SM712

Asymmetrical TVS Diode

Description

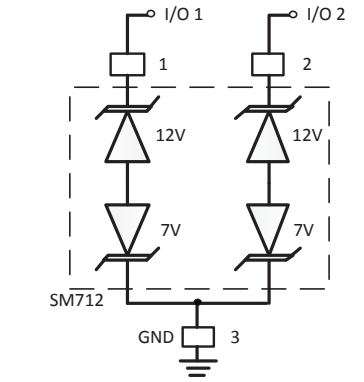
The SM712 is designed for asymmetrical (12V to –7V) protection in multi-point data transmission application, The SM712 replace four discrete components by integrating two 12V and two 7V TVS diodes in a single package. The SM712 complies with the IEC 61000-4-2 (ESD) with ±30kV air and ±30kV contact discharge. It is assembled into a lead-free SOT-23 package. It is designed to protect components which are connected to data and transmission lines from voltage surges.

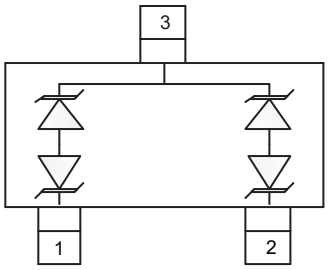


SOT-23

Features

- Ultra low leakage: nA level
- Operating voltage: 7V or 12V
- Low clamping voltage
- Complies with following standards:
  - – IEC 61000-4-2 (ESD) immunity test
    - Air discharge: ±30kV
    - Contact discharge: ±30kV
  - – IEC61000-4-5 (Lightning) 17A or 12A (8/20μs)
- RoHS Compliant





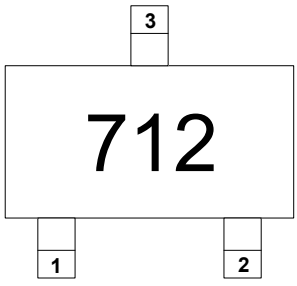
Circuit diagram

Mechanical Characteristics

- Package: SOT-23
- Lead Finish: Matte Tin
- Case Material: “Green” Molding Compound.
- Terminal Connections: See Diagram Below
- Marking Information: See Below

Applications

- Wireless System
- Networks
- Portable Instrumentation
- RS485 Ports



712= Device code

Marking (Top View)

Ordering Information

Part Number	Packaging	Reel Size
SM712	3000/Tape & Reel	7 inch

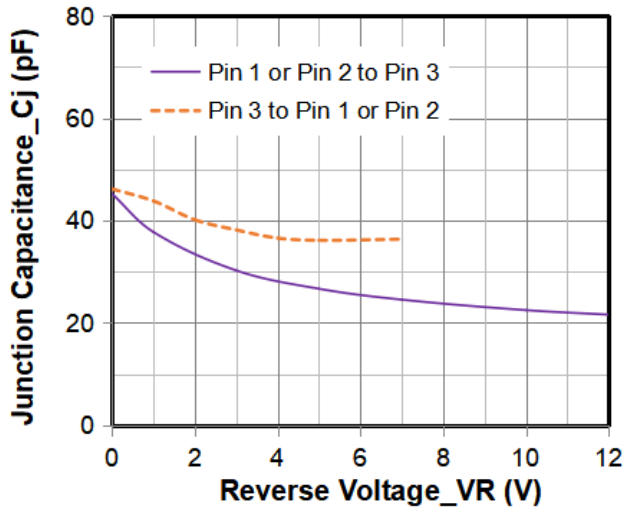
Absolute Maximum Ratings

Rating	Symbol	Value	Units
Peak Pulse Power (tp = 8/20μs)	P_{PK}	300	W
Peak Pulse Current (tp = 8/20μs), Pin 1 or 2 to Pin 3 Peak Pulse Current (tp = 8/20μs), Pin 3 to Pin 1 or 2	I_{PP}	12 17	A
ESD per IEC 61000-4-2 (Contact) ESD per IEC 61000-4-2 (Air)	V_{ESD}	30 30	kV
Lead Soldering Temperature	T_L	260 (10 sec.)	°C
Operating Temperature	T_J	-55 to +125	°C
Storage Temperature	T_{STG}	-55 to +150	°C

