

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

# 2SK2776

HIGH SPEED, HIGH CURRENT SWITCHING APPLICATIONS  
 CHOPPER REGULATOR, DC-DC CONVERTER AND MOTOR DRIVE APPLICATIONS

- Low Drain-Source ON Resistance :  $R_{DS(ON)} = 0.75\Omega$  (Typ.)
- High Forward Transfer Admittance :  $|Y_{fs}| = 7.0S$  (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	$I_D$	8 A
	Pulse	$I_{DP}$	32 A
Drain Power Dissipation ( $T_c = 25^\circ C$ )	$P_D$	65	W
Single Pulse Avalanche Energy**	$E_{AS}$	312	mJ
Avalanche Current	$I_{AR}$	8	A
Repetitive Avalanche Energy*	$E_{AR}$	6.5	mJ
Channel Temperature	$T_{ch}$	150	$^\circ C$
Storage Temperature Range	$T_{stg}$	$-55 \sim 150$	$^\circ C$

HERMAL CHARACTERISTICS

CHARACTERISTIC	SYMBOL	MAX.	UNIT
Thermal Resistance, Channel to Case	$R_{th(ch-c)}$	1.92	$^\circ C/W$
Thermal Resistance, Channel to Ambient	$R_{th(ch-a)}$	83.3	$^\circ C/W$

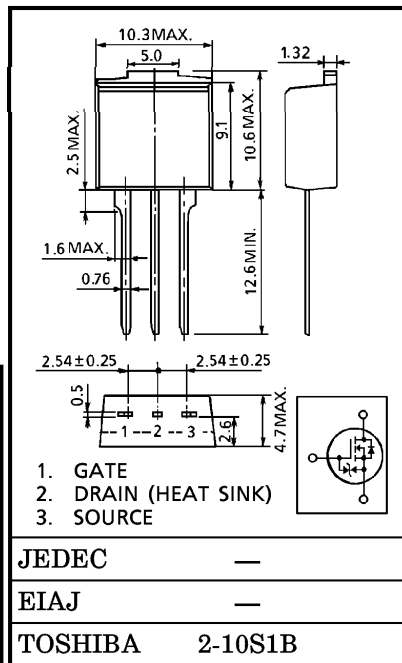
Note ;

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

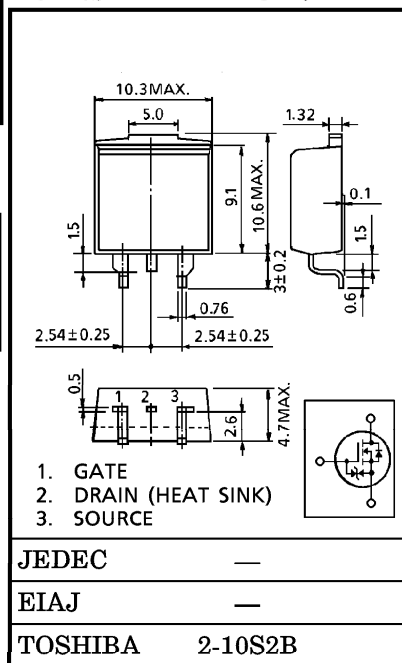
\*\*  $V_{DD} = 90V$ , Starting  $T_{ch} = 25^\circ C$ ,  $L = 8.3mH$   
 $R_G = 25\Omega, I_{AR} = 8A$

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

INDUSTRIAL APPLICATIONS  
 TO-220FL Unit in mm



TO-220SM Unit in mm



Weight : 1.5g

961001EAA2

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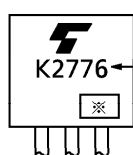
ELECTRICAL CHARACTERISTICS (Ta = 25°C)

