PQ1CF1

TO-220 Type Chopper Regulator

■ Features

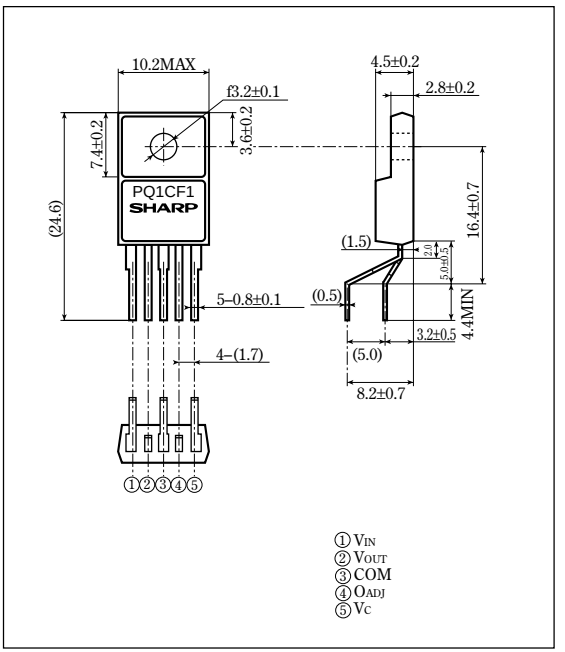
- Maximum switching current: 3.5A
- With ON/OFF control function
- Built-in oscillation circuit
  (oscillation frequency: TYP.70kHz)
- Built-in overheat protection, overcurrent protection function
- Variable output voltage (V_{ref} to 35V /-V_{ref} to -30V)
  [Possible to choose step down output/inversing output according to external connection circuit]

■ Applications

- Facsimiles
- Printers
- Switching power supplies
- Personal computers

■ Outline Dimensions

(Unit : mm)



■ Absolute Maximum Ratings

(T_a=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 terminal voltage	I_{SW}	3.5	A
Power dissipation (No heat sink)	P_{D1}	1.5	W
Power dissipation (With infinite heat sink)	P_{D2}	15	W
※4 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} terminal and COM terminal.
※2 Voltage between V_{OUT} terminal and COM terminal.
※3 Voltage between V_C terminal and COM terminal.
※4 Overheat protection may operate at 125<=T_j<=150˚C

• Please refer to the chapter " Handling Precautions ".

■ Electrical Characteristics

(Unless otherwise specified, conditions shall be V_{IN}=12V, I_O=0.5A, V_O=5V, T_a=25°C)

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Output saturation voltage	V_{SAT}	I_{SW}=3A	—	1.3	1.8	V
Reference voltage	V_{ref}	—	1.235	1.26	1.285	V
Reference voltage temperature fluctuation	ΔV_{ref}	T_j=0 to 125°C	—	±0.6	—	%
Load regulation	$\lvert Reg_L \rvert$	I_O=0.5 to 3A	—	0.2	1.5	%
Line regulation	$\lvert Reg_I \rvert$	V_{IN}=8 to 35V	—	0.6	2.5	%
Efficiency	η	I_O=3A	—	80	—	%
Oscillation frequency	fo	—	60	70	80	kHz
Oscillation frequency temperature fluctuation	Δfo	T_j=0 to 125°C	—	±5	—	%
Maximum duty	D_{MAX}	④terminal is open	90	—	—	%
Overcurrent detecting level	I_L	—	3.9	5.1	6.3	A
Charge current 1	I_{CHG1}	②④terminal is open, ⑤terminal	-50	-30	-10	μA
Charge current 2	I_{CHG2}	②④terminal is open, ⑤terminal=0.7V	-150	-100	-50	μA
Input threshold voltage	V_{THL}	Duty=0%, ④terminal=0V, ⑤terminal	0.75	0.9	1.2	V
	V_{THH}	Duty=D_{MAX}, ④terminal is open, ⑤terminal	1.55	1.8	2.05	V
On threshold voltage	$V_{TH(ON)}$	④terminal=0V, ⑤terminal	0.5	0.6	0.7	V
Stand-by current	I_{SD}	V_{IN}=40V, ⑤terminal=0V	—	140	400	μA
Output OFF-state dissipation current	I_{qS}	V_{IN}=40V, ⑤terminal=0.7V	—	8	16	mA

