

PQ1CG38M2FZH PQ1CG38M2RZH

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

■ 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 functions
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. **PQ1CG38M2FZH**: Zigzag forming
PQ1CG38M2RZH: Self-stand forming
9. RoHS directive compliant

■ Applications

1. Color TV
2. Digital OA equipment
3. Facsimiles, printers and OA equipment
4. Personal computers and amusement equipment

■ Absolute Maximum Ratings

($T_a=25^\circ\text{C}$)

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}	0.8	A
	P_{D1}	1.4	W
*4 Power dissipation	P_{D2}	14	W
	T_j	150	$^\circ\text{C}$
Operating temperature	T_{opr}	-20 to +80	$^\circ\text{C}$
Storage temperature	T_{stg}	-40 to +150	$^\circ\text{C}$
Soldering temperature	T_{sol}	260(10s)	$^\circ\text{C}$

*1 Voltage between V_{IN} terminal and COM terminal

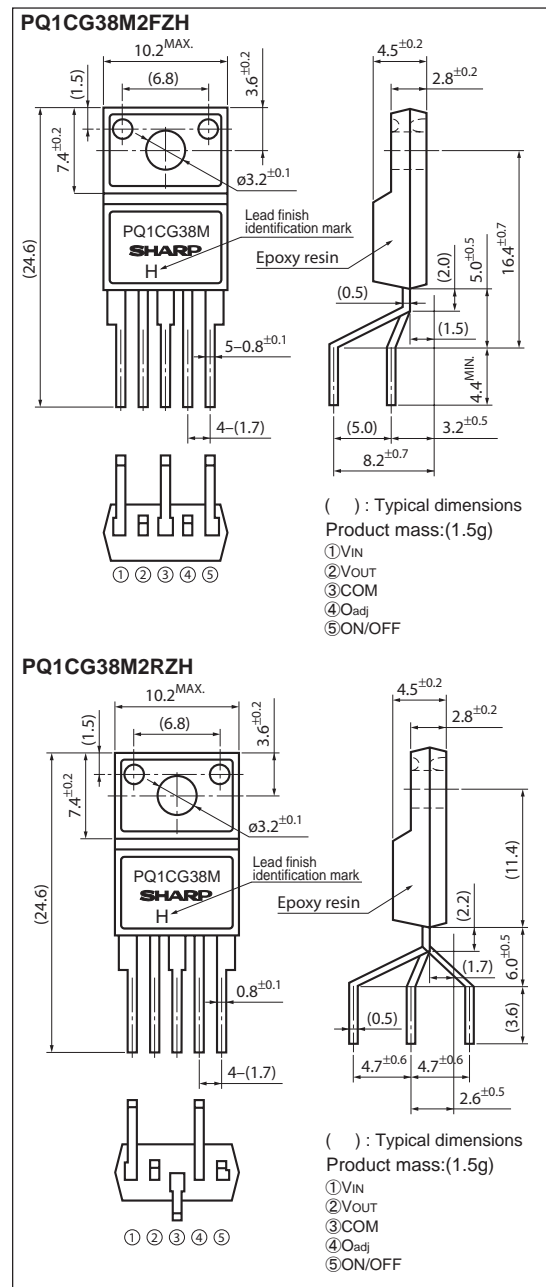
*2 Voltage between V_{OUT} terminal and COM terminal

*3 Voltage between V_{SOFT} terminal and COM terminal

*4 PD1: No heat sink, PD2: With infinite heat sink

*5 There is case that over heat protection function operates at the temperature $T_j=125^\circ\text{C}$ to 150°C , so this item cannot be used in this temperature range.

