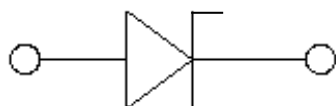


## Zener Diodes



### Features

- Moisture sensitivity level 1
- Zener voltage 2.4V~47V

### Application

- Linear voltage regulator
- DC regulator
- Small-signal surge protection

### Mechanical data

- **Package:** SOD-323
- **Terminals:** Tin plated leads, solderable per J-STD-002 and JESD22-B102

### ■ Maximum Ratings (T<sub>a</sub>=25°C Unless otherwise specified)

| Parameter                              | Symbol           | Unit | Value                           |
|----------------------------------------|------------------|------|---------------------------------|
| Forward voltage @ I <sub>F</sub> =10mA | V <sub>F</sub>   | V    | 0.9                             |
| Power dissipation                      | P <sub>D</sub>   | mW   | 200                             |
| Maximum regulator current              | I <sub>ZM</sub>  | mA   | P <sub>D</sub> / V <sub>Z</sub> |
| Junction temperature                   | T <sub>J</sub>   | °C   | -55 to +150                     |
| Storage temperature                    | T <sub>STG</sub> | °C   | -55 to +150                     |



# MMSZ5221BS THRU MMSZ5261BS

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## ■ Electrical Characteristics (T<sub>A</sub>=25°C Unless otherwise specified)

