Pb Free Plating Product

FSW30N50C

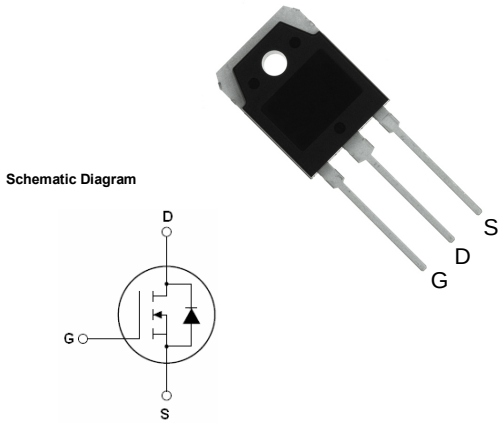
THINKISEMI 24A,500V N-CHANNEL PLANAR STRIPE POWER MOSFETs

Features
※ Low ON Resistance
※ Low Gate Charge
※ Peak Current vs Pulse Width Curve
※ ESD Capability Improved
※ 100% Avalanche Tested

Application
※ Uninterruptible Power Supply(UPS)
※ LCD Panel Power
※ DC-AC Inverter,Amplifier and SMPS

Mechanical Data
※ Case:TO-3P non-isolated package
※ Epoxy: UL 94V-0 rate flame retardant
※ Terminals: Solderable per MIL-STD-202 method 208
※ Polarity: As per configuration
※ Mounting position: Any
※ Weight: 6.0 gram approximately

TO-3P pkg outline & internal configuration



Absolute Maximum Ratings

T_C = 25°C unless otherwise noted

Symbol	Parameter		FSW30N50C	Units
V_{DSS}	Drain-Source Voltage		500	V
I_D	Drain Current - Continuous (T_C = 25℃)		24	A
	- Continuous (T_C = 100℃)		15	A
I_{DM}	Drain Current - Pulsed	(Note 1)	96	A
V_{GSS}	Gate-Source Voltage		±30	V
EAS	Single Pulsed Avalanche Energy	(Note 2)	1150	mJ
I_{AR}	Avalanche Current	(Note 1)	24	A
E_{AR}	Repetitive Avalanche Energy	(Note 1)	29	mJ
dv/dt	Peak Diode Recovery dv/dt	(Note 3)	4.5	V/ns
P_D	Power Dissipation (T_C = 25℃)		290	W
	- Derate above 25℃		2.33	W/℃
T_J, T_{STG}	Operating and Storage Temperature Range		-55 to +150	℃
T_L	Maximum lead temperature for soldering purposes, 1/8" from case for 5 seconds		300	℃

Thermal Characteristics

Symbol	Parameter	Typ	Max	Units
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	--	0.43	℃/W
$R_{\theta JS}$	Thermal Resistance, Case-to-Sink Typ.	0.24	--	℃/W
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	--	40	℃/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 uA	500	--	--	V
$\triangle BV_{DSS}$ / $\triangle T_J$	Breakdown Voltage Temperature Coefficient	I_D = 250 uA, Referenced to 25℃	--	0.5	--	V/℃
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 500 V, V_{GS} = 0 V	--	--	1	uA
		V_{DS} = 400 V, T_C = 125℃	--	--	10	uA
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 uA	2.0	--	4.0	V
$R_{DS(on)}$	Static Drain-Source On-Resistance	V_{GS} = 10 V, I_D = 12 A	--	0.16	0.2	Ω
g_{FS}	Forward Transconductance	V_{DS} = 40 V, I_D = 12 A (Note 4)	--	15	--	S
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{DS} = 25 V, V_{GS} = 0 V, f = 1.0 MHz	--	3500	--	pF
C_{oss}	Output Capacitance		--	520	--	pF
C_{rss}	Reverse Transfer Capacitance		--	55	--	pF
Switching Characteristics						
$t_{d(on)}$	Turn-On Delay Time	V_{DD} = 250 V, I_D = 24 A, R_G = 25 Ω (Note 4, 5)	--	100	--	ns
t_r	Turn-On Rise Time		--	250	--	ns
$t_{d(off)}$	Turn-Off Delay Time		--	200	--	ns
t_f	Turn-Off Fall Time		--	150	--	ns
Q_g	Total Gate Charge	V_{DS} = 400 V, I_D = 24 A, V_{GS} = 10 V (Note 4, 5)	--	90	--	nC
Q_{gs}	Gate-Source Charge		--	22	--	nC
Q_{gd}	Gate-Drain Charge		--	45	--	nC
Drain-Source Diode Characteristics and Maximum Ratings						
I_S	Maximum Continuous Drain-Source Diode Forward Current		--	--	24	A
I_{SM}	Maximum Pulsed Drain-Source Diode Forward Current		--	--	96	A
V_{SD}	Drain-Source Diode Forward Voltage	V_{GS} = 0 V, I_S = 24 A	--	--	1.4	V
t_{rr}	Reverse Recovery Time	V_{GS} = 0 V, I_S = 24 A, dI_F / dt = 100 A/us (Note 4)	--	400	--	ns
Q_{rr}	Reverse Recovery Charge		--	4.3	--	uC

