

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: $|Y_{fs}| = 2.1 S$ (typ.)
- Low leakage current: $I_{DSS} = 100 \mu A$ (max) ($V_{DS} = 150 V$)
- Enhancement model: $V_{th} = 2.0 \sim 4.0 V$ ($V_{DS} = 10 V, I_D = 1 mA$)

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

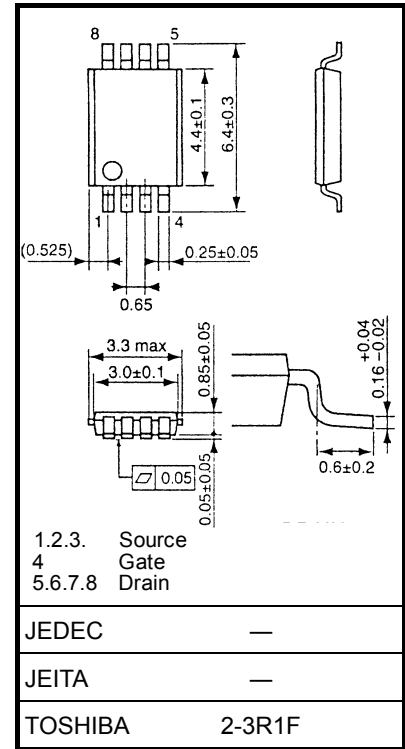
Characteristic		Symbol	Rating	Unit
Drain-source voltage		V_{DSS}	150	V
Drain-gate voltage ($R_{GS} = 20 k\Omega$)		V_{DGR}	150	V
Gate-source voltage		V_{GSS}	± 20	V
Drain current	DC (Note 1)	I_D	2.1	A
	Pulse (Note 1)	I_{DP}	8.4	
Drain power dissipation ($t = 10 s$) (Note 2a)		P_D	1.5	W
Drain power dissipation ($t = 10 s$) (Note 2b)		P_D	0.6	
Single-pulse avalanche energy(Note3)		E_{AS}	3	mJ
Avalanche current		I_{AR}	2.1	A
Repetitive avalanche energy (Note2a, 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: 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).

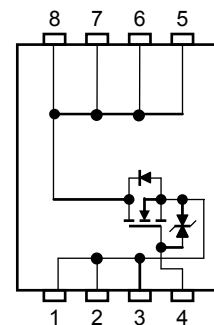
This transistor is an electrostatic-sensitive device. Handle with care.

Unit: mm



Weight: 0.036 g (typ.)

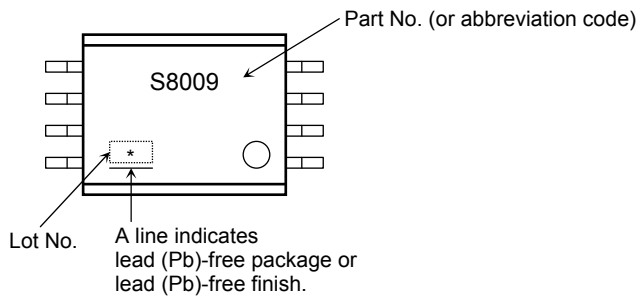
Circuit Configuration



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

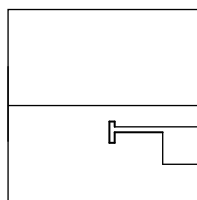
Marking (Note 5)



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

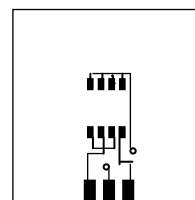
Note 2:

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



(a)

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



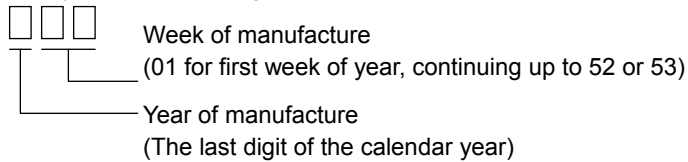
(b)

