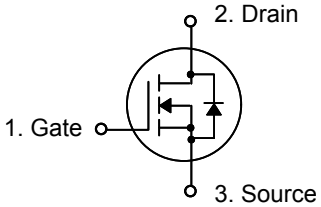
Pb Free Plating Product

IRFP250NPbF

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

Features

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

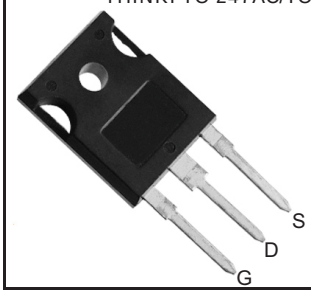


BV_{DSS} = 200V

$R_{DS(ON)}$ = 0.075 ohm

I_D = 30A

THINKI-TO-247AC/TO-247S



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 rds(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°C	Continuous Drain Current, V_{GS} @ 10V	30	A
I_D @ T_C = 100°C	Continuous Drain Current, V_{GS} @ 10V	21	
I_{DM}	Pulsed Drain Current ①⑤	120	
P_D @T_C = 25°C	Maximum Power Dissipation	214	W
	Linear Derating Factor	1.4	W/°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 T_{STG}	Operating Junction and Storage Temperature Range	-55 to + 175	°C
	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	°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°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 = 250μA
$\Delta V_{(BR)DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	——	0.26	——	V/°C	Reference to 25°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 = 250μA
gfs	Forward Trans conductance	17	——	——	S	V_{DS} = 50V, I_D = 18A④
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°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°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= 3.9Ω
t_f	Fall Time	——	33	——		R_D= 5.5Ω , See Fig.10④
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°C,I_S = 18A,V_{GS} = 0V ④
t_{rr}	Reverse Recovery Time	——	186	279	ns	T_J = 25°C ,I_F = 18A
Q_{rr}	Reverse Recovery Charge	——	1.3	2.0	μC	di/dt = 100A/μs ④

Notes:

① Repetitive rating; pulse width limited by max. junction temperature. (See fig. 11).

② Starting T_J = 25°C, L = 1.9mH, R_G = 25Ω, I_{AS} = 18A.(See fig. 12).

③ I_{SD} ≤ 18A, di/dt ≤ 374A/μs, V_{DD} ≤ $V_{(BR)DSS}$, T_J ≤ 175°C.

④ Pulse width ≤ 300μs; duty cycle ≤ 2%.

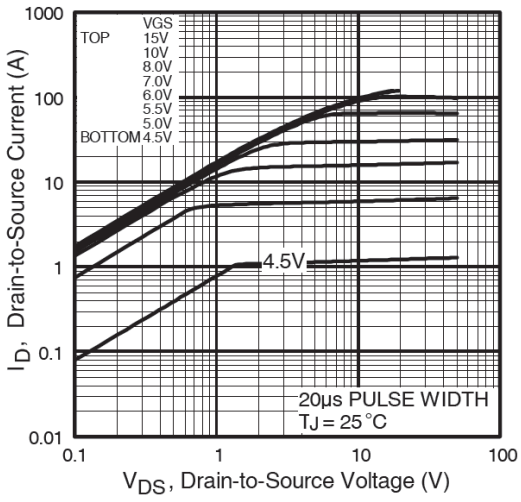


Fig. 1 Typical Output Characteristics

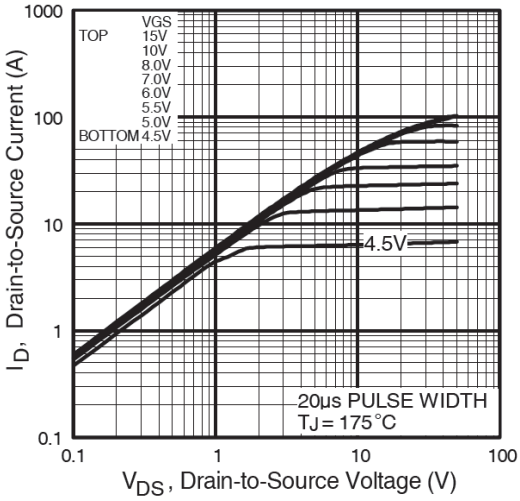


Fig. 2 Typical Output Characteristics

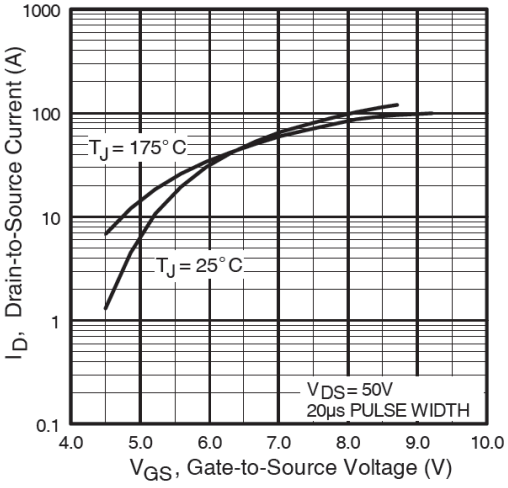


Fig. 3 Typical Transfer Characteristics

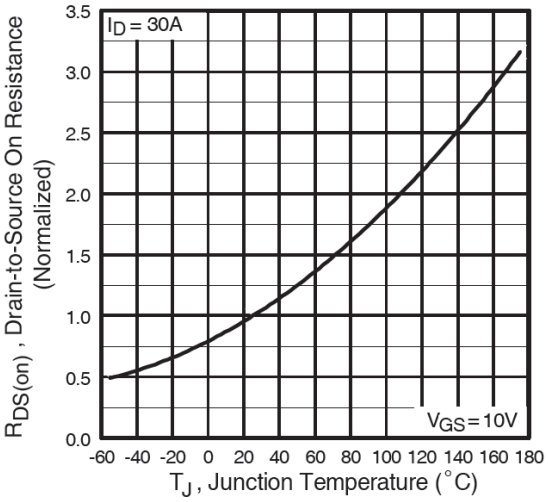


Fig. 4 Normalized On-Resistance vs. Temperature

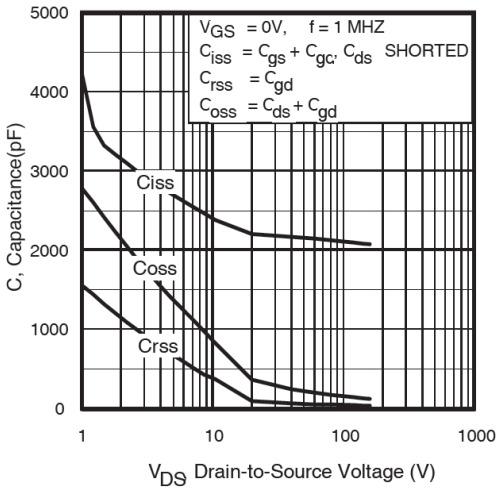


Fig 5. Typical Capacitance vs. Drain-to-Source Voltage

