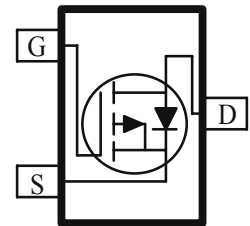
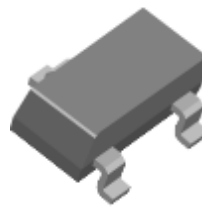


P-Channel 20-V (D-S) MOSFET

These miniature surface mount MOSFETs utilize a high cell density trench process to provide low $r_{DS(on)}$ and to ensure minimal power loss and heat dissipation. Typical applications are DC-DC converters and power management in portable and battery-powered products such as computers, printers, PCMCIA cards, cellular and cordless telephones.

- Low $r_{DS(on)}$ provides higher efficiency and extends battery life
- Low thermal impedance copper leadframe SC70-3 saves board space
- Fast switching speed
- High performance trench technology

| PRODUCT SUMMARY | | |
|-----------------|--------------------------|-----------|
| V_{DS} (V) | $r_{DS(on)}$ (OHM) | I_D (A) |
| -20 | 0.079 @ $V_{GS} = -4.5V$ | -1.7 |
| | 0.110 @ $V_{GS} = -2.5V$ | -1.5 |



| ABSOLUTE MAXIMUM RATINGS ($T_A = 25^\circ C$ UNLESS OTHERWISE NOTED) | | | | |
|---|--------------------|----------------|------------|------------|
| Parameter | | Symbol | Maximum | Units |
| Drain-Source Voltage | | V_{DS} | -20 | V |
| Gate-Source Voltage | | V_{GS} | ± 8 | |
| Continuous Drain Current ^a | $T_A = 25^\circ C$ | I_D | -1.7 | A |
| | $T_A = 70^\circ C$ | | -1.4 | |
| Pulsed Drain Current ^b | | I_{DM} | -2.5 | |
| Continuous Source Current (Diode Conduction) ^a | | I_S | ± 0.28 | A |
| Power Dissipation ^a | $T_A = 25^\circ C$ | P_D | 0.34 | W |
| | $T_A = 70^\circ C$ | | 0.22 | |
| Operating Junction and Storage Temperature Range | | T_J, T_{stg} | -55 to 150 | $^\circ C$ |

| THERMAL RESISTANCE RATINGS | | | | |
|--|----------------|------------|---------|--------------|
| Parameter | | Symbol | Maximum | Units |
| Maximum Junction-to-Ambient ^a | $t \leq 5$ sec | R_{THJA} | 375 | $^\circ C/W$ |
| | Steady-State | | 430 | |

Notes

- a. Surface Mounted on 1" x 1" FR4 Board.
- b. Pulse width limited by maximum junction temperature

| SPECIFICATIONS ($T_A = 25^\circ\text{C}$ UNLESS OTHERWISE NOTED) | | | | | | |
|---|--------------|---|--------|-------|-----------|------|
| Parameter | Symbol | Test Conditions | Limits | | | Unit |
| | | | Min | Typ | Max | |
| Static | | | | | | |
| Gate-Threshold Voltage | $V_{GS(th)}$ | $V_{DS} = V_{GS}, I_D = -250 \mu\text{A}$ | -0.4 | | | V |
| Gate-Body Leakage | I_{GSS} | $V_{DS} = 0 \text{ V}, V_{GS} = \pm 8 \text{ V}$ | | | ± 100 | nA |
| Zero Gate Voltage Drain Current | I_{DSS} | $V_{DS} = -16 \text{ V}, V_{GS} = 0 \text{ V}$ | | | -1 | uA |
| | | $V_{DS} = -16 \text{ V}, V_{GS} = 0 \text{ V}, T_J = 55^\circ\text{C}$ | | | -10 | |
| On-State Drain Current ^A | $I_{D(on)}$ | $V_{DS} = -5 \text{ V}, V_{GS} = -4.5 \text{ V}$ | -5 | | | A |
| Drain-Source On-Resistance ^A | $r_{DS(on)}$ | $V_{GS} = -4.5 \text{ V}, I_D = -1.7 \text{ A}$ | | | 79 | mΩ |
| | | $V_{GS} = -2.5 \text{ V}, I_D = -1.5 \text{ A}$ | | | 110 | |
| Forward Transconductance ^A | g_{fs} | $V_{DS} = -5 \text{ V}, I_D = -1.25 \text{ A}$ | | 9 | | S |
| Diode Forward Voltage | V_{SD} | $I_S = -0.46 \text{ A}, V_{GS} = 0 \text{ V}$ | | -0.65 | | V |
| Dynamic^b | | | | | | |
| Total Gate Charge | Q_g | $V_{DS} = -10 \text{ V}, V_{GS} = -4.5 \text{ V},$ $I_D = -1.7 \text{ A}$ | | 7.2 | | nC |
| Gate-Source Charge | Q_{gs} | | | 1.7 | | |
| Gate-Drain Charge | Q_{gd} | | | 1.5 | | |
| Turn-On Delay Time | $t_{d(on)}$ | $V_{DD} = -10 \text{ V}, I_L = -1 \text{ A},$ $V_{GEN} = -4.5 \text{ V}, R_G = 6 \Omega$ | | 10 | | ns |
| Rise Time | t_r | | | 9 | | |
| Turn-Off Delay Time | $t_{d(off)}$ | | | 27 | | |
| Fall-Time | t_f | | | 11 | | |

