

N-Ch 20V Fast Switching MOSFETs

RC12N02S

Product Summary

BVDSS	RDS(on)	ID
20V	8mΩ	12.0A

- Green Device Available
- Super Low Gate Charge
- Excellent Cdv/dt effect decline
- Advanced high cell density Trench technology

Description

The RC12N02S is the high cell density trench N-ch MOSFETs, which provides excellent RDS(on) and efficiency for most of the small power switching and load switch applications.

The RC12N02S meet the RoHS and Green Product requirement with full function reliability approved.

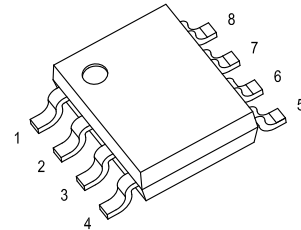
Absolute Maximum Ratings

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	20	V
V_{GS}	Gate-Source Voltage	± 12	V
$I_D@T_A=25^\circ\text{C}$	Continuous Drain Current, $V_{GS} @ 4.5V^1$	12.0	A
$I_D@T_A=70^\circ\text{C}$	Continuous Drain Current, $V_{GS} @ 4.5V^1$	7.0	A
I_{DM}	Pulsed Drain Current ²	34	A
$P_D@T_A=25^\circ\text{C}$	Total Power Dissipation ³	3	W
$P_D@T_A=70^\circ\text{C}$	Total Power Dissipation ³	0.86	W
T_{STG}	Storage Temperature Range	-55 to 150	$^\circ\text{C}$
T_J	Operating Junction Temperature Range	-55 to 150	$^\circ\text{C}$

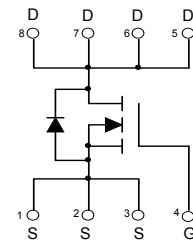
Thermal Data

Symbol	Parameter	Max.	Unit
$R_{\theta JA}$	Thermal Resistance Junction-ambient ¹	100	$^\circ\text{C/W}$

SOP8



Equivalent Circuit



N-Ch 20V Fast Switching MOSFETs

RC12N02S

■Electrical Characteristics (T_J=25℃ unless otherwise specified)

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Units
Off Characteristic						
V _{(BR)DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V, I _D =250μA	20	-	-	V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =20V, V _{GS} =0V,	-	-	1.0	μA
I _{GSS}	Gate to Body Leakage Current	V _{DS} =0V, V _{GS} =±12V	-	-	±100	nA
On Characteristics						
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _D =250μA	0.5	0.75	1.2	V
R _{DS(on)}	Static Drain-Source on-Resistance note3	V _{GS} =4.5V, I _D =15A	-	8	11.2	mΩ
		V _{GS} =2.5V, I _D =10A	-	11.7	17.5	
Dynamic Characteristics						
C _{iss}	Input Capacitance	V _{DS} =10V, V _{GS} =0V, f=1.0MHz	-	1000	-	pF
C _{oss}	Output Capacitance		-	182	-	pF
C _{rss}	Reverse Transfer Capacitance		-	164	-	pF
Q _g	Total Gate Charge	V _{DS} =10V, I _D =15A, V _{GS} =4.5V	-	15	-	nC
Q _{gs}	Gate-Source Charge		-	2	-	nC
Q _{gd}	Gate-Drain(“Miller”) Charge		-	5.2	-	nC
Switching Characteristics						
t _{d(on)}	Turn-on Delay Time	V _{DS} =10V, I _D =15A, R _{GEN} =3Ω, V _{GS} =4.5V	-	9	-	ns
t _r	Turn-on Rise Time		-	25	-	ns
t _{d(off)}	Turn-off Delay Time		-	37	-	ns
t _f	Turn-off Fall Time		-	14	-	ns
Drain-Source Diode Characteristics and Maximum Ratings						
I _S	Maximum Continuous Drain to Source Diode Forward Current		-	-	40	A
I _{SM}	Maximum Pulsed Drain to Source Diode Forward Current		-	-	120	A
V _{SD}	Drain to Source Diode Forward Voltage	V _{GS} =0V, I _S =30A	-	-	1.2	V

