

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: $R_{DS(ON)} = 6.5 \text{ m}\Omega$ (typ.)
- High forward transfer admittance: $|Y_{fs}| = 36 \text{ S}$ (typ.)
- Low leakage current: $I_{DSS} = 10 \text{ }\mu\text{A}$ (max) ($V_{DS} = 20 \text{ V}$)
- Enhancement mode: $V_{th} = 0.5$ to 1.2 V ($V_{DS} = 10 \text{ V}$, $I_D = 1 \text{ mA}$)

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

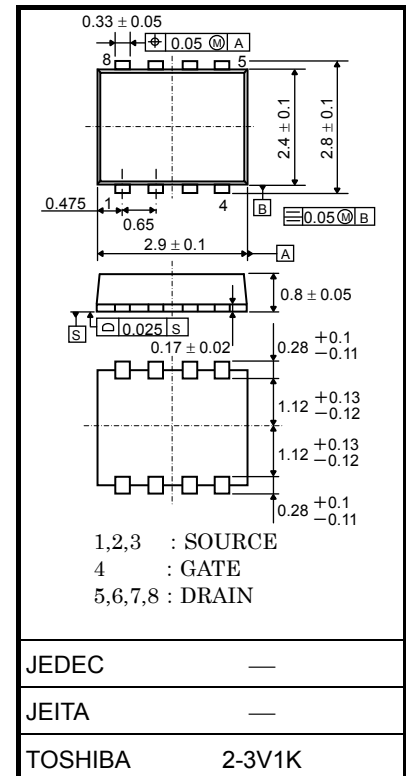
Characteristic	Symbol	Rating	Unit	
Drain-source voltage	V_{DSS}	20	V	
Drain-gate voltage ($R_{GS} = 20 \text{ k}\Omega$)	V_{DGR}	20	V	
Gate-source voltage	V_{GSS}	± 12	V	
Drain current	DC (Note 1)	I_D	9.1	A
	Pulse (Note 1)	I_{DP}	36.4	
Drain power dissipation ($t = 5 \text{ s}$) (Note 2a)	P_D	1.68	W	
Drain power dissipation ($t = 5 \text{ s}$) (Note 2b)	P_D	0.84		
Single pulse avalanche energy (Note 3)	E_{AS}	21.5	mJ	
Avalanche current	I_{AR}	9.1	A	
Repetitive avalanche energy (Note 4)	E_{AR}	0.168	mJ	
Channel temperature	T_{ch}	150	$^\circ\text{C}$	
Storage temperature range	T_{stg}	-55 to 150	$^\circ\text{C}$	

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).

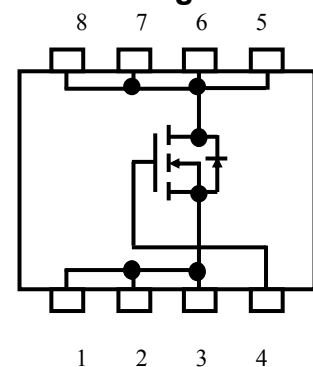
This transistor is an electrostatic-sensitive device. Handle with care.

Unit: mm

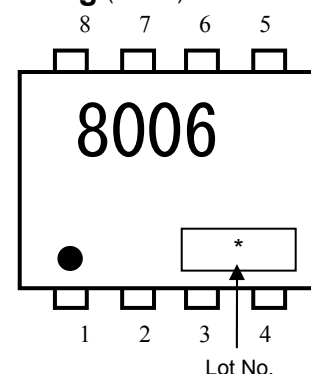


Weight: 0.017g (typ.)

Circuit Configuration



Marking (Note 5)

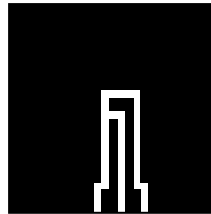


Thermal Characteristics

Characteristic	Symbol	Max	Unit
Thermal resistance, channel to ambient (t = 5 s) (Note 2a)	$R_{th(ch-a)}$	74.4	°C/W
Thermal resistance, channel to ambient (t = 5 s) (Note 2b)	$R_{th(ch-a)}$	148.8	°C/W

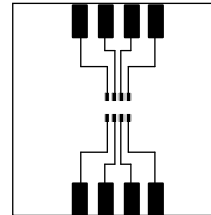
Note 1: Ensure that the channel temperature does not exceed 150°C.

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



(a)

FR-4
25.4 × 25.4 × 0.8t
(Unit: mm)



(b)

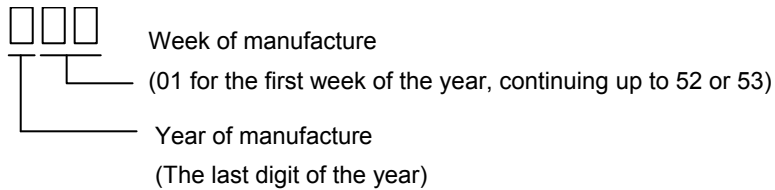
FR-4
25.4 × 25.4 × 0.8t
(Unit: mm)

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

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):

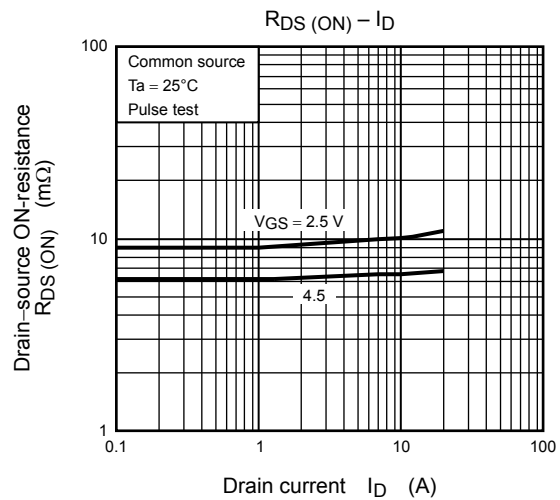
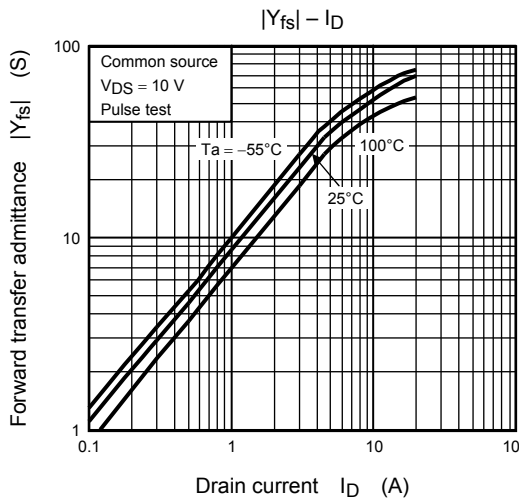
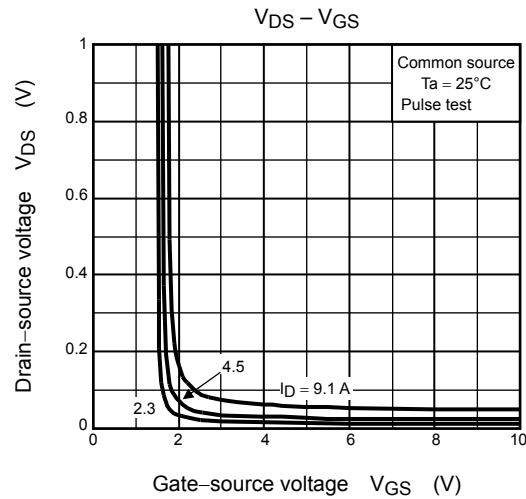
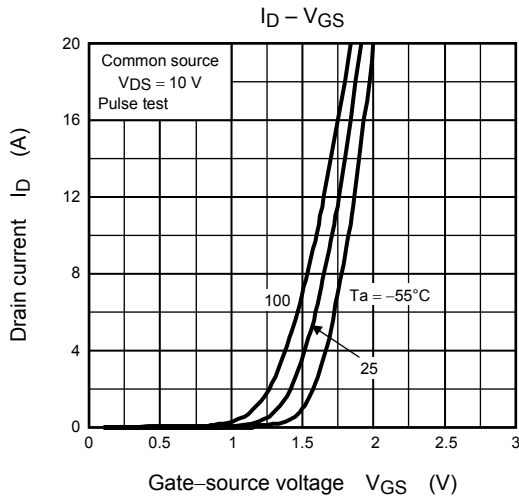
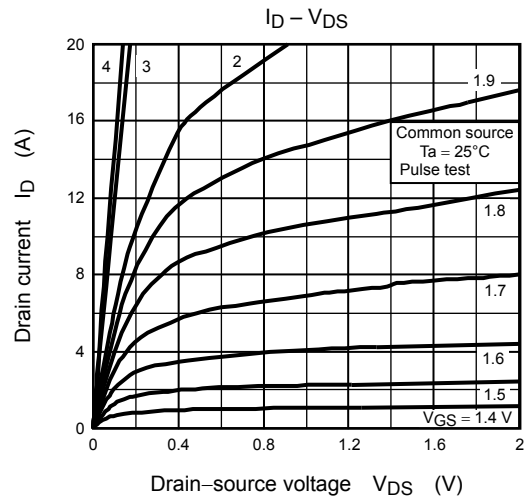
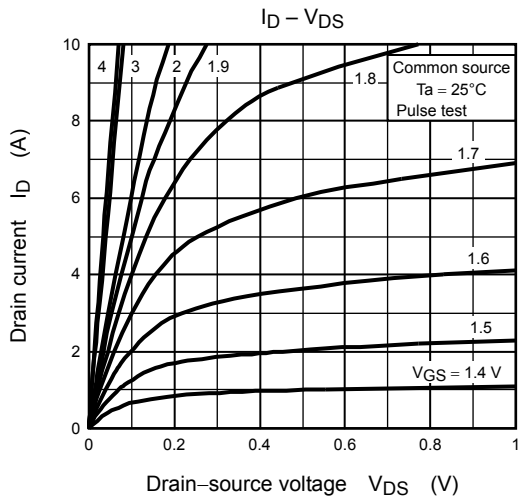


