

TOSHIBA Field Effect Transistor Silicon P Channel MOS Type (L^2 - π -MOSV)

2SJ380

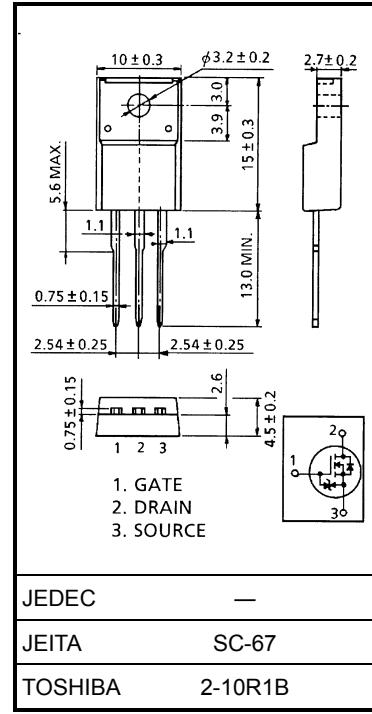
Relay Drive, DC-DC Converter and Motor Drive Applications

Unit: mm

- 4-V gate drive
- Low drain-source ON resistance: $R_{DS(ON)} = 0.15 \Omega$ (typ.)
- High forward transfer admittance: $|Y_{fs}| = 7.7 \text{ S}$ (typ.)
- Low leakage current: $I_{DSS} = -100 \mu\text{A}$ (max) ($V_{DS} = -100 \text{ V}$)
- Enhancement mode: $V_{th} = -0.8 \sim -2.0 \text{ V}$ ($V_{DS} = -10 \text{ V}$, $I_D = -1 \text{ mA}$)

Absolute Maximum Ratings ($T_a = 25^\circ\text{C}$)

Characteristics	Symbol	Rating	Unit
Drain-source voltage	V_{DSS}	-100	V
Drain-gate voltage ($R_{GS} = 20 \text{ k}\Omega$)	V_{DGR}	-100	V
Gate-source voltage	V_{GSS}	± 20	V
Drain current	DC (Note 1)	I_D	A
	Pulse (Note 1)	I_{DP}	
Drain power dissipation ($T_c = 25^\circ\text{C}$)	P_D	35	W
Single pulse avalanche energy (Note 2)	E_{AS}	312	mJ
Avalanche current	I_{AR}	-12	A
Repetitive avalanche energy (Note 3)	E_{AR}	3.5	mJ
Channel temperature	T_{ch}	150	$^\circ\text{C}$
Storage temperature range	T_{stg}	-55~150	$^\circ\text{C}$



Weight: 1.9 g (typ.)

Note: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) are within the absolute maximum ratings. Please design the appropriate reliability upon reviewing the Toshiba Semiconductor Reliability Handbook ("Handling Precautions"/Derating Concept and Methods) and individual reliability data (i.e. reliability test report and estimated failure rate, etc.).

Thermal Characteristics

Characteristics	Symbol	Max	Unit
Thermal resistance, channel to case	$R_{th}(\text{ch-c})$	3.57	$^\circ\text{C/W}$
Thermal resistance, channel to ambient	$R_{th}(\text{ch-a})$	62.5	$^\circ\text{C/W}$

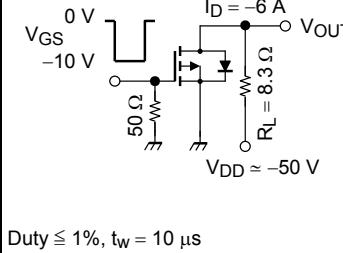
Note1: Ensure that the channel temperature does not exceed 150°C.

