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# FDMC86260ET150

## N-Channel Power Trench<sup>®</sup> MOSFET

150 V, 25 A, 34 mΩ

### Features

- Extended T<sub>J</sub> rating to 175°C
- Max r<sub>DS(on)</sub> = 34 mΩ at V<sub>GS</sub> = 10 V, I<sub>D</sub> = 5.4 A
- Max r<sub>DS(on)</sub> = 44 mΩ at V<sub>GS</sub> = 6 V, I<sub>D</sub> = 4.8 A
- High performance technology for extremely low r<sub>DS(on)</sub>
- 100% UIL Tested
- Termination is Lead-free
- RoHS Compliant

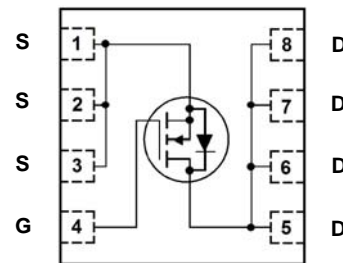
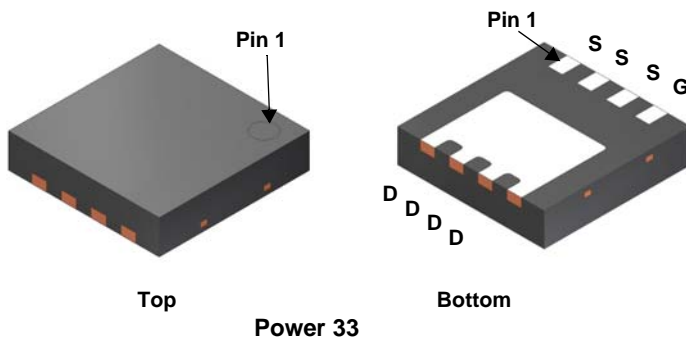


### General Description

This N-Channel MOSFET is produced using Fairchild Semiconductor's advanced Power Trench<sup>®</sup> process that has been especially tailored to minimize the on-state resistance and yet maintain superior switching performance.

### Application

- DC-DC Conversion



### MOSFET Maximum Ratings

T<sub>A</sub> = 25 °C unless otherwise noted

| Symbol                            | Parameter  | Ratings                          | Units |
|-----------------------------------|--|----------------------------------|-------|
| V <sub>DS</sub>                   | Drain to Source Voltage                          | 150                              | V     |
| V <sub>GS</sub>                   | Gate to Source Voltage                           | ±20                              | V     |
| I <sub>D</sub>                    | Drain Current -Continuous                        | T <sub>C</sub> = 25 °C (Note 5)  | 25    |
|                                   | -Continuous                                      | T <sub>C</sub> = 100 °C (Note 5) | 18    |
|                                   | -Continuous                                      | T <sub>A</sub> = 25 °C (Note 1a) | 5.4   |
|                                   | -Pulsed  | (Note 4)                         | 116   |
| E <sub>AS</sub>                   | Single Pulse Avalanche Energy                    | (Note 3)                         | 121   |
| P <sub>D</sub>                    | Power Dissipation                                | T <sub>C</sub> = 25 °C           | 65    |
|                                   | Power Dissipation                                | T <sub>A</sub> = 25 °C (Note 1a) | 2.8   |
| T <sub>J</sub> , T <sub>STG</sub> | Operating and Storage Junction Temperature Range | -55 to +175                      | °C    |

### Thermal Characteristics

|                  |   |           |     |      |
|------------------|---|-----------|-----|------|
| R <sub>θJC</sub> | Thermal Resistance, Junction to Case    | (Note 1)  | 2.3 | °C/W |
| R <sub>θJA</sub> | Thermal Resistance, Junction to Ambient | (Note 1a) | 53  |      |

