

2SJ304

DC-DC Converter, Relay Drive and Motor Drive Applications

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

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

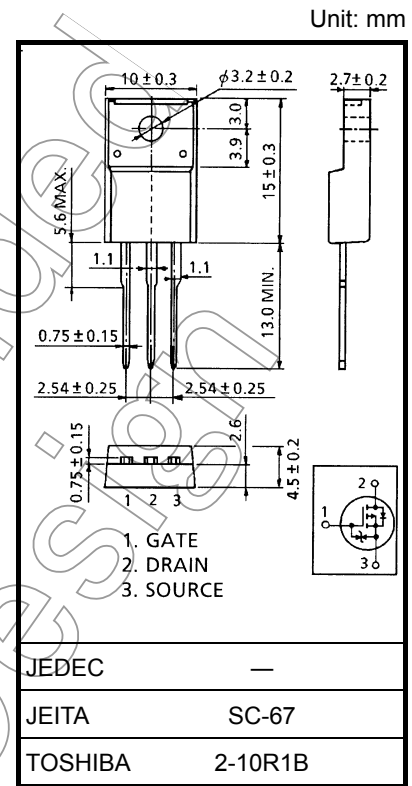
Note: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) 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.



Weight: 1.9 g (typ.)

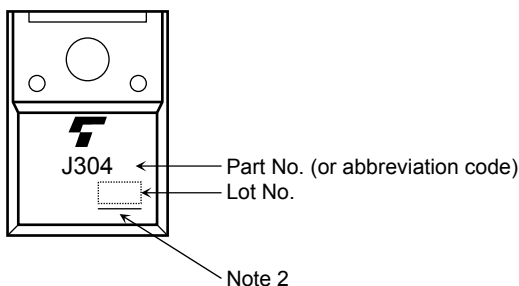
Electrical Characteristics (Ta = 25°C)

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		$R_{DS(ON)}$	$V_{GS} = -4\text{ V}, I_D = -5\text{ A}$	—	130	190	m Ω
			$V_{GS} = -10\text{ V}, I_D = -7\text{ A}$	—	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
Reverse transfer capacitance		C_{rss}		—	220	—	
Output capacitance		C_{oss}		—	550	—	
Switching time	Rise time	t_r		—	20	—	ns
	Turn-on time	t_{on}		—	30	—	
	Fall time	t_f		—	25	—	
	Turn-off time	t_{off}		Duty $\leq 1\%$, $t_w = 10\mu\text{s}$	—	100	
Total gate charge (Gate-source plus gate-drain)		Q_g	$V_{DD} = -48\text{ V}, V_{GS} = -10\text{ V}, I_D = -14\text{ A}$	—	45	—	nC
Gate-source charge		Q_{gs}		—	30	—	
Gate-drain ("miller") charge		Q_{gd}		—	15	—	

Source-Drain Ratings and Characteristics (Ta = 25°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}	$I_{DR} = -14\text{ A}, V_{GS} = 0\text{ V}$	—	110	—	ns
Reverse recovery charge	Q_{rr}	$dI_{DR} / dt = 50\text{ A} / \mu\text{s}$	—	0.18	—	μC

