

TOSHIBA Field Effect Transistor Silicon N-Channel MOS Type (π -MOSVII)

TPCA8006-H

Switching Regulator Applications
 Motor Drive Applications
 DC/DC Converter Applications

Unit: mm

- Small footprint due to a small and thin package
- High speed switching
- Low drain-source ON-resistance
 : $R_{DS(ON)} = 41\text{ m}\Omega$ (typ.) ($V_{GS}=10\text{V}$, $I_D=9\text{A}$)
- High forward transfer admittance: $|Y_{fs}| = 15\text{ S}$ (typ.)
- Low leakage current: $I_{DSS} = 100\text{ }\mu\text{A}$ (max) ($V_{DS} = 100\text{ V}$)
- Enhancement mode: $V_{th} = 3.0\text{ to }5.0\text{ V}$ ($V_{DS} = 10\text{ V}$, $I_D = 1\text{ mA}$)

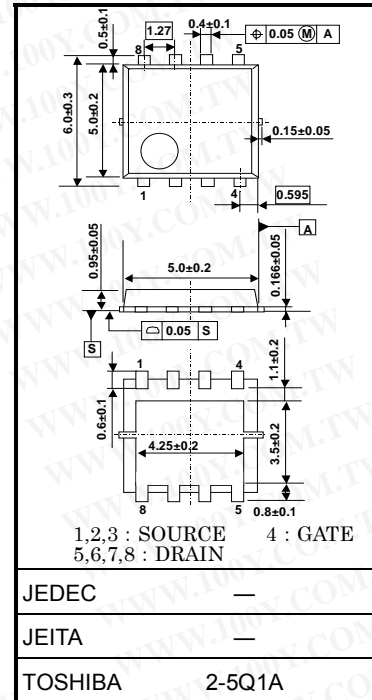
Absolute Maximum Ratings ($T_a = 25^\circ\text{C}$)

Characteristic		Symbol	Rating	Unit
Drain-source voltage		V_{DSS}	100	V
Drain-gate voltage ($R_{GS} = 20\text{ k}\Omega$)		V_{DGR}	100	V
Gate-source voltage		V_{GSS}	± 20	V
Drain current	DC (Note 1)	I_D	18	A
	Pulsed (Note 1)	I_{DP}	36	
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}	224	mJ
Avalanche current		I_{AR}	18	A
Repetitive avalanche energy (Note 2a) (Note 4)		E_{AR}	4.5	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 4, refer to the next page.

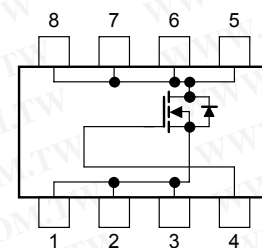
Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) are within 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.



Weight: 0.069 g (typ.)

Circuit Configuration

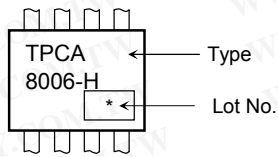


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Thermal Characteristics

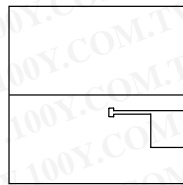
Characteristic	Symbol	Max	Unit
Thermal resistance, channel to case ($T_c=25^\circ\text{C}$)	$R_{th(ch-c)}$	2.78	$^\circ\text{C/W}$
Thermal resistance, channel to ambient ($t = 10\text{ s}$) (Note 2a)	$R_{th(ch-a)}$	44.6	$^\circ\text{C/W}$
Thermal resistance, channel to ambient ($t = 10\text{ s}$) (Note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

Marking (Note 5)



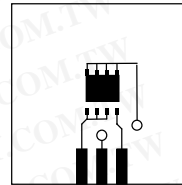
Note 1: The channel temperature should not exceed 150°C during use.

