

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

TPCA8107-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: $Q_{SW} = 9.7 \text{ nC (typ.)}$
- Low drain-source ON-resistance: $R_{DS(ON)} = 24\text{m}\Omega \text{ (typ.)}$
- High forward transfer admittance: $|Y_{fs}| = 14 \text{ S (typ.)}$
- Low leakage current: $I_{DSS} = -10 \mu\text{A (max)} \text{ (} V_{DS} = -40 \text{ V)}$
- Enhancement mode: $V_{th} = -0.8 \text{ to } -2.0 \text{ V (} V_{DS} = -10 \text{ V, } I_D = -1 \text{ mA)}$

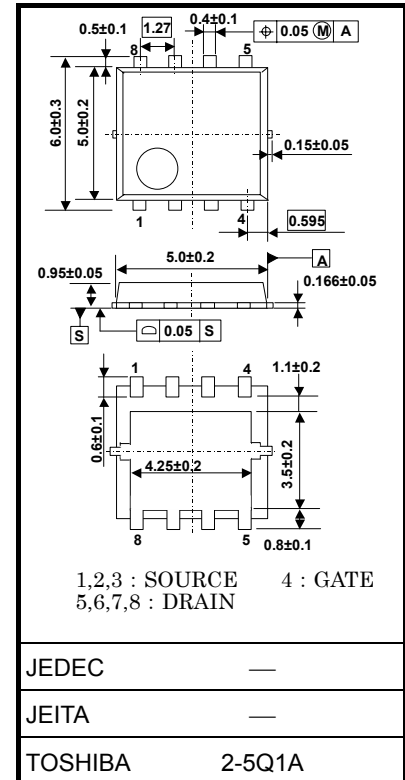
Maximum Ratings (Ta = 25°C)

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	-7.5	A
	Pulsed (Note 1)	I_{DP}	-30	
Drain power dissipation ($T_c = 25^\circ\text{C}$)		P_D	30	W
Drain power dissipation ($t = 10 \text{ s}$) (Note 2a)		P_D	2.8	W
Drain power dissipation ($t = 10 \text{ s}$) (Note 2b)		P_D	1.6	W
Single-pulse avalanche energy (Note 3)		E_{AS}	26	mJ
Avalanche current		I_{AR}	-7.5	A
Repetitive avalanche energy (Note 2a) (Note 4)		E_{AR}	1.9	mJ
Channel temperature		T_{ch}	150	°C
Storage temperature range		T_{stg}	-55 to 150	°C

Note: For Notes 1 to 4, refer to the next page.

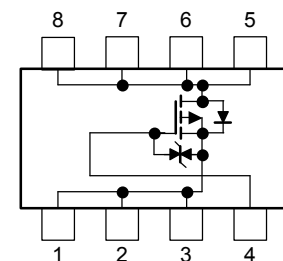
This transistor is an electrostatic-sensitive device. Handle with care.

Unit: mm



Weight: 0.066 g (typ.)

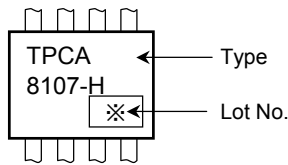
Circuit Configuration



Thermal Characteristics

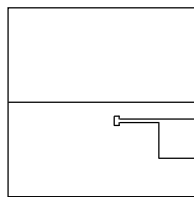
Characteristics	Symbol	Max	Unit
Thermal resistance, channel to case ($T_c=25^\circ\text{C}$)	$R_{th}(\text{ch-c})$	4.17	$^\circ\text{C/W}$
Thermal resistance, channel to ambient ($t = 10 \text{ s}$) (Note 2a)	$R_{th}(\text{ch-a})$	44.6	$^\circ\text{C/W}$
Thermal resistance, channel to ambient ($t = 10 \text{ s}$) (Note 2b)	$R_{th}(\text{ch-a})$	78.1	$^\circ\text{C/W}$

Marking (Note 5)



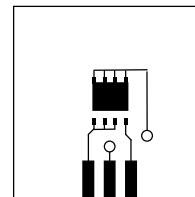
Note 1: The channel temperature should not exceed 150°C during use.

