

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

**2SK2610**

## Chopper Regulator, DC-DC Converter and Motor Drive Applications

- Low drain-source ON resistance :  $R_{DS\text{ (ON)}} = 2.3\ \Omega$  (typ.)
- High forward transfer admittance :  $|Y_{fs}| = 4.4\ \text{S}$  (typ.)
- Low leakage current :  $Id_{SS} = 100\ \mu\text{A}$  (max) ( $V_{DS} = 720\ \text{V}$ )
- Enhancement mode :  $V_{th} = 2.0$  to  $4.0\ \text{V}$  ( $V_{DS} = 10\ \text{V}$ ,  $Id = 1\ \text{mA}$ )

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

Characteristics		Symbol	Rating	Unit
Drain-source voltage		V <sub>DSS</sub>	900	V
Drain-gate voltage ( $R_{GS} = 20\text{ k}\Omega$ )		V <sub>DGR</sub>	900	V
Gate-source voltage		V <sub>GSS</sub>	±30	V
Drain current	DC (Note 1)	I <sub>D</sub>	5	A
	Pulse (Note 1)	I <sub>DP</sub>	15	
Drain power dissipation ( $T_c = 25^\circ\text{C}$ )		P <sub>D</sub>	150	W
Single pulse avalanche energy (Note 2)		E <sub>AS</sub>	595	mJ
Avalanche current		I <sub>AR</sub>	5	A
Repetitive avalanche energy (Note 3)		E <sub>AR</sub>	15	mJ
Channel temperature		T <sub>ch</sub>	150	°C
Storage temperature range		T <sub>stg</sub>	-55 to 150	°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	$R_{th\ (ch-c)}$	0.833	°C / W
Thermal resistance, channel to ambient	$R_{th\ (ch-a)}$	50	°C / W

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

Note 2:  $V_{DD} = 90$  V,  $T_{ch} = 25^\circ\text{C}$  (initial),  $L = 43.6$  mH,  $I_{AR} = 5$  A,  $R_G = 25$   $\Omega$

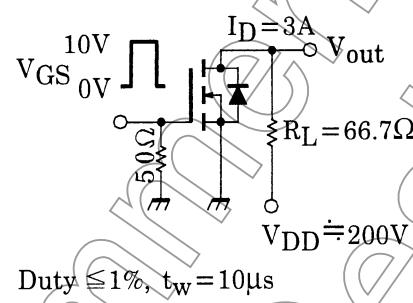
Note 3: Repetitive rating: pulse width limited by maximum channel temperature

This transistor is an electrostatic-sensitive device.

Please handle with caution.

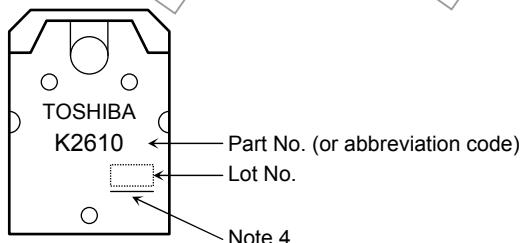
Electrical Characteristics ( $T_a = 25^\circ C$ )

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Gate leakage current	$I_{GSS}$	$V_{GS} = \pm 30 V, V_{DS} = 0 V$	—	—	$\pm 10$	$\mu A$
Gate-source breakdown voltage	$V_{(BR) GSS}$	$I_G = \pm 10 \mu A, V_{DS} = 0 V$	$\pm 30$	—	—	V
Drain cut-off current	$I_{DSS}$	$V_{DS} = 720 V, V_{GS} = 0 V$	—	—	100	$\mu A$
Drain-source breakdown voltage	$V_{(BR) DSS}$	$I_D = 10 mA, V_{GS} = 0 V$	900	—	—	V
Gate threshold voltage	$V_{th}$	$V_{DS} = 10 V, I_D = 1 mA$	2.0	—	4.0	V
Drain-source ON resistance	$R_{DS (ON)}$	$V_{GS} = 10 V, I_D = 3.0 A$	—	2.3	2.5	$\Omega$
Forward transfer admittance	$ Y_{fs} $	$V_{DS} = 20 V, I_D = 3.0 A$	1.1	4.4	—	S
Input capacitance	$C_{iss}$	$V_{DS} = 25 V, V_{GS} = 0 V, f = 1 MHz$	—	1200	—	pF
Reverse transfer capacitance	$C_{rss}$		—	20	—	
Output capacitance	$C_{oss}$		—	120	—	
Switching time	Rise time	$t_r$	—	40	—	ns
	Turn-on time	$t_{on}$	—	90	—	
	Fall time	$t_f$	—	60	—	
	Turn-off time	$t_{off}$	—	200	—	
Total gate charge (gate-source plus gate-drain)	$Q_g$	$V_{DD} \approx 400 V, V_{GS} = 10 V, I_D = 5 A$	—	45	—	nC
Gate-source charge	$Q_{gs}$		—	25	—	
Gate-drain ("miller") Charge	$Q_{gd}$		—	20	—	

