

RCU50R \ RCU52R

APPLICATION NOTE
Remote Mounted 1+1 & 2+1 Redundancy Control
and Switch System for BUC/ BDC /LNA /LNB's.

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

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Section 1

Introduction

The RCU50R 1+1 and RCU52R 2+1 remote mounted units provide a fully outdoor BUC, BDC , LNA's or LNB's redundancy switching control solution, which minimises cross-site control and drive cables, costs and complexity whilst improving antenna isolation.

The units are designed to drive and monitor remote mounted waveguide switches, BUC, BDC, LNA and LNB's. A range of 10 MHz reference signal generation, locking and pass through options as well as DC supply can also be provided to drive the BUC, BDC, LNA and LNB units. For LNB's, wave-guide switch drive and monitoring is provided along with with internal or optional external L-band coaxial switches (for non-ganged Wave-guide Switch applications). For BUC's and BDC's, internal or external SHF co-axial switch units can be provided.

The RCU50R \RCU52R units are designed for remote control via Ethernet, but are also offered with basic local controls. Remote control includes an embedded web-browser with SNMP network management support. In remote mode, the on-line unit can be selected and monitored whilst keeping switch-over automatic in case of failure. Peak can offer dedicated indoor rack mounted user interface units (Ethernet based), see FPC100 .

In AUTO mode, the unit monitors the alarm signals or DC current (with user settable alarm levels) and if a fault condition develops within the on-line unit, traffic is automatically switched to the standby unit.

The flexibility of the design allows for customization, so please consult the factory if the features that you require are not outlined in this Application Note. Peak can supply external redundant PSU's(OPS27),switches and cabling, for more details please consult the factory.

Operational Features

- External wave-guide or co-axial switch control
- Comprehensive remote control, plus local manual controls and indicators
- Minimises capex through reduced cross-site control and drive cable costs
- Compatible with most makes of BUC, BDC , LNA's or LNB's.
- Optional reference generation, external reference locking or 'pass through'

