



PRODUCT / PROCESS CHANGE NOTIFICATION

PCN-000439

Date: 9NOV2017

P1/2

- Semtech Corporation, 200 Flynn Road, Camarillo CA 93012
- Semtech Canada Corporation, 4281 Harvester Road, Burlington, Ontario L7L 5M4 Canada
- Semtech Irvine, 5141 California Ave., Suite 100, Irvine CA 92617
- Semtech Neuchatel Sarl, Route des Gouttes d'Or 40, CH-2000 Neuchatel Switzerland
- Semtech Bristol - EMEA Limited, Block B, St James Court, Great Park Road, Bristol BS32 4QJ, UK
- Semtech Corpus Christi SA de CV, Carretera Matamorros Edificio 7, Reynosa, Tamaulipas, Mexico 88780
- Semtech Plano, 1101 Resource Drive, Suite 121, Plano TX 75074
-

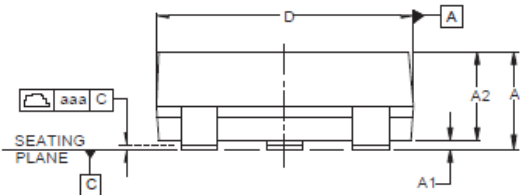
Change Details

Part Number(s) Affected:
SM712.TCT

Customer Part Number(s) Affected: N/A

Description, Purpose and Effect of Change:

- a. For the benefit of our customers, Semtech has qualified additional manufacturing capacity for protection products.
 - a. The additional assembly and test site: Diodes, Shanghai, China.
- b. POD update in the datasheet. POD update to dimension A and A2 Dimensions as outlined below



Dim	Is Now: POD			Was:- POD		
	Min	Nom	Max	Min	Nom	Max
A	0.89	-	1.2	0.89	-	1.12
A2	0.88	-	1.1	0.88	-	1.02

Change Classification	<input checked="" type="checkbox"/> Major <input type="checkbox"/> Minor	Impact to Form, Fit, Function	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Impact to Data Sheet	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	New Revision or Date	Sep2017 <input type="checkbox"/> N/A

Impact to Performance, Characteristics or Reliability:

- There is no impact to Function or Reliability for this change.
- There is an update to the POD in the datasheet.

Implementation Date	7FEB2018	Work Week	TBA
Last Time Ship (LTS) Of unchanged product	Not Applicable Additional Capacity	Affecting Lot No. / Serial No. (SN)	Not Applicable
Sample Availability	9NOV2017	Qualification Report Availability	Included in attachment

Supporting Documents for Change Validation/Attachments:

- Reliability Report
- Updated SM712 Datasheet.



PRODUCT / PROCESS CHANGE NOTIFICATION

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P2/2

Issuing Authority

Semtech Business Unit:

Semtech Contact Info:

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Camarillo, CA 93012
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Phone:: (949) 269-4443 [office]

FOR FURTHER INFORMATION & WORLDWIDE SALES COVERAGE: <http://www.semtech.com/contact/index.html#support>

Rel Job Detail Report

by Sublot, by Sequence
 Contact: Gurmail Sajjan
 (805) 480 2142
 gsajjan@semtech.com

<i>Businessunit</i>	<i>Protection</i>			
<i>Reljob#</i>	<i>Part_Number, Job Name/Type</i>	<i>Fab, Package</i>	<i>Rel Job Status</i>	<i>Key Dates:</i>
6359	SM712	ASMC12TVS	Rel Testing Complete Passes All Requirements	<i>Job Accepted:</i> 30-May-2017
	Package Qual	SOT-23		<i>Requested CD:</i>
	New Product on qualified process with un-qualified package			<i>Actual Start Date:</i> 15-May-2017
				<i>ECD for Conditional:</i>
				<i>Job ECD:</i> 25-Jul-2017

Completed Tasks

<i>I.O</i>	<i>Lot</i>	<i>AssemblyLot</i>	<i>DateCode</i>				
	AER4153	AER4153	1719				
<i>Seq</i>	<i>TaskCode</i>	<i>SampleSize</i>	<i>Criteria</i>	<i>Complete</i>	<i>Failures</i>	<i>DataSource</i>	<i>Results/Comments</i>
1	Data-Prep	None	None	19-May-2017		Camarillo	
2	HTRB_Pre_Elect_150°C_RT24	210	Pass on Zero Fails	07-Jun-2017	0	Camarillo	
3	HTRB_150°C_Real Time_0024	210	Pass on Zero Fails	23-Jun-2017	0	Camarillo	
4	HTRB_Pre_Elect	210	Pass on Zero Fails	22-May-2017	0	Camarillo	
5	BI_BD_Valid	NA	Meet HTOL Schematics	22-May-2017		Camarillo	
6	HTRB_150°C_0072	105	Pass on Zero Fails	26-May-2017	0	Camarillo	
7	HTRB_150°C_0408	105	Pass on Zero Fails	09-Jun-2017	0	Camarillo	
8	HTS_Pre_Elect	77	Pass on Zero Fails	23-May-2017	0	Camarillo	
9	HTS_0168	77	Pass on Zero Fails	30-May-2017	0	Camarillo	
10	HTS_0500	77	Pass on Zero Fails	16-Jun-2017	0	Camarillo	
11	HTS_1000	77	Pass on Zero Fails	06-Jul-2017	0	Camarillo	
12	85/85_W/Pre_Pre Elec	40	0	24-May-2017	0	Camarillo	
13	85°C/85%RH_BD_Valid	40	Pass on Zero Fails	24-May-2017	0	Camarillo	
14	85/85_120hr_On/Off	40	Pass on Zero Fails	31-May-2017	0	Camarillo	
15	Pre_Conditioning_Level_1	NA	MSL 1	19-May-2017	0	Camarillo	

