

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

2SK3700

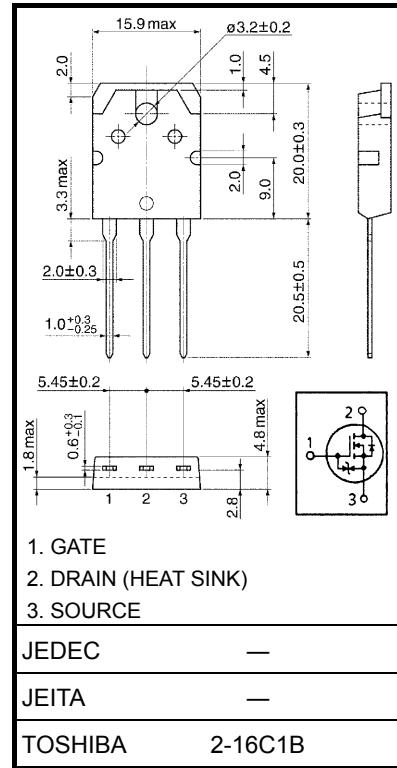
Switching Regulator Applications

Unit: mm

- Low drain-source ON-resistance: $R_{DS(ON)} = 2.0 \Omega$ (typ.)
- High forward transfer admittance: $|Y_{fs}| = 4.5 \text{ S}$ (typ.)
- Low leakage current: $I_{DSS} = 100 \mu\text{A}$ (max) ($V_{DS} = 720 \text{ V}$)
- Enhancement model: $V_{th} = 2.0$ to 4.0 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}	900	V
Drain-gate voltage ($R_{GS} = 20 \text{ k}\Omega$)	V_{DGR}	900	V
Gate-source voltage	V_{GSS}	± 30	V
Drain current	DC (Note 1) I_D	5	A
	Pulse (Note 1) I_{DP}	15	
Drain power dissipation ($T_c=25^\circ\text{C}$)	P_D	150	W
Single pulse avalanche energy (Note 2)	E_{AS}	351	mJ
Avalanche current	I_{AR}	5	A
Repetitive avalanche energy (Note 3)	E_{AR}	15	mJ
Channel temperature	T_{ch}	150	$^\circ\text{C}$
Storage temperature range	T_{stg}	-55 to 150	$^\circ\text{C}$



1. GATE
2. DRAIN (HEAT SINK)
3. SOURCE

JEDEC —
JEITA —
TOSHIBA 2-16C1B

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	$R_{th}(\text{ch-c})$	0.833	$^\circ\text{C/W}$
Thermal resistance, channel to ambient	$R_{th}(\text{ch-a})$	50	$^\circ\text{C/W}$

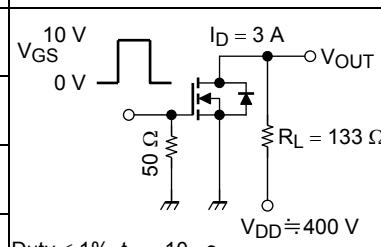
Note 1: Ensure that the temperature does not exceed 150°C .Note 2: $V_{DD} = 90 \text{ V}$, $T_{ch} = 25^\circ\text{C}$ (initial), $L = 25.7 \text{ mH}$, $R_G = 25 \Omega$, $I_{AR} = 5 \text{ A}$

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

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

Start of commercial production
2002-06

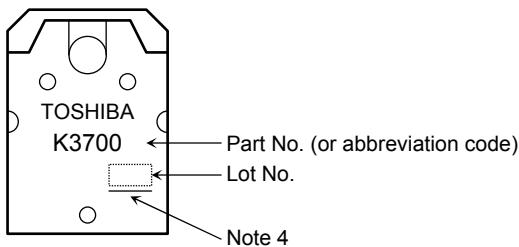
Electrical Characteristics ($T_a = 25^\circ C$)

