INTRODUCTION

This document explains how to install PCB mounted Furse ESP Surge Protection Devices (SPDs):

ESP PCB/06D I ESP PCB/15D I ESP PCB/30D I ESP PCB/50D I ESP PCB/110D I ESP PCB/TN I ESP PCB/06E I ESP PCB/15E I ESP PCB/30E I ESP PCB/50E I ESP PCB/110E

1. **Safety note:**
   Warning! Installation by person with electrotechnical expertise only.

   Warnung! Installation nur durch elektrotechnische Fachkraft.

   Avvertenza! Fare installare solo da un elettricista qualificato.
   Avertissement! Installation uniquement par des personnes qualifiées en électrotechnique.

   Advertencia! La instalación deberá ser realizada únicamente por electricistas especializados.

2. **Before installation**

2.1 Make sure that the system's maximum line voltage (DC or AC peak) will never exceed the maximum working voltage of the SPD.

Otherwise the SPD will clamp signal voltages as though they were transient overvoltages.

	Normal Working Voltage	Maximum Working Voltage
ESP PCB/06D	6 V	7.79 V
ESP PCB/15D	15 V	19 V
ESP PCB/30D	30 V	37.1 V
ESP PCB/50D	50 V	58 V
ESP PCB/110D	110 V	132 V
ESP PCB/TN	-	296 V
ESP PCB/06E	6 V	7.79 V
ESP PCB/15E	15 V	16.7 V
ESP PCB/30E	30 V	36.7 V
ESP PCB/50E	50 V	56.7 V
ESP PCB/110E	110 V	132 V

2.2 Be sure that the SPD's bandwidth will not restrict the system bandwidth.

	Bandwidth (-3 dB)
ESP PCB/06D	800 kHz
ESP PCB/15D	2.5 MHz
ESP PCB/30D	4.0 MHz
ESP PCB/50D	6.0 MHz
ESP PCB/110D	9.0 MHz
ESP PCB/TN	20.0 MHz
ESP PCB/06E	1.5 MHz
ESP PCB/15E, ESP PCB/30E, ESP PCB/50E, ESP PCB/110	45 MHz

2.3 Check that the voltage drop caused by the resistance of the unit does not interfere with the normal operation of the system.

	Line Resistance
ESP PCB/D Series	9.4 Ω
ESP PCB/E Series	1.0 Ω

2.4 Ensure that the current passing through the SPD does not exceed:

- 300 mA DC or AC RMS (ESP PCB/06D, ESP PCB/15D, ESP PCB/30D, ESP PCB/50D, ESP 110D & ESP PCB/TN),
- 1.25 A DC or AC RMS (ESP PCB/06E, ESP PCB/15E, ESP PCB/30E, ESP PCB/50E & ESP PCB/110E)

3. **Installation**

3.1 Track layout

The line inputs on the PCB represent the most likely entry point for transient overvoltages into the system.

To counteract risk of of damage from surge current activity, use the largest track width the board can accommodate for the line inputs.

The track width connected to the clean output pins does not affect surge current capabilities, however care must be taken to ensure the transient is not picked up on the output tracks.

When using large track widths, remember to allow sufficient track separation to ensure adequate creepage and clearance.

Additionally, consider:

- Using both the top and bottom copper layers on the PCB, and
- Using a high PCB copper plating level

As this will considerably increase the current handling of the tracks.

Note: Furse PCB protectors are capable of handling 10 kA of surge current, although track layout or choice of connectors on the PCB may restrict the unit's performance (since the line and earth tracks need to be capable of handling 10 kA).

If the track fails before 10 kA, the surge protection offered will be limited to what the track can handle before breakdown.

Dirty line tracks should be routed parallel and as close together as possible.

This should also be implemented on the clean tracks (see Figure 1).

Clean (outgoing) tracks should never be routed close and parallel to line (incoming) tracks or dirty barrier earth connections as the transient can be re-introduced after the protector due to electromagnetic coupling (see Figures 2 & 3).

If it is unavoidable the clean tracks can cross the line tracks at 90°.

Do not create large loops with the line or clean tracks as this will increase electromagnetic coupling.

If multiple SPDs are used on a PCB, dirty line and clean lines should be kept at least 20 mm apart (see Figure 4).

This separation distance must still be implemented on multi-layer PCBs, as the interference will easily pass through the board.

Figure 1:
Maximum line to clean separation. Large input tracks and pads (using top and bottom copper layers). Earth pin is bonded to an earth layer/ plane.

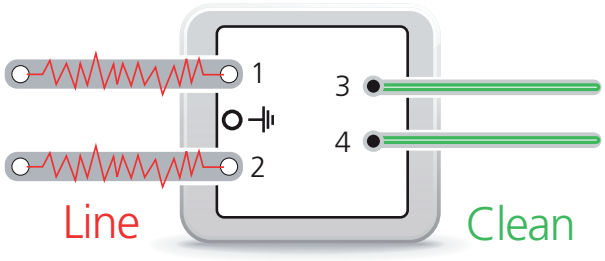


Figure 2:
All dirty ('line') incoming tracks are separated from the clean output tracks, individual line and clean tracks are routed close together. Earth pins are bonded to an earth layer/plane.

