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# FDMA3027PZ

## Dual P-Channel PowerTrench<sup>®</sup> MOSFET

-30 V, -3.3 A, 87 mΩ

### Features

- Max  $r_{DS(on)}$  = 87 mΩ at  $V_{GS} = -10$  V,  $I_D = -3.3$  A
- Max  $r_{DS(on)}$  = 152 mΩ at  $V_{GS} = -4.5$  V,  $I_D = -2.3$  A
- HBM ESD protection level > 2 kV typical (Note 3)
- Low profile - 0.8 mm maximum - in the new package MicroFET 2x2 mm
- RoHS Compliant

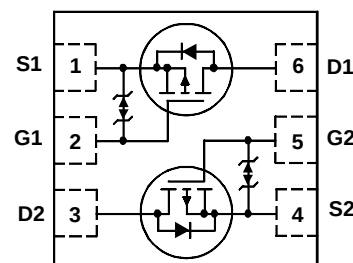
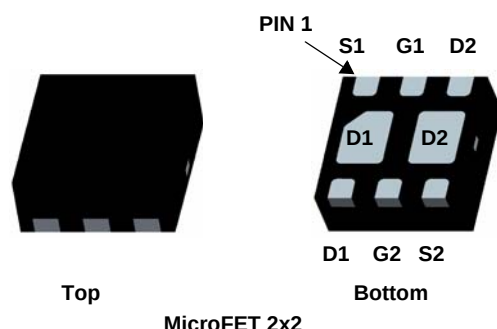


### General Description

This device is designed specifically as a single package solution for dual switching requirements such as gate driver for larger Mosfets. It features two independent P-Channel MOSFETs with low on-state resistance for minimum conduction losses. The MicroFET 2x2 package offers exceptional thermal performance for its physical size and is well suited to linear mode applications. G-S zener has been added to enhance ESD voltage level.

### Applications

- Load Switch
- Discrete Gate Driver



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

| Symbol         | Parameter                                        | Ratings     | Units            |
|----------------|--------------------------------------------------|-------------|------------------|
| $V_{DS}$       | Drain to Source Voltage                          | -30         | V                |
| $V_{GS}$       | Gate to Source Voltage                           | $\pm 25$    | V                |
| $I_D$          | Drain Current -Continuous (Note 1a)              | -3.3        | A                |
|                | -Pulsed                                          | -15         |                  |
| $P_D$          | Power Dissipation (Note 1a)                      | 1.4         | W                |
|                | Power Dissipation (Note 1b)                      | 0.7         |                  |
| $T_J, T_{STG}$ | Operating and Storage Junction Temperature Range | -55 to +150 | $^\circ\text{C}$ |

### Thermal Characteristics

|                 |                                                                        |     |                    |
|-----------------|------------------------------------------------------------------------|-----|--------------------|
| $R_{\theta JA}$ | Thermal Resistance for Single Operation, Junction to Ambient (Note 1a) | 86  | $^\circ\text{C/W}$ |
|                 | Thermal Resistance for Single Operation, Junction to Ambient (Note 1b) | 173 |                    |
|                 | Thermal Resistance for Dual Operation, Junction to Ambient (Note 1c)   | 69  |                    |
|                 | Thermal Resistance for Dual Operation, Junction to Ambient (Note 1d)   | 151 |                    |
|                 | Thermal Resistance for Single Operation, Junction to Ambient (Note 1e) | 160 |                    |
|                 | Thermal Resistance for Dual Operation, Junction to Ambient (Note 1f)   | 133 |                    |

### Package Marking and Ordering Information

| Device Marking | Device     | Package      | Reel Size | Tape Width | Quantity   |
|----------------|------------|--------------|-----------|------------|------------|
| 327            | FDMA3027PZ | MicroFET 2X2 | 7 "       | 8 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         | $I_D = -250\text{ }\mu\text{A}$ , $V_{GS} = 0\text{ V}$                      | -30 |     |          | V                      |
| $\frac{\Delta BV_{DSS}}{\Delta T_J}$ | Breakdown Voltage Temperature Coefficient | $I_D = -250\text{ }\mu\text{A}$ , referenced to $25\text{ }^{\circ}\text{C}$ |     | -22 |          | 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 to Source Leakage Current            | $V_{GS} = \pm 25\text{ V}$ , $V_{DS} = 0\text{ V}$                           |     |     | $\pm 10$ | $\mu\text{A}$          |

