

N-Channel Power MOSFET

Description

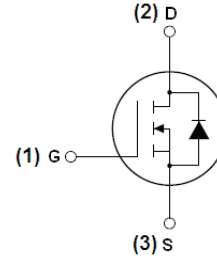
The RMP5N50TI uses advanced trench technology and design to provide excellent $R_{DS(ON)}$ with low gate charge. It can be used in a wide variety of applications.

General Features

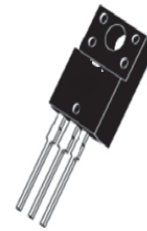
- $V_{DS} = 500V, I_D = 5A$
 $R_{DS(ON)} < 1.5 \Omega @ V_{GS} = 10V$
- High density cell design for ultra low $R_{DS(on)}$
- Fully characterized avalanche voltage and current
- Good stability and uniformity with high E_{AS}
- Excellent package for good heat dissipation
- Special process technology for high ESD capability

Application

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



Schematic diagram



TO-220F top view

100% UIS TESTED!

100% ΔV_{ds} TESTED!

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
5N50	RMP5N50TI	TO-220F	-	-	-

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

Symbol	Parameter	Limit	Unit
		TO-220F	
V_{DS}	Drain-Source Voltage ^a	500	V
V_{GS}	Gate-Source Voltage	± 30	V
I_D	Drain Current-Continuous, $T_C = 25^\circ C$	5	A
	Drain Current-Continuous, $T_C = 100^\circ C$	3	A
I_{DM}	Drain Current-Pulsed ^b	20	A
P_D	Maximum Power Dissipation @ $T_J = 25^\circ C$	30	W
EAS	Single Pulsed Avalanche Energy ^d	125	mJ
T_J, T_{STG}	Operating and Store Temperature Range	-55 to 150	$^\circ C$

Thermal Characteristic

Symbol	Parameter	Value	Unit
$R_{\theta JC}$	Thermal Resistance, Junction-Case Max.	4.17	$^\circ C/W$

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

Off Characteristics

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS} = 0V, I_D = 250\mu A$	500	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 500V, V_{GS} = 0V$	-	-	1	μA
I_{GSS}	Forward Gate Body Leakage Current	$V_{DS} = 0V, V_{GS} = \pm 30V$	-	-	± 100	nA

On Characteristics

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = 250\mu A$	2	-	4	V
$R_{DS(on)}$	Static Drain-Source On-Resistance ^c	$V_{GS} = 10V, I_D = 2.5A$	-	1.35	1.5	Ω

Dynamic Characteristics

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
C_{iss}	Input Capacitance	$V_{DS} = 25V,$ $V_{GS} = 0V,$ $f = 1.0MHz$	-	545	-	pF
C_{oss}	Output Capacitance		-	63	-	pF
C_{rss}	Reverse Transfer Capacitance		-	5.5	-	pF

On Characteristics

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-On Delay Time	$V_{DD} = 250V, I_D = 5A,$ $V_{GS} = 10V$	-	9	-	ns
t_r	Turn-On Rise Time		-	11	-	ns
$t_{d(off)}$	Turn-Off Delay Time		-	29	-	ns
t_f	Turn-Off Fall Time		-	16	-	ns
Q_g	Total Gate Charge	$V_{DS} = 400V, I_D = 5A,$ $V_{GS} = 10V$	-	13	-	nC
Q_{gs}	Gate-Source Charge		-	3.3	-	nC
Q_{gd}	Gate-Drain Charge		-	5	-	nC

Drain-Source Diode Characteristics

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
I_S	Drain-Source Diode Forward Continuous Current	$V_{GS} = 0V$	-	-	5	A
I_{SM}	Maximum Pulsed Current	$V_{GS} = 0V$	-	-	20	A
V_{SD}	Drain-Source Diode Forward Voltage	$V_{GS} = 0V, I_S = 10A$	-	-	1.4	V

Notes:

- $T_J +25^{\circ}\text{C}$ to $+150^{\circ}\text{C}$
- Repetitive rating; pulse width limited by maximum junction temperature.
- Pulse width $\leq 300\mu s$; duty cycle $\leq 2\%$
- $L = 10mH, I_{AS} = 5A$

RATING AND CHARACTERISTICS CURVES (RMP5N50TI)

