Belcom
MICROWAVES

mBLC

Block Up Converter Series

User Manual

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Printed in Belcom
July 2013

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List of Updates

No.	Date	Description	Page Number
1.0	September 2009	New release	All
2.0	July 2013	Major revision	All

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List of Acronyms and Abbreviations

mBLC series:	Belcom low power (1 to 8 Watt) BUC series	L:	Length
BUC:	Block Up Converter	Kg:	Kilogram
C:	Celsius	KHz:	Kilohertz
CIF:	Cost, Insurance, Fright	MHz:	Megahertz
DC:	Direct Current	RF:	Radio Frequency
GHz:	Gigahertz	RMA:	Return Material Authorization
H:	Height	SCPC:	Single Channel Per Carrier
IF:	Intermediate Frequency	VSAT:	Very Small Aperture Terminal
IFL:	IF Cable	VSWR:	Voltage Standing Wave Ratio
		W:	Watts, Width

Safety Instructions Definitions

WARNING

An operating procedure, practice, and so forth, which, if not correctly followed, could result in personal injury or loss of life.

CAUTION

An operating procedure, practice, and so forth, which if not strictly observed, could result in damage to or destruction of equipment.

NOTE

An operating procedure, practice, and so forth, which is recommended to highlight for better work order or for efficiency.

Preface

Scope

This manual contains the operational procedures and activities performed on the mBLC BUC series.

The manual consists of the following chapters:

Chapter 1: **Introduction**

Introduction to the mBLC series.

Chapter 2: **Handling, Installation and Operation**

Instructions on how to handle and install the mBLC series BUCs.

Chapter 3: **Maintenance**

Procedures that should be covered while using the mBLC series BUCs.

Trobleshooting

Certificates

ISO 9001-2008 Certified Quality Management System

"Needs to demonstrate its ability to consistently provide product that meets customer and applicable statutory and regulatory requirements, and aims to enhance customer satisfaction through the effective application of the system, including processes for continual improvement of the system and the assurance of conformity to customer and applicable statutory and regulatory requirements."

General Safety Guidelines

- The mBLC BUC should be located in a Restricted Access Location (RAL) - access should be allowed to service personnel only.
- The mBLC BUC is required to be connected to the earthing of the building structure. grounding is provided via the OMT waveguide flange and through the antenna pole. All 8 screws connecting the unit to the OMT are to be securely tightened. The installer shall verify that the antenna is bonded to the building structure ground.
- The earthed side of the mBLC is connected to the shielding of the coax cable and the shielding should be earthed in the building infrastructure.
- Use local agency approved cable that complies with the appropriate temperature and power ratings.
- When servicing the mBLC BUC, obey all safety instructions related to transmitting antennas maintenance.

WARNING

Always observe standard safety precautions during installation, operation and maintenance of this product.

WARNING

Handle this product only as instructed in this manual. Do not attempt to operate or maintain this product in a manner not specifically stated in this manual.

CAUTION

Hot surface while in operation, do not touch.

1. Introduction

This chapter serves as an introduction to the mBLC series. It includes the following sections:

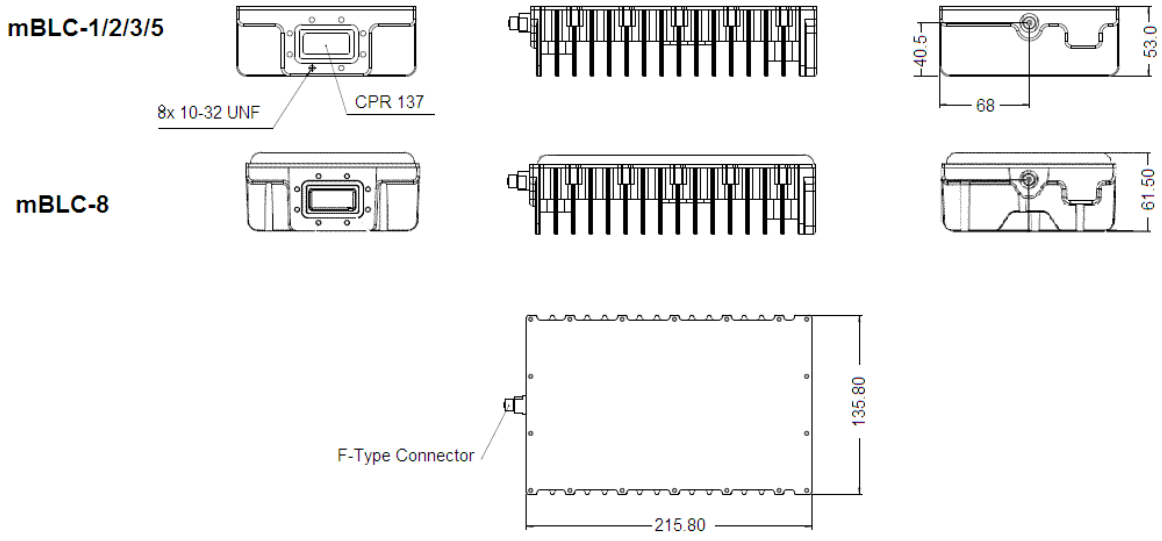
- Section 1.1: Overview
- Section 1.2: Features and Benefits
- Section 1.3: Available Models and Configurations
- Section 1.4: Technical Data and Specifications

