EDMI Dual Band Variant 450 Communications Hub Variant (CS-21)

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Approver: Rajan Bhandari

Date: 15/04/2019

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Document Classification: Public

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Preface

Privacy information

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Revision history

Name	Description of Change	Date	Version
EDMI	First Version	05/03/2019	1.0
EDMI	Several corrections to WAN frequencies across the document	04/04/2019	1.1
EDMI	Receiver WAN frequencies slightly modified	15/04/2019	1.2

Approval

Name	Position	Signature	Date
Rajan Bhandari	Technical Director		

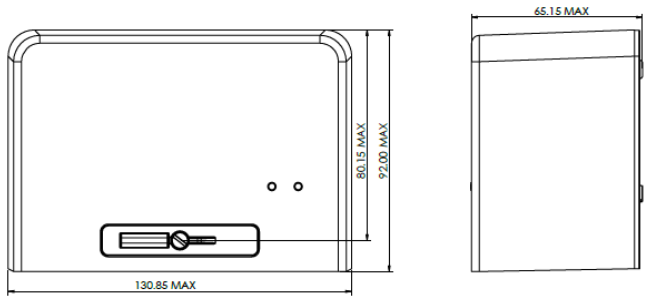
Table of Contents

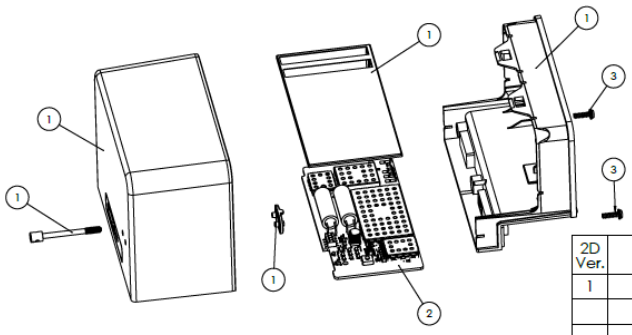
1 Dual Band EDMI Variant 450 Communications Hub

1.1 Photograph

1.2 Communications Hub Enclosure Engineering Drawing

ITEM NO.	PART NUMBER/ DESCRIPTION	QTY.
1	820-00037 MECHANICAL ASSEMBLY CS-21	1
2	830-00032 PCB ASSEMBLY CS-21	1
3	365-00001 SCREW CS-11	2





2D Ver.	DESCRIPTION	BY	DATE	ECN No.
1	INITIAL RELEASE	SPW	25-02-19	N/A

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ALL MATERIALS/PROCESSES RoHS COMPLIANT

SURFACE FINISH: N/A

MATERIAL: N/A

ALL DIMEMSIONS ARE IN MILLIMETRES.

3D DATA IS MASTER AND FEATURES WITHOUT TOLERANCES OR DIMENSIONS SHOULD CONFORM TO TOLERANCES:

