

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

TPCP8004

Notebook PC Applications

Portable Equipment Applications

- Small footprint due to a small and thin package
- High speed switching
- Small gate charge: $Q_g = 26\text{nC}$ (typ.)
- Low drain-source ON-resistance: $R_{DS(ON)} = 7\text{m}\Omega$ (typ.)
- High forward transfer admittance: $|Y_{fs}| = 21\text{S}$ (typ.)
- Low leakage current: $I_{DSS} = 10\mu\text{A}$ (max) ($V_{DS} = 30\text{V}$)
- Enhancement mode: $V_{th} = 1.3$ to 2.5V ($V_{DS} = 10\text{V}$, $I_D = 1\text{mA}$)

Absolute Maximum Ratings (Ta=25°C)

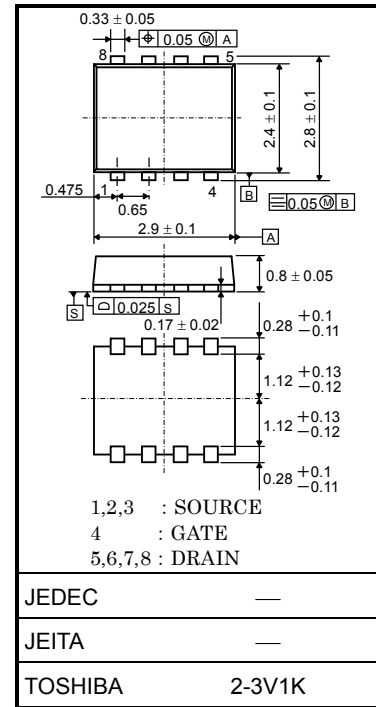
Characteristics	Symbol	Rating	Unit
Drain-source voltage	V_{DSS}	30	V
Drain-gate voltage ($R_{GS}=20\text{ k}\Omega$)	V_{DGR}	30	V
Gate-source voltage	V_{GSS}	± 20	V
Drain current	DC (Note 1)	I_D	8.3
	Pulse (Note 1)	I_{DP}	33.2
Drain power dissipation (t = 5 s) (Note 2a)	P_D	1.68	W
Drain power dissipation (t = 5 s) (Note 2b)	P_D	0.84	W
Single-pulse avalanche energy (Note 3)	E_{AS}	17.9	mJ
Avalanche current	I_{AR}	8.3	A
Repetitive avalanche energy (Note 4)	E_{AR}	0.021	mJ
Channel temperature	T_{ch}	150	°C
Storage temperature range	T_{stg}	-55 to 150	°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.).

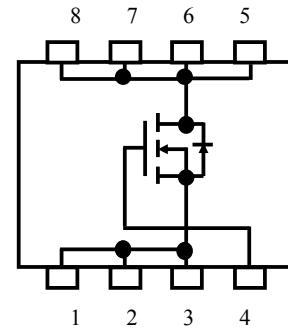
This transistor is an electrostatic-sensitive device. Handle with care.

Unit: mm

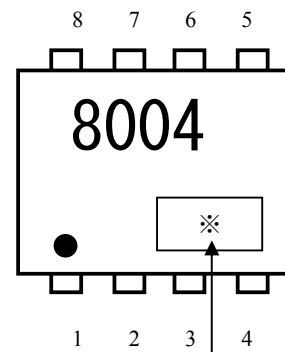


Weight: 0.017g(typ.)

Circuit Configuration



Marking (Note 5)



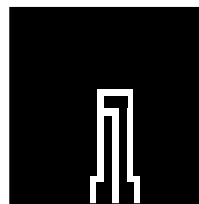
Lot No.

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

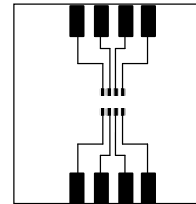
Note 1: Ensure that the channel temperature does not exceed 150°C.

