

IRT Eurocard Types

DVT-3210/xxx, DVT-3211/xxx Serial Digital Fibre Optic LASER Transmitters & DVR-3210/xxx

Reclocking Serial Digital Fibre Optic Receiver

 $(/\mathbf{x}\mathbf{x}\mathbf{x} = /\mathbf{APC} \text{ or } /\mathbf{PC})$



Designed and manufactured in Australia

IRT can be found on the Internet at: http://www.irtelectronics.com

DVT-3210/xxx, DVT-3211/xxx & DVR-3210/xxx

Serial Digital Fibre Optic Link

(/xxx = /APC or /PC)

Instruction Manual

Table of Contents

Section	Page
Operational safety	3
Description	4
Applications	4
Specifications	5
Cicuit description	6
DVT-3210 / DVT-3211	6
DVR-3210	7
Pre-installation	8
Installation	8
Front & rear panel diagrams	9
Maintenance	10
Warranty and service	10
Equipment return	10
Drawing list index	11

This instruction book applies to units later than S/N 0005001.

Operational Safety:

WARNING

Operation of electronic equipment involves the use of voltages and currents that may be dangerous to human life. Note that under certain conditions dangerous potentials may exist in some circuits when power controls are in the **OFF** position. Maintenance personnel should observe all safety regulations.

Do not make any adjustments inside equipment with power **ON** unless proper precautions are observed. All internal adjustments should only be made by suitably qualified personnel. All operational adjustments are available externally without the need for removing covers or use of extender cards.

Optical Safety

The light emitted from the LASER diode used in this system is invisible and may be harmful to the human eye. Avoid looking directly into the fibre optic cable or connectors or into the collimated beam along their axis when the device is in operation. Operating the LASER diode outside of its maximum ratings may cause device failure or a safety hazard.



Description

The IRT DVT-3210/xxx and DVR-3210/xxx are transmit and receive modules designed principally for use as a 270 Mb/s SMPTE/EBU serial digital video Fibre Optic transmission link, using 9/125 single mode fibre for optical transmission circuits with path attenuation of 24 dB or less. This enables the use of space saving fibre optic cable for reliable transmission of digital video signals over lengths greater than can be provided with coaxial cable. The transmit/receive system specifications apply to all signal conditions, including the SMPTE 259M pathological test sequence.

The suffix /xxx designates the type of connector fitted - /APC for angled faced connector or /PC for flat faced connector. For ease of explanation the suffix /xxx will be dropped from further reference to the model numbers within this handbook.

The DVT-3210 transmitter features an input circuit with automatic cable equalisation for Belden 8281 or PFS1/2 coaxial cable followed by a 1300nm LASER transmitter.

The DVT-3211 transmitter is the same as the DVT-3210 module except that it uses an 8 dB higher output powered laser for use where longer or lossier paths are used.

The DVR-3210 receiver uses a PIN photodiode detector pre-amp module, signal conditioning and a reclocking circuit with **automatic data rate selection** of 143 Mb/s, 177 Mb/s, 270 Mb/s and 360 Mb/s. Two serial digital outputs are provided from the transmission link.

Digital signal presence detector circuits in the transmitter and receiver provide a LED (signal) indication on the front panel of each unit, as well as a relay contact output for remote indication of the presence or absence of the serial digital signal. Power supply monitoring is provided by front panel LED (DC) indicators as well as relay contact outputs for remote indication. On the DVT-3210, a LED (laser) indicator as well as a relay contact output for remote indication, will indicate failure of the laser operation. Test points on the front panel of the DVR-3210 provide an indication of the received optical signal level, with a LED (optical) indicator as well as a relay contact output for remote indication, to indicate loss of optical signal.

The DVT-3210, DVT-3211 and DVR-3210 are built in 3U extended Eurocard (220 mm x 100 mm) modules designed to mount in the IRT 3 RU and 1 RU family of Eurocard frames. The fibre and video connections are made to the rear of the module, with the fibre connectors directly mounted on the rear of the modules and the video and alarm connections via a rear connector panel.

Applications

The DVT-3210/DVR-3210 Serial Digital Fibre Optic transmission system is intended to be used where reliable signal transmission is required over distances greater than 200 metres, or where the space saving and immunity to electromagnetic interference of optical fibre is required. The low cost of fibre verses Belden 8281 or equivalent coaxial cable makes fibre more economical that cable over distances greater than 200 metres especially when bundled fibres can be used to carry, multiple signals between the locations. A total of up to 12 modules can be mounted in a 3 RU 19" rack chassis, or a mix with other digital video distribution modules in the IRT Eurocard range.

The system is intended for use with 9/125 single mode fibre, which typically has an attenuation of less than 0.4 dB/km giving a typical link length of 50-60 km. The DVT-3210/DVR-3210 is designed to work reliably over the full 0 to 24dB optical path range. For shorter distance link lengths 62.5/125 multimode fibre can be used as limited by it's bandwidth of 500 MHz/km (max) @ 1300nm for this type of cable, giving a typical link length of 3km.