**On Characteristics**

|                                        |                                                          |                                                                                       |    |      |     |                        |
|----------------------------------------|----------------------------------------------------------|---------------------------------------------------------------------------------------|----|------|-----|------------------------|
| $V_{GS(th)}$                           | Gate to Source Threshold Voltage                         | $V_{GS} = V_{DS}$ , $I_D = -250\text{ }\mu\text{A}$                                   | -1 | -1.9 | -3  | V                      |
| $\frac{\Delta V_{GS(th)}}{\Delta T_J}$ | Gate to Source Threshold Voltage Temperature Coefficient | $I_D = -250\text{ }\mu\text{A}$ , referenced to $25\text{ }^{\circ}\text{C}$          |    | 5    |     | mV/ $^{\circ}\text{C}$ |
| $r_{DS(on)}$                           | Static Drain to Source On Resistance                     | $V_{GS} = -10\text{ V}$ , $I_D = -3.3\text{ A}$                                       |    | 69   | 87  | m $\Omega$             |
|                                        |                                                          | $V_{GS} = -4.5\text{ V}$ , $I_D = -2.3\text{ A}$                                      |    | 108  | 152 |                        |
|                                        |                                                          | $V_{GS} = -10\text{ V}$ , $I_D = -3.3\text{ A}$ , $T_J = 125\text{ }^{\circ}\text{C}$ |    | 97   | 122 |                        |
| $g_{FS}$                               | Forward Transconductance                                 | $V_{DS} = -5\text{ V}$ , $I_D = -3.3\text{ A}$                                        |    | 6    |     | S                      |

**Dynamic Characteristics**

|           |                              |                                                                         |  |     |     |          |
|-----------|------------------------------|-------------------------------------------------------------------------|--|-----|-----|----------|
| $C_{iss}$ | Input Capacitance            | $V_{DS} = -15\text{ V}$ , $V_{GS} = 0\text{ V}$ ,<br>$f = 1\text{ MHz}$ |  | 324 | 435 | pF       |
| $C_{oss}$ | Output Capacitance           |                                                                         |  | 59  | 80  | pF       |
| $C_{rss}$ | Reverse Transfer Capacitance |                                                                         |  | 53  | 80  | pF       |
| $R_g$     | Gate Resistance              |                                                                         |  | 12  |     | $\Omega$ |

**Switching Characteristics**

|              |                               |                                                                                                            |                                                    |     |    |    |
|--------------|-------------------------------|------------------------------------------------------------------------------------------------------------|----------------------------------------------------|-----|----|----|
| $t_{d(on)}$  | Turn-On Delay Time            | $V_{DD} = -15\text{ V}$ , $I_D = -3.3\text{ A}$ ,<br>$V_{GS} = -10\text{ V}$ , $R_{GEN} = 6\text{ }\Omega$ |                                                    | 5.2 | 11 | ns |
| $t_r$        | Rise Time                     |                                                                                                            |                                                    | 3   | 10 | ns |
| $t_{d(off)}$ | Turn-Off Delay Time           |                                                                                                            |                                                    | 17  | 31 | ns |
| $t_f$        | Fall Time                     |                                                                                                            |                                                    | 11  | 25 | ns |
| $Q_{g(TOT)}$ | Total Gate Charge             | $V_{GS} = 0\text{ V to } -10\text{ V}$                                                                     | $V_{DD} = -15\text{ V}$ ,<br>$I_D = -3.3\text{ A}$ | 7.2 | 10 | nC |
|              | Total Gate Charge             | $V_{GS} = 0\text{ V to } -5\text{ V}$                                                                      |                                                    | 4.1 | 6  | nC |
| $Q_{gs}$     | Gate to Source Charge         |                                                                                                            |                                                    | 1.0 |    | nC |
| $Q_{gd}$     | Gate to Drain "Miller" Charge |                                                                                                            |                                                    | 1.9 |    | nC |