Notes

- Pulse test: PW \leq 300us duty cycle \leq 2%.
- Guaranteed by design, not subject to production testing.
- Repetitive rating, pulse width limited by junction temperature.

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Typical Electrical Characteristics

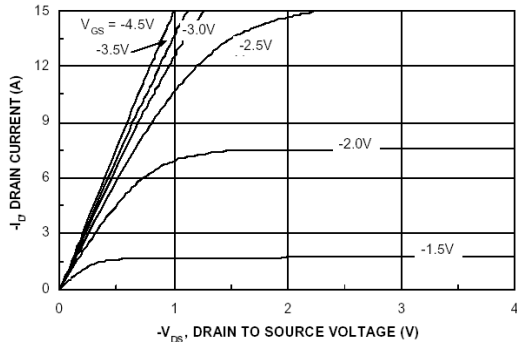


Figure 1. On-Region Characteristics

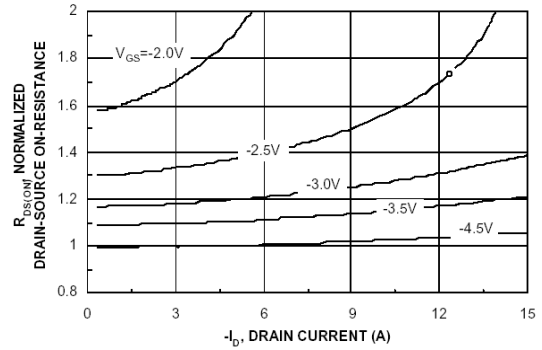


Figure 2. On-Resistance Variation with Drain Current and Gate Voltage

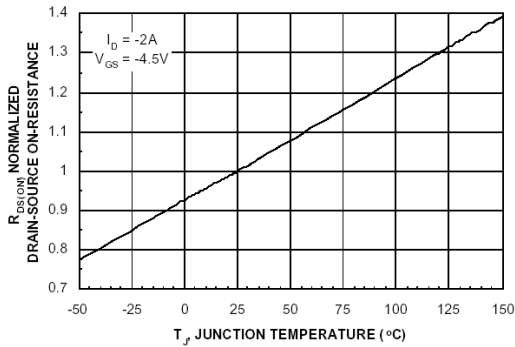


Figure 3. On-Resistance Variation with Temperature

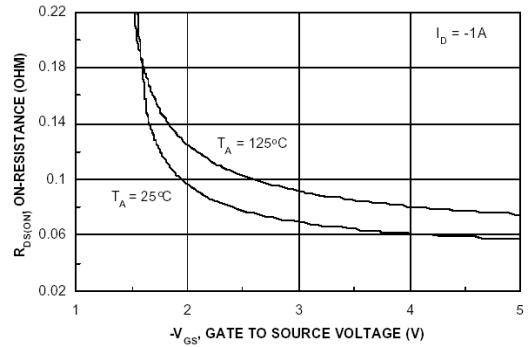


Figure 4. On-Resistance Variation with Gate to Source Voltage

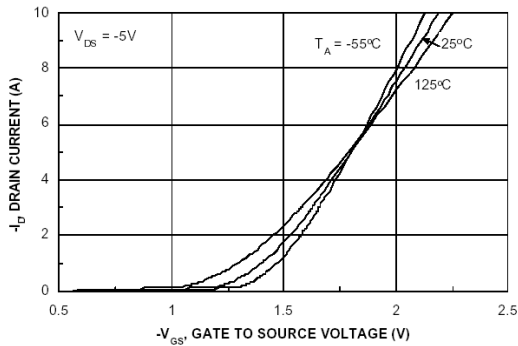


Figure 5. Transfer Characteristics

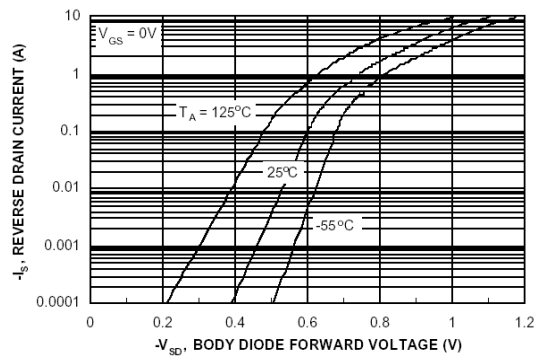


Figure 6. Body Diode Forward Voltage Variation with Source Current and Temperature