1.1 RCU50R System Block Diagram

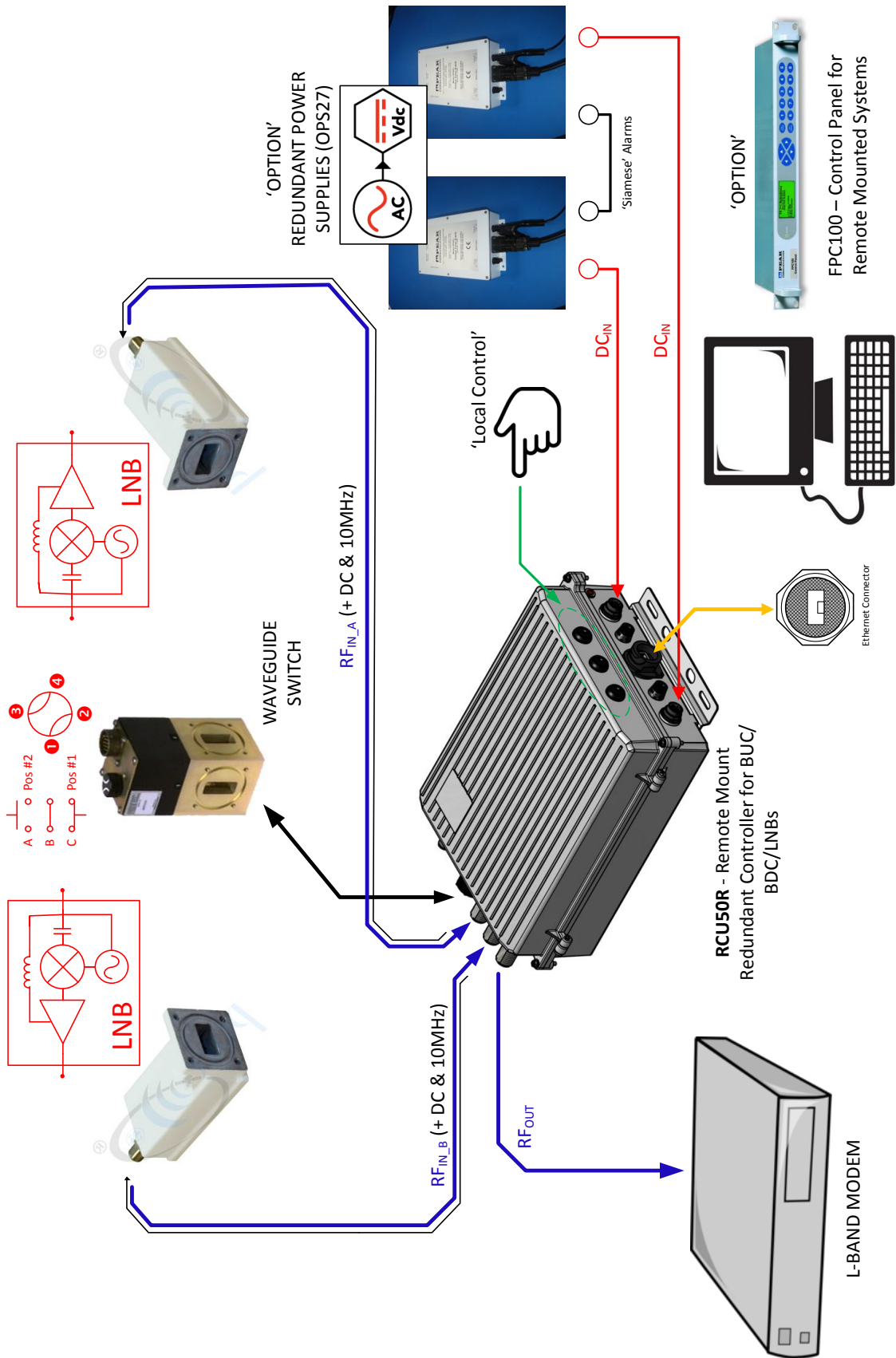


Figure 1.1: RCU50R System Block Diagram

1.2 1+1 Redundancy

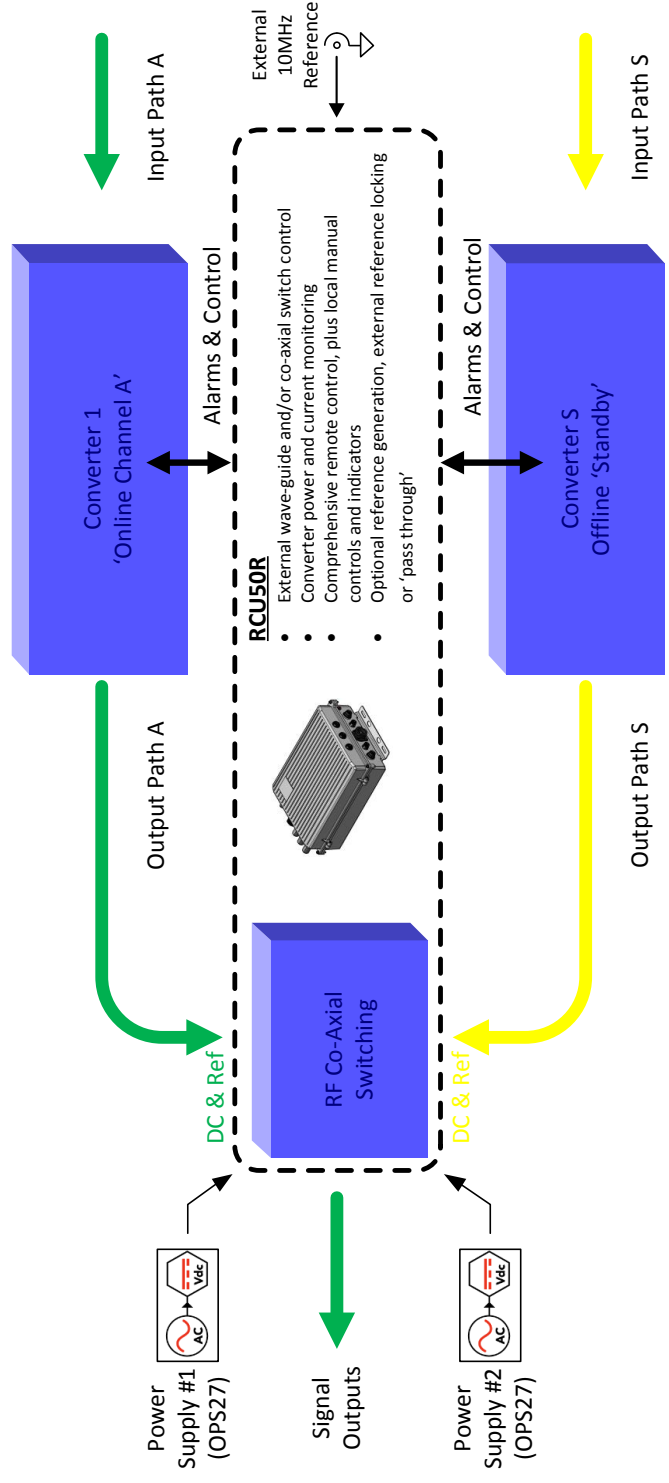


Figure 1.2: 1:1 Redundancy System

1.3 2+1 Redundancy

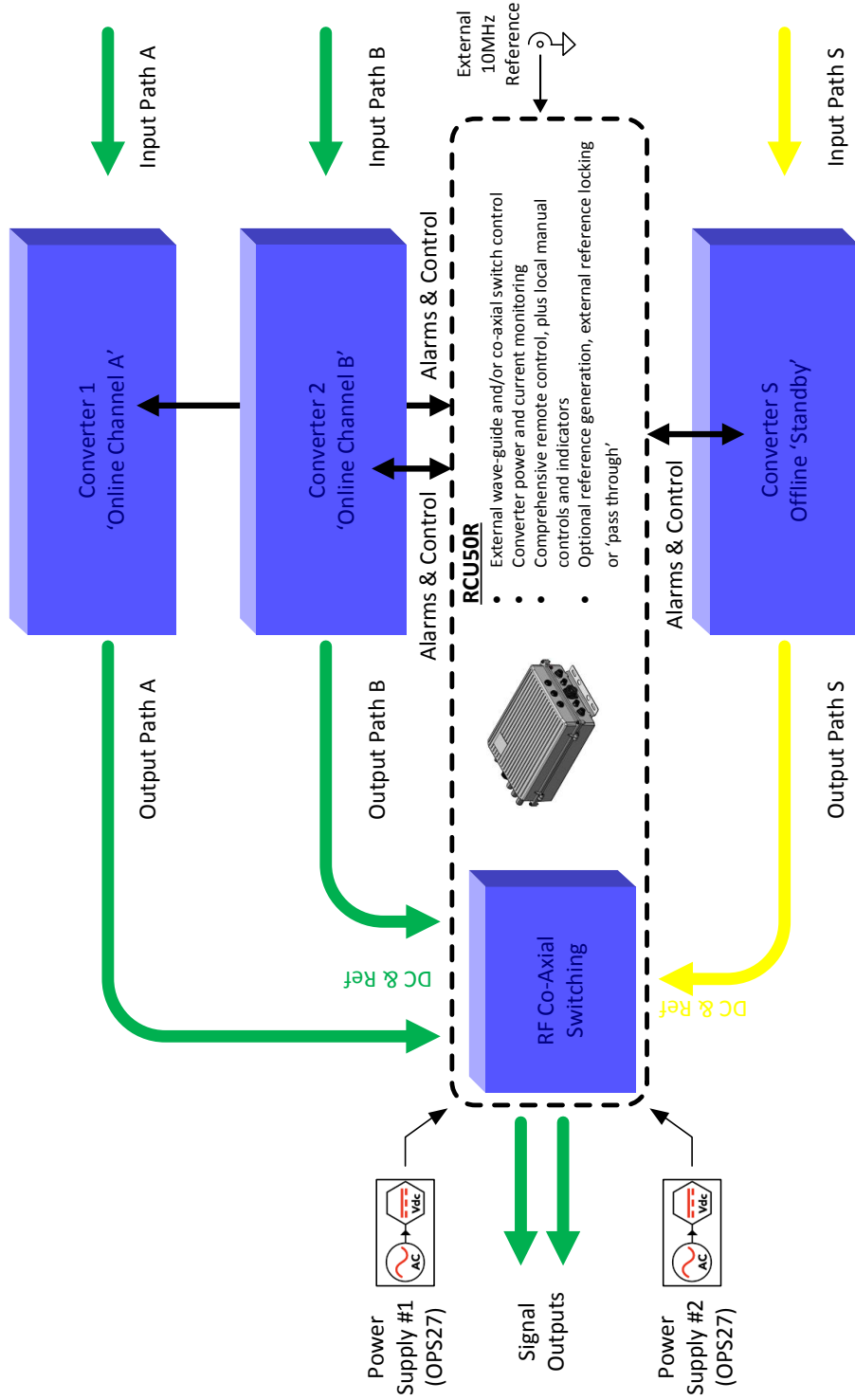


Figure 1.3: 2:1 Redundancy System

1.4 Converter Current Monitoring

Internal to the RCU50R \ RCU52R there are three selectable solid state relays they are capable of driving both resistive or inductive loads with one side connected to ground. There is active protection against low energy spikes.

The solid state relays have an integrated analogue current sense function which delivers a current proportional to the load current according to a known ratio, K-Factor, see calibration process in Section 1.10: Accurate Current Monitoring Using Engineering Test Page in order to achieve best accuracy for current monitoring.

Output current limitation protects the device in overload condition. In case of long overload duration, the device limits the dissipated power to safe level up to thermal shut-down intervention. Thermal shut-down with automatic restart allows the device to recover normal operation.