Marking

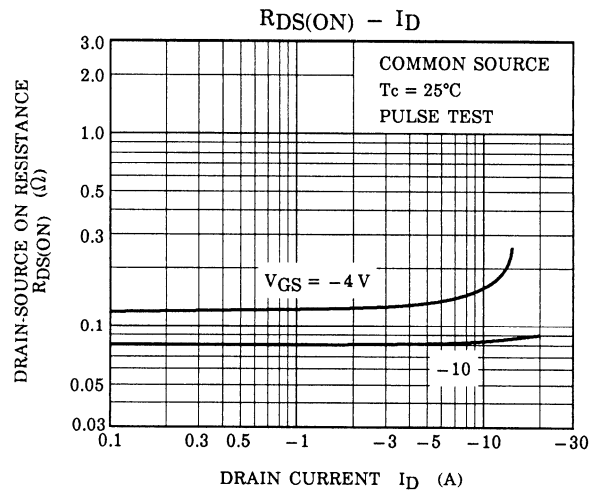
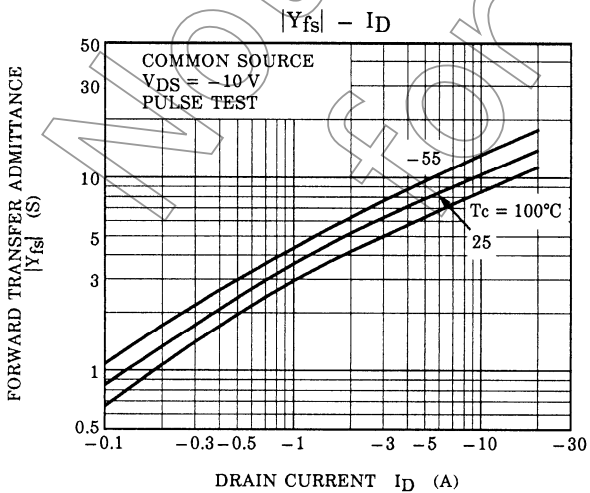
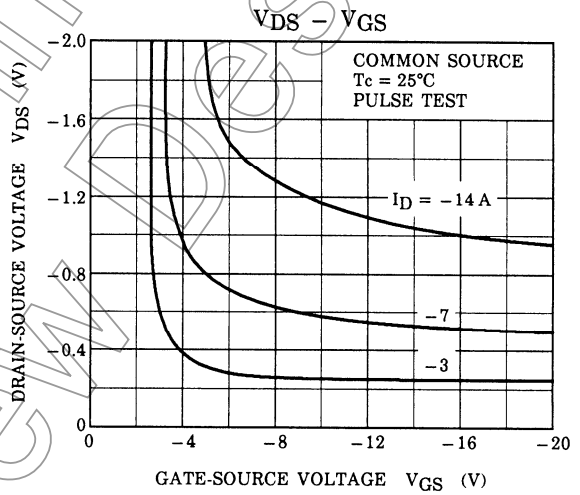
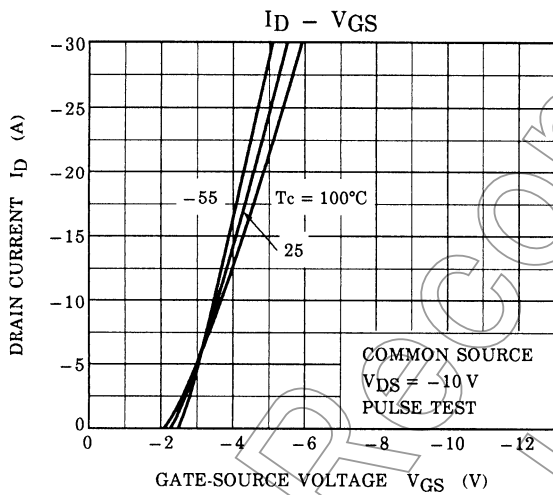
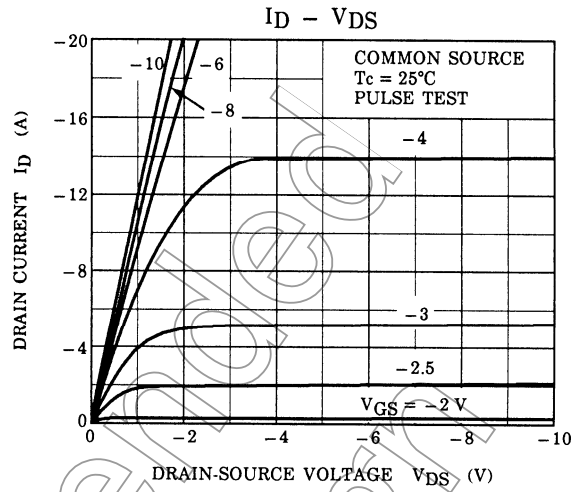
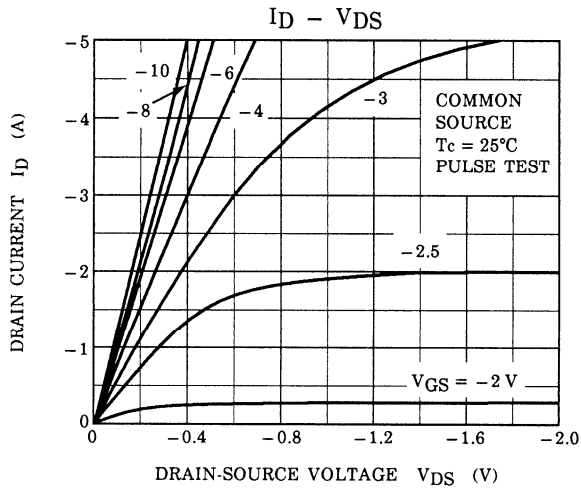


