

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

TPCF8001

Notebook PC Applications

Portable Equipment Applications

- Low drain-source ON resistance: $R_{DS(ON)} = 19 \text{ m}\Omega$ (typ.)
- High forward transfer admittance: $|Y_{fs}| = 8 \text{ S}$ (typ.)
- Low leakage current: $I_{DSS} = 10 \text{ }\mu\text{A}$ (max.) ($V_{DS} = 30 \text{ V}$)
- Enhancement mode: $V_{th} = 1.3 \text{ to } 2.5 \text{ V}$
($V_{DS} = 10 \text{ V}$, $I_D = 1 \text{ mA}$)

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

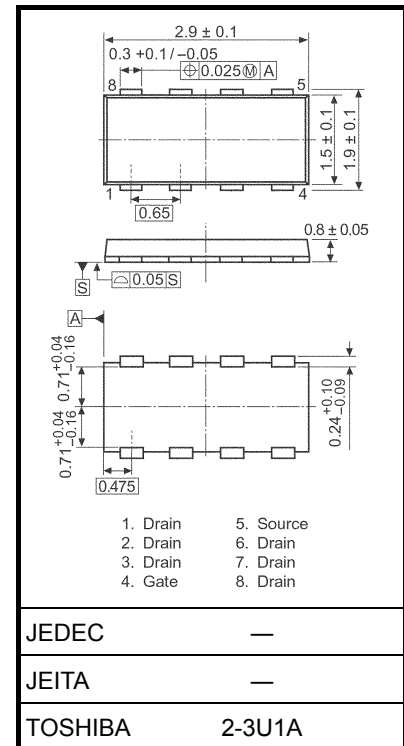
Characteristics		Symbol	Rating	Unit
Drain-source voltage		V_{DSS}	30	V
Drain-gate voltage ($R_{GS} = 20 \text{ k}\Omega$)		V_{DGR}	30	V
Gate-source voltage		V_{GSS}	± 20	V
Drain current	DC (Note 1)	I_D	7	A
	Pulse (Note 1)	I_{DP}	28	
Drain power dissipation (t = 5 s) (Note 2a)		P_D	2.5	W
Drain power dissipation (t = 5 s) (Note 2b)		P_D	0.7	W
Single-pulse avalanche energy (Note 3)		E_{AS}	8	mJ
Avalanche current		I_{AR}	3.5	A
Repetitive avalanche energy (Note 4)		E_{AR}	0.25	mJ
Channel temperature		T_{ch}	150	$^\circ\text{C}$
Storage temperature range		T_{stg}	-55~150	$^\circ\text{C}$

Note: For Notes 1 to 5, refer to the next page

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.).

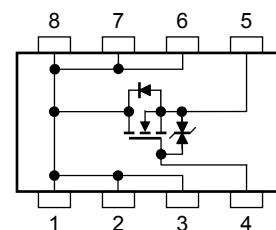
This transistor is an electrostatic-sensitive device. Handle with care.

Unit: mm



Weight: 0.011 g (typ.)

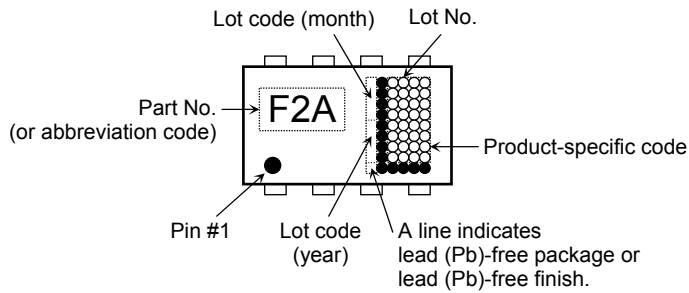
Circuit Configuration



Thermal Characteristics

Characteristics	Symbol	Max.	Unit
Thermal resistance, channel to ambient (t = 5 s) (Note 2a)	$R_{th(ch-a)}$	50.0	°C/W
Thermal resistance, channel to ambient (t = 5 s) (Note 2b)	$R_{th(ch-a)}$	178.6	°C/W

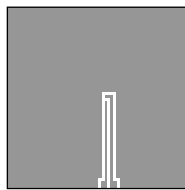
Marking (Note 5)