CHARACTERISTIC		SYMBOL	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> = 4A	—	0.75	0.85	Ω
Forward Transfer Admittance		Y <sub>fs</sub>	V <sub>DS</sub> = 10V, I <sub>D</sub> = 4A	3.5	7.0	—	S
Input Capacitance		C <sub>iss</sub>	V <sub>DS</sub> = 10V, V <sub>GS</sub> = 0V, f = 1MHz	—	1300	—	pF
Reverse Transfer Capacitance		C <sub>rss</sub>		—	130	—	
Output Capacitance		C <sub>oss</sub>		—	400	—	
Switching Time	Rise Time	t <sub>r</sub>	<p>V<sub>GS</sub> 10V 0V 50Ω I<sub>D</sub> = 4A V<sub>out</sub> R<sub>L</sub> = 50Ω V<sub>DD</sub> ≐ 200V</p>	—	26	—	ns
	Turn-on Time	t <sub>on</sub>		—	45	—	
	Fall Time	t <sub>f</sub>		—	40	—	
	Turn-off Time	t <sub>off</sub>		V <sub>IN</sub> : t <sub>r</sub> , t <sub>f</sub> < 5ns, Duty ≤ 1%, t <sub>w</sub> = 10μs	—	140	
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> = 8A	—	30	—	nC
Gate-Source Charge		Q <sub>gs</sub>		—	17	—	
Gate-Drain ("Miller") Charge		Q <sub>gd</sub>		—	13	—	

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>	—	—	—	8	A
Pulse Drain Reverse Current	I <sub>DRP</sub>	—	—	—	32	A
Diode Forward Voltage	V <sub>DSF</sub>	I <sub>DR</sub> = 8A, V <sub>GS</sub> = 0V	—	—	-1.7	V
Reverse Recovery Time	t <sub>rr</sub>	I <sub>DR</sub> = 8A, V <sub>GS</sub> = 0V	—	1200	—	ns
Reverse Recovery Charge	Q <sub>rr</sub>	dI <sub>DR</sub> / dt = 100A / μs	—	10	—	μC

MARKING

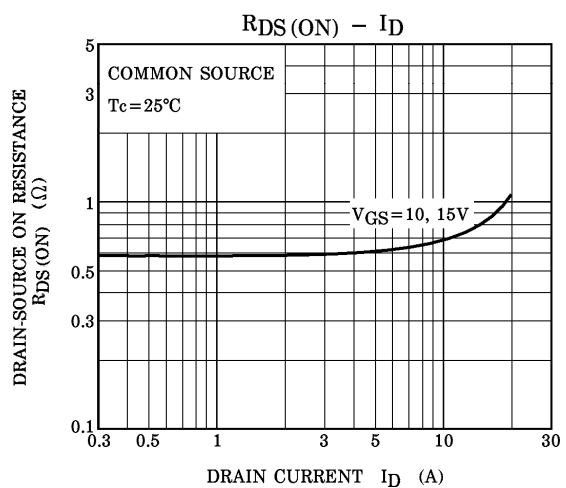
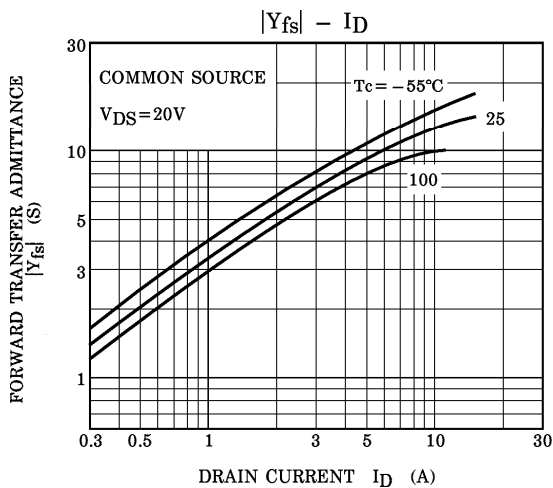
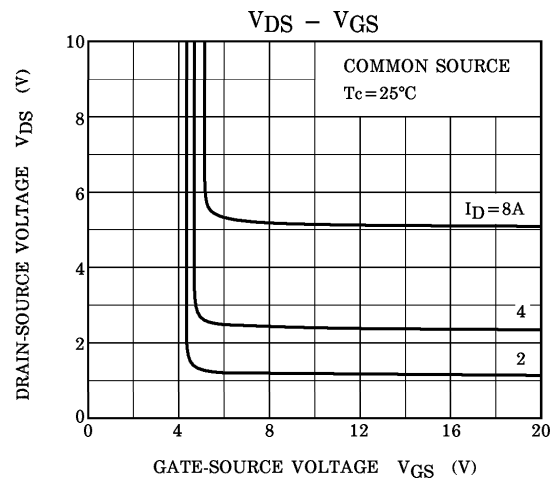
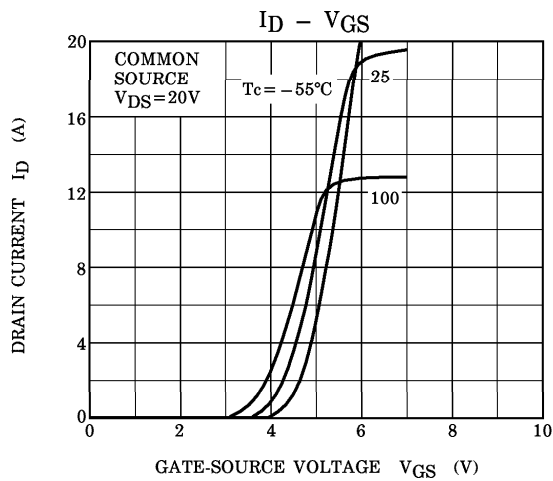
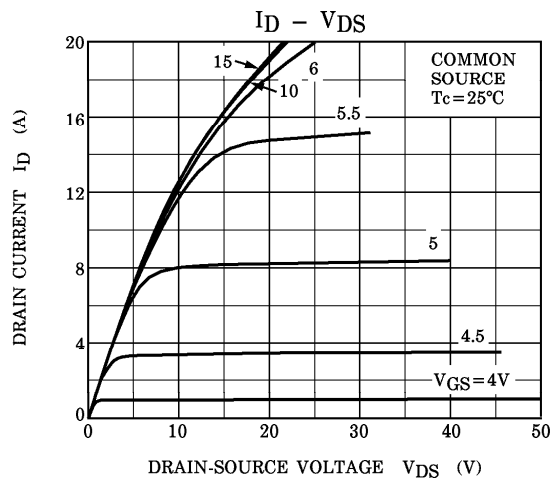
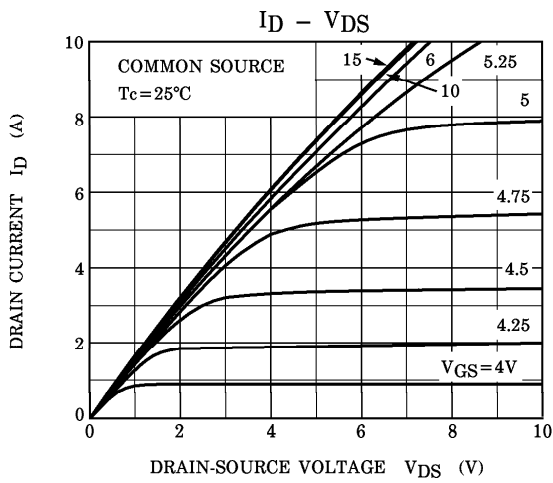


