



EDMI DB Standard 420 ITCH (CS-22) User Guide

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Preface

Privacy information

This document is public information and is shared on EDM I's webpage.

Revision history

Name	Description of Change	Date	Version
EDMI	First Version	01/09/2020	1.0

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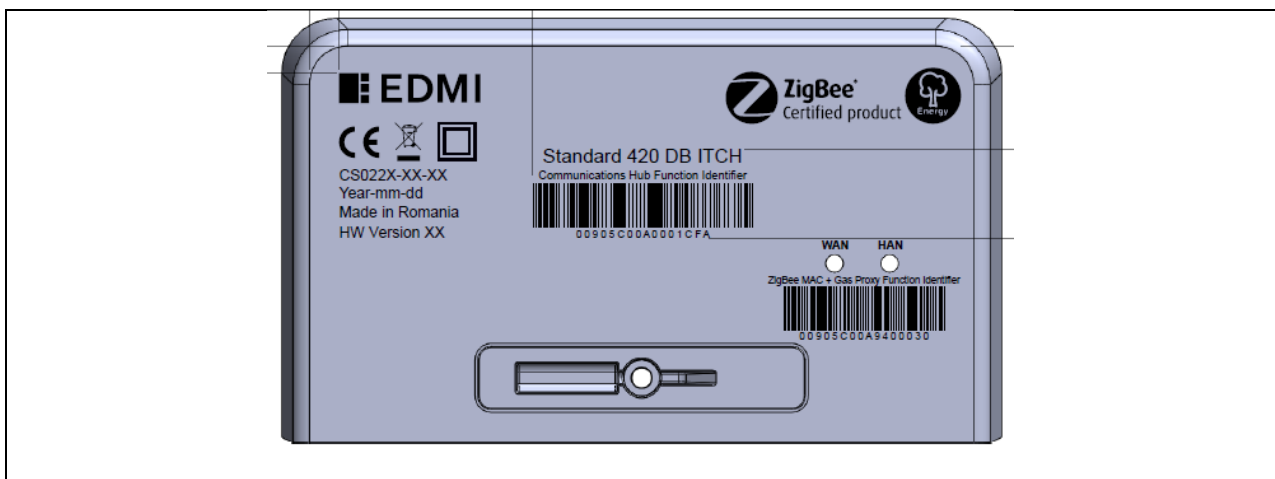
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1 EDM I Standard 420 Dual Band ITCH

