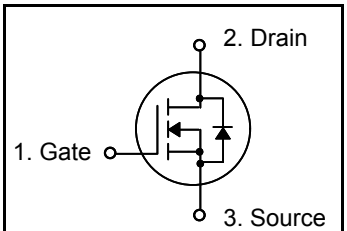
Pb Free Plating Product

W30NF20

ThinkiSemi 200V,32A N-Channel Planar Process Power MOSFETs

Features

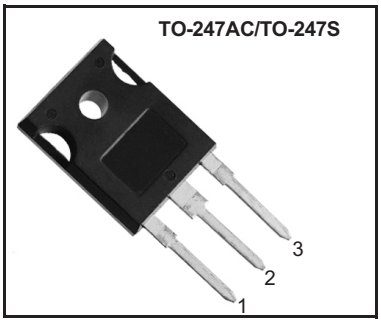
- $R_{DS(on)}$ (Max 0.085 Ω)@V_{GS}=10V
- Gate Charge (Typical 95nC)
- Improved dv/dt Capability
- High ruggedness
- 100% Avalanche Tested



BV_{DSS} = 200V

$R_{DS(ON)}$ = 0.085 ohm

I_D = 32A



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

T_C = 25°C unless otherwise noted

Symbol	Parameter		W30NF20	Units
V_{DSS}	Drain-Source Voltage		200	V
I_D	Drain Current - Continuous (T_C = 25°C)		32	A
	Drain Current - Continuous (T_C = 100°C)		20.3	A
I_{DM}	Drain Current - Pulsed	(Note 1)	128	A
V_{GSS}	Gate-Source Voltage		± 30	V
E_{AS}	Single Pulsed Avalanche Energy	(Note 2)	600	mJ
I_{AR}	Avalanche Current	(Note 1)	32	A
E_{AR}	Repetitive Avalanche Energy	(Note 1)	20.4	mJ
dv/dt	Peak Diode Recovery dv/dt	(Note 3)	5.5	V/ns
P_D	Power Dissipation (T_C = 25°C)		204	W
	- Derate above 25°C		1.63	W/°C
T_J, T_{STG}	Operating and Storage Temperature Range		-55 to +150	°C
T_L	Maximum lead temperature for soldering purposes, 1/8" from case for 5 seconds		300	°C

Thermal Characteristics

Symbol	Parameter	Typ	Max	Units
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	--	0.61	°C/W
$R_{\theta CS}$	Thermal Resistance, Case-to-Sink	0.24	--	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	--	40	°C/W

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Electrical Characteristics

T_C = 25°C unless otherwise noted

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
Off Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS} = 0 V, I_D = 250 µA	200	--	--	V
ΔBV_{DSS} / ΔT_J	Breakdown Voltage Temperature Coefficient	I_D = 250 µA, Referenced to 25°C	--	0.2	--	V/°C
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 200 V, V_{GS} = 0 V	--	--	10	µA
		V_{DS} = 160 V, T_C = 125°C	--	--	100	µA
I_{GSSF}	Gate-Body Leakage Current, Forward	V_{GS} = 30 V, V_{DS} = 0 V	--	--	100	nA
I_{GSSR}	Gate-Body Leakage Current, Reverse	V_{GS} = -30 V, V_{DS} = 0 V	--	--	-100	nA
On Characteristics						
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS} = V_{GS}, I_D = 250 µA	2.0	--	4.0	V
$R_{DS(on)}$	Static Drain-Source On-Resistance	V_{GS} = 10 V, I_D = 16 A	--	0.071	0.085	Ω
g_{FS}	Forward Transconductance	V_{DS} = 40 V, I_D = 16 A (Note 4)	--	27	--	S
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{DS} = 25 V, V_{GS} = 0 V, f = 1.0 MHz	--	2600	3400	pF
C_{oss}	Output Capacitance		--	330	430	pF
C_{rss}	Reverse Transfer Capacitance		--	75	100	pF
Switching Characteristics						
$t_{d(on)}$	Turn-On Delay Time	V_{DD} = 100 V, I_D = 32 A, R_G = 25 Ω (Note 4, 5)	--	30	70	ns
t_r	Turn-On Rise Time		--	240	490	ns
$t_{d(off)}$	Turn-Off Delay Time		--	295	600	ns
t_f	Turn-Off Fall Time		--	195	400	ns
Q_g	Total Gate Charge	V_{DS} = 160 V, I_D = 32 A, V_{GS} = 10 V (Note 4, 5)	--	95	123	nC
Q_{gs}	Gate-Source Charge		--	13	--	nC
Q_{gd}	Gate-Drain Charge		--	43	--	nC
Drain-Source Diode Characteristics and Maximum Ratings						
I_S	Maximum Continuous Drain-Source Diode Forward Current		--	--	32	A
I_{SM}	Maximum Pulsed Drain-Source Diode Forward Current		--	--	128	A
V_{SD}	Drain-Source Diode Forward Voltage	V_{GS} = 0 V, I_S = 32 A	--	--	1.5	V
t_{rr}	Reverse Recovery Time	V_{GS} = 0 V, I_S = 32 A, dI_F / dt = 100 A/µs (Note 4)	--	220	--	ns
Q_{rr}	Reverse Recovery Charge		--	1.89	--	µC

