

TENTATIVE TOSHIBA FIELD EFFECT TRANSISTOR SILICON N CHANNEL MOS TYPE (L<sup>2</sup>-π-MOS V)

# 2SK2741

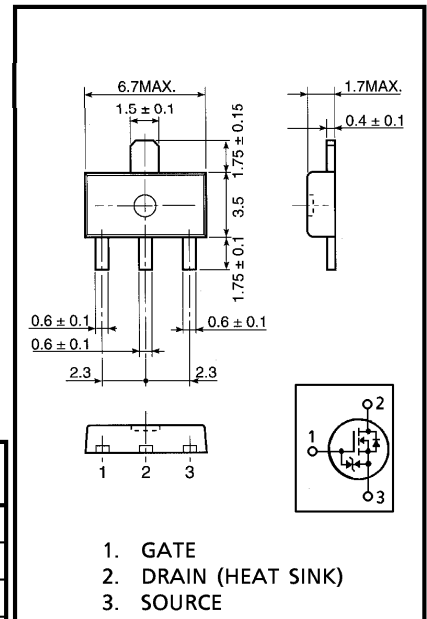
HIGH SPEED, HIGH CURRENT SWITCHING APPLICATIONS

INDUSTRIAL APPLICATIONS

CHOPPER REGULATOR, DC-DC CONVERTER AND MOTOR DRIVE APPLICATIONS

Unit in mm

- 4 V Gate Drive
- Low Drain-Source ON Resistance :  $R_{DS(ON)} = 0.12 \Omega$  (Typ.)
- High Forward Transfer Admittance :  $|Y_{fs}| = 5.0 S$  (Typ.)
- Low Leakage Current :  $I_{DSS} = 100 \mu A$  (Max.) ( $V_{DS} = 60 V$ )
- Enhancement-Mode :  $V_{th} = 0.8 \sim 2.0 V$  ( $V_{DS} = 10 V, I_D = 1 mA$ )



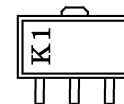
MAXIMUM RATINGS (Ta = 25°C)

CHARACTERISTIC	SYMBOL	RATING	UNIT
Drain-Source Voltage	$V_{DSS}$	60	V
Drain-Gate Voltage ( $R_{GS} = 20 k\Omega$ )	$V_{DGR}$	60	V
Gate-Source Voltage	$V_{GSS}$	±20	V
Drain Current	DC	$I_D$	5
	Pulse	$I_{DP}$	20
Drain Power Dissipation***	$P_D$	2.5	W
Single Pulse Avalanche Energy**	$E_{AS}$	129	mJ
Avalanche Current	$I_{AR}$	5	A
Repetitive Avalanche Energy*	$E_{AR}$	0.25	mJ
Channel Temperature	$T_{ch}$	150	°C
Storage Temperature Range	$T_{stg}$	-55~150	°C

JEDEC	—
EIAJ	—
TOSHIBA	2-7H1B

Weight : 0.12 g (Typ.)

MARKING



THERMAL CHARACTERISTICS

CHARACTERISTIC	SYMBOL	MAX.	UNIT
Thermal Resistance, Channel to Ambient	$R_{th(ch-a)}$	50	°C/W

Note ;

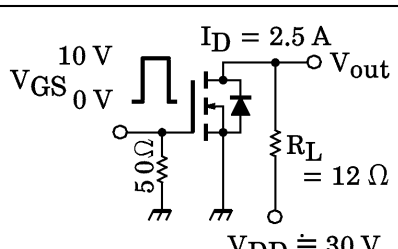
- \* Repetitive rating ; Pulse Width Limited by Max. junction temperature.
- \*\*  $V_{DD} = 25 V, T_{ch} = 25^\circ C$  (initial),  $L = 7 mH, R_G = 25 \Omega, I_{AR} = 5 A$
- \*\*\* Mounted on ceramic substrate (1 inch<sup>2</sup> × 0.8 t)

