AVALON RF

ODX402 / ODX502 / ODX602
COFDM Digital Video Diversity Receiver

User's Guide & Operating Manual

REV. B
02 Feb 2009

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1.   General

The ODX402/ ODX502/ OODX602 receiver is a new introduction to the Avalon digital video family. It is a rugged 2-antenna diversity receiver using maximal ratio combining to mitigate fading & multipath effects. The receiver is ideal for demanding high-end video applications that require robust video. The low power consumption & the quick switching between 16 channels gives added convenience in handheld & or body worn applications.

Features like OSD menu, two video outputs & front or rear antenna inputs enhance suitability of the ODX602 to various applications.

The ODX402 is a VHF/ UHF receiver, the ODX502 is a L-band receiver and the ODX602 is a S-band receiver.

NOTE

Unless explicitly stated, every reference in this document to the ODX602 also implies the ODX402 and ODX502. The main difference between the models is the frequency range.

The ODX602 receiver has the following standard channels:

A video channel.
An audio channel.
A data channel for telemetry data.

Optional features include:

- Wide version (- W) to accommodate a Avalon Transceiver TR430-2G for high speed 115Kbps data or TR423 for 9.6Kbps
- Data transceiver (Opt 11) – installs a TR423 transceiver
- Talk back audio channel (Option 31)
- Rack Mount Kit (Option R2)
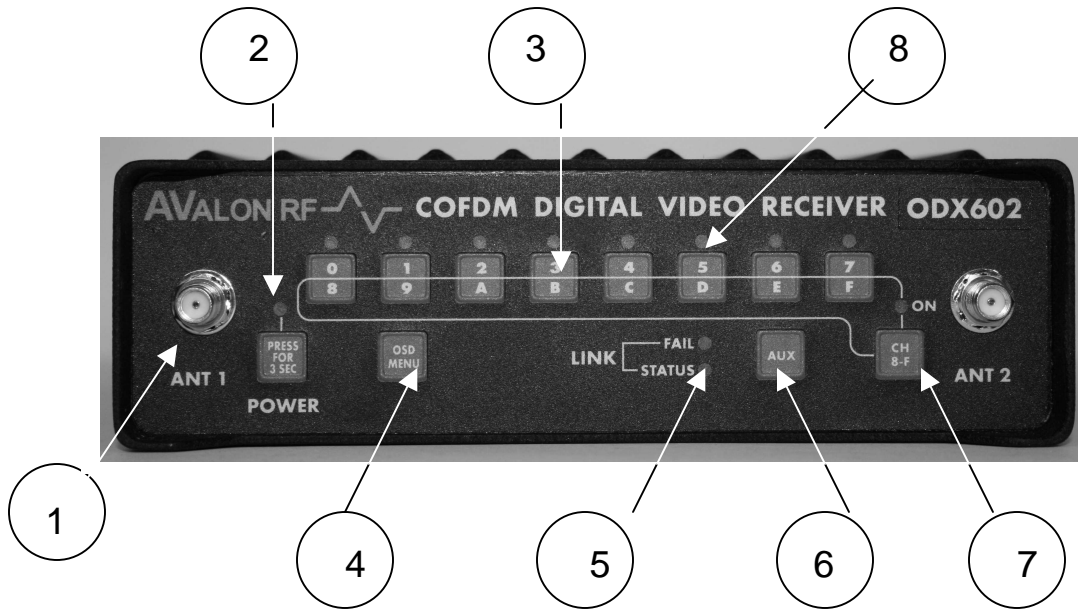
Figure A – Front Panel
ODX402/ODX502/ODX602 Controls, Indicators and Connectors

    1 - Antenna 1 Input
    2 - Power Indicator LED
    3 - Channel Select Switches
    4 - OSD Menu Switch
    5 - Link Indicators
    6 - AUX switch (Reserved)
    7 - Bank select switch
    8 - Channel Indicator led's

Figure B – Rear Panel
ODX402/ODX502/ODX602 Controls and Connectors

1 **Rear Antenna inputs**
2 **Audio Output Connector**
3 **Power Connector**
4 **Video Outputs**
5 **Data Output/Program Connector**

