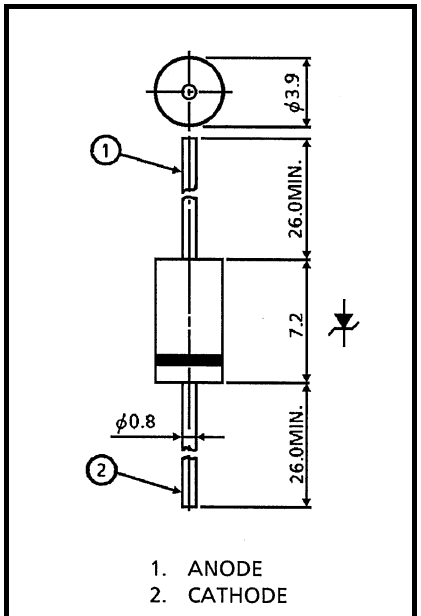
TOSHIBA ZENER DIODE SILICON DIFFUSED TYPE

2Z12~2Z51

CONSTANT VOLTAGE REGULATION
TRANSIENT SUPPRESSORS

- Average Power Dissipation : P = 1.5W
- Peak Reverse Power Dissipation
  : P_{RSM} = 900W at t_w = 200 μs
- Zener Voltage : V_Z = 12 V ~ 51 V
- Plastic Mold Package

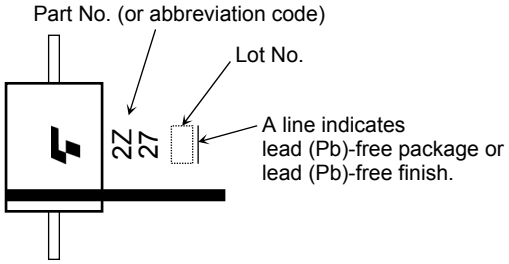
Unit in mm



JEDEC	—
JEITA	—
TOSHIBA	3−4B1A

Weight : 0.47 g

MARKING



Abbreviation Code	Part No.
2Z27	2Z27

ABSOLUTE MAXIMUM RATINGS (Ta = 25°C)

CHARACTERISTIC	SYMBOL	RATING	UNIT
Power Dissipation	P	1.5	W
Junction Temperature	T_j	−40 ~ 150	°C
Storage Temperature Range	T_{stg}	−40 ~ 150	°C

Note: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) are within the absolute maximum ratings.
Please design the appropriate reliability upon reviewing the Toshiba Semiconductor Reliability Handbook (“Handling Precautions”/Derating Concept and Methods) and individual reliability data (i.e. reliability test report and estimated failure rate, etc).

ELECTRICAL CHARACTERISTICS (Ta=25°C)

TYPE	ZENER CHARACTERISTICS					TEMPERATURE COEFFICIENT OF ZENER VOLTAGE α_T (mV / °C)		FORWARD VOLTAGE		REVERSE CURRENT	
	ZENER VOLTAGE V_Z (V)			ZENER IMPEDANCE r_d (Ω)	MEASUREMENT CURRENT I_Z (mA)			V_F (V)	MEASUREMENT CURRENT I_F (A)	I_R (μA)	MEASUREMENT VOLTAGE V_R (V)
	MIN.	TYP.	MAX.	MAX.		TYP.	MAX.	MAX.		MAX	
2Z12	10.8	12	13.2	30	10	8	13	1.2	0.2	5	10.2
2Z13	11.7	13	14.3	30	10	9	14	1.2	0.2	5	11.1
2Z15	13.5	15	16.5	30	10	11	17	1.2	0.2	5	12.8
2Z16	14.4	16	17.6	30	10	12	19	1.2	0.2	5	13.6
*2Z16A	15.2	16	16.8	30	10	12	19	1.2	0.2	5	13.6
2Z18	16.2	18	19.8	30	10	14	23	1.2	0.2	5	15.3
*2Z18A	17.1	18	18.9	30	10	14	23	1.2	0.2	5	15.3
2Z20	18.0	20	22.0	30	10	16	26	1.2	0.2	5	17.1
2Z22	19.8	22	24.2	30	10	18	28	1.2	0.2	5	18.8
2Z24	21.6	24	26.4	30	10	20	32	1.2	0.2	5	20.5
2Z27	24.3	27	29.7	30	10	23	36	1.2	0.2	5	23.1
*2Z27A	25.7	27	28.3	30	10	23	36	1.2	0.2	5	23.1
2Z30	27.0	30	33.0	30	10	25	40	1.2	0.2	5	25.6
2Z33	29.7	33	36.3	30	10	26	41	1.2	0.2	5	28.2
2Z36	32.4	36	39.6	30	9	28	45	1.2	0.2	5	30.8
2Z43	38.7	43	47.3	40	7	33	53	1.2	0.2	5	34.4
2Z47	42.3	47	51.7	65	6	38	60	1.2	0.2	5	40.2
2Z51	45.9	51	56.1	65	6	43	68	1.2	0.2	5	43.6

