

## N-Channel Super Trench Power MOSFET

### Description

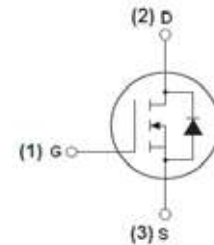
The RM12N100S8 uses **Super Trench** technology that is uniquely optimized to provide the most efficient high frequency switching performance. Both conduction and switching power losses are minimized due to an extremely low combination of  $R_{DS(ON)}$  and  $Q_g$ . This device is ideal for high-frequency switching and synchronous rectification.

### General Features

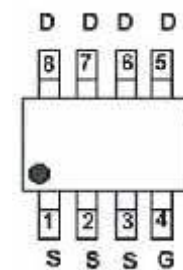
- $V_{DS} = 100V, I_D = 12A$   
 $R_{DS(ON)} = 8m\Omega$  (typical) @  $V_{GS} = 10V$   
 $R_{DS(ON)} = 11m\Omega$  (typical) @  $V_{GS} = 4.5V$
- Excellent gate charge x  $R_{DS(on)}$  product(FOM)
- Very low on-resistance  $R_{DS(on)}$
- 150 °C operating temperature
- Pb-free lead plating
- 100% UIS tested

### Application

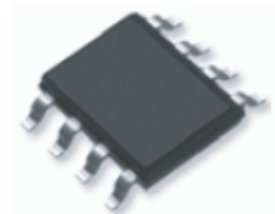
- DC/DC Converter
- Ideal for high-frequency switching and synchronous rectification
- Halogen-free



Schematic diagram



pin assignment



SOP-8 top view

**100% UIS TESTED!**

### Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
12N100	RM12N100S8	SOP-8	-	-	-

### Absolute Maximum Ratings ( $T_A = 25^\circ\text{C}$ unless otherwise noted)

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	$V_{DS}$	100	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	V
Drain Current-Continuous	$I_D$	12	A
Drain Current-Continuous( $T_C = 100^\circ\text{C}$ )	$I_D(100^\circ\text{C})$	9	A
Maximum Power Dissipation	$P_D$	3.1	W
Operating Junction and Storage Temperature Range	$T_J, T_{STG}$	-55 To 150	$^\circ\text{C}$

## Thermal Characteristic

Thermal Resistance, Junction-to-Ambient <sup>(Note 2)</sup>	$R_{\theta JA}$	40	$^{\circ}\text{C}/\text{W}$
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## Electrical Characteristics ( $T_A=25^{\circ}\text{C}$ unless otherwise noted)

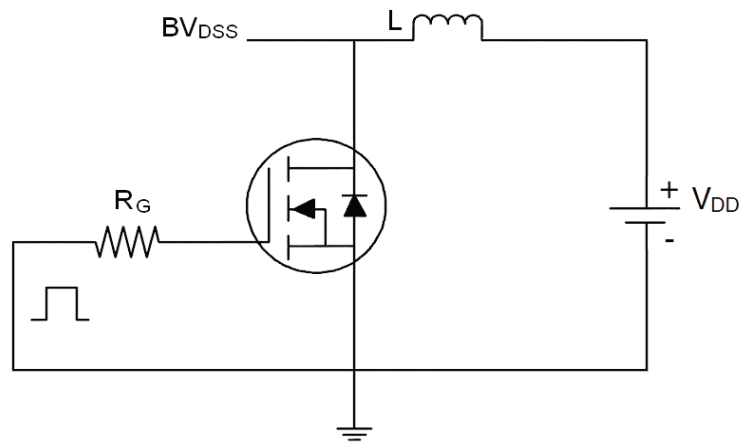
Parameter	Symbol	Condition	Min	Typ	Max	Unit
<b>Off Characteristics</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	$V_{GS}=0V, I_D=250\mu A$	100	-	-	V
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS}=100V, V_{GS}=0V$	-	-	1	$\mu A$
Gate-Body Leakage Current	$I_{GSS}$	$V_{GS}=\pm 20V, V_{DS}=0V$	-	-	$\pm 100$	nA
<b>On Characteristics</b> <sup>(Note2)</sup>						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	1.0	1.6	2.5	V
Drain-Source On-State Resistance	$R_{DS(on)}$	$V_{GS}=10V, I_D=12A$	-	8	10	m $\Omega$
		$V_{GS}=4.5V, I_D=12A$	-	11	13.2	m $\Omega$
Forward Transconductance	$g_{FS}$	$V_{DS}=10V, I_D=10A$	-	10	-	S
<b>Dynamic Characteristics</b> <sup>(Note3)</sup>						
Input Capacitance	$C_{iss}$	$V_{DS}=50V, V_{GS}=0V,$ $F=1.0\text{MHz}$	-	2250	-	PF
Output Capacitance	$C_{oss}$		-	410	-	PF
Reverse Transfer Capacitance	$C_{rss}$		-	25	-	PF
<b>Switching Characteristics</b> <sup>(Note 3)</sup>						
Turn-on Delay Time	$t_{d(on)}$	$V_{DD}=50V, I_D=1A, R_L=6\Omega,$ $R_G=1\Omega, V_{GS}=10V$	-	14.6	30	nS
Turn-on Rise Time	$t_r$		-	21.5	44	nS
Turn-Off Delay Time	$t_{d(off)}$		-	54	108	nS
Turn-Off Fall Time	$t_f$		-	83.3	168	nS
Total Gate Charge	$Q_g$	$I_D=10A, V_{DD}=50V, V_{GS}=10V$	-	37.8	76	nC
Gate-Source Charge	$Q_{gs}$		-	7.8	-	nC
Gate-Drain Charge	$Q_{gd}$		-	8.4	-	nC
<b>Drain-Source Diode Characteristics</b>						
Diode Forward Voltage <sup>(Note 2)</sup>	$V_{SD}$	$V_{GS}=0V, I_S=10A$	-	-	1.0	V

