

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

2SJ402

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

- 4 V Gate Drive
- Low Drain-Source ON Resistance : $R_{DS(ON)} = 29 \text{ m}\Omega$ (Typ.)
- High Forward Transfer Admittance : $|Y_{fs}| = 23 \text{ S}$ (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 (Ta = 25°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	-30	A
	Pulse	I_{DP}	-120	A
Drain Power Dissipation ($T_c = 25^\circ\text{C}$)		P_D	100	W
Single Pulse Avalanche Energy**		E_{AS}	936	mJ
Avalanche Current		I_{AR}	-30	A
Repetitive Avalanche Energy*		E_{AR}	10	mJ
Channel Temperature		T_{ch}	150	°C
Storage Temperature Range		T_{stg}	-55~150	°C

THEMAL CHARACTERISTICS

CHARACTERISTIC	SYMBOL	MAX.	UNIT
Thermal Resistance, Channel to Case	$R_{th(ch-c)}$	1.25	°C/W
Thermal Resistance, Channel to Ambient	$R_{th(ch-a)}$	83.3	°C/W

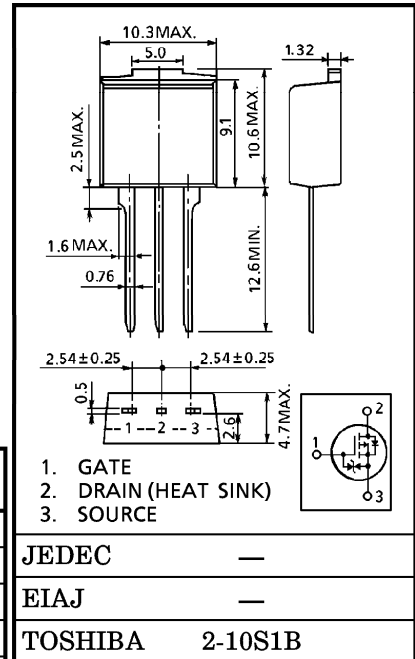
Note ;

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

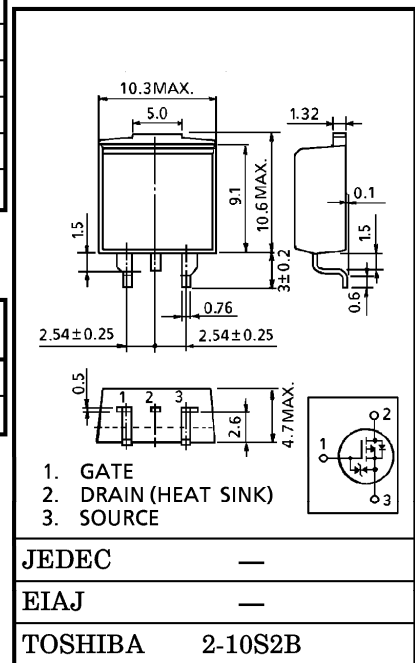
** $V_{DD} = -50 \text{ V}$, Starting $T_{ch} = 25^\circ\text{C}$, $L = 747 \mu\text{H}$, $R_G = 25 \Omega$, $I_{AR} = -30 \text{ A}$

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

INDUSTRIAL APPLICATIONS
TO-220FL Unit in mm



TO-220SM Unit in mm



Weight : 1.5 g

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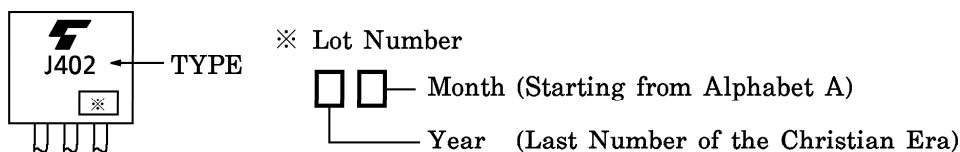
ELECTRICAL CHARACTERISTICS (Ta = 25°C)