2.   Specifications

2.1   Frequency Range (Model Dependent).
The frequency range of each model has a base number that identifies its band. E.g 4 is UHF, 5 is L-band & so on. The 'standard' frequency ranges for the various models are as follows:
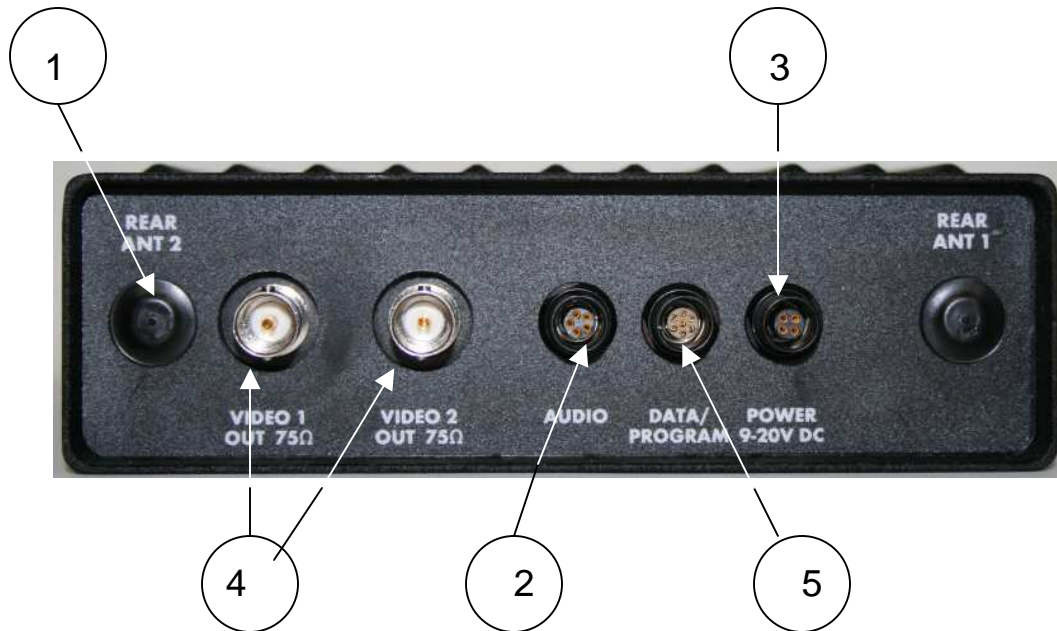
ODX402: UHF receiver with a tuning range of 170-230 MHz or 470MHz-862MHz.
ODX502: L-band receiver with a tuning range of 900 MHz-1200 MHz or 1.2GHz-1.8GHz.
ODX602: S-band receiver with a tuning range of 2.1GHz-2.5GHz or 2.3 –2.7 GHz.

There can be 16 channels within the operating range. For frequency ranges other than those indicated, please contact Avalon RF sales.

2.2   Power Input – (Circle 3 on rear panel).

a) The power input connector is a 4 pin on the rear panel of the ODX602.

Pin 1 – Power Return

Pin 2 – NC

Pin 3 – NC

Pin 4 – Power Input (+9Vdc to +20Vdc)

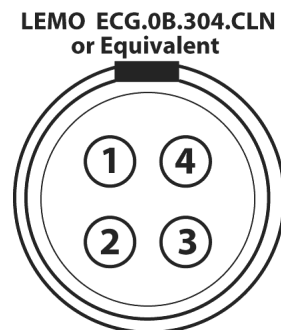LEMO ECG.0B.304.CLN or Equivalent

Figure C – Power Input

b) The ODX602 operates off a 9Vdc to 20Vdc unregulated voltage source with a ripple of less than 0.5Vp.p.

c) Input Current is <0.6 Amps at an input voltage of 12Vdc.

d) Power is switched ON/OFF via a front panel electronic switch.

e) The ODX602 power input is protected against reverse polarity and also has a under voltage lock-out.

2.3   Antenna Inputs, total of 2 (Circle 1 on front panel).

The standard ODX602 has 2 SMA (f) inputs on the front panel. The –R option installs the antenna options on the rear panel. This is most convenient in rack mount or OEM installations. The input impedance is 50 ohms.