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

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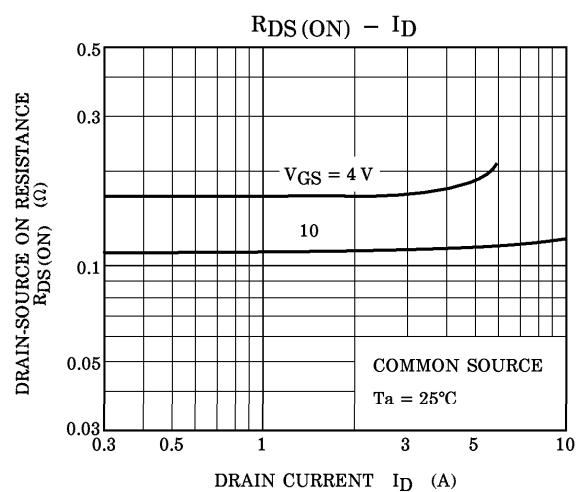
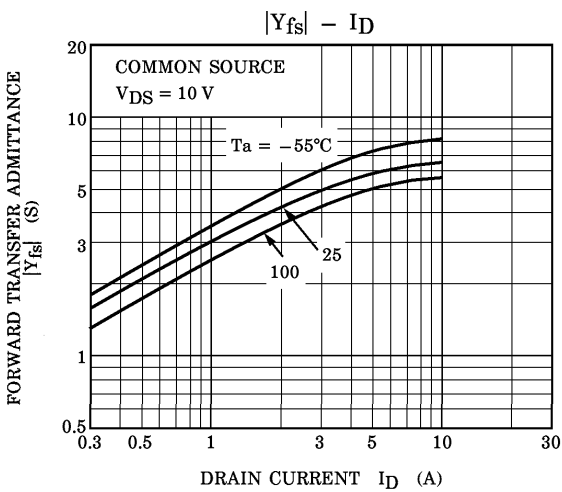
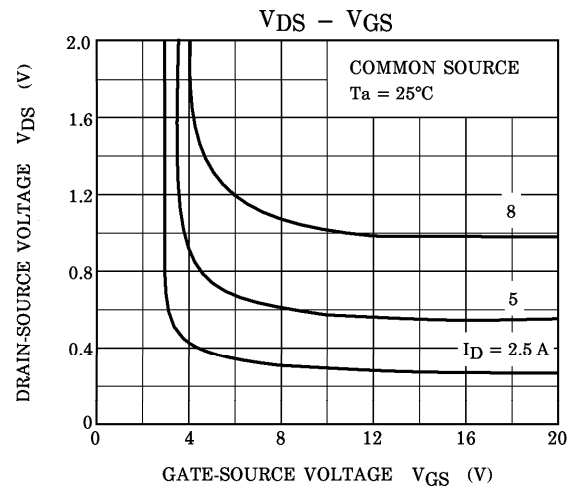
