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

Signal Line Systems

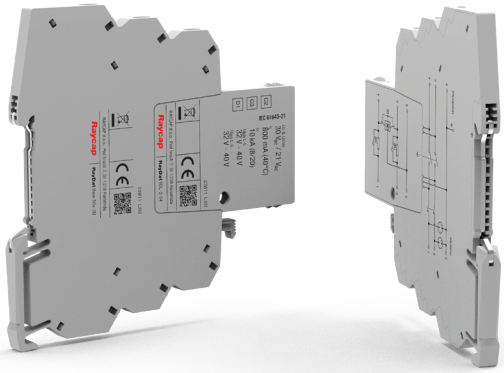
RayDat NSL-2 LF Series
RayDat NSL-2 Series

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.

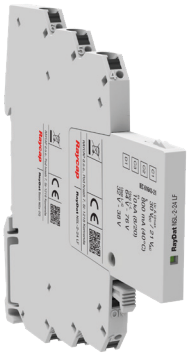
RoHS COMPLIANT CE UL LISTED

DATA SHEET

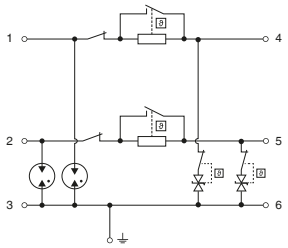
Modular SPD for Single Pair

RayDat NSL-2 LF Series

D1 • C1 • C2 • C3



IEC/EN Category: D1/C1/C2/C3
Voltages: 5, 12, 24 V DC
Frequency Range: up to 1 MHz
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	5 V	12 V	24 V
Maximum Continuous Operating Voltage (DC)		U_c	8.5 V	15 V	30 V
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 (10 kV / 5 kA)	(Line-Line)	U_p	80 V	100 V	160 V
	(Line-Ground)		100 V	110 V	140 V
C3 Voltage Protection Level (1 kV / µs)	(Line-Line)	U_p	48 V	60 V	120 V
	(Line-Ground)		24 V	30 V	60 V
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)		18 V - 46 V	32 V - 62 V	66 V - 98 V
	(Line-Ground)		9 V - 23 V	16 V - 31 V	33 V - 49 V
Response Time Overvoltage Protection		t_A		< 1 ns	
Thermal Protection				Yes	
Insulation Resistance of the Protection	(Line-Line)	R_{iso}	> 340 kΩ	> 7.5 MΩ	> 15 MΩ
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 mm² (solid)	
				14 AWG / 2.5 mm² (flexible)	
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	
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

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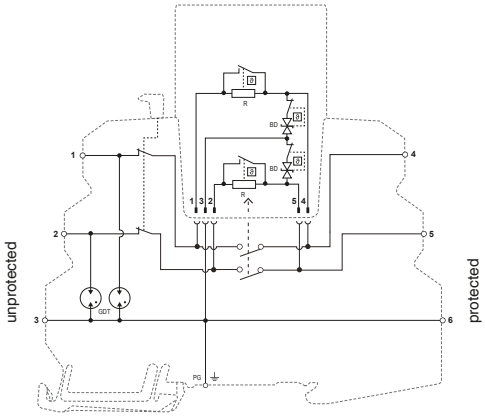
RayDat NSL-2 LF Series

