

PQ070XZ5MZ/ PQ070XZ01Z

■ Features

1. Low voltage operation (Minimum operating voltage:2.35V)
2.5V input → available 1.5 to 1.8V
2. Low dissipation current
Dissipation current at no load:MAX.2mA
(Conventional model:MAX.10mA)
OFF-state dissipation current:MAX.5μA

■ Applications

1. Peripheral equipment of personal computers
2. Power supplies for various electronic equipment such as DVD player or STB

■ Model Line-up

Output current (I _O)	Package type	Variable output
0.5A	Taping	PQ070XZ5MZP
	Sleeve	PQ070XZ5MZZ
1A	Taping	PQ070XZ01ZP
	Sleeve	PQ070XZ01ZZ

■ Absolute Maximum Ratings (Ta=25°C)

Parameter	Symbol	Rating	Unit
*1 Input voltage	V _{IN}	10	V
*1 Output control voltage	V _C	10	V
*1 Output adjustment terminal voltage	V _{ADJ}	5	V
Output current	I _O	0.5	A
		1	
*2 Power dissipation	P _D	8	W
*3 Junction temperature	T _j	150	°C
Operating temperature	T _{opr}	-40 to +85	°C
Storage temperature	T _{stg}	-40 to +150	°C
Soldering temperature	T _{sol}	260 (10s)	°C

*1 All are open except GND and applicable terminals

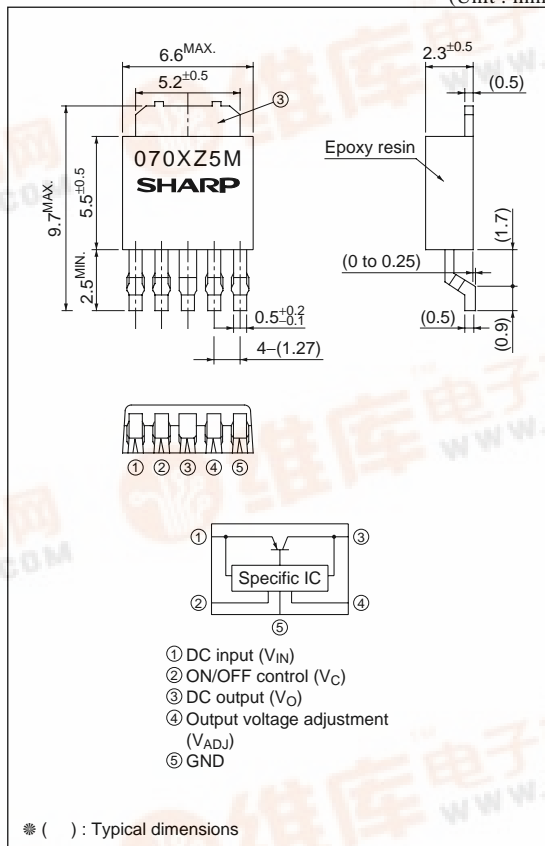
*2 P_D:With infinite heat sink

*3 Overheat protection may operate at the condition T_j=125°C to 150°C

SC-63 Package, Low Voltage Operation Low Power-loss Voltage Regulator

■ Outline Dimensions

(Unit : mm)



■ Electrical Characteristics

(Unless otherwise specified, condition shall be $V_{IN}=5V$, $V_O=3V(R_1=1k\Omega)$, $I_O=0.3A$, $V_C=2.7V$, $T_a=25^\circ C$, (PQ070XZ5MZ))

(Unless otherwise specified, condition shall be $V_{IN}=5V$, $V_O=3V(R_1=1k\Omega)$, $I_O=0.5A$, $V_C=2.7V$, $T_a=25^\circ C$, (PQ070XZ01Z))

