

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

# 2SK2661

HIGH SPEED, HIGH CURRENT SWITCHING APPLICATIONS

INDUSTRIAL APPLICATIONS

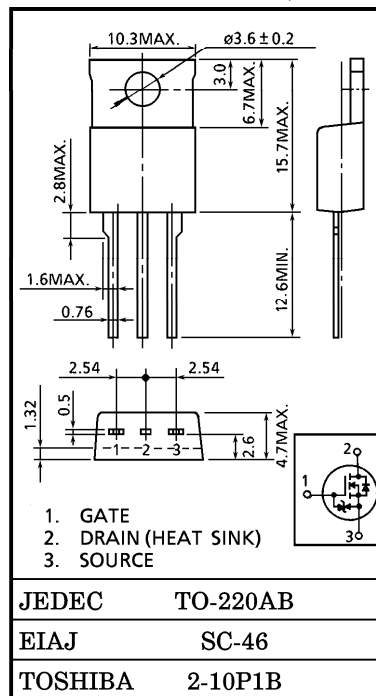
CHOPPER REGULATOR, DC-DC CONVERTER AND MOTOR DRIVE APPLICATIONS

Unit in mm

- Low Drain-Source ON Resistance :  $R_{DS(ON)} = 1.35\Omega$  (Typ.)
- High Forward Transfer Admittance :  $|Y_{fs}| = 4.0S$  (Typ.)
- Low Leakage Current :  $I_{DSS} = 100\mu A$  (Max.) ( $V_{DS} = 500V$ )
- 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		$V_{DSS}$	500	V
Drain-Gate Voltage ( $R_{GS} = 20k\Omega$ )		$V_{DGR}$	500	V
Gate-Source Voltage		$V_{GSS}$	$\pm 30$	V
Drain Current	DC	$I_D$	5	A
	Pulse	$I_{DP}$	20	A
Drain Power Dissipation ( $T_c = 25^\circ C$ )		$P_D$	75	W
Single Pulse Avalanche Energy**		$E_{AS}$	180	mJ
Avalanche Current		$I_{AR}$	5	A
Repetitive Avalanche Energy*		$E_{AR}$	7.5	mJ
Channel Temperature		$T_{ch}$	150	$^\circ C$
Storage Temperature Range		$T_{stg}$	$-55 \sim 150$	$^\circ C$



THERMAL CHARACTERISTICS

CHARACTERISTIC	SYMBOL	MAX.	UNIT
Thermal Resistance, Channel to Case	$R_{th(ch-c)}$	1.67	$^\circ C/W$
Thermal Resistance, Channel to Ambient	$R_{th(ch-a)}$	83.3	$^\circ C/W$

Note ;

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

\*\*  $V_{DD} = 90V$ , Starting  $T_{ch} = 25^\circ C$ ,  $L = 12.2mH$ ,  $R_G = 25\Omega$ ,  $I_{AR} = 5A$

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

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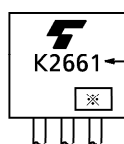
ELECTRICAL CHARACTERISTICS (Ta = 25°C)

