

TOSHIBA FIELD EFFECT TRANSISTOR SILICON N CHANNEL MOS TYPE ( $\pi$ -MOS $\nu$ )

# 2SK2836

HIGH SPEED, HIGH CURRENT SWITCHING APPLICATIONS

INDUSTRIAL APPLICATIONS

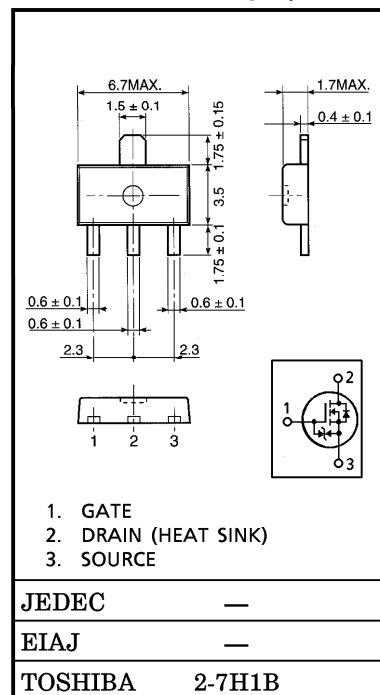
CHOPPER REGULATOR, DC-DC CONVERTER AND MOTOR DRIVE APPLICATIONS

Unit in mm

- Low Drain-Source ON Resistance :  $R_{DS(ON)} = 6.4\Omega$  (Typ.)
- High Forward Transfer Admittance :  $|Y_{fs}| = 0.85S$  (Typ.)
- Low Leakage Current :  $I_{DSS} = 100\mu A$  (Max) ( $V_{DSS} = 600V$ )
- Enhancement-Mode :  $V_{th} = 2.0 \sim 4.0V$  ( $V_{DS} = 10V, I_D = 1mA$ )

MAXIMUM RATINGS ( $T_a = 25^\circ C$ )

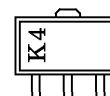
CHARACTERISTIC	SYMBOL	RATING	UNIT
Drain-Source Voltage	$V_{DSS}$	600	V
Drain-Gate Voltage ( $R_{GS} = 20k\Omega$ )	$V_{DGR}$	600	V
Gate-Source Voltage	$V_{GSS}$	$\pm 30$	V
Drain Current	DC	$I_D$	1 A
	Pulse	$I_{DP}$	2 A
Drain Power Dissipation***	$P_D$	2.5	W
Single Pulse Avalanche Energy**	$E_{AS}$	56	mJ
Avalanche Current	$I_{AR}$	1	A
Repetitive Avalanche Energy*	$E_{AR}$	0.25	mJ
Channel Temperature	$T_{ch}$	150	$^\circ C$
Storage Temperature Range	$T_{stg}$	$-55 \sim 150$	$^\circ C$



JEDEC	—
EIAJ	—
TOSHIBA	2-7H1B

Weight : 0.12g (Typ.)

MARKING



THERMAL CHARACTERISTICS

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

Note ;

- \* Repetitive rating ; Pulse Width Limited by Max. junction temperature.
- \*\*  $V_{DD} = 90V$ , Starting  $T_{ch} = 25^\circ C$ ,  $L = 100mH$ ,  $R_G = 25\Omega$ ,  $I_{AR} = 1A$
- \*\*\* Mounted on ceramic substrate ( $1inch^2 \times 0.8t$ )

