

TOSHIBA FIELD EFFECT TRANSISTOR SILICON N CHANNEL MOS TYPE (U-MOS II)

# 2SK2987

**HIGH CURRENT SWITCHING APPLICATIONS**

DC-DC CONVERTER, RELAY DRIVE AND MOTOR DRIVE APPLICATIONS

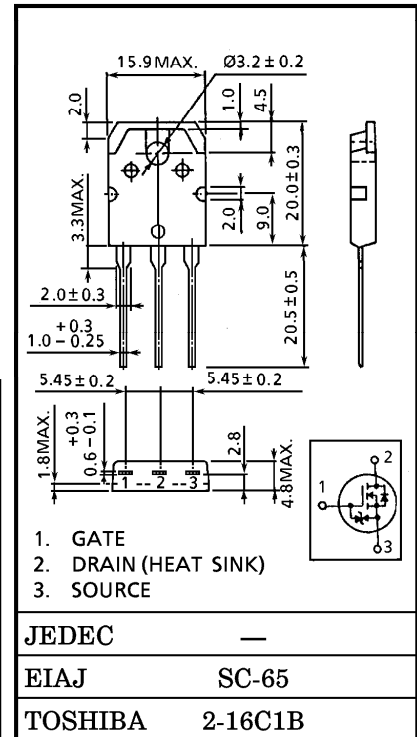
**INDUSTRIAL APPLICATIONS**

Unit in mm

- Low Drain-Source ON Resistance :  $R_{DS(ON)} = 4.5m\Omega$  (Typ.)
- High Forward Transfer Admittance :  $|Y_{fs}| = 80S$  (Typ.)
- Low Leakage Current :  $I_{DSS} = 100\mu A$  (Max.) ( $V_{DS} = 60V$ )
- Enhancement-Mode :  $V_{th} = 1.3 \sim 2.5V$  ( $V_{DS} = 10V, I_D = 1mA$ )

**MAXIMUM RATINGS (Ta = 25°C)**

CHARACTERISTIC		SYMBOL	RATING	UNIT
Drain-Source Voltage		$V_{DSS}$	60	V
Drain-Gate Voltage ( $R_{GS} = 20k\Omega$ )		$V_{DGR}$	60	V
Gate-Source Voltage		$V_{GSS}$	$\pm 20$	V
Drain Current	DC	$I_D$	70	A
	Pulse	$I_{DP}$	280	
Drain Power Dissipation ( $T_c = 25^\circ C$ )		$P_D$	150	W
Single Pulse Avalanche Energy**		$E_{AS}$	490	mJ
Avalanche Current		$I_{AR}$	70	A
Repetitive Avalanche Energy*		$E_{AR}$	15	mJ
Channel Temperature		$T_{ch}$	150	°C
Storage Temperature Range		$T_{stg}$	-55~150	°C



Weight 4.6g

**THERMAL CHARACTERISTICS**

CHARACTERISTIC	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 ;

\* Repetitive rating ; Pulse Width Limited by Max. junction temperature.

\*\*  $V_{DD} = 25V$ , Starting  $T_{ch} = 25^\circ C$ ,  $L = 136\mu H$ ,  $I_{AR} = 70A$ ,  $R_G = 25\Omega$

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

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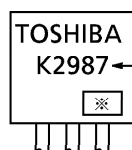
ELECTRICAL CHARACTERISTICS (Ta = 25°C)

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT	
Gate Leakage Current	$I_{GSS}$	$V_{GS} = \pm 16V, V_{DS} = 0V$	—	—	$\pm 10$	$\mu A$	
Drain Cut-off Current	$I_{DSS}$	$V_{DS} = 60V, V_{GS} = 0V$	—	—	100	$\mu A$	
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$I_D = 10mA, V_{GS} = 0V$	60	—	—	V	
	$V_{(BR)DSX}$	$I_D = 10mA, V_{GS} = -20V$	40	—	—		
Gate Threshold Voltage	$V_{th}$	$V_{DS} = 10V, I_D = 1mA$	1.3	—	2.5	V	
Drain-Source ON Resistance	$R_{DS(ON)}$	$V_{GS} = 10V, I_D = 35A$	—	4.5	5.8	m $\Omega$	
		$V_{GS} = 4V, I_D = 35A$	—	5.8	10		
Forward Transfer Admittance	$ Y_{fs} $	$V_{DS} = 10V, I_D = 35A$	40	80	—	S	
Input Capacitance	$C_{iss}$	$V_{DS} = 10V, V_{GS} = 0V, f = 1MHz$	—	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	$t_{off}$		$V_{IN} : t_r, t_f < 5ns$ $Duty \leq 1\%, t_w = 10\mu s$	—	480	
Total Gate Charge (Gate-Source Plus Gate-Drain)	$Q_g$	$V_{DD} \approx 48V, V_{GS} = 10V, I_D = 70A$	—	210	—	nC	
Gate-Source Charge	$Q_{gs}$		—	145	—		
Gate-Drain ("Miller") Charge	$Q_{gd}$		—	65	—		

SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS (Ta = 25°C)

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Continuous Drain Reverse Current	$I_{DR}$	—	—	—	70	A
Pulse Drain Reverse Current	$I_{DRP}$	—	—	—	280	A
Diode Forward Voltage	$V_{DSF}$	$I_{DR} = 70A, V_{GS} = 0V$	—	—	-1.5	V
Reverse Recovery Time	$t_{rr}$	$I_{DR} = 70A, V_{GS} = 0V$	—	60	—	ns
Reverse Recovery Charge	$Q_{rr}$	$dI_{DR} / dt = 50A / \mu s$	—	50	—	nC

MARKING

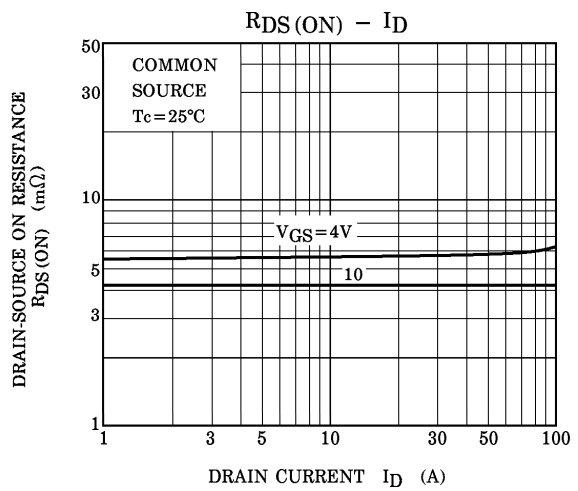
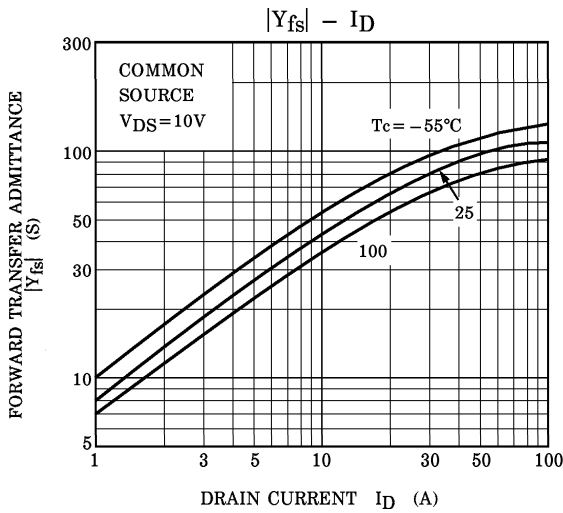
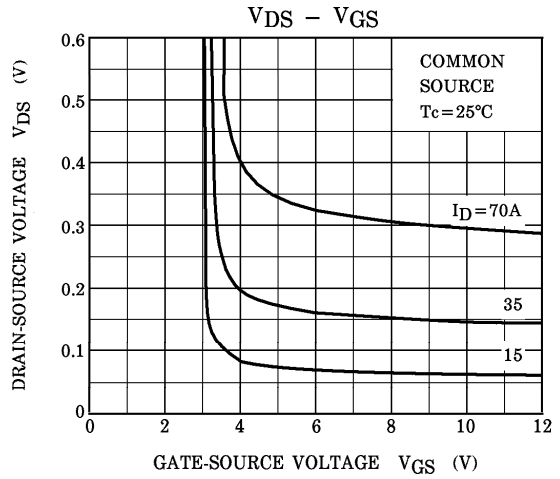
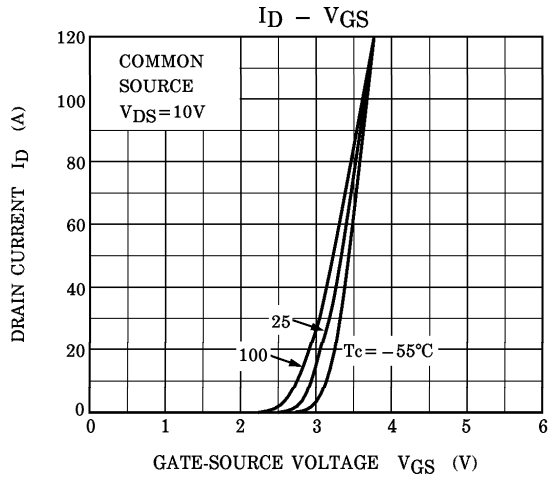
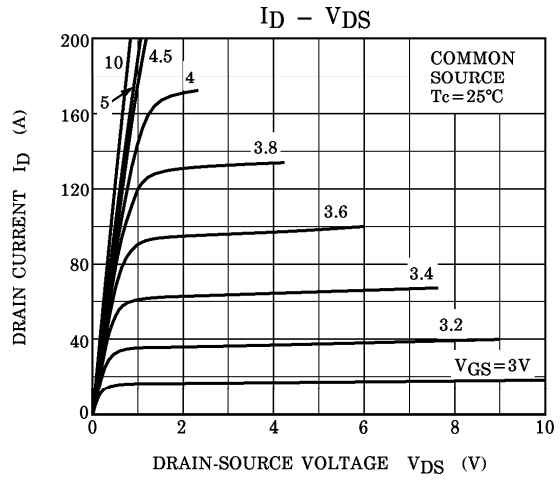
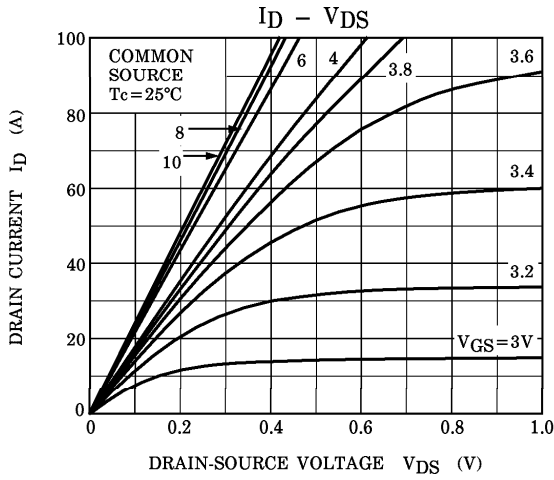


