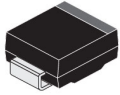
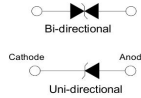


## 600W SURFACE MOUNT TRANSIENT VOLTAGE SUPPRESSORS

**SMBJXXX**



DO-214AA (SMB)



**DO-214AA(SMB)**  
**Surface Mount**  
**Plastic Package**  
**RoHS compliant**

### FEATURES:

1. Glass passivated chip
2. 600 W peak pulse power capability with a 10/1000 us waveform, repetitive rate (duty cycle):0.01 %
3. Excellent clamping capability
4. Low reverse leakage
5. Very fast response time
6. Lead and body according with RoHS standard
7. This device is available in AEC-Q101 complaint also.
8. This product is available in AEC-Q101 Qualified and PPAP Capable also.

**Note:** For AEC-Q101 qualified products, please use suffix -AQ in the part number while ordering.

### ABSOLUTE MAXIMUM RATINGS (Ta = 25 °C Unless otherwise specified)

PARAMETER	SYMBOL	VALUE	UNIT
Peak Pulse Power Dissipation on 10/1000 $\mu$ s Waveform <sup>1</sup> ,	P <sub>PP</sub>	600	W
Power Dissipation on Infinite Heat Sink at T <sub>L</sub> = 75°C	P <sub>D</sub>	5	W
Peak Pulse Current of on 10/1000 $\mu$ s Waveform <sup>1</sup>	I <sub>PP</sub>	See next table	A
Peak forward surge current, 8.3 ms single half sine wave unidirectional only <sup>2</sup>	I <sub>FSM</sub>	100	A
Maximum instantaneous forward voltage at 50 A for unidirectional only <sup>3</sup>	V <sub>F</sub>	3.5/6.5	V
Operating Junction Temperature Range	T <sub>J</sub> , T <sub>STG</sub>	-55 to +150	°C

### Note:

1. Non-repetitive current pulse per Fig.5 and derated above T<sub>A</sub>= 25 °C per Fig.1.
2. Measured on 8.3 ms single half sine-wave or equivalent square wave, duty cycle = 4 pulses per minute maximum.
3. V<sub>F</sub><3.5V for devices of V<sub>BR</sub><200V and V<sub>F</sub><6.5V for devices of V<sub>BR</sub>>201V.



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**ELECTRICAL CHARACTERISTICS** at (Ta = 25 °C Unless otherwise specified)

