



## ATLAS SCT Barrel module wire-bonding scheme

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**ATL-xx-xx-xxxx**

Institute Document No.

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Page: **1 of 4**

Modified: **08/03/01**

Rev. No.: **B**

### Project breakdown name

## ATLAS SCT Barrel module wire-bonding scheme

*abstract*

*Prepared by:*  
**T. Kohriki, Y. Unno, KEK**

*Checked by:*  
**Blockbold**

*Approved by:*  
**Blockbold**

**Blockbold**

*Distribution List*

***History of Changes***

<b><i>Rev. No.</i></b>	<b><i>Date</i></b>	<b><i>Pages</i></b>	<b><i>Description of changes</i></b>
A	13/10/2000	All	First version
B	08/03/2001	Figures	Added the missing “cal3” pad

## 1 Introduction

The SCT Barrel module is made of:

1. Two pairs of ATLAS98 barrel sensors being glued on the top and the back sides of the centre core plate where the centre core plate, baseboard, is functioning to conduct the heat of electronics and sensors to the cooling end and to provide electrical path of the high voltage to the backside of the sensors
2. Readout hybrid, one-piece construction of cable and readout electronics sections, being wrapping around the top and the back side sensors, glued at the cooling and far end extensions of the baseboard, which extensions are insulated with ceramics facings in order to isolate the HV in the baseboard
3. 12 readout LSI's, ABCD3T, being mounted on the readout electronics sections of the hybrid; 6 chips on the top and the other 6 chips on the backside section
4. Pitch adaptors being mounted on the hybrid, in order to make wire bonds to be parallel, in front of the readout chips where the sensor side pitch is 80  $\mu\text{m}$  and the chip side 48  $\mu\text{m}$  to match the sensor strip and the LSI readout channel pitches, respectively.

This note is describing the wire bonding pattern in these electrical systems. Assembly steps of the module would be:

1. Assembling the hybrid
2. Assembling the hybrid into the sensor-baseboard assembly.

Wire bond pattern drawings will be given in this sequence; first of the hybrid and then of the connection of the hybrid and the sensor-baseboard assembly.

## 2 Wire-bonding drawings

The hybrid wire bond pattern is given in 13 drawings:

1. Overall hybrid schematics
2. Vicinity of individual chips; 12 drawings for the chips, M00, S01, S02, S03, S04, and E05 of the top side and M08, S09, S10, S11, S12, and E13 of the back side. Bond patterns to the pitch adaptor are also included.

Following these drawings, the wire bond patterns between the hybrid and the sensor-baseboard assembly are given in 5 drawings:

3. Overall schematics of the sensor-baseboard and the hybrid
4. Vicinity of the four corners where the sensor bias connections are being made.

In the drawings, wire bonds are colour-classified as

Green: common to all chips

Red: specific pattern to the chips

Blue: HV connections.

Number of pads has multiple wires drawn in the drawings. These are actual number of wires to be made. Repetition of wire bonds, e.g., individual channels of chips, is abbreviated.

### 3 Wire bond loop heights

In order to have a good pull strength, the wire bond loop height recommended is about 20~25% of the bonds distance. Table 1 gives an example of the barrel module built at KEK. In the table, the symbols shows

L: bonds distance

H: height difference of pads

h: loop height over the higher pad

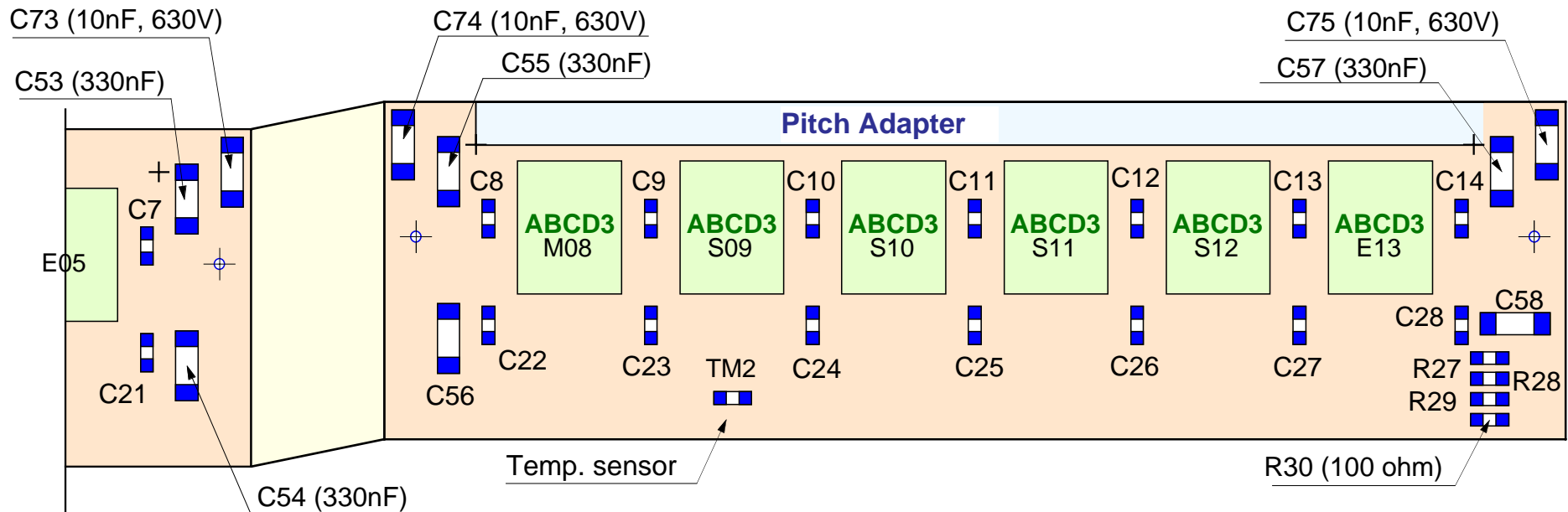
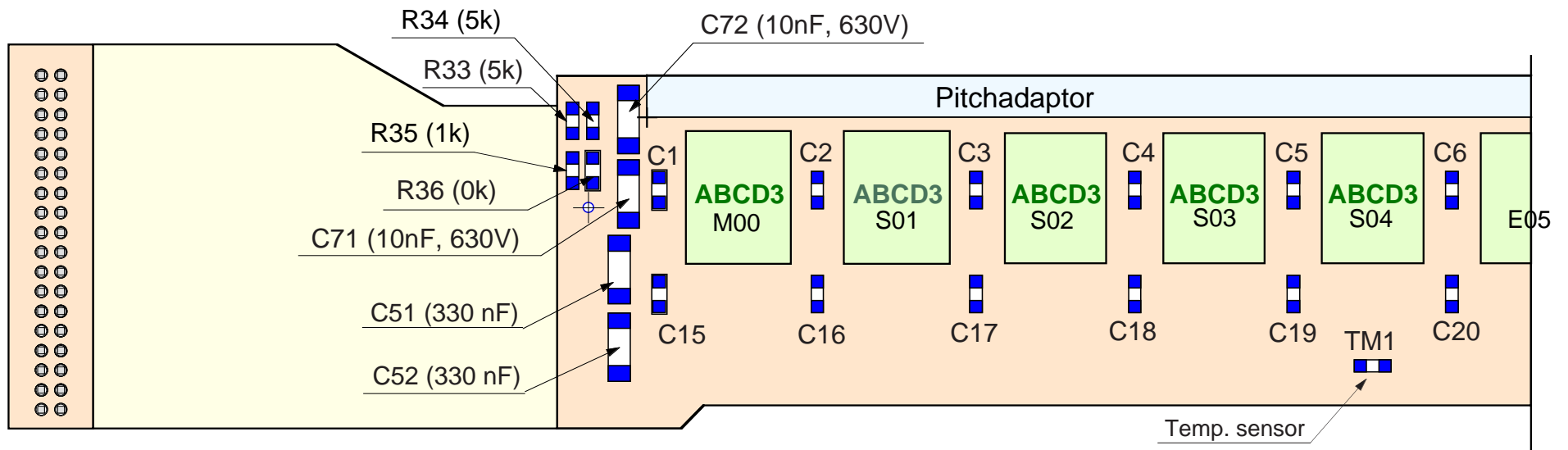
ratio: h/L.

**Table 1 Wire bond loop heights of an example of KEK modules**

Bond	L [mm]	H [mm]	h [mm]	Ratio (h/L)
Sensor-sensor long	4.0	0	0.94	24%
Sensor-sensor short	3.3	0	0.63	19%
Sensor-pitch adaptor long	2.9	1.2	0.78	27%
Sensor-pitch adaptor short	2.3	1.2	0.48	21%
Pitch adaptor-chip long	2.0	0.32	0.49	25%
Pitch adaptor-chip short	1.5	0.32	0.29	19%
Chip-hybrid	1.3	0.51	0.28	22%

