

# PQxxxEF01SZ Series

TO-220 Type, Low Voltage Operation Low Power-Loss Voltage Regulators

## ■ Features

- Low voltage operation (Minimum operating voltage: 2.35V)  
2.5V input → available 1.5 to 1.8V output
- Low dissipation current  
Dissipation current at no load: MAX.2mA  
Output OFF-state dissipation current: MAX.5μA
- Low power-loss  
Dropout voltage : MAX.0.5 V
- Built-in overcurrent and overheat protection functions

## ■ Applications

- Peripheral equipment of personal computers
- Power supplies for various electronic equipment such as DVD player or STB
- LBP

## ■ Model Line-up

Output voltage	Model No.	Output voltage	Model No.
1.5V	<b>PQ015EF01SZ</b>	2.5V	<b>PQ025EF01SZ</b>
1.8V	<b>PQ018EF01SZ</b>	3.3V	<b>PQ033EF01SZ</b>

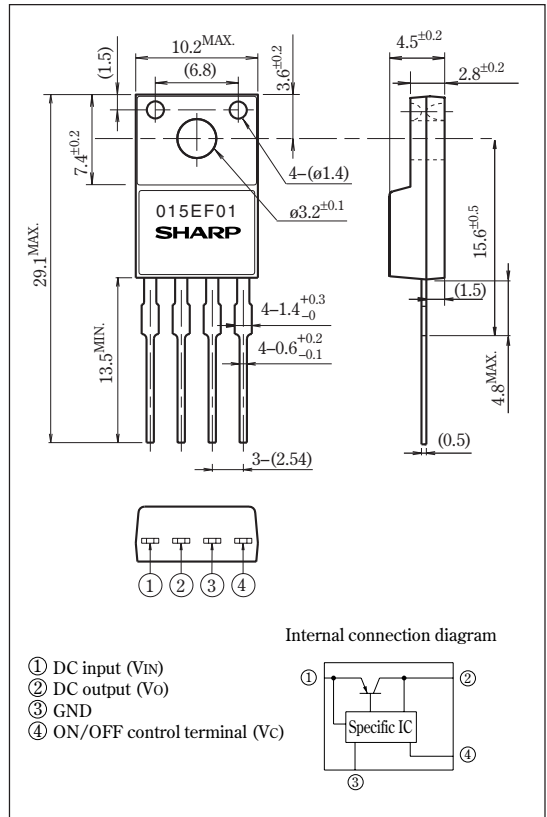
## ■ Absolute Maximum Ratings (Ta=25°C)

Parameter	Symbol	Rating	Unit
*1 Input voltage	V <sub>IN</sub>	10	V
*1 ON/OFF control terminal voltage	V <sub>C</sub>	10	V
Output current	I <sub>O</sub>	1.0	A
	P <sub>D1</sub>	1.4	W
*2 Power dissipation	P <sub>D2</sub>	15	
	*3 Junction temperature	T <sub>j</sub>	150
Operating temperature	T <sub>opr</sub>	-40 to +85	°C
Storage temperature	T <sub>stg</sub>	-40 to +150	°C
Soldering temperature	T <sub>sol</sub>	260 (10s)	°C

\*1 All are open except GND and applicable terminals.  
 \*2 P<sub>D1</sub>: No heat sink, P<sub>D2</sub>: With infinite heat sink.  
 \*3 Overheat protection may operate at T<sub>j</sub>=125°C to 150°C.

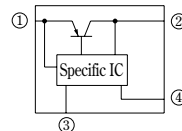
## ■ Outline Dimensions

(Unit : mm)



- ① DC input (V<sub>IN</sub>)
- ② DC output (V<sub>O</sub>)
- ③ GND
- ④ ON/OFF control terminal (V<sub>C</sub>)

Internal connection diagram



•Please refer to the chapter " Handling Precautions ".

