

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

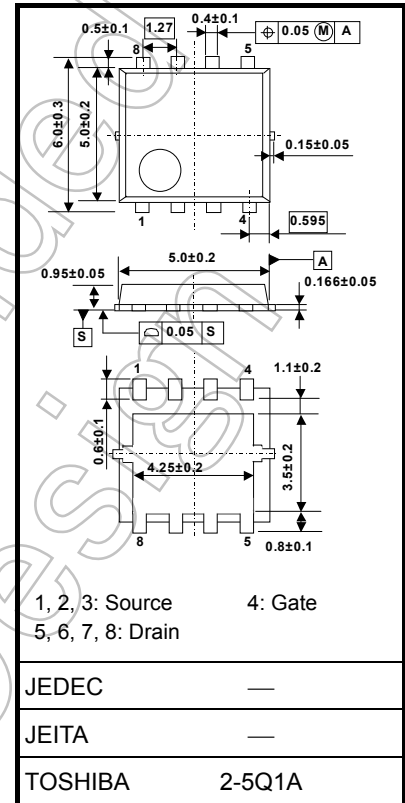
Characteristics		Symbol	Rating	Unit
Drain-source voltage		$V_{DSS}$	-12	V
Drain-gate voltage ( $R_{GS} = 20 \text{ k}\Omega$ )		$V_{DGR}$	-12	V
Gate-source voltage		$V_{GSS}$	$\pm 8$	V
Drain current	DC (Note 1)	$I_D$	-6	A
	Pulse (Note 1)	$I_{DP}$	-24	
Drain power dissipation ( $T_c = 25^\circ\text{C}$ )		$P_D$	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).

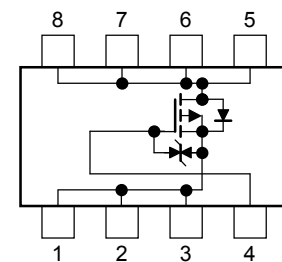
This transistor is an electrostatic-sensitive device. Handle with caution.

Unit: mm



Weight: 0.076 g (typ.)

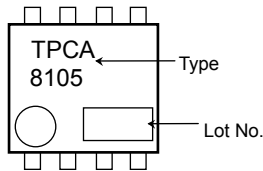
## Circuit Configuration



## 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	

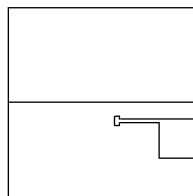
## Marking (Note 5)



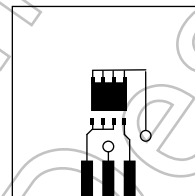
Note 1: The channel temperature should not exceed  $150^\circ\text{C}$  during use.

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

(b) Device mounted on a glass-epoxy board (b)



(a)

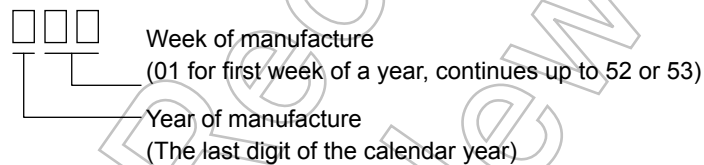


(b)

Note 3:  $V_{DD} = -10\text{ V}$ ,  $T_{ch} = 25^\circ\text{C}$  (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)

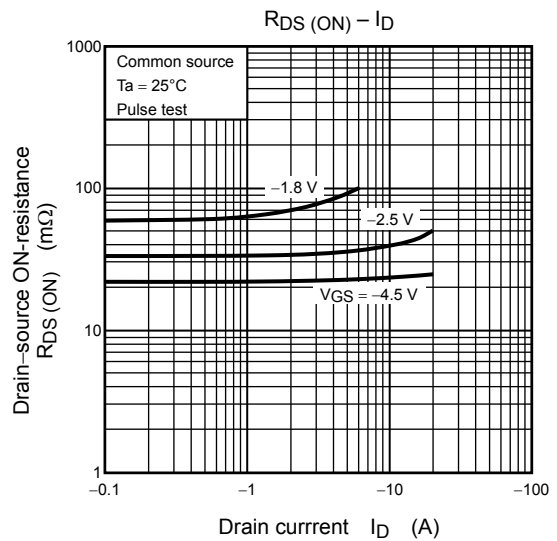
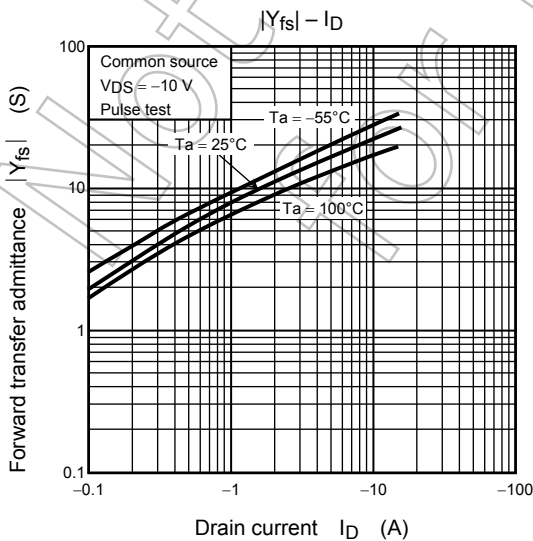
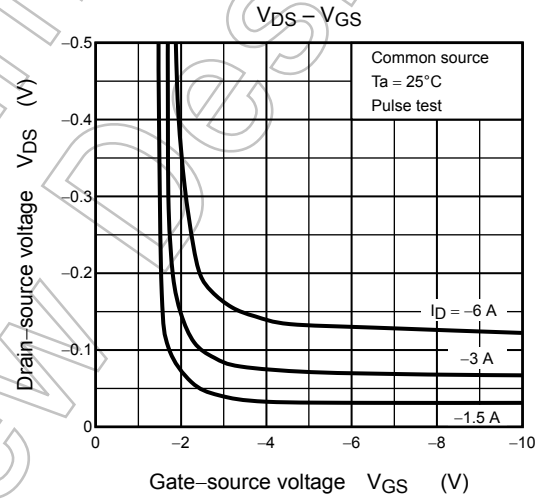
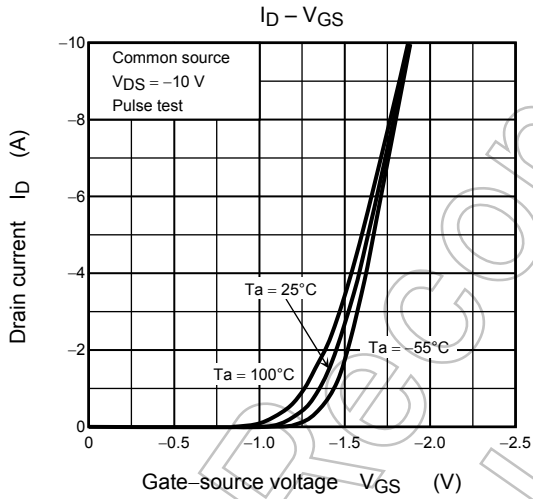
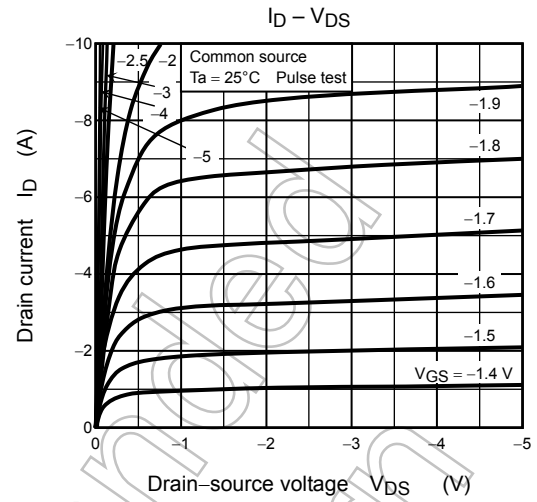
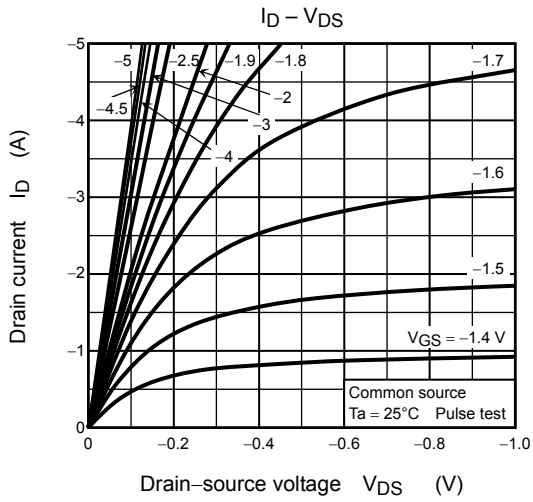