### Notes:

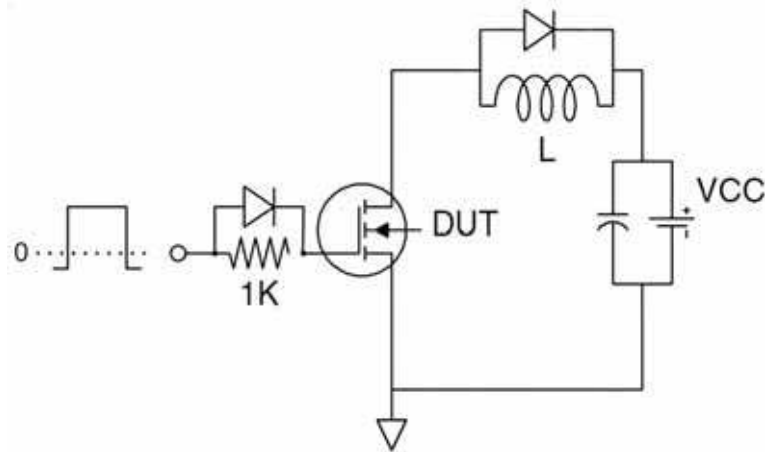
1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Pulse Test: Pulse Width  $\leq 300\mu s$ , Duty Cycle  $\leq 2\%$ .
3. Guaranteed by design, not subject to production

## Test Circuit

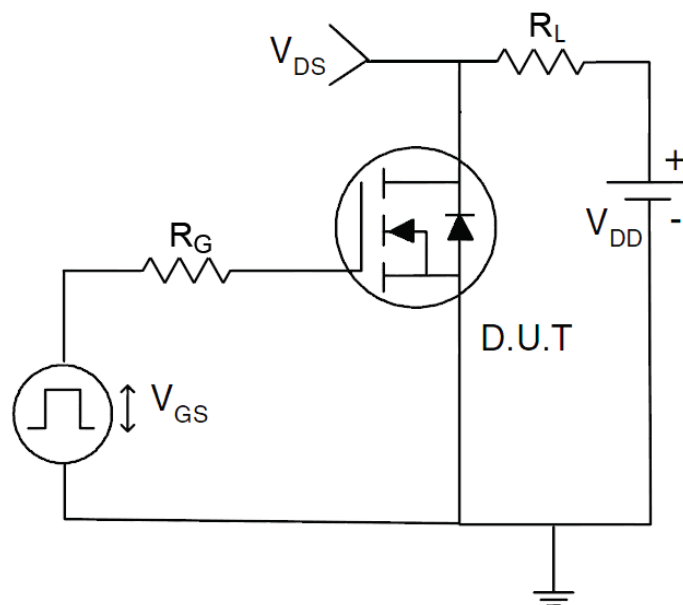
### 1) $E_{AS}$ test Circuit



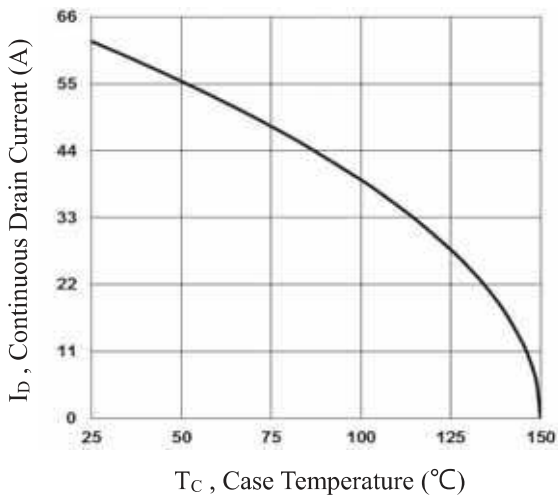
### 2) Gate charge test Circuit



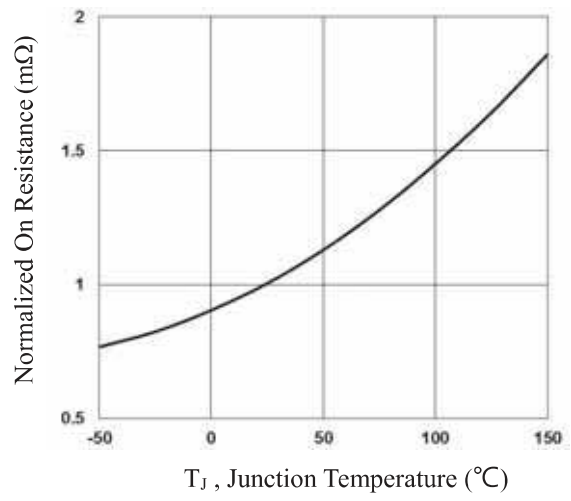
### 3) Switch Time Test Circuit



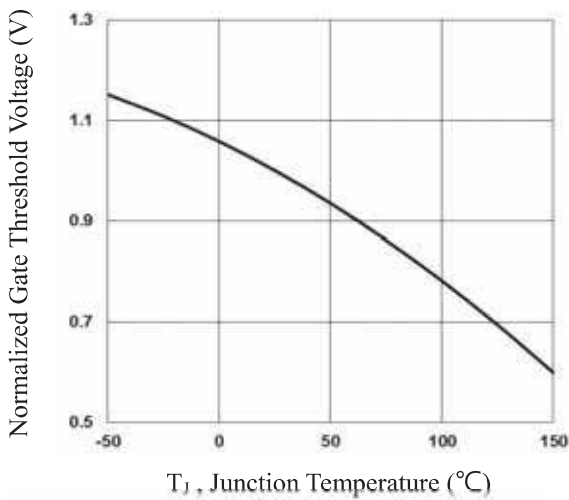
## RATING AND CHARACTERISTICS CURVES (RM12N100S8)



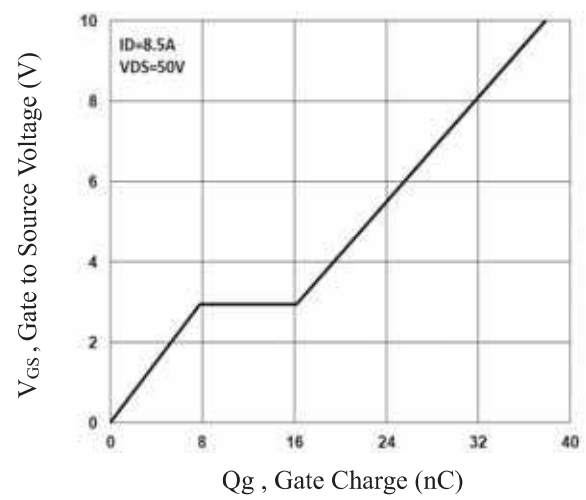
**Fig.1 Continuous Drain Current vs.  $T_C$**



