

RoHS Compliant Product
A suffix of "-C" specifies halogen and lead-free

DESCRIPTION

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

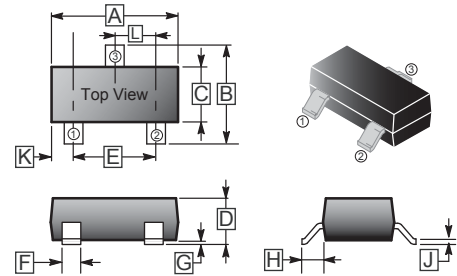
FEATURES

- Low $R_{DS(on)}$ provides higher efficiency and extends battery life.
- Low thermal impedance copper lead frame SC-59 saves board space.
- Fast switching speed.
- High performance trench technology.

Application

DC-DC converters and power management in portable and battery-powered products such as computers, printers, PCMCIA cards, cellular and cordless telephones.

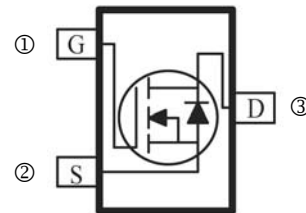
SC-59



| REF. | Millimeter | | REF. | Millimeter | |
|------|------------|------|------|------------|------|
| | Min. | Max. | | Min. | Max. |
| A | 2.70 | 3.10 | G | 0.10 REF. | |
| B | 2.25 | 3.00 | H | 0.40 REF. | |
| C | 1.30 | 1.70 | J | 0.10 | 0.20 |
| D | 1.00 | 1.40 | K | 0.45 | 0.55 |
| E | 1.70 | 2.30 | L | 0.85 | 1.15 |
| F | 0.35 | 0.50 | | | |

PACKAGE INFORMATION

| Package | MPQ | LeaderSize |
|---------|-----|------------|
| SC-59 | 3K | 7' inch |



ABSOLUTE MAXIMUM RATINGS ($T_A=25^\circ\text{C}$ unless otherwise noted)

| Parameter | Symbol | Ratings | Unit |
|---|------------------------------|-----------------|------------------|
| Drain-Source Voltage | V_{DS} | 20 | V |
| Gate-Source Voltage | V_{GS} | ± 8 | V |
| Continuous Drain Current ¹ | $I_D @ T_A=25^\circ\text{C}$ | 3.4 | A |
| | $I_D @ T_A=70^\circ\text{C}$ | 2.2 | A |
| Pulsed Drain Current ² | I_{DM} | 10 | A |
| Continuous Source Current (Diode Conduction) ¹ | I_S | 1.6 | A |
| Power Dissipation ¹ | $P_D @ T_A=25^\circ\text{C}$ | 1.25 | W |
| | $P_D @ T_A=70^\circ\text{C}$ | 0.8 | W |
| Operating Junction and Storage Temperature Range | T_j, T_{stg} | -55 ~ 150 | $^\circ\text{C}$ |
| Thermal Resistance Ratings | | | |
| Maximum Junction to Ambient ¹ | $t \leq 5 \text{ sec}$ | $R_{\theta JA}$ | 100 |
| | Steady State | | 166 |

Notes:

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

ELECTRICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$ unless otherwise specified)