**Drain-Source Diode Characteristics**

|          |                                       |                                                            |  |       |      |    |
|----------|---------------------------------------|------------------------------------------------------------|--|-------|------|----|
| $V_{SD}$ | Source to Drain Diode Forward Voltage | $V_{GS} = 0\text{ V}$ , $I_S = -3.3\text{ A}$ (Note 2)     |  | -0.94 | -1.3 | V  |
| $t_{rr}$ | Reverse Recovery Time                 | $I_F = -3.3\text{ A}$ , $di/dt = 100\text{ A}/\mu\text{s}$ |  | 20    | 32   | ns |
| $Q_{rr}$ | Reverse Recovery Charge               |                                                            |  | 10    | 18   | nC |

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

### Notes:

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

- (a)  $R_{\theta JA} = 86^\circ\text{C/W}$  when mounted on a 1 in<sup>2</sup> pad of 2 oz copper, 1.5" x 1.5" x 0.062" thick PCB. For single operation.
- (b)  $R_{\theta JA} = 173^\circ\text{C/W}$  when mounted on a minimum pad of 2 oz copper. For single operation.
- (c)  $R_{\theta JA} = 69^\circ\text{C/W}$  when mounted on a 1 in<sup>2</sup> pad of 2 oz copper, 1.5" x 1.5" x 0.062" thick PCB. For dual operation.
- (d)  $R_{\theta JA} = 151^\circ\text{C/W}$  when mounted on a minimum pad of 2 oz copper. For dual operation.
- (e)  $R_{\theta JA} = 160^\circ\text{C/W}$  when mounted on a 30 mm<sup>2</sup> pad of 2 oz copper. For single operation.
- (f)  $R_{\theta JA} = 133^\circ\text{C/W}$  when mounted on a 30 mm<sup>2</sup> pad of 2 oz copper. For dual operation.



a.  $86^\circ\text{C/W}$  when mounted on a 1 in<sup>2</sup> pad of 2 oz copper



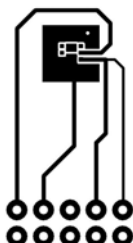
b.  $173^\circ\text{C/W}$  when mounted on a minimum pad of 2 oz copper



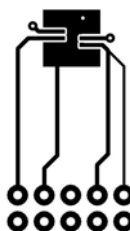
c.  $69^\circ\text{C/W}$  when mounted on a 1 in<sup>2</sup> pad of 2 oz copper



d.  $151^\circ\text{C/W}$  when mounted on a minimum pad of 2 oz copper



e.  $160^\circ\text{C/W}$  when mounted on 30 mm<sup>2</sup> pad of 2 oz copper



f.  $133^\circ\text{C/W}$  when mounted on 30 mm<sup>2</sup> pad of 2 oz copper

2. Pulse Test : Pulse Width < 300 us, Duty Cycle < 2.0%

3. The diode connected between gate and source serves only as protection against ESD. No gate overvoltage rating is implied.

