MZP4729A Series

3 Watt DO-41 Surmetic™ 30 Zener Voltage Regulators

This is a complete series of 3 Watt Zener diodes with limits and excellent operating characteristics that reflect the superior capabilities of silicon–oxide passivated junctions. All this in an axial–lead, transfer–molded plastic package that offers protection in all common environmental conditions.

Specification Features:

- Zener Voltage Range – 3.6 V to 30 V
- ESD Rating of Class 3 (>16 KV) per Human Body Model
- Surge Rating of 98 W @ 1 ms
- Maximum Limits Guaranteed on up to Six Electrical Parameters
- Package No Larger than the Conventional 1 Watt Package

Mechanical Characteristics:

CASE: Void free, transfer–molded, thermosetting plastic

FINISH: All external surfaces are corrosion resistant and leads are readily solderable

MAXIMUM LEAD TEMPERATURE FOR SOLDERING PURPOSES: 230°C, 1/16″ from the case for 10 seconds

POLARITY: Cathode indicated by polarity band

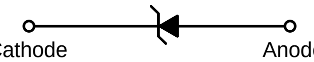
MOUNTING POSITION: Any

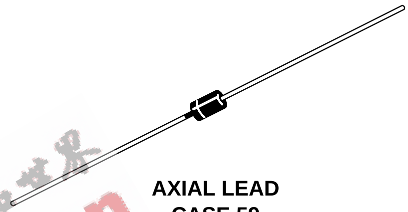
MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Max. Steady State Power Dissipation @ T_L = 75°C, Lead Length = 3/8″ Derate above 75°C	P_D	3 24	W mW/°C
Steady State Power Dissipation @ T_A = 50°C Derate above 50°C	P_D	1 6.67	W mW/°C
Operating and Storage Temperature Range	T_J, T_{stg}	–65 to +200	°C

ON Semiconductor™

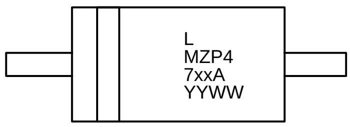
http://onsemi.com





AXIAL LEAD
CASE 59
PLASTIC

MARKING DIAGRAM



L	=	Assembly Location
MZP47xxA	=	Device Code (See Table Next Page)
YY	=	Year
WW	=	Work Week

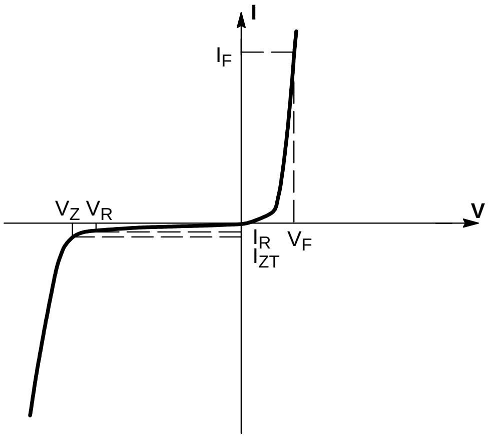
ORDERING INFORMATION

Device	Package	Shipping
MZP47xxA	Axial Lead	2000 Units/Box
MZP47xxARL	Axial Lead	6000/Tape & Reel
MZP47xxATA	Axial Lead	4000/Ammo Pack
MZP47xxARR1 †	Axial Lead	2000/Tape & Reel
MZP47xxARR2 ‡	Axial Lead	2000/Tape & Reel

† Polarity band **up** with cathode lead off first
‡ Polarity band **down** with cathode lead off first

ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted, V_F = 1.5 V Max @ I_F = 200 mA for all types)

Symbol	Parameter
V_Z	Reverse Zener Voltage @ I_{ZT}
I_{ZT}	Reverse Current
Z_{ZT}	Maximum Zener Impedance @ I_{ZT}
I_{ZK}	Reverse Current
Z_{ZK}	Maximum Zener Impedance @ I_{ZK}
I_R	Reverse Leakage Current @ V_R
V_R	Breakdown Voltage
I_F	Forward Current
V_F	Forward Voltage @ I_F
I_R	Surge Current @ T_A = 25°C



Zener Voltage Regulator

ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted, V_F = 1.5 V Max @ I_F = 200 mA for all types)

Device (Note 1)	Device Marking	Zener Voltage (Note 2) V_Z (Volts) Min	Nom	Max	@ I_{ZT} mA	Zener Impedance (Note 3) Z_{ZT} @ I_{ZT} Ω	Z_{ZK} @ I_{ZK} Ω	mA	Leakage Current I_R @ V_R µA Max	Volts	I_R (Note 4) mA
MZP4729A	MZP4729A	3.42	3.6	3.78	69	10	400	1	100	1	1260
MZP4734A	MZP4734A	5.32	5.6	5.88	45	5	600	1	10	2	810
MZP4735A	MZP4735A	5.89	6.2	6.51	41	2	700	1	10	3	730
MZP4736A	MZP4736A	6.46	6.8	7.14	37	3.5	700	1	10	4	660
MZP4737A	MZP4737A	7.13	7.5	7.88	34	4	700	0.5	10	5	605
MZP4738A	MZP4738A	7.79	8.2	8.61	31	4.5	700	0.5	10	6	550
MZP4740A	MZP4740A	9.50	10	10.50	25	7	700	0.25	10	7.6	454
MZP4741A	MZP4741A	10.45	11	11.55	23	8	700	0.25	5	8.4	414
MZP4744A	MZP4744A	14.25	15	15.75	17	14	700	0.25	5	11.4	304
MZP4745A	MZP4745A	15.20	16	16.80	15.5	16	700	0.25	5	12.2	285
MZP4746A	MZP4746A	17.10	18	18.90	14	20	750	0.25	5	13.7	250
MZP4749A	MZP4749A	22.80	24	25.20	10.5	25	750	0.25	5	18.2	190
MZP4750A	MZP4750A	25.65	27	28.35	9.5	35	750	0.25	5	20.6	170
MZP4751A	MZP4751A	28.50	30	31.50	8.5	40	1000	0.25	5	22.8	150
MZP4752A	MZP4752A	31.35	33	34.65	7.5	45	1000	0.25	5	25.1	135
MZP4753A	MZP4753A	34.20	36	37.80	7.0	50	1000	0.25	5	27.4	125

1. **TOLERANCE AND TYPE NUMBER DESIGNATION**
   The type numbers listed have a standard tolerance on the nominal zener voltage of ±5%.
2. **ZENER VOLTAGE (V_Z) MEASUREMENT**
   ON Semiconductor guarantees the zener voltage when measured at 90 seconds while maintaining the lead temperature (T_L) at 30°C ±1°C, 3/8″ from the diode body.
3. **ZENER IMPEDANCE (Z_Z) DERIVATION**
   The zener impedance is derived from 60 seconds AC voltage, which results when an AC current having an rms value equal to 10% of the DC zener current (I_{ZT} or I_{ZK}) is superimposed on I_{ZT} or I_{ZK}.
4. **SURGE CURRENT (I_R) NON–REPETITIVE**
   The rating listed in the electrical characteristics table is maximum peak, non–repetitive, reverse surge current of 1/2 square wave or equivalent sine wave pulse of 1/120 second duration superimposed on the test current, I_{ZT}, per JEDEC standards. However, actual device capability is as described in Figure 3 of the General Data sheet for Surmetic 30s.

