

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



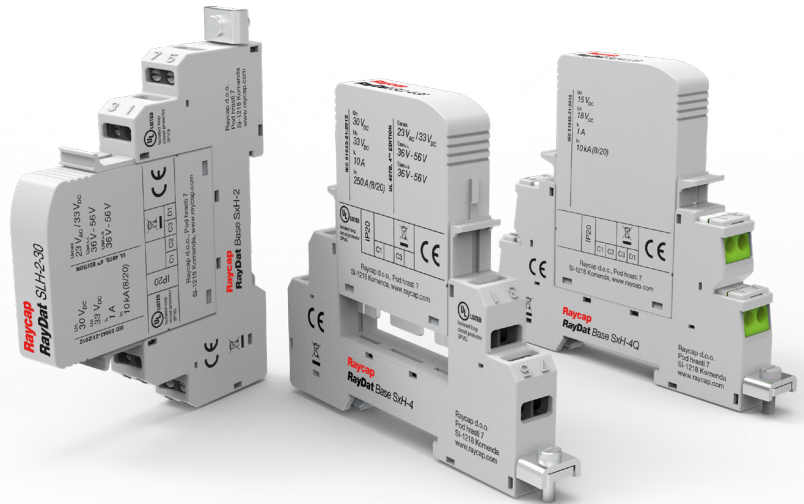
**RayDat SL Series**

**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

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

\*UL Listed



**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.



# DATA SHEET

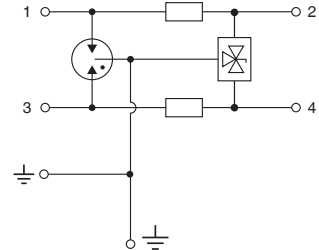
## Modular SPD for Single Pair RayDat SLH-2 Series D1 • C1 • C2 • C3

\*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
<b>Electrical</b>								
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						
<b>Mechanical</b>								
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		35mm DIN Rail						
<b>Order Information</b>								
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

# DATA SHEET

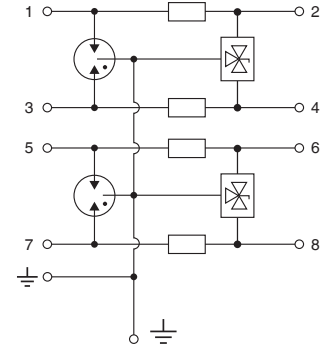
## Modular SPD for Two Pair RayDat SLH-4 Series D1 • C1 • C2 • C3

\*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

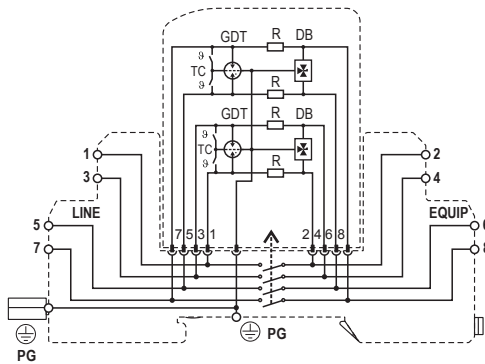
SLH-4 Series		5	12*	15	24*	30*	48	60
<b>Electrical</b>								
Lines Protected		2 (4 Conductors)						
Nominal Operating Voltage (DC)	$U_n$	5V	12V	15V	24V	30V	48V	60V
Maximum Continuous Operating Voltage (DC)	$U_c$	6V	15V	18V	28V	33V	52V	64V
Rated Load Current at 25°C	$I_L$	1 A						
C2 Nominal Discharge Current (8/20µs)	$I_n$	10 kA						
Maximum Discharge Current (8/20µs)	$I_{max}$	20 kA						
D1 Impulse Current (10/350µs)	$I_{imp}$	5 kA						
Residual Voltage at 5kA (8/20µs)	$U_{res}$	<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	1.6-2.0Ω						
Transverse Capacitance	C	50 pF						
Cut-off Frequency	$f_G$	30 MHz						
<b>Mechanical</b>								
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		35mm DIN Rail						
<b>Order Information</b>								
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

# RayDat SLH-4 Series

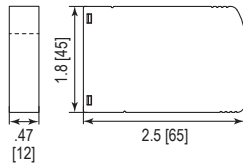
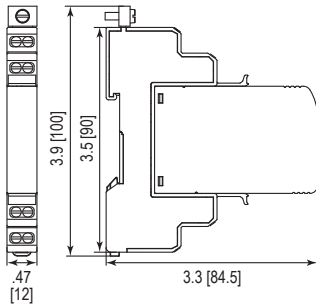
## Internal Configuration

### Legend

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



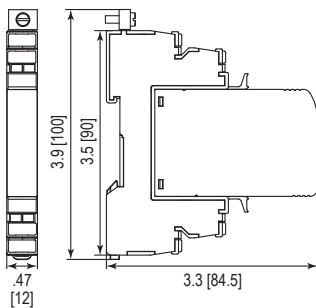
## Dimensions & Packaging



SLH-4 Series	5	12	15	24	30	48	60
<b>Dimensions</b>							
Weight per Unit	2.32 oz [66 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						

