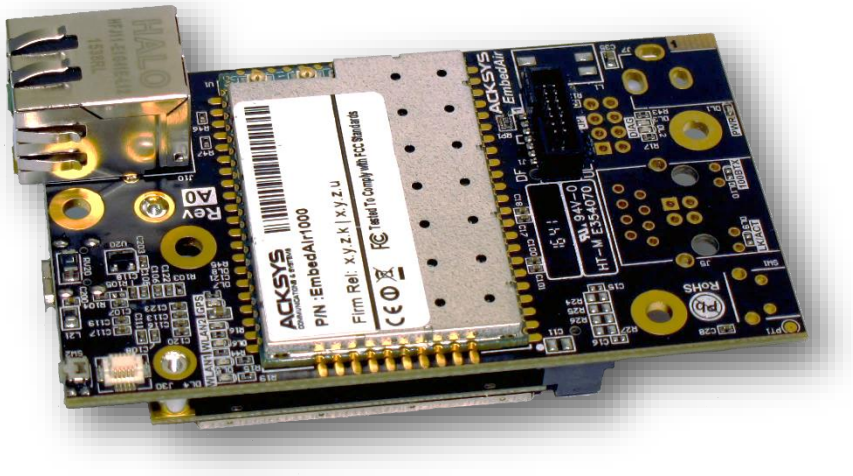

EmbedAir1000
HARDWARE MANUAL

ACKSYS
COMMUNICATIONS & SYSTEMS

EmbedAir1000 HARDWARE MANUAL

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TABLE OF CONTENTS

I INTRODUCTION

This hardware documentation applies to the following products:

- EmbedAir1000/R2 (Dual WiFi & RJ version)
- EmbedAir1000/R7 (WiFi, 4G & RJ version)
- EmbedAir1000/T2 (Dual WiFi & TTL version)
- EmbedAir1000/T7 (WiFi, 4G & TTL version)

Together with the "WaveOS User Guide (ref DTUS070)", it covers product installation, configuration and usage, and general information about Wi-Fi protocols.

This hardware manual describes equipment installation, such as power supplies, dimensions and connectors.

The "WaveOS User Guide (DTUS070)" describes the configuration and use of the equipment.

Regulatory information / Disclaimers

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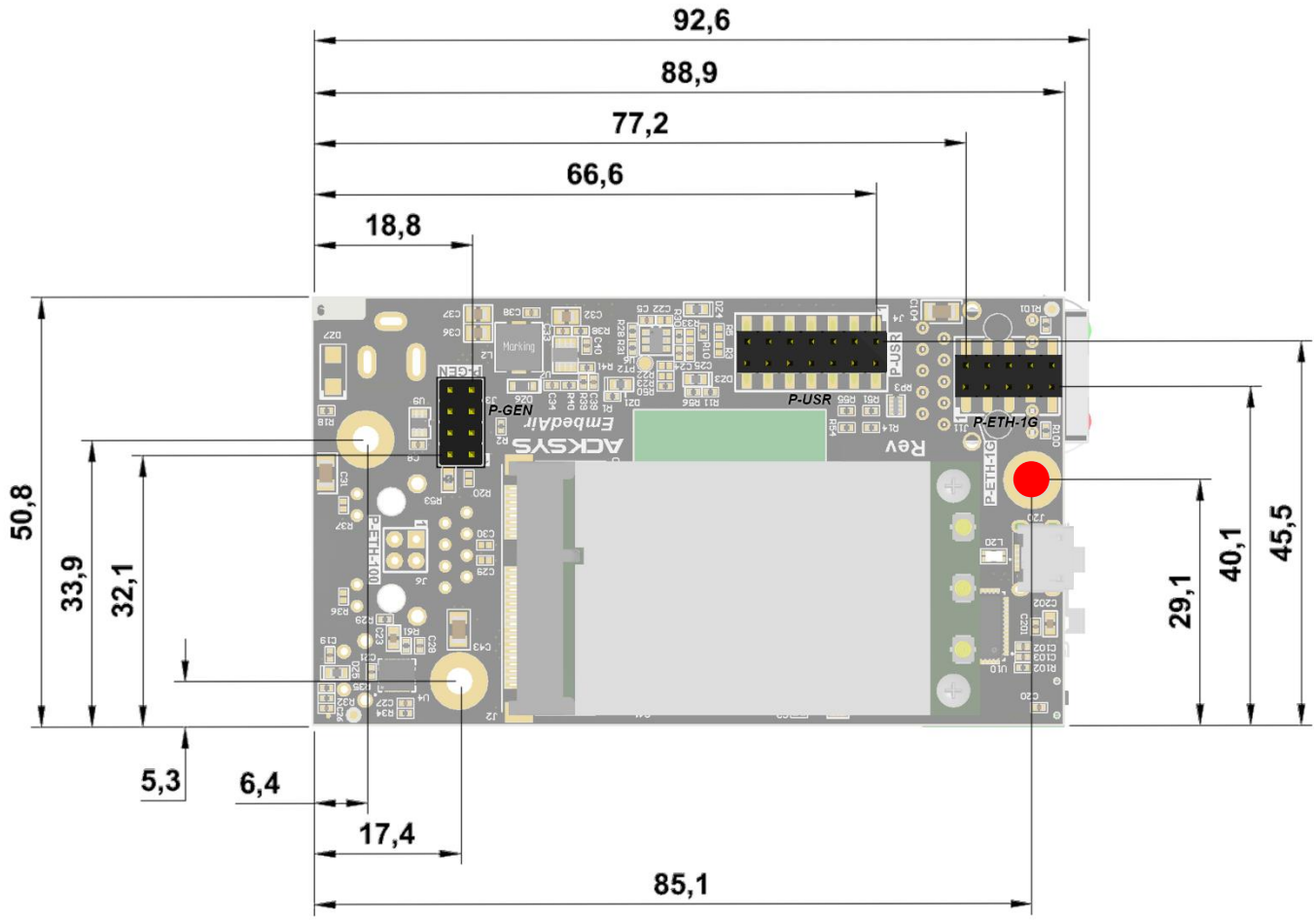
This product might include unintentional technical or typographical errors. Changes are periodically made to the information herein to correct such errors and these changes are incorporated in new editions of the publication.

