

Description:

This N+P Channel MOSFET uses advanced trench technology and design to provide excellent $R_{DS(on)}$ with low gate charge.

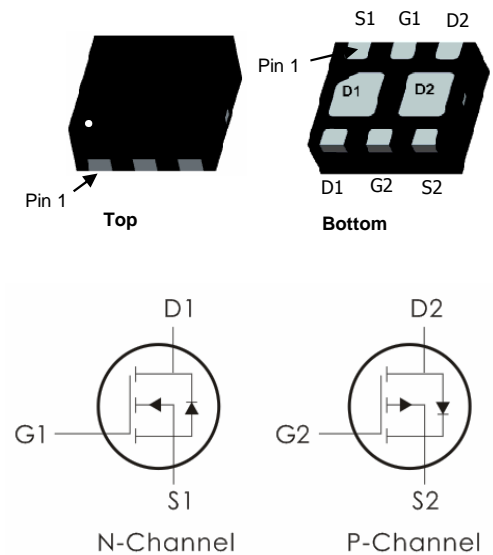
It can be used in a wide variety of applications.

Features:

N-Channel: $V_{DS}=30V, I_D=5.5A, R_{DS(on)} < 24m\Omega @ V_{GS}=10V$ (Typ: $18m\Omega$)

P-Channel: $V_{DS}=-30V, I_D=-3.7A, R_{DS(on)} < 46m\Omega @ V_{GS}=-10V$ (Typ: $36m\Omega$)

- 1) Low gate charge.
- 2) Green device available.
- 3) Advanced high cell density trench technology for ultra low $R_{DS(on)}$.
- 4) Excellent package for good heat dissipation.
- 5) MSL3



Package Marking and Ordering Information:

Part NO.	Marking	Package	Packing
RC520NPG	C520NP	DFN2*2-6D	3000 pcs/Reel

Absolute Maximum Ratings: ($T_A=25^\circ C$ unless otherwise noted)

Symbol	Parameter	N-Channel	P-Channel	Units
V_{DS}	Drain-Source Voltage	30	-30	V
V_{GS}	Gate-Source Voltage	± 20	± 20	V
I_D	Continuous Drain Current- $T_C=25^\circ C$ ¹	5.5	-3.7	A
	Continuous Drain Current- $T_C=100^\circ C$ ¹	3.8	-2.6	
I_{DM}	Pulsed Drain Current ²	22	-14.8	A
P_D	Power Dissipation - $T_C=25^\circ C$	1.25	1.25	W
T_J, T_{STG}	Operating and Storage Junction Temperature Range	-55 to +150		$^\circ C$

Thermal Characteristics:

Symbol	Parameter	N-CH	P-CH	Units
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	100	100	$^\circ C/W$

N-Channel Electrical Characteristics: ($T_A=25^\circ\text{C}$ unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
Off Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=250\ \mu\text{A}$	30	---	---	V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{GS}=0V, V_{DS}=30V$	---	---	1	μA
I_{GSS}	Gate-Source Leakage Current	$V_{GS}=\pm 20V, V_{DS}=0A$	---	---	± 100	nA
On Characteristics						
$V_{GS(th)}$	Gate-Source Threshold Voltage	$V_{GS}=V_{DS}, I_D=250\ \mu\text{A}$	1.2	1.5	2.5	V
$R_{DS(on)}$	Drain-Source On Resistance ⁴	$V_{GS}=10V, I_D=3A$	---	18	24	m Ω
		$V_{GS}=4.5V, I_D=2A$	---	27	34	
Dynamic Characteristics						
C_{iss}	Input Capacitance	$V_{DS}=15V, V_{GS}=0V, f=1\text{MHz}$	---	450	---	pF
C_{oss}	Output Capacitance		---	57.7	---	
C_{rss}	Reverse Transfer Capacitance		---	48	---	
Switching Characteristics⁴						
$t_{d(on)}$	Turn-On Delay Time	$V_{DS}=15V, I_D=3A,$ $R_{REN}=3\ \Omega, V_{GS}=10V$	---	2	---	ns
t_r	Rise Time		---	2.5	---	ns
$t_{d(off)}$	Turn-Off Delay Time		---	10.5	---	ns
t_f	Fall Time		---	2	---	ns
Q_g	Total Gate Charge		$V_{GS}=10V, V_{DS}=15V,$ $I_D=3A$	---	10	---
Q_{gs}	Gate-Source Charge	---		1.2	---	nC
Q_{gd}	Gate-Drain "Miller" Charge	---		1.8	---	nC
Drain-Source Diode Characteristics						
I_S	Continuous Drain to Source Diode	$V_D=V_G=0V$	---	---	4.6	A
I_{SM}	Pulsed Drain to Source Diode		---	---	18.3	A
V_{SD}	Source-Drain Diode Forward Voltage	$V_{GS}=0V, I_S=3A$	---	---	1.2	V