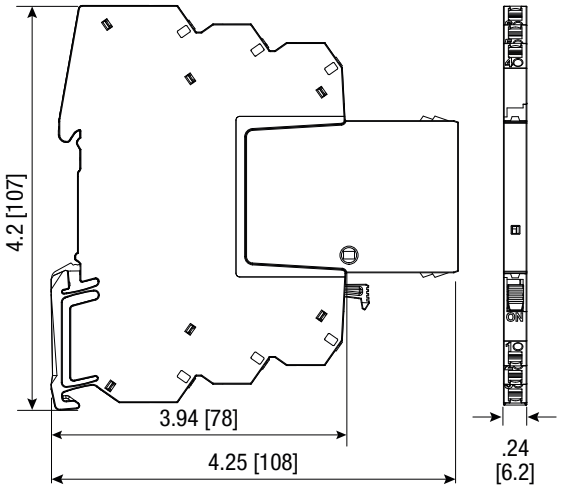
Configuration



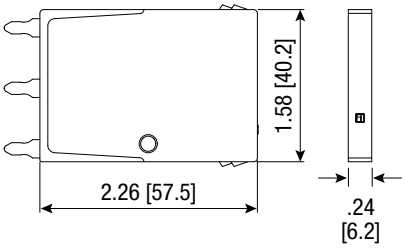
Legend

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

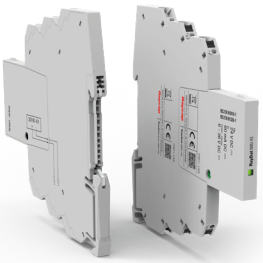
Dimensions & Packaging



NSL-2-xx LF Series	5	12	24
Dimensions			
Weight per Unit		2.12 oz [60 g]	
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 LF Series	5	12	24
Dimensions			
Weight per Unit		0.56 oz [16 g]	
Packaging Dimensions (Single Unit)		4.45 × 4.37 × 0.43" [113 × 111 × 11 mm]	
Minimum Package Quantity		15 pieces	



Monitoring Unit
Transmiter
& Receiver
available for all
product variants.

inches
[mm]

RoHS COMPLIANT

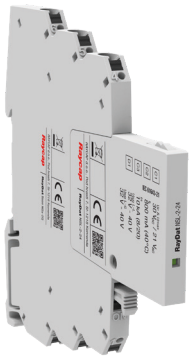
Raycap www.raycap.com

DATA SHEET

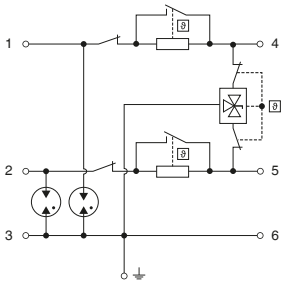
Modular SPD for Single Pair

RayDat NSL-2 Series

D1 • C1 • C2 • C3



IEC/EN Category: D1/C1/C2/C3
Voltages: 5, 12, 24, 48 V 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	5 V	12 V	24 V	48 V
Maximum Continuous Operating Voltage (DC)		U_c	8.5 V	15 V	30 V	54 V
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 (10 kV / 5 kA)	(Line-Line)	U_p	140 V	150 V	170 V	210 V
	(Line-Ground)		260 V	270 V	290 V	300 V
C3 Voltage Protection Level (1 kV / µs)	(Line-Line)	U_p	24 V	36 V	70 V	130 V
	(Line-Ground)		24 V	36 V	70 V	130 V
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)		9 V - 25 V	16 V - 33 V	33 V - 51 V	60 V - 81 V
	(Line-Ground)		9 V - 25 V	16 V - 33 V	33 V - 51 V	60 V - 81 V
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 mm² (solid)		
				14 AWG / 2.5 mm² (flexible)		
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		
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

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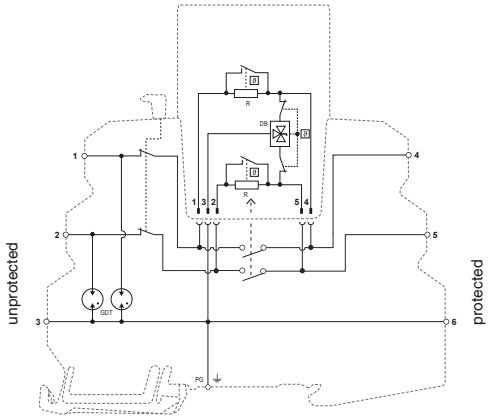
RayDat NSL-2 Series

