

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

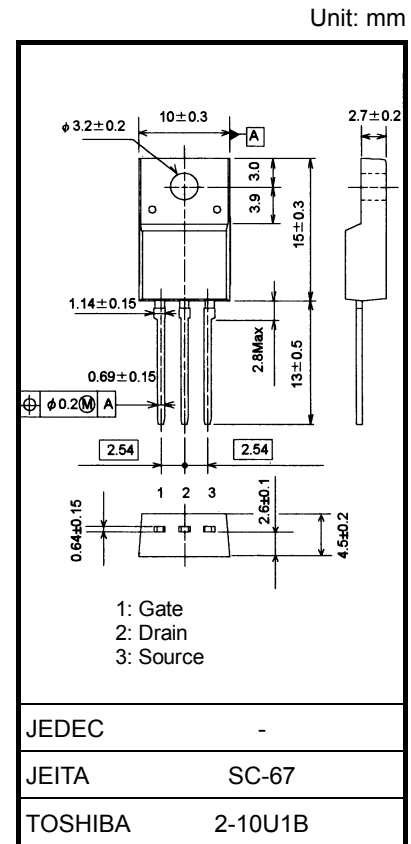
TK80A08K3

Switching Regulator Applications

- Low drain-source ON-resistance: $R_{DS(ON)} = 3.6 \text{ m}\Omega$ (typ.)
- High forward transfer admittance: $|Y_{fs}| = 200 \text{ S}$
- Low leakage current: $I_{DSS} = 10 \text{ }\mu\text{A}$ (max) ($V_{DS} = 75 \text{ V}$)
- Enhancement mode: $V_{th} = 2.0 \text{ to } 4.0 \text{ V}$ ($V_{DS} = 10 \text{ V}$, $I_D = 1 \text{ mA}$)

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

Characteristics		Symbol	Rating	Unit
Drain-source voltage		V_{DSS}	75	V
Drain-gate voltage ($R_{GS} = 20 \text{ k}\Omega$)		V_{DGR}	75	V
Gate-source voltage		V_{GSS}	± 20	V
Drain current	DC (Note 1)	I_D	80	A
	Pulse (Note 1)	I_{DP}	320	
Drain power dissipation ($T_c = 25^\circ\text{C}$)		P_D	40	W
Single pulse avalanche energy (Note 2)		E_{AS}	443	mJ
Avalanche current		I_{AR}	80	A
Repetitive avalanche energy (Note 3)		E_{AR}	4	mJ
Channel temperature		T_{ch}	150	$^\circ\text{C}$
Storage temperature range		T_{stg}	-55 to 150	$^\circ\text{C}$



Weight: 1.7 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	$R_{th(ch-c)}$	3.125	$^\circ\text{C/W}$
Thermal resistance, channel to ambient	$R_{th(ch-a)}$	62.5	$^\circ\text{C/W}$

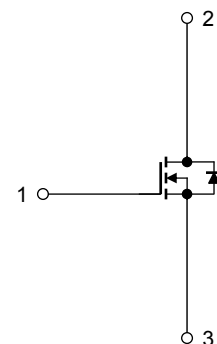
Note 1: Ensure that the channel and lead temperatures do not exceed 150°C .

Note 2: $V_{DD} = 25 \text{ V}$, $T_{ch} = 25^\circ\text{C}$, $L = 100 \text{ }\mu\text{H}$, $I_{AR} = 80 \text{ A}$, $R_G = 1 \text{ }\Omega$

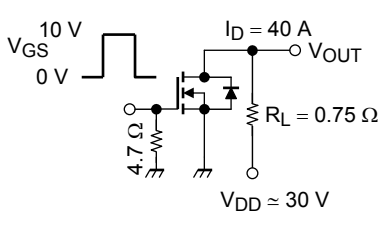
Note 3: Repetitive rating: pulse width limited by maximum channel temperature

This transistor is an electrostatic-sensitive device. Handle with care.