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Test Conditions |
|---|--------------|------|------|------|---------------|--|
| Gate-Threshold Voltage | $V_{GS(th)}$ | 0.7 | 0.8 | 1.2 | V | $V_{DS}=V_{GS}$, $I_D=250\mu\text{A}$ |
| Gate-Body Leakage | I_{GSS} | - | - | 100 | nA | $V_{DS}=0$, $V_{GS}=8\text{V}$ |
| Zero Gate Voltage Drain Current | I_{DSS} | - | - | 1 | μA | $V_{DS}=16\text{V}$, $V_{GS}=0$ |
| | | - | - | 10 | | $V_{DS}=20\text{V}$, $V_{GS}=0$, $T_J=55^\circ\text{C}$ |
| On-State Drain Current ¹ | $I_{D(on)}$ | 7 | - | - | A | $V_{DS}=5\text{V}$, $V_{GS}=4.5\text{V}$ |
| Drain-Source On-Resistance ¹ | $R_{DS(ON)}$ | - | - | 76 | m Ω | $V_{GS}=4.5\text{V}$, $I_D=3.4\text{A}$ |
| | | - | - | 103 | | $V_{GS}=2.5\text{V}$, $I_D=2.9\text{A}$ |
| Forward Transconductance ¹ | g_{fs} | - | 7 | - | S | $V_{DS}=5\text{V}$, $I_D=1.5\text{A}$ |
| Diode Forward Voltage | V_{SD} | - | 0.7 | - | V | $I_S=1.6\text{A}$, $V_{GS}=0$ |
| Dynamic ² | | | | | | |
| Total Gate Charge | Q_g | - | 3.5 | - | nC | $V_{DS}=10\text{V}$, $V_{GS}=4.5\text{V}$, $I_D=3.4\text{A}$ |
| Gate-Source Charge | Q_{gs} | - | 0.55 | - | | |
| Gate-Drain Charge | Q_{gd} | - | 0.95 | - | | |
| Input Capacitance | C_{iss} | - | 815 | - | pF | $V_{DS}=15\text{V}$, $V_{GS}=0$, $f=1\text{MHz}$ |
| Output Capacitance | C_{oss} | - | 175 | - | | |
| Reverse Transfer Capacitance | C_{rss} | - | 106 | - | | |
| Turn-on Delay Time | $T_{d(on)}$ | - | 5 | - | nS | $V_{DD}=10\text{V}$, $V_{GEN}=4.5\text{V}$, $R_L=6\Omega$, $R_G=6\Omega$ |
| Rise Time | T_r | - | 8 | - | | |
| Turn-off Delay Time | $T_{d(off)}$ | - | 11 | - | | |
| Fall Time | T_f | - | 3 | - | | |

Notes:

- 1 Pulse test : $PW \leq 300 \mu\text{s}$ duty cycle $\leq 2\%$.
- 2 Guaranteed by design, not subject to production testing.

CHARACTERISTIC CURVE

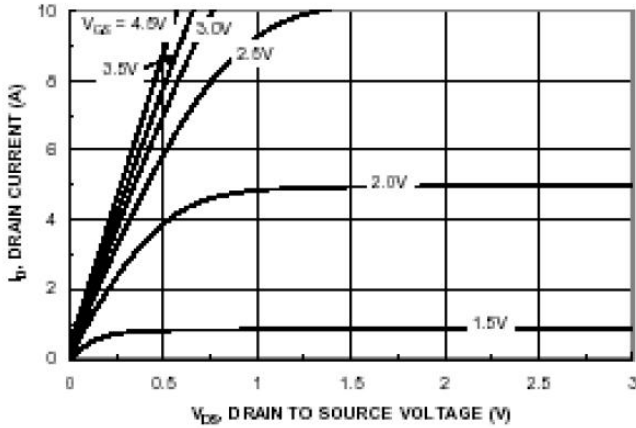


Figure 1. On-Region Characteristics.

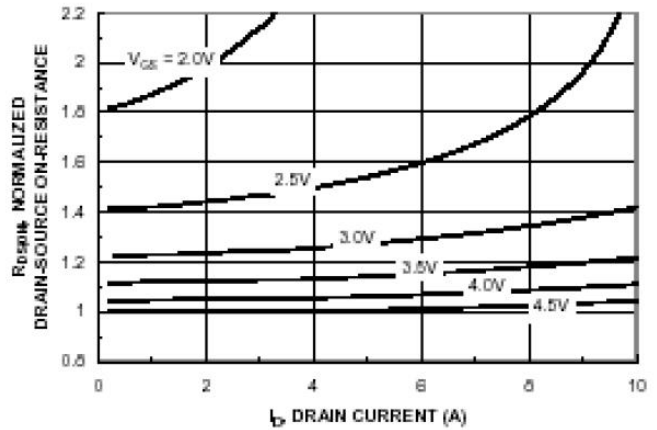


Figure 2. On-Resistance Variation with Drain Current and Gate Voltage.

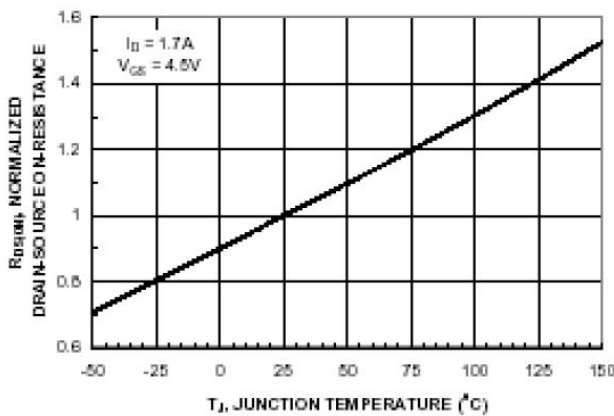


Figure 3. On-Resistance Variation with Temperature.