CHARACTERISTIC		SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Gate Leakage Current		I <sub>GSS</sub>	V <sub>GS</sub> = ±25V, V <sub>DS</sub> = 0V	—	—	±10	μA
Gate-Source Breakdown Voltage		V (BR) GSS	I <sub>G</sub> = ±10μA, V <sub>DS</sub> = 0V	±30	—	—	V
Drain Cut-off Current		I <sub>DSS</sub>	V <sub>DS</sub> = 500V, V <sub>GS</sub> = 0V	—	—	100	μA
Drain-Source Breakdown Voltage		V (BR) DSS	I <sub>D</sub> = 10mA, V <sub>GS</sub> = 0V	500	—	—	V
Gate Threshold Voltage		V <sub>th</sub>	V <sub>DS</sub> = 10V, I <sub>D</sub> = 1mA	2.0	—	4.0	V
Drain-Source ON Resistance		R <sub>DS (ON)</sub>	V <sub>GS</sub> = 10V, I <sub>D</sub> = 2.5A	—	1.35	1.50	Ω
Forward Transfer Admittance		Y <sub>fs</sub>	V <sub>DS</sub> = 10V, I <sub>D</sub> = 2.5A	2.5	4.0	—	S
Input Capacitance		C <sub>iss</sub>	V <sub>DS</sub> = 25V, V <sub>GS</sub> = 0V, f = 1MHz	—	780	—	pF
Reverse Transfer Capacitance		C <sub>rss</sub>		—	60	—	
Output Capacitance		C <sub>oss</sub>		—	200	—	
Switching Time	Rise Time	t <sub>r</sub>	<p>V<sub>GS</sub> 10V 0V, I<sub>D</sub> = 2.5A, R<sub>L</sub> = 90Ω, V<sub>DD</sub> ≐ 225V</p> <p>V<sub>IN</sub> : t<sub>r</sub>, t<sub>f</sub> &lt; 5ns, Duty ≦ 1%, t<sub>w</sub> = 10μs</p>	—	12	—	ns
	Turn-on Time	t <sub>on</sub>		—	25	—	
	Fall Time	t <sub>f</sub>		—	15	—	
	Turn-off Time	t <sub>off</sub>		—	60	—	
Total Gate Charge (Gate-Source Plus Gate-Drain)		Q <sub>g</sub>	V <sub>DD</sub> ≐ 400V, V <sub>GS</sub> = 10V, I <sub>D</sub> = 5A	—	17	—	nC
Gate-Source Charge		Q <sub>gs</sub>		—	11	—	
Gate-Drain ("Miller") Charge		Q <sub>gd</sub>		—	6	—	

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> = 5A, V <sub>GS</sub> = 0V	—	—	-1.7	V
Reverse Recovery Time	t <sub>rr</sub>	I <sub>DR</sub> = 5A, V <sub>GS</sub> = 0V	—	1400	—	ns
Reverse Recovery Charge	Q <sub>rr</sub>	dI <sub>DR</sub> / dt = 100A / μs	—	9	—	μC

