

Pb Free Plating Product

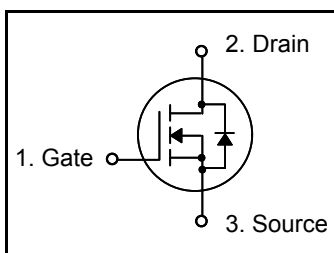
IRFP250NPbF



ThinkiSemi 200V,30A N-Channel Planar Process Power MOSFETs

Features

- $R_{DS(on)}$ (Max 0.075 Ω)@ $V_{GS}=10V$
- Gate Charge (Max 123nC)
- Improved dv/dt Capability
- High ruggedness
- 100% Avalanche Tested

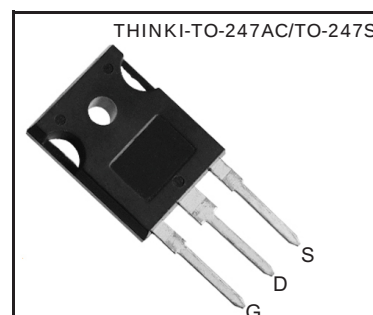


$BV_{DSS} = 200V$
 $R_{DS(ON)} = 0.075 \text{ ohm}$
 $I_D = 30A$

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-247AC pkg is well suited for adaptor power unit and small power inverter application.



Absolute Maximum Ratings

Symbol	Parameter	Max.	Units
I_D @ $T_C = 25^\circ C$	Continuous Drain Current, V_{GS} @ 10V	30	A
I_D @ $T_C = 100^\circ C$	Continuous Drain Current, V_{GS} @ 10V	21	
I_{DM}	Pulsed Drain Current ①⑤	120	
P_D @ $T_C = 25^\circ C$	Maximum Power Dissipation	214	W
	Linear Derating Factor	1.4	W/ $^\circ C$
V_{GS}	Gate-to-Source Voltage	± 20	V
E_{AS}	Single Pulse Avalanche Energy ②⑤	315	mJ
I_{AR}	Avalanche Current ①⑤	30	A
E_{AR}	Repetitive Avalanche Energy ①	21	mJ
dv/dt	Peak Diode Recovery dv/dt③⑤	8.6	V/ns
T_J	Operating Junction and	-55 to + 175	$^\circ C$
T_{STG}	Storage Temperature Range		
	Soldering Temperature, for 10 seconds (1.6mm from case)	300	
	Mounting torque, 6-32 or M3 screw	10 lbf•in (1.1N•m)	

Thermal Resistance

Symbol	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case	—	0.7	$^\circ C/W$
$R_{\theta CS}$	Case-to-Sink, Flat, Greased Surface	0.24	—	
$R_{\theta JA}$	Junction-to-Ambient	—	40	

Electrical characteristics @ $T_J = 25^\circ\text{C}$ (unless otherwise specified)

	Parameter	Min.	Typ.	Max.	Units	Conditions
$V_{(BR)DSS}$	Drain-to-Source Breakdown Voltage	200	—	—	V	$V_{GS} = 0V, I_D = 250\mu A$
$\Delta V_{(BR)DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	—	0.26	—	$V/^\circ\text{C}$	Reference to $25^\circ\text{C}, I_D = 1mA$
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	—	—	0.075	Ω	$V_{GS} = 10V, I_D = 18A$ ④
$V_{GS(th)}$	Gate Threshold Voltage	2.0	—	4.0	V	$V_{DS} = V_{GS}, I_D = 250\mu A$
g_{fs}	Forward Trans conductance	17	—	—	S	$V_{DS} = 50V, I_D = 18A$ ④
I_{DSS}	Drain-to-Source Leakage Current	—	—	25	μA	$V_{DS} = 200V, V_{GS} = 0V$
		—	—	250		$V_{DS} = 160V, V_{GS} = 0V, T_J = 150^\circ\text{C}$
I_{GSS}	Gate-to-Source Forward Leakage	—	—	100	nA	$V_{GS} = 20V$
	Gate-to-Source Reverse Leakage	—	—	-100		$V_{GS} = -20V$

