

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

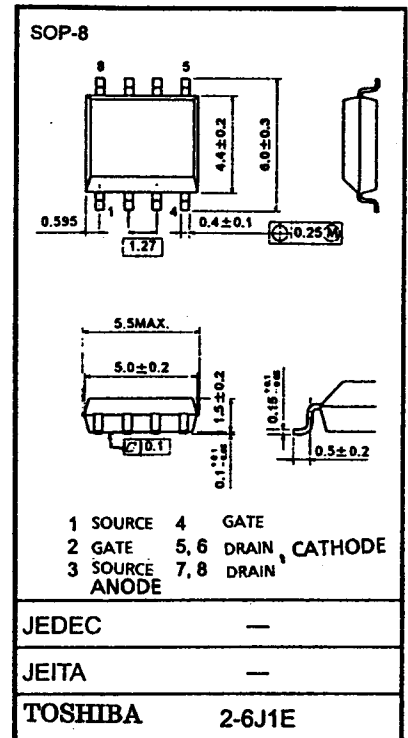
CHARACTERISTIC	SYMBOL	RATING		UNIT	
		Q1	Q2		
Drain - Source Voltage	$V_{DSS}$	30	30	V	
Drain - Gate Voltage ( $R_{GS} = 20\text{ k}\Omega$ )	$V_{DGR}$	30	30	V	
Gate - Source Voltage	$V_{GSS}$	$\pm 20$	$\pm 20$	V	
Drain Current	DC (Notel)	$I_D$	6	8.6	A
	Pulse	$I_{DP}$	24	34.4	A
Drain Power Dissipation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

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

THIS TRANSISTOR IS AN ELECTROSTATIC SENSITIVE DEVICE.

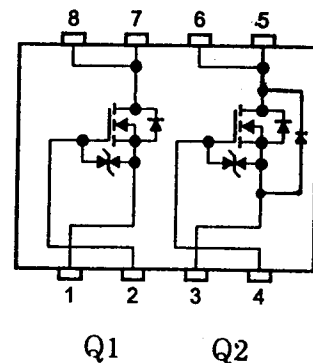
PLEASE HANDLE WITH CAUTION.

UNIT: mm



Weight: 0.08g (Typ)

### CIRCUIT CONFIGURATION

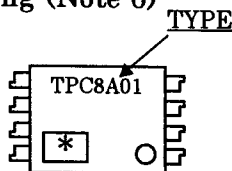


**TENTATIVE**

### 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	°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	

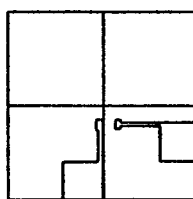
### Marking (Note 6)



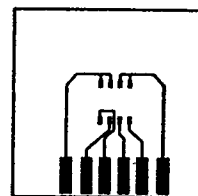
Note1: Please use devices on condition that the channel temperature is below 150°C.

Note2:

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



FR-4  
25.4X25.4X0.8  
(Unit in mm)



FR-4  
25.4X25.4X0.8  
(Unit in mm)

(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.

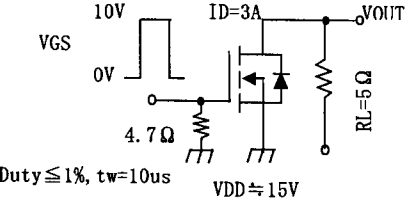
Note6: O on lower right of the marking indicates Pin 1

\* 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)