1.1 Overview

The mBLC products are high linearity Block-Up Converters (BUC).

They are used for satellite communication and operates at the C-Band frequency range.

Figure 1-1: mBLC series Outline



1.2 Features and Benefits

- An outdoor sealed BUC
- Operating temperature: -40°C to +60°C
- Easy for installation and operation
- Reliable
- Supported by Belcom Microwaves
- Designed for use in either VSAT or SCPC applications
- Mounted on the OMT
- Powered via the IFL cable (24V indoor DC power supply and power inserter is available upon request.

1.3 Available Models and Configurations

Table 1-1: Available Models and Configurations

Model	*Output Power @ P1dB (W)*	Input Frequency (MHz)	Output Frequency (GHz)	LO Frequency (MHz)	Power Consumption (W)	Weight (Kg)
mBLC-1	1	950 - 1525	5.85 - 6.425	4900	15	1.9
mBLPA-1		1075 - 1435	6.365 - 6.725	5290		
mBLIN-1		975 - 1275	6.725 - 7.025	5750		
mBLWC-1		950 - 1825	5.85 - 6.725	4900		
mBLC-2	2	950 - 1525	5.85 - 6.425	4900	24	1.9
mBLPA-2		1075 - 1435	6.365 - 6.725	5290		
mBLIN-2		975 - 1275	6.725 - 7.025	5750		
mBLWC		950 - 1825	5.85 - 6.725	4900		
mBLC-3	3	950 - 1525	5.85 - 6.425	4900	28	1.9
mBLPA-3		1075 - 1435	6.365 - 6.725	5290		
mBLIN-3		975 - 1275	6.725 - 7.025	5750		
mBLWC-3		950 - 1825	5.85 - 6.725	4900		
mBLC-5	5	950 - 1525	5.85 - 6.425	4900	48	1.9
mBLPA-5		1075 - 1435	6.365 - 6.725	5290		
mBLIN-5		975 - 1275	6.725 - 7.025	5750		
mBLWC-5		950 - 1825	5.85 - 6.725	4900		
mBLC-8	8	950 - 1525	5.85 - 6.425	4900	55	2.3
mBLPA-8		1075 - 1435	6.365 - 6.725	5290		
mBLIN-8		975 - 1275	6.725 - 7.025	5750		

1.4 Technical Data and Specifications

Table 1-2: Technical Data and Specifications

Electrical Specifications:	
Nominal Gain:	
mBLC-1	53dB
mBLC-2, mBLC-3	55dB
mBLC-5	58dB
mBLC-8	60dB
Gain Stability:	
Gain Variations over full band:	±2dB
Gain variations over 36MHz:	±1dB
Gain Variation over Temp (-40 to +60°C):	±1dB
Intermodulation distortion at 6dB Back off:	-27dBc
Spurious @ P1dB:	-60dBc
Harmonics @P1dB - 3dB:	-50dBc
Phase Noise:	
100Hz:	-60dBc/Hz
1KHz:	-70dBc/Hz
10KHz:	-80dBc/Hz
100KHz:	-90dBc/Hz
1MHz:	-100dBc/Hz
External Reference requirements	
External Reference frequency:	10 MHz
External Reference signal level:	-10 to +7dBm
External Reference phase noise requirements:	
- 10Hz:	-105dBc/Hz
- 100Hz:	-134dBc/Hz
- 1KHz:	-144dBc/Hz
- 10KHz:	-154dBc/Hz
Wideband noise in TX band	
mBLC-1, mBLC-2, mBLC-3	-94dBm/Hz max
mBLC-5, mBLC-8	-90dBm/Hz max
Wideband noise in RX band	-160dBm/Hz max