■ Block Diagram

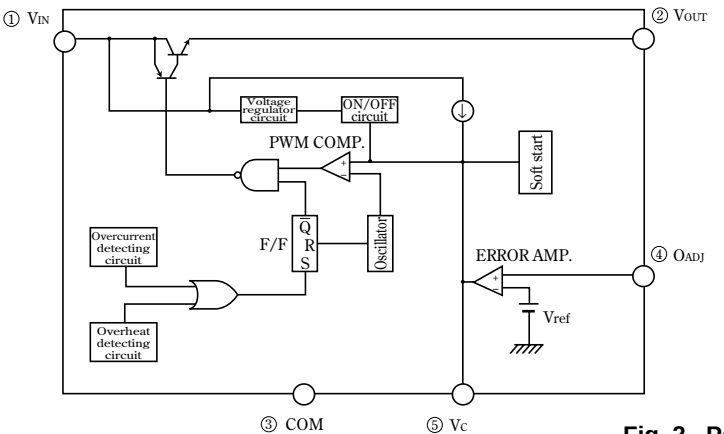
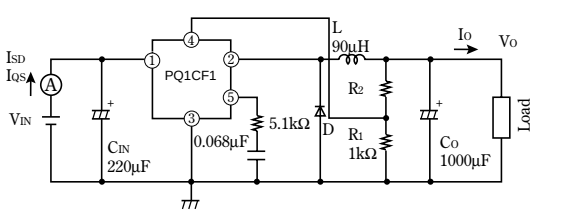
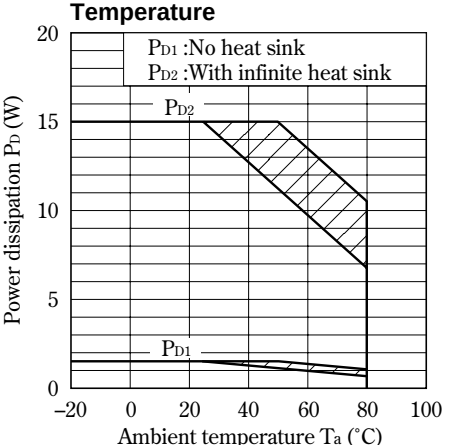


