

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.

## FEATURES

- Low  $R_{DS(on)}$  provides higher efficiency and extends battery life.
- Low gate charge
- Fast switch
- Miniature SC-59 surface mount package saves board space.

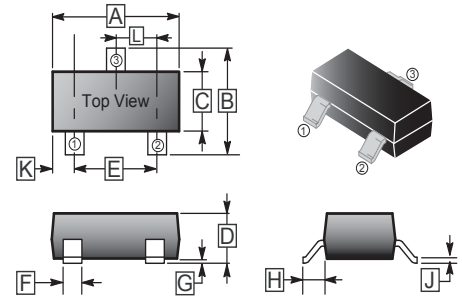
## APPLICATION

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

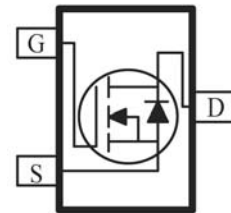
## PACKAGE INFORMATION

| Package | MPQ | Leader Size |
|---------|-----|-------------|
| SC-59   | 3K  | 7 inch      |

## 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 |      |            |      |



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

| Parameter   |                              | Symbol          | Ratings  | Unit                        |
|---|------------------------------|-----------------|----------|-----------------------------|
| Drain-Source Voltage                                      |                              | $V_{DS}$        | 20       | V                           |
| Gate-Source Voltage                                       |                              | $V_{GS}$        | $\pm 12$ | V                           |
| Continuous Drain Current <sup>1</sup>                     | $I_D @ T_A=25^\circ\text{C}$ | $I_D$           | 5.3      | A                           |
|   | $I_D @ T_A=70^\circ\text{C}$ |                 | 4.3      | A                           |
| Pulsed Drain Current <sup>2</sup>                         |                              | $I_{DM}$        | $\pm 20$ | A                           |
| Continuous Source Current (Diode Conduction) <sup>1</sup> |                              | $I_S$           | 1.6      | A                           |
| Power Dissipation <sup>1</sup>                            | $P_D @ T_A=25^\circ\text{C}$ | $P_D$           | 1.3      | W                           |
|   | $P_D @ T_A=70^\circ\text{C}$ |                 | 0.8      | W                           |
| Operating Junction and Storage Temperature Range          |                              | $T_J, T_{STG}$  | -55~150  | $^\circ\text{C}$            |
| <b>Thermal Resistance Ratings</b>                         |                              |                 |          |                             |
| Maximum Junction to Ambient <sup>1</sup>                  | $t \leq 5$ sec               | $R_{\theta JA}$ | 100      | $^\circ\text{C} / \text{W}$ |
|   | 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  | -    | 2         | V             | $V_{DS}=V_{GS}$ , $I_D=250\mu\text{A}$  |
| Gate-Body Leakage                       | $I_{GSS}$    | -    | -    | $\pm 100$ | nA            | $V_{DS}=0$ , $V_{GS} = \pm 8\text{V}$   |
| Zero Gate Voltage Drain Current         | $I_{DSS}$    | -    | -    | 1         | $\mu\text{A}$ | $V_{DS}=16\text{V}$ , $V_{GS}=0$  |
|   |              | -    | -    | 10        |               | $V_{DS}=16\text{V}$ , $V_{GS}=0$ , $T_J=55^\circ\text{C}$                         |
| On-State Drain Current <sup>1</sup>     | $I_{D(on)}$  | 10   | -    | -         | A             | $V_{DS} = 5\text{V}$ , $V_{GS}=4.5\text{V}$                                       |
| Drain-Source On-Resistance <sup>1</sup> | $R_{DS(ON)}$ | -    | -    | 32        | m $\Omega$    | $V_{GS}=4.5\text{V}$ , $I_D=4.6\text{A}$  |
|   |              | -    | -    | 44        |               | $V_{GS}=2.5\text{V}$ , $I_D=3.9\text{A}$  |
| Forward Transconductance <sup>1</sup>   | $g_{fs}$     | -    | 11.3 | -         | S             | $V_{DS}=10\text{V}$ , $I_D=4\text{A}$   |
| Diode Forward Voltage                   | $V_{SD}$     | -    | 0.75 | -         | V             | $I_S=1.6\text{A}$ , $V_{GS}=0$  |
| <b>Dynamic <sup>2</sup></b>             |              |      |      |           |               |   |
| Total Gate Charge                       | $Q_g$        | -    | 13.4 | -         | nC            | $V_{DS}=10\text{V}$ , $V_{GS}= 4.5\text{V}$ ,<br>$I_D=4\text{A}$                  |
| Gate-Source Charge                      | $Q_{gs}$     | -    | 0.9  | -         |               |   |
| Gate-Drain Charge                       | $Q_{gd}$     | -    | 2    | -         |               |   |
| Turn-on Delay Time                      | $T_{d(on)}$  | -    | 8    | -         | nS            | $V_{DD}=10\text{V}$ , $V_{GEN}=4.5\text{V}$ ,<br>$R_L=15\Omega$ , $I_D=1\text{A}$ |
| Rise Time                               | $T_r$        | -    | 24   | -         |               |   |
| Turn-off Delay Time                     | $T_{d(off)}$ | -    | 35   | -         |               |   |
| Fall Time                               | $T_f$        | -    | 10   | -         |               |   |

