

TENTATIVE TOSHIBA FIELD EFFECT TRANSISTOR SILICON N CHANNEL MOS TYPE (L²-π-MOS V)

2SK2741

HIGH SPEED, HIGH CURRENT SWITCHING APPLICATIONS

CHOPPER REGULATOR, DC-DC CONVERTER AND MOTOR DRIVE APPLICATIONS

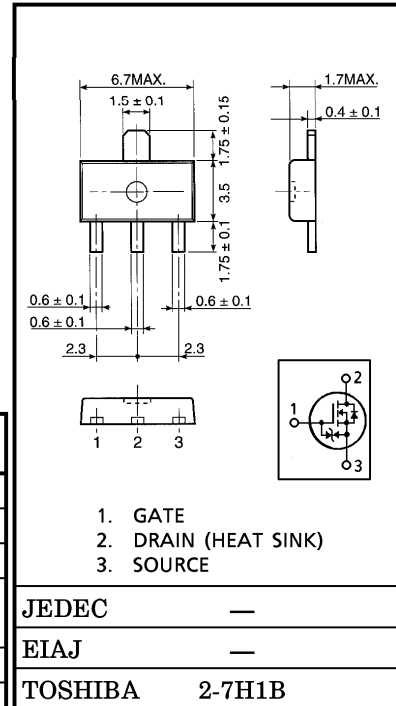
INDUSTRIAL APPLICATIONS

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 : $V_{th} = 0.8 \sim 2.0 V$ ($V_{DS} = 10 V, I_D = 1 mA$)

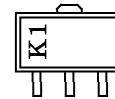
MAXIMUM RATINGS (Ta = 25°C)

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	A
	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



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 inch² × 0.8 t)

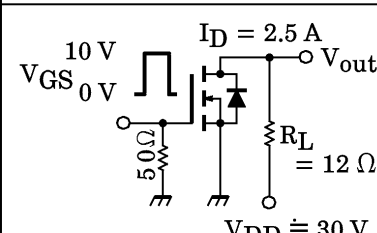
This transistor is an electrostatic sensitive device.

Please handle with caution.

