

FDBL86062-F085

N-Channel POWERTRENCH[®] MOSFET

100 V, 300 A, 2.0 mΩ

Features

- Typical $R_{DS(on)} = 1.5 \text{ m}\Omega$ at $V_{GS} = 10 \text{ V}$, $I_D = 80 \text{ A}$
- Typical $Q_{g(tot)} = 95 \text{ nC}$ at $V_{GS} = 10 \text{ V}$, $I_D = 80 \text{ A}$
- UIS Capability
- Qualified to AEC Q101
- This Device is Pb-Free and is RoHS Compliant

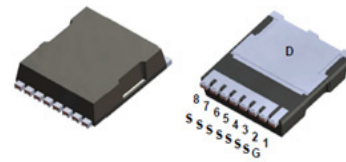
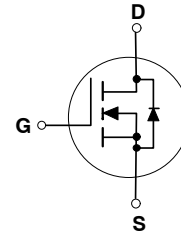
Applications

- Automotive Engine Control
- PowerTrain Management
- Solenoid and Motor Drivers
- Integrated Starter/Alternator
- Primary Switch for 12 V Systems



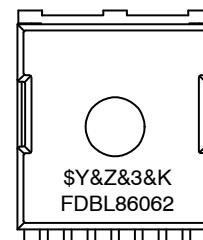
ON Semiconductor[®]

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H-PSOF8L 11.68x9.80
CASE 100CU

MARKING DIAGRAM



| | |
|-----------|---------------------------|
| \$Y | = ON Semiconductor Logo |
| &Z&3 | = Data Code (Year & Week) |
| &K | = Lot |
| FDBL86062 | = Specific Device Code |

ORDERING INFORMATION

See detailed ordering and shipping information on page 2 of this data sheet.

FDBL86062–F085

MOSFET MAXIMUM RATINGS $T_J = 25^\circ\text{C}$ unless otherwise noted

| Symbol | Parameter | Rating | Units | |
|-----------------|--|--------------------------|---------------------------|---|
| V_{DSS} | Drain-to-Source Voltage | 100 | V | |
| V_{GS} | Gate-to-Source Voltage | ± 20 | V | |
| I_D | Drain Current - Continuous ($V_{GS} = 10$) (Note 1) | $T_C = 25^\circ\text{C}$ | 300 | A |
| | Pulsed Drain Current | $T_C = 25^\circ\text{C}$ | See Figure 4 | |
| E_{AS} | Single Pulse Avalanche Energy (Note 2) | 352 | mJ | |
| P_D | Power Dissipation | 429 | W | |
| | Derate Above 25°C | 2.9 | W/ $^\circ\text{C}$ | |
| T_J, T_{STG} | Operating and Storage Temperature | -55 to +175 | $^\circ\text{C}$ | |
| $R_{\theta JC}$ | Thermal Resistance, Junction to Case | 0.35 | $^\circ\text{C}/\text{W}$ | |
| $R_{\theta JA}$ | Maximum Thermal Resistance, Junction to Ambient (Note 3) | 43 | $^\circ\text{C}/\text{W}$ | |

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.

- Current is limited by silicon.
- Starting $T_J = 25^\circ\text{C}$, $L = 0.1$ mH, $I_{AS} = 84$ A, $V_{DD} = 100$ V during inductor charging and $V_{DD} = 0$ V during time in avalanche.
- $R_{\theta JA}$ 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 $R_{\theta JA}$ is determined by the board design. The maximum rating presented here is based on mounting on a 1 in² pad of 2oz copper.

