



Technology for Light
Components · Optics · Automation

Technical delivery specification

BJB GmbH & Co. KG
Werler Str. 1
59755 Arnsberg
Germany
www.bjb.com



Technical delivery specification:

Subject: double-sided not plated-through / plated-through printed-circuit boards
for one-sided LED-fittings and on top based electric assemblies



Technology for Light
Components · Optics · Automation

1st Scope of the agreement / application

The Technical delivery specification applies to all assemblies (electronic devices) of LED-Lamps, which serve in their functional character the operation of LED-lights as well as the necessary printed circuit boards bought by the supplier.

2nd Data for the producing assemblies and printed circuit-boards

The provided assemblies and printed circuit boards are to be produced according to the data. The single data are checked to an examination of producibility and possible fault characteristics (CAM). If in faulty details are recognized in the examination which cause a correction of the design, BJB must be put in knowledge of it. The necessary corrections are carried out exclusively by BJB (Exceptions have to be regulated in written form) and the related data provided to the supplier again.

3rd Quality assurance system and revision

Description of the quality assurance system

(1) The supplier commits himself-based on ISO 9000 ff.- to introduce and maintain a quality assurance system with the obligation of achieving a zero-fault target and ensuring the continued improvement of his performance. As a proof of the maintained quality assurance system the supplier will send a copy of the valid certificate to BJB without being asked again.

Quality audit

(1) The supplier is obliged to the quality assurance system. He is further obliged to record corresponding notes about all tests which have been carried out in the context of this quality assurance agreement.

Those records shall be kept for at least 10 years; statutory retention obligations remain untouched of this.

(2) The supplier agrees that such records shall be open to inspection for BJB at all

Technical delivery specification:

Subject: double-sided not plated-through / plated-through printed-circuit boards
for one-sided LED-fittings and on top based electric assemblies



Technology for Light
Components · Optics · Automation

reasonable times. This involves all certificates of the incoming goods, outgoing goods, notes from examination to the series release (return to service), first sample test reports and matching parts, work plans, audit plans, as far as available the lifecycle card, proofs of the staff instructions, proofs of the calibration of the test equipment.

(3) During the ordinary business- and operating times is BJB authorized to do quality audits at the supplier. These serve the purpose to proof efficiency and precision of the quality assurance system. The supplier is furthermore responsible for the quality of the produced and delivered contract products also after an audit.

(4) The supplier is authorized to refuse the inspection of business documents if business secrets are concerned.

Sub-supplier data, production sites, supplier shares and the results of sub-supplier audits are BJB on desire to disclose. The supplier makes sure that BJB receives an access right to his sub-suppliers in well-founded cases.

4th First sample test report

Unless otherwise agreed in order of a new assembly, a first sample test report has to be made and enclosed in electronic form at the same time with the first delivery of this assembly included.

- 1) Contents of the first sample report with regard to the used printed circuit-board:
 - a. Used materials (data sheets or their sources)
 - b. Cutting analysis with pictures (the cutting coupon is archived by the supplier)
 - c. Measuring the product after drawing
 - d. Outgoing goods examination according to IPC A600
 - e. Solder shock according to IPC TM 650 (288°C/10s/floating)
 - f. Cross cutting test solder stop GT0 after IPC TM 650

Technical delivery specification:

Subject: double-sided not plated-through / plated-through printed-circuit boards
for one-sided LED-fittings and on top based electric assemblies



Technology for Light
Components · Optics · Automation

- g. AOI
- h. Electrical test

2) in addition to 1) on delivery of assemblies (electric devices):

- a. circuit diagramme
- b. Mounting plan and mounting alternatives
- c. Outgoing goods examination according to IPC A 610

5th Requirements on the production process and the inspection

The production of the products described under point 1. Is carried out according to the sets of rules of IPC class 2.

The list of all binding sets of rules and standards for the production and inspection of the products are listed under point 12. Also valid are the sets of rules and standards with references to other detail specifications.

The electric parameter must fit to the specifications to 100 percent. The test results must be documented and handed over on request. For every delivery lot the passed inspection is to be certificated and added to the delivery.

6th Etched patterns

The geometrical dimensions in the data for the etched patterns have to be adapted in such a way that the foot of finished etched structure corresponds to the theoretical image with the following tolerance:

$\pm 10\%$ of the smallest structure width, but not more than $20\ \mu\text{m}$ with structures $\leq 1,0\text{mm}$ and $\pm 50\ \mu\text{m}$ with structures $> 1,0\text{mm}$.

The review occurs with an AOI inspection (automated optical inspection).

Technical delivery specification:

Subject: double-sided not plated-through / plated-through printed-circuit boards
for one-sided LED-fittings and on top based electric assemblies

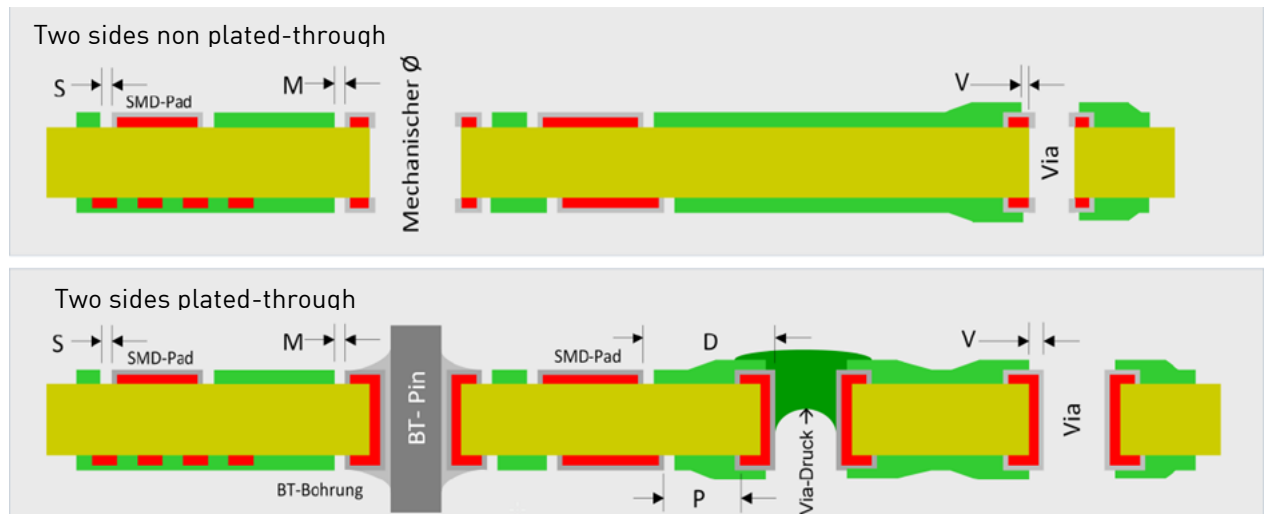


Technology for Light
Components · Optics · Automation

7th Solder-stop cover / Via-filler

The records of the solder-stop cover and the optionally applied via-filler are delivered 1:1 to the Pad-geometries.

The printed circuit board manufacturer can adapt these data in such a way that the tolerances, dimensions and guidelines corresponds to the following description:



| Double-sided not plated through | | Double-sided plated through | |
|---------------------------------|---------------------|-----------------------------|---------------------|
| dimension | Wert | dimension | Wert |
| S | Min. 50µm/Max 75µm | S | Min. 50µm/Max 75µm |
| M | Min. 50µm/Max 75µm | M | Min. 50µm/Max 75µm |
| V | Min. 50µm/Max 100µm | V | Min. 50µm/Max 100µm |
| | | D | ≥ 300µm |
| | | P | ≥ 150µm |

In case of the solder-resist has to be applied twice due to the thick structured copper layers, it has to be realized “wet in wet” i.e. the first coat of solder-resist is only pre-dried, then afterwards applying the second coat of solder-resist.

Technical delivery specification:

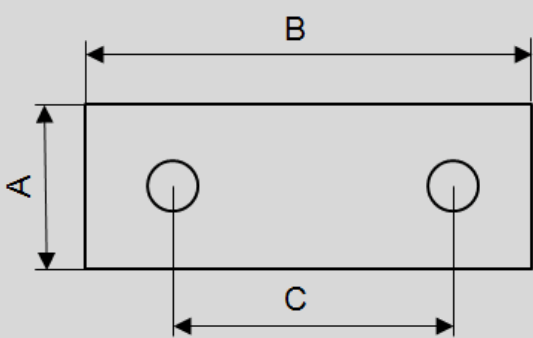
Subject: double-sided not plated-through / plated-through printed-circuit boards
for one-sided LED-fittings and on top based electric assemblies



Technology for Light
Components · Optics · Automation

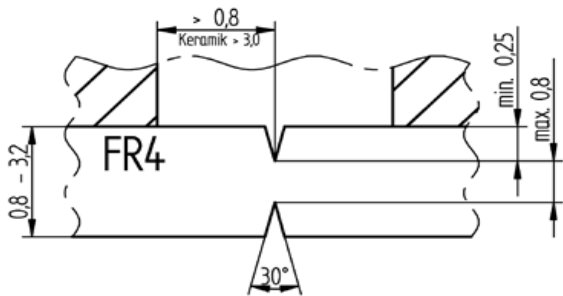
8th Tolerance details of measure length including milling of "Nutzen"

Vermaßung von Längenmaßen
dimensioning of linear measures

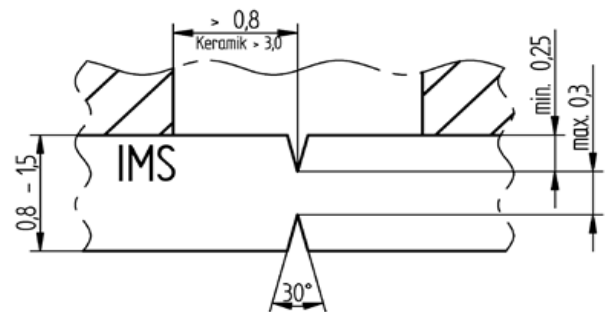


| Maß dimension | Länge length | Toleranz tolerance |
|------------------|-----------------|-----------------------|
| A, B | ≤ 200 | ± 0,1 |
| | > 200 ≤ 300 | ± 0,15 |
| | > 300 ≤ 600 | ± 0,2 |
| | > 600 ≤ 1000 | ± 0,3 |
| | > 1000 | ± 0,4 |
| C | ≤ 300 | ± 0,1 |
| | > 300 | ± 0,15 |

Ritznut / V-cut



Ritznut / V-cut



The tolerance details in the drawing assigned to the product are higher rated than these details.

Technical delivery specification:

Subject: double-sided not plated-through / plated-through printed-circuit boards
for one-sided LED-fittings and on top based electric assemblies



Technology for Light
Components · Optics · Automation

9th Identification and traceability

Every printed circuit board within the active area of the single circuit board must be indicated as follows:

- a. Printed circuit board number including the version: The printed circuit board number and the version are inserted in the layout data by BJB, covered with an etched solder-stop.
- b. Coding of the production week and year upon delivery (Datecode); each two-digit:
calendar week=55-calendar week
Year=55-calendar week
There will be a placed marker in the drawing documents for the Datecode.

10th Laminate structure

The laminate structure with the following details are laid down in the data set as follows:

- selected materials characteristics
- Set of rules and regulations
Optional: material description and base material manufacturer

Deviations are permitted only with the written consent of BJB

11th Packaging

Please note the packaging regulations (www.bjb.com).

Technical delivery specification:

Subject: double-sided not plated-through / plated-through printed-circuit boards
for one-sided LED-fittings and on top based electric assemblies



Technology for Light
Components · Optics · Automation

12th Additional documents

| Set of rules and regulations / norm | Description / Designation |
|-------------------------------------|--|
| QSV____ | Quality assurance agreement (if agreed) |
| BO____ | Order organization |
| <u>DIN</u> EN ISO 9001 | Quality management system |
| IPC-2221 | Generic standard on printed board design |
| IPC-2222 | Sectional design standard for rigid board design |
| IPC-6011 | Generic performance |
| IPC-6012 | Qualification and specification for rigid board design |
| IPC-4101 | Specification for base materials for rigid and multilayer boards |
| IPC-A-600 | Printed circuit board acceptance |
| IPC-A-610 | Assembly acceptance / electronic devices |
| IPC-SM 840 | Qualification and specification performance of solder mask |
| IPC-TM 650 | Test methods manual |