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



(a)

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



(b)

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

Note 3: $V_{DD} = 50\text{ V}$, $T_{ch} = 25^\circ\text{C}$ (initial), $L = 0.8\text{ mH}$, $R_G = 25\ \Omega$, $I_{AR} = 18\text{ A}$

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

Note 5: * Weekly code: (Three digits)



Week of manufacture
 (01 for first week of year, continuing up to 52 or 53)

Year of manufacture
 (The last digit of the calendar year)

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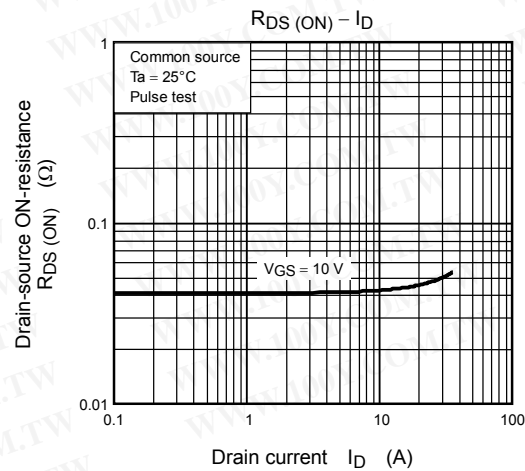
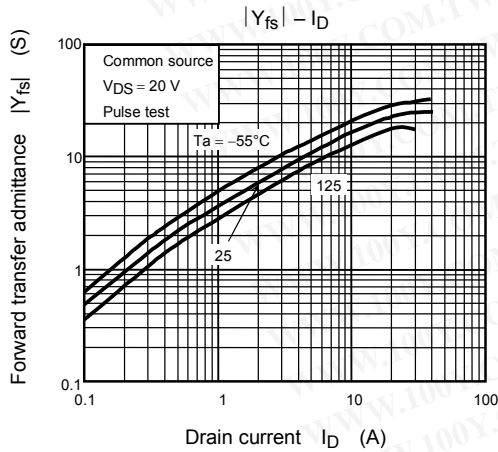
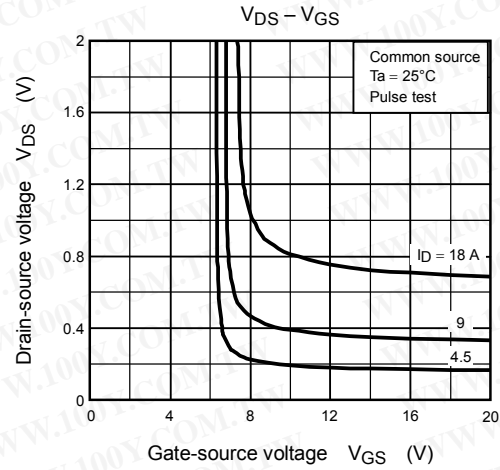
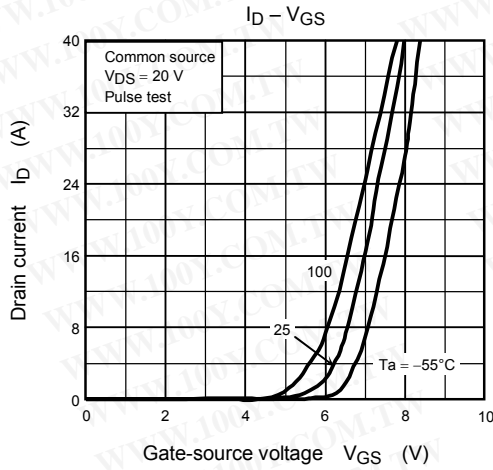
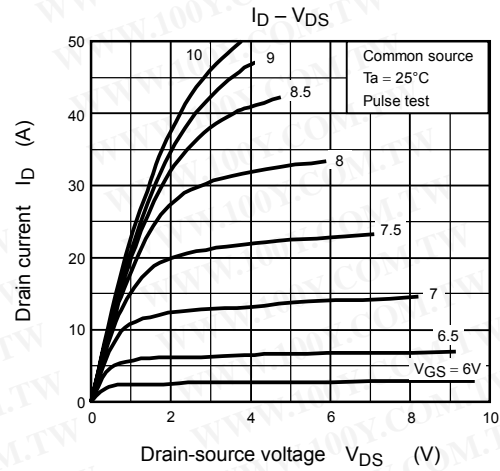
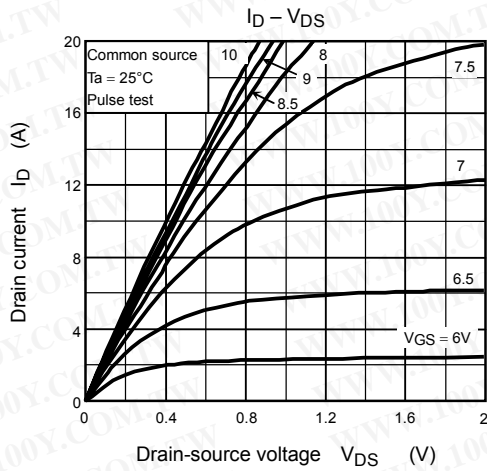
Electrical Characteristics (Ta = 25°C)

