

TOSHIBA Field Effect Transistor Silicon P-Channel MOS Type (Ultra-High-speed U-MOSIII)

TPCP8103-H

High Efficiency DC-DC Converter Applications
 Notebook PC Applications
 Portable Equipment Applications
 CCFL Inverter Applications

- Small footprint due to a small and thin package
- High speed switching
- Small gate charge: $Q_{SW} = 6.5 \text{ nC}$ (typ.)
- Low drain-source ON-resistance: $R_{DS(ON)} = 31 \text{ m}\Omega$ (typ.)
- High forward transfer admittance: $|Y_{fs}| = 10 \text{ S}$ (typ.)
- Low leakage current: $I_{DSS} = -10 \mu\text{A}$ (max) ($V_{DS} = -40\text{V}$)
- Enhancement mode: $V_{th} = -0.8 \text{ to } -2.0 \text{ V}$ ($V_{DS} = -10 \text{ V}$, $I_D = -1\text{mA}$)

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

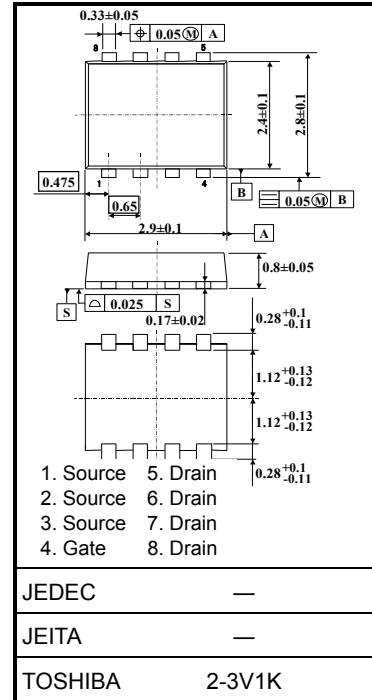
Characteristic		Symbol	Rating	Unit
Drain-source voltage		V_{DSS}	-40	V
Drain-gate voltage ($R_{GS} = 20 \text{ k}\Omega$)		V_{DGR}	-40	V
Gate-source voltage		V_{GSS}	± 20	V
Drain current	DC (Note 1)	I_D	-4.8	A
	Pulsed (Note 1)	I_{DP}	-19.2	
Drain power dissipation	($t = 5 \text{ s}$) (Note 2a)	P_D	1.68	W
Drain power dissipation	($t = 5 \text{ s}$) (Note 2b)	P_D	0.84	W
Single-pulse avalanche energy	(Note 3)	E_{AS}	10.7	mJ
Avalanche current		I_{AR}	-4.8	A
Repetitive avalanche energy	(Note 4)	E_{AR}	0.09	mJ
Channel temperature		T_{ch}	150	$^\circ\text{C}$
Storage temperature range		T_{stg}	-55 to 150	$^\circ\text{C}$

Note: For Notes 1 to 4, 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).

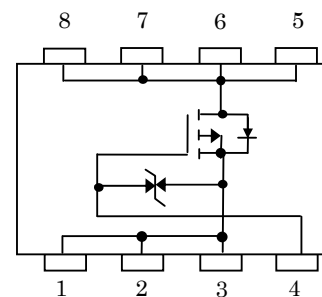
This transistor is an electrostatic-sensitive device. Handle with care.

Unit: mm

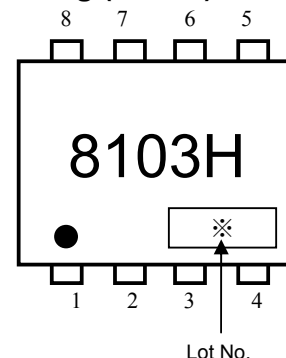


Weight: 0.017 g (typ.)

Circuit Configuration



Marking (Note 5)

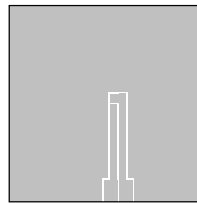


Thermal Characteristics

Characteristic	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

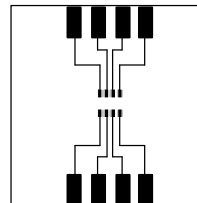
Note 1: The channel temperature should not exceed 150°C during use.