Part Number		Device Marking code		Reverse Stand-off voltage	Breakdown Voltage $V_{BR}$ @ $I_T$		Test Current	Maximum Clamping Voltage @ $I_{PP}$	Max. Peak Pulse Current	Max. Reverse Leakage @ $V_{RWM}$
UNI-POLAR	BI-POLAR	UNI	BI	$V_{RWM}(V)$	Min (V)	Max (V)	$I_T(mA)$	$V_{CMAX}(V)$	$I_{PP} (A)$	$I_R (\mu A)$
SMBJ5.0A	SMBJ5.0CA	KE	AE	5.0	6.40	7.00	10	9.20	65.30	800
SMBJ6.0A	SMBJ6.0CA	KG	AG	6.0	6.67	7.37	10	10.30	58.30	800
SMBJ6.5A	SMBJ6.5CA	KK	AK	6.5	7.22	7.98	10	11.20	53.60	500
SMBJ7.0A	SMBJ7.0CA	KM	AM	7.0	7.78	8.60	10	12.00	50.00	200
SMBJ7.5A	SMBJ7.5CA	KP	AP	7.5	8.33	9.21	1	12.90	46.60	100
SMBJ8.0A	SMBJ8.0CA	KR	AR	8.0	8.89	9.83	1	13.60	44.20	50
SMBJ8.5A	SMBJ8.5CA	KT	AT	8.5	9.44	10.40	1	14.40	41.70	20
SMBJ9.0A	SMBJ9.0CA	KV	AV	9.0	10.00	11.10	1	15.40	39.00	10
SMBJ10A	SMBJ10CA	KX	AX	10.0	11.10	12.30	1	17.00	35.30	5
SMBJ11A	SMBJ11CA	KZ	AZ	11.0	12.20	13.50	1	18.20	33.00	1
SMBJ12A	SMBJ12CA	LE	BE	12.0	13.30	14.70	1	19.90	30.20	1
SMBJ13A	SMBJ13CA	LG	BG	13.0	14.40	15.90	1	21.50	27.90	1
SMBJ14A	SMBJ14CA	LK	BK	14.0	15.60	17.20	1	23.20	25.90	1
SMBJ15A	SMBJ15CA	LM	BM	15.0	16.70	18.50	1	24.40	24.60	1
SMBJ16A	SMBJ16CA	LP	BP	16.0	17.80	19.70	1	26.00	23.10	1
SMBJ17A	SMBJ17CA	LR	BR	17.0	18.90	20.90	1	27.60	21.80	1
SMBJ18A	SMBJ18CA	LT	BT	18.0	20.00	22.10	1	29.20	20.60	1
SMBJ20A	SMBJ20CA	LV	BV	20.0	22.20	24.50	1	32.40	18.60	1
SMBJ22A	SMBJ22CA	LX	BX	22.0	24.40	26.90	1	35.50	16.90	1
SMBJ24A	SMBJ24CA	LZ	BZ	24.0	26.70	29.50	1	38.90	15.50	1
SMBJ26A	SMBJ26CA	ME	CE	26.0	28.90	31.90	1	42.10	14.30	1
SMBJ28A	SMBJ28CA	MG	CG	28.0	31.10	34.40	1	45.40	13.30	1
SMBJ30A	SMBJ30CA	MK	CK	30.0	33.30	36.80	1	48.40	12.40	1
SMBJ33A	SMBJ33CA	MM	CM	33.0	36.70	40.60	1	53.30	11.30	1
SMBJ36A	SMBJ36CA	MP	CP	36.0	40.00	44.20	1	58.10	10.40	1
SMBJ40A	SMBJ40CA	MR	CR	40.0	44.40	49.10	1	64.50	9.30	1
SMBJ43A	SMBJ43CA	MT	CT	43.0	47.80	52.80	1	69.40	8.70	1
SMBJ45A	SMBJ45CA	MV	CV	45.0	50.00	55.30	1	72.70	8.30	1
SMBJ48A	SMBJ48CA	MX	CX	48.0	53.30	58.90	1	77.40	7.80	1
SMBJ51A	SMBJ51CA	MZ	CZ	51.0	56.70	62.70	1	82.40	7.30	1
SMBJ54A	SMBJ54CA	NE	DE	54.0	60.00	66.30	1	87.10	6.90	1
SMBJ58A	SMBJ58CA	NG	DG	58.0	64.40	71.20	1	93.60	6.50	1
SMBJ60A	SMBJ60CA	NK	DK	60.0	66.70	73.70	1	96.80	6.20	1
SMBJ64A	SMBJ64CA	NM	DM	64.0	71.10	78.60	1	103.00	5.90	1

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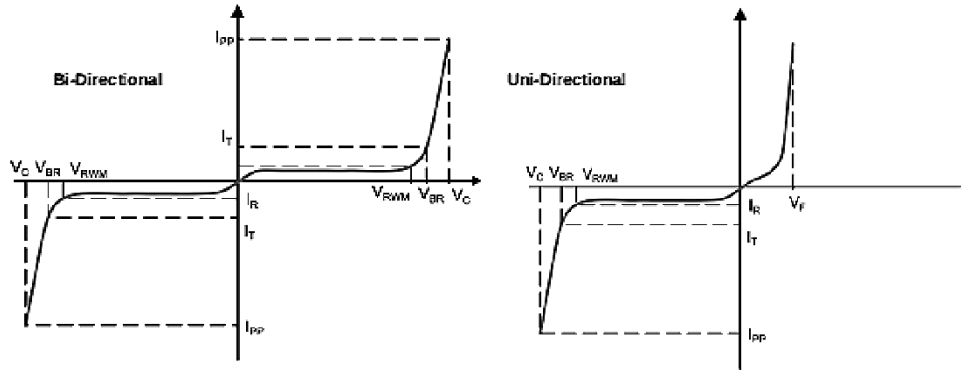


