SPR60N04-C

60A, 40V, $R_{DS(ON)}$ 8.5mΩ
N-Channel Enhancement Mode Power MOSFET

SeCoS
Elektronische Bauelemente

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

DESCRIPTION

The SPR60N04-C is the highest performance trench N-Ch MOSFETs with extreme high cell density, which provide excellent $R_{DS(ON)}$ and gate charge for most of the synchronous buck converter applications.

The SPR60N04-C meet the RoHS and Green Product requirement with full function reliability approved.

FEATURES

- Advanced High Cell Density Technology
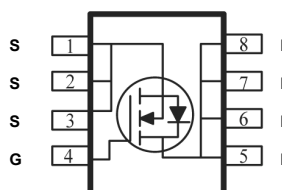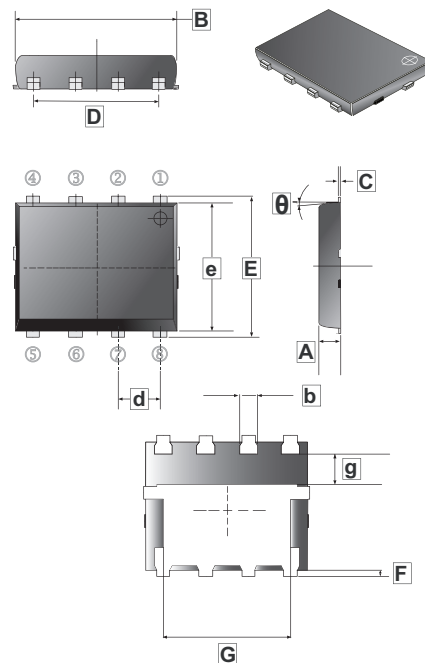- Super Low Gate Charge

MARKING

60N04

□ = Date code

D D D D

S S S G
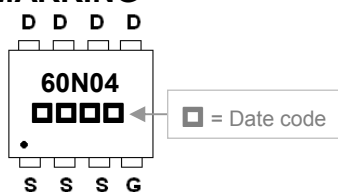
PR-8PP

PACKAGE INFORMATION

Package	MPQ	Leader Size
PR-8PP	3K	13 inch

ORDER INFORMATION

Part Number	Type
SPR60N04-C	Lead (Pb)-free and Halogen-free

S 1 — 8 D
S 2 — 7 D
S 3 — 6 D
G 4 — 5 D

REF.	Millimeter Min.	Millimeter Max.	REF.	Millimeter Min.	Millimeter Max.
A	0.9	1.1	θ	0°	12°
B	4.9	5.1	b	0.33	0.51
C	0.2	0.3	d	1.27 BSC	
D	3.81	4	e	5.7	5.9
E	5.95	6.2	g	1.1	1.4
F	0.1	0.2			
G	3.81	4			

ABSOLUTE MAXIMUM RATINGS

Parameter		Symbol	Ratings	Unit
Drain-Source Voltage		V_{DS}	40	V
Gate-Source Voltage		V_{GS}	±20	V
Continuous Drain Current [1], @V_{GS}=10V	T_C=25°C	I_D	60	A
	T_C=100°C		45	
	T_A=25°C		12	
	T_A=70°C		9.6	
Pulsed Drain Current [3]		I_{DM}	120	A
Total Power Dissipation	T_C=25°C	P_D	52	W
	T_A=25°C		2	
Operating Junction & Storage Temperature		T_J, T_{STG}	-55~150	°C
Thermal Resistance Ratings				
Thermal Resistance Junction-Ambient [1]		$R_{\theta JA}$	62.5	°C/W
Thermal Resistance Junction-Ambient [2]			110	
Thermal Resistance Junction-Case [1]		$R_{\theta JC}$	2.4	