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)



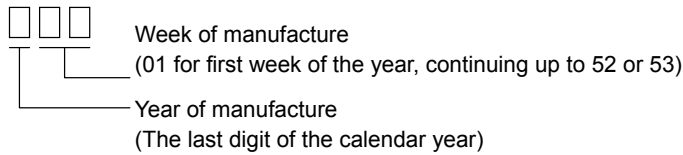
(b)

FR-4
25.4 × 25.4 × 0.8
(Unit: mm)

Note 3: $V_{DD} = -24\text{ V}$, $T_{ch} = 25^\circ\text{C}$ (initial), $L = 0.5\text{ mH}$, $R_G = 25\ \Omega$, $I_{AR} = -4.8\text{ A}$

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

Note 5: * Weekly code: (Three digits)

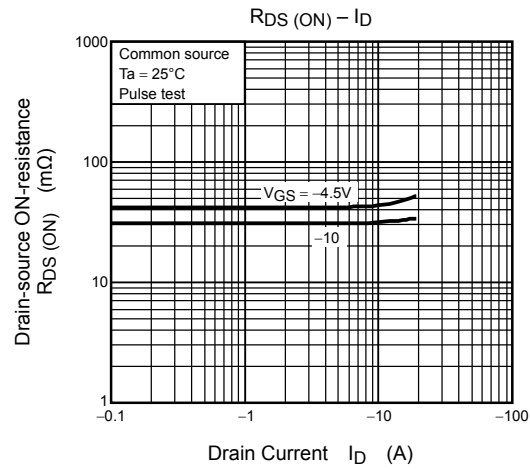
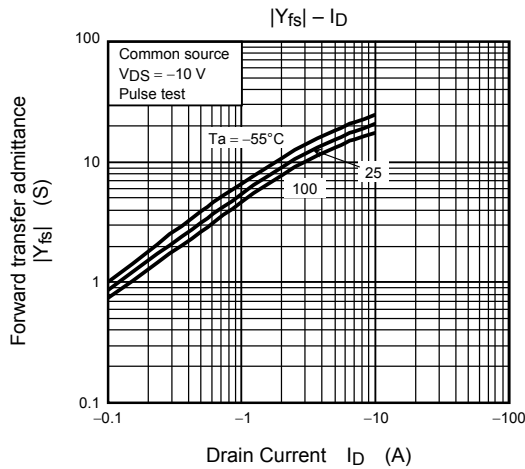
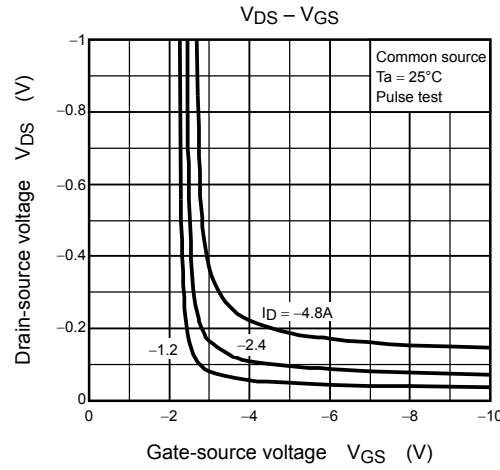
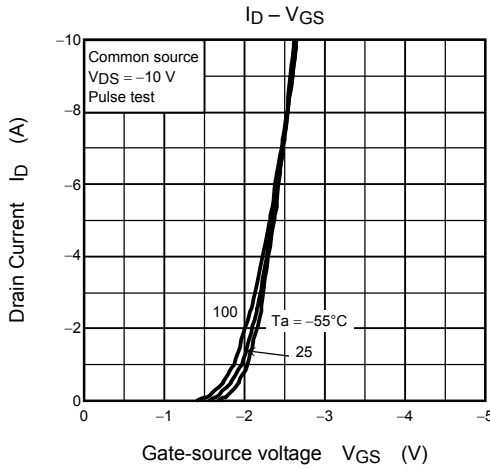
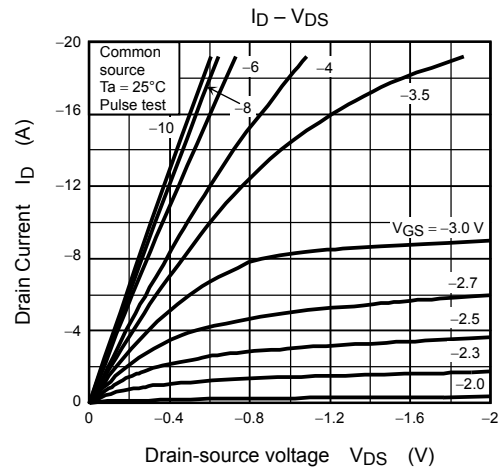
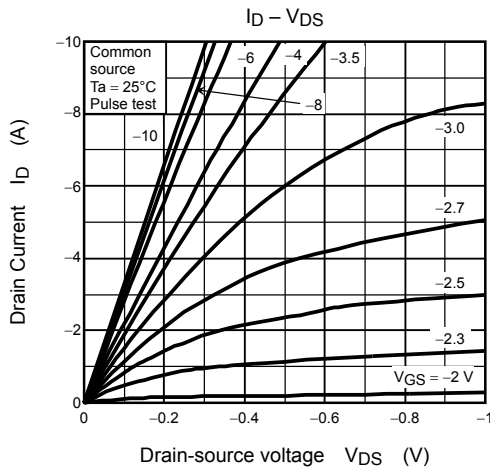


