

TOSHIBA FIELD EFFECT TRANSISTOR SILICON P CHANNEL MOS TYPE (L^2 - π -MOSV)

2SJ438

HIGH SPEED, HIGH CURRENT SWITCHING APPLICATIONS

DC-DC CONVERTER, RELAY DRIVE AND MOTOR DRIVE APPLICATIONS

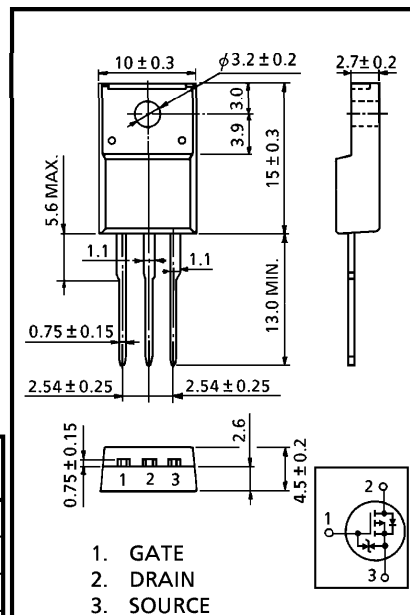
INDUSTRIAL APPLICATIONS

Unit in mm

- 4 V Gate Drive
- Low Drain-Source ON Resistance : $R_{DS(ON)} = 0.16 \Omega$ (Typ.)
- High Forward Transfer Admittance : $|Y_{fs}| = 4.0 S$ (Typ.)
- Low Leakage Current : $I_{DSS} = -100 \mu A$ (Max.) ($V_{DS} = -60 V$)
- Enhancement-Mode : $V_{th} = -0.8 \sim -2.0 V$
($V_{DS} = -10 V$, $I_D = -1 mA$)

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

CHARACTERISTIC	SYMBOL	RATING	UNIT
Drain-Source Voltage	V_{DSS}	-60	V
Drain-Gate Voltage ($R_{GS} = 20 k\Omega$)	V_{DGR}	-60	V
Gate-Source Voltage	V_{GSS}	± 20	V
Drain Current	DC	I_D	-5
	Pulse	I_{DP}	-20
Drain Power Dissipation ($T_c = 25^\circ C$)	P_D	25	W
Single Pulse Avalanche Energy**	E_{AS}	273	mJ
Avalanche Current	I_{AR}	-5	A
Repetitive Avalanche Energy*	E_{AR}	2	mJ
Channel Temperature	T_{ch}	150	$^\circ C$
Storage Temperature Range	T_{stg}	-55~150	$^\circ C$



JEDEC

EIAJ

SC-67

TOSHIBA 2-10R1B

Weight : 1.9 g

THERMAL CHARACTERISTICS

CHARACTERISTIC	SYMBOL	MAX.	UNIT
Thermal Resistance, Channel to Case	$R_{th(ch-c)}$	5.0	$^\circ C/W$
Thermal Resistance, Channel to Ambient	$R_{th(ch-a)}$	62.5	$^\circ C/W$

Note ;

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

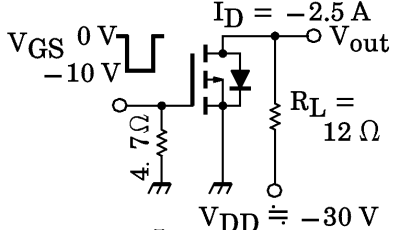
** $V_{DD} = -25 V$, $T_{ch} = 25^\circ C$ (initial), $L = 14.84 mH$, $R_G = 25 \Omega$, $I_{AR} = -5 A$

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

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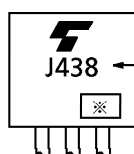
ELECTRICAL CHARACTERISTICS (Ta = 25°C)

