

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

TPC8216-H

High Efficiency DC-DC Converter Applications

Notebook PC Applications

Portable-Equipment Applications

- Small footprint due to a small and thin package
- High-speed switching
- Small gate charge: $Q_{SW} = 3.4 \text{ nC}$ (typ.)
- Low drain-source ON-resistance: $R_{DS(ON)} = 13.6 \text{ m}\Omega$ (typ.)
- High forward transfer admittance: $|Y_{fs}| = 19 \text{ S}$ (typ.)
- Low leakage current: $I_{DSS} = 10 \text{ }\mu\text{A}$ (max) ($V_{DS} = 30 \text{ V}$)
- Enhancement mode: $V_{th} = 1.3 \text{ to } 2.3 \text{ V}$ ($V_{DS} = 10 \text{ V}$, $I_D = 0.1 \text{ mA}$)

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

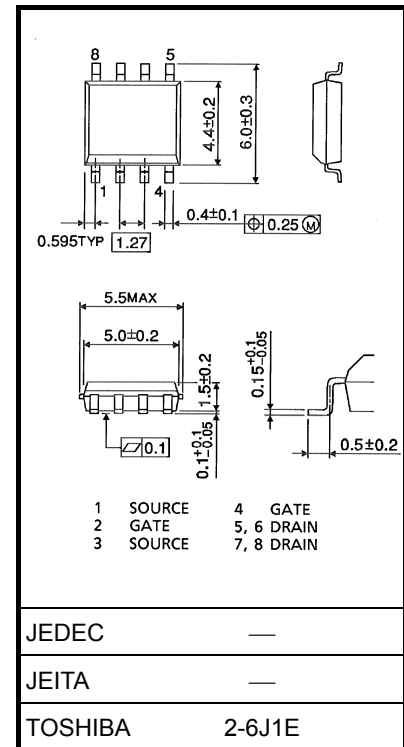
Characteristic		Symbol	Rating	Unit
Drain-source voltage		V_{DSS}	30	V
Drain-gate voltage ($R_{GS} = 20 \text{ k}\Omega$)		V_{DGR}	30	V
Gate-source voltage		V_{GSS}	± 20	V
Drain current	D C (Note 1)	I_D	6.4	A
	Pulse (Note 1)	I_{DP}	25.6	
Drain power dissipation ($t = 10 \text{ s}$) (Note 2a)	Single-device operation (Note 3a)	$P_D(1)$	1.5	W
	Single-device value at dual operation (Note 3b)	$P_D(2)$	1.1	
Drain power dissipation ($t = 10 \text{ s}$) (Note 2b)	Single-device operation (Note 3a)	$P_D(1)$	0.75	W
	Single-device value at dual operation (Note 3b)	$P_D(2)$	0.45	
Single-pulse avalanche energy (Note 4)		E_{AS}	53	mJ
Avalanche current		I_{AR}	6.4	A
Repetitive avalanche energy (Note 2a, Note 3b, Note 5)		E_{AR}	0.13	mJ
Channel temperature		T_{ch}	150	$^\circ\text{C}$
Storage temperature range		T_{stg}	-55 to 150	$^\circ\text{C}$

Note: For Notes 1 to 4, 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).

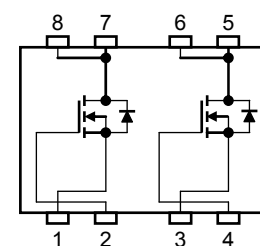
This transistor is an electrostatic-sensitive device. Handle with care.

Unit: mm



Weight: 0.085 g (typ.)