Rel Job Detail Report

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16 Pre_Elect_Precond	231	Pass on Zero Fails	23-May-2017	0	Camarillo
17 Precond_Temp_Cyc_5cyc	231	Pass on Zero Fails	23-May-2017	0	Camarillo
18 Precond_HTS_24hr	231	Pass on Zero Fails	24-May-2017	0	Camarillo
19 Precond_85/85_NoElec168hr	231	Pass on Zero Fails	31-May-2017	0	Camarillo
20 Precond_260°C_IR_Ref_Char	231	Pass on Zero Fails	31-May-2017	0	Camarillo
21 T/C_Pre_Elect	77	Pass on Zero Fails	31-May-2017	0	Camarillo
22 T/C_wPre_0250	77	Pass on Zero Fails	06-Jun-2017	0	Camarillo
23 T/C_wPre_0500	77	Pass on Zero Fails	13-Jun-2017	0	Camarillo
24 T/C_wPre_1000	77	Pass on Zero Fails	21-Jun-2017	0	Camarillo
25 Cross_Section TC 1000 Cyc	15		21-Jun-2017		Camarillo
26 85°C/85%RH_W/Pre_Pre Elec	77	Pass on Zero Fails	21-May-2017	0	Camarillo
27 85°C/85%RH_BD_Valid	77	Pass on Zero Fails	01-Jun-2017	0	Camarillo
28 85°C/85%RH_Biased_168hrs	77	Pass on Zero Fails	08-Jun-2017	0	Camarillo
29 85°C/85%RH_Biased_500hrs	77	Pass on Zero Fails	23-Jun-2017	0	Camarillo
30 85°C/85%RH_Biased_1000hrs	77	Pass on Zero Fails	14-Jul-2017	0	Camarillo
31 Cross_Section 85°C/85%RH	15		14-Jul-2017		Camarillo
32 CSAM Analysis	22	Pass on Zero Fails	24-May-2017	0	Camarillo
33 Precond_Temp_Cyc_5cyc	22	Pass on Zero Fails	25-May-2017	0	Camarillo
34 Precond_HTS_24hr	22	Pass on Zero Fails	26-May-2017	0	Camarillo
35 Precond_85/85_NoElec168hr	22	Pass on Zero Fails	02-Jun-2017	0	Camarillo
36 Precond_260°C_IR_Ref_Char	22	Pass on Zero Fails	02-Jun-2017	0	Camarillo
37 CSAM Analysis	22	Pass on Zero Fails	06-Jun-2017	0	Camarillo
38 Construct_Package	5 unique packaged devices minimum.	No Major Findings, Q&R to review construction analysis report.	12-Jun-2017	0	Camarillo
39 Rider_Card_Wash/Bake	231		22-May-2017	0	Camarillo
40 Pack_Clos	0	0	17-Jul-2017		Camarillo