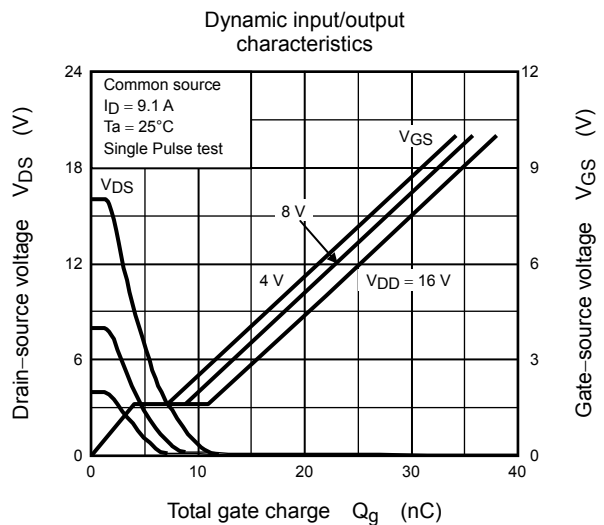
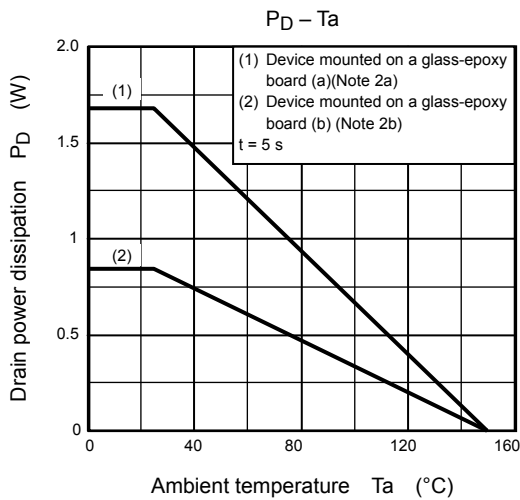
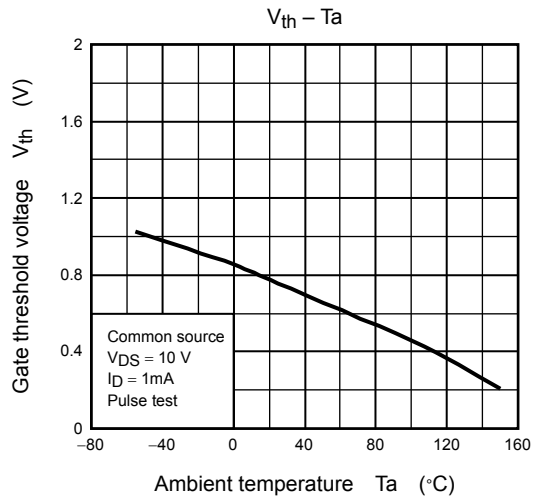
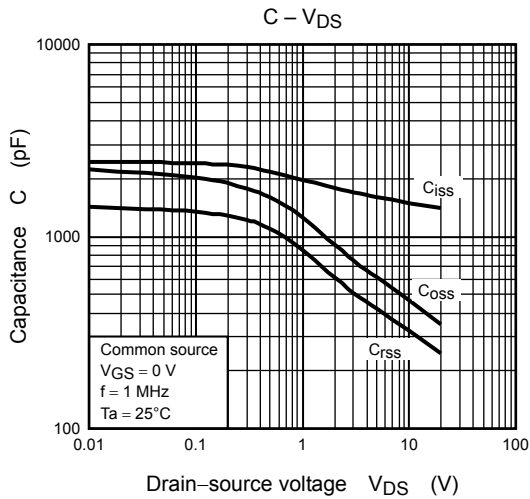
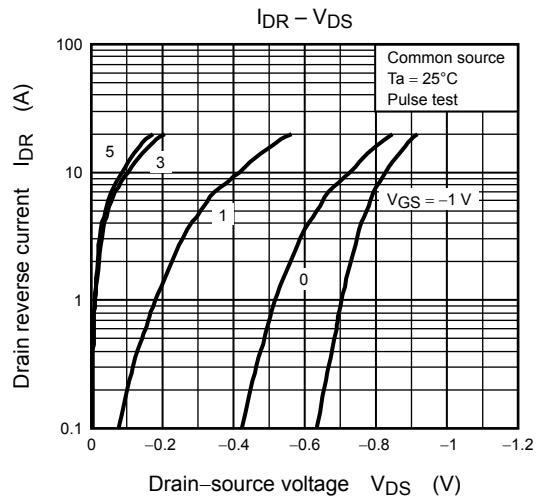
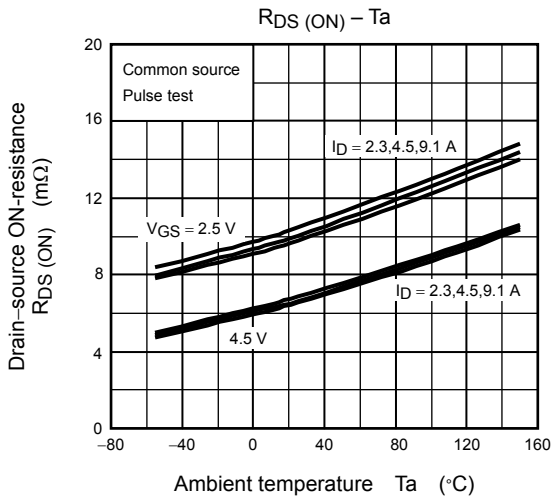
Electrical Characteristics (Ta = 25°C)