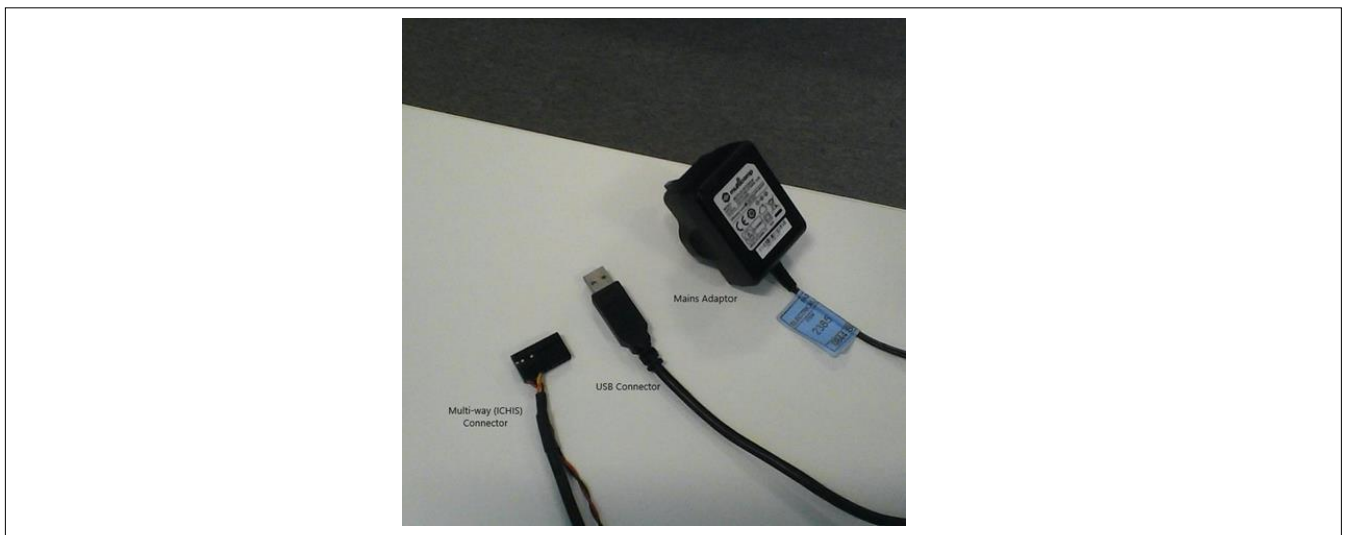
1.1 Overview / Photographs

The Standard 420 DB ITCH consists of:

- Communications hub (ITCH)
- Cable assembly providing a mains plug, USB connector and a multi-way connector for the hub