**ELECTRICAL CHARACTERISTICS** at (Ta = 25 °C Unless otherwise specified)

Part Number		Device Marking code		Reverse Stand-off voltage	Breakdown Voltage $V_{BR}$ @ $I_T$		Test Current	Maximum Clamping Voltage @ $I_{PP}$	Max. Peak Pulse Current	Max. Reverse Leakage @ $V_{RWM}$
UNI-POLAR	BI-POLAR	UNI	BI	$V_{RWM}(V)$	Min (V)	Max (V)	$I_T(mA)$	$V_{CMAX}(V)$	$I_{PP} (A)$	$I_R (\mu A)$
SMBJ70A	SMBJ70CA	NP	DP	70.0	77.8	86.00	1	113.00	5.30	1
SMBJ75A	SMBJ75CA	NR	DR	75.0	83.30	92.10	1	121.00	5.00	1
SMBJ78A	SMBJ78CA	NT	DT	78.0	86.70	95.80	1	126.00	4.80	1
SMBJ85A	SMBJ85CA	NV	DV	85.0	94.40	104.00	1	137.00	4.40	1
SMBJ90A	SMBJ90CA	NX	DX	90.0	100.00	111.00	1	146.00	4.10	1
SMBJ100A	SMBJ100CA	NZ	DZ	100.0	111.00	123.00	1	162.00	3.70	1
SMBJ110A	SMBJ110CA	PE	EE	110.0	122.00	135.00	1	177.00	3.40	1
SMBJ120A	SMBJ120CA	PG	EG	120.0	133.00	147.00	1	193.00	3.10	1
SMBJ130A	SMBJ130CA	PK	EK	130.0	144.00	159.00	1	209.00	2.90	1
SMBJ150A	SMBJ150CA	PM	EM	150.0	167.00	185.00	1	243.00	2.50	1
SMBJ160A	SMBJ160CA	PP	EP	160.0	178.00	197.00	1	259.00	2.30	1
SMBJ170A	SMBJ170CA	PR	ER	170.0	189.00	209.00	1	275.00	2.20	1
SMBJ180A	SMBJ180CA	PT	ET	180.0	201.00	222.00	1	292.00	2.10	1
SMBJ188A	SMBJ188CA	PV	EV	188.0	209.00	231.00	1	304.00	2.00	1
SMBJ200A	SMBJ200CA	PX	EX	200.0	224.00	247.00	1	324.0	1.9	1
SMBJ210A	SMBJ210CA	PZ	EZ	210.0	237.00	263.00	1	340.0	1.8	1
SMBJ220A	SMBJ220CA	QE	FE	220.0	246.00	272.00	1	356.0	1.7	1
SMBJ250A	SMBJ250CA	QG	FG	250.0	279.00	309.00	1	405.0	1.5	1
SMBJ300A	SMBJ300CA	QK	FK	300.0	335.00	371.00	1	486.0	1.3	1
SMBJ350A	SMBJ350CA	QM	FM	350.0	391.00	432.00	1	567.0	1.1	1
SMBJ400A	SMBJ400CA	QP	FP	400.0	447.00	494.00	1	648.0	0.9	1
SMBJ440A	SMBJ440CA	QR	FR	440.0	492.00	543.00	1	713.0	0.9	1
SMBJ480A	SMBJ480CA	QP	FP	480.0	536.00	593.00	1	750.0	0.8	1
SMBJ500A	SMBJ500CA	QV	FV	500.0	558.00	618.00	1	762.0	0.8	1
SMBJ510A	SMBJ510CA	QX	FX	510.0	570.00	630.00	1	762.0	0.8	1
SMBJ520A	SMBJ520CA	QR	FR	520.0	578.00	640.00	1	762.0	0.8	1
SMBJ550A	SMBJ550CA	QT	FT	550.0	615.00	680.00	1	860.0	0.7	1

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### I-V Curve Characteristics



