

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

TPCT4204

TENTATIVE

Lithium Ion Secondary Battery Applications

- Lead(Pb)-Free
- Small footprint due to small and thin package
- Low source-source ON resistance: $R_{SS} (ON) = (22)m\Omega$ (typ.)
- High forward transfer admittance: $|Y_{fs}| = (25) S$ (typ.)
- Low leakage current: $I_{SSS} = 10 \mu A$ (max) ($V_{SS} = 30 V$)
- Enhancement-model: $V_{th} = 0.5$ to $1.2 V$ ($V_{SS} = 10 V$, $I_S = 200 \mu A$)
- Common drain

Maximum Ratings ($T_a = 25^\circ C$)

Characteristics	Symbol	Rating	Unit
Source-source voltage	V_{SSS}	30	V
Gate-source voltage	V_{GSS}	± 12	V
Source current	DC (Note 1)	I_S	A
	Pulse (Note 1)	I_{SP}	
Power dissipation ($t = 10s$) (Note 2a,3)	P_D	1.7	W
Power dissipation ($t = 10s$) (Note 2b,3)	P_D	0.51	W
Single pulse avalanche energy (Note 4)	E_{AS}	TBD	mJ
Avalanche current	I_{AR}	6	A
Repetitive avalanche energy (Note 2a, 5)	E_{AR}	0.17	mJ
Channel temperature	T_{ch}	150	$^\circ C$
Storage temperature range	T_{stg}	-55 to 150	$^\circ C$

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

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

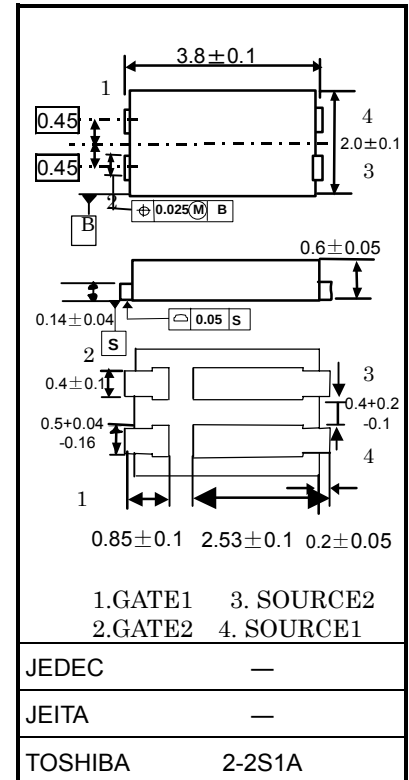


WARNING 【Handling Precaution for Power MOSFET in use of Protection Circuit for Battery Pack】

Flame-retardant resins of UL94-V0 flammability class are used in packages, however, they are not noncombustible. Use a unit, for example PTC Thermistor, which can shut off the power supply if a short-circuit occurs.

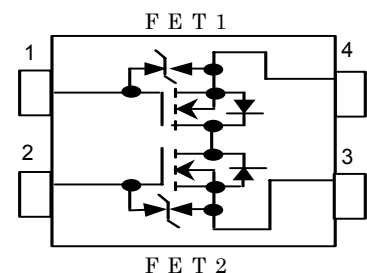
If the power supply is not shut off on the occurring short-circuit, a large short-circuit current will flow continuously, which may cause the device to catch fire or smoke.

Unit: mm



Weight: 0.012 g (typ.)

Circuit Configuration

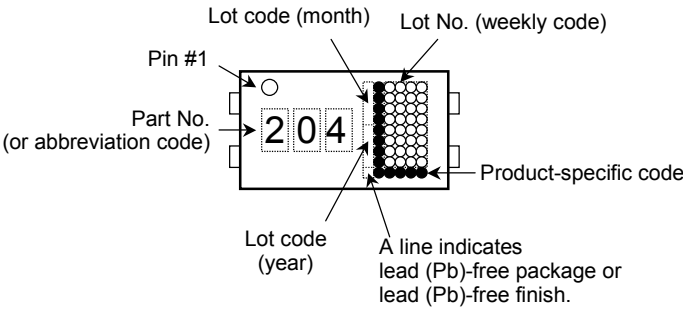


Thermal Characteristics

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

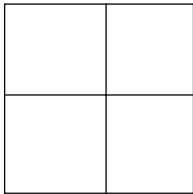
Marking (Note 6)



Note 1: Ensure that the channel temperature does not exceed 150°C.

Note 2:

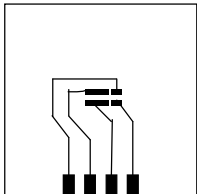
(a) Device mounted on a glass-epoxy board



(a)

FR-4
25.4 × 25.4 × 0.8
(Unit: mm)

(b) Device mounted on a glass-epoxy board



(b)

FR-4
25.4 × 25.4 × 0.8
(Unit: mm)

Note 3: The power dissipation and thermal resistance values are shown for both FETs.

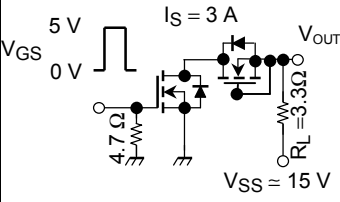
Note 4: $V_{DD} = 24\text{ V}$, $T_{ch} = 25^\circ\text{C}$ (initial), $L = \text{ mH}$, $R_G = 25\ \Omega$, $I_{AR} = 6\text{ A}$

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

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

Electrical Characteristics (Ta = 25°C)

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Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Gate leakage current		I _{GSS}	V _{GS} = ±10 V, V _{SS} = 0 V (Note 8)	—	—	±10	μA
Source cut-OFF current		I _{SSS}	V _{SS} = 30 V, V _{GS} = 0 V (Note 8)	—	—	10	μA
Drain-source breakdown voltage		V _(BR) SSS	I _S = 10 mA, V _{GS} = 0 V (Note 8)	30	—	—	V
		V _(BR) SSX	I _S = 10 mA, V _{GS} = −12 V (Note 8)	15	—	—	
Gate threshold voltage		V _{th}	V _{SS} = 10 V, I _S = 200 μA (Note 8)	0.5	—	1.2	V
Drain-source ON resistance		R _{SS} (ON)	V _{GS} = 2.5 V, I _S = 3 A (Note 7)	(24)	(33)	(44)	mΩ
			V _{GS} = 4.0 V, I _S = 3 A (Note 7)	(18.5)	(23)	(29.5)	
			V _{GS} = 4.5 V, I _S = 3 A (Note 7)	(17.5)	(22)	(28)	
Forward transfer admittance		Y _{fs}	V _{SS} = 10 V, I _S = 3 A (Note 8)	(12.5)	(25)	—	S
Input capacitance		C _{iSS}	V _{SS} = 10 V, V _{GS} = 0 V, f = 1 MHz (Note 8)	—	(1990)	—	pF
Reverse transfer capacitance		C _{rSS}		—	(150)	—	
Output capacitance		C _{oss}		—	(210)	—	
Switching time	Rise time	t _r		—	TBD	—	ns
	Turn-on time	t _{on}		—	TBD	—	
	Fall time	t _f		—	TBD	—	
	Turn-off time	t _{off}		Duty ≤ 1%, t _W = 10 μs (Note 8)	—	TBD	
Total gate charge		Q _g	V _{SS} = 24 V, V _{GS} = 5 V, I _S = 6 A (Note 8)	—	TBD	—	nC
Gate-source charge1		Q _{gs1}		—	TBD	—	
Diode (source-source) forward voltage		V _{SSF}	I _{SR} = 6 A, V _{GS} = 0 V (Note 9)	—	—	−1.2	V

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