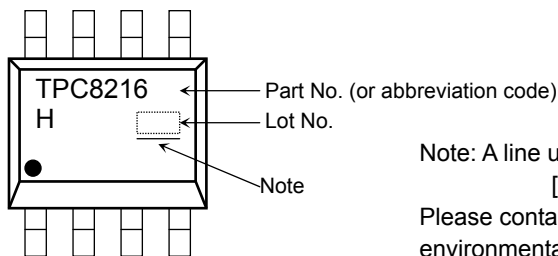
Circuit Configuration



Thermal Characteristics

Characteristic		Symbol	Max	Unit
Thermal resistance, channel to ambient (t = 10 s)	Single-device operation (Note 3a)	$R_{th(ch-a)}(1)$	83.3	°C/W
	Single-device value at dual operation (Note 3b)	$R_{th(ch-a)}(2)$	114	
Thermal resistance, channel to ambient (t = 10 s)	Single-device operation (Note 3a)	$R_{th(ch-a)}(1)$	167	
	Single-device value at dual operation (Note 3b)	$R_{th(ch-a)}(2)$	278	

Marking



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

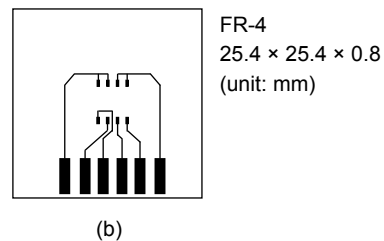
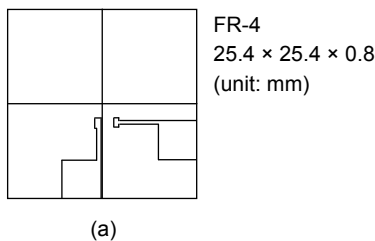
[[G]]/RoHS COMPATIBLE or [[G]]/RoHS [[Pb]]

Please contact your TOSHIBA sales representative for details as to environmental matters such as the RoHS compatibility of Product. The RoHS is the Directive 2002/95/EC of the European Parliament and of the Council of 27 January 2003 on the restriction of the use of certain hazardous substances in electrical and electronic equipment.

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)



Note 3:

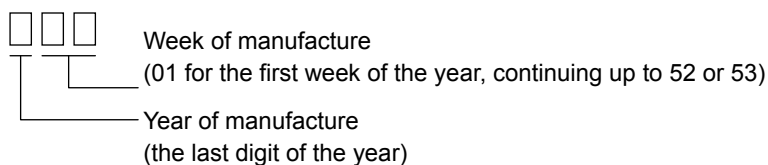
- The power dissipation and thermal resistance values are shown for a single device (During single-device operation, power is only applied to one device.)
- The power dissipation and thermal resistance values are shown for a single device (During dual operation, power is evenly applied to both devices.)

Note 4: $V_{DD} = 24\text{ V}$, $T_{ch} = 25^\circ\text{C}$ (Initial), $L = 1.0\text{ mH}$, $R_G = 25\ \Omega$, $I_{AR} = 6.4\text{ A}$

Note 5: Repetitive rating: pulse width limited by maximum channel temperature

Note 6: • on the lower left of the marking indicates Pin 1.

* Weekly code: (three digits)

