24 and 40 Watt Peak Power Zener Transient Voltage Suppressors

SOT–23 Dual Common Anode Zeners for ESD Protection

These dual monolithic silicon zener diodes are designed for applications requiring transient overvoltage protection capability. They are intended for use in voltage and ESD sensitive equipment such as computers, printers, business machines, communication systems, medical equipment and other applications. Their dual junction common anode design protects two separate lines using only one package. These devices are ideal for situations where board space is at a premium.

Specification Features:

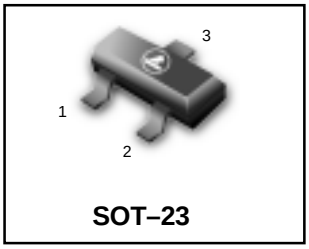
- SOT–23 Package Allows Either Two Separate Unidirectional Configurations or a Single Bidirectional Configuration
- Working Peak Reverse Voltage Range – 3 V to 26 V
- Standard Zener Breakdown Voltage Range – 5.6 V to 33 V
- Peak Power – 24 or 40 Watts @ 1.0 ms (Unidirectional), per Figure 5. Waveform
- ESD Rating of Class N (exceeding 16 kV) per the Human Body Model
- Maximum Clamping Voltage @ Peak Pulse Current
- Low Leakage < 5.0 µA
- Flammability Rating UL 94V–O
- We declare that the material of product compliance with RoHS requirements.

Mechanical Characteristics:

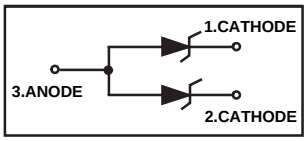
CASE: Void-free, transfer-molded, thermosetting plastic case
FINISH: Corrosion resistant finish, easily solderable
MAXIMUM CASE TEMPERATURE FOR SOLDERING PURPOSES: 260°C for 10 Seconds
Package designed for optimal automated board assembly
Small package size for high density applications
Available in 8 mm Tape and Reel

Use the Device Number to order the 7 inch/3,000 unit reel. Replace the “T1” with “T3” in the Device Number to order the 13 inch/10,000 unit reel.

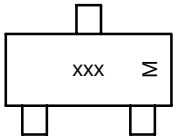
LMBZ6V8ALT1G Series



SOT–23



MARKING DIAGRAM



xxx = Device Code
M = Date Code

ORDERING INFORMATION

Device	Package	Shipping
LMBZ5V6ALT1G/T3G	SOT–23	3000/10000Tape & Reel
LMBZ6V2ALT1G/T3G	SOT–23	3000/10000Tape & Reel
LMBZ6V8ALT1G/T3G	SOT–23	3000/10000 Tape & Reel
LMBZ9V1ALT1G/T3G	SOT–23	3000/10000 Tape & Reel
LMBZ10VALT1G/T3G	SOT–23	3000/10000 Tape & Reel
LMBZ12VALT1G/T3G	SOT–23	3000/10000 Tape & Reel
LMBZ15VALT1G/T3G	SOT–23	3000/10000 Tape & Reel
LMBZ18VALT1G/T3G	SOT–23	3000/10000 Tape & Reel
LMBZ20VALT1G/T3G	SOT–23	3000/10000 Tape & Reel
LMBZ27VALT1G/T3G	SOT–23	3000/10000 Tape & Reel
LMBZ33VALT1G/T3G	SOT–23	3000/10000 Tape & Reel

DEVICE MARKING INFORMATION

See specific marking information in the device marking column of the table on page 3 of this data sheet.

LMBZ6V8ALT1G Series

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Peak Power Dissipation @ 1.0 ms (Note 1.) LMBZ5V6ALT1G thru LMBZ10VALT1G @ $T_L \le 25°C$ LMBZ12VALT1G thru LMBZ33VALT1G	P_{pk}	24 40	Watts
Total Power Dissipation on FR–5 Board (Note 2.) @ $T_A = 25°C$ Derate above 25°C	P_D	225 1.8	mW mW/°C
Thermal Resistance Junction to Ambient	$R_{\theta JA}$	556	°C/W
Total Power Dissipation on Alumina Substrate (Note 3.) @ $T_A = 25°C$ Derate above 25°C	P_D	300 2.4	mW mW/°C
Thermal Resistance Junction to Ambient	$R_{\theta JA}$	417	°C/W
Junction and Storage Temperature Range	T_J, T_{stg}	– 55 to +150	°C
Lead Solder Temperature – Maximum (10 Second Duration)	T_L	260	°C

