

## N-Channel Enhancement Mode Power MOSFET

### Description

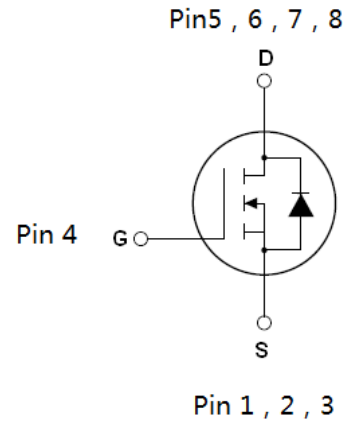
The RM80N30DF uses advanced trench technology to provide excellent  $R_{DS(ON)}$ , low gate charge. This device is suitable for use as a load switch or in PWM applications.

### General Features

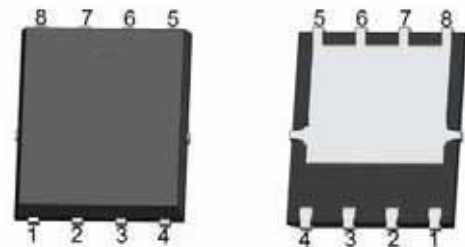
- $V_{DS} = 30V, I_D = 81A$   
 $R_{DS(ON)} < 9m\Omega @ V_{GS}=4.5V$   
 $R_{DS(ON)} < 5.5m\Omega @ V_{GS}=10V$
- High Power and current handling capability
- Lead free product is acquired
- Surface mount package

### Application

- PWM applications
- Load switch
- Power management
- Halogen-free



**Schematic diagram**



**Top View**

**Bottom View**

### Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
80N30	RM80N30DF	DFN5X6-8L	Ø330mm	12mm	2500 units

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

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	$V_{DS}$	30	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	V
Drain Current-Continuous	$I_D$	81	A
Drain Current-Continuous( $T_C=100^\circ C$ )	$I_D(100^\circ C)$	51	A
Pulsed Drain Current	$I_{DM}$	160	A
Maximum Power Dissipation	$P_D$	59	W
Single pulse avalanche energy <sup>(Note 5)</sup>	$E_{AS}$	150	mJ
Operating Junction and Storage Temperature Range	$T_J, T_{STG}$	-55 To 150	$^\circ C$

Thermal Resistance, Junction-to-Case <sup>(Note 2)</sup>	$R_{\theta JC}$	2.1	$^\circ C/W$
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## Electrical Characteristics (T<sub>A</sub>=25°C unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	V <sub>GS</sub> =0V, I <sub>D</sub> =-250μA	30	-	-	V
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> =24V, V <sub>GS</sub> =0V	-	-	1	μA
Gate-Body Leakage Current	I <sub>GSS</sub>	V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V	-	-	±100	nA
<b>On Characteristics</b> <sup>(Note 3)</sup>						
Gate Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA,	1.2	-	2.5	V
Drain-Source On-State Resistance	R <sub>DS(ON)</sub>	V <sub>GS</sub> =10V, I <sub>D</sub> = 30 A	-	-	5.5	mΩ
		V <sub>GS</sub> =4.5V, I <sub>D</sub> = 15A	-	-	9	mΩ
<b>Dynamic Characteristics</b> <sup>(Note4)</sup>						
Input Capacitance	C <sub>ISS</sub>	V <sub>DS</sub> =15V, V <sub>GS</sub> =0V, F=1.0MHz	-	2295	-	PF
Output Capacitance	C <sub>OSS</sub>		-	267	-	PF
Reverse Transfer Capacitance	C <sub>RSS</sub>		-	210	-	PF
<b>Switching Characteristics</b> <sup>(Note 4)</sup>						
Turn-on Delay Time	t <sub>d(on)</sub>	V <sub>DD</sub> =15V, I <sub>D</sub> =15A, V <sub>GS</sub> =10V, R <sub>GEN</sub> =3.3Ω	-	7.8	-	nS
Turn-on Rise Time	t <sub>r</sub>		-	15	-	nS
Turn-Off Delay Time	t <sub>d(off)</sub>		-	37.3	-	nS
Turn-Off Fall Time	t <sub>f</sub>		-	10.6	-	nS
Total Gate Charge	Q <sub>g</sub>	V <sub>DS</sub> =15V, I <sub>D</sub> =15A, V <sub>GS</sub> =4.5V	-	20	-	nC
Gate-Source Charge	Q <sub>gs</sub>		-	7.6	-	nC
Gate-Drain Charge	Q <sub>gd</sub>		-	7.2	-	nC
<b>Drain-Source Diode Characteristics</b>						
Diode Forward Voltage <sup>(Note 3)</sup>	V <sub>SD</sub>	V <sub>GS</sub> =0V, I <sub>S</sub> =1A	-	-	1.0	V
Diode Forward Current <sup>(Note 2)</sup>	I <sub>S</sub>	V <sub>G</sub> =V <sub>D</sub> =0V ,Force Current	-	-	81	A
Pulsed Source Current	I <sub>Sm</sub>	V <sub>G</sub> =V <sub>D</sub> =0V ,Force Current	-	-	160	A

