

## Description

The PNMTOF650V4 is a high voltage power MOSFET and is designed to have better characteristics, such as fast switching time, low gate charge, low on-state resistance and have a high rugged avalanche characteristics. This power MOSFET is usually used at high speed switching applications in switching power supplies and adaptors.

## Feature

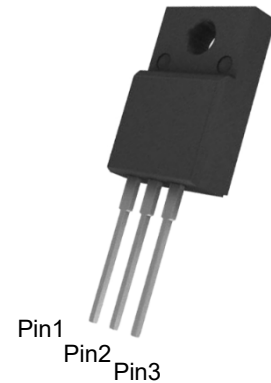
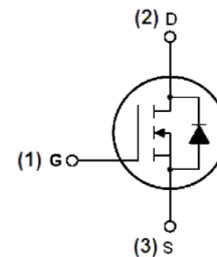
- $R_{DS(ON)} \leq 2.6 \Omega @ V_{GS}=10V, I_D=2A$
- Fast switching capability
- Avalanche energy tested
- Improved dv/dt capability, high ruggedness

## Applications

- Automotive applications
- Power switching application
- Hard switched and high frequency circuits
- Uninterruptible power supply

## Mechanical data

- Case: TO-220F-3L
- Approx. Weight: 1.77g (0.062oz)
- Lead free finish, RoHS compliant
- Case Material: "Green" molding compound, UL flammability classification 94V-0, "Halogen-free".


**TO-220F-3L (Top View)**

**Schematic diagram**

## Absolute maximum rating@25°C

Rating	Symbol	Value	Units
Drain-Source Voltage	$V_{DS}$	650	V
Gate-Source Voltage	$V_{GS}$	$\pm 30$	V
Drain Current-Continuous	$I_D$	$T_C=25^\circ C$	4
		$T_C=100^\circ C$	2.5
Pulsed Drain Current	$I_{DM}$	16	A
Single Pulse Avalanche Energy	$E_{AS}$	173	mJ
Peak Diode Recovery dv/dt	dv/dt	2.1	V/ns
Maximum Power Dissipation	$P_D$	50	W
Junction and Storage Temperature Range	$T_J, T_{STG}$	-55~+150	°C
Junction-to-Ambient	$R_{\theta JA}$	63	°C/W
Junction-to-Case	$R_{\theta JC}$	4.0	°C/W

## Electrical characteristics per line@25°C (unless otherwise specified)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Units
Off Characteristics						
Drain-Source Breakdown Voltage	$BV_{DSS}$	$V_{GS}=0V, I_D=250\mu A$	650	-	-	V
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS}=650V, V_{GS}=0V$	-	-	1.0	$\mu A$
Gate-Body Leakage Current	$I_{GSS}$	$V_{GS}=\pm 30V, V_{DS}=0V$	-	-	$\pm 100$	nA
On Characteristics						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	2.0	-	4.0	V
Static Drain-Source On-Resistance	$R_{DS(on)}$	$V_{GS}=10V, I_D=2A$	-	2.4	2.6	$\Omega$
Forward Transfer Conductance	$g_{fs}$	$V_{DS}=15V, I_D=2A$	-	2.7	-	S
Dynamic Parameters						
Input Capacitance	$C_{iss}$	$V_{DS}=25V, V_{GS}=0V,$ $f=1MHz$	-	581	-	pF
Output Capacitance	$C_{oss}$		-	63	-	
Reverse Transfer Capacitance	$C_{rss}$		-	11	-	
Gate Resistance	$R_G$	-	-	1.9	-	$\Omega$
Switching Parameters						
Turn-on Delay Time	$t_{d(on)}$	$V_{DS}=325V,$ $R_G=2.5\Omega, I_D=4A$	-	45	-	ns
Turn-on Rise Time	$t_r$		-	100	-	
Turn-Off Delay Time	$t_{d(off)}$		-	200	-	
Turn-Off Fall Time	$t_f$		-	130	-	
Total Gate Charge	$Q_g$	$V_{DS}=480V, I_D=4A,$ $V_{GS}=10V$	-	25	-	nC
Gate-Source Charge	$Q_{gs}$		-	17	-	
Gate-Drain Charge	$Q_{gd}$		-	20	-	
Drain-Source Diode Characteristics						
Body Diode Reverse Recovery Time	$t_{rr}$	$I_S=20A, di/dt=100A/\mu s,$ $V_{GS}=0V$	-	690	-	ns
Body Diode Reverse Recovery Charge	$Q_{rr}$		-	9.0	-	$\mu C$
Diode Forward Current	$I_S$	-	-	-	4.0	A
Diode Forward Voltage	$V_{SD}$	$V_{GS}=0V, I_S=20A$	-	-	1.3	V

