

Q1:TOSHIBA FIELD EFFECT TRANSISTOR SILICON N CHANNEL MOS TYPE (U—MOSⅢ)

Q2: INCLUDES SCHOTTKY BARRIER DIODE FIELD EFFECT TRANSISTOR SILICON N CHANNEL MOS TYPE (U—MOSⅢ)

TPC8A01

TENTATIVE

DC-DC CONVERTER

NOTE BOOK PC

PORTABLE MACHINES AND TOOLS

- Includes Schottky Barrier Diode Type. (Q2)
- Compact and thin package, and a small mounting area. (Q1, Q2)
- High Speed Switching. (Q1)
- Small Gate Charge. (Q1): $Q_g = \text{ nC (Typ.)}$
- Low Drain - Source ON Resistance. (Q2): $R_{DS(ON)} = \text{ m}\Omega \text{ (Typ.)}$
- High Forward Transfer Admittance. (Q2): $|Y_{fs}| = \text{ S (Typ.)}$
- Low Leakage Current. (Q1, Q2): $I_{DSS} = 10 \mu\text{ A (Max.)}$ ($V_{DS} = 30\text{ V}$)
- Enhancement - Mode. (Q1, Q2): $V_{th} = 1.3 \sim 2.5\text{ V}$ ($V_{DS} = 10\text{ V}$, $I_D = 1\text{ mA}$)

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

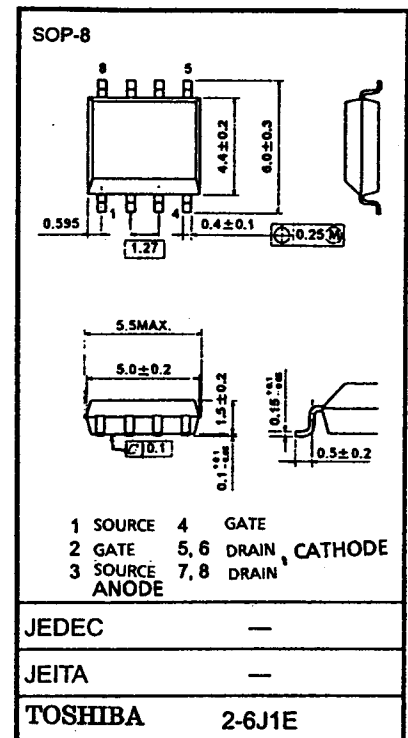
CHARACTERISTIC		SYMBOL	RATING		UNIT
			Q1	Q2	
Drain - Source Voltage		V_{DSS}	30	30	V
Drain - Gate Voltage($R_{GS}=20\text{ k } \Omega$)		V_{DGR}	30	30	V
Gate - Source Voltage		V_{GSS}	± 20	± 20	V
Drain Current	DC (Notel)	I_D	6	8.6	A
	Pulse	I_{DP}	24	34.4	A
Drain Power Dissipation ($t=10s$) (Note2a)	Single-deviceOperation (Note3a)	$P_{D(1)}$	1.5		W
	Single-device value at dual Operation (Note3b)	$P_{D(2)}$	1.1		
Drain Power Dissipation ($t=10s$) (Note2b)	Single-deviceOperation (Note3a)	$P_{D(1)}$	0.75		
	Single-device value at dual Operation (Note3b)	$P_{D(2)}$	0.45		
Single Pulse Avalanche Energy (Note4)		E_{AS}			m J
Avalanche Current (Notel)		I_{AR}	6.0	8.6	A
Repetitive Avalanche Energy Single-device value at dual Operation (Note2a, 3b, 5)		E_{AR}	0.11		m J
Channel Temperature		T_{ch}	150		$^{\circ}\text{C}$
Storage Temperature Range		T_{stg}	$-55\sim 150$		$^{\circ}\text{C}$

Note: (Note1), (Note2), (Note3), (Note4), (Note5) Please see next page.

THIS TRANSISTOR IS AN ELECTROSTATIC SENSITIVE DEVICE.

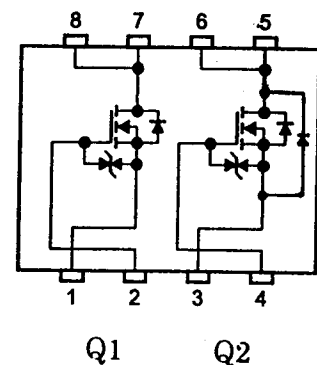
PLEASE HANDLE WITH CAUTION.

