

Pb Free Plating Product

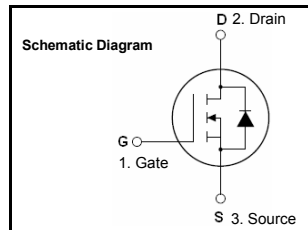
IRFP4227PbF



ThinkiSemi 96Ampere,200Volt Silicon N-Channel Planar Power MOSFET

Features

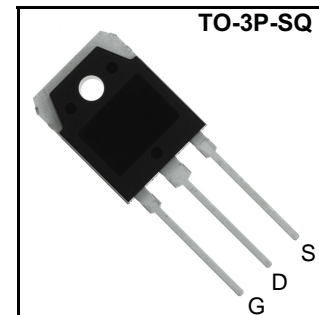
- High ruggedness
- $R_{DS(on)}$ (Max.0.24 Ω)@ $V_{GS}=10V, I_D=48A$
- Gate Charge (Typical 140nC)
- Improved dv/dt Capability
- 100% Avalanche Tested



$BV_{DSS} = 200V$
 $R_{DS(on)} = 0.020\Omega$ (Typical)
 $I_D = 96A$

General Description

This N-channel enhancement mode field-effect power transistor using THINKI Semiconductor advanced planar stripe, DMOS technology intended for off-line switch mode power supply. Also, especially designed to minimize $r_{ds(on)}$ and high rugged avalanche characteristics. The TO-3PB-SQ pkg is well suited for adaptor power unit and power inverter/amplifier application.



Absolute (Tc=25°C unless otherwise specified):

Symbol	Parameter	Rating	Units
V_{DSS}	Drain-to-Source Voltage	200	V
I_D	Continuous Drain Current	96	A
	Continuous Drain Current $T_C=100^\circ C$	75	A
I_{DM}^{a1}	Pulsed Drain Current(pulse width limited by T_{JM})	225	A
V_{GS}	Gate-to-Source Voltage	± 30	V
E_{AS}	Single Pulse Avalanche Energy	3500	mJ
E_{AR}^{a1}	Avalanche Energy ,Repetitive	250	mJ
I_{AR}^{a1}	Avalanche Current	60	A
dv/dt^{a2}	Peak Diode Recovery dv/dt	5.0	V/ns
P_D	Power Dissipation	600	W
	Derating Factor above 25°C	4.8	W/°C
T_J, T_{stg}	Operating Junction and Storage Temperature Range	150, -55 to 150	°C
T_L	Maximum Temperature for Soldering	300	°C

Caution Stresses greater than those in the "Absolute Maximum Ratings" may cause permanent damage to the device

Thermal Characteristics

Symbol	Parameter	Rating	Units
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	0.21	$^{\circ}\text{C}/\text{W}$
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	40	$^{\circ}\text{C}/\text{W}$

Electrical Characteristics (Tc=25°C unless otherwise specified) :

OFF Characteristics						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
V_{DSS}	Drain to Source Breakdown Voltage	$V_{GS}=0\text{V}, I_D=250\mu\text{A}$	200	--	--	V
I_{DSS}	Drain to Source Leakage Current	$V_{DS}=200\text{V}, V_{GS}=0\text{V}, T_a=25^{\circ}\text{C}$	--	--	1.0	μA
		$V_{DS}=160\text{V}, V_{GS}=0\text{V}, T_a=125^{\circ}\text{C}$	--	--	100	
$I_{GSS(F)}$	Gate to Source Forward Leakage	$V_{GS}=+30\text{V}$	--	--	100	nA
$I_{GSS(R)}$	Gate to Source Reverse Leakage	$V_{GS}=-30\text{V}$	--	--	-100	nA

ON Characteristics						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
$R_{DS(ON)}$	Drain-to-Source On-Resistance	$V_{GS}=10\text{V}, I_D=48\text{A}$	--	20	24	m Ω
$V_{GS(TH)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=250\mu\text{A}$	2.0	--	4.0	V
g_{fs}	Forward Trans conductance	$V_{DS}=15\text{V}, I_D=48\text{A}$	--	50	--	S

Pulse width < 380 μs ; duty cycle < 2%.