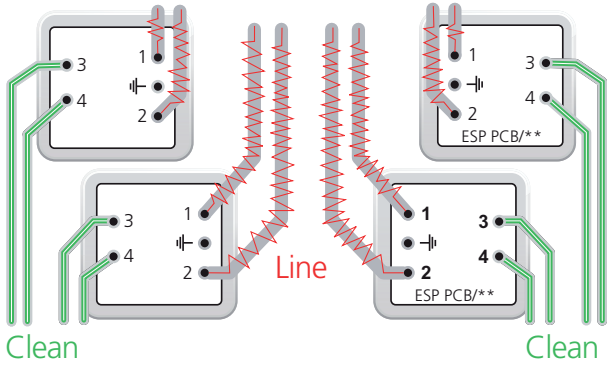


Figure 3:
Output tracks will create a large induction loop and are too close to input tracks. Input pads could be made larger. Transient will be re-introduced after protector.

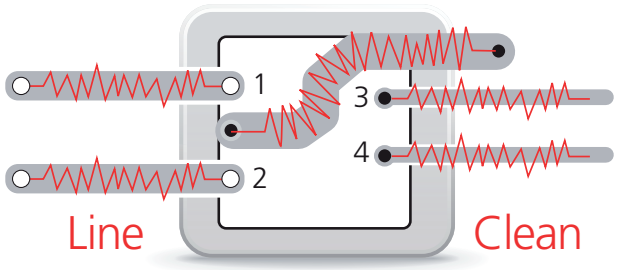
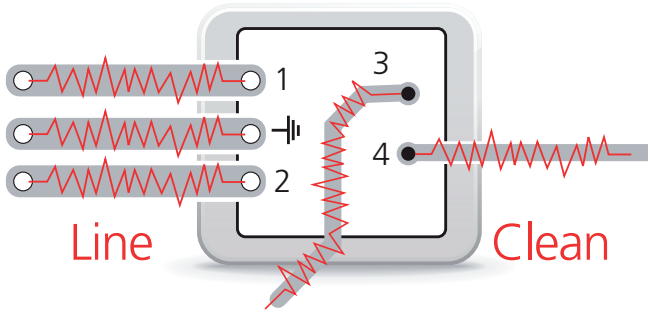


Figure 4:
Earth track too close and parallel to output tracks. Input pads could be made larger. Transient will be re-introduced after protector.



... continued overleaf

4.2 Positioning the ESP PCB protector

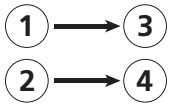
Furse ESP PCB protectors are connected in series, and should be soldered directly onto the PCB.

Use the largest pad size possible, as small solder joints can break down with a transient overvoltage.

The line end of the protector should be positioned as close to the line input of the PCB as possible, minimising the track distance.

The clean end of the SPD should be connected to the tracks going to the protected components.

The input/line and output/clean connections of the protector are paired as follows:



4.3 Earthing

The use of an earth layer or plane is highly recommended as this reduces the electromagnetic field produced by a transient discharging to earth considerably, and hence the chance of the transient being picked up on the clean tracks.

Connect the earth to the main star point of the earthing system, routeing away from all other connections.

SAFETY NOTE:

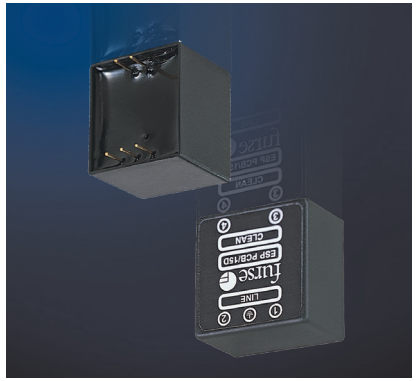
1. Always handle cables by their insulation

2. Never work on SPDs or their cables during a storm

Environment

Consider the protection of the environment! Used electrical and electronic equipment must NOT be disposed of with domestic waste. The device contains valuable raw materials which can be recycled. Therefore, contact ABB for disposal of this equipment.

Notes



for PCB mounted Surge Protection Devices

ESP PCB/D & PCB/TN Series,
ESP PCB/E Series

INSTALLATION INSTRUCTIONS

Contact us

ABB Furse
UK Office
Wilford Road
Nottingham NG2 1EB
Tel: +44 (0) 115 964 3700
Fax: +44 (0) 115 986 0071
National Sales Tel: +44 (0) 333 999 9900
National Sales Fax: +44 (0) 333 999 9901
E-Mail: enquiry@furse.com

www.furse.com

© Copyright ABB. 11/2018 9AKK106713A1380