Raycap

Surge Protection for Data & Signal Line Systems

2021

CATALOG

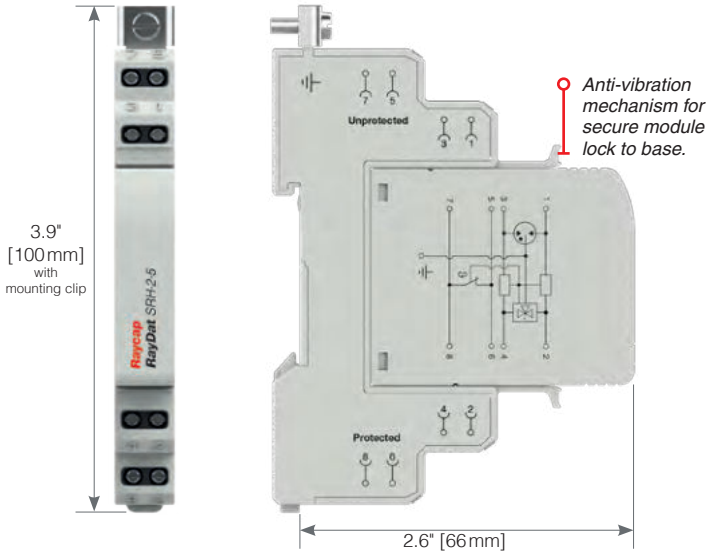
About Raycap

Raycap was founded in 1987 with a vision of creating and providing solutions that protect the world's infrastructure. From telecommunications to new and traditional energy networks, and from transportation systems to industrial applications of all types, Raycap is there with solutions to ensure equipment uptime in spite of harsh electrical environments. The company strives to keep its customers' sophisticated, mission-critical equipment running seamlessly and continuously, and is driven to make ongoing advancements in its surge protection technologies and product offerings.

Table of Contents

RayDat Modular Features

RayDat surge protection for data and signal line systems provide unsurpassed electrical protection for signal power applications. These products meet the diverse requirements of industrial and other signal protection applications. RayDat products are available in a variety of operating voltages and configurations that conform to the latest industry standards and certifications.



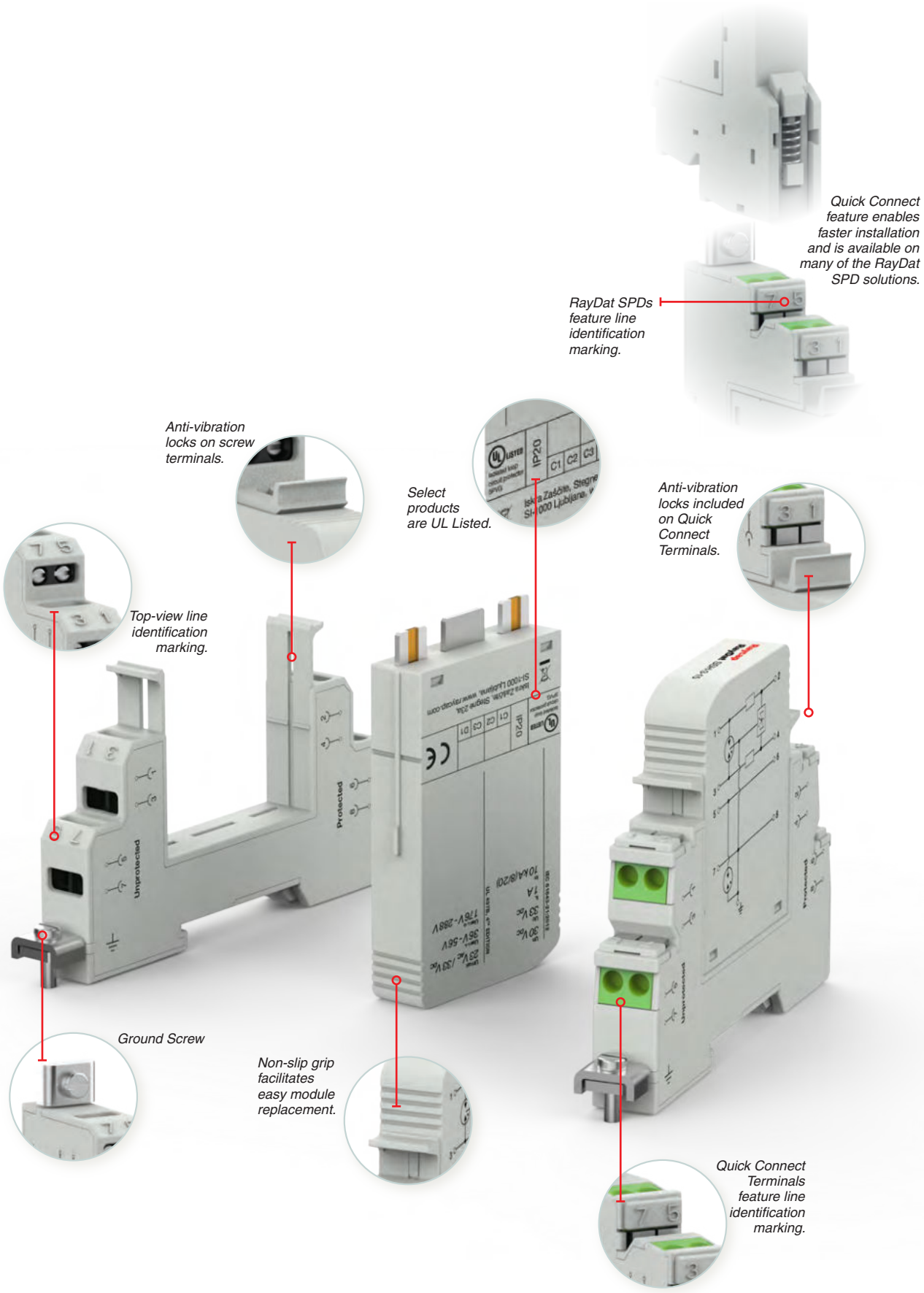
Raycap's anti-vibration mechanism ensures the pluggable surge protection modules remain locked onto their bases despite severe shock or vibration conditions.

RayDat SBH-3-5

RayDat SSH-3-24

RayDat SLH-4-30

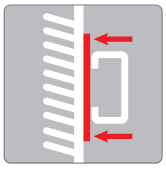
RayDat SPH-4-30


Quick Connect feature enables faster installation and is available on many of the RayDat SPD solutions.
RayDat SPDs feature line identification marking.
Anti-vibration locks on screw terminals.
Select products are UL Listed.
Anti-vibration locks included on Quick Connect Terminals.
Top-view line identification marking.
Ground Screw
Non-slip grip facilitates easy module replacement.
Quick Connect Terminals feature line identification marking.

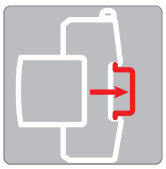
Icons Description

For easier selection see icons below and their descriptions.

Wall Mounted
Product is designed to be mounted directly on a wall



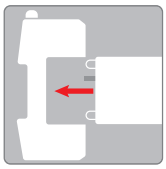
DIN Rail Mounted
Products are mounted directly on a DIN Rail



Compact Product Design
Product housing is one piece, a non-pluggable design

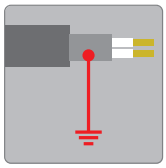
Screw Connection Terminals
Screw type connection for all protection lines

Modular Product Design
Product is designed in two pieces having a base and a replaceable plug in SPD module



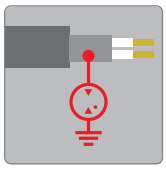
Spring Connection Terminals
Push-in connection for all protection lines

Shield Directly Grounded
Shield is connected to the Earth potential



Wire Connection
Product is installed using integrated wires

Shield Indirectly Grounded
Shield is isolated with a GDT to the Earth potential

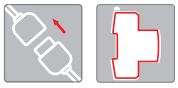
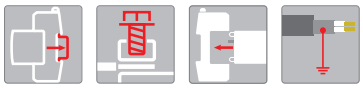
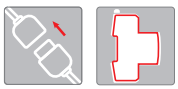


Plug-In Connection
Product is ready to use, no special installation required

EX Certificat
SPD is certified for explosive environments

Selection Guide

Signal & Data Transmission

Signal Type	Mounting, Connection Type, Shield Handling, Pluggabilty	Recommended SPD	Category
0-20 mA, 4-20 mA Current Loops ** UL Listed*		RayDat SPH-2-30	D1/C1/C2/C3
		RayDat SPH-4-30	D1/C1/C2/C3
ARCNET		RayCox BNC 5	C1/C2/C3
Binary Signals ** UL Listed*		RayDat SPH-2-30	D1/C1/C2/C3
		RayDat SPH-4-30	D1/C1/C2/C3
		RayDat SLH-2 Series	D1/C1/C2/C3
		RayDat SLH-4 Series	D1/C1/C2/C3
		RayDat SGH-3 Series	D1/C1/C2/C3
		RayDat SSH-3 Series	D1/C1/C2/C3
		RayDat SUI-4 Series	D1/C1/C2/C3
BITBUS (IEEE-1118) ** UL Listed*		RayDat SBH-3-5	D1/C1/C2/C3
CAN Bus (Data Line) ** UL Listed*		RayDat SBH-3-12	D1/C1/C2/C3
		RayDat SLH-2-12	D1/C1/C2/C3
		RayDat SLH-4-12	D1/C1/C2/C3
		RayDat SSH-3-12	D1/C1/C2/C3
CAN Bus (Power Line)		RayDat PSC-2-24	C1/C2/C3
		ProTec DMDR 20/24	Class III Type 3
CAN Bus (Data line + Power Line)		RayDat SUH-2-24PS	D1/C1/C2/C3
CCTV ControlNet		RayCox BNC 12	C1/C2/C3

I_n [kA]	I_{imp} [kA]	Wires protected	Voltages [V]	I_L [A]	Page	Product Image
10 kA	2.5 kA	2	30*	1 A	34	
10 kA	5 kA	4	30*	1 A	36	
10 kA	-	1	10	0.1 A	88	
10 kA	2.5 kA	2	30*	1 A	34	
10 kA	5 kA	4	30*	1 A	36	
10 kA	2.5 kA	2	5, 12, 15, 24, 30*, 48, 60	1 A	22	
10 kA	5 kA	4	5, 12, 15, 24, 30*, 48, 60	1 A	24	
10 kA	2.5 kA	3	5, 12, 15, 24, 30, 48, 60	1 A	62	
10 kA	2.5 kA	3	5*, 12*, 15, 24, 30*, 48, 60	1 A	26	
20 kA	5 kA	4	5, 12, 15, 24, 30*, 48, 60	1 A	30	
10 kA	2.5 kA	3	5*	1 A	60	
10 kA	2.5 kA	3	12*	1 A	60	
10 kA	2.5 kA	2	12	1 A	22	
10 kA	5 kA	4	12	1 A	24	
10 kA	2.5 kA	3	12*	1 A	26	
10 kA	-	2	24	4 A	118	
1.2 kA	-	2	24	-	120	
10 kA	2.5 kA	2	24	1 A	112	
10 kA	-	1	24	0.1 A	88	

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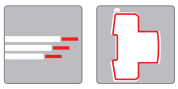
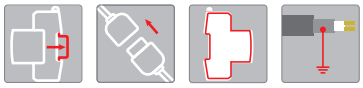
Signal & Data Transmission

Signal Type	Mounting, Connection Type, Shield Handling, Pluggabilty	Recommended SPD	Category
Data Highway Plus ** UL Listed*		RayDat SBH-3-12	D1/C1/C2/C3
		RayDat SLH-2-12	D1/C1/C2/C3
		RayDat SLH-4-12	D1/C1/C2/C3
DeviceNet (Data Line) ** UL Listed*		RayDat SBH-3-12	D1/C1/C2/C3
		RayDat SLH-2-12	D1/C1/C2/C3
		RayDat SLH-4-12	D1/C1/C2/C3
		RayDat SGH-3-12	D1/C1/C2/C3
DeviceNet (Power Line)		RayDat PSC-2-24	C1/C2/C3
		ProTec DMDR 20/24	Class III Type 3
DeviceNet (Data + Power Line)		RayDat SUH-2-24PS	D1/C1/C2/C3
EIB KNX Bus		RayDat KNX	D1/C1/C2/C3
Ex(i) Circuits Fieldbus (Ex) PROFIBUS PA (Ex)		RayDat Ex-2	D1/C1/C2/C3
		RayDat PLP Ex	D1/C1/C2/C3
Ethernet CAT 6 Ethernet CAT 5 Power Over Ethernet (PoE) Industrial Ethernet Voice Over IP (VoIP) CDDI Token Ring ** UL Listed*		RayDat NET 6 POE	D1/C1/C2/C3
Genius Bus ** UL Listed*		RayDat SLH-2-12	D1/C1/C2/C3
		RayDat SLH-4-12	D1/C1/C2/C3
		RayDat SSH-3-12	D1/C1/C2/C3

I_n [kA]	I_{imp} [kA]	Wires protected	Voltages [V]	I_L [A]	Page	Product Image
10 kA	2.5 kA	3	12*	1 A	60	
10 kA	2.5 kA	2	12	1 A	22	
10 kA	5 kA	4	12	1 A	24	
10 kA	2.5 kA	3	12*	1 A	60	
10 kA	2.5 kA	2	12	1 A	22	
10 kA	5 kA	4	12	1 A	24	
10 kA	2.5 kA	3	12	1 A	62	
10 kA	-	2	24	4 A	118	
1.2 kA	-	2	24	-	120	
10 kA	2.5 kA	2	24	1 A	112	
5 kA	1 kA	2	180	7 A	66	
5 kA	1 kA	2	12, 24	0.5 A	50	
up to 10 kA	up to 2.0 kA	2, 3, 4	24, 48	-	52	
150 A	1 kA	8	48*	1 A	56	
10 kA	2.5 kA	2	12	1 A	22	
10 kA	5 kA	4	12	1 A	24	
10 kA	2.5 kA	3	12*	1 A	26	

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Signal & Data Transmission

Signal Type	Mounting, Connection Type, Shield Handling, Pluggabilty	Recommended SPD	Category
INTERBUS Inline (Remote) Modbus ** UL Listed*		RayDat SBH-3-5	D1/C1/C2/C3
		RayDat SLH-2-5	D1/C1/C2/C3
		RayDat SSH-3-5	D1/C1/C2/C3
INTERBUS Inline (I/O)		RayDat SLH-2-24	D1/C1/C2/C3
		RayDat SLH-4-24	D1/C1/C2/C3
		RayDat SUI-4-24	D1/C1/C2/C3
INTERBUS Field Multiplexer ** UL Listed*		RayDat SBH-3-5	D1/C1/C2/C3
		RayDat SGH-3-5	D1/C1/C2/C3
Local Operating Network (LON) ** UL Listed*		RayDat SBH-3-5	D1/C1/C2/C3
		RayDat SLH-2-5	D1/C1/C2/C3
		RayDat SLH-4-5	D1/C1/C2/C3
		RayDat SGH-3-5	D1/C1/C2/C3
Opto Interface ** UL Listed*		RayDat SPH-2-30	D1/C1/C2/C3
		RayDat SPH-4-30	D1/C1/C2/C3
		RayDat SBH-3-30	D1/C1/C2/C3
		RayDat SSH-3-30	D1/C1/C2/C3
PROFIBUS DP[1]/PA[2] ** UL Listed*		RayDat SBH-3-5[1] RayDat SBH-3-30[2]	D1/C1/C2/C3
		RayDat SLH-2-5[1] RayDat SLH-2-24[2]	D1/C1/C2/C3

I_n [kA]	I_{imp} [kA]	Wires protected	Voltages [V]	I_L [A]	Page	Product Image
10 kA	2.5 kA	3	5*	1 A	60	
10 kA	2.5 kA	2	5	1 A	22	
10 kA	2.5 kA	3	5*	1 A	26	
10 kA	2.5 kA	2	24	1 A	22	
10 kA	5 kA	4	24	1 A	24	
20 kA	5 kA	4	24	1 A	80	
10 kA	2.5 kA	3	5*	1 A	60	
10 kA	2.5 kA	3	5	1 A	62	
10 kA	2.5 kA	3	5*	1 A	60	
10 kA	2.5 kA	2	5	1 A	22	
10 kA	5 kA	4	5	1 A	24	
10 kA	2.5 kA	3	5	1 A	62	
10 kA	2.5 kA	2	30*	1 A	34	
10 kA	5 kA	4	30*	1 A	36	
10 kA	2.5 kA	3	30*	1 A	60	
10 kA	2.5 kA	3	30*	1 A	26	
10 kA	2.5 kA	3	5*, 30*	1 A	60	
10 kA	2.5 kA	2	5, 24	1 A	22	

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Signal & Data Transmission

Signal Type	Mounting, Connection Type, Shield Handling, Pluggabilty	Recommended SPD	Category
PROFIBUS DP[1]/PA[2] ** UL Listed*		RayDat SBH-3-5[1] RayDat SBH-3-30[2]	D1/C1/C2/C3
		RayDat SLH-2-5[1] RayDat SLH-2-24[2]	D1/C1/C2/C3
		RayDat SBH-3-30[2]	D1/C1/C2/C3
		RayDat SSH-3-5[1] RayDat SSH-3-30[2]	D1/C1/C2/C3
RS 232 ** UL Listed*		RayDat SBH-3-12	D1/C1/C2/C3
		RayDat SGH-3-12	D1/C1/C2/C3
RS 422, V.11, X.21 ** UL Listed*		RayDat SLH-2-12	D1/C1/C2/C3
		RayDat SLH-4-12	D1/C1/C2/C3
		RayDat RS 485	D1/C1/C2/C3
RS 423A ** UL Listed*		RayDat SLH-4-12	D1/C1/C2/C3
		RayDat RS 485	D1/C1/C2/C3
RS 485 ** UL Listed*		RayDat SBH-3-12	D1/C1/C2/C3
		RayDat SSH-3-12	D1/C1/C2/C3
		RayDat SLH-4-12	D1/C1/C2/C3
		RayDat RS 485	D1/C1/C2/C3

I_n [kA]	I_{imp} [kA]	Wires protected	Voltages [V]	I_L [A]	Page	Product Image
10 kA	2.5 kA	3	5*, 30*	1 A	60	
10 kA	2.5 kA	2	5, 24	1 A	22	
10 kA	2.5 kA	3	30*	1 A	60	
10 kA	2.5 kA	3	5*, 30*	1 A	26	
10 kA	2.5 kA	3	12*	1 A	60	
10 kA	2.5 kA	3	12	1 A	62	
10 kA	2.5 kA	2	12	1 A	22	
10 kA	5 kA	4	12	1 A	24	
20 kA	2.5 kA	6	5	0.5 A	64	
10 kA	2.5 kA	4	12	1 A	24	
20 kA	2.5 kA	6	5	0.5 A	64	
10 kA	2.5 kA	3	12*	1 A	60	
10 kA	2.5 kA	3	12*	1 A	26	
10 kA	2.5 kA	4	12	1 A	24	
20 kA	2.5 kA	6	5	0.5 A	64	

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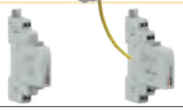
Signal & Data Transmission

Signal Type	Mounting, Connection Type, Shield Handling, Pluggabilty	Recommended SPD	Category
Synchronous Data Link Control (SDLC) ** UL Listed*		RayDat SLH-2-5	D1/C1/C2/C3
		RayDat SLH-4-5	D1/C1/C2/C3
		RayDat SGH-3-5	D1/C1/C2/C3
		RayDat SSH-3-5	D1/C1/C2/C3
SINEC L1, SINEC L2 ** UL Listed*		RayDat SLH-2-5	D1/C1/C2/C3
		RayDat SLH-4-5	D1/C1/C2/C3
		RayDat SBH-3-5	D1/C1/C2/C3
		RayDat SSH-3-5	D1/C1/C2/C3
Suconet		RayDat SLH-4-5	D1/C1/C2/C3
		RayDat RS 485	D1/C1/C2/C3
Temperature Measurement ** UL Listed*		RayDat SPH-2-30	D1/C1/C2/C3
		RayDat SPH-4-30	D1/C1/C2/C3
		RayDat SBH-3-30	D1/C1/C2/C3
		RayDat SSH-3-30	D1/C1/C2/C3
TTL ** UL Listed*		RayDat SLH-2-12	D1/C1/C2/C3
		RayDat SLH-4-12	D1/C1/C2/C3
		RayDat SBH-3-12	D1/C1/C2/C3
		RayDat SSH-3-12	D1/C1/C2/C3

I_n [kA]	I_{imp} [kA]	Wires protected	Voltages [V]	I_L [A]	Page	Product Image
10 kA	2.5 kA	2	5	1 A	22	
10 kA	5 kA	4	5	1 A	24	
10 kA	2.5 kA	3	5	1 A	62	
10 kA	2.5 kA	3	5*	1 A	26	
10 kA	2.5 kA	2	5	1 A	22	
10 kA	5 kA	4	5	1 A	24	
10 kA	2.5 kA	3	5*	1 A	60	
10 kA	2.5 kA	3	5*	1 A	26	
10 kA	2.5 kA	4	5	1 A	24	
20 kA	2.5 kA	6	5	0.5 A	64	
10 kA	2.5 kA	2	30*	1 A	34	
10 kA	5 kA	4	30*	1 A	36	
10 kA	2.5 kA	3	30*	1 A	60	
10 kA	2.5 kA	3	30*	1 A	26	
10 kA	2.5 kA	2	12	1 A	22	
10 kA	5 kA	4	12	1 A	24	
10 kA	2.5 kA	3	12*	1 A	60	
10 kA	2.5 kA	3	12*	1 A	26	

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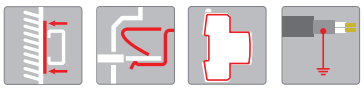
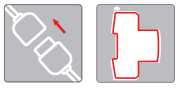
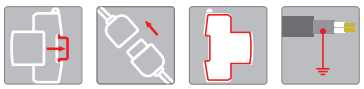
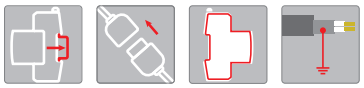
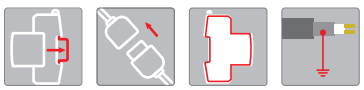
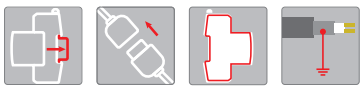
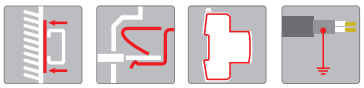
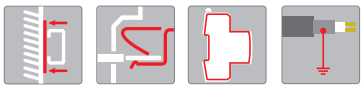
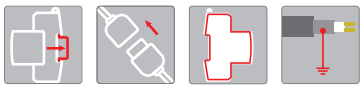
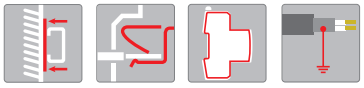
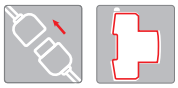
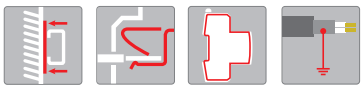
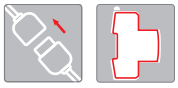
Telecommunication

Signal Type	Mounting, Connection Type, Shield Handling, Pluggabilty	Recommended SPD	Category
ADSL, ADSL2, ADSL 2+		RayTel 20	D1/C1/C2/C3
		RayTel 10	C1/C2/C3
		RayDat SLH-2-110	D1/C1/C2/C3
		RayDat SPH-2-230	D1/C1/C2/C3
E1 ** UL Listed*		RayDat NET 6 POE	D1/C1/C2/C3
		RayDat SLH-4-24	D1/C1/C2/C3
		RayDat SPH-4-30	D1/C1/C2/C3
		RayDat SUI-4-24	D1/C1/C2/C3
G.703/G.704 ** UL Listed*		RayDat NET 6 POE	D1/C1/C2/C3
		RayDat SLH-4-24	D1/C1/C2/C3
		RayDat SPH-4-30	D1/C1/C2/C3
		RayDat SUI-4-24	D1/C1/C2/C3
HDSL ** UL Listed*		RayDat SLH-4-24	D1/C1/C2/C3
		RayDat SPH-4-30	D1/C1/C2/C3
		RayDat SUI-4-24	D1/C1/C2/C3
		RayDat NET 6 POE	D1/C1/C2/C3
ISDN S_O ** UL Listed*		RayDat SLH-4-12	D1/C1/C2/C3
		RayDat NET 6 POE	D1/C1/C2/C3

I_n [kA]	I_{imp} [kA]	Wires protected	Voltages [V]	I_L [A]	Page	Product Image
10 kA	2.5 kA	2	110	0.6 A	72	
2.5 kA	-	2	110	0.15 A	70	
10 kA	2.5 kA	2	110	1 A	76	
10 kA	2.5 kA	2	230	5 A	74	
150 A	1 kA	8	48*	1 A	56	
10 kA	5 kA	4	24	1 A	24	
10 kA	5 kA	4	30*	1 A	36	
20 kA	5 kA	4	24	1 A	30	
150 A	1 kA	8	48*	1 A	56	
10 kA	5 kA	4	24	1 A	24	
10 kA	5 kA	4	30*	1 A	36	
20 kA	5 kA	4	24	1 A	30	
10 kA	5 kA	4	24	1 A	24	
10 kA	5 kA	4	30*	1 A	36	
20 kA	5 kA	4	24	1 A	30	
150 A	1 kA	8	48*	1 A	56	
10 kA	5 kA	4	12	1 A	24	
150 A	1 kA	8	48*	1 A	56	

-continued-

Telecommunication

Signal Type	Mounting, Connection Type, Shield Handling, Pluggabilty	Recommended SPD	Category
ISDN U_O		RayDat SLH-2-110	D1/C1/C2/C3
		RayDat SPH-2-230	D1/C1/C2/C3
		RayTel 20	D1/C1/C2/C3
		RayTel 10	C1/C2/C3
POTS		RayDat SLH-2-110	D1/C1/C2/C3
		RayDat SPH-2-230	D1/C1/C2/C3
		RayTel 20	D1/C1/C2/C3
		RayTel 10	C1/C2/C3
SDSL ** UL Listed*		RayDat SLH-4-12	D1/C1/C2/C3
		RayDat NET 6 POE	D1/C1/C2/C3
SHDSL		RayDat SGH-3-5	D1/C1/C2/C3
		RayDat SLH-2-5	D1/C1/C2/C3
		RayDat SLH-4-5	D1/C1/C2/C3
T-DSL		RayDat SLH-2-110	D1/C1/C2/C3
		RayDat SPH-2-230	D1/C1/C2/C3
		RayTel 20	D1/C1/C2/C3
		RayTel 10	C1/C2/C3
VDSL		RayTel 20	D1/C1/C2/C3
		RayTel 10	C1/C2/C3
		RayDat SLH-2-110	D1/C1/C2/C3
		RayDat SPH-2-230	D1/C1/C2/C3

I_n [kA]	I_{imp} [kA]	Wires protected	Voltages [V]	I_L [A]	Page	Product Image
10 kA	2.5 kA	2	110	1 A	76	
10 kA	2.5 kA	2	230	5 A	74	
10 kA	2.5 kA	2	110	0.6 A	72	
2.5 kA	-	2	110	0.15 A	70	
10 kA	2.5 kA	2	110	1 A	76	
10 kA	2.5 kA	2	230	5 A	74	
10 kA	2.5 kA	2	110	0.6 A	72	
2.5 kA	-	2	110	0.15 A	70	
10 kA	5 kA	4	12	1 A	24	
150 A	1 kA	8	48*	1 A	56	
10 kA	2.5 kA	3	5	1 A	62	
10 kA	2.5 kA	2	5	1 A	22	
10 kA	5 kA	4	5	1 A	24	
10 kA	2.5 kA	2	110	1 A	76	
10 kA	2.5 kA	2	230	5 A	74	
10 kA	2.5 kA	2	110	0.6 A	72	
2.5 kA	-	2	110	0.15 A	70	
10 kA	2.5 kA	2	110	0.6 A	72	
2.5 kA	-	2	110	0.15 A	70	
10 kA	2.5 kA	2	110	1 A	76	
10 kA	2.5 kA	2	230	5 A	74	

Modular Surge Protective Devices (SPDs) for Data & Signal Lines

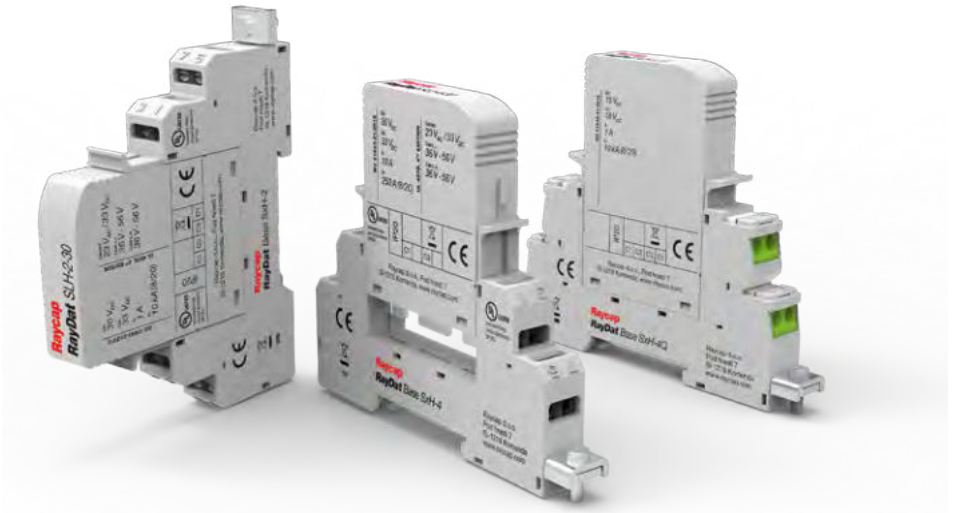
RayDat SL Series

RayDat SLH-2*
RayDat SLH-4*
RayDat SSH-3*
RayDat SLL-4*
RayDat SUI-4*

*UL Listed

Special features:

- Very high surge ratings
- The connection lines remain enabled during module replacement
- High density – up to 4 protected lines at only 12mm width
- Equipped with Screw or Quick connect (spring loaded) terminals



Symbol Legend:


DIN Rail Mounting


Screw Connect Terminals


Quick Connect Terminals


Modular design


Shield Directly Grounded


Shield Indirectly Grounded

These efficient overvoltage barriers (except RayDat SLL) contain both, coarse and fine protection stages, and provide longitudinal and a transverse surge protection, while RayDat SLL contains fine protection stage only.

The initial protection stage comprises a three-pole gas discharge tube (GDT) that is designed to divert the primary surge energy. The subsequent fine protection stage is carried out using fast bi-directional silicon avalanche diodes (SAD). Care is taken in the design of the fine protection stage to avoid capacitive line loading, thereby ensuring a low insertion loss and wide operating frequency range.

Series line impedances ensure energy coordination between the coarse and a fine protection stages at all levels of a surge incident. To protect against the hazards of electric shock and fire, which often results when power frequency (or lines frequency) contact occurs between power and communication lines (often called mains incursion), a thermo-clip is included on the primary protection stage to divert the power frequency current to ground.

The plug-in module/base design facilitates replacement of a failed module without the need to remove system wiring. If the module is unplugged from the base, the connection lines remain enabled.