#### References

[1] Author(s), "Title", reference id, date



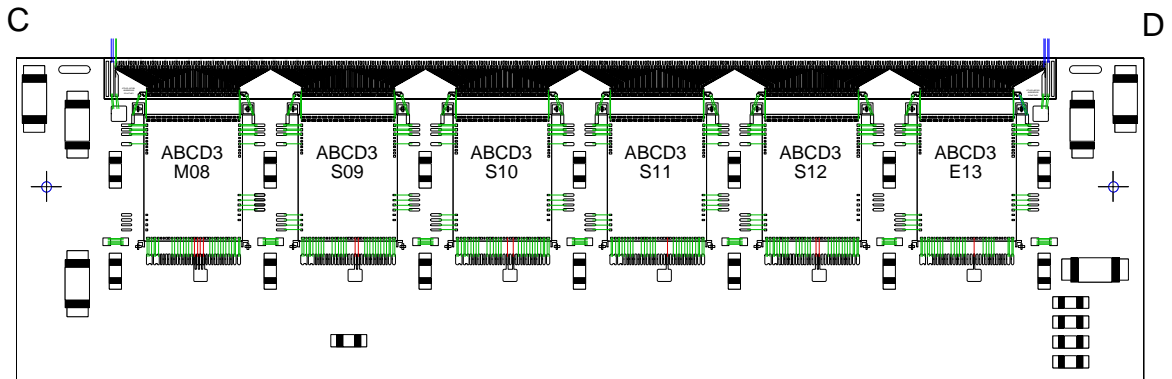
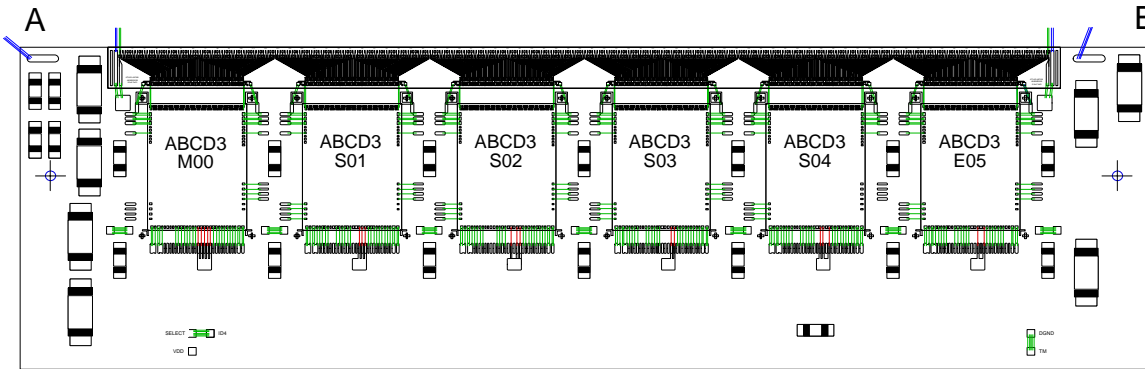
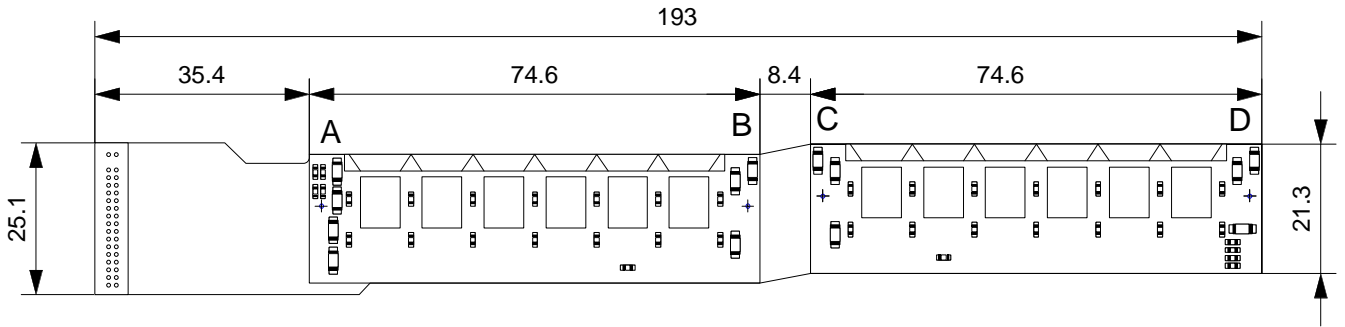
99.2.12 T.Kondo  
 99.4.15, 99.5.18  
 00.1.10, 00.1.25,  
 00.2.9, 00.2.14,  
 00.5.11, 00.8.22  
 01.3.09

## Components of the ABCD3T Cu/Polyimide Hybrid

Refer the Circuit-diagram version (2000.7.12) or later for component numbers

C1~C28 : Murata GRM39X7R224K10  
 C51~C58 : Murata GRM42-6X7R334K50  
 C71~75 : Murata GHM1530X7R103K630

Scale x0.8



	08/03/01	Added missing "cal3" pad
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ORIGINAL SCALE	TITLE	DRAWING No.	
x2(x1/4)	K4 ABCD hybrid Drawing of Bonding All	A4-AT2k10-01- 1/13-R1	2k1003/R1 T.Kohriki@KEK

Back bias pad

Front bias pad

Det.ch.0

Det.ch.1

ATLAS-JAPAN  
49/80KEK93  
0.2x2.7x63

# ABCD3 M00

SELECT  ID4

VDD 



08/03/01

Added missing "cal3" pad

ORIGINAL SCALE

x10

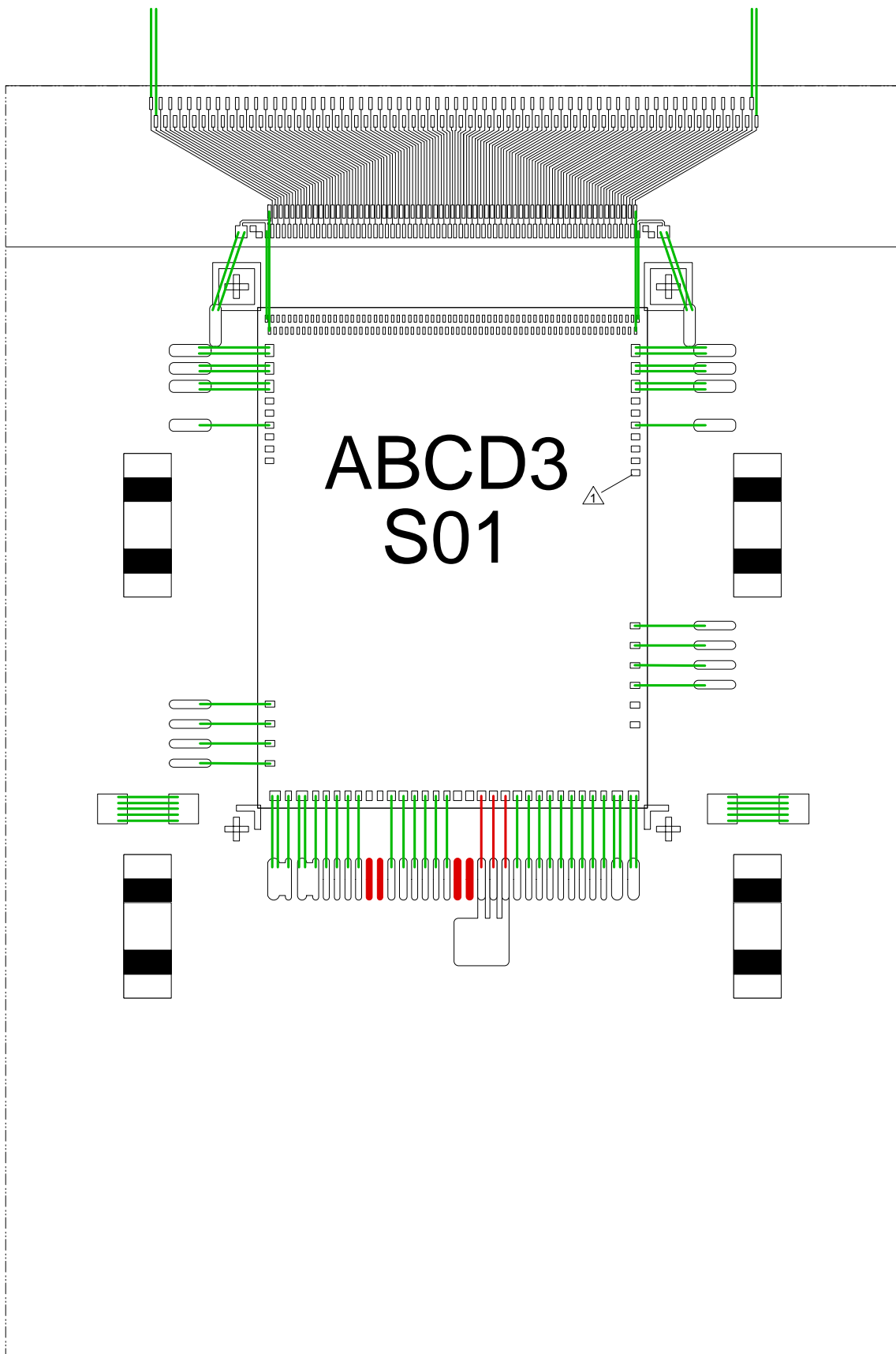
TITLE

K4 ABCD hybrid  
Drawing of Bonding  
M00

DRAWING No.

A4-AT2k10-01-2 /13-R1

2k1003/R1  
T.Kohriki@KEK



08/03/01

Added missing "cal3" pad

ORIGINAL SCALE

x10

TITLE

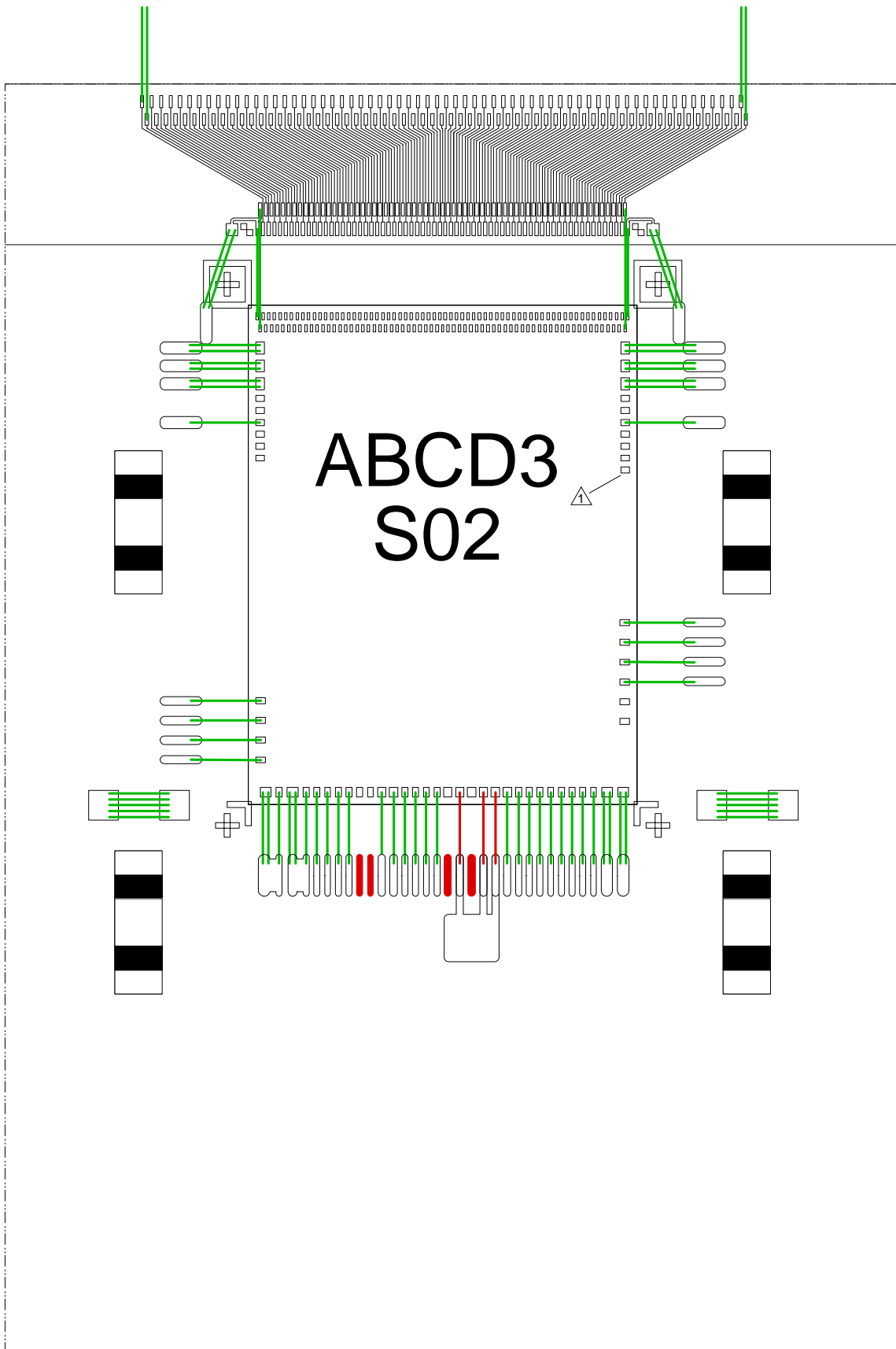
K4 ABCD hybrid  
Drawing of Bonding  
S01

DRAWING No.

