PQ1Xxx1M2ZP Series

Low Output Current, Compact Surface Mount Type Low Power-Loss Voltage Regulators

■ Features

- Compact surface mount package (2.9×1.6×1.1mm)
- Low power-loss
  (Dropout voltage: TYP. 0.11 V/MAX. 0.26V at I_O=60mA)
- Also compatible ceramic capacitors because of suppressing oscillation level
- High ripple rejection (TYP. 70dB)
- Low dissipation current
  (Dissipation current at no load: TYP. 150μA)
- Built-in ON/OFF control function
  (Dissipation current at OFF-state: MAX. 1μA)
- Built-in overcurrent and overheat protection functions

*It is available for every 0.1V of output voltage (1.3V to 5.0V)

■ Applications

- Cellular phones
- Cordless phones
- Personal information tools
- Cameras/Camcoders
- PCMCIA cards for notebook PCs

■ Model Line-up

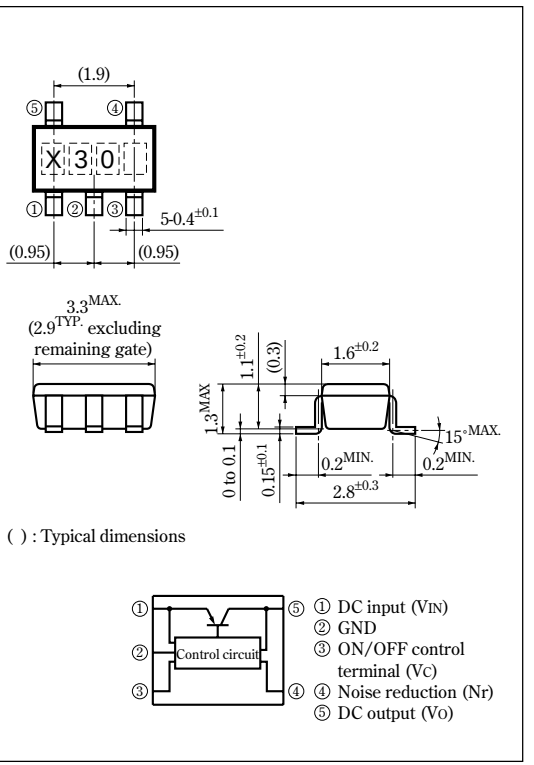
Output Voltage (TYP.)	Model No.	Output Voltage (TYP.)	Model No.
2.5V	**PQ1X251M2ZP**	3.8V	**PQ1X381M2ZP**
2.8V	**PQ1X281M2ZP**	4.0V	**PQ1X401M2ZP**
3.0V	**PQ1X301M2ZP**	4.2V	**PQ1X421M2ZP**
3.3V	**PQ1X331M2ZP**	4.5V	**PQ1X451M2ZP**
3.6V	**PQ1X361M2ZP**	5.0V	**PQ1X501M2ZP**

■ Absolute Maximum Ratings (Ta=25°C)

Parameter	Symbol	Rating	Unit
※1Input voltage	V_{IN}	9	V
※1ON/OFF control terminal voltage	V_C	9	V
Output current	I_O	300	mA
※2Power dissipation	P_D	350	mW
※3Junction temperature	T_j	150	˚C
Operating temperature	T_{opr}	−30 to +80	˚C
Storage temperature	T_{stg}	−55 to +150	˚C
Soldering temperature	T_{sol}	260 (10s)	˚C

※1 All are open except GND and applicable terminals
※2 At mounted on PCB
※3 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, V_{IN}=V_O(TYP)+1.0V, I_O=30mA, V_C=1.8V, Ta=25˚C)

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Output voltage	V_O	–	Refer to the following table.1			V
※4Output peak current	I_{op}	–	180	300	–	mA
Recommended output current	–	–	–	–	150	mA
Load regulation	$R_{egL}1$	I_O=5 to 60mA	–	10	50	mV
	$R_{egL}2$	I_O=5 to 100mA	–	20	100	mV
	$R_{egL}3$	I_O=5 to 150mA	–	40	160	mV
Line regulation	R_{egI}	V_{IN}=V_O(TYP)+1V to V_O(TYP)+6V(MAX. 9.0V)	–	3.0	20	mV
Temperature coefficient of output voltage	T_CV_O	I_O=10mA, T_j=–25 to +75˚C	–	0.05	–	mV/˚C
Ripple rejection	RR	Refer to Fig.2	–	70	–	dB
Output noise voltage	$V_{no\ (rms)}$	10Hz<f<100kHz, C_n=0.1µF, I_O=30mA	Refer to the following table.2			µV
Dropout voltage	$V_{I-O}1$	I_O=60mA ※5	–	0.11	0.26	V
	$V_{I-O}2$	I_O=150mA ※5	–	0.20	0.4	
※6ON-state voltage for control	$V_{C\ (ON)}$	–	1.8	–	–	V
ON-state current for control	$I_{C\ (ON)}$	V_C=1.8V	–	5	30	µA
OFF-state voltage for control	$V_{C\ (OFF)}$	–	–	–	0.4	V
Quiescent current	I_q	I_O=0mA	–	150	200	µA
Output OFF-state dissipation current	I_{qs}	V_C=0.2V	–	–	1	µA

※4 Output current shall be the value when output voltage lowers 0.3V from the voltage at I_O=30mA.
※5 Input voltage when output voltage falls 0.1V from that at Vin=Vo(TYP)+1.0V.
※6 In case that the control terminal (③ pin) is open, output voltage should be OFF state.

Table.1 Output Voltage Line-up

(V_{IN}=V_O(TYP)+1.0V, I_O=30mA, V_C=1.8V, Ta=25°C)

Model No.	Symbol	MIN.	TYP.	MAX.	Unit
PQ1X251M2ZP	V_O	2.440	2.5	2.560	V
PQ1X281M2ZP	V_O	2.740	2.8	2.860	V
PQ1X301M2ZP	V_O	2.940	3.0	3.060	V
PQ1v331M2ZP	V_O	3.234	3.3	3.366	V
PQ1X361M2ZP	V_O	3.528	3.6	3.672	V
PQ1X381M2ZP	V_O	3.724	3.8	3.876	V
PQ1X401M2ZP	V_O	3.920	4.0	4.080	V
PQ1X421M2ZP	V_O	4.116	4.2	4.284	V
PQ1X451M2ZP	V_O	4.410	4.5	4.590	V
PQ1X501M2ZP	V_O	4.900	5.0	5.100	V

Table.2 Output Noise Voltage Line-up

(V_{IN}=V_O(TYP)+1.0V, I_O=30mA, V_C=1.8V, C_n=0.1µF, 10Hz<f<100kHz, Ta=25°C)

Model No.	Symbol	MIN.	TYP.	MAX.	Unit
PQ1X251M2ZP	$V_{no(rms)}$	–	25	–	µV
PQ1X281M2ZP	$V_{no(rms)}$	–	25	–	µV
PQ1X301M2ZP	$V_{no(rms)}$	–	30	–	µV
PQ1X331M2ZP	$V_{no(rms)}$	–	30	–	µV
PQ1X361M2ZP	$V_{no(rms)}$	–	35	–	µV
PQ1X381M2ZP	$V_{no(rms)}$	–	35	–	µV
PQ1X401M2ZP	$V_{no(rms)}$	–	40	–	µV
PQ1X421M2ZP	$V_{no(rms)}$	–	40	–	µV
PQ1X451M2ZP	$V_{no(rms)}$	–	45	–	µV
PQ1X501M2ZP	$V_{no(rms)}$	–	50	–	µV