RoHS COMPLIANT CE UL LISTED

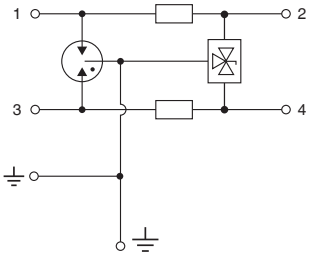
Modular SPD for Single Pair

RayDat SLH-2 Series

D1 • C1 • C2 • C3

***UL Listed**

IEC/EN Category: D1/C1/C2/C3
Surge Discharge Ratings: I_n: 10 kA, I_{max}: 20 kA, I_{imp}: 2.5 kA
Voltages: 5, 12, 15, 24, 30*, 48, 60 V DC
Frequency Range: 30 MHz
Housing: Modular Design
Compliance: IEC/EN 61643-21
UL 497B 4th Edition
Configuration:



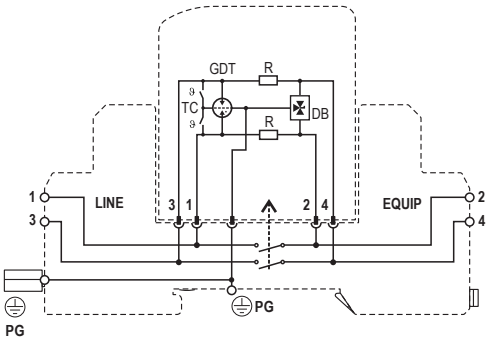
Technical Data

SLH-2 Series			5	12	15	24	30*	48	60
Electrical									
Lines Protected						1 (2 Conductors)			
Nominal Operating Voltage (DC)		U_n	5 V	12 V	15 V	24 V	30 V	48 V	60 V
Maximum Continuous Operating Voltage (DC)		U_c	6 V	15 V	18 V	28 V	33 V	52 V	64 V
Rated Load Current at 25°C		I_L				1 A			
C2 Nominal Discharge Current (8/20 µs)		I_n				10 kA			
Maximum Discharge Current (8/20 µs)		I_{max}				20 kA			
D1 Impulse Current (10/350 µs)		I_{imp}				2.5 kA			
Residual Voltage at 5 kA (8/20 µs)		U_{res}	< 22 V	< 42 V	< 48 V	< 70 V	< 80 V	< 140 V	< 160 V
Rated Spark Overvoltage	(Line-Ground)		7-10 V	16-21 V	21-25 V	31-37 V	36-44 V	57-69 V	68-84 V
	(Line-Line)		7-10 V	16-21 V	21-25 V	31-37 V	36-44 V	57-69 V	68-84 V
Response Time Overvoltage Protection		t_A				< 1 ns			
Thermal Protection						Yes			
Insulation Resistance of the Protection		R_{iso}	≥ 6 KΩ	≥ 15 MΩ	≥ 18 MΩ	≥ 28 MΩ	≥ 33 MΩ	≥ 52 MΩ	≥ 64 MΩ
Serial Resistance per Path		R				1.6-2.0 Ω			
Transverse Capacitance		C				50 pF			
Cut-off Frequency		f_G				30 MHz			
Mechanical									
Temperature Range						-40 °F to +176 °F [-40 °C to +80 °C]			
Terminal Cross Section Multi-strand (max.)						12 AWG [4 mm², 2.5 mm² Q Version]			
Terminal Screw Torque						4.5 lbf·in [0.5 Nm]			
Degree of Protection IEC/EN 60529						IP 20 (built-in)			
Housing Material						Thermoplastic; Grey; Extinguishing Degree V-0			
Mounting IEC/EN 60715						35 mm DIN Rail			
Order Information									
Order Code			5	12	15	24	30*	48	60
SLH-2-xxx			7086.33	7086.34	7086.35	7086.36	7082.80	7086.37	7086.38
SLH-2-xxxQ (Quick Connect Terminals)			7085.05	7085.06	7085.07	7085.08	7085.09	7085.10	7085.11
SLH-2-xxxM (module)			7086.40	7086.41	7086.42	7086.43	7082.81	7086.44	7086.45

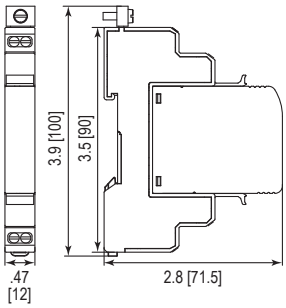
Internal Configuration

Legend

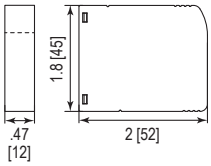
DB Diode Block
GDT Gas Discharge Tube
PG Protective Grounding
R Resistor
TC Thermo-clip



Dimensions & Packaging

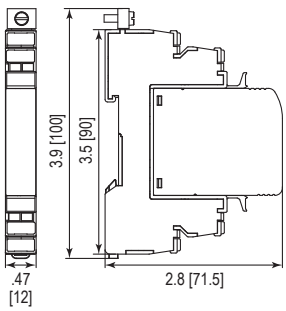


SLH-2 Series	5	12	15	24	30	48	60
Dimensions							
Weight per Unit	1.83 oz [52 g]						
Dimensions DIN 43880	2/3 TE						
Packaging Dimensions (Single Unit)	3.4 × .59 × 4" [87 × 15 × 102 mm]						
Minimum Package Quantity	15 pieces						



SLH-2-xxxM Series	5	12	15	24	30	48	60
Dimensions							
Weight per Unit	.84 oz [24 g]						
Packaging Dimensions (Single Unit)	3.4 × .59 × 4" [87 × 15 × 102 mm]						
Minimum Package Quantity	15 pieces						

Quick Connect Terminals



SLH-2-xxxQ Series	5	12	15	24	30	48	60
Dimensions							
Weight per Unit	1.90 oz [54 g]						
Dimensions DIN 43880	2/3 TE						
Packaging Dimensions (Single Unit)	3.4 × .59 × 4" [87 × 15 × 102 mm]						
Minimum Package Quantity	15 pieces						

inches
[mm]

RoHS COMPLIANT

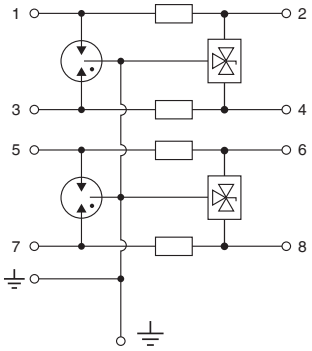
Modular SPD for Two Pair

RayDat SLH-4 Series

D1 • C1 • C2 • C3

***UL Listed**

IEC/EN Category: D1/C1/C2/C3
Surge Discharge Ratings: I_n: 10 kA, I_{max}: 20 kA, I_{imp}: 5 kA
Voltages: 5, 12, 15, 24, 30*, 48, 60 V DC
Frequency Range: 30 MHz
Housing: Modular Design
Compliance: IEC/EN 61643-21
UL 497B 4th Edition
Configuration:



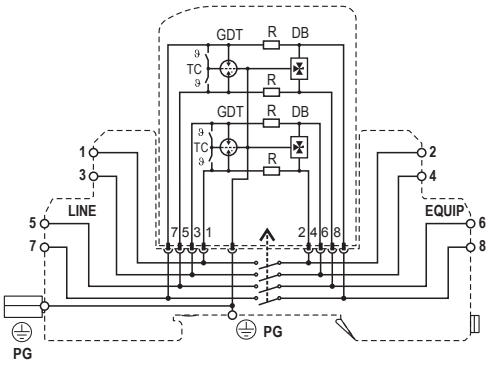
Technical Data

SLH-4 Series			5	12	15	24	30*	48	60
Electrical									
Lines Protected						2 (4 Conductors)			
Nominal Operating Voltage (DC)		U_n	5V	12V	15V	24V	30V	48V	60V
Maximum Continuous Operating Voltage (DC)		U_c	6V	15V	18V	28V	33V	52V	64V
Rated Load Current at 25°C		I_L				1 A			
C2 Nominal Discharge Current (8/20 µs)		I_n				10 kA			
Maximum Discharge Current (8/20 µs)		I_{max}				20 kA			
D1 Impulse Current (10/350 µs)		I_{imp}				5 kA			
Residual Voltage at 5 kA (8/20 µs)		U_{res}	<22V	<42V	<48V	<70V	<80V	<140V	<160V
Rated Spark Overvoltage	(Line-Ground)		7-10V	17-21V	21-25V	31-37V	36-44V	57-69V	68-84V
	(Line-Line)		7-10V	17-21V	21-25V	31-37V	36-44V	57-69V	68-84V
Response Time Overvoltage Protection		t_A				<1 ns			
Thermal Protection						Yes			
Insulation Resistance of the Protection		R_{iso}	≥ 6 KΩ	≥ 15 MΩ	≥ 18 MΩ	≥ 28 MΩ	≥ 33 MΩ	≥ 52 MΩ	≥ 64 MΩ
Serial Resistance per Path		R				1.6-2.0 Ω			
Transverse Capacitance		C				50 pF			
Cut-off Frequency		f_G				30 MHz			
Mechanical									
Temperature Range						-40 °F to +176 °F [-40 °C to +80 °C]			
Terminal Cross Section Multi-strand (max.)						12 AWG [4 mm², 2.5 mm² Q Version]			
Terminal Screw Torque						4.5 lbf·in [0.5 Nm]			
Degree of Protection IEC/EN 60529						IP 20 (built-in)			
Housing Material						Thermoplastic; Grey; Extinguishing Degree V-0			
Mounting IEC/EN 60715						35 mm DIN Rail			
Order Information									
Order Code			5	12	15	24	30*	48	60
SLH-4-xxx			7086.47	7086.48	7086.49	7086.50	7082.78	7086.51	7086.52
SLH-4-xxxQ (Quick Connect Terminals)			7085.13	7085.14	7085.15	7085.16	7085.17	7085.18	7085.19
SLH-4-xxxM (module)			7086.54	7086.55	7086.56	7086.57	7082.79	7086.58	7086.59

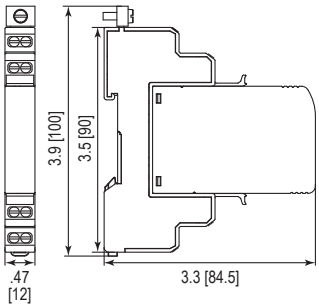
Internal Configuration

Legend

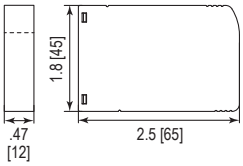
DB Diode Block
GDT Gas Discharge Tube
PG Protective Grounding
R Resistor
TC Thermo-clip



Dimensions & Packaging

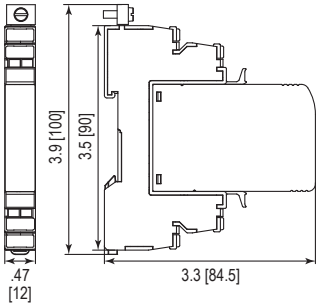


SLH-4 Series	5	12	15	24	30	48	60
Dimensions							
Weight per Unit	2.32 oz [66 g]						
Dimensions DIN 43880	2/3 TE						
Packaging Dimensions (Single Unit)	3.4 × .59 × 4" [87 × 15 × 102 mm]						
Minimum Package Quantity	15 pieces						



SLH-4-xxxM Series	5	12	15	24	30	48	60
Dimensions							
Weight per Unit	1.05 oz [30 g]						
Packaging Dimensions (Single Unit)	3.4 × .59 × 4" [87 × 15 × 102 mm]						
Minimum Package Quantity	15 pieces						

Quick Connect Terminals



SLH-4-xxxQ Series	5	12	15	24	30	48	60
Dimensions							
Weight per Unit	2.32 oz [66 g]						
Dimensions DIN 43880	2/3 TE						
Packaging Dimensions (Single Unit)	3.4 × .59 × 4" [87 × 15 × 102 mm]						
Minimum Package Quantity	15 pieces						

inches
[mm]

RoHS COMPLIANT

SPD for Shielded Cable

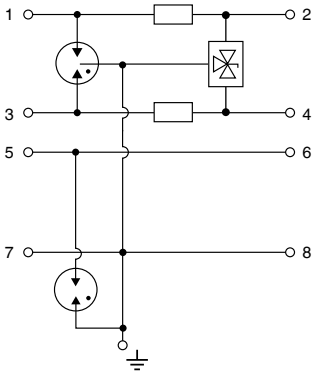
RayDat SSH-3 Series

D1 • C1 • C2 • C3

***UL Listed**

IEC/EN Category: D1/C1/C2/C3
Surge Discharge Ratings: I_n: 10 kA, I_{max}: 20 kA, I_{imp}: 2.5 kA
Voltages: 5*, 12*, 15, 24, 30*, 48, 60 V DC
Frequency Range: 30 MHz
Housing: Modular Design
Compliance: IEC/EN 61643-21
UL 497B 4th Edition

Configuration:



Technical Data

SSH-3 Series		5*	12*	15	24	30*	48	60
Electrical								
Lines Protected		1 (2 Conductors)						
Nominal Operating Voltage (DC)	U_n	5V	12V	15V	24V	30V	48V	60V
Maximum Continuous Operating Voltage (DC)	U_c	6V	15V	18V	28V	33V	52V	64V
Rated Load Current at 25°C	I_L	1 A						
C2 Nominal Discharge Current (8/20 µs)	I_n	10 kA						
Maximum Discharge Current (8/20 µs)	I_{max}	20 kA						
D1 Impulse Current (10/350 µs)	I_{imp}	2.5 kA						
Residual Voltage at 5 kA (8/20 µs) (Line-Line)	U_{res}	<22V	<42V	<48V	<70V	<80V	<140V	<160V
Rated Spark Overvoltage (Shield-Ground)		184-276V						
(Line-Line), (Line-Ground)		7-10V	16-21V	20-24V	30-36V	35-43V	55-68V	67-85V
Response Time Overvoltage Protection (Shield-Ground)	t_A	<100 ns						
(Line-Line), (Line-Ground)		<1 ns						
Insulation Resistance of the Protection (Shield-Ground)	R_{iso}	> 1 GΩ / 100 V						
(Line-Line), (Line-Ground)		≥ 6 KΩ	≥ 15 MΩ	≥ 18 MΩ	≥ 28 MΩ	≥ 33 MΩ	≥ 52 MΩ	≥ 64 MΩ
Serial Resistance per Path	R	1.6-2.0 Ω						
Transverse Capacitance (Shield-Ground)	C	5 pF						
(Line-Line), (Line-Ground)		50 pF						
Cut-off Frequency	f_G	30 MHz						
Mechanical								
Temperature Range		-40 °F to +176 °F [-40 °C to +80 °C]						
Terminal Cross Section Multi-strand (max.)		12 AWG [4 mm², 2.5 mm² Q Version]						
Terminal Screw Torque		4.5 lbf·in [0.5 Nm]						
Degree of Protection IEC/EN 60529		IP 20 (built-in)						
Housing Material		Thermoplastic; Grey; Extinguishing Degree V-0						
Mounting IEC/EN 60715		35 mm DIN Rail						

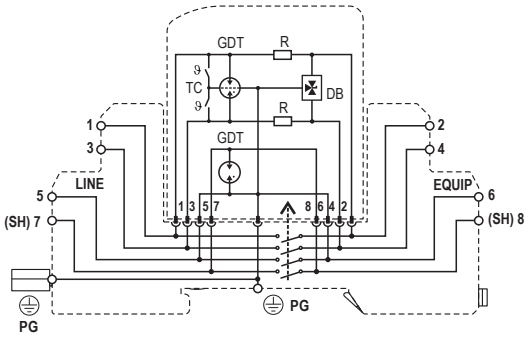
Order Information

Order Code	5*	12*	15	24	30*	48	60
SSH-3-xxx	7086.01	7086.02	7086.03	7086.04	7086.05	7086.06	7086.07
SSH-3-xxxQ (Quick Connect Terminals)	7086.90	7086.91	7086.92	7086.93	7086.94	7086.95	7086.96
SSH-3-xxxM (module)	7086.09	7086.10	7086.11	7086.12	7086.13	7086.14	7086.15

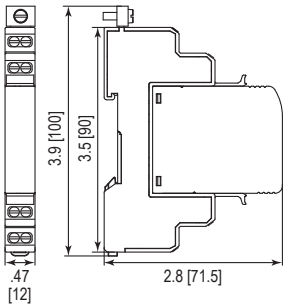
Internal Configuration

Legend

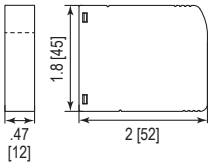
DB	*Diode Block*
GDT	*Gas Discharge Tube*
PG	*Protective Grounding*
R	*Resistor*
SH	*Shielded*
TC	*Thermo-clip*



Dimensions & Packaging

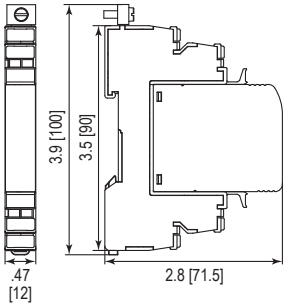


SSH-3 Series	5	12	15	24	30	48	60
Dimensions							
Weight per Unit	2.11 oz [60 g]						
Dimensions DIN 43880	2/3 TE						
Packaging Dimensions (Single Unit)	3.4 × .59 × 4" [87 × 15 × 102 mm]						
Minimum Package Quantity	15 pieces						



SSH-3-xxxM Series	5	12	15	24	30	48	60
Dimensions							
Weight per Unit	.91 oz [26 g]						
Packaging Dimensions (Single Unit)	3.4 × .59 × 4" [87 × 15 × 102 mm]						
Minimum Package Quantity	15 pieces						

Quick Connect Terminals



SSH-3-xxxQ Series	5	12	15	24	30	48	60
Dimensions							
Weight per Unit	2.18 oz [62 g]						
Dimensions DIN 43880	2/3 TE						
Packaging Dimensions (Single Unit)	3.4 × .59 × 4" [87 × 15 × 102 mm]						
Minimum Package Quantity	15 pieces						

inches
[mm]

RoHS COMPLIANT

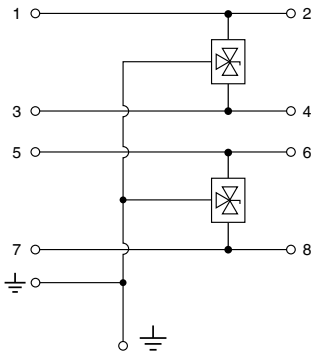
SPD for Two Pair with Single Protection Mode

RayDat SLL-4 Series

C1 • C3

UL Listed

IEC/EN Category: C1/C3
Surge Discharge Ratings: I_n: 250 A
Voltages: 30 V DC
Frequency Range: 30 MHz
Housing: Modular Design
Compliance: IEC/EN 61643-21
UL 497B 4th Edition
Configuration:

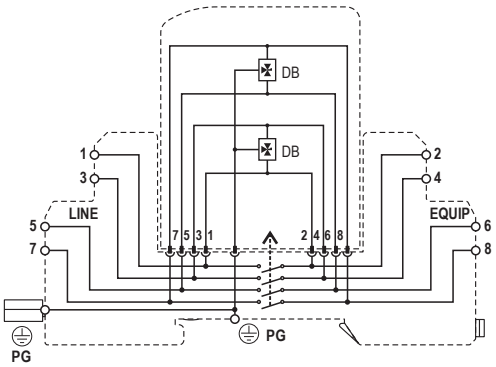


Technical Data

SLL-4 Series			30
Electrical			
Lines Protected			2 (4 Conductors)
Nominal Operating Voltage (DC)		U_n	30 V
Maximum Continuous Operating Voltage (DC)		U_c	33 V
Rated Load Current at 25°C		I_L	10 A
C1 Nominal Discharge Current (8/20 µs)		I_n	250 A
Residual Voltage at 5 kA (8/20 µs)	(Line-Line)	U_{res}	< 80 V
Rated Spark Overvoltage	(Line-Line)		36-44 V
	(Line-Ground)		36-44 V
Response Time Overvoltage Protection	(Line-Line)	t_A	< 1 ns
	(Line-Ground)		< 1 ns
Insulation Resistance of the Protection	(Line-Line)	R_{iso}	≥ 33 MΩ
	(Line-Ground)		≥ 33 MΩ
Serial Resistance per Path		R	0.1 Ω
Transverse Capacitance	(Line-Line)	C	50 pF
	(Line-Line)		50 pF
Cut-off Frequency		f_G	30 MHz
Mechanical			
Temperature Range			-40 °F to +176 °F [-40 °C to +80 °C]
Terminal Cross Section Multi-strand (max.)			12 AWG [4 mm², 2.5 mm² Q Version]
Terminal Screw Torque			4.5 lbf·in [0.5 Nm]
Degree of Protection IEC/EN 60529			IP 20 (built-in)
Housing Material			Thermoplastic; Grey; Extinguishing Degree V-0
Mounting IEC/EN 60715			35 mm DIN Rail
Order Information			
Order Code			**30**
SLL-4-xx			7082.92
SLL-4-xxQ (Quick Connect Terminals)			7085.27
SLL-4-xxM (module)			7082.93

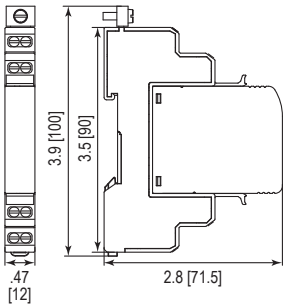
RayDat SLL-4 Series

Internal Configuration

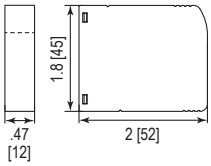


Legend
DB Diode Block
PG Protective Grounding

Dimensions & Packaging

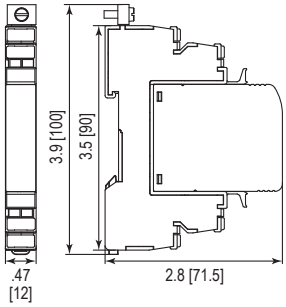


SLL-4 Series	30
Dimensions	
Weight per Unit	1.97 oz [56 g]
Dimensions DIN 43880	2/3 TE
Packaging Dimensions (Single Unit)	3.4 × .59 × 4" [87 × 15 × 102 mm]
Minimum Package Quantity	15 pieces



SLL-4-xxM Series	30
Dimensions	
Weight per Unit	.77 oz [22 g]
Packaging Dimensions (Single Unit)	3.4 × .59 × 4" [87 × 15 × 102 mm]
Minimum Package Quantity	15 pieces

Quick Connect Terminals



SLL-4-xxQ Series	30
Dimensions	
Weight per Unit	2.04 oz [58 g]
Dimensions DIN 43880	2/3 TE
Packaging Dimensions (Single Unit)	3.4 × .59 × 4" [87 × 15 × 102 mm]
Minimum Package Quantity	15 pieces

inches
[mm]

RoHS COMPLIANT

SPD for Two Pair Exposed Lines

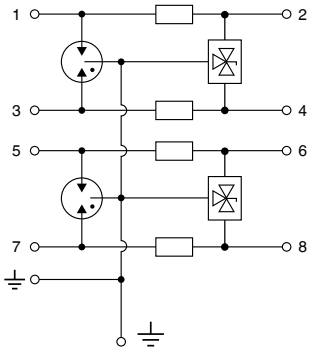
RayDat SUI-4 Series

***UL Listed**

D1 • C1 • C2 • C3

IEC/EN Category: D1/C1/C2/C3
Surge Discharge Ratings: I_n: 20 kA, I_{max}: 30 kA, I_{imp}: 5 kA
Voltages: 5, 12, 15, 24, 30*, 48, 60 V DC
Frequency Range: 30 MHz
Housing: Modular Design
Compliance: IEC/EN 61643-21
UL 497B 4th Edition

Configuration:



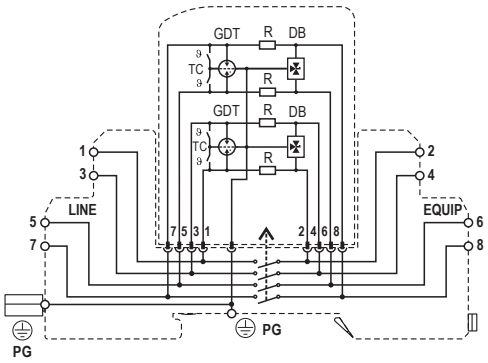
Technical Data

SUI-4 Series			5	12	15	24	30*	48	60
Electrical									
Lines Protected						2 (4 Conductors)			
Nominal Operating Voltage (DC)		U_n	5 V	12 V	15 V	24 V	30 V	48 V	60 V
Maximum Continuous Operating Voltage (DC)		U_c	6 V	15 V	18 V	28 V	33 V	52 V	64 V
Rated Load Current at 25°C		I_L				1 A			
C2 Nominal Discharge Current (8/20 µs)		I_n				20 kA			
Maximum Discharge Current (8/20 µs)		I_{max}				30 kA			
D1 Impulse Current (10/350 µs)		I_{imp}				5 kA			
Residual Voltage at 5 kA (8/20 µs)		U_{res}	< 22 V	< 42 V	< 48 V	< 70 V	< 80 V	< 140 V	< 160 V
Rated Spark Overvoltage	(Line-Ground)		7-10 V	16-21 V	21-25 V	31-37 V	36-44 V	57-69 V	68-84 V
	(Line-Line)		7-10 V	16-21 V	21-25 V	31-37 V	36-44 V	57-69 V	68-84 V
Response Time Overvoltage Protection		t_A				< 1 ns			
Thermal Protection						Yes			
Insulation Resistance of the Protection		R_{iso}	≥ 6 KΩ	≥ 15 MΩ	≥ 18 MΩ	≥ 28 MΩ	≥ 33 MΩ	≥ 52 MΩ	≥ 64 MΩ
Serial Resistance per Path		R				1.6-2.0 Ω			
Transverse Capacitance		C				50 pF			
Cut-off Frequency		f_G				30 MHz			
Mechanical									
Temperature Range						-40 °F to +176 °F [-40 °C to +80 °C]			
Terminal Cross Section Multi-strand (max.)						12 AWG [4 mm²]			
Terminal Screw Torque						4.5 lbf·in [0.5 Nm]			
Degree of Protection IEC/EN 60529						IP 20 (built-in)			
Housing Material						Thermoplastic; Grey; Extinguishing Degree V-0			
Mounting IEC/EN 60715						35 mm DIN Rail			
Order Information									
Order Code			5	12	15	24	30*	48	60
SUI-4-xxx			7083.21	7083.22	7083.23	7083.24	7083.25	7083.26	7083.27
SUI-4-xxxM (module)			7083.29	7083.30	7083.31	7083.32	7083.33	7083.34	7083.35

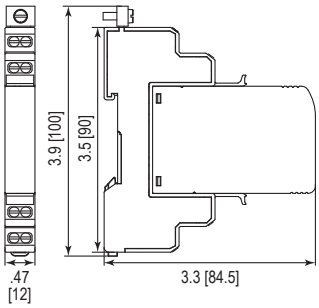
Internal Configuration

Legend

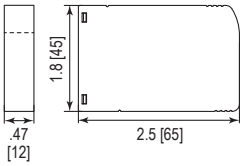
DB	*Diode Block*
GDT	*Gas Discharge Tube*
PG	*Protective Grounding*
R	*Resistor*
TC	*Thermo-clip*



Dimensions & Packaging



SUI-4 Series	5	12	15	24	30	48	60
Dimensions							
Weight per Unit	2.46 oz [70 g]						
Dimensions DIN 43880	2/3 TE						
Packaging Dimensions (Single Unit)	3.4 × .59 × 4" [87 × 15 × 102 mm]						
Minimum Package Quantity	15 pieces						



SUI-4-xxxM Series	5	12	15	24	30	48	60
Dimensions							
Weight per Unit	1.05 oz [30 g]						
Packaging Dimensions (Single Unit)	3.4 × .59 × 4" [87 × 15 × 102 mm]						
Minimum Package Quantity	15 pieces						

inches
[mm]

RoHS COMPLIANT

Modular Surge Protective Devices (SPDs) for Data & Signal Lines

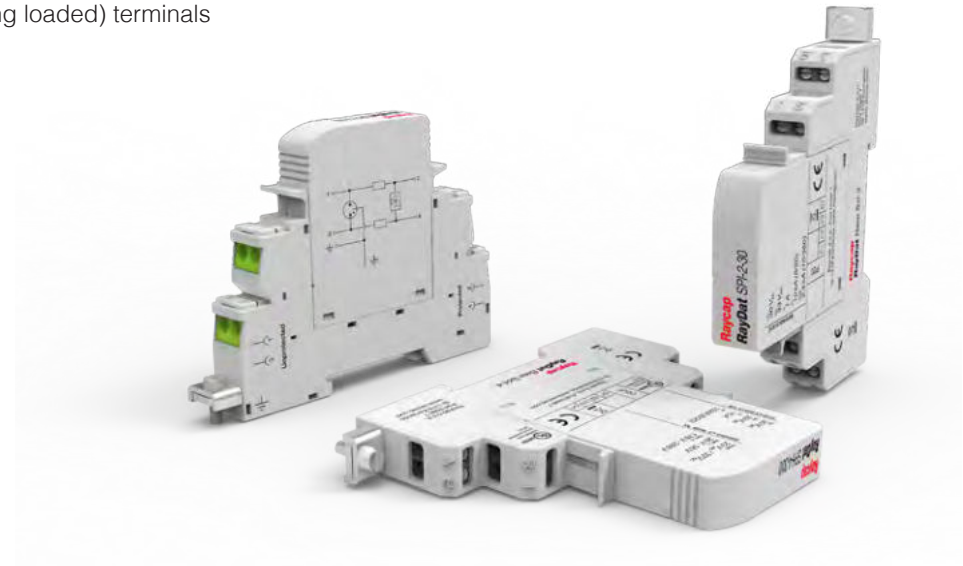
RayDat SP Series

RayDat SPH-2*
RayDat SPH-4*
RayDat SPI-2
RayDat SPI-4

*UL Listed

Special features:

- Very high surge ratings
- The connection lines remain enabled during module replacement
- High density – up to 2 protected pairs at only 12mm width
- Equipped with Screw or Quick connect (spring loaded) terminals



Symbol Legend:

DIN Rail Mounting

Screw Connect Terminals

Quick Connect Terminals

Modular design

Shield Directly Grounded

The RayDat SP Series of surge protective devices has been developed to protect a pair loop, which could be ungrounded onto data, signal and communication circuits. It is intended for those applications where high ground potential rises may frequently occur, such as in locations close to electric railways. The circuit topology consists of a multi-stage protector providing both, common (longitudinal) mode and differential (transverse) mode protection. Coarse protection is provided by a three terminal gas discharge tube (GDT), while fine protection is provided using a high-speed silicon avalanche diode (SAD) or metal oxide varistor (MOV) stage.

Care is taken between these two stages to ensure coordination without voltage or surge current blind spots occurring.
Thermal protection reduces the hazards of thermal runaway, should there be an inadvertent mains incursion fault. Both common (longitudinal) mode and differential (transverse) mode protection is provided. If the module is unplugged from the base, the connection lines remain enabled.