Dynamic Electrical Characteristics @ $T_J = 25^\circ\text{C}$ (unless otherwise specified)

Q_g	Total Gate Charge	—	—	123	nC	$I_D = 18A$
Q_{gs}	Gate-to-Source Charge	—	—	21		$V_{DS} = 160V$
Q_{gd}	Gate-to-Drain Charge	—	—	57		$V_{GS} = 10V$, See Fig.6 and 13 ④
$t_{d(on)}$	Turn-On Delay Time	—	14	—	ns	$V_{DD} = 100V$
t_r	Rise Time	—	43	—		$I_D = 18A$
$t_{d(off)}$	Turn-Off Delay Time	—	41	—		$R_G = 3.9\Omega$
t_f	Fall Time	—	33	—		$R_D = 5.5\Omega$, See Fig.10 ④
L_D	Internal Drain Inductance	—	5.0	—	nH	Between lead, 6mm (0.25in.) from package and center of die contact
L_S	Internal Source Inductance	—	13	—		
C_{iss}	Input Capacitance	—	2159	—	pF	$V_{GS} = 0V$
C_{oss}	Output Capacitance	—	315	—		$V_{DS} = 25V$
C_{rss}	Reverse Transfer Capacitance	—	83	—		$f = 1.0MHz$, See Fig.5

Diode Characteristics

	Parameter	Min.	Typ.	Max.	Units	Conditions
I_S	Continuous Source Current (Body Diode)	—	—	30	A	MOSFET symbol showing the integral reverse p-n junction diode.
I_{SM}	Pulsed Source Current (Body Diode) ①	—	—	120		
V_{SD}	Diode Forward Voltage	—	—	1.3	V	$T_J = 25^\circ\text{C}, I_S = 18A, V_{GS} = 0V$ ④
t_{rr}	Reverse Recovery Time	—	186	279	ns	$T_J = 25^\circ\text{C}, I_F = 18A$
Q_{rr}	Reverse Recovery Charge	—	1.3	2.0	μC	$di/dt = 100A/\mu s$ ④

Notes:

- ① Repetitive rating; pulse width limited by max. junction temperature. (See fig. 11).
- ② Starting $T_J = 25^\circ\text{C}$, $L = 1.9mH$, $R_G = 25\Omega$, $I_{AS} = 18A$. (See fig. 12).
- ③ $I_{SD} \leq 18A$, $di/dt \leq 374A/\mu s$, $V_{DD} \leq V_{(BR)DSS}$, $T_J \leq 175^\circ\text{C}$.
- ④ Pulse width $\leq 300\mu s$; duty cycle $\leq 2\%$.

