ENGLISH (UK)

REFERENCE GUIDE

CT2020HD

ENGLISH (UK)

Please read this first!

If you do not understand the contents of this manual:
Do not operate this equipment.

Also, translation of this manual into any EC official language can be made available, at your cost.

ITALIANO

LEGGERE QUESTO AVVISO PER PRIMO!

Se non si capisce il contenuto del presente manuale
NON UTILIZZARE L'APPARECCHIATURA.

È anche disponibile la versione italiana di questo manuale, ma il costo è a carico dell'utente.

SVENSKA

LÄS DETTA FÖRST!

Om Ni inte förstår informationen i denna handbok
ARBETA DÅ INTE MED DENNA UTRUSTNING.

En översättning till detta språk av denna handbok kan också anskaffas, på Er bekostnad.

NEDERLANDS

LEES DIT EERST!

Als u de inhoud van deze handleiding niet begrijpt
STEL DEZE APPARATUUR DAN NIET IN WERKING.

U kunt tevens, op eigen kosten, een vertaling van deze handleiding krijgen.

PORTUGUÊS

LEIA O TEXTO ABAIXO ANTES DE MAIS NADA!

Se não compreende o texto deste manual
NÃO UTILIZE O EQUIPAMENTO.

O utilizador poderá também obter uma tradução do manual para o português à própria custa.

SUOMI

LUE ENNEN KÄYTTÖÄ!

Jos et ymmärrä käsikirjan sisältöä
ÄLÄ KÄYTÄ LAITETTA.

Käsikirja voidaan myös suomentaa asiakkaan kustannuksella.

FRANÇAIS

AVANT TOUT, LISEZ CE QUI SUIT!

Si vous ne comprenez pas les instructions contenues dans ce manuel
NE FAITES PAS FONCTIONNER CET APPAREIL.

En outre, nous pouvons vous proposer, à vos frais, une version française de ce manuel.

DANSK

LÆS DETTE FØRST!

Udstyret må ikke betjenes

MEDMINDRE DE TIL FULDE FORSTÅR INDHOLDET AF DENNE HÅNDBOG.

Vi kan også for Deres regning levere en dansk oversættelse af denne håndbog.

DEUTSCH

LESEN SIE ZUERST DIESEN HINWEIS!

Sollte Ihnen der Inhalt dieses Handbuches nicht klar verständlich sein, dann
Bedienen Sie dieses Gerät nicht.

Eine Übersetzung des Handbuches in dieser Sprache ist gegen Berechnung lieferbar.

ΕΛΛΗΝΙΚΑ

ΔΙΑΒΑΣΤΕ ΠΡΩΤΑ ΑΥΤΟ!

Αν δεν καταλάβετε το περιεχόμενο αυτού του βοηθήματος/εγχειριδίου
ΜΗΝ ΛΕΙΤΟΥΡΓΗΣΕΤΕ ΑΥΤΟΝ ΤΟΝ ΕΞΟΠΛΙΣΜΟ.

Επίσης, αυτό το εγχειρίδιο είναι διαθέσιμο σε μετάφραση σε αυτή τη γλώσσα και μπορείτε να το αγοράσετε.

ESPAÑOL

LEA ESTE AVISO PRIMERO!

Si no entiende el contenido de este manual
NO OPERE ESTE EQUIPO.

Podemos asimismo suministrarle una traducción de este manual al (idioma) previo pago de una cantidad adicional que deberá abonar usted mismo.

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Preliminary Pages

Chapters 1 to 3

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About this Reference Guide

This Reference Guide provides instructions and information for the installation and operation of the CT2020HD.

This Reference Guide should be kept in a safe place for reference for the life of the equipment. It is not intended that this Reference Guide will be amended by the issue of individual pages. Any revision will be by a complete reissue. Further copies of this Reference Guide can be ordered from the address shown on *page ix*. If passing the equipment to a third party, also pass the relevant documentation.

Issues of this Reference Guide are listed below:

Issue	Date	Build Version	Comments
1	March 2008	1.0	Initial release.