Rel Job Detail Report

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2.0	Lot	AER4177	AssemblyLot	AER4177	DateCode	1719
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Seq	TaskCode	SampleSize	Criteria	Complete	Failures	DataSource	Results/Comments
1	Data-Prep	None	None	19-May-2017		Camarillo	
2	HTRB_Pre_Elect_150°C_RT24	210	Pass on Zero Fails	07-Jun-2017	0	Camarillo	
3	HTRB_150°C_Real Time_0024	210	Pass on Zero Fails	29-Jun-2017	0	Camarillo	
4	HTRB_Pre_Elect	210	Pass on Zero Fails	22-May-2017	0	Camarillo	
5	BI_BD_Valid	NA	Meet HTOL Schematics	22-May-2017		Camarillo	
6	HTRB_150°C_0072	105	Pass on Zero Fails	26-May-2017	0	Camarillo	
7	HTRB_150°C_0408	105	Pass on Zero Fails	09-Jun-2017	0	Camarillo	
8	HTS_Pre_Elect	77	Pass on Zero Fails	23-May-2017	0	Camarillo	
9	HTS_0168	77	Pass on Zero Fails	30-May-2017	0	Camarillo	
10	HTS_0500	77	Pass on Zero Fails	16-Jun-2017	0	Camarillo	
11	HTS_1000	77	Pass on Zero Fails	06-Jul-2017	0	Camarillo	
12	85/85_W/Pre_Pre Elec	40	Pass on Zero Fails	24-May-2017	0	Camarillo	
13	85°C/85%RH_BD_Valid	40	Pass on Zero Fails	24-May-2017	0	Camarillo	
14	85/85_120hr_On/Off	40	Pass on Zero Fails	31-May-2017	0	Camarillo	
15	Pre_Conditioning_Level_1	NA	MSL 1	19-May-2017	0	Camarillo	
16	Pre_Elect_Precond	231	Pass on Zero Fails	23-May-2017	0	Camarillo	
17	Precond_Temp_Cyc_5cyc	231	Pass on Zero Fails	23-May-2017	0	Camarillo	
18	Precond_HTS_24hr	231	Pass on Zero Fails	24-May-2017	0	Camarillo	
19	Precond_85/85_NoElec168hr	231	Pass on Zero Fails	31-May-2017	0	Camarillo	
20	Precond_260°C_IR_Ref_Char	154	Pass on Zero Fails	31-May-2017	0	Camarillo	
21	T/C_Pre_Elect	77	Pass on Zero Fails	31-May-2017	0	Camarillo	
22	T/C_wPre_0250	77	Pass on Zero Fails	06-Jun-2017	0	Camarillo	
23	T/C_wPre_0500	77	Pass on Zero Fails	13-Jun-2017	0	Camarillo	
24	T/C_wPre_1000	77	Pass on Zero Fails	21-Jun-2017	0	Camarillo	
25	Cross_Section TC 1000 Cyc	15		21-Jun-2017		Camarillo	

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26	85°C/85%RH_W/Pre_Pre Elec	77	Pass on Zero Fails	31-May-2017	0	Camarillo
27	85°C/85%RH_BD_Valid	77	Pass on Zero Fails	01-Jun-2017	0	Camarillo
28	85°C/85%RH_Biased_168hrs	77	Pass on Zero Fails	08-Jun-2017	0	Camarillo
29	85°C/85%RH_Biased_500hrs	77	Pass on Zero Fails	23-Jun-2017	0	Camarillo
30	85°C/85%RH_Biased_1000hrs	77	Pass on Zero Fails	14-Jul-2017	0	Camarillo
31	Cross_Section 85°C/85%RH	15		14-Jul-2017		Camarillo
32	CSAM Analysis	22	Pass on Zero Fails	24-May-2017	0	Camarillo
33	Precond_Temp_Cyc_5cyc	22	Pass on Zero Fails	25-May-2017	0	Camarillo
34	Precond_HTS_24hr	22	Pass on Zero Fails	26-May-2017	0	Camarillo
35	Precond_85/85_NoElec168hr	22	Pass on Zero Fails	02-Jun-2017	0	Camarillo
36	Precond_260°C_IR_Ref_Char	22	Pass on Zero Fails	02-Jun-2017	0	Camarillo
37	CSAM Analysis	22	Pass on Zero Fails	06-Jun-2017	0	Camarillo
38	Rider_Card_Wash/Bake	213		22-May-2017	0	Camarillo
39	Pack_Clos	0	0	17-Jul-2017		Camarillo

3.0	Lot	AER4178	AssemblyLot	AER4178	DateCode	1719
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Seq	TaskCode	SampleSize	Criteria	Complete	Failures	DataSource	Results/Comments
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12 85/85_W/Pre_Pre Elec	40		24-May-2017	0	Camarillo
13 85°C/85%RH_BD_Valid	40	Pass on Zero Fails	24-May-2017	0	Camarillo
14 85/85_120hr_On/Off	40	Pass on Zero Fails	31-May-2017	0	Camarillo
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37 CSAM Analysis	22	Pass on Zero Fails	06-Jun-2017	0	Camarillo
38 Rider_Card_Wash/Bake	231		22-May-2017	0	Camarillo

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39 Pack_Clos

0

0

17-Jul-2017

Camarillo

PROTECTION PRODUCTS

Description

The SM712 transient voltage suppressor (TVS) diode is designed for asymmetrical (12V to -7V) protection in multi-point data transmission standard RS-485 applications. The SM712 may be used to protect devices from transient voltages resulting from electrostatic discharge (ESD), electrical fast transients (EFT), and lightning.

The SM712 features more than 500 Watts ($t_p = 8/20 \mu s$) of power handling capability to accommodate the higher transient voltage levels which may be expected in extended common mode applications. This provides higher equipment reliability and eliminates the "guess work" required when using Zener diodes that are not rated to handle such transient conditions.