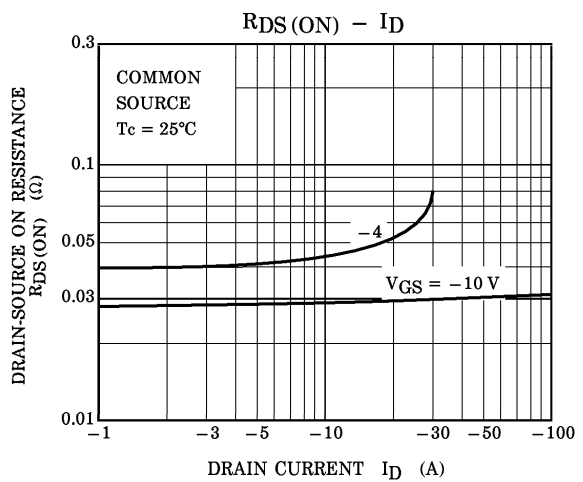
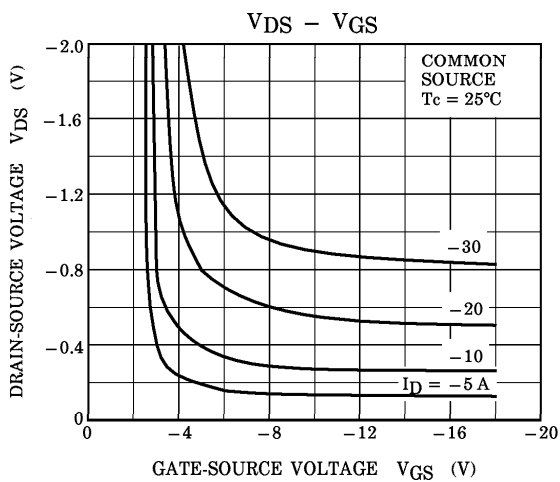
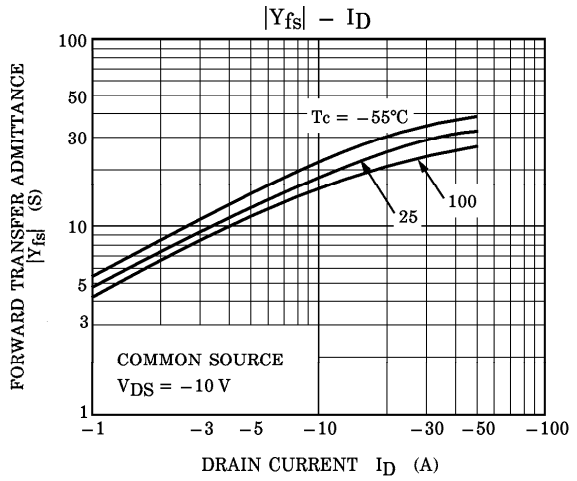
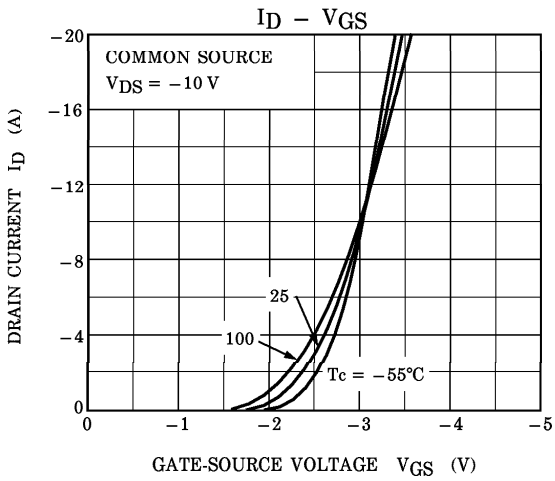
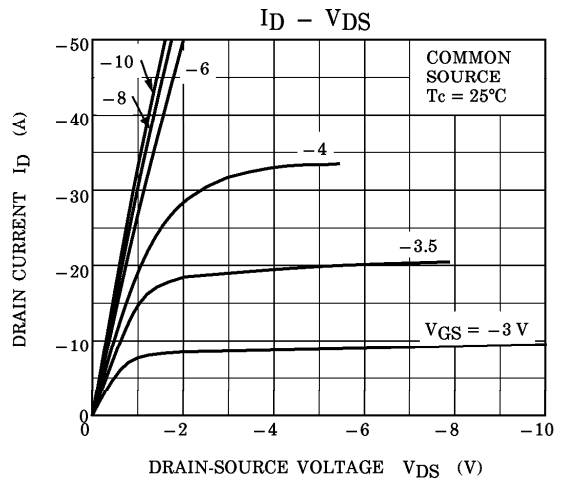
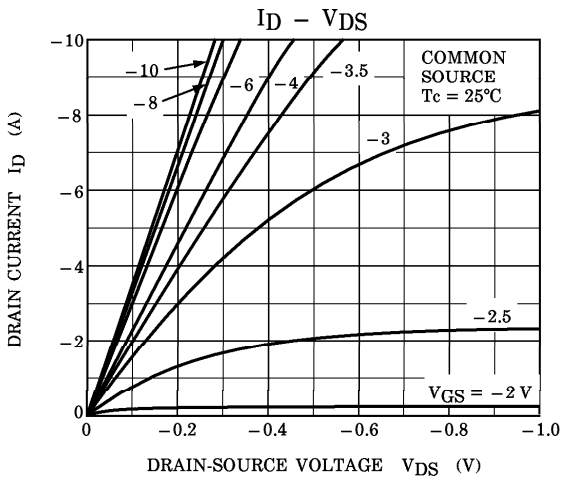
CHARACTERISTIC		SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Gate Leakage Current		I_{GSS}	$V_{GS} = \pm 16\text{ V}, V_{DS} = 0\text{ V}$	—	—	± 10	μA
Drain Cut-off Current		I_{DSS}	$V_{DS} = -60\text{ V}, V_{GS} = 0\text{ V}$	—	—	-100	μA
Drain-Source Breakdown Voltage		$V(\text{BR})_{DSS}$	$I_D = -10\text{ mA}, V_{GS} = 0\text{ V}$	-60	—	—	V
Gate Threshold Voltage		V_{th}	$V_{DS} = -10\text{ V}, I_D = -1\text{ mA}$	-0.8	—	-2.0	V
Drain-Source ON Resistance		$R_{DS(\text{ON})}$	$V_{GS} = -4\text{ V}, I_D = -15\text{ A}$	—	46	60	m Ω
