

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

2SK2986

DC-DC Converter, Relay Drive and Motor Drive Applications

Unit: mm

- Low drain-source ON resistance : $R_{DS(ON)} = 4.5 \text{ m}\Omega$ (typ.)
- High forward transfer admittance : $|Y_{fs}| = 80 \text{ S}$ (typ.)
- Low leakage current : $I_{DSS} = 100 \text{ }\mu\text{A}$ (max) ($V_{DS} = 60 \text{ V}$)
- Enhancement mode : $V_{th} = 1.3 \text{ to } 2.5 \text{ V}$ ($V_{DS} = 10 \text{ V}$, $I_D = 1 \text{ mA}$)

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

Characteristics		Symbol	Rating	Unit
Drain-source voltage		V_{DSS}	60	V
Drain-gate voltage ($R_{GS} = 20 \text{ k}\Omega$)		V_{DGR}	60	V
Gate-source voltage		V_{GSS}	± 20	V
Drain current	DC (Note 1)	I_D	55	A
	Pulse ($t \leq 10 \text{ s}$) (Note 1)	I_{DP}	70	
	Pulse ($t \leq 1 \text{ ms}$) (Note 1)		280	
Drain power dissipation ($T_c = 25^\circ\text{C}$)		P_D	100	W
Single pulse avalanche energy (Note 2)		E_{AS}	525	mJ
Avalanche current		I_{AR}	55	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	$^\circ\text{C}$

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

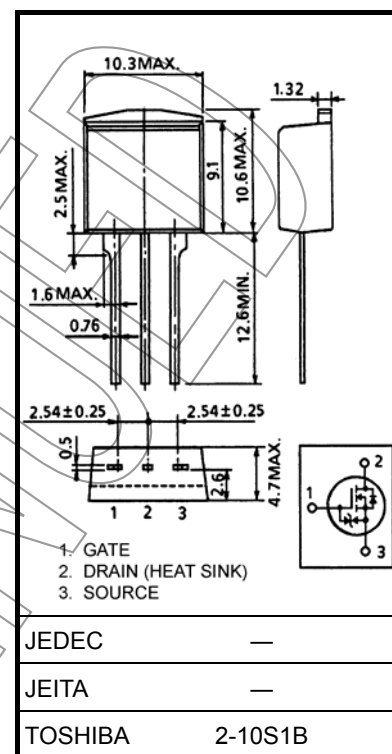
Characteristics	Symbol	Max	Unit
Thermal resistance, channel to case	$R_{th(ch-c)}$	1.25	$^\circ\text{C} / \text{W}$
Thermal resistance, channel to ambient	$R_{th(ch-a)}$	83.3	$^\circ\text{C} / \text{W}$

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

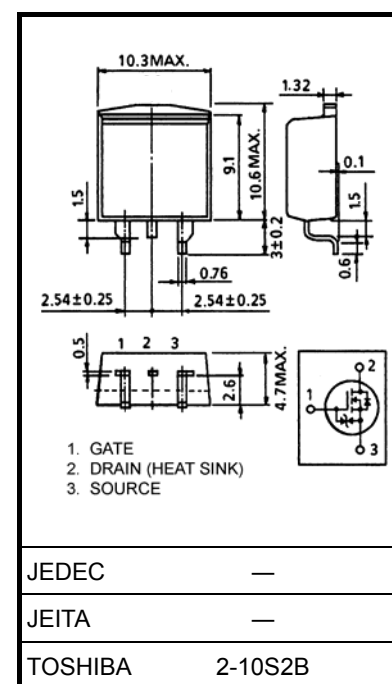
Note 2: $V_{DD} = 25 \text{ V}$, $T_{ch} = 25^\circ\text{C}$ (initial), $L = 236 \text{ }\mu\text{H}$, $I_{AR} = 55 \text{ A}$, $R_G = 25 \text{ }\Omega$

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

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

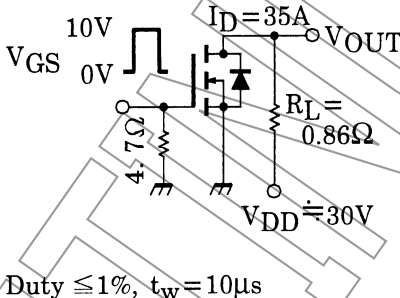


Weight: 1.5 g (typ.)



