

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

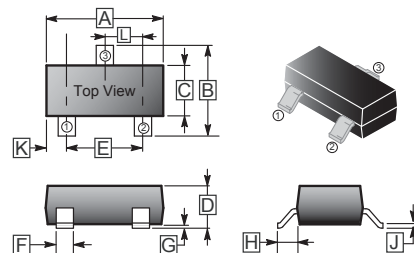
SC-59

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

## 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.



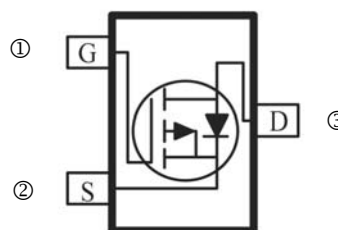
REF.	Millimeter		REF.	Millimeter	
	Min.	Max.		Min.	Max.
A	2.70	3.10	G	0.10	REF.
B	2.25	3.00	H	0.40	REF.
C	1.30	1.70	J	0.10	0.20
D	1.00	1.40	K	0.45	0.55
E	1.70	2.30	L	0.85	1.15
F	0.35	0.50			

## PRODUCT SUMMARY

SMG2321P		
$V_{DS}(V)$	$R_{DS(on)}$ (m $\Omega$ )	$I_D(A)$
-20	52@ $V_{GS} = -4.5V$	-3.6
	72@ $V_{GS} = -2.5V$	-3.1
	120@ $V_{GS} = -1.8V$	-2.7

## PACKAGE INFORMATION

Package	MPQ	LeaderSize
SC-59	3K	7' inch



## ABSOLUTE MAXIMUM RATINGS AND THERMAL DATA ( $T_A = 25^\circ C$ unless otherwise specified)

PARAMETER	SYMBOL	RATING	UNIT
Drain-Source Voltage	$V_{DS}$	-20	V
Gate-Source Voltage	$V_{GS}$	$\pm 8$	V
Continuous Drain Current <sup>1</sup>	$I_D$	$T_A = 25^\circ C$	-3.6
		$T_A = 70^\circ C$	-1.8
Pulsed Drain Current <sup>2</sup>	$I_{DM}$	-10	A
Continuous Source Current (Diode Conduction) <sup>1</sup>	$I_S$	$\pm 0.46$	A
Power Dissipation <sup>1</sup>	$P_D$	$T_A = 25^\circ C$	1.25
		$T_A = 70^\circ C$	0.8
Operating Junction and Storage Temperature Range	$T_J, T_{STG}$	-55 ~ 150	$^\circ C$
THERMAL RESISTANCE DATA			
Maximum Junction to Ambient <sup>1</sup>	$t \leq 5$ sec	$R_{\theta JA}$	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	$V_{GS(th)}$	-0.7	-	-	V	$V_{DS} = V_{GS}, I_D = -250\mu\text{A}$
Gate-Body Leakage	$I_{GSS}$	-	-	$\pm 100$	nA	$V_{DS} = 0\text{V}, V_{GS} = \pm 8\text{V}$
Zero Gate Voltage Drain Current	$I_{DSS}$	-	-	-1	$\mu\text{A}$	$V_{DS} = -16\text{V}, V_{GS} = 0\text{V}$
		-	-	-10		$V_{DS} = -16\text{V}, V_{GS} = 0\text{V}, T_J = 55^\circ\text{C}$
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>	$R_{DS(ON)}$	-	-	0.052	$\Omega$	$V_{GS} = -4.5\text{V}, I_D = -3.6\text{A}$
		-	-	0.072		$V_{GS} = -2.5\text{V}, I_D = -3.1\text{A}$
		-	-	0.120		$V_{GS} = -1.8\text{V}, I_D = -2.7\text{A}$
Forward Transconductance <sup>1</sup>	$g_{FS}$	-	12	-	S	$V_{DS} = -5\text{V}, I_D = -1.25\text{A}$
Diode Forward Voltage	$V_{SD}$	-	-0.60	-	V	$I_S = -0.46\text{A}, V_{GS} = 0\text{V}$
<b>Dynamic <sup>2</sup></b>						
Total Gate Charge	$Q_g$	-	12.0	-	nC	$I_D = -2.4\text{A}$
Gate-Source Charge	$Q_{gs}$	-	2.0	-		$V_{DS} = -5\text{V}$
Gate-Drain Charge	$Q_{gd}$	-	2.0	-		$V_{GS} = -4.5\text{V}$
Input Capacitance	$C_{ISS}$	-	1312	-	pF	P-Channel $V_{DS} = -15\text{V}, V_{GS} = 0\text{V}, f = 1\text{MHz}$
Output Capacitance	$C_{OSS}$	-	130	-		
Reverse Transfer Capacitance	$C_{RSS}$	-	106	-		
Turn-On Delay Time	$T_{d(ON)}$	-	6.5	-	nS	$V_{DD} = -10\text{V}$
Rise Time	$T_r$	-	20	-		$V_{GEN} = -4.5\text{V}$
Turn-Off Delay Time	$T_{d(OFF)}$	-	31	-		$R_G = 6\Omega$
Fall Time	$T_f$	-	21	-		$I_L = -1\text{A}$