SLH-4-xxxM Series	5	12	15	24	30	48	60
<b>Dimensions</b>							
Weight per Unit	1.05 oz [30 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



SLH-4-xxxQ Series	5	12	15	24	30	48	60
<b>Dimensions</b>							
Weight per Unit	2.32 oz [66 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]

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



# DATA SHEET

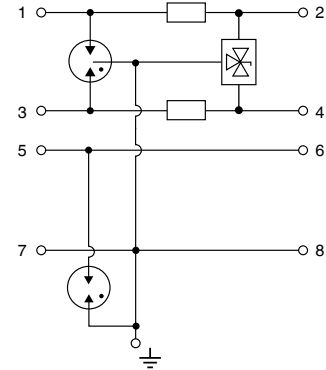
## SPD for Shielded Cable RayDat SSH-3 Series D1 • C1 • C2 • C3

\*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

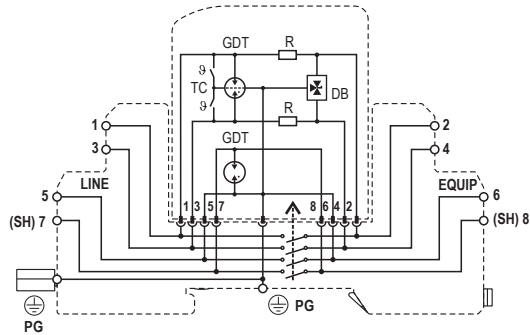
SSH-3 Series		5*	12*	15	24	30*	48	60
<b>Electrical</b>								
Lines Protected		1 (2 Conductors)						
Nominal Operating Voltage (DC)	$U_n$	5V	12V	15V	24V	30V	48V	60V
Maximum Continuous Operating Voltage (DC)	$U_c$	6V	15V	18V	28V	33V	52V	64V
Rated Load Current at 25°C	$I_L$	1 A						
C2 Nominal Discharge 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)	$t_A$	<100ns						
	(Line-Line), (Line-Ground)	<1 ns						
Insulation Resistance of the Protection (Shield-Ground)	$R_{iso}$	> 1 GΩ/100V						
	(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						
<b>Mechanical</b>								
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		IP 20 (built-in)						
Housing Material		Thermoplastic; Grey; Extinguishing Degree V-0						
Mounting IEC/EN 60715		35mm DIN Rail						
<b>Order Information</b>								
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

# RayDat SSH-3 Series

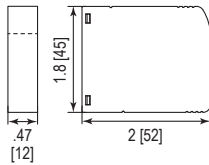
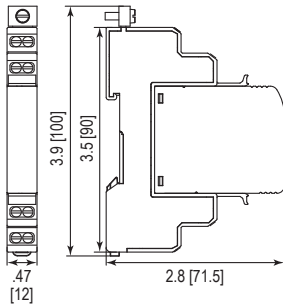
## Internal Configuration

### Legend

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



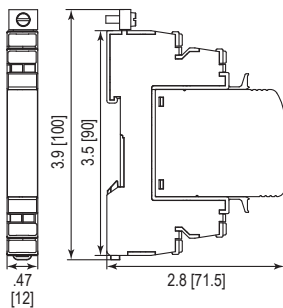
## Dimensions & Packaging



SSH-3 Series	5	12	15	24	30	48	60
<b>Dimensions</b>							
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						

SSH-3-xxxM Series	5	12	15	24	30	48	60
<b>Dimensions</b>							
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						

## Quick Connect Terminals



SSH-3-xxxQ Series	5	12	15	24	30	48	60
<b>Dimensions</b>							
Weight per Unit	2.18 oz [62g]						
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						

inches  
[mm]

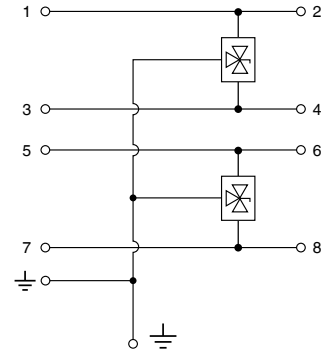
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IEC/EN Category: C1/C3  
 Surge Discharge Ratings:  $I_n$ : 250 A  
 Voltages: 30V DC  
 Frequency Range: 30 MHz  
 Housing: Modular Design  
 Compliance: IEC/EN 61643-21  
 UL 497B 4th Edition

Configuration:



**Technical Data**

**SLL-4 Series**

**30**

**Electrical**

Lines Protected		2 (4 Conductors)
Nominal Operating Voltage (DC)	$U_n$	30V
Maximum Continuous Operating Voltage (DC)	$U_c$	33V
Rated Load Current at 25°C	$I_L$	10 A
C1 Nominal Discharge Current (8/20µs)	$I_n$	250 A
Residual Voltage at 5kA (8/20µs)	(Line-Line) $U_{res}$	< 80V
Rated Spark Overvoltage	(Line-Line)	36-44V
	(Line-Ground)	36-44V
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 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		IP 20 (built-in)
Housing Material		Thermoplastic; Grey; Extinguishing Degree V-0
Mounting IEC/EN 60715		35mm DIN Rail

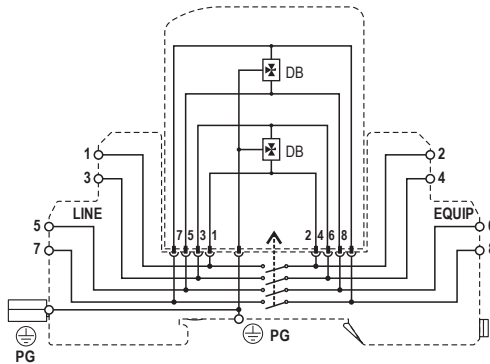
**Order Information**

Order Code		<b>30</b>
SLL-4-xx		7082.92
SLL-4-xxQ (Quick Connect Terminals)		7085.27
SLL-4-xxM (module)		7082.93

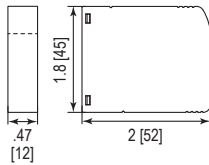
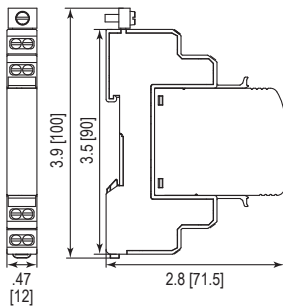
# RayDat SLL-4 Series

## Internal Configuration

**Legend**  
 DB Diode Block  
 PG Protective Grounding



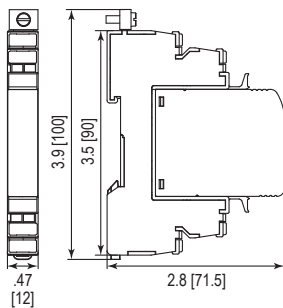
## Dimensions & Packaging



SLL-4 Series	30
<b>Dimensions</b>	
Weight per Unit	1.97 oz [56g]
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

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

## Quick Connect Terminals



SLL-4-xxQ Series	30
<b>Dimensions</b>	
Weight per Unit	2.04 oz [58g]
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]

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# DATA SHEET

## SPD for Two Pair Exposed Lines

### RayDat SUI-4 Series

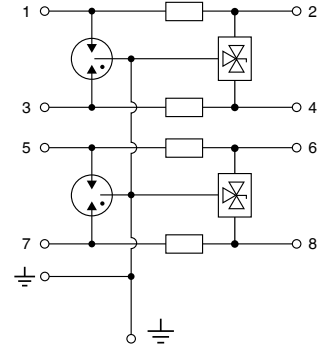
D1 • C1 • C2 • C3

\*UL Listed



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, 60V DC  
 Frequency Range: 30 MHz  
 Housing: Modular Design  
 Compliance: IEC/EN 61643-21  
 UL 497B 4th Edition

Configuration:



### Technical Data

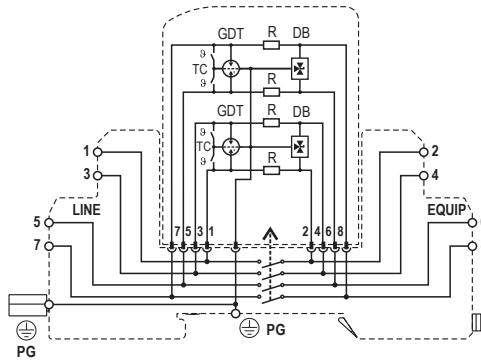
SUI-4 Series		5	12	15	24	30*	48	60
<b>Electrical</b>								
Lines Protected		2 (4 Conductors)						
Nominal Operating Voltage (DC)	$U_n$	5V	12V	15V	24V	30V	48V	60V
Maximum Continuous Operating Voltage (DC)	$U_c$	6V	15V	18V	28V	33V	52V	64V
Rated Load Current at 25°C	$I_L$	1 A						
C2 Nominal Discharge Current (8/20µs)	$I_n$	20 kA						
Maximum Discharge Current (8/20µs)	$I_{max}$	30 kA						
D1 Impulse Current (10/350µs)	$I_{imp}$	5 kA						
Residual Voltage at 5kA (8/20µs)	$U_{res}$	<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	1.6-2.0Ω						
Transverse Capacitance	C	50 pF						
Cut-off Frequency	$f_G$	30 MHz						
<b>Mechanical</b>								
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> ]						
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		35mm DIN Rail						
<b>Order Information</b>								
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

# RayDat SUI-4 Series

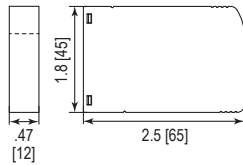
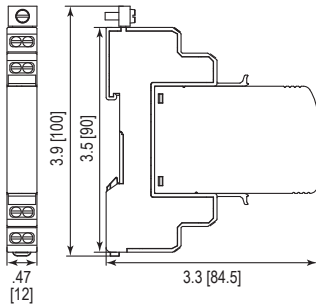
## Internal Configuration

### 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
<b>Dimensions</b>							
Weight per Unit	2.46 oz [70g]						
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						

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

inches  
[mm]

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

