

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

2SK2376

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 : $R_{DS(ON)} = 13 \text{ m}\Omega$ (Typ.)
- High Forward Transfer Admittance : $|Y_{fs}| = 40 \text{ S}$ (Typ.)
- Low Leakage Current : $I_{DSS} = 100 \mu\text{A}$ (Max.) ($V_{DS} = 60 \text{ V}$)
- Enhancement-Mode : $V_{th} = 0.8 \sim 2.0 \text{ V}$
($V_{DS} = 10 \text{ V}, I_D = 1 \text{ mA}$)

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

CHARACTERISTIC	SYMBOL	RATING	UNIT
Drain-Source Voltage	V_{DSS}	60	V
Drain-Gate Voltage ($R_{GS} = 20 \text{ k}\Omega$)	V_{DGR}	60	V
Gate-Source Voltage	V_{GSS}	± 20	V
Drain Current	DC	I_D	45 A
	Pulse	I_{DP}	180 A
Drain Power Dissipation ($T_c = 25^\circ\text{C}$)	P_D	100	W
Single Pulse Avalanche Energy**	E_{AS}	701	mJ
Avalanche Current	I_{AR}	45	A
Repetitive Avalanche Energy*	E_{AR}	10	mJ
Channel Temperature	T_{ch}	150	$^\circ\text{C}$
Storage Temperature Range	T_{stg}	$-55 \sim 150$	$^\circ\text{C}$

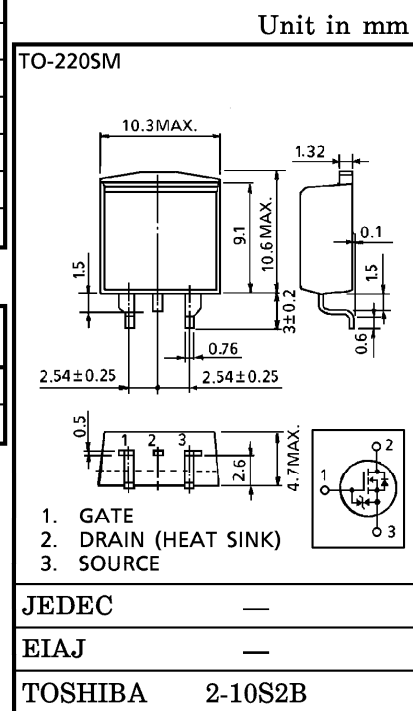
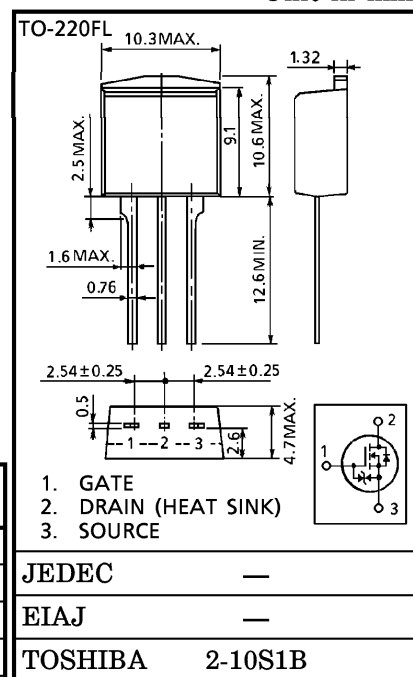
THERMAL CHARACTERISTICS

CHARACTERISTIC	SYMBOL	MAX.	UNIT
Thermal Resistance, Channel To Case	$R_{th(ch-c)}$	1.25	$^\circ\text{C}/\text{W}$
Thermal Resistance, Channel To Ambient	$R_{th(ch-a)}$	83.3	$^\circ\text{C}/\text{W}$

Note ;

- * Repetitive rating ; Pulse Width Limited by Max. junction temperature.
- ** $V_{DD} = 25 \text{ V}, T_{ch} = 25^\circ\text{C}$ (initial), $L = 471 \mu\text{H}, R_G = 25 \Omega, I_{AR} = 45 \text{ A}$

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



Weight : 1.5 g

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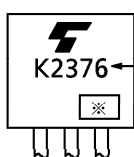
ELECTRICAL CHARACTERISTICS (Ta = 25°C)