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**TENTATIVE**

## Electrical Characteristics (T<sub>a</sub>=25°C)

Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Gate leakage current		I <sub>GSS</sub>	V <sub>GS</sub> =±16V, V <sub>DS</sub> =0V	-	-	±10	μA
Drain cut-OFF current		I <sub>DSS</sub>	V <sub>DS</sub> =30V, V <sub>GS</sub> =0V	-	-	10	μA
Drain-source breakdown voltage		V <sub>(BR)DSS</sub>	I <sub>D</sub> =10mA, V <sub>GS</sub> =0V	30	-	-	V
		V <sub>(BR)DSX</sub>	I <sub>D</sub> =10mA, V <sub>GS</sub> =-20V	15	-	-	
Gate threshold voltage		V <sub>th</sub>	V <sub>DS</sub> =10V, I <sub>D</sub> =1mA	1.3	-	2.5	V
Drain-source ON resistance		R <sub>DS(ON)</sub>	V <sub>GS</sub> =4.5V, I <sub>D</sub> =4A	-	26	33	mΩ
			V <sub>GS</sub> =10V, I <sub>D</sub> =6A	-	18	23	
Forward transfer admittance		Y <sub>fs</sub>	V <sub>DS</sub> =10V, I <sub>D</sub> =3.0A	3.8	7.6	-	S
Input capacitance		C <sub>iss</sub>	V <sub>DS</sub> =10V, V <sub>GS</sub> =0V, f=1MHz	-	830	-	pF
Reverse transfer capacitance		C <sub>rss</sub>		-	130	-	
Output capacitance		C <sub>oss</sub>		-	400	-	
Switching time	Rise time	t <sub>r</sub>		-	18	-	ns
	Turn-ON time	t <sub>on</sub>		-	25	-	
	Fall time	t <sub>f</sub>		-	3.3	-	
	Turn-OFF time	t <sub>off</sub>		-	20	-	
Total gate charge (gate-source plus gate-drain)		Q <sub>g</sub>	V <sub>DD</sub> ≐24V, V <sub>GS</sub> =10V, I <sub>D</sub> =6.0A	-	14	-	nC
Gate-source charge 1		Q <sub>gs1</sub>		-	-	-	
Gate-Drain("miller")charge		Q <sub>gd</sub>		-	3.4	-	

## Source-Drain Diode Ratings and Characteristics (T<sub>a</sub>=25°C)

Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Drain reverse current	Pulse	I <sub>DRP</sub>	-	-	-	24	A
Diode forward voltage		V <sub>DSF</sub>	I <sub>DR</sub> =6.0A, V <sub>GS</sub> =0V	-	-	-1.2	V

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**TENTATIVE**

## Electrical Characteristics (T<sub>a</sub>=25°C)

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit	
Gate leakage current	I <sub>GSS</sub>	V <sub>GS</sub> =±16V, V <sub>DS</sub> =0V	-	-	±10	μA	
Drain cut-OFF current	I <sub>DSS</sub>	V <sub>DS</sub> =30V, V <sub>GS</sub> =0V	-	-	500	μA	
Drain-source breakdown voltage	V <sub>(BR)DSS</sub>	I <sub>D</sub> =10mA, V <sub>GS</sub> =0V	30	-	-	V	
	V <sub>(BR)DSX</sub>	I <sub>D</sub> =10mA, V <sub>GS</sub> =-20V	15	-	-		
Gate threshold voltage	V <sub>th</sub>	V <sub>DS</sub> =10V, I <sub>D</sub> =1mA	1.3	-	2.5	V	
Drain-source ON resistance	R <sub>DS(ON)</sub>	V <sub>GS</sub> =4.5V, I <sub>D</sub> =8.6A	-	20	26	mΩ	
		V <sub>GS</sub> =10V, I <sub>D</sub> =8.6A	-	16	21		
Forward transfer admittance	Y <sub>fs</sub>	V <sub>DS</sub> =10V, I <sub>D</sub> =4.3A	5.7	11.4	-	S	
Input capacitance	C <sub>iss</sub>	V <sub>DS</sub> =10V, V <sub>GS</sub> =0V, f=1MHz	-	2120	-	pF	
Reverse transfer capacitance	C <sub>rss</sub>		-	230	-		
Output capacitance	C <sub>oss</sub>		-	430	-		
Switching time	Rise time	t <sub>r</sub>		-	7.1	-	ns
	Turn-ON time	t <sub>on</sub>		-	18	-	
	Fall time	t <sub>f</sub>		-	5.6	-	
	Turn-OFF time	t <sub>off</sub>		-	33	-	
Total gate charge (gate-source plus gate-drain)	Q <sub>g</sub>	V <sub>DD</sub> ≐ 24V, V <sub>GS</sub> =10V, I <sub>D</sub> =8.6A	-	35	-	nC	
Gate-source charge 1	Q <sub>gs1</sub>		-	-	-		
Gate-Drain("miller")charge	Q <sub>gd</sub>		-	6.6	-		

## Source-Drain Diode Ratings and Characteristics (T<sub>a</sub>=25°C)

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Drain reverse current	I <sub>DRP</sub>	-	-	-	-	A
Diode forward voltage	V <sub>DSF</sub>	I <sub>DR</sub> =1.0A, V <sub>GS</sub> =0V	-	-0.48	-0.5	V

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