RoHS COMPLIANT CE UL LISTED

Modular SPD for Single Pair

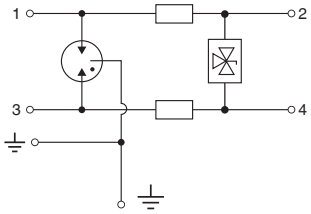
RayDat SPH-2 Series

D1 • C1 • C2 • C3

UL Listed

IEC/EN Category: D1/C1/C2/C3
Surge Discharge Ratings: I_n: 10 kA, I_{max}: 20 kA, I_{imp}: 2.5 kA
Voltages: 30 V DC
Frequency Range: 30 MHz, 10 MHz
Housing: Modular Design
Compliance: IEC/EN 61643-21
UL 497B 4th Edition

Configuration:



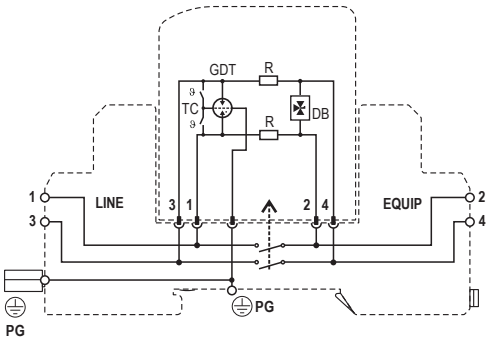
Technical Data

SPH-2 Series			30
Electrical			
Lines Protected			1 (2 Conductors)
Nominal Operating Voltage (DC)		U_n	30 V
Maximum Continuous Operating Voltage (DC)		U_c	33 V
Rated Load Current at 25°C		I_L	1 A
C2 Nominal Discharge Current (8/20 µs)		I_n	10 kA
Maximum Discharge Current (8/20 µs)		I_{max}	20 kA
D1 Impulse Current (10/350 µs)		I_{imp}	2.5 kA
Residual Voltage at 5 kA (8/20 µs)	(Line-Line)	U_{res}	< 80 V
Rated Spark Overvoltage	(Line-Ground)		184-276 V
	(Line-Line)		36-44 V
Response Time Overvoltage Protection	(Line-Line)	t_A	< 1 ns
	(Line-Ground)		< 100 ns
Insulation Resistance of the Protection	(Line-Ground)	R_{iso}	> 1 GΩ / 100 V
	(Line-Line)		≥ 33 MΩ
Serial Resistance per Path		R	1.6-2.0 Ω
Transverse Capacitance	(Line-Line)	C	50 pF
	(Line-Ground)		5 pF
Cut-off Frequency		f_G	30 MHz
Mechanical			
Temperature Range			-40 °F to +176 °F [-40 °C to +80 °C]
Terminal Cross Section Multi-strand (max.)			12 AWG
			4 mm², 2.5 mm² Q Version
Terminal Screw Torque			4.5 lbf·in [0.5 Nm]
Degree of Protection IEC/EN 60529			IP 20 (built-in)
Housing Material			Thermoplastic; Grey; Extinguishing Degree V-0
Mounting IEC/EN 60715			35 mm DIN Rail
Order Information			
Order Code			**30**
SPH-2-xxx			7082.84
SPH-2-xxxQ (Quick Connect Terminals)			7085.25
SPH-2-xxxM (module)			7082.85

Internal Configuration

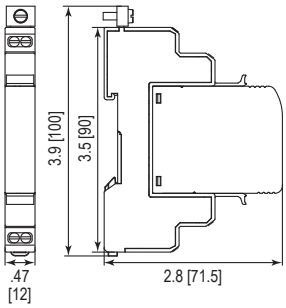
Legend

DB	*Diode Block*
GDT	*Gas Discharge Tube*
PG	*Protective Grounding*
R	*Resistor*
TC	*Thermo-clip*

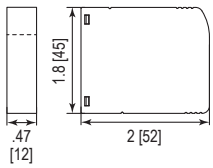


SPH-2-30

Dimensions & Packaging

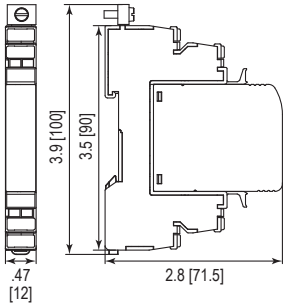


SPH-2 Series	30
Dimensions	
Weight per Unit	1.83 oz [52 g]
Dimensions DIN 43880	2/3 TE
Packaging Dimensions (Single Unit)	3.4 × .59 × 4" [87 × 15 × 102 mm]
Minimum Package Quantity	15 pieces



SPH-2-xxxM Series	30
Dimensions	
Weight per Unit	.84 oz [24 g]
Packaging Dimensions (Single Unit)	3.4 × .59 × 4" [87 × 15 × 102 mm]
Minimum Package Quantity	15 pieces

Quick Connect Terminals



SPH-2-xxxQ Series	30
Dimensions	
Weight per Unit	1.9 oz [54 g]
Dimensions DIN 43880	2/3 TE
Packaging Dimensions (Single Unit)	3.4 × .59 × 4" [87 × 15 × 102 mm]
Minimum Package Quantity	15 pieces

inches
[mm]

RoHS COMPLIANT

Modular SPD for Two Pair

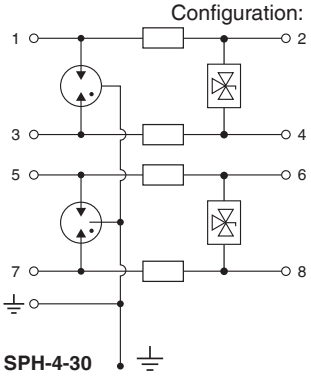
RayDat SPH-4 Series

D1 • C1 • C2 • C3

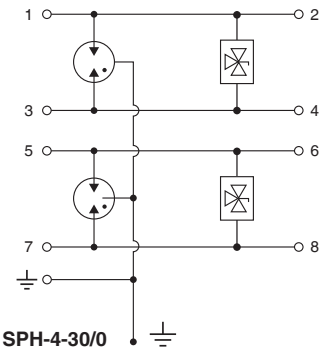
UL Listed

IEC/EN Category: D1/C1/C2/C3
Surge Discharge Ratings: I_n: 10 kA, I_{max}: 20 kA, I_{imp}: 5 kA
Voltages: 30 V DC
Frequency Range: 30 MHz
Housing: Modular Design
Compliance: IEC/EN 61643-21
UL 497B 4th Edition

Configuration:



SPH-4-30



SPH-4-30/0

Technical Data

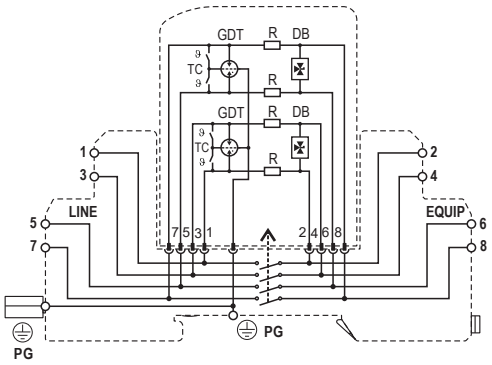
SPH-4 Series			30	30/0
Electrical				
Lines Protected			2 (4 Conductors)	
Nominal Operating Voltage (DC)		U_n	30 V	
Maximum Continuous Operating Voltage (DC)		U_c	33 V	
Rated Load Current at 25°C		I_L	1 A	10 A
C2 Nominal Discharge Current (8/20 µs)		I_n	10 kA	
Maximum Discharge Current (8/20 µs)		I_{max}	20 kA	
D1 Impulse Current (10/350 µs)		I_{imp}	5 kA	
Residual Voltage at 5 kA (8/20 µs)	(Line-Line)	U_{res}	< 80 V	
Rated Spark Overvoltage	(Line-Ground)		184-276 V	
	(Line-Line)		36-44 V	
Response Time Overvoltage Protection	(Line-Line)	t_A	< 1 ns	
	(Line-Ground)		< 100 ns	
Insulation Resistance of the Protection	(Line-Ground)	R_{iso}	> 1 GΩ / 100 V	
	(Line-Line)		≥ 33 MΩ	
Serial Resistance per Path		R	1.6-2.0 Ω	0.1 Ω
Transverse Capacitance	(Line-Line)	C	50 pF	
	(Line-Ground)		5 pF	
Cut-off Frequency		f_G	30 MHz	
Mechanical				
Temperature Range			-40 °F to +176 °F [-40 °C to +80 °C]	
Terminal Cross Section Multi-strand (max.)			12 AWG	
			4 mm², 2.5 mm² Q Version	
Terminal Screw Torque			4.5 lbf·in [0.5 Nm]	
Degree of Protection IEC/EN 60529			IP 20 (built-in)	
Housing Material			Thermoplastic; Grey; Extinguishing Degree V-0	
Mounting IEC/EN 60715			35 mm DIN Rail	

Order Information		
Order Code	**30**	**30/0**
SPH-4-xx	7082.82	7086.89
SPH-4-xxQ (Quick Connect Terminals)	7085.24	7085.28
SPH-4-xxM (module)	7082.83	7085.29

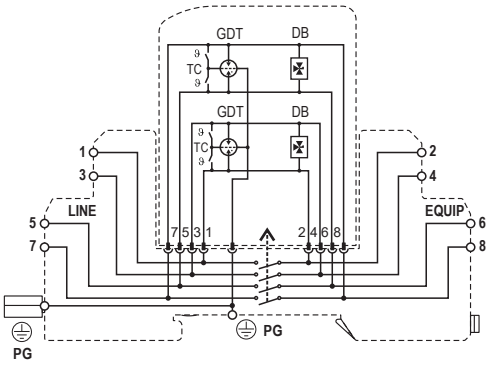
Internal Configuration

Legend

DB Diode Block
GDT Gas Discharge Tube
PG Protective Grounding
R Resistor
TC Thermo-clip

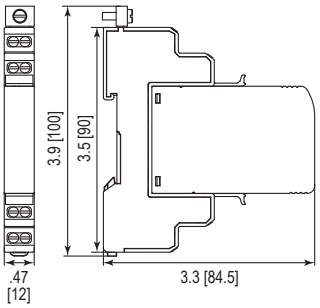


SPH-4-30

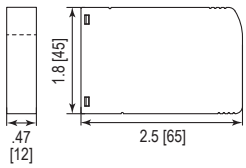


SPH-4-30/0

Dimensions & Packaging

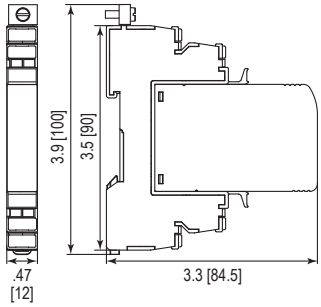


SPH-4 Series	30	30/0
Dimensions		
Weight per Unit	2.32 oz [66 g]	2.25 oz [64 g]
Dimensions DIN 43880	2/3 TE	
Packaging Dimensions (Single Unit)	3.4 × .59 × 4" [87 × 15 × 102 mm]	
Minimum Package Quantity	15 pieces	



SPH-4-xxM Series	30	30/0
Dimensions		
Weight per Unit	1.05 oz [30 g]	.99 oz [28 g]
Packaging Dimensions (Single Unit)	3.4 × .59 × 4" [87 × 15 × 102 mm]	
Minimum Package Quantity	15 pieces	

Quick Connect Terminals



SPH-4-xxQ Series	30	30/0
Dimensions		
Weight per Unit	2.40 oz [68 g]	2.32 oz [66 g]
Dimensions DIN 43880	2/3 TE	
Packaging Dimensions (Single Unit)	3.4 × .59 × 4" [87 × 15 × 102 mm]	
Minimum Package Quantity	15 pieces	

inches
[mm]

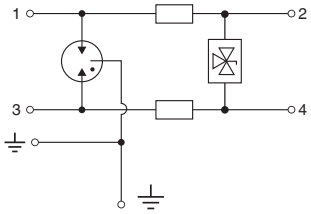
RoHS COMPLIANT

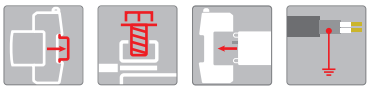
Modular SPD for Two Pair

RayDat SPI-2 Series

D1 • C1 • C2 • C3

IEC/EN Category: D1/C1/C2/C3
Surge Discharge Ratings: I_n: 10 kA, I_{max}: 20 kA, I_{imp}: 2.5 kA
Voltages: 30 V DC
Frequency Range: 30 MHz, 10 MHz
Housing: Modular Design
Compliance: IEC/EN 61643-21
Configuration:





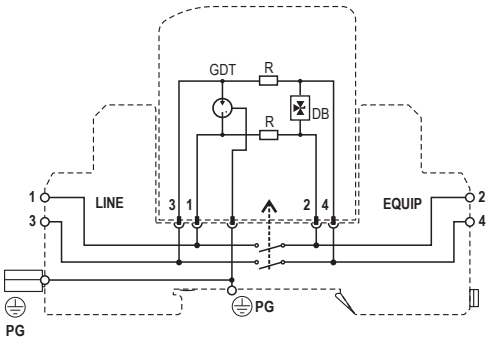
Technical Data

SPI-2 Series			30
Electrical			
Lines Protected			1 (2 Conductors)
Nominal Operating Voltage (DC)		U_n	30 V
Maximum Continuous Operating Voltage (DC)		U_c	33 V
Rated Load Current at 25°C		I_L	1 A
C2 Nominal Discharge Current (8/20 µs)		I_n	10 kA
Maximum Discharge Current (8/20 µs)		I_{max}	20 kA
D1 Impulse Current (10/350 µs)		I_{imp}	2.5 kA
Total Impulse Current (10/350 µs)		I_{imp}	5 kA
Residual Voltage at 5 kA (8/20 µs)	(Line-Line)	U_{res}	< 80 V
Rated Spark Overvoltage	(Line-Ground)		184-276 V
	(Line-Line)		36-44 V
Response Time Overvoltage Protection	(Line-Line)	t_A	< 1 ns
	(Line-Ground)		< 100 ns
Insulation Resistance of the Protection	(Line-Ground)	R_{iso}	> 1 GΩ / 100 V
	(Line-Line)		≥ 33 MΩ
Serial Resistance per Path		R	1.6-2.0 Ω
Transverse Capacitance	(Line-Line)	C	50 pF
	(Line-Ground)		5 pF
Cut-off Frequency		f_G	30 MHz
Mechanical			
Temperature Range			-40 °F to +176 °F [-40 °C to +80 °C]
Terminal Cross Section Multi-strand (max.)			12 AWG
			4 mm², 2.5 mm² Q Version
Terminal Screw Torque			4.5 lbf·in [0.5 Nm]
Degree of Protection IEC/EN 60529			IP 20 (built-in)
Housing Material			Thermoplastic; Grey; Extinguishing Degree V-0
Mounting IEC/EN 60715			35 mm DIN Rail
Order Information			
Order Code			**30**
SPI-2-xxx			7085.67
SPI-2-xxxM (module)			7085.68

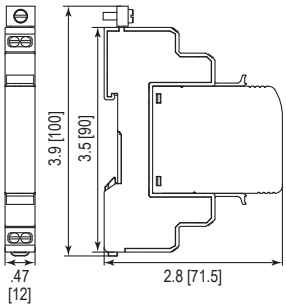
RayDat SPI-2 Series

Legend

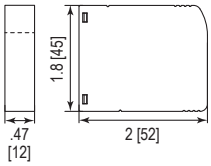
DB Diode Block
GDT Gas Discharge Tube
PG Protective Grounding
R Resistor



Dimensions & Packaging



SPI-2 Series	30
Dimensions	
Weight per Unit	1.90 oz [54 g]
Dimensions DIN 43880	2/3 TE
Packaging Dimensions (Single Unit)	3.4 × .59 × 4" [87 × 15 × 102 mm]
Minimum Package Quantity	15 pieces



SPI-2-xxxM Series	30
Dimensions	
Weight per Unit	.84 oz [24 g]
Packaging Dimensions (Single Unit)	3.4 × .59 × 4" [87 × 15 × 102 mm]
Minimum Package Quantity	15 pieces

inches
[mm]

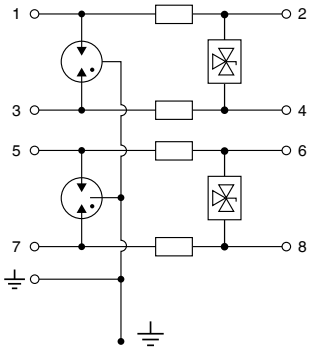
RoHS COMPLIANT CE

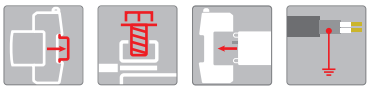
Modular SPD for Two Pair

RayDat SPI-4 Series

D1 • C1 • C2 • C3

IEC/EN Category: D1/C1/C2/C3
Surge Discharge Ratings: I_n: 10 kA, I_{max}: 20 kA, I_{imp}: 2.5 kA
Voltages: 30 V DC
Frequency Range: 30 MHz, 10 MHz
Housing: Modular Design
Compliance: IEC/EN 61643-21
Configuration:





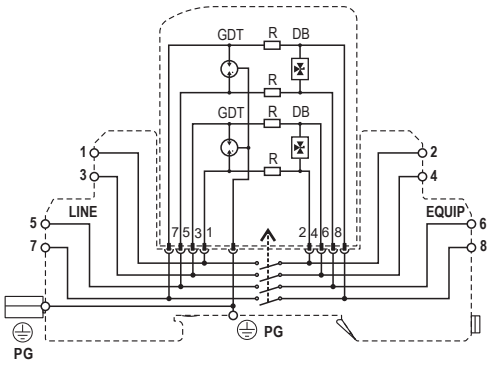
Technical Data

SPI-4 Series			30
Electrical			
Lines Protected			2 (4 Conductors)
Nominal Operating Voltage (DC)		U_n	30 V
Maximum Continuous Operating Voltage (DC)		U_c	33 V
Rated Load Current at 25°C		I_L	1 A
C2 Nominal Discharge Current (8/20 µs)		I_n	10 kA
Maximum Discharge Current (8/20 µs)		I_{max}	20 kA
D1 Impulse Current (10/350 µs)		I_{imp}	2.5 kA
Total Impulse Current (10/350 µs)		I_{imp}	10 kA
Residual Voltage at 5 kA (8/20 µs)	(Line-Line)	U_{res}	< 80 V
Rated Spark Overvoltage	(Line-Ground)		184-276 V
	(Line-Line)		36-44 V
Response Time Overvoltage Protection	(Line-Line)	t_A	< 1 ns
	(Line-Ground)		< 100 ns
Insulation Resistance of the Protection	(Line-Ground)	R_{iso}	> 1 GΩ / 100 V
	(Line-Line)		≥ 33 MΩ
Serial Resistance per Path		R	1.6-2.0 Ω
Transverse Capacitance	(Line-Line)	C	50 pF
	(Line-Ground)		5 pF
Cut-off Frequency		f_G	30 MHz
Mechanical			
Temperature Range			-40 °F to +176 °F [-40 °C to +80 °C]
Terminal Cross Section Multi-strand (max.)			12 AWG
			4 mm², 2.5 mm² Q Version
Terminal Screw Torque			4.5 lbf·in [0.5 Nm]
Degree of Protection IEC/EN 60529			IP 20 (built-in)
Housing Material			Thermoplastic; Grey; Extinguishing Degree V-0
Mounting IEC/EN 60715			35 mm DIN Rail
Order Information			
Order Code			**30**
SPI-4-xxx			7085.69
SPI-4-xxxM (module)			7085.70

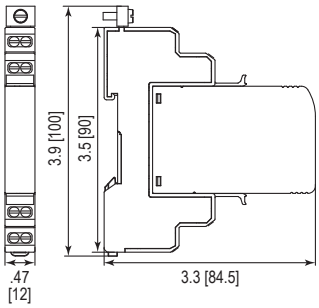
RayDat SPI-4 Series

Legend

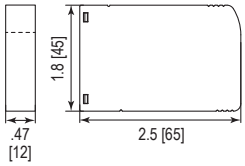
DB Diode Block
GDT Gas Discharge Tube
PG Protective Grounding
R Resistor



Dimensions & Packaging



SPI-4 Series	30
Dimensions	
Weight per Unit	2.40 oz [68 g]
Dimensions DIN 43880	2/3 TE
Packaging Dimensions (Single Unit)	3.4 × .59 × 4" [87 × 15 × 102 mm]
Minimum Package Quantity	15 pieces



SPI-4-xxM Series	30
Dimensions	
Weight per Unit	1.05 oz [30 g]
Packaging Dimensions (Single Unit)	3.4 × .59 × 4" [87 × 15 × 102 mm]
Minimum Package Quantity	15 pieces

inches
[mm]

RoHS COMPLIANT CE

Modular Surge Protective Devices (SPDs) for Data & Signal Lines

RayDat SRH Series

RayDat SRH-2*
RayDat SRH-2L*

**UL Listed*

Special features:

- Very high surge ratings
- The connection lines remain enabled during module replacement
- Version available with potential free contact for fault detection
- Version available with LED visual indication for fault detection

Symbol Legend:

DIN Rail Mounting

Screw Connect Terminals

Quick Connect Terminals

Modular design

Shield Directly Grounded

These efficient overvoltage barriers contain both, coarse and fine protection stages and provide longitudinal and a transverse surge protection.

These products also feature an additional set of voltage free contacts which can be used for remote signalization and monitoring of the device's status. If the unit fails, the contacts change state.

The initial protection stage comprises a three-pole gas discharge tube (GDT) and is designed to divert the primary surge energy. The subsequent fine protection stage is carried out using fast bi-directional silicon avalanche diodes (SAD).

The design of the fine protection stage enables the product to avoid capacitive line loading and ensures a low insertion loss and wide operating frequency range.

Series line impedances ensure energy coordination between the coarse and a fine protection stages at all levels of a surge incident. To protect against the hazards of electric shock and fire, which often results when power frequency contact occurs between power and communication lines, often called mains incursion, a thermo-clip is included on the primary protection stage to divert the power frequency current to ground.

RoHS COMPLIANT CE UL LISTED

SPD with Remote Contacts

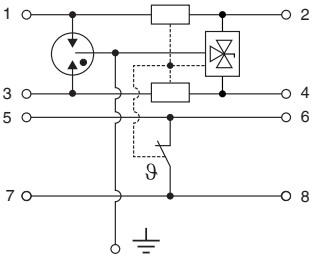
RayDat SRH-2 Series

D1 • C1 • C2 • C3

***UL Listed**

IEC/EN Category: D1/C1/C2/C3
Surge Discharge Ratings: I_n: 10 kA, I_{max}: 20 kA, I_{imp}: 2.5 kA
Voltages: 5*, 12*, 15, 24*, 30*, 48, 60 V DC
Frequency Range: 30 MHz
Housing: Modular Design
Compliance: IEC/EN 61643-21
UL 497B 4th Edition

Configuration:



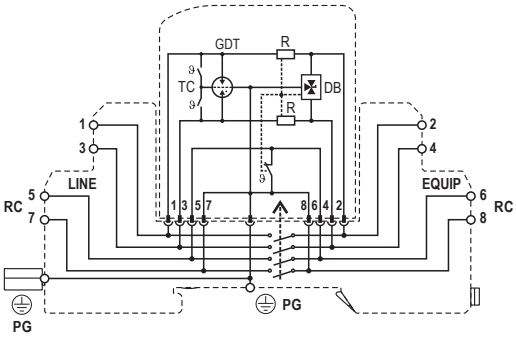
Technical Data

SRH-2 Series			5*	12*	15	24*	30*	48	60
Electrical									
Lines Protected						1 (2 Conductors)			
Nominal Operating Voltage (DC)		U_n	5V	12V	15V	24V	30V	48V	60V
Maximum Continuous Operating Voltage (DC)		U_c	6V	15V	18V	28V	33V	52V	64V
Rated Load Current at 25°C		I_L				1 A			
C2 Nominal Discharge Current (8/20 µs)		I_n				10 kA			
Maximum Discharge Current (8/20 µs)		I_{max}				20 kA			
D1 Impulse Current (10/350 µs)		I_{imp}				2.5 kA			
Residual Voltage at 5 kA (8/20 µs)		U_{res}	<22V	<42V	<48V	<70V	<80V	<140V	<160V
Rated Spark Overvoltage	(Line-Ground)		7-10V	16-21V	21-25V	31-37V	36-44V	57-69V	68-84V
	(Line-Line)		7-10V	16-21V	21-25V	31-37V	36-44V	57-69V	68-84V
Response Time Overvoltage Protection		t_A				<1 ns			
Thermal Protection						Yes			
Insulation Resistance of the Protection		R_{iso}	≥ 6 KΩ	≥ 15 MΩ	≥ 18 MΩ	≥ 28 MΩ	≥ 33 MΩ	≥ 52 MΩ	≥ 64 MΩ
Serial Resistance per Path		R				1.6-2.0 Ω			
Transverse Capacitance		C				50 pF			
Cut-off Frequency		f_G				30 MHz			
Mechanical									
Temperature Range						-40 °F to +176 °F [-40 °C to +80 °C]			
Terminal Cross Section Multi-strand (max.)						12 AWG [4 mm², 2.5 mm² Q Version]			
Terminal Screw Torque						4.5 lbf·in [0.5 Nm]			
Degree of Protection IEC/EN 60529						IP 20 (built-in)			
Housing Material						Thermoplastic; Grey; Extinguishing Degree V-0			
Mounting IEC/EN 60715						35 mm DIN Rail			
Remote Contacts Ratings						AC 250 V/0.5 A, DC 50 V/1 A			
Order Information									
Order Code			5*	12*	15	24*	30*	48	60
SRH-2-xxx			7086.17	7086.18	7086.19	7086.20	7086.21	7086.22	7086.23
SRH-2-xxxQ (Quick Connect Terminals)			7085.33	7085.34	7085.35	7085.36	7085.37	7085.38	7085.39
SRH-2-xxxM (module)			7086.25	7086.26	7086.27	7086.28	7086.29	7086.30	7086.31

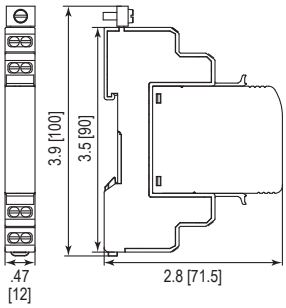
Internal Configuration

Legend

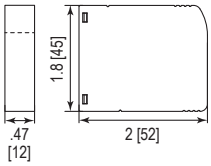
DB	*Diode Block*
GDT	*Gas Discharge Tube*
PG	*Protective Grounding*
R	*Resistor*
RC	*Remote Control (NC)*
TC	*Thermo-clip*



Dimensions & Packaging

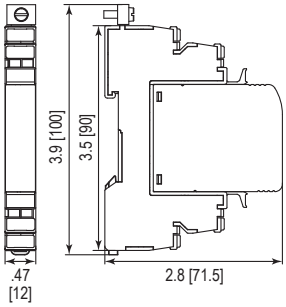


SRH-2 Series	5	12	15	24	30	48	60
Dimensions							
Weight per Unit	2.04 oz [58 g]						
Dimensions DIN 43880	2/3 TE						
Packaging Dimensions (Single Unit)	3.4 × .59 × 4" [87 × 15 × 102 mm]						
Minimum Package Quantity	15 pieces						



SRH-2-xxxM Series	5	12	15	24	30	48	60
Dimensions							
Weight per Unit	.84 oz [24 g]						
Packaging Dimensions (Single Unit)	3.4 × .59 × 4" [87 × 15 × 102 mm]						
Minimum Package Quantity	15 pieces						

Quick Connect Terminals



SRH-2-xxxQ Series	5	12	15	24	30	48	60
Dimensions							
Weight per Unit	2.11 oz [60 g]						
Dimensions DIN 43880	2/3 TE						
Packaging Dimensions (Single Unit)	3.4 × .59 × 4" [87 × 15 × 102 mm]						
Minimum Package Quantity	15 pieces						

inches
[mm]

RoHS COMPLIANT

SPD with Visual Indication

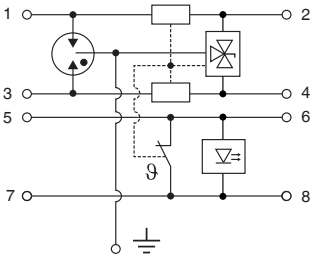
RayDat SRH-2L Series

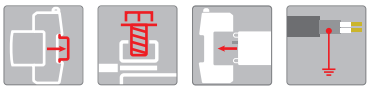
D1 • C1 • C2 • C3

UL Listed

IEC/EN Category: D1/C1/C2/C3
Surge Discharge Ratings: I_n: 10 kA, I_{max}: 20 kA, I_{imp}: 2.5 kA
Voltages: 5, 12, 24, 30 V DC
Frequency Range: 30 MHz
Housing: Modular Design
Compliance: IEC/EN 61643-21
UL 497B 4th Edition

Configuration:





Technical Data

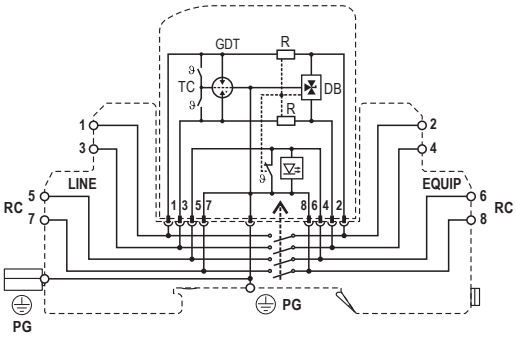
SRH-2L Series			5	12	24	30
Electrical						
Lines Protected				1 (2 Conductors)		
Nominal Operating Voltage (DC)		U_n	5 V	12 V	24 V	30 V
Maximum Continuous Operating Voltage (DC)		U_c	6 V	15 V	28 V	33 V
Rated Load Current at 25°C		I_L		1 A		
C2 Nominal Discharge Current (8/20 µs)		I_n		10 kA		
Maximum Discharge Current (8/20 µs)		I_{max}		20 kA		
D1 Impulse Current (10/350 µs)		I_{imp}		2.5 kA		
Residual Voltage at 5 kA (8/20 µs)		U_{res}	< 22 V	< 42 V	< 70 V	< 80 V
Rated Spark Overvoltage	(Line-Ground)		7-10 V	16-21 V	31-37 V	36-44 V
	(Line-Line)		7-10 V	16-21 V	31-37 V	36-44 V
Response Time Overvoltage Protection		t_A		< 1 ns		
Thermal Protection				Yes		
Insulation Resistance of the Protection		R_{iso}	≥ 6 KΩ	≥ 15 MΩ	≥ 28 MΩ	≥ 33 MΩ
Serial Resistance per Path		R		1.6-2.0 Ω		
Transverse Capacitance		C		50 pF		
Cut-off Frequency		f_G		30 MHz		
Mechanical						
Temperature Range				-40 °F to +176 °F [-40 °C to +80 °C]		
Terminal Cross Section Multi-strand (max.)				12 AWG [4 mm²]		
Terminal Screw Torque				4.42 lbf·in [0.5 Nm]		
Degree of Protection IEC/EN 60529				IP 20 (built-in)		
Housing Material				Thermoplastic; Grey; Extinguishing Degree V-0		
Mounting IEC/EN 60715				35 mm DIN Rail		
Remote Contacts Ratings				AC 250 V/0.5 A, DC 50 V/1 A		
Order Information						
Order Code			5	12	24	30
SRH-2-xxxL			7085.44	7085.46	7085.48	7085.42
SRH-2-xxxLM (module)			7085.45	7085.47	7085.49	7085.43
SRH-2-xxxLQ			7085.56	7085.58	7085.60	7085.62

RayDat SRH-2L Series

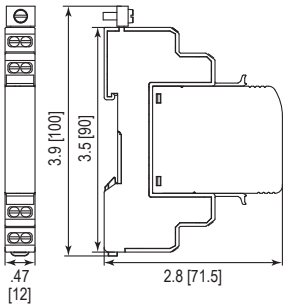
Internal Configuration

Legend

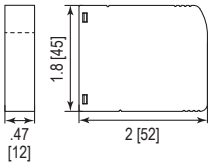
DB	*Diode Block*
GDT	*Gas Discharge Tube*
PG	*Protective Grounding*
R	*Resistor*
RC	*Remote Control (NC)*
TC	*Thermo-clip*



Dimensions & Packaging

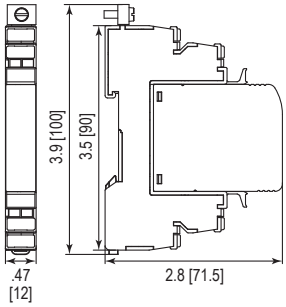


SRH-2L Series	5	12	24	30
Dimensions				
Weight per Unit	2.04 oz [58 g]			
Dimensions DIN 43880	2/3 TE			
Packaging Dimensions (Single Unit)	3.4 × .59 × 4" [87 × 15 × 102 mm]			
Minimum Package Quantity	15 pieces			



SRH-2-xxxLM Series	5	12	24	30
Dimensions				
Weight per Unit	.85 oz [24 g]			
Packaging Dimensions (Single Unit)	3.4 × .59 × 4" [87 × 15 × 102 mm]			
Minimum Package Quantity	15 pieces			

Quick Connect Terminals



SRH-2LQ Series	5	12	24	30
Dimensions				
Weight per Unit	2.11 oz [60 g]			
Dimensions DIN 43880	2/3 TE			
Packaging Dimensions (Single Unit)	3.4 × .59 × 4" [87 × 15 × 102 mm]			
Minimum Package Quantity	15 pieces			

inches
[mm]

RoHS COMPLIANT

RayDat PSU-14

RayDat PSU-14		127 621
Electrical		
Input Voltage	U_{out}	21.5V DC ... 28V DC
Output Voltage		max. 28V DC
Output Current	I_{out}	2x2mA
Input Terminals		3 (+), 1 (-)

RayDat PSU-PB-7P

RayDat PSU-PB-7P	127 622
Electrical	
Number of Poles	7

RayDat PSU-PB-6P

RayDat PSU-PB-6P	127 623
Electrical	
Number of Poles	6

Surge Protective Devices
(SPDs) for Explosive Environments

Ex Protection

RayDat Ex-2
RayDAT PLP Ex
RayDAT PLP2 Ex
RayDAT PLP-24/5 Ex
RayDAT PLP3L Ex

Special features:

- Very high surge ratings
- High density – up to 4 protected lines
- Version for DIN rail mounting available
- Version in metal (Stainless steel) housing available

Symbol Legend:

DIN Rail Mounting

Screw Connect Terminals

Compact Design

Modular Design

Wire Connection

Shield Directly Grounded

Ex Certificate

RoHS COMPLIANT

1180

800466

The RayDat Ex Series is intended to provide protection to low voltage signal and data circuits, located in potentially explosive environments.

