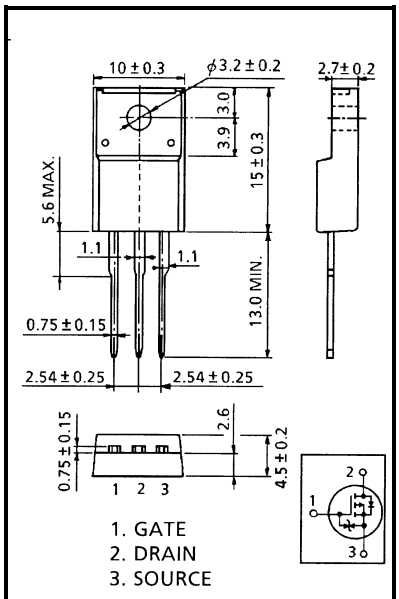
TOSHIBA Field Effect Transistor Silicon P Channel MOS Type (L^2−π−MOSIV)

2SJ304

DC−DC Converter, Relay Drive and Motor Drive Applications

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

Unit: mm



JEDEC	—
JEITA	SC-67
TOSHIBA	2-10R1B

Weight: 1.9 g (typ.)

Maximum Ratings (Ta = 25°C)

Characteristics		Symbol	Rating	Unit
Drain−source voltage		V_{DSS}	−60	V
Drain−gate voltage (R_{GS} = 20 kΩ)		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 (Tc = 25°C)		P_D	40	W
Channel temperature		T_{ch}	150	°C
Storage temperature range		T_{stg}	−55~150	°C

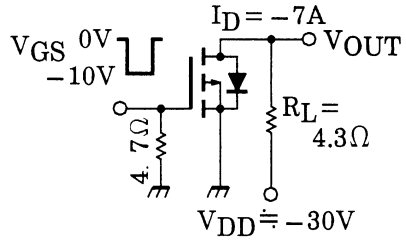
Thermal Characteristics

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

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

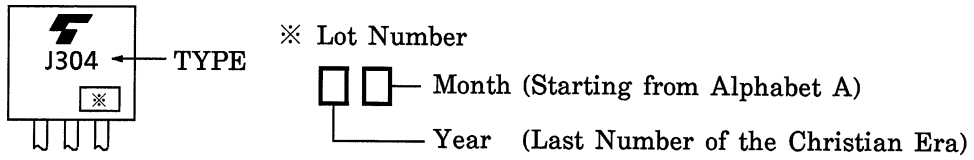
Electrical Characteristics (Ta = 25°C)

Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Gate leakage current		I_{GSS}	V_{GS} = ±16 V, V_{DS} = 0 V	—	—	±10	μA
Drain cut−off current		I_{DSS}	V_{DS} = −60 V, V_{GS} = 0 V	—	—	−100	μA
Drain−source breakdown voltage		$V_{(BR)\ DSS}$	I_D = −10 mA, V_{GS} = 0 V	−60	—	—	V
Gate threshold voltage		V_{th}	V_{DS} = −10 V, I_D = −1 mA	−0.8	—	−2.0	V
Drain−source ON resistance		$R_{DS\ (ON)}$	V_{GS} = −4 V, I_D = −5 A	—	130	190	mΩ
			V_{GS} = −10 V, I_D = −7 A	—	80	120	
Forward transfer admittance		$\|Y_{fs}\|$	V_{DS} = −10 V, I_D = −7 A	5.0	8.0	—	S
Input capacitance		C_{iss}	V_{DS} = −10 V, V_{GS} = 0 V, f = 1 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}		—	100	—	
Total gate charge (Gate−source plus gate−drain)		Q_g	V_{DD} ≈ −48 V, V_{GS} = −10 V, I_D = −14 A	—	45	—	nC
Gate−source charge		Q_{gs}		—	30	—	
Gate−drain (“miller”) charge		Q_{gd}		—	15	—	

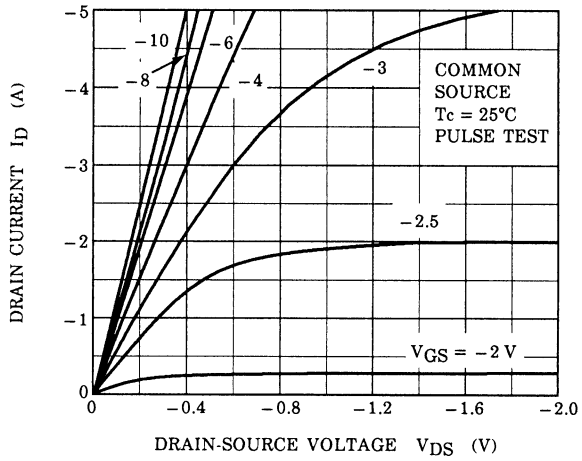
Source−Drain Ratings and Characteristics (Ta = 25°C)

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 A, V_{GS} = 0 V	—	—	1.7	V
Reverse recovery time	t_{rr}	I_{DR} = −14 A, V_{GS} = 0 V dI_{DR} / dt = 50 A / μs	—	110	—	ns
Reverse recovery charge	Q_{rr}		—	0.18	—	μC

Marking



$I_D - V_{DS}$



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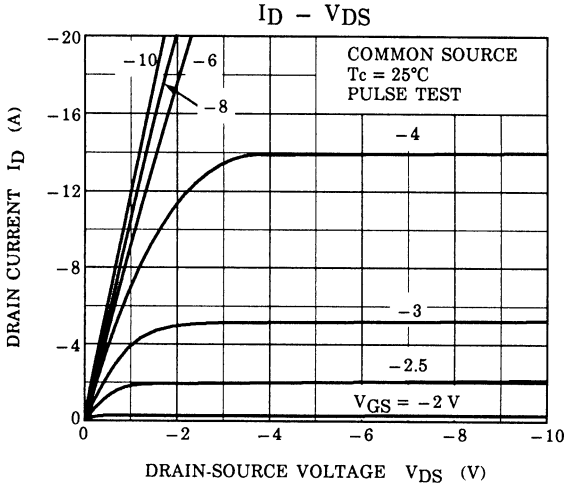
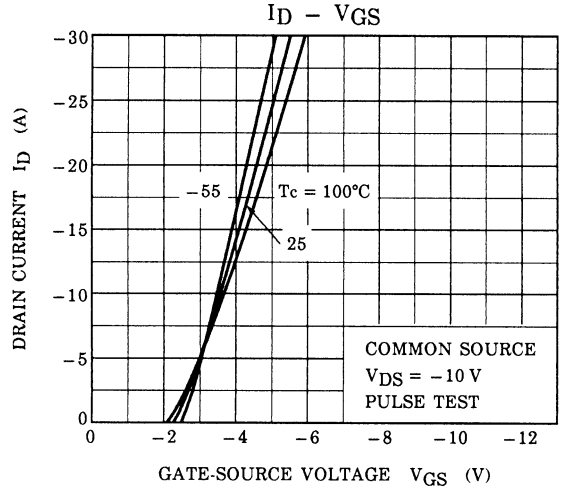
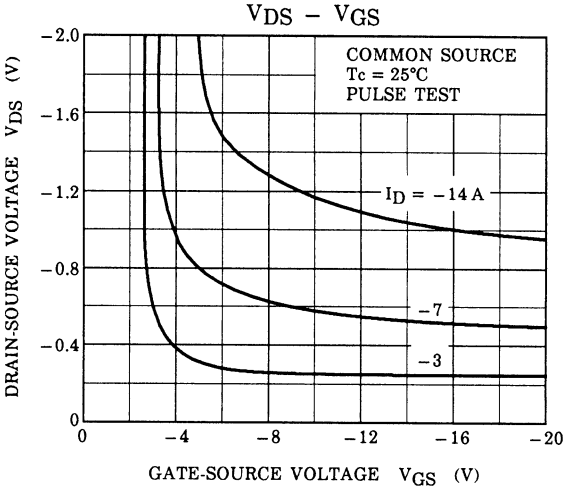