ELECTRICAL CHARACTERISTICS (T_J=25°C unless otherwise specified)

| Parameter		Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Drain-Source Breakdown Voltage		BV_{DSS}	40	-	-	V	V_{GS}=0, I_D=250µA
Gate Threshold Voltage		$V_{GS(th)}$	1	-	2.5	V	V_{DS}=V_{GS}, I_D=250µA
Forward Transconductance		g_{fs}	-	39	-	S	V_{DS}=5V, I_D=12A
Gate-Source Leakage Current		I_{GSS}	-	-	±100	nA	V_{GS}= ±20V
Drain-Source Leakage Current	T_J=25°C	I_{DSS}	-	-	1	µA	V_{DS}=32V, V_{GS}=0
	T_J=55°C		-	-	5		V_{DS}=32V, V_{GS}=0
Static Drain-Source On-Resistance [4]		$R_{DS(ON)}$	-	-	8.5	mΩ	V_{GS}=10V, I_D=12A
			-	-	10		V_{GS}=4.5V, I_D=10A
Total Gate Charge		Q_g	-	18.8	-	nC	I_D=12A V_{DS}=20V V_{GS}=4.5V
Gate-Source Charge		Q_{gs}	-	4.7	-		
Gate-Drain ("Miller") Change		Q_{gd}	-	8.2	-		
Turn-on Delay Time		$T_{d(on)}$	-	14.3	-	nS	V_{DD}=15V I_D=1A V_{GS}=10V R_G=3.3Ω
Rise Time		T_r	-	2.6	-		
Turn-off Delay Time		$T_{d(off)}$	-	77	-		
Fall Time		T_f	-	4.8	-		
Input Capacitance		C_{iss}	-	2332	-	pF	V_{GS}=0 V_{DS}=15V f=1MHz
Output Capacitance		C_{oss}	-	193	-		
Reverse Transfer Capacitance		C_{rss}	-	138	-		
Source-Drain Diode							
Diode Forward Voltage [4]		V_{SD}	-	-	1.2	V	I_S=1A, V_{GS}=0
Continuous Source Current [1]		I_S	-	-	60	A	
Pulsed Source Current [3]		I_{SM}	-	-	120	A	

Notes:
1. Surface mounted on a 1 inch^2 FR-4 board with 2OZ copper.
2. When Mounted On Min. Copper Pad.
3. Pulse width limited by maximum junction temperature, pulse width≦300µs, duty cycle≦2%.
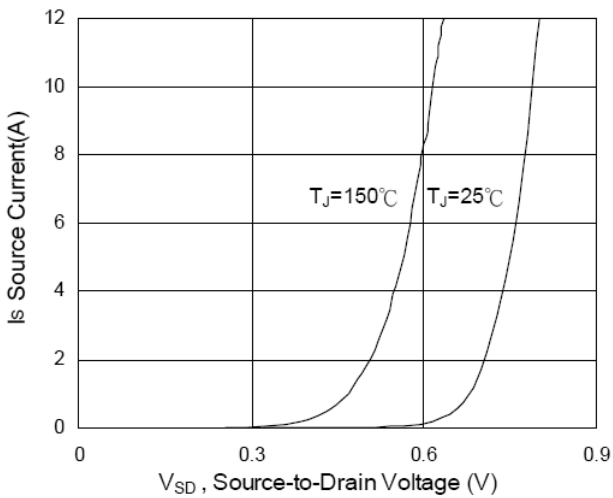4. The data tested by pulsed, pulse width≦300µs, duty cycle≦2%.

