Prisemi®

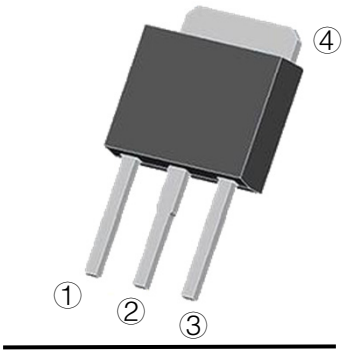
PNMIP650V4

N-Channel MOSFET

Description

The PNMIP650V4 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.

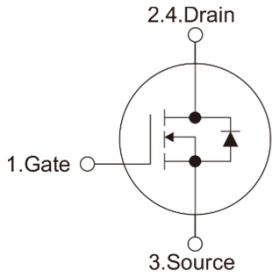
MOSFET Product Summary		
V_{DS}(V)	$R_{DS(on)}$(Ω)	I_D(A)
650	2.36 @ V_{GS} = 10V	4.0



TO-251 (Top View)

Feature

- Fast switching capability
- Avalanche energy tested
- Improved dv/dt capability, high ruggedness



Schematic diagram

Mechanical data

- Case: TO-251
- Approx. Weight: 0.315g (0.011oz)
- Lead free finish, RoHS compliant
- Case Material: “Green” molding compound, UL flammability classification 94V-0,“Halogen-free”.

Absolute maximum rating@25℃

Rating		Symbol	Value	Units
Drain-Source Voltage		V_{DS}	650	V
Gate-Source Voltage		V_{GS}	±30	V
Drain Current-Continuous	T_C=25℃	I_D	4.0	A
	T_C=100℃		2.5	
Pulsed Drain Current[2]		I_{DM}	16	A
Avalanche Energy, Single Pulsed[3]		E_{AS}	173	mJ
Peak Diode Recovery dv/dt[4]		dv/dt	2.1	V/ns
Maximum Power Dissipation		P_D	54	W
Operating Junction and Storage Temperature Range		T_J,T_{STG}	-55 ~ +150	℃
Junction-to-Ambient		$R_{θJA}$	63	℃/W
Junction to Case		$R_{θJC}$	2.31	℃/W

Electrical characteristics per line@25℃ (unless otherwise specified)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Units
Off Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS} = 0V,I_D = 250μA	650	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 650V,V_{GS} = 0V	-	-	1.0	μA
Gate-Body Leakage Current	I_{GSS}	V_{GS} = ±30V,V_{DS} = 0V	-	-	±100	nA
On Characteristics						
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS},I_D = 250μA	2.0	-	4.0	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	V_{GS} = 10V,I_D = 2.0A	-	2.36	2.6	Ω
Dynamic Characteristics						
Input Capacitance	C_{lss}	V_{DS} = 25V,V_{GS} = 0V, f = 1.0MHz	-	560	-	pF
Output Capacitance	C_{oss}		-	55	-	
Reverse Transfer Capacitance	C_{rss}		-	10	-	
Switching Characteristics						
Turn-on Delay Time[5)]	$t_{d(on)}$	V_{DS} = 100V, V_{GS} = 10V, I_D = 4.0A, R_G = 25Ω[5,6)]	-	7.0	-	ns
Turn-on Rise Time	t_r		-	16	-	
Turn-Off Delay Time	$t_{d(off)}$		-	36	-	
Turn-Off Fall Time	t_f		-	22	-	
Total Gate Charge[5)]	Q_g	V_{DS} = 520V, V_{GS} = 10V, I_D = 4.0A, I_G = 1mA[5,6)]	-	13	-	nC
Gate-Source Charge	Q_{gs}		-	4.0	-	
Gate-Drain Charge	Q_{gd}		-	2.2	-	
Drain-Source Diode Characteristics						
Diode Forward Voltage[5)]	V_{SD}	V_{GS} = 0V,I_S = 4.0A	-	-	1.4	V
Diode Continuous Current	I_S		-	-	4.0	A
Diode Pulsed Current	I_{SM}		-	-	16	A
Reverse Recovery Time[5)]	t_{rr}	V_{GS} = 0V,I_S = 4.0A, di/dt = 100A/μs	-	250	-	nS
Reverse Recovery Charge	Q_{rr}		-	4.5	-	μC

Notes:

1. Absolute maximum ratings are those values beyond which the device could be permanently damaged. Absolute maximum ratings are stress ratings only and functional device operation is not implied.
2. Repetitive Rating: Pulse width limited by maximum junction temperature.
3. L = 30mH, I_{AS} = 3.4A, V_{DD} = 50V, R_G = 25Ω, Starting T_J = 25°C
4. I_{SD} ≤ 4A, di/dt ≤ 200A/μs, V_{DD} ≤ BV_{DSS}, Starting T_J = 25°C
5. Pulse Test: Pulse width ≤ 300μs, Duty cycle ≤ 2%.
6. Essentially independent of operating temperature.

