Box illumination

*by **pmd**technologies*

Abstract

This document describes the LED modules used in the calibration boxes.

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1. Functional Description

The Tango_IFM_Box_Illumination_V0100 PCB is designed to build different patterns with wired 5 mm LEDs. The distance between the LEDs is 30 mm. Multiple PCBs are connected with a simple multi-pin connector with a pitch of 2.54 mm. The distance spanned by the multi-pin connector is calculated with ~10 mm. The LEDs are mounted at the bottom-side.

1.1. Connection polarity and series resistance

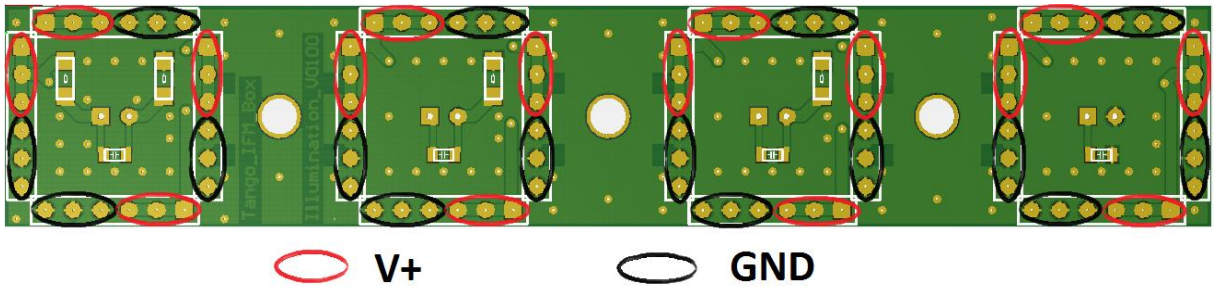

Figure 1: Connection polarity

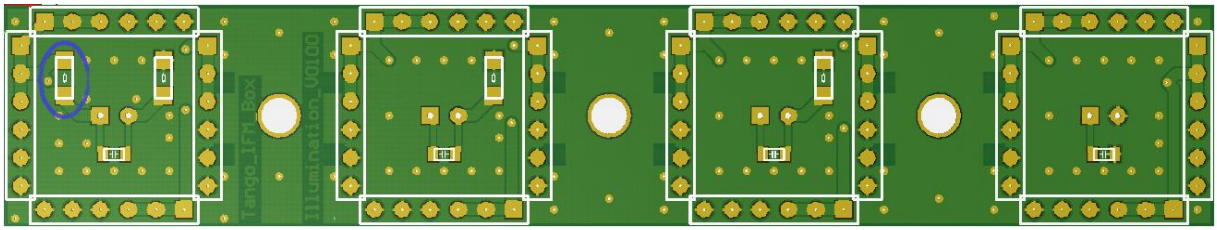

Figure 2: Series resistance

The series resistance is calculated by the number of LEDs on one PCB.

LEDs per PCB	Series resistance	
4	100R	
3	170R	(not used in this case)
2	240R	
1	300R	

→ between 20mA and 22mA per path

Table 1: Series resistors used for Osram SFH 4550 LEDs and a supply-voltage of 8V

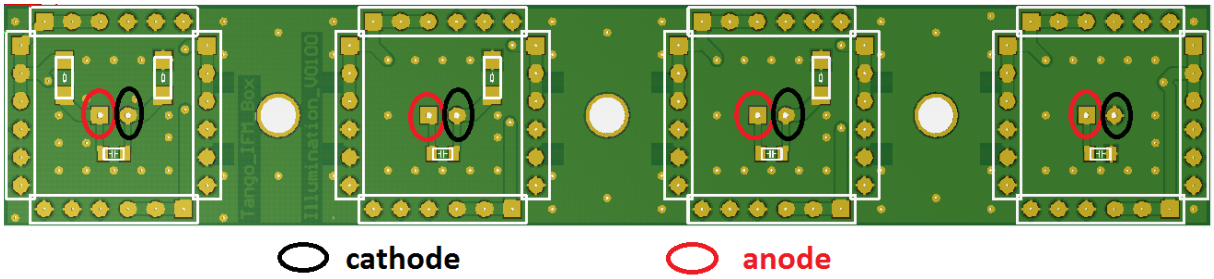

Figure 3: LED polarity

The LEDs are mounted at the bottom-side of the PCB.