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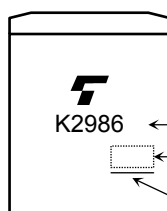
Electrical Characteristics (Ta = 25°C)

Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Gate leakage current		I _{GSS}	V _{GS} = ±16 V, V _{DS} = 0 V	—	—	±10	μA
Drain cut-off current		I _{DSS}	V _{DS} = 60 V, V _{GS} = 0 V	—	—	100	μA
Drain-source breakdown voltage		V (BR) DSS	I _D = 10 mA, V _{GS} = 0 V	60	—	—	V
		V (BR) DSX	I _D = 10 mA, V _{GS} = -20 V	40	—	—	
Gate threshold voltage		V _{th}	V _{DS} = 10 V, I _D = 1 mA	1.3	—	2.5	V
Drain-source ON resistance		R _{DS (ON)}	V _{GS} = 10 V, I _D = 35 A	—	4.5	5.8	mΩ
			V _{GS} = 4 V, I _D = 35 A	—	5.8	10	
Forward transfer admittance		Y _{fs}	V _{DS} = 10 V, I _D = 35 A	40	80	—	S
Input capacitance		C _{iss}	V _{DS} = 10 V, V _{GS} = 0 V, f = 1 MHz	—	9300	—	pF
Reverse transfer capacitance		C _{rss}		—	910	—	
Output capacitance		C _{oss}		—	1435	—	
Switching time	Rise time	t _r		—	18	—	ns
	Turn-on time	t _{on}		—	50	—	
	Fall time	t _f		—	110	—	
	Turn-off time	t _{off}		—	480	—	
Total gate charge (gate-source plus gate-drain)		Q _g	V _{DD} = 48 V, V _{GS} = 10 V, I _D = 55 A	—	210	—	nC
Gate-source charge		Q _{gs}		—	145	—	
Gate-drain ("miller") Charge		Q _{gd}		—	65	—	

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

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Continuous drain reverse current (Note 1)	I _{DR}	—	—	—	55	A
Pulse drain reverse current (Note 1)	I _{DRP}	t ≤ 10 s	—	—	70	A
		t ≤ 1 ms	—	—	280	
Forward voltage (diode)	V _{DSF}	I _{DR} = 55 A, V _{GS} = 0 V	—	—	-1.5	V
Reverse recovery time	t _{rr}	I _{DR} = 55 A, V _{GS} = 0 V, dI _{DR} / dt = 50 A / μs	—	60	—	ns
Reverse recovery charge	Q _{rr}		—	50	—	nC

Marking



K2986 ← Part No. (or abbreviation code)

← Lot No.

