

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

2SK3506

Relay Drive and DC-DC Converter Applications

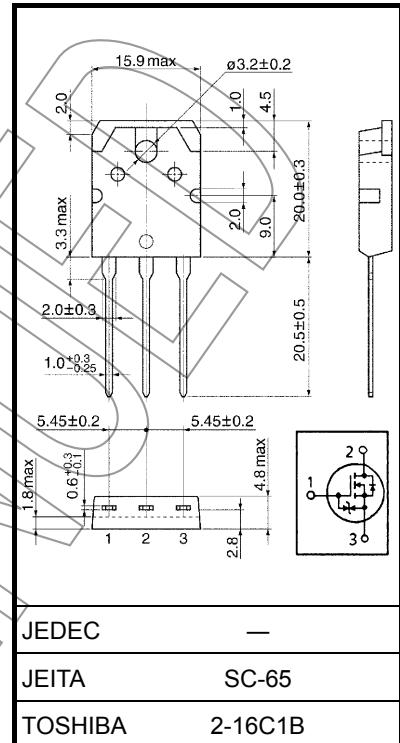
Motor Drive Applications

Unit: mm

- Low drain-source ON resistance: $R_{DS(ON)} = 16 \text{ m}\Omega$ (typ.)
- High forward transfer admittance: $|Y_{fs}| = 26 \text{ S}$ (typ.)
- Low leakage current: $I_{DSS} = 100 \mu\text{A}$ (max) ($V_{DS} = 30 \text{ V}$)
- Enhancement model: $V_{th} = 1.5$ to 3.0 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}	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	45	A
	Pulse (Note 1) I_{DP}	135	
Drain power dissipation ($T_c = 25^\circ\text{C}$)	P_D	100	W
Single pulse avalanche energy (Note 2)	E_{AS}	220	mJ
Avalanche current	I_{AR}	45	A
Repetitive avalanche energy (Note 3)	E_{AR}	10	mJ
Channel temperature	T_{ch}	150	$^\circ\text{C}$
Storage temperature range	T_{stg}	-55 to 150	$^\circ\text{C}$



Weight: 4.6 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	$R_{th}(ch-c)$	1.25	$^\circ\text{C}/\text{W}$
Thermal resistance, channel to ambient	$R_{th}(ch-a)$	50	$^\circ\text{C}/\text{W}$

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), $L = 78 \mu\text{H}$, $I_{AR} = 45 \text{ A}$, $R_G = 25 \Omega$

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

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

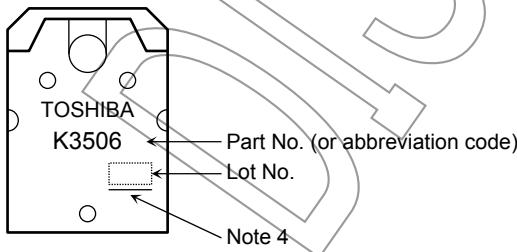
Electrical Characteristics ($T_a = 25^\circ\text{C}$)

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}	$V_{DS} = 30\text{ V}$, $V_{GS} = 0\text{ V}$	—	—	100	μA
Drain-source breakdown voltage	$V_{(BR) DSS}$	$I_D = 10\text{ mA}$, $V_{GS} = 0\text{ V}$	30	—	—	V
Gate threshold voltage	V_{th}	$V_{DS} = 10\text{ V}$, $I_D = 1\text{ mA}$	1.5	—	3.0	V
Drain-source ON resistance	$R_{DS (\text{ON})}$	$V_{GS} = 10\text{ V}$, $I_D = 25\text{ A}$	—	16	20	$\text{m}\Omega$
Forward transfer admittance	$ Y_{fs} $	$V_{DS} = 10\text{ V}$, $I_D = 25\text{ A}$	13	26	—	S
Input capacitance	C_{iss}	$V_{DS} = 10\text{ V}$, $V_{GS} = 0\text{ V}$, $f = 1\text{ MHz}$	—	1500	—	pF
Reverse transfer capacitance	C_{rss}		—	480	—	
Output capacitance	C_{oss}		—	680	—	
Switching time	Rise time	t_r	—	11	—	ns
	Turn-ON time	t_{on}	—	18	—	
	Fall time	t_f	—	60	—	
	Turn-OFF time	t_{off}	—	130	—	
Total gate charge (gate-source plus gate-drain)	Q_g	$V_{DD} \approx 24\text{ V}$, $V_{GS} = 10\text{ V}$, $I_D \approx 45\text{ A}$	—	39	—	nC
Gate-source charge	Q_{gs}		—	25	—	
Gate-drain ("miller") charge	Q_{gd}		—	14	—	

Source-Drain Ratings and Characteristics ($T_a = 25^\circ\text{C}$)

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}	—	—	—	135	A
Forward voltage (diode)	V_{DSF}	$I_{DR} = 45\text{ A}$, $V_{GS} = 0\text{ V}$	—	—	-1.7	V
Reverse recovery time	t_{rr}	$I_{DR} = 45\text{ A}$, $V_{GS} = 0\text{ V}$, $dI_{DR}/dt = 50\text{ A}/\mu\text{s}$	—	100	—	ns
Reverse recovery charge	Q_{rr}		—	200	—	nC

Marking



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

Not underlined: [[Pb]]/INCLUDES > MCV

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

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