

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

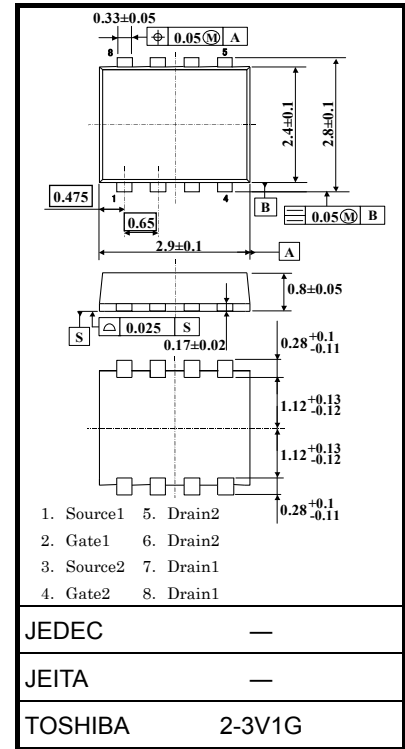
Characteristics		Symbol	Rating	Unit
Drain-source voltage		V_{DSS}	30	V
Drain-gate voltage ($R_{GS} = 20\text{ k}\Omega$)		V_{DGR}	30	V
Gate-source voltage		V_{GSS}	± 20	V
Drain current	DC (Note 1)	I_D	4.2	A
	Pulse (Note 1)	I_{DP}	16.8	
Drain power dissipation ($t = 5\text{ s}$) (Note 2a)	Single-device 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	
	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).

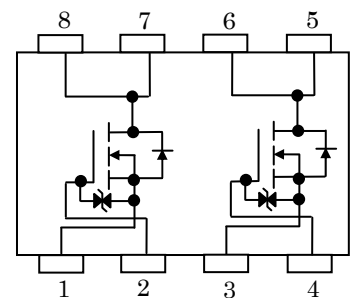
This transistor is an electrostatic-sensitive device. Handle with caution.

Unit: mm

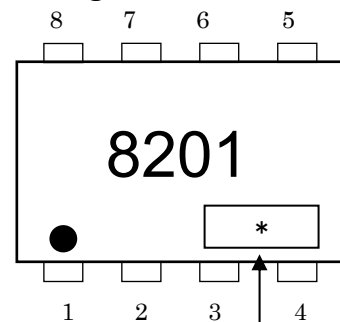


Weight: 0.017 g (typ.)

Circuit Configuration



Marking (Note 6)

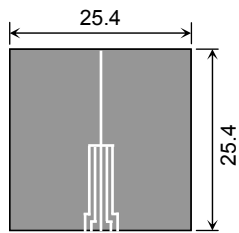


Thermal Characteristics

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	

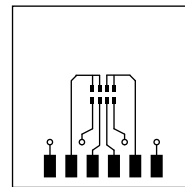
Note 1: The channel temperature should not exceed 150°C during use.

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



(a)

FR-4
25.4 × 25.4 × 0.8
(Unit: mm)



(b)

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.)

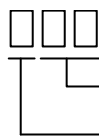
b) The power dissipation and thermal resistance values shown are for a single device. (During dual operation, power is evenly applied to both devices.)

