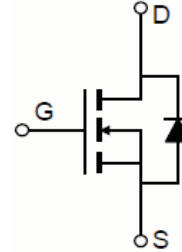


N-Channel Super Trench Power MOSFET

Description

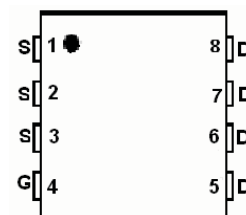
The RM180N60DF uses **Super Trench** technology that is uniquely optimized to provide the most efficient high frequency switching performance. Both conduction and switching power losses are minimized due to an extremely low combination of $R_{DS(on)}$ and Q_g . This device is ideal for high-frequency switching and synchronous rectification.



Schematic diagram

General Features

- $V_{DS} = 60V, I_D = 180A$
- $R_{DS(on)} < 2.3 m\Omega @ V_{GS} = 10V$
- $R_{DS(on)} < 3.5 m\Omega @ V_{GS} = 4.5V$
- Excellent gate charge x $R_{DS(on)}$ product
- Very low on-resistance $R_{DS(on)}$
- 150 °C operating temperature
- Pb-free lead plating
- 100% UIS tested



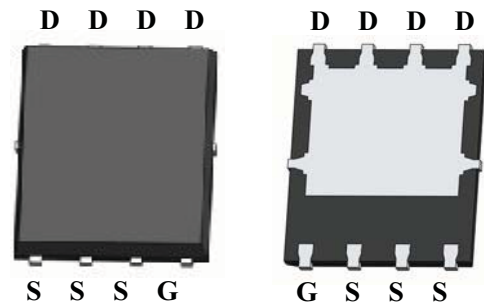
Marking and pin assignment

Application

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

100% UIS TESTED!

100% ΔV_{ds} TESTED!



Top View

Bottom View

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
180N60	RM180N60DF	DFN5X6-8L	-	-	-

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

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DS}	60	V
Gate-Source Voltage	V_{GS}	± 20	V
Continuous Drain Current ($T_a = 25^\circ C$)	I_D	180	A
Continuous Drain Current ($T_a = 100^\circ C$)	I_D	120	A
Pulsed Drain Current ⁽¹⁾	I_{DM}	720	A
Singel Pulsed Avalanche Energy ⁽²⁾	E_{AS}	306	mJ
Power Dissipation	P_D	150	W
Thermal Resistance from Junction to Case	$R_{\theta JC}$	1.12	$^\circ C/W$
Junction Temperature	T_J	150	$^\circ C$
Storage Temperature	T_{STG}	-55~ +150	$^\circ C$

MOSFET ELECTRICAL CHARACTERISTICS ($T_a=25^\circ\text{C}$ unless otherwise noted)

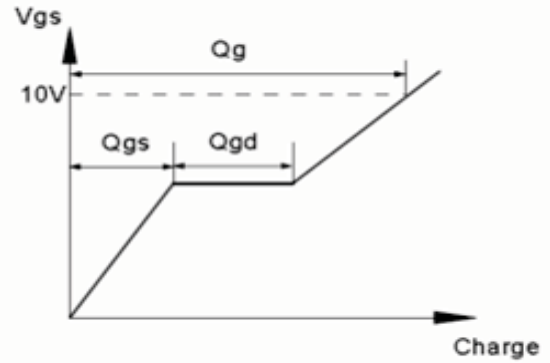
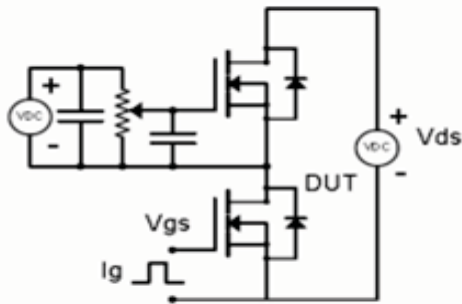
Parameter	Symbol	Test Condition	Min	Type	Max	Unit
Static Characteristics						
Drain-source breakdown voltage	$V_{(BR)DSS}$	$V_{GS} = 0V, I_D = 250\mu A$	60	-	-	V
Zero gate voltage drain current	I_{DSS}	$V_{DS} = 60V, V_{GS} = 0V$	-	-	1	μA
Gate-body leakage current	I_{GSS}	$V_{GS} = \pm 20V, V_{DS} = 0V$	-	-	± 100	nA
Gate threshold voltage ⁽³⁾	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\mu A$	1.5	2.0	3.0	V
Drain-source on-resistance ⁽³⁾	$R_{DS(on)}$	$V_{GS} = 10V, I_D = 20A$	-	1.9	2.3	$m\Omega$
		$V_{GS} = 4.5V, I_D = 10A$	-	3.0	3.5	$m\Omega$
Forward Threshold Voltage	g_{fs}	$V_{DS} = 5V, I_D = 20A$	-	75	-	S
Dynamic characteristics						
Input Capacitance	C_{iss}	$V_{DS} = 25V, V_{GS} = 0V, f = 100KHz$	-	6052	-	pF
Output Capacitance	C_{oss}		-	1470	-	
Reverse Transfer Capacitance	C_{rss}		-	185	-	
Switching characteristics						
Turn-on delay time	$t_{d(on)}$	$V_{DD} = 30V, I_D = 25A,$ $V_{GS} = 10V, R_G = 2\Omega$	-	21	-	ns
Turn-on rise time	t_r		-	25	-	
Turn-off delay time	$t_{d(off)}$		-	65	-	
Turn-off fall time	t_f		-	35	-	
Total Gate Charge	Q_g	$V_{DS} = 30V, I_D = 25A,$ $V_{GS} = 10V$	-	110	-	nC
Gate-Source Charge	Q_{gs}		-	20	-	
Gate-Drain Charge	Q_{gd}		-	21	-	
Reverse Recovery Charge	Q_{rr}	$I_F = 20A, di/dt = 100A/\mu s$		80		nC
Reverse Recovery Time	T_{rr}	$I_F = 20A, di/dt = 100A/\mu s$		40		ns
Source-Drain Diode characteristics						
Diode Forward voltage ⁽³⁾	V_{DS}	$V_{GS} = 0V, I_S = 10A$	-	-	1.3	V
Diode Forward current ⁽⁴⁾	I_S		-	-	150	A

