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Roles	How to select names for the metadata field above
Approver	Manager Hardware Design

external Hardware Design Description (eHDD)

for DH9

Table of contents

1 General

1.1 Scope

This document describes the hardware design of DH9 on a high functional block level.

DH9 is DECT handset. In addition to normal DECT telephony and messaging, DH9 also include Bluetooth connectivity.

1.2 Abbreviations

N/A   Not Applicable

TBD   To Be Determined

TBC   To Be Decided

1.3 Document History

Version	Date	Author	Description
1.0			

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2   Top level block diagram for DH9

Below you can see a top-level electronic block diagram of the DH9 handset. Note that the functionality inside the dotted boxes are different mounting options of the PCBA.
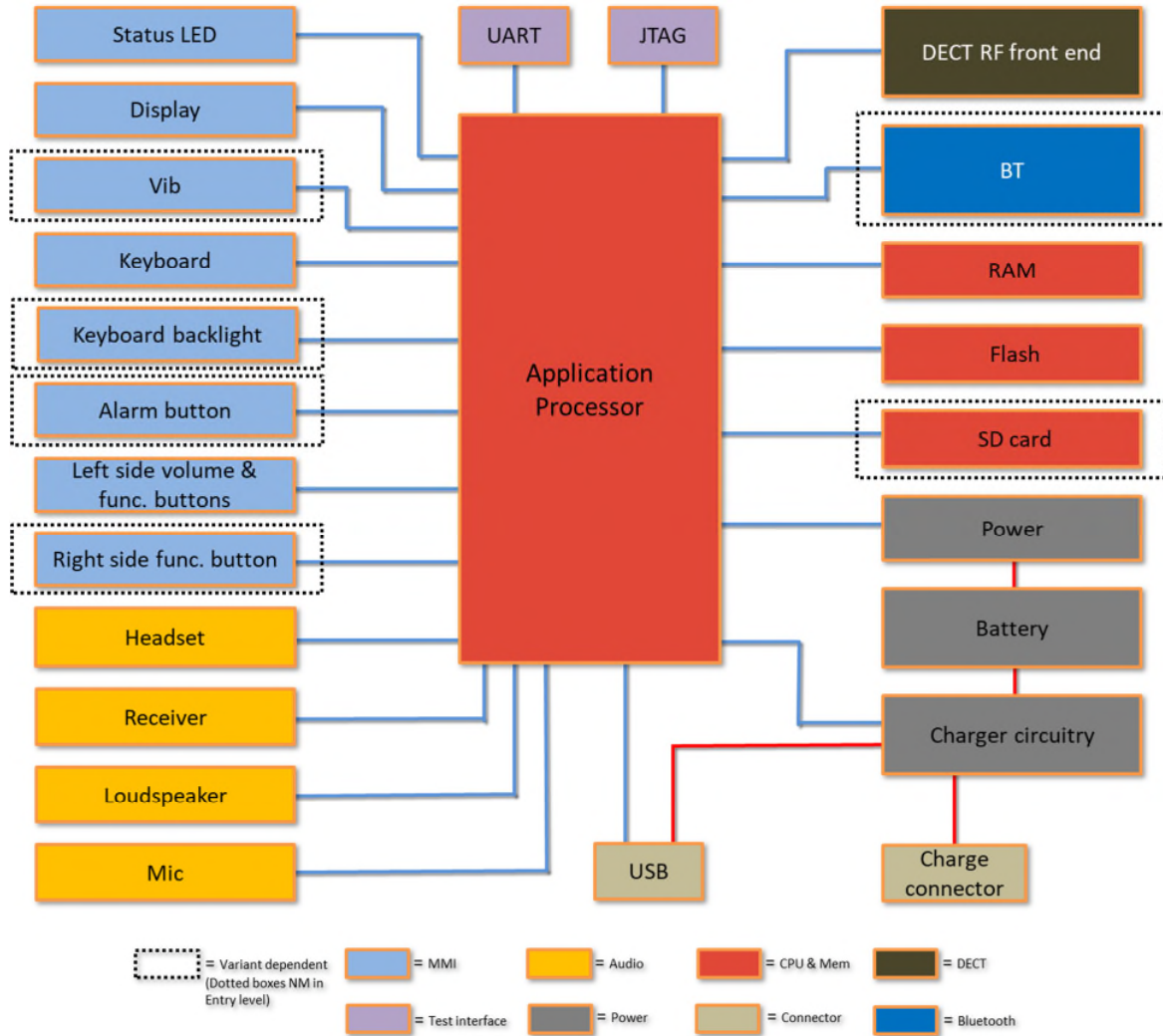
Figure 1: Top level block diagram

