Operation notes

●Precautions when storing and transporting ICs

(1) When storing ICs, to prevent oxidation of the pins, store the ICs as close to room temperature as possible, in a dry location. As a minimum, the following conditions must be met:

Humidity ····· 75% Max.

Temperature ··· 0 to + 30°C

(2) ICs should be stored in containers that protect them from electrostatic discharge.

(3) Care should be taken to ensure that the ICs are protected from water or other conductive liquids. In addition, the storage location should be free of dust and harmful gases.

(4) When transporting ICs, pack them in a conductive case or wrap them in aluminum foil. Do not use containers that retain static charges.

(5) When transporting ICs that have been mounted onto PC boards, place conductive material between the boards and make sure that all capacitors are discharged on the boards.

(6) When transporting ICs, protect them as much as possible from mechanical vibration and shock.

●Precautions when attaching ICs

(1) Depending on the IC, in some circuit configurations it appears that some pins are not connected. Do not use these pins as PC board wiring tie-points. Even if the pin is not internally used, using it as a tie-point can cause trouble such as oscillation.

(2) Cutting or forming heat sinks, forming packages, or processing packages can cause the thermal resistance to increase or cause stress to be applied, and these can lead to premature failure of the device.

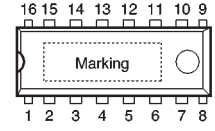
(3) Because the heat sink is at the same potential as the IC pellet ground, the heat sink should be either connected to the ground or left open. If left open, destruction of the IC may occur if voltage is applied to the heat sink.

(4) When mounting a heat sink, applying an even film of silicone grease will reduce the thermal contact resistance.

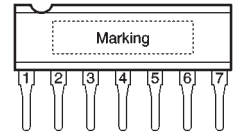
Depending on the silicone grease components, oil may be absorbed, adversely affecting the reliability of the device, so select the silicone grease carefully.

(5) When mounting ICs onto PC boards, make sure they are mounted in the correct orientation.

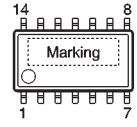
SIPs (single in-line packages) and ZIPs (zigzag in-line packages) are marked at the front of the package, and if the characters are positioned so that they are normally readable, Pin 1 will be on the lower left side of the device.DIPs (dual in-line packages), SOPs (small out-line packages) and QFPs (quad flat packages) have the marking on the top of the package, and if the characters are positioned so that they are normally readable, Pin 1 will be on the lower left side of the device.



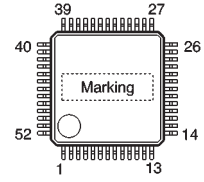
DIP



SIP



SOP



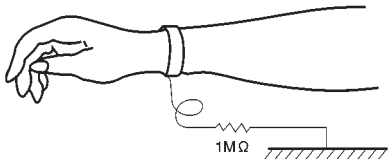
SQFP

If an IC is mounted in the wrong orientation and power is applied, the IC may be destroyed.

(6) When mounting ICs on PC boards, match the space between IC pins to that between mounting holes, and make sure excessive stress is not applied to the IC when mounting it.

(7) Check the soldering iron before using it, to make sure current is not leaking from it. Using a leaking soldering iron and bringing it in contact with the input pins of the IC can cause failure of the IC.

(8) All persons, work benches, measuring instruments, and belt conveyors should be grounded to protect against AC leakage. All persons working with the soldering process should be grounded with wrist straps as shown below.



Make sure the resistance between the person and the ground is on the person's side, to prevent electrical shock.

All work benches, conveyor belts and linking sections of work benches should be connected to ground. If several conveyor sections are linked, there may be locations between them that are not shorted. Always ground the entire linkage and make sure there is no AC leakage at any point.

(9) To reduce the possibility of damage from electrostatic discharge, care should be taken to properly control the room humidity. This is particularly true in the winter when static electricity is most likely to be a problem.

(10) Care should be taken with device leads and with assembly sequencing to avoid applying static charges to IC leads. PC board pins should be shorted together to keep them at the same potential. This helps to avoid the possibility of applying static charges to the ICs.

●Measurement and inspection precautions

(1) If power is applied to an IC whose leads are shorted with solder bridges, the IC may be destroyed. Before applying power, thoroughly check the soldered connections on the board.

(2) When the power switch of power supplies or of measuring instruments is turned on and off, large surge voltages can be generated which can destroy ICs. Grounding should be used to prevent the generation of such surges.

(3) When measuring and inspecting ICs, turn the power supply on only after the IC or board has reached the required voltage. Never remove an IC or board to which a power supply is connected, as the IC may be subjected to excessive, destructive currents caused by the differences in the sequencing of the removal of IC pins or measuring instrument connections.

(4) Since excessive current flow is a common cause of IC destruction, the power supply used with ICs should be provided with a current limiting circuit. In addition to the above precautions, if questions arise as to the safe handling and use of ICs, contact your Rohm representative. Also, contact the company prior to using a device under special conditions.

●IC thermal design

IC characteristics are greatly affected by operating temperature. If the maximum junction temperature is exceeded, the device performance will deteriorate and the device may fail prematurely.

Temperature must be considered in the design of an IC, both from the standpoint of preventing instantaneous destruction and that of assuring longterm high reliability.

The absolute maximum ratings for the IC are indicated by the maximum junction temperature (Tj Max.) or the operating temperature range (Topr). These values should be used as a reference when determining the thermal design using the Pd-Ta characteristic (thermal derating curve).

Thermal balance is taken into consideration when the IC itself is designed, so that there will be no problems with circuit operation. In order to assure longterm reliable performance of the IC, however, the thermal design should allow a substantial margin for thermal discharge in actual operation.

Even if a sufficiently large heat sink is used, an adequate heat discharging effect may not be maintained if the heat sink is not torqued properly. Also, if proper ventilation is not provided, the IC temperature may rise excessively, so the thermal design must provide for more protection than may actually be called for by the application.