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

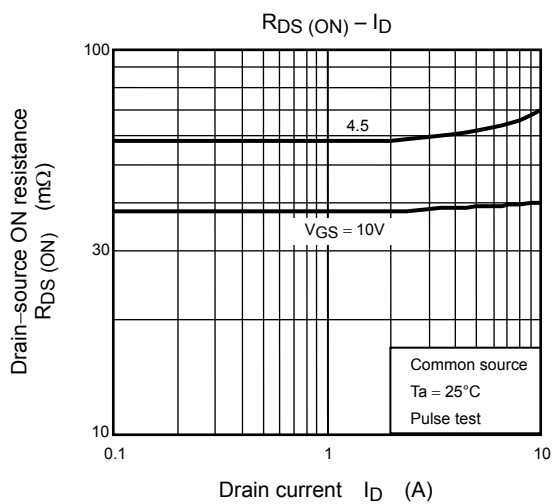
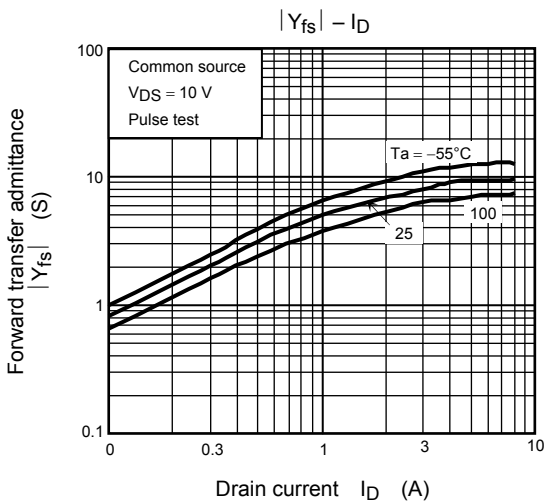
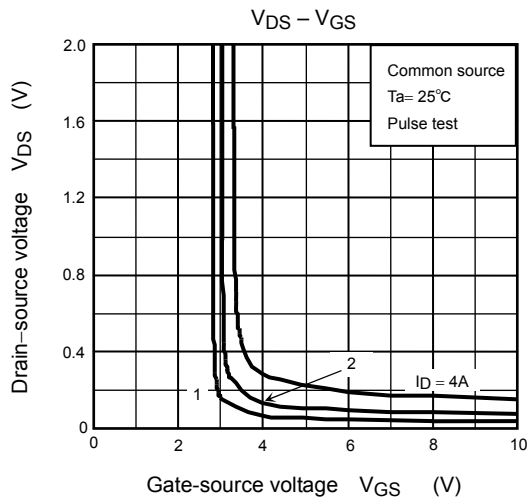
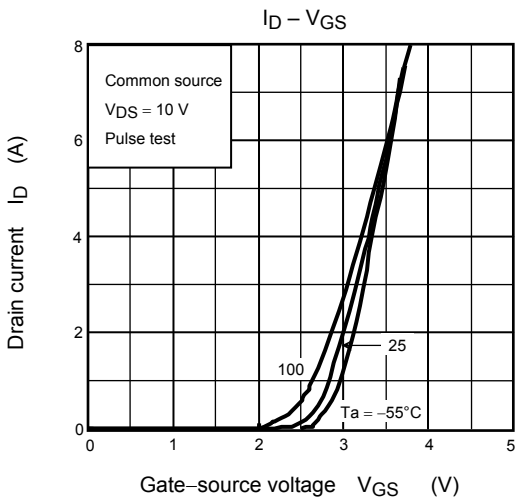
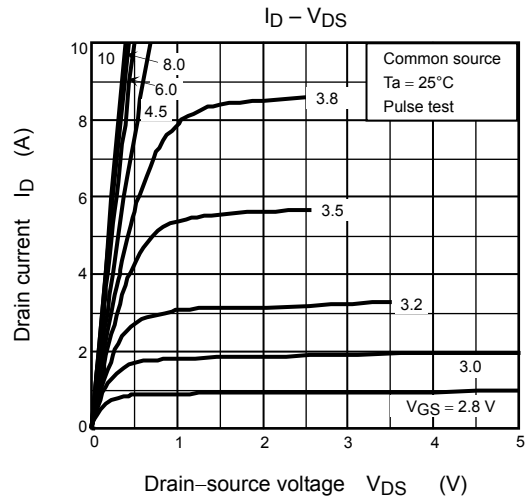
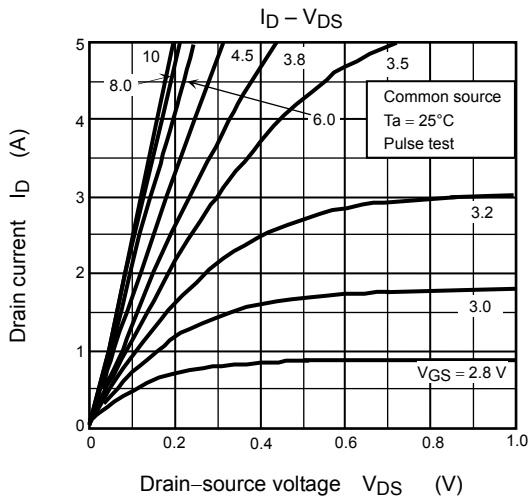
(The last digit of the calendar year)

