



PRODUCT CHANGE NOTIFICATION
PCN-000870
Date: 9DEC2022

P1/1

Semtech Corporation, 200 Flynn Road, Camarillo CA 93012

Change Details

Part Number(s) Affected: RCLAMP2402B.TCT	Customer Part Number(s) Affected: <input checked="" type="checkbox"/> N/A
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Description, Purpose and Effect of Change:
 Semtech PN RCLAMP2402B.TCT is being migrated from ASMC 5" wafer fab to ASMC 8" wafer fab.
 Due to this migration the capacitance of the 8" version of this device is 10% higher than the 5" version of the device.
 All other parameters are unchanged.

Parameter	5" [POR]	8" [New]
C _J : Pin 1 to Pin 2	0.9 pF [Max]	1.0 pF [Max]
C _J : Pin 1 to Pin 3	1.5 pF [Max]	1.65 pF [Max]
C _J : Pin 2 to Pin 3		

5" version will no longer be available after Q1 of 2023

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	<input checked="" type="checkbox"/> N/A

Impact to Performance, Characteristics or Reliability:

- Impact to data sheet = Refer to above C_J changes
- Change in performance - capacitance has been relaxed by 10% from previous datasheet

Implementation Date	Q1 2023	Work Week	To Be Advised
Last Time Ship (LTS) Of unchanged product	Not Applicable	Affecting Lot No. / Serial No. (SN)	Not Applicable
Sample Availability	Immediate	Qualification Report Availability	Attached

Supporting Documents for Change Validation/Attachments:

- Final Qualification Report
- Updated Datasheet
- Test Characterization Report

Issuing Authority

Semtech Business Unit:	Protection Business Unit	
Semtech Contact Info:	QA representative: Les Fang Yuen lfangyuen@semtech.com +1 949-269-4443	Digital signature

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

RCLAMP2412B NPI QUALIFICATION

Semtech Job#	7648
Accepted Date	06-13-2022
Job Type	New Device Qual.
Business Unit	Protection
Package Type	SC-75
Package Lead	3
Assembly Designator	Diode Inc
Master Process	21L
Fab Designator	ASMC21TVS
Rel Job Status	Rel Testing Complete Passes All Requirements
Comment	Note that this is for 8" wafer qual.

Completed Tasks

Sub Lot #	Part	Lot	Assembly Lot	Date Code			
1	RClamp2402B	1	AER9091	2225			
Task#	Task Code	Sam ple Size	Criteria	Failures	Task On Actual	Task Off Actual	Comments
1	Data-Prep	None	None	0	07-25-2022	07-25-2022	
2	HTRB_Pre_Elect_150°C_RT24	105	Pass on Zero Fails	0	08-03-2022	08-03-2022	
3	HTRB_150°C_Real Time_0024	105	Pass on Zero Fails	0	08-08-2022	08-09-2022	
4	HTRB_Pre_Elect	105	Pass on Zero Fails	0	07-26-2022	07-26-2022	
5	BL_BD_Valid	NA	Meet HTOL Schematics	0	07-25-2022	07-25-2022	
6	HTRB_150°C_0072	105	Pass on Zero Fails	0	07-26-2022	07-29-2022	
7	HTRB_150°C_0408	105	Pass on Zero Fails	0	07-29-2022	08-09-2022	
8	HTS_Pre_Elect	77	Pass on Zero Fails	0	08-01-2022	08-01-2022	
9	HTS_0168	77	Pass on Zero Fails	0	08-01-2022	08-08-2022	
10	HTS_0500	77	Pass on Zero Fails	0	08-08-2022	08-22-2022	
11	HTS_1000	77	Pass on Zero Fails	0	08-22-2022	09-12-2022	
12	ROSE Clean/ Test	251	Pass on Zero Fails	0	07-25-2022	07-25-2022	
13	85°C/85%RH_N/Pre_Pre Elec	20	Pass with 0 fail	0	08-03-2022	08-03-2022	
14	85°C/85%RH_BD_Valid	20	Pass on Zero Fails	0	08-02-2022	08-03-2022	
15	85/85_120hr_On/Off	20	Pass on Zero Fails	0	08-03-2022	08-08-2022	
16	Pre_Elect_Precond	231	Pass on Zero Fails	0	07-26-2022	07-26-2022	
17	Precond_Temp_Cyc_5cyc	231	Pass on Zero Fails	0	07-26-2022	07-26-2022	
18	Precond_HTS_24hr	231	Pass on Zero Fails	0	07-26-2022	07-27-2022	
19	Precond_85/85_NoElec168hr	231	Pass on Zero Fails	0	07-27-2022	08-03-2022	
20	Precond_IR_Refl_Char	231	Pass on Zero Fails	0	08-03-2022	08-03-2022	
21	T/C_Pre_Elect	77	Pass on Zero Fails	0	08-03-2022	08-03-2022	
22	T/C_wPre_0250	77	Pass on Zero Fails	0	08-03-2022	08-08-2022	