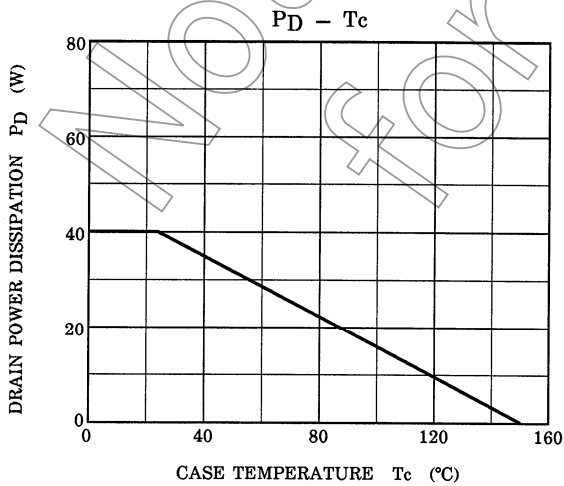
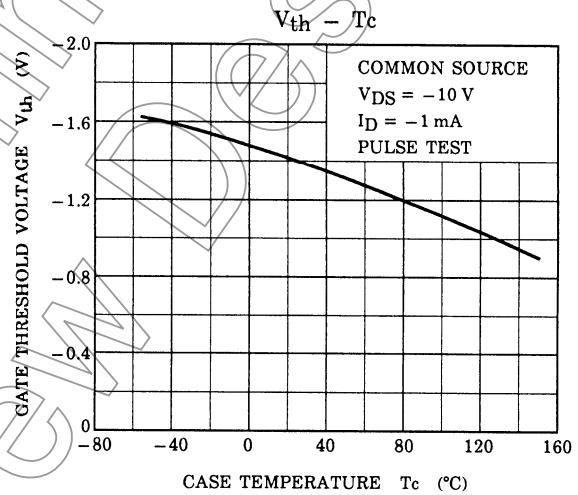
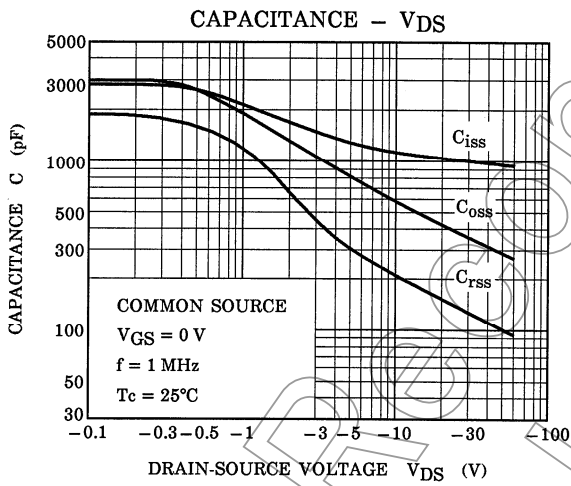
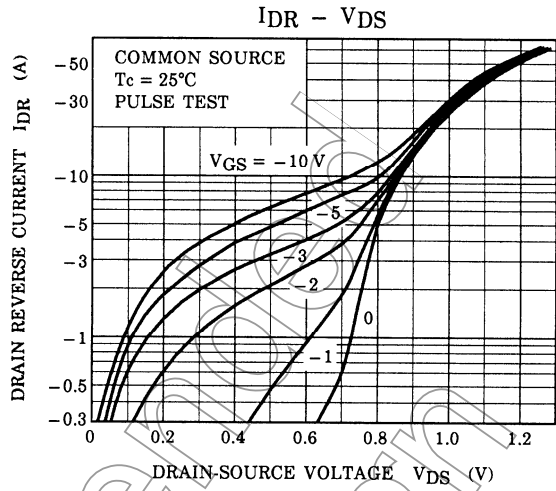
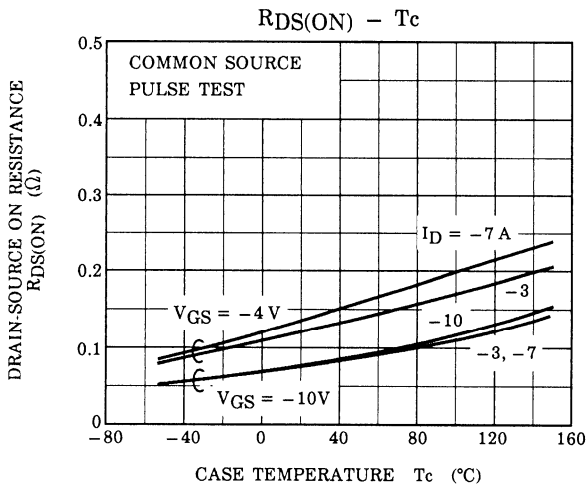
Note 2: A line under a Lot No. identifies the indication of product Labels.