Notes:1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature

2. EAS condition: T_J=25℃, V_{DD}=10V, V_G=4.5V, L=0.5mH, R_G=25Ω, I_{AS}=9.6A

3. Pulse Test: Pulse Width≤300μs, Duty Cycle≤0.5%

N-Ch 20V Fast Switching MOSFETs RC12N02S

Typical Performance Characteristics

Figure 1: Output Characteristics

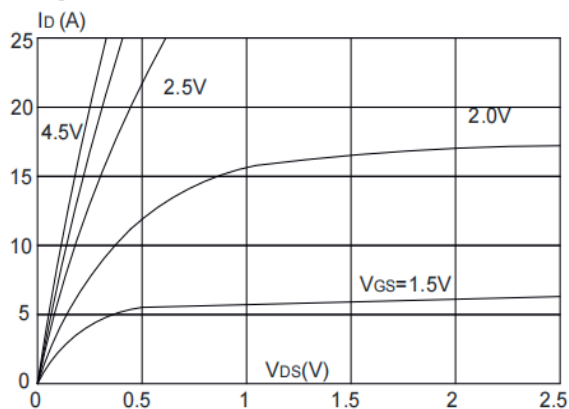


Figure 2: Typical Transfer Characteristics

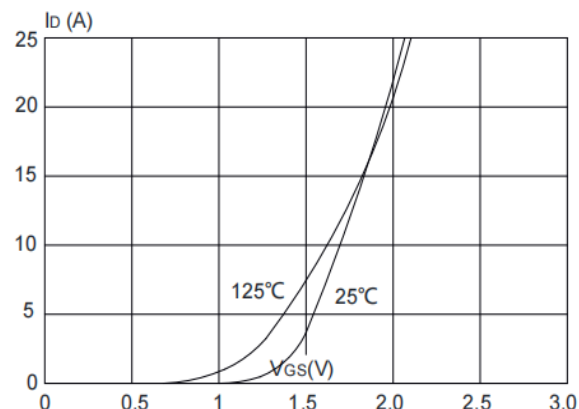


Figure 3: On-resistance vs. Drain Current

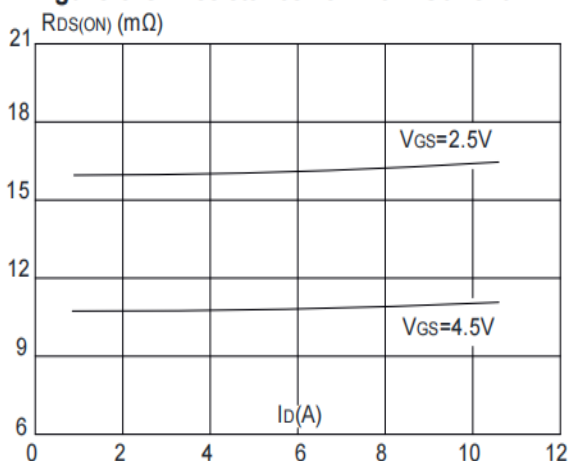


Figure 4: Body Diode Characteristics

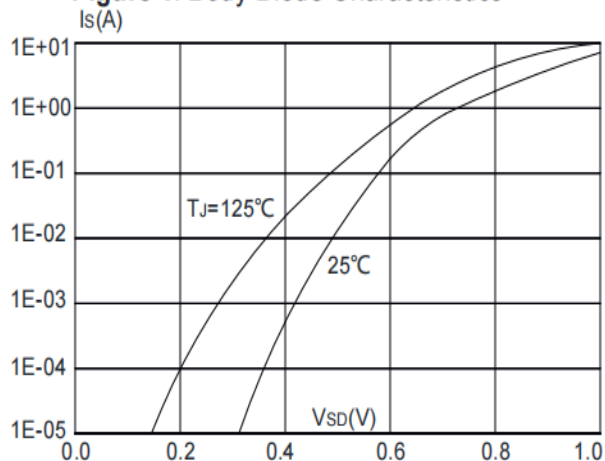


Figure 5: Gate Charge Characteristics

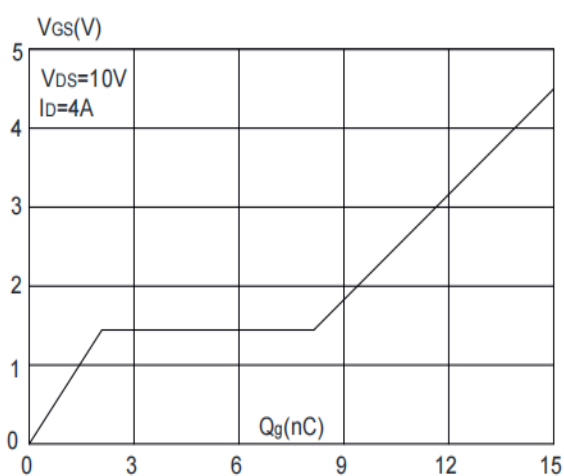
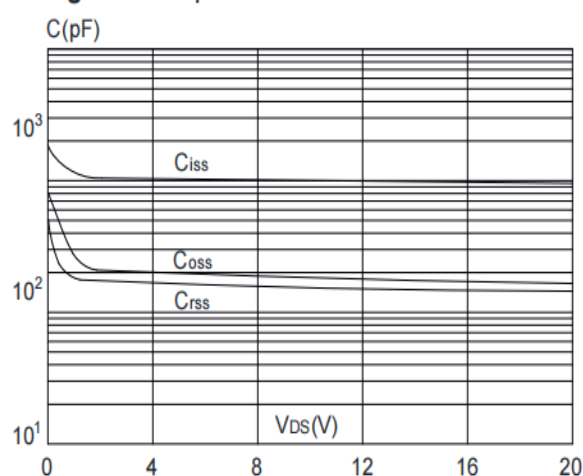


