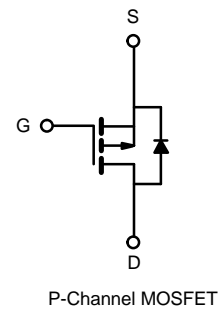
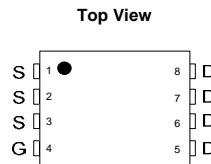
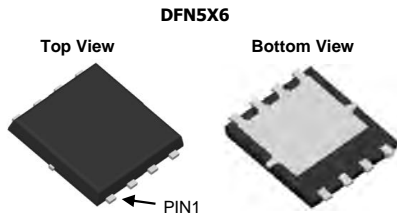


P-Channel 200V (D-S) MOSFET

| PRODUCT SUMMARY | | |
|---------------------------|------------------|-----|
| V_{DS} (V) | -200 | |
| $R_{DS(on)}$ (Ω) | $V_{GS} = -10$ V | 2.0 |
| Q_g max. (nC) | 50 | |
| Q_{gs} (nC) | 8.0 | |
| Q_{gd} (nC) | 30 | |
| Configuration | Single | |

FEATURES

- Dynamic dV/dt rating
- Repetitive avalanche rated
- P-channel
- Fast switching
- Ease of paralleling
- Simple drive requirements

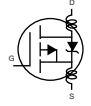



| ABSOLUTE MAXIMUM RATINGS ($T_C = 25$ °C, unless otherwise noted) | | | | |
|---|-------------------|----------------|----------------|----------|
| PARAMETER | | SYMBOL | LIMIT | UNIT |
| Drain-Source Voltage | | V_{DS} | -200 | V |
| Gate-Source Voltage | | V_{GS} | ± 20 | V |
| Continuous Drain Current | V_{GS} at -10 V | I_D | $T_C = 25$ °C | -4.0 |
| | | | $T_C = 100$ °C | -2.0 |
| Pulsed Drain Current ^a | | I_{DM} | -6 | A |
| Linear Derating Factor | | | 1.0 | W/°C |
| Single Pulse Avalanche Energy ^b | | E_{AS} | 300 | mJ |
| Repetitive Avalanche Current ^a | | I_{AR} | -3 | A |
| Repetitive Avalanche Energy ^a | | E_{AR} | 10 | mJ |
| Maximum Power Dissipation | $T_C = 25$ °C | P_D | 85 | W |
| Peak Diode Recovery dV/dt ^c | | dV/dt | -5.0 | V/ns |
| Operating Junction and Storage Temperature Range | | T_J, T_{stg} | -55 to +150 | °C |
| Soldering Recommendations (Peak temperature) ^d | for 10 s | | 300 | |
| Mounting Torque | 6-32 or M3 screw | | 10 | lbf · in |
| | | | 1.1 | N · m |

Notes

- Repetitive rating; pulse width limited by maximum junction temperature (see fig. 11).
- $V_{DD} = -50$ V, starting $T_J = 25$ °C, $L = 8.7$ mH, $R_g = 25$ Ω , $I_{AS} = -11$ A (see fig. 12).
- $I_{SD} \leq -11$ A, $dI/dt \leq 150$ A/ μ s, $V_{DD} \leq V_{DS}$, $T_J \leq 150$ °C.
- 1.6 mm from case.

| THERMAL RESISTANCE RATINGS | | | | |
|-------------------------------------|------------|------|------|------|
| PARAMETER | SYMBOL | TYP. | MAX. | UNIT |
| Maximum Junction-to-Ambient | R_{thJA} | - | 62 | °C/W |
| Case-to-Sink, Flat, Greased Surface | R_{thCS} | 0.50 | - | |
| Maximum Junction-to-Case (Drain) | R_{thJC} | - | 1.0 | |

| SPECIFICATIONS ($T_J = 25\text{ }^\circ\text{C}$, unless otherwise noted) | | | | | | |
|---|---------------------|---|------|------|----------|---------------|
| PARAMETER | SYMBOL | TEST CONDITIONS | MIN. | TYP. | MAX. | UNIT |
| Static | | | | | | |
| Drain-Source Breakdown Voltage | V_{DS} | $V_{GS} = 0\text{ V}, I_D = -250\text{ }\mu\text{A}$ | -200 | - | - | V |
| V_{DS} Temperature Coefficient | $\Delta V_{DS}/T_J$ | Reference to $25\text{ }^\circ\text{C}$, $I_D = -1\text{ mA}$ | - | -0.2 | - | V/°C |
| Gate-Source Threshold Voltage | $V_{GS(th)}$ | $V_{DS} = V_{GS}, I_D = -250\text{ }\mu\text{A}$ | -1.5 | - | -4.0 | V |
| Gate-Source Leakage | I_{GSS} | $V_{GS} = \pm 20\text{ V}$ | - | - | ± 10 | μA |
| Zero Gate Voltage Drain Current | I_{DSS} | $V_{DS} = -200\text{ V}, V_{GS} = 0\text{ V}$ | - | - | -100 | μA |
| | | $V_{DS} = -160\text{ V}, V_{GS} = 0\text{ V}, T_J = 125\text{ }^\circ\text{C}$ | - | - | -500 | |
| Drain-Source On-State Resistance | $R_{DS(on)}$ | $V_{GS} = -10\text{ V}, I_D = -0.5\text{ A}^b$ | - | 2.0 | - | Ω |
| Forward Transconductance | g_{fs} | $V_{DS} = -50\text{ V}, I_D = -0.5\text{ A}^b$ | 4.1 | - | - | S |
| Dynamic | | | | | | |
| Input Capacitance | C_{iss} | $V_{GS} = 0\text{ V}, V_{DS} = -25\text{ V}, f = 1.0\text{ MHz}$, see fig. 5 | - | 700 | - | pF |
| Output Capacitance | C_{oss} | | - | 370 | - | |
| Reverse Transfer Capacitance | C_{rss} | | - | 81 | - | |
| Total Gate Charge | Q_g | $V_{GS} = -10\text{ V}, I_D = -11\text{ A}, V_{DS} = -160\text{ V}$, see fig. 6 and 13 ^b | - | - | 5.0 | nC |
| Gate-Source Charge | Q_{gs} | | - | - | 8.0 | |
| Gate-Drain Charge | Q_{gd} | | - | - | 3.0 | |
| Turn-On Delay Time | $t_{d(on)}$ | $V_{DD} = -100\text{ V}, I_D = -11\text{ A}, R_g = 9.1\text{ }\Omega, R_D = 8.6\text{ }\Omega$, see fig. 10 ^b | - | 14 | - | ns |
| Rise Time | t_r | | - | 43 | - | |
| Turn-Off Delay Time | $t_{d(off)}$ | | - | 39 | - | |
| Fall Time | t_f | | - | 38 | - | |
| Internal Drain Inductance | L_D | Between lead, 6 mm (0.25") from package and center of die contact  | - | 4.5 | - | nH |
| Internal Source Inductance | L_S | | - | 7.5 | - | |
| Gate Input Resistance | R_g | $f = 1\text{ MHz}$, open drain | 0.3 | - | 1.7 | Ω |
| Drain-Source Body Diode Characteristics | | | | | | |
| Continuous Source-Drain Diode Current | I_S | MOSFET symbol showing the integral reverse p-n junction diode  | - | - | -2 | A |
| Pulsed Diode Forward Current ^a | I_{SM} | | - | - | -4 | |
| Body Diode Voltage | V_{SD} | $T_J = 25\text{ }^\circ\text{C}, I_S = -11\text{ A}, V_{GS} = 0\text{ V}^b$ | - | - | -5 | V |
| Body Diode Reverse Recovery Time | t_{rr} | $T_J = 25\text{ }^\circ\text{C}, I_F = -11\text{ A}, dI/dt = 100\text{ A}/\mu\text{s}^b$ | - | 250 | 300 | ns |
| Body Diode Reverse Recovery Charge | Q_{rr} | | - | 2.9 | 3.6 | μC |
| Forward Turn-On Time | t_{on} | Intrinsic turn-on time is negligible (turn-on is dominated by L_S and L_D) | | | | |

Notes

- a. Repetitive rating; pulse width limited by maximum junction temperature (see fig. 11).
- b. Pulse width $\leq 300\text{ }\mu\text{s}$; duty cycle $\leq 2\%$.

TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

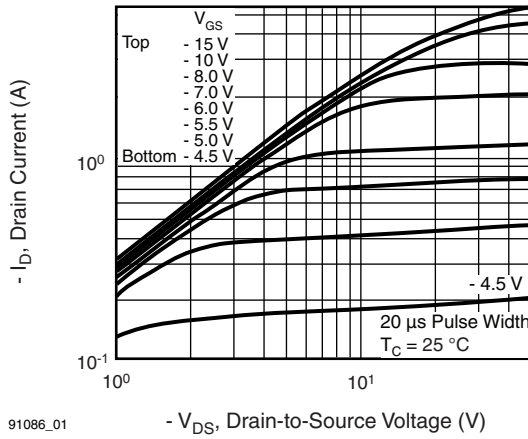


Fig. 1 - Typical Output Characteristics, $T_C = 25\text{ }^\circ\text{C}$

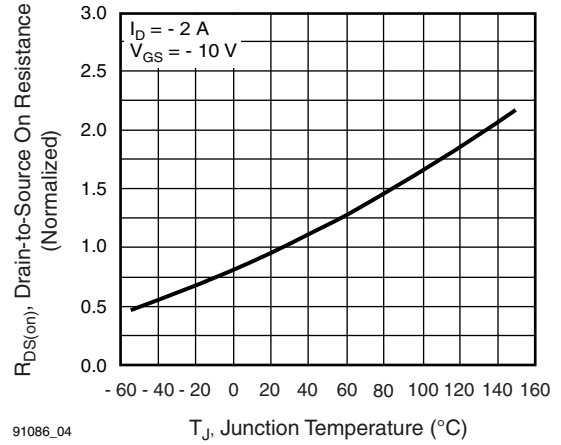


Fig. 4 - Normalized On-Resistance vs. Temperature

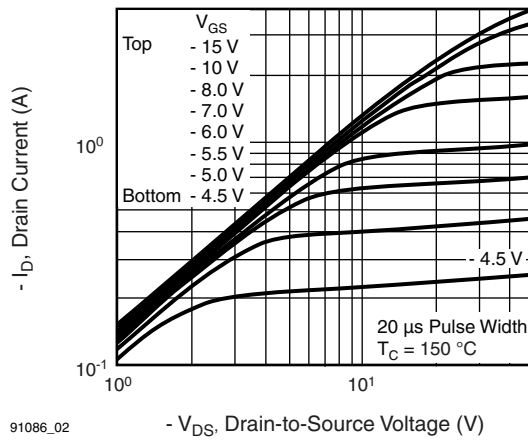


Fig. 2 - Typical Output Characteristics, $T_C = 150\text{ }^\circ\text{C}$

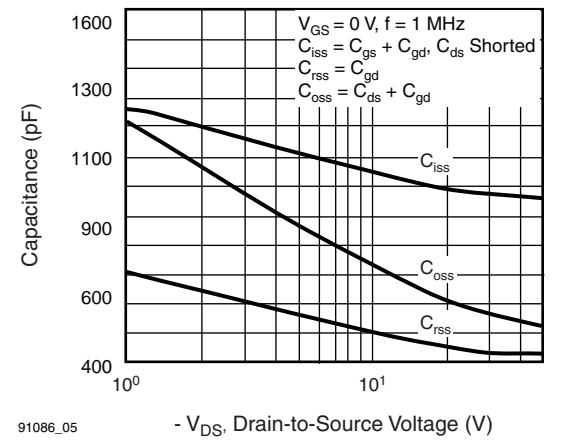


Fig. 5 - Typical Capacitance vs. Drain-to-Source Voltage

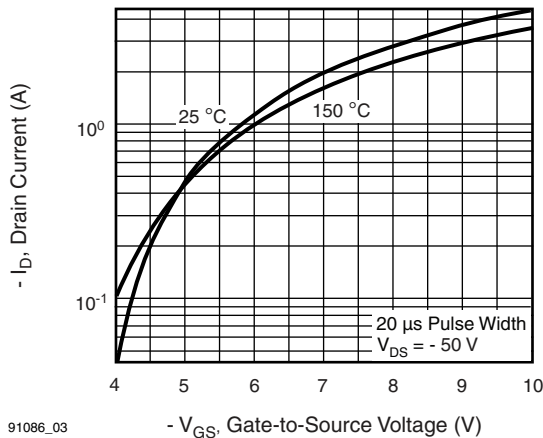


Fig. 3 - Typical Transfer Characteristics

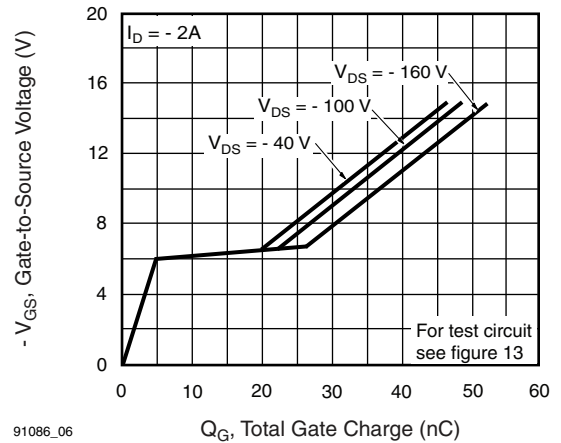
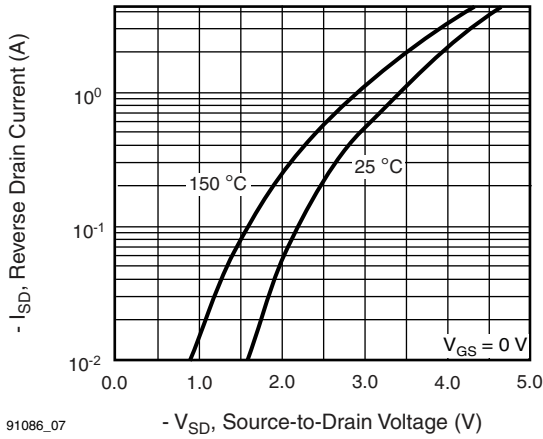
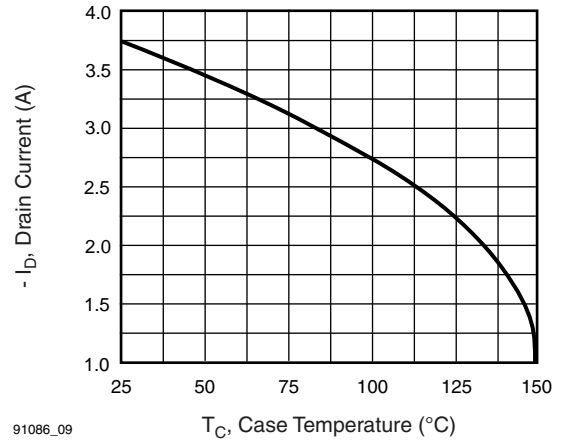