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Input voltage range	V_{IN}	—	2.35	—	10	V
Output voltage	V_O	—	1.5	—	7	V
Load regulation	<div> <div>PQ070XZ5MZ</div> <div>PQ070XZ01Z</div> </div> R_{regL}	$I_O=5mA$ to $0.5A$	—	0.2	2	%
		$I_O=5mA$ to $1A$				
Line regulation	R_{regI}	$V_{IN}=4$ to $8V$, $I_O=5mA$	—	0.2	1	%
Ripple Rejection	RR	Refer to Fig.2	45	60	—	dB
Dropout voltage	<div> <div>PQ070XZ5MZ</div> <div>PQ070XZ01Z</div> </div> V_{I-O}	$V_{IN}=2.85V$, $I_O=0.3mA$	—	—	0.5	V
		$V_{IN}=2.85V$, $I_O=0.5mA$				
Reference voltage	V_{ref}	—	1.225	± 1.25	1.275	V
Reference voltage temperature coefficient	$T_C V_{ref}$	$T_J=0$ to $125^\circ C$, $I_O=5mA$	—	± 1.0	—	%
*4 Output on control voltage	$V_C(ON)$	*4	2	—	—	V
Output on control current	$I_C(ON)$	—	—	—	200	μA
Output off control voltage	$V_C(OFF)$	$I_O=0A$	—	—	0.8	V
Output off control current	$I_C(OFF)$	$I_O=0A$, $V_C=0.4V$	—	—	2	μA
Quiescent current	I_q	$I_O=0A$	—	1	2	mA
Output off dissipation current	I_{qs}	$V_C=0.4V$	—	—	5	μA

*4 In case of opening control terminal ②, output voltage turns off

Fig.1 Standard Test Circuit

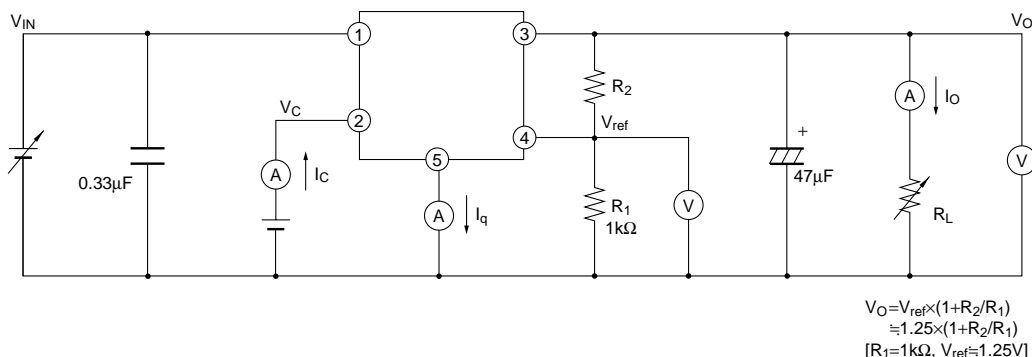


Fig.2 Test Circuit for Ripple Rejection

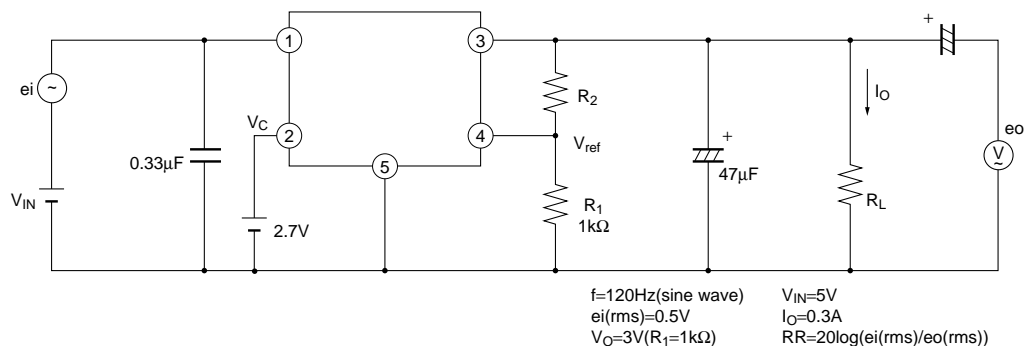
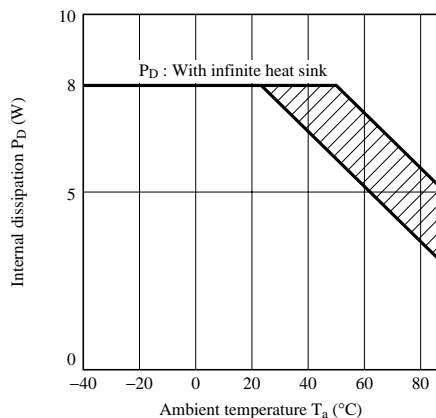