0 TO 6MM: ±0.05MM
6.01 TO 30MM: ±0.10MM
30.01 TO 90MM: ±0.15MM
90.01 TO 150MM: ±0.20MM
150.01 & ABOVE: ±0.25MM

DRAFTED BY	SPW	25/02/2019
DESIGNED BY	SPW	25/02/2019
CHECKED BY	NK	25/02/2019
APPROVED BY	NK	25/02/2019

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TITLE: MAIN ASSEMBLY CS-21

3RD ANGLE PROJECTION

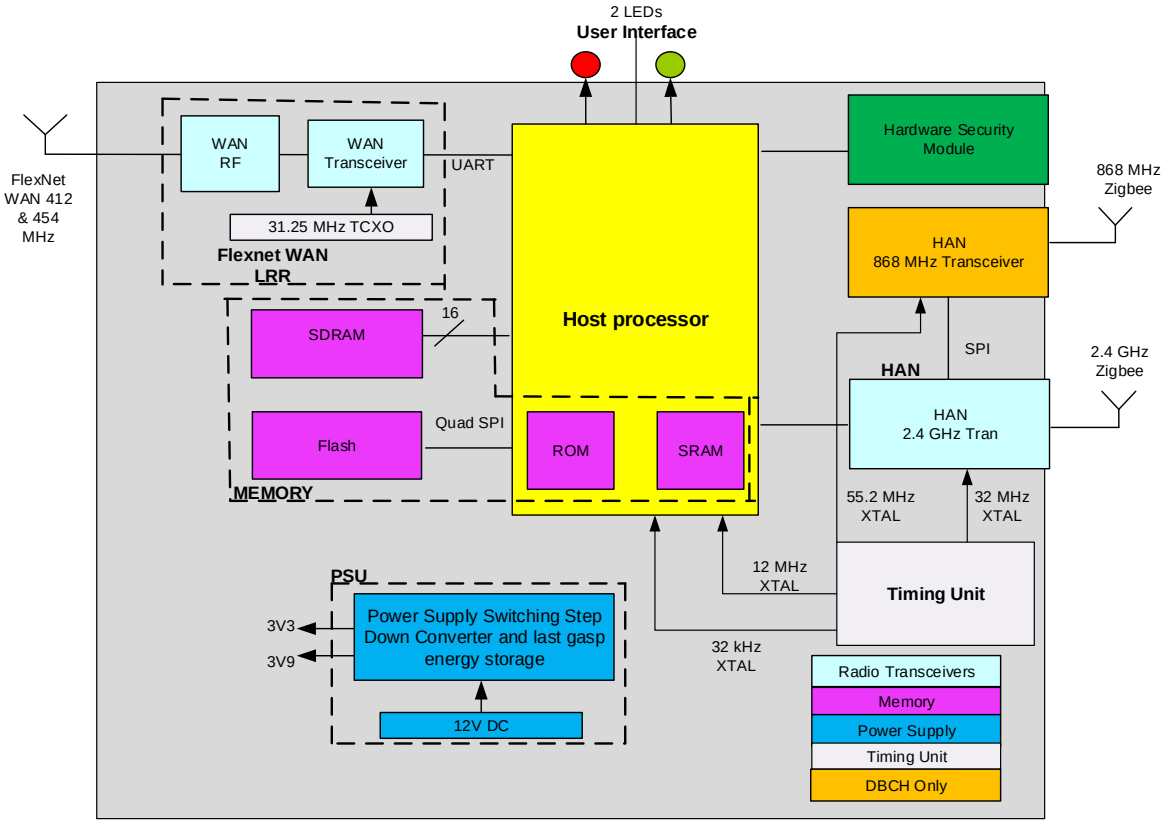
DRAWING NO. 810-00015

FOR DRAWING VERSION SEE TABLE

SHEET SIZE A3

SCALE: 1:5 | SHEET: 1 of 1 | 3D MODEL: 810-00015 MAIN ASSEMBLY CS-21 | 3D REV: 1

1.3 Communications Hub Block Diagram



1.4 General Specification

For terms and abbreviations used in this document please see the DCC document: Joint HAN Radio Testing Methodology (JTM v3.2).

Specification	Description
Dimensions (mm)	*Height from bottom face:* 92mm *Height from ICHIS datum: 80mm* *Depth: 65mm* *Width: 131mm*
Weight (g)	*200g*
Environment Protection	IP Rating: IP53

	Ambient temperature limits: -20°C to 55°C
SM WAN specification	*Standard : ETSI EN300 113-1* *Frequency Range:* *Transmit: 412-414 and 453.0-455.0 MHz* *Receive: 453.0-455.0 MHz* *TRP: 1W Maximum.*

HAN Specification

Transceiver	
TRP: 2.4GHz	*>6.5dBM*
TRP: Sub-GHz (excluding 915Mhz)	*>11dBm*
TRS: 2.4GHz	*<-91.5dBm*
TRS: Sub GHz(excluding 915Mhz)	*<-97dBm*
MAPL : (Sub GHz excluding 915Mhz)	*>108dB*
MAPL : 2.4GHz	*>99dB*
MAPL : Sub GHz 915Mhz	*>40dB*
Directivity	*Omni*
Maximum Output Power	*13dBm EIRP for 2.4Ghz* *14dBm ERP for Sub GHz*
Note! *The CS-21 Sub GHz radio complies with "Receiver Category 2" per EN 300 220-1 v3.1.1:2017*	

Power Consumption (W)	*6W maximum* *1W typical*

Visual Indicator	*SM WAN_LED (Left)* *SM HAN_LED (Right)*

ICHIS Connections	*Pins 1, 2: DC input* *Pins 3, 4: COM* *Pin 5: CH_PR (Communications Hub Present)* *Pin 6: MT_PR (Meter Present)*

Labelling	See section 1.7

Packing	*See section 1.9 to 1.11*

1.5 Sub GHz 915-921 MHz Channel

MAPL for 915 MHz >40dB. This is not recommended for use.

