

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

## DESCRIPTION

The miniature surface mount MOSFETs utilize high cell density process. Low  $R_{DS(on)}$  assures minimal power loss and conserves energy, making this device ideal for use in power management circuitry.

## FEATURES

- Low  $R_{DS(on)}$  provides higher efficiency and extends battery life.
- Miniature SC-59 surface mount package saves board space.
- Fast switching speed.
- High performance trench technology.
- Low gate charge 7.2Nc.

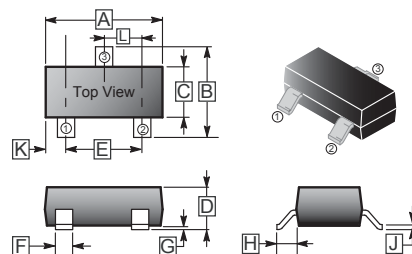
## APPLICATION

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

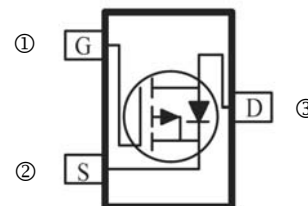
## PACKAGE INFORMATION

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	$V_{GS}$	$\pm 8$	V
Continuous Drain Current <sup>1</sup>	$I_D$	$T_A=25^\circ\text{C}$	-4.1
		$T_A=70^\circ\text{C}$	-3.3
Pulsed Drain Current <sup>2</sup>	$I_{DM}$	$\pm 10$	A
Continuous Source Current (Diode Conduction) <sup>1</sup>	$I_S$	$\pm 0.46$	A
Power Dissipation <sup>1</sup>	$P_D$	$T_A=25^\circ\text{C}$	1.25
		$T_A=70^\circ\text{C}$	0.8
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>	$R_{\theta JA}$	$t \leq 5$ sec	100
		Steady-State	150

Notes:

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

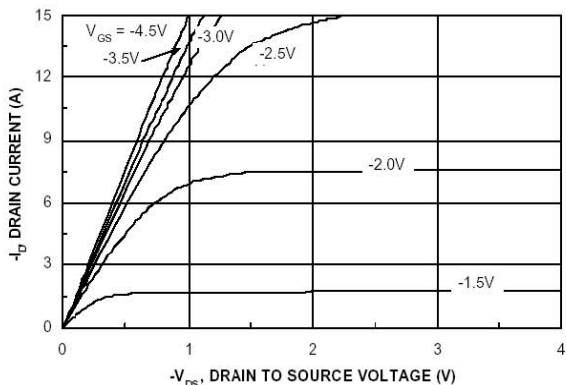
**ELECTRICAL CHARACTERISTICS** ( $T_A=25^\circ\text{C}$  unless otherwise specified)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Conditions
<b>Static</b>						
Gate-Threshold Voltage	$V_{GS(th)}$	-0.4	-	-	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>	$I_{D(ON)}$	-5	-	-	A	$V_{DS}= -5\text{V}$ , $V_{GS}= -4.5\text{V}$
Drain-Source On-Resistance <sup>1</sup>	$R_{DS(ON)}$	-	-	0.079	$\Omega$	$V_{GS}= -4.5\text{V}$ , $I_D= -4.1\text{A}$
		-	-	0.110		$V_{GS}= -2.5\text{V}$ , $I_D= -3.2\text{A}$
Forward Transconductance <sup>1</sup>	$g_{FS}$	-	9	-	S	$V_{DS}= -5\text{V}$ , $I_D= -1.25\text{A}$
Diode Forward Voltage	$V_{SD}$	-	-0.65	-	V	$I_S= -0.46\text{A}$ , $V_{GS}=0$
<b>Dynamic <sup>2</sup></b>						
Total Gate Charge	$Q_g$	-	7.2	-	nC	$I_D= -4.1\text{A}$ $V_{DS}= -10\text{V}$ $V_{GS}= -4.5\text{V}$
Gate-Source Charge	$Q_{gs}$	-	1.7	-		
Gate-Drain Charge	$Q_{gd}$	-	1.5	-		
Input Capacitance	$C_{ISS}$	-	520	-	pF	$V_{DS}=15\text{V}$ , $V_{GS}=0\text{V}$ , $f=1\text{MHz}$
Output Capacitance	$C_{OSS}$	-	130	-		
Reverse Transfer Capacitance	$C_{RSS}$	-	70	-		
Turn-On Delay Time	$T_{d(ON)}$	-	8	-	nS	$V_{DD}= -10\text{V}$ $V_{GEN}= -4.5\text{V}$ $R_G=6\Omega$ $I_L= -1\text{A}$
Rise Time	$T_r$	-	18	-		
Turn-Off Delay Time	$T_{d(OFF)}$	-	52	-		
Fall Time	$T_f$	-	39	-		