**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**

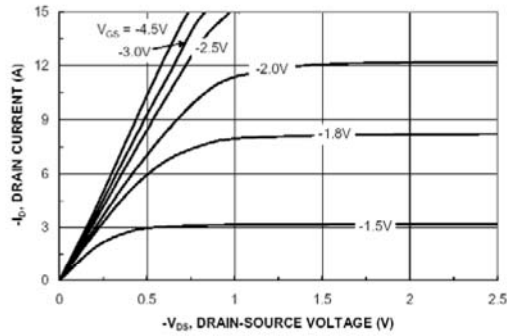


Figure 1. On-Region Characteristics

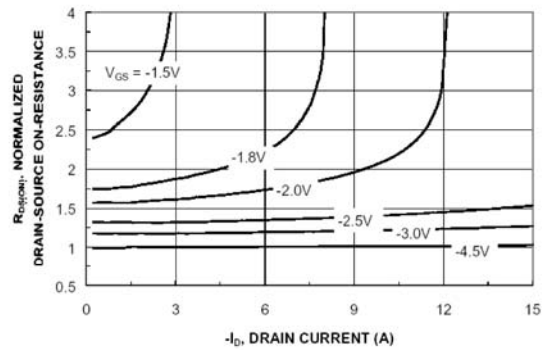


Figure 2. On-Resistance Variation with Drain Current and Gate Voltage

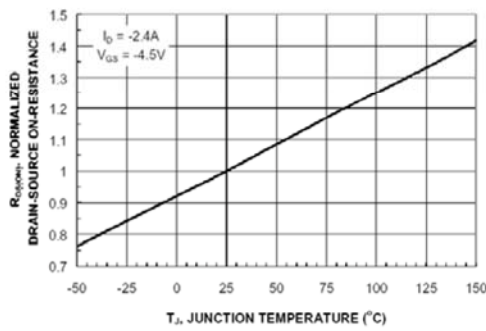


Figure 3. On-Resistance Variation with Temperature

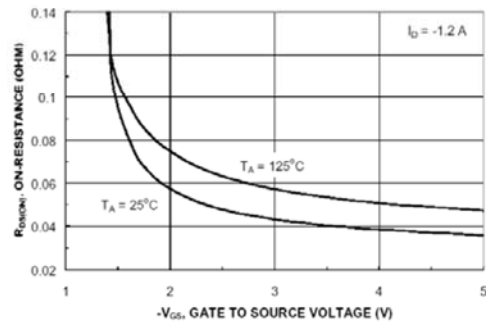


Figure 4. On-Resistance Variation with Gate to Source Voltage

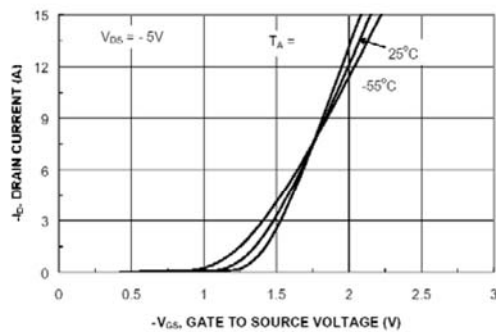


Figure 5. Transfer Characteristics

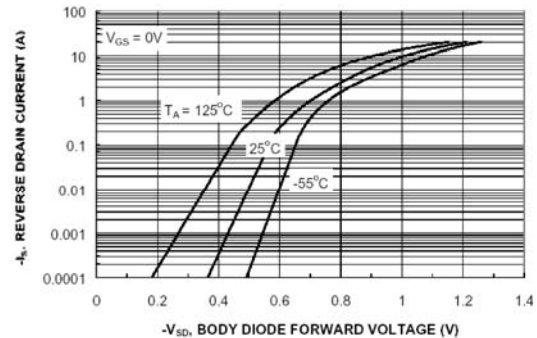


Figure 6. Body Diode Forward Voltage Variation with Source Current and Temperature