**SHARP**

Notice In the absence of confirmation by device specification sheets, SHARP takes no responsibility for any defects that may occur in equipment using any SHARP devices shown in catalogs, data books, etc. Contact SHARP in order to obtain the latest device specification sheets before using any SHARP device.  
 Internet Internet address for Electronic Components Group <http://sharp-world.com/ecg/>

**Electrical Characteristics** (Unless otherwise specified, condition shall be  $V_{IN}=V_O(TYP.)+1V$ ,  $I_O=0.5A$ ,  $V_C=2.7V$ ,  $T_a=25^\circ C$ )

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Input voltage	$V_{IN}$	-	Refer to the table below			V
Output voltage	$V_O$	-	Refer to the table below			V
Load regulation	$Reg_L$	$I_O=5mA$ to $1A$	-	0.2	2.0	%
Line regulation	$Reg_I$	$V_{IN}=V_O(TYP.)+1V$ to $V_O(TYP.)+6V$ , $I_O=5mA$	-	0.1	1.0	%
Temperature coefficient of output voltage	$T_C V_O$	$T_j=0$ to $125^\circ C$ , $I_O=5mA$	-	$\pm 0.01$	-	%/ $^\circ C$
Ripple Rejection	RR	-	45	60	-	dB
*5 Dropout voltage	$V_{i-o}$	$I_O=0.5A$ (at $V_O=0.95V$ )	-	-	0.5	V
*4 ON-state voltage for control	$V_C(ON)$	-	2	-	-	V
ON-state current for control	$I_C(ON)$	-	-	-	200	$\mu A$
OFF-state voltage for control	$V_C(OFF)$	$I_O=0A$	-	-	0.8	V
OFF-state current for control	$I_C(OFF)$	$I_O=0A$ , $V_C=0.4V$	-	-	-2	$\mu A$
Quiescent current	$I_q$	$I_O=0A$	-	1	2	mA
Output OFF-state dissipation current	$I_{qs}$	$I_O=0A$ , $V_C=0.4V$	-	-	5	$\mu A$

\*4 In case of opening control terminal④, output voltage turns off.

\*5 In case of PQ033EF01SZ, apply to PQ033EF01SZ specification sheet.

**Input Voltage Line-up**

Model No.	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
PQ015EF01SZ	$V_{IN}$	$I_O=0.5A$ , $V_C=2.7V$ , $T_a=25^\circ C$	2.35	-	10	V
PQ018EF01SZ			2.35	-	10	
PQ025EF01SZ			3.0	-	10	
PQ033EF01SZ			3.8	-	10	

**Output Voltage Line-up**

Model No.	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
PQ015EF01SZ	$V_O$	$V_{IN}=V_O(TYP.)+1V$ , $I_O=0.5A$ , $V_C=2.7V$ , $T_a=25^\circ C$	1.45	1.5	1.55	V
PQ018EF01SZ			1.75	1.8	1.85	
PQ025EF01SZ			2.438	2.5	2.562	
PQ033EF01SZ			3.218	3.3	3.382	

Fig.1 Test Circuit

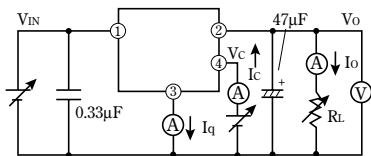
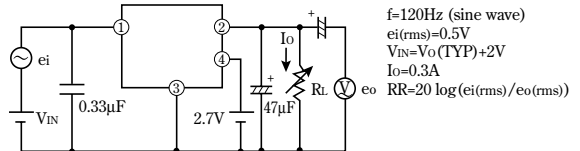
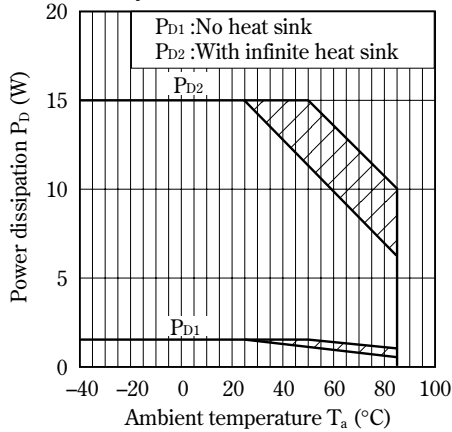