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT	
Gate Leakage Current	I _{GSS}	V _{GS} = ±16 V, V _{DS} = 0 V	—	—	±10	μA	
Drain Cut-off Current	I _{DSS}	V _{DS} = 60 V, V _{GS} = 0 V	—	—	100	μA	
Drain-Source Breakdown Voltage	V _{(BR) DSS}	I _D = 10 mA, V _{GS} = 0 V	60	—	—	V	
Gate Threshold Voltage	V _{th}	V _{DS} = 10 V, I _D = 1 mA	0.8	—	2.0	V	
Drain-Source ON Resistance	R _{D(S) ON}	V _{GS} = 4 V, I _D = 25 A	—	19	25	mΩ	
		V _{GS} = 10 V, I _D = 25 A	—	13	17		
Forward Transfer Admittance	Y _{fs}	V _{DS} = 10 V, I _D = 25 A	28	40	—	S	
Input Capacitance	C _{iss}	V _{DS} = 10 V, V _{GS} = 0 V f = 1 MHz	—	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 < 5 ns, Duty ≤ 1%, t _w = 10 μs	—	180	
Total Gate Charge (Gate-Source Plus Gate-Drain)	Q _g	V _{DD} ≐ 48 V, V _{GS} = 10 V	—	110	—	nC	
Gate-Source Charge	Q _{gs}	I _D = 45 A	—	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} = 45 A, V _{GS} = 0 V	—	—	-1.7	V
Reverse Recovery Time	t _{rr}	I _{DR} = 45 A, V _{GS} = 0 V	—	120	—	ns
Reverse Recovery Charge	Q _{rr}	dI _{DR} / dt = 50 A / μs	—	0.2	—	μC