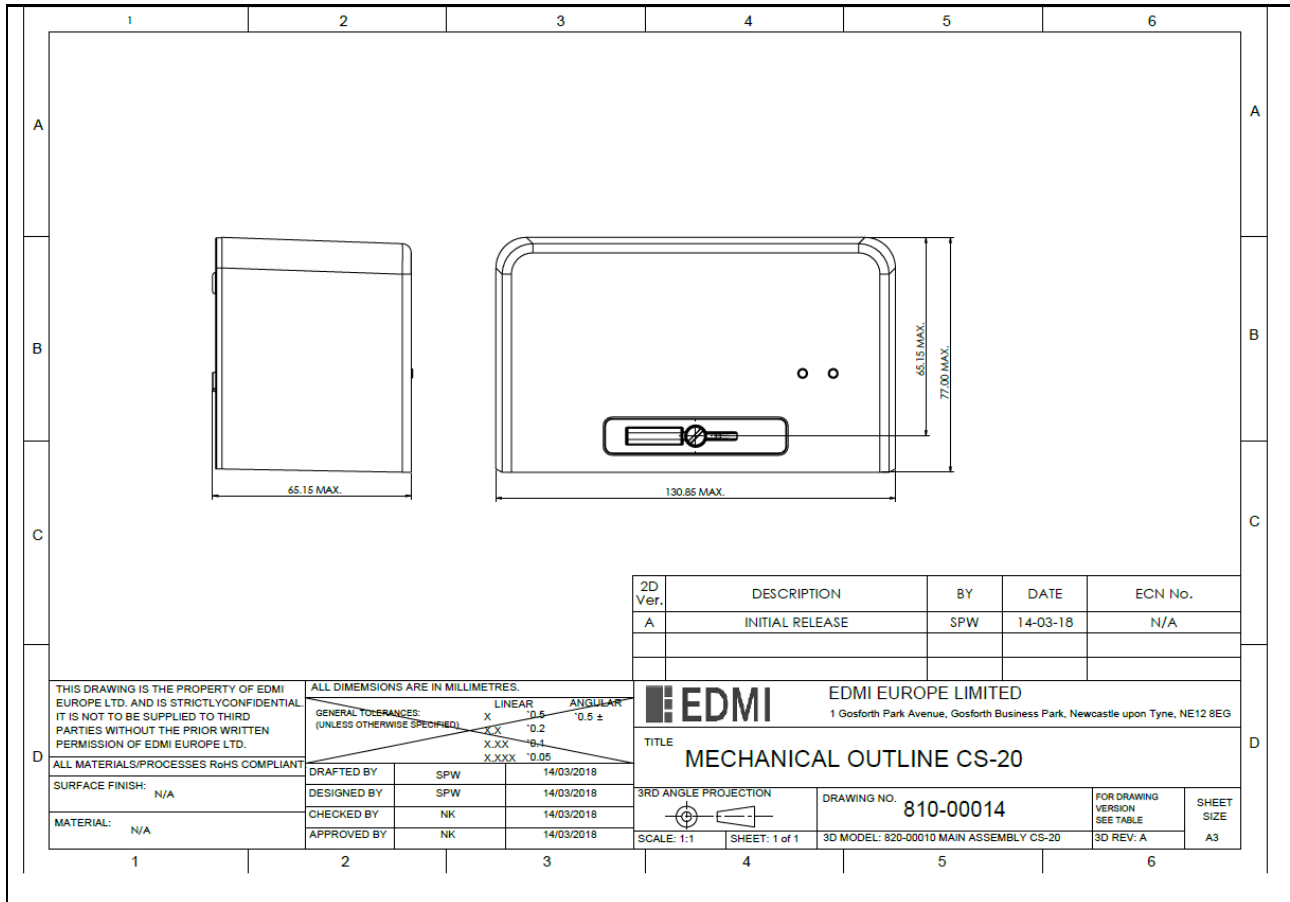
ITCH Communications hub



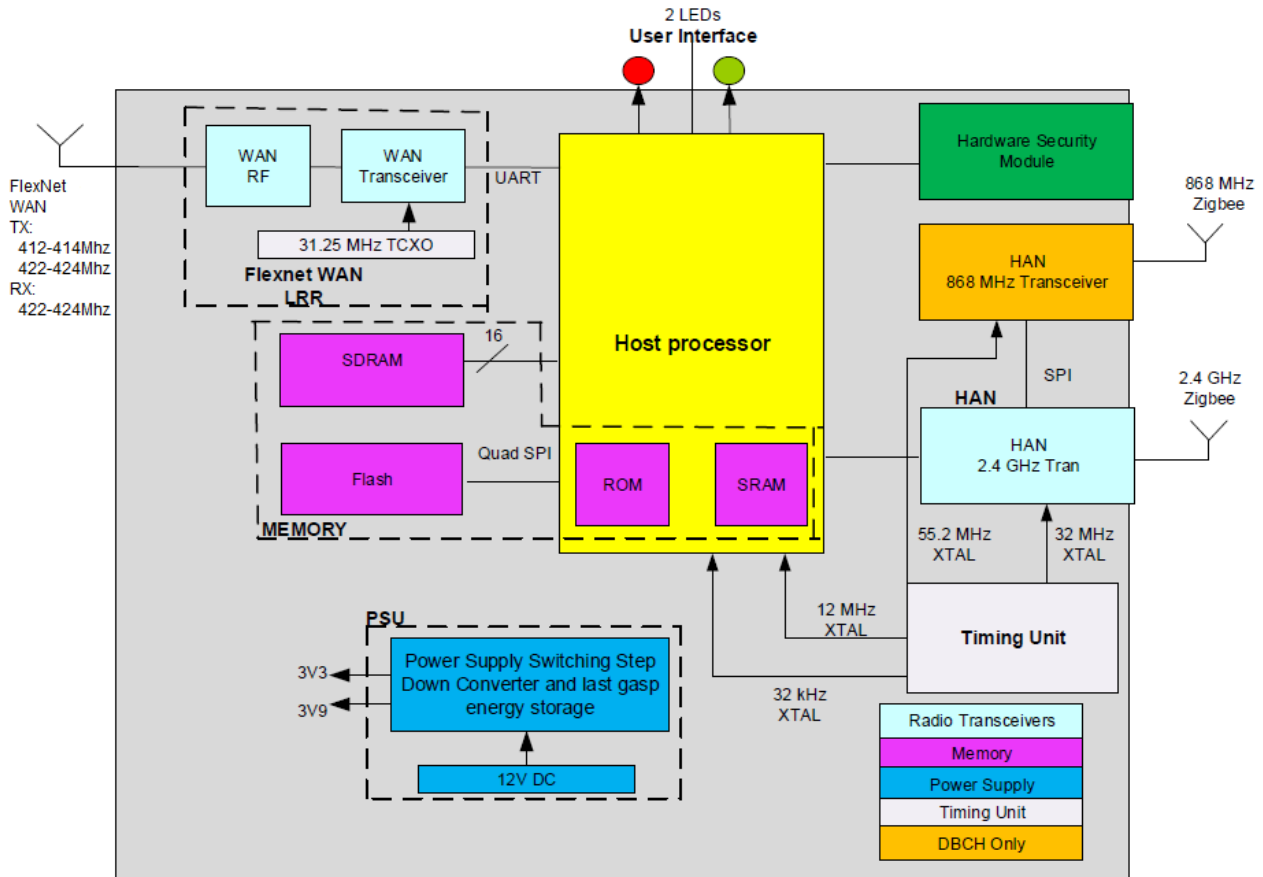
ITCH Connection Cable

The complete Standard 420 DB ITCH assembly is CE marked.

1.2 Communications Hub Enclosure Engineering Drawing



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)	<i>Height from bottom face: 77mm</i> <i>Height from ICHIS datum: 65mm</i> <i>Depth: 65mm</i> <i>Width: 131mm</i>
Weight (g)	<i>200g</i>
Environment Protection	IP Rating: IP53 Indoor without suction Ambient temperature limits: -20°C to 55°C Relative Humidity: Non-condensing / Annual mean < 75% Mechanical Class: M1 (according to MID 2014/32/EU) Electromagnetic Class: E1 (according to MID 2014/32/EU)
SM WAN specification	<i>Standard : ETSI EN300 113-1</i> <i>Frequency Range:</i> <i>Transmit: 412-414 and 422-424 MHz</i> <i>Receive: 422-424 MHz</i> <i>TRP: 1W Maximum.</i>

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
2.4Ghz14dBm ERP for Sub
GHz**Note!** The CS-20 Sub GHz radio complies with "Receiver
Category 2" per EN 300 220-1 v3.1.1:2017

Power Consumption (W)	<i>6W maximum</i> <i>1W typical</i>
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Visual Indicator	<i>SM WAN_LED (Left)</i> <i>SM HAN_LED (Right)</i>
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ICHIS Connections	<p><i>Pins 1, 2: DC input</i></p> <p><i>Pins 3, 4: COM</i></p> <p><i>Pin 5: CH_PR (Communications Hub Present)</i></p> <p><i>Pin 6: MT_PR (Meter Present)</i></p>
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Labelling	See section 1.7
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Packing	See section 1.9 to 1.11
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1.5 Sub GHz 915-921 MHz Channel