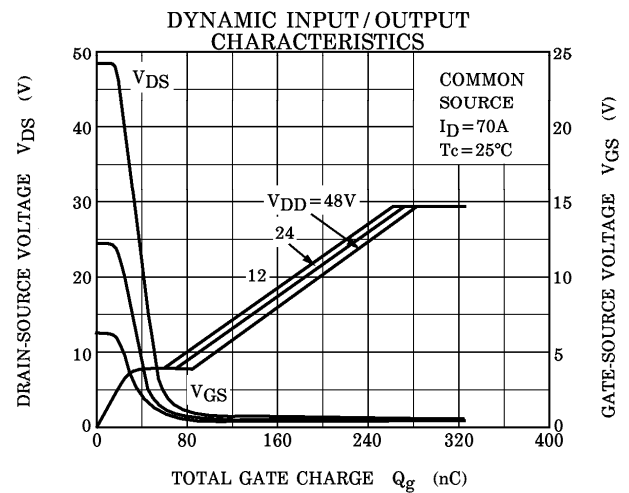
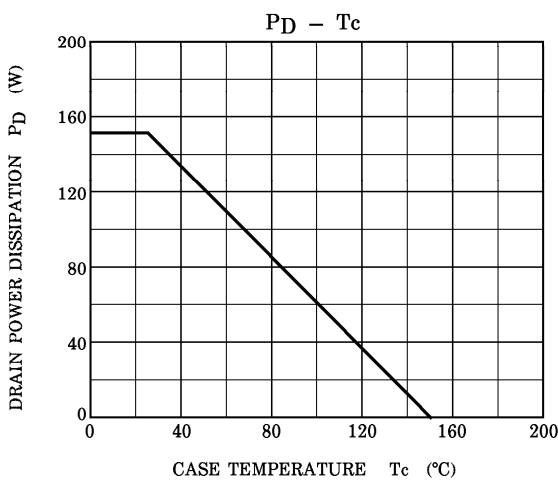
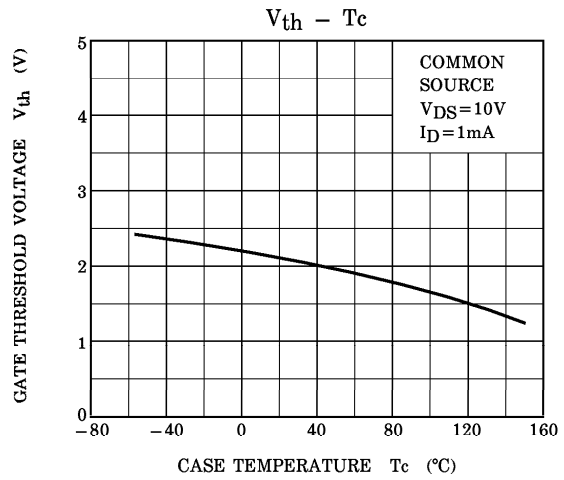
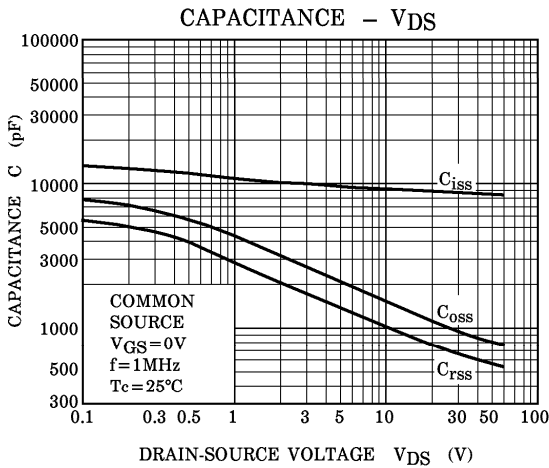
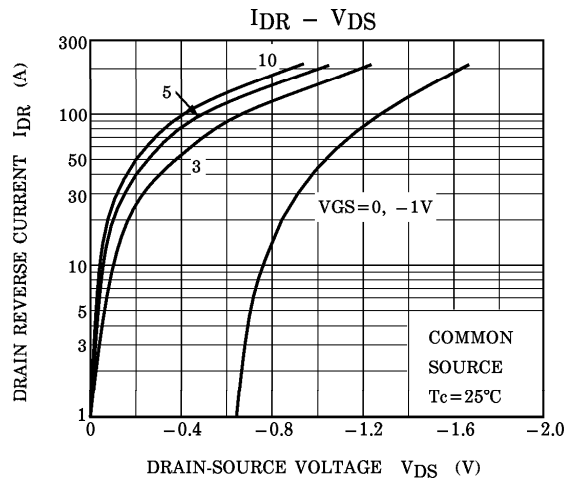
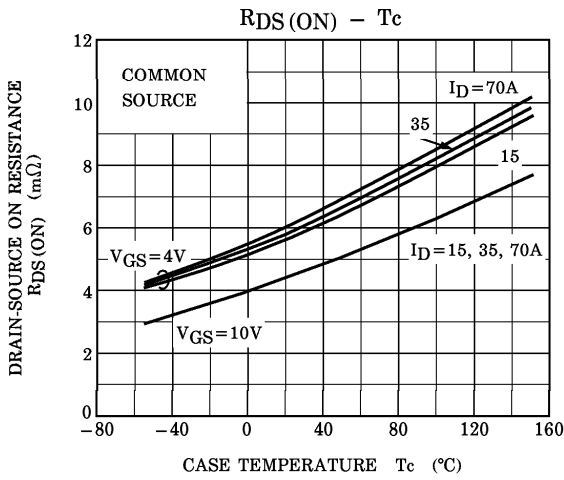