DVR-3210/DVT-3210/DVT-3211 Technical Specifications

System performance DVR-3210 - Receiver

Video outputs

Receiver reclocking

Output rise time Residual jitter Connectors

 $2 \text{ x ASI/SDI}, 0.8 \text{V} \pm 10\%$. $75\Omega > 15$ dB return loss to 360 MHz. Factory set for 270 Mb/s operation. 360 Mb/s data rate available at time of ordering. (Other data rates available on request). <1.0 ns, (700 ps typically). <200 ps at 270 Mb/s. BNC on rear panel.

Designed for use with 9/125 single mode fibre.

1300 nm PIN detector, -7 to -34 dBm input level.

1300 nm LASER emitter, -8 dBm typically.

1300 nm LASER emitter, 0 dBm typically.

28 Vac CT (14-0-14) or ± 16 Vdc.

(Specify on ordering. Other optical connector types available upon request).

SC/APC on bracket attached to module.

DVT-3210/DVT-3211 - Transmitters

Signal input SMPTE/EBU 143, 177, 270 or 360 Mb/s serial data (SDI or ASI). 75 Ω >15 dB return loss to 360 MHz. Automatic, better than 250 metres at 270 Mb/s for Belden 8281 or equivalent cable. Cable compensation Connector BNC on rear panel.

24 dB maximum.

1310 nm \pm 30 nm.

3 nm typically.

Optical

Optical path loss Optical fibre Optical wavelength Spectral width Optical connectors

DVR-3210 optical input DVT-3210 optical output DVT-3211 optical output

Power requirements:

Voltage Consumption

Indicators on DVR-3210 and DVT-3210/DVT-3211:

LED (green) for +5V. Power Serial digital signal present LED (green) for signal present. Optical output fail LED (red) on DVT-3210/DVT-3211 panel Optical signal level Voltage test points on DVR-3210 panel. Alarm outputs Three relays energised in the normal condition to indicate loss of DC power, SDI signal or laser power out of range for the DVT-3210 & DVT-3211, loss of DC power, optical signal or SDI signal for the DVR-3210. Relay circuits are wired with contacts normally open (or closed) to ground as set by links on the circuit board.

DVR-3210 2.8 VA, DVT-3210 2.8 VA, DVT-3211 2.8VA.

General:

Operating temperature Mechanical

Size Weight Front panel Rear assembly 0 to 50° C ambient. Suitable for mounting in IRT 19" rack chassis types with input, output and power connections to the rear. 6 HP x 3U Extended Eurocard (220 mm x 100 mm). With rear assembly <410 gm for each module. Grey enamel, silk-screened black lettering & red IRT logo. Detachable silk-screened PCB with direct mount connectors to Eurocard and external signals.

Due to our policy of continuing development these specifications are subject to change without notice.

Circuit Description

DVT-3210 / DVT-3211:

The serial digital input circuit consists of U1 a CLC014 adaptive cable equaliser IC, which automatically adapts to equalise any cable length from zero metres to 250 metres of Belden 8281 or equivalent cable. The carrier detect and output mute circuit of the CLC014 is used to mute the output when no signal is present. The CLC014 is insensitive to the pathological patterns that can be present in the serial digital video signal.

The signal from the carrier detect circuit of U1 is inverted by Q1 to drive a **SIGNAL** present LED indicator LD1 on the front panel of the unit and to enable relay RL1 when signal is present.

The contact of RL1 is wired to pin 2 of both SK2 and SK3 on the rear panel.

Connecting LK1 pins 2-3 sets the circuit so that when the input signal is present a ground is applied to SK2 pin 2. Connecting LK1 pins 1-2 sets the circuit so that when the input signal is not present a ground is applied to SK2 pin 2.

The output of the CLC014 input stage is coupled to U2 the MAX3261 laser driver. The laser driver circuitry incorporates average optical power feedback, which monitors and actively adjusts the laser for constant output power. The laser driver also provides an indication of laser failure at pin 8.

The alarm signal at U2/8 is inverted by Q2 to drive a **LASER** fail LED indicator LD2 on the front panel and to enable relay RL2 when a fault is indicated.

The contact of RL2 is wired to pin 3 of both SK2 and SK3 on the rear panel.

Connecting LK2 pins 2-3 sets the circuit so that when the laser fails a ground is applied to SK2 pin 3.

Connecting LK2 pins 1-2 sets the circuit so that when the laser is operating correctly a ground is applied to SK2 pin 3.

The dual AC inputs are rectified by D1 to D8, and then regulated in CONV1 a switch mode regulator module to provide the -5V operating voltage for the unit.

A front panel **DC** LED indicator LD3 and relay RL3 are powered from the -5 volt supply to indicate the presence of DC power in the module.

The contact of RL3 is wired to pin 4 of both SK2 and SK3 on the rear panel.

Connecting LK3 pins 2-3 sets the circuit so that when power is present a ground is applied to SK2 pin 4.

Connecting LK3 pins 1-2 sