

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

TPCP8204

Portable Equipment Applications

Motor Drive Applications

- Small footprint due to small and thin package
- Low drain-source ON resistance: $R_{DS(ON)} = 38 \text{ m}\Omega$ (typ.)
($V_{GS}=10\text{V}$)
- High forward transfer admittance: $|Y_{fs}| = 8 \text{ S}$ (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 ($T_a = 25^\circ\text{C}$)

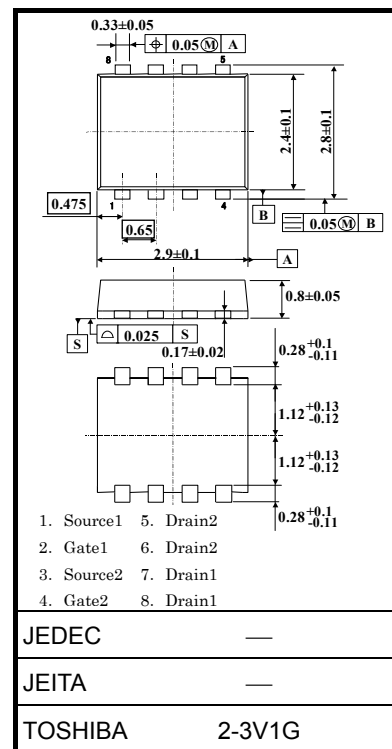
Characteristics		Symbol	Rating	Unit
Drain-source voltage		V_{DSS}	30	V
Drain-gate voltage ($R_{GS} = 20 \text{ k}\Omega$)		V_{DGR}	30	V
Gate-source voltage		V_{GSS}	± 20	V
Drain current	DC (Note 1)	I_D	4.2	A
	Pulse (Note 1)	I_{DP}	16.8	
Drain power dissipation ($t = 5 \text{ s}$) (Note 2a)	Single-device 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}	0.009	mJ
Channel temperature		T_{ch}	150	$^\circ\text{C}$
Storage temperature range		T_{stg}	$-55 \sim 150$	$^\circ\text{C}$

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).

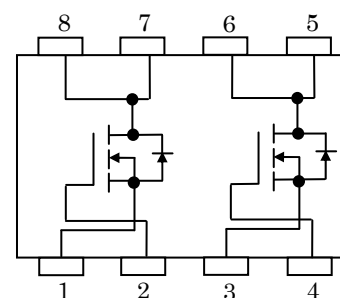
This transistor is an electrostatic-sensitive device. Handle with caution.

Unit: mm

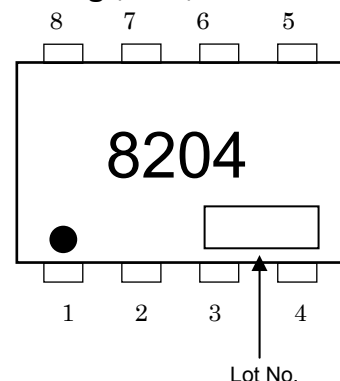


Weight: 0.017 g (typ.)

Circuit Configuration



Marking (Note 6)



Thermal Characteristics

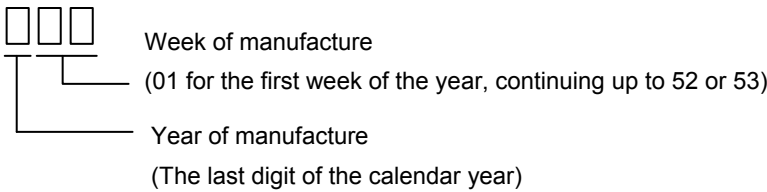
Characteristics		Symbol	Max	Unit
Thermal resistance, channel to ambient (t = 5 s) (Note 2a)	Single-device operation (Note 3a)	R _{th} (ch-a) (1)	84.5	°C/W
	Single-device value at dual operation (Note 3b)	R _{th} (ch-a) (2)	101.6	
Thermal resistance, channel to ambient (t = 5 s) (Note 2b)	Single-device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

