PQ1CZ41H2ZxH

TO-220 Type Chopper Regulator,
built-in 300kHz oscillation circuit

Features

1. Maximum switching current: 1.5A
2. Built-in ON-OFF control function
3. Built-in soft start function to suppress overshoot of output voltage in power on sequence or ON/OFF control sequence
4. Built-in oscillation circuit
   (Oscillation frequency: TYP.300kHz)
5. Built-in overheat protection function, overcurrent protection function
6. SC-63 Surface Mount Type package
7. Variable output voltage
   (Output variable range: Vref to 35V– Vref to –30V)
   [Possible to select step-down output/inversing output according to external connection circuit]
8. PQ1CZ41H2ZZH: Sleeve-packaged product
   PQ1CZ41H2ZPH: Tape-packaged product
9. RoHS directive compliant

Applications

1. Color TV, STB
2. LCD monitors
3. Facsimiles, plinters and other OA equipment
4. CD-ROM drives/DVD-ROM drivers
5. Air conditioners

Absolute Maximum Ratings

(Ta=25°C)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Rating</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Voltage input</td>
<td>(V_{IN})</td>
<td>40</td>
<td>V</td>
</tr>
<tr>
<td>Error input voltage</td>
<td>(V_{ADJ})</td>
<td>7</td>
<td>V</td>
</tr>
<tr>
<td>Input - output voltage</td>
<td>(V_{LO})</td>
<td>41</td>
<td>V</td>
</tr>
<tr>
<td>2 Output - COM voltage</td>
<td>(V_{OUT})</td>
<td>-1</td>
<td>V</td>
</tr>
<tr>
<td>3 ON/OFF control voltage</td>
<td>(V_{C})</td>
<td>-0.3 to +40</td>
<td>V</td>
</tr>
<tr>
<td>Switching current</td>
<td>(I_{SW})</td>
<td>1.5</td>
<td>A</td>
</tr>
<tr>
<td>Power dissipation</td>
<td>(P_{D})</td>
<td>5</td>
<td>W</td>
</tr>
<tr>
<td>Junction temperature</td>
<td>(T_{J})</td>
<td>150</td>
<td>°C</td>
</tr>
<tr>
<td>Operating temperature</td>
<td>(T_{OPR})</td>
<td>-40 to +85</td>
<td>°C</td>
</tr>
<tr>
<td>Storage temperature</td>
<td>(T_{STG})</td>
<td>-40 to +150</td>
<td>°C</td>
</tr>
<tr>
<td>Soldering temperature</td>
<td>(T_{SOL})</td>
<td>260(10s)</td>
<td>°C</td>
</tr>
</tbody>
</table>

*1 Voltage between \(V_{IN}\) terminal and COM terminal
*2 Voltage between \(V_{OUT}\) terminal and COM terminal
*3 Voltage between ON/OFF control and COM terminal
*4 \(P_{D}\): With infinite heat sink
*5 There is case that over heat protection function operates at the temperature \(T_{J}=125°C\) to 150°C, so this item cannot be used in this temperature range.

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

(Unless otherwise specified, condition shall be \( V_{IN}=12V, I_O=0.2A, V_O=5V \), ON-OFF terminals is open, \( T_a=25^\circ C \))