### Notes:

1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board, t ≤ 10 sec.
3. Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.
4. Guaranteed by design, not subject to production

## RATING AND CHARACTERISTICS CURVES (RM80N30DF)

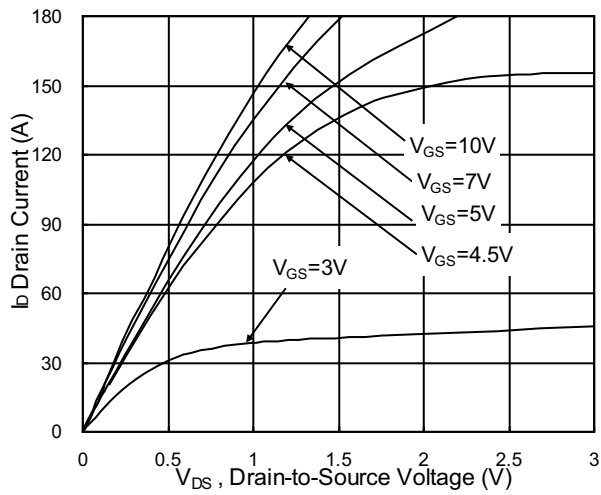


Fig.1 Typical Output Characteristics

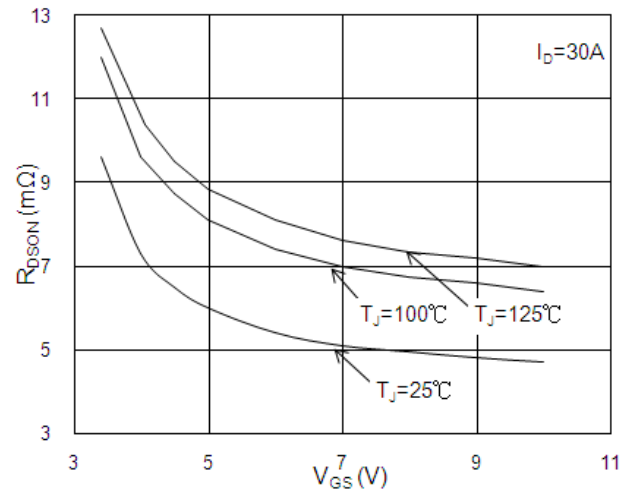


Fig.2 On-Resistance vs. G-S Voltage