PACKAGE MARKING AND ORDERING INFORMATION

| Device Marking | Device | Package | Reel Size | Tape Width | Quantity |
|----------------|----------------|---------|-----------|------------|------------|
| FDBL86062 | FDBL86062–F085 | MO–299A | 13" | 24 mm | 2000 Units |

ELECTRICAL CHARACTERISTICS $T_J = 25^\circ\text{C}$, unless otherwise noted

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

OFF CHARACTERISTICS

| | | | | | | | |
|------------|-----------------------------------|---------------------------------------|------------------------------------|---|-----------|----|---------------|
| B_{VDSS} | Drain-to-Source Breakdown Voltage | $I_D = 250 \mu\text{A}, V_{GS} = 0$ V | 100 | – | – | V | |
| I_{DSS} | Drain-to-Source Leakage Current | $V_{DS} = 100$ V, $V_{GS} = 0$ V | $T_J = 25^\circ\text{C}$ | – | – | 5 | μA |
| | | | $T_J = 175^\circ\text{C}$ (Note 4) | – | – | 2 | mA |
| I_{GSS} | Gate-to-Source Leakage Current | $V_{GS} = \pm 20$ V | – | – | ± 100 | nA | |

ON CHARACTERISTICS

| | | | | | | | |
|--------------|----------------------------------|--|------------------------------------|-----|-----|-----|------------|
| $V_{GS(th)}$ | Gate to Source Threshold Voltage | $V_{GS} = V_{DS}, I_D = 250 \mu\text{A}$ | 2.0 | 3.1 | 4.5 | V | |
| $R_{DS(on)}$ | Drain to Source On Resistance | $I_D = 80$ A, $V_{GS} = 10$ V | $T_J = 25^\circ\text{C}$ | – | 1.5 | 2.0 | m Ω |
| | | | $T_J = 175^\circ\text{C}$ (Note 4) | – | 3.3 | 4.3 | |

DYNAMIC CHARACTERISTICS

| | | | | | | | |
|--------------|-------------------------------|---|---------------------------------|------|----|----------|----|
| C_{iss} | Input Capacitance | $V_{DS} = 50$ V, $V_{GS} = 0$ V, $f = 1$ MHz | – | 6970 | – | pF | |
| C_{oss} | Output Capacitance | | – | 3950 | – | | |
| C_{rss} | Reverse Transfer Capacitance | | – | 29 | – | | |
| R_g | Gate Resistance | $f = 1$ MHz | – | 0.4 | – | Ω | |
| $Q_{g(TOT)}$ | Total Gate Charge at 10 V | $V_{GS} = 0$ to 10 V | $V_{DD} = 80$ V $I_D = 80$ A | – | 95 | 124 | nC |
| $Q_{g(th)}$ | Threshold Gate Charge | $V_{GS} = 0$ to 2 V | | – | 13 | – | |
| Q_{gs} | Gate-to-Source Gate Charge | | | – | 31 | – | |
| Q_{gd} | Gate-to-Drain "Miller" Charge | | | – | 20 | – | |

FDBL86062–F085

ELECTRICAL CHARACTERISTICS (continued) $T_J = 25^\circ\text{C}$, unless otherwise noted

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

SWITCHING CHARACTERISTICS

| | | | | | | |
|--------------|----------------|--|---|----|----|----|
| t_{on} | Turn-On Time | $V_{DD} = 50\text{ V}$, $I_D = 80\text{ A}$, $V_{GS} = 10\text{ V}$, $R_{GEN} = 6\ \Omega$ | – | – | 73 | ns |
| $t_{d(on)}$ | Turn-On Delay | | – | 31 | – | |
| t_r | Rise Time | | – | 25 | – | |
| $t_{d(off)}$ | Turn-Off Delay | | – | 36 | – | |
| t_f | Fall Time | | – | 9 | – | |
| t_{off} | Turn-Off Time | | – | – | 59 | |

DRAIN–SOURCE DIODE CHARACTERISTICS

| | | | | | | |
|----------|-------------------------------|--|---|-----|------|----|
| V_{SD} | Source-to-Drain Diode Voltage | $I_{SD} = 80\text{ A}$, $V_{GS} = 0\text{ V}$ | – | – | 1.25 | V |
| | | $I_{SD} = 40\text{ A}$, $V_{GS} = 0\text{ V}$ | – | – | 1.2 | |
| t_{rr} | Reverse-Recovery Time | $I_F = 80\text{ A}$, $dI_{SD}/dt = 100\text{ A}/\mu\text{s}$, $V_{DD} = 80\text{ V}$ | – | 115 | 150 | ns |
| Q_{rr} | Reverse-Recovery Charge | | – | 172 | 224 | 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.