Note…

The Build Version in the table refers to an overall number which encompasses all the various software/firmware versions of video, audio, etc in the device.

Acknowledgements

General

All best endeavors have been made to acknowledge registered trademarks and trademarks used throughout this Reference Guide. Any notified omissions will be rectified in the next issue of this Reference Guide. Some trademarks may be registered in some countries but not in others.

Registered trademarks and trademarks used are acknowledged below and marked with their respective symbols. However, they are not marked within the text of this Reference Guide.

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Ethernet® is a registered trademark of Xerox Corporation.

XILINX® is a registered trademark of Xilinx Inc.

Warnings, Cautions and Notes

Heed Warnings

All warnings on the product and in the operating instructions should be adhered to. The manufacturer can not be held responsible for injuries or damage where warnings and cautions have been ignored or taken lightly.

Read Instructions

All the safety and operating instructions should be read before this product is operated.

Follow Instructions

All operating and use instructions should be followed.

Retain Instructions

The safety and operating instructions should be retained for future reference.

Warnings...

Warnings give information which, if strictly observed, will prevent personal injury or death, OR DAMAGE TO PERSONAL PROPERTY OR THE ENVIRONMENT. They are boxed and shaded for emphasis, as in this example, and are placed immediately preceding the point at which the reader requires them.

Cautions...

Cautions give information which, if strictly followed, will prevent damage to equipment or other goods. They are boxed for emphasis, as in this example, and are placed immediately preceding the point at which the reader requires them.

Notes...

Notes provide supplementary information. They are highlighted for emphasis, as in this example, and are placed immediately after the relevant text.

EMC Compliance

This equipment is certified to the EMC requirements detailed in *Annex B, Technical Specification*. To maintain this certification, only use the leads supplied or if in doubt contact Customer Services.

RF Exposure Info:

For body worn operation, device has been tested and meets FCC RF exposure guidelines when used with an accessory that contains no metal and that positions device a minimum of 20cm from the body. Use of other accessories may not ensure compliance with FCC RF exposure guidelines.

Technical Training

Training Courses

BMS Europe provides a wide range of training courses on the operation and maintenance of our products and on their supporting technologies. BMS can provide both regularly scheduled courses and training tailored to individual needs. Courses can be run either at your premises or at one of our dedicated training facilities.

Where to Find Us

For further information on BMS Europe training program please

contact us:

International Telephone: + 49 6124 7239-00
International Facsimile + 49 6124 7239-29

Customer Services and BMS Europe Postal Address

BMS-Europe GmbH & Co. KG

Schwalbacher Straße 12

65321 Heidenrod – Kemel

Germany

Return of Equipment

If you need to return equipment for repair, please contact

Tel: + 49 6124 7239-00

Fax: + 49 6124 7239-29

BMS-Europe GmbH & Co. KG

Schwalbacher Straße 12

65321 Heidenrod – Kemel

Germany

1. Introduction to the CT2020HD

1.1 Preliminary Remarks

The present manual is provided for users and operators of the CT2020HD Transmitter. It is intended to support the installation, operation, maintenance and daily use of the unit in general.

The manual should be kept with the CT2020HD Transmitter and may be consulted when questions occur. If problems should remain after you have read the manual carefully or if you have any further questions concerning the functionality or operation of the Transmitter, please contact the Customer Service.

1.2 Designation and P/N

Designation	CT2020HD	
	Frequency range	P/N
	2.0 – 2.3 GHz	11.2422.500
	2.3 – 2.6 GHz	11.2422.100

1.3 Description

General Information on D-ENG (Digital Electronic News Gathering)

The introduction of the DVB standard established the basis for digital broadcast video transmission making efficient use of the available bandwidth. Powerful compression algorithms allow a reduction in the amount of data to be transferred, while maintaining the high quality standards for video and audio signals used in broadcasting applications. New modulation techniques and error correction algorithms ensure a secure signal transmission even when the transmission conditions are poor.