It is intended for use on inherently safe circuits in accordance with the ATEX directive. The protection module should be located as close as possible to the end-user equipment being protected. The circuit consists of a multi-stage protector providing both, common (longitudinal) mode and differential (transverse) mode protection.

Coarse protection is provided using a three terminal gas discharge tube (GDT), while fine protection is provided using a high-speed bi-directional silicon stage. Care is taken between these two stages to ensure coordination without voltage or surge current blind spots occurring.

SPD for Explosive Environments

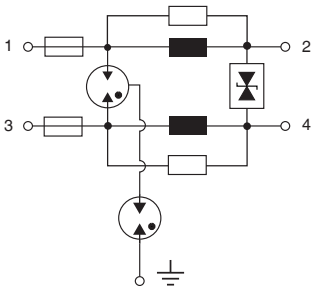
RayDat Ex-2 Series

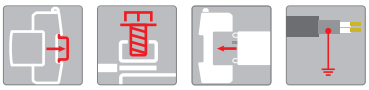
D1 • C1 • C2 • C3

IEC/EN Category: D1/C1/C2/C3
Surge Discharge Ratings: I_n: 5 kA, I_{max}: 10 kA, I_{imp}: 1 kA
Voltages: 12, 24 V DC
Max. Operating Voltage: U_c: 15, 28 V DC
Terminals: Stranded to 4 mm²
Housing: Modular Design
Compliance: IIEC/EN 61643-21

CE 1180
IEC 60079-0:2011
IEC 60079-11:2011
Ex
EN 60079-0:2012+A11:2013
EN 60079-11:2012

Configuration:





	Input Power Pi	Temperature Class	Maximum Ambient
$U_o = U_i$	Pi=1W	T6	50 °C
$I_o = I_i$	Pi=1.3W	T5	55 °C
$P_o = P_i$	Pi=2W	T4	60 °C

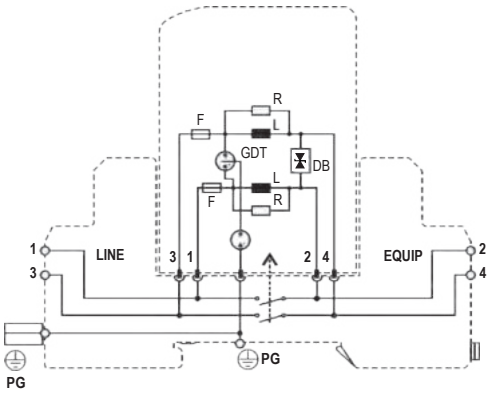
Technical Data

Ex-2 Series		12	24
Type			
Intrinsic Safety Parameters			
Explosion Protected		II 1G Ex ia IIC T* Ga (-40 °C ≤ Ta ≤ *°C)	
Maximum Input Voltage	U_i	16 V	29 V
Maximum Input Current	I_i	500 mA	
Maximum Input Power	P_i	2 W	
Maximum Internal Capacitance	C_i	10 nF	
Maximum Internal Inductance	L_i	0.11 mH	
Number of Protected Pairs		1 (2 Conductors)	
Electrical			
Nominal Operating Voltage (DC)	U_n	12 V	24 V
Maximum Continuous Operating Voltage (DC)	U_c	15 V	28 V
Rated Load Current at 25°C	I_L	500 mA	
Nominal Discharge Current (8/20 µs)	I_n	5 kA	
Maximum Discharge Current (8/20 µs)	I_{max}	10 kA	
D1 Impulse Current (10/350 µs)	I_{imp}	1 kA	
Residual Voltage at 5 kA (8/20 µs)	U_{res}	< 145 V	
Rated Spark Overvoltage (Line-Line)		16-21 V	31-37 V
(Line-Ground)		584-876 V	
Response Time Overvoltage Protection	t_A	< 1 ns	
Insulation Resistance at U_c	R_{iso}	≥ 15 MΩ	≥ 28 MΩ
Insulation Resistance at 500 V DC (Line-Ground)		> 1 GΩ	
Serial Resistance per Path	R	<1 Ω	
Transverse Capacitance	C	<10 pF	
Cut-off Frequency	f_G	3 MHz	
Mechanical			
Terminal Cross Section Multi-strand (max.)		12 AWG [4 mm²]	
Terminal Screw Torque		4.5 lbf·in [0.5 Nm]	
Degree of Protection IEC/EN 60529		IP 20 (built-in)	
Housing Material		Thermoplastic; Grey; Extinguishing Degree V-0	
Mounting IEC/EN 60715		35 mm DIN Rail	
Order Information			
Order Code		**12**	**24**
Ex-2-xx		704 120	704 121

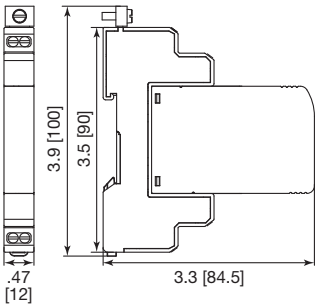
Internal Configuration

Legend

DB	*Diode Block*
F	*Fuse*
GDT	*Gas Discharge Tube*
L	*Inductor*
PG	*Protective Grounding*
R	*Resistor*



Dimensions & Packaging



Ex-2 Series	12	24
Dimensions		
Weight per Unit	3.10 oz [88 g]	
Dimensions DIN 43880	2/3 TE	
Packaging Dimensions (Single Unit)	3.4 × .59 × 4" [87 × 15 × 102 mm]	
Minimum Package Quantity	15 pieces	

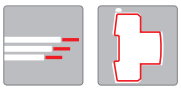
inches
[mm]

RoHS COMPLIANT

SPD for Explosive Environments

RayDat PLP Ex Series

D1 • C1 • C2 • C3



IEC/EN Category: D1/C1/C2/C3
Surge Discharge Ratings: I_n: 10 kA, I_{max}: 20 kA, I_{imp}: 2.0 kA
Voltages: 24, 48, 24/5 V DC
Max. Operating Voltage: U_C: 33, 54, 33/7.5 V DC
Frequency Range: 30 MHz
Enclosure: Stainless Steel IP 54
Terminals: Connecting Cables 1 mm², 250 mm length
Housing: Conduit Fitting
Compliance: IEC/EN 61643-21

CE 1180
IEC 60079-0:2011
IEC 60079-11:2011

Ex
EN 60079-0:2012+A11:2013
EN 60079-11:2012

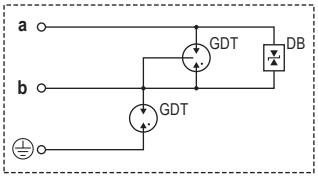
SGS c us 800466
UL 60079-0, 6th Edition
UL 60079-11, 6th Edition
CAN/CSA C22.2 No. 60079-0:2015
CAN/CSA C22.2 No. 60079-11:2014

Technical Data

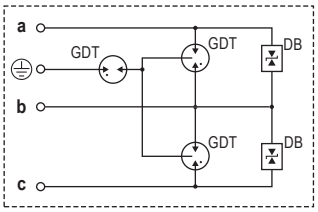
PLPEx			PLP-24Ex	PLP2-24Ex	PLP2-48Ex	PLP-24/5Ex	PLP3L-24Ex
Type							
Intrinsic Safety Parameters							
IECEx BAS 14.0167X			Ex ia IIC T6 Ga (-30°C ≤ 50°C), Ex ia IIIC T85°C Da (-30°C ≤ 50°C)				
Basefa14ATEX0364X			II 1G Ex ia IIC T6 Ga (-30°C ≤ 50°C), II 1D Ex ia IIIC T85°C Da (-30°C ≤ 50°C)				
SGSNA/18/BAS/00003			Class I, Zone 0 AEx ia IIC T6 Ga (-30°C ≤ 50°C), Ex ia IIC T6 Ga (-30°C ≤ 50°C), Zone 20 AEx ia IIIC T85°C Da (-30°C ≤ 50°C), Ex ia IIIC T85°C Da (-30°C ≤ 50°C)				
Maximum Input Voltage		U_i	50 V				
Maximum Input Current		I_i	800 mA				
Maximum Input Power		P_i	2 W				
Maximum Internal Inductance		L_i	60 µH				
Electrical							
Nominal Operating Voltage (DC)		U_n	24 V	24 V	48 V	24 V/5 V	24 V
Maximum Continuous Operating Voltage (DC)		U_c	33 V	33 V	54 V	33 V/7.5 V	33 V
Rated Spark Overvoltage	(Line-Ground)		584-864 V	584-864 V	584-864 V	584-864 V	584-864 V
	(Line-Line)		36-44 V	36-44 V	58-68 V	36-44 V, 9-13 V	36-44 V
Total Nominal Discharge Current (8/20 µs)		I_n	5 kA	10 kA	10 kA	10 kA	7.5 kA
Total Discharge Current (8/20 µs)		I_{max}	10 kA	20 kA	20 kA	20 kA	15 kA
Total Impulse Current (10/350 µs)		I_{imp}	1.0 kA	2.0 kA	2.0 kA	2.0 kA	1.5 kA
Residual Voltage at I_{max} (8/20 µs)	(Line-Ground)	U_{res}	< 1.3 kV	< 1.3 kV	< 1.3 kV	< 1.3 kV	< 1.3 kV
Response Time Overvoltage Protection		t_A	< 1 ns				
Insulation Resistance of the Protection	(Line-Line)	R_{iso}	> 32 MΩ	> 32 MΩ	> 32 MΩ	> 32 MΩ/75 kΩ	> 32 MΩ
Insulation Resistance at	U(Line-Ground) = 500 V DC	R	> 1 GΩ				
Transverse Capacitance		C	< 30 pF				
Cut-off Frequency		f_G	30 MHz				
Mechanical							
Ambient Temperature Range			-22 °F < Ta < +140 °F [-30 °C < Ta < +60 °C]				
Connection Cables	D × L		17 AWG x 9.8" [1 mm² × 250 mm]				
Degree of Protection IEC/EN 60529			IP 54				
Housing Material			Stainless Steel				
Dimension	Length		3.07" [78 mm]	4.72" [120 mm]	4.72" [120 mm]	4.72" [120 mm]	4.72" [120 mm]
Order Information							
Order Code			**PLP-24Ex**	**PLP2-24Ex**	**PLP2-48Ex**	**PLP-24/5Ex**	**PLP3L-24Ex**
1/2" NPT			127 594	127 600	127 597	127 603	127 606
M20 × 1.5			127 595	127 601	127 598	127 604	127 607
G 1/2" (BSP 1/2 inch)			127 596	127 602	127 599	127 605	127 608

Internal Configuration

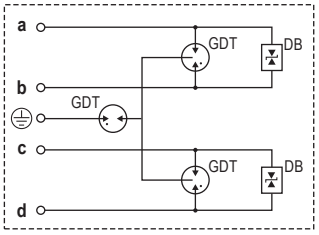
Legend
DB Diode Block
GDT Gas Discharge Tube



PLP-24Ex

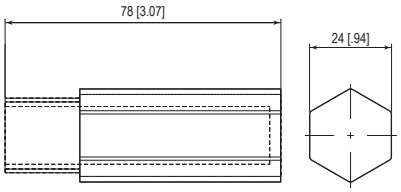


PLP3L-24Ex

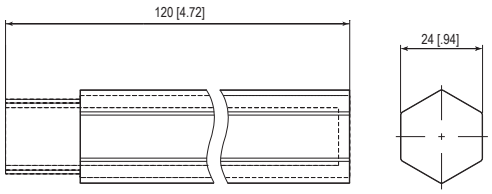


PLP2-24Ex
PLP2-48Ex
PLP-24/5Ex

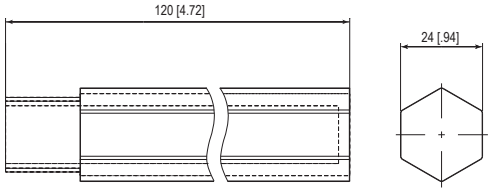
Dimensions & Packaging



PLP-24Ex	PLP-24 Ex 1/2" NPT	PLP-24 Ex M 20 × 1/2"	PLP-24 Ex G 1/2"
Dimensions			
Weight per Unit		5.99 oz [170 g]	
Packaging Dimensions (Single Unit)		1.34 × 1.34× 4.25" [34 × 34 × 108 mm]	
Minimum Package Quantity		6 pieces	



PLP2-xxEx	PLP2-xx Ex 1/2" NPT	PLP2-xx Ex M 20 × 1/2"	PLP2-xx Ex G 1/2"
Dimensions			
Weight per Unit		10.22 oz [290 g]	
Packaging Dimensions (Single Unit)		1.34 × 1.34× 5.43" [34 × 34 × 138 mm]	
Minimum Package Quantity		6 pieces	



PLP3L-24Ex	PLP3L-24 Ex 1/2" NPT	PLP3L-24 Ex M 20 × 1/2"	PLP3L-24 Ex G 1/2"
Dimensions			
Weight per Unit		10.22 oz [290 g]	
Packaging Dimensions (Single Unit)		1.34 × 1.34× 5.43" [34 × 34 × 138 mm]	
Minimum Package Quantity		6 pieces	

inches
[mm]

Surge Protective Devices
(SPDs) for Local Area Networks (LAN)

Local Area Networks (LAN)

RayDat NET 6 POE*

**UL Listed*

Special features:

- Very high surge ratings
- Metal housing with DIN rail mounting
- Cat 6 capability
- POE compliant in accordance to IEEE 802.3af, IEEE 802.3at and IEEE 802.3bt.

Symbol Legend:


DIN Rail Mounting


Plug-In Connection


Compact Design


Shield Directly Grounded

RayDat NET 6 POE is intended to protect Local Area Networks (LAN) from overvoltage surges and electrostatic discharges created by switching transients inside buildings. LAN systems are particularly prone to such disturbances due to long cable lengths since long cable lengths often behave like antennas to atmospheric disturbances. The product provides protection to all four lines in the UTP, STP and is Cat 6 capable. Ground potential equalization between signal and protective network or PC chassis ground is provided. The product is suitable for protection of 1 Gbit/s lines and fully compatible with all versions of PoE applications. It is compatible with standards IEEE 802.3af, IEEE 802.3at and IEEE 802.3bt.

RoHS COMPLIANT CE UL LISTED

SPD for LAN Category 6 Networks

RayDat NET 6 POE

D1 • C1 • C2 • C3

UL Listed

IEC/EN Category: D1/C1/C2/C3
Surge Discharge Ratings: I_n: 10 kA, I_{imp}: 1 kA
Voltages: 48 V DC
Max. Operating Voltage: 50 V
Frequency Range: 250 MHz, up to Cat 6, up to PoE++ Compatible
Housing: Compact Design
Compliance: IEC/EN 61643-21
UL 497B 4th Edition

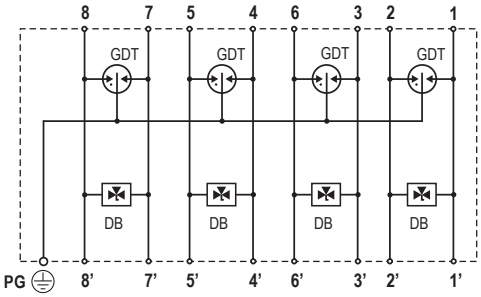
Technical Data

NET 6 POE			48
Electrical			
Number of Protected Pairs			4 Pairs (8 Conductors)
Nominal Operating Voltage (DC)		U_n	48 V
Maximum Continuous Operating Voltage (DC)	(Line-Line)	U_c	50 V
	(Pair-Pair)		72 V
Rated Load Current at 25°C		I_L	1 A
Nominal Discharge Current (8/20 µs)	(Line-Line)	I_n	150 A
C2 Total Discharge Current (8/20 µs)	(Lines-Ground)	I_n	10 kA
D1 Impulse Current (10/350 µs)		I_{imp}	1 kA
Voltage Protection Level at I_n	(Line-Line)	U_p	150 V
	(Line-Ground)		550 V
Response Time Overvoltage Protection		t_A	< 1 ns
Cut-off Frequency		f_G	250 MHz
Mechanical			
Temperature Range			-40 °F to +176 °F [-40 °C to +80 °C]
Connection Type			Input/Output: RJ45 Sockets
Degree of Protection IEC/EN 60529			IP 20
Housing Material			Metal
Mounting IEC/EN 60715			35 mm DIN Rail
Order Information			
Order Code			**48**
NET 6 POE			706 312

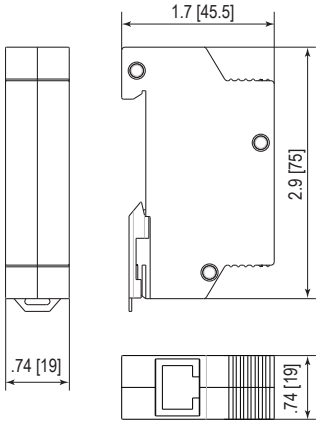
RayDat NET 6 POE

Internal Configuration

Legend
DB Diode Block
GDT Gas Discharge Tube
PG Protective Grounding



Dimensions & Packaging



NET 6 POE	48
Dimensions	
Weight per Unit	4.23 oz [120 g]
Dimensions DIN 43880	.74" [19 mm]
Packaging Dimensions (Single Unit)	3.1 × .91 × 4.3" [78 × 23 × 108 mm]
Minimum Package Quantity	12 pieces

inches
[mm]

RoHS COMPLIANT

Surge Protective Devices
(SPDs) for Bus Systems

Bus Systems

RayDat SBH-3*
RayDat SGH-3
RayDat RS 485
RayDat KNX

*UL Listed

Special features:

- Very high surge ratings
- Equipped with screw or quick connect (spring loaded) terminals
- Different shield handling options available
- The connection lines remain enabled during module replacement

Symbol Legend:


DIN Rail Mounting


Screw Connect Terminals


Quick Connect Terminals


Modular Design


Shield Indirectly Grounded

The RayDat SBH-3 Series of surge protective devices has been developed to protect fieldbus systems (CAN Bus, Profibus DP, RS 232/V.24 m, RS 485, Sinec L2). It is intended for those applications where high ground potential rises may frequently occur, such as in locations close to electric railways.

The RayDat RS 485 has been designed to protect all versions of RS 485. It can be used for protection of RS 422 and V.11 protocol as well.

Coarse protection is provided by a three terminal gas discharge tube (GDT), while fine protection is provided using a high-speed silicon stage, which provides both, common (longitudinal) mode protection from each line to protective ground and differential (transverse) mode protection between each pair. Care is taken to ensure coordination between these two stages without voltage or surge current blind spots occurring. Thermal protection is provided to reduce the hazards of thermal runaway, should there be an inadvertent mains incursion fault.

RayDat KNX – has been designed to protect KNX systems. Its special design allows the protector to be installed directly to bus terminals.

RoHS COMPLIANT CE UL LISTED

Modular SPD for Industrial Fieldbus Systems

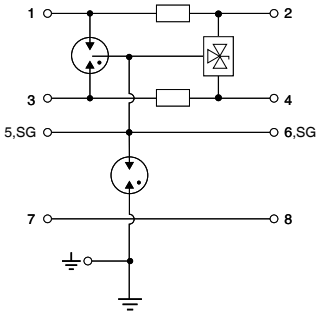
RayDat SBH-3 Series

D1 • C1 • C2 • C3

UL Listed

IEC/EN Category: D1/C1/C2/C3
Surge Discharge Ratings: I_n: 10 kA, I_{max}: 20 kA, I_{imp}: 2.5 kA
Voltages: 5, 12, 30 V DC
Frequency Range: 30 MHz
Housing: Modular Design
Compliance: IEC/EN 61643-21
UL 497B 4th Edition

Configuration:



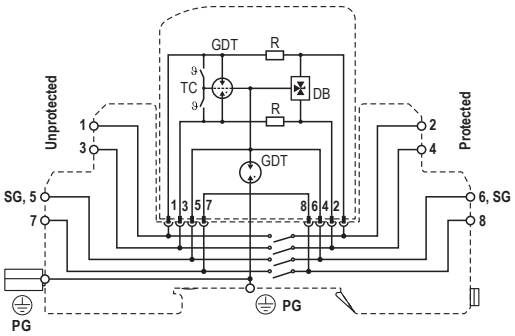
Technical Data

SBH-3 Series			5	12	30
Electrical					
Lines Protected				1 (2 Conductors)	
Nominal Operating Voltage (DC)		U_n	5 V	12 V	30 V
Maximum Continuous Operating Voltage (DC)		U_c	6 V	15 V	33 V
Rated Load Current at 25°C		I_L		1 A	
C2 Nominal Discharge Current (8/20 µs)		I_n		10 kA	
Maximum Discharge Current (8/20 µs)		I_{max}		20 kA	
D1 Impulse Current (10/350 µs)		I_{imp}		2.5 kA	
Residual Voltage at 5 kA (8/20 µs)	(Line-Line)	U_{res}	< 22 V	< 42 V	< 80 V
Rated Spark Overvoltage	(SG-Ground)			184-276 V	
	(Line-Line)		7-10 V	16-19 V	35-43 V
Response Time Overvoltage Protection	(Line-Line)	t_A		< 1 ns	
	(Line-Ground)			< 100 ns	
Insulation Resistance of the Protection	(Line-Ground)	R_{iso}		> 1 GΩ / 100 V	
	(Line-Line)		≥ 6 KΩ	≥ 15 MΩ	≥ 33 MΩ
Serial Resistance per Path		R		1.6-2.0 Ω	
Transverse Capacitance	(Line-Line)	C		50 pF	
	(Line-Ground)			5 pF	
Cut-off Frequency		f_G		30 MHz	
Mechanical					
Temperature Range				-40 °F to +176 °F [-40 °C to +80 °C]	
Terminal Cross Section Multi-strand (max.)				12 AWG	
				4 mm², 2.5 mm² Q Version	
Terminal Screw Torque				4.5 lbf·in [0.5 Nm]	
Degree of Protection IEC/EN 60529				IP 20 (built-in)	
Housing Material				Thermoplastic; Grey; Extinguishing Degree V-0	
Mounting IEC/EN 60715				35 mm DIN Rail	
Order Information					
Order Code			5	12	30
SBH-3-xx			7082.86	7082.88	7082.90
SBH-3-xxQ (Quick Connect Terminals)			7085.21	7085.22	7085.23
SBH-3-xxM (module)			7082.87	7082.89	7082.91

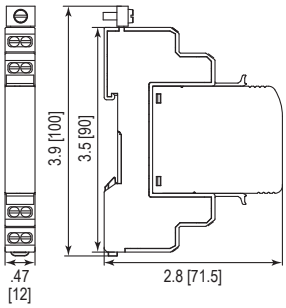
Internal Configuration

Legend

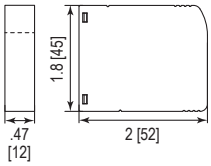
DB	*Diode Block*
GDT	*Gas Discharge Tube*
PG	*Protective Grounding*
R	*Resistor*
SG	*Signal Grounding*
TC	*Thermo-clip*



Dimensions & Packaging

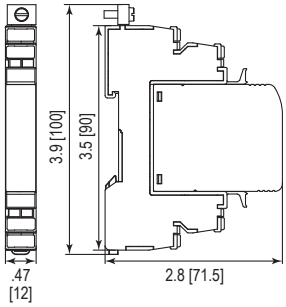


SBH-3 Series	5	12	30
Dimensions			
Weight per Unit		2.11 oz [60 g]	
Dimensions DIN 43880		2/3 TE	
Packaging Dimensions (Single Unit)		3.4 × .59 × 4" [87 × 15 × 102 mm]	
Minimum Package Quantity		15 pieces	



SBH-3-xxM Series	5	12	30
Dimensions			
Weight per Unit		.91 oz [26 g]	
Packaging Dimensions (Single Unit)		3.4 × .59 × 4" [87 × 15 × 102 mm]	
Minimum Package Quantity		15 pieces	

Quick Connect Terminals



SBH-3-xxQ Series	5	12	30
Dimensions			
Weight per Unit		2.18 oz [62 g]	
Dimensions DIN 43880		2/3 TE	
Packaging Dimensions (Single Unit)		3.4 × .59 × 4" [87 × 15 × 102 mm]	
Minimum Package Quantity		15 pieces	

inches
[mm]

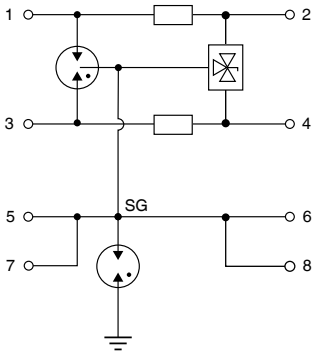
RoHS COMPLIANT

SPD with Separated Signal Ground (RS 232)

RayDat SGH-3 Series

D1 • C1 • C2 • C3

IEC/EN Category: D1/C1/C2/C3
Surge Discharge Ratings: I_n: 10 kA, I_{max}: 20 kA, I_{imp}: 2.5 kA
Voltages: 5, 12, 15, 24, 30, 48, 60, 110 V DC
Frequency Range: 30 MHz
Housing: Modular Design
Compliance: IEC/EN 61643-21
Configuration:



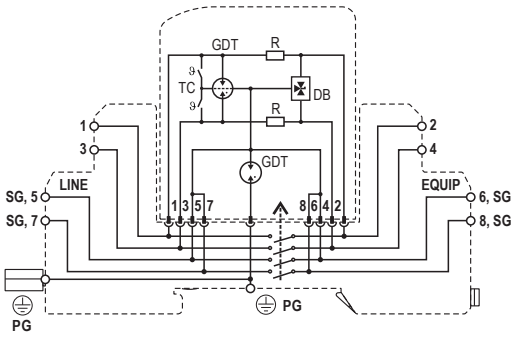
Technical Data

SGH-3 Series			5	12	15	24	30	48	60
Electrical									
Lines Protected						1 (2 Conductors)			
Nominal Operating Voltage (DC)		U_n	5 V	12 V	15 V	24 V	30 V	48 V	60 V
Maximum Continuous Operating Voltage (DC)		U_c	6 V	15 V	18 V	28 V	33 V	52 V	64 V
Rated Load Current at 25°C		I_L				1 A			
C2 Nominal Discharge Current (8/20 µs)		I_n				10 kA			
Maximum Discharge Current (8/20 µs)		I_{max}				20 kA			
D1 Impulse Current (10/350 µs)		I_{imp}				2.5 kA			
Residual Voltage at 5 kA (8/20 µs)	(Line-Line)	U_{res}	< 22 V	< 42 V	< 48 V	< 70 V	< 80 V	< 140 V	< 160 V
Rated Spark Overvoltage	(SG-Ground)					184-276 V			
	(Line-Line), (Line-SG)		7-10 V	16-19 V	20-24 V	30-36 V	35-43 V	55-68 V	67-85 V
Response Time Overvoltage Protection	(Line-Line)	t_A				< 1 ns			
	(Line-Ground)					< 100 ns			
Insulation Resistance of the Protection	(Line-Line)	R_{iso}	≥ 6 KΩ	≥ 15 MΩ	≥ 18 MΩ	≥ 28 MΩ	≥ 33 MΩ	≥ 52 MΩ	≥ 64 MΩ
	(Line-Ground)					> 1 GΩ / 100 V			
Serial Resistance per Path		R				1.6-2.0 Ω			
Transverse Capacitance	(Line-Line)	C				50 pF			
	(Line-Ground)					5 pF			
Cut-off Frequency		f_G				30 MHz			
Mechanical									
Temperature Range						-40 °F to +176 °F [-40 °C to +80 °C]			
Terminal Cross Section Multi-strand (max.)						12 AWG [4 mm², 2.5 mm² Q Version]			
Terminal Screw Torque						4.5 lbf·in [0.5 Nm]			
Degree of Protection IEC/EN 60529						IP 20 (built-in)			
Housing Material						Thermoplastic; Grey; Extinguishing Degree V-0			
Mounting IEC/EN 60715						35 mm DIN Rail			
Order Information									
Order Code			5	12	15	24	30	48	60
SGH-3-xxx			7086.61	7086.62	7086.63	7086.64	7086.65	7086.66	7086.67
SGH-3-xxxM (module)			7086.69	7086.70	7086.71	7086.72	7086.73	7086.74	7086.75

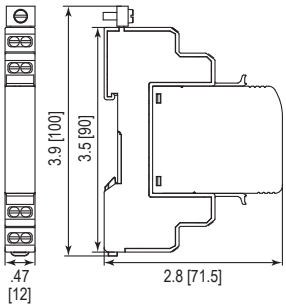
Internal Configuration

Legend

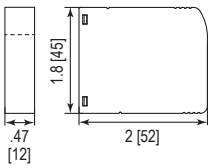
DB	*Diode Block*
GDT	*Gas Discharge Tube*
R	*Resistor*
PG	*Protective Grounding*
SG	*Signal Grounding*
TC	*Thermo-clip*



Dimensions & Packaging



SGH-3 Series	5	12	15	24	30	48	60
Dimensions							
Weight per Unit	2.11 oz [60 g]						
Dimensions DIN 43880	2/3 TE						
Packaging Dimensions (Single Unit)	3.4 × .59 × 4" [87 × 15 × 102 mm]						
Minimum Package Quantity	15 pieces						



SGH-3-xxxM Series	5	12	15	24	30	48	60
Dimensions							
Weight per Unit	.91 oz [26 g]						
Packaging Dimensions (Single Unit)	3.4 × .59 × 4" [87 × 15 × 102 mm]						
Minimum Package Quantity	15 pieces						

inches
[mm]

RoHS COMPLIANT CE

SPD for RS-485 Systems

RayDat RS 485

D1 • C1 • C2 • C3

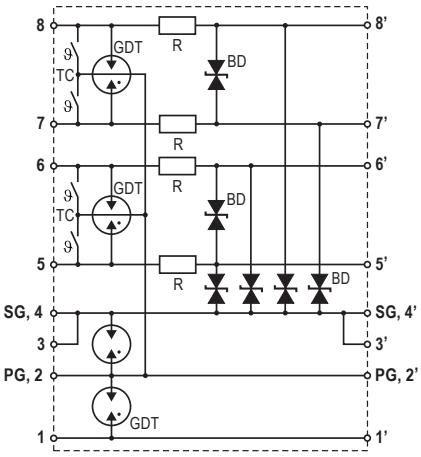
IEC/EN Category: D1/C1/C2/C3
Surge Discharge Ratings: I_n: 20 kA, I_{imp}: 2.5 kA
Voltages: 5 V DC
Max. Operating Voltage: 6 V DC
Frequency Range: 1 MHz
Housing: 16 Terminal, Compact Design
Compliance: IEC/EN 61643-21