4. The maximum value is specified by design at $T_J = 175^\circ\text{C}$. Product is not tested to this condition in production.

TYPICAL CHARACTERISTICS

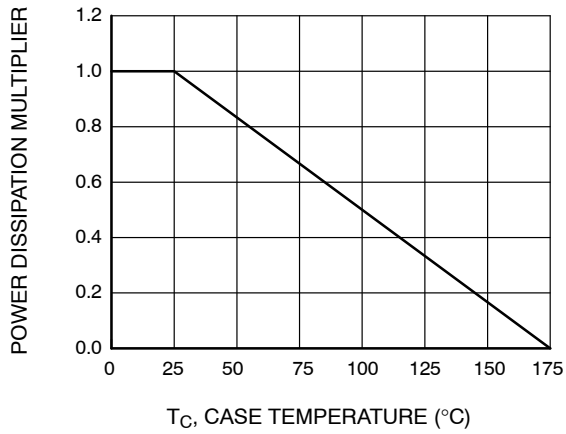


Figure 1. Normalized Power Dissipation vs. Case Temperature

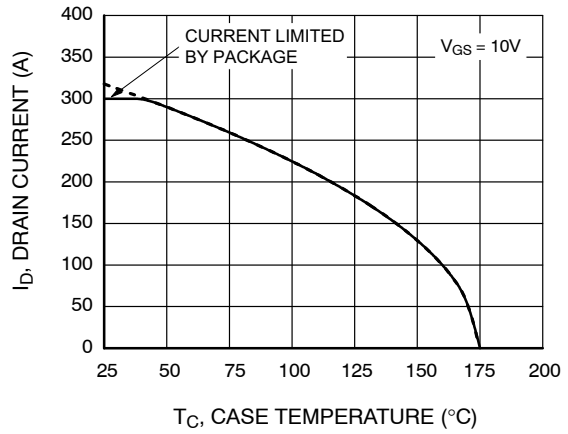