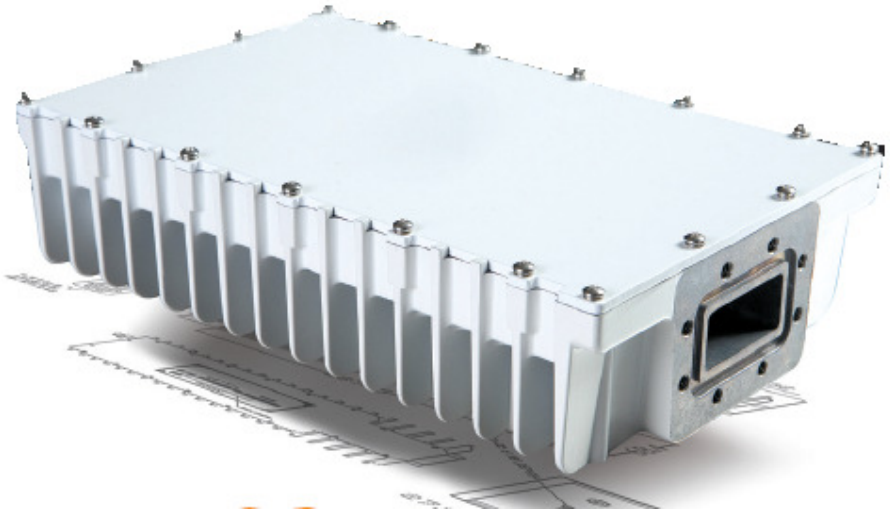
Input VSWR:	2.0:1
Input Impedance:	75 (50 Ω optional)
Mechanical Specifications:	
Dimensions (W x L x H): mBLC-1/2/5 mBLC-8	 215.8 x 135.8 x 53.0 mm 215.8 x 135.8 x 61.5 mm
Weight (Kg): mBLC-1/2/5 mBLC-8	 1.9 kg 2.3 kg
Finish:	White polyurethane paint
Ambient Environmental Conditions:	
Operating Temperature:	-40 to +60°C
Storage Temperature:	-55 to +85°C
Relative Humidity:	100%
Altitude:	Up to 3000 meter
Interface:	
RF Output Connector:	CPR-137G
RF Input Connector:	F Type (option -N Type)

1.5 General Description

The items shown on the mBLC series outer surface are:

- IF Input Connector: The modem or power inserter cable connection to the BUC.
- CPR137 RF Output: BUC RF output.

Figure 1-2: General Description



2. Handling, Installation and Operation

This chapter provides instructions on how to handle and install the mBLC system and includes the following sections:

- Section 2.1: Handling
- Section 2.1.6: Unpacking
- Section 2.4: Installation and Operation

2.1 Handling

2.1.1 Transportation

The mBLC series BUC may be transported by land, air or sea while packed in its original packaging.

2.1.2 Storage

While packed in its original package, the mBLC series BUC may be stored at the following conditions:

- Temperature Range: -55 to 85°C
- Relative Humidity: up to 95% (non-condensing)

2.1.3 Return of Equipment

When returning equipment to Belcom Microwaves Ltd. for repair or replacement:

1. Identify, in writing, the condition of the equipment.
2. Refer to the sales order, purchase order and the date the equipment was received.

Notify Belcom Microwaves Ltd. sales department of the equipment condition and obtain a Return Material Authorization (RMA) number and shipping instructions. Consult Belcom Microwaves Ltd. sales department for the best shipment method.

NOTE

Do not return any equipment without an RMA number. This is important for prompt and efficient handling of the returned equipment and of the associated complaint.

2.1.4 Equipment Damage or Loss in Transit

Belcom Microwaves Ltd. is not responsible for damage or loss of equipment during transit. In case of damage or loss of goods, contact the responsible transport carrier.

When declaring equipment as damaged during transit preserve the original shipping cartons to facilitate inspection reporting.

Belcom Microwaves Ltd. is responsible for damage or loss of equipment only if the purchase order includes a "door-to-door" delivery (CIF by Incoterm). Nevertheless, in any case of damage or loss of equipment, it is recommended to contact Belcom Microwaves Ltd. which will make efforts to assist.

2.1.5 Receiving and Inspection

The mBLC will arrive in standard shipping containers. Immediately upon receipt of the mBLC module, check the Bill of Lading against the actual equipment you have received. Inspect the shipping containers exteriors for visible damage incurred during shipping.

CATION

Handle the BUC with extreme care. Excessive shock may damage the BUC's internal parts.