Task#	Task Code	Sample Size	Criteria	Failures	Task On Actual	Task Off Actual	Comments
23	T/C_wPre_0500	77	Pass on Zero Fails	0	08-08-2022	08-15-2022	
24	Cross_Section TC 500 Cyc	5	Pass on Zero Fails	0	08-15-2022	08-16-2022	
25	T/C_wPre_1000	77	Pass on Zero Fails	0	08-15-2022	08-24-2022	
26	HAST Pre_Elect	77	Pass on Zero Fails	0	08-03-2022	08-03-2022	
27	HAST_BD_Validation	N/A	Pass on Zero Fails	0	08-03-2022	08-05-2022	
28	HAST_wPRE_264 Hrs 110°C	77	Pass on Zero Fails	0	08-05-2022	08-17-2022	
29	HAST Pre_Elect	77	Pass on Zero Fails	0	08-03-2022	08-03-2022	
30	HAST_unbias_264hrs_110°C	77	Pass on Zero Fails	0	08-05-2022	08-17-2022	
31	CSAM Analysis	22	Pass on Zero Fails	0	08-05-2022	08-05-2022	
32	Precond_Temp_Cyc_5cyc	22	Pass on Zero Fails	0	08-08-2022	08-08-2022	
33	Precond_HTS_24hr	22	Pass on Zero Fails	0	08-08-2022	08-09-2022	
34	Precond_85/85_NoElec168hr	22	Pass on Zero Fails	0	08-09-2022	08-16-2022	
35	Precond_260°C_IR_Ref_Char	22	Pass on Zero Fails	0	08-16-2022	08-16-2022	
36	CSAM Analysis	22	Pass on Zero Fails	0	08-16-2022	08-16-2022	
37	Pack_Clos	0	0	0	09-14-2022	09-14-2022	

Sub Lot #	Part	Lot	Assembly Lot	Date Code
2	RClamp2402B	1	AER-9126	2227

Task#	Task Code	Sample Size	Criteria	Failures	Task On Actual	Task Off Actual	Comments
1	Data-Prep	None	None	0	08-29-2022	08-29-2022	
2	HTRB_Pre_Elect_150°C_RT24	105	Pass on Zero Fails	0	08-31-2022	08-31-2022	
3	HTRB_150°C_Real Time_0024	105	Pass on Zero Fails	0	09-01-2022	09-01-2022	
4	HTRB_Pre_Elect	105	Pass on Zero Fails	0	08-30-2022	08-30-2022	
5	BI_BD_Valid	105	Meet HTOL Schematics	0	08-30-2022	08-30-2022	
6	HTRB_150°C_0072	105	Pass on Zero Fails	0	08-30-2022	09-02-2022	
7	HTRB_150°C_0408	105	Pass on Zero Fails	0	09-02-2022	09-15-2022	
8	HTS_Pre_Elect	77	Pass on Zero Fails	0	08-29-2022	08-29-2022	
9	HTS_0168	77	Pass on Zero Fails	0	08-29-2022	09-06-2022	
10	HTS_0500	77	Pass on Zero Fails	0	09-06-2022	09-19-2022	
11	HTS_1000	77	Pass on Zero Fails	0	09-19-2022	10-10-2022	

Task#	Task Code	Sample Size	Criteria	Failures	Task On Actual	Task Off Actual	Comments
12	Pre_Conditioning_Level_1	NA	MSL 1	0	08-31-2022	08-31-2022	
13	ROSE Clean/ Test	231	Pass on Zero Fails	0	08-29-2022	08-29-2022	
14	Pre_Elect_Precond	231	Pass on Zero Fails	0	08-30-2022	08-30-2022	
15	Precond_Temp_Cyc_5cyc	231	Pass on Zero Fails	0	08-30-2022	08-30-2022	
16	Precond_HTS_24hr	231	Pass on Zero Fails	0	08-30-2022	08-31-2022	
17	Precond_85/85_NoElec168hr	231	Pass on Zero Fails	0	08-31-2022	09-07-2022	
18	Precond_260°C_IR_Ref_Char	231	Pass on Zero Fails	0	09-07-2022	09-07-2022	
19	T/C_Pre_Elect	77	Pass on Zero Fails	0	09-07-2022	09-07-2022	
20	T/C_wPre_0250	77	Pass on Zero Fails	0	09-07-2022	09-13-2022	
21	T/C_wPre_0500	77	Pass on Zero Fails	0	09-13-2022	09-19-2022	
22	Cross_Section TC 500 Cyc	5	Pass on Zero Fails	0	09-19-2022	09-20-2022	
23	T/C_wPre_1000	77	Pass on Zero Fails	0	09-20-2022	09-28-2022	
24	HAST Pre_Elect	77	Pass on Zero Fails	0	09-07-2022	09-07-2022	
25	HAST_BD_Validation	N/A	Pass on Zero Fails	0	09-08-2022	09-08-2022	
26	HAST_wPRE_264 Hrs 110°C	77	Pass on Zero Fails	0	09-16-2022	09-28-2022	
27	HAST Pre_Elect	77	Pass on Zero Fails	0	09-07-2022	09-07-2022	
28	HAST_unbias_264hrs_110°C	77	Pass on Zero Fails	0	09-16-2022	09-28-2022	
29	CSAM Analysis	22	Pass on Zero Fails	0	09-12-2022	09-12-2022	
30	Precond_Temp_Cyc_5cyc	22	Pass on Zero Fails	0	09-12-2022	09-12-2022	
31	Precond_HTS_24hr	22	Pass on Zero Fails	0	09-12-2022	09-13-2022	
32	Precond_85/85_NoElec168hr	22	Pass on Zero Fails	0	09-13-2022	09-20-2022	
33	Precond_260°C_IR_Ref_Char	22	Pass on Zero Fails	0	09-20-2022	09-20-2022	
34	CSAM Analysis	22	Pass on Zero Fails	0	09-20-2022	09-20-2022	
35	Pack_Clos	0	0	0	10-12-2022	10-12-2022	

