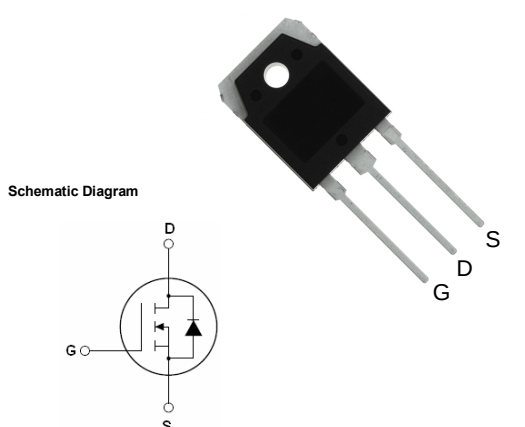


Pb Free Plating Product

TK20J50D



THINKISEMI 20A,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  The diagram shows a TO-3P package with three leads labeled D (Drain), S (Source), and G (Gate). Below it is a schematic diagram of an N-channel MOSFET with the same pin labels.
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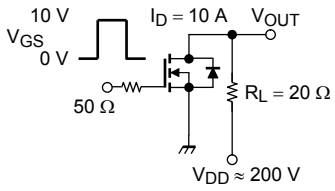
Absolute Maximum Ratings (Ta = 25°C)

Characteristics		Symbol	Rating	Unit
Drain-source voltage		V_{DSS}	500	V
Gate-source voltage		V_{GSS}	±30	V
Drain current	DC (Note 1)	I_D	20	A
	Pulse (Note 1)	I_{DP}	80	
Drain power dissipation (Tc = 25°C)		P_D	280	W
Single pulse avalanche energy (Note 2)		E_{AS}	470	mJ
Avalanche current		I_{AR}	20	A
Repetitive avalanche energy (Note 3)		E_{AR}	28	mJ
Channel temperature		T_{ch}	150	°C
Storage temperature range		T_{stg}	-55 to 150	°C

Thermal Characteristics

Characteristics	Symbol	Max	Unit
Thermal resistance, channel to case	$R_{th (ch-c)}$	0.446	°C/W
Thermal resistance, channel to ambient	$R_{th (ch-a)}$	50	°C/W

Electrical Characteristics (Ta = 25°C)

Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Gate leakage current		I_{GSS}	$V_{GS} = \pm 30 \text{ V}, V_{DS} = 0 \text{ V}$	—	—	± 1	μA
Drain cut-off current		I_{DSS}	$V_{DS} = 500 \text{ V}, V_{GS} = 0 \text{ V}$	—	—	10	μA
Drain-source breakdown voltage		$V_{(BR)DSS}$	$I_D = 10 \text{ mA}, V_{GS} = 0 \text{ V}$	500	—	—	V
Gate threshold voltage		V_{th}	$V_{DS} = 10 \text{ V}, I_D = 1 \text{ mA}$	2.0	—	4.0	V
Drain-source ON-resistance		$R_{DS(ON)}$	$V_{GS} = 10 \text{ V}, I_D = 10 \text{ A}$	—	0.22	0.27	Ω
Forward transfer admittance		$ Y_{fs} $	$V_{DS} = 10 \text{ V}, I_D = 10 \text{ A}$	2.4	8.5	—	S
Input capacitance		C_{iss}	$V_{DS} = 25 \text{ V}, V_{GS} = 0 \text{ V}, f = 1 \text{ MHz}$	—	2600	—	pF
Reverse transfer capacitance		C_{rss}		—	11	—	
Output capacitance		C_{oss}		—	280	—	
Switching time	Rise time	t_r		—	50	—	ns
	Turn-on time	t_{on}		—	100	—	
	Fall time	t_f		—	25	—	
	Turn-off time	t_{off}		—	150	—	
Total gate charge		Q_g	$V_{DD} \approx 400 \text{ V}, V_{GS} = 10 \text{ V}, I_D = 20 \text{ A}$	—	45	—	nC
Gate-source charge		Q_{gs}		—	28	—	
Gate-drain charge		Q_{gd}		—	17	—	

Source-Drain Ratings and Characteristics (Ta = 25°C)

