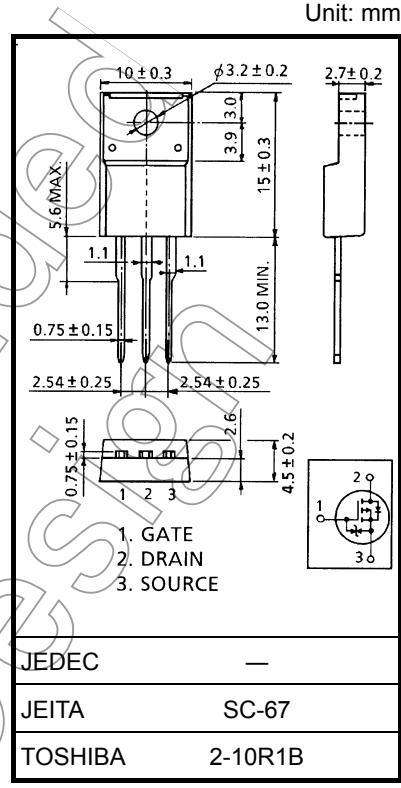


TOSHIBA Field Effect Transistor Silicon P Channel MOS Type (L²-π-MOSIV)

2SJ304

DC-DC Converter, Relay Drive and Motor Drive Applications

- 4-V gate drive
- Low drain-source ON resistance : $R_{DS\text{ (ON)}} = 80\text{ m}\Omega$ (typ.)
- High forward transfer admittance : $|Y_{fs}| = 8.0\text{ S}$ (typ.)
- Low leakage current : $ID_{SS} = -100\text{ }\mu\text{A}$ (max) ($V_{DS} = -60\text{ V}$)
- Enhancement mode : $V_{th} = -0.8\text{ to }-2.0\text{ V}$ ($V_{DS} = -10\text{ V}$, $ID = -1\text{ mA}$)



Absolute 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	-14
	Pulse (Note 1)	I_{DP}	-56
Drain power dissipation ($T_c = 25^\circ\text{C}$)	P_D	40	W
Channel temperature	T_{ch}	150	$^\circ\text{C}$
Storage temperature range	T_{stg}	-55 to 150	$^\circ\text{C}$

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

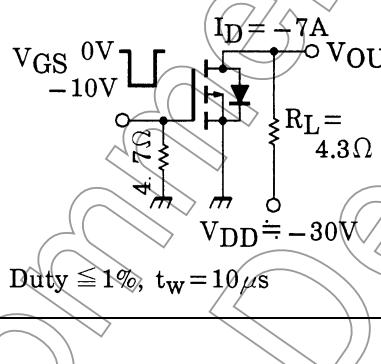
Characteristics	Symbol	Max	Unit
Thermal resistance, channel to case	$R_{th\ (ch-c)}$	3.125	°C / W
Thermal resistance, channel to ambient	$R_{th\ (ch-a)}$	62.5	°C / W

Note 1: Ensure that the channel temperature does not exceed 150°C.

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

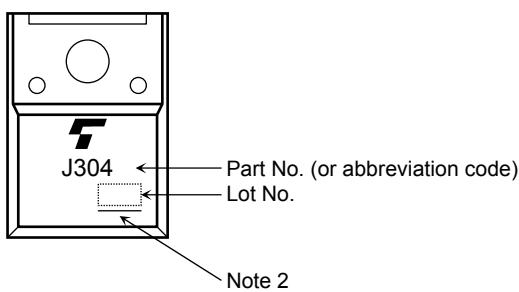
Electrical Characteristics ($T_a = 25^\circ\text{C}$)