Sub Lot #	Part	Lot	Assembly Lot	Date Code
3	RClamp2402B	1	AER-009211	2233

Task#	Task Code	Sample Size	Criteria	Failures	Task On Actual	Task Off Actual	Comments
1	Data-Prep	None	None	0	09-07-2022	09-07-2022	
2	HTRB_Pre_Elect_150°C_RT24	105	Pass on Zero Fails	0	09-13-2022	09-13-2022	
3	HTRB_150°C_Real Time_0024	105	Pass on Zero Fails	0	09-14-2022	09-15-2022	
4	HTRB_Pre_Elect	105	Pass on Zero Fails	0	09-09-2022	09-09-2022	

Task#	Task Code	Sample Size	Criteria	Failures	Task On Actual	Task Off Actual	Comments
5	BI_BD_Valid	105	Meet HTOL Schematics	0	09-09-2022	09-09-2022	
6	HTRB_150°C_0072	105	Pass on Zero Fails	0	09-09-2022	09-12-2022	
7	HTRB_150°C_0408	105	Pass on Zero Fails	0	09-12-2022	09-26-2022	
8	HTS_Pre_Elect	77	Pass on Zero Fails	0	09-08-2022	09-08-2022	
9	HTS_0168	77	Pass on Zero Fails	0	09-08-2022	09-15-2022	
10	HTS_0500	77	Pass on Zero Fails	0	09-15-2022	09-29-2022	
11	HTS_1000	77	Pass on Zero Fails	0	09-29-2022	10-20-2022	
12	Pre_Conditioning_Level_1	NA	MSL 1	0	09-09-2022	09-09-2022	
13	ROSE Clean/ Test	231	Pass on Zero Fails	0	09-08-2022	09-08-2022	
14	Pre_Elect_Precond	231	Pass on Zero Fails	0	09-12-2022	09-12-2022	
15	Precond_Temp_Cyc_5cyc	231	Pass on Zero Fails	0	09-12-2022	09-12-2022	
16	Precond_HTS_24hr	231	Pass on Zero Fails	0	09-12-2022	09-13-2022	
17	Precond_85/85_NoElec168hr	231	Pass on Zero Fails	0	09-13-2022	09-20-2022	
18	Precond_260°C_IR_Ref_Char	231	Pass on Zero Fails	0	09-20-2022	09-20-2022	
19	T/C_Pre_Elect	77	Pass on Zero Fails	0	09-20-2022	09-20-2022	
20	T/C_wPre_0250	77	Pass on Zero Fails	0	09-20-2022	09-26-2022	
21	T/C_wPre_0500	77	Pass on Zero Fails	0	09-26-2022	09-30-2022	
22	Cross_Section TC 500 Cyc	5	Pass on Zero Fails	0	09-30-2022	09-30-2022	
23	T/C_wPre_1000	77	Pass on Zero Fails	0	09-30-2022	10-10-2022	
24	HAST_Pre_Elect	77	Pass on Zero Fails	0	09-20-2022	09-20-2022	
25	HAST_BD_Validation	77	Pass on Zero Fails	0	09-16-2022	09-16-2022	
26	HAST_wPRE_264 Hrs 110°C	77	Pass on Zero Fails	0	09-22-2022	10-04-2022	
27	HAST_Pre_Elect	77	Pass on Zero Fails	0	09-20-2022	09-20-2022	
28	HAST_unbias_264hrs_110°C	77	Pass on Zero Fails	0	09-22-2022	10-04-2022	
29	CSAM Analysis	22	Pass on Zero Fails	0	09-22-2022	09-22-2022	
30	Precond_Temp_Cyc_5cyc	22	Pass on Zero Fails	0	09-26-2022	09-26-2022	
31	Precond_HTS_24hr	22	Pass on Zero Fails	0	09-26-2022	09-27-2022	
32	Precond_85/85_NoElec168hr	22	Pass on Zero Fails	0	09-27-2022	10-04-2022	
33	Precond_260°C_IR_Ref_Char	22	Pass on Zero Fails	0	10-04-2022	10-04-2022	
34	CSAM Analysis	22	Pass on Zero Fails	0	10-04-2022	10-05-2022	
35	Pack_Clos	0	0	0	10-24-2022	10-24-2022	

PROTECTION PRODUCTS

Description

RClamp[®] TVS diodes are designed to protect sensitive electronics from damage or latch-up due to ESD & EOS. These devices offer desirable characteristics for board level protection including fast response time, low operating and low clamping voltage.

