

**DESCRIPTION/FEATURES**

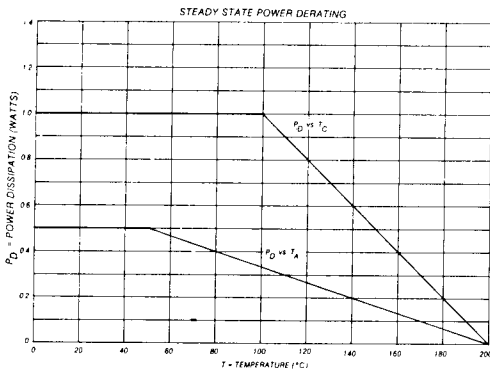
- LEADLESS PACKAGE FOR SURFACE MOUNT TECHNOLOGY
- IDEAL FOR HIGH DENSITY MOUNTING
- VOLTAGE RANGE—2.4 TO 200 VOLTS
- HERMETICALLY SEALED, DOUBLE-SLUG GLASS CONSTRUCTION
- METALLURGICALLY BONDED CONSTRUCTION AVAILABLE AS DASH ONE.

**MAXIMUM RATINGS**

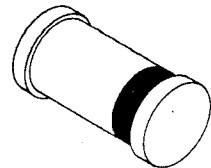
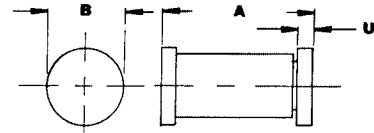
500 mW DC Power Rating (See Power Derating Curve)  
-65°C to +200°C Operating and Storage Junction Temperature  
Power Derating 3.33 mW/°C above 50°C

**APPLICATION**

This surface mountable zener diode series is similar to the 1N5221 thru 1N5281 registration in the DO-35 equivalent package except that it meets the new JEDEC surface mount outline DO-213AA. It is an ideal selection for applications of high density and low parasitic requirements. Due to its glass hermetic qualities, it may also be considered for high reliability applications when required by a source control drawing (SCD).



**LEADLESS GLASS  
ZENER DIODES**



| DIM | MILLIMETERS |      | INCHES |       |
|-----|-------------|------|--------|-------|
|     | MIN         | MAX  | MIN    | MAX   |
| A   | 3.30        | 3.75 | 0.130  | 0.148 |
| B   | 1.60        | 1.75 | 0.063  | 0.069 |
| U   | 41          | 56   | 0.016  | 0.022 |

DO-213AA

**MECHANICAL  
CHARACTERISTICS**

CASE: Hermetically sealed glass with solder contact tabs at each end.

FINISH: All external surfaces are corrosion resistant, readily solderable.

POLARITY: Banded end is cathode.

THERMAL RESISTANCE: 100°C/Watt typical junction to contact (case) tabs.

MOUNTING POSITION: Any.

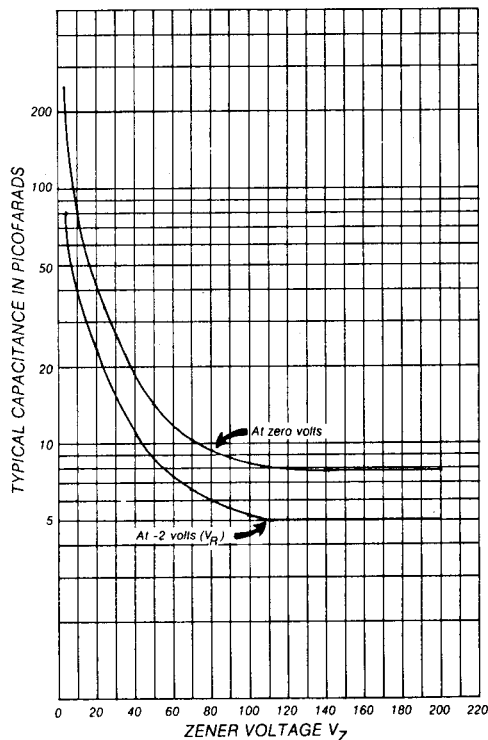
# MLL5221 thru MLL 5281

## ELECTRICAL CHARACTERISTICS

( $T_A = 25^\circ\text{C}$  unless otherwise noted. Based on dc measurements at thermal equilibrium; case temperature maintained at  $30 \pm 2^\circ\text{C}$ .  $V_F = 1.1\text{V}$  max @  $I_F = 200\text{ mA}$  for all types.)

