The BSF4004 is Band selective Class B product that utilises filter and amplifier techniques to amplify channels in the bands 423.0-425 MHz and 428.0-430.0MHz.

In normal operation the repeater would consist of a number of narrow band filters that have been duplexed together to form a common input or output port for single antenna operation. The purpose of the filter / duplexer is to ensure that the equipment operating bandwidth is limited to the band of frequencies required to be amplified/repeater. The filter ensures that noise and any Intermodulation is limited to within the operating transmission band. The filter must prevent any noise reaching the antenna port at the receiver frequencies as any noise at this point will affect the ability to receive. The receiver input filter is used to ensure that only the required input band of frequencies are presented to the radio board (amplification and control module). The filter also ensures that the high level transmit output does not cause overload damage of blocking of the receiver ability to detect the wanted input frequencies.

This document will detail the operation for each of the components and provide explanatory drawings of the system and its application.

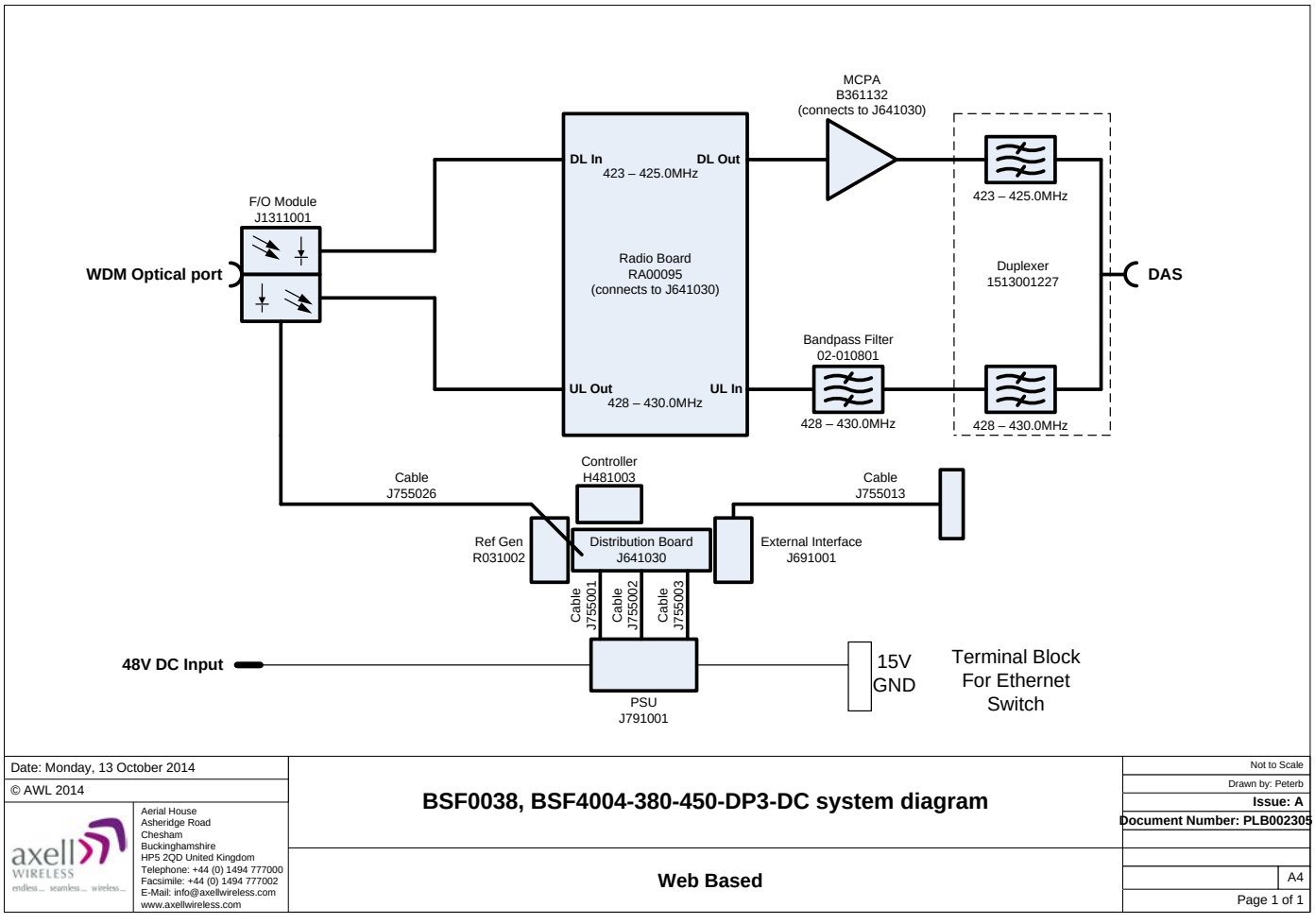

Figure 1. UHF BSF4004 for Type approval – Part number BSF0038.

The UHF BSF4004 consists of 4 major components to perform RF amplification of the DL and UL paths.

1. Radio Board for amplification, gain control, power monitoring and Level control
2. Downlink power amplifier
3. Fibre optic WDM transmitter/receiver
4. Input and output spectrum defining band pass filters for band selectivity.

There are also a number of supporting Power and Control modules including:

5. PSU
6. Distribution Board
7. Alarm interface
8. Controller
9. Reference Generator

Module Function

1. Radio board module provides the initial gain in the DL path DL the entire gain in the UL direction. Internal ceramic filters provide UL and DL selectivity. In addition it provides attenuation control and level control in both the UL and DL directions. The automatic level control limits the output power of the unit by detecting the output power level of the uplink or downlink. If the input power is high enough to drive the output greater than the specified power then attenuation is switched in limiting the output power to keep the unit within specification The ALC (automatic level control has a dynamic range of 30dB.

2. The Downlink output amplifier provides 37dB of gain and has a P1dB of 47dBm and an IP3 of 68dBm. The amplifier utilises high linearity class A techniques to minimise Intermodulation generation in the presence of multiple carriers. The amplifier output power is limited to 37dBm (5W) composite power to ensure high linearity to keep spurious products to a minimum.

3. The FO slave unit provides RF to optical signal conversion in both directions. As downlink and uplink optical signals are combined using WDM – only one fibre is required. The WDM Fibre Optic Converter in the repeater works in parallel with a corresponding unit in the OMU which is linked via the fibre (SC/APC port). A pilot tone can be sent between the Fibre Optic Converters in the OMU and the repeater to define the loss in the fibre. Based on this information the repeater automatically adjusts the attenuation to compensate for the fibre loss. On the Fibre Optic Converter module there are six LED indicators; one for power status, one for error, two for the data communication and two for the RF signals.

4. Band pass filters are fitted at the input and output of the DL and UL RF chains, these filters are used to limits the out of band noise and prevents out-of-band signals from overloading the radio module.

5. The PSU is a high efficiency 300w switched mode module that converts the 110v AC input or 48V DC to 2 DC output voltages of 24v, 15v and 6.45v.

6. The Distribution board is used to connect the DC power and the RS485 control signals between the associated modules and the PSU / Controller card.

7. The Alarm interface card is used to connect the 4 external alarms into the controller card.

8. The Controller is based upon a Linux processor and software, which is used to control and monitor the active components within the repeater. A Web browser accessed GUI allows the operator to enter the required channel frequencies and to adjust the Gain and Squelch settings. The controller also provides a summary alarm output upon the failure of any active device.

9. The Reference Generator is used to provide an accurate stable 10MHz Reference signal to the DSP to ensure that the channel selectivity is centred on the wanted channel frequency.