| Type number | Device marking | V <sub>Z</sub> @ I <sub>ZT</sub> (V) |      |       | Z <sub>ZT</sub> (Ω)  |      | Z <sub>ZK</sub> (Ω)  |      | I <sub>R</sub> (μA) @V <sub>R</sub> |                    | Diode capacitance Cd (pF) | Non-repetitive peak reverse current I <sub>zsm</sub> (A) |
|-------------|----------------|--------------------------------------|------|-------|----------------------|------|----------------------|------|-------------------------------------|--------------------|---------------------------|----------------------------------------------------------|
|             |                | Min.                                 | Typ. | Max.  | I <sub>ZT</sub> (mA) | Max. | I <sub>ZK</sub> (mA) | Max. | Max                                 | V <sub>R</sub> (V) | Max                       | Max                                                      |
| MMSZ5221BS  | C1             | 2.28                                 | 2.4  | 2.52  | 20                   | 30   | 0.25                 | 1200 | 100                                 | 1.0                | 450                       | 6                                                        |
| MMSZ5222BS  | C2             | 2.38                                 | 2.5  | 2.63  | 20                   | 30   | 0.25                 | 1250 | 100                                 | 1.0                | 450                       | 6                                                        |
| MMSZ5223BS  | C3             | 2.57                                 | 2.7  | 2.84  | 20                   | 30   | 0.25                 | 1300 | 75                                  | 1.0                | 450                       | 6                                                        |
| MMSZ5225BS  | C5             | 2.85                                 | 3.0  | 3.15  | 20                   | 29   | 0.25                 | 1600 | 50                                  | 1.0                | 450                       | 6                                                        |
| MMSZ5226BS  | G1             | 3.14                                 | 3.3  | 3.47  | 20                   | 28   | 0.25                 | 1600 | 25                                  | 1.0                | 450                       | 6                                                        |
| MMSZ5227BS  | G2             | 3.42                                 | 3.6  | 3.78  | 20                   | 24   | 0.25                 | 1700 | 15                                  | 1.0                | 450                       | 4.5                                                      |
| MMSZ5228BS  | G3             | 3.71                                 | 3.9  | 4.10  | 20                   | 23   | 0.25                 | 1900 | 10                                  | 1.0                | 450                       | 4.5                                                      |
| MMSZ5229BS  | G4             | 4.09                                 | 4.3  | 4.52  | 20                   | 22   | 0.25                 | 2000 | 5                                   | 1.0                | 450                       | 3.5                                                      |
| MMSZ5230BS  | G5             | 4.47                                 | 4.7  | 4.94  | 20                   | 19   | 0.25                 | 1900 | 5                                   | 2.0                | 300                       | 3.5                                                      |
| MMSZ5231BS  | E1             | 4.85                                 | 5.1  | 5.36  | 20                   | 17   | 0.25                 | 1600 | 5                                   | 2.0                | 300                       | 3                                                        |
| MMSZ5232BS  | E2             | 5.32                                 | 5.6  | 5.88  | 20                   | 11   | 0.25                 | 1600 | 5                                   | 3.0                | 200                       | 3                                                        |
| MMSZ5234BS  | E4             | 5.89                                 | 6.2  | 6.51  | 20                   | 7    | 0.25                 | 1000 | 5                                   | 4.0                | 200                       | 3                                                        |
| MMSZ5235BS  | E5             | 6.46                                 | 6.8  | 7.14  | 20                   | 5    | 0.25                 | 750  | 3                                   | 5.0                | 200                       | 2                                                        |
| MMSZ5236BS  | F1             | 7.13                                 | 7.5  | 7.88  | 20                   | 6    | 0.25                 | 500  | 3                                   | 6.0                | 150                       | 2                                                        |
| MMSZ5237BS  | F2             | 7.79                                 | 8.2  | 8.61  | 20                   | 8    | 0.25                 | 500  | 3                                   | 6.5                | 150                       | 2                                                        |
| MMSZ5239BS  | F4             | 8.65                                 | 9.1  | 9.56  | 20                   | 10   | 0.25                 | 600  | 3                                   | 7.0                | 150                       | 1.8                                                      |
| MMSZ5240BS  | F5             | 9.50                                 | 10   | 10.50 | 20                   | 17   | 0.25                 | 600  | 3                                   | 8.0                | 90                        | 1.8                                                      |
| MMSZ5241BS  | H1             | 10.45                                | 11   | 11.55 | 20                   | 22   | 0.25                 | 600  | 2                                   | 8.4                | 85                        | 1.8                                                      |
| MMSZ5242BS  | H2             | 11.40                                | 12   | 12.60 | 20                   | 30   | 0.25                 | 600  | 1                                   | 9.1                | 85                        | 1.8                                                      |
| MMSZ5243BS  | H3             | 12.35                                | 13   | 13.65 | 9.5                  | 13   | 0.25                 | 600  | 0.5                                 | 9.9                | 80                        | 1                                                        |
| MMSZ5245BS  | H5             | 14.25                                | 15   | 15.75 | 8.5                  | 16   | 0.25                 | 600  | 0.1                                 | 11.0               | 75                        | 1                                                        |
| MMSZ5246BS  | J1             | 15.20                                | 16   | 16.80 | 7.8                  | 17   | 0.25                 | 600  | 0.1                                 | 12.0               | 75                        | 1                                                        |
| MMSZ5248BS  | J3             | 17.10                                | 18   | 18.90 | 7                    | 21   | 0.25                 | 600  | 0.1                                 | 14.0               | 70                        | 1                                                        |
| MMSZ5250BS  | J5             | 19.00                                | 20   | 21.00 | 6.2                  | 25   | 0.25                 | 600  | 0.1                                 | 15.0               | 60                        | 1                                                        |
| MMSZ5251BS  | K1             | 20.90                                | 22   | 23.10 | 5.6                  | 29   | 0.25                 | 600  | 0.1                                 | 17.0               | 60                        | 0.6                                                      |



