

TOSHIBA Field Effect Transistor Silicon N Channel MOS Type ( $\pi$ -MOSV)

# TPCS8006

High-Speed Switching Applications  
 Switching Regulator Applications  
 DC-DC Converter Applications

- Low drain-source ON resistance:  $R_{DS(ON)} = 0.8 \Omega$  (typ.)
- High forward transfer admittance:  $|Y_{fs}| = 1.6 S$  (typ.)
- Low leakage current:  $I_{DSS} = 100 \mu A$  (max) ( $V_{DS} = 250 V$ )
- Enhancement model:  $V_{th} = 1.5 \sim 3.5 V$  ( $V_{DS} = 10 V, I_D = 1 mA$ )

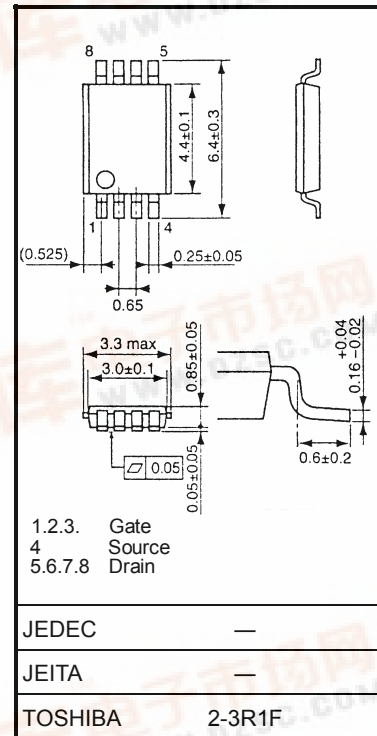
## Maximum Ratings ( $T_a = 25^\circ C$ )

Characteristics		Symbol	Rating	Unit
Drain-source voltage		$V_{DSS}$	250	V
Drain-gate voltage ( $R_{GS} = 20 k\Omega$ )		$V_{DGR}$	250	V
Gate-source voltage		$V_{GSS}$	$\pm 20$	V
Drain current	DC (Note 1)	$I_D$	1.1	A
	Pulse (Note 1)	$I_{DP}$	4.4	
Drain power dissipation ( $t = 10 s$ ) (Note 2a)		$P_D$	1.5	W
Drain power dissipation ( $t = 10 s$ ) (Note 2b)		$P_D$	0.6	
Single pulse avalanche energy (Note 3)		$E_{AS}$	0.07	mJ
Avalanche current		$I_{AR}$	1.1	A
Repetitive avalanche energy (Note 2a, Note 4)		$E_{AR}$	0.15	mJ
Channel temperature		$T_{ch}$	150	$^\circ C$
Storage temperature range		$T_{stg}$	$-55 \sim 150$	$^\circ C$

Note 1, Note 2, Note 3 and Note 4: See the next page.

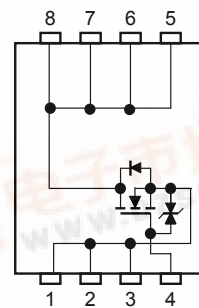
This transistor is an electrostatic-sensitive device. Please handle with caution.

Unit: mm



Weight: 0.035 g (typ.)

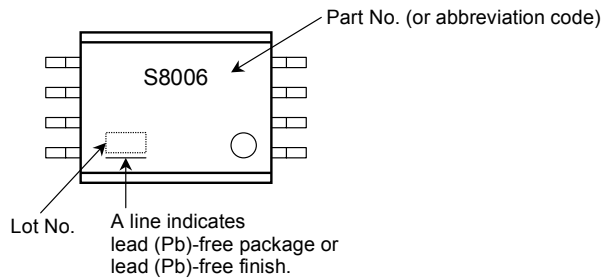
## Circuit Configuration



## Thermal Characteristics

Characteristics	Symbol	Max	Unit
Thermal resistance, channel to ambient (t = 10 s) (Note 2a)	$R_{th(ch-a)}$	83.3	°C/W
Thermal resistance, channel to ambient (t = 10 s) (Note 2b)	$R_{th(ch-a)}$	208	°C/W