A4-AT2k10-01- 3 /13-R1

2k1003/R1  
T.Kohriki@KEK





08/03/01

Added missing "cal3" pad

ORIGINAL SCALE

TITLE

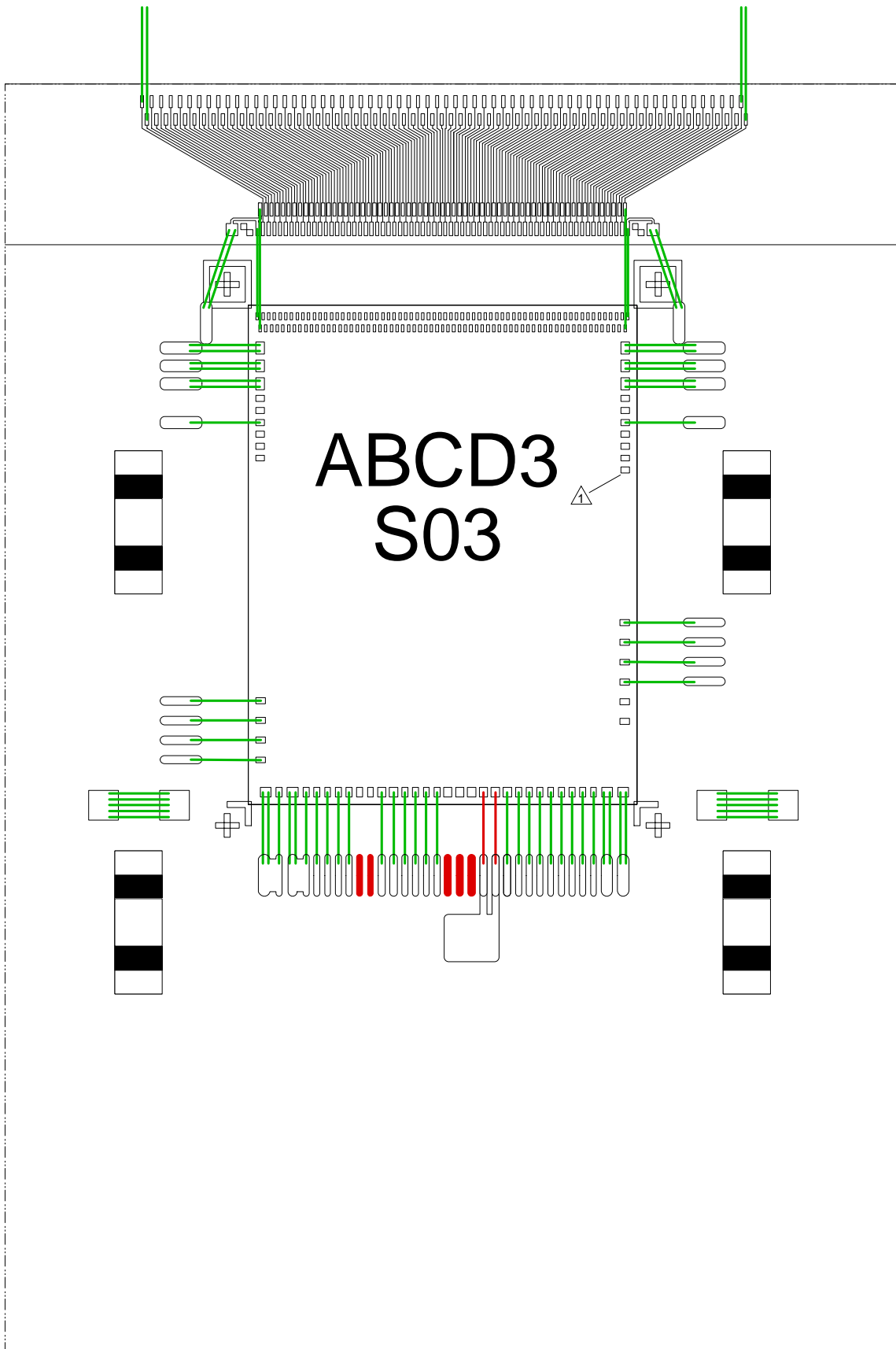
DRAWING No.

x10

K4 ABCD hybrid  
Drawing of Bonding  
S02

A4-AT2k10-01-4 /13-R1

2k1003/R1  
T.Kohriki@KEK



08/03/01

Added missing "cal3" pad

ORIGINAL SCALE

x10

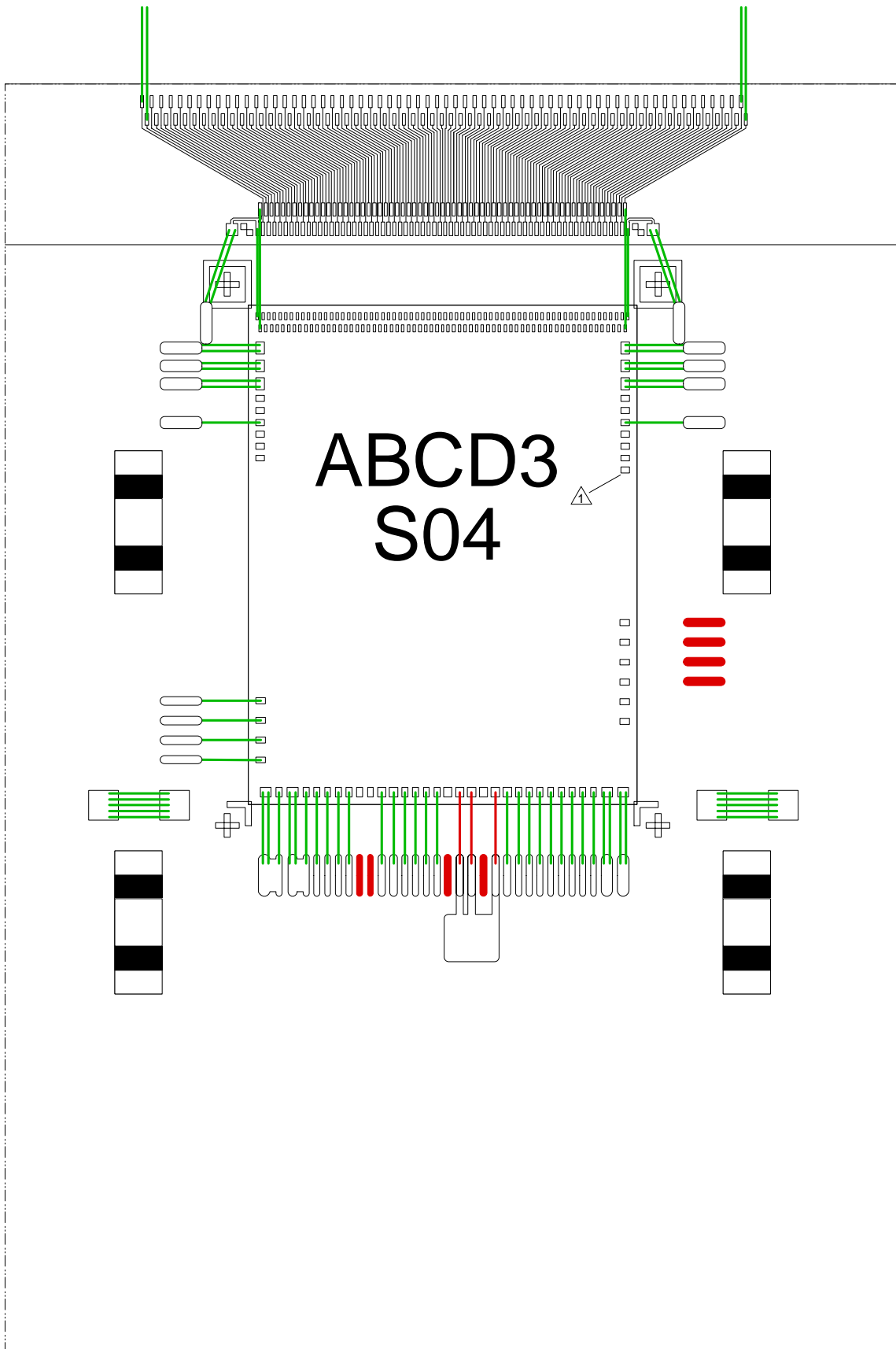
TITLE

K4 ABCD hybrid  
Drawing of Bonding  
S03

DRAWING No.