The design goals of good signal performance in the 868 MHz band, circuit design efficiency and immunity to high level adjacent cellular band signals resulted in reduced performance in the 915 MHz band.

The 915 MHz MAPL achieved is significantly below the standard Sub-GHz MAPL requirements (more than 50 dB below).

1.6 JTM

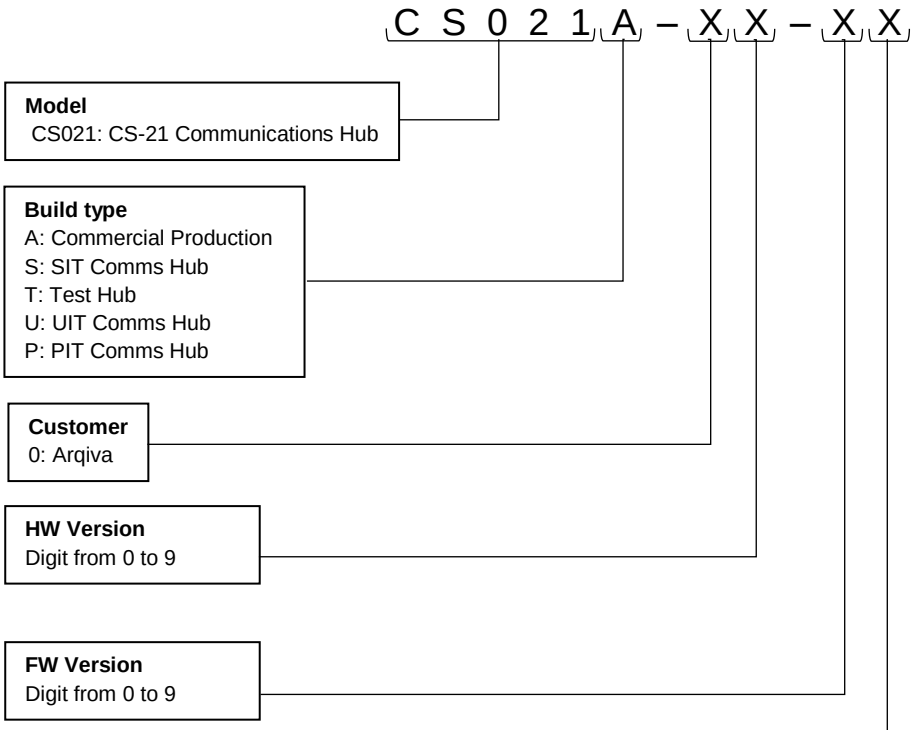
The Communications Hub has met the MAPL criteria for Sub GHz band (excl. 915MHz) and 2.4 GHz band as defined in JTM v3.2 document

