

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

DESCRIPTION

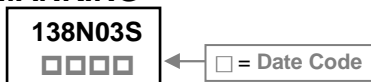
The SPR138N03S-C is the highest performance N-Ch MOSFETs with extreme high cell density, which provide excellent $R_{DS(ON)}$ and gate charge for most of the synchronous buck converter applications.

The SPR138N03S-C meet the RoHS and Green Product requirement with full function reliability approved.

FEATURES

- High Speed Power Switching
- Super Low Gate Charge
- Green Device Available

MARKING



PACKAGE INFORMATION

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

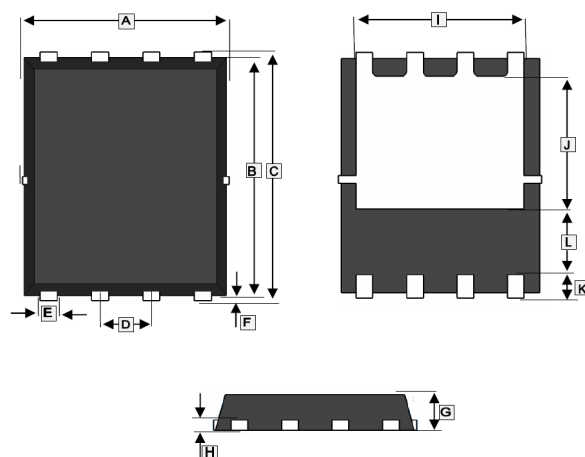
ORDER INFORMATION

Part Number	Type
SPR138N03S-C	Lead (Pb)-free and Halogen-free

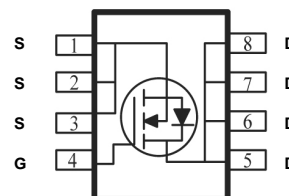
ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Ratings	Unit
Drain-Source Voltage	V_{DS}	30	V
Gate-Source Voltage	V_{GS}	± 20	V
Continuous Drain Current ¹ @ $V_{GS}=10V$	I_D	$T_C=25^\circ C$	138
		$T_C=100^\circ C$	88
Pulsed Drain Current ^{2,3}	I_{DM}	350	A
Total Power Dissipation ¹	P_D	54.3	W
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55~150	$^\circ C$
Thermal Resistance Ratings			
Maximum Thermal Resistance Junction-Ambient ¹	$R_{\theta JA}$	62.5	$^\circ C/W$
Maximum Thermal Resistance Junction-Case ¹	$R_{\theta JC}$	2.3	

PR-8PP



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.	



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}	30	-	-	V	$V_{GS}=0, I_D=250\mu\text{A}$	
Gate Threshold Voltage	$V_{GS(th)}$	1	-	2.5	V	$V_{DS}=V_{GS}, I_D=250\mu\text{A}$	
Forward Transconductance	g_{fs}	-	35	-	S	$V_{DS}=5\text{V}, I_D=20\text{A}$	
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	$V_{DS}=24\text{V}, V_{GS}=0$
		$T_J=55^\circ\text{C}$	-	-	5		$V_{DS}=24\text{V}, V_{GS}=0$
Static Drain-Source On-Resistance ²	$R_{DS(ON)}$	-	1.3	1.6	m Ω	$V_{GS}=10\text{V}, I_D=20\text{A}$	
		-	1.9	2.5		$V_{GS}=4.5\text{V}, I_D=20\text{A}$	
Total Gate Charge	Q_g	-	45	-	nC	$I_D=20\text{A}$ $V_{DS}=15\text{V}$ $V_{GS}=10\text{V}$	
Gate-Source Charge	Q_{gs}	-	9.8	-			
Gate-Drain Charge	Q_{gd}	-	6.5	-			
Turn-on Delay Time	$T_{d(on)}$	-	10.3	-	nS	$V_{DD}=15\text{V}$ $I_D=20\text{A}$ $V_{GS}=10\text{V}$ $R_G=3.3\Omega$	
Rise Time	T_r	-	6.2	-			
Turn-off Delay Time	$T_{d(off)}$	-	56	-			
Fall Time	T_f	-	8.4	-			
Input Capacitance	C_{iss}	-	3420	-	pF	$V_{GS}=0$ $V_{DS}=15\text{V}$ $f=1\text{MHz}$	
Output Capacitance	C_{oss}	-	1916	-			
Reverse Transfer Capacitance	C_{rss}	-	196	-			
Source-Drain Diode							
Continuous Source Current ¹	I_S	-	-	138	A		
Pulsed Source Current ^{2,3}	I_{SM}	-	-	350	A		
Diode Forward Voltage ²	V_{SD}	-	-	1.2	V	$V_{GS}=0, I_S=1\text{A}, T_J=25^\circ\text{C}$	

Notes:

- Surface Mounted on 1inch² FR4 Board with 2OZ copper.
- The data tested by pulsed, Pulse Width $\leq 300\mu\text{s}$, Duty Cycle $\leq 2\%$.
- The power dissipation is limited by 150 $^\circ\text{C}$, junction temperature.