Typical Electrical Characteristics

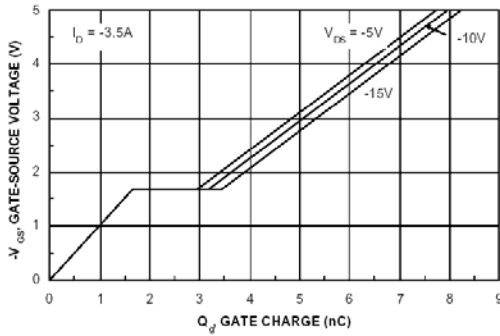


Figure 7. Gate Charge Characteristic

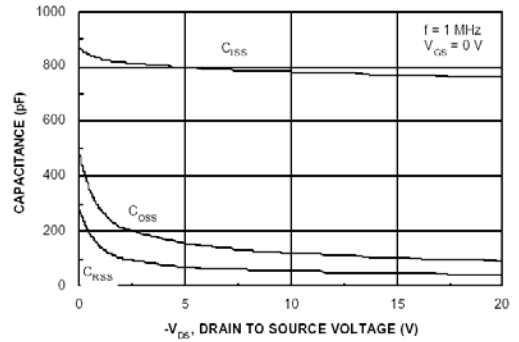


Figure 8. Capacitance Characteristic

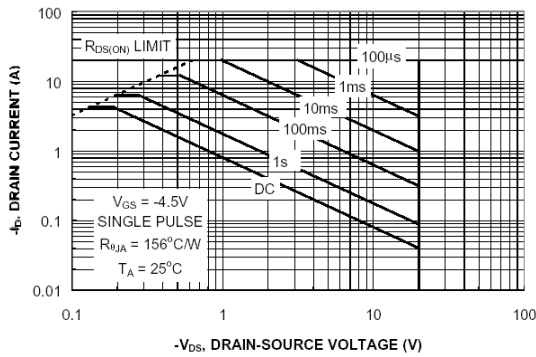


Figure 9. Maximum Safe Operating Area

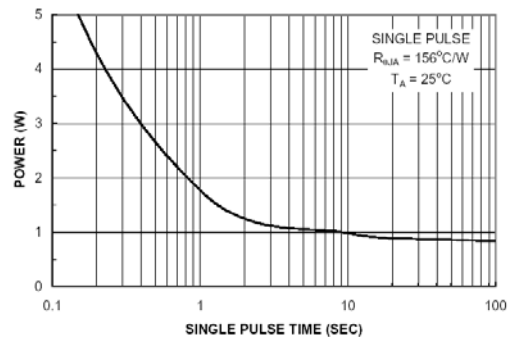


Figure 10. Single Pulse Maximum Power Dissipation

Normalized Thermal Transient Junction to Ambient

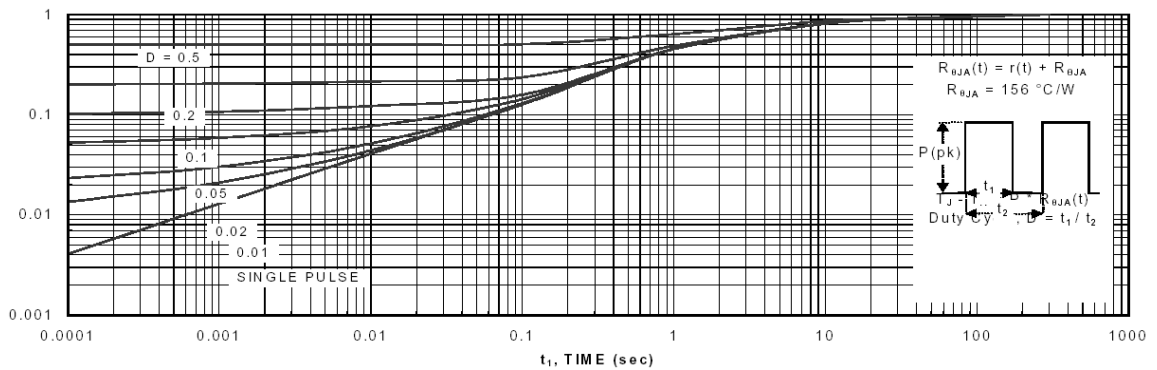
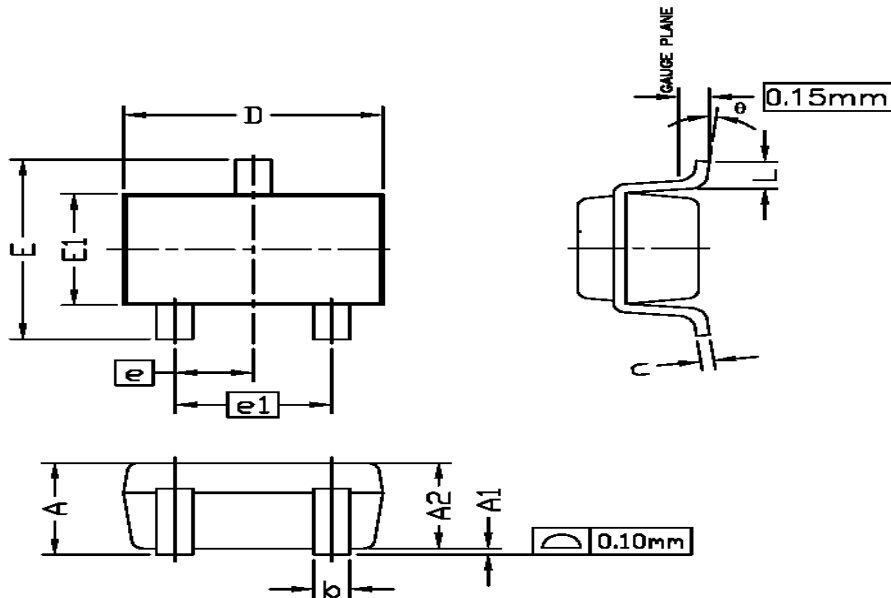


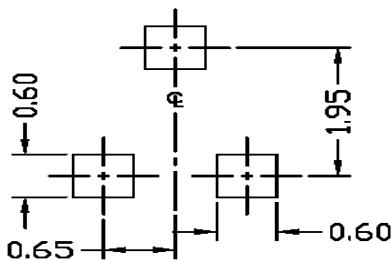
Figure 11. Transient Thermal Response Curve.

Package Information

SC70 PACKAGE OUTLINE



RECOMMENDED LAND PATTERN



UNIT: mm

| SYMBOLS | DIMENSIONS IN MILLIMETERS | | | DIMENSIONS IN INCHES | | |
|---------|---------------------------|------|------|----------------------|-------|-------|
| | MIN | NOM | MAX | MIN | NOM | MAX |
| A | | | 1.10 | | | 0.043 |
