

## REFERENCE GUIDE V. 1.3

# CT2430LD and CT2430LD-S



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### Chapter 1: Introduction to the CT2430LD

Gives a general description of the equipment and its main features and functions. Identifies the controls, indicators and connectors on the front and rear panels.

### Chapter 2: Installing the Equipment

Provides a guide to the suitability of an installation and gives detailed procedures for the preparation and installation of the equipment. Also details the external connectors and provides **important safety information**.

### Chapter 3: Operating the Equipment Locally

Describes local control in detail. Provides the power-up/power-down procedures and other general operating/control/set-up procedures.

### Annex A: List of Abbreviations

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## About this Reference Guide

This Reference Guide provides instructions and information for the installation and operation of the CT2430LD.

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 viii*. 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.
1	January 2009	1.1	Update
1	March 2009	1.2	Notes added

### 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.

### Registered Trademarks

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Musicam<sup>®</sup> is a registered trademark of Thomson and Télédiffusion de France (TDF), Europe, and is a registered trademark of CCS (now Musicam USA Incorporated), USA.

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# 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 30cm 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 CT2430LD

## 1.1 Preliminary Remarks

The present manual is provided for users and operators of the CT2430LD 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 CT2430 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

Device	PN	SDI-Input	Freq.Range	IDX-Battery Mount	A.Bauer -Battery Mount	FCC-ID
<b>CT2430LD</b>	11.2440.000		2.28 – 2.55GHz	X		
<b>CT2430LD-BOS</b>	11.2446.000		2.28 – 2.55GHz	X		
<b>CT2430LD-S</b>	11.2440.100	X	2.28 – 2.55GHz	X		
<b>CT2430LD</b>	11.2467.000		2.0 – 2.3GHz	X		
<b>CT2430LD-S</b>	11.2467.100	X	2.0 – 2.3GHz	X		
<b>CT2430LD-S</b>	11.2467.110	X	2.025 – 2.110GHz		X	VFB-CT2430LDLS

## 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 CT2430 has the following inputs:

- PAL or NTSC BNC(f)
- SDI\* (only CT2430LD-S)

### 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 1 W (+30 dBm). The output port of the Power Amplifier is located on top of the CT2430LD.

## 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 CT2430LD.
- When you connect the CT2430LD 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