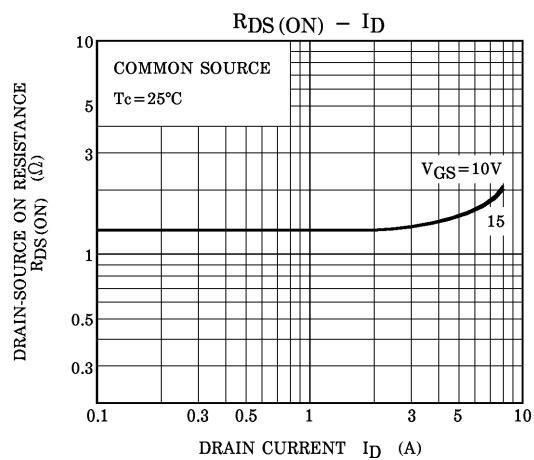
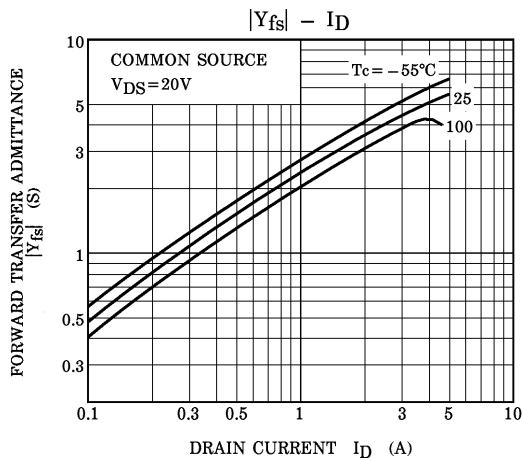
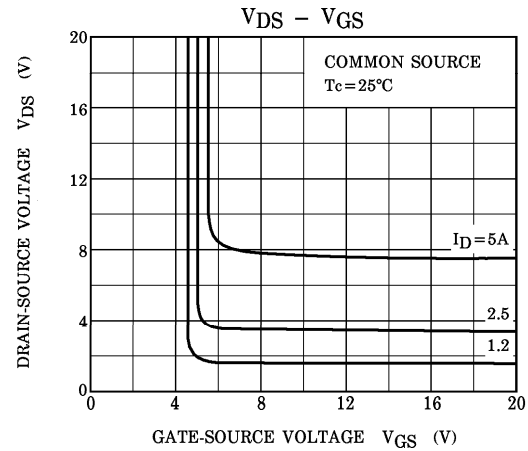
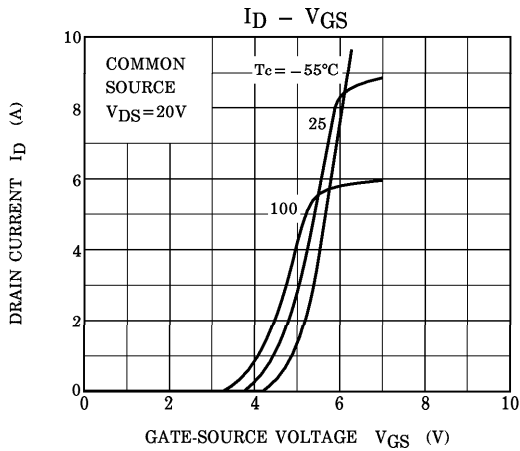
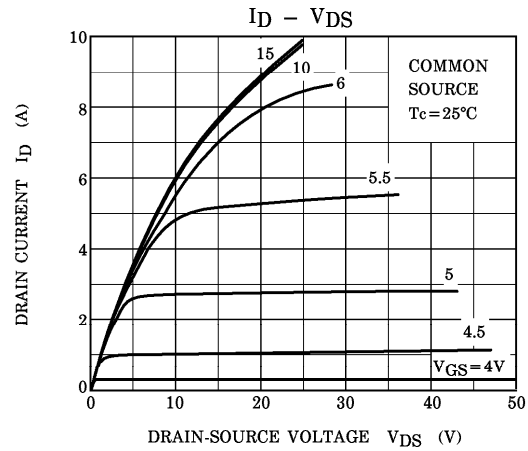
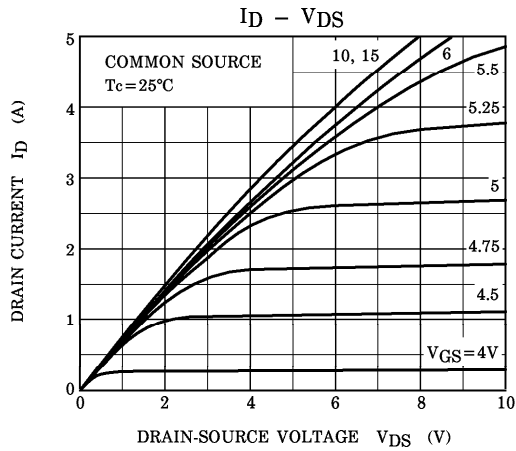