Figure 2. Maximum Continuous Drain Current vs. Case Temperature

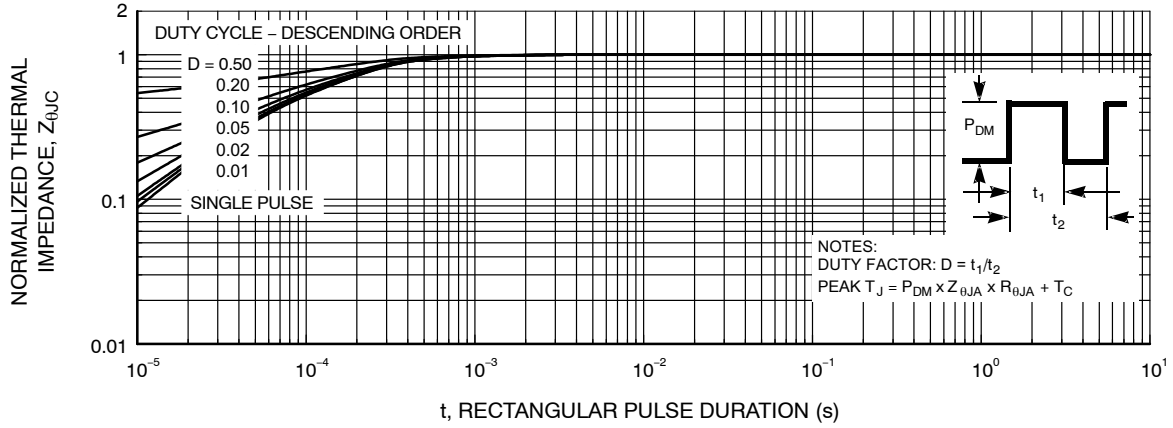


Figure 3. Normalized Maximum Transient Thermal Impedance

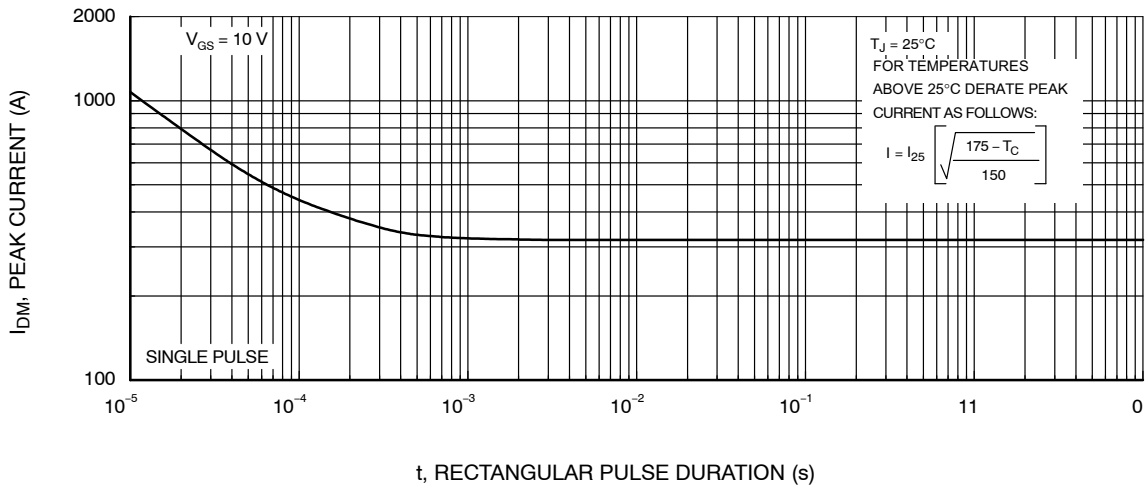


Figure 4. Peak Current Capability

TYPICAL CHARACTERISTICS (continued)

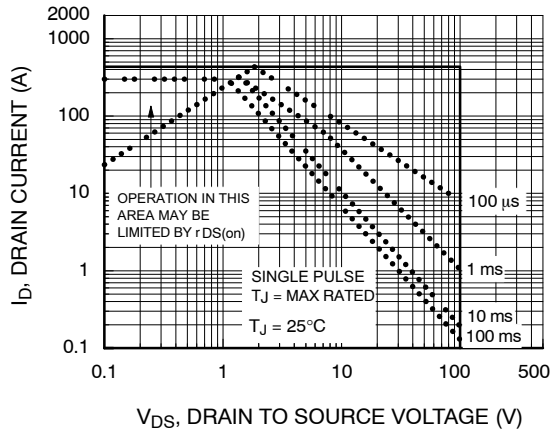
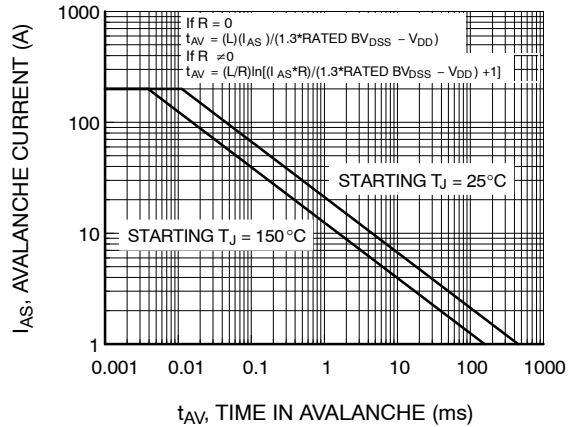