			$V_{GS} = -10\text{ V}, I_D = -15\text{ A}$	—	29	38	
Forward Transfer Admittance		$ Y_{fs} $	$V_{DS} = -10\text{ V}, I_D = -15\text{ A}$	14	23	—	S
Input Capacitance		C_{iss}	$V_{DS} = -10\text{ V}, V_{GS} = 0\text{ V},$ $f = 1\text{ MHz}$	—	3300	—	pF
Reverse Transfer Capacitance		C_{rss}		—	460	—	
Output Capacitance		C_{oss}		—	1450	—	
Switching Time	Rise Time	t_r		—	20	—	ns
	Turn-on Time	t_{on}		—	25	—	
	Fall Time	t_f		—	35	—	
	Turn-off Time	t_{off}		$V_{IN} : t_r, t_f < 5\text{ ns}$ $\text{Duty} \leq 1\%, t_W = 10\ \mu\text{s}$	—	130	
Total Gate Charge (Gate-Source Plus Gate-Drain)		Q_g	$V_{DD} \doteq -48\text{ V}, V_{GS} = -10\text{ V}$	—	110	—	nC
Gate-Source Charge		Q_{gs}	$I_D = -30\text{ A}$	—	75	—	
Gate-Drain ("Miller") Charge		Q_{gd}		—	35	—	