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

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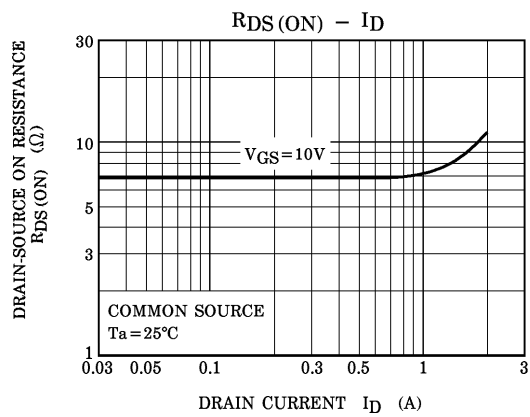
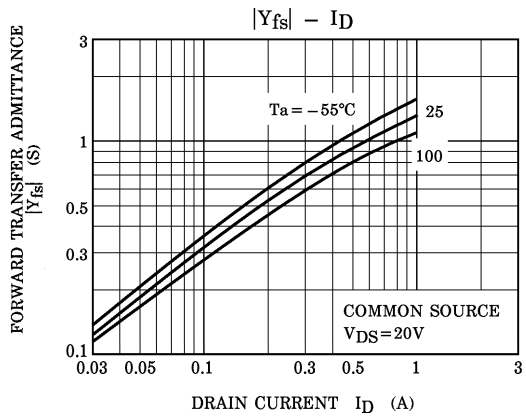
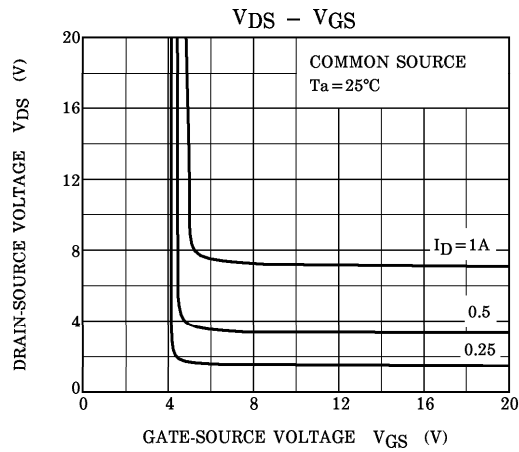
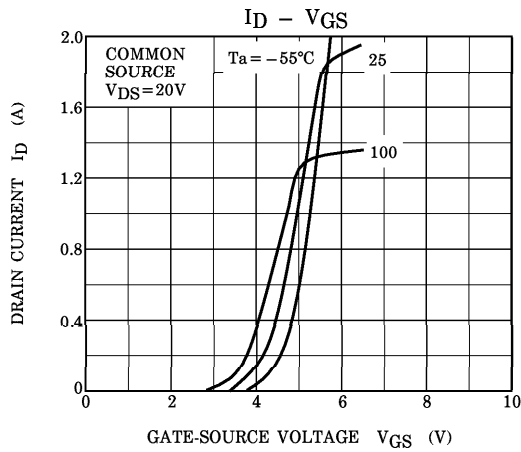
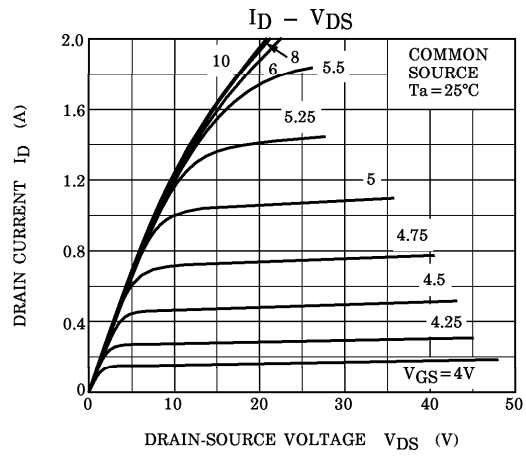
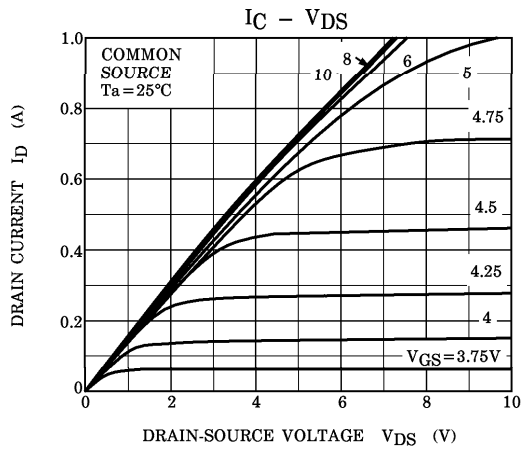
