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1) AIM OF THE DOCUMENT

Aim of this document is to explain TVR's standard sales conditions. TVR, if not otherwise specified in the client's order or in the technical documentation, guarantees the compliance of the produced PCBs

2) DEFINITIONS

PCB Printed Circuit Board

PTH Plated Through Hole

Via an electrical connection hole between layers

ODB++ Open Data Base standard for CAM applications

Anular ring width between drill and pad

Inner layer layer inside the multilayer circuit

HAL Hot air levelling, type of finishing with a tin-lead alloy or lead free

Solder resist PCB's protective paint

BGA Ball Grid Array

Scoring Incision of the PCBs

Aspect Ratio Relationship between the hole's length and diameter

3) REGULATIONS

IPC-A-600 Acceptability of printed boards

IPC-6012 Qualification and Performance Specification for Rigid Printed Boards

IPC-TM-650 Tests method manual

4) CERTIFICATIONS

TVR is certified UNI EN ISO 9001:2015. The Company has also the product's certification UL (file number 132602)

5) SALES TERMS

Sales terms are determined in our confirmation order, in which there are the definitive commercial terms (price, shipping, payment). By the confirmation order TVR accepts the given technical specifications to produce the pcbs. For everything not explicitly written in the sales specifications, is valid what is specified in this document.



6) GENERAL TERMS OF CONTRACT

The general terms of contract for the pcbs supply are regulated by the following rules and are considered accepted by the confirmation order.

- 1) TVR accepts complaints about pcbs' non compliance by and no later than 60 days from the delivery date. Later than that deadline TVR will no longer accept any complaints.*
- 2) TVR, in case of there is a proof of any defects in the pcbs, is willing to pay an amount of money at the most of four times the price of the sold pcbs.*
- 3) TVR requires the respect of the payment terms established in TVR's offer. Later than the deadline, any other products being delivered will be stopped until the payment is settled. If teh delays are repeated, the payment terms could be reviewed.*

7) PRODUCTION DOCUMENTATION

The production documentation provided by the customer must preferably be provided in electronic format and sent as a compressed file to the email address vendite@tvrsl.com; the file will contain:

- PCB's layer and drilling
- Supporting files if any (wheel, drilling tools)
- technical data about materials, finishing, lay-up etc.

**8) TVR CAPABILITY**

FILES	ODB++; GERBER RS274X
	GERBER RS274D+wheel; DXF;DPF
	Drilling in EXCELLON; EIA; SIEB&MEYER
	.txt; .pdf; .jpg; .dwg technical data not related the PCB

BASE MATERIAL	ISOLA:DE 104; E Cu 117; E Cu104 KF; PCL 370 HR
	PANASONIC: R1755V; MEGTRON6
	CEM 1; CEM 3
	TEFLON; ROGER; POLYIMIDE; KAPTON

MATERIAL THICKNESS	STANDARD	HIGH TECH
	1,6 mm	MIN 0,3 mm MAX 6,5 mm

COPPER THICKNESS	STANDARD	HIGH TECH
	17-35-70 µm	5 µm up to 240 µm

DRILLS DIAMETER	STANDARD	HIGH TECH
	0,2 mm	Up to 0,075 mm

ASPECT RATIO	STANDARD	HIGH TECH
	8:1	Up to 22:1

NUMBER OF LAYER	STANDARD	HIGH TECH
	10	Up to 52

MIN. LINES & SPACING LAYER	STANDARD			HIGH TECH		
	Cu 17 µm	Cu 35 µm	Cu 70 µm	Cu 17 µm	Cu 35 µm	Cu 70 µm
	100 µm	125 µm	180 µm	50 µm	100 µm	150 µm



TECHNICAL SPECIFICATIONS

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MIN. LINES & SPACING OUTER	STANDARD			HIGH TECH			
	Cu 17 µm	Cu 35 µm	Cu 70 µm	Cu 5 µm	Cu 17 µm	Cu 35 µm	Cu 70µm
	120 µm	180 µm	250 µm	30 µm	100 µm	150 µm	220 µm

MIN. ANULAR RING	STANDARD		HIGH TECH	
	VIAS	PTH DRILLS	VIAS	PTH DRILLS
	75 µm	100 µm	50 µm	75 µm

MIN. SILKSCREEN TRACK	STANDARD
	100 µm

MIN. ROUTING	STANDARD
	0,8 mm

SOLDER RESIST	STANDARD	FUORI STANDARD
	Colour GREEN	NOT green
	Thickness solder on line 5 µm	>10 µm <25 µm
	Solder Sliver 100 µm	Solder Sliver 150 µm

ELECTRICAL TEST	STANDARD	FUORI STANDARD
	30 VOLT; 5,5 MΩ	500 VOLT; 1000GΩ

9) SURFACE TREATMENT

<i>FINISHING</i>	<i>DEPOSIT</i>	<i>FINISHING DURATION FOR WELDABILITY *</i>
HASL	1 µm ≤ Sn/Pb ≤ 30 µm	1 year
HASL Lead Free	1 µm ≤ Sn ≤ 30 µm	1 year
ENIG	3 µm ≤ Ni ≤ 7 µm 0,05 µm ≤ Au ≤ 0,12 µm	6 months
Ni/Au electrolytic	3 µm ≤ Ni ≤ 7 µm Au ≥ 0,4 µm	6 months
Chemical tin	0,8-1,2 µm	6 months
Passivated copper	0,3-0,5 µm	3 months
Gold electroplated pins	Ni ≥ 4 µm Au ≥ 0,8 µm	-

* the warranty of solderability always refers to the preservation of the PCB in a controlled humidity and temperature environment.