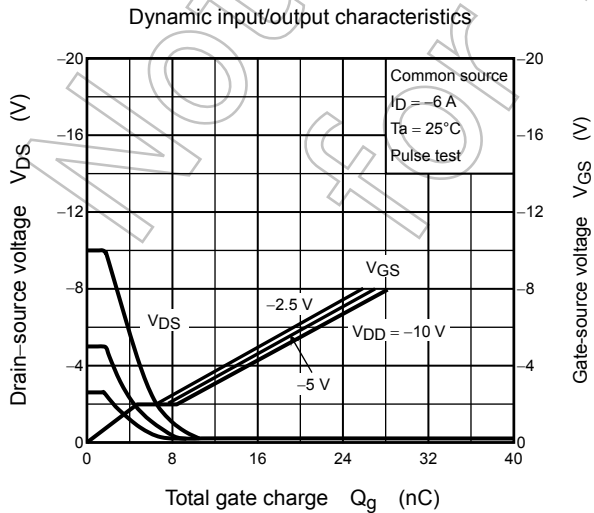
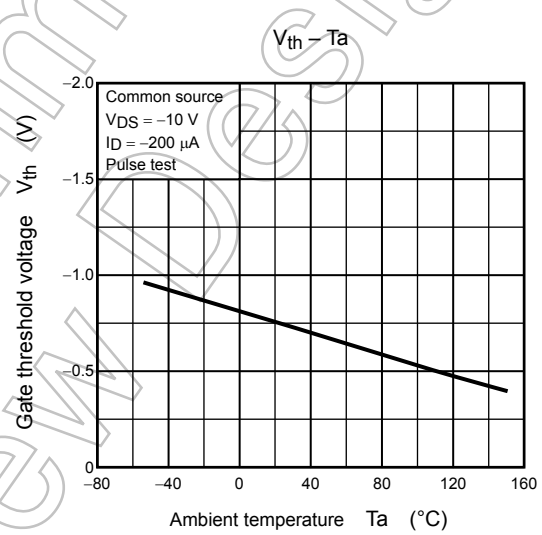
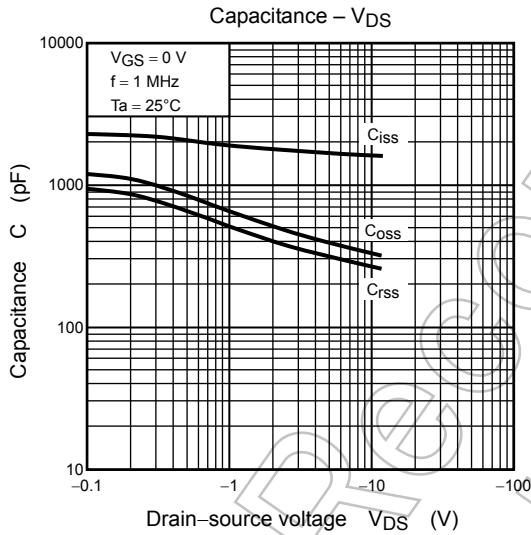
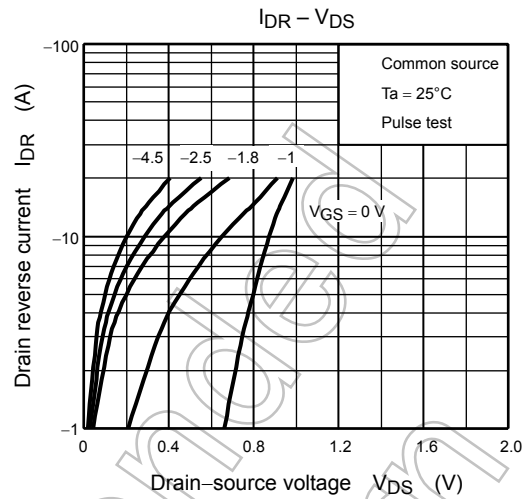
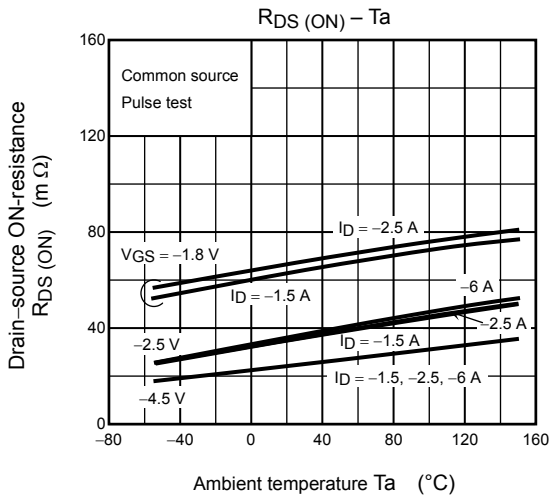
## Electrical Characteristics (Ta = 25°C)

