Absolute Maximum Ratings

Rating	Symbol	Value	Units
Peak Pulse Power (tp = 8/20µs)	P_{PK}	550- 700	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}	21 38	A
ESD per IEC 61000-4-2 (Contact)(1) ESD per IEC 61000-4-2 (Air)(1)	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				1	µA
		V_R = 7 V, Pin 3 to Pin 1 or 2				20	
Clamping Voltage	V_C	I_{PP} = 5A, Pin 1 or 2 to Pin 3, tp = 8/20µs				20	V
		I_{PP} = 5A, Pin 3 to Pin 1 or 2, tp = 8/20µs				10	
Clamping Voltage	V_C	I_{PP} = 21A, Pin 1 or 2 to Pin 3, tp = 8/20µs				26	V
		I_{PP} = 38A, Pin 3 to Pin 1 or 2, tp = 8/20µs				19	
Junction Capacitance	C_J	V_R = 0V	Pin 1 or 2 to Pin 3			75	pF
			Pin 3 to Pin 1 or 2			75	
		V_R =12V	Pin 1 or 2 to Pin 3		57		
		V_R =7V	Pin 3 to Pin 1 or 2		35		

Notes:
(1): ESD Gun return path to Ground Reference Plane (GRP)
(2): Transmission Line Pulse Test (TLP) Settings: tp = 100ns, tr = 0.2ns, I_{TLP} and V_{TLP} averaging window: t_1 = 70ns to t_2 = 90ns.
(3): Dynamic resistance calculated from I_{TLP} = 4A to I_{TLP} = 16A.

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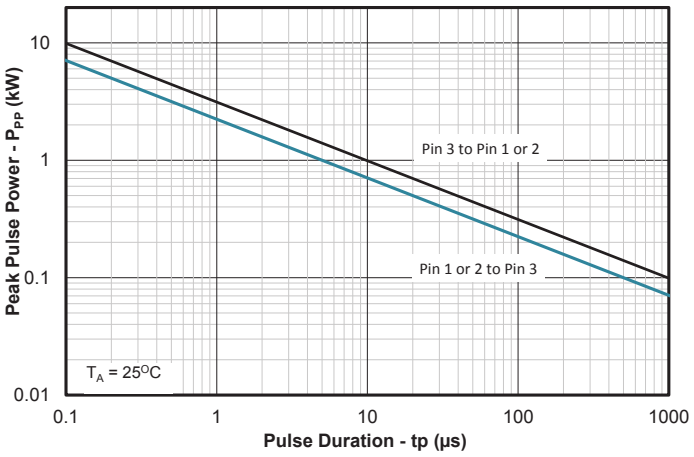
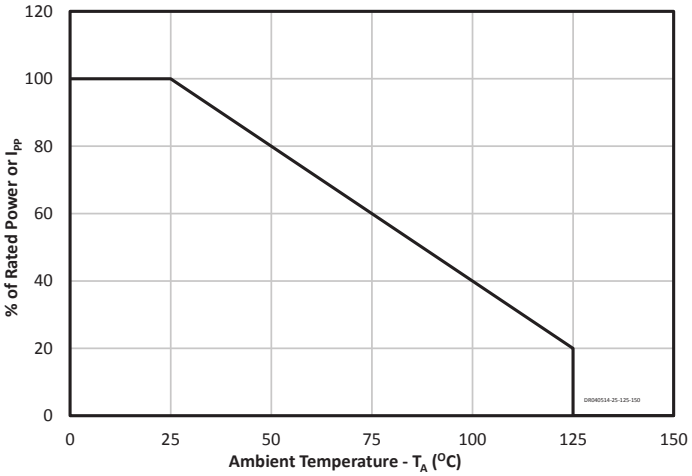
Typical Characteristics

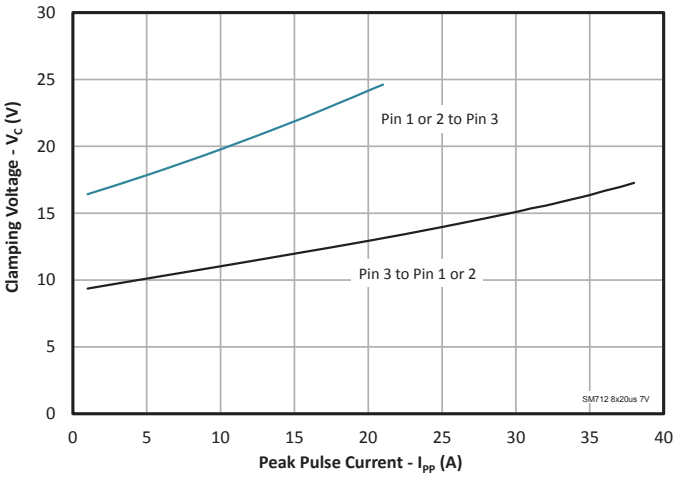
Non-Repetitive Peak Pulse Power vs. Pulse Time