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

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Continuous drain reverse current (Note 1)	$I_{DR}$	—	—	—	5	A
Pulse drain reverse current (Note 1)	$I_{DRP}$	—	—	—	15	A
Forward voltage (diode)	$V_{DSF}$	$I_{DR} = 5 A, V_{GS} = 0 V$	—	—	-1.9	V
Reverse recovery time	$t_{rr}$	$I_{DR} = 5 A, V_{GS} = 0 V, dI_{DR} / dt = 100 A / \mu s$	—	1300	—	ns
Reverse recovery charge	$Q_{rr}$		—	11	—	$\mu C$

## Marking

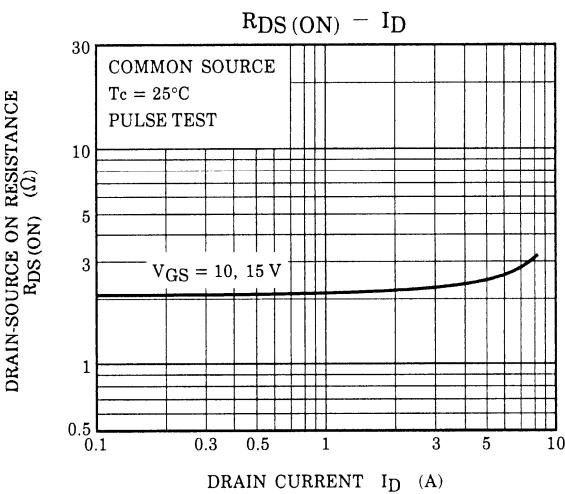
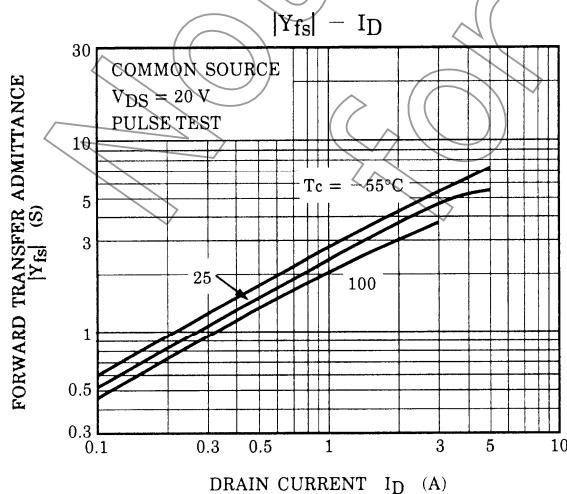
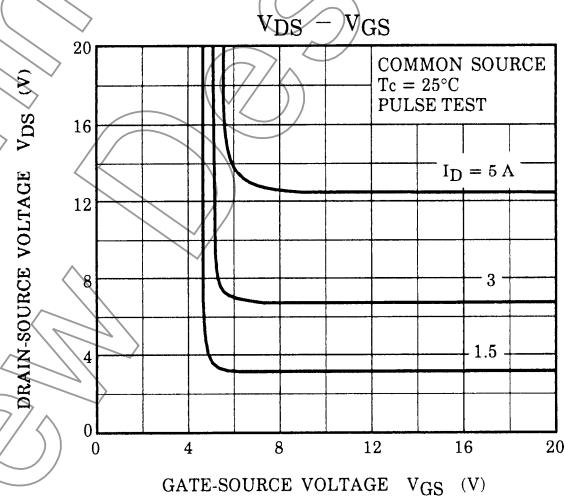
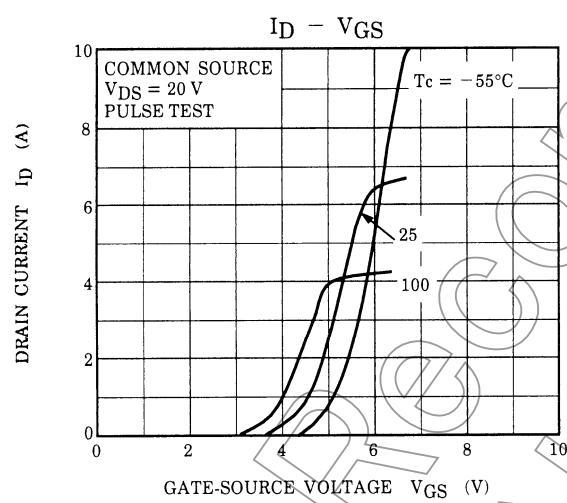
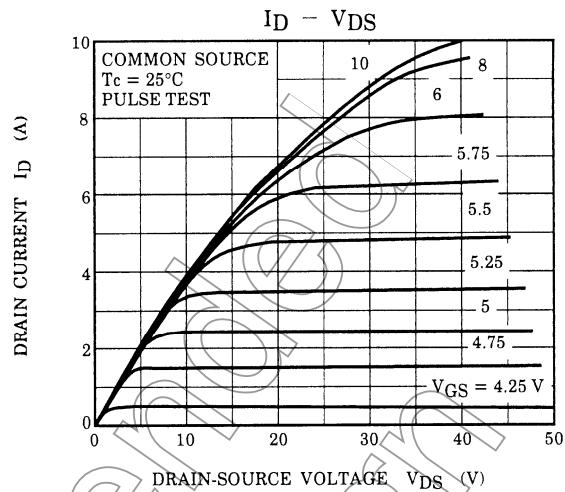
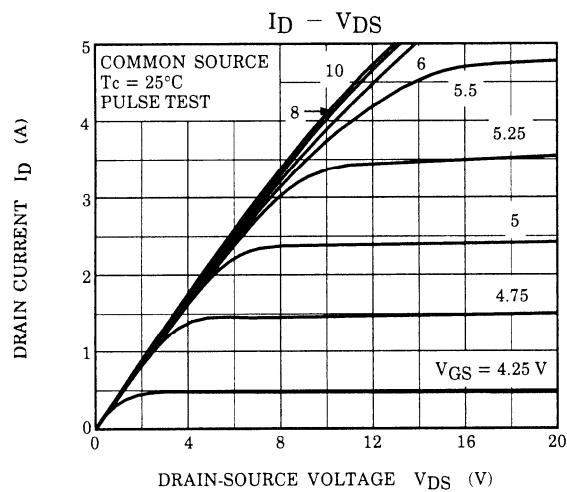