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

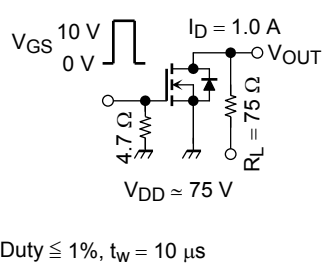
Note 4: Repetitive rating: pulse width limited by maximum channel temperature

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

* Weekly code: (Three digits)

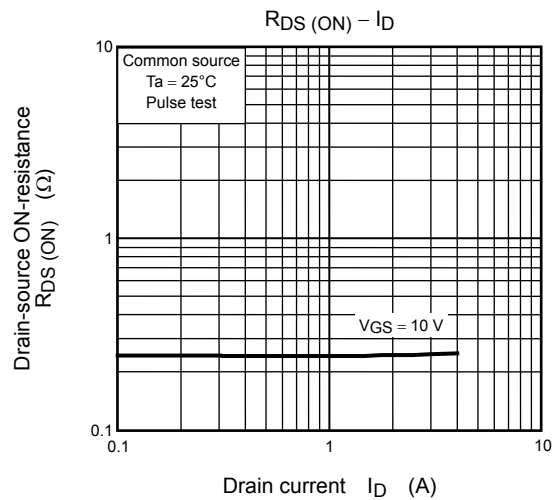
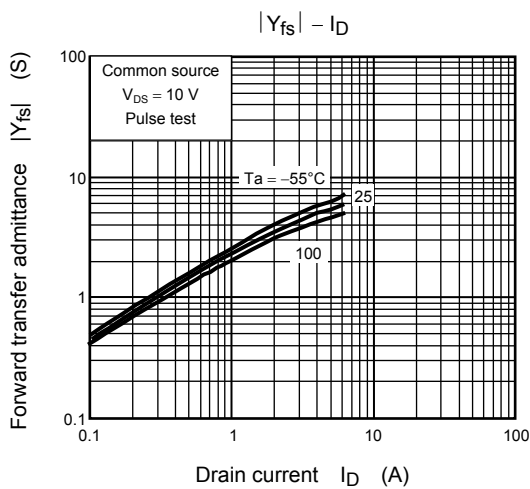
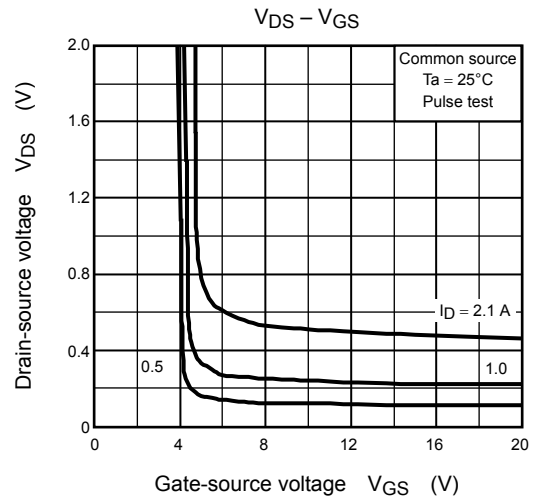
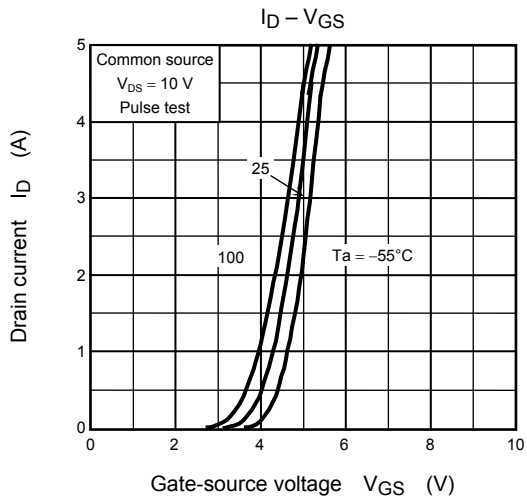
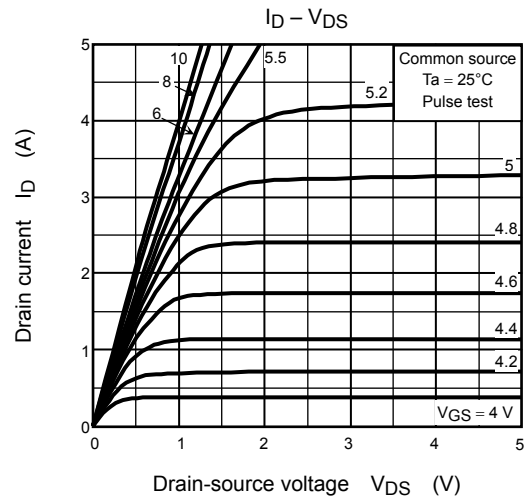
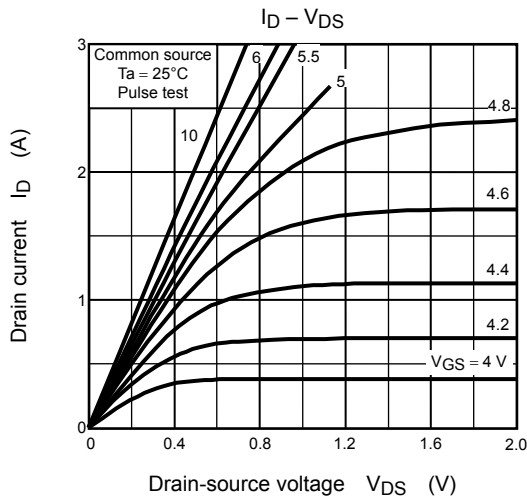


