

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

TPCA8105

Notebook PC Applications
 Portable Equipment Applications

- Small footprint due to compact and slim package
- Low drain-source ON-resistance : $R_{DS(ON)} = 23 \text{ m}\Omega$ (typ.)
 $(V_{GS} = -4.5\text{V})$
- High forward transfer admittance : $|Y_{fs}| = 14 \text{ S}$ (typ.)
- Low leakage current : $I_{DSS} = -10 \text{ }\mu\text{A}$ ($V_{DS} = -12 \text{ V}$)
- Enhancement mode
 : $V_{th} = -0.5 \text{ to } -1.2 \text{ V}$ ($V_{DS} = -10 \text{ V}$, $I_D = -200 \text{ }\mu\text{A}$)

Absolute Maximum Ratings (Ta = 25°C)

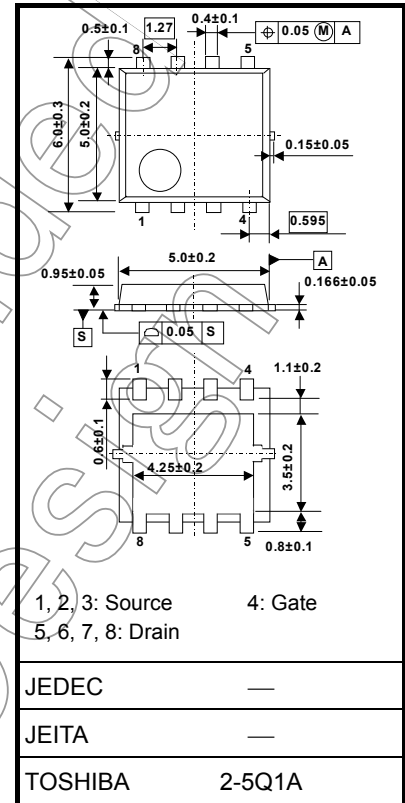
Characteristics		Symbol	Rating	Unit
Drain-source voltage		V_{DSS}	-12	V
Drain-gate voltage ($R_{GS} = 20 \text{ k}\Omega$)		V_{DGR}	-12	V
Gate-source voltage		V_{GSS}	± 8	V
Drain current	DC (Note 1)	I_D	-6	A
	Pulse (Note 1)	I_{DP}	-24	
Drain power dissipation ($T_c = 25^\circ\text{C}$)		P_D	20	W
Drain power dissipation ($t = 10 \text{ s}$) (Note 2a)		P_D	2.8	
Drain power dissipation ($t = 10 \text{ s}$) (Note 2b)		P_D	1.6	
Single pulse avalanche energy (Note 3)		E_{AS}	25.1	mJ
Avalanche current		I_{AR}	-6	A
Repetitive avalanche energy ($T_c = 25^\circ\text{C}$) (Note 4)		E_{AR}	0.8	mJ
Channel temperature		T_{ch}	150	$^\circ\text{C}$
Storage temperature range		T_{stg}	-55 to 150	$^\circ\text{C}$

Note: For (Note 1), (Note 2), (Note 3), (Note 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).

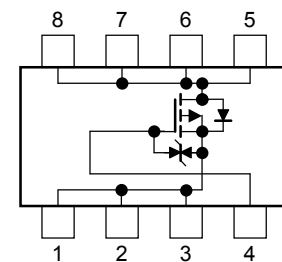
This transistor is an electrostatic-sensitive device. Handle with caution.

Unit: mm



Weight: 0.076 g (typ.)

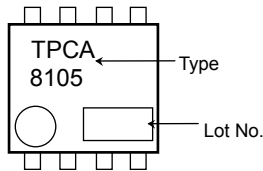
Circuit Configuration



Thermal Characteristics

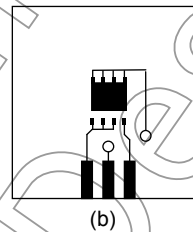
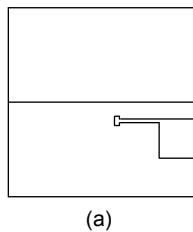
Characteristics	Symbol	Max	Unit
Thermal resistance, channel to case ($T_c = 25\text{ }^\circ\text{C}$)	$R_{th(ch-c)}$	6.25	$^\circ\text{C/W}$
Thermal resistance, channel to ambient ($t = 10\text{ s}$) (Note 2a)	$R_{th(ch-a)}$	44.6	$^\circ\text{C/W}$
Thermal resistance, channel to ambient ($t = 10\text{ s}$) (Note 2b)	$R_{th(ch-a)}$	78.1	

Marking (Note 5)



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

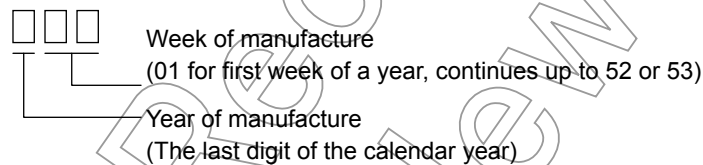
Note 2: (a) Device mounted on a glass-epoxy board (a) (b) Device mounted on a glass-epoxy board (b)



Note 3: $V_{DD} = -10\text{ V}$, $T_{ch} = 25^\circ\text{C}$ (initial), $L = 0.5\text{ mH}$, $R_G = 25\ \Omega$, $I_{AR} = -6.0\text{ A}$

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

Note 5: Weekly code: (Three digits)



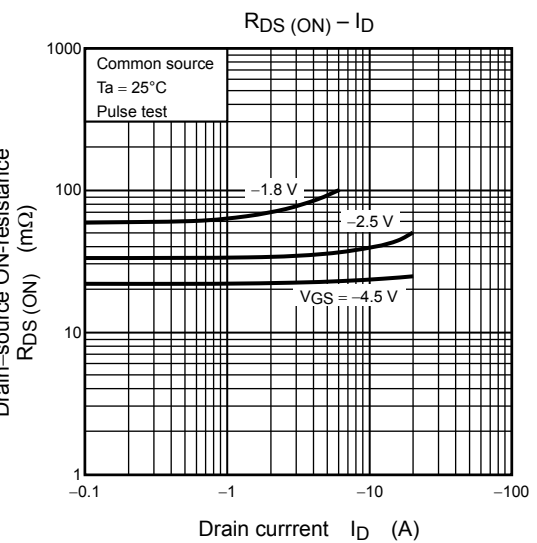
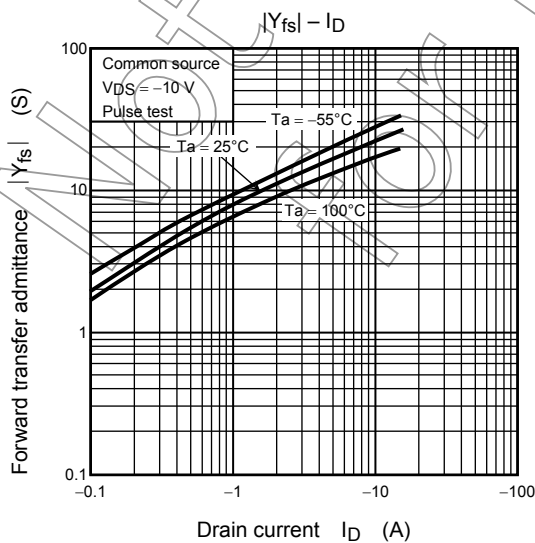
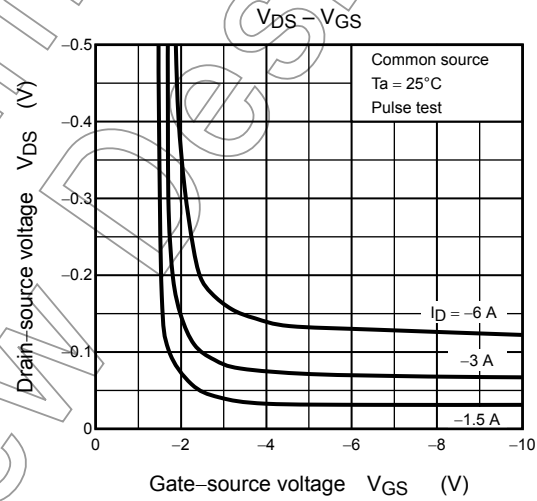
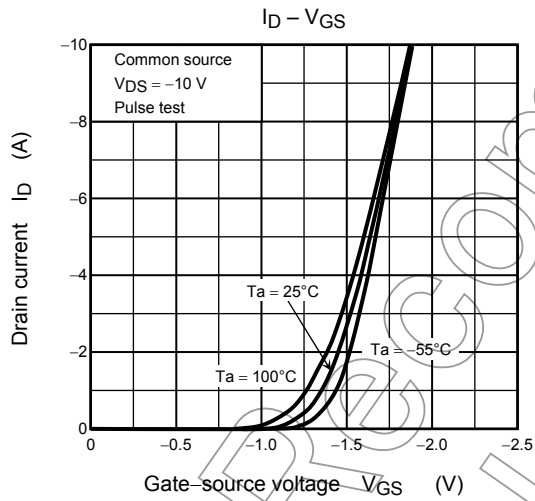
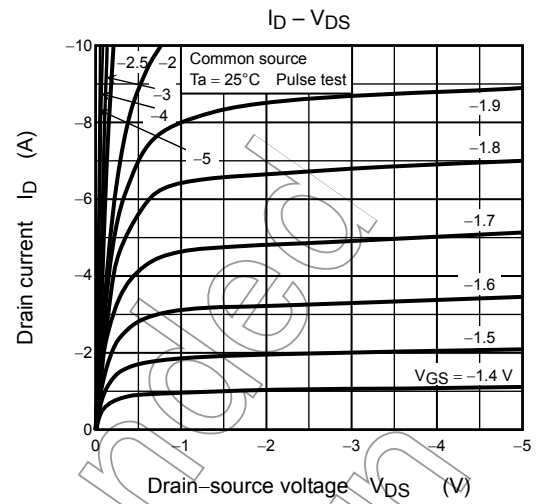
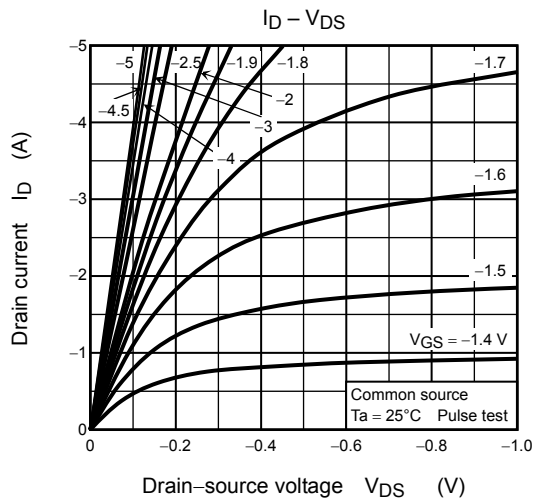
Not for New Design

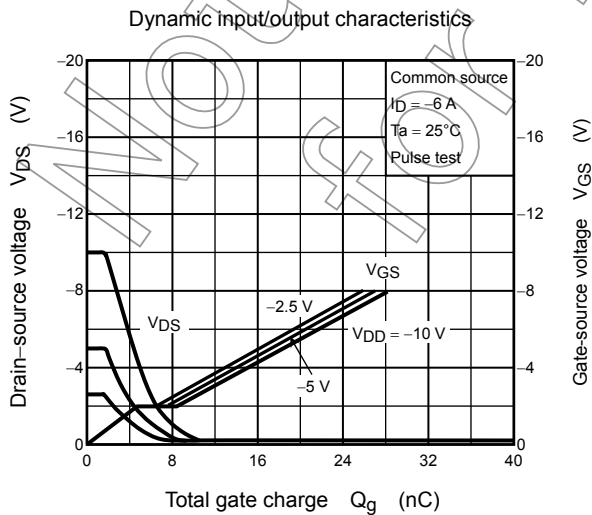
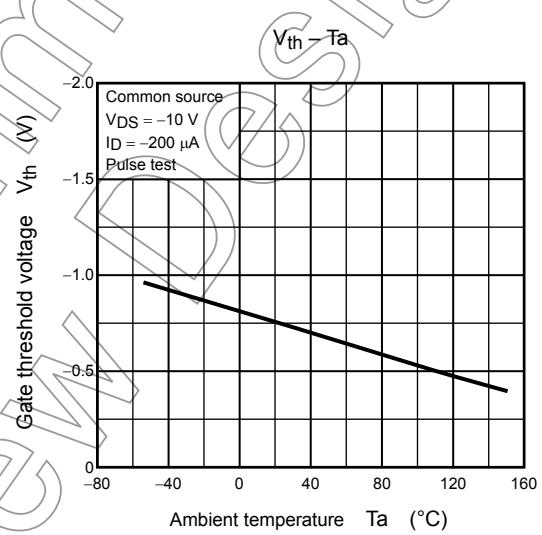
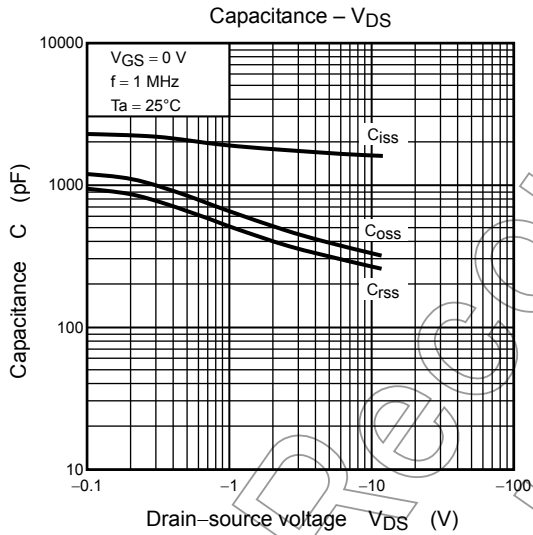
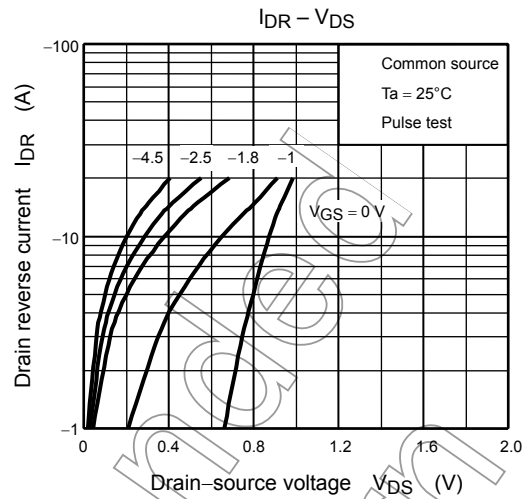
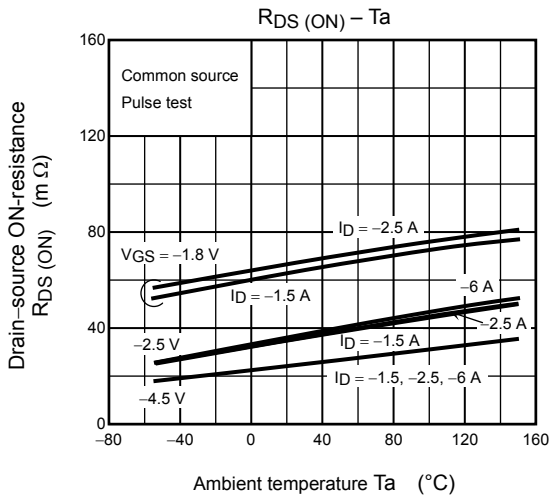
Electrical Characteristics (Ta = 25°C)