Notes:
1. Repetitive Rating : Pulse width limited by maximum junction temperature
2. L = 3.4mH, I_{AS} = 24A, V_{DD} = 50V, R_G = 25Ω, Starting T_J = 25°C
3. I_{SD} ≤ 24A, di/dt ≤ 200A/us, V_{DD} ≤ BV_{DSS}, Starting T_J = 25°C
4. Pulse Test : Pulse width ≤ 300us, Duty cycle ≤ 2%
5. Essentially independent of operating temperature

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Typical Characteristics

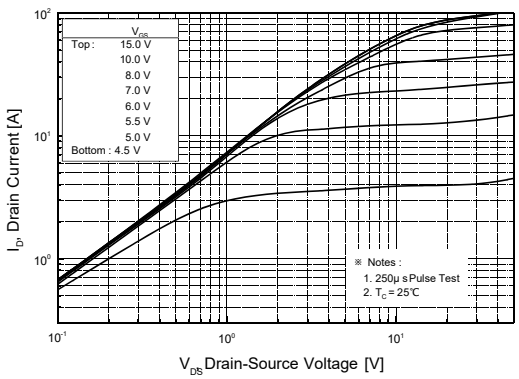


Figure 1. On-Region Characteristics

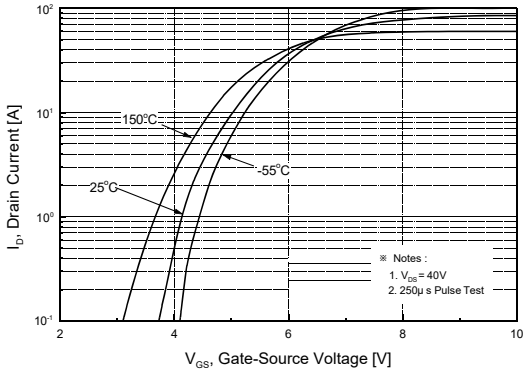


Figure 2. Transfer Characteristics

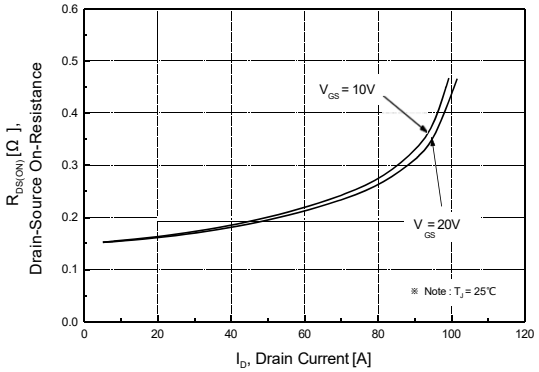


Figure 3. On-Resistance Variation vs Drain Current and Gate Voltage

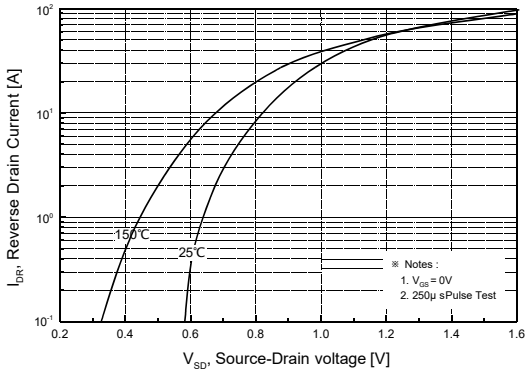


Figure 4. Body Diode Forward Voltage Variation with Source Current and Temperature

