

# MOSFET – P-Channel, POWER TRENCH® -30 V, -14.5 A, 7.8 mΩ

## FDS6673BZ

### General Description

This P-Channel MOSFET is produced using onsemi's advanced Power Trench process that has been especially tailored to minimize the on-state resistance.

This device is well suited for Power Management and load switching applications common in Notebook Computers and Portable Battery Packs.

### Features

- Max  $R_{DS(on)}$  = 7.8 mΩ @  $V_{GS} = -10$  V,  $I_D = -14.5$  A
- Max  $R_{DS(on)}$  = 12 mΩ @  $V_{GS} = -4.5$  V,  $I_D = -12$  A
- Extended  $V_{GS}$  Range (-25 V) for Battery Applications
- HBM ESD Protection Level of 6.5 kV Typical (Note 3)
- High Performance Trench Technology for Extremely Low  $R_{DS(on)}$
- High Power and Current Handling Capability
- Pb-Free, Halide Free and RoHS Compliant

### ABSOLUTE MAXIMUM RATINGS

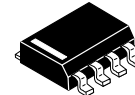
$T_A = 25^\circ\text{C}$  unless otherwise noted.

| Symbol         | Parameter                                                        | Ratings           | Unit             |
|----------------|------------------------------------------------------------------|-------------------|------------------|
| $V_{DS}$       | Drain to Source Voltage                                          | -30               | V                |
| $V_{GS}$       | Gate to Source Voltage                                           | $\pm 25$          | V                |
| $I_D$          | Drain Current<br>– Continuous (Note 1a)<br>– Pulsed              | -14.5<br>-75      | A                |
| $P_D$          | Maximum Power dissipation<br>(Note 1a)<br>(Note 1b)<br>(Note 1c) | 2.5<br>1.2<br>1.0 | W                |
| $T_J, T_{STG}$ | Operating and Storage Junction Temperature Range                 | -55 to +150       | $^\circ\text{C}$ |

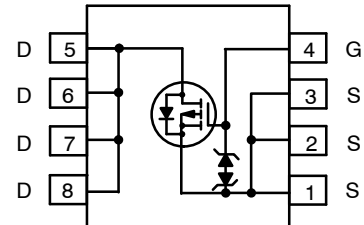
Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

### THERMAL CHARACTERISTICS

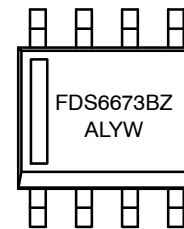
| Symbol          | Parameter                                         | Ratings | Unit               |
|-----------------|---------------------------------------------------|---------|--------------------|
| $R_{\theta JA}$ | Thermal Resistance, Junction to Ambient (Note 1a) | 50      | $^\circ\text{C/W}$ |
| $R_{\theta JC}$ | Thermal Resistance, Junction to Case (Note 1)     | 25      | $^\circ\text{C/W}$ |



SOIC8  
CASE 751EB



### MARKING DIAGRAM



FDS6673BZ = Specific Device Code  
A = Assembly Side  
L = Wafer Lot Number  
YW = Assembly Start Week

### ORDERING INFORMATION

| Device    | Package                            | Shipping†             |
|-----------|------------------------------------|-----------------------|
| FDS6673BZ | SOIC8<br>(Pb-Free/<br>Halide Free) | 2500 /<br>Tape & Reel |

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specification Brochure, [BRD8011/D](#).

# FDS6673BZ

## ELECTRICAL CHARACTERISTICS $T_A = 25^\circ\text{C}$ unless otherwise noted.

| Symbol | Parameter | Test Conditions | Min | Typ | Max | Unit |
|--------|-----------|-----------------|-----|-----|-----|------|
|--------|-----------|-----------------|-----|-----|-----|------|