Fig.2 Test Circuit of Ripple Rejection



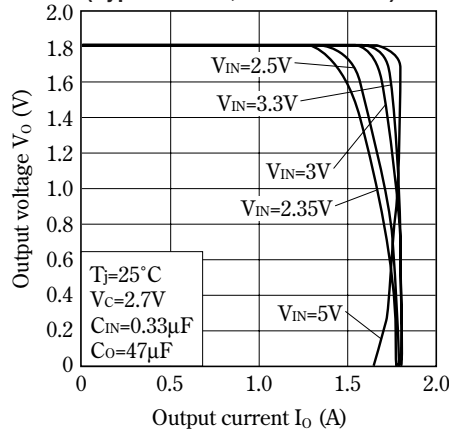
$f=120Hz$  (sine wave)  
 $e_i(rms)=0.5V$   
 $V_{IN}=V_O(TYP.)+2V$   
 $I_O=0.3A$   
 $RR=20 \log(e_i(rms)/e_o(rms))$

**Fig.3 Power Dissipation vs. Ambient Temperature**

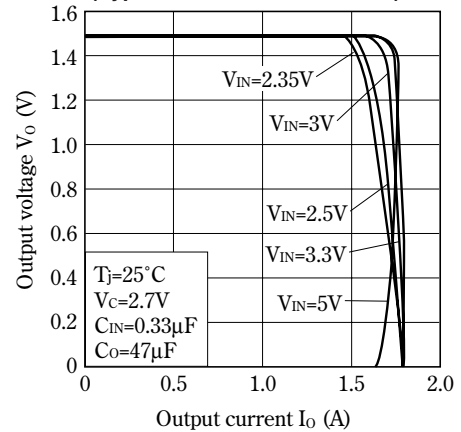


Note) Oblique line portion: Overheat protection may operate in this area.

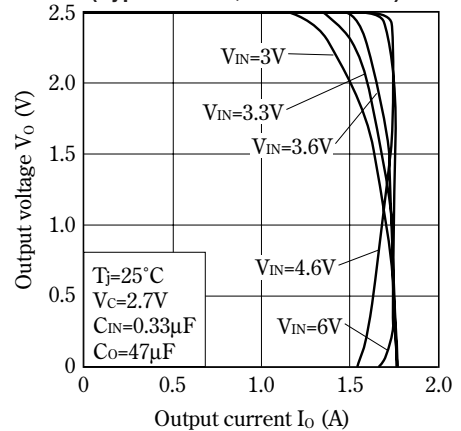
**Fig.5 Overcurrent Protection Characteristics (Typical Value, PQ018EF01SZ)**



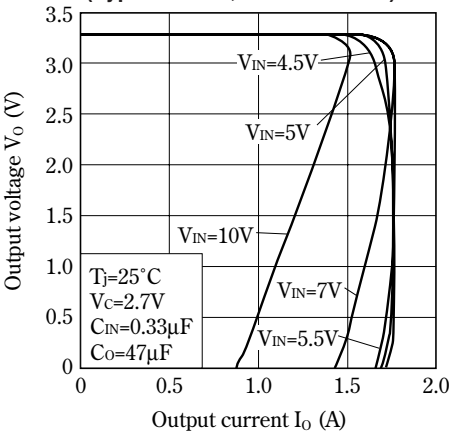
**Fig.4 Overcurrent Protection Characteristics (Typical Value, PQ015EF01SZ)**



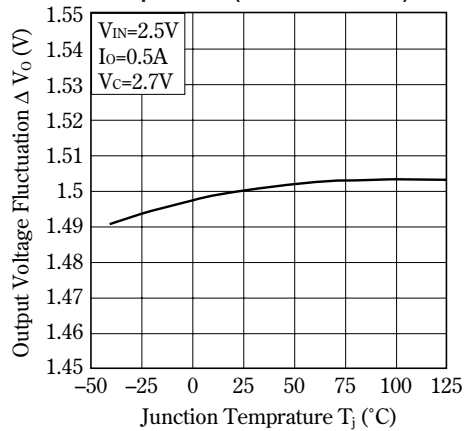
**Fig.6 Overcurrent Protection Characteristics (Typical Value, PQ025EF01SZ)**



