

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

TPC8014

Lithium Ion Battery Applications
Portable Equipment Applications
Notebook PC Applications

- Small footprint due to small and thin package
- Low drain-source ON resistance: $R_{DS(ON)} = 11 \text{ m}\Omega$ (typ.)
- High forward transfer admittance: $|Y_{fs}| = 10 \text{ S}$ (typ.)
- Low leakage current: $I_{DSS} = 10 \text{ }\mu\text{A}$ (max) ($V_{DS} = 30 \text{ V}$)
- Enhancement mode: $V_{th} = 1.3 \text{ to } 2.5 \text{ V}$ ($V_{DS} = 10 \text{ V}$, $I_D = 1 \text{ mA}$)

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

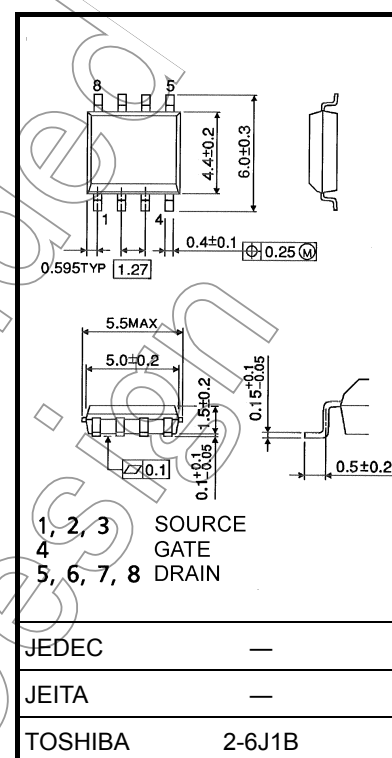
Characteristics		Symbol	Rating	Unit
Drain-source voltage		V_{DSS}	30	V
Drain-gate voltage ($R_{GS} = 20 \text{ k}\Omega$)		V_{DGR}	30	V
Gate-source voltage		V_{GSS}	± 20	V
Drain current	DC (Note 1)	I_D	11	A
	Pulse (Note 1)	I_{DP}	44	
Drain power dissipation ($t = 10 \text{ s}$) (Note 2a)		P_D	1.9	W
Drain power dissipation ($t = 10 \text{ s}$) (Note 2b)		P_D	1.0	W
Single pulse avalanche energy (Note 3)		E_{AS}	157	mJ
Avalanche current		I_{AR}	11	A
Repetitive avalanche energy (Note 2a) (Note 4)		E_{AR}	0.19	mJ
Channel temperature		T_{ch}	150	$^\circ\text{C}$
Storage temperature range		T_{stg}	-55 to 150	$^\circ\text{C}$

Note: (Note 1), (Note 2), (Note 3) and (Note 4): See 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).

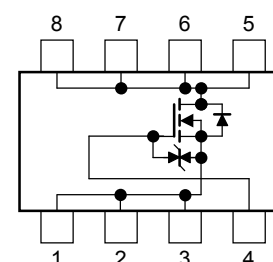
This transistor is an electrostatic-sensitive device. Please handle with caution.

Unit: mm



Weight: 0.08 g (typ.)

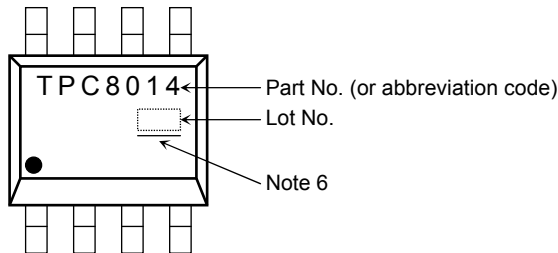
Circuit Configuration



Thermal Characteristics

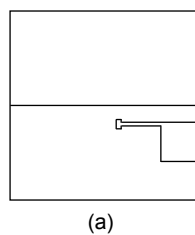
Characteristics	Symbol	Max	Unit
Thermal resistance, channel to ambient (t = 10 s) (Note 2a)	$R_{th(ch-a)}$	65.8	°C/W
Thermal resistance, channel to ambient (t = 10 s) (Note 2b)	$R_{th(ch-a)}$	125	°C/W

Marking (Note 5)

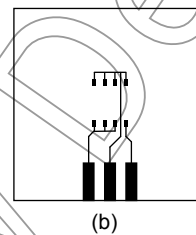


Note 1: Ensure that the channel temperature does not exceed 150°C.

