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## PQ1CX12H2ZPQ

Bootstrap system  
Chopper Regulator

### Features

1. Maximum switching current: 2.5A
2. High efficiency (efficiency : 88% [ $V_{IN}=5V, V_{OUT}=3.3V$ ])
3. Built-in oscillation circuit  
(Oscillation frequency: TYP. 150kHz)
4. Built-in overheat, overcurrent protection functions
5. Variable output voltage  
(Output variable range:  $V_{ref}$  to 24V)
6. RoHS directive compliant

### Applications

1. AV equipment
2. Digital OA equipment

### Absolute Maximum Ratings

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

Parameter	Symbol	Rating	Unit
*1 Input voltage	$V_{IN}$	33	V
*2 Boost terminal voltage	$V_B$	33	V
*3 Voltage between $V_B$ and $V_{IN}$	$V_{B-I}$	15	V
Malfunction input voltage	$V_{adj}$	7	V
Input-output voltage	$V_{I-O}$	34	V
*4 Output-GND voltage	$V_{OUT}$	-1	V
*5 ON/OFF control voltage	$V_C$	-0.3 to 20	V
Switching current	$I_{SW}$	2.5	A
*6 Power dissipation	$P_D$	0.9	W
*7 Junction temperature	$T_j$	150	$^\circ\text{C}$
Operating temperature	$T_{opr}$	-30 to +85	$^\circ\text{C}$
Storage temperature	$T_{stg}$	-40 to +150	$^\circ\text{C}$
Soldering temperature	$T_{sol}$	260 (for 10s)	$^\circ\text{C}$

\*1 Voltage between  $V_{IN}$  and GND

\*2 Voltage between  $V_B$  and GND

\*3 Voltage between  $V_B$  and  $V_{IN}$

\*4 Voltage between  $V_{OUT}$  and GND

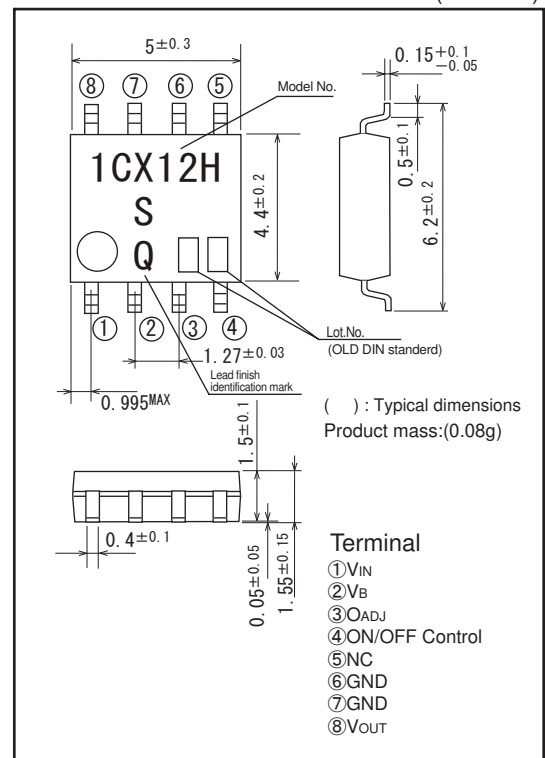
\*5 Voltage between ON/OFF and GND

\*6 At the time of the PCB mounting

\*7 There is case that over heat protection function operates at the temperature  $T_j=125^\circ\text{C}$  to  $150^\circ\text{C}$ , so this item cannot be used in this temperature range.

### Outline Dimensions

(Unit:mm)



Lead finish: Lead-free solder plating  
(Composition: Sn2Bi)

Notice The content of data sheet is subject to change without prior notice.

In the absence of confirmation by device specification sheets, SHARP takes no responsibility for any defects that may occur in equipment using any SHARP devices shown in catalogs, data books, etc. Contact SHARP in order to obtain the latest device specification sheets before using any SHARP device.

## Electrical Characteristics

(VIN=5 V, Io=0.5 A, Vo=3.3V, Terminal No. 4 open and Ta=25°C unless otherwise specified)

