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

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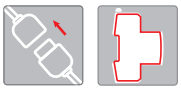
DATA SHEET SPD for Telecommunication Side

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

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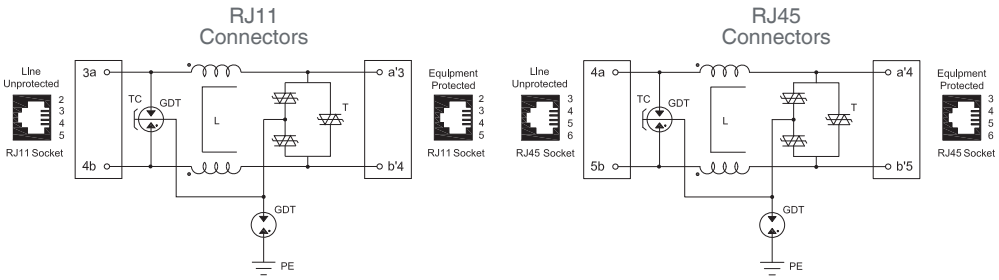
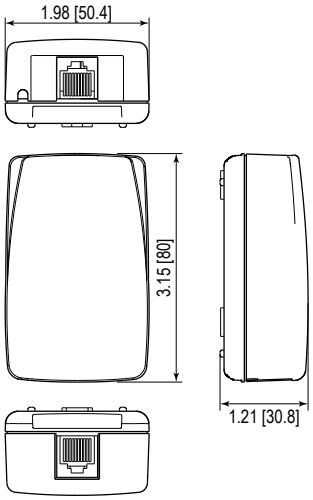
Internal Configuration



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]

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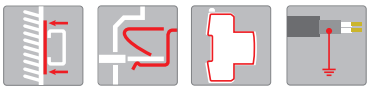
DATA SHEET SPD for DSL Networks

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

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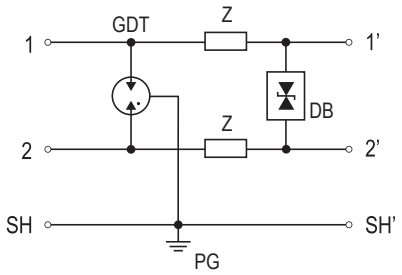
RayTel 20

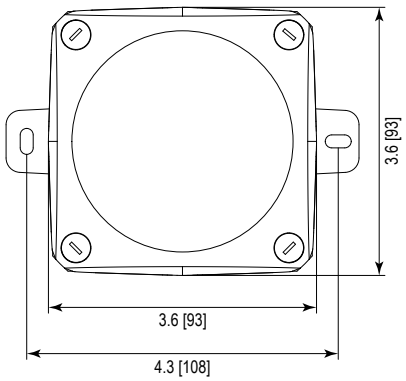
Internal Configuration

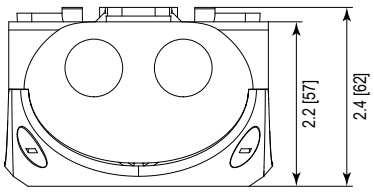


Legend

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]

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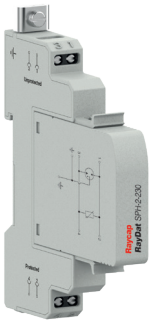
DATA SHEET

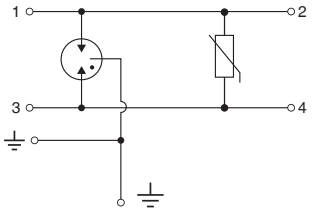
Modular SPD for Single Pair

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

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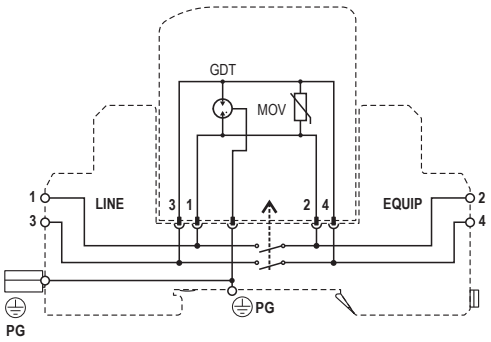
RayDat SPH-2-230

