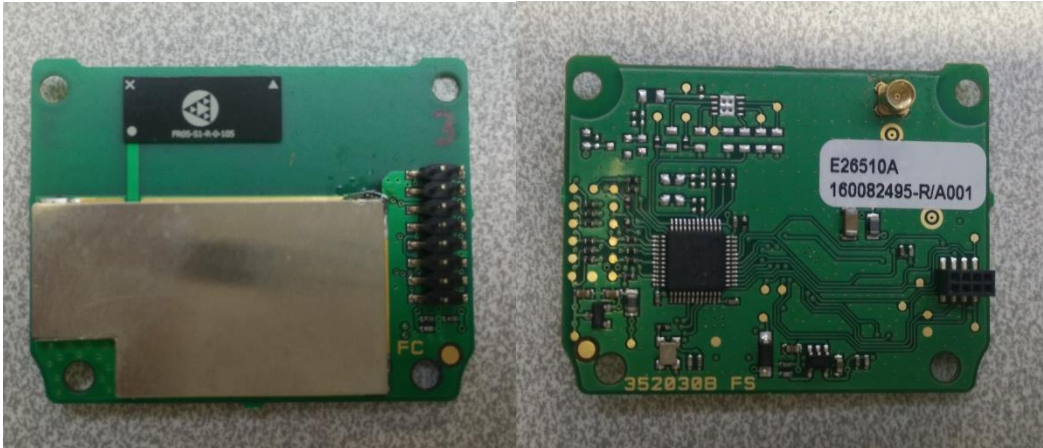


# Module integration manual



## Product Description

The RF module with the FCCID number *OQMSB* is a compact high performance module for 25 kHz narrow band 2-FSK operation with embedded proprietary protocol.

The modules are completely shielded and certified for operation under the US radio regulations for license-free use.

## Applications

Remote controlled machines  
Cranes

## Features

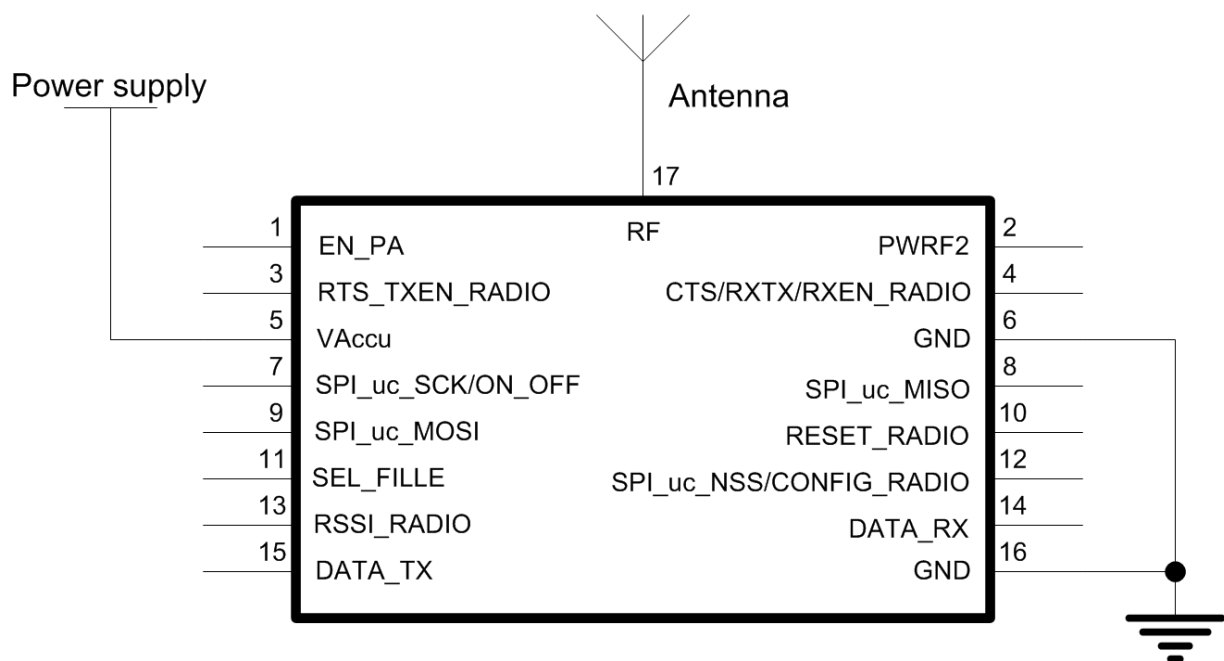
- Smallest in the world (50 x 39 x 0.7 mm)
- 25 kHz narrow band multi-channel operation
- Very low current consumption
- Addressing and Error check
- No external components
- Easy to use data interface
- Wide supply voltage range, 2.8 – 5.5 V
- Conforms with FCC CFR 47 part 15

## Quick Reference Data

Parameter	Jay RF Module	Units
Frequency band	911.8 – 918.2	MHz
Number of channels	64	
Channel bandwidth	25	kHz
Data rate	4.8	kbits/s
Max output power (typ.)	-8	dBm
Sensitivity	-114	dBm
Supply voltage	2.8 – 5.5	Volts
Current consumption, RX	31	mA
Current consumption, TX	37	mA

\* Programmable. Maximum allowed radiated power under FCC CFR 47, part 15 is -1 dBm ERP.

