

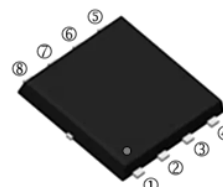
RoHS Compliant Product
A suffix of "-C" specifies halogen & lead-free

DESCRIPTION

The SPR46N04-C is the highest performance trench N-Ch MOSFETs with extreme high cell density, which provide excellent $R_{DS(ON)}$ for most of the synchronous buck converter applications.

The SPR46N04-C meet the RoHS and Green Product requirement with full function reliability approved.

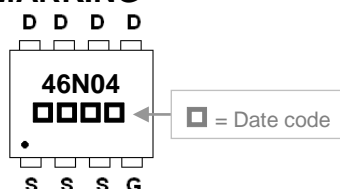
PR-8PP



FEATURES

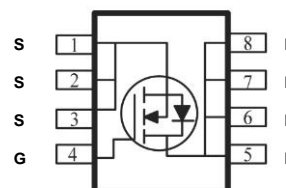
- Advanced High Cell Density Technology
- Super Low Gate Charge
- Green Device Available

MARKING



PACKAGE INFORMATION

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



ORDER INFORMATION

Part Number	Type
SPR46N04-C	Lead (Pb)-free and Halogen-free

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 @ $V_{GS}=10V$	I_D	$T_C=25^\circ C$	46	A
		$T_C=100^\circ C$	28	
		$T_A=25^\circ C$	10	
		$T_A=70^\circ C$	8	
Pulsed Drain Current ²	I_{DM}	100	A	
Total Power Dissipation	$T_C=25^\circ C$	P_D	46	W
Operating Junction & Storage Temperature	T_J, T_{STG}	-55~150	$^\circ C$	
Thermal Resistance Ratings				
Thermal Resistance Junction-Ambient ¹	$R_{\theta JA}$	62	$^\circ C/W$	
Thermal Resistance Junction-Case ¹	$R_{\theta JC}$	2.7		

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

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Conditions	
Drain-Source Breakdown Voltage	BV_{DSS}	40	-	-	V	$V_{GS}=0, I_D=250\mu\text{A}$	
Gate Threshold Voltage	$V_{GS(th)}$	1	-	2.5	V	$V_{DS}=V_{GS}, I_D=250\mu\text{A}$	
Gate-Source Leakage Current	I_{GSS}	-	-	± 100	nA	$V_{GS}=\pm 20\text{V}$	
Drain-Source Leakage Current	I_{DSS}	$T_J=25^\circ\text{C}$	-	-	1	μA	$V_{DS}=32\text{V}, V_{GS}=0$
		$T_J=55^\circ\text{C}$	-	-	5		$V_{DS}=32\text{V}, V_{GS}=0$
Static Drain-Source On-Resistance ³	$R_{DS(ON)}$	-	9.5	11.5	m Ω	$V_{GS}=10\text{V}, I_D=20\text{A}$	
		-	13.5	16.5		$V_{GS}=4.5\text{V}, I_D=10\text{A}$	
Forward Transconductance	g_{fs}	-	36	-	S	$V_{DS}=5\text{V}, I_D=20\text{A}$	
Gate Resistance	R_g	-	1.5	-	Ω	$V_{GS}=V_{DS}=0\text{V}, f=1\text{MHz}$	
Total Gate Charge	Q_g	-	11.2	-	nC	$I_D=12\text{A}$ $V_{DS}=20\text{V}$ $V_{GS}=4.5\text{V}$	
Gate-Source Charge	Q_{gs}	-	4.8	-			
Gate-Drain ("Miller") Charge	Q_{gd}	-	4.1	-			
Turn-on Delay Time	$T_{d(on)}$	-	6.9	-	ns	$V_{DD}=12\text{V}$ $I_D=6\text{A}$ $V_{GS}=10\text{V}$ $R_G=3.3\Omega$	
Rise Time	T_r	-	26.7	-			
Turn-off Delay Time	$T_{d(off)}$	-	19.4	-			
Fall Time	T_f	-	2.7	-			
Input Capacitance	C_{iss}	-	1274	-	pF	$V_{GS}=0\text{V}$ $V_{DS}=15\text{V}$ $f=1\text{MHz}$	
Output Capacitance	C_{oss}	-	113	-			
Reverse Transfer Capacitance	C_{rss}	-	63	-			
Source-Drain Diode							
Diode Forward Voltage ³	V_{SD}	-	-	1.2	V	$I_S=1\text{A}, V_{GS}=0$	
Continuous Source Current ¹	I_S	-	-	46	A	$V_G=V_D=0\text{V},$ Force Current	
Pulsed Source Current ²	I_{SM}	-	-	100	A		