## Typical Characteristics

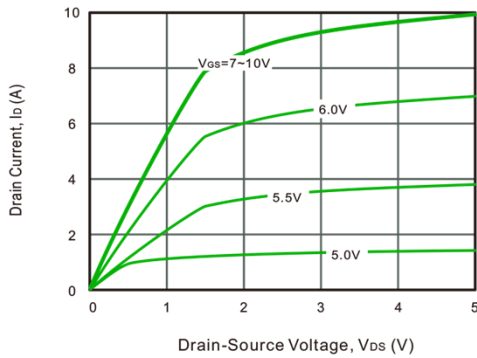


Fig.1 Output characteristics

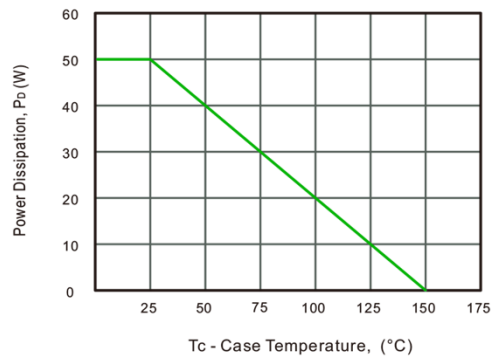


Fig.2 Power Dissipation

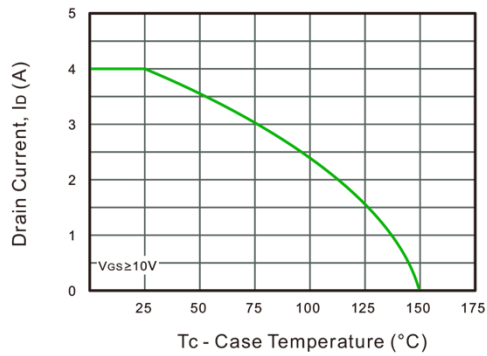


Fig.3 Drain Current Derating

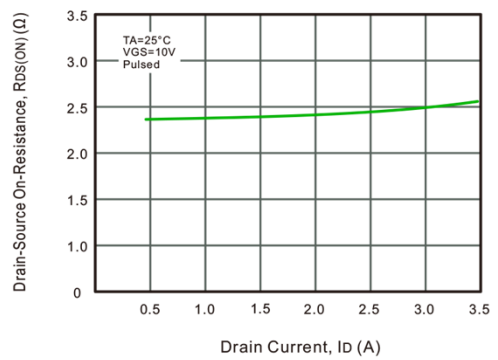


Fig.4 Drain-Source On-Resistance vs. Drain Current

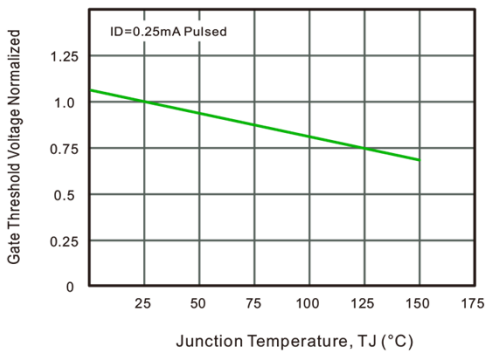


Fig.5 Gate Threshold Voltage vs. Junction Temperature

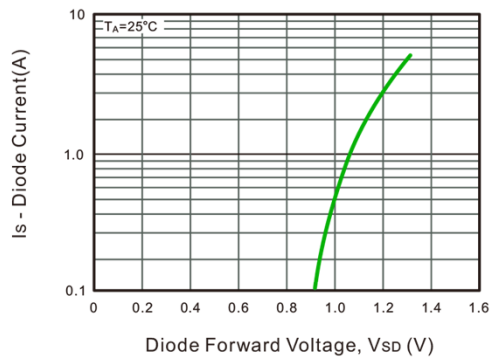