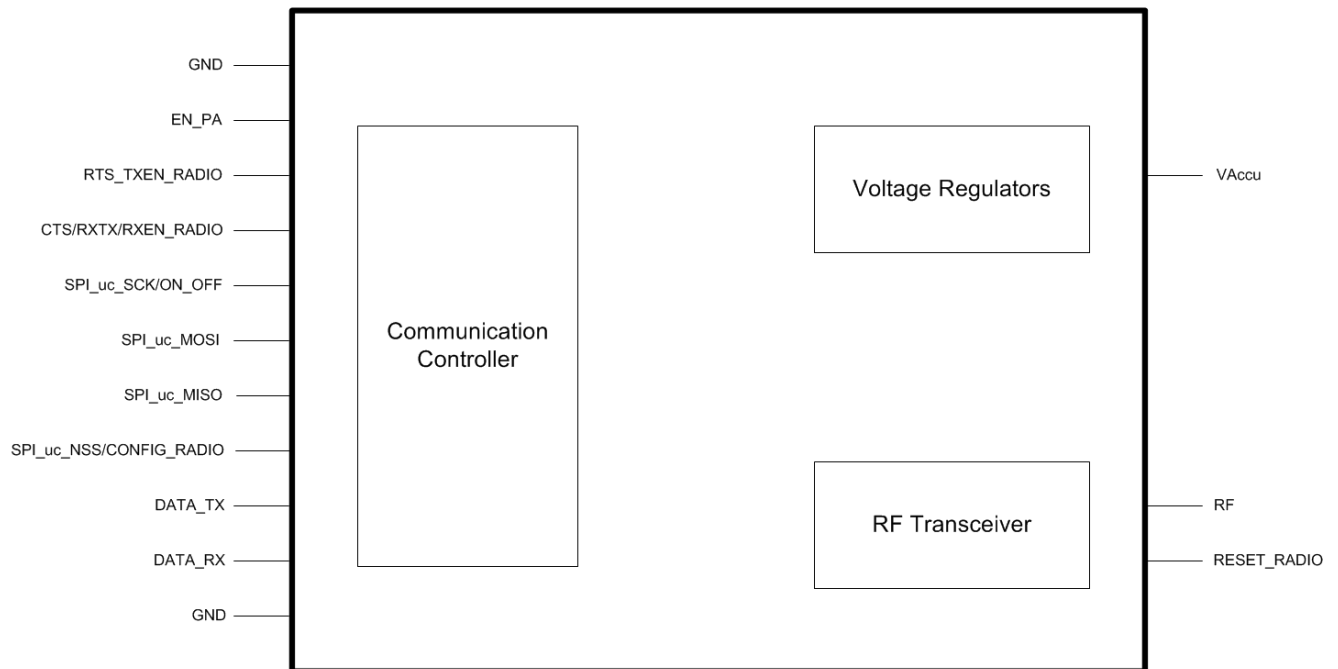
## Typical Application Circuit



## Pin Description

Pin no	Pin name	Description
1	EN_PA	PA enable input, active high
2	PWRF2	Not used
3	RTS_TXEN_RADIO	Not used
4	CTS/RXTX/RXEN_RADIO	UART Clear to Send
5	VAccu	Supply voltage input
6	GND	System ground
7	SPI_uc_SCK/ON_OFF	SPI Clock
8	SPI_uc_MISO	SPI MISO
9	SPI_uc_MOSI	SPI MOSI
10	RESET_RADIO	Reset
11	SEL_FILLE	Not used
12	SPI_uc_NSS/CONFIG_RADIO	SPI Chip Select
13	RSSI_RADIO	Not used
14	DATA_RX	UART RX Data
15	DATA_TX	UART TX Data
16	GND	System ground
17	RF	RF I/O connection to antenna

## Block Diagram



The module contains a communication controller with embedded proprietary protocol software, a narrow band high performance RF transceiver and three internal voltage regulators.

The communication controller handles the radio packet protocol. Data to be sent by the host is received at the DATA\_RX pin and buffered in the communication controller. The data packet is then assembled with preamble, synchronization word and data with CRC check sum before it is transmitted on RF.

The asynchronous UART interface consists of DATA\_TX, DATA\_RX and CTS/RXTX/RXEN\_RADIO signals and it is used for hardware handshake flow control.

The RF transceiver modulates the data to be transmitted on RF frequency, and demodulates data that are received. Narrow band technology is used to enhance sensitivity and selectivity.

