

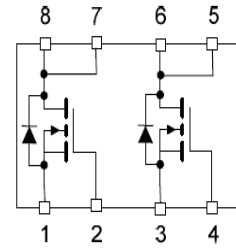
N-Channel Enhancement Mode Power MOSFET

Description

The RMD50N40DF 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.

General Feature

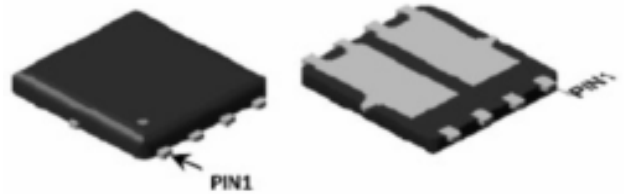
- $V_{DS} = 40V, I_D = 65A$
 $R_{DS(ON)} < 7.5m\Omega @ V_{GS}=10V$ (Typ:6.8m Ω)
 $R_{DS(ON)} < 10m\Omega @ V_{GS}=4.5V$ (Typ:8.5m Ω)
- Special process technology for high ESD capability
- High density cell design for ultra low Rdson
- Fully characterized Avalanche voltage and current
- Good stability and uniformity with high E_{AS}
- Excellent package for good heat dissipation



Schematic diagram

Application

- Power switching application
- Hard switched and high frequency circuits
- Uninterruptible power supply
- Halogen-free



Top View

Bottom View

100% UIS TESTED!
100% ΔV_{ds} TESTED!

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
D50N40	RMD50N40DF	DFN5X6-8L	-	-	-

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

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DS}	40	V
Gate-Source Voltage	V_{GS}	± 20	V
Continuous Drain Current ($T_a = 25^\circ C$)	I_D	65	A
Continuous Drain Current ($T_a = 100^\circ C$)	I_D	41	A
Pulsed Drain Current ⁽¹⁾	I_{DM}	260	A
Singel Pulsed Avalanche Energy ⁽²⁾	E_{AS}	96	mJ
Power Dissipation	P_D	48	W
Thermal Resistance from Junction to Case ⁽⁴⁾	$R_{\theta JC}$	2.6	$^\circ C/W$
Thermal Resistance from Junction to Ambient ⁽⁴⁾	$R_{\theta JA}$	62	$^\circ C/W$
Junction Temperature	T_J	150	$^\circ C$
Storage Temperature	T_{STG}	-55~ +150	$^\circ C$

Electrical Characteristics (T_c=25°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 = 250μA	40	-	-	V
Zero gate voltage drain current	I _{DSS}	V _{DS} = 40V, V _{GS} = 0V	-	-	1	μA
Gate-body leakage current	I _{GSS}	V _{GS} = ±20V, V _{DS} = 0V	-	-	±100	nA
Gate threshold voltage ⁽³⁾	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 250μA	1	1.5	2.5	V
Drain-source on-resistance ⁽³⁾	R _{DS(on)}	V _{GS} = 10V, I _D = 30A	-	6.8	7.5	mΩ
		V _{GS} = 4.5V, I _D = 20A	-	8.5	10	
Dynamic characteristics						
Input Capacitance	C _{iss}	V _{DS} = 20V, V _{GS} = 0V, f = 1MHz	-	2956	-	pF
Output Capacitance	C _{oss}		-	225	-	
Reverse Transfer Capacitance	C _{rss}		-	197	-	
Switching characteristics						
Turn-on delay time	t _{d(on)}	V _{DD} = 20V, I _D = 30A, R _L = 1Ω V _{GS} = 10V, R _G = 3Ω	-	8	-	ns
Turn-on rise time	t _r		-	16	-	
Turn-off delay time	t _{d(off)}		-	21	-	
Turn-off fall time	t _f		-	10	-	
Total Gate Charge	Q _g	V _{DS} = 20V, I _D = 30A, V _{GS} = 10V	-	46	-	nC
Gate-Source Charge	Q _{gs}		-	7.2	-	
Gate-Drain Charge	Q _{gd}		-	8.8	-	
Source-Drain Diode characteristics						
Diode Forward voltage ⁽³⁾	V _{DS}	V _{GS} = 0V, I _S = 1A	-	-	1.2	V
Diode Forward current ⁽⁴⁾	I _S		-	-	65	A

