

Created by : David COROLLEUR	Reference DC-2008-029	Title Hands Free Car Kit Module CK5050+ - Datasheet
Revised by : J.J. DORMARD	Date 20//2008	edition N°: 1.03
Approved by :	Date	Function

# Hands Free Car Kit Module CK5050+



## Datasheet



# Parrot

### Product Scope

Parrot has identified a demand for the integration of the telephony into a host product like car radio or navigation system. The answer to this demand is **CK5050+**.

The CK5050+ is a feature-rich **Bluetooth Hands Free Car Kit** solution dedicated for the integration of Handsfree Bluetooth applications in car radios and car telematics systems.

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## 1 Product Overview

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This document is the Datasheet of the Parrot CK5050+ Bluetooth Module.

The CK5050+ is a feature-rich Bluetooth platform dedicated for the integration of Bluetooth applications in car audios, car telematic systems or any systems requiring a complete embedded Bluetooth solution.

### 1.1 CK5050+ Features

---

- **Bluetooth connectivity**
  - Bluetooth Power Class 2 Radio
  - Embedded Bluetooth v1.1, v1.2 & v2.0 compliant
  - Embedded profiles
  - Compatible with all Bluetooth phones
  - Pairing and connection with all Bluetooth Devices: Phones, Smartphones, PDA ...
  - Multiple user support: Up to 5 paired phones
  - Multiple connection (up to 3 device connected at the same time)
  - Multiple profile (for example A2DP and HFP at the same time with same or different devices)
- **Phone**
  - Pick-up, Hang-up, Redial
  - Automatic answer (from host via dial command)
  - Send DTMF during calls
  - Private Mode
- **Phone Book**
  - Automatic Phone book synchronization over Bluetooth (up to 1000 names)
  - Call history (dialed number, received calls, missed calls)
  - All Synchronization Methods
  - Full Unicode for compatibility with numerous characters sets (European, Russian, Chinese, Japanese...)
- **Digital Signal Processing and Acoustics**
  - Acoustic Echo cancellation for Full Duplex operation
  - Noise reduction
  - Beam forming with 2 microphones inputs
  - Volume control
  - Speaker dependant voice recognition (trained names and keyword)
  - Speaker independent voice recognition (Nuance licensing)
  - Text To Speech feature.
- **Audio Streaming**
  - Embedded SBC decoder
  - Embedded MP3 decoder from Thomson Licensing (optional)
  - Stereo audio output
- **Miscellaneous**
  - Provide Phone Battery Level and Network Level, Carrier Name (depends on phones)
  - Embedded test pattern
- **Software Update**
  - Full standard Software available (free upgrade from Parrot homepage)
  - Software update available through Bluetooth or UART
  - Very large compatibility with Phones, Smartphones, PDAs, Music players
- **USB**
  - USB 2.0 Full Speed
  - Access to mass storage device
  - File browsing

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## 1.2 Memory Flash required

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- Flash required for the CODE: **Around 2Mbytes**
- Flash required for the user Data (settings, phonebook...): **Around 4 MBytes**
- Flash required for speaker independent voice recognition and text to speech:

Voice recognition only: **3 Mbytes + 1.1 Mbytes per language**

Voice recognition and Text To Speech: **7 Mbytes + 16 Mbytes per language**

Example for 1 language:

		Code	Data	Required	Memory Flash
<b>VR + TTS</b>	<b>23 MBytes</b>	2 MBytes	4 MBytes	<b>29 MBytes</b>	<b>256 MBits</b>
<b>VR only</b>	<b>4.1 MBytes</b>	2 MBytes	4 MBytes	<b>10.1 MBytes</b>	<b>128 Mbits</b>

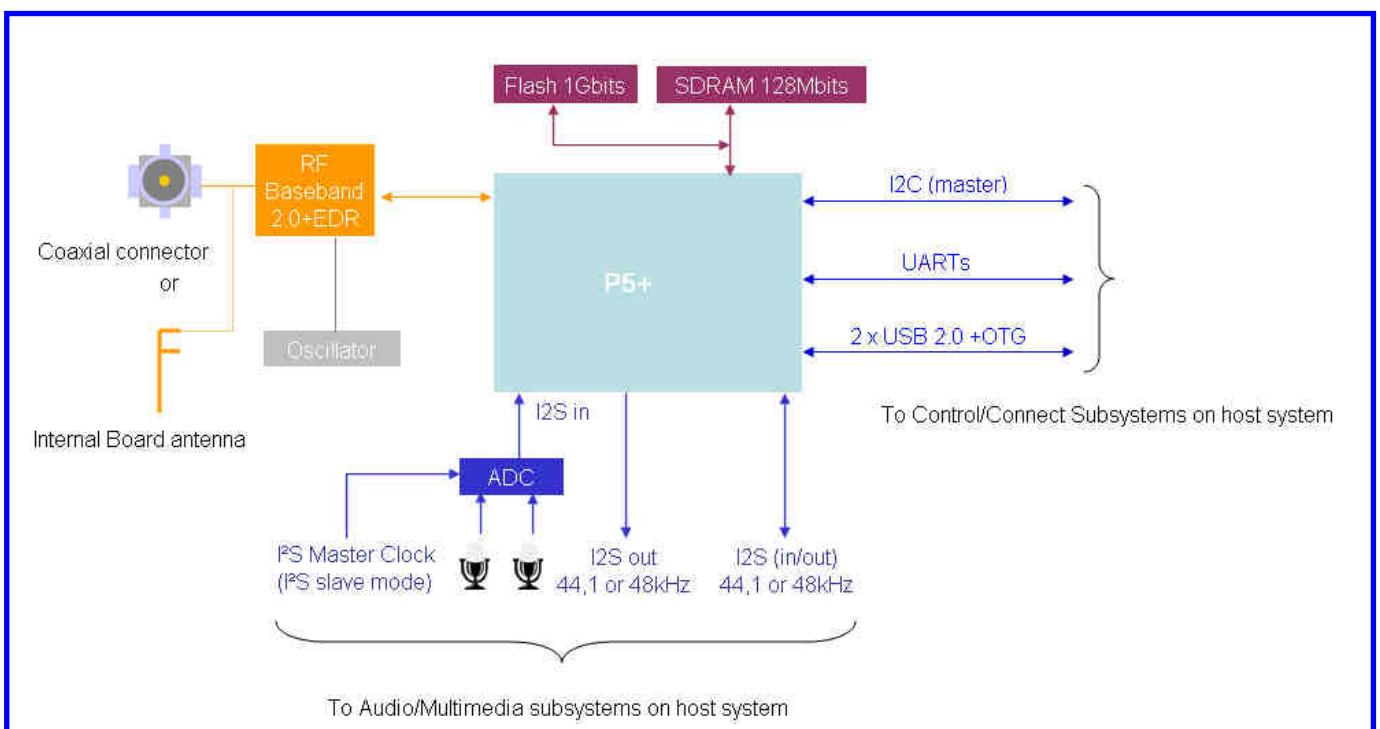
Example for 6 languages:

		Code	Data	Required	Memory Flash
<b>VR + TTS</b>	<b>103 MBytes</b>	2 MBytes	4 MBytes	<b>109 MBytes</b>	<b>1 GBits</b>
<b>VR only</b>	<b>9,6 MBytes</b>	2 MBytes	4 MBytes	<b>15.6 MBytes</b>	<b>128/256 Mbits</b>

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## 2 Electrical Architecture

### 2.1 CK5050+ internal Block Diagram



CK5050+ Simplified Block Diagram

The main electrical interfaces provided by the CK5050+ are:

- Bluetooth: 2.0 EDR
- Audio:

Digital I2S interface: 1 stereo input + 2 stereo output (need to have an I2S codec on the motherboard)

Analog interface: 2 audio inputs

- Serial Link : UART for the software interface through AT commands
- 2 x USB 2.0 OTG
- I<sup>2</sup>C Interface
- 3.3 V Power Supply
- Flash : 256Mbits / 512Mbits / 1Gbits
- SDRAM: 64Mbits/ 128Mbits

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## 2.2 Electrical Interfaces Characteristics

Absolute Maximum Rating				
	Min		Max	Unit
Supply Voltage	-0.3		3.8	V
Storage Temperature	-40		+125	°C

Operating Conditions				
	Min		Max	Unit
Supply Voltage	3,2		3.6	V
Ambiant Temperature	-40		+85	°C

