# PQ1CG2032FZ/PQ1CG2032RZ

TO-220 Type Chopper Regulators

## ■ Features

- Maximum switching current: 3.5A
- Built-in ON/OFF control function
- Built-in soft start function to suppress overshoot of output voltage in power on sequence or ON/OFF control sequence
- Built-in oscillation circuit
  (Oscillation frequency: TYP. 70kHz)
- Built-in overheat, overcurrent protection function
- TO-220 package
- 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]
- PQ1CG2032FZ: Zigzag forming
  PQ1CG2032RZ: Self-stand forming

## ■ Applications

- Switching power supplies
- Facsimiles, printers and other OA equipment
- Battery chargers
- Personal computers and amusement equipment

## ■ Absolute Maximum Ratings

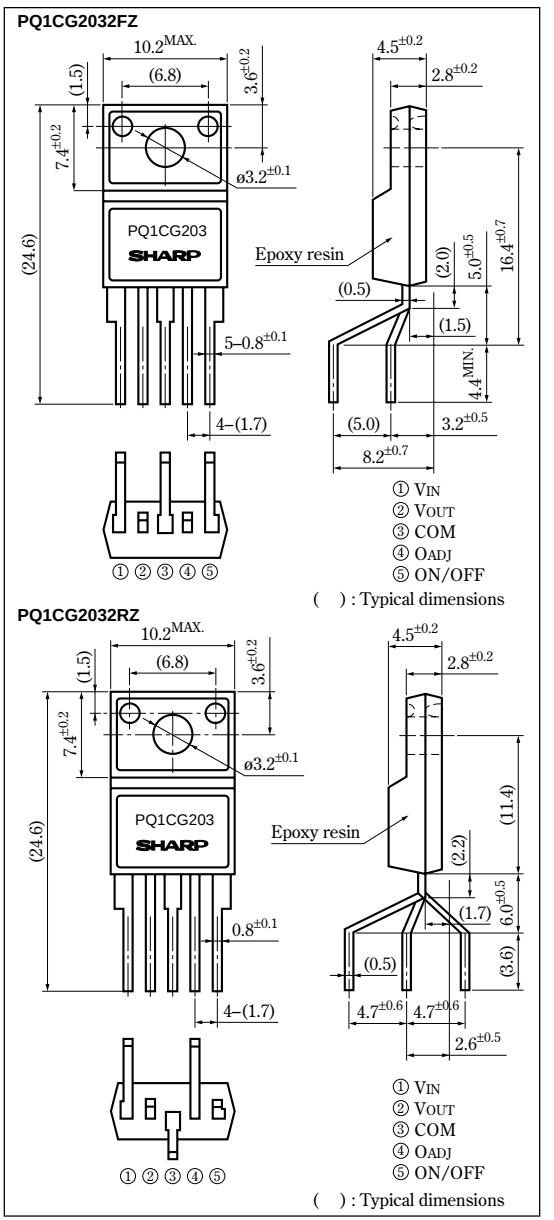
(Ta=25°C)

| Parameter | Symbol | Rating | Unit |
|---|---|---|---|
| ※1 Input voltage | $V_{IN}$ | 40 | V |
| Error input voltage | $V_{ADJ}$ | 7 | V |
| Input-output voltage | $V_{I-O}$ | 41 | V |
| ※2 Output – COM voltage | $V_{OUT}$ | –1 | V |
| ※3 ON/OFF control voltage | $V_C$ | –0.3 to +40 | V |
| Switching current | $I_{SW}$ | 3.5 | A |
| ※4 Power dissipation | $P_{D1}$ | 1.4 | W |
| | $P_{D2}$ | 14 | W |
| ※5 Junction temperature | $T_j$ | 150 | ˚C |
| Operating temperature | $T_{opr}$ | –20 to +80 | ˚C |
| Storage temperature | $T_{stg}$ | –40 to +150 | ˚C |
| Soldering temperature | $T_{sol}$ | 260 (10s) | ˚C |

※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 Overheat protection may operate at $T_j$=125˚C to 150˚C

## ■ Outline Dimensions

(Unit : mm)



