Silicon N Channel MOS Type (U-MOSⅡ) / Silicon Epitaxial Schottky Barrier Diode

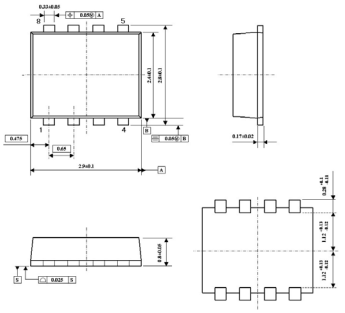
Preliminary

TPCP8AA1

○ DC-DC Converter

- Combined Nch MOSFET and Schottky Diode into one Package.
- Low $R_{DS\ (ON)}$ and Low V_F

単位: mm



1:Anode
2:N/C
3:Source
4:Gate
5,6:Drain
7,8:Cathode

JEDEC	―
JEITA	―
TOSHIBA	P S 8

Weight: mg (typ)

Maximum Ratings (Ta = 25°C) MOSFET

Characteristics		Symbol	Rating	Unit
Drain-Source voltage		V_{DS}	20	V
Gate-Source voltage		V_{GSS}	±12	V
Drain current	DC	I_D	1.6	A
	Pulse	I_{DP} (Note 2)	3.2	
Drain power dissipation		P_D (Note 1)	1.0	W
Channel temperature		T_{ch}	150	°C

Maximum Ratings (Ta = 25°C) SCHOTTKY DIODE

Characteristics	Symbol	Rating	Unit
Maximum (peak) reverse voltage	V_{RM}	30	V
Reverse voltage	V_R	25	V
Average forward current	I_O	0.7	A
Peak one cycle surge forward current (non-repetitive)	I_{FSM}	4 (50 Hz)	A
Junction temperature	T_j	125	°C

Maximum Ratings (Ta = 25°C) MOSFET, DIODE COMMON

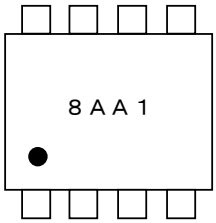
Characteristics	Symbol	Rating	Unit
Storage temperature	T_{stg}	−55~125	°C
Operating temperature	T_{opr} (Note 3)	−40~100	°C

Note 1: Mounted on FR4 board
(25.4 mm × 25.4 mm × 1.6 t, Cu pad: 645 mm^2)

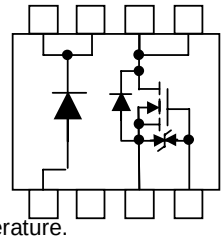
Note 2: The pulse width limited by max channel temperature.

Note 3: Operating temperature limited by max channel temperature and max junction temperature.

Making



Equivalent



Handling Precaution

When handling individual devices (which are not yet mounting on a circuit board), be sure that the environment is protected against electrostatic discharge. Operators should wear anti-static clothing and use containers and other objects that are made of anti-static materials.

The Channel-to-Ambient thermal resistance $R_{th\ (ch\text{-}a)}$ and the drain power dissipation P_D vary according to the board material, board area, board thickness and pad area. When using this device, please take heat dissipation fully into account.

MOSFET

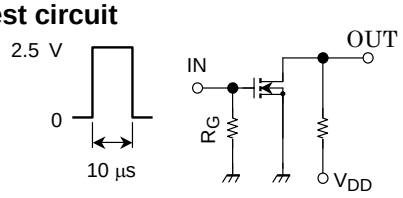
Electrical Characteristics (Ta = 25°C)

Characteristic		Symbol	Test Condition	Min	Typ.	Max	Unit
Gate leakage current		I_{GSS}	V_{GS} = ±12 V, V_{DS} = 0	—	—	±1	μA
Drain-Source breakdown voltage		$V_{(BR)\ DSS}$	I_D = 1 mA, V_{GS} = 0	20	—	—	V
		$V_{(BR)\ DSX}$	I_D = 1 mA, V_{GS} = -12 V	12	—	—	
Drain Cut-off current		I_{DSS}	V_{DS} = 20 V, V_{GS} = 0	—	—	1	μA
Gate threshold voltage		V_{th}	V_{DS} = 3 V, I_D = 0.1 mA	0.5	—	1.2	V
Forward transfer admittance		$\|Y_{fs}\|$	V_{DS} = 3 V, I_D = 0.8 A (Note 4)	2.0	—	—	S
Drain-Source ON resistance		$R_{DS\ (ON)}$	I_D = 0.8 A, V_{GS} = 4 V (Note 4)	—	77	105	mΩ
			I_D = 0.8 A, V_{GS} = 2.5 V (Note 4)	—	100	140	
			I_D = 0.8 A, V_{GS} = 2.0 V (Note 4)	—	125	210	
Input capacitance		C_{iss}	V_{DS} = 10 V, V_{GS} = 0, f = 1 MHz	—	306	—	pF
Reverse transfer capacitance		C_{rss}	V_{DS} = 10 V, V_{GS} = 0, f = 1 MHz	—	44	—	pF
Output capacitance		C_{oss}	V_{DS} = 10 V, V_{GS} = 0, f = 1 MHz	—	74	—	pF
Switching time	Turn-on time	t_{on}	V_{DD} = 10 V, I_D = 0.8 A	—	16	—	ns
	Turn-off time	t_{off}	V_{GS} = 0~2.5 V, R_G = 4.7 Ω	—	15	—	

Note 4: Pulse measurement

Switching Time Test Circuit

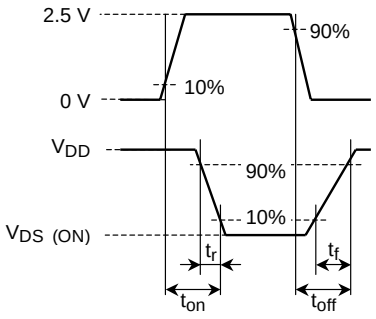
(a) Test circuit



V_{DD} = 10 V
R_G = 4.7 Ω
Duty ≦ 1%
IN: t_r, t_f < 5 ns
Common Source
Ta = 25°C

(b) V_{IN}

(c) V_{out}



Precaution

V_{th} can be expressed as voltage between gate and source when low operating current value is I_D = 100 μA for this product. For normal switching operation, $V_{GS\ (on)}$ requires higher voltage than V_{th} and $V_{GS\ (off)}$ requires lower voltage than V_{th}.

(Relationship can be established as follows: $V_{GS\ (off)} < V_{th} < V_{GS\ (on)}$)

Please take this into consideration for using the device.

V_{GS} recommended voltage of 2.5 V or higher to turn on this product.

Schottky Diode

Electrical Characteristics (Ta = 25°C)

Characteristic	Symbol	Test Condition	Min	Typ.	Max	Unit
Forward voltage	$V_{F\ (1)}$	I_F = 0.5 A	—	0.36	0.41	V
	$V_{F\ (2)}$	I_F = 0.7 A	—	0.40	0.45	V
Reverse current	I_R	V_R = 10V	—	—	100	μA
Total capacitance	C_T	V_R = 10 V, f = 1 MHz	—	20	—	pF

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