The DVB-T standard was established for terrestrial digital TV broadcasting, in particular considering the difficult conditions of radio transmission. The highly efficient OFDM multicarrier modulation procedure enables transmission without interference even under multipath propagation conditions occurring with non-directional transmission or reception. Practical experience soon has proved that the DVB-T standard guarantees ruggedness of transmission to an extent even allowing mobile reception.

Increasing miniaturization, in particular of MPEG encoders and OFDM modulators, enables using the DVB-T standard for mobile portable transmission systems.

Previous analog FM systems were adversely affected by signal reflections directly resulting in video and audio interferences. Such effects do not occur when the digital ENG system (D-ENG) is deployed. Even mobile transmission from moving vehicles or the use of omni-directional antennas on the transmitting or receiving side does not impair the picture or sound quality at all, opening a completely new range of applications in TV production and news gathering.

Video Inputs

The CT2020HD accepts only HDSDI information at the input:

- HDSDI BNC(f)

OFDM Modulator

The digital data signal for wireless transmission is processed by the OFDM Modulator and following IQ Modulator. The OFDM (Orthogonal Frequency Division Multiplex) modulation procedure has a major impact on the transmission properties and was specifically developed for terrestrial radio transmission.

User interface

With its integrated Multifunctional Display it is easy to set up the transmit frequency, display contrast. The current Software version can also be displayed.

Power Linear Amplifier

The linear power amplifier amplifies the output signal of the Modulator to an output of about 400 mW (+26 dBm). The output port of the Low-Power Amplifier is located on top of the CT2020HD.

2. Installing the Equipment

2.1 Safety instructions

Warning

The regulations of VDE0100 must be observed for installation and operation of the unit.

Caution

- Establish all other connections before starting the unit by connecting it to 12VDC. Essential a valid video signal must be connected to the desired input before power on the CT2020HD.
- When you connect the CT2020HD as described in the following sections, make sure that the "Caution" instructions given there are observed.
- Make sure that there is sufficient air circulation to ensure adequate cooling of the unit.
  External forced ventilation may be required if the unit is installed in a rack or cabinet.

