

Assembly Instructions: IR Receivers

GENERAL

Vishay leaded IR receiver modules can be mounted in any position. The leads may be bent, but the bend should not be less than 1.5 mm from the bottom of the plastic package. During bending, force should not be transmitted from the leads to the package (e.g. by spreading the leads).

If the device is mounted near heat generating components, the resulting increase in ambient temperature should not exceed the specified ratings.

SOLDERING INSTRUCTIONS

Protection against overheating is essential when a device is being soldered. It is recommended, where the design permits, that the length of the leads between the solder joint and the package be left as long as possible. The maximum permissible soldering temperature for plastic encapsulated devices is governed by the maximum permissible heat that may be applied to the plastic rather than by the maximum permissible junction temperature of the die.

The maximum temperatures and soldering times for iron and wave soldering are given in table 1.

TABLE 1 - MAXIMUM SOLDERING TEMPERATURES

	IRON SOLDERING			WAVE SOLDERING		
	IRON TEMPERATURE	DISTANCE OF THE SOLDERING POSITION FROM THE LOWER EDGE OF THE CASE	MAXIMUM ALLOWABLE SOLDERING TIME PER PIN	SOLDERING TEMPERATURE SEE TEMPERATURE TIME PROFILES	DISTANCE OF THE SOLDERING POSITION FROM THE LOWER EDGE OF THE CASE	MAXIMUM ALLOWABLE SOLDERING TIME
IR receiver for through hole assembly without holder	≤ 350 °C	≥ 2 mm	3 s	260 °C	≥ 1 mm	10 s
IR receiver for through hole assembly with plastic holder	≤ 350 °C	n/a	3 s	260 °C	n/a	5 s
IR receiver for through hole assembly with metal holder	≤ 350 °C	n/a	3 s	260 °C	n/a	10 s
IR receiver for SMD assembly	≤ 350 °C	n/a	3 s	-	-	-

SOLDERING METHODS

There are several commonly used methods to solder devices onto the circuit board.

(a) Reflow Soldering

Reflow soldering uses contact-free heating and derives the energy for soldering the components either from convection heating or from direct infrared radiation.

The heating rate in an IR oven depends on the heat absorption of the components' surfaces and on the ratio of the components' masses to their irradiated surfaces.

The relevant temperature for components soldered in a reflow process is defined as the package peak temperature (PPT), sometimes misleadingly referred to the peak reflow temperature (PRT). Both terms refer to the temperature at the top of the package, not the temperature of the solder joint.

The PPT of a component in an IR oven cannot be determined through calculation. The PPT of a component may be obtained by measuring its temperature while it is being transported through the oven.

The solder profile for a given board often depends on reliably soldering the larger, more massive components. The PPTs of smaller components tend to react more quickly than the larger ones. Care should be taken that their maximum ratings are not exceeded.

The parameters which influence the PPT of the component are the following:

- Time in the oven and power of the oven
- Mass of the component
- Size of the component
- Size of the printed circuit board
- Absorption coefficient of the surfaces
- Layout density
- Optical spectrum of the radiation source
- Ratio of radiated to convected energy

A PPT vs. time profile of the reflow process, suitable for SMD devices, is given in Fig. 2. Reflow soldering is not suitable for most leaded IR receivers (e.g. minimold may be reflow soldered), and may cause damage to them.

Soldering Instructions

- Reflow soldering must be done according to MSL4 within 72 h after opening the dry pack envelope, and while stored below a maximum temperature of 30 °C and below a relative humidity of 60 %
- Set the furnace temperatures for pre-heating and heating such that the PPT of the component does not exceed the reflow temperature profile shown in the diagram. Exercise extreme care to keep the PPT below 260 °C
- Handling after reflow should be done only after the assembly has cooled off

(b) Wave soldering

In wave soldering, one or more continuously replenished waves are generated in a bath of molten solder. The circuit boards to be soldered are moved in the opposite direction to that of the wave and across the wave's crest.

A temperature-time profile of the entire process is given in Fig. 3. Wave soldering is suitable for leaded IR receivers but not for the SMD packages.

Note for parts mounted in plastic holders: the temperatures used for soldering exceed the melting temperature of plastic. A wave-soldering process not exceeding 5 s will therefore often deform the hooks used to attach the holder to the PCB, but will not affect the functionality of the holder. After soldering, the leads securely hold the device to the board.