2.1.6 Unpacking Instructions

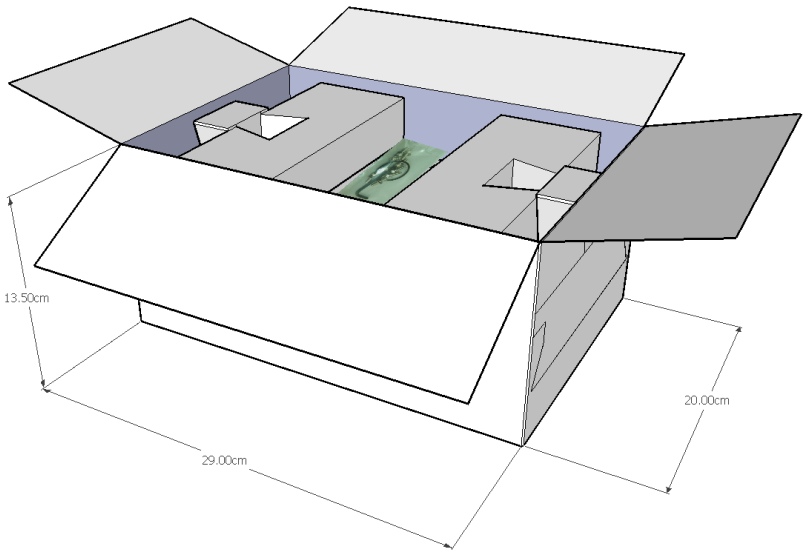
NOTE

Before unpacking the shipping containers, move them near to the site where the system will be mounted. Ensure that the containers are oriented correctly in accordance with the "This Side UP" labels. Carefully remove the BUC and packing material from the shipping containers..

1. Visually inspect the packages for traces of excessive moisture or external damage.
2. Carefully open the package, obeying all handling labels ("This Side Up", "Open This End", Fragile, etc.).

   A general view of the open packages is shown in Figure 2-1:

Figure 2-1: mBLC Series Package Open View



3. Using the supplied packing list, verify that all items were received and remained undamaged during the shipment. Verify that all items are complete. If there are any omissions or evidence of improper packaging, please notify Belcom Microwaves Ltd. immediately.

2.2 Labeling

Figure 2-2: Labeling

2.2.1 Part number structure

mBL**X**-**P**

X- Frequency Band
- C- C Band
- PA- Palapa
- IN- Ext. C (Insat)
- WC-Wide C (Standard C and Palapa)

P- Output power @ 1 db GC
- 1 - 1WATT
- 2 - 2WATT
- 3 - 3WATT
- 5 - 5WATT
- 8 - 8WATT

2.2.2 Serial number structure

AAAABQSSSS

AAAA- part number

B – Year (“9” = 2009)

Q – Quarter (1 to 4)

SSSS – Running Serial number.

2.3 Packing List

Verify that the following items are found in the package. In case of differences between this list and the actual shipment part list, the shipment part list stands:

Table 2-1: Packing List

	Description	Belcom Microwaves P/N	Quantity
1	BUC, mBLC series	mBL…	1
2	Waveguide Assembly kit	A10559	1
2a	Screw set, NF10-32X5/8", SOC CAP ST.ST	106243610	9
2b	Allen key 5-32	511999100	1
2c	O-Ring WR-137	617999004	1

2.4 Installation and Operation

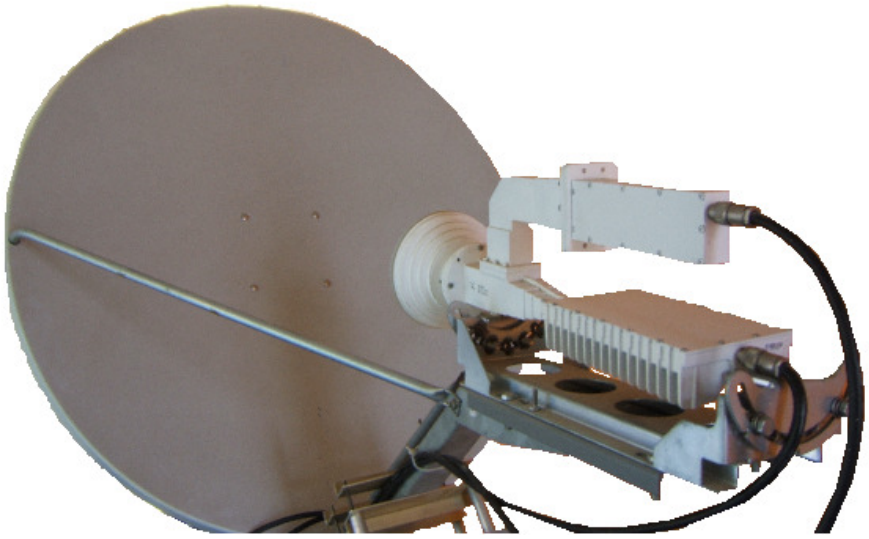
The installation process comprises the following stages:

- Section 2.4.1: Mechanical and Electrical Installation
- Section 2.4.2: limitations on the total resistance of the IF cable
- Section 2.4.3 : Post Installation Checks and Operation

2.4.1 Mechanical and Electrical Installation

1. Install the BUC with the ribs up.
2. Fasten the BUC to the OMT using 8 screw(supplied).
3. Connect the IFL cable from the modem to the IF connector in the BUC .
4. Seal the connector of the IF cable to the BUC using a sealing tape.

Figure 2-3: Installing the mBLC Series



2.4.2 limitations on the total resistance of the IF cable

Note the following limitations on the total resistance of the IF cable connecting the BUC to the modem.

Table 2-2: IF Cable Maximum Permitted Resistance

BUC model	DC Maximum Power Consumption (W)	Minimum Input Voltage to the BUC (V)	Cable Maximum. Resistance (Ω)*
mBLC-1/2/3	24	15	5.6
mBLC-5	48	15	2.8
mBLC-8	55	15	2.4

* Sum of the center conductor and shield resistance

2.4.3 Post Installation Checks and Operation

Switch ON the Modem and check the uplink performance.

3. Maintenance

3.1 Preventive Maintenance

The mBLC series does not require any preventive maintenance .

3.2 Troubleshooting

3.2.1 General

NOTE

In any case of a suspected unit, it is recommended to try a spare unit, if available, in the same position and with the same cables, in order to verify whether the fault is in the unit or in another part of the system.

1. Make sure that the modem is turned on.
2. Make sure that the 10MHz reference signal in the modem is turned on.
3. Make sure that the total resistance of the cable is within the limits of table 2-2.
   An easy way to test it is to connect the BUC to the modem using short a IFL cable (less then 10m) if the BUC then functions properly, the resistance of the installation cable is too high. Use a shorter cable or a cable with lower resistance.

3.2.2 Detailed troubleshooting procedure

Problem / Suspicion: No output power
Possible cause: Missing power supply
Indications:
- System indicates no uplink signal.
- BUC surface temperature remains low after 15 minutes.

Further checks and remedy:
- Check the IFL cable connections.
- Check DC voltage at the IFL cable end (BUC side).

Problem / Suspicion: No output power
Possible cause: Internal temperature protection activated. (Excessive ambient temperature might trigger the temperature protection.)
Indications:
- System indicates no uplink signal.
- BUC surface temperature hot.

Further checks and remedy:
- Let the unit cool down for 15 minutes.
- If possible, prevent direct sun radiation on the unit.

Problem / Suspicion: No output power
Possible cause: Wrong frequency sense setup in the modem
Indications:
- System indicates no uplink signal.
- Further checks and remedy:
- Check modem setup. Make sure modem is configured for positive frequency sense.

Problem / Suspicion: No output power
Possible cause: Missing or low 10 MHz reference
Indications:
- System indicates no uplink signal.
- BUC surface temperature remains low after 15 minutes.

Further checks and remedy:
Check modem setup. Make sure modem is configured to provide a reference signal.

Problem / Suspicion: No output power
Possible cause: Power supply low voltage
Indications:
- System indicates no uplink signal.

Further checks and remedy:
- Check the IFL cable specified DC resistance. (Use Belcom Microwaves cable resistance application.)
- Check the IFL cable for breaks and proper connectors assembly.

Problem / Suspicion: No output power
Possible cause: Missing IF signal
Indications:
- System indicates no uplink signal.

Further checks and remedy:
- Check the IFL cable for breaks and proper connectors assembly.
- Check indoor equipment cable connections.

Problem / Suspicion: Low output power
Possible cause: Low IF input level
Indications:
- System indicates low uplink power

Further checks and remedy:
- Check the IFL cable for breaks and proper connectors assembly.
- Check the IFL cable specified attenuation. Assure proper IF level at the IF connector (BUC side).
- Check modem output power setting.
- Check indoor equipment cable connections.

Problem / Suspicion: Spectral interference
Possible cause: Improper DC supply or neighbor equipment interference or Improper modem signal
Indications:
- System or other equipment interfered by the transmission.

Further checks and remedy:
- Turn the unit off in order to isolate the interference. Make sure the right interferer is located.