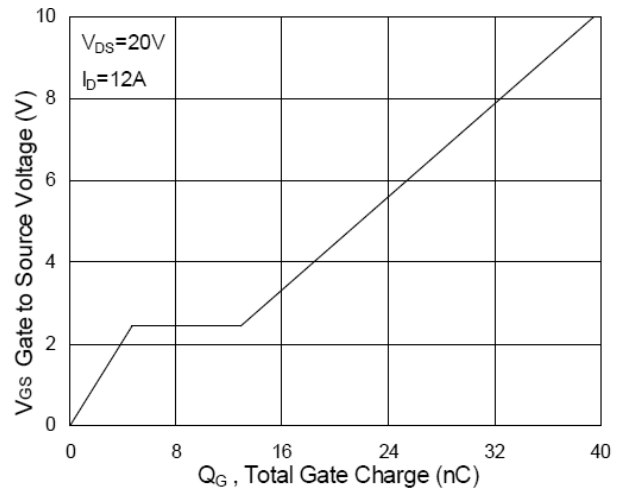# CHARACTERISTIC CURVES
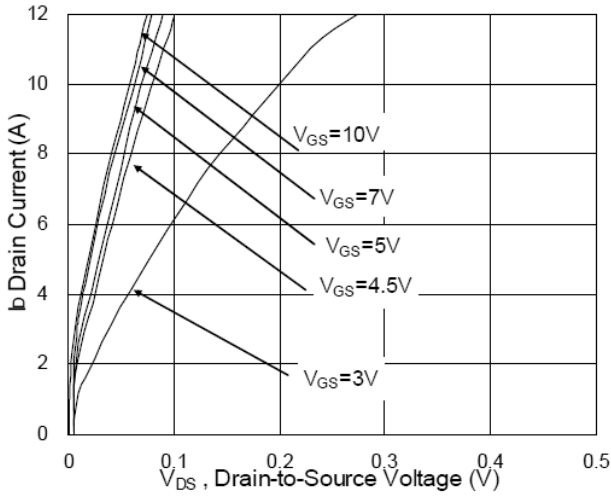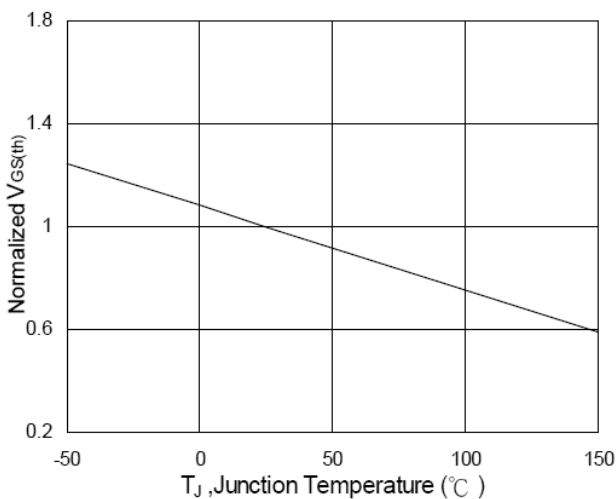

Fig.1 Typical Output Characteristics
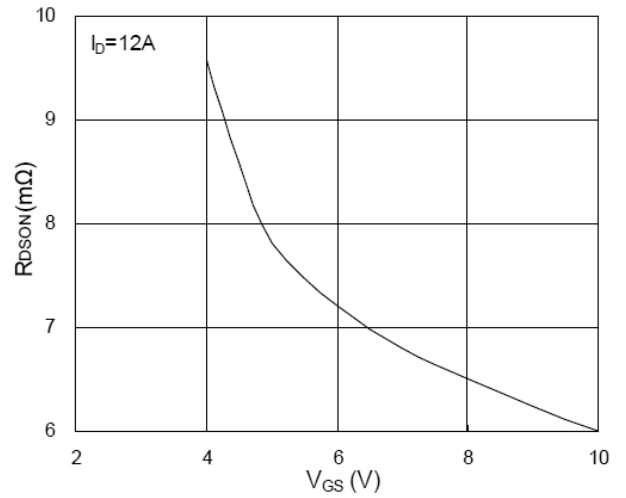
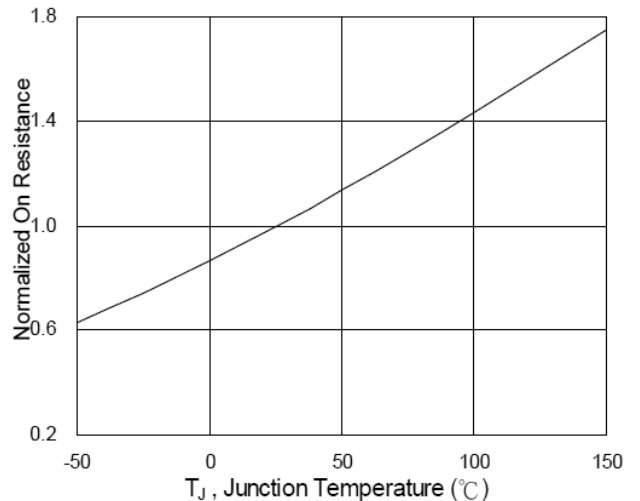**Fig.2 On-Resistance vs. G-S Voltage**

