

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

TPCP8101

Notebook PC Applications

Portable Equipment Applications

- Small footprint due to small and thin package
- Low drain-source ON-resistance: $R_{DS(ON)} = 24 \text{ m}\Omega$ (typ.)
- High forward transfer admittance: $|Y_{fs}| = 14 \text{ S}$ (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 ($T_a = 25^\circ\text{C}$)

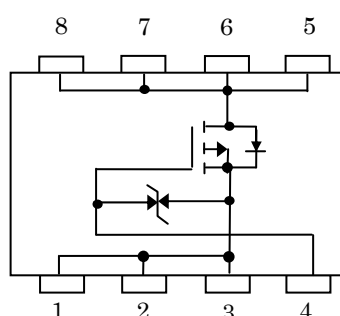
Characteristic		Symbol	Rating	Unit
Drain-source voltage		V_{DSS}	-20	V
Drain-gate voltage ($R_{GS} = 20 \text{ k}\Omega$)		V_{DGR}	-20	V
Gate-source voltage		V_{GSS}	± 8	V
Drain current	DC (Note 1)	I_D	-5.6	A
	Pulse (Note 1)	I_{DP}	-22.4	
Drain power dissipation ($t = 5 \text{ s}$) (Note 2a)		P_D	1.68	W
Drain power dissipation ($t = 5 \text{ s}$) (Note 2b)		P_D	0.84	W
Single-pulse avalanche energy (Note 3)		E_{AS}	20.3	mJ
Avalanche current		I_{AR}	-5.6	A
Repetitive avalanche energy (Note 4)		E_{AR}	0.168	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.

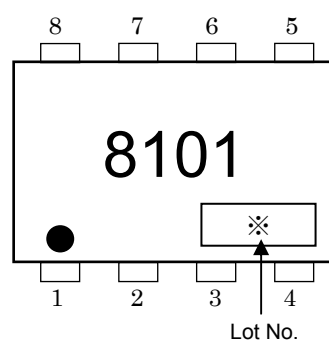
Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) are within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

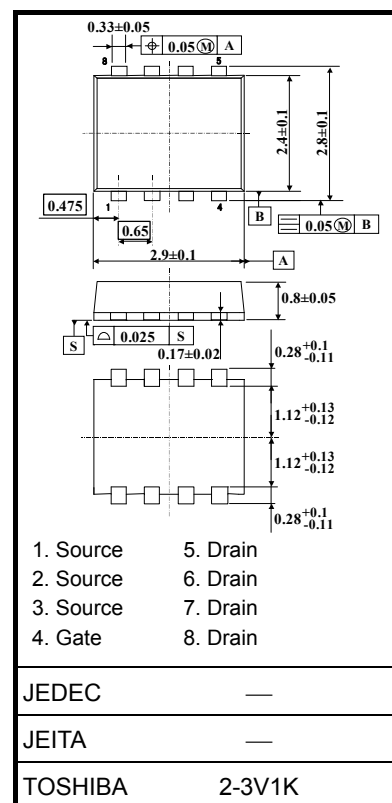
Circuit Configuration



Marking (Note 5)



Unit: mm



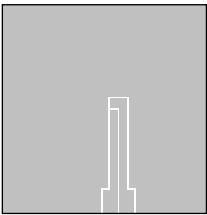
Weight: 0.017 g (typ.)

Thermal Characteristics

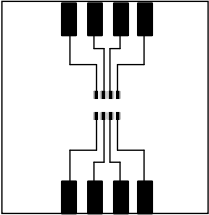
Characteristics	Symbol	Max	Unit
Thermal resistance, channel to ambient (t = 5 s) (Note 2a)	$R_{th (ch-a)}$	74.4	°C/W
Thermal resistance, channel to ambient (t = 5 s) (Note 2b)	$R_{th (ch-a)}$	148.8	°C/W

Note 1: Ensure that the channel temperature does not exceed 150°C during use of the device.