II MECHANICAL DIMENSIONS

Bottom view

All dimensions in mm ± 0.2



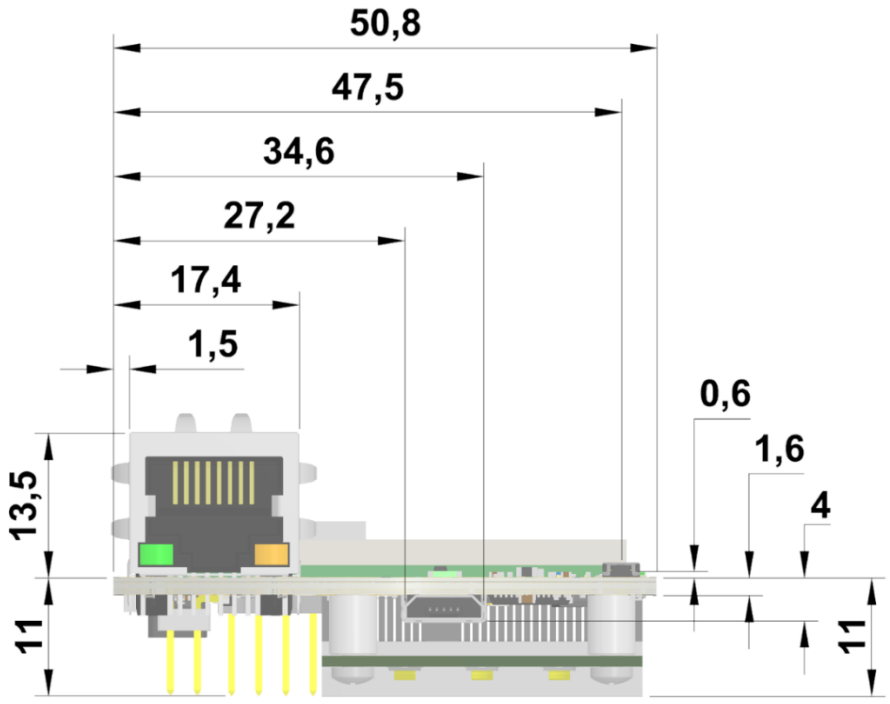
Mounting holes (3 x Ø3.2mm) isolated from GND and connected to RJ45 shielding

For /R7 and /T7 version, the hole in red is replaced by a M3 female standoff

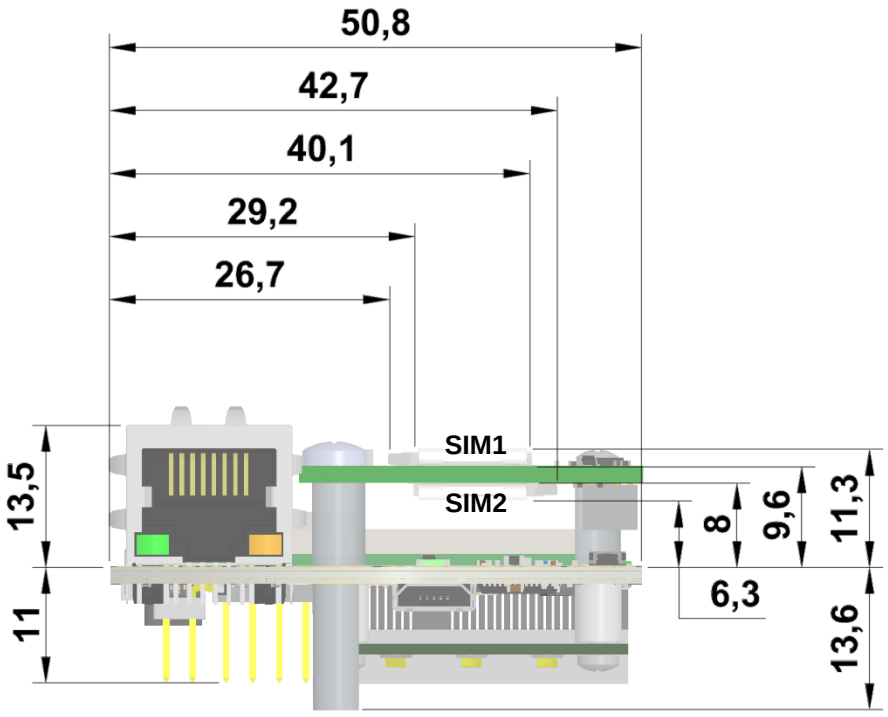
Front view

All dimensions in mm ± 0.2

II



For all versions



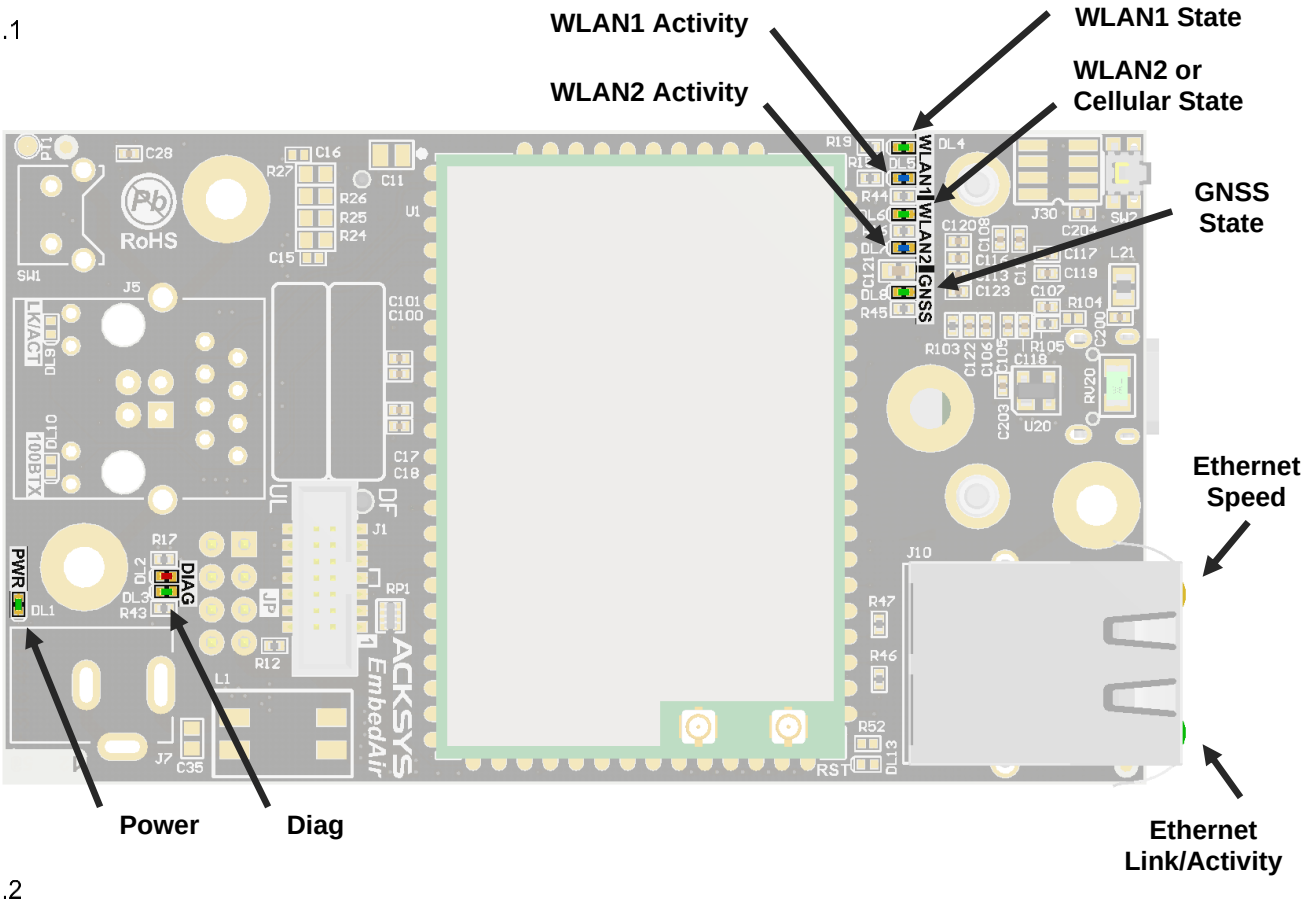
SIMs & standoff for /R7 and /T7 versions