Typical Characteristics

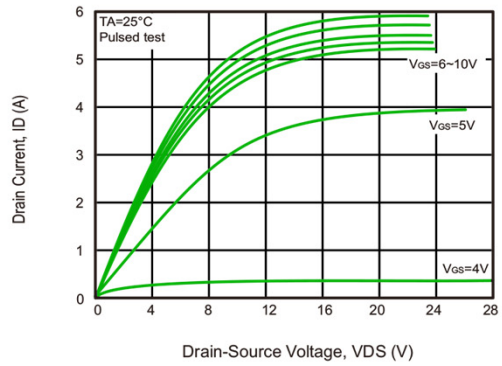


Fig.1 Drain Current vs. Gate-Source Voltage

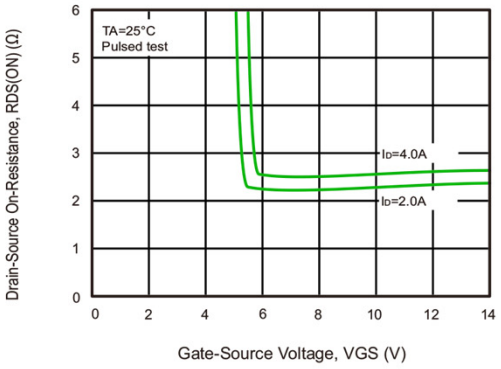


Fig.2 Drain-Source On-Resistance vs. Gate-Source Voltage

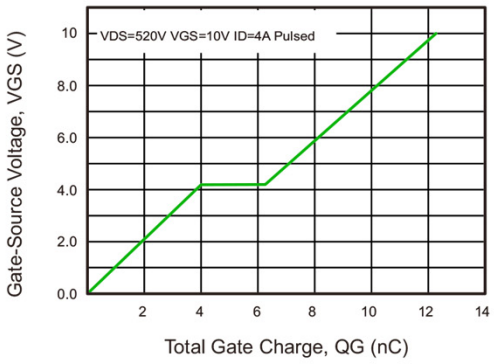


Fig.3 Gate Charge Characteristics

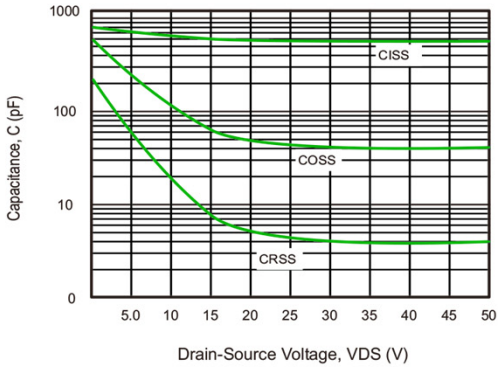


Fig.4 Capacitance Characteristics

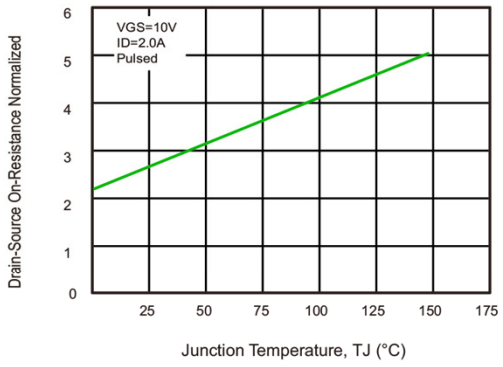


Fig.5 Drain-Source On-Resistance vs. Junction Temperature

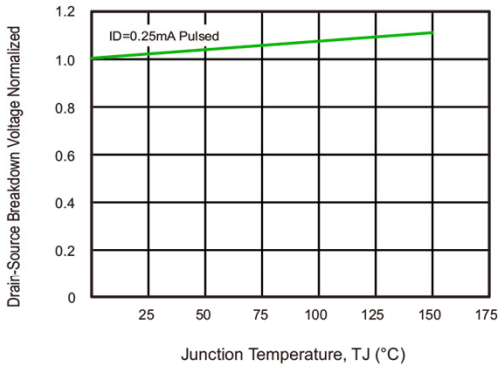


Fig.6 Breakdown Voltage vs. Junction Temperature

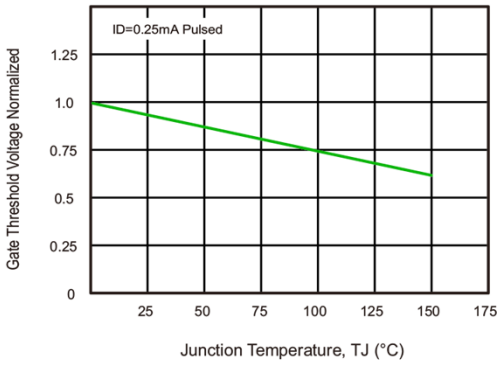