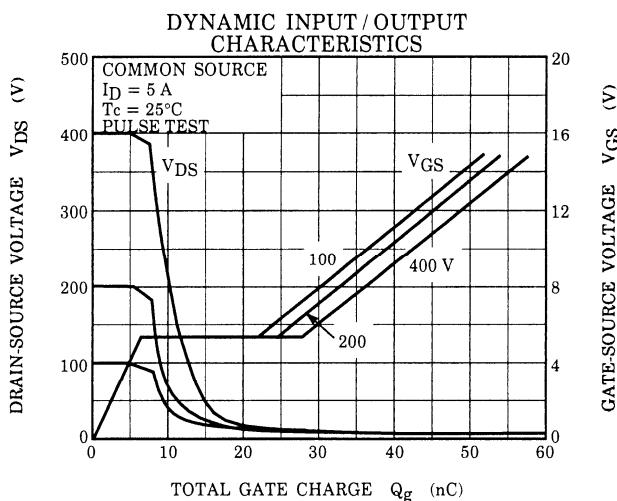
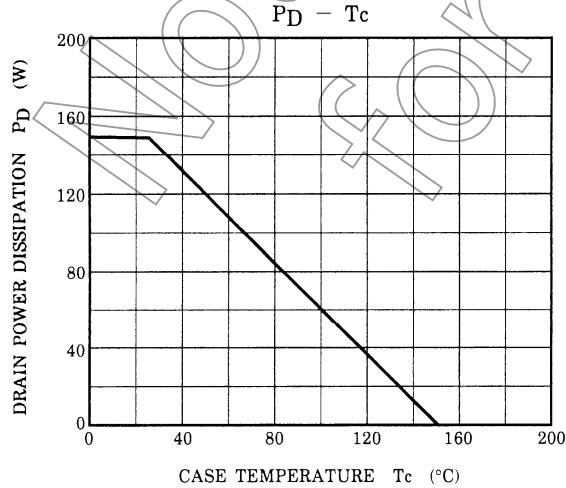
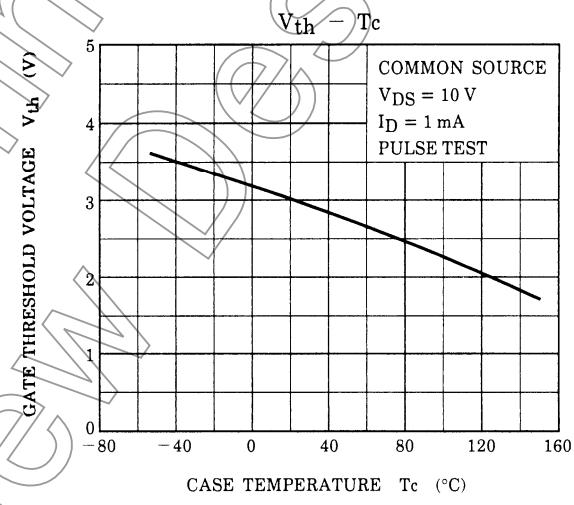
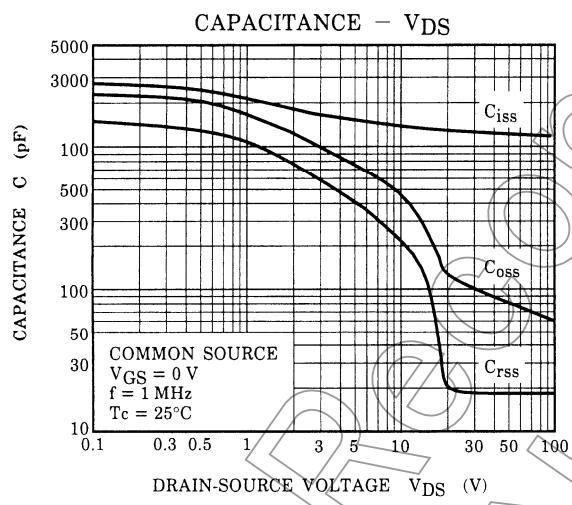
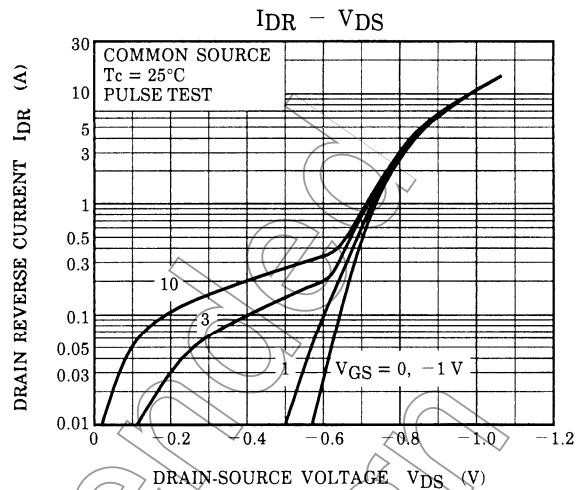
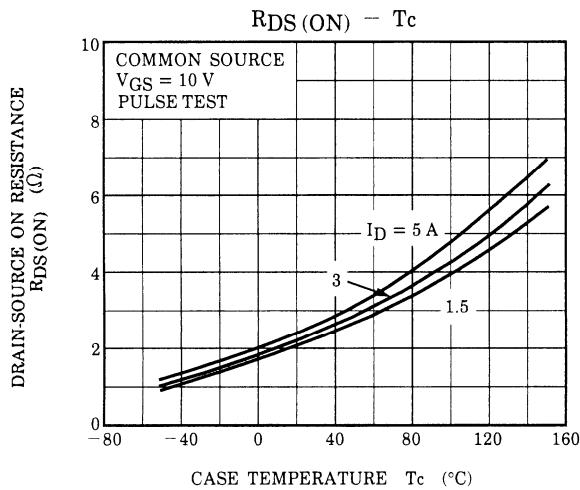
Note 4: A line under a Lot No. identifies the indication of product Labels.

