



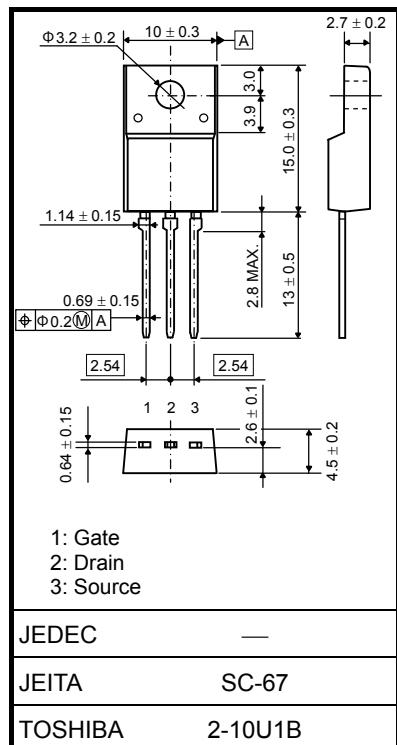
TK6A50D

Switching Regulator Applications

- Low drain-source ON-resistance: $R_{DS\ (ON)} = 1.2\ \Omega$ (typ.)
- High forward transfer admittance: $|Y_{fs}| = 2.5\ S$ (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 ($T_a = 25^\circ C$)

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	6	A
	Pulse ($t = 1\ ms$) (Note 1) I _{DP}	24	
Drain power dissipation ($T_c = 25^\circ C$)	P_D	35	W
Single pulse avalanche energy (Note 2)	E _{AS}	144	mJ
Avalanche current	I _{AR}	6	A
Repetitive avalanche energy (Note 3)	E _{AR}	3.5	mJ
Channel temperature	T _{ch}	150	°C
Storage temperature range	T _{stg}	-55 to 150	°C

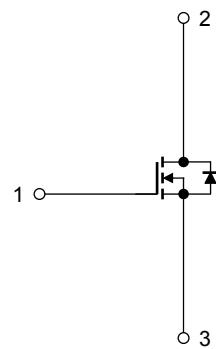


Weight: 1.7 g (typ.)

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)	3.57	°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: $V_{DD} = 90\ V$, $T_{ch} = 25^\circ C$ (initial), $L = 6.8\ mH$, $R_G = 25\ \Omega$, $I_{AR} = 6\ A$

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}	$V_{GS} = \pm 30 \text{ V}, V_{DS} = 0 \text{ V}$	—	—	± 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}	$V_{DS} = 10 \text{ V}, I_D = 1 \text{ mA}$	2.4	—	4.4	V	
Drain-source ON resistance	$R_{DS (\text{ON})}$	$V_{GS} = 10 \text{ V}, I_D = 3 \text{ A}$	—	1.2	1.4	Ω	
Forward transfer admittance	$ Y_{fs} $	$V_{DS} = 10 \text{ V}, I_D = 3 \text{ A}$	0.6	2.5	—	S	
Input capacitance	C_{iss}	$V_{DS} = 25 \text{ V}, V_{GS} = 0 \text{ V}, f = 1 \text{ MHz}$	—	540	—	pF	
Reverse transfer capacitance	C_{rss}		—	3	—		
Output capacitance	C_{oss}		—	60	—		
Switching time	Rise time	t_r	 V_{GS} 10 V V_{GS} 0 V 50 Ω $I_D = 3 \text{ A}$ V_{OUT} $R_L = 67 \Omega$ $V_{DD} \approx 200 \text{ V}$ Duty $\leq 1\%$, $t_w = 10 \mu\text{s}$	—	18	—	ns
	Turn-on time	t_{on}		—	40	—	
	Fall time	t_f		—	8	—	
	Turn-off time	t_{off}		—	55	—	
Total gate charge	Q_g	$V_{DD} \approx 400 \text{ V}, V_{GS} = 10 \text{ V}, I_D = 6 \text{ A}$	—	11	—	nC	
Gate-source charge	Q_{gs}		—	6	—		
Gate-drain charge	Q_{gd}		—	5	—		

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

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Continuous drain reverse current (Note 1)	I_{DR}	—	—	—	6	A
Pulse drain reverse current (Note 1)	I_{DRP}	—	—	—	24	A
Forward voltage (diode)	V_{DSF}	$I_{DR} = 6 \text{ A}, V_{GS} = 0 \text{ V}$	—	—	-1.7	V
Reverse recovery time	t_{rr}	$I_{DR} = 6 \text{ A}, V_{GS} = 0 \text{ V},$ $dI_{DR}/dt = 100 \text{ A}/\mu\text{s}$	—	1000	—	ns
Reverse recovery charge	Q_{rr}		—	6	—	μC

Marking