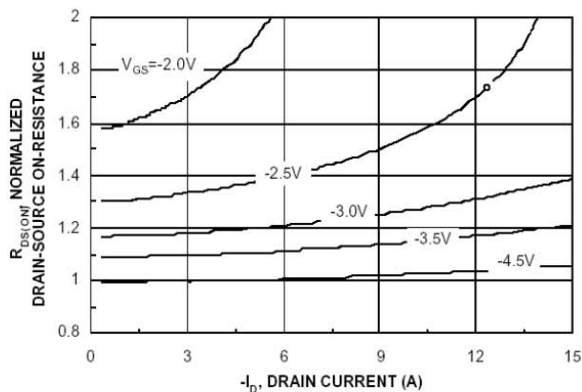
Notes:

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

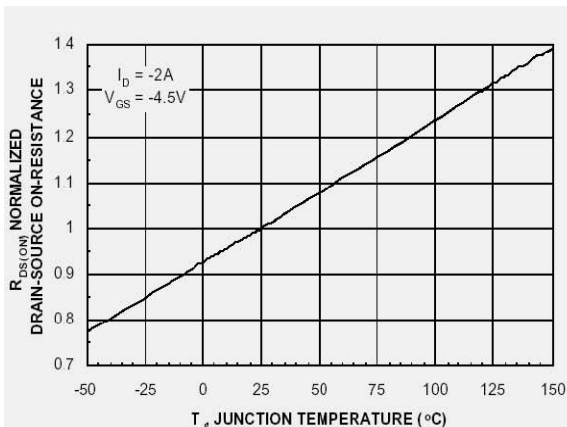
**CHARACTERISTIC CURVE**



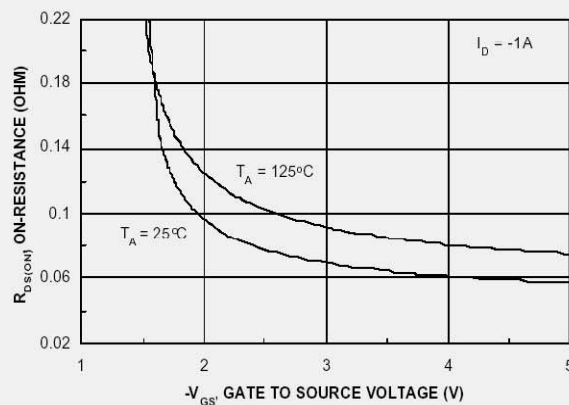
**Figure 1. On-Region Characteristics**



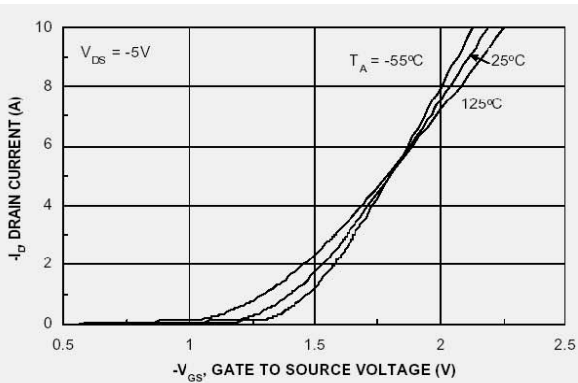
**Figure 2. On-Resistance Variation with Drain Current and Gate Voltage**



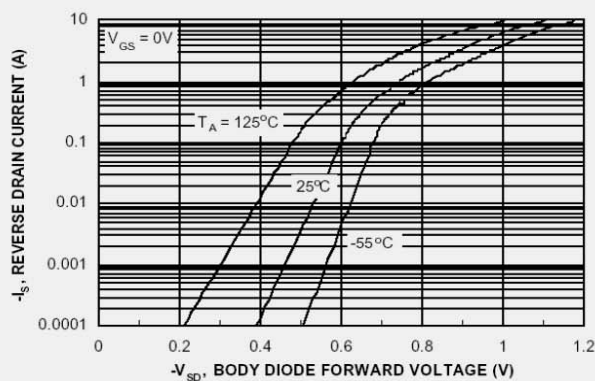
**Figure 3. On-Resistance Variation with Temperature**



