

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

# TPCM8001-H

High Speed and High Efficiency DC-DC Converters

Notebook PC Applications

Portable Equipment Applications

Unit: mm

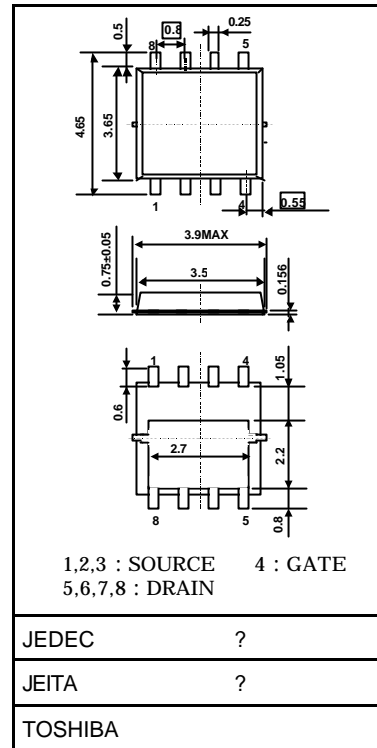
- Small footprint due to small and thin package
- High speed switching
- Small gate charge:  $Q_g = 19 \text{ nC}$  (typ.)
- Low drain-source ON resistance:  $R_{DS(ON)} = 7 \text{ m}\Omega$  (typ.)
- High forward transfer admittance:  $|Y_{fs}| = 36 \text{ S}$  (typ.)
- Low leakage current:  $I_{DSS} = 10 \mu\text{A}$  (max) ( $V_{DS} = 30 \text{ V}$ )
- Enhancement mode:  $V_{th} = 1.1 \text{ to } 2.3 \text{ V}$  ( $V_{DS} = 10 \text{ V}$ ,  $I_D = 1 \text{ mA}$ )

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

Characteristics	Symbol	Rating	Unit
Drain-source voltage	$V_{DSS}$	30	V
Drain-gate voltage ( $R_{GS} = 20 \text{ k}\Omega$ )	$V_{DGR}$	30	V
Gate-source voltage	$V_{GSS}$	$\pm 20$	V
Drain current	DC (Note 1)	$I_D$	20
	Pulsed (Note 1)	$I_{DP}$	60
Drain power dissipation ( $T_c = 25^\circ\text{C}$ )	$P_D$	TBD	W
Drain power dissipation ( $t = 10 \text{ s}$ ) (Note 2a)	$P_D$	TBD	W
Drain power dissipation ( $t = 10 \text{ s}$ ) (Note 2b)	$P_D$	TBD	W
Single pulse avalanche energy (Note 3)	$E_{AS}$	TBD	mJ
Avalanche current	$I_{AR}$	TBD	A
Repetitive avalanche energy ( $T_c = 25^\circ\text{C}$ ) (Note 4)	$E_{AR}$	TBD	mJ
Channel temperature	$T_{ch}$	150	$^\circ\text{C}$
Storage temperature range	$T_{stg}$	-55 to 150	$^\circ\text{C}$

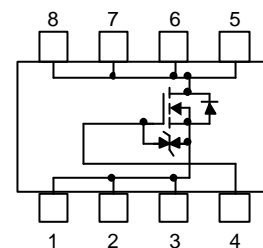
Note: For (Note 1), (Note 2), (Note 3), (Note 4), please refer to the next page.

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



Weight: g (typ.)

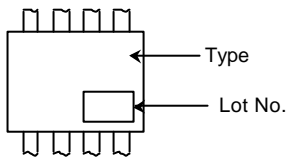
## Circuit Configuration



**Thermal Characteristics**

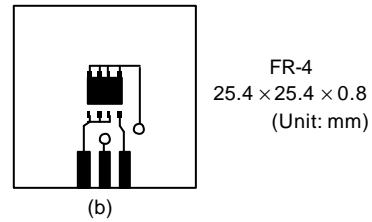
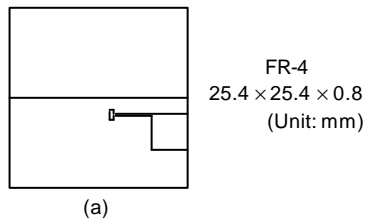
Characteristics	Symbol	Max	Unit
Thermal resistance, channel to case ( $T_c=25$ )	$R_{th (ch-c)}$	TBD	°C/W
Thermal resistance, channel to ambient ( $t = 10$ s) (Note 2a)	$R_{th (ch-a)}$	TBD	°C/W
Thermal resistance, channel to ambient ( $t = 10$ s) (Note 2b)	$R_{th (ch-a)}$	TBD	°C/W