Notes:

1. Repetitive Rating: pulse width limited by maximum junction temperature
2. EAS Condition: T_J = 25°C, V_{DD} = 20V, R_G = 25 Ω, L = 0.5mH
3. Pulse Test: pulse width ≤ 300μs, duty cycle ≤ 2%
4. Surface Mounted on FR4 Board, t ≤ 10 sec

Test Circuit

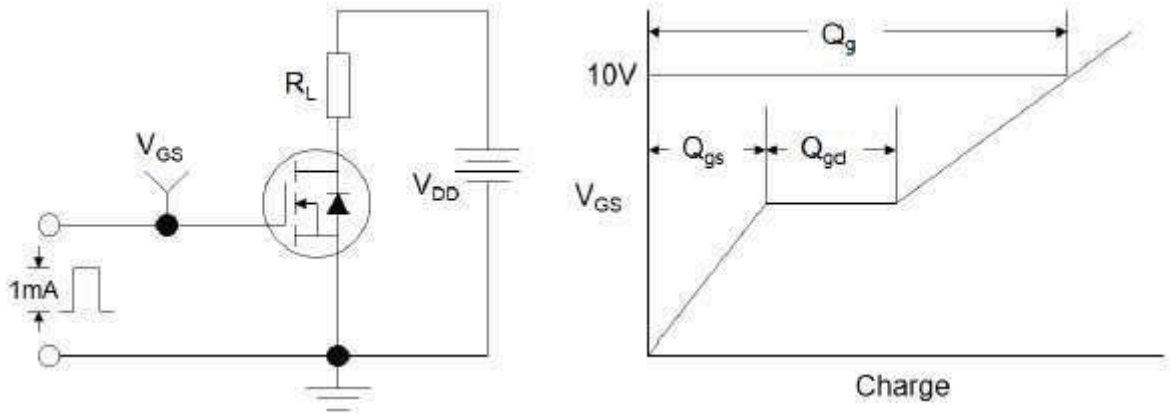


Figure 1: Gate Charge Test Circuit & Waveform

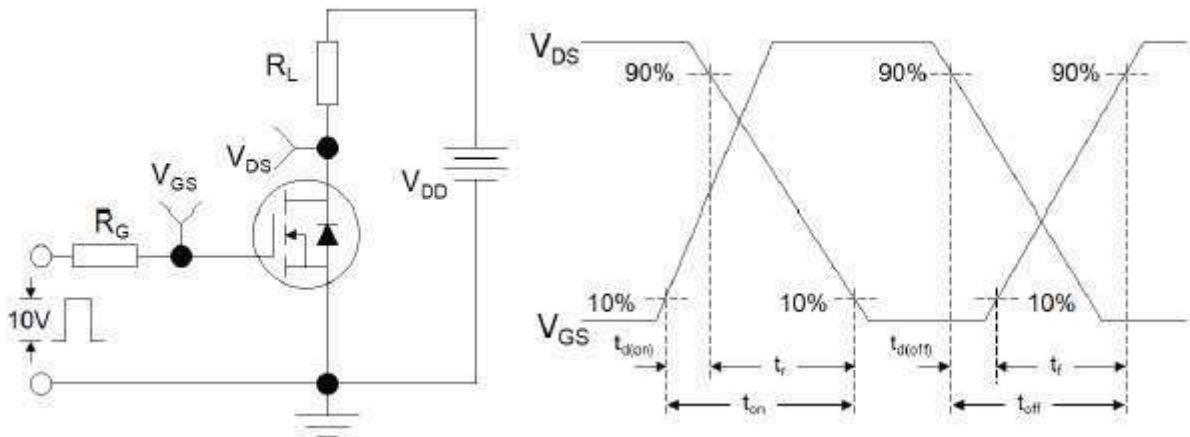


Figure 2: Resistive Switching Test Circuit & Waveforms

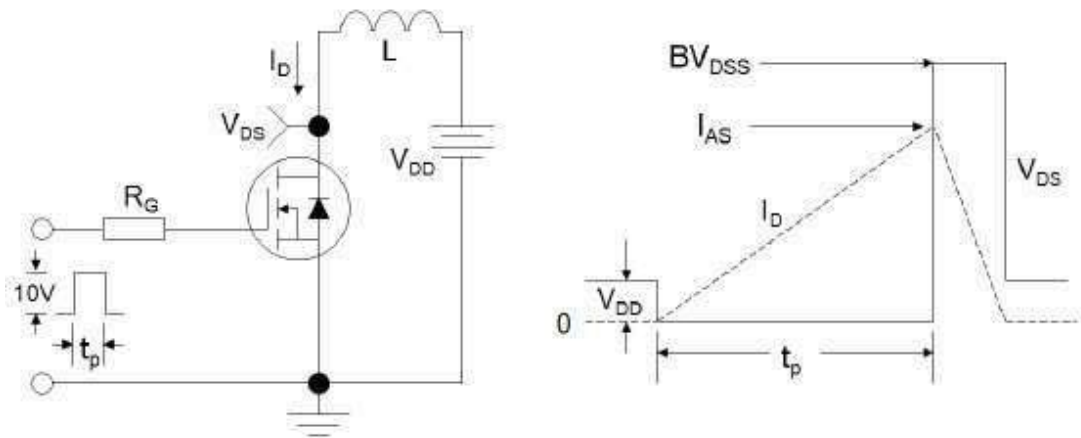


Figure 3: Unclamped Inductive Switching Test Circuit & Waveforms

RATING AND CHARACTERISTICS CURVES (RMD50N40DF)