III LEDS AND BUTTON

Leds

The leds are directly available on the EmbedAir1000:

III.1



III.2

Signals relocation

All the leds and button are also made available to the host motherboard via the P-GEN (J3) & P-USR (J4) connectors (see information in the following chapters) in order to be used in your own way.

III.2.1 Power

GREEN while powered on

III.2.2 Diag

GREEN when product is OK and initialized
RED during initialization (~ 40 seconds)
Flashing when firmware in flash is not valid
OFF or RED for more than 2min: Hardware/Software failure

III.2.3 WLAN (1/2) State

Fixed GREEN when radio is associated
Flashing GREEN when unassociated

For /R7 and /T7 version (Cellular 4G), WLAN2 LED is used for Cellular card

III.2.4 WLAN (1/2) Activity

Flashing BLUE when there is activity on radio (sending or receiving) or during the search for a Wi-Fi access point (only in "Bridge Mode")

For /R7 and /T7 version (Cellular 4G), WLAN2 LED is used for Cellular card

III.2.5 Ethernet Speed

OFF when Ethernet connection is negotiated in **10 or 100** MBit/s
YELLOW when Ethernet connection is negotiated in **1000** MBit/s

Available at the same location either directly on the board (for TTL version) or on the RJ connector (for RJ version)

III.2.6 Ethernet Link/Activity

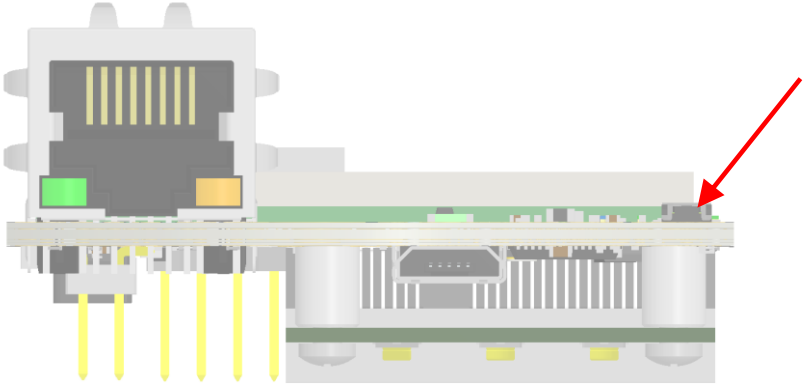
Fixed GREEN when link is established with another Ethernet product
Flashing GREEN when there is activity on Ethernet (sending or receiving)

Available at the same location either directly on the board (for TTL version) or on the RJ connector (for RJ version)

III.2.7 GNSS State

OFF when GNSS is disabled
Fixed GREEN when position is established (3 satellites are viewed at least)
Flashing GREEN when position is being searched (less than 3 satellites are viewed)

III.3 Reset



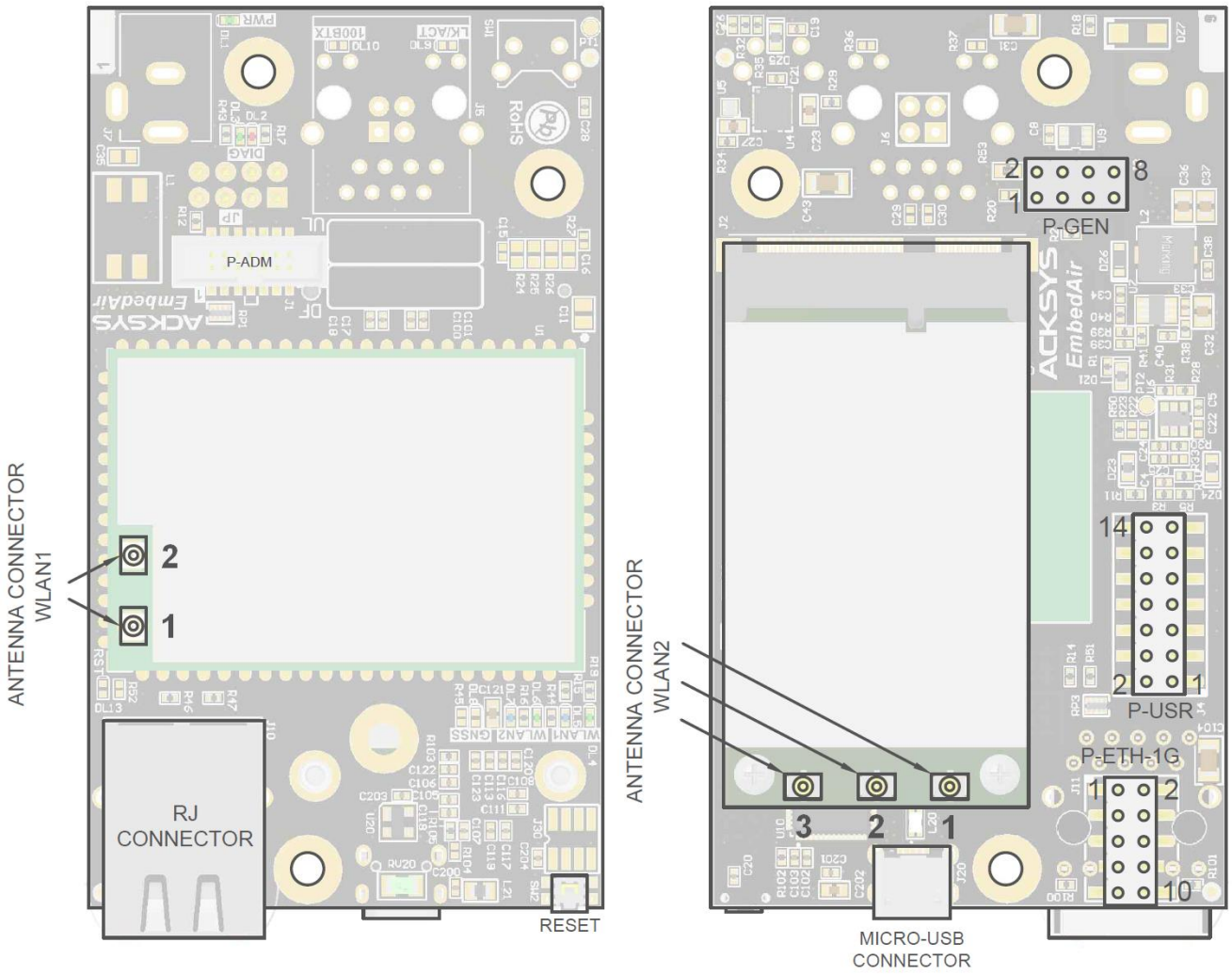
The Reset button allows you to re-start the product or reconfigure it to default factory settings (see "WaveOS User Guide - DTUS070" for more information)