Notes:

- Surface mounted on a 1 inch² FR-4 board with 2OZ copper.
- Pulse width limited by maximum junction temperature, pulse width $\leq 300\mu\text{s}$, duty cycle $\leq 2\%$.
- The data tested by pulsed, pulse width $\leq 300\mu\text{s}$, duty cycle $\leq 2\%$.

TYPICAL CHARACTERISTICS CURVES

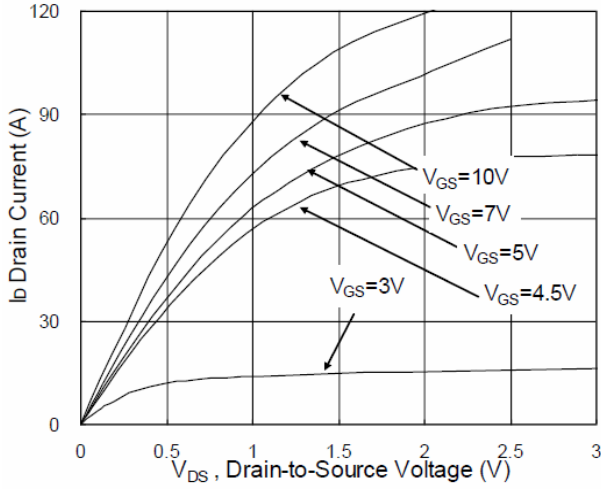


Fig.1 Typical Output Characteristics