Fig. 6 - Typical Gate Charge vs. Drain-to-Source Voltage



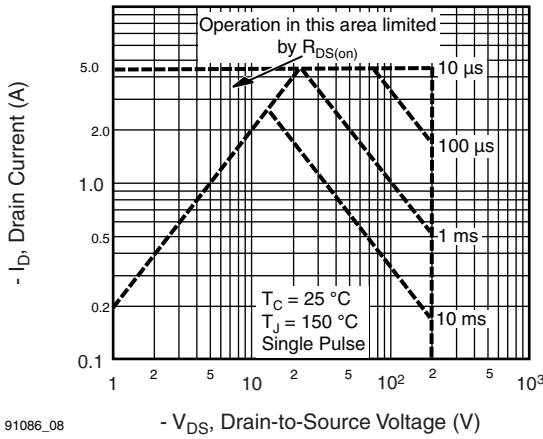
91086_07

Fig. 7 - Typical Source-Drain Diode Forward Voltage



91086_09

Fig. 9 - Maximum Drain Current vs. Case Temperature



91086_08

Fig. 8 - Maximum Safe Operating Area

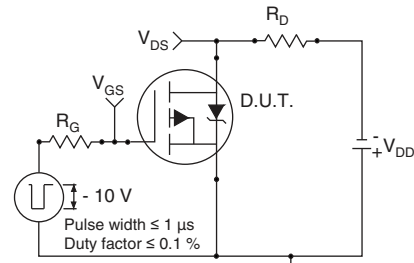


Fig. 10a - Switching Time Test Circuit

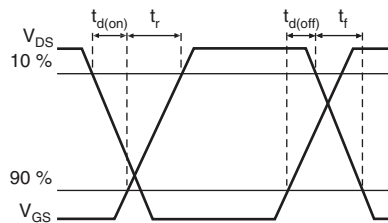
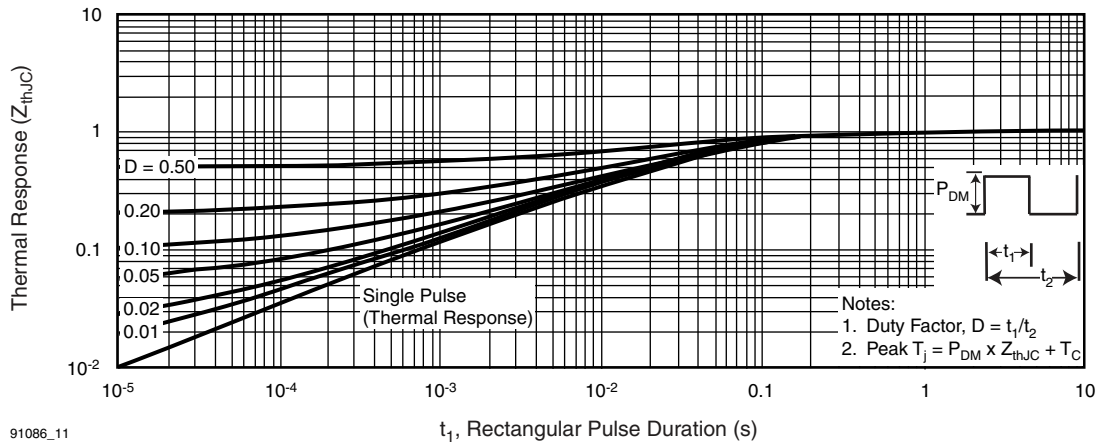