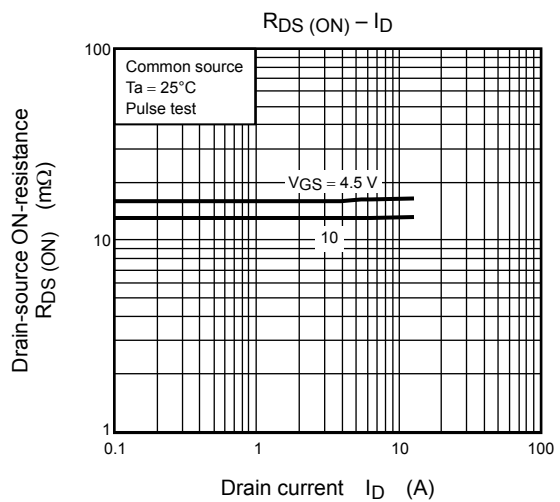
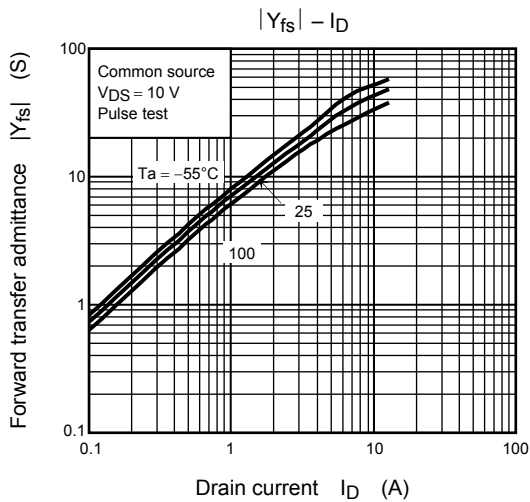
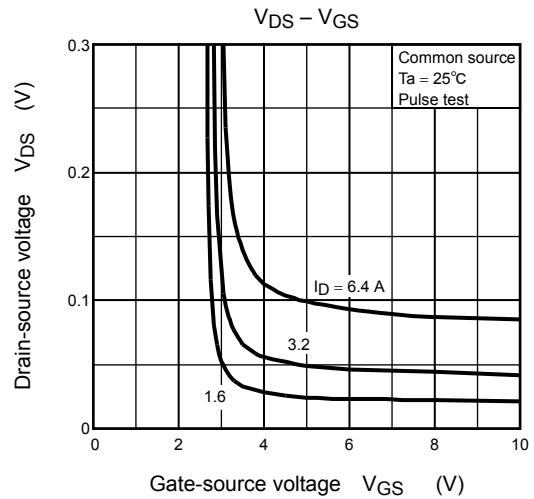
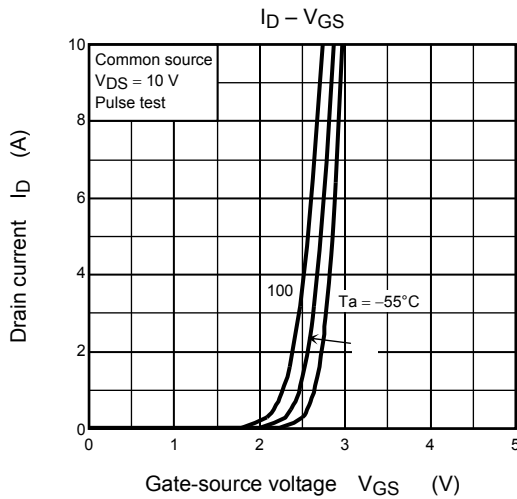
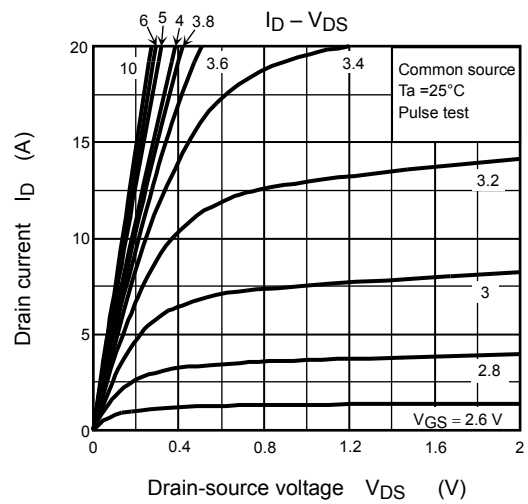
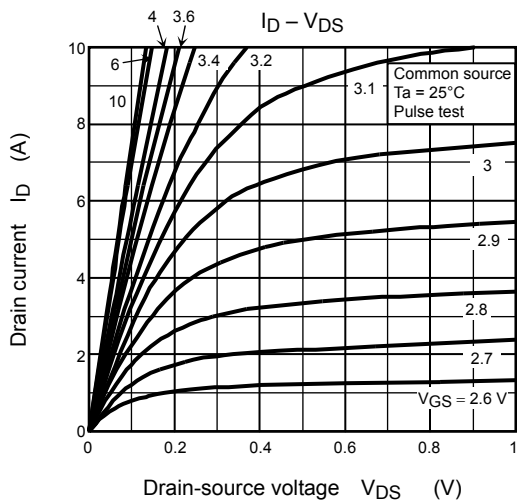