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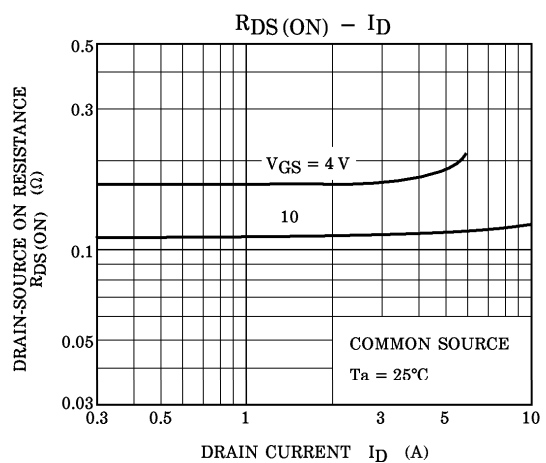
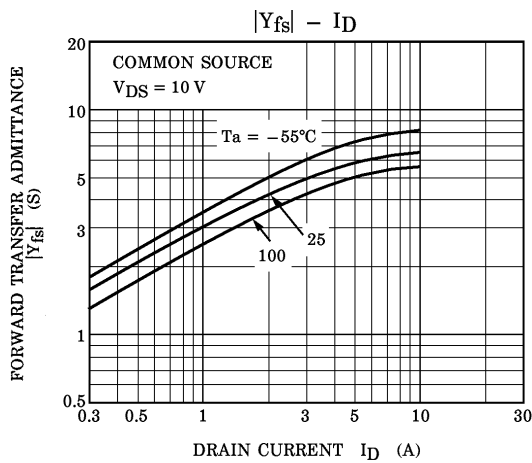
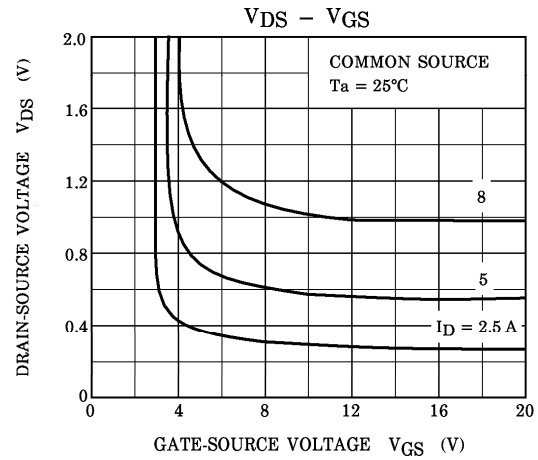
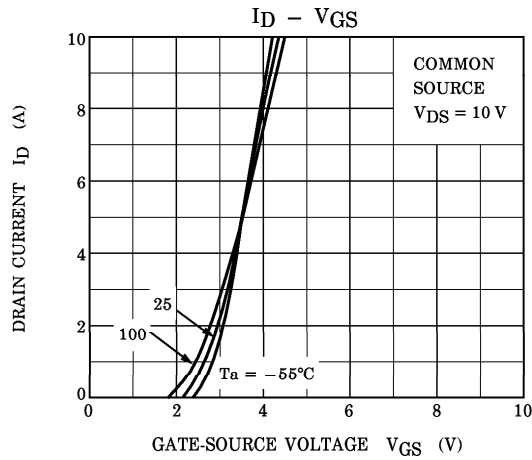
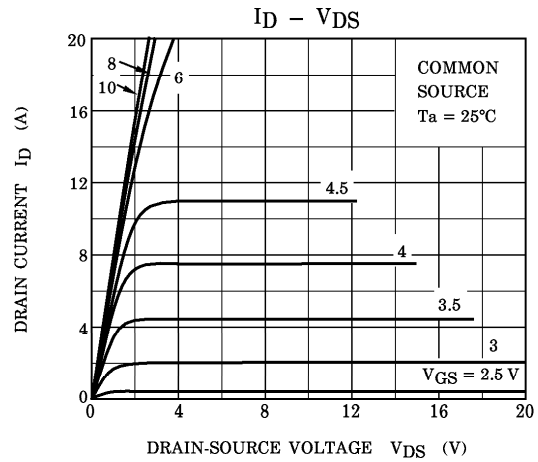
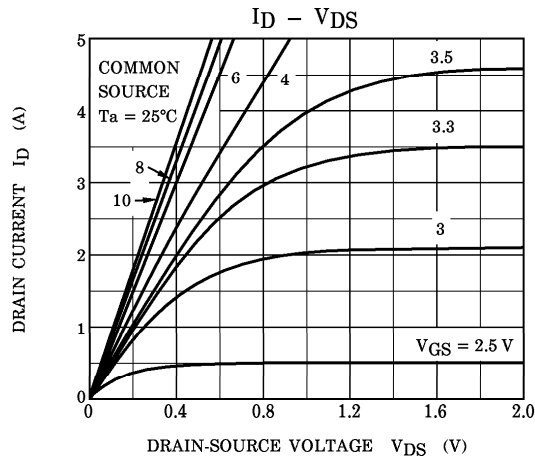