UNIT: mm



Weight: 0.08g (Typ)

CIRCUIT CONFIGURATION

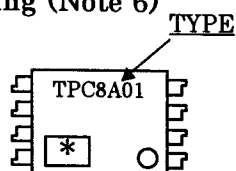


TENTATIVE

THERMAL CHARACTERISTICS

CHARACTERISTICS		SYMBOL	MAX.	UNIT
Thermal resistance, channel to ambient ($t=10s$) (Note 2a)	Single-device operation (Note3a)	$R_{th(ch-a)(1)}$	83.3	$^{\circ}C/W$
	Single-device value at dual operation (Note3b)	$R_{th(ch-a)(2)}$	114	
Thermal resistance, channel to ambient ($t=10s$) (Note 2b)	Single-device operation (Note3a)	$R_{th(ch-a)(1)}$	167	
	Single-device value at dual operation (Note3b)	$R_{th(ch-a)(2)}$	278	

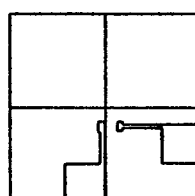
Marking (Note 6)



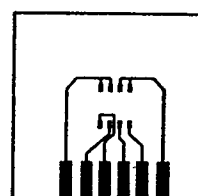
Note1: Please use devices on condition that the channel temperature is below 150 $^{\circ}C$.

Note2:

- (a) Device mounted on glass-epoxy board (a) (b) Device mounted on glass-epoxy board (b)



(a)



(b)

Note3:

- (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 device)

Note4: Q1: $V_{DD}=24V$, $T_{ch}=25^{\circ}C$ (initial), $L=$ mH, $I_{AR}=$ A, $R_G=25\Omega$

Q2: $V_{DD}=24V$, $T_{ch}=25^{\circ}C$ (initial), $L=$ mH, $I_{AR}=$ A, $R_G=25\Omega$

Note5: Repetitive rating ; Pulse Width Limited by maximum channel temperature.

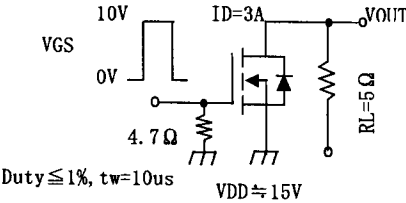
Note6: O on lower right of the marking indicates Pin 1

* shows lot number. (Year of manufacture: last decimal digit of the year of manufacture, Month of manufacture: January to December are denoted by letter A to L respectively)

Q 1

TENTATIVE

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

Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Gate leakage current		I_{GSS}	$V_{\text{GS}}=\pm 16\text{V}, V_{\text{DS}}=0\text{V}$	—	—	± 10	μA
Drain cut-OFF current		I_{DSS}	$V_{\text{DS}}=30\text{V}, V_{\text{GS}}=0\text{V}$	—	—	10	μA
Drain-source breakdown voltage		$V_{(\text{BR})\text{DSS}}$	$I_{\text{D}}=10\text{mA}, V_{\text{GS}}=0\text{V}$	30	—	—	V
		$V_{(\text{BR})\text{DSX}}$	$I_{\text{D}}=10\text{mA}, V_{\text{GS}}=-20\text{V}$	15	—	—	
Gate threshold voltage		V_{th}	$V_{\text{DS}}=10\text{V}, I_{\text{D}}=1\text{mA}$	1.3	—	2.5	V
Drain-source ON resistance		$R_{\text{DS(ON)}}$	$V_{\text{GS}}=4.5\text{V}, I_{\text{D}}=4\text{A}$	—	26	33	$\text{m}\Omega$
			$V_{\text{GS}}=10\text{V}, I_{\text{D}}=6\text{A}$	—	18	23	
Forward transfer admittance		$ Y_{\text{fs}} $	$V_{\text{DS}}=10\text{V}, I_{\text{D}}=3.0\text{A}$	3.8	7.6	—	S
Input capacitance		C_{iss}	$V_{\text{DS}}=10\text{V}, V_{\text{GS}}=0\text{V}, f=1\text{MHz}$	—	830	—	pF
Reverse transfer capacitance		C_{rss}		—	130	—	
Output capacitance		C_{oss}		—	400	—	
Switching time	Rise time	t_{r}	 $\text{Duty} \leq 1\%, t_{\text{w}}=10\mu\text{s}$ $V_{\text{DD}} \approx 15\text{V}$	—	18	—	ns
	Turn-ON time	t_{on}		—	25	—	
	Fall time	t_{f}		—	3.3	—	
	Turn-OFF time	t_{off}		—	20	—	
Total gate charge (gate-source plus gate-drain)		Q_{g}	$V_{\text{DD}} \doteq 24\text{V}, V_{\text{GS}}=10\text{V}, I_{\text{D}}=6.0\text{A}$	—	14	—	nC
Gate-source charge 1		Q_{gs1}		—	—	—	
Gate-Drain("miller")charge		Q_{gd}		—	3.4	—	