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



(a)



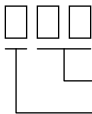
(b)

Note 3: $V_{DD} = -16\text{ V}$, $T_{ch} = 25^\circ\text{C}$ (initial), $L = 0.5\text{ mH}$, $R_G = 25\ \Omega$, $I_{AR} = -5.6\text{ A}$

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

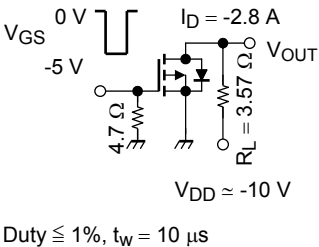
Note 5: • on the lower left of the marking indicates Pin 1.

* Weekly code (three digits):



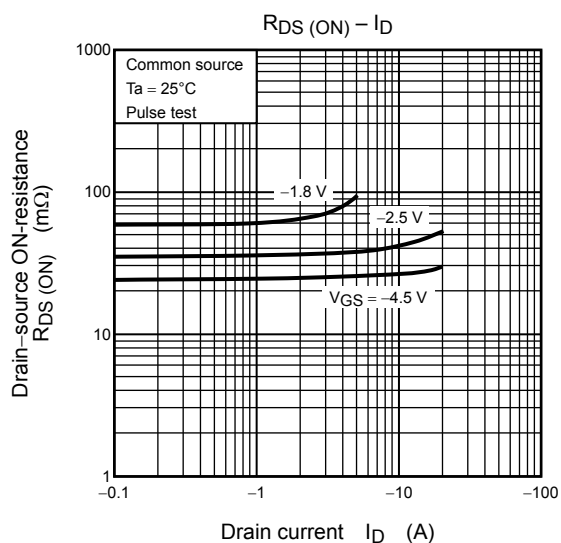
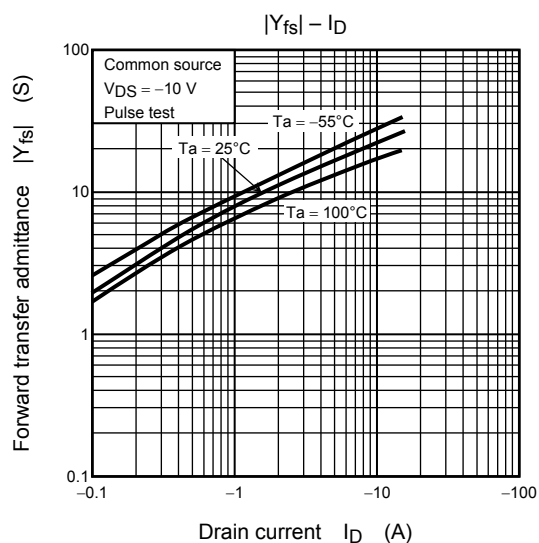
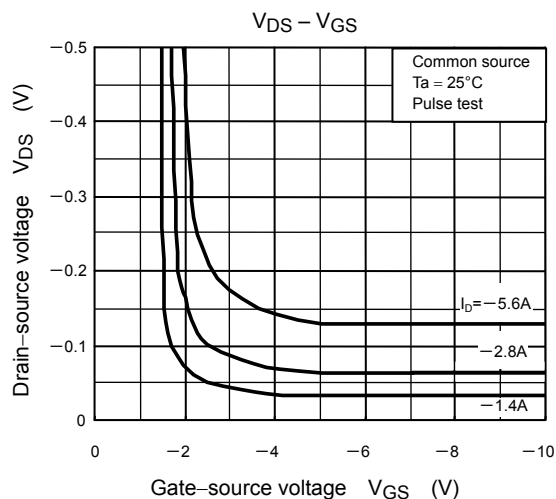
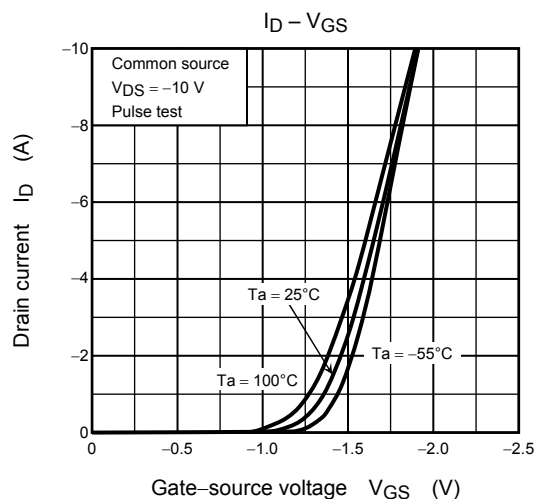
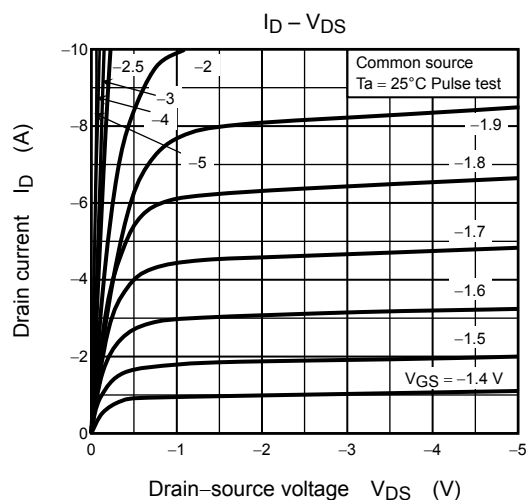
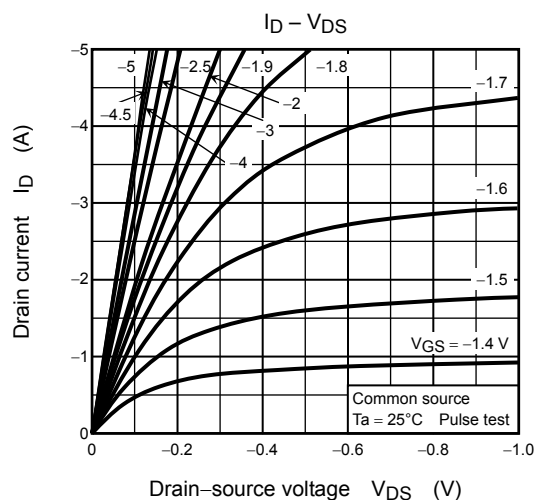
Week of manufacture
(01 for the first week of the year, continuing up to 52 or 53)
Year of manufacture
(The last digit of the calendar year)