Fig. 10b - Switching Time Waveforms



91086_11

Fig. 11 - Maximum Effective Transient Thermal Impedance, Junction-to-Case

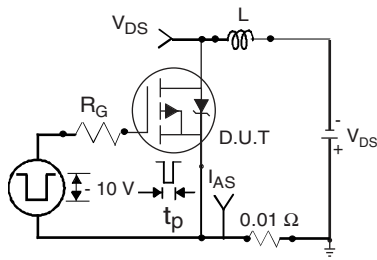


Fig. 12a - Unclamped Inductive Test Circuit

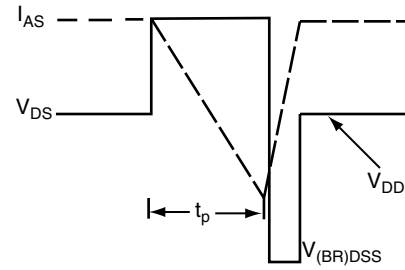


Fig. 12b - Unclamped Inductive Waveforms

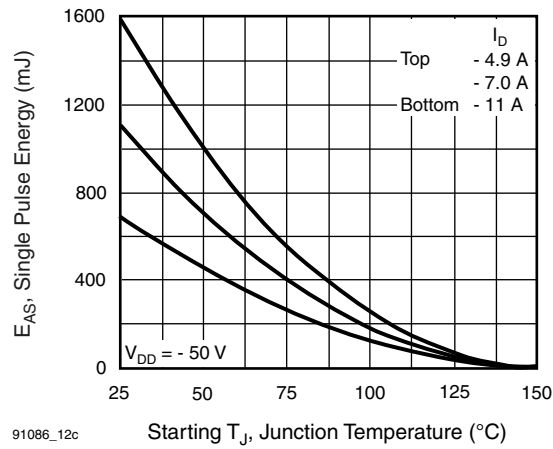


Fig. 12c - Maximum Avalanche Energy vs. Drain Current