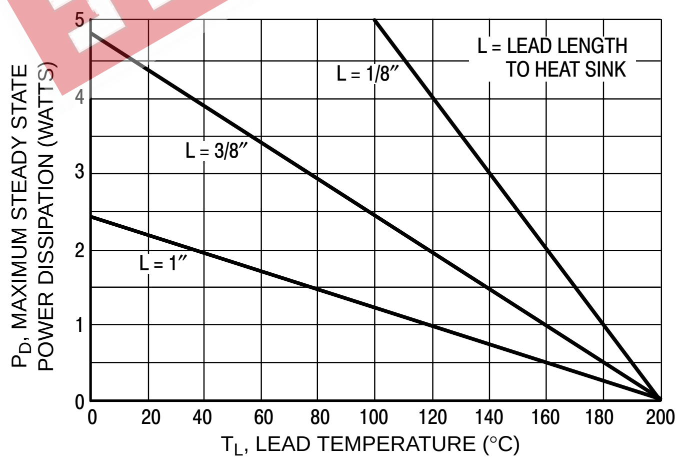


Figure 1. Power Temperature Derating Curve

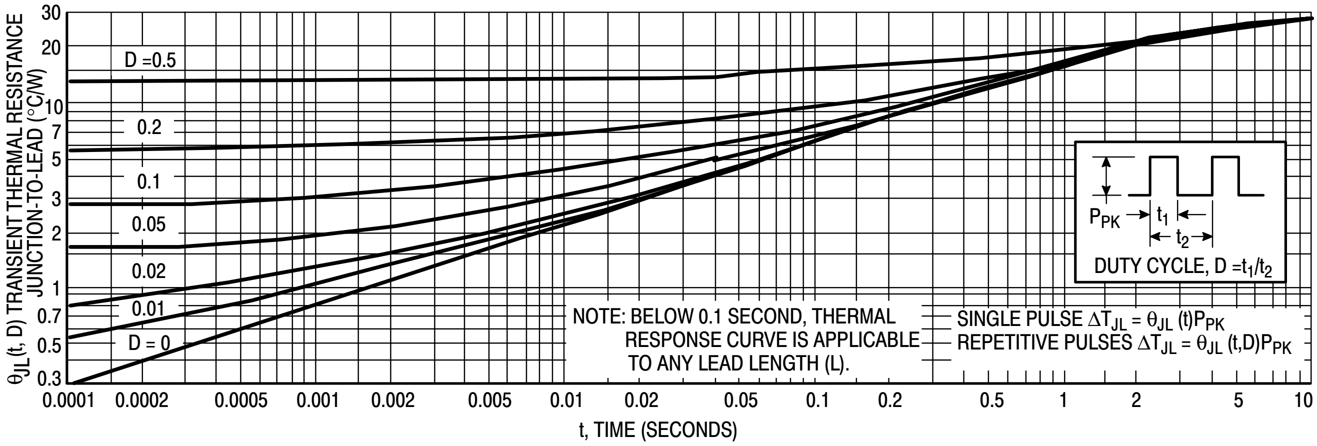


Figure 2. Typical Thermal Response L, Lead Length = 3/8 Inch

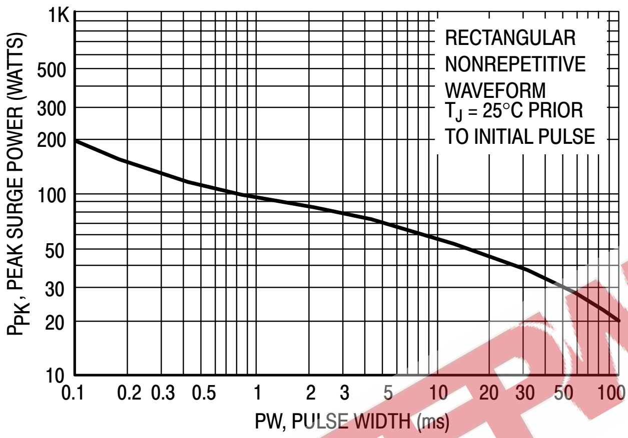


Figure 3. Maximum Surge Power

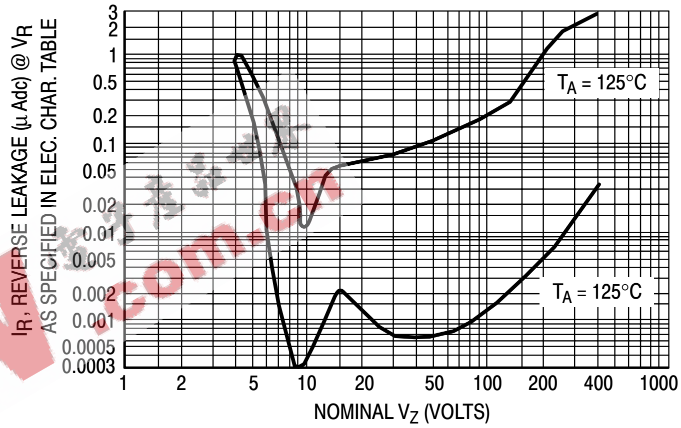


Figure 4. Typical Reverse Leakage

APPLICATION NOTE

Since the actual voltage available from a given zener diode is temperature dependent, it is necessary to determine junction temperature under any set of operating conditions in order to calculate its value. The following procedure is recommended:

Lead Temperature, T_L, should be determined from:

$$T_L = \theta_{LA} P_D + T_A$$

θ_{LA} is the lead-to-ambient thermal resistance (°C/W) and P_D is the power dissipation. The value for θ_{LA} will vary and depends on the device mounting method. θ_{LA} is generally 30–40°C/W for the various clips and tie points in common use and for printed circuit board wiring.