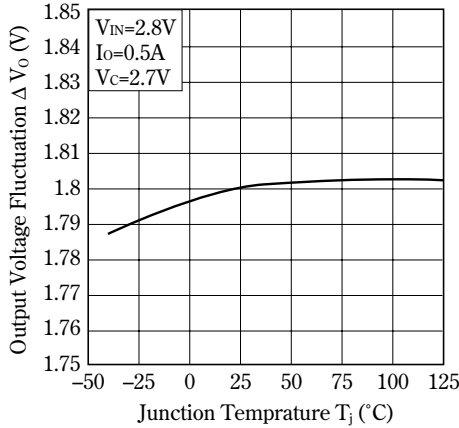
**Fig.7 Overcurrent Protection Characteristics (Typical Value, PQ033EF01SZ)**



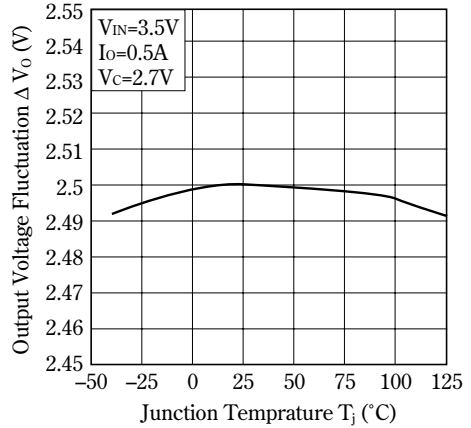
**Fig.8 Output Voltage Fluctuation vs. Junction Temperature (PQ015EF01SZ)**



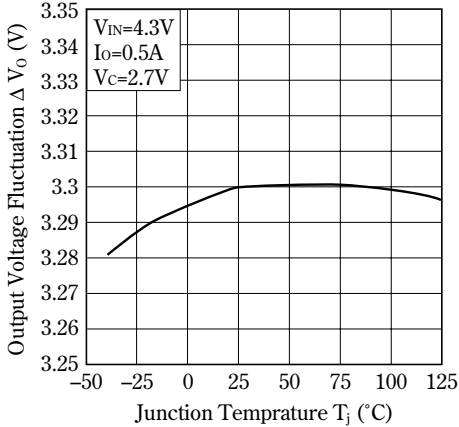
**Fig.9 Output Voltage Fluctuation vs. Junction Temperature (PQ018EF01SZ)**



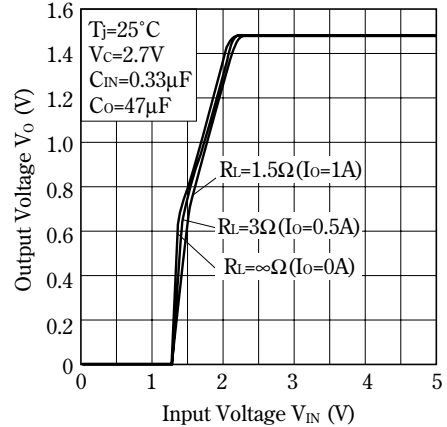
**Fig.10 Output Voltage Fluctuation vs. Junction Temperature (PQ025EF01SZ)**



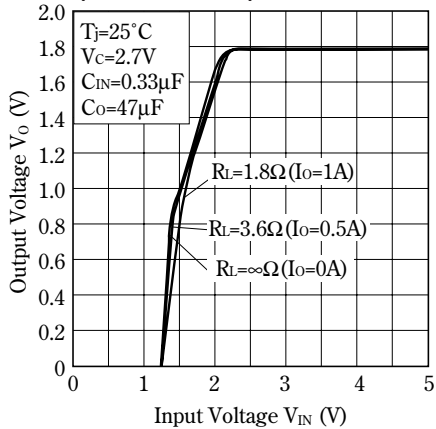
**Fig.11 Output Voltage Fluctuation vs. Junction Temperature (PQ033EF01SZ)**



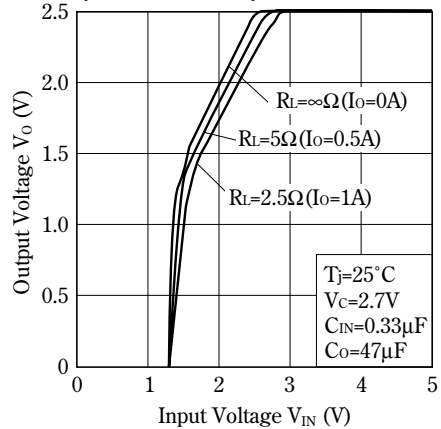
**Fig.12 Output Voltage vs. Input Voltage (PQ015EF01SZ)**