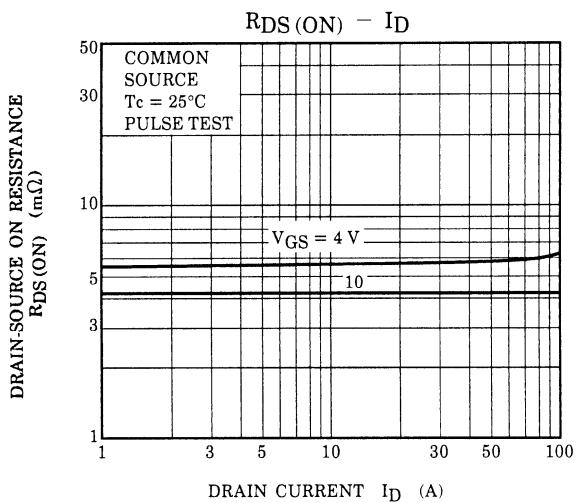
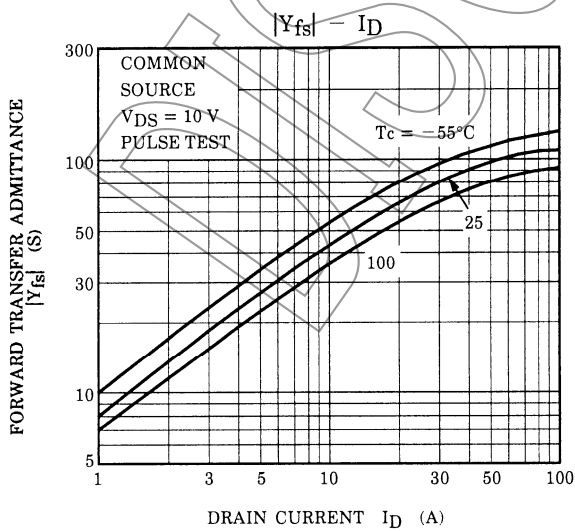
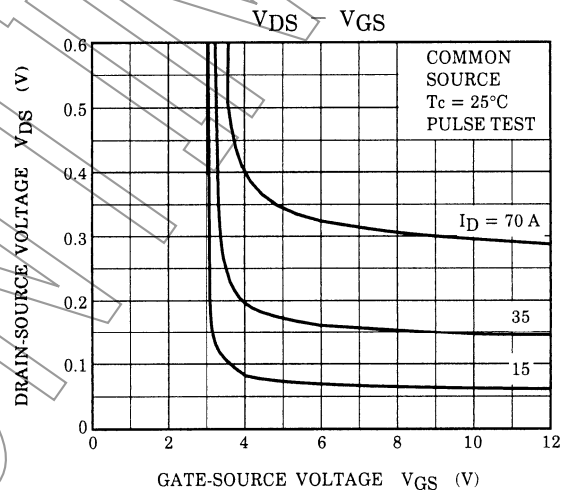
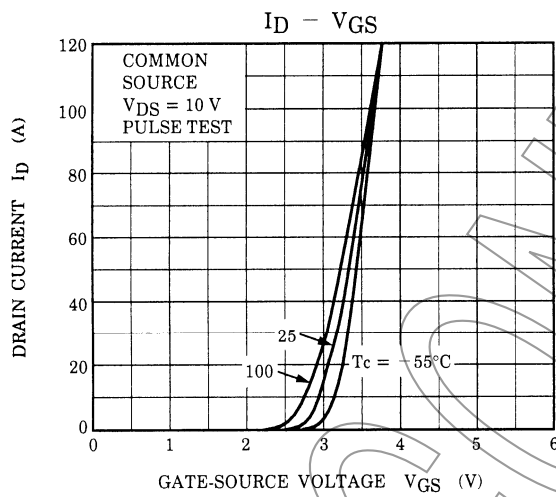
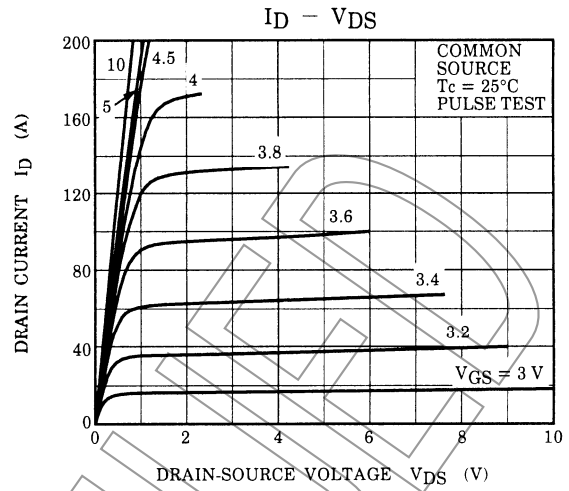
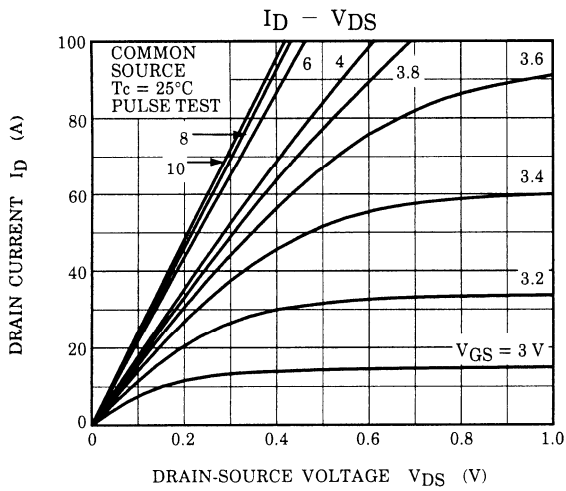
← Note 4

