

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

# 2SK2376

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

- 4V Gate Drive
- Low Drain-Source ON Resistance : R<sub>DS(ON)</sub> = 13mΩ (Typ.)
- High Forward Transfer Admittance : |Y<sub>fs</sub>| = 40S (Typ.)
- Low Leakage Current : I<sub>DSS</sub> = 100μA (Max.) (V<sub>DS</sub> = 60V)
- Enhancement-Mode : V<sub>th</sub> = 0.8~2.0V (V<sub>DS</sub> = 10V, I<sub>D</sub> = 1mA)

MAXIMUM RATINGS (Ta = 25°C)

CHARACTERISTIC		SYMBOL	RATING	UNIT
Drain-Source Voltage		V <sub>DSS</sub>	60	V
Drain-Gate Voltage (R <sub>GS</sub> = 20kΩ)		V <sub>DGR</sub>	60	V
Gate-Source Voltage		V <sub>GS</sub>	±20	V
Drain Current	DC	I <sub>D</sub>	45	A
	Pulse	I <sub>DP</sub>	180	A
Drain Power Dissipation (Tc = 25°C)		P <sub>D</sub>	100	W
Single Pulse Avalanche Energy**		E <sub>AS</sub>	701	mJ
Avalanche Current		I <sub>AR</sub>	45	A
Repetitive Avalanche Energy*		E <sub>AR</sub>	10	mJ
Channel Temperature		T <sub>ch</sub>	150	°C
Storage Temperature Range		T <sub>stg</sub>	-55~150	°C

**THERMAL CHARACTERISTICS**

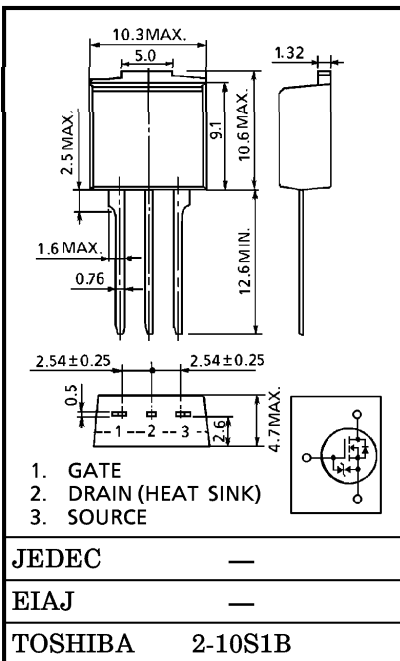
CHARACTERISTIC	SYMBOL	MAX.	UNIT
Thermal Resistance, Channel To Case	R <sub>th(ch-c)</sub>	1.25	°C/W
Thermal Resistance, Channel To Ambient	R <sub>th(ch-a)</sub>	83.3	°C/W

Note ;

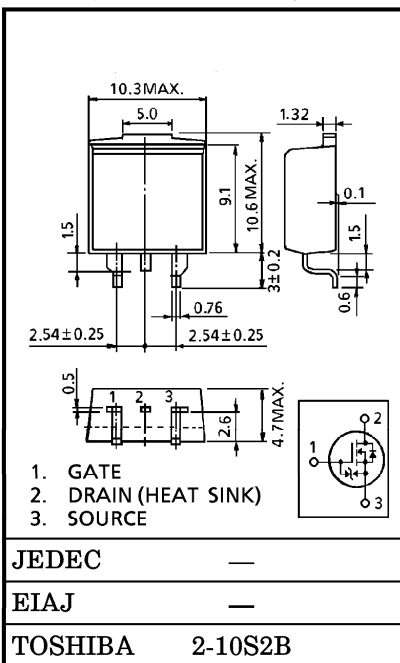
- \* Repetitive rating ; Pulse Width Limited by Max. junction temperature.
- \*\* V<sub>DD</sub> = 25V, Starting T<sub>ch</sub> = 25°C, L = 471μH, R<sub>G</sub> = 25Ω, I<sub>AR</sub> = 45A

**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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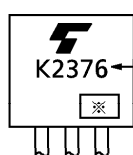
ELECTRICAL CHARACTERISTICS (Ta = 25°C)