**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**

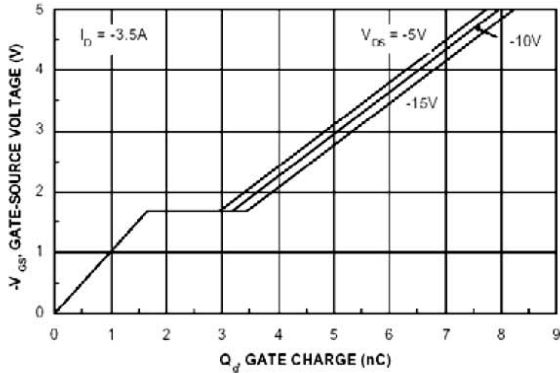


Figure 7. Gate Charge Characteristic

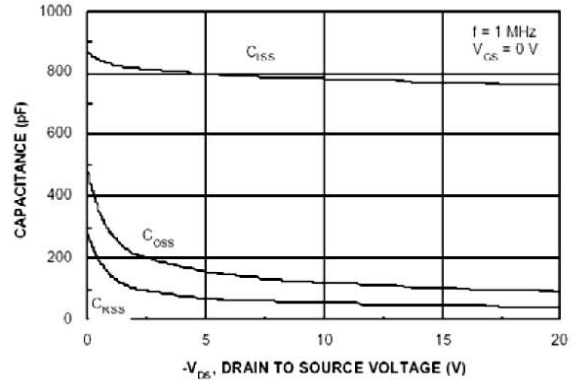


Figure 8. Capacitance Characteristic

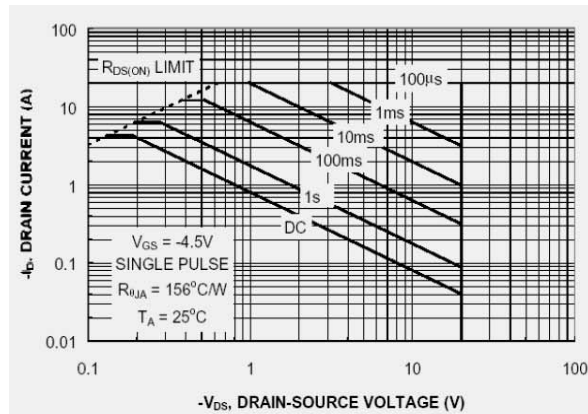


Figure 9. Maximum Safe Operating Area

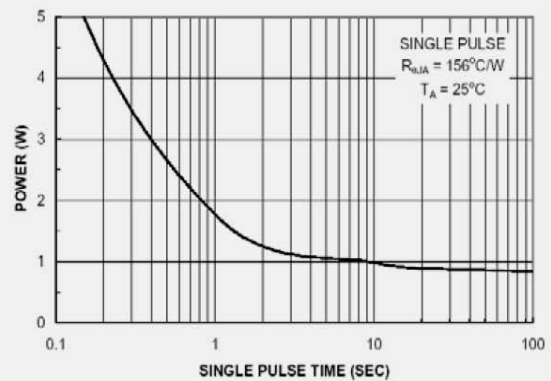


Figure 10. Single Pulse Maximum Power Dissipation

**Normalized Thermal Transient Junction to Ambient**

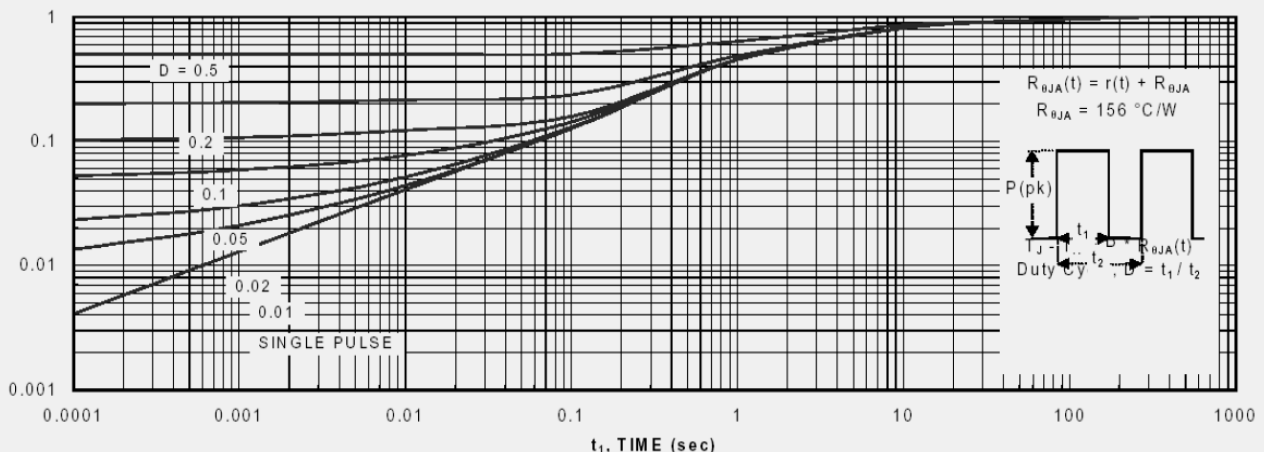


Figure 11. Transient Thermal Response Curve.