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit	
Gate leakage current	I_{GSS}	$V_{GS} = \pm 25 V, V_{DS} = 0 V$	—	—	± 10	μA	
Gate-source breakdown voltage	$V_{(BR) GSS}$	$I_G = \pm 10 \mu A, V_{DS} = 0 V$	± 30	—	—	V	
Drain cut-OFF current	I_{DSS}	$V_{DS} = 720 V, V_{GS} = 0 V$	—	—	100	μA	
Drain-source breakdown voltage	$V_{(BR) DSS}$	$I_G = 10 mA, V_{GS} = 0 V$	900	—	—	V	
Gate threshold voltage	V_{th}	$V_{DS} = 10 V, I_D = 1 mA$	2.0	—	4.0	V	
Drain-source ON resistance	$R_{DS} (\text{ON})$	$V_{GS} = 10 V, I_D = 3 A$	—	2.0	2.5	Ω	
Forward transfer admittance	$ Y_{fs} $	$V_{DS} = 20 V, I_D = 3 A$	2.0	4.5	—	S	
Input capacitance	C_{iss}	$V_{DS} = 25 V, V_{GS} = 0 V, f = 1 \text{ MHz}$	—	1150	—	pF	
Reverse transfer capacitance	C_{rss}		—	20	—		
Output capacitance	C_{oss}		—	100	—		
Switching time	Rise time	t_r	 Duty $\leq 1\%$, $t_w = 10 \mu s$	—	30	—	ns
	Turn-ON time	t_{on}		—	70	—	
	Fall time	t_f		—	60	—	
	Turn-OFF time	t_{off}		—	170	—	
Total gate charge (gate-source plus gate-drain)	Q_g	$V_{DD} \approx 400 V, V_{GS} = 10 V, I_D = 5 A$	—	28	—	nC	
Gate-source charge	Q_{gs}		—	17	—		
Gate-drain ("miller") charge	Q_{gd}		—	11	—		

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}	$I_{DR} = 5 A, V_{GS} = 0 V$	—	—	-1.7	V
Reverse recovery time	t_{rr}	$I_{DR} = 5 A, V_{GS} = 0 V,$ $dI_{DR}/dt = 100 A/\mu s$	—	900	—	ns
Reverse recovery charge	Q_{rr}	$I_{DR} = 5 A, V_{GS} = 0 V,$ $dI_{DR}/dt = 100 A/\mu s$	—	5.4	—	μC

