ESD SAFETY AND RULES OF CONDUCT FOR LEDS

INTRODUCTION

DEFINITION OF ELECTROSTATIC DISCHARGE - ESD

Electrostatic discharge (ESD) is a spark or discharge which is caused by a large potential difference in an electrically insulating material and causes a very short, high electrical pulse. The cause of the potential is usually a charge caused by frictional electricity.

EXAMPLES

» lighting
» walkin on the carpet
» friction on cotton sweater
» discharge when touching a railing

TYPICAL ELECTROSTATIC VOLTAGES

Many everyday activities cause very high voltages to build up in our bodies. In the case of static discharge, a person can feel the electrical voltage from about 3000 V. However, semiconductor components, including LEDs and LED drivers, can be damaged frim as low as 10 V.

CHARGING THROUGH FRICTION ELECTRICITY

ACTIVITY	CHARGING VOLTAGE depending on relative humidity	
	10-20%	65-90%
walking over carpet	35000 V	1500 V
walking over vinyl floor	12000 V	250 V
working in a sitting position (movements on the chair)	6000 V	100 V
using a plastic bag	20000 V	1200 V

ESD-DAMAGE

LEDs can be so massively damaged by ESD that they fail completely. This means, that they neither emit light nor are electrically conductive. If the LED is damaged but still electrically conductive, it is referred to as a malfunction.

TOTAL FAILURE

An LED that has totally failed due to ESD not only remains completely dark, but is also no longer electrically conductive. Therefore, other LEDs connected in series do not light up either, even if they are intact. This is immediately visible after the damage.

» immediately visible
» several LEDs in an electrical series do not light up

FAULT

In contrast to total failure, LEDs can also be damaged in such a way that they initially still emit light, but quickly become dimmer. Since the damaged components remain electrically conductive, the rest of the module continues to shine normally.

» damaged LEDs still emit light initially
» they quickly become dimmer

MOST DAMAGE BECOMES VISIBLE AFTER A SHORT PERIOD OF OPERATION. WE RECOMMEND A FUNCTION TEST OF APPROX. 1 HOUR, ESPECIALLY FOR INSTALLATIONS THAT ARE DIFFICULT TO ACCES.

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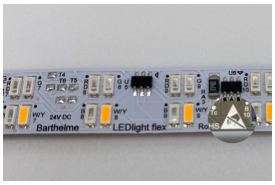
MEASURES AGAINT ESD DAMAGE

HOW IS ESD INDICATED?

The pictogram on the right indicates that ESD protective measures are to be taken. Both objects and work areas can be labeled with it.



PROTECTIVE MEASURES

1. PERSON RELATED GROUNDING

Grounding is a very important measure. The best prevention is to connect personnel directly to ground with personal grounding systems:

» **ESD shoes** or

» **heel straps** should be worn on both feet to ensure constant contact with the grounded floor

2. NEUTRALIZATION

If an isolator is statically charged, it can cause ESD damage on contract. To mitigate this risk, an ionizer can be used that generates billions of charged particles and thus neutralizes the static charge of the isolator.

NEUTRALIZATION DOES NOT REPLACE GROUNDING OR PREVENTION!

3. WORKPLACE-RELATED PROTECTIVE MEASURES

» separate ESD protection area/work area (labeled)

» dissipative work surface

» ESD safe work chair

» floor protected against electrostatic charge

» only appropriately compliant materials used

» ionizers/neutralizers are used

» grounding by means of grounding cable

» platsics must be specially for ESD areas accordingly

4. PREVENTION

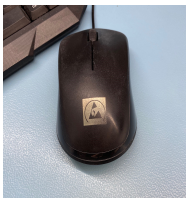
General

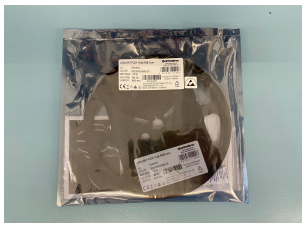
» An ESD-protected area is only to be entered under observance of the protective measures

» At an ESD-protected workstation, there should be no unnecessary objects, such as coffee cups, protective covers, styrofoam, or others isolators

» soldering irons, screwdrivers and other tools should be ESD certified, as indicated by the pictogram

» test grounding devices daily





During handling

» in addition to grounding, use cotton gloves and avoid touching metallic contacts.

» keep the LED modules separate during storage and transport. Open contacts must be protected. Contact with isolators such as clothing, carpets, hair, etc. must be avoided. Pay attention to preservation of the ESD packaging especially when transporting outside an ESD area!

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