1. Non–repetitive current pulse per Figure 5. and derate above $T_A = 25°C$ per Figure 6.
2. FR–5 = 1.0 x 0.75 x 0.62 in.
3. Alumina = 0.4 x 0.3 x 0.024 in., 99.5% alumina

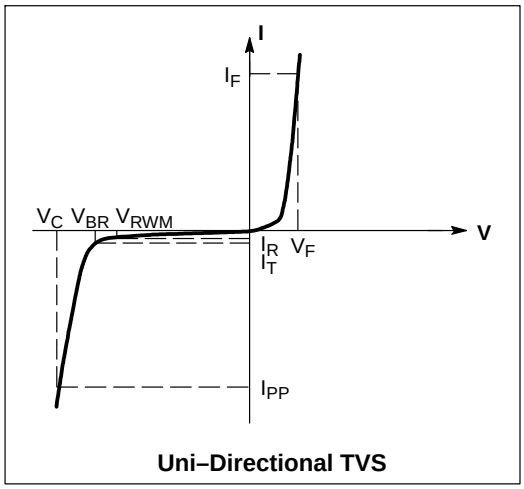
*Other voltages may be available upon request

ELECTRICAL CHARACTERISTICS

($T_A = 25°C$ unless otherwise noted)

UNIDIRECTIONAL (Circuit tied to Pins 1 and 3 or 2 and 3)

Symbol	Parameter
I_{PP}	Maximum Reverse Peak Pulse Current
V_C	Clamping Voltage @ I_{PP}
V_{RWM}	Working Peak Reverse Voltage
I_R	Maximum Reverse Leakage Current @ V_{RWM}
V_{BR}	Breakdown Voltage @ I_T
I_T	Test Current
ΘV_{BR}	Maximum Temperature Coefficient of V_{BR}
I_F	Forward Current
V_F	Forward Voltage @ I_F
Z_{ZT}	Maximum Zener Impedance @ I_{ZT}
I_{ZK}	Reverse Current
Z_{ZK}	Maximum Zener Impedance @ I_{ZK}



Uni–Directional TVS

LMBZ6V8ALT1G Series

ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted)
UNIDIRECTIONAL (Circuit tied to Pins 1 and 3 or Pins 2 and 3)

(V_F = 0.9 V Max @ I_F = 10 mA) **24 WATTS**

Device	Device Marking	V_{RWM}	I_R @ V_{RWM}	Breakdown Voltage				Max Zener Impedance (Note 5.)			V_C @ I_{PP} (Note 6.)		ΘV_{BR}
				V_{BR} (Note 4.) (V)			@ I_T	Z_{ZT} @ I_{ZT}	Z_{ZK} @ I_{ZK}		V_C	I_{PP}	
		Volts	µA	Min	Nom	Max	mA	Ω	Ω	mA	V	A	mV/°C
LMBZ5V6ALT1G	5A6	3.0	5.0	5.32	5.6	5.88	20	11	1600	0.25	8.0	3.0	1.26
LMBZ6V2ALT1G	6A2	3.0	0.5	5.89	6.2	6.51	1.0	–	–	–	8.7	2.76	2.80

(V_F = 1.1 V Max @ I_F = 200 mA)

Device	Device Marking	V_{RWM}	I_R @ V_{RWM}	Breakdown Voltage				V_C @ I_{PP} (Note 6.)		ΘV_{BR}
				V_{BR} (Note 4.) (V)			@ I_T	V_C	I_{PP}	
		Volts	µA	Min	Nom	Max	mA	V	A	mV/°C
LMBZ6V8ALT1G	6A8	4.5	0.5	6.46	6.8	7.14	1.0	9.6	2.5	3.4
LMBZ9V1ALT1G	9A1	6.0	0.3	8.65	9.1	9.56	1.0	14	1.7	7.5
LMBZ10VALT1G	10A	6.5	0.3	9.50	10	10.5	1.0	14.2	1.7	7.5