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



(a)



(b)

Note 3: $V_{DD} = 24\text{ V}$, $T_{ch} = 25^\circ\text{C}$ (initial), $L = 1.0\text{ mH}$, $R_G = 25\ \Omega$, $I_{AR} = 11\text{ A}$

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

Note 5: • on the lower left 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)

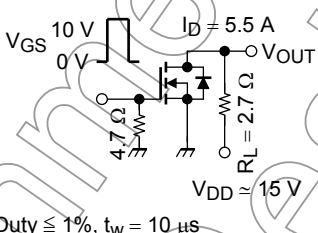
Note 6: A line under a Lot No. identifies the indication of product Labels.

Not underlined: [[Pb]]/INCLUDES > MCV

Underlined: [[G]]/RoHS COMPATIBLE or [[G]]/RoHS [[Pb]]

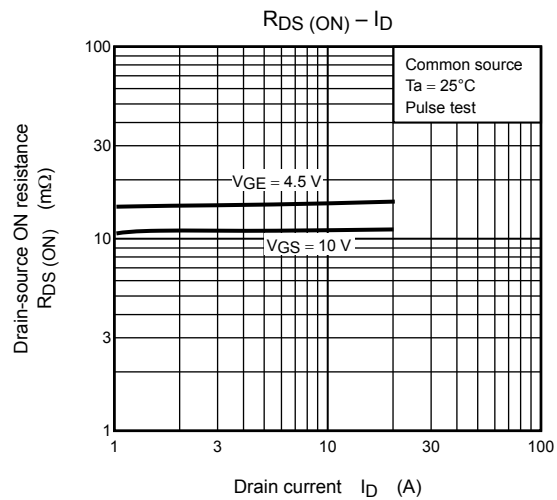
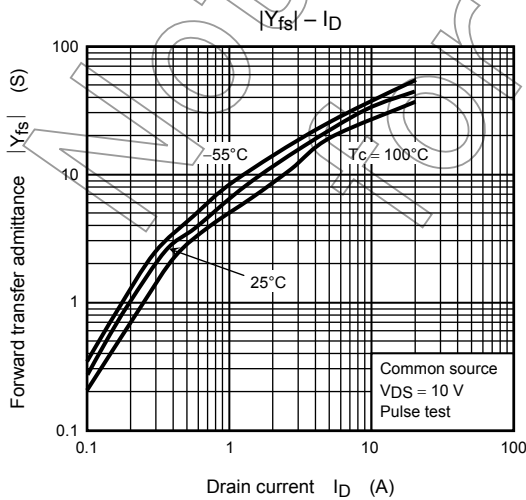
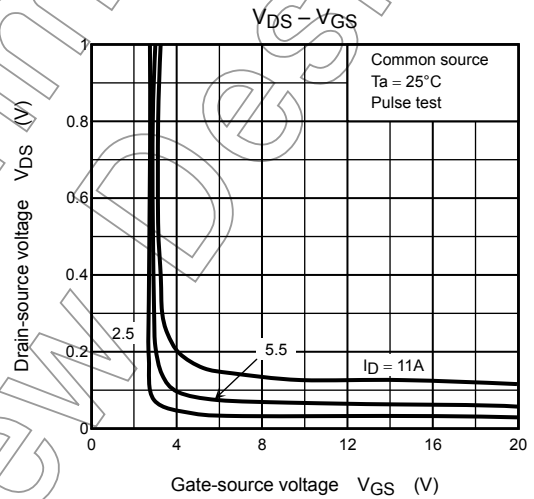
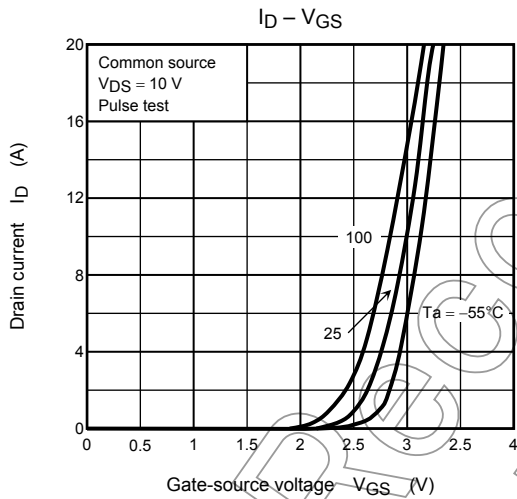
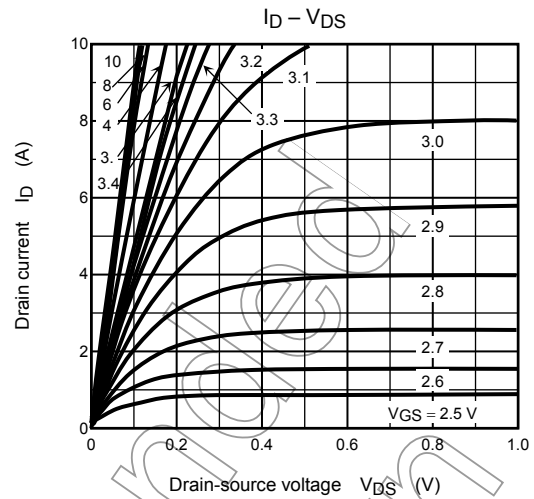
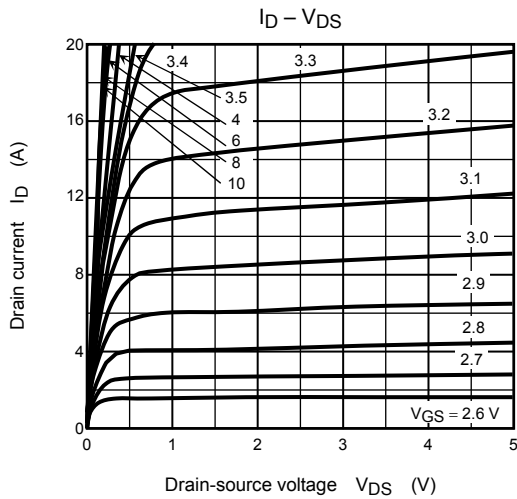
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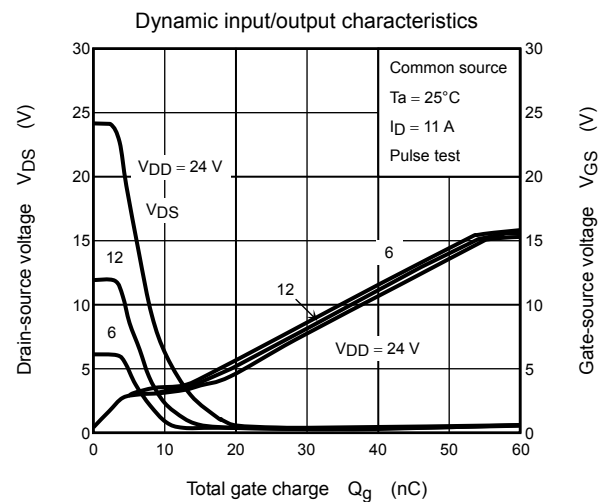
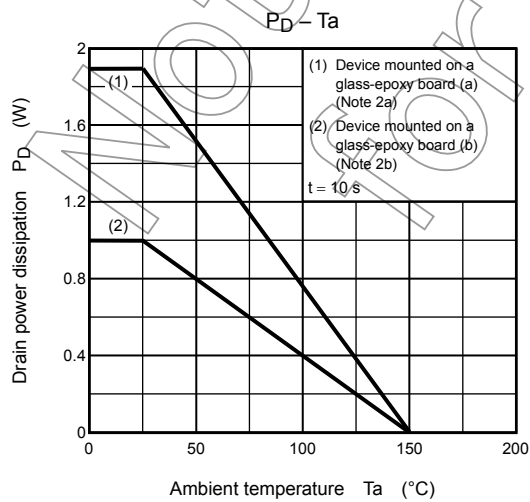
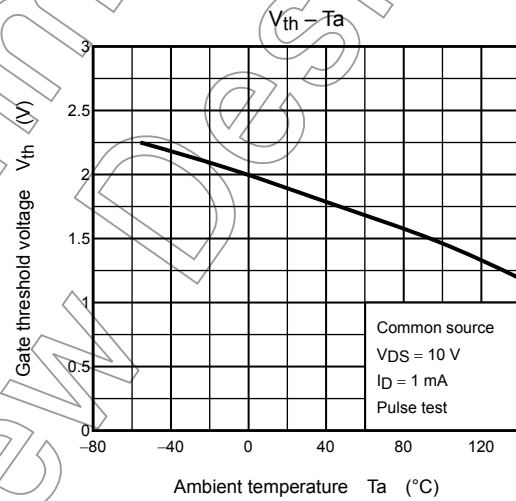
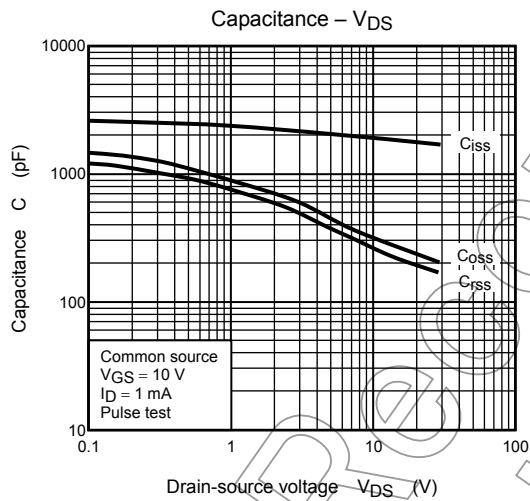
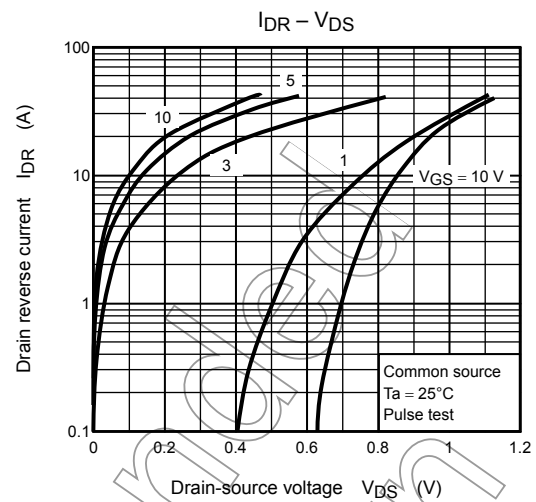
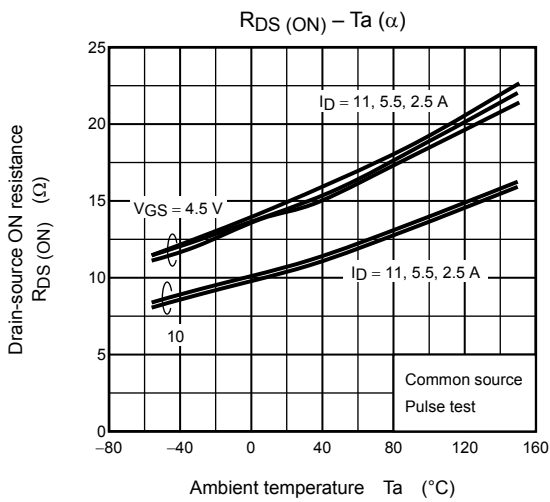
Electrical Characteristics (Ta = 25°C)