3   Product view and pictures

3.1   Exploded product view

Below is a product exploded view, consisting of the front-cover assembly, the main PCB assembly and the back-cover assembly.
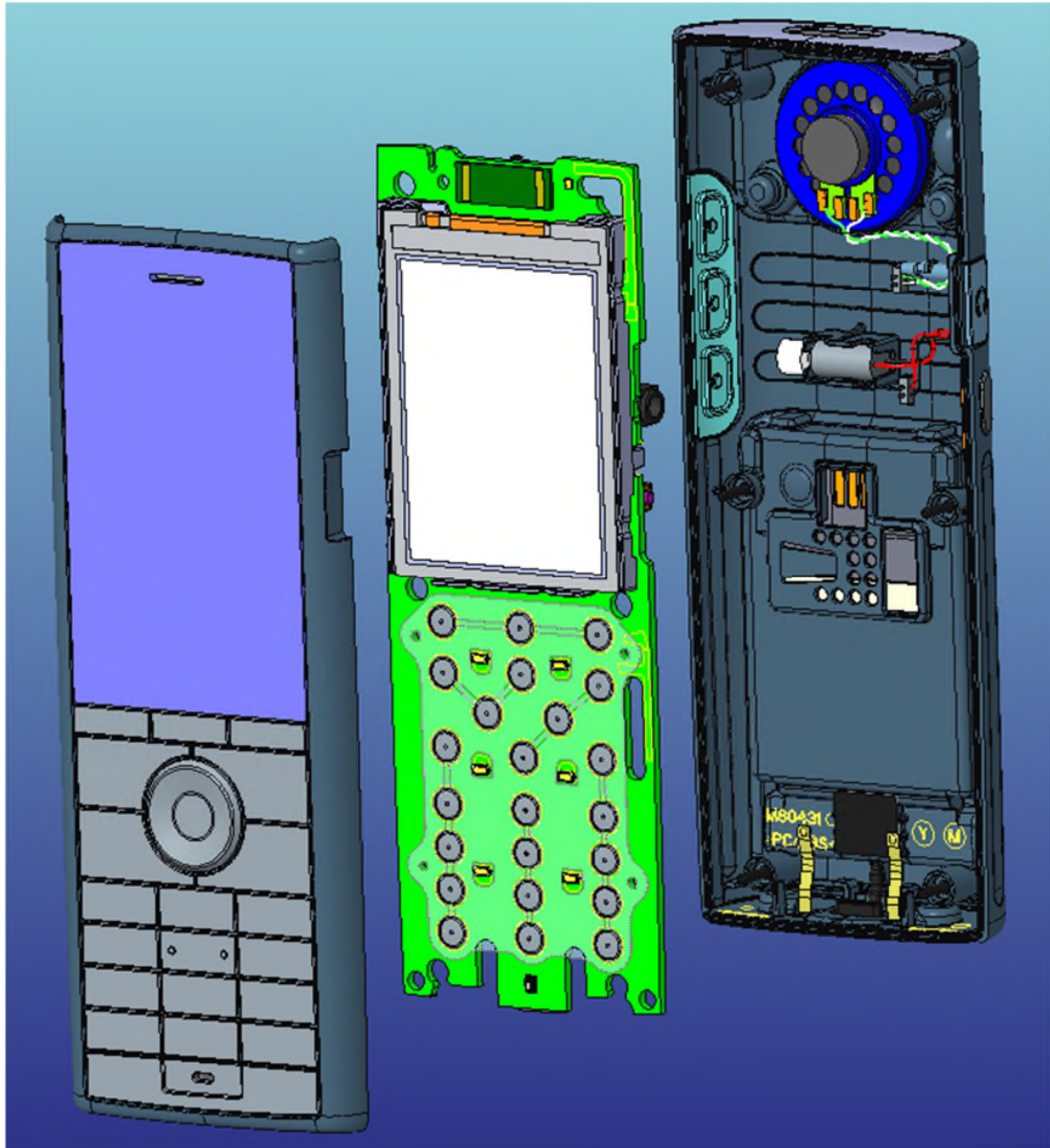