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Voltage ratio VOUT-VIN	DI-O	-	15	-	-	%
Output saturation voltage	Vsat	Isw=2.0A	-	0.25	0.4	V
Reference voltage	VREF	-	1.235	1.26	1.285	V
Load regulation	RegL	Io=0.5 to 2.0A	-	0.2	1.5	%
Line regulation	Regl	VIN=5 to 20V	-	1	2.5	%
Efficiency	$\eta$	Io=2.0 A	-	88	-	%
Oscillation frequency	fo	-	135	150	165	kHz
Overcurrent detection level	IL	Switching current peak	2.55	3.2	4.2	A
Maximum Duty	DMAX	Terminal 3 = 1.1 V	83	90	-	%
Charge current	ICHG	Terminal 3,8:OPEN, Terminal 4	-	-10	-	$\mu$ A
Input threshold voltage	VTHL	Duty=0 %,Terminal 3=0V,Terminal 4	-	1.3	-	V
	VTHH	Duty=DMAX,Terminal 3:OPEN,Terminal 4	-	2.3	-	V
ON threshold voltage	VTHON	Terminal 3 = 0V,Terminal 4	0.7	0.8	0.9	V
Standby current	ISD	VIN=33V,Terminal 4 = 0V	-	120	400	$\mu$ A
Output OFF-state consumption current	IQS	VIN=33V,Terminal 4 = 0.9V	-	5	10	mA
Minimum Input Voltage	VIN(MIN)	-	-	-	4.5	V
Minimum Boost Voltage	VBOOST(MIN)	V <sub>B</sub> -V <sub>OUT</sub> Voltage	-	-	3	V

Fig.1 Test Circuit

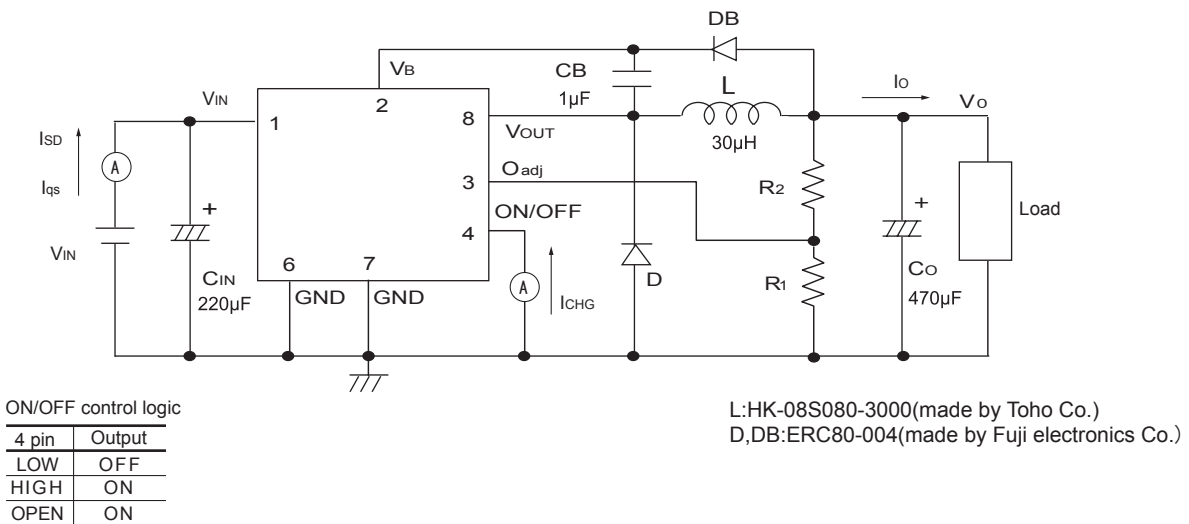
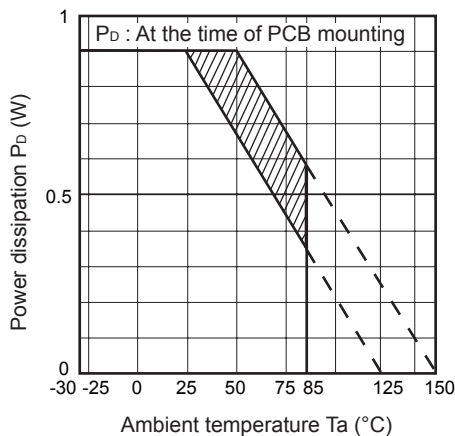


Fig.2 Power Dissipation vs.Ambient Temperature



Note)Oblique line portion:Overheat protection may operate in this area

Fig.3 Overcurrent Protection Characteristics (Typical Value)