A4-AT2k10-01-5 /13-R1

2k1003/R1  
T.Kohriki@KEK



08/03/01

Added missing "cal3" pad

ORIGINAL SCALE

x10

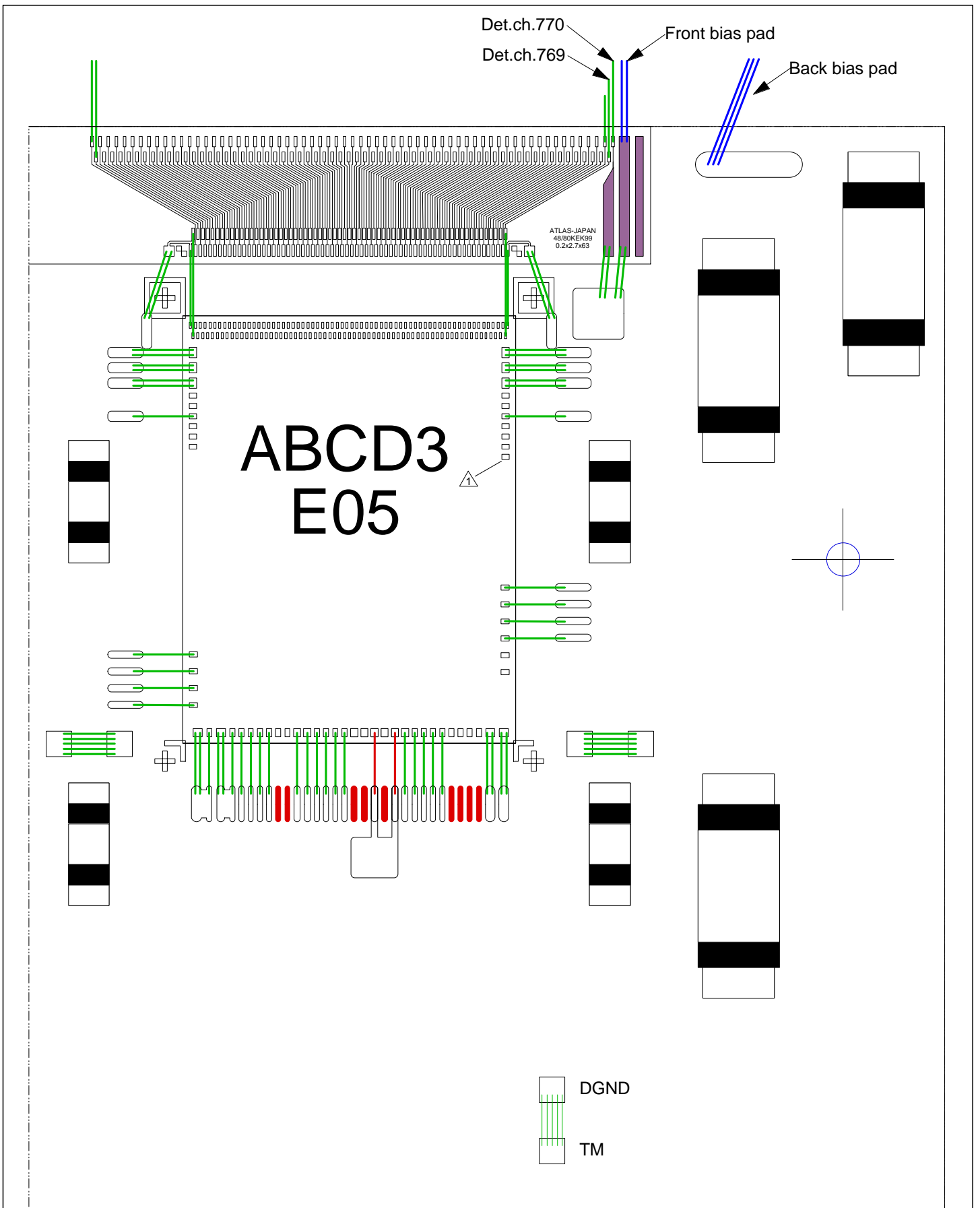
TITLE

K4 ABCD hybrid  
Drawing of Bonding  
S04

DRAWING No.

A4-AT2k10-01-6 /13-R1

2k1003/R1  
T.Kohriki@KEK



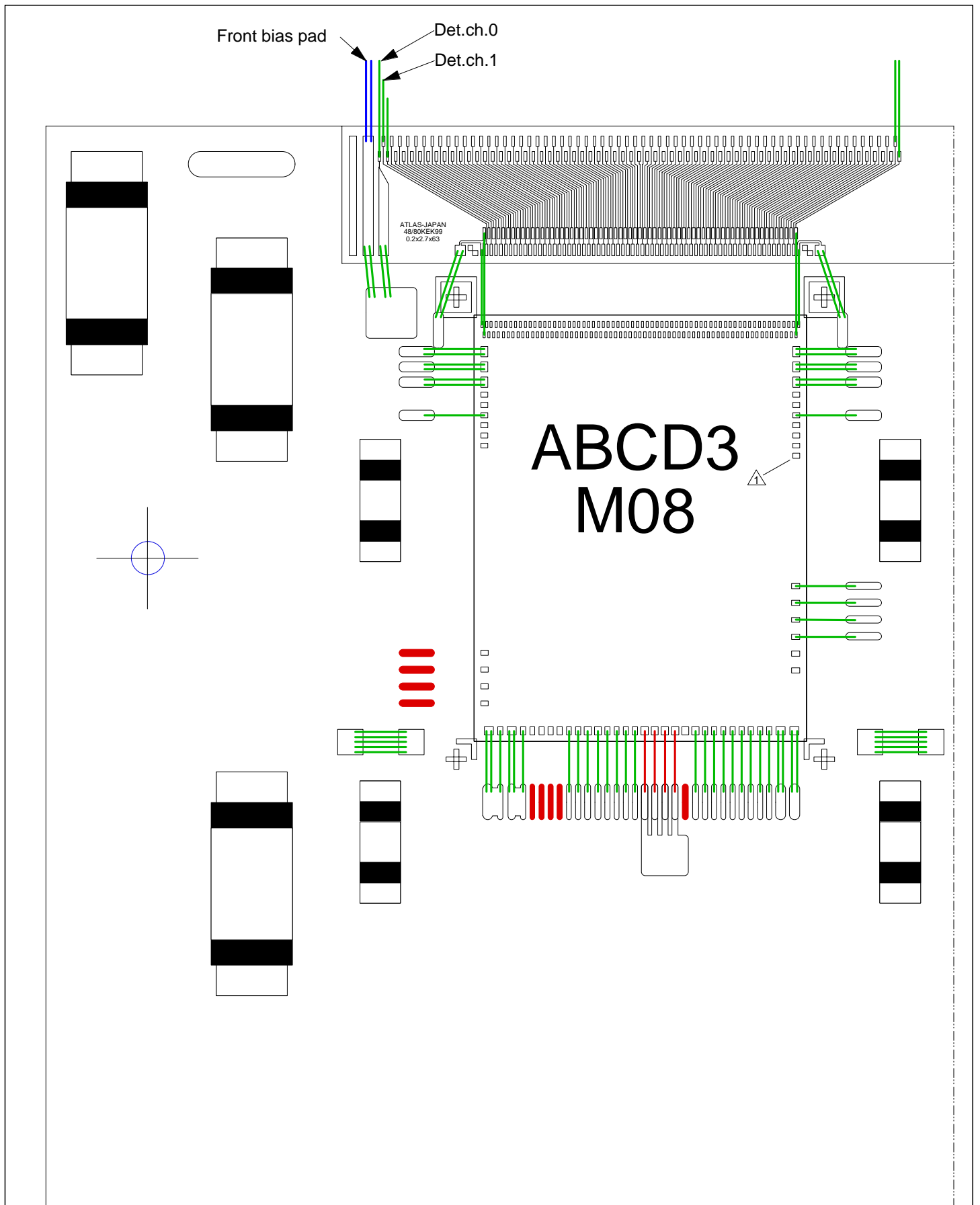
△ 08/03/01 Added missing "cal3" pad

ORIGINAL SCALE  
x10

TITLE  
K4 ABCD hybrid  
Drawing of Bonding  
E05

DRAWING No.  
A4-AT2k10-01- 7 /13-R1

2k1003/R1  
T.Kohriki@KEK



⚠ 08/03/01 Added missing "cal3" pad

ORIGINAL SCALE

x10

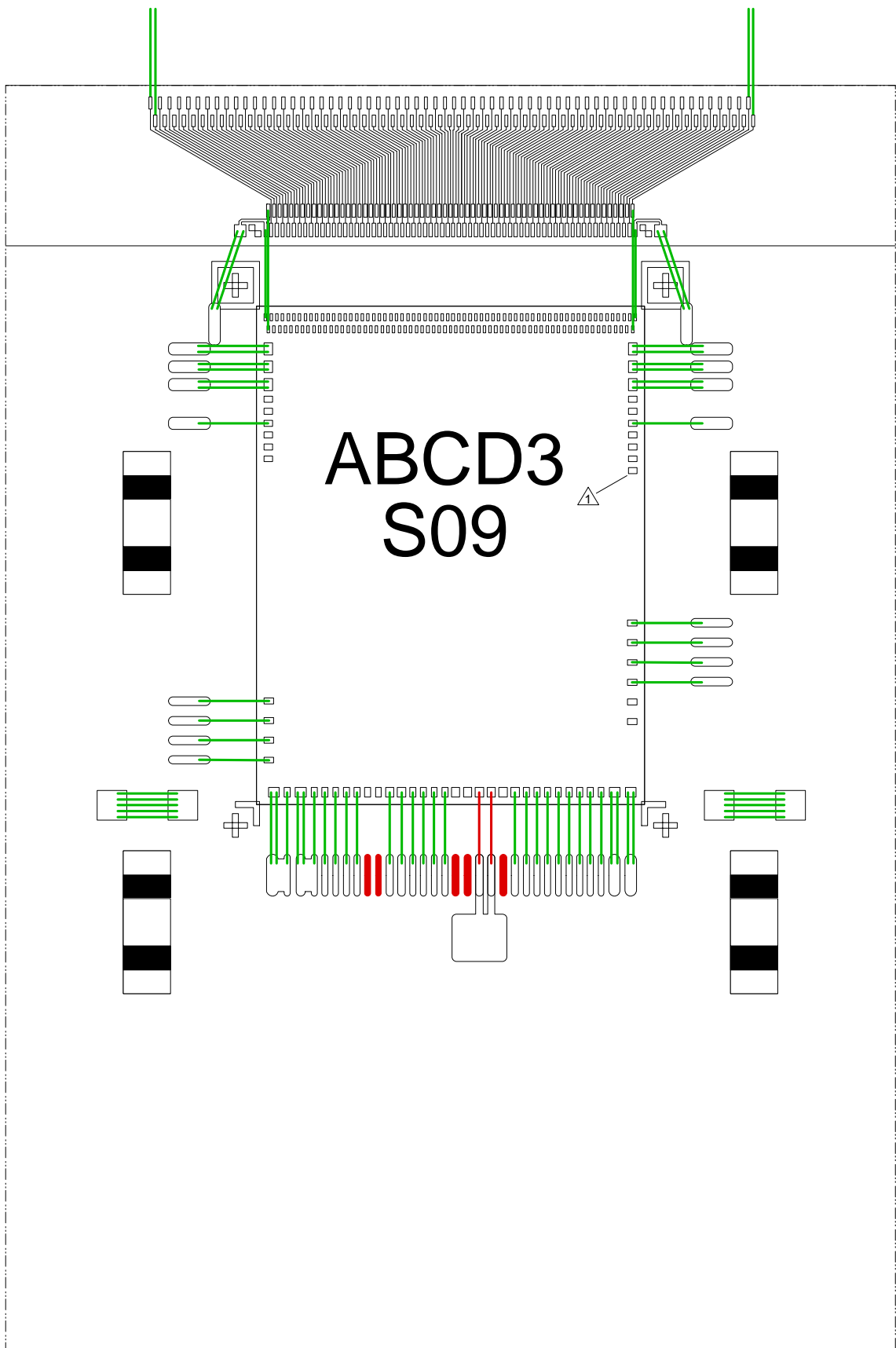
TITLE

K4 ABCD hybrid  
Drawing of Bonding  
M08

DRAWING No.