Notes:

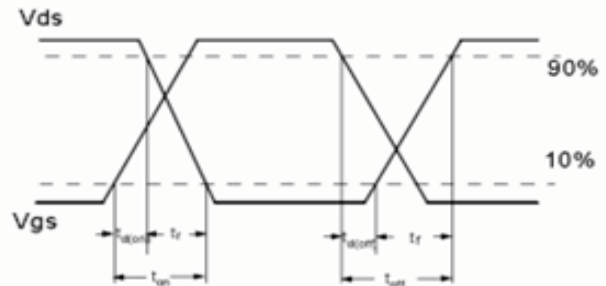
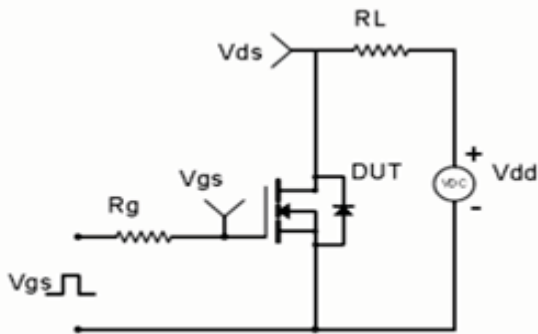
1. Repetitive Rating: pulse width limited by maximum junction temperature
2. EAS Condition: $T_J = 25^\circ\text{C}, V_{DD} = 48V, R_G = 25\Omega, L = 0.5Mh$
3. Pulse Test: pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$
4. Surface Mounted on FR4 Board, $t \leq 10$ sec

Test Circuit & Waveform

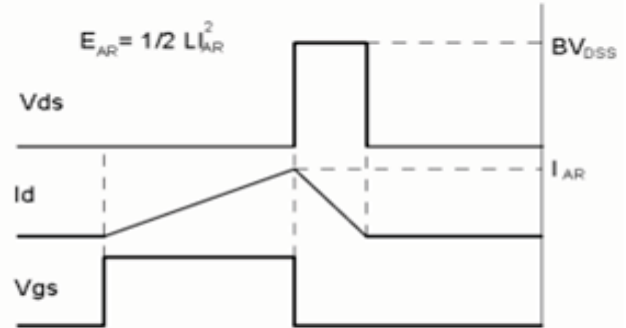
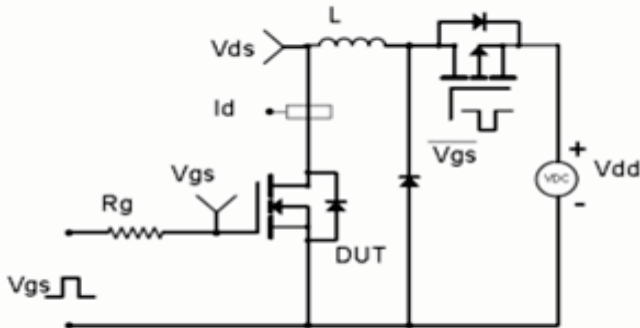
Gate Charge Test Circuit & Waveform



