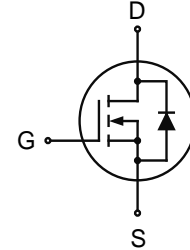


## N-Channel Enhancement Mosfet

### Feature

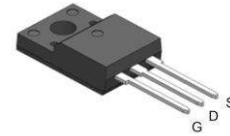
- 900V,3 A  
RDS(ON)  $\leq 3.5 \Omega$  @ VGS=10V, TYP=2.8 $\Omega$
- Fast Switching
- Low ON Resistance(Rdson $\leq 3.5\Omega$ )
- 100% Single Pulse avalanche energy Test
- Rohs compliant



Schematic Diagram

### Application

- Switch Mode Power Supply (SMPS)
- Electronic Ballast
- Electronic Transformer
- Halogen-free



TO-220F

### Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity (PCS)
3N90F	RMP3N90TI	TO-220F	-	-	1000

### ABSOLUTE MAXIMUM RATINGS (T<sub>J</sub>=25°C unless otherwise noted)

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V <sub>DS</sub>	900	V
Gate-Source Voltage	V <sub>GS</sub>	±30	V
Continuous Drain Current (T <sub>C</sub> =25°C)	I <sub>D</sub>	3	A
Continuous Drain Current (T <sub>C</sub> =100°C)	I <sub>D</sub>	1.9	A
Pulsed Drain Current <sup>(1)</sup>	I <sub>DM</sub>	12	A
Power Dissipation	P <sub>D</sub>	38	W
Single Pulse Avalanche Energy <sup>(2)</sup>	E <sub>AS</sub>	54	mJ
Junction to case <sup>(3)</sup>	R <sub>θJC</sub>	3.25	°C/W
Junction to Ambient <sup>(3)</sup>	R <sub>θJA</sub>	62.5	°C/W
Junction Temperature	T <sub>J</sub>	150	°C
Storage Temperature	T <sub>STG</sub>	-55~ +150	°C

## MOSFET ELECTRICAL CHARACTERISTICS(T<sub>J</sub>=25°C unless otherwise noted)

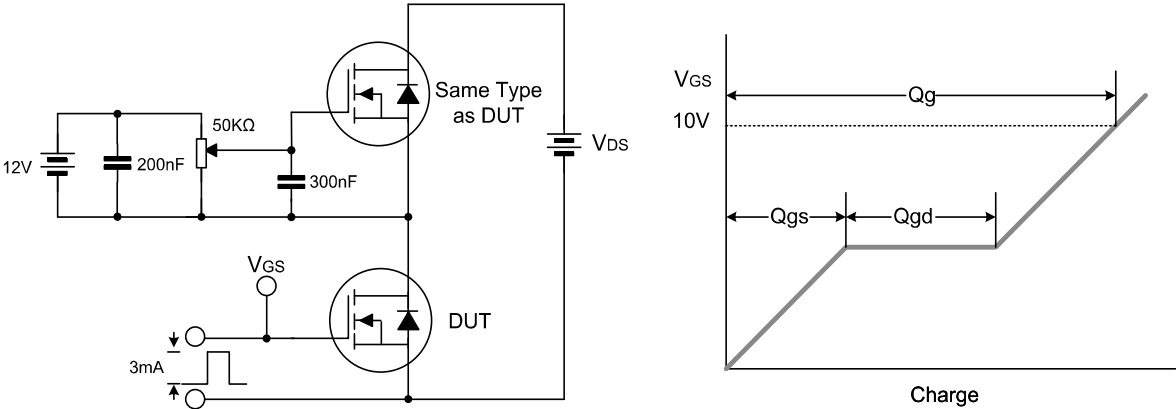
Parameter	Symbol	Test Condition	Min	Type	Max	Unit
<b>Static Characteristics</b>						
Drain-source breakdown voltage	V <sub>(BR)DSS</sub>	V <sub>GS</sub> = 0V, I <sub>D</sub> =250μA	900	-	-	V
Zero gate voltage drain current	I <sub>DSS</sub>	V <sub>DS</sub> =900V, V <sub>GS</sub> = 0V, T <sub>J</sub> =25°C	-	-	1	μA
		V <sub>DS</sub> =720V, V <sub>GS</sub> = 0V, T <sub>J</sub> =125°C	-	-	10	μA
Gate-body leakage current	I <sub>GSS</sub>	V <sub>GS</sub> =±30V,V <sub>DS</sub> = 0V	-	-	±100	nA
Gate threshold voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA	3.0	-	5.0	V
Drain-source on-resistance	R <sub>DS(on)</sub>	V <sub>GS</sub> =10V, I <sub>D</sub> =1.5A	-	2.5	3.5	Ω
<b>Dynamic characteristics</b>						
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> =25V, V <sub>GS</sub> =0V, f =1MHz	-	850	-	pF
Output Capacitance	C <sub>oss</sub>		-	56	-	
Reverse Transfer Capacitance	C <sub>rss</sub>		-	14	-	
Forward Transconductance	G <sub>fs</sub>	V <sub>DS</sub> =40V, I <sub>D</sub> =1.5A		2.5		S
<b>Switching characteristics</b>						
Turn-on delay time	t <sub>d(on)</sub>	V <sub>DD</sub> =450V, I <sub>D</sub> =3.0A, V <sub>GS</sub> =10V, R <sub>G</sub> =25Ω	-	16	-	ns
Turn-on rise time	t <sub>r</sub>		-	35	-	
Turn-off delay time	t <sub>d(off)</sub>		-	35	-	
Turn-off fall time	t <sub>f</sub>		-	45	-	
Total Gate Charge	Q <sub>g</sub>	V <sub>DS</sub> =720V, I <sub>D</sub> =3.0A, V <sub>GS</sub> =10V	-	19	-	nC
Gate-Source Charge	Q <sub>gs</sub>		-	4.2	-	
Gate-Drain Charge	Q <sub>gd</sub>		-	9.1	-	
<b>Source-Drain Diode characteristics</b>						
Diode Forward voltage	V <sub>SD</sub>	V <sub>GS</sub> =0V, I <sub>S</sub> =3.0A	-	-	1.4	V
Diode Forward current	I <sub>S</sub>		-	-	3.0	A
Body Diode Reverse Recovery Time	t <sub>rr</sub>	V <sub>GS</sub> =0V, I <sub>F</sub> =3.0A,		570		ns
Body Diode Reverse Recovery Charge	Q <sub>rr</sub>	dI <sub>F</sub> /dt=100A/μs		3.6		uC