Note 2: $V_{DD} = -25 \text{ V}$, $T_{ch} = 25^\circ\text{C}$ (initial), $L = 2.94 \text{ mH}$, $R_G = 25 \Omega$, $I_{AR} = -12 \text{ A}$

Note 3: Repetitive rating: pulse width limited by maximum junction temperature

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

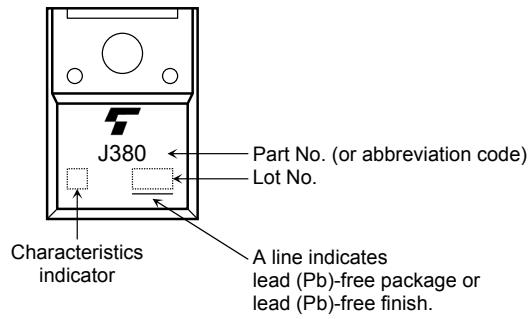
Electrical Characteristics (Tc = 25°C)

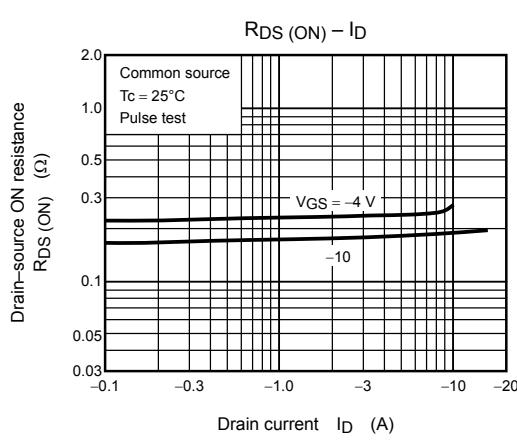
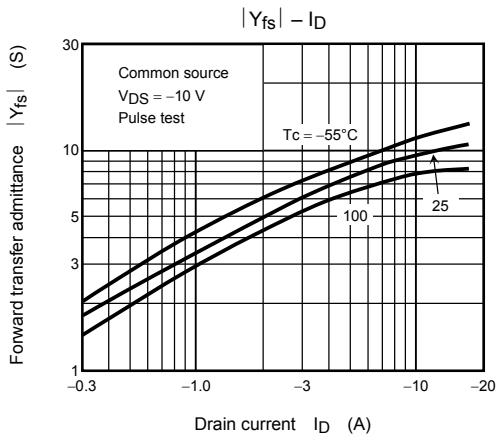
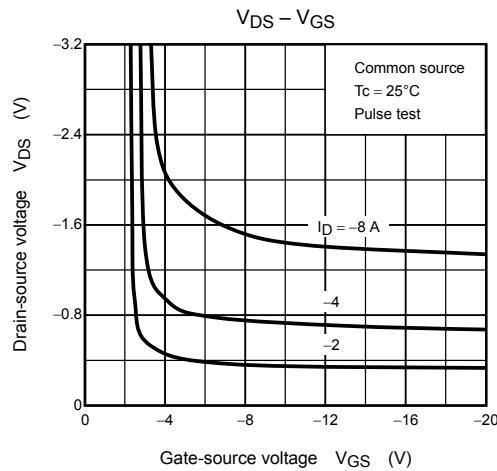
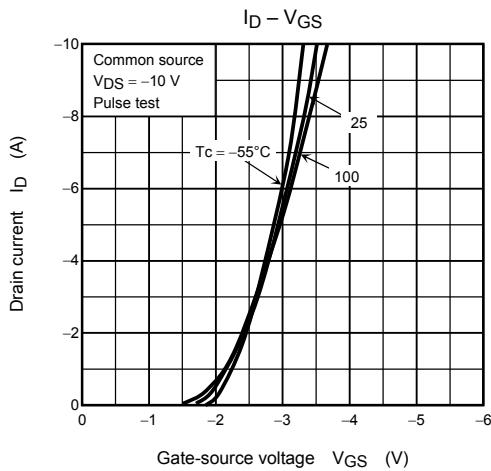
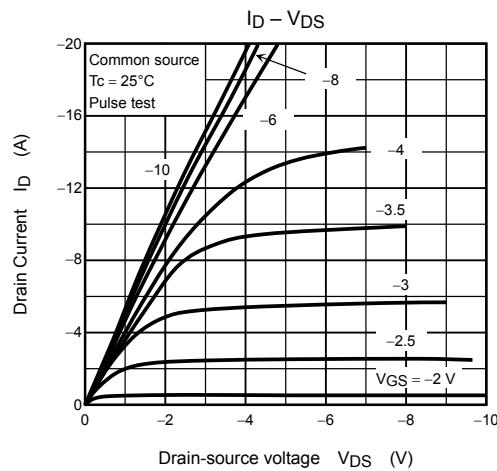
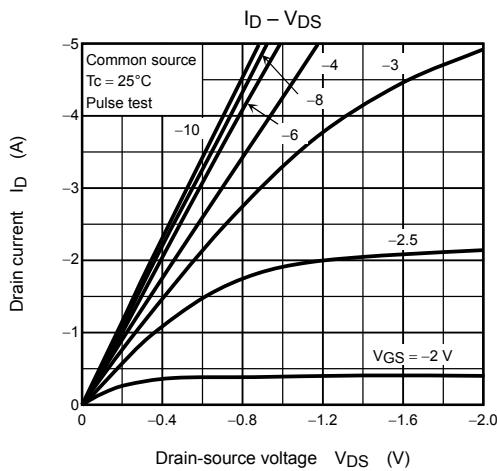
Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Gate leakage current	I _{GSS}	V _{GS} = ±16 V, V _{DS} = 0 V	—	—	±10	μA
Drain cut-off current	I _{DSS}	V _{DS} = -100 V, V _{GS} = 0 V	—	—	-100	μA