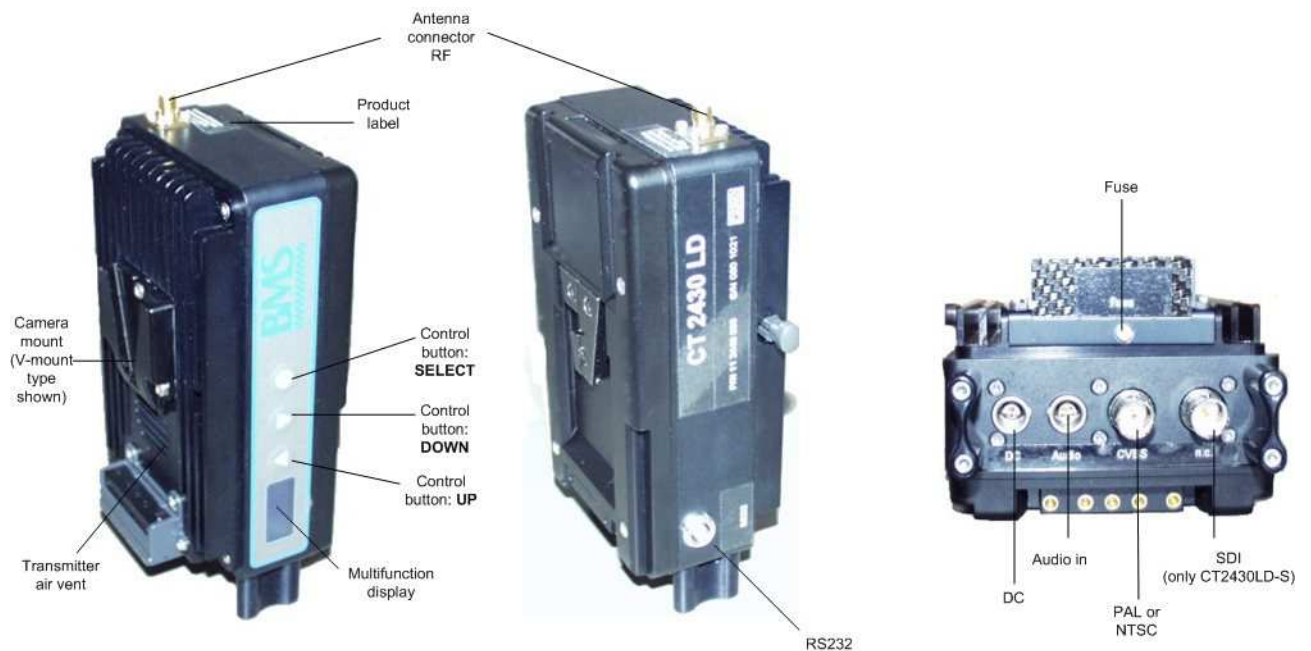


Figure 1 Input connector of the CT2430LD

- **RF Connector**

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

The CT2430 provides a RF output of about 1 W (+30dBm).

### Connecting Signal Sources

The Video signal supplied by the camera has to be applied to the PAL/NTSC BNC (f) connector of the transmitter ( and SDI for CT2430LD-S\*).

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 SMA (m) connector can be directly mount at the RF out socket.

## Connecting the 12VDC Supply Voltage

### Caution

When using a battery or power pack, make sure that the minimum supply current is at least 3A and the output voltage matches the input voltage range of the CT2430LD.

Failure to comply with these requirements **may cause fatal damage** to the battery/power pack and/or CT2430LD.

## Battery Powered Operation of the CT2430LD

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

## 2.3 Shut-Down

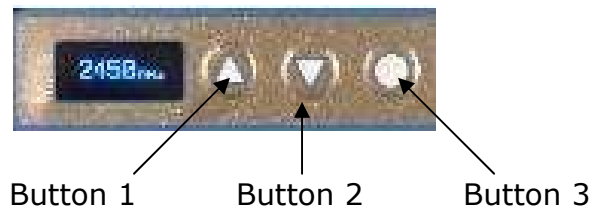
### Caution

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.

**BMS**  
**CT2430**

Display during self test

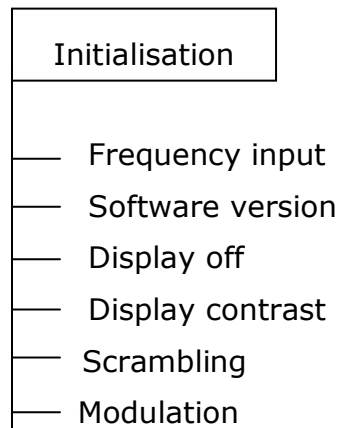
After the self test, the current frequency is displayed.

**2100 MHz**

Current transmit frequency

With its automatic 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

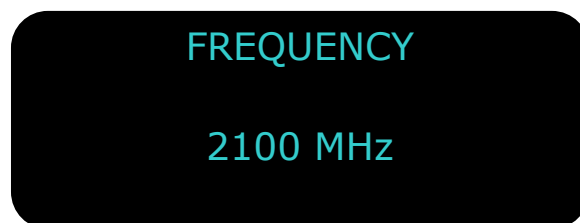


To get access to a sub menu, use the button 1 or 2.

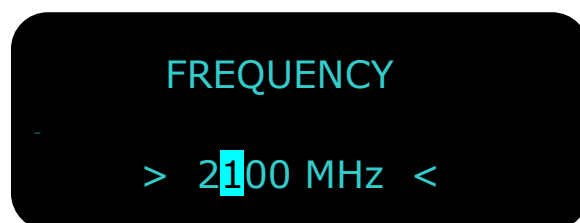
To exit all sub menus press button 3.

### 3.2 Frequency input

At the frequency menu the current frequency is displayed.



To change the frequency press button 3 for 3sec.



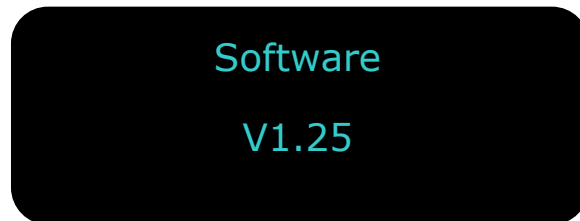
The flashing cursor displays the current changeable position of the frequency. By the use of button 1 and 2 the flashing position can be changed, digit for digit. To change the next position of the frequency use button 3 and afterwards continue as described before. To save the changed frequency press 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 Display

In the sub menu 'Display' you can set the duration for the Display. Here you can set how long the display has to be on.



