

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

DESCRIPTION

The SMG5409 provide the designer with best combination of fast switching, low on-resistance and cost-effectiveness. The SMG5409 is universally preferred for all commercial-industrial surface mount applications and suited for low voltage applications such as DC/DC converters.

FEATURES

- Simple Drive Requirement
- Small Package Outline

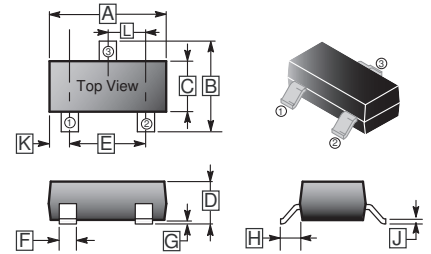
MARKING

5409

PACKAGE INFORMATION

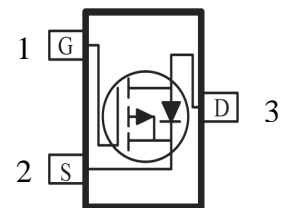
Package	MPQ	Leader Size
SC-59	3K	7 inch

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			

TOP VIEW



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

Parameter	Symbol	Ratings	Unit
Drain-Source Voltage	V_{DS}	-30	V
Gate-Source Voltage	V_{GS}	± 20	V
Continuous Drain Current ²	I_D	$T_A=25^\circ\text{C}$	-2.6
		$T_A=70^\circ\text{C}$	-2
Pulsed Drain Current ¹	I_{DM}	-12	A
Power Dissipation	P_D	1.38	W
Linear Derating Factor		0.01	W / $^\circ\text{C}$
Operating Junction and Storage Temperature Range	T_j, T_{stg}	-55~150	$^\circ\text{C}$
Thermal Resistance Rating			
Maximum Junction to Ambient ²	$R_{\theta JA}$	90	$^\circ\text{C} / \text{W}$

Notes:

1. Pulse width limited by Max. junction temperature.
2. Surface mounted on 1 in² copper pad of FR4 board; 270 $^\circ\text{C}/\text{W}$ when mounted on Min. copper pad.

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

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Static						
Drain-Source Breakdown Voltage	BV_{DSS}	-30	-	-	V	$V_{GS}=0, I_D = -250\mu\text{A}$
Gate-Threshold Voltage	$V_{GS(th)}$	-1.0	-	-3.0	V	$V_{DS}=V_{GS}, I_D = -250\mu\text{A}$
Gate-Body Leakage Current	I_{GSS}	-	-	± 100	nA	$V_{GS}=\pm 20\text{V}$
Drain-Source Leakage Current	I_{DSS}	-	-	-1	μA	$V_{DS} = -30\text{V}, V_{GS}=0$
		-	-	-5		$V_{DS} = -24\text{V}, V_{GS}=0$
Drain-Source On-Resistance ¹	$R_{DS(ON)}$	-	-	120	m Ω	$V_{GS} = -10\text{V}, I_D = -2.6\text{A}$
		-	-	170		$V_{GS} = -4.5\text{V}, I_D = -2.0\text{A}$
Forward Transconductance	g_{fs}	-	4	-	S	$V_{DS} = -5\text{V}, I_D = -2.5\text{A}$
Dynamic						
Total Gate Charge ¹	Q_g	-	5	8	nC	$V_{DS} = -24\text{V},$ $V_{GS} = -4.5\text{V},$ $I_D = -2.6\text{A}$
Gate-Source Charge	Q_{gs}	-	1	-		
Gate-Drain Charge	Q_{gd}	-	3	-		
Turn-on Delay Time ¹	$T_{d(on)}$	-	8	-	nS	$V_{DS} = -15\text{V},$ $V_{GS} = -10\text{V},$ $R_G=3.3\Omega,$ $R_D=15\Omega,$ $I_D = -1\text{A}$
Rise Time	T_r	-	5	-		
Turn-off Delay Time	$T_{d(off)}$	-	20	-		
Fall Time	T_f	-	7	-		
Input Capacitance	C_{iss}	-	412	660	pF	$V_{GS}=0,$ $V_{DS} = -25\text{V},$ $f=1.0\text{MHz}$
Output Capacitance	C_{oss}	-	91	-		
Reverse Transfer Capacitance	C_{rss}	-	62	-		
Source-Drain Diode						
Diode Forward Voltage ¹	V_{SD}	-	-	-1	V	$I_S = -1\text{A}, V_{GS}=0$
Reverse Recovery Time ¹	T_{RR}	-	16.8	-	ns	$I_S = -2.6\text{A}, V_{GS}=0$
Reverse Recovery Charge	Q_{RR}	-	10	-	nC	$dI/dt=100\text{A}/\mu\text{s}$