■ Outline Dimensions



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■ Electrical Characteristics

(Unless otherwise specified, condition shall be $V_{IN}=12V, I_o=0.5A, V_o=5V$, ON-OFF terminals is open, $T_a=25^\circ C$)

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 $125^\circ C$	—	± 0.5	—	%
Load regulation	$ R_{egL} $	$I_o=0.2$ to $0.5A$	—	0.2	1.5	%
Line regulation	$ R_{egI} $	$V_{IN}=8$ 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 $125^\circ C$	—	± 3	—	%
Overcurrent detecting level	I_L	Switching current peak	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 terminal=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
Stand-by current	I_{SD}	$V_{IN}=40V$,⑤ terminal=0V	—	120	400	μA
Output OFF-state dissipation current	I_{QS}	$V_{IN}=40V$,④ terminal=0V,⑤ terminal=0.9V	—	5	10	mA

Fig.1 Test Circuit

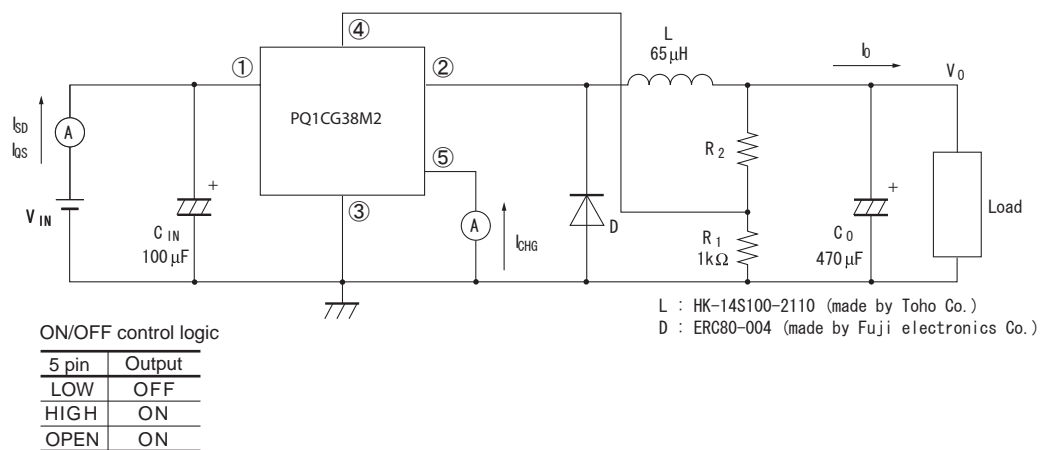
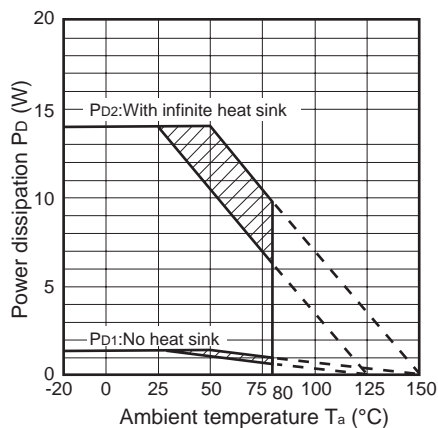


Fig.2 Power Dissipation vs.Ambient Temperature



Note) Oblique line portion:Overheat protection may operate in this area

Fig.3 Overcurrent Protection Characteristics (Typical Value)