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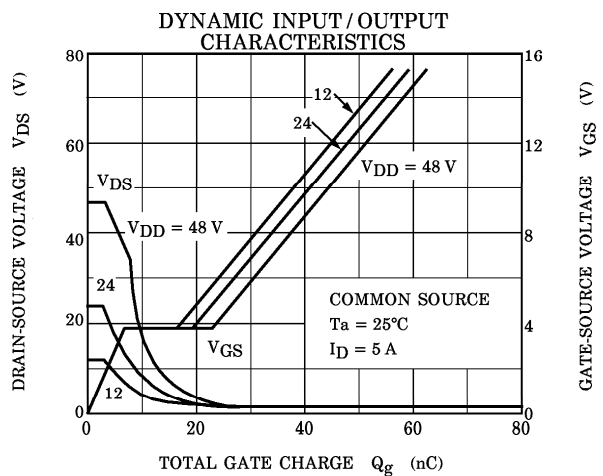
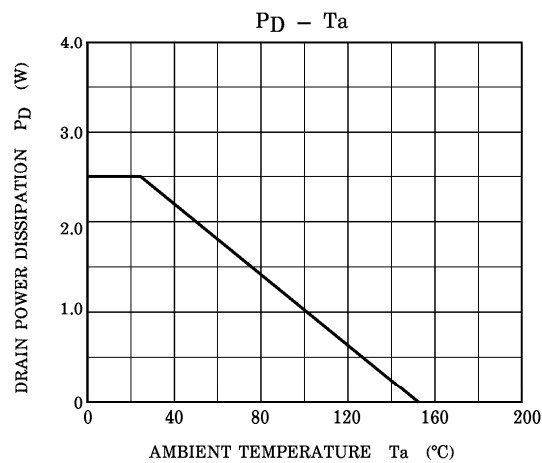
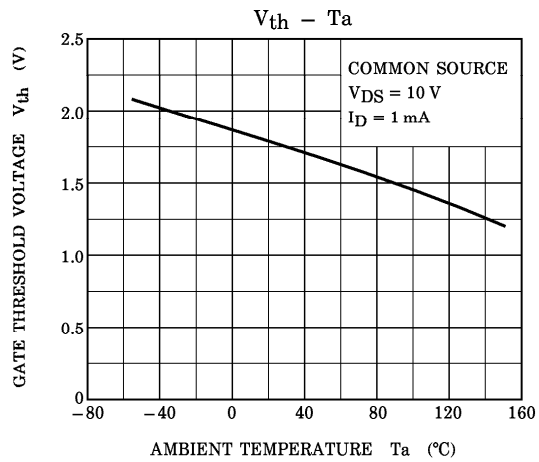
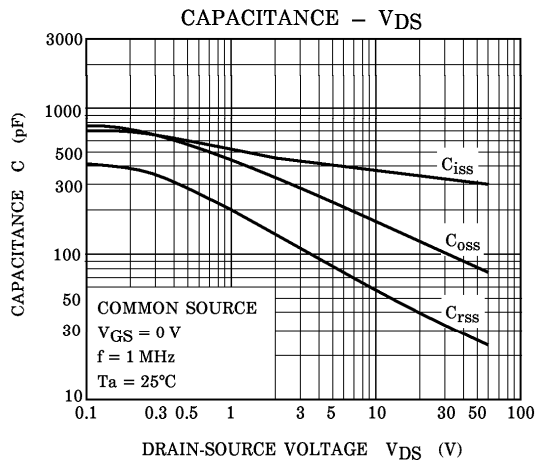
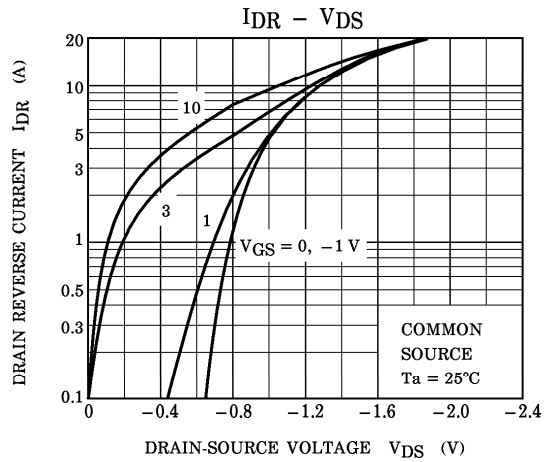
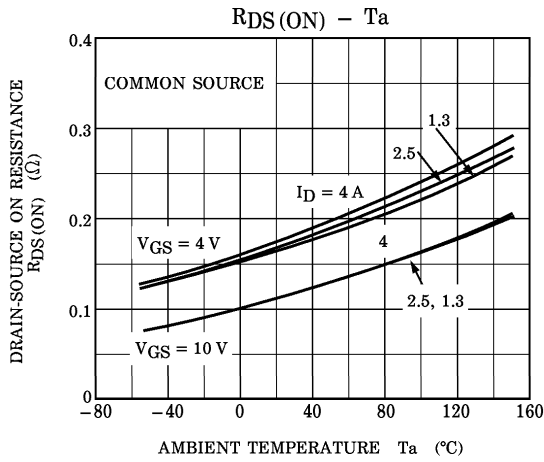
ELECTRICAL CHARACTERISTICS (Ta = 25°C)

