

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

TPCP8102

Notebook PC Applications

Portable Equipment Applications

- Small footprint due to small and thin package
- Low drain-source ON-resistance: $R_{DS(ON)} = 13.5 \text{ m}\Omega$ (typ.)
- High forward transfer admittance: $|Y_{fs}| = 24 \text{ S}$ (typ.)
- Low leakage current: $I_{DSS} = -10 \text{ }\mu\text{A}$ (max) ($V_{DS} = -20 \text{ V}$)
- Enhancement model: $V_{th} = -0.45 \text{ to } -1.2 \text{ V}$
($V_{DS} = -10 \text{ V}$, $I_D = -200 \text{ }\mu\text{A}$)

Absolute Maximum Ratings (Ta = 25°C)

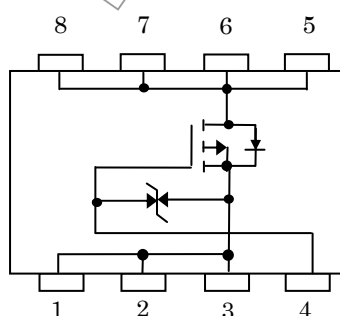
Characteristic		Symbol	Rating	Unit
Drain-source voltage		V_{DSS}	-20	V
Drain-gate voltage ($R_{GS} = 20\text{ k}\Omega$)		V_{DGR}	-20	V
Gate-source voltage		V_{GSS}	± 12	V
Drain current	DC (Note 1)	I_D	-7.2	A
	Pulse (Note 1)	I_{DP}	-28.8	
Drain power dissipation (t = 5 s) (Note 2a)		P_D	1.68	W
Drain power dissipation (t = 5 s) (Note 2b)		P_D	0.84	W
Single-pulse avalanche energy (Note 3)		E_{AS}	33.7	mJ
Avalanche current		I_{AR}	-7.2	A
Repetitive avalanche energy (Note 4)		E_{AR}	0.168	mJ
Channel temperature		T_{ch}	150	$^{\circ}\text{C}$
Storage temperature range		T_{stg}	-55~150	$^{\circ}\text{C}$

Note: For Notes 1 to 5, refer to the next page.

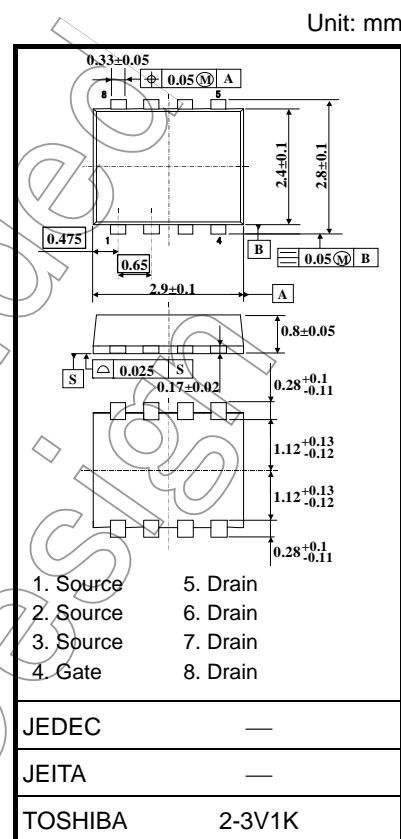
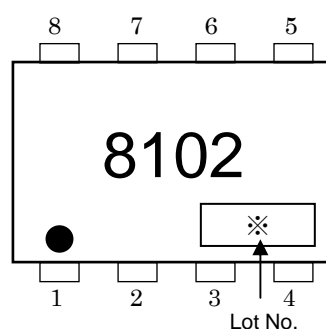
Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) are within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

Circuit Configuration



Marking (Note 5)



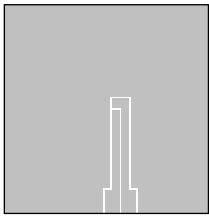
Weight: 0.017 g (typ.)

Thermal Characteristics

Characteristics	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

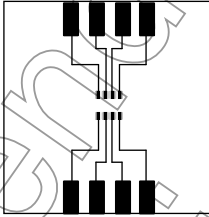
Note 1: Ensure that the channel temperature does not exceed 150°C during use of the device.

