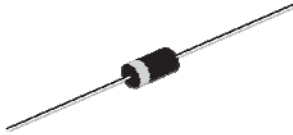


TRANSIENT VOLTAGE SUPPRESSOR

SA5.0 ~ SA440CA



DO-15

DO-15
Leaded Plastic Package
RoHS compliant

FEATURES:

1. Glass Passivated Die Construction
2. Uni-directional Versions Available
3. Excellent Clamping Capability

APPLICATIONS:

1. Communication System
2. Power Supplies
3. Medical Equipment
4. Business Machines

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

PARAMETER	SYMBOL	VALUE	UNIT
Peak Power Dissipation ¹ @T _L = 25°C Pulse Width = 1ms	P _{PK}	500	W
Forward Surge Current ² @T _A = 25°C	I _{FSM}	70	A
Power Dissipation, @T _L = 75°C Lead lengths 0.375"(9.5mm)	P _{M(AV)}	3	W
Storage Temperature Range	T _{STG}	-55 to +150	°C
Operating Junction Temperature Range	T _J	-55 to +150	°C

1. 10 X 1000 us, non-repetitive
2. 1/2 sine wave (or equivalent square wave), PW = 8.3 ms, duty cycle = 4 pulses per minute maximum
3. Mounted on minimum recommended pad layout
4. A transient suppressor is normally selected according to the working peak reverse voltage (VRWM), which should be equal to or greater than the DC or continuous peak operating voltage level
5. VBR measured at pulse test current IT at an ambient temperature of 25°C
6. Surge current waveform as per Figure 1 and derate as per Figure 3.



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

Type Number		Reverse Stand-off Voltage	Breakdown Voltage Min. @I _T	Breakdown Voltage Max. @I _T	Test Current	Maximum Clamping Voltage @I _P	Peak Pulse Current	Reverse Leakage @V _{RMW}
Uni	Bi	V _{RMW} (V)	V _{BR MIN} (V)	V _{BR MAX} (V)	T _T (mA)	V _C (V)	I _{PP} (A)	I _R (uA)
SA5.0	SA5.0C	5.0	6.4	7.6	10	9.5	55.4	600.0
SA5.0A	SA5.0CA	5.0	6.4	7.3	10.0	9.2	55.4	600.0
SA6.0	SA6.0C	6.0	6.7	8.5	10.0	11.4	49.5	600.0
SA6.0A	SA6.0CA	6.0	6.7	7.7	10.0	10.3	49.5	600.0
SA6.5	SA6.5C	6.5	7.2	9.1	10.0	12.3	45.5	400.0
SA6.5A	SA6.5CA	6.5	7.2	8.3	10.0	11.2	45.5	400.0
SA7.0	SA7.0C	7.0	7.8	9.9	10.0	13.3	42.5	150.0
SA7.0A	SA7.0CA	7.0	7.8	9.0	10.0	12.0	42.5	150.0
SA7.5	SA7.5C	7.5	8.3	10.7	1.0	14.3	39.5	50.0
SA7.5A	SA7.5CA	7.5	8.3	9.6	1.0	12.9	39.5	50.0
SA8.0	SA8.0C	8.0	8.9	11.3	1.0	15.0	37.5	25.0
SA8.0A	SA8.0CA	8.0	8.9	10.2	1.0	13.6	37.5	25.0
SA8.5	SA8.5C	8.5	9.4	11.9	1.0	15.9	35.4	10.0
SA8.5A	SA8.5CA	8.5	9.4	10.8	1.0	14.4	35.4	10.0
SA9.0	SA9.0C	9.0	10.0	12.6	1.0	16.9	33.1	5.0
SA9.0A	SA9.0CA	9.0	10.0	11.5	1.0	15.4	33.1	5.0
SA10	SA10C	10	11.1	14.1	1.0	18.8	30.0	3.0
SA10A	SA10CA	10	11.1	12.8	1.0	17.0	30.0	3.0
SA11	SA11C	11	12.2	15.4	1.0	20.1	28.0	3.0
SA11A	SA11CA	11	12.2	14.0	1.0	18.2	28.0	3.0
SA12	SA12C	12	13.3	16.9	1.0	22.0	25.6	3.0
SA12A	SA12CA	12	13.3	15.3	1.0	19.9	25.6	3.0
SA13	SA13C	13	14.4	18.2	1.0	23.8	23.7	3.0
SA13A	SA13CA	13	14.4	16.5	1.0	21.5	23.7	3.0
SA14	SA14C	14	15.6	19.8	1.0	25.8	22.0	3.0
SA14A	SA14CA	14	15.6	17.9	1.0	23.2	22.0	3.0
SA15	SA15C	15	16.7	21.1	1.0	26.9	20.9	3.0
SA15A	SA15CA	15	16.7	19.2	1.0	24.4	20.9	3.0
SA16	SA16C	16	17.8	22.6	1.0	28.8	19.6	3.0
SA16A	SA16CA	16	17.8	20.5	1.0	26.0	19.6	3.0
SA17	SA17C	17	18.9	23.9	1.0	30.5	18.5	3.0
SA17A	SA17CA	17	18.9	21.7	1.0	27.6	18.5	3.0
SA18	SA18C	18	20.0	25.3	1.0	32.2	17.5	3.0
SA18A	SA18CA	18	20.0	23.3	1.0	29.2	17.5	3.0
SA20	SA20C	20	22.2	28.1	1.0	35.8	15.7	3.0
SA20A	SA20CA	20	22.2	25.5	1.0	32.4	15.7	3.0
SA22	SA22C	22	24.4	29.8	1.0	39.4	12.9	3.0
SA22A	SA22CA	22	24.4	26.9	1.0	35.5	14.4	3.0
SA24	SA24C	24	26.7	32.6	1.0	43.0	11.9	3.0
SA24A	SA24CA	24	26.7	29.7	1.0	38.9	13.1	3.0
SA26	SA26CA	26	28.6	35.3	1.0	46.6	10.9	3.0

SA5.0 - SA440A
Rev01 28062022ESW



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

Type Number		Reverse Stand-off Voltage	Breakdown Voltage Min.@I _T	Breakdown Voltage Max. @I _T	Test Current	Maximum Clamping Voltage @I _P	Peak Pulse Current	Reverse Leakage @V _{RMW}
Uni	Bi	V _{RMW} (V)	V _{BR MIN} (V)	V _{BR MAX} (V)	T _T (mA)	V _C (V)	I _{PP} (A)	I _R (uA)
SA26A	SA26CA	26	28.6	31.9	1.0	42.1	12.1	3.0
SA28	SA28C	28	31.1	38.0	1.0	50.0	10.2	3.0
SA28A	SA28CA	28	31.1	34.4	1.0	45.4	11.2	3.0
SA30	SA30C	30	33.3	40.7	1.0	53.5	9.5	3.0
SA30A	SA30CA	30	33.3	36.8	1.0	48.4	10.5	3.0
SA33	SA33C	33	36.7	44.9	1.0	59.0	8.6	3.0
SA33A	SA33CA	33	36.7	40.6	1.0	53.3	9.6	3.0
SA36	SA36C	36	40.0	48.9	1.0	64.3	7.9	3.0
SA36A	SA36CA	36	40.0	44.2	1.0	58.1	8.8	3.0
SA40A	SA40CA	40	44.4	54.3	1.0	71.4	7.1	3.0
SA43	SA43C	43	47.8	58.4	1.0	76.7	6.6	3.0
SA43A	SA43CA	43	47.8	52.8	1.0	96.4	7.3	3.0
SA45	SA45C	45	50.0	61.1	1.0	80.3	6.4	3.0
SA45A	SA45CA	45	50.0	55.3	1.0	72.7	7.0	3.0
SA48	SA48C	48	53.3	65.2	1.0	85.5	6.0	3.0
SA48A	SA48CA	48	53.3	58.9	1.0	77.4	6.6	3.0
SA51	SA51C	51	56.7	69.3	1.0	91.1	5.6	3.0
SA51A	SA51CA	51	56.7	62.7	1.0	82.4	6.2	3.0
SA54	SA54C	54	60.0	73.3	1.0	96.3	5.3	3.0
SA54A	SA54CA	54	60.0	66.3	1.0	87.1	5.9	3.0
SA58	SA58C	58	64.4	78.7	1.0	87.1	5.9	3.0
SA58A	SA58CA	58	64.4	71.2	1.0	93.6	5.4	3.0
SA60	SA60C	60	66.7	81.5	1.0	107.0	4.8	3.0
SA60A	SA60CA	60	66.7	73.7	1.0	96.8	5.3	3.0
SA64	SA64C	64	71.1	86.9	1.0	114.0	4.5	3.0
SA64A	SA64CA	64	71.1	78.6	1.0	103.0	5.0	3.0
SA70	SA70C	70	77.8	95.1	1.0	125.0	4.1	3.0
SA70A	SA70CA	70	77.8	86.0	1.0	113.0	4.5	3.0
SA75	SA75C	75	83.0	102.0	1.0	134.0	3.8	3.0
SA75A	SA75CA	75	83.0	92.1	1.0	121.0	4.2	3.0
SA78	SA78C	78	86.0	106.0	1.0	139.0	3.7	3.0
SA78A	SA78CA	78	86.0	95.8	1.0	126.0	4.0	3.0
SA85	SA85C	85	94.0	115.0	1.0	151.0	3.4	3.0
SA85A	SA85CA	85	94.0	104.0	1.0	137.0	3.7	3.0
SA90	SA90C	90	100.0	122.0	1.0	160.0	3.2	3.0
SA90A	SA90CA	90	100.0	111.0	1.0	146.0	3.3	3.0
SA100	SA100C	100	111.0	136.0	1.0	179.0	2.8	3.0
SA100A	SA100CA	100	111.0	123.0	1.0	162.0	3.1	3.0

SA5.0 - SA440A
Rev01 28062022ESW



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

Type Number		Reverse Stand-off Voltage	Breakdown Voltage Min. @I _T	Breakdown Voltage Max. @I _T	Test Current	Maximum Clamping Voltage @I _P	Peak Pulse Current	Reverse Leakage @V _{RMW}
Uni	Bi	V _{RMW} (V)	V _{BR MIN} (V)	V _{BR MAX} (V)	T _T (mA)	V _C (V)	I _{PP} (A)	I _R (uA)
SA110	SA110CA	110	122.0	149.0	1.0	196.0	2.6	3.0
SA110A	SA110CA	110	122.0	135.0	1.0	177.0	2.9	3.0
SA120	SA120C	120	133.0	163.0	1.0	214.0	2.4	3.0
SA120A	SA120CA	120	133.0	147.0	1.0	193.0	2.6	3.0
SA130	SA130C	130	144.0	176.0	1.0	231.0	2.2	3.0
SA130A	SA130CA	130	144.0	159.0	1.0	209.0	2.4	3.0
SA150	SA150C	150	167.0	204.0	1.0	268.0	1.9	3.0
SA150A	SA150CA	150	167.0	185.0	1.0	243.0	2.1	3.0
SA160	SA160C	160	178.0	218.0	1.0	287.0	1.7	3.0
SA160A	SA160CA	160	178.0	197.0	1.0	259.0	2.0	3.0
SA170	SA170C	170	189.0	231.0	1.0	304.0	1.7	3.0
SA170A	SA170CA	170	189.0	209.0	1.0	275.0	1.9	3.0
SA180	SA180C	180	200.0	244.0	1.0	321.0	1.6	3.0
SA180A	SA180CA	180	200.0	221.0	1.0	290.0	1.7	3.0
SA190	SA190C	190	211.0	258.0	1.0	339.0	1.5	3.0
SA190A	SA190CA	190	211.0	233.0	1.0	306.0	1.6	3.0
SA200	SA200C	200	222.0	271.0	1.0	356.0	1.4	3.0
SA200A	SA200CA	200	222.0	245.0	1.0	322.0	1.6	3.0
SA210	SA210C	210	233.0	285.0	1.0	375.0	1.3	3.0
SA210A	SA210CA	210	233.0	258.0	1.0	339.0	1.5	3.0
SA220	SA220C	220	244.0	298.0	1.0	392.0	1.3	3.0
SA220A	SA220A	220	244.0	270.0	1.0	355.0	1.4	3.0
SA250	SA250C	250	278.0	340.0	1.0	447.0	1.1	3.0
SA250A	SA250CA	250	278.0	307.0	1.0	403.0	1.3	3.0
SA300	SA300C	300	333.0	407.0	1.0	535.0	0.9	3.0
SA300A	SA300CA	300	333.0	368.0	1.0	484.0	1.0	3.0
SA350	SA350C	350	389.0	475.0	1.0	624.0	0.8	3.0
SA350A	SA350CA	350	389.0	430.0	1.0	565.0	0.9	3.0
SA400	SA400C	400	444.0	523.0	1.0	687.0	0.7	3.0
SA400A	SA400CA	400	444.0	491.0	1.0	645.0	0.8	3.0
SA440	SA440C	440	489.0	598.0	1.0	786.0	0.7	3.0
SA440A	SA440CA	440	489.0	540.0	1.0	710.0	0.7	3.0