2.2 Connectors

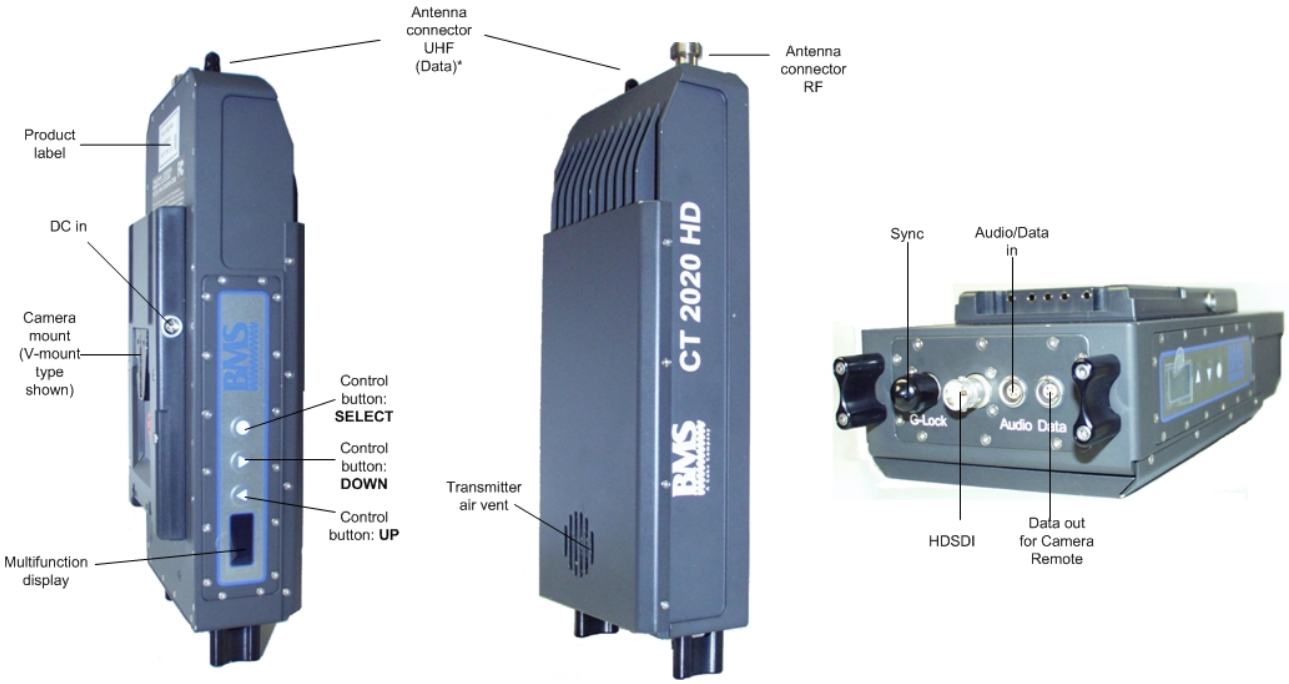


Figure 1 Input connector of the CT2020HD

- **RF Connector**

  The RF output signal of the Low-Power Amplifier is fed out at the N(f) connector on top of the unit.

  The CT2020HD provides a RF output of about 400 mW (+26dBm).

Connecting Signal Sources

The Video signal supplied by the camera has to be applied to the HDSDI BNC(f) connector of the transmitter.

The Audio signal supplied by the camera has to be applied to the Audio in 5pol Lemo connector of the transmitter.

Connecting the RF Output

A Omni directional antenna with N(m) connector can be directly mount at the RF out socket.

Connecting the UHF Data Input (optional)

A UHF antenna with SMA (m) connector can be directly mount at the UHF in socket.

Connecting the 12VDC Supply Voltage

Caution

When using a battery or power pack, make sure that the maximum supply current is at least 3A and the output voltage matches the input voltage range of the CT2020HD.

Failure to comply with these requirements **may cause fatal damage** to the battery/power pack and/or CT2020HD.

Battery Powered Operation of the CT2020HD

Many types of batteries are available on the market and we tried to support the best ones.

2.3 Shut-Down

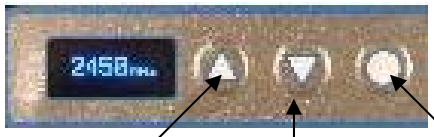
Caution

To shut-down the unit, first disconnect it from the 12VDC supply voltage.

After disconnection from the supply voltage by removing the battery or disconnecting the 12VDC supply cable, the other connecting cables can be removed from the unit.

3. Operating the Equipment

3.1 Multifunctional display



During start up, the transmitter is in a self test mode. After the self test, for a short time the transmitters name is displayed after it changes to the current frequency.

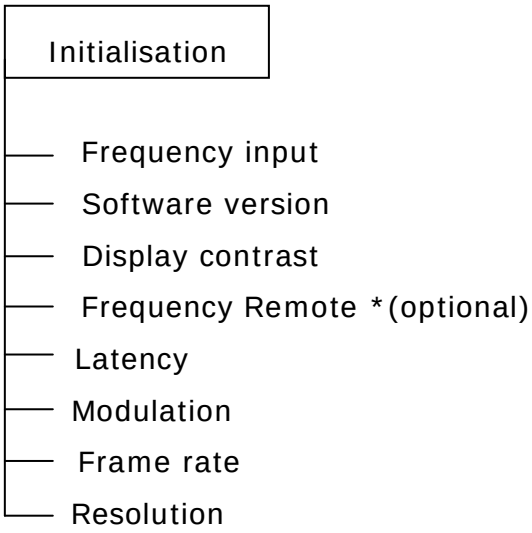
Display during self test

After the self test, the current frequency is displayed.

Current transmit frequency

With its automatically COFDM setup the customer menu is very easy to handle. When Button 3 is pressed and held for approximately 2sec. the setup menu is accessible.

