

## 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.

**DATA SHEET**

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:  $I_n$ : 10kA,  $I_{imp}$ : 1kA  
 Voltages: 48V DC  
 Max. Operating Voltage: 50V  
 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)	$U_n$	48V
Maximum Continuous Operating Voltage (DC)	(Line-Line) $U_c$	50V
	(Pair-Pair)	72V
Rated Load Current at 25°C	$I_L$	1 A
Nominal Discharge Current (8/20 $\mu$ s)	(Line-Line) $I_n$	150 A
C2 Total Discharge Current (8/20 $\mu$ s)	(Lines-Ground) $I_n$	10 kA
D1 Impulse Current (10/350 $\mu$ s)	$I_{imp}$	1 kA
Voltage Protection Level at $I_n$	(Line-Line) $U_p$	150V
	(Line-Ground)	550V
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	35mm DIN Rail

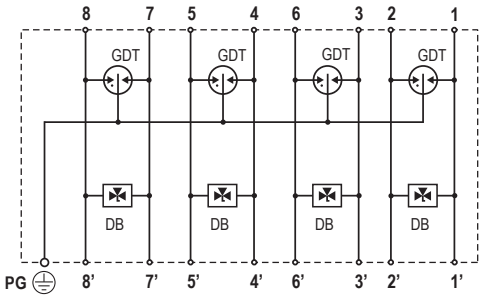
**Order Information**

Order Code	<b>48</b>
NET 6 POE	706 312

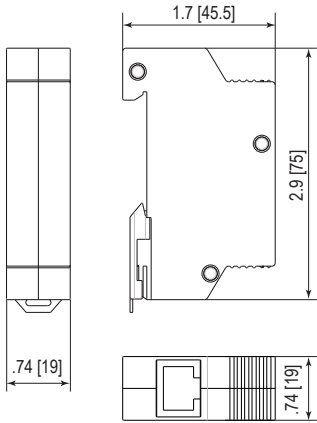
RayDat NET 6 POE

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 x .91 x 4.3" [78 x 23 x 108 mm]
Minimum Package Quantity	12 pieces

inches  
[mm]

Information contained in this document is subject to change at any time without notice.



## Surge Protective Devices (SPDs) for Bus Systems



### Bus Systems

#### 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

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

\*UL Listed



#### 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.

# Modular SPD for Industrial Fieldbus Systems

## RayDat SBH-3 Series

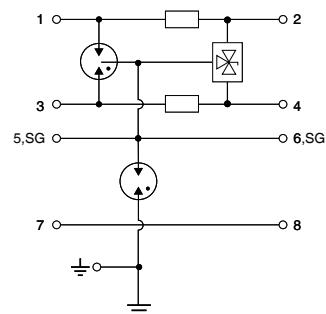
D1 • C1 • C2 • C3

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 <sub>n</sub>	5V	12V	30V
Maximum Continuous Operating Voltage (DC)	U <sub>c</sub>	6V	15V	33V
Rated Load Current at 25°C	I <sub>L</sub>		1 A	
C2 Nominal Discharge Current (8/20 μs)	I <sub>n</sub>		10 kA	
Maximum Discharge Current (8/20 μs)	I <sub>max</sub>		20 kA	
D1 Impulse Current (10/350 μs)	I <sub>imp</sub>		2.5 kA	
Residual Voltage at 5 kA (8/20 μs)	(Line-Line) U <sub>res</sub>	< 22V	< 42V	< 80V
Rated Spark Overvoltage	(SG-Ground)		184-276V	
	(Line-Line)	7-10V	16-19V	35-43V
Response Time Overvoltage Protection	(Line-Line) t <sub>A</sub>		< 1 ns	
	(Line-Ground)		< 100 ns	
Insulation Resistance of the Protection	(Line-Ground) R <sub>iso</sub>		> 1 GΩ/100V	
	(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 <sub>G</sub>		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

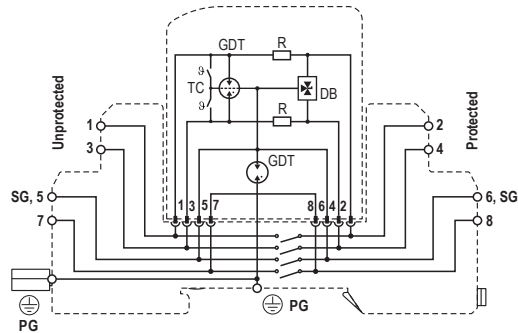
Order Code	5	12	30
SBH-3-xx	7082.86	7082.88	7082.90
SBH-3-xxQ (Quick Connect Terminals)	7085.21	7085.22	7085.23
SBH-3-xxM (module)	7082.87	7082.89	7082.91