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		$R_{DS(ON)}$	$V_{GS} = -4 \text{ V}, I_D = -2.5 \text{ A}$	—	0.24	0.28	Ω
			$V_{GS} = -10 \text{ V}, I_D = -2.5 \text{ A}$	—	0.16	0.19	
Forward Transfer Admittance		$ Y_{fs} $	$V_{DS} = -10 \text{ V}, I_D = -2.5 \text{ A}$	2.0	4.0	—	S
Input Capacitance		C_{iss}	$V_{DS} = -10 \text{ V}, V_{GS} = 0 \text{ V},$ $f = 1 \text{ MHz}$	—	630	—	pF
Reverse Transfer Capacitance		C_{rss}		—	95	—	
Output Capacitance		C_{oss}		—	290	—	
Switching Time	Rise Time	t_r		—	25	—	ns
	Turn-on Time	t_{on}		—	45	—	
	Fall Time	t_f		—	55	—	
	Turn-off Time	t_{off}		—	200	—	
Total Gate Charge (Gate-Source Plus Gate-Drain)		Q_g	$V_{DD} \cong -48 \text{ V}, V_{GS} = -10 \text{ V},$ $I_D = -5 \text{ A}$	—	22	—	nC
Gate-Source Charge		Q_{gs}		—	16	—	
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}	$I_{DR} = -5 \text{ A}, V_{GS} = 0 \text{ V}$	—	—	1.7	V
Reverse Recovery Time	t_{rr}	$I_{DR} = -5 \text{ A}, V_{GS} = 0 \text{ V}$	—	80	—	ns
Reverse Recovery Charge	Q_{rr}	$dI_{DR} / dt = 50 \text{ A} / \mu\text{s}$	—	0.1	—	μC