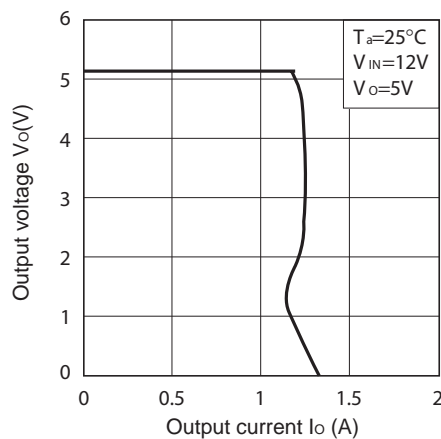


Fig.4 Efficiency vs. Input Voltage

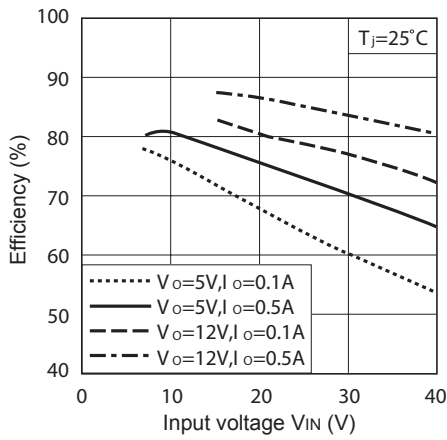


Fig.5 Output Saturation Voltage vs. Switching Current

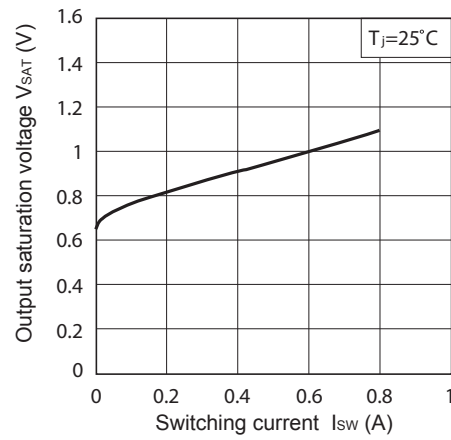


Fig.6 Stand-by Current vs. Input Voltage

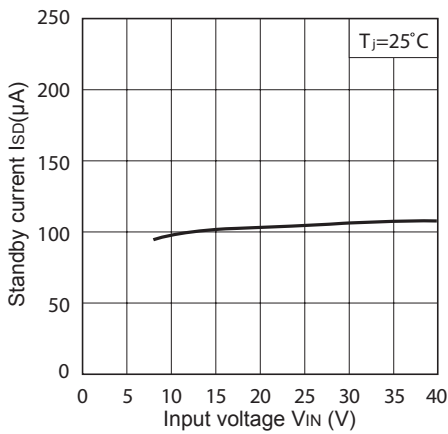


Fig.7 Reference Voltage Fluctuation vs. Junction Temperature

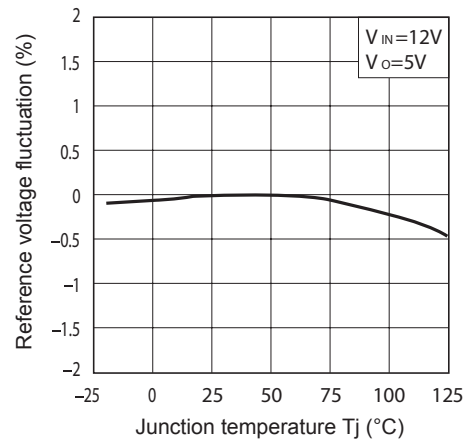