The supply voltage is connected to the VAccu pin. The module contains three internal voltage regulators and can therefore operate over a wide supply voltage range.



## FCC

The OEM integrators are responsible for ensuring that the end-user has no manual instructions to remove or install module.

The module is limited to OEM installation ONLY

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.

### **These following instructions/statements shall be reported on the User Manual:**

Any changes or modifications to this equipment not expressly approved by **JAY électronique** may cause, harmful interference and void the FCC authorization to operate this equipment

This equipment complies with FCC's radiation exposure limits set forth for an uncontrolled environment under the following conditions:

1. This equipment should be installed and operated such that a minimum separation distance of 20cm is maintained between the radiator (antenna) and user's/nearby person's body at all times.
2. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

The RF module has been certified for mobile and fixed applications. If the module will be used for portable application the device must undergo SAR testing and the following instructions shall be reported on the User Manual.

**The separate approval is required for all other operating configurations, including portable configurations with respect to Part 2.1093 and different antenna configurations.**

#### If SAR measurement is not required:

This portable equipment with it's antenna complies with FCC's radiation exposure limits set forth for an uncontrolled environment. To maintain compliance, follow the instructions below :

1. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.
2. Avoid direct contact to the antenna, or keep contact to a minimum while using this equipment.

#### If SAR measurement is required:

This portable equipment with it's antenna complies with FCC's radiation exposure limits set forth for an uncontrolled environment. This equipment has shown compliance with FCC's Specific Absorption Rate (SAR) limits. To maintain compliance, follow the instructions below :

1. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.



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Date:  
November 21, 2016

**Authorized antennas:**

Modèle	Connecteur	Type	Polarisation	Gain (dBi)	Fréquences (MHz)	Autre(s)
FR05-S1-R-0-105	N/A	Chip antenna	N/A	0	902-928	Antenne validée
VUA10xBM	BNC - 50Ω	Tuned	Vertical	5	806-870	Plan de masse (60x60cm) requis
FLX900/915-FME	FME femelle - 50Ω	1/2 onde	Vertical	7*	820-960	
VUB884	BNC - 50Ω	1/4 onde	Vertical	0	911-918	Antenne validée
EDBS-PRO900-4-BNC	BNC male - 50Ω	1/4 onde	Vertical	1,5	860-920	Plan de masse (16x16cm) requis
VUA001B	BNC - 50Ω	1/4 onde	Vertical	2	890-960	

# Antenna FR05-S1-R-0-105



DATA SHEET - SHORT-RANGE WIRELESS

## Small SMD chip antenna for low consumption, small form-factor Zigbee™ devices



Fractus specialises in enabling effective mobile communications. Using fractal technology, we design and manufacture optimised antennas to make your wireless devices more competitive. Our mission is to help our clients develop innovative products and accelerate their time to market through our expertise in antenna design, testing and manufacturing.

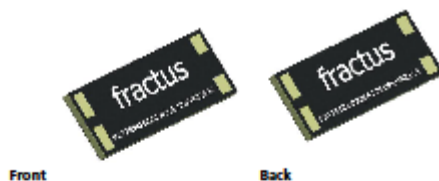
### Fractus® EZConnect™ Zigbee™ Chip Antenna

P/N: FR05-S1-R-0-105

The Fractus **EZConnect Zigbee Chip Antenna** is a compact rectangular antenna suitable for smart home, security and other industrial devices using the 915 MHz ISM band, where low power consumption and cost are top of mind. Taking advantage of the space-filling properties of fractals, this **compact monopole** antenna is ideal for use within indoor (highly scattered) as well as outdoor environments.

The **Fractus EZConnect Zigbee Chip Antenna** speeds your time to market by allowing you to easily integrate it within your industrial design (SMD mounting).

**18 x 7,3 x 1 mm** (Image larger than actual size)



### Product Benefits

#### ■ Small form factor

Allows integration into space limited areas easily and effectively.

#### ■ Broad bandwidth

Ensures robust performance in different PCB dimensions and plastic housing, without the need for a matching network.

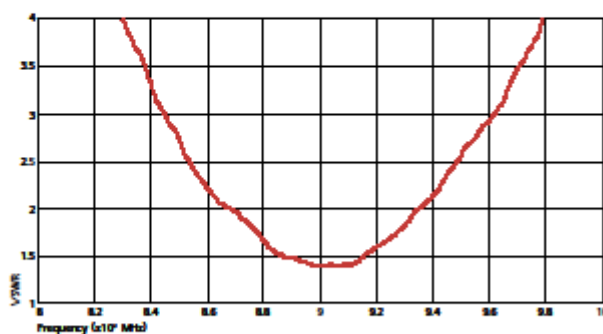
#### ■ High performance

Optimises power consumption and increases device range.

#### ■ Omnidirectional pattern

Increases device robustness due to a uniform radiation pattern.

