

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



Signal Line Systems

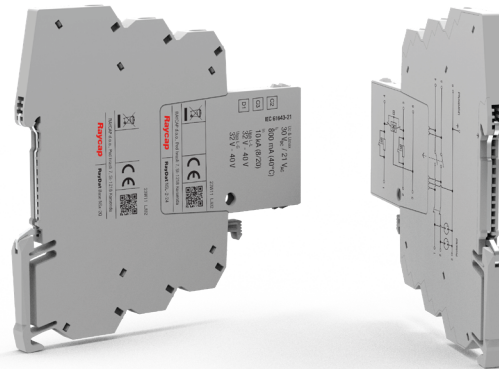
RayDat NSL-2 LF Series
RayDat NSL-2 Series

Special features:

- Narrow form factor - just 6.2 mm wide
- Very high surge ratings
- Different shield-handling options available
- The connection lines remain enabled during module replacement (hot swapping)
- Equipped with quick connect terminals for fast wiring

Application:

- Signals and communication circuits which could be isolated from ground



Raycap offers surge protectors for a variety of analog signal lines. In industrial operations, analog signals are used in control systems for sensing and measurement purposes.

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

Sensors such as temperature sensors, pressure sensors, level sensors, and position sensors generate analog signals that provide continuous and precise information about the physical parameters being measured.

Due to their internal configuration, RayDat analog signal protection products can also protect high-frequency signals.

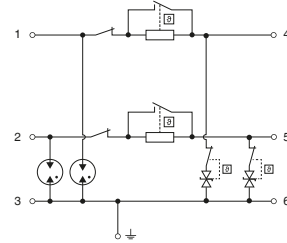
DATA SHEET

Modular SPD for Single Pair RayDat NSL-2 LF Series D1 • C1 • C2 • C3



IEC/EN Category: D1/C1/C2/C3
 Voltages: 5, 12, 24V DC
 Frequency Range: up to 1MHz
 Housing: Modular Design
 Compliance: IEC/EN 61643-21
 UL 497B 4th Edition

Configuration:



Technical Data

RayDat NSL-2-xx LF Series

5

12

24

Electrical

Lines Protected	1 (2 Conductors)			
Nominal Operating Voltage (DC)	U_n	5V	12V	24V
Maximum Continuous Operating Voltage (DC)	U_c	8.5V	15V	30V
Rated Load Current at 40 °C	I_L		800 mA	
Rated Load Current at 70 °C	I_L		600 mA	
C2 Nominal Discharge Current (8/20 μ s)	(Line-Line) I_n		10 kA	
	(Line-Ground)		10 kA	
C2 Total Nominal Discharge Current (8/20 μ s)	I_n		20 kA	
C2 Voltage Protection Level (10kV/5kA)	(Line-Line) U_p	80V	100V	160V
	(Line-Ground)	100V	110V	140V
C3 Voltage Protection Level (1 kV/ μ s)	(Line-Line) U_p	48V	60V	120V
	(Line-Ground)	24V	30V	60V
D1 Impulse Current (10/350 μ s)	(Line-Line) I_{imp}		2.5 kA	
	(Line-Ground)		2.5 kA	
D1 Total Impulse Current (10/350 μ s)	I_{imp}		5 kA	
Rated Spark Overvoltage	(Line-Line)	18V - 46V	32V - 62V	66V - 98V
	(Line-Ground)	9V - 23V	16V - 31V	33V - 49V
Response Time Overvoltage Protection	t_A		< 1 ns	
Thermal Protection			Yes	
Insulation Resistance of the Protection	(Line-Line) R_{iso}	> 340 k Ω	> 7.5 M Ω	> 15 M Ω
Serial Resistance per Path	R		1 Ω	
Capacitance	(Line-Line) C	typ. 5 nF	typ. 3 nF	typ. 1.5 nF
	(Line-Ground)	typ. 10 nF	typ. 6 nF	typ. 3 nF
Maximum Frequency	f_G	250 kHz	500 kHz	1 MHz