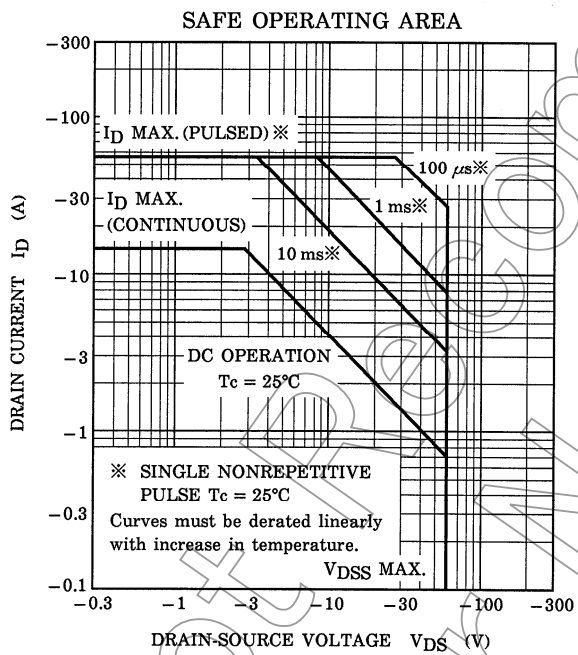
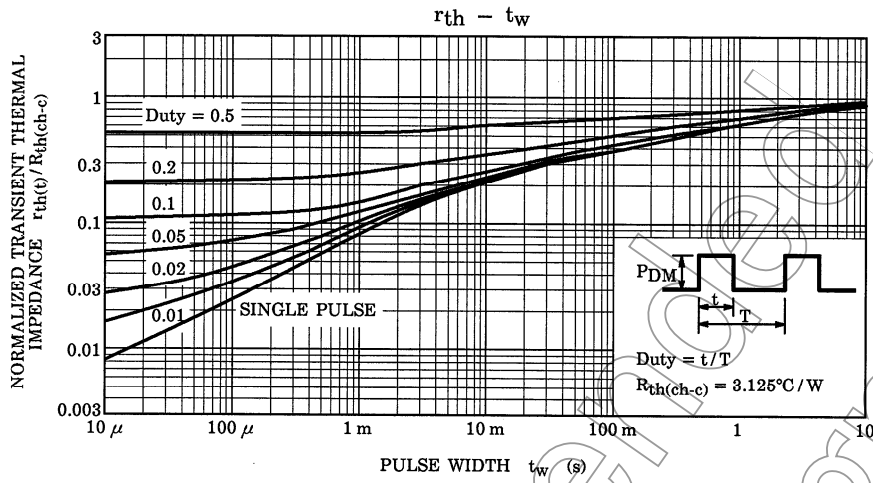
Not underlined: $[[\text{Pb}]]/\text{INCLUDES} > \text{MCV}$

Underlined: $[[\text{G}]]/\text{RoHS COMPATIBLE}$ or $[[\text{G}]]/\text{RoHS} [[\text{Pb}]]$

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