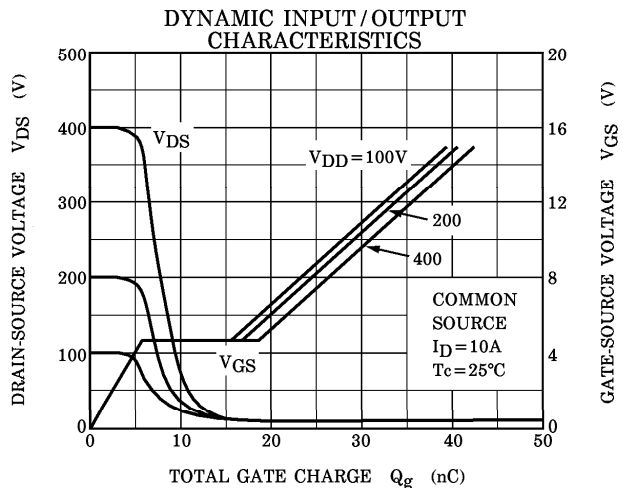
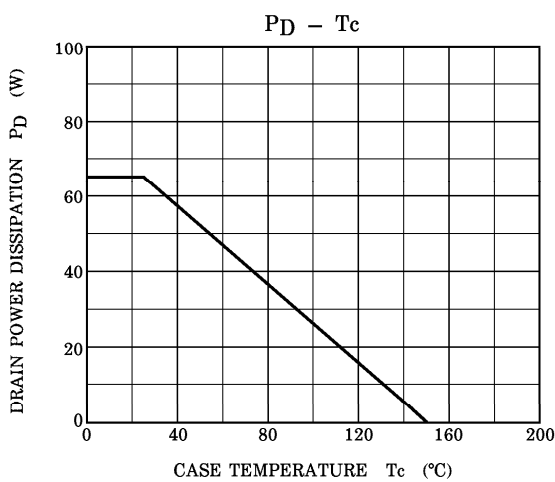
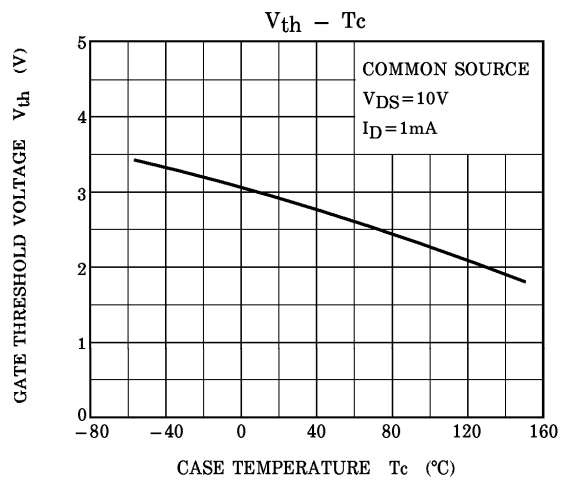
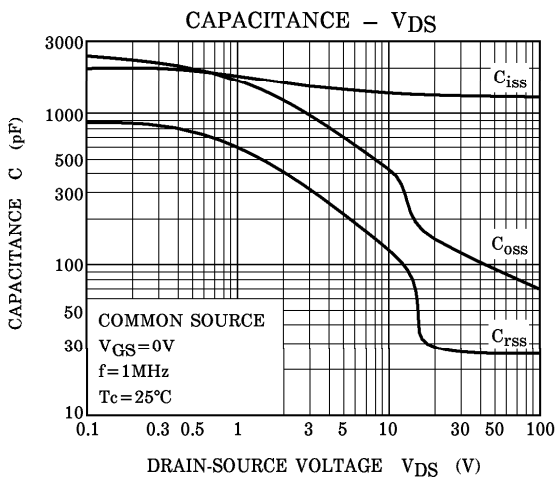
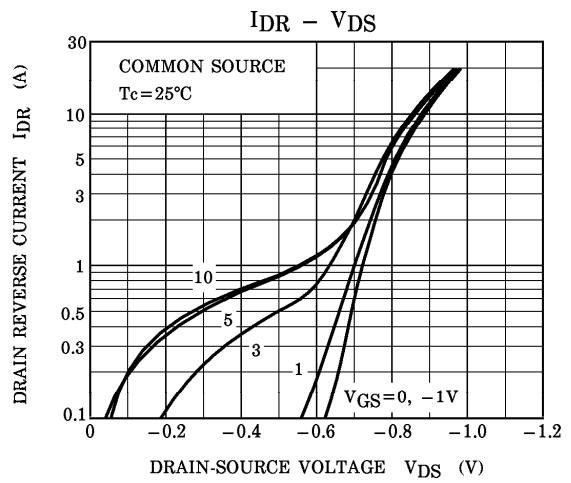
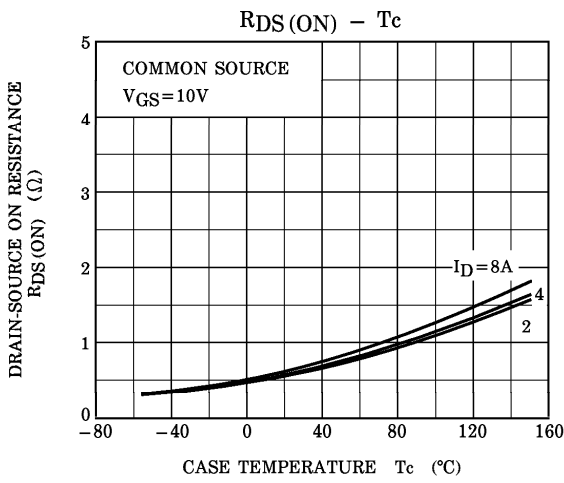
TYPE