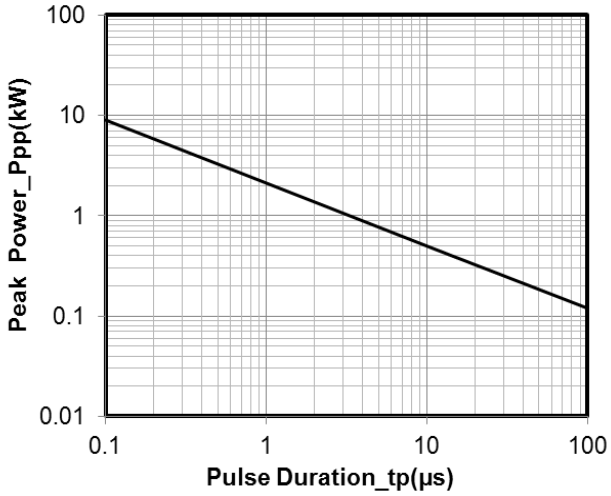
Electrical Characteristics (T=25°C unless otherwise specified)

Parameter	Symbol	Conditions		Min.	Typ.	Max.	Units
Reverse Stand-Off Voltage	V_{RWM}	Pin 1 or Pin 2 to 3				12	V
		Pin 3 to Pin 1 or 2				7	
Reverse Breakdown Voltage	V_{BR}	I_t = 1mA, Pin 1 or 2 to Pin 3		13.3			V
		I_t = 1mA, Pin 3 and Pin 1 or 2		7.5			
Reverse Leakage Current	I_R	V_R = 12 V, Pin 1 or Pin 2 to 3				0.5	μA
		V_R = 7 V, Pin 3 to Pin 1 or 2				0.5	
Clamping Voltage	V_C	I_{PP} = 5A, Pin 1 or 2 to Pin 3, tp = 8/20μs			18.5	20	V
		I_{PP} = 5A, Pin 3 to Pin 1 or 2, tp = 8/20μs			12.5	14	
Clamping Voltage	V_C	I_{PP} = 12A, Pin 1 or 2 to Pin 3, tp = 8/20μs			22	26	V
		I_{PP} = 17A, Pin 3 to Pin 1 or 2, tp = 8/20μs			17	19	
Junction Capacitance	C_J	V_R = 0V	Pin 1 or 2 to Pin 3		47		pF
			Pin 3 to Pin 1 or 2		47		
		V_R =12V	Pin 1 or 2 to Pin 3		22		
		V_R =7V	Pin 3 to Pin 1 or 2		35		

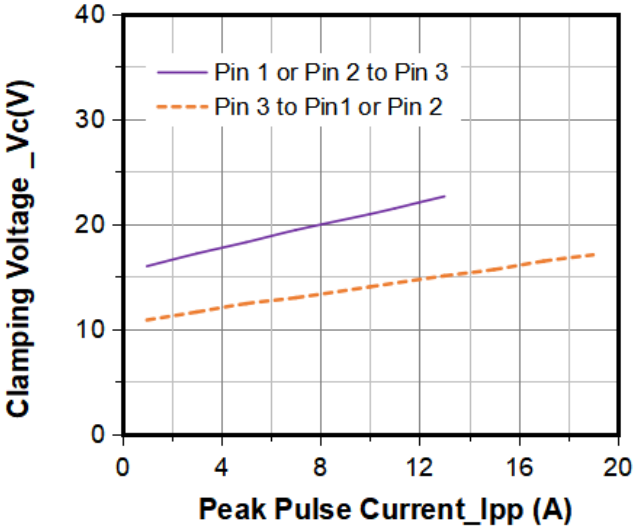
Typical Performance Characteristics (T_A=25°C unless otherwise Specified)



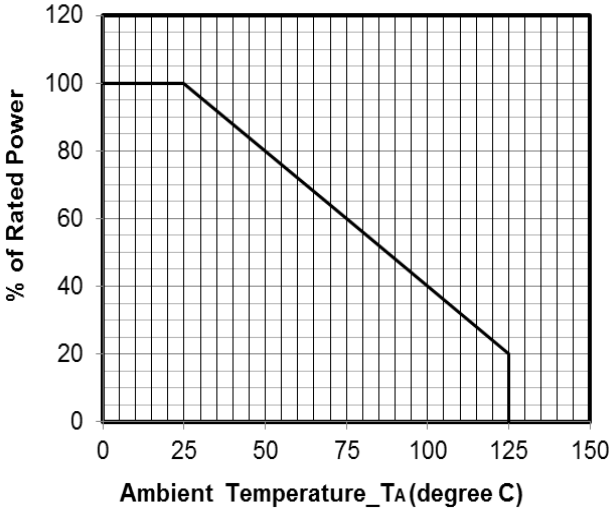
Junction Capacitance vs. Reverse Voltage