- UART:** 16C550 Compatible Type. A bit "Start Bit=0" is added to the beginning of each word (8bits). The Least Significant Bit (LSB) is sent first. A "Stop Bit=1" is sent by the transmitter at the end of each word.  
 MaxVOL=0.15V  
 MinVOH=Vcc-0v15 (at IOH=0.1mA) open collector with build in 2.5k pull up  
 MaxVIL=0.8V  
 MinVIH=2V

UART0\_TX & UART1\_TX:

	Min	Max	Condition
Trise (ns)		10	Clod = 50pF
Tfall (ns)		10	Clod = 50pF

The UART1\_RX and UART0\_RX are Schmitt trigger inputs

- I2C**  
 MaxVOL=0.15V  
 MinVOH=Vcc-0v15  
 MaxVIL=0.8V  
 MinVIH=2V
- RESET:** Asynchronous reset signal, used to reset the Parrot Daughter Board, active low.  
 MaxVIL=0.4V  
 MinVIH=2.5V
- MIC\_PWR:** Connect to electret condenser microphone (Impedance less than 2.2kOhms)  
 Electrical characteristics of microphone:  
 Operating voltage: 2..02V-2.48V DC  
 Current consumption: 500µA max.  
 Use of pre-amplified microphones is in option.  
 Optional: another power supply (from motherboard) can be used to supply the microphone(s)
- VCC:** Supply voltage 3.4V(-0.2V/+0.2V) including tolerances, thermal changes, noise over/under shoot due to load change and/or car battery voltage change, load dump.  
 Mean current : <300 mA (All components active and communication or streaming mode)  
 Peak current < 1.5A during switch on: > mA during 700 ms (max).

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**POWER CONSUMPTION**

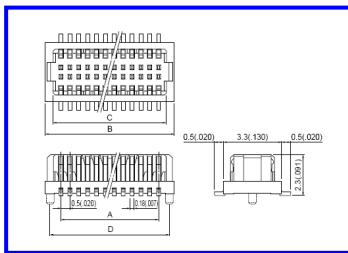
<b>FUNCTIONING MODES</b>	<b>CURRENT ON 3.4V</b>	<b>REMARKS</b>
STOP MODE	<20 $\mu$ A	BT radio and Parrot5+ ASIC stopped, Internal voltage regulator switched off.(Power off or Reset active)
STANDBY MODE	<200 mA	BT module in sniff mode, Parrot ASIC in idle
HANDSFREE MODE	<300 mA	Hands free communication with a Bluetooth enabled phone
AUDIO STREAMING	<300 mA	Reception of an encoded stream, decoding, playing of the audio

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### 2.3 Main Connector Pinout

Main connectors:

Male connector:

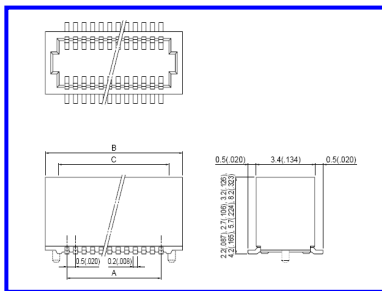


Circuits	Model No.	Dimensions mm(in.)			
		With bosses	A	B	C
40	<b>40R-JMCS-G-B-TF (S)</b>	9.5(.374)	11.3(.445)	10.4(.409)	10.7(.421)

**Material and Finish**

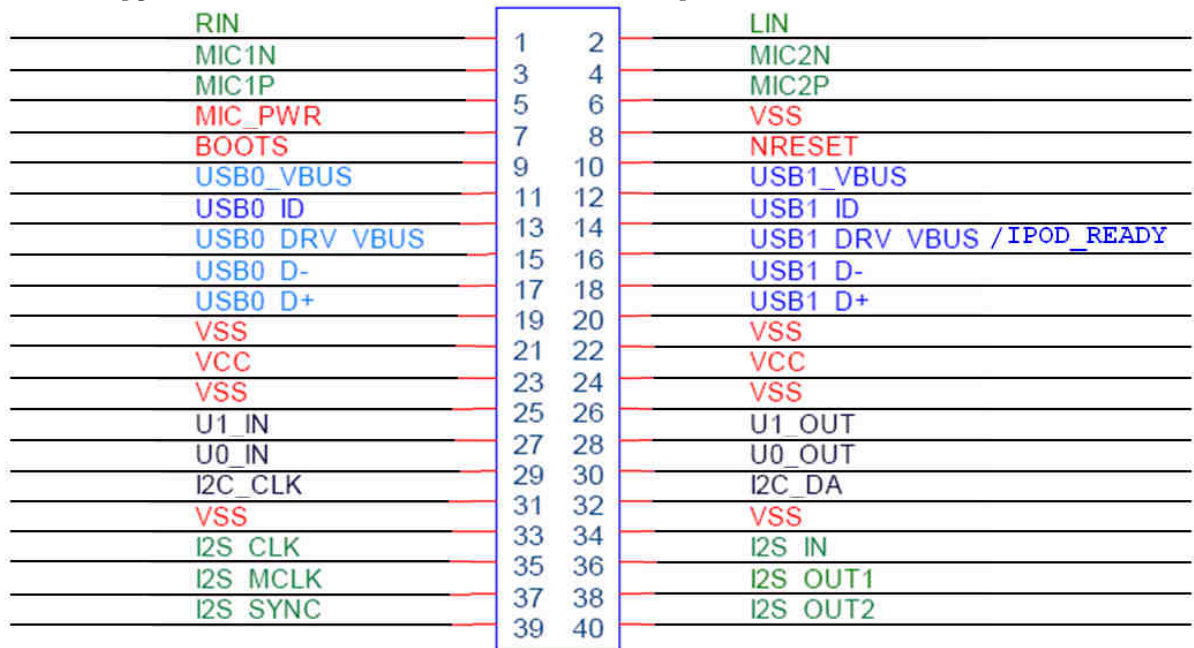
Contact: Phosphor bronze, gold-plated  
Housing: Modified nylon 6T, UL94V-0

Female connector:



Circuits	9.0(.354")	Dimensions mm(in.)			
		A	B	C	D
40	<b>40P9.0-JMCS-G-B-TF</b>	9.5(.374)	11.9(.469)	10.4(.409)	10.7(.421)

The following pinout allows an interface to the CK5050+ according to market standards:



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PIN	FUNCTION	INPUT / OUTPUT	COMMENT
1	RIN	I	Line in : right input
2	LIN	I	Line in : left input
3	MIC1N	I	Microphones : Analog audio inputs
4	MIC2N	I	
5	MIC1P	I	
6	MIC2P	I	
7	MIC_PWR	O	Microphone power supply
8	VSS	I	Ground
9	BOOTS	I	To update the soft
10	NRESET	I	RESET trigger Input
11	USB0_VBUS	I	USB0 Vbus 5V
12	USB1_VBUS	I	USB1 Vbus 5V
13	USB0_ID	I	USB0 ID pin of mini AB receptacle (OTG)
14	USB1_ID	I	USB1 ID pin of mini AB receptacle (OTG)
15	USB0_DRV_VBUS	O	Drive VBUS (OTG) USB0
16	USB1_DRV_VBUS / IPOD_READY	O/I	Drive VBUS (OTG) USB1 / Connected to IPOD_Authentication_Coprocessor
17	USB0_D-	O/I	USB0 interface D- signal
18	USB1_D-	O/I	USB1 interface D- signal
19	USB0_D+	O/I	USB0 interface D+ signal
20	USB1_D+	O/I	USB1 interface D+ signal
21	VSS	I	Ground
22	VSS	I	Ground
23	VCC	I	POWER 3.4V
24	VCC	I	POWER 3.4V
25	VSS	I	Ground
26	VSS	I	Ground
27	U1_IN	I	16C550 Compatible type (for <b>Debug</b> interface)
28	U1_OUT	O	
29	U0_IN	I	16C550 Compatible type (for <b>Host AT commands and Flash Update</b> interface)
30	U0_OUT	O	
31	I2C_CLK	O	I2C clock
32	I2C_DA	O/I	I2C data
33	VSS	I	Ground
34	VSS	I	Ground
35	I2S_CLK	O/I	I2S serial clock
36	I2S_IN	I	I2S serial data in 1
37	I2S_MCLK	O/I	I2S Master clock
38	I2S_OUT1	O	I2S serial data out
39	I2S_SYNC	O/I	I2S synchronization
40	I2S_OUT2	O	I2S serial data out (secondary)