RClamp2402B has a typical capacitance of only 0.7pF (pin 1 to 2). This means it can be used on circuits operating in excess of 3GHz without signal attenuation. They may be used to meet the ESD immunity requirements of IEC 61000-4-2, Level 4 ($\pm 25\text{kV}$ air, $\pm 15\text{kV}$ contact discharge). Each device can be configured to protect one bidirectional line or two unidirectional lines.

These devices are in a small SC-75 (SOT-523) package and feature a lead-free, matte tin finish. They are compatible with both lead free and SnPb assembly techniques. They are designed for use in applications where board space is at a premium. The combination of small size, low capacitance, and high level of ESD protection makes them a flexible solution for applications such as Automatic Test Equipment and USB 2.0.

Features

- Transient protection for high-speed data lines to IEC 61000-4-2 (ESD) $\pm 25\text{kV}$ (air), $\pm 15\text{kV}$ (contact) IEC 61000-4-4 (EFT) 40A (5/50ns)
- Protects up to two I/O lines
- Low Line-to-Line capacitance: 0.7pF(Typical)
- Low insertion loss to $>3.0\text{GHz}$
- Low clamping voltage
- Operating voltage: 24V
- Solid-state silicon-avalanche technology

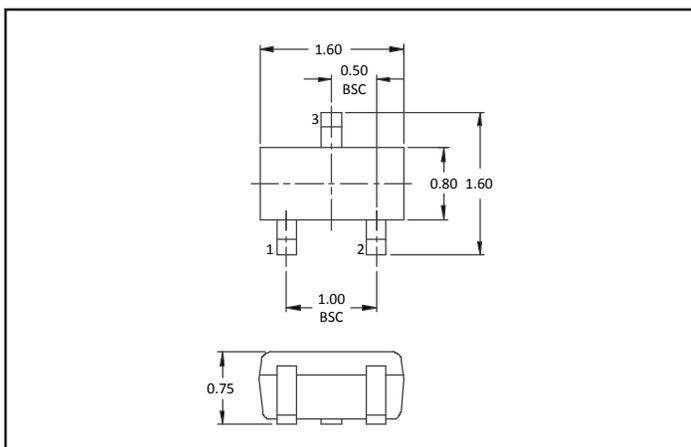
Mechanical Characteristics

- SC-75 (SOT-523) package
- Lead Finish: Matte Tin
- Pb-Free, Halogen Free, RoHS/WEEE Compliant
- Molding compound flammability rating: UL 94V-0
- Packaging: Tape and Reel

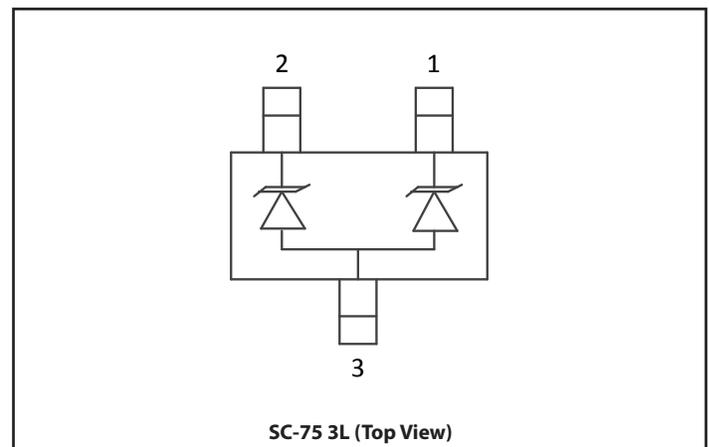
Applications

- Cellular Handsets & Accessories
- Notebook Computers
- Tablets
- Portable Instrumentation
- USB 2.0
- Firewire Ports

Nominal Dimensions (mm)



Schematic & Pin Configuration



Absolute Maximum Rating

Rating	Symbol	Value	Units
Peak Pulse Power ($t_p = 8/20\mu s$)	P_{PK}	200	W
Peak Pulse Current ($t_p = 8/20\mu s$)	I_{PP}	4	A
ESD per IEC 61000-4-2 (Air) ⁽¹⁾ ESD per IEC 61000-4-2 (Contact) ⁽¹⁾	V_{ESD}	± 25 ± 15	kV
Junction Temperature Operating Temperature	T_J & T_{OP}	-55 to +125	°C
Storage Temperature	T_{STG}	-55 to +150	°C