SA5.0 - SA440A
Rev01 28062022ESW

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

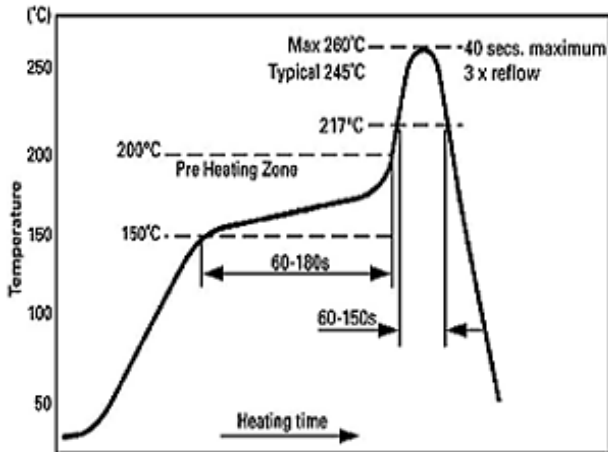
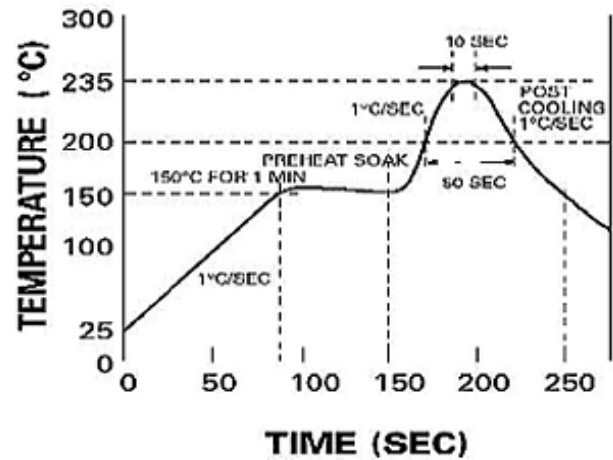


Figure 2



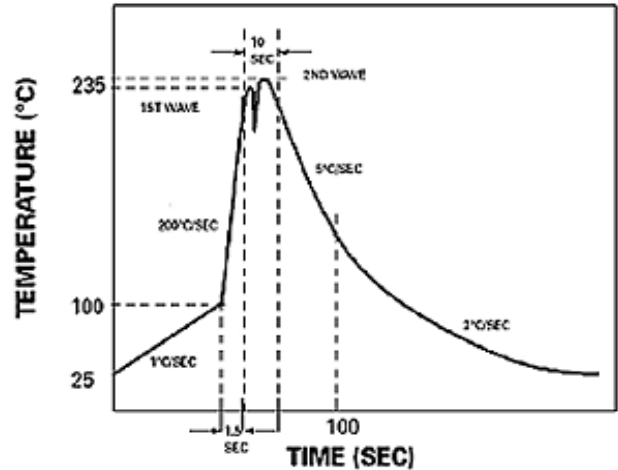
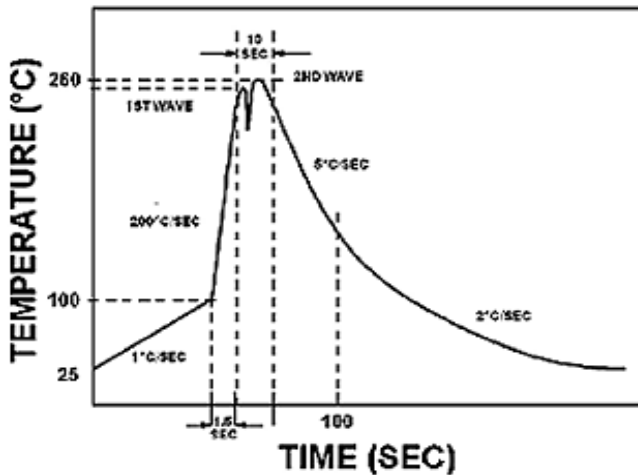
Reflow profiles in tabular form