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

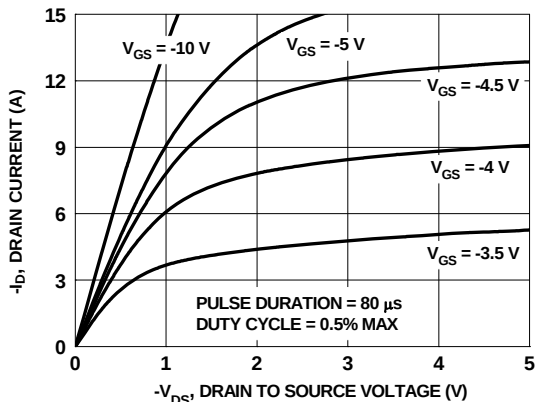


Figure 1. On-Region Characteristics

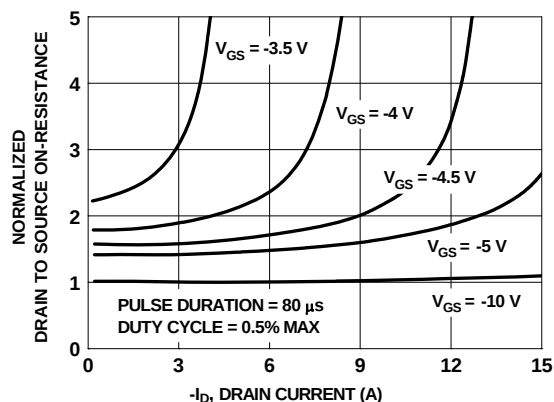


Figure 2. Normalized On-Resistance vs Drain Current and Gate Voltage

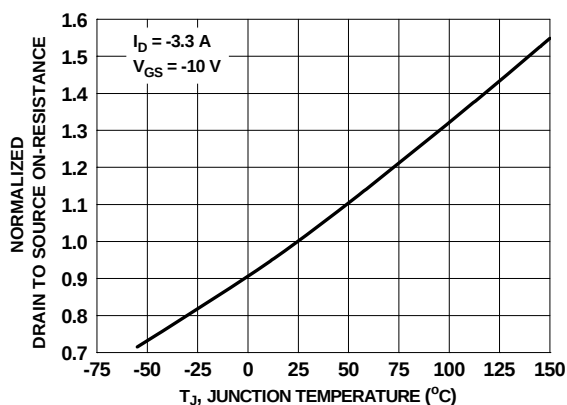


Figure 3. Normalized On-Resistance vs Junction Temperature

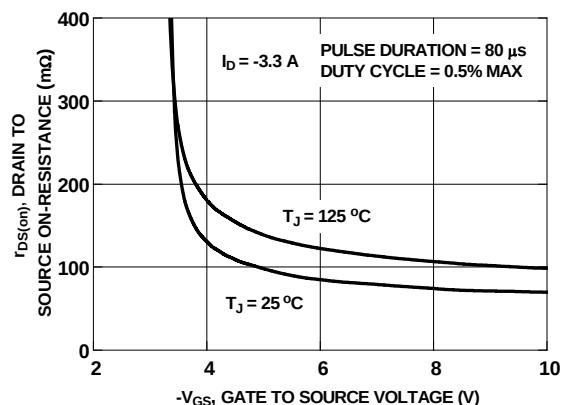


Figure 4. On-Resistance vs Gate to Source Voltage

