

Installation and Operating handbook

L533 Full Ku to L Band Downconverter

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EN 55022 CLASS B
EN 50082-1
EN 60950



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**IMPORTANT NOTE: THE INFORMATION AND SPECIFICATIONS
CONTAINED IN THIS DOCUMENT SUPERCEDE ALL PREVIOUSLY
PUBLISHED INFORMATION CONCERNING THIS PRODUCT**

PEAK COMMUNICATIONS Ltd maintains a continuing programme of product improvement and therefore reserves the right to change specifications without notice

INTRODUCTION

The L533 Ku to L Band Downconverter is a high grade unit which can be applied to many situations where good stability and phase noise is required.

The unit is housed in 19 inch 1'U' high chassis, suitable for rack mounting, is 400 mm deep and may be fitted with rack slides if required.

SPECIFICATION

Input ranges:	10.95 to 11.70GHz 11.70 to 12.25GHz 12.25 to 12.75GHz
Corresponding output frequencies	950 to 1700MHz 950 to 1500MHz 950 to 1450MHz
Band Selection	Manual (Optionally remote)
Input connector:	SMA female (N-type optional)
Input impedance:	50Ω
Typical input level:	-80dBm
Conversion gain:	27±1 dB
Input maximum aggregate power	-40dBm
Local Oscillators:	10.0, 10.75, 11.30 GHz
1 dB Compression point	+7 dBm output
3rd Order Intercept point	+17 dBm min
Output phase noise (typical)	-63 dBc/Hz @ 100 Hz -73 dBc/Hz @ 1 kHz -80 dBc/Hz @ 10 kHz -90 dBc/Hz @ 100 kHz -100 dBc/Hz @ 1 MHz
Output connector:	SMA female (N-type optional)
Output Impedance:	50Ω
In-band spuri:	<-60dBm
Alarms	Separate relay contacts for power supply failure, LO failure and BDC failure
Temperature:	0°C to +50°C operating, -40°C to 85°C storage
Relative humidity:	0 to 90% operating, 0 to 95% storage
Housing	19 inch 1'U' high chassis 400mm deep
Power requirements	230 Volt AC ± 10% or 115 Volt ± 10 % selectable. 100 watt max. (fused 2 x 1 amp)
Options	
External Reference	10MHz 0dBm input on 50Ω BNC female
Remote Control:	RS232/485 on 9 way D type

EMC AND SAFETY

EMC

The L533 Ku Band Downconverter has been designed to comply with the following standards;

Emissions : EN 55022 Class B; Limits and methods of measurement of radio interference characteristics of Information Technology Equipment.

Immunity : EN 50082 Part 1; Generic immunity standard, part 1: Domestic, commercial and light industrial environment.

The equipment must be operated with its lid on at all times. If it is necessary to remove the lid for routine servicing or fault finding then it is essential that the lid is fitted back correctly before normal operation.

For the Alarm and Remote Control data interfaces all 'D' type connectors must have grounding fingers on the plug shell to guarantee continuous shielding. The back-shells must comply to the requirements of VDE 0871 and FCC 20708, providing at least 40 dB of attenuation from 30 MHz to 1 GHz.

Connecting cables must be of the shielded type

Operation of the equipment in a non standard manner will invalidate compliancy to these standards.

Safety

To ensure safety of operator the L533 Ku Band Downconverter unit has been designed to comply with the following safety standard;

EN 60950 Safety of information technology equipment, including electrical business machines.

Before operation the user must ensure that the installation complies with the information given.

The equipment is designed to operate in a static 19 inch rack system conforming to IEC 297-2. Operation of the equipment in transportable vehicles equipped with the means of providing a stable environment is permissible. Operation of the equipment on board vehicles, ships or aircraft without means of environmental conditioning will invalidate the safety compliancy; please contact the factory for further advice. Operation of the

equipment in an environment other than that stated in the specifications will also invalidate the safety compliancy. The equipment must not be operated above 2000 metre altitude, extremes of temperature; excessive dust, moisture or vibration; flammable gases; corrosive or explosive atmospheres.

Installation

The equipment is classified in EN 60950 as a pluggable equipment class A for connection to the mains supply, as such it is provided with a mains inlet cord suitable for use in the country of operation. In normal circumstances this will be of an adequate length for installation in the rack. If the mains cord proves to be too short then any replacement must have a similar type fuse (if fitted) and be manufactured to similar specification: check for HAR, BASEC or HOXXX-X ratings on the cable. The connector ends should be marked with one of the following : BS1636A (UK free plug 13 amp); BSI, VDE, NF-USE, UL, CSA, OVE, CEBEC, NEMKO, DEMKO, SETI, IMQ, SEV and KEMA-KEUR for the IEC 6 amp free socket. Schuko and North American free plugs must have similar markings.

