

TOSHIBA Field Effect Transistor Silicon P Channel MOS Type (L²-π-MOSV)

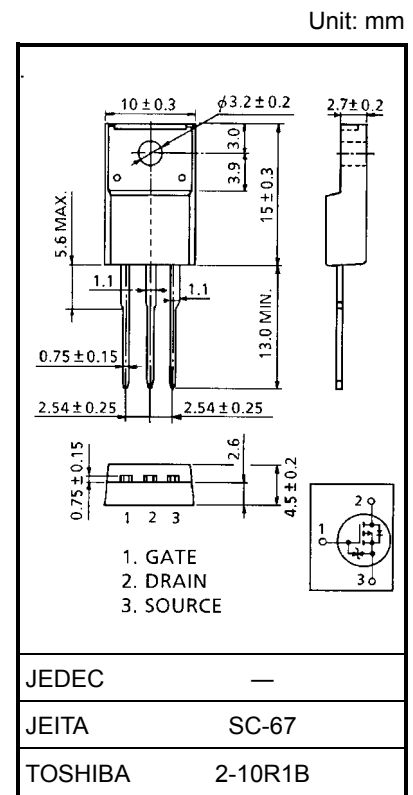
2SJ438

DC-DC Converter, Relay Drive and Motor Drive Applications

- 4 V gate drive
- Low drain-source ON resistance : $R_{DS(ON)} = 0.16 \Omega$ (typ.)
- High forward transfer admittance : $|Y_{fs}| = 4.0 \text{ S}$ (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)

Characteristics	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 (Note 1)	I_D	-5	A
	Pulse (Note 1)	I_{DP}	-20	A
Drain power dissipation ($T_c = 25^\circ\text{C}$)	P_D	25	W	
Single pulse avalanche energy (Note 2)	E_{AS}	273	mJ	
Avalanche current	I_{AR}	-5	A	
Repetitive avalanche energy (Note 3)	E_{AR}	2	mJ	
Channel temperature	T_{ch}	150	°C	
Storage temperature range	T_{stg}	-55~150	°C	



Weight: 1.9 g (typ.)

Thermal Characteristics

Characteristics	Symbol	Max	Unit
Thermal resistance, channel to case	$R_{th(ch-c)}$	5.0	°C / W
Thermal resistance, channel to ambient	$R_{th(ch-a)}$	62.5	°C / W

Note 1: Please use devices on condition that the channel temperature is below 150°C.

Note 2: $V_{DD} = -25 \text{ V}$, $T_{ch} = 25^\circ\text{C}$ (initial), $L = 14.84 \text{ mH}$, $R_G = 25 \Omega$, $I_{AR} = -5 \text{ A}$

Note 3: Repetitive rating; Pulse width limited by maximum channel temperature.

This transistor is an electrostatic sensitive device.

Please handle with caution.

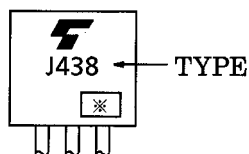
Electrical Characteristics (Ta = 25°C)

Characteristics		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	$V_{DD} \approx -48\text{ V}, V_{GS} = -10\text{ V}, I_D = -5\text{ A}$	—	22	—	nC
Gate-source charge		Q_{gs}		—	16	—	
Gate-drain ("miller") charge		Q_{gd}		—	6	—	

Source-Drain Ratings and Characteristics (Ta = 25°C)

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Continuous drain reverse current (Note 1)	I_{DR}	—	—	—	-5	A
Pulse drain reverse current (Note 1)	I_{DRP}	—	—	—	-20	A
Forward voltage (diode)	V_{DSF}	$I_{DR} = -5\text{ A}, V_{GS} = 0\text{ V}$	—	—	1.7	V
Reverse recovery time	t_{rr}	$I_{DR} = -5\text{ A}, V_{GS} = 0\text{ V} \text{ d}I_{DR} / \text{d}t = 50\text{ A} / \mu\text{s}$	—	80	—	ns
Reverse recovery charge	Q_{rr}		—	0.1	—	μC