Menu structure

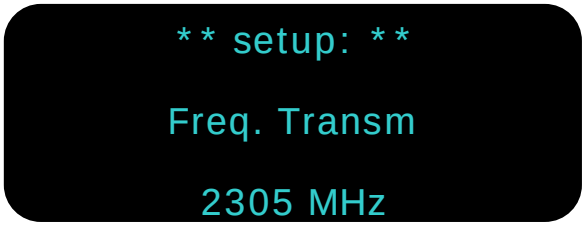


To get access to a sub menu, use the button 1 or 2.

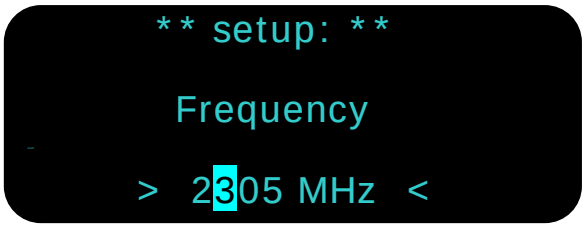
To exit all sub menus press button 3.

3.2 Frequency input

At the frequency menu the current frequency is displayed.



To change the frequency press button 3 for 3sec.

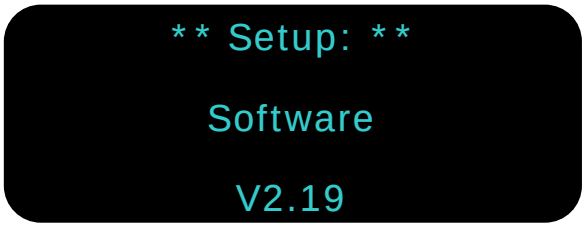


The flashing cursor displays the current changeable position of the frequency. By the use of button 1 and 2 the flashing position can be changed, digit for digit. To change the next position of the frequency use button 3 and afterwards continue as described before. To save the changed frequency press button 3 after all digits of the frequency are set. You also leave the frequency setup with this final step.

To exit this submenu, press button 3.

3.3 Software Version

In the Sub-menu Software the actual Software version number is shown.



To exit this submenu, press button 3.

3.4 Contrast

In the sub menu ‘Display Contrast’ an adjustment, relative to the surrounding brightness, can be made.

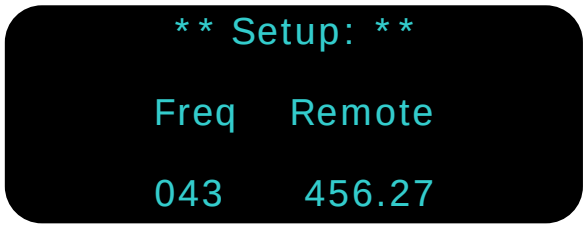
Edit mode is reached by pressing button 3 for 2 seconds. Here, through buttons 1 & 2, the desired contrast value can be entered. The range is between 0= Dark to 127= Bright The contrast value at delivery is 031.

To exit this submenu, press button 3.

3.5 Remote Frequency*(optional)

In the sub menu ’Remote Frequency’ the frequency of the data receiver can be set. This setting is however, only valid for the CT2020HD Series, which have integrated data receivers.

Edit mode is reached by pressing button 3 for 2 seconds. Here, with buttons 1 & 2, the various frequency channels can be chosen. Confirmation of the channel is achieved by pressing button 3. A channel/frequency overview is available on request.

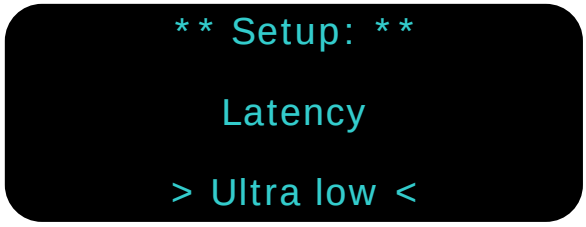


To exit this submenu, press button 3.

3.6 Latency

In the sub-menu 'Latency' the latancy can be chosen. There are two setting, "Ultra low" and "Standard".

