

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

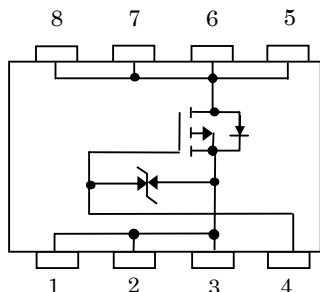
Characteristic	Symbol	Rating	Unit	
Drain-source voltage	V_{DSS}	-20	V	
Drain-gate voltage ($R_{GS} = 20 \text{ k}\Omega$)	V_{DGR}	-20	V	
Gate-source voltage	V_{GSS}	± 8	V	
Drain current	DC (Note 1)	I_D	-5.6	A
	Pulse (Note 1)	I_{DP}	-22.4	
Drain power dissipation (t = 5 s) (Note 2a)	P_D	1.68	W	
Drain power dissipation (t = 5 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.

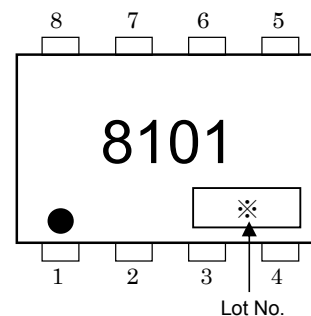
Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) are within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

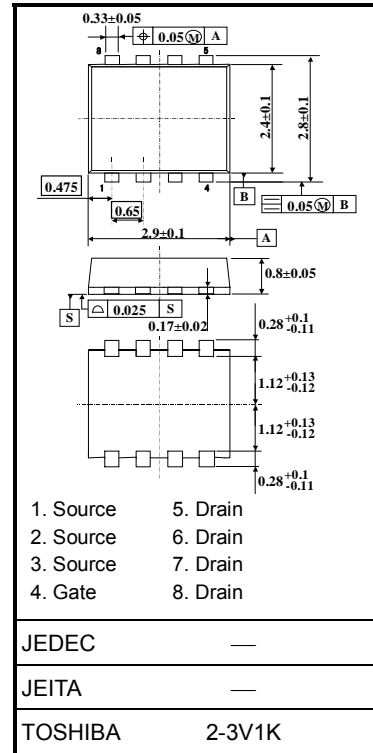
Circuit Configuration



Marking (Note 5)



Unit: mm



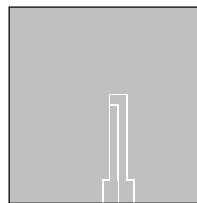
Weight: 0.017 g (typ.)

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

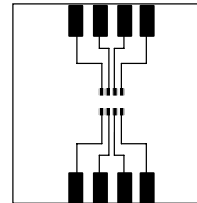
Note 1: Ensure that the channel temperature does not exceed 150°C during use of the device.

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



(a)

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), $L = 0.5\text{ mH}$, $R_G = 25\ \Omega$, $I_{AR} = -5.6\text{ A}$