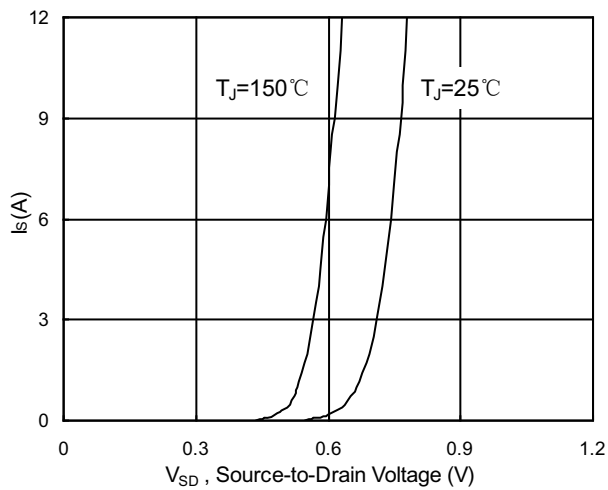


Fig.3 Forward Characteristics of Reverse

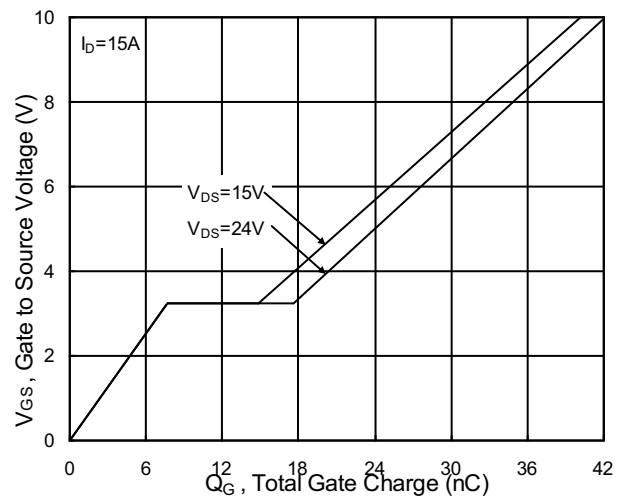


Fig.4 Gate-Charge Characteristics

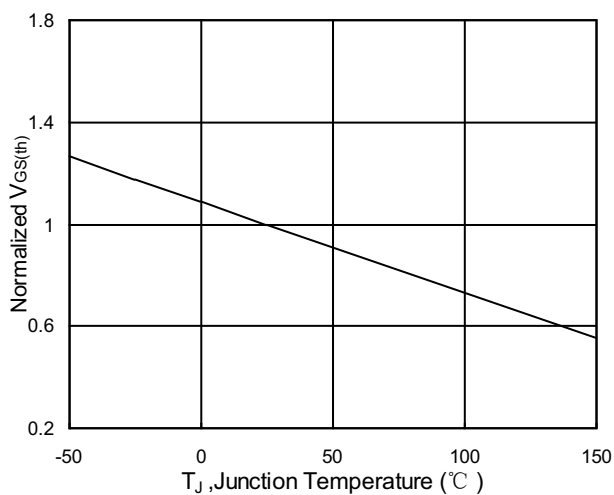


Fig.5 Normalized  $V_{GS(th)}$  vs.  $T_J$

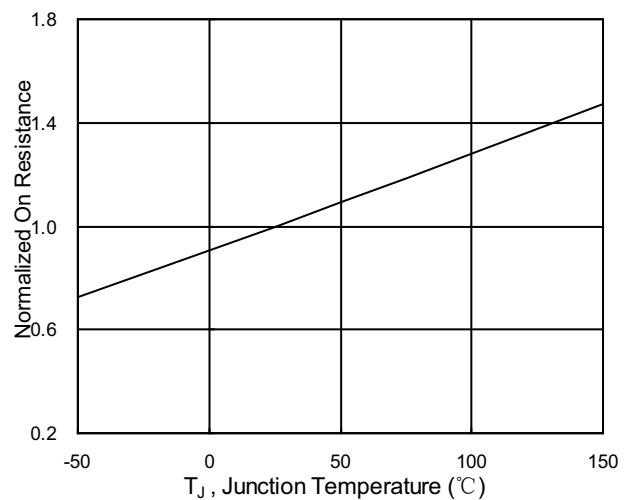


Fig.6 Normalized  $R_{DS(on)}$  vs.  $T_J$

# RATING AND CHARACTERISTICS CURVES (RM80N30DF)

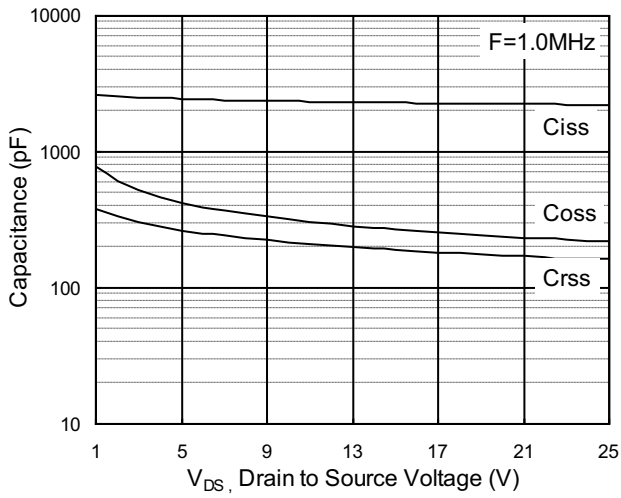