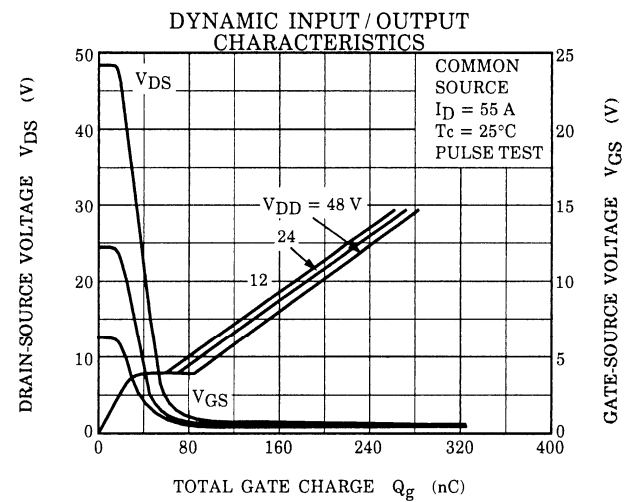
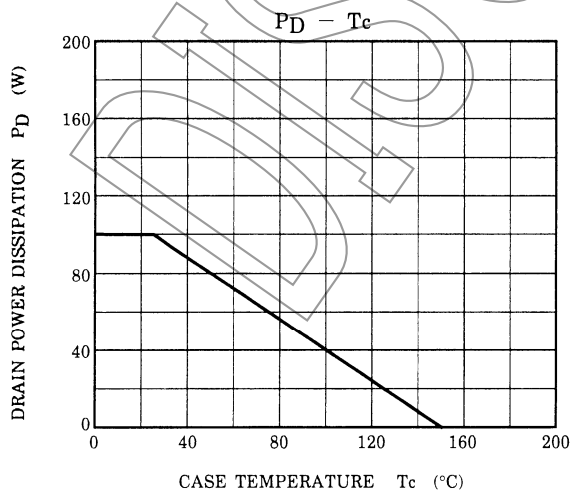
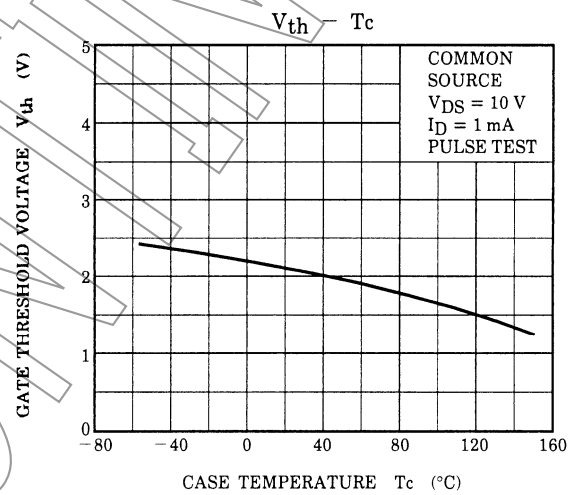
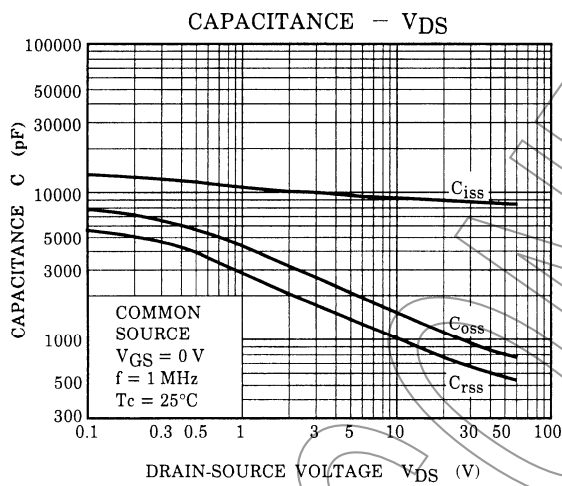