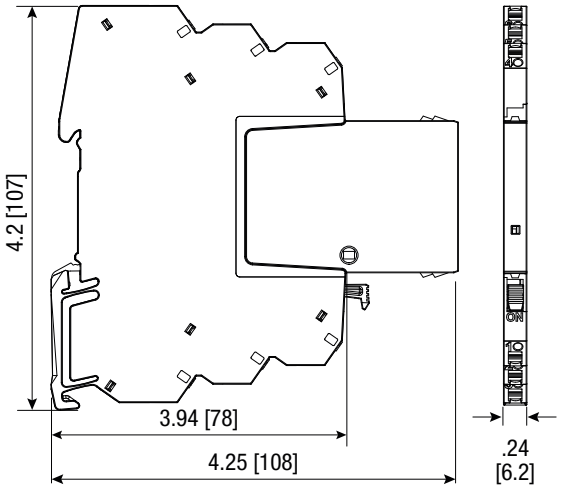
Configuration



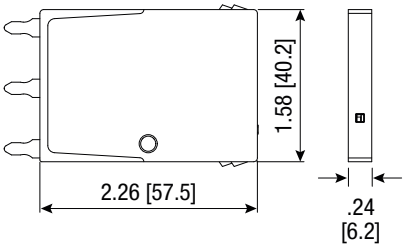
Legend

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

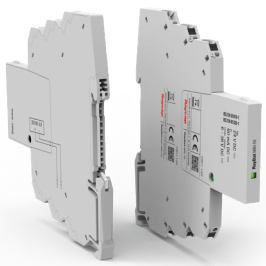
Dimensions & Packaging



NSL-2-xx Series	5	12	24	48
Dimensions				
Weight per Unit	2.12 oz [60 g]			
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 [16 g]			
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]

RoHS COMPLIANT

Modular Surge Protective Devices (SPDs)
for Single Pair Systems

RayDat NSP-2 LF Series
RayDat NSP-2 Series

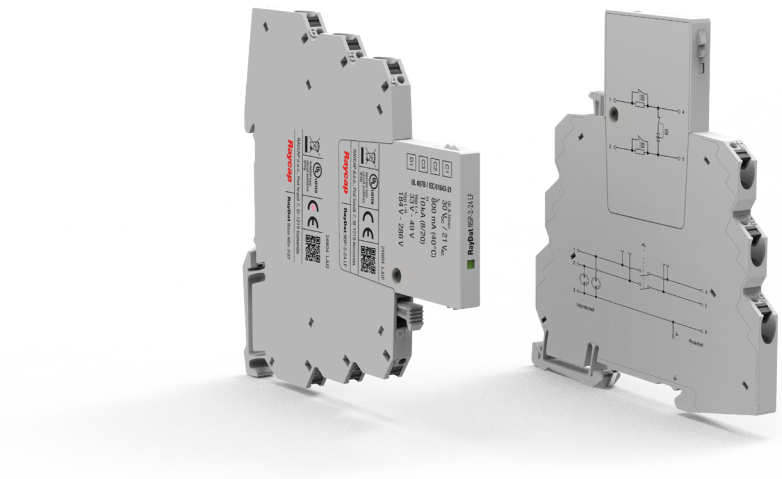
Single Pair Systems

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.

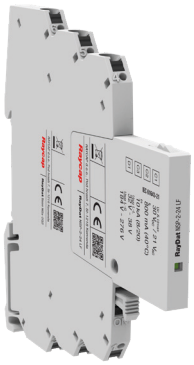
RoHS COMPLIANT CE UL LISTED

DATA SHEET

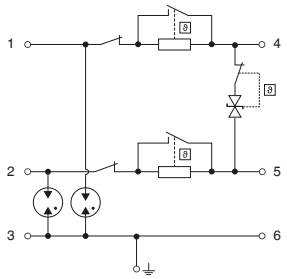
Modular Low Frequency SPD for Single Pair