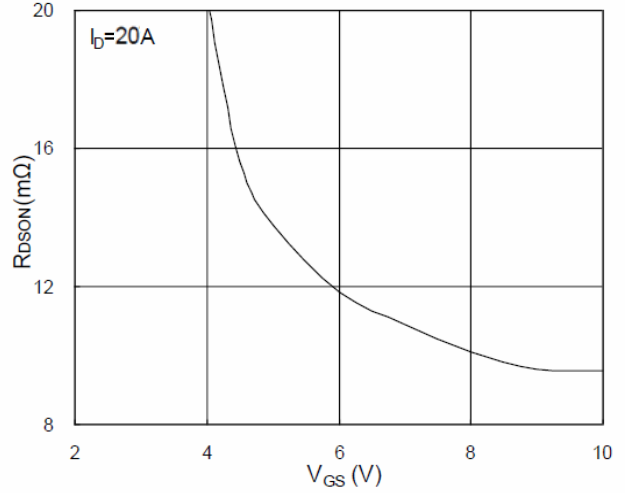


Fig.2 On-Resistance vs. G-S Voltage

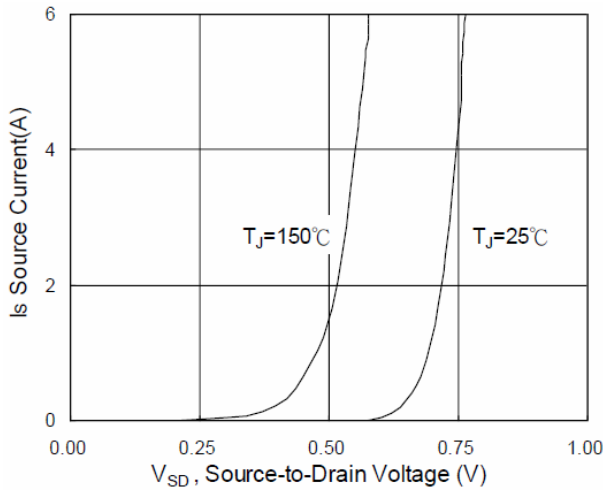


Fig.3 Forward Characteristics of Reverse

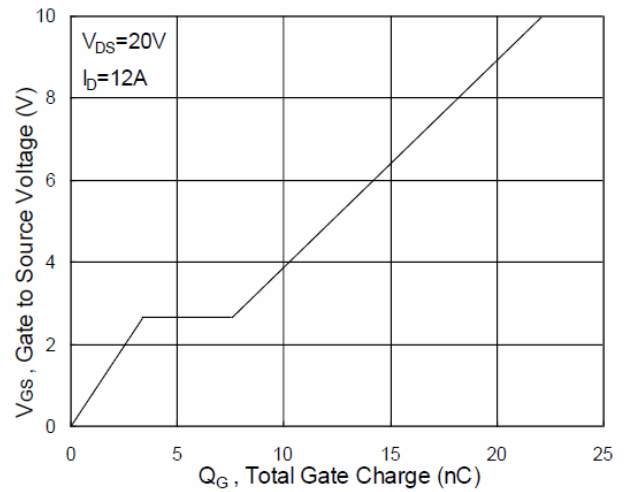


Fig.4 Gate-Charge Characteristics

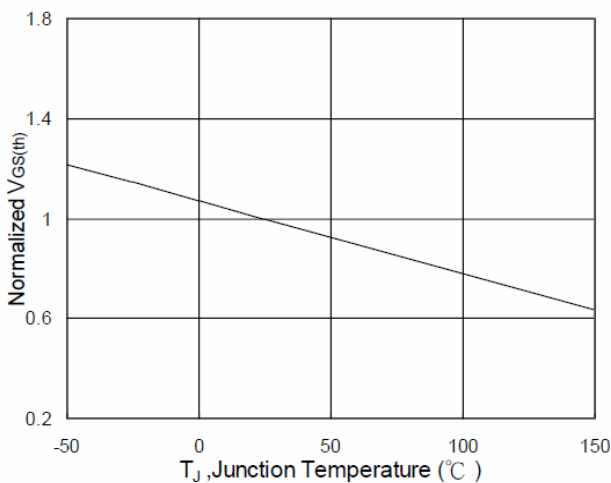


Fig.5 $V_{GS(th)}$ vs. T_J

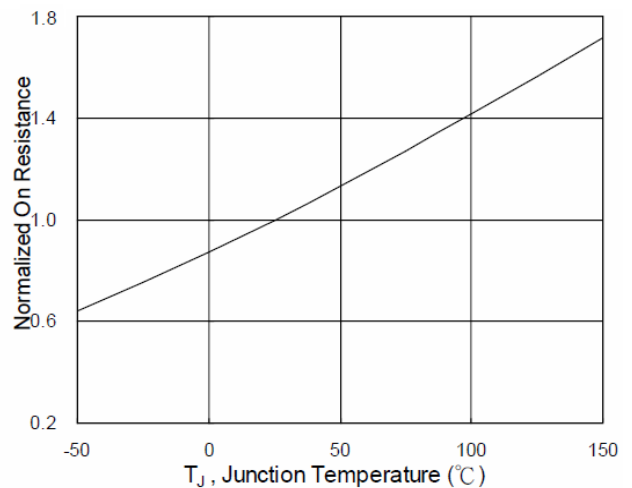


Fig.6 Normalized $R_{DS(on)}$ vs. T_J