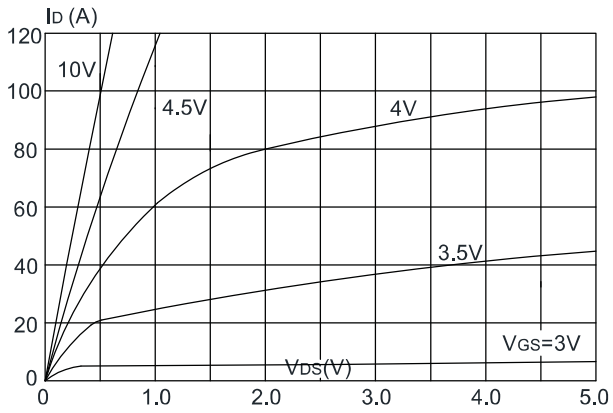


Figure 1: Output Characteristics

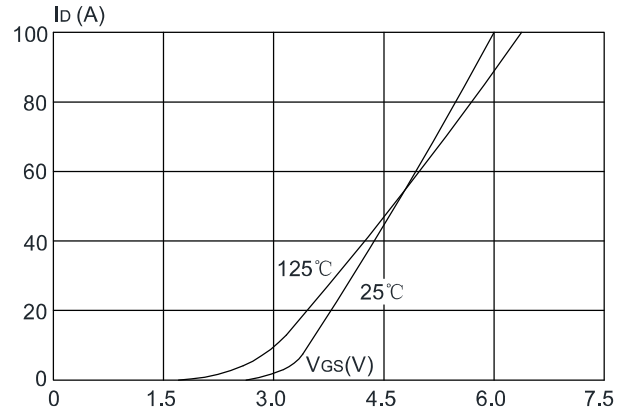


Figure 2: Typical Transfer Characteristics

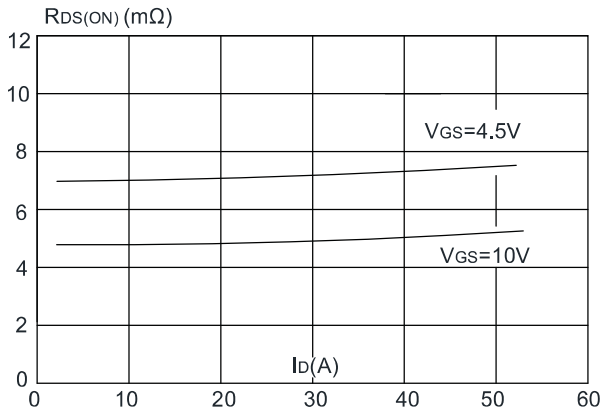


Figure 3: On-resistance vs. Drain Current