TYPICAL CHARACTERISTICS CURVE

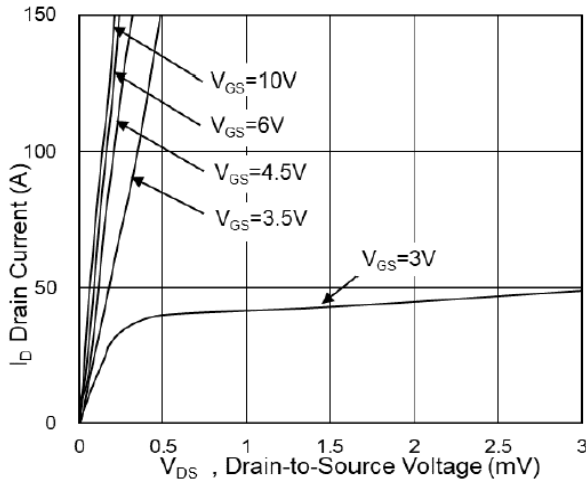


Fig.1 Typical Output Characteristics

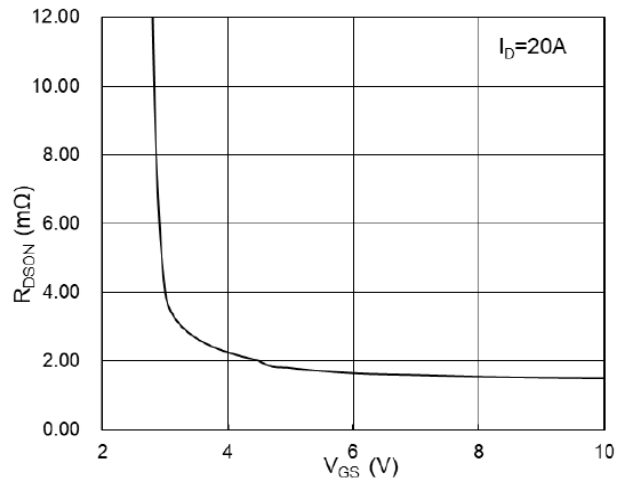


Fig.2 On-Resistance vs G-S Voltage

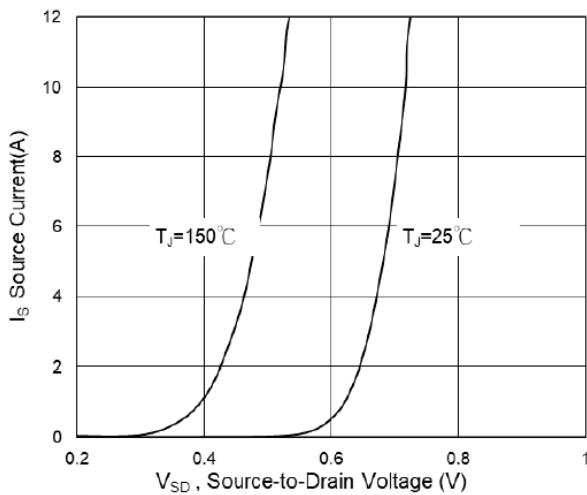


Fig.3 Source Drain Forward Characteristics

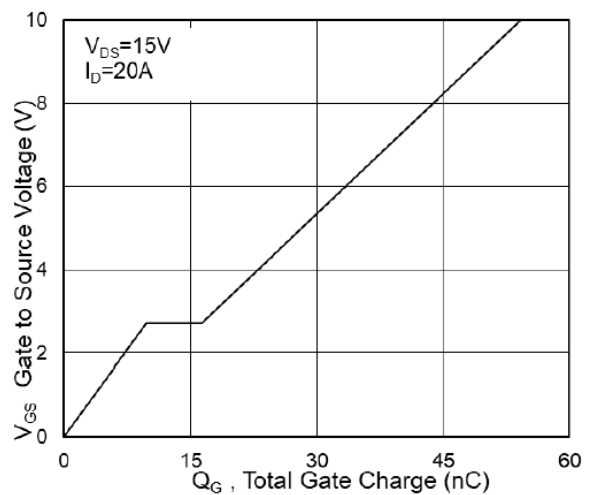