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

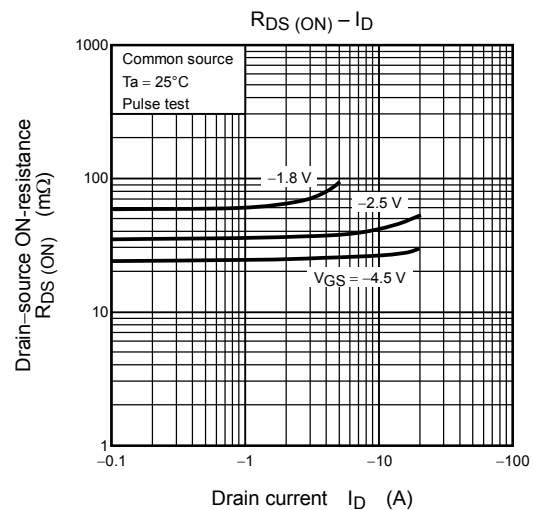
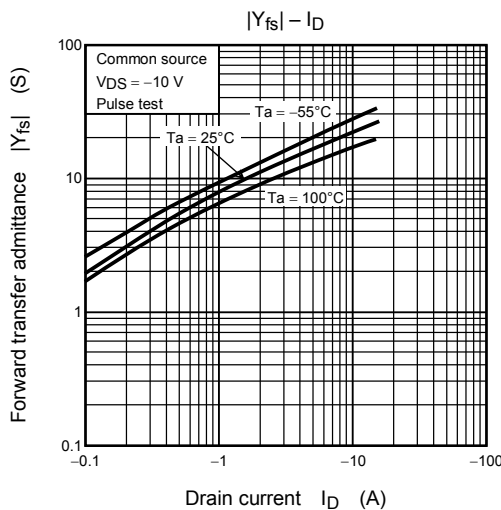
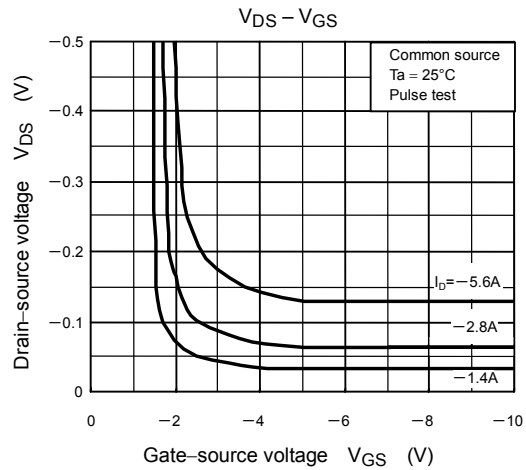
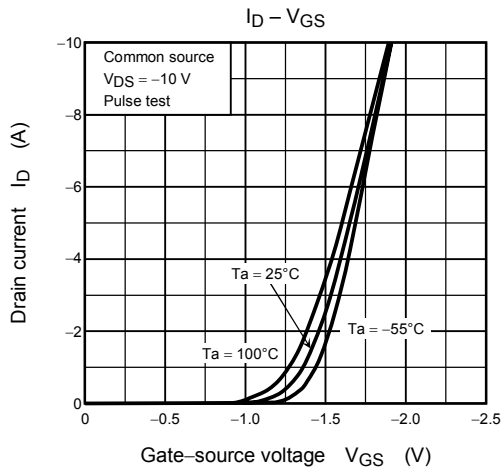
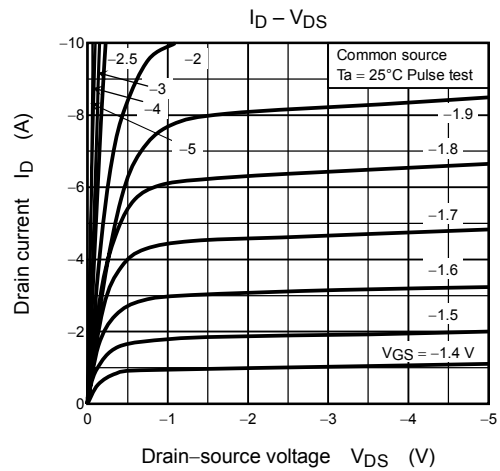
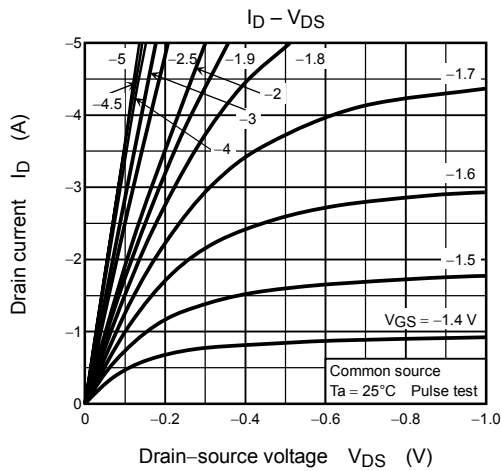
(The last digit of the calendar year)

