

Surge Protective Devices (SPDs) for Bus Systems



Bus Systems

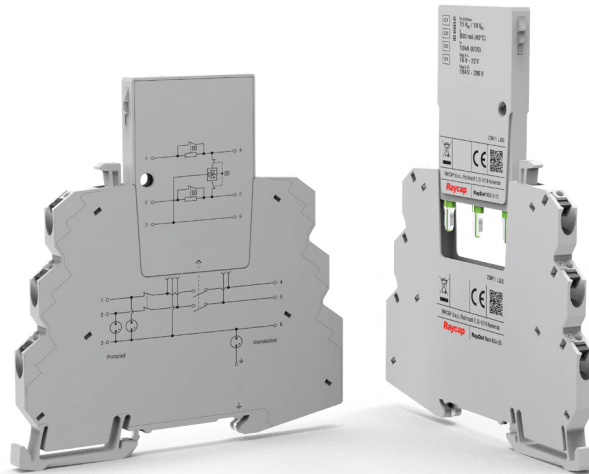
RayDat NSB-3 LF Series
RayDat NSB-3 Series

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:

- Fieldbus systems
(CAN Bus, Profibus DP,
RS 232/V.24 m, RS 485, Sinec L2)



Bus systems play a pivotal role in communicating between connected equipment in modern smart homes, offices, and factories. A wide range of electronic devices use digital signals. As the reliance on digital equipment grows, so does the need to protect these critical systems from electrical overvoltage.

The RayDat NSB-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). The products are intended for those applications where high ground potential rises may frequently occur, such as in locations close to electric railways.

DATA SHEET

Modular SPD for Industrial Fieldbus Systems

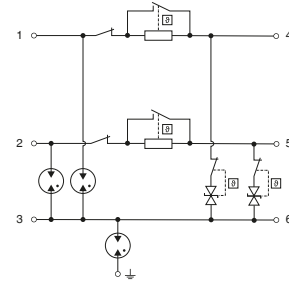
RayDat NSB-3 LF Series

D1 • C1 • C2 • C3



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

Configuration:



Technical Data

NSB-3 LF Series

5

12

24

Electrical

Lines Protected	1 (3 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 μs)	(Line-Line)	I_n	10 kA		
	(Line-Ground)		10 kA		
C2 Total Nominal Discharge Current (8/20 μs)	I_n		10 kA		
C2 Voltage Protection Level (10kV/5kA)	(Line-Line)	U_p	80V	100V	160V
	(Line-Ground)		1100V	1100V	1100V
C3 Voltage Protection Level (1 kV/μs)	(Line-Line)	U_p	48V	60V	120V
	(Line-Ground)		650V	660V	680V
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}		2.5 kA		
Rated Spark Overvoltage	(Line-Line)		18V-46V	32V-62V	66V-98V
	(Line-Ground)		193V-334V	200V-354V	217V-360V
Response Time Overvoltage Protection	t_A		< 1 ns		
Thermal Protection			Yes		
Insulation Resistance of the Protection	(Line-Line)	R_{iso}	> 340 kΩ	> 15 MΩ	> 30 MΩ
Serial Resistance per Path		R	1 Ω		
Capacitance	(Line-Line)	C	typ. 5 nF	typ. 2 nF	typ. 0.8 nF
	(Line-Ground)		typ. 10 pF	typ. 10 pF	typ. 10 pF
Maximum Frequency	f_G		550 kHz	1.2 MHz	2 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

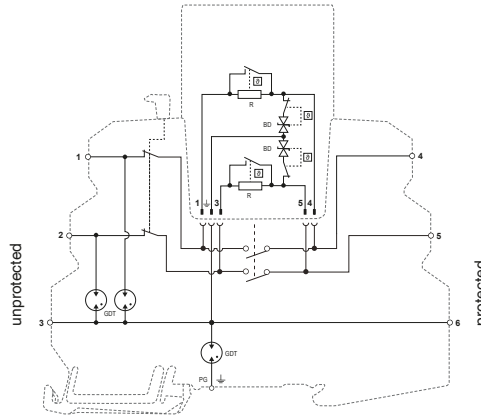
Order Code	5	12	24
NSB-3-xx LF	7088.15	7088.17	7088.19
NSB-3-xxM LF (module)	7088.16	7088.18	7088.20