### OFF CHARACTERISTICS

|                                      |                                           |                                                              |     |     |          |                      |
|--------------------------------------|-------------------------------------------|--------------------------------------------------------------|-----|-----|----------|----------------------|
| $BV_{DSS}$                           | Drain to Source Breakdown Voltage         | $I_D = -250\ \mu\text{A}$ , $V_{GS} = 0\ \text{V}$           | -30 | -   | -        | V                    |
| $\frac{\Delta BV_{DSS}}{\Delta T_J}$ | Breakdown Voltage Temperature Coefficient | $I_D = -250\ \mu\text{A}$ , Referenced to $25^\circ\text{C}$ | -   | -20 | -        | mV/ $^\circ\text{C}$ |
| $I_{DSS}$                            | Zero Gate Voltage Drain Current           | $V_{DS} = -24\ \text{V}$ , $V_{GS} = 0\ \text{V}$            | -   | -   | -1       | $\mu\text{A}$        |
| $I_{GSS}$                            | Gate-Body Leakage                         | $V_{GS} = \pm 25\ \text{V}$ , $V_{DS} = 0\ \text{V}$         | -   | -   | $\pm 10$ | $\mu\text{A}$        |

### ON CHARACTERISTICS (Note 2)

|                                        |                                                          |                                                                                |    |      |     |                      |
|----------------------------------------|----------------------------------------------------------|--------------------------------------------------------------------------------|----|------|-----|----------------------|
| $V_{GS(th)}$                           | Gate to Source Threshold Voltage                         | $V_{DS} = V_{GS}$ , $I_D = -250\ \mu\text{A}$                                  | -1 | -1.9 | -3  | V                    |
| $\frac{\Delta V_{GS(th)}}{\Delta T_J}$ | Gate to Source Threshold Voltage Temperature Coefficient | $I_D = -250\ \mu\text{A}$ , Referenced to $25^\circ\text{C}$                   | -  | 8.1  | -   | mV/ $^\circ\text{C}$ |
| $R_{DS(on)}$                           | Drain to Source On-Resistance                            | $I_D = -14.5\ \text{A}$ , $V_{GS} = -10\ \text{V}$ ,                           | -  | 6.5  | 7.8 | m $\Omega$           |
|                                        |                                                          | $I_D = -12\ \text{A}$ , $V_{GS} = -4.5\ \text{V}$                              | -  | 9.6  | 12  |                      |
|                                        |                                                          | $I_D = -14.5\ \text{A}$ , $V_{GS} = -10\ \text{V}$ , $T_J = 125^\circ\text{C}$ | -  | 9.7  | 12  |                      |
| $g_{FS}$                               | Forward Transconductance                                 | $V_{DS} = -5\ \text{V}$ , $I_D = -14.5\ \text{A}$                              | -  | 60   | -   | S                    |

### DYNAMIC CHARACTERISTICS

|           |                              |                                                                           |   |      |      |    |
|-----------|------------------------------|---------------------------------------------------------------------------|---|------|------|----|
| $C_{iss}$ | Input Capacitance            | $V_{DS} = -15\ \text{V}$ , $V_{GS} = 0\ \text{V}$ , $f = 1.0\ \text{MHz}$ | - | 3500 | 4700 | pF |
| $C_{oss}$ | Output Capacitance           |                                                                           | - | 600  | 800  |    |
| $C_{rss}$ | Reverse Transfer Capacitance |                                                                           | - | 600  | 900  |    |

### SWITCHING CHARACTERISTICS (Note 2)

|              |                     |                                                                                                   |   |      |     |    |
|--------------|---------------------|---------------------------------------------------------------------------------------------------|---|------|-----|----|
| $t_{d(on)}$  | Turn-On Delay Time  | $V_{DD} = -15\ \text{V}$ , $I_D = -1\ \text{A}$ , $V_{GS} = -10\ \text{V}$ , $R_{GS} = 6\ \Omega$ | - | 14   | 26  | ns |
| $t_r$        | Rise Time           |                                                                                                   | - | 16   | 29  |    |
| $t_{d(off)}$ | Turn-Off Delay Time |                                                                                                   | - | 225  | 306 |    |
| $t_f$        | Fall Time           |                                                                                                   | - | 105  | 167 |    |
| $Q_g$        | Total Gate Charge   | $V_{DS} = -15\ \text{V}$ , $I_D = -14.5\ \text{A}$ , $V_{GS} = -10\ \text{V}$                     | - | 88   | 124 | nC |
| $Q_g$        | Total Gate Charge   | $V_{DS} = -15\ \text{V}$ , $I_D = -14.5\ \text{A}$ , $V_{GS} = -5\ \text{V}$                      | - | 46   | 65  | nC |
| $Q_{gs}$     | Gate-Source Charge  |                                                                                                   | - | 8    | -   |    |
| $Q_{gd}$     | Gate-Drain Charge   |                                                                                                   | - | 23.5 | -   |    |