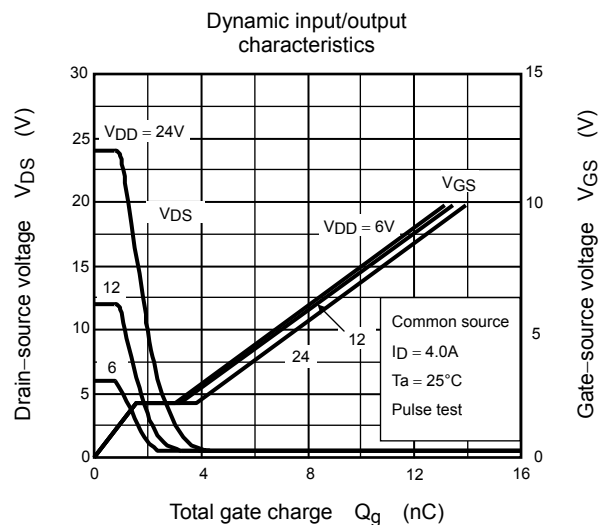
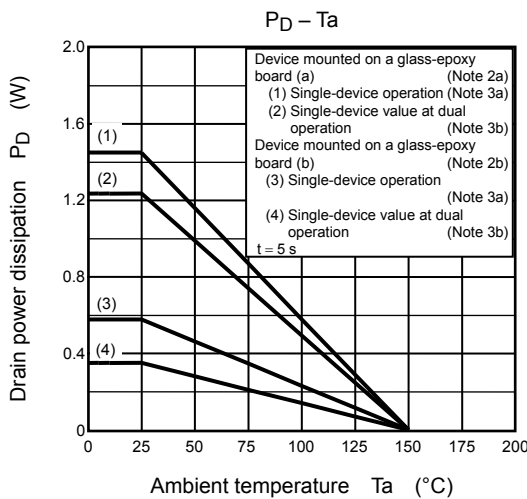
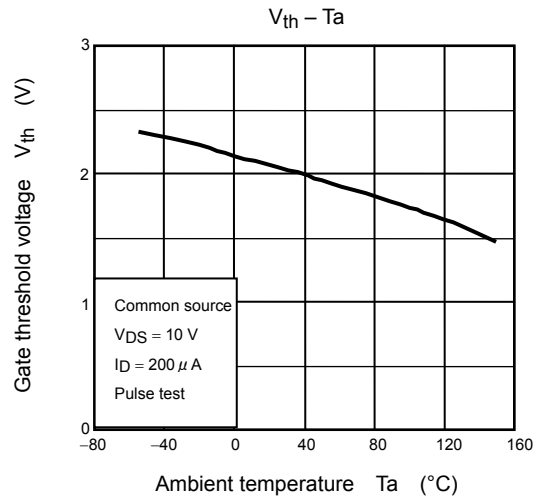
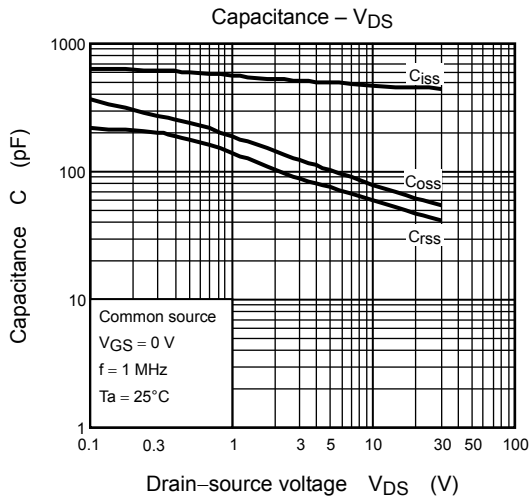
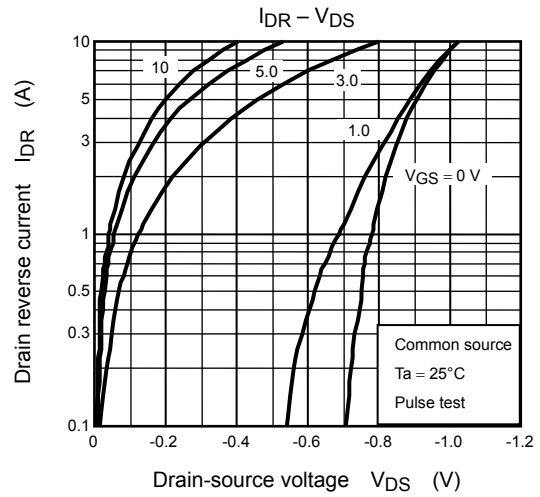
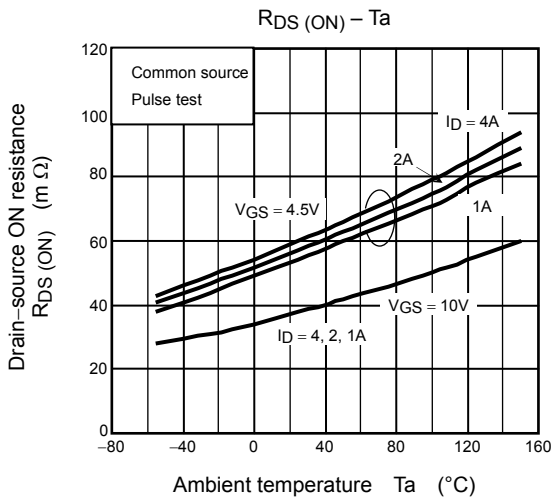
Electrical Characteristics (Ta = 25°C)