Figure 5. Forward Bias Safe Operating Area



NOTE: Refer to ON Semiconductor Application Notes AN7514 and AN7515

Figure 6. Unclamped Inductive Switching Capability

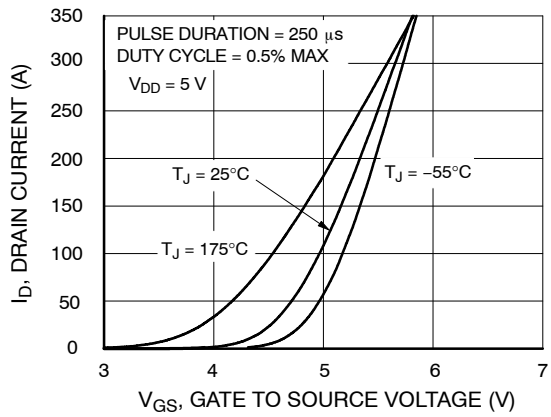


Figure 7. Transfer Characteristics

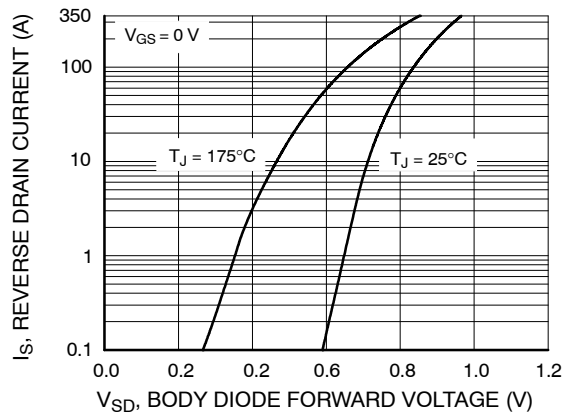


Figure 8. Forward Diode Characteristics

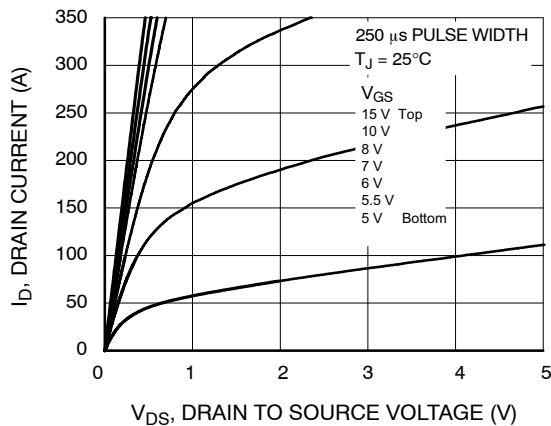


Figure 9. Saturation Characteristics

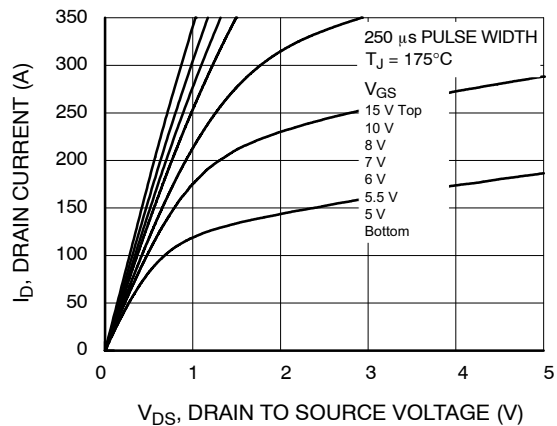


Figure 10. Saturation Characteristics

TYPICAL CHARACTERISTICS (continued)