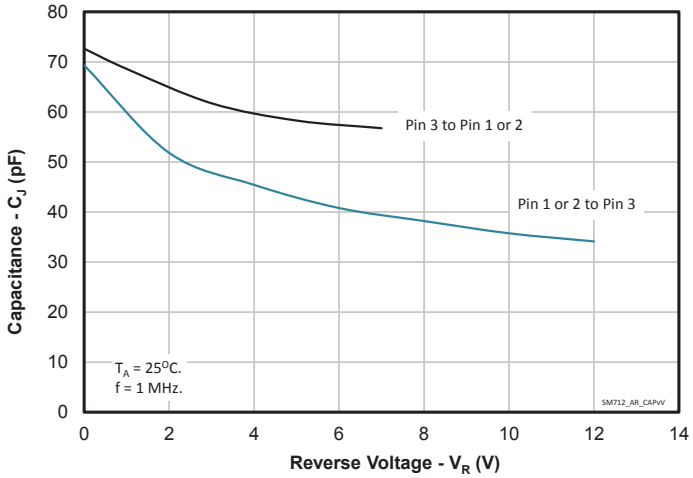
Power Derating Curve



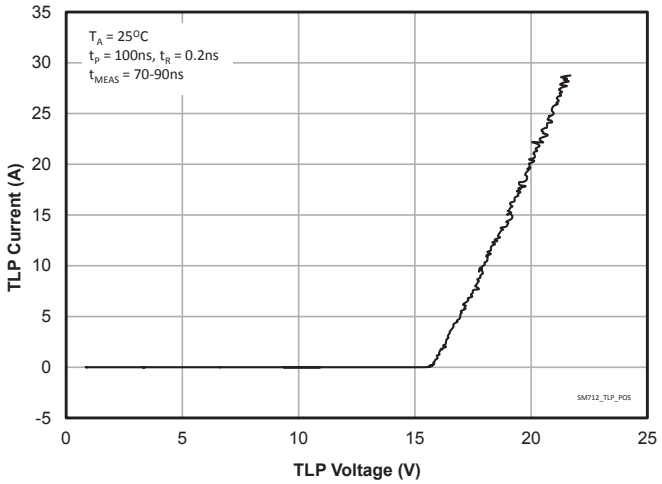
Clamping Voltage vs. Peak Pulse Current (tp = 8/20µs)



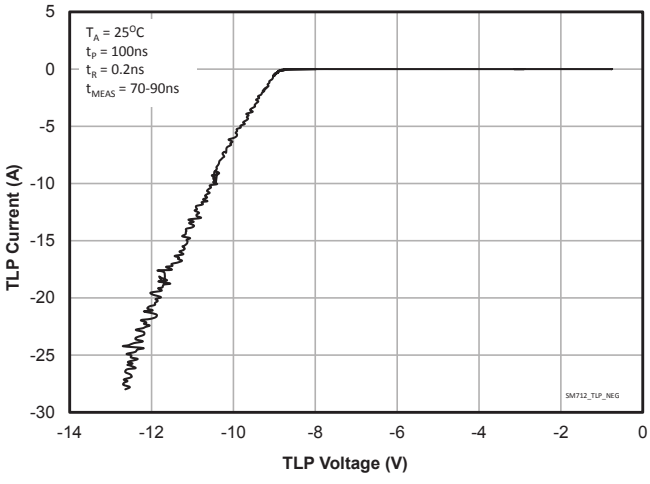
Capacitance vs. Reverse Voltage



TLP IV Curve (Pin 1 or 2 to Pin 3)



TLP IV Curve (Pin 3 to Pin 1 or 2)