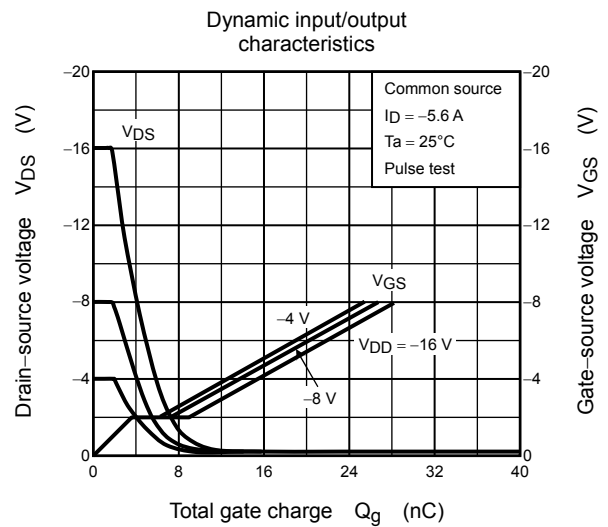
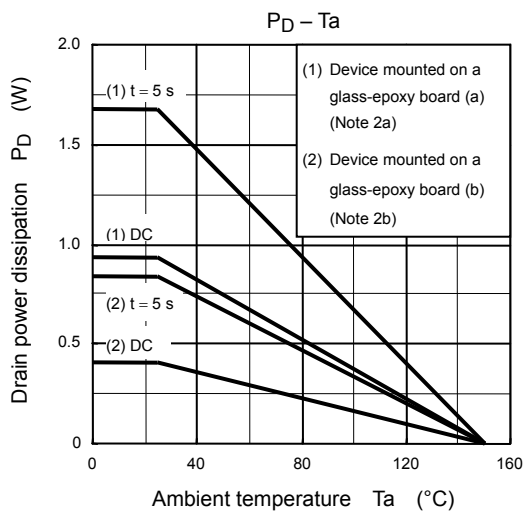
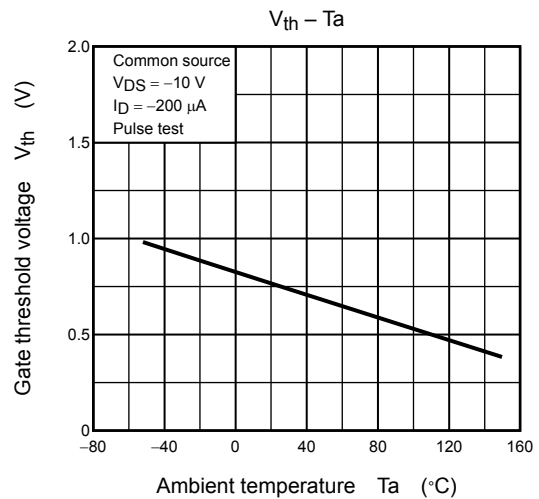
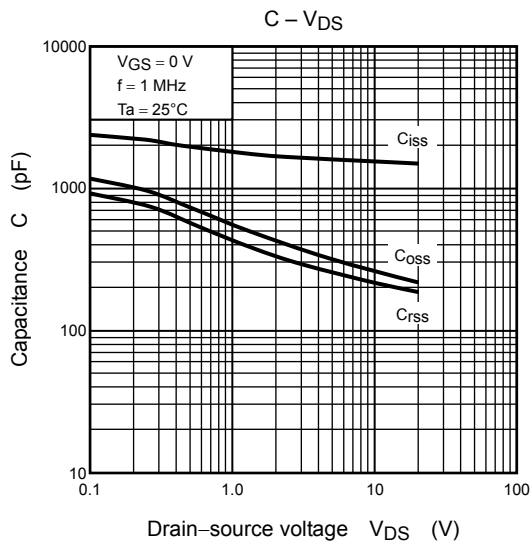
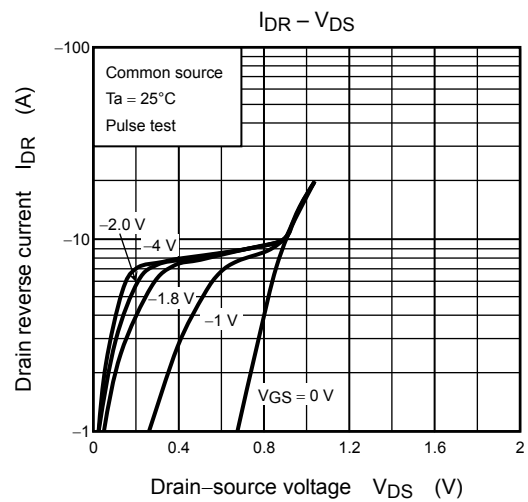
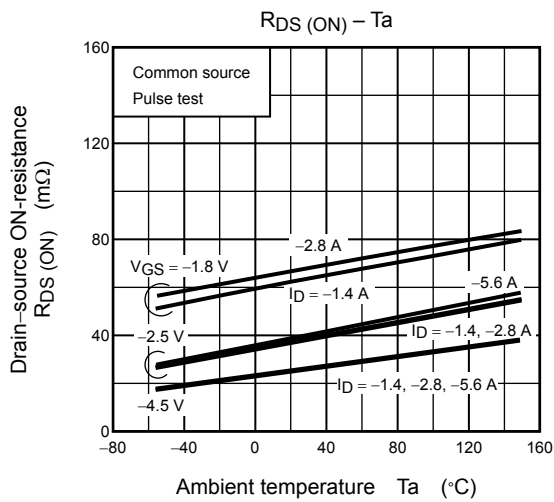
Electrical Characteristics (Ta = 25°C)

