Notes on maximum ratings

●The necessity for maximum ratings

Maximum ratings are those values established which, if exceeded even momentarily, may result in functional deterioration, thermal damage, or operational limitations, in addition to shortened life and limited reliability.

(1) Power supply voltage (V_{CC} Max.)

Provided the device is operated at this voltage value or a lower value, voltage may be applied continuously without causing problems.

(2) Power supply current (I_{CC} Max.)

Provided the device is operated at this current value or a lower value, current may be applied continuously without causing problems.

(3) Maximum power dissipation (Pd Max.)

To prevent thermal destruction of the IC, the device must be operated at the maximum junction temperature (Tj Max.) or a lower value.

The maximum power dissipation may be expressed in a number of forms as a function of the ambient temperature (Ta), heat sink shape and heat sink size.

Pd = P - Po

$$\eta \text{ (Efficiency)} = \frac{Po}{P} = \frac{Po}{Pd + Po}$$

P = Power supplied from device power supply

Po = Power supplied by the device in the load(s)

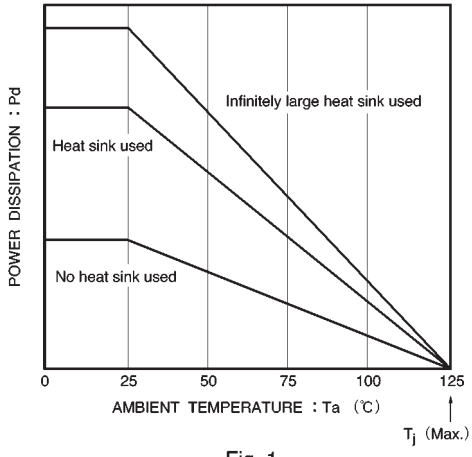

Fig. 1

To determine the surface area of the required heat sink for the device such that the junction temperature Tj Max. Does not exceed the allowed maximum, from the maximum operating temperature (Ta Max.) and Pd Max. taking Po and η into consideration, refer to Figure 1.

When sizing a heat sink, ensure that you include sufficient margin to accommodate even those sets of operating conditions not foreseen at the time of equipment design.

With a Pd - Ta curve such as that seen in Figure 1, the Pd - Ta curve should be given priority over Pd. Max. The Pd - Ta curve guarantees non-destruction of the IC, but does not guarantee function of the circuit. In other words, it guarantees only that characteristics such as voltage gain, distortion, and amplitude detection will not cause destruction of the IC. If Pd Max. is applied to the IC at Ta, it is normal for the IC pellet temperature to reach the maximum rated storage temperature (Tstg Max.).

(4) Operating temperature (Topr)

Even when operating at an ambient temperature of Ta = 25°C, not all electrical characteristics can be guaranteed, but basic circuit function is guaranteed. If you have any questions about the operation of the device in the normal operating range, please consult Rohm Corporation before including the device in a particular design.

(5) Storage temperature (Tstg)

If the IC is stored within this temperature range, there will be no deterioration of performance or functions. However, even within this range, care should be taken to prevent sudden changes in temperature, as this type of stress can lead to a deterioration of IC performance.