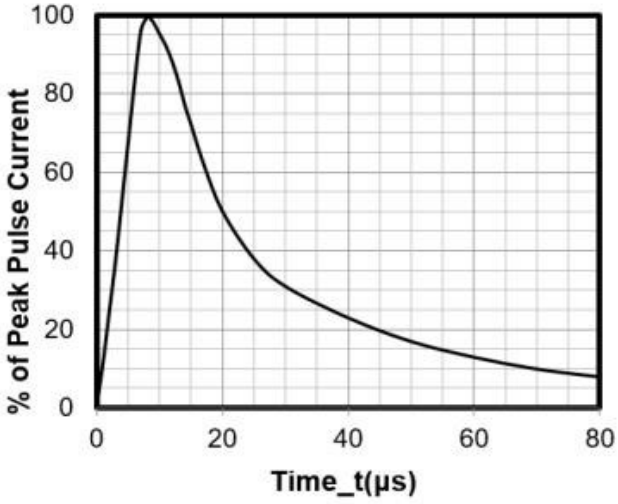
Peak Pulse Power vs. Pulse Time



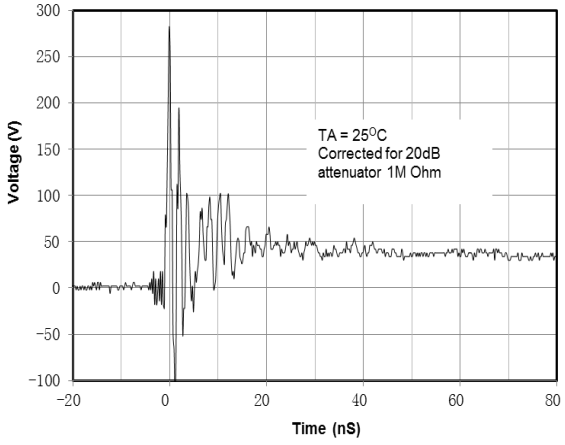
Clamping Voltage vs. Peak Pulse Current



Power Derating Curve



8 X 20μs Pulse Waveform

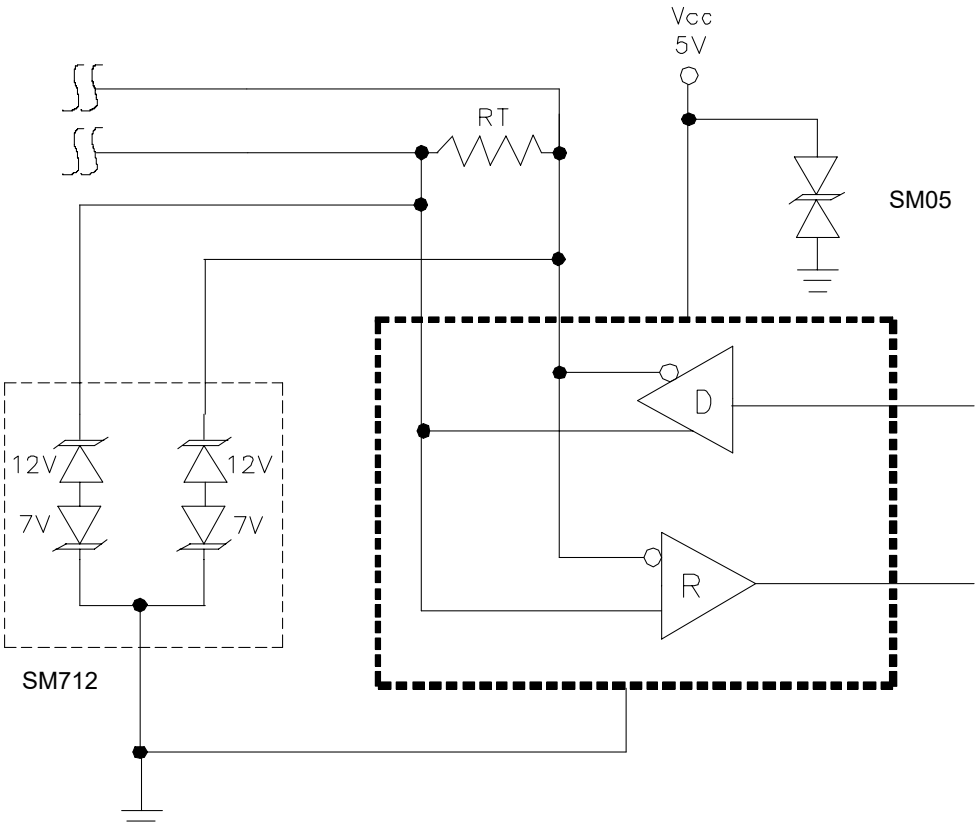


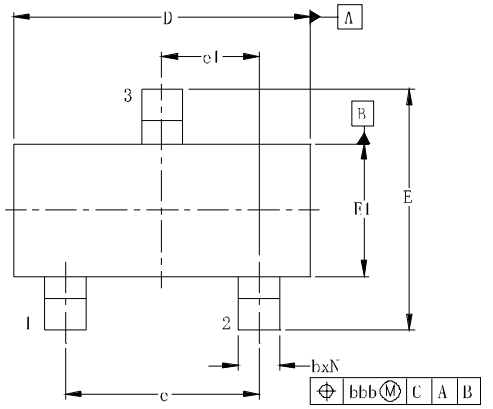
ESD Clamping Voltage

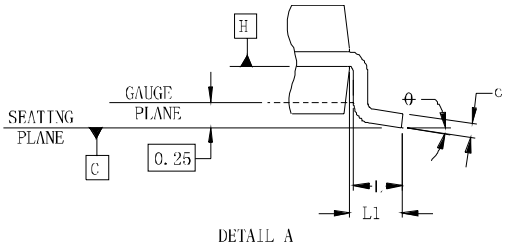
8 kV Contact per IEC61000−4−2

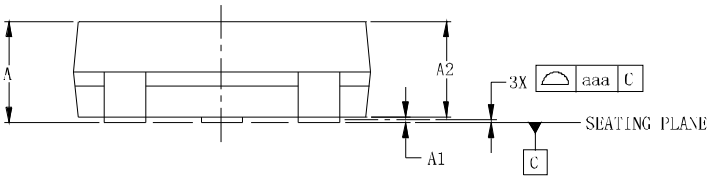
SM712 on RS-485 Data Lines Application

EIA RS-485 specifies a ±7V ground difference between devices on the bus. This permits the bus voltage to range from +12V (5V + 7V) to -7V (0 - 7V). The SM712 is designed to protect two RS-485 data lines in extended common mode applications. The SM712 may be used to protect devices from transient voltages resulting from ESD, EFT, and light ning. The device is designed with asymmetrical operating voltages for optimum protection. The TVS diodes at pins 1 and 2 have a working voltage of 12volts. These pins are