MARKING

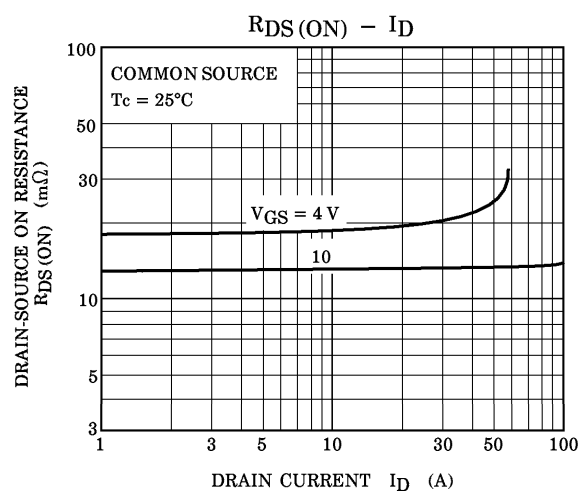
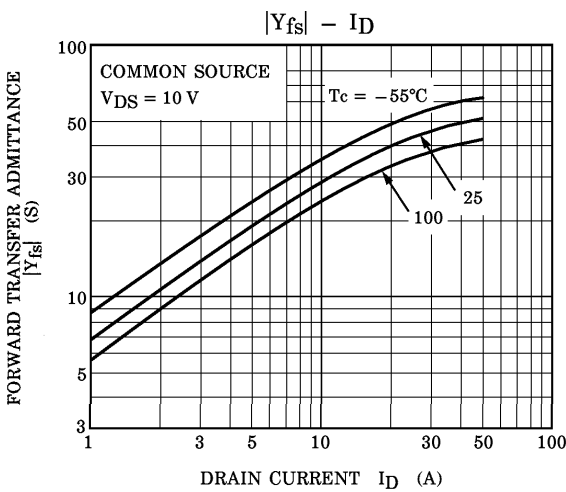
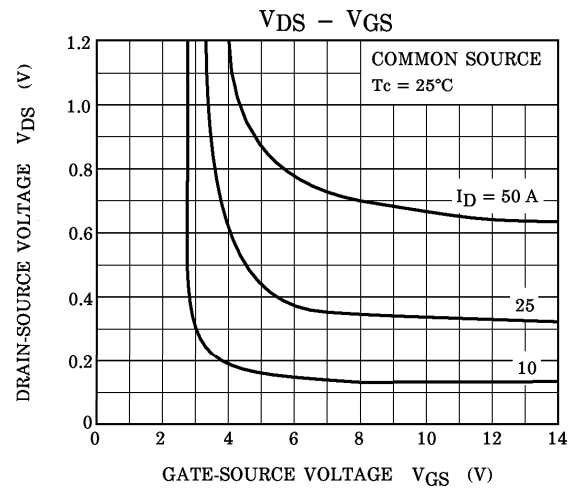
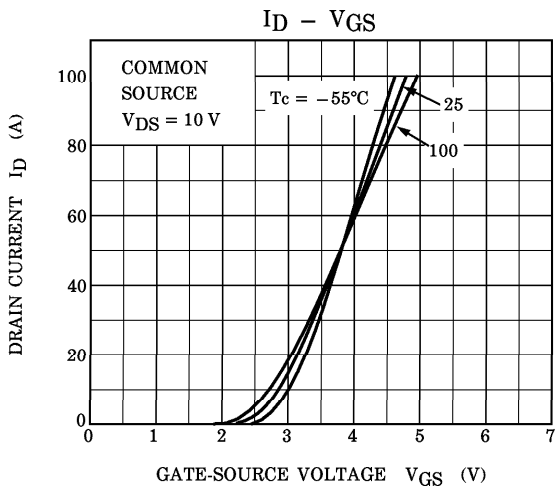
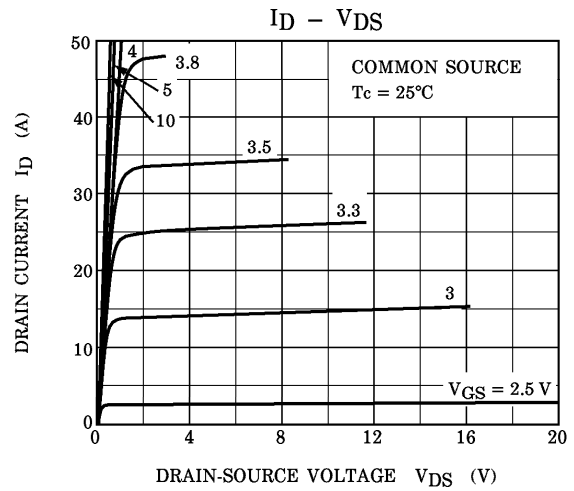
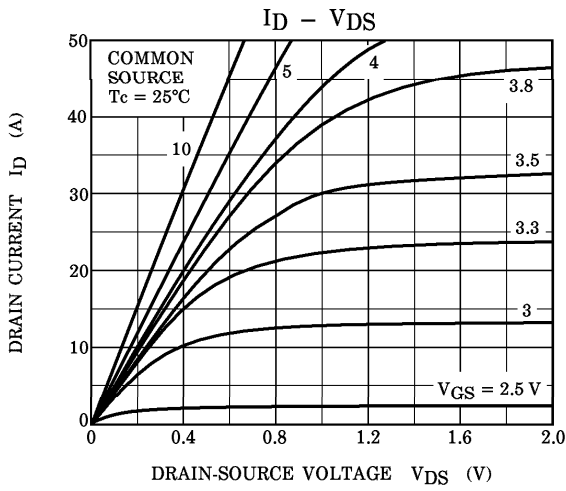


TYPE

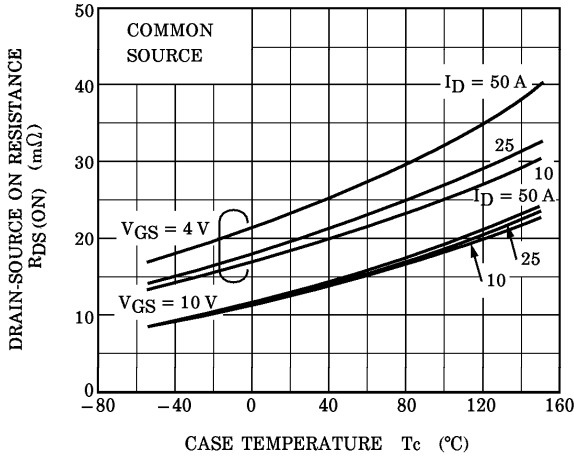
※ Lot Number

□ □ — Month (Starting from Alphabet A)

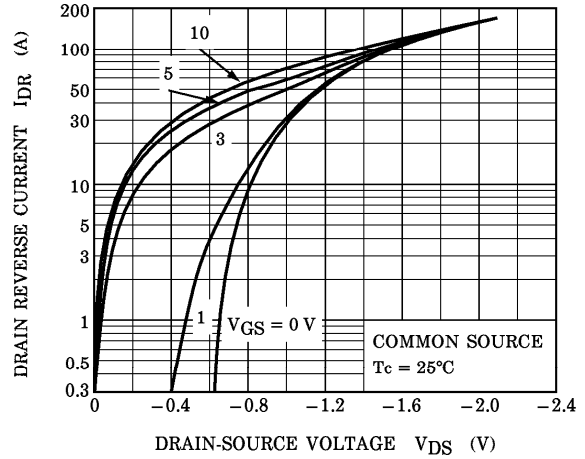
— Year (Last Number of the Christian Era)