**Patent Pending:** WO0154225, WO0122528, PCT/EP01/10589, PCT/EP02/07837, US60/613394, US60/627653 and PCT/EP02/07836



<b>Frequency Range</b>	902 - 928 MHz
<b>Efficiency</b>	> 40 %
<b>Peak Gain</b>	> 0 dBi
<b>VSWR</b>	< 2:1
<b>Weight</b>	0.20 g
<b>Temperature</b>	-40 to +85 °C
<b>Impedance</b>	50 Ω unbalanced
<b>Dimensions</b>	18 x 7,3 x 1 mm

Measured results from a standard PCB of 120x65 mm

Please contact your sales representative at Richardson Electronics to obtain additional information on recommended configurations for different UWB devices. Richardson Electronics: [www.roll.com](http://www.roll.com) Fractus: [wireless@fractus.com](mailto:wireless@fractus.com) Reference: DS\_FR05-S1-E-0-105\_v01

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Date:  
November 21, 2016

## VUA10xBM

# Magnetic Mount Antenna

VUA10xAM/BM

25/07/2013 v1

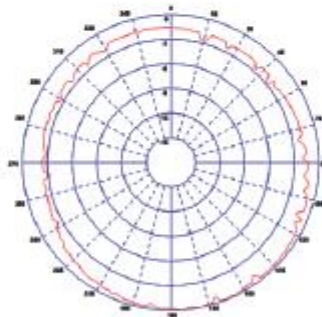


- 5dBi gain
- Flexible overmoulded construction

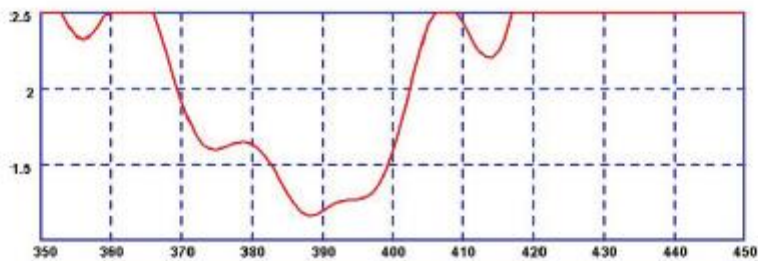
The VU10xAM/BM offers a magnetic mount omni-directional antenna with 5dBi gain.

The antenna whip incorporates a flexible moulded "spring" section and stainless steel radiating element for long term reliability

Typical H-Plane (390MHz)



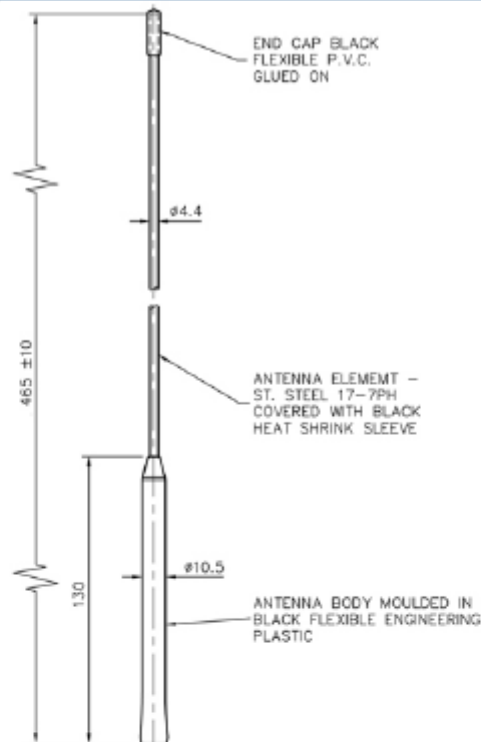
Typical VSWR\*



\*Measured on a 2 x 2 ft (600mm x 600mm) ground plane with 3m(10') of CS23 cable



## Technical Specification



### Part Number

VUA103AM      VUA105AM      VUA103BM      VUA105BM

### Electrical Data

	VUA103AM	VUA105AM	VUA103BM	VUA105BM
Frequency Range (MHz)	410-430	410-430	806-870	806-870
Operational Band	S2	S2	S3	S3
Gain: Isotropic	3dBi	3dBi	3dBi	3dBi
Compared to 1/4 wave	3dBd	3dBd	3dBd	3dBd
/SWR	< 1.8:1	< 1.8:1	< 1.2:1	< 1.2:1
Polarisation	Vertical	Vertical	Vertical	Vertical
Pattern	Omn-directional	Omn-directional	Omn-directional	Omn-directional
Impedance	50Ω	50Ω	50Ω	50Ω
Max Input Power (W)	60	60	60	60

