

TOSHIBA Field Effect Transistor Silicon N Channel MOS Type( -MOSV)

# TPCA8008-H

**TENTATIVE**

## High Speed and High Efficiency DC-DC Converters

Unit: mm

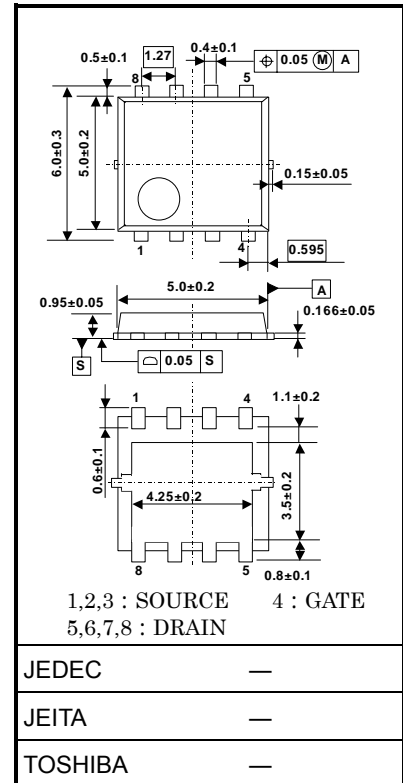
- Small footprint due to small and thin package
- High speed switching
- Small gate charge:  $Q_g = 10\text{nC}$  (typ.)
- Low drain-source ON resistance:  $R_{DS(ON)} = 470\text{m}\Omega$  (typ.)
- High forward transfer admittance:  $|Y_{fs}| = S$  (typ.)
- Low leakage current:  $I_{DSS} = 100\ \mu\text{A}$  (max) ( $V_{DS} = 100\ \text{V}$ )
- Enhancement mode:  $V_{th} = 2$  to  $4\text{V}$  ( $V_{DS} = 10\ \text{V}$ ,  $I_D = 1\ \text{mA}$ )

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

Characteristics		Symbol	Rating	Unit
Drain-source voltage		$V_{DSS}$	250	V
Drain-gate voltage ( $R_{GS} = 20\ \text{k}\Omega$ )		$V_{DGR}$	250	V
Gate-source voltage		$V_{GSS}$	$\pm 20$	V
Drain current	DC (Note 1)	$I_D$	4	A
	Pulsed (Note 1)	$I_{DP}$	8	
Drain power dissipation	( $T_c=25^\circ\text{C}$ )	$P_D$	45	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)		$E_{AS}$	11	mJ
Avalanche current		$I_{AR}$	4	A
Repetitive avalanche energy ( $T_c=25^\circ\text{C}$ ) (Note 4)		$E_{AR}$	1.5	mJ
Channel temperature		$T_{ch}$	150	$^\circ\text{C}$
Storage temperature range		$T_{stg}$	-55~150	$^\circ\text{C}$

Note: For (Note 1), (Note 2), (Note 3), (Note 4), please refer to the next page.

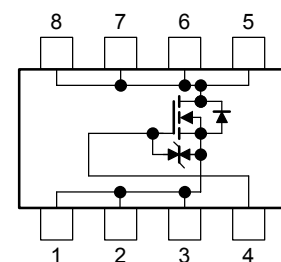
This transistor is an electrostatic sensitive device. Please handle with caution.



JEDEC	—
JEITA	—
TOSHIBA	—

Weight: 0.08 g (typ.)

### Circuit Configuration

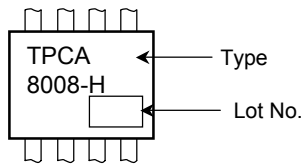


## Thermal Characteristics

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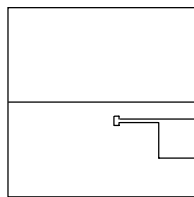
Characteristics	Symbol	Max	Unit
Thermal resistance, channel to case ( $T_c=25$ )	$R_{th(ch-c)}$	2.78	$^{\circ}C/W$
Thermal resistance, channel to ambient ( $t = 10$ s) (Note 2a)	$R_{th(ch-a)}$	44.6	$^{\circ}C/W$
Thermal resistance, channel to ambient ( $t = 10$ s) (Note 2b)	$R_{th(ch-a)}$	78.1	$^{\circ}C/W$

## Marking (Note 5)



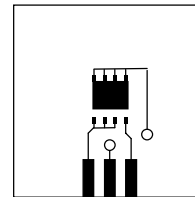
Note 1: Please use devices on condition that the channel temperature is below 150°C.