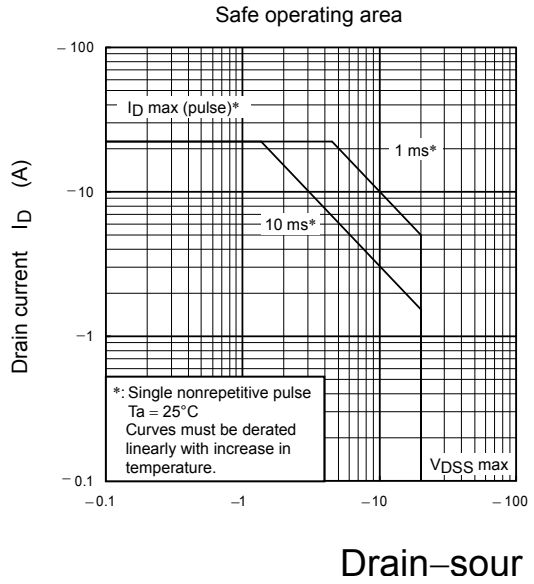
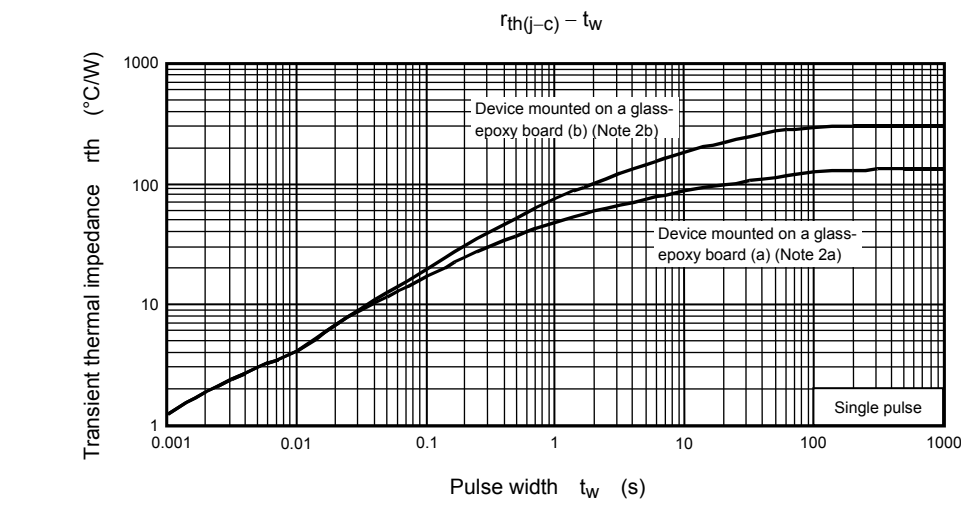
Characteristic		Symbol	Test Condition	Min	Typ.	Max	Unit
Gate leakage current		I _{GSS}	V _{GS} = ±8 V, V _{DS} = 0 V	—	—	±10	μA
Drain cutoff current		I _{DSS}	V _{DS} = -20 V, V _{GS} = 0 V	—	—	-10	μA
Drain-source breakdown voltage		V _(BR) DSS	I _D = -10 mA, V _{GS} = 0 V	-20	—	—	V
		V _(BR) DSX	I _D = -10 mA, V _{GS} = 8 V	-12	—	—	
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} = -1.8 V, I _D = -1.4 A	—	67	90	mΩ
			V _{GS} = -2.5 V, I _D = -2.8 A	—	36	41	
			V _{GS} = -4.5 V, I _D = -2.8 A	—	24	30	
Forward transfer admittance		Y _{fs}	V _{DS} = -10 V, I _D = -2.8 A	7	14	—	S
Input capacitance		C _{iss}	V _{DS} = -10 V, V _{GS} = 0 V, f = 1 MHz	—	1550	—	pF
Reverse transfer capacitance		C _{rss}		—	215	—	
Output capacitance		C _{oss}		—	265	—	
Switching time	Rise time	t _r	 V_{DD} ≈ -10 V Duty ≤ 1%, t_w = 10 μs	—	7	—	ns
	Turn-on time	t _{on}		—	13	—	
	Fall time	t _f		—	21	—	
	Turn-off time	t _{off}		—	68	—	
Total gate charge (gate-source plus gate-drain)		Q _g	V _{DD} ≈ -16 V, V _{GS} = -5 V, I _D = -5.6 A	—	19	—	nC
Gate-source charge		Q _{gs}		—	14	—	
Gate-drain (“Miller”) charge		Q _{gd}		—	5	—	

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

Characteristic		Symbol	Test Condition	Min	Typ.	Max	Unit
Drain reverse current	Pulse (Note 1)	I_{DRP}	—	—	—	-22.4	A
Forward voltage (diode)		V_{DSF}	$I_{DR} = -5.6 \text{ A}, V_{GS} = 0 \text{ V}$	—	—	1.2	V







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