



TK5A65D

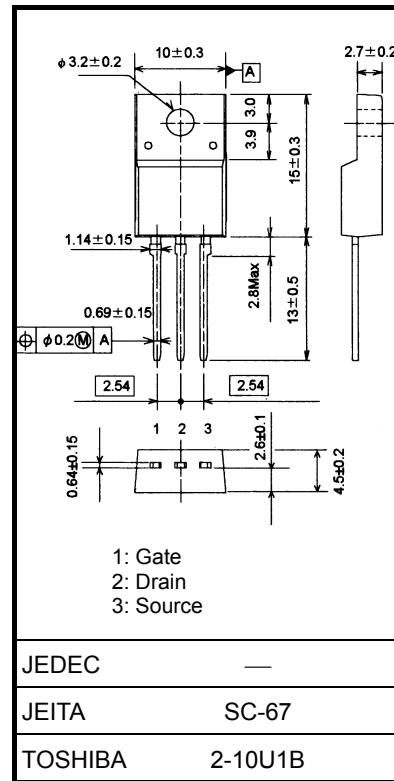
Switching Regulator Applications

Unit: mm

- Low drain-source ON resistance: $R_{DS(ON)} = 1.2 \Omega$ (typ.)
- High forward transfer admittance: $|Y_{fs}| = 2.6 \text{ S}$ (typ.)
- Low leakage current: $I_{DSS} = 10 \mu\text{A}$ (max) ($V_{DS} = 650 \text{ V}$)
- Enhancement-mode: $V_{th} = 2.0$ to 4.0 V ($V_{DS} = 10 \text{ V}$, $I_D = 1 \text{ mA}$)

Absolute Maximum Ratings ($T_a = 25^\circ\text{C}$)

Characteristics	Symbol	Rating	Unit
Drain-source voltage	V_{DSS}	650	V
Gate-source voltage	V_{GSS}	± 30	V
Drain current	DC (Note 1) I_D	5	A
	Pulse ($t = 1 \text{ ms}$) (Note 1) I_{DP}	20	
Drain power dissipation ($T_c = 25^\circ\text{C}$)	P_D	40	W
Single pulse avalanche energy (Note 2)	E_{AS}	180	mJ
Avalanche current	I_{AR}	5	A
Repetitive avalanche energy (Note 3)	E_{AR}	4.0	mJ
Channel temperature	T_{ch}	150	$^\circ\text{C}$
Storage temperature range	T_{stg}	-55 to 150	$^\circ\text{C}$



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

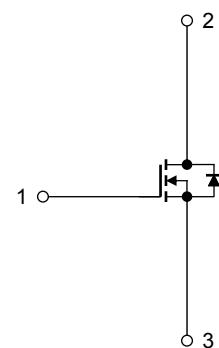
Characteristics	Symbol	Max	Unit
Thermal resistance, channel to case	$R_{th}(\text{ch-c})$	3.125	$^\circ\text{C/W}$
Thermal resistance, channel to ambient	$R_{th}(\text{ch-a})$	62.5	$^\circ\text{C/W}$

Note 1: Please use devices on conditions that the channel temperature is below 150°C .

Note 2: $V_{DD} = 90 \text{ V}$, $T_{ch} = 25^\circ\text{C}$ (initial), $L = 14.4 \text{ mH}$, $R_G = 25 \Omega$, $I_{AR} = 5 \text{ A}$

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

This transistor is an electrostatic sensitive device. Please handle with caution.



Electrical Characteristics (Ta = 25°C)

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit	
Gate leakage current	I _{GSS}	V _{GS} = ±30 V, V _{DS} = 0 V	—	—	±1	µA	
Drain cut-off current	I _{DSS}	V _{DS} = 650 V, V _{GS} = 0 V	—	—	10	µA	
Drain-source breakdown voltage	V _{(BR) DSS}	I _D = 10 mA, V _{GS} = 0 V	650	—	—	V	
Gate threshold voltage	V _{th}	V _{DS} = 10 V, I _D = 1 mA	2.0	—	4.0	V	
Drain-source ON resistance	R _{DS} (ON)	V _{GS} = 10 V, I _D = 2.5 A	—	1.2	1.43	Ω	
Forward transfer admittance	Y _{fs}	V _{DS} = 10 V, I _D = 2.5 A	0.7	2.6	—	S	
Input capacitance	C _{iss}	V _{DS} = 25 V, V _{GS} = 0 V, f = 1 MHz	—	800	—	pF	
Reverse transfer capacitance	C _{rss}		—	4	—		
Output capacitance	C _{oss}		—	100	—		
Switching time	Rise time	t _r	 10 V V _{GS} 0 V 50 Ω I _D = 2.5 A V _{OUT} R _L = 80 Ω V _{DD} ≈ 200 V Duty ≤ 1%, t _W = 10 µs	—	20	—	ns
	Turn-on time	t _{on}		—	40	—	
	Fall time	t _f		—	12	—	
	Turn-off time	t _{off}		—	60	—	
Total gate charge	Q _g	V _{DD} ≈ 400 V, V _{GS} = 10 V, I _D = 5 A	—	16	—	nC	
Gate-source charge	Q _{gs}		—	10	—		
Gate-drain charge	Q _{gd}		—	6	—		

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

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Continuous drain reverse current (Note 1)	I _{DR}	—	—	—	5	A
Pulse drain reverse current (Note 1)	I _{DRP}	—	—	—	20	A
Forward voltage (diode)	V _{DSF}	I _{DR} = 5 A, V _{GS} = 0 V	—	—	-1.7	V
Reverse recovery time	t _{rr}	I _{DR} = 5 A, V _{GS} = 0 V, dI _{DR} /dt = 100 A/µs	—	1200	—	ns
Reverse recovery charge	Q _{rr}		—	10	—	µC

Marking