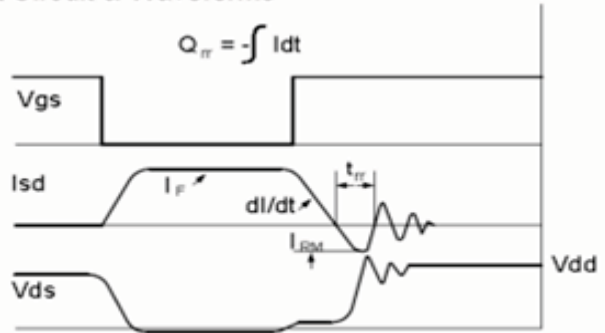
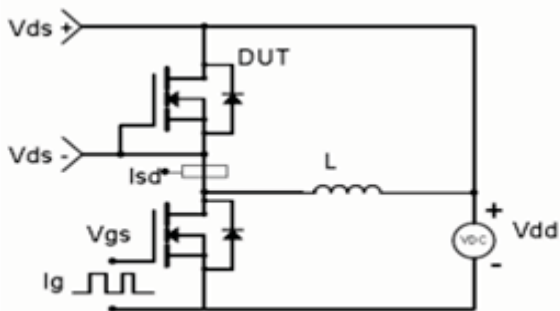
Resistive Switching Test Circuit & Waveforms



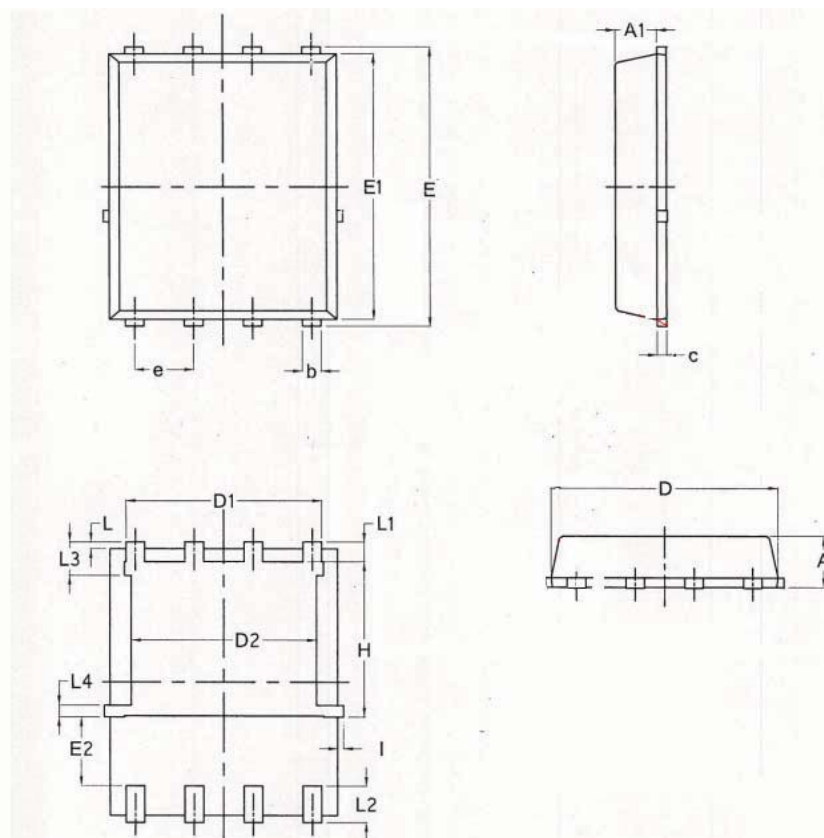
Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms



DFN5X6-8L Package Information



Symbol	Dimensions In Millimeters			Dimensions In Inches		
	Min.	Nom.	Max.	Min.	Nom.	Max.
A	0.90	1.10	1.17	0.0354	0.0433	0.0461
A1	0.824	0.897	0.97	0.0324	0.0353	0.0382
b	0.33	0.41	0.50	0.0130	0.0161	0.0197
C	0.150	0.20	0.250	0.0059	0.0079	0.0098
D	4.80	4.90	5.00	0.1890	0.1929	0.1969
D1	3.91	4.22	4.36	0.1539	0.1661	0.1717
D2	3.85	4.00	4.15	0.1516	0.1575	0.1634
E	5.90	60.5	6.15	0.2323	0.2382	0.2421
E1	5.65	5.76	5.85	0.2224	0.2268	0.2303
E2	1.10	/	/	0.0433	/	/
e	1.27 BSC			0.050 BSC		
L	0.05	0.15	0.25	0.0020	0.0059	0.0098
L1	0.38	0.425	0.50	0.0150	0.0167	0.0197
L2	0.51	0.785	0.86	0.0201	0.0309	0.0339
L3	0.55	0.70	0.85	0.0217	0.0276	0.0335
L4	0.10	0.25	0.40	0.0039	0.0098	0.0157
H	3.25	3.35	3.58	0.1280	0.1319	0.1409
I	0	/	0.18	0	/	0.0071

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