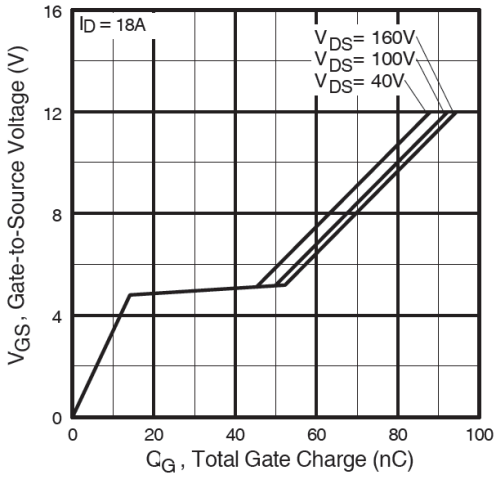


Fig 6. Typical Gate Charge vs. Gate-to-Source Voltage

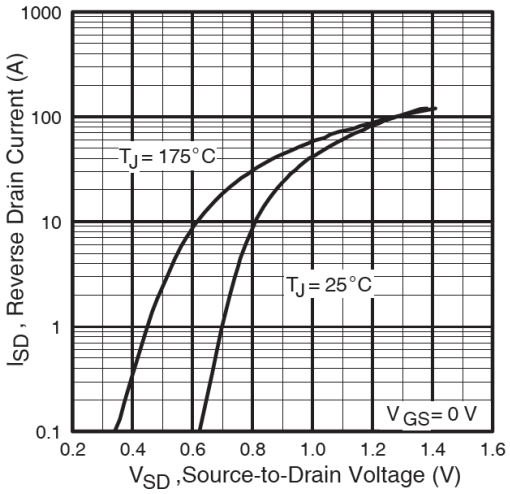


Fig. 7 Typical Source-to-Drain Diode Forward Voltage

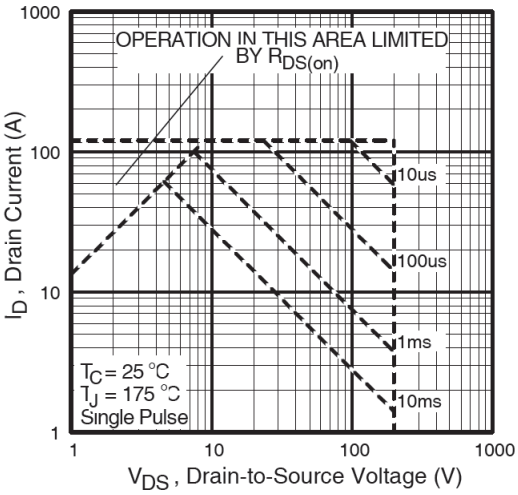


Fig 8. Maximum Safe Operating Area

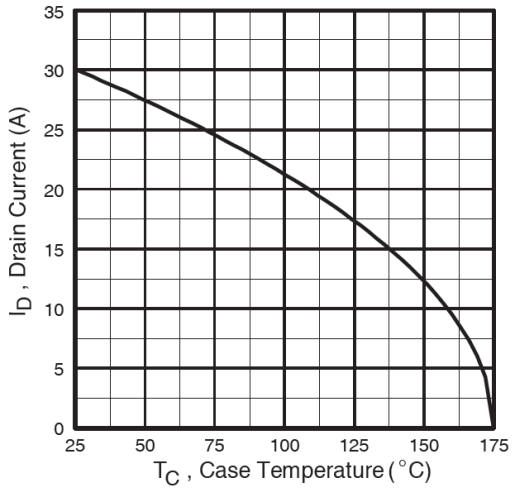


Fig 9. Maximum Drain Current vs. Case Temperature

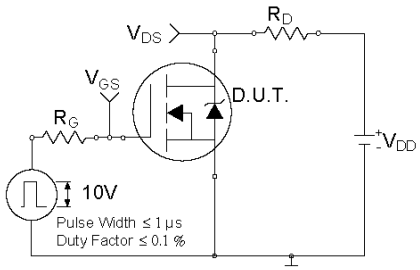