Fig.6 Body-diode Forward Characteristics

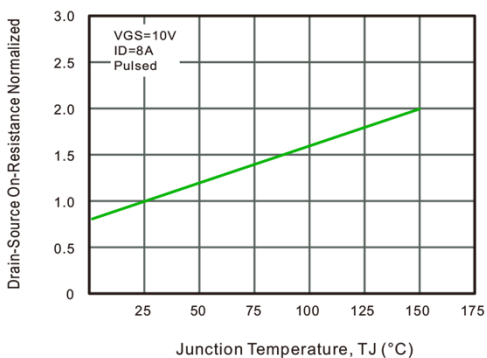


Fig.7 Drain-Source On-Resistance vs. Junction Temperature

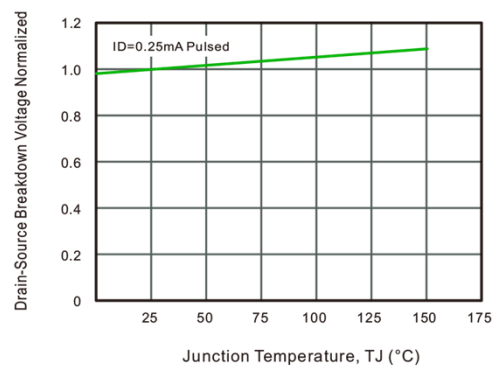
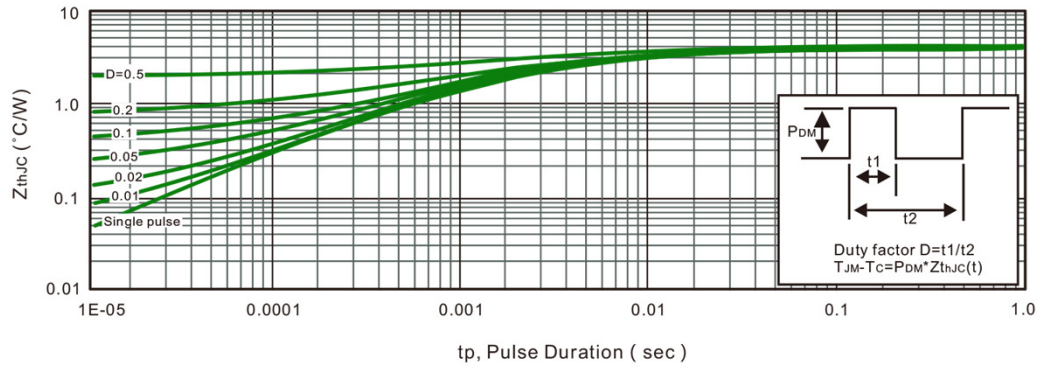
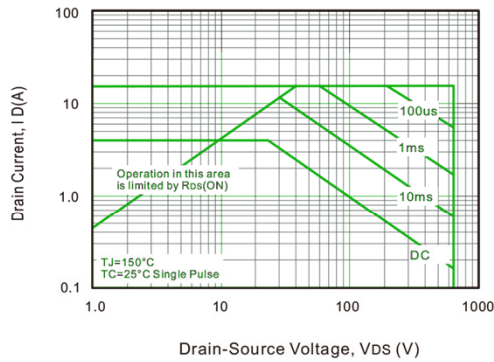
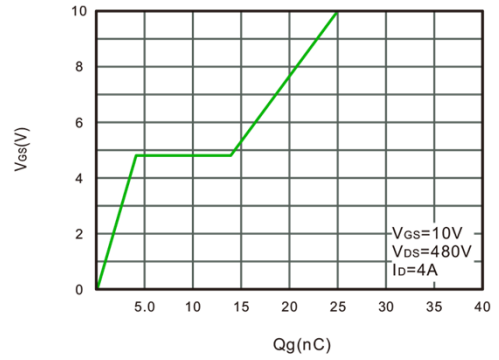
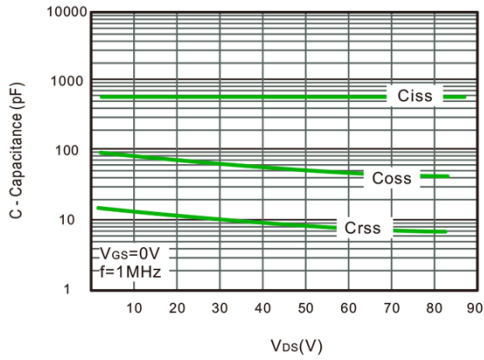
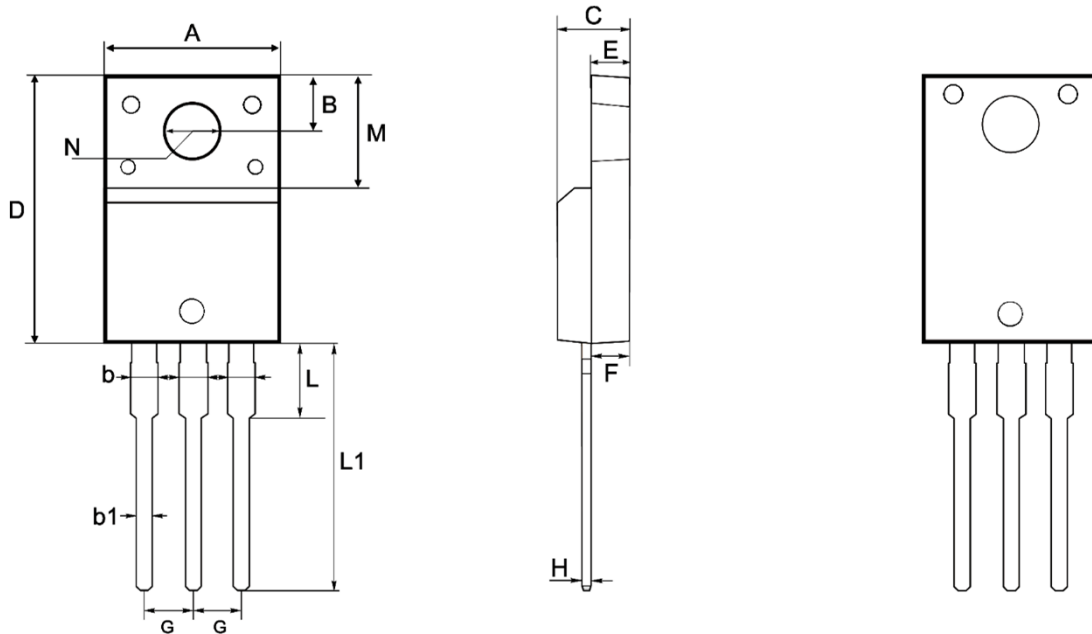


Fig.8 Breakdown Voltage vs. Junction Temperature




## Product dimension (TO-220F-3L)



Dim	Millimeters		Inches	
	Min	Max	Min	Max
A	10.08	10.28	0.397	0.405
B	3.17	3.37	0.125	0.133
b	1.24	1.44	0.049	0.057
b1	0.70	0.90	0.028	0.035
C	4.50	4.90	0.177	0.193
D	15.67	16.07	0.617	0.633
E	2.34	2.74	0.092	0.108
F	2.34	2.74	0.092	0.108
G	2.44	2.64	0.096	0.104
H	0.40	0.60	0.016	0.024
L	2.98	3.38	0.117	0.133
L1	13.30	13.70	0.524	0.539
M	6.38	6.98	0.251	0.275
N	3.18 Typ.		0.125 Typ.	


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