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



(a)

FR-4
25.4 × 25.4 × 0.8
(Unit: mm)



(b)

FR-4
25.4 × 25.4 × 0.8
(Unit: mm)

Note 3: $V_{DD} = 24V$, $T_{ch} = 25^{\circ}C$ (initial), $L = 0.2mH$, $R_G = 1 \Omega$, $I_{AR} = 8.3 A$

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)



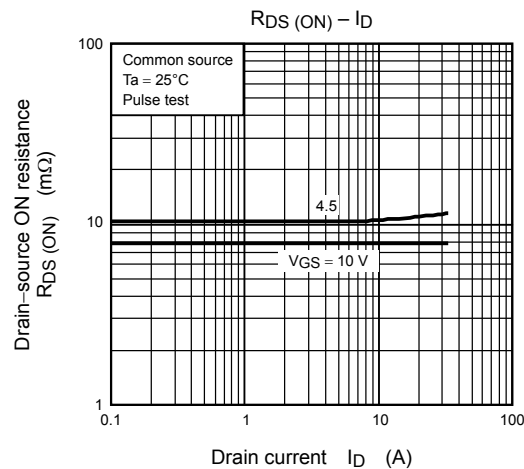
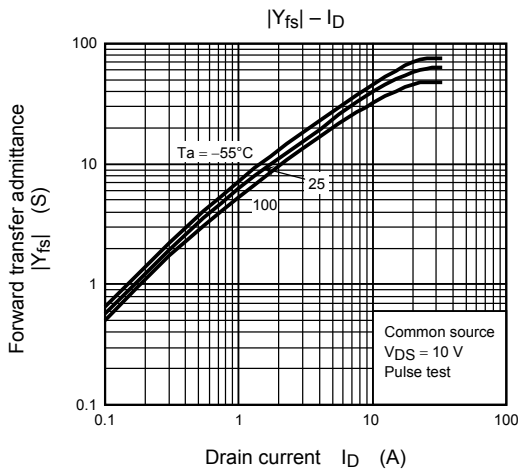
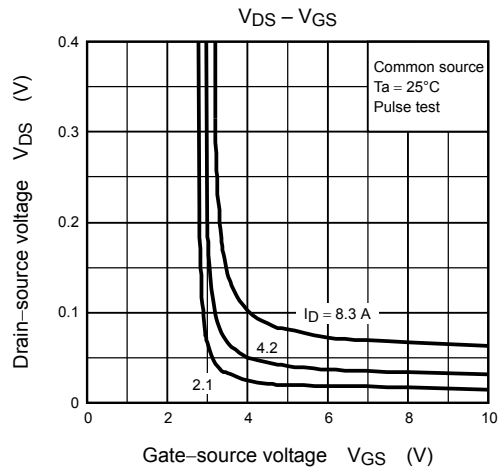
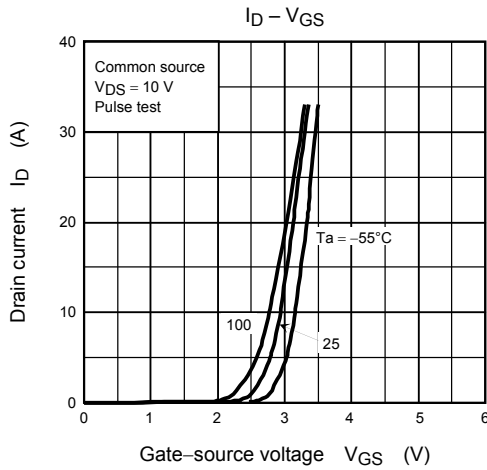
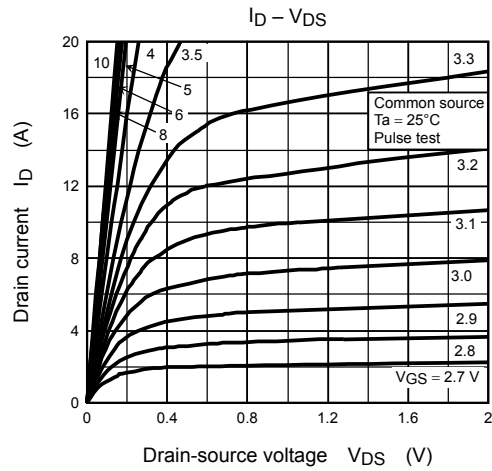
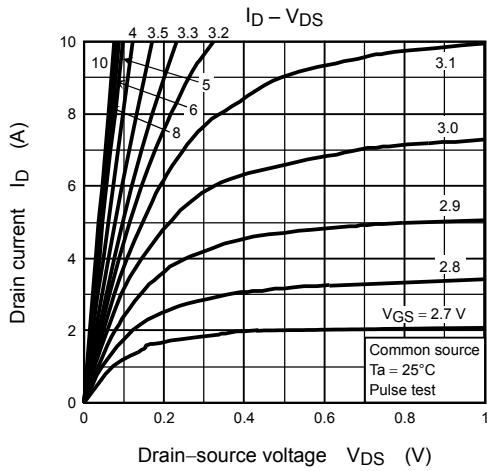
Week of manufacture
(01 for the first week of the year, continuing up to 52 or 53)
Year of manufacture
(The last digit of the year)

