

TOSHIBA Field Effect Transistor Silicon N-Channel MOS Type (U-MOSIV)

TPCC8009

Lithium Ion Battery Applications
 Notebook PC Applications
 Portable Equipment Applications

- Small footprint due to a small and thin package
- Low drain-source ON-resistance:
 $R_{DS(ON)} = 5\text{ m}\Omega$ (typ.) ($V_{GS} = 10\text{ V}$)
- Low leakage current: $I_{DSS} = 10\text{ }\mu\text{A}$ (max) ($V_{DS} = 30\text{ V}$)
- Enhancement mode: $V_{th} = 2.0\text{ to }3.0\text{ V}$ ($V_{DS} = 10\text{ V}$, $I_D = 0.2\text{ mA}$)

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

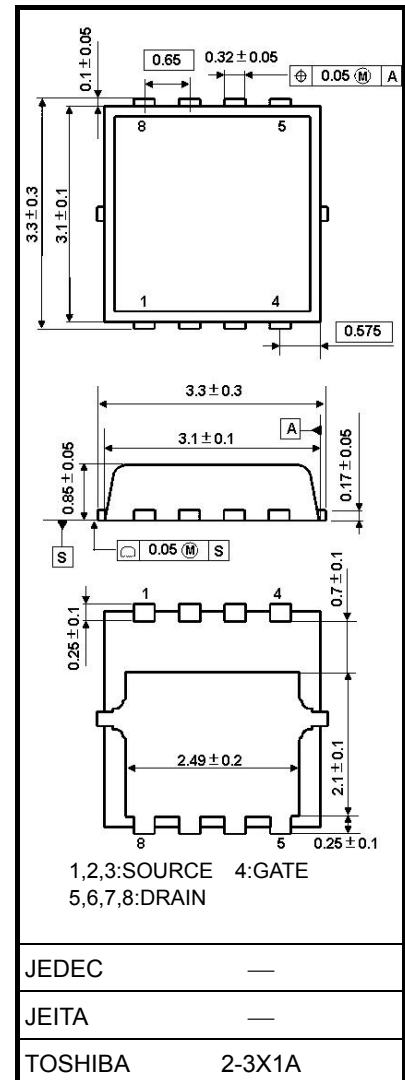
Characteristic	Symbol	Rating	Unit
Drain-source voltage	V_{DSS}	30	V
Drain-gate voltage ($R_{GS} = 20\text{ k}\Omega$)	V_{DGR}	30	V
Gate-source voltage	V_{GSS}	± 20	V
Drain current	DC (Note 1)	I_D	24
	Pulsed (Note 1)	I_{DP}	72
Drain power dissipation ($T_c = 25^\circ\text{C}$)	P_D	27	W
Drain power dissipation ($t = 10\text{ s}$) (Note 2a)	P_D	1.9	W
Drain power dissipation ($t = 10\text{ s}$) (Note 2b)	P_D	0.7	W
Single-pulse avalanche energy (Note 3)	E_{AS}	75	mJ
Avalanche current	I_{AR}	24	A
Channel temperature	T_{ch}	150	$^\circ\text{C}$
Storage temperature range	T_{stg}	-55 to 150	$^\circ\text{C}$

Note: For Notes 1 to 3, 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).

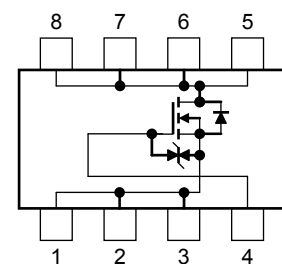
This transistor is an electrostatic-sensitive device. Handle with care.

Unit: mm



Weight: 0.02 g (typ.)

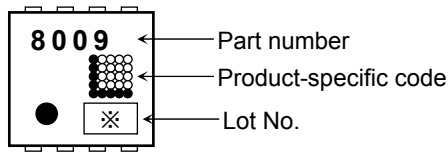
Circuit Configuration



Thermal Characteristics

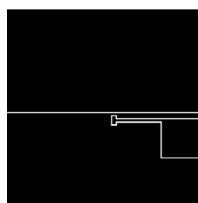
Characteristic	Symbol	Max	Unit
Thermal resistance, channel to case ($T_c = 25^\circ\text{C}$)	$R_{th} (ch-c)$	4.7	$^\circ\text{C/W}$
Thermal resistance, channel to ambient ($t = 10\text{ s}$) (Note 2a)	$R_{th} (ch-a)$	66	$^\circ\text{C/W}$
Thermal resistance, channel to ambient ($t = 10\text{ s}$) (Note 2b)	$R_{th} (ch-a)$	180	$^\circ\text{C/W}$

Marking (Note 4)



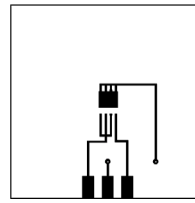
Note 1: Ensure that the channel temperature does not exceed 150°C .