| Type No (Note 1) | Nominal Zener Voltage $V_Z$ @ $I_{ZT}$ Volts (Note 2) | Test Current $I_{ZT}$ mA | Max Zener Impedance A and B Suffix only |   | Max Reverse Leakage Current       |      |            |   | Max Zener Voltage (A and B Suffix only) $V_Z$ (%/°C) (Note 3) |
|------------------|---|--------------------------|---|---|-----------------------------------|------|------------|---|---|
|                  |   |                          | $Z_{ZT}$ @ $I_{ZT}$ Ohms                | $Z_{ZK}$ @ $I_{ZK} = 0.25\text{ mA}$ Ohms | A and B Suffix only               |      | Non Suffix |   |   |
|                  |   |                          |   |   | $I_R$ @ $V_R$ Volts $\mu\text{A}$ | A    | B          | $I_R$ @ $V_R$ Used for Suffix A $\mu\text{A}$ |   |
| MLL5221          | 2.4   | 20                       | 30                                      | 1200                                      | 100                               | 0.95 | 1.0        | 200   | -0.085  |
| MLL5222          | 2.5   | 20                       | 30                                      | 1250                                      | 100                               | 0.95 | 1.0        | 200   | -0.085  |
| MLL5223          | 2.7   | 20                       | 30                                      | 1300                                      | 75                                | 0.95 | 1.0        | 150   | -0.080  |
| MLL5224          | 2.8   | 20                       | 30                                      | 1400                                      | 75                                | 0.95 | 1.0        | 150   | -0.080  |
| MLL5225          | 3.0   | 20                       | 29                                      | 1600                                      | 50                                | 0.95 | 1.0        | 100   | -0.075  |
| MLL5226          | 3.3   | 20                       | 24                                      | 1600                                      | 25                                | 0.95 | 1.0        | 100   | -0.070  |
| MLL5227          | 3.6   | 20                       | 24                                      | 1700                                      | 15                                | 0.95 | 1.0        | 100   | -0.065  |
| MLL5228          | 3.9   | 20                       | 23                                      | 1900                                      | 10                                | 0.95 | 1.0        | 75  | -0.060  |
| MLL5229          | 4.3   | 20                       | 22                                      | 2000                                      | 5.0                               | 0.95 | 1.0        | 50  | -0.055  |
| MLL5230          | 4.7   | 20                       | 19                                      | 1900                                      | 5.0                               | 1.9  | 2.0        | 50  | -0.030  |
| MLL5231          | 5.1   | 20                       | 17                                      | 1800                                      | 5.0                               | 1.9  | 2.0        | 50  | +0.030  |
| MLL5232          | 5.6   | 20                       | 11                                      | 1800                                      | 5.0                               | 2.9  | 3.0        | 50  | +0.038  |
| MLL5233          | 6.0   | 20                       | 7.0                                     | 1800                                      | 3.0                               | 3.3  | 3.5        | 50  | +0.038  |
| MLL5234          | 6.2   | 20                       | 7.0                                     | 1900                                      | 5.0                               | 3.8  | 4.0        | 50  | +0.045  |
| MLL5235          | 6.8   | 20                       | 5.8                                     | 1750                                      | 3.0                               | 4.5  | 5.0        | 30  | +0.050  |
| MLL5236          | 7.5   | 20                       | 8.0                                     | 500                                       | 3.0                               | 5.7  | 6.0        | 30  | +0.058  |
| MLL5237          | 8.2   | 20                       | 8.0                                     | 500                                       | 3.0                               | 6.2  | 6.5        | 30  | +0.062  |
| MLL5238          | 8.7   | 20                       | 8.0                                     | 600                                       | 3.0                               | 6.8  | 6.5        | 30  | +0.065  |
| MLL5239          | 9.1   | 20                       | 10                                      | 600                                       | 3.0                               | 6.7  | 7.0        | 30  | +0.068  |
| MLL5240          | 10  | 70                       | 17                                      | 600                                       | 3.0                               | 7.6  | 8.0        | 30  | +0.075  |
| MLL5241          | 11  | 20                       | 22                                      | 600                                       | 2.0                               | 8.0  | 8.4        | 30  | +0.076  |
| MLL5242          | 12  | 20                       | 30                                      | 600                                       | 1.0                               | 8.7  | 9.1        | 10  | +0.077  |
| MLL5243          | 13  | 20                       | 13                                      | 600                                       | 0.5                               | 9.4  | 9.9        | 10  | +0.079  |
| MLL5244          | 14  | 9.0                      | 15                                      | 800                                       | 0.1                               | 9.5  | 10         | 10  | +0.082  |
| MLL5245          | 15  | 6.5                      | 16                                      | 600                                       | 0.1                               | 10.5 | 11         | 10  | +0.082  |
| MLL5246          | 16  | 7.4                      | 17                                      | 600                                       | 0.1                               | 11.4 | 12         | 10  | +0.083  |
| MLL5247          | 17  | 7.4                      | 19                                      | 600                                       | 0.1                               | 12.4 | 13         | 10  | +0.084  |
| MLL5248          | 18  | 7.0                      | 21                                      | 600                                       | 0.1                               | 13.3 | 14         | 10  | +0.085  |
| MLL5249          | 19  | 6.6                      | 23                                      | 600                                       | 0.1                               | 13.3 | 14         | 10  | +0.086  |