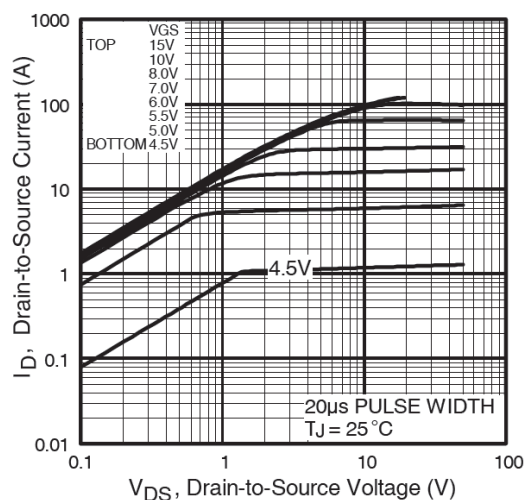


Fig. 1 Typical Output Characteristics

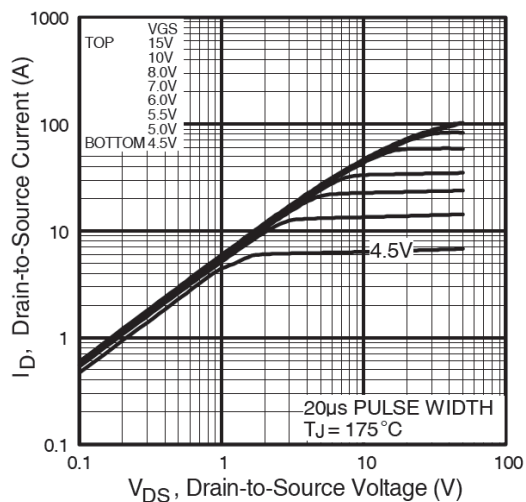


Fig. 2 Typical Output Characteristics

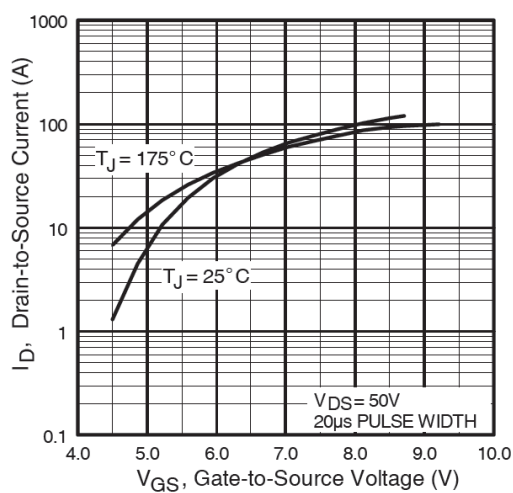


Fig. 3 Typical Transfer Characteristics

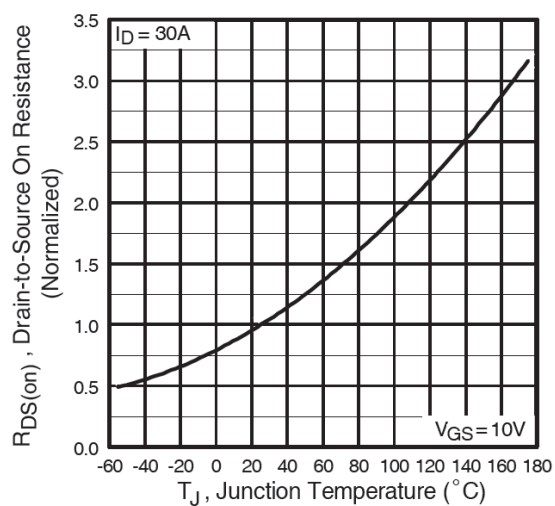


Fig. 4 Normalized On-Resistance vs. Temperature

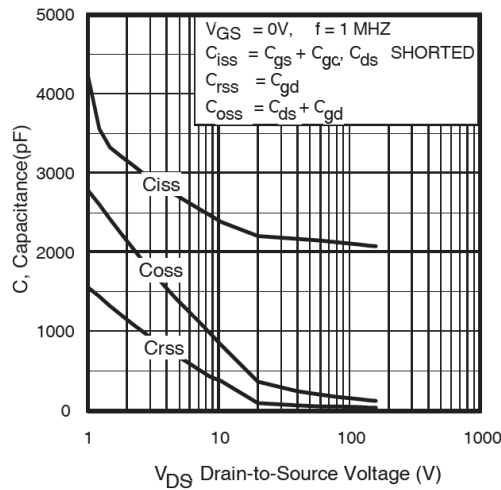


Fig 5. Typical Capacitance vs.
Drain-to-Source Voltage

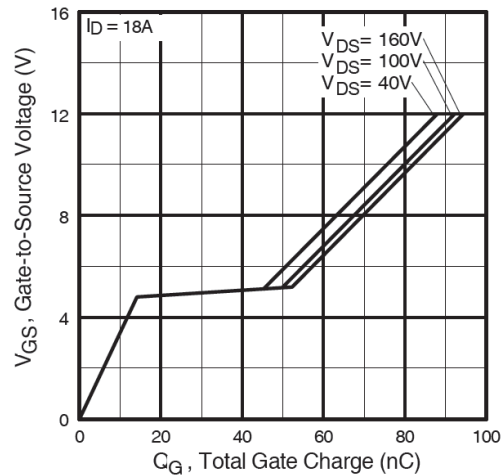


Fig 6. Typical Gate Charge vs.
Gate-to-Source Voltage