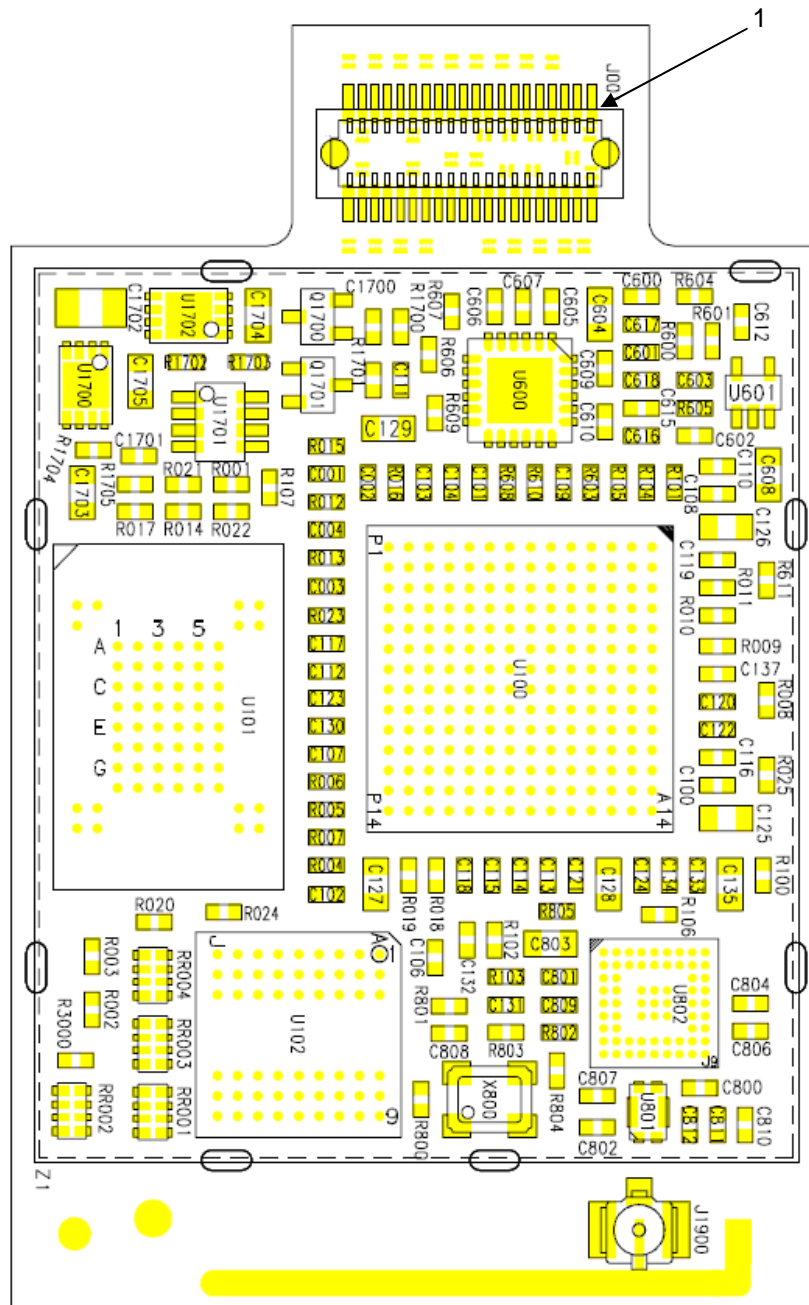
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### 3 Hardware layout

#### 3.1 Components placement with internal antenna (PI040123AA)

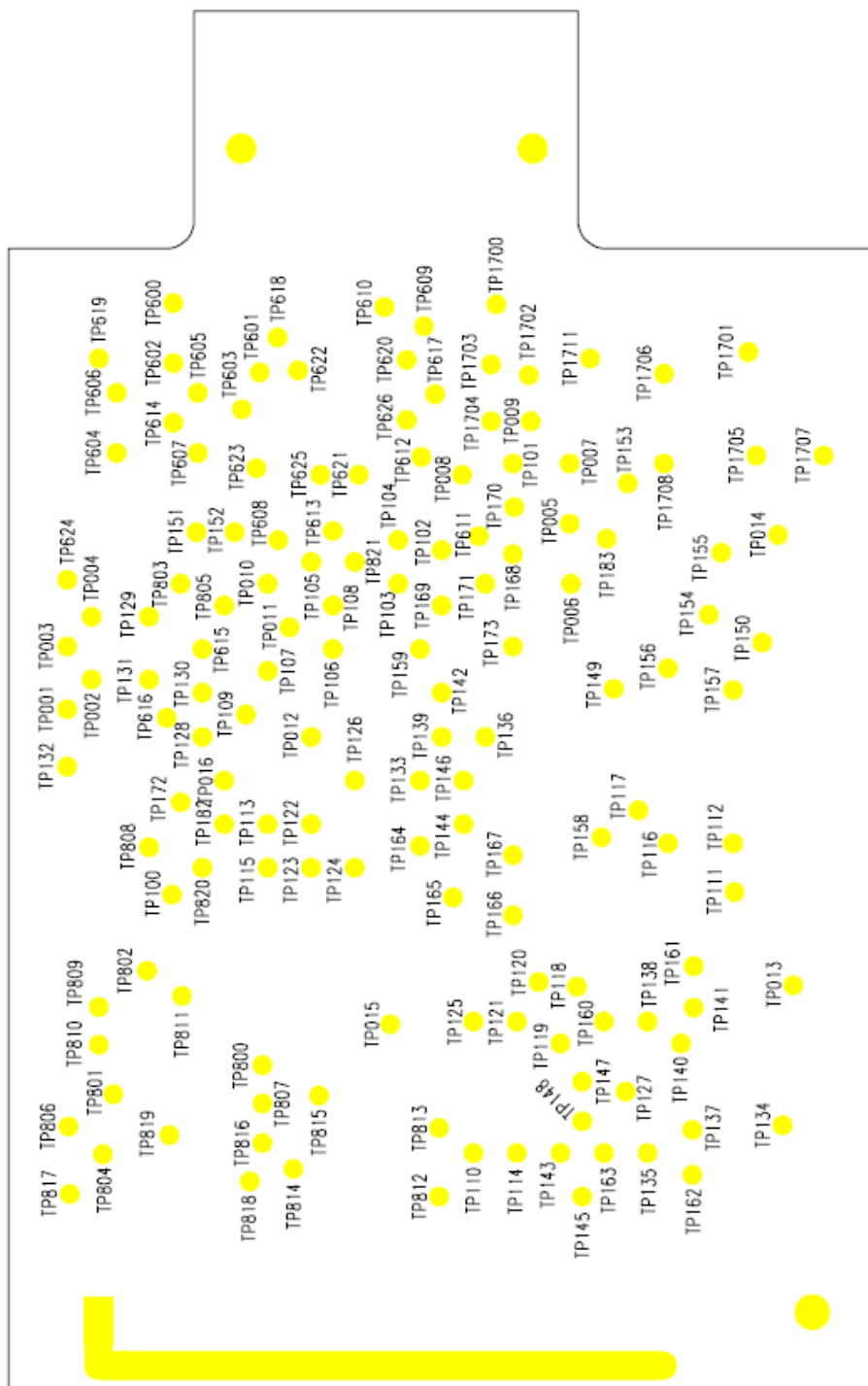
**Details:**

**U100:** Parrot5+ ASIC (BGA) + **U101/U102:** SDRAM/Flash (BGA) + **U802** BT radio transceiver (BGA) + **U1702:** 1V8 Voltage regulator (DFN8) + **U1700:** 1V2 Voltage regulator (DFN8) + **U1701:** Voltage supervisor (TSOT8) + **U600:** ADC (QFN) + **X800:** Precision crystal oscillator + **J001:** Main connector