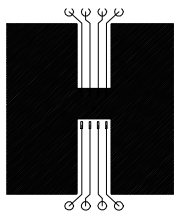
### DRAIN-SOURCE DIODE CHARACTERISTICS AND MAXIMUM RATINGS

|          |                                       |                                                              |   |      |      |    |
|----------|---------------------------------------|--------------------------------------------------------------|---|------|------|----|
| $V_{SD}$ | Drain to Source Diode Forward Voltage | $V_{GS} = 0\ \text{V}$ , $I_S = -2.1\ \text{A}$              | - | -0.7 | -1.2 | V  |
| $t_{rr}$ | Reverse Recovery Time                 | $I_F = 14.5\ \text{A}$ , $di/dt = 100\ \text{A}/\mu\text{s}$ | - | -    | 45   | ns |
| $Q_{rr}$ | Reverse Recovery Charge               | $I_F = 14.5\ \text{A}$ , $di/dt = 100\ \text{A}/\mu\text{s}$ | - | -    | 34   | nC |

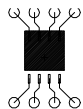
Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

### NOTES:

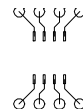
- $R_{\theta JA}$  is the sum of the junction-to-case and case-to-ambient thermal resistance where the case thermal reference is defined as the solder mounting surface of the drain pins.  $R_{\theta JC}$  is guaranteed by design while  $R_{\theta CA}$  is determined by the user's board design.



a)  $50^\circ\text{C}/\text{W}$  (10 sec) when mounted on a  $1\ \text{in}^2$  pad of 2 oz. copper.



b)  $105^\circ\text{C}/\text{W}$  when mounted on a  $0.04\ \text{in}^2$  pad of 2 oz. copper.



b)  $125^\circ\text{C}/\text{W}$  when mounted on a minimum pad.

- Pulse Test: Pulse Width  $< 300\ \mu\text{s}$ , Duty Cycle  $< 2.0\%$
- The diode connected between the gate and source serves only as protection against ESD. No gate overvoltage rating is implied.