### Package Marking and Ordering Information

| Device Marking | Device         | Package | Reel Size | Tape Width | Quantity   |
|----------------|----------------|---------|-----------|------------|------------|
| FDMC86260ET    | FDMC86260ET150 | Power33 | 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         | $I_D = 250\text{ }\mu\text{A}, V_{GS} = 0\text{ V}$                       | 150 |     |           | V                    |
| $\frac{\Delta BV_{DSS}}{\Delta T_J}$ | Breakdown Voltage Temperature Coefficient | $I_D = 250\text{ }\mu\text{A}$ , referenced to $25\text{ }^\circ\text{C}$ |     | 110 |           | mV/ $^\circ\text{C}$ |
| $I_{DSS}$                            | Zero Gate Voltage Drain Current           | $V_{DS} = 120\text{ V}, V_{GS} = 0\text{ V}$                              |     |     | 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 | 2.7 | 4  | 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                     | $V_{GS} = 10\text{ V}, I_D = 5.4\text{ A}$                                  |   | 27  | 34 | m $\Omega$           |
|  |  | $V_{GS} = 6\text{ V}, I_D = 4.8\text{ A}$                                   |   | 31  | 44 |                      |
|  |  | $V_{GS} = 10\text{ V}, I_D = 5.4\text{ A}, T_J = 125\text{ }^\circ\text{C}$ |   | 55  | 69 |                      |
| $g_{FS}$                               | Forward Transconductance                                 | $V_{DD} = 10\text{ V}, I_D = 5.4\text{ A}$                                  |   | 19  |    | S                    |

### Dynamic Characteristics

|           |                              |   |     |      |      |          |
|-----------|------------------------------|---|-----|------|------|----------|
| $C_{iss}$ | Input Capacitance            | $V_{DS} = 75\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$ |     | 1000 | 1330 | pF       |
| $C_{oss}$ | Output Capacitance           |   |     | 105  | 140  | pF       |
| $C_{rss}$ | Reverse Transfer Capacitance |   |     | 4.8  | 10   | pF       |
| $R_g$     | Gate Resistance              |   | 0.1 | 0.6  | 1.8  | $\Omega$ |

### Switching Characteristics

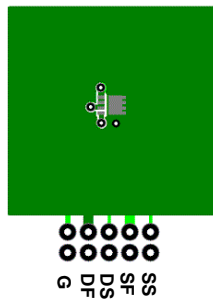
|              |                               |   |  |     |    |    |
|--------------|-------------------------------|---|--|-----|----|----|
| $t_{d(on)}$  | Turn-On Delay Time            | $V_{DD} = 75\text{ V}, I_D = 5.4\text{ A}, V_{GS} = 10\text{ V}, R_{GEN} = 6\text{ }\Omega$ |  | 9.5 | 19 | ns |
| $t_r$        | Rise Time                     |   |  | 2   | 10 | ns |
| $t_{d(off)}$ | Turn-Off Delay Time           |   |  | 17  | 30 | ns |
| $t_f$        | Fall Time                     |   |  | 3.3 | 10 | ns |
| $Q_{g(TOT)}$ | Total Gate Charge             | $V_{GS} = 0\text{ V to }10\text{ V}$  | $V_{DD} = 75\text{ V}, I_D = 5.4\text{ A}$ | 15  | 21 | nC |
| $Q_{g(TOT)}$ | Total Gate Charge             | $V_{GS} = 0\text{ V to }6\text{ V}$   |  | 9.7 | 14 | nC |
| $Q_{gs}$     | Total Gate Charge             |   |  | 4.0 |    | nC |
| $Q_{gd}$     | Gate to Drain "Miller" Charge |   |  | 3.1 |    | nC |

### Drain-Source Diode Characteristics

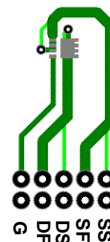
|          |                                       |  |  |      |     |    |
|----------|---------------------------------------|--|--|------|-----|----|
| $V_{SD}$ | Source to Drain Diode Forward Voltage | $V_{GS} = 0\text{ V}, I_S = 5.4\text{ A}$ (Note 2)     |  | 0.77 | 1.3 | V  |
|          |                                       | $V_{GS} = 0\text{ V}, I_S = 1.9\text{ A}$ (Note 2)     |  | 0.72 | 1.2 | V  |
| $t_{rr}$ | Reverse Recovery Time                 | $I_F = 5.4\text{ A}, di/dt = 100\text{ A}/\mu\text{s}$ |  | 64   | 102 | ns |
| $Q_{rr}$ | Reverse Recovery Charge               |  |  | 85   | 137 | nC |

Notes:

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



a. 53  $^\circ\text{C}/\text{W}$  when mounted on a 1 in<sup>2</sup> pad of 2 oz copper



b. 125  $^\circ\text{C}/\text{W}$  when mounted on a minimum pad of 2 oz copper

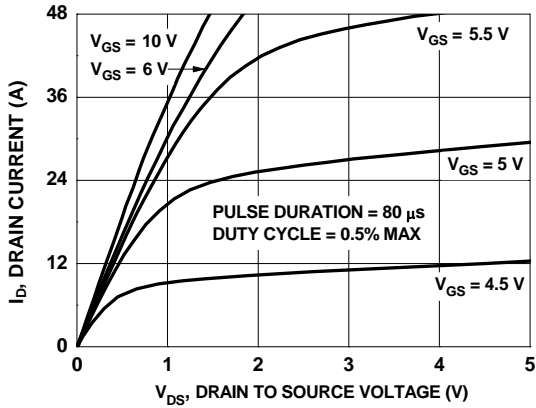
2. Pulse Test: Pulse Width < 300  $\mu\text{s}$ , Duty cycle < 2.0%.

3.  $E_{AS}$  of 121 mJ is based on starting  $T_J = 25\text{ }^\circ\text{C}$ ,  $L = 3\text{ mH}$ ,  $I_{AS} = 9\text{ A}$ ,  $V_{DD} = 150\text{ V}$ ,  $V_{GS} = 10\text{ V}$ . 100% test at  $L = 0.1\text{ mH}$ ,  $I_{AS} = 22\text{ A}$ .

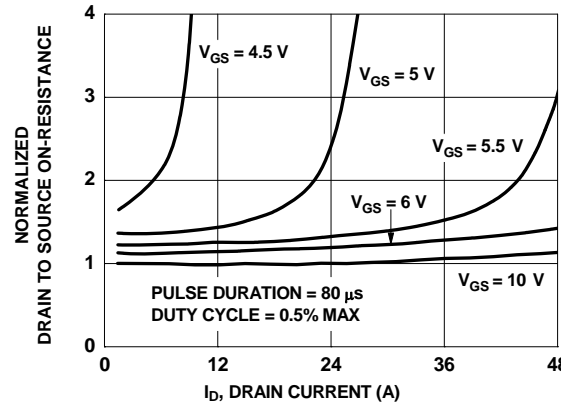
4. Pulsed  $I_d$  please refer to Fig 11 SOA graph for more details.

5. Computed continuous current limited to Max Junction Temperature only, actual continuous current will be limited by thermal & electro-mechanical application board design.

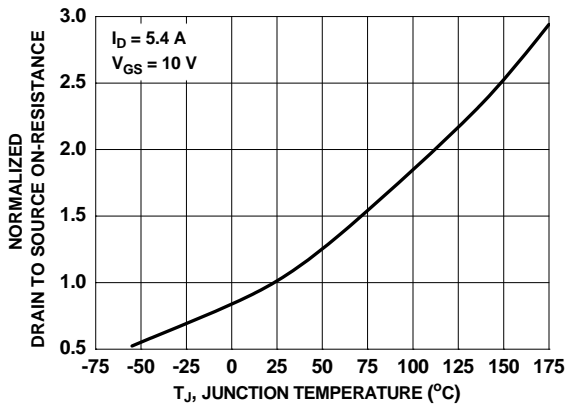
**Typical Characteristics**  $T_J = 25^\circ\text{C}$  unless otherwise noted



