

TOSHIBA Field Effect Transistor Silicon P Channel MOS Type

SSM3J120TU

○ Power Management Switch Applications

○ High-Current Switching Applications

- 1.5 V drive
- Low on-resistance

$$R_{on} = 140 \text{ m}\Omega \text{ (max) (@}V_{GS} = -1.5 \text{ V)}$$

$$R_{on} = 78 \text{ m}\Omega \text{ (max) (@}V_{GS} = -1.8 \text{ V)}$$

$$R_{on} = 49 \text{ m}\Omega \text{ (max) (@}V_{GS} = -2.5 \text{ V)}$$

$$R_{on} = 38 \text{ m}\Omega \text{ (max) (@}V_{GS} = -4.0 \text{ V)}$$

Absolute Maximum Ratings (Ta = 25°C)

Characteristics		Symbol	Rating	Unit
Drain-Source voltage		V_{DS}	-20	V
Gate-Source voltage		V_{GS}	± 8	V
Drain current	DC	I_D	-4.0	A
	Pulse	I_{DP}	-8.0	
Drain power dissipation	P_D (Note 1)	800	mW	
	P_D (Note 2)	500		
Channel temperature		T_{ch}	150	°C
Storage temperature		T_{stg}	-55~150	°C

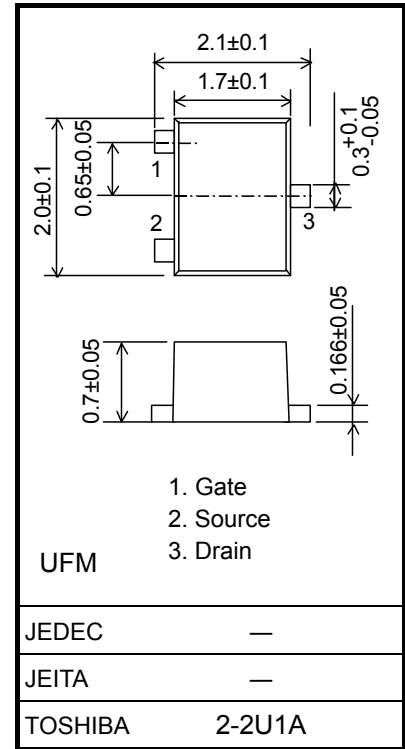
Note: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.)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

Note 1 : Mounted on ceramic board
(25.4 mm × 25.4 mm × 0.8 t, Cu Pad: 645 mm²)

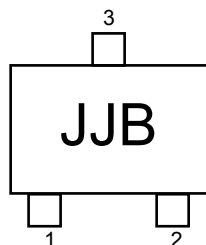
Note 2 : Mounted on FR4 board
(25.4 mm × 25.4 mm × 1.6 t, Cu Pad: 645 mm²)

Unit: mm

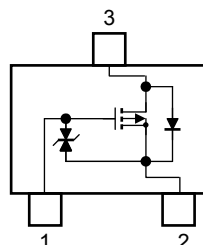


Weight: 6.6mg (typ.)

Marking



Equivalent Circuit (top view)



Start of commercial production
2005-11

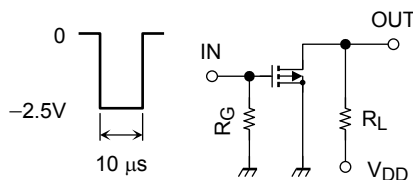
Electrical Characteristics (Ta = 25°C)