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



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

(a)

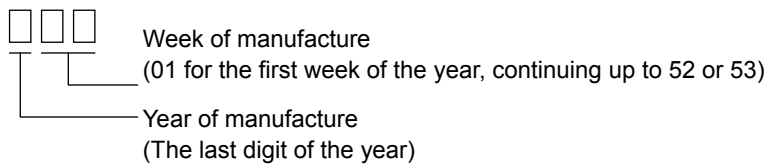


FR-4
 $25.4 \times 25.4 \times 0.8$
 (Unit: mm)

(b)

Note 3: $V_{DD} = 24\text{ V}$, $T_{ch} = 25^\circ\text{C}$ (initial), $L = 100\ \mu\text{H}$, $I_{AR} = 24\text{ A}$

Note 4: * Weekly code: (Three digits)

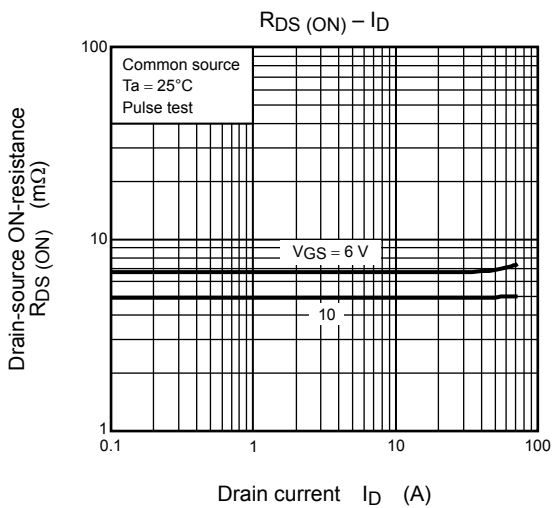
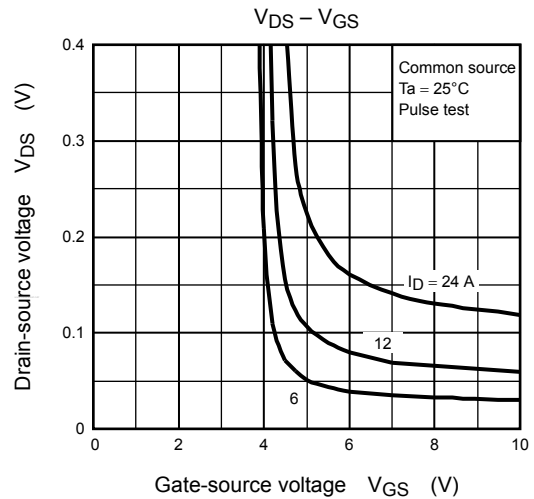
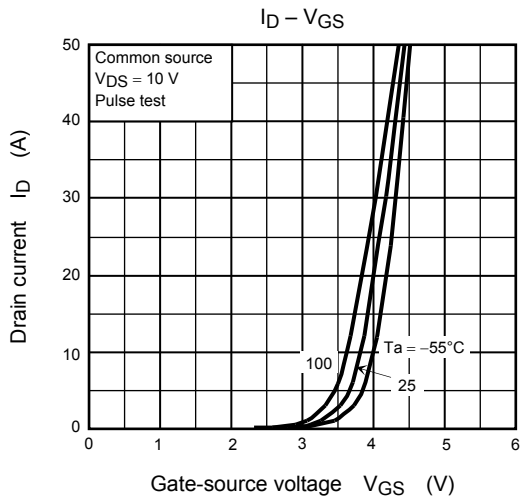
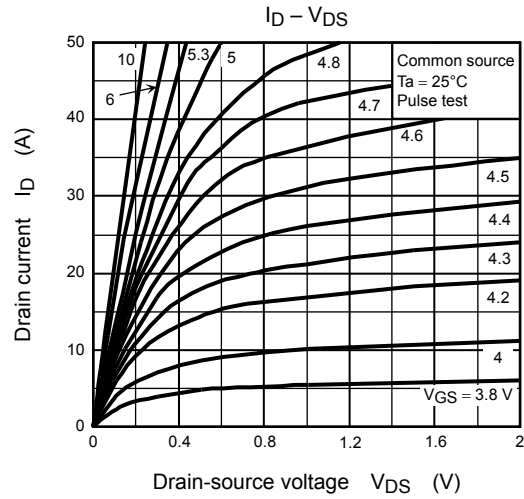
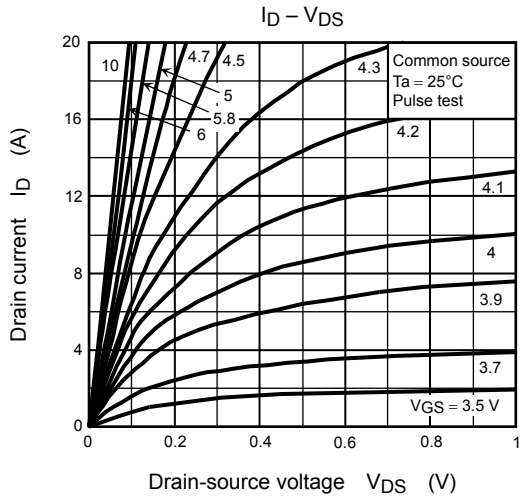


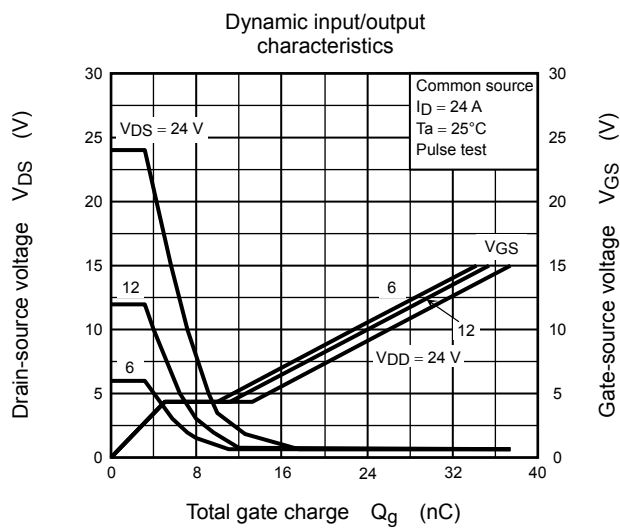
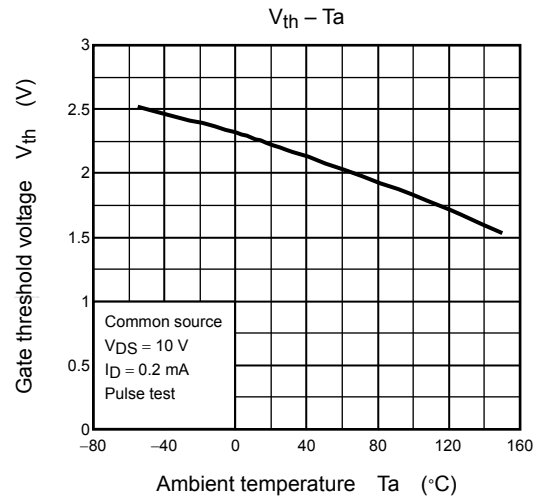
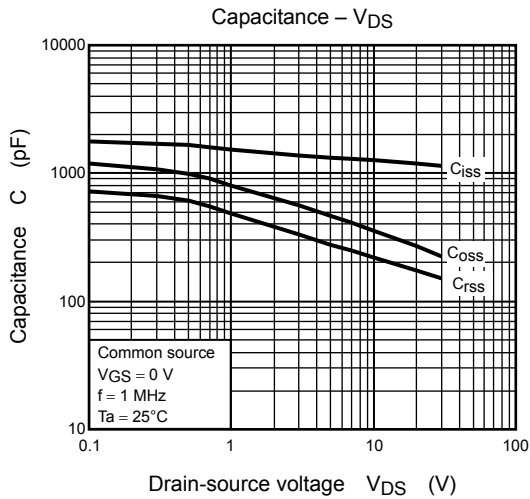
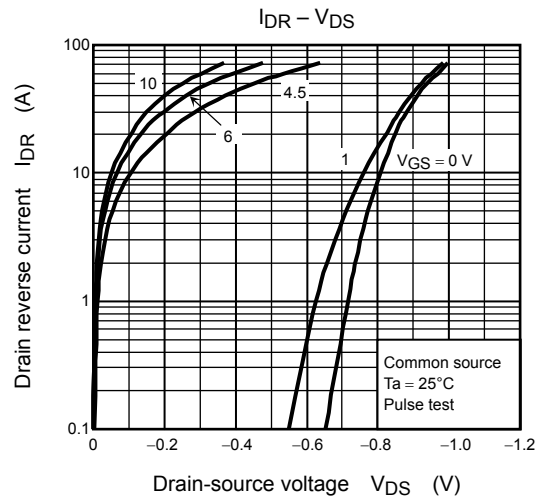
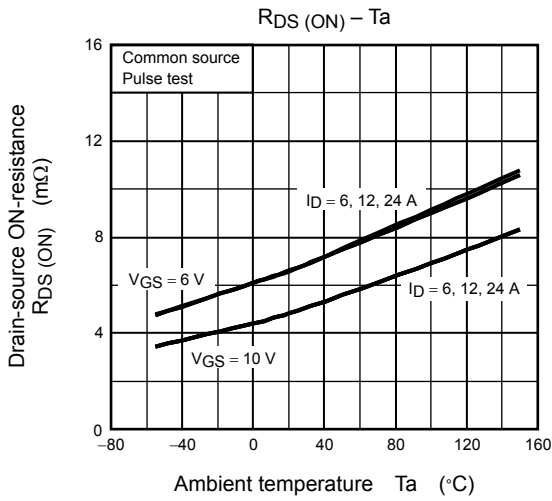
Electrical Characteristics (Ta = 25°C)