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



(a)

FR-4
 $25.4 \times 25.4 \times 0.8$
(Unit: mm)



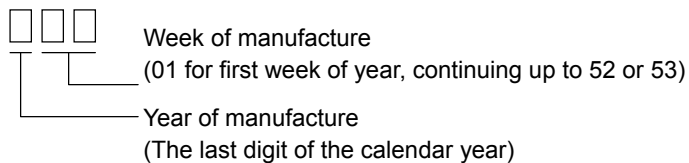
(b)

FR-4
 $25.4 \times 25.4 \times 0.8$
(Unit: mm)

Note 3: $V_{DD} = -24 \text{ V}$, $T_{ch} = 25^\circ\text{C}$ (initial), $L = 0.5 \text{ mH}$, $R_G = 25 \Omega$, $I_{AR} = -7.5 \text{ A}$

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

Note 5: * Weekly code: (Three digits)

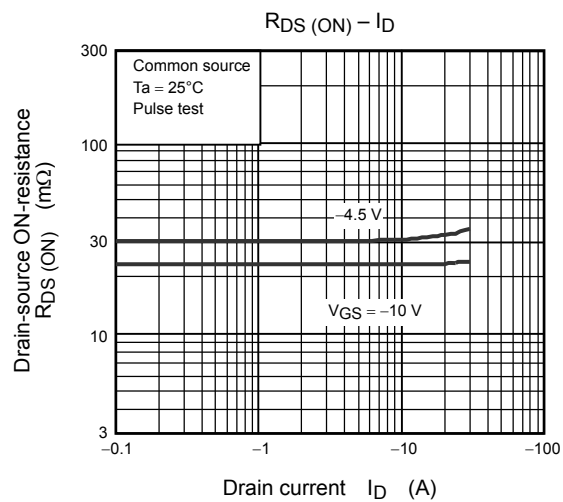
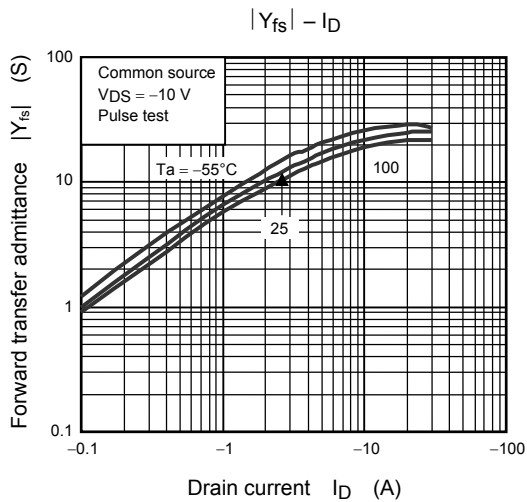
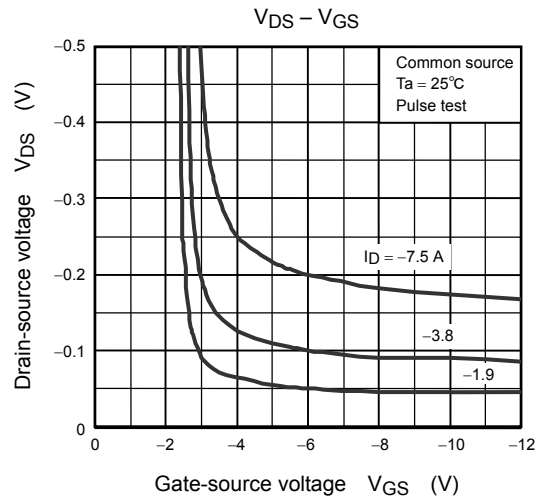
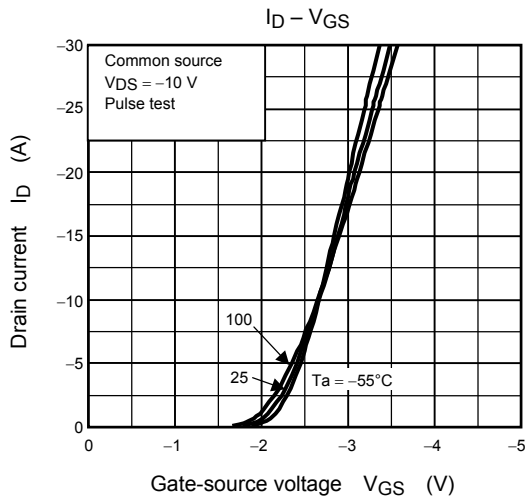
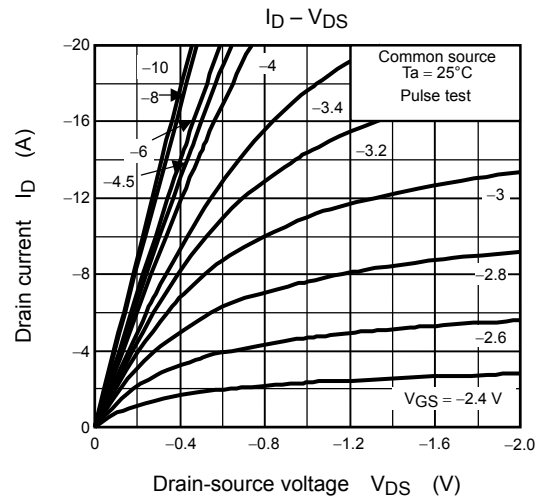
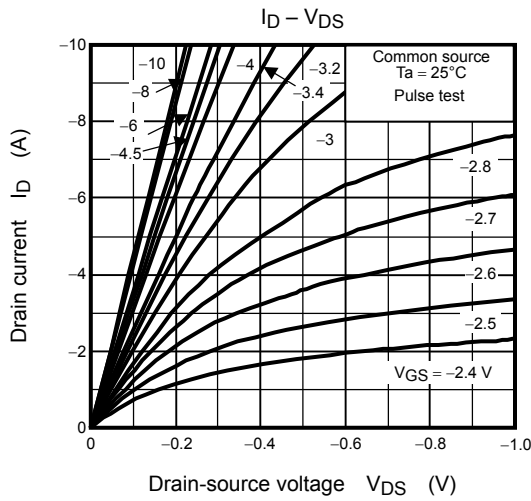