RayDat NSB-3 LF Series

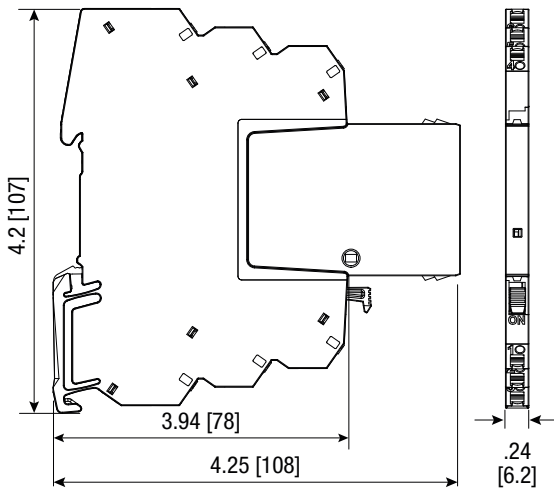
Configuration

Legend

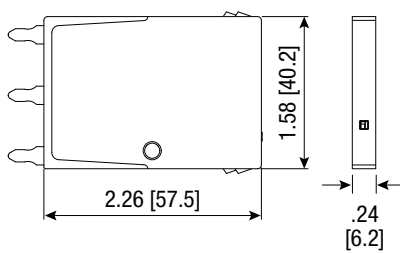
- BD Bi-directional TVS Diode
- GDT Gas Discharge Tube
- PG Protective Grounding
- R Resistor



Dimensions & Packaging



NSB-3 LF Series	5	12	24
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		



NSB-3-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 Industrial Fieldbus Systems

RayDat NSB-3 Series

D1 • C1 • C2 • C3



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

Voltages: 5, 12, 24, 48 V DC

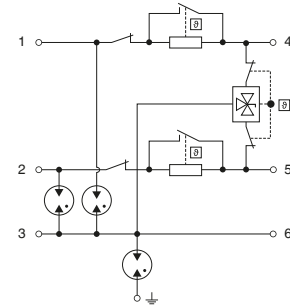
Frequency Range: 120 MHz

Housing: Modular Design

Compliance: IEC/EN 61643-21

UL 497B 4th Edition

Configuration:



Technical Data

NSB-3 Series

5 12 24 48

Electrical

Lines Protected	1 (3 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	10 kA			
C2 Voltage Protection Level (10 kV/5 kA)	(Line-Line)	U_p 140V	150V	170V	210V
	(Line-Ground)	1100V	1100V	1100V	1150V
C3 Voltage Protection Level (1 kV/μs)	(Line-Line)	U_p 24V	36V	70V	130V
	(Line-Ground)	650V	660V	680V	740V
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}	2.5 kA			
Rated Spark Overvoltage	(Line-Line)	9V-25V	16V-33V	33V-51V	60V-81V
	(Line-Ground)	193V-311V	200V-319V	217V-337V	244V-367V
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. 10 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

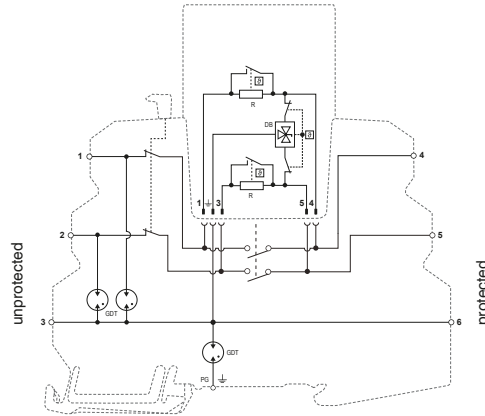
Order Code	5	12	24	48
NSB-3-xx	7088.09	7088.11	7088.13	7088.54
NSB-3-xxM (module)	7088.10	7088.12	7088.14	7088.55

RayDat NSB-3 Series

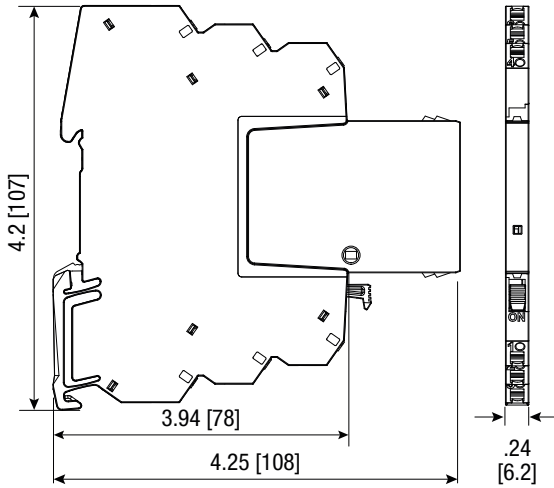
Configuration

Legend

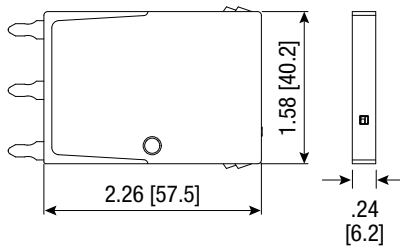
- DB Diode Block
- GDT Gas Discharge Tube
- PG Protective Grounding
- R Resistor



Dimensions & Packaging



NSB-3 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			



NSB-3-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
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