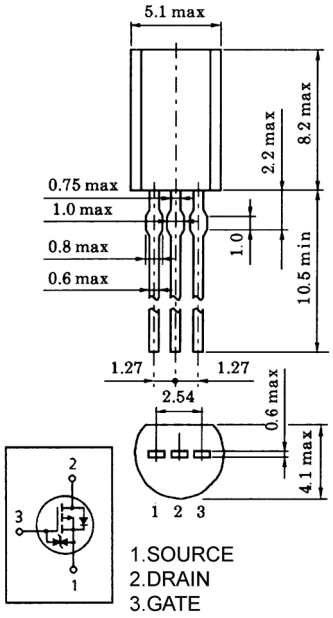
TOSHIBA Field Effect Transistor Silicon P Channel MOS Type (L^2−π−MOSVI)

2SJ537

Chopper Regulator, DC−DC Converter and Motor Drive Applications

- Low drain−source ON resistance : $R_{DS\ (ON)}$ = 0.16 Ω (typ.)
- High forward transfer admittance : $|Y_{fs}|$ = 3.5 S (typ.)
- Low leakage current : I_{DSS} = −100 μA (V_{DS} = −50 V)
- Enhancement−mode : V_{th} = −0.8~−2.0 V (V_{DS} = −10 V, I_D = −1 mA)

Unit: mm



JEDEC	TO-92MOD
JEITA	—
TOSHIBA	2-5J1C

Weight: 0.36 g (typ.)

Absolute Maximum Ratings (Ta = 25°C)

Characteristics		Symbol	Rating	Unit
Drain−source voltage		V_{DSS}	−50	V
Drain−gate voltage (R_{GS} = 20 kΩ)		V_{DGR}	−50	V
Gate−source voltage		V_{GSS}	±20	V
Drain current	DC (Note 1)	I_D	−5	A
	Pulse (Note 1)	I_{DP}	−15	A
Drain power dissipation		P_D	0.9	W
Channel temperature		T_{ch}	150	°C
Storage temperature range		T_{stg}	−55~150	°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).

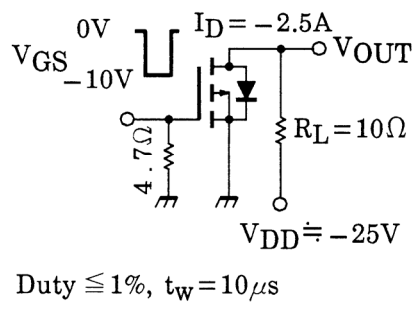
Thermal Characteristics

Characteristics	Symbol	Max	Unit
Thermal resistance, channel to ambient	$R_{th\ (ch-a)}$	138	°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.

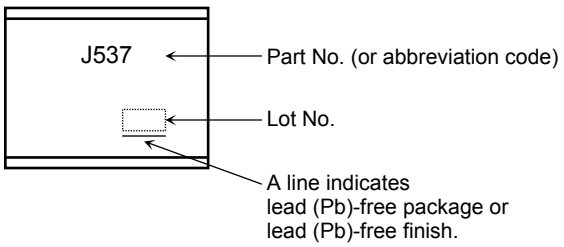
Electrical Characteristics (Ta = 25°C)

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} = −50 V, V_{GS} = 0 V	—	—	−100	μA
Drain−source breakdown voltage		$V_{(BR)\ DSS}$	I_D = −10 mA, V_{GS} = 0 V	−50	—	—	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 = −1.3 A	—	0.27	0.34	Ω
			V_{GS} = −10 V, I_D = −2.5 A	—	0.16	0.19	
Forward transfer admittance		$\|Y_{fs}\|$	V_{DS} = −10 V, I_D = −2.5 A	1.5	3.5	—	S
Input capacitance		C_{iss}	V_{DS} = −10 V, V_{GS} = 0 V, f = 1 MHz	—	470	—	pF
Reverse transfer capacitance		C_{rss}		—	60	—	
Output capacitance		C_{oss}		—	210	—	
Switching time	Rise time	t_r		—	25	—	ns
	Turn−on time	t_{on}		—	35	—	
	Fall time	t_f		—	20	—	
	Turn−off time	t_{off}		—	120	—	
Total gate charge (Gate−source plus gate−drain)		Q_g	V_{DD} ≈ −40 V, V_{GS} = −10 V, I_D = −5 A	—	18	—	nC
Gate−source charge		Q_{gs}		—	13	—	
Gate−drain (“miller”) charge		Q_{gd}		—	5	—	