(V_F = 1.1 V Max @ I_F = 200 mA) **40 WATTS**

Device	Device Marking	V_{RWM}	I_R @ V_{RWM}	Breakdown Voltage				V_C @ I_{PP} (Note 6.)		ΘV_{BR}
				V_{BR} (Note 4.) (V)			@ I_T	V_C	I_{PP}	
		Volts	nA	Min	Nom	Max	mA	V	A	mV/°C
LMBZ12VALT1G	12A	8.5	200	11.40	12	12.60	1.0	17	2.35	7.5
LMBZ15VALT1G	15A	12	50	14.25	15	15.75	1.0	21	1.9	12.3
LMBZ18VALT1G	18A	14.5	50	17.10	18	18.90	1.0	25	1.6	15.3
LMBZ20VALT1G	20A	17	50	19.00	20	21.00	1.0	28	1.4	17.2
LMBZ27VALT1G	27A	22	50	25.65	27	28.35	1.0	40	1.0	24.3
LMBZ33VALT1G	33A	26	50	31.35	33	34.65	1.0	46	0.87	30.4

4. V_{BR} measured at pulse test current I_T at an ambient temperature of 25°C.
5. Z_{ZT} and Z_{ZK} are measured by dividing the AC voltage drop across the device by the AC current applied. The specified limits are for $I_{Z(AC)}$ = 0.1 $I_{Z(DC)}$, with the AC frequency = 1.0 kHz.
6. Surge current waveform per Figure 5. and derate per Figure 6.

TYPICAL CHARACTERISTICS

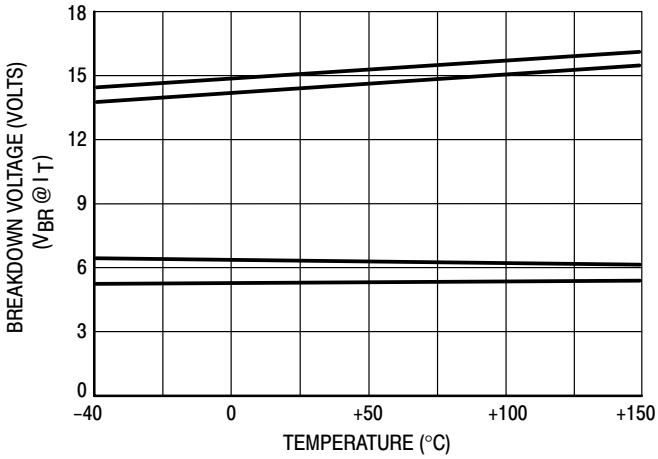


Figure 1. Typical Breakdown Voltage versus Temperature

(Upper curve for each voltage is bidirectional mode, lower curve is unidirectional mode)

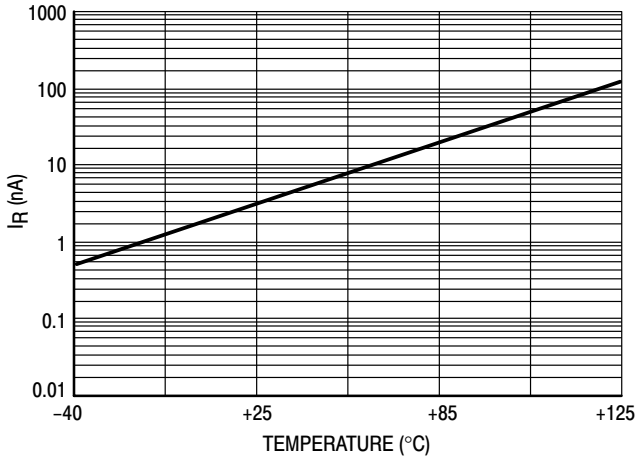


Figure 2. Typical Leakage Current versus Temperature

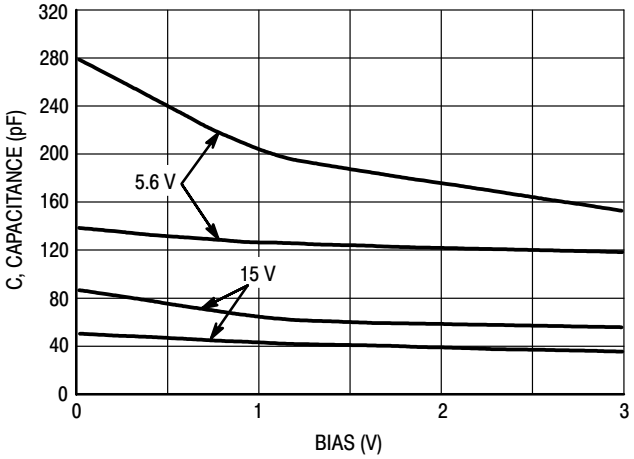


Figure 3. Typical Capacitance versus Bias Voltage

(Upper curve for each voltage is unidirectional mode, lower curve is bidirectional mode)