Dynamic Characteristics						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
C_{iss}	Input Capacitance	$V_{GS}=0\text{V}, V_{DS}=25\text{V}$ $f=1.0\text{MHz}$	--	7500	--	pF
C_{oss}	Output Capacitance		--	880	--	
C_{rss}	Reverse Transfer Capacitance		--	180	--	

Resistive Switching Characteristics						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
$t_{d(ON)}$	Turn-on Delay Time	$I_D=96\text{A}, V_{DD}=100\text{V}$ $V_{GS}=10\text{V}, R_g=25\Omega$	--	68	--	ns
t_r	Rise Time		--	120	--	
$t_{d(OFF)}$	Turn-Off Delay Time		--	485	--	
t_f	Fall Time		--	145	--	
Q_g	Total Gate Charge	$I_D=96\text{A}, V_{DD}=100\text{V}$ $V_{GS}=10\text{V}$	--	140	--	nC
Q_{gs}	Gate to Source Charge		--	22	--	
Q_{gd}	Gate to Drain ("Miller") Charge		--	55	--	

Source-Drain Diode Characteristics						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
I_{SD}	Continuous Source Current (Body Diode)		--	--	96	A
I_{SM}	Maximum Pulsed Current (Body Diode)		--	--	225	A
V_{SD}	Diode Forward Voltage	$I_S=96A, V_{GS}=0V$	--	--	1.5	V
t_{rr}	Reverse Recovery Time	$I_S=96A, T_J=25^\circ C$	--	485	--	ns
Q_{rr}	Reverse Recovery Charge	$di_F/dt=100A/\mu s, V_{GS}=0V$	--	4.8	--	uC

a1: Repetitive rating; pulse width limited by maximum junction temperature

a2: $I_{SD}=90A, di/dt \leq 100A/\mu s, V_{DD} \leq BV_{DS}$, Start $T_J=25^\circ C$