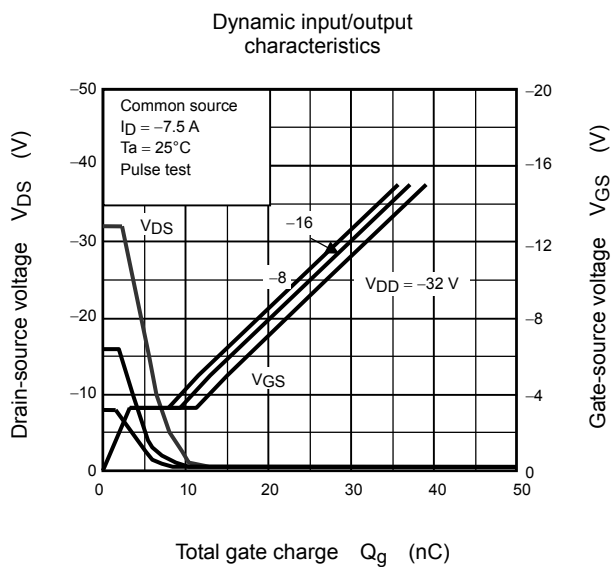
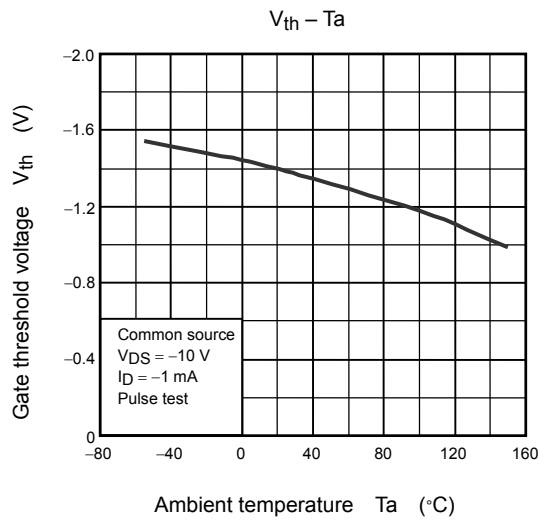
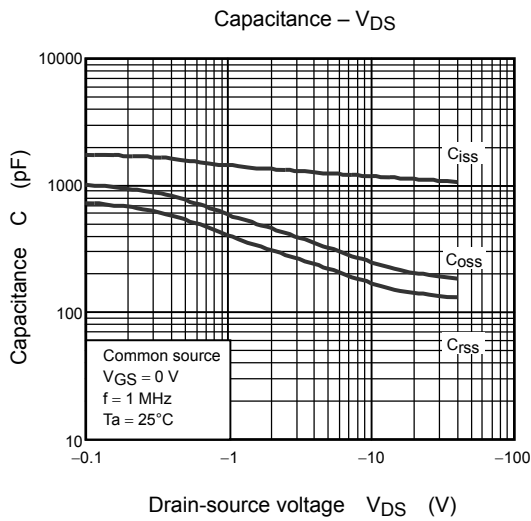
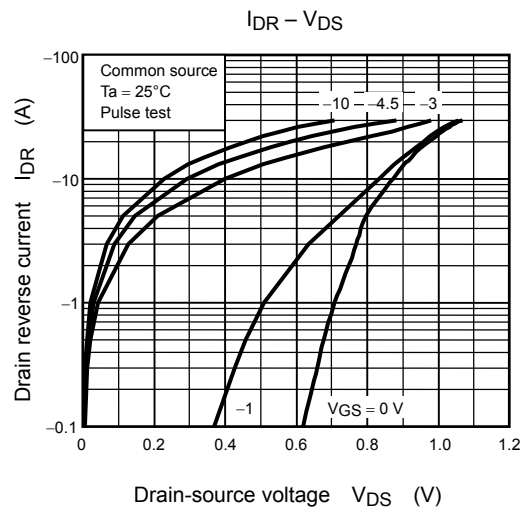
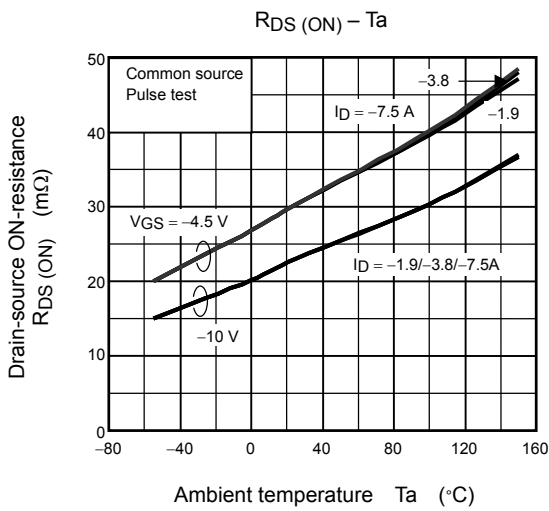
Electrical Characteristics (Ta = 25°C)