COMPONENTS SIDE

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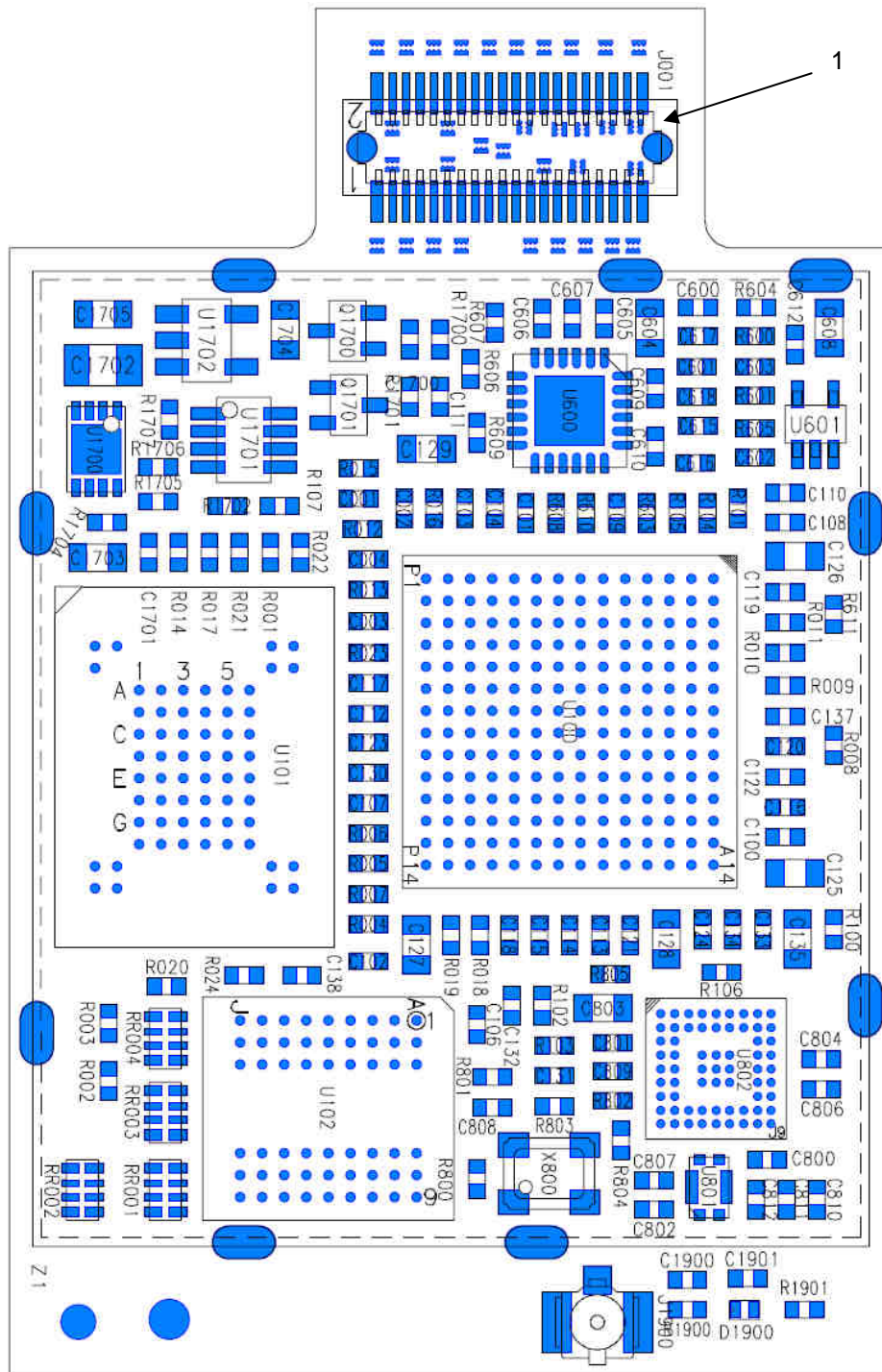


BOTTOM SIDE

PCB size: 32mm x 50.7mm Tolerances +/- 0.1 mm

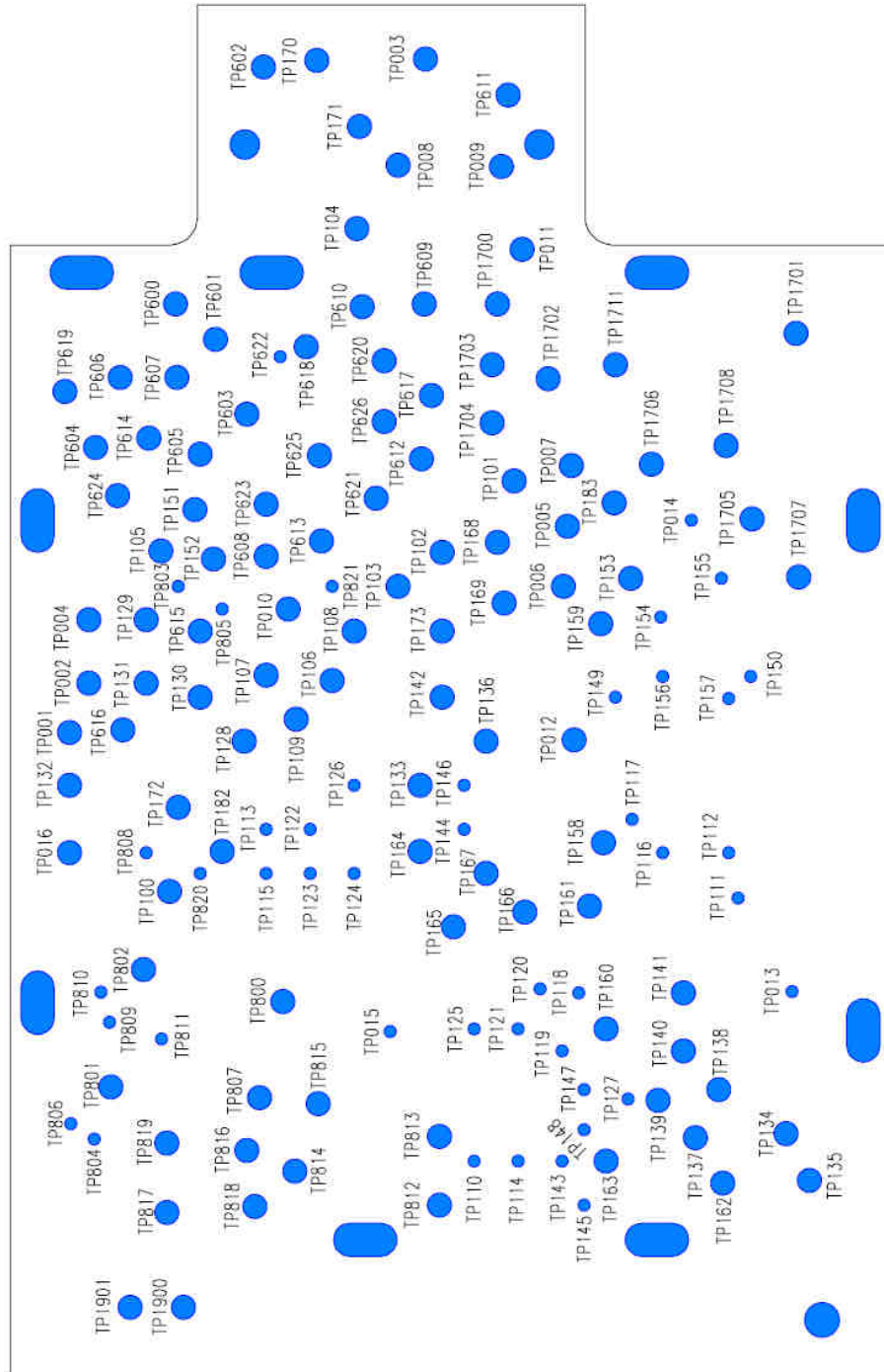
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### 3.2 Components placement without internal antenna (PI040114AA - PI040124AA)



COMPONENTS SIDE

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**BOTTOM SIDE**

**PCB size: 32mm x 49.7mm Tolerances +/- 0.1 mm**

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## 4 Software Specifications

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### 4.1 Bluetooth Stack

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- HCI (Host Controller interface),
- L2CAP (Logical Link Control and Adaptation Protocol),
- RFCOMM (TS011...),
- SDP (Service Discovery Protocol),
- OBEX (IrDA Object Exchange).