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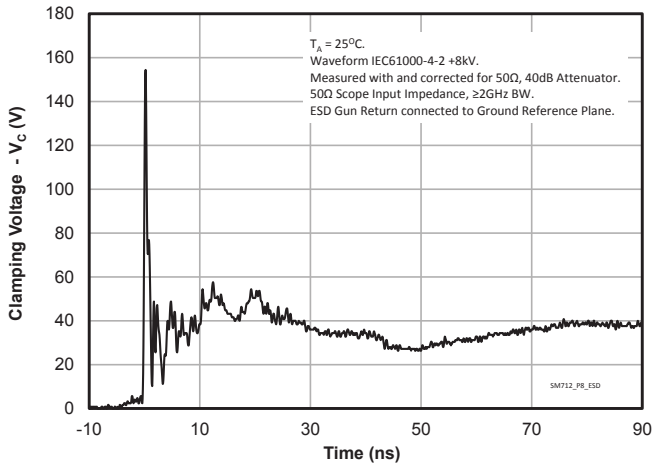
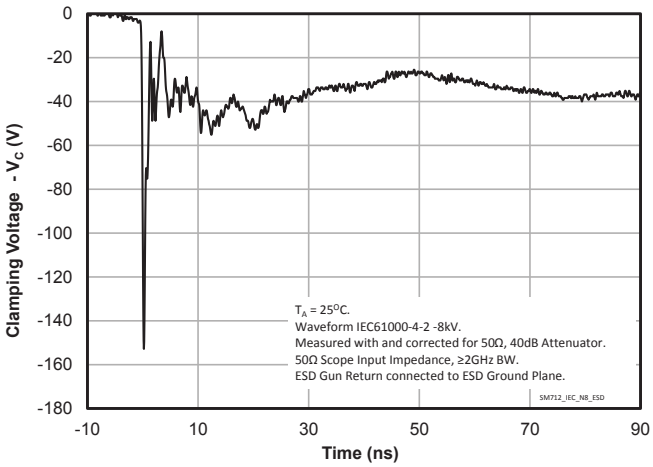
Typical Characteristics

ESD Clamping Voltage (+8kV Contact per IEC 61000-4-2)



ESD Clamping Voltage (-8kV Contact per IEC 61000-4-2)



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Application Information

Device Connection for Protection of Two RS-485 Data Lines

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 lightning. The device is designed with asymmetrical operating voltages for optimum protection. The TVS diodes at pins 1 and 2 have a working voltage of 12 volts. These pins are connected to the differential data line pairs. The TVS diodes at pin 3 have a working voltage of 7 volts. Pin 3 is connected to ground. The internal TVS diodes of the SM712 will protect the transceiver input from positive transient votlage spikes greater than 12V and negative spikes greater than 7V.

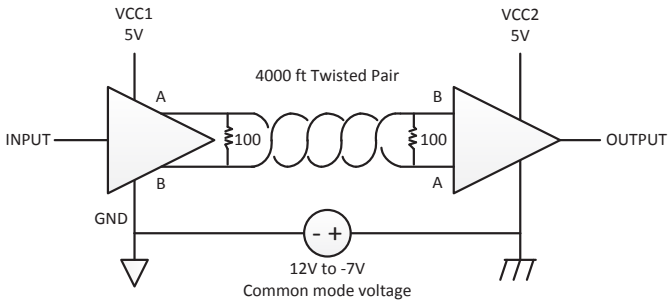
A series current limiting resistor may be added in applications requiring enhanced surge immunity.

Circuit Board Layout Recommendations

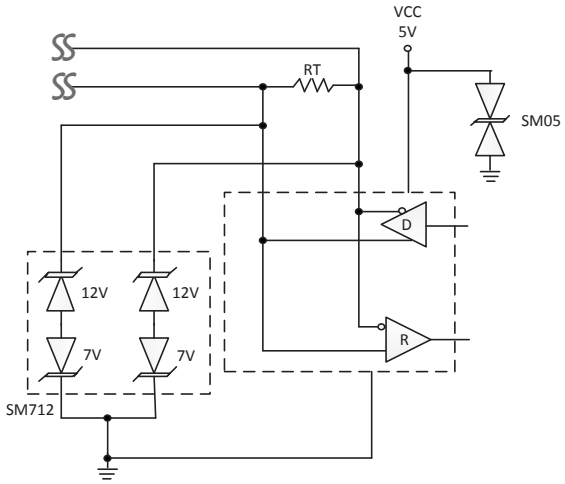
Good circuit board layout is critical for the suppression of fast rise time transients such as ESD. The following guidelines are recommended:

- Place the SM712 near the input terminals or connectors to restrict electromagnetic coupling.
- Minimize the path length between the SM712 and the protected line. This minimizes voltage overshoot due to parastic inductance of board traces.
- Use ground planes whenever possible.
- Long, single trace ground conductors should be avoided. The ground pin (Pin 3) should be connected directly to a ground plane on the circuit board for best results.
- Minimize all conductive loops including power and ground loops.
- Never run critical signals near board edges.

