



# FDMD8280

## Dual N-Channel Power Trench<sup>®</sup> MOSFET 80 V, 40 A, 8.2 mΩ

### Features

- Max  $r_{DS(on)}$  = 8.2 mΩ at  $V_{GS} = 10\text{ V}$ ,  $I_D = 11\text{ A}$
- Max  $r_{DS(on)}$  = 11 mΩ at  $V_{GS} = 8\text{ V}$ ,  $I_D = 9.5\text{ A}$
- Ideal for flexible layout in primary side of bridge topology
- Termination is Lead-free and RoHS Compliant
- 100% UIL tested
- Kelvin High Side MOSFET drive pin-out capability

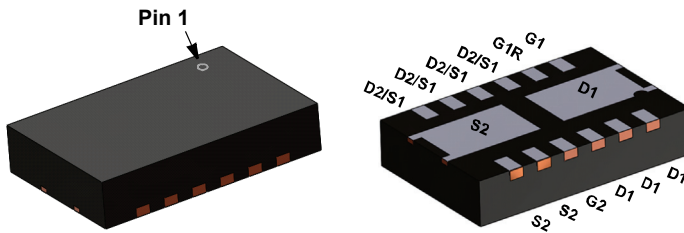


### General Description

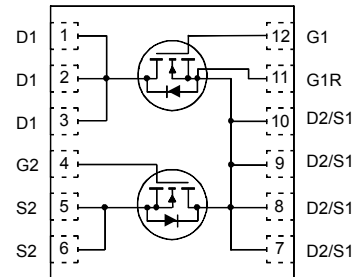
This device includes two 80V N-Channel MOSFETs in a dual Power (3.3 mm X 5 mm) package. HS source and LS Drain internally connected for half/full bridge, low source inductance package, low  $r_{DS(on)}$ /Qg FOM silicon.

### Applications

- Synchronous Buck : Primary Switch of Half / Full bridge converter for telecom
- Motor Bridge : Primary Switch of Half / Full bridge converter for BLDC motor
- MV POL : 48V Synchronous Buck Switch



Power 3.3 x 5



### MOSFET Maximum Ratings $T_A = 25\text{ °C}$ unless otherwise noted

| Symbol         | Parameter  | Rated                          | Units |
|----------------|--|--------------------------------|-------|
| $V_{DS}$       | Drain to Source Voltage                          | 80                             | V     |
| $V_{GS}$       | Gate to Source Voltage                           | ±20                            | V     |
| $I_D$          | Drain Current -Continuous                        | $T_C = 25\text{ °C}$           | A     |
|                | Drain Current -Continuous                        | $T_A = 25\text{ °C}$ (Note 1a) |       |
|                | -Pulsed  | (Note 4)                       |       |
| $E_{AS}$       | Single Pulse Avalanche Energy                    | (Note 3)                       | mJ    |
| $P_D$          | Power Dissipation                                | $T_C = 25\text{ °C}$           | W     |
|                | Power Dissipation                                | $T_A = 25\text{ °C}$ (Note 1a) |       |
|                | Power Dissipation                                | $T_A = 25\text{ °C}$ (Note 1b) |       |
| $T_J, T_{STG}$ | Operating and Storage Junction Temperature Range | -55 to +150                    | °C    |

### Thermal Characteristics

|                 |   |           |      |
|-----------------|---|-----------|------|
| $R_{\theta JC}$ | Thermal Resistance, Junction to Case    | 3.3       | °C/W |
| $R_{\theta JA}$ | Thermal Resistance, Junction to Ambient | (Note 1a) |      |
| $R_{\theta JA}$ | Thermal Resistance, Junction to Ambient | (Note 1b) |      |

### Package Marking and Ordering Information

| Device Marking | Device   | Package       | Reel Size | Tape Width | Quantity   |
|----------------|----------|---------------|-----------|------------|------------|
| 8280           | FDMD8280 | Power 3.3 x 5 | 13 "      | 12 mm      | 3000 units |