Internal Connection



Electrical Characteristics (Ta = 25°C)

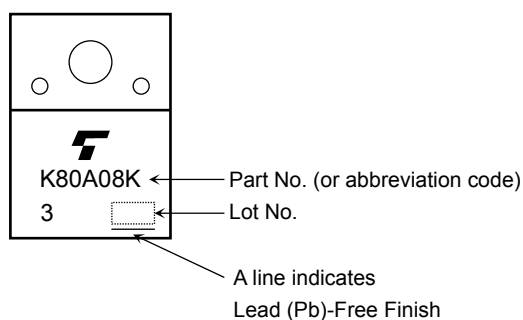
Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Gate leakage current		I_{GSS}	$V_{GS} = \pm 20 \text{ V}, V_{DS} = 0 \text{ V}$	—	—	± 1	μA
Drain cut-OFF current		I_{DSS}	$V_{DS} = 75 \text{ V}, V_{GS} = 0 \text{ V}$	—	—	10	μA
Drain-source breakdown voltage	$V_{(BR) DSS}$		$I_D = 10 \text{ mA}, V_{GS} = 0 \text{ V}$	75	—	—	V
	$V_{(BR) DSX}$		$I_D = 10 \text{ mA}, V_{GS} = -20 \text{ V}$	55	—	—	
Gate threshold voltage		V_{th}	$V_{DS} = 10 \text{ V}, I_D = 1 \text{ mA}$	2.0	—	4.0	V
Drain-source ON-resistance (Note 4)		$R_{DS(ON)}$	$V_{GS} = 10 \text{ V}, I_D = 40 \text{ A}$	—	3.6	4.5	$\text{m}\Omega$
Forward transfer admittance		$ Y_{fs} $	$V_{DS} = 10 \text{ V}, I_D = 40 \text{ A}$	100	200	—	S
Input capacitance		C_{iss}	$V_{DS} = 10 \text{ V}, V_{GS} = 0 \text{ V}, f = 1 \text{ MHz}$	—	8200	—	pF
Reverse transfer capacitance		C_{rss}		—	770	—	
Output capacitance		C_{oss}		—	1140	—	
Switching time	Rise time	t_r		—	30	—	ns
	Turn-ON time	t_{on}		—	55	—	
	Fall time	t_f		—	33	—	
	Turn-OFF time	t_{off}		—	150	—	
Total gate charge (gate-source plus gate-drain)		Q_g	$V_{DD} \approx 60 \text{ V}, V_{GS} = 10 \text{ V}, I_D = 80 \text{ A}$	—	175	—	nC
Gate-source charge 1		Q_{gs1}		—	40	—	
Gate-drain ("miller") charge		Q_{gd}		—	65	—	
Gate switch charge		Q_{sw}		—	80	—	