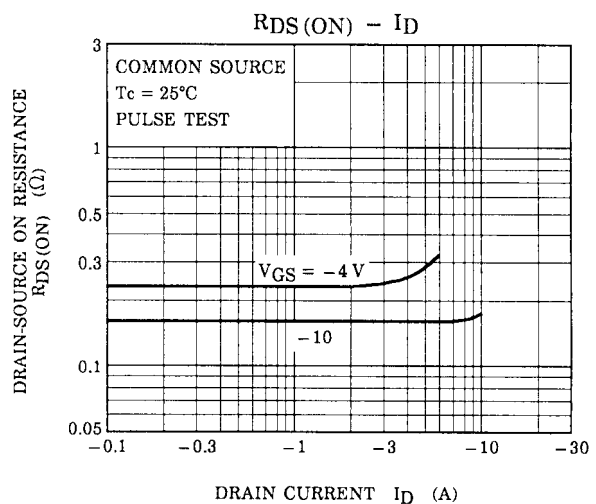
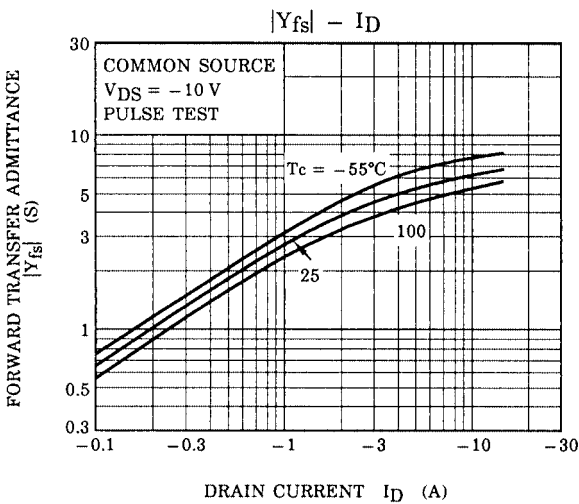
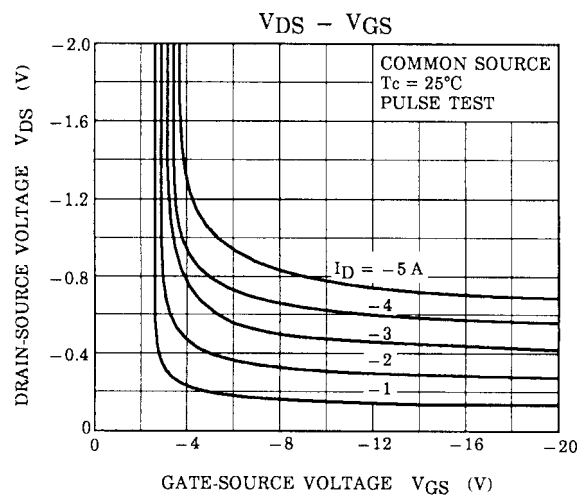
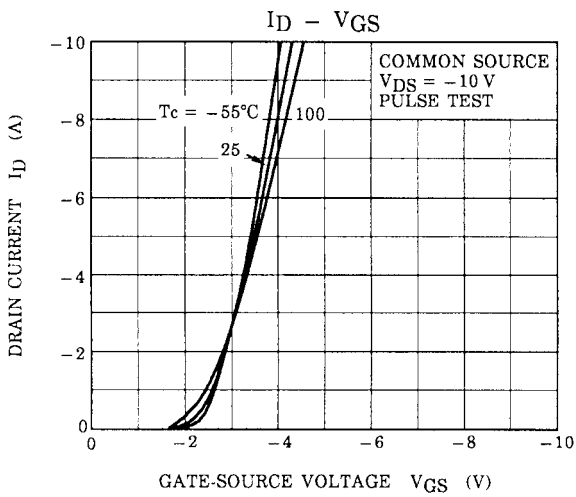
