

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

2SJ401

HIGH SPEED, HIGH CURRENT SWITCHING APPLICATIONS

DC-DC CONVERTER, RELAY DRIVE AND MOTOR DRIVE APPLICATIONS

- 4 V Gate Drive
- Low Drain-Source ON Resistance : $R_{DS(ON)} = 33 \text{ m}\Omega$ (Typ.)
- High Forward Transfer Admittance : $|Y_{fs}| = 20 \text{ S}$ (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	-20	A
	Pulse	I_{DP}	-80	A
Drain Power Dissipation ($T_c = 25^\circ\text{C}$)		P_D	100	W
Single Pulse Avalanche Energy**		E_{AS}	800	mJ
Avalanche Current		I_{AR}	-20	A
Repetitive Avalanche Energy*		E_{AR}	10	mJ
Channel Temperature		T_{ch}	150	°C
Storage Temperature Range		T_{stg}	-55~150	°C

THERMAL 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

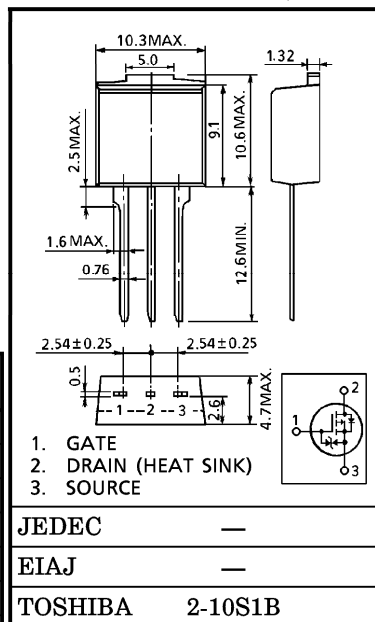
Note ;

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

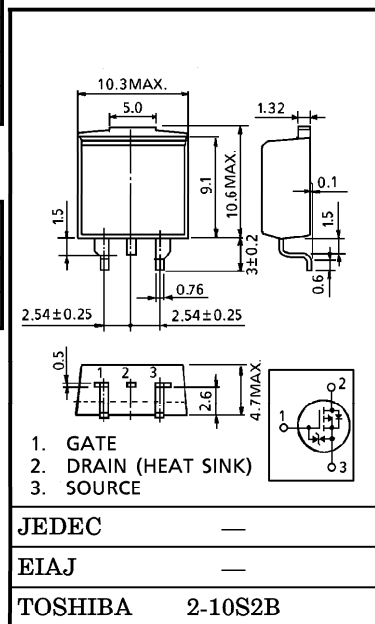
** $V_{DD} = -50 \text{ V}$, Starting $T_{ch} = 25^\circ\text{C}$, $L = 1.44 \text{ mH}$
 $R_G = 25 \Omega$, $I_{AR} = -20 \text{ A}$

**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

961001FAA2

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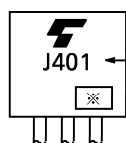
ELECTRICAL CHARACTERISTICS (Ta = 25°C)

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	$V_{(BR)DSS}$	$I_D = -10\text{ mA}, V_{GS} = 0\text{ V}$	-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	$R_{DS(ON)}$	$V_{GS} = -4\text{ V}, I_D = -10\text{ A}$	—	50	90	m Ω	
		$V_{GS} = -10\text{ V}, I_D = -10\text{ A}$	—	33	45		
Forward Transfer Admittance	$ Y_{fs} $	$V_{DS} = -10\text{ V}, I_D = -10\text{ A}$	10	20	—	S	
Input Capacitance	C_{iss}	$V_{DS} = 10\text{ V}, V_{GS} = 0\text{ V},$ $f = 1\text{ MHz}$	—	2800	—	pF	
Reverse Transfer Capacitance	C_{rss}		—	450	—		
Output Capacitance	C_{oss}		—	1300	—		
Switching Time	Rise Time	t_r		—	15	—	ns
	Turn-on Time	t_{on}		—	35	—	
	Fall Time	t_f		—	25	—	
	Turn-off Time	t_{off}		$V_{IN} : t_r, t_f < 5\text{ ns}$ $V_{DD} \doteq -30\text{ V}$ $\text{Duty} \leq 1\%, t_w = 10\ \mu\text{s}$	—	120	
Total Gate Charge (Gate-Source Plus Gate-Drain)	Q_g	$V_{DD} \doteq -48\text{ V}, V_{GS} = -10\text{ V}$	—	90	—	nC	
Gate-Source Charge	Q_{gs}	$I_D = -20\text{ A}$	—	65	—		
Gate-Drain ("Miller") Charge	Q_{gd}		—	25	—		