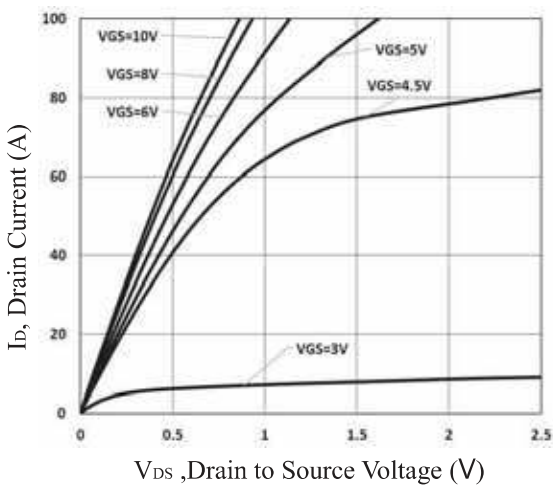
**Fig.2 Normalized RDSON vs.  $T_J$**



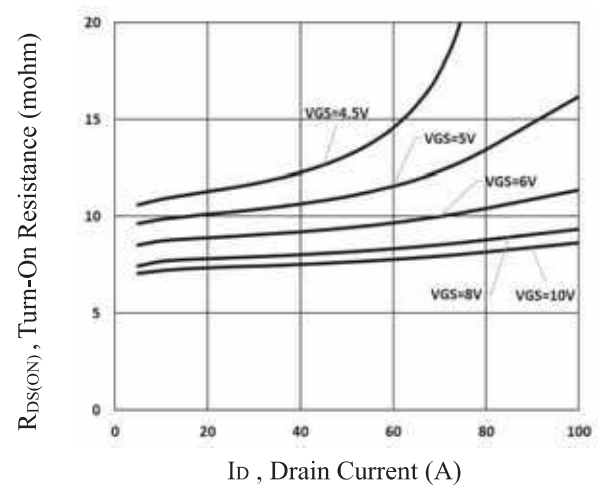
**Fig.3 Normalized  $V_{th}$  vs.  $T_J$**



**Fig.4 Gate Charge Characteristics**

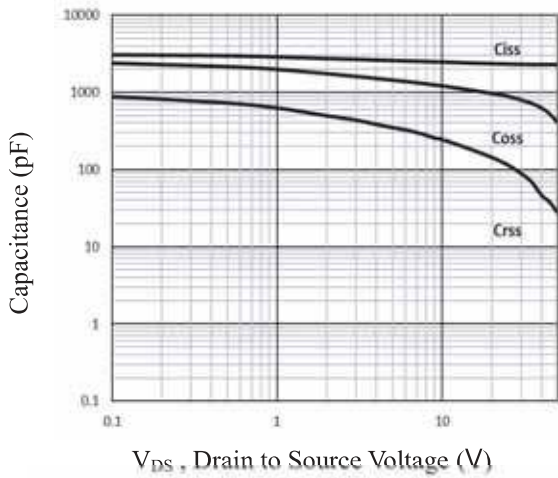


**Fig.5 Typical Output Characteristics**

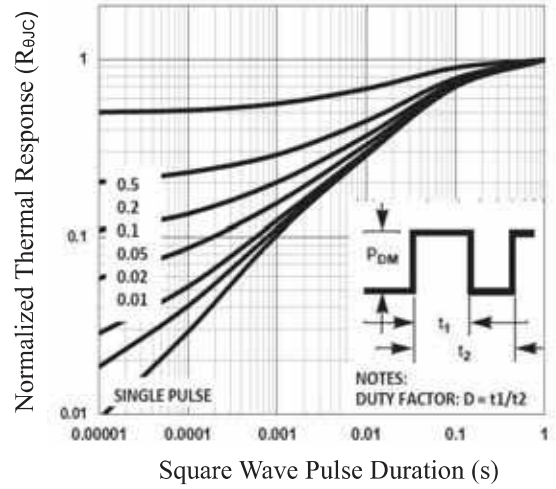


**Fig.6 Turn-On Resistance vs.  $I_D$**

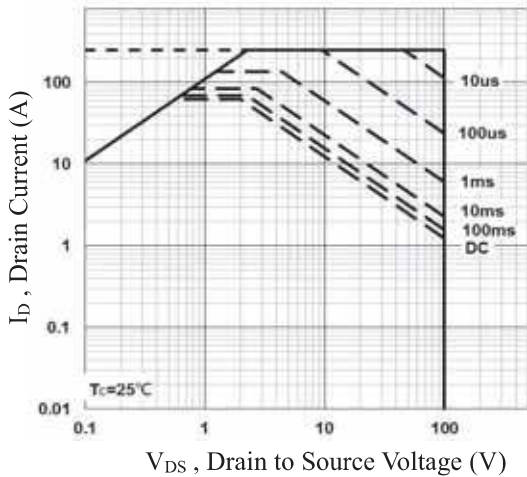
## RATING AND CHARACTERISTICS CURVES (RM12N100S8)