Marking

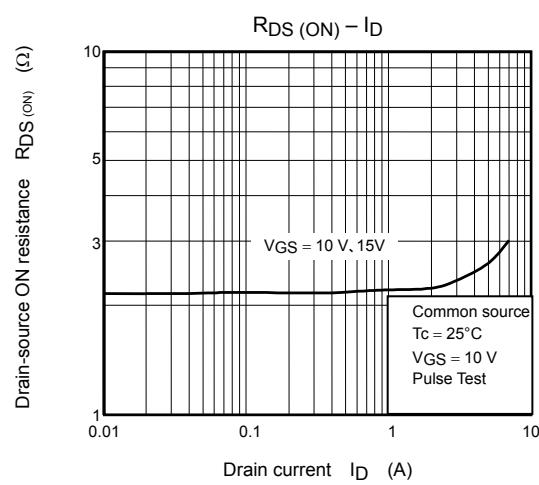
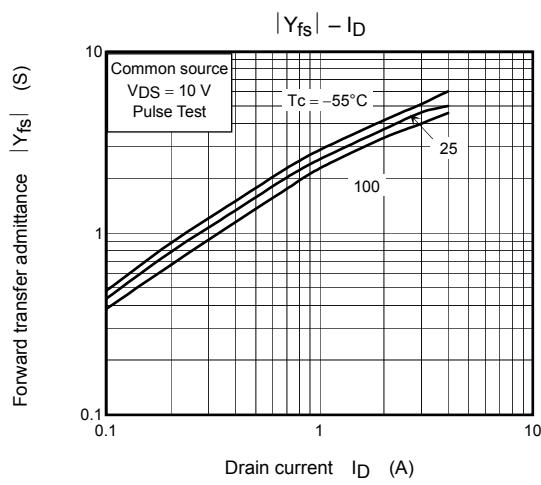
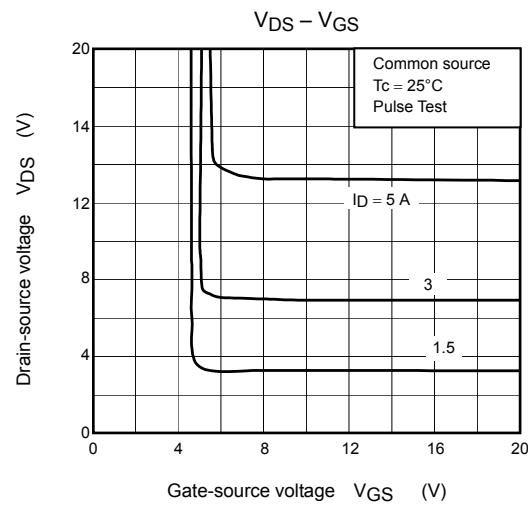
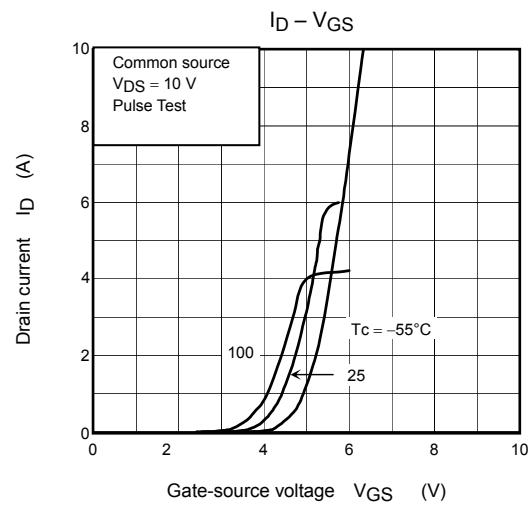
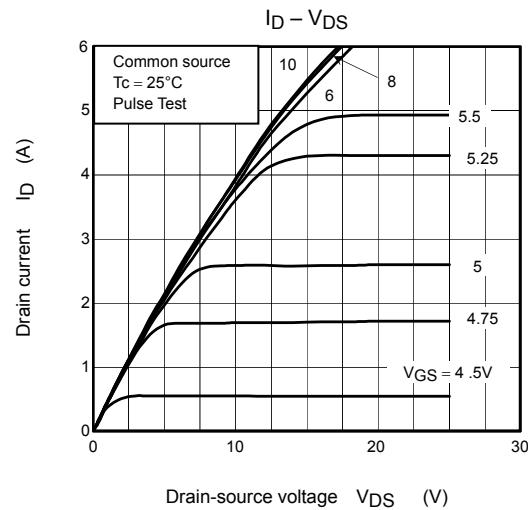
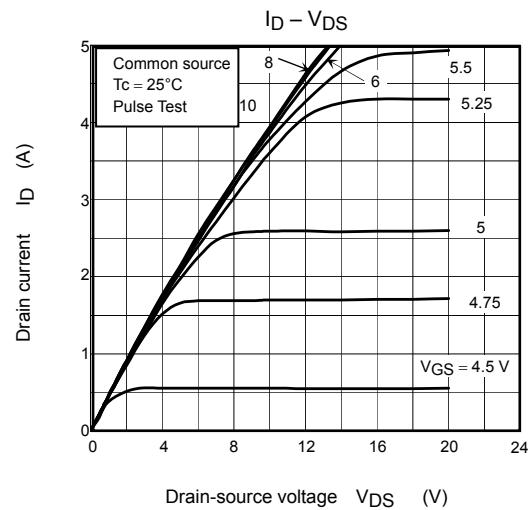


