

TOSHIBA Field Effect Transistor Silicon N-Channel MOS Type (MACH II π -MOS V)

TPCS8009-H

High-Speed Switching Applications

Switching Regulator Applications

DC/DC Converter Applications

- Low drain-source ON-resistance: $R_{DS(ON)} = 0.27 \Omega$ (typ.)
- High forward transfer admittance: $|Y_{fs}| = 2.1 \text{ S}$ (typ.)
- Low leakage current: $I_{DSS} = 100 \mu\text{A}$ (max) ($V_{DS} = 150 \text{ V}$)
- Enhancement model: $V_{th} = 2.0 \sim 4.0 \text{ V}$ ($V_{DS} = 10 \text{ V}$, $I_D = 1 \text{ mA}$)

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

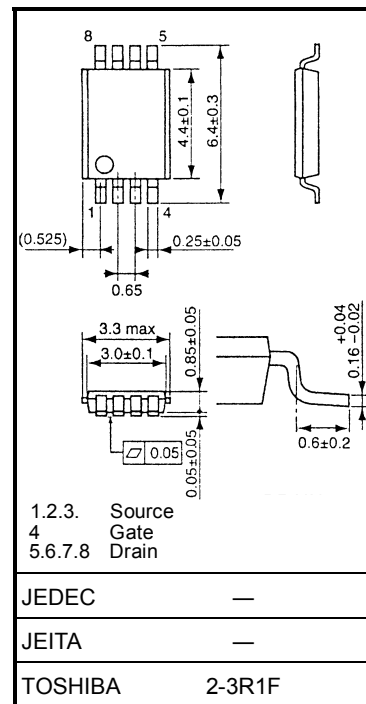
Characteristic		Symbol	Rating	Unit
Drain-source voltage		V_{DSS}	150	V
Drain-gate voltage ($R_{GS} = 20 \text{ k}\Omega$)		V_{DGR}	150	V
Gate-source voltage		V_{GSS}	± 20	V
Drain current	DC (Note 1)	I_D	2.1	A
	Pulse (Note 1)	I_{DP}	8.4	
Drain power dissipation ($t = 10 \text{ s}$) (Note 2a)		P_D	1.5	W
Drain power dissipation ($t = 10 \text{ s}$) (Note 2b)		P_D	0.6	
Single-pulse avalanche energy (Note 3)		E_{AS}	3	mJ
Avalanche current		I_{AR}	2.1	A
Repetitive avalanche energy (Note 2a, Note 4)		E_{AR}	0.15	mJ
Channel temperature		T_{ch}	150	$^\circ\text{C}$
Storage temperature range		T_{stg}	$-55 \sim 150$	$^\circ\text{C}$

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).

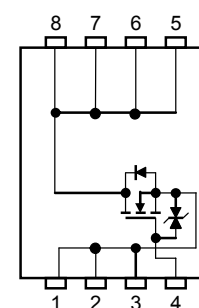
This transistor is an electrostatic-sensitive device. Handle with care.

Unit: mm



Weight: 0.036 g (typ.)

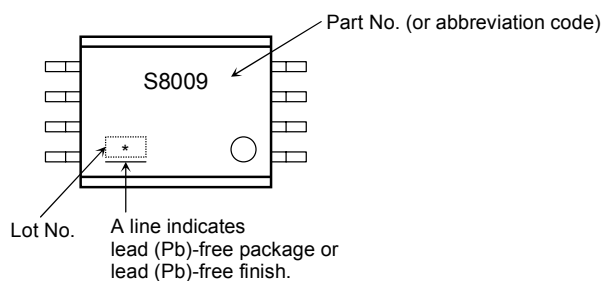
Circuit Configuration



Thermal Characteristics

Characteristic	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

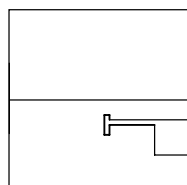
Marking (Note 5)



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

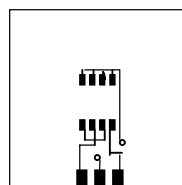
Note 2:

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



(a)

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



(b)

Note 3: $V_{DD} = 50\text{ V}$, $T_{ch} = 25^\circ\text{C}$ (initial), $L = 1.0\text{ mH}$, $R_G = 25\ \Omega$, $I_{AR} = 2.1\text{ A}$

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

Note 5: ○ on the lower right of the marking indicates Pin 1.