Notes:
1. Repetitive Rating : Pulse width limited by maximum junction temperature
2. L = 0.88mH, I_{AS} = 32A, V_{DD} = 50V, R_G = 25 Ω, Starting T_J = 25°C
3. I_{SD} ≤ 32A, di/dt ≤ 300A/µs, V_{DD} ≤ BV_{DSS}, Starting T_J = 25°C
4. Pulse Test : Pulse width ≤ 300µs, Duty cycle ≤ 2%
5. Essentially independent of operating temperature

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Typical Characteristics

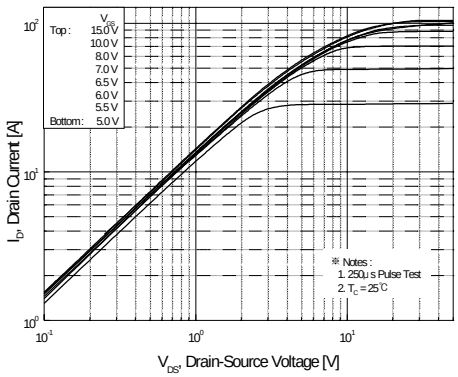

Figure 1. On-Region Characteristics

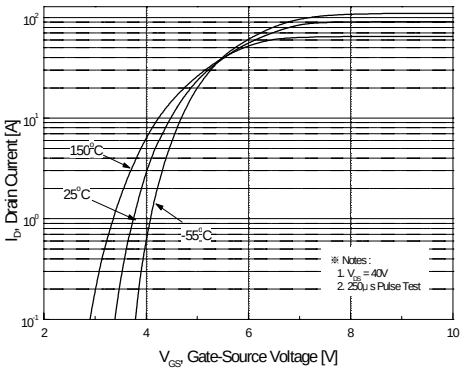

Figure 2. Transfer Characteristics

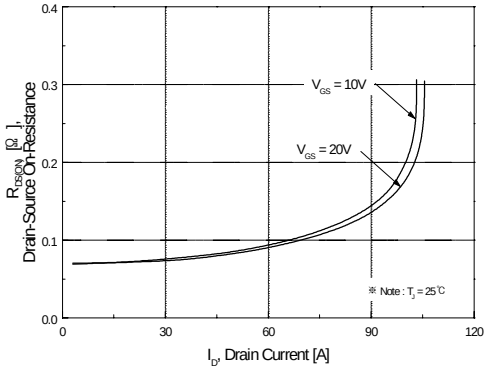

Figure 3. On-Resistance Variation vs Drain Current and Gate Voltage

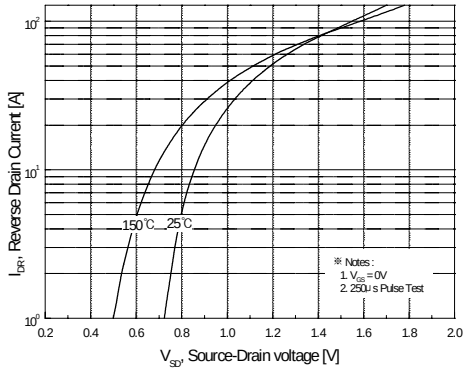

Figure 4. Body Diode Forward Voltage Variation with Source Current and Temperature