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit	
Drain-Source breakdown voltage	V (BR) DSS	I _D = -1 mA, V _{GS} = 0	-20	—	—	V	
	V (BR) DSX	I _D = -1 mA, V _{GS} = +8 V	-12	—	—		
Drain cut-off current	I _{DSS}	V _{DS} = -20 V, V _{GS} = 0	—	—	-10	μA	
Gate leakage current	I _{GSS}	V _{GS} = ±8 V, V _{DS} = 0	—	—	±1	μA	
Gate threshold voltage	V _{th}	V _{DS} = -3 V, I _D = -1 mA	-0.3	—	-1.0	V	
Forward transfer admittance	Y _{fs}	V _{DS} = -3 V, I _D = -2.0 A (Note 3)	6.1	12.1	—	S	
Drain-Source ON-resistance	R _{DS (ON)}	I _D = -3.0 A, V _{GS} = -4.0 V (Note 3)	—	28	38	mΩ	
		I _D = -2.0 A, V _{GS} = -2.5 V (Note 3)	—	34	49		
		I _D = -1.0 A, V _{GS} = -1.8 V (Note 3)	—	47	78		
		I _D = -0.3 A, V _{GS} = -1.5 V (Note 3)	—	60	140		
Input capacitance	C _{iss}	V _{DS} = -10 V, V _{GS} = 0 f = 1 MHz	—	1484	—	pF	
Output capacitance	C _{oss}		—	185	—	pF	
Reverse transfer capacitance	C _{rss}		—	169	—	pF	
Switching time	Turn-on time	t _{on}	V _{DD} = -10 V, I _D = -2.0 A V _{GS} = 0 to -2.5 V, R _G = 4.7 Ω	—	67	—	ns
	Turn-off time	t _{off}		—	92	—	
Total gate charge	Q _g	V _{DS} = -16 V, I _{DS} = -4.0 A, V _{GS} = -4.0 V,	—	22.3	—	nC	
Gate-Source charge	Q _{gs}		—	14.9	—		
Gate-Drain charge	Q _{gd}		—	7.3	—		
Drain-Source forward voltage	V _{DSF}	I _D = 4.0 A, V _{GS} = 0 (Note 3)	—	0.8	1.2	V	

Note 3: Pulse test

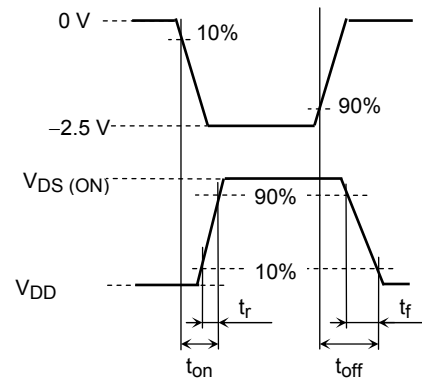
Switching Time Test Circuit

(a) Test Circuit



V_{DD} = -10 V
 R_G = 4.7 Ω
 Duty ≤ 1%
 V_{IN}: t_r, t_f < 5 ns
 Common Source
 Ta = 25 °C