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

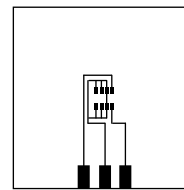
Note 2: (a) Device mounted on a glass-epoxy board (a)

(b) Device mounted on a glass-epoxy board (b)



(a)

FR-4
25.4 × 25.4 × 0.8
(Unit: mm)



(b)

FR-4
25.4 × 25.4 × 0.8
(Unit: mm)

Note 3: $V_{DD} = 24\text{ V}$, $T_{ch} = 25^\circ\text{C}$ (initial), $L = 0.5\text{ mH}$, $R_G = 25\ \Omega$, $I_{AR} = 3.5\text{ A}$

Note 4: Repetitive rating: pulse width limited by maximum channel temperature

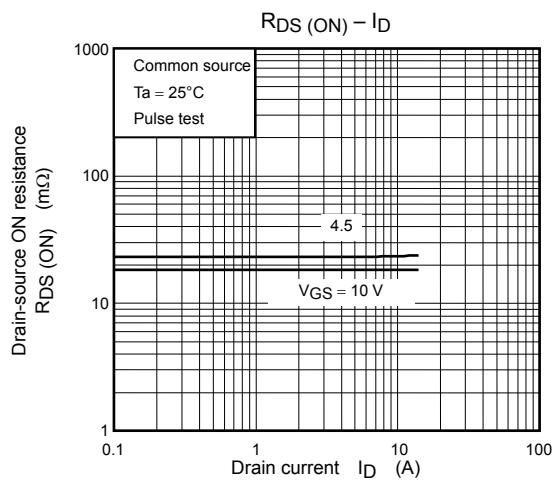
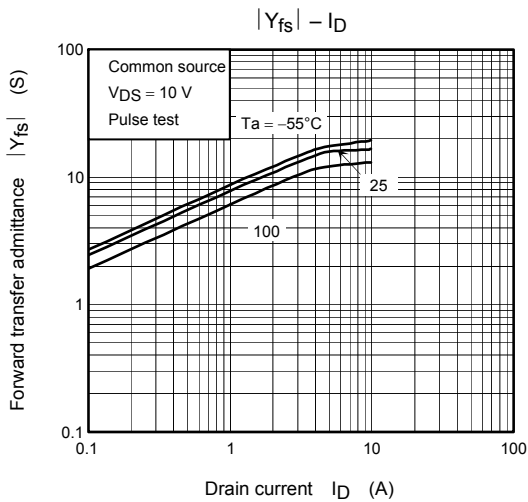
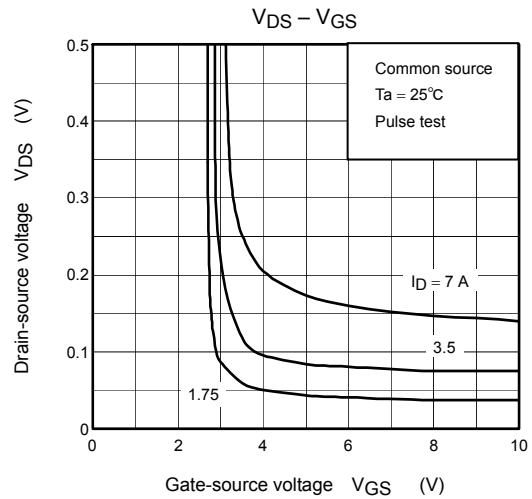
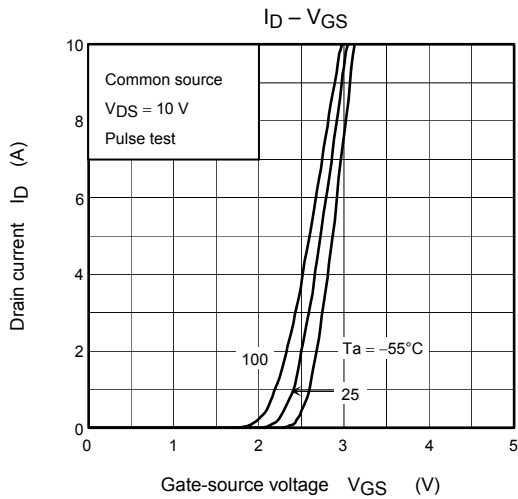
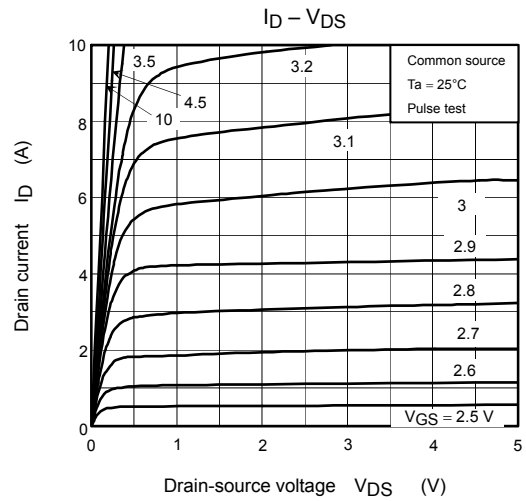
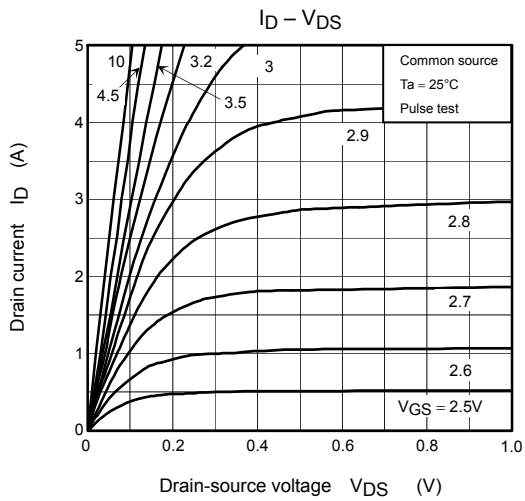
Note 5: “●” on the lower left of the marking indicates Pin 1.