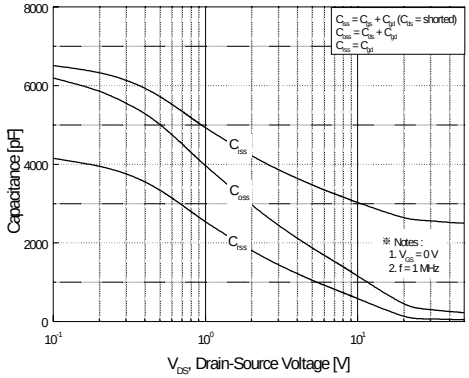

Figure 5. Capacitance Characteristics

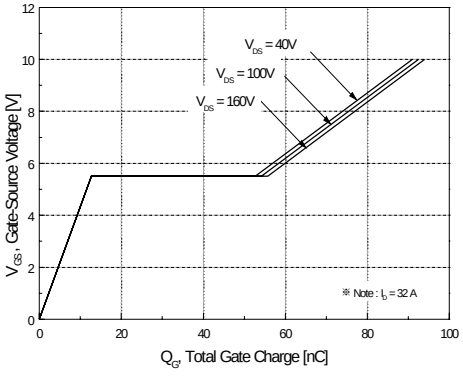

Figure 6. Gate Charge Characteristics

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Typical Characteristics (Continued)