- P<sub>PPM</sub>** Peak Pulse Power Dissipation - Max power dissipation
- V<sub>RWM</sub>** Reverse Stand-off Voltage - Maximum voltage that can be applied to TVS without operation
- V<sub>BR</sub>** Breakdown Voltage – Maximum voltage that flows though the TVS at a specified current ( $I_T$ )
- V<sub>C</sub>** Clamping Voltage – Peak voltage measured across the TVS at a specified IPPM (peak impulse current)
- I<sub>R</sub>** Reverse Leakage Current – Current measured at  $V_R$
- V<sub>F</sub>** Forward Voltage Drop for Uni-directional

## TYPICAL CHARACTERISTIC CURVES

Fig 1: Pulse Derating Curve

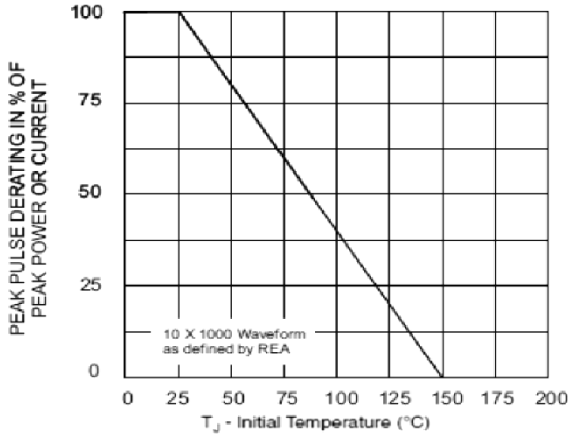


Fig 4: Peak pulse power Rating Curve

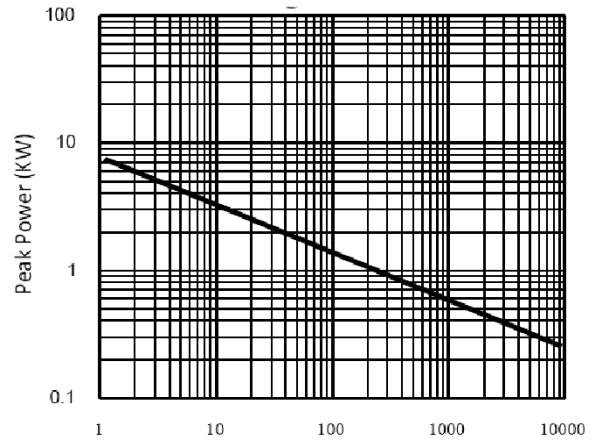