Fig.1 Test Circuit

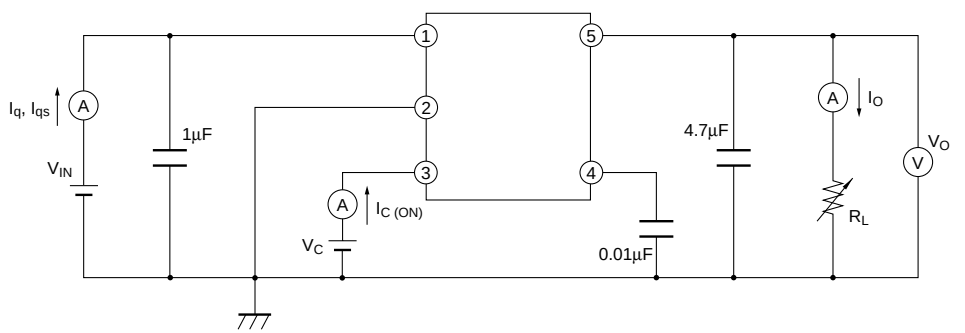
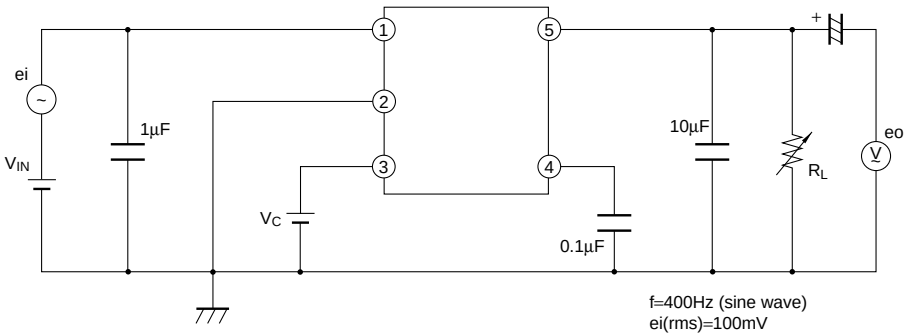
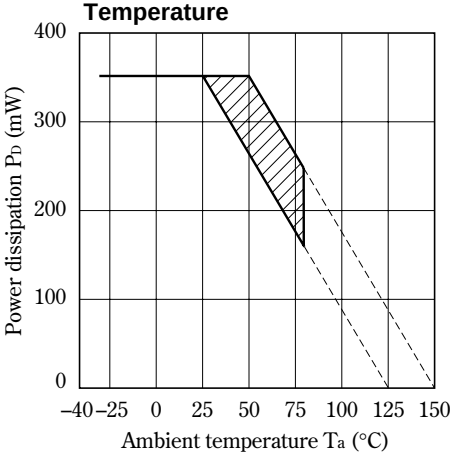


Fig.2 Test Circuit for Ripple Rejection



f=400Hz (sine wave)
ei(rms)=100mV
$V_{IN}=V_O$(TYP)+1.0V
V_C=1.8V
I_O=10mA
RR=20log(ei(rms)/eo(rms))

Fig.3 Power Dissipation vs. Ambient Temperature



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

Fig.4 Overcurrent Protection Characteristics (Typical Value)

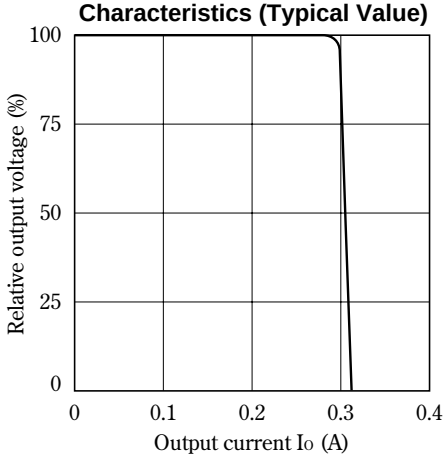


Fig.5 Output Voltage Fluctuation vs. Junction Temperature (PQ1X301M2ZP)(Typical Value)

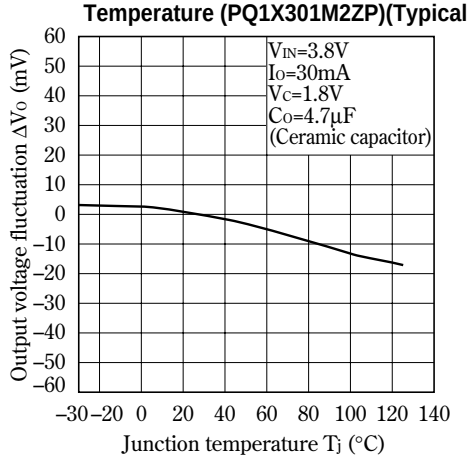


Fig.6 Output Voltage vs. Input Voltage (PQ1X301M2ZP)(Typical Value)