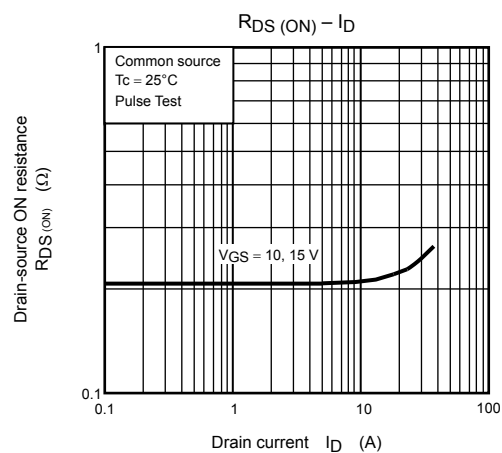
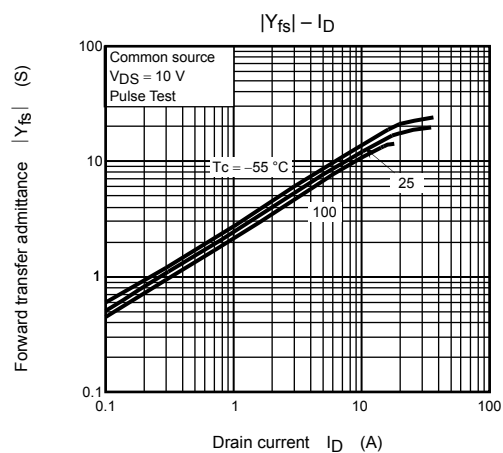
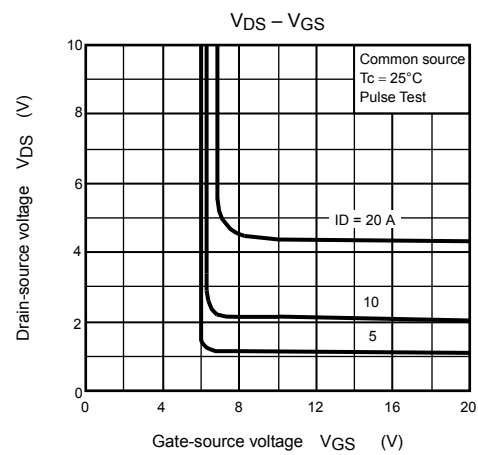
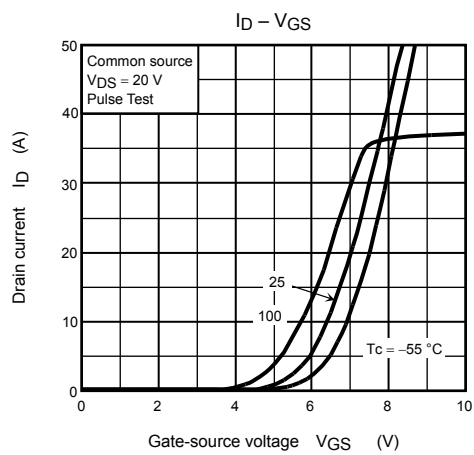
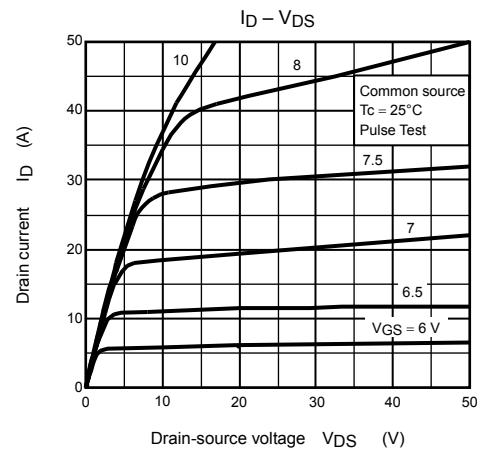
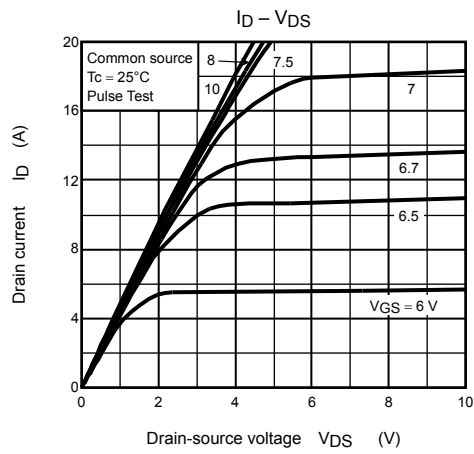
Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Continuous drain reverse current (Note 1)	I_{DR}	—	—	—	20	A
Pulse drain reverse current (Note 1)	I_{DRP}	—	—	—	80	A
Forward voltage (diode)	V_{DSF}	$I_{DR} = 20 \text{ A}, V_{GS} = 0 \text{ V}$	—	—	-1.7	V
Reverse recovery time	t_{rr}	$I_{DR} = 20 \text{ A}, V_{GS} = 0 \text{ V},$	—	1700	—	ns
Reverse recovery charge	Q_{rr}	$dI_{DR}/dt = 100 \text{ A}/\mu\text{s}$	—	26	—	μC