Fig 2: Maximum Non-Repetitive Surge Current

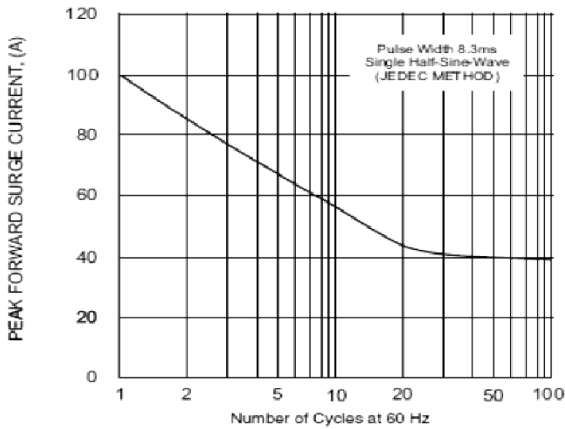


Fig 5: Pulse Waveform

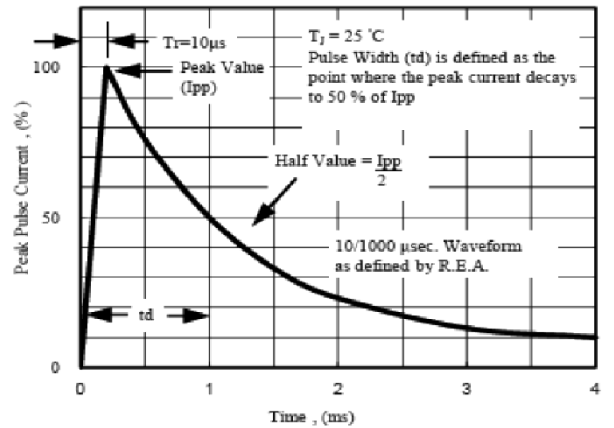


Fig 3: Steady State Power Derating Curve

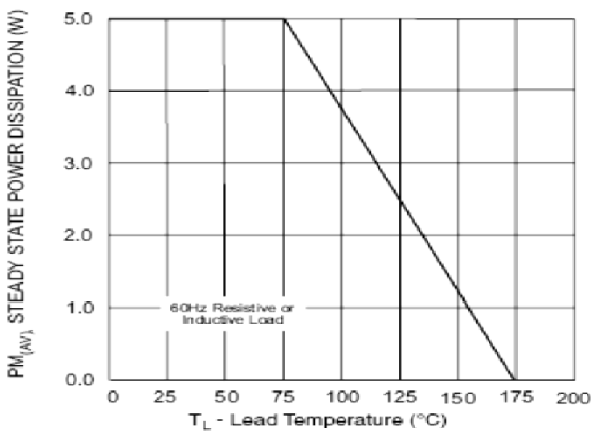
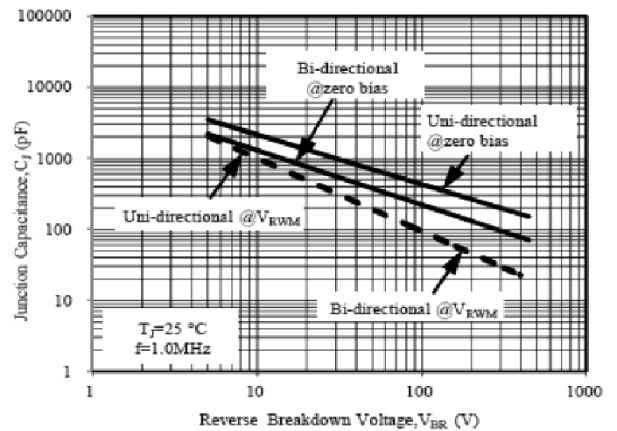
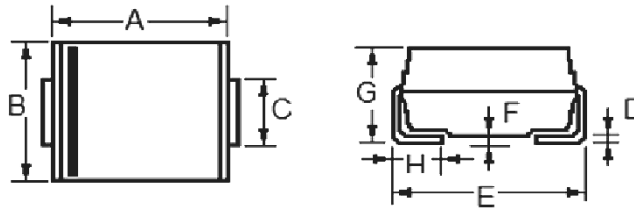


Fig 6: Typical Junction Capacitance



## PACKAGE DETAILS

### DO-214AA(SMB) PACKAGE OUTLINE AND DIMENSIONS

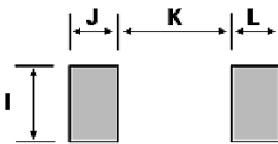


DIM	Millimeters		Inches	
	Min	Max	Min	Max
A	4.06	4.57	0.16	0.18
B	3.3	3.94	0.13	0.155
C	1.8	2.2	0.07	0.086
D	0.13	0.31	0.006	0.012
E	5.21	5.59	0.2	0.22
F	--	0.2	--	0.008
G	2.13	2.44	0.084	0.096
H	0.76	1.52	0.03	0.06