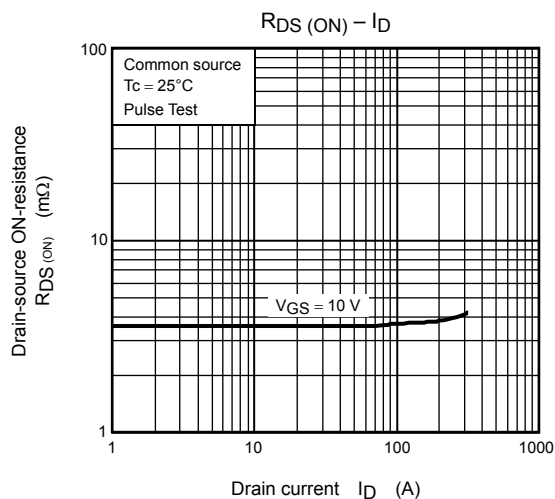
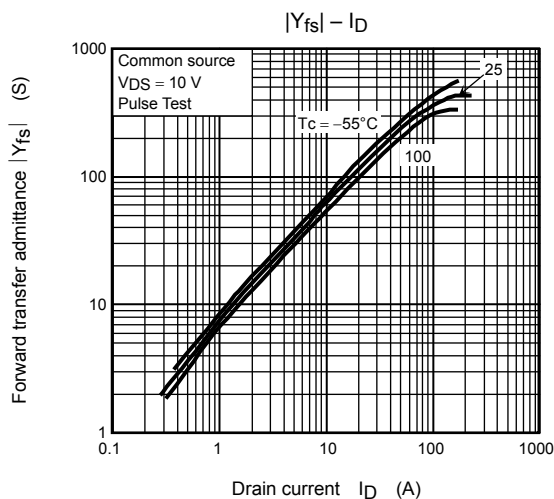
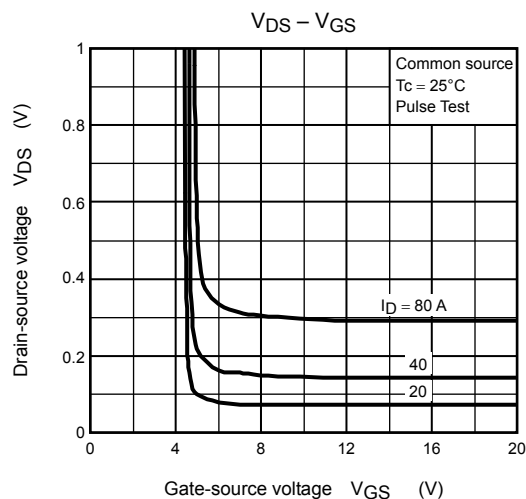
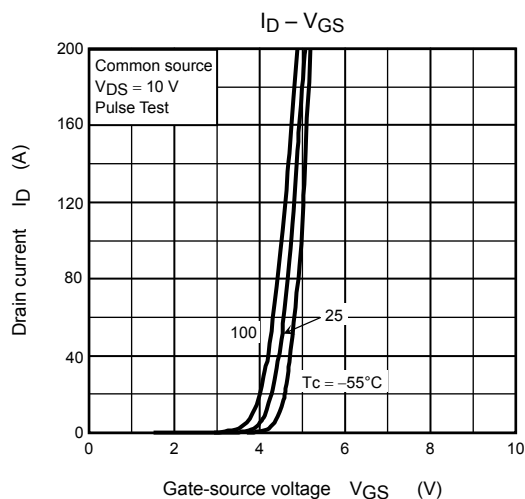
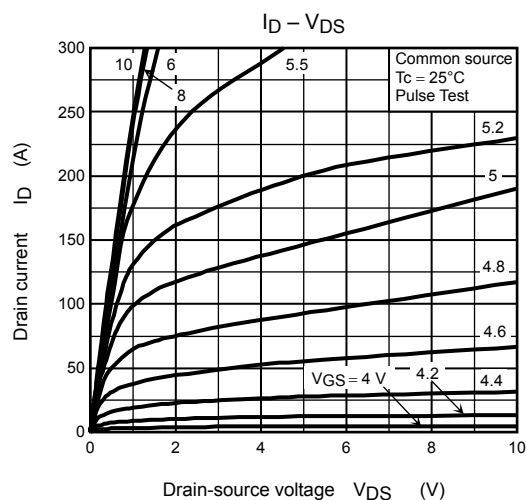
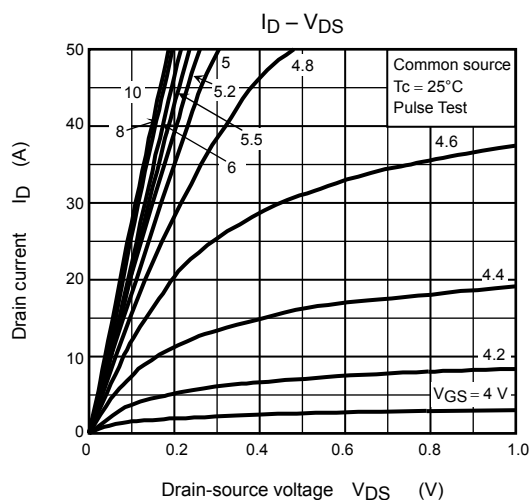
Note 4: Measured at lead standoff.

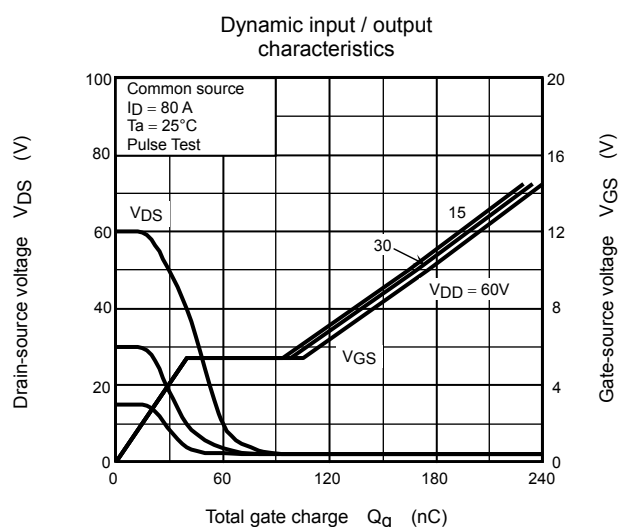
Source-Drain Ratings and Characteristics (Ta = 25°C)