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			24
Electrical			
Lines Protected			1 (2 Conductors)
Nominal Operating Voltage (DC)		U_n	24 V
Maximum Continuous Operating Voltage (DC)		U_c	30 V
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 (10 kV / 5 kA)	(Line-Line)	U_p	140 V
	(Line-Ground)		950 V
C3 Voltage Protection Level (1 kV / µs)	(Line-Line)	U_p	60 V
	(Line-Ground)		650 V
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)		33 V - 49 V
	(Line-Ground)		184 V - 286 V
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
Capacitance	(Line-Line)	C	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 mm² (solid)
			14 AWG / 2.5 mm² (flexible)
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
Operating State / Fault Indication			Green Flag / Red Flag
Order Information			
Order Code			**24**
NSP-2-xx LF			7088.03
NSL-2-xxM LF (module)			7088.04

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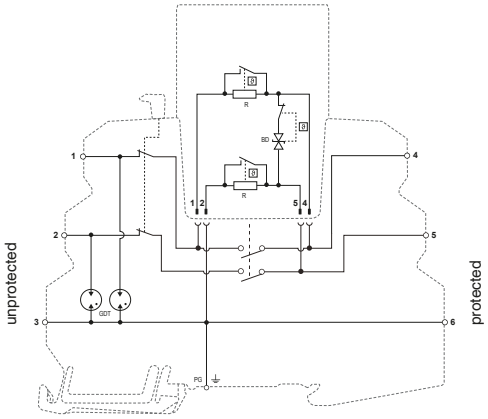
RayDat NSP-2 LF Series

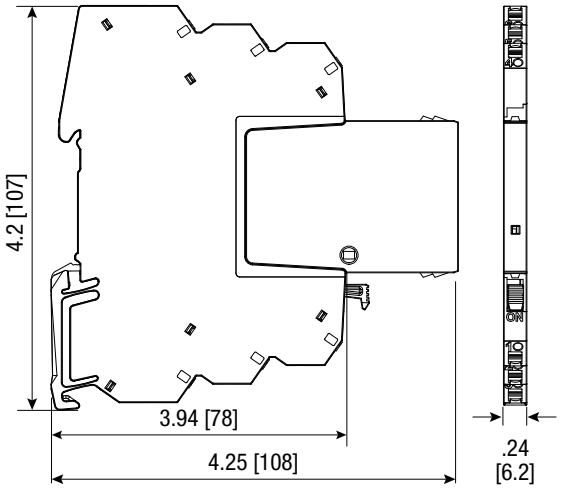
Configuration



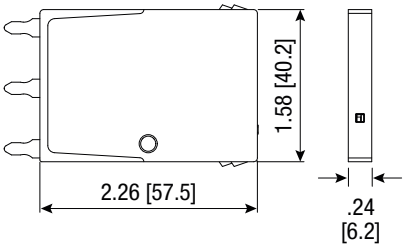
Legend

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

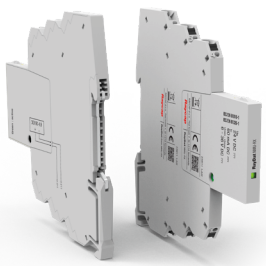
Dimensions & Packaging



NSP-2 LF Series	24
Dimensions	
Weight per Unit	2.12 oz [60 g]
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
Dimensions	
Weight per Unit	0.56 oz [16 g]
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]