Drain-source breakdown voltage	V _{(BR) DSS}	I _D = -10 mA, V _{GS} = 0 V	-100	—	—	V
Gate threshold voltage	V _{th}	V _{DS} = -10 V, I _D = -1 mA	-0.8	—	-2.0	V
Drain-source ON resistance	R _{D5 (ON)}	V _{GS} = -4 V, I _D = -6 A	—	0.25	0.32	Ω
		V _{GS} = -10 V, I _D = -6 A	—	0.15	0.21	
Forward transfer admittance	Y _{fs}	V _{DS} = -10 V, I _D = -6 A	4.5	7.7	—	S
Input capacitance	C _{iss}	V _{DS} = -10 V, V _{GS} = 0 V, f = 1 MHz	—	1100	—	pF
Reverse transfer capacitance	C _{rss}		—	200	—	pF
Output capacitance	C _{oss}		—	440	—	pF
Switching time	Rise time	t _r		—	18	—
	Turn-on time	t _{on}		—	30	—
	Fall time	t _f		—	18	—
	Turn-off time	t _{off}		—	65	—
Total gate charge (gate-source plus gate-drain)	Q _g	V _{DD} ≈ -80 V, V _{GS} = -10 V, I _D = -12 A	—	48	—	nC
Gate-source charge	Q _{gs}		—	29	—	nC
Gate-drain ("miller") charge	Q _{gd}		—	19	—	nC