The SM712 replaces four discrete components by integrating two 12V and two 7V TVS diodes in a single package. The integrated design aids in reducing voltage over-shoot associated with trace inductance. The low clamping voltage of SM712 minimizes the stress on the protected transceiver.

Features

- Transient Protection to
 - ♦ IEC 61000-4-2 (ESD): $\pm 30kV$ (Air), $\pm 30kV$ (Contact)
 - ♦ IEC 61000-4-4 (EFT): 40A (5/50ns)
 - ♦ IEC 61000-4-5 (Lightning): 21A for 12V TVS & 38A for 7V TVS ($t_p = 8/20\mu s$)
- Protects two +12V to -7V lines
- Peak pulse power ($t_p = 8/20\mu s$): 500-700W
- Low capacitance
- Low clamping voltage
- Solid-State Silicon-Avalanche Technology

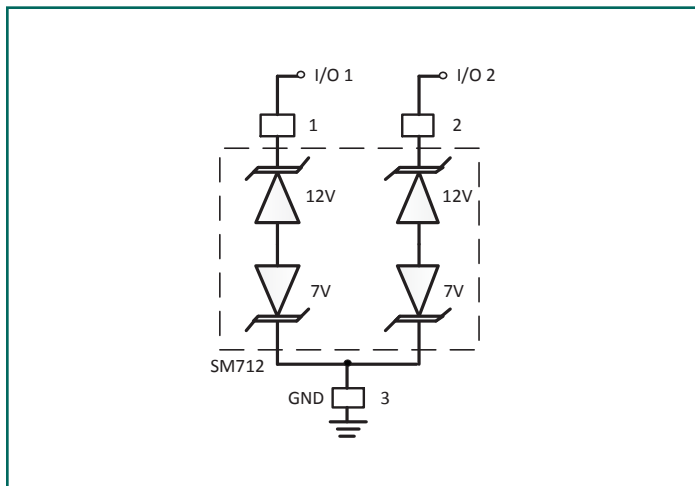
Mechanical Characteristics

- JEDEC SOT23 Package
- Molding Compound Flammability Rating: UL 94V-0
- Pb-Free, Halogen Free, RoHS/WEEE compliant
- Marking: 712
- Packaging: Tape and Reel

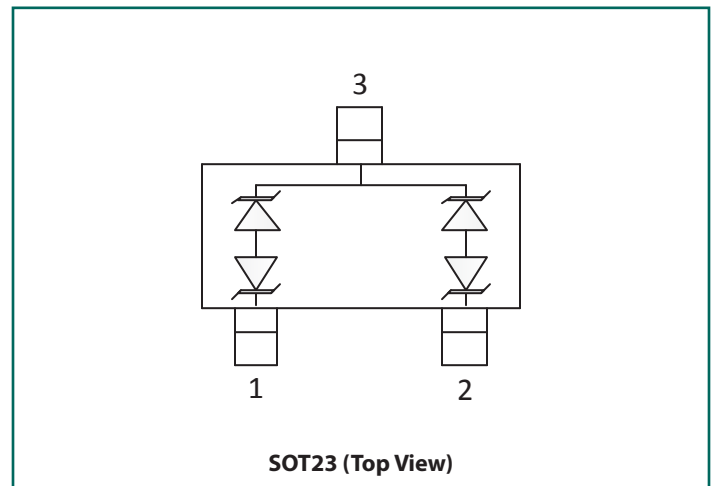
Applications

- RS-485 transceivers with extended common mode range
- Security systems
- Automatic Teller Machines
- HFC systems
- Networks

Circuit Diagram



Schematic and Pin Configuration



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	I _{PP}	21	A
Peak Pulse Current (tp = 8/20μs), Pin 3 to Pin 1 or 2		38	
ESD per IEC 61000-4-2 (Contact) ⁽¹⁾	V _{ESD}	30	kV
ESD per IEC 61000-4-2 (Air) ⁽¹⁾		30	
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		
			Pin 3 to Pin 1 or 2		35		

Notes:

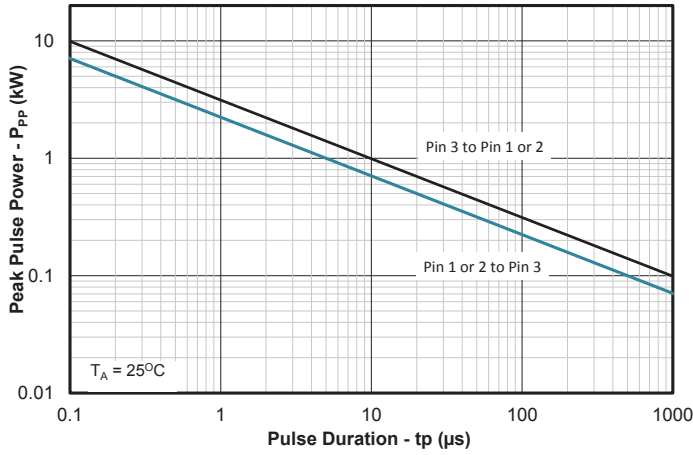
(1): ESD Gun return path to Ground Reference Plane (GRP)

(2): Transmission Line Pulse Test (TLP) Settings: tp = 100ns, tr = 0.2ns, I_{TLP} and V_{TLP}, averaging window: t₁ = 70ns to t₂ = 90ns.