Note: * Production upon request.

Handling Precaution

The absolute maximum ratings denote the absolute maximum ratings, which are rated values and must not be exceeded during operation, even for an instant. The following are the general derating methods that we recommend when you design a circuit with a device.

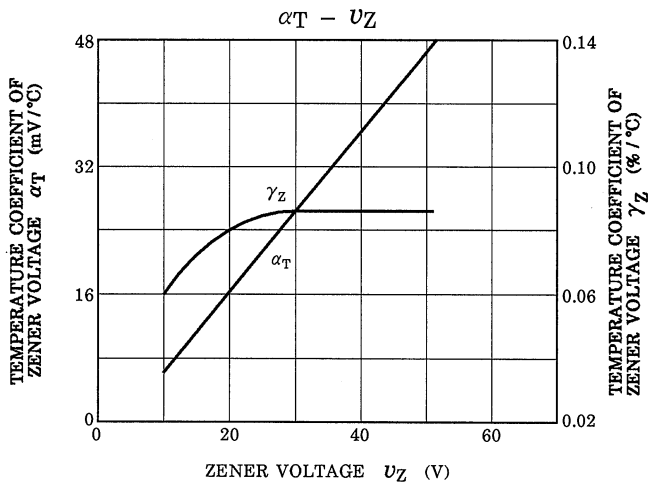
P: We recommend that the worst case power dissipation be no greater than 50% of the absolute maximum rating of power dissipation. Carry out adequate heat design.

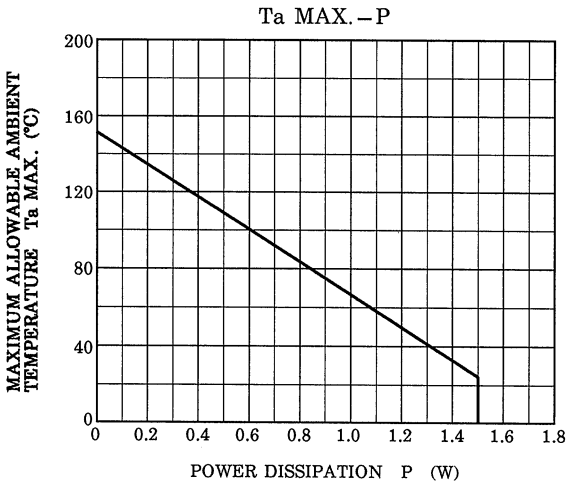
P_{RSM}: We recommend that a device be used within the recommended area in the figure, P_{RSM}-tw.