**CHARACTERISTIC CURVE**

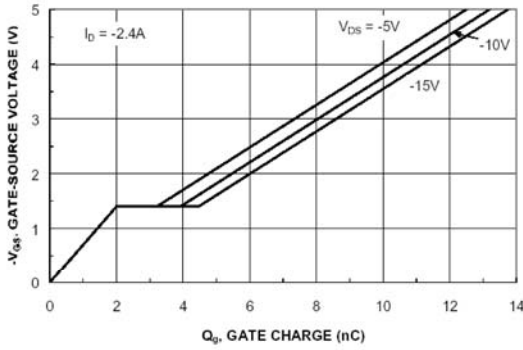


Figure 7. Gate Charge Characteristic

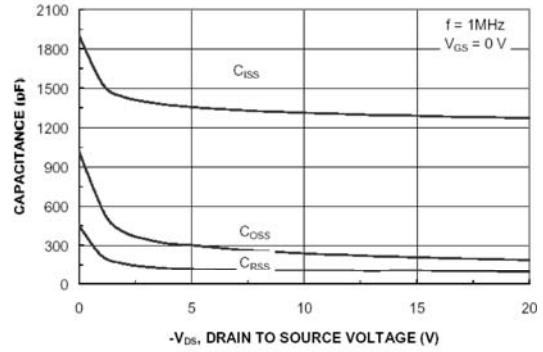


Figure 8. Capacitance Characteristic

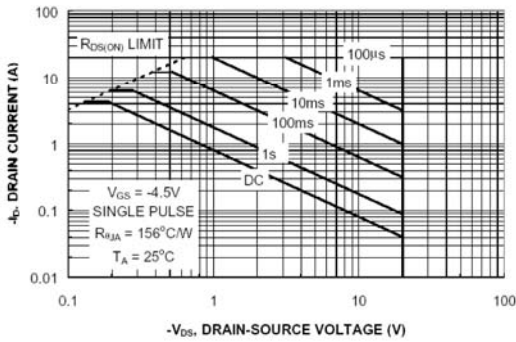


Figure 9. Maximum Safe Operating Area

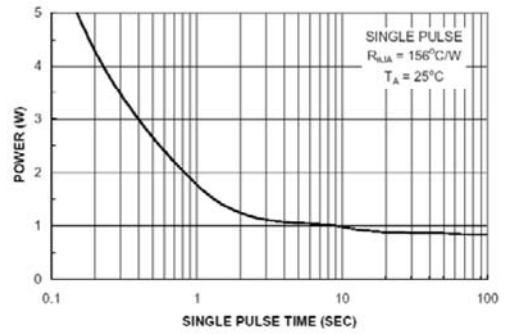


Figure 10. Single Pulse Maximum Power Dissipation

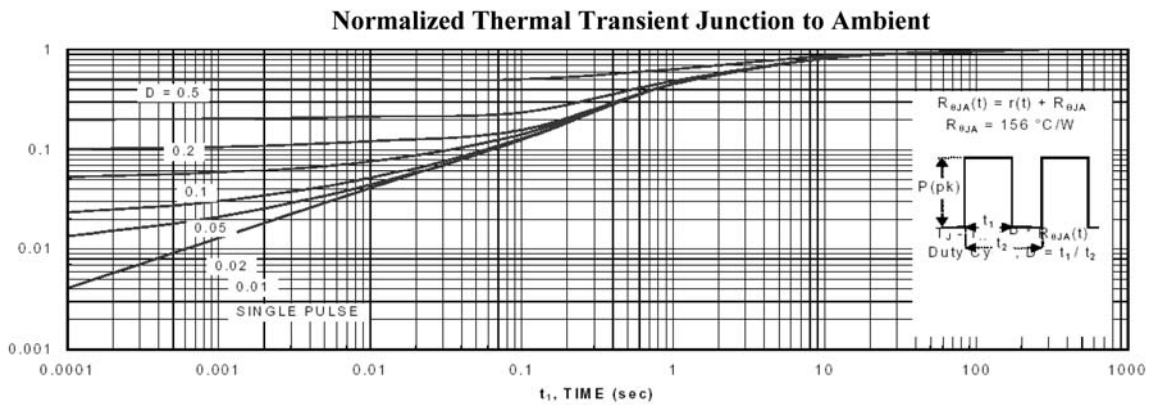


Figure 11. Transient Thermal Response Curve.