PQ1CG38M2FZ/ PQ1CG38M2RZ

TO-220 Type Chopper Regulator

■ General Description

Sharp's chopper regurator **PQ1CG38M2FZ/PQ1CG38M2RZ** of TO-220 package uses PWM method.

It is suitable for the applications of large voltage difference between input and output and applications of negative power supply thanks to its low heat loss.

■ Features

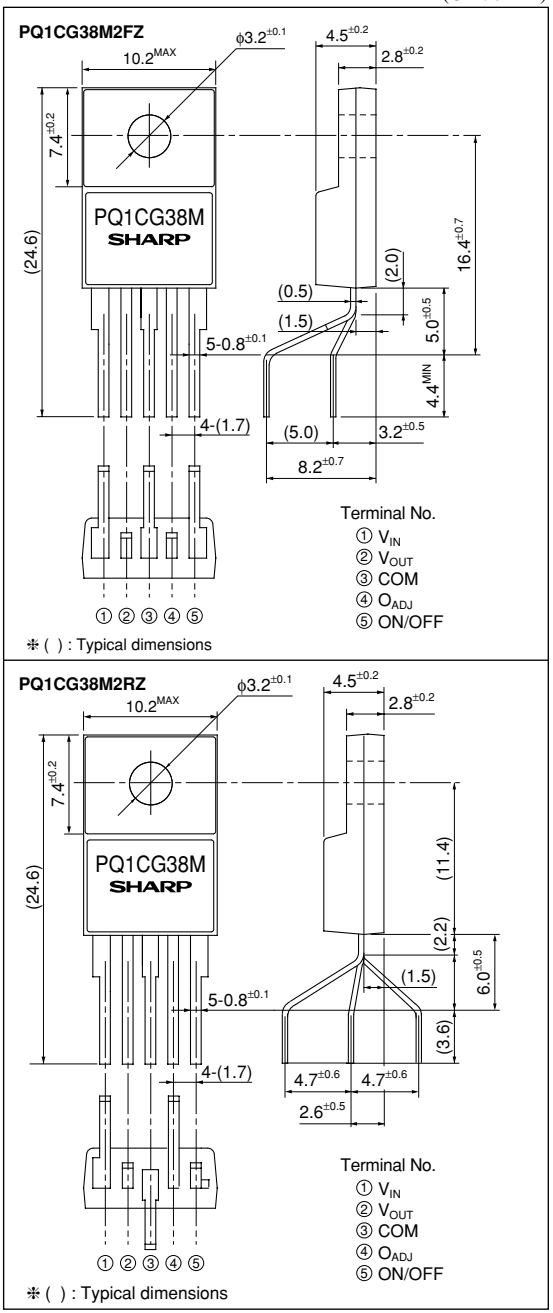
1. Maximum switching current:0.8A
2. Built-in ON/OFF control function
3. Built-in soft start function to suppress overshoot of output voltage in power on sequence or ON/OFF control sequence
4. Built-in oscillation circuit
   (Oscillation frequency:TYP. 300kHz)
5. Built-in overheat/overcurrent protection function
6. TO-220 package
7. Variable output voltage
   (Output variable range:V_{REF} to 35V/$-V_{REF}$ to $-30V$)
   [Possible to select step-down output/inverting output according to external connection circuit]
8. **PQ1CG38M2FZ**:Zigzag forming
   PQ1CG38M2RZ:Self-stand forming

■ Applications

1. Switching power supplies
2. Facsimiles, printers and other OA equipment
3. Battery chargers
4. Personal computers and amusement equipment

■ Outline Dimensions

(Unit : mm)



■ Absolute Maximum Ratings (T_a=25°C)

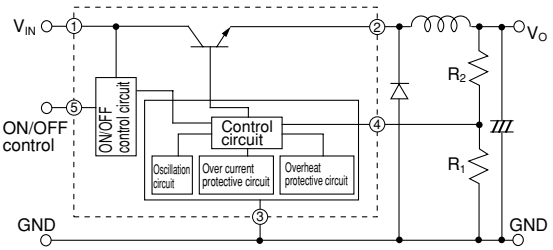
Parameter	Symbol	Rating	Unit
*1 Input voltage	V_{IN}	40	V
Output adjustment terminal voltage	V_{ADJ}	7	V
Dropout voltage	V_{I-O}	41	V
*2 Output to COM voltage	V_{OUT}	−1	V
*3 ON/OFF control voltage	V_C	−0.3 to +40	V
Switching current	I_{SW}	0.8	A
*4 Power dissipation	P_{D1}	1.4	W
	P_{D2}	14	W
*5 Junction 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 (for 10s)	°C