RS-485 Common Mode Voltages



RS-485 Protection Circuit



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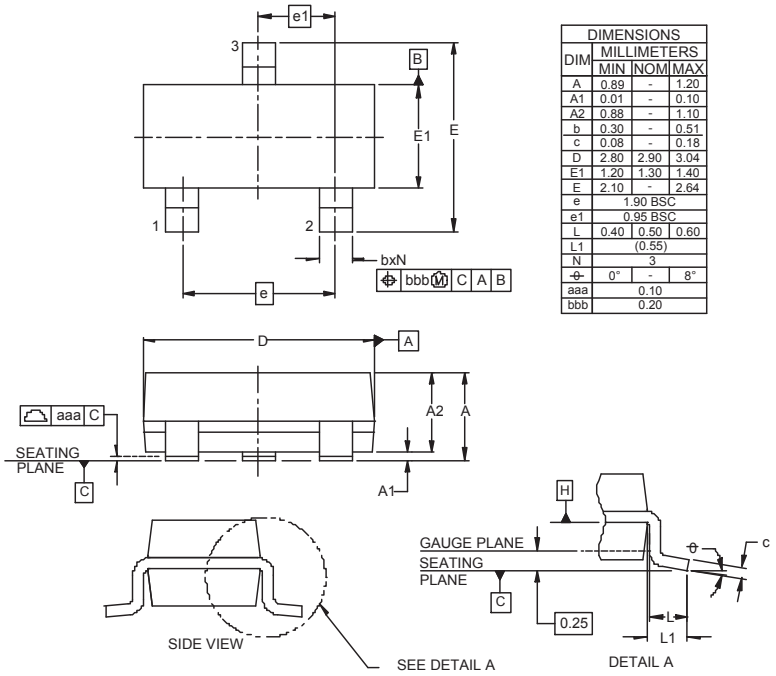
Outline Drawing - SOT-23

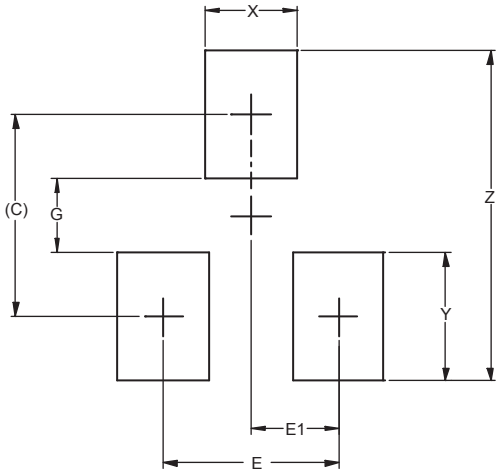


DIMENSIONS			
DIM	MILLIMETERS		
	MIN	NOM	MAX
A	0.89	-	1.20
A1	0.01	-	0.10
A2	0.88	-	1.10
b	0.30	-	0.51
c	0.08	-	0.18
D	2.80	2.90	3.04
E1	1.20	1.30	1.40
E	2.10	-	2.64
e	1.90 BSC		
e1	0.95 BSC		
L	0.40	0.50	0.60
L1	(0.55)		
N	3		
θ	0°	-	8°
aaa	0.10		
bbb	0.20		

NOTES:

1. CONTROLLING DIMENSIONS ARE IN MILLIMETERS (ANGLES IN DEGREES).
2. DATUMS -A- AND -B- TO BE DETERMINED AT DATUM PLANE -H-
3. DIMENSIONS "E1" AND "D" DO NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS.

Land Pattern - SOT-23



DIMENSIONS	
DIM	MILLIMETERS
C	(2.20)
G	0.80
E1	0.95
E	1.90
X	1.00
Y	1.40
Z	3.60

NOTES:

1. CONTROLLING DIMENSIONS ARE IN MILLIMETERS (ANGLES IN DEGREES).
2. THIS LAND PATTERN IS FOR REFERENCE PURPOSES ONLY CONSULT YOUR MANUFACTURING GROUP TO ENSURE YOUR COMPANY'S MANUFACTURING GUIDELINES ARE MET.
3. REFERENCE IPC-SM-782A.

