

2SK3754

Relay Drive, DC-DC Converter and
Motor Drive Applications

- 4.5-V gate drive
- Low drain-source ON resistance: $R_{DS(ON)} = 71 \text{ m}\Omega$ (typ.)
- High forward transfer admittance: $|Y_{fs}| = 5.0 \text{ S}$ (typ.)
- Low leakage current: $I_{DSS} = 10 \text{ }\mu\text{A}$ (max) ($V_{DS} = 30 \text{ V}$)
- Enhancement-model: $V_{th} = 1.3\sim 2.5 \text{ V}$ ($V_{DS} = 10 \text{ V}$, $I_D = 1 \text{ mA}$)

Absolute Maximum Ratings (Ta = 25°C)

Characteristics		Symbol	Rating	Unit
Drain-source voltage		V_{DSS}	30	V
Drain-gate voltage ($R_{GS} = 20 \text{ k}\Omega$)		V_{DGR}	30	V
Gate-source voltage		V_{GSS}	± 20	V
Drain current	DC (Note 1)	I_D	5	A
	Pulse (Note 1)	I_{DP}	15	
Drain power dissipation ($T_c = 25^\circ\text{C}$)		P_D	25	W
Single pulse avalanche energy (Note 2)		E_{AS}	4.0	mJ
Avalanche current		I_{AR}	2.5	A
Repetitive avalanche energy (Note 3)		E_{AR}	2.5	mJ
Channel temperature		T_{ch}	150	°C
Storage temperature range		T_{stg}	-55~150	°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	$R_{th(ch-c)}$	5.0	°C/W
Thermal resistance, channel to ambient	$R_{th(ch-a)}$	62.5	°C/W

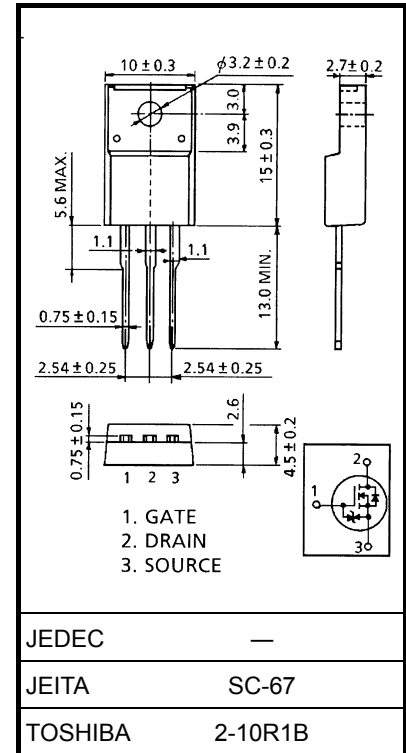
Note 1: Please use devices on conditions that the channel temperature is below 150°C.

Note 2: $V_{DD} = 24 \text{ V}$, $T_{ch} = 25^\circ\text{C}$ (initial), $L = 0.5 \text{ mH}$, $R_G = 25 \text{ }\Omega$, $I_{AR} = 2.5 \text{ A}$

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

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

Unit: mm



Weight: 1.9 g (typ.)

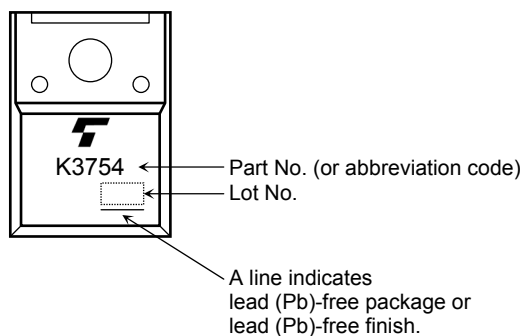
Electrical Characteristics (Ta = 25°C)

Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Gate leakage current		I_{GSS}	$V_{GS} = \pm 16\text{ V}, V_{DS} = 0\text{ V}$	—	—	± 10	μA
Drain cut-off current		I_{DSS}	$V_{DS} = 30\text{ V}, V_{GS} = 0\text{ V}$	—	—	10	μA
Drain-source breakdown voltage		$V_{(BR)DSS}$	$I_D = 10\text{ mA}, V_{GS} = 0\text{ V}$	30	—	—	V
		$V_{(BR)DSX}$	$I_D = 10\text{ mA}, V_{GS} = -20\text{ V}$	15	—	—	
Gate threshold voltage		V_{th}	$V_{DS} = 10\text{ V}, I_D = 1\text{ mA}$	1.3	—	2.5	V
Drain-source ON resistance		$R_{DS(ON)}$	$V_{GS} = 4.5\text{ V}, I_D = 2.5\text{ A}$	—	78	99	m Ω
			$V_{GS} = 10\text{ V}, I_D = 2.5\text{ A}$	—	71	89	
Forward transfer admittance		$ Y_{fs} $	$V_{DS} = 10\text{ V}, I_D = 2.5\text{ A}$	2.5	5.0	—	S
Input capacitance		C_{iss}	$V_{DS} = 10\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$	—	1250	—	pF
Reverse transfer capacitance		C_{rss}		—	155	—	
Output capacitance		C_{oss}		—	170	—	
Switching time	Rise time	t_r		—	7	—	ns
	Turn-on time	t_{on}		—	16	—	
	Fall time	t_f		—	18	—	
	Turn-off time	t_{off}		Duty $\leq 1\%$, $t_w = 10\ \mu\text{s}$	—	69	
Total gate charge		Q_g	$V_{DD} \approx 24\text{ V}, V_{GS} = 10\text{ V}, I_D = 5\text{ A}$	—	25	—	nC
Gate-source charge		Q_{gs}		—	20	—	
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}	—	—	—	5	A
Pulse drain reverse current (Note 1)	I_{DRP}	—	—	—	15	A
Reverse recovery time	t_{rr}	$I_{DR} = 5\text{ A}, V_{GS} = 0\text{ V},$	—	37	—	ns
Reverse recovery charge	Q_{rr}	$dI_{DR}/dt = 50\text{ A}/\mu\text{s}$	—	20	—	nC

Marking



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