## Electrical Characteristics $T_J = 25\text{ }^\circ\text{C}$ unless otherwise noted

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

### Off Characteristics

|                                      |   |   |    |    |           |                      |
|--------------------------------------|---|---|----|----|-----------|----------------------|
| $BV_{DSS}$                           | Drain to Source Breakdown Voltage         | $I_D = 250\text{ }\mu\text{A}$ , $V_{GS} = 0\text{ V}$                    | 80 |    |           | V                    |
| $\frac{\Delta BV_{DSS}}{\Delta T_J}$ | Breakdown Voltage Temperature Coefficient | $I_D = 250\text{ }\mu\text{A}$ , referenced to $25\text{ }^\circ\text{C}$ |    | 48 |           | mV/ $^\circ\text{C}$ |
| $I_{DSS}$                            | Zero Gate Voltage Drain Current           | $V_{DS} = 64\text{ V}$ , $V_{GS} = 0\text{ V}$                            |    |    | 1         | $\mu\text{A}$        |
| $I_{GSS}$                            | Gate to Source Leakage Current            | $V_{GS} = \pm 20\text{ V}$ , $V_{DS} = 0\text{ V}$                        |    |    | $\pm 100$ | nA                   |

### On Characteristics

|  |  |  |     |     |      |                      |
|--|--|--|-----|-----|------|----------------------|
| $V_{GS(th)}$                           | Gate to Source Threshold Voltage                         | $V_{GS} = V_{DS}$ , $I_D = 250\text{ }\mu\text{A}$                               | 2.0 | 3.0 | 4.0  | V                    |
| $\frac{\Delta V_{GS(th)}}{\Delta T_J}$ | Gate to Source Threshold Voltage Temperature Coefficient | $I_D = 250\text{ }\mu\text{A}$ , referenced to $25\text{ }^\circ\text{C}$        |     | -9  |      | mV/ $^\circ\text{C}$ |
| $r_{DS(on)}$                           | Static Drain to Source On Resistance                     | $V_{GS} = 10\text{ V}$ , $I_D = 11\text{ A}$                                     |     | 6.6 | 8.2  | m $\Omega$           |
|  |  | $V_{GS} = 8\text{ V}$ , $I_D = 9.5\text{ A}$                                     |     | 7.5 | 11   |                      |
|  |  | $V_{GS} = 10\text{ V}$ , $I_D = 11\text{ A}$ , $T_J = 125\text{ }^\circ\text{C}$ |     | 10  | 12.4 |                      |
| $g_{FS}$                               | Forward Transconductance                                 | $V_{DD} = 10\text{ V}$ , $I_D = 11\text{ A}$                                     |     | 29  |      | S                    |

### Dynamic Characteristics

|           |                              |  |     |      |      |          |
|-----------|------------------------------|--|-----|------|------|----------|
| $C_{iss}$ | Input Capacitance            | $V_{DS} = 40\text{ V}$ , $V_{GS} = 0\text{ V}$<br>$f = 1\text{ MHz}$ |     | 2179 | 3050 | pF       |
| $C_{oss}$ | Output Capacitance           |  |     | 341  | 480  | pF       |
| $C_{rss}$ | Reverse Transfer Capacitance |  |     | 15   | 25   | pF       |
| $R_g$     | Gate Resistance              |  | 0.1 | 2.7  | 5.4  | $\Omega$ |

### Switching Characteristics

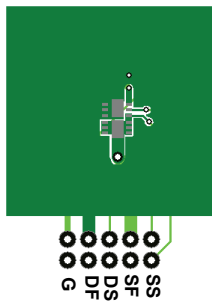
|              |                               |  |                                       |     |    |    |    |
|--------------|-------------------------------|--|---------------------------------------|-----|----|----|----|
| $t_{d(on)}$  | Turn-On Delay Time            | $V_{DD} = 40\text{ V}$ , $I_D = 11\text{ A}$<br>$V_{GS} = 10\text{ V}$ , $R_{GEN} = 6\text{ }\Omega$ |                                       | 15  | 27 | ns |    |
| $t_r$        | Rise Time                     |  |                                       | 12  | 22 | ns |    |
| $t_{d(off)}$ | Turn-Off Delay Time           |  |                                       | 26  | 42 | ns |    |
| $t_f$        | Fall Time                     |  |                                       | 8.9 | 18 | ns |    |
| $Q_{g(TOT)}$ | Total Gate Charge             |  | $V_{GS} = 0\text{ V to } 10\text{ V}$ |     | 31 | 44 | nC |
|              | Total Gate Charge             |  | $V_{GS} = 0\text{ V to } 8\text{ V}$  |     | 25 | 35 | nC |
| $Q_{gs}$     | Gate to Source Charge         | $V_{DD} = 40\text{ V}$<br>$I_D = 11\text{ A}$  |                                       | 9.5 |    | nC |    |
| $Q_{gd}$     | Gate to Drain "Miller" Charge |  |                                       | 6.6 |    | nC |    |

### Drain-Source Diode Characteristics

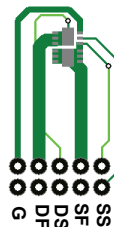
|          |                                       |  |  |     |     |    |
|----------|---------------------------------------|--|--|-----|-----|----|
| $V_{SD}$ | Source to Drain Diode Forward Voltage | $V_{GS} = 0\text{ V}$ , $I_S = 11\text{ A}$ (Note 2)     |  | 0.8 | 1.3 | V  |
|          |                                       | $V_{GS} = 0\text{ V}$ , $I_S = 1.8\text{ A}$ (Note 2)    |  | 0.7 | 1.2 |    |
| $t_{rr}$ | Reverse Recovery Time                 | $I_F = 11\text{ A}$ , $di/dt = 100\text{ A}/\mu\text{s}$ |  | 27  | 43  | ns |
| $Q_{rr}$ | Reverse Recovery Charge               |  |  | 12  | 22  | nC |

#### NOTES:

- $R_{\theta JA}$  is determined with the device mounted on a  $1\text{ in}^2$  pad 2 oz copper pad on a  $1.5 \times 1.5\text{ in.}$  board of FR-4 material.  $R_{\theta JC}$  is guaranteed by design while  $R_{\theta CA}$  is determined by the user's board design.



a.  $60\text{ }^\circ\text{C/W}$  when mounted on a  $1\text{ in}^2$  pad of 2 oz copper



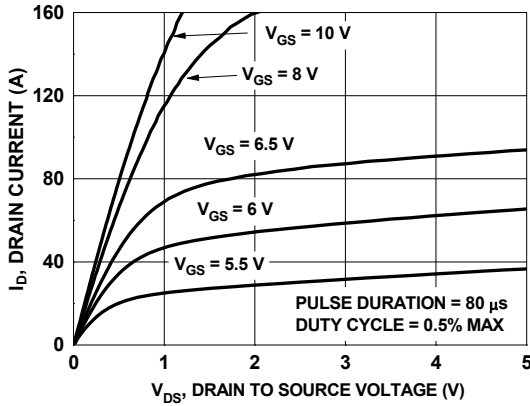
b.  $130\text{ }^\circ\text{C/W}$  when mounted on a minimum pad of 2 oz copper

- Pulse Test: Pulse Width  $< 300\text{ }\mu\text{s}$ , Duty cycle  $< 2.0\%$ .