Notes:

1. Computed continuous current assumes the condition of $T_{j,Max}$ while the actual continuous current depends on the thermal & electro-mechanical application board design
2. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature
3. EAS condition : $T_J=25^{\circ}C, V_{DD}=15V, V_G=10V, L=0.5mH$
4. Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 0.5\%$

Test Circuit

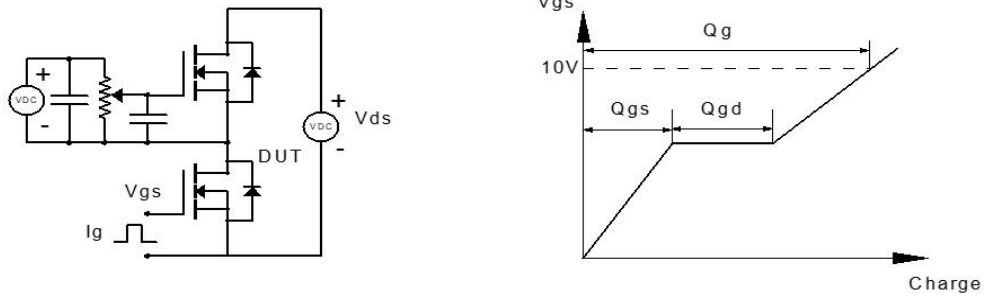


Figure 1: Gate Charge Test Circuit & Waveform

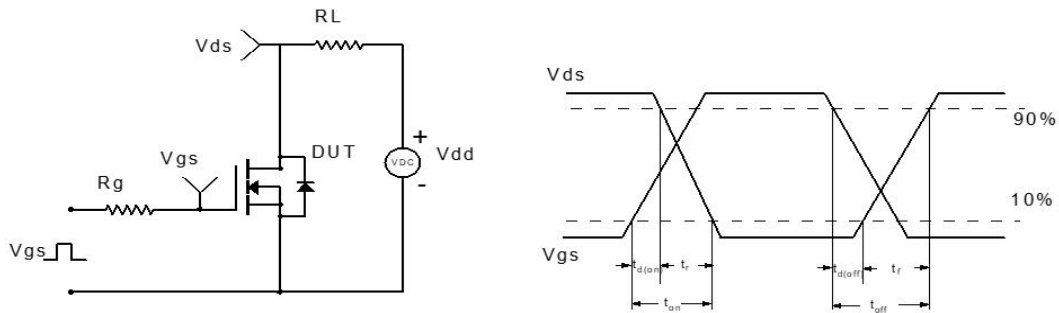


Figure 2: Resistive Switching Test Circuit & Waveform

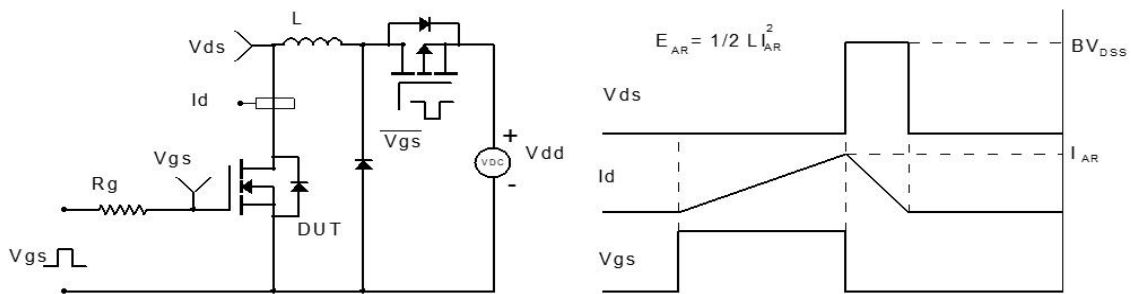


Figure 3: Unclamped Inductive Switching Test Circuit & Waveform

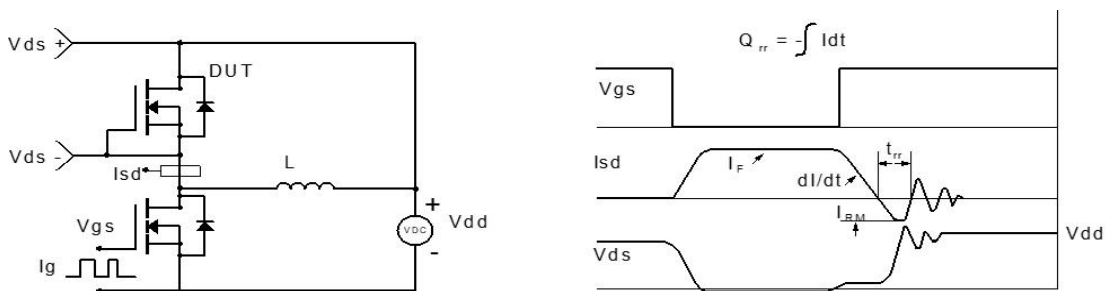


Figure 4: Diode Recovery Test Circuit & Waveform

P-Channel Electrical Characteristics: ($T_A=25^\circ\text{C}$ unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
Off Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=250\ \mu\text{A}$	-30	---	---	V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{GS}=0V, V_{DS}=-30V$	---	---	-1	μA
I_{GSS}	Gate-Source Leakage Current	$V_{GS}=\pm 20V, V_{DS}=0A$	---	---	± 100	nA
On Characteristics						
