

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

TPCP8002

Notebook PC Applications

Portable Equipment Applications

- Lead (Pb)-Free
- Small footprint due to small and thin package
- Low drain-source ON-resistance
: $R_{DS(ON)} = 7\text{ m}\Omega$ (typ.)
- High forward transfer admittance
: $|Y_{fs}| = 36\text{ S}$ (typ.)
- Low leakage current
: $I_{DSS} = 10\text{ }\mu\text{A}$ ($V_{DS} = 20\text{ V}$)
- Enhancement mode
: $V_{th} = 0.5\text{ to }1.2\text{ V}$ ($V_{DS} = 10\text{ V}$, $I_D = 0.2\text{ mA}$)

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

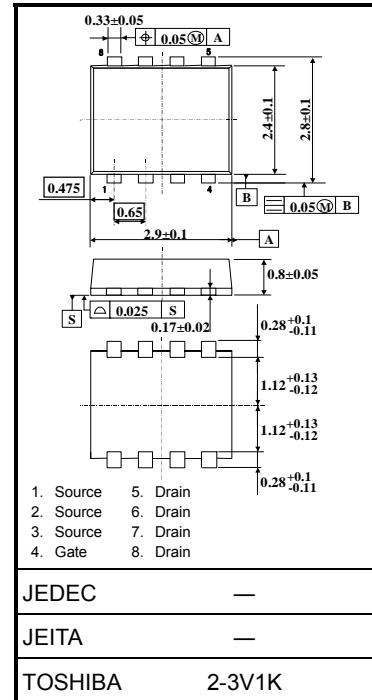
Characteristic		Symbol	Rating	Unit
Drain-source voltage		V_{DSS}	20	V
Drain-gate voltage ($R_{GS} = 20\text{ k}\Omega$)		V_{DGR}	20	V
Gate-source voltage		V_{GSS}	± 12	V
Drain current	DC (Note 1)	I_D	9.1	A
	Pulse (Note 1)	I_{DP}	36.4	
Drain power dissipation ($t = 5\text{ s}$) (Note 2a)		P_D	1.68	W
Drain power dissipation ($t = 5\text{ s}$) (Note 2b)		P_D	0.84	
Single pulse avalanche energy (Note 3)		E_{AS}	21.5	mJ
Avalanche current		I_{AR}	9.1	A
Repetitive avalanche energy (Note 4)		E_{AR}	0.168	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 5, refer to the next page.

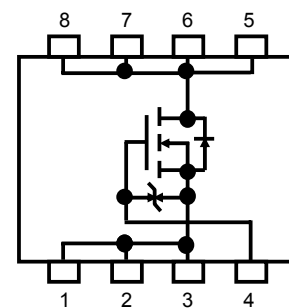
Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) are within 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.

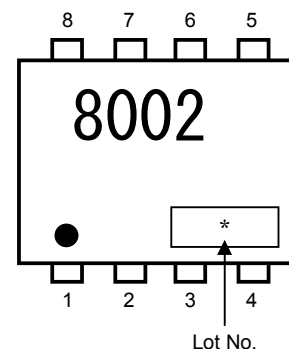
Unit: mm



Circuit Configuration



Marking (Note 5)

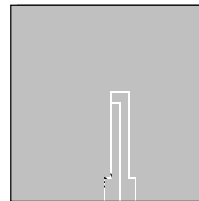


Thermal Characteristics

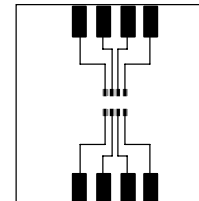
Characteristic	Symbol	Max	Unit
Thermal resistance, channel to ambient (t = 5 s) (Note 2a)	$R_{th(ch-a)}$	74.4	°C/W
Thermal resistance, channel to ambient (t = 5 s) (Note 2b)	$R_{th(ch-a)}$	148.8	°C/W

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

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



FR-4
25.4 × 25.4 × 0.8t
Unit : (mm)



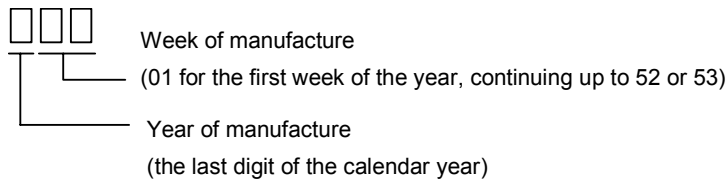
FR-4
25.4 × 25.4 × 0.8t
Unit : (mm)

Note 3: $V_{DD} = 16\text{ V}$, $T_{ch} = 25^\circ\text{C}$ (initial), $L = 0.2\text{ mH}$, $R_G = 25\ \Omega$, $I_{AR} = 9.1\text{ A}$

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

Note 5: ● on the lower left of the marking indicates Pin 1.

* Weekly code (3 digits):

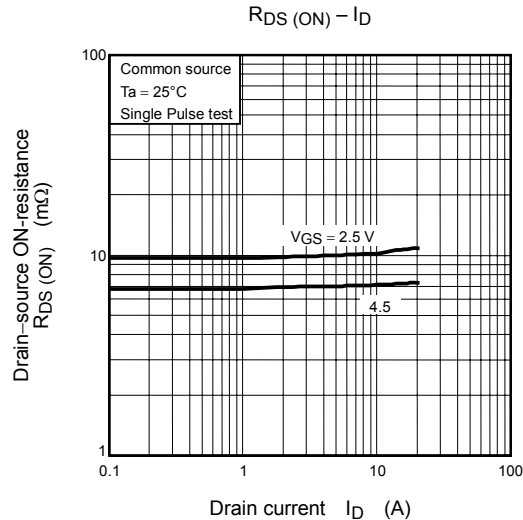
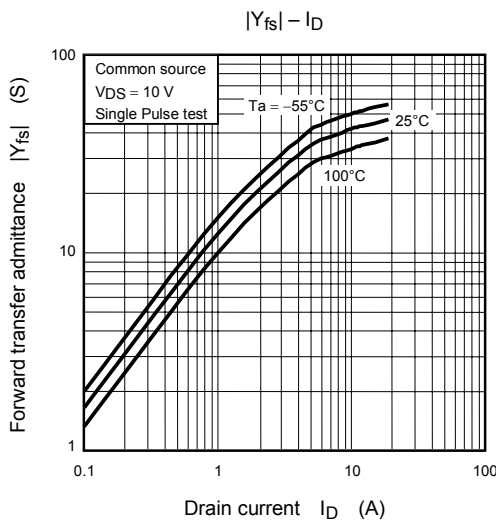
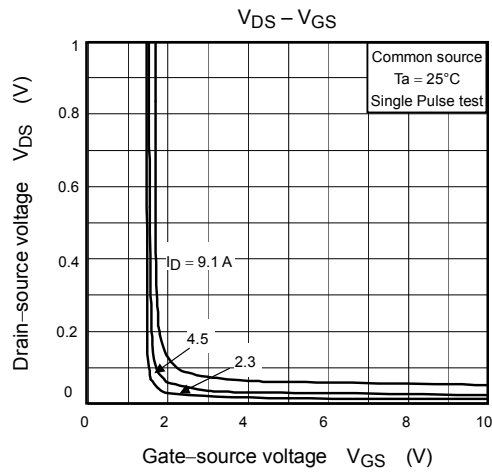
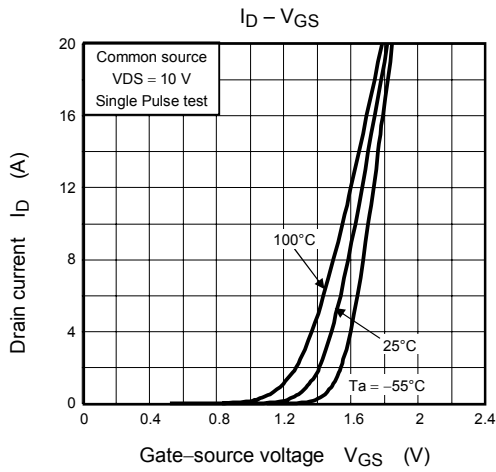
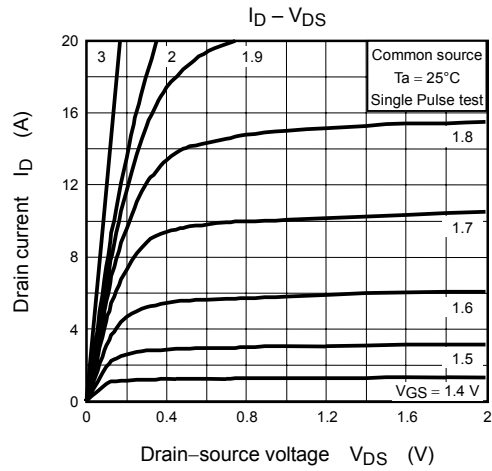
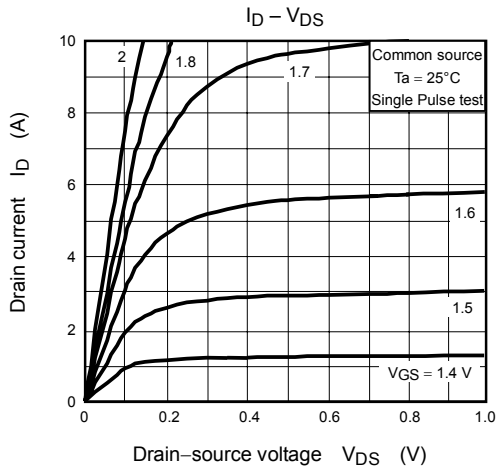


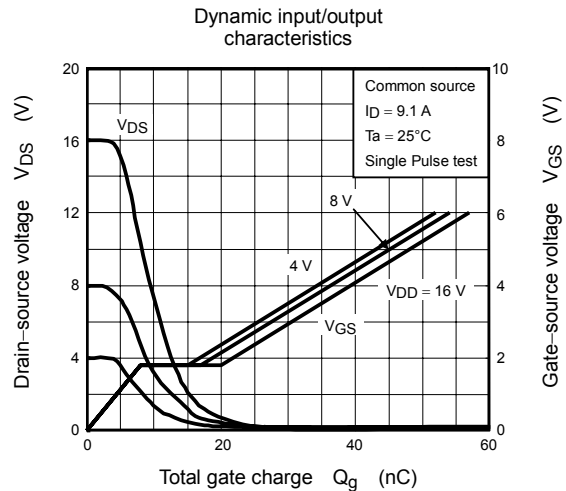
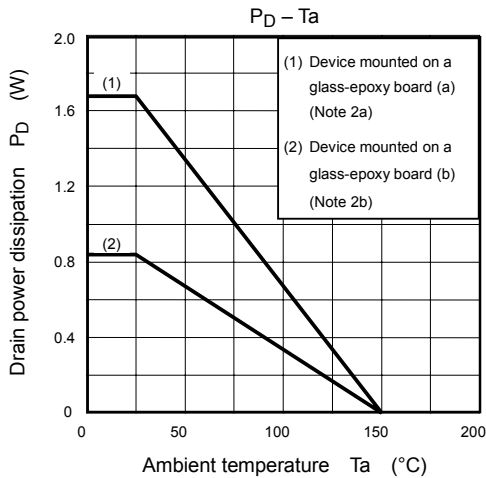
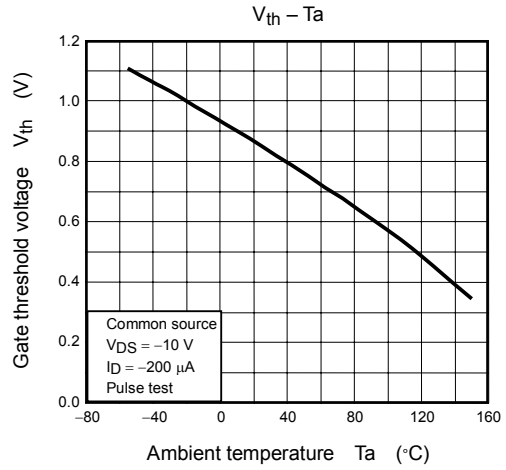
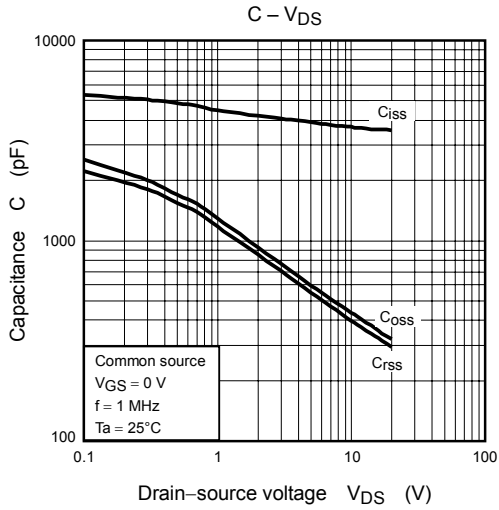
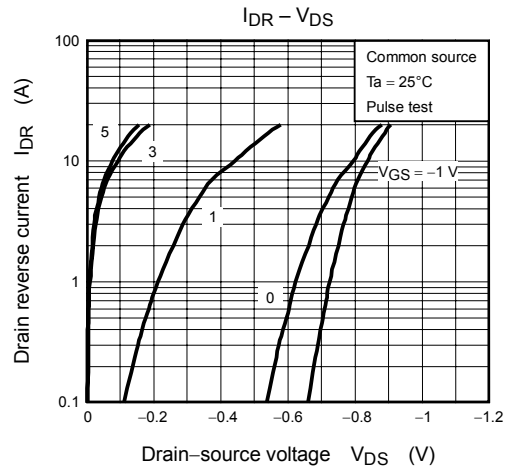
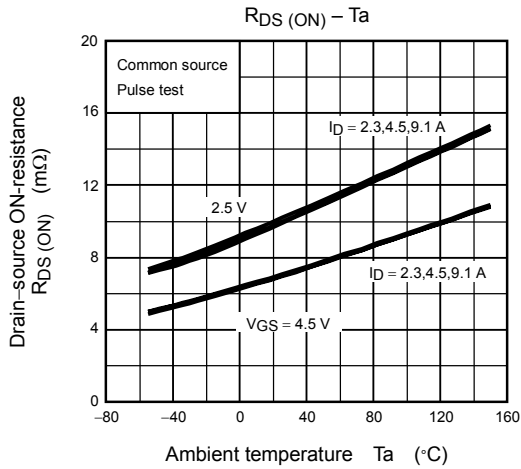
Electrical Characteristics (Ta = 25°C)