Fig.7 Gate Threshold Voltage vs. Junction Temperature

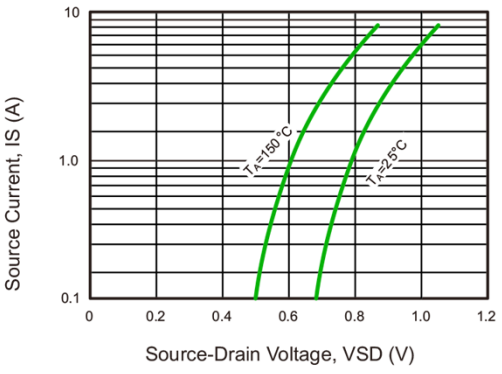


Fig.8 Source Current vs. Source-Drain Voltage

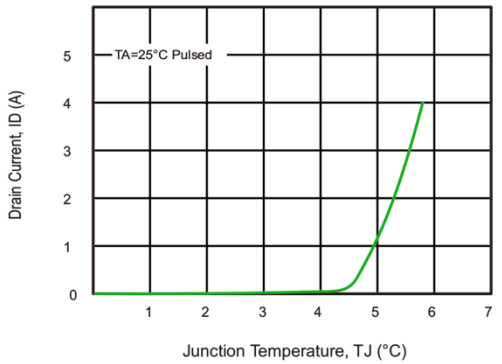


Fig.9 Drain Current vs. Gate-Source Voltage

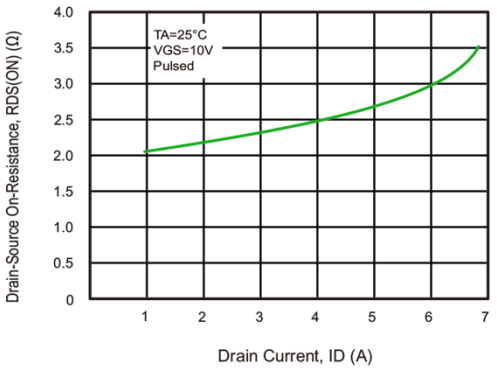


Fig.10 Drain-Source On-Resistance vs. Drain Current

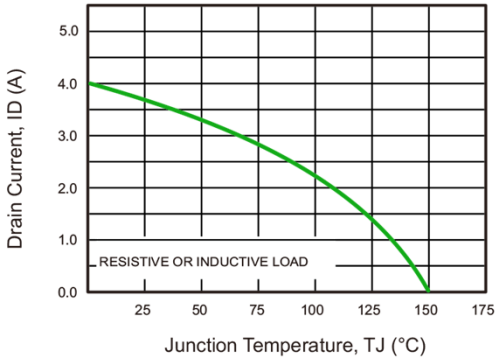


Fig.11 Drain Current vs. Junction Temperature

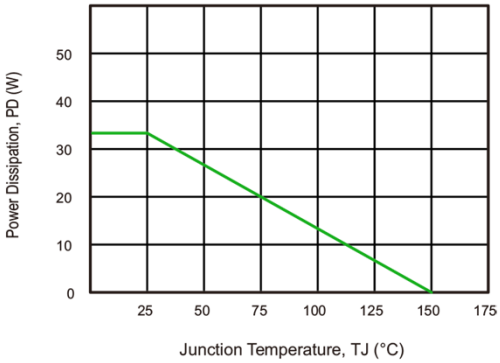


Fig.12 Power Dissipation vs. Junction Temperature

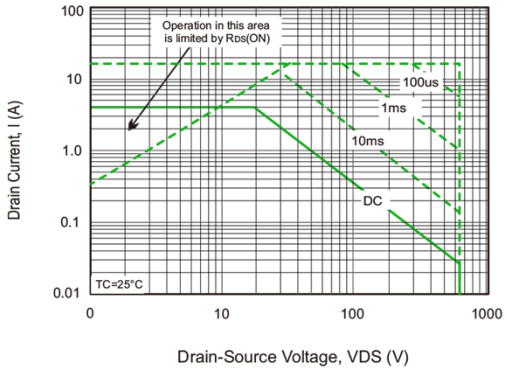
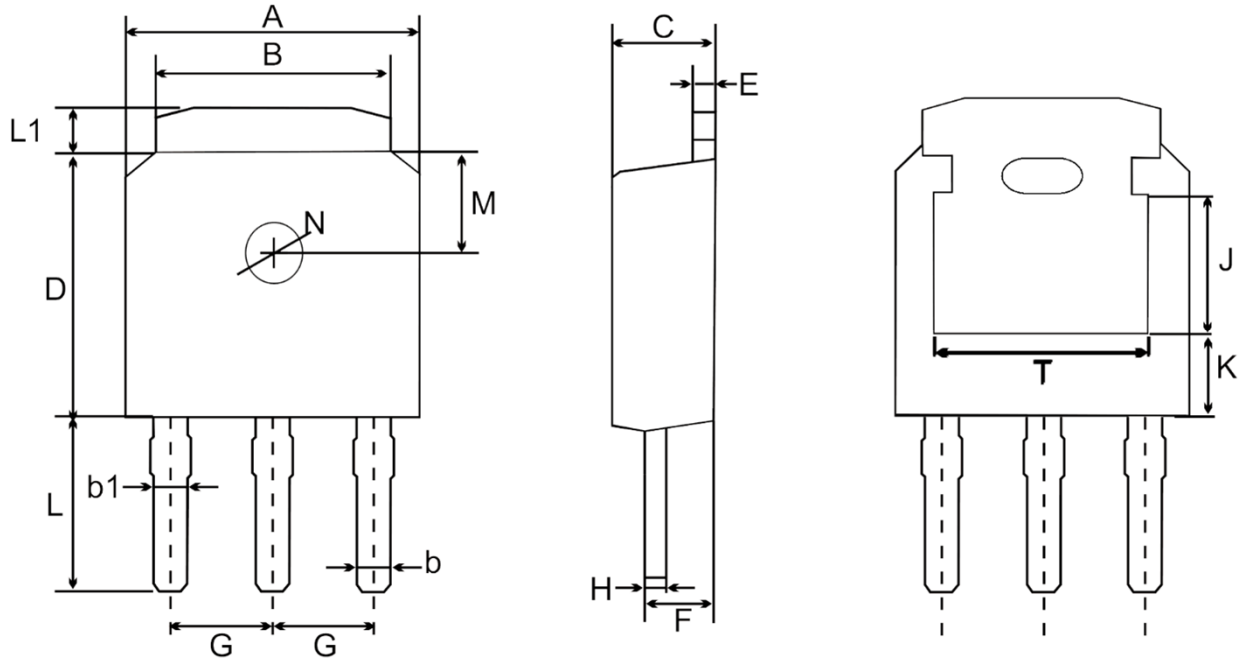


Fig.13 Safe Operating Area

Product dimension (TO-251)



Dim	Millimeters		Inches	
	Min	Max	Min	Max
A	6.30	6.70	0.248	0.264
B	5.10	5.50	0.201	0.217
b	0.30	0.80	0.012	0.031
b1	0.76	0.90	0.030	0.035
C	2.10	2.50	0.083	0.098
D	5.90	6.30	0.232	0.248
E	0.40	0.60	0.016	0.024
F	1.30	1.80	0.051	0.071
G	2.29 Typ.		0.090 Typ.	
H	0.45	0.55	0.018	0.022
L	3.90	4.30	0.154	0.169
L1	0.80	1.20	0.031	0.047
M	1.80 Typ.		0.071 Typ.	
N	1.30 Typ.		0.051 Typ.	
J	3.16 Ref.		0.124 Ref.	
K	1.80 Ref.		0.071 Ref.	
T	4.83 Ref.		0.190 Ref.	

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