2.4   Video Outputs (Circle 4 on rear panel)

The ODX602 has 2 video outputs – Video 1 and Video 2. Dual video outputs enable one to be used for monitoring while the other can be used for recording. Video output connector is a BNC type with a 75 Ω (ohm) impedance.

a) Output is NTSC/PAL/RS170A/CCIR baseband from 20 Hz to 5.5 MHz for NTSC or 20 Hz – 6.5 MHz for PAL.

a) Output amplitude is 1 Vp.p. with negative sync tips of 0.3 Vp.p.

2.5   Audio Outputs (Circle 2 on rear panel)
Audio output is through a 5 pin connector located on the rear panel. Both stereo outputs are 600 balanced. The amplitude (volume) can ba adjusted through the RS232 terminal.

Pin 1 – Audio Return

Pin 2 – Left Audio + Output

Pin 3 – Right Audio + Output

Pin 4 – Right Audio - Output

Pin 5 – Left Audio - Output
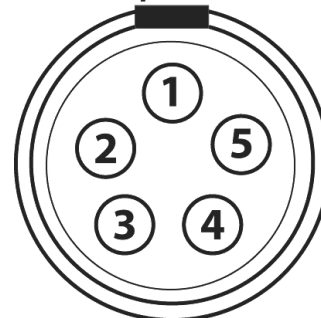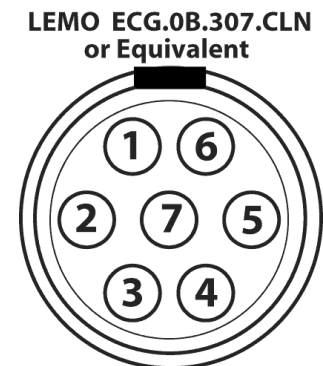
LEMO ECG.0B.305.CLN
or Equivalent

Figure D – Audio Output(s)

2.6   Program/ Data output
       (Circle 5 on rear panel).

       The Data/ Program connector is a LEMO type ECG.0B.307.CLN or
       equivalent:

       The connector pin-out is:

        Pin 1   –   Ground

        Pin 2   –   NC

        Pin 3   –   NC

        Pin 4   –   NC

        Pin 5   –   RS232 Input

        Pin 6   –   RS232 Output

        Pin 7   –   Ground

LEMO ECG.0B.307.CLN or Equivalent

Figure E –Data/ Program Output

2.7   Wireless Digital Link (WDL) Antenna (Circle 6 of Front Panel)

       a) The antenna connector is a SMA (f) with 50 Ω (ohm) impedance.

       b) The WDL operating frequency range is 300MHz to 1000MHz.

                                   NOTE

          For operation in the USA, the WDL is preset for operation at
          433.2MHz.

       c) Maximum transmitter output power is 10mW at 433.2MHz. For
          UAV applications, the TR423 output power is 250 mW or 1W for
          the TR430-2G.

2.8   WDL Interface (Figure C, circle 6).

The WDL connector is a 6 pin Hirose male connector. The pinout is as shown below. The dc power to this module is independent & may be turned on/ off without affecting the operation of the main unit.
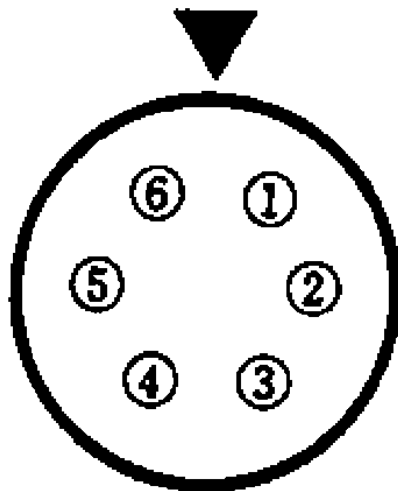
Figure F – WDL Interface

Pin #	Function	Pin #	Function
1	Power Input -	4	RS232 Tx
2	NC	5	RS232 Rx
3	Power Input +	6	RS232 Ground/Return

2.8.1 WDL Power Input (pins 1 and 8).
   a) The WDL requires a 9Vdc to 16Vdc unregulated voltage source with a ripple of less than 0.5Vp.p.
   b) Input current is 350 mA during transmit & 60 mA during receive at nominal 12Vdc.