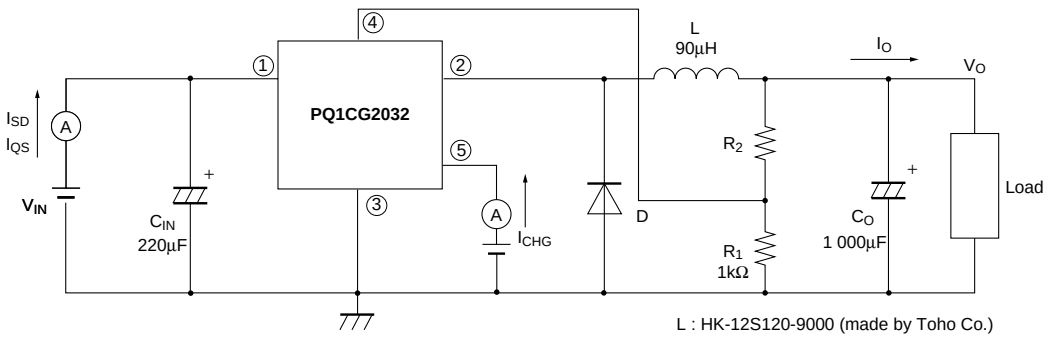

• Please refer to the chapter " Handling Precautions ".

## ■ Electrical Characteristics

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

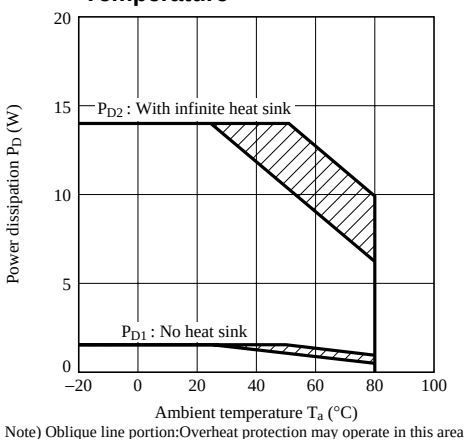
| Parameter | Symbol | Conditions | MIN. | TYP. | MAX. | Unit |
|---|---|---|---|---|---|---|
| Output saturation voltage | $V_{SAT}$ | $I_{SW}$=3A | – | 1.4 | 1.8 | V |
| Reference voltage | $V_{ref}$ | – | 1.235 | 1.26 | 1.285 | V |
| Reference voltage temperature fluctuation | $\Delta V_{ref}$ | $T_j$=0 to 125˚C | – | ±0.5 | – | % |
| Load regulation | $\|R_{egL}\|$ | $I_O$=0.5 to 3A | – | 0.2 | 1.5 | % |
| Line regulation | $\|R_{egI}\|$ | $V_{IN}$=8 to 35V | – | 0.5 | 2.5 | % |
| Efficiency | η | $I_O$=3A | – | 80 | – | % |
| Oscillation frequency | $f_O$ | – | 60 | 70 | 80 | kHz |
| Oscillation frequency temperature fluctuation | $\Delta f_O$ | $T_j$=0 to 125˚C | – | ±2 | – | % |
| Overcurrent detecting level | $I_L$ | – | 3.6 | 4.2 | 5.8 | A |
| Charge current | $I_{CHG}$ | ②,④ terminals is open, ⑤ terminal | – | –10 | – | µA |
| Input threshold voltage | $V_{THL}$ | Duty ratio=0%,④ terminal=0V, ⑤ terminal | – | 1.3 | – | V |
| | $V_{THH}$ | Duty ratio=100%,④ terminals is open, ⑤ terminal | – | 2.3 | – | V |
| ON threshold voltage | $V_{TH(ON)}$ | ④ terminal=0V, ⑤ terminal | 0.7 | 0.8 | 0.9 | V |
| Stand-by current | $I_{SD}$ | $V_{IN}$=40V, ⑤ terminal=0V | – | 140 | 400 | µA |
| Output OFF-state dissipation current | $I_{QS}$ | $V_{IN}$=40V, ⑤ terminal=0.9V | – | 8 | 16 | mA |

### Fig.1 Test Circuit




L : HK-12S120-9000 (made by Toho Co.)
D :ERC80-004 (made by Fuji electronics Co.)

