

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

2SK2991

HIGH SPEED, HIGH VOLTAGE SWITCHING APPLICATIONS

DC-DC CONVERTER RELAY DRIVE AND MOTOR DRIVE APPLICATIONS

INDUSTRIAL 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}	± 30	V
Drain Current	DC	I_D	5 A
	Pulse	I_{DP}	20 A
Drain Power Dissipation ($T_c = 25^\circ C$)	P_D	50	W
Single Pulse Avalanche Energy**	E_{AS}	180	mJ
Avalanche Current	I_{AR}	5	A
Repetitive Avalanche Energy*	E_{AR}	4	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	$R_{th(ch-c)}$	2.5	$^\circ C / W$
Thermal Resistance, Channel to Ambient	$R_{th(ch-a)}$	83.3	$^\circ C / W$

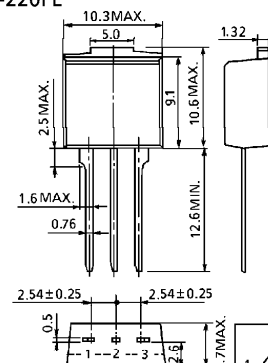
(Note)

* 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.

TO-220FL



1. GATE
2. DRAIN (HEAT SINK)
3. SOURCE

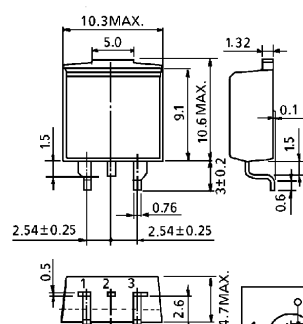
JEDEC —

EIAJ —

TOSHIBA 2-10S1B

Weight : 1.5g (Typ.)

TO-220SM



1. GATE
2. DRAIN (HEAT SINK)
3. SOURCE

JEDEC —

EIAJ —

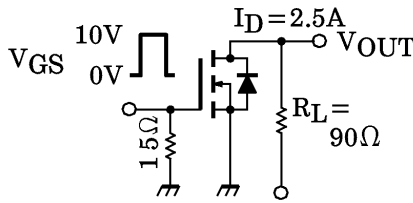
TOSHIBA 2-10S2B

Weight : 1.5g (Typ.)

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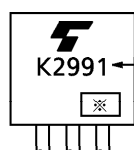
ELECTRICAL CHARACTERISTICS (Ta = 25°C)

CHARACTERISTIC		SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Gate Leakage Current		I_{GSS}	$V_{GS} = \pm 25V, V_{DS} = 0V$	—	—	± 10	μA
Gate-Source Breakdown Voltage		$V_{(BR)GSS}$	$I_G = \pm 10\mu A, V_{DS} = 0V$	± 30	—	—	V
Drain Cut-off Current		I_{DSS}	$V_{DS} = 500V, V_{GS} = 0V$	—	—	100	μA
Drain-Source Breakdown Voltage		$V_{(BR)DSS}$	$I_D = 10mA, V_{GS} = 0V$	500	—	—	V
Gate Threshold Voltage		V_{th}	$V_{DS} = 10V, I_D = 1mA$	2.0	—	4.0	V
Drain-Source ON Resistance		$R_{DS(ON)}$	$V_{GS} = 10V, I_D = 2.5A$	—	1.35	1.50	Ω
Forward Transfer Admittance		$ Y_{fs} $	$V_{DS} = 10V, I_D = 2.5A$	2.5	4.0	—	S
Input Capacitance		C_{iss}	$V_{DS} = 10V, V_{GS} = 0V, f = 1MHz$	—	780	—	pF
Reverse Transfer Capacitance		C_{rss}		—	60	—	
Output Capacitance		C_{oss}		—	200	—	
Switching Time	Rise Time	t_r	 $V_{IN} : t_r, t_f < 5ns, V_{DD} \doteq 225V$ Duty $\leq 1\%, t_w = 10\mu s$	—	12	—	ns
	Turn-on Time	t_{on}		—	25	—	
	Fall Time	t_f		—	15	—	
	Turn-off Time	t_{off}		—	60	—	
Total Gate Charge (Gate-Source Plus Gate-Drain)		Q_g	$V_{DD} \doteq 400V, V_{GS} = 10V, I_D = 5A$	—	17	—	nC
Gate-Source Charge		Q_{gs}		—	11	—	
Gate-Drain ("Miller") Charge		Q_{gd}		—	6	—	