A4-AT2k10-01-8 /13-R1

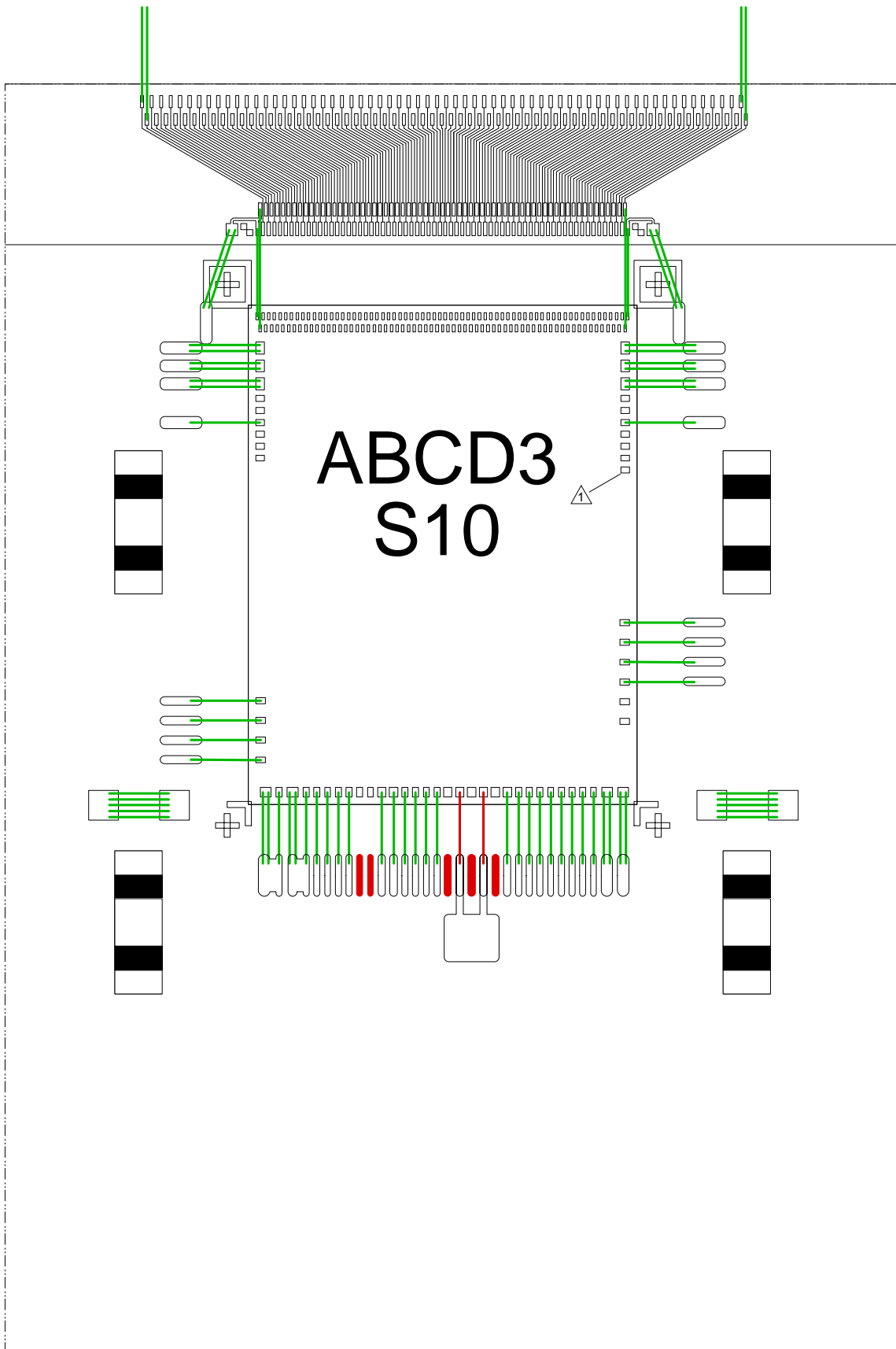
2k1003/R1  
T.Kohriki@KEK



ABCD3  
S09

⚠	08/03/01	Added missing "cal3" pad
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ORIGINAL SCALE	TITLE	DRAWING No.	
x10	K4 ABCD hybrid Drawing of Bonding S09	A4-AT2k10-01- 9/13-R1	2k1003/R1 T.Kohriki@KEK



08/03/01

Added missing "cal3" pad

ORIGINAL SCALE

x10

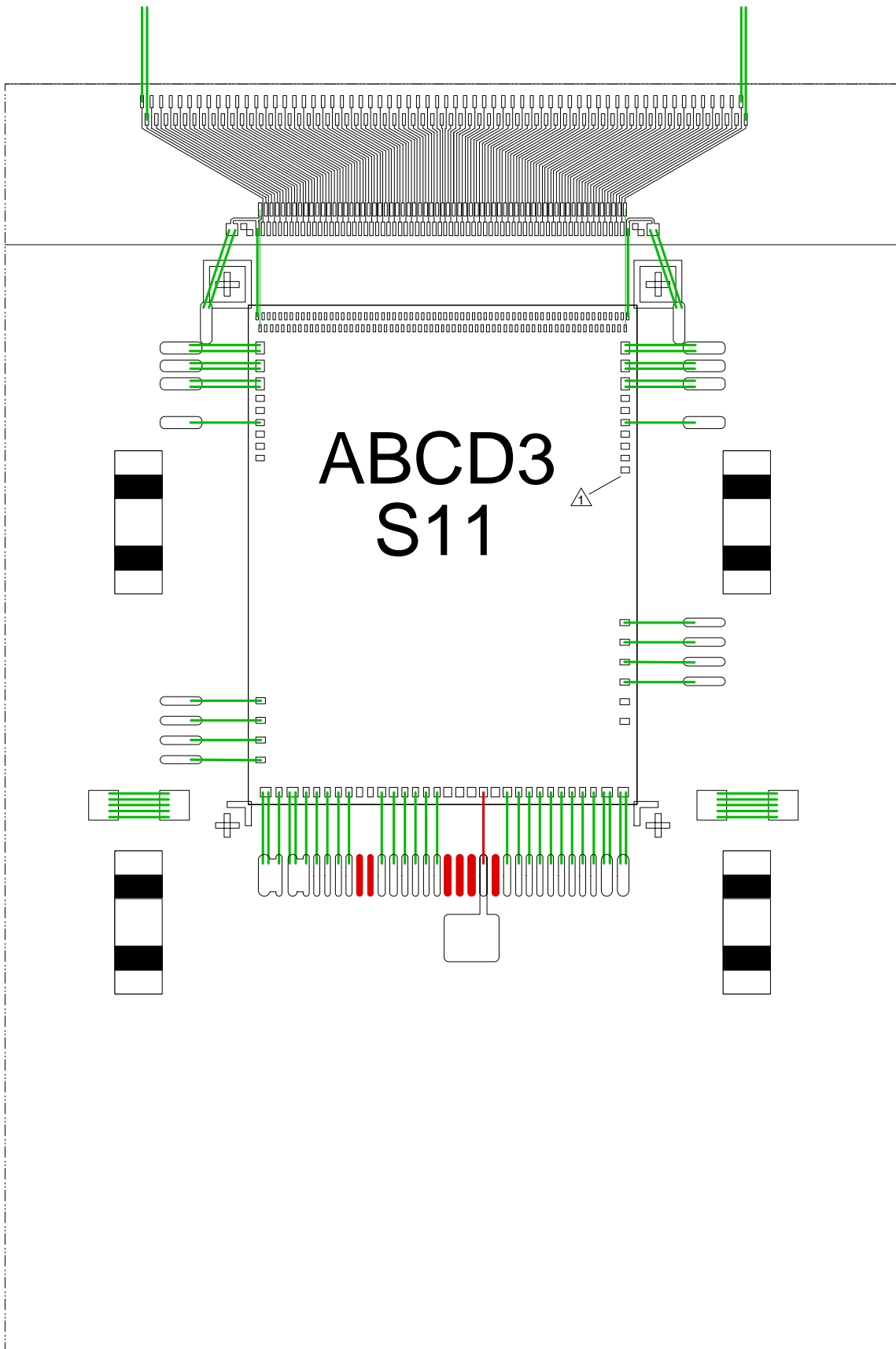
TITLE

K4 ABCD hybrid  
Drawing of Bonding  
S10

DRAWING No.