Fig.8 Load Regulation vs. Output Current

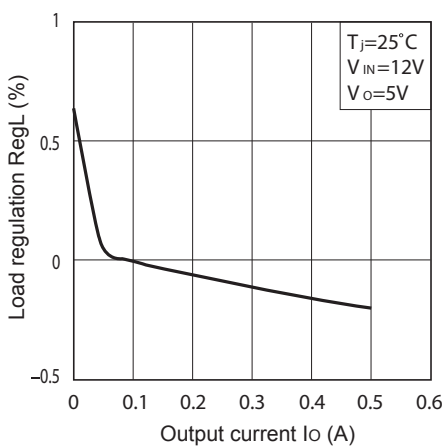


Fig.9 Line Regulation vs. Input Voltage

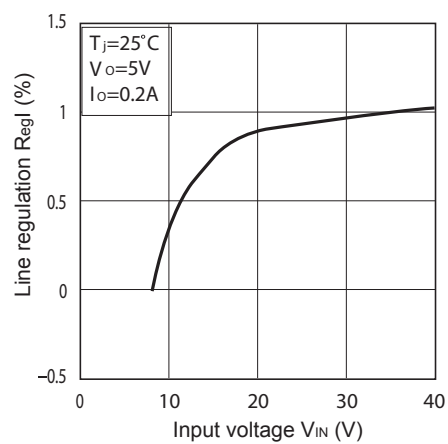


Fig.10 Oscillation Frequency Fluctuation vs. Junction Temperature

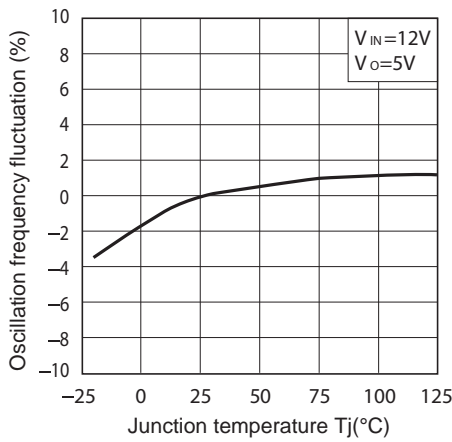


Fig.11 Overcurrent Detecting Level Fluctuation vs. Junction Temperature

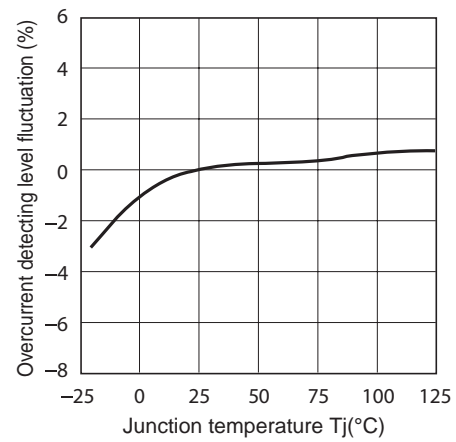


Fig.12 Threshold Voltage vs. Junction Temperature