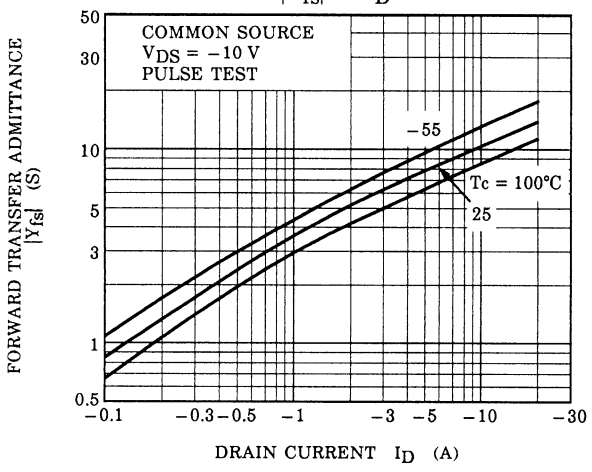
$I_D - V_{GS}$



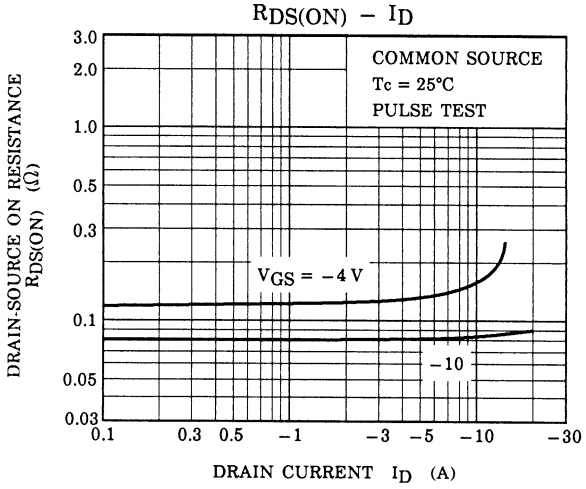
$V_{DS} - V_{GS}$



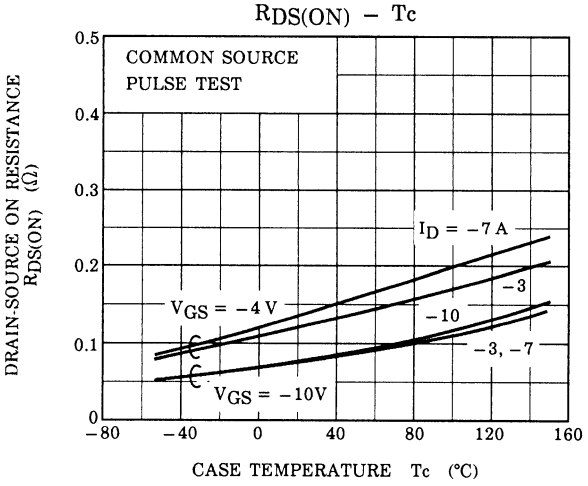
$|Y_{fs}| - I_D$



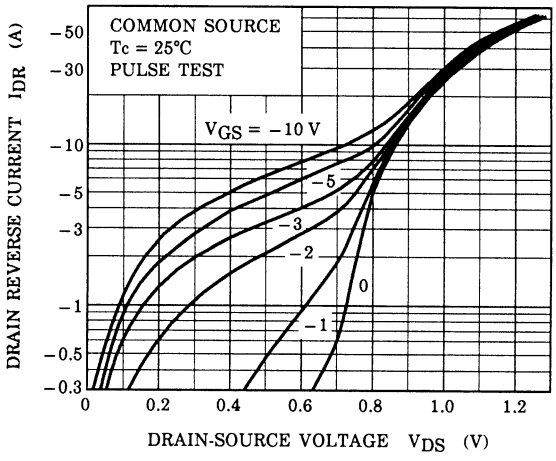
$R_{DS(ON)} - I_D$



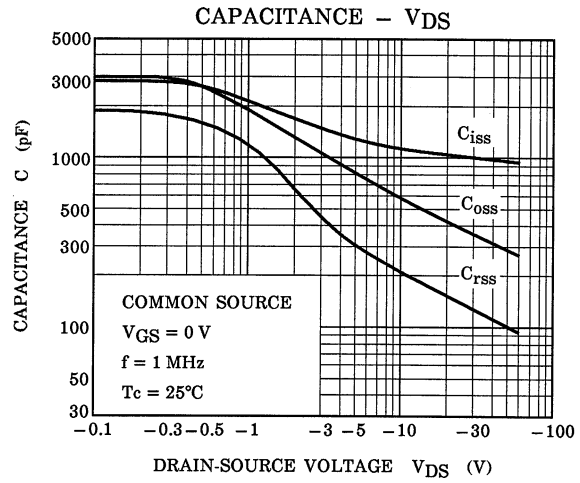
$R_{DS(ON)}$ – Tc



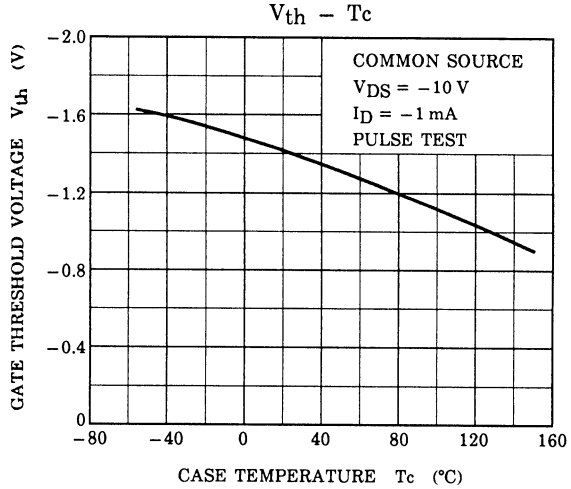
I_{DR} – V_{DS}



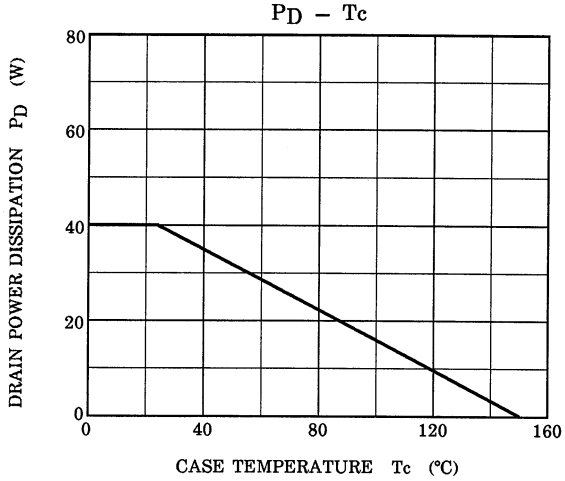
CAPACITANCE – V_{DS}

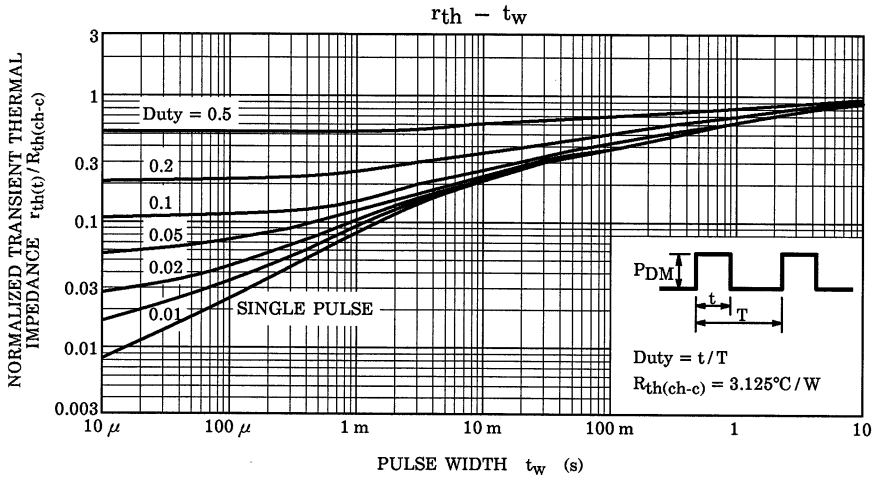


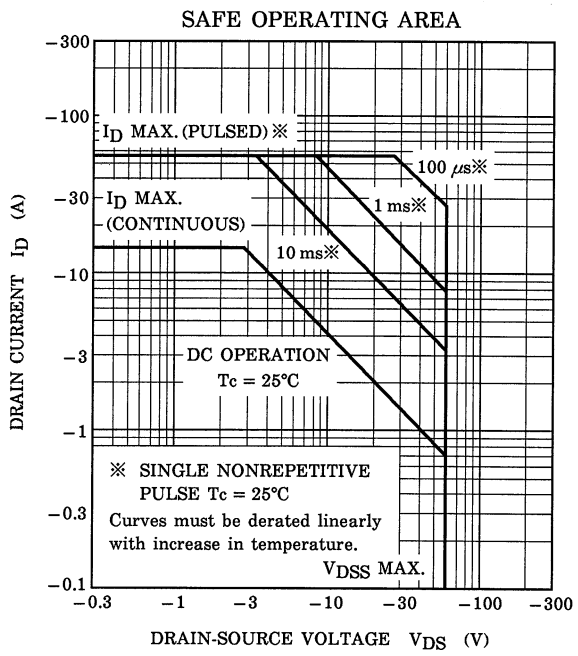
V_{th} – Tc



P_D – Tc




r_{th} – t_w
NORMALIZED TRANSIENT THERMAL IMPEDANCE $r_{th(t)}/R_{th(ch-c)}$
3
1
0.3
0.1
0.03
0.01
0.003
Duty = 0.5
0.2
0.1
0.05
0.02
0.01
SINGLE PULSE
P_{DM}
t
T
Duty = t/T
$R_{th(ch-c)}$ = 3.125°C/W
10 μ
100 μ
1 m
10 m
100 m
1
10
PULSE WIDTH t_w (s)


SAFE OPERATING AREA
DRAIN CURRENT I_D (A)
−300
−100
−30
−10
−3
−1
−0.3
−0.1
I_D MAX. (PULSED) ※
100 μs※
I_D MAX. (CONTINUOUS)
1 ms※
10 ms※
DC OPERATION
Tc = 25°C
※ SINGLE NONREPETITIVE PULSE Tc = 25°C
Curves must be derated linearly with increase in temperature.
V_{DSS} MAX.
−0.3
−1
−3
−10
−30
−100
−300
DRAIN-SOURCE VOLTAGE V_{DS} (V)

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