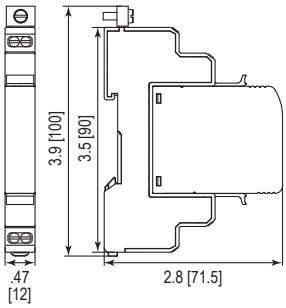
Internal Configuration



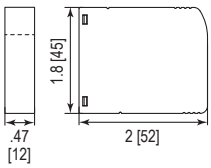
Legend

GDT Gas Discharge Tube
MOV Metal Oxide Varistor
PG Protective Grounding

Dimensions & Packaging

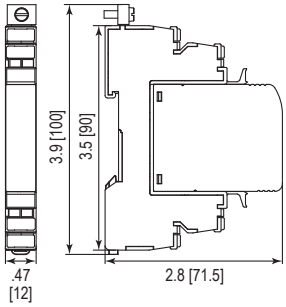


SPH-2-xxx	230
Dimensions	
Weight per Unit	2.11 oz [60 g]
Dimensions DIN 43880	2/3 TE
Packaging Dimensions (Single Unit)	3.4 × .59 × 4" [87 × 15 × 102 mm]
Minimum Package Quantity	15 pieces



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]

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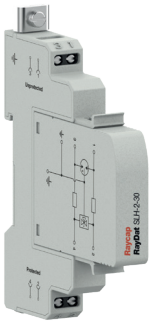
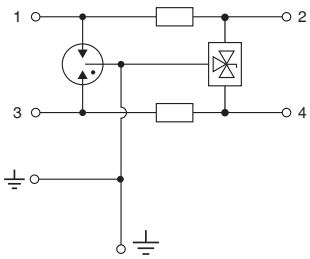
DATA SHEET Modular SPD for Single Pair

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

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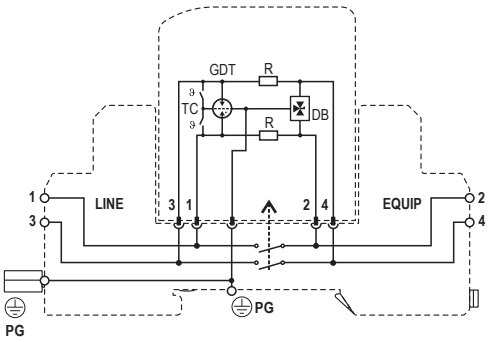
RayDat SLH-2-110

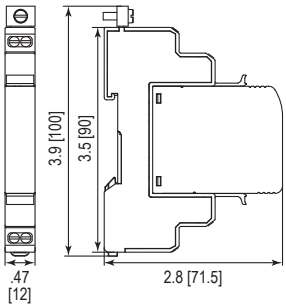
Internal Configuration

Legend

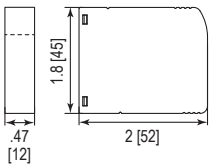
DB Diode Block
GDT Gas Discharge Tube
PG Protective Grounding
R Resistor
TC Thermo-clip



Dimensions & Packaging

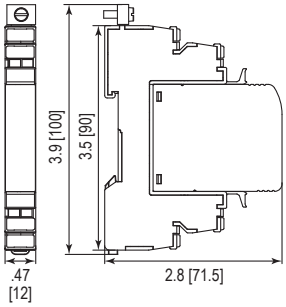


SLH-2-xxx	110
Dimensions	
Weight per Unit	1.83 oz [52 g]
Dimensions DIN 43880	2/3 TE
Packaging Dimensions (Single Unit)	3.4 × .59 × 4" [87 × 15 × 102 mm]
Minimum Package Quantity	15 pieces



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]

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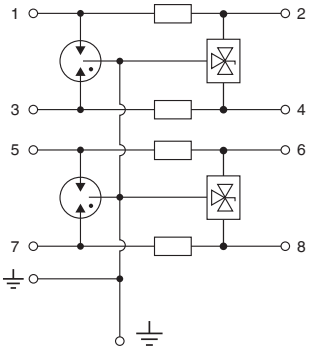
DATA SHEET