### 4.2 Bluetooth Profiles Supported

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- Generic Access Profile
- GAP
- Phone Management
  - HFP 0.96 - 1.0 - 1.5
  - HSP 1.0
- Message Management
  - MAP 1.0
- Phone Book
  - PBAP 1.0
  - SYNC 1.1 (IrMC SYNC over BT)
  - SYNCML
  - OPP 1.0 Server/Client (Vcard 2.1)
  - GSM 07.07 AT Commands
  - Nokia synchronization protocol
- Multimedia
  - A2DP (Audio)
  - SBC decoding
  - (optional MP3 decoding)
  - AVDTP
  - AVRCP
- Others
  - SPP 1.1
  - BNEP, PAN
  - FTP 1.0
  - Image transfer over OPP
  - DUNP 1.1
  - Software update over SPP
  - Remote configuration

### 4.3 Software Architecture

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See Bluetooth Stack Software Specification (Confidential).

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## 4.4 Software Interface

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The main target of the software interface is to provide a high level command set, hiding the internal complexity of the Bluetooth function and the variability of its standard across different devices.

This software interface is based on well-known AT commands. Some of these commands are directly derived from the GSM 07.07 recommendation and from the appropriate Bluetooth profiles.

Some supplementary commands are used to manage Bluetooth related functions like device pairing and connection management as well as the acoustic and speech recognition functions.

AT Command List and Bluetooth AT Command Software Specification is available.

BLUES supports Unicode, which allows the management of accents and phonebook in any language.

BLUES is also very friendly with a flexible MMI. One can use BLUES with a simple single or double key interface as well as a diversity of graphic displays.

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## 5 Mechanical Design

The CK5050+ features a male connector allowing a connection to the motherboard through a female connector.

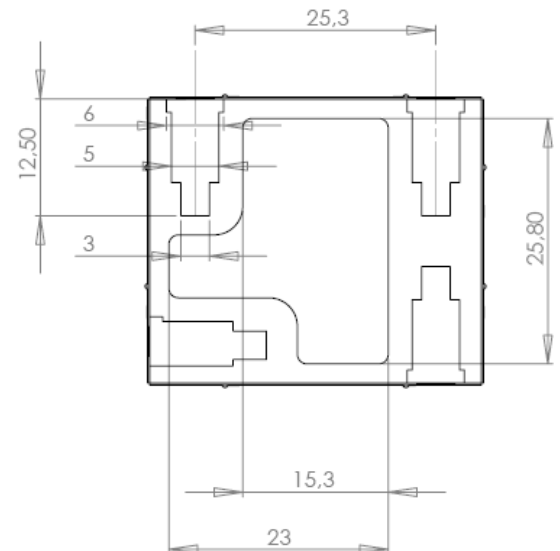
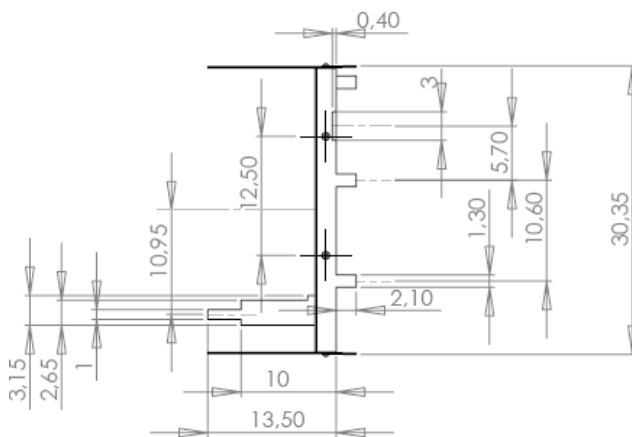
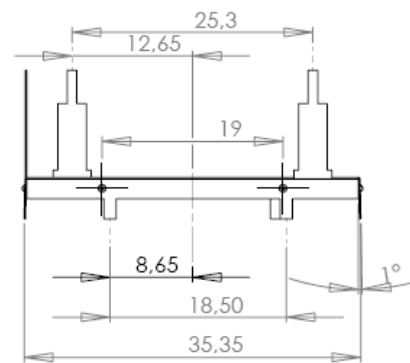
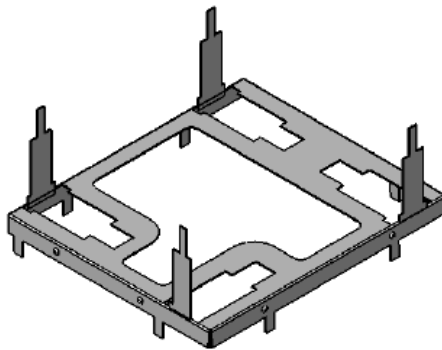
### Board to Board Main Connector

- 40 PIN connector
- 0.5mm pitch double row

#### 5.1.1 Shielding

- SHIELDING

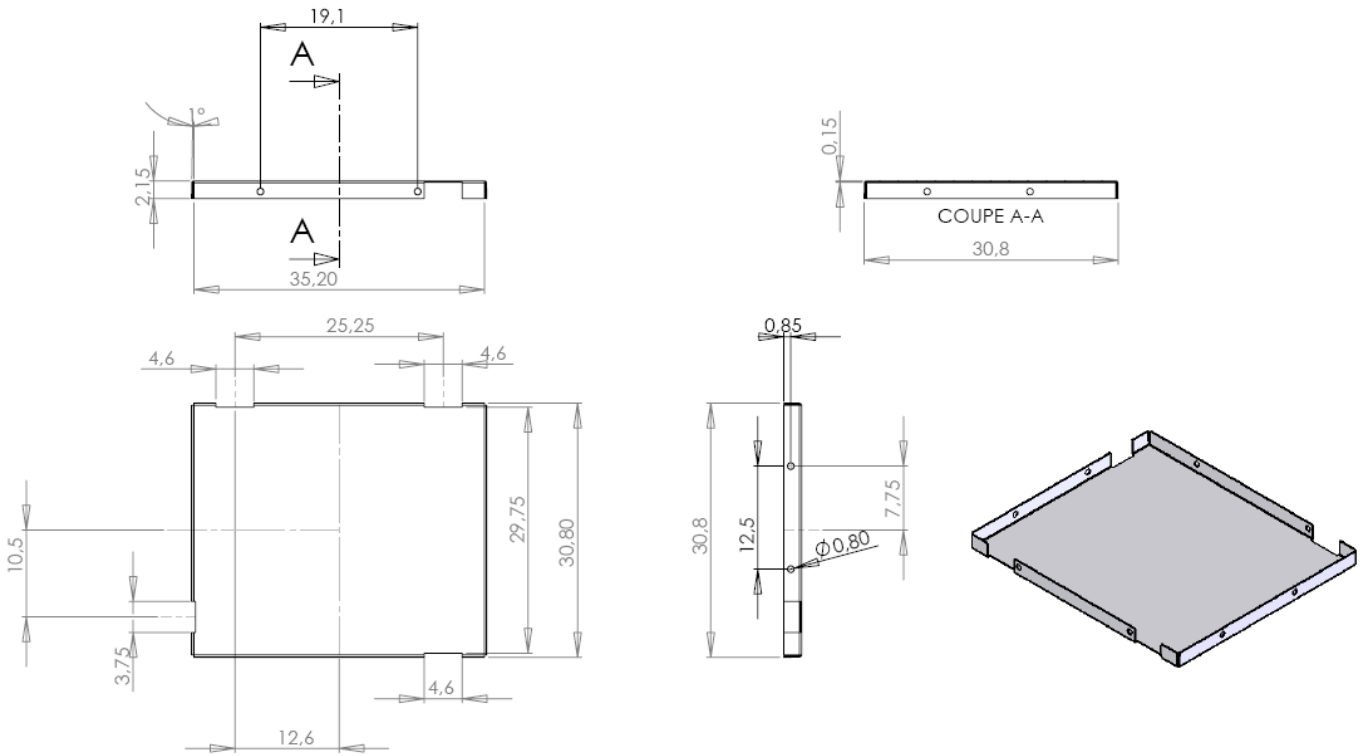
##### PART1





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**PART2**



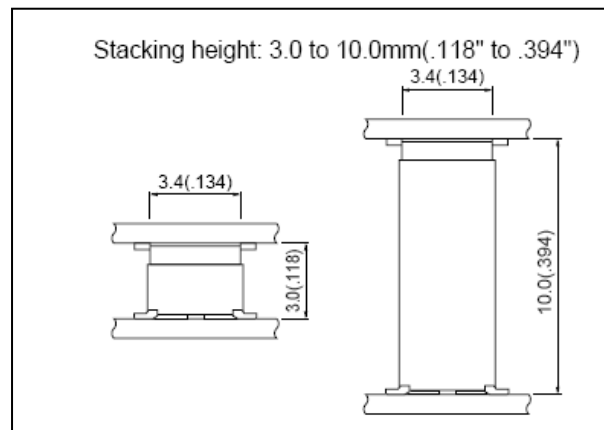
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### 5.1.2 CK5050+ versions