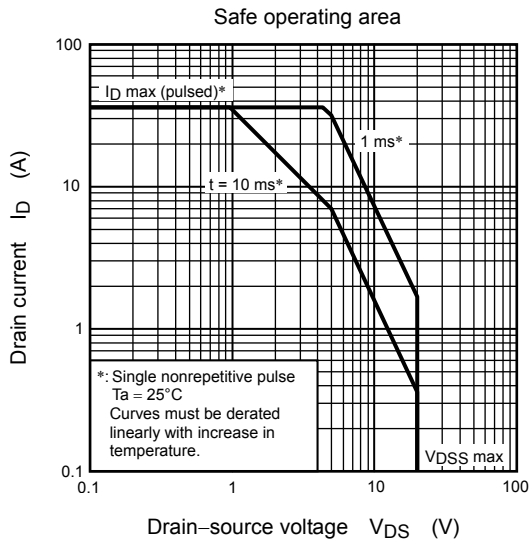
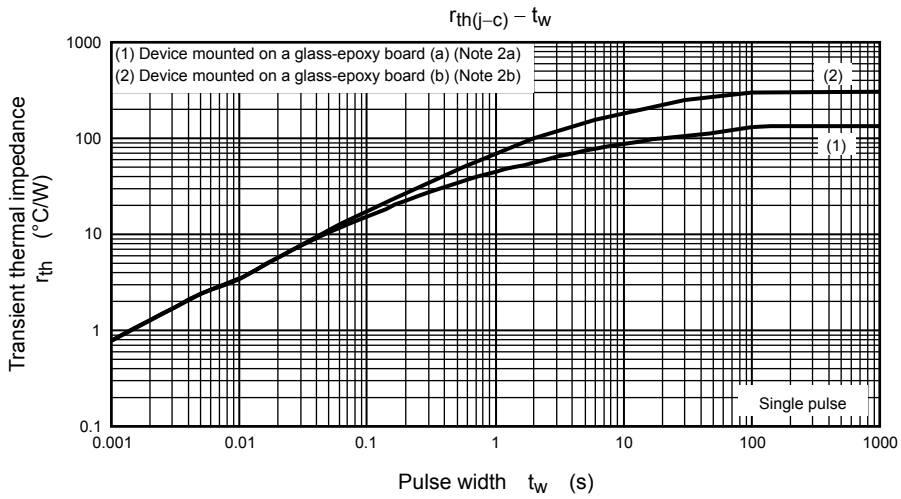
Characteristic		Symbol	Test Condition	Min	Typ.	Max	Unit
Gate leakage current		I_{GSS}	$V_{GS} = \pm 12\text{ V}, V_{DS} = 0\text{ V}$	—	—	± 100	nA
Drain cut-off current		I_{DSS}	$V_{DS} = 20\text{ V}, V_{GS} = 0\text{ V}$	—	—	10	μA
Drain-source breakdown voltage		$V_{(BR)DSS}$	$I_D = 10\text{ mA}, V_{GS} = 0\text{ V}$	20	—	—	V
		$V_{(BR)DSX}$	$I_D = 10\text{ mA}, V_{GS} = -12\text{ V}$	8	—	—	
Gate threshold voltage		V_{th}	$V_{DS} = 10\text{ V}, I_D = 1\text{ mA}$	0.5	—	1.2	V
Drain-source ON-resistance		$R_{DS(ON)}$	$V_{GS} = 2.5\text{ V}, I_D = 4.5\text{ A}$	—	9.5	13.7	m Ω
			$V_{GS} = 4.5\text{ V}, I_D = 4.5\text{ A}$	—	6.5	10	
Forward transfer admittance		$ Y_{fs} $	$V_{DS} = 10\text{ V}, I_D = 4.5\text{ A}$	18	36	—	S
Input capacitance		C_{iss}	$V_{DS} = 10\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$	—	1480	—	pF
Reverse transfer capacitance		C_{rss}		—	330	—	
Output capacitance		C_{oss}		—	470	—	
Switching time	Rise time	t_r	<p>$V_{GS} = 5\text{ V}$ 0 V $I_D = 4.5\text{ A}$ $47\ \Omega$ $2.22\ \Omega$ V_{OUT} $V_{DD} \approx 10\text{ V}$ Duty $\leq 1\%$, $t_w = 10\ \mu\text{s}$</p>	—	8	—	ns
	Turn-on time	t_{on}		—	16	—	
	Fall time	t_f		—	19	—	
	Turn-off time	t_{off}		—	53	—	
Total gate charge (gate-source plus gate-drain)		Q_g	$V_{DD} \approx 16\text{ V}, V_{GS} = 5\text{ V}, I_D = 9.1\text{ A}$	—	22	—	nC
Gate-source charge 1		Q_{gs1}		—	4	—	
Gate-drain ("Miller") charge		Q_{gd}		—	7	—	

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

Characteristic		Symbol	Test Condition	Min	Typ.	Max	Unit
Drain reverse current	Pulse (Note 1)	I_{DRP}	—	—	—	36.4	A
Forward voltage (diode)		V_{DSF}	$I_{DR} = 9.1\text{ A}, V_{GS} = 0\text{ V}$	—	—	-1.2	V







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