

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

TPC6004

Notebook PC Applications

Portable Equipment Applications

- Low drain-source ON resistance: $R_{DS(ON)} = 19 \text{ m}\Omega$ (typ.)
- High forward transfer admittance: $|Y_{fs}| = 11 \text{ S}$ (typ.)
- Low leakage current: $I_{DSS} = 10 \text{ }\mu\text{A}$ (max) ($V_{DS} = 20 \text{ V}$)
- Enhancement model: $V_{th} = 0.5 \text{ to } 1.2 \text{ V}$ ($V_{DS} = 10 \text{ V}$, $I_D = 200 \text{ }\mu\text{A}$)

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}	± 12	V
Drain current	DC (Note 1)	I_D	6	A
	Pulse (Note 1)	I_{DP}	24	
Drain power dissipation ($t = 5 \text{ s}$) (Note 2a)		P_D	2.2	W
Drain power dissipation ($t = 5 \text{ s}$) (Note 2b)		P_D	0.7	W
Single pulse avalanche energy (Note 3)		E_{AS}	5.8	mJ
Avalanche current		I_{AR}	3	A
Repetitive avalanche energy (Note 4)		E_{AR}	0.22	mJ
Channel temperature		T_{ch}	150	$^\circ\text{C}$
Storage temperature range		T_{stg}	-55 to 150	$^\circ\text{C}$

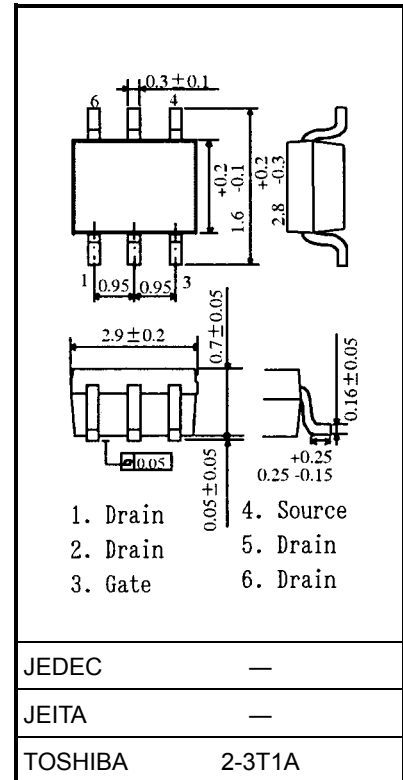
Thermal Characteristics

Characteristics	Symbol	Max	Unit
Thermal resistance, channel to ambient ($t = 5 \text{ s}$) (Note 2a)	$R_{th(ch-a)}$	56.8	$^\circ\text{C/W}$
Thermal resistance, channel to ambient ($t = 5 \text{ s}$) (Note 2b)	$R_{th(ch-a)}$	178.5	$^\circ\text{C/W}$

Note: (Note 1), (Note 2), (Note 3), (Note 4), (Note 5) Please see next page.

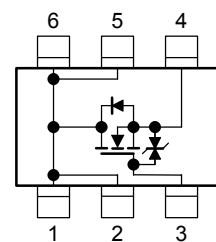
This transistor is an electrostatically sensitive device. Please handle it with caution.

Unit: mm

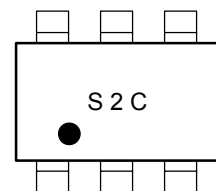


Weight: 0.011 g (typ.)

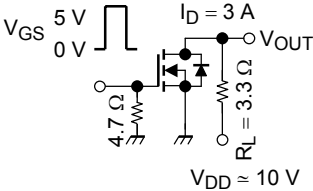
Circuit Configuration



Marking (Note 5)



Electrical Characteristics (Ta = 25°C)