CK5050+ VERSIONS			
PI Number	Connector type	Bluetooth Antenna	Model
PI040114	Female (9 mm)	External	CK5050+FEA
PI040123	Male	Internal	CK5050+MIA
PI040124	Male	External	CK5050+MEA

#### ▪ CK5050+ WITH MALE CONNECTOR

- CK5050+  
40R-JMCS-G-TF from JST
- Host  
40P3.0-JMCS-G-TF  
Or  
40P10.0-JMCS-G-TF



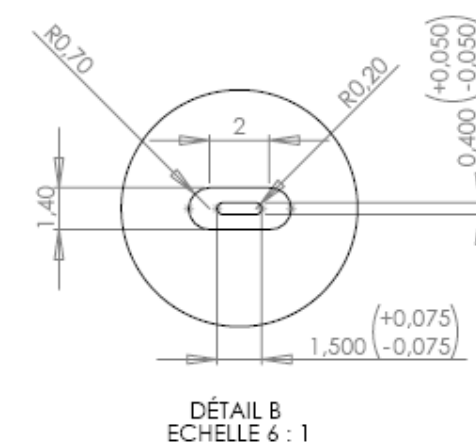
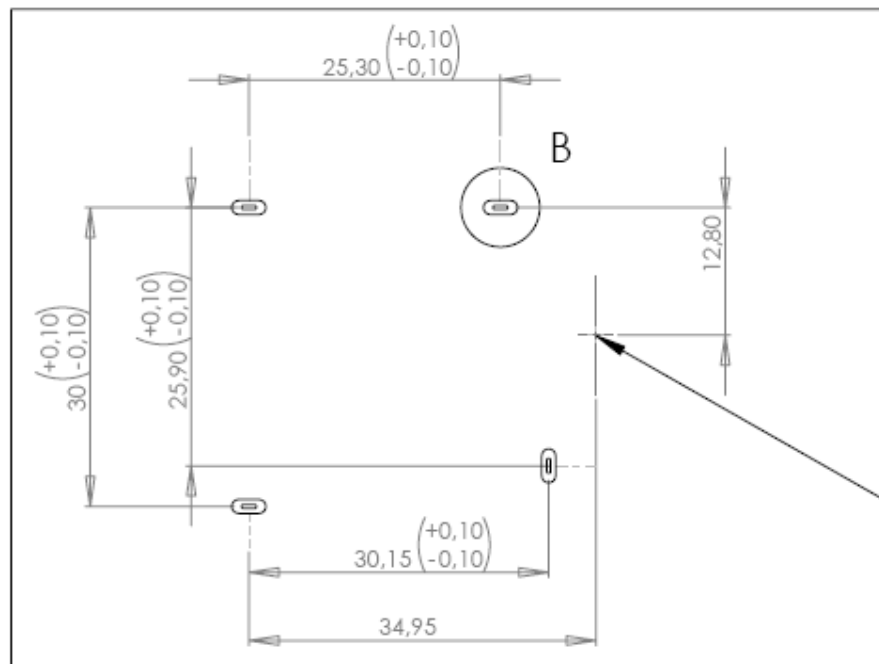
#### ▪ CK5050+ WITH FEMALE CONNECTOR

- CK5050+  
40P9.0-JMCS-G-B-TF from JST
- Host  
40RF-JMCS-G-1-TF from JST (Absorption misalignment type)

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### 5.1.3 Integration on the motherboard

TOP VIEW



Connector center

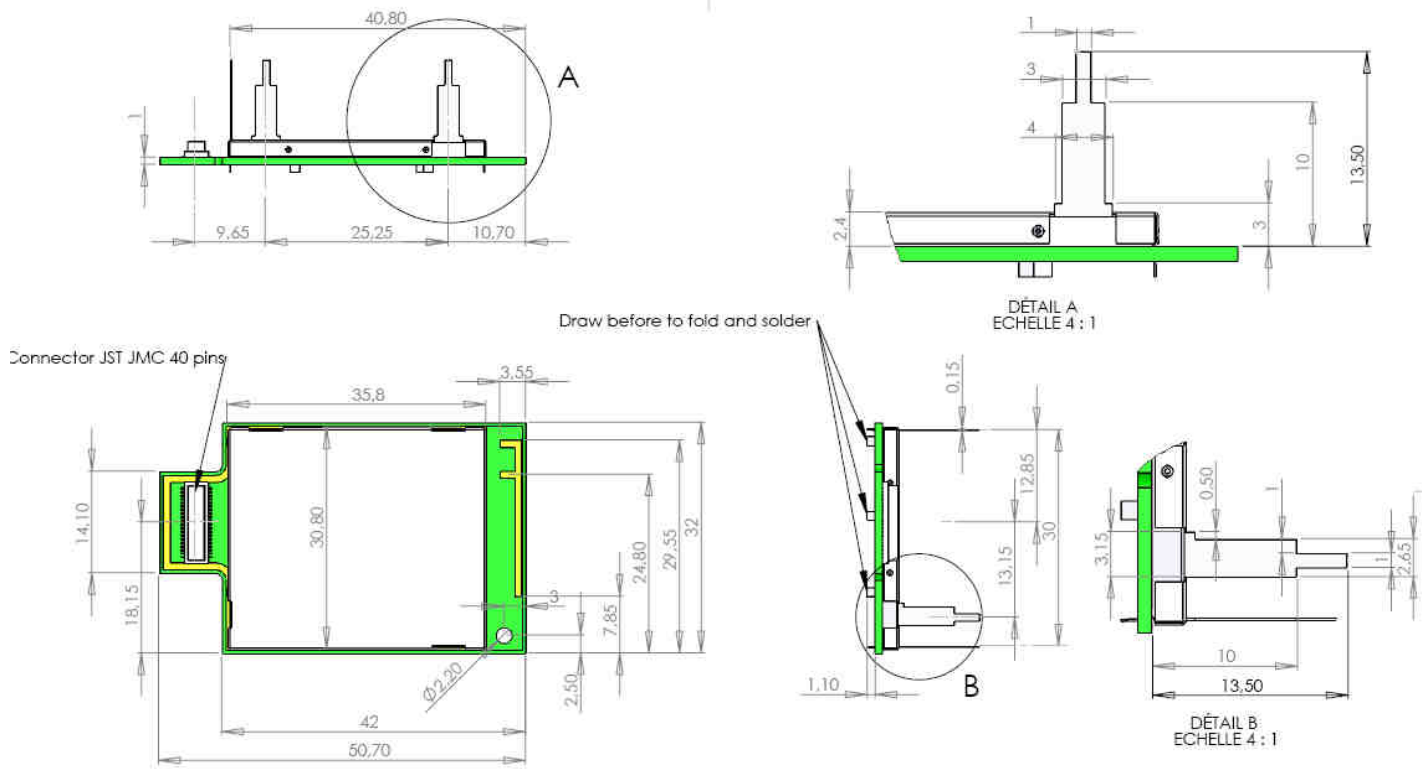
bottomview: the ground ring depend of your process.