Mechanical

Temperature Range	-40 °F to +176 °F [-40 °C to +80 °C]
Conductor Cross Section (max.)	12 AWG / 4 mm ² (solid) 14 AWG / 2.5 mm ² (flexible)
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
Operating State / Fault Indication	Green Flag / Red Flag

Order Information

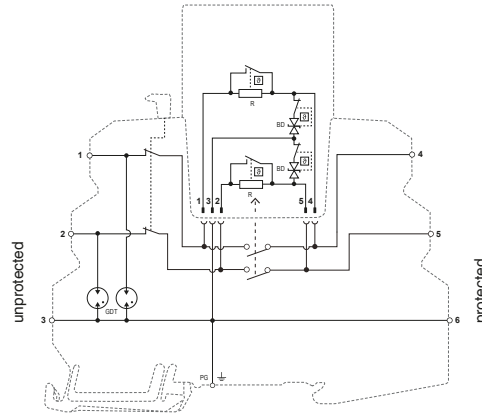
Order Code	5	12	24
NSL-2-xx LF	7088.32	7088.34	7088.36
NSL-2-xxM LF (module)	7088.33	7088.35	7088.37

RayDat NSL-2 LF Series

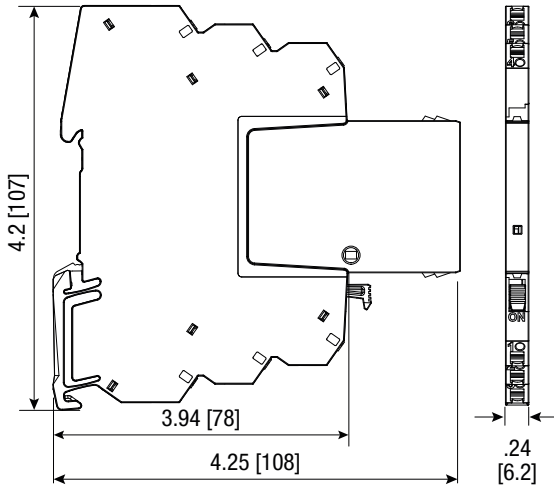
Configuration

Legend

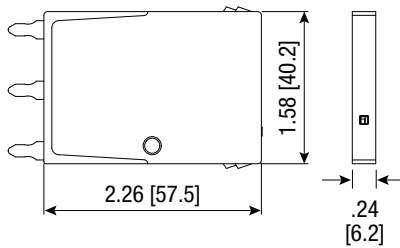
- DB Diode Block
- GDT Gas Discharge Tube
- PG Protective Grounding
- R Resistor



Dimensions & Packaging



NSL-2-xx LF Series	5	12	24
Dimensions			
Weight per Unit	2.12 oz [60g]		
Dimensions DIN 43880	.24" [6.2mm]		
Packaging Dimensions (Single Unit)	4.45×4.37×0.43" [113×111×11 mm]		
Minimum Package Quantity	15 pieces		



NSL-2-xxxM LF Series	5	12	24
Dimensions			
Weight per Unit	0.56 oz [16g]		
Packaging Dimensions (Single Unit)	4.45×4.37×0.43" [113×111×11 mm]		
Minimum Package Quantity	15 pieces		

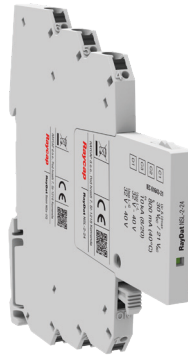


Monitoring Unit
Transmitter
& Receiver
available for all
product variants.

inches
[mm]

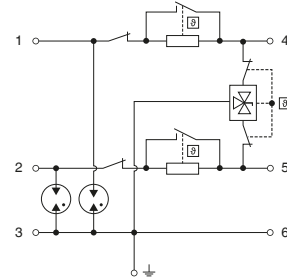


DATA SHEET Modular SPD for Single Pair
RayDat NSL-2 Series
D1•C1•C2•C3



IEC/EN Category: D1/C1/C2/C3
 Voltages: 5, 12, 24, 48V DC
 Frequency Range: 120 MHz
 Housing: Modular Design
 Compliance: IEC/EN 61643-21
 UL 497B 4th Edition