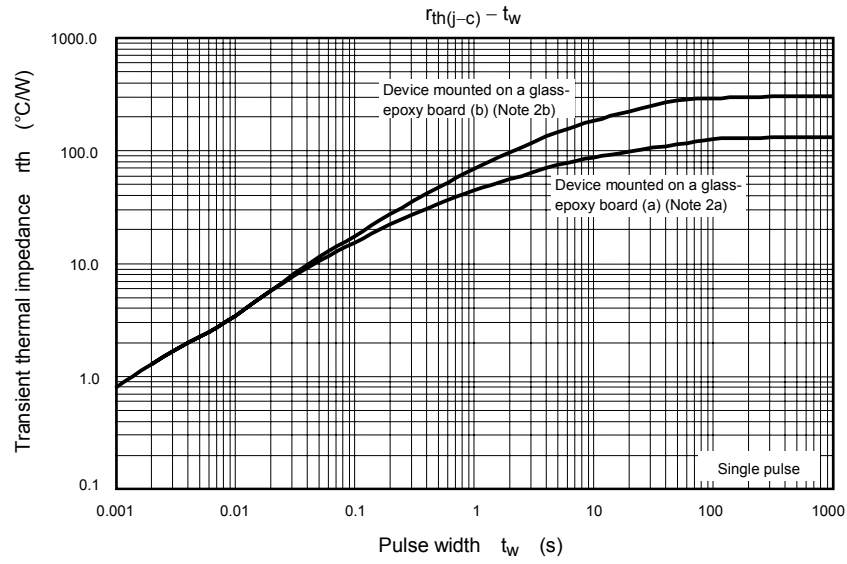
Characteristic		Symbol	Test Condition	Min	Typ.	Max	Unit
Gate leakage current		I_{GSS}	$V_{GS} = \pm 10\text{ V}, V_{DS} = 0\text{ V}$	—	—	± 10	μA
Drain cut-off current		I_{DSS}	$V_{DS} = 20\text{ V}, V_{GS} = 0\text{ V}$	—	—	10	μA
Drain-source breakdown voltage		$V_{(BR)DSS}$	$I_D = 10\text{ mA}, V_{GS} = 0\text{ V}$	20	—	—	V
		$V_{(BR)DSX}$	$I_D = 10\text{ mA}, V_{GS} = -12\text{ V}$	8	—	—	
Gate threshold voltage		V_{th}	$V_{DS} = 10\text{ V}, I_D = 0.2\text{ mA}$	0.5	—	1.2	V
Drain-source ON-resistance		$R_{DS(ON)}$	$V_{GS} = 2.5\text{ V}, I_D = 4.5\text{ A}$	—	10	13.7	m Ω
			$V_{GS} = 4.5\text{ V}, I_D = 4.5\text{ A}$	—	7	10	
Forward transfer admittance		$ Y_{fs} $	$V_{DS} = 10\text{ V}, I_D = 4.5\text{ A}$	18	36	—	S
Input capacitance		C_{iss}	$V_{DS} = 10\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$	—	3700	—	pF
Reverse transfer capacitance		C_{rss}		—	400	—	
Output capacitance		C_{oss}		—	450	—	
Switching time	Rise time	t_r		—	14	—	ns
	Turn-on time	t_{on}		—	24	—	
	Fall time	t_f		—	30	—	
	Turn-off time	t_{off}		Duty $\leq 1\%$, $t_w = 10\ \mu\text{s}$	—	110	
Total gate charge (gate-source plus gate-drain)		Q_g	$V_{DD} \approx 16\text{ V}, V_{GS} = 5\text{ V}, I_D = 9.1\text{ A}$	—	48	—	nC
Gate-source charge 1		Q_{gs1}		—	8	—	
Gate-drain ("Miller") charge		Q_{gd}		—	12	—	

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

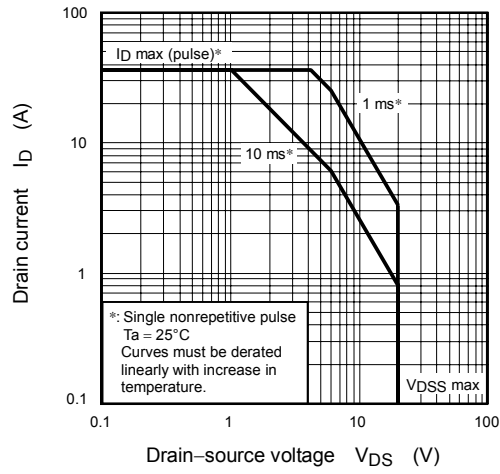
Characteristic		Symbol	Test Condition	Min	Typ.	Max	Unit
Drain reverse current	Pulse (Note 1)	I_{DRP}	—	—	—	36.4	A
Forward voltage (diode)		V_{DSF}	$I_{DR} = 9.1\text{ A}, V_{GS} = 0\text{ V}$	—	—	-1.2	V







Safe operating area



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