Figure 2: Product exploded view

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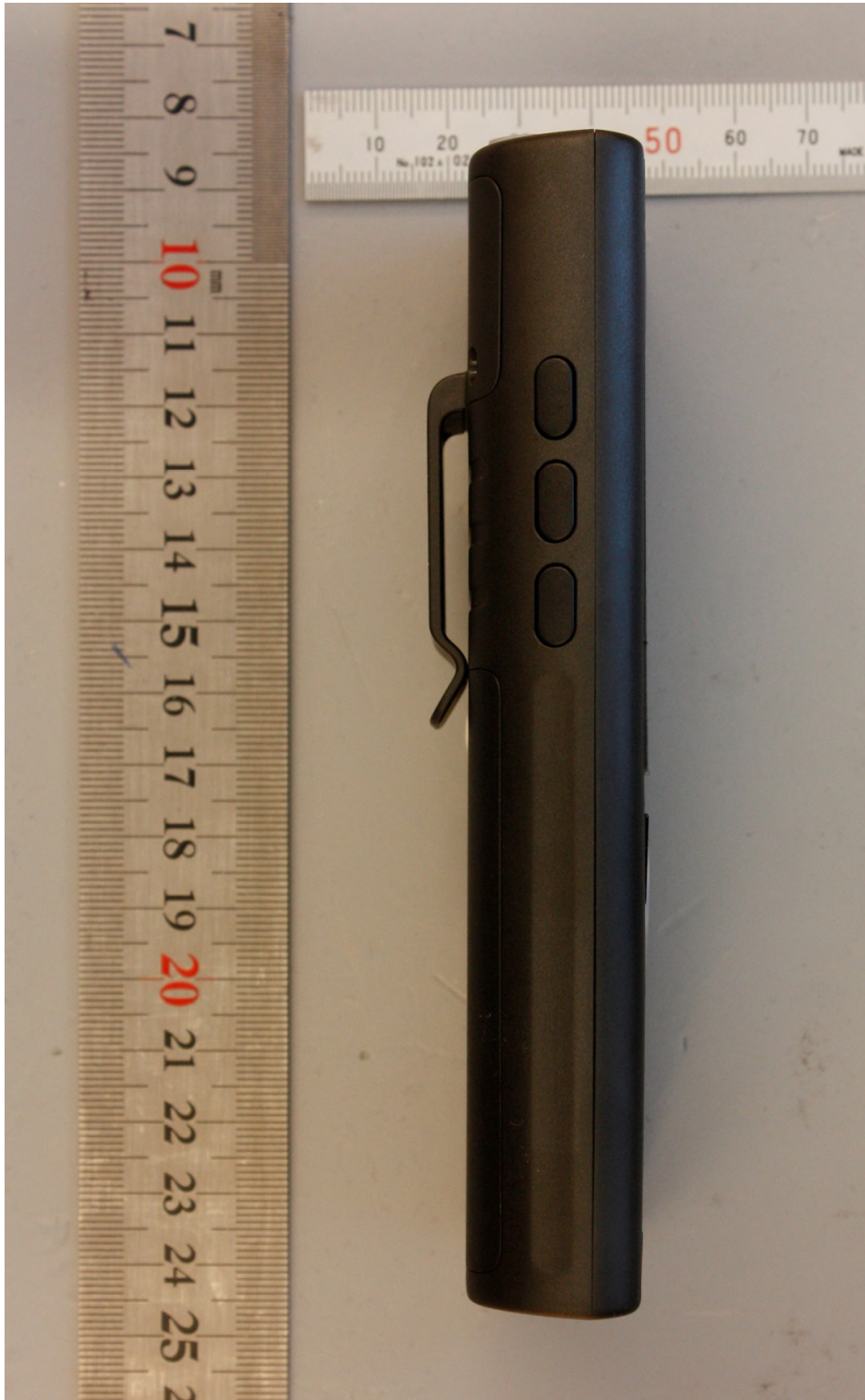### 3.2 External product pictures