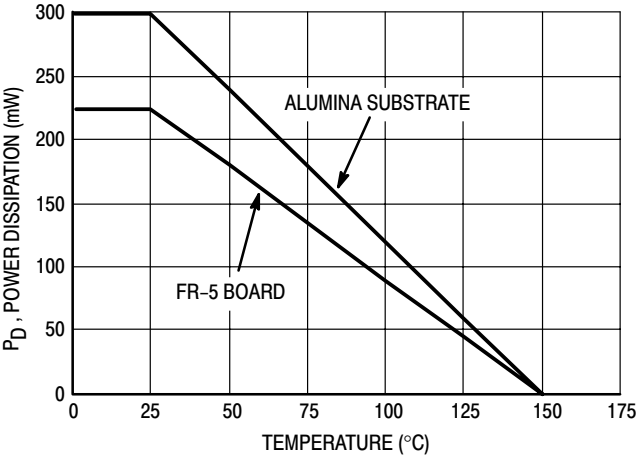


Figure 4. Steady State Power Derating Curve

TYPICAL CHARACTERISTICS

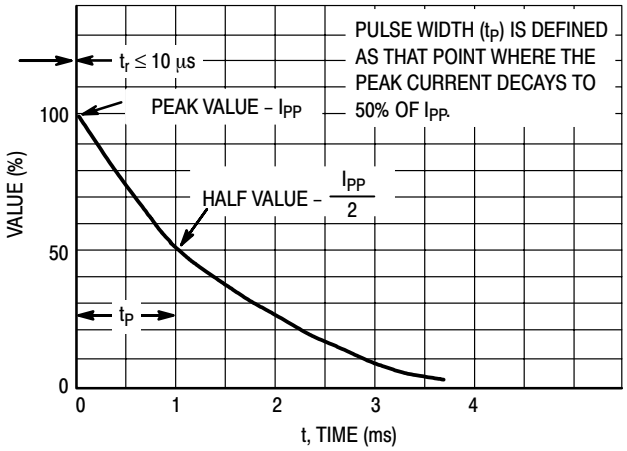


Figure 5. Pulse Waveform

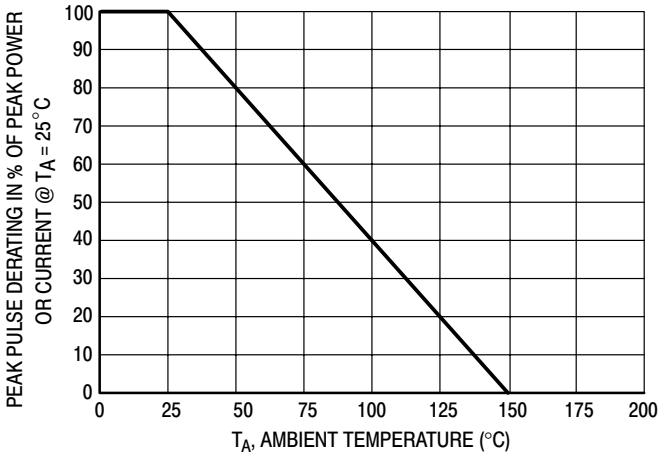


Figure 6. Pulse Derating Curve

LMBZ5V6ALT1

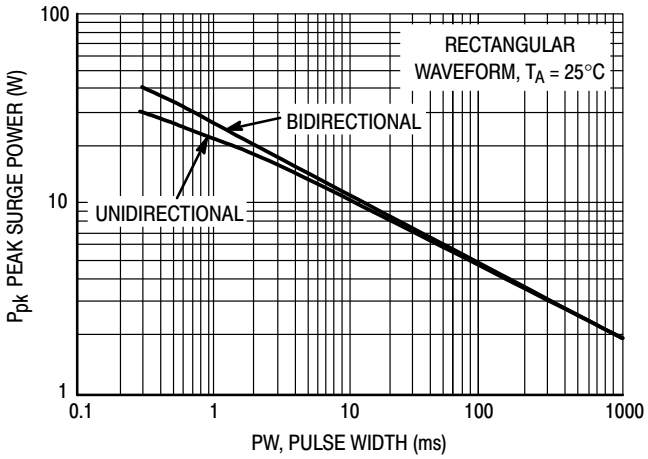


Figure 7. Maximum Non–repetitive Surge Power, P_{pk} versus PW

Power is defined as V_{RSM} x I_Z(pk) where V_{RSM} is the clamping voltage at I_Z(pk).