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

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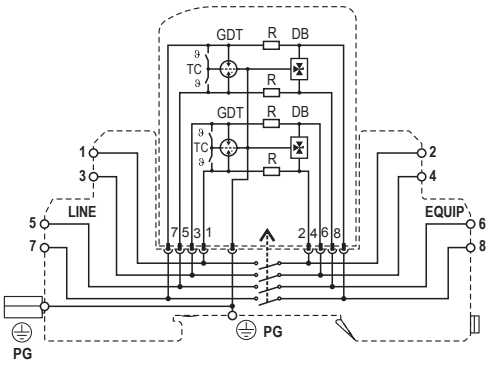
RayDat SLH-4-110

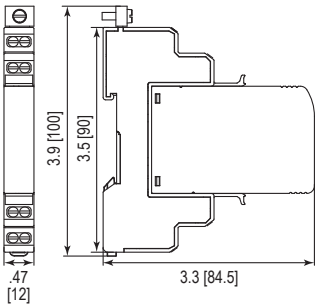
Internal Configuration



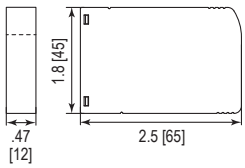
Legend

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

Dimensions & Packaging

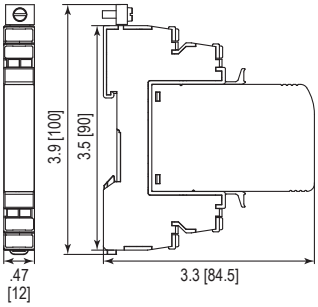


SLH-4-xxx	110
Dimensions	
Weight per Unit	2.32 oz [66 g]
Dimensions DIN 43880	2/3 TE
Packaging Dimensions (Single Unit)	3.4 × .59 × 4" [87 × 15 × 102 mm]
Minimum Package Quantity	15 pieces



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]

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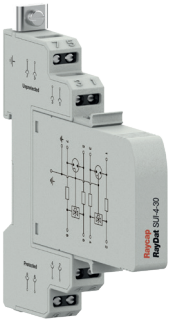
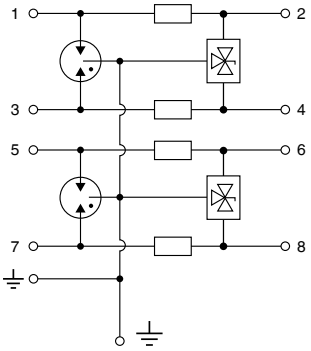
DATA SHEET SPD for Two Pair Exposed Lines

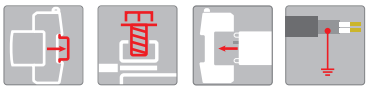
RayDat SUI-4-110

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

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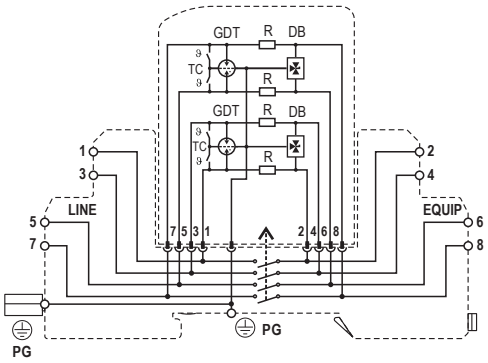
RayDat SUI-4-110

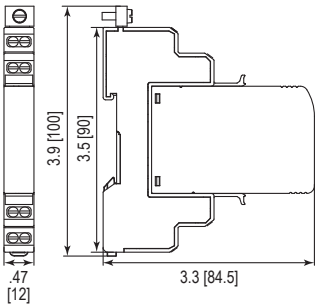
Internal Configuration



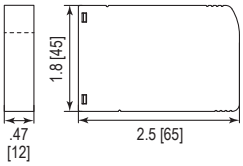
Legend

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]

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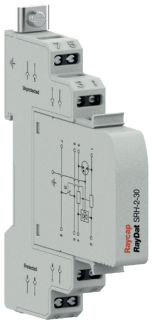
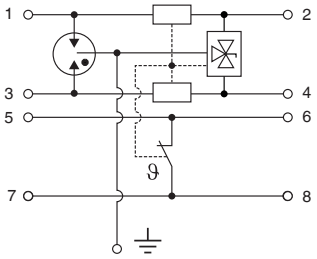
DATA SHEET SPD with Remote Contacts