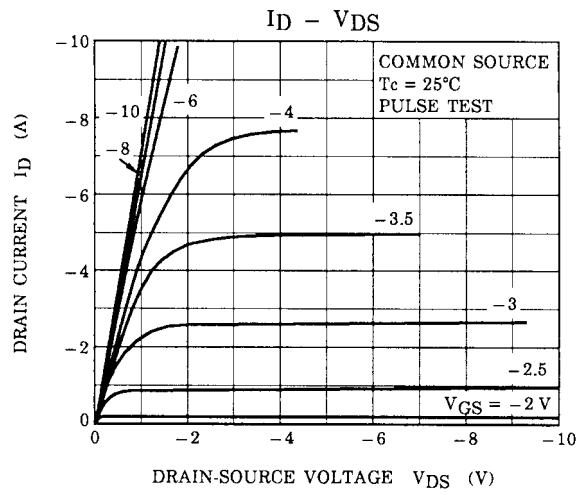
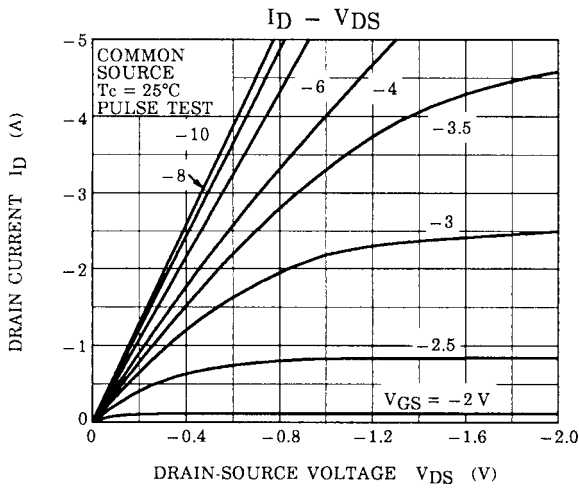
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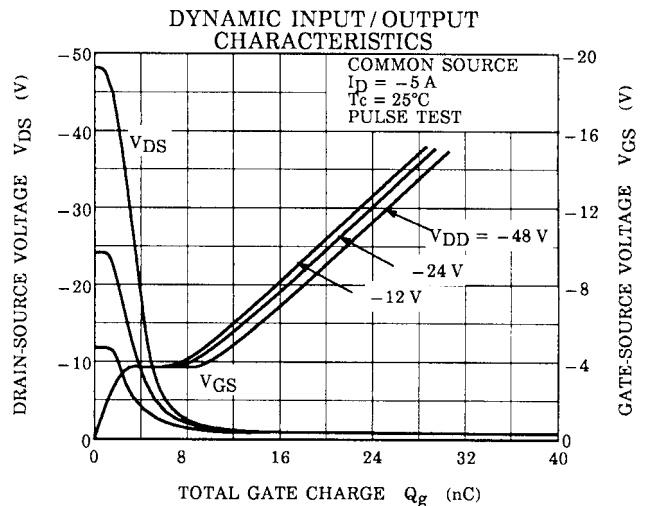
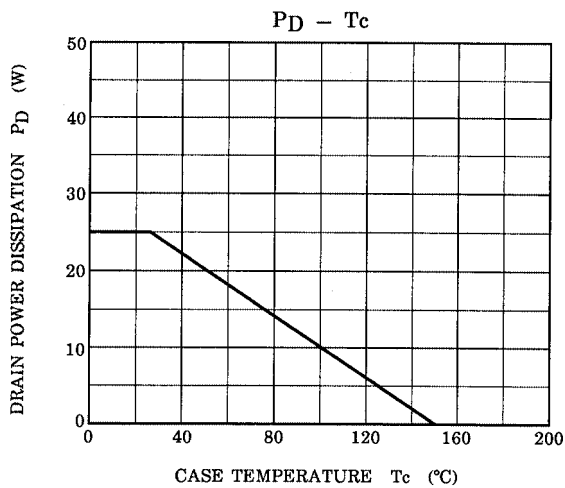