Fig.4 Gate-Charge Characteristics

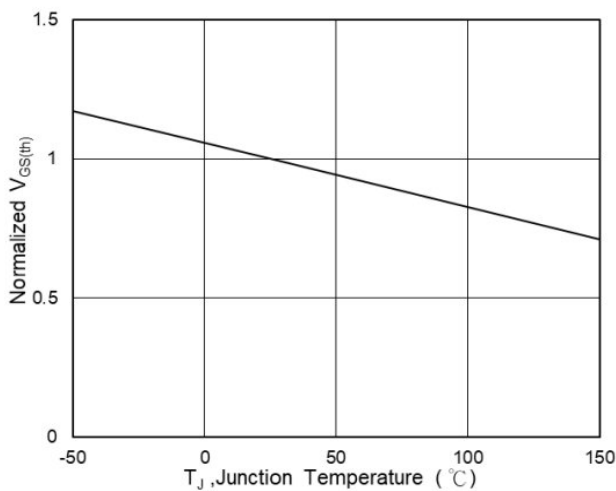


Fig.5 Normalized $V_{GS(th)}$ vs T_J

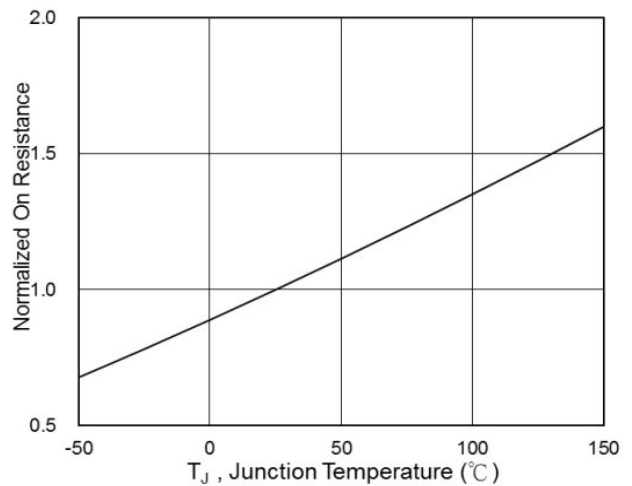


Fig.6 Normalized $R_{DS(ON)}$ vs T_J

TYPICAL CHARACTERISTICS CURVE

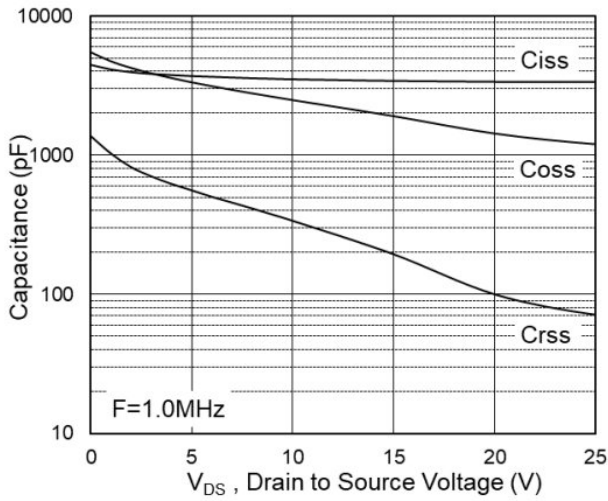


Fig.7 Capacitance