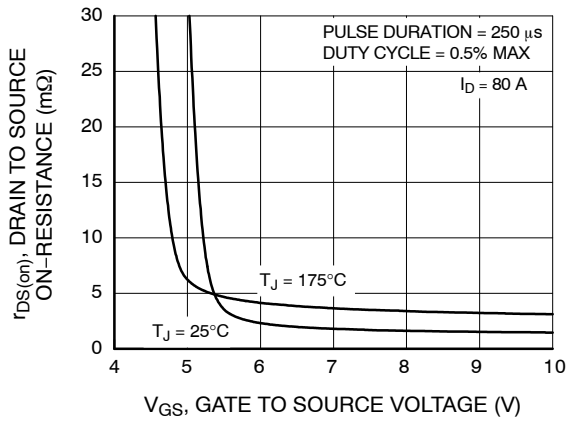


Figure 11. $R_{DS(on)}$ vs. Gate Voltage

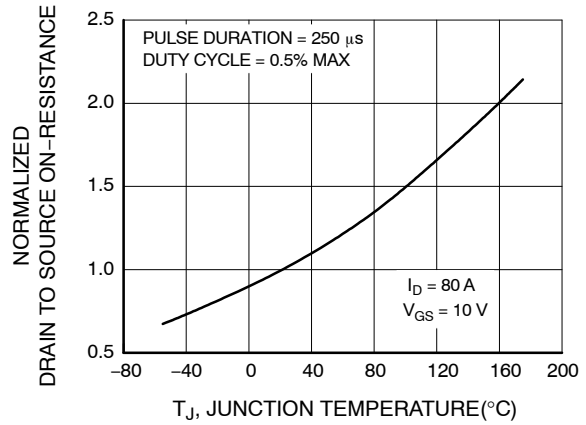


Figure 12. Normalized $R_{DS(on)}$ vs. Junction Temperature

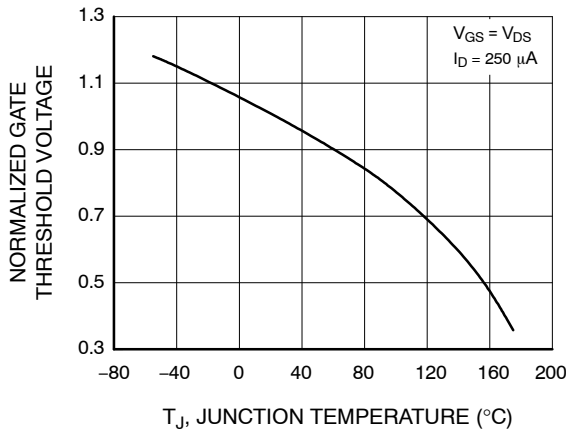


Figure 13. Normalized Gate Threshold Voltage vs. Temperature

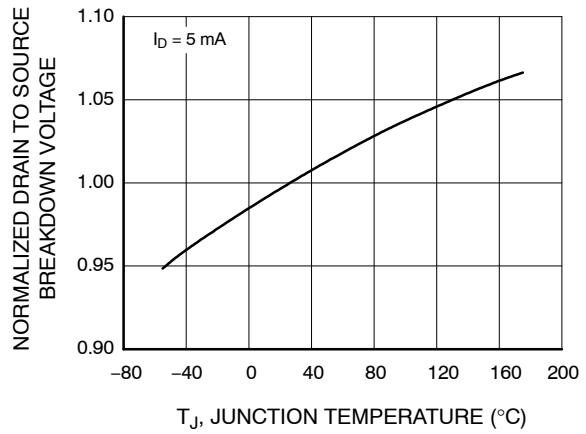


Figure 14. Normalized Drain to Source Breakdown Voltage vs. Junction Temperature

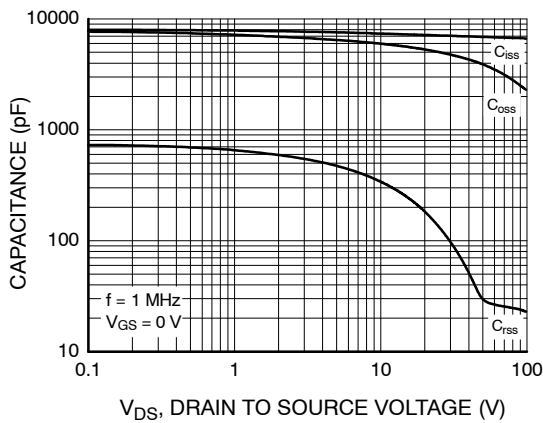


Figure 15. Capacitance vs. Drain to Source Voltage

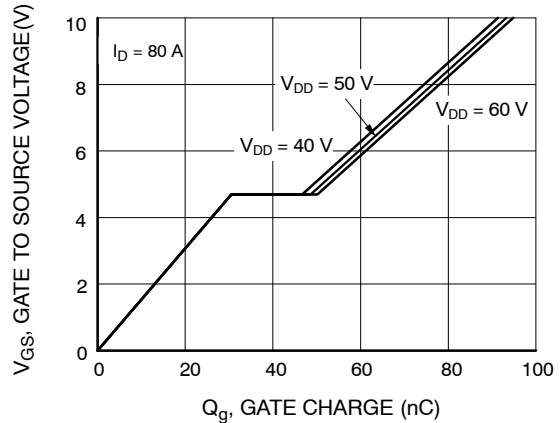


Figure 16. Gate Charge vs. Gate to Source Voltage

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MECHANICAL CASE OUTLINE

PACKAGE DIMENSIONS

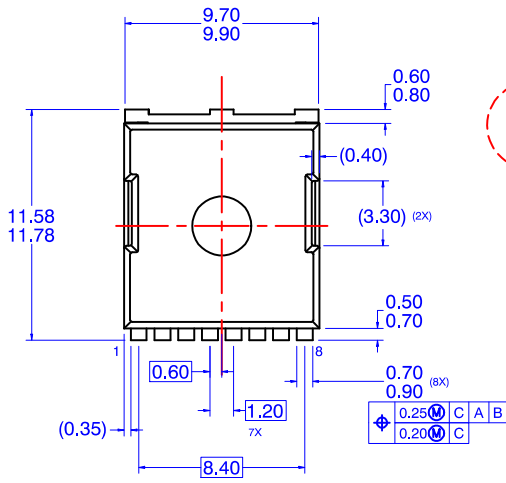