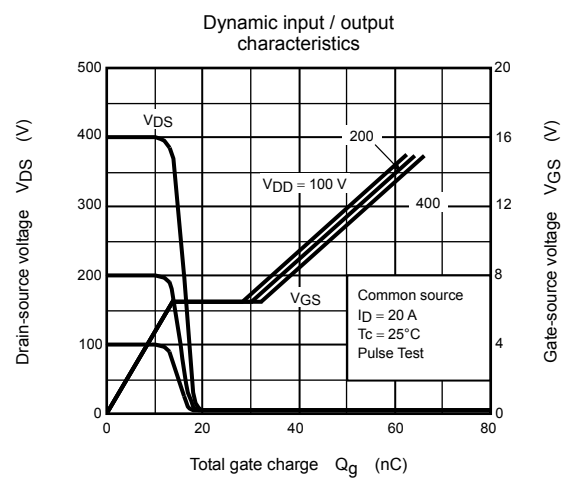
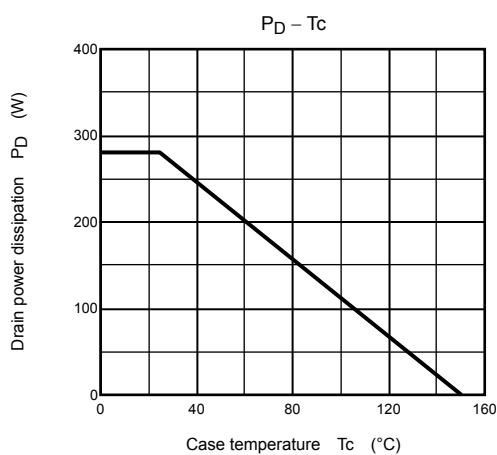
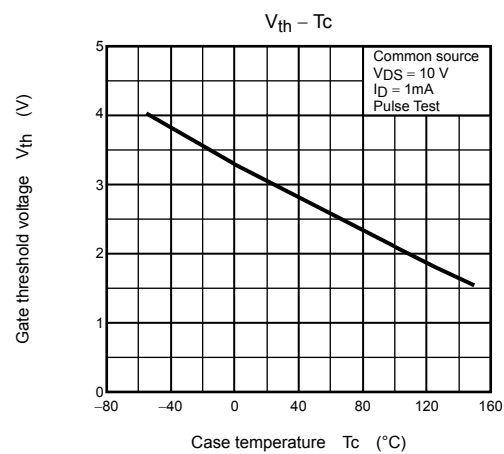
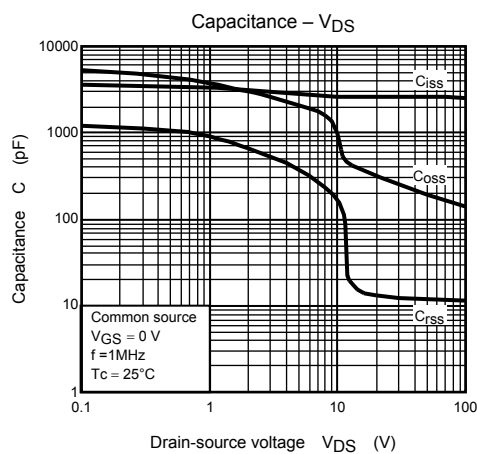
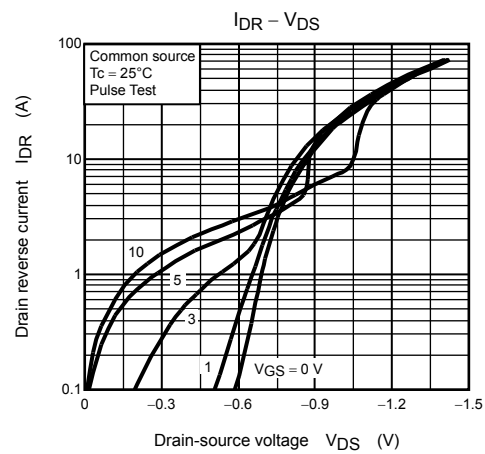
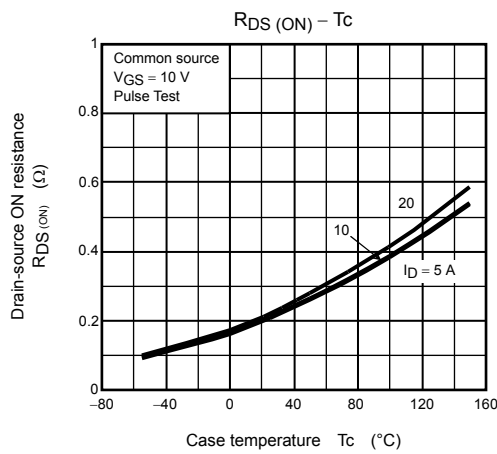
Note 1: Ensure that the channel temperature does not exceed 150°C.