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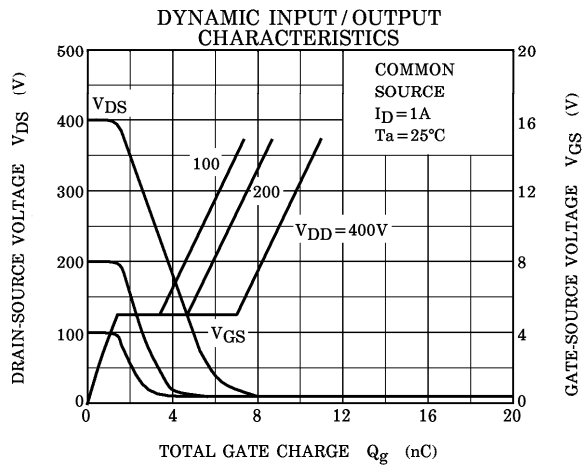
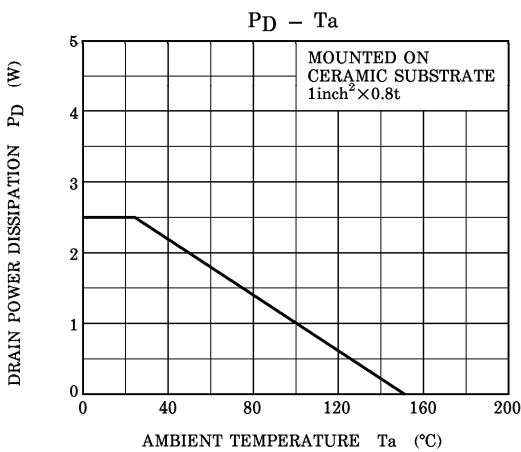
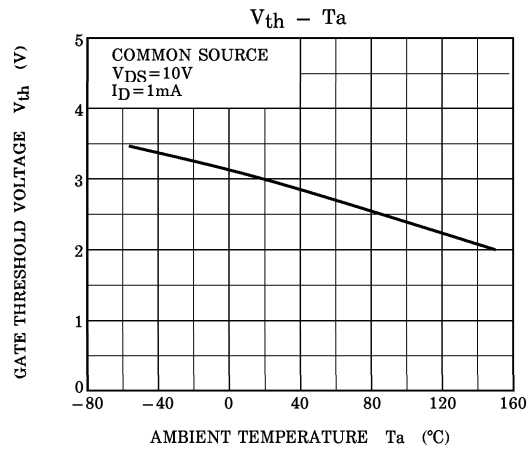
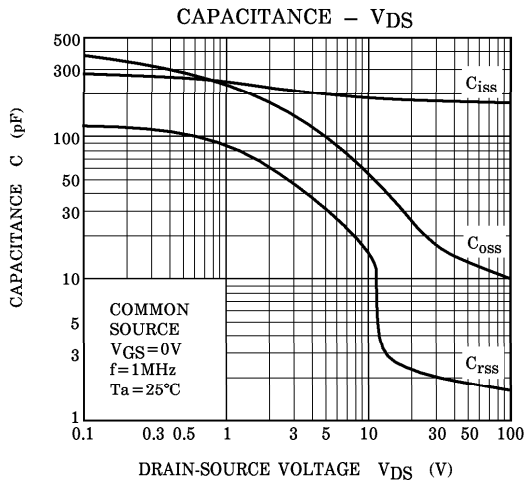
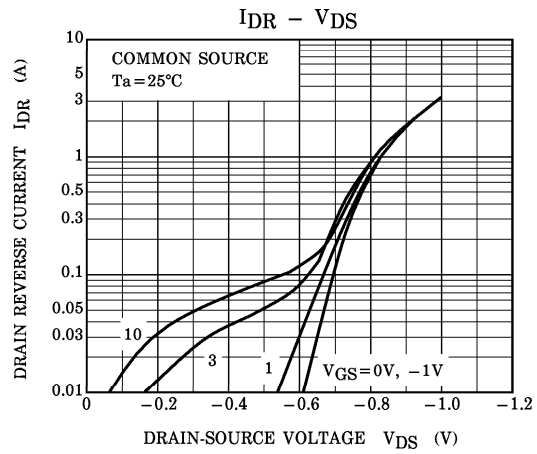
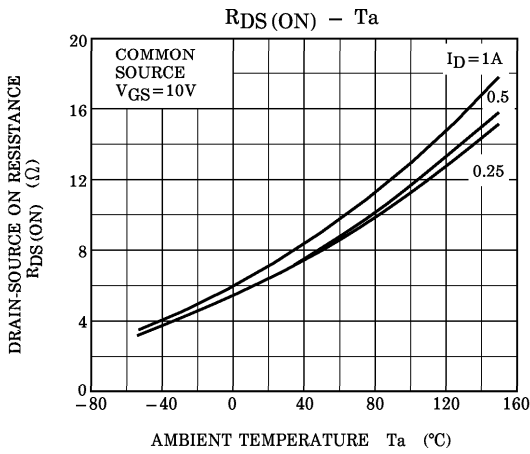
## ELECTRICAL CHARACTERISTICS (Ta = 25°C)