### Mechanical Data

Dimensions	VUA103AM		VUA105AM		VUA103BM		VUA105BM	
	mm	inch	mm	inch	mm	inch	mm	inch
Total Height	417	16.4"	417	16.4"	300	11.8"	300	11.8"
Base Diameter	10.5	.4"	10.5	.4"	10.5	.4"	10.5	.4"
Operating Temp (°C)	-40° / +80°C (-40° / 176°F)		-40° / +80°C (-40° / 176°F)		-40° / +80°C (-40° / 176°F)		-40° / +80°C (-40° / 176°F)	
Cable length (m)	3		3		3		3	
Cable Type					CS23			
Termination	BNC		BNC		BNC		BNC	

**PANORAMA ANTENNAS**

Panorama Antennas Ltd  
Frogmore, London, SW18 1HF, United Kingdom

Waiver: The data given above is indicative of the performance of the product/s under particular conditions and does not imply a guarantee of performance. These specifications are subject to change without notice. Copyright © Panorama Antennas Ltd. All rights reserved.

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www.panorama-antennas.com



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Date:  
November 21, 2016

**FLX 900/...-FME**  
*Antenne dipôle 1/2 λ, alimentée à la base, pour un équipement portable dans la bande des 900 MHz avec le système FME*



**DESCRIPTION:**

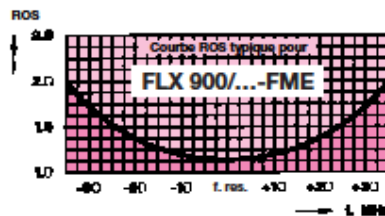
- ★ Antenne flexible en acier, couverte d'un tube de silicone noir.
- ★ Fouet 1/2 λ alimenté à la base, indépendant du plan de sol.
- ★ Gain élevé et couplage efficace du portable grâce au design demi-onde.
- ★ Gain de 5 dB comparé à une antenne 1/4 λ sur le même équipement.
- ★ Fabriquée avec des matériaux de la plus haute qualité pour assurer une longue durée de vie.
- ★ Livrée pré-réglée pour une fréquence précise ou un réseau cellulaire.
- ★ Afin d'optimiser la flexibilité pour changer le connecteur, l'antenne est lancée avec le nouveau système universel de connecteurs FME.
- ★ Prévue pour une installation avec les connecteurs FME "black-line" de PROCOM. (Les connecteurs doivent être commandés séparément): BFME-BNC, BFME-TNC, BFME-N, BFME-MUHF, BFME-MQ, BFME-EBNC, BFME-ETNC et BFME-EMUHF.

**DESIGNATIONS POUR COMMANDER:**

Lors de votre commande, veuillez préciser la fréquence centrale ou le réseau cellulaire.

**EXEMPLES POUR COMMANDER:**

FREQUENCE/ RESEAU CELLULAIRE	TYPE
915 MHz	FLX 900/915-FME
NMT-900	FLX 900/NMT-FME
ETACS	FLX 900/ETACS-FME



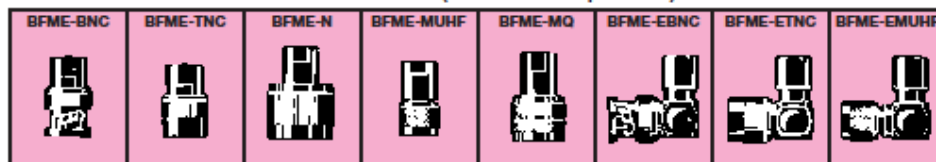
**SPECIFICATIONS:**

ELECTRIQUES	
TYPE D'ANTENNE	Antenne 1/2λ alimentée à la base pour un équipement portable
FREQUENCE	900 MHz (820-980 MHz)
IMPEDANCE	Nom. 50 Ω
POLARISATION	Verticale
GAIN	5 dB (comparé à une antenne 1/4λ)
LARGEUR DE BDE	> 70 MHz à ROS < 2,0
ROS	< 1,3 à la fréq. de résonance
PUISSANCE MAX.	25 Watts
MECANIQUES	
MATERIAUX	Fil en acier flexible couvert d'un tube de silicone Laiton chromé noir
COULEUR	Noir
HAUTEUR TOTALE	Environ 170 mm (dép. du type)
POIDS	Environ 25 g
CONNECTEUR	FME (format) (Connecteurs BFME changeables à commander séparément)

**VEUILLEZ NOTER QUE:**

L'antenne FLX 900 est aussi disponible avec connecteur SMA, mais dans ce cas, l'antenne est livrée avec connecteur fixe (et non pas le système FME). Veuillez nous contacter pour des informations supplémentaires sur cette version spéciale.

**CONNECTEURS BFME RECOMMANDES: (à commander séparément)**



01 200 1

PROCOM France S.A.R.L. se réserve le droit d'améliorer les spécifications sans préavis.

VUB884

This antenna is designed by Jay Electronique.