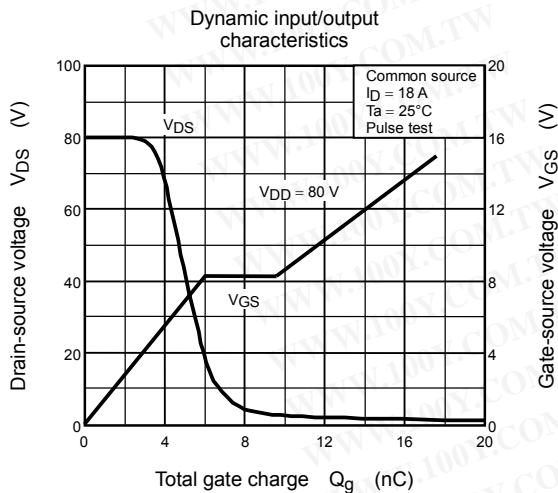
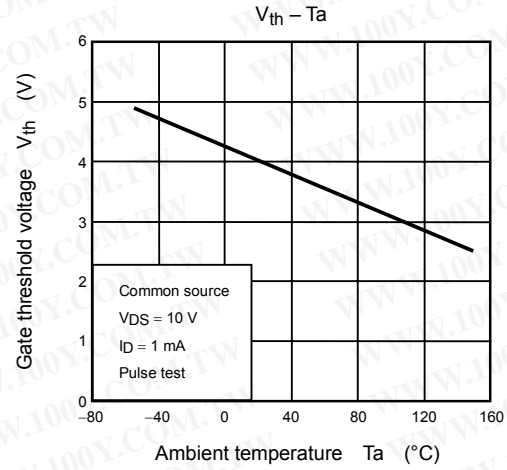
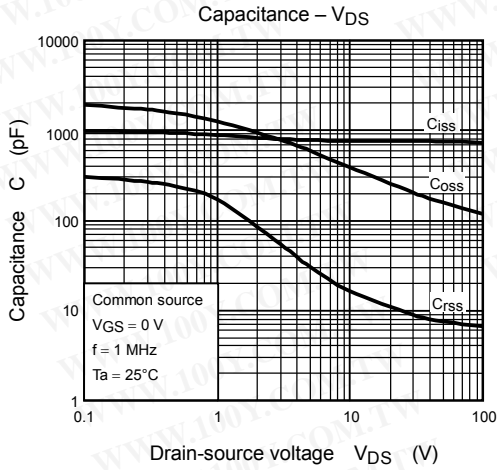
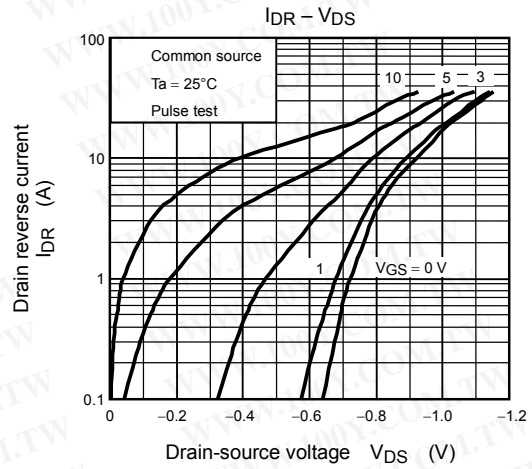
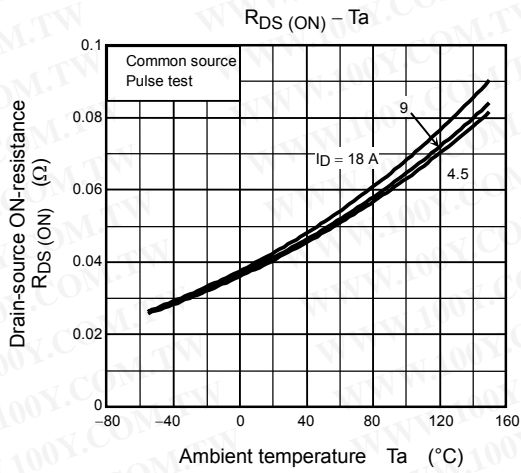
Characteristic		Symbol	Test Condition	Min	Typ.	Max	Unit
Gate leakage current		I_{GSS}	$V_{GS} = \pm 20\text{ V}, V_{DS} = 0\text{ V}$	—	—	± 100	nA
Drain cutoff current		I_{DSS}	$V_{DS} = 100\text{ V}, V_{GS} = 0\text{ V}$	—	—	100	μA
Drain-source breakdown voltage		$V_{(BR)DSS}$	$I_D = 10\text{ mA}, V_{GS} = 0\text{ V}$	100	—	—	V
Gate threshold voltage		V_{th}	$V_{DS} = 10\text{ V}, I_D = 1\text{ mA}$	3.0	—	5.0	V
Drain-source ON-resistance		$R_{DS(ON)}$	$V_{GS} = 10\text{ V}, I_D = 9\text{ A}$	—	41	67	m Ω
Forward transfer admittance		$ Y_{fs} $	$V_{DS} = 10\text{ V}, I_D = 9\text{ A}$	7.5	15	—	S
Input capacitance		C_{iss}	$V_{DS} = 10\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$	—	780	—	pF
Reverse transfer capacitance		C_{rss}		—	17	—	
Output capacitance		C_{oss}		—	390	—	
Switching time	Rise time	t_r	<p>$V_{GS} = 10\text{ V}$ 0 V $I_D = 9\text{ A}$ V_{OUT} 4.7Ω $R_L = 5.6\Omega$ $V_{DD} \approx 50\text{ V}$ Duty $\leq 1\%$, $t_w = 10\mu\text{s}$</p>	—	3	—	ns
	Turn-on time	t_{on}		—	13	—	
	Fall time	t_f		—	2	—	
	Turn-off time	t_{off}		—	13	—	
Total gate charge (gate-source plus gate-drain)		Q_g	$V_{DD} \approx 80\text{ V}, V_{GS} = 10\text{ V}, I_D = 18\text{ A}$	—	12	—	nC
Gate-source charge 1		Q_{gs1}		—	5.6	—	
Gate-drain ("Miller") charge		Q_{gd}		—	4.0	—	
Gate switch charge		Q_{sw}		—	6.9	—	