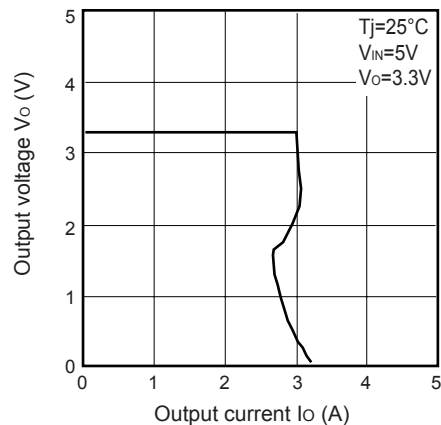


Fig.4 Efficiency vs. Input Voltage

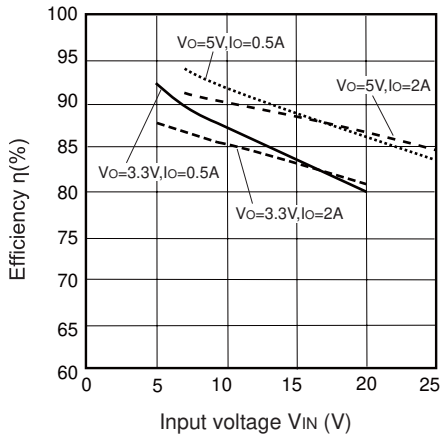


Fig.5 Output Saturation Voltage vs. Switching Current

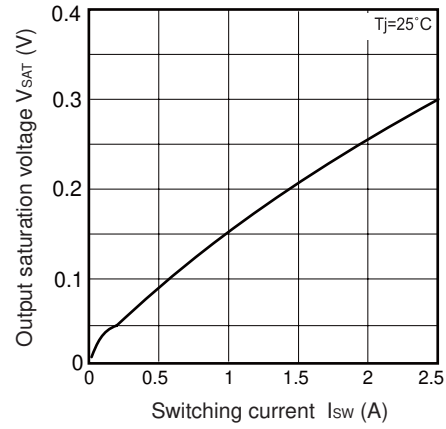


Fig.6 Stand-by Current vs. Input Voltage

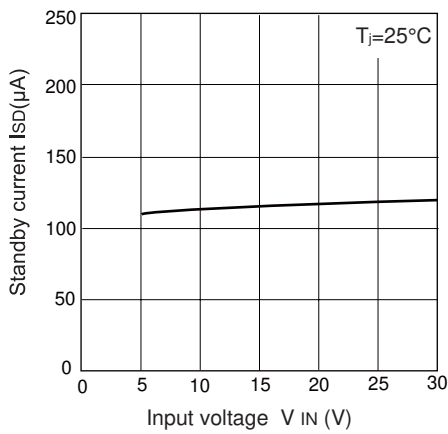


Fig.7 Reference Voltage Fluctuation vs. Junction Temperature

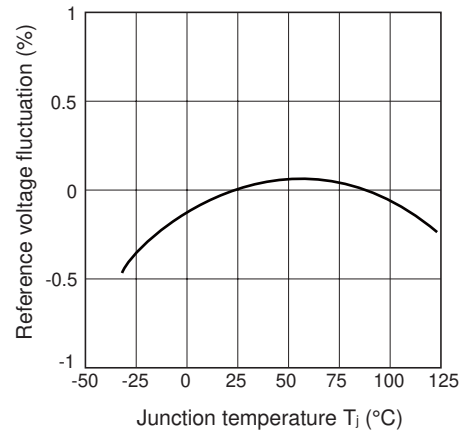


Fig.8 Load Regulation vs. Output Current

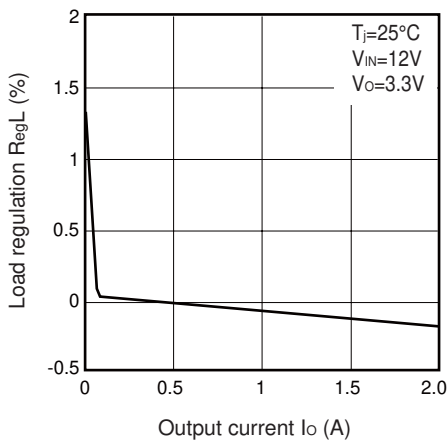


Fig.9 Line Regulation vs. Input Voltage

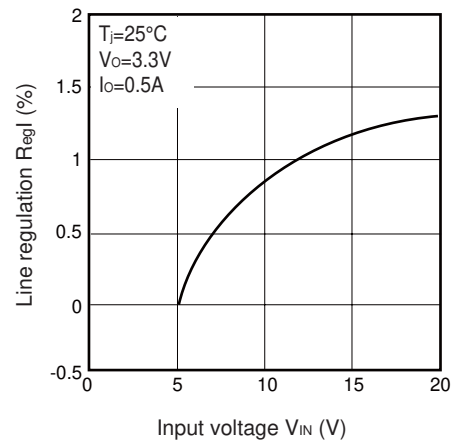


Fig.10 Oscillation Frequency Fluctuation vs. Junction Temperature

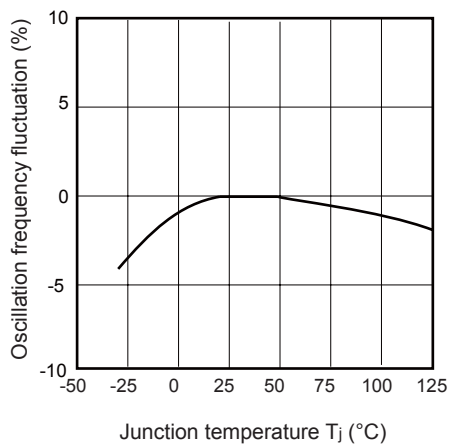