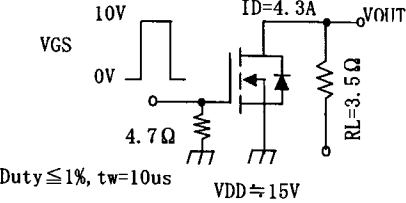
Source-Drain Diode Ratings and Characteristics ($T_a=25^\circ\text{C}$)

Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Drain reverse current	Pulse	I_{DRP}	—	—	—	24	A
Diode forward voltage		V_{DSF}	$I_{\text{DR}}=6.0\text{A}, V_{\text{GS}}=0\text{V}$	—	—	-1.2	V

Q 2

TENTATIVE

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

Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Gate leakage current		I_{GSS}	$V_{\text{GS}}=\pm 16\text{V}, V_{\text{DS}}=0\text{V}$	—	—	± 10	μA
Drain cut-OFF current		I_{DSS}	$V_{\text{DS}}=30\text{V}, V_{\text{GS}}=0\text{V}$	—	—	500	μA
Drain-source breakdown voltage		$V_{(\text{BR})\text{DSS}}$	$I_{\text{D}}=10\text{mA}, V_{\text{GS}}=0\text{V}$	30	—	—	V
		$V_{(\text{BR})\text{DSX}}$	$I_{\text{D}}=10\text{mA}, V_{\text{GS}}=-20\text{V}$	15	—	—	
Gate threshold voltage		V_{th}	$V_{\text{DS}}=10\text{V}, I_{\text{D}}=1\text{mA}$	1.3	—	2.5	V
Drain-source ON resistance		$R_{\text{DS(ON)}}$	$V_{\text{GS}}=4.5\text{V}, I_{\text{D}}=8.6\text{A}$	—	20	26	$\text{m}\Omega$
			$V_{\text{GS}}=10\text{V}, I_{\text{D}}=8.6\text{A}$	—	16	21	
Forward transfer admittance		$ Y_{\text{fs}} $	$V_{\text{DS}}=10\text{V}, I_{\text{D}}=4.3\text{A}$	5.7	11.4	—	S
Input capacitance		C_{iss}	$V_{\text{DS}}=10\text{V}, V_{\text{GS}}=0\text{V}, f=1\text{MHz}$	—	2120	—	pF
Reverse transfer capacitance		C_{rss}		—	230	—	
Output capacitance		C_{oss}		—	430	—	
Switching time	Rise time	t_{r}		—	7.1	—	ns
	Turn-ON time	t_{on}		—	18	—	
	Fall time	t_{f}		—	5.6	—	
	Turn-OFF time	t_{off}		—	33	—	
Total gate charge (gate-source plus gate-drain)		Q_{g}	$V_{\text{DD}}\doteq 24\text{V}, V_{\text{GS}}=10\text{V}, I_{\text{D}}=8.6\text{A}$	—	35	—	nC
Gate-source charge 1		Q_{gs1}		—	—	—	
Gate-Drain("miller")charge		Q_{gd}		—	6.6	—	

Source-Drain Diode Ratings and Characteristics ($T_a=25^\circ\text{C}$)

Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Drain reverse current	Pulse	I_{DRP}	—	—	—	—	A
Diode forward voltage		V_{DSF}	$I_{\text{DR}}=1.0\text{A}, V_{\text{GS}}=0\text{V}$	—	-0.48	-0.5	V

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