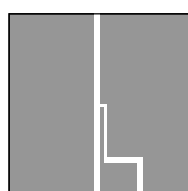
Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Gate leakage current		I _{GSS}	V _{GS} = ±10 V, V _{DS} = 0 V	—	—	±10	μA
Drain cut-OFF current		I _{DSS}	V _{DS} = 20 V, V _{GS} = 0 V	—	—	10	μA
Drain-source breakdown voltage		V _{(BR) DSS}	I _D = 10 mA, V _{GS} = 0 V	20	—	—	V
		V _{(BR) DSX}	I _D = 10 mA, V _{GS} = -12 V	8	—	—	
Gate threshold voltage		V _{th}	V _{DS} = 10 V, I _D = 200 μA	0.5	—	1.2	V
Drain-source ON resistance		R _{DS (ON)}	V _{GS} = 2.0 V, I _D = 3 A	—	30	37	mΩ
			V _{GS} = 2.5 V, I _D = 3 A	—	25	32	
			V _{GS} = 4.5 V, I _D = 3 A	—	19	24	
Forward transfer admittance		Y _{fs}	V _{DS} = 10 V, I _D = 3 A	5.5	11	—	S
Input capacitance		C _{iss}	V _{DS} = 10 V, V _{GS} = 0 V, f = 1 MHz	—	1400	—	pF
Reverse transfer capacitance		C _{rss}		—	165	—	
Output capacitance		C _{oss}		—	180	—	
Switching time	Rise time	t _r	 V _{GS} 5 V 0 V I _D = 3 A V _{OUT} 4.7 Ω 3.3 Ω R _L = 3.3 Ω V _{DD} ≈ 10 V Duty ≤ 1%, t _w = 10 μs	—	5	—	ns
	Turn-ON time	t _{on}		—	10	—	
	Fall time	t _f		—	14	—	
	Turn-OFF time	t _{off}		—	60	—	
Total gate charge (gate-source plus gate-drain)		Q _g	V _{DD} ≈ 16 V, V _{GS} = 5 V, I _D = 6 A	—	17	—	nC
Gate-source charge		Q _{gs}		—	13	—	
Gate-drain (“miller”) charge		Q _{gd}		—	4	—	

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

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Pulse drain reverse current (Note 1)	I_{DRP}	—	—	—	24	A
Forward voltage (Diode)	V_{DSF}	$I_{DR} = 6 \text{ A}, V_{GS} = 0 \text{ V}$	—	—	-1.2	V

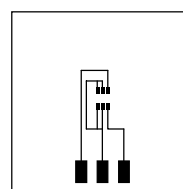
Note 1: Please use devices on condition that the channel temperature is below 150°C.

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)