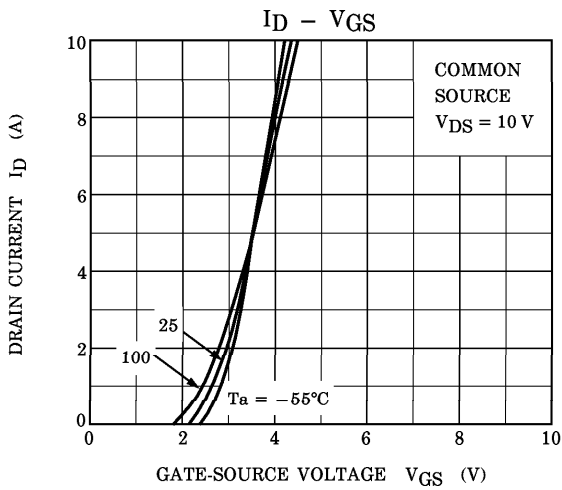
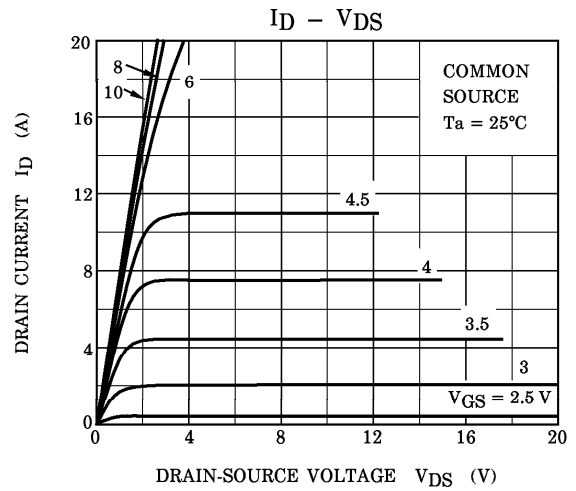
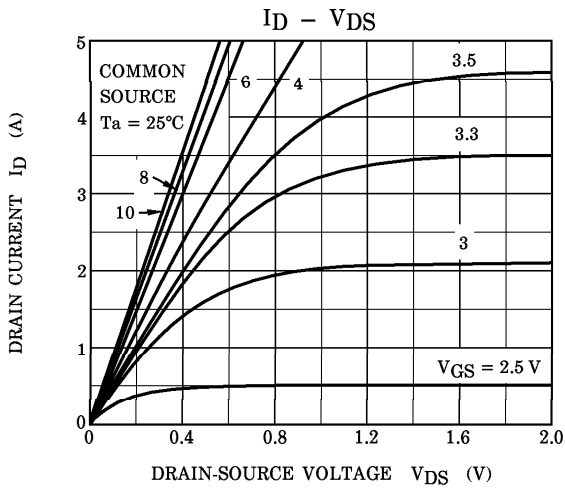
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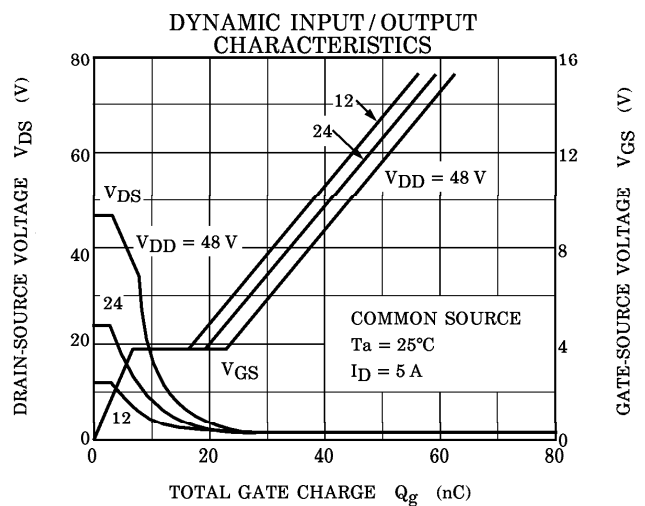