| MLL5250          | 20  | 6.2                      | 25                                      | 600                                       | 0.1                               | 14.3 | 15         | 10  | +0.086  |
| MLL5251          | 22  | 5.6                      | 29                                      | 600                                       | 0.1                               | 16.2 | 17         | 10  | +0.087  |
| MLL5252          | 24  | 5.2                      | 33                                      | 600                                       | 0.1                               | 17.1 | 18         | 10  | +0.088  |
| MLL5253          | 25  | 5.0                      | 35                                      | 600                                       | 0.1                               | 18.1 | 19         | 10  | +0.089  |
| MLL5254          | 27  | 4.6                      | 41                                      | 600                                       | 0.1                               | 20   | 21         | 10  | +0.090  |
| MLL5255          | 28  | 4.5                      | 44                                      | 600                                       | 0.1                               | 22   | 23         | 10  | +0.091  |
| MLL5256          | 30  | 4.2                      | 49                                      | 600                                       | 0.1                               | 22   | 23         | 10  | +0.091  |
| MLL5257          | 33  | 3.8                      | 58                                      | 700                                       | 0.1                               | 24   | 25         | 10  | +0.092  |
| MLL5258          | 36  | 3.4                      | 70                                      | 700                                       | 0.1                               | 26   | 27         | 10  | +0.093  |
| MLL5259          | 39  | 3.2                      | 80                                      | 800                                       | 0.1                               | 29   | 30         | 10  | +0.094  |
| MLL5260          | 43  | 3.0                      | 93                                      | 900                                       | 0.1                               | 31   | 33         | 10  | +0.095  |
| MLL5261          | 47  | 2.7                      | 105                                     | 1000                                      | 0.1                               | 34   | 36         | 10  | +0.095  |
| MLL5262          | 51  | 2.5                      | 125                                     | 1100                                      | 0.1                               | 37   | 39         | 10  | +0.096  |
| MLL5263          | 56  | 2.2                      | 150                                     | 1300                                      | 0.1                               | 41   | 43         | 10  | +0.096  |
| MLL5264          | 60  | 2.1                      | 170                                     | 1400                                      | 0.1                               | 44   | 46         | 10  | +0.097  |
| MLL5265          | 67  | 2.0                      | 185                                     | 1400                                      | 0.1                               | 45   | 47         | 10  | +0.097  |
| MLL5266          | 68  | 1.8                      | 230                                     | 1600                                      | 0.1                               | 49   | 52         | 10  | +0.097  |
| MLL5267          | 75  | 1.7                      | 270                                     | 1700                                      | 0.1                               | 53   | 56         | 10  | +0.098  |
| MLL5268          | 82  | 1.5                      | 330                                     | 2000                                      | 0.1                               | 59   | 62         | 10  | +0.098  |
| MLL5269          | 87  | 1.4                      | 370                                     | 2200                                      | 0.1                               | 65   | 68         | 10  | +0.099  |
| MLL5270          | 91  | 1.4                      | 400                                     | 2300                                      | 0.1                               | 66   | 69         | 10  | +0.099  |
| MLL5271          | 100   | 1.3                      | 500                                     | 2600                                      | 0.1                               | 72   | 76         | 10  | +0.110  |
| MLL5272          | 110   | 1.1                      | 750                                     | 3000                                      | 0.1                               | 80   | 84         | 10  | +0.110  |
| MLL5273          | 120   | 1.0                      | 900                                     | 4000                                      | 0.1                               | 86   | 91         | 10  | +0.110  |
| MLL5274          | 130   | 0.95                     | 1100                                    | 4500                                      | 0.1                               | 94   | 99         | 10  | +0.110  |
| MLL5275          | 140   | 0.90                     | 1300                                    | 4500                                      | 0.1                               | 101  | 106        | 10  | +0.110  |
| MLL5276          | 150   | 0.85                     | 1500                                    | 5000                                      | 0.1                               | 108  | 114        | 10  | +0.110  |
| MLL5277          | 160   | 0.80                     | 1700                                    | 5500                                      | 0.1                               | 116  | 122        | 10  | +0.110  |
| MLL5278          | 170   | 0.74                     | 1900                                    | 5500                                      | 0.1                               | 123  | 129        | 10  | +0.110  |
| MLL5279          | 180   | 0.68                     | 2200                                    | 6000                                      | 0.1                               | 130  | 137        | 10  | +0.110  |
| MLL5280          | 190   | 0.64                     | 2400                                    | 6500                                      | 0.1                               | 137  | 144        | 10  | +0.110  |
| MLL5281          | 200   | 0.65                     | 2500                                    | 7000                                      | 0.1                               | 144  | 152        | 10  | +0.110  |