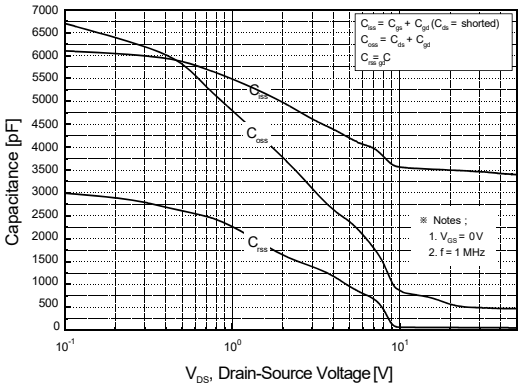


Figure 5. Capacitance Characteristics

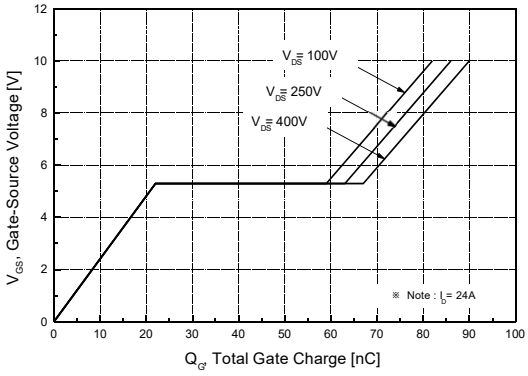


Figure 6. Gate Charge Characteristics

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Typical Characteristics (Continued)