### 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)

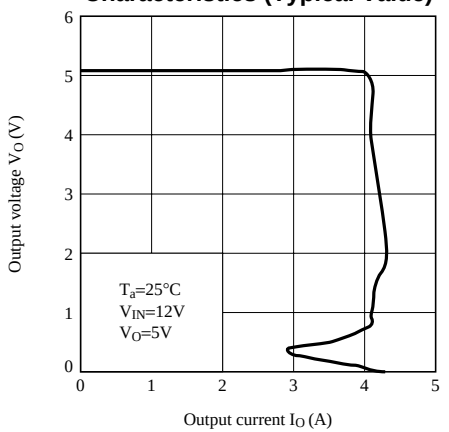


**Fig.4 Efficiency vs. Input Voltage**

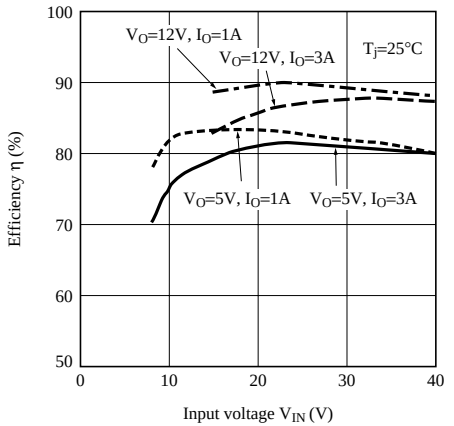



**Fig.5 Output Saturation Voltage vs. Switching Current**

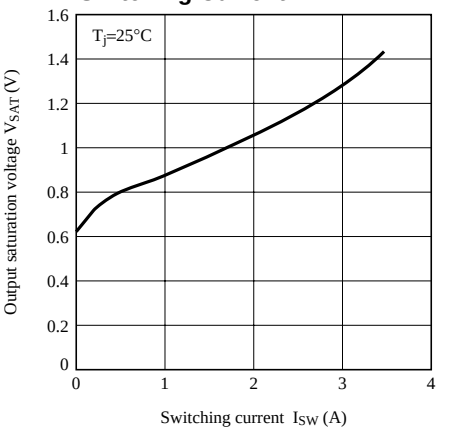



**Fig.6 Stand-by Current vs. Intput Voltage**

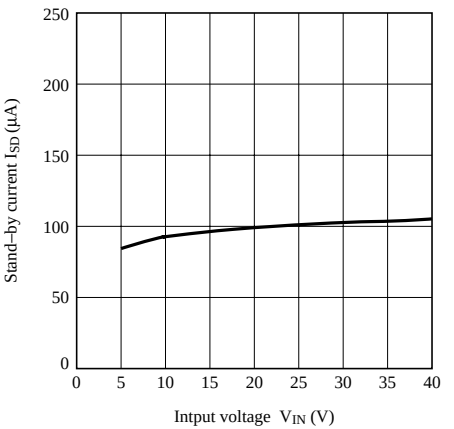



**Fig.7 Reference Voltage Fluctuation vs. Junction Temperature**

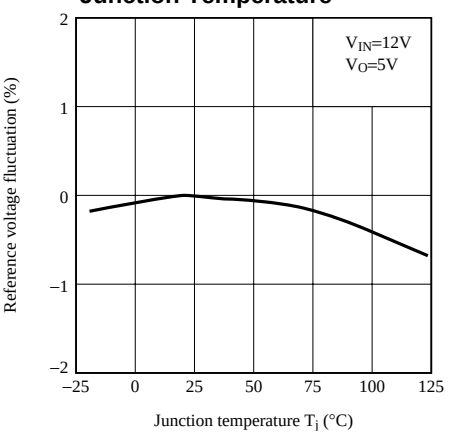