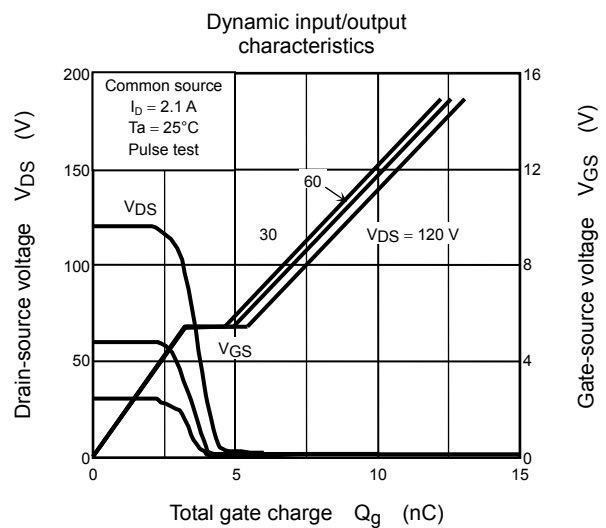
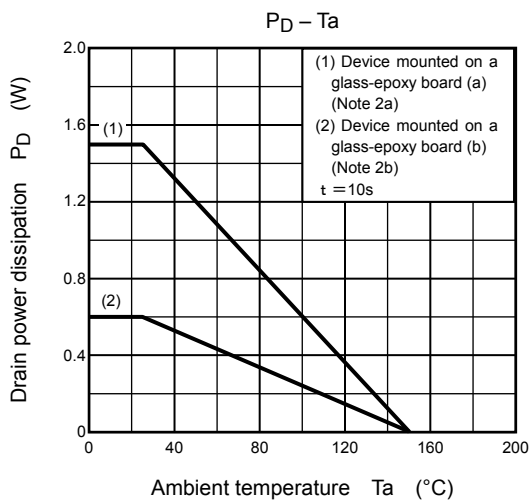
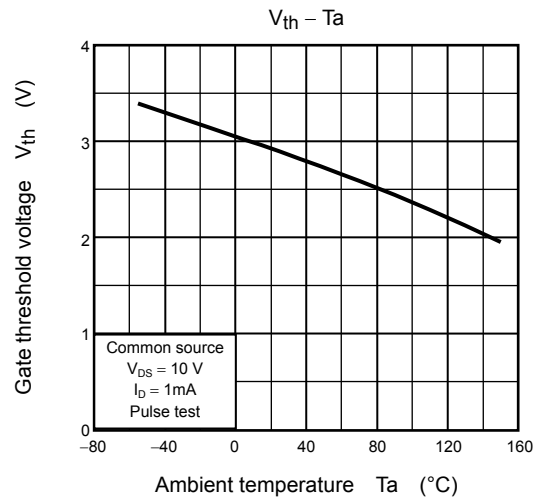
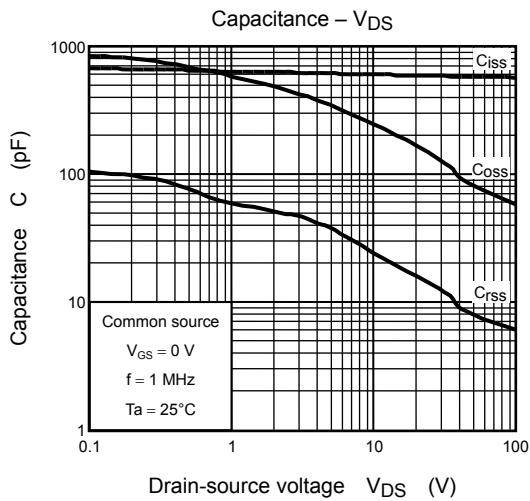
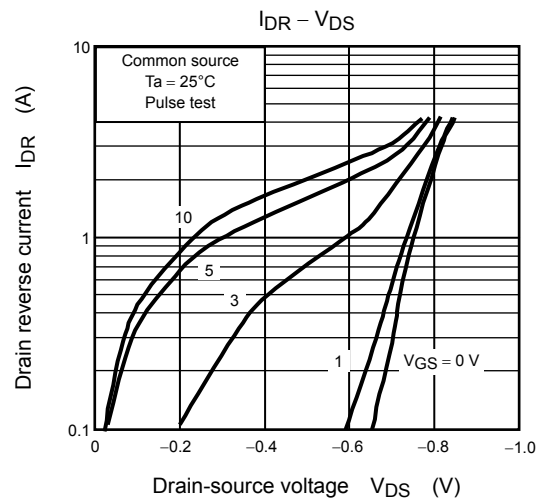
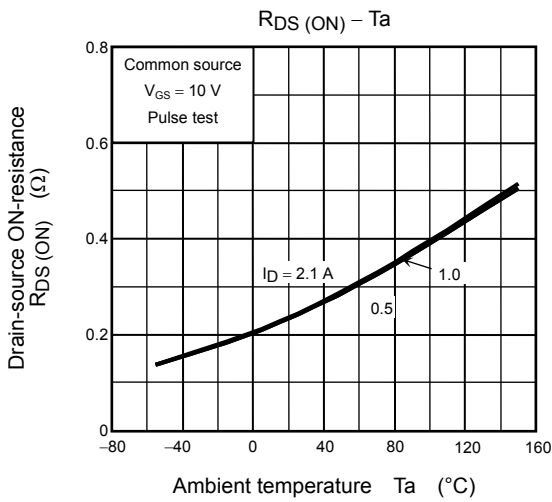
Electrical Characteristics (Ta = 25°C)