IV EVALUATION BOARD

An evaluation board, called EmbedAir/CB, is available separately. Please see DTFRUS057 for information

V WIRING CONNECTORS

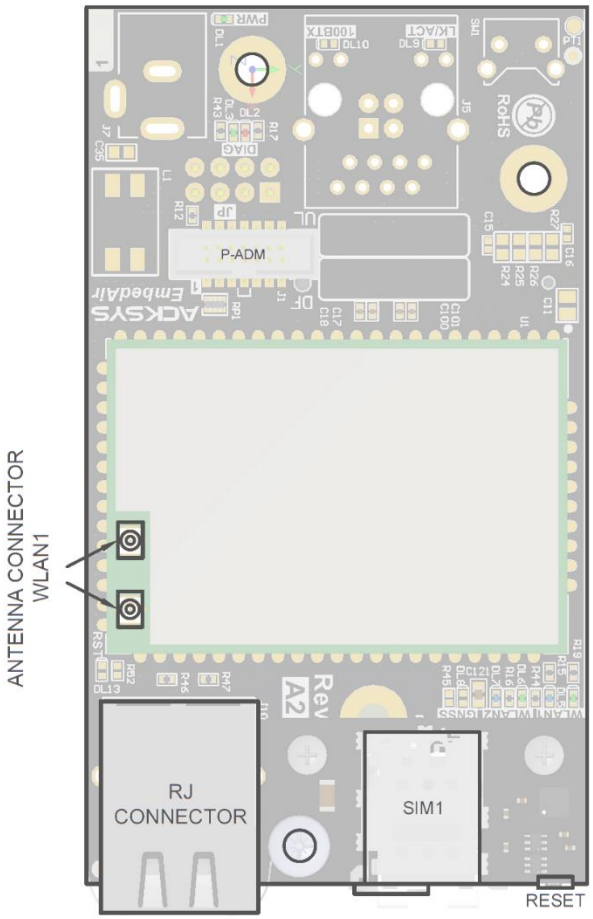
Pinout for /R2 and /T2 versions



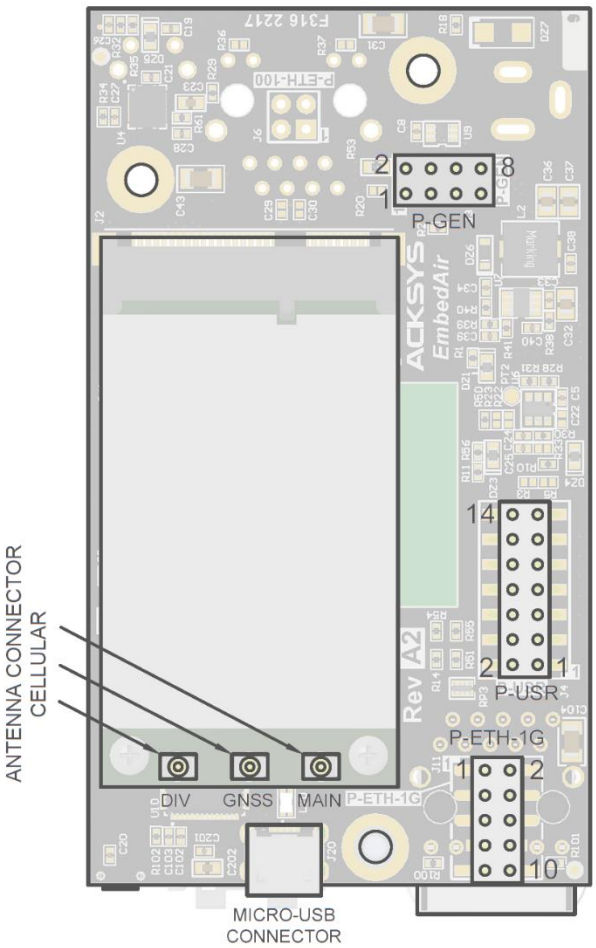
Top view

Bottom view

Pinout for /R7 and /T7 versions



Top view



Bottom view

P-GEN (J3)

HE10/HE13/HE14/Strip Male Header 2.54mm pitch, 2x4 pins

- Compatible with HE10/HE13/HE14 Female Receptacle
  (ex: SAMTEC Series BCS, BSW, ESQ, ESW...)
  (ex: ANTELEC Series APC104, FT2...)

V.3

Pin	In / Out	Function	Voltage	Max current for /R2 & /T2	Max current for /R7 & /T7
1	-	*Not used, should not be connected*	-	-	-
2	Out	3V3 (for LEDs or reference only)	+3.3V	100 mA	100 mA
3	-	*Not used, should not be connected*	-	-	-
4	Open drain Out	LED WLAN1 Activity	active at 0V	15 mA	15 mA
5	Open drain Out	LED Diag	"Green" at 0V	15 mA	15 mA
6	In	Reset	active at 3.3V	20 µA	20 µA
7	In	Power +5V	**+5V ± 0.25**	1.1 A 2.4 A peak	1.1 A 1.7 A peak
8	-	Power GND	**0V**		

WARNING : You must take care of the polarity of the power supply source. There is no protection on this product.