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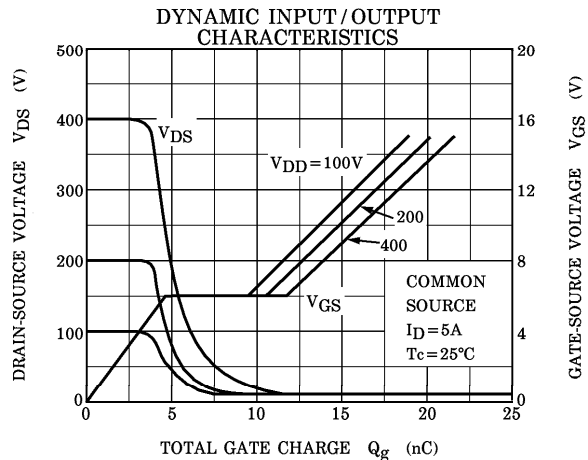
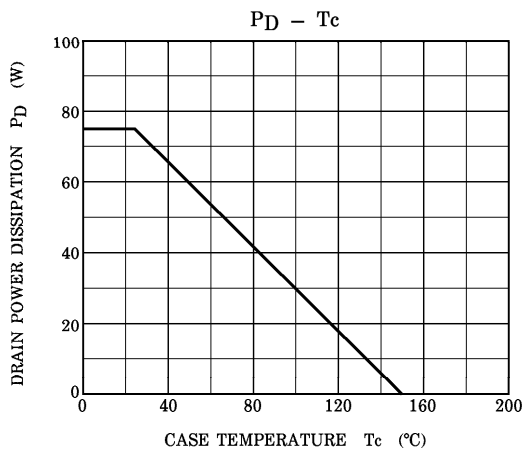
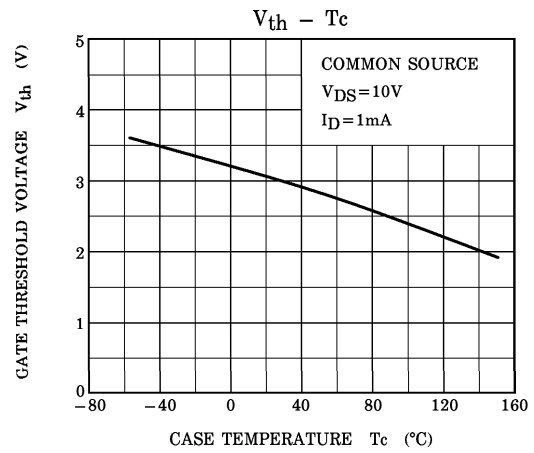
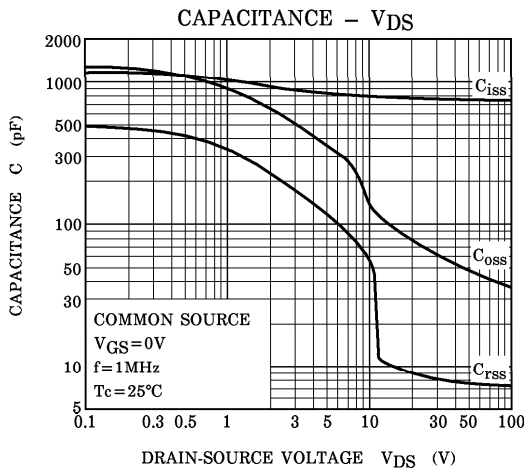
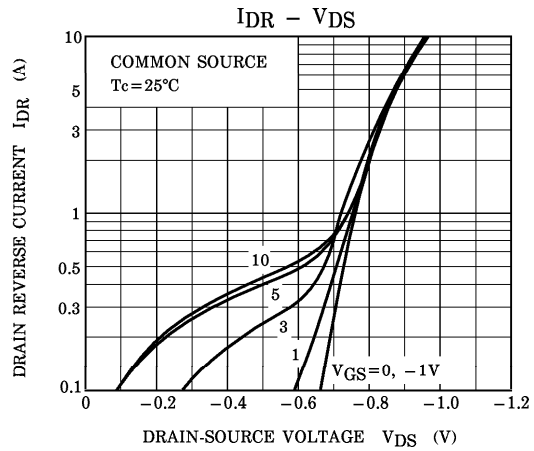
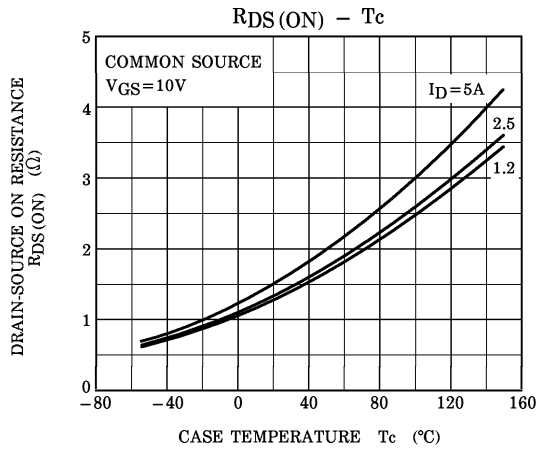