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

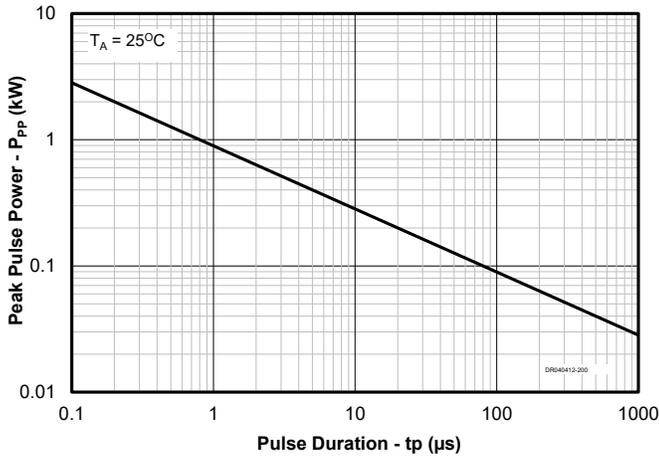
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Units
Reverse Stand-Off Voltage	V_{RWM}	Between any two pins			24	V
Reverse Breakdown Voltage	V_{BR}	$I_t = 1mA$, between any two pins	26.7			V
Reverse Leakage Current	I_R	$V_{RWM} = 24V$, between any two pins			1	μA
Clamping Voltage	V_C	$t_p = 8/20\mu s$ Pin 1 to Pin 2			45	V
		$t_p = 8/20\mu s$ Pin 1 or Pin 2 to Pin 3	$I_{PP} = 1A$		50	
		$t_p = 8/20\mu s$ Pin 1 to Pin 2	$I_{PP} = 4A$		55	
Junction Capacitance	C_J	$V_R = 0V$, $f = 1MHz$, Pin 1 to Pin 2		0.7	1	pF
Junction Capacitance	C_J	$V_R = 0V$, $f = 1MHz$, Pin 1 or Pin 2 to Pin 3			1.65	pF

Note:

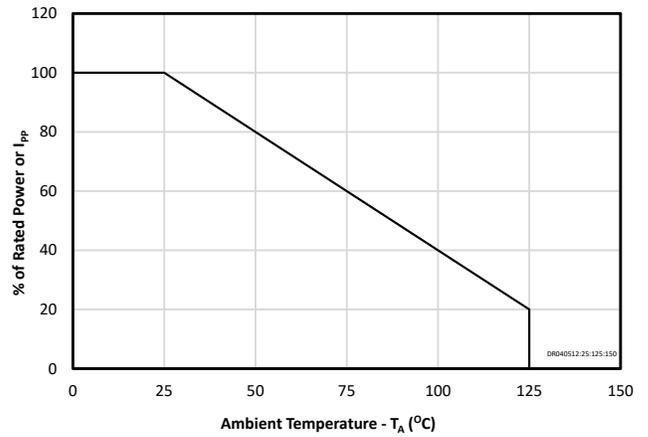
1) ESD gun return path connected to ESD ground plane.

Typical Characteristics

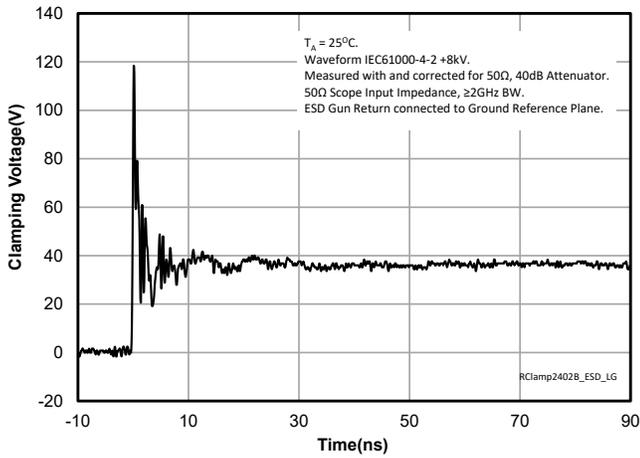
Non Repetitive Peak Pulse Power vs. Pulse Time



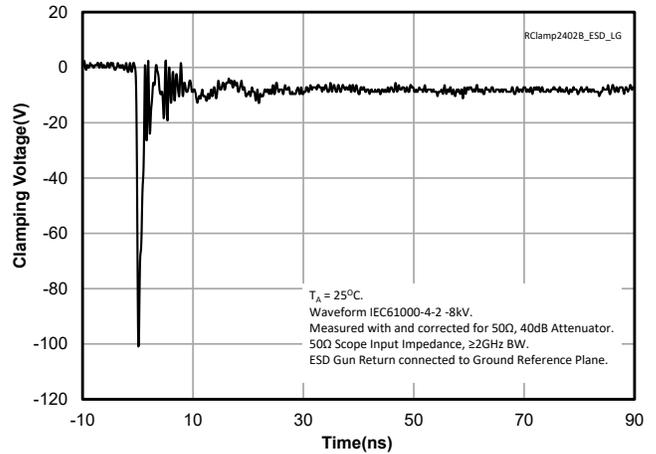
Power Derating Curve



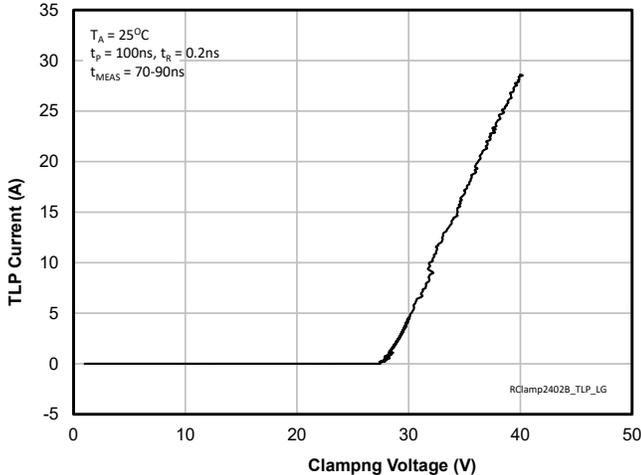
**ESD Clamping (8kV Contact per IEC 61000-4-2)
Pin 1 or Pin 2 to Pin 3**



