TOSHIBA FIELD EFFECT TRANSISTOR SILICON P CHANNEL MOS TYPE (L^2-π-MOSⅣ)

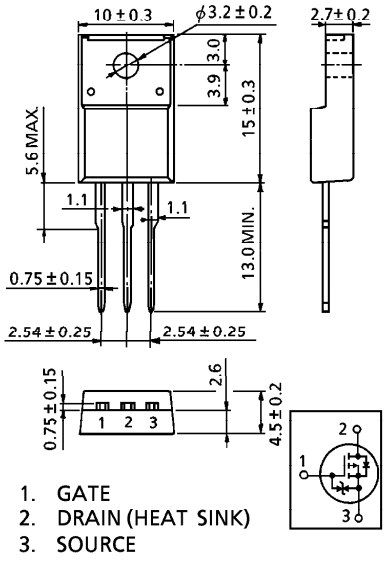
2SJ304

HIGH SPEED, HIGH CURRENT SWITCHING APPLICATIONS.

DC-DC CONVERTER, RELAY DRIVE AND MOTOR DRIVE APPLICATIONS.

INDUSTRIAL APPLICATIONS

Unit in mm



1. GATE
2. DRAIN (HEAT SINK)
3. SOURCE

JEDEC	—
EIAJ	SC-67
TOSHIBA	2-10R1B

Weight : 1.9g

- 4-Volt Gate Drive
- Low Drain-Source ON Resistance : $R_{DS(ON)}=80m\Omega$ (Typ.)
- High Forward Transfer Admittance : $|Y_{fs}|=8.0S$ (Typ.)
- Low Leakage Current : $I_{DSS}=-100\mu A$ (Max.) ($V_{DS}=-60V$)
- Enhancement-Mode : $V_{th}=-0.8\sim-2.0V$ ($V_{DS}=-10V$, $I_D=-1mA$)

MAXIMUM RATINGS (Ta = 25°C)

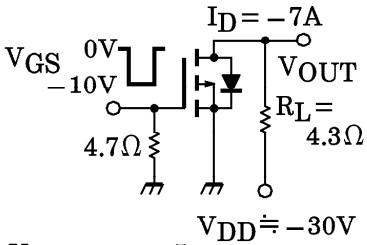
CHARACTERISTIC		SYMBOL	RATING	UNIT
Drain-Source Voltage		V_{DSS}	−60	V
Drain-Gate Voltage ($R_{GS}=20k\Omega$)		V_{DGR}	−60	V
Gate-Source Voltage		V_{GSS}	±20	V
Drain Current	DC	I_D	−14	A
	Pulse	I_{DP}	−56	
Drain Power Dissipation (Tc=25°C)		P_D	40	W
Channel Temperature		T_{ch}	150	°C
Storage Temperature Range		T_{stg}	−55~150	°C

THERMAL CHARACTERISTICS

CHARACTERISTIC	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

This transistor is an electrostatic sensitivedevice.
Please handle with caution.

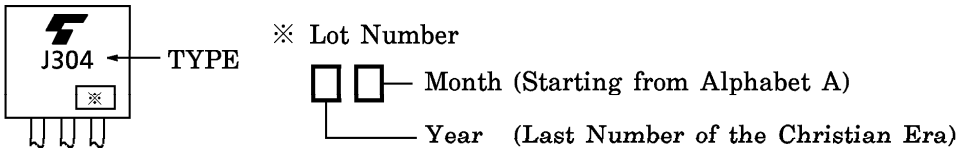
ELECTRICAL CHARACTERISTICS (Ta = 25°C)

CHARACTERISTIC		SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Gate Leakage Current		I_{GSS}	$V_{GS}=\pm16V$, $V_{DS}=0V$	—	—	±10	μA
Drain Cut-off Current		I_{DSS}	$V_{DS}=-60V$, $V_{GS}=0V$	—	—	−100	μA
Drain-Source Breakdown Voltage		$V_{(BR)DSS}$	$I_D=-10mA$, $V_{GS}=0V$	−60	—	—	V
Gate Threshold Voltage		V_{th}	$V_{DS}=-10V$, $I_D=-1mA$	−0.8	—	−2.0	V
Drain-Source ON Resistance		$R_{DS(ON)}$	$V_{GS}=-4V$, $I_D=-5A$	—	130	190	mΩ
			$V_{GS}=-10V$, $I_D=-7A$	—	80	120	
Forward Transfer Admittance		$\|Y_{fs}\|$	$V_{DS}=-10V$, $I_D=-7A$	5.0	8.0	—	S
Input Capacitance		C_{iss}	$V_{DS}=-10V$, $V_{GS}=0V$, f=1MHz	—	1200	—	pF
Reverse Transfer Capacitance		C_{rss}		—	220	—	
Output Capacitance		C_{oss}		—	550	—	
Switching Time	Rise Time	t_r	 V_{IN} : t_r, $t_f<5ns$, Duty ≦ 1%, $t_w=10\mu s$	—	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	$V_{DD}\fallingdotseq-48V$, $V_{GS}=-10V$, $I_D=-14A$	—	45	—	nC
Gate-Source Charge		Q_{gs}		—	30	—	
Gate-Drain ("Miller") Charge		Q_{gd}		—	15	—	