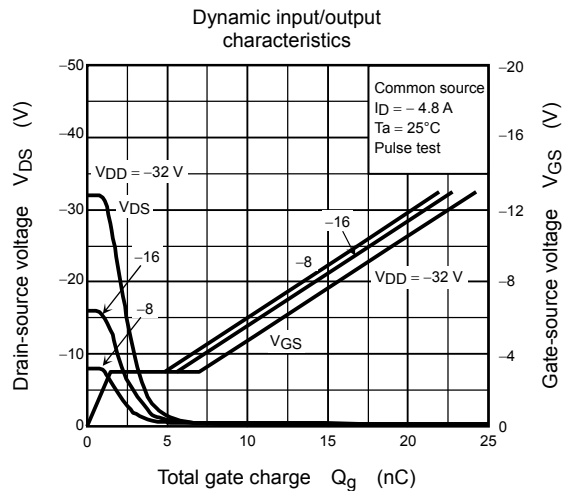
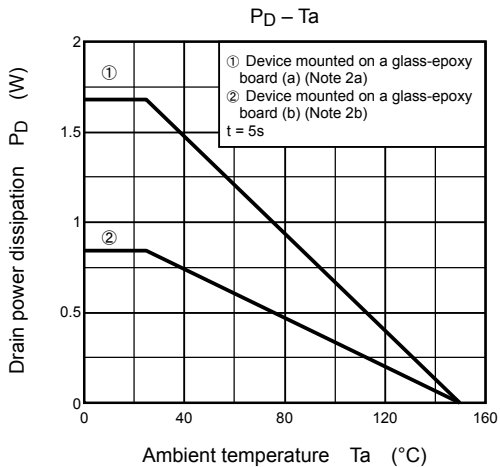
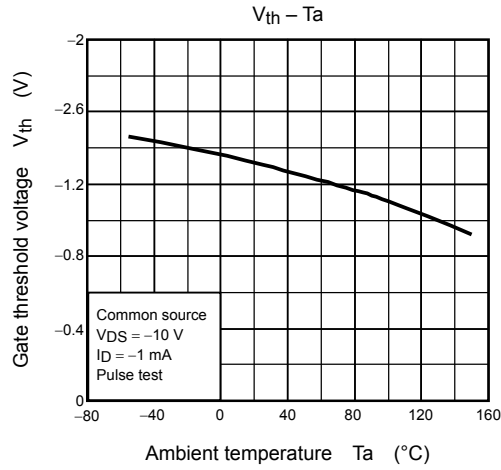
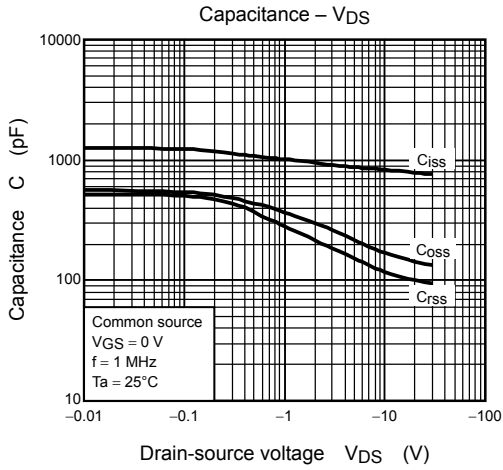
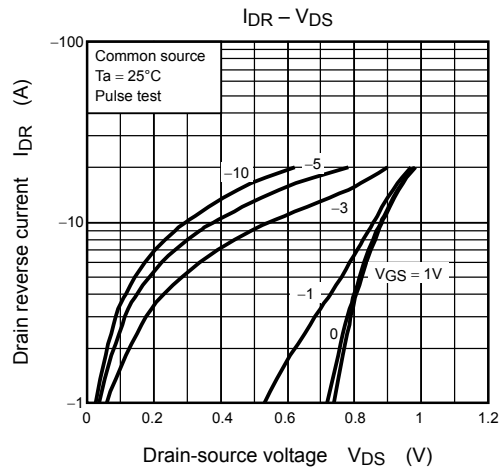
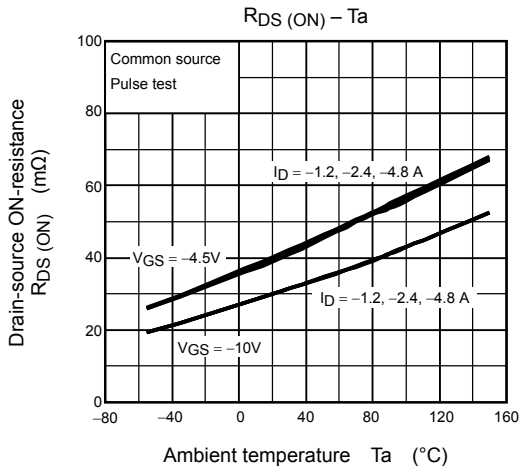
Electrical Characteristics (Ta = 25°C)