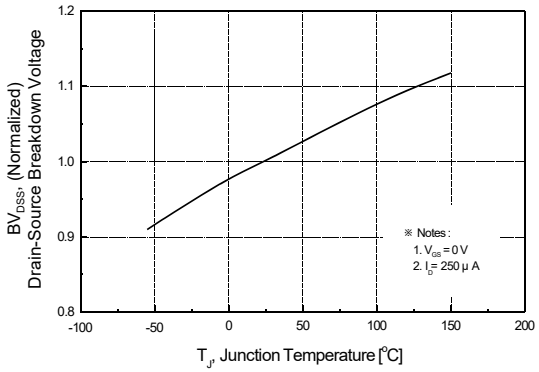


Figure 7. Breakdown Voltage Variation vs Temperature

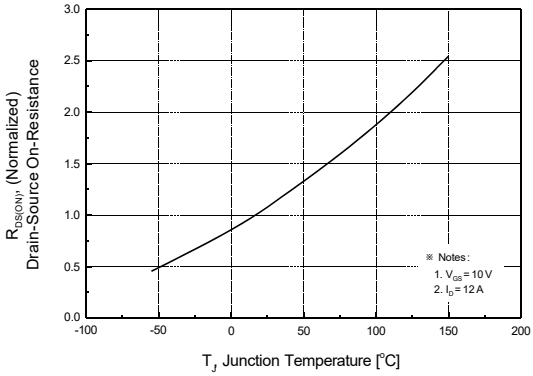


Figure 8. On-Resistance Variation vs Temperature

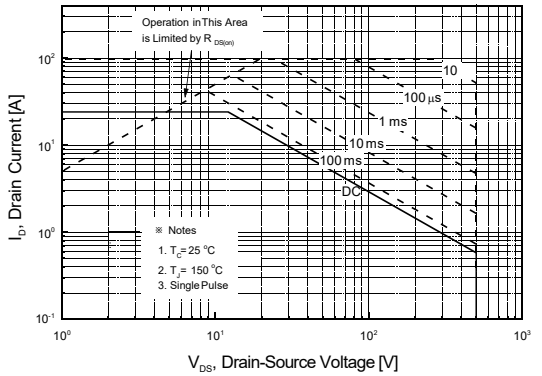


Figure 9. Maximum Safe Operating Area

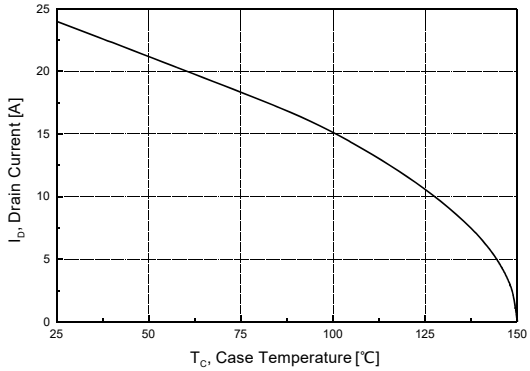


Figure 10. Maximum Drain Current vs Case Temperature

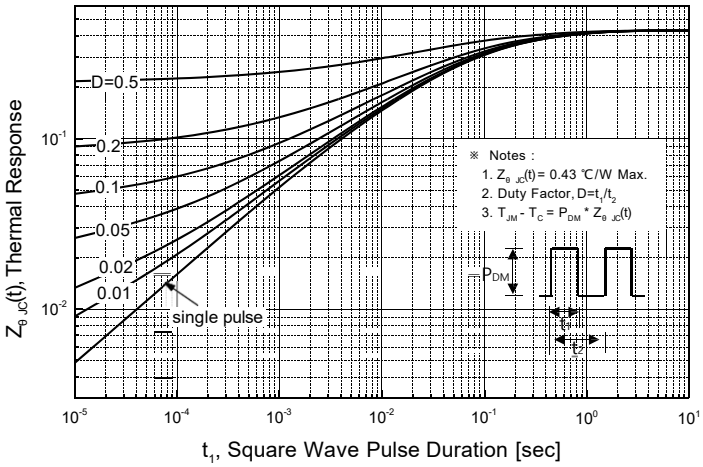
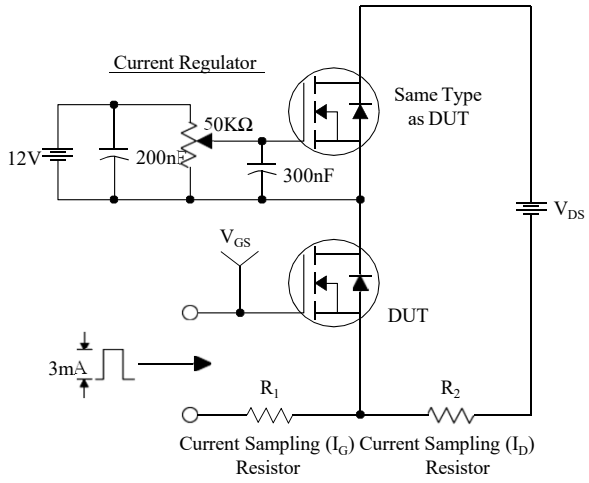
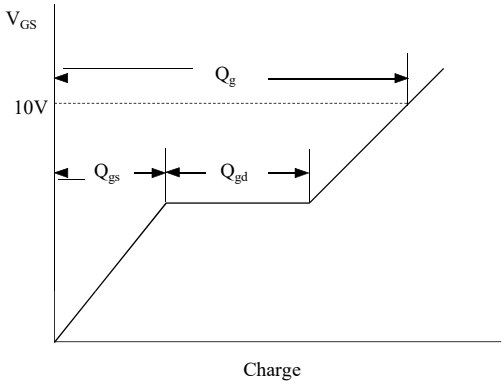


Figure 11. Transient Thermal Response Curve

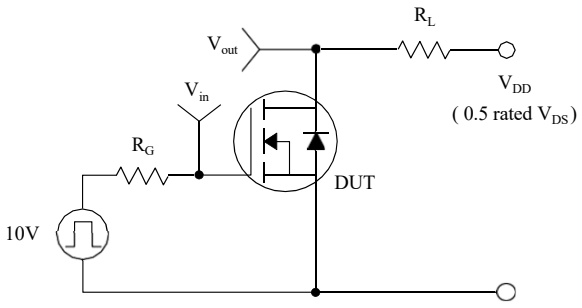
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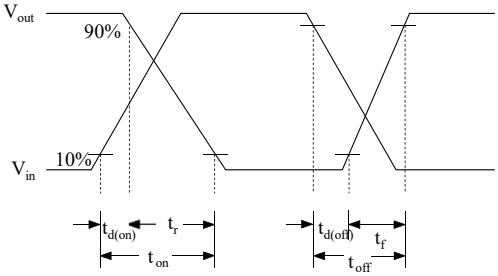
Gate Charge Test Circuit & Waveform