Configuration:



Technical Data

RayDat NSL-2-xx Series **5** **12** **24** **48**

Electrical

Lines Protected		1 (2 Conductors)			
Nominal Operating Voltage (DC)	U_n	5V	12V	24V	48V
Maximum Continuous Operating Voltage (DC)	U_c	8.5V	15V	30V	54V
Rated Load Current at 40 °C	I_L	800 mA			
Rated Load Current at 70 °C	I_L	600 mA			
C2 Nominal Discharge Current (8/20 µs)	(Line-Line) I_n	10 kA			
	(Line-Ground)	10 kA			
C2 Total Nominal Discharge Current (8/20 µs)	I_n	20 kA			
C2 Voltage Protection Level (10kV/5kA)	(Line-Line) U_p	140V	150V	170V	210V
	(Line-Ground)	260V	270V	290V	300V
C3 Voltage Protection Level (1 kV/µs)	(Line-Line) U_p	24V	36V	70V	130V
	(Line-Ground)	24V	36V	70V	130V
D1 Impulse Current (10/350 µs)	(Line-Line) I_{imp}	2.5 kA			
	(Line-Ground)	2.5 kA			
D1 Total Impulse Current (10/350 µs)	I_{imp}	5 kA			
Rated Spark Overvoltage	(Line-Line)	9V-25V	16V-33V	33V-51V	60V-81V
	(Line-Ground)	9V-25V	16V-33V	33V-51V	60V-81V
Response Time Overvoltage Protection	t_A	< 1 ns			
Thermal Protection		Yes			
Insulation Resistance of the Protection	(Line-Line) R_{iso}	> 170 kΩ	> 7.5 MΩ	> 15 MΩ	> 27 MΩ
Serial Resistance per Path	R	1 Ω			
Capacitance	(Line-Line) C	typ. 25 pF			
	(Line-Ground)	typ. 20 pF			
Maximum Frequency	f_G	120 MHz			

Mechanical

Temperature Range	-40 °F to +176 °F [-40 °C to +80 °C]
Conductor Cross Section (max.)	12 AWG / 4 mm ² (solid) 14 AWG / 2.5 mm ² (flexible)
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
Operating State / Fault Indication	Green Flag / Red Flag

Order Information

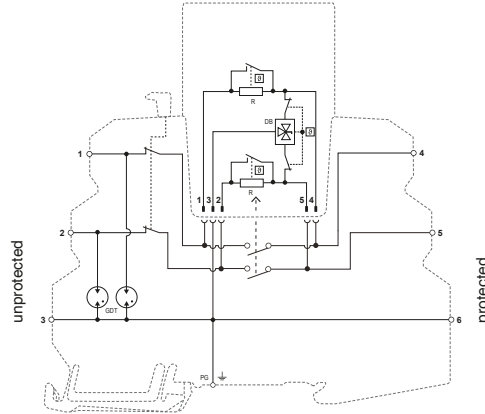
Order Code	5	12	24	48
NSL-2-xx	7088.26	7088.28	7088.01	7088.30
NSL-2-xxM (module)	7088.27	7088.29	7088.02	7088.31