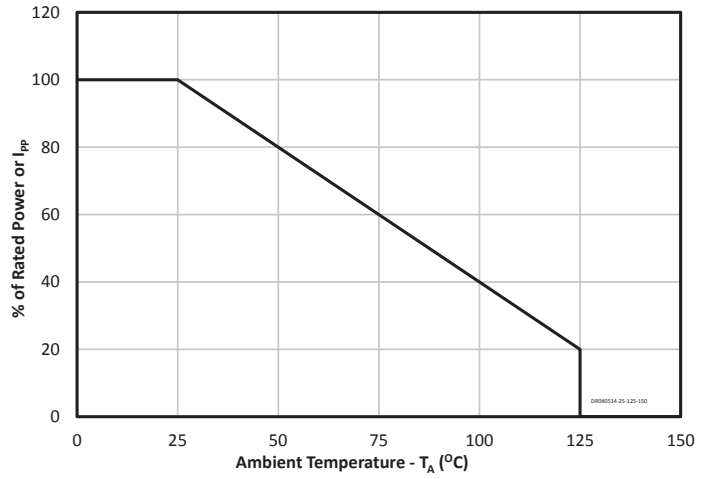
(3): Dynamic resistance calculated from I_{TLP} = 4A to I_{TLP} = 16A.

Typical Characteristics

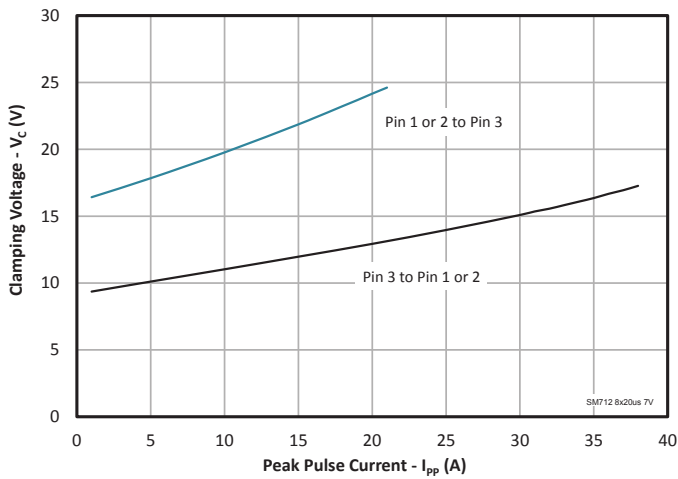
Non-Repetitive Peak Pulse Power vs. Pulse Time



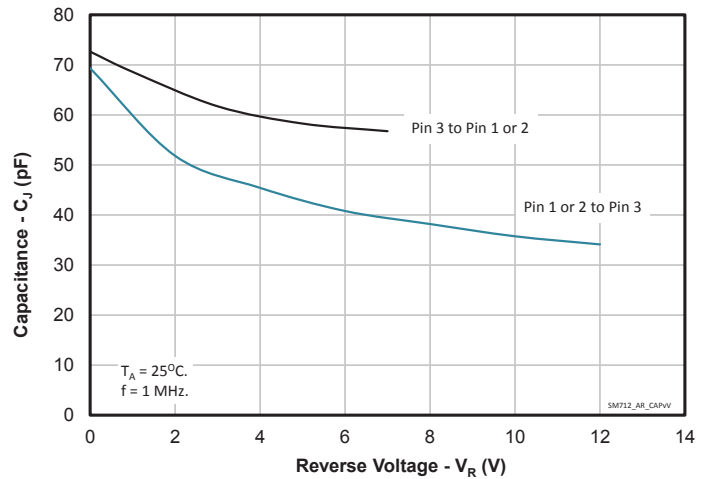
Power Derating Curve



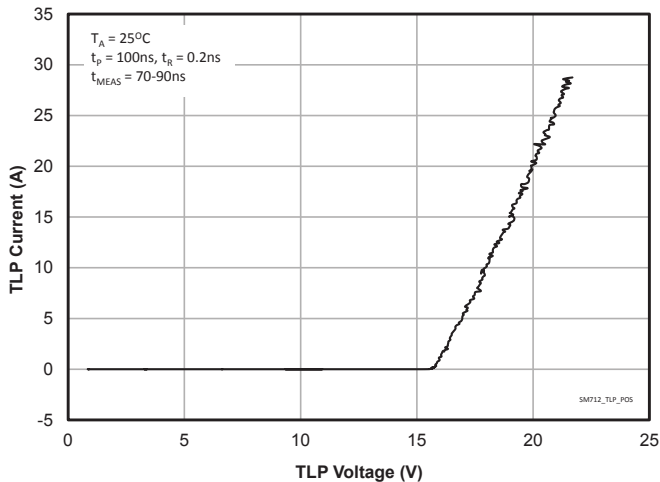
Clamping Voltage vs. Peak Pulse Current ($t_p = 8/20\mu$ s)