### Notes:

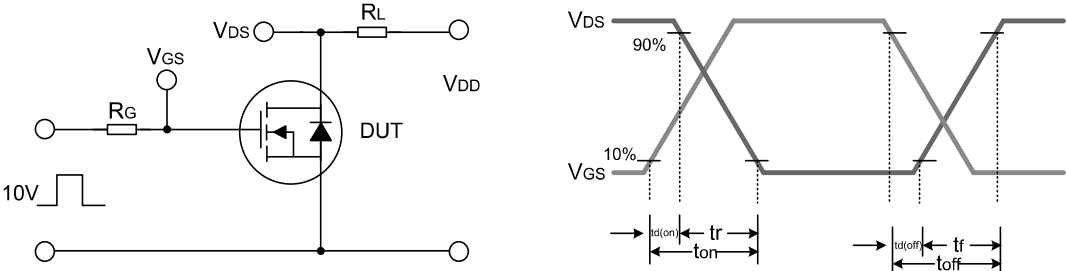
1. Repetitive Rating:pulse width limited by maximum junction temperature.
2. L=12mH,R<sub>g</sub>=25Ω,V<sub>DD</sub>=50V I<sub>AS</sub>=3.0A , starting T<sub>J</sub>=25°C.
4. Repetitive rating; pulse width limited by maximum junction tempera

# Test Circuit

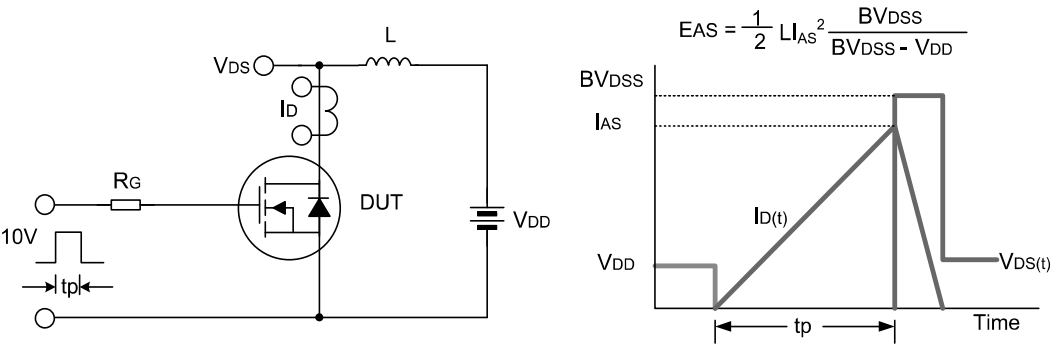
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveform



Unclamped Inductive Switching Test Circuit & Waveform



# RATING AND CHARACTERISTICS CURVES (RMP3N90TI)

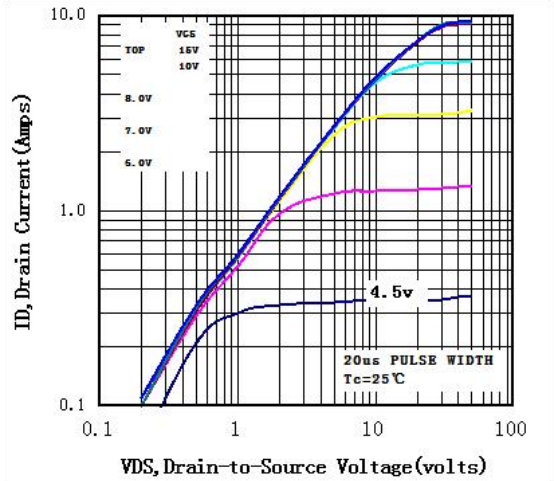


Fig1 Typical Output Characteristics,  $T_c=25^\circ\text{C}$

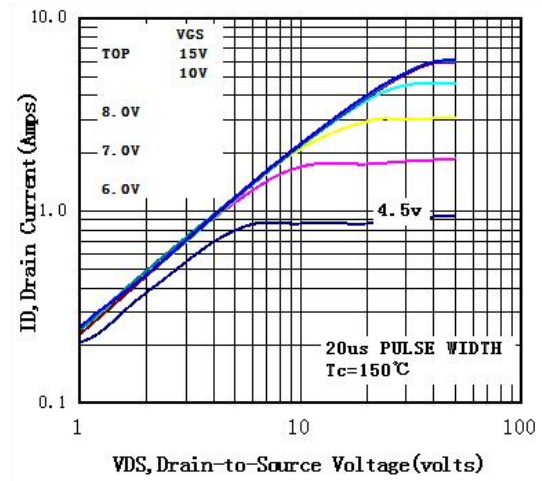


Fig2 Typical Output Characteristics,  $T_c=150^\circ\text{C}$

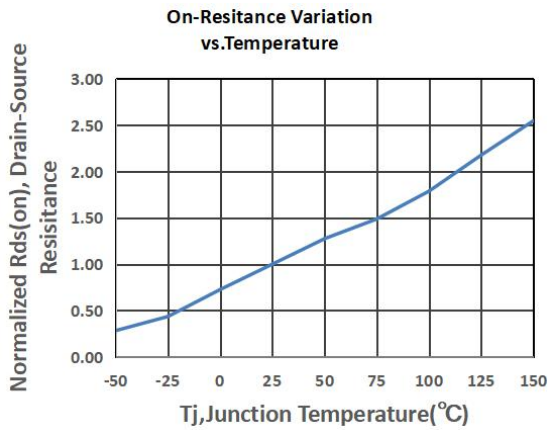


Fig3 Normalized Resistance Vs. Temperature

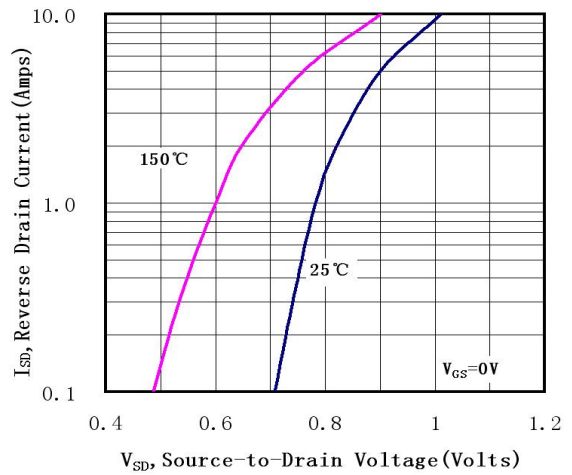


Fig4 Typical Source-Drain Diode Forward Voltage