RayDat NSL-2 Series

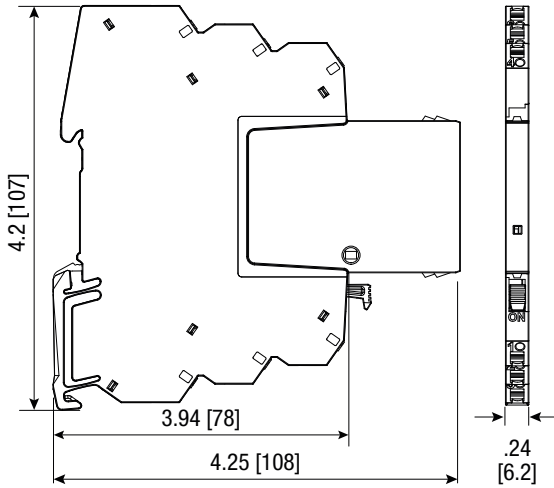
Configuration

Legend

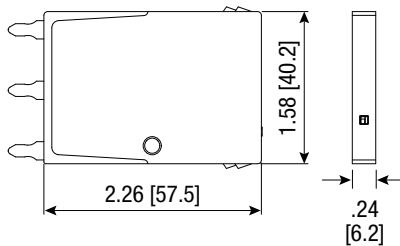
- DB Diode Block
- GDT Gas Discharge Tube
- PG Protective Grounding
- R Resistor



Dimensions & Packaging



NSL-2-xx Series	5	12	24	48
Dimensions				
Weight per Unit	2.12 oz [60g]			
Dimensions DIN 43880	.24" [6.2 mm]			
Packaging Dimensions (Single Unit)	4.45×4.37×0.43" [113×111×11 mm]			
Minimum Package Quantity	15 pieces			



NSL-2-xxxM Series	5	12	24	48
Dimensions				
Weight per Unit	0.56 oz [16g]			
Packaging Dimensions (Single Unit)	4.45×4.37×0.43" [113×111×11 mm]			
Minimum Package Quantity	15 pieces			



Monitoring Unit
Transmitter
& Receiver
available for all
product variants.

inches
[mm]



Modular Surge Protective Devices (SPDs) for Single Pair Systems



Single Pair Systems

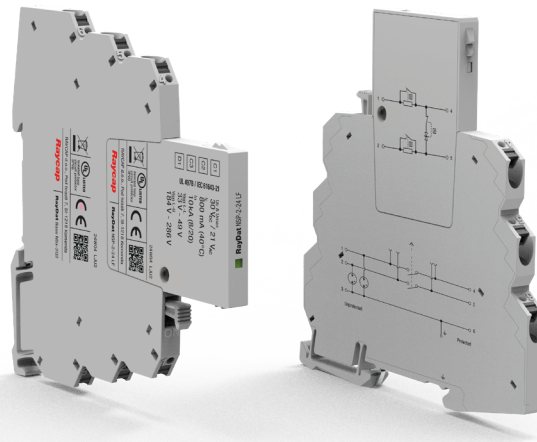
RayDat NSP-2 LF Series
RayDat NSP-2 Series

Special features:

- Narrow form factor - just 6.2 mm wide
- Very high surge ratings
- Different shield-handling options available
- The connection lines remain enabled during module replacement (hot swapping)
- Equipped with quick connect terminals for fast wiring

Application:

- Current loops



Raycap offers surge protectors for a variety of analog signal lines. In industrial operations, analog signals are used in control systems for sensing and measurement purposes.

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 locations close to electric railways. Sensors such as temperature sensors,

pressure sensors, level sensors, and position sensors generate analog signals that provide continuous and precise information about the physical parameters being measured.

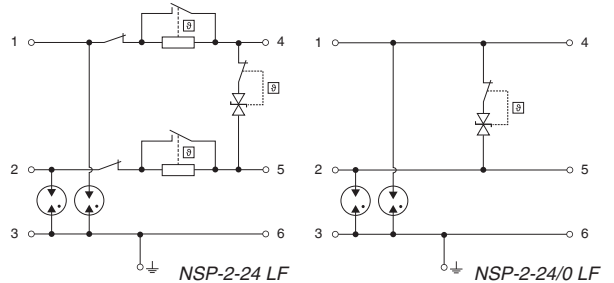
Due to their internal configuration, RayDat analog signal protection products can also protect high-frequency signals.