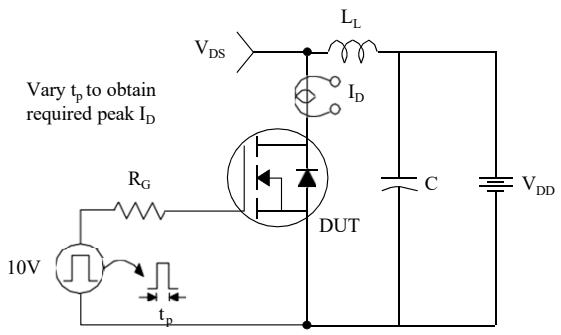


Resistive Switching Test Circuit & Waveforms

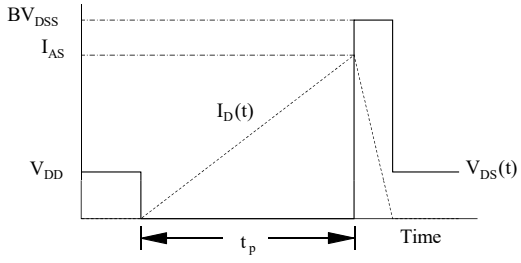




Unclamped Inductive Switching Test Circuit & Waveforms

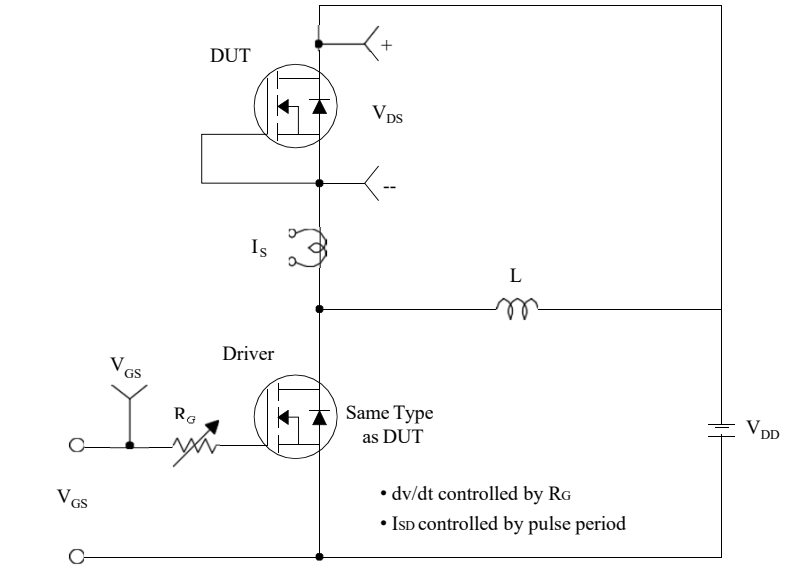


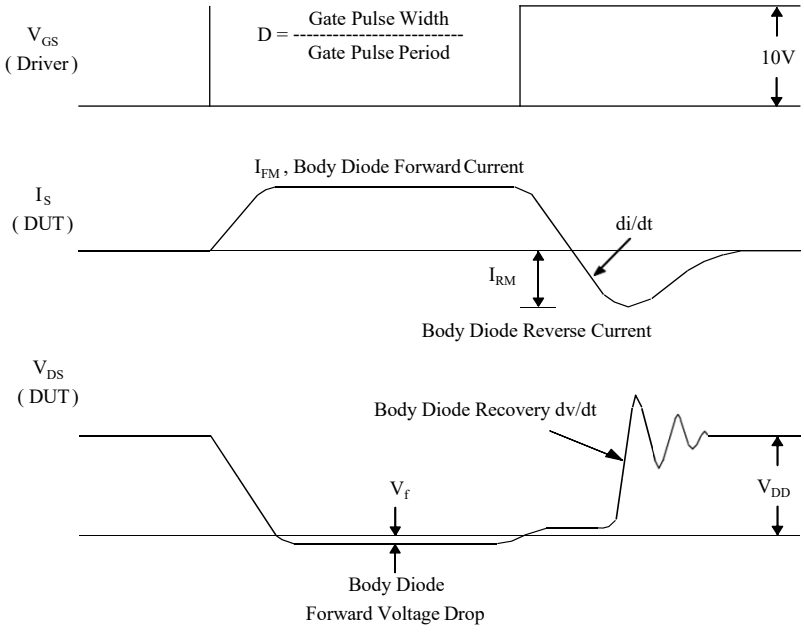
$$E_{AS} = \frac{1}{2} L_L I_{AS}^2 \frac{BV_{DSS}}{BV_{DSS} - V_{DD}}$$



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Peak Diode Recovery dv/dt Test Circuit & Waveforms

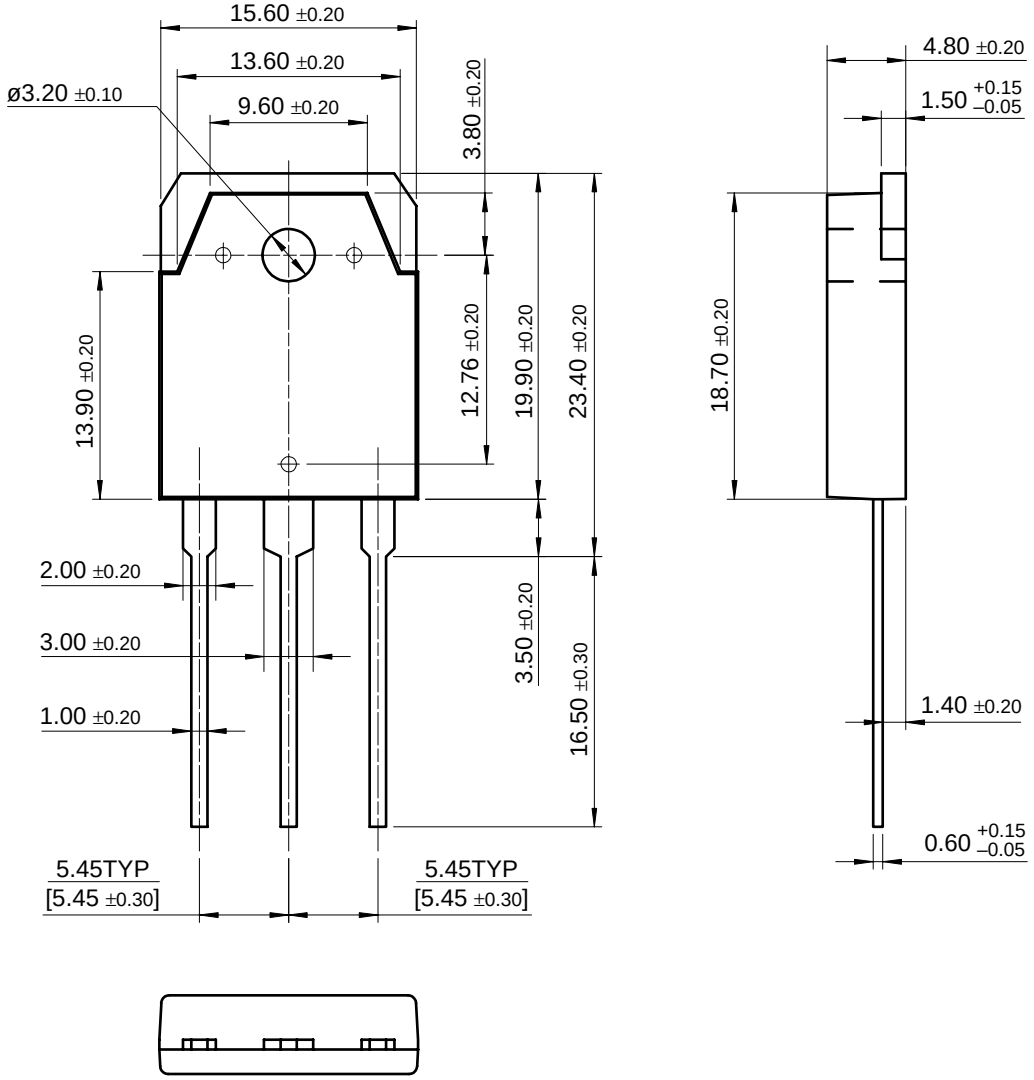




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THINKI TO-3P Package Dimensions

TO-3PN-SQ/TO-3PB-SQ



Dimensions in Millimeters

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