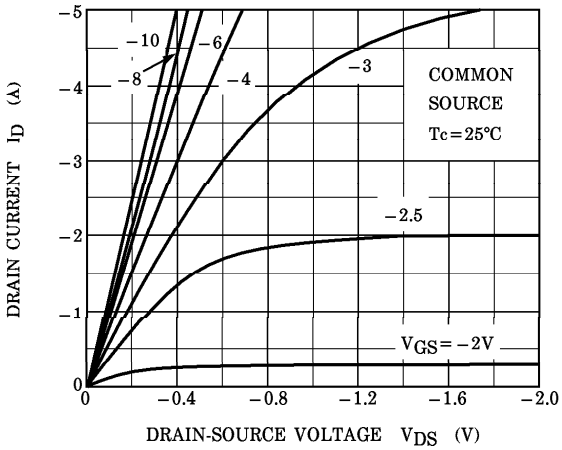
SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS (Ta = 25°C)

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Continuous Drain Reverse Current	I_{DR}	—	—	—	−14	A
Pulse Drain Reverse Current	I_{DRP}	—	—	—	−56	A
Diode Forward Voltage	V_{DSF}	$I_{DR}=-14A$, $V_{GS}=0V$	—	—	1.7	V
Reverse Recovery Time	t_{rr}	$I_{DR}=-14A$, $V_{GS}=0V$, $dI_{DR}/dt=50A/\mu s$	—	110	—	ns
Reverse Recovered Charge	Q_{rr}		—	0.18	—	μC