1.7 Communications Hub Labelling / Artwork Engineering Drawing

710-00062 CS-21 ARTWORK (1)19-02-19 SPW

1.8 Product SKU Naming Convention

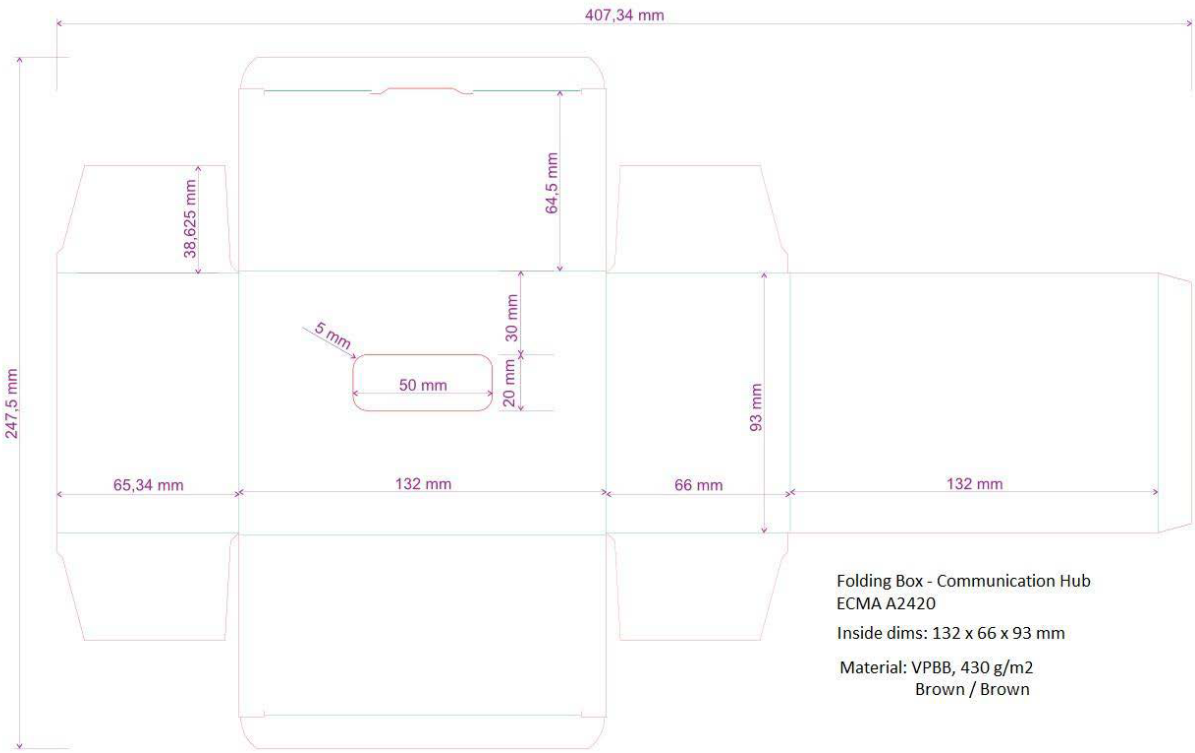
The product SKU is a 10-character code label printed on top left side front face of the Communications Hub. The string of characters relates to the following product information:



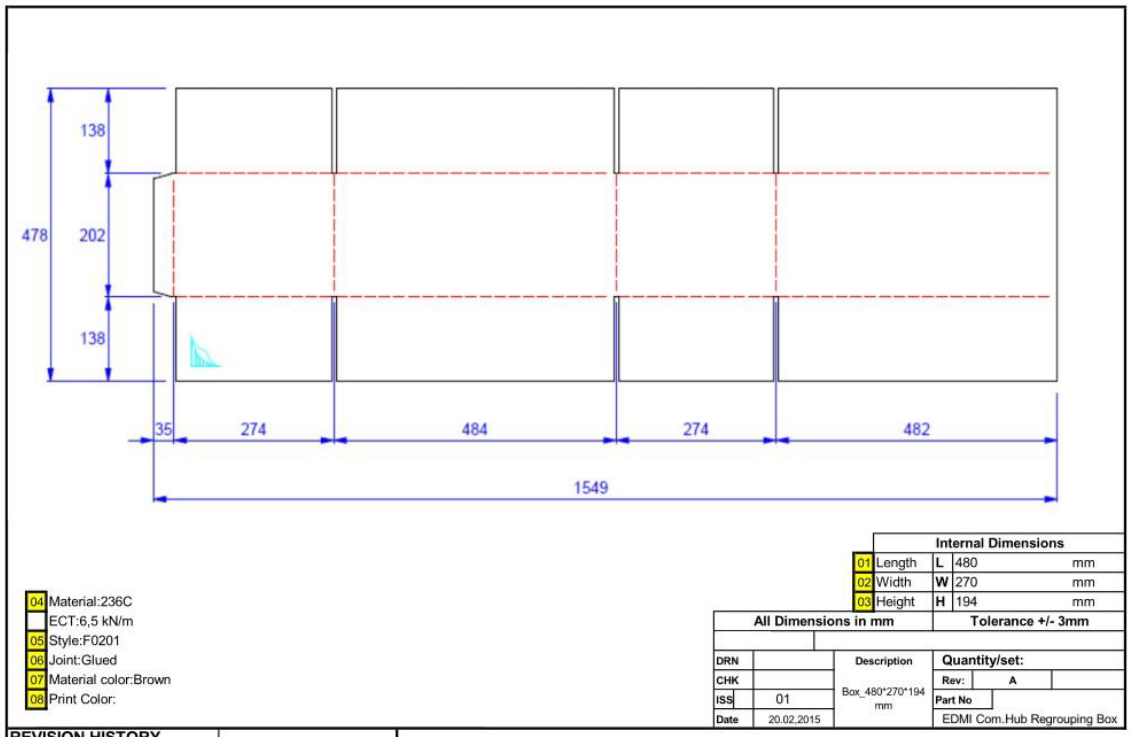
Configuration Identifier – Build Options				
Identifier	**FW**	**Certifications**	**JTAG**	**Environment**
2	Non-Debug	Production	Disabled	Production
3	Non-Debug	Production	Disabled	UIT-A
4	Debug	Production	Disabled	UIT-A
5	Non-Debug	Production	Disabled	UIT-B
6	Debug	Production	Disabled	UIT-B
D	Debug	ZigBee Test	Enabled	SIT-B
F	Debug	ZigBee Test	Enabled	PIT-A
G	Limited Debug*	Production	Disabled	UIT-A
H	Limited Debug*	Production	Disabled	UIT-B