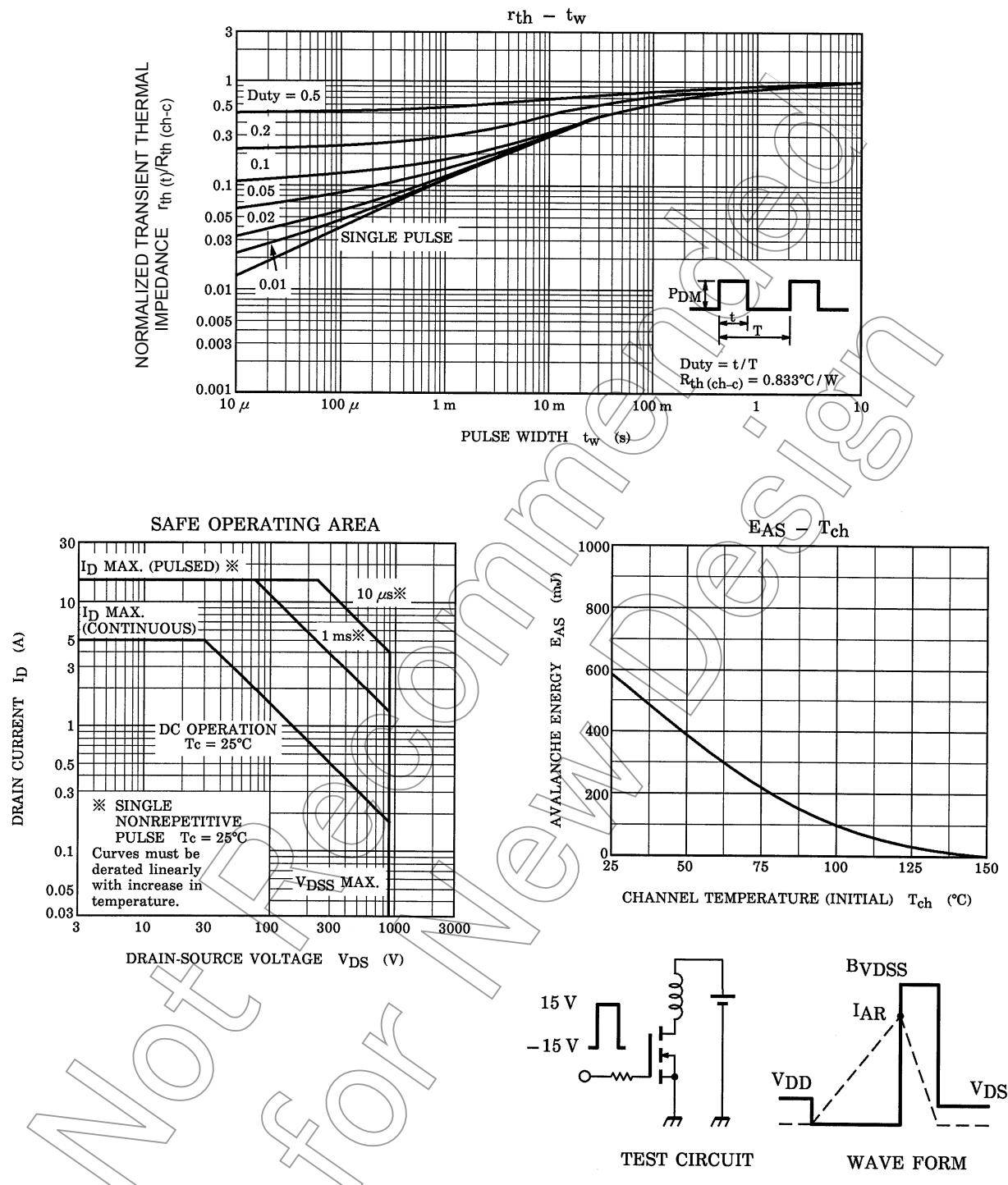
Not underlined: [[Pb]]/INCLUDES > MCV

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

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$$R_G = 25 \Omega$$

$$V_{DD} = 90 \text{ V}, L = 43.6 \text{ mH} \quad EAS = \frac{1}{2} \cdot L \cdot I^2 \cdot \left( \frac{BVDSS}{BVDSS - V_{DD}} \right)$$

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