*1 Voltage between V_{IN} and COM
*2 Voltage between V_{OUT} and COM
*3 Voltage between ON/OFF and COM
*4 P_{D1}:No heat sink P_{D2}:With infinite heat sink
*5 Overheat protector may operate for T_j=125 to 150°C

■ Electrical Characteristics (V_{IN}=12V, I_O=0.2A, Terminal No.5 open and T_a=25°C unless otherwise specified)

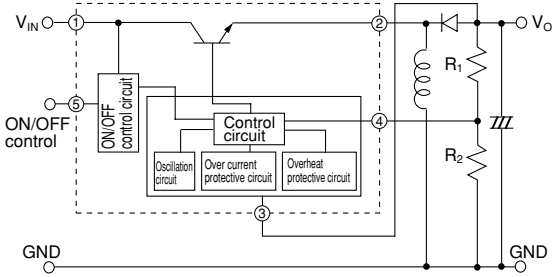
Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Output saturation voltage	V_{SAT}	I_{SW}=0.5A	–	0.95	1.5	V
Reference voltage	V_{REF}	–	1.235	1.26	1.285	V
Reference voltage temperature fluctuation	ΔV_{REF}	T_j=0 to 125°C	–	±0.5	–	%
Load regulation	$\|R_{eg}L\|$	I_O=0.1 to 0.5A	–	0.2	1.5	%
Line regulation	$\|R_{eg}I\|$	V_{IN}=8 to 35V	–	1	2.5	%
Efficiency	η	I_O=0.5A	–	80	–	%
Oscillation frequency	f_O	–	270	300	330	kHz
Oscillation frequency temperature fluctuation	Δf_O	T_j=0 to 125°C	–	±3	–	%
Overcurrent detection level	I_L	–	0.85	1.2	1.6	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=1.1V,⑤ terminal	–	2.1	–	V
ON threshold voltage	$V_{TH(ON)}$	④ terminal=0V,⑤ terminal	0.7	0.8	0.9	V
Standby current	I_{SD}	V_{IN}=40V,⑤ terminal=0V	–	120	400	µA
Output OFF-state consumption current	I_{QS}	V_{IN}=40V,⑤ terminal=0.9V	–	5	10	mA

Fig.1 Step Down Voltage Output Circuit Diagram



V_O=V_{REF}×(1+R_2/R_1)
V_O=V_{REF} to +35V (V_{REF}≒1.26V)
Here, the upper limit is restricted by V_{IN}–V_{SAT} value according to the input.

Fig.2 Inverting Output Circuit Diagram



V_O=−V_{REF}×(1+R_2/R_1)
V_O=−V_{REF} to −30V (V_{REF}≒1.26V)
Here, the upper limit of the absolute value is restricted by 40V–V_{IN} according to the input.

NOTICE

- The circuit application examples in this publication are provided to explain representative applications of SHARP devices and are not intended to guarantee any circuit design or license any intellectual property rights. SHARP takes no responsibility for any problems related to any intellectual property right of a third party resulting from the use of SHARP's devices.
- Contact SHARP in order to obtain the latest device specification sheets before using any SHARP device. SHARP reserves the right to make changes in the specifications, characteristics, data, materials, structure, and other contents described herein at any time without notice in order to improve design or reliability. Manufacturing locations are also subject to change without notice.
- Observe the following points when using any devices in this publication. SHARP takes no responsibility for damage caused by improper use of the devices which does not meet the conditions and absolute maximum ratings to be used specified in the relevant specification sheet nor meet the following conditions:

  (i) The devices in this publication are designed for use in general electronic equipment designs such as:
  --- Personal computers
  --- Office automation equipment
  --- Telecommunication equipment [terminal]
  --- Test and measurement equipment
  --- Industrial control
  --- Audio visual equipment
  --- Consumer electronics

  (ii) Measures such as fail-safe function and redundant design should be taken to ensure reliability and safety when SHARP devices are used for or in connection with equipment that requires higher reliability such as:
  --- Transportation control and safety equipment (i.e., aircraft, trains, automobiles, etc.)
  --- Traffic signals
  --- Gas leakage sensor breakers
  --- Alarm equipment
  --- Various safety devices, etc.

  (iii) SHARP devices shall not be used for or in connection with equipment that requires an extremely high level of reliability and safety such as:
  --- Space applications
  --- Telecommunication equipment [trunk lines]
  --- Nuclear power control equipment
  --- Medical and other life support equipment (e.g., scuba).

- Contact a SHARP representative in advance when intending to use SHARP devices for any "specific" applications other than those recommended by SHARP or when it is unclear which category mentioned above controls the intended use.
- If the SHARP devices listed in this publication fall within the scope of strategic products described in the Foreign Exchange and Foreign Trade Control Law of Japan, it is necessary to obtain approval to export such SHARP devices.
-
- Contact and consult with a SHARP representative if there are any questions about the contents of this publication.