

Under Development

Boot Strap System Chopper Regulator

[PQ1CX12H2ZP]

Features

- High efficiency: TYP 87% (Compare to conventional model: 5% up)
- Low dissipation current: $I_{OS} = \text{MAX } 7\text{mA}$ (Compare to conventional model: 56% down)
- Compact package: SOP8 - pin (Outline dimension: 5.2 × 6.2 × 1.5 mm)
 - Compare to SC -63 package (Mounting area): 49% down
 - Compare to TO -263 package (Mounting area): 77% down

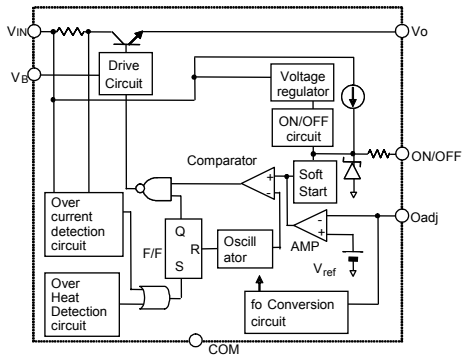
Expansion of Chopper Regulator

| System | General purpose type | Boot strap system |
|-------------------|-------------------------|-------------------------|
| Model No. | PQ1CY1032ZP/ZZ | PQ1CX12H2ZP |
| Efficiency | TYP 82% (12V → 5V, 2A) | TYP 87% (12V → 5V, 2A) |
| | TYP 75% (5V → 3.3V, 2A) | TYP 85% (5V → 3.3V, 2A) |
| SW current (MAX) | 3.5 A | 2.5 A |
| Input voltage | 4.5 to 40 V | 4.5 to 20 V |
| Package | TO-263 type 5 -pin | SOP8 -pin |
| Outline dimension | 10.6 × 13.7 × 3.5 mm | 5.2 × 6.2 × 1.5 mm |

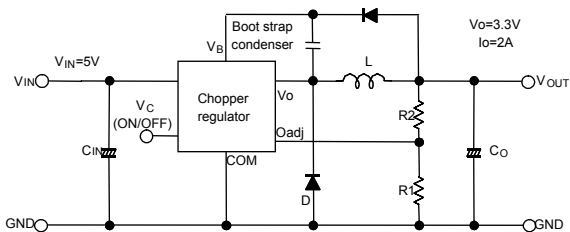
Specifications

| Parameter | Symbol | Characteristics | Conditions |
|---------------------------------------|-----------|-----------------------|---|
| Input voltage | V_{IN} | MAX 20 V | |
| Output saturation voltage | V_{SAT} | TYP 0.3 V | $I_{SW} = 2.0 \text{ A}$ |
| Switching current | I_{SW} | MAX 2.5 A | |
| Output OFF -state dissipation current | I_{OS} | MAX 7 mA | $V_{IN} = 20 \text{ V}$ |
| Stand-by current | I_{SD} | MAX 400 μA | $V_{IN} = 20 \text{ V}$ |
| Reference voltage | V_{ref} | TYP 1.26 V | |
| Oscillation frequency | f_{OSC} | TYP 150 kHz | |
| Efficiency | η | TYP 87% | $V_{IN} = 12\text{V}, V_O = 5\text{V}, I_O = 2\text{A}$ |
| Operating temperature | T_{opr} | -30 to +85 °C | |

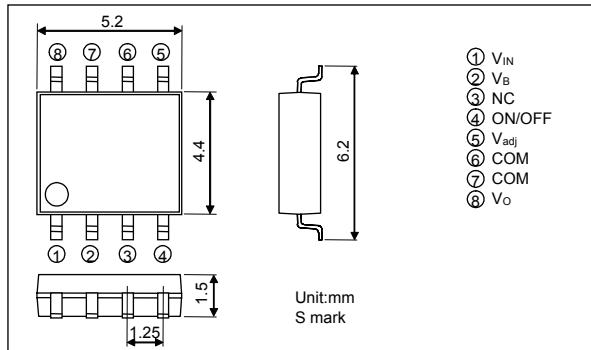
Block Diagram



Application Circuit



Outline Dimensions

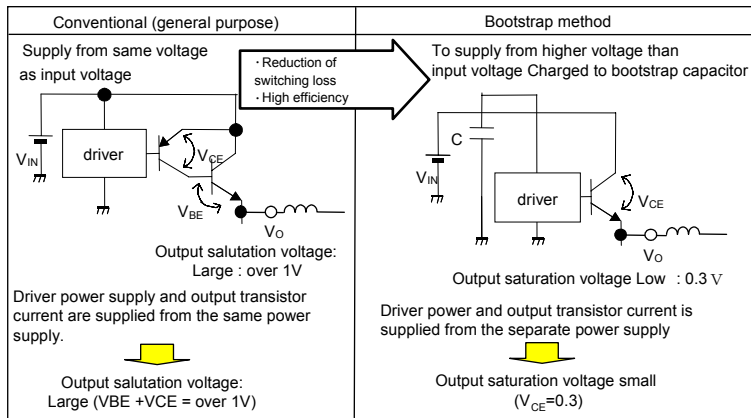


Line-up of Chopper Regulator

| Step down output / Reverse output | Package | SW current | Oscillation frequency | Model |
|-----------------------------------|----------|------------|-----------------------|--------------------|
| TO-220 | TO-220 | 0.8A | 300kHz | PQ1CG38M2FZ/RZ |
| | | 1.5A | 100kHz | PQ1CG21H2FZ/RZ |
| | | 3.5A | 300kHz | PQ1CG41H2FZ/RZ |
| TO-263 | TO-263 | 3.5A | 70kHz | PQ1CG2032FZ/RZ |
| | | 3.5A | 150kHz | PQ1CG3032FZ/RZ |
| | | 3.5A | 150kHz | PQ1CY1032ZP/ZZ |
| SC-63 | SC-63 | 0.8A | 300kHz | PQ1CZ38M2ZP/ZZ |
| | | 1.5A | 100kHz | PQ1CZ21H2ZP/ZZ |
| | | 1.5A | 300kHz | PQ1CZ41H2ZP/ZZ |
| SOP8-pin | SOP8-pin | 2.5A | 150kHz | PQ1CX12H2ZP |

Feature of Bootstrap Method Chopper Regulator

Bootstrap capacitor is installed to supply higher controlled voltage than input voltage to switching transistor inside. The higher efficiency is obtained due to the switching transistors' saturated voltage become low by higher controlled voltage than supplied input voltage.



- High Efficiency 82% against conventional model
- The method 87% (at $V_{IN} = 12\text{V} \rightarrow V_O = 5\text{V}$)

Drastic improvement of efficiencies in dropper application below 5V

- Efficiency improvement at low input
- Conventional efficiency 75% → 85% ($V_{IN} = 5\text{V} \rightarrow V_O = 3.3\text{V}$)