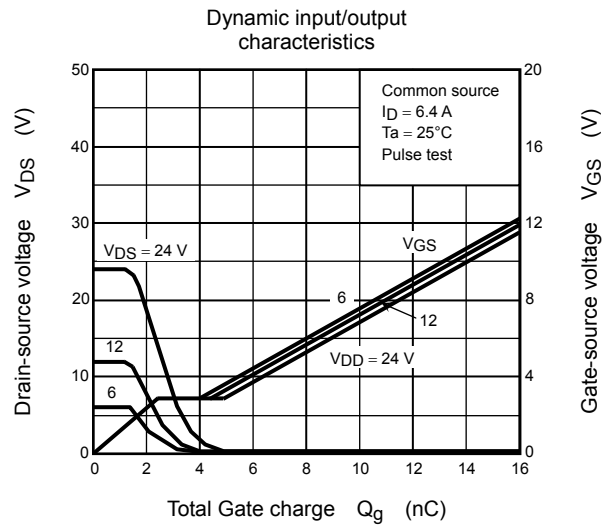
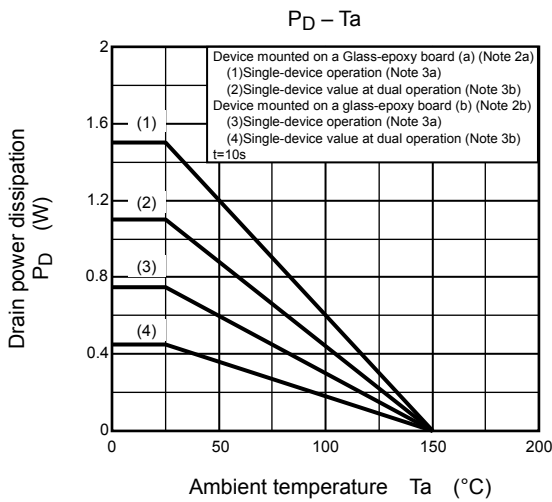
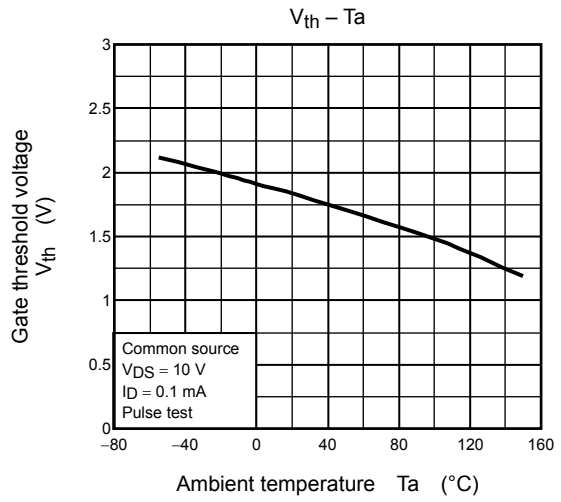
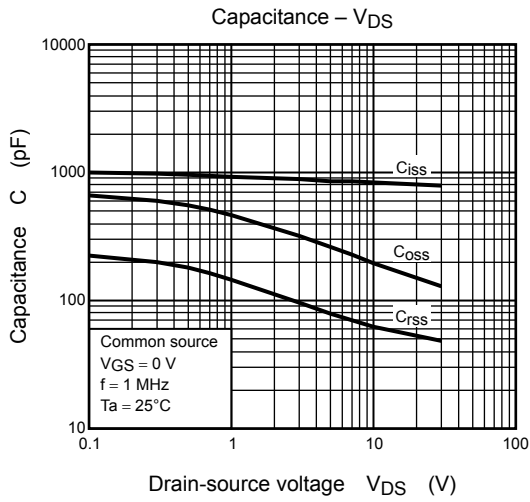
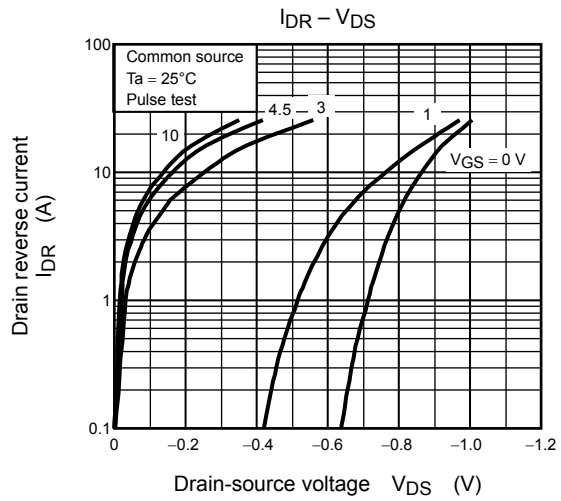
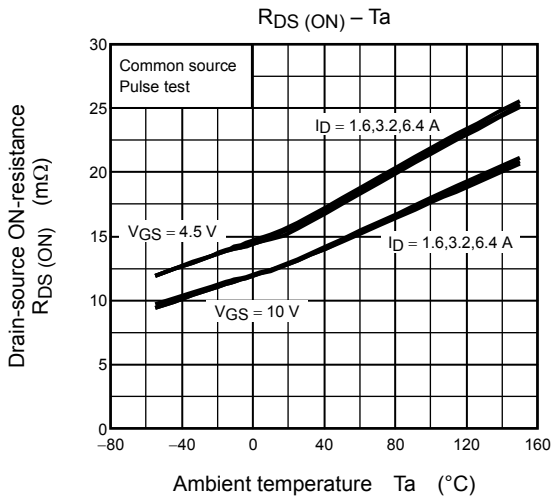
Electrical Characteristics (Ta = 25°C)