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)



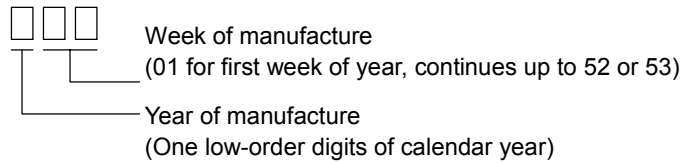
(b)

FR-4  
25.4 × 25.4 × 0.8  
(Unit: mm)

Note 3:  $V_{DD} = 50$  V ,  $T_{ch} = 25^{\circ}C$  (initial) ,  $L = 1$  mH ,  $R_G = 25 \Omega$  ,  $I_{AR} = 4$  A

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

Note 5: \* Weekly code: (Three digits)



## Electrical Characteristics (Ta = 25°C)

### TENTATIVE

Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Gate leakage current		$I_{GSS}$	$V_{GS} = \pm 16\text{ V}, V_{DS} = 0\text{ V}$	—	—	$\pm 10$	$\mu\text{A}$
Drain cut-OFF current		$I_{DSS}$	$V_{DS} = 250\text{ V}, V_{GS} = 0\text{ V}$	—	—	100	$\mu\text{A}$
Drain-source breakdown voltage		$V_{(BR)DSS}$	$I_D = 10\text{ mA}, V_{GS} = 0\text{ V}$	250	—	—	V
		$V_{(BR)DSX}$	$I_D = 10\text{ mA}, V_{GS} = -5\text{ V}$	250	—	—	
		$V_{(BR)DSX}$	$I_D = 10\text{ mA}, V_{GS} = -20\text{ V}$	200	—	—	
Gate threshold voltage		$V_{th}$	$V_{DS} = 10\text{ V}, I_D = 1\text{ mA}$	2.0	—	4.0	V
Drain-source ON resistance		$R_{DS(ON)}$	$V_{GS} = 10\text{ V}, I_D = 2\text{ A}$	—	0.47	0.58	$\Omega$
Forward transfer admittance		$ Y_{fs} $	$V_{DS} = 10\text{ V}, I_D = 2\text{ A}$	1.5	3.0	—	S
Input capacitance		$C_{iss}$	$V_{DS} = 10\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$	—	600	—	pF
Reverse transfer capacitance		$C_{rss}$		—	20	—	
Output capacitance		$C_{oss}$		—	220	—	
Switching time	Rise time	$t_r$	<p><math>V_{GS} = 10\text{ V}, 0\text{ V}</math>  <math>I_D = 2\text{ A}</math>  <math>V_{DD} = 125\text{ V}</math>  <math>R_L = 63\Omega</math>  <math>4.7\Omega</math>  <math>V_{OUT}</math>                      Duty <math>\leq 1\%</math>, <math>t_w = 10\ \mu\text{s}</math></p>	—	8	—	ns
	Turn-ON time	$t_{on}$		—	17	—	
	Fall time	$t_f$		—	13	—	
	Turn-OFF time	$t_{off}$		—	70	—	
Total gate charge (gate-source plus gate-drain)		$Q_g$	$V_{DD} = 200\text{ V}, V_{GS} = 10\text{ V}, I_D = 4\text{ A}$	—	10	—	nC
Gate-source charge 1		$Q_{gs1}$		—	7.6	—	
Gate-drain ("miller") charge		$Q_{gd}$		—	2.4	—	
Gate switch charge		$Q_{sw}$		—	3.7	—	

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

Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Drain reverse current	Pulse (Note 1)	$I_{DRP}$	—	—	—	8	A
Forward voltage (diode)		$V_{DSF}$	$I_{DR} = 4\text{ A}, V_{GS} = 0\text{ V}$	—	—	-2.0	V

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