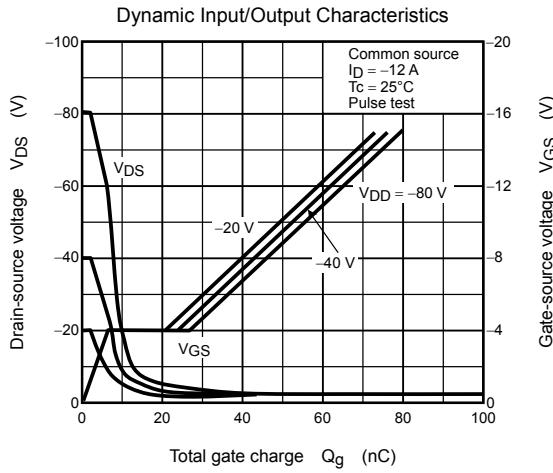
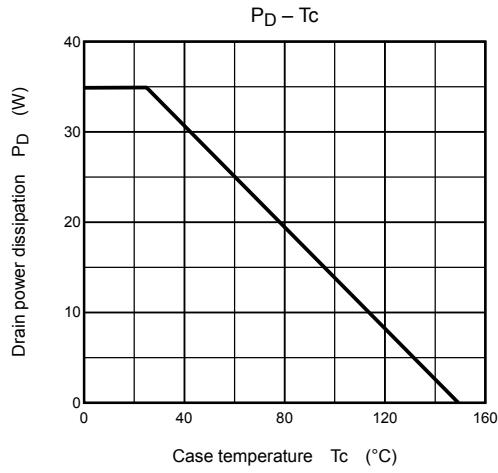
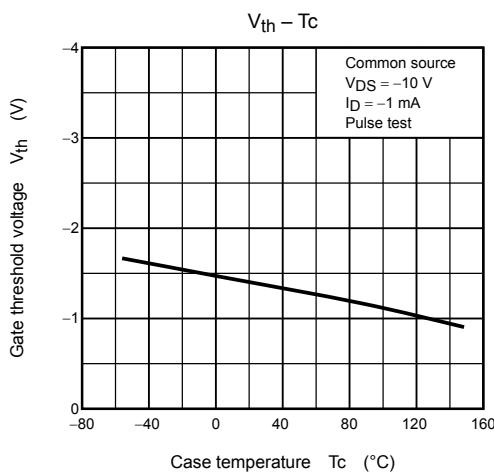
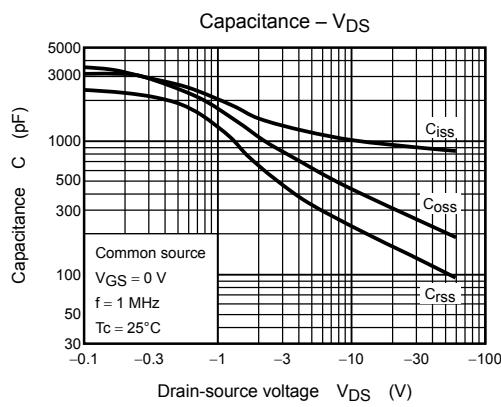
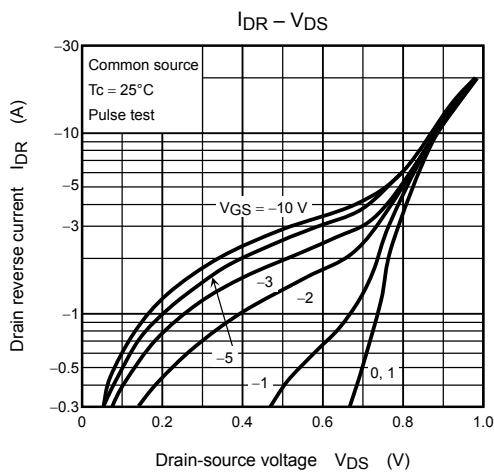
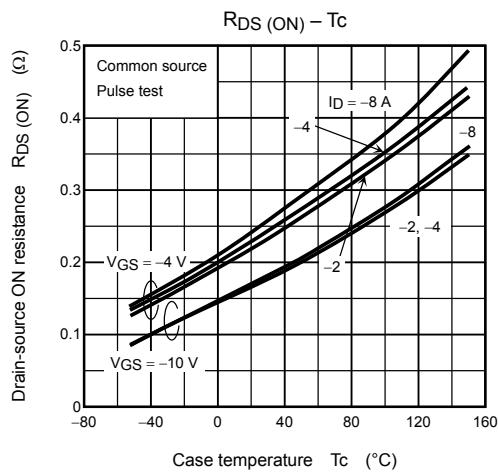
Source-Drain Ratings and Characteristics (Tc = 25°C)

