

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

DESCRIPTION

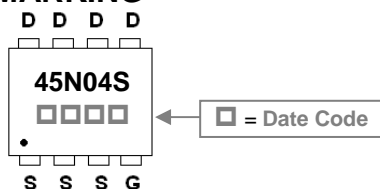
The SPR45N04S-C is the Shielded Gate Technology N-Ch MOSFETs with extreme high cell density, which provide excellent $R_{DS(ON)}$ and gate charge for most of the synchronous buck converter applications.

The SPR45N04S-C meet the RoHS and Green Product requirement with full function reliability approved.

FEATURES

- Shielded Gate Trench Technology
- Super Low Gate Charge
- Green Device Available

MARKING

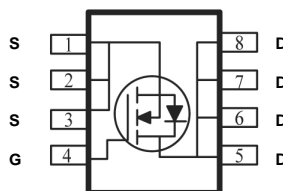


PACKAGE INFORMATION

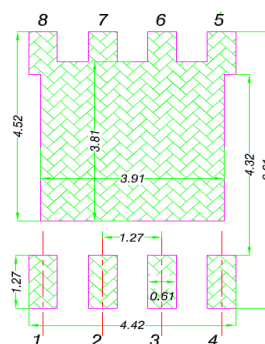
Package	MPQ	Leader Size
PR-8PP	3K	13 inch

ORDER INFORMATION

Part Number	Type
SPR45N04S-C	Lead (Pb)-free and Halogen-free



Mounting Pad Layout



REF.	Millimeter		REF.	Millimeter	
	Min.	Max.		Min.	Max.
A	4.90	5.10	G	0.80	1.00
B	5.70	5.90	H	0.254 REF.	
C	5.95	6.20	I	4.00 REF.	
D	1.27 BSC.		J	3.40 REF.	
E	0.35	0.49	K	0.60 REF.	
F	0.10	0.20	L	1.40 REF.	

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 @ $V_{GS}=10V$	$T_C=25^\circ C$	45	A
	$T_C=100^\circ C$	29	
Pulsed Drain Current ²	I_{DM}	90	A
Total Power Dissipation ³	P_D	21	W
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55~150	$^\circ C$
Thermal Resistance Ratings			
Maximum Thermal Resistance Junction-Ambient ¹	$R_{\theta JA}$	65	$^\circ C/W$
Maximum Thermal Resistance Junction-Case ¹	$R_{\theta JC}$	6	

ELECTRICAL CHARACTERISTICS ($T_J=25^\circ C$ unless otherwise specified)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Conditions	
Drain-Source Breakdown Voltage	BV_{DSS}	40	-	-	V	$V_{GS}=0, I_D=250\mu A$	
Gate Threshold Voltage	$V_{GS(th)}$	1	1.9	2.5	V	$V_{DS}=V_{GS}, I_D=250\mu A$	
Gate-Source Leakage Current	I_{GSS}	-	-	± 100	nA	$V_{GS}=\pm 20V, V_{DS}=0$	
Drain-Source Leakage Current	I_{DSS}	$T_J=25^\circ C$	-	-	1	μA	$V_{DS}=32V, V_{GS}=0$
		$T_J=55^\circ C$	-	-	5		
Static Drain-Source On-Resistance ²	$R_{DS(ON)}$	-	4.7	6.5	m Ω	$V_{GS}=10V, I_D=15A$	
		-	7.5	10.5		$V_{GS}=4.5V, I_D=15A$	
Gate Resistance	R_g	-	1.9	-	Ω	$V_{GS}=V_{DS}=0V, f=1MHz$	
Total Gate Charge	Q_g	-	19.8	-	nC	$I_D=15A$ $V_{DS}=20V$ $V_{GS}=10V$	
Gate-Source Charge	Q_{gs}	-	3.9	-			
Gate-Drain Change	Q_{gd}	-	4.7	-			
Turn-on Delay Time	$T_{d(on)}$	-	11.5	-	nS	$V_{DD}=20V$ $I_D=15A$ $V_{GS}=10V$ $R_G=3\Omega$	
Rise Time	T_r	-	9.2	-			
Turn-off Delay Time	$T_{d(off)}$	-	23.8	-			
Fall Time	T_f	-	15.4	-			
Input Capacitance	C_{iss}	-	1078	-	pF	$V_{GS}=0$ $V_{DS}=20V$ $f=1MHz$	
Output Capacitance	C_{oss}	-	483	-			
Reverse Transfer Capacitance	C_{rss}	-	49	-			
Source-Drain Diode							
Continuous Source Current ¹	I_S	-	-	45	A	$V_G=V_D=0V, \text{Force Current}$	
Diode Forward Voltage ²	V_{SD}	-	-	1.2	V	$V_{GS}=0, I_S=1A, T_J=25^\circ C$	

Notes:

1. The data tested by surface mounted on a 1 inch² FR-4 board with 2oz copper.
2. The data tested by pulsed, Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 2\%$.
3. The power dissipation is limited by 150°C, junction temperature.
4. The data is theoretically the same as I_D and I_{DM} , in real applications, should be limited by total power dissipation.

TYPICAL CHARACTERISTICS CURVE

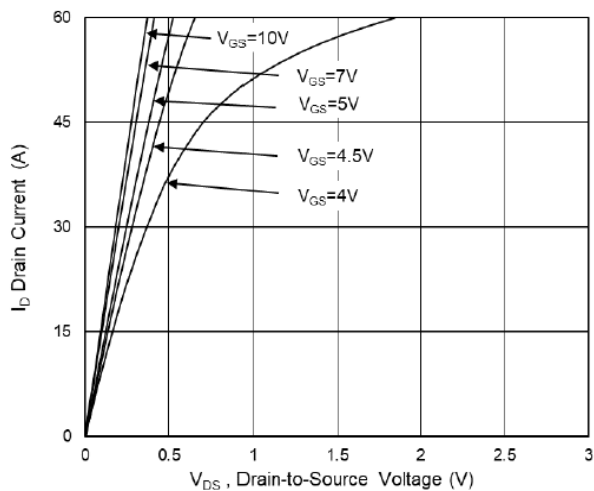