(b) V_{IN}



(c) V_{OUT}

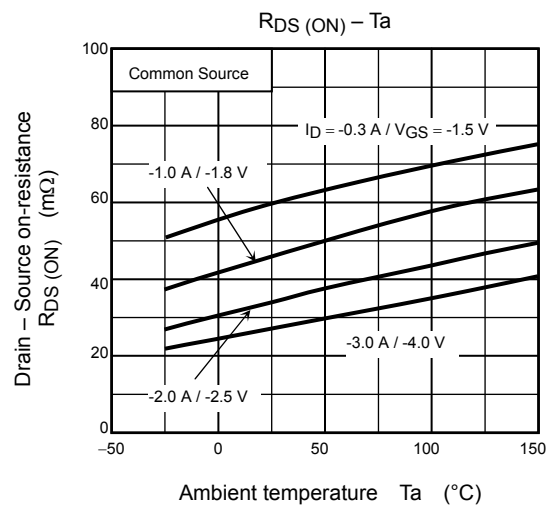
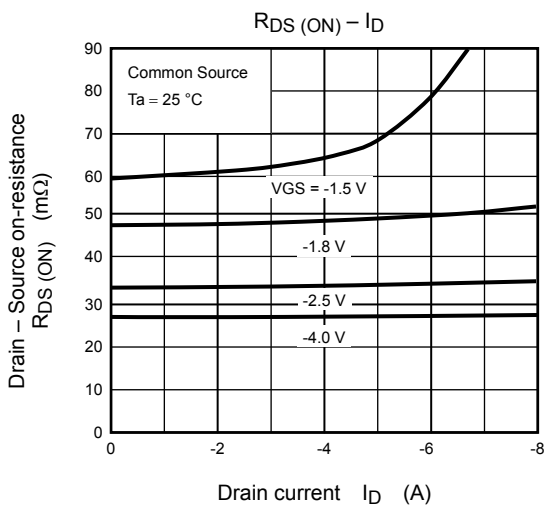
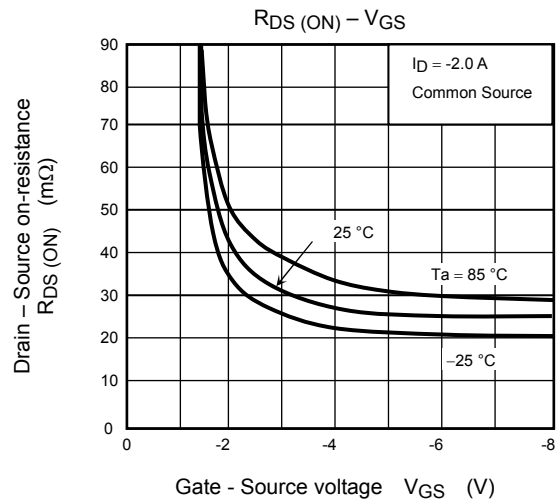
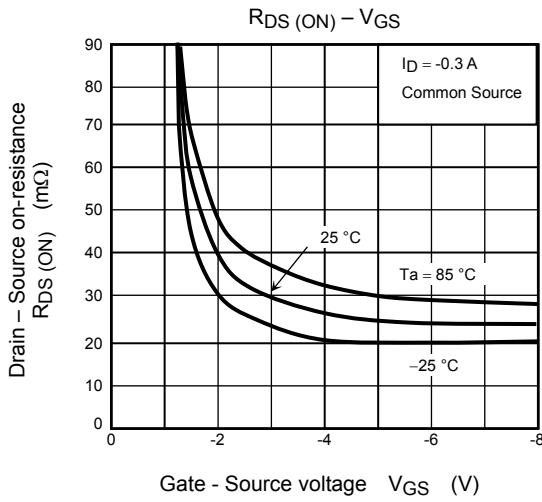
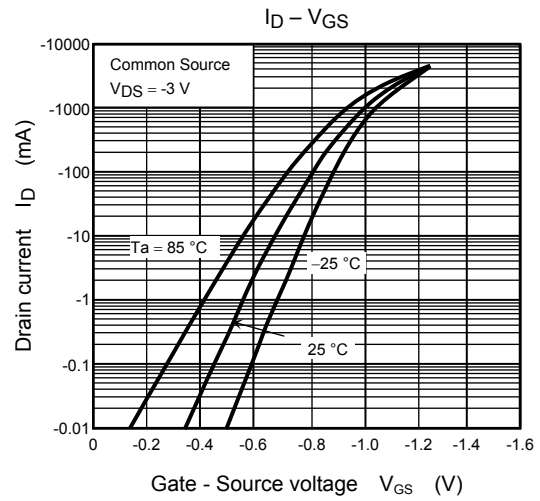
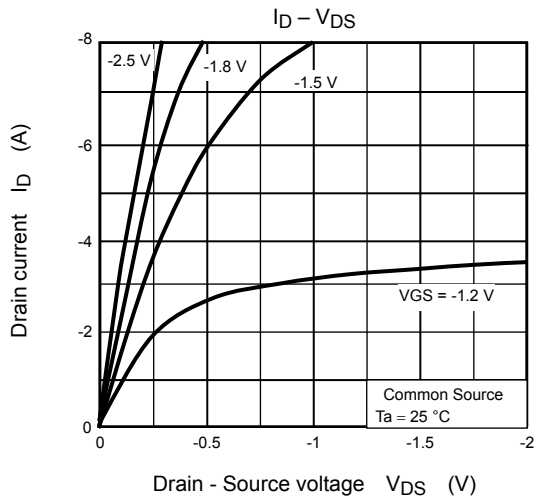
Precaution