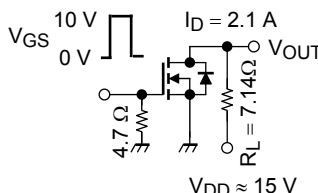


- Note 3: a) The power dissipation and thermal resistance values shown are for a single device. (During single-device operation, power is only applied to one device.)
- b) The power dissipation and thermal resistance values shown are for a single device. (During dual operation, power is evenly applied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

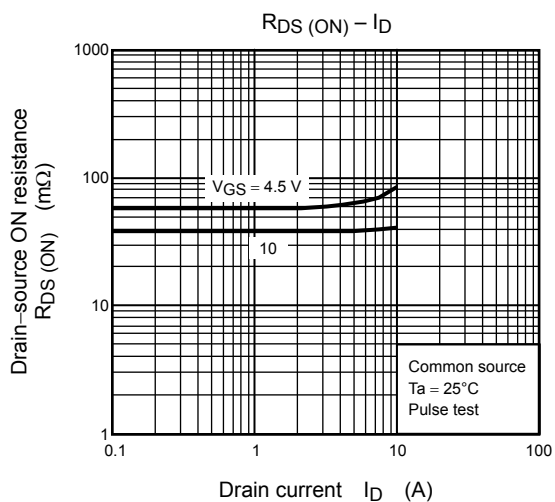
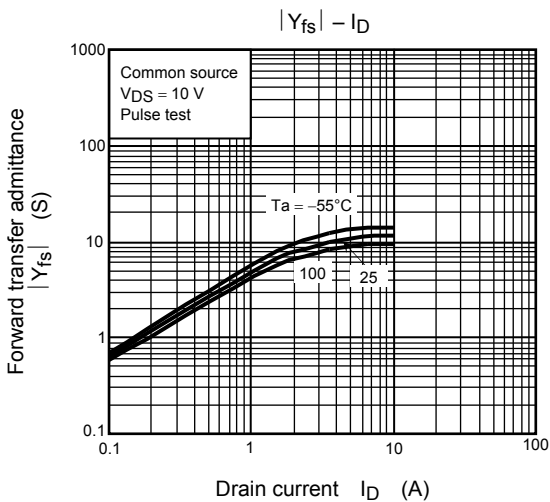
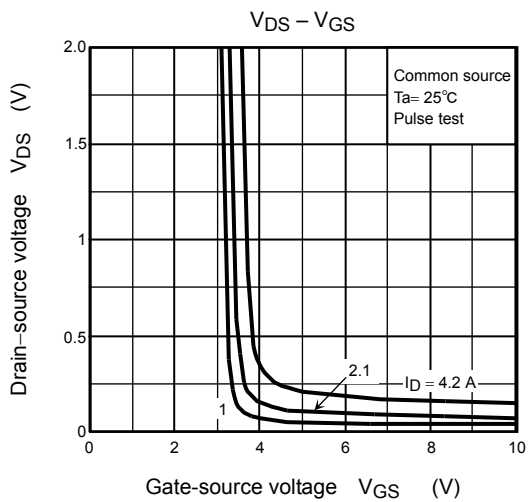
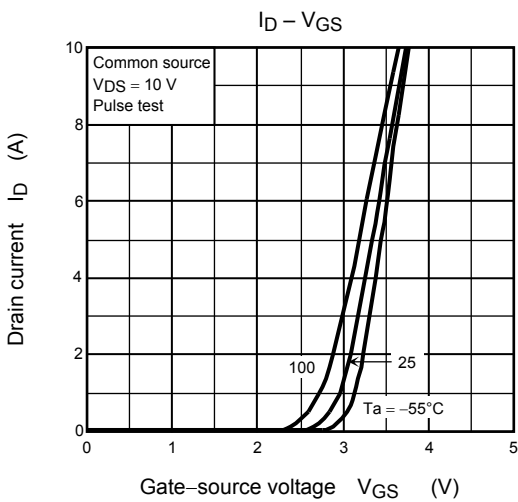
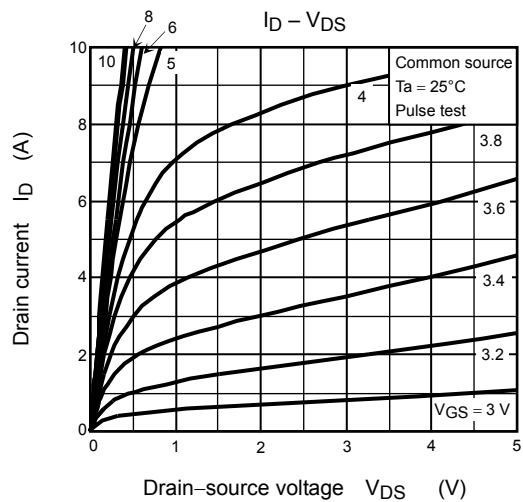
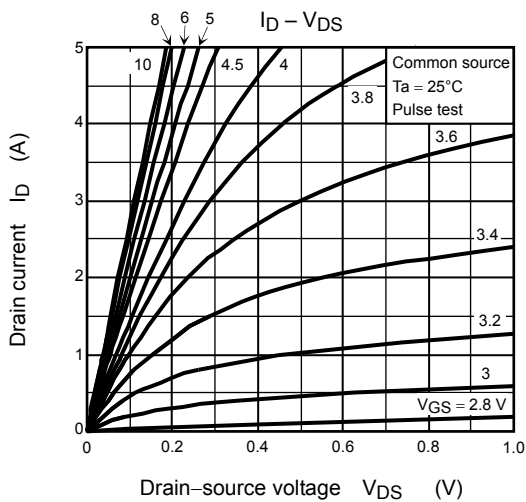