Technical Data

RS 485

Electrical			
Number of Protected Pairs			2(4 Conductors)
Nominal Operating Voltage (DC)		U_n	5V
Maximum Continuous Operating Voltage (DC)		U_c	6V
Rated Load Current at 25°C		I_L	500 mA
C2 Nominal Discharge Current (8/20 µs)	(Line-Line)	I_n	20 kA
D1 Impulse Current (10/350 µs)		I_{imp}	2.5 kA
Residual Voltage at 5 kA (8/20µs)	(Line-Line)	U_{res}	20V
Rated Spark Overvoltage	(5, 6, 7 & 8-4, SG)		6.5V–8.5V
	(5-6 & 7-8)		6.5V–8.5V
	(5,6,7 & 8-2, PG)		78V–116V
Response Time Overvoltage Protection	(5,6,7,8,SG)	t_A	<1 ns
Thermal Protection	(5,6,7,8)		Yes
Insulation Resistance of Protection		R_{iso}	6 kΩ
Serial Resistance per Path		R	1.7–1.9 Ω
Transverse Capacitance		C	<2nF
Cut-off Frequency		f_G	>1 MHz
Mechanical			
Temperature Range			-40 °F to +176 °F [-40 °C to +80 °C]
Terminal Cross Section Multi-strand (max.)			2x14 AWG [2×2.5 mm²]
Terminal Screw Torque			17.7 lbf.in [2.0 Nm]
Degree of Protection IEC/EN 60529			IP 20 (built-in)
Housing Material			Thermoplastic; Grey; Extinguishing Degree V-0
Mounting IEC/EN 60715			35 mm DIN Rail
Order Information			
Order Code			
RS 485			703 812

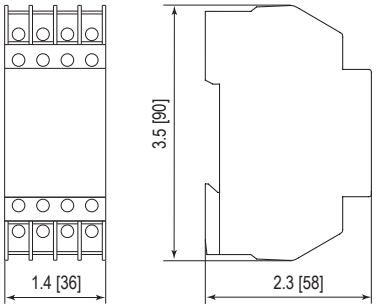
Internal Configuration



Legend

BD	*Bi-directional TVS Diode*
GDT	*Gas Discharge Tube*
PG	*Protective Grounding*
R	*Resistor*
SG	*Signal Grounding*
TC	*Thermo-clip*

Dimensions & Packaging



RS 485

Dimensions	
Weight per Unit	4.02 oz [114 g]
Dimensions DIN 43880	2 TE
Packaging Dimensions (Single Unit)	1.5 × 2.9 × 4.2" [39 × 74 × 106 mm]
Minimum Package Quantity	6 pieces

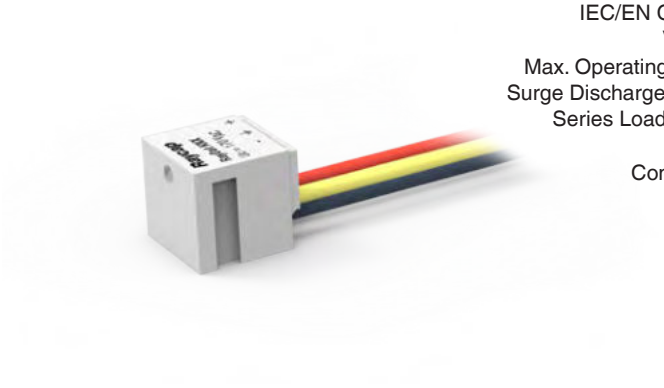
inches
[mm]

RoHS COMPLIANT CE

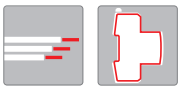
SPD with Terminal Connection for Bus Systems

RayDat KNX

D1 • C1 • C2 • C3



IEC/EN Category: D1/C1/C2/C3
Voltages: 110 V DC
Max. Operating Voltage: 180 V DC
Surge Discharge Ratings: I_n: 5 kA, I_{max}: 10 kA
Series Load Current: 7 A
Housing: Compact Design
Compliance: IEC/EN 61643-21



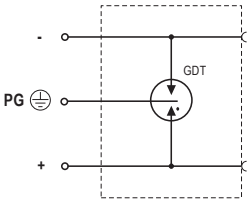
Technical Data

RayDat KNX

Electrical			
Number of Protected Pairs			1 (2 conductors)
Nominal Operating Voltage (DC)		U_n	110 V
Maximum Continuous Operating Voltage (DC)		U_c	170 V
Rated Load Current at 25°C		I_L	7 A
C2 Nominal Discharge Current (8/20 µs)		I_n	5 kA
Maximum Discharge Current (8/20 µs)		I_{imp}	1 kA
Residual Voltage at 5 kA (8/20 µs)	(Line-Ground)	U_{res}	< 600 V
	(Line-Line)		< 1000 V
Response Time Overvoltage Protection		t_A	< 100 ns
Thermal Protection			No
Insulation Resistance of the Protection		R_{iso}	≥ 1 GΩ
Serial Resistance per Path		R	< 0.1 Ω
Cut-off Frequency		f_G	50 MHz
Mechanical			
Temperature Range			-40 °F to +176 °F [-40 °C to +80 °C]
LIne Conductors Cross Section (max.)			20 AWG [0.5 mm²]
Ground Conductor Cross Section (max.)			18 AWG [0.75 mm²]
Connecting Conductor Length			5.9" [150 mm]
Degree of Protection IEC/EN 60529			IP 20 (built-in)
Housing Material			Thermoplastic; Grey; Extinguishing Degree V-0
Order Information			
Order Code			
RayDat KNX			127 649

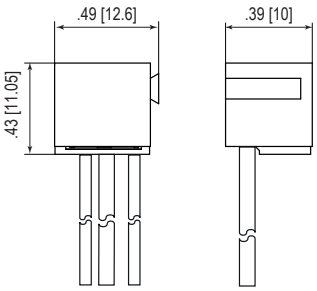
RayDat KNX

Internal Configuration



Legend
GDT Gas Discharge Tube
PG Protective Grounding

Dimensions & Packaging



RayDat KNX

Dimensions	
Weight per Unit	.28 oz [8 g]
Packaging Dimensions (Single Unit)	3.1 × .91 × .4.3" [78 × 23 × 108 mm]
Minimum Package Quantity	12 pieces

inches
[mm]

RoHS COMPLIANT CE

Modular & Compact Surge Protective Devices (SPDs) for Telecommunication Systems

Telecommunication Systems

RayTel 10
RayTel 20
RayDat SPH-2-230
RayDat SPH-4-230
RayDat SLH-2-110
RayDat SLH-4-110
RayDat SUI-4-110
RayDat SRH-2-110
RayDat SGH-3-110

Special features:

- Very high surge ratings
- Equipped with screw or quick connect (spring loaded) or RJ 45 terminals
- Wall mounting or DIN rail mounting versions available
- High frequency range (up to 250MHz) suitable for all DSL lines

Symbol Legend:


DIN Rail Mounting


Screw Connect Terminals


Quick Connect Terminals


Plug-In Connection


Modular Design


Shield Directly Grounded

These SPDs protect a subscriber's telecommunication equipment from overvoltages, caused by lightning strikes, switching operations, and surges coming from the telecommunication networks. The complete surge protection on the telecommunication side fully enables signal transmission of the DSL technologies, even in systems with extreme cable runs.

Operational deterioration and insertion loss are negligible in the operating frequency range. The protective module is adapted to the frequency characteristic of the subscriber's twisted pairs since the same module can be used in ADSL, ADSL2 and ADSL2+ protocols over POTS and ISDN lines.

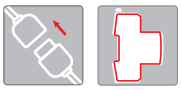
RoHS COMPLIANT CE

SPD for Telecommunication Side

RayTel 10

C1 • C2 • C3

IEC/EN Category: C1/C2/C3
Surge Discharge Ratings: I_n: 5 kA, I_{max}: 10 kA
Voltages: 175 V DC
Max. Operating Voltage: 175 V DC
Housing: Compact Design
Compliance: IEC/EN 61643-21



Technical Data

RayTel 10

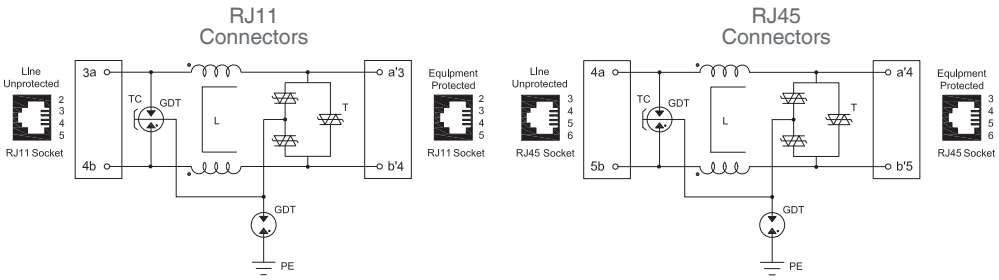
Electrical			
Maximum Continuous Operating DC Voltage		U_c	175 V
Maximum Operating Current		I_L	150 mA
Nominal Discharge Current (8/20 µs)	(a/b-PE, a-b)	I_n	2.5 kA
Maximum Discharge Current (8/20 µs)		I_{max}	5 kA
Protection Level at [U_p] at [I_n] (8/20 µs)	(a-b)	U_p	≤ 300 V
Protection Level at [U_p] at [I_n] (8/20 µs)	(a/b-PE)	U_p	≤ 1000 V
Series Resistance at 20°C [R]		R	0.2 - 0.4 Ω
Series Inductance [L]		L	2 x 25 µH
Capacitance [C]		C	<100 pF
Frequence Range		f_G	up to 10 MHz
Response Time (a-b)		t_A	<5 ns
Response Time (a, b-PE)		t_A	<100 ns
Connection (Input/Output)			RJ11 or RJ45
Mechanical			
Temperature Range			-40 °F to +140 °F [-40 °C to +60 °C]
Degree of Protection IEC/EN 60529			IP 20 (built-in)
Housing Material			Thermoplastic; Grey; Extinguishing Degree V-0
Order Information			
Order Code			
RayTel 10			124 150

RayTel 10

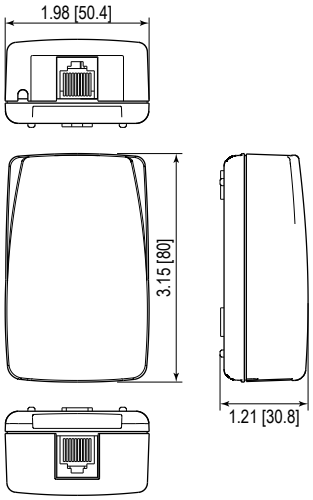
Internal Configuration

Legend

GDT Gas Discharge Tube
PE Ground
T Thyristor Surge Suppressor
TC Thermo-clip



Dimensions & Packaging



RayTel 10

Dimensions	
Weight per Unit	2.46 oz [70 g]
Packaging Dimensions (Single Unit)	4.2 × 2.9 × 1.4" [108 × 75 × 36 mm]
Minimum Package Quantity	8 pieces

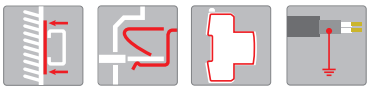
inches
[mm]

RoHS COMPLIANT CE

SPD for DSL Networks

RayTel 20

IEC/EN Category: D1/C1/C2/C3
Surge Discharge Ratings: I_n: up to 20 kA, I_{imp}: up to 7.5 kA
Voltages: 110 V DC
Max. Operating Voltage: 180 V DC
Frequency Range: up to 250 MHz
Housing: Compact Design
Compliance: IEC/EN 61643-21



Technical Data

RayTel 20

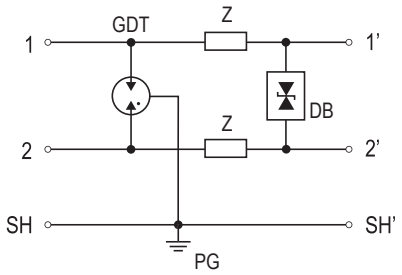
Electrical			
Type per IEC/EN 61643-21			D1/C1/C2/C3
Number of Protected Pairs			1 Pair (2 Conductors)
Nominal Operating Voltage (DC)		U_n	110 V
Maximum Continuous Operating Voltage (DC)		U_c	180 V
Maximum Continuous Operating Voltage (AC)		U_c	127 V
Nominal Current at 40°C		I_L	0.6 A
C2 Total Nominal Discharge Current	(8/20 µs)	I_n	20 kA
C2 Nominal Discharge Current per Line	(8/20 µs)	I_n	10 kA
D1 Total Lightning Impulse Current	(10/350 µs)	I_{imp}	7.5 kA
D1 Lightning Impulse Current per Line	(10/350 µs)	I_{imp}	2.5 kA
Voltage Protection Level at at 1 kV/µs C3	(Line-Line)	U_p	< 250 V
	(Lines-Ground)		< 550 V
Voltage Protection Level at I_n	(Lines-Ground)	U_p	< 750 V
Series Resistance per Line		R_S	1.6 - 2.0 Ω
Bandwidth		f_G	up to 250 MHz
Capacitance	(Line-Line)	C	≤ 20 pF
	(Lines-Ground)	C	≤ 10 pF
Mechanical			
Temperature Range			-13 °F to +176 °F [-25 °C to +80 °C]
Cross-sectional Area of the Signal Lines			0.13 - 2.5 mm² (solid)
Cross-sectional Area of the Signal Lines			0.13 - 2.5 mm² (flexible)
Cross-sectional Area of the Earth Terminal			0.2 - 2.5 mm²
Connection Type			PCB Terminals
Degree of Protection IEC/EN 60529			IP 66
Housing Material			Polypropylene; Grey
Order Information			
Order Code			
RayTel 20			124 152

RayTel 20

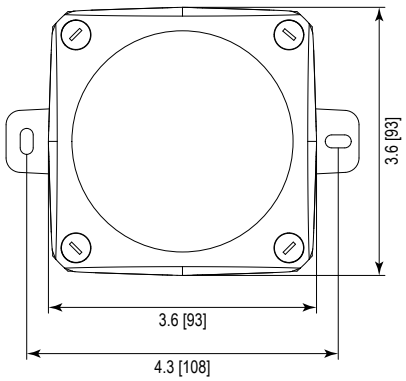
Internal Configuration

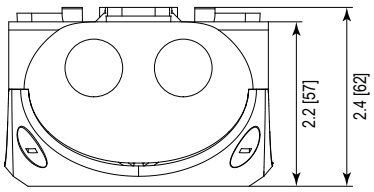
Legend

DB Diode Block
GDT Gas Discharge Tube
PG Protective Grounding
Z Impedance



Dimensions & Packaging





RayTel 20

Dimensions	
Weight per Unit	5.29 oz [150 g]
Packaging Dimensions (Single Unit)	3.6 × 3.6 × 2.4" [93 × 93 × 63 mm]
Minimum Package Quantity	1 piece

inches
[mm]

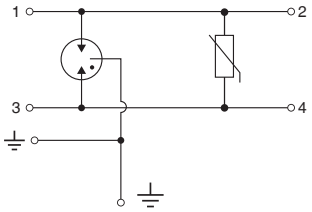
RoHS COMPLIANT CE

Modular SPD for Single Pair

RayDat SPH-2-230

D1 • C1 • C2 • C3

IEC/EN Category: D1/C1/C2/C3
Surge Discharge Ratings: I_n: 10 kA, I_{max}: 20 kA, I_{imp}: 2.5 kA
Voltages: 230 V DC
Frequency Range: 30 MHz, 10 MHz
Compliance: IEC/EN 61643-21
Configuration:

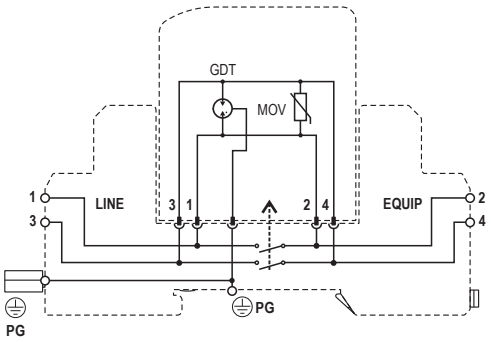


Technical Data

SPH-2-xxx			230
Electrical			
Lines Protected			1 (2 Conductors)
Nominal Operating Voltage (DC)		U_n	230 V
Maximum Continuous Operating Voltage (DC)		U_c	320 V
Rated Load Current at 25°C		I_L	5 A
C2 Nominal Discharge Current (8/20 µs)		I_n	10 kA
Maximum Discharge Current (8/20 µs)		I_{max}	20 kA
D1 Impulse Current (10/350 µs)		I_{imp}	2.5 kA
Residual Voltage at 5 kA (8/20 µs)	(Line-Line)	U_{res}	< 700 V
Rated Spark Overvoltage	(Line-Ground)		350-550 V
	(Line-Line)		350-429 V
Response Time Overvoltage Protection	(Line-Line)	t_A	< 25 ns
	(Line-Ground)		< 100 ns
Insulation Resistance of the Protection	(Line-Ground)	R_{iso}	> 1 GΩ / 100 V
	(Line-Line)		≥ 100 MΩ
Serial Resistance per Path		R	0.1 Ω
Transverse Capacitance	(Line-Line)	C	100 pF
	(Line-Ground)		5 pF
Cut-off Frequency		f_G	10 MHz
Mechanical			
Temperature Range			-40 °F to +176 °F [-40 °C to +80 °C]
Terminal Cross Section Multi-strand (max.)			12 AWG
			4 mm², 2.5 mm² Q Version
Terminal Screw Torque			4.5 lbf·in [0.5 Nm]
Degree of Protection IEC/EN 60529			IP 20 (built-in)
Housing Material			Thermoplastic; Grey; Extinguishing Degree V-0
Mounting IEC/EN 60715			35 mm DIN Rail
Order Information			
Order Code			**230**
SPH-2-xxx			7081.06
SPH-2-xxxQ (Quick Connect Terminals)			7085.26
SPH-2-xxxM (module)			7081.08

RayDat SPH-2-230

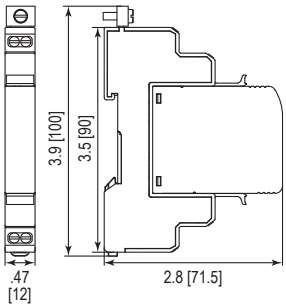
Internal Configuration



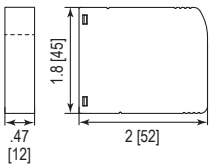
Legend

GDT Gas Discharge Tube
MOV Metal Oxide Varistor
PG Protective Grounding

Dimensions & Packaging

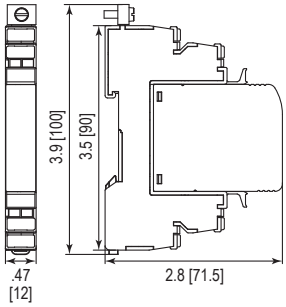


SPH-2-xxx	230
Dimensions	
Weight per Unit	2.11 oz [60 g]
Dimensions DIN 43880	2/3 TE
Packaging Dimensions (Single Unit)	3.4 × .59 × 4" [87 × 15 × 102 mm]
Minimum Package Quantity	15 pieces



SPH-2-xxxM Series	230
Dimensions	
Weight per Unit	.91 oz [26 g]
Packaging Dimensions (Single Unit)	3.4 × .59 × 4" [87 × 15 × 102 mm]
Minimum Package Quantity	15 pieces

Quick Connect Terminals



SPH-2-xxxQ Series	230
Dimensions	
Weight per Unit	2.18 oz [62 g]
Dimensions DIN 43880	2/3 TE
Packaging Dimensions (Single Unit)	3.4 × .59 × 4" [87 × 15 × 102 mm]
Minimum Package Quantity	15 pieces

inches
[mm]

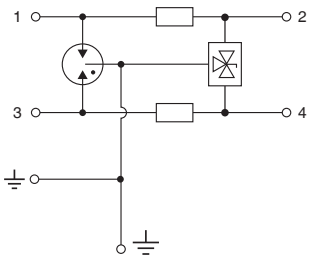
RoHS COMPLIANT CE

Modular SPD for Single Pair

RayDat SLH-2-110

D1 • C1 • C2 • C3

IEC/EN Category: D1/C1/C2/C3
Surge Discharge Ratings: I_n: 10 kA, I_{max}: 20 kA, I_{imp}: 2.5 kA
Voltages: 110 V DC
Frequency Range: 30 MHz
Housing: Modular Design
Compliance: IEC/EN 61643-21
Configuration:



Technical Data

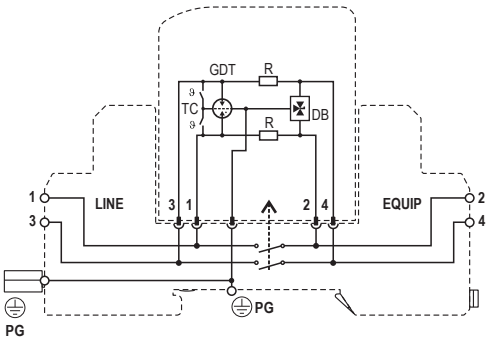
SLH-2-xxx		110
Electrical		
Lines Protected		1 (2 Conductors)
Nominal Operating Voltage (DC)	U_n	110 V
Maximum Continuous Operating Voltage (DC)	U_c	170 V
Rated Load Current at 25°C	I_L	1 A
C2 Nominal Discharge Current (8/20 µs)	I_n	10 kA
Maximum Discharge Current (8/20 µs)	I_{max}	20 kA
D1 Impulse Current (10/350 µs)	I_{imp}	2.5 kA
Residual Voltage at 5 kA (8/20 µs)	U_{res}	< 450 V
Rated Spark Overvoltage (Line-Ground)		184-264 V
(Line-Line)		184-264 V
Response Time Overvoltage Protection	t_A	< 1 ns
Thermal Protection		Yes
Insulation Resistance of the Protection	R_{iso}	≥ 170 MΩ
Serial Resistance per Path	R	1.6-2.0 Ω
Transverse Capacitance	C	50 pF
Cut-off Frequency	f_G	30 MHz
Mechanical		
Temperature Range		-40 °F to +176 °F [-40 °C to +80 °C]
Terminal Cross Section Multi-strand (max.)		12 AWG [4 mm², 2.5 mm² Q Version]
Terminal Screw Torque		4.5 lbf·in [0.5 Nm]
Degree of Protection IEC/EN 60529		IP 20 (built-in)
Housing Material		Thermoplastic; Grey; Extinguishing Degree V-0
Mounting IEC/EN 60715		35 mm DIN Rail
Order Information		
Order Code		**110**
SLH-2-xxx		7086.39
SLH-2-xxxQ (Quick Connect Terminals)		7085.12
SLH-2-xxxM (module)		7086.46

RayDat SLH-2-110

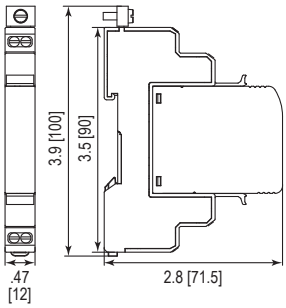
Internal Configuration

Legend

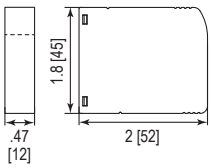
DB Diode Block
GDT Gas Discharge Tube
PG Protective Grounding
R Resistor
TC Thermo-clip



Dimensions & Packaging

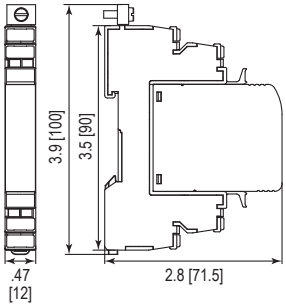


SLH-2-xxx	110
Dimensions	
Weight per Unit	1.83 oz [52 g]
Dimensions DIN 43880	2/3 TE
Packaging Dimensions (Single Unit)	3.4 × .59 × 4" [87 × 15 × 102 mm]
Minimum Package Quantity	15 pieces



SLH-2-xxxM Series	110
Dimensions	
Weight per Unit	.84 oz [24 g]
Packaging Dimensions (Single Unit)	3.4 × .59 × 4" [87 × 15 × 102 mm]
Minimum Package Quantity	15 pieces

Quick Connect Terminals



SLH-2-xxxQ Series	110
Dimensions	
Weight per Unit	1.90 oz [54 g]
Dimensions DIN 43880	2/3 TE
Packaging Dimensions (Single Unit)	3.4 × .59 × 4" [87 × 15 × 102 mm]
Minimum Package Quantity	15 pieces

inches
[mm]

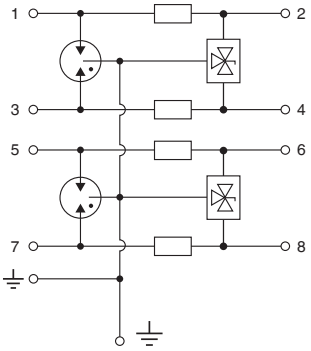
RoHS COMPLIANT CE

Modular SPD for Two Pair

RayDat SLH-4-110

D1 • C1 • C2 • C3

IEC/EN Category: D1/C1/C2/C3
Surge Discharge Ratings: I_n: 10 kA, I_{max}: 20 kA, I_{imp}: 5 kA
Voltages: 110 V DC
Frequency Range: 30 MHz
Housing: Modular Design
Compliance: IEC/EN 61643-21
Configuration:



Technical Data

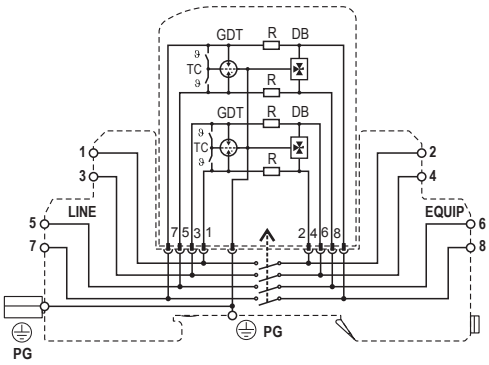
SLH-4-xxx		110
Electrical		
Lines Protected		2 (4 Conductors)
Nominal Operating Voltage (DC)	U_n	110 V
Maximum Continuous Operating Voltage (DC)	U_c	170 V
Rated Load Current at 25°C	I_L	1 A
C2 Nominal Discharge Current (8/20 µs)	I_n	10 kA
Maximum Discharge Current (8/20 µs)	I_{max}	20 kA
D1 Impulse Current (10/350 µs)	I_{imp}	5 kA
Residual Voltage at 5 kA (8/20 µs)	U_{res}	< 450 V
Rated Spark Overvoltage (Line-Ground)		184-264 V
(Line-Line)		184-264 V
Response Time Overvoltage Protection	t_A	< 1 ns
Thermal Protection		Yes
Insulation Resistance of the Protection	R_{iso}	≥ 170 MΩ
Serial Resistance per Path	R	1.6-2.0 Ω
Transverse Capacitance	C	50 pF
Cut-off Frequency	f_G	30 MHz
Mechanical		
Temperature Range		-40 °F to +176 °F [-40 °C to +80 °C]
Terminal Cross Section Multi-strand (max.)		12 AWG [4 mm², 2.5 mm² Q Version]
Terminal Screw Torque		4.5 lbf·in [0.5 Nm]
Degree of Protection IEC/EN 60529		IP 20 (built-in)
Housing Material		Thermoplastic; Grey; Extinguishing Degree V-0
Mounting IEC/EN 60715		35 mm DIN Rail
Order Information		
Order Code		**110**
SLH-4-xxx		7086.53
SLH-4-xxxQ (Quick Connect Terminals)		7085.20
SLH-4-xxxM (module)		7086.60

RayDat SLH-4-110

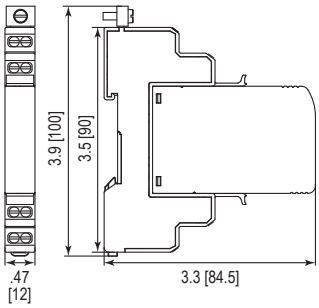
Internal Configuration

Legend

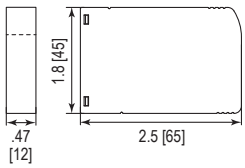
DB	*Diode Block*
GDT	*Gas Discharge Tube*
PG	*Protective Grounding*
R	*Resistor*
TC	*Thermo-clip*



Dimensions & Packaging

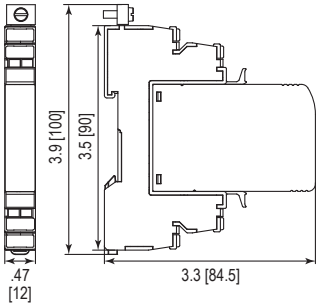


SLH-4-xxx	110
Dimensions	
Weight per Unit	2.32 oz [66 g]
Dimensions DIN 43880	2/3 TE
Packaging Dimensions (Single Unit)	3.4 × .59 × 4" [87 × 15 × 102 mm]
Minimum Package Quantity	15 pieces



SLH-4-xxxM Series	110
Dimensions	
Weight per Unit	1.05 oz [30 g]
Packaging Dimensions (Single Unit)	3.4 × .59 × 4" [87 × 15 × 102 mm]
Minimum Package Quantity	15 pieces

Quick Connect Terminals



SLH-4-xxxQ Series	110
Dimensions	
Weight per Unit	2.32 oz [66 g]
Dimensions DIN 43880	2/3 TE
Packaging Dimensions (Single Unit)	3.4 × .59 × 4" [87 × 15 × 102 mm]
Minimum Package Quantity	15 pieces

inches
[mm]

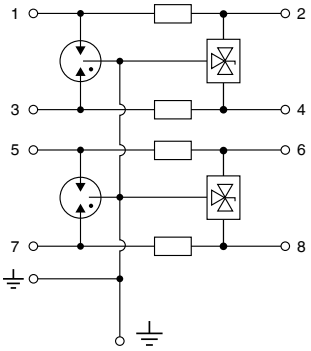
RoHS COMPLIANT CE

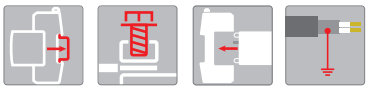
SPD for Two Pair Exposed Lines

RayDat SUI-4-110

D1 • C1 • C2 • C3

IEC/EN Category: D1/C1/C2/C3
Surge Discharge Ratings: I_n: 20 kA, I_{max}: 30 kA, I_{imp}: 5 kA
Voltages: 110 V DC
Frequency Range: 30 MHz
Housing: Modular Design
Compliance: IEC/EN 61643-21
Configuration:





Technical Data

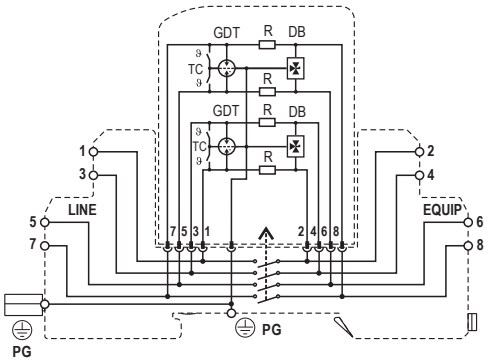
SUI-4-xxx		110
Electrical		
Lines Protected		2 (4 Conductors)
Nominal Operating Voltage (DC)	U_n	110 V
Maximum Continuous Operating Voltage (DC)	U_c	170 V
Rated Load Current at 25°C	I_L	1 A
C2 Nominal Discharge Current (8/20 µs)	I_n	20 kA
Maximum Discharge Current (8/20 µs)	I_{max}	30 kA
D1 Impulse Current (10/350 µs)	I_{imp}	5 kA
Residual Voltage at 5 kA (8/20 µs)	U_{res}	< 450 V
Rated Spark Overvoltage (Line-Ground)		184-264 V
(Line-Line)		184-264 V
Response Time Overvoltage Protection	t_A	< 1 ns
Thermal Protection		Yes
Insulation Resistance of the Protection	R_{iso}	≥ 170 MΩ
Serial Resistance per Path	R	1.6-2.0 Ω
Transverse Capacitance	C	50 pF
Cut-off Frequency	f_G	30 MHz
Mechanical		
Temperature Range		-40 °F to +176 °F [-40 °C to +80 °C]
Terminal Cross Section Multi-strand (max.)		12 AWG [4 mm²]
Terminal Screw Torque		4.5 lbf·in [0.5 Nm]
Degree of Protection IEC/EN 60529		IP 20 (built-in)
Housing Material		Thermoplastic; Grey; Extinguishing Degree V-0
Mounting IEC/EN 60715		35 mm DIN Rail
Order Information		
Order Code		**110**
SUI-4-xxx		7083.28
SUI-4-xxxM (module)		7083.36