LMBZ5V6ALT1

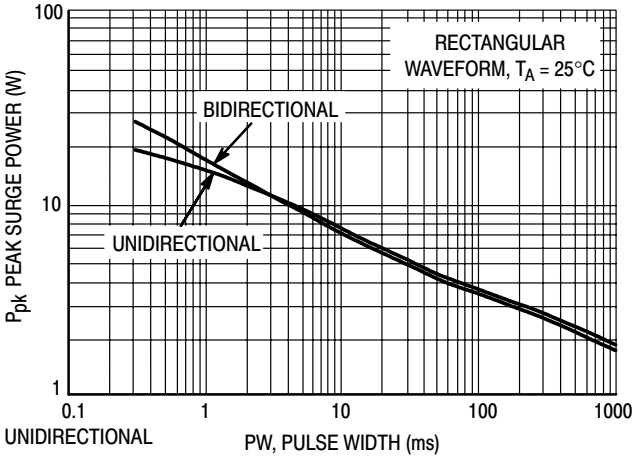


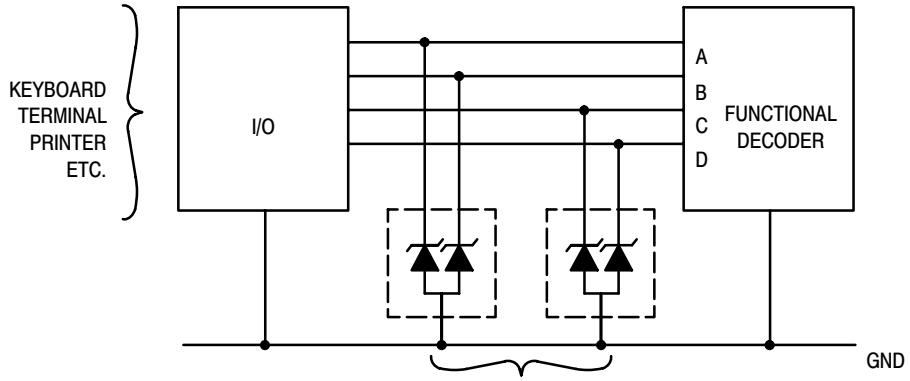
Figure 8. Maximum Non–repetitive Surge Power, P_{pk}(NOM) versus PW

Power is defined as V_Z(NOM) x I_Z(pk) where V_Z(NOM) is the nominal zener voltage measured at the low test current used for voltage classification.

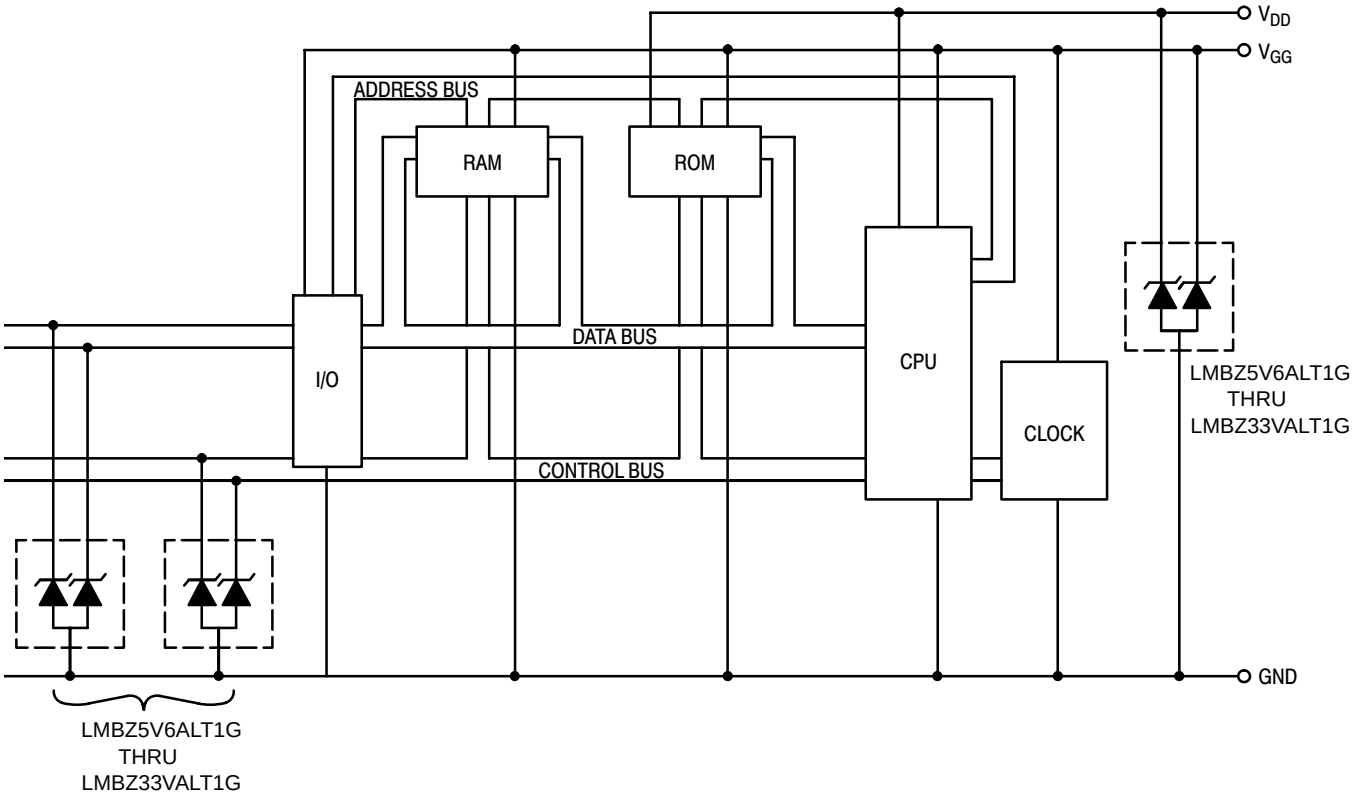
TYPICAL COMMON ANODE APPLICATIONS

A quad junction common anode design in a SOT–23 package protects four separate lines using only one package. This adds flexibility and creativity to PCB design especially when board space is at a premium. Two simplified examples of TVS applications are illustrated below.

