



# UMX5601-UMX5615

## ULTRA LOW MAGNETIC MOMENT PIN DIODE FOR MRI APPLICATIONS

RoHS COMPLIANT



### DESCRIPTION

The UMX5601, UMX5610 & UMX5615<sup>TM</sup> PIN diode series was designed to provide ultra low magnetic PIN diodes for in bore surface coil applications associated with higher field strength (3T and greater) MR scanners. These PIN diodes produce the minimum artifacts (magnetic field distortions) available in the industry, today. The diodes have been tested in magnetic fields of  $\pm 7$  Tesla.

**The UMX5600 PIN diodes have a magnetic moment at 7 T of 4E-8 (J/T).**

The diodes are offered in a surface mount package. The SM package utilizes a round end cap to mark the anode. The cathode is square. The fully passivated PIN diode chip is full face metallurgically bonded to shortened high conductive pins for lower thermal and electrical resistances. The PIN diodes feature low forward bias resistance and high zero bias impedance. The UMX5615 PIN diodes are characterized at 64, 128, and 300 MHz. This series of products meets RoHS requirements per EU Directive 2002/95/EC.

**IMPORTANT:** For the most current data, consult our website: [www.MICROSEMI.com](http://www.MICROSEMI.com)

### ABSOLUTE MAXIMUM RATINGS AT 25° C (UNLESS OTHERWISE SPECIFIED)

| Parameter             | Symbol       | 5601        | 5605 | 5610 | 5615 | Unit |
|-----------------------|--------------|-------------|------|------|------|------|
| Peak Reverse Voltage  | $V_R$        | 100         | 500  | 1000 | 1500 | V    |
| RMS Reverse Voltage   | $V_{R(RMS)}$ | 70          | 350  | 700  | 1060 | V    |
| Storage Temperature   | $T_{STG}$    | -65 to +175 |      |      |      | °C   |
| Operating Temperature | $T_{OP}$     | -65 to +150 |      |      |      | °C   |

### THERMAL CHARACTERISTICS (UNLESS OTHERWISE SPECIFIED)

| Thermal Impedance                                | Symbol   | Value | Unit    |
|--------------------------------------------------|----------|-------|---------|
| UMX5601SM<br>UMX5605SM<br>UMX5610SM<br>UMX5615SM | $\theta$ | 2     | °C/Watt |



### KEY FEATURES

- Ultra low magnetic construction
- SOGO passivated chip
- Thermally matched configuration
- RoHS compliant <sup>1</sup>
- Low capacitance at 0 V bias
- Low conductance at 0 V bias
- Metallurgical bond
- Fused-in-glass construction
- Non cavity design
- Available in surface mount package.
- Compatible with automatic insertion equipment

1- These devices are supplied with Silver terminations. Other terminal finishes may be available on request. Consult factory for details.

### APPLICATIONS/BENEFITS

- High B Field (3T+) in bore
- APPLICATIONS:
- Active or semi-active (not passive)
  - MR blocking circuits
  - MR detuning circuits
  - MR disable circuits
  - MR receiver protector circuits



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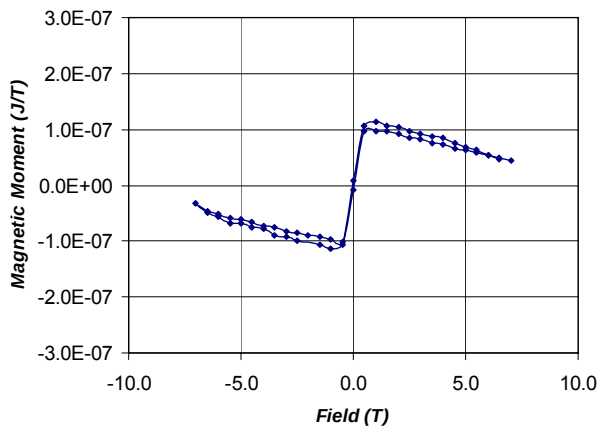
RoHS COMPLIANT



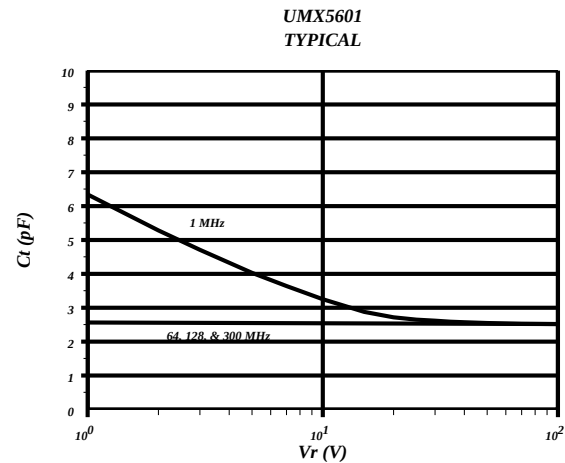
### ELECTRICAL PARAMETERS @ 25°C (unless otherwise specified)