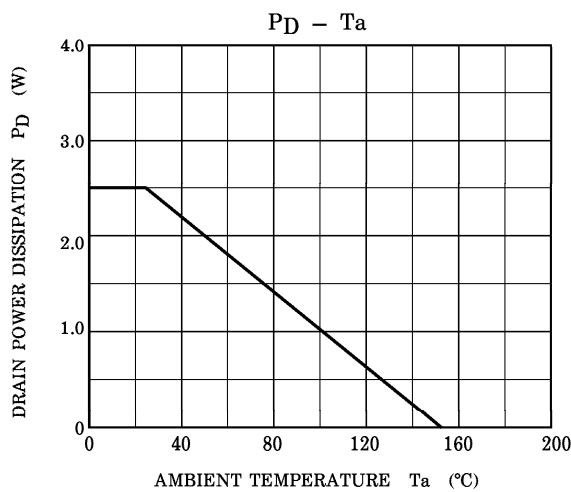
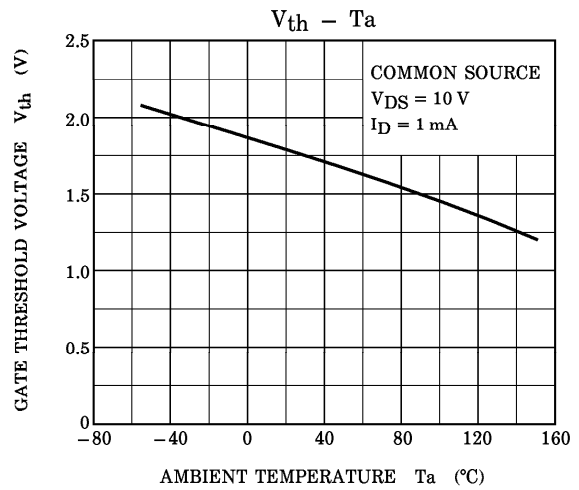
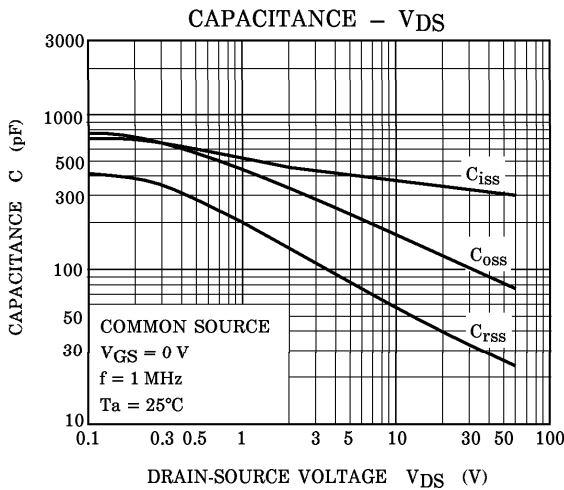
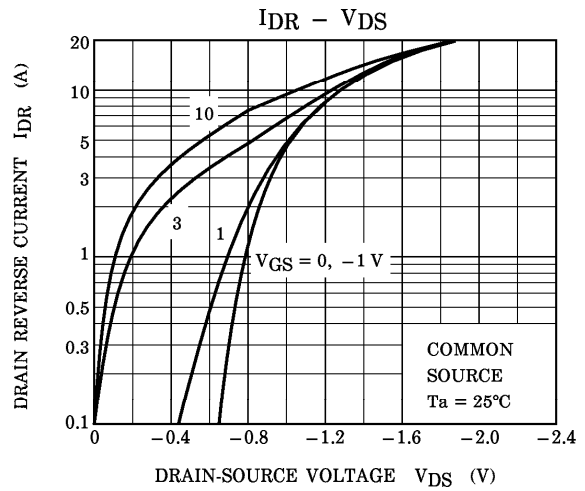
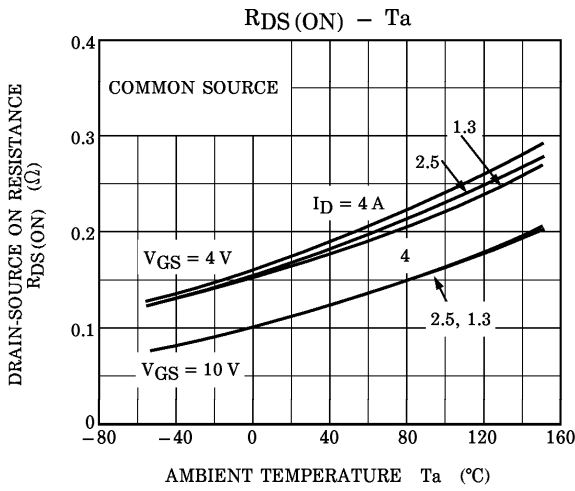
ELECTRICAL CHARACTERISTICS (Ta = 25°C)