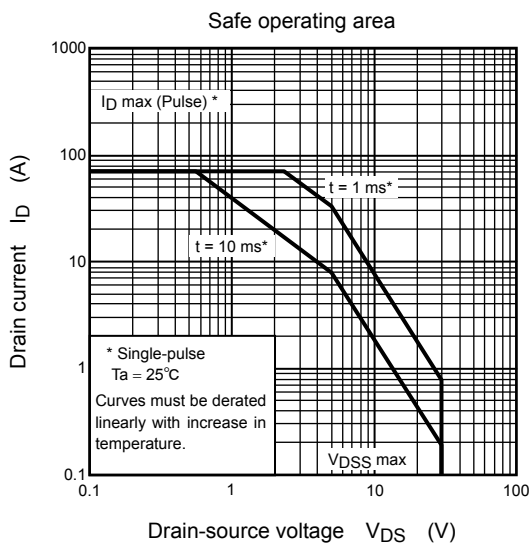
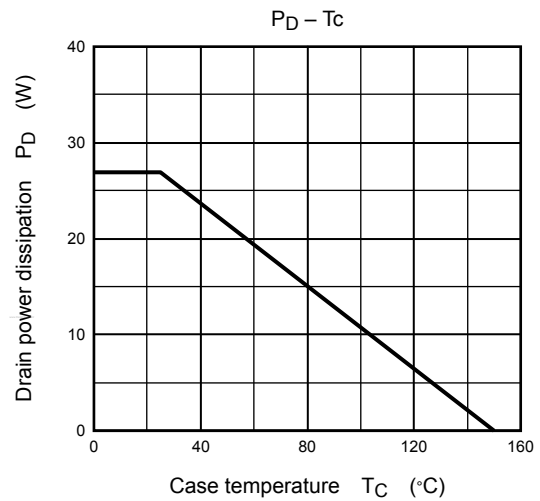
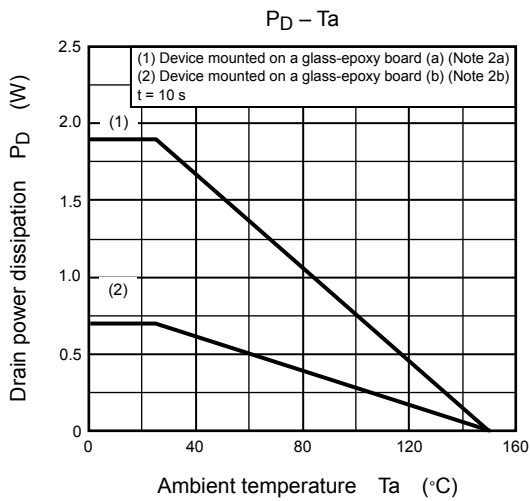
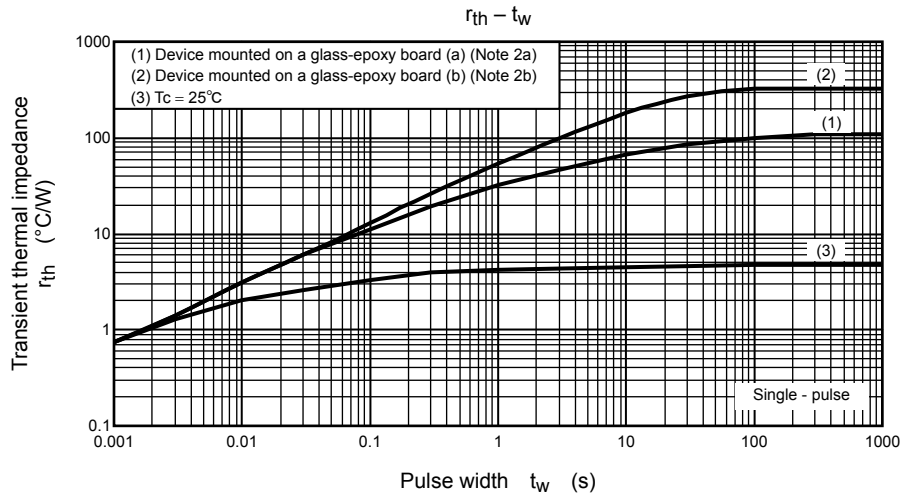
Characteristic		Symbol	Test Condition	Min	Typ.	Max	Unit
Gate leakage current		I_{GSS}	$V_{GS} = \pm 16\text{ V}, V_{DS} = 0\text{ V}$	—	—	± 10	μA
Drain cutoff current		I_{DSS}	$V_{DS} = 30\text{ V}, V_{GS} = 0\text{ V}$	—	—	10	μA
Drain-source breakdown voltage		$V_{(BR)DSS}$	$I_D = 10\text{ mA}, V_{GS} = 0\text{ V}$	30	—	—	V
		$V_{(BR)DSX}$	$I_D = 10\text{ mA}, V_{GS} = -20\text{ V}$	10	—	—	
Gate threshold voltage		V_{th}	$V_{DS} = 10\text{ V}, I_D = 0.2\text{ mA}$	2.0	—	3.0	V
Drain-source ON-resistance		$R_{DS(ON)}$	$V_{GS} = 6\text{ V}, I_D = 12\text{ A}$	—	7.2	11	$\text{m}\Omega$
			$V_{GS} = 10\text{ V}, I_D = 12\text{ A}$	—	5	7	
Input capacitance		C_{iss}	$V_{DS} = 10\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$	—	1270	—	pF