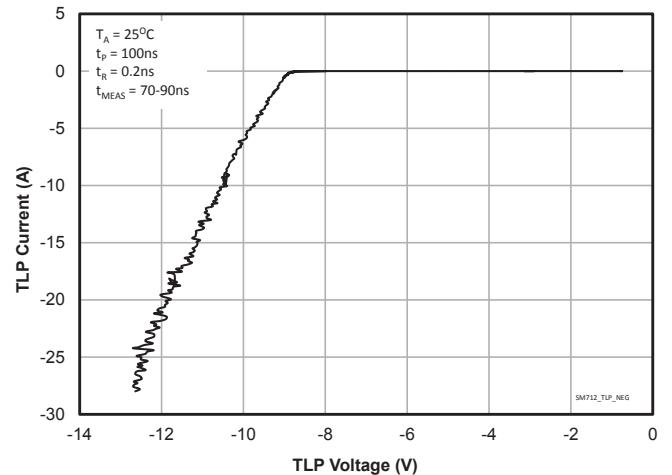
Capacitance vs. Reverse Voltage



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

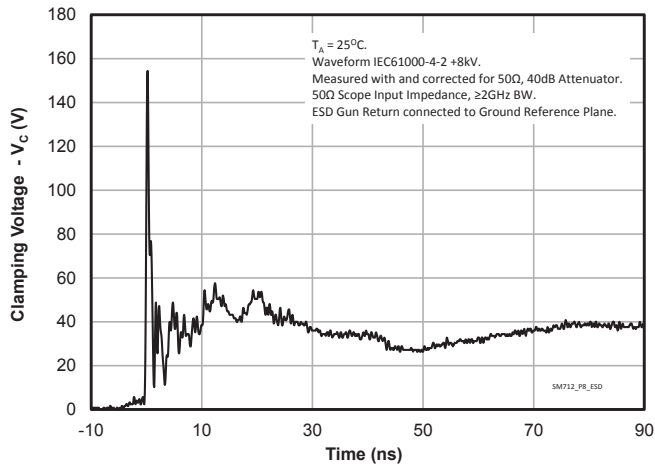


TLP IV Curve (Pin 3 to Pin 1 or 2)

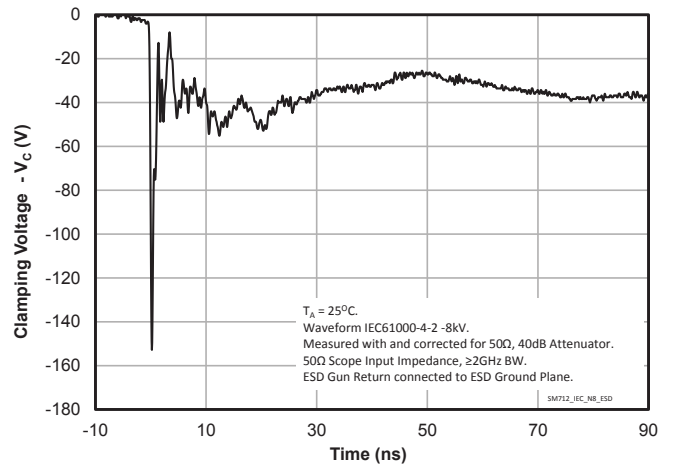


Typical Characteristics

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



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



Application Information

Device Connection for Protection of Two RS-485 Data Lines

EIA RS-485 specifies a $\pm 7V$ 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 voltage spikes greater than 12V and negative spikes greater than 7V.

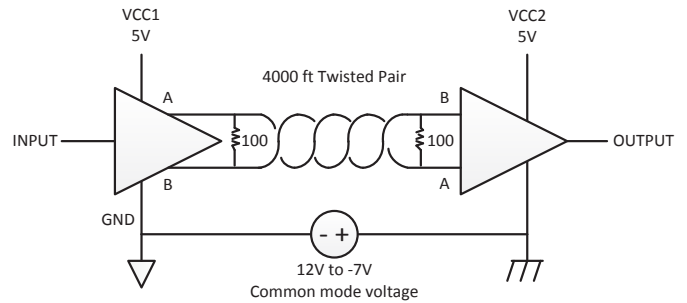
A series current limiting resistor may be added in applications requiring enhanced surge immunity.