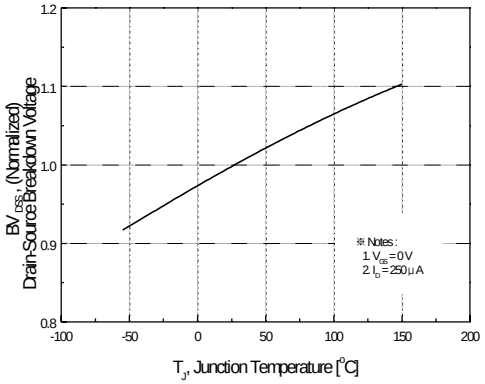

Figure 7. Breakdown Voltage Variation vs Temperature

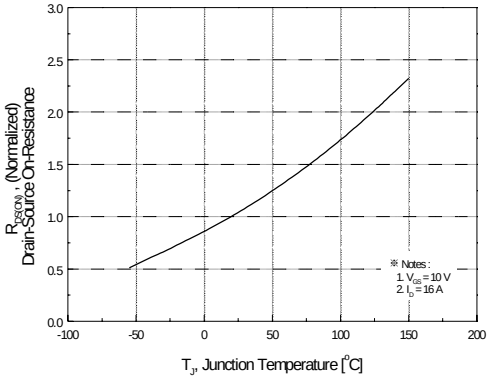

Figure 8. On-Resistance Variation vs Temperature

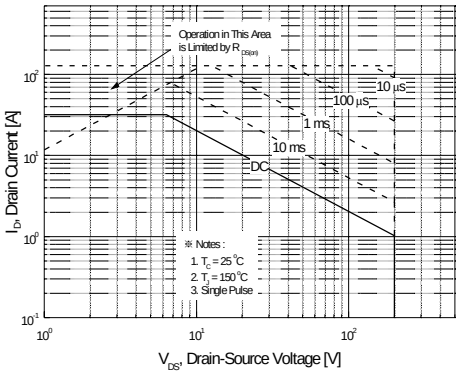

Figure 9. Maximum Safe Operating Area

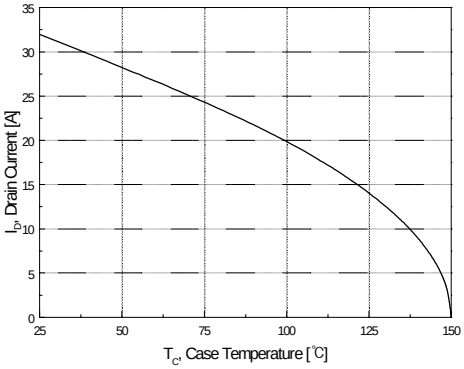

Figure 10. Maximum Drain Current vs Case Temperature

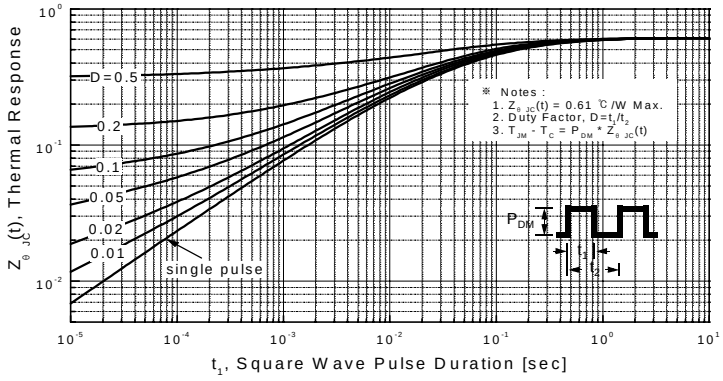

Figure 11. Transient Thermal Response Curve

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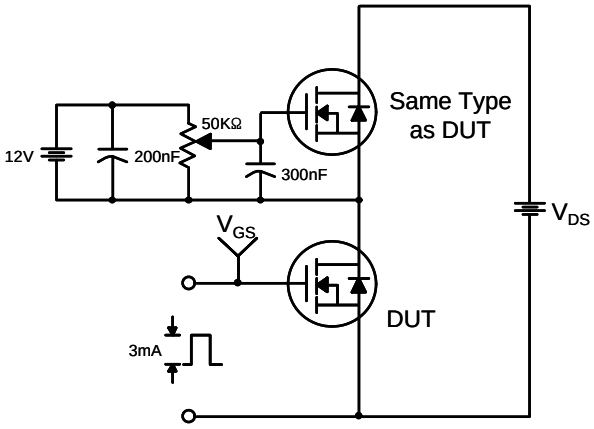
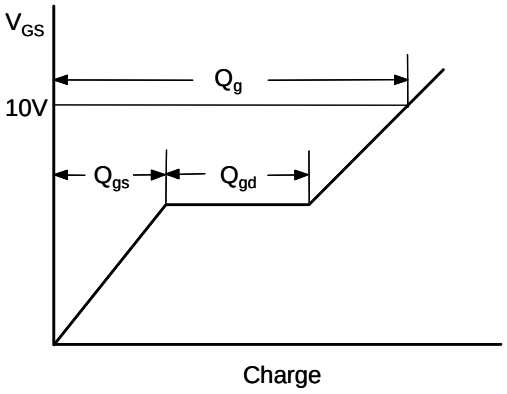
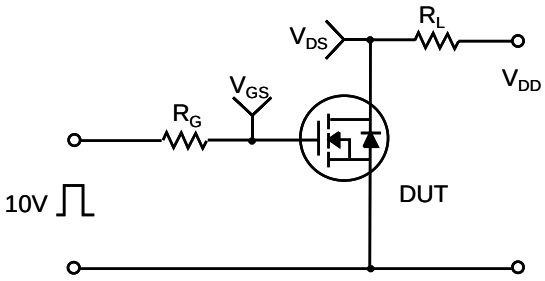
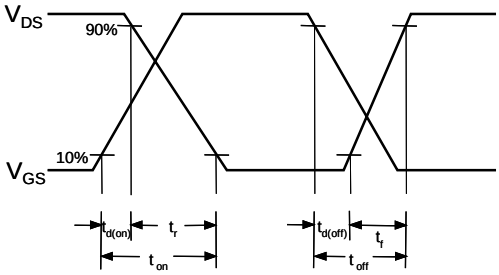
Gate Charge Test Circuit & Waveform



