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

## **TPCP8006**

# Notebook PC Applications Portable Equipment Applications

· Small footprint due to small and thin package

• Low drain-source ON-resistance: RDS (ON) =  $6.5 \text{ m}\Omega$  (typ.)

• High forward transfer admittance:  $|Y_{fs}| = 36 \text{ S (typ.)}$ 

• Low leakage current:  $IDSS = 10 \mu A \text{ (max) (VDS} = 20 \text{ V)}$ 

• Enhancement mode:  $V_{th} = 0.5$  to 1.2 V ( $V_{DS} = 10$  V,  $I_{D} = 1$  mA)

#### Absolute Maximum Ratings (Ta = 25°C)

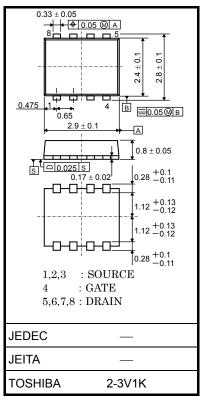
Characteristic		Symbol	Rating	Unit		
Drain-source voltage		V <sub>DSS</sub>	20	V		
Drain-gate vol	tage (R <sub>G</sub>	s = 20 kΩ)	$V_{DGR}$	20	V	
Gate-source v	oltage		V <sub>GSS</sub>	±12	V	
Drain aurrent	DC	(Note 1)	I <sub>D</sub>	9.1	Α	
Pulse (Note 1) I <sub>DP</sub>	36.4	A .				
Drain power dissipation (t = 5 s) (Note 2a)			P <sub>D</sub>	1.68	W	
Drain power dissipation (t = 5 s) (Note 2b)			P <sub>D</sub>	0.84		
Single pulse avalanche energy (Note 3)		E <sub>AS</sub>	21.5	mJ		
Avalanche current		I <sub>AR</sub>	9.1	Α		
Repetitive avalanche energy (Note 4)		E <sub>AR</sub>	0.168	mJ		
Channel temperature			T <sub>ch</sub>	150	°C	
Storage temperature range		T <sub>stg</sub>	-55 to 150	°C		

Note: For Notes 1 to 5, 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).

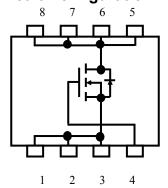
This transistor is an electrostatic-sensitive device. Handle with care.

Unit: mm

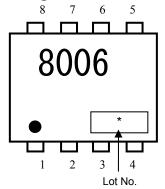


Weight: 0.017g (typ.)

#### **Circuit Configuration**



#### Marking (Note 5)



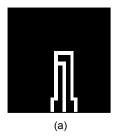
#### **Thermal Characteristics**

Characteristic	Symbol	Max	Unit
Thermal resistance, channel to ambient (t = 5 s) (Note 2a)	R <sub>th (ch-a)</sub>	74.4	°C/W
Thermal resistance, channel to ambient (t = 5 s) (Note 2b)	R <sub>th (ch-a)</sub>	148.8	°C/W

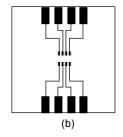
Note 1: Ensure that the channel temperature does not exceed 150°C.

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

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



FR-4  $25.4 \times 25.4 \times 0.8t$  (Unit: mm)



FR-4  $25.4 \times 25.4 \times 0.8t$  (Unit: mm)

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Note 3:  $V_{DD}$  = 16 V,  $T_{ch}$  = 25°C (initial), L = 0.2 mH,  $R_G$  = 25  $\Omega$ ,  $I_{AR}$  = 9.1 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):



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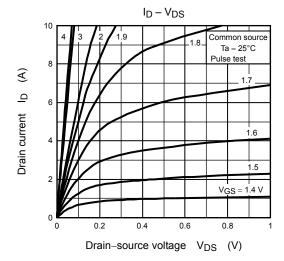
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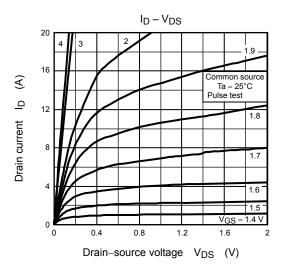
Cha	aracteristic	Symbol	Test Condition	Min	Тур.	Max	Unit
Gate leakage current		I <sub>GSS</sub>	$V_{GS} = \pm 12 \text{ V}, V_{DS} = 0 \text{ V}$	_	_	±100	nA
Drain cut-off current		I <sub>DSS</sub>	V <sub>DS</sub> = 20 V, V <sub>GS</sub> = 0 V	_	_	10	μА
Drain-source breakdown voltage		V (BR) DSS	I <sub>D</sub> = 10 mA, V <sub>GS</sub> = 0 V	20	_	_	V
		V (BR) DSX	I <sub>D</sub> = 10 mA, V <sub>GS</sub> = -12 V	8	_	_	V
Gate threshold vo	oltage	V <sub>th</sub>	V <sub>DS</sub> = 10 V, I <sub>D</sub> = 1 mA	0.5	_	1.2	٧
Drain-source ON-resistance		-	V <sub>GS</sub> = 2.5 V, I <sub>D</sub> = 4.5 A	_	9.5	13.7	- mΩ
		R <sub>DS</sub> (ON)	V <sub>GS</sub> = 4.5 V, I <sub>D</sub> = 4.5 A	_	6.5	10	
Forward transfer admittance		Y <sub>fs</sub>	V <sub>DS</sub> = 10 V, I <sub>D</sub> = 4.5 A	18	36	_	S
Input capacitance		C <sub>iss</sub>	V <sub>DS</sub> = 10 V, V <sub>GS</sub> = 0 V, f = 1 MHz	_	1480	_	pF
Reverse transfer capacitance		C <sub>rss</sub>		_	330	_	
Output capacitance		C <sub>oss</sub>		_	470	_	
	Rise time	t <sub>r</sub>	A 5.7 P	_	8	_	- ns
Switching time	Turn-on time	t <sub>on</sub>		_	16	_	
	Fall time	t <sub>f</sub>		_	19	_	
	Turn-off time	t <sub>off</sub>	- V <sub>DD</sub> ≈ 10 V Duty ≤ 1%, t <sub>W</sub> = 10 μs	_	53	_	
Total gate charge (gate-source plus gate-drain)		Qg	$V_{DD} \approx 16 \text{ V}, V_{GS} = 5 \text{ V}, I_D = 9.1 \text{ A}$	_	22	_	nC
Gate-source charge 1		Q <sub>gs1</sub>		_	4	_	
Gate-drain ("Miller") charge		Q <sub>gd</sub>		_	7	_	

