

TOSHIBA Field Effect Transistor Silicon P Channel MOS Type (U-MOS III)

TPCF8301

Notebook PC Applications
 Portable Equipment Applications

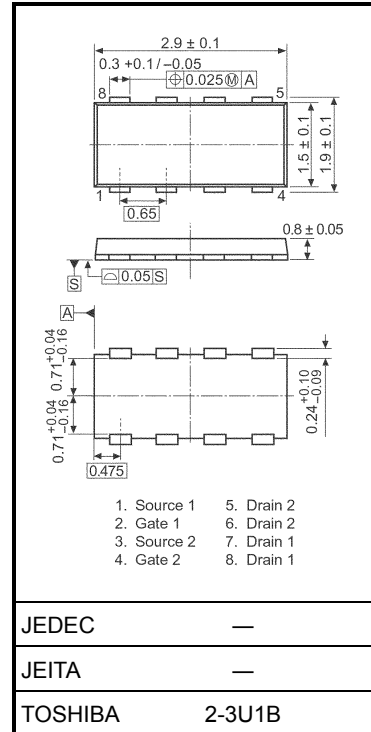
- Low drain-source ON resistance: $R_{DS(ON)} = 72 \text{ m}\Omega$ (typ.)
- High forward transfer admittance: $|Y_{fs}| = 4.7 \text{ S}$ (typ.)
- Low leakage current: $I_{DSS} = -10 \text{ }\mu\text{A}$ (max) ($V_{DS} = -20 \text{ V}$)
- Enhancement model: $V_{th} = -0.5 \text{ to } -1.2 \text{ V}$
 ($V_{DS} = -10 \text{ V}$, $I_D = -200 \text{ }\mu\text{A}$)

Absolute Maximum Ratings ($T_a = 25^\circ\text{C}$)

Characteristics		Symbol	Rating	Unit
Drain-source voltage		V_{DSS}	-20	V
Drain-gate voltage ($R_{GS} = 20 \text{ k}\Omega$)		V_{DGR}	-20	V
Gate-source voltage		V_{GSS}	± 8	V
Drain current	DC (Note 1)	I_D	-2.7	A
	Pulse (Note 1)	I_{DP}	-10.8	
Drain power dissipation ($t = 5 \text{ s}$) (Note 2a)	Single-device operation (Note 3a)	$P_D(1)$	1.35	W
	Single-device value at dual operation (Note 3b)	$P_D(2)$	1.12	
Drain power dissipation ($t = 5 \text{ s}$) (Note 2b)	Single-device operation (Note 3a)	$P_D(1)$	0.53	
	Single-device value at dual operation (Note 3b)	$P_D(2)$	0.33	
Single pulse avalanche energy (Note 4)		E_{AS}	1.2	mJ
Avalanche current		I_{AR}	-1.35	A
Repetitive avalanche energy Single-device value at dual operation (Note 2a, 3b, 5)		E_{AR}	0.11	mJ
Channel temperature		T_{ch}	150	$^\circ\text{C}$
Storage temperature range		T_{stg}	-55~150	$^\circ\text{C}$

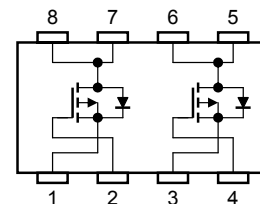
Note: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.)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

Unit: mm



Weight: 0.011 g (typ.)

Circuit Configuration



Thermal Characteristics

Characteristics		Symbol	Max	Unit
Thermal resistance, channel to ambient (t = 5 s) (Note 2a)	Single-device operation (Note 3a)	$R_{th(ch-a)}(1)$	92.6	°C/W
	Single-device value at dual operation (Note 3b)	$R_{th(ch-a)}(2)$	111.6	
Thermal resistance, channel to ambient (t = 5 s) (Note 2b)	Single-device operation (Note 3a)	$R_{th(ch-a)}(1)$	235.8	°C/W
	Single-device value at dual operation (Note 3b)	$R_{th(ch-a)}(2)$	378.8	

Note: (Note 1), (Note 2), (Note 3), (Note 4), (Note 5) and (Note 6): See the next page.

