

Application note for device mounting instructions

Introduction

This document outlines the minimum mounting conditions for Westcode high power press-pack diodes, thyristors, GTO's and IGBT's.

Recommendations for interface properties

The interfaces to the device pole faces (either heatsink or busbar) must conduct both thermal and electrical energy from the device. It is important that these interfaces maintain a stable contact throughout the lifetime of the equipment to ensure reliable operation of the device. Both the surface geometry and finish are important factors to consider.

Surface roughness

The surface roughness is a measure of the microstructure of the surface and is expressed as a R_a value as per BS EN ISO 4287:1998+A1 2009. A roughness, $R_a \leq 1.6\mu\text{m}$ for all contact surfaces is recommended.

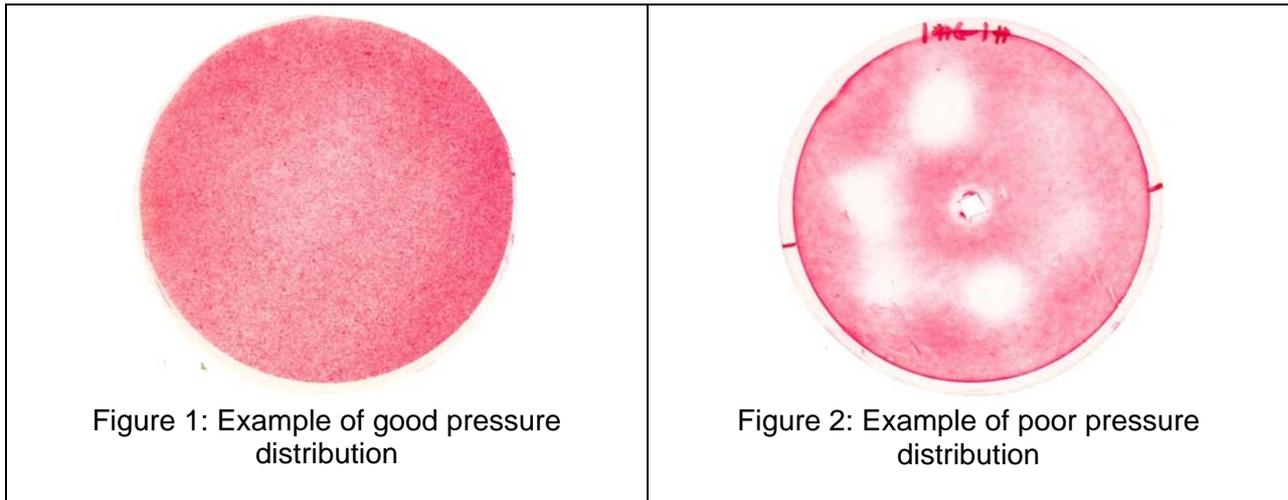
Surface flatness

Flatness is a measure of the net variation of a surface defined by two parallel planes. A flatness of $30\mu\text{m}$ is required for thyristors, diodes and GTO's and $10\mu\text{m}$ for IGBT's for all interface surfaces within the clamping structure and clamp force range specified in the device data sheet.

Note 1: The flatness of an IGBT greater than that specified in the clamped condition may be seen prior to the device being clamped. This is due to differential thermal expansion of the housing components post manufacture and in no way reflects or impacts the device flatness once it is clamped to the nominal force.

Note 2: The stack components must only deflect elastically. A flatness greater than the maximum specified may result if plastic deformation of the contact surfaces (such as cooler collapse) occurs under loading.

Westcode recommends the use of Fuji Prescale film; see www.fujifilm-prescale.eu or a similar film product to confirm the pressure uniformity of the mechanical design of the assembly. The film is manufactured in a number of different pressure ranges and should be inserted between the device contact face and the cooler or heatsink. A good pressure distribution and a non-uniform pressure distribution are shown in figures 1 and 2 respectively.



Surface finish

In order to maintain a good electrical connection and avoid corrosion over time, Westcode recommends that all non-aluminium contact surfaces be nickel-plated. Chemical plating is preferable to electroplating in high reliability applications. Plating depth should be 4-6µm in accordance with that applied to the device.

Surface preparation prior to assembly

All contact surfaces should be clean and dry prior to assembly. If necessary all non-plated contact surfaces should be lightly abraded to remove oxide films with a rotary wire brush using a suitable contact grease to form a slurry or alternatively polished using 3M Scotchbright™ or a similar product. Note that the slurry produced by the abrasion should be left on the contact surface until the device is ready to be mounted (to prevent re-oxidation). The contact surfaces should then be cleaned using ethanol or similar solvent and a lint free cloth. Lint free gloves should be worn when handling prepared parts. A very thin film of suitable mounting grease, such as Jetlube SCX13 (Westcode part number XSGSCX13) should be applied to the device. When the device has been clamped to full load a small bead approximately 0.1mm in diameter should be squeezed out from between the contact surfaces.

Mounting Force, F_M

The mounting force, F_M is the recommended force to be applied for optimal device performance. The data sheet ratings are not guaranteed if the mounting force is lower than that specified in the data sheet. The thermal impedance and the on-state voltage drop will increase, and the short circuit current rating will decrease when the force is reduced below the rated value.

Too high a mounting force could reduce the load cycling capability. The mounting force must be uniformly applied across the whole area of the pole face, this is particularly important for press-pack IGBT's. Variations in contact pressure of more than 10% across the pole face are not permitted.

Application support

A full range of clamps, coolers and other assembly parts are available from Westcode. Please contact your local distributor, Area Sales Manager or the factory direct for more information.