Edit mode is reached by pressing button 3 for 2 seconds. Here, through buttons 1 & 2, the two modes can be chosen. Confirmation is achieved by pressing button 3.

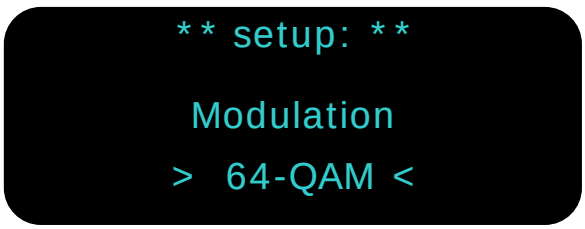


To exit this submenu, press button 3.

3.7 Modulation

In the sub menu 'Modulation' the Modulation method can be changed. The following options are possible:

- QPSK
- 16 QAM
- 64 QAM



Edit mode is reached by pressing button 3 for 2 seconds

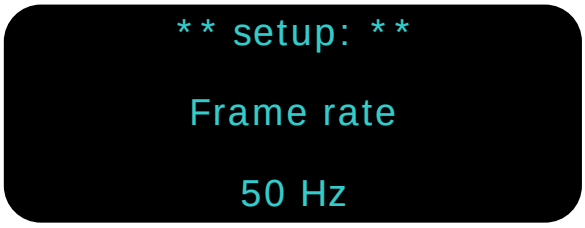
With the arrow indicators 1 & 2 the desired Modulation can be chosen. To confirm press button 3.

To exit this submenu, press button 3.

3.8Framerate

In the sub menu 'Frame rate' the following Frame rates are available:

- 50 Hz
- 59,94 Hz
- 60 Hz



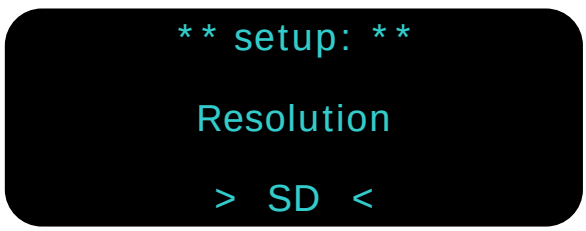
With the arrow indicators 1 & 2 the desired Frame rate can be chosen. To confirm press button 3.

To exit this submenu, press button 3.

3.9 Resolution

In the sub menu 'Resolution' the desired resolution of your transmitter can be chosen There are three possible options available

- SD
- 720p
- 1080i



Edit mode is reached by pressing button 3 for 2 seconds.

With the arrow indicators 1 & 2 the desired Modulation can be chosen. To confirm press button 3.

To exit this submenu, press button 3.

List of Abbreviations

The following specific abbreviations are used within this document:

4:2:0	Digital video coding method in which the color difference signals are sampled on alternate lines at half the luminance rate.
4:2:2	Digital video coding method in which the color difference signals are sampled on all lines at half the luminance rate.
COFDM	Coded Orthogonal Frequency Division Multiplex (digital modulation procedure)
Composite	CVBS video signal, 1 V_{pk-pk}
CVBS	Color Video Black Sync Signal
D-ENG	Digital Electronic News Gathering
DVB-T	Digital Video Broadcasting Terrestrial
EMC	Electromagnetic Compatibility
ETS	European Telecommunications Standard
FBAS	German for CVBS
FEC	Forward Error Correction
FM	Frequency Modulation (analog modulation procedure)
IF	Intermediate Frequency
IEC	International Electro-technical Committee
ISO	International Standards Organisation
kbit/s	1000 bits per second
Mbit/s	Million bits per second.
MP@ML	Main Profile at Main Level: A subset of the MPEG-2 standard, which supports digital video storage (DVD etc.) and transmissions up to 15 Mbit/s over various mediums.
MPEG	Motion Pictures Experts Group (compression technique)
NTSC	National Television Systems Committee
OFDM	Orthogonal Frequency Division Multiplex
QAM	Quadrature Amplitude Modulation: A method of modulating digital signals
QPSK	Quadrature phase shift keying (digital modulation technique)
PAL	Phase Alternation Line (a color TV broadcasting system)
PCM	Pulse Code Modulation
RF	Radio Frequency
RGB	Red, green, blue. The chroma information in a video signal.
RS 232, RS-232	EIA-232