Profile Feature	Sn-Pb System	Pb-Free System
Average Ramp-Up Rate	~3°C/second	~3°C/second
Preheat		
– Temperature Range	150-170°C	150-200°C
– Time	60-180 seconds	60-180 seconds
Time maintained above:		
– Temperature	200°C	217°C
– Time	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

TYPICAL CHARACTERISTICS CURVES

Fig 1: Pulse Waveform

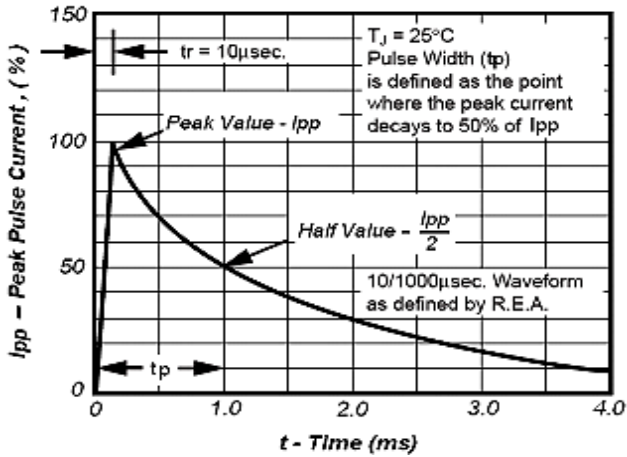


