

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

TPCP8201

Portable Equipment Applications
 Motor Drive Applications
 DC-DC Converter Applications

- Lead(Pb)-Free
- Low drain-source ON resistance: $R_{DS(ON)} = 38 \text{ m}\Omega$ (typ.)
- High forward transfer admittance: $|Y_{fs}| = 7.0 \text{ S}$ (typ.)
- Low leakage current: $I_{DSS} = 10 \text{ }\mu\text{A}$ ($V_{DS} = 30 \text{ V}$)
- 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 ($T_a = 25^\circ\text{C}$)

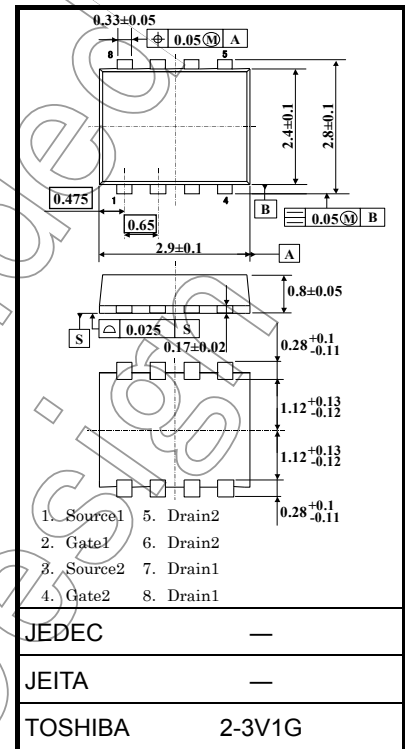
Characteristics		Symbol	Rating	Unit
Drain-source voltage		V_{DS}	30	V
Drain-gate voltage ($R_{GS} = 20 \text{ k}\Omega$)		V_{DGR}	30	V
Gate-source voltage		V_{GSS}	± 20	V
Drain current	DC (Note 1)	I_D	4.2	A
	Pulse (Note 1)	I_{DP}	16.8	
Drain power dissipation ($t = 5 \text{ s}$) (Note 2a)	Single-device operation (Note 3a)	$P_D(1)$	1.48	W
	Single-device value at dual operation (Note 3b)	$P_D(2)$	1.23	
Drain power dissipation ($t = 5 \text{ s}$) (Note 2b)	Single-device operation (Note 3a)	$P_D(1)$	0.58	W
	Single-device value at dual operation (Note 3b)	$P_D(2)$	0.36	
Single pulse avalanche energy (Note 4)		E_{AS}	2.86	mJ
Avalanche current		I_{AR}	2.1	A
Repetitive avalanche energy Single-device value at dual operation (Note 2a, 3b, 5)		E_{AR}	0.12	mJ
Channel temperature		T_{ch}	150	$^\circ\text{C}$
Storage temperature range		T_{stg}	-55~150	$^\circ\text{C}$

Note: For Notes 1 to 6, 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).

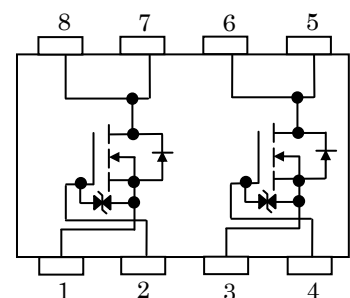
This transistor is an electrostatic-sensitive device. Handle with caution.

Unit: mm

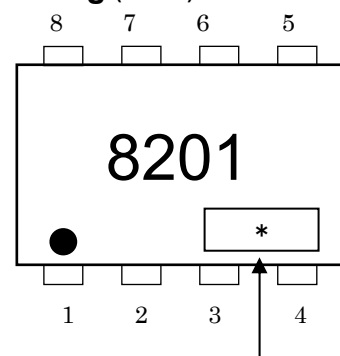


Weight: 0.017 g (typ.)