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

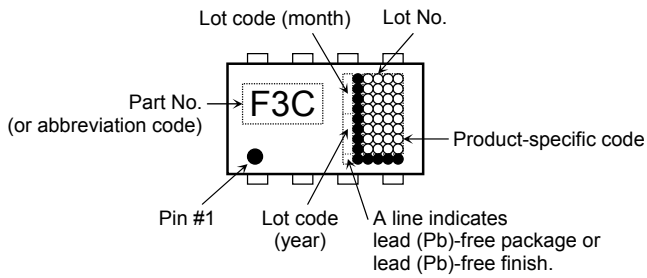
Electrical Characteristics (Ta = 25°C)

Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Gate leakage current		I_{GSS}	$V_{GS} = \pm 8\text{ V}, V_{DS} = 0\text{ V}$	—	—	± 10	μA
Drain cut-off current		I_{DSS}	$V_{DS} = -20\text{ V}, V_{GS} = 0\text{ V}$	—	—	-10	μA
Drain-source breakdown voltage		$V_{(BR)DSS}$	$I_D = -10\text{ mA}, V_{GS} = 0\text{ V}$	-20	—	—	V
		$V_{(BR)DSX}$	$I_D = -10\text{ mA}, V_{GS} = 8\text{ V}$	-12	—	—	
Gate threshold voltage		V_{th}	$V_{DS} = -10\text{ V}, I_D = -200\text{ }\mu\text{A}$	-0.5	—	-1.2	V
Drain-source ON resistance		$R_{DS(ON)}$	$V_{GS} = -1.8\text{ V}, I_D = -0.7\text{ A}$	—	215	300	m Ω
		$R_{DS(ON)}$	$V_{GS} = -2.5\text{ V}, I_D = -1.4\text{ A}$	—	110	160	
		$R_{DS(ON)}$	$V_{GS} = -4.5\text{ V}, I_D = -1.4\text{ A}$	—	72	110	
Forward transfer admittance		$ Y_{fs} $	$V_{DS} = -10\text{ V}, I_D = -1.4\text{ A}$	2.4	4.7	—	S
Input capacitance		C_{iss}	$V_{DS} = -10\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$	—	470	—	pF
Reverse transfer capacitance		C_{rss}		—	70	—	
Output capacitance		C_{oss}		—	80	—	
Switching time	Rise time	t_r		—	5	—	ns
	Turn-on time	t_{on}		—	9	—	
	Fall time	t_f		—	8	—	
	Turn-off time	t_{off}		—	26	—	
Total gate charge (gate-source plus gate-drain)		Q_g	$V_{DD} \approx -16\text{ V}, V_{GS} = -5\text{ V}, I_D = -2.7\text{ A}$	—	6	—	nC
Gate-source charge		Q_{gs}		—	4	—	
Gate-drain ("miller") charge		Q_{gd}		—	2	—	

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

Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Drain reverse current	Pulse (Note 1)	I_{DRP}	—	—	—	-10.8	A
Forward voltage (diode)		V_{DSF}	$I_{DR} = -2.7\text{ A}, V_{GS} = 0\text{ V}$	—	—	1.2	V

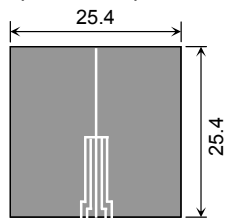
Marking (Note 6)



Note 1: Ensure that the channel temperature does not exceed 150°C.

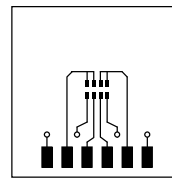
Note 2: (a) Device mounted on a glass-epoxy board (a) (b) Device mounted on a glass-epoxy board (b)

Note 3: a) The power dissipation and thermal resistance values are shown for a single device



(a)

FR-4
25.4 × 25.4 × 0.8
(unit: mm)



(b)

FR-4
25.4 × 25.4 × 0.8
(unit: mm)