TYPICAL CHARACTERISTICS

Fig. 1. Output Characteristics @ 25°C

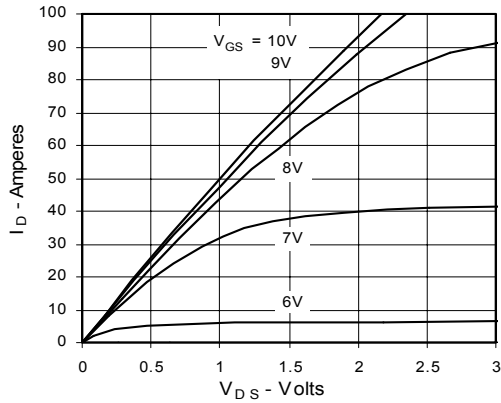


Fig. 2. Extended Output Characteristics @ 25°C

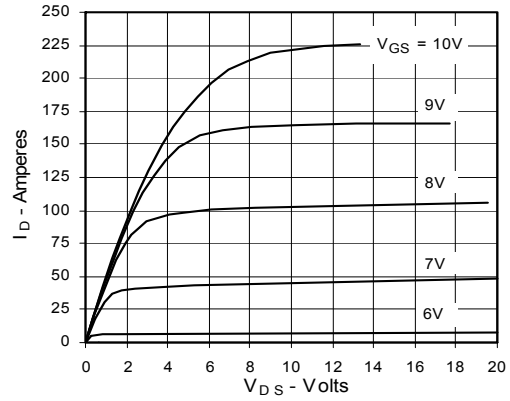


Fig. 3. Output Characteristics @ 150°C

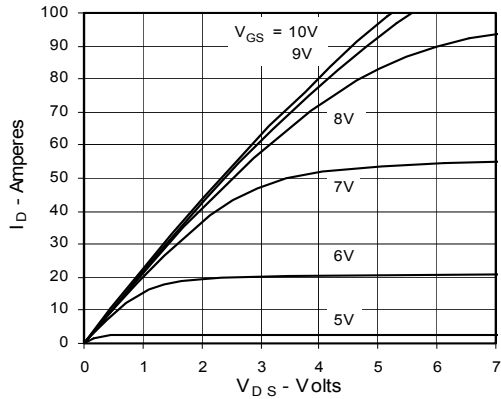


Fig. 4. $R_{DS(on)}$ Normalized to 0.5 I_{D25} Value vs. Junction Temperature

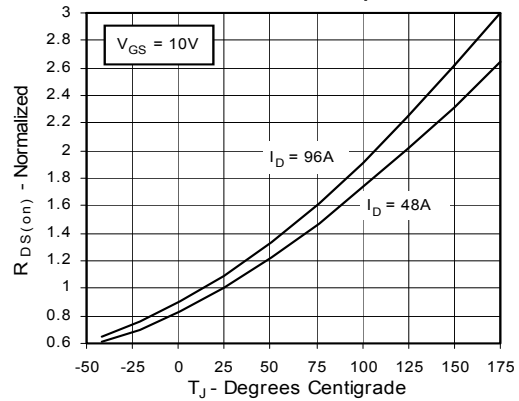


Fig. 5. $R_{DS(on)}$ Normalized to 0.5 I_{D25} Value vs. I_D

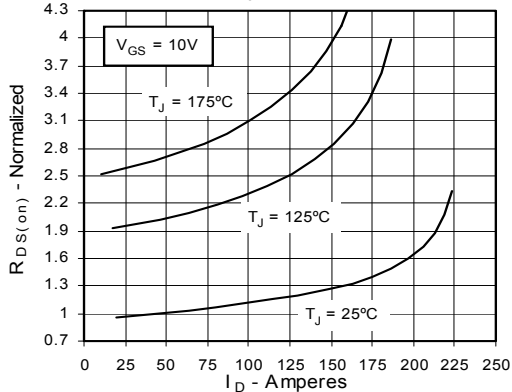


Fig. 6. Drain Current vs. Case Temperature

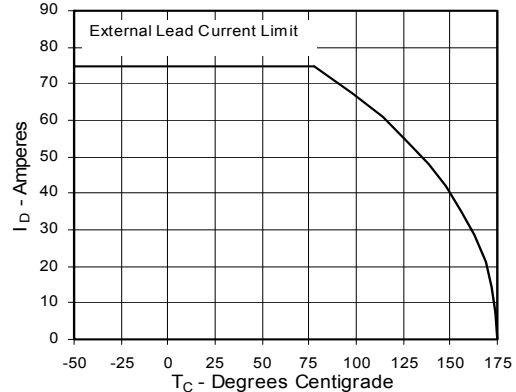


Fig. 7. Input Admittance

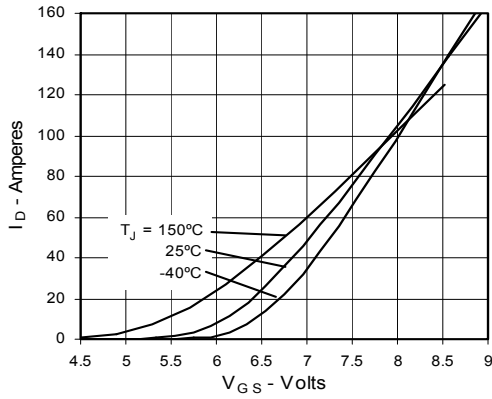


Fig. 8. Trans conductance

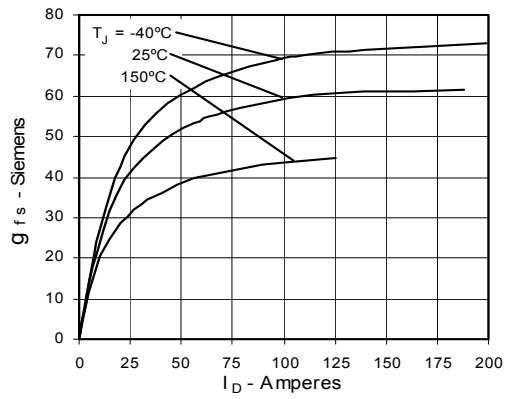