*ITCH device

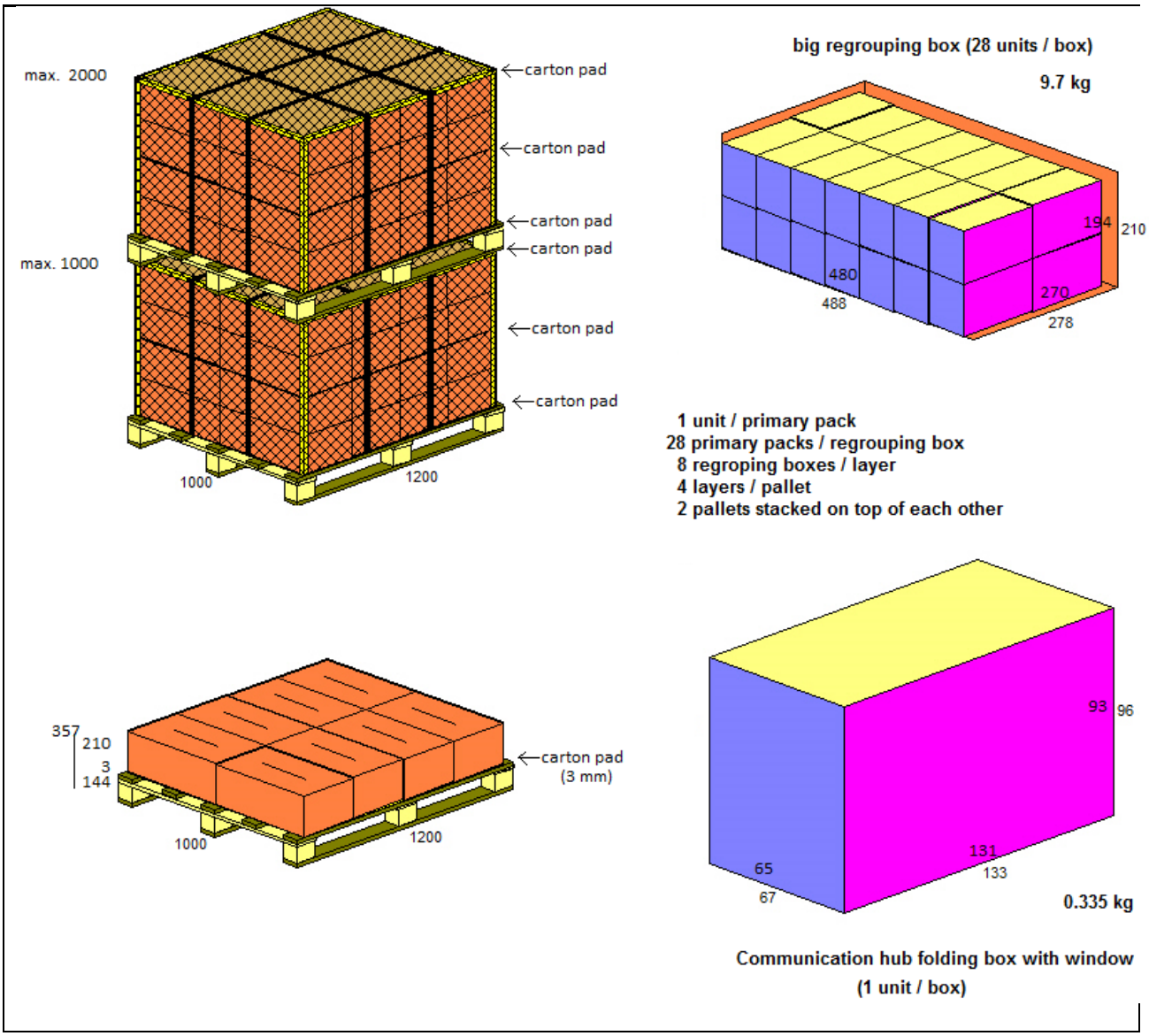
1.9 Packaging Drawing (Box)



1.10 Packaging Drawing (Carton)



1.11 Packaging Drawing (Pallet Loading)



1.12 Compliance Declaration

Hereby, *EDMI Europe Ltd* declares that this *Variant 450 DB (CS-21) Communications Hub equipment* is in compliance with the essential requirements and other relevant provisions of Directive 2014/53/EU.