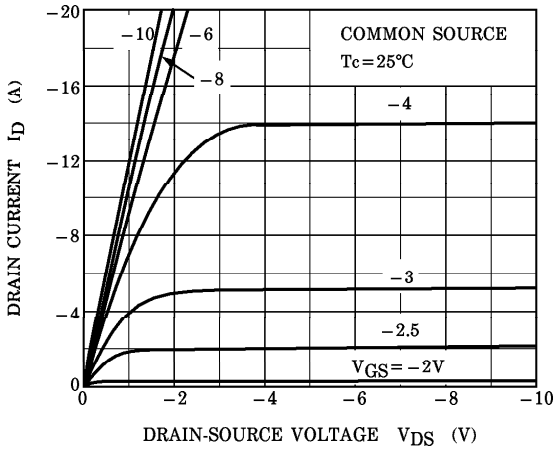
MARKING



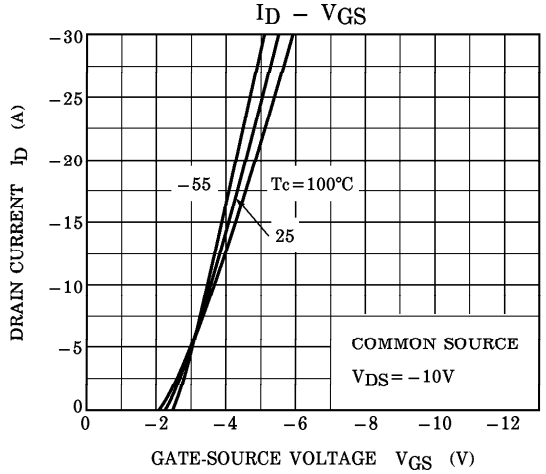
$I_D - V_{DS}$



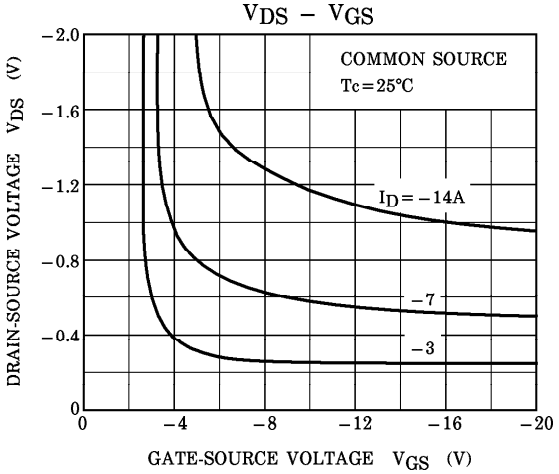
$I_D - V_{DS}$



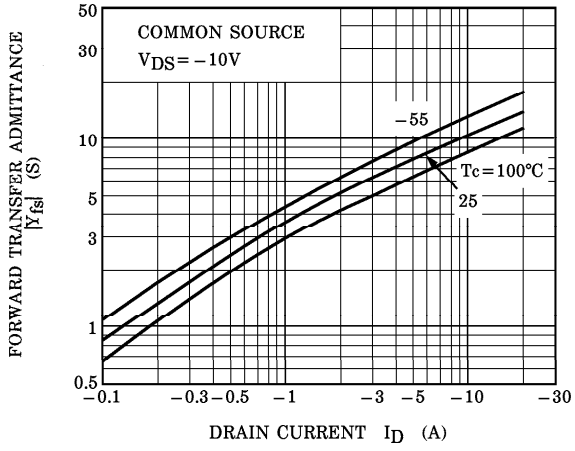
$I_D - V_{GS}$



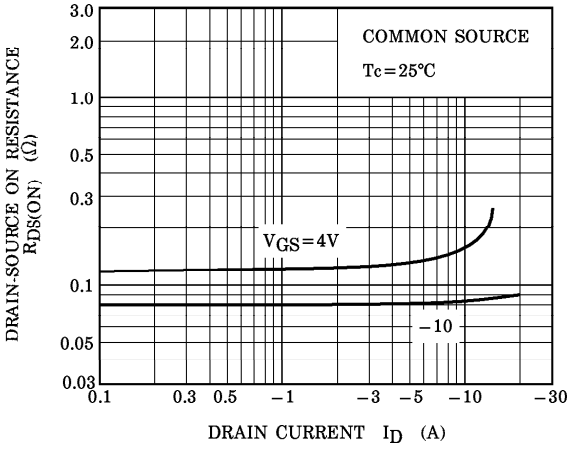
$V_{DS} - V_{GS}$



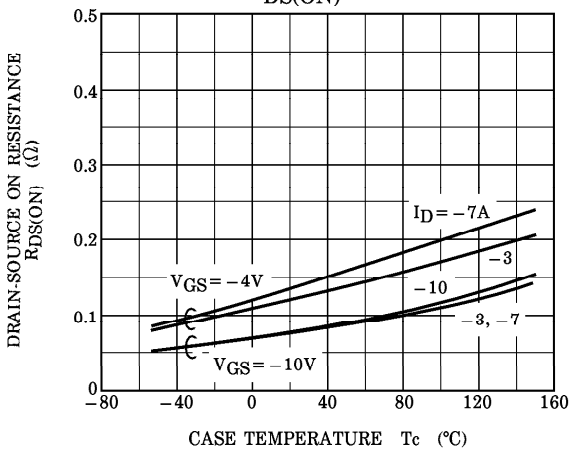
$|Y_{fs}| - I_D$



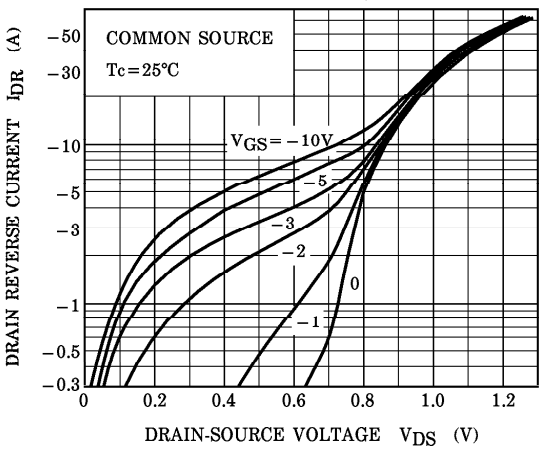
$R_{DS(ON)} - I_D$



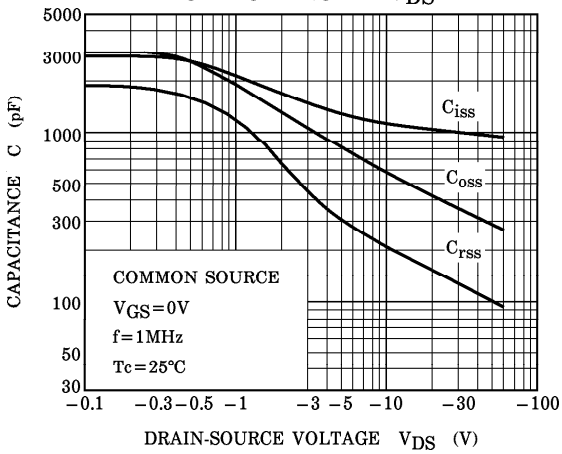