The temperature of the lead can also be measured using a thermocouple placed on the lead as close as possible to the tie point. The thermal mass connected to the tie point is normally large enough so that it will not significantly respond to heat surges generated in the diode as a result of pulsed operation once steady-state conditions are achieved. Using the measured value of T_L, the junction temperature may be determined by:

$$T_J = T_L + \Delta T_{JL}$$

ΔT_{JL} is the increase in junction temperature above the lead temperature and may be found from Figure 2 for a train of power pulses (L = 3/8 inch) or from Figure 10 for dc power.

$$\Delta T_{JL} = \theta_{JL} P_D$$

For worst-case design, using expected limits of I_Z, limits of P_D and the extremes of T_J (ΔT_J) may be estimated. Changes in voltage, V_Z, can then be found from:

$$\Delta V = \theta_{VZ} \Delta T_J$$

θ_{VZ}, the zener voltage temperature coefficient, is found from Figures 5 and 6.

Under high power-pulse operation, the zener voltage will vary with time and may also be affected significantly by the zener resistance. For best regulation, keep current excursions as low as possible.

Data of Figure 2 should not be used to compute surge capability. Surge limitations are given in Figure 3. They are lower than would be expected by considering only junction temperature, as current crowding effects cause temperatures to be extremely high in small spots resulting in device degradation should the limits of Figure 3 be exceeded.

TEMPERATURE COEFFICIENT RANGES

(90% of the Units are in the Ranges Indicated)

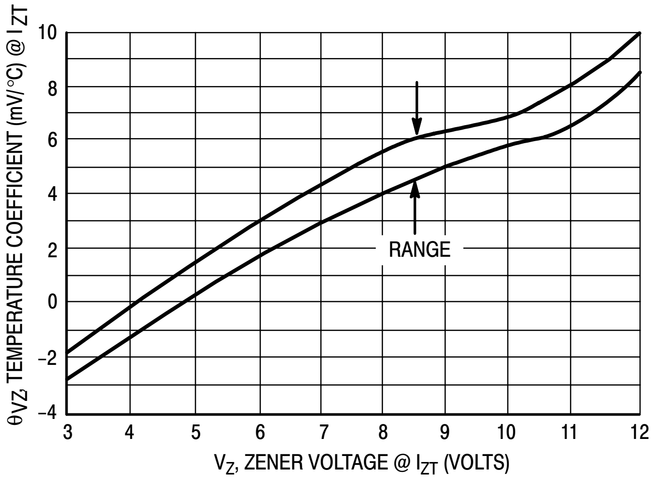


Figure 5. Units To 12 Volts

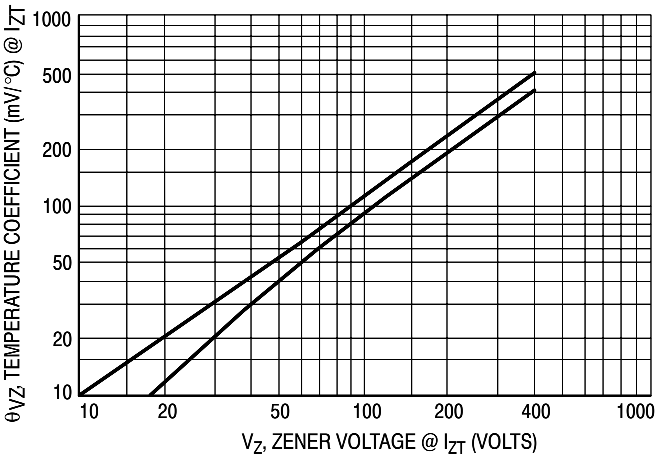


Figure 6. Units 10 To 400 Volts

ZENER VOLTAGE versus ZENER CURRENT

(Figures 7, 8 and 9)