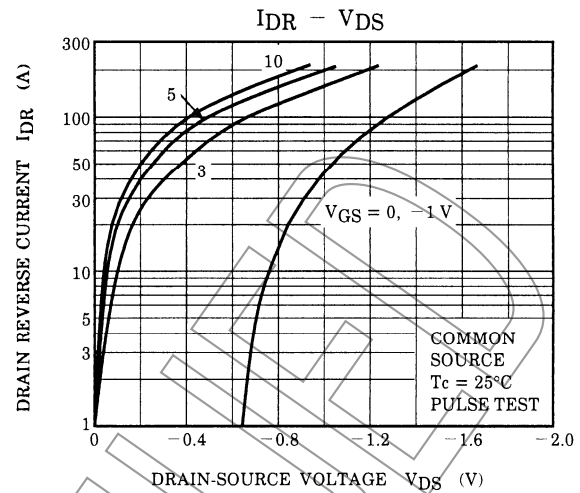
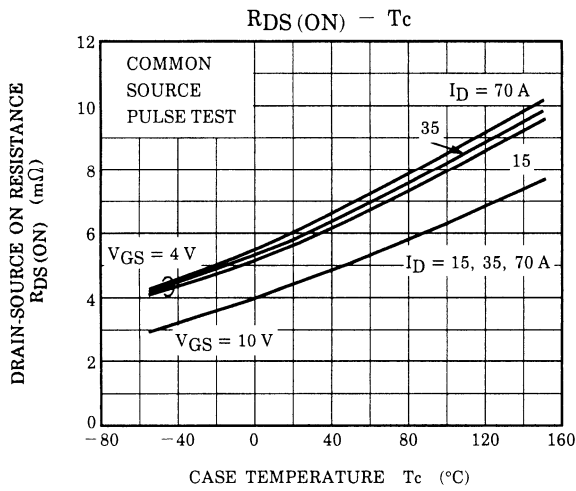
Note 4: A line under a Lot No. identifies the indication of product Labels.