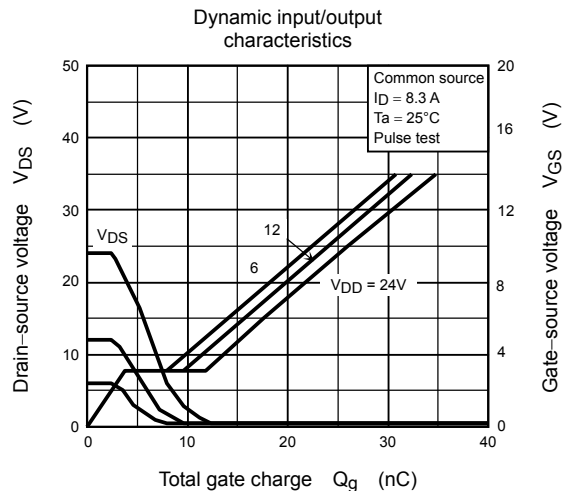
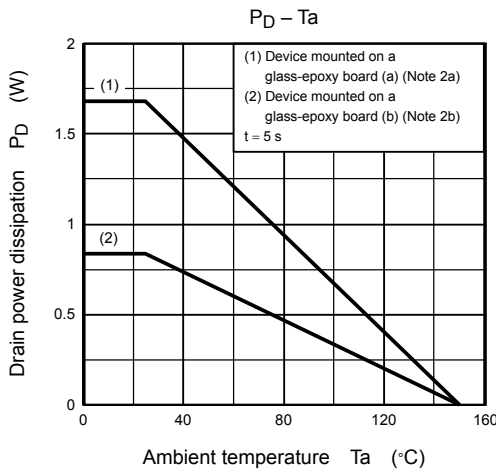
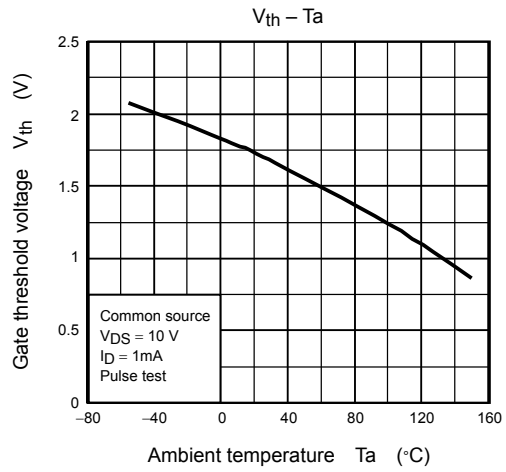
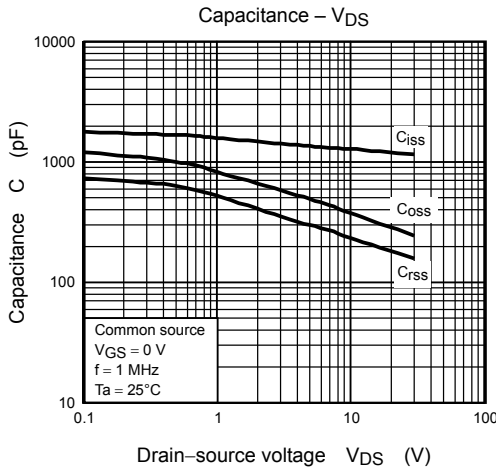
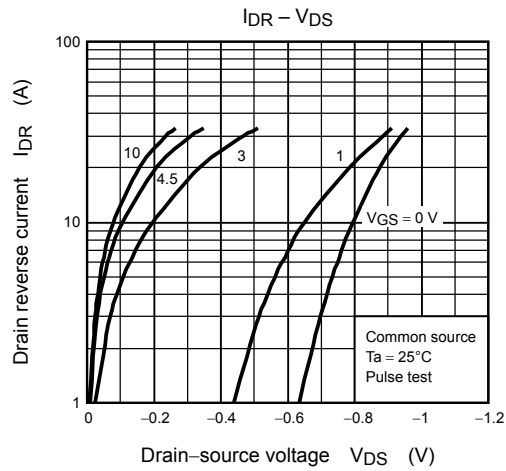
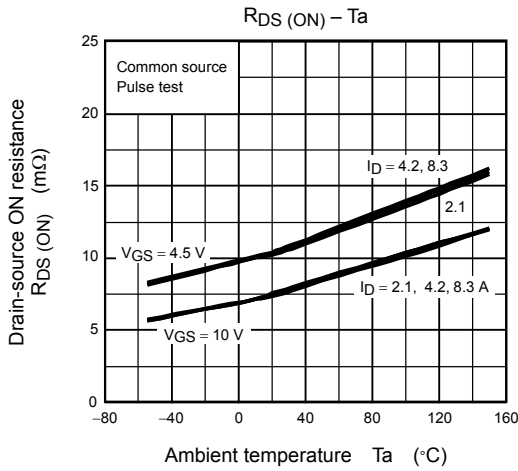
Electrical Characteristics (Ta = 25°C)