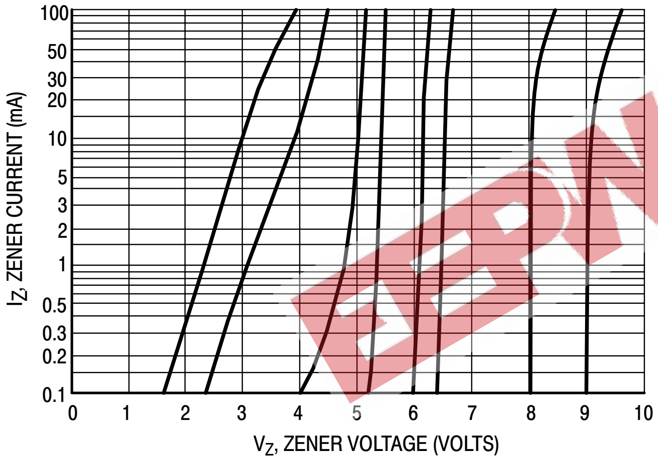


Figure 7. V_Z = 3.3 thru 10 Volts

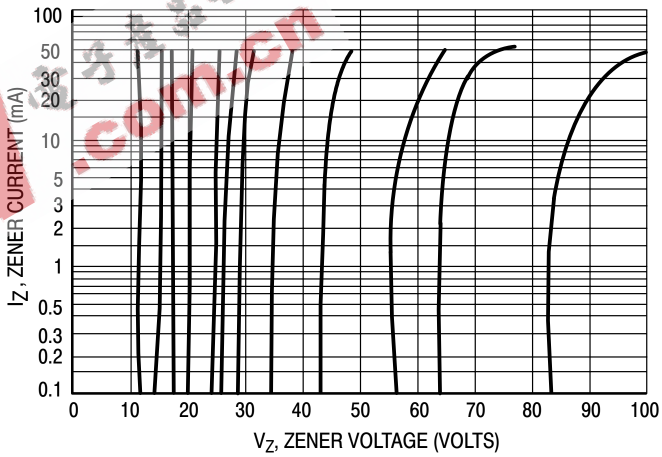


Figure 8. V_Z = 12 thru 82 Volts

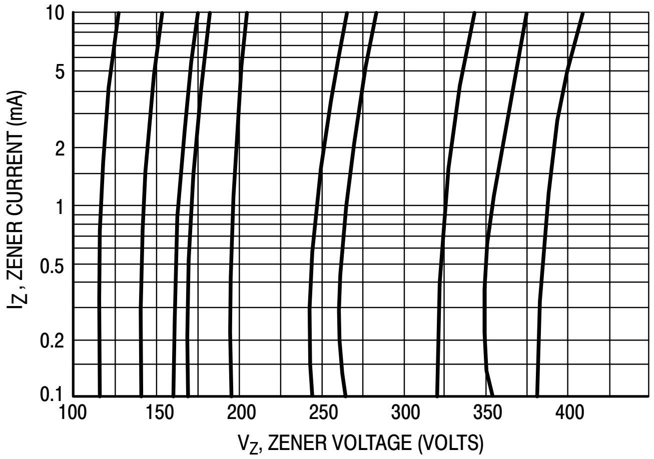


Figure 9. V_Z = 100 thru 400 Volts

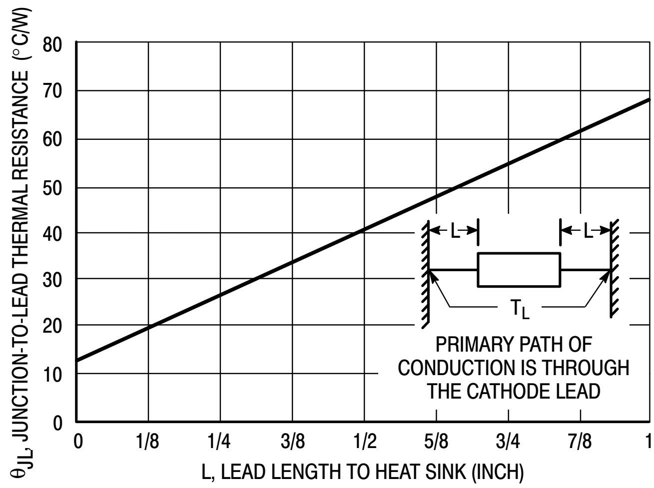


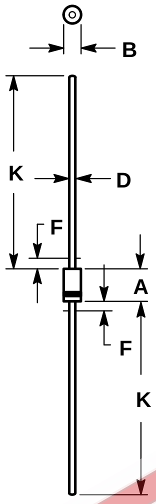
Figure 10. Typical Thermal Resistance

OUTLINE DIMENSIONS

Zener Voltage Regulators – Axial Leaded

3 Watt DO–41 Surmetic™ 30

PLASTIC DO–41
CASE 59–10
ISSUE R



NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. 59–04 OBSOLETE, NEW STANDARD 59–09.
4. 59–03 OBSOLETE, NEW STANDARD 59–10.
5. ALL RULES AND NOTES ASSOCIATED WITH JEDEC DO–41 OUTLINE SHALL APPLY
6. POLARITY DENOTED BY CATHODE BAND.
7. LEAD DIAMETER NOT CONTROLLED WITHIN F DIMENSION.

	INCHES		MILLIMETERS	
DIM	MIN	MAX	MIN	MAX
A	0.161	0.205	4.10	5.20
B	0.079	0.106	2.00	2.70
D	0.028	0.034	0.71	0.86
F	---	0.050	---	1.27
K	1.000	---	25.40	---

PUBLICATION ORDERING INFORMATION

Literature Fulfillment:
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