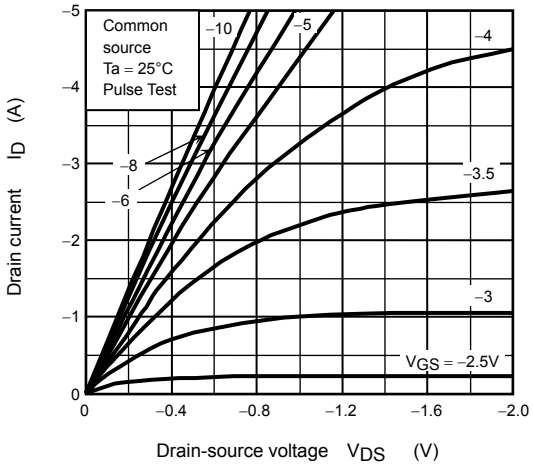
Source−Drain Ratings and Characteristics (Ta = 25°C)

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Continuous drain reverse current (Note 1)	I_{DR}	—	—	—	−5	A
Pulse drain reverse current (Note 1)	I_{DRP}	—	—	—	−15	A
Forward voltage (diode)	V_{DSF}	I_{DR} = −5 A, V_{GS} = 0 V	—	—	1.5	V

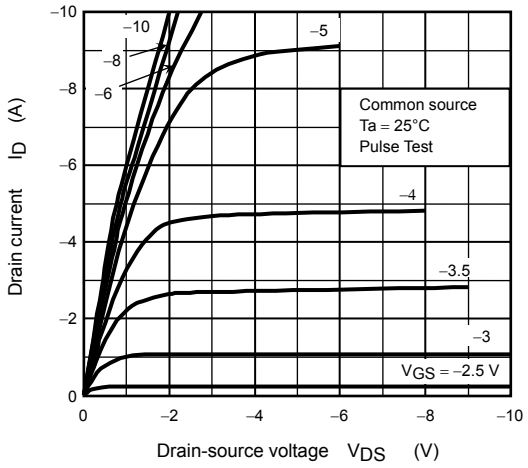
Marking



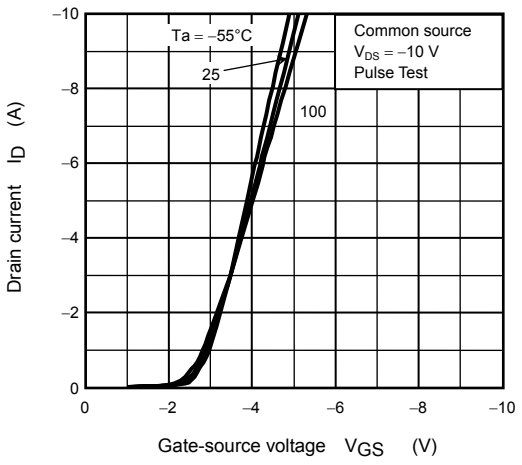
$I_D - V_{DS}$



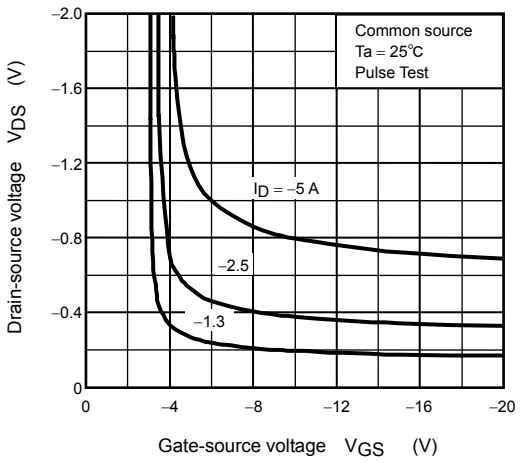
$I_D - V_{DS}$



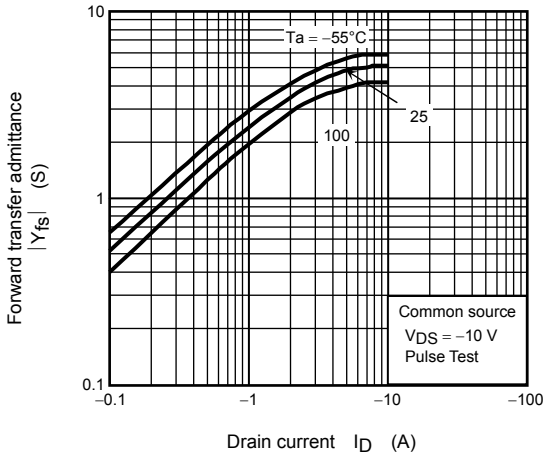
$I_D - V_{GS}$