P-USR (J4)

HE10/HE13/HE14/Strip Male Header 2.54mm pitch, 2x3 pins

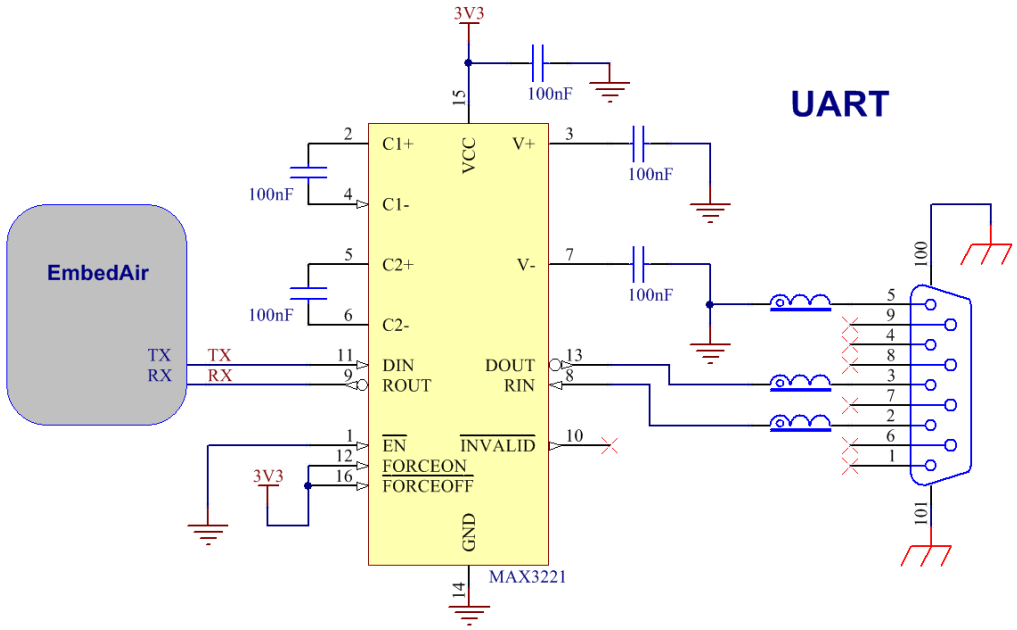
- Compatible with HE10/HE13/HE14 Female Receptacle
  (ex: SAMTEC Series BCS, BSW, ESQ, ESW...)
V.4 (ex: ANTELEC Series APC104, FT2...)

- This connector is not needed for common use of the EmbedAir1000. It only provides some additional functions.

I²C and UART1&2 should be only used with ACKSYS authorization. Their incorrect use could irremediably corrupt the product and void all pertaining guaranty.

Pin	In / Out	Function	Description	Voltage	Max current
1	Open drain Out	SCL	For I²C *(Address 0x48, 0x62, 0x74 already used and polled regularly. Linux I²C driver, support for /dev/i2c-0, I2C leds and gpios, PCA and PCF algorithms)*	0-3.3V	-
3		SDA			
5	In	RX1	For UART1, Reserved for factory testing, do not use	0-3.3V	-
7	Out	TX1			
9	In	RX2	User UART2, May be left unconnected if not used	0-3.3V	-
11	Out	TX2			
13	Out	RTS2			
14	In	CTS2			
2	Open drain Out	LED WLAN1 State	State of WiFi 1	active at 0V	15 mA
4	Open drain Out	LED WLAN2/Cellular State	State of WiFi 2 or Cellular	active at 0V	15 mA
6	Open drain Out	LED WLAN2/Cellular Activity	Activity on WiFi 2 or Cellular	active at 0V	15 mA
8	Open drain Out	LED GNSS State	State of GNSS	active at 0V	15 mA
10	Out	LED Ethernet Link/Activity		active at 0V	2 mA
12	Out	LED Ethernet Speed		active at 0V	2 mA

Example of wiring for UART with RS232 transceiver and DB9 male connector (DTE mode):



RJ CONNECTOR (J10)

V.5

LAN-Transformer RJ45 10/100/1000 Base T

Only available on RJ version

It allows connecting a classical Ethernet cable (*cat 5e* or *cat 6* for 1000 BaseT)

V.6

Micro-USB CONNECTOR (J20)

Micro-USB 2.0 Type B Connector

This connector gives the possibility of electrically powering the module (instead of using P-GEN connector), or connecting a USB device *(under ACKSYS authorization for control and driver)*.

Warning: It is necessary to power the module from a USB source with a minimum current of 2.4A. Consequently, it cannot be powered from a computer or an USB hub, limited to 500mA or 900mA !
AC/DC power adapter must be used in this case. But 900 mA is enough to only use the built in 11n WiFi interface.
In case of failure of the product, always check the voltage level on the module itself, the minimum voltage is 5V-5% = 4,75V. In some cases the resistance and the length of the USB cable used with the power supply can cause a voltage drop below 4.75V.
This can be avoided by choosing a USB power adapter able to provide 5.25V. By this way, it will happily work at the full current range, no matter what cable you use!

P-ETH-1G (J11)

HE10/HE13/HE14/Strip Male Header 2.54mm pitch, 2x5 pins

Only available on TTL version

- Compatible with HE10/HE13/HE14 Female Receptacle (ex: SAMTEC Series BCS, BSW, ESQ, ESW and ANTELEC Series APC104, FT2…)

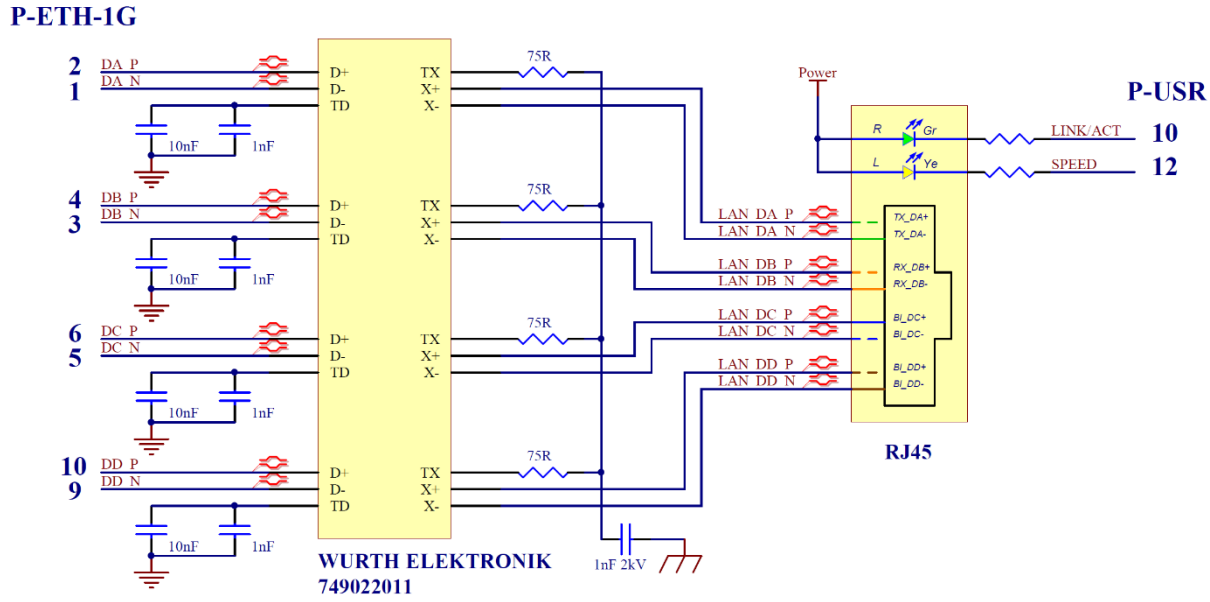
V.7

This connector gives directly raw signals from the Ethernet PHY component, without insulation. The PHY used on the EmbedAir1000 is *88E1512* from *Marvell.*