Fig 2: Pulse Derating Curve

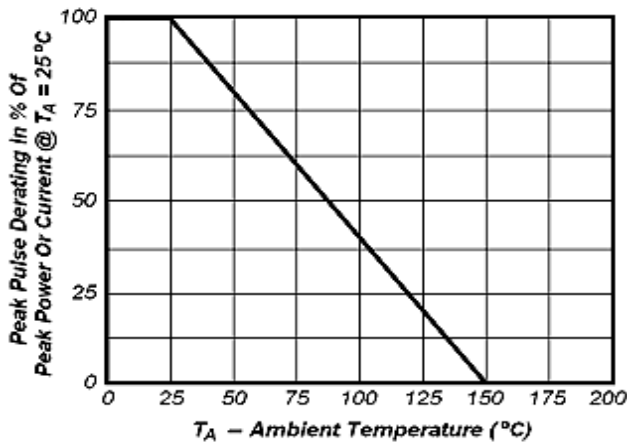


Fig 3: Peak Pulse Power Rating curve

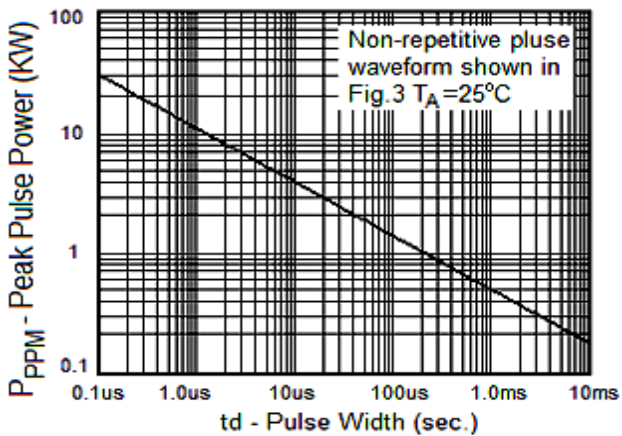


Fig 4: Maximum Non-Repetitive Peak Forward Surge Current

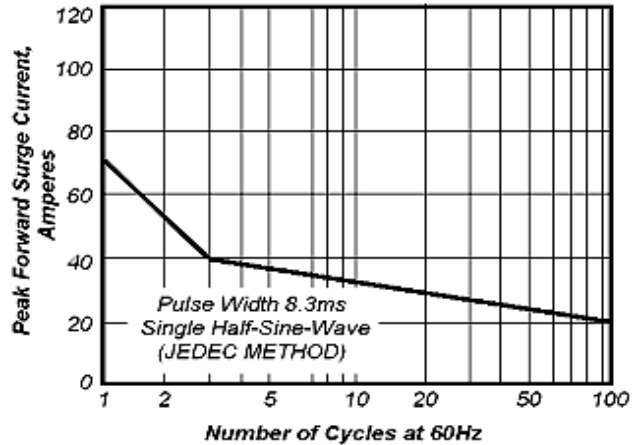


Fig 5: Typical Junction Capacitance

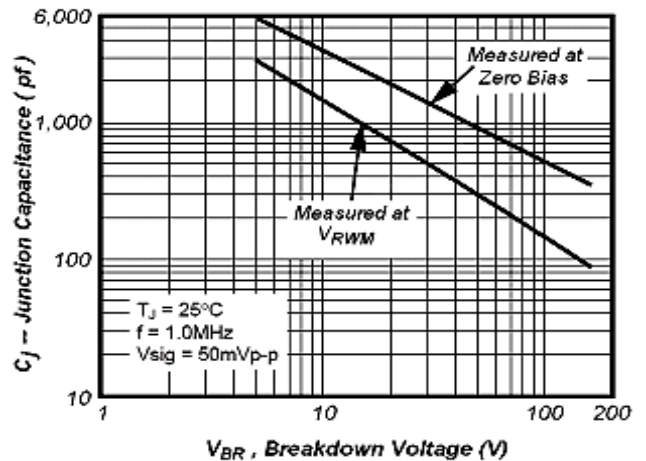
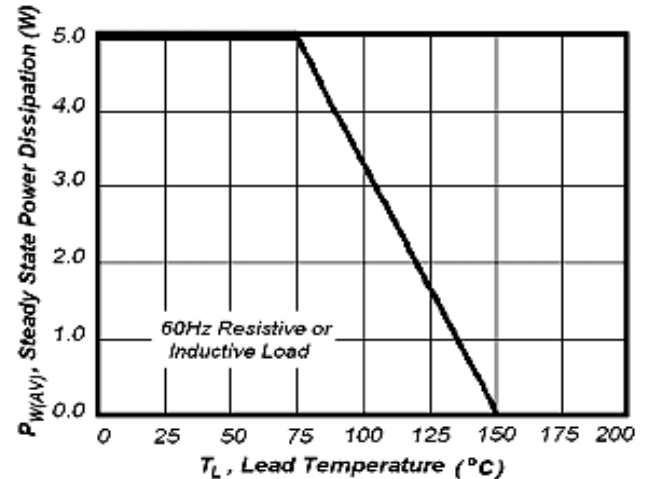
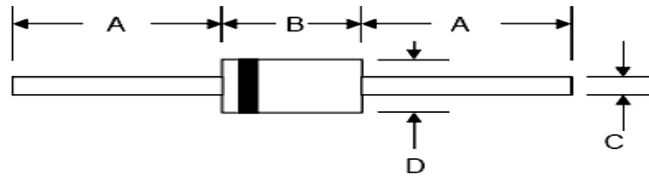