Figure 3: DH9 front

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Figure 4: DH9 back

Figure 5: DH9 left side

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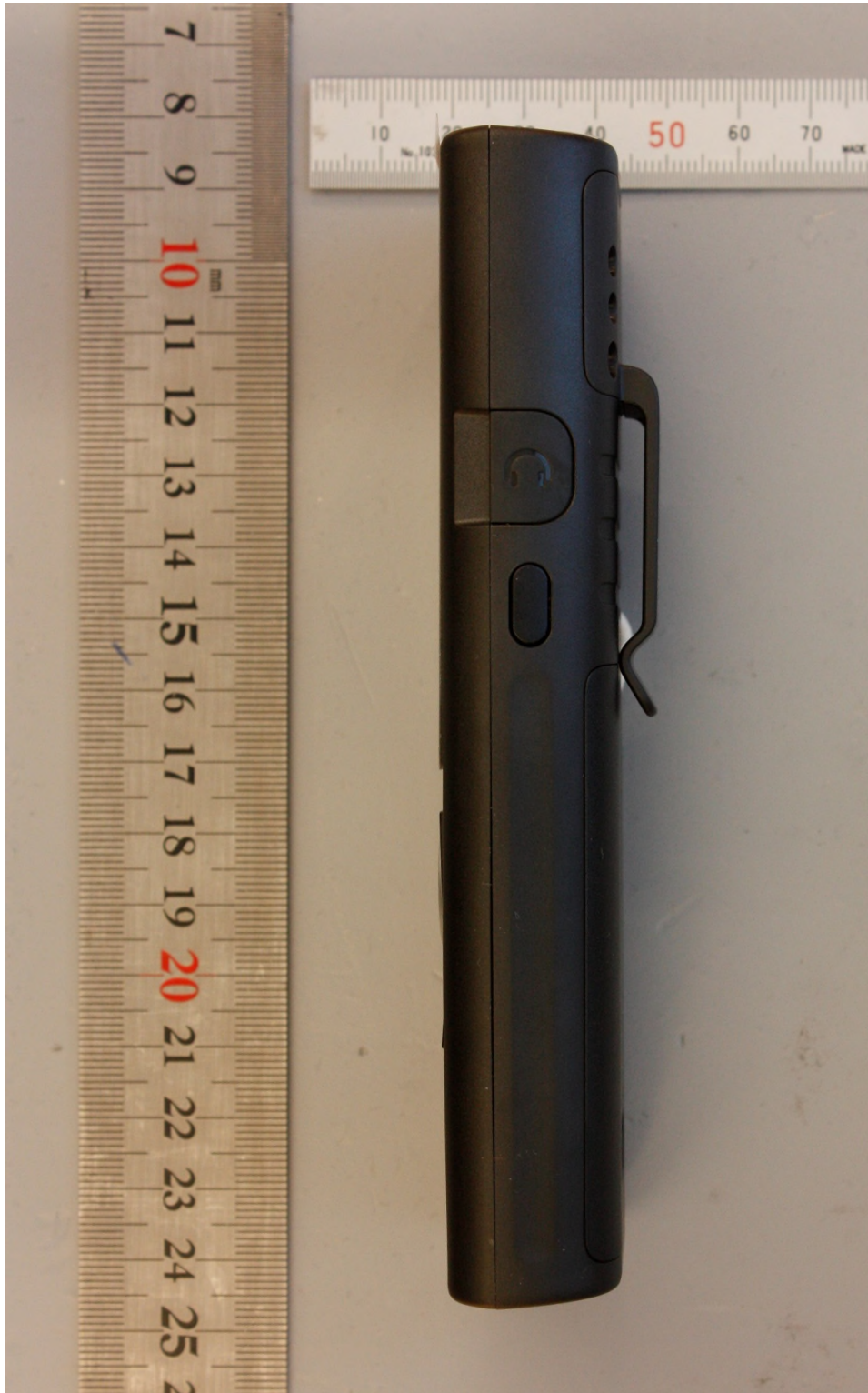
Figure 6: DH9 right side