Circuit Configuration



Marking (Note 6)

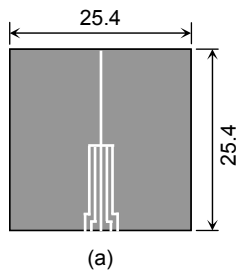


Thermal Characteristics

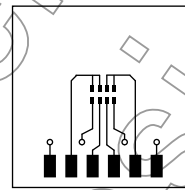
Characteristics		Symbol	Max	Unit
Thermal resistance, channel to ambient (t = 5 s) (Note 2a)	Single-device operation (Note 3a)	R _{th} (ch-a) (1)	84.5	°C/W
	Single-device value at dual operation (Note 3b)	R _{th} (ch-a) (2)	101.6	
Thermal resistance, channel to ambient (t = 5 s) (Note 2b)	Single-device operation (Note 3a)	R _{th} (ch-a) (1)	215.5	°C/W
	Single-device value at dual operation (Note 3b)	R _{th} (ch-a) (2)	347.2	

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 × 0.8
(Unit: mm)



FR-4
25.4 × 25.4 × 0.8
(Unit: mm)

Note 3: a) The power dissipation and thermal resistance values shown are for a single device. (During single-device operation, power is only applied to one device.)

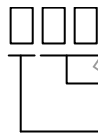
b) The power dissipation and thermal resistance values shown are for a single device. (During dual operation, power is evenly applied to both devices.)

Note 4: V_{DD} = 24 V, T_{ch} = 25°C (initial), L = 0.5 mH, R_G = 25 Ω, I_{AR} = 2.1 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 (3 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)

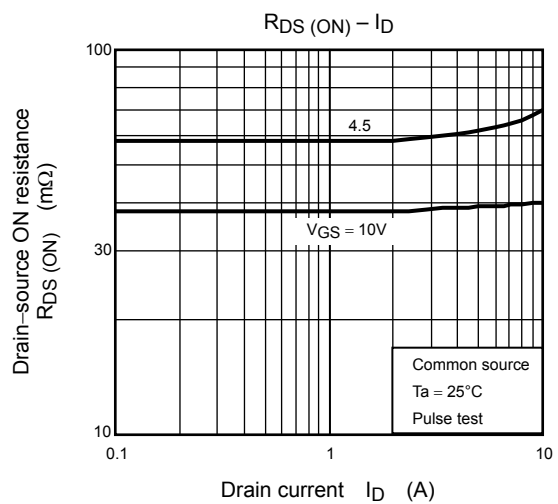
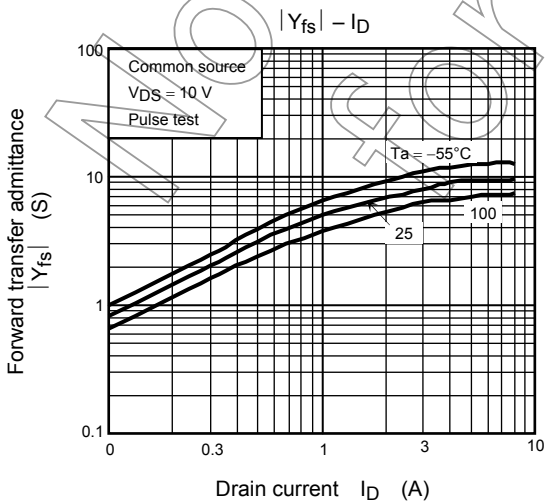
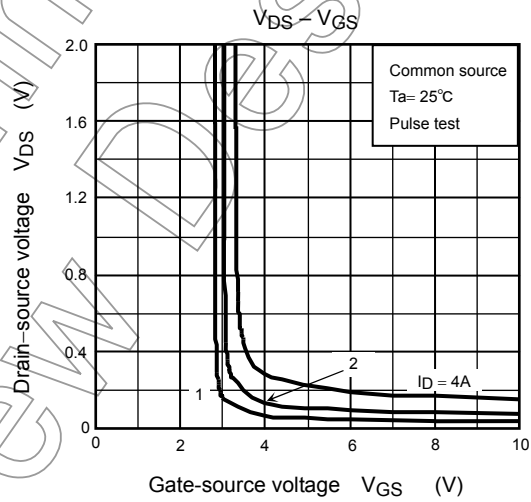
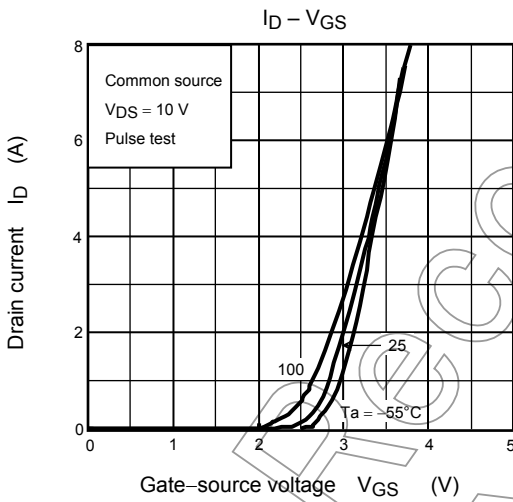
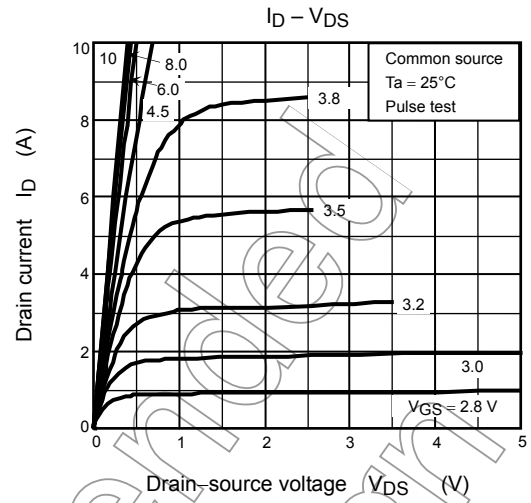
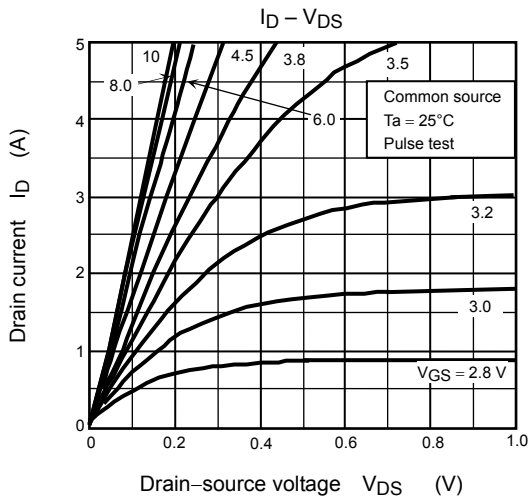
Not for New