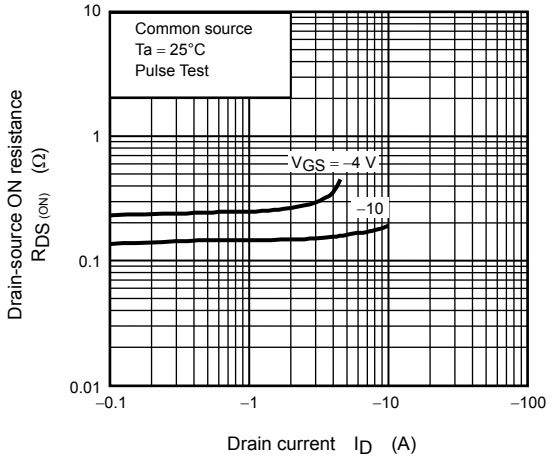
$V_{DS} - V_{GS}$



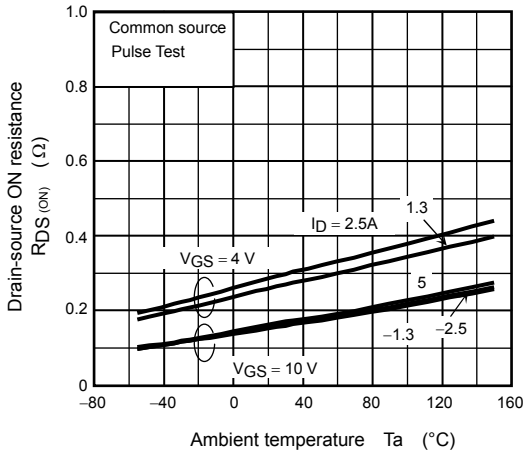
$|Y_{fs}| - I_D$



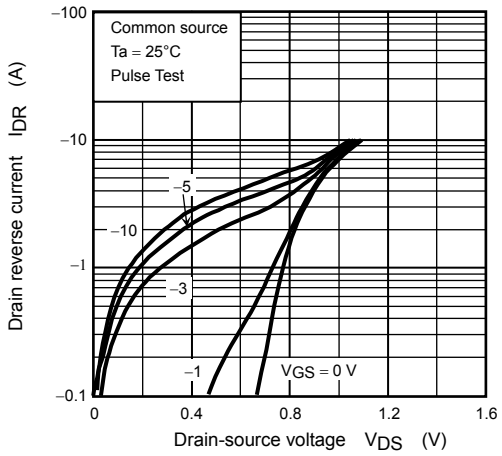
$R_{DS\ (ON)} - I_D$



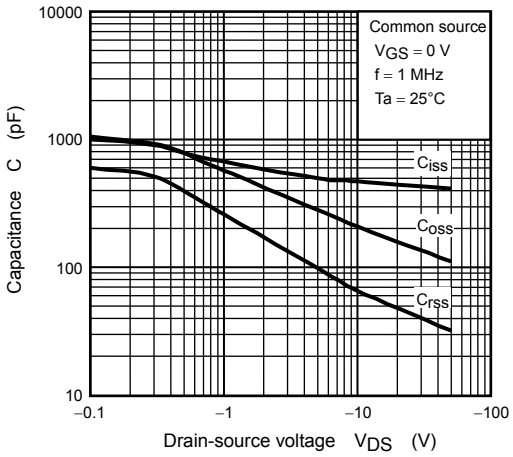
$R_{DS\ (ON)}$ – Ta



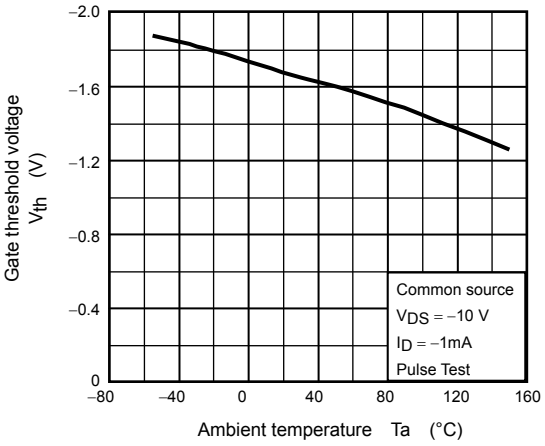
I_{DR} – V_{DS}



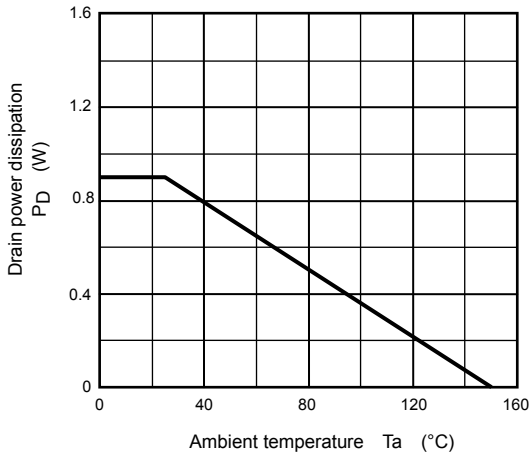
Capacitance – V_{DS}



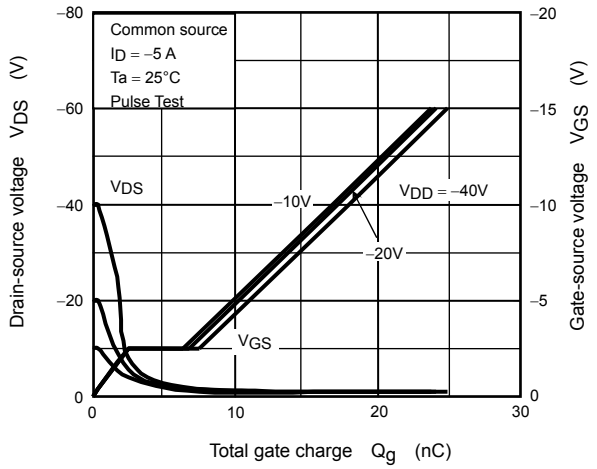
V_{th} – Ta

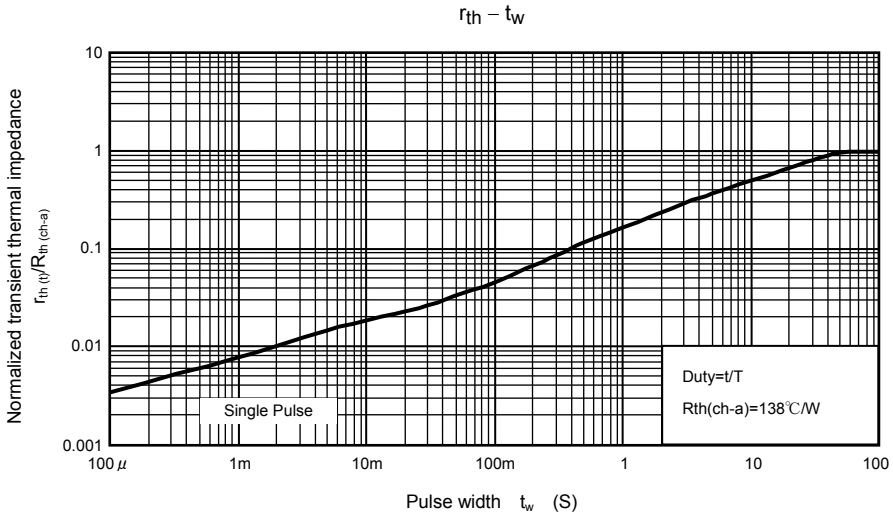


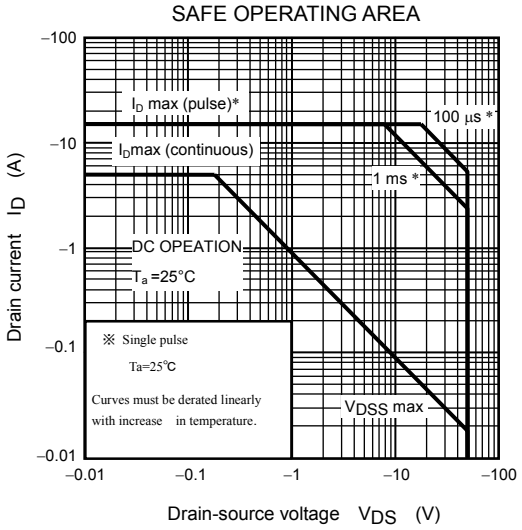
P_D – Ta



Dynamic input / output characteristics




$r_{th} - t_w$
Normalized transient thermal impedance $r_{th\ (t)}/R_{th\ (ch-a)}$
10
1
0.1
0.01
0.001
100 μ
1m
10m
100m
1
10
100
Single Pulse
Duty=t/T
Rth(ch-a)=138℃/W
Pulse width t_w (S)


SAFE OPERATING AREA
Drain current I_D (A)
−100
−10
−1
−0.1
−0.01
I_D max (pulse)*
100 μs *
$I_D$max (continuous)
1 ms *
DC OPEATION
T_a =25°C
※ Single pulse
Ta=25℃
Curves must be derated linearly
with increase in temperature.
V_{DSS} max
−0.01
−0.1
−1
−10
−100
Drain-source voltage V_{DS} (V)

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20070701-EN

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