(c) Soldering iron

The process of hand soldering with an iron cannot be carried out in a repeatable and controlled way.

This process should not be considered for use in applications where reliability is important. There is no SMD classification for this process.

Manual Soldering for SMD

- Use a soldering iron of 25 W or less. Adjust the temperature of the soldering iron below 350 °C
- Finish soldering within 3 s
- Handle products only after the temperature has cooled off

WARNING

Opto devices are sensitive to damage due to moisture release if they are subjected to infrared reflow or a similar soldering process (e.g. wave soldering) without being properly dried.

Dry box storage is recommended as soon as the aluminum shipping bag has been opened to prevent moisture absorption by the devices. The following conditions should be observed if dry boxes are not available:

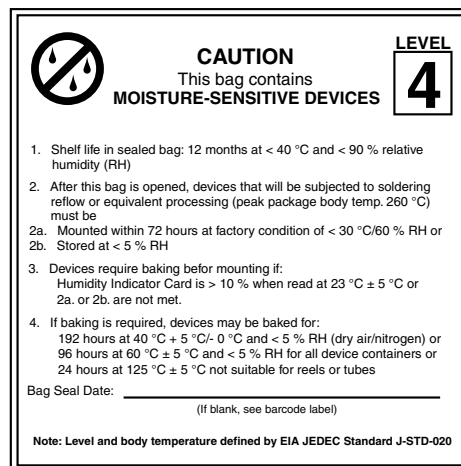
- Storage temperature 10 °C to 30 °C
- Storage humidity at 60 % RH maximum

If the devices are stored for some time under these conditions (max. time depends on the MSL level), the moisture content will then be too high for reliable reflow soldering.

The devices can be reconditioned to recover to an acceptable moisture content by drying under the following conditions:

192 h at 40 °C + 5 °C / - 0 °C and < 5 % RH (dry air / nitrogen)
or 24 h at 125 °C + 5 °C not suitable for reel or tubes
or 96 h at 60 °C ± 5 °C and < 5 % RH for all device containers.

An EIA JEDEC® standard JSTD-020 label is included on all dry packs. Standard IR Receiver SMD packages like Heimdall and Panhead are qualified according to MSL4 requirements, as well as Minimold DF1P devices. Belobog is qualified according to MSL3 requirements. VSOP devices are qualified according to MSL1 requirements.



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Fig. 1 - Example of JSTD-020 Level 4 Label

TEMPERATURE-TIME PROFILES

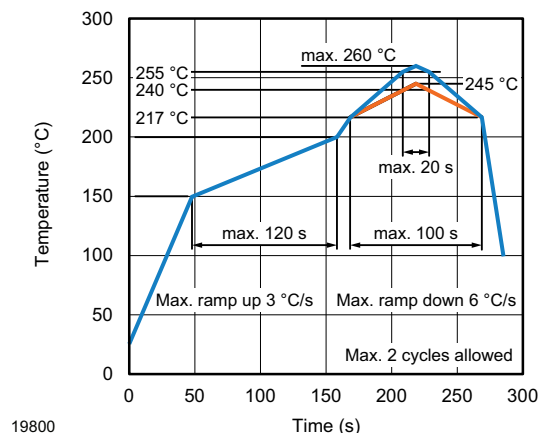


Fig. 2 - Infrared Reflow Soldering of Opto Devices (SMD package only)

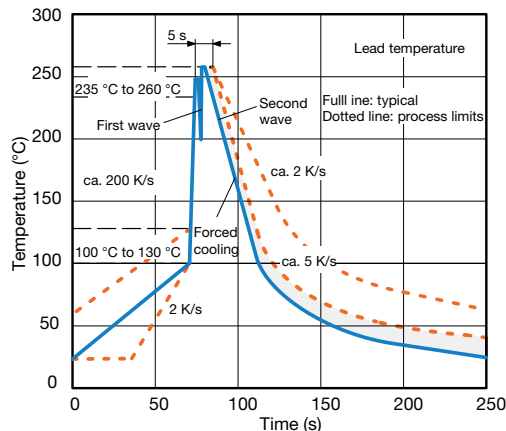


Fig. 3 - Wave Soldering of Opto Devices (leaded IR receiver package only)