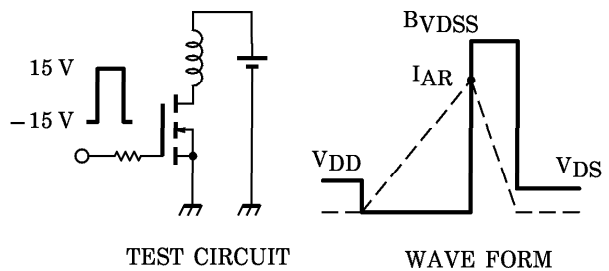
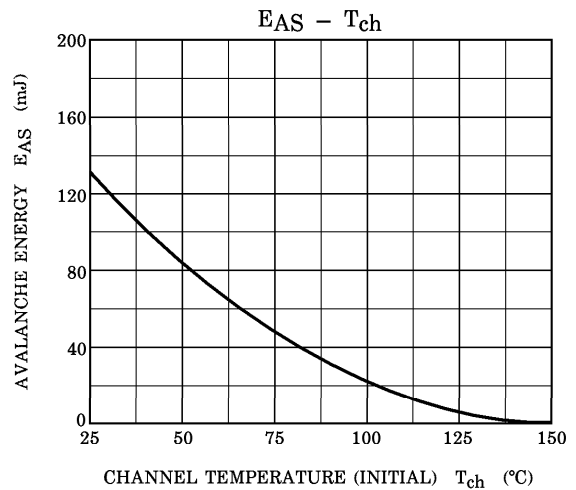
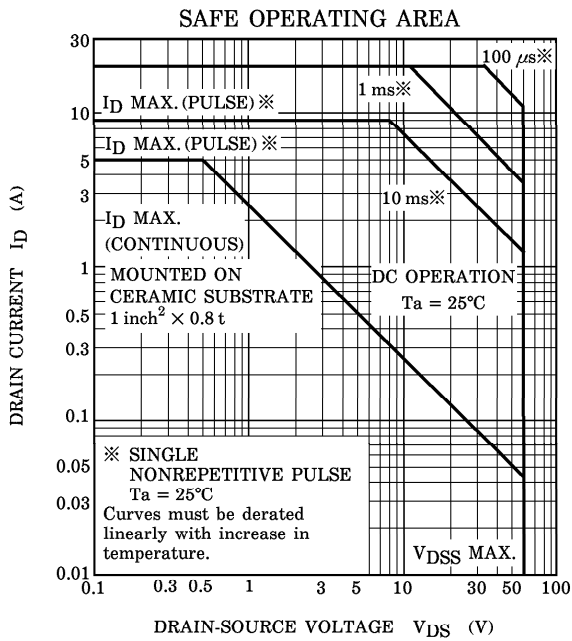
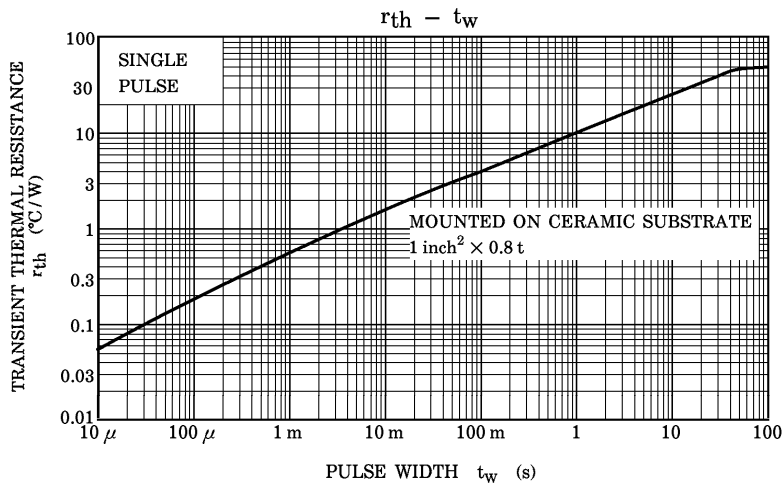
CHARACTERISTIC		SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Gate Leakage Current		I <sub>GSS</sub>	V <sub>GS</sub> = ±16 V, V <sub>DS</sub> = 0 V	—	—	±10	μA
Drain Cut-off Current		I <sub>DSS</sub>	V <sub>DS</sub> = 60 V, V <sub>GS</sub> = 0 V	—	—	100	μA
Drain-Source Breakdown Voltage		V(BR)DSS	I <sub>D</sub> = 10 mA, V <sub>GS</sub> = 0 V	60	—	—	V
Gate Threshold Voltage		V <sub>th</sub>	V <sub>DS</sub> = 10 V, I <sub>D</sub> = 1 mA	0.8	—	2.0	V
Drain-Source ON Resistance		R <sub>D(S) ON</sub>	V <sub>GS</sub> = 4 V, I <sub>D</sub> = 1.3 A	—	0.20	0.30	Ω
			V <sub>GS</sub> = 10 V, I <sub>D</sub> = 2.5 A	—	0.12	0.16	
Forward Transfer Admittance		Y <sub>fs</sub>	V <sub>DS</sub> = 10 V, I <sub>D</sub> = 2.5 A	3.0	5.0	—	S
Input Capacitance		C <sub>iss</sub>	V <sub>DS</sub> = 10 V, V <sub>GS</sub> = 0 V, f = 1 MHz	—	370	—	pF
Reverse Transfer Capacitance		C <sub>rss</sub>		—	60	—	
Output Capacitance		C <sub>oss</sub>		—	180	—	
Switching Time	Rise Time	t <sub>r</sub>	 <p>V<sub>GS</sub> 10 V 0 V 50 Ω I<sub>D</sub> = 2.5 A V<sub>out</sub> R<sub>L</sub> = 12 Ω V<sub>DD</sub> ≐ 30 V</p>	—	18	—	ns