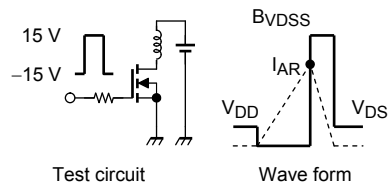
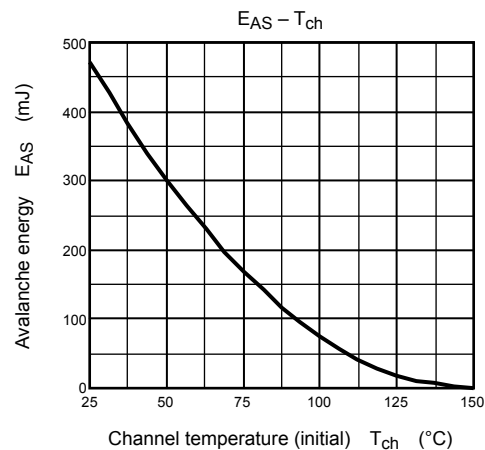
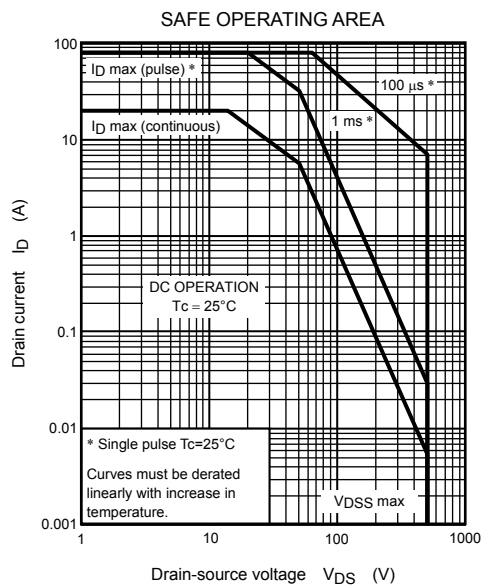
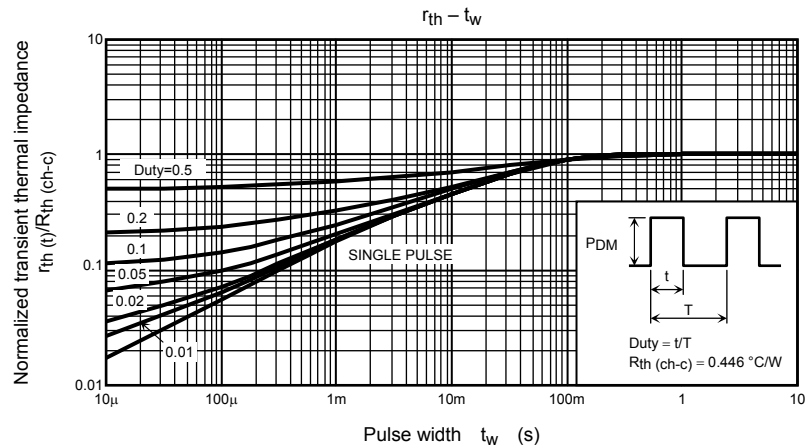
Note 2: $V_{DD} = 90 \text{ V}$, $T_{ch} = 25^\circ\text{C}$ (initial), $L = 2.0 \text{ mH}$, $R_G = 25 \Omega$, $I_{AR} = 20 \text{ A}$

Note 3: Repetitive rating: pulse width limited by maximum channel temperature

This transistor is an electrostatic-sensitive device. Handle with care.







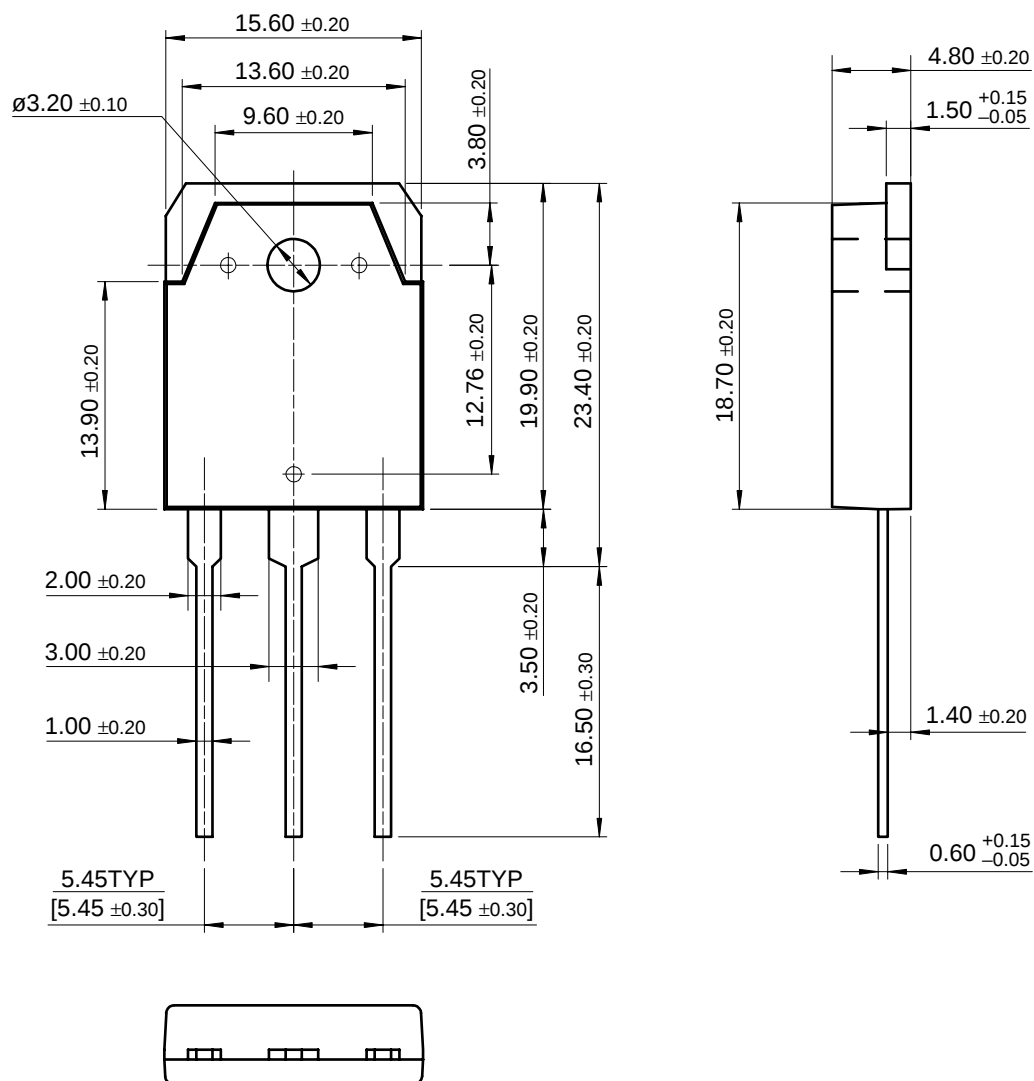
$$R_G = 25\ \Omega$$

$$V_{DD} = 90\ \text{V}, L = 2.0\ \text{mH}$$

$$E_{AS} = \frac{1}{2} \cdot L \cdot I_{AR}^2 \cdot \left(\frac{BVDSS}{BVDSS - V_{DD}} \right)$$

THINKI TO-3P Package Dimensions

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



Dimensions in Millimeters