DATA SHEET

Modular Low Frequency SPD for Single Pair RayDat NSP-2 LF Series D1 • C1 • C2 • C3



IEC/EN Category: D1/C1/C2/C3
 Voltages: 24, 24/0 V DC
 Frequency Range: 1.5 MHz
 Housing: Modular Design
 Compliance: IEC/EN 61643-21, UL 497B 4th Edition
 Configuration:



Technical Data

NSP-2 LF Series

Electrical

		24	24/0
Lines Protected		1 (2 Conductors)	
Nominal Operating Voltage (DC)	U_n	24V	24V
Maximum Continuous Operating Voltage (DC)	U_c	30V	30V
Rated Load Current at 40 °C	I_L	800 mA	12 A
Rated Load Current at 70 °C	I_L	600 mA	10 A
C2 Nominal Discharge Current (8/20 μs)	(Line-Line) I_n	10 kA	250 A
	(Line-Ground)		10 kA
C2 Total Nominal Discharge Current (8/20 μs)	I_n		20 kA
C2 Voltage Protection Level (10kV/5kA)	(Line-Line) U_p	140V	-
	(Line-Ground)	950V	950V
C3 Voltage Protection Level (1 kV/μs)	(Line-Line) U_p	60V	60V
	(Line-Ground)		650V
D1 Impulse Current (10/350 μs)	(Line-Line) I_{imp}		2.5 kA
	(Line-Ground)		2.5 kA
D1 Total Impulse Current (10/350 μs)	I_{imp}		5 kA
Rated Spark Overvoltage	(Line-Line)	33V - 49V	33V - 51V
	(Line-Ground)	184V - 286V	184V - 286V
Response Time Overvoltage Protection	t_A	< 1 ns	
Thermal Protection		Yes	
Insulation Resistance of the Protection	(Line-Line) R_{iso}	> 15 MΩ	
Serial Resistance per Path	R	1 Ω	0.1 Ω
Capacitance	(Line-Line) C	typ. 1 nF	typ. 1 nF
	(Line-Ground)		typ. 15 pF
Maximum Frequency	f_G	1.5 MHz	

Mechanical

Temperature Range	-40 °F to +176 °F [-40 °C to +80 °C]
Conductor Cross Section (max.)	12 AWG / 4 mm ² (solid)
	14 AWG / 2.5 mm ² (flexible)
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
Operating State / Fault Indication	Green Flag / Red Flag

Order Information

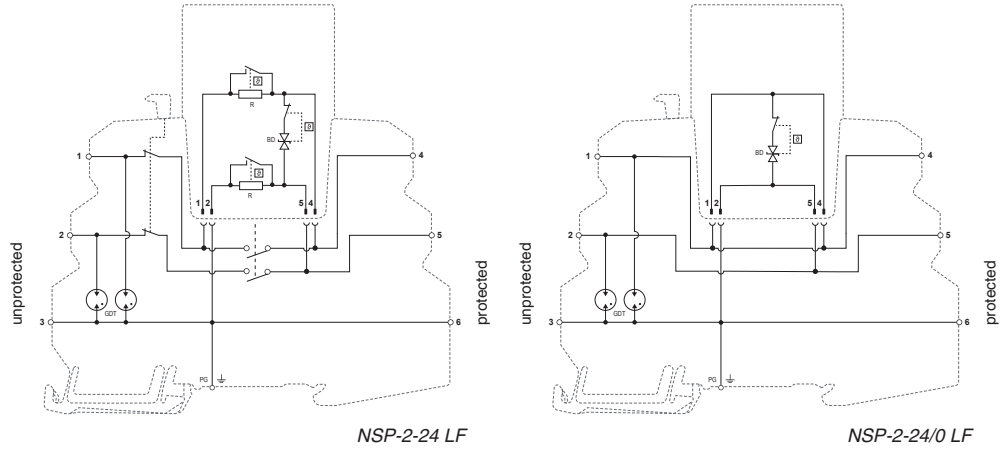
Order Code	24	24/0
NSP-2-xx LF	7088.03	7088.60
NSL-2-xxM LF (module)	7088.04	7088.61