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

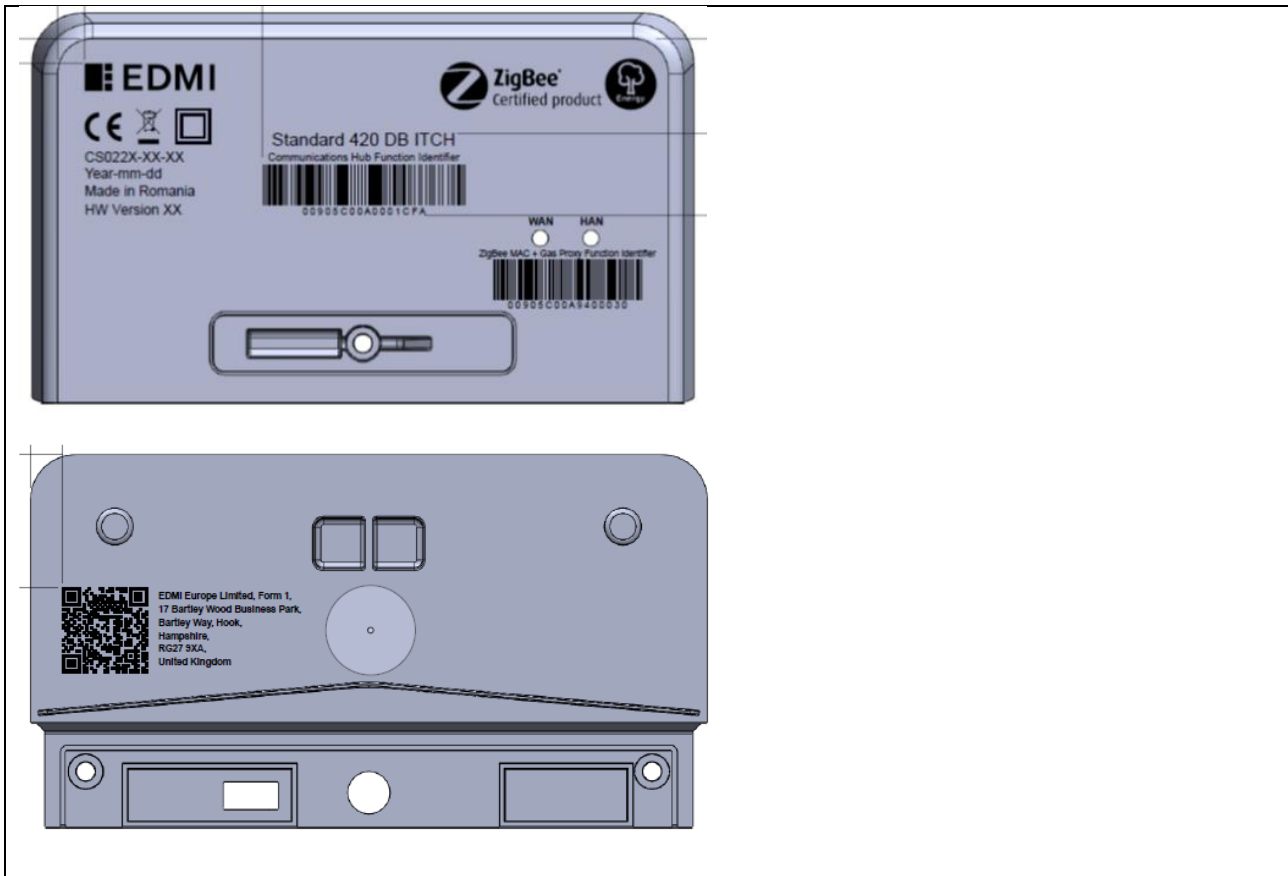
The design goals of good signal performance in the 868 MHz band, circuit design efficiency and immunity to high level adjacent cellular band signals resulted in reduced performance in the 915 MHz band.