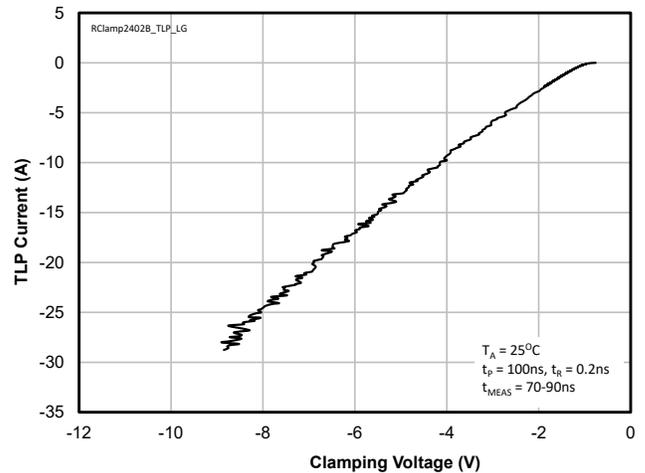
**ESD Clamping (-8kV Contact per IEC 61000-4-2)
Pin 1 or Pin 2 to Pin 3**



**TLP Characteristic (Positive)
Pin 1 or Pin 2 to Pin 3**

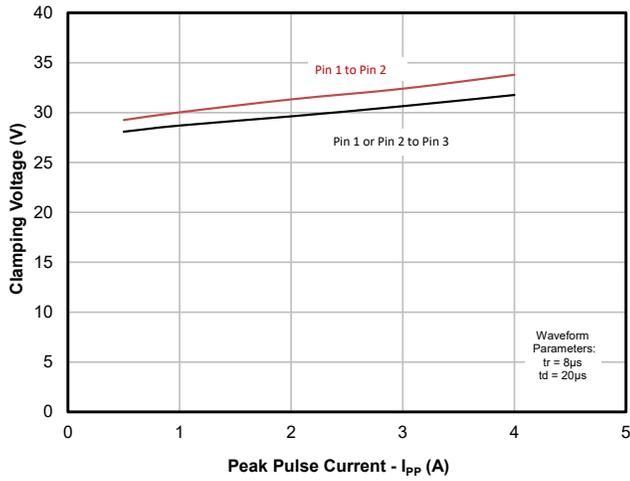


**TLP Characteristic (Negative)
Pin 1 or Pin 2 to Pin 3**

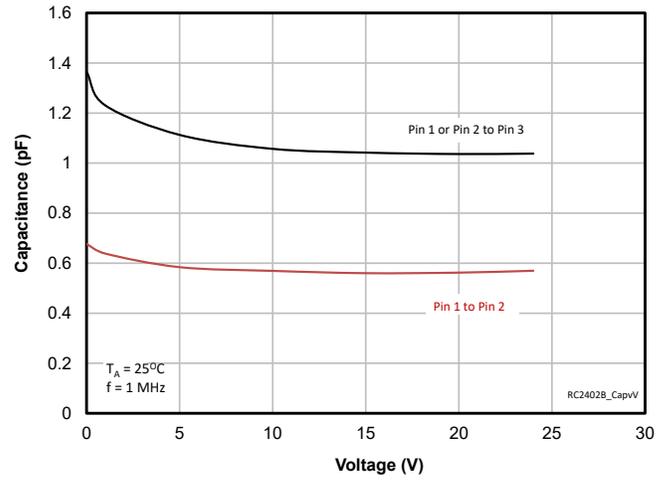


Typical Characteristics (Continued)

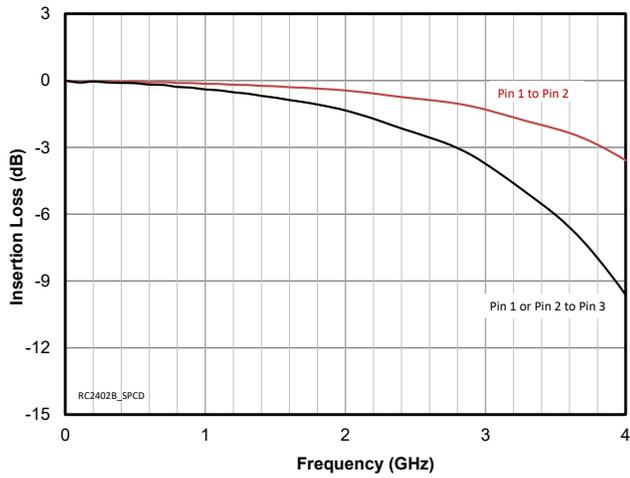
Clamping Voltage vs. Peak Pulse Current ($t_p=8/20\mu s$)