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

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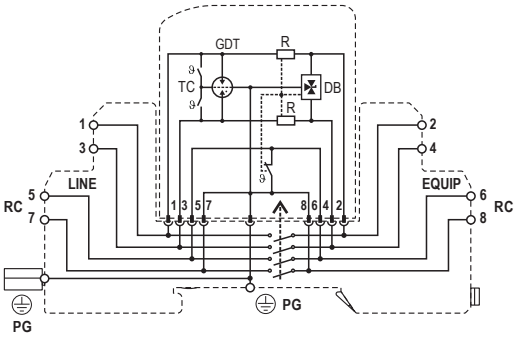
RayDat SRH-2-110

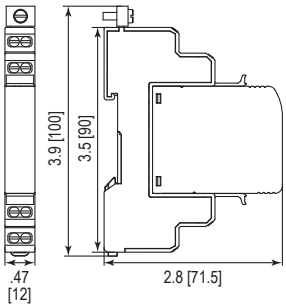
Internal Configuration

Legend

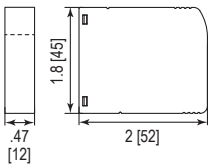
DB	*Diode Block*
GDT	*Gas Discharge Tube*
PG	*Protective Grounding*
R	*Resistor*
RC	*Remote Control (NC)*
TC	*Thermo-clip*



Dimensions & Packaging

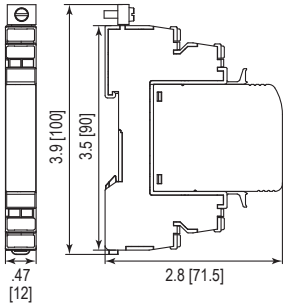


SRH-2-xxx	110
Dimensions	
Weight per Unit	2.04 oz [58 g]
Dimensions DIN 43880	2/3 TE
Packaging Dimensions (Single Unit)	3.4 × .59 × 4" [87 × 15 × 102 mm]
Minimum Package Quantity	15 pieces



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]

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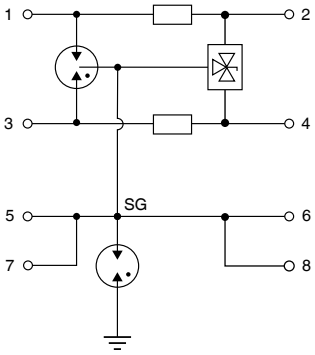
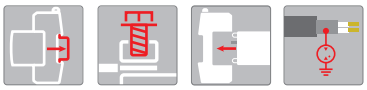
DATA SHEET SPD with Separated Signal Ground (RS 232)

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

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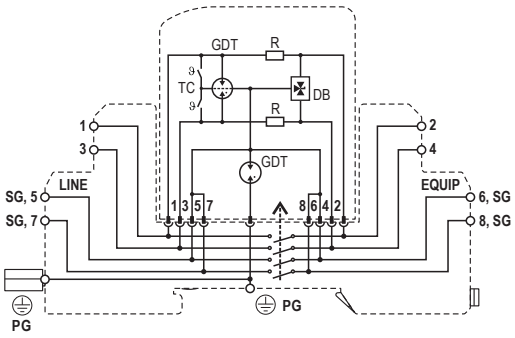
RayDat SGH-3-110

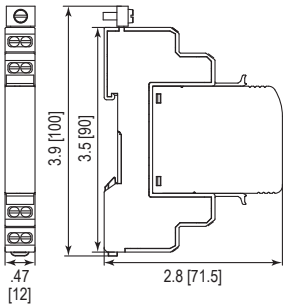
Internal Configuration

Legend

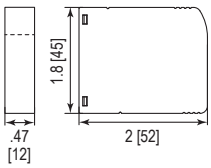
DB	*Diode Block*
GDT	*Gas Discharge Tube*
R	*Resistor*
PG	*Protective Grounding*
SG	*Signal Grounding*
TC	*Thermo-clip*



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]

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