$V_{GS(th)}$	Gate-Source Threshold Voltage	$V_{GS}=V_{DS}, I_D=250\ \mu\text{A}$	-1	-1.5	-2.5	V
$R_{DS(on)}$	Drain-Source On Resistance ⁴	$V_{GS}=-10V, I_D=-2A$	---	36	46	m Ω
		$V_{GS}=-4.5V, I_D=-1A$	---	57	72	
Dynamic Characteristics						
C_{iss}	Input Capacitance	$V_{DS}=-15V, V_{GS}=0V, f=1\text{MHz}$	---	450	---	pF
C_{oss}	Output Capacitance		---	59.8	---	
C_{rss}	Reverse Transfer Capacitance		---	50	---	
Switching Characteristics						
$t_{d(on)}$	Turn-On Delay Time	$V_{DD}=-15V, I_D=-3A$ $V_{GS}=-10V, R_{GEN}=3\ \Omega$	---	2.3	---	ns
t_r	Rise Time		---	4.6	---	ns
$t_{d(off)}$	Turn-Off Delay Time		---	9.4	---	ns
t_f	Fall Time		---	1.7	---	ns
Q_g	Total Gate Charge	$V_{GS}=-10V, V_{DS}=-15V,$ $I_D=-3A$	---	8.5	---	nC
Q_{gs}	Gate-Source Charge		---	0.9	---	nC
Q_{gd}	Gate-Drain "Miller" Charge		---	1.4	---	nC
Drain-Source Diode Characteristics						
I_S	Continuous Drain to Source Diode	$V_D=V_G=0V$	---	---	-2.8	A
I_{SM}	Pulsed Drain to Source Diode		---	---	-12.3	---
T_{rr}	Reverse Recovery Time	$I_F=-3A, T_J=25^\circ\text{C}$	---	9	---	ns
Q_{rr}	Reverse Recovery Charge	$dI/dt=100A/\mu\text{s}$	---	3	---	nC
V_{SD}	Source-Drain Diode Forward Voltage	$V_{GS}=0V, I_S=-2A$	---	---	-1.2	V