SDI	Serial Digital Interface
TS	Transport Stream
XLR	Audio connector featuring three leads, two for signal and one for GND
YUV	Y: Luminance component (brightness), U and V: chrominance (color difference)
Y/C	Broadcast Video with separate color, Y luminance and C chroma (sometimes called S-Video)

Technical Specification

B.1 Compliance[1]

B.1.1 Safety

This equipment has been designed and tested to meet the requirements of the following:

EN 60950	European	Safety of information technology equipment including business equipment.
IEC 60950	International	Safety of information technology equipment including business equipment.

B.1.2 EMC[2]

The equipment has been designed and tested to meet the following:

EN 55022 and AS/NZS 3548	European Australia and New Zealand	Emission Standard Limits and methods of measurement of radio frequency interference characteristics of information technology equipment - Class A.
EN 61000-3-2[3]	European	Electromagnetic Compatibility (EMC), Part 3 Limits; Section 2. Limits for harmonic current emissions (equipment input current ≤ 16 A per phase).
EN 61000-3-3[3]	European	Electromagnetic Compatibility (EMC), Part 3. Limits; Section 3. Limitation of voltage fluctuations and flicker in low voltage supply systems for equipment with rated current ≤ 16 A.
EN 55024:1998	European	Information technology equipment - Immunity characteristics - Limits and methods of measurement.

[1] The version of the standards shown is that applicable at the time of manufacture.

[2] The EMC tests were performed with the Technical Earth attached, and configured using recommended cables.

[3] Applies only to models of the equipment using mains (ac) power sources.

B.1.3 Shock and Vibration

The device chassis complies with the requirements of ETS 300-019-2-5 Table 2, for both non-operational and operational states, without any special mounting or casing requirements over and above the standard mounting requirements specified.

ETS 300-019-2-5	European	Equipment Engineering (EE): Environmental conditions and environmental tests for telecommunications equipment Part 2-5: Specification of environmental tests Ground Vehicle Installations. Table 2.

B.1.4 CE Marking

CE

The CE mark is affixed to indicate compliance with the following directives:

89/336/EEC of 3 May 1989 on the approximation of the laws of the Member States relating to electromagnetic compatibility.

73/23/EEC of 19 February 1973 on the harmonisation of the laws of the Member States relating to electrical equipment designed for use within certain voltage limits.

B.1.5 FCC Marking

FCC ID: VFB-CT2020HD-2000 for P/N 11.2422.500

VFB-CT2020HD-2300 for P/N 11.2422.100

Radio Frequency Interference (FCC 15.105)

This equipment has been tested and found to comply with the limits for Class B digital devices pursuant to Part 15 of the FCC Rules. 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. 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 and correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and the receiver.
- Connect the equipment to 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.

Labeling Requirements (FCC 15.19)

This equipment complies with Part 15 of FCC Rules. Operation is subject to the following two conditions:

- This device may not cause harmful interference, and
- This device must accept any interference received, including interference that may cause undesired operation.

Modifications (FCC 15.21)

Changes or modifications to this equipment not expressly approved by BMS may void the user's authority to operate this equipment.

B.2 Technical Specifications

Signal Parameters

Frequency	2.0 - 2.3 GHz or 2.3 – 2.6 GHz (other on request)
Video Input	HDSDI - BNC(f)
Audio Input	1x Analogue audio in Line or Mic Level – 5pol Lemo
Modulator	COFDM, ETS 300744, 2k carriers only Bandwidth: 8 MHz QPSK,16 QAM,64 QAM
RF Output Power	400 mW
Power Input	11 to 17.5 VDC
Power Consumption	23W
Operating Conditions	Ambient temperature -20°C to +45°C
Dimensions (W x D x H)	272 mm x 106 mm x 56 mm (without Battery bracket)
Weight	1.45 kg approx