

TOSHIBA Field Effect Transistor Silicon N Channel MOS Type ( $\pi$ -MOSIV)

## 2SK3700

## Switching Regulator Applications

- Low drain-source ON-resistance:  $R_{DS(ON)} = 2.0\ \Omega$  (typ.)
- High forward transfer admittance:  $|Y_{fs}| = 4.5\ S$  (typ.)
- Low leakage current:  $I_{DSS} = 100\ \mu A$  (max) ( $V_{DS} = 720\ V$ )
- Enhancement model:  $V_{th} = 2.0$  to  $4.0\ V$  ( $V_{DS} = 10\ V$ ,  $I_D = 1\ mA$ )

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

Characteristics		Symbol	Rating	Unit
Drain-source voltage		$V_{DSS}$	900	V
Drain-gate voltage ( $R_{GS} = 20\ k\Omega$ )		$V_{DGR}$	900	V
Gate-source voltage		$V_{GSS}$	$\pm 30$	V
Drain current	DC (Note 1)	$I_D$	5	A
	Pulse (Note 1)	$I_{DP}$	15	
Drain power dissipation ( $T_c = 25^\circ C$ )		$P_D$	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	$^\circ C$
Storage temperature range		$T_{stg}$	-55 to 150	$^\circ C$

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

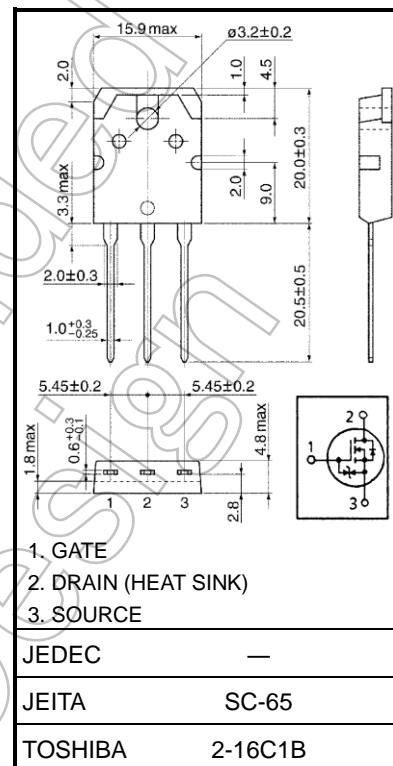
Note 1: Ensure that the temperature does not exceed  $150^\circ C$ .

Note 2:  $V_{DD} = 90\ V$ ,  $T_{ch} = 25^\circ C$  (initial),  $L = 25.7\ mH$ ,  $R_G = 25\ \Omega$ ,  $I_{AR} = 5\ A$

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

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

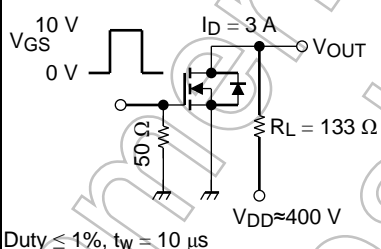
Unit: mm



Weight: 4.6 g (typ.)

Start of commercial production  
2002-06

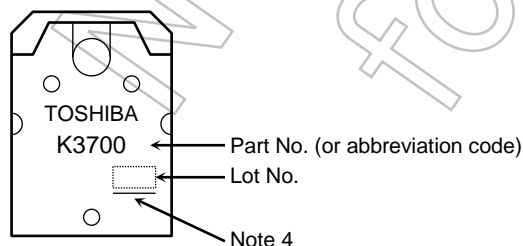
## Electrical Characteristics (Ta = 25°C)

Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Gate leakage current		IGSS	VGS = ±25 V, VDS = 0 V	—	—	±10	μA
Gate-source breakdown voltage		V (BR) GSS	IG = ±10 μA, VDS = 0 V	±30	—	—	V
Drain cut-OFF current		IDSS	VDS = 720 V, VGS = 0 V	—	—	100	μA
Drain-source breakdown voltage		V (BR) DSS	IG = 10 mA, VGS = 0 V	900	—	—	V
Gate threshold voltage		Vth	VDS = 10 V, ID = 1 mA	2.0	—	4.0	V
Drain-source ON resistance		RDS (ON)	VGS = 10 V, ID = 3 A	—	2.0	2.5	Ω
Forward transfer admittance		Yfs	VDS = 20 V, ID = 3 A	2.0	4.5	—	S
Input capacitance		Ciss	VDS = 25 V, VGS = 0 V, f = 1 MHz	—	1150	—	pF
Reverse transfer capacitance		Crss		—	20	—	
Output capacitance		Coss		—	100	—	
Switching time	Rise time	tr		—	30	—	ns
	Turn-ON time	ton		—	70	—	
	Fall time	tf		—	60	—	
	Turn-OFF time	toff		—	170	—	
Total gate charge (gate-source plus gate-drain)		Qg	VDD = 400 V, VGS = 10 V, ID = 5 A	—	28	—	nC
Gate-source charge		Qgs		—	17	—	
Gate-drain ("miller") charge		Qgd		—	11	—	

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

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Continuous drain reverse current (Note 1)	IDR	—	—	—	5	A
Pulse drain reverse current (Note 1)	IDRP	—	—	—	15	A
Forward voltage (diode)	VDSF	IDR = 5 A, VGS = 0 V	—	—	−1.7	V
Reverse recovery time	trr	IDR = 5 A, VGS = 0 V,	—	900	—	ns
Reverse recovery charge	Qrr	dIDR/dt = 100 A/μs	—	5.4	—	μC

## Marking

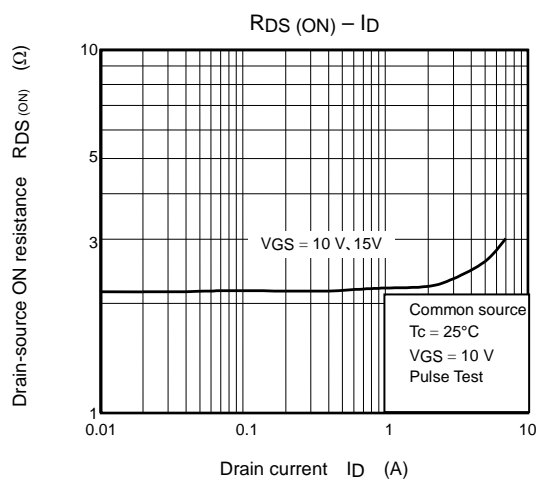
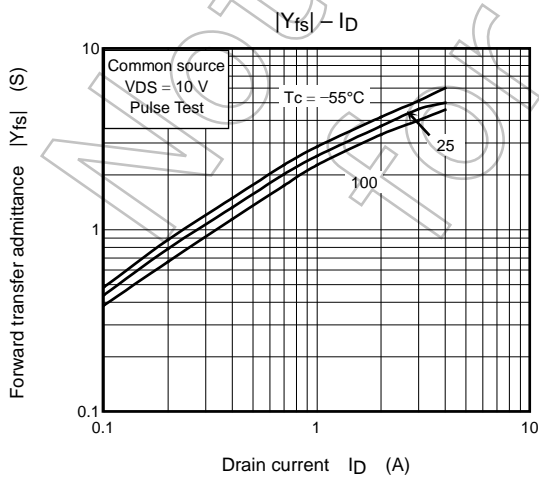
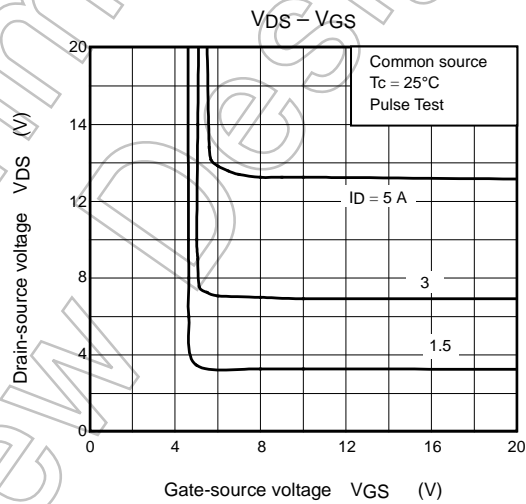
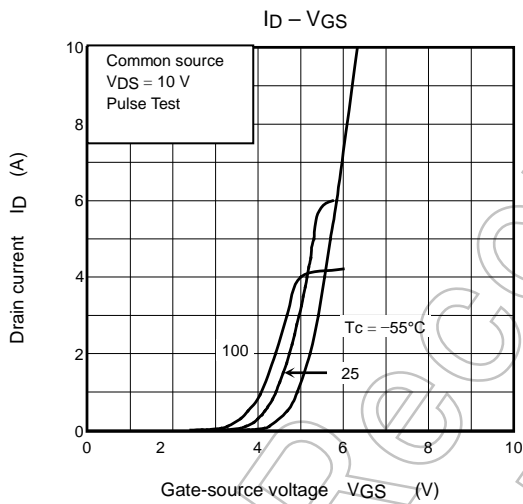
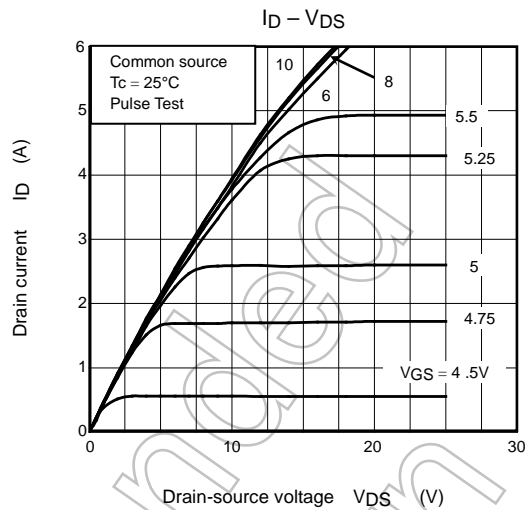
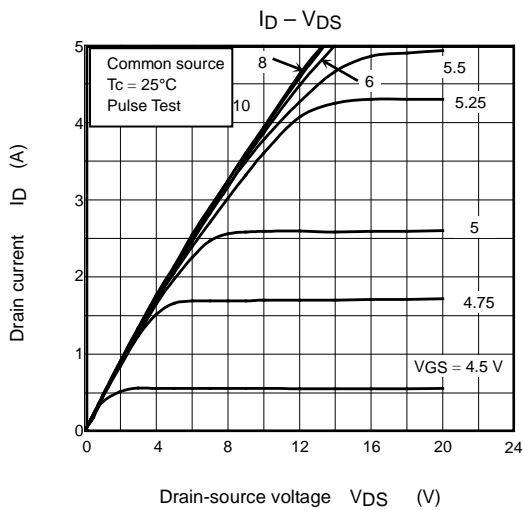