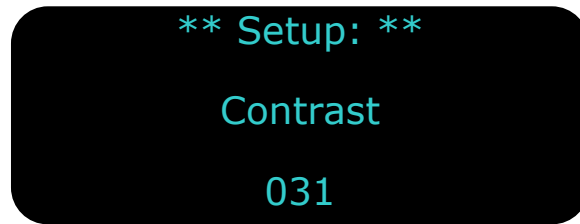
Edit mode is reached by pressing button 3 for 2 seconds. Here, through buttons 1 & 2, the desired contrast value can be entered. The range is between 0=Dark to 240 seconds in 15 sec steps.

To exit this submenu, press button 3.

### 3.5 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.



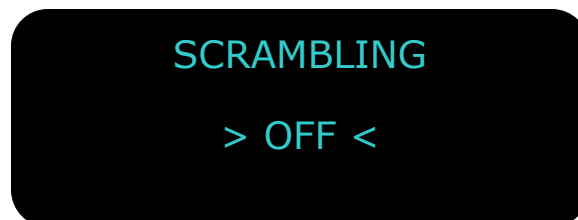
To exit this submenu, press button 3.

### 3.6 Scrambling

In the sub-menu 'SCRAMBLING' the scrambling can be chosen. There are 4 settings available:

- OFF
- ABS
- AES128
- AES256

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

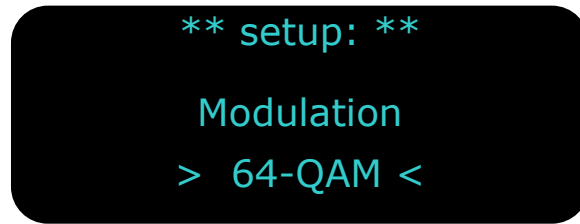


To exit this submenu, press button 3.

### 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.

## 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<sup>1</sup>

#### 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<sup>2</sup>

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 <sup>3</sup>	European	Electromagnetic Compatibility (EMC), Part 3 Limits; Section 2. Limits for harmonic current emissions (equipment input current $\leq 16$ A per phase).
EN 61000-3-3 <sup>3</sup>	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 $\leq 16$ A.
EN 55024:1998	European	Information technology equipment - Immunity characteristics - Limits and methods of measurement.

<sup>1</sup> The version of the standards shown is that applicable at the time of manufacture.

<sup>2</sup> The EMC tests were performed with the Technical Earth attached, and configured using recommended cables.

<sup>3</sup> 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.
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### B.1.4 CE Marking



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-CT2430LDLS

#### Radio Frequency Interference

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.

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.

### **Modifications**

Changes or modifications made to this equipment not expressly approved by Broadcast Microwave Services may void the FCC authorization to operate this equipment.

### **Radiofrequency radiation exposure Information**

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance of 20 cm between the radiator and your body.

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



## B.2 Technical Specifications

### Signal Parameters

<b>Frequency</b>	2.025 to 2.110 GHz (other frequencies on request)
<b>Channel Bandwidth</b>	6/7/8 MHz
<b>Video Input</b>	PAL or NTSC - BNC(f) SDI -BNC(f)* (CT2430LD-S only)
<b>Audio Input</b>	1x Analogue audio in Line or Mic Level – 5pol Lemo
<b>Modulator</b>	COFDM, ETS 300744, 2k carriers only Bandwidth: 8 MHz QPSK,16 QAM,64 QAM <ul style="list-style-type: none"> <li>• FEC 1/2,2/3,3/4</li> <li>• Guard 1/4,1/8,1/16,1/32</li> </ul>
<b>Video Encoding</b>	MPEG-2 4:2:0 MP@ML
<b>Audio Encoding</b>	MPEG Layer 2
<b>RF Output Power</b>	1 W
<b>Power Input</b>	11 to 17.5 VDC 2pol Lemo
<b>Power Consumption</b>	12W
<b>Operating Conditions</b>	Ambient temperature -20°C to +50°C
<b>Dimensions (W x D x H)</b>	138 mm x 87 mm x 27 mm (without Battery bracket)
<b>Weight</b>	0.5 kg approx