## MMSZ5221BS THRU MMSZ5261BS

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| Type number | Device marking | V <sub>Z</sub> @ I <sub>ZT</sub> (V) |      |       | Z <sub>VT</sub> (Ω)  |      | Z <sub>ZK</sub> (Ω)  |      | I <sub>R</sub> (μA) @V <sub>R</sub> |                    | Diode capacitance Cd (pF) | Non-repetitive peak reverse current I <sub>ZSM</sub> (A) |
|-------------|----------------|--------------------------------------|------|-------|----------------------|------|----------------------|------|-------------------------------------|--------------------|---------------------------|----------------------------------------------------------|
|             |                | Min.                                 | Typ. | Max.  | I <sub>ZT</sub> (mA) | Max. | I <sub>ZK</sub> (mA) | Max. | Max                                 | V <sub>R</sub> (V) | Max                       | Max                                                      |
| MMSZ5252BS  | K2             | 22.80                                | 24   | 25.20 | 5.2                  | 33   | 0.25                 | 600  | 0.1                                 | 18.0               | 55                        | 0.6                                                      |
| MMSZ5254BS  | K4             | 25.65                                | 27   | 28.35 | 4.6                  | 41   | 0.25                 | 600  | 0.1                                 | 21.0               | 50                        | 0.6                                                      |
| MMSZ5256BS  | M1             | 28.50                                | 30   | 31.50 | 4.2                  | 49   | 0.25                 | 600  | 0.1                                 | 23.0               | 50                        | 0.6                                                      |
| MMSZ5257BS  | M2             | 31.35                                | 33   | 34.65 | 3.8                  | 58   | 0.25                 | 700  | 0.1                                 | 25.0               | 45                        | 0.6                                                      |
| MMSZ5258BS  | M3             | 34.20                                | 36   | 37.80 | 3.4                  | 70   | 0.25                 | 700  | 0.1                                 | 27.0               | 45                        | 0.6                                                      |
| MMSZ5259BS  | M4             | 37.05                                | 39   | 40.95 | 3.2                  | 80   | 0.25                 | 800  | 0.1                                 | 30.0               | 45                        | 0.6                                                      |
| MMSZ5260BS  | M5             | 40.85                                | 43   | 45.15 | 3                    | 93   | 0.25                 | 900  | 0.1                                 | 33.0               | 40                        | 0.6                                                      |
| MMSZ5261BS  | N1             | 44.65                                | 47   | 49.35 | 2.7                  | 105  | 0.25                 | 1000 | 0.1                                 | 36.0               | 40                        | 0.5                                                      |

### ■ Thermal Characteristics

| Parameter                               | Symbol                          | Unit | Value |
|-----------------------------------------|---------------------------------|------|-------|
| Thermal resistance, junction-to-ambient | R <sub>θJA</sub> <sup>(1)</sup> | °C/W | 625   |
| Thermal resistance, junction-to-case    | R <sub>θJC</sub> <sup>(1)</sup> | °C/W | 500   |

#### Note:

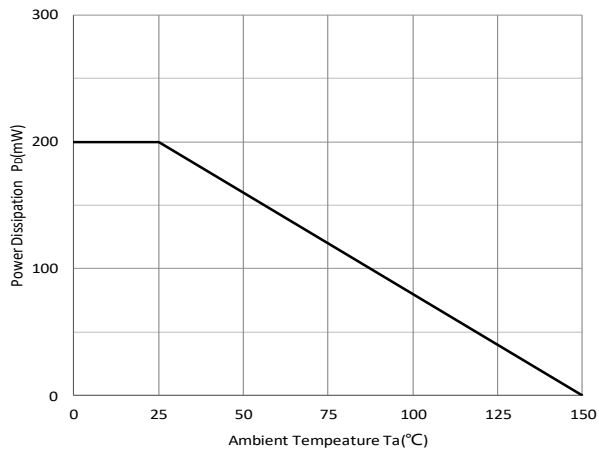
(1) Thermal resistance from junction to ambient and from junction to case mounted on P.C.B. with 8mm\*9mm copper pad areas