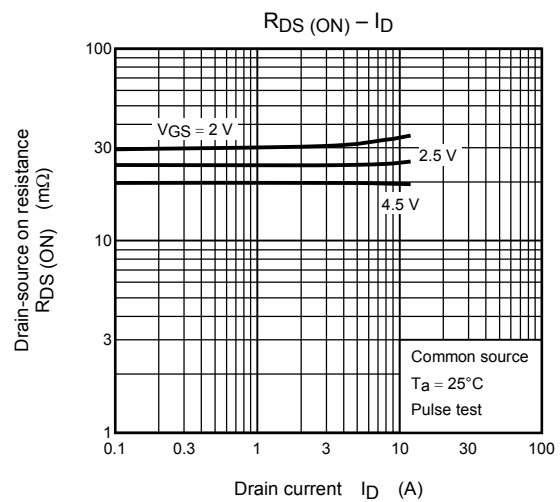
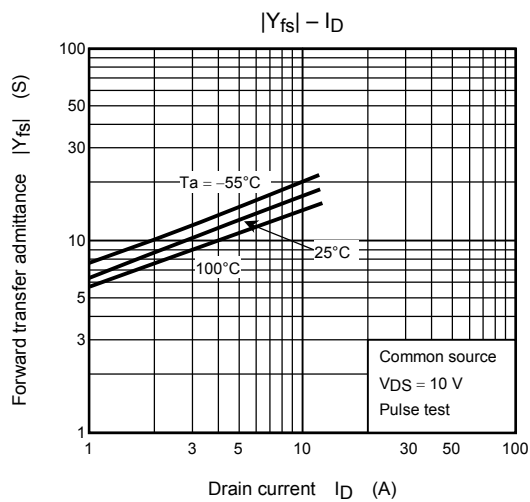
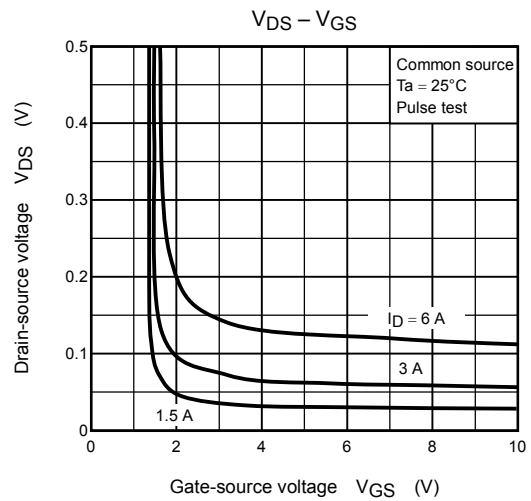
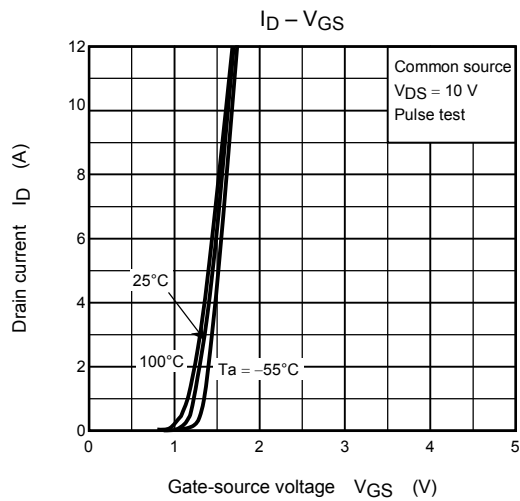
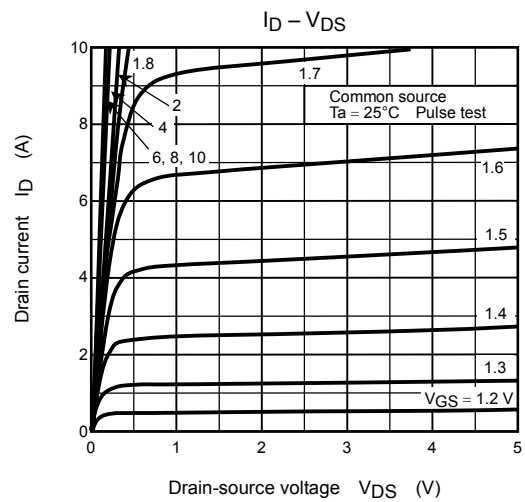
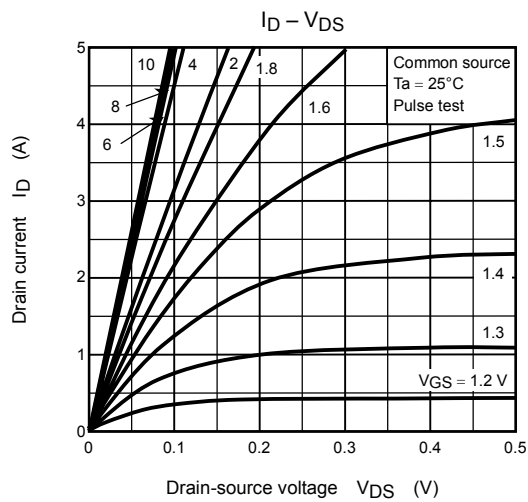
(b)