## TYPICAL CHARACTERISTICS

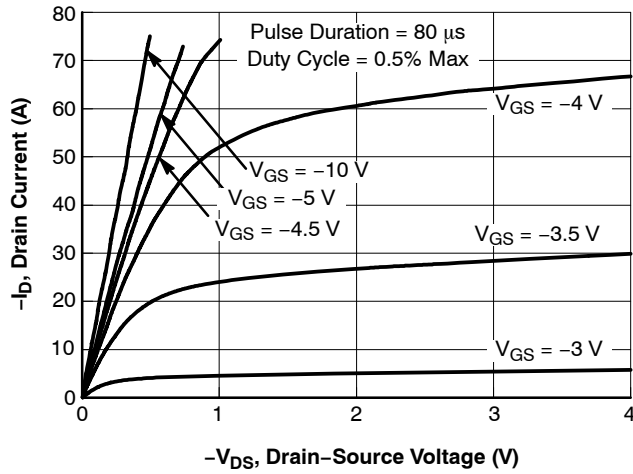


Figure 1. On Region Characteristics

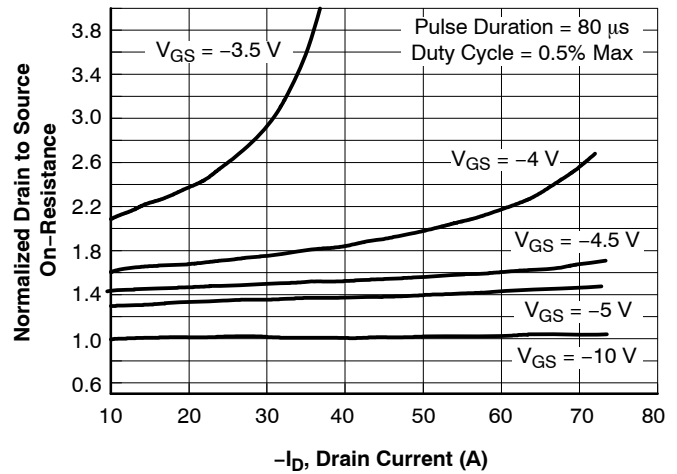


Figure 2. Normalized On-Resistance vs. Drain Current and Gate Voltage

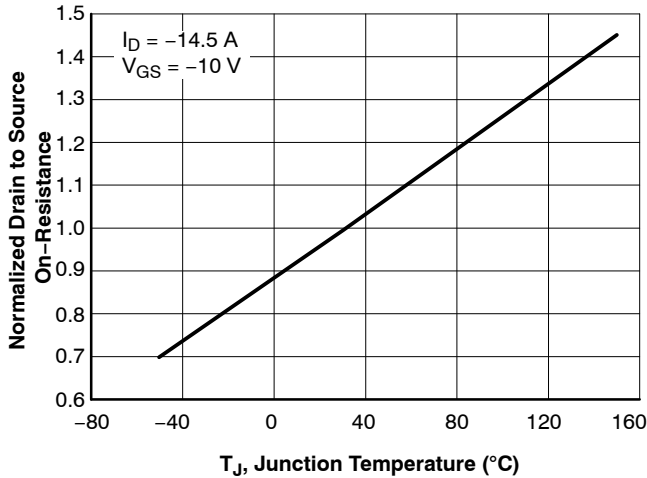


Figure 3. Normalized On-Resistance vs. Junction Temperature