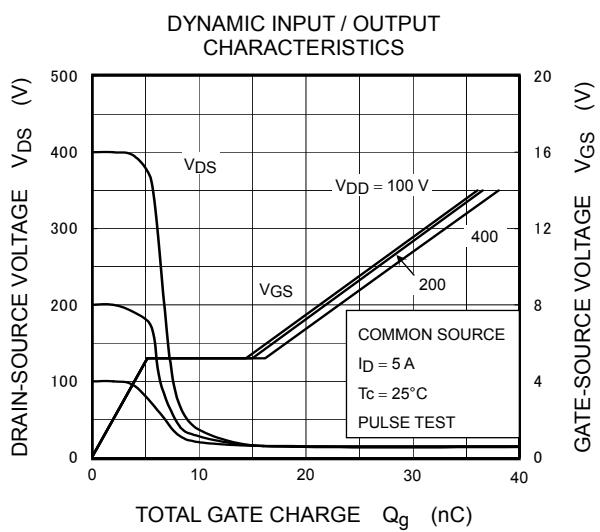
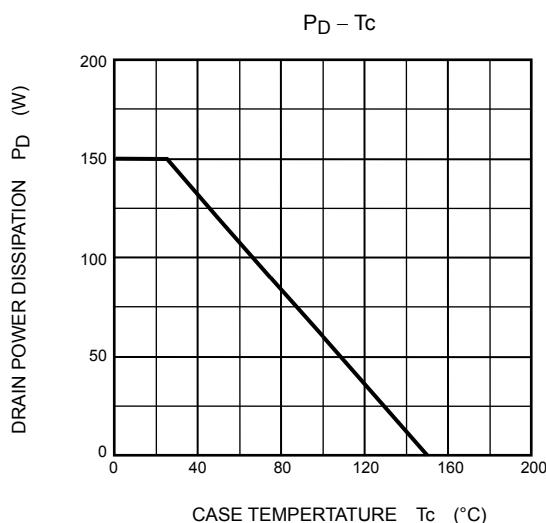
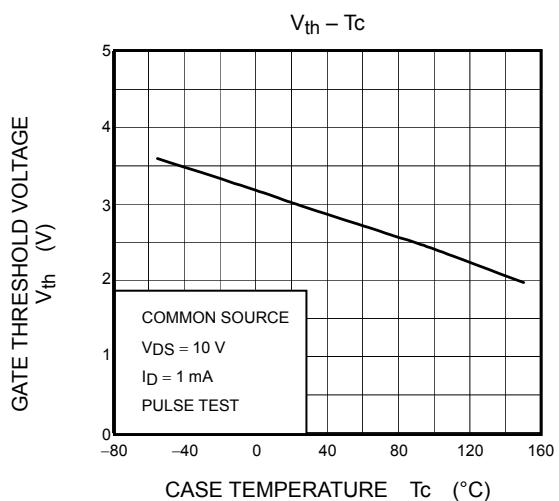
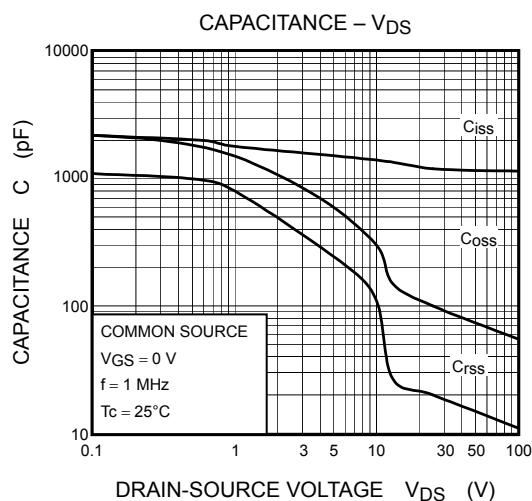
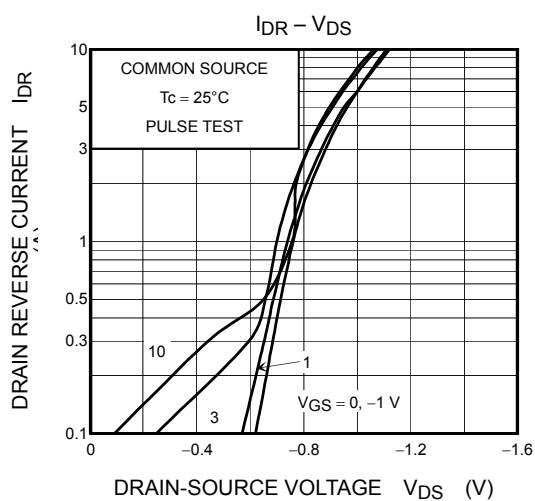
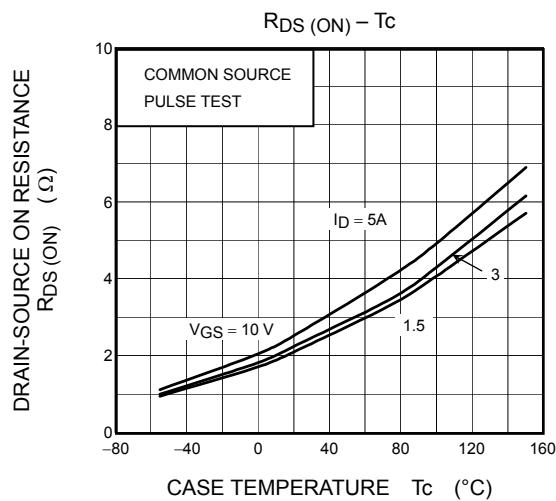
Note 4: A line under a Lot No. identifies the indication of product Labels.