A4-AT2k10-01-10/13-R1

2k1003/R1  
T.Kohriki@KEK



08/03/01

Added missing "cal3" pad

ORIGINAL SCALE

x10

TITLE

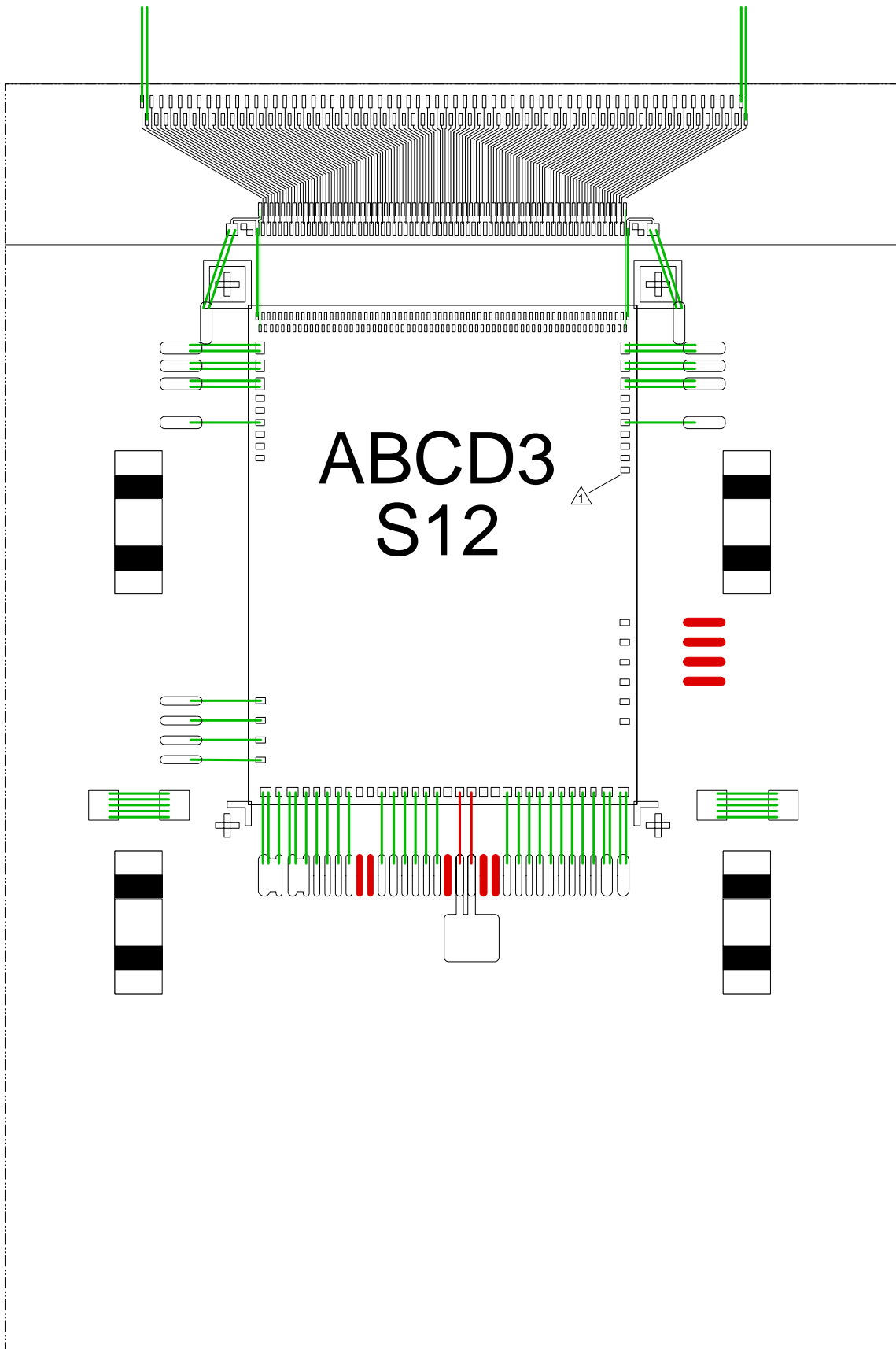
K4 ABCD hybrid  
Drawing of Bonding  
S11

DRAWING No.

A4-AT2k10-01-11/13-R1

2k1003/R1  
T.Kohriki@KEK





08/03/01

Added missing "cal3" pad

ORIGINAL SCALE

x10

TITLE

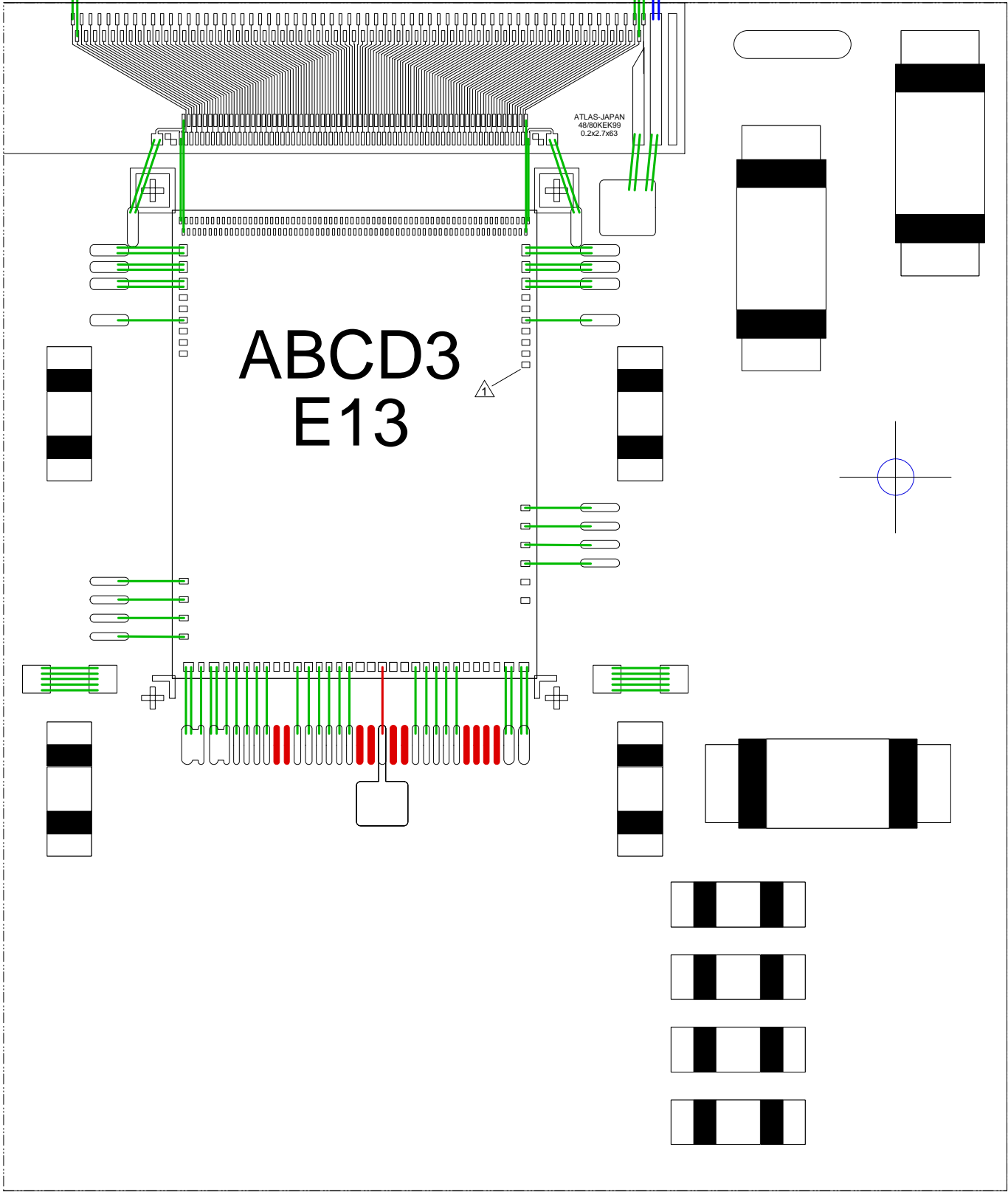
K4 ABCD hybrid  
Drawing of Bonding  
S12

DRAWING No.