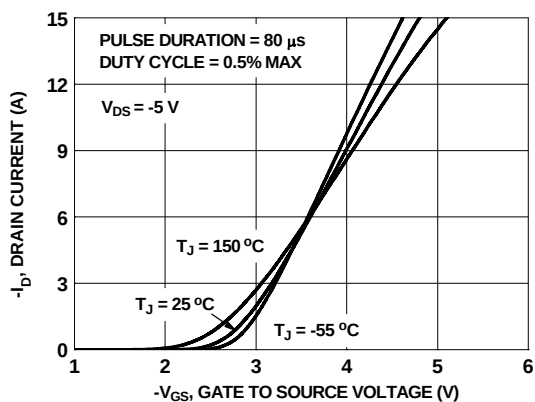


Figure 5. Transfer Characteristics

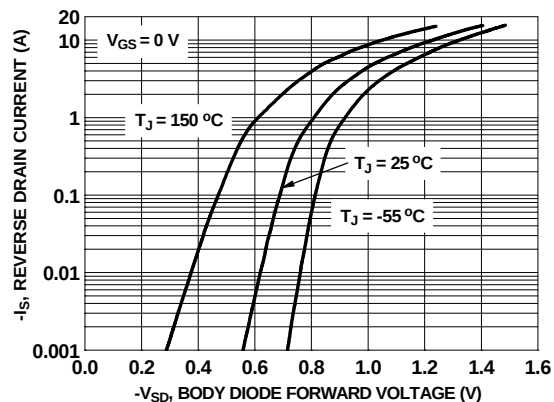


Figure 6. Source to Drain Diode Forward Voltage vs Source Current

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

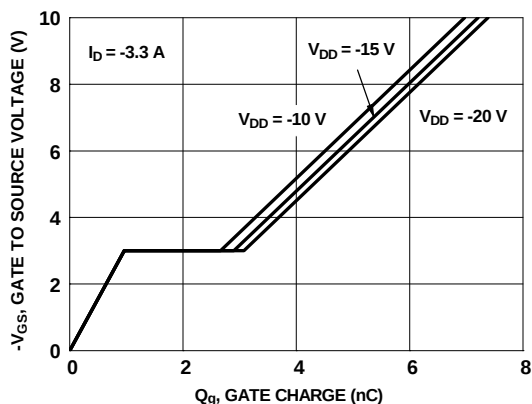


Figure 7. Gate Charge Characteristics

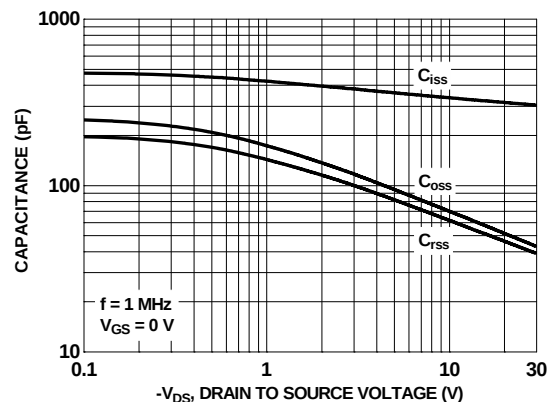


Figure 8. Capacitance vs Drain to Source Voltage