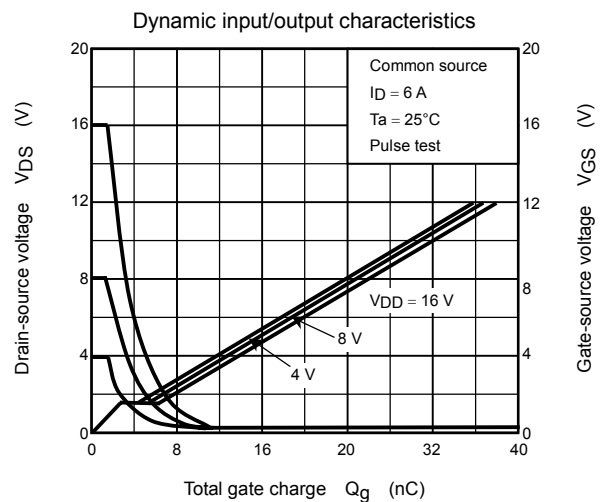
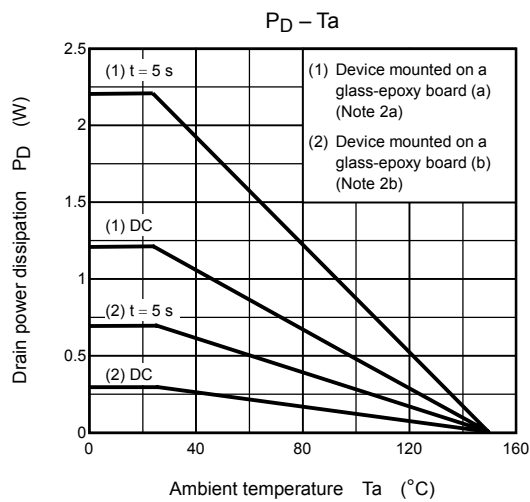
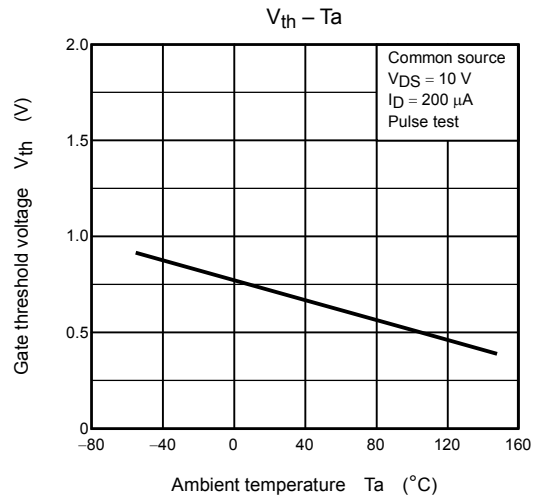
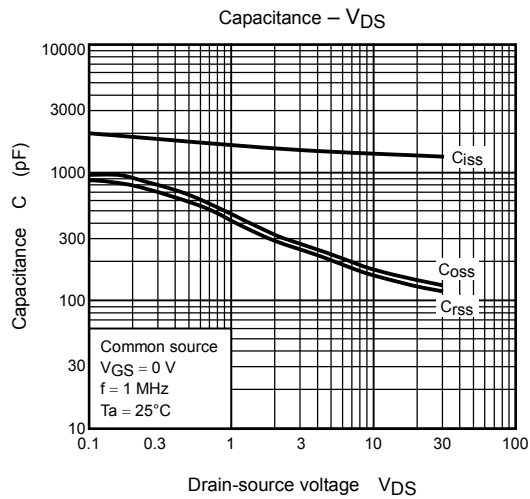
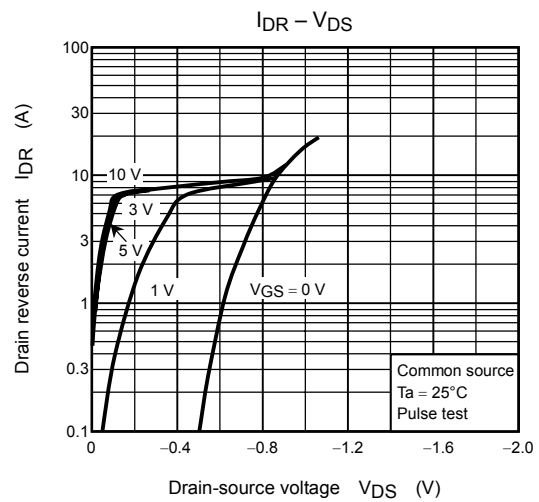
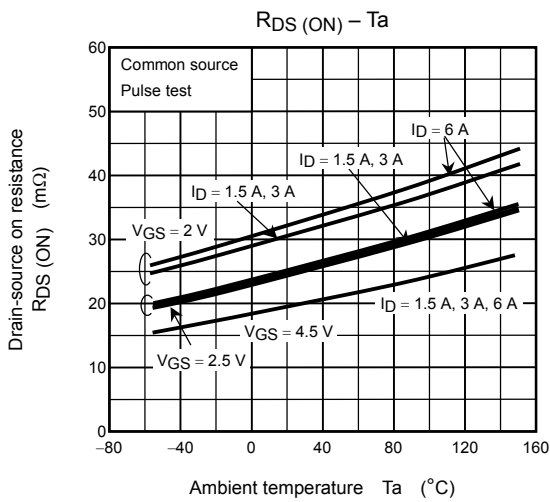
FR-4
25.4 × 25.4 × 0.8
Unit: (mm)