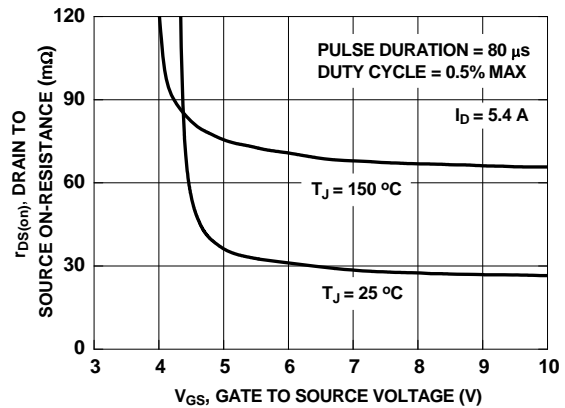
**Figure 1. On-Region Characteristics**



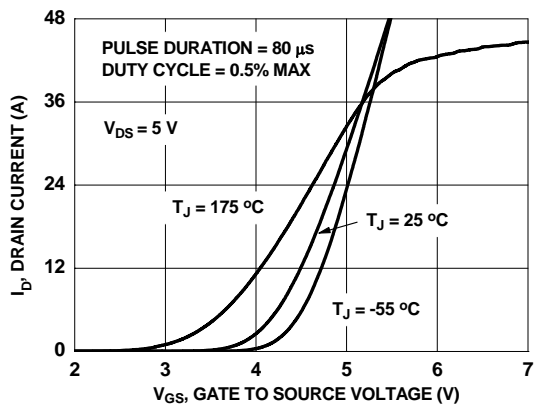
**Figure 2. Normalized On-Resistance vs Drain Current and Gate Voltage**



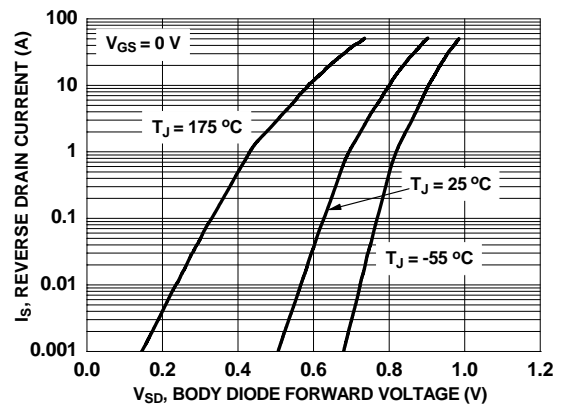
**Figure 3. Normalized On-Resistance vs Junction Temperature**



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

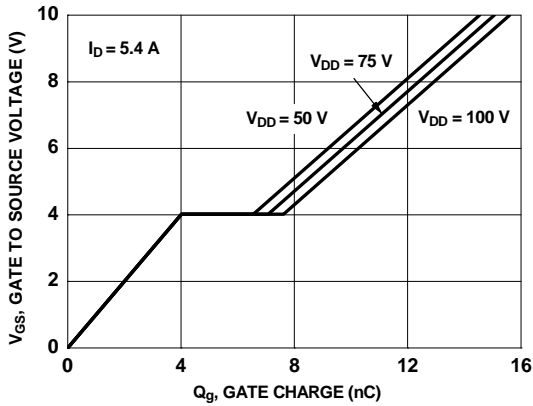


**Figure 5. Transfer Characteristics**

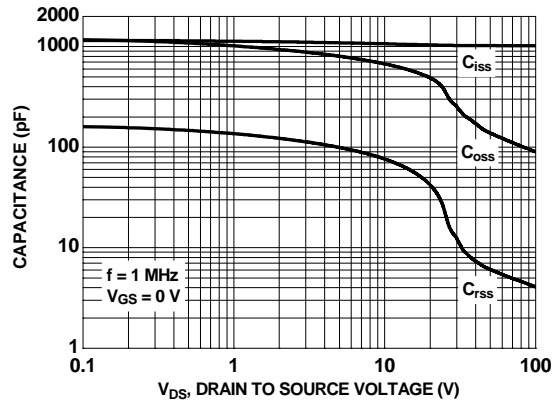


**Figure 6. Source to Drain Diode Forward Voltage vs Source Current**

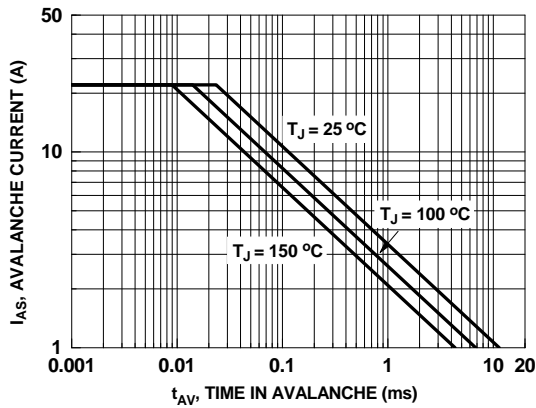
**Typical Characteristics**  $T_J = 25\text{ }^\circ\text{C}$  unless otherwise noted