2 Expected Normal Use and Warnings

2.1 Home User

This equipment contains no end user serviceable parts and as such end users should not be directly operating or touching this equipment.

Note! Only qualified Smart Meter Installers should install / remove this equipment.

2.2 Exclusions

The installation, maintenance and decommissioning of the equipment is covered in documentation available to authorized professional engineering companies.

2.3 Restrictions

This equipment is intended for use in the United Kingdom only, specifically in the northern CSP zone.

3 Appendix - Noise

3.1 Noise Limit

Noise limits for hosts as referred to in ICHIS (Intimate Communications Hub Interface Specification):

WAN

Permissible noise floor rise above thermal noise: ≤7 dB between 453.0 MHz and 455.0 MHz

HAN

Permissible noise floor rise above thermal noise: ≤ 3.5 dB between 2.405 GHz and 2.480 GHz

Permissible noise floor rise above thermal noise: ≤ 7 dB between 863.25 MHz and 872.85 MHz

3.2 Noise Calculations

3.2.1 WAN

From fundamental theory, thermal noise floor in a 20 kHz bandwidth (at room temperature of 296 K) is: -173.87 + 10*log (20 kHz) = -130.86 dBm

The required minimum carrier to noise ratio of the communication scheme and the noise figure of the Communications Hub internal design is used to find the minimum WAN TRS.

To maintain the WAN link budget the noise contribution from the ICHIS host has been set to 7 dB above thermal in the 20 kHz bandwidth. This equates to: -130.86 + 7 dBm = -123.86 dBm

3.2.2 HAN 2.4GHz

From fundamental theory, thermal noise floor in a 2 MHz bandwidth (at room temperature of 296 K) is: -173.87 + 10*log (2 MHz) dBm = -110.86 dBm

Adding the required minimum carrier to noise ratio of the communication scheme and the noise figure of the Communications Hub internal design gives a minimum TRS of -91.5 dBm (see General Specification above).

To maintain the HAN link budget the noise contribution from the ICHIS host has been set to 3.5 dB above thermal in the 2 MHz bandwidth. This equates to: -110.86 + 3.5 dBm = -107.36 dBm

3.2.3 HAN Sub GHz

From fundamental theory, thermal noise floor in a 200 kHz bandwidth (at room temperature of 296 K) is: -173.87 + 10*log (200 kHz) dBm = -120.86 dBm

Adding the required minimum carrier to noise ratio of the communication scheme and the noise figure of the Communications Hub internal design gives a minimum TRS of -97 dBm (see General Specification above).

To maintain the HAN link budget the noise contribution from the ICHIS host has been set to 7 dB above thermal in the 200 kHz bandwidth. This equates to: -120.86 + 7 dBm = -113.86 dBm

3.3 Spectrum Analyser Guide Settings

The following are guide sets for measurement equipment settings. These settings are refined by ICHIS test methodology. Please see the test methodology documentation for a step by step guide and safe working methods.

3.3.1 WAN

centre frequency	454.0	MHz
span	2	MHz
RBW	20	kHz
VBW	100	kHz
detector	RMS	
Average	off	
sweep speed	30	sec
ref level	-55	dBm
Attenuator	0	dB
Pre Amp	on	
Units	dBm	

3.3.2 HAN 2.4 GHz

centre frequency	2445	MHz
span	100	MHz
RBW	2000	kHz
VBW	5000	kHz
detector	RMS	
Average	off	
sweep speed	30	sec
ref level	-55	dBm
Attenuator	0	dB
Pre Amp	on	

Units	dBm	

3.3.3 WAN Sub GHz

centre frequency	870	MHz
span	13	MHz
RBW	200	kHz
VBW	1000	kHz
detector	RMS	
Average	off	
sweep speed	30	sec
ref level	-55	dBm
Attenuator	0	dB
Pre Amp	on	
Units	dBm	

3.3.4 ICHIS Interface Specification

https://www.smartdcc.co.uk/document-centre/communications-hubs/intimate-communications-hub-interface-specification/