Antenna gain: 0 dBi @ 915 MHz





**EBDS**

**EBDS-PRO900-4-BNC**

Antenne 900Mhz – ¼ onde

Spécifications mécaniques:

Connector	BNC MALE
Cable	NA
Operation Temp.	-30°C ~ +60°C
Material-Radome	ABS
Dimension (L*W*H)	Ø15.5*Ø1.5*12mm
Weight	20g ± 2g
RoHS compliant	Yes

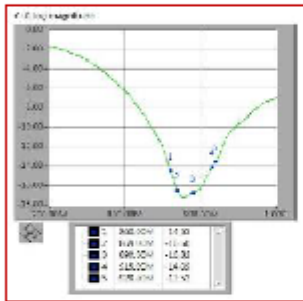
Spécifications électriques:

Frequency Range	860-920MHz
VSWR	≤ 2
Gain	1.5dB (Nominal) grounded 15° 16dBi
Impedance	50Ω±5Ω
Polarization	Vertical
Beamwidth	
H-PLANE	360°
E-PLANE	54°
Max. Power	5 Watt
Isolation	NA

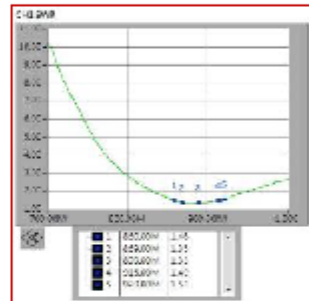
**En résumé**

- 860-920Mhz
- Omnidirectionnelle
- ¼ onde
- -30°C / +60°C
- Installation en extérieur ou intérieur

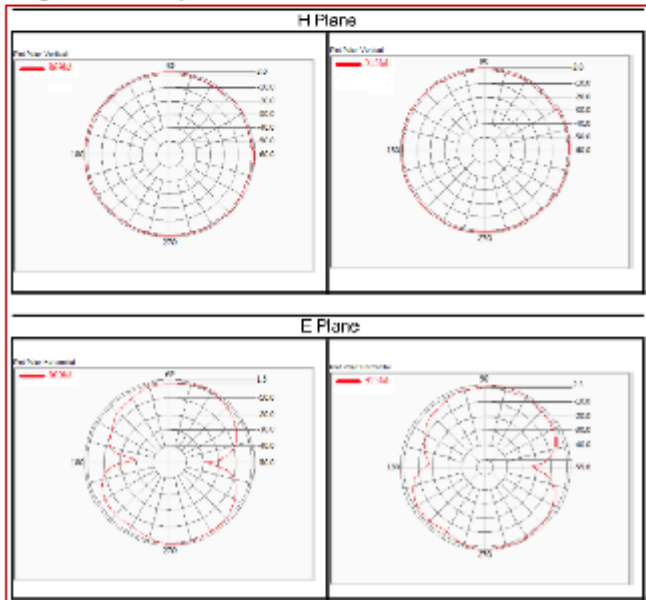
Réponse en fréquence:



VSWR:



Diagrammes de rayonnement:



**Description**



V1.0 - EBDS se réserve le droit de modifier toute spécification sans préavis

VUA001B

## ISM Band

### ISM Band Potable ¼ Wave Antenna

Omni Directional

ROHS Compliant

SCADA



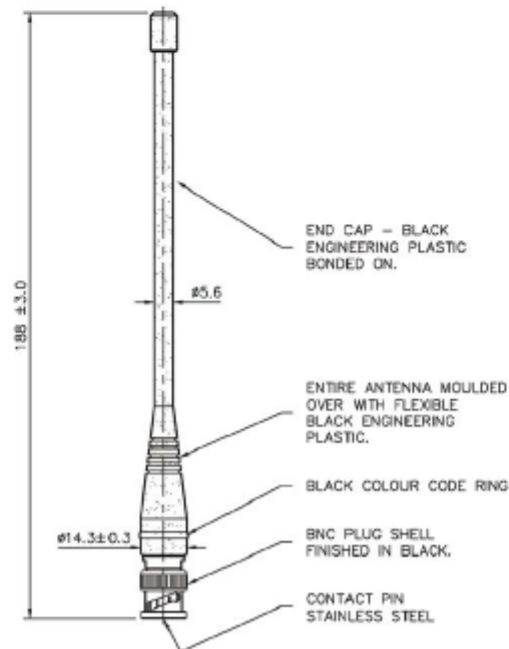
### VUA001A

Pre-tuned to frequency  
Colour coded

Panorama offers a comprehensive range of portable antennas. The VUA001 is overmoulded in polyester. This feature improves both the durability and life expectancy of the antenna.

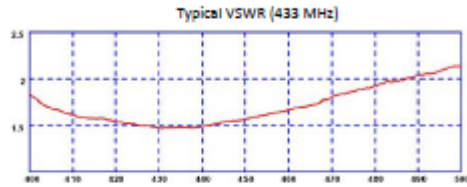
Each pre-tuned frequency band has its own colour code making it easy to identify the correct product.