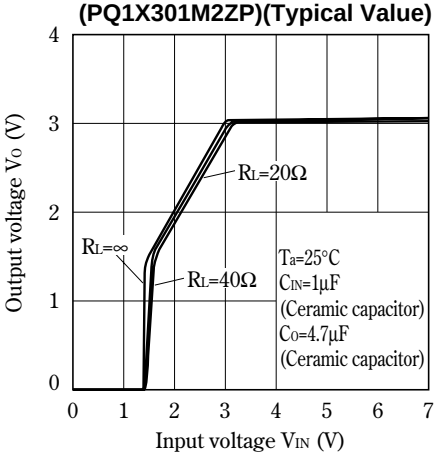


Fig.7 Circuit Operating Current vs. Input Voltage (PQ1X301M2ZP)(Typical Value)

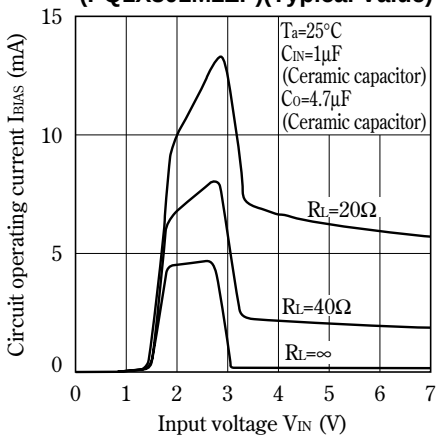


Fig.8 Dropout Voltage vs. Junction Temperature (PQ1X301M2ZP)(Typical Value)

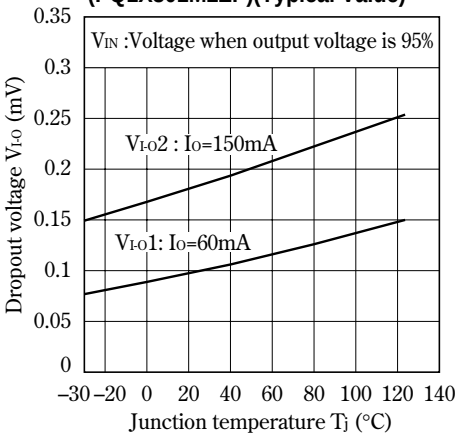


Fig.9 Quiescent Current vs. Junction Temperature (Typical Value)

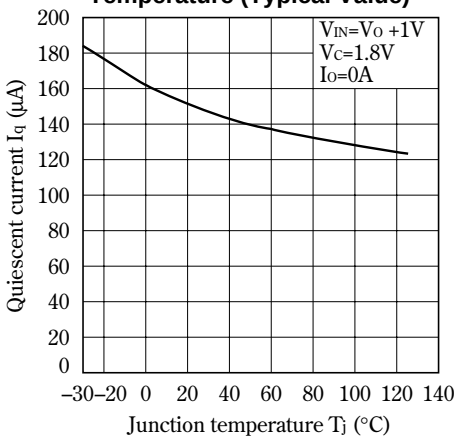


Fig.10 Ripple Rejection vs. Input Ripple Frequency (PQ1X281M2ZP)(Typical Value)

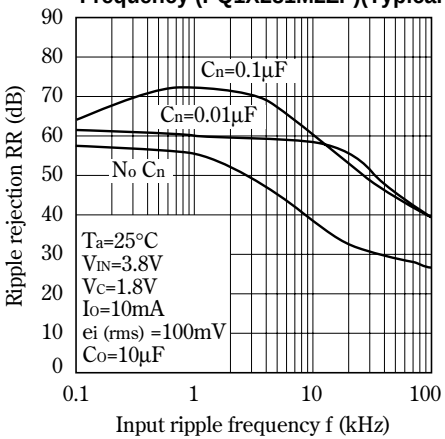
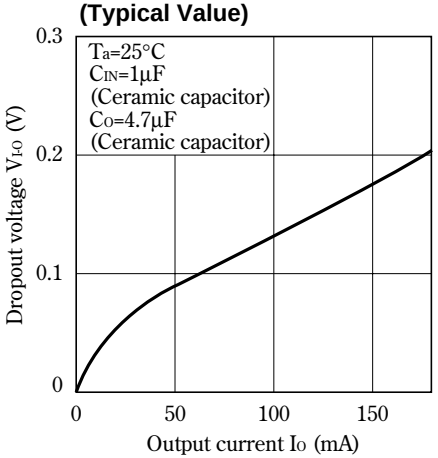


Fig.11 Dropout Voltage vs. Output Current (Typical Value)



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.