

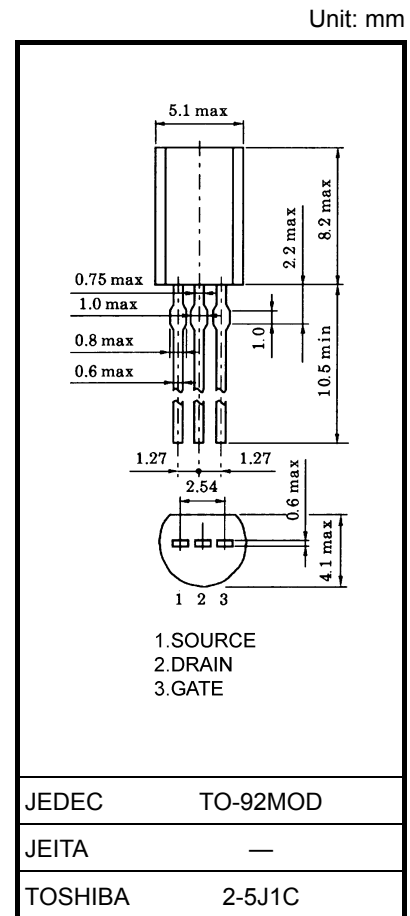
# 2SK3670

## 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:  $|Y_{fs}| = 2.1 S$  (typ.)
- Low leakage current:  $I_{DSS} = 100 \mu A$  (max) ( $V_{DS} = 150 V$ )
- Enhancement mode:  $V_{th} = 0.5 \sim 1.3 V$  ( $V_{DS} = 10 V, I_D = 200 \mu A$ )

### Absolute Maximum Ratings ( $T_a = 25^\circ C$ )

Characteristics	Symbol	Rating	Unit
Drain-source voltage	$V_{DS}$	150	V
Drain-gate voltage ( $R_{GS} = 20 k\Omega$ )	$V_{DGR}$	150	V
Gate-source voltage	$V_{GSS}$	$\pm 12$	V
Drain current	DC (Note 1)	$I_D$	0.67
	Pulse ( $t \leq 5s$ ) (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	m J
Avalanche current	$I_{AR}$	0.67	A
Repetitive avalanche energy (Note 3)	$E_{AS}$	0.09	m J
Channel temperature	$T_{ch}$	150	$^\circ C$
Storage temperature range	$T_{stg}$	-55~150	$^\circ C$



Weight: 0.36 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

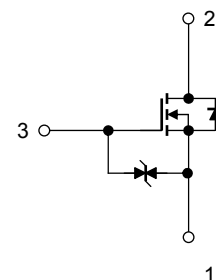
Characteristics	Symbol	Max	Unit
Thermal resistance, channel to ambient	$R_{th(ch-a)}$	138	$^\circ C / W$

Note 1: Ensure that the channel temperature does not exceed  $150^\circ C$ .

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

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

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



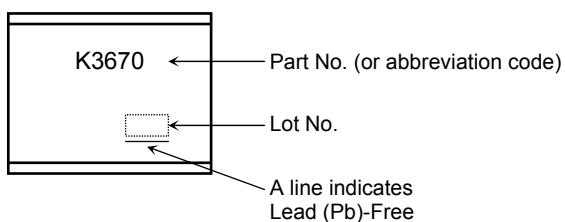
## Electrical Characteristics (Ta = 25°C)

Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Gate leakage current		$I_{GSS}$	$V_{GS} = \pm 9.6 \text{ V}, V_{DS} = 0 \text{ V}$	—	—	$\pm 10$	$\mu\text{A}$
Drain cut-off current		$I_{DSS}$	$V_{DS} = 150 \text{ V}, V_{GS} = 0 \text{ V}$	—	—	100	$\mu\text{A}$
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	$\Omega$
			$V_{GS} = 4 \text{ V}, I_D = 0.5 \text{ A}$	—	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



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