* Weekly code: (Three digits)



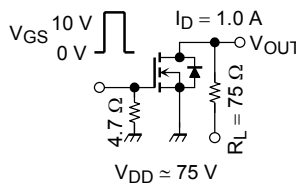
Week of manufacture

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

Year of manufacture

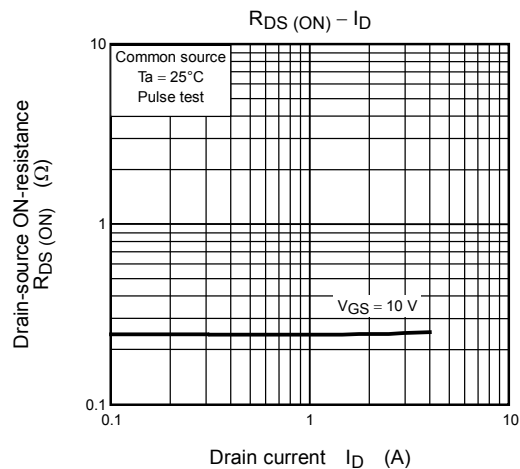
(The last digit of the calendar year)

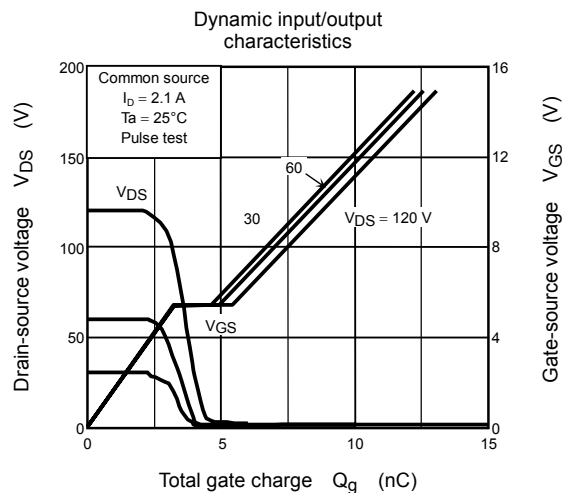
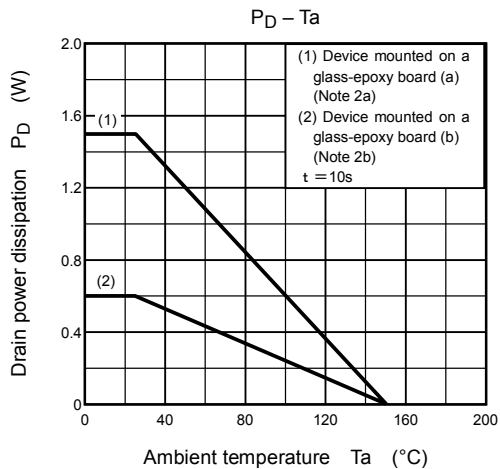
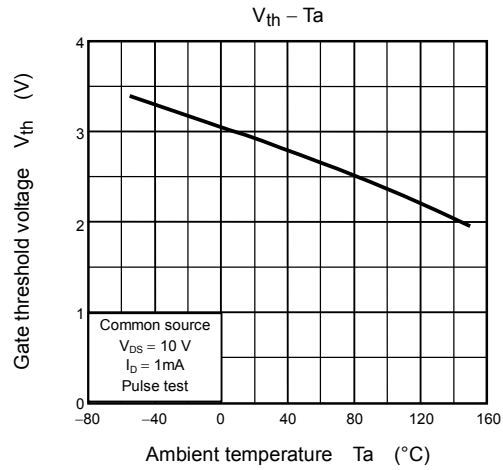
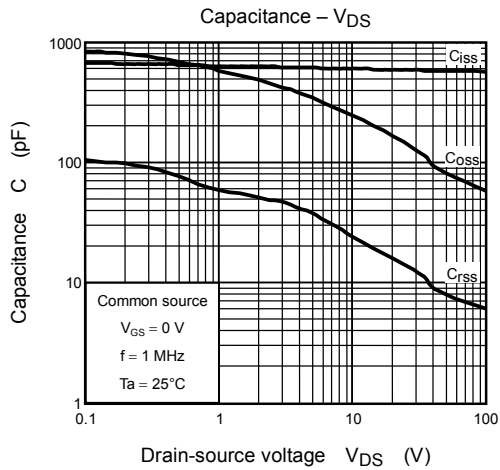
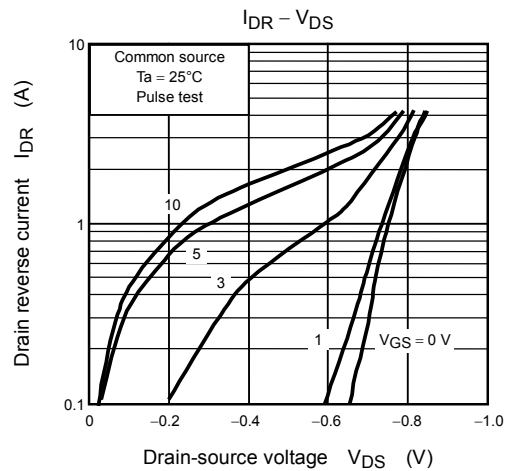
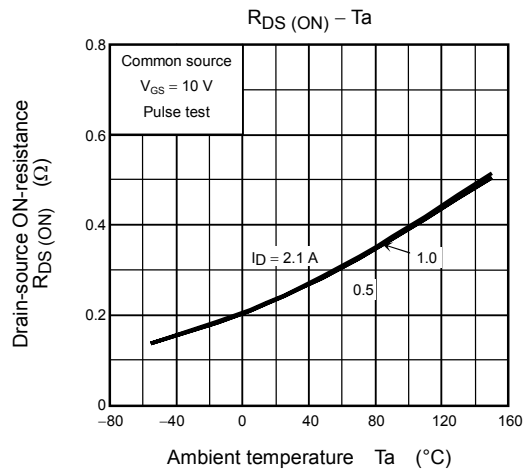
Electrical Characteristics (Ta = 25°C)