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Conditions</th>
<th>MIN.</th>
<th>TYP.</th>
<th>MAX.</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output saturation voltage</td>
<td>( V_{SAT} )</td>
<td>( I_{SW}=1A )</td>
<td>–</td>
<td>0.9</td>
<td>1.5</td>
<td>V</td>
</tr>
<tr>
<td>Reference voltage</td>
<td>( V_r )</td>
<td>–</td>
<td>1.235</td>
<td>1.26</td>
<td>1.285</td>
<td>V</td>
</tr>
<tr>
<td>Reference voltage temperature fluctuation</td>
<td>( \Delta V_{ref} )</td>
<td>( T_j=0 ) to ( 125^\circ C )</td>
<td>–</td>
<td>( \pm 0.5 )</td>
<td>–</td>
<td>%</td>
</tr>
<tr>
<td>Load regulation</td>
<td>(</td>
<td>R_{reg}</td>
<td>)</td>
<td>( I_o=0.2 ) to ( 1A )</td>
<td>–</td>
<td>0.2</td>
</tr>
<tr>
<td>Line regulation</td>
<td>(</td>
<td>R_{reg}</td>
<td>)</td>
<td>( V_{IN}=8 ) to ( 35V )</td>
<td>–</td>
<td>1.2</td>
</tr>
<tr>
<td>Efficiency</td>
<td>( \eta )</td>
<td>( I_o=1A )</td>
<td>–</td>
<td>84</td>
<td>–</td>
<td>%</td>
</tr>
<tr>
<td>Oscillation frequency</td>
<td>( f_o )</td>
<td>–</td>
<td>270</td>
<td>300</td>
<td>330</td>
<td>kHz</td>
</tr>
<tr>
<td>Oscillation frequency temperature fluctuation</td>
<td>( \Delta f_o )</td>
<td>( T_j=0 ) to ( 125^\circ C )</td>
<td>–</td>
<td>( \pm 3 )</td>
<td>–</td>
<td>%</td>
</tr>
<tr>
<td>Overcurrent detecting level</td>
<td>( I_{CHG} )</td>
<td>–</td>
<td>1.55</td>
<td>2.0</td>
<td>2.6</td>
<td>A</td>
</tr>
<tr>
<td>Input threshold voltage</td>
<td>( V_{THL} )</td>
<td>Duty ratio=0%</td>
<td>–</td>
<td>10</td>
<td>–</td>
<td>( \mu A )</td>
</tr>
<tr>
<td></td>
<td>( V_{THH} )</td>
<td>Duty ratio=100%</td>
<td>1.3</td>
<td>–</td>
<td>V</td>
<td></td>
</tr>
<tr>
<td>ON threshold voltage</td>
<td>( V_{TH(ON)} )</td>
<td>( 4 ) terminal=0V</td>
<td>0.7</td>
<td>0.8</td>
<td>0.9</td>
<td>V</td>
</tr>
<tr>
<td>Stand-by current</td>
<td>( ISD )</td>
<td>( V_{IN}=40V ), ( 5 ) terminal=0V</td>
<td>–</td>
<td>140</td>
<td>400</td>
<td>( \mu A )</td>
</tr>
<tr>
<td>Output OFF-state dissipation current</td>
<td>( I_{QS} )</td>
<td>( V_{IN}=40V ), ( 5 ) terminal=0.9V</td>
<td>–</td>
<td>8</td>
<td>12</td>
<td>mA</td>
</tr>
</tbody>
</table>

#### Fig. 1 Test Circuit

![Test Circuit](image)

- 5 pin: Output
- LOW: OFF
- HIGH: ON
- OPEN: ON

#### Fig. 2 Power Dissipation vs. Ambient Temperature

![Power Dissipation vs. Ambient Temperature](image)

#### Fig. 3 Overcurrent Protection Characteristics (Typical Value)

![Overcurrent Protection Characteristics](image)

Note: Oblique line portion: Overheat protection may operate in this area
**Fig. 4** Efficiency vs. Input Voltage

![Graph showing efficiency vs. input voltage with different curves for different voltages and currents.](image)

**Fig. 5** Output Saturation Voltage vs. Switching Current

![Graph showing output saturation voltage vs. switching current for different temperatures.](image)

**Fig. 6** Stand-by Current vs. Input Voltage

![Graph showing stand-by current vs. input voltage.](image)

**Fig. 7** Reference Voltage Fluctuation vs. Junction Temperature

![Graph showing reference voltage fluctuation vs. junction temperature.](image)

**Fig. 8** Load Regulation vs. Output Current

![Graph showing load regulation vs. output current.](image)

**Fig. 9** Line Regulation vs. Input Voltage

![Graph showing line regulation vs. input voltage.](image)
Fig. 10 Oscillation Frequency Fluctuation vs. Junction Temperature

Fig. 11 Overcurrent Detecting Level Fluctuation vs. Junction Temperature

Fig. 12 On Threshold Voltage vs. Junction Temperature

Fig. 13 Operating Dissipation Current vs. Input Voltage

Fig. 14 Power Dissipation vs. Ambient Temperature (Typical Value)

Material: Glass-cloth epoxy resin
Size: 50x50x1.6mm
Cu thickness: 35μm
Fig.15 Block Diagram

Fig.16 Step Down Type Circuit Diagram

Fig.17 Polarity Inversion Type Circuit Diagram

In case that polarity is reverse, depending on the conditions, there is cases that output voltage can not gain, please use this device after confirming the output voltage at the actual conditions.