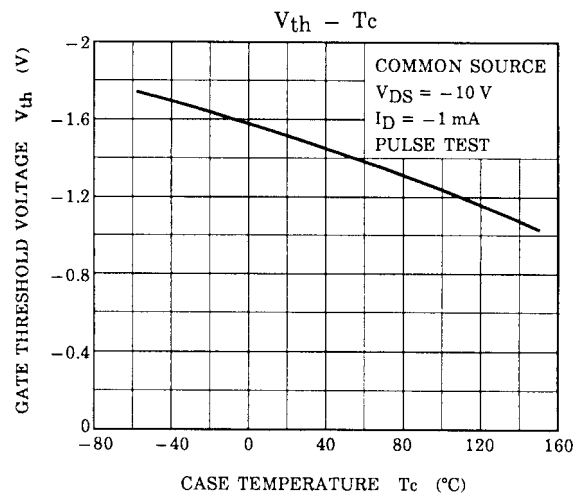
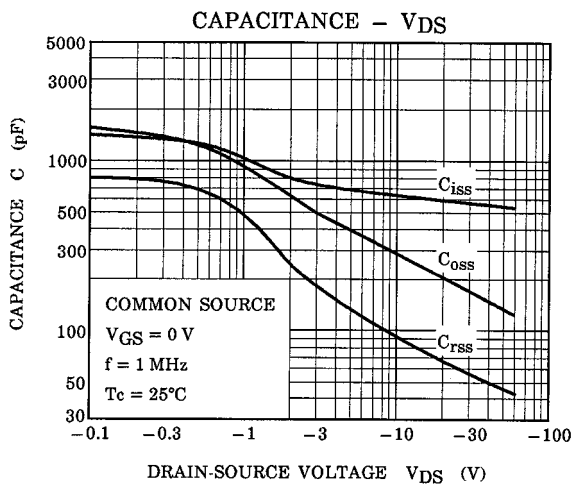
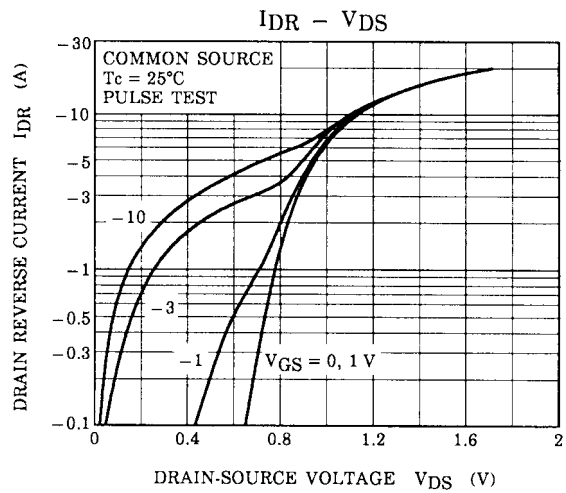
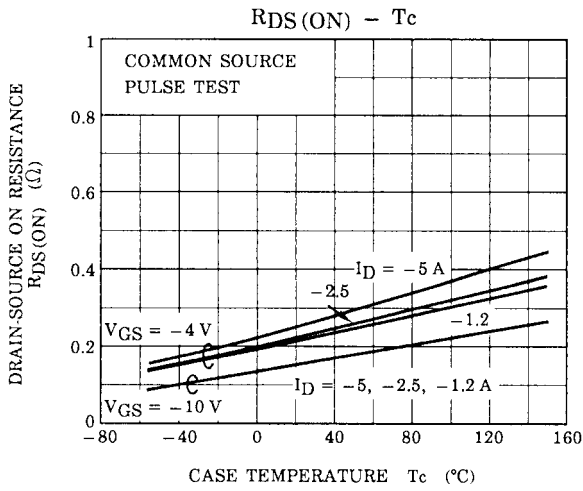