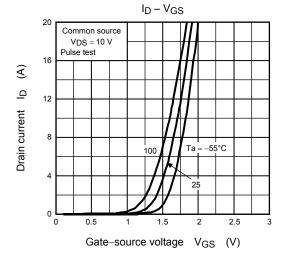
### Source-Drain Ratings and Characteristics (Ta = 25°C)

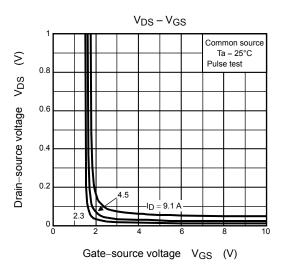
Characteristic		Symbol	Test Condition	Min	Тур.	Max	Unit
Drain reverse current	Pulse (Note 1)	I <sub>DRP</sub>	_	_	_	36.4	Α
Forward voltage (diode)		$V_{DSF}$	I <sub>DR</sub> = 9.1 A, V <sub>GS</sub> = 0 V	_	_	-1.2	V

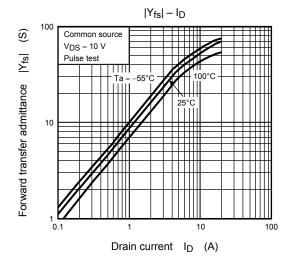
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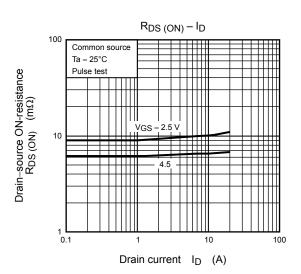


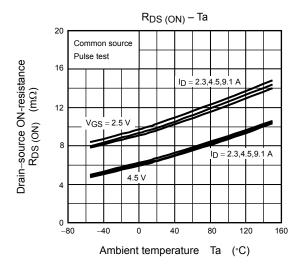


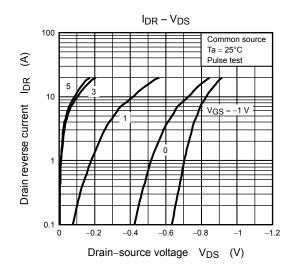


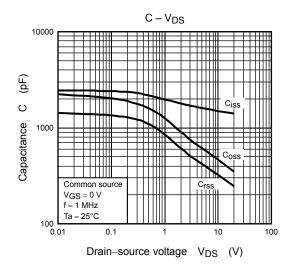


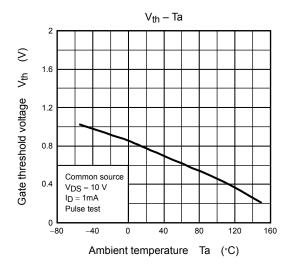


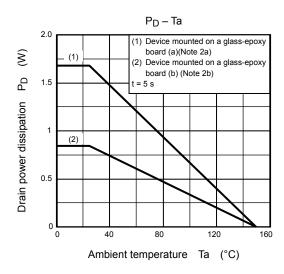


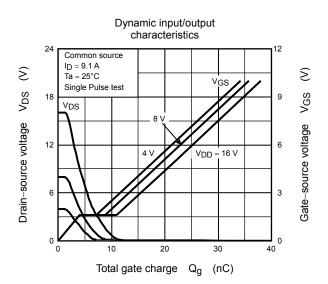


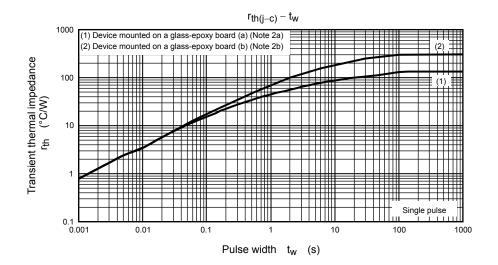


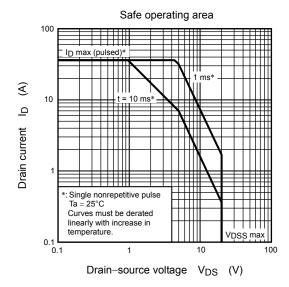












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