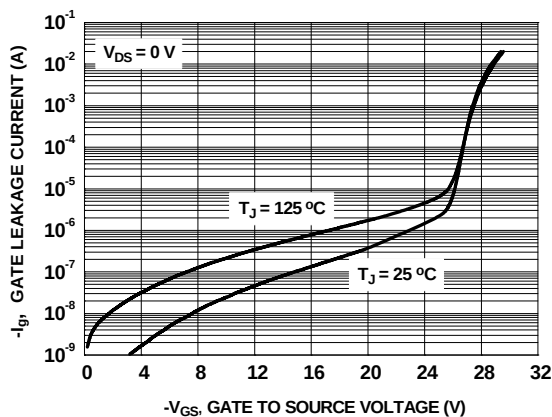


Figure 9. Gate Leakage Current vs Gate to Source Voltage

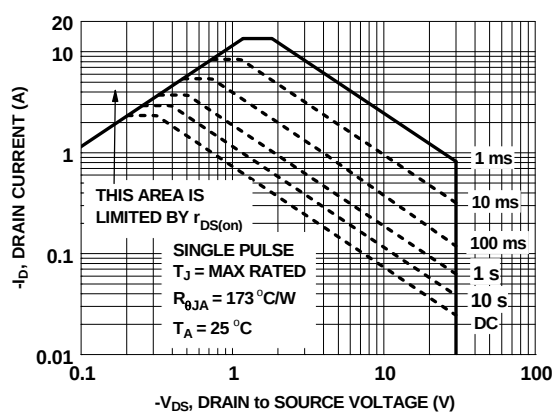


Figure 10. Forward Bias Safe Operating Area

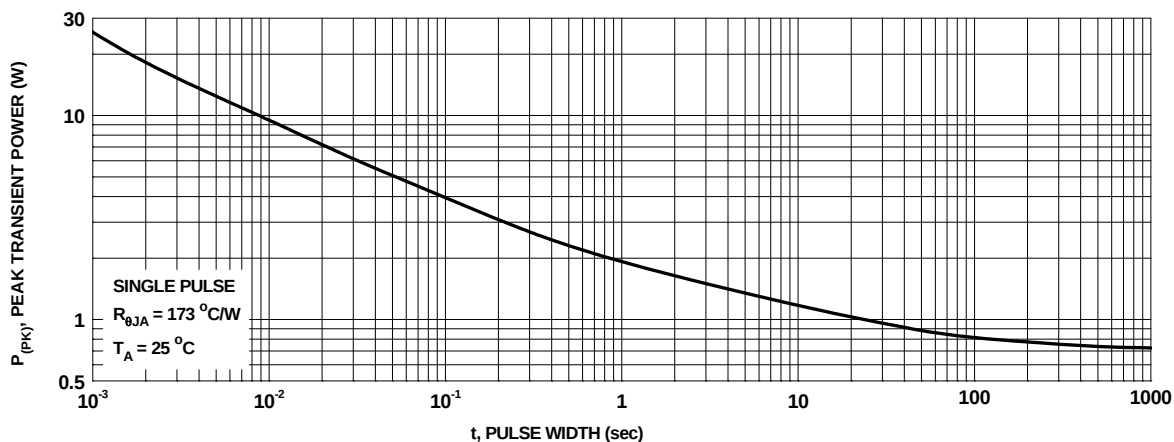
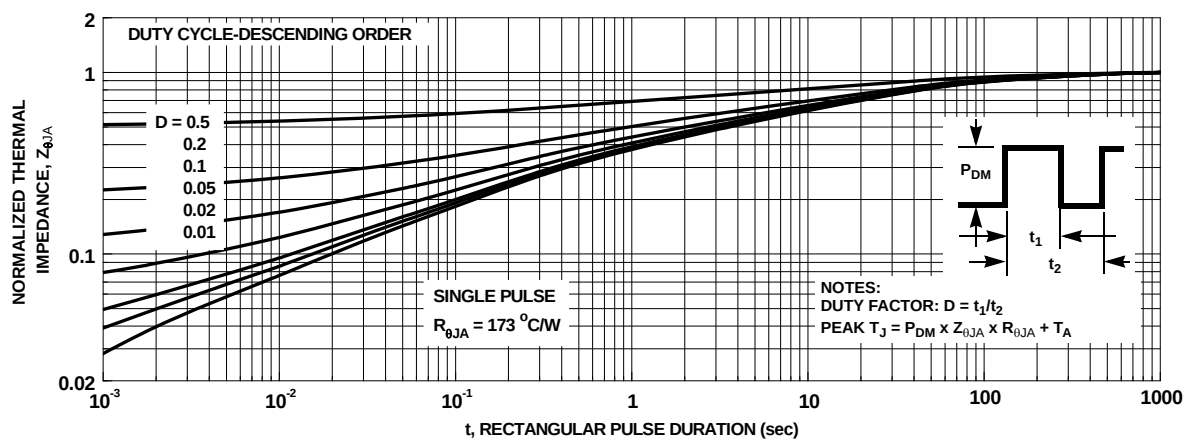
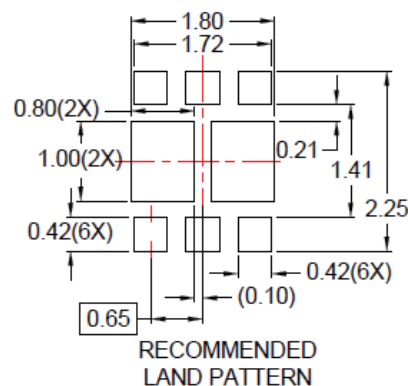
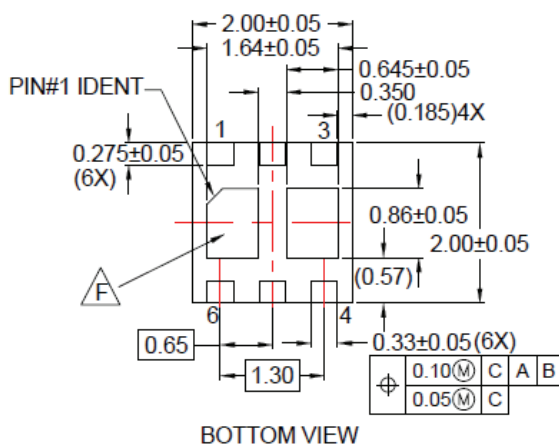
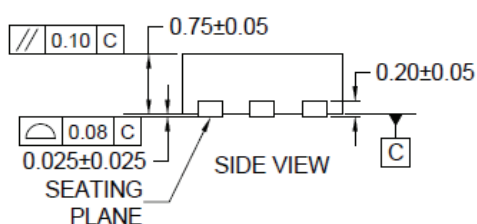
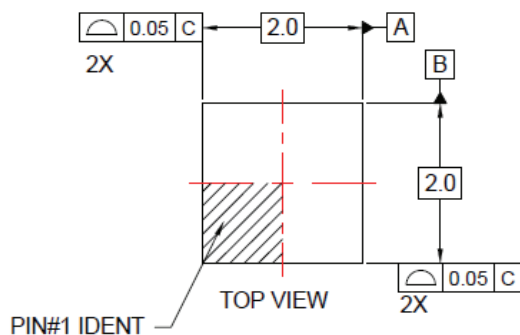


