

2SK3670

Chopper Regulator and DC-DC Converter Applications

- 2.5V-Gate Drive
- Low drain-source ON-resistance: $R_{DS(ON)} = 1.0 \Omega$ (typ.)
- High forward transfer admittance: $|Y_{fs}| = 2.1 \text{ S}$ (typ.)
- Low leakage current: $I_{DSS} = 100 \mu\text{A}$ (max) ($V_{DS} = 150 \text{ V}$)
- Enhancement mode: $V_{th} = 0.5$ to 1.3 V ($V_{DS} = 10 \text{ V}$, $I_D = 200 \mu\text{A}$)

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

Characteristics	Symbol	Rating	Unit
Drain-source voltage	V_{DSS}	150	V
Drain-gate voltage ($R_{GS} = 20 \text{ k}\Omega$)	V_{DGR}	150	V
Gate-source voltage	V_{GSS}	± 12	V
Drain current	DC (Note 1)	I_D	0.67
	Pulse ($t \leq 5\text{s}$) (Note 1)	I_{DP}	1
	Pulse (Note 1)	I_{DP}	3
Drain power dissipation	P_D	0.9	W
Single pulse avalanche energy (Note 2)	E_{AS}	41	mJ
Avalanche current	I_{AR}	0.67	A
Repetitive avalanche energy (Note 3)	E_{AR}	0.09	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 ambient	$R_{th(ch-a)}$	138	$^\circ\text{C} / \text{W}$

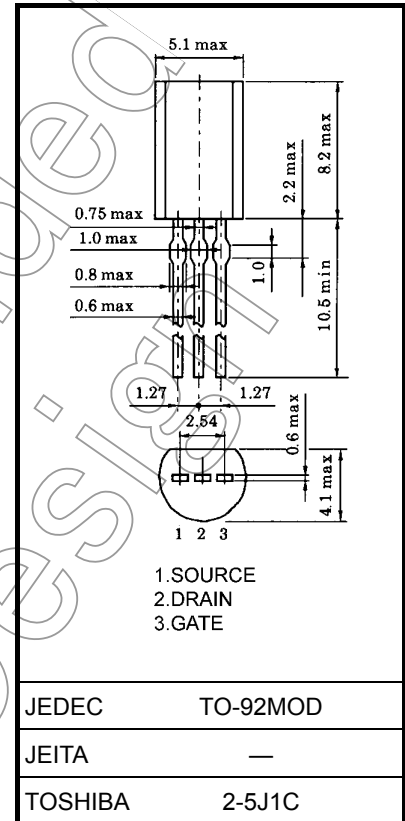
Note 1: Ensure that the channel temperature does not exceed 150°C .

Note 2: $V_{DS} = 50\text{V}$, $T_{ch} = 25^\circ\text{C}$ (initial), $L = 135\text{mH}$, $I_{AR} = 0.67\text{A}$, $R_G = 25\Omega$

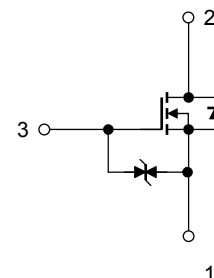
Note 3: Repetitive rating: pulse width limited by maximum channel temperature

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

Unit: mm



Weight: 0.36 g (typ.)



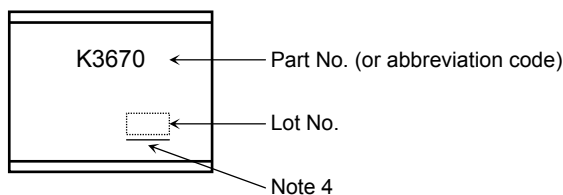
Electrical Characteristics (Ta = 25°C)

Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Gate leakage current		I_{GSS}	$V_{GS} = \pm 9.6 \text{ V}, V_{DS} = 0 \text{ V}$	—	—	± 10	μA
Drain cut-off current		I_{DSS}	$V_{DS} = 150 \text{ V}, V_{GS} = 0 \text{ V}$	—	—	100	μA
Drain-source breakdown voltage		$V_{(BR)DSS}$	$I_D = 10 \text{ mA}, V_{GS} = 0 \text{ V}$	150	—	—	V
Gate threshold voltage		V_{th}	$V_{DS} = 10 \text{ V}, I_D = 200 \mu\text{A}$	0.5	—	1.3	V
Drain-source ON-resistance		$R_{DS(ON)}$	$V_{GS} = 2.5 \text{ V}, I_D = 0.5 \text{ A}$	—	1.1	2	Ω
			$V_{GS} = 4 \text{ V}, I_D = 0.5 \text{ A}$	—	1.0	1.7	
Forward transfer admittance		$ Y_{fs} $	$V_{DS} = 10 \text{ V}, I_D = 0.5 \text{ A}$	1.0	2.1	—	S
Input capacitance		C_{iss}	$V_{DS} = 10 \text{ V}, V_{GS} = 0 \text{ V}, f = 1 \text{ MHz}$	—	230	—	pF
Reverse transfer capacitance		C_{rss}		—	14	—	
Output capacitance		C_{oss}		—	50	—	
Switching time	Rise time	t_r		—	16	—	ns
	Turn-on time	t_{on}		—	40	—	
	Fall time	t_f		—	23	—	
	Turn-off time	t_{off}		—	95	—	
Total gate charge (gate-source plus gate-drain)		Q_g	$V_{DD} \approx 120 \text{ V}, V_{GS} = 5 \text{ V}, I_D = 1 \text{ A}$	—	4.6	—	nC
Gate-source charge		Q_{gs}		—	2.9	—	
Gate-drain ("miller") Charge		Q_{gd}		—	1.7	—	

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

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Continuous drain reverse current (Note 1)	I_{DR}	—	—	—	0.67	A
Pulse drain reverse current (t=5s) (Note 1)	I_{DRP}	—	—	—	1	A
Pulse drain reverse current (Note 1)	I_{DRP}	—	—	—	3	A
Forward voltage (diode)	V_{DSF}	$I_{DR} = 0.5 \text{ A}, V_{GS} = 0 \text{ V}$	—	—	-1.5	V
Reverse recovery time	t_{rr}	$I_{DR} = 1 \text{ A}, V_{GS} = 0 \text{ V}$	—	95	—	ns
Reverse recovery charge	Q_{rr}	$dI_{DR} / dt = 50 \text{ A} / \mu\text{s}$	—	110	—	nC

Marking



Note 4: A line under a Lot No. identifies the indication of product Labels.

[[G]]/RoHS COMPATIBLE or [[G]]/RoHS [[Pb]]

Please contact your TOSHIBA sales representative for details as to environmental matters such as the RoHS compatibility of Product. The RoHS is the Directive 2002/95/EC of the European Parliament and of the Council of 27 January 2003 on the restriction of the use of certain hazardous substances in electrical and electronic equipment.

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