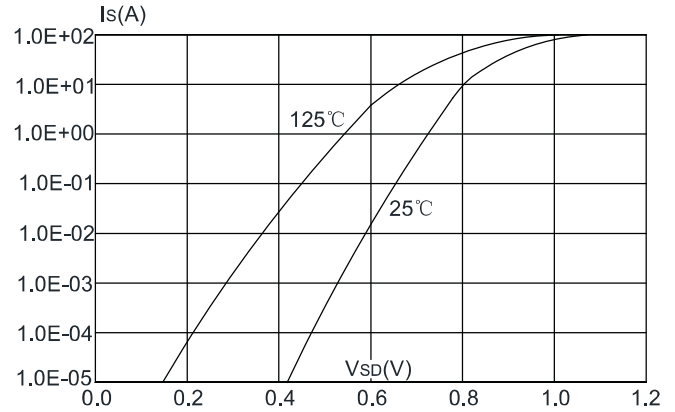


Figure 4: Body Diode Characteristics

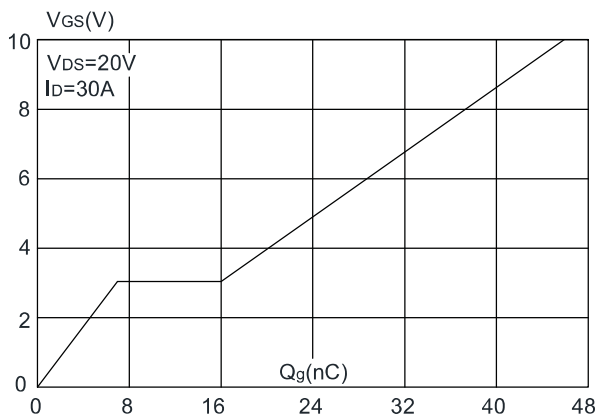


Figure 5: Gate Charge Characteristics

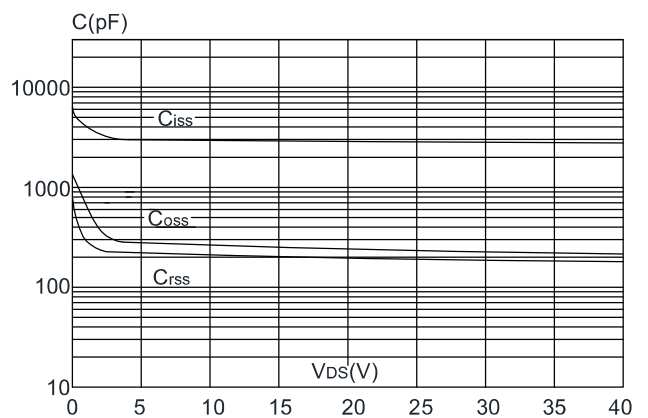


Figure 6: Capacitance Characteristics

RATING AND CHARACTERISTICS CURVES (RMD50N40DF)