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

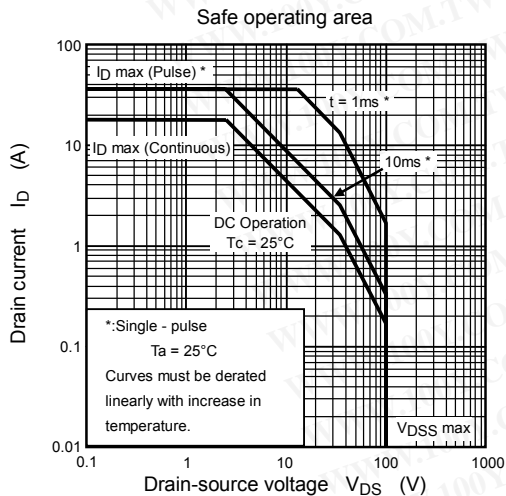
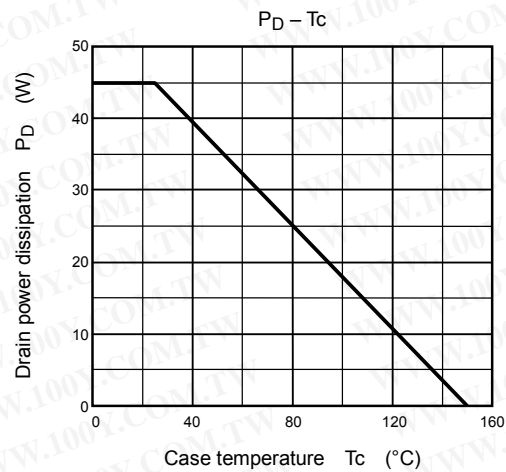
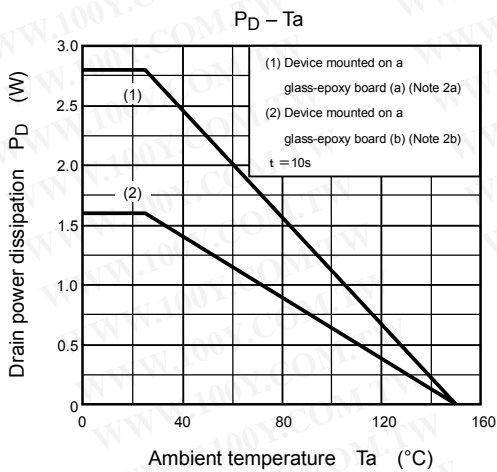
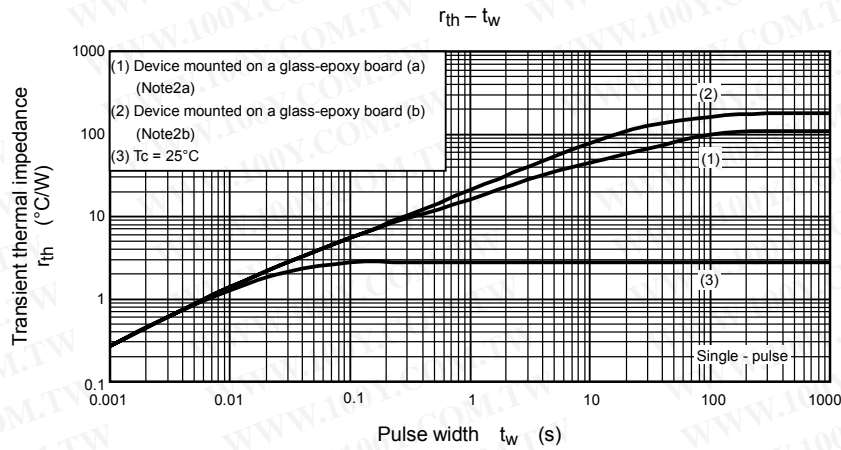
Characteristic		Symbol	Test Condition	Min	Typ.	Max	Unit
Drain reverse current	Pulse	I_{DRP}	—	—	—	36	A
Forward voltage (diode)		V_{DSF}	$I_{DR} = 18\text{ A}, V_{GS} = 0\text{ V}$	—	—	-1.7	V

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