$R_{DS(ON)}$ – Tc



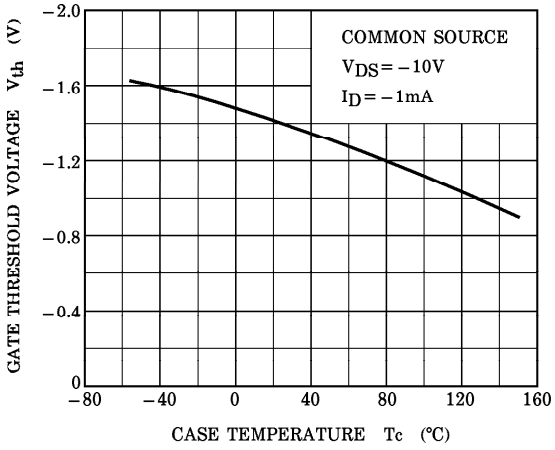
I_{DR} – V_{DS}



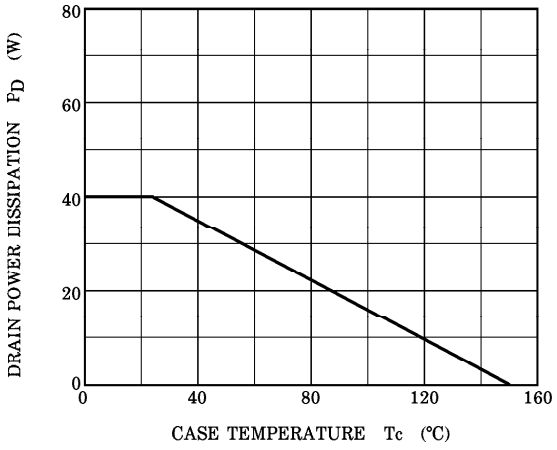
CAPACITANCE – V_{DS}

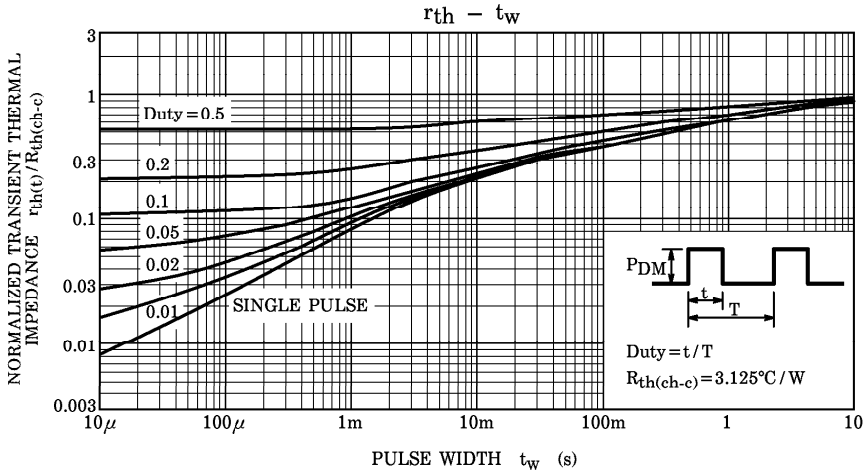


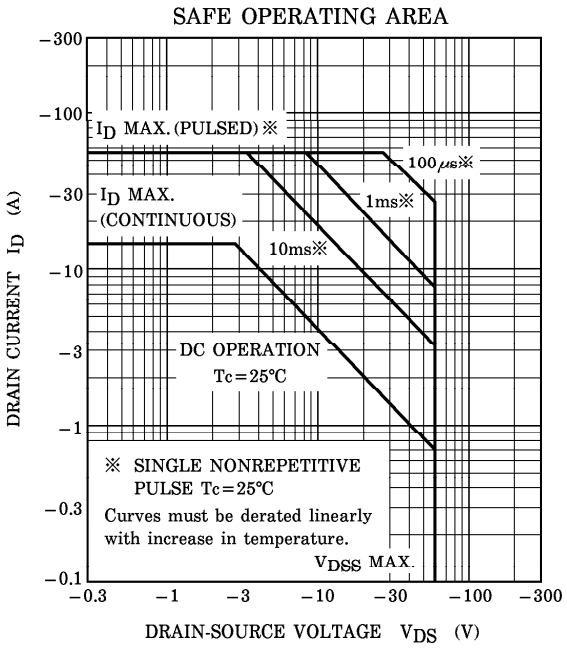
V_{th} – Tc



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
10μ
100μ
1m
10m
100m
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) ※
100μs※
1ms※
I_D MAX. (CONTINUOUS)
10ms※
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)