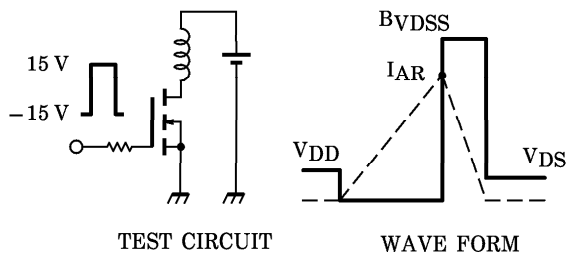
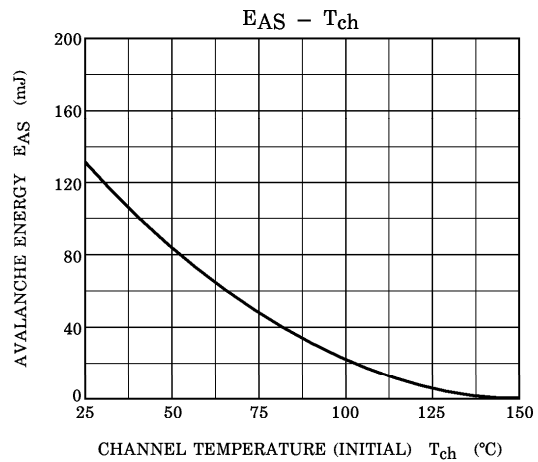
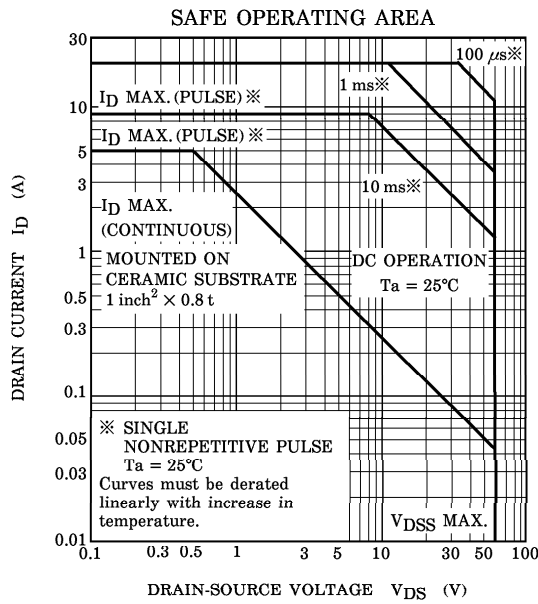
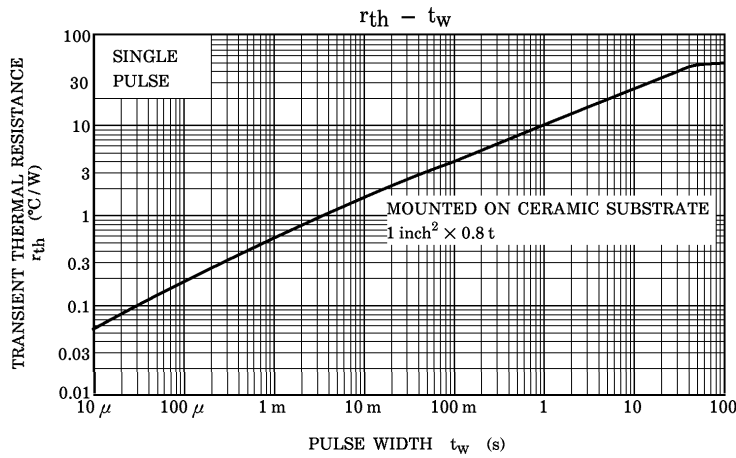
CHARACTERISTIC		SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Gate Leakage Current		I_{GSS}	$V_{GS} = \pm 16 \text{ V}, V_{DS} = 0 \text{ V}$	—	—	± 10	μA
Drain Cut-off Current		I_{DSS}	$V_{DS} = 60 \text{ V}, V_{GS} = 0 \text{ V}$	—	—	100	μA
Drain-Source Breakdown Voltage		$V_{(BR)DSS}$	$I_D = 10 \text{ mA}, V_{GS} = 0 \text{ V}$	60	—	—	V
Gate Threshold Voltage		V_{th}	$V_{DS} = 10 \text{ V}, I_D = 1 \text{ mA}$	0.8	—	2.0	V
Drain-Source ON Resistance		$R_{DS(ON)}$	$V_{GS} = 4 \text{ V}, I_D = 1.3 \text{ A}$	—	0.20	0.30	Ω
			$V_{GS} = 10 \text{ V}, I_D = 2.5 \text{ A}$	—	0.12	0.16	
Forward Transfer Admittance		$ Y_{fs} $	$V_{DS} = 10 \text{ V}, I_D = 2.5 \text{ A}$	3.0	5.0	—	S
Input Capacitance		C_{iss}	$V_{DS} = 10 \text{ V}, V_{GS} = 0 \text{ V},$ $f = 1 \text{ MHz}$	—	370	—	pF
Reverse Transfer Capacitance		C_{rss}		—	60	—	
Output Capacitance		C_{oss}		—	180	—	