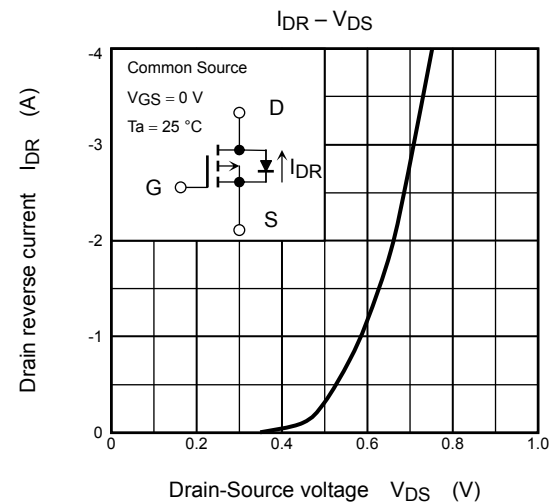
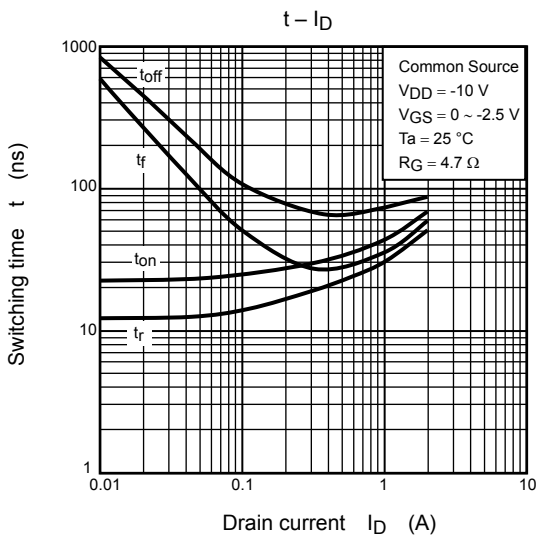
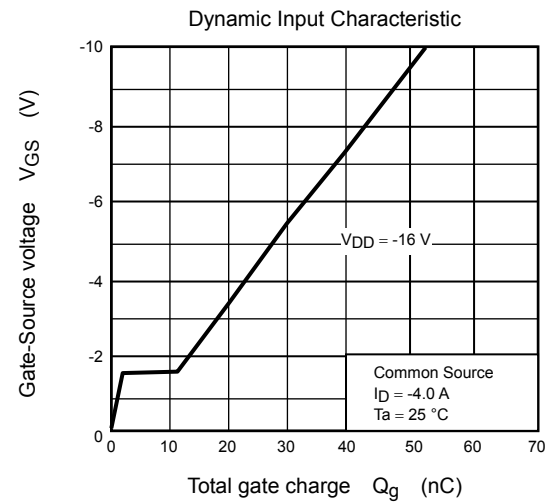
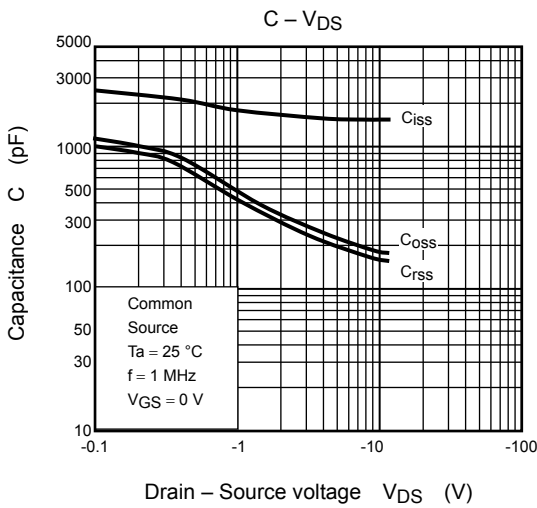
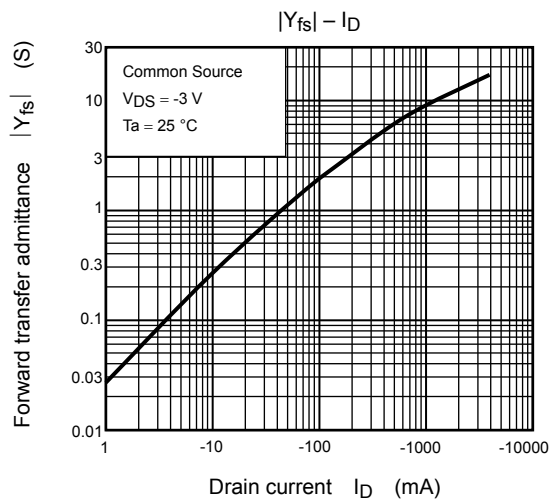
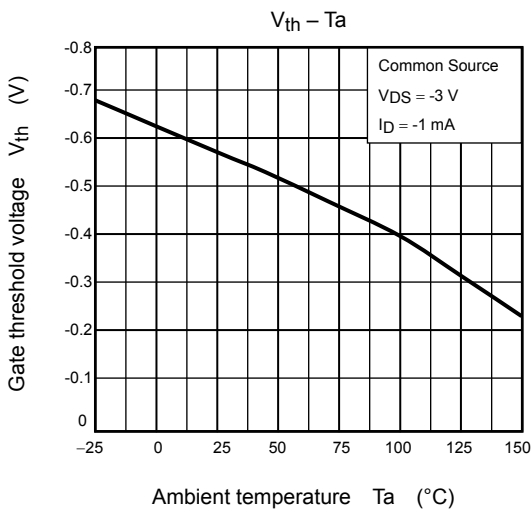
V_{th} can be expressed as the voltage between the gate and source when the low operating current value is I_D = -1mA for this product. For normal switching operation, V_{GS (on)} requires a higher voltage than V_{th} and V_{GS (off)} requires a lower voltage than V_{th}. (The relationship can be established as follows: V_{GS (off)} < V_{th} < V_{GS (on)}.)