RayDat SUI-4-110

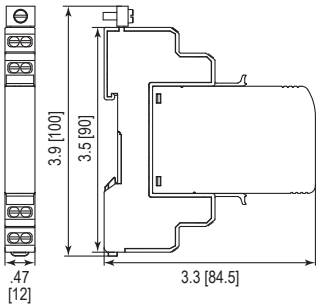
Internal Configuration

Legend

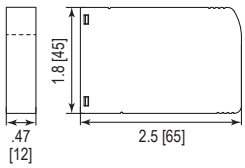
DB	*Diode Block*
GDT	*Gas Discharge Tube*
PG	*Protective Grounding*
R	*Resistor*
TC	*Thermo-clip*



Dimensions & Packaging



SUI-4-xxx	110
Dimensions	
Weight per Unit	2.46 oz [70 g]
Dimensions DIN 43880	2/3 TE
Packaging Dimensions (Single Unit)	3.4 × .59 × 4" [87 × 15 × 102 mm]
Minimum Package Quantity	15 pieces



SUI-4-xxxM Series	110
Dimensions	
Weight per Unit	1.05 oz [30 g]
Packaging Dimensions (Single Unit)	3.4 × .59 × 4" [87 × 15 × 102 mm]
Minimum Package Quantity	15 pieces

inches
[mm]

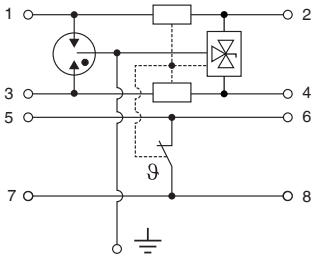
RoHS COMPLIANT CE

SPD with Remote Contacts

RayDat SRH-2-110

D1 • C1 • C2 • C3

IEC/EN Category: D1/C1/C2/C3
Surge Discharge Ratings: I_n: 10 kA, I_{max}: 20 kA, I_{imp}: 2.5 kA
Voltages: 110 V DC
Frequency Range: 30 MHz
Housing: Modular Design
Compliance: IEC/EN 61643-21
Configuration:



Technical Data

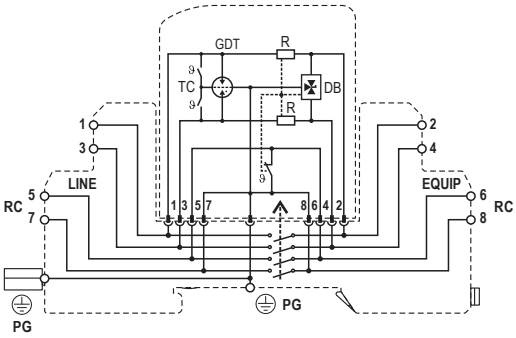
SRH-2-xxx		110
Electrical		
Lines Protected		1 (2 Conductors)
Nominal Operating Voltage (DC)	U_n	110 V
Maximum Continuous Operating Voltage (DC)	U_c	170 V
Rated Load Current at 25°C	I_L	1 A
C2 Nominal Discharge Current (8/20 µs)	I_n	10 kA
Maximum Discharge Current (8/20 µs)	I_{max}	20 kA
D1 Impulse Current (10/350 µs)	I_{imp}	2.5 kA
Residual Voltage at 5 kA (8/20 µs)	U_{res}	< 450 V
Rated Spark Overvoltage (Line-Ground)		184-264 V
(Line-Line)		184-264 V
Response Time Overvoltage Protection	t_A	< 1 ns
Thermal Protection		Yes
Insulation Resistance of the Protection	R_{iso}	≥ 170 MΩ
Serial Resistance per Path	R	1.6-2.0 Ω
Transverse Capacitance	C	50 pF
Cut-off Frequency	f_G	30 MHz
Mechanical		
Temperature Range		-40 °F to +176 °F [-40 °C to +80 °C]
Terminal Cross Section Multi-strand (max.)		12 AWG [4 mm², 2.5 mm² Q Version]
Terminal Screw Torque		4.5 lbf·in [0.5 Nm]
Degree of Protection IEC/EN 60529		IP 20 (built-in)
Housing Material		Thermoplastic; Grey; Extinguishing Degree V-0
Mounting IEC/EN 60715		35 mm DIN Rail
Remote Contacts Ratings		AC 250 V/0.5 A, DC 50 V/1 A
Order Information		
Order Code		**110**
SRH-2-xxx		7086.24
SRH-2-xxxQ (Quick Connect Terminals)		7085.40
SRH-2-xxxM (module)		7086.32

RayDat SRH-2-110

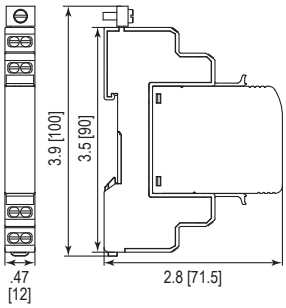
Internal Configuration

Legend

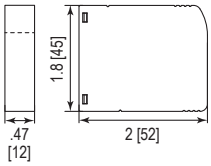
DB	*Diode Block*
GDT	*Gas Discharge Tube*
PG	*Protective Grounding*
R	*Resistor*
RC	*Remote Control (NC)*
TC	*Thermo-clip*



Dimensions & Packaging

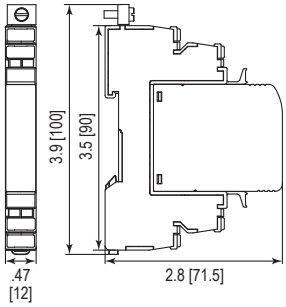


SRH-2-xxx	110
Dimensions	
Weight per Unit	2.04 oz [58 g]
Dimensions DIN 43880	2/3 TE
Packaging Dimensions (Single Unit)	3.4 × .59 × 4" [87 × 15 × 102 mm]
Minimum Package Quantity	15 pieces



SRH-2-xxxM Series	110
Dimensions	
Weight per Unit	.84 oz [24 g]
Packaging Dimensions (Single Unit)	3.4 × .59 × 4" [87 × 15 × 102 mm]
Minimum Package Quantity	15 pieces

Quick Connect Terminals



SRH-2-xxxQ Series	110
Dimensions	
Weight per Unit	2.11 oz [60 g]
Dimensions DIN 43880	2/3 TE
Packaging Dimensions (Single Unit)	3.4 × .59 × 4" [87 × 15 × 102 mm]
Minimum Package Quantity	15 pieces

inches
[mm]

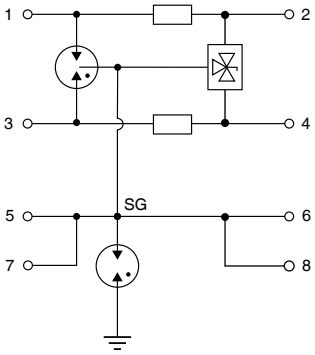
RoHS COMPLIANT CE

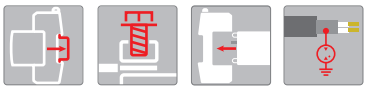
SPD with Separated Signal Ground (RS 232)

RayDat SGH-3-110

D1 • C1 • C2 • C3

IEC/EN Category: D1/C1/C2/C3
Surge Discharge Ratings: I_n: 10 kA, I_{max}: 20 kA, I_{imp}: 2.5 kA
Voltages: 110 V DC
Frequency Range: 30 MHz
Housing: Modular Design
Compliance: IEC/EN 61643-21
Configuration:





Technical Data

SGH-3-xxx

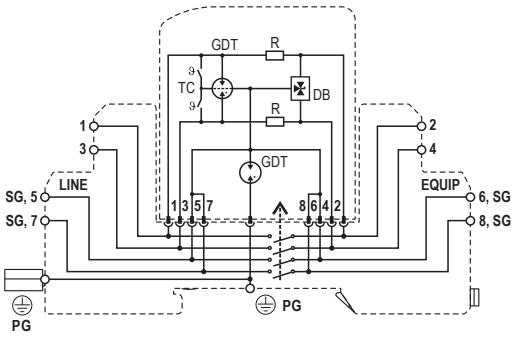
Electrical			
Lines Protected			1 (2 Conductors)
Nominal Operating Voltage (DC)		U_n	110 V
Maximum Continuous Operating Voltage (DC)		U_c	170 V
Rated Load Current at 25°C		I_L	1 A
C2 Nominal Discharge Current (8/20 µs)		I_n	10 kA
Maximum Discharge Current (8/20 µs)		I_{max}	20 kA
D1 Impulse Current (10/350 µs)		I_{imp}	2.5 kA
Residual Voltage at 5 kA (8/20 µs)	(Line-Line)	U_{res}	< 450 V
Rated Spark Overvoltage	(SG-Ground)		184-276 V
	(Line-Line), (Line-SG)		184-264 V
Response Time Overvoltage Protection	(Line-Line)	t_A	< 1 ns
	(Line-Ground)		< 100 ns
Insulation Resistance of the Protection	(Line-Line)	R_{iso}	≥ 170 MΩ
	(Line-Ground)		> 1 GΩ / 100 V
Serial Resistance per Path		R	1.6-2.0 Ω
Transverse Capacitance	(Line-Line)	C	50 pF
	(Line-Ground)		5 pF
Cut-off Frequency		f_G	30 MHz
Mechanical			
Temperature Range			-40 °F to +176 °F [-40 °C to +80 °C]
Terminal Cross Section Multi-strand (max.)			12 AWG [4 mm², 2.5 mm² Q Version]
Terminal Screw Torque			4.5 lbf·in [0.5 Nm]
Degree of Protection IEC/EN 60529			IP 20 (built-in)
Housing Material			Thermoplastic; Grey; Extinguishing Degree V-0
Mounting IEC/EN 60715			35 mm DIN Rail
Order Information			
Order Code			**110**
SGH-3-xxx			7086.68
SGH-3-xxxM (module)			7086.76

RayDat SGH-3-110

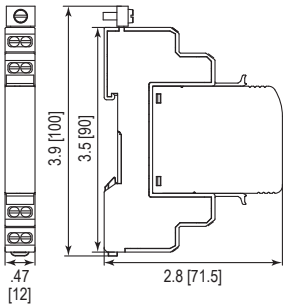
Internal Configuration

Legend

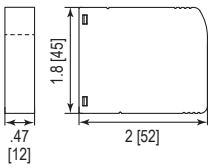
DB	*Diode Block*
GDT	*Gas Discharge Tube*
R	*Resistor*
PG	*Protective Grounding*
SG	*Signal Grounding*
TC	*Thermo-clip*



Dimensions & Packaging



SGH-3-xxx	110
Dimensions	
Weight per Unit	2.11 oz [60 g]
Dimensions DIN 43880	2/3 TE
Packaging Dimensions (Single Unit)	3.4 × .59 × 4" [87 × 15 × 102 mm]
Minimum Package Quantity	15 pieces



SGH-3-xxxM Series	110
Dimensions	
Weight per Unit	.91 oz [26 g]
Packaging Dimensions (Single Unit)	3.4 × .59 × 4" [87 × 15 × 102 mm]
Minimum Package Quantity	15 pieces

inches
[mm]

RoHS COMPLIANT CE

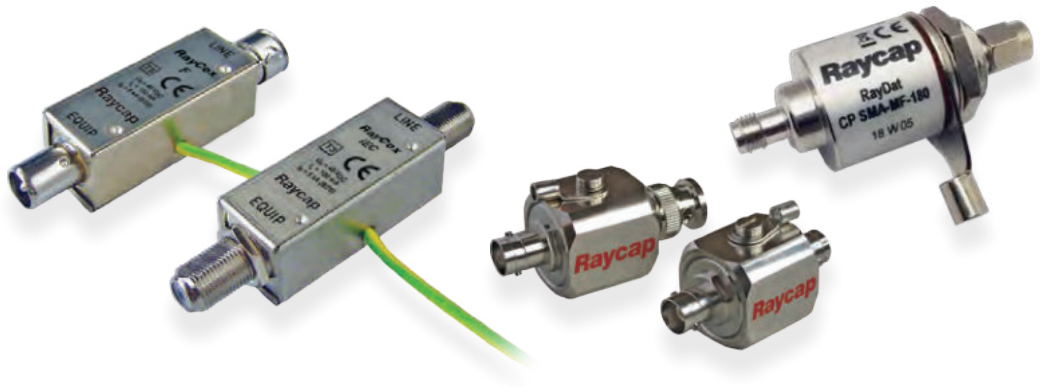
Surge Protective Devices (SPDs)
for Coaxial & RF Systems

Coaxial & RF Systems

Special features:

- Very high surge ratings
- Equipped with various types of terminals
- High frequency range (up to 250MHz) suitable for all DSL lines
- Robust metal housing

RayCox BNC
RayCox IEC, F
RayDat CP BNC
RayDat CP 7/16
RayDat CP N
RayDat CP N-6G
RayDat CP TNC-6G
RayDat CP UHF
RayDat CP F75
RayDat CP TV75
RayDat CP SMA-MF



Symbol Legend:


Compact Design


Quick Connect Terminals


Plug-In Connection


Shield Directly Grounded

Coaxial protection devices are intended to protect TV sets, aerial amplifiers, CCTV/ CATV systems as well as RF antenna systems. Moreover, they are suitable for frequencies up to 6 GHz.

The careful design, low capacitance gas discharge arresters and high-quality termination connectors ensure a minimum of insertion loss throughout the frequency band.

Surge protection devices are designed to match the requirements for 50 Ohm or 75 Ohm typical impedance. Different types of connectors (BNC, IEC TV, BNC, 7/16, N, TNC UHF and SMA) are used to enable easy installation.

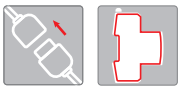
The CP coaxial cable protectors are designed in accordance with IEC 61643-21: 2012 standards and regulations.

RoHS COMPLIANT CE

Coaxial SPD for Analog Video Surveillance Systems

RayCox BNC Series

C1 • C2 • C3



IEC/EN Category: C1/C2/C3
Surge Discharge Ratings: I_n: 10 kA, I_{max}: 20 kA
Voltages: 10, 24 V DC
Max. Operating Voltage: 12, 24 V DC
Frequency Range: 100 MHz
Series Load Current: 100 mA
Enclosure: In-line Installation
Termination: BNC Connectors
Housing: Shielded Enclosure
Compliance: IEC/EN 61643-21

Technical Data

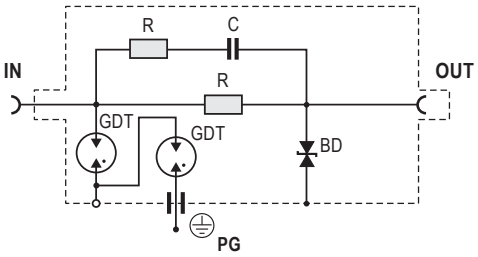
BNC			BNC 5	BNC 12
Electrical				
Nominal Operating Voltage (DC)		U_n	10 V	24 V
Maximum Continuous Operating Voltage (DC)		U_c	12 V	28 V
Rated Operating Current at 25°C		I_L	100 mA	
C2 Nominal Discharge Current (8/20 µs)		I_n	10 kA	
Maximum Discharge Current (8/20 µs)		I_{max}	20 kA	
Residual Voltage at 5 kA (8/20µs)	(Wire-Shield)	U_{res}	< 35 V	< 65 V
Rated Spark Overvoltage	(Wire-Shield)		13.5 V – 16.5 V	30 V – 36 V
	(Shield-Ground)		72 V – 108 V	72 V – 108 V
Response Time Overvoltage Protection	(Wire-Shield)	t_A	< 10 ns	
	(Shield-Ground)		< 100 ns	
Insulation Resistance of Protection	(Wire-Shield)	R_{iso}	≥ 12 MΩ	≥ 28 MΩ
	(Shield-Ground)		≥ 1 GΩ	
Serial Resistance per Path		R	9 – 11 Ω	
Transverse Capacitance	(Wire-Shield)	C	30 pF	
	(Shield-Ground)		1 pF	
Cut-off Frequency		f_G	100 MHz	
Transmission Rate			16 Mbit/s	
Mechanical				
Temperature Range			-40 °F to +176 °F [-40 °C to +80 °C]	
Connection			BNC Connector	
Degree of Protection IEC/EN 60529			IP 20 (built-in)	
Housing Material			Metal	
Order Information				
Order Code			**BNC 5**	**BNC 12**
BNC xx			7050.22	7050.13

RayCox BNC Series

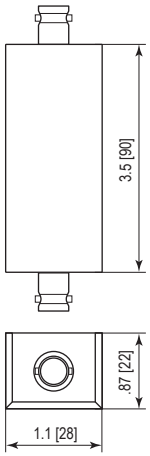
Internal Configuration

Legend

BD Bi-directional TVS Diode
C Capacitor
GDT Gas Discharge Tube
PG Protective Grounding
R Resistor



Dimensions & Packaging



BNC	BNC 5	BNC 12
Dimensions		
Weight per Unit	2.04 oz [58 g]	
Packaging Dimensions (Single Unit)	5.5 × 7.9" [140 × 200 mm]	

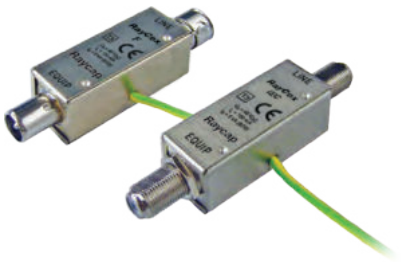
inches
[mm]

RoHS COMPLIANT CE

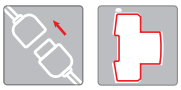
Coaxial SPD for TV & Cable TV

RayCox IEC 48, F 48

C1 • C2 • C3



IEC/EN Category: C1/C2/C3
Surge Discharge Ratings: I_n: 5 kA
Voltages: 48 V DC
Max. Operating Voltage: 60 V DC
Frequency Range: 40 – 860 MHz
Series Load Current: 100 mA
Termination: IEC TV or F Connectors
Housing: In-line Installation, Shielded Enclosure
Compliance: IEC/EN 61643-21



Technical Data

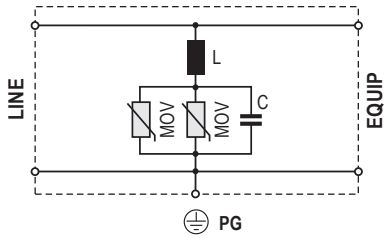
			IEC 48	F 48
Electrical				
Nominal Operating Voltage (DC)		U_n	48 V	
Maximum Continuous Operating Voltage (DC)		U_c	60 V	
Rated Operating Current at 25°C		I_L	100 mA	
C2 Nominal Discharge Current (8/20 µs)		I_n	5 kA	
Residual Voltage at 5 kA (8/20µs)		U_{res}	< 500 V	
Rated Spark Overvoltage	(Wire-Shield)		90 V – 110 V	
Response Time Overvoltage Protection	(Wire-Shield)	t_A	< 25 ns	
Insulation Resistance of Protection	(Wire-Shield)	R_{iso}	≥ 6 MΩ	
Serial Resistance per Path		R	< 0.1 Ω	
Frequency Range		f_G	40 – 860 MHz	
Mechanical				
Temperature Range			-40 °F to +176 °F [-40 °C to +80 °C]	
Connection			TV Connector	F Connector
Degree of Protection IEC/EN 60529			IP 20 (built-in)	
Housing Material			Metal	
Order Information				
Order Code			**IEC 48**	**F 48**
XXX 48			125 093	125 094

RayCox IEC 48, F 48

Internal Configuration

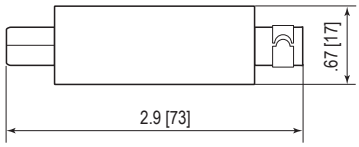
Legend

C	*Capacitor*
L	*Inductor*
MOV	*Metal Oxide Varistor*
PG	*Protective Grounding*

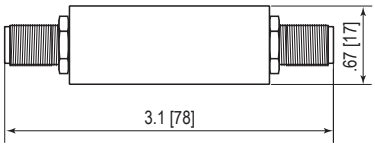


Dimensions & Packaging

IEC 48



F 48



	IEC 48	F 48
Dimensions		
Weight per Unit	1.13 oz [32 g]	
Packaging Dimensions (Single Unit)	3.5 × 5.9" [90 × 150 mm]	

inches
[mm]

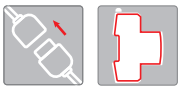
RoHS COMPLIANT CE

In-line SPD for Coaxial & RF Systems

RayDat CP BNC Series

C1 • C2 • C3

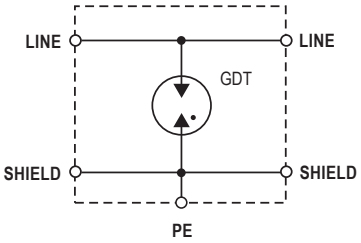
IEC/EN Category: C1/C2/C3
Surge Discharge Ratings: I_n: 10 kA, I_{max}: 20 kA
Max. Operating Voltage: 70, 180, 280 V
Maximum Peak Power: 40, 125, 300 W
Frequency Range: DC – 2.6 GHz
Impedance: 50 Ω
Insertion Loss: < 0.4 dB
Return Loss: > 20 dB
Termination: BNC Type (F-F, M-F)
Housing: In-line Installation, Shielded Enclosure
Compliance: IEC/EN 61643-21



Technical Data

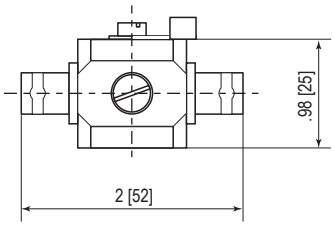
CP BNC		70	180	280
Electrical				
Maximum Continuous Operating Voltage	U_c	70 V	180 V	280 V
Maximum Peak Power	P_{max}	40 W	125 W	300 W
C2 Nominal Discharge Current (8/20 µs)	I_n		10 kA	
Maximum Discharge Current (8/20 µs)	I_{max}		20 kA	
Residual Voltage at (1 kV/µs)	U_{res}	< 600 V	< 700 V	< 900 V
Impedance	Z		50 Ω	
Insertion Loss	I_L		< 0.4 dB	
Return Loss	R_L		> 20 dB	
Insulation Resistance of Protection	R_{iso}		> 10 GΩ	
Frequency Range	f_G		0 – 2.6 GHz	
Mechanical				
Temperature Range			-40 °F to +176 °F [-40 °C to +80 °C]	
Connection		BNC Female/Female		BNC Male/Female
Degree of Protection IEC/EN 60529			IP 20 (built-in)	
Housing Material			Metal	
Order Information				
Order Code		**70**	**180**	**280**
CP BNC-FF-xxx		800 850	800 851	800 852
CP BNC-MF-xxx		800 853	800 854	800 855

Internal Configuration

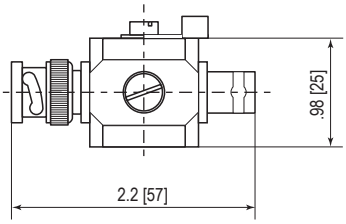


Legend
GDT Gas Discharge Tube
PE Ground

Dimensions & Packaging



CP BNC-FF



CP BNC-MF

	CP BNC-FF-xxx			CP BNC-MF-xxx		
CP BNC	**70**	**180**	**280**	**70**	**180**	**280**
Dimensions						
Weight per Unit	3.74 oz [106 g]			4.02 oz [114 g]		
Packaging Dimensions (Single Unit)	2.9 × 1.2 × 1.2" [73 × 30 × 30 mm]					
Minimum Package Quantity	100 pieces					

inches
[mm]

RoHS COMPLIANT CE

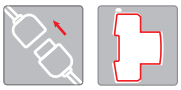
In-line SPD for Coaxial & RF Systems

RayDat CP 7/16 Series

C1 • C2 • C3

CCP-7/16 Series

IEC/EN Category: C1/C2/C3
Surge Discharge Ratings: I_n: 10 kA, I_{max}: 20 kA
Max. Operating Voltage: 70, 180, 280 V
Maximum Peak Power: 40, 125, 300 W
Frequency Range: DC – 2.5 GHz
Impedance: 50 Ω
Insertion Loss: < 0.2 dB
Return Loss: > 20 dB
Termination: 7/16 Type (M-F)
Housing: Bulkhead Installation, Shielded Enclosure
Compliance: IEC/EN 61643-21

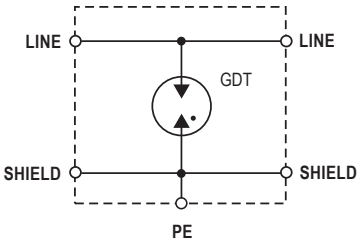


Technical Data

CP 7/16-MF		70	180	280
Electrical				
Maximum Continuous Operating Voltage	U_c	70 V	180 V	280 V
Maximum Peak Power	P_{max}	40 W	125 W	300 W
C2 Nominal Discharge Current (8/20 µs)	I_n		10 kA	
Maximum Discharge Current (8/20 µs)	I_{max}		20 kA	
Residual Voltage at (1 kV/µs)	U_{res}	< 600 V	< 700 V	< 900 V
Impedance	Z		50 Ω	
Insertion Loss	I_L		< 0.2 dB	
Return Loss	R_L		> 20 dB	
Insulation Resistance of Protection	R_{iso}		> 10 GΩ	
Frequency Range	f_G		0 – 2.5 GHz	
Mechanical				
Temperature Range			-40 °F to +176 °F [-40 °C to +80 °C]	
Connection			7/16 Male/Female	
Degree of Protection IEC/EN 60529			IP 20 (built-in)	
Housing Material			Metal	
Order Information				
Order Code		**70**	**180**	**280**
CP 7/16-MF-xxx		800 856	800 857	800 858

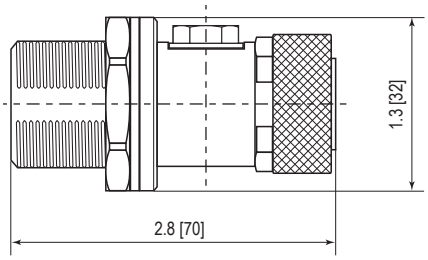
RayDat CP 7/16 Series

Internal Configuration



Legend
GDT *Gas Discharge Tube*
PE *Ground*

Dimensions & Packaging



CP 7/16-MF	70	180	280
Dimensions			
Weight per Unit	7.7 oz [218 g]		
Packaging Dimensions (Single Unit)	3.2 × 1.6 × 1.6" [82 × 40 × 40 mm]		
Minimum Package Quantity	100 pieces		

inches
[mm]

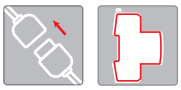
RoHS COMPLIANT CE

In-line SPD for Coaxial & RF Systems

RayDat CP N Series

C1 • C2 • C3

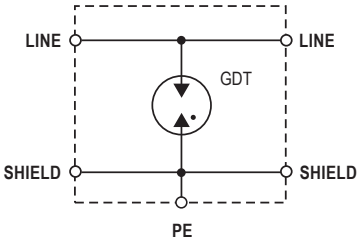
IEC/EN Category: C1/C2/C3
Surge Discharge Ratings: I_n: 10 kA, I_{max}: 20 kA
Max. Operating Voltage: 70, 180, 280 V
Maximum Peak Power: 40, 125, 300 W
Frequency Range: DC – 2.6 GHz
Impedance: 50 Ω
Insertion Loss: < 0.4 dB
Return Loss: > 20 dB
Termination: N Type (F-F, M-F)
Housing: In-line Installation, Shielded Enclosure
Compliance: IEC/EN 61643-21



Technical Data

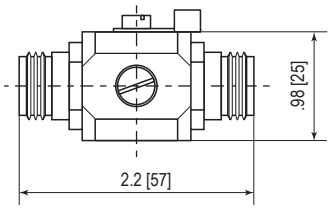
CP-N		70	180	280
Electrical				
Maximum Continuous Operating Voltage	U_c	70 V	180 V	280 V
Maximum Peak Power	P_{max}	40 W	125 W	300 W
C2 Nominal Discharge Current (8/20 µs)	I_n	10 kA		
Maximum Discharge Current (8/20 µs)	I_{max}		20 kA	
Residual Voltage at (1 kV/µs)	U_{res}	< 600 V	< 700 V	< 900 V
Impedance	Z		50 Ω	
Insertion Loss	I_L		< 0.4 dB	
Return Loss	R_L		> 20 dB	
Insulation Resistance of Protection	R_{iso}		> 10 GΩ	
Frequency Range	f_G		0 – 2.6 GHz	
Mechanical				
Temperature Range			-40 °F to +176 °F [-40 °C to +80 °C]	
Connection		N Female/Female		N Male/Female
Degree of Protection IEC/EN 60529			IP 20 (built-in)	
Housing Material			Metal	
Order Information				
Order Code		**70**	**180**	**280**
CP N-FF-xxx		800 859	800 860	800 861
CP N-MF-xxx		800 862	800 863	800 864

Internal Configuration

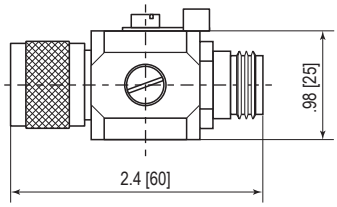


Legend
GDT *Gas Discharge Tube*
PE *Ground*

Dimensions & Packaging



CP N-FF



CP N-MF

	CP N-FF-xxx			CP N-MF-xxx		
CP N	**70**	**180**	**280**	**70**	**180**	**280**
Dimensions						
Weight per Unit	4.87 oz [138 g]			5.01 oz [142 g]		
Packaging Dimensions (Single Unit)	2.9 × 1.2 × 1.2" [73 × 30 × 30 mm]					
Minimum Package Quantity	100 pieces					

inches
[mm]

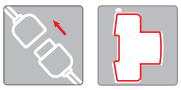
RoHS COMPLIANT CE

In-line SPD for High Frequency Coaxial & RF Systems

RayDat CP N-6G Series

C1 • C2 • C3

IEC/EN Category: C1/C2/C3
Surge Discharge Ratings: I_n: 10 kA, I_{max}: 20 kA
Max. Operating Voltage: 180 V
Maximum Peak Power: 125 W
Frequency Range: DC – 6.0 GHz
Impedance: 50 Ω
Insertion Loss: < 0.4 dB
Return Loss: > 20 dB
Termination: N Type (F-F, M-F)
Housing: Bulkhead Installation, Shielded Enclosure
Compliance: IEC/EN 61643-21

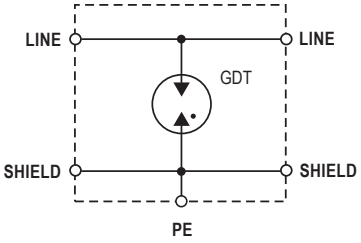


Technical Data

CP N-6G		CP N-6G-FF	CP N-6G-MF
Electrical			
Maximum Continuous Operating Voltage	U_c	180 V	
Maximum Peak Power	P_{max}	125 W	
C2 Nominal Discharge Current (8/20 µs)	I_n	10 kA	
Maximum Discharge Current (8/20 µs)	I_{max}	20 kA	
Residual Voltage at (1 kV/µs)	U_{res}	< 700 V	
Impedance	Z	50 Ω	
Insertion Loss	I_L	< 0.4 dB	
Return Loss	R_L	> 20 dB	
Insulation Resistance of Protection	R_{iso}	> 10 GΩ	
Frequency Range	f_G	0 – 6.0 GHz	
Mechanical			
Temperature Range		-40 °F to +176 °F [-40 °C to +80 °C]	
Connection		N Female/Female	N Male/Female
Degree of Protection IEC/EN 60529		IP 20 (built-in)	
Housing Material		Metal	
Order Information			
Order Code			
CP N-6G-XX		800 865	800 866