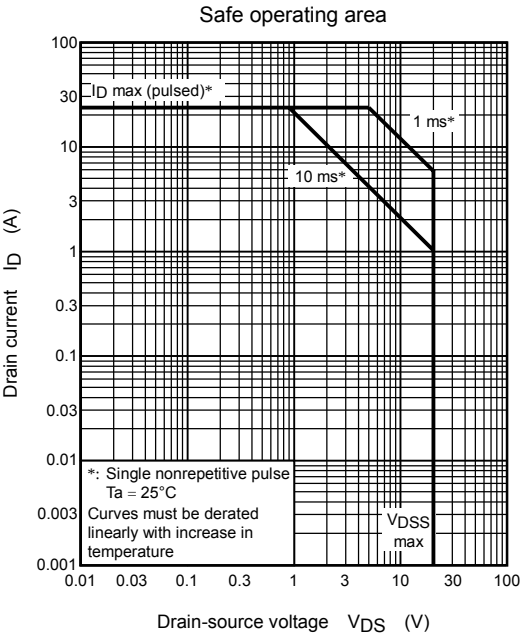
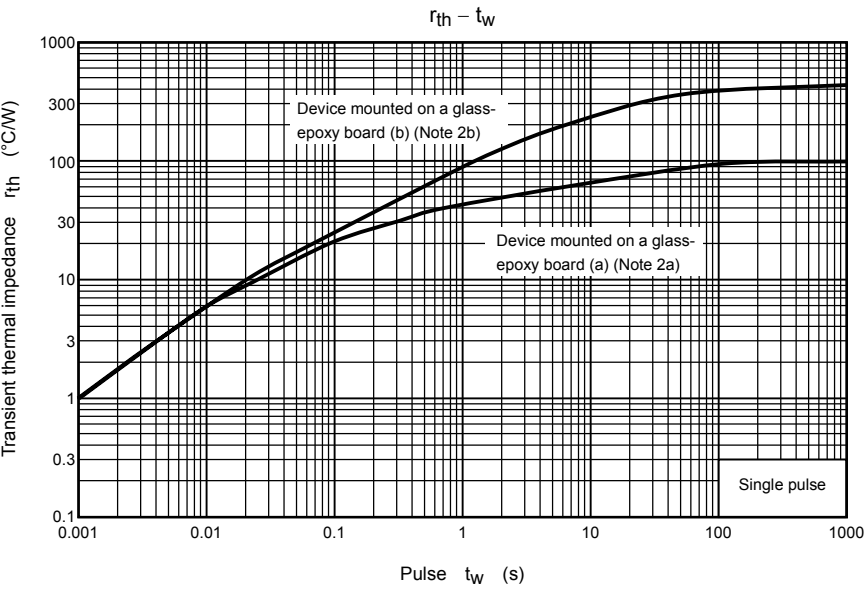
Note 3: $V_{DD} = 16 \text{ V}$, $T_{ch} = 25^\circ\text{C}$ (initial), $L = 0.5 \text{ mH}$, $R_G = 25 \Omega$, $I_{AR} = 3.0 \text{ A}$

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

Note 5: Black round marking "•" locates on the left lower side of parts number marking "S2C" indicates terminal No.1.







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