Fig. 9. Source Current vs. Source-To-Drain Voltage

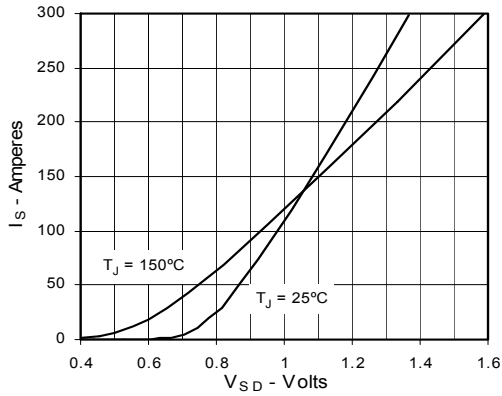


Fig. 10. Gate Charge

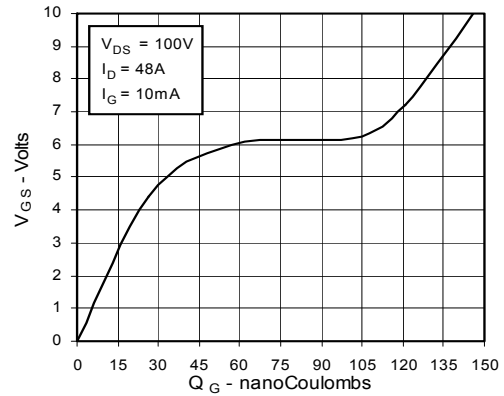


Fig. 11. Capacitance

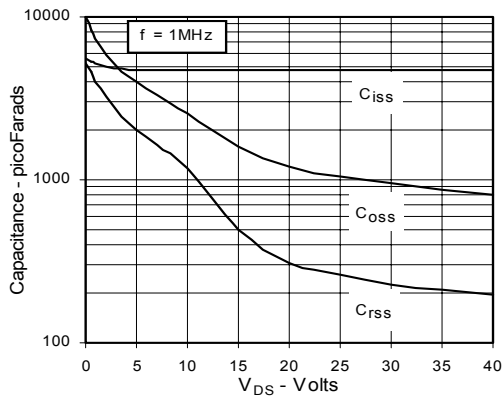


Fig. 12. Forward-Bias Safe Operating Area

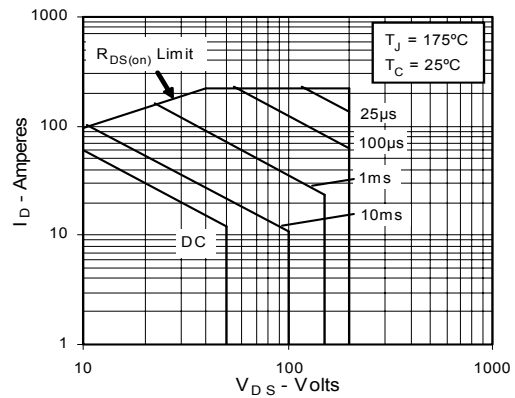
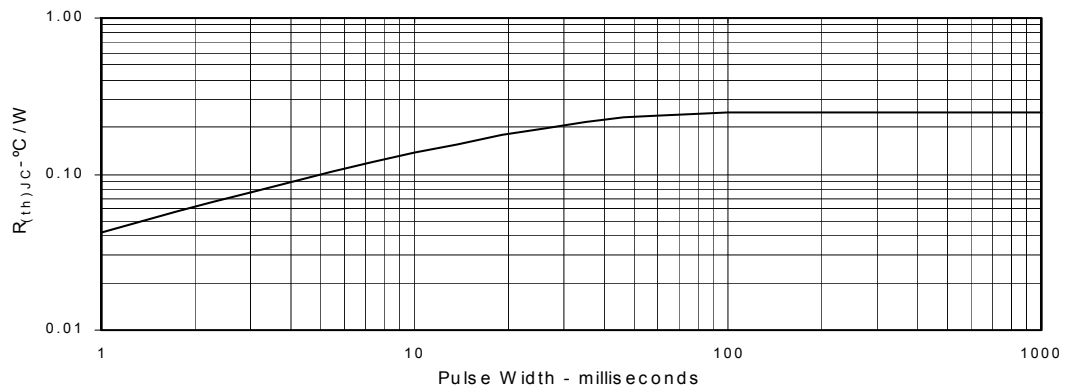
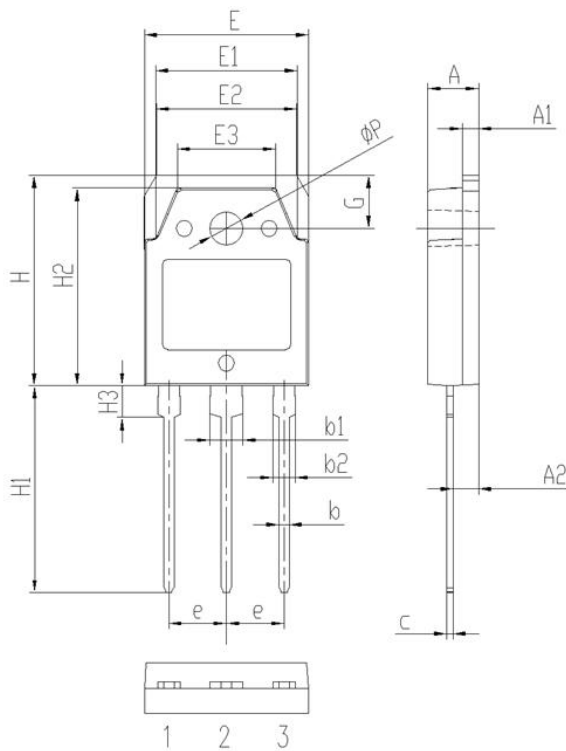


Fig. 13. Maximum Transient Thermal Resistance



Package Outline

THINKI TO-3P-SQ



Symbol	Dimensions(millimeters)	
	Min.	Max.
A	4.60	5.00
A1	1.50	2.00
A2	2.20	2.60
b	0.80	1.20
b1	2.90	3.30
b2	1.90	2.30
c	0.40	0.80
e	5.25	5.65
E	15.3	15.7
E1	13.2	13.6
E2	13.1	13.5
E3	9.10	9.50
H	19.7	20.1
H1	19.1	20.1
H2	18.3	18.7
H3	2.80	3.20
G	4.80	5.20
ΦP	3.00	3.40