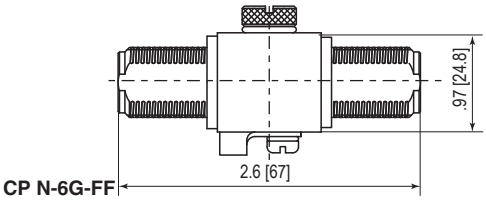
RayDat CP N-6G Series

Internal Configuration

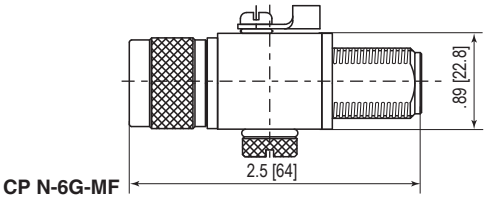


Legend
GDT *Gas Discharge Tube*
PE *Ground*

Dimensions & Packaging



CP N-6G-FF



CP N-6G-MF

CP N-6G	CP N-6G-FF	CP N-6G-MF
Dimensions		
Weight per Unit	4.65 oz [132 g]	4.58 oz [130 g]
Packaging Dimensions (Single Unit)	2.9 × 1.2 × 1.2" [73 × 30 × 30 mm]	
Minimum Package Quantity	100 pieces	

inches
[mm]

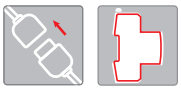
RoHS COMPLIANT CE

In-line SPD for High Frequency Coaxial & RF Systems

RayDat CP TNC-6G Series

C1 • C2 • C3

IEC/EN Category: C1/C2/C3
Surge Discharge Ratings: I_n: 10 kA, I_{max}: 20 kA
Max. Operating Voltage: 180 V
Maximum Peak Power: 125 W
Frequency Range: DC – 6.0 GHz
Impedance: 50 Ω
Insertion Loss: < 0.4 dB
Return Loss: > 20 dB
Termination: TNC Type (F-F, M-F)
Housing: In-line Installation, Shielded Enclosure
Compliance: IEC/EN 61643-21

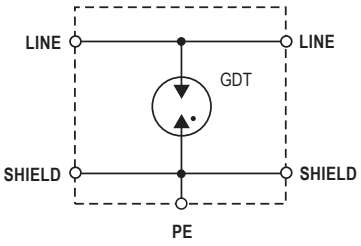


Technical Data

CP TNC-6G		CP TNC-6G-FF	CP TNC-6G-MF
Electrical			
Maximum Continuous Operating Voltage	U_c	180 V	
Maximum Peak Power	P_{max}	125 W	
C2 Nominal Discharge Current (8/20 µs)	I_n	10 kA	
Maximum Discharge Current (8/20 µs)	I_{max}	20 kA	
Residual Voltage at (1 kV/µs)	U_{res}	< 700 V	
Impedance	Z	50 Ω	
Insertion Loss	I_L	< 0.4 dB	
Return Loss	R_L	> 20 dB	
Insulation Resistance of Protection	R_{iso}	> 10 GΩ	
Frequency Range	f_G	0 – 6.0 GHz	
Mechanical			
Temperature Range		-40 °F to +176 °F [-40 °C to +80 °C]	
Connection		TNC Female/Female	TNC Male/Female
Degree of Protection IEC/EN 60529		IP 20 (built-in)	
Housing Material		Metal	
Order Information			
Order Code			
CP TNC-6G-XX		800 867	800 868

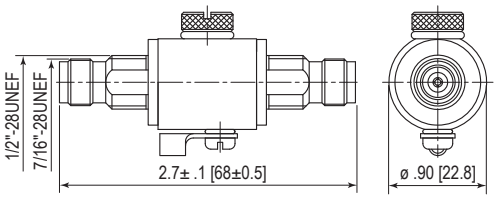
RayDat CP TNC-6G Series

Internal Configuration

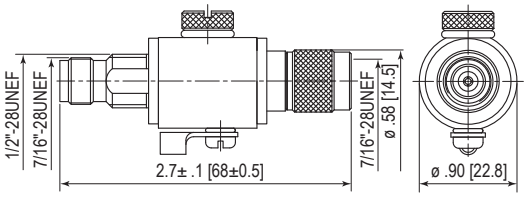


Legend
GDT *Gas Discharge Tube*
PE *Ground*

Dimensions & Packaging



CP TNC-6G-FF



CP TNC-6G-MF

CP TNC-6G	CP TNC-6G-FF	CP TNC-6G-MF
Dimensions		
Weight per Unit	4.6 oz [130 g]	4.51 oz [128 g]
Packaging Dimensions (Single Unit)	2.9 × 1.2 × 1.2" [73 × 30 × 30 mm]	
Minimum Package Quantity	100 pieces	

inches
[mm]

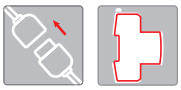
RoHS COMPLIANT CE

In-line SPD for Coaxial & RF Systems

RayDat CP UHF Series

C1 • C2 • C3

IEC/EN Category: C1/C2/C3
Surge Discharge Ratings: I_n: 10 kA, I_{max}: 20 kA
Max. Operating Voltage: 70, 180, 280 V
Maximum Peak Power: 40, 125, 300 W
Frequency Range: DC – 600 MHz
Impedance: 50 Ω
Insertion Loss: < 0.4 dB
Return Loss: > 20 dB
Termination: UHF Type (F-F, M-F)
Housing: In-line Installation, Shielded Enclosure
Compliance: IEC/EN 61643-21

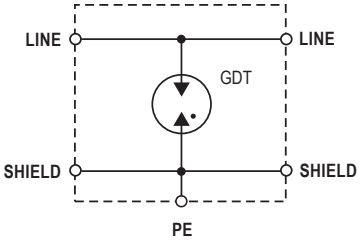


Technical Data

CP UHF		70	180	280
Electrical				
Maximum Continuous Operating Voltage	U_c	70 V	180 V	280 V
Maximum Peak Power	P_{max}	40 W	125 W	300 W
C2 Nominal Discharge Current (8/20 µs)	I_n		10 kA	
Maximum Discharge Current (8/20 µs)	I_{max}		20 kA	
Residual Voltage at (1 kV/µs)	U_{res}	< 600 V	< 700 V	< 900 V
Impedance	Z		50 Ω	
Insertion Loss	I_L		< 0.4 dB	
Return Loss	R_L		> 20 dB	
Insulation Resistance of Protection	R_{iso}		> 10 GΩ	
Frequency Range	f_G		0 – 600 MHz	
Mechanical				
Temperature Range			-40 °F to +176 °F [-40 °C to +80 °C]	
Connection		UHF Female/Female		UHF Male/Female
Degree of Protection IEC/EN 60529			IP 20 (built-in)	
Housing Material			Metal	
Order Information				
Order Code		**70**	**180**	**280**
CP UHF-FF-xxx		800 869	800 870	800 871
CP UHF-MF-xxx		800 872	800 873	800 874

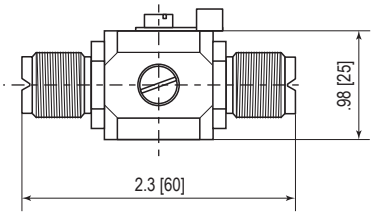
RayDat CP UHF Series

Internal Configuration

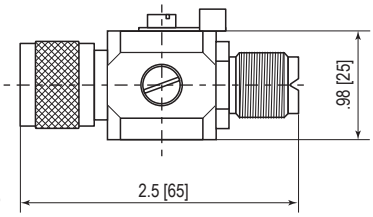


Legend
GDT *Gas Discharge Tube*
PE *Ground*

Dimensions & Packaging



CP UHF-FF



CP UHF-MF

	CP UHF-FF-xxx			CP UHF-MF-xxx		
CP UHF	**70**	**180**	**280**	**70**	**180**	**280**
Dimensions						
Weight per Unit	3.67 oz [104 g]			3.67 oz [104 g]		
Packaging Dimensions (Single Unit)	2.4 × 1.2 × 1.4" [62 × 30 × 35 mm]					
Minimum Package Quantity	100 pieces					

inches
[mm]

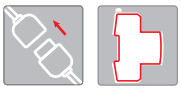
RoHS COMPLIANT CE

In-line SPD for Coaxial & RF Systems

RayDat CP F75 Series

C1 • C2 • C3

IEC/EN Category: C1/C2/C3
Surge Discharge Ratings: I_n: 10 kA, I_{max}: 20 kA
Max. Operating Voltage: 70, 180 V
Maximum Peak Power: 40, 125 W
Frequency Range: DC – 2.0 GHz
Impedance: 75 Ω
Insertion Loss: < 0.4 dB
Return Loss: > 20 dB
Termination: F Type (F-F, M-F)
Housing: In-line Installation, Shielded Enclosure
Compliance: IEC/EN 61643-21

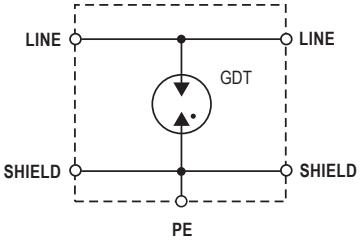


Technical Data

CP F75		70	180
Electrical			
Maximum Continuous Operating Voltage	U_c	70 V	180 V
Maximum Peak Power	P_{max}	40 W	125 W
C2 Nominal Discharge Current (8/20 µs)	I_n	10 kA	
Maximum Discharge Current (8/20 µs)	I_{max}	20 kA	
Residual Voltage at (1 kV/µs)	U_{res}	< 600 V	< 700 V
Impedance	Z	75 Ω	
Insertion Loss	I_L	< 0.4 dB	
Return Loss	R_L	> 20 dB	
Insulation Resistance of Protection	R_{iso}	> 10 GΩ	
Frequency Range	f_G	0 – 2.0 GHz	
Mechanical			
Temperature Range		-40 °F to +176 °F [-40 °C to +80 °C]	
Connection		F Female/Female	F Male/Female
Degree of Protection IEC/EN 60529		IP 20 (built-in)	
Housing Material		Metal	
Order Information			
Order Code		**70**	**180**
CP F75-FF-xxx		800 875	800 876
CP F75-MF-xxx		800 877	800 878

RayDat CP F75 Series

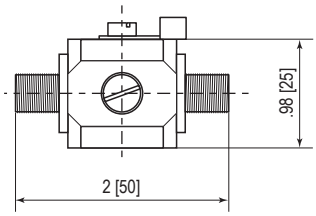
Internal Configuration



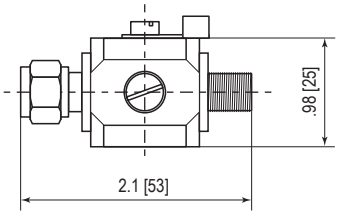
Legend
GDT *Gas Discharge Tube*
PE *Ground*

Dimensions & Packaging

CP F75-FF



CP F75-MF



	CP F75-FF		CP F75-MF	
CP F75	**70**	**180**	**70**	**180**
Dimensions				
Weight per Unit	2.82 oz [80 g]		2.96 oz [84 g]	
Packaging Dimensions (Single Unit)	2.8 × 1.2 × 1.2" [73 × 30 × 30 mm]			
Minimum Package Quantity	100 pieces			

inches
[mm]

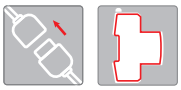
RoHS COMPLIANT CE

In-line SPD for Coaxial & RF Systems

RayDat CP TV75 Series

C1 • C2 • C3

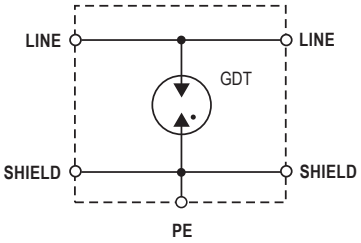
IEC/EN Category: C1/C2/C3
Surge Discharge Ratings: I_n: 10 kA, I_{max}: 20 kA
Max. Operating Voltage: 70, 180 V
Maximum Peak Power: 40, 125 W
Frequency Range: DC – 2.0 GHz
Impedance: 75 Ω
Insertion Loss: < 0.4 dB
Return Loss: > 20 dB
Termination: TV Type (F-F, M-F)
Housing: In-line Installation, Shielded Enclosure
Compliance: IEC/EN 61643-21



Technical Data

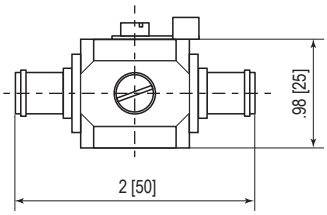
CP TV75		70	180
Electrical			
Maximum Continuous Operating Voltage	U_c	70 V	180 V
Maximum Peak Power	P_{max}	40 W	125 W
C2 Nominal Discharge Current (8/20 µs)	I_n	10 kA	
Maximum Discharge Current (8/20 µs)	I_{max}	20 kA	
Residual Voltage at (1 kV/µs)	U_{res}	< 600 V	< 700 V
Impedance	Z	75 Ω	
Insertion Loss	I_L	< 0.4 dB	
Return Loss	R_L	> 20 dB	
Insulation Resistance of Protection	R_{iso}	> 10 GΩ	
Frequency Range	f_G	0 – 2.0 GHz	
Mechanical			
Temperature Range		-40 °F to +176 °F [-40 °C to +80 °C]	
Connection		TV Female/Female	TV Male/Female
Degree of Protection IEC/EN 60529		IP 20 (built-in)	
Housing Material		Metal	
Order Information			
Order Code		**70**	**180**
CP TV75-FF-xx		800 879	800 880
CP TV75-MF-xx		800 881	800 882

Internal Configuration

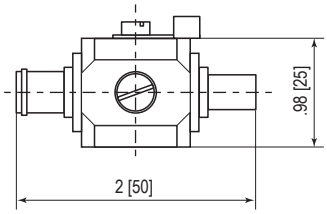


Legend
GDT Gas Discharge Tube
PE Ground

Dimensions & Packaging



CP TV75-FF



CP TV75-MF

	CP TV75-FF-xxx		CP TV75-MF-xxx	
CP TV75	**70**	**180**	**70**	**180**
Dimensions				
Weight per Unit	2.82 oz [80 g]		2.89 [82 g]	
Packaging Dimensions (Single Unit)	2.8 × 1.2 × 1.2" [73 × 30 × 30 mm]			
Minimum Package Quantity	100 pieces			

inches
[mm]

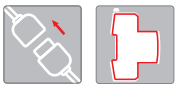
RoHS COMPLIANT CE

In-line SPD for Coaxial & RF Systems

RayDat CP-SMA Series

D1 • C1 • C2 • C3

IEC/EN Category: D1/C1/C2/C3
Surge Discharge Ratings: I_n: 5 kA, I_{max}: 10 kA, I_{imp}: 1 kA
Max. Operating Voltage: 180 V
Maximum Peak Power: 125 W
Frequency Range: DC – 6 GHz
Impedance: 50 Ω
Insertion Loss: < 0.25 dB
Return Loss: > 20 dB
Termination: SMA Type (M-F)
Housing: In-line Installation, Shielded Enclosure
Compliance: IEC/EN 61643-21

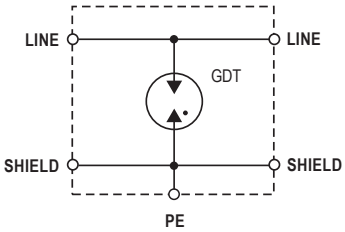


Technical Data

CP-SMA		180
Electrical		
Maximum Continuous Operating Voltage	U_c	180 V
Maximum Peak Power	P_{max}	125 W
C2 Nominal Discharge Current (8/20 µs)	I_n	5 kA
Maximum Discharge Current (8/20 µs)	I_{max}	10 kA
D1 Impulse Discharge Current (10/350 µs)	I_{imp}	1 kA
Residual Voltage at (1 kV/µs)	U_{res}	1600 V
Impedance	Z	50 Ω
Insertion Loss	I_L	< 0.25 dB
Return Loss	R_L	> 20 dB
Insulation Resistance of Protection at U_c	R_{iso}	> 10 GΩ
Frequency Range	f_G	0 - 6.0 GHz
Mechanical		
Temperature Range		-40 ° C to +80 ° C
Connection		SMA Male to SMA Female
Degree of Protection IEC/EN 60529		IP 20
Housing Material		Metal
Order Information		
CP-SMA-MF-180		800 887

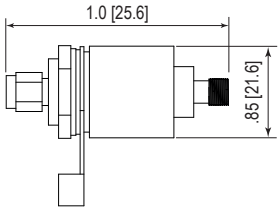
RayDat CP-SMA Series

Internal Configuration



Legend
GDT *Gas Discharge Tube*
PE *Ground*

Dimensions & Packaging



CP-SMA	180
Dimensions	
Weight per Unit	2.40 oz [68 g]
Packaging Dimensions (Single Unit)	20.84 × 1.58 × 1.58" [72 × 40 × 40 mm]
Minimum Package Quantity	100 pieces

inches
[mm]

RoHS COMPLIANT CE

Surge Protective Devices (SPDs)
for Power and Signal Lines

RayDat SUH-2-PS

Power and Signal Lines

Special features:

- Very high surge ratings
- The connection lines remain enabled during module replacement
- Protection of up to 2 signal lines and 1 power line
- Equipped with screw terminals

Symbol Legend:


DIN Rail Mounting


Screw Connect Terminals


Modular Design


Shield Directly Grounded

The RayDat SUH-2 PS Series has been developed to protect systems with one supply and one signal line (CAN bus, DeviceNet, etc.). This efficient overvoltage protective device is intended to protect lines from overvoltage surges and electrostatic discharges created by switching transients in buildings.

The signal line circuit is designed to minimize inter-capacitance, and shunt capacitance, thereby maximizing the operating frequency to 30 MHz. If the module is unplugged out of the base, the connection lines remain enabled.

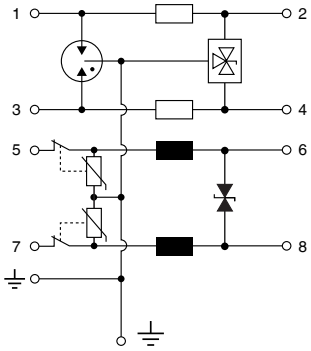
RoHS COMPLIANT CE

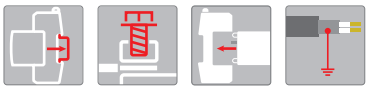
SPD for DC Power Supply & Data

RayDat SUH-2 PS

D1 • C1 • C2 • C3

IEC/EN Category: D1/C1/C2/C3
Surge Discharge Ratings: I_n: 10 kA, I_{max}: 20 kA, I_{imp}: 2.5 kA
Voltages: 24 V DC (Data Line)
24 V AC (Power Line)
Frequency Range: 30 MHz
Housing: Modular Design
Compliance: IEC/EN 61643-21
Configuration:





Technical Data

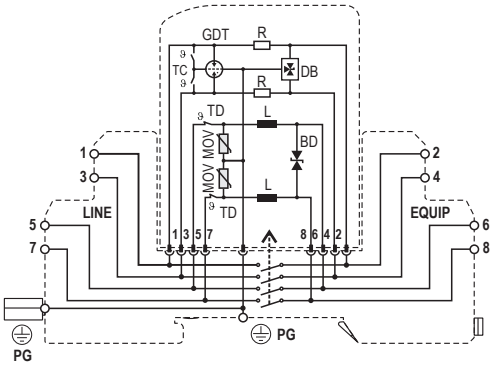
SUH-2 PS		Data Line	Power Supply Line
Electrical			
Lines Protected		2 (1 Data Line + 1 Power Supply Line)	
Nominal Operating Voltage (DC)	U_n	24 V	24 V AC/30 V DC
Maximum Continuous Operating Voltage (DC)	U_c	28 V	28 V AC/40 V DC
Rated Load Current at 25°C	I_L	1 A	3 A
C2 Nominal Discharge Current (8/20 µs)	I_n	10 kA	
Maximum Discharge Current (8/20 µs)	I_{max}	20 kA	
D1 Impulse Current (10/350 µs)	I_{imp}	2.5 kA	-
Residual Voltage at 5 kA (8/20 µs)	U_{res}	< 70 V	< 100 V
Rated Spark Overvoltage (Line-Ground)		31-37 V	90-110 V
(Line-Line)		31-37 V	42-52 V
Response Time Overvoltage Protection	t_A	< 1 ns	
Insulation Resistance of the Protection	R_{iso}	≥ 28 MΩ	≥ 40 MΩ
Serial Resistance per Path	R	1.6-2.0 Ω	<0.2 Ω
Serial Inductivity	L		15 µH
Transverse Capacitance	C	50 pF	6.0 nF
Cut-off Frequency	f_G	30 MHz	1 kHz
Mechanical			
Temperature Range		-40 °F to +176 °F [-40 °C to +80 °C]	
Terminal Cross Section Multi-strand (max.)		12 AWG [4 mm²]	
Terminal Screw Torque		4.5 lbf·in [0.5 Nm]	
Degree of Protection IEC/EN 60529		IP 20 (built-in)	
Housing Material		Thermoplastic; Grey; Extinguishing Degree V-0	
Mounting IEC/EN 60715		35 mm DIN Rail	
Order Information			
Order Code		**24**	
SUH-2-xxPS		7086.81	
SUH-2-xxPSM (module)		7086.82	

RayDat SUH-2 PS

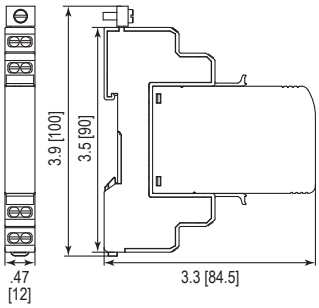
Internal Configuration

Legend

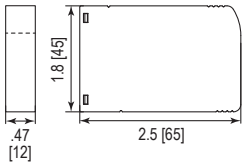
BD	*Bi-directional TVS Diode*
DB	*Diode Block*
GDT	*Gas Discharge Tube*
L	*Inductor*
MOV	*Metal Oxide Varistor*
PG	*Protective Grounding*
R	*Resistor*
TC	*Thermo-clip*
TD	*Thermal Disconnecter*



Dimensions & Packaging



SUH-2-xxPS	24
Dimensions	
Weight per Unit	2.53 oz [72 g]
Dimensions DIN 43880	2/3 TE
Packaging Dimensions (Single Unit)	3.4 × .59 × 4" [87 × 15 × 102 mm]
Minimum Package Quantity	15 pieces



SUH-2-xxPSM	24
Dimensions	
Weight per Unit	1.19 oz [34 g]
Packaging Dimensions (Single Unit)	3.4 × .59 × 4" [87 × 15 × 102 mm]
Minimum Package Quantity	15 pieces

inches
[mm]

RoHS COMPLIANT CE

Modular & Compact Surge Protective Devices (SPDs) for DC Power Systems

DC Power Systems

RayDat SPLH*
RayDat PSC-2
ProTec DMDR 20
UL Listed

Special features:

- Very high surge ratings
- Protects either floated or grounded lines
- Equipped with screw terminals
- High load current is provided (up to 7A)

Symbol Legend:


DIN Rail Mounting


Screw Connect Terminals


Modular Design


Compact Design


Shield Directly Grounded

The RayDat SPLH-2 Series has been developed to protect ungrounded DC power supplies. Coarse protection is provided using two pole gas discharge tubes (GDT), while fine protection is provided using a high-speed silicon (SAD) stage. Care is taken to ensure coordination between these two stages without voltage or surge current blind spots occurring.

The RayDat PSC-2 Series is designed to protect power supplies. Coarse protection is provided by varistors (MOV), while fine protection is provided using a high-speed silicon (SAD) stage.

Internal thermal disconnectors are used to reduce the hazards of thermal runaway during fault conditions or mains incursion onto the low voltage data circuit. If the module is unplugged out of the base, the connection lines remain enabled.

The ProTec DMDR Series is designed to meet the unique requirements of protection for DC power systems found in telecom power and railway applications. The ProTec DMDR Series provides both, common and differential mode protection using high nominal discharge rating for extended operating life under DC conditions.

RoHS COMPLIANT CE UL LISTED

Compact Single-pole SPD

RayDat SPLH-2-7A

UL Listed

D1 • C1 • C2 • C3

IEC/EN Category: D1/C1/C2/C3
Surge Discharge Ratings: I_n: 10 kA, I_{imp}: 2.5 kA
Voltages: 36 V DC
Series Load Current: 7 A
Enclosure: DIN 43880 2TE, DIN Rail Mount
Terminals: Stranded to 2.5 mm²
Housing: Compact Design
Compliance: IEC/EN 61643-21
UL 497B 4th Edition

Technical Data

SPLH-2-7A

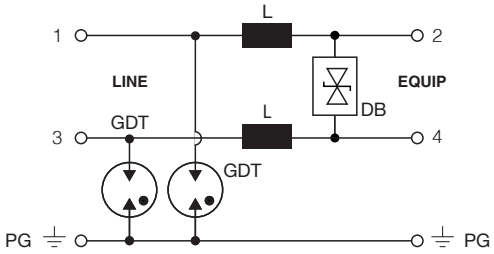
Electrical			
Nominal Operating Voltage (DC)		U_n	36 V
Maximum Continuous Operating Voltage (DC)		U_c	45 V
Rated Load Current at 45°C		I_L	7 A
Rated Load Current at 80°C		I_L	5 A
C2 Nominal Discharge Current (8/20 µs)	(Line-Ground)	I_n	10 kA
C2 Total Nominal Discharge Current (8/20 µs)		I_n	20 kA
D1 Impulse Current (10/350 µs)	(Line-Ground)	I_{imp}	2.5 kA
D1 Total Impulse Current (10/350 µs)		I_{imp}	5 kA
Voltage Protection Level at C2 (8/20 µs)	(Line-Ground)	U_p	< 1000 V
Voltage Protection Level at C2 (8/20 µs)	(Line-Line)	U_p	< 180 V
Response Time Overvoltage Protection		t_A	< 1 ns
Insulation Resistance of the Protection		R_{iso}	> 45 MΩ
Serial Resistance per Path		R	< 1 Ω
Serial Inductivity		L	22 µH
Transverse Capacitance	(Line-Ground)	C	< 2 nF
Transverse Capacitance	(Line-Line)	C	< 100 pF
Mechanical & Environmental			
Temperature Range		T_a	-40 °C to +80 °C
Terminal Screw Torque		M_{max}	0.5 Nm
Conductor Cross Section			2.5 mm² (Solid, Stranded)
Mounting			35 mm DIN Rail, EN 60715
Degree of Protection			IP 20
Housing Material			Thermoplastic: Extinguishing Degree UL 94 V-0
Order Information			
Order Code			
SPLH-2-7A			127 626

RayDat SPLH-2-7A

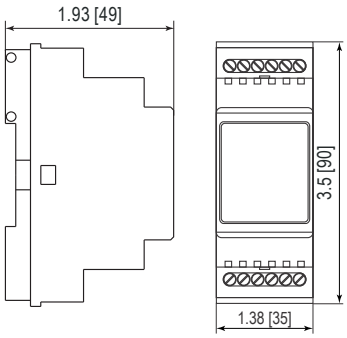
Internal Configuration

Legend

DB Diode Block
GDT Gas Discharge Tube
PG Protective Grounding
L Inductor



Dimensions & Packaging



Dimensions & Packaging	
SPLH-2-7A	
Dimensions DIN 43880	2 TE
Single Unit Weight	3.17 oz [90 g]
Packaging Dimensions (Single Unit)	4.29 × 3.03 × 1.65" [109 × 77 × 42 mm]
Minimum Order Quantity	7 Units

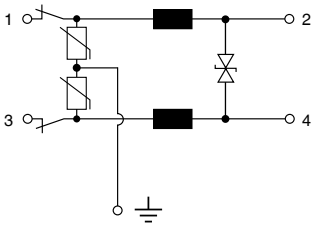
inches
[mm]

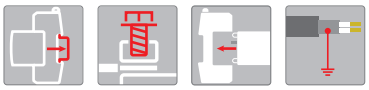
SPD for DC Power Systems with Low Residual Voltage

RayDat PSC-2 Series

C1 • C2 • C3

IEC/EN Category: C1/C2/C3
Surge Discharge Ratings: I_n: 10 kA, I_{max}: 20 kA
Voltages: 12, 24, 48 V DC
Serial Inductivity: 10 – 14 µH
Housing: Modular Design
Compliance: IEC/EN 61643-21
Configuration:





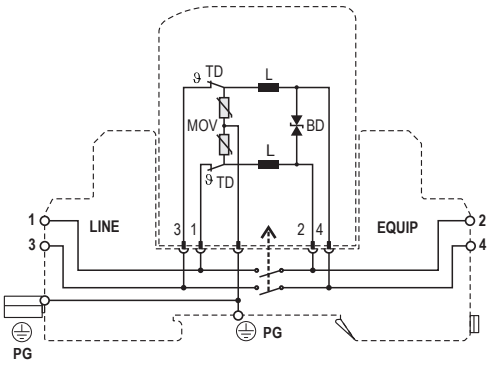
Technical Data

PSC-2 Series			12	24	48
Electrical					
Lines Protected				1 (2 Conductors)	
Nominal Operating Voltage (DC)		U_n	12 V	24 V	48 V
Maximum Continuous Operating Voltage (DC)		U_c	15 V	28 V	52 V
Rated Operating Current at 25 °C		I_L		4 A	
C2 Nominal Discharge Current (8/20 µs)		I_n		10 kA	
Maximum Discharge Current (8/20 µs)		I_{max}		20 kA	
Residual Voltage at 5 kA (8/20 µs)		U_{res}	< 32 V	< 60 V	< 135 V
Rated Spark Overvoltage	(1, 3-PG)		90-110 V	90-110 V	90-110 V
	(1, 3)		16-20 V	30-36 V	57-69 V
Response Time Overvoltage Protection		t_A		< 1 ns	
Thermal Protection				Thermal Disconnection	
Insulation Resistance of the Protection		R_{iso}	≥ 15 MΩ	≥ 28 MΩ	≥ 52 MΩ
Serial Inductance per Path		L		10 – 14 µH	
Transverse Capacitance		C	< 5 nF	< 3 nF	< 1.5 nF
Mechanical					
Temperature Range				-40 °F to +176 °F [-40 °C to +80 °C]	
Terminal Cross Section Multi-strand (max.)				12 AWG [4 mm²]	
Terminal Screw Torque				4.5 lbf·in [0.5 Nm]	
Degree of Protection IEC/EN 60529				IP 20 (built-in)	
Housing Material				Thermoplastic; Grey; Extinguishing Degree V-0	
Mounting IEC/EN 60715				35 mm DIN Rail	
Order Information					
Order Code			12	24	48
PSC-2-xx			7086.83	7086.84	7086.85
PSC-2-xxM (module)			7086.86	7086.87	7086.88

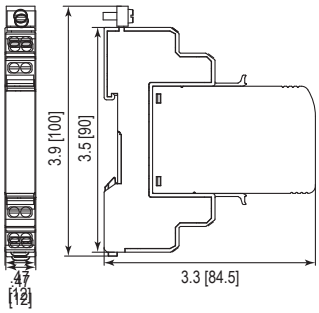
Internal Configuration

Legend

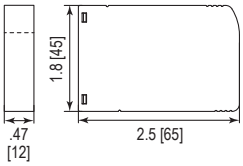
BD	*Bi-Directional TVS Diode*
L	*Inductor*
MOV	*Metal Oxide Varistor*
PG	*Protective Ground*
TD	*Thermal Disconnecter*



Dimensions & Packaging



PSC-2 Series	12	24	48
Dimensions			
Weight per Unit		2.25 oz [64 g]	
Dimensions DIN 43880		2/3 TE	
Packaging Dimensions (Single Unit)		3.4 × .59 × 4" [87 × 15 × 102 mm]	
Minimum Package Quantity		15 pieces	