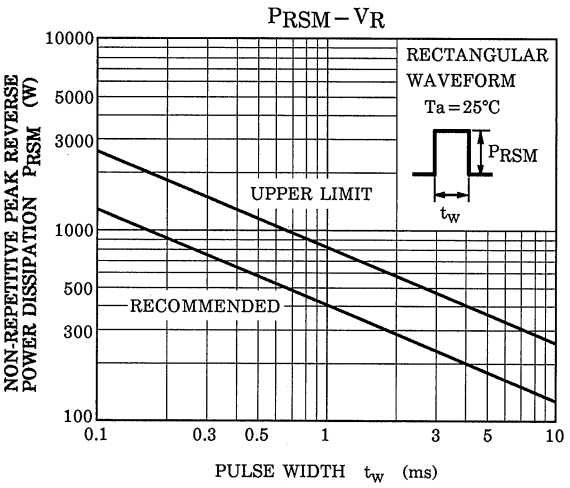
T_j: Derate this rating when using a device in order to ensure high reliability. We recommend that the device be used at a T_j of below 120°C.

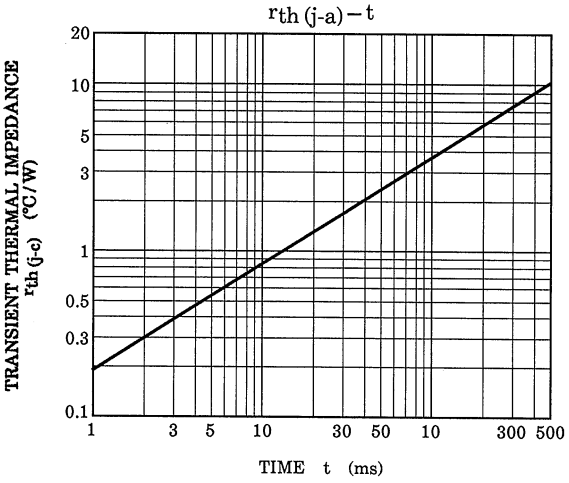
Thermal resistance between junction and ambient fluctuates depending on the device's mounting condition. When using a device, design a circuit board and a soldering land size to match the appropriate thermal resistance value.

Please refer to the Rectifiers databook for further information.


αT – υZ
TEMPERATURE COEFFICIENT OF ZENER VOLTAGE αT (mV/°C)
TEMPERATURE COEFFICIENT OF ZENER VOLTAGE γZ (%/°C)
48
32
16
0
0.14
0.10
0.06
0.02
γZ
αT
0
20
40
60
ZENER VOLTAGE υZ (V)


Ta MAX. – P
MAXIMUM ALLOWABLE AMBIENT TEMPERATURE Ta MAX. (°C)
200
160
120
80
40
0
0 0.2 0.4 0.6 0.8 1.0 1.2 1.4 1.6 1.8
POWER DISSIPATION P (W)


PRSM – VR
NON-REPETITIVE PEAK REVERSE POWER DISSIPATION PRSM (W)
10000
5000
3000
1000
500
300
100
RECTANGULAR WAVEFORM
Ta = 25°C
PRSM
tw
UPPER LIMIT
RECOMMENDED
0.1 0.3 0.5 1 3 5 10
PULSE WIDTH tw (ms)


rth (j-a) – t
TRANSIENT THERMAL IMPEDANCE rth (j-c) (°C/W)
20
10
5
3
1
0.5
0.3
0.1
1 3 5 10 30 50 10 300 500
TIME t (ms)

RESTRICTIONS ON PRODUCT USE

20070701-EN

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- TOSHIBA is continually working to improve the quality and reliability of its products. Nevertheless, semiconductor devices in general can malfunction or fail due to their inherent electrical sensitivity and vulnerability to physical stress. It is the responsibility of the buyer, when utilizing TOSHIBA products, to comply with the standards of safety in making a safe design for the entire system, and to avoid situations in which a malfunction or failure of such TOSHIBA products could cause loss of human life, bodily injury or damage to property.
  In developing your designs, please ensure that TOSHIBA products are used within specified operating ranges as set forth in the most recent TOSHIBA products specifications. Also, please keep in mind the precautions and conditions set forth in the “Handling Guide for Semiconductor Devices,” or “TOSHIBA Semiconductor Reliability Handbook” etc.
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