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

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Continuous Drain Reverse Current	I_{DR}	—	—	—	-20	A
Pulse Drain Reverse Current	I_{DRP}	—	—	—	-80	A
Diode Forward Voltage	V_{DSF}	$I_{DR} = -20\text{ A}, V_{GS} = 0\text{ V}$	—	—	1.7	V
Reverse Recovery Time	t_{rr}	$I_{DR} = -20\text{ A}, V_{GS} = 0\text{ V}$	—	75	—	ns
Reverse Recovery Charge	Q_{rr}	$dI_{DR}/dt = -50\text{ A}/\mu\text{s}$	—	83	—	nC

MARKING

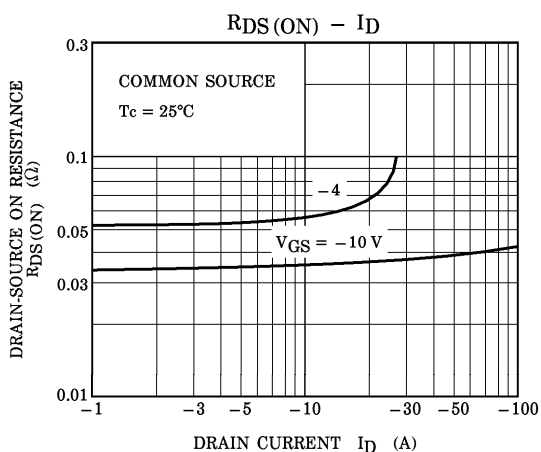
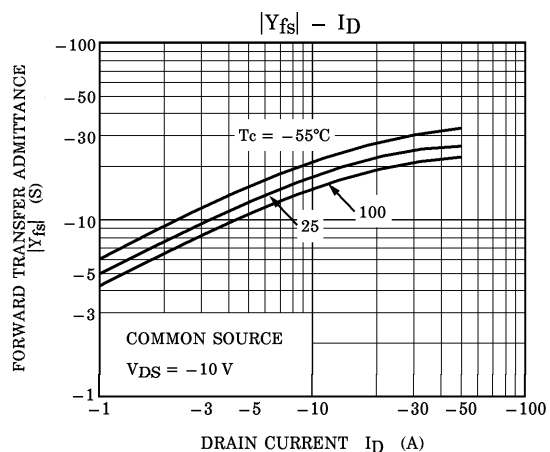
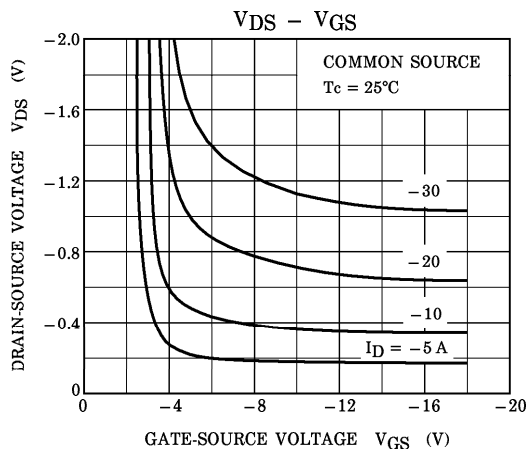
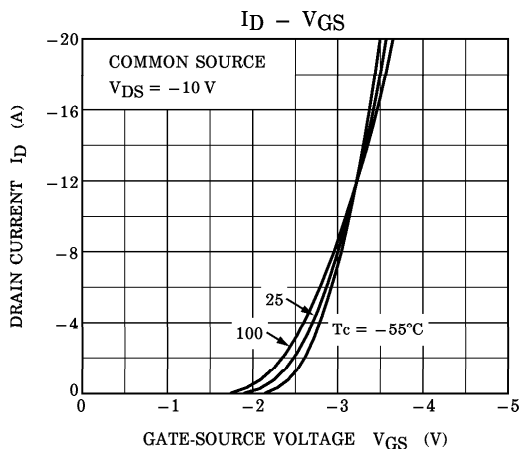
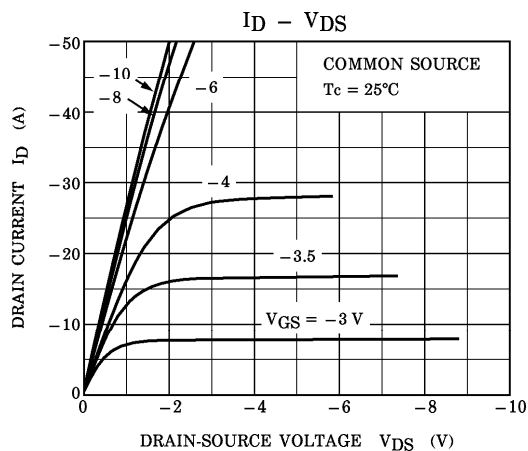
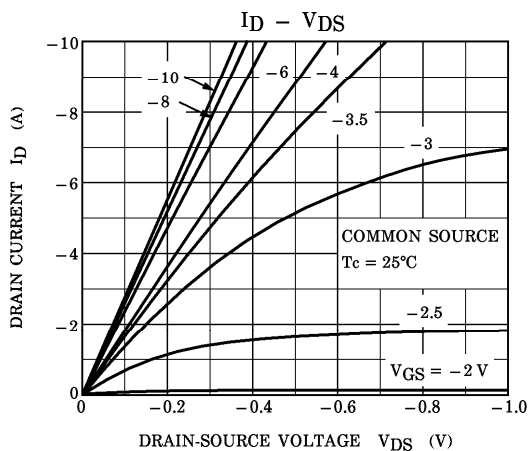


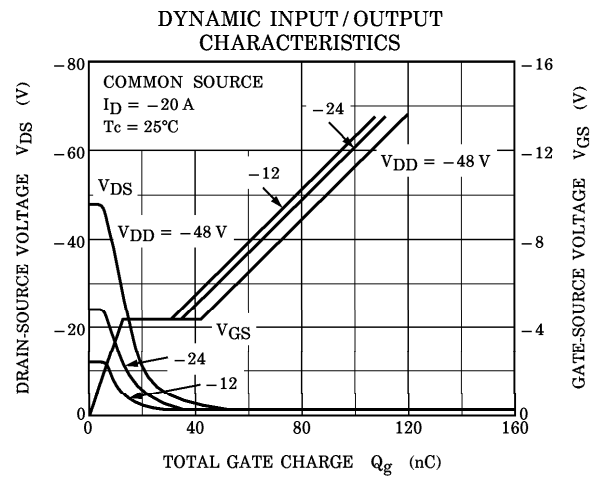
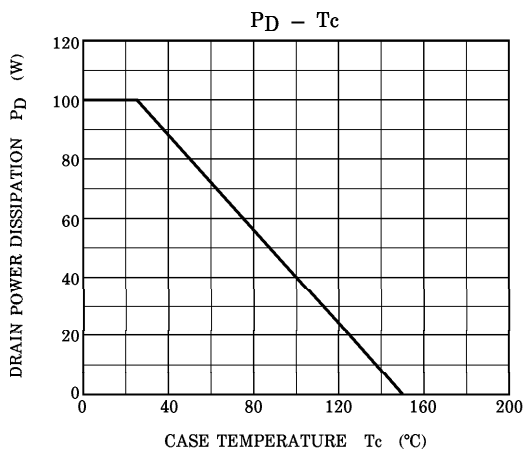
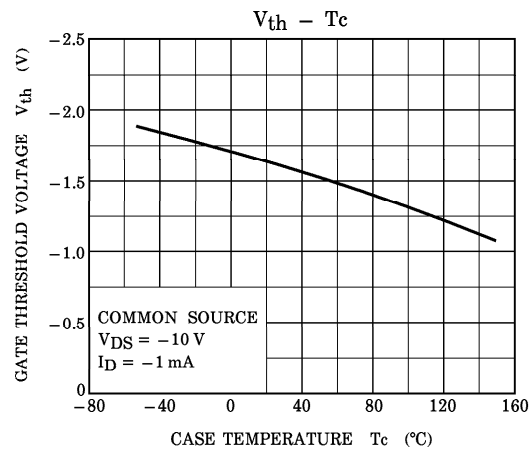
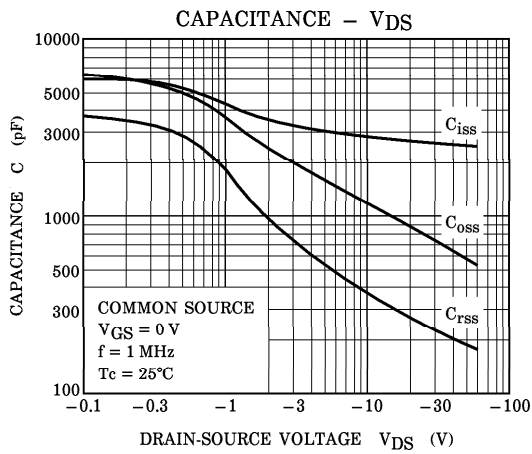
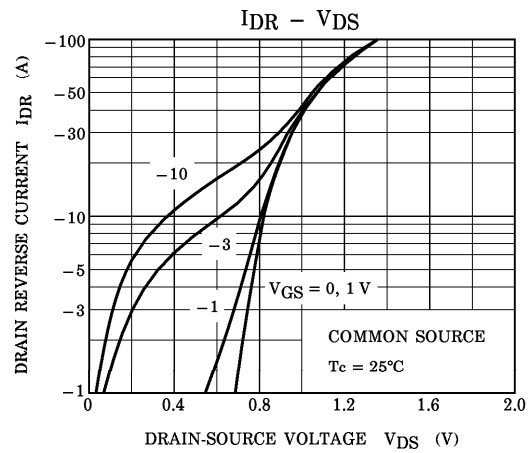
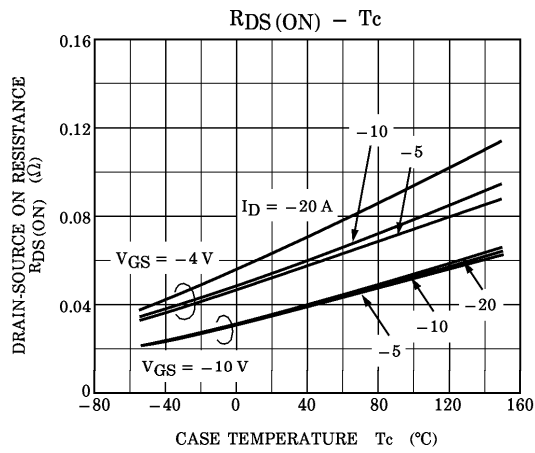
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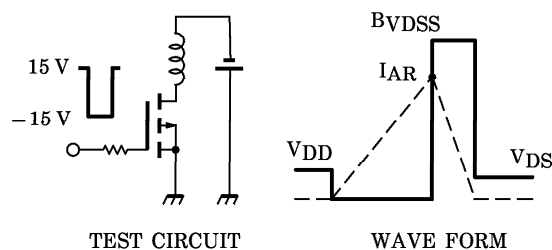