**Fig.8 Load Regulation vs. Output Current**

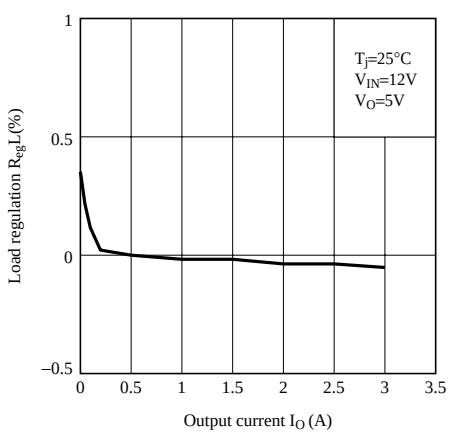



**Fig.9 Line Regulation vs. Input Voltage**

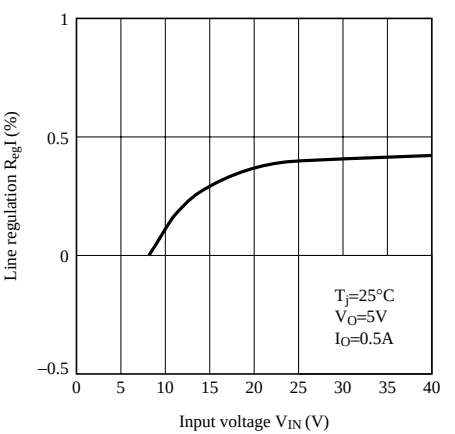


**Fig.10 Oscillation Frequency Fluctuation vs. Junction Temperature**

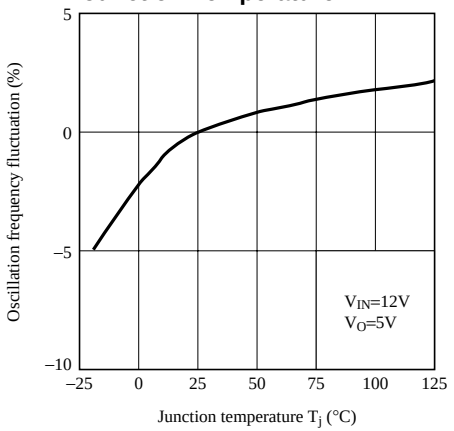



**Fig.11 Overcurrent Detecting Level Fluctuation vs. Junction Temperature**

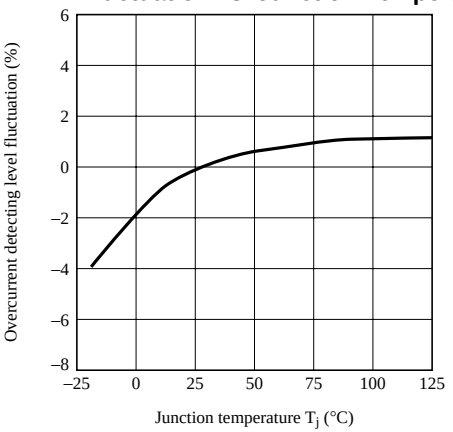