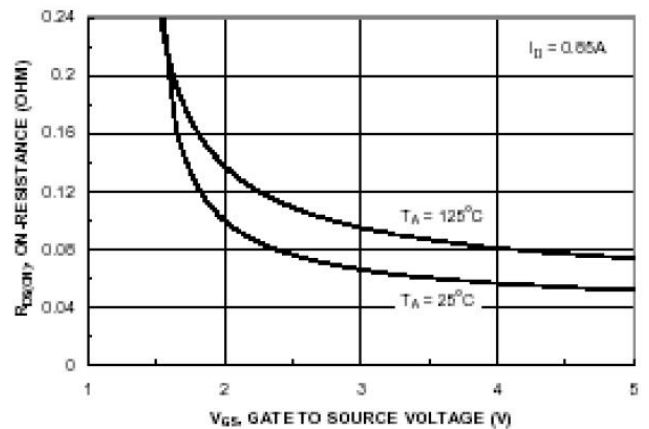


Figure 4. On-Resistance Variation with Gate-to-Source Voltage.

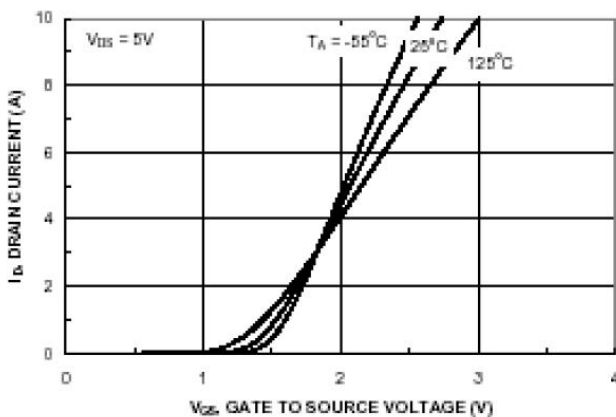


Figure 5. Transfer Characteristics.

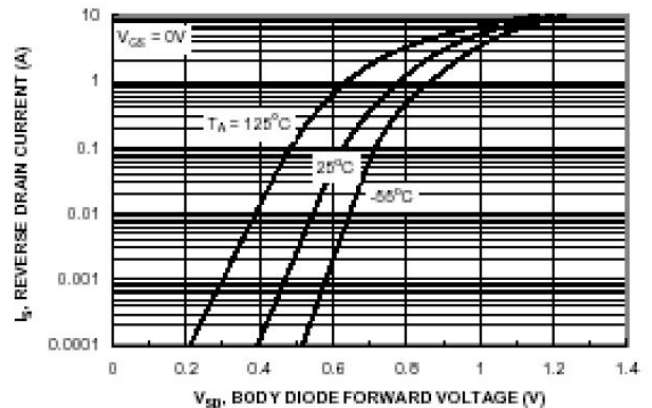


Figure 6. Body Diode Forward Voltage Variation with Source Current and Temperature.

CHARACTERISTIC CURVE

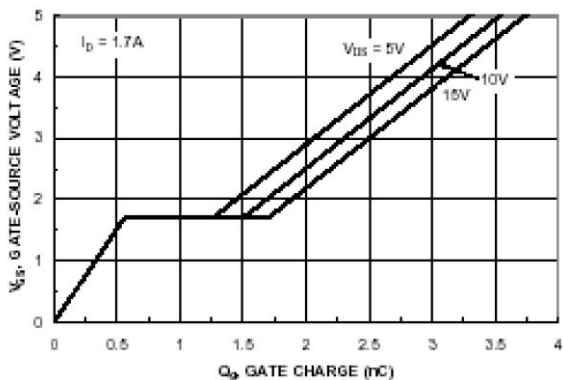


Figure 7. Gate Charge Characteristics.