**Marking (Note 5)**



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

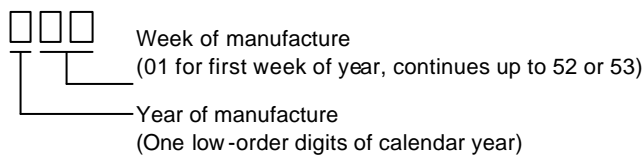
Note 2: (a) Device mounted on a glass-epoxy board (a)      (b) Device mounted on a glass-epoxy board (b)



Note 3:  $V_{DD} = 24$  V ,  $T_{ch} = 25$ °C (initial) ,  $L =$  mH ,  $R_G = 25$   $\Omega$  ,  $I_{AR} =$  A

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

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



**Electrical Characteristics (Ta = 25°C)**

Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Gate leakage current		$I_{GSS}$	$V_{GS} = \pm 16\text{ V}, V_{DS} = 0\text{ V}$	—	—	$\pm 10$	$\mu\text{A}$
Drain cut-OFF current		$I_{DSS}$	$V_{DS} = 30\text{ V}, V_{GS} = 0\text{ V}$	—	—	10	$\mu\text{A}$
Drain-source breakdown voltage		$V_{(BR) DSS}$	$I_D = 10\text{ mA}, V_{GS} = 0\text{ V}$	30	—	—	V
		$V_{(BR) DSX}$	$I_D = 10\text{ mA}, V_{GS} = -20\text{ V}$	15	—	—	
Gate threshold voltage		$V_{th}$	$V_{DS} = 10\text{ V}, I_D = 1\text{ mA}$	1.1	—	2.3	V
Drain-source ON resistance		$R_{DS(ON)}$	$V_{GS} = 4.5\text{ V}, I_D = 10\text{ A}$	—	10	14	$\text{m}\Omega$
			$V_{GS} = 10\text{ V}, I_D = 10\text{ A}$	—	7	9.5	
Forward transfer admittance		$ Y_{fs} $	$V_{DS} = 10\text{ V}, I_D = 10\text{ A}$	18	36	—	S
Input capacitance		$C_{iss}$	$V_{DS} = 10\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$	—	1130	—	pF
Reverse transfer capacitance		$C_{rss}$		—	120	—	
Output capacitance		$C_{oss}$		—	480	—	
Switching time	Rise time	$t_r$		—	2.5	—	ns
	Turn-ON time	$t_{on}$		—	9	—	
	Fall time	$t_f$		—	3	—	
	Turn-OFF time	$t_{off}$		—	19	—	
Total gate charge (gate-source plus gate-drain)		$Q_g$	$V_{DD} \approx 24\text{ V}, V_{GS} = 10\text{ V}, I_D = 20\text{ A}$	—	19	—	nC
			$V_{DD} \approx 24\text{ V}, V_{GS} = 5\text{ V}, I_D = 20\text{ A}$	—	11	—	
Gate-source charge 1		$Q_{gs1}$	$V_{DD} \approx 24\text{ V}, V_{GS} = 10\text{ V}, I_D = 20\text{ A}$	—	3.9	—	
Gate-drain ("miller") charge		$Q_{gd}$		—	4.0	—	
Gate switch charge		$Q_{sw}$		—	6.0	—	

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

Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Drain reverse current	Pulse (Note 1)	$I_{DRP}$	—	—	—	60	A
Forward voltage (diode)		$V_{DSF}$	$I_{DR} = 20\text{ A}, V_{GS} = 0\text{ V}$	—	—	-1.2	V

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