Figure 6: Capacitance Characteristics



N-Ch 20V Fast Switching MOSFETs RC12N02S

Figure 7: Normalized Breakdown Voltage vs. Junction Temperature

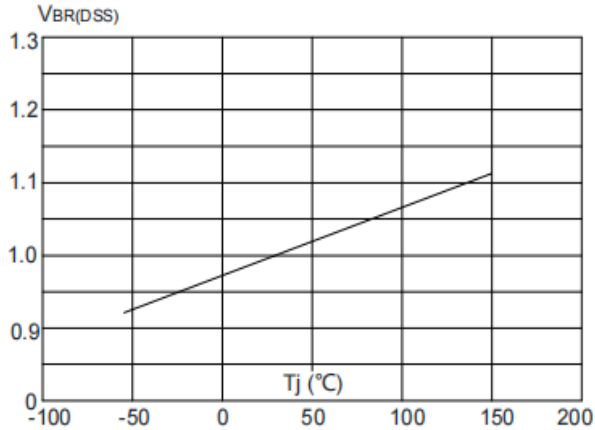


Figure 8: Normalized on Resistance vs. Junction Temperature

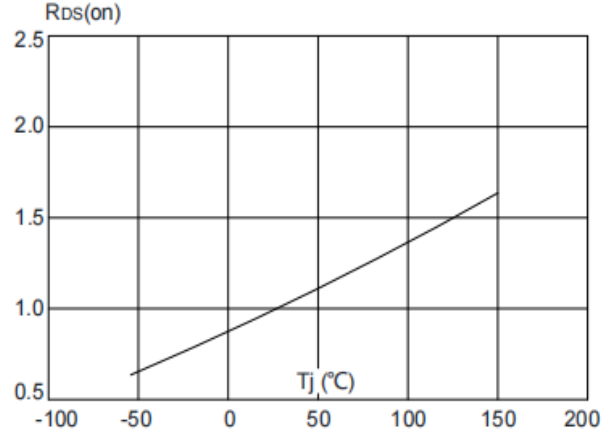


Figure 9: Maximum Safe Operating Area

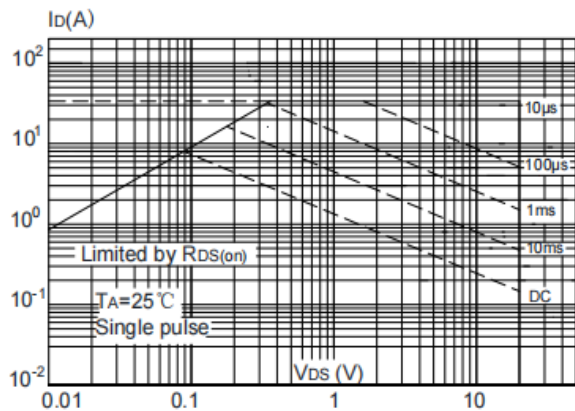


Figure 10: Maximum Continuous Drain Current vs. Ambient Temperature

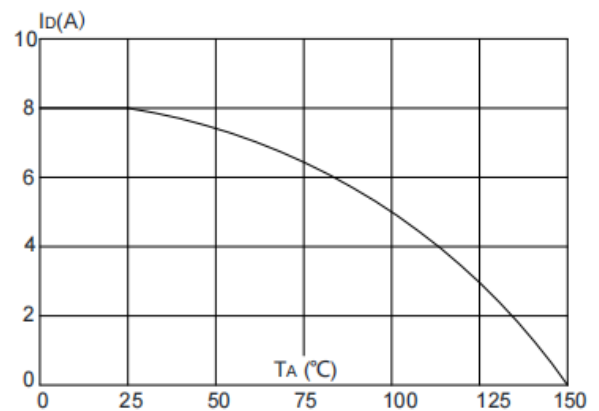
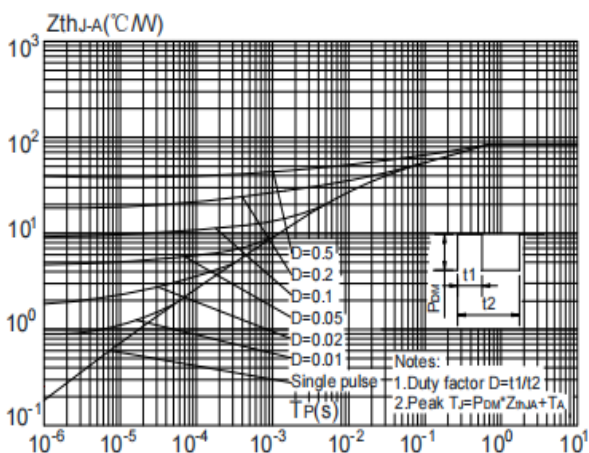