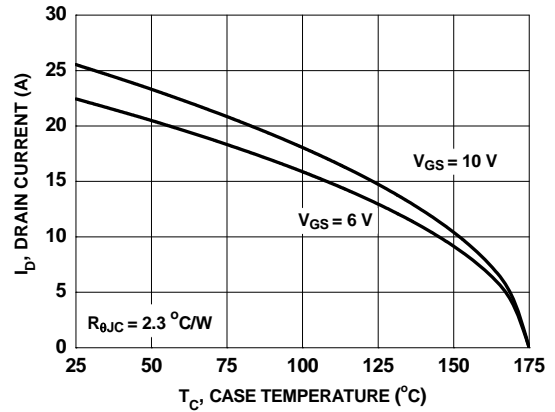
**Figure 7. Gate Charge Characteristics**



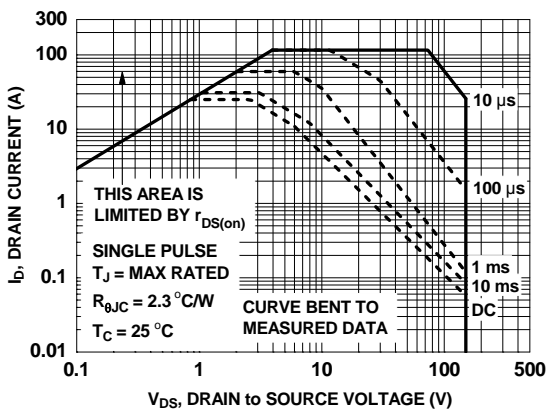
**Figure 8. Capacitance vs Drain to Source Voltage**



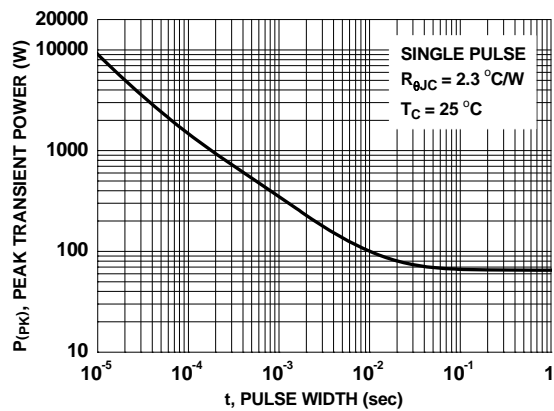
**Figure 9. Unclamped Inductive Switching Capability**