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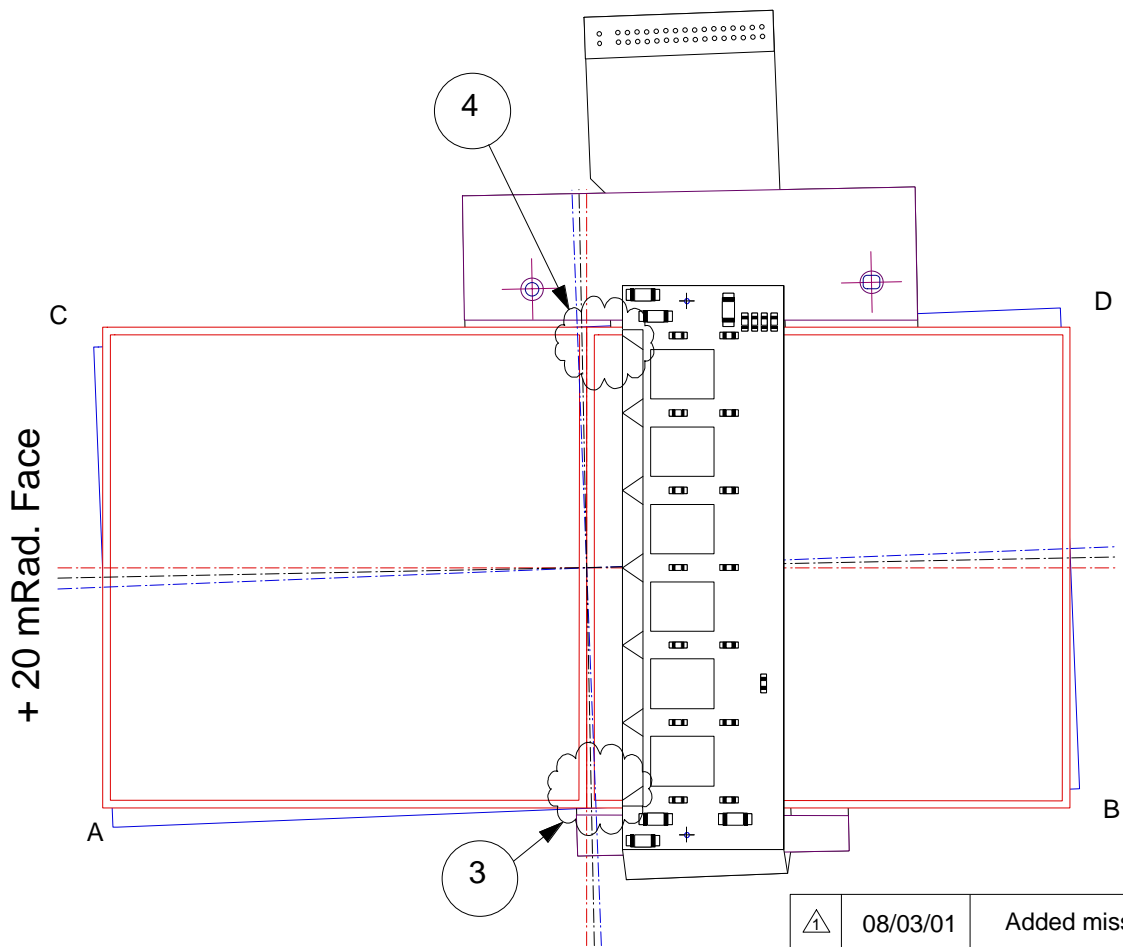
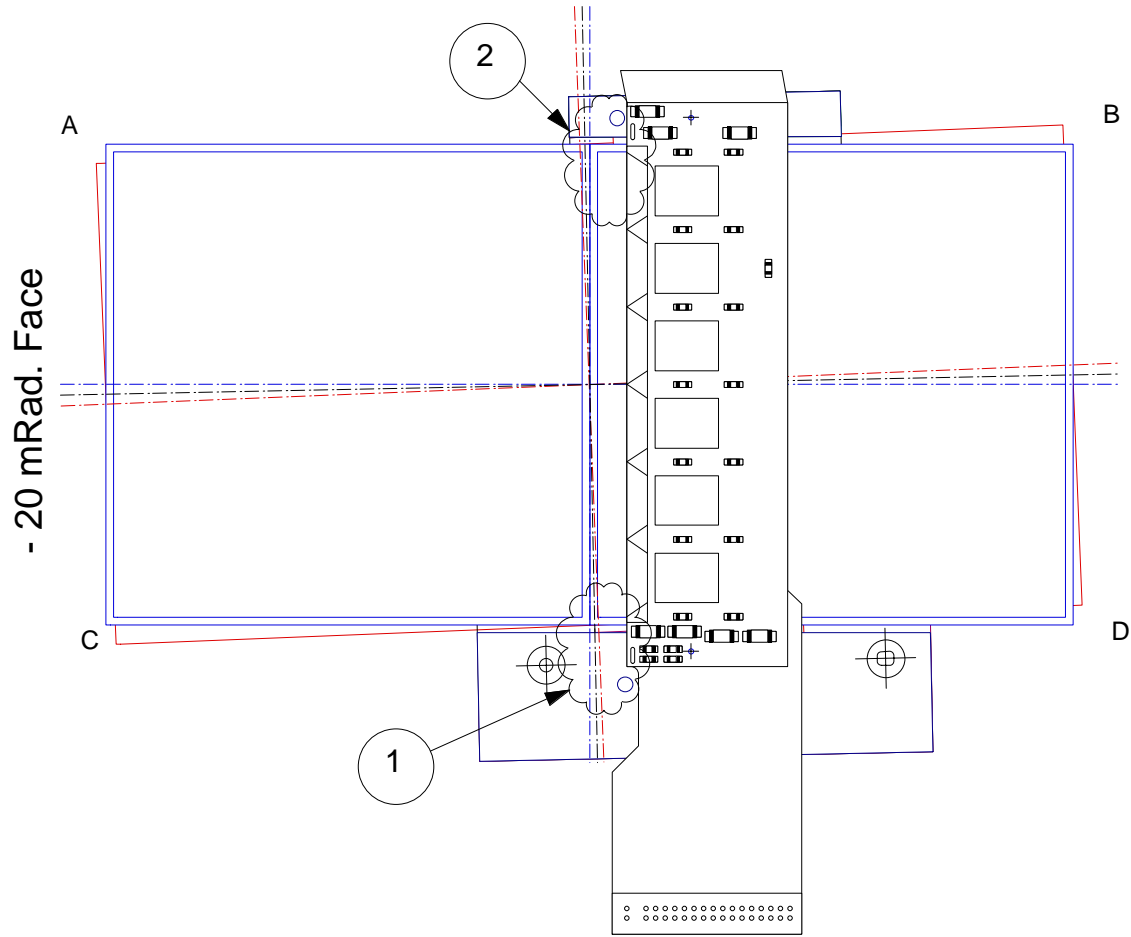
2k1003/R1  
T.Kohriki@KEK

Det.ch.770  
 Det.ch.769  
 Front bias pad



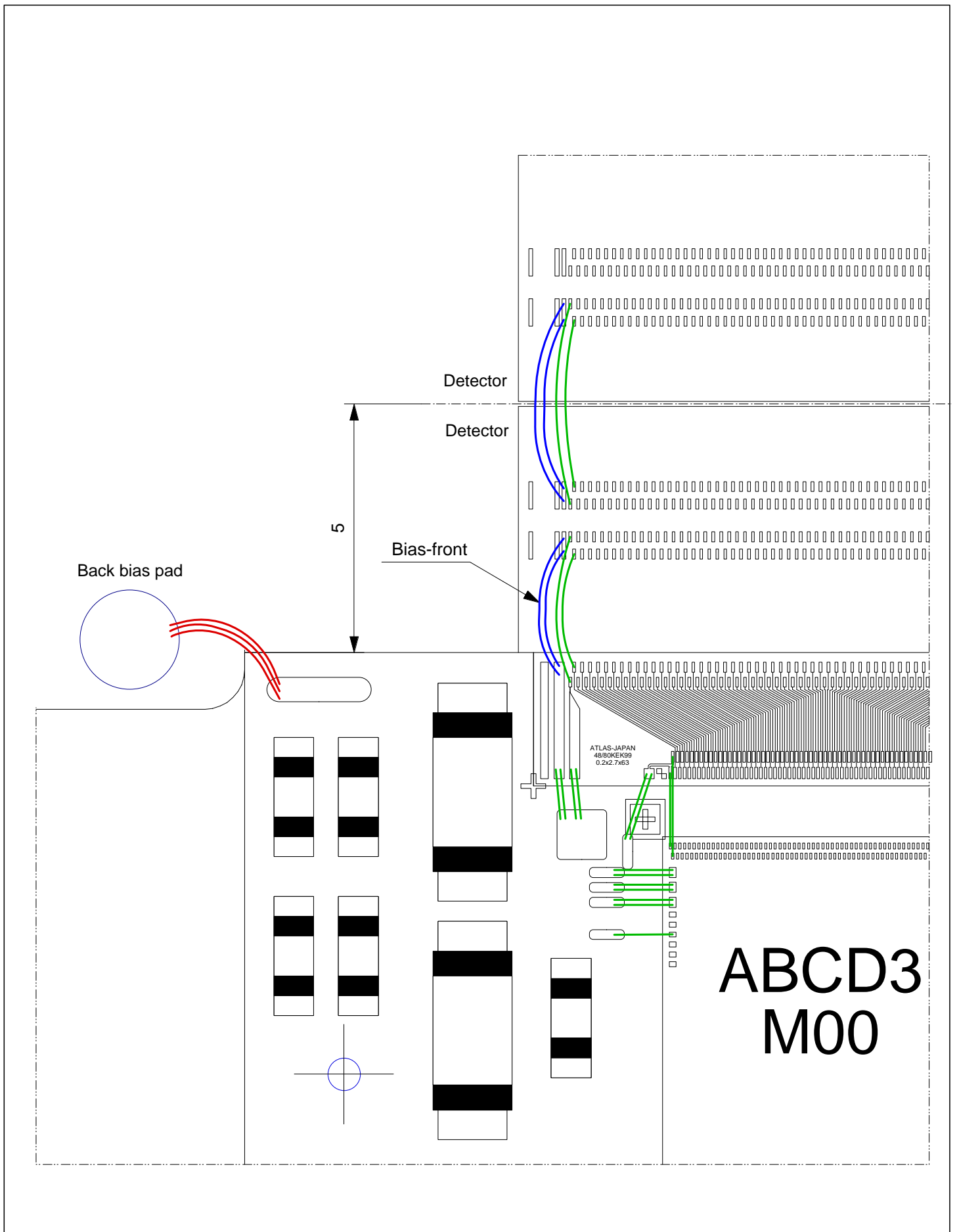
△ 08/03/01 Added missing "cal3" pad

ORIGINAL SCALE x10	TITLE K4 ABCD hybrid Drawing of Bonding E13	DRAWING No. A4-AT2k10-01-13/13-R1	2k1003/R1 T.Kohriki@KEK
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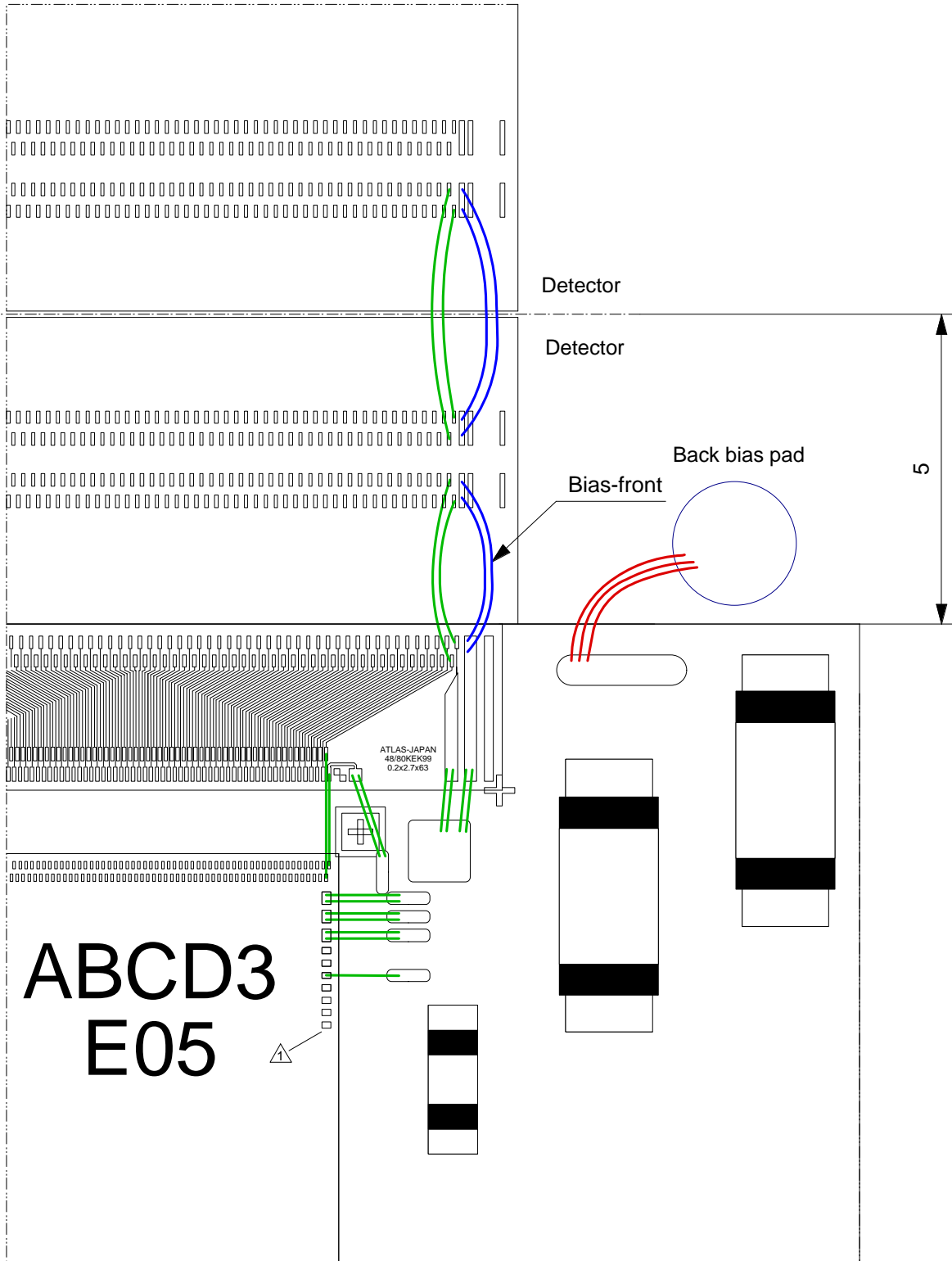
⚠ 08/03/01 Added missing "cal3" pad