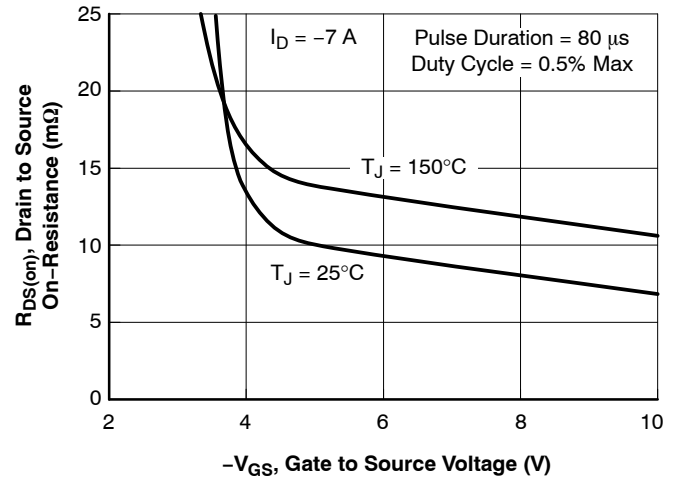


Figure 4. On-Resistance vs. Gate to Source Voltage

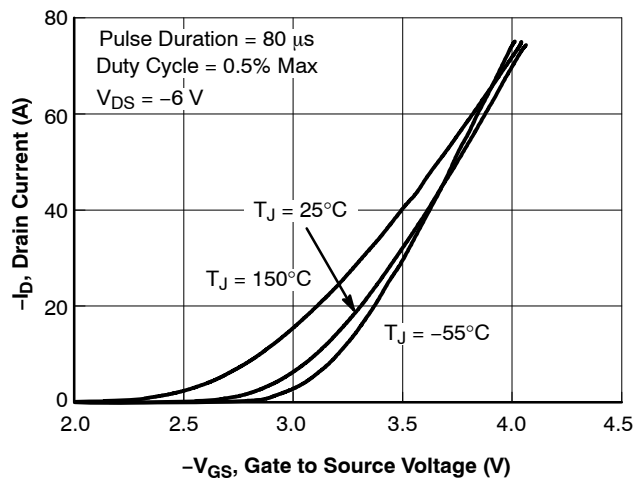


Figure 5. Transfer Characteristics

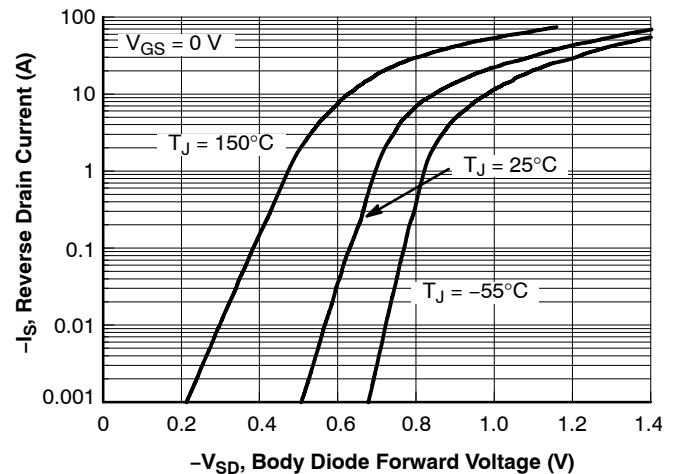


Figure 6. Source to Drain Diode Forward Voltage vs. Source Current

TYPICAL CHARACTERISTICS (continued)