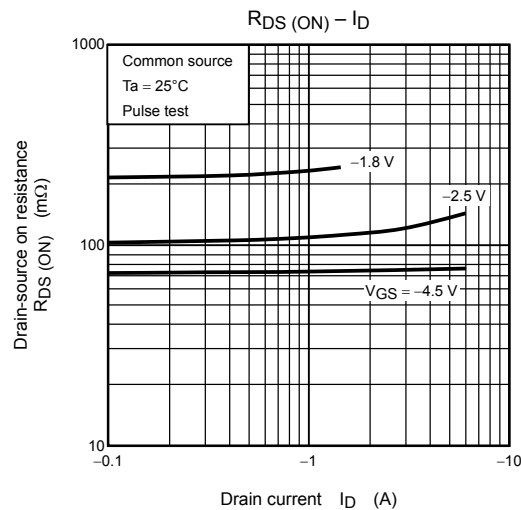
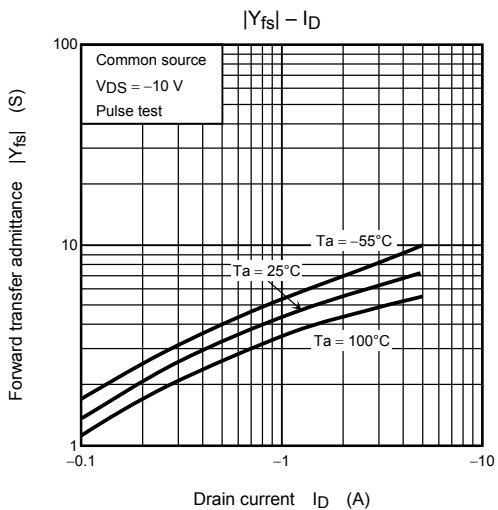
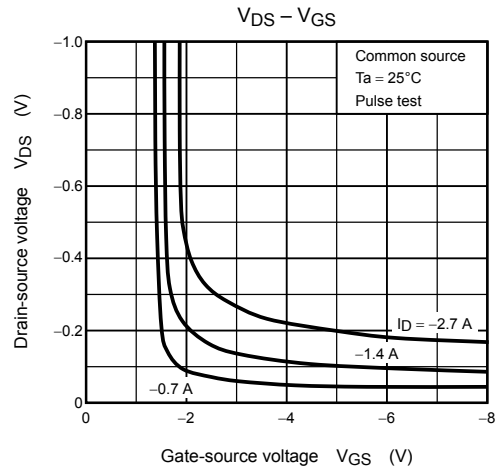
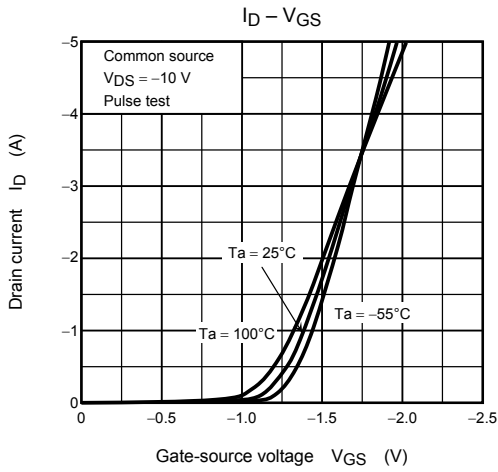
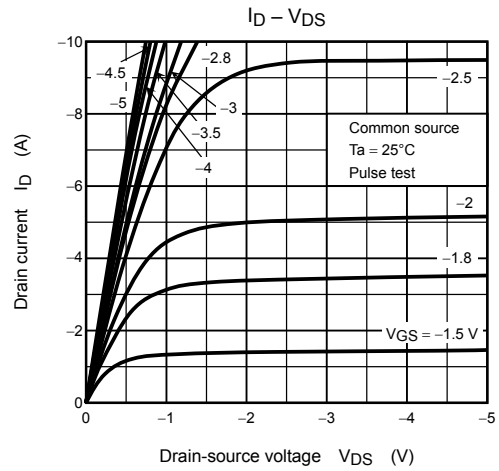
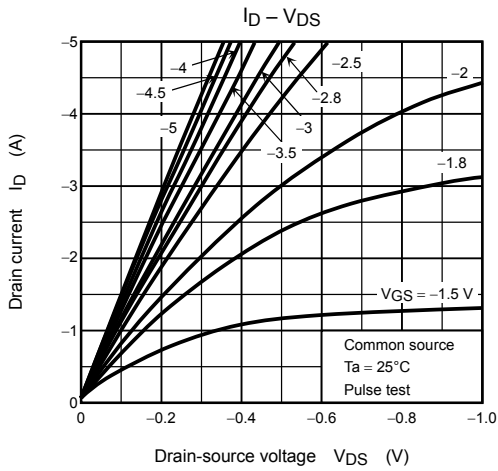
(During single-device operation, power is only applied to one device.)

