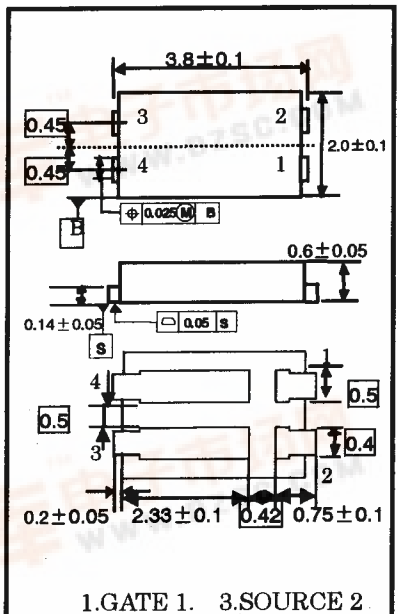
TOSHIBA Field Effect Transistor Silicon N Channel MOS Type (U-MOSIII)

TPCT4202

Lithium Ion Battery Applications

- Lead(Pb)-Free
- Small footprint due to small and thin package
- Low drain-source ON resistance: R_{SS} (ON) =30.5mΩ (typ.)
- High forward transfer admittance: $|Y_{fs}|$ = 15S (typ.)
- Low leakage current: I_{SSS} = 10 μA (max) (V_{DS} = 30 V)
- Enhancement-mode: V_{th} = 0.5~1.2 V (V_{SS} = 10 V, I_S = 200 μA)
- Common drain

Unit: mm



1.GATE 1. 3.SOURCE 2
2.GATE 2 4.SOURCE 1

JEDEC	—
JEITA	—
TOSHIBA	

Weight: 0.010 g (typ.)

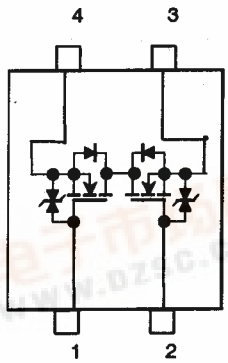
Maximum Ratings (Ta = 25°C)

Characteristics		Symbol	Rating	Unit
Source-source voltage		V_{SSS}	30	V
Gate-source voltage		V_{GSS}	±12	V
Drain current	DC (Note 1)	I_S	6	A
	Pulse (Note 1)	I_{SP}	24	
Drain power dissipation (t = 10 s) (Note 2a)	Single-device value at dual operation (Note 3)	P_D	1.7	W
Drain power dissipation (t = 10 s) (Note 2b)	Single-device value at dual operation (Note 3)	P_D	0.51	W
Single pulse avalanche energy (Note 4)		E_{AS}	46.8	mJ
Avalanche current		I_{AR}	6	A
Repetitive avalanche energy Single-device value at dual operation (Note 2a, 3, 5)		E_{AR}	0.17	mJ
Channel temperature		T_{ch}	150	°C
Storage temperature range		T_{stg}	−55~150	°C

Note: (Note 1), (Note 2), (Note 3), (Note 4), (Note 5) please refer to the next page.

This transistor is an electrostatic sensitive device. Please handle with caution.

Circuit Configuration



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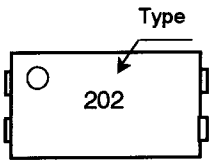
Thermal Characteristics

Characteristics		Symbol	Max	Unit
Thermal resistance, channel to ambient (t = 10 s) (Note 2a)	Single-device value at dual operation (Note 3)	$R_{th\ (ch-a)}$	76	°C/W
Thermal resistance, channel to ambient (t = 10 s) (Note 2b)	Single-device value at dual operation (Note 3)	$R_{th\ (ch-a)}$	244	°C/W

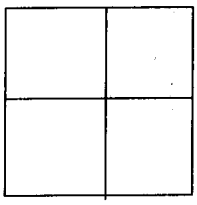
Marking (Note 5)



Note 1: Please use devices on condition that the channel temperature is below 150°C.

Note 2:

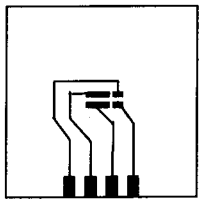
(a) Device mounted on a glass-epoxy board



FR-4
25.4 × 25.4 × 0.8
(unit: mm)

(a)

(b) Device mounted on a glass-epoxy board



FR-4
25.4 × 25.4 × 0.8
(unit: mm)

(b)

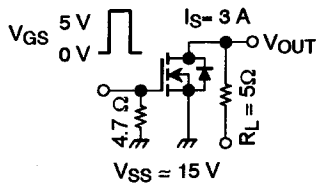
Note 3: The power dissipation and thermal resistance values are shown for a single device (During dual operation, power is evenly applied to both devices.)

Note 4: V_{DD} = 24 V, T_{ch} = 25°C (initial), L = 1.0 mH, R_G = 25 Ω, I_{AR} = 6 A

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

Note 6: ○ on lower right of the marking indicates Pin 1.

Electrical Characteristics (Ta = 25°C)

Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Gate leakage current		I_{GSS}	V_{GS} = ±10 V, V_{SS} = 0 V	—	—	±10	μA
Source cut-OFF current		I_{SSS}	V_{SS} = 30 V, V_{GS} = 0 V	—	—	10	μA
Source -source breakdown voltage		$V_{(BR)\ SSS}$	I_S = 10 mA, V_{GS} = 0 V	30	—	—	V
		$V_{(BR)\ SSX}$	I_S = 10 mA, V_{GS} = −12 V	15	—	—	
Gate threshold voltage		V_{th}	V_{SS} = 10 V, I_S = 200 μA	0.5	—	1.2	V
Source -source ON resistance		$R_{SS\ (ON)}$	V_{GS} = 2.5 V, I_S = 3 A	30	40	52	mΩ
			V_{GS} = 4.0 V, I_S = 3 A	26	32	39	
			V_{GS} = 4.5 V, I_S = 3 A	24	30.5	38	
Forward transfer admittance		$\|Y_{fs}\|$	V_{SS} = 10 V, I_S = 3 A	7.5	15	—	S
Input capacitance		C_{iss}	V_{SS} = 10 V, V_{GS} = 0 V, f = 1 MHz	—	1540	—	pF
Reverse transfer capacitance		C_{rss}		—	180	—	
Output capacitance		C_{oss}		—	250	—	
Switching time	Rise time	t_r	 Duty ≤ 1%, t_w = 10 μs	—	34	—	ns
	Turn-ON time	t_{on}		—	41	—	
	Fall time	t_f		—	60	—	
	Turn-OFF time	t_{off}		—	161	—	
Total gate charge (gate-source plus gate-drain)		Q_g	V_{SS} ≈ 24 V, V_{GS} = 5 V, I_D = 6 A	—	21	—	nC
Gate-source charge 1		Q_{gs1}		—	3	—	
Gate- source ("miller") charge		Q_{gs}		—	6	—	

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

Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Source reverse current	Pulse (Note 1)	I_{SRP}	—	—	—	24	A
Forward voltage (diode)		V_{SSF}	I_{SR} = 6 A, V_{GS} = 0 V	—	—	−1.2	V

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