**Notes:**

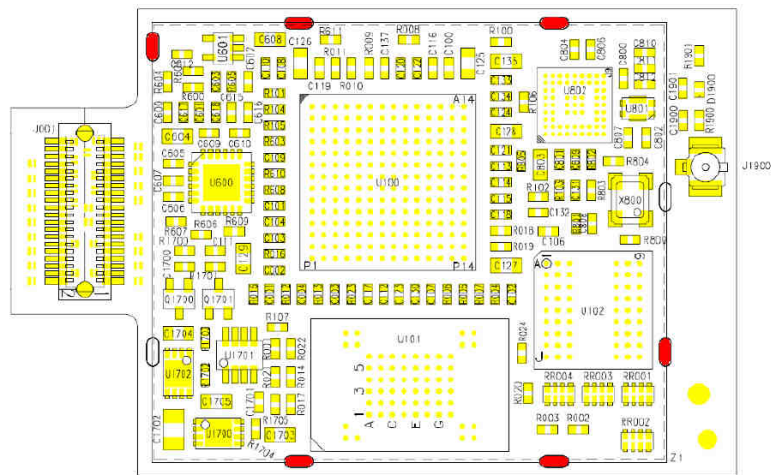
All geometry is to be derived from the CAD database.  
Critical to function dimensions called out on this drawing are only for inspection purposes



▪ CK5050+ WITH PCB ANTENNA (PI040123AA)



Mechanical dimensions (Tolerances:  $-0.1/0.1$  mm for the thickness and  $-0.2/0.2$  mm for length and the width) with internal BT antenna

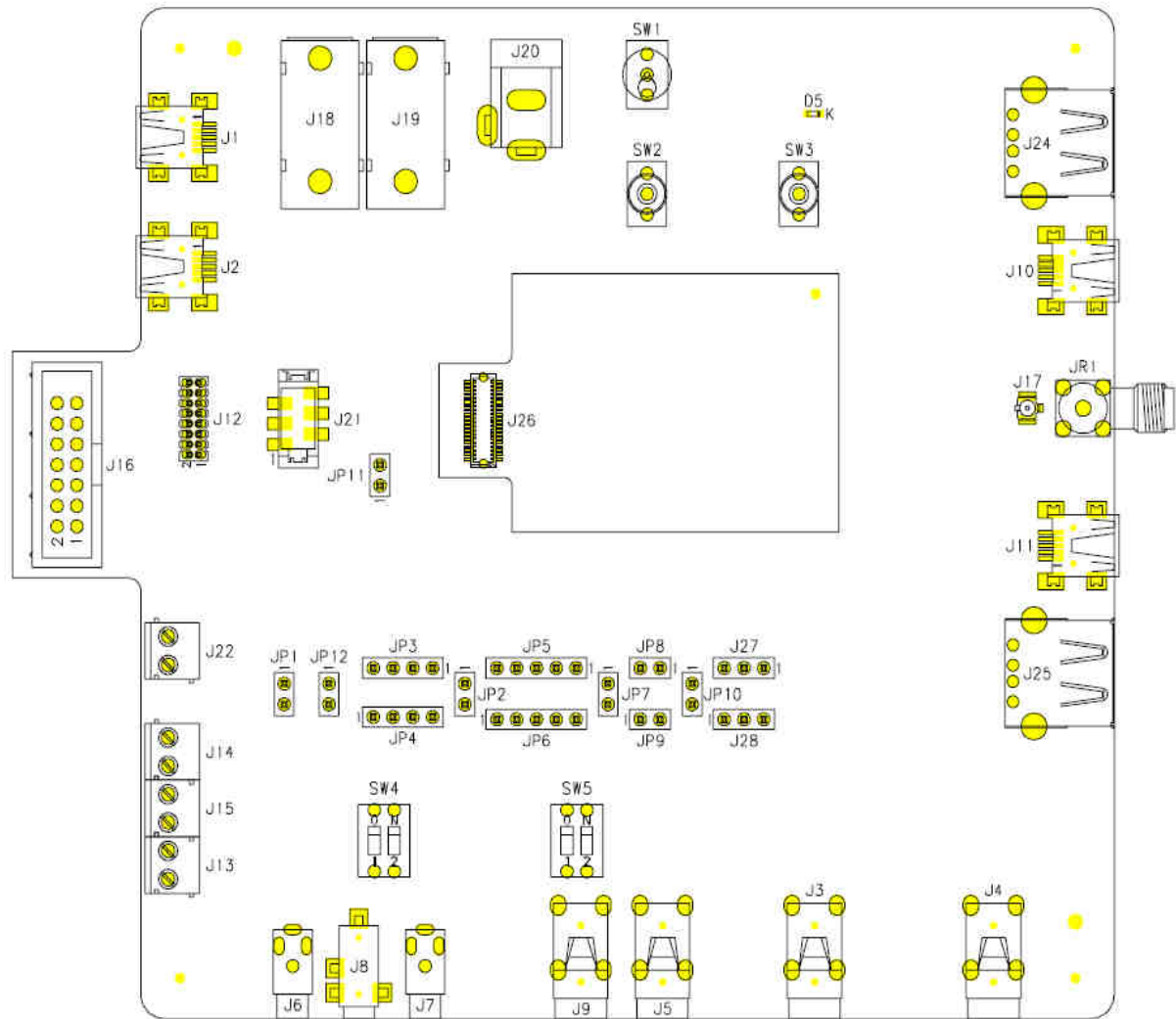


The holes highlighted are the holes where the shielding is soldered

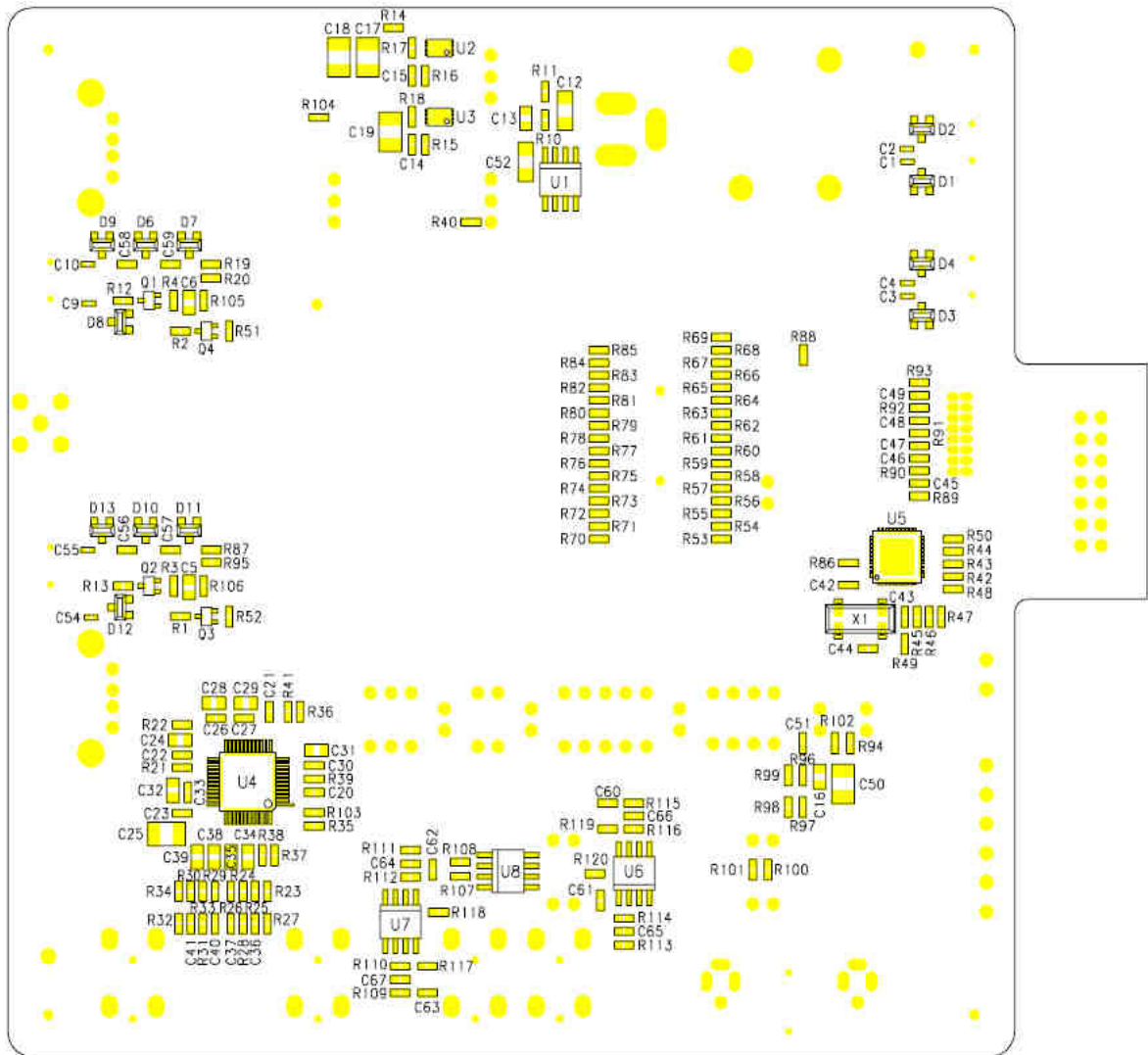


## 6 Development Tools

- Demo board available
- Host Software Interface specification
- Host software example with C++ source code.