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

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Continuous Drain Reverse Current	I_{DR}	—	—	—	5	A
Pulse Drain Reverse Current	I_{DRP}	—	—	—	20	A
Diode Forward Voltage	V_{DSF}	$I_{DR} = 5A, V_{GS} = 0V$	—	—	−1.7	V
Reverse Recovery Time	t_{rr}	$I_{DR} = 5A, V_{GS} = 0V$	—	1400	—	ns
Reverse Recovery Charge	Q_{rr}	$dI_{DR} / dt = 100A / \mu s$	—	9	—	μC

MARKING

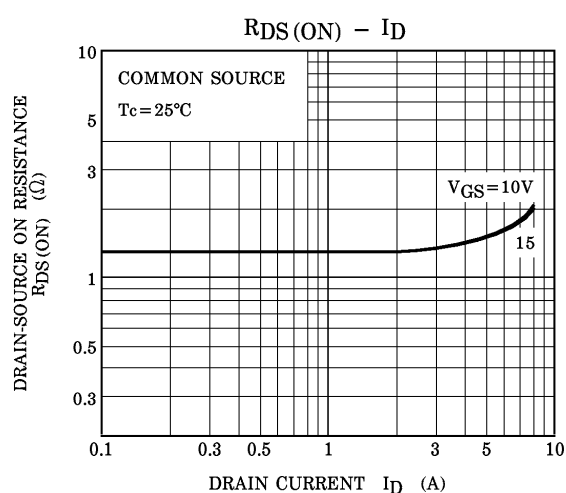
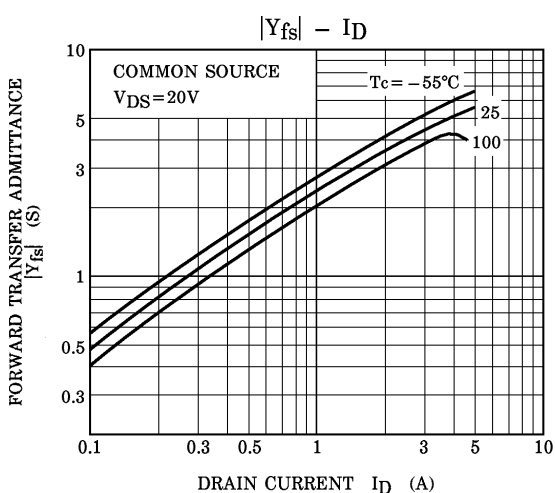
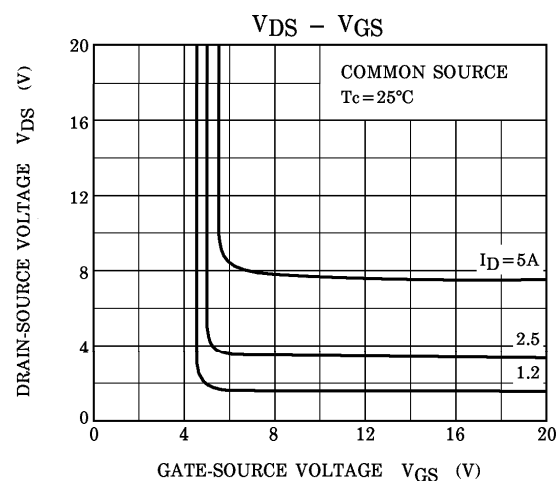
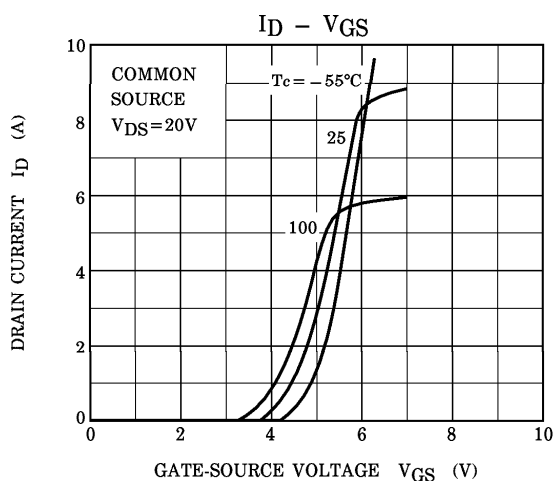
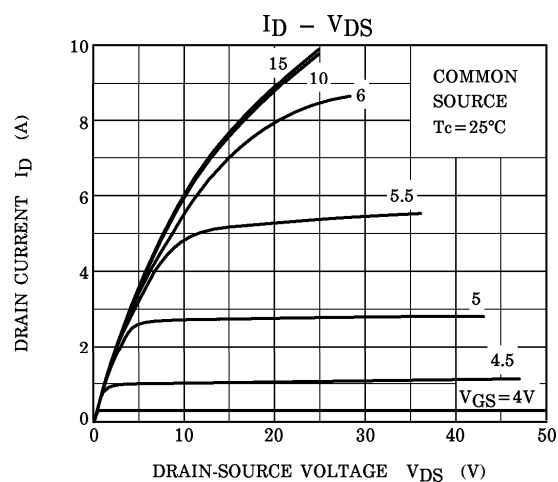
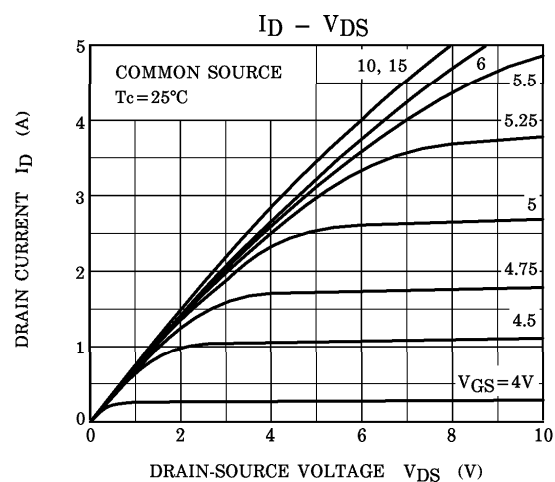