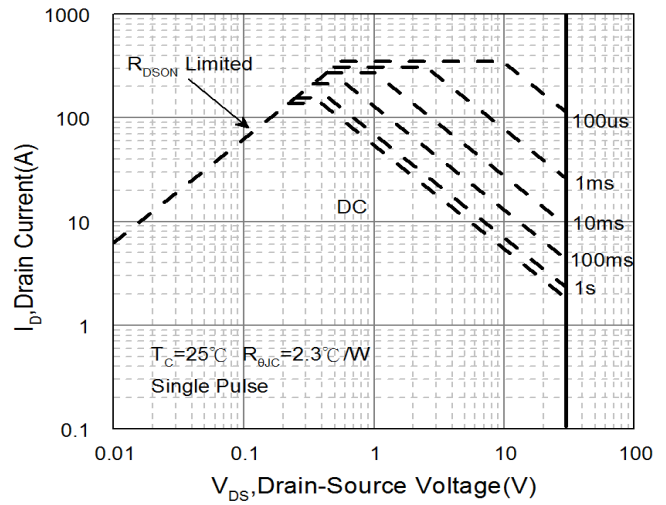


Fig.8 Safe Operating Area

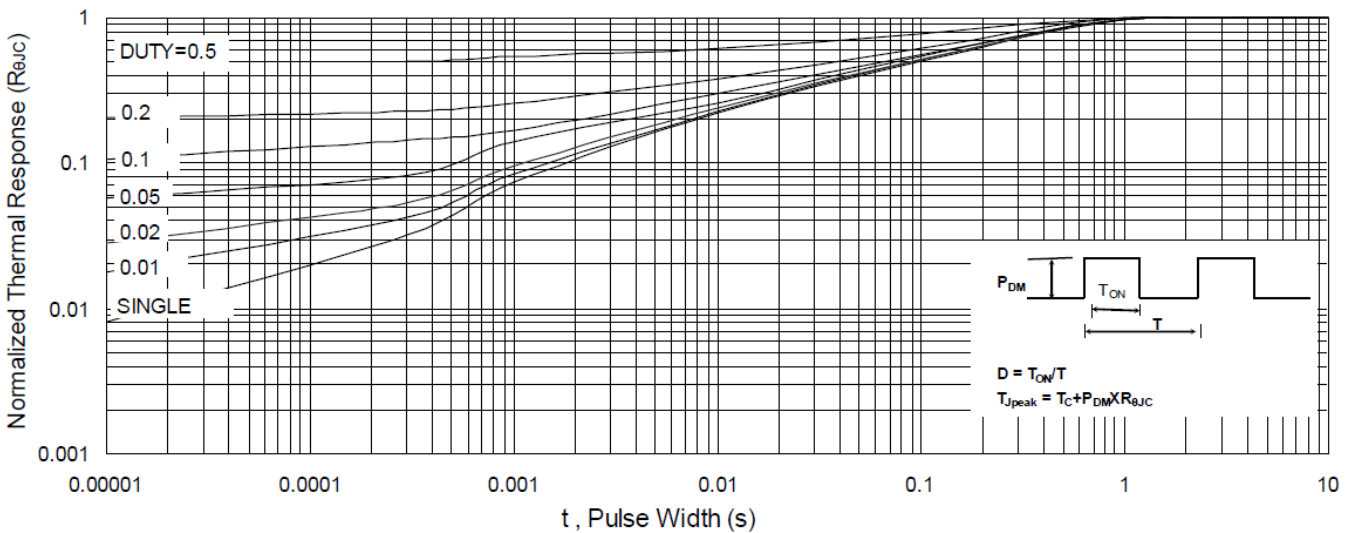


Fig.9 Normalized Maximum Transient Thermal Impedance

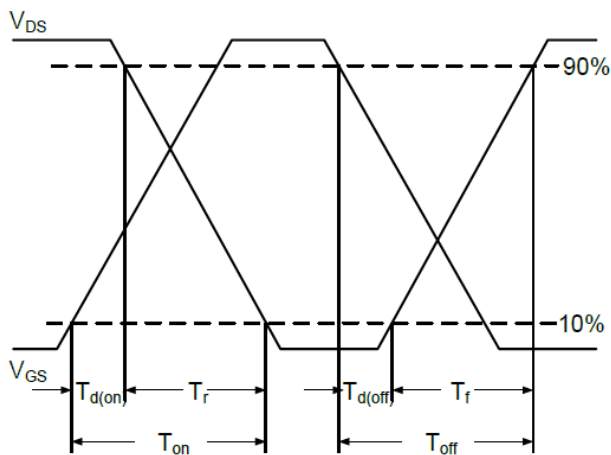


Fig.10 Switching Time Waveform

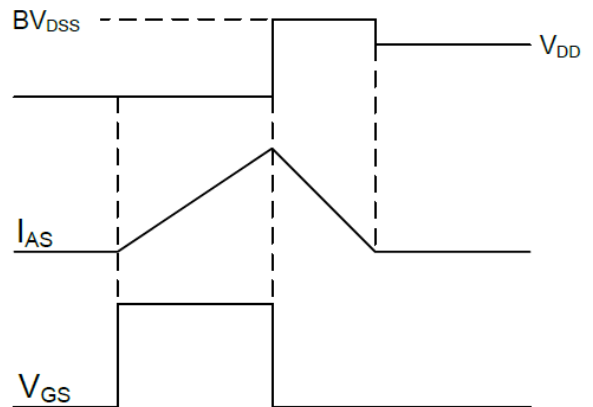


Fig.11 Unclamped Inductive Waveform