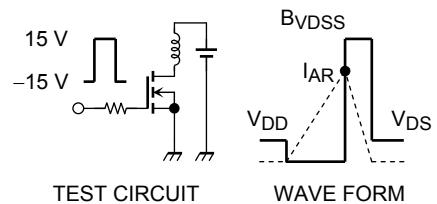
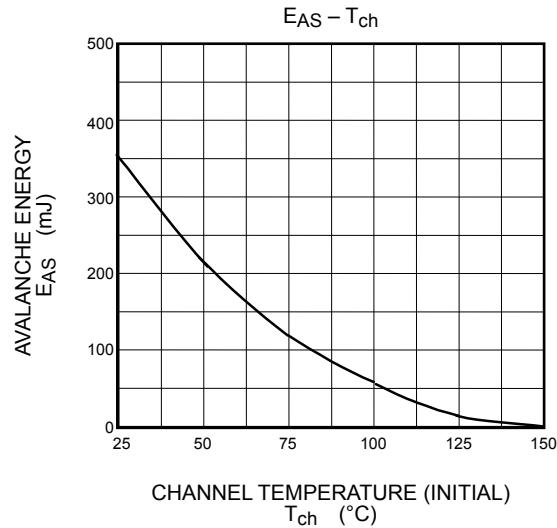
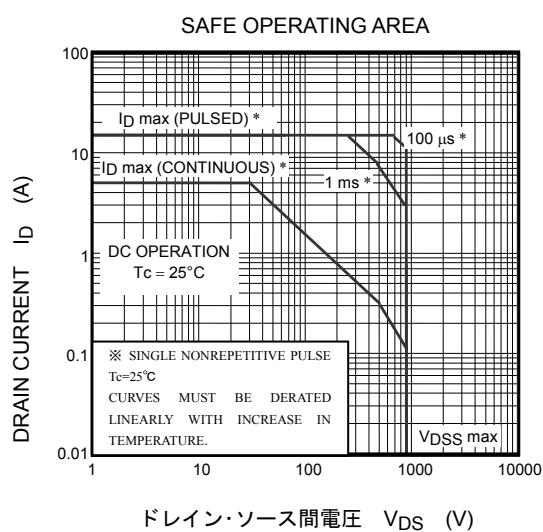
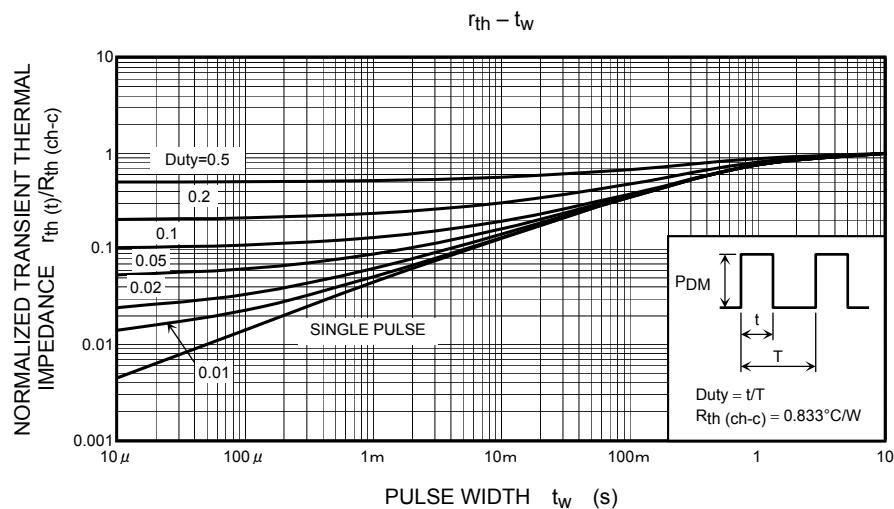
Not underlined: [[Pb]]/INCLUDES > MCV

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

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$$R_G = 25 \Omega$$

$$V_{DD} = 90 \text{ V}, L = 25.7 \text{ mH}$$

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

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