## MECHANICAL CHARACTERISTICS

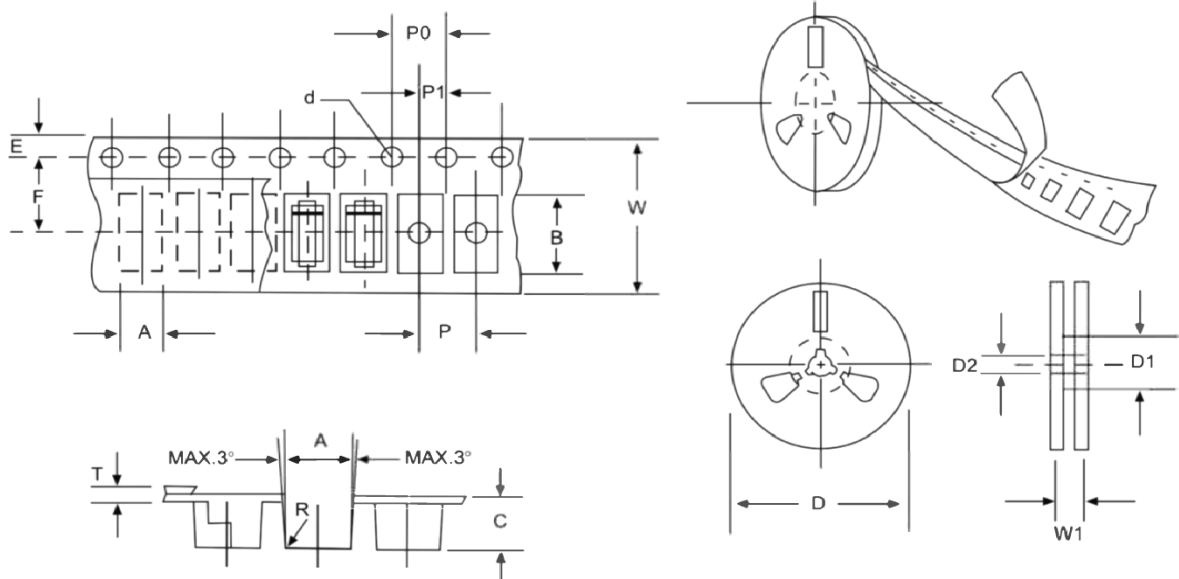
1. Case: DO214AA/(SMB) Molded plastic
2. Lead: Solderable per MIL-STD-750, method 2026
3. Epoxy: UL 94V-0 rate flame retardant
4. Polarity: Color band denotes cathode end except Bipolar
5. Mounting position: Any

## SOLDER PAD LAYOUT



DIM	Millimeters		Inches	
	Min	Max	Min	Max
J	0.085	--	2.16	--
K	--	0.107	--	2.740
L	0.085	--	2.16	--

## Package Information Reel Tapping Specifications



### Configuration of DO-214AA(SMB)Package

Item	Symbol	Dimensions mm(inches)
Carrier Width	A	3.76/4.09±0.1(0.148/0.16±0.004)
Carrier Length	B	5.69/5.82±0.1(0.224/0.229±0.004)
Carrier depth	C	2.67/3.33±0.1(0.105/0.131±0.004)
Sprocket hole	d	1.5±0.1/-0(0.059±0.004/0)
Reel outside Diameter	D	330±2.0(13.0±0.079)
Reel inner Diameter	D1	75±1.0(2.95±0.039)
Free Hole Diameter	D2	13±0.5(0.512±0.020)
Sprocket hole position	E	1.75±0.1(0.069±0.004)
Punch hole position	F	5.5±0.05(0.217±0.002)
Punch hole pitch	P	8.0±0.1(0.315±0.004)
Sprocket hole pitch	PO	4.0±0.1(0.157±0.004)
Embossment center	P1	2.0±0.1(0.079±0.004)
Total tape thickness	T	0.25/0.30±0.02(0.010/0.12±0.0008)
Tape width	W	12.0±0.1(0.472±0.004)
Reel width	W1	16.8±2.0(0.66±0.079)

### Recommended Reflow Solder Profiles

The recommended reflow solder profiles for Pb and Pb-free devices are shown below.

Figure 1 shows the recommended solder profile for devices that have Pb-free terminal plating, and where a Pb-free solder is used.

Figure 2 shows the recommended solder profile for devices with Pb-free terminal plating used with leaded solder, or for devices with leaded terminal plating used with a leaded solder.