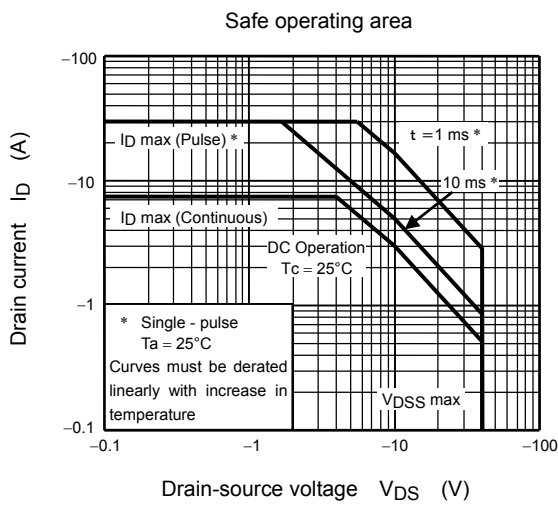
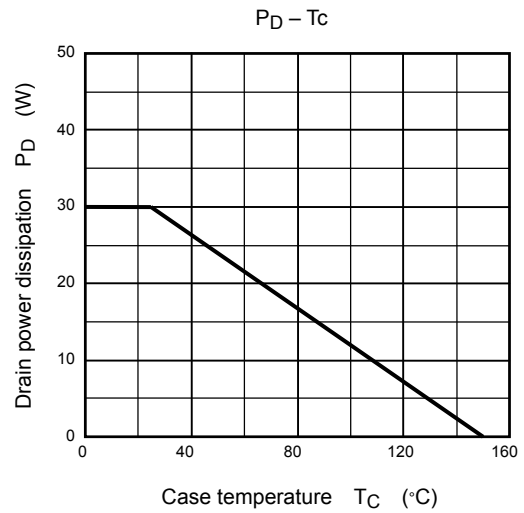
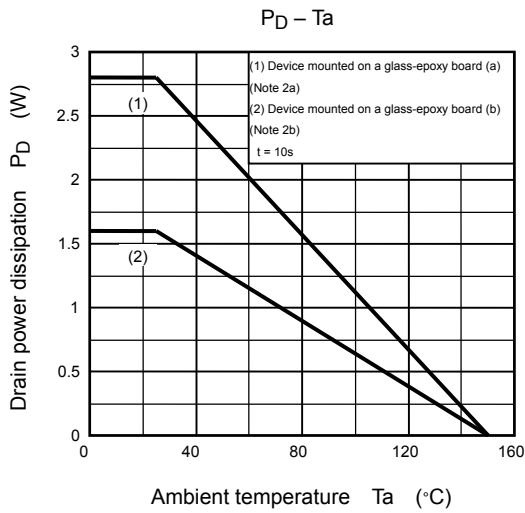
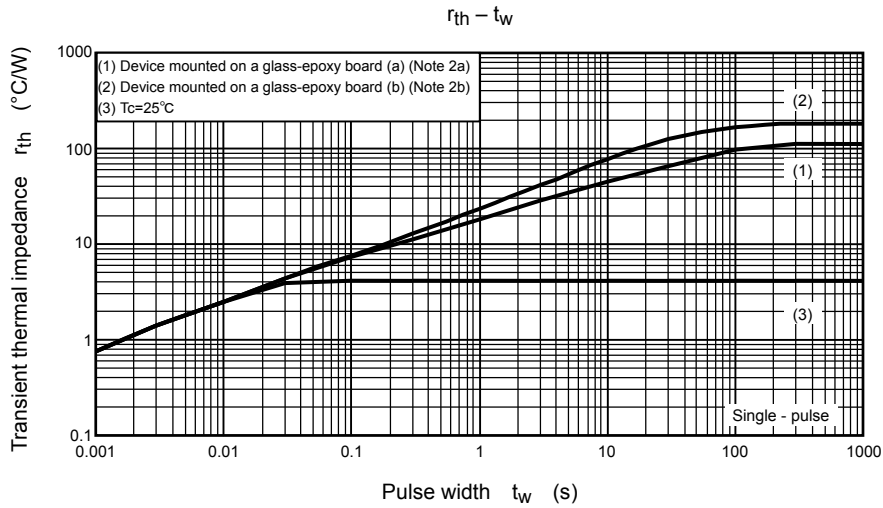
Characteristic		Symbol	Test Condition	Min	Typ.	Max	Unit
Gate leakage current		I_{GSS}	$V_{GS} = \pm 16 \text{ V}, V_{DS} = 0 \text{ V}$	—	—	± 10	μA
Drain cutoff current		I_{DSS}	$V_{DS} = -40 \text{ V}, V_{GS} = 0 \text{ V}$	—	—	-10	μA
Drain-source breakdown voltage		$V_{(BR)DSS}$	$I_D = -10 \text{ mA}, V_{GS} = 0 \text{ V}$	-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		$R_{DS(ON)}$	$V_{GS} = -4.5 \text{ V}, I_D = -3.8 \text{ A}$	—	29	37	m Ω
			$V_{GS} = -10 \text{ V}, I_D = -3.8 \text{ A}$	—	24	30	
Forward transfer admittance		$ Y_{fs} $	$V_{DS} = -10 \text{ V}, I_D = -3.8 \text{ A}$	7	14	—	S
Input capacitance		C_{iss}	$V_{DS} = -10 \text{ V}, V_{GS} = 0 \text{ V}, f = 1 \text{ MHz}$	—	1190	—	pF
Reverse transfer capacitance		C_{rss}		—	170	—	
Output capacitance		C_{oss}		—	250	—	