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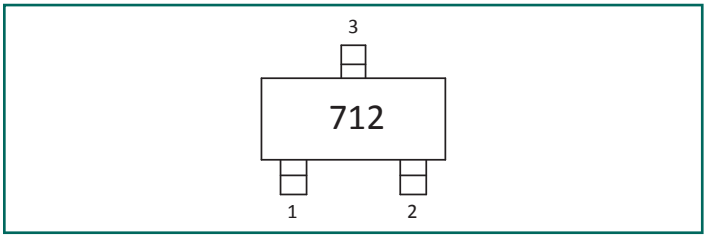
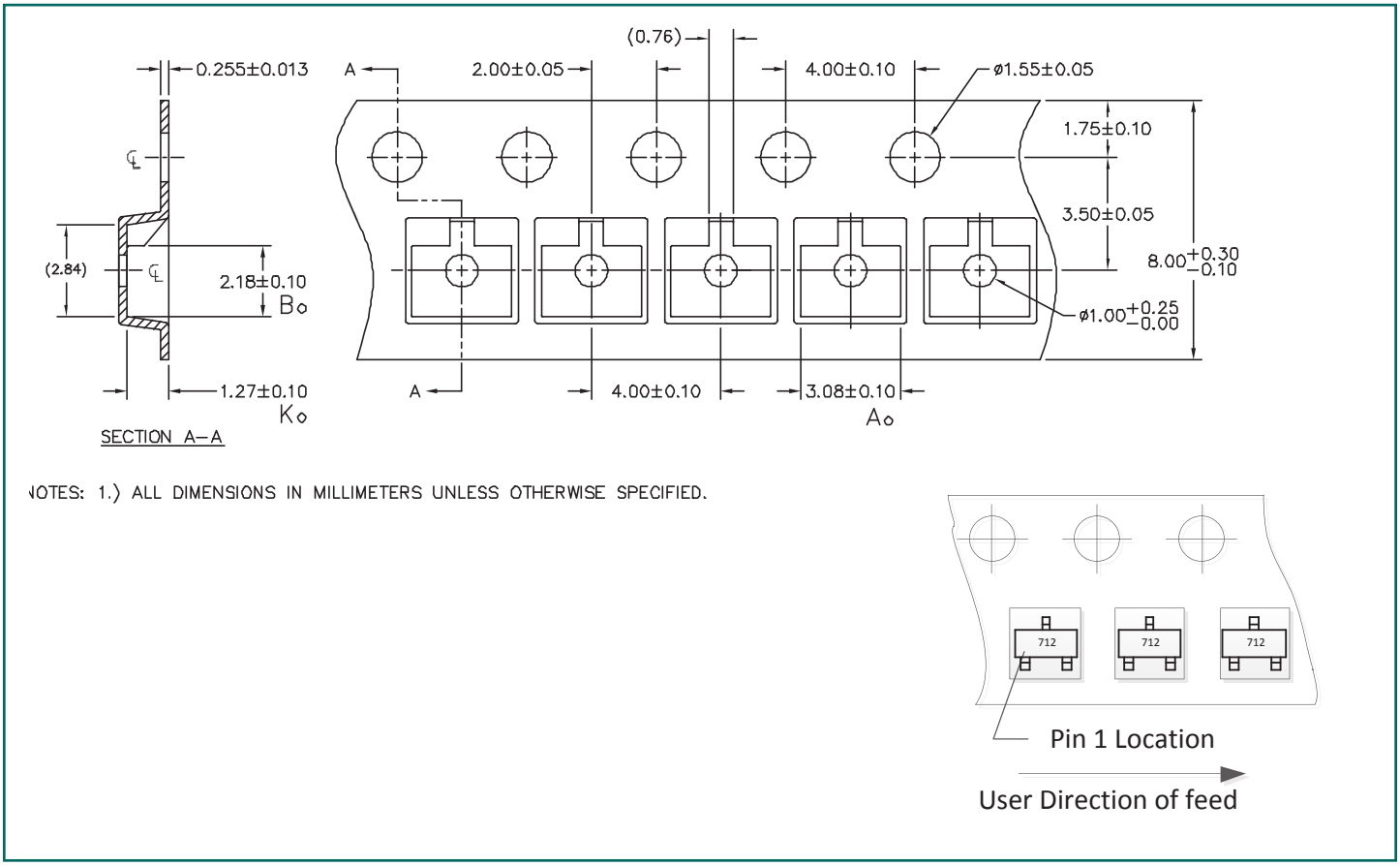
Marking Code



Tape and Reel Specification



Ordering Information

Part Number	Qty per Reel	Reel Size	Carrier Tape	Pitch
SM712.TCT	3,000	7 Inch	Plastic	4mm
MicroClamp and uClamp are registered trademarks of Semtech Corporation.				

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