Fig 10a. Switching Time Test Circuit

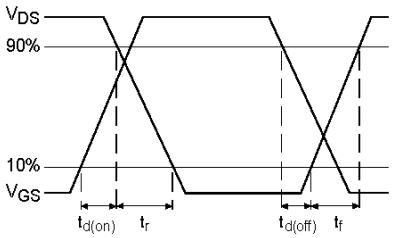


Fig 10a. Switching Time Waveforms

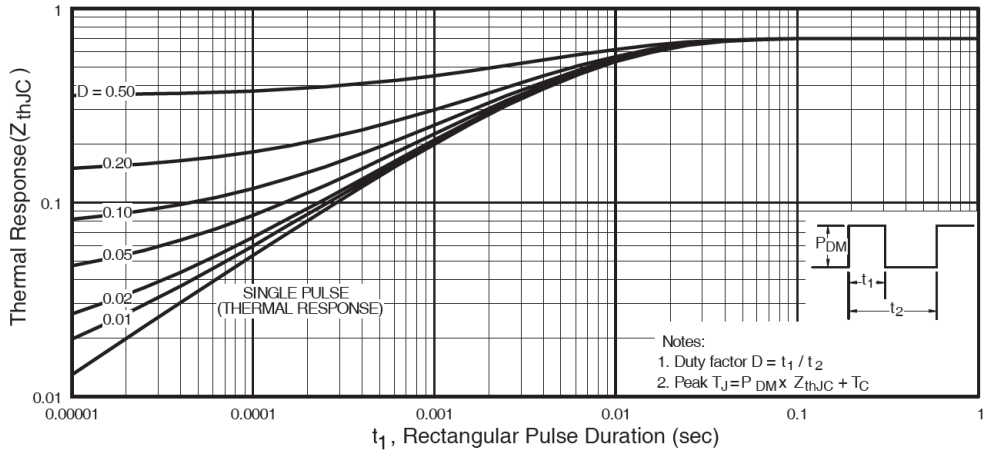


Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Case

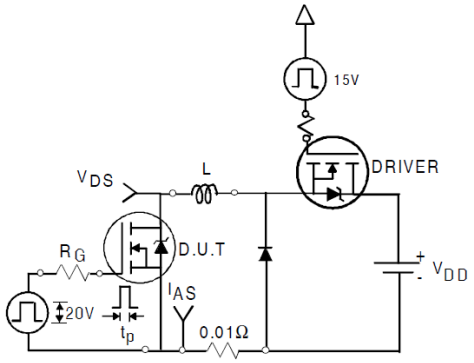


Fig. 12a. Unclamped Inductive Test Circuit

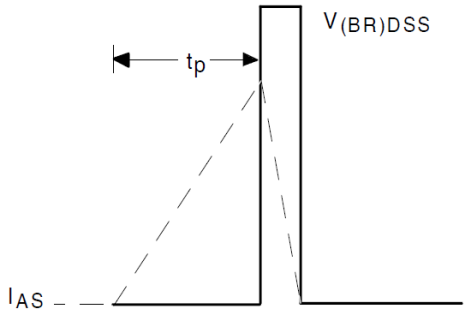


Fig. 12b. Unclamped Inductive Waveforms