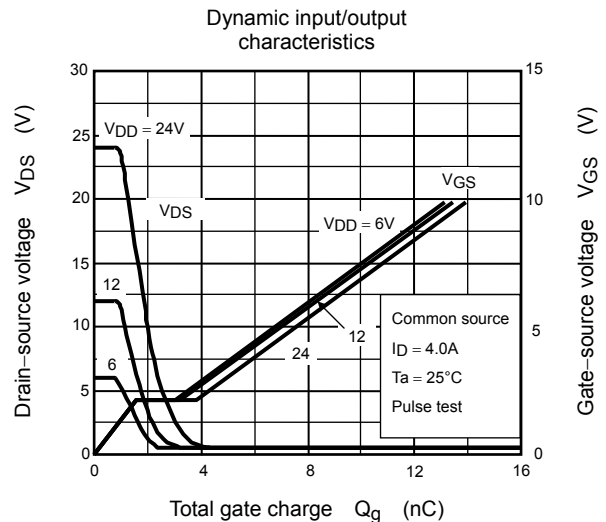
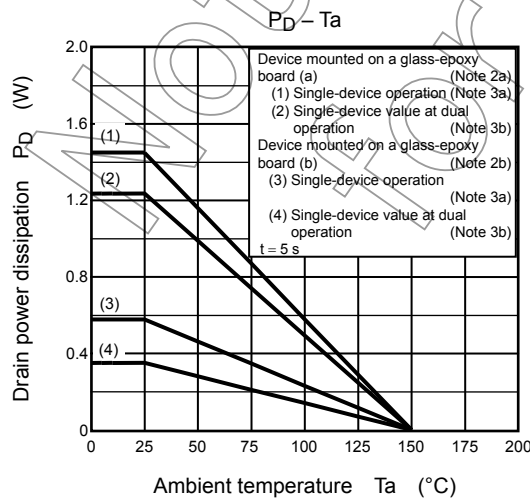
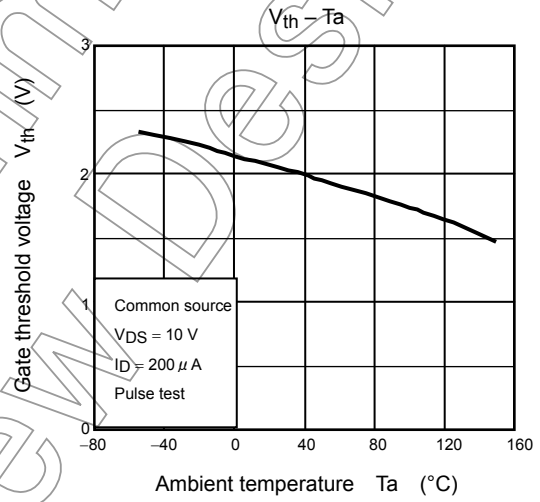
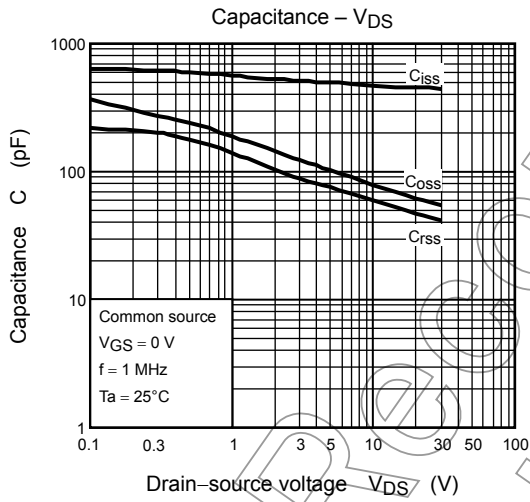
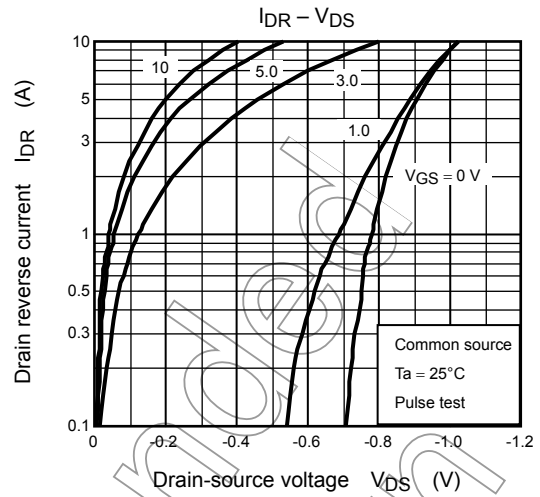
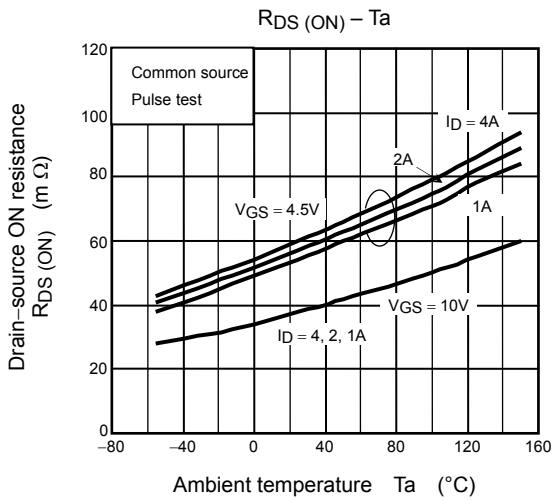
Electrical Characteristics (Ta = 25°C)