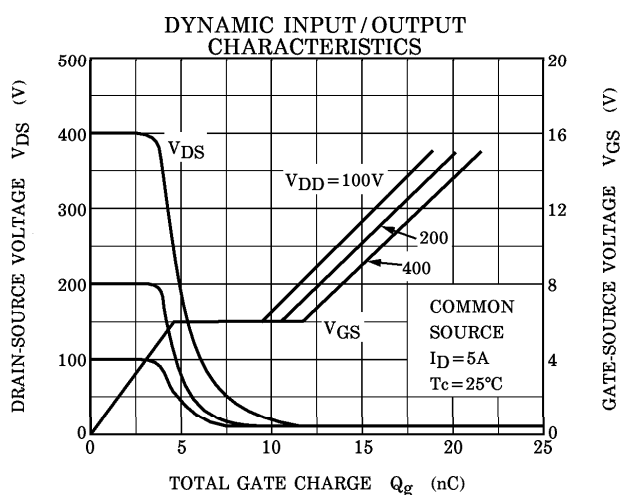
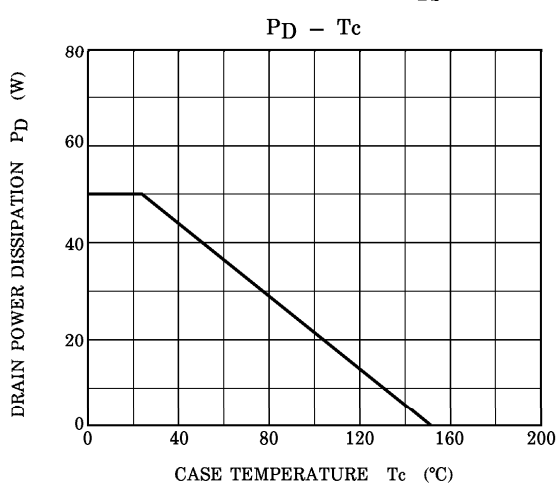
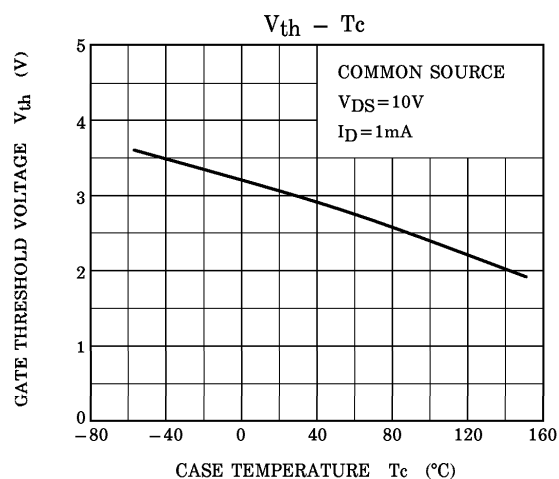
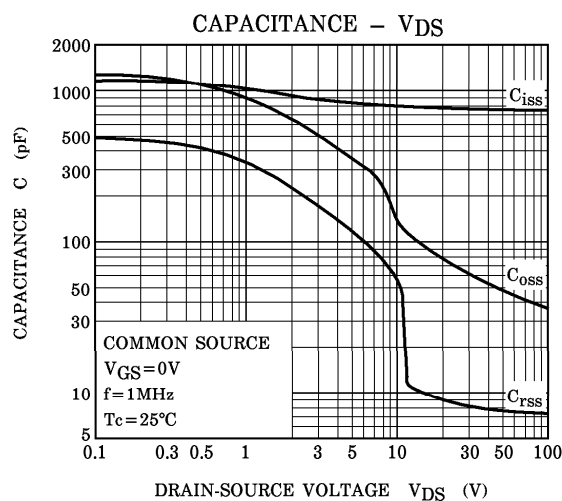
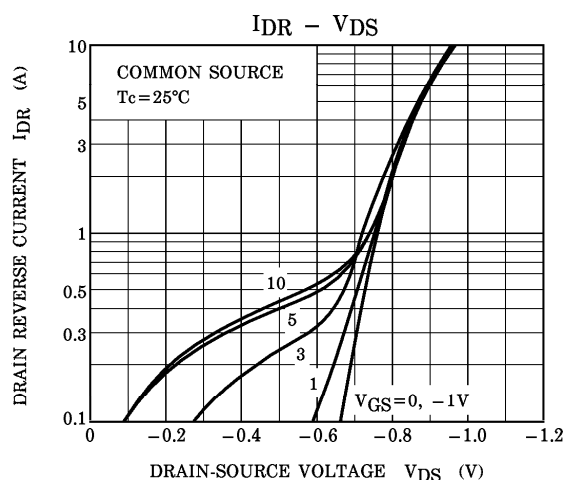
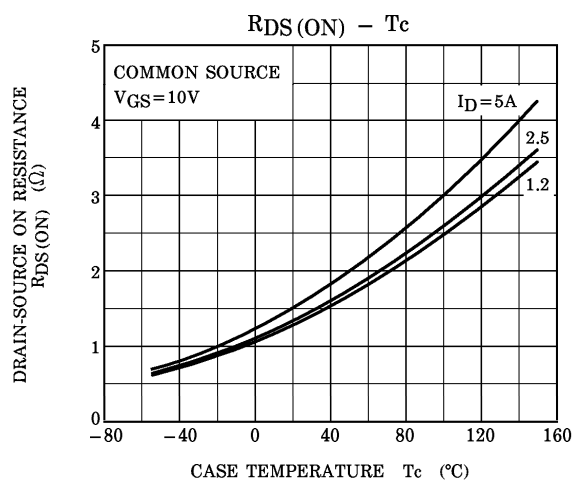
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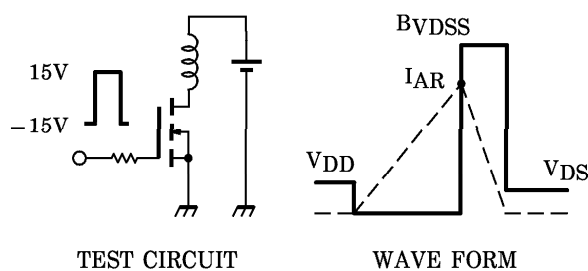