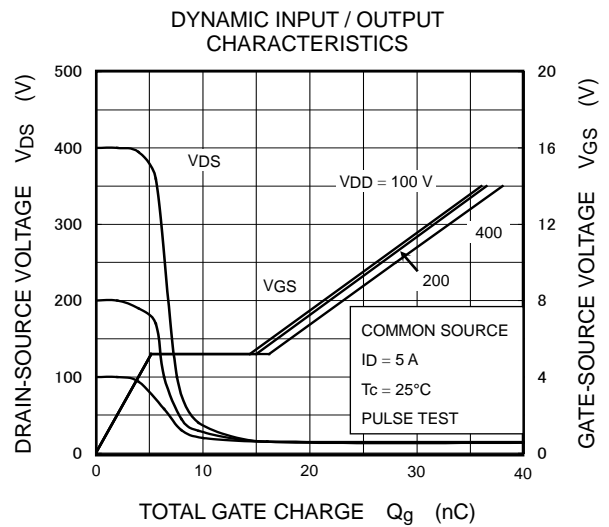
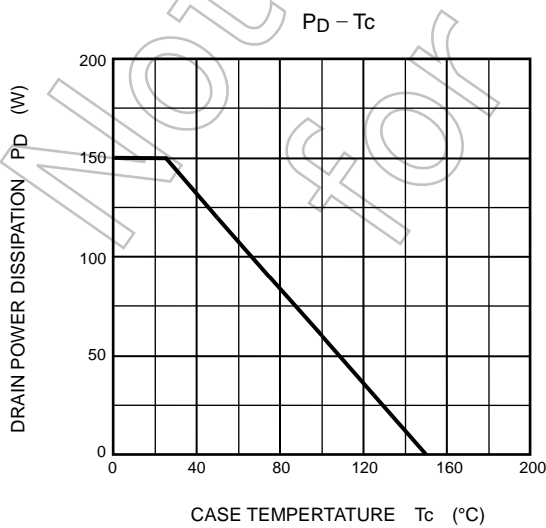
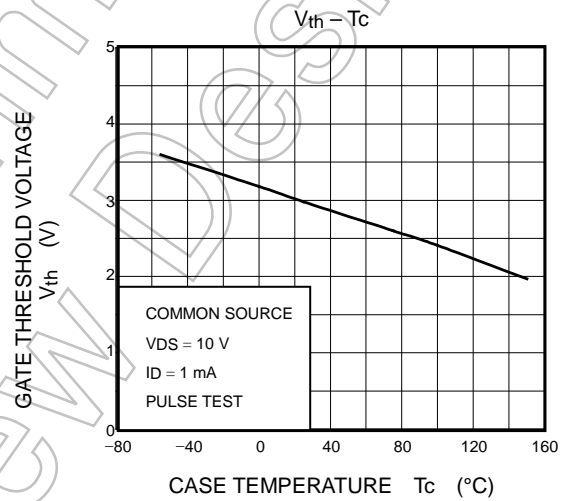
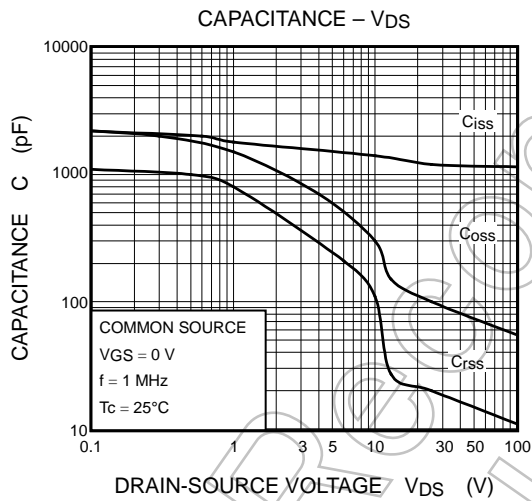
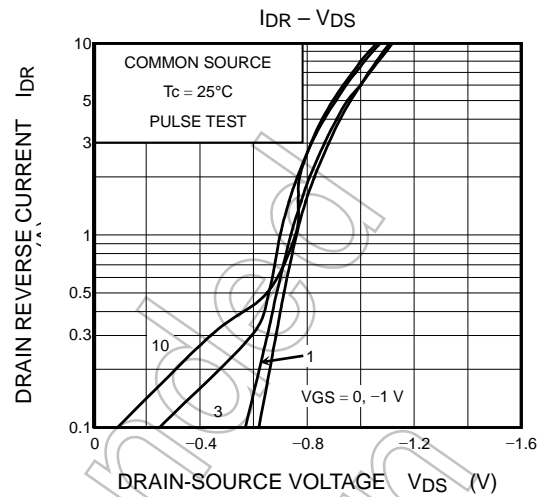
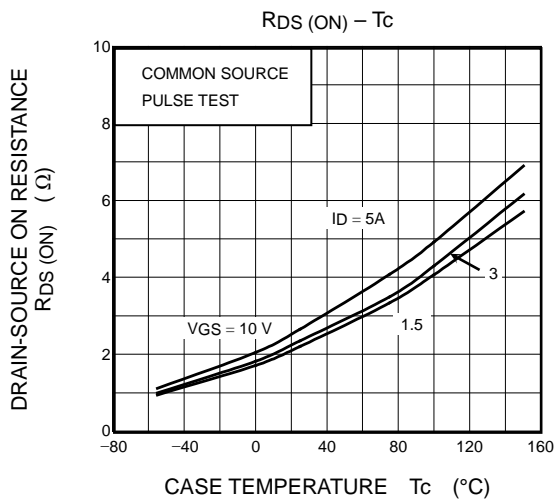
Note 4: A line under a Lot No. identifies the indication of product Labels.