CK5050 WORKBENCH/TOP SIDE VIEW



CK5050 WORKBENCH/BOTTOM SIDE VIEW (not released)



Prepared	<b>David COROLLEUR</b>	Title <b>CK5050+ Datasheet</b>			<b>25</b>
Approved	<b>Hocine BELKHOUDJA</b>	Date <b>15/04/08</b>	Revision <b>1.01</b>	File <b>CK5050+_Datasheet_1.03_EA.doc</b>	

## 7 FCC Requirements for module application

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FCC ID: RKXCK5050PEA06

In accordance with FCC Part 15, the CK5050+ is listed as a Limited Modular Transmitter device.

In support of the Modular Transmitter Approval, the following is stated:

- The module does have buffered modulation / data inputs.
- The module does regulate its own power supply.
- The module have its own RF shielding
- The module can be tested as a stand-alone device.
- The module is labeled with the proper FCC ID, and labeling instructions are provided to OEM end users for external product labels.
- The module does have instruction for proper use.
- The module does meet the FCC RF regulations.

Limited Modular Transmitter Approval, is granted, instead of Modular Transmitter Approval, because the following condition is not met:

- The module does not have a permanently attached antenna.

- The applicant of the final device into which the module CK5050+ is installed is not required to obtain a new authorization for this. Moreover, module CK5050+ is also submitted to CE mark, Bluetooth certification, and is considered is an automotive product. This product respects FCC part 15 C requirements for a Bluetooth application.
- Module CK5050+ is labelled with its own FCC number on its shielding, and, if the FCC ID is not visible when the module is installed inside final device, then the outside of the device into which the module is installed must also display a label referring to the enclosed module. This exterior label can use wording such as the following: “Contains Transmitter Module FCC ID: RKXCK5050PEA06” or “Contains FCC ID: RKXCK5050PEA06”. Any similar wording that expresses the same meaning may be used.

- Module CK5050+ can not be integrated in a final device which is connected to the AC power lines. It is necessary that final device must be supplied by a battery.

- FCC RF exposure requirements: This device and its antenna(s) must not be collocated or operating in conjunction with any other antenna or transmitter.

- THIS DEVICE COMPLIES WITH PART 15 OF THE FCC RULES. OPERATION IS SUBJECT TO THE FOLLOWING TWO CONDITIONS:

- (1) THIS DEVICE MAY NOT CAUSE HARMFUL INTERFERENCE, AND
- (2) THIS DEVICE MUST ACCEPT ANY INTERFERENCE RECEIVED, INCLUDING INTERFERENCE THAT MAY CAUSE UNDESIRED OPERATION.

NOTE: THE MANUFACTURER IS NOT RESPONSIBLE FOR ANY RADIO OR TV INTERFERENCE CAUSED BY UNAUTHORIZED MODIFICATIONS TO THIS EQUIPMENT. SUCH MODIFICATIONS COULD VOID THE USER'S AUTHORITY TO OPERATE THE EQUIPMENT.

Prepared	<b>David COROLLEUR</b>	Title <b>CK5050+ Datasheet</b>			<b>26</b>
Approved	<b>Hocine BELKHOUDJA</b>	Date <b>15/04/08</b>	Revision <b>1.01</b>	File <b>CK5050+_Datasheet_1.03_EA.doc</b>	

## 8 CE DECLARATION

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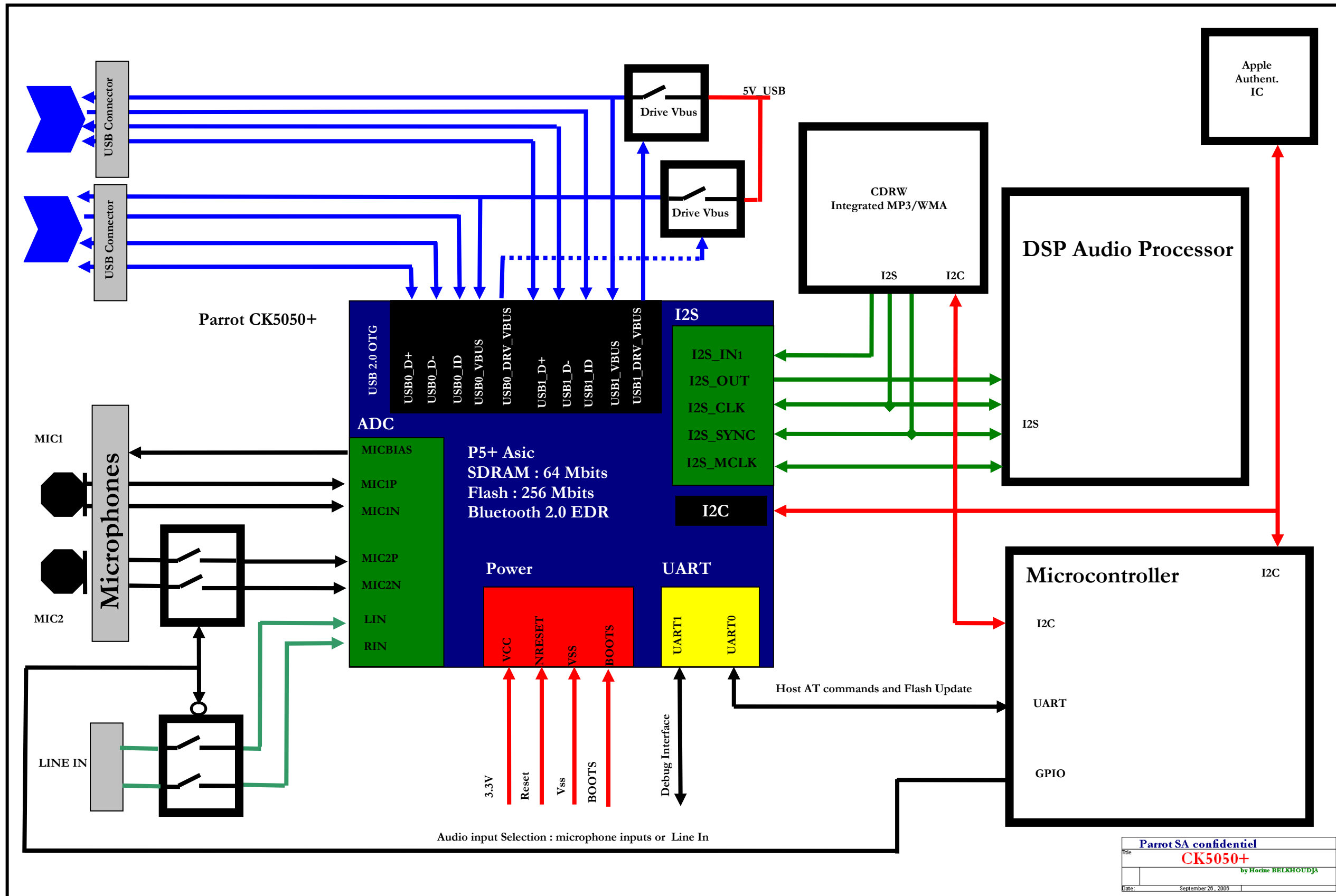
We, Parrot SA 174 quai de Jemmapes 75010 Paris France, declare under our sole responsibility that our product (Parrot CK5050+) is in conformity with the Radio and Telecommunication equipment directive 1999/5/EC R&TTE according to the essentials requirements and respect the norms listed below :

<b>3.1-a) Electrical Safety</b>	<b>EN60950-1:2001/A11:2004</b>
<b>EMF</b>	<b>EN50371 (06/2002)</b>
<b>3.1-b) EMC</b>	<b>EN301 489-17 V1.2.1</b>
<b>3.2 Radio</b>	<b>EN300 328 V1.7.1</b>

Paris, September 9th , 2008

Qualification Manager

Arezki Guerrab



Parrot SA confidentiel  
**CK5050+**  
 by Hocine BELKHOUDJA  
 Date: September 26, 2006