MARKING



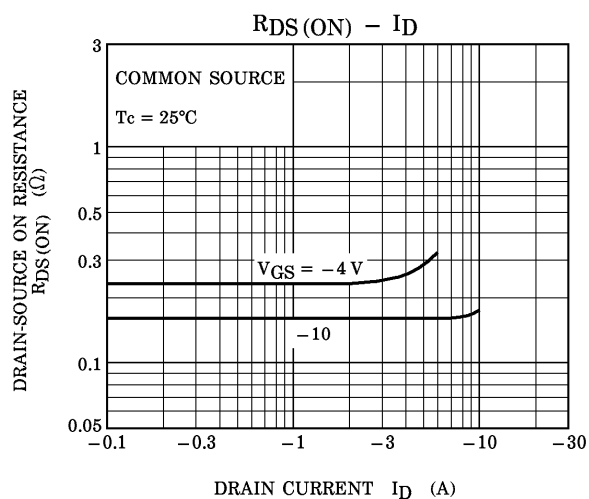
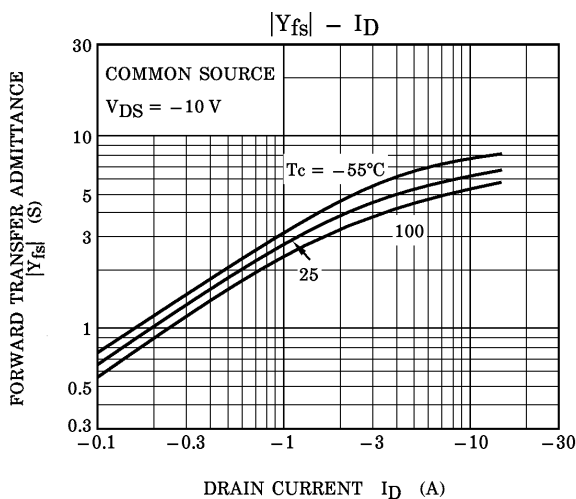
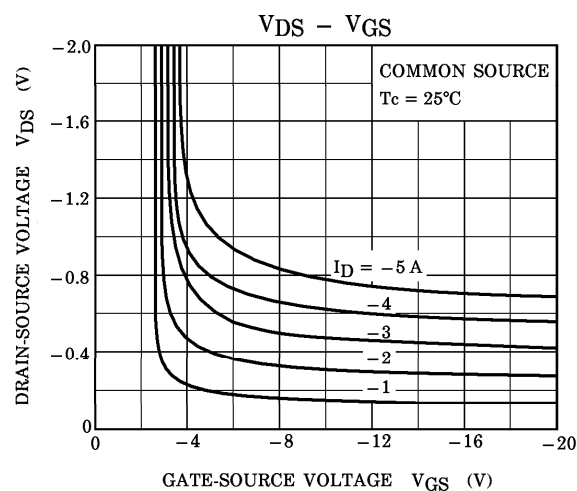
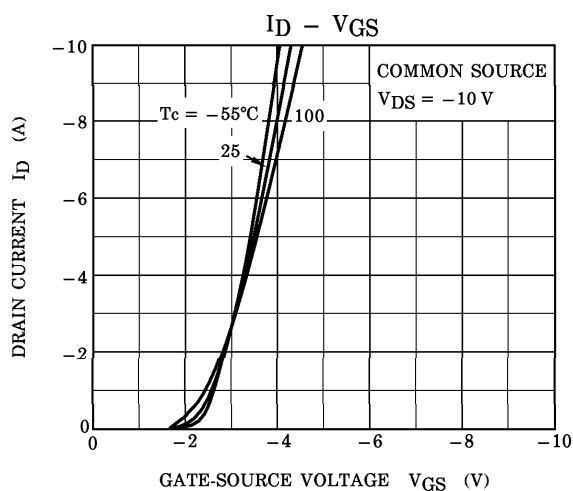
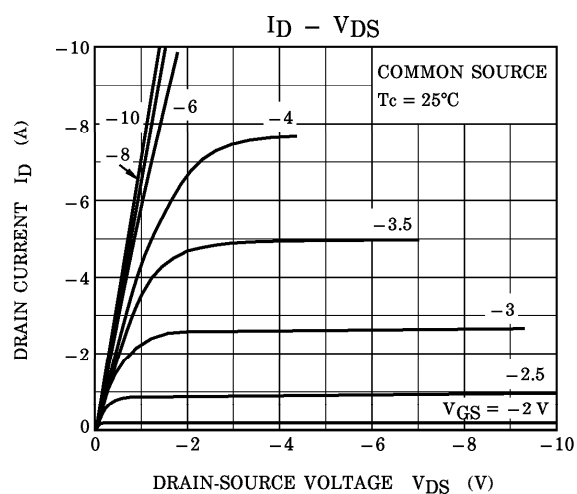
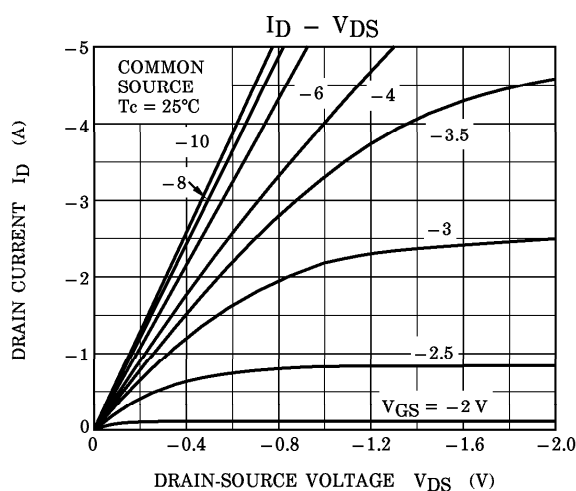
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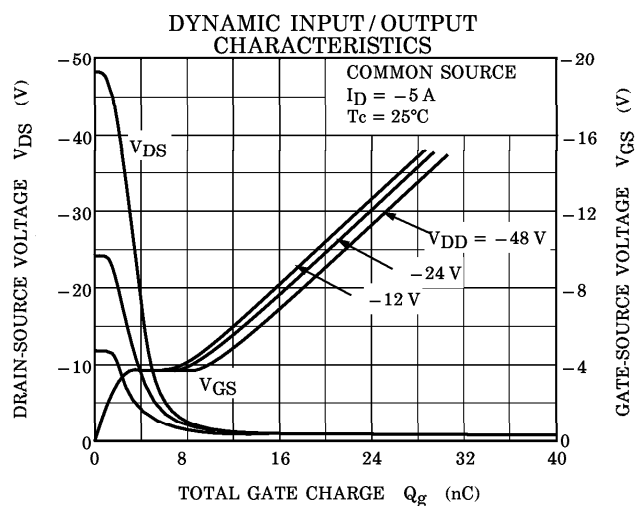