Notes:

1. Pulse width $\leq 300\mu\text{s}$, duty cycle $\leq 2\%$.

CHARACTERISTIC CURVES

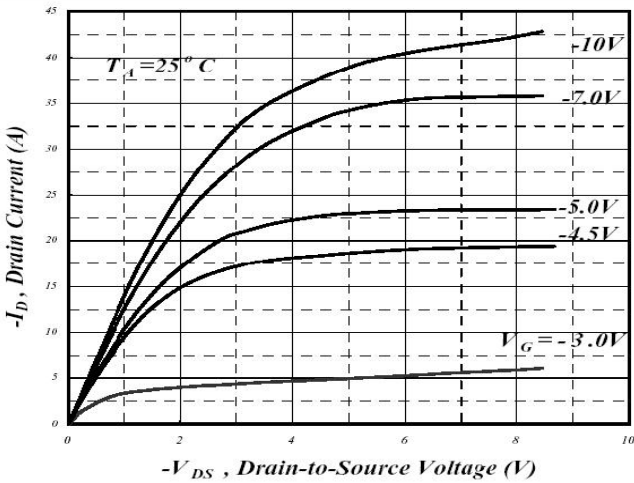


Fig 1. Typical Output Characteristics

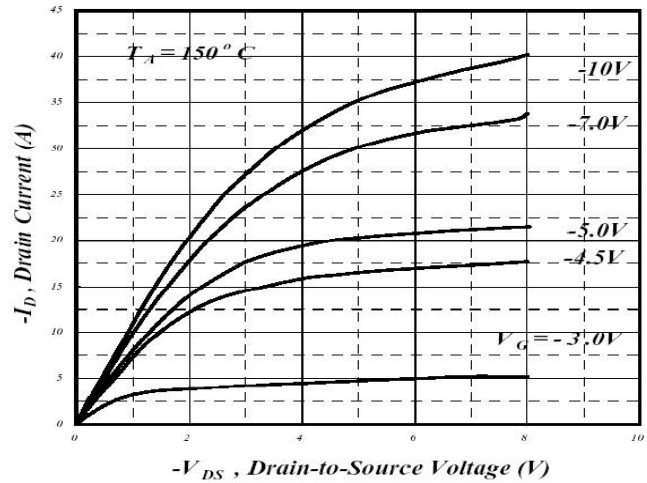


Fig 2. Typical Output Characteristics

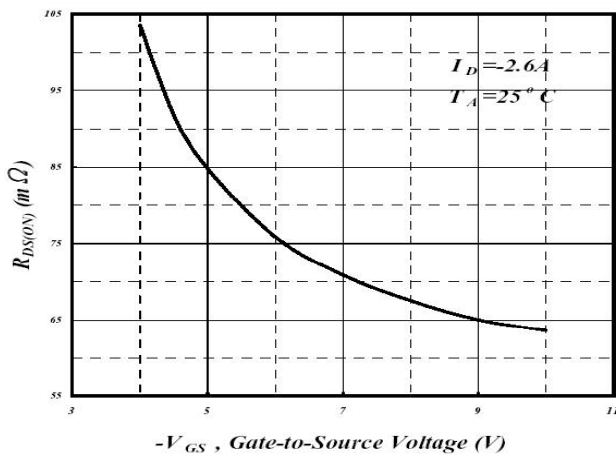


Fig 3. On-Resistance v.s. Gate Voltage

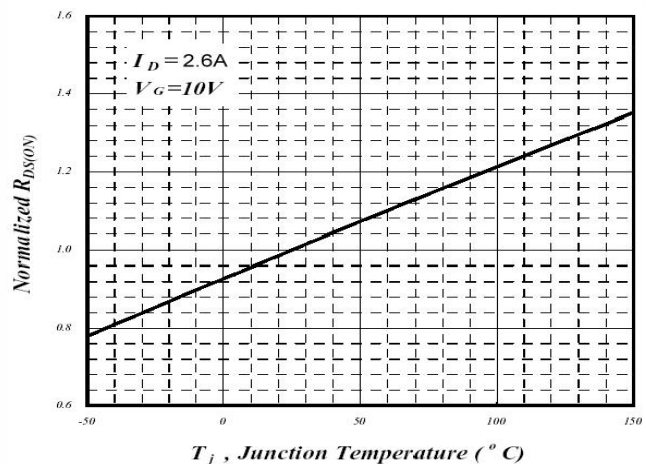