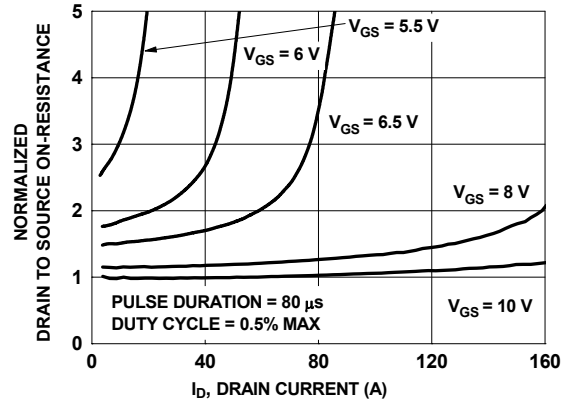
- $E_{AS}$  of 150 mJ is based on starting  $T_J = 25\text{ }^\circ\text{C}$ ,  $L = 3\text{ mH}$ ,  $I_{AS} = 10\text{ A}$ ,  $V_{DD} = 72\text{ V}$ ,  $V_{GS} = 10\text{ V}$ . 100% tested at  $L = 0.1\text{ mH}$ ,  $I_{AS} = 32\text{ A}$ .

- Pulse  $I_d$  measured at  $t_d \leq 250\text{ }\mu\text{s}$ , refer to Fig 11 SOA graph for more details.

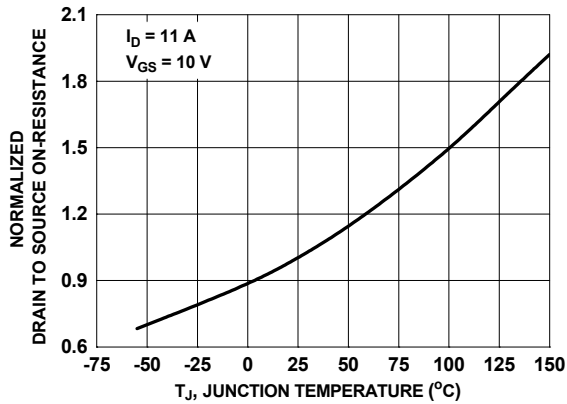
**Typical Characteristics**  $T_J = 25\text{ }^\circ\text{C}$  unless otherwise noted



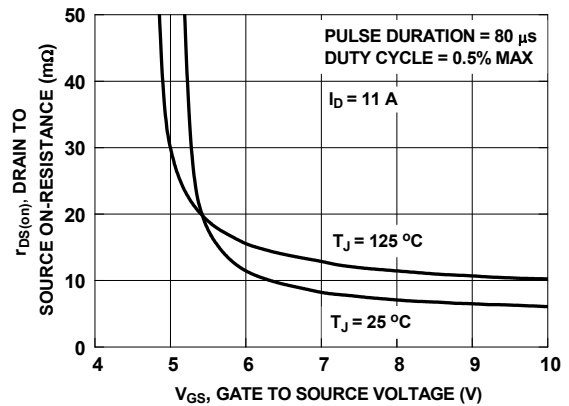
**Figure 1. On-Region Characteristics**



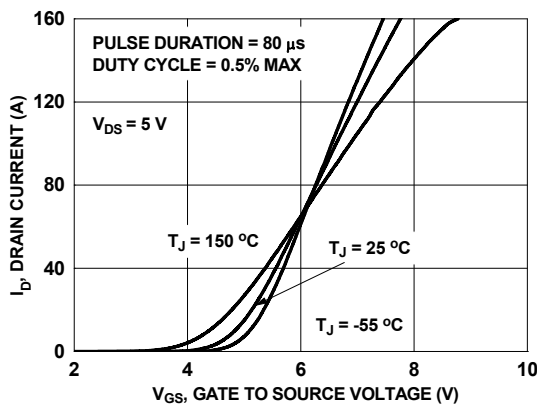
**Figure 2. Normalized On-Resistance vs Drain Current and Gate Voltage**



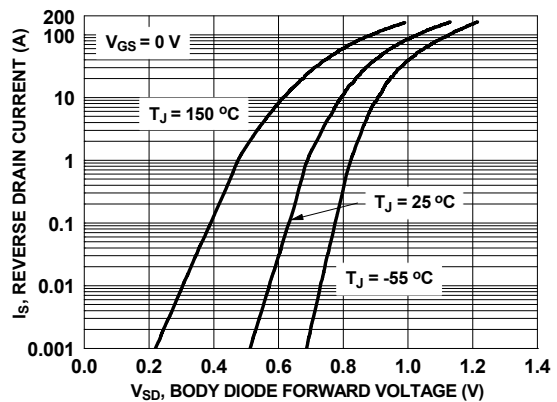
**Figure 3. Normalized On Resistance vs Junction Temperature**



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

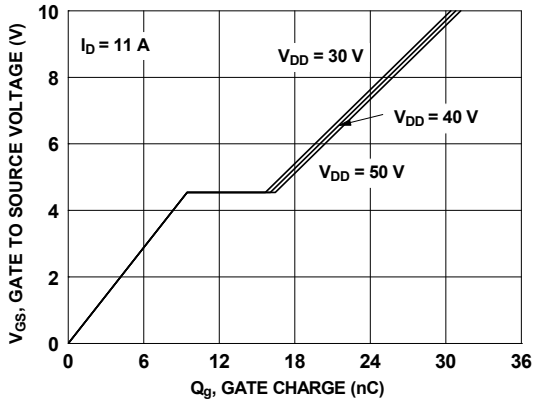


**Figure 5. Transfer Characteristics**

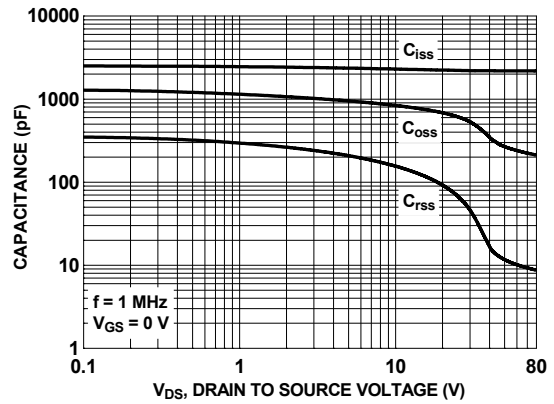


**Figure 6. Source to Drain Diode Forward Voltage vs Source Current**

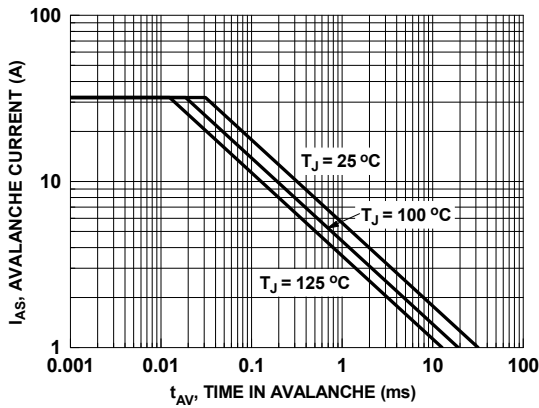
**Typical Characteristics**  $T_J = 25\text{ }^\circ\text{C}$  unless otherwise noted



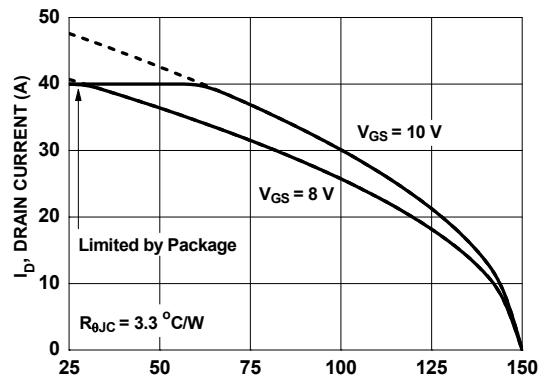
**Figure 7. Gate Charge Characteristics**



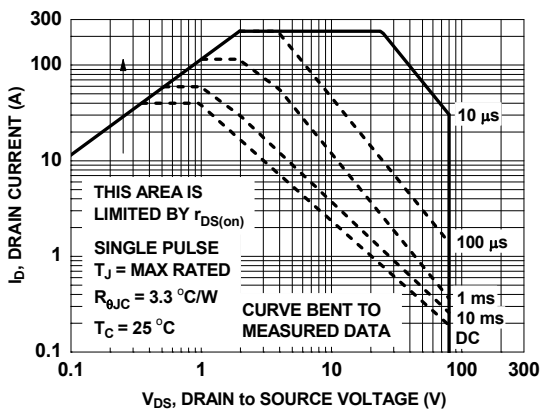
**Figure 8. Capacitance vs Drain to Source Voltage**



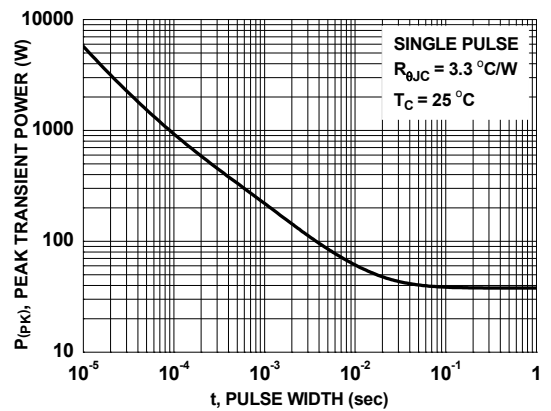
**Figure 9. Gate Leakage Current vs Gate to Source Voltage**