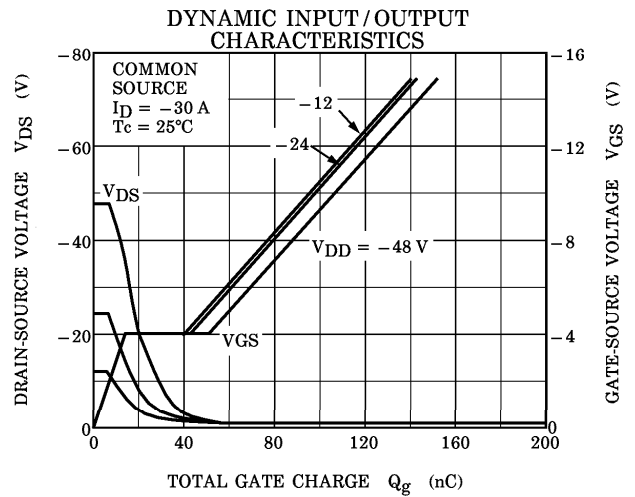
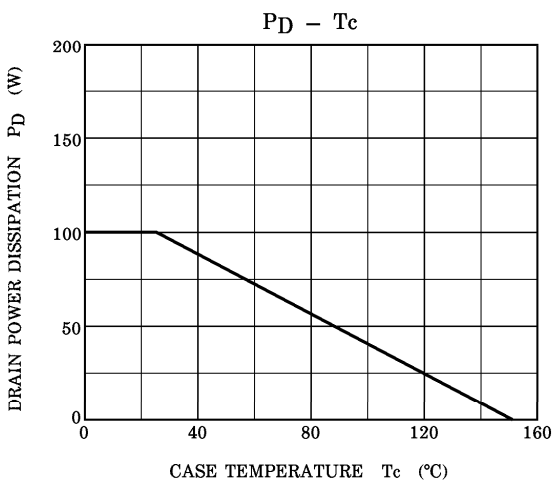
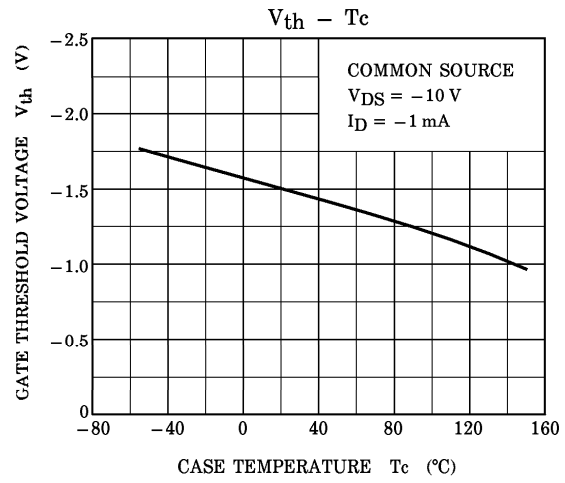
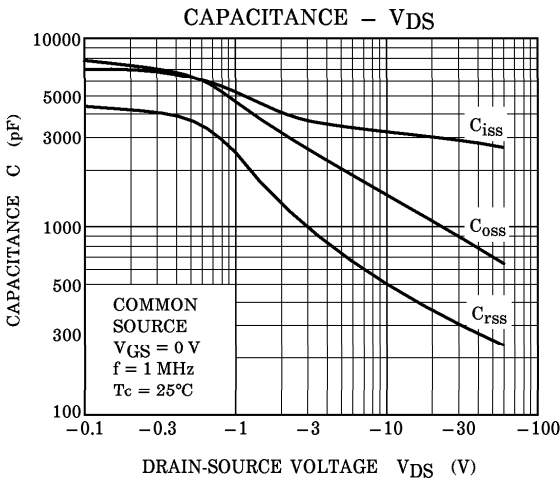
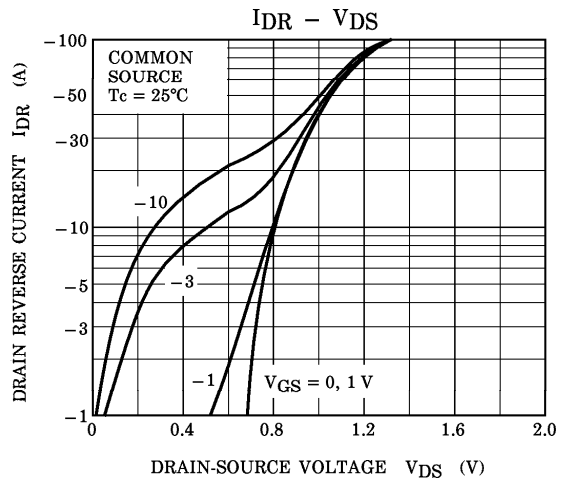
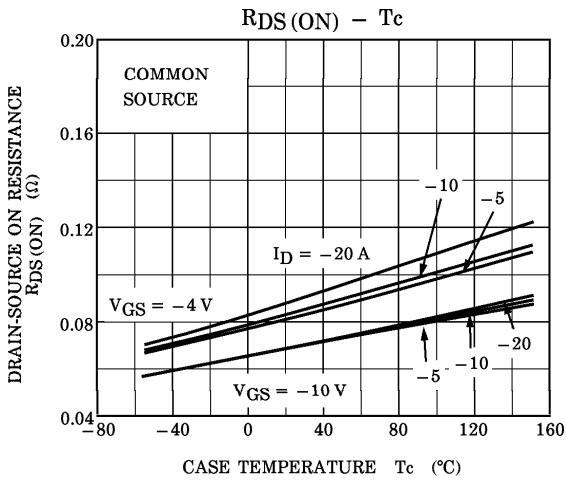
SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS (Ta = 25°C)