| A1 | 0.00 | | 0.10 | 0.00 | | 0.004 |
| A2 | 0.7 | 0.9 | 1.00 | 0.028 | 0.035 | 0.039 |
| b | 0.15 | | 0.30 | 0.006 | | 0.012 |
| c | 0.08 | | 0.22 | 0.003 | | 0.009 |
| D | 1.85 | 2.10 | 2.15 | 0.073 | 0.083 | 0.085 |
| E | 1.80 | 2.30 | 2.40 | 0.071 | 0.091 | 0.094 |
| e | 0.65 BSC | | | 0.026 BSC | | |
| e1 | 1.30 BSC | | | 0.051 BSC | | |
| E1 | 1.1 | 1.30 | 1.4 | 0.043 | 0.051 | 0.055 |
| L | 0.26 | 0.36 | 0.46 | 0.010 | 0.014 | 0.018 |
| θ | 0° | 4° | 8° | 0° | 4° | 8° |

NOTE

1. ALL DIMENSIONS ARE IN MILLIMETERS.
2. DIMENSIONS ARE INCLUSIVE OF PLATING.
3. PACKAGE BODY SIZES EXCLUDE MOLD FLASH AND GATE BURRS.
MOLD FLASH AT THE NON-LEAD SIDES SHOULD BE LESS THAN 3 MILS EACH.
4. DIE IS FACING UP FOR MOLD AND FACING DOWN FOR TRIM/FORM.
ie: REVERSE TRIM/FORM.
5. DIMENSION L IS MEASURED IN GAUGE PLANE.
6. CONTROLLING DIMENSION IS MILLIMETER.
CONVERTED INCH DIMENSIONS ARE NOT NECESSARILY EXACT.