CHARACTERISTIC		SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Gate Leakage Current		$I_{GSS}$	$V_{GS} = \pm 16V, V_{DS} = 0V$	—	—	$\pm 10$	$\mu A$
Drain Cut-off Current		$I_{DSS}$	$V_{DS} = 60V, V_{GS} = 0V$	—	—	100	$\mu A$
Drain-Source Breakdown Voltage		$V_{(BR) DSS}$	$I_D = 10mA, V_{GS} = 0V$	60	—	—	V
Gate Threshold Voltage		$V_{th}$	$V_{DS} = 10V, I_D = 1mA$	0.8	—	2.0	V
Drain-Source ON Resistance		$R_{DS(ON)}$	$V_{GS} = 4V, I_D = 25A$	—	19	25	m $\Omega$
			$V_{GS} = 10V, I_D = 25A$	—	13	17	
Forward Transfer Admittance		$ Y_{fs} $	$V_{DS} = 10V, I_D = 25A$	28	40	—	S
Input Capacitance		$C_{iss}$	$V_{DS} = 10V, V_{GS} = 0V$ $f = 1MHz$	—	3350	—	pF
Reverse Transfer Capacitance		$C_{rss}$		—	550	—	
Output Capacitance		$C_{oss}$		—	1600	—	
Switching Time	Rise Time	$t_r$		—	25	—	ns
	Turn-on Time	$t_{on}$		—	55	—	
	Fall Time	$t_f$		—	60	—	
	Turn-off Time	$t_{off}$		$V_{IN} : t_r, t_f < 5ns,$ $Duty \leq 1\%, t_w = 10\mu s$	—	180	
Total Gate Charge (Gate-Source Plus Gate-Drain)		$Q_g$	$V_{DD} \doteq 48V, V_{GS} = 10V$ $I_D = 45A$	—	110	—	nC
Gate-Source Charge		$Q_{gs}$		—	70	—	
Gate-Drain ("Miller") Charge		$Q_{gd}$		—	40	—	

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

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Continuous Drain Reverse Current	$I_{DR}$	—	—	—	45	A
Pulse Drain Reverse Current	$I_{DRP}$	—	—	—	180	A
Diode Forward Voltage	$V_{DSF}$	$I_{DR} = 45A, V_{GS} = 0V$	—	—	-1.7	V
Reverse Recovery Time	$t_{rr}$	$I_{DR} = 45A, V_{GS} = 0V$	—	120	—	ns
Reverse Recovery Charge	$Q_{rr}$	$dI_{DR} / dt = 50A / \mu s$	—	0.2	—	$\mu C$