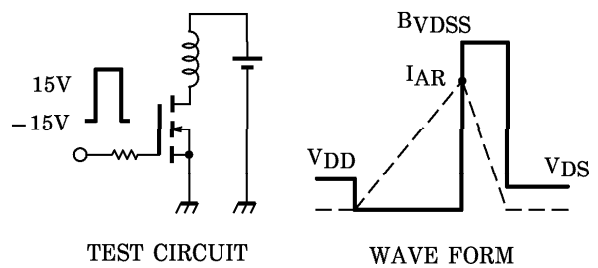
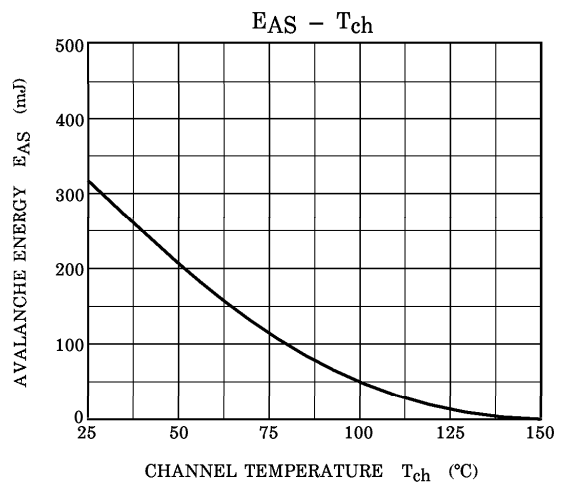
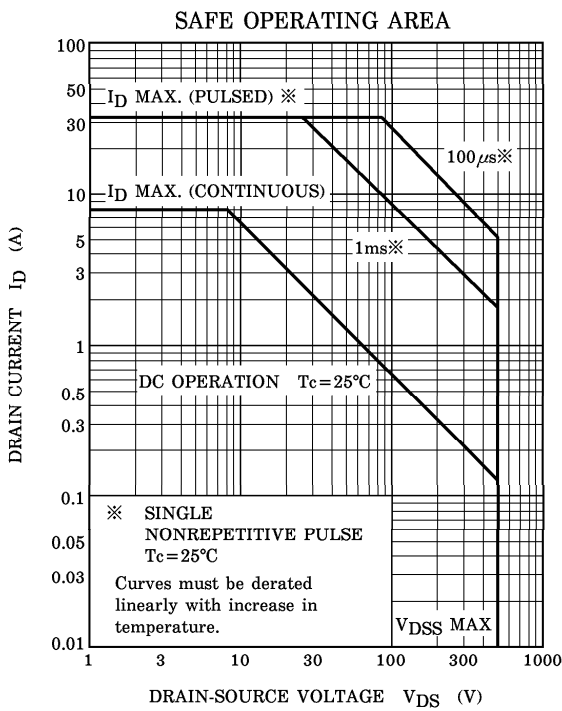
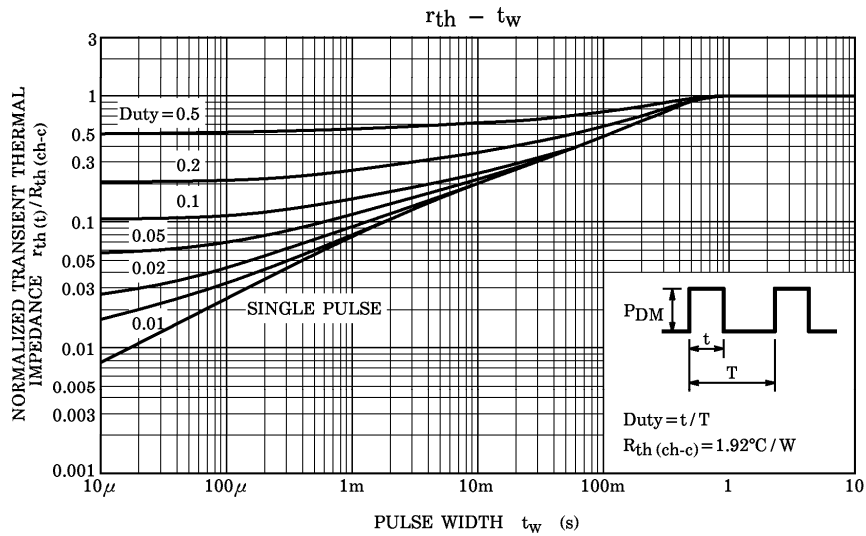
※ Lot Number

□ □ — Month (Starting from Alphabet A)

— Year (Last Number of the Christian Era)







Peak  $I_{AR} = 8\text{A}$ ,  $R_G = 25\Omega$   
 $V_{DD} = 90\text{V}$ ,  $L = 8.3\text{mH}$

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