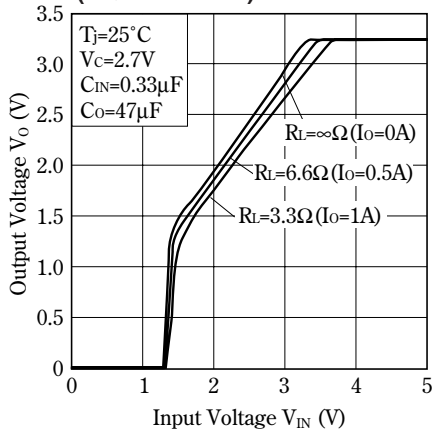
**Fig.13 Output Voltage vs. Input Voltage (PQ018EF01SZ)**



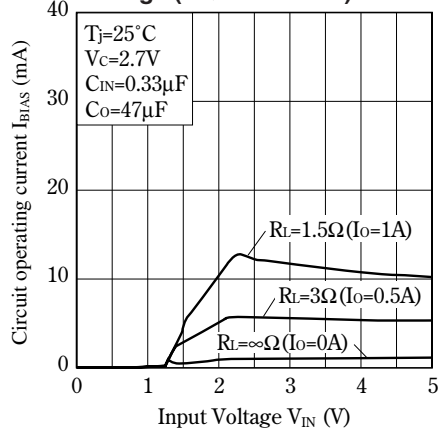
**Fig.14 Output Voltage vs. Input Voltage (PQ025EF01SZ)**



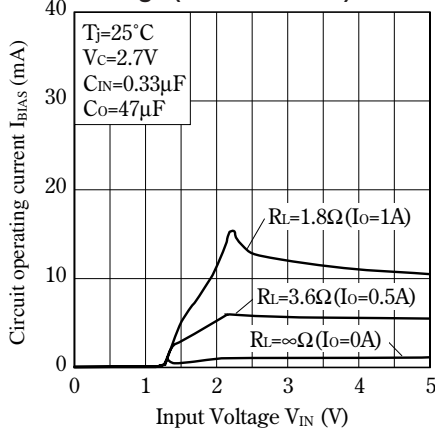
**Fig.15 Output Voltage vs. Input Voltage (PQ033EF01SZ)**



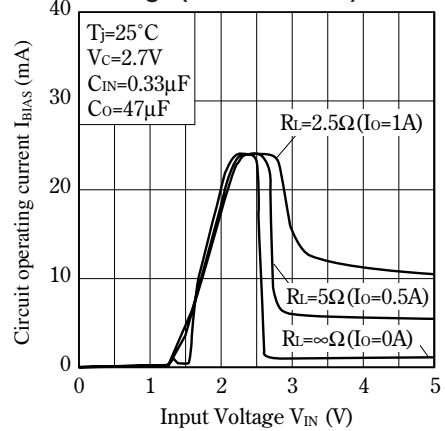
**Fig.16 Circuit Operating Current vs. Input Voltage (PQ015EF01SZ)**



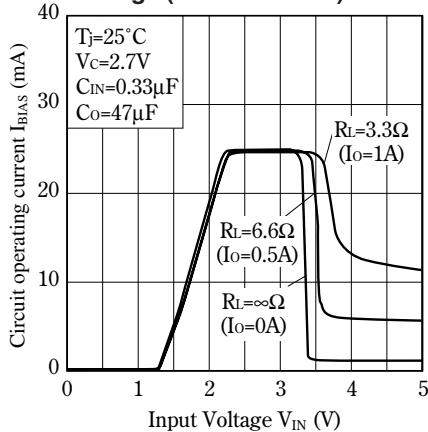
**Fig.17 Circuit Operating Current vs. Input Voltage (PQ018EF01SZ)**