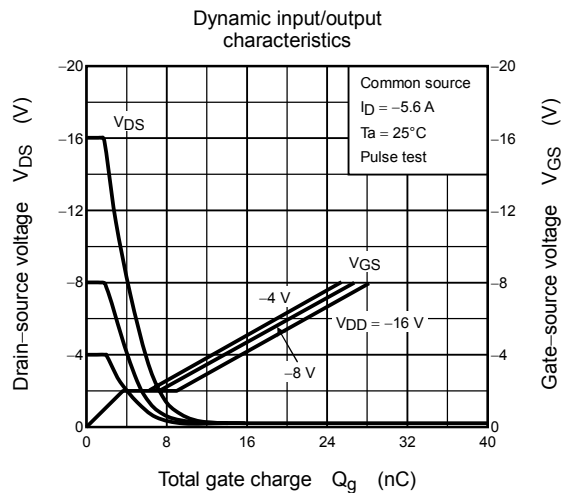
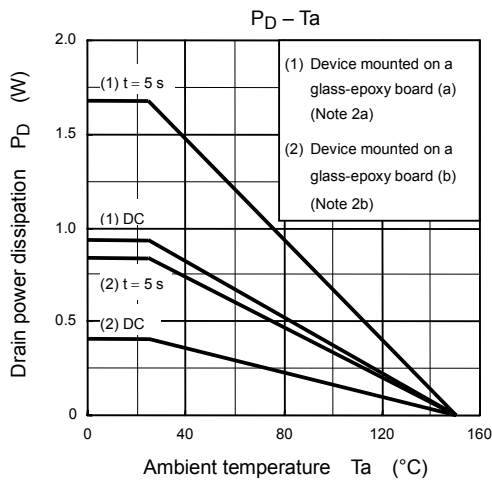
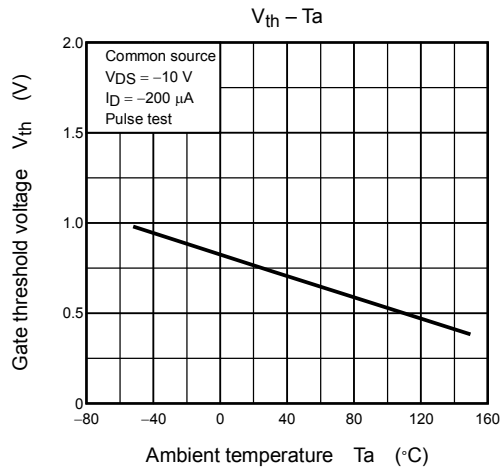
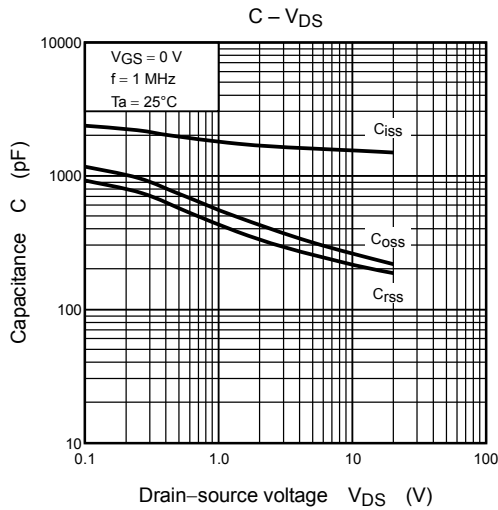
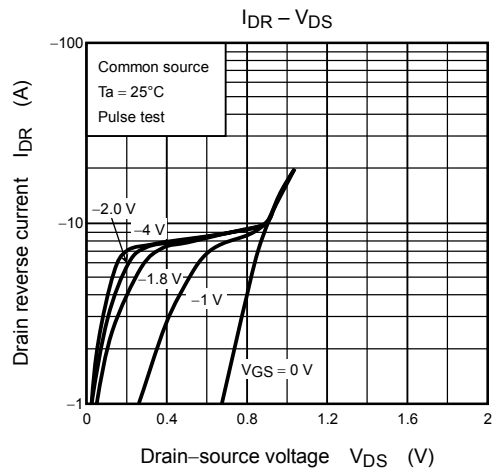
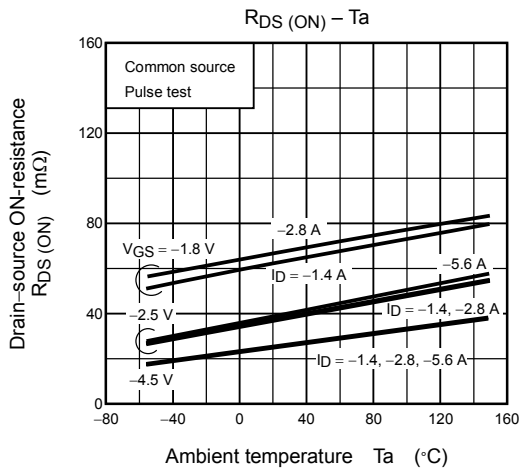
Electrical Characteristics (Ta = 25°C)