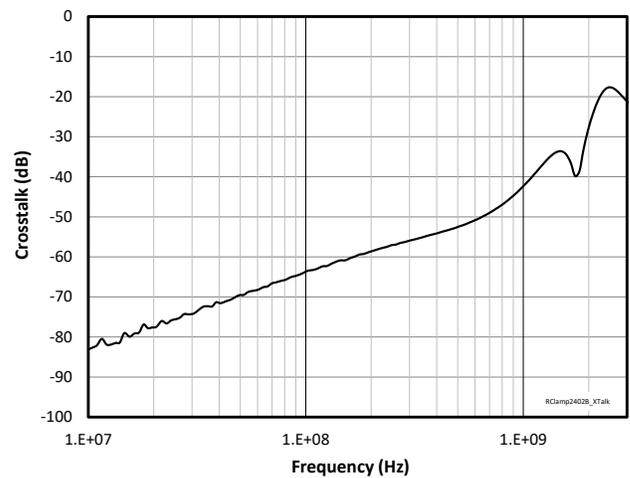
Capacitance vs. Reverse Voltage



Insertion Loss S21



Crosstalk



Application Information

Device Connection Options

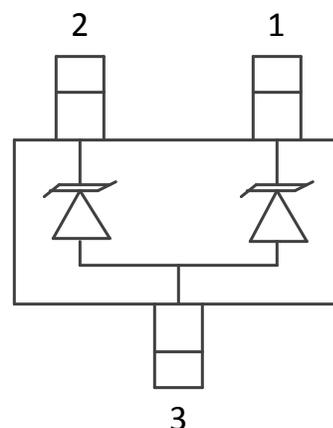
This device is optimized for protection of 1 line operating in excess of 3GHz. It may also be used to protect two lines operating in excess of 2GHz. The device is connected as follows: Protection for one line with <math><1\text{pF}</math> capacitance can be achieved by connecting one data line to either pin 1 or pin 2 with the other pin connected to ground. Pin 3 is not connected. The connection to ground should be made directly to a ground plane. The path length should also be kept as short as possible to minimize parasitic inductance.

Protection of two lines is achieved by connecting data lines at pins 1 & 2. Pin 3 is connected to ground. The connection to ground should be made directly to a ground plane. The path length should also be kept as short as possible to minimize parasitic inductance.

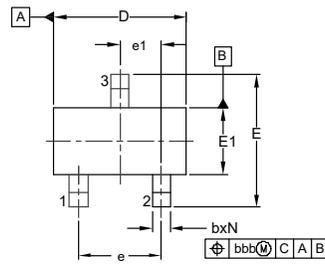
Matte Tin Lead Finish

Matte tin has become the industry standard lead-free replacement for SnPb lead finishes. A matte tin finish is composed of 100% tin solder with large grains. Since the solder volume on the leads is small compared to the solder paste volume that is placed on the land pattern of the PCB, the reflow profile will be determined by the requirements of the solder paste. Therefore, these devices are compatible with both lead-free and SnPb assembly techniques. In addition, unlike other lead-free compositions, matte tin does not have any added alloys that can cause degradation of the solder joint.

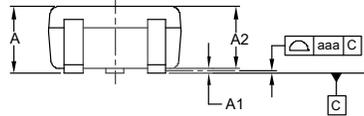
Figure 1. Pin Configuration



Outline Drawing - SC75 3L



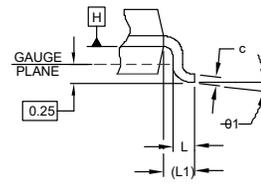
DIMENSIONS			
DIM	MILLIMETERS		
	MIN	NOM	MAX
A	0.60	-	0.90
A1	0.00	-	0.10
A2	0.60	0.75	0.80
b	0.15	-	0.30
c	0.10	-	0.20
D	1.50	1.60	1.70
E	1.45	1.60	1.75
E1	0.75	0.80	0.85
e	1.00 BSC		
e1	0.50 BSC		
L	0.10	0.22	0.30
L1	(0.40)		
N	3		
θ	0°	-	8°
aaa	0.10		
bbb	0.20		