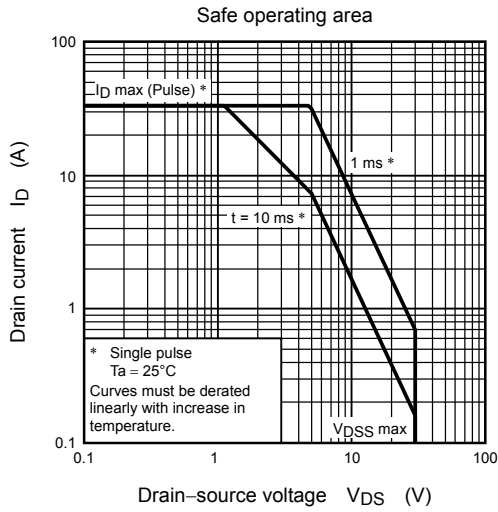
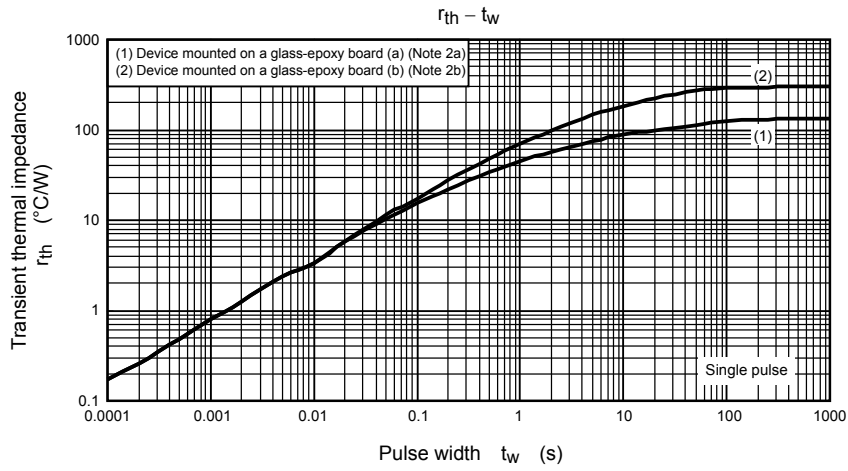
Characteristic		Symbol	Test Condition	Min	Typ.	Max	Unit
Gate leakage current		I _{GSS}	V _{GS} = ±20 V, V _{DS} = 0 V	—	—	±100	nA
Drain cutoff current		I _{DSS}	V _{DS} = 30 V, V _{GS} = 0 V	—	—	10	μA
Drain-source breakdown voltage		V (BR) DSS	I _D = 10 mA, V _{GS} = 0 V	30	—	—	V
		V (BR) DSX	I _D = 10 mA, V _{GS} = -20 V	10	—	—	
Gate threshold voltage		V _{th}	V _{DS} = 10 V, I _D = 1mA	1.3	—	2.5	V
Drain-source ON-resistance		R _{DS (ON)}	V _{GS} = 4.5 V, I _D = 4.2A	—	10.5	14	mΩ
			V _{GS} = 10 V, I _D = 4.2A	—	7	8.5	
Forward transfer admittance		Y _{fs}	V _{DS} = 10 V, I _D = 4.2A	10	21	—	S
Input capacitance		C _{iss}	V _{DS} = 10 V, V _{GS} = 0 V, f = 1MHz	—	1270	—	pF
Reverse transfer capacitance		C _{rss}		—	240	—	
Output capacitance		C _{oss}		—	380	—	
Switching time	Rise time	t _r		—	12	—	ns
	Turn-on time	t _{on}		—	23	—	
	Fall time	t _f		—	9	—	
	Turn-off time	t _{off}		—	35	—	
Total gate charge (gate-source plus gate-drain)		Q _g	V _{DD} ≈ 24 V, V _{GS} = 10 V, I _D = 8.3 A	—	26	—	nC
Gate-source charge 1		Q _{gs1}		—	3.8	—	
Gate-drain ("Miller") charge		Q _{gd}		—	8	—	

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

Characteristic		Symbol	Test Condition	Min	Typ.	Max	Unit
Drain reverse current	Pulse (Note 1)	I _{DRP}	—	—	—	33.2	A
Forward voltage (diode)		V _{DSF}	I _{DR} = 8.3 A, V _{GS} = 0 V	—	—	-1.2	V







RESTRICTIONS ON PRODUCT USE

20070701-EN GENERAL

- The information contained herein is subject to change without notice.
- TOSHIBA is continually working to improve the quality and reliability of its products. Nevertheless, semiconductor devices in general can malfunction or fail due to their inherent electrical sensitivity and vulnerability to physical stress. It is the responsibility of the buyer, when utilizing TOSHIBA products, to comply with the standards of safety in making a safe design for the entire system, and to avoid situations in which a malfunction or failure of such TOSHIBA products could cause loss of human life, bodily injury or damage to property.
In developing your designs, please ensure that TOSHIBA products are used within specified operating ranges as set forth in the most recent TOSHIBA products specifications. Also, please keep in mind the precautions and conditions set forth in the "Handling Guide for Semiconductor Devices," or "TOSHIBA Semiconductor Reliability Handbook" etc.
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