The installation of the equipment and the connection to the mains supply must be made in compliance to local or national wiring regulations for a category II impulse over voltage installation. The positioning of the equipment must be such that the mains supply socket outlet for the equipment should be near the equipment and easily accessible or that there should be another suitable means of disconnection from the mains supply.

The equipment is designed to operate from a TN type power supply system as specified in EN 60950. This is a system that has separate earth, line and neutral conductors. The equipment is not designed to operate with an IT power system which has no direct connection to earth.

UNIT DESCRIPTION

Front panel indicators and switches

The L533 Ku Band Downconverter front panel has 5 indicator lights and 1 switch which are as follows

STATUS	Normally lit GREEN but will turn RED with any internal failure causing an alarm such low power
REMOTE	Lit GREEN only when selected (Optional feature)
BAND 1	Lit GREEN when selected Input 10.95 to 11.70GHz, LO of 10.00GHz
BAND 2	Lit GREEN when selected Input 11.70 to 12.25GHz, LO of 10.75GHz
BAND 3	Lit GREEN when selected Input 12.25 to 12.75GHz, LO of 11.30GHz

REMOTE/LOCAL (Optional)

Allows remote selection and interrogation of band selection. In Remote mode the BAND SELECT switch is disabled

BAND SELECT

Selects one of the 3 bands

L533 Rear panel connections

Ku BAND INPUT	Input at Ku Band in the frequency range 10.95 to 12.75 GHz.
L BAND OUTPUT	Output in the frequency range 950 to max of 1700 MHz.

REMOTE 9 way D type RS232/485 serial interface. Configuration for baud rate and RS485 address is set inside the unit as described later.

RS485 Rx -	1	6	RS485 RX+
RS485 Tx -	2	7	RS485 TX +
RS232 Tx	3	8	RS232 Rx
	4	9	GND
	5		

EXT REF 10MHz 0dBm input – This is a factory fitted option and may not be present

EXT INTERFACE Digital interface with the following signals

GND	1	9	PSU N/C
PSU Relay Common	2	10	LO N/C
LO Relay Common	3	11	BDC N/O
Current Sense Relay Common	4	12	Not used
Not used	5	13	Not used
Not used	6	14	Not used
Not used	7	15	LO N/O
Not used	8		

Normally closed means the state of the internal relay with no power gives open contacts. In normal operation (no alarm) these contacts are closed.

OPERATION

Ensure the voltage selector on the rear of the panel is set to the correct setting. The unit is factory set at 230 Volts

On switching on the unit the STATUS indicator on the front of the unit will show GREEN if all is OK.

If the alarm continues to show check alarm conditions on the rear panel

Connect the signal in to the INPUT connector taking note of the power of the signal being input. Care should be taken if the equipment connected to this socket has any DC present as the input to the unit has a low DC tolerance.

The input connector is rated to 18GHz and is a precision connector. Ensure a good quality connector is used to avoid poor contacts.

Output from the unit at L Band is from the output marked OUTPUT.

On the front panel select band by repeatedly pushing BAND SELECT until the required band is selected.

Alarms

The PSU and LO failure relay contacts used are open when the unit is not powered or has a fault. In normal operating conditions the relays are energized and the contacts are closed.

The BDC failure relay contacts used are closed when the unit is not powered or has a fault. In normal operating conditions the relays are not energized and the contacts are open.

The PSU and LO alarms on the D type connector can be chained to give a summary alarm. A typical configuration could be to link pin 3 to pin 9, pin 4 to pin 10 then connect a piece of twin wire to pins 2 and 11. In normal conditions these 2 wires should show continuity.

Typically if pins 1 and 2 are joined in addition to the above an alarm indication would be a non grounding signal

Alarms are due to the following reasons

1. 5 Volt rail drops to 0 Volts. The unit will indicate a PSU failure.
2. DRO is out of lock. The unit will alarm when the DRO phase volts drop below 2 Volts or exceed 12 Volts.
3. BDC not taking any current.

Internal adjustments

1. Internal frequency reference adjust (factory set) is a potentiometer on the PCB

Frequency calculations

Output frequency = Ku Band - LO of BDC selected

e.g.

