

TOSHIBA FIELD EFFECT TRANSISTOR SILICON P CHANNEL MOS TYPE (L<sup>2</sup>-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 ( $T_a = 25^\circ\text{C}$ )

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		$V_{GSS}$	$\pm 20$	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	$^\circ\text{C}$
Storage Temperature Range		$T_{stg}$	-55~150	$^\circ\text{C}$

HERMAL 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	$^\circ\text{C} / \text{W}$

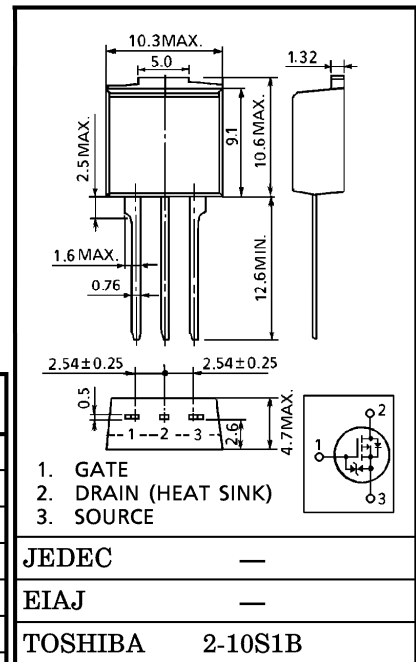
Note ;

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

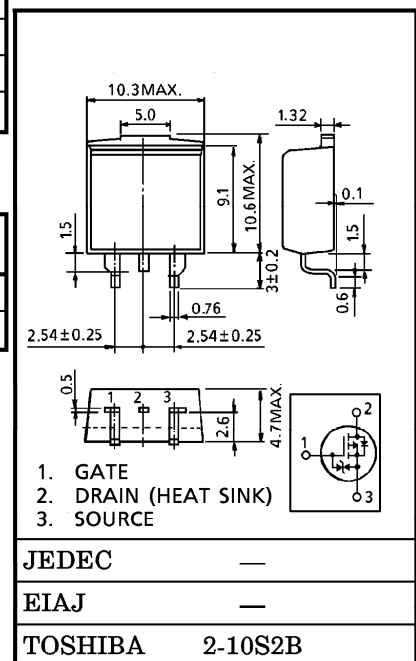
\*\*  $V_{DD} = -50 \text{ V}$ , Starting  $T_{ch} = 25^\circ\text{C}$ ,  $L = 1.44 \text{ mH}$   
 $R_G = 25 \Omega$ ,  $I_{AR} = -20 \text{ A}$

**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

961001EAA2

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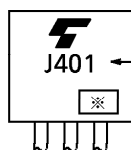
ELECTRICAL CHARACTERISTICS (Ta = 25°C)

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT	
Gate Leakage Current	IGSS	VGS = ±16 V, VDS = 0 V	—	—	±10	μA	
Drain Cut-off Current	IDSS	VDS = -60 V, VGS = 0 V	—	—	-100	μA	
Drain-Source Breakdown Voltage	V(BR)DSS	ID = -10 mA, VGS = 0 V	-60	—	—	V	
Gate Threshold Voltage	Vth	VDS = -10 V, ID = -1 mA	-0.8	—	-2.0	V	
Drain-Source ON Resistance	RDS(ON)	VGS = -4 V, ID = -10 A	—	50	90	mΩ	
		VGS = -10 V, ID = -10 A	—	33	45		
Forward Transfer Admittance	Yfs	VDS = -10 V, ID = -10 A	10	20	—	S	
Input Capacitance	Ciss	VDS = 10 V, VGS = 0 V, f = 1 MHz	—	2800	—	pF	
Reverse Transfer Capacitance	Crss		—	450	—		
Output Capacitance	Coss		—	1300	—		
Switching Time	Rise Time	tr		—	15	—	ns
	Turn-on Time	ton		—	35	—	
	Fall Time	tf		—	25	—	
	Turn-off Time	t <sub>off</sub>		—	120	—	
Total Gate Charge (Gate-Source Plus Gate-Drain)	Qg	VDD = -48 V, VGS = -10 V	—	90	—	nC	
Gate-Source Charge	Qgs	ID = -20 A	—	65	—		
Gate-Drain ("Miller") Charge	Qgd		—	25	—		

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

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Continuous Drain Reverse Current	IDR	—	—	—	-20	A
Pulse Drain Reverse Current	IDRP	—	—	—	-80	A
Diode Forward Voltage	VDSF	IDR = -20 A, VGS = 0 V	—	—	1.7	V
Reverse Recovery Time	t <sub>rr</sub>	IDR = -20 A, VGS = 0 V	—	75	—	ns
Reverse Recovery Charge	Q <sub>rr</sub>	dIDR / dt = -50 A / μs	—	83	—	nC

MARKING

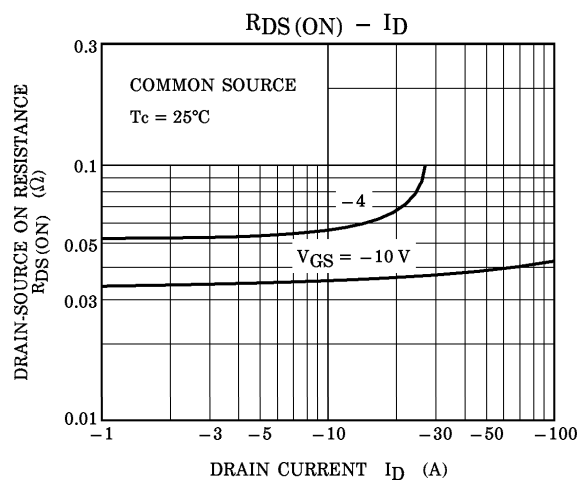
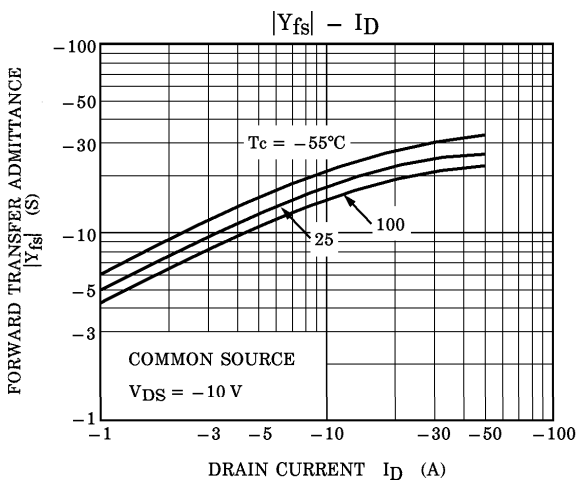
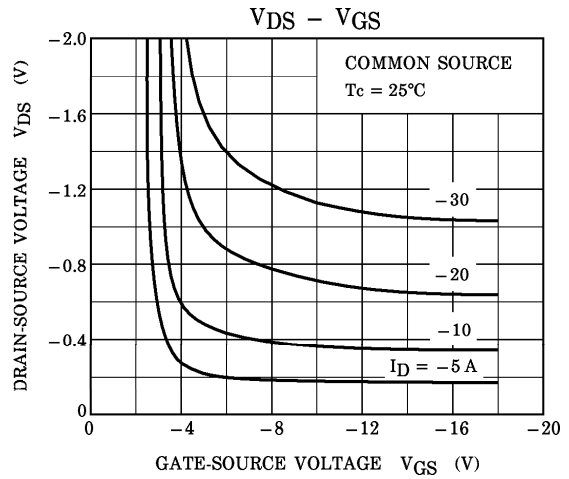
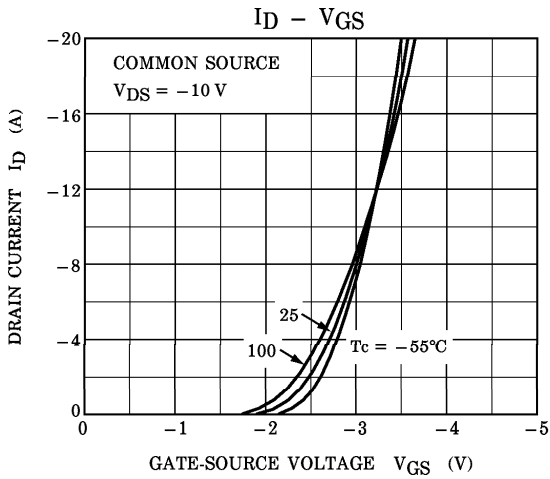
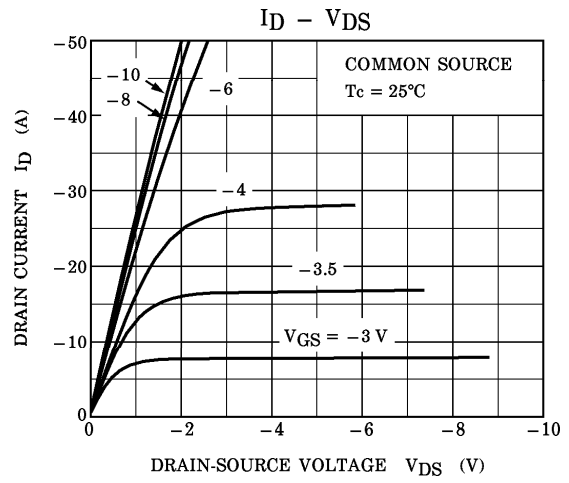
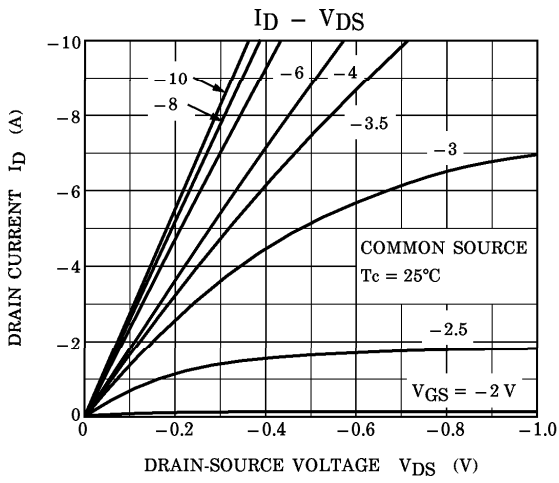