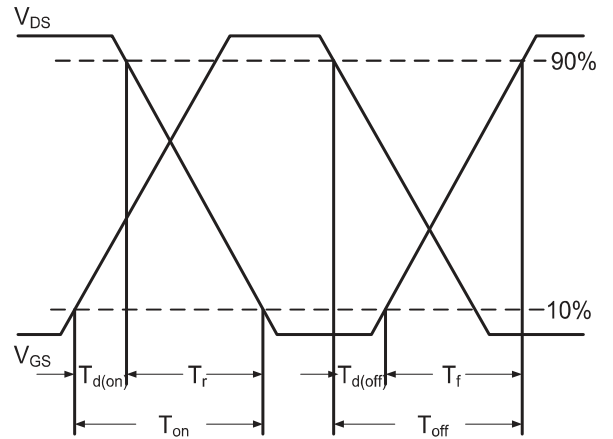
**Fig.7 Capacitance Characteristics**



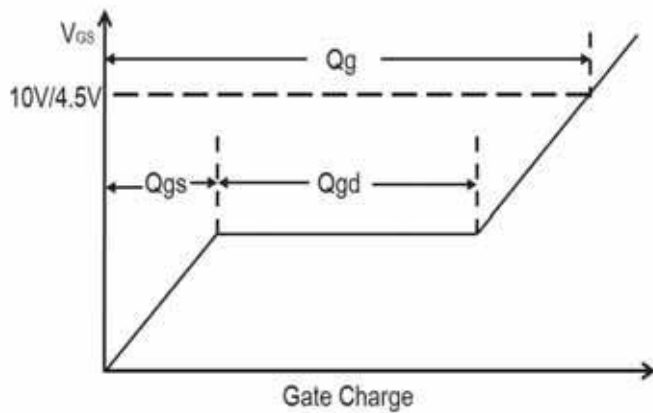
**Fig.8 Normalized Transient Impedance**



**Fig.9 Maximum Safe Operation Area**

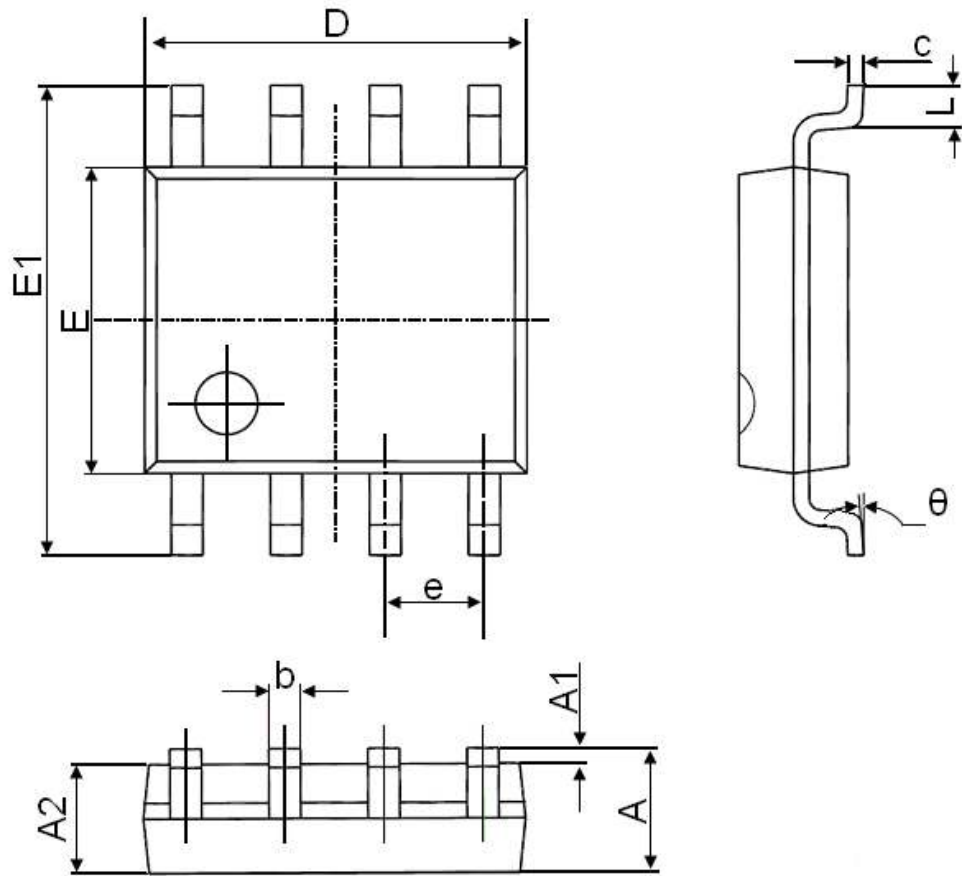


**Fig.10 Switching Time Waveform**



**Fig.11 Gate Charge Waveform**

## 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
$\theta$	0°	8°	0°	8°

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