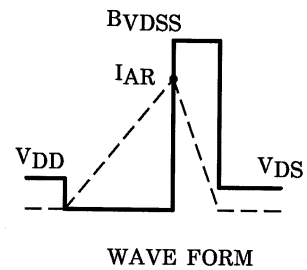
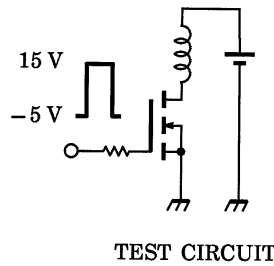
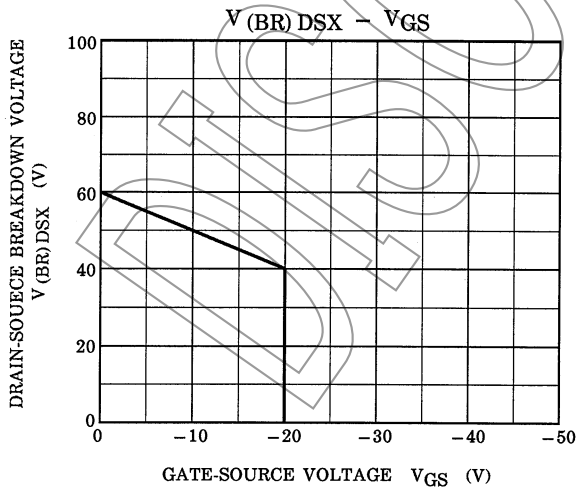
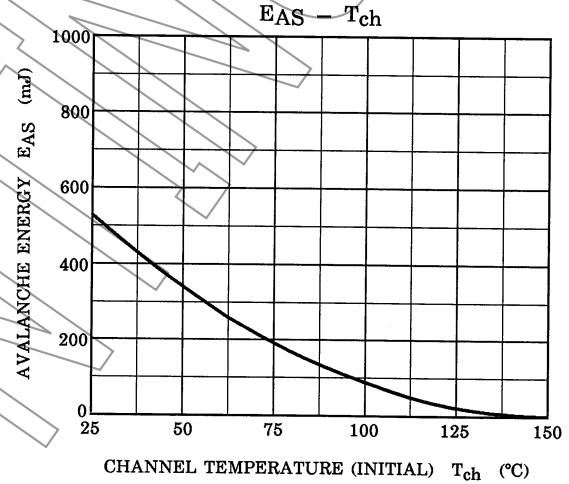
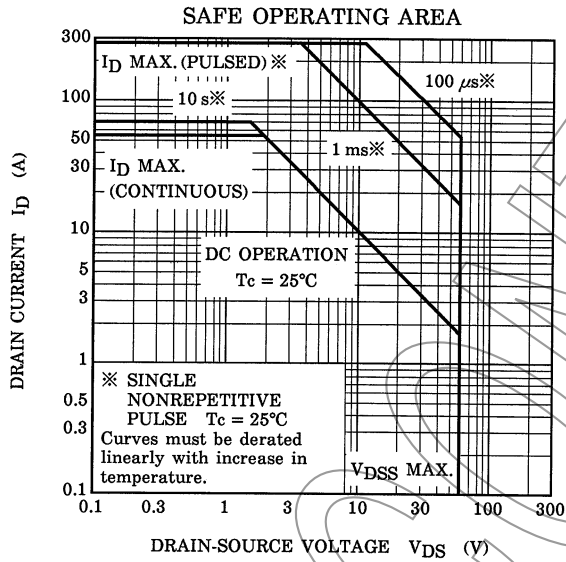
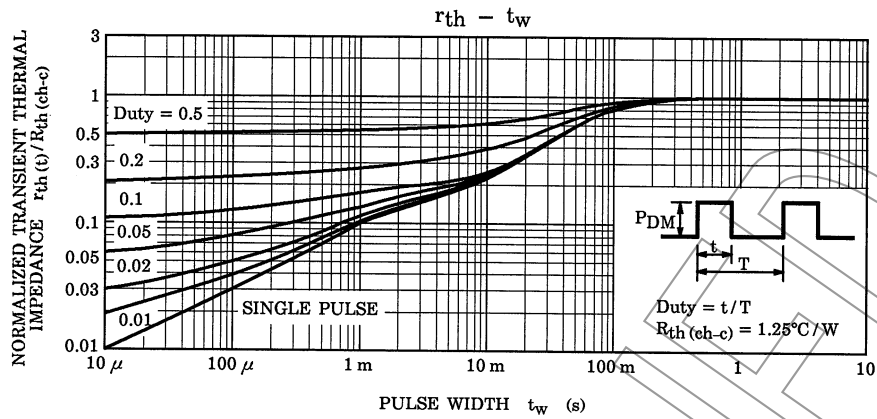
Not underlined: [[Pb]]/INCLUDES > MCV

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

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$$R_G = 25 \, \Omega$$

$$V_{DD} = 25 \, \text{V}, L = 236 \, \mu\text{H}$$

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

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