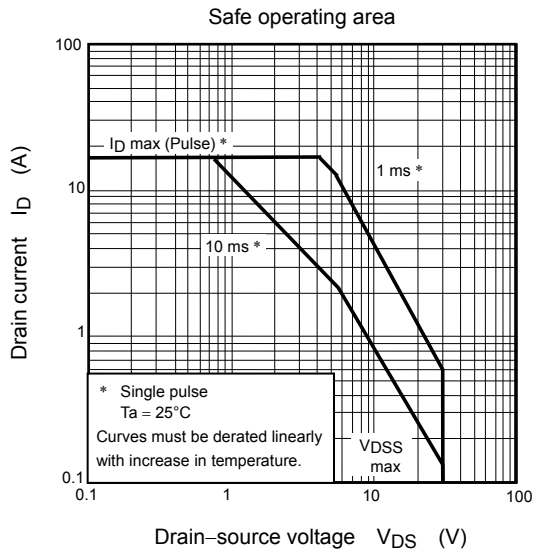
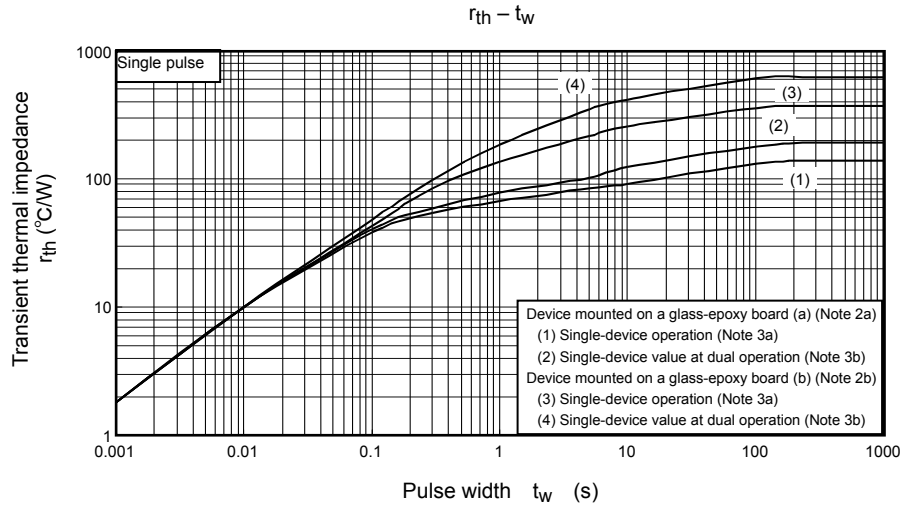
Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Gate leakage current		I_{GSS}	$V_{GS} = \pm 16\text{ V}, V_{DS} = 0\text{ V}$	—	—	± 10	μA
Drain cut-off current		I_{DSS}	$V_{DS} = 30\text{ V}, V_{GS} = 0\text{ V}$	—	—	10	μA
Drain-source breakdown voltage		$V_{(BR)DSS}$	$I_D = 10\text{ mA}, V_{GS} = 0\text{ V}$	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 $\leq 1\%$, $t_w = 10\ \mu\text{s}$	—	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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