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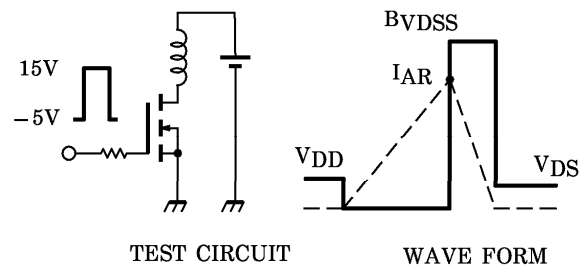
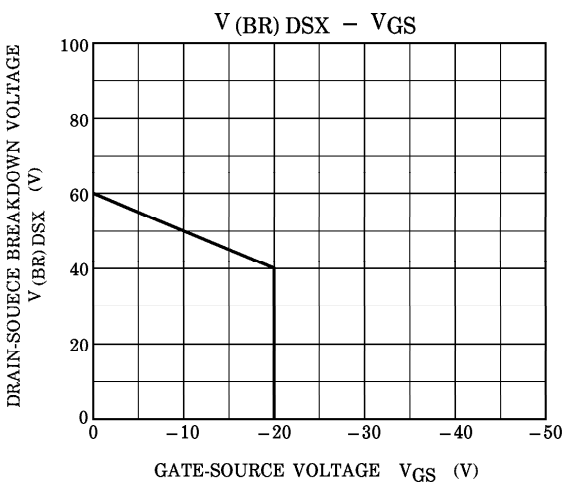
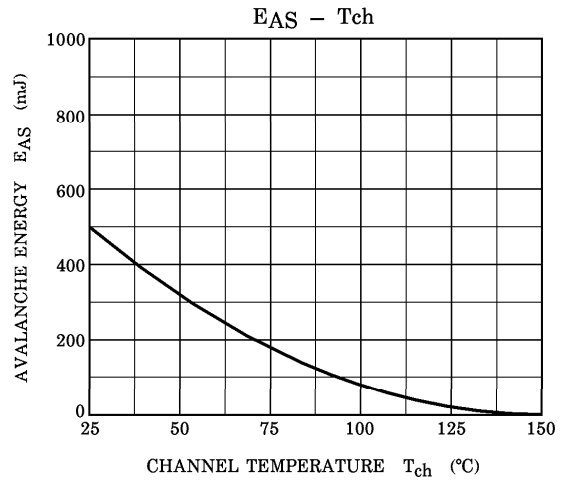
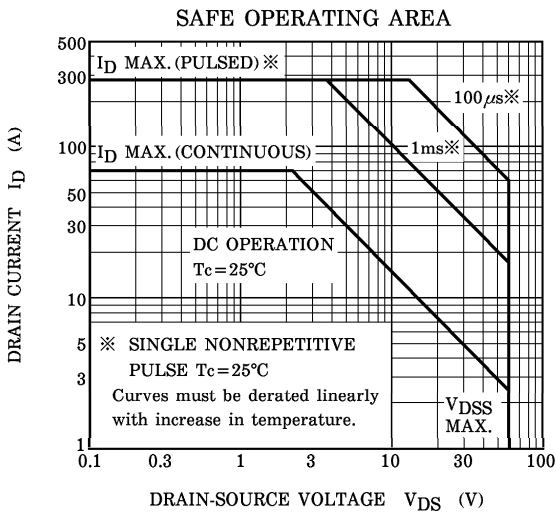
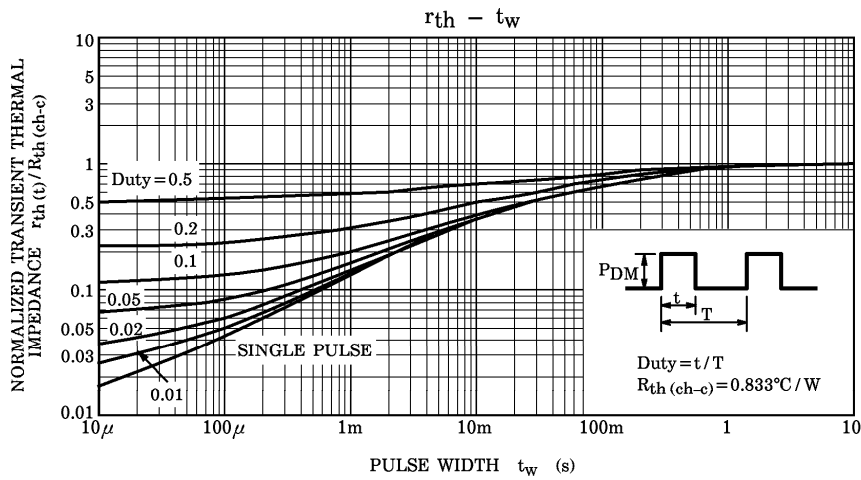
※ Lot Number

□ □ — Month (Starting from Alphabet A)

— Year (Last Number of the Christian Era)







Peak  $I_{AR} = 70A$ ,  $R_G = 25\Omega$   
 $V_{DD} = 25V$ ,  $L = 136\mu H$

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