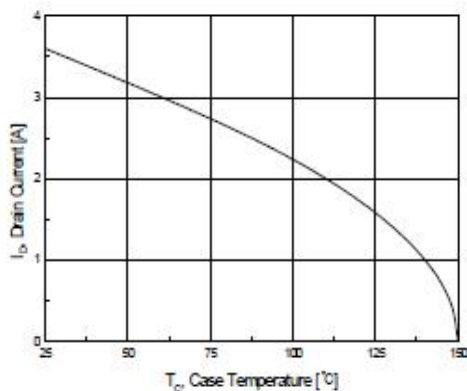


Fig5 Maximum Drain Current Vs. Case Temperature

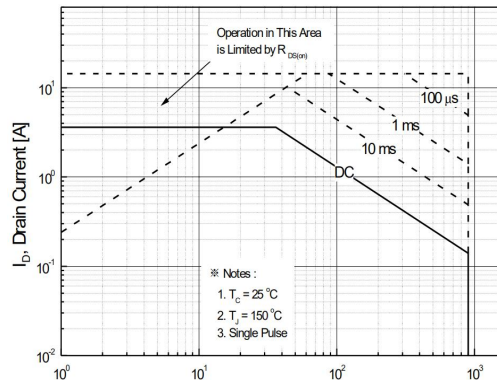
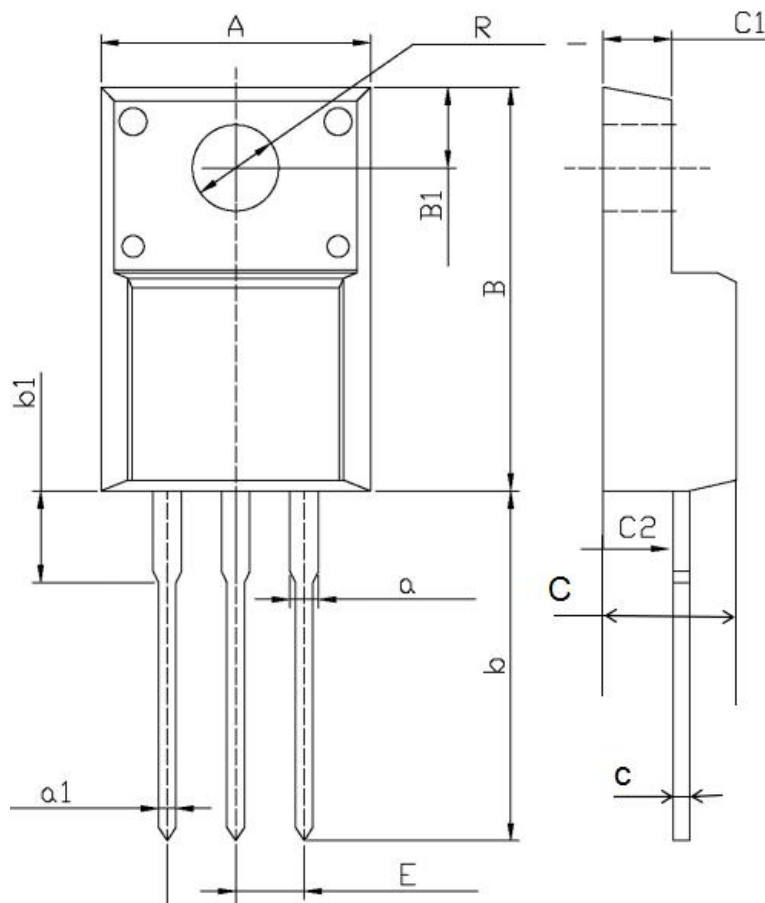


Fig6 Maximum Safe Operating Area

## Package Dimensions of TO-220F



UNIT: mm

SYMBOL	min	nom	max	SYMBOL	min	nom	max
A	9.90		10.36	a	1.08		1.48
B	15.40		16.40	a1	0.70		0.90
B1	3.05		3.55	E	2.34		2.75
C	4.40		5.00	C1	2.25		2.85
c	0.40		0.60	C2	2.45		3.05
b	12.40		13.50	R	2.90		3.35
b1	2.60		3.60				

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