

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

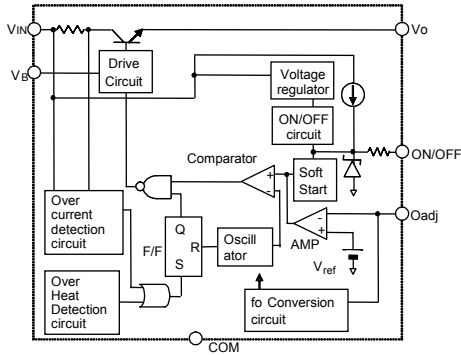
### Expansion of Chopper Regulator

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

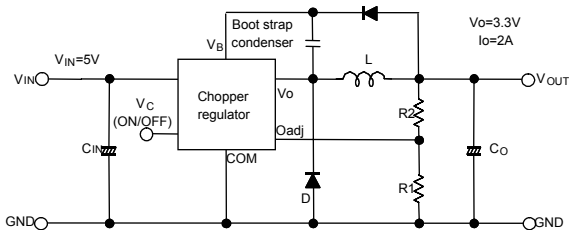
### Specifications

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 $\mu\text{A}$	$V_{IN} = 20 \text{ V}$
Reference voltage	$V_{ref}$	TYP 1.26 V	
Oscillation frequency	$f_{OSC}$	TYP 150 kHz	
Efficiency	$\eta$	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	

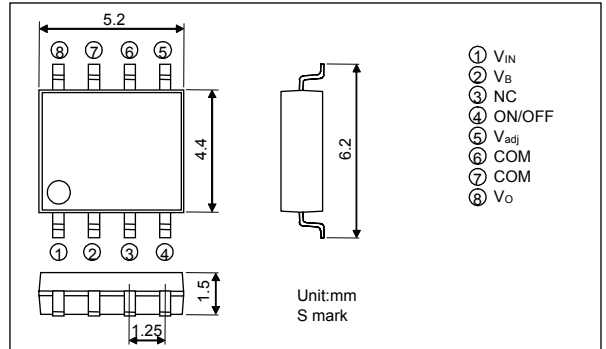
### Block Diagram



### Application Circuit



### Outline Dimensions

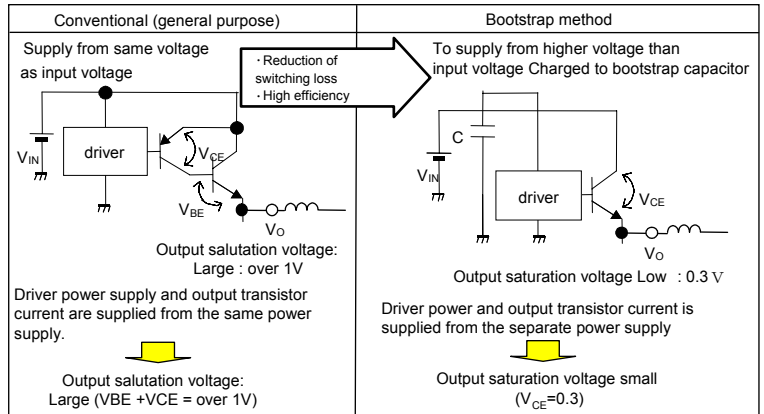


### Line-up of Chopper Regulator

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	<b>PQ1CX12H2ZP</b>

### 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% ( $V_{IN} = 5\text{V} \rightarrow V_O = 3.3\text{V}$ )