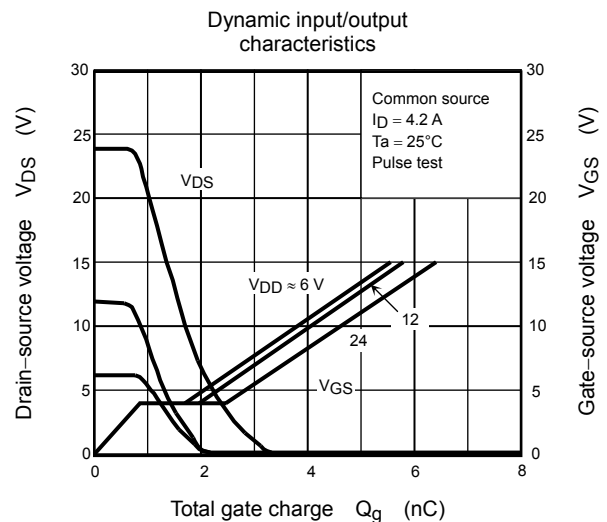
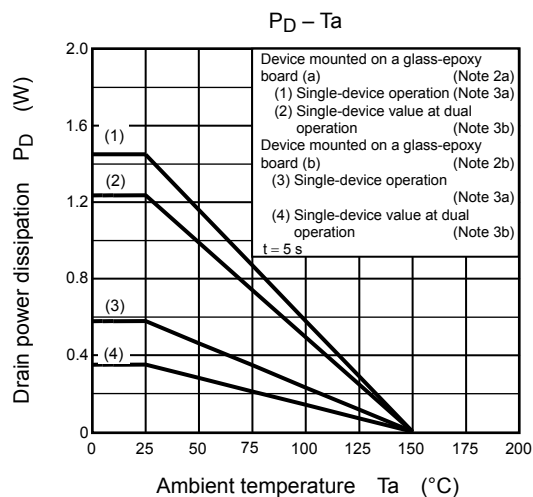
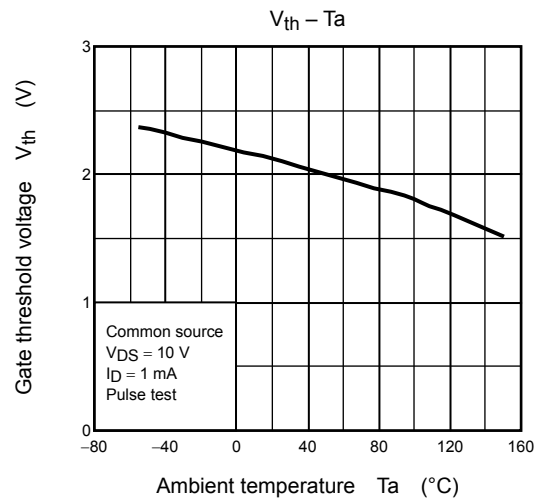
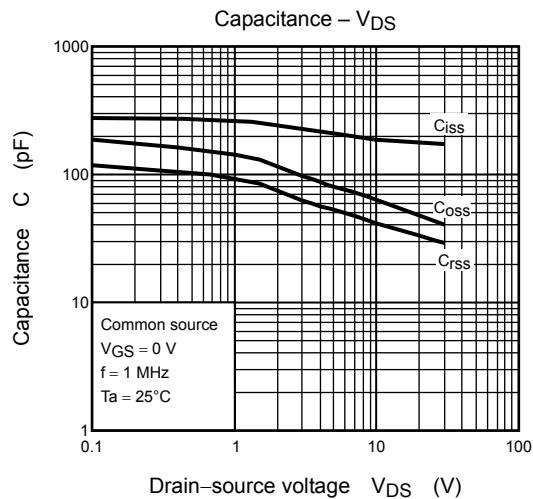
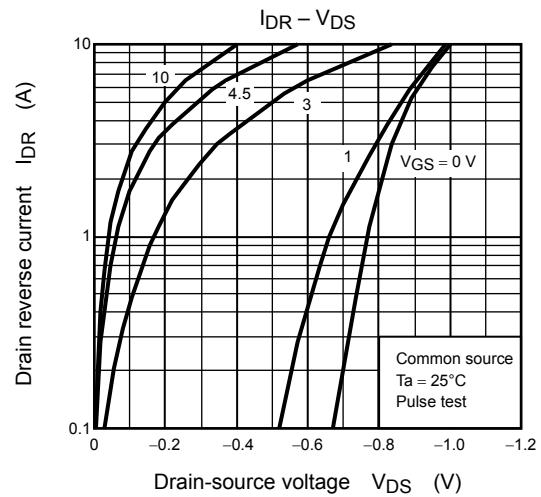
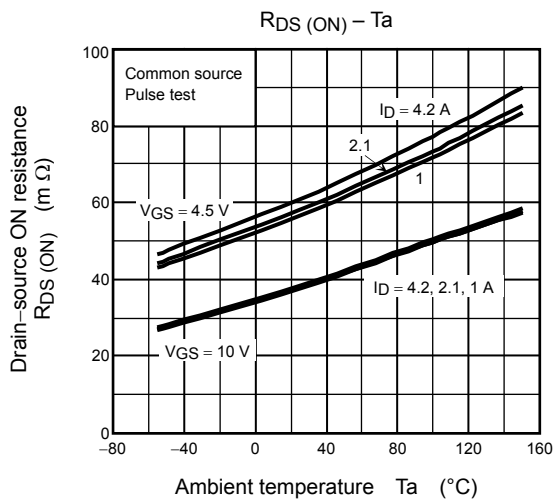
Electrical Characteristics (Ta = 25°C)