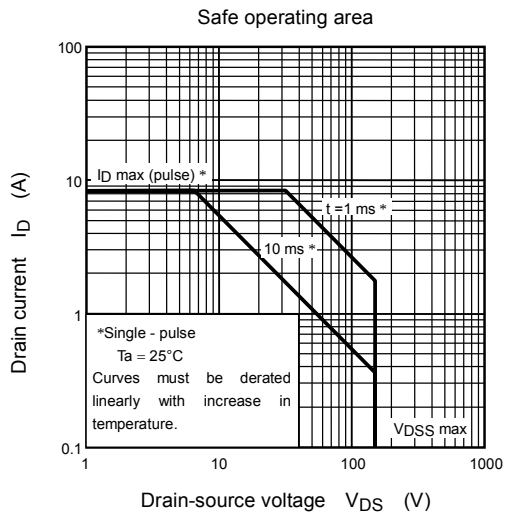
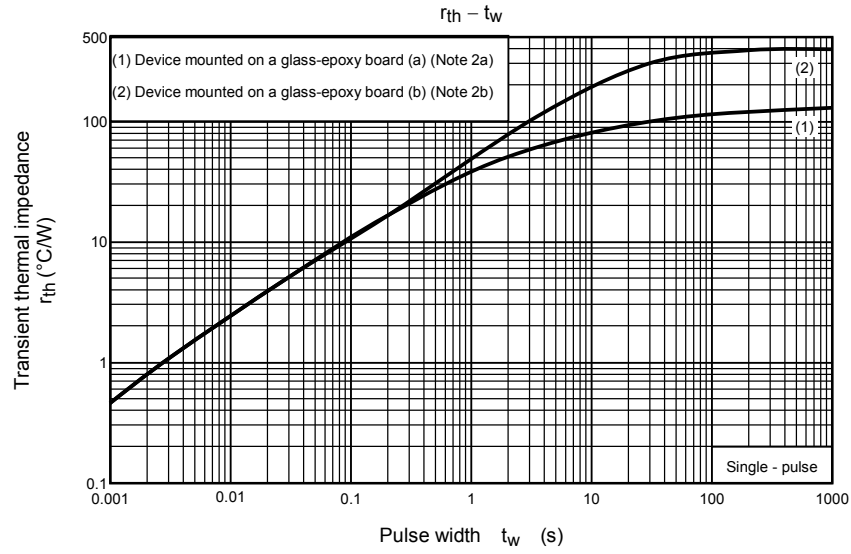
Characteristic		Symbol	Test Condition	Min	Typ.	Max	Unit
Gate leakage current		I _{GSS}	V _{GS} = ±16 V, V _{DS} = 0 V	—	—	±10	μA
Drain cutoff current		I _{DSS}	V _{DS} = 150 V, V _{GS} = 0 V	—	—	100	μA
Drain-source breakdown voltage		V (BR) DSS	I _D = 10 mA, V _{GS} = 0 V	150	—	—	V
		V (BR) DSX	I _D = 10 mA, V _{GS} = −5 V	150	—	—	
		V (BR) DSX	I _D = 10 mA, V _{GS} = −20 V	100	—	—	
Gate threshold voltage		V _{th}	V _{DS} = 10 V, I _D = 1 mA	2.0	—	4.0	V
Drain-source ON-resistance		R _{DS (ON)}	V _{GS} = 10 V, I _D = 1.0 A	—	0.27	0.35	Ω
Forward transfer admittance		Y _{fs}	V _{DS} = 10 V, I _D = 1.0 A	0.9	2.1	—	S
Input capacitance		C _{iss}	V _{DS} = 10 V, V _{GS} = 0 V, f = 1 MHz	—	600	—	pF
Reverse transfer capacitance		C _{rss}		—	20	—	pF
Output capacitance		C _{oss}		—	220	—	pF
Switching time	Rise time	t _r	 Duty ≤ 1%, t_w = 10 μs	—	35	—	ns
	Turn-on time	t _{on}		—	95	—	
	Fall time	t _f		—	20	—	
	Turn-off time	t _{off}		—	120	—	
Total gate charge (gate-source plus gate-drain)		Q _g	V _{DD} ≈ 120V, V _{GS} = 10 V, I _D = 2.1 A	—	10	—	nC
Gate-source charge		Q _{gs}		—	7.5	—	nC
Gate-drain ("Miller") charge		Q _{gd}		—	2.5	—	nC
Gate switch charge		Q _{sw}		—	3.3	—	nC

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

Characteristic		Symbol	Test Condition	Min	Typ.	Max	Unit
Drain reverse current (pulse) (Note 1)		I_{DRP}	—	—	—	8.4	A
Forward voltage (diode)		V_{DSF}	$I_{DR} = 2.1 \text{ A}, V_{GS} = 0 \text{ V}$	—	—	-2.0	V







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