Switching Time	Rise Time	t_r	 <p>$I_D = 2.5 \text{ A}$ $V_{GS} = 10 \text{ V}$ $V_{DD} \doteq 30 \text{ V}$ $R_L = 12 \Omega$ 50Ω</p>	—	18	—	ns
	Turn-on Time	t_{on}		—	25	—	
	Fall Time	t_f		—	55	—	
	Turn-off Time	t_{off}		$V_{IN} : t_r, t_f < 5 \text{ ns},$ $\text{Duty} \leq 1\%, t_w = 10 \mu\text{s}$	—	170	
Total Gate Charge (Gate-Source Plus Gate-Drain)		Q_g	$V_{DD} \doteq 48 \text{ V}, V_{GS} = 10 \text{ V},$ $I_D = 5 \text{ A}$	—	12	—	nC
Gate-Source Charge		Q_{gs}		—	8	—	
Gate-Drain ("Miller") Charge		Q_{gd}		—	4	—	

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

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Continuous Drain Reverse Current	I_{DR}	—	—	—	5	A
Pulse Drain Reverse Current	I_{DRP}	—	—	—	20	A
Diode Forward Voltage	V_{DSF}	$I_{DR} = 5 \text{ A}, V_{GS} = 0 \text{ V}$	—	—	-1.7	V
Reverse Recovery Time	t_{rr}	$I_{DR} = 5 \text{ A}, V_{GS} = 0 \text{ V}$	—	70	—	ns
Reverse Recovered Charge	Q_{rr}	$dI_{DR} / dt = 50 \text{ A} / \mu\text{s}$	—	0.1	—	μC







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

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