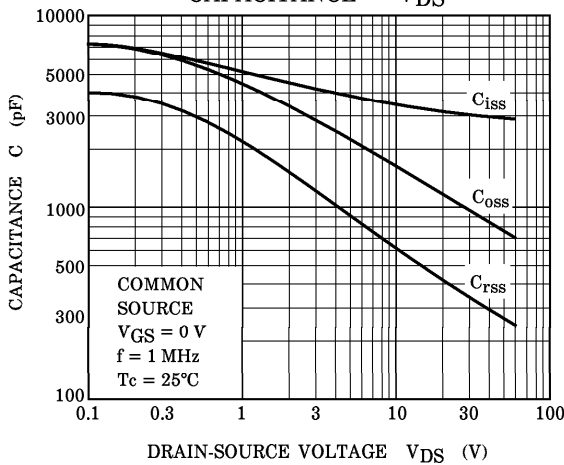
$R_{DS(ON)} - T_c$



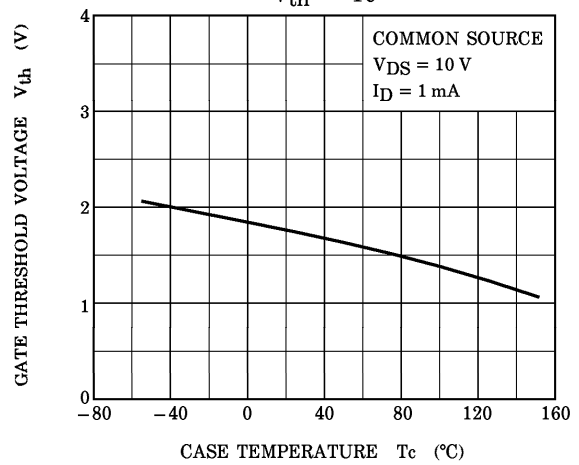
$I_{DR} - V_{DS}$



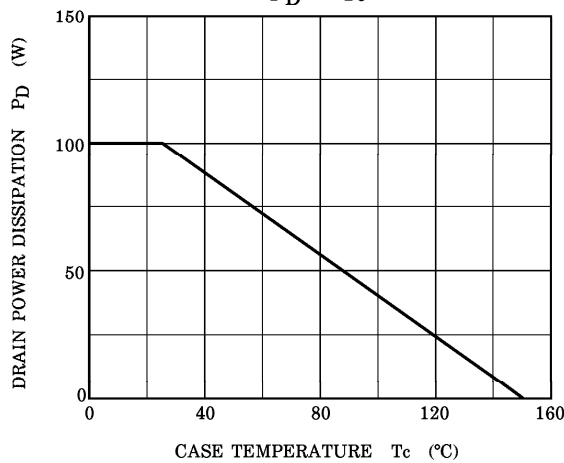
CAPACITANCE - V_{DS}



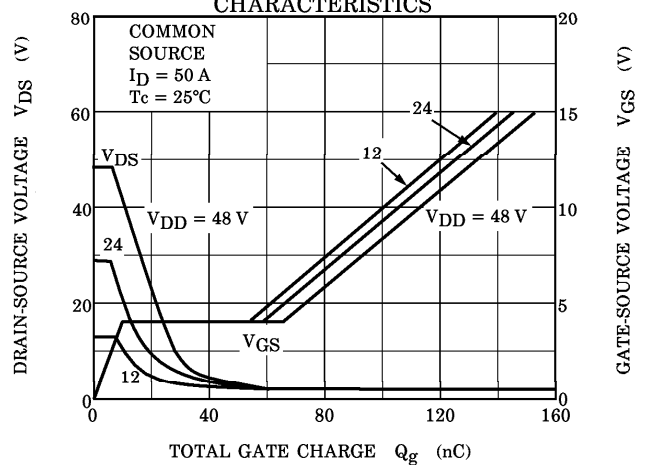
$V_{th} - T_c$

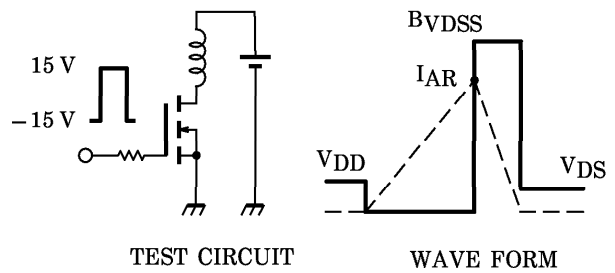
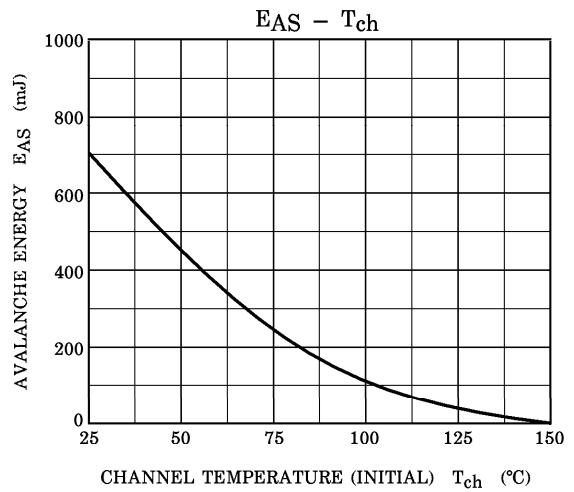
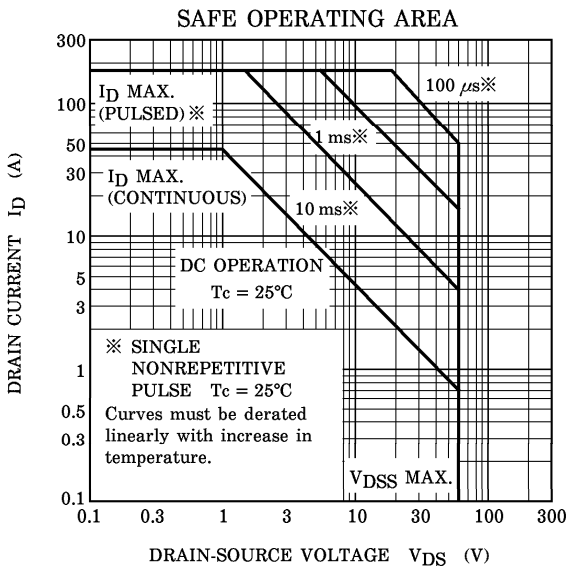
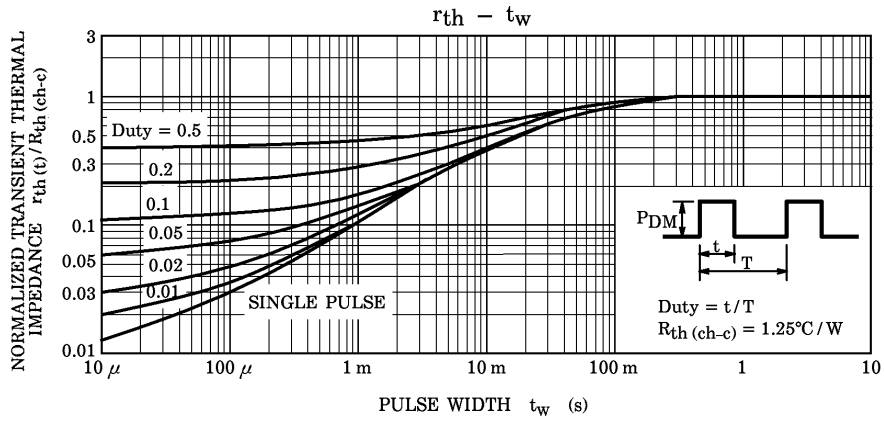


$P_D - T_c$



DYNAMIC INPUT/OUTPUT CHARACTERISTICS





Peak $I_{AR} = 45 \text{ A}$, $R_G = 25 \Omega$, $E_{AS} = \frac{1}{2} \cdot L \cdot I^2 \cdot \left(\frac{BVDSS}{BVDSS - V_{DD}} \right)$
 $V_{DD} = 25 \text{ V}$, $L = 471 \mu\text{H}$