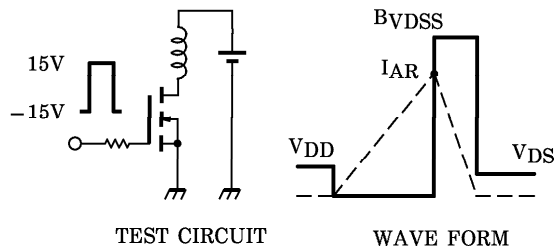
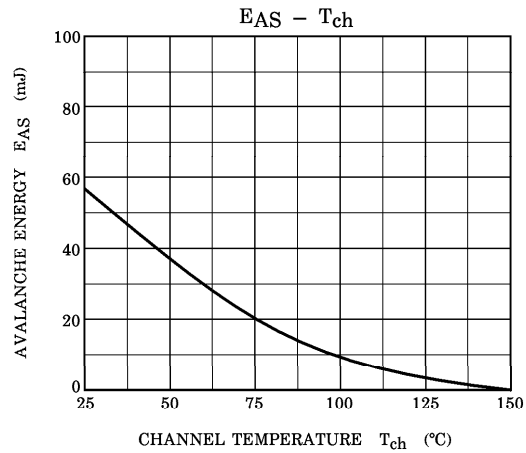
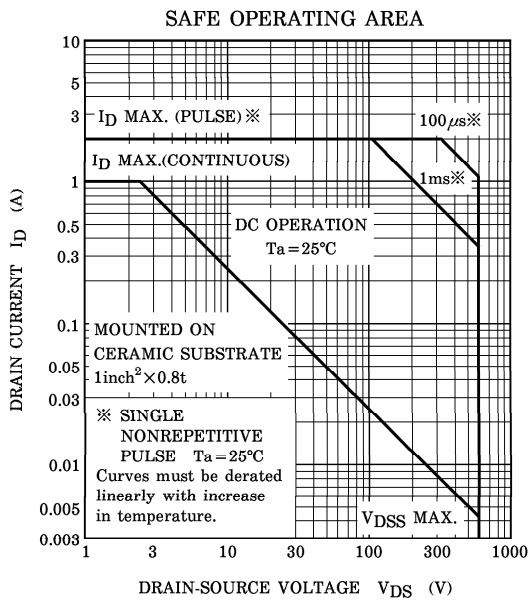
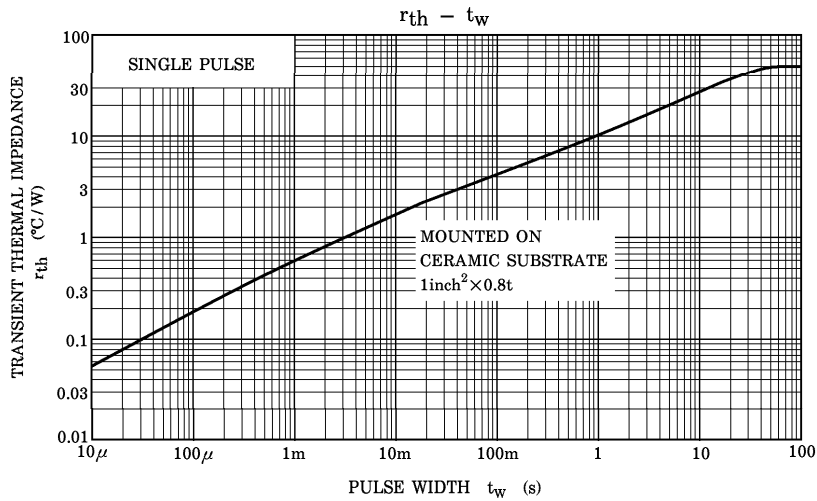
CHARACTERISTIC		SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Gate Leakage Current		$I_{GSS}$	$V_{GS} = \pm 25V, V_{DS} = 0V$	—	—	$\pm 10$	$\mu A$
Gate-Source Breakdown Voltage		$V_{(BR)GSS}$	$I_G = \pm 10\mu A, V_{DS} = 0V$	$\pm 30$	—	—	V
Drain Cut-off Current		$I_{DSS}$	$V_{DS} = 600V, V_{GS} = 0V$	—	—	100	$\mu A$
Drain-Source Breakdown Voltage		$V_{(BR)DSS}$	$I_D = 10mA, V_{GS} = 0V$	600	—	—	V
Gate Threshold Voltage		$V_{th}$	$V_{DS} = 10V, I_D = 1mA$	2.0	—	4.0	V
Drain-Source ON Resistance		$R_{DS(ON)}$	$V_{GS} = 10V, I_D = 0.5A$	—	6.4	9.0	$\Omega$
Forward Transfer Admittance		$ Y_{fs} $	$V_{DS} = 10V, I_D = 0.5A$	0.4	0.85	—	S
Input Capacitance		$C_{iss}$	$V_{DS} = 10V, V_{GS} = 0V$ $f = 1MHz$	—	190	—	pF
Reverse Transfer Capacitance		$C_{rss}$		—	15	—	