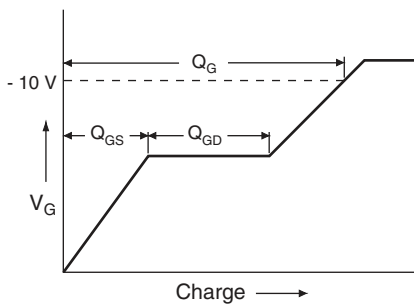


Fig. 13a - Basic Gate Charge Waveform

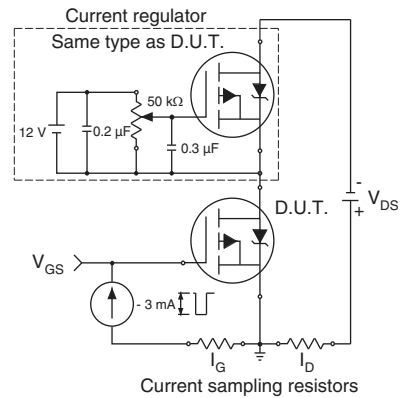


Fig. 13b - Gate Charge Test Circuit

Peak Diode Recovery dV/dt Test Circuit

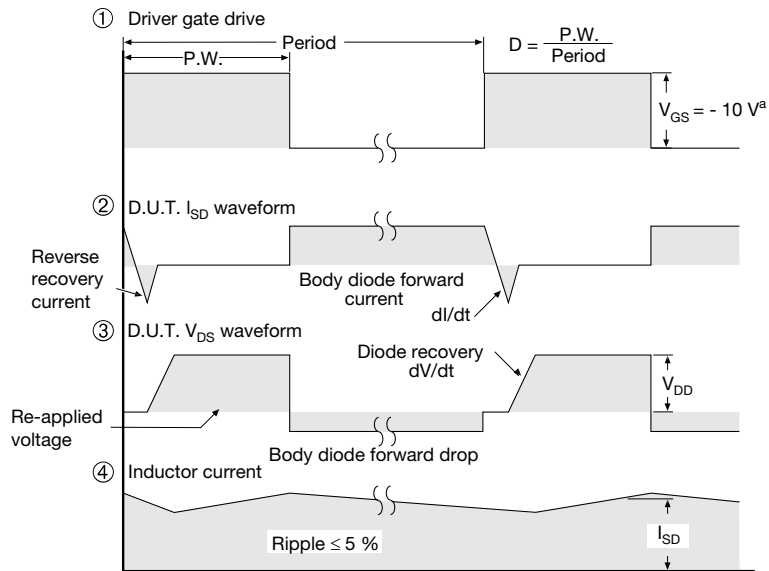
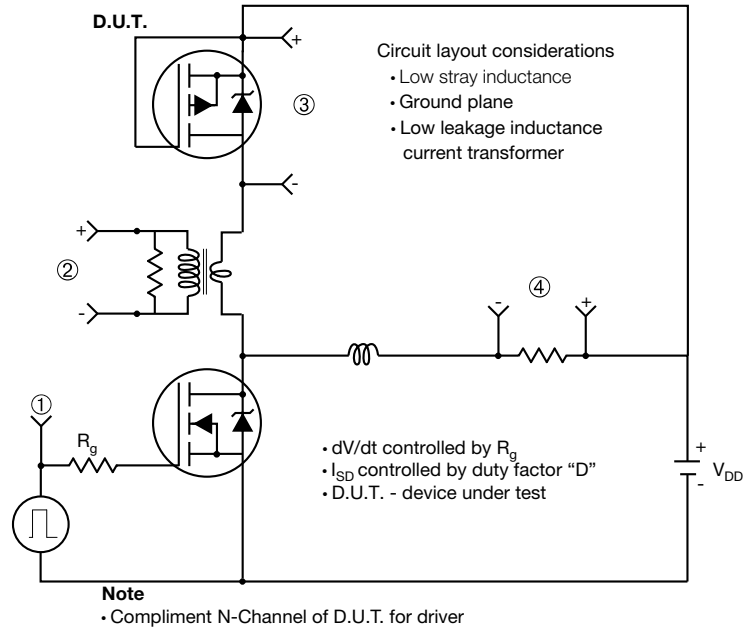
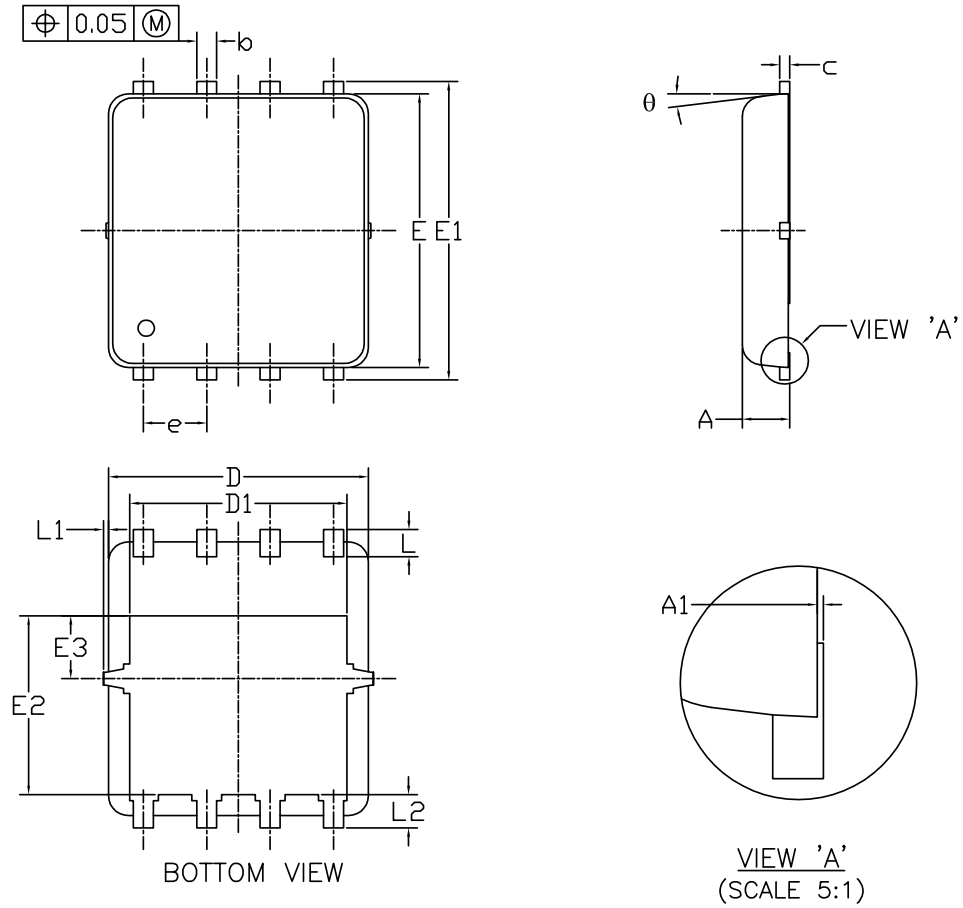
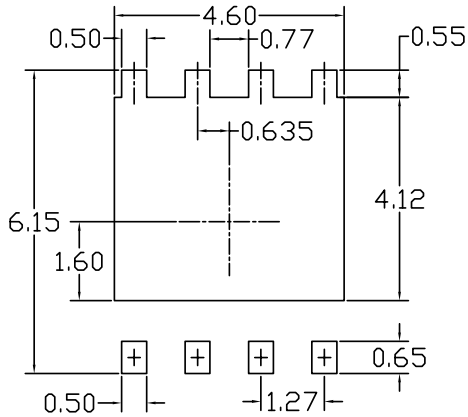