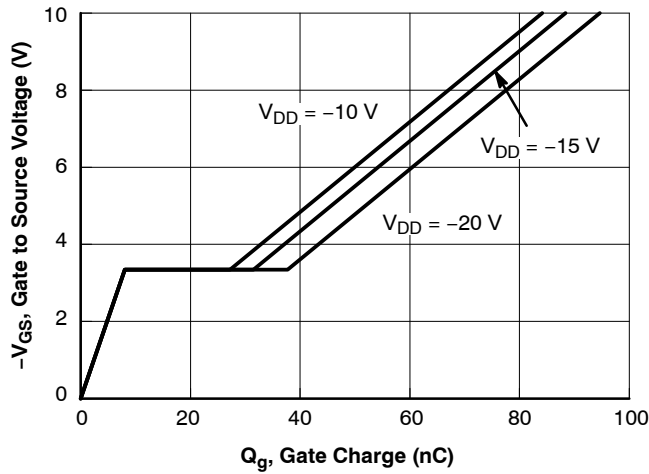


Figure 7. Gate Charge Characteristics

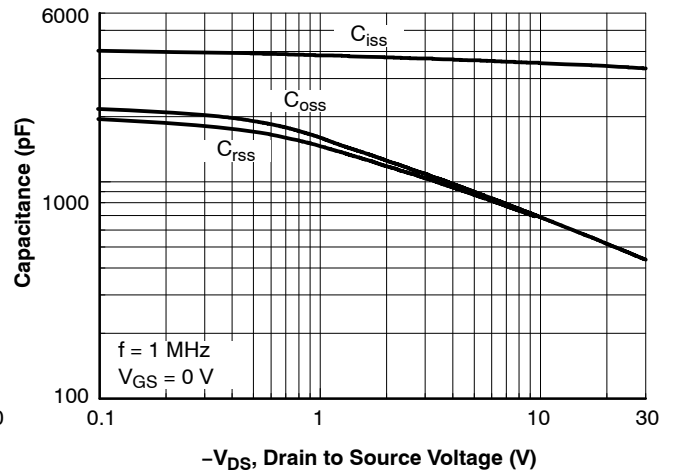


Figure 8. Capacitance vs. Drain to Source Voltage

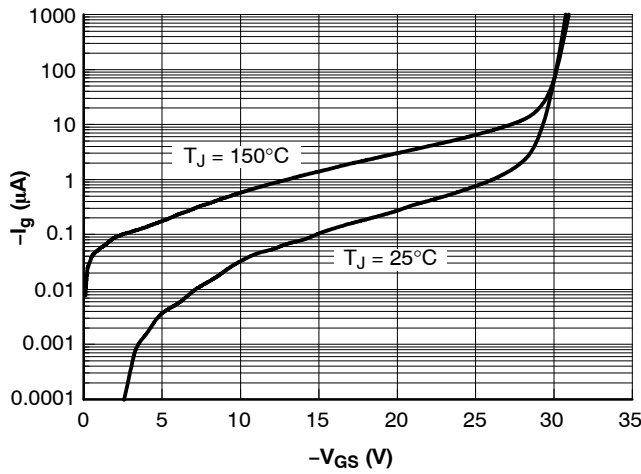


Figure 9.  $I_g$  vs.  $V_{GS}$

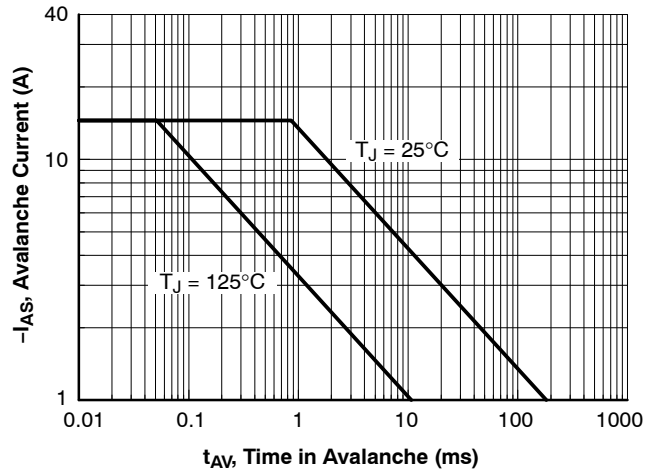


Figure 10. Unclamped Inductive Switching Capability

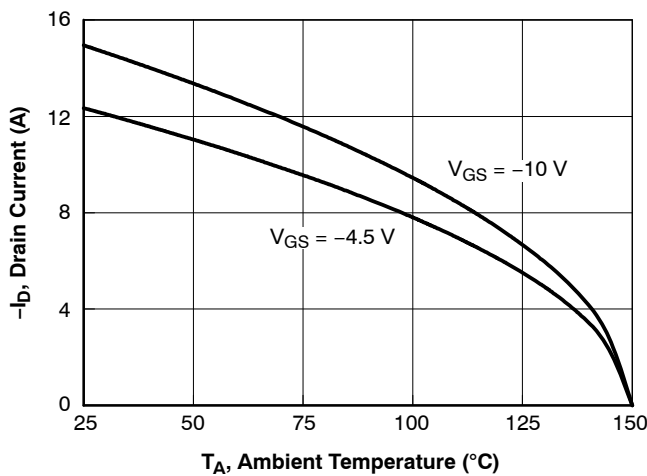


Figure 11. Maximum Continuous Drain Current vs Ambient Temperature

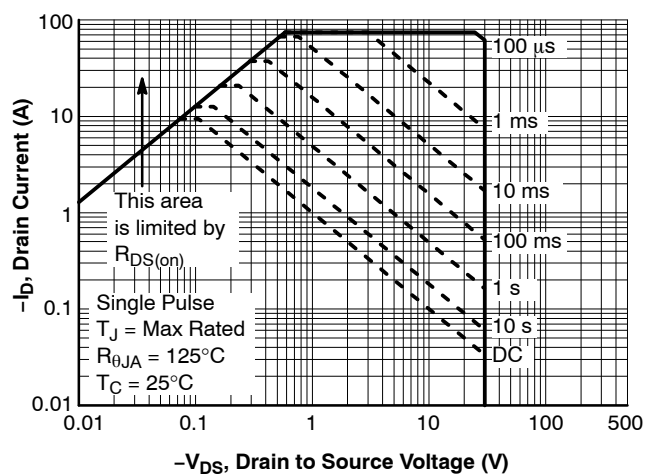


Figure 12. Single Pulse Maximum Power Dissipation

TYPICAL CHARACTERISTICS (continued)