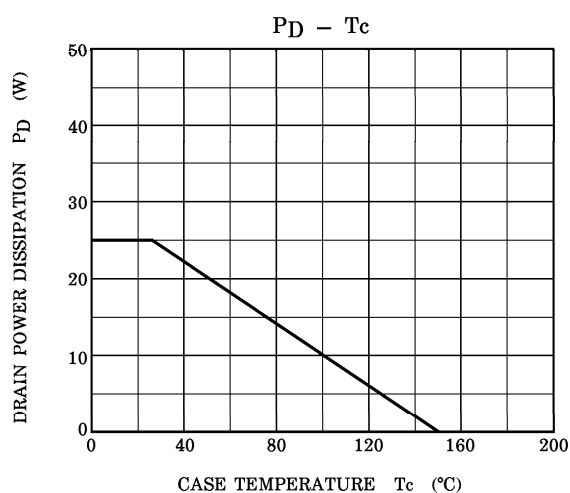
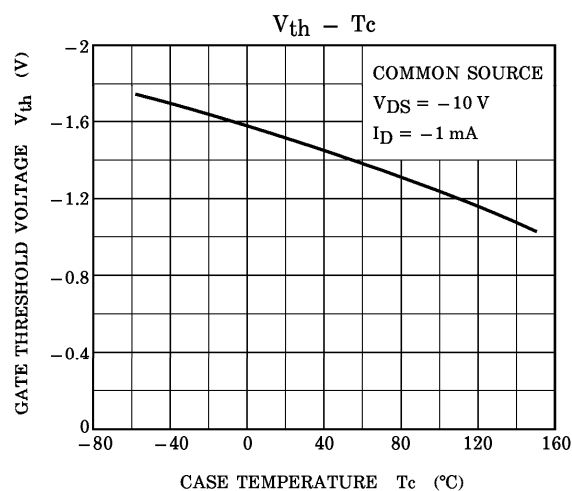
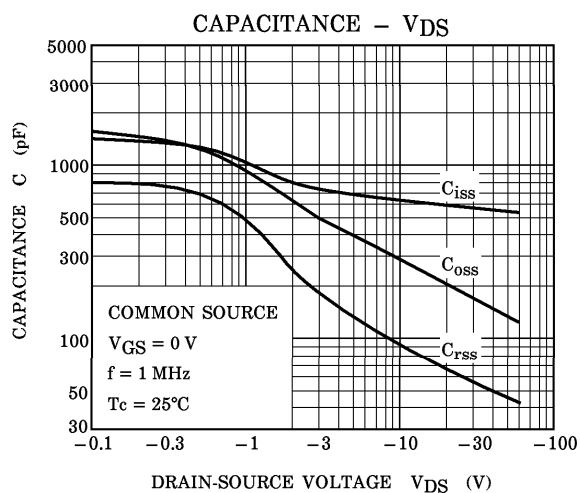
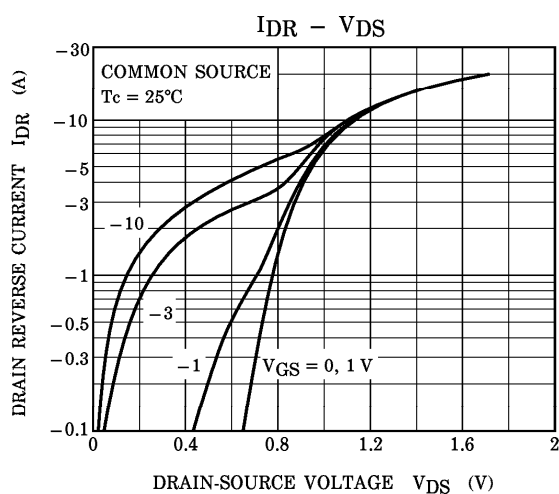
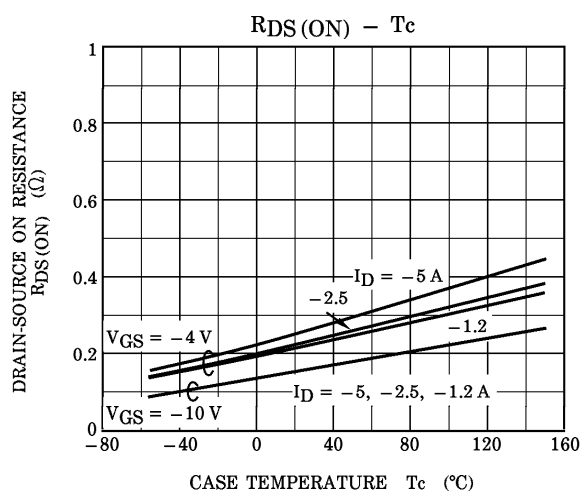
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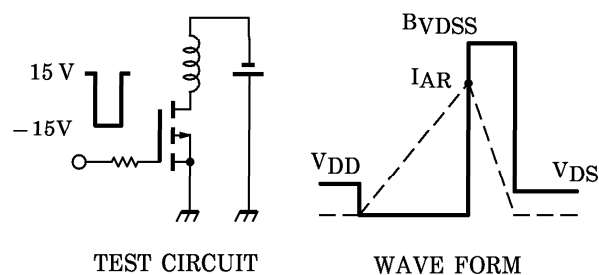