Fig.3 Forward Characteristics of Reverse
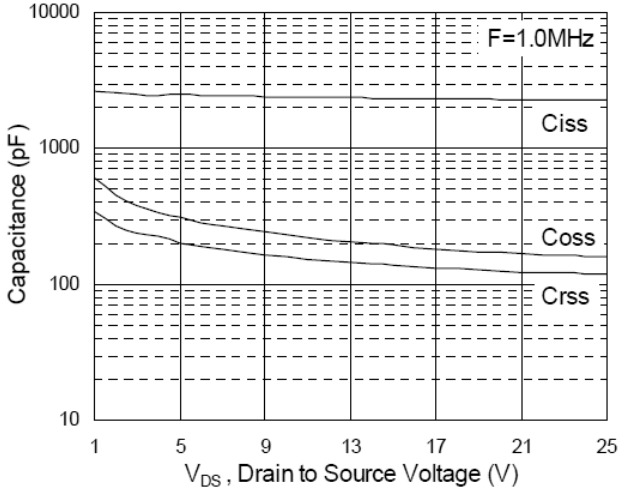

Fig.4 Gate-Charge Characteristics

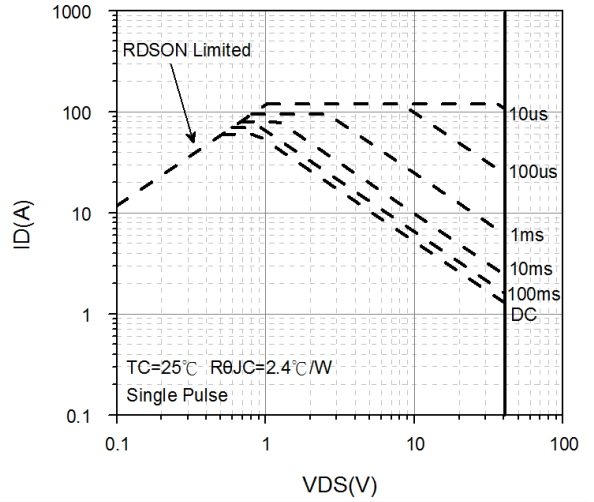

Fig.5 Normalized V_{GS(th)} vs. T_J
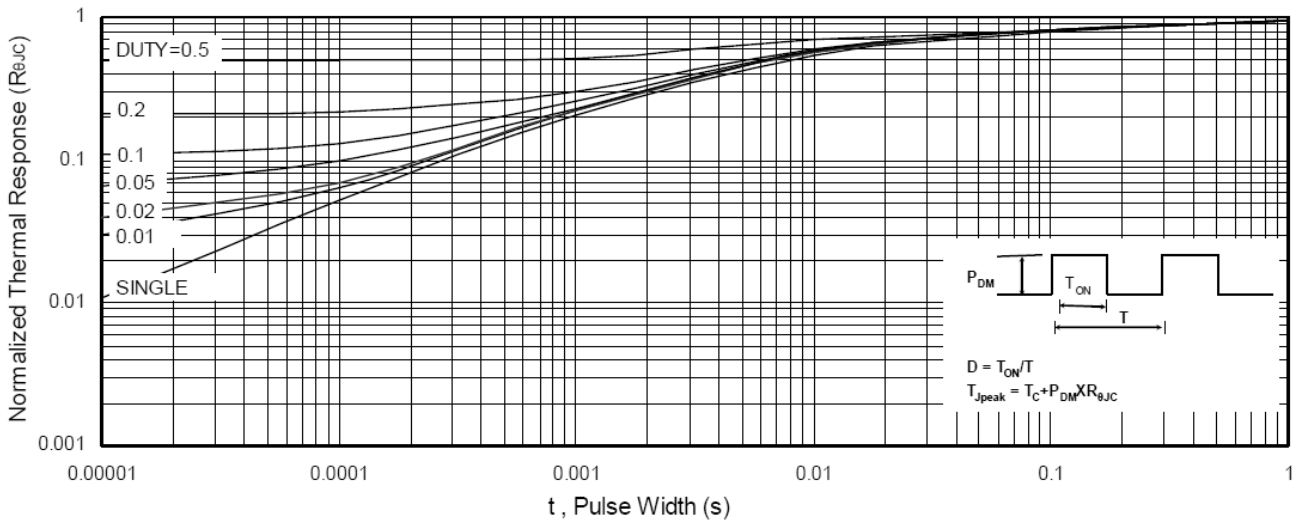

Fig.6 Normalized R_{DSON} vs. T_J

CHARACTERISTIC CURVES