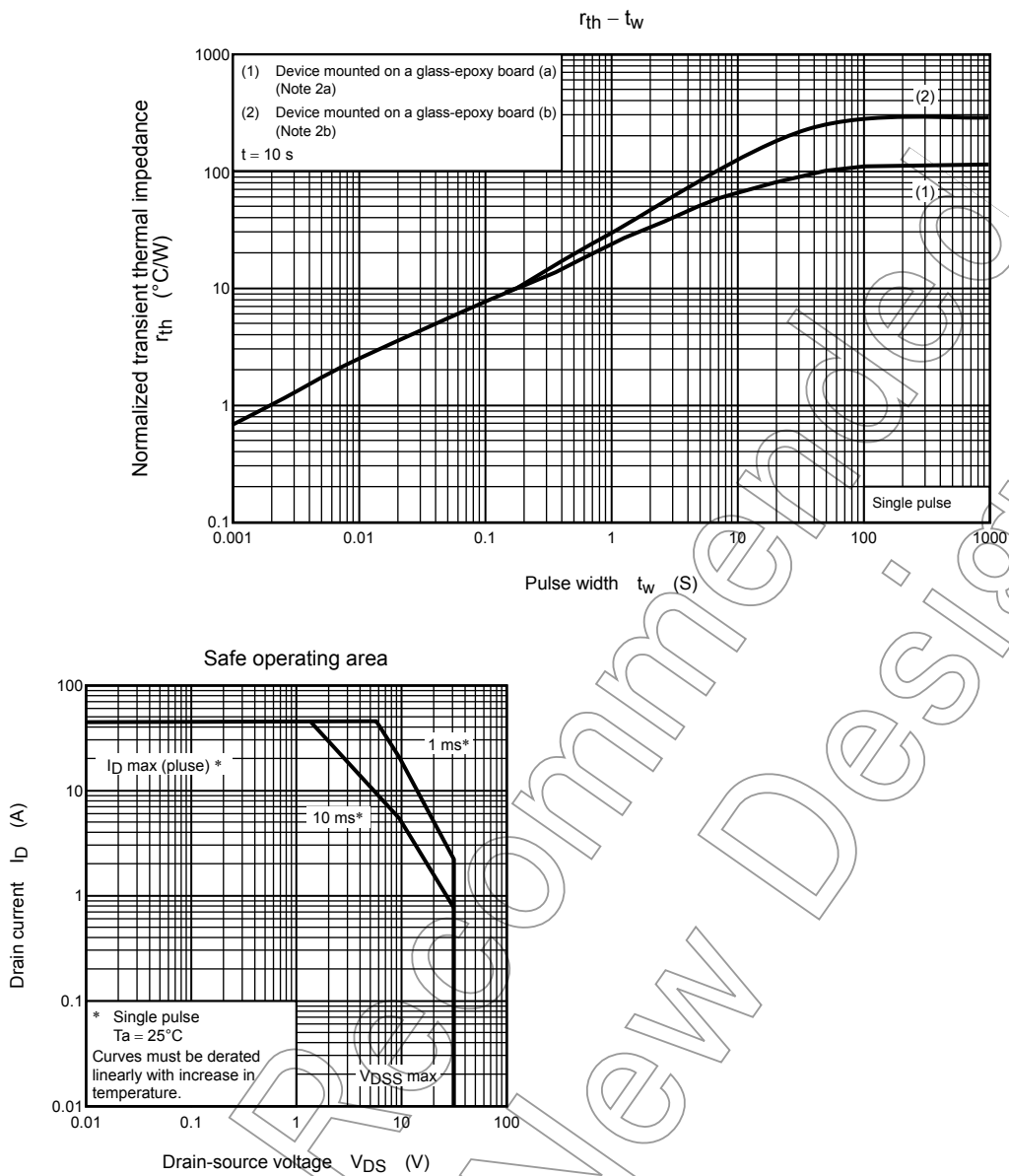
Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Gate leakage current		I _{GSS}	V _{GS} = ±16 V, V _{DS} = 0 V	—	—	±10	μA
Drain cut-OFF current		I _{DSS}	V _{DS} = 30 V, V _{GS} = 0 V	—	—	10	μA
Drain-source breakdown voltage		V _(BR) DSS	I _D = 10 mA, V _{GS} = 0 V	30	—	—	V
		V _(BR) DSX	I _D = 10 mA, V _{GS} = -20 V	15	—	—	
Gate threshold voltage		V _{th}	V _{DS} = 10 V, I _D = 1 mA	1.3	—	2.5	V
Drain-source ON resistance		R _{DS} (ON)	V _{GS} = 4.5 V, I _D = 5.5 A	—	15	22	mΩ
			V _{GS} = 10 V, I _D = 5.5 A	—	11	14	
Forward transfer admittance		Y _{fs}	V _{DS} = 10 V, I _D = 5.5 A	5	10	—	S
Input capacitance		C _{iss}	V _{DS} = 10 V, V _{GS} = 0 V, f = 1 MHz	—	1860	—	pF
Reverse transfer capacitance		C _{rss}		—	270	—	
Output capacitance		C _{oss}		—	320	—	
Switching time	Rise time	t _r	 V _{GS} 10 V 0 V I _D = 5.5 A V _{OUT} 4.7 Ω 2.7 Ω V _{DD} ≈ 15 V Duty ≤ 1%, t _W = 10 μs	—	9	—	ns
	Turn-ON time	t _{on}		—	19	—	
	Fall time	t _f		—	20	—	
	Turn-OFF time	t _{off}		—	69	—	
Total gate charge (gate-source plus gate-drain)		Q _g	V _{DD} ≈ 24 V, V _{GS} = 10 V, I _D = 11 A	—	39	—	nC
Gate-source charge 1		Q _{gs1}		—	4	—	
Gate-drain ("miller") charge		Q _{gd}		—	9	—	

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

Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Drain reverse current	Pulse (Note 1)	I_{DRP}	—	—	—	44	A
Forward voltage (diode)		V_{DSF}	$I_{DR} = 11 \text{ A}, V_{GS} = 0 \text{ V}$	—	—	-1.2	V







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