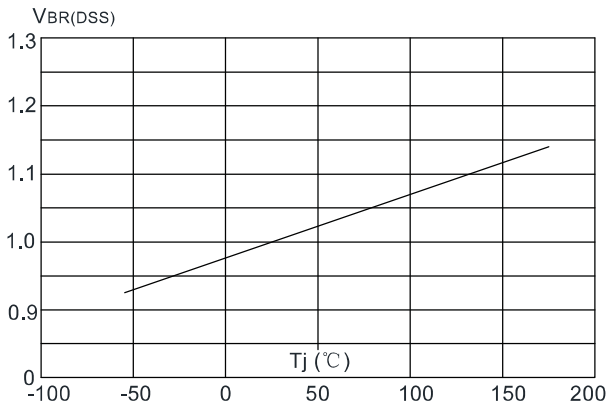


Figure 7: Normalized Breakdown Voltage vs. Junction Temperature

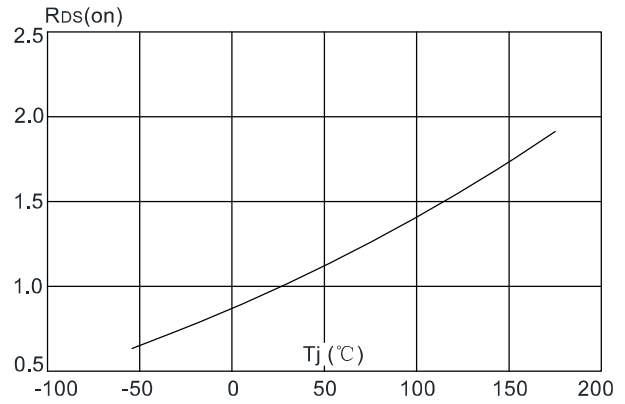


Figure 8: Normalized on Resistance vs. Junction Temperature

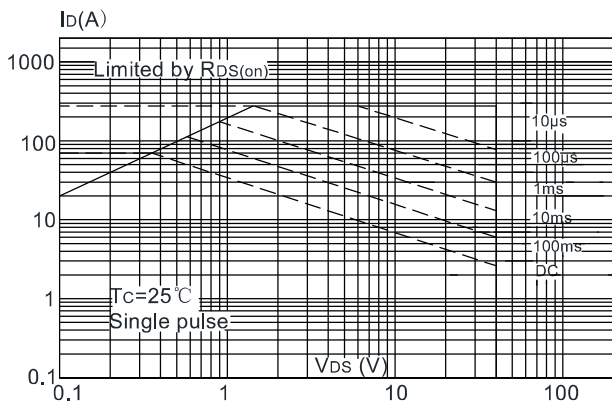


Figure 9: Maximum Safe Operating Area

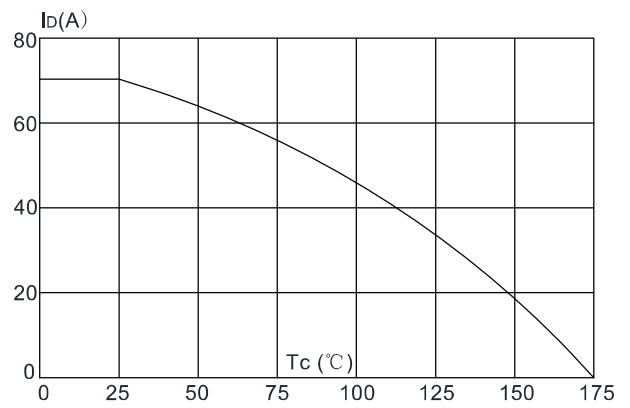


Figure 10: Maximum Continuous Drain Current vs. Case Temperature

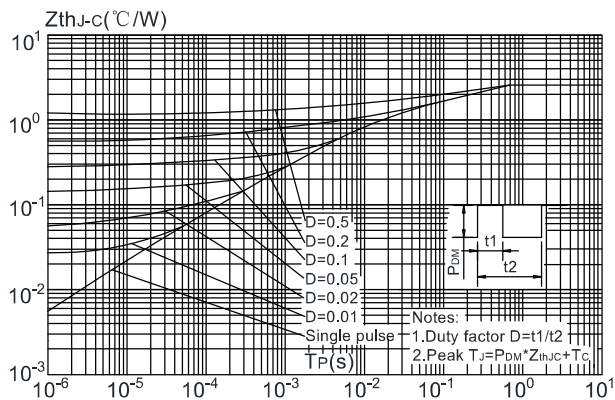