MARKING

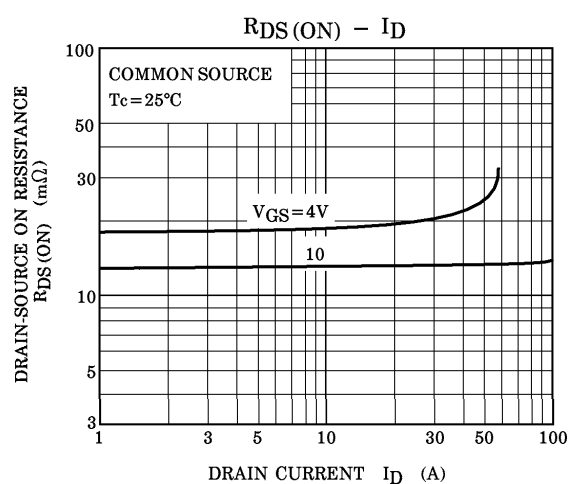
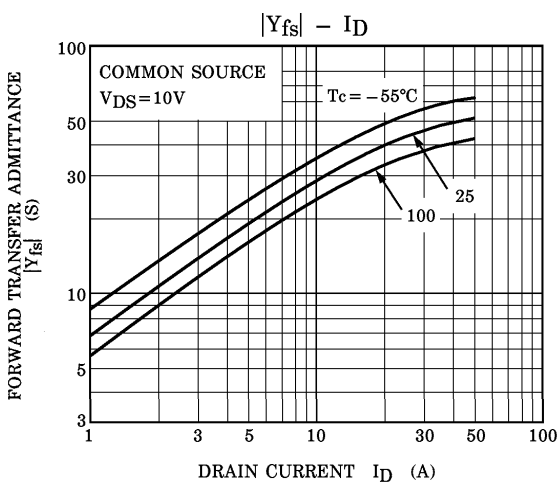
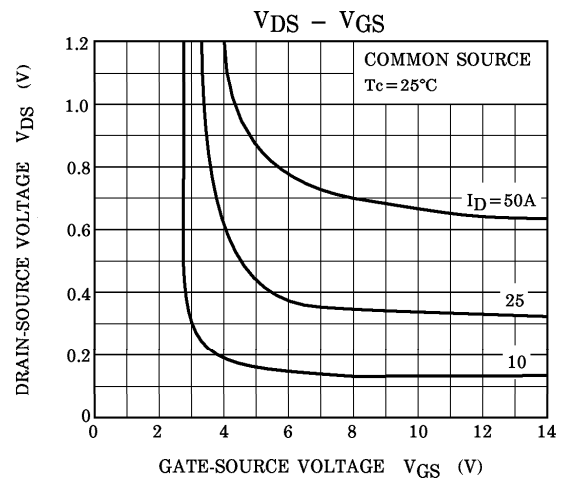
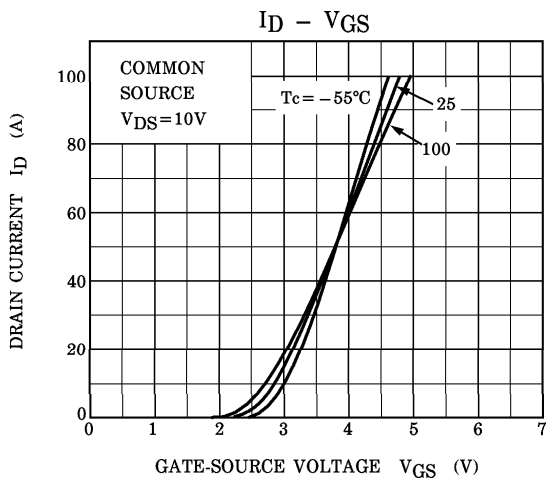
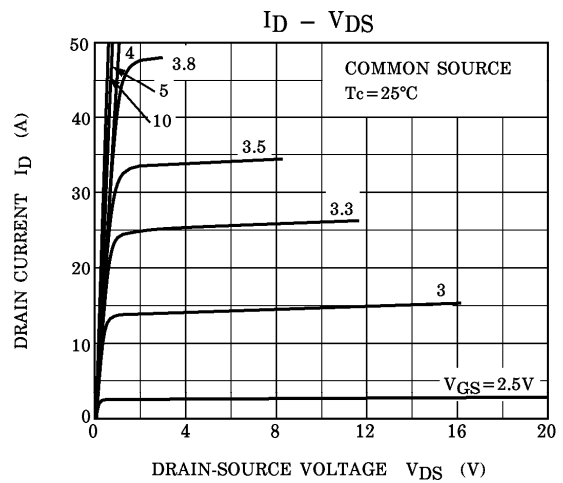
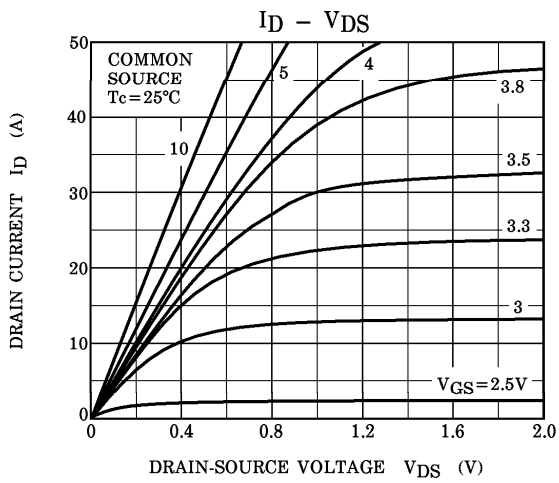


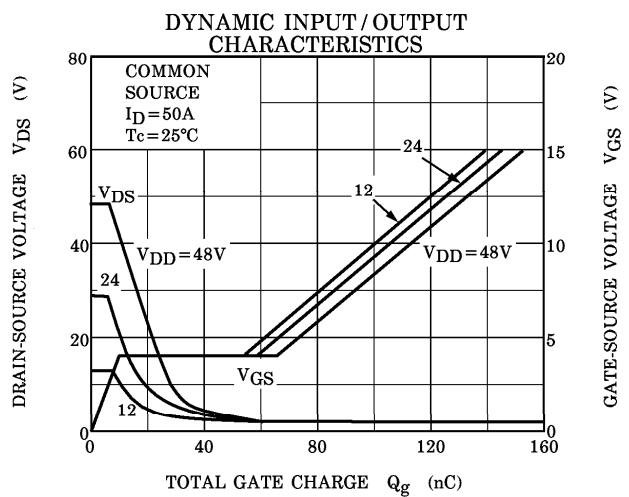
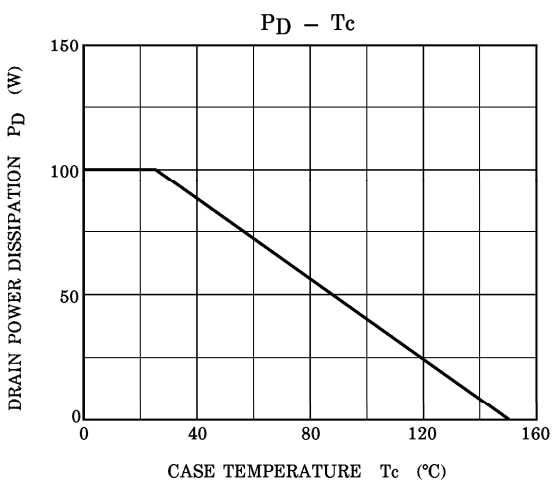
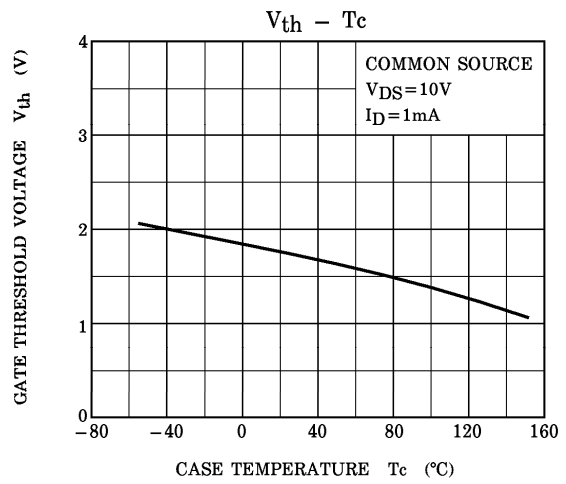
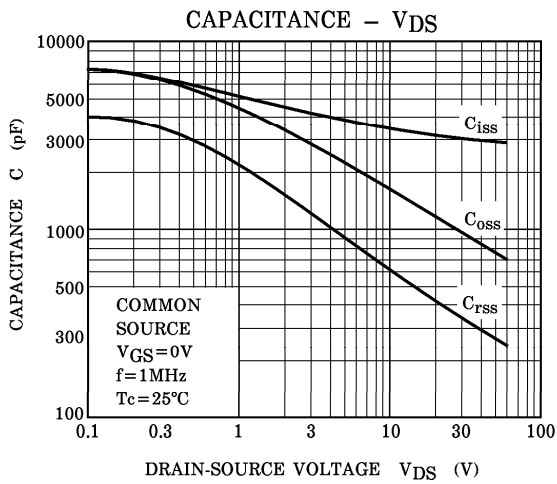
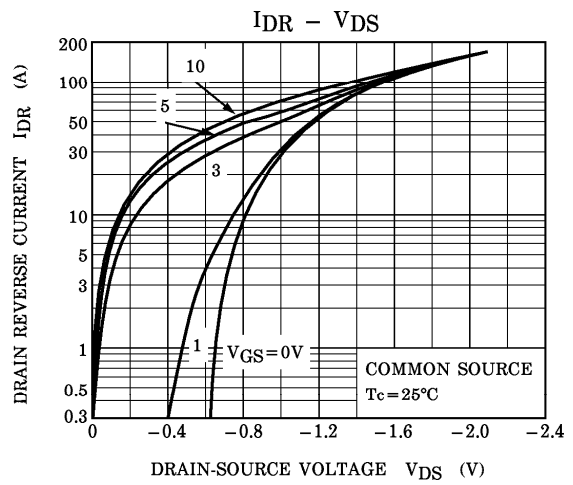
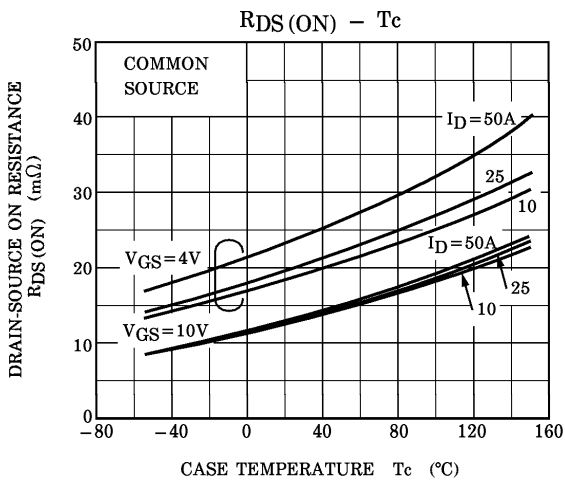
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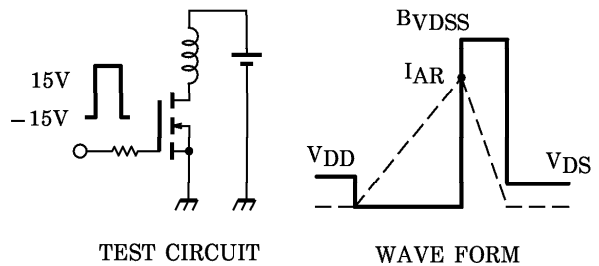