Fig 4. Normalized On-Resistance v.s. Junction Temperature

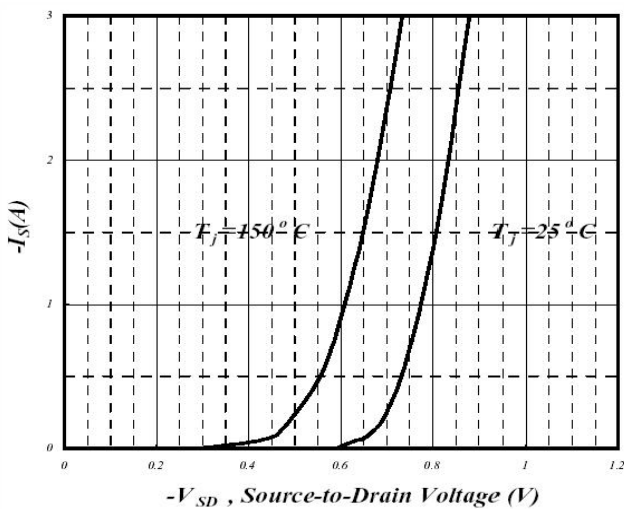


Fig 5. Forward Characteristics of Reverse Diode

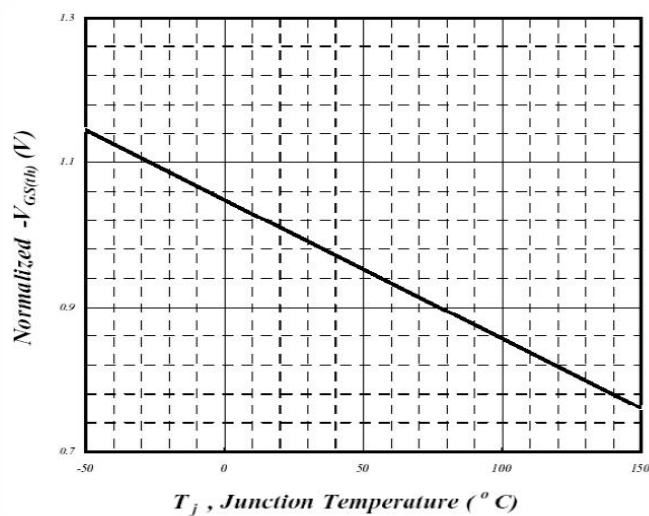


Fig 6. Gate Threshold Voltage v.s. Junction Temperature

CHARACTERISTIC CURVES

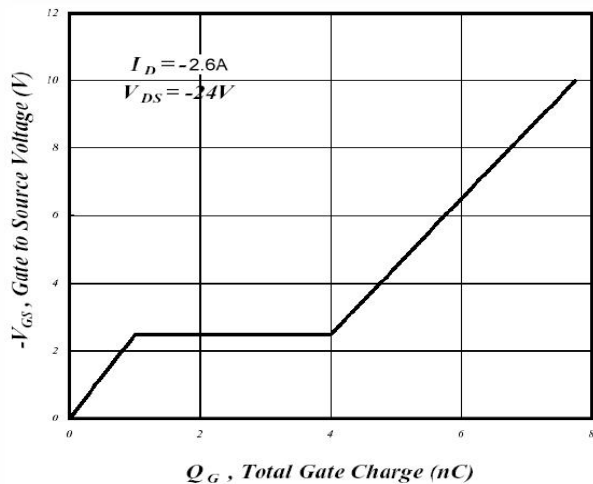


Fig 7. Gate Charge Characteristics

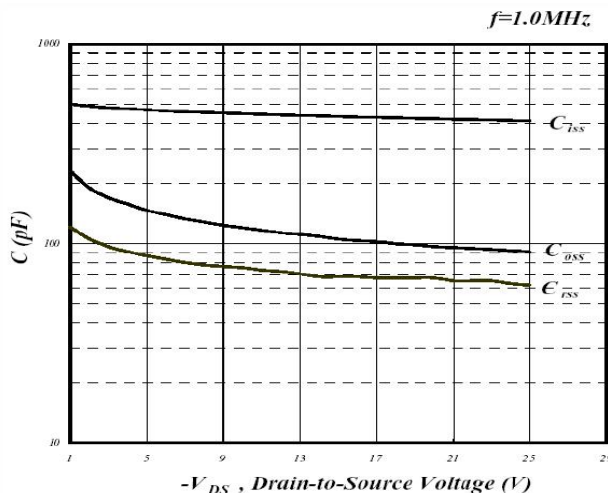