For input of 11.535GHz with BAND 1 selected. LO for this band is 10.00GHz

Output= 11.535-10.00 = 1.535GHz = 1535MHz

Frequency range	LO	Output
10.95 - 11.70	10.00	0.95 to 1.70 GHz (950 to 1700MHz)
11.70 - 12.25	10.75	0.95 to 1.50 GHz (950 to 1500MHz)
12.25 - 12.75	11.30	0.95 to 1.45 GHz (950 to 1450MHz)

EXTERNAL REFERENCE OPTION

If fitted this system allows the locking of the internal 10MHz reference to an outside station clock. The system detects RF on the BNC connector on the rear panel which is assumed to be 10MHz and within about 1ppm of 10MHz. If this RF is detected the LED on the front panel EXT REF is lit and the internal locking circuitry is enabled.

REMOTE CONTROL INTERFACING OPTION

The L533 Downconverter unit may be monitored and controlled remotely via a RS485 multidrop bus. The connection is made via the D type on the rear of the unit.

The unit transmits and receives data serially in an asynchronous format using the standard ASCII character set. The serial data consists of message frames composed of the following message characters: STX, BYTE COUNT, DEVICE ADDRESS, INSTRUCTION, BODY, CHECKSUM, ETX. All characters are compulsory except for the message body. The presence of a message body is determined by the message type (INSTRUCTION). The total number of message characters in a message frame may range from a minimum of 6 to a maximum of 255.

The remote control follows the following protocol: (in byte form)

[STX] start of message character #02.

[B] char defining how many characters are in the message including the STX & ETX parts.

[A] **Address of unit.** Address ranges from ASCII character 32 to 47. (configurable via dip switches - see earlier)

[I] **Instruction number.**

The possible instructions are:

STATUS REQUEST character 32

STATUS REPLY character 33

CONFIGURE character 34

[MESSAGE]

numerous characters from length 0 upwards. If no message present enter a 0.

[CHKSUM]

The checksum is used to verify the accuracy of the message frame. The checksum is defined as the summation of all the bytes in the message, *beginning* with the 3rd byte (DEVICE ADDRESS) and extending through the body of the message, *ending* with the last byte before the checksum. The total of the bytes is then ANDed with 255 so that the checksum is truncated to a single byte.

[ETX] End of transmission character #03

All message to and from the unit follow the above protocol with a character format of 8 data bits, one stop bit, no parity, baud rate 9600, 4800 or 2400. Note that all numeric values are shown as **decimal**.

Message Information

Status Request message:

In order to find out the STATUS of the unit a status request message must be sent.

STATUS REQUEST:

Instruction 32

Example for a Status Request to a unit that has been configured as address 32. The following characters should be sent.

2, 6, 32, 32, 64, 3

This is explained as follows - character 2 is start of message, Character 6 denotes the message has 6 characters in total, Character 32 is instruction 32 (status request) character 64 is the checksum (32 plus 32 added), Character 3 is end of message.

The unit would then reply with a STATUS REPLY message.

Status Reply message

This message tells the host computer the status of the unit.

STATUS REPLY:

Instruction 33

Message body: (all bytes/chars)

<u>Description</u>	<u>Values</u>
Position of the remote/local switch	"R" or "L" ("R" = Remote) ("L" = Local)
Summary alarm status	"0" or "1" (0 = Alarm) (1 = OK)
Band Selected	"1" "2" "3" or "?" ("1" – "3" the selected band) ("?" band not known)

Configure Message

This message is sent to the unit, when the host computer wishes to change which LNB is switched in.

The command will only change which band is selected IF the unit is in REMOTE mode via the front panel switch.

CONFIGURE

Instruction 34

Message body: (all bytes/chars)

<u>Description</u>	<u>Values</u>
Band to Select	“1”, “2”, or “3”

Internal configuration of unit

Note the internal cable change required to connect to the microprocessor.

RS485 - 232 address/ baud rate configuration switches

No	Colour	Function
1	Brown	RS485 address select
2	Red	RS485 address select
3	Orange	RS485 address select
4	Yellow	RS485 address select
5	Green	Baud Rate select
6	Blue	Baud Rate select
7	Violet	Baud Rate select
8	Grey	Baud Rate select

Baud rate selection with switches 5- 8 (0=off)

5	6	7	8	Baud rate
0	0	0	1	300
0	0	1	0	2400
0	1	0	0	9600
1	0	0	0	19200

Any Configuration of switches not shown here means the baud rate defaults to 9600.

RS485 unit address with switches 1 - 4 (0=off)

Note addresses have been started at 32 to avoid any possible conflict in reading data

4	3	2	1	Address
0	0	0	0	32
1	0	0	0	33
0	1	0	0	34
1	1	0	0	35
0	0	1	0	36
1	0	1	0	37
0	1	1	0	38
1	1	1	0	39
0	0	0	1	40
1	0	0	1	41
0	1	0	1	42
1	1	0	1	43
0	0	1	1	44
1	0	1	1	45
0	1	1	1	46
1	1	1	1	47