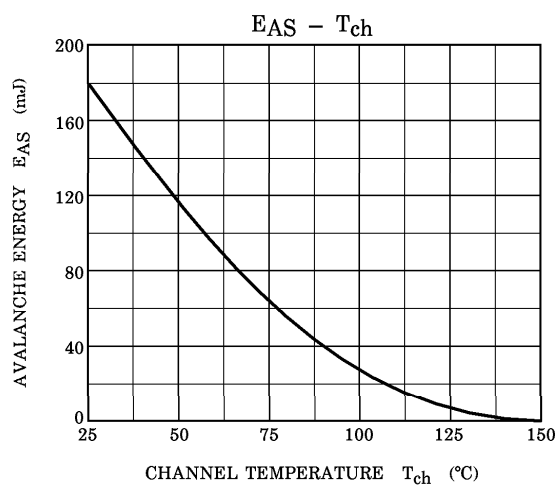
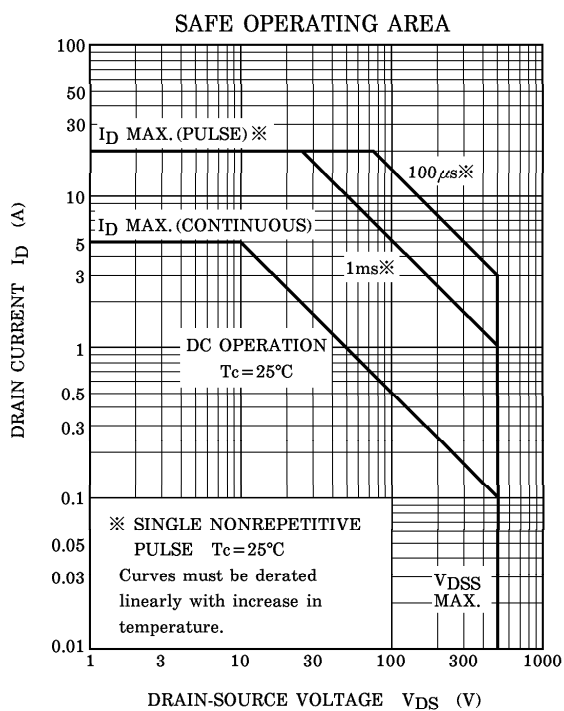
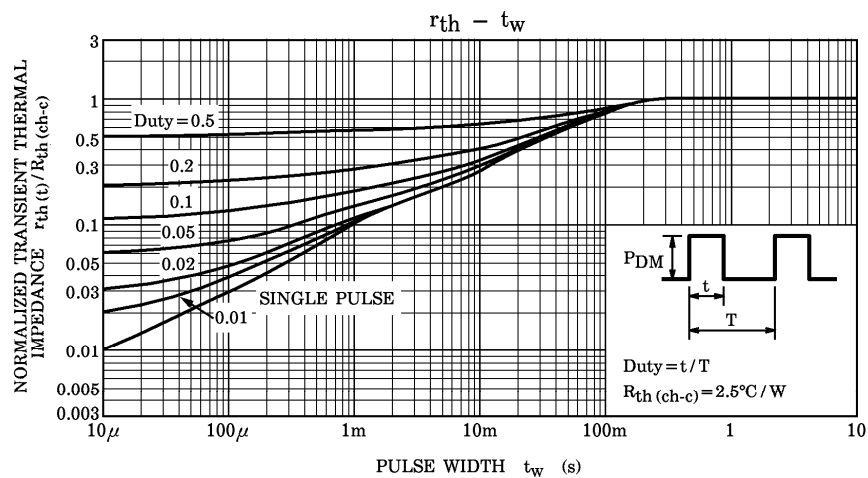


Month (Starting from Alphabet A)

Year (Last Number of the Christian Era)







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

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