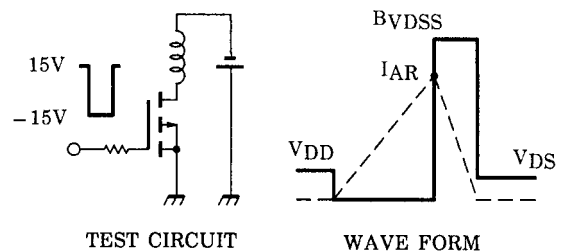
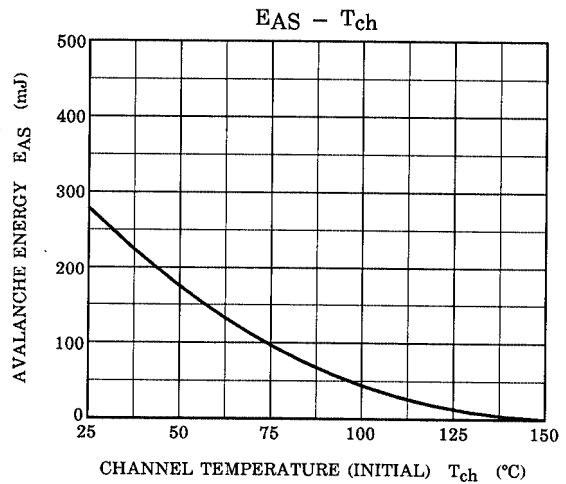
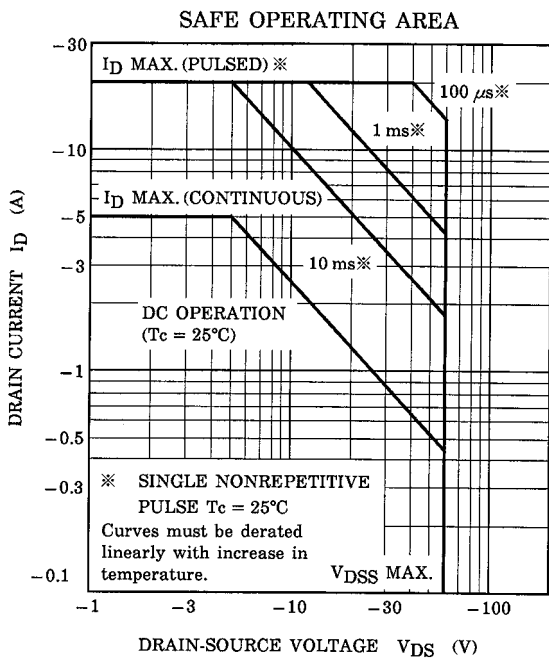
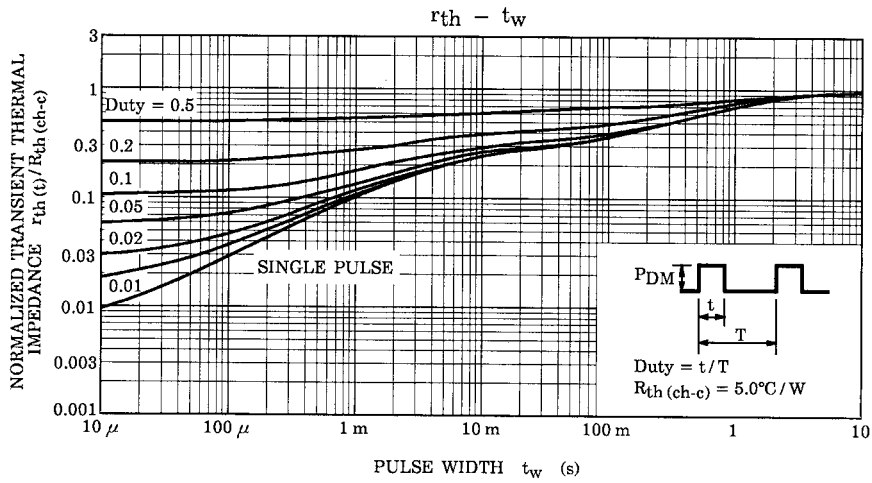
※ Lot Number

□ □ — Month (Starting from Alphabet A)

□ — Year (Last Number of the Christian Era)







$R_G = 25\Omega$
 $V_{DD} = -25V, L = 14.84mH$

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

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