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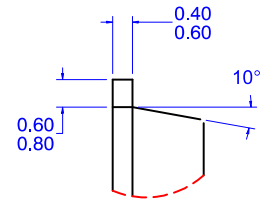
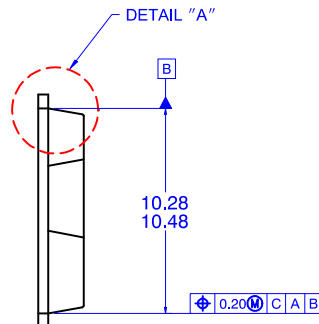
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CASE 100CU
ISSUE O

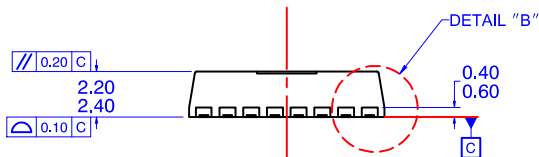
DATE 30 NOV 2016



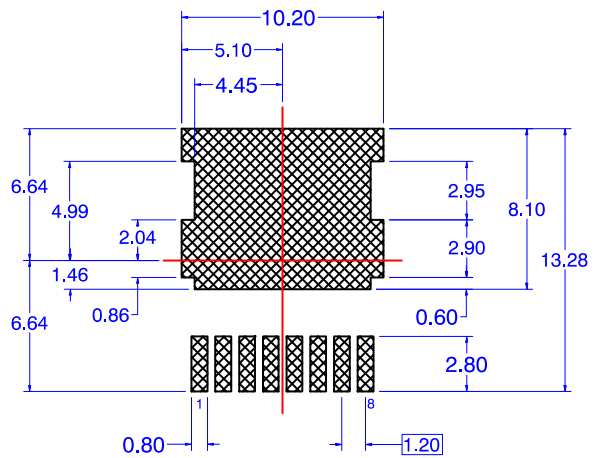
TOP VIEW



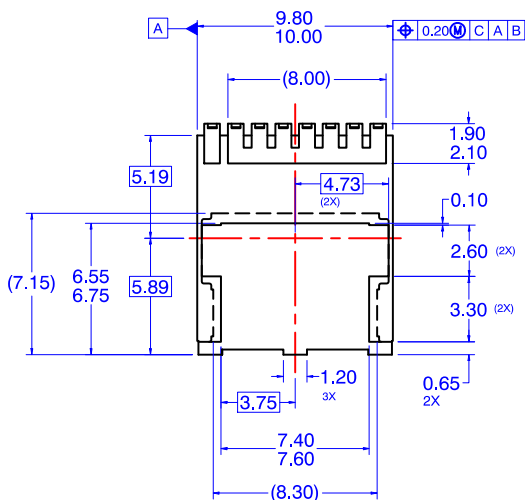
DETAIL "A"



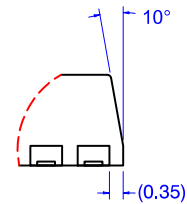
SIDE VIEW



LAND PATTERN RECOMMENDATION



BOTTOM VIEW



DETAIL "B"

- NOTES: UNLESS OTHERWISE SPECIFIED
- A) PACKAGE STANDARD REFERENCE: JEDEC MO-299, ISSUE A, DATED NOVEMBER 2009.
 - 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.

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