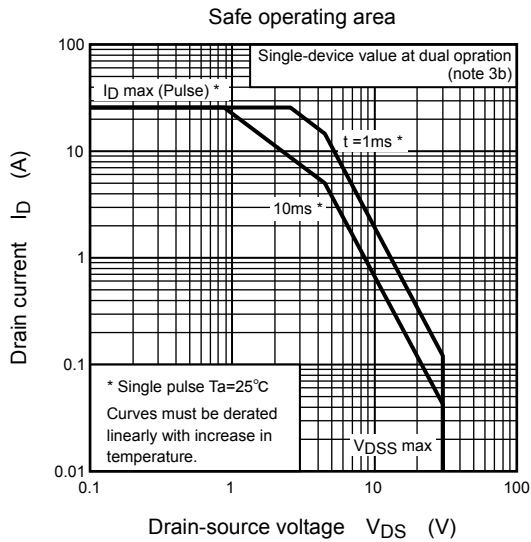
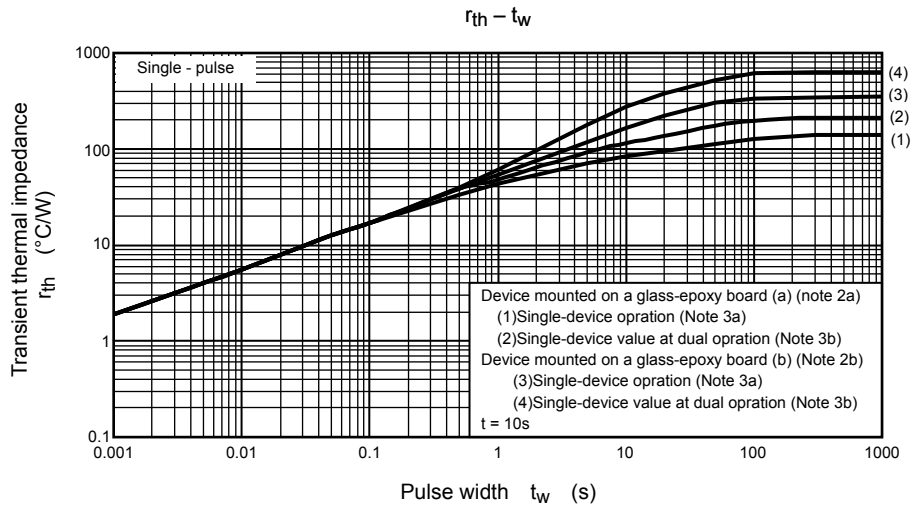
Characteristic		Symbol	Test Condition	Min	Typ.	Max	Unit
Gate leakage current		I_{GSS}	$V_{GS} = \pm 20\text{ V}, V_{DS} = 0\text{ V}$	—	—	± 100	nA
Drain cutoff current		I_{DSS}	$V_{DS} = 30\text{ V}, V_{GS} = 0\text{ V}$	—	—	10	μA
Drain-source breakdown voltage		$V_{(BR)DSS}$	$I_D = 10\text{ mA}, V_{GS} = 0\text{ V}$	30	—	—	V
		$V_{(BR)DSX}$	$I_D = 10\text{ mA}, V_{GS} = -20\text{ V}$	15	—	—	
Gate threshold voltage		V_{th}	$V_{DS} = 10\text{ V}, I_D = 0.1\text{ mA}$	1.3	—	2.3	V
Drain-source ON-resistance		$R_{DS(ON)}$	$V_{GS} = 4.5\text{ V}, I_D = 3.2\text{ A}$	—	16.5	23.0	m Ω
		$R_{DS(ON)}$	$V_{GS} = 10\text{ V}, I_D = 3.2\text{ A}$	—	13.6	20.0	
Forward transfer admittance		$ Y_{fs} $	$V_{DS} = 10\text{ V}, I_D = 3.2\text{ A}$	9.5	19	—	S
Input capacitance		C_{iss}	$V_{DS} = 10\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$	—	900	1170	pF
Reverse transfer capacitance		C_{riss}		—	65	104	
Output capacitance		C_{oss}		—	200	—	