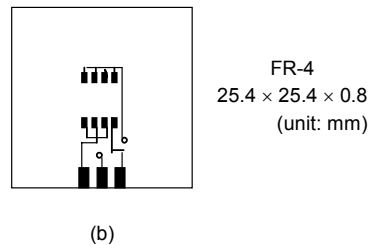
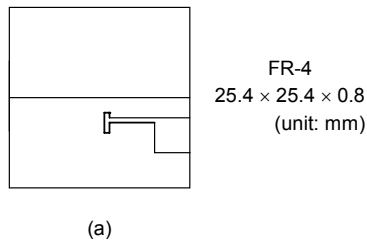
## Marking (Note 5)



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)

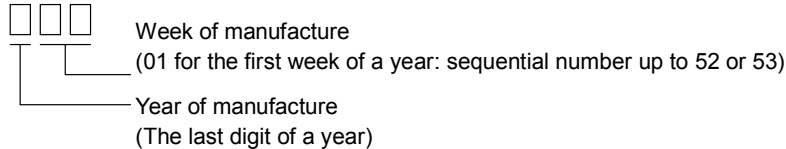


Note 3:  $V_{DD} = 50\text{ V}$ ,  $T_{ch} = 25^\circ\text{C}$  (initial),  $L = 1.0\text{ mH}$ ,  $R_G = 25\ \Omega$ ,  $I_{AR} = 1.1\text{ A}$

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

Note 5:  $\bigcirc$  on lower right 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		$I_{GSS}$	$V_{GS} = \pm 16\text{ V}, V_{DS} = 0\text{ V}$	—	—	$\pm 10$	$\mu\text{A}$
Drain cut-OFF current		$I_{DSS}$	$V_{DS} = 250\text{ V}, V_{GS} = 0\text{ V}$	—	—	100	$\mu\text{A}$
Drain-source breakdown voltage		$V_{(BR)DSS}$	$I_D = 10\text{ mA}, V_{GS} = 0\text{ V}$	250	—	—	V
Gate threshold voltage		$V_{th}$	$V_{DS} = 10\text{ V}, I_D = 1\text{ mA}$	1.5	—	3.5	V
Drain-source ON resistance		$R_{DS(ON)}$	$V_{GS} = 10\text{ V}, I_D = 0.5\text{ A}$	—	0.8	1.0	$\Omega$
Forward transfer admittance		$ Y_{fs} $	$V_{DS} = 10\text{ V}, I_D = 0.5\text{ A}$	0.7	1.6	—	S
Input capacitance		$C_{iss}$	$V_{DS} = 10\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$	—	380	—	pF
Reverse transfer capacitance		$C_{rss}$		—	32	—	pF
Output capacitance		$C_{oss}$		—	105	—	pF
Switching time	Rise time	$t_r$	<p><math>V_{GS} = 10\text{ V}</math> <math>0\text{ V}</math> <math>I_D = 0.5\text{ A}</math> <math>V_{OUT}</math> <math>47\ \Omega</math> <math>V_{DD} \approx 100\text{ V}</math> <math>R_L = 200\ \Omega</math></p>	—	11	—	ns
	Turn-ON time	$t_{on}$		—	20	—	
	Fall time	$t_f$		—	15	—	
	Turn-OFF time	$t_{off}$		Duty $\leq 1\%$ , $t_w = 10\ \mu\text{s}$	—	45	
Total gate charge (gate-source plus gate-drain)		$Q_g$	$V_{DD} \approx 200\text{ V}, V_{GS} = 10\text{ V}, I_D = 1.1\text{ A}$	—	11	—	nC
Gate-source charge		$Q_{gs}$		—	7	—	nC
Gate-drain ("miller") charge		$Q_{gd}$		—	4	—	nC

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

Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Drain reverse current (pulse)	(Note 1)	$I_{DRP}$	—	—	—	4.4	A
Forward voltage (diode)		$V_{DSF}$	$I_{DR} = 1.1\text{ A}, V_{GS} = 0\text{ V}$	—	—	-2.0	V
Reverse recovery time		$t_{rr}$	$I_{DR} = 1.1\text{ A}, V_{GS} = 0\text{ V},$	—	100	—	ns
Reverse recovery charge		$Q_{rr}$	$dI_{DR}/dt = 100\text{ A}/\mu\text{s}$	—	320	—	nC

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