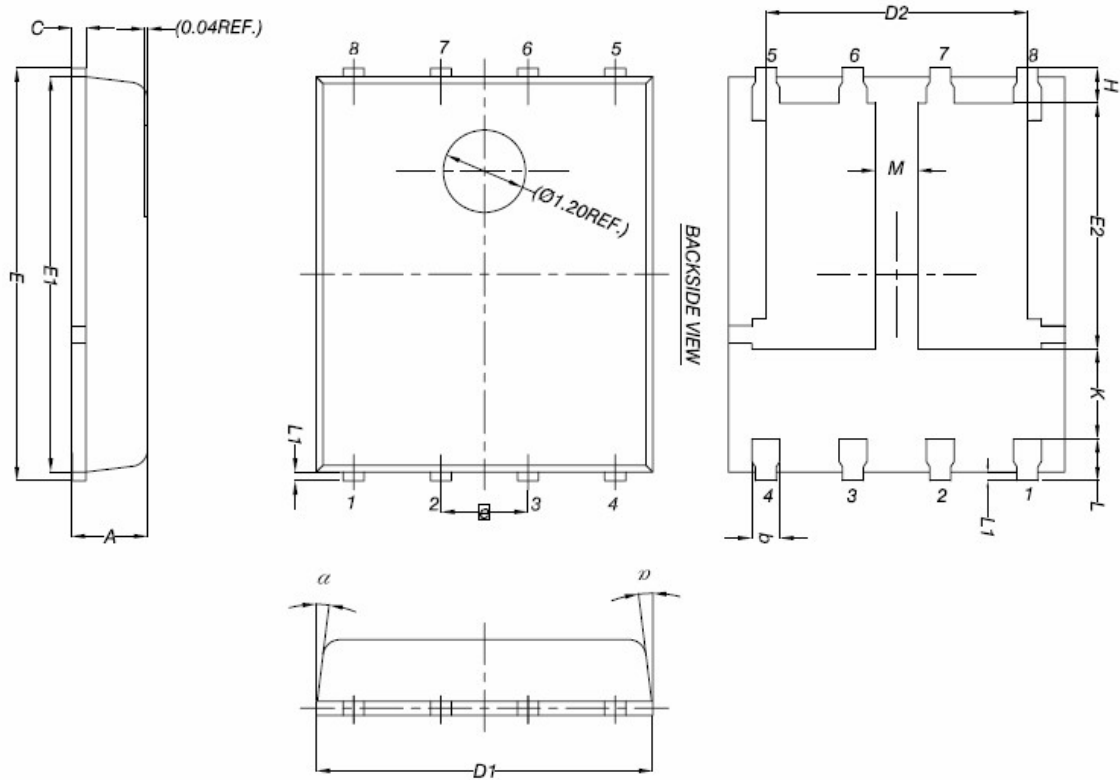


Figure.11: Maximum Effective Transient Thermal Impedance, Junction-to-Case

DFN5X6-8L Package Information



DIM.	MILLIMETERS		
	MIN.	NOM.	MAX.
A	0.90	1.00	1.10
b	0.33	0.41	0.51
C	0.20	0.25	0.30
D1	4.80	4.90	5.00
D2	3.61	3.81	3.96
E	5.90	6.00	6.10
E1	5.70	5.75	5.80
E2	3.38	3.58	3.78
e	1.27 BSC		
H	0.41	0.51	0.61
K	1.10	-	-
L	0.51	0.61	0.71
L1	0.06	0.13	0.20
M	0.50	-	-
α	0°	-	12°