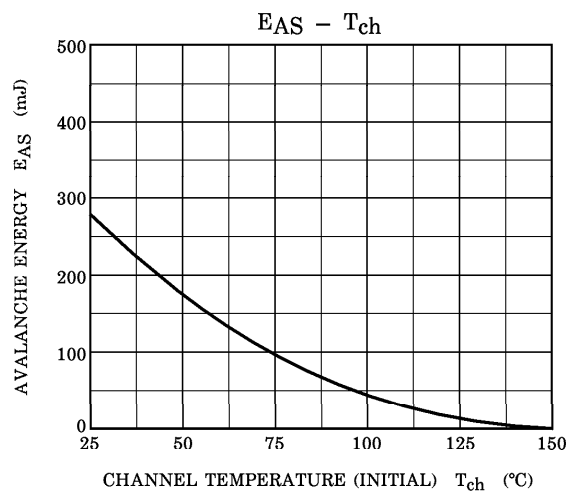
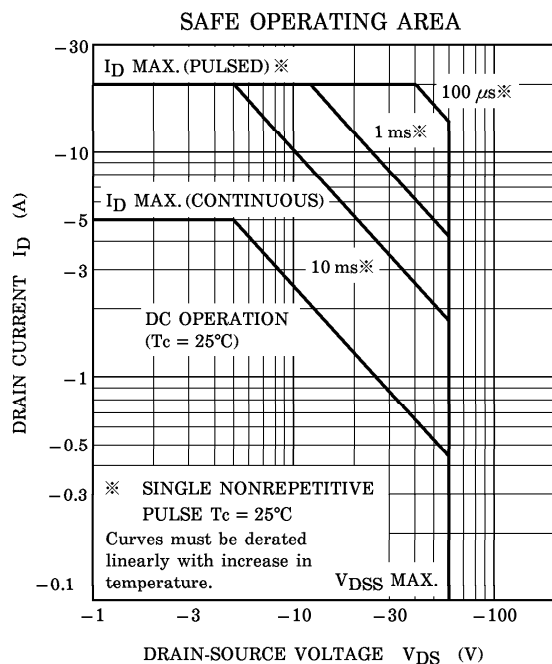
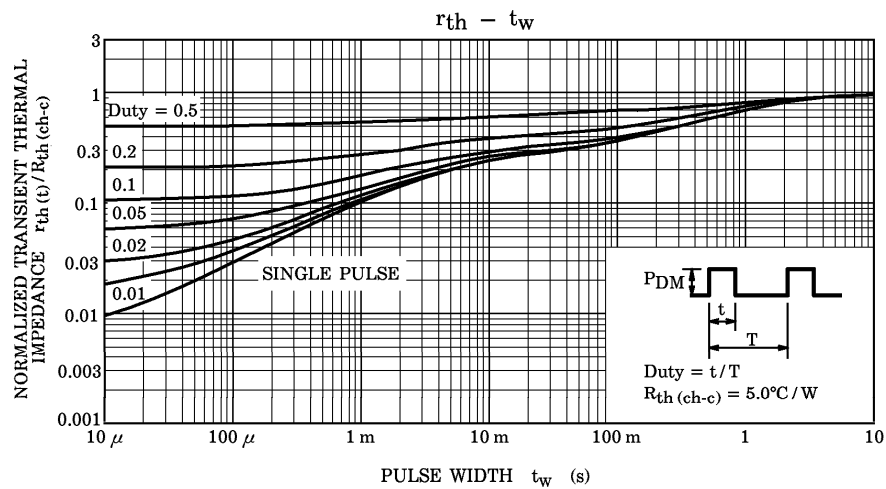


Month (Starting from Alphabet A)

Year (Last Number of the Christian Era)







Peak $I_{AR} = -5\text{ A}$, $R_G = 25\Omega$
 $V_{DD} = -25\text{ V}$, $L = 14.84\text{ mH}$

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