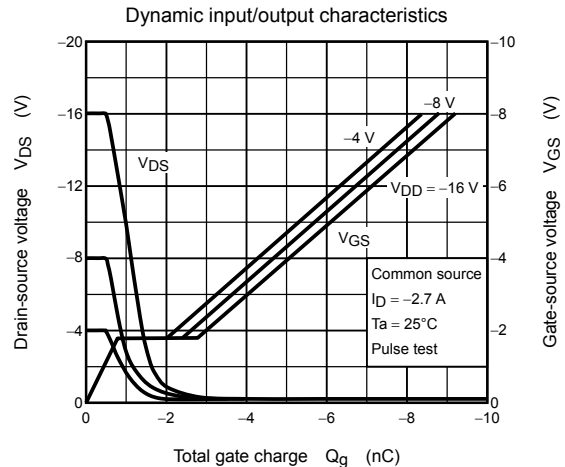
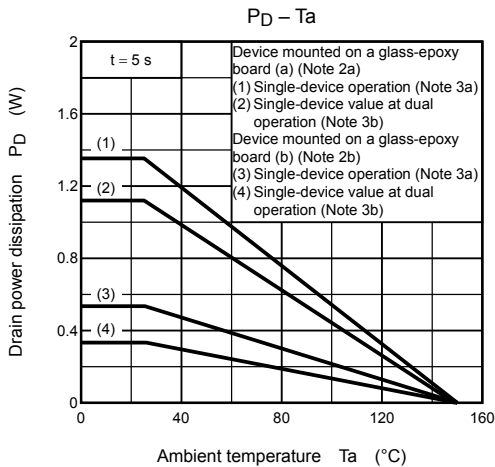
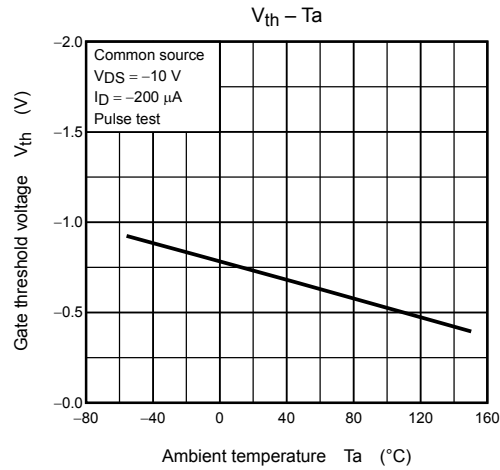
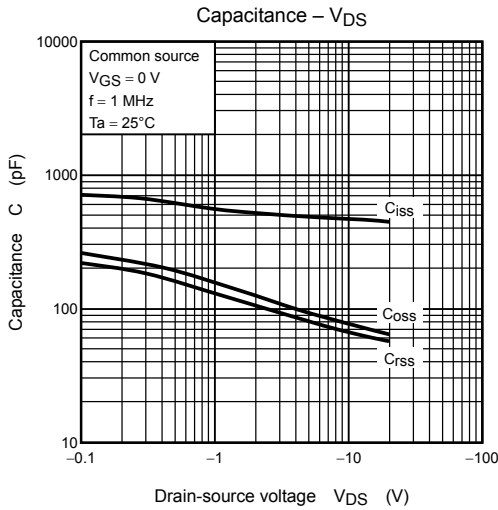
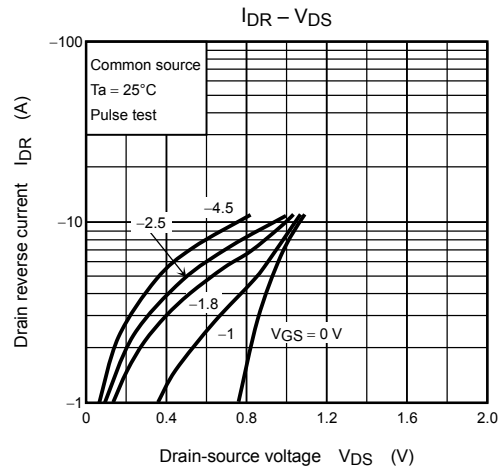
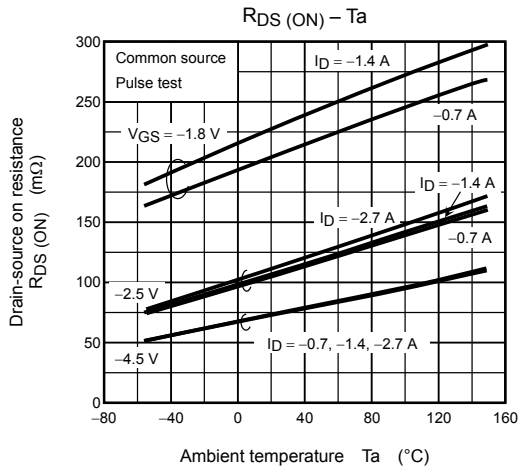
b) The power dissipation and thermal resistance values are shown for a single device
(During dual operation, power is evenly applied to both devices.)