**Fig.12 Threshold Voltage vs. Junction Temperature**

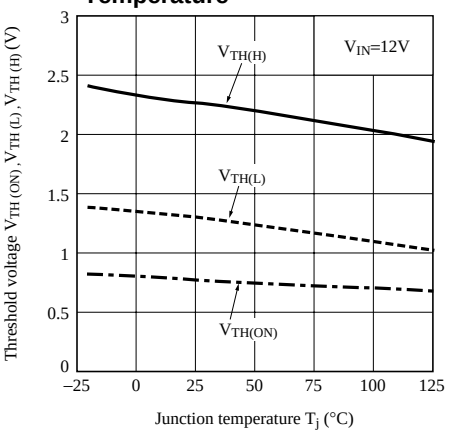



**Fig.13 Operating Dissipation Current vs. Input Voltage**

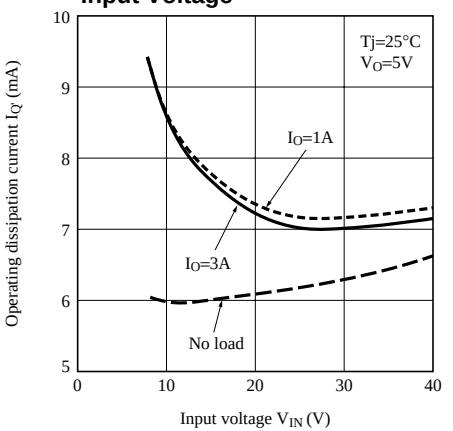



**Fig.14 Block Diagram**

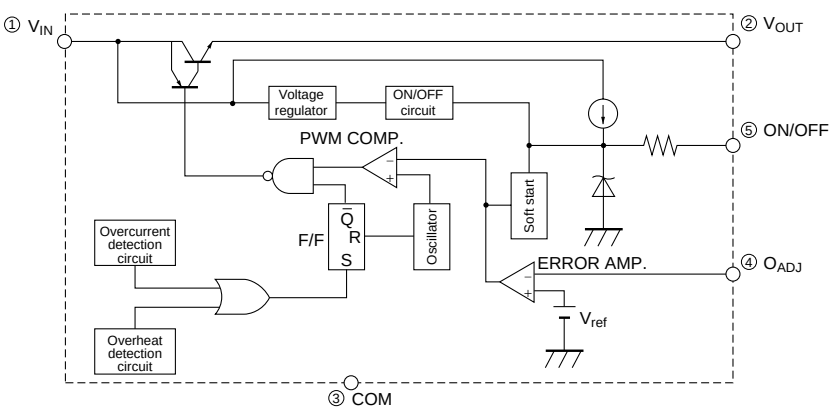


**Fig.15 Step Down Type Circuit Diagram**

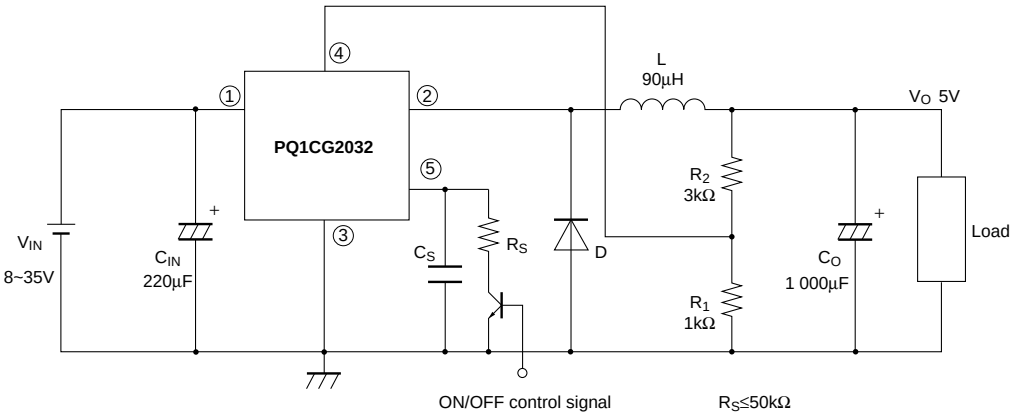
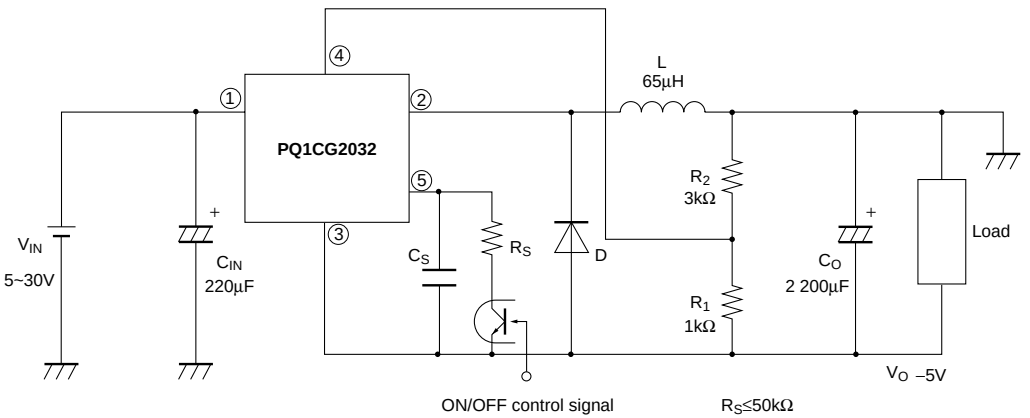



**Fig.16 Polarity Inversion Type Circuit Diagram**



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