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**

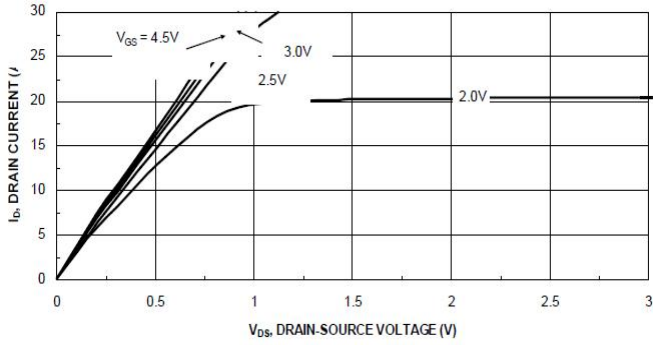


Figure 1. Output Characteristics

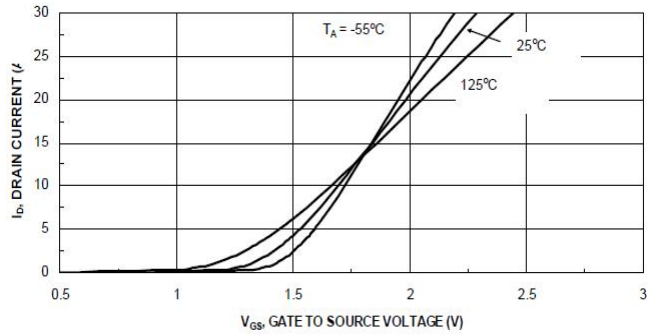


Figure 2. Transfer Characteristics

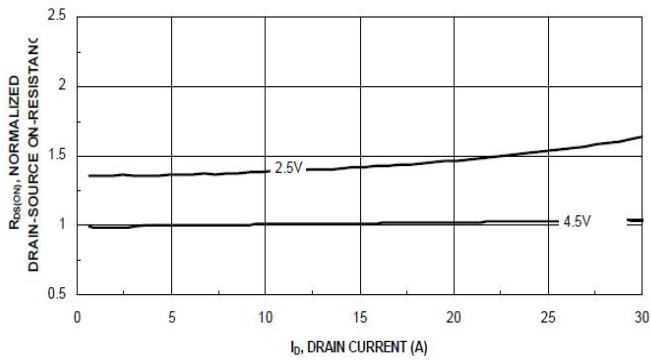


Figure 3. On-Resistance vs. Drain Current

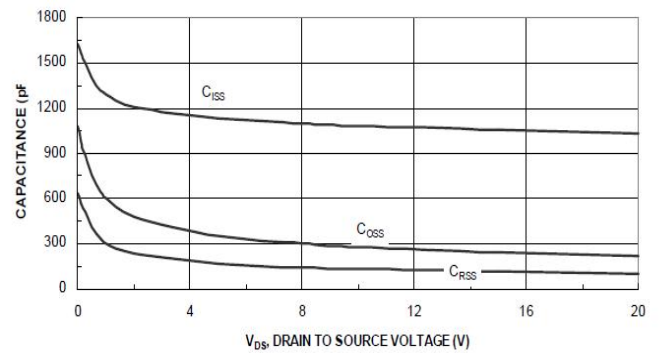