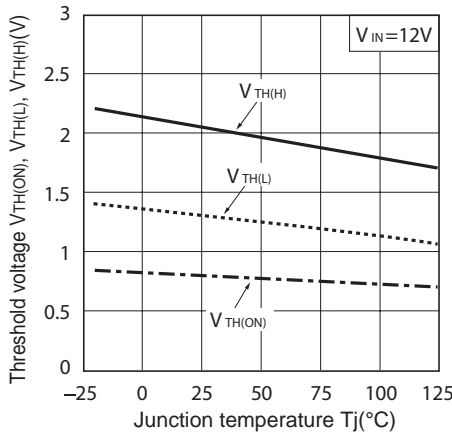


Fig.13 Operating Dissipation Current vs. Input Voltage

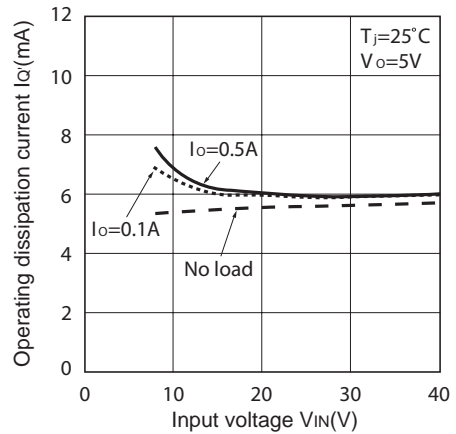


Fig.14 Block Diagram

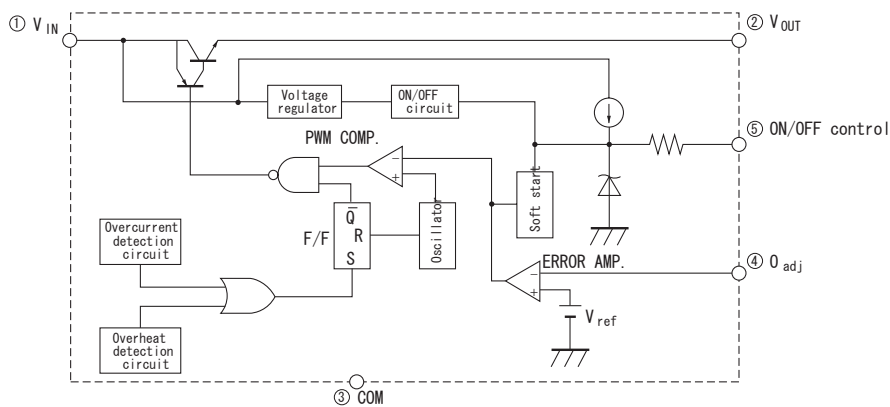


Fig.15 Step Down Type Circuit Diagram

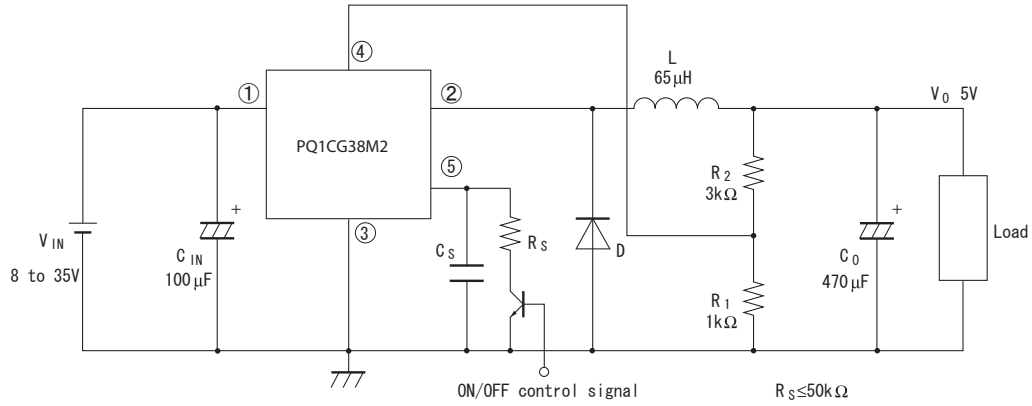
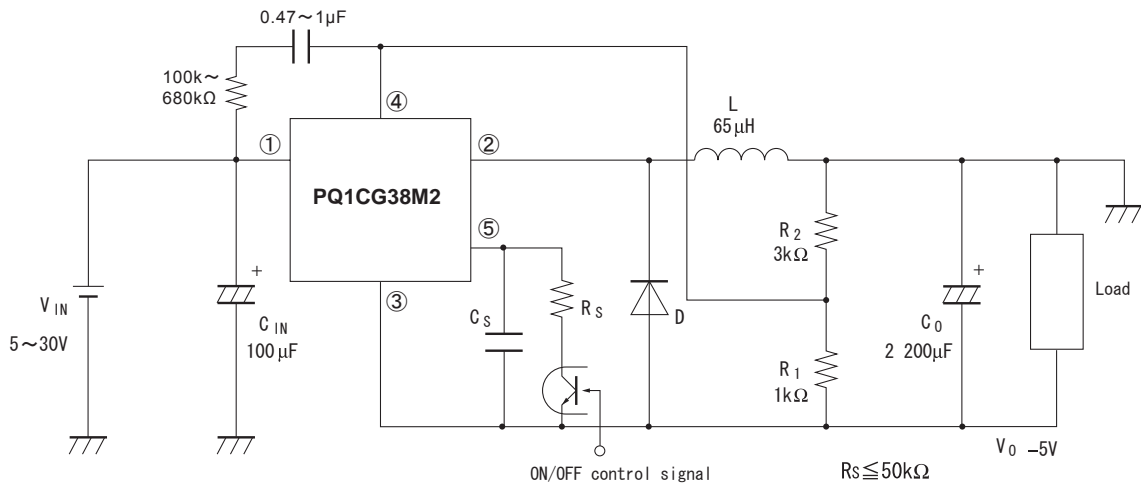


Fig.16 Polarity Inversion Type Circuit Diagram



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.