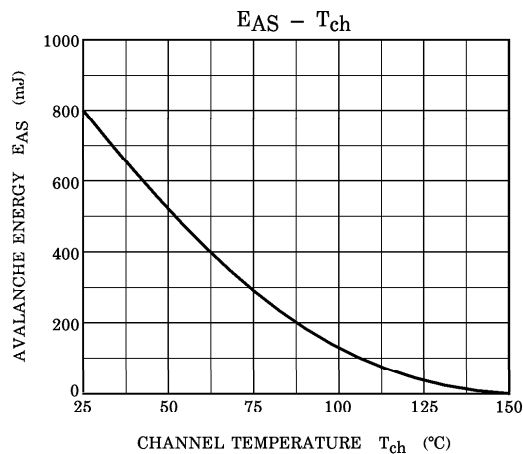
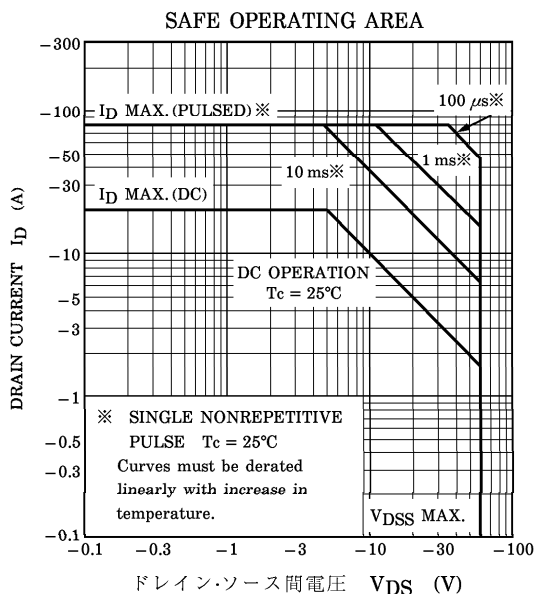
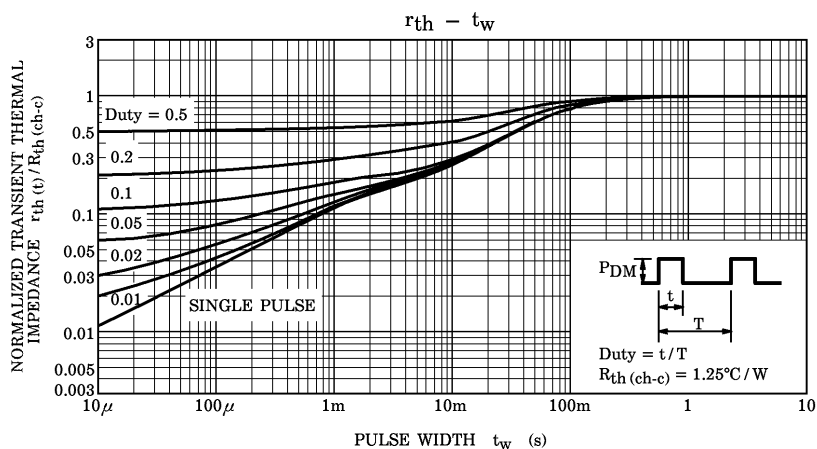
※ Lot Number

□ □ — Month (Starting from Alphabet A)

— Year (Last Number of the Christian Era)







Peak $I_{AR} = -20$ A, $R_G = 25 \Omega$
 $V_{DD} = -50$ V, $L = 1.44$ mH

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