Notes:

1. Computed continuous current assumes the condition of $T_{j,Max}$ while the actual continuous current depends on the thermal & electro-mechanical application board design
2. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature
3. EAS condition : $T_J=25^{\circ}C, V_{DD}=-15V, V_G=-10V, L=0.5mH$
4. Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 0.5\%$

Test Circuit

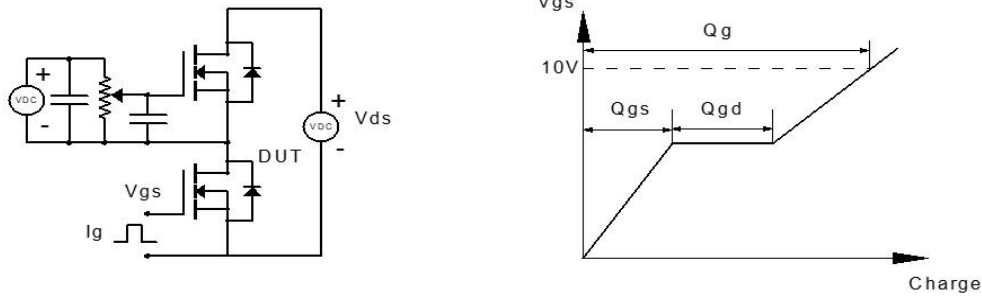


Figure 1: Gate Charge Test Circuit & Waveform

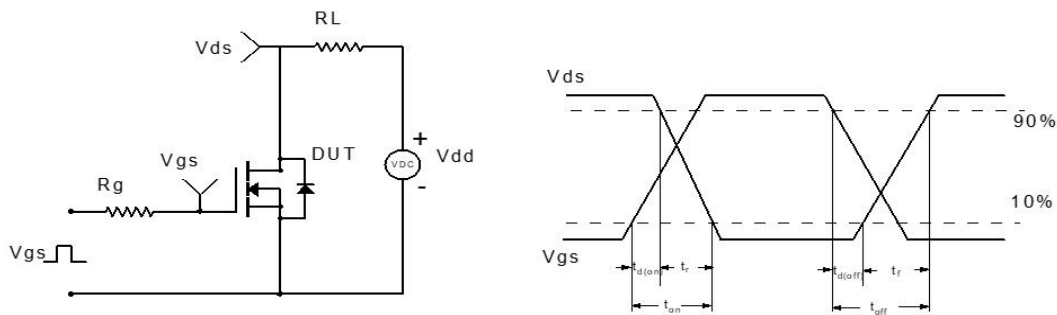


Figure 2: Resistive Switching Test Circuit & Waveform

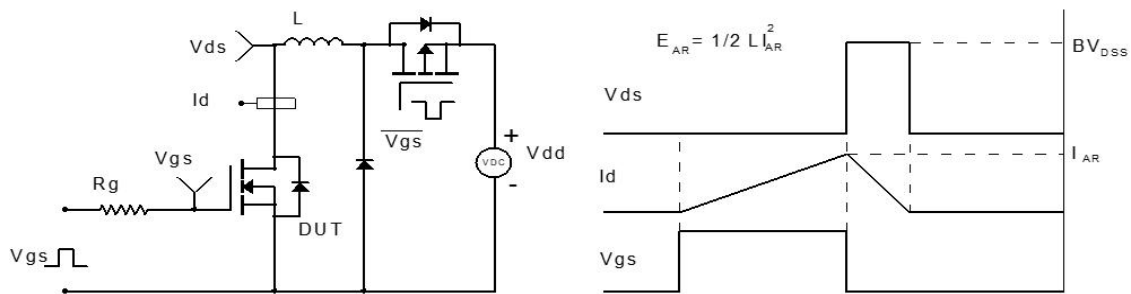


Figure 3: Unclamped Inductive Switching Test Circuit & Waveform

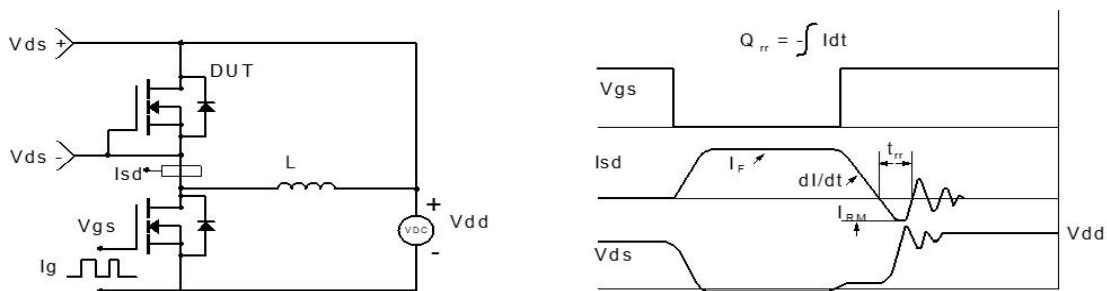