Fig.3 Internal Dissipation vs. Ambient Temperature



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

Fig.5 Overcurrent Protection Characteristics (PQ070XZ5MZ)

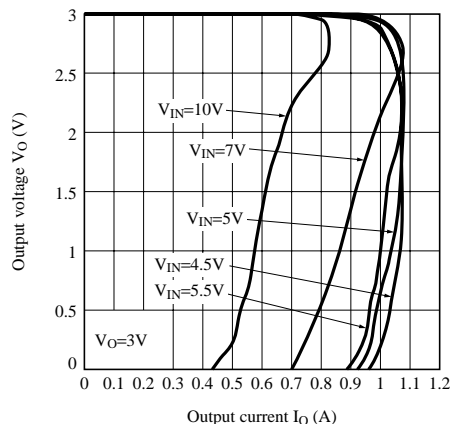


Fig.7 Output Voltage vs. Input Voltage (PQ070XZ5MZ)

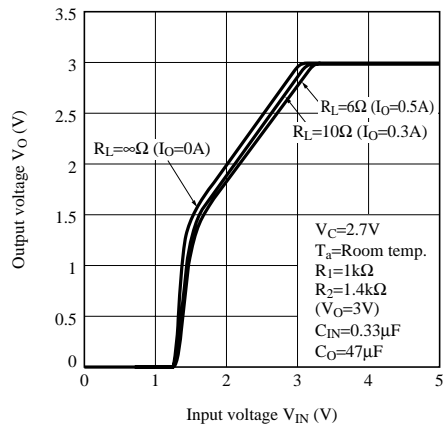


Fig.4 Overcurrent Protection Characteristics (PQ070XZ01Z)

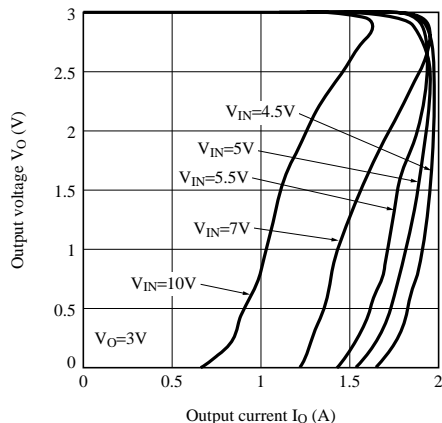


Fig.6 Reference Voltage vs. Ambient Temperature

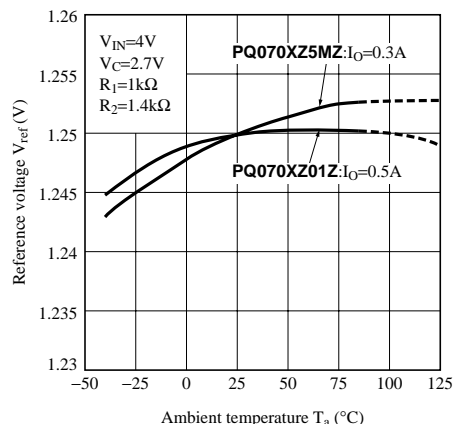


Fig.8 Output Voltage vs. Input Voltage (PQ070XZ01Z)

