T OSHIBA Field Effect Transistor with Built-in Schottky Barrier Diode
Silicon N Channel MOS Type (Ultra-High-Speed U-MOS Ⅲ)

TPC8A02-H

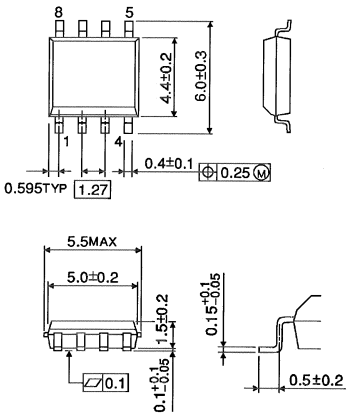
DC-DC CONVERTER

Notebook PC Applications

Portable Equipment Applications

- Built-in schottky barrier diode
  Low forward voltage: V_{DSF} = 0.6V(Max.)
- High-speed switching.
- Small gate charge.: Qsw = 11 nC(Typ.)
- Low drain-source ON resistance: $R_{DS\ (ON)}$ = 4.3 mΩ (typ.)
- High forward transfer admittance: $|Y_{fs}|$ = 40 S (typ.)
- Low leakage current: I_{DSS} = 100 μA (max) (V_{DS} = 30 V)
- Enhancement-mode: V_{th} = 1.1 to 2.3 V (V_{DS} = 10 V, I_D = 1 mA)

Unit: mm



1,2,3 SOURCE, ANODE
4 GATE
5,6,7,8 DRAIN, CATHODE

JEDEC	—
JEITA	—
TOSHIBA	2-6J1B

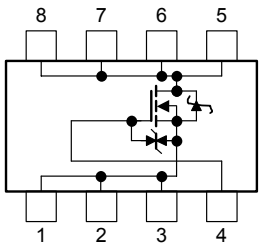
Weight: 0.080 g (typ.)

Maximum Ratings (Ta = 25°C)

Characteristics		Symbol	Rating	Unit
Drain-source voltage		V_{DSS}	30	V
Drain-gate voltage (R_{GS} = 20 kΩ)		V_{DGR}	30	V
Gate-source voltage		V_{GSS}	±20	V
Drain current	DC (Note 1)	I_D	16	A
	Pulse (Note 1)	I_{DP}	48	
Drain power dissipation (t = 10 s) (Note 2a)		P_D	1.9	W
Drain power dissipation (t = 10 s) (Note 2b)		P_D	1.0	W
Single pulse avalanche energy (Note 3)		E_{AS}	166	mJ
Avalanche current		I_{AR}	16	A
Repetitive avalanche energy (Note 2a) (Note 4)		E_{AR}	0.11	mJ
Channel temperature		T_{ch}	150	°C
Storage temperature range		T_{stg}	−55 to 150	°C

Note: For Notes 1 to 5, refer to the next page.

Circuit Configuration

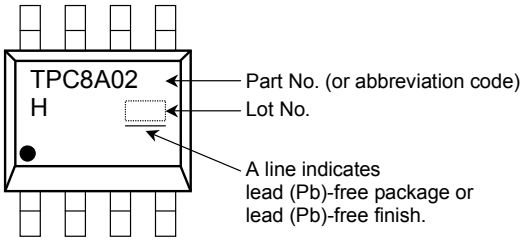


This transistor is an electrostatic-sensitive device. Handle with caution. Schottky barrier diodes have large-reverse-current-leakage characteristic compared to other rectifier products. This current leakage combined with improper operating temperature or voltage may cause thermal runaway. Please take forward and reverse loss into consideration during design.

Thermal Characteristics

Characteristics	Symbol	Max	Unit
Thermal resistance, channel to ambient (t = 10 s) (Note 2a)	$R_{th\ (ch\text{-}a)}$	65.8	°C/W
Thermal resistance, channel to ambient (t = 10 s) (Note 2b)	$R_{th\ (ch\text{-}a)}$	125	°C/W

Marking (Note 5)



Note 1: Ensure that the channel temperature does not exceed 150°C.

Note 2:

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

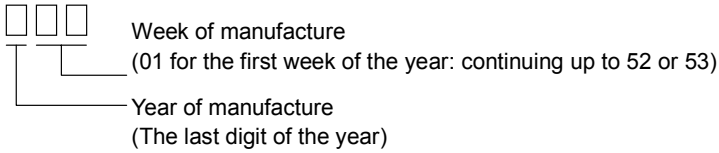
(a) (b)

Note 3: V_{DD} = 24 V, T_{ch} = 25°C (initial), L = 0.5 mH, R_G = 25Ω, I_{AR} = 16 A

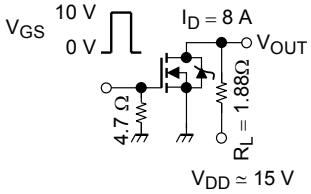
Note 4: Repetitive rating: pulse width limited by maximum channel temperature

Note 5: • on the lower left of the marking indicates Pin 1.

* 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} = 30 V, V_{GS} = 0 V	—	—	100	μA
Drain-source breakdown voltage		$V_{(BR)\ DSS}$	I_D = 10 mA, V_{GS} = 0 V	30	—	—	V
		$V_{(BR)\ DSX}$	I_D = 10 mA, V_{GS} = −20 V	15	—	—	
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} = 4.5 V, I_D = 8 A	—	6.2	8.5	mΩ
			V_{GS} = 10 V, I_D = 8 A	—	4.3	5.6	
Forward transfer admittance		$\|Y_{fs}\|$	V_{DS} = 10 V, I_D = 8 A	20	40	—	S
Input capacitance		C_{iss}	V_{DS} = 10 V, V_{GS} = 0 V, f = 1 MHz	—	1970	—	pF
Reverse transfer capacitance		C_{rss}		—	240	—	
Output capacitance		C_{oss}		—	950	—	
Switching time	Rise time	t_r	 Duty ≦ 1%, t_w = 10 μs	—	6	—	ns
	Turn-ON time	t_{on}		—	14	—	
	Fall time	t_f		—	12	—	
	Turn-OFF time	t_{off}		—	26	—	
Total gate charge (gate-source plus gate-drain)		Q_g	V_{DD} ≃ 24 V, V_{GS} = 10 V, I_D = 16 A	—	34	—	nC
			V_{DD} ≃ 24 V, V_{GS} = 5 V, I_D = 16 A	—	19	—	
Gate-source charge 1		Q_{gs1}	V_{DD} ≃ 24 V, V_{GS} = 10 V, I_D = 16 A	—	6	—	
Gate-drain (“miller”) charge		Q_{gd}		—	8.4	—	
Gate switch charge		Q_{sw}		—	11	—	

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

Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Peak forward current	Pulse (Note 1)	I_{FP}	—	—	—	48	A
Forward voltage (diode)		V_{DSF}	I_{DR} = 1.0 A, V_{GS} = 0 V	—	-0.45	−0.6	V
			I_{DR} = 16 A, V_{GS} = 0 V	—	—	−1.2	

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