

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

TENTATIVE

TPCA8014-H

High Speed and High Efficiency DC-DC Converters

Notebook PC Applications

Portable Equipment Applications

- Small footprint due to small and thin package
- High speed switching
- Small gate charge: $Q_{sw} = 7.4 \text{ nC (typ.)}$
- Low drain-source ON resistance: $R_{DS(ON)} = 10.5 \text{ m}\Omega \text{ (typ.)}$
- High forward transfer admittance: $|Y_{fs}| = \text{TBD S (typ.)}$
- Low leakage current: $I_{DSS} = 10 \mu\text{A (max)} (V_{DS} = 40 \text{ V})$
- Enhancement mode: $V_{th} = 1.1 \text{ to } 2.3 \text{ V} (V_{DS} = 10 \text{ V}, I_D = 1 \text{ mA})$

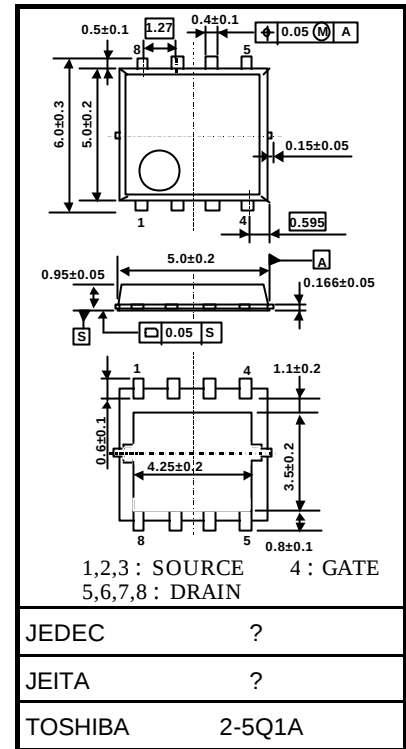
Maximum Ratings ($T_a = 25^\circ\text{C}$)

Characteristics		Symbol	Rating	Unit
Drain-source voltage		V_{DSS}	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	30	A
	Pulsed (Note 1)	I_{DP}	90	
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}	84	mJ
Avalanche current		I_{AR}	30	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.

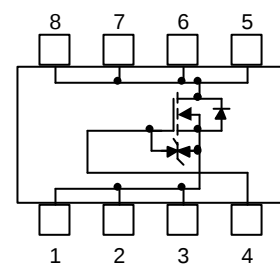
This transistor is an electrostatic sensitive device. Please handle with caution.

Unit: mm



Weight: 0.080 g (typ.)

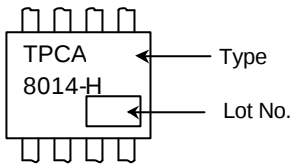
Circuit Configuration



Thermal Characteristics

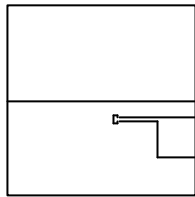
Characteristics	Symbol	Max	Unit
Thermal resistance, channel to case ($T_c=25\text{ }^{\circ}\text{C}$)	$R_{th(ch-c)}$	2.78	$^{\circ}\text{C/W}$
Thermal resistance, channel to ambient ($t = 10\text{ s}$) (Note 2a)	$R_{th(ch-a)}$	44.6	$^{\circ}\text{C/W}$
Thermal resistance, channel to ambient ($t = 10\text{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

Marking (Note 5)

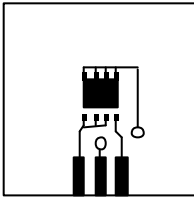


Note 1: Please use devices on condition that the channel temperature is below 150°C.

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



(a)

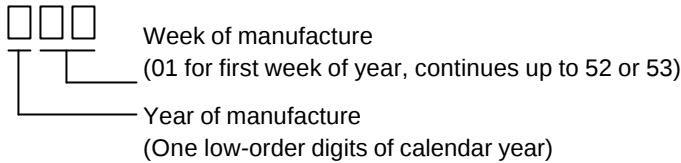


(b)

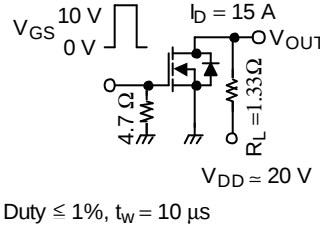
Note 3: $V_{DD} = 24\text{ V}$, $T_{ch} = 25^{\circ}\text{C}$ (initial), $L = 0.1\text{ mH}$, $R_G = 25\text{ }\Omega$, $I_{AR} = 30\text{ A}$

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} = ±16 V, V _{DS} = 0 V	—	—	±10	μA
Drain cut-OFF current		I _{DSS}	V _{DS} = 40 V, V _{GS} = 0 V	—	—	10	μA
Drain-source breakdown voltage		V (BR) DSS	I _D = 10 mA, V _{GS} = 0 V	40	—	—	V
		V (BR) DSX	I _D = 10 mA, V _{GS} = -20 V	25	—	—	
Gate threshold voltage		V _{th}	V _{DS} = 10 V, I _D = 1 mA	1.1	—	2.3	V
Drain-source ON resistance		R _{DS (ON)}	V _{GS} = 10 V, I _D = 15 A	—	7.0	9.5	mΩ
			V _{GS} = 4.5 V, I _D = 15 A	—	10.5	15	
Forward transfer admittance		Y _{fs}	V _{DS} = 10 V, I _D = 15 A	TBD	TBD	—	S
Input capacitance		C _{iss}	V _{DS} = 10 V, V _{GS} = 0 V, f = 1 MHz	—	1365	—	pF
Reverse transfer capacitance		C _{rss}		—	110	—	
Output capacitance		C _{oss}		—	500	—	
Gate resistance		R _g		—	1.0	—	Ω
Switching time	Rise time	t _r	 V_{GS} 10 V 0 V I_D = 15 A V_{OUT} 4.7 Ω R_L = 1.33 Ω V_{DD} = 20 V Duty ≤ 1%, t_w = 10 μs	—	5	—	ns
	Turn-ON time	t _{on}		—	11	—	
	Fall time	t _f		—	3	—	
	Turn-OFF time	t _{off}		—	18	—	
Total gate charge (gate-source plus gate-drain)		Q _g	V _{DD} ≈ 32 V, V _{GS} = 10 V, I _D = 30 A	—	22	—	nC
			V _{DD} ≈ 32 V, V _{GS} = 5 V, I _D = 30 A	—	12	—	
Gate-source charge 1		Q _{gs1}	V _{DD} ≈ 32 V, V _{GS} = 10 V, I _D = 30 A	—	5.1	—	
Gate-drain ("miller") charge		Q _{gd}		—	4.9	—	
Gate switch charge		Q _{sw}		—	7.4	—	

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

Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Drain reverse current	Pulse (Note 1)	I_{DRP}	—	—	—	90	A
Forward voltage (diode)		V_{DSF}	$I_{DR} = 30 \text{ A}, V_{GS} = 0 \text{ V}$	—	—	-1.2	V

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