Fig.1 Typical Output Characteristics

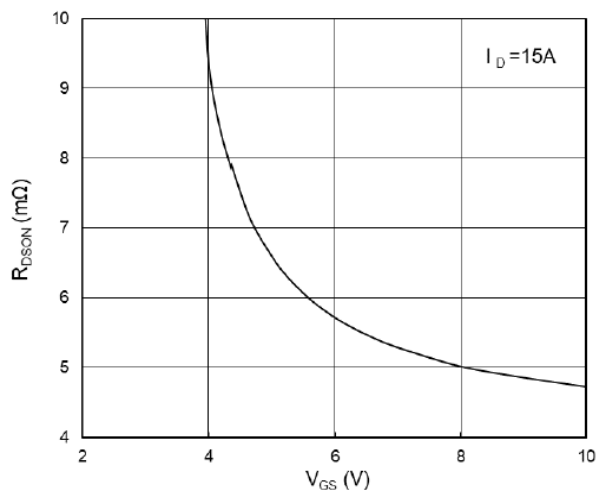


Fig.2 On-Resistance vs G-S Voltage

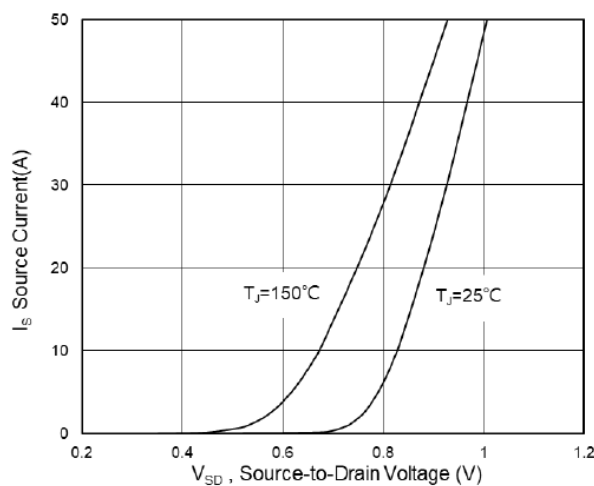


Fig.3 Source Drain Forward Characteristics

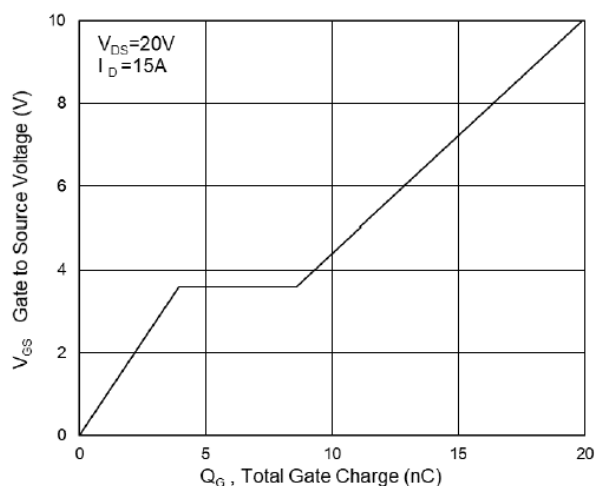


Fig.4 Gate-Charge Characteristics

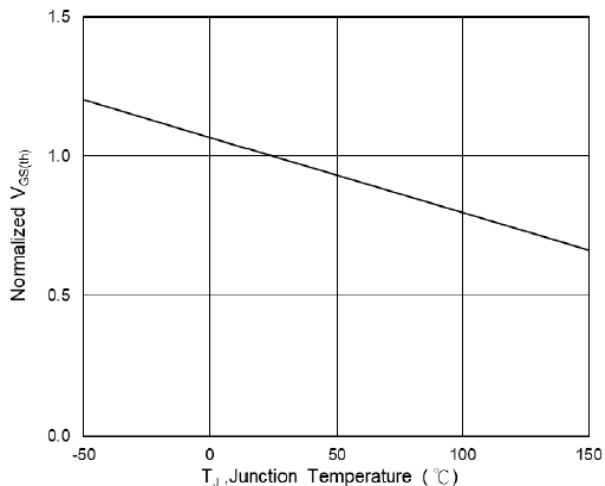


Fig.5 Normalized $V_{GS(th)}$ vs T_J

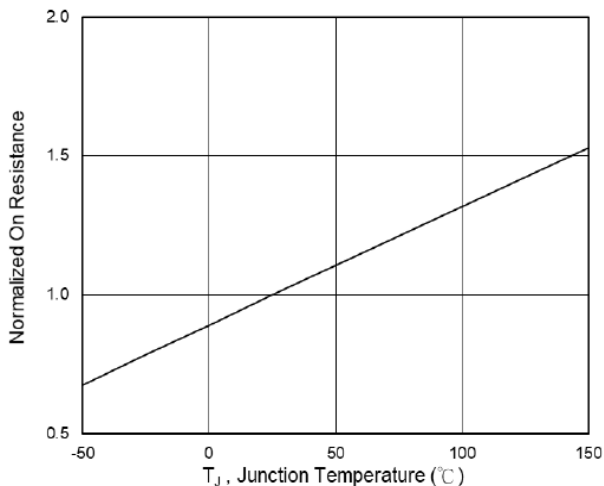


Fig.6 Normalized $R_{DS(ON)}$ vs T_J

