

TOSHIBA Field Effect Transistor Silicon N Channel MOS Type (π -MOSV)

2SK2744

Chopper Regulator, DC-DC Converter and Motor Drive Applications

- 4-V gate drive
- Low drain-source ON resistance: $R_{DS(ON)} = 15 \text{ m}\Omega$ (typ.)
- High forward transfer admittance: $|Y_{fs}| = 27 \text{ S}$ (typ.)
- Low leakage current: $I_{DSS} = 100 \text{ }\mu\text{A}$ (max) ($V_{DS} = 50 \text{ V}$)
- Enhancement mode: $V_{th} = 1.5 \text{ to } 3.5 \text{ V}$ ($V_{DS} = 10 \text{ V}$, $I_D = 1 \text{ mA}$)

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

Characteristics	Symbol	Rating	Unit
Drain-source voltage	V_{DSS}	50	V
Drain-gate voltage ($R_{GS} = 20 \text{ k}\Omega$)	V_{DGR}	50	V
Gate-source voltage	V_{GSS}	± 20	V
Drain current	DC (Note 1)	I_D	45
	Pulse (Note 1)	I_{DP}	180
Drain power dissipation ($T_c = 25^\circ\text{C}$)	P_D	125	W
Single pulse avalanche energy (Note 2)	E_{AS}	95	mJ
Avalanche current	I_{AR}	45	A
Repetitive avalanche energy (Note 3)	E_{AR}	12.5	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	$R_{th(ch-c)}$	1.0	$^\circ\text{C/W}$
Thermal resistance, channel to ambient	$R_{th(ch-a)}$	50	$^\circ\text{C/W}$

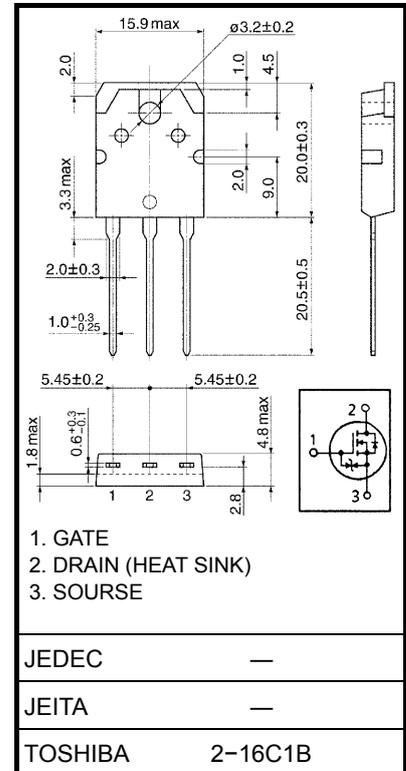
Note 1: Ensure that the channel temperature does not exceed 150°C .

Note 2: $V_{DD} = 25 \text{ V}$, $T_{ch} = 25^\circ\text{C}$ (initial), $L = 58 \text{ }\mu\text{H}$, $R_G = 25 \text{ }\Omega$, $I_{AR} = 45 \text{ A}$

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

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

Unit: mm



Weight: 4.6 g (typ.)

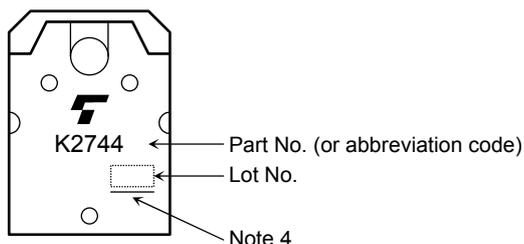
Electrical Characteristics (Ta = 25°C)

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}	$V_{DS} = 50\text{ V}, V_{GS} = 0\text{ V}$	—	—	100	μA
Drain-source breakdown voltage		$V_{(BR)DSS}$	$I_D = 10\text{ mA}, V_{GS} = 0\text{ V}$	50	—	—	V
Gate threshold voltage		V_{th}	$V_{DS} = 10\text{ V}, I_D = 1\text{ mA}$	1.5	—	3.5	V
Drain-source ON resistance		$R_{DS(ON)}$	$V_{GS} = 10\text{ V}, I_D = 25\text{ A}$	—	15	20	$\text{m}\Omega$
Forward transfer admittance		$ Y_{fs} $	$V_{DS} = 10\text{ V}, I_D = 25\text{ A}$	15	27	—	S
Input capacitance		C_{iss}	$V_{DS} = 10\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$	—	2300	—	pF
Reverse transfer capacitance		C_{rss}		—	420	—	pF
Output capacitance		C_{oss}		—	1200	—	pF
Switching time	Rise time	t_r		—	30	—	ns
	Turn-on time	t_{on}		—	45	—	
	Fall time	t_f		—	80	—	
	Turn-off time	t_{off}		—	230	—	
Total gate charge (gate-source plus gate-drain)		Q_g	$V_{DD} \approx 40\text{ V}, V_{GS} = 10\text{ V}, I_D = 45\text{ A}$	—	68	—	nC
Gate-source charge		Q_{gs}		—	20	—	nC
Gate-drain ("miller") charge		Q_{gd}		—	48	—	nC

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

Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Continuous drain reverse current (Note 1)		I_{DR}	—	—	—	45	A
Pulse drain reverse current (Note 1)		I_{DRP}	—	—	—	180	A
Forward voltage (diode)		V_{DSF}	$I_{DR} = 45\text{ A}, V_{GS} = 0\text{ V}$	—	—	-1.8	V
Reverse recovery time		t_{rr}	$I_{DR} = 45\text{ A}, V_{GS} = 0\text{ V}$	—	130	—	ns
Reverse recovery charge		Q_{rr}	$dI_{DR}/dt = 50\text{ A}/\mu\text{s}$	—	0.3	—	μC

Marking



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

Not underlined: $[[\text{Pb}]]/\text{INCLUDES} > \text{MCV}$

Underlined: $[[\text{G}]]/\text{RoHS COMPATIBLE}$ or $[[\text{G}]]/\text{RoHS} [[\text{Pb}]]$

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