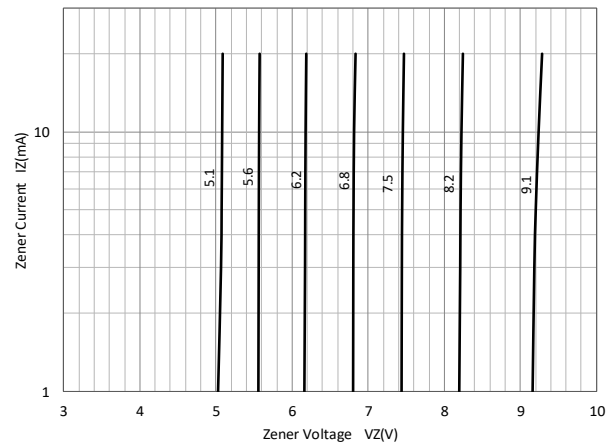
# MMSZ5221BS THRU MMSZ5261BS

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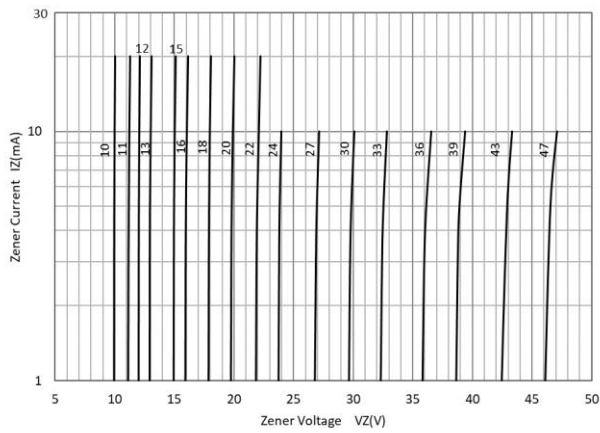
**Fig 1:  $P_D$ - $T_a$  Curve**



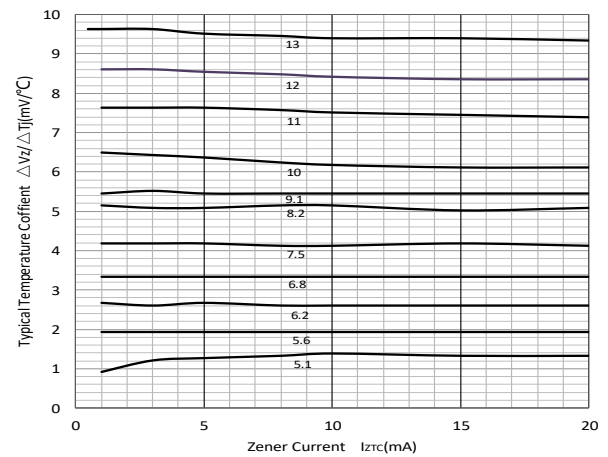
**Fig 2: Zener Breakdown Characteristics**



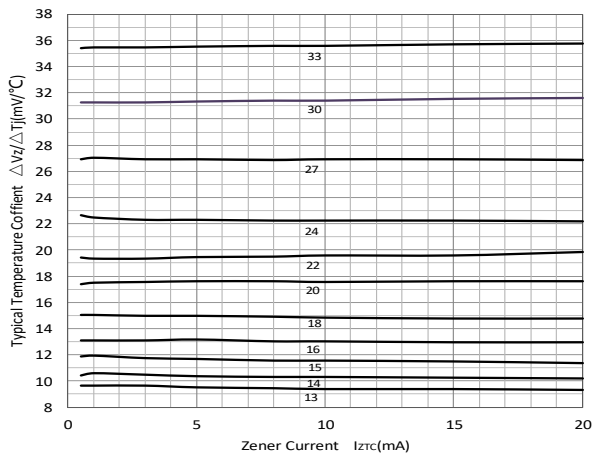
**Fig 3: Zener Breakdown Characteristics**



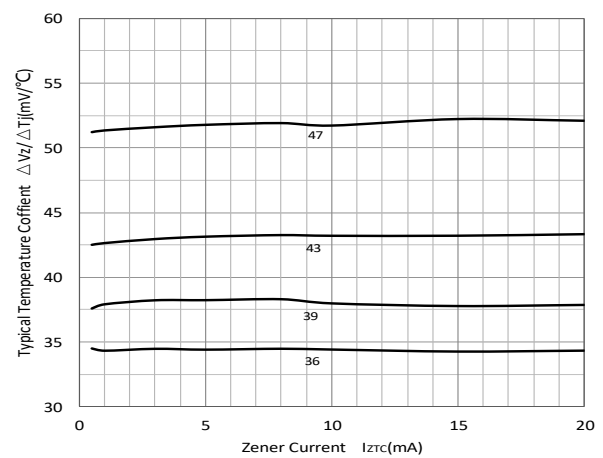
**Fig 4: Typical Temperature Coefficient**