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	$V_{(\text{BR})\text{DSS}}$	$I_D = -10\text{ mA}$, $V_{GS} = 0\text{ V}$	-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	$R_{DS}(\text{ON})$	$V_{GS} = -4\text{ V}$, $I_D = -5\text{ A}$	—	130	190	$\text{m}\Omega$
		$V_{GS} = -10\text{ V}$, $I_D = -7\text{ A}$	—	80	120	
Forward transfer admittance	$ Y_{fs} $	$V_{DS} = -10\text{ V}$, $I_D = -7\text{ A}$	5.0	8.0	—	S
Input capacitance	C_{iss}	$V_{DS} = -10\text{ V}$, $V_{GS} = 0\text{ V}$, $f = 1\text{ MHz}$	—	1200	—	pF
			—	220	—	
			—	550	—	
Reverse transfer capacitance	C_{rss}	$V_{DS} = -10\text{ V}$, $V_{GS} = 0\text{ V}$, $f = 1\text{ MHz}$	—	—	—	pF
Output capacitance	C_{oss}		—	—	—	
Switching time	Rise time	t_r	—	20	—	ns
	Turn-on time	t_{on}	—	30	—	
	Fall time	t_f	—	25	—	
	Turn-off time	t_{off}	—	100	—	
Total gate charge (Gate-source plus gate-drain)	Q_g	$V_{DD} \approx -48\text{ V}$, $V_{GS} = -10\text{ V}$, $I_D = -14\text{ A}$	—	45	—	nC
Gate-source charge	Q_{gs}		—	30	—	
Gate-drain ("miller") charge	Q_{gd}		—	15	—	

Source-Drain Ratings and Characteristics ($T_a = 25^\circ\text{C}$)

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Continuous drain reverse current (Note 1)	I_{DR}	—	—	—	-14	A
Pulse drain reverse current (Note 1)	I_{DRP}	—	—	—	-56	A
Forward voltage (diode)	V_{DSF}	$I_{DR} = -14\text{ A}$, $V_{GS} = 0\text{ V}$	—	—	1.7	V
Reverse recovery time	t_{rr}	$I_{DR} = -14\text{ A}$, $V_{GS} = 0\text{ V}$ $dI_{DR} / dt = 50\text{ A} / \mu\text{s}$	—	110	—	ns
Reverse recovery charge	Q_{rr}		—	0.18	—	μC