Fig.7 Capacitance

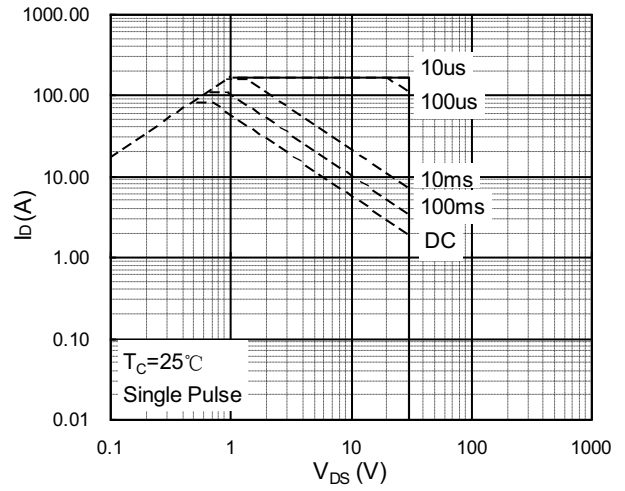


Fig.8 Safe Operating Area

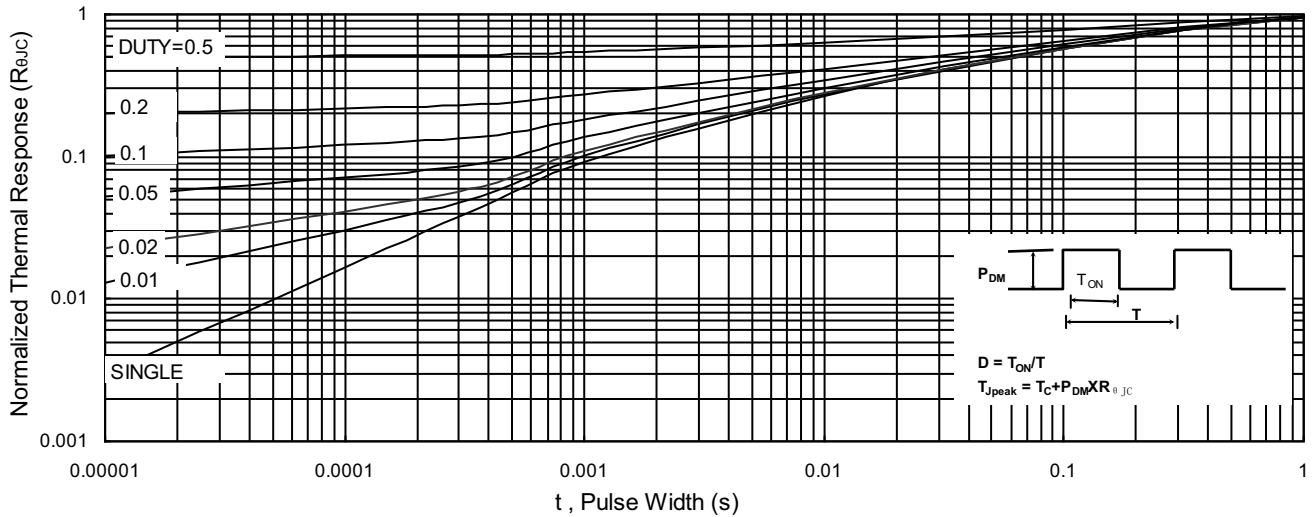


Fig.9 Normalized Maximum Transient Thermal Impedance

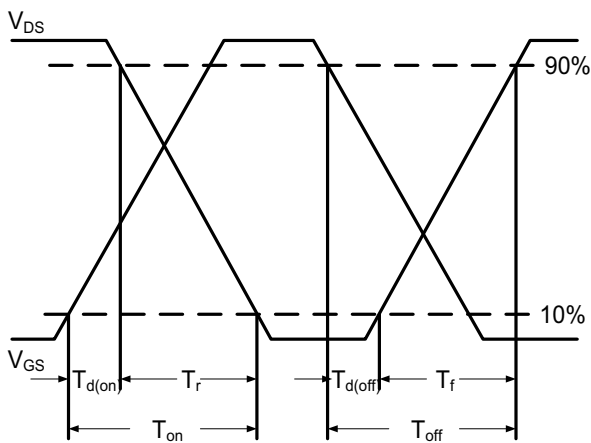


Fig.10 Switching Time Waveform

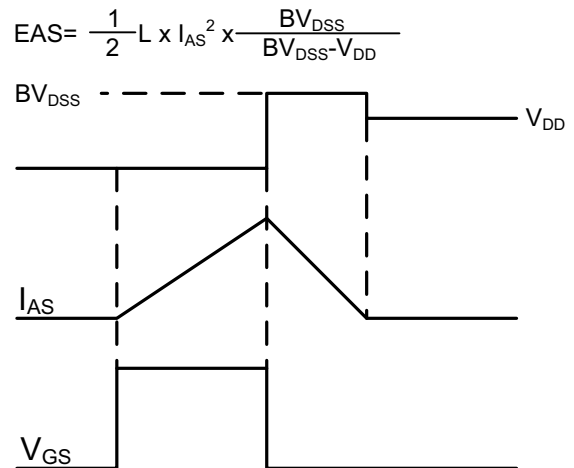
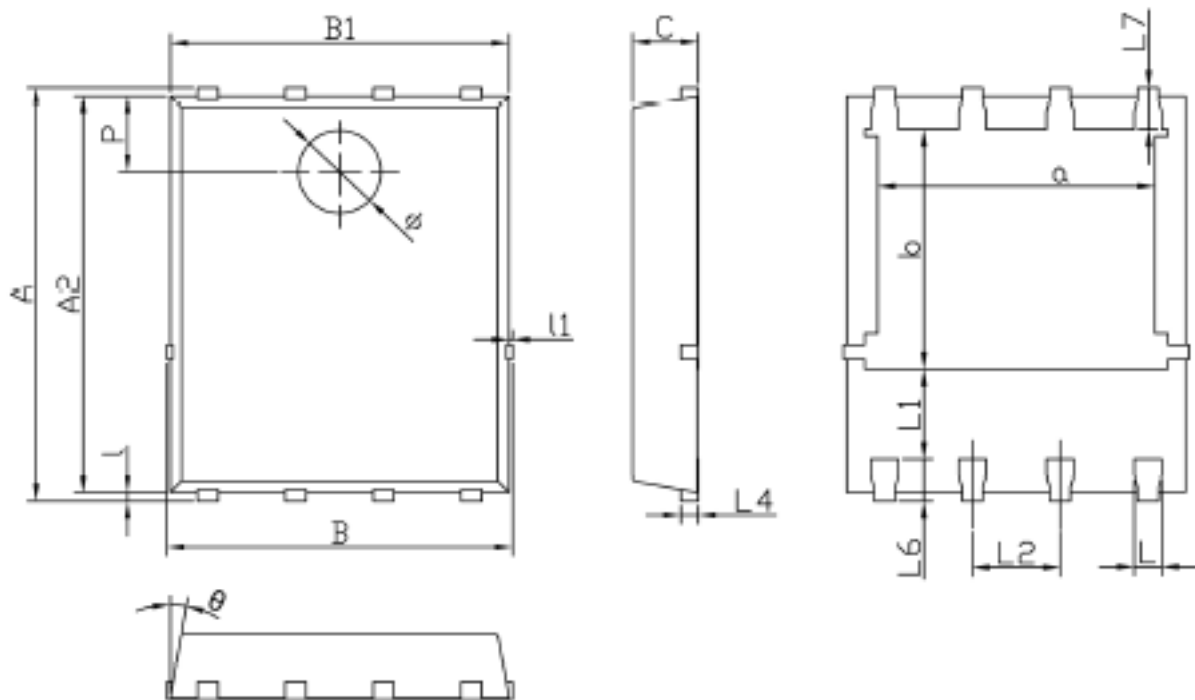


Fig.11 Unclamped Inductive Switching Waveform

## DFN5X6-8L Package Information



Dimensions In Millimeterer			
Symbol	MIN	TYP	MAX
A	5.90	6.00	6.10
a	3.91	4.01	4.11
A2	5.70	5.75	5.80
B	4.90	5.00	5.10
b	3.37	3.47	3.57
D1	4.00	4.20	5.00
C	0.90	0.95	1.00
L	0.35	0.40	0.45
l	0.06	0.13	0.20
L1	1.10	-	-
l1	-	-	0.10
L2	1.17	1.27	1.37
L4	0.21	0.26	0.34
L6	0.51	0.61	0.71
L7	0.51	0.61	0.71
P	1.00	1.10	1.20
$\alpha$	8°	10°	12°
$\phi$	1.10	1.20	1.30

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