Circuit Board Layout Recommendations

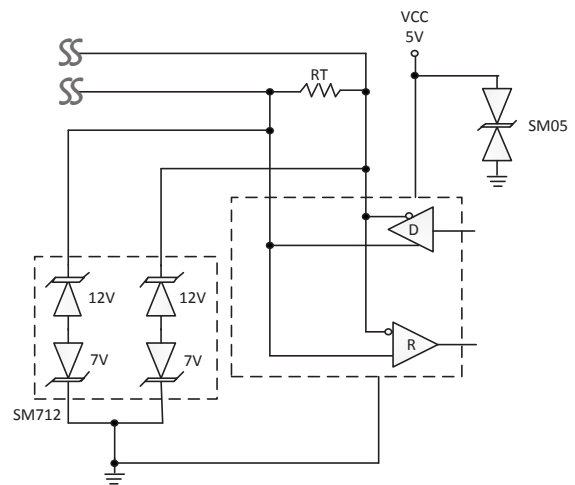
Good circuit board layout is critical for the suppression of fast rise time transients such as ESD. The following guidelines are recommended:

- 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 parasitic 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.

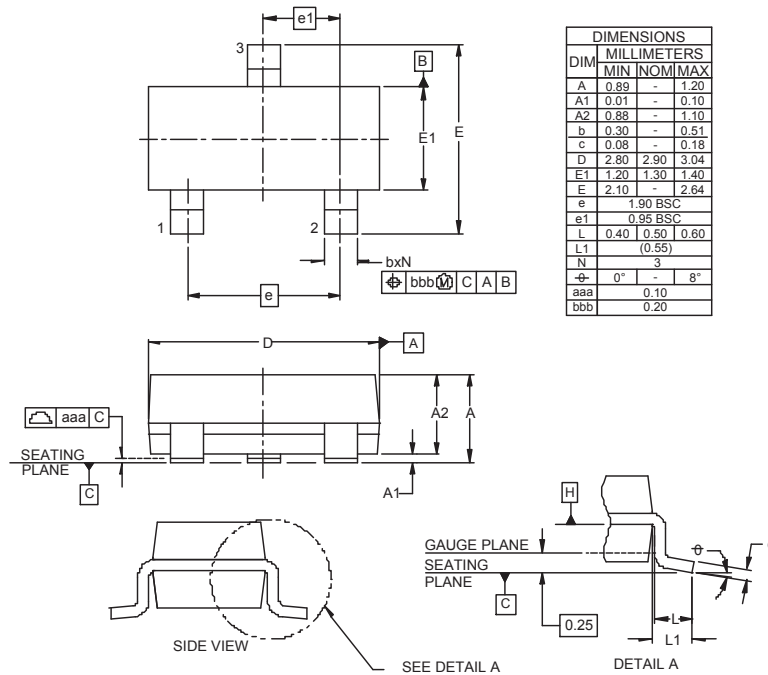
RS-485 Common Mode Voltages



RS-485 Protection Circuit

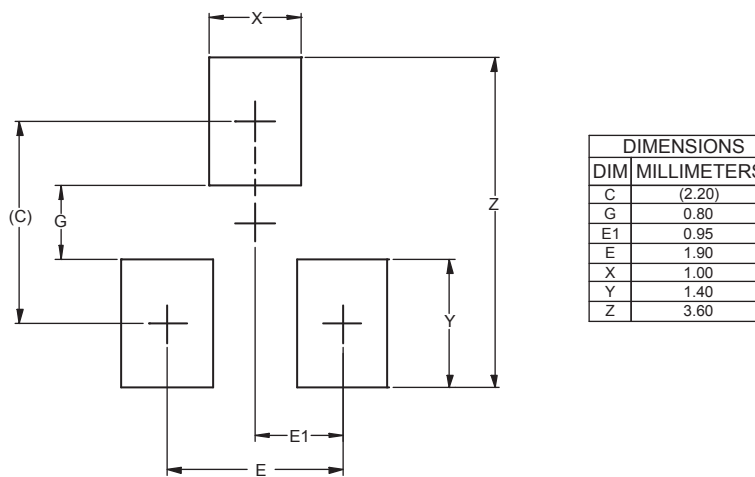


Outline Drawing - SOT-23



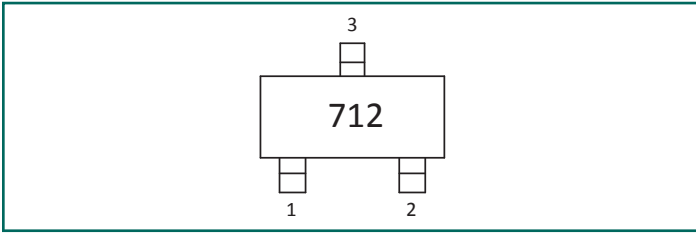
- NOTES:
1. CONTROLLING DIMENSIONS ARE IN MILLIMETERS (ANGLES IN DEGREES).
 2. DATUMS **-A-** AND **-B-** TO BE DETERMINED AT DATUM PLANE **-H-**
 3. DIMENSIONS "E1" AND "D" DO NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS.