	Turn-on Time	t <sub>on</sub>		—	25	—	
	Fall Time	t <sub>f</sub>		—	55	—	
	Turn-off Time	t <sub>off</sub>		V <sub>IN</sub> : t <sub>r</sub> , t <sub>f</sub> < 5 ns, Duty ≐ 1%, t <sub>w</sub> = 10 μs	—	170	
Total Gate Charge (Gate-Source Plus Gate-Drain)		Q <sub>g</sub>	V <sub>DD</sub> ≐ 48 V, V <sub>GS</sub> = 10 V, I <sub>D</sub> = 5 A	—	12	—	nC
Gate-Source Charge		Q <sub>gs</sub>		—	8	—	
Gate-Drain ("Miller") Charge		Q <sub>gd</sub>		—	4	—	

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

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Continuous Drain Reverse Current	I <sub>DR</sub>	—	—	—	5	A
Pulse Drain Reverse Current	I <sub>DRP</sub>	—	—	—	20	A
Diode Forward Voltage	V <sub>DSF</sub>	I <sub>DR</sub> = 5 A, V <sub>GS</sub> = 0 V	—	—	-1.7	V
Reverse Recovery Time	t <sub>rr</sub>	I <sub>DR</sub> = 5 A, V <sub>GS</sub> = 0 V	—	70	—	ns
Reverse Recovered Charge	Q <sub>rr</sub>	dI <sub>DR</sub> / dt = 50 A / μs	—	0.1	—	μC







Peak  $I_{AR} = 5 \text{ A}$ ,  $R_G = 25 \Omega$   
 $V_{DD} = 25 \text{ V}$ ,  $L = 7 \text{ mH}$

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