2.8.2 Serial RS232 I/O(pins 2 and 3).

For frequency setting, baud rate commands etc. please refer TR430-2G or RT423 manual (as applicable).

2.9   Size

Configuration	Dimensions
ODX602 (See Figure G)	6" W x 1.75" H x 6.2" D 152mm x 44mm x 158mm

2.10 Weight

Net Weight	1.3 lb. (0.58Kg)
Shipping weight	2 lbs. (0.92Kg)

2.11 Mounting Methods

2.11.1   Rack Mounting (Option R2)
A special rack mounting kit is available from Avalon RF for mounting 2 ODX602 in a 1U high rack. For rack mount applications, it may be beneficial to have rear connector mounting. Please call for pricing & details.

2.11.2   Other Mounting methods
The ODX602 has a provision for mounting on the top and bottom faces. A set of four (4) blind tapped holes has been provided for mounting purposes. The holes have been tapped for ANSI/ASME 4-40 size screw.

NOTE

DO NOT unscrew or attempt to use any other holes other than the ones shown in Fig H for mounting purposes. Screws other than the ones installed, if used in the holes not meant for mounting will short internal parts causing irreparable damage to the unit. Such action will also VOID the Warranty.
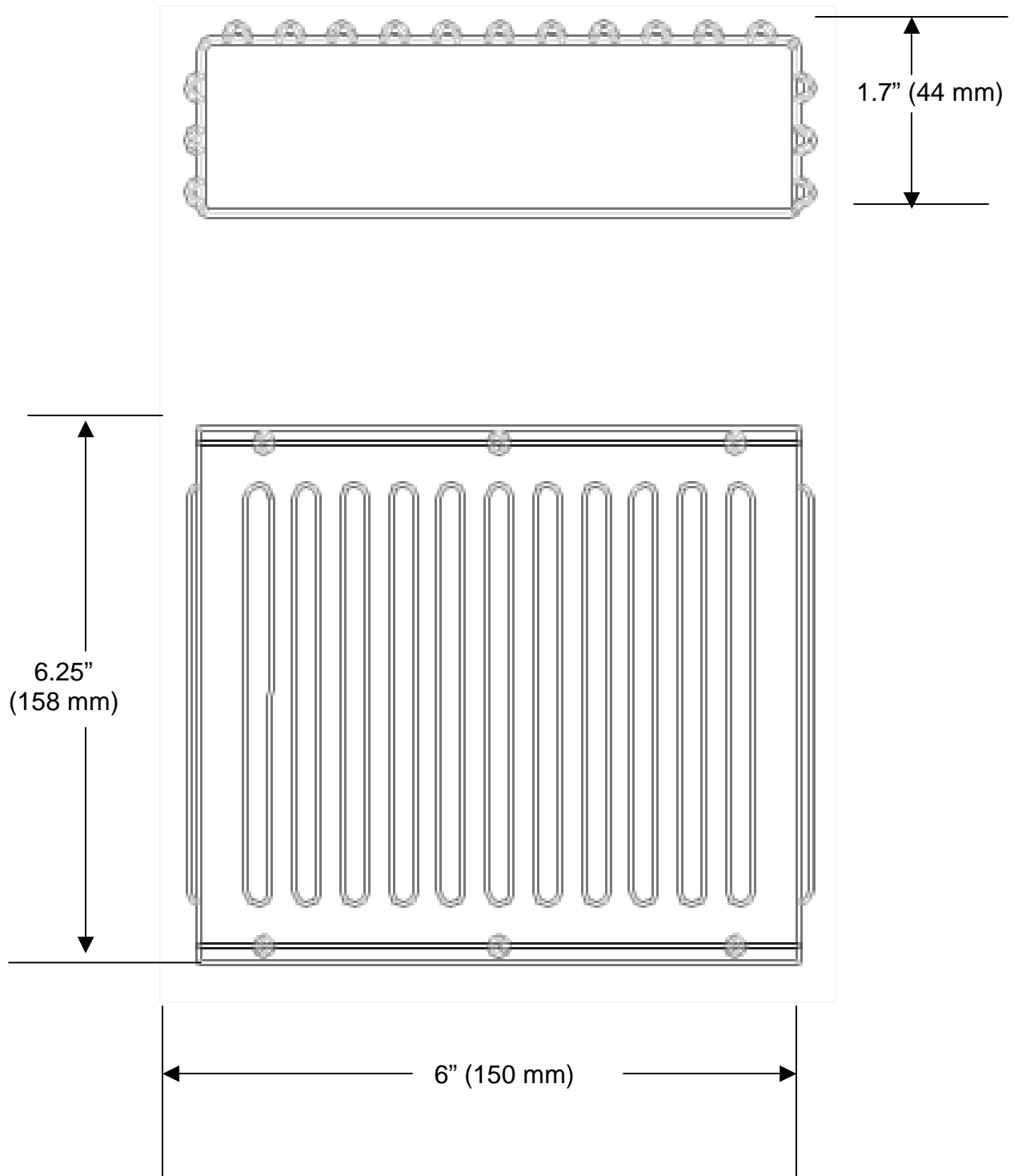
1.7" (44 mm)