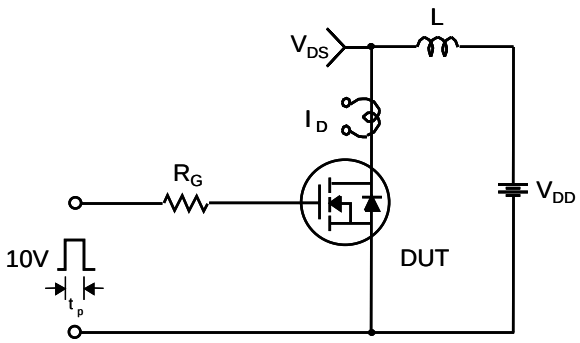


Resistive Switching Test Circuit & Waveforms

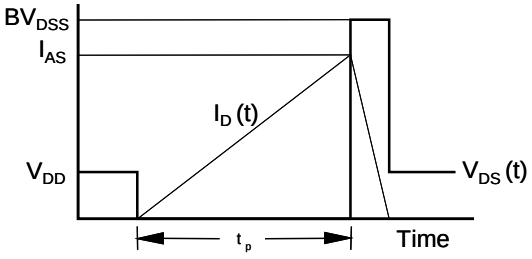




Unclamped Inductive Switching Test Circuit & Waveforms



$$E_{AS} = \frac{1}{2} L I_{AS}^2 \frac{BV_{DSS}}{BV_{DSS} - V_{DD}}$$



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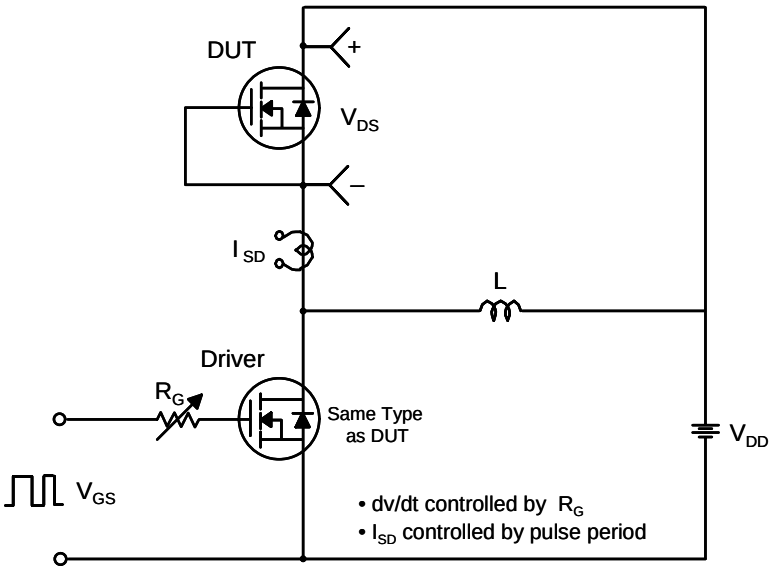
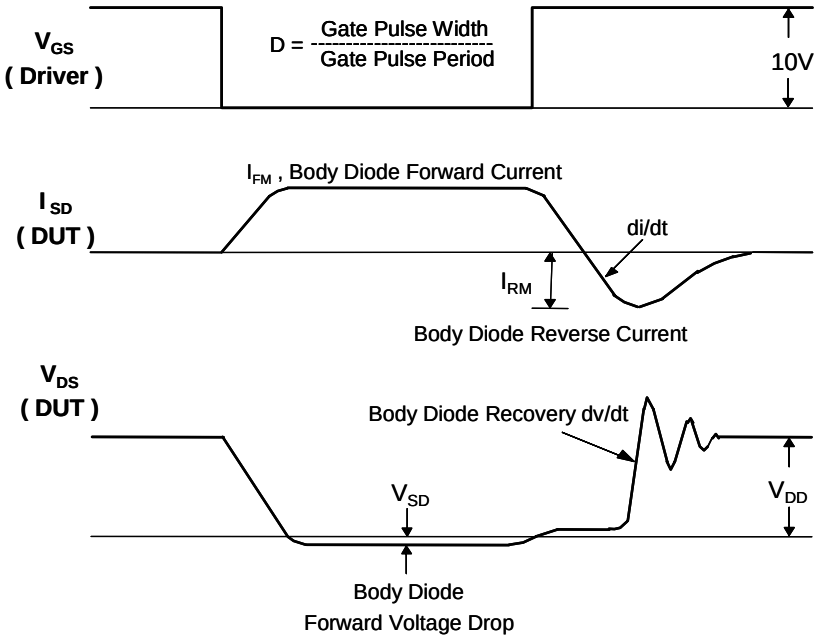
Peak Diode Recovery dv/dt Test Circuit & Waveforms





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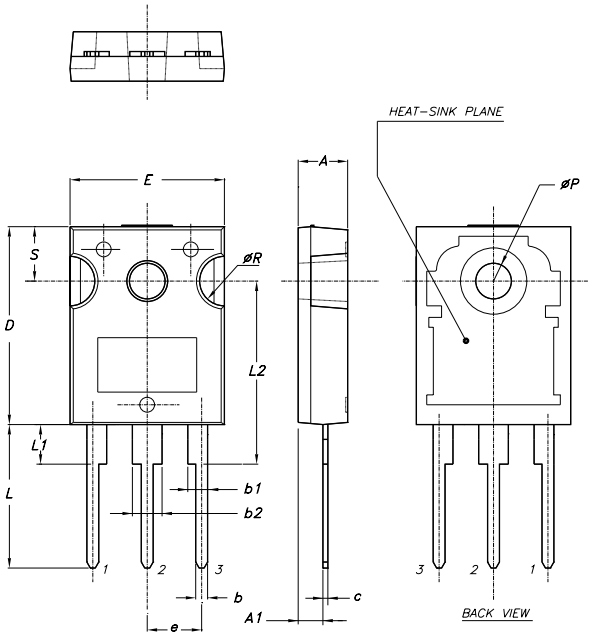
THINKI TO-247AC/TO-247S MECHANICAL DATA

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	



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