

Pb Free Plating Product

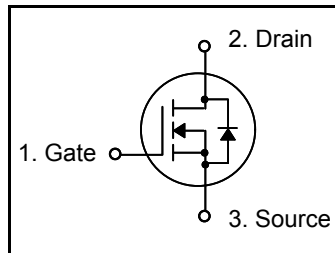
IRFP250MPbF



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

Features

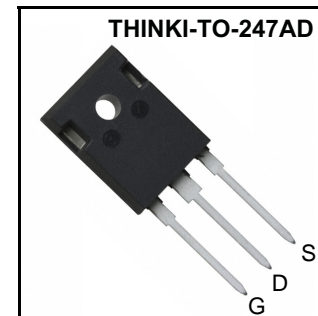
- $R_{DS(on)}$ (Max 0.075 Ω)@ $V_{GS}=10V$
- Gate Charge (Max 123nC)
- Improved dv/dt Capability
- High ruggedness
- 100% Avalanche Tested



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

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-247AD 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/°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
ΔV _{(BR)DSS} /ΔT _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
g _{fs}	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	μA	V _{DS} = 160V, V _{GS} = 0V, T _J = 150°C
I _{GSS}	Gate-to-Source Forward Leakage	—	—	100	nA	V _{DS} = 20V
	Gate-to-Source Reverse Leakage	—	—	-100	nA	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	nC	V _{DS} = 160V
Q _{gd}	Gate-to-Drain Charge	—	—	57	nC	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	—	ns	I _D = 18A
t _{d(off)}	Turn-Off Delay Time	—	41	—	ns	R _G = 3.9Ω
t _f	Fall Time	—	33	—	ns	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	—	nH	
C _{iss}	Input Capacitance	—	2159	—	pF	V _{GS} = 0V
C _{oss}	Output Capacitance	—	315	—	pF	V _{DS} = 25V
C _{rss}	Reverse Transfer Capacitance	—	83	—	pF	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	A	
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%.