Marking

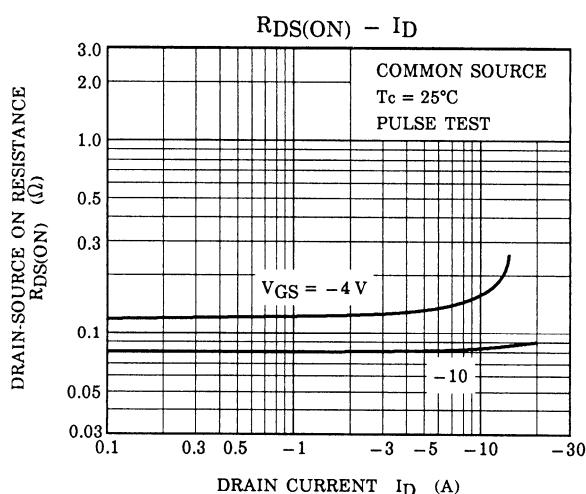
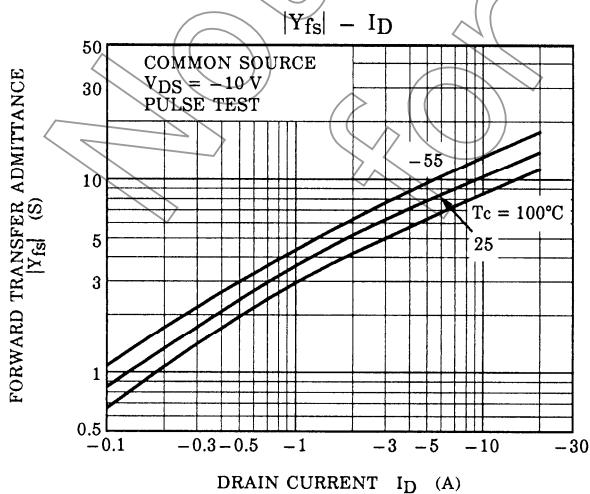
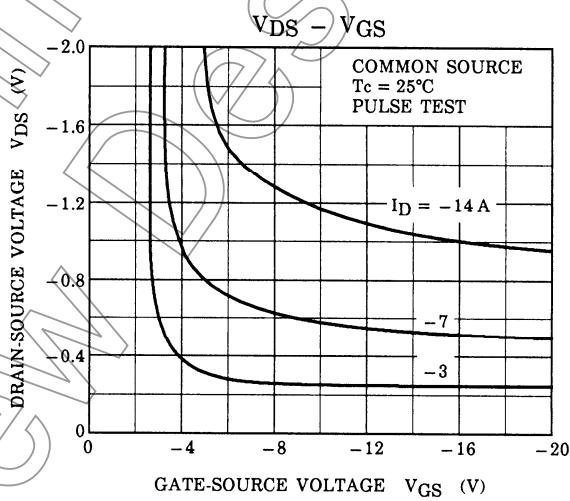
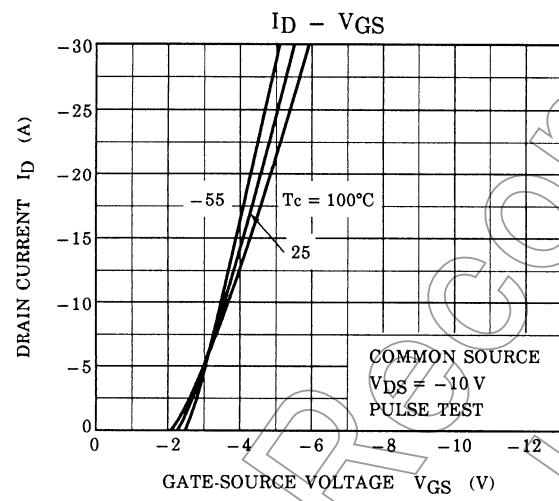
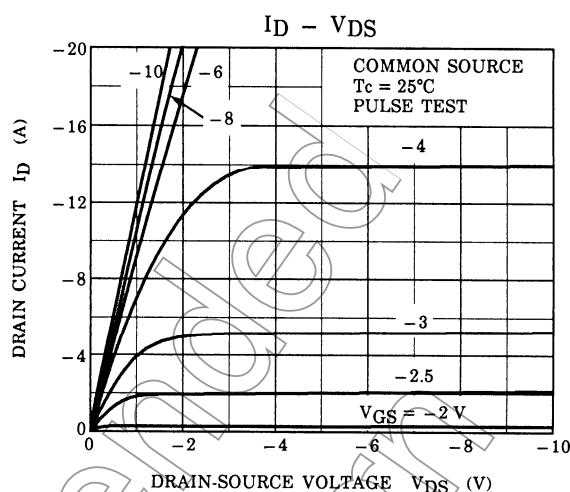
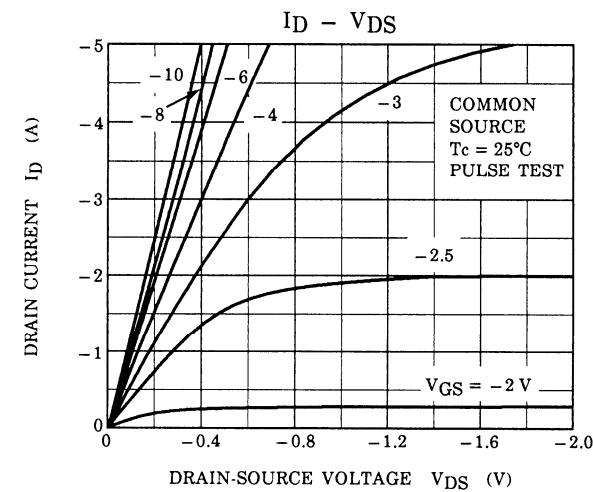