Fig.11 Overcurrent Detecting Level Fluctuation vs. Junction Temperature

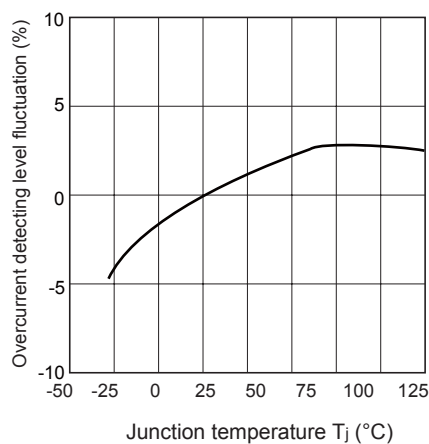


Fig.12 Threshold Voltage vs. Junction Temperature

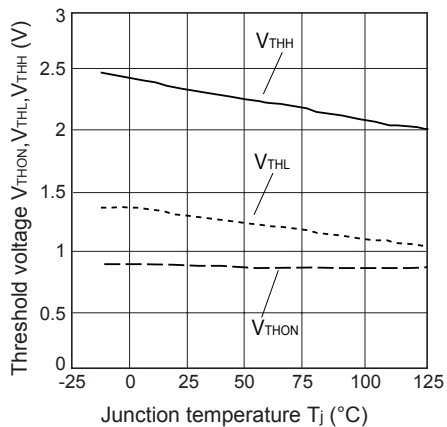


Fig.13 Operating Dissipation Current vs. Input Voltage

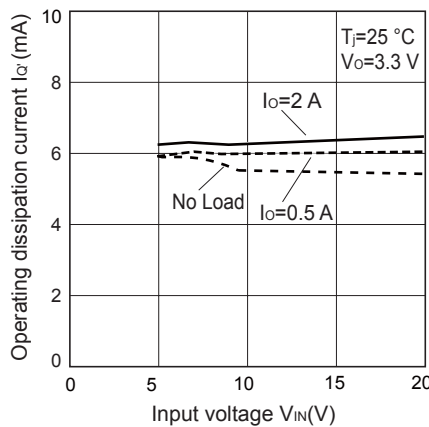
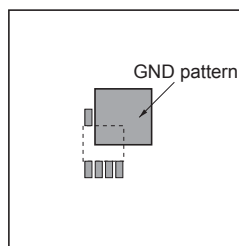
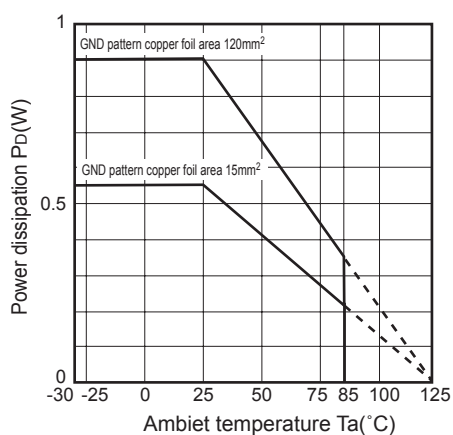


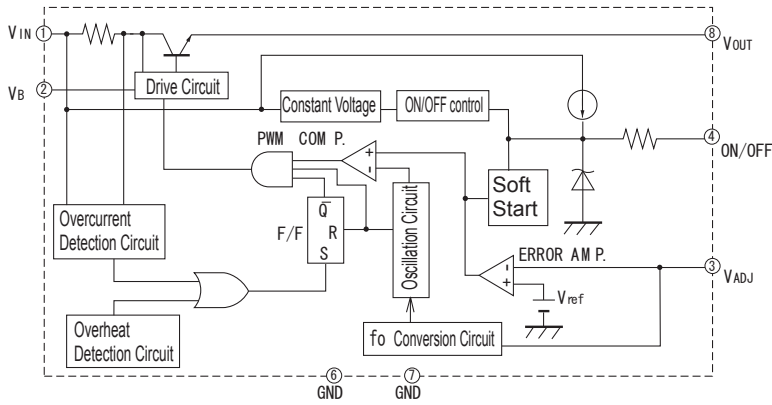
Fig.14 PD-Ta rating(Typical value)



Mounting PCB

Material : Glass-cloth epoxy resin  
 Size : 30mm × 30mm × 1mm  
 GND pattern copper foil area : 120mm<sup>2</sup>,35μm

■ Block Diagram



■ Step-down voltage output circuit diagram