#### Technical Drawing



# ISM Band

## ISM Band Portable ¼ Wave Antenna

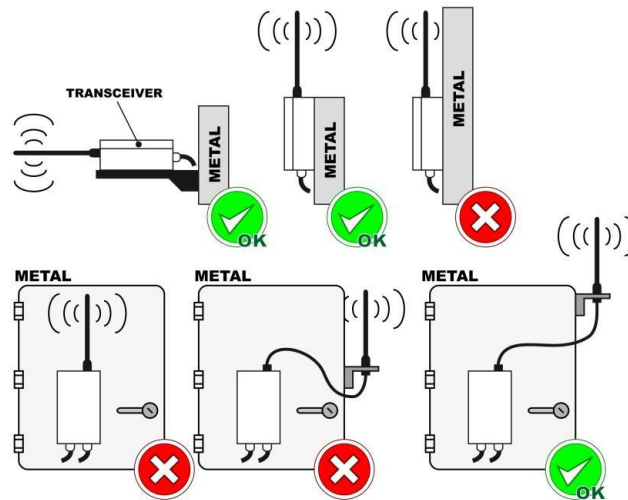


Part No.		VUA001A	VUA001B
<b>Electrical Data</b>			
Frequency Range (MHz)		406-472	890-960
Operational Band		ISM433	90MHz
VSWR (Typical)		< 2.1 : 1	< 2.1 : 1
Gain: Isotropic (Typical)		2dBi	2dBi
Compared to ¼ wave (Typical)		0dB	0dB
Impedance		50Ω	50Ω
Max Input Power (W)		25	25
<b>Mechanical Data</b>			
Dimensions (mm)	Length	186	92
	Diameter	16	16
Operating Temp (°C)		-40° / +80°C	-40° / +80°C
Material		Engineering Plastic	Engineering Plastic
Colour Coding		Black	Black
<b>Connector</b>			
Type		BNC plug	BNC plug

**Antenna installation requirements:**

The external antenna must be installed at a distance from the class 3 cables and power components (power supply, motor, variable speed drives ...) while remaining in an area which is favourable to radio reception. It must be located at a certain height.

No metal object which could form a screen should be located in front of the external antenna (risk of communication cut-out).



**Moreover, the host equipment must be labelled as follows:**

*Contains Transmitter Module FCC ID : OQMSB or Contains FCC ID : OQMSB*

*“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.”*

*(When the device is so small or for such use that it is not practicable to place the statement specified above on it, the information required shall be placed in a prominent location in the instruction manual or pamphlet supplied to the user or, alternatively, shall be placed on the container in which the device is marketed.)*

**User Manual shall include the following instructions/statements:**

**For class A Equipment**

*This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.*

**For class B Equipment**

*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*

**Warning:**

*This modular is used exclusively by Jay Electronique.*



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Date:  
November 21, 2016



## IC

The OEM integrators are responsible for ensuring that the end-user has no manual instructions to remove or install module.

### **These following instructions/statements shall be reported on the User Manual:**

*This equipment complies with RSS102's radiation exposure limits set forth for an uncontrolled environment under the following conditions:*

- 1. This equipment should be installed and operated such that a minimum separation distance of 20cm is maintained between the radiator (antenna) and user's/nearby person's body at all times.*
- 2. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.*

*Cet équipement est conforme aux limites d'expositions de la CNR102 applicables pour un environnement non contrôlé aux conditions suivantes:*

- 1. Cet équipement devra être installé et fonctionner de telle manière qu'une distance minimale de séparation de 20 cm soit maintenue entre la partie rayonnante (l'antenne) et l'utilisateur / les personnes à proximité à tout moment.*
- 2. Cet émetteur ne doit pas être co-localisé ou opérer en conjonction avec toute autre antenne ou émetteur.*

*The RF module has been certified for mobile and fixed applications. If the module will be used for portable application the device must undergo SAR testing and the following instructions shall be reported on the User Manual:*

*Le module RF a été certifié pour les applications mobiles et fixes. Si le module est utilisé pour une application portable, l'appareil doit subir un test DAS et les instructions suivantes doivent être consignées dans le manuel de l'utilisateur:*

If SAR measurement is not required:

*This portable equipment with it's antenna complies with RSS102's radiation exposure limits set forth for an uncontrolled environment. To maintain compliance, follow the instructions below :*

- 1. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.*
- 2. Avoid direct contact to the antenna, or keep contact to a minimum while using this equipment.*

Si la mesure de DAS n'est pas requise:

*Cet équipement portable avec ses antennes est conforme aux limites d'expositions de la CNR102 applicables pour un environnement non contrôlé. Pour maintenir la conformité suivez les instructions ci-dessous:*

- 1 *Cet émetteur ne doit pas être co-localisé ou opérer en conjonction avec toute autre antenne ou émetteur.*
- 2 *Évitez tout contact direct avec l'antenne ou gardez le contact au minimum pendant l'utilisation de cet équipement.*