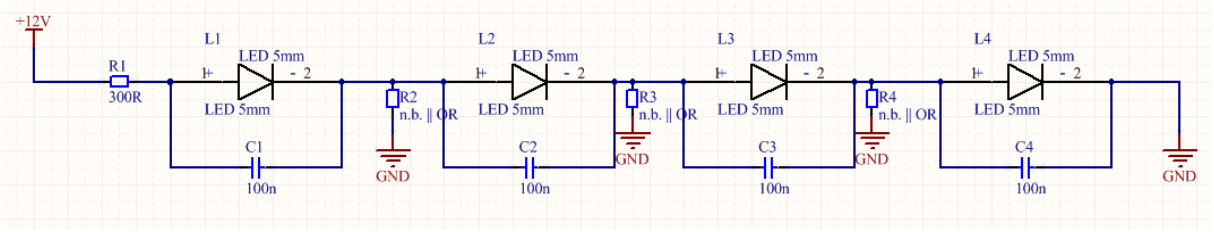

Figure 4: Schematic of one LED line

The capacitors parallel to the LEDs are not necessary in this case, values of serial resistance are shown in Table 1.

In case of a line with 4 LEDs the 0R resistors are not equipped. If the PCB is cut to 1, 2 or 3 LEDs, Figure 6 shows which resistor must be equipped.

1.2. Cutting PCBs

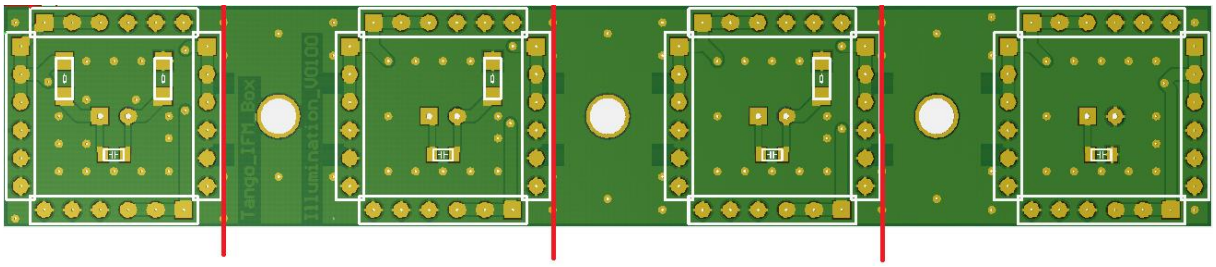

Figure 5: Possible cuts

It's possible to cut the PCB in the red-marked lines. The cut-line is defined by 4 vias to keep the 30 mm pattern.

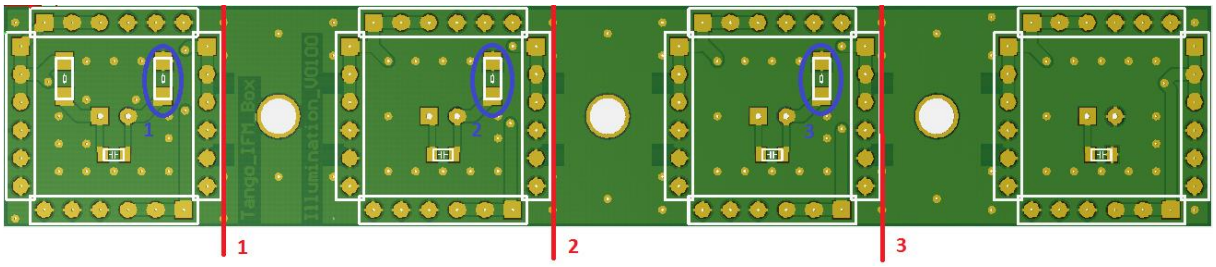

Figure 6: 0R resistance to connect to GND

When cutting a PCB, a 0R resistor must be added to connect the last LED pin in line to GND. If the PCB is cut at 1st mark, 1st resistor must be added. If it's cut in 2nd mark, 2nd resistor and so on.

1.3. Connecting PCBs

Each PCB has to be supplied from the slim side of the 1st LED.

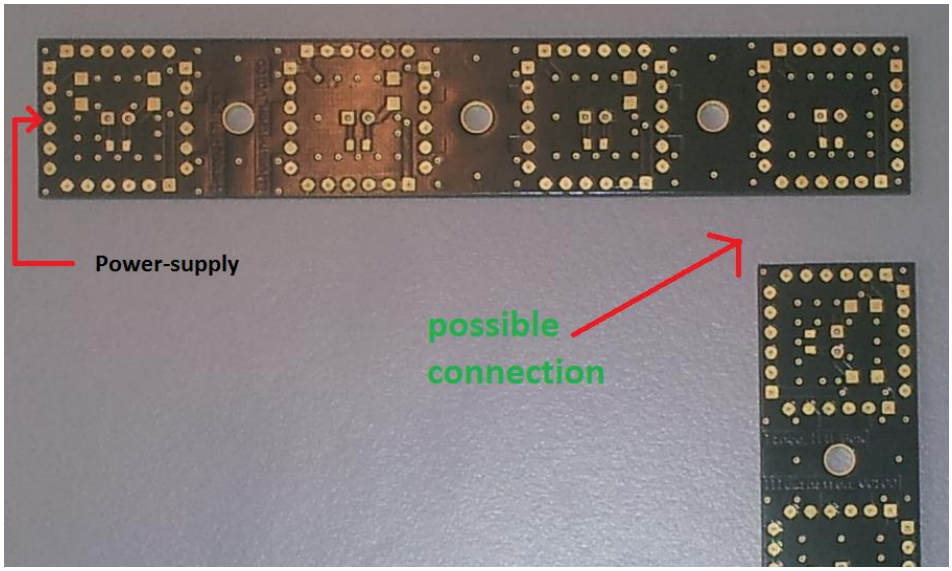

Figure 7: Possible connection 1

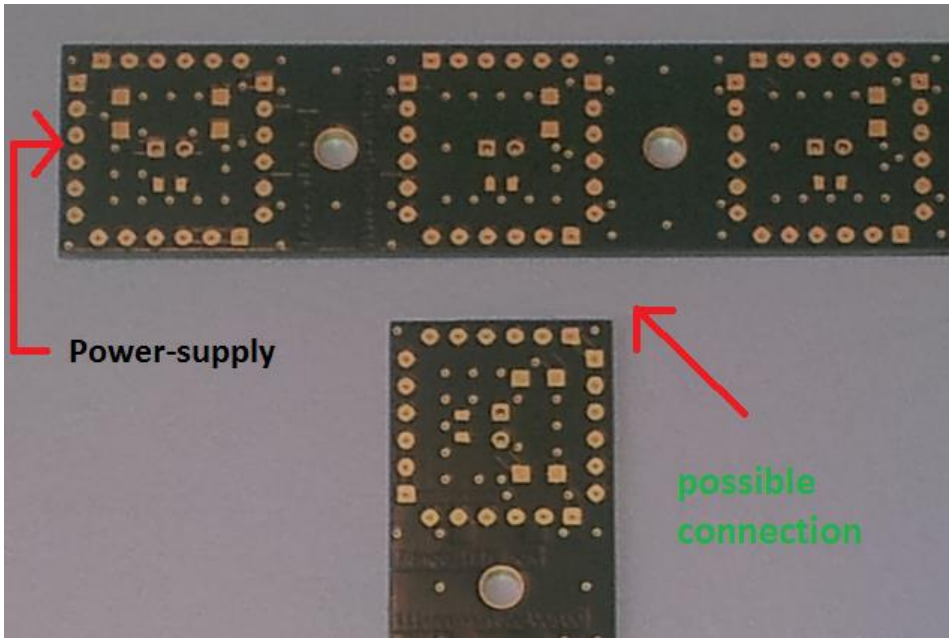

Figure 8: Possible connection 2

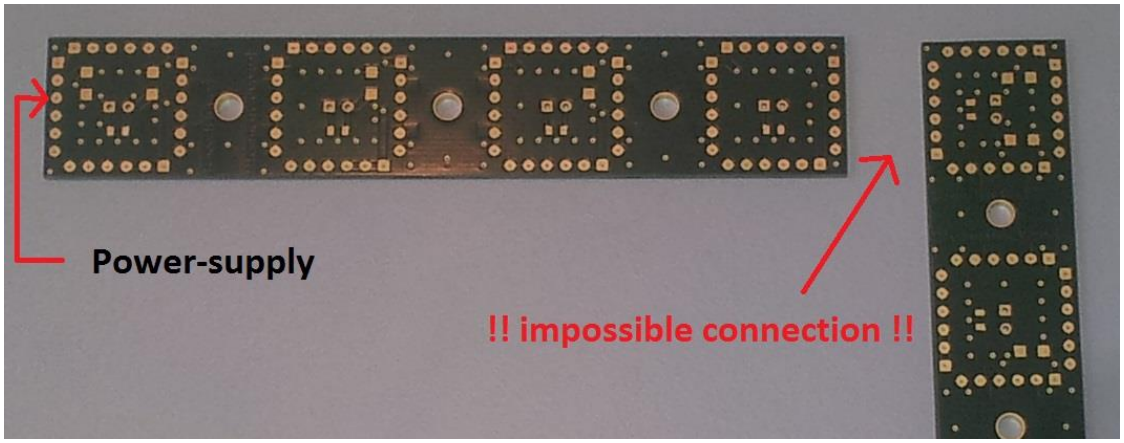

Figure 9: Impossible connection

2. Controlling with µC

To switch LEDs on and off with a µC or another 5 V signal a setup with a transistor or mosfet is needed.

In the example case the following setup to switch the illumination with an Arduino is used:

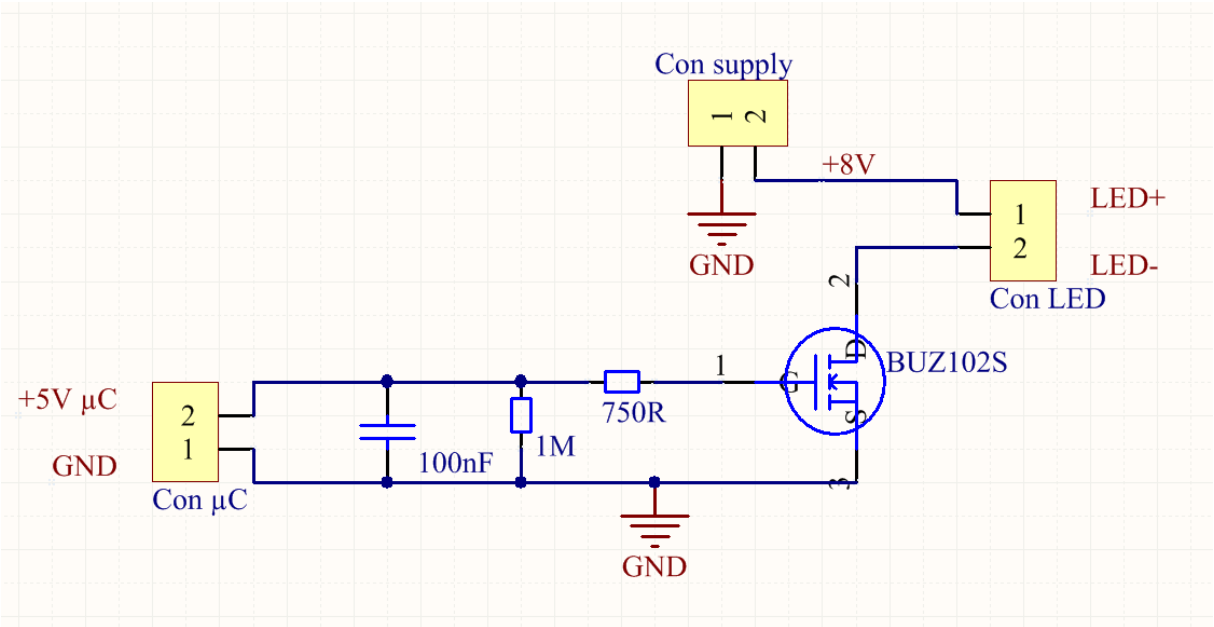

Figure 10: Transistor schematic for controlling with µC

3. Soldered PCB and calibration setup

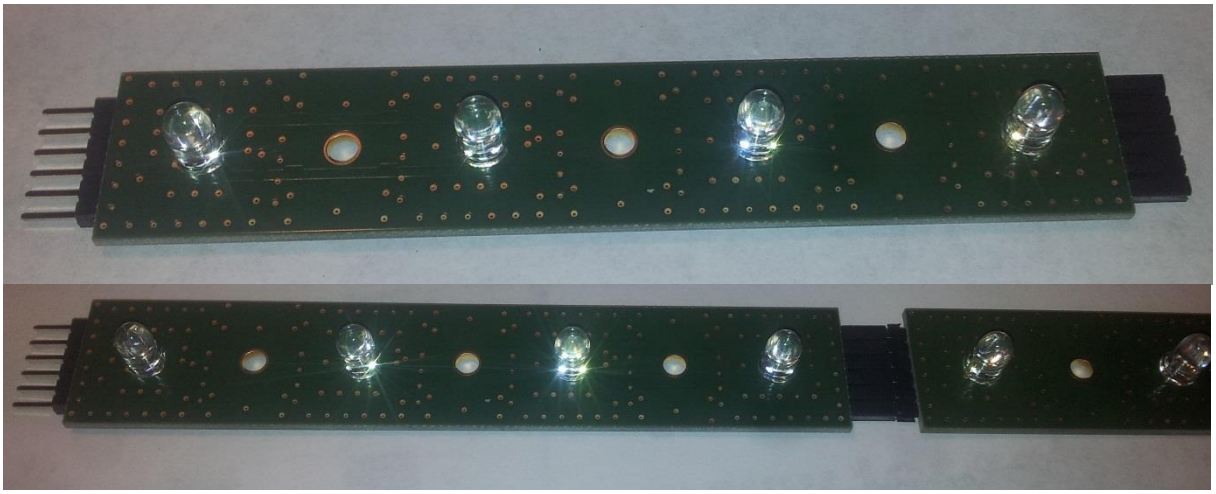

Figure 11: Bottom-side of PCB

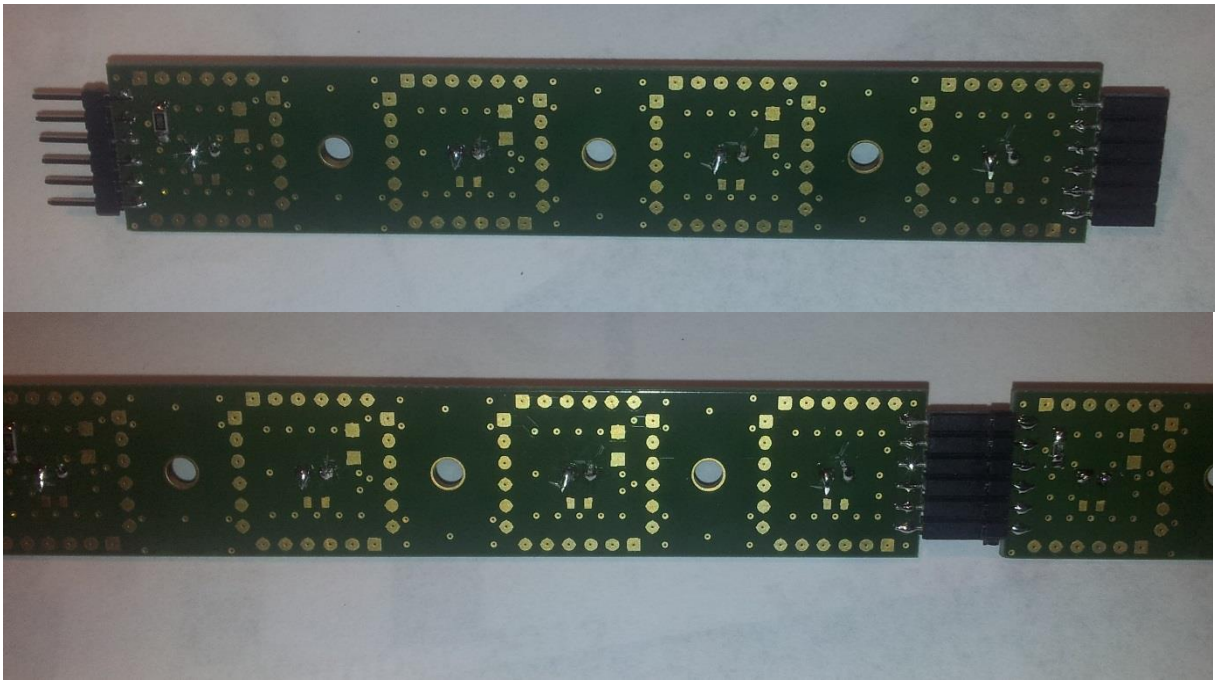

Figure 12: Top-side of PCB

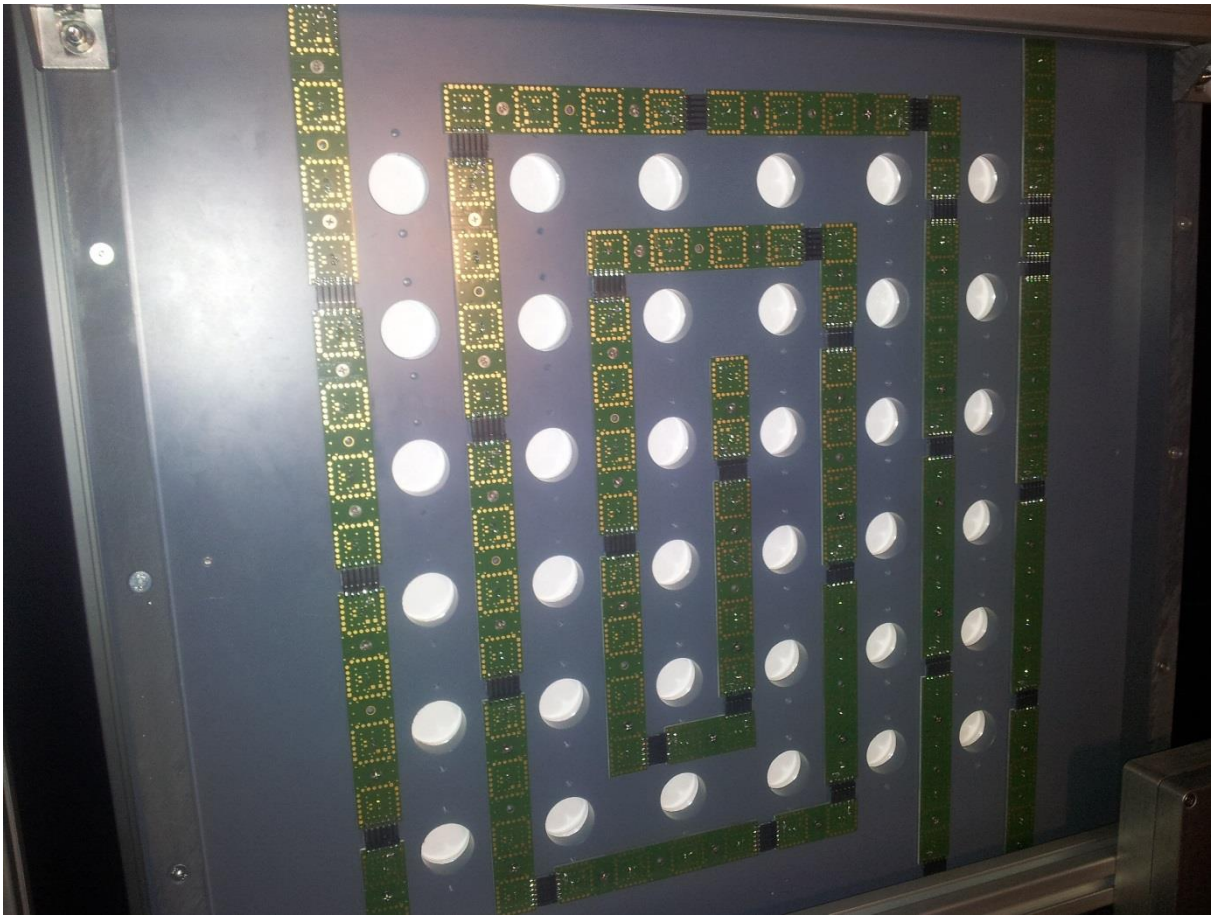

Figure 13: Connected PCBs in calibration setup

Document History

Document title: Box illumination – Cal-1-6-AN

Revision	Origin of Change	Submission Date	Description of Change
0	TLe	2016-05-10	New Application Note