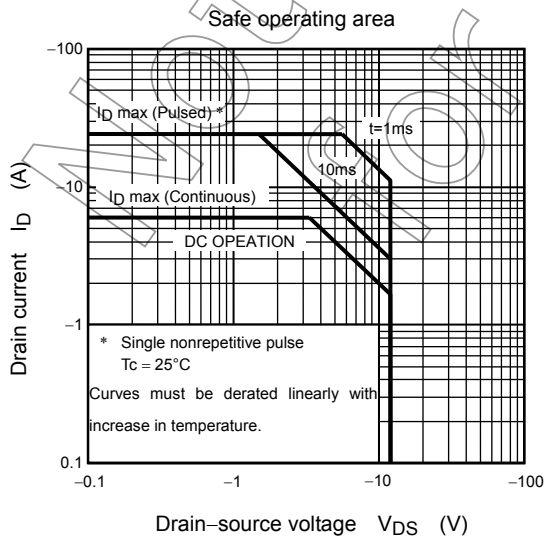
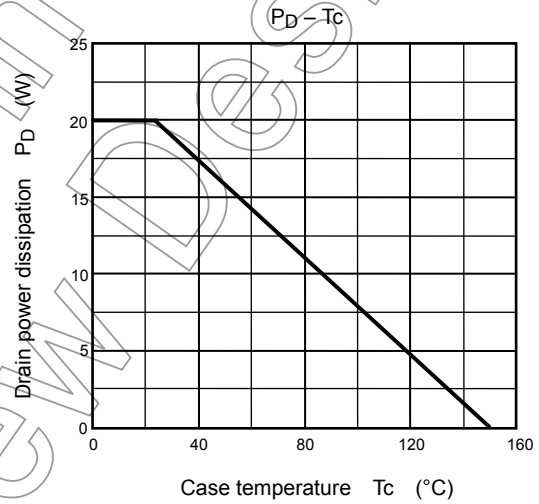
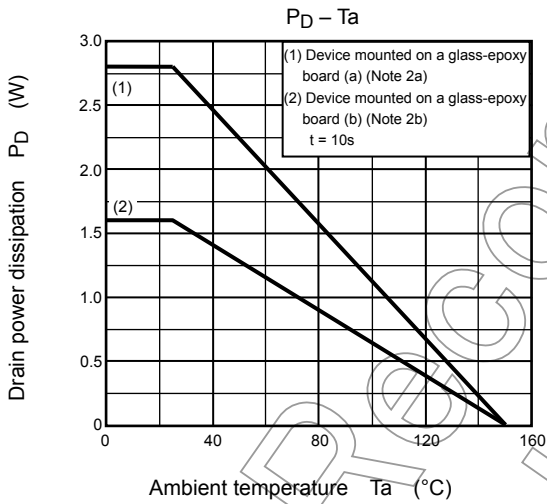
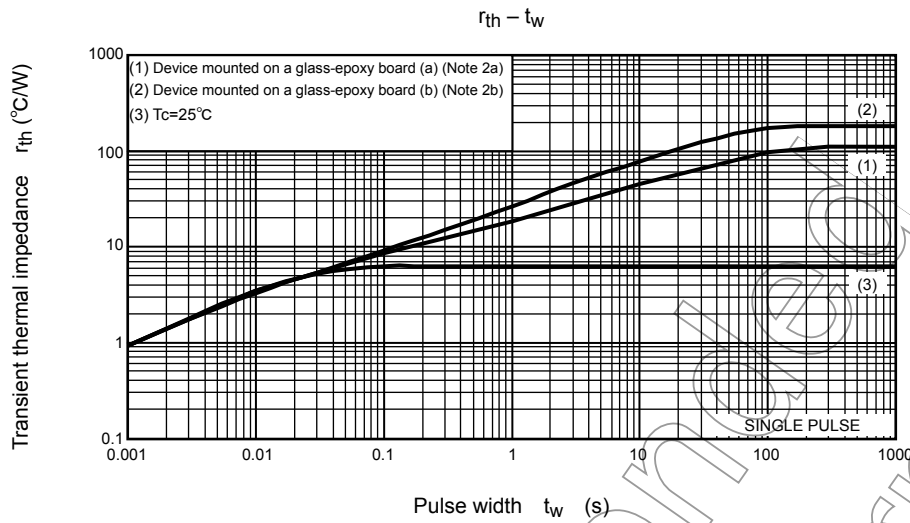
Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit	
Gate leakage current		I_{GSS}	$V_{GS} = \pm 8 \text{ V}, V_{DS} = 0 \text{ V}$	—	—	± 10	μA	
Drain cut-off current		I_{DSS}	$V_{DS} = -12 \text{ V}, V_{GS} = 0 \text{ V}$	—	—	-10	μA	
Drain-source breakdown voltage		$V_{(BR)DSS}$	$I_D = -10 \text{ mA}, V_{GS} = 0 \text{ V}$	-12	—	—	V	
		$V_{(BR)DSX}$	$I_D = -10 \text{ mA}, V_{GS} = 8 \text{ V}$	-4	—	—		
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		$R_{DS(ON)}$	$V_{GS} = -1.8 \text{ V}, I_D = -1.5 \text{ A}$	—	65	92	m Ω	
			$V_{GS} = -2.5 \text{ V}, I_D = -3.0 \text{ A}$	—	36	51		
			$V_{GS} = -4.5 \text{ V}, I_D = -3.0 \text{ A}$	—	23	33		
Forward transfer admittance		$ Y_{fs} $	$V_{DS} = -10 \text{ V}, I_D = -3.0 \text{ A}$	7	14	—	S	
Input capacitance		C_{iss}	$V_{DS} = -10 \text{ V}, V_{GS} = 0 \text{ V}, f = 1 \text{ MHz}$	—	1600	—	pF	
Reverse transfer capacitance		C_{rss}		—	260	—		
Output capacitance		C_{oss}		—	335	—		
Switching time	Rise time	t_r		—	7	—	ns	
	Turn-on time	t_{on}		—	13	—		
	Fall time	t_f		—	21	—		
	Turn-off time	t_{off}		Duty $\leq 1\%$, $t_w = 10 \mu\text{s}$	—	68		—
Total gate charge (gate-source plus gate-drain)		Q_g	$V_{DD} \approx -10 \text{ V}, V_{GS} = -5 \text{ V}$	—	18	—	nC	
Gate-source charge		Q_{gs}		$I_D = -6 \text{ A}$	—	14.5		—
Gate-drain ("Miller") charge		Q_{gd}		—	3.5	—		

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

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







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