TYPICAL CHARACTERISTICS CURVES

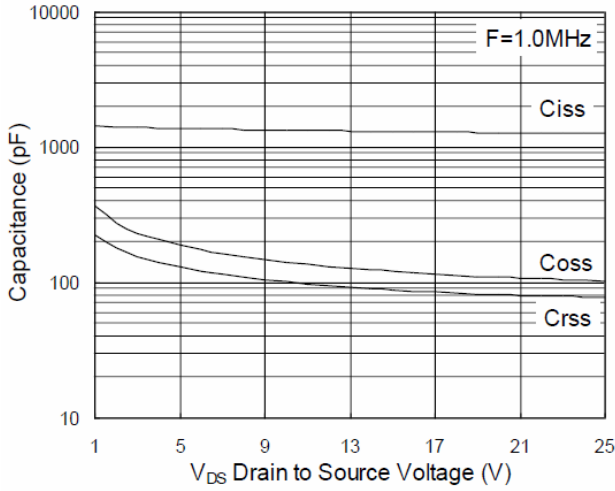


Fig.7 Capacitance

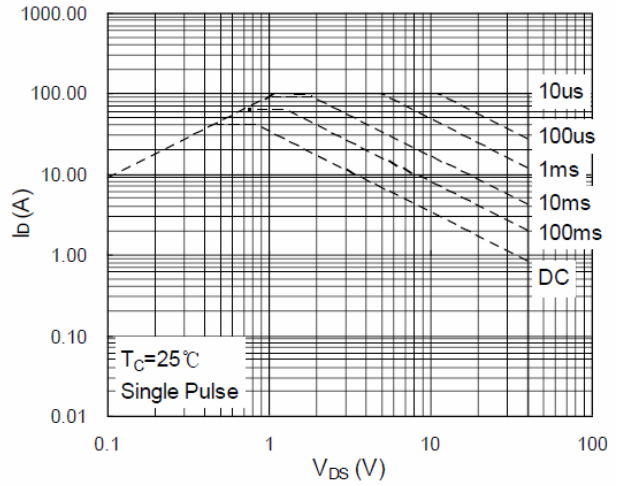


Fig.8 Safe Operating Area

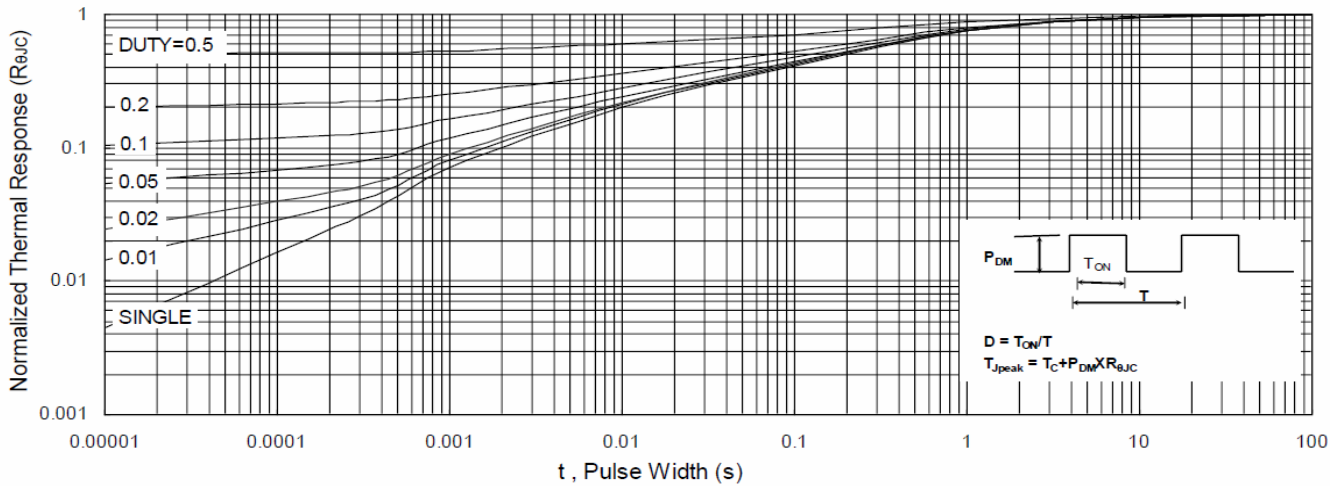


Fig.9 Normalized Maximum Transient Thermal Impedance

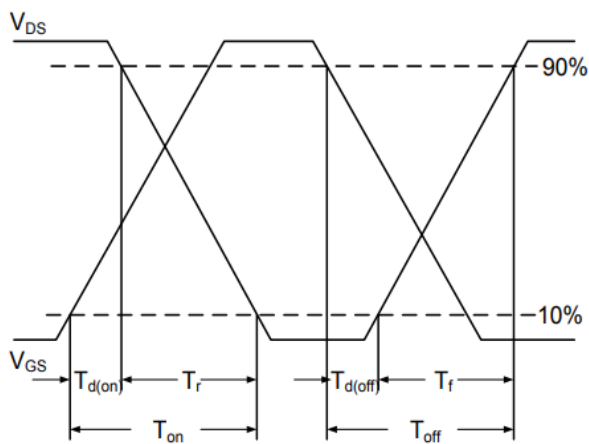


Fig.10 Switching Time Waveform

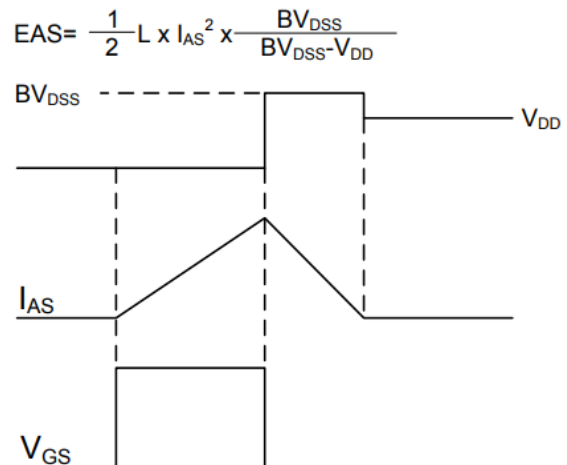