Additional Features:

- Undervoltage shut-down
- Overvoltage clamp
- Load current limitation
- Protection against loss of ground and loss of V_{cc}
- Thermal shut down

1.5 Automatic Redundancy Switching

A pair of BUC, BDC, LNA's or LNB's can be configured with the RCU50R \ RCU52R series of switching and control units to operate as a 1+1 or 2+1 redundant pair.

RCU50R \ RCU52R units are supplied with a basic 'manual' front panel control utilising push button LED switches for REMOTE/ LOCAL mode selection, and A/ AUTO/ B position selection, along with a standard remote (web-browser based) control facility. All RCU50R \ RCU52R units are available with optional cable sets that include all necessary IF, RF and control interface cables. As co-axial switches are used for output switching, losses are minimised.

Using the front panel push button LED switches or remote control interface, the RCU50R \ RCU52R unit is set to:

- 'A' - Unit A to be switched online.
- 'AUTO' - the unit monitors the online unit and in the event of a fault condition, automatically switches to the standby unit.
- 'B' - Unit B to be switched online.

Utilising push button LED switches for REMOTE/ LOCAL mode selection, the RCU50R \ RCU52R unit can be set to either manual or automatic mode.

In 'MANUAL' [M] mode the standby unit routing can be selected to be; 'Unit A' [1]; unit A to be switched online 'Unit B' [2]; unit B to be switched online Changeovers are minimised, i.e. a unit taken off line due to an alarm, will remain 'off line' even if it returns to the non-alarm state. If it does return to the non-alarm state then it will act as the [standby] unit.

1.6 Band Switching

Dual band Block Down-converters (BDC) are often deployed in VSAT systems, where the supply voltage controls the LO and band selection. The RCU50R \ RCU52R can be configured to perform this band selection operation. A good example would be the Swedish Microwave SMW-C-PLL-5.15/5.75-D, [see Table A.1 RCU50R - Supported Devices (Typical)].

Table 1.1: Dual Band BDC [SMW-C-PLL-5.15/5.75-D]

Parameter	Band 1	Band 2
Input Frequency	3.4 - 4.2 GHz	4.2 - 4.8 GHz
LO	5.15 GHz	5.75GHz
Output Frequency	950-1750 MHz	950-1550MHz
Switching Voltage	(11.5 ≤) 13v (≤ 14)	(16 ≤)18v
Current Consumption	≈400mA typ	≈400mA typ.