Figure 1

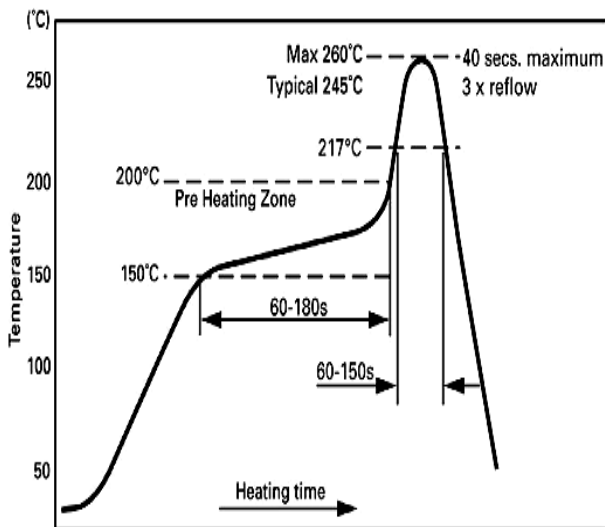
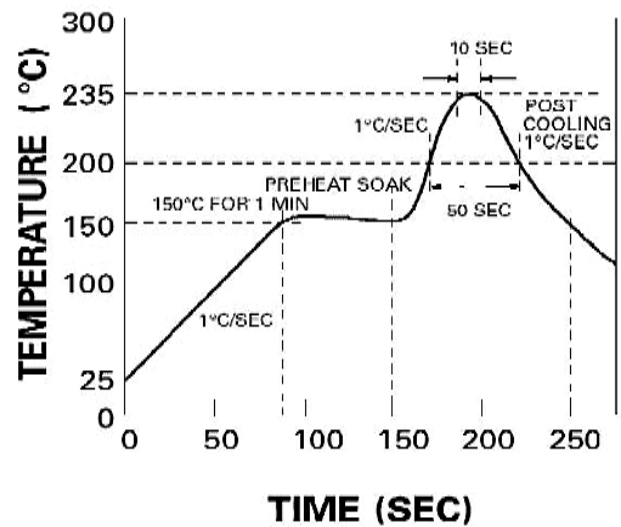


Figure 2



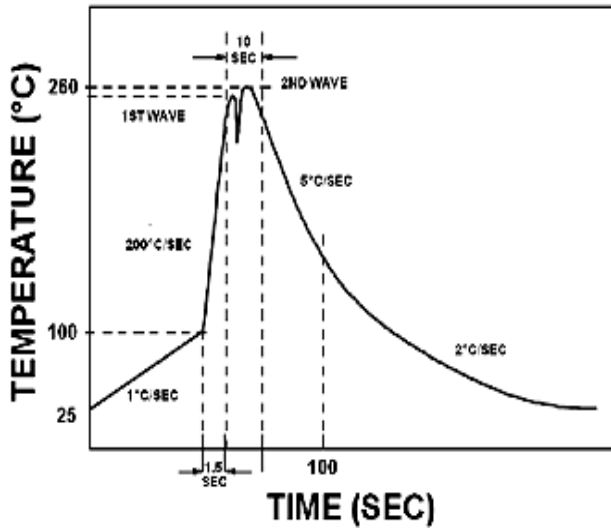
#### Reflow profiles in tabular form

Profile Feature	Sn-Pb System	Pb-Free System
Average Ramp-Up Rate	~3°C/second	~3°C/second
<b>Preheat</b>		
– Temperature Range	150-170°C	150-200°C
– Time	60-180 seconds	60-180 seconds
Time maintained above:		
– Temperature	200°C	217°C
– Tim	30-50 seconds	60-150 seconds
Peak Temperature	235°C	260°C max.
Time within +0 -5°C of actual Peak	10 seconds	40 seconds
Ramp-Down Rate	3°C/second max.	6°C/second max.

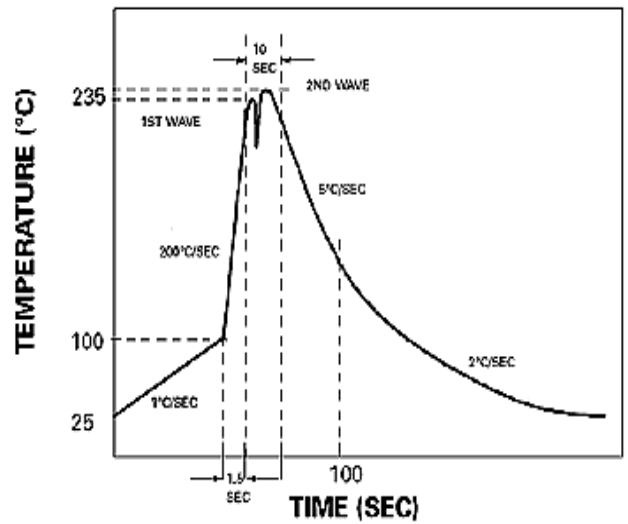


### Recommended Wave Solder Profiles

The Recommended solder Profile For Devices with Pb-free terminal plating where a Pb-free solder is used