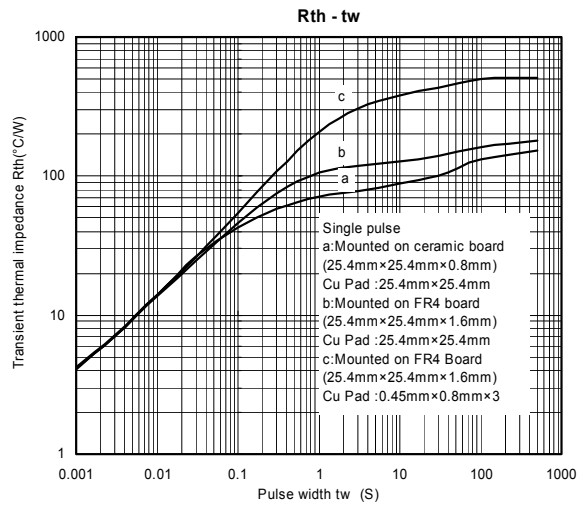
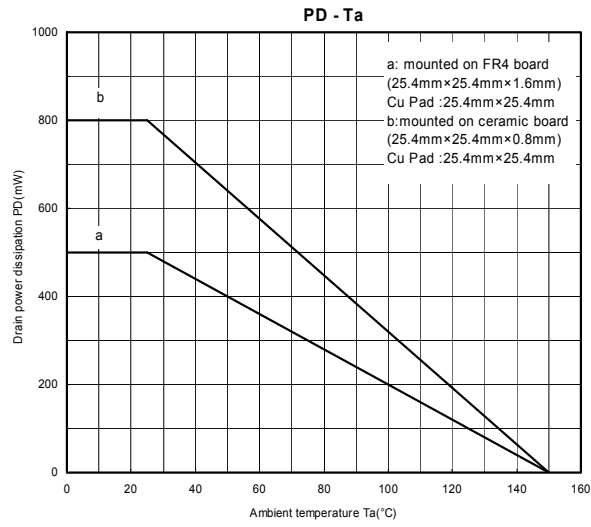
Be sure to take this into consideration when using the device.

Handling Precaution

When handling individual devices (which are not yet mounted on a circuit board), ensure that the environment is protected against static electricity. Operators should wear anti-static clothing, and containers and other objects that come into direct contact with devices should be made of anti-static materials.







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