1.7 Waveguide/Coax Switching

The RCU50R \RCU52R can be configured to support both positive and negative pulsed waveguide switches and coaxial (internal) redundancy switches. The RCU50R \RCU52R has internal high side (+ve pulse) and low side (-ve pulse) DC switches to allow both options (see Fig 1.4 Waveguide Switch). Coaxial Switches are also supported for redundancy switching with internal Bias-T's for reference signal and DC power distribution(see Fig 1.5 Coaxial Switch).

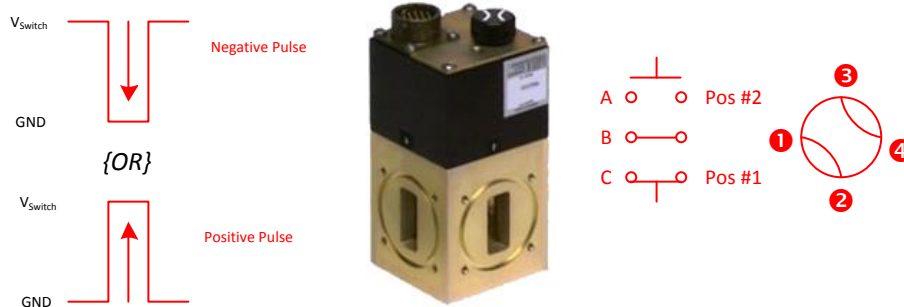


Figure 1.4: Waveguide Switch

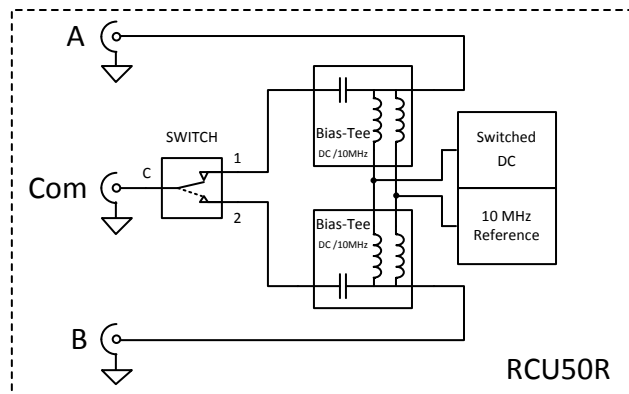


Figure 1.5: Coaxial Switch

1.8 Internal and External 10 MHz Reference

The RCU50R has an internal high stability Oven Controlled Crystal Oscillator (OCXO) to provide a reference frequency for the external BUC, BDC , LNA or LNB modules. This has the capability to be phase locked to an external system reference or accurately set using the RCU50R \RCU52R trim function available on the Engtest.html webpage [See Figure: 1.9: Webpage - Engtest for 12v Setting.]

1.9 RCU50R Webpage Configure Unit

Table 1.2: RCU50R - Current Monitoring Typical Settings

LNB Voltage	12v	18v
Channel A	258mA	360mA
<i>Range</i>	<i>(200mA to 300mA)</i>	<i>(300mA to 400mA)</i>
Channel B	208mA	290mA
<i>Range</i>	<i>(150mA to 250mA)</i>	<i>(250mA to 350mA)</i>