| Parameter                            | Symbol   | Conditions                                                                          | Min      | Typ.                | Max       | Units                                            |
|--------------------------------------|----------|-------------------------------------------------------------------------------------|----------|---------------------|-----------|--------------------------------------------------|
| Forward Voltage (Note 1)             | $V_F$    | $I_F = 100 \text{ mA}$                                                              |          | 0.75                | 1.0       | V                                                |
| Reverse Break Down Voltage (UMX5601) | $V_{BR}$ | $I_R = 10 \text{ uA}$                                                               | 100      |                     |           | V                                                |
| Reverse Break Down Voltage (UMX5605) | $V_{BR}$ | $I_R = 10 \text{ uA}$                                                               | 500      |                     |           | V                                                |
| Reverse Break Down Voltage (UMX5610) | $V_{BR}$ | $I_R = 10 \text{ uA}$                                                               | 1000     |                     |           | V                                                |
| Reverse Break Down Voltage (UMX5615) | $V_{BR}$ | $I_R = 10 \text{ uA}$                                                               | 1500     |                     |           | V                                                |
| Reverse Current (UMX5601)            | $I_R$    | $V_R = 80 \text{ V}$                                                                |          |                     | 1         | $\mu\text{A}$                                    |
| Reverse Current (UMX5605)            | $I_R$    | $V_R = 400 \text{ V}$                                                               |          |                     | 1         | $\mu\text{A}$                                    |
| Reverse Current (UMX5610)            | $I_R$    | $V_R = 800 \text{ V}$                                                               |          |                     | 1         | $\mu\text{A}$                                    |
| Reverse Current (UMX5615)            | $I_R$    | $V_R = 1200 \text{ V}$                                                              |          |                     | 1         | $\mu\text{A}$                                    |
| Inductance                           | $L_S$    |                                                                                     |          | 900                 |           | pH                                               |
| Magnetic moment                      | $m$      | @ 7T<br>@ 1T                                                                        |          | 4E-8<br>1E-7        |           | J/T<br>J/T                                       |
| Mass Susceptibility                  | $\chi_p$ | @ 7T<br>@ 1T                                                                        |          | -3.3E-11<br>6.5E-10 |           | $\text{m}^3/\text{kg}$<br>$\text{m}^3/\text{kg}$ |
| Volume Susceptibility                | $\chi$   | >1T to 7T<br><1T                                                                    |          | -3.1E-7<br>5.9E-6   |           | SI<br>SI                                         |
| Capacitance                          | $C_T$    | $V_R = 0 \text{ V}, F = 1 \text{ MHz}$<br>$V_R = 50 \text{ V}, F = 1 \text{ MHz}$   |          | 9<br>2.6            | 10<br>3.0 | pF                                               |
| Parallel Resistance                  | $R_P$    | $V_R = 0 \text{ V}, F = 64 \text{ MHz}$<br>$V_R = 30 \text{ V}, F = 64 \text{ MHz}$ | 5<br>100 | 9<br>250            |           | kOhms                                            |
| Series Resistance                    | $R_S$    | $I_F = 100 \text{ mA}, F = 64 \text{ MHz}$                                          |          | 0.3                 | 0.5       | Ohms                                             |
| Lifetime                             | $\tau$   | $I_F = 10 \text{ mA}$                                                               | 5        | 15                  |           | us                                               |

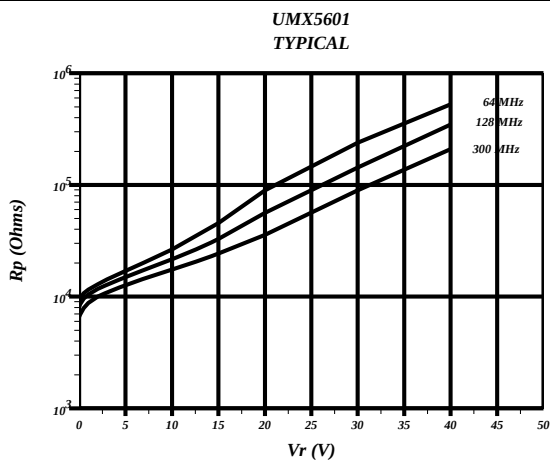
### MAGNETIC MOMENT VS FIELD



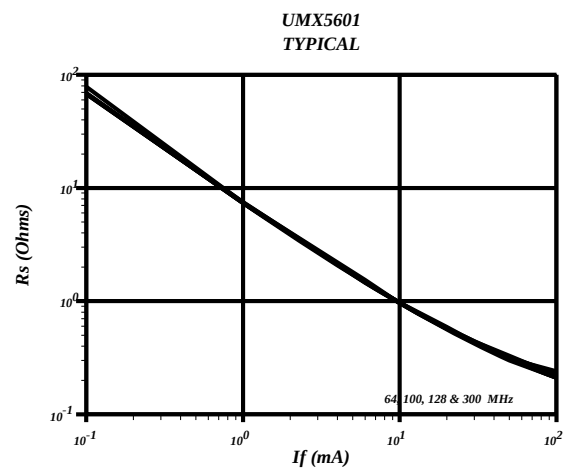
### C-V CURVES



### RP - PARALLEL RESISTANCE



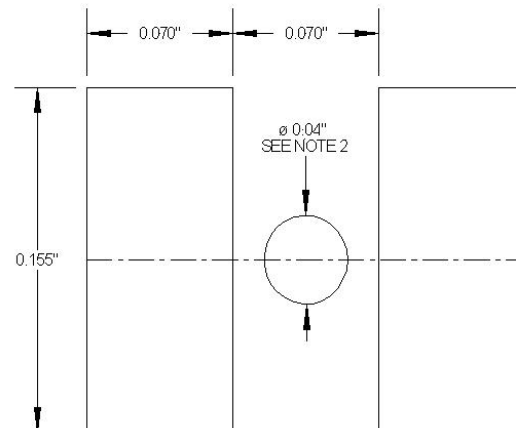
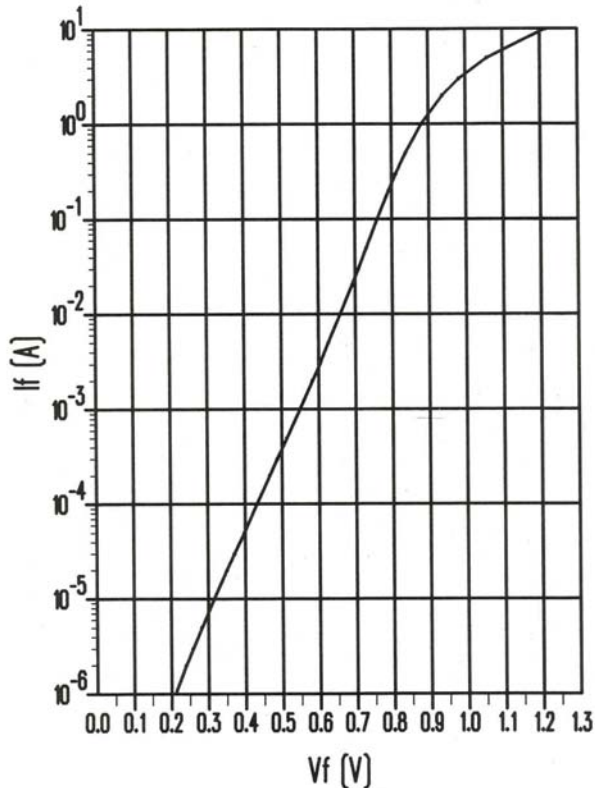
### RS VS IF



### VF VS IF

### SM STYLE SOLDER FOOTPRINT

UMX5601  
TYPICAL

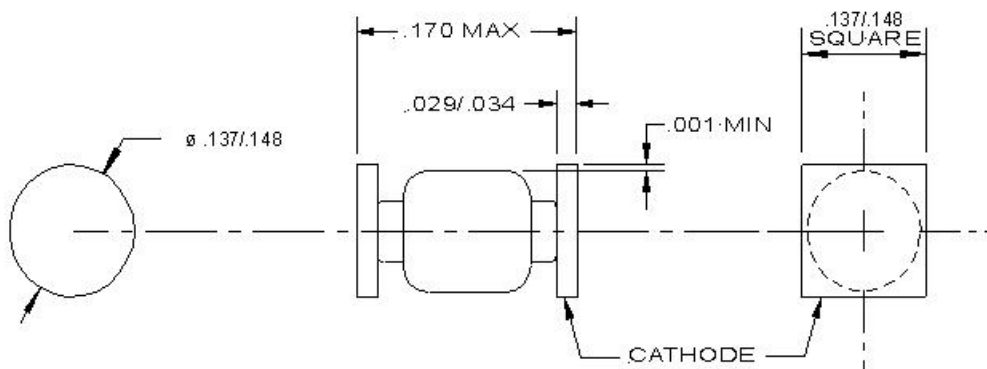


#### NOTES:

1. These dimensions will match the terminals and provide for additional solder fillets at the outboard ends at least as wide as the terminals themselves, assuming accuracy of device placement within .005 inches.
2. If the mounting method chosen requires use of an adhesive separate from the solder compound, a round (or square) spot of cement as shown should be centrally located.

Dimensions shown are in inches

### "SM" STYLE PACKAGE OUTLINE



DIMENSIONS SHOWN ARE IN INCHES



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NOTES

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NOTES