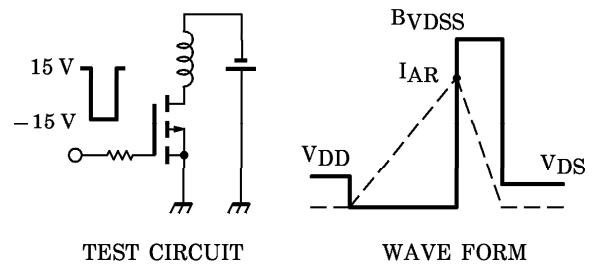
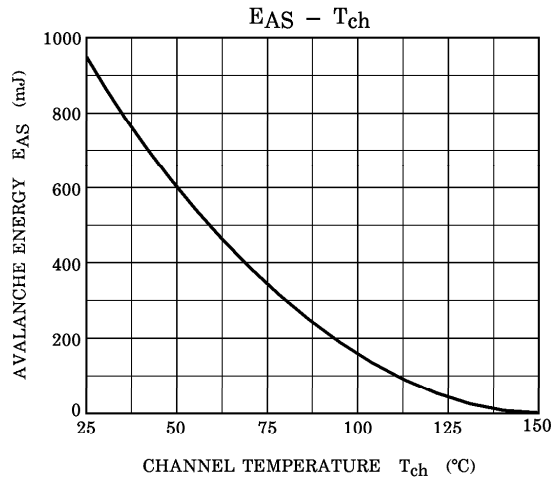
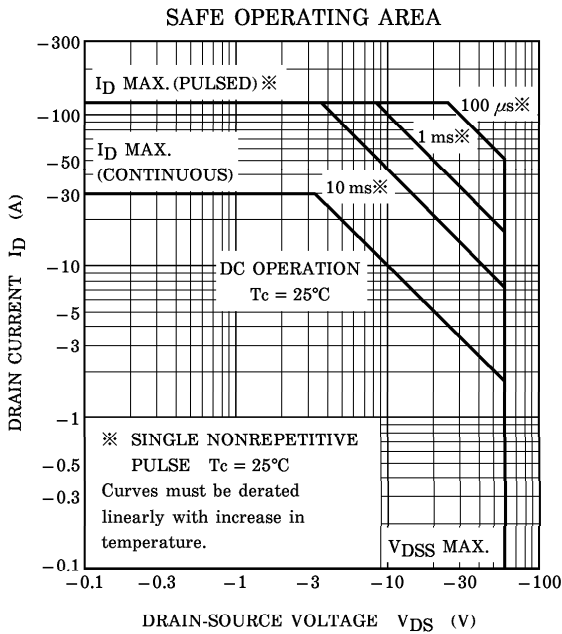
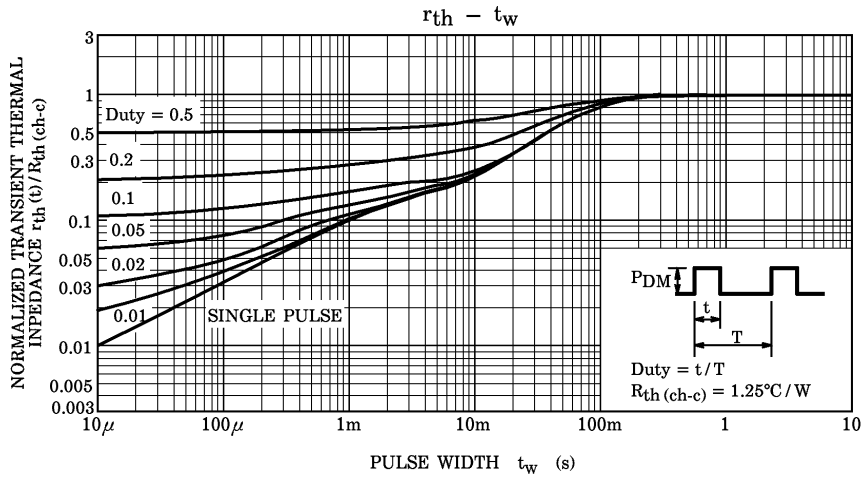
CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Continuous Drain Reverse Current	I_{DR}	—	—	—	-30	A
Pulse Drain Reverse Current	I_{DRP}	—	—	—	-120	A
Diode Forward Voltage	V_{DSF}	$I_{DR} = -30\text{ A}, V_{GS} = 0\text{ V}$	—	—	1.7	V
Reverse Recovery Time	t_{rr}	$I_{DR} = -30\text{ A}, V_{GS} = 0\text{ V}$	—	100	—	ns
Reverse Recovery Charge	Q_{rr}	$dI_{DR}/dt = 50\text{ A}/\mu\text{s}$	—	0.16	—	μC

MARKING









Peak $I_{AR} = -30$ A, $R_G = 25 \Omega$
 $V_{DD} = -50$ V, $L = 747 \mu\text{H}$

$$E_{AS} = \frac{1}{2} \cdot L \cdot I^2 \cdot \left(\frac{BVDSS}{BVDSS - VDD} \right)$$