TYPICAL CHARACTERISTICS CURVE

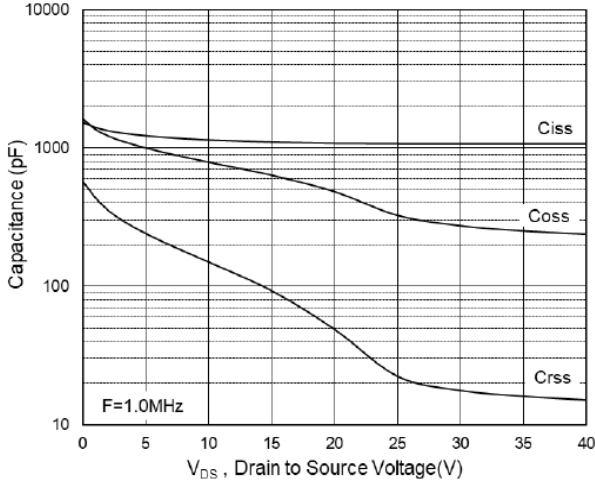


Fig.7 Capacitance

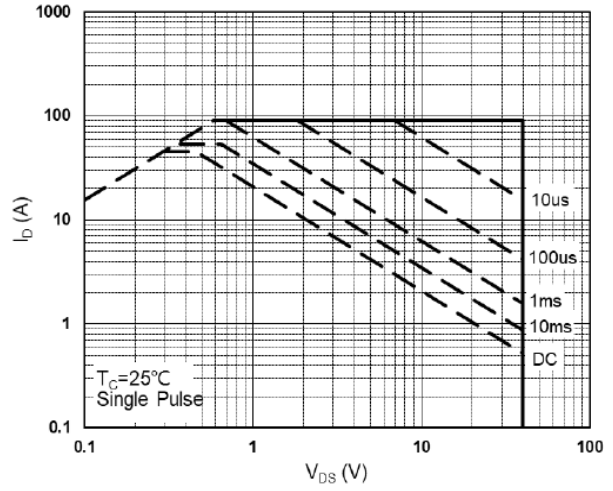


Fig.8 Safe Operating Area

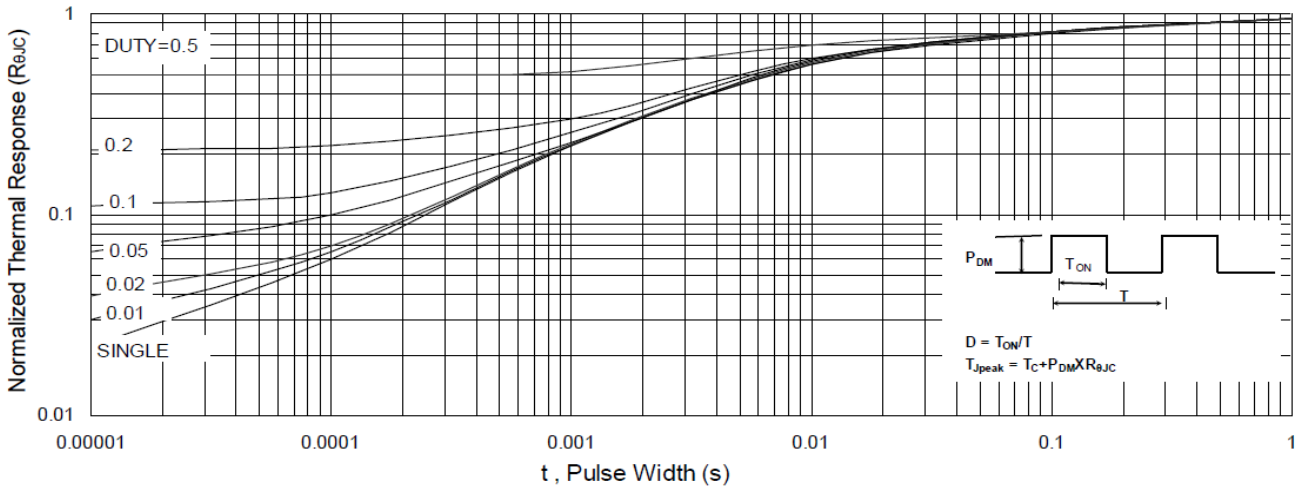


Fig.9 Normalized Maximum Transient Thermal Impedance

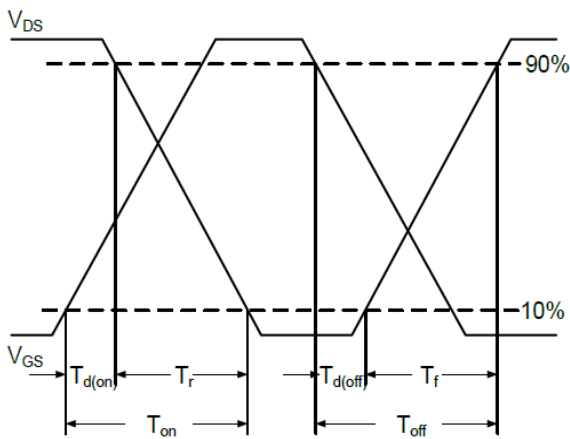


Fig.10 Switching Time Waveform

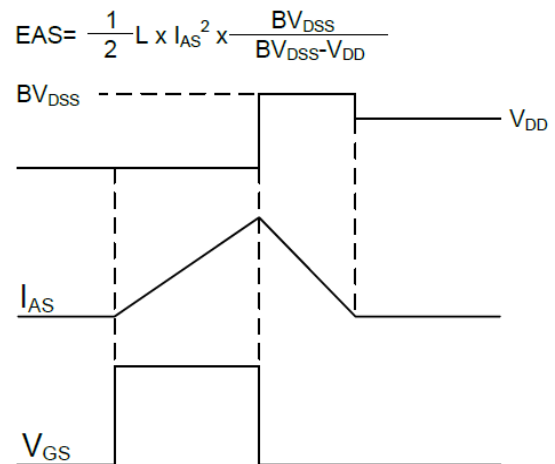


Fig.11 Unclamped Inductive Switching Waveform