RayDat NSP-2 LF Series

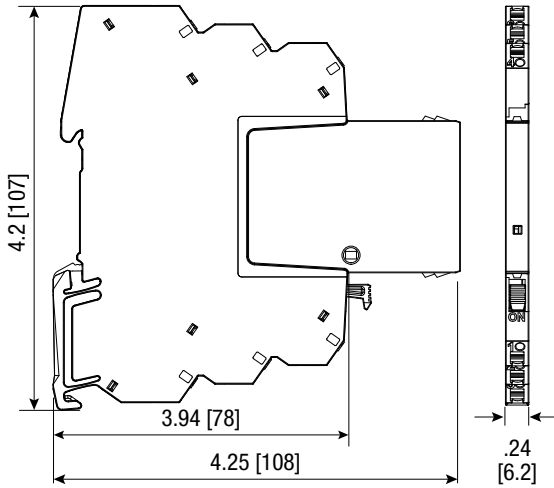
Configuration

Legend

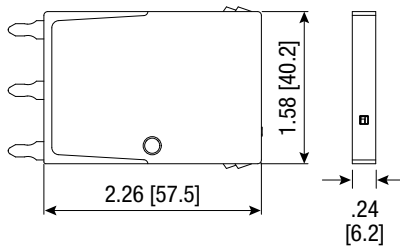
- BD Bi-directional TVS Diode
- GDT Gas Discharge Tube
- PG Protective Grounding
- R Resistor



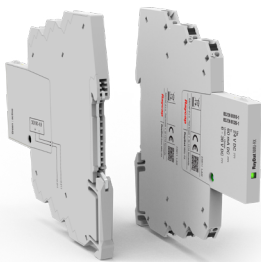
Dimensions & Packaging



NSP-2 LF Series	24	24/0
Dimensions		
Weight per Unit	2.12 oz [60g]	2.05 oz [58g]
Dimensions DIN 43880	.24" [6.2 mm]	
Packaging Dimensions (Single Unit)	4.45×4.37×0.43" [113×111×11 mm]	
Minimum Package Quantity	15 pieces	



NSP-2-xxxM LF Series	24	24/0
Dimensions		
Weight per Unit	0.56 oz [16g]	0.49 oz [14g]
Packaging Dimensions (Single Unit)	4.45×4.37×0.43" [113×111×11 mm]	
Minimum Package Quantity	15 pieces	



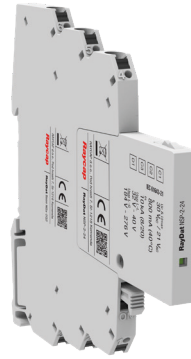
Monitoring Unit
Transmitter
& Receiver
available for all
product variants.

inches
[mm]



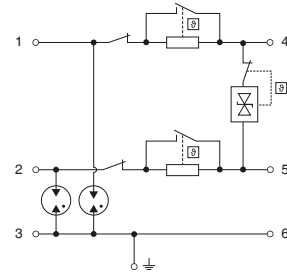
DATA SHEET

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



IEC/EN Category: D1/C1/C2/C3
 Voltages: 24, 110 V DC
 Frequency Range: 120 MHz
 Housing: Modular Design
 Compliance: IEC/EN 61643-21
 UL 497B 4th Edition

Configuration:



Technical Data

NSP-2 Series

24

110*

Electrical

Lines Protected		1 (2 Conductors)	
Nominal Operating Voltage (DC)	U_n	24V	110V
Maximum Continuous Operating Voltage (DC)	U_c	30V	170V
Rated Load Current at 40 °C	I_L		800 mA
Rated Load Current at 70 °C	I_L		600 mA
C2 Nominal Discharge Current (8/20 μ s)	(Line-Line) I_n		10 kA
	(Line-Ground)		10 kA
C2 Total Nominal Discharge Current (8/20 μ s)	I_n		20 kA
C2 Voltage Protection Level (10kV/5kA)	(Line-Line) U_p	180V	400V
	(Line-Ground)	950V	980V
C3 Voltage Protection Level (1 kV/ μ s)	(Line-Line) U_p	70V	300V
	(Line-Ground)		650V
D1 Impulse Current (10/350 μ s)	(Line-Line) I_{imp}		2.5 kA
	(Line-Ground)		2.5 kA
D1 Total Impulse Current (10/350 μ s)	I_{imp}		5 kA
Rated Spark Overvoltage	(Line-Line)	33V - 51V	188V - 255V
	(Line-Ground)	184V - 286V	184V - 276V
Response Time Overvoltage Protection	t_A		< 1 ns
Thermal Protection			Yes
Insulation Resistance of the Protection	(Line-Line) R_{iso}	> 15 M Ω	> 85 M Ω
Serial Resistance per Path	R		1 Ω
Capacitance	(Line-Line) C		typ. 25 pF
	(Line-Ground)		typ. 15 pF
Maximum Frequency	f_G		120 MHz