6.25"
(158 mm)

6" (150 mm)

Figure G – ODX602 Mechanical Specifications - Inches [mm]
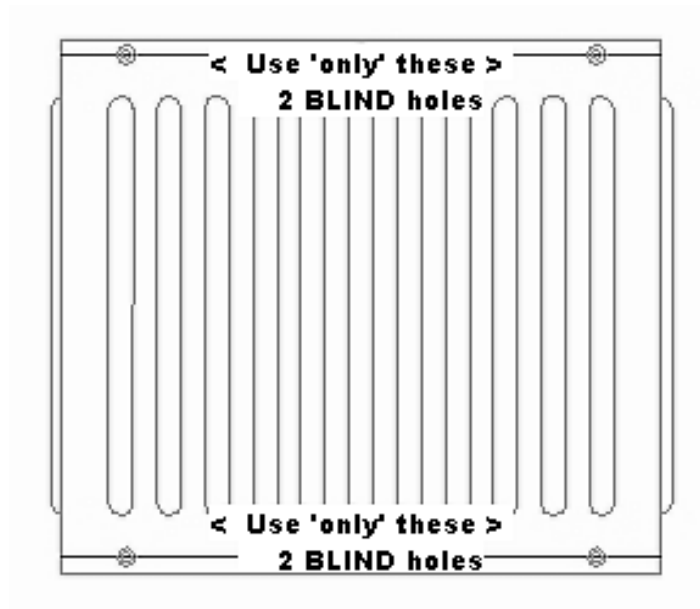
Figure H – ODX602 Mounting Holes

2.10 **Environmental Conditions.**

The ODX602 is designed to meet the following environmental conditions:

a)   Operating temperature -4° to 122° F
                             (-20° to 50° C)

b)   Storage temperature   -13° to 150° F
                             (-25° to 65° C)

c)   Vibration   1.5G, from 10Hz to 2KHz, sine
                             wave, three axis

d)   Shock   15G, 25msec, half sine wave,
                             three axis

e)   Humidity   5 to 95%, non-condensing

f)   Inclination   Any

g)   Altitude   -1500 feet to 15,000 feet
                             (-450 meter to 4,500 meter)

3.   Operating Instructions

3.1   **Human Interface.**

3.1.1 Front Panel Channel Select Switches (Circle 3 on figure A)

The ODX602 has a provision of 16 channels. The frequencies associated with a channel have been factory programmed but can be changed by the user through the serial RS232 interface. The front panel has a bank of 8 switches to allow quick switching between channels. The channels are numbered 0-F (hexadecimal format wherein A is 10, B is 11 … F is 15) that correspond to the OTX627 channels. A second bank select switch selects Bank 0-7 or 8-F. The led corresponding to the selected channel glows to indicate the selected channel.