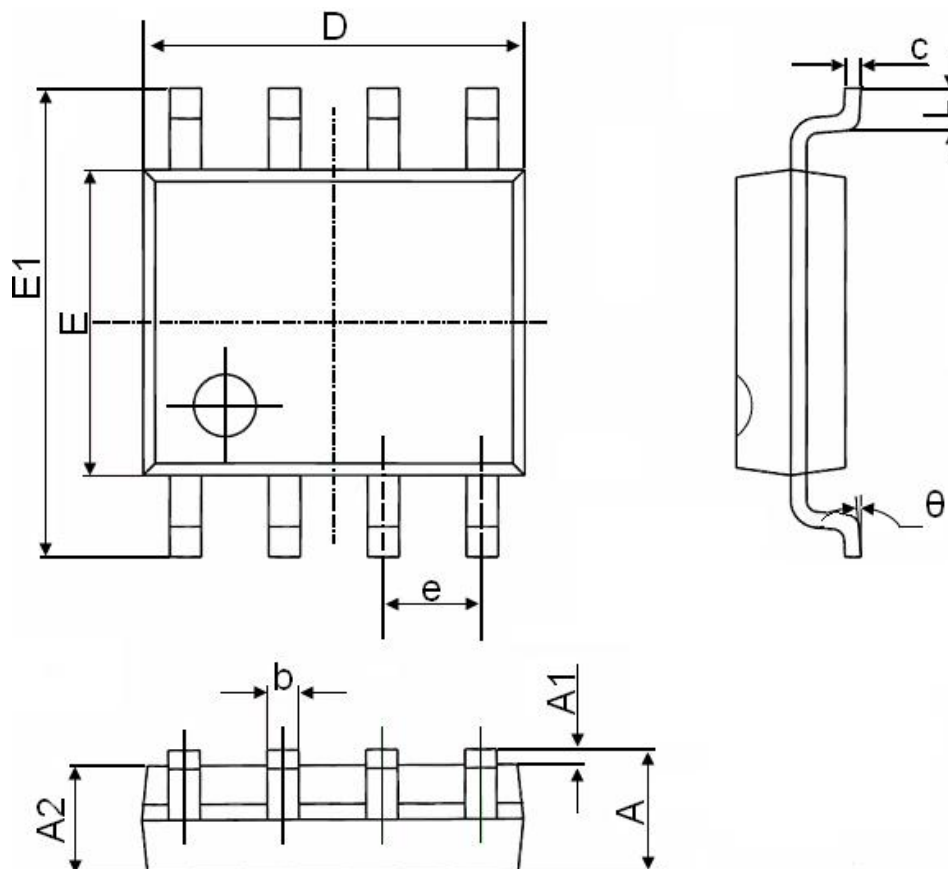


Figure.11: Maximum Effective Transient Thermal Impedance, Junction-to-Ambient



N-Ch 20V Fast Switching MOSFETs RC12N02S

■ SOP-8 Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	1.350	1.750	0.053	0.069
A1	0.100	0.250	0.004	0.010
A2	1.350	1.550	0.053	0.061
b	0.330	0.510	0.013	0.020
c	0.170	0.250	0.006	0.010
D	4.700	5.100	0.185	0.200
E	3.800	4.000	0.150	0.157
E1	5.800	6.200	0.228	0.244
e	1.270(BSC)		0.050(BSC)	
L	0.400	1.270	0.016	0.050
θ	0°	8°	0°	8°