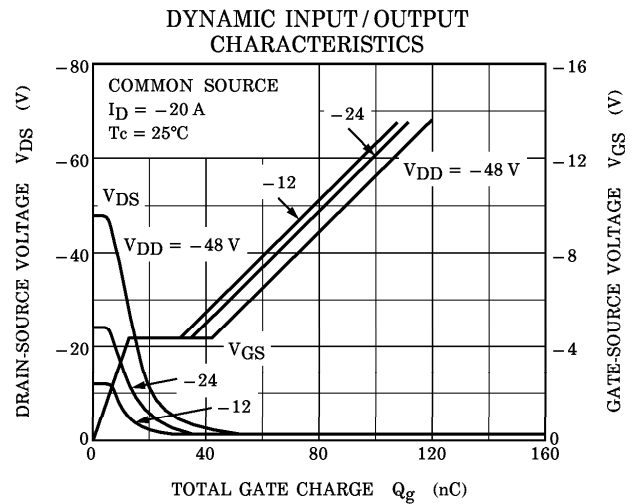
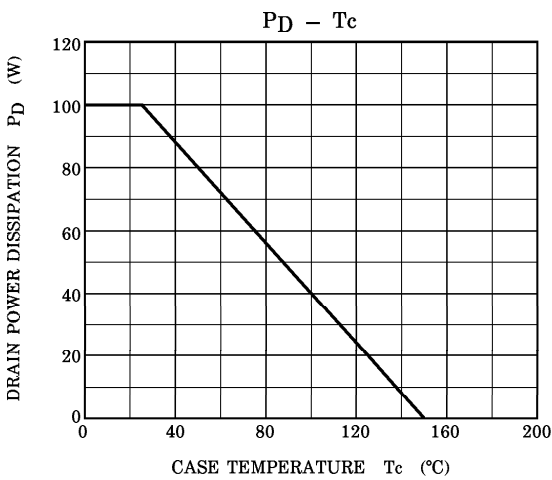
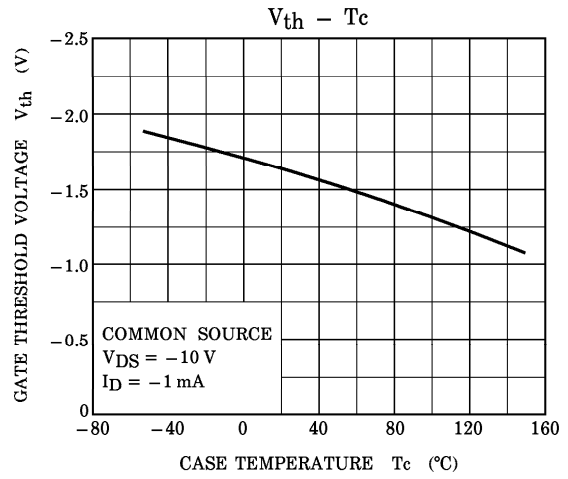
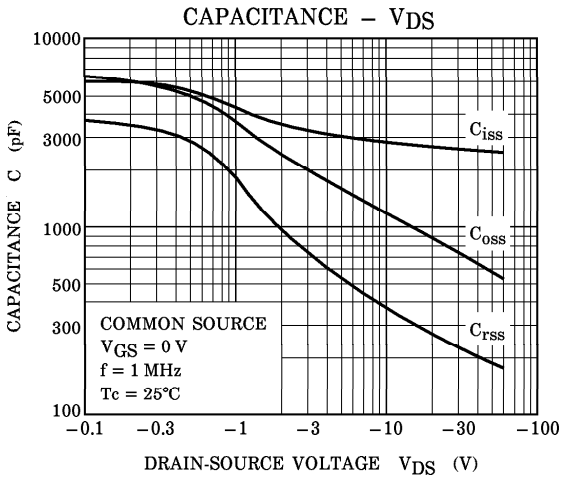
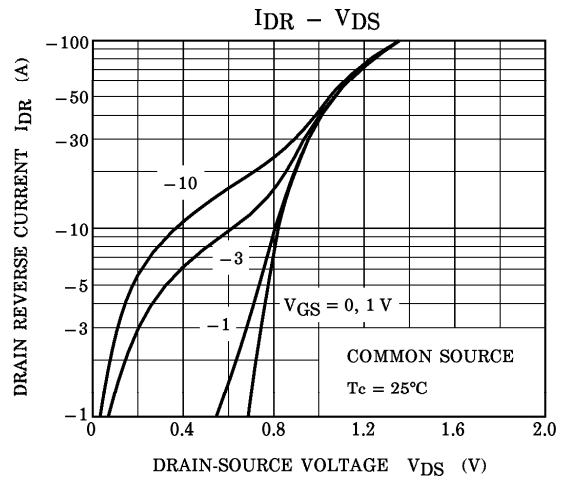
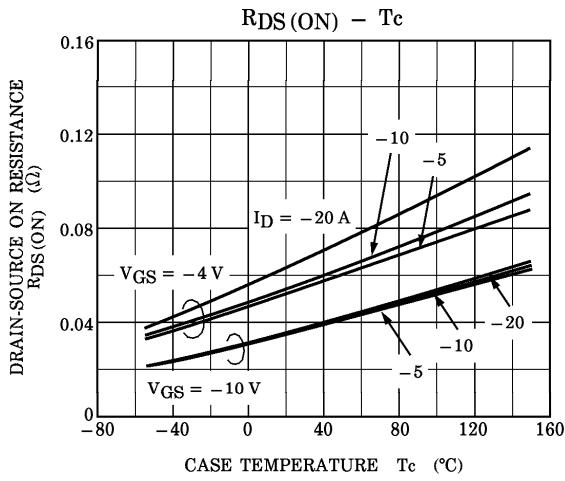
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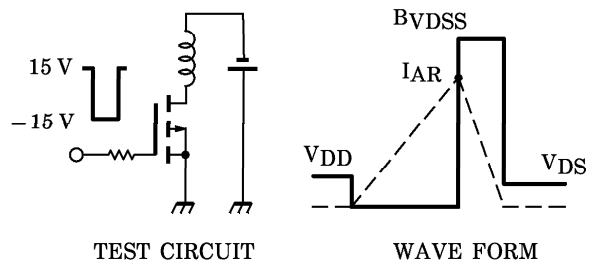