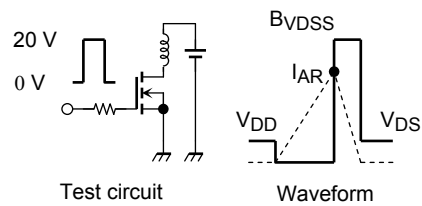
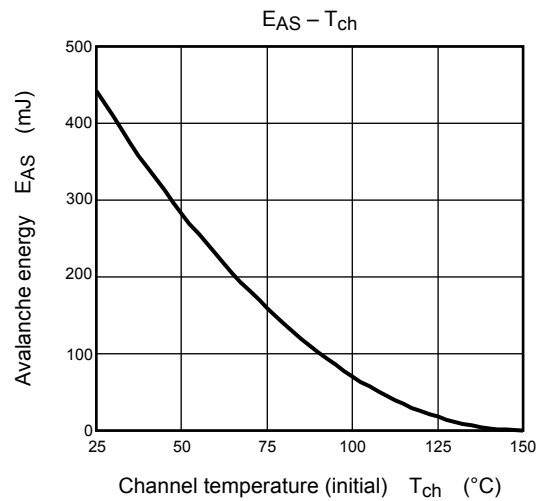
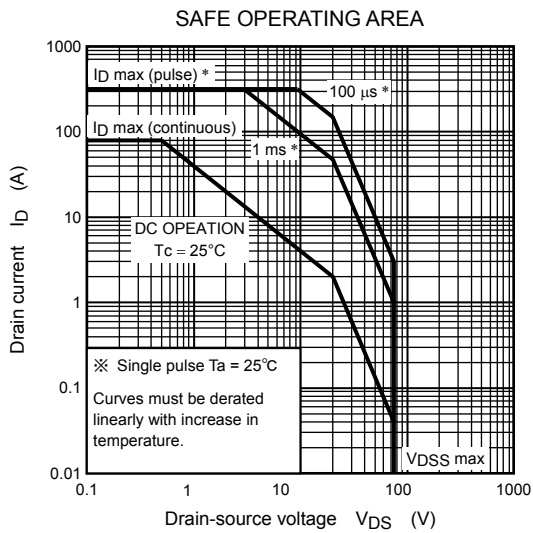
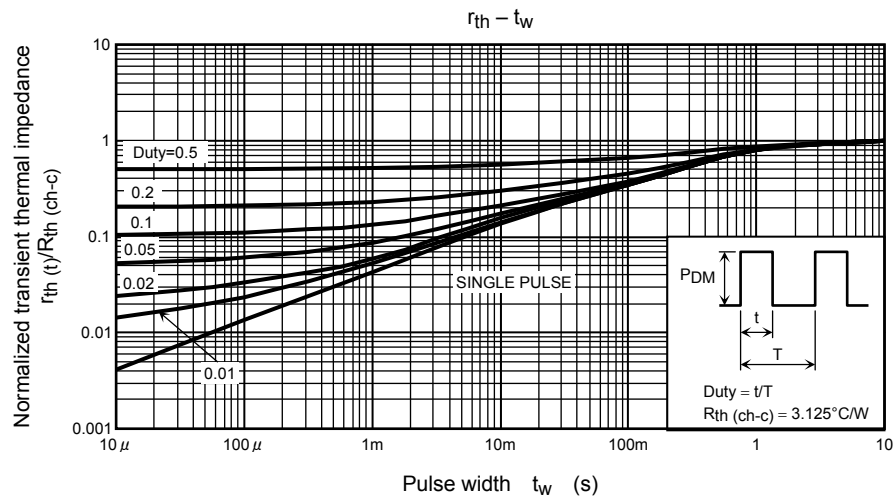
Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Continuous drain reverse current (Note 1)	I_{DR}	—	—	—	80	A
Pulse drain reverse current (Note 1)	I_{DRP}	—	—	—	320	A
Forward voltage (diode)	V_{DSF}	$I_{DR} = 80 \text{ A}, V_{GS} = 0 \text{ V}$	—	-0.9	-1.2	V
Reverse recovery time	t_{rr}	$I_{DR} = 80 \text{ A}, V_{GS} = 0 \text{ V},$	—	60	—	ns
Reverse recovery charge	Q_{rr}	$dI_{DR}/dt = 50 \text{ A}/\mu\text{s}$	—	60	—	nC

Marking









$$R_G = 1 \Omega$$

$$V_{DD} = 25 V, L = 100 \mu H$$

$$E_{AS} = \frac{1}{2} \cdot L \cdot I^2 \cdot \left(\frac{B_{VDSS}}{B_{VDSS} - V_{DD}} \right)$$

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20070701-EN GENERAL

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