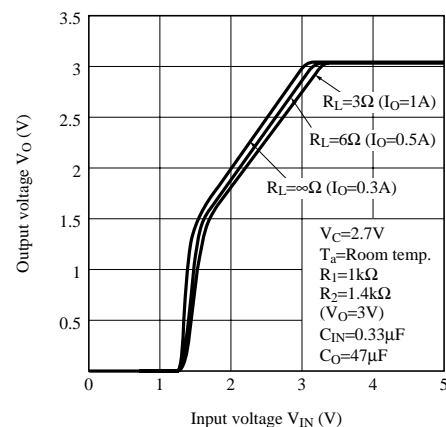


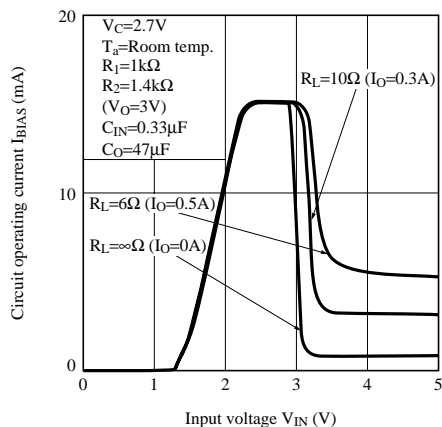
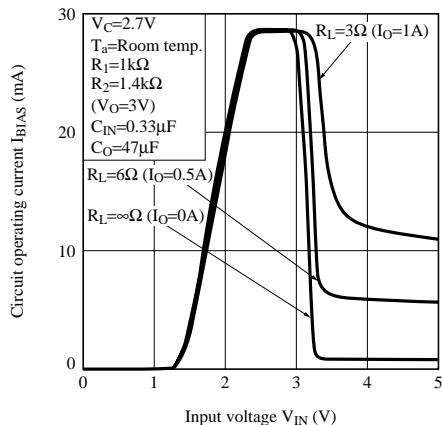
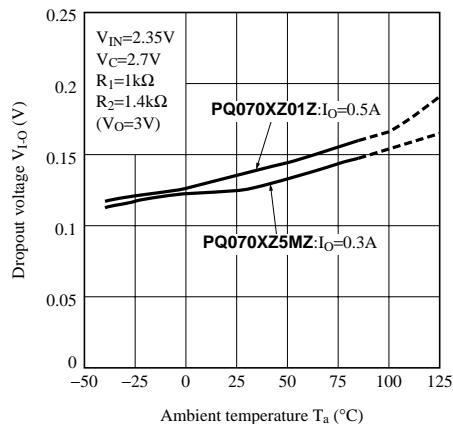
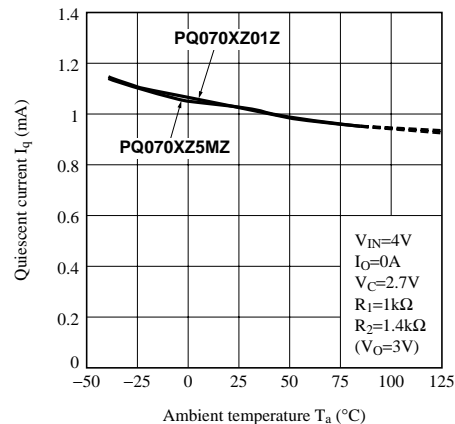
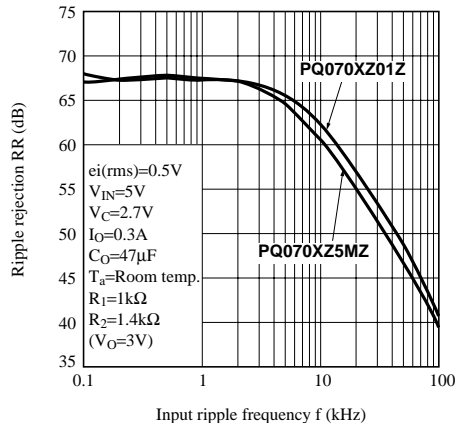
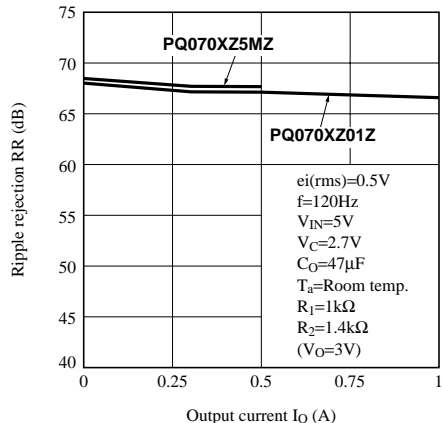
Fig.9 Circuit Operating Current vs. Input Voltage (PQ070XZ5MZ)