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

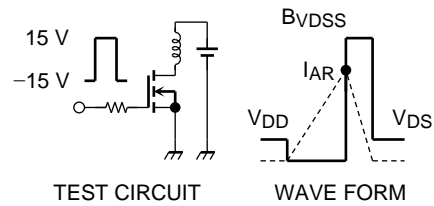
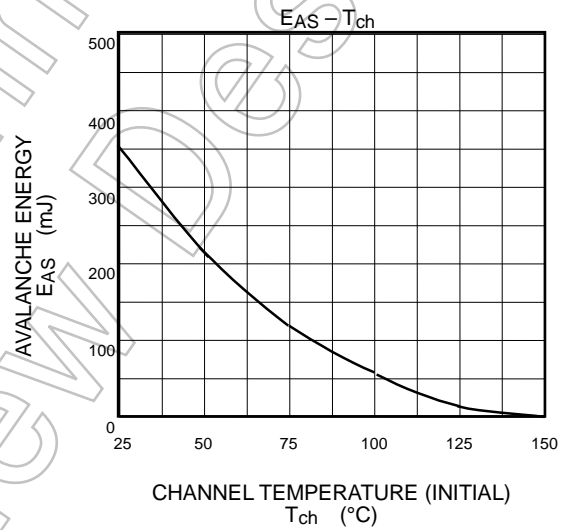
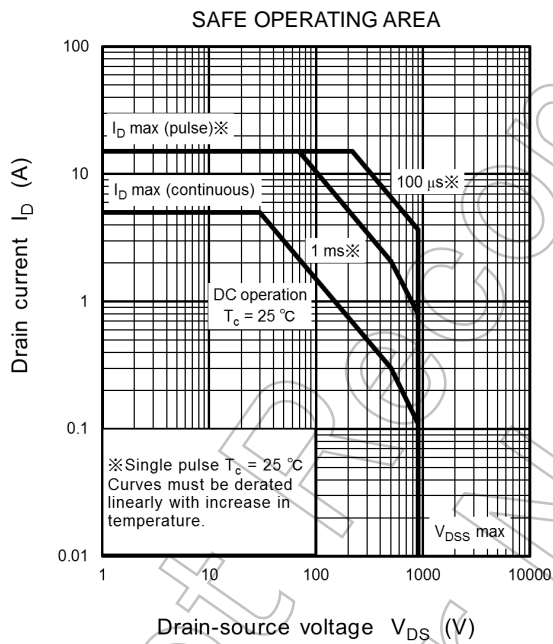
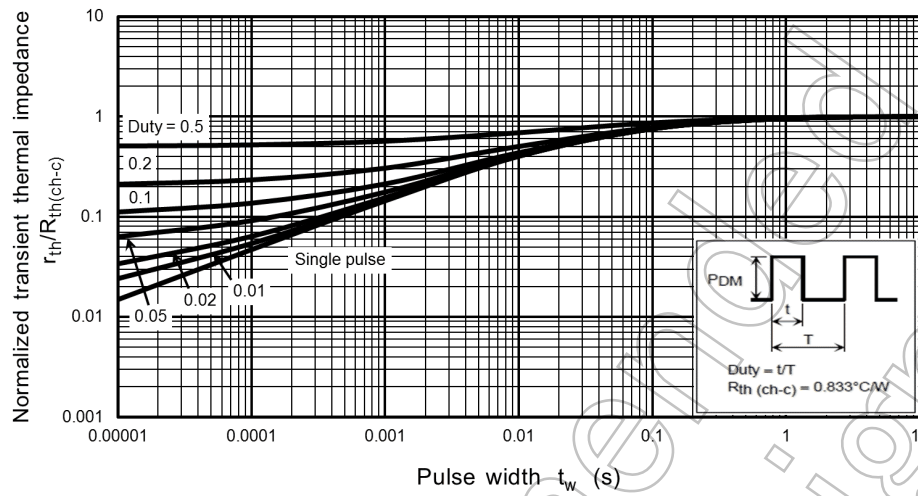
Underlined: [[G]]/RoHS COMPATIBLE or [[G]]/RoHS [[Pb]]

Please contact your TOSHIBA sales representative for details as to environmental matters such as the RoHS compatibility of Product. The RoHS is the Directive 2011/65/EU of the European Parliament and of the Council of 8 June 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment.





$r_{th} - t_w$



$$R_G = 25 \Omega, V_{DD} = 90 \text{ V}, L = 25.7 \text{ mH}$$

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

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