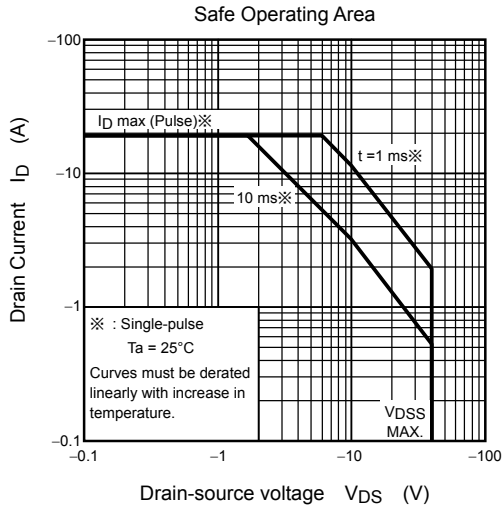
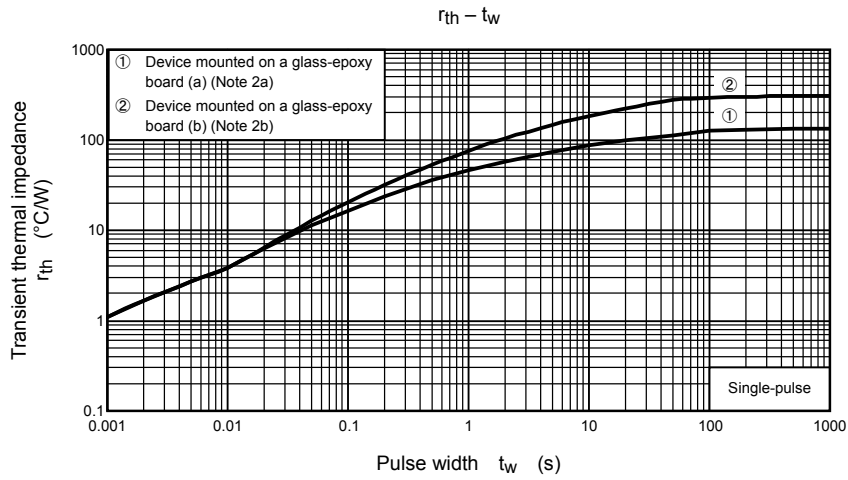
Characteristic		Symbol	Test Condition	Min	Typ.	Max	Unit
Gate leakage current		I_{GSS}	$V_{GS} = \pm 16\text{ V}, V_{DS} = 0\text{ V}$	—	—	± 10	μA
Drain cutoff current		I_{DSS}	$V_{DS} = -40\text{ V}, V_{GS} = 0\text{ V}$	—	—	-10	μA
Drain-source breakdown voltage		$V_{(BR)DSS}$	$I_D = -10\text{ mA}, V_{GS} = 0\text{ V}$	-40	—	—	V
		$V_{(BR)DSX}$	$I_D = -10\text{ mA}, V_{GS} = 20\text{ V}$	-20	—	—	
Gate threshold voltage		V_{th}	$V_{DS} = -10\text{ V}, I_D = -1\text{ mA}$	-0.8	—	-2.0	V
Drain-source ON-resistance		$R_{DS(ON)}$	$V_{GS} = -4.5\text{ V}, I_D = -2.4\text{ A}$	—	42	54	$\text{m}\Omega$
			$V_{GS} = -10\text{ V}, I_D = -2.4\text{ A}$	—	31	40	
Forward transfer admittance		$ Y_{fs} $	$V_{DS} = -10\text{ V}, I_D = -2.4\text{ A}$	5	10	—	S
Input capacitance		C_{iss}	$V_{DS} = -10\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$	—	800	—	pF
Reverse transfer capacitance		C_{riss}		—	115	—	
Output capacitance		C_{oss}		—	165	—	
Switching time	Rise time	t_r	<p>$V_{GS} = -10\text{ V}$ $I_D = -2.4\text{ A}$ $V_{DD} \approx -20\text{ V}$ $R_L = 8.33\Omega$ 4.7Ω V_{OUT} $Duty \leq 1\%, t_w = 10\ \mu\text{s}$</p>	—	6.5	—	ns
	Turn-on time	t_{on}		—	12.5	—	
	Fall time	t_f		—	9	—	
	Turn-off time	t_{off}		—	37	—	
Total gate charge (gate-source plus gate-drain)		Q_g	$V_{DD} \approx -32\text{ V}, V_{GS} = -10\text{ V}, I_D = -4.8\text{ A}$	—	19	—	nC
			$V_{DD} \approx -32\text{ V}, V_{GS} = -5\text{ V}, I_D = -4.8\text{ A}$	—	11	—	
Gate-source charge 1		Q_{gs1}	$V_{DD} \approx -32\text{ V}, V_{GS} = -10\text{ V}, I_D = -4.8\text{ A}$	—	1.5	—	
Gate-drain ("Miller") charge		Q_{gd}		—	5.5	—	
Gate switch charge		Q_{SW}		—	6.5	—	

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

Characteristic		Symbol	Test Condition	Min	Typ.	Max	Unit
Drain reverse current	Pulse (Note 1)	I_{DRP}	—	—	—	-19.2	A
Forward voltage (diode)		V_{DSF}	$I_{DR} = -4.8\text{ A}, V_{GS} = 0\text{ V}$	—	—	1.2	V







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