3.1.2 Front Panel Indicators (Circles 2, 5 & 8 on figure A).

The ODX602 has 4 sets of indicators-

a) Power indicator (Circle 2): This red led indicates the unit is powered ON. A brief flash when the 'Power' is pressed indicates that the input voltage is too low for operation. This is called a 'Under-Voltage Lockout'.
b) Channel indicators (Circle 8): These are yellow led's indicating the selected channel
c) Bank indicator : This green led when lit indicates that Bank 8-F has been selected.
d) Link indicators (Circle 5): This is a set of 2 yellow led's that provide quick visual indication of the video link. The STATUS led will glow when the receiver has locked to a valid COFDM signal. The FAIL led blinks whenever there the link reception has degraded to a noticeable degree.

3.1.3 OSD Menu Control (Circle 4 on figure A).

This switch allows the user to enable or disable the 'on-screen display (OSD)'. It has a 4 settings as explained later.

3.1.4 Power On/Off (Circle 5 on figure A).

The power on/off switch controls power to the unit. It is an electronic switch & must be kept pressed for 3 sec.

3.2   **Operating the ODX602.**

The ODX602 has the following user controls/ functions:

3.2.1 Power On/Off

The ODX602 has a electronic on/off switch. The switch must be held pressed for at least 3 sec to turn the unit on or off. This shuts off power to the entire receiver. The on condition is indicated by the power led glowing red.

3.2.2 Channel selection

Select the desired channel by pressing the switch. A tactile feedback gives indication of the switch press.

3.2.3 Bank Select Switch

This switch has a toggle function. At power on, it is 'off' indicating that the channel bank 0-7 has been selected. When pressed, the green led above it glows indicating that channel bank 8-F is now selected. Pressing the switch again will turn off this selection.

3.2.4 OSD Menu

The OSD Menu brings up the 'on-screen display'. At power on, the default mode is – OSD OFF. It has 4 modes that it cycles through on each key press – ID mode, Quality mode, Audio Volume and OSD OFF.

The ID mode shows the SID (service ID) of the received channel, the channel's frequency & an indication of the rf signal level together with a signal quality red/green indication.

Quality mode is more useful to technically inclined or the advanced user. It gives a more enhanced display of each of the two antennas input signal levels, the signal quality of each & the combined BER (Bit Error Rate) of the recovered signal. The BER is a measure of the overall quality of the combined signal (from antenna 1 & 2). For MPEG-2, blotchy effect is seen at a BER of about 2 x 10^{-3}. The typical rf level at this point is around –95 dBm, although other factors like severe multi-path or interference could cause high BER at much higher signal levels. The normal user should only use this, if at all, to judge the cause of poor performance or to get a feel of the locations effects to the wireless link.

Audio Volume Mode shows the current audio volume/ output level setting. It is only a display of the setting. The value can be changed through the serial RS232 interface.

OSD OFF mode as it implies does not put any on-screen display. Please note that even though OSD Menu is off, when a channel is changed, there will be a brief OSD for 3 secs, indicating the new channel info, the SID etc. When the lock has been established, the OSD disappears.

3.2.5 Antenna Use

This digital system uses COFDM modulation that gives a great advantage of a robust video link. However, there are differences when compared to a 'traditional analog' video system. One of the main differences is the input signal level permitted for good signal reception. That directly translates into transmitter power & use of antennas. The ODX602 receiver has excellent sensitivity allowing use of small low profile antennas. High antenna gain will saturate the front end of the receiver & result in distortion of the received signal thereby causing errors in reception.

Please consult Avalon RF for choice & use of antennas.

4.   Ordering Information

ODX402 – Basic Receiver
ODX502 – Basic Receiver
ODX602 – Basic Receiver

Every ODX602 comes with the standard features and following accessories:

4.1   One ODX402 or ODX502 or ODX602 in a ZIPLOCK ESD bag.

4.2   One BX002U 12V low noise regulated Universal AC adapter for worldwide use (except for country specific plug).

4.3   A user manual (the one you're reading).

4.4   A warranty card.

4.5   One reusable carton with foam lining.

4.6   **Optional features:**

Option 01   Programming cable for RS232 interface. Programming instructions are provided in a separate document only for advanced users.

Option 11   Two way serial communication channel.

Option 31   Audio talk back input

Option R2   Rack mount kit to mount 2 ODX602 in a rack.