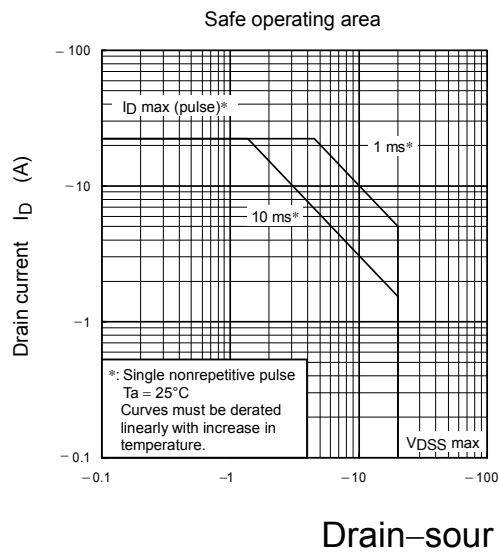
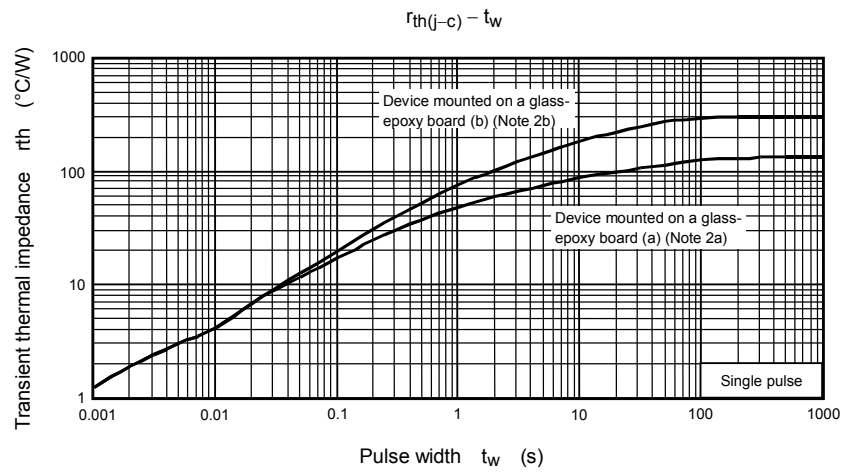
Characteristic		Symbol	Test Condition	Min	Typ.	Max	Unit
Gate leakage current		I_{GSS}	$V_{GS} = \pm 8 \text{ V}, V_{DS} = 0 \text{ V}$	—	—	± 10	μA
Drain cutoff current		I_{DSS}	$V_{DS} = -20 \text{ V}, V_{GS} = 0 \text{ V}$	—	—	-10	μA
Drain-source breakdown voltage		$V_{(BR)DSS}$	$I_D = -10 \text{ mA}, V_{GS} = 0 \text{ V}$	-20	—	—	V
		$V_{(BR)DSX}$	$I_D = -10 \text{ mA}, V_{GS} = 8 \text{ V}$	-12	—	—	
Gate threshold voltage		V_{th}	$V_{DS} = -10 \text{ V}, I_D = -200 \mu\text{A}$	-0.5	—	-1.2	V
Drain-source ON-resistance		$R_{DS(ON)}$	$V_{GS} = -1.8 \text{ V}, I_D = -1.4 \text{ A}$	—	67	90	m Ω
			$V_{GS} = -2.5 \text{ V}, I_D = -2.8 \text{ A}$	—	36	41	
			$V_{GS} = -4.5 \text{ V}, I_D = -2.8 \text{ A}$	—	24	30	
Forward transfer admittance		$ Y_{fs} $	$V_{DS} = -10 \text{ V}, I_D = -2.8 \text{ A}$	7	14	—	S
Input capacitance		C_{iss}	$V_{DS} = -10 \text{ V}, V_{GS} = 0 \text{ V}, f = 1 \text{ MHz}$	—	1550	—	pF
Reverse transfer capacitance		C_{rss}		—	215	—	
Output capacitance		C_{oss}		—	265	—	
Switching time	Rise time	t_r	<p>V_{GS} 0 V, -5 V $I_D = -2.8 \text{ A}$ V_{OUT} $R_L = 3.57 \Omega$ $V_{DD} \approx -10 \text{ V}$ Duty $\leq 1\%$, $t_w = 10 \mu\text{s}$</p>	—	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	$V_{DD} \approx -16 \text{ V}, V_{GS} = -5 \text{ V}, I_D = -5.6 \text{ A}$	—	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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