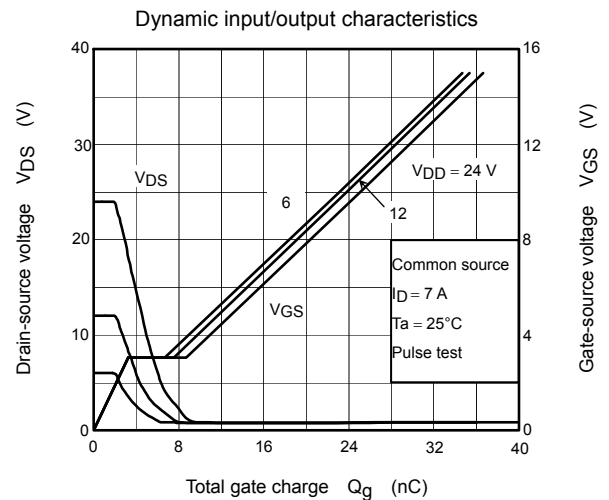
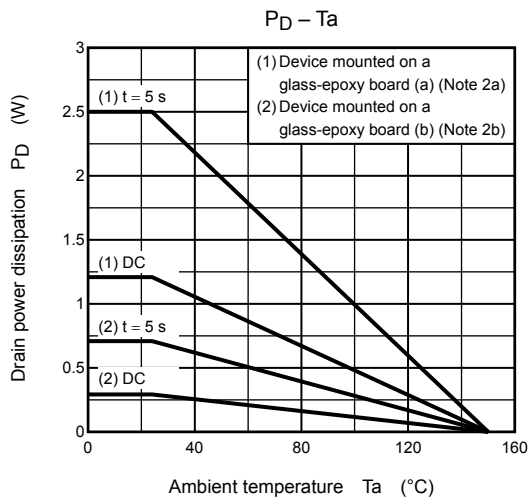
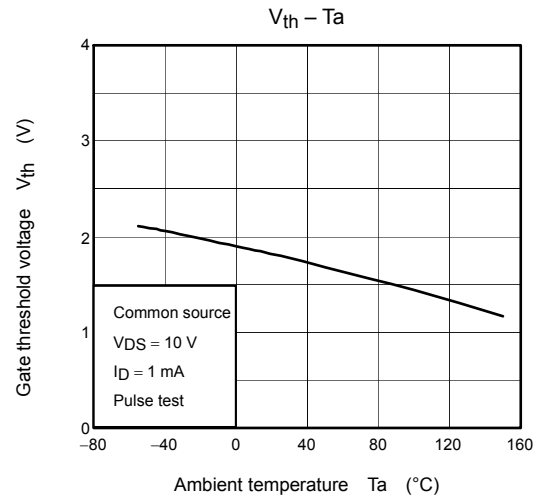
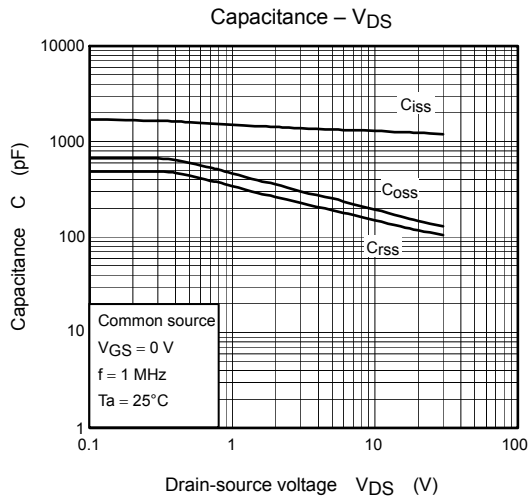
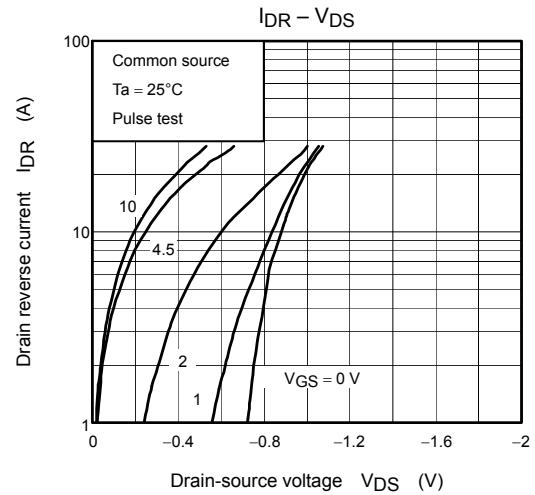
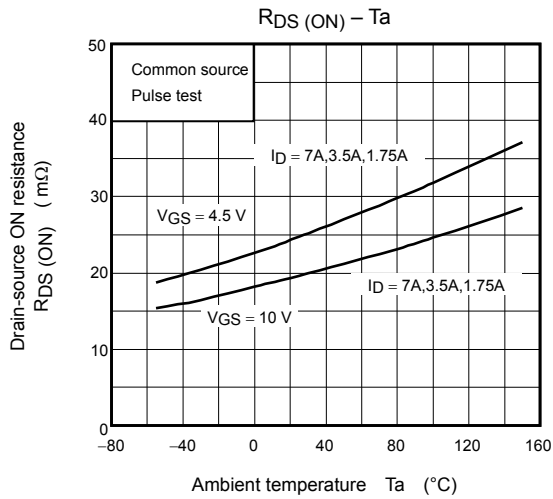
Electrical Characteristics (Ta = 25°C)