Figure 11. Single Pulse Maximum Power Dissipation

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



## Dimensional Outline and Pad Layout



## NOTES:

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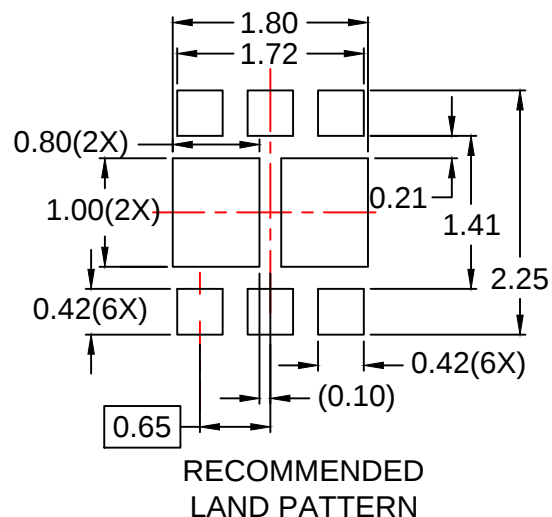
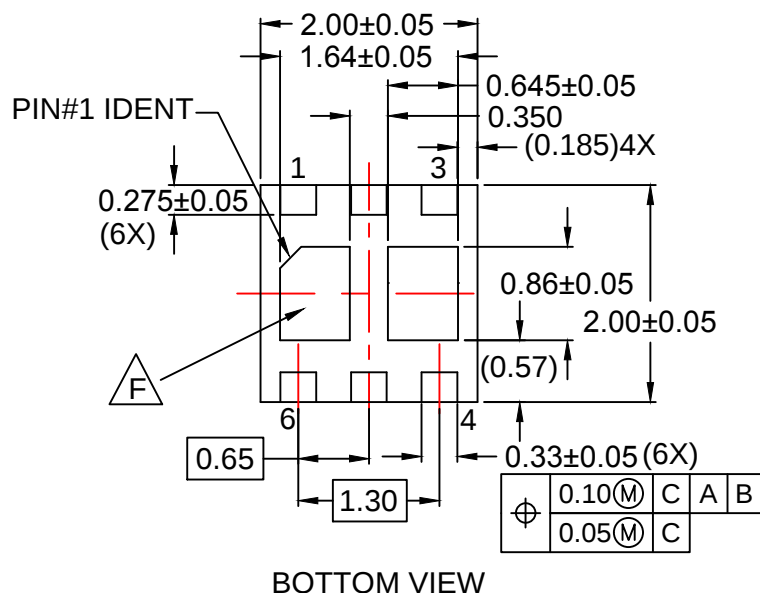
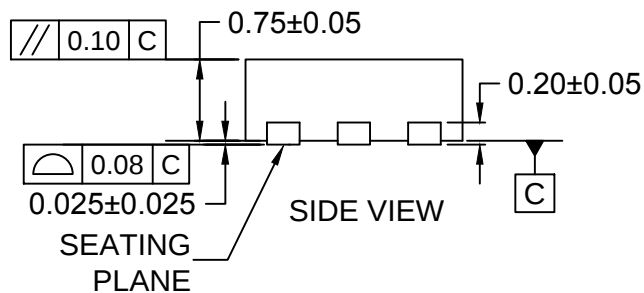
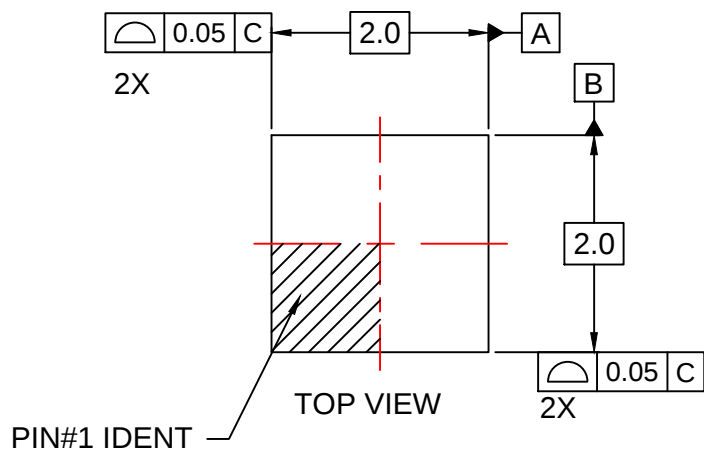
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| Datasheet Identification | Product Status        | Definition                                                                                                                                                                                          |
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| Preliminary              | First Production      | Datasheet contains preliminary data; supplementary data will be published at a later date. Fairchild Semiconductor reserves the right to make changes at any time without notice to improve design. |
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Rev. I68



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