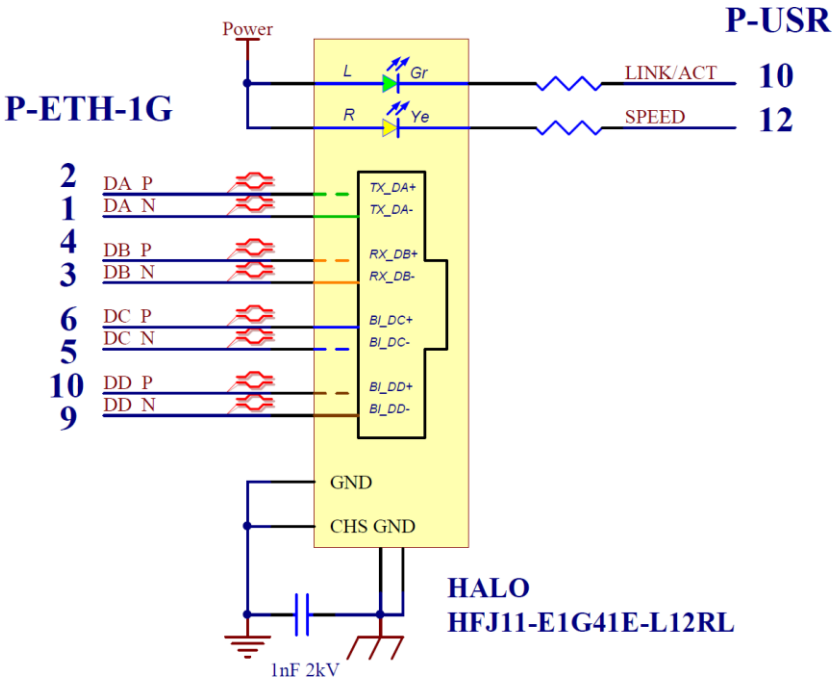
These signals can be used to relocate a RJ45 Plug far away in your system. The signals should be correctly insulated, routed with wires of equal lengths and with 100 ohms differential impedance, especially with long distance. You can see at the next page some examples of insulation for these signals

You can also connect two PHY together by using two transformers (using two times "Example 1", for each PHY)

Example 1 : with Transformer and RJ separated



Example 2 : with transformer included in RJ



ANTENNA CONNECTOR

For all versions :
2 x U.FL male connectors, from Hirose, for WiFi 1 (WLAN1)
Antenna connector #1 : Antenna 1 (RF chain 1)
Antenna connector #2 : Antenna 2 (RF chain 2)

V.8

For /R2 & /T2 versions :
3 x U.FL male connectors, from Hirose, for WiFi 2 (WLAN2)
Antenna connector #1 : Antenna 1 (RF chain 1)
Antenna connector #2 : Antenna 2 (RF chain 2)
Antenna connector #3 : Antenna 3 (RF chain 3)

For /R7 & /T7 versions :
3 x U.FL male connectors, from Hirose, for Cellular and GNSS
Antenna connector #Main : Cellular Main
Antenna connector #GNSS : GNSS
Antenna connector #Div : Cellular Diversity

Connect WiFi antenna connectors to 2.4/5GHz antennas with 50ohms coaxial cable (with U.FL female connector according to radio card)

- 2 antennas must be used for WiFi 1 to achieve max. performance (11n with 2 streams).
- 3 antennas must be used for WiFi 2 to achieve max. performance (11 ac with 3 streams).

Connect Cellular antenna connectors to 2G/3G/4G antennas according the frequency used, with 50ohms coaxial cable (with U.FL female connector according to radio card)

Connect GNSS antenna connector to special GNSS active antenna with 50ohms coaxial cable (with U.FL female connector according to radio card)

WARNING: Verify that antennas hardware configuration matches with software configuration (see "WaveOS User Guide" ref DTUS070). If not, it may disturb and reduce performances of radio module.

SIM SLOTS

/R7 & /T7 versions have 2 slots for Nano-SIM (4FF) :
- Up : SIM1
- Down : SIM2

V.9 With a little non-metallic spike, push the little tab at the left (SIM1) or the right (SIM2) of the slot: It will unlock the tray
Put your Nano-SIM inside the tray, with electrical connections on the top.
Push the tray with Nano-SIM inside the slot, until you feel a “click” and until the little tab gets back.

WARNING the direction is different according the slot:
- **for SIM1, Tray upside down (Nano-SIM on the bottom)**
- **for SIM2, Tray right side up (Nano-SIM on the top)**

If the tray doesn’t enter well, don’t force on it and verify the direction of the slot.

P-ADM (J1)

V.10 This connector, present on the board, is voluntarily not documented and shouldn't be used/connected.

VI MOUNTING OF THE DEVICE

VI.1

Standard mounting

Plug the EmbedAir1000 at a height of 12mm minimum from your motherboard, with the previously indicated connectors.

On /R7 and /T7 versions, one of the holes is already mounted with a 12mm M3 female standoff (see II.1 chapter). If you need more than 12mm between your motherboard and the product, you can change it by another longer standoff.

VII DEFAULT CONFIGURATION

- **Ethernet** :
  - Auto-negotiation
  - Auto-crossing

- **Wi-Fi 1**:
  - Disabled
  - Mode: Access Point
  - Wi-Fi: 802.11n, HT20, 5GHz band
  - Channel: 36
  - SSID: acksys *(broadcast)*
  - Security: *disabled*

- **Wi-Fi 2**:
  - Disabled
  - Mode: Access Point
  - Wi-Fi: 802.11ac, HT20, 5GHz band
  - Channel: 36
  - SSID: acksys *(broadcast)*
  - Security: *disabled*

- Cellular:
  - Disabled
  - SIM choice : SIM1

- Web Server IP address:

http://192.168.1.253

More information about configuration is provided in the document "WaveOS User Guide - DTUS070".

VIII TECHNICAL CHARACTERISTICS

Mechanical characteristics	
Dimensions (w/o antennas)	EmbedAir1000/R2 & /R7 (RJ versions) L x l x h = 92.6 x 50.8 x 27.2 mm L x l x h = 3.62 x 1.97 x 1.06 in EmbedAir1000/T2 & /T7 (TTL version) L x l x h = 92.6 x 50.8 x 26.5 mm L x l x h = 3.62 x 1.97 x 1.02 in
Weight	/R2 version **:** max 47 g (1.66 oz) /T2 version **:** max 42 g (1.48 oz) /R7 version **:** max 57 g (2.01 oz) /T7 version **:** max 52 g (1.83 oz)
Enclosure	None
Operating temperatures ranges	/R2 & /T2 versions: -40 to +70°C /R7 & /T7 versions: -35 to +75°C in standard features (3GPP Compliant), until -40 to +75°C in extended range *(The module remains the ability to establish and maintain SMS and data transmission. There is no unrecoverable malfunction. There are also no effects on radio spectrum and no harm to radio network. Only one or more parameters like Pout might reduce in their value and exceed the specified tolerances. When the temperature returns to normal operating temperature levels, the module will meet 3GPP specifications again.)*
Status indicators	9 LEDs: see LEDs definition section
Push button	Short push, anytime: → Reset Long push (> 2 sec.): - while operating: → Restore factory settings - while in emergency upgrade mode: → Restore factory settings - at startup: → Enter emergency upgrade

Power supply Input	
Voltage	5V ± 0.25V power supplies, without polarity protection. 5.5W max average *(12W peak for /R2 & /T2 versions, 8.5W peak for /R7 & /T7 versions)*
Inrush current	4.5A < 20µs *for /R2 & /T2 versions* 1.4A < 100µs *for /R7 & /T7 versions*

Software	
Device configuration	Automatic device discovery Built in web based utility for easy configuration from any web browser (username/password protection & https)
Firmware upgrade	Yes (via web browser)
SNMP	SNMP V1, V2C, V3
Operating mode	AP (Access Point)/ Repeater, Bridge/Client, Mesh, WDS
AP mode only	
Network topology	Infrastructure or mesh modes
Security	WEP, WPA-PSK/WPA2-PSK, WPA/ WPA2 with 802.1x authenticator, SSID visibility status.
Client/Bridge mode only	
Network topology	infrastructure mode, ad-hoc mode
Security	WEP, WPA-PSK, WPA2-PSK. 802.1x supplicant. AES/TKIP/WEP by hardware encryption
Mesh mode only	
Network topology	mesh mode
Security	WEP, WPA-PSK, WPA2-PSK. 802.1x supplicant. AES/TKIP/WEP by hardware encryption

Ethernet interface	
Number of ports	1
Type of ports	10 BASE T, 100 BASE Tx or 1000 BASE T automatic negotiation (HDX/FDX,10/100 Mbps), auto MDI/MDI-X
Connector	RJ45 for EmbedAir1000/R2 and /R7 "Free use" for EmbedAir1000/T2 and /T7

Wi-Fi 1 interface		
Radio modes	Support for IEEE 802.11a/h, 802.11b, 802.11g and 802.11n.	
Chipset	Qualcomm QCA95xx	
Data rates	802.11n : up to 300 Mbps 802.11a/h : 6 to 54 Mbps 802.11b : 1 to 11 Mbps 802.11g : 1 to 54 Mbps	
Frequency band for 802.11a/n	5 GHz; 5.170 to 5.835 GHz	
Frequency band for 802.11b/g/n	2.4 GHz; 2.402 to 2.494 GHz	
Antennas & Connectors	2 x U.FL male connector *Delivered without antennas*	
Radio specifications for WiFi 1 :		
Tx output power (Radio card output per chain)	802.11n HT20 2.4GHz band	20.5 dBm @ 7.2 Mbps (MCS 0) 18 dBm @ 72.2 Mbps (MCS 7)
	802.11n HT40 2.4GHz band	20.5 dBm @ 15 Mbps (MCS 0) 18 dBm @ 150 Mbps (MCS 7)
	802.11n HT20 5GHz band	18 dBm @ 7.2 Mbps (MCS 0) 15 dBm @ 72.2 Mbps (MCS 7)
	802.11n HT40 5GHz band	18 dBm @ 15 Mbps (MCS 0) 15 dBm @ 150 Mbps (MCS 7)
	Value for 1 stream, add 3 dBm for 2 streams	
Rx sensitivity (Radio card input)	802.11n HT20 2.4GHz band	-92 dBm @ 7.2Mbps (MCS 0) -76 dBm @ 72.2Mbps (MCS 7)
	802.11n HT40 2.4GHz band	-90 dBm @ 15 Mbps (MCS 0) -73 dBm @ 150 Mbps (MCS 7)
	802.11n HT20 5GHz band	-96 dBm @ 7.2Mbps (MCS 0) -75 dBm @ 72.2Mbps (MCS 7)
	802.11n HT40 5GHz band	-91 dBm @ 15 Mbps (MCS 0) -72 dBm @ 150 Mbps (MCS 7)

Wi-Fi 2 interface		
Radio modes		Support for IEEE 802.11a/h, 802.11b, 802.11g, 802.11n and 802.11ac.
Chipset		Qualcomm QCA98xx
Data rates		802.11ac : up to 1300Mbps 802.11n : up to 450 Mbps 802.11a/h : 6 to 54 Mbps 802.11b : 1 to 11 Mbps 802.11g : 1 to 54 Mbps
Frequency band for 802.11a/n		5 GHz; 5.170 to 5.835 GHz
Frequency band for 802.11b/g/n		2.4 GHz; 2.402 to 2.494 GHz
Antennas & Connectors		3 x U.FL male connector, *delivered without antennas*
Radio specifications for WiFi 2 :		
Tx output power (Radio card output per chain)	802.11b 2.4GHz band	20 dBm @ 1 Mbps 20 dBm @ 11 Mbps
	802.11g 2.4GHz band	21 dBm @ 6 Mbps 18 dBm @ 54 Mbps
	802.11a 5GHz band	20 dBm @ 6 Mbps 15 dBm @ 54 Mbps
	802.11n HT20 2.4GHz band	21 dBm @ 7.2 Mbps (MCS 0) 16 dBm @ 72.2 Mbps (MCS 7)
	802.11n HT40 2.4GHz band	20 dBm @ 15 Mbps (MCS 0) 16 dBm @ 150 Mbps (MCS 7)
	802.11n/ac VHT20 5GHz band	19 dBm @ 7.2 Mbps (MCS 0) 14 dBm @ 72.2 Mbps (MCS 7) 13 dBm @ 86.7 Mbps (VHT MCS 8)
	802.11n/ac VHT40 5GHz band	18 dBm @ 15 Mbps (MCS 0) 14 dBm @ 150 Mbps (MCS 7) 13 dBm @ 200 Mbps (VHT MCS 9)
	802.11ac VHT80 5GHz band	18 dBm @ 32.5 Mbps (MCS 0) 14 dBm @ 325 Mbps (MCS 7) 13 dBm @ 433.3 Mbps (VHT MCS 9)
	Value for 1 chain, add 3 dBm for 2 chains, 5 dBm for 3 chains Tolerance ± 2 dB	
Rx sensitivity (Radio card input)	Antenna configuration	Typical/max (3 Rx)
	802.11b 2.4GHz band	-95 dBm @ 1 Mbps -90 dBm @ 11 Mbps
	802.11g 2.4GHz band	-94 dBm @ 6 Mbps -80 dBm @ 54 Mbps
	802.11a 5GHz band	-94 dBm @ 6 Mbps -80 dBm @ 54 Mbps
	802.11n HT20 2.4GHz band	-94 dBm @ 7.2 Mbps (MCS 0) -77 dBm @ 72.2 Mbps (MCS 7)
	802.11n HT40 2.4GHz band	-93 dBm @ 15 Mbps (MCS 0) -75 dBm @ 150 Mbps (MCS 7)
	802.11n/ac VHT20 5GHz band	-93 dBm @ 7.2 Mbps (MCS 0) -73 dBm @ 72.2 Mbps (MCS 7) -71 dBm @ 86.7 Mbps (VHT MCS 8)
	802.11n/ac VHT40 5GHz band	-90 dBm @ 15 Mbps (MCS 0) -73 dBm @ 150 Mbps (MCS 7) -68 dBm @ 200 Mbps (VHT MCS 9)
	802.11ac VHT80 5GHz band	-89 dBm @ 32.5 Mbps (MCS 0) -72 dBm @ 325 Mbps (MCS 7) -68 dBm @ 433.3 Mbps (VHT MCS 9)
	Tolerance ± 2 dB	

Cellular interface		
Category	4	
Chipset	Qualcomm	
Data rates	LTE: LTE FDD: Max 150Mbps (DL)/Max 50Mbps (UL) LTE TDD: Max 130Mbps (DL)/Max 30Mbps (UL) UMTS: DC-HSDPA: Max 42Mbps (DL) HSUPA: Max 5.76Mbps (UL) WCDMA: Max 384Kbps (DL)/Max 384Kbps (UL) GSM: EDGE: Max 296Kbps (DL)/Max 236.8Kbps (UL) GPRS: Max 107Kbps (DL)/Max 85.6Kbps (UL)	
Band	LTE TDD: B1/B2/B3/B4/B5/B7/B8/B12/B13/B18/B19/B20/B25/B26/B28 LTE TDD: B38/B39/B40/B41 WCDMA: B1/B2/B4/B5/B6/B8/B19 GSM: B2/B3/B5/B8	
GNSS	GPS/GLONASS/BeiDou/Galileo/QZSS (Optional)	
Antennas & Connectors	3 x U.FL male connector *Delivered without antennas*	
Radio specifications for Cellular :		
Tx output power	Class 3 (23dBm±2dB) for LTE FDD bands Class 3 (23dBm±2dB) for LTE TDD bands Class 3 (24dBm+1/-3dB) for WCDMA bands Class E2 (27dBm±3dB) for GSM850 8-PSK Class E2 (27dBm±3dB) for EGSM900 8-PSK Class E2 (26dBm±3dB) for DCS1800 8-PSK Class E2 (26dBm±3dB) for PCS1900 8-PSK Class 4 (33dBm±2dB) for GSM850 Class 4 (33dBm±2dB) for EGSM900 Class 1 (30dBm±2dB) for DCS1800 Class 1 (30dBm±2dB) for PCS1900	
Rx sensitivity	LTE B1: -99.5(10M) LTE B2: -99.9dBm (10M) LTE B3: -99.7dBm (10M) LTE B4: -99.7dBm (10M) LTE B5: -99.9dBm (10M) LTE B7: -99.2dBm (10M) LTE B8: -99.8dBm (10M) LTE B12: -99.8dBm (10M) LTE B13: -99.5dBm (10M) LTE B18: -100dBm (10M) LTE B19: -99.9dBm (10M) LTE B20: -99.8dBm (10M) LTE B25: -100dBm(10M) LTE B26: -99.5dBm (10M) LTE B28: -99.6dBm (10M) LTE B38: -99dBm (10M) LTE B39: -99.5dBm(10M) LTE B40: -99.2dBm (10M) LTE B41: -99dBm (10M)	WCDMA B1: -109.2dBm WCDMA B2: -110dBm WCDMA B4: -109.7dBm WCDMA B5: -110.4dBm WCDMA B6: -110.5dBm WCDMA B8: -110.5dBm WCDMA B19: -110.1dBm GSM850: -108dBm GSM900: -108dBm DCS: -107.5dBm PCS: -107.5dBm

Radio & EMC Certificate	CE : a3(1)(a) : EN 62311, EN 60950-1 a3(1)(b) : ETSI EN 301 489-1, ETSI EN 301 489-17 a3(2) : ETSI EN 300 328, ETSI EN 301 893 **CE Warning :** Additional testing must be done to establish a DoC according to the RED directive (old R&TTE) of your whole product (Enclosure, carrier board with the EmbedAir module and its power supply, RF cables and antennas). FC : FCC CFR Title 47 Part 15 Subpart C Section 15.247 **FCC Warning :** 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. Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment If the FCC identification number is not visible when the module is installed inside another 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: Z9W-RMB & TK4WLE900VX**", when the module is installed inside another device, the user manual of this device must contain below warning statements; 1. 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. (2) This device must accept any interference received, including interference that may cause undesired operation. 2. Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment. NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures: -Reorient or relocate the receiving antenna. -Increase the separation between the equipment and receiver. -Connect the equipment into an outlet on a circuit different from that to which the receiver is connected. -Consult the dealer or an experienced radio/TV technician for help. This modular complies with FCC RF radiation exposure limits for an uncontrolled environment. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter. This modular must be installed and operated with a minimum distance of 20 cm between the radiator and user body. The device indoor use only for 5150MHz~5250MHz. IC : **IC Warning:** This device complies with Industry Canada's license-exempt RSSs. Operation is subject to the following two conditions: (1) This device may not cause interference; and (2) This device must accept any interference, including interference that may cause undesired operation of the device. Cet appareil est conforme aux CNR exemptes de licence d'Industrie Canada . Son fonctionnement est soumis aux deux conditions suivantes : (1) Ce dispositif ne peut causer d'interférences ; et (2) Ce dispositif doit accepter toute interférence , y compris les interférences qui peuvent causer un mauvais fonctionnement de l'appareil. This modular complies with IC RF radiation exposure limits set forth for an uncontrolled environment. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter. If the IC number is not visible when the module is installed inside another 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 IC: 11468A-RMB & 7849A-WLE900VX**" , when the module is installed inside another device, the user manual of this device must contain below warning statements; 1. This device complies with Industry Canada's license-exempt RSSs. Operation is subject to the following two conditions: (1) This device may not cause interference; and (2) This device must accept any interference, including interference that may cause undesired operation of the device. 2. Cet appareil est conforme aux CNR exemptes de licence d'Industrie Canada . Son fonctionnement est soumis aux deux conditions suivantes : (1) Ce dispositif ne peut causer d'interférences ; et (2) Ce dispositif doit accepter toute interférence , y compris les interférences qui peuvent causer un mauvais fonctionnement de l'appareil. The devices must be installed and used in strict accordance with the manufacturer's instructions as described in the user documentation that comes with the product This modular complies with FCC RF radiation exposure limits for an uncontrolled environment. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter. This modular must be installed and operated with a minimum distance of 20 cm between the radiator and user body. The device indoor use only for 5150MHz~5250MHz.