Gate resistance		R_g	$V_{DS} = 10\text{ V}, V_{GS} = 0\text{ V}, f = 5\text{ MHz}$	—	2.5	3.6	Ω
Switching time	Rise time	t_r	<p>$V_{GS} = 10\text{ V}$ $V_{GS} = 0\text{ V}$ $I_D = 3.2\text{ A}$ $R_L = 4.7\Omega$ $V_{DD} \approx 15\text{ V}$ 出力 Duty $\leq 1\%$, $t_w = 10\mu\text{s}$</p>	—	2.3	—	ns
	Turn-on time	t_{on}		—	7.0	—	
	Fall time	t_f		—	9.2	—	
	Turn-off time	t_{off}		—	28	—	
Total gate charge (gate-source plus gate-drain) (Note 7)		Q_g	$V_{DD} \approx 24\text{ V}, V_{GS} = 10\text{ V}, I_D = 6.4\text{ A}$	—	14	—	nC
			$V_{DD} \approx 24\text{ V}, V_{GS} = 5\text{ V}, I_D = 6.4\text{ A}$	—	7.6	—	
Gate-source charge 1		Q_{gs1}	$V_{DD} \approx 24\text{ V}, V_{GS} = 10\text{ V}, I_D = 6.4\text{ A}$	—	2.4	—	
Gate-drain ("Miller") charge		Q_{gd}		—	2.5	—	
Gate switch charge		Q_{sw}		—	3.4	—	

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

Characteristic		Symbol	Test Condition	Min	Typ.	Max	Unit
Drain reverse current	Pulse (Note 1)	I_{DRP}	—	—	—	25.6	A
Forward voltage (diode)		V_{DSF}	$I_{DR} = 6.4\text{ A}, V_{GS} = 0\text{ V}$	—	—	-1.2	V







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