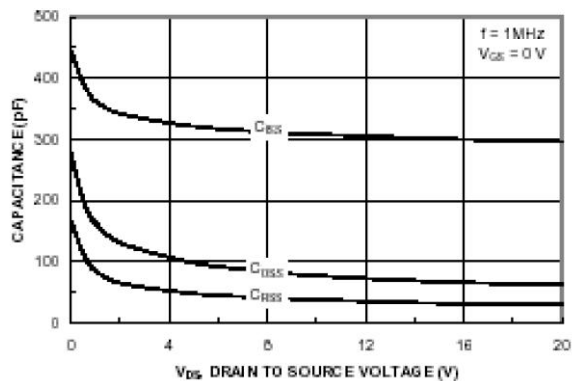


Figure 8. Capacitance Characteristics.

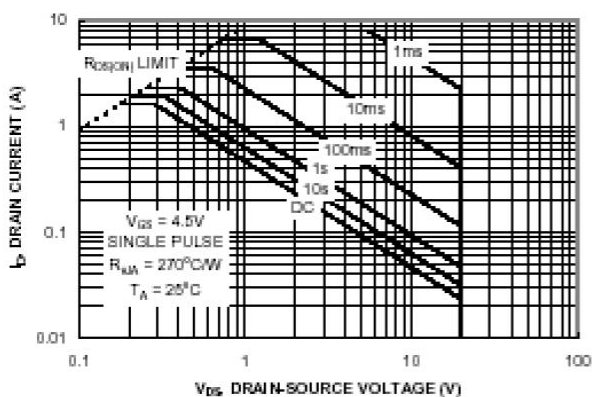


Figure 9. Maximum Safe Operating Area.

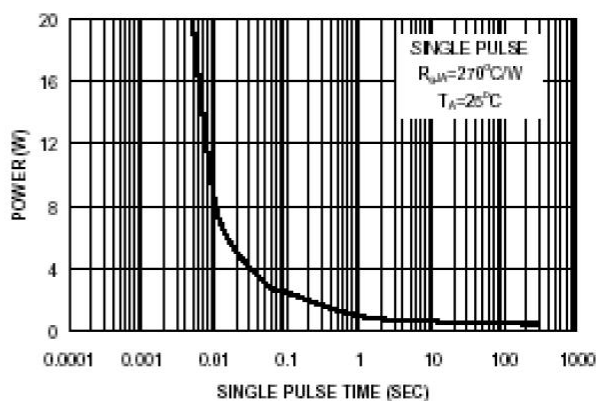


Figure 10. Single Pulse Maximum Power Dissipation.

Normalized Thermal Transient Impedance, Junction to Ambient

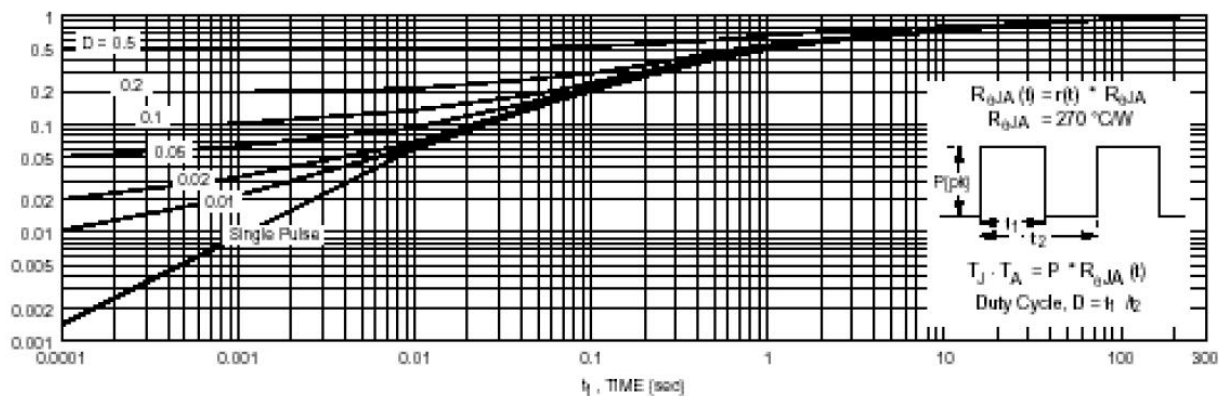


Figure 11. Transient Thermal Response Curve.

Thermal characterization performed using the conditions described in Note 1b.
Transient thermal response will change depending on the circuit board design.