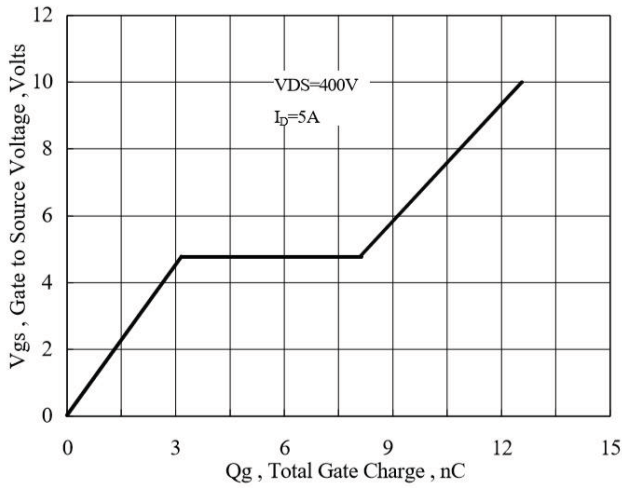


Figure 1. Gate Charge Characteristics

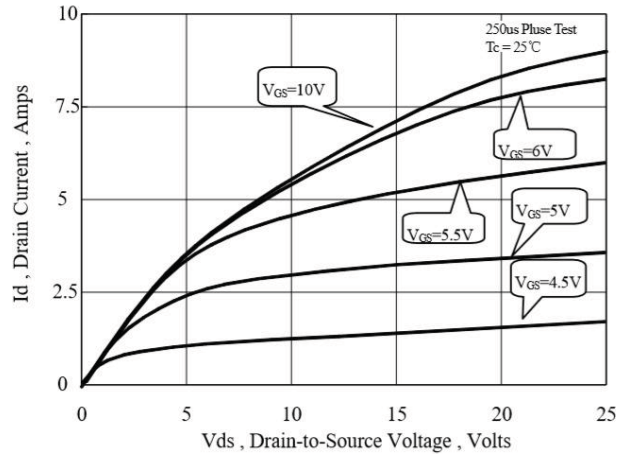


Figure 2. On-State Characteristics

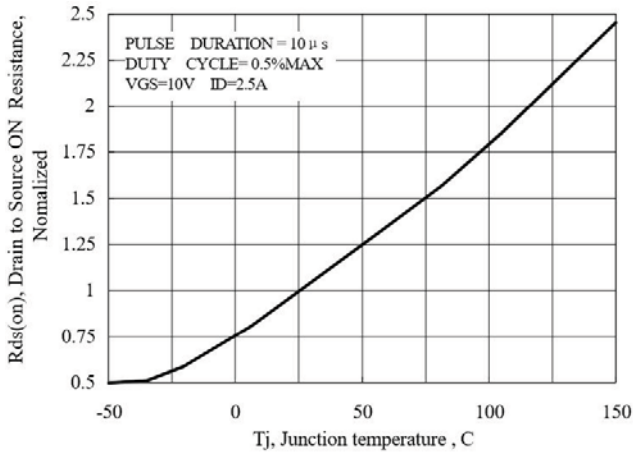


Figure 3. Normalized On-Resistance Variation

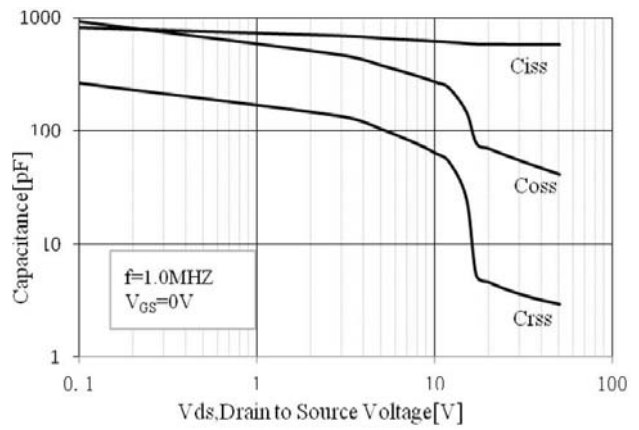


Figure 4 Typical Capacitance vs Drain to Source Voltage

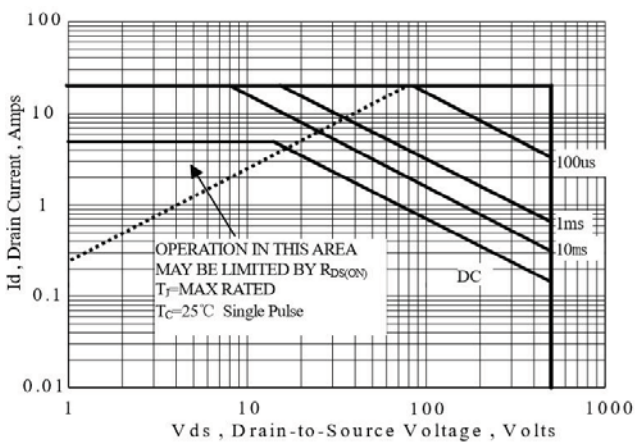


Figure 5 Maximum Forward Bias Safe Operating Area

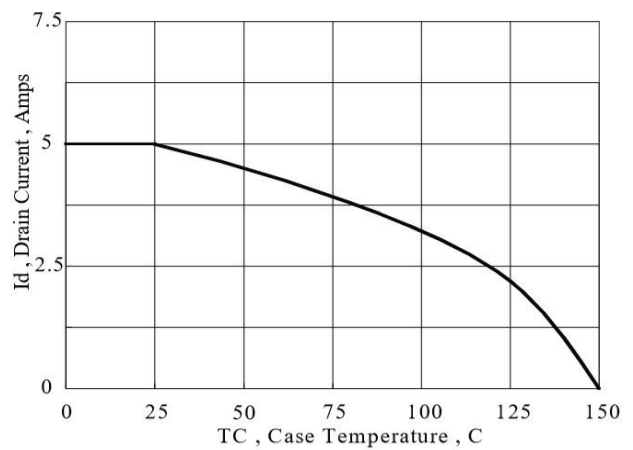
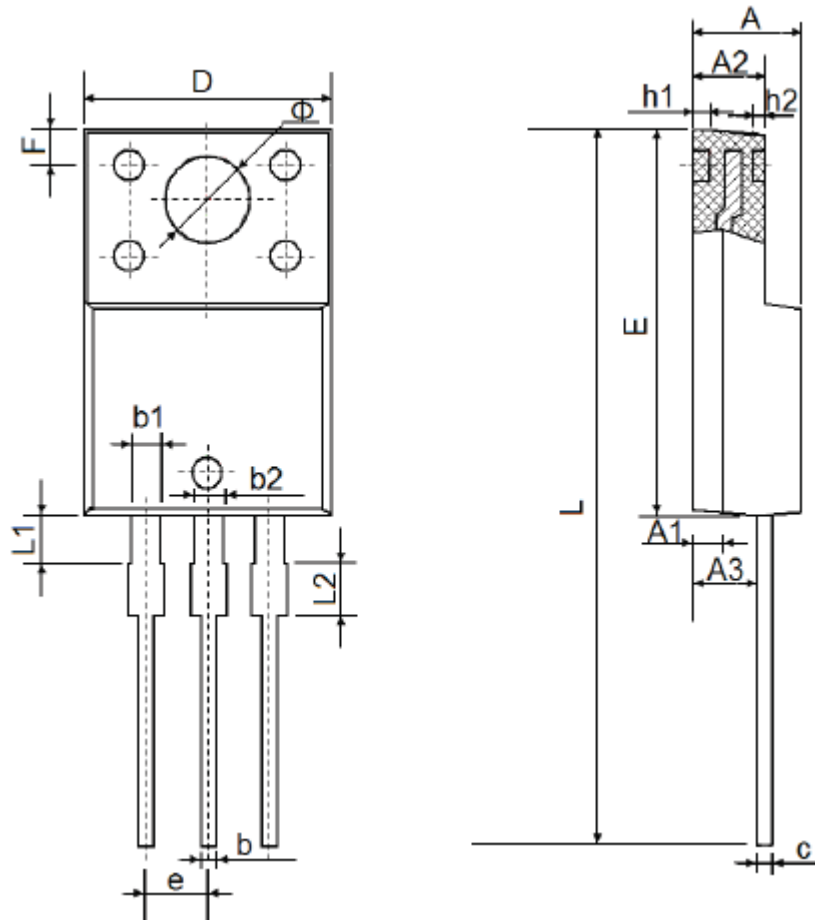


Figure 6. Maximum Continuous Drain Current vs Case Temperature

TO 220F

TO-220F Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	4.300	4.700	0.169	0.185
A1	1.300REF		0.051REF	
A2	2.800	3.200	0.110	0.126
A3	2.500	2.900	0.098	0.114
b	0.500	0.750	0.020	0.030
b1	1.100	1.350	0.043	0.053
b2	1.500	1.750	0.059	0.069
c	0.500	0.750	0.020	0.030
D	9.960	10.360	0.392	0.408
E	14.800	15.200	0.583	0.598
e	2.540TYP.		0.100TYP	
F	2.700REF		0.106REF	
Φ	3.500REF		0.138REF	
h1	0.800REF		0.031REF	
h2	0.500REF		0.020REF	
L	28.000	28.400	1.102	1.118
L1	1.700	1.900	0.067	0.075
L2	1.900	2.100	0.075	0.083

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