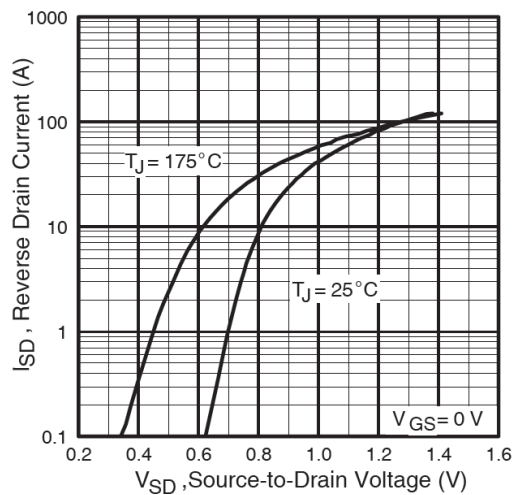


Fig. 7 Typical Source-to-Drain Diode
Forward Voltage

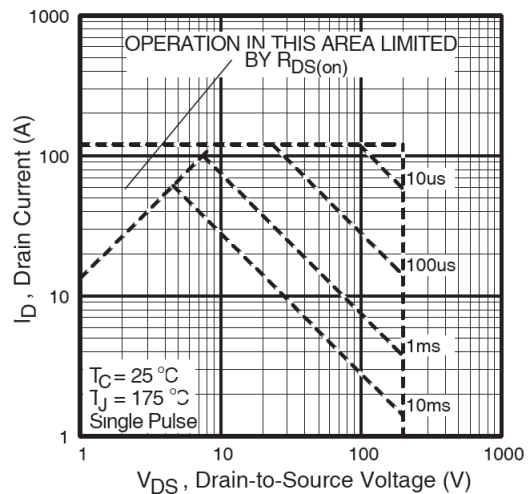


Fig 8. Maximum Safe Operating Area

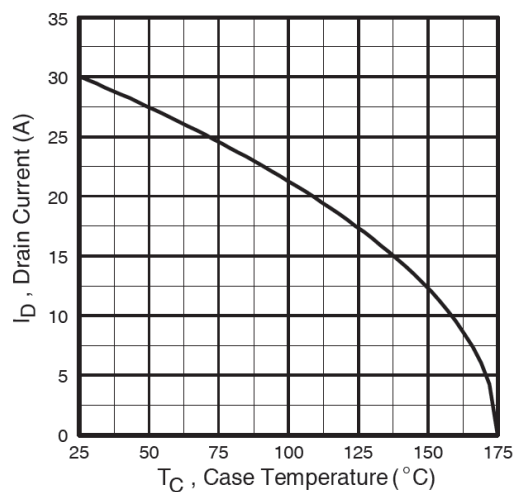


Fig 9. Maximum Drain Current vs. Case Temperature

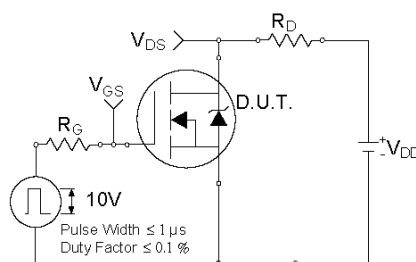


Fig 10a. Switching Time Test Circuit

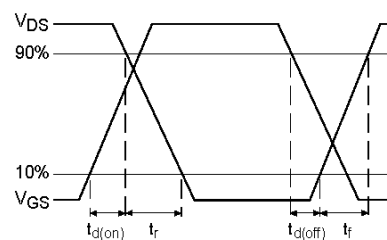


Fig 10a. Switching Time Waveforms

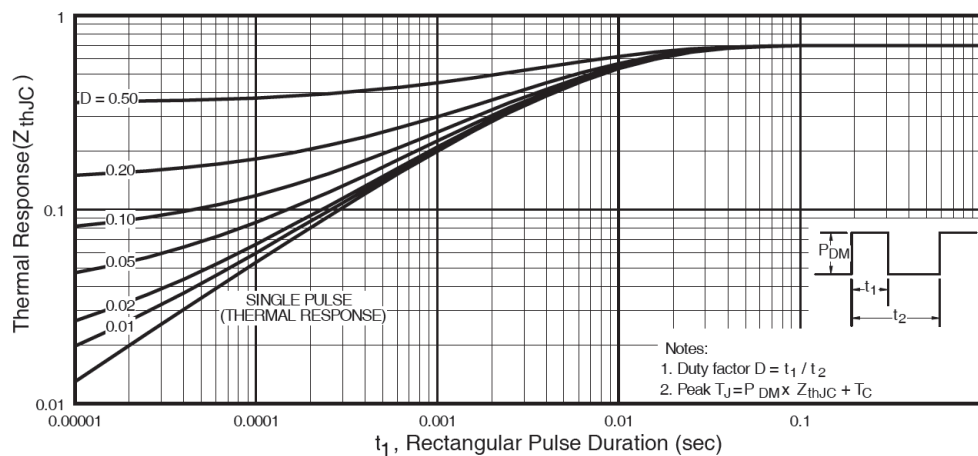


Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Case