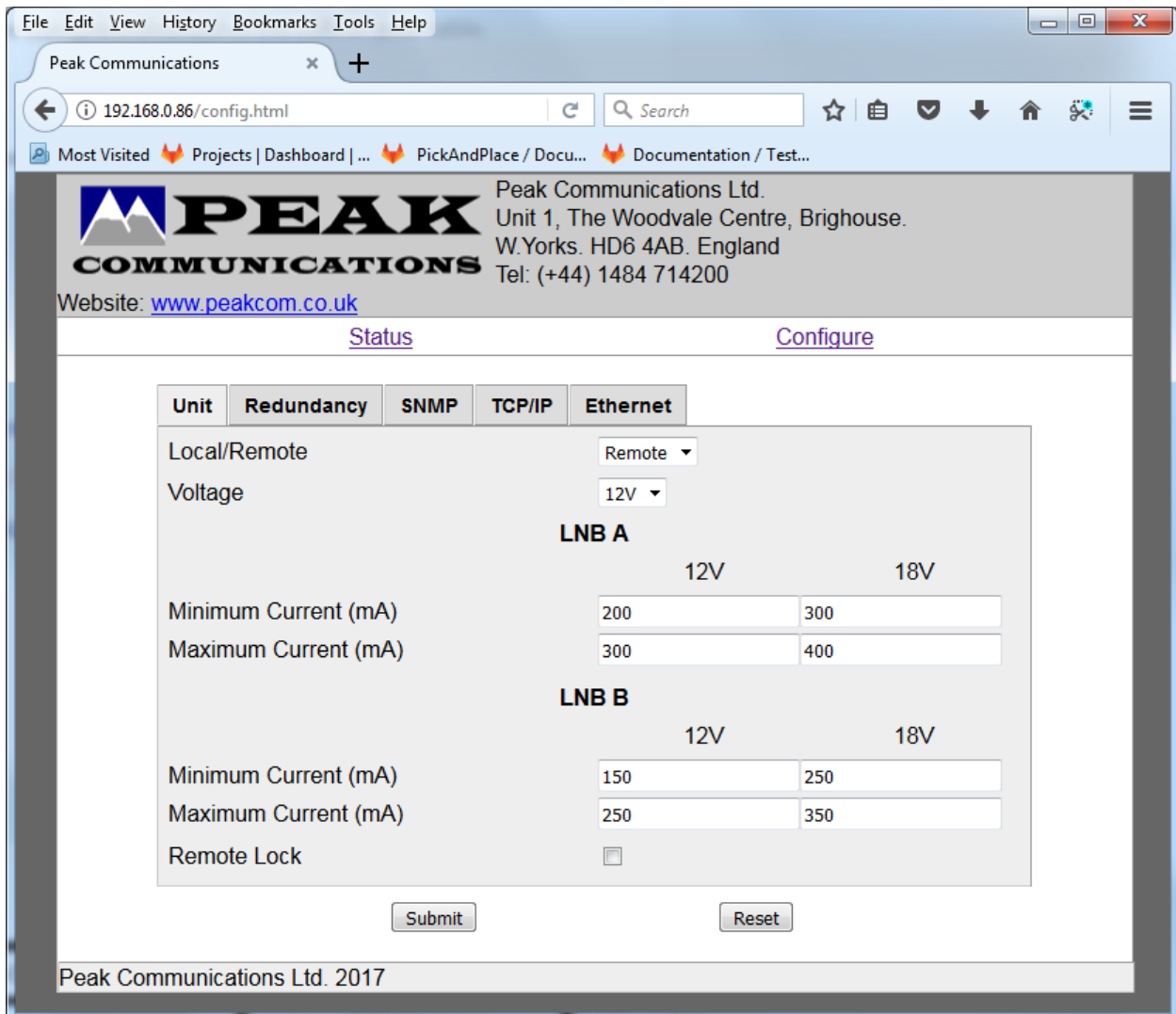


Figure 1.6: Webpage - LNB Current Limit Configuration

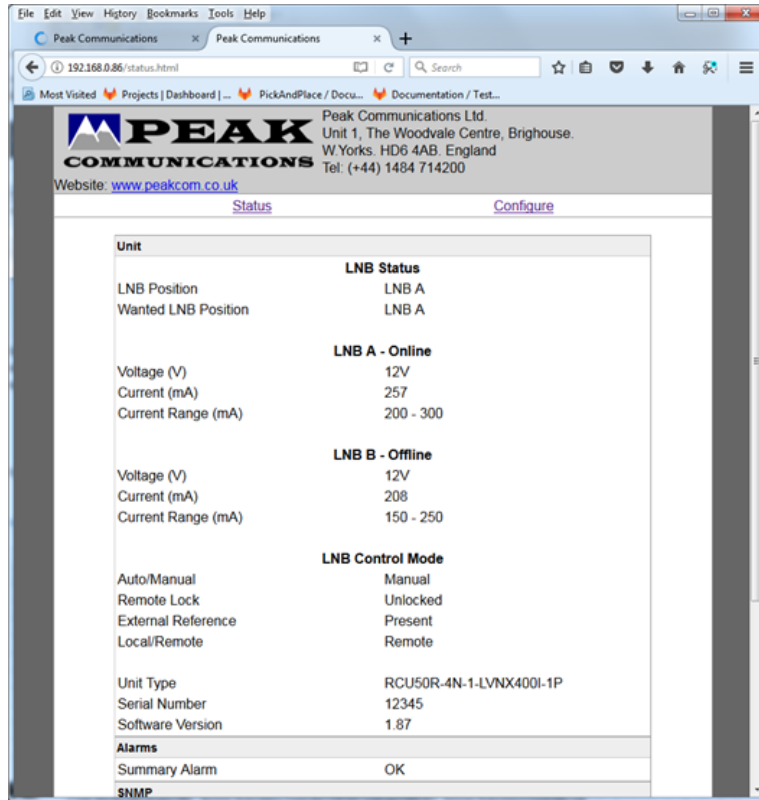


Figure 1.7: Webpage - RCU50R Status (12v)

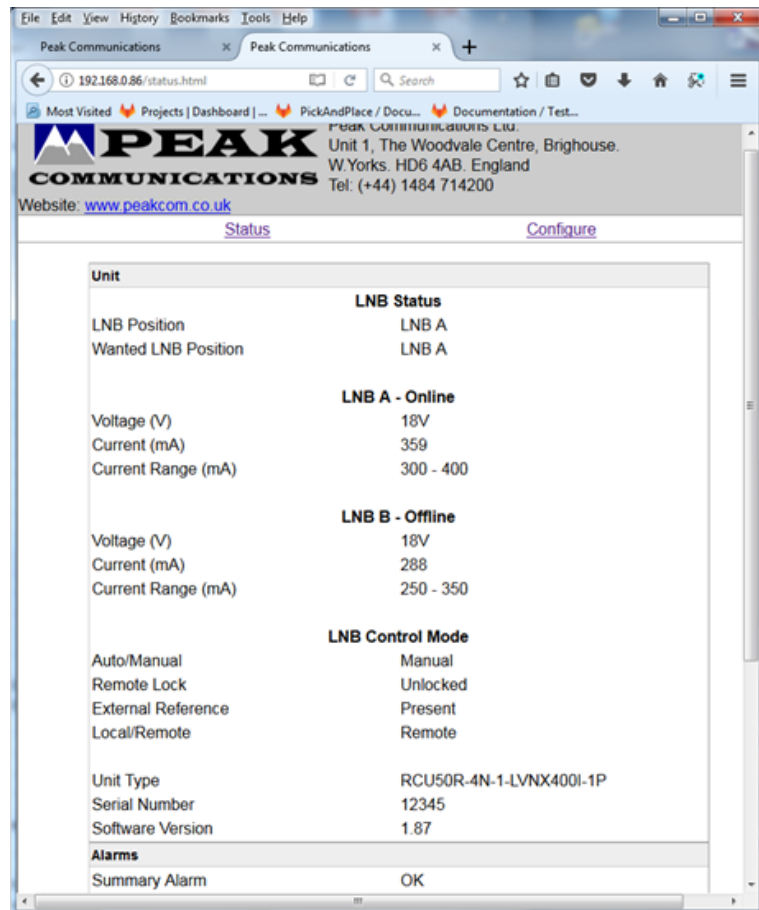


Figure 1.8: Webpage - RCU50R Status (18v)

1.10 Accurate Current Monitoring Using Engineering Test Page

- Enter the engineering test page at: 192.168.0.XX/engtest.html
- Set the calibration type to automatic
- Enter the expected current at the LNB [Example: 260mA (with 200 to 300 range)]
- The K value will be automatically adjusted to the appropriate value to read the expected 120mA (LNB-A and LNB-B, K values should be similar values ≈ 0.35 to ≈ 0.45 for same load)
- Check the status pages current readings are as expected.
- Fine tune (trim) function for internal reference crystal is also contained on this Engtest.html webpage.