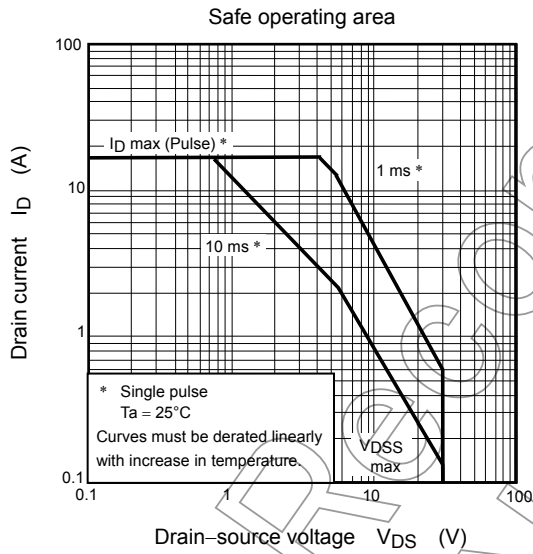
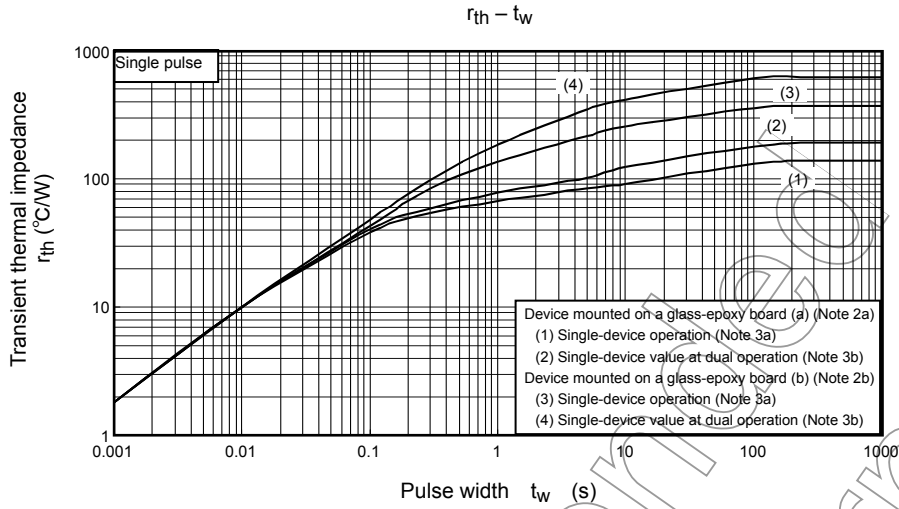
Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Gate leakage current		I_{GSS}	$V_{GS} = \pm 16\text{ V}, V_{DS} = 0\text{ V}$	—	—	± 10	μA
Drain cut-off current		I_{DSS}	$V_{DS} = 30\text{ V}, V_{GS} = 0\text{ V}$	—	—	10	μA
Drain-source breakdown voltage		$V_{(BR)DSS}$	$I_D = 10\text{ mA}, V_{GS} = 0\text{ V}$	30	—	—	V
		$V_{(BR)DSX}$	$I_D = 10\text{ mA}, V_{GS} = -20\text{ V}$	15	—	—	
Gate threshold voltage		V_{th}	$V_{DS} = 10\text{ V}, I_D = 1\text{ mA}$	1.3	—	2.5	V
Drain-source ON resistance		$R_{DS(ON)}$	$V_{GS} = 4.5\text{ V}, I_D = 2.1\text{ A}$	—	58	77	m Ω
			$V_{GS} = 10\text{ V}, I_D = 2.1\text{ A}$	—	38	50	
Forward transfer admittance		$ Y_{fs} $	$V_{DS} = 10\text{ V}, I_D = 2.1\text{ A}$	3.5	7.0	—	S
Input capacitance		C_{iss}	$V_{DS} = 10\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$	—	470	—	pF
Reverse transfer capacitance		C_{rss}		—	60	—	
Output capacitance		C_{oss}		—	80	—	
Switching time	Rise time	t_r		—	5.2	—	ns
	Turn-on time	t_{on}		—	8.3	—	
	Fall time	t_f		—	4.0	—	
	Turn-off time	t_{off}		Duty $\leq 1\%$, $t_w \geq 10\ \mu\text{s}$	—	22	
Total gate charge (gate-source plus gate-drain)		Q_g	$V_{DD} \approx 24\text{ V}, V_{GS} = 10\text{ V}, I_D = 4.2\text{ A}$	—	10	—	nC
Gate-source charge 1		Q_{gs1}		—	1.7	—	
Gate-drain ("miller") charge		Q_{gd}		—	2.4	—	

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

Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Drain reverse current	Pulse (Note 1)	I_{DRP}	—	—	—	16.8	A
Forward voltage (diode)		V_{DSF}	$I_{DR} = 4.2\text{ A}, V_{GS} = 0\text{ V}$	—	—	-1.2	V







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