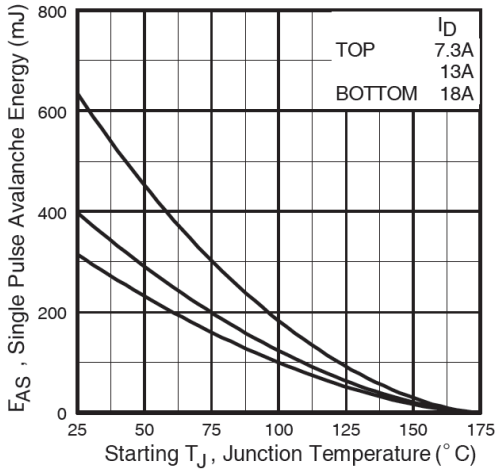


Fig 12c. Maximum Avalanche Energy vs. Drain Current

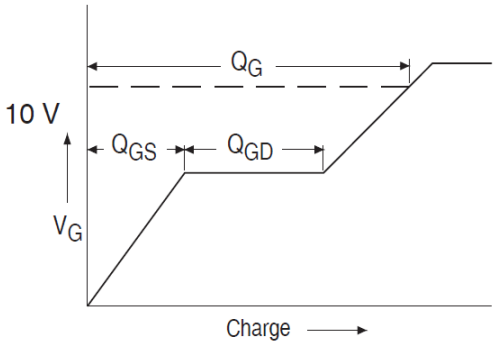


Fig 13a. Basic Gate Charge Waveform

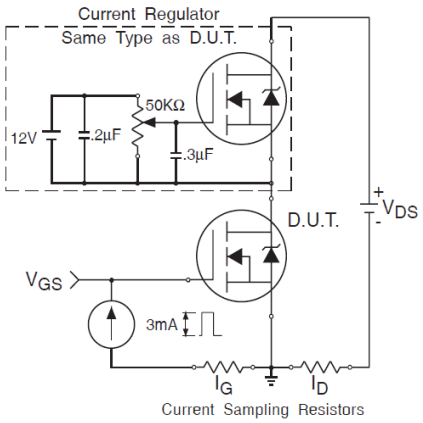


Fig 13b. Gate Charge Test Circuit

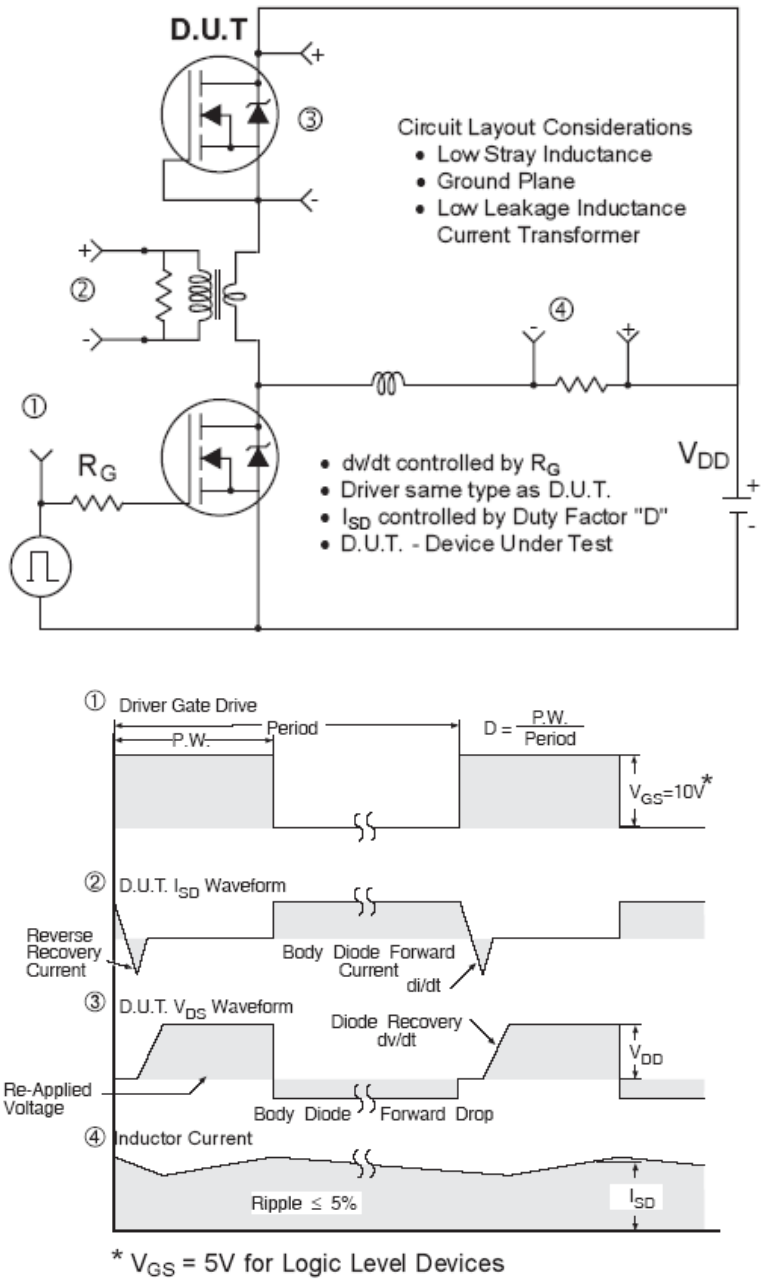


Fig 14. Peak Diode Recovery dv/dt Test Circuit for N-Channel IR MOSFET™

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