Reverse transfer capacitance		C_{rss}		—	230	—	
Output capacitance		C_{oss}		—	360	—	
Switching time	Rise time	t_r	<p>$V_{GS} = 10\text{ V}$ 0 V $I_D = 12\text{ A}$ V_{OUT} $4.7\ \Omega$ $R_L = 1.25\ \Omega$ $V_{DD} \approx 15\text{ V}$ Duty $\leq 1\%$, $t_w = 10\ \mu\text{s}$</p>	—	6	—	ns
	Turn-on time	t_{on}		—	13	—	
	Fall time	t_f		—	6	—	
	Turn-off time	t_{off}		—	23	—	
Total gate charge (gate-source plus gate-drain)		Q_g	$V_{DD} \approx 24\text{ V}, V_{GS} = 10\text{ V}, I_D = 24\text{ A}$	—	26	—	nC
Gate-source charge 1		Q_{gs1}		—	5	—	
Gate-drain ("Miller") charge		Q_{gd}		—	8.2	—	

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

Characteristic		Symbol	Test Condition	Min	Typ.	Max	Unit
Drain reverse current	Pulse (Note 1)	I_{DRP}	—	—	—	72	A
Forward voltage (diode)		V_{DSF}	$I_{DR} = 24\text{ A}, V_{GS} = 0\text{ V}$	—	—	-1.2	V







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