## RayDat SBH-3 Series

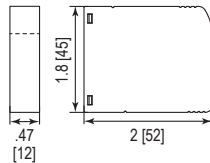
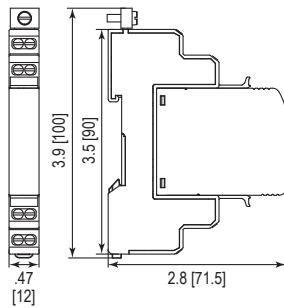
### Internal Configuration

#### Legend

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



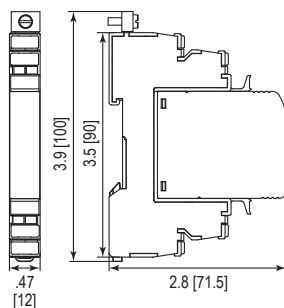
### Dimensions & Packaging



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

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

### Quick Connect Terminals



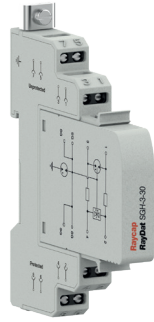
SBH-3-xxQ Series	5	12	30
<b>Dimensions</b>			
Weight per Unit	2.18 oz [62 g]		
Dimensions DIN 43880	2/3 TE		
Packaging Dimensions (Single Unit)	3.4 x .59 x 4" [87 x 15 x 102 mm]		
Minimum Package Quantity	15 pieces		

inches  
[mm]

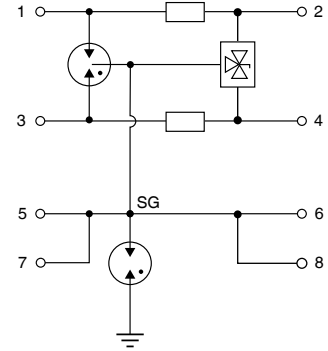
## SPD with Separated Signal Ground (RS 232)

### 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

#### Electrical

		5	12	15	24	30	48	60
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 $\mu$ s)	$I_n$	10 kA						
Maximum Discharge Current (8/20 $\mu$ s)	$I_{max}$	20 kA						
D1 Impulse Current (10/350 $\mu$ s)	$I_{imp}$	2.5 kA						
Residual Voltage at 5 kA (8/20 $\mu$ s)	(Line-Line) $U_{res}$	<22V	<42V	<48V	<70V	<80V	<140V	<160V
Rated Spark Overvoltage	(SG-Ground)	184-276V						
	(Line-Line), (Line-SG)	7-10V	16-19V	20-24V	30-36V	35-43V	55-68V	67-85V
Response Time Overvoltage Protection	(Line-Line) $t_A$	< 1 ns						
	(Line-Ground)	< 100 ns						
Insulation Resistance of the Protection	(Line-Line) $R_{iso}$	$\geq 6 K\Omega$	$\geq 15 M\Omega$	$\geq 18 M\Omega$	$\geq 28 M\Omega$	$\geq 33 M\Omega$	$\geq 52 M\Omega$	$\geq 64 M\Omega$
	(Line-Ground)	> 1 G $\Omega$ /100V						
Serial Resistance per Path	$R$	1.6-2.0 $\Omega$						
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 mm <sup>2</sup> , 2.5 mm <sup>2</sup> Q Version]
Terminal Screw Torque	4.5 lbf-in [0.5 Nm]
Degree of Protection IEC/EN 60529	IP20 (built-in)
Housing Material	Thermoplastic; Grey; Extinguishing Degree V-0
Mounting IEC/EN 60715	35 mm DIN Rail

#### Order Information

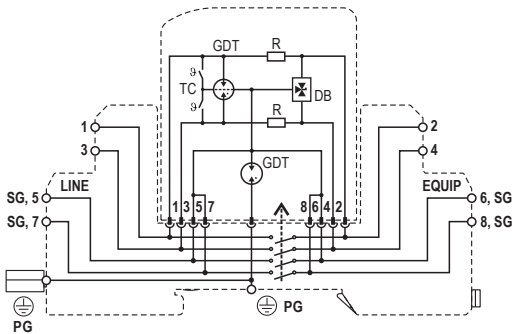
Order Code	5	12	15	24	30	48	60
SGH-3-xxx	7086.61	7086.62	7086.63	7086.64	7086.65	7086.66	7086.67
SGH-3-xxxM (module)	7086.69	7086.70	7086.71	7086.72	7086.73	7086.74	7086.75

RayDat SGH-3 Series

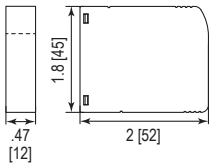
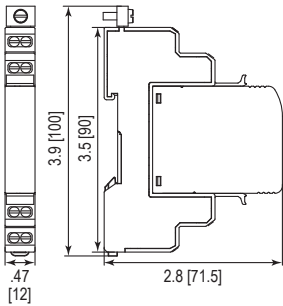
Internal Configuration