Fig.10 Circuit Operating Current vs. Input Voltage (PQ070XZ01Z)

Fig.11 Dropout Voltage vs. Ambient Temperature

Fig.12 Quiescent Current vs. Ambient Temperature

Fig.13 Ripple Rejection vs. Input Ripple Frequency

Fig.14 Ripple Rejection vs. Output Current


Fig.15 Example of Application

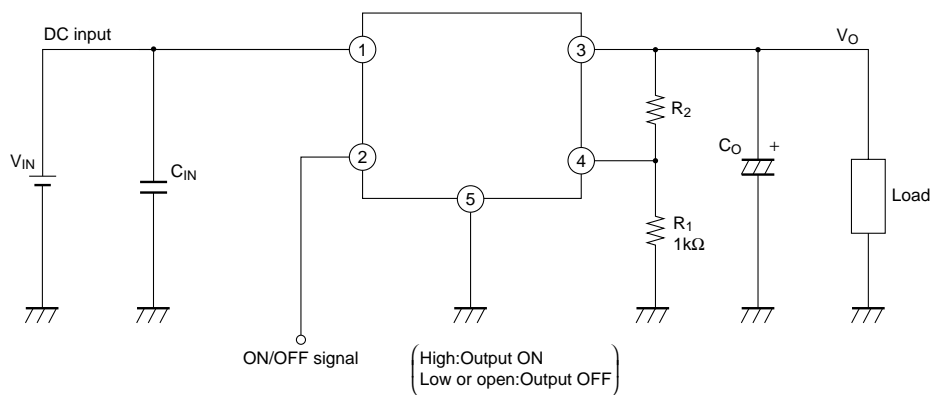
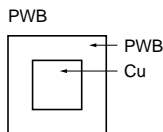
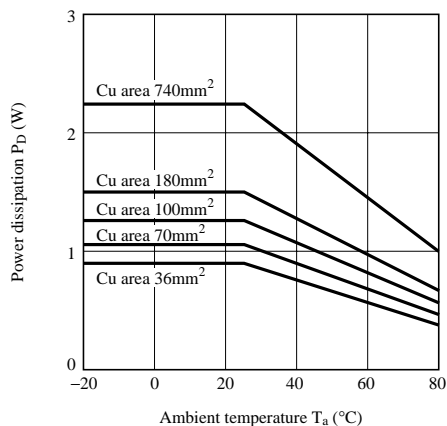
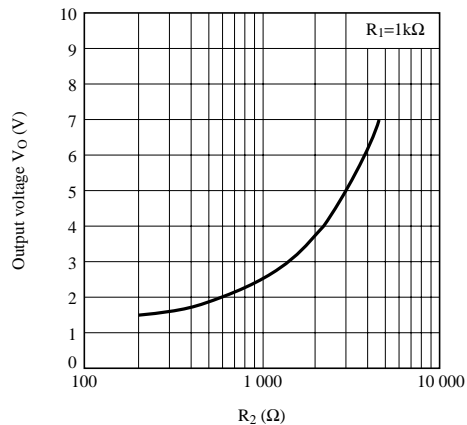