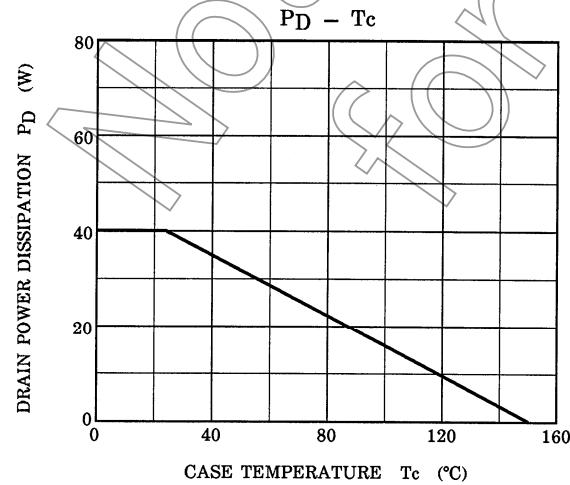
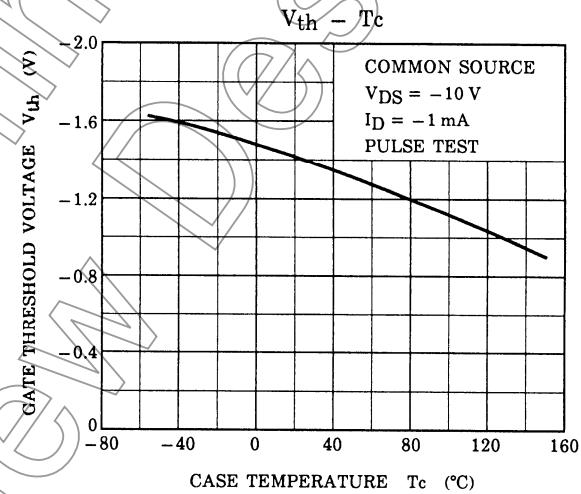
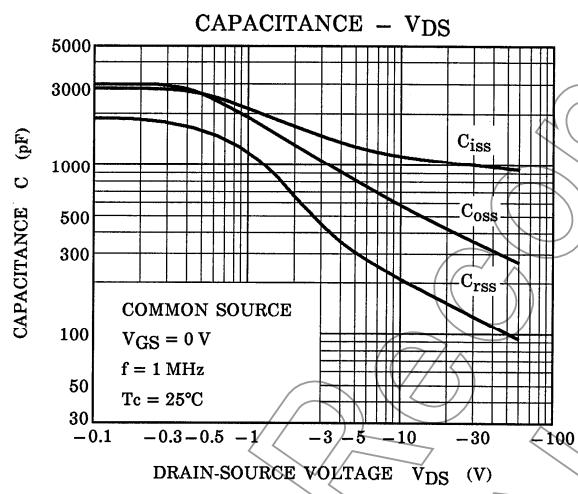
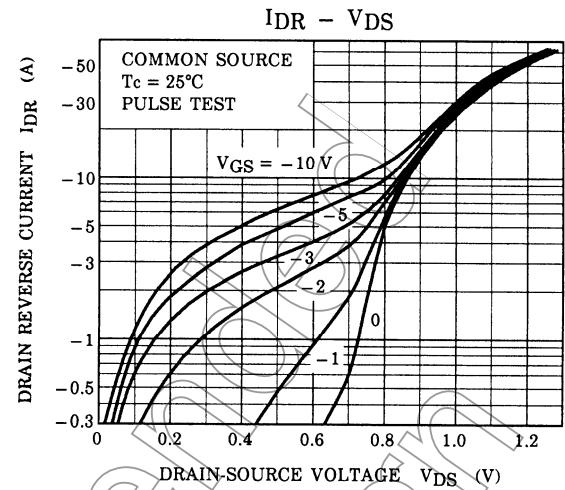
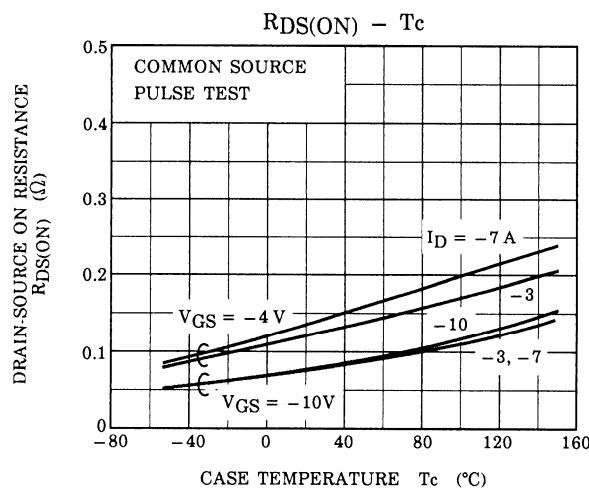
Note 2: A line under a Lot No. identifies the indication of product Labels.