The Recommended solder Profile For Devices with Pb-free terminal plating used with leaded solder, or for devices with leaded terminal plating used with leaded solder



### Wave Profiles in Tabular Form

Profile Feature	Sn-Pb System	Pb-free System
Average Ramp-Up Rate	~200°C/second	~200°C/second
Heating rate during preheat	Typical 1-2, Max 4°C/sec	Typical 1-2, Max 4°C/Sec
Final preheat Temperature	Within 125°C of Solder Temp	Within 125°C of Solder Temp
Peak Temperature	235°C	260°C max.
Time within +0 -5°C of actual Peak	10 seconds	10 seconds
Ramp-Down Rate	5°C/second max.	5°C/second max.



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## Recommended Product Storage Environment for Discrete Semiconductor Devices

This storage environment assumes that the Diodes and transistors are packed properly inside the original packing supplied by CDIL.

- Temperature 5 °C to 30 °C
- Humidity between 40 to 70 %RH
- Air should be clean.
- Avoid harmful gas or dust.
- Avoid outdoor exposure or storage in areas subject to rain or water spraying .
- Avoid storage in areas subject to corrosive gas or dust. Product shall not be stored in areas exposed to direct sunlight.
- Avoid rapid change of temperature.
- Avoid condensation.
- Mechanical stress such as vibration and impact shall be avoided.
- The product shall not be placed directly on the floor.
- The product shall be stored on a plane area. They should not be turned upside down. They should not be placed against the wall.

### **Shelf Life of CDIL Products**

The shelf life of products is the period from product manufacture to shipment to customers. The product can be unconditionally shipped within this period. The period is defined as 2 years.

If products are stored longer than the shelf life of 2 years the products shall be subjected to quality check as per CDIL quality procedure.

The products are further warranted for another one year after the date of shipment subject to the above conditions in CDIL original packing.

### **Floor Life of CDIL Products and MSL Level**

When the products are opened from the original packing, the floor life will start.

For this, the following JEDEC table may be referred:

JEDEC MSL Level		
Level	Time	Condition
1	Unlimited	≤30 °C / 85% RH
2	1 Year	≤30 °C / 60% RH
2a	4 Weeks	≤30 °C / 60% RH
3	168 Hours	≤30 °C / 60% RH
4	72 Hours	≤30 °C / 60% RH
5	48 Hours	≤30 °C / 60% RH
5a	24 Hours	≤30 °C / 60% RH
6	Time on Label(TOL)	≤30 °C / 60% RH



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## Customer Notes

### Component Disposal Instructions

1. CDIL Semiconductor Devices are RoHS compliant, customers are requested to please dispose as per prevailing Environmental Legislation of their Country.
2. In Europe, please dispose as per EU Directive 2002/96/EC on Waste Electrical and Electronic Equipment (WEEE).

## Disclaimer

The product information and the selection guides facilitate selection of the CDIL's Semiconductor Device(s) best suited for application in your product(s) as per your requirement. It is recommended that you completely review our Data Sheet(s) so as to confirm that the Device(s) meet functionality parameters for your application. The information furnished in the Data Sheet and on the CDIL Web Site/CD are believed to be accurate and reliable. CDIL however, does not assume responsibility for inaccuracies or incomplete information. Furthermore, CDIL does not assume liability whatsoever, arising out of the application or use of any CDIL product; neither does it convey any license under its patent rights nor rights of others. These products are not designed for use in life saving/support appliances or systems. CDIL customers selling these products (either as individual Semiconductor Devices or incorporated in their end products), in any life saving/support appliances or systems or applications do so at their own risk and CDIL will not be responsible for any damages resulting from such sale(s).

CDIL strives for continuous improvement and reserves the right to change the specifications of its products without prior notice.



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