ORIGINAL SCALE x1	TITLE K4 ABCD module Drawing of Bonding All	DRAWING No. A4-AT2k10-02- 1/5-R1	2k1012/R1 T.Kohriki@KEK
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⚠	08/03/01	Added missing "cal3" pad
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ORIGINAL SCALE	TITLE	DRAWING No.	
x10	K4 ABCD module Drawing of Bonding Detail (1)	A4-AT2k10-02- 2/5-R1	2k1012/R1 T.Kohriki@KEK



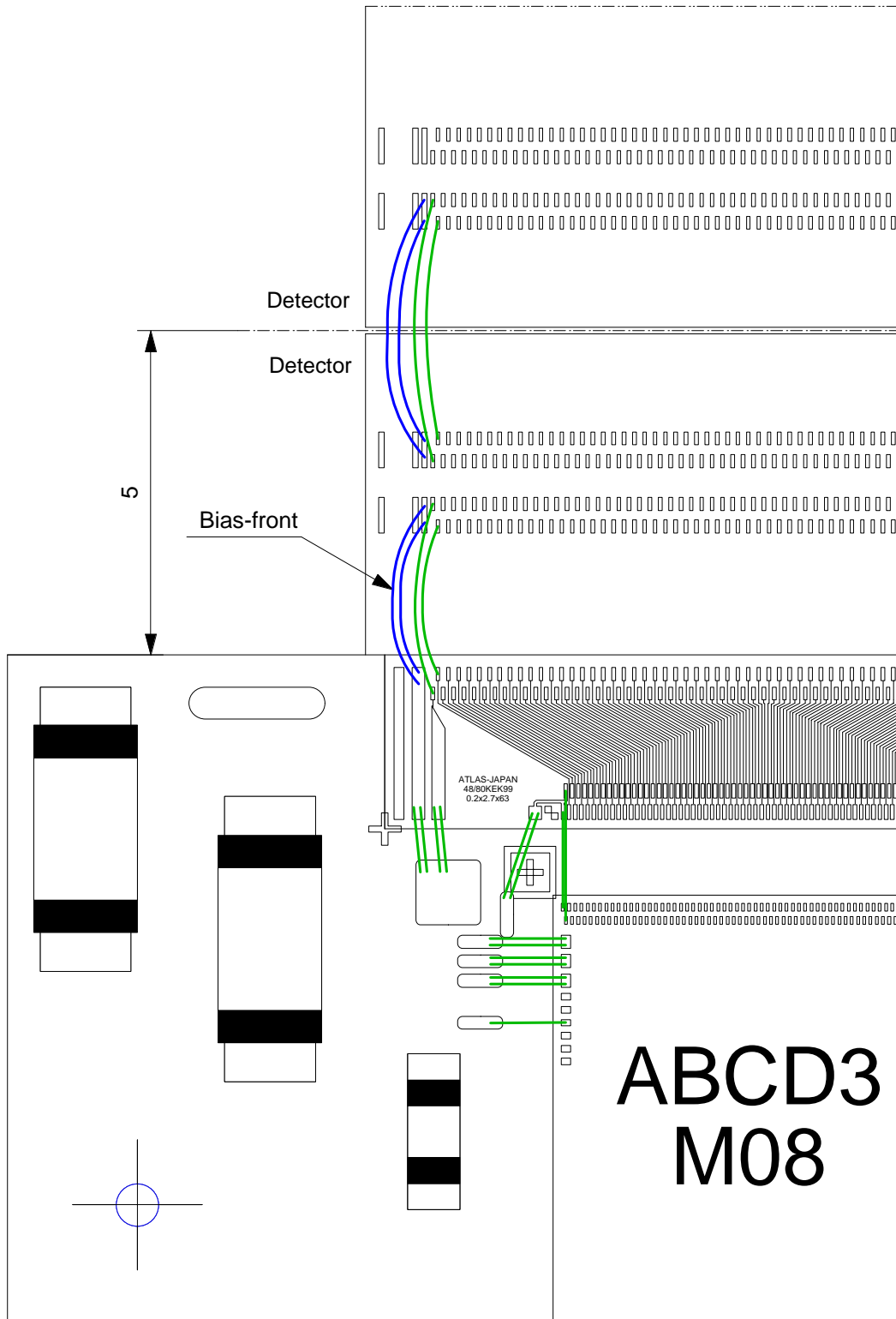
⚠ 08/03/01 Added missing "cal3" pad

ORIGINAL SCALE  
x10

TITLE  
K4 ABCD module  
Drawing of Bonding  
Detail (2)

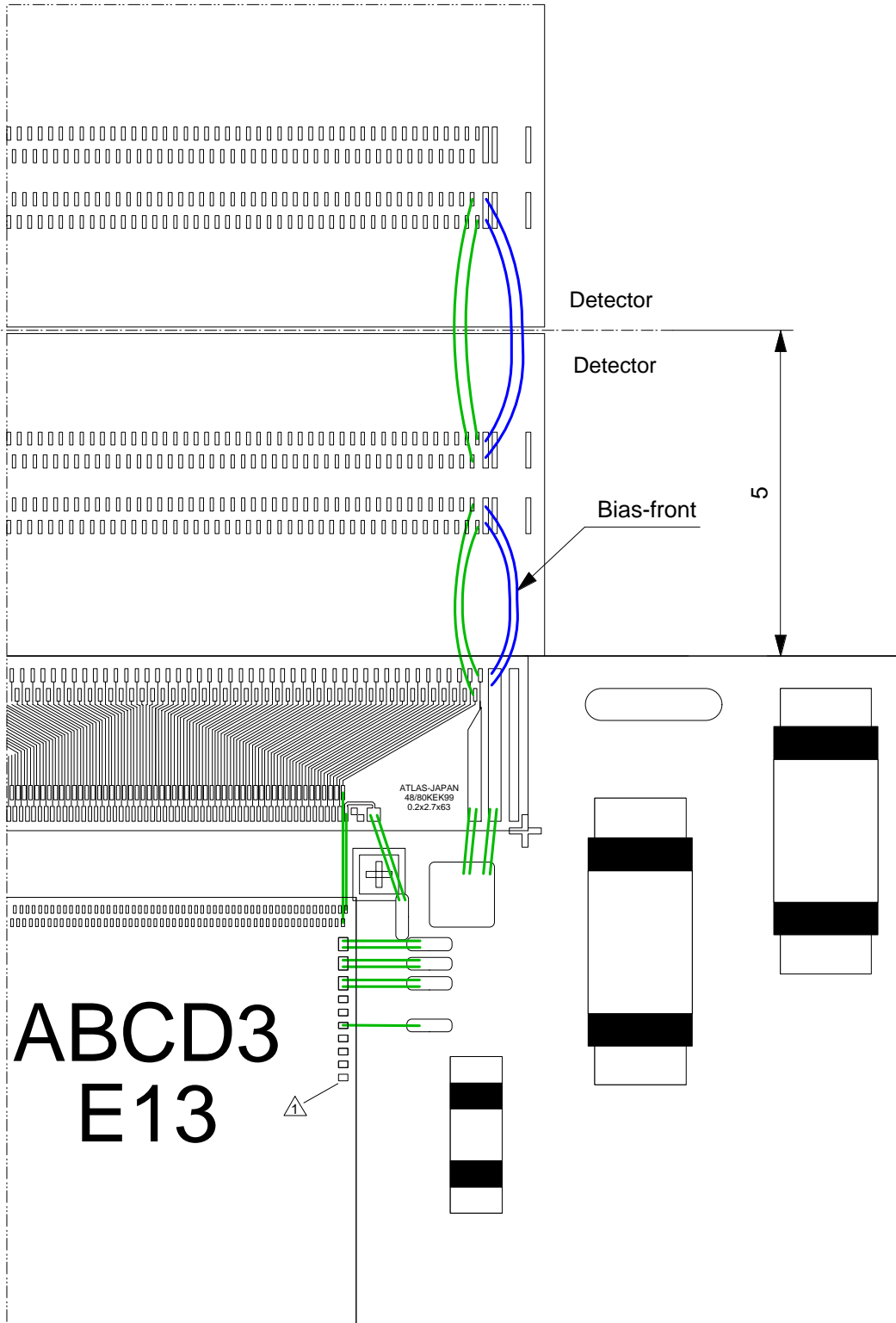
DRAWING No.  
A4-AT2k10-02- 35-R1

2k1012/R1  
T.Kohriki@KEK



⚠	08/03/01	Added missing "cal3" pad
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ORIGINAL SCALE	TITLE	DRAWING No.	
x10	K4 ABCD module Drawing of Bonding Detail (3)	A4-AT2k10-02- 4/5-R1	2k1012/R1 T.Kohriki@KEK



⚠ 08/03/01 Added missing "cal3" pad

ORIGINAL SCALE

TITLE

DRAWING No.

x10

K4 ABCD module  
Drawing of Bonding  
Detail (4)

A4-AT2k10-02- 5/5-R1

2k1012/R1  
T.Kohriki@KEK