connected to the differential data line pairs. The TVS diodes at pin 3 have a working voltage of 7volts. Pin 3 is connected to ground. The internal TVS diodes of the SM712 will protect the transceiver input from positive transient voltage spikes greater than 12V and negative spikes greater than 7V.



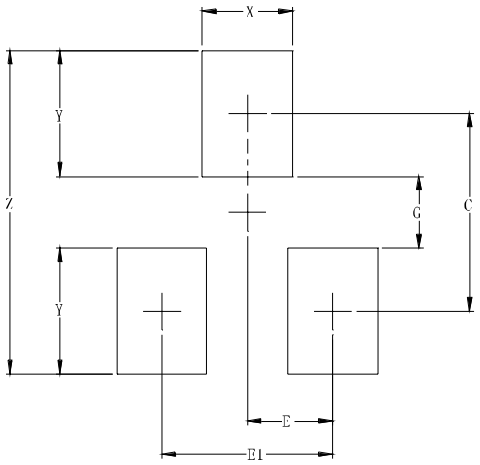






DIMENSIONS						
SYM	INCHES			MILLIMETERS		
	MIN	NOM	MAX	MIN	NOM	MAX
A	0.035	-	0.045	0.89	-	1.15
A1	0.000	-	0.004	0.01	-	0.10
A2	0.035	0.037	0.040	0.88	0.95	1.02
b	0.012	-	0.020	0.30	-	0.51
c	0.003	-	0.007	0.08	-	0.18
D	0.110	0.114	0.120	2.80	2.90	3.04
E	0.082	0.093	0.104	2.10	2.37	2.64
E1	0.047	0.051	0.055	1.20	1.30	1.40
e	0.075			1.90BSC		
e1	0.037			0.95BSC		
L	0.015	0.020	0.024	0.40	0.50	0.60
L1	0.022			0.55		
N	3			3		
θ	0°	-	8°	0°	-	8°
aaa	0.004			0.10		
bbb	0.008			0.20		

Suggested Land Pattern



DIMENSIONS		
SYM	INCHES	MILLIMETERS
C	0.087	2.20
E	0.037	0.95
E1	0.075	1.90
G	0.031	0.80
X	0.039	1.00
Y	0.055	1.40
Z	0.141	3.60