**Figure 10. Maximum Continuous Drain Current vs Case Temperature**

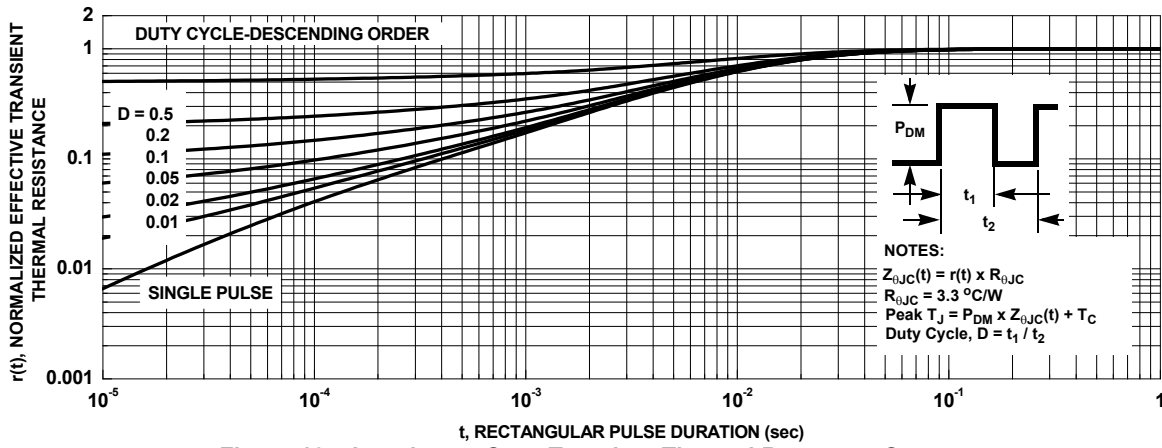


**Figure 11. Forward Bias Safe Operating Area**



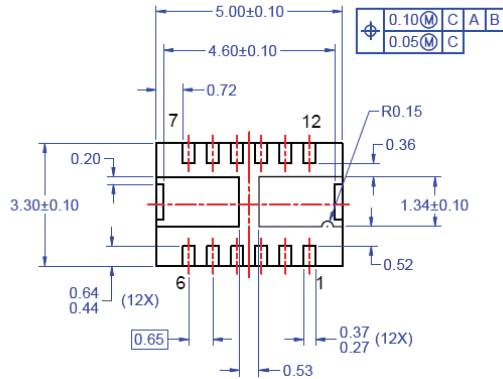
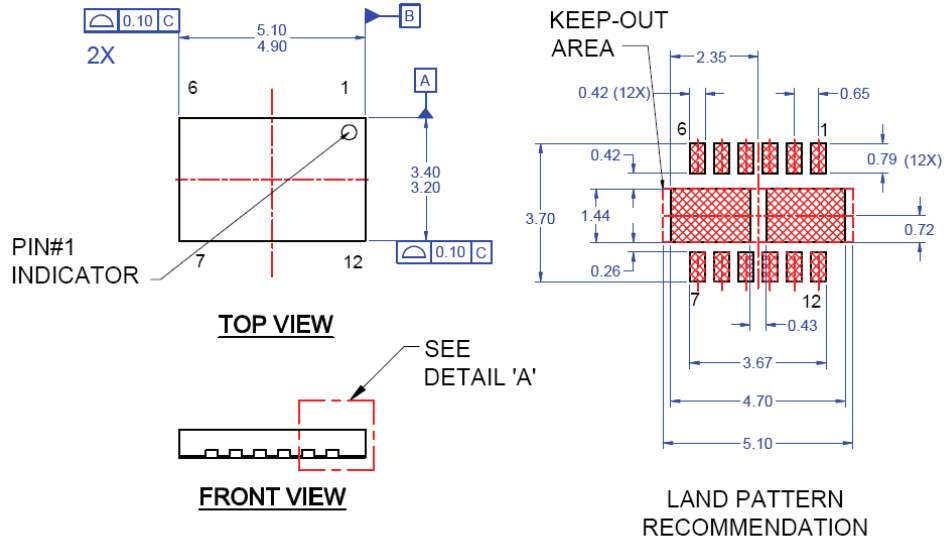
**Figure 12. Single Pulse Maximum Power Dissipation**

**Typical Characteristics**  $T_J = 25\text{ }^\circ\text{C}$  unless otherwise noted

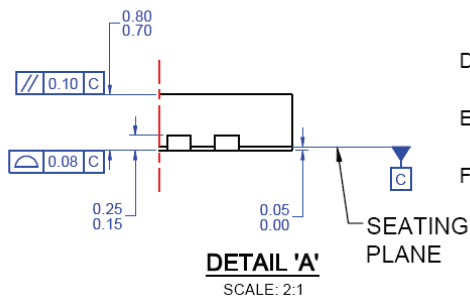


**Figure 13. Junction-to-Case Transient Thermal Response Curve**

## Dimensional Outline and Pad Layout



**BOTTOM VIEW**



**DETAIL 'A'**

SCALE: 2:1

NOTES: UNLESS OTHERWISE SPECIFIED

- A) DOES NOT FULLY CONFORM TO JEDEC REGISTRATION, MO-229 DATED 8/2012
- B) ALL DIMENSIONS ARE IN MILLIMETERS.
- C) DIMENSIONS DO NOT INCLUDE BURRS OR MOLD FLASH. MOLD FLASH OR BURRS DOES NOT EXCEED 0.10MM.
- D) DIMENSIONING AND TOLERANCING PER ASME Y14.5M-1994.
- E) IT IS RECOMMENDED TO HAVE NO TRACES OR VIAS WITHIN THE KEEP OUT AREA.
- F) DRAWING FILE NAME: MKT-PQFN12BREV1


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| Fairchild Semiconductor®   | MillerDrive™                                    | SuperSOT™-3                           | UniFET™          |
| FACT Quiet Series™   | MotionMax™                                      | SuperSOT™-6                           | VCX™             |
| FACT®  | MotionGrid®                                     | SuperSOT™-8                           | VisualMax™       |
| FAST®  | MTi®  | SupreMOS®                             | VoltagePlus™     |
| FastvCore™   | MTx®  | SyncFET™                              | XS™              |
| FETBench™  | MVN®  | Sync-Lock™                            | Xsens™           |
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