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Figure 7: DH9 top

Figure 8: DH9 bottom

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3.3 Internal product pictures

Below are pictures of the main PCB assembly, front and back. The front side is facing the front of the phone. The back side is facing the back of the phone. The upper PCB antenna is DECT, and the lower PCB antenna is Bluetooth.
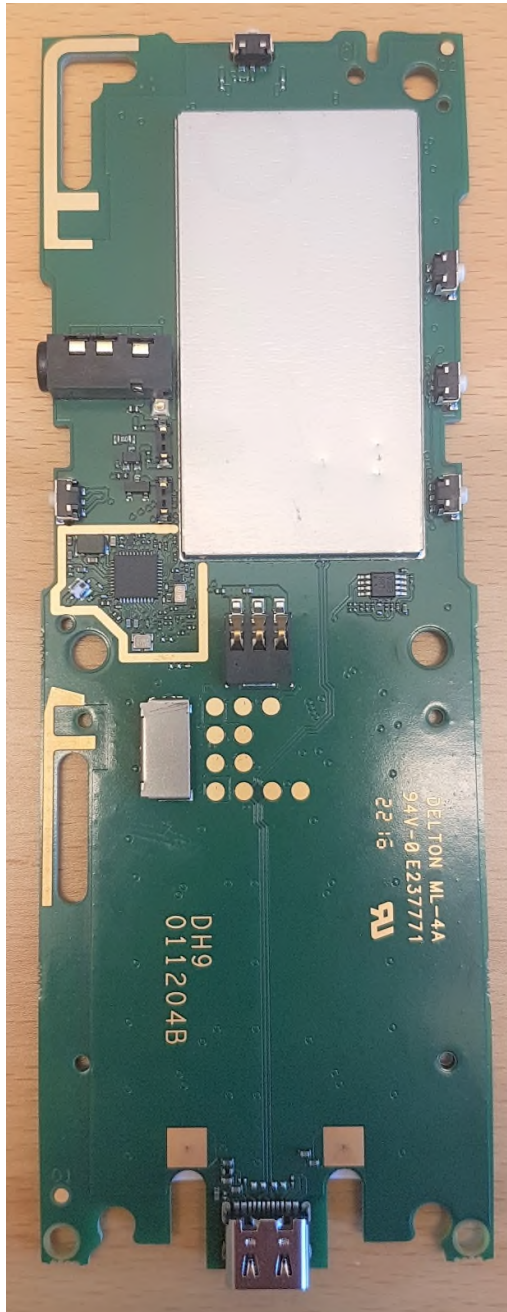

Figure 9: Main PCBA front side

Figure 10: Main PCB back side

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Figure 11: Shield can, back side

3.4   Label placement

Figure 12: DH9 label placement

4 Model differences/similarities

4.1 General

As can be seen in the block schematics, DH9 exists in different mounting options.

There are two different variants. Both variants share the same PCB and the same PCB antennas but has different component BOMs.

From an EMC/ESD point of view, worst case is a fully mounted PCB, i.e. DH9-DB "Business level".

From a radio point of view, they are identical.

4.2 Table of functional differences

Functionality	DH9-DA "Entry level"	DH9-DB "Business level"
Status LED	Yes	Yes
Display	Yes	Yes
Vibrator	-	Yes
Keyboard	Yes	Yes
Keyboard backlight	-	Yes
Alarm button	-	Yes
Left side buttons	Yes	Yes
Right side button	Yes	Yes
Headset connector	Yes	Yes
Earpiece/receiver	Yes	Yes
Loudspeaker	Yes	Yes
Microphone	Yes	Yes
Charger interface	Yes	Yes
SD-card connector	-	Yes
DECT radio	Yes	Yes
Bluetooth radio	Yes	Yes

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4.3 Mechanical differences

As can be seen in the picture below the top area differs between the DH9-DB "Business level" (to the right in the picture) and DH9-DA "Entry level". The Entry level doesn't have a top button. Furthermore, the DH9-DA "Entry level" doesn't have a right side button

Marked with A: On the Business variant the top surface is a standalone part, on the Entry variant the top surface is integrated in the back cover.
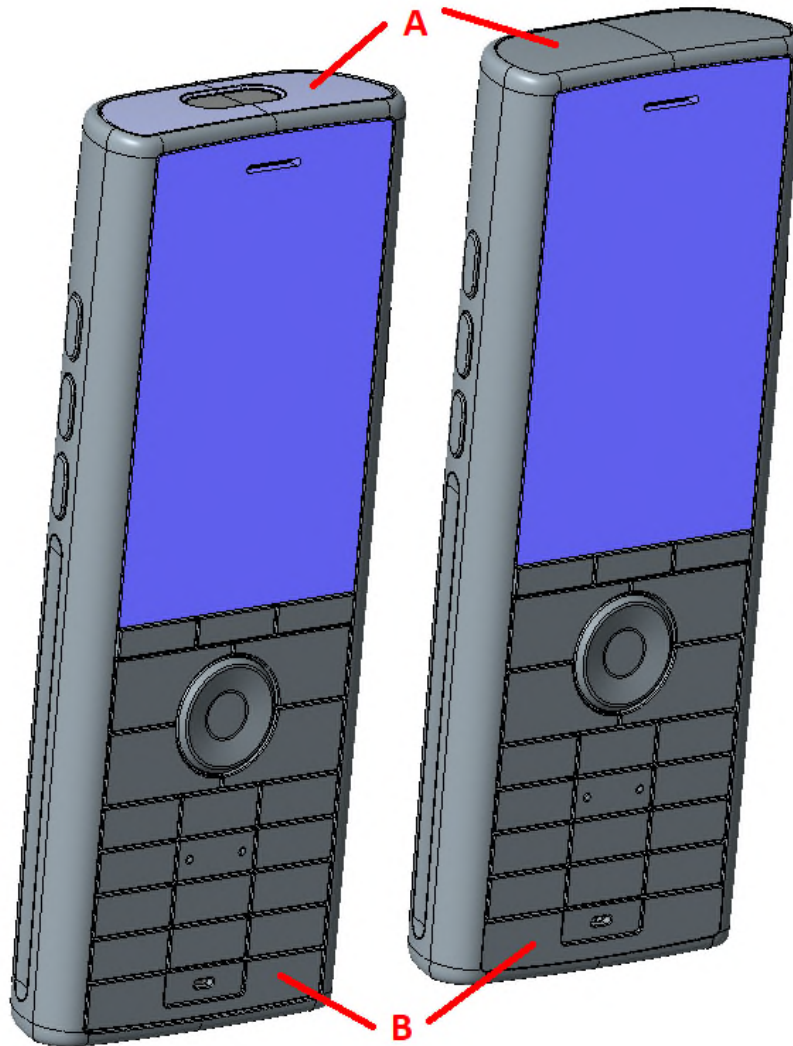

Figure 13: Mechanical differences front and top

Marked with B: On the Entry variant this surface is integrated in the front cover, on the Business variant this is a standalone part with the same coating as the keyboard.

Marked with C: The Business variant has a right side functional key, the Entry variant does not.
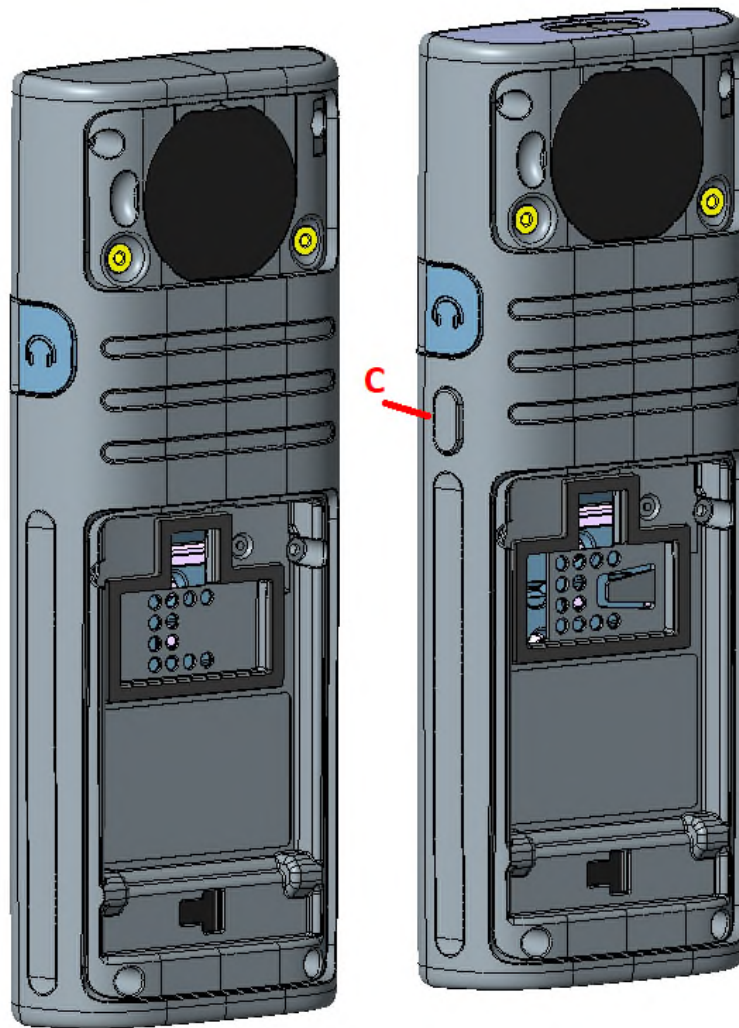

Figure 14: Mechanical differences right side

5 Operational description

5.1 Oscillators

The main CPU and DECT parts use a 10.368 MHz crystal oscillator.

The Bluetooth module is using a 24 MHz and a 32.768 kHz crystal.

5.2 CPU

The main CPU is a SC14445 from Dialog.

5.3 DECT radio

The DECT radio is based on a DECT chip (SC14445 from Dialog), which has a complete DECT radio transceiver integrated, designed to perform the complete receive function without an external SAW filter at IF. For transmit, an RF Power Amplifier (RFPA) has been implemented. During receive mode, the signal at the Rx input is down converted to an intermediate frequency of 864kHz.

For EU-DECT 1881.792MHz – 1897.344MHz are used and for US-DECT 1921.536MHz – 1928.448MHz are used. GFSK is used as modulation, which is the standard for DECT.

The antenna is a quarter wave PCB antenna with a 50 Ohm feed. The antenna type looks like the IFA antenna (Inverted F Antenna), but the ground plane orientation differs. The antenna gain is 1dBi.

5.4 Bluetooth radio

A Bluetooth chip (CYW20721 from Cypress) with almost all RF functionality on chip is used. Only a bandpass filter and the antenna are external.

A 26MHz + 32.768kHz crystals are used as frequency reference.

The Bluetooth antenna is of the same type as the DECT antenna also integrated in the PCB. The antenna gain is <3dBi.

6 Tune-up values

US DECT power ≤20.4 dBm
EU DECT power ≤25 dBm
Bluetooth power ≤3 dBm