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

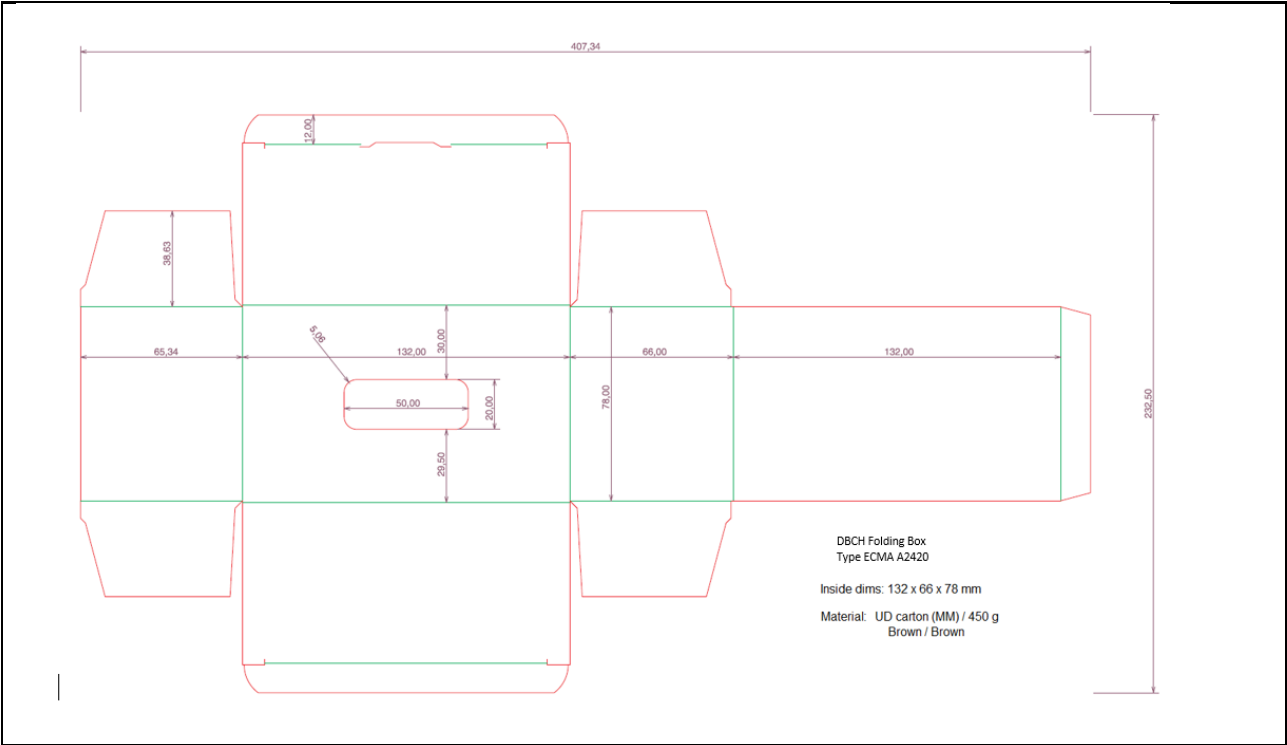
1.6 JTM

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

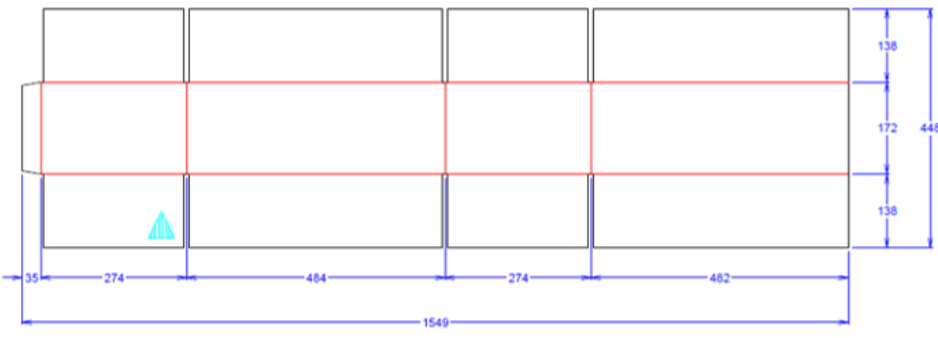


1.8 Packaging Drawing (Box)



1.9 Packaging Drawing (Carton)

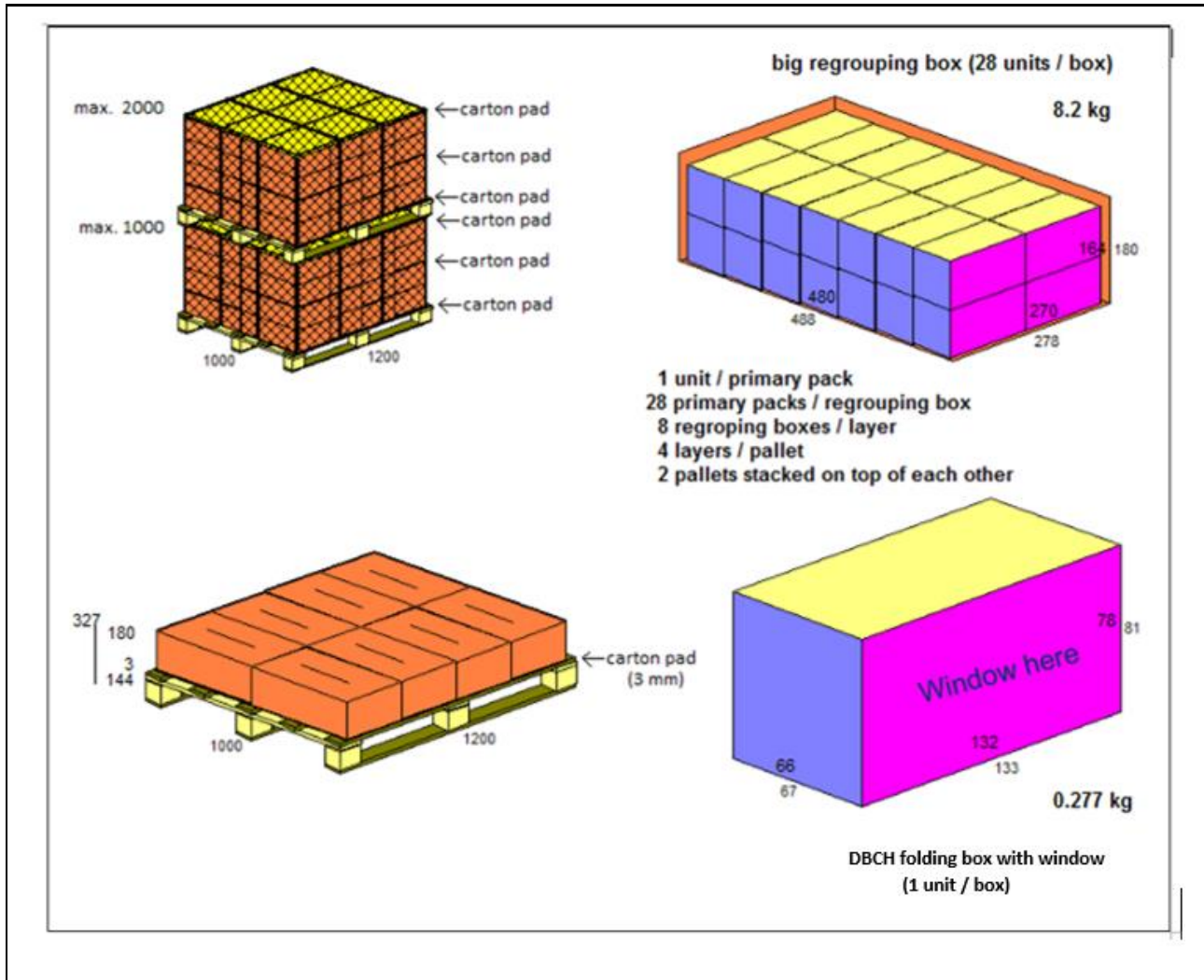
REVISION	CHANGE	ORIGINATOR	DATE
REV A	New release		05/31/2017
REV B			
REV C			



CUSTOMER:	
DESCRIPTION:	
DESIGN STYLE:	
FEFCO 0201	
INSIDE DIMENSIONS:	UNIT:
L: 480	mm
W: 270	mm
D: 164	mm
TOLERANCES: +3/-3 mm	
MATERIAL:	
236 C	
ECT: 6.5 kN/m	
MAT. COLOR: Brown	
PRINT COLOR: N/A	
JOINT: Glued	
QUANTITY/SET: 1	
SPO:	
RULE LENGTH:	
9285mm	
BLANK SIZE:	
448 x 1549mm	
VIEW: outside	
TOOL NR:	
NOTE:	
Box weight: 368 g	

DESIGNER:	PART NO.:
CHK:	EDMI DBCH Regrouping Box
DATE: 05/31/2017	

1.10 Packaging Drawing (Pallet Loading)



2 Appendix - Noise

2.1 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 422 MHz and 424 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

2.2 Noise Calculations

2.2.1 WAN

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

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: $-130.86 + 7 \text{ dBm} = -123.86 \text{ dBm}$

2.2.2 HAN 2.4GHz

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

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: $-110.86 + 3.5 \text{ dBm} = -107.36 \text{ dBm}$

2.2.3 HAN Sub GHz

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

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: $-120.86 + 7 \text{ dBm} = -113.86 \text{ dBm}$

2.3 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.

2.3.1 WAN

centre frequency	423	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	

2.3.2 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	
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2.3.3 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	

2.3.4 ICHIS Interface Specification

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