Fig 6: Steady State Power Derating Curve



PACKAGE DETAIL

DO-15 Leaded Plastic Package



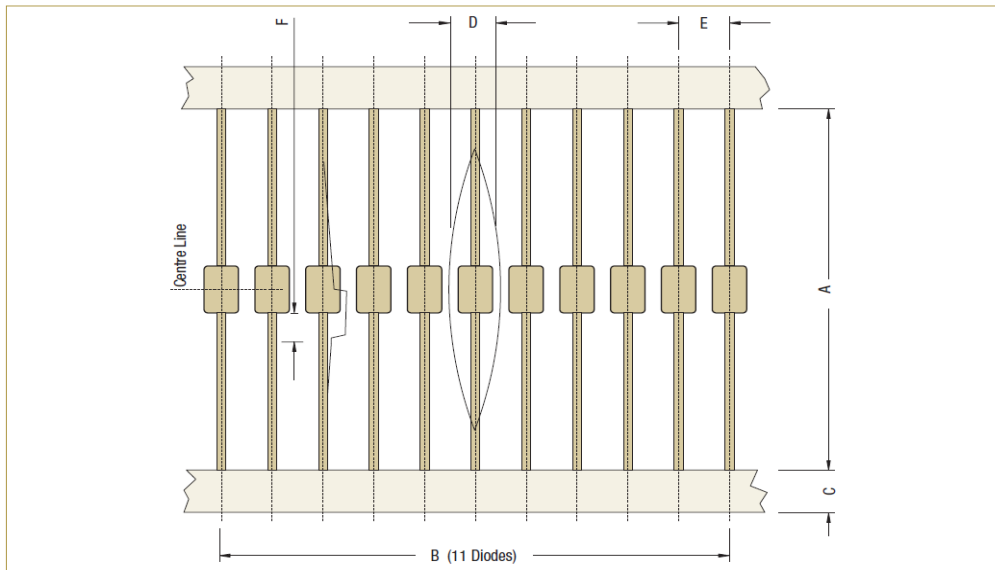
REF.	DIMENSIONS			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	25.4	31	1.000	1.220
B	5.84	7.62	0.230	0.300
C	0.71	0.86	0.028	0.034
D	2.64	3.56	0.104	0.140

Packaging Specifications

T & A: Tape and Ammo Pack; T & R: Tape and Reel; Bulk: Loose in Poly Bags; Tube: Tube and Carton; K: 1,000

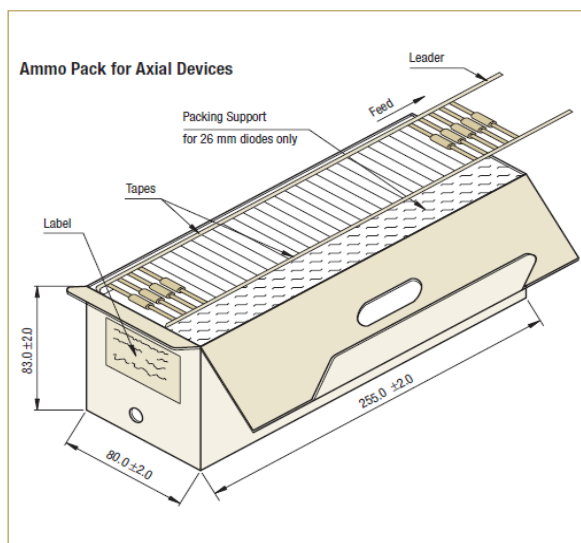
Package / Case Type	Packaging Type	Std. Packing		Inner Carton		Outer Carton		
		Qty	Qty	Size L x W x H (cm)	Gross Weight (Kg)	Qty	Size L x W x H (cm)	Gross Weight (Kg)
D0-15	T & A	3,000	3K	26 x 8.5 x 15	1.3	27K	46 x 33 x 25	12.8

Axial Tape and Ammo Packaging



Axial Tape Specifications

Device	Type	A		B		C		D		E		F	
		mm	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min
D0-15	52 mm	50.0	54.0	48.0	52.0	5.5	6.5	—	1.5R	4.5	5.5	—	1.0



Taping Specification

- 300 mm (Min) leader tape on every roll.
- No. of empty places allowed 0.25% without consecutive empty places.
- Ends of leads shall normally not protrude beyond the tapes.
- Components shall be held sufficiently in the tape or tapes so that they can not come free in normal handling.



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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.



CDIL is a registered trademark of

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CIN No. U32109DL1964PTC004291

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Rev01 28062022ESW