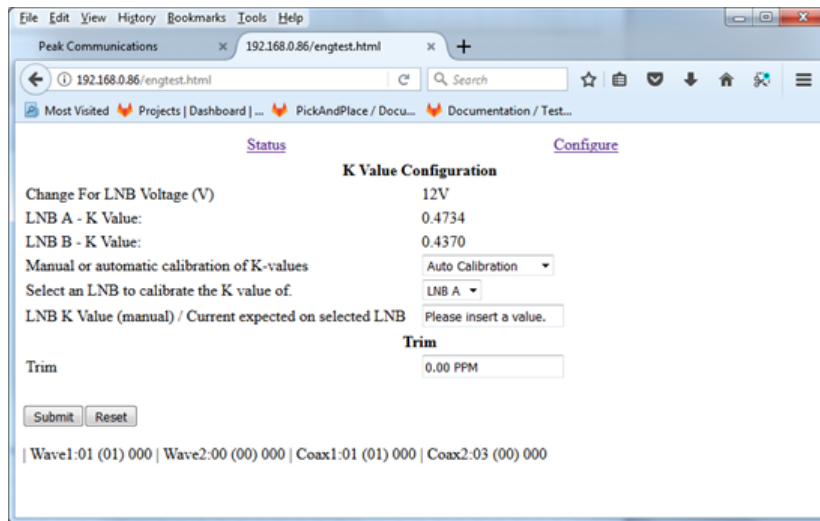


Figure 1.9: Webpage - Engtest for 12v Setting

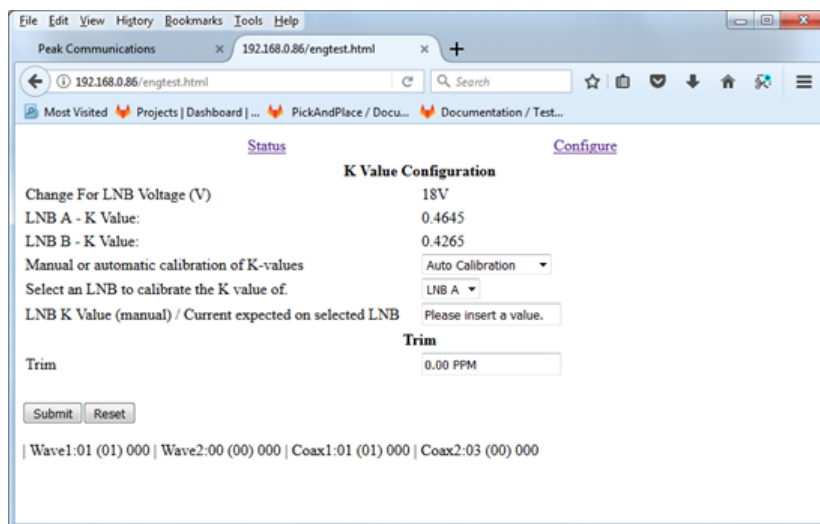


Figure 1.10: Webpage - Engtest for 18v Setting

Appendix A

Supported Devices

The lists below are not exhaustive. The RCU50R \ RCU52R units are compatible with most major waveguide switch, BUC, BDC, LNA and LNB manufacturers. Peak have undertaken many legacy system upgrades as well as new systems, so the factory should be consulted for compatibility on a case by case basis.

Supported Converters

Table A.1: RCU50R - Supported Devices (Typical)

Device	Manufacturer	Low Band			High Band		
		Voltage	Current	Overcurrent	Voltage	Current	Overcurrent
SMW-WDL-PLL-TypeE	SWM	12.9v	320mA	+50mA	18v	230mA	+50mA
SMW-C-PLL-5.15/5.75-D	SWM	12.9v	480mA	+50mA	18v	480mA	+50mA
SMW-C-PLL-5.15-E	SWM	12.9v	380mA	+50mA	<i>N/A single band unit</i>		

Supported Waveguide Switches

- Advanced Switch Technology - AST229RM-W10P-N24
- Advanced Switch Technology - AST75SDFM-W10P-N24