Fig.7 Capacitance

Fig.8 Safe Operating Area

Fig.9 Normalized Maximum Transient Thermal Impedance

$$D = T_{ON}/T$$
$$T_{Jpeak} = T_C + P_{DM} \times R_{\theta JC}$$
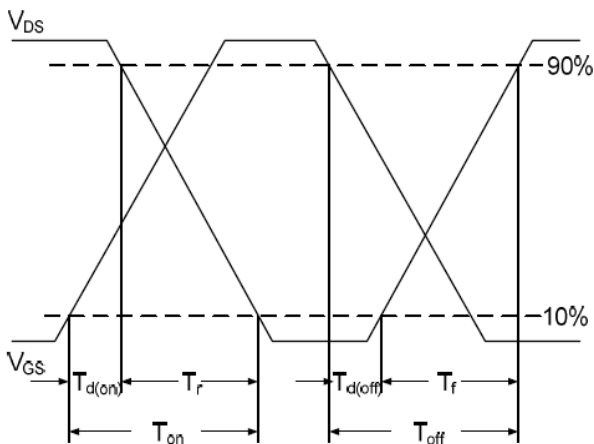
Fig.10 Switching Time Waveform
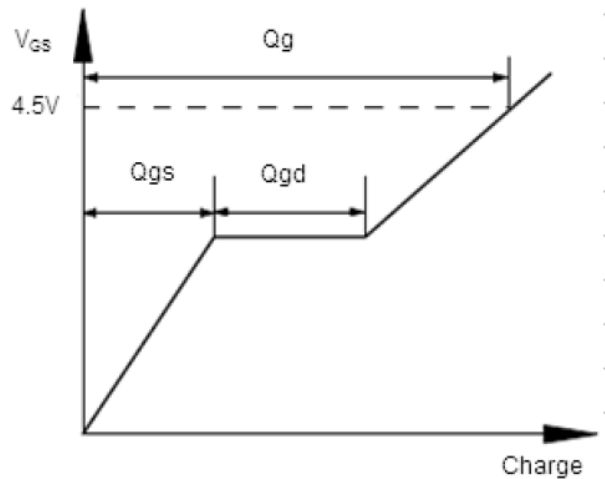
Fig.11 Gate Charge Waveform