Switching time	Rise time	t_r	<p>$V_{GS} = 0 \text{ V}$ -10 V $I_D = -3.8 \text{ A}$ V_{OUT} 4.7Ω $R_L = 5.33 \Omega$ $V_{DD} \approx -20 \text{ V}$ Duty $\leq 1\%$, $t_w = 10 \mu\text{s}$</p>	—	5	—	ns
	Turn-on time	t_{on}		—	12	—	
	Fall time	t_f		—	12	—	
	Turn-off time	t_{off}		—	43	—	
Total gate charge (gate-source plus gate-drain)		Q_g	$V_{DD} \approx -32 \text{ V}, V_{GS} = -10 \text{ V}, I_D = -7.5 \text{ A}$	—	27	—	nC
			$V_{DD} \approx -32 \text{ V}, V_{GS} = -5 \text{ V}, I_D = -7.5 \text{ A}$	—	15	—	
Gate-source charge 1		Q_{gs1}	$V_{DD} \approx -32 \text{ V}, V_{GS} = -10 \text{ V}, I_D = -7.5 \text{ A}$	—	3.2	—	
Gate-drain ("Miller") charge		Q_{gd}		—	8.1	—	
Gate switch charge		Q_{sw}		—	9.7	—	

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

Characteristic		Symbol	Test Condition	Min	Typ.	Max	Unit
Drain reverse current	Pulse (Note 1)	I_{DRP}	—	—	—	-30	A
Forward voltage (diode)		V_{DSF}	$I_{DR} = -7.5 \text{ A}, V_{GS} = 0 \text{ V}$	—	—	1.2	V







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20070701-EN

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