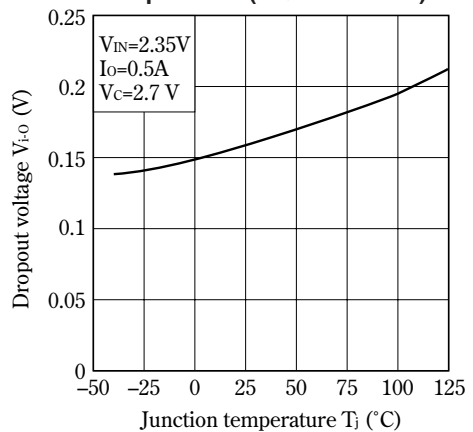
**Fig.18 Circuit Operating Current vs. Input Voltage (PQ025EF01SZ)**



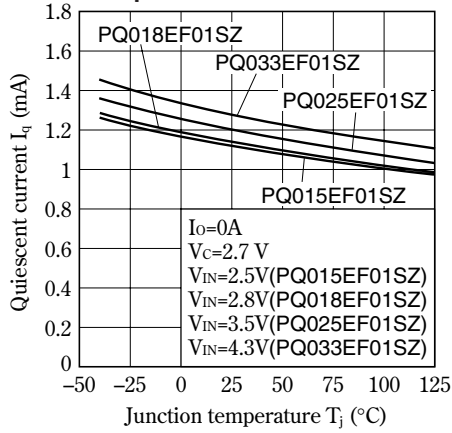
**Fig.19 Circuit Operating Current vs. Input Voltage (PQ033EF01SZ)**



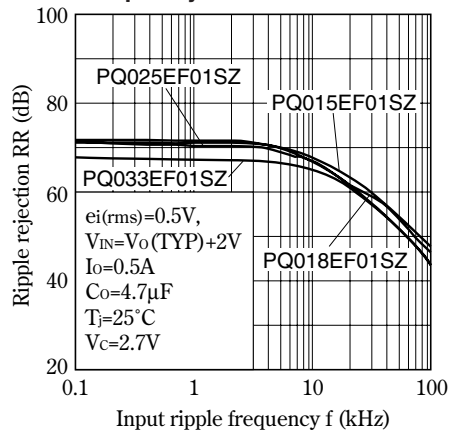
**Fig.20 Dropout Voltage vs. Junction Temperature (PQ033EF01SZ)**



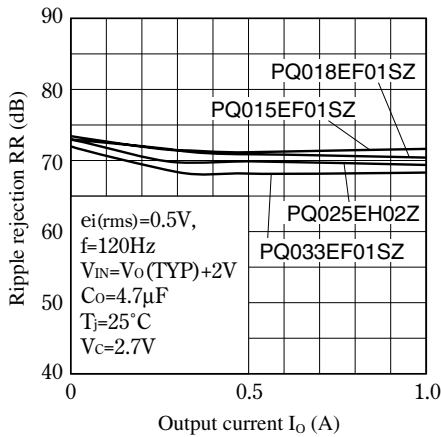
**Fig.21 Quiescent Current vs. Junction Temperature**



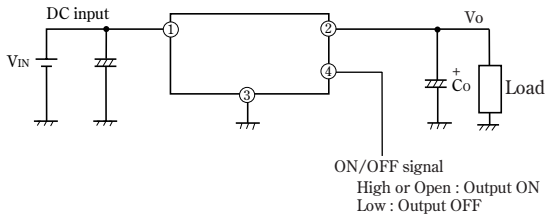
**Fig.22 Ripple Rejection vs. Input Ripple Frequency**



**Fig.23 Ripple Rejection vs. Output Current**



■ Typical Application



## 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).
- If the SHARP devices listed in this publication fall within the scope of strategic products described in the Foreign Exchange and Foreign Trade Law of Japan, it is necessary to obtain approval to export such SHARP devices.
- This publication is the proprietary product of SHARP and is copyrighted, with all rights reserved. Under the copyright laws, no part of this publication may be reproduced or transmitted in any form or by any means, electronic or mechanical, for any purpose, in whole or in part, without the express written permission of SHARP. Express written permission is also required before any use of this publication may be made by a third party.
- Contact and consult with a SHARP representative if there are any questions about the contents of this publication.