CAPACITANCE vs.  $V_Z$  CURVE



**NOTE 1:** Table as shown lists type numbers, which indicate a tolerance of  $\pm 20\%$  with guaranteed limits on only  $V_Z$ ,  $I_R$ , and  $V_F$ . Devices with guaranteed limits on all six parameters are indicated by suffix "A" for  $\pm 10\%$ , "B" for  $\pm 5\%$ , "C" for  $\pm 2\%$ , and "D" for  $\pm 1\%$  tolerance.

**NOTE 2:** The electrical characteristics are measured after allowing the device to stabilize for 20 seconds.

**NOTE 3:** Temperature coefficient ( $\alpha_{VZ}$ ). Test conditions for temperature coefficient are as follows:

- $I_{ZT} = 7.5\text{ mA}$ ,  $T_1 = 25^\circ\text{C}$ ,  
 $T_2 = 125^\circ\text{C}$  (MLL5221A, B thru MLL5242A, B)
- $I_{ZT} = \text{Rated } I_{ZT}$ ,  $T_1 = 25^\circ\text{C}$ ,  
 $T_2 = 125^\circ\text{C}$  (MLL5243A, B thru MLL5281A, B)

Device to be temperature stabilized with current applied prior to reading breakdown voltage at the specified ambient temperature.