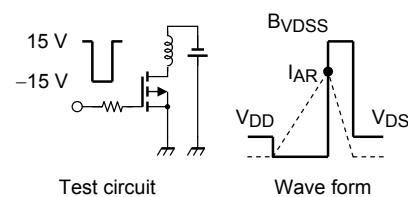
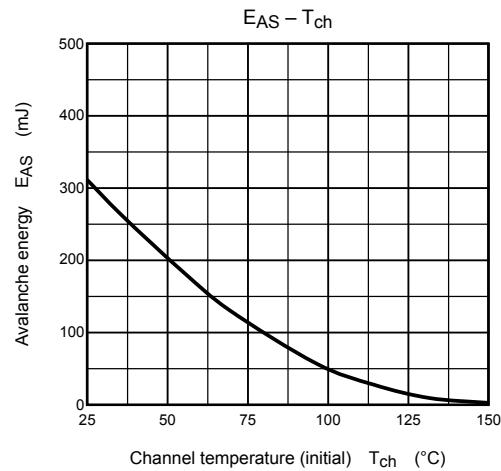
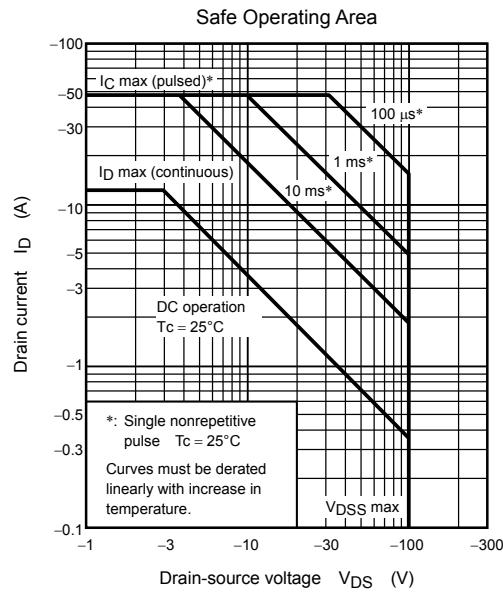
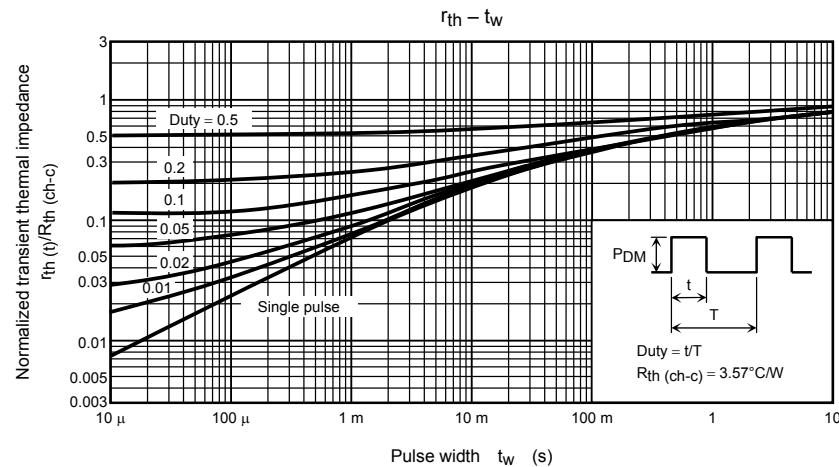
Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Continuous drain reverse current (Note 1)	I _{DR}	—	—	—	-12	A
Pulse drain reverse current (Note 1)	I _{DRP}	—	—	—	-48	A
Forward voltage (diode)	V _{DSF}	I _{DR} = -12 A, V _{GS} = 0 V	—	—	1.7	V
Reverse recovery time	t _{rr}	I _{DR} = -12 A, V _{GS} = 0 V dI _{DR} /dt = 50 A/μs	—	160	—	ns
Reverse recovery charge	Q _{rr}		—	0.5	—	μC

Marking









$$R_G = 25 \Omega$$

$$V_{DD} = -25 \text{ V}, L = 2.94 \text{ mH}$$

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

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