SEATING PLANE



SIDE VIEW

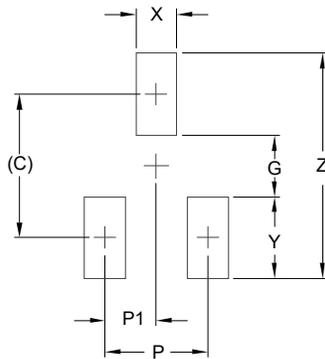


DETAIL A

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 - SC75 3L

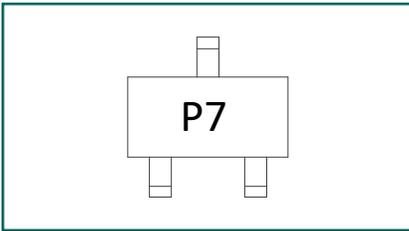


DIMENSIONS	
DIM	MILLIMETERS
C	(1.40)
G	0.60
P	1.00
P1	0.50
X	0.40
Y	0.80
Z	2.20

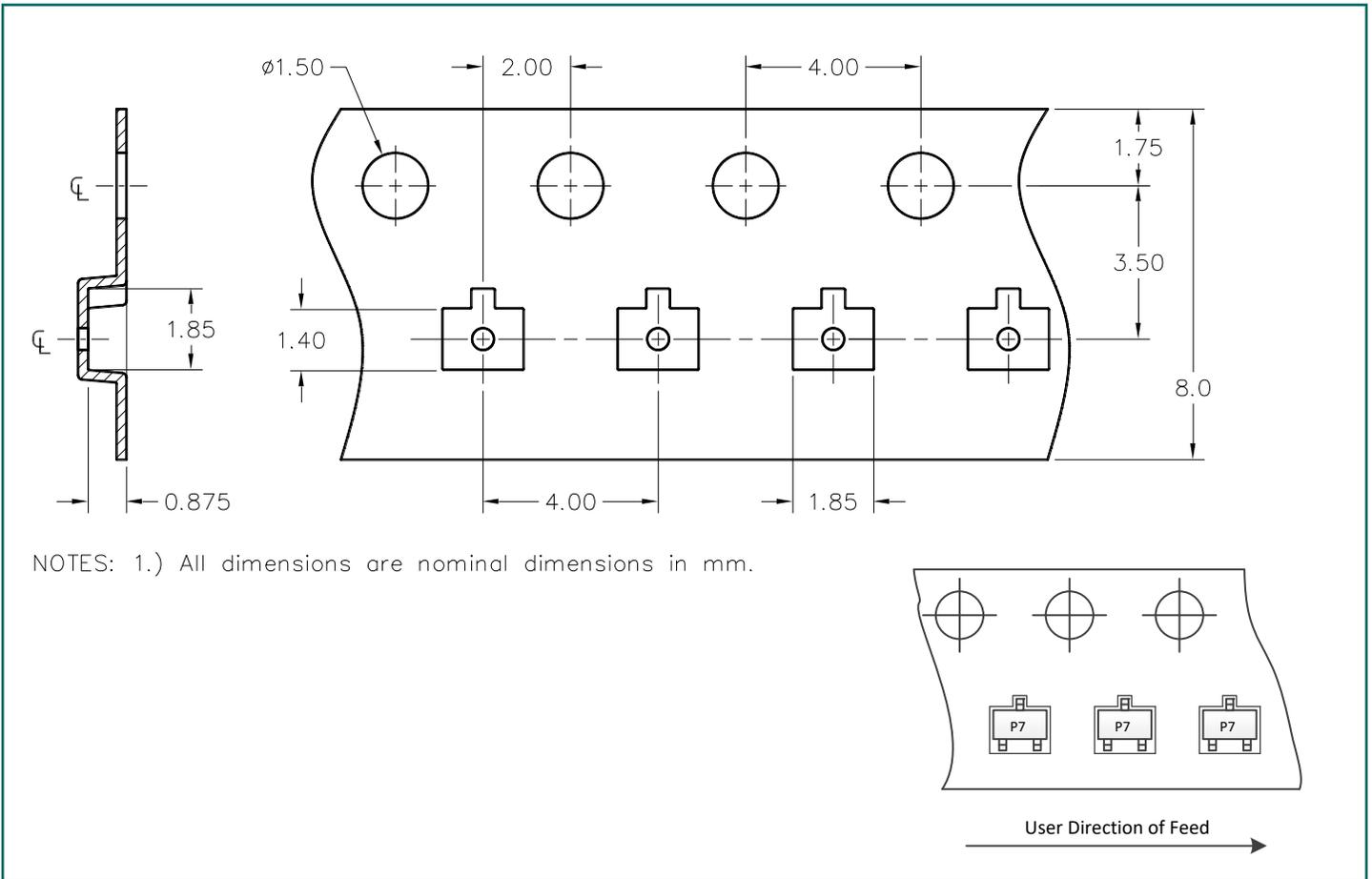
NOTES:

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.

Marking Code



Tape and Reel Specification



Ordering Information

Part Number	Qty per Reel	Reel Size
RClamp2402B.TCT	3,000	7"



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RClamp2402B.TCT Characterization Report:

Les – 09/15/2022

Test Summary



RClamp2402B.TCT

AER-9211 POR

Parameter	Symbol	Conditions	Units	Min.	Typ.	Max.	Ave.	Ave.
Reverse Stand-Off Voltage	V_{RWM}	L-G, L-L	V			24		
Reverse Breakdown Voltage	V_{BR}	$I_t = 1\text{mA}$, L-G, L-L	V	26.7			27.3	32.6
Reverse Leakage Current	I_R	$V_{RWM} = 24\text{V}$, L-G or L-L	μA			1	0.003	0.2
Clamping Voltage	V_C	$t_p = 8/20\mu\text{s}$	$I_{PP} = 4\text{A}$, L-G	V		50	32.0	40.8
			$I_{PP} = 1\text{A}$, L-L			45	30.1	36.9
			$I_{PP} = 4\text{A}$, L-L			55	33.9	43.3
Junction Capacitance	C_J	$V_R = 0\text{V}$, $f = 1\text{MHz}$	L-G	pF		1.65*	1.44	0.6
			L-L		0.6	1	0.70	0.3
Peak Pulse Current	I_{PP}	$t_p = 8/20\mu\text{s}$	A			4	10	7
Peak Pulse Power	P_{PP}	$t_p = 8/20\mu\text{s}$	W			200	398.08	332.02
ESD per IEC 61000-4-2	V_{ESD}	Contact	kV			± 15	± 30	± 20
		Air				± 25	± 30	± 30



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