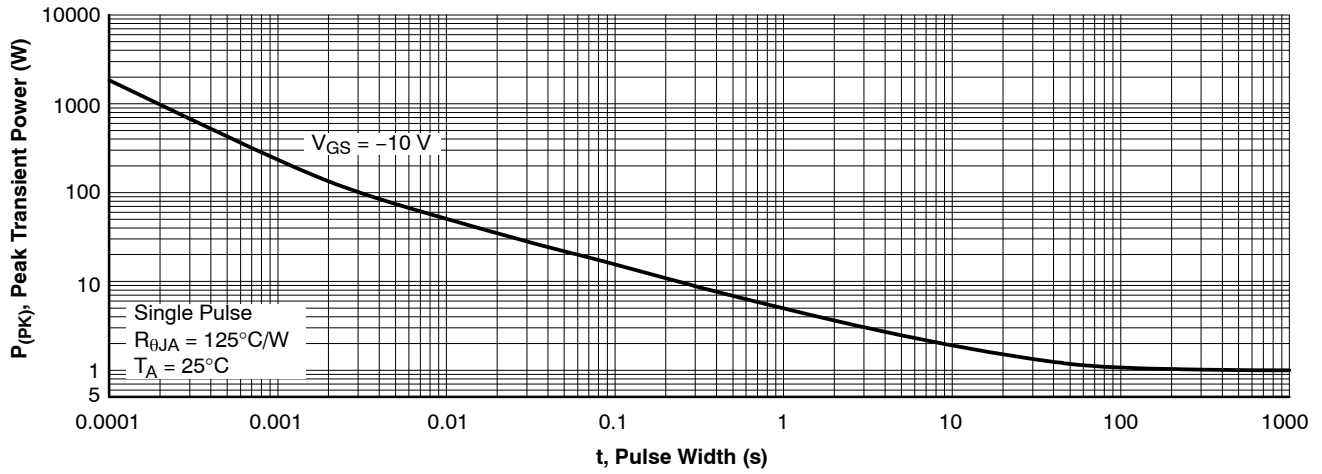


Figure 13. Single Pulse Maximum Power Dissipation

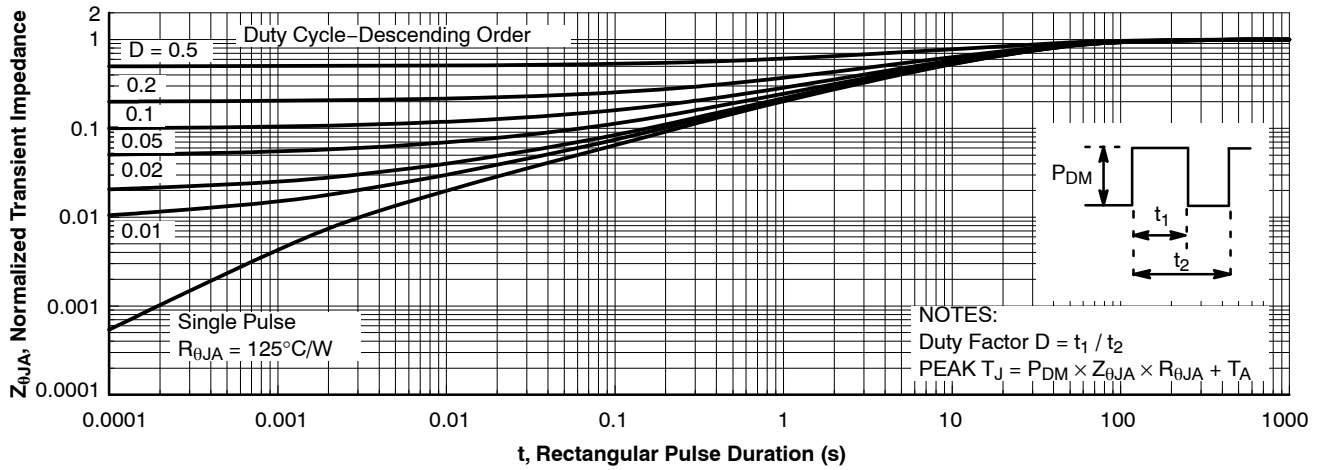
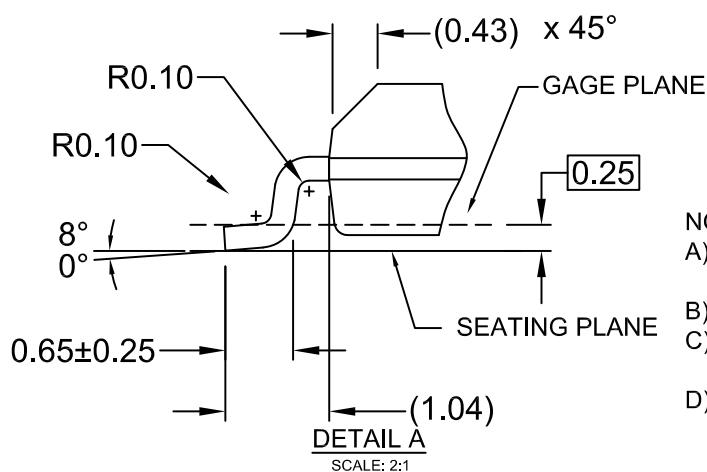
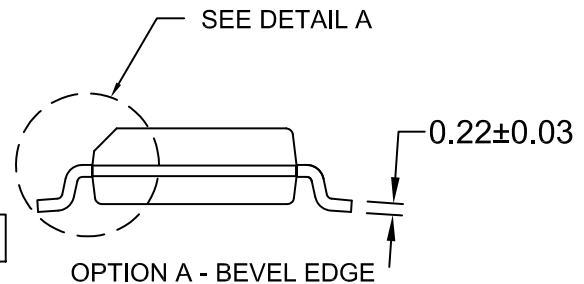
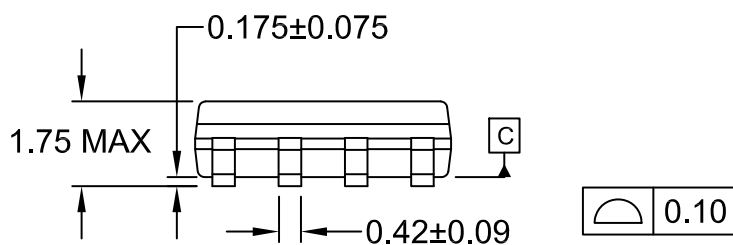
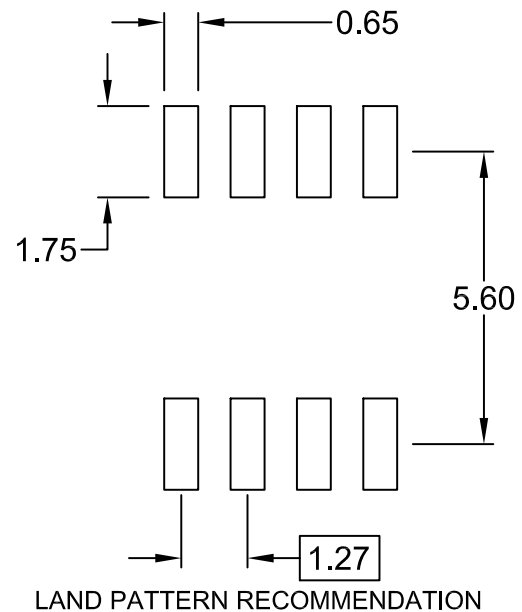
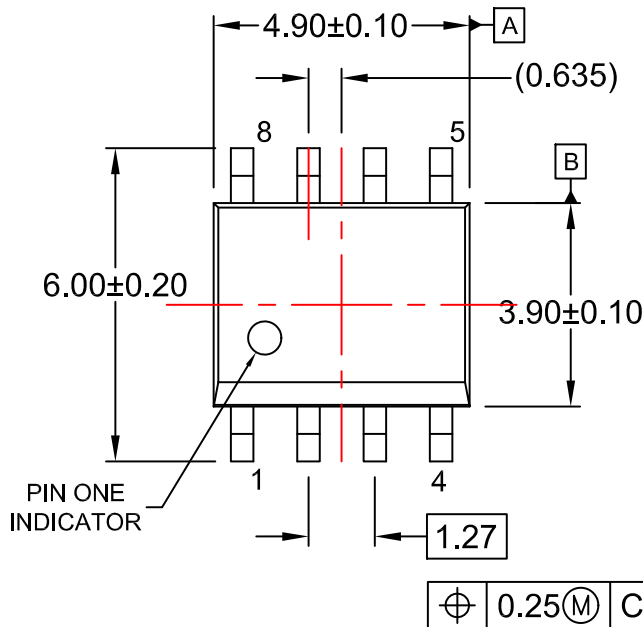


Figure 14. Junction-to-Ambient Transient Thermal Response Curve

**SOIC8**  
**CASE 751EB**  
**ISSUE A**

DATE 24 AUG 2017



**NOTES:**

- A) THIS PACKAGE CONFORMS TO JEDEC MS-012, VARIATION AA.
- B) ALL DIMENSIONS ARE IN MILLIMETERS.
- C) DIMENSIONS DO NOT INCLUDE MOLD FLASH OR BURRS.
- D) LANDPATTERN STANDARD: SOIC127P600X175-8M

|                         |                    |                                                                                                                                                                                  |
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