Figure 4. Capacitance

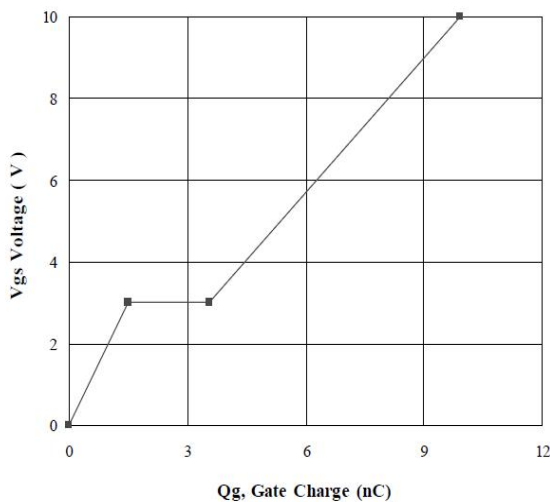


Figure 5. Gate Charge

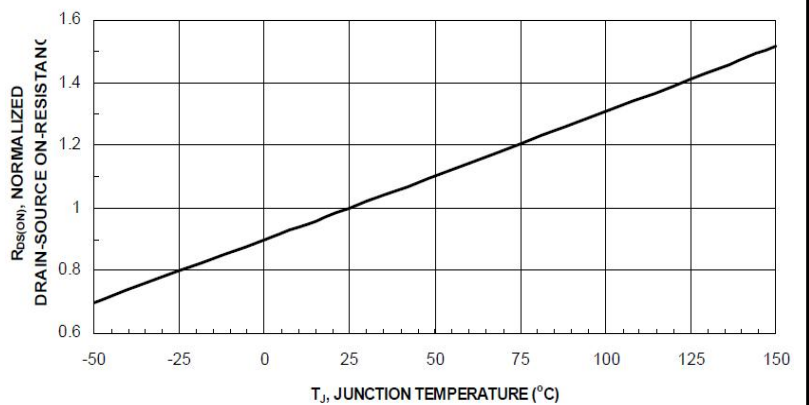


Figure 6. On-Resistance vs. Junction Temperature

**CHARACTERISTIC CURVE**

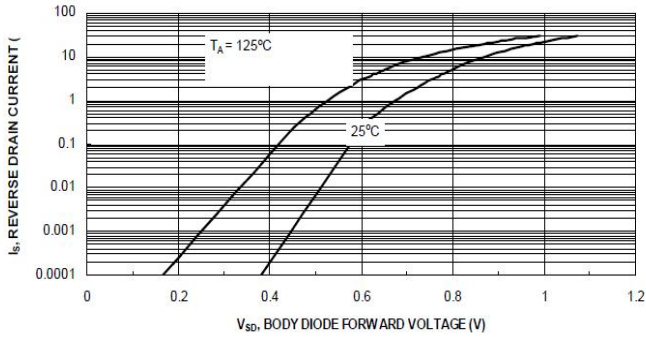


Figure 7. Source-Drain Diode Forward Voltage

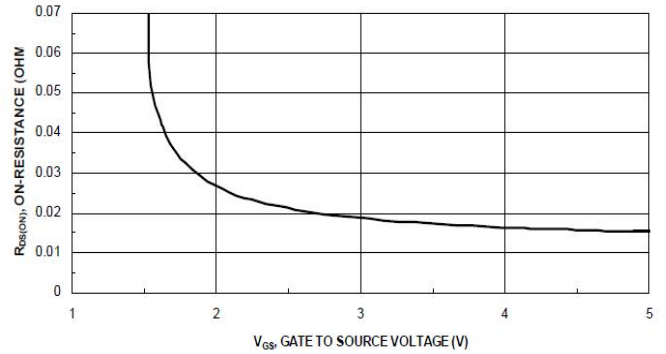