Fig. 14 - For P-Channel

DFN5x6_8L_EP1_P PACKAGE OUTLIN



RECOMMENDED LAND PATTERN



| SYMBOLS | DIMENSIONS IN MILLIMETERS | | | DIMENSIONS IN INCHES | | |
|----------|---------------------------|-------|-------|----------------------|-------|-------|
| | MIN | NOM | MAX | MIN | NOM | MAX |
| A | 0.85 | 0.95 | 1.00 | 0.033 | 0.037 | 0.039 |
| A1 | 0.00 | --- | 0.05 | 0.000 | --- | 0.002 |
| b | 0.30 | 0.40 | 0.50 | 0.012 | 0.016 | 0.020 |
| c | 0.15 | 0.20 | 0.25 | 0.006 | 0.008 | 0.010 |
| D | 5.10 | 5.20 | 5.30 | 0.201 | 0.205 | 0.209 |
| D1 | 4.25 | 4.35 | 4.45 | 0.167 | 0.171 | 0.175 |
| E | 5.45 | 5.55 | 5.65 | 0.215 | 0.219 | 0.222 |
| E1 | 5.95 | 6.05 | 6.15 | 0.234 | 0.238 | 0.242 |
| E2 | 3.525 | 3.625 | 3.725 | 0.139 | 0.143 | 0.147 |
| E3 | 1.175 | 1.275 | 1.375 | 0.046 | 0.050 | 0.054 |
| e | 1.27 BSC | | | 0.050 BSC | | |
| L | 0.45 | 0.55 | 0.65 | 0.018 | 0.022 | 0.026 |
| L1 | 0 | --- | 0.15 | 0 | --- | 0.006 |
| L2 | 0.68 REF | | | 0.027 REF | | |
| θ | 0° | --- | 10° | 0° | --- | 10° |

NOTE

UNIT: mm

1. PACKAGE BODY SIZES EXCLUDE MOLD FLASH AND GATE BURRS.
MOLD FLASH AT THE NON-LEAD SIDES SHOULD BE LESS THAN 6 MILS EACH.
2. CONTROLLING DIMENSION IS MILLIMETER.
CONVERTED INCH DIMENSIONS ARE NOT NECESSARILY EXACT.

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