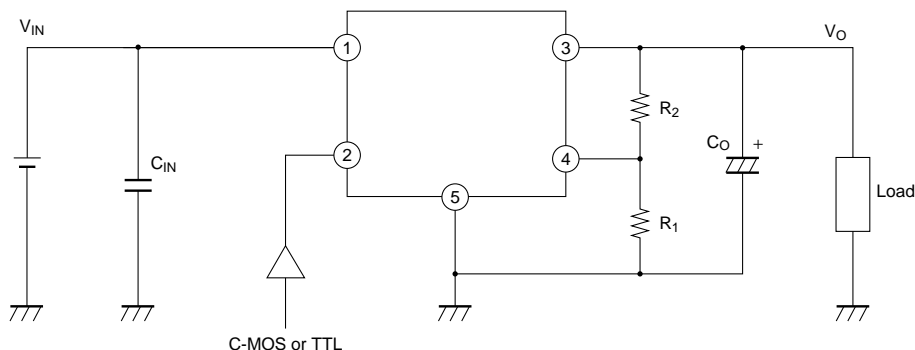
Fig.16 Power Dissipation vs. Ambient Temperature (Typical Value)



Material : Glass-cloth epoxy resin
 Size : 50×50×1.6mm
 Cu thickness : 35 μ m

Fig.17 Output Voltage vs. R_2 

■ Precautions for Use



1. External connection

- (1) The connecting wiring of C_O , C_{IN} and each terminal, fin portion must be as short as possible. It may oscillate by type, value and wiring condition of capacitor. Confirm the output waveform in actual using condition beforehand.
- (2) ON/OFF control terminal ② is compatible with LS-TTL. It enables to be directly driven by TTL or C-MOS standard logic (RCA4000 series).
- (3) If voltage is applied under the conditions that device pin is connected divergently or reversely, the deterioration of characteristics or damage may occur. Never allow improper mounting.

2. Thermal protection design

Maximum power dissipation of devices is obtained by the following equation.

$$P_D = I_O \times (V_{IN} - V_O) + V_{IN} \times I_q$$

When ambient temperature T_a and power dissipation P_D (MAX.) during operation are determined, operate element within the safety operation area specified by the derating curve. Insufficient radiation gives an unfavorable influence to the normal operation and reliability of the device.

In the external area of the safety operation area shown by the derating curve, the overheat protection circuit may operate to shut-down output. However please avoid keeping such condition for a long time.

3. ESD (Electrostatic Sensitivity Discharge)

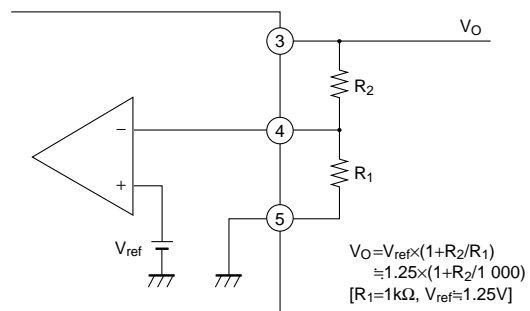
Be careful not to apply electrostatic discharge to the device since this device employs a bipolar IC and may be damaged by electrostatic discharge. Followings are some methods against excessive voltage caused by electrostatic discharge.

- (1) Human body must be grounded to discharge the electro charge which is charged in the body or cloth.
- (2) Anything that is in contact with the device such as workbench, inserter, or measuring instrument must be grounded.
- (3) Use a soldering dip basin with a minimum leak current (isolation resistance $10M\Omega$ or more) from the AC power supply line.

Also the soldering dip basin must be grounded.

■ Output Voltage Fine Tuning

1. Connecting external resistors R_1 and R_2 to terminals ③, ④, ⑤ allows the output voltage to be fine tuned from 1.5V to 7V. Refer to the figure below and Fig.17 when connecting external resistors for fine tuning output voltage.



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.
- 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.