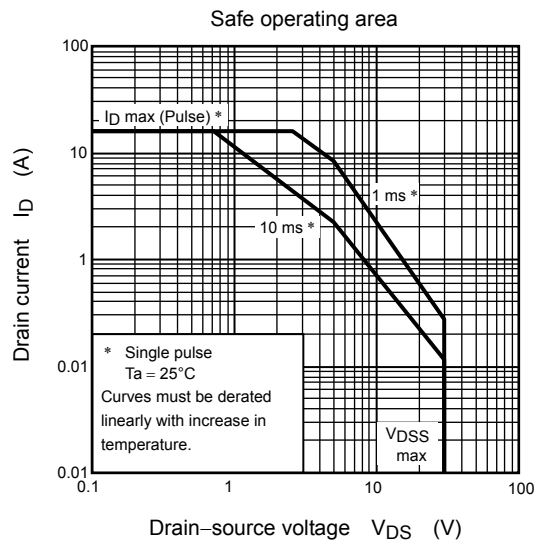
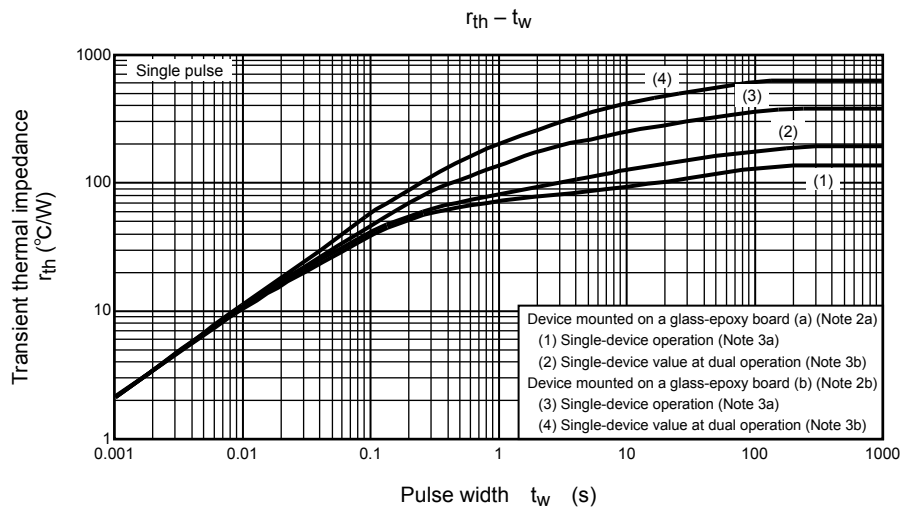
Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Gate leakage current		I _{GSS}	V _{GS} = ±20 V, V _{DS} = 0 V	—	—	±100	nA
Drain cut-off current		I _{DSS}	V _{DS} = 30 V, V _{GS} = 0 V	—	—	10	μA
Drain-source breakdown voltage	V _{(BR) DSS}	I _D = 10 mA, V _{GS} = 0 V	30	—	—	V	
	V _{(BR) DSX}	I _D = 10 mA, V _{GS} = -20 V	10	—	—		
Gate threshold voltage		V _{th}	V _{DS} = 10 V, I _D = 1 mA	1.3	—	2.5	V
Drain-source ON resistance		R _{DS (ON)}	V _{GS} = 4.5 V, I _D = 2.1 A	—	58	77	mΩ
			V _{GS} = 10 V, I _D = 2.1 A	—	38	50	
Forward transfer admittance		Y _{fs}	V _{DS} = 10 V, I _D = 2.1 A	4	8	—	S
Input capacitance		C _{iss}	V _{DS} = 10 V, V _{GS} = 0 V, f = 1 MHz	—	190	—	pF
Reverse transfer capacitance		C _{rss}		—	45	—	
Output capacitance		C _{oss}		—	65	—	
Switching time	Rise time	t _r	 <p>V_{DD} ≈ 15 V</p>	—	4.5	—	ns
	Turn-on time	t _{on}		—	9.0	—	
	Fall time	t _f		—	3.0	—	
	Turn-off time	t _{off}		Duty ≤ 1%, t _w = 10 μs	—	12.0	
Total gate charge (gate-source plus gate-drain)		Q _g	V _{DD} ≈ 24 V, V _{GS} = 10 V, I _D = 4.2 A	—	4.6	—	nC
Gate-source charge 1		Q _{gs1}		—	0.7	—	
Gate-drain ("miller") charge		Q _{gd}		—	1.4	—	

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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