**Fig 5: Typical Temperature Coefficient**

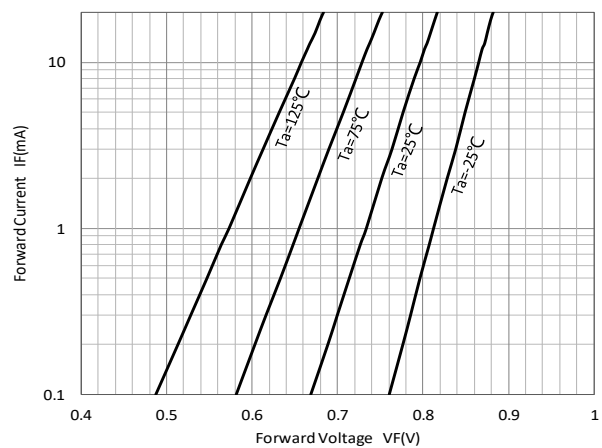


**Fig 6: Typical Temperature Coefficient**





**Fig 7: Typical Forward Voltage**





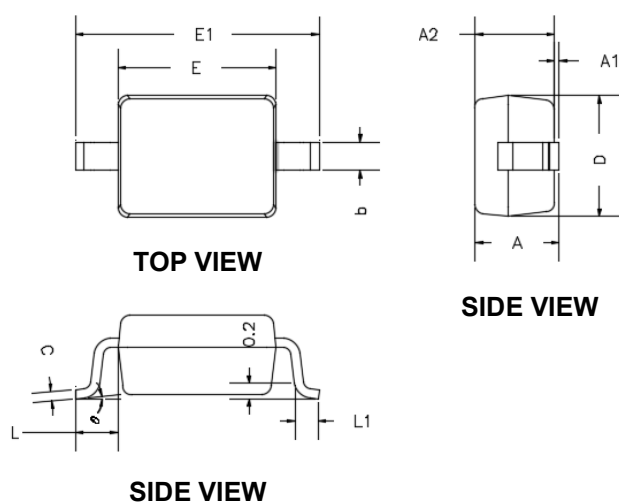
# MMSZ5221BS THRU MMSZ5261BS

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## ■ Ordering Information

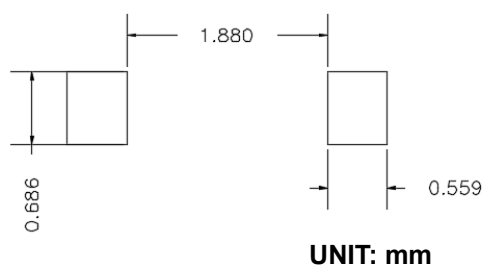
| Preferred P/N              | Packing code | Unit weight(g)     | Minimum package(pcs) | Inner box quantity(pcs) | Outer carton quantity(pcs) | Delivery mode |
|----------------------------|--------------|--------------------|----------------------|-------------------------|----------------------------|---------------|
| MMSZ5221BS THRU MMSZ5261BS | F2           | Approximate 0.0048 | 3000                 | 30000                   | 120000                     | 7" reel       |
| MMSZ5221BS THRU MMSZ5261BS | F3           | Approximate 0.0048 | 10000                | /                       | 210000                     | 13" reel      |

## ■ Outline Dimensions



| DIMENSIONS |           |        |          |        |
|------------|-----------|--------|----------|--------|
| DIM        | INCHES    |        | MM       |        |
|            | MIN       | MAX    | MIN      | MAX    |
| A          | ---       | 0.0393 | ---      | 1.0000 |
| A1         | 0.0000    | 0.0039 | 0.0000   | 0.1000 |
| A2         | 0.0314    | 0.0354 | 0.8000   | 0.9000 |
| b          | 0.0098    | 0.0157 | 0.2500   | 0.4000 |
| c          | 0.0031    | 0.0059 | 0.0800   | 0.1500 |
| D          | 0.0472    | 0.0551 | 1.2000   | 1.4000 |
| E          | 0.0629    | 0.0709 | 1.6000   | 1.8000 |
| E1         | 0.0984    | 0.1063 | 2.5000   | 2.7000 |
| L          | 0.0187TYP |        | 0.475TYP |        |
| L1         | 0.0098    | 0.0157 | 0.250    | 0.400  |
| θ          | 0°        | 8°     | 0°       | 8°     |

## ■ Suggested Pad Layout





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