Output Capacitance		$C_{oss}$		—	55	—	
Switching Time	Rise Time	$t_r$		—	12	—	ns
	Turn-on Time	$t_{on}$		—	55	—	
	Fall Time	$t_f$		—	40	—	
	Turn-off Time	$t_{off}$		—	90	—	
Total Gate Charge (Gate-Source Plus Gate-Drain)		$Q_g$	$V_{DD} \doteq 400V, V_{GS} = 10V$	—	9	—	nC
Gate-Source Charge		$Q_{gs}$	$I_D = 1A$	—	3.5	—	
Gate-Drain ("Miller") Charge		$Q_{gd}$		—	5.5	—	

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

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Continuous Drain Reverse Current	$I_{DR}$	—	—	—	1	A
Pulse Drain Reverse Current	$I_{DRP}$	—	—	—	2	A
Diode Forward Voltage	$V_{DSF}$	$I_{DR} = 1A, V_{GS} = 0V$	—	—	-1.7	V
Reverse Recovery Time	$t_{rr}$	$I_{DR} = 1A, V_{GS} = 0V$	—	145	—	ns
Reverse Recovery Charge	$Q_{rr}$	$dI_{DR} / dt = 100A / \mu s$	—	0.46	—	$\mu C$







Peak  $I_{AR}=1A$ ,  $R_G=25\Omega$   
 $V_{DD}=90V$ ,  $L=100mH$

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