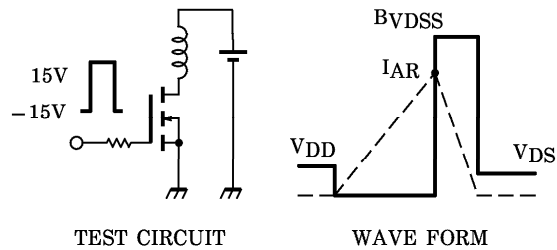
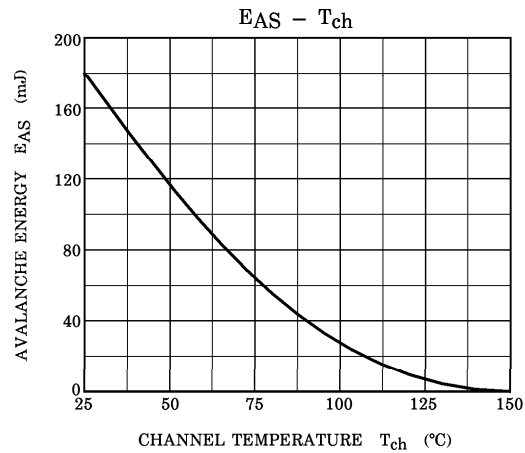
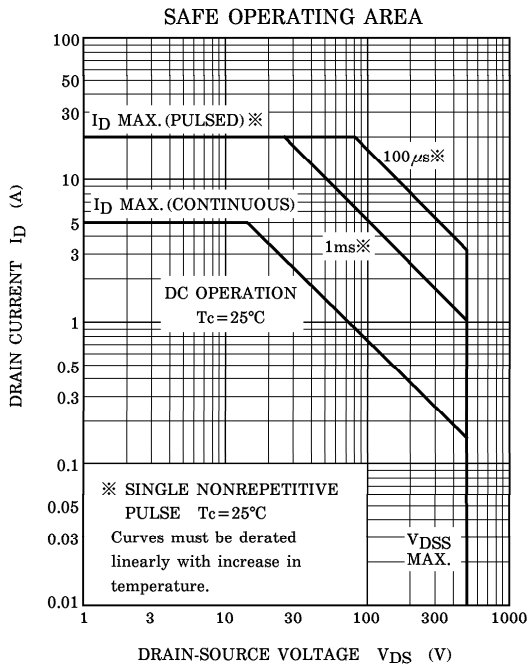
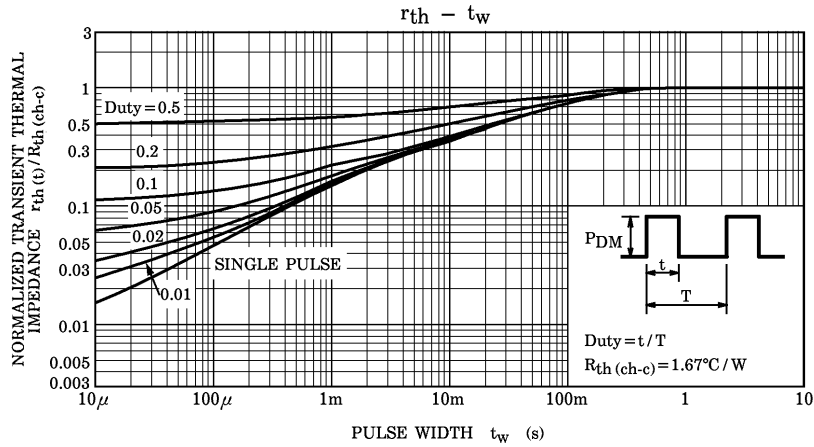
※ Lot Number

□ □ — Month (Starting from Alphabet A)

— Year (Last Number of the Christian Era)







Peak  $I_{AR} = 5\text{A}$ ,  $R_G = 25\Omega$ ,  $V_{DD} = 90\text{V}$ ,  $L = 12.2\text{mH}$

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