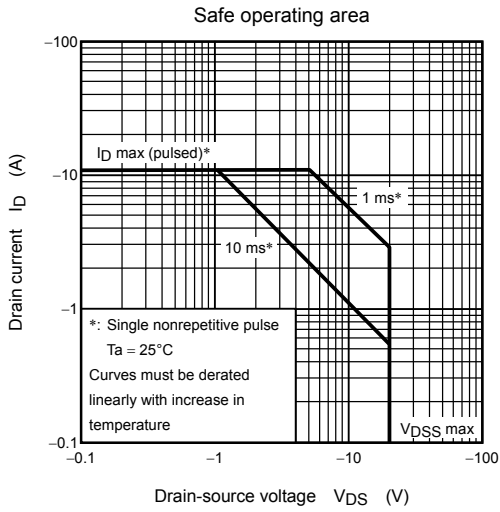
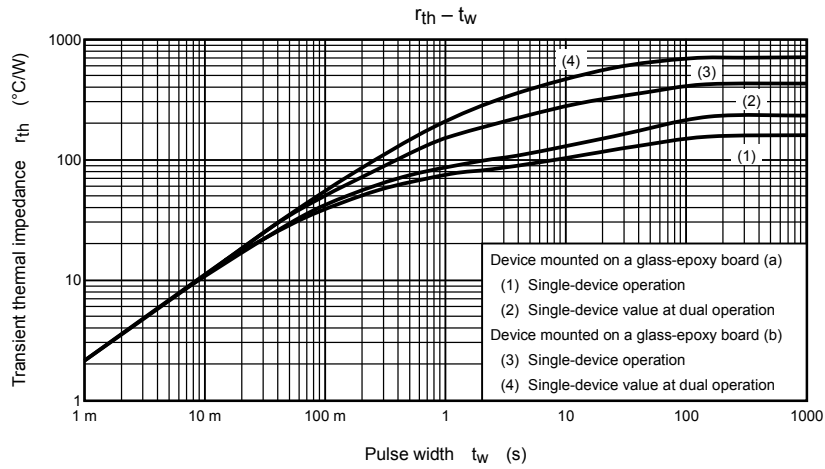
Note 4: $V_{DD} = -16$ V, $T_{ch} = 25^\circ\text{C}$ (initial), $L = 0.5$ mH, $R_G = 25 \Omega$, $I_{AR} = -1.35$ A

Note 5: Repetitive rating: Pulse width limited by maximum channel temperature.

Note 6: A dot on the lower left of the marking indicates Pin 1







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20070701-EN

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