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 × 0.8
(Unit: mm)

(a)



FR-4
25.4 × 25.4 × 0.8
(Unit: mm)

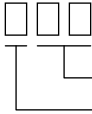
(b)

Note 3: $V_{DD} = -16\text{ V}$, $T_{ch} = 25^\circ\text{C}$ (initial), $L = 0.5\text{ mH}$, $R_G = 25\ \Omega$, $I_{AR} = -7.2\text{ A}$

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

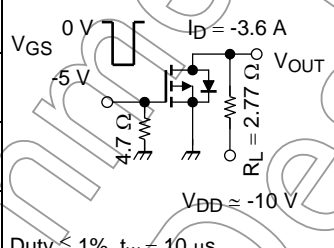
Note 5: • on the lower left of the marking indicates Pin 1.

* Weekly code (three digits):



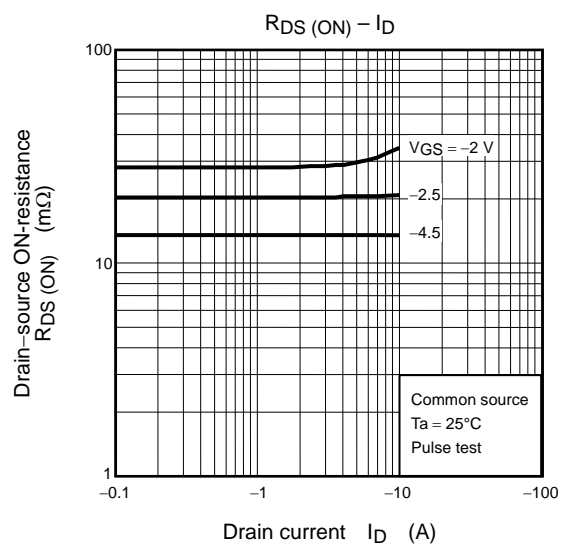
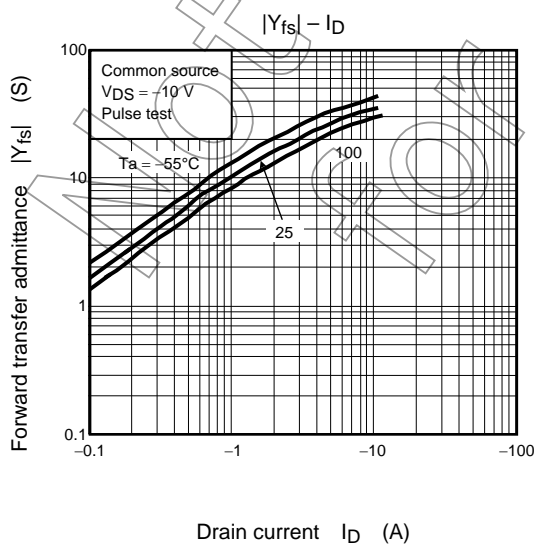
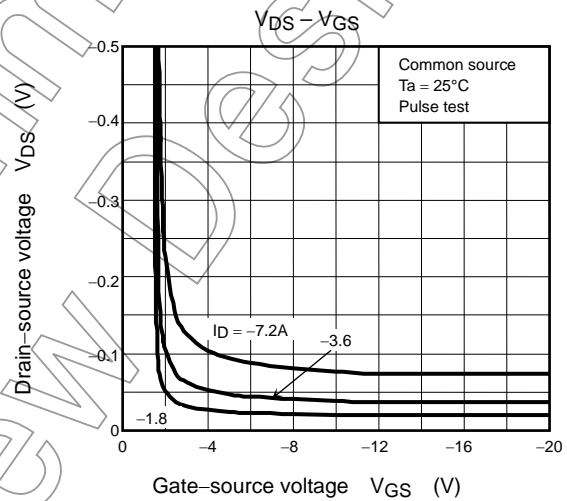
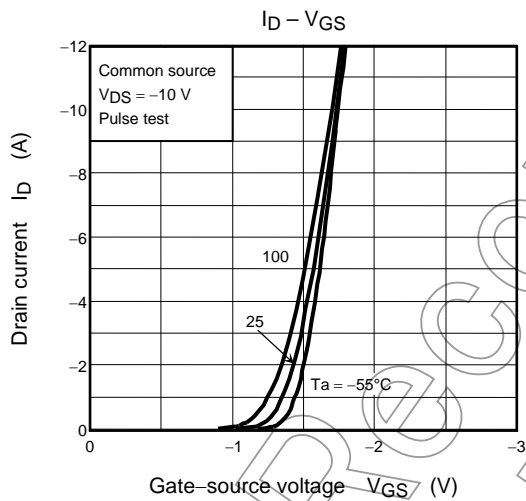
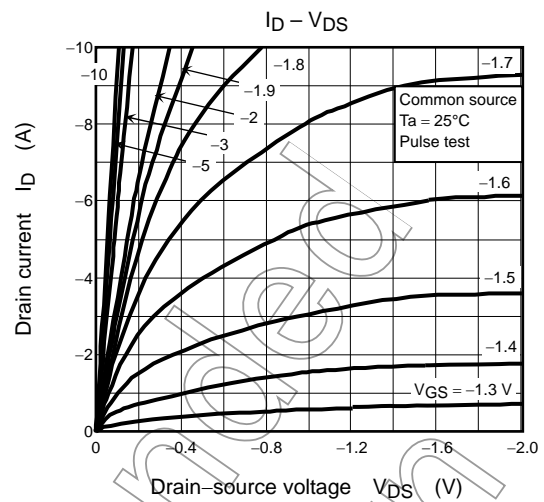
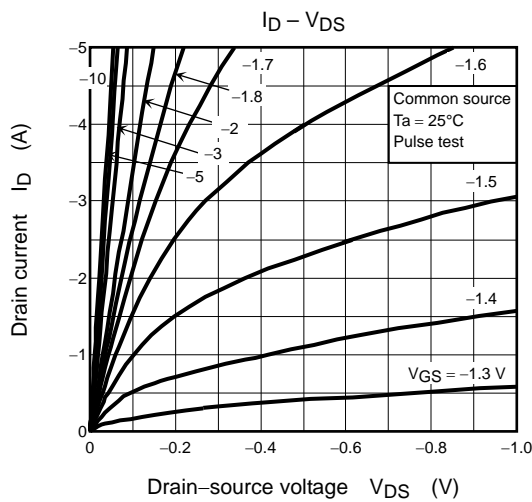
Week of manufacture
(01 for the first week of the year, continuing up to 52 or 53)
Year of manufacture
(The last digit of the calendar year)

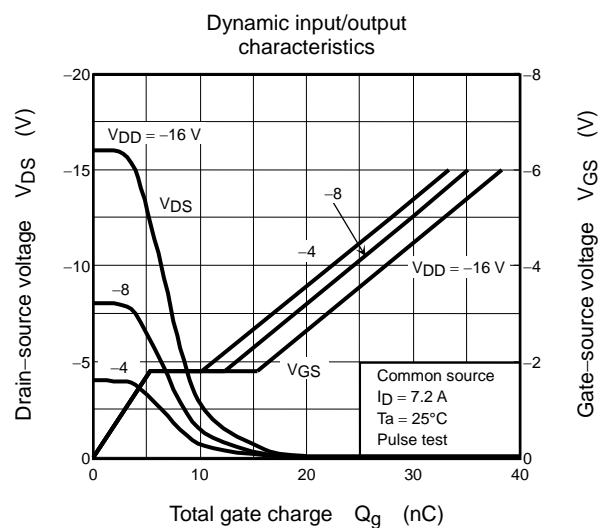
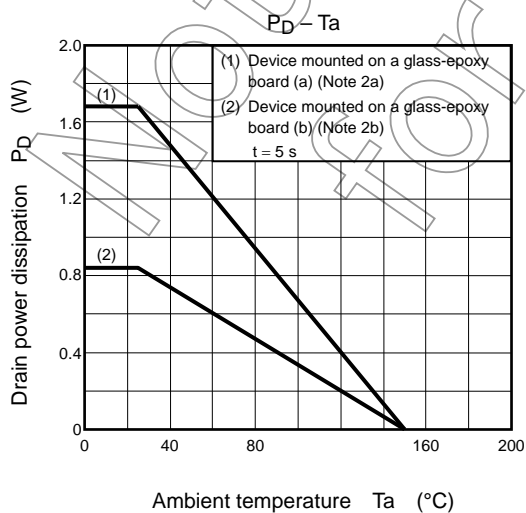
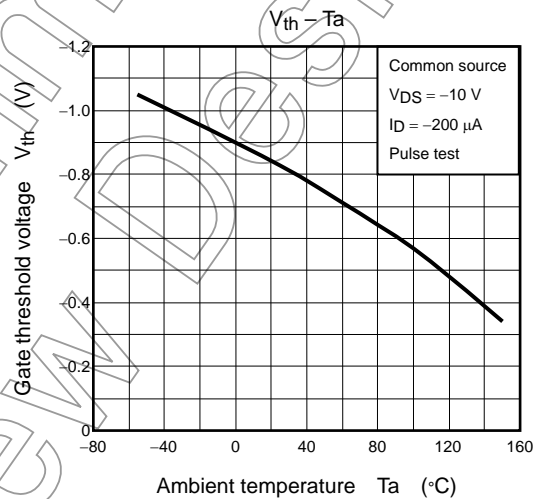
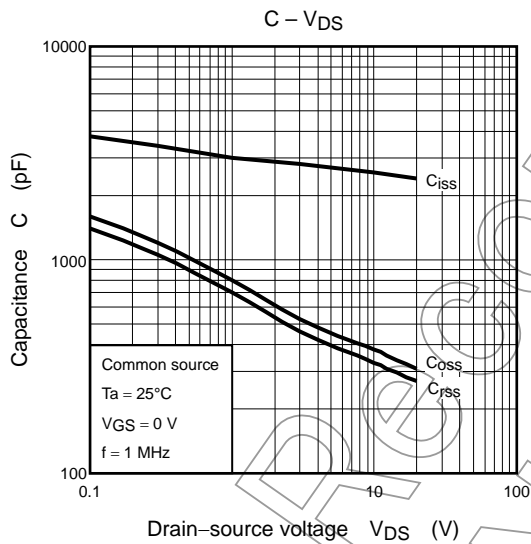
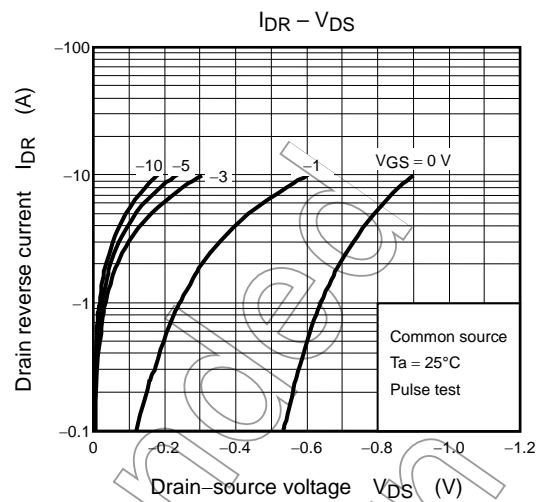
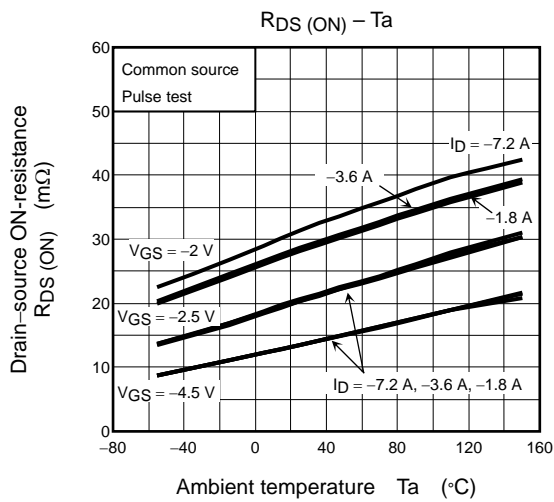
Electrical Characteristics (Ta = 25°C)

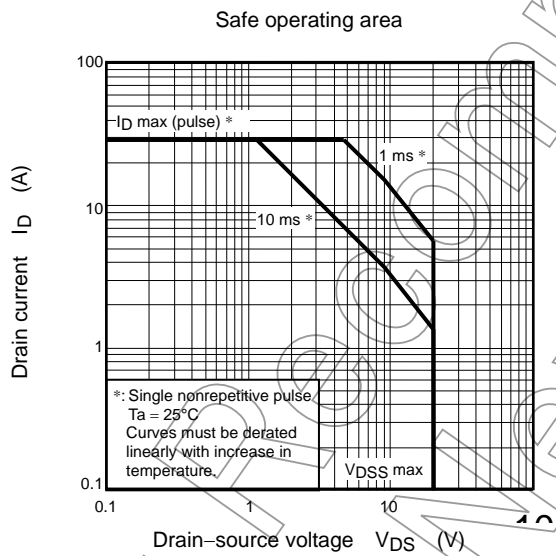
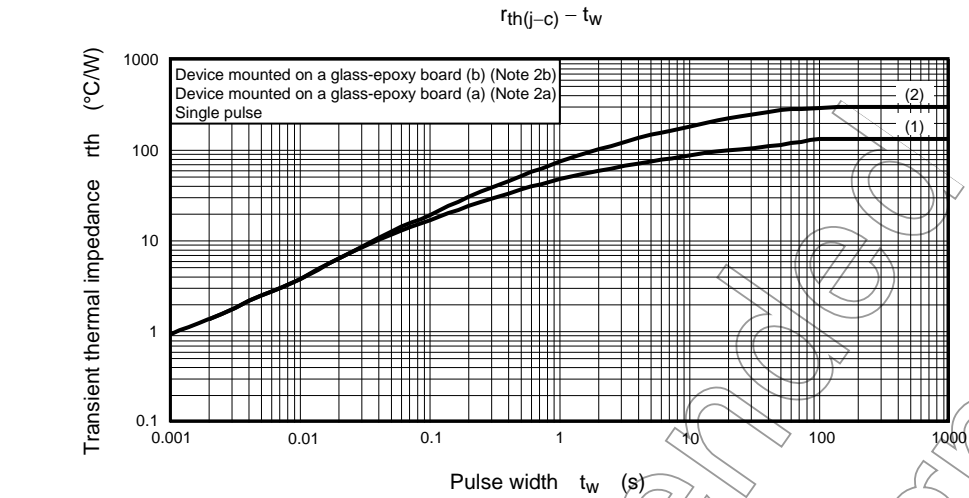
Characteristic		Symbol	Test Condition	Min	Typ.	Max	Unit
Gate leakage current		I_{GSS}	$V_{GS} = \pm 10 \text{ V}, V_{DS} = 0 \text{ V}$	—	—	± 10	μA
Drain cutoff current		I_{DSS}	$V_{DS} = -20 \text{ V}, V_{GS} = 0 \text{ V}$	—	—	-10	μA
Drain-source breakdown voltage		$V_{(BR) DSS}$	$I_D = -10 \text{ mA}, V_{GS} = 0 \text{ V}$	-20	—	—	V
		$V_{(BR) DSX}$	$I_D = -10 \text{ mA}, V_{GS} = 12 \text{ V}$	-8	—	—	
Gate threshold voltage		V_{th}	$V_{DS} = -10 \text{ V}, I_D = -200 \mu\text{A}$	-0.45	—	-1.2	V
Drain-source ON-resistance		$R_{DS(ON)}$	$V_{GS} = -2.0 \text{ V}, I_D = -1.8 \text{ A}$	—	29	80	$\text{m}\Omega$
			$V_{GS} = -2.5 \text{ V}, I_D = -3.6 \text{ A}$	—	20	30	
			$V_{GS} = -4.5 \text{ V}, I_D = -3.6 \text{ A}$	—	13.5	18	
Forward transfer admittance		$ Y_{fs} $	$V_{DS} = -10 \text{ V}, I_D = -3.6 \text{ A}$	12	24	—	S
Input capacitance		C_{iss}	$V_{DS} = -10 \text{ V}, V_{GS} = 0 \text{ V}, f = 1 \text{ MHz}$	—	2560	—	pF
Reverse transfer capacitance		C_{rss}		—	330	—	
Output capacitance		C_{oss}		—	380	—	
Switching time	Rise time	t_r		—	5	—	ns
	Turn-on time	t_{on}		—	14	—	
	Fall time	t_f		—	42	—	
	Turn-off time	t_{off}		—	142	—	
Total gate charge (gate-source plus gate-drain)		Q_g	$V_{DD} \approx -16 \text{ V}, V_{GS} = -5 \text{ V}, I_D = -7.2 \text{ A}$	—	33	—	nC
Gate-source charge 1		Q_{gs1}		—	5.4	—	
Gate-drain ("Miller") charge		Q_{gd}		—	10	—	

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

Characteristic		Symbol	Test Condition	Min	Typ.	Max	Unit
Drain reverse current	Pulse (Note 1)	I_{DRP}	—	—	—	-28.8	A
Forward voltage (diode)		V_{DSF}	$I_{DR} = -3.6 \text{ A}, V_{GS} = 0 \text{ V}$	—	—	1.2	V







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