Fig. 1 Test Circuit



L : HK-12S120-9000R(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

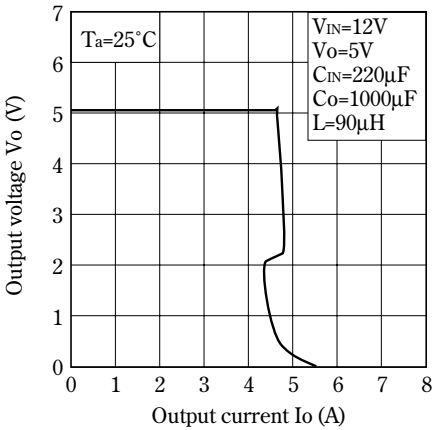


Fig. 4 Efficiency vs. Input Voltage

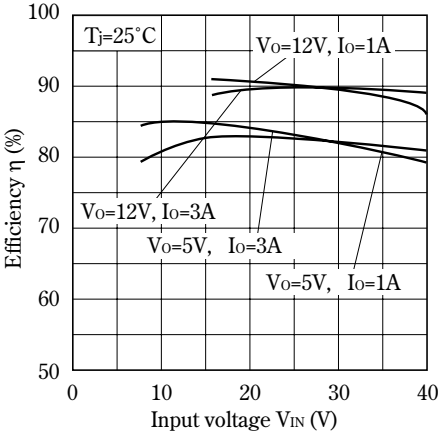


Fig. 5 Switching Current vs. Output Saturation Voltage

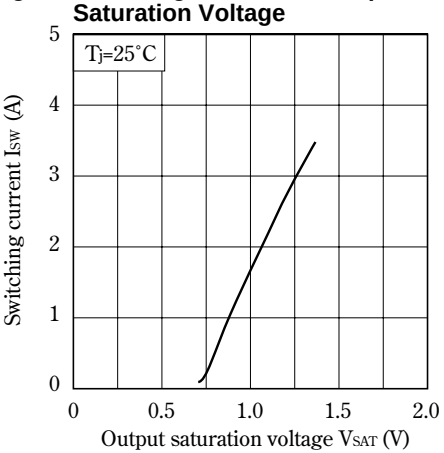


Fig. 6 Reference Voltage Fluctuation vs. Junction Temperature

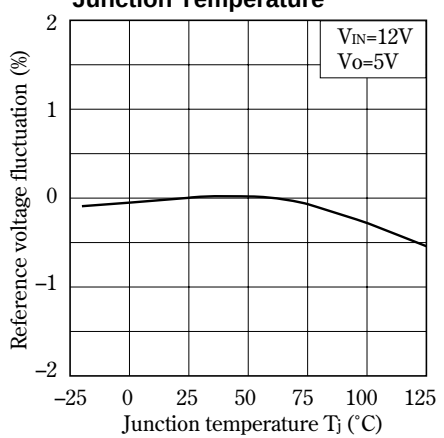


Fig. 7 Load Regulation vs. Output Current

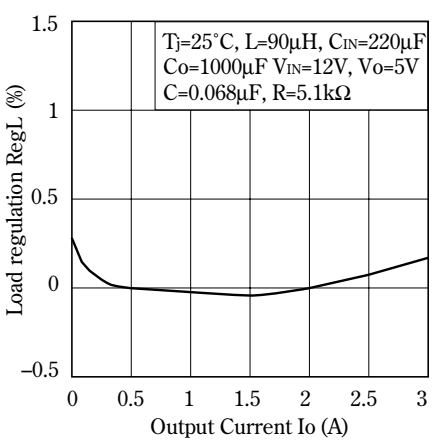


Fig. 8 Line Regulation vs. Input Voltage

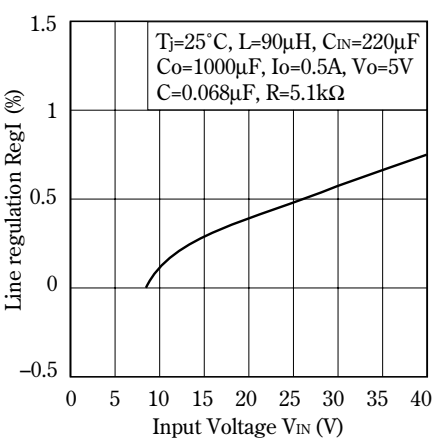


Fig. 9 Oscillation Frequency Fluctuation vs. Junction Temperature

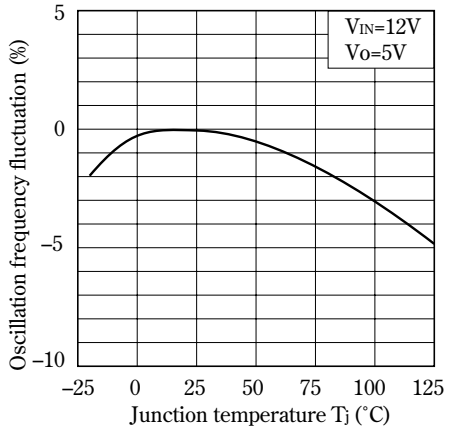


Fig.10 Overcurrent Detecting Level Fluctuation vs. Junction Temperature

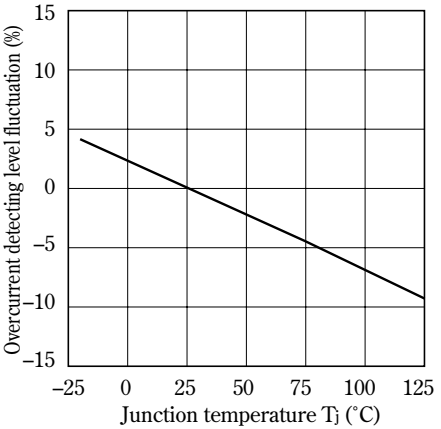


Fig.11 Threshold Voltage vs. Junction Temperature

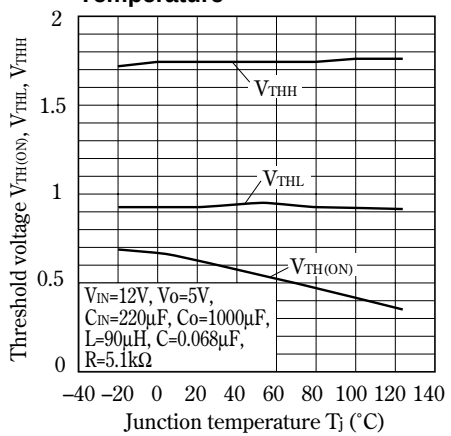
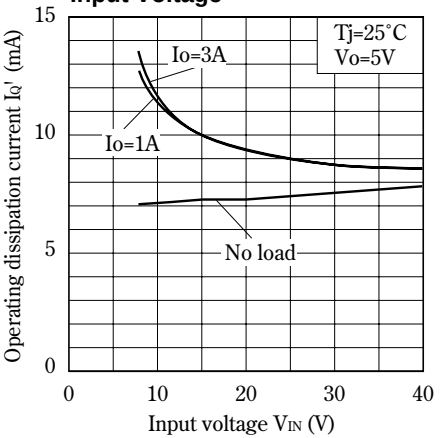
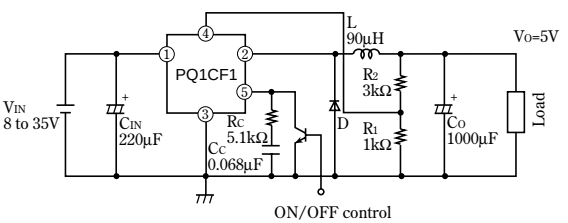


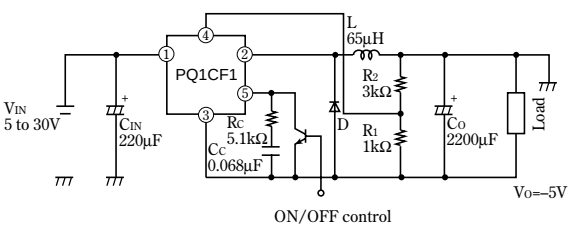
Fig.12 Operating Dissipation Current vs. Input Voltage



■ **Step-down Type Circuit Diagram (5V Output)**



■ **Polarity Inversion Type Circuit Diagram (-5V output)**



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  --- Office automation equipment
  --- Telecommunication equipment [terminal]
  --- Test and measurement equipment
  --- Industrial control
  --- Audio visual equipment
  --- Consumer electronics

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