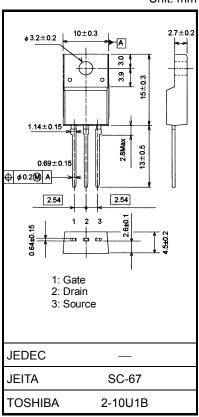# TK4A50D

Yixin

Switching Regulator Applications

Unit: mm

- Low drain-source ON-resistance: $R_{DS\,(ON)} = 1.7\,\Omega$ (typ.)
- High forward transfer admittance: $|Y_{fs}| = 1.5$ S (typ.)
- Low leakage current: $I_{DSS} = 10\,\mu A$ (max) ($V_{DS} = 500$ V)
- Enhancement mode: $V_{th} = 2.4$ to 4.4 V ($V_{DS} = 10$ V, $I_D = 1$ mA)

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	4	A
	Pulse (t = 1 ms) (Note 1)	I_{DP}	16	
Drain power dissipation (Tc = 25°C)		P_D	30	W
Single pulse avalanche energy (Note 2)		E_{AS}	156	mJ
Avalanche current		I_{AR}	4	A
Repetitive avalanche energy (Note 3)		E_{AR}	3.0	mJ
Channel temperature		T_{ch}	150	°C
Storage temperature range		T_{stg}	−55 to 150	°C

JEDEC	—
JEITA	SC-67
TOSHIBA	2-10U1B

Weight: 1.7 g (typ.)

1: Gate
2: Drain
3: Source

Note: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) are within the absolute maximum ratings. Please design the appropriate reliability upon reviewing the Toshiba Semiconductor Reliability Handbook ("Handling Precautions"/"Derating Concept and Methods") and individual reliability data (i.e. reliability test report and estimated failure rate, etc).
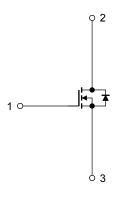
Thermal Characteristics

Characteristics	Symbol	Max	Unit
Thermal resistance, channel to case	$R_{th\,(ch-c)}$	4.17	°C/W
Thermal resistance, channel to ambient	$R_{th\,(ch-a)}$	62.5	°C/W

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

Note 2: $V_{DD} = 90$ V, $T_{ch} = 25$°C (initial), L = 17 mH, $R_G = 25\ \Omega$, $I_{AR} = 4$ A

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

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

Electrical Characteristics (Ta = 25°C)

Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Gate leakage current		I_{GSS}	$V_{GS} = \pm 30$ V, $V_{DS} = 0$ V	—	—	±1	μA
Drain cut-off current		I_{DSS}	$V_{DS} = 500$ V, $V_{GS} = 0$ V	—	—	10	μA
Drain-source breakdown voltage		$V_{(BR)DSS}$	$I_D = 10$ mA, $V_{GS} = 0$ V	500	—	—	V
Gate threshold voltage		V_{th}	$V_{DS} = 10$ V, $I_D = 1$ mA	2.4	—	4.4	V
Drain-source ON resistance		$R_{DS(ON)}$	$V_{GS} = 10$ V, $I_D = 2$ A	—	1.7	2.0	Ω
Forward transfer admittance		$|Y_{fs}|$	$V_{DS} = 10$ V, $I_D = 2$ A	0.4	1.5	—	S
Input capacitance		C_{iss}		—	380	—	
Reverse transfer capacitance		C_{rss}	$V_{DS} = 25$ V, $V_{GS} = 0$ V, f = 1 MHz	—	2.5	—	pF
Output capacitance		C_{oss}		—	45	—	
Switching time	Rise time	t_r		—	15	—	
	Turn-on time	t_{on}		—	35	—	
	Fall time	t_f		—	7	—	ns
	Turn-off time	t_{off}	Duty ≤ 1%, $t_w = 10$ μs	—	55	—	
Total gate charge		Q_g		—	9	—	
Gate-source charge		Q_{gs}	$V_{DD} \approx 400$ V, $V_{GS} = 10$ V, $I_D = 4$ A	—	5	—	nC
Gate-drain charge		Q_{gd}		—	4	—	

Test circuit (Switching time): V_{GS} = 10 V / 0 V, $I_D = 2$ A, V_{OUT}, 50 Ω, $R_L = 100$ Ω, $V_{DD} \approx 200$ V

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

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Continuous drain reverse current (Note 1)	I_{DR}	—	—	—	4	A
Pulse drain reverse current (Note 1)	I_{DRP}	—	—	—	16	A
Forward voltage (diode)	V_{DSF}	$I_{DR} = 4$ A, $V_{GS} = 0$ V	—	—	−1.7	V
Reverse recovery time	t_{rr}	$I_{DR} = 4$ A, $V_{GS} = 0$ V,	—	800	—	ns
Reverse recovery charge	Q_{rr}	$dI_{DR}/dt = 100$ A/μs	—	4.4	—	μC

Marking

K4A50D

— Part No. (or abbreviation code)

— Lot No.

— Note 4