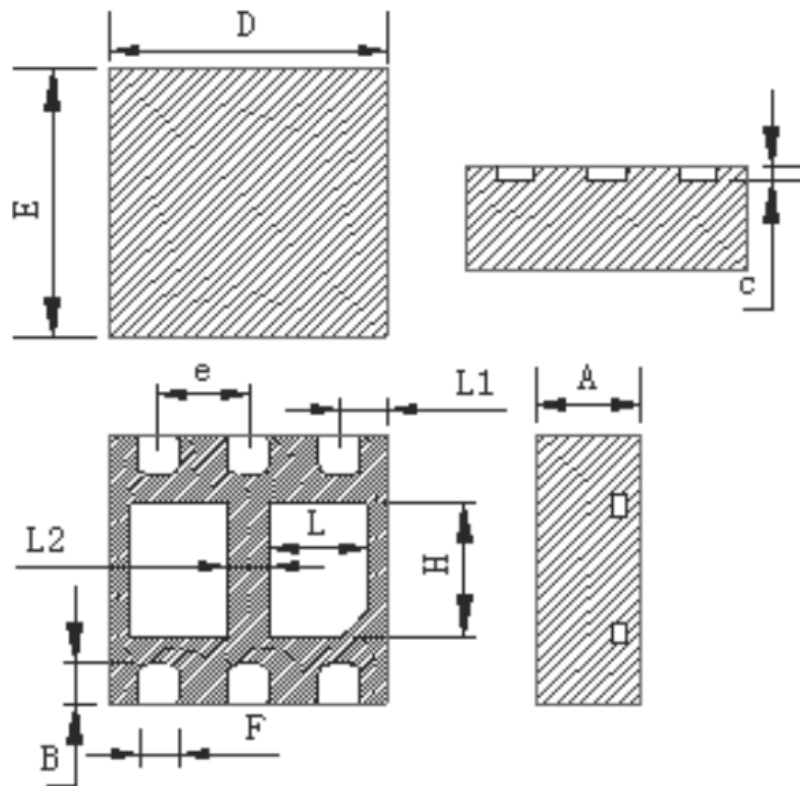


Figure 4: Diode Recovery Test Circuit & Waveform

DFN2X2-6D Package Outline Data

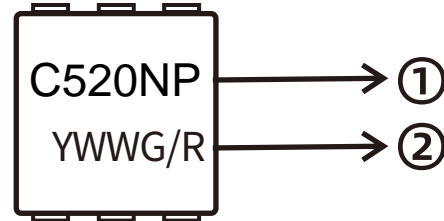
UNIT: mm



Symbol	Min	Typ	Max
A	0.68	0.75	0.80
B	0.20	0.30	0.40
C		0.203	
D	1.90	2.00	2.10
E	1.90	2.00	2.10
e		0.65	
F	0.20	0.30	0.40
H	0.85	1.00	1.10
L	0.55	0.70	0.80
L1	0.25	0.35	0.45
L2	0.20	0.30	0.40

Marking Information:

- ①: Part NO.
- ②: Date Code (YWWG / R)
 Y: Year Code , last digit of the year
 WW : Week Code (01-53)
 G/R: G(Green) /R(Lead Free)



Previous Version

Version	Date	Subjects (major changes since last revision)
1.0	2025-09-10	Release of final version

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