RoHS COMPLIANT

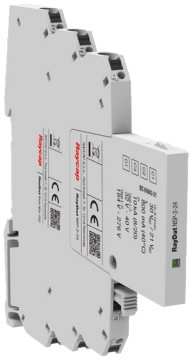
Raycap www.raycap.com

DATA SHEET

Modular SPD for Single Pair

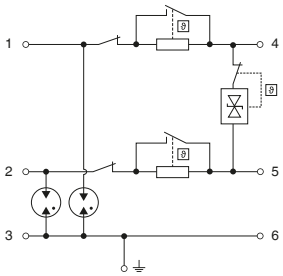
RayDat NSP-2 Series

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

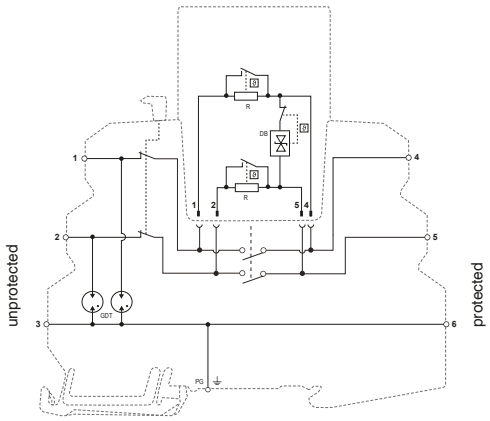
NSP-2 Series			24	110*
Electrical				
Lines Protected			1 (2 Conductors)	
Nominal Operating Voltage (DC)		U_n	24 V	110 V
Maximum Continuous Operating Voltage (DC)		U_c	30 V	170 V
Rated Load Current at 40 °C		I_L	800 mA	
Rated Load Current at 70 °C		I_L	600 mA	
C2 Nominal Discharge Current (8/20 µs)	(Line-Line)	I_n	10 kA	
	(Line-Ground)		10 kA	
C2 Total Nominal Discharge Current (8/20 µs)		I_n	20 kA	
C2 Voltage Protection Level (10 kV / 5 kA)	(Line-Line)	U_p	180 V	400 V
	(Line-Ground)		950 V	980 V
C3 Voltage Protection Level (1 kV / µs)	(Line-Line)	U_p	70 V	300 V
	(Line-Ground)		650 V	
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)		33 V - 51 V	188 V - 255 V
	(Line-Ground)		184 V - 286 V	184 V - 276 V
Response Time Overvoltage Protection		t_A	< 1 ns	
Thermal Protection			Yes	
Insulation Resistance of the Protection	(Line-Line)	R_{iso}	> 15 MΩ	> 85 MΩ
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 mm² (solid)	
			14 AWG / 2.5 mm² (flexible)	
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	
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.*

Raycap

RayDat NSP-2 Series

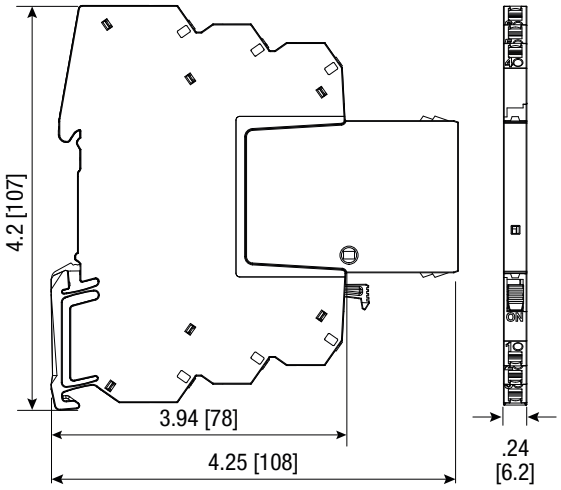
Configuration



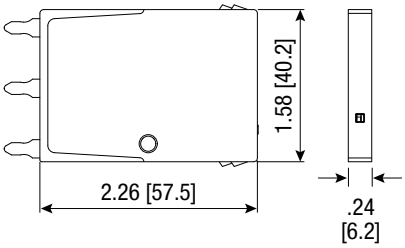
Legend

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

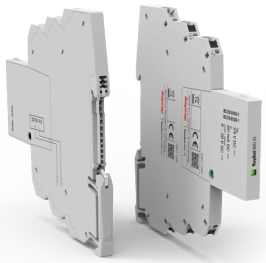
Dimensions & Packaging



NSP-2 Series	24	110*
Dimensions		
Weight per Unit	2.12 oz [60 g]	
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 Series	24	110*
Dimensions		
Weight per Unit	0.56 oz [16 g]	
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]

RoHS COMPLIANT

Raycap www.raycap.com