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

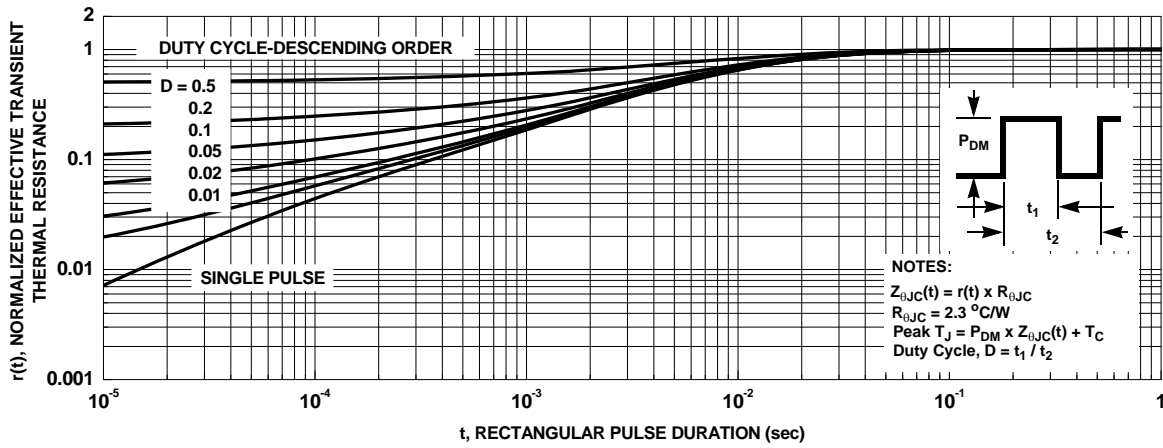


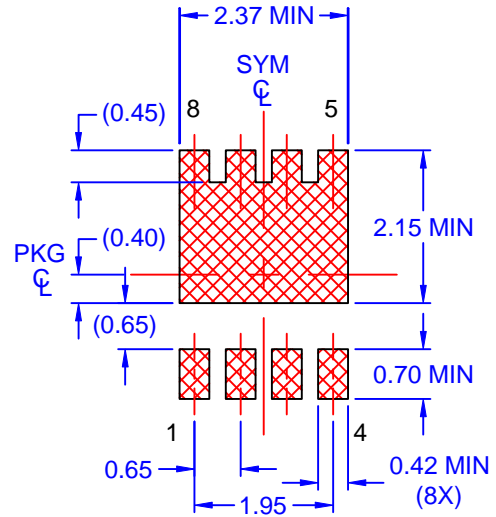
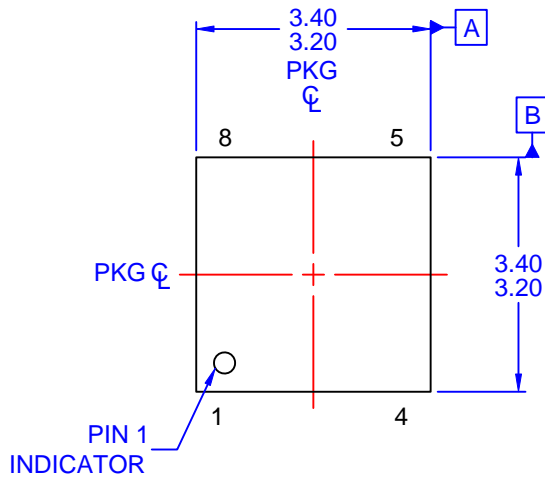
**Figure 11. Forward Bias Safe Operating Area**



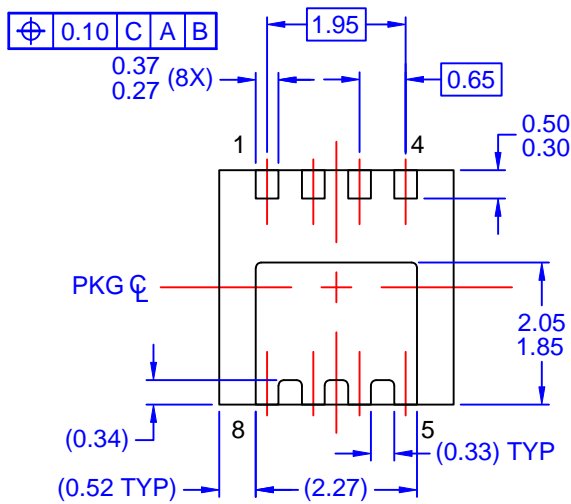
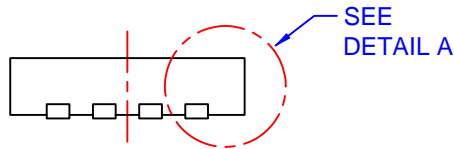
**Figure 12. Single Pulse Maximum Power Dissipation**

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



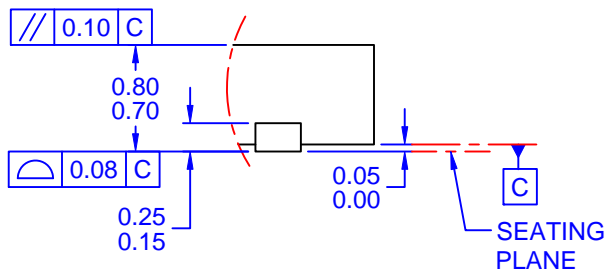


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- B) ALL DIMENSIONS ARE IN MILLIMETERS.
- C) DIMENSIONS DO NOT INCLUDE BURRS OR MOLD FLASH. MOLD FLASH OR BURRS DOES NOT EXCEED 0.10MM.
- D) DIMENSIONING AND TOLERANCING PER ASME Y14.5M-1994.
- E) DRAWING FILE NAME: PQFN08HREV1



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SCALE: 2X

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