PSC-2-xxM	12	24	48
Dimensions			
Weight per Unit		1.26 oz [36 g]	
Packaging Dimensions (Single Unit)		3.4 × .59 × 4" [87 × 15 × 102 mm]	
Minimum Package Quantity		15 pieces	

inches
[mm]

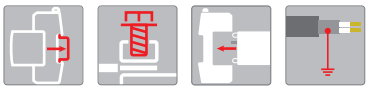
RoHS COMPLIANT CE

SPD for DC Power Systems

ProTec DMDR 20 Series

Class III

IEC/EN Category: Class III/Type 3
Surge Discharge Ratings: U_{oc} /I_{cw} = up to 6 kV/3 kA
I_{max} = up to 4 kA (8/20 µs)
Protection Element: High Energy MOV and GDT
Voltages: 24, 48, 60, 120 V AC
Status Indication: Remote Contacts + LED
Housing: Modular Design
Compliance: IEC 61643-11:2011
EN 61643-11:2012

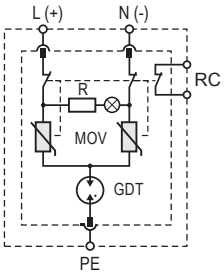


Technical Data

ProTec DMDR 20 Series			24	48	60	120
Electrical						
Nominal AC/DC Voltage		U_o	17 V/24 V	34 V/48 V	43 V/60 V	85 V/120 V
Maximum Continuous Operating Voltage (AC/DC)		U_c	24 V/34 V	48 V/60 V	60 V/75 V	120 V/150 V
Open Circuit Voltage of the Combination Wave Generator (1.2/50 µs)		U_{oc}	2.4 kV	2.4 kV	6 kV	6 kV
Short Circuit Current of the Combination Wave Generator (8/20 µs)		I_{cw}	1.2 kA	1.2 kA	3 kA	3 kA
Maximum Discharge Current (8/20 µs)		I_{max}	2 kA	2 kA	4 kA	4 kA
Voltage Protection Level	(L-N)	U_p	< 250 V	< 500 V	< 600 V	< 1100 V
	(L-PE)/(N-PE)		< 700 V	< 800 V	< 850 V	< 1200 V
Response Time of Overvoltage Protection	(L-N)	t_A	< 25 ns			
	(L-PE)/(N-PE)		< 100 ns			
Back-Up Fuse (if mains > 32A)			32 A gG			
Short-Circuit Current Rating (AC)		I_{SCCR}	2 kA			
TOV Withstand 5s (AC)		U_T	115 V	148 V	163 V	225 V
Number of Ports			1			
Mechanical						
Temperature Range		T_a	-40 °F to +158 °F [-40 °C to +70 °C]			
Permissible Humidity		RH	5%...95%			
Terminal Screw Torque		M_{max}	4.5 lbf·in [0.5 Nm]			
Conductor Cross Section (max.)			10 AWG (Solid, Stranded) / 12 AWG (Flexible)			
			6 mm² (Solid, Stranded) / 4 mm² (Flexible)			
Mounting			35 mm DIN Rail, EN 60715			
Degree Of Protection			IP 20 (built-in)			
Housing Material			Thermoplastic: Extinguishing Degree UL 94 V-0			
Thermal Protection			Yes			
Operating Status Indication			Green LED			
Order Information						
Order Code			24	48	60	120
ProTec DMDR 20/xxx			510 783	510 833	510 834	510 835
ProTec DMDR 20/xxxM (module)			510 784	510 836	510 837	510 838

ProTec DMDR 20 Series

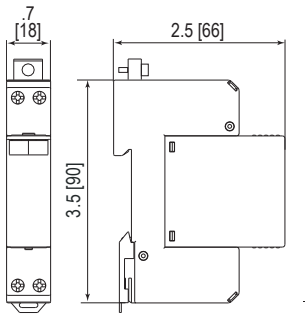
Internal Configuration



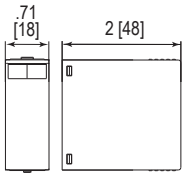
Legend

GDT	*Gas Discharge Tube*
MOV	*Metal Oxide Varistor*
PE	*Ground*
R	*Resistor*
RC	*Remote Control (NC)*

Dimensions & Packaging



ProTec DMDR 20 Series	24	48	60	120
Dimensions				
Weight per Unit		3.38 oz [96 g]		
Dimensions DIN 43880		1 TE		
Packaging Dimensions (Single Unit)		4.2 × 3 × .9" [109 × 77 × 24 mm]		
Minimum Package Quantity		12 pieces		



ProTec DMDR 20/xxx M	24	48	60	120
Dimensions				
Weight per Unit		1.12 oz [32 g]		
Packaging Dimensions (Single Unit)		3.8 × 3 × 4.3" [98 × 77 × 110 mm]		
Minimum Package Quantity		12 pieces		

inches
[mm]

RoHS COMPLIANT CE

Regulatory Standards

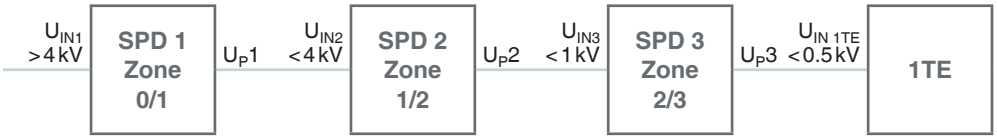
1	IEC 61643-21:2012	Low voltage surge protective devices – Part 21: Surge protective devices connected to telecommunications and signaling networks – Performance requirements and testing methods
2	IEC 61643-22:2015	Low voltage surge protective devices – Part 21: Surge protective devices connected to telecommunications and signaling networks – Performance requirements and testing methods
3	IEC 61643-11:2011	Surge protective devices connected to low voltage power distribution systems – Requirements and test methods
4	IEC 61643-12:2020	Surge protective devices connected to low voltage power distribution systems – Selection and application principles
5	IEC 60364-5-53:2019	Electrical installation of buildings – Part 5-53: Selection and erection of electrical equipment-isolation, switching and control
6	IEC 61000-4-5:2017	Electromagnetic compatibility (EMC) – Part 4-5: Testing and measurement techniques – Surge immunity test
7	IEC 62305-1:2010	Protection against lightning – Part 1: General principles
8	IEC 62305-2:2010	Protection against lightning – Part 2: Risk management
9	IEC 62305-3:2010	Protection against lightning – Part 3: Physical damage to structures and life hazard
10	IEC 62305-4:2010	Protection against lightning – Part 4: Electrical and electronic systems within structures
11	ITU-T K.20:2019	Resistibility of telecommunication equipment installed in a telecommunications center to overvoltages and overcurrents
12	ITU-T K.21:2019	Resistibility of telecommunication equipment installed in customer premises to overvoltages and overcurrents
13	ITU-T K.44:2019	Resistibility tests for telecommunication equipment exposed to overvoltages and overcurrents – Basic Recommendation
14	IEC 60099-4:2014	Surge arresters – Part 4: Metal-oxide surge arresters without gaps for AC systems
15	IEC 60099-5:2018	Surge arresters – Part 5: Selection and application recommendations
16	IEC PAS 60099-7:2004	Surge arresters – Part 7: Glossary of terms and definitions from IEC publications 60099-1, 60099-4, 60099-6, 61643-11, 61643-12, 61643-21, 61643-311, 61643-321, 61643-331 and 61643-341
17	IEC 60038:2009	IEC standard voltages
18	UL 497B 4th Edition	Protectors for Data Communications and Fire-Alarm Circuits
19	IEC 62497-2:2010	Railway applications – Insulation coordination – Part 2: Overvoltages and related protection
20	EN 50526-1:2012	Railway applications – Fixed installations – DC surge arresters and voltage limiting devices – Part 1: Surge arresters
21	EN 50123-5:2003	Railway applications – Fixed installations – DC switchgear – Part 5: Surge arresters and low-voltage limiters for specific use in DC systems
22	EN 50122-1:2017	Railway applications – Fixed installations – Part 1: Protective provisions relating to electrical safety and earthing
23	IEC 60364-7-712:2002	Electrical installations of buildings – Part 7-712: Requirements for special installations or locations – Solar photovoltaic (PV) power supply systems
24	HD 60364-7-712:2016	Electrical installations of buildings – Part 7-712: Requirements for special installations or locations – Solar photovoltaic (PV) power supply systems
25	EN 61173:2001	Overvoltage protection for photovoltaic (PV) power generating systems – guide 32. SIST EN 61400-1:2006/A1:2011 Wind turbines – Part 1: Design requirements (IEC 61400-1:2005/A1:2010)
26	IEC 61400-24:2019	Wind turbine generator systems – Part 24: Lightning protection
27	EN 50539-12:2014	Low-voltage surge protective devices – Surge protective devices for specific application including DC – Part 12: Selection and application principles – SPDs connected to photovoltaic installations
28	EN 50539-11:2012	Low-voltage surge protective devices - Surge protective devices for specific application including DC – Part 11: Requirements and tests for SPDs in photovoltaic applications
29	IEEE 802.3-2018	IEEE standard for Ethernet

References

Selection Table for Recommended Surge Protective Devices (SPDs)

Recommended SPDs for use in zone interfaces according to IEC 62305-1 and IEC 61000-4-5, based on correlation between standards IEC 61643-11 and IEC 61643-21.

Lightning Protection Zones	Test Class of SPD to IEC 61643-11	Category of SPD to IEC 61643-21
0/1	Test Class 1	D1
1/2	Test Class 2	C2
2/3	Test Class 3	C1



Typical Components Used in SPDs Voltage-limiting and Current Limiting Devices

Voltage-clamping Devices

Varistor (MOV)

A varistor is a bipolar, non-linear resistor with symmetrical voltage-current characteristics, where the resistance decreases with increasing characteristic curve.

Transient Voltage Suppression (TVS) Diode

A TVS diode is a clamping device that limits voltage spikes by the low impedance avalanche breakdown of the P/N junction. TVS diode contains a P/N junction similar to a Zener diode but with a larger cross section, which is proportional to its surge power rating. TVS diode has a very short response time, making it suitable for limiting fast rising transient voltages.

Voltage-switching Devices

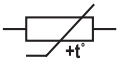
Gas Discharge Tube (GDT)

A GDT is an arrangement of electrodes in a gas within an insulating, temperature-resistant ceramic or glass cylinder. Because of their switching characteristic and rugged construction, GDTs exceed other components in current carrying capability.

Thyristor Surge Suppressor (TSS) Fixed Voltage Types

A Thyristor surge suppressor is voltage-switching device, when above a certain breakdown current, the NPNP structure regenerates and switches to a low voltage condition. The multiple PN junctions of the TSS reduce the overall capacitance.

Current Limiting Devices



Positive Temperature Coefficient Resistor (PTC Resistor)

PTC resistors are ceramic components whose electrical resistance rapidly increases when a certain temperature is exceeded. An overcurrent condition causes the devices to increase their resistance, thus reducing current flow.

Common Terminology

1.2/50 µs Voltage Impulse
Voltage impulse with a nominal virtual front time of 1.2 µs and a nominal time to half-value of 50 µs.

8/20 µs Current Impulse
Current impulse with a nominal virtual front time of 8 µs and a nominal time to half-value of 20 µs.

American Wire Gauge (AWG)
American Wire Gauge (AWG) is a standardized wire gauge system for the diameters of round, solid, nonferrous, electrically conducting wire. The larger the AWG number or wire gauge, the smaller the physical size of the wire. The smallest AWG size is 40 and the largest is 000 (4/0).

Combination Wave
The combination wave is delivered by a generator that applies a 1.2/50 µs voltage impulse across an open circuit and an 8/20 µs current impulse into a short circuit. The voltage, current amplitude and waveforms that are delivered to the SPD are determined by the generator impedance and the impedance of the SPD to which the surge is applied. The short-circuit current is symbolized by I_{sc}. The open-circuit voltage is symbolized by U_{oc}.

Environmental Protection Provided by Enclosure--Ingress Protection Rating (IP)
The extent of protection provided by an enclosure against access to hazardous parts, against ingress of solid foreign objects and/or against ingress of water per IEC 60529.

Impulse Discharge Current I_{imp} (10/350 µs Current Impulse)
The crest value of a discharge current through SPD with specified charge transfer Q and specified energy W/R in a specified time.

Maximum Continuous Operating Voltages (U_C or MCOV)
The maximum root-mean square (RMS) or DC voltage, which may be continuously applied to the SPD's mode of protection.

Maximum Discharge Current I_{max}
Crest value of a current through the SPD having an 8/20 µs waveshape and magnitude according to the manufacturers specifications: I_{max} is greater than I_n.

Metal Oxide Varistor (MOV)
A varistor is a bipolar, non-linear resistor with a symmetrical voltage current characteristic, where the resistance decreases with an increasing characteristic curve.

Multi-pole Surge Protective Device (SPD)
Type of SPD with more than one mode of protection, or a combination of electrically interconnected SPDs offered as a unit.

Nominal AC Voltage U_o/U_n
In TN and TT Systems: Nominal RMS AC line voltage to earth; in IT Systems: Nominal AC voltage between line conductor and neutral conductor or midpoint conductor.

Overcurrent Protection
Overcurrent device such as a circuit-breaker or fuse, which could be part of the electrical installation located externally upstream of the SPD.

Residual Voltage U_{res}
The crest value of voltage that appears between the terminals of an SPD due to the passage of discharge current.

SPD Disconnecter
Internal build-in external device required for disconnecting an SPD or part of an SPD from the power system.

Surge Protective Device (SPD)
A device that is intended to limit surge overvoltages and divert surge currents. It contains at least on nonlinear component.

Total Discharge Current I_{Total}
Current which flows through earth conductor of a multi-pole SPD during the total discharge current test.

Voltage Protection Level U_P
Maximum voltage to be expected at the SPD terminals due to an impulse stress with defined voltage steepness and impulse stress with a discharge current, given amplitude and waveshape.

Product Index

D1 • C1 • C2 • C3 Analogue Systems Modular SPDs for Data & Signal Lines

	Product Name	Order Code	Dimensions DIN 43880	Page
	RayDat SLH-2-5	7086.33	2/3TE	22
	RayDat SLH-2-12	7086.34	2/3TE	22
	RayDat SLH-2-15	7086.35	2/3TE	22
	RayDat SLH-2-24	7086.36	2/3TE	22
	RayDat SLH-2-30	7082.80	2/3TE	22
	RayDat SLH-2-48	7086.37	2/3TE	22
	RayDat SLH-2-60	7086.38	2/3TE	22
	RayDat SLH-2-110	7086.39	2/3TE	76
	RayDat SLH-2-5M	7086.40	2/3TE	22
	RayDat SLH-2-12M	7086.41	2/3TE	22
	RayDat SLH-2-15M	7086.42	2/3TE	22
	RayDat SLH-2-24M	7086.43	2/3TE	22
	RayDat SLH-2-30M	7082.81	2/3TE	22
	RayDat SLH-2-48M	7086.44	2/3TE	22
	RayDat SLH-2-60M	7086.45	2/3TE	22
	RayDat SLH-2-110M	7086.46	2/3TE	76
	RayDat SLH-2-5Q	7085.05	2/3TE	22
	RayDat SLH-2-12Q	7085.06	2/3TE	22
	RayDat SLH-2-15Q	7085.07	2/3TE	22
	RayDat SLH-2-24Q	7085.08	2/3TE	22
	RayDat SLH-2-30Q	7085.09	2/3TE	22
	RayDat SLH-2-48Q	7085.10	2/3TE	22
	RayDat SLH-2-60Q	7085.11	2/3TE	22
	RayDat SLH-2-110Q	7085.12	2/3TE	76
	RayDat SLH-4-5	7086.47	2/3TE	24
	RayDat SLH-4-12	7086.48	2/3TE	24
	RayDat SLH-4-15	7086.49	2/3TE	24
	RayDat SLH-4-24	7086.50	2/3TE	24
	RayDat SLH-4-30	7082.78	2/3TE	24
	RayDat SLH-4-48	7086.51	2/3TE	24
	RayDat SLH-4-60	7086.52	2/3TE	24
	RayDat SLH-4-110	7086.53	2/3TE	78
	RayDat SLH-4-5M	7086.54	2/3TE	24
	RayDat SLH-4-12M	7086.55	2/3TE	24
	RayDat SLH-4-15M	7086.56	2/3TE	24
	RayDat SLH-4-24M	7086.57	2/3TE	24
	RayDat SLH-4-30M	7082.79	2/3TE	24
	RayDat SLH-4-48M	7086.58	2/3TE	24
	RayDat SLH-4-60M	7086.59	2/3TE	24
	RayDat SLH-4-110M	7086.60	2/3TE	78
	RayDat SLH-4-5Q	7085.13	2/3TE	24
	RayDat SLH-4-12Q	7085.14	2/3TE	24
	RayDat SLH-4-15Q	7085.15	2/3TE	24
	RayDat SLH-4-24Q	7085.16	2/3TE	24
	RayDat SLH-4-30Q	7085.17	2/3TE	24
	RayDat SLH-4-48Q	7085.18	2/3TE	24
	RayDat SLH-4-60Q	7085.19	2/3TE	24
	RayDat SLH-4-110Q	7085.20	2/3TE	78
	RayDat SPH-2-30	7082.84	2/3TE	34
	RayDat SPH-2-230	7081.06	2/3TE	74
	RayDat SPH-2-30M	7082.85	2/3TE	34
	RayDat SPH-2-230M	7081.08	2/3TE	74
	RayDat SPH-2-30Q	7085.25	2/3TE	34
	RayDat SPH-2-230Q	7085.26	2/3TE	74
	RayDat SPH-4-30	7082.82	2/3TE	36
	RayDat SPH-4-30/0	7086.89	2/3TE	36
	RayDat SPH-4-30M	7082.83	2/3TE	36
	RayDat SPH-4-30/0M	7085.29	2/3TE	36
	RayDat SPH-4-30Q	7085.24	2/3TE	36
	RayDat SPH-4-30/0Q	7085.28	2/3TE	36

D1 • C1 • C2 • C3 Analogue Systems Modular SPDs for Data & Signal Lines *-continued*

	Product Name	Order Code	Dimensions DIN 43880	Page
	RayDat SPI-2-30	7085.67	2/3TE	38
	RayDat SPI-2-30M	7085.68	2/3TE	38
	RayDat SPI-4-30	7085.69	2/3TE	40
	RayDat SPI-4-30M	7085.70	2/3TE	40
	RayDat SRH-2-5	7086.17	2/3TE	44
	RayDat SRH-2-12	7086.18	2/3TE	44
	RayDat SRH-2-15	7086.19	2/3TE	44
	RayDat SRH-2-24	7086.20	2/3TE	44
	RayDat SRH-2-30	7086.21	2/3TE	44
	RayDat SRH-2-48	7086.22	2/3TE	44
	RayDat SRH-2-60	7086.23	2/3TE	44
	RayDat SRH-2-110	7086.24	2/3TE	82
	RayDat SRH-2-5M	7086.25	2/3TE	44
	RayDat SRH-2-12M	7086.26	2/3TE	44
	RayDat SRH-2-15M	7086.27	2/3TE	44
	RayDat SRH-2-24M	7086.28	2/3TE	44
	RayDat SRH-2-30M	7086.29	2/3TE	44
	RayDat SRH-2-48M	7086.30	2/3TE	44
	RayDat SRH-2-60M	7086.31	2/3TE	44
	RayDat SRH-2-110M	7086.32	2/3TE	82
	RayDat SRH-2-5Q	7085.33	2/3TE	44
	RayDat SRH-2-12Q	7085.34	2/3TE	44
	RayDat SRH-2-15Q	7085.35	2/3TE	44
	RayDat SRH-2-24Q	7085.36	2/3TE	44
	RayDat SRH-2-30Q	7085.37	2/3TE	44
	RayDat SRH-2-48Q	7085.38	2/3TE	44
	RayDat SRH-2-60Q	7085.39	2/3TE	44
	RayDat SRH-2-110Q	7085.40	2/3TE	82
	RayDat SRH-2-5-L	7085.44	2/3TE	46
	RayDat SRH-2-12-L	7085.46	2/3TE	46
	RayDat SRH-2-24-L	7085.48	2/3TE	46
	RayDat SRH-2-30-L	7085.42	2/3TE	46
	RayDat SRH-2-5-LM	7085.45	2/3TE	46
	RayDat SRH-2-12-LM	7085.47	2/3TE	46
	RayDat SRH-2-24-LM	7085.49	2/3TE	46
	RayDat SRH-2-30-LM	7085.43	2/3TE	46
	RayDat SRH-2-5-LQ	7085.56	2/3TE	46
	RayDat SRH-2-12-LQ	7085.58	2/3TE	46
	RayDat SRH-2-24-LQ	7085.60	2/3TE	46
	RayDat SRH-2-30-LQ	7085.62	2/3TE	46
	**RayDat SRH-2L Accessories**			
	RayDat PSU-14	127 621	2/3TE	48
	RayDat PSU-PB-7P	127 622	2/3TE	48
	RayDat PSU-PB-6P	127 623	2/3TE	48

	Product Name	Order Code	Dimensions DIN 43880	Page
D1 • C1 • C2 • C3 Analogue Systems Modular SPDs for Data & Signal Lines				*-continued*
	RayDat SSH-3-5	7086.01	2/3TE	26
	RayDat SSH-3-12	7086.02	2/3TE	26
	RayDat SSH-3-15	7086.03	2/3TE	26
	RayDat SSH-3-24	7086.04	2/3TE	26
	RayDat SSH-3-30	7086.05	2/3TE	26
	RayDat SSH-3-48	7086.06	2/3TE	26
	RayDat SSH-3-60	7086.07	2/3TE	26
	RayDat SSH-3-5M	7086.09	2/3TE	26
	RayDat SSH-3-12M	7086.10	2/3TE	26
	RayDat SSH-3-15M	7086.11	2/3TE	26
	RayDat SSH-3-24M	7086.12	2/3TE	26
	RayDat SSH-3-30M	7086.13	2/3TE	26
	RayDat SSH-3-48M	7086.14	2/3TE	26
	RayDat SSH-3-60M	7086.15	2/3TE	26
	RayDat SSH-3-5Q	7086.90	2/3TE	26
	RayDat SSH-3-12Q	7086.91	2/3TE	26
	RayDat SSH-3-15Q	7086.92	2/3TE	26
	RayDat SSH-3-24Q	7086.93	2/3TE	26
	RayDat SSH-3-30Q	7086.94	2/3TE	26
	RayDat SSH-3-48Q	7086.95	2/3TE	26
	RayDat SSH-3-60Q	7086.96	2/3TE	26
	RayDat SUI-4-5	7083.21	2/3TE	30
	RayDat SUI-4-12	7083.22	2/3TE	30
	RayDat SUI-4-15	7083.23	2/3TE	30
	RayDat SUI-4-24	7083.24	2/3TE	30
	RayDat SUI-4-30	7083.25	2/3TE	30
	RayDat SUI-4-48	7083.26	2/3TE	30
	RayDat SUI-4-60	7083.27	2/3TE	30
	RayDat SUI-4-110	7083.28	2/3TE	80
	RayDat SUI-4-5M	7083.29	2/3TE	30
	RayDat SUI-4-12M	7083.30	2/3TE	30
	RayDat SUI-4-15M	7083.31	2/3TE	30
	RayDat SUI-4-24M	7083.32	2/3TE	30
	RayDat SUI-4-30M	7083.33	2/3TE	30
	RayDat SUI-4-48M	7083.34	2/3TE	30
	RayDat SUI-4-60M	7083.35	2/3TE	30
	RayDat SUI-4-110M	7083.36	2/3TE	80
D1 • C1 • C2 • C3 Analogue Systems SPDs for Explosive Environments				
	RayDat Ex-2-12V	704 120	1TE	50
	RayDat Ex-2-24V	704 121	1TE	50
	RayDat PLP-24Ex 1/2" NPT	127 594		52
	RayDat PLP-24Ex M20×1.5	127 595		52
	RayDat PLP-24Ex G 1/2"	127 596		52
	RayDat PLP2-24Ex 1/2" NPT	127 600		52
	RayDat PLP2-24Ex M20×1.5	127 601		52
	RayDat PLP2-24Ex G 1/2"	127 602		52
	RayDat PLP2-48 Ex 1/2" NPT	127 597		52
	RayDat PLP2-48 Ex M20×1.5	127 598		52
	RayDat PLP2-48 Ex G 1/2"	127 599		52
	RayDat PLP-24/5 Ex 1/2" NPT	127 603		52
	RayDat PLP-24/5 Ex M20×1.5	127 604		52
	RayDat PLP-24/5 Ex G 1/2"	127 605		52
	RayDat PLP3L-24Ex 1/2" NPT	127 606		52
	RayDat PLP3L-24Ex M20×1.5	127 607		52
	RayDat PLP3L-24Ex G 1/2"	127 608		52

	Product Name	Order Code	Dimensions DIN 43880	Page
C1 • C3 Analogue Systems Modular SPDs for Data & Signal Lines				
	RayDat SLL-4-30	7082.92	2/3TE	28
	RayDat SLL-4-30M	7082.93	2/3TE	28
	RayDat SLL-4-30Q	7085.27	2/3TE	28
D1 • C1 • C2 • C3 Digital Systems Modular & Compact SPDs for Bus System Data & Signal Lines				
	RayDat SBH-3-5	7082.86	2/3TE	60
	RayDat SBH-3-12	7082.88	2/3TE	60
	RayDat SBH-3-30	7082.90	2/3TE	60
	RayDat SBH-3-5M	7082.87	2/3TE	60
	RayDat SBH-3-12M	7082.89	2/3TE	60
	RayDat SBH-3-30M	7082.91	2/3TE	60
	RayDat SBH-3-5Q	7085.21	2/3TE	60
	RayDat SBH-3-12Q	7085.22	2/3TE	60
	RayDat SBH-3-30Q	7085.23	2/3TE	60
	RayDat SGH-3-5	7086.61	2/3TE	62
	RayDat SGH-3-12	7086.62	2/3TE	62
	RayDat SGH-3-15	7086.63	2/3TE	62
	RayDat SGH-3-24	7086.64	2/3TE	62
	RayDat SGH-3-30	7086.65	2/3TE	62
	RayDat SGH-3-48	7086.66	2/3TE	62
	RayDat SGH-3-60	7086.67	2/3TE	62
	RayDat SGH-3-110	7086.68	2/3TE	84
	RayDat SGH-3-5M	7086.69	2/3TE	62
	RayDat SGH-3-12M	7086.70	2/3TE	62
	RayDat SGH-3-15M	7086.71	2/3TE	62
	RayDat SGH-3-24M	7086.72	2/3TE	62
	RayDat SGH-3-30M	7086.73	2/3TE	62
	RayDat SGH-3-48M	7086.74	2/3TE	62
	RayDat SGH-3-60M	7086.75	2/3TE	62
	RayDat SGH-3-110M	7086.76	2/3TE	84
	RayDat RS 485	703 812	2TE	64
D1 • C1 • C2 • C3 Digital Systems SPDs for Bus System Data & Signal Lines				
	RayDat KNX	127 649		66
D1 • C1 • C2 • C3 Digital Systems SPDs for Local Area Network Data & Signal Lines				
	RayDat NET 6 POE	706 312		56

D1 • C1 • C2 • C3 Telecommunication Systems Modular & Compact SPDs for Data & Signal Lines

	Product Name	Order Code	Dimensions DIN 43880	Page
	RayDat SGH-3-110	7086.68	2/3TE	84
	RayDat SGH-3-110M	7086.76	2/3TE	84
	RayDat SLH-2-110	7086.39	2/3TE	76
	RayDat SLH-2-110M	7086.46	2/3TE	76
	RayDat SLH-2-110Q	7085.12	2/3TE	76
	RayDat SLH-4-110	7086.53	2/3TE	78
	RayDat SLH-4-110M	7086.60	2/3TE	78
	RayDat SLH-4-110Q	7085.20	2/3TE	78
	RayDat SPH-2-230	7081.06	2/3TE	74
	RayDat SPH-2-230M	7081.08	2/3TE	74
	RayDat SPH-2-230Q	7085.26	2/3TE	74
	RayDat SRH-2-110	7086.24	2/3TE	82
	RayDat SRH-2-110M	7086.32	2/3TE	82
	RayDat SRH-2-110Q	7085.40	2/3TE	82
	RayDat SUI-4-110	7083.28	2/3TE	80
	RayDat SUI-4-110M	7083.36	2/3TE	80
	RayTel 10	124 150		70
	RayTel 20	124 152		72

C1 • C2 • C3 Coaxial & RF Systems SPDs for Data & Signal Lines

	Product Name	Order Code	Dimensions DIN 43880	Page
	RayCox BNC 5	7050.22		88
	RayCox BNC 12	7050.13		88
	RayCox IEC 48	125 093		90
	RayCox F48	125 094		90
	RayDat CP BNC-FF-70	800 850		92
	RayDat CP BNC-FF-180	800 851		92
	RayDat CP BNC-FF-280	800 852		92
	RayDat CP BNC-MF-70	800 853		92
	RayDat CP BNC-MF-180	800 854		92
	RayDat CP BNC-MF-280	800 855		92
	RayDat CP 7/16-MF-70	800 856		94
	RayDat CP 7/16-MF-180	800 857		94
	RayDat CP 7/16-MF-280	800 858		94
	RayDat CP N-FF-70	800 859		96
	RayDat CP N-FF-180	800 860		96
	RayDat CP N-FF-280	800 861		96
	RayDat CP N-MF-70	800 862		96
	RayDat CP N-MF-180	800 863		96
	RayDat CP N-MF-280	800 864		96
	RayDat CP N-6G-FF-180	800 865		98
	RayDat CP N-6G-MF-180	800 866		98
	RayDat CP TNC-6G-FF-180	800 867		100
	RayDat CP TNC-6G-MF-180	800 868		100
	RayDat CP UHF-FF-70	800 869		102
	RayDat CP UHF-FF-180	800 870		102
	RayDat CP UHF-FF-280	800 871		102
	RayDat CP UHF-MF-70	800 872		102
	RayDat CP UHF-MF-180	800 873		102
	RayDat CP UHF-MF-280	800 874		102
	RayDat CP F75-FF-70	800 875		104
	RayDat CP F75-FF-180	800 876		104
	RayDat CP F75-MF-70	800 877		104
	RayDat CP F75-MF-180	800 878		104
	RayDat CP TV75-FF-70	800 879		106
	RayDat CP TV75-FF-180	800 880		106
	RayDat CP TV75-MF-70	800 881		106
	RayDat CP TV75-MF-180	800 882		106
	RayDat CP-SMA	800 887		108

	Product Name	Order Code	Dimensions DIN 43880	Page
D1 • C1 • C2 • C3 Modular SPDS for Power & Signal Lines				
	RayDat SUH-2-30PS	7086.81	2/3TE	112
	RayDat SUH-2-30PSM	7086.82	2/3TE	112
Class III • D1 • C1 • C2 • C3 Modular & Compact SPDs for DC Power Systems				
	ProTec DMDR 20/24V	510 783	1TE	120
	ProTec DMDR 20/48V	510 833	1TE	120
	ProTec DMDR 20/60V	510 834	1TE	120
	ProTec DMDR 20/120V	510 835	1TE	120
	Module ProTec DMDR 20/24V	510 784	1TE	120
	Module ProTec DMDR 20/48V	510 836	1TE	120
	Module ProTec DMDR 20/60V	510 837	1TE	120
	Module ProTec DMDR 20/120V	510 838	1TE	120
	RayDat PSC-2-12	7086.83	2/3TE	118
	RayDat PSC-2-24	7086.84	2/3TE	118
	RayDat PSC-2-48	7086.85	2/3TE	118
	RayDat PSC-2-12M	7086.86	2/3TE	118
	RayDat PSC-2-24M	7086.87	2/3TE	118
	RayDat PSC-2-48M	7086.88	2/3TE	118
	RayDat SPLH-2-7A	127 626	2TE	116

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