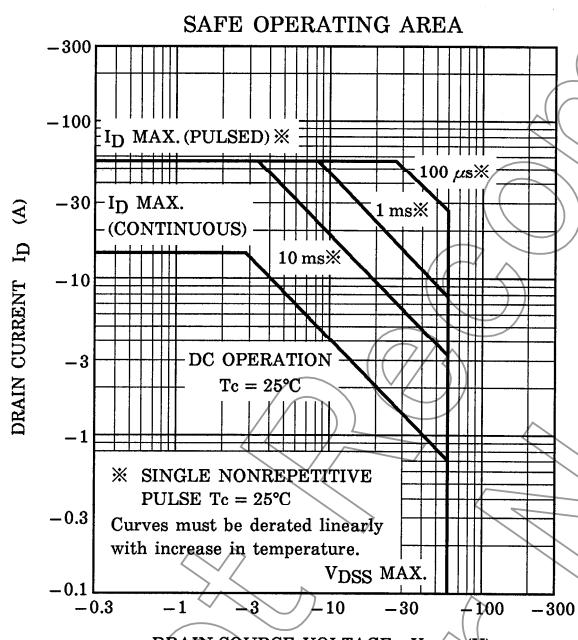
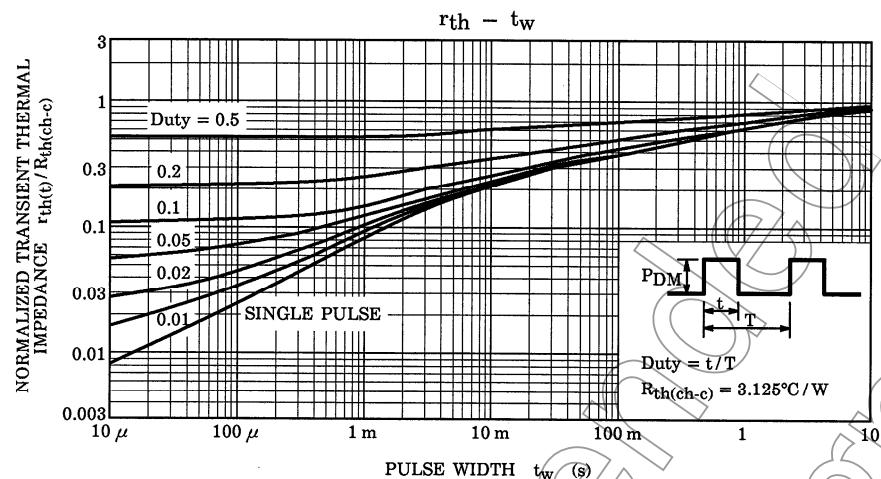
Not underlined: [[Pb]]/INCLUDES > MCV

Underlined: [[G]]/RoHS COMPATIBLE or [[G]]/RoHS [[Pb]]

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