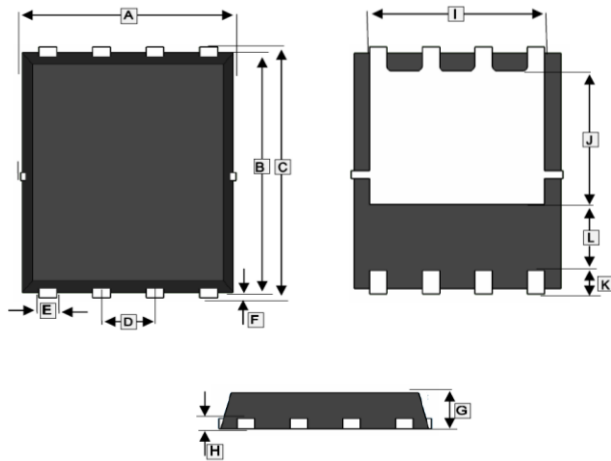


Fig.11 Unclamped Inductive Switching Waveform

PACKAGE OUTLINE DIMENSIONS

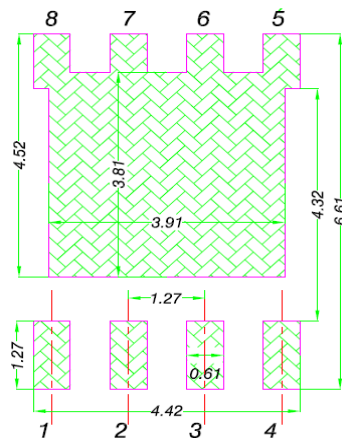
PR-8PP



REF.	Millimeter	
	Min.	Max.
A	4.90	5.10
B	5.70	5.90
C	5.90	6.20
D	1.27 BSC.	
E	0.33	0.51
F	0.06	0.20
G	0.80	1.10
H	0.254 REF.	
I	4.00 REF.	
J	3.40 REF.	
K	0.60 REF.	
L	1.40 REF.	

MOUNTING PAD LAYOUT

PR-8PP



*Dimensions in millimeters