

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

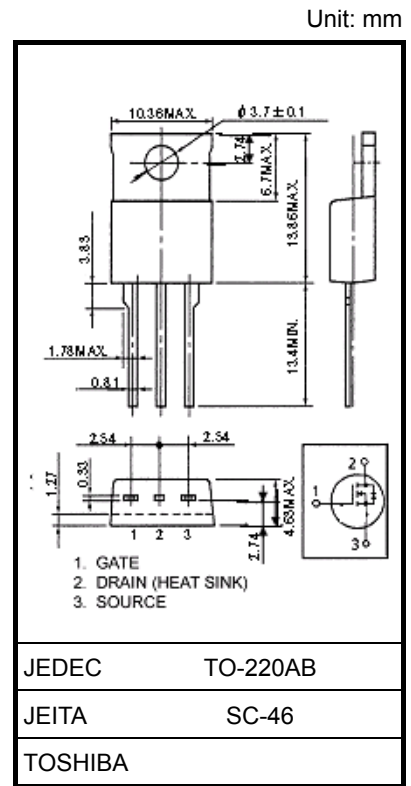
# TK80E08K3

■ E-Bike/UPS/Inverter

- Low drain-source ON resistance :  $R_{DS(ON)} = 7.5 \text{ m}\Omega$  (typ.)
- High forward transfer admittance :  $|Y_{fs}| = 135 \text{ S}$  (typ.)
- Low leakage current :  $I_{DSS} = 10 \text{ }\mu\text{A}$  (max) ( $V_{DS} = 75 \text{ V}$ )
- Enhancement mode :  $V_{th} = 2.0\sim 4.0 \text{ V}$  ( $V_{DS} = 10 \text{ V}, I_D = 1 \text{ mA}$ )

**Absolute Maximum Ratings (Ta = 25°C)**

Characteristics		Symbol	Rating	Unit
Drain-source voltage		$V_{DSS}$	75	V
Drain-gate voltage ( $R_{GS} = 20 \text{ k}\Omega$ )		$V_{DGR}$	75	V
Gate-source voltage		$V_{GSS}$	$\pm 20$	V
Drain current	DC (Note 1)	$I_D$	80	A
	DC (Note 1,4)	$I_D$	70	A
	Pulse (Note 1)	$I_{DP}$	240	A
Drain power dissipation ( $T_c = 25^\circ\text{C}$ )		$P_D$	200	W
Single pulse avalanche energy (Note 2)		$E_{AS}$	107	mJ
Avalanche current		$I_{AR}$	40	A
Repetitive avalanche energy (Note 3)		$E_{AR}$	20	mJ
Peak diode recovery dv/dt (Note 5)		dv/dt	12	V/ns
Channel temperature (Note 4)		$T_{ch}$	175	$^\circ\text{C}$
Storage temperature range (Note 4)		$T_{stg}$	-55~175	$^\circ\text{C}$



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	$R_{th(ch-c)}$	0.75	$^\circ\text{C} / \text{W}$
Thermal resistance, channel to ambient	$R_{th(ch-a)}$	83.3	$^\circ\text{C} / \text{W}$

- Note 1: Ensure that the channel temperature does not exceed 175°C.
- Note 2:  $V_{DD} = 25 \text{ V}, T_{ch} = 25^\circ\text{C}$  (initial),  $L = 100 \text{ }\mu\text{H}, R_G = 25 \text{ }\Omega, I_{AR} = 40\text{A}$
- Note 3: Repetitive rating: pulse width limited by maximum channel temperature
- Note 4:  $T_c=100$
- Note 5:  $I_{DR} = 80\text{A}, di/dt = 160\text{A}/\mu\text{s}, T_{ch} = T_{ch \text{ max}}$ .

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

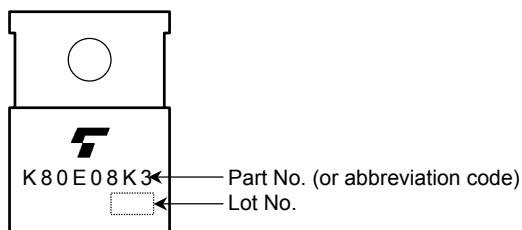
### Electrical Characteristics (Ta = 25°C)

Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Gate leakage current		$I_{GSS}$	$V_{GS} = \pm 20\text{ V}, V_{DS} = 0\text{ V}$	—	—	$\pm 1$	$\mu\text{A}$
Drain cut-off current		$I_{DSS}$	$V_{DS} = 75\text{ V}, V_{GS} = 0\text{ V}$	—	—	10	$\mu\text{A}$
Drain-source breakdown voltage		$V_{(BR)DSS}$	$I_D = 10\text{ mA}, V_{GS} = 0\text{ V}$	75	—	—	V
		$V_{(BR)DSX}$	$I_D = 10\text{ mA}, V_{GS} = -20\text{ V}$	45	—	—	V
Gate threshold voltage		$V_{th}$	$V_{DS} = 10\text{ V}, I_D = 1\text{ mA}$	2.0	—	4.0	V
Drain-source ON resistance		$R_{DS(ON)}$	$V_{GS} = 10\text{ V}, I_D = 40\text{ A}$	—	7.5	9.0	$\text{m}\Omega$
Forward transfer admittance		$ Y_{fs} $	$V_{DS} = 10\text{ V}, I_D = 40\text{ A}$	67	135	—	S
Input capacitance		$C_{iss}$	$V_{DS} = 10\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$	—	3600	—	pF
Reverse transfer capacitance		$C_{rss}$		—	350	—	
Output capacitance		$C_{oss}$		—	500	—	
Switching time	Rise time	$t_r$		—	95	—	ns
	Turn-on time	$t_{on}$		—	135	—	
	Fall time	$t_f$		—	85	—	
	Turn-off time	$t_{off}$		—	220	—	
Total gate charge (Gate-source plus gate-drain)		$Q_g$	$V_{DD} \approx 75\text{ V}, V_{GS} = 10\text{ V}, I_D = 80\text{ A}$	—	75	—	nC
Gate-source charge		$Q_{gs}$		—	44	—	
Gate-drain ("miller") charge		$Q_{gd}$		—	31	—	

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

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Continuous drain reverse current (Note 1)	$I_{DR}$	—	—	—	80	A
Pulse drain reverse current (Note 1)	$I_{DRP}$	—	—	—	240	A
Forward voltage (diode)	$V_{DSF}$	$I_{DR} = 80\text{ A}, V_{GS} = 0\text{ V}$	—	—	-1.5	V
Reverse recovery time	$t_{rr}$	$I_{DR} = 80\text{ A}, V_{GS} = 0\text{ V}$	—	45	—	ns
Reverse recovery charge	$Q_{rr}$	$dI_{DR} / dt = 100\text{ A} / \mu\text{s}$	—	72	—	$\mu\text{C}$

### Marking



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