Fig 8. Typical Capacitance Characteristics

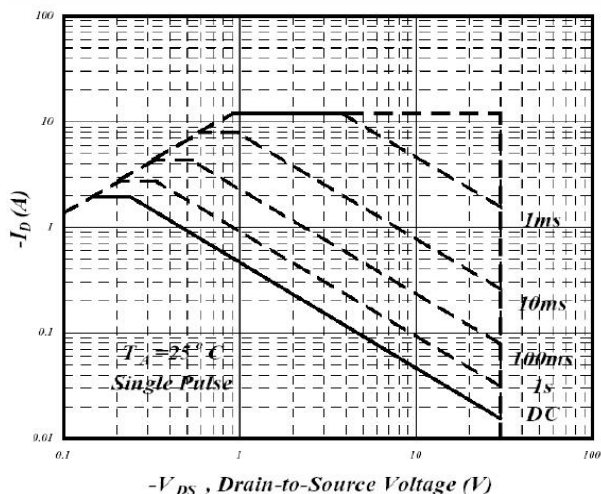


Fig 9. Maximum Safe Operating Area

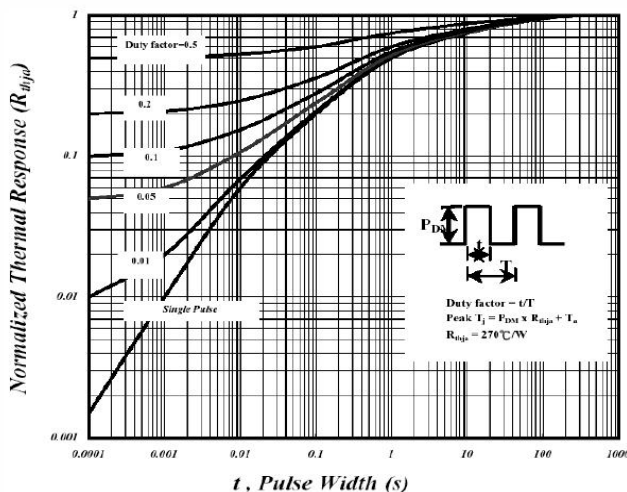


Fig 10. Effective Transient Thermal Impedance

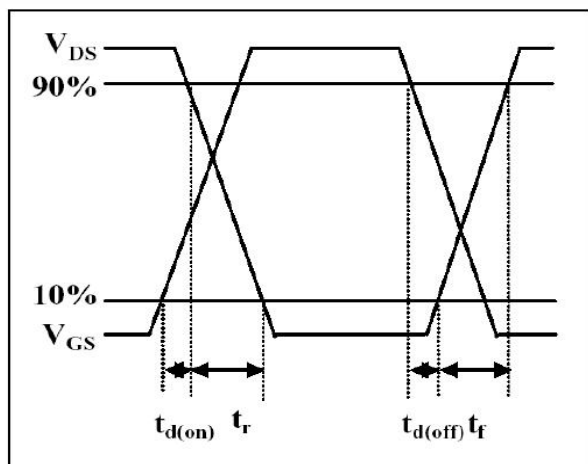


Fig 11. Switching Time Waveform

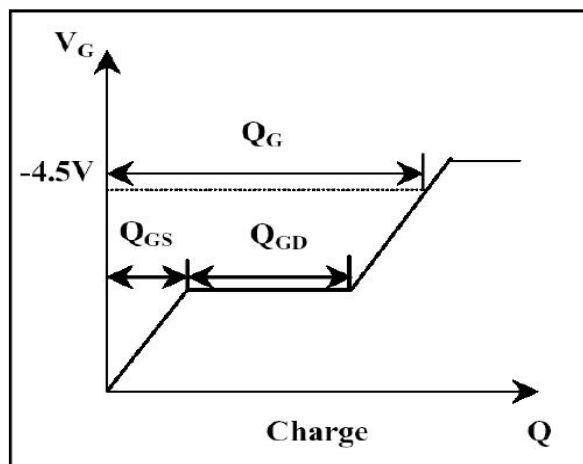


Fig 12. Gate Charge Waveform