Land Pattern - SOT-23

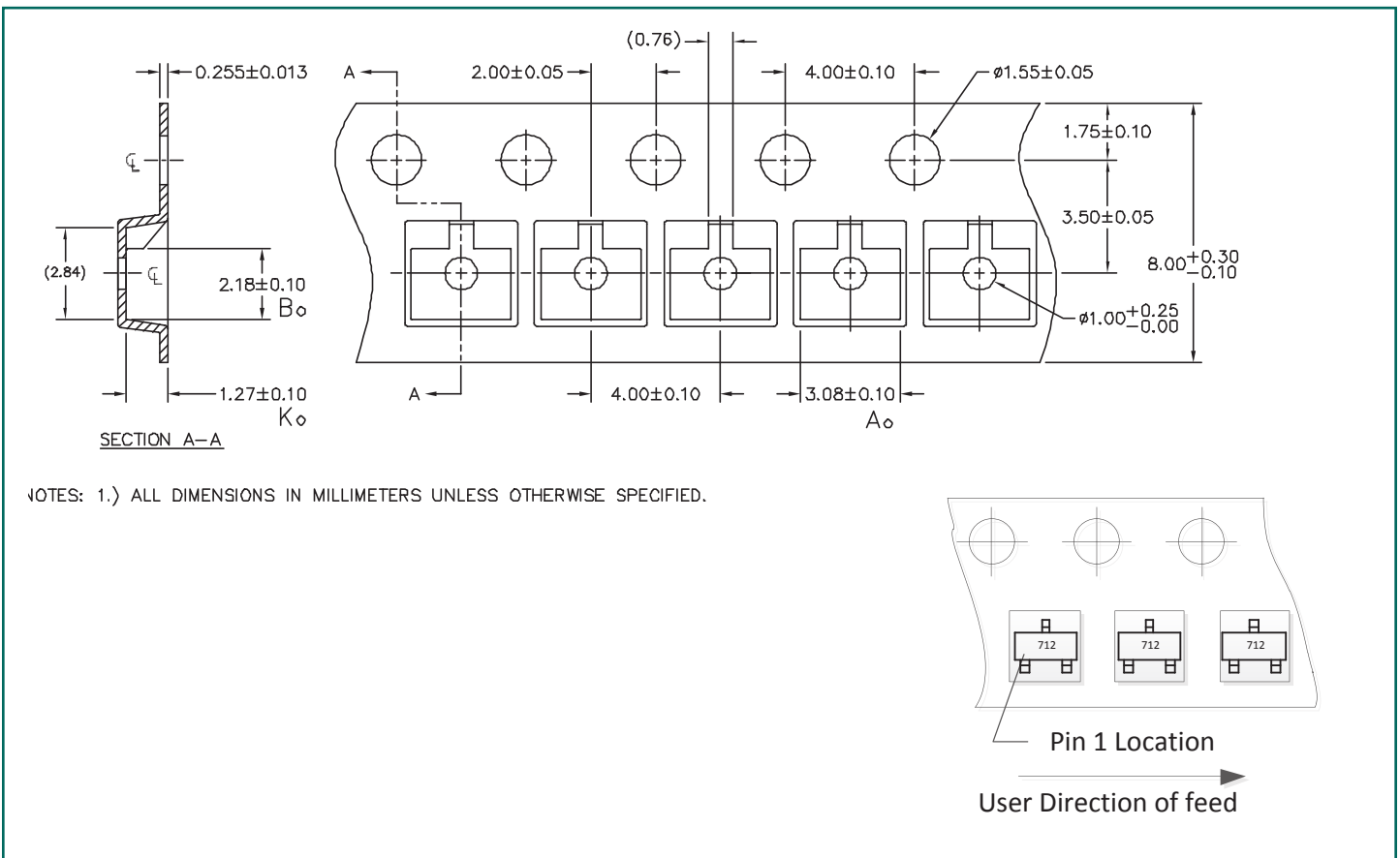


- NOTES:
1. CONTROLLING DIMENSIONS ARE IN MILLIMETERS (ANGLES IN DEGREES).
 2. THIS LAND PATTERN IS FOR REFERENCE PURPOSES ONLY CONSULT YOUR MANUFACTURING GROUP TO ENSURE YOUR COMPANY'S MANUFACTURING GUIDELINES ARE MET.
 3. REFERENCE IPC-SM-782A.

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

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