Mechanical

Temperature Range	-40 °F to +176 °F [-40 °C to +80 °C]
Conductor Cross Section (max.)	12 AWG / 4 mm ² (solid)
	14 AWG / 2.5 mm ² (flexible)
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
Operating State / Fault Indication	Green Flag / Red Flag

Order Information

Order Code	24	110*
NSP-2-xx	7088.05	7088.07
NSP-2-xxM (module)	7088.06	7088.08

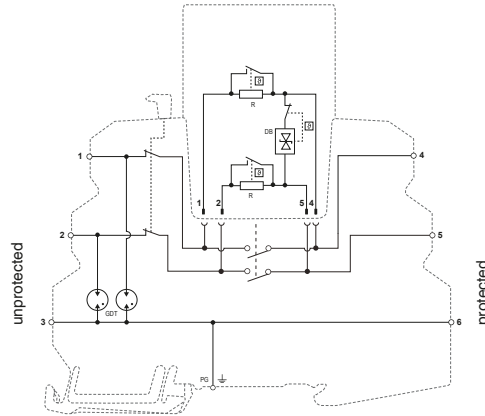
*No UL Certification.

RayDat NSP-2 Series

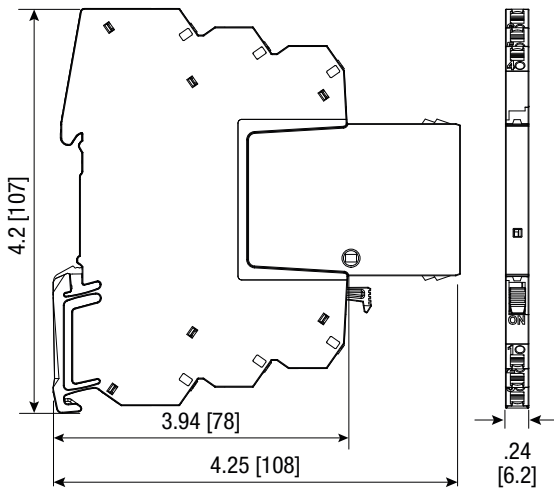
Configuration

Legend

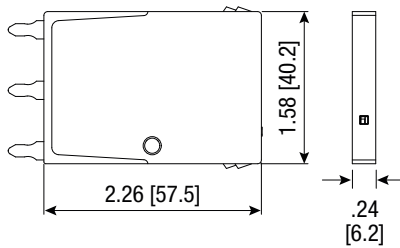
- DB Diode Block
- GDT Gas Discharge Tube
- PG Protective Grounding
- R Resistor



Dimensions & Packaging



NSP-2 Series	24	110*
Dimensions		
Weight per Unit	2.12 oz [60g]	
Dimensions DIN 43880	.24" [6.2mm]	
Packaging Dimensions (Single Unit)	4.45×4.37×0.43" [113×111×11 mm]	
Minimum Package Quantity	15 pieces	



NSP-2-xxxM Series	24	110*
Dimensions		
Weight per Unit	0.56 oz [16g]	
Packaging Dimensions (Single Unit)	4.45×4.37×0.43" [113×111×11 mm]	
Minimum Package Quantity	15 pieces	



Monitoring Unit
Transmitter
& Receiver
available for all
product variants.

inches
[mm]