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 [60g]						
Dimensions DIN 43880	2/3 TE						
Packaging Dimensions (Single Unit)	3.4 x .59 x 4" [87 x 15 x 102mm]						
Minimum Package Quantity	15 pieces						

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

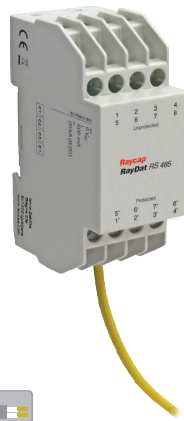
inches  
[mm]



# 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 VDC  
 Max. Operating Voltage: 6 VDC  
 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	$I_L$	500mA
C2 Nominal Discharge Current (8/20µs) (Line-Line)	$I_n$	20kA
D1 Impulse Current (10/350µs)	$I_{imp}$	2.5kA
Residual Voltage at 5kA (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	$R_{iso}$	6kΩ
Serial Resistance per Path	$R$	1.7 – 1.9Ω
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 mm <sup>2</sup> ]
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	35mm DIN Rail

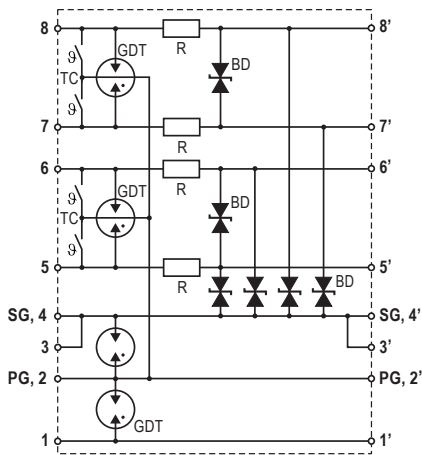
##### Order Information

Order Code	
RS 485	703 812

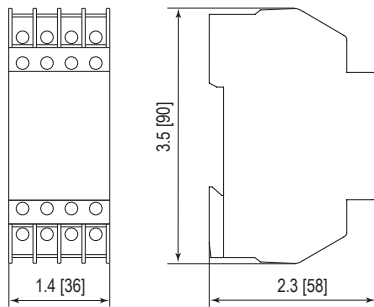
Internal Configuration

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

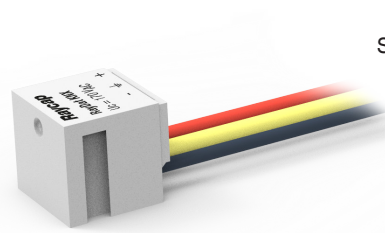
Weight per Unit	4.02 oz [114 g]
Dimensions DIN 43880	2TE
Packaging Dimensions (Single Unit)	1.5 × 2.9 × 4.2" [39 × 74 × 106 mm]
Minimum Package Quantity	6 pieces

inches  
[mm]

## SPD with Terminal Connection for Bus Systems

### RayDat KNX

D1 • C1 • C2 • C3



IEC/EN Category: D1/C1/C2/C3

Voltages: 24 V AC

Max. Operating Voltage: 170 V DC

Surge Discharge Ratings:  $I_n$ : 5 kA,  $I_{max}$ : 10 kA,  $I_{imp}$ : 1 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 (AC)	$U_n$	24 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)	$I_{max}$	10 kA
D1 Impulse Current (10/350 μs)	$I_{imp}$	1 kA
Residual Voltage at 5 kA (8/20 μs)	$U_{res}$	(Line-Ground) < 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	20 AWG [0.5 mm <sup>2</sup> ]
Ground Conductor Cross Section	18 AWG [0.75 mm <sup>2</sup> ]
Connecting Conductor Length	7.9" [200 mm]
Degree of Protection IEC/EN 60529	IP 20 (built-in)
Housing Material	Thermoplastic; Grey; Extinguishing Degree V-0

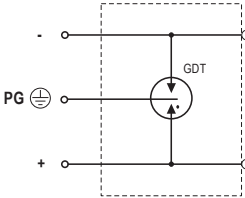
#### Order Information

Order Code	
RayDat KNX	127 649

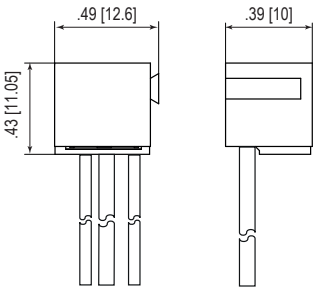
RayDat KNX

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 x .91 x .43" [78 x 23 x 108 mm]
Minimum Package Quantity	12 pieces

inches  
[mm]