Figure 8. On-Resistance vs. Gate-to-Source Voltage

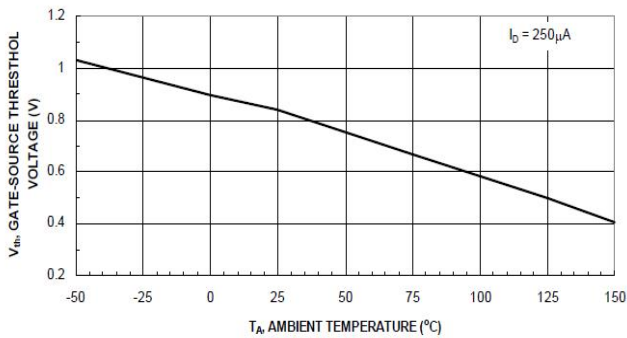


Figure 9. Threshold Voltage

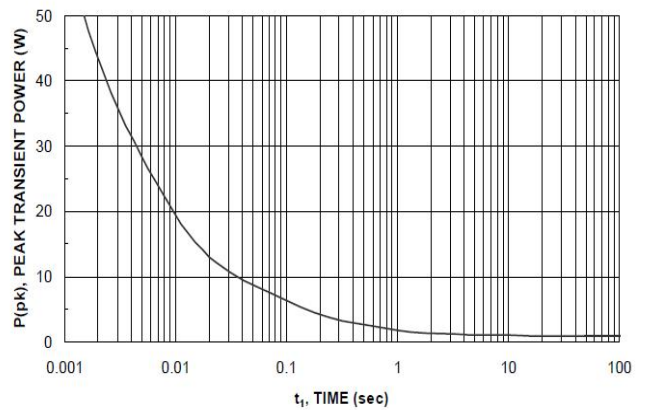


Figure 10. Single Pulse Power

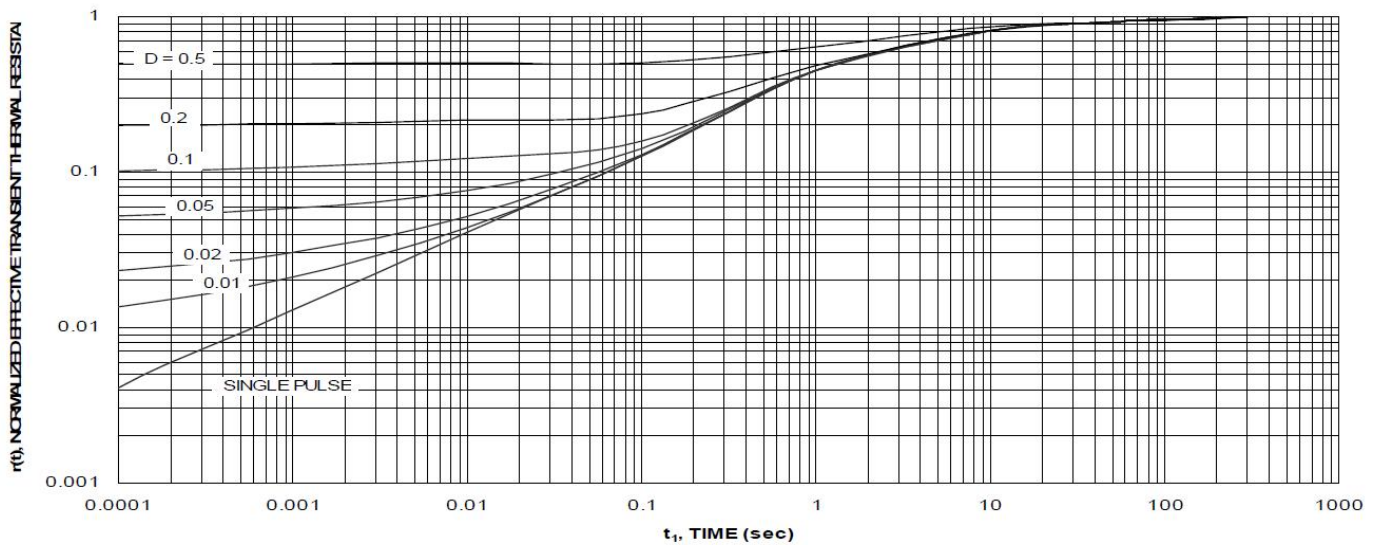


Figure 11. Normalized Thermal Transient Impedance, Junction-to-Ambient