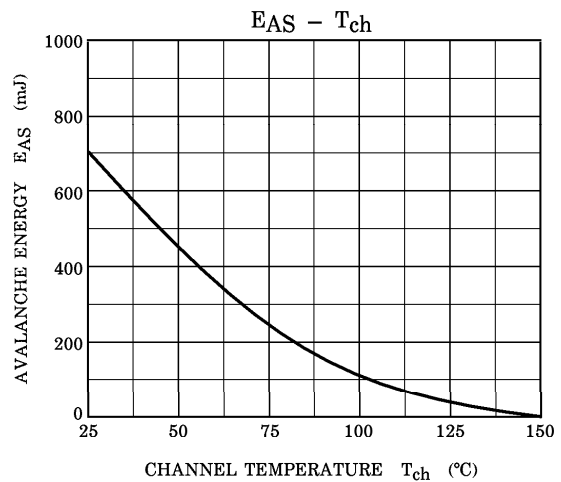
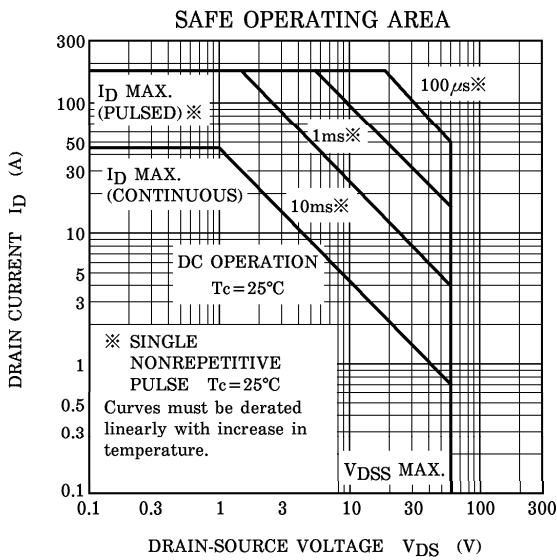
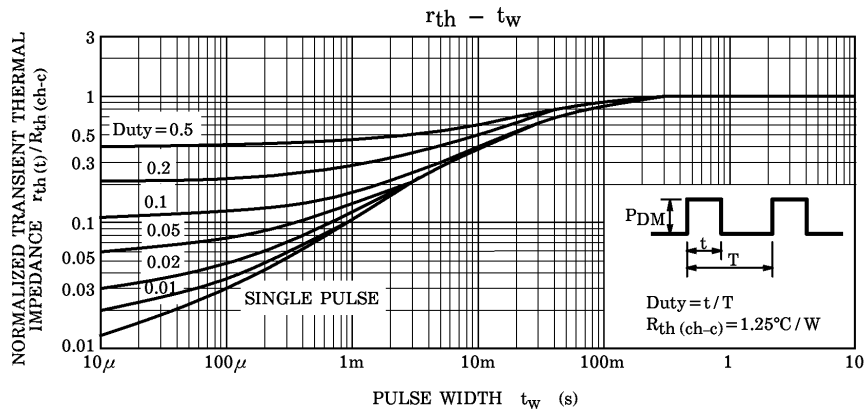
※ Lot Number

□ □ — Month (Starting from Alphabet A)

— Year (Last Number of the Christian Era)







Peak  $I_{AR} = 45A$ ,  $R_G = 25\Omega$   
 $V_{DD} = 25V$ ,  $L = 471\mu H$

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