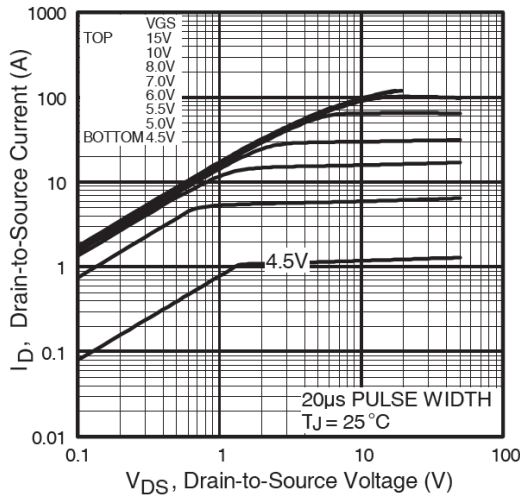


Fig. 1 Typical Output Characteristics

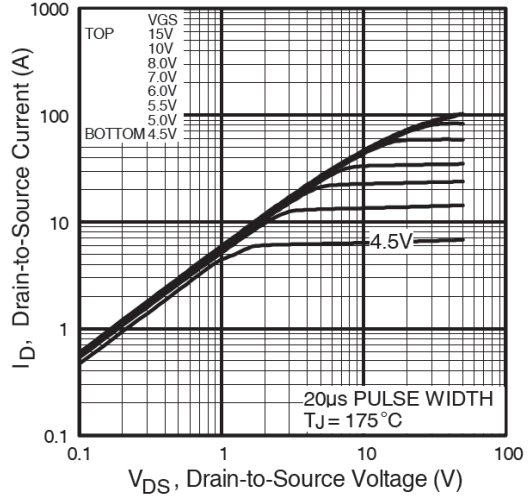


Fig. 2 Typical Output Characteristics

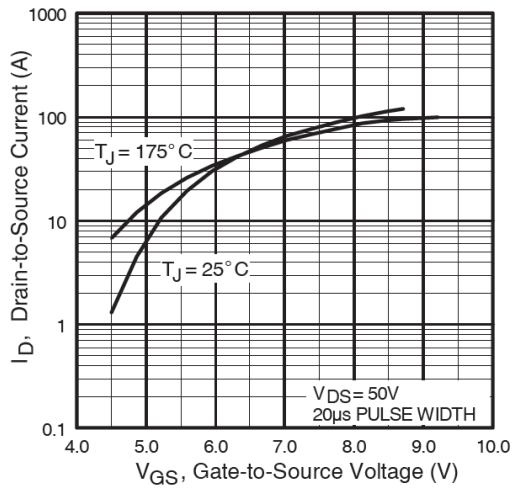


Fig. 3 Typical Transfer Characteristics

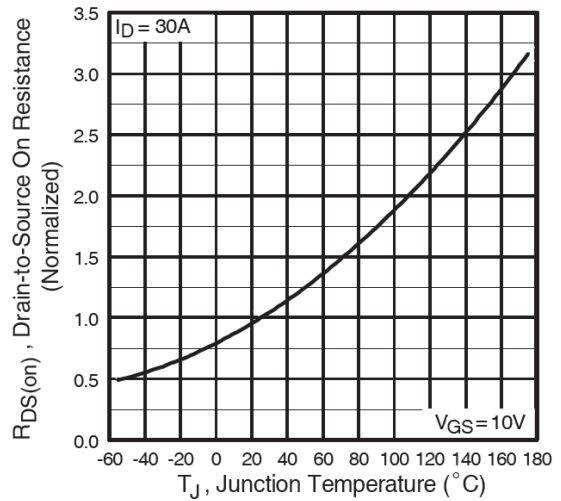


Fig. 4 Normalized On-Resistance vs. Temperature

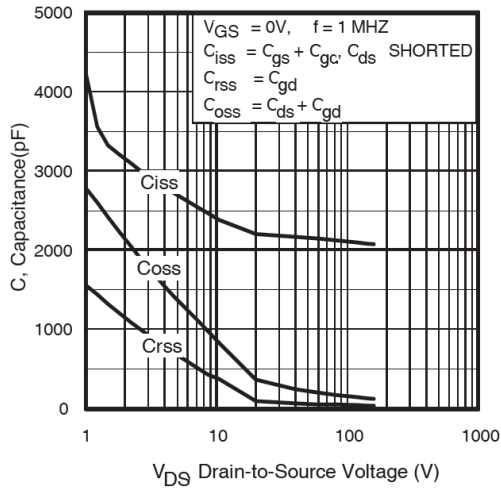


Fig 5. Typical Capacitance vs. Drain-to-Source Voltage

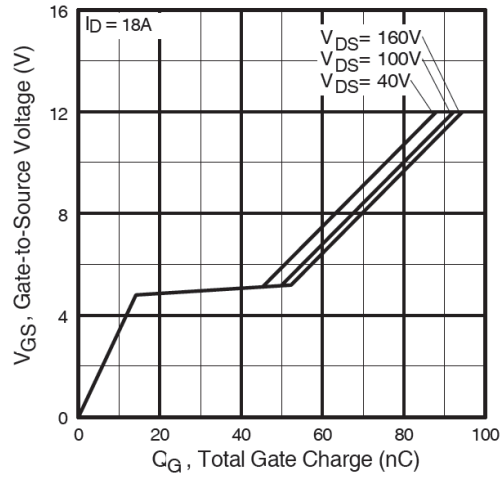


Fig 6. Typical Gate Charge vs. Gate-to-Source Voltage

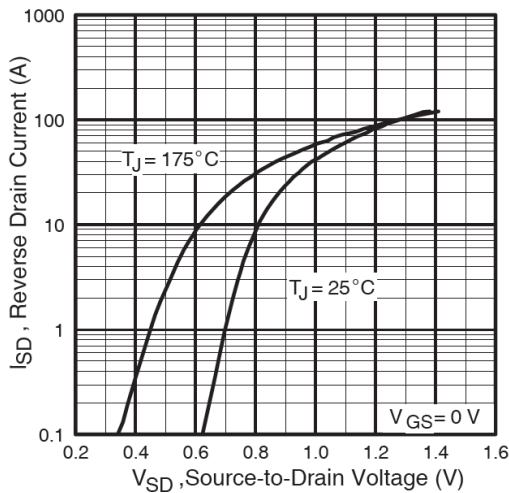


Fig 7. Typical Source-to-Drain Diode Forward Voltage

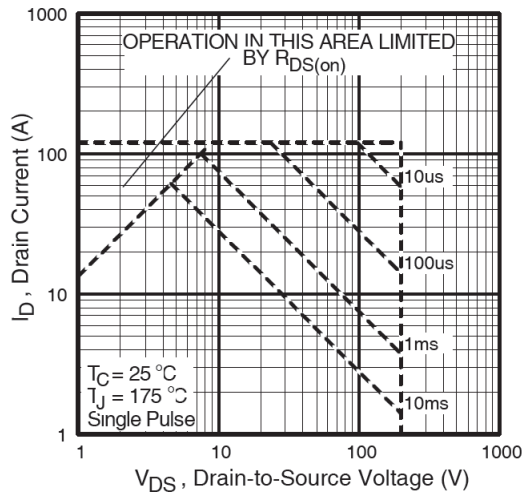


Fig 8. Maximum Safe Operating Area

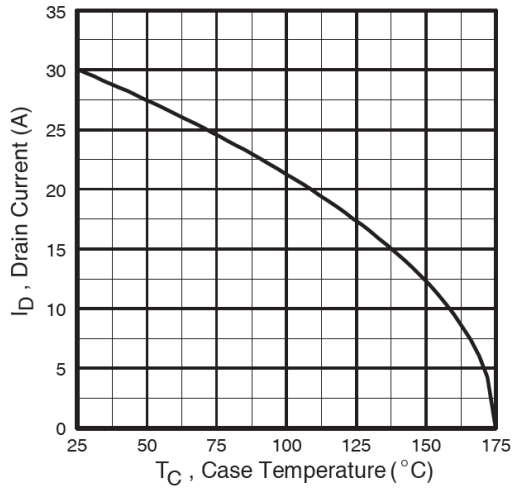


Fig 9. Maximum Drain Current vs. Case Temperature

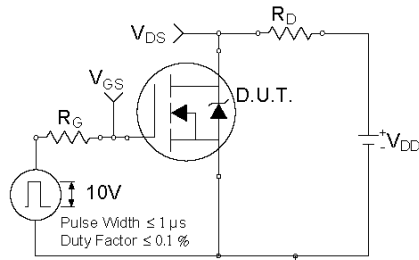


Fig 10a. Switching Time Test Circuit

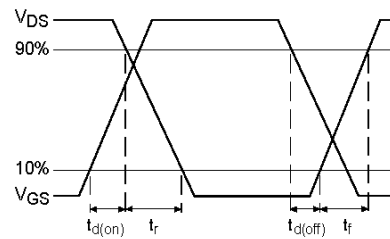


Fig 10a. Switching Time Waveforms

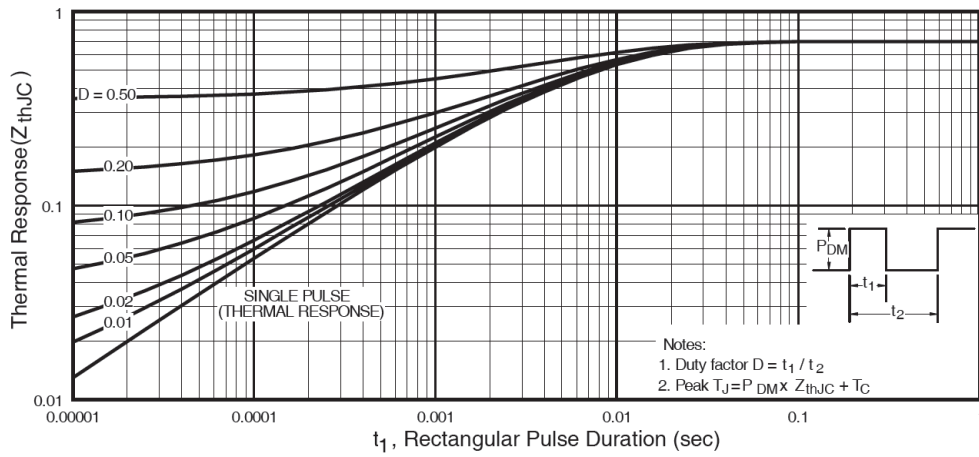


Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Case

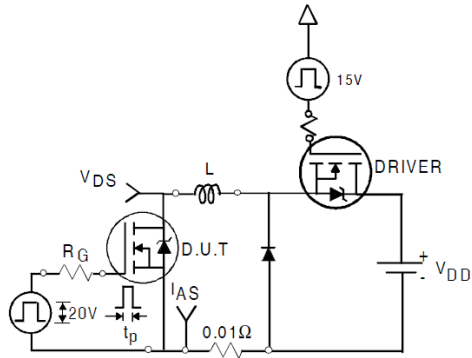


Fig. 12a. Unclamped Inductive Test Circuit

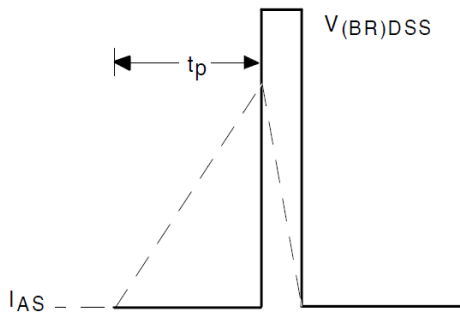


Fig. 12b. Unclamped Inductive Waveforms

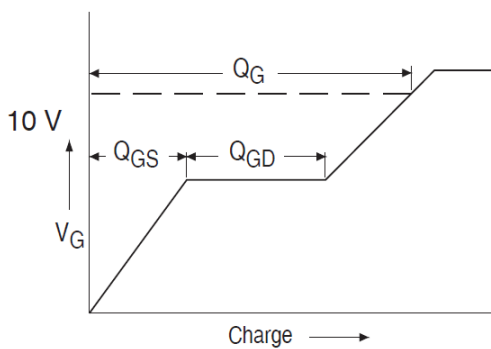


Fig 13a. Basic Gate Charge Waveform

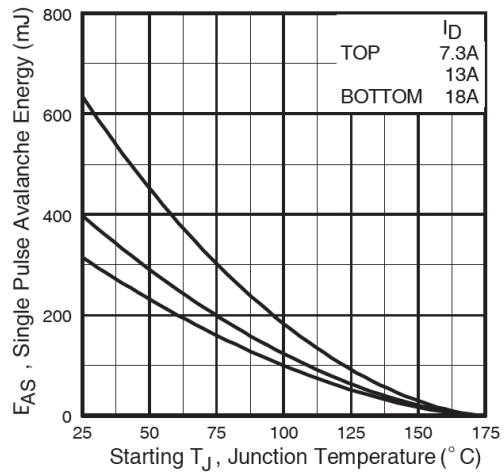


Fig 12c. Maximum Avalanche Energy vs. Drain Current

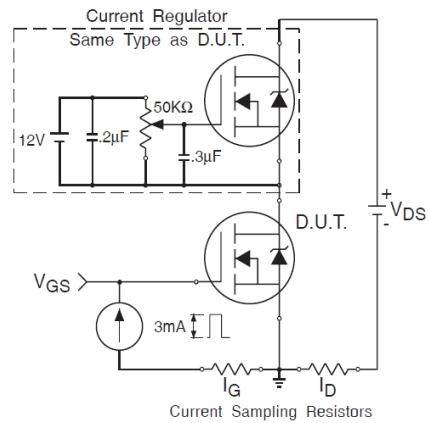


Fig 13b. Gate Charge Test Circuit