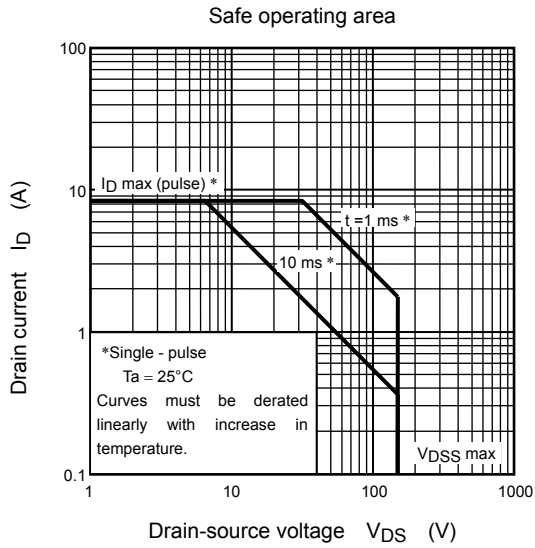
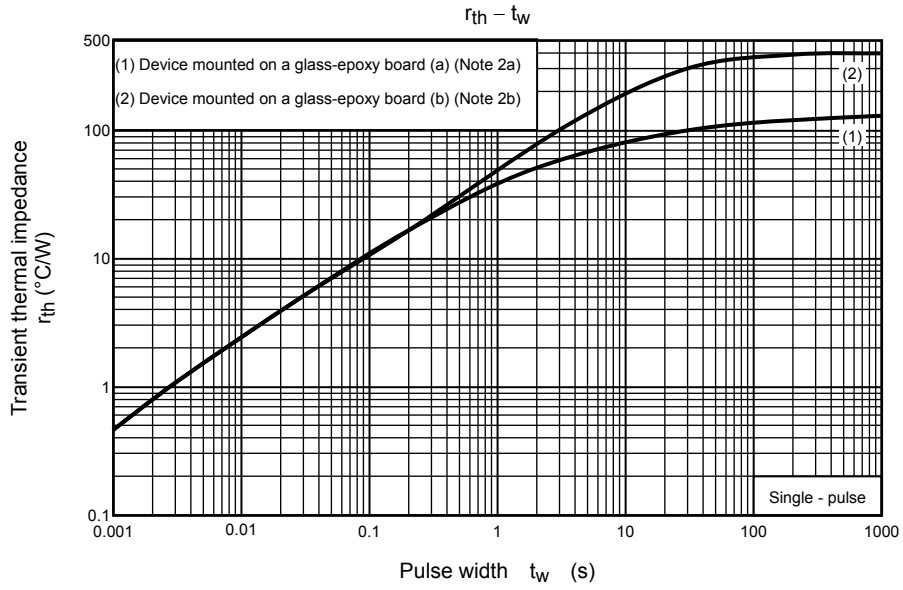
Characteristic		Symbol	Test Condition	Min	Typ.	Max	Unit
Gate leakage current		I_{GSS}	$V_{GS} = \pm 16\text{ V}, V_{DS} = 0\text{ V}$	—	—	± 10	μA
Drain cutoff current		I_{DSS}	$V_{DS} = 150\text{ V}, V_{GS} = 0\text{ V}$	—	—	100	μA
Drain-source breakdown voltage		$V_{(BR)DSS}$	$I_D = 10\text{ mA}, V_{GS} = 0\text{ V}$	150	—	—	V
		$V_{(BR)DSX}$	$I_D = 10\text{ mA}, V_{GS} = -5\text{ V}$	150	—	—	
		$V_{(BR)DSX}$	$I_D = 10\text{ mA}, V_{GS} = -20\text{ V}$	100	—	—	
Gate threshold voltage		V_{th}	$V_{DS} = 10\text{ V}, I_D = 1\text{ mA}$	2.0	—	4.0	V
Drain-source ON-resistance		$R_{DS(ON)}$	$V_{GS} = 10\text{ V}, I_D = 1.0\text{ A}$	—	0.27	0.35	Ω
Forward transfer admittance		$ Y_{fs} $	$V_{DS} = 10\text{ V}, I_D = 1.0\text{ A}$	0.9	2.1	—	S
Input capacitance		C_{iss}	$V_{DS} = 10\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$	—	600	—	pF
Reverse transfer capacitance		C_{rss}		—	20	—	pF
Output capacitance		C_{oss}		—	220	—	pF
Switching time	Rise time	t_r	 <p>$V_{GS} = 10\text{ V}$ 0 V $I_D = 1.0\text{ A}$ V_{OUT} $R_L = 75\ \Omega$ $V_{DD} \approx 75\text{ V}$ Duty $\leq 1\%$, $t_w = 10\ \mu\text{s}$</p>	—	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	$V_{DD} \approx 120\text{ V}, V_{GS} = 10\text{ V}, I_D = 2.1\text{ A}$	—	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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