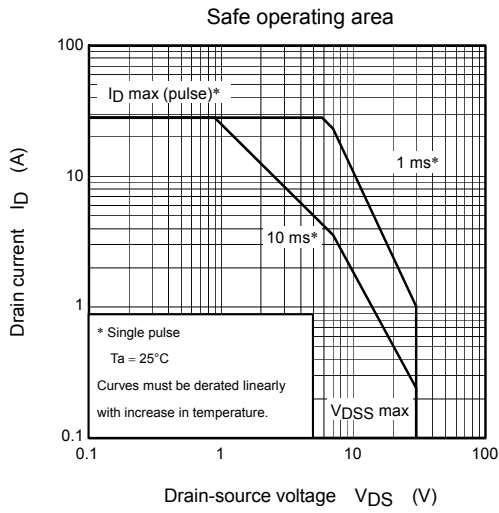
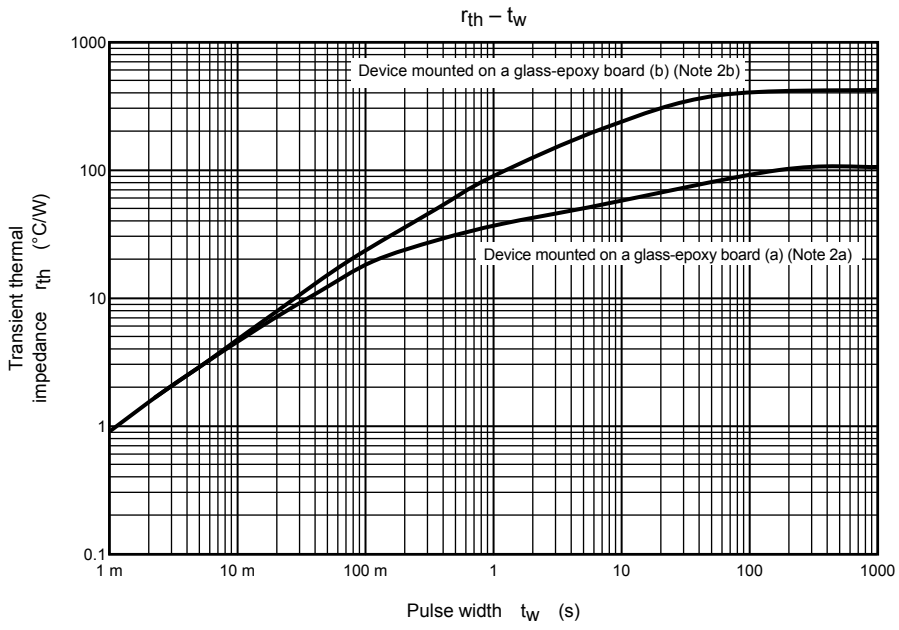
Characteristics		Symbol	Test Condition	Min.	Typ.	Max.	Unit
Gate leakage current		I_{GSS}	$V_{GS} = \pm 16\text{ V}, V_{DS} = 0\text{ V}$	—	—	± 10	μA
Drain cut-off current		I_{DSS}	$V_{DS} = 30\text{ V}, V_{GS} = 0\text{ V}$	—	—	10	μA
Drain-source breakdown voltage		$V_{(BR)DSS}$	$I_D = 10\text{ mA}, V_{GS} = 0\text{ V}$	30	—	—	V
		$V_{(BR)DSX}$	$I_D = 10\text{ mA}, V_{GS} = -20\text{ V}$	15	—	—	
Gate threshold voltage		V_{th}	$V_{DS} = 10\text{ V}, I_D = 1\text{ mA}$	1.3	—	2.5	V
Drain-source ON resistance		$R_{DS(ON)}$	$V_{GS} = 4.5\text{ V}, I_D = 3.5\text{ A}$	—	24	31	$\text{m}\Omega$
			$V_{GS} = 10\text{ V}, I_D = 3.5\text{ A}$	—	19	23	
Forward transfer admittance		$ Y_{fs} $	$V_{DS} = 10\text{ V}, I_D = 3.5\text{ A}$	4	8	—	S
Input capacitance		C_{iss}	$V_{DS} = 10\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$	—	1270	—	pF
Reverse transfer capacitance		C_{rss}		—	150	—	
Output capacitance		C_{oss}		—	190	—	
Switching time	Rise time	t_r	<p>$V_{GS} = 10\text{ V}$ 0 V $I_D = 3.5\text{ A}$ V_{OUT} 4.7Ω 4.3Ω $R_L = 4.3\Omega$ $V_{DD} \approx 15\text{ V}$ Duty $\leq 1\%$, $t_w = 10\ \mu\text{s}$</p>	—	3.8	—	ns
	Turn-on time	t_{on}		—	9.4	—	
	Fall time	t_f		—	8.4	—	
	Turn-off time	t_{off}		—	40	—	
Total gate charge (gate-source plus gate-drain)		Q_g	$V_{DD} \approx 24\text{ V}, V_{GS} = 10\text{ V}, I_D = 7.0\text{ A}$	—	25.4	—	nC
Gate-source charge 1		Q_{gs1}		—	3.6	—	
Gate-drain ("miller") charge		Q_{gd}		—	6.2	—	

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

Characteristics		Symbol	Test Condition	Min.	Typ.	Max.	Unit
Drain reverse current	Pulse (Note 1)	I_{DRP}	—	—	—	28	A
Forward voltage (diode)		V_{DSF}	$I_{DR} = 7.0\text{ A}, V_{GS} = 0\text{ V}$	—	—	-1.2	V







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20070701-EN

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