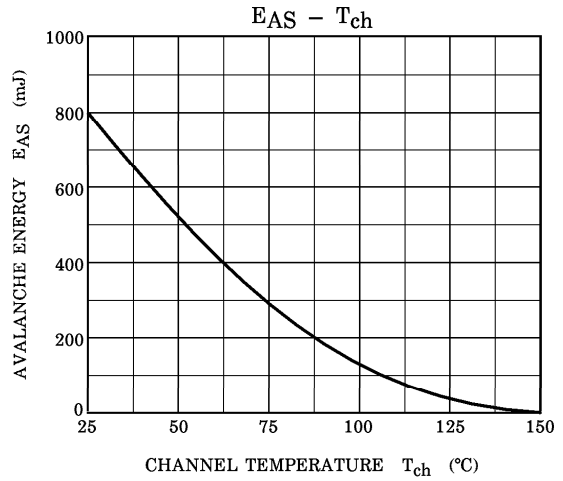
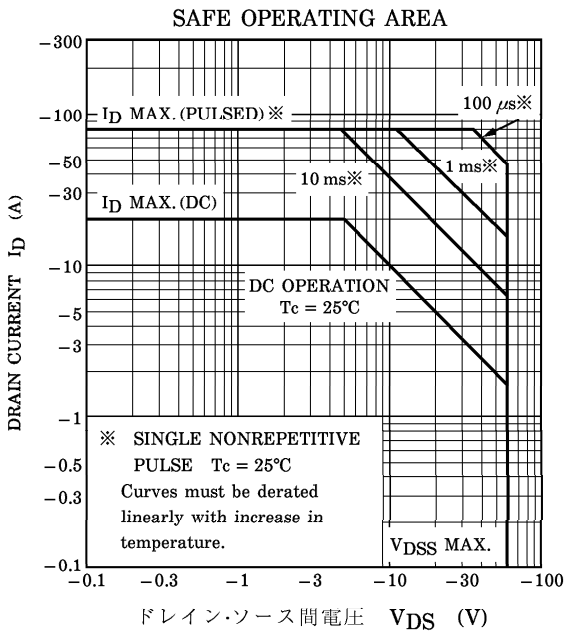
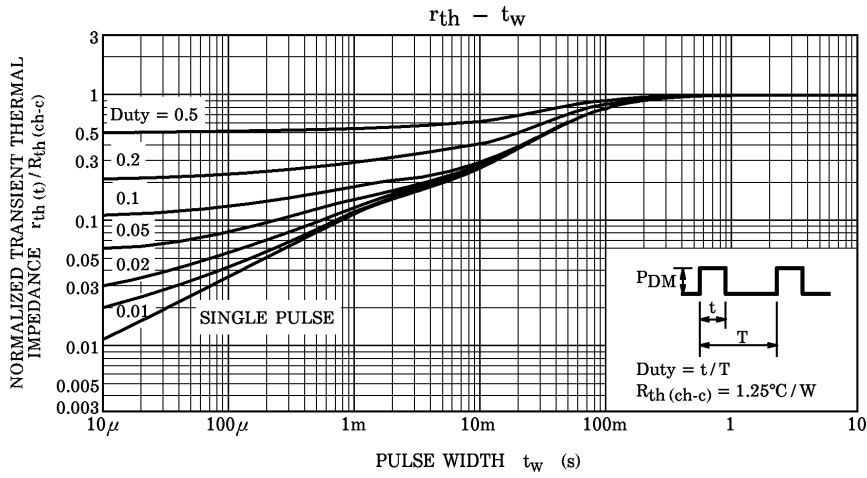
※ Lot Number

□ □ — Month (Starting from Alphabet A)

— Year (Last Number of the Christian Era)







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

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