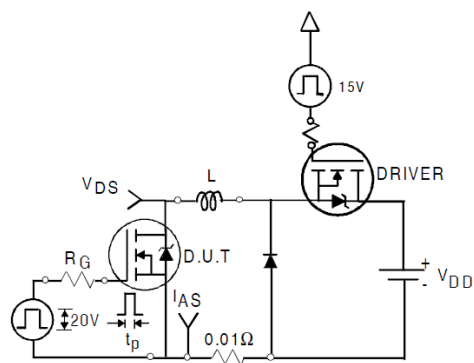


Fig. 12a. Unclamped Inductive Test Circuit

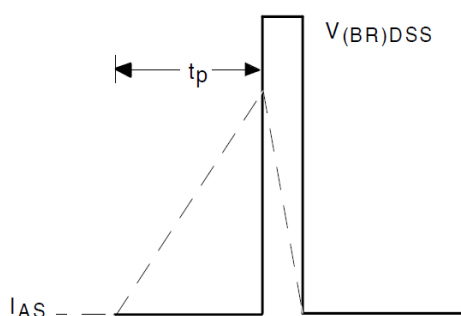


Fig. 12b. Unclamped Inductive Waveforms

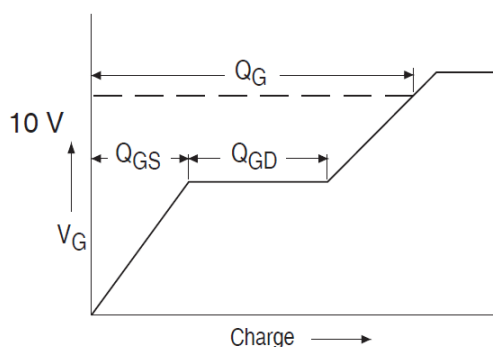


Fig 13a. Basic Gate Charge Waveform

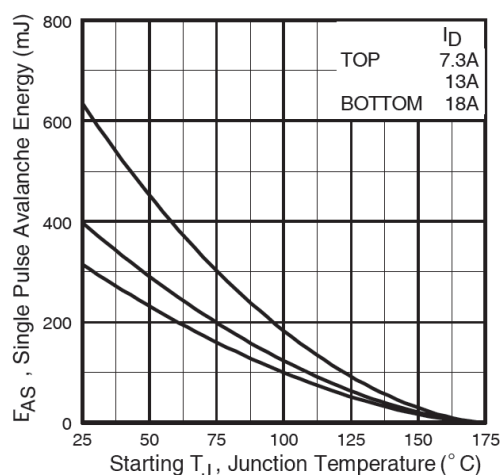


Fig 12c. Maximum Avalanche Energy vs. Drain Current

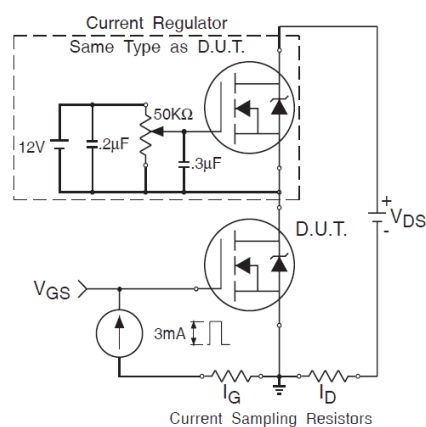


Fig 13b. Gate Charge Test Circuit

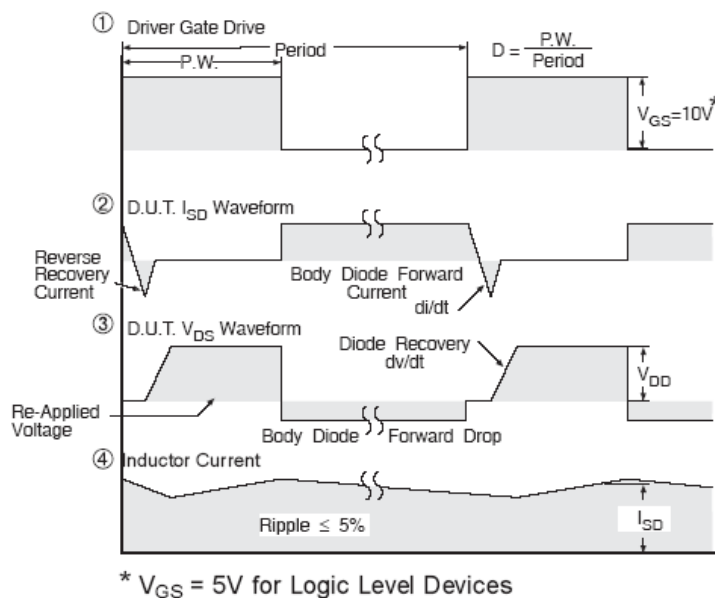
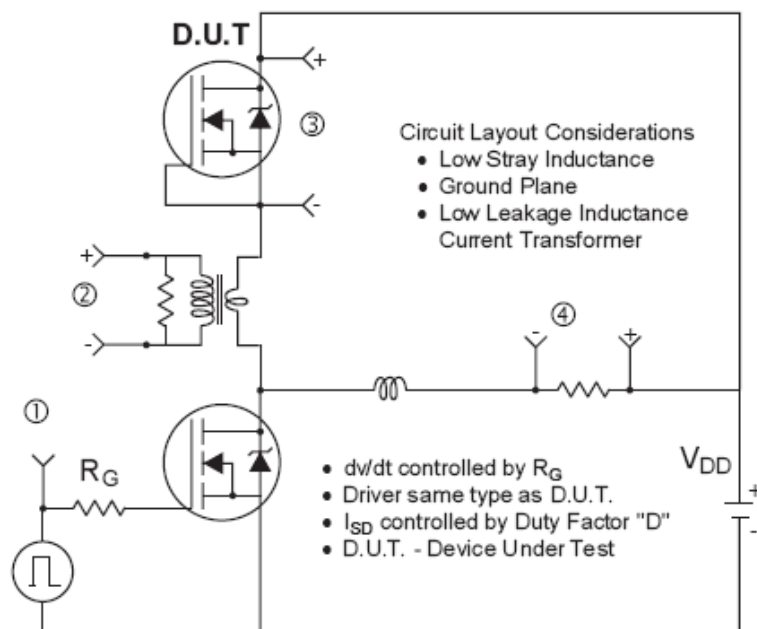


Fig 14. Peak Diode Recovery dv/dt Test Circuit for N-Channel IR MOSFET™

THINKI TO-247AC/TO-247S MECHANICAL DATA

DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
A	4.85		5.15	0.19		0.20
A1	2.20		2.60	0.086		0.102
b	1.0		1.40	0.039		0.055
b1	2.0		2.40	0.079		0.094
b2	3.0		3.40	0.118		0.134
c	0.40		0.80	0.015		0.03
D	19.85		20.15	0.781		0.793
E	15.45		15.75	0.608		0.620
e		5.45			0.214	
L	14.20		14.80	0.560		0.582
L1	3.70		4.30	0.14		0.17
L2		18.50			0.728	
øP	3.55		3.65	0.140		0.143
øR	4.50		5.50	0.177		0.216
S		5.50			0.216	