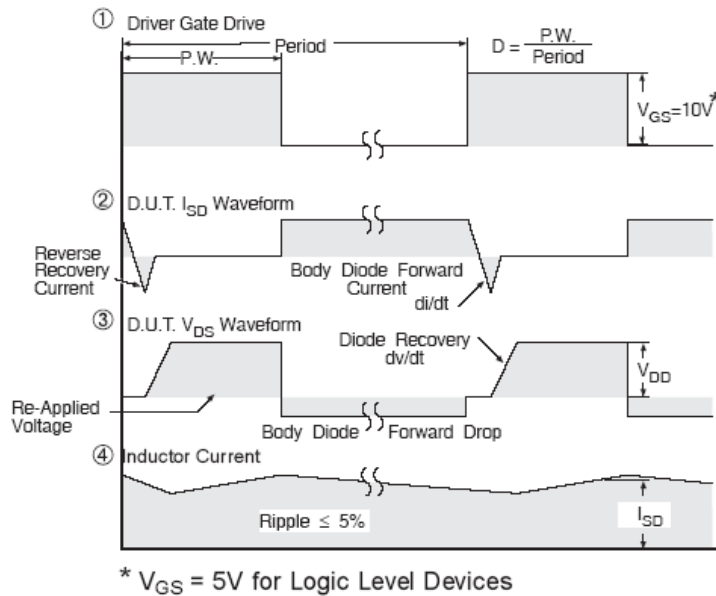
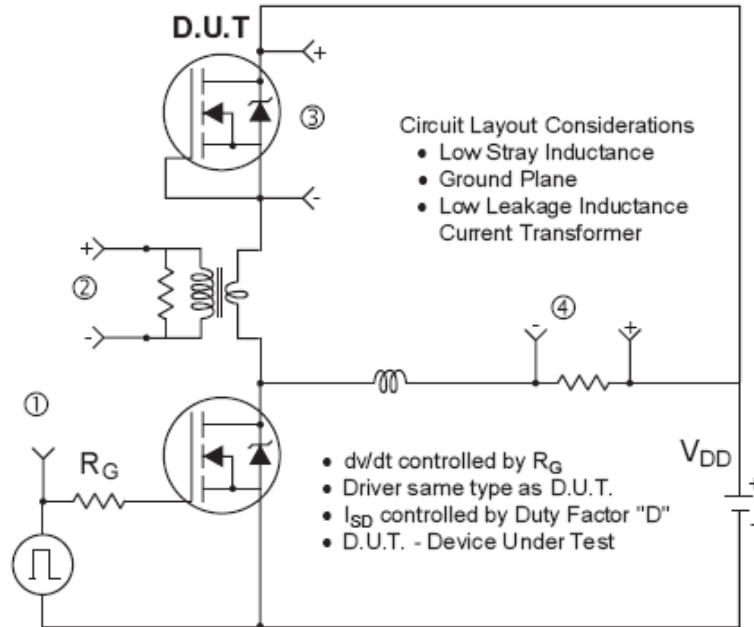
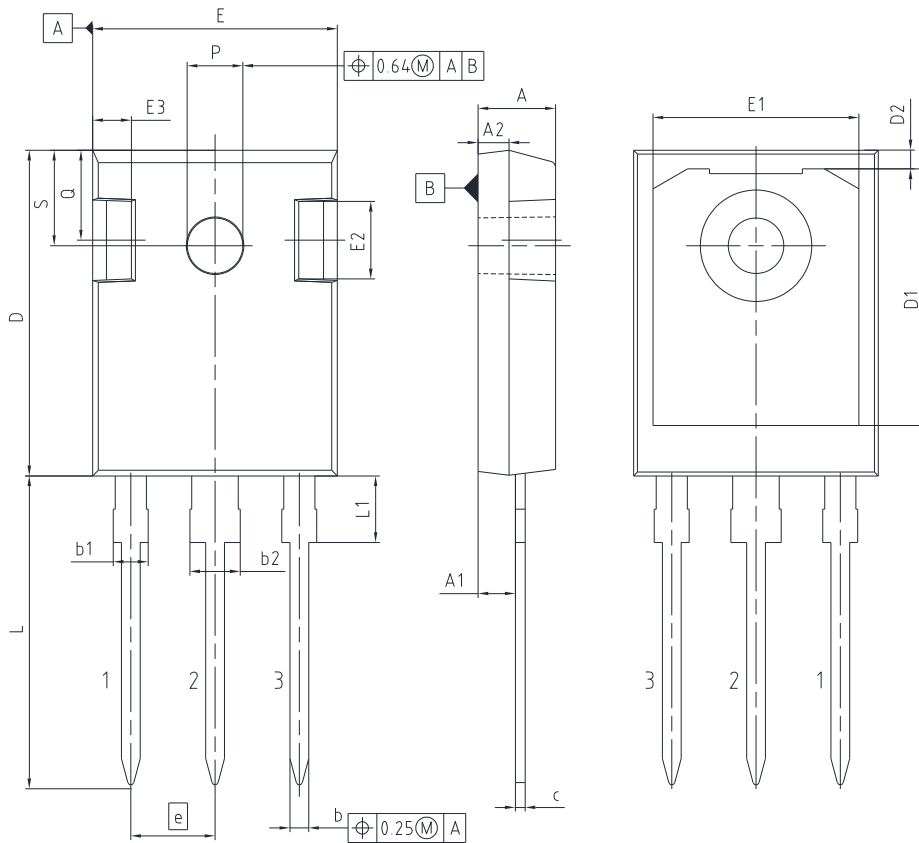


Fig 14. Peak Diode Recovery dv/dt Test Circuit for N-Channel IR MOSFET™

THINKI TO-247AD MECHANICAL DATA



DIMENSIONS	MILLIMETERS	
	MIN.	MAX.
A	4.70	5.30
A1	2.20	2.60
A2	1.50	2.50
b	1.00	1.40
b1	1.60	2.41
b2	2.57	3.43
c	0.38	0.89
D	20.70	21.50
D1	13.08	17.65
D2	0.51	1.35
E	15.50	16.30
E1	12.38	14.15
E2	3.40	5.10
E3	1.00	2.60
e	5.44	
L	19.80	20.40
L1	3.85	4.50
P	3.50	3.70
Q	5.35	6.25
S	6.04	6.30