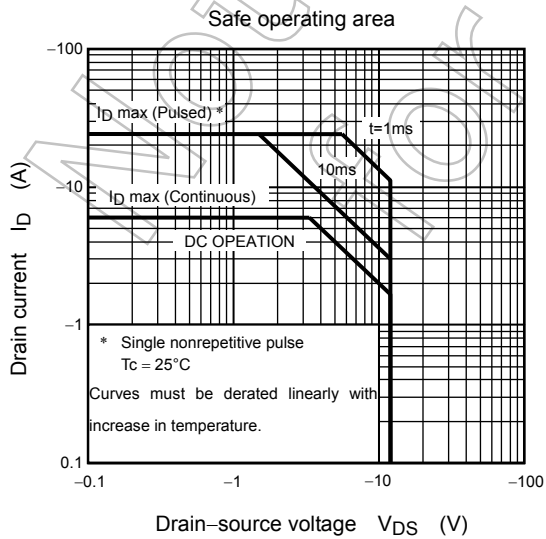
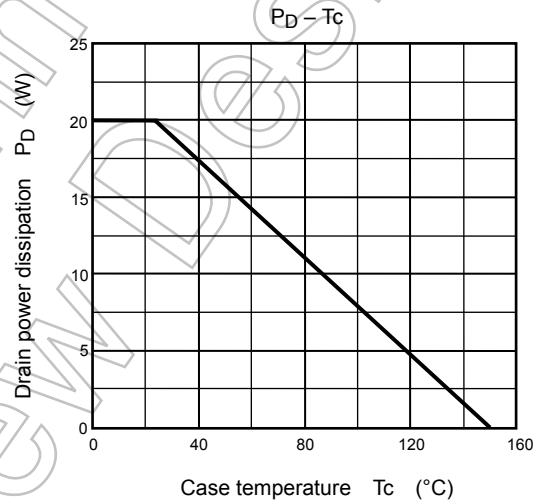
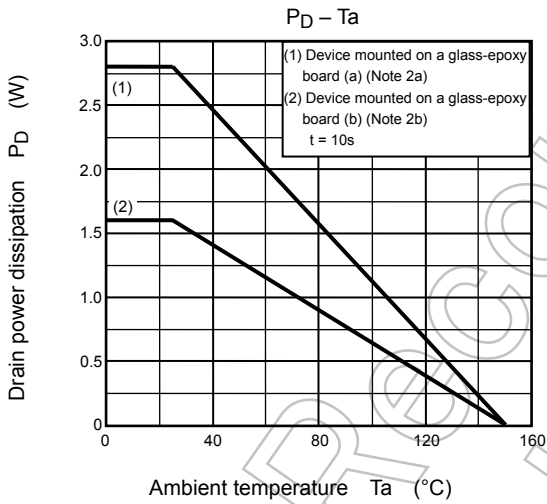
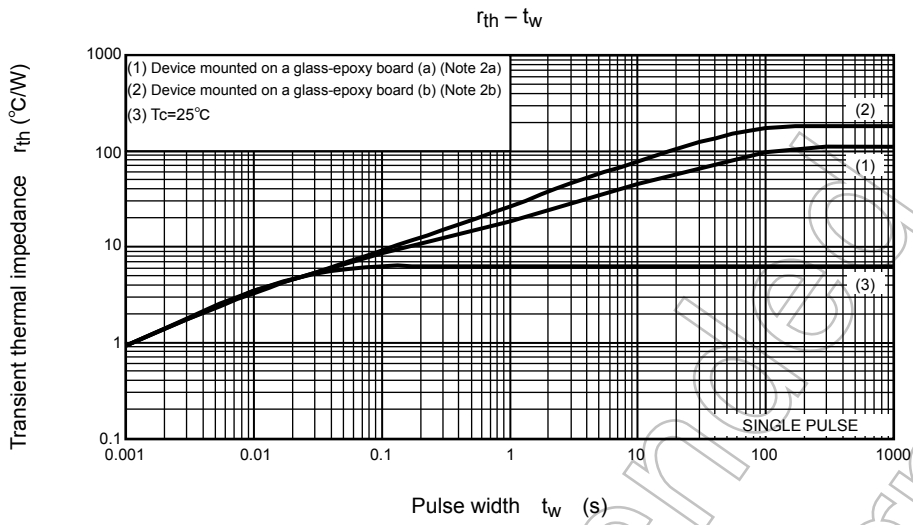
Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit	
Gate leakage current		$I_{GSS}$	$V_{GS} = \pm 8 \text{ V}, V_{DS} = 0 \text{ V}$	—	—	$\pm 10$	$\mu\text{A}$	
Drain cut-off current		$I_{DSS}$	$V_{DS} = -12 \text{ V}, V_{GS} = 0 \text{ V}$	—	—	-10	$\mu\text{A}$	
Drain-source breakdown voltage		$V_{(BR)DSS}$	$I_D = -10 \text{ mA}, V_{GS} = 0 \text{ V}$	-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 $\Omega$	
			$V_{GS} = -2.5 \text{ V}, I_D = -3.0 \text{ A}$	—	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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