



TK40A10J1

Switching Regulator Applications

- Small gate charge: $Q_g = 76\text{nC}$ (typ.)
- Low drain-source ON-resistance: $R_{DS(ON)} = 11.5\text{ m}\Omega$ (typ.)
- High forward transfer admittance: $|Y_{fs}| = 90\text{ S}$
- Low leakage current: $I_{DSS} = 10\text{ }\mu\text{A}$ (max) ($V_{DS} = 100\text{ V}$)
- Enhancement mode: $V_{th} = 1.1\text{ to }2.3\text{ V}$ ($V_{DS} = 10\text{ V}$, $I_D = 1\text{ mA}$)

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

Characteristics		Symbol	Rating	Unit
Drain-source voltage		V_{DSS}	100	V
Drain-gate voltage ($R_{GS} = 20\text{ k}\Omega$)		V_{DGR}	100	V
Gate-source voltage		V_{GSS}	± 20	V
Drain current	DC (Note 1)	I_D	40	A
	Pulse (Note 1)	I_{DP}	160	
Drain power dissipation ($T_c = 25^\circ\text{C}$)		P_D	40	W
Single pulse avalanche energy (Note 2)		E_{AS}	202	mJ
Avalanche current		I_{AR}	40	A
Repetitive avalanche energy (Note 3)		E_{AR}	2.4	mJ
Channel temperature		T_{ch}	150	$^\circ\text{C}$
Storage temperature range		T_{stg}	-55 to 150	$^\circ\text{C}$

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

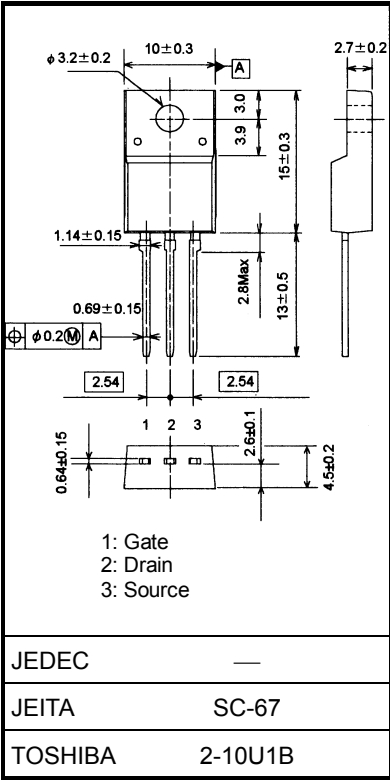
Note 1: Ensure that the channel and lead temperatures do not exceed 150°C .

Note 2: $V_{DD} = 25\text{ V}$, $T_{ch} = 25^\circ\text{C}$, $L = 200\text{ }\mu\text{H}$, $I_{AR} = 40\text{ A}$, $R_G = 1\text{ }\Omega$

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

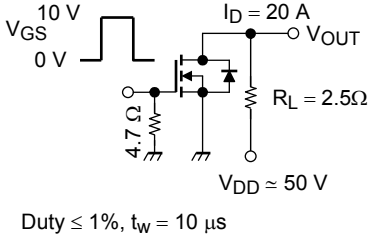
This transistor is an electrostatic- sensitive device. Handle with care.

Unit: mm



Weight: 1.7 g (typ.)

Electrical Characteristics (Ta = 25°C)

Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Gate leakage current		I _{GSS}	V _{GS} = ±16 V, V _{DS} = 0 V	—	—	±10	μA
Drain cut-OFF current		I _{DSS}	V _{DS} = 100 V, V _{GS} = 0 V	—	—	10	μA
Drain-source breakdown voltage		V (BR) DSS	I _D = 10 mA, V _{GS} = 0 V	100	—	—	V
		V (BR) DSX	I _D = 10 mA, V _{GS} = -20 V	60	—	—	
Gate threshold voltage		V _{th}	V _{DS} = 10 V, I _D = 1 mA	1.1	—	2.3	V
Drain-source ON resistance		R _{DS (ON)}	V _{GS} = 4.5 V, I _D = 20A	—	13	17	mΩ
			V _{GS} = 10 V, I _D = 20A	—	11.5	15	
Forward transfer admittance		Y _{fs}	V _{DS} = 10 V, I _D = 20 A	45	90	—	S
Input capacitance		C _{iss}	V _{DS} = 10V, V _{GS} = 0 V, f = 1 MHz	—	4300	—	pF
Reverse transfer capacitance		C _{rss}		—	230	—	
Output capacitance		C _{oss}		—	790	—	
Switching time	Rise time	t _r	 Duty ≤ 1%, t _w = 10 μs	—	14	—	ns
	Turn-ON time	t _{on}		—	22	—	
	Fall time	t _f		—	24	—	
	Turn-OFF time	t _{off}		—	115	—	
Total gate charge (gate-source plus gate-drain)		Q _g	V _{DD} ≈ 80 V, V _{GS} = 5 V, I _D = 40A	—	44	—	nC
			V _{DD} ≈ 80 V, V _{GS} = 10 V, I _D = 40A	—	76	—	
Gate-source charge 1		Q _{gs1}	V _{DD} ≈ 80 V, V _{GS} = 10 V, I _D = 40A	—	11	—	
Gate-drain (“miller”) charge		Q _{gd}		—	21	—	
Gate switch charge		Q _{sw}		—	24	—	

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

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Continuous drain reverse current (Note 1)	IDR	—	—	—	40	A
Pulse drain reverse current (Note 1)	IDRP	—	—	—	160	A
Forward voltage (diode)	VDSF	IDR = 40 A, VGS = 0 V	—	-0.9	-1.2	V
Reverse recovery time	trr	IDR = 40 A, VGS = 0 V,	—	55	—	ns
Reverse recovery charge	Qrr	dIDR/dt = 50 A/μs	—	63	—	nC

Marking