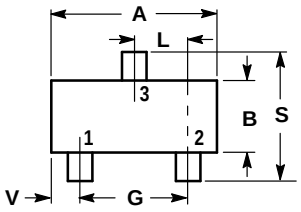
Computer Interface Protection

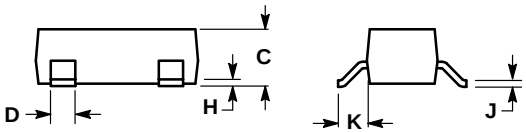


Microprocessor Protection



SOT-23

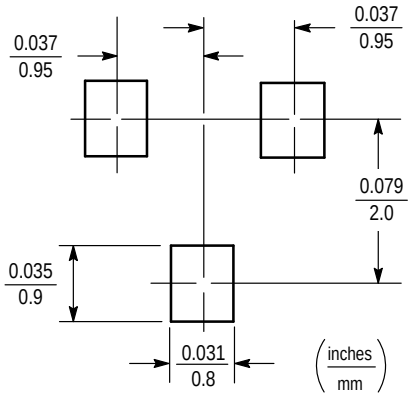




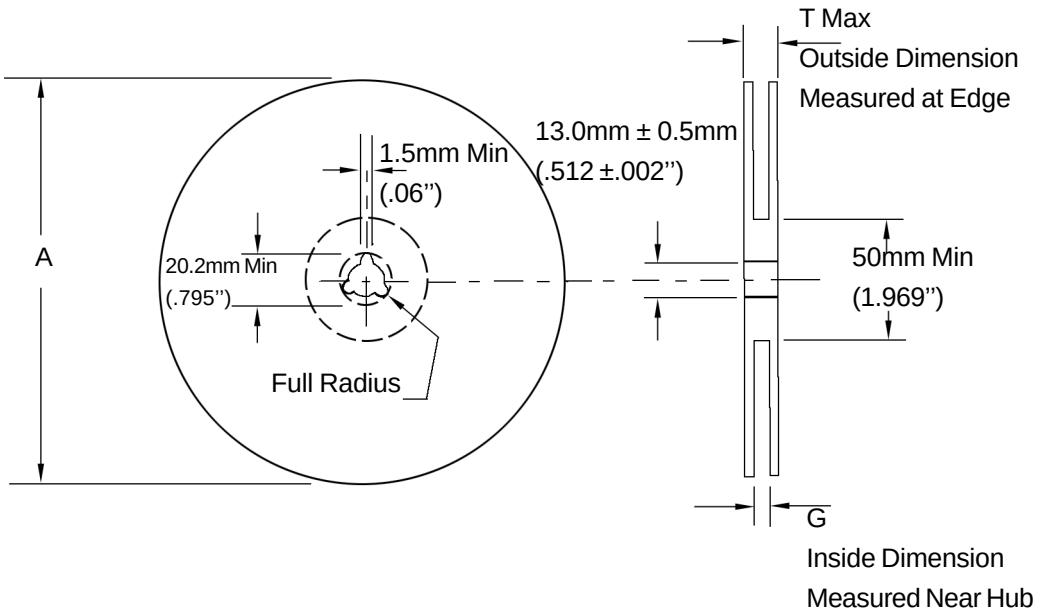
NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.1102	0.1197	2.80	3.04
B	0.0472	0.0551	1.20	1.40
C	0.0350	0.0440	0.89	1.11
D	0.0150	0.0200	0.37	0.50
G	0.0701	0.0807	1.78	2.04
H	0.0005	0.0040	0.013	0.100
J	0.0034	0.0070	0.085	0.177
K	0.0140	0.0285	0.35	0.69
L	0.0350	0.0401	0.89	1.02
S	0.0830	0.1039	2.10	2.64
V	0.0177	0.0236	0.45	0.60

PIN 1. BASE
2. EMITTER
3. COLLECTOR



EMBOSSED TAPE AND REEL DATA FOR DISCRETES



Size	A Max	G	T Max
8 mm	330mm (12.992")	8.4mm+1.5mm, -0.0 (.33"+.059", -0.00)	14.4mm (.56")

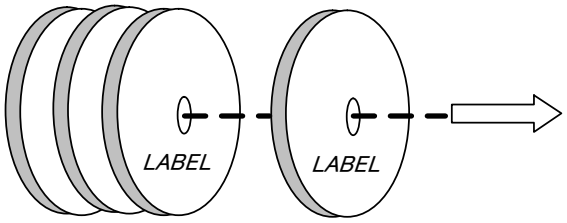
Reel Dimensions

Metric Dimensions Govern — English are in parentheses for reference only

Storage Conditions

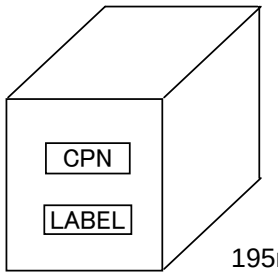
Temperature: 5 to 40 Deg.C (20 to 30 Deg. C is preferred)
Humidity: 30 to 80 RH (40 to 60 is preferred)
Recommended Period: One year after manufacturing
(This recommended period is for the soldering condition only. The characteristics and reliabilities of the products are not restricted to this limitation)

Shipment Specification



10 Reel

3000PCS/Reel
8000PCS/Reel (SOT-723,SOD-723)



Dim(Unit:mm)

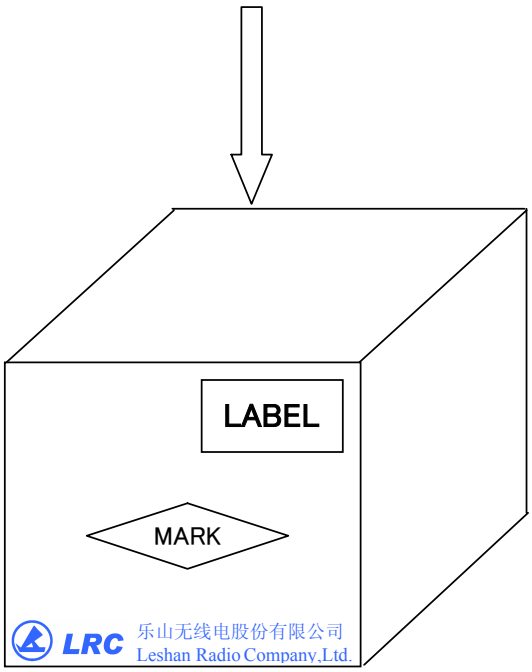
195mm*195mm*150mm

10Reel/Inner Box

30KPCS/Inner Box
80KPCS/Inner Box (SOT-723,SOD-723)

Dim(Unit:mm)

460mm*400mm*420mm



12 Inner Box/Carton

360KPCS/Carton
960KPCS/Carton (SOT-723,SOD-723)