TOSHIBA Field Effect Transistor Silicon N Channel MOS Type (U-MOSIII)

2SK3754

Relay Drive, DC–DC Converter and Motor Drive Applications

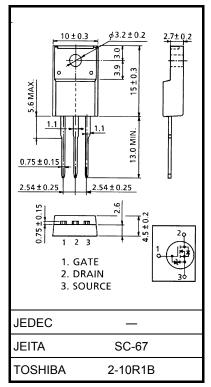
• 4.5-V gate drive

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- Low drain-source ON resistance: R_{DS} (ON) = 71 m Ω (typ.)
- High forward transfer admittance: $|Y_{fs}| = 5.0 \text{ S} (typ.)$
- Low leakage current: $IDSS = 10 \mu A (max) (VDS = 30 V)$
- 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 (F	R _{GS} = 20 kΩ)	V _{DGR}	30	V	
Gate-source voltage		V _{GSS}	±20	V	
Drain current	DC (Note 1)	I _D	5	А	
	Pulse (Note 1)	I _{DP}	15	A	
Drain power dissipat	ion (Tc = 25°C)	PD	25	W	
Single pulse avalanc	he energy (Note 2)	E _{AS}	4.0	mJ	
Avalanche current		I _{AR}	2.5	А	
Repetitive avalanche	e energy (Note 3)	E _{AR}	2.5	mJ	
Channel temperature	9	T _{ch}	150	°C	
Storage temperature	range	T _{stg}	-55~150	°C	



Weight: 1.9 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 (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 V, T_{ch} = 25°C (initial), L = 0.5 mH, R_G = 25 Ω , I_{AR} = 2.5 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

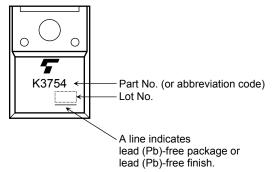
Electrical Characteristics (Ta = 25°C)

Chara	cteristics	Symbol	Test Condition	Min	Тур.	Max	Unit
Gate leakage curr	ent	I _{GSS}	$V_{GS}=\pm 16~V,~V_{DS}=0~V$			±10	μA
Drain cut-off curre	nt	I _{DSS}	$V_{DS} = 30 \text{ V}, \text{ V}_{GS} = 0 \text{ V}$	_	_	10	μA
Drain-source breakdown voltage		V (BR) DSS	$I_D = 10 \text{ mA}, V_{GS} = 0 \text{ V}$	30			V
		V (BR) DSX	$I_D = 10 \text{ mA}, V_{GS} = -20 \text{ V}$ 1			_	v
Gate threshold voltage		V _{th}	$V_{DS} = 10 \text{ V}, \text{ I}_{D} = 1 \text{ mA}$	1.3		2.5	V
Drain-source ON resistance		R _{DS (ON)}	$V_{GS} = 4.5 \text{ V}, \text{ I}_{D} = 2.5 \text{ A}$		78	99	mΩ
		NDS (ON)	$V_{GS}=10~V,~I_D=2.5~A$		71	89	
Forward transfer a	admittance	Y _{fs}	$V_{DS} = 10 \text{ V}, \text{ I}_{D} = 2.5 \text{ A}$	2.5	5.0	—	S
Input capacitance		C _{iss}	V _{DS} = 10 V, V _{GS} = 0 V, f = 1 MHz		1250	_	pF
Reverse transfer capacitance		C _{rss}			155	—	
Output capacitance		C _{oss}			170	_	
Switching time	Rise time	tr	$V_{GS}^{10 V}$ $_{0 V}^{10 V}$ $_{0 V}^{I_D} = 2.5 A$ $_{0 V}^{I_D} = 2.5$	_	7	_	• ns
	Turn-on time	t _{on}			16		
	Fall time	t _f			18	_	
	Turn-off time	t _{off}	Duty \leq 1%, t _w = 10 µs	_	69		
Total gate charge		Qg		_	25		nC
Gate-source charge		Q _{gs}	$V_{DD}\simeq 24~V,~V_{GS}=10~V,~I_{D}=5~A$	_	20		
Gate-drain charge		Q _{gd}			5		

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

Characteristics	Symbol	Test Condition	Min	Тур.	Max	Unit
Continuous drain reverse current (Note 1)	I _{DR}	—	_	_	5	А
Pulse drain reverse current (Note 1)	I _{DRP}	—	_	_	15	А
Reverse recovery time	t _{rr}	$I_{DR} = 5 \text{ A}, \text{ V}_{GS} = 0 \text{ V},$	_	37	_	ns
Reverse recovery charge	Q _{rr}	dI _{DR} /dt = 50 A/µs	_	20		nC

Marking





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