If SAR measurement is required:

*This portable equipment with it's antenna complies with RSS102's radiation exposure limits set forth for an uncontrolled environment. This equipment has shown compliance with RSS102's Specific Absorption Rate (SAR) limits. To maintain compliance, follow the instructions below :*

1. *This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.*

Si la mesure de DAS est requise:

*Cet équipement portable avec ses antennes est conforme aux limites d'expositions de la CNR102 applicables pour un environnement non contrôlé. Cet équipement a démontré la conformité aux limites de Débit d'Absorption Spécifique (DAS). Pour maintenir la conformité suivez les instructions ci-dessous:*

- 1 *Cet émetteur ne doit pas être co-localisé ou opérer en conjonction avec toute autre antenne ou émetteur.*

*This radio transmitter (IC: 3393A-SB) has been approved by Industry Canada to operate with the antenna types listed below with the maximum permissible gain indicated. Antenna types not included in this list, having a gain greater than the maximum gain indicated for that type, are strictly prohibited for use with this device.*

*Le présent émetteur radio (IC : 3393A-SB) a été approuvé par Industrie Canada pour fonctionner avec les types d'antenne énumérés ci-dessous et ayant un gain admissible maximal. Les types d'antenne non inclus dans cette liste, et dont le gain est supérieur au gain maximal indiqué, sont strictement interdits pour l'exploitation de l'émetteur.*

**Authorized antennas / Antennes autorisées :**

Modèle	Connecteur	Type	Polarisation	Gain (dBi)	Fréquences (MHz)	Autre(s)
FR05-S1-R-0-105	N/A	Chip antenna	N/A	0	902-928	Antenne validée
VUA10xBM	BNC - 50Ω	Tuned	Vertical	5	806-870	Plan de masse (60x60cm) requis
FLX900/915-FME	FME femelle - 50Ω	1/2 onde	Vertical	7*	820-960	
VUB884	BNC - 50Ω	1/4 onde	Vertical	0	911-918	Antenne validée
EDBS-PRO900-4-BNC	BNC male - 50Ω	1/4 onde	Vertical	1,5	860-920	Plan de masse (16x16cm) requis
VUA001B	BNC - 50Ω	1/4 onde	Vertical	2	890-960	

*The characteristic of antennas are listed in previous paragraphs.*

*Les caractéristiques des antennes sont décrites dans les paragraphes précédents.*

### Antenna installation requirements / Exigences d'installation des antennes :

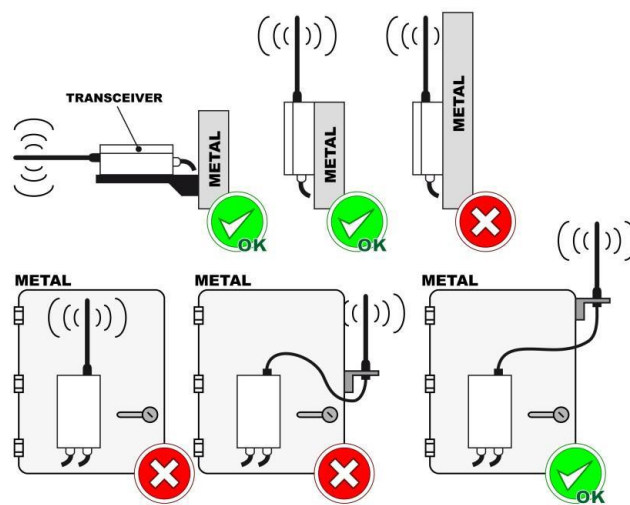
The external antenna must be installed at a distance from the class 3 cables and power components (power supply, motor, variable speed drives ...) while remaining in an area which is favourable to radio reception. It must be located at a certain height.

No metal object which could form a screen should be located in front of the external antenna (risk of communication cut-out).

L'antenne devra être éloignée des câbles de classe 3 et éléments de puissance (alimentation, moteur, variateurs...) tout en restant dans une zone favorable à la réception et à l'émission radio.

Le Transceiver doit être idéalement situé en hauteur, au-dessus de l'opérateur manipulant le module opérateur, l'antenne dirigée vers le bas.

Il ne devra y avoir entre l'opérateur et l'antenne aucune masse métallique pouvant faire écran (risque de coupures de communication).



*This device complies with Industry Canada's licence-exempt RSSs.*

*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 of the device.*

*Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence.*

*L'exploitation est autorisée aux deux conditions suivantes :*

- 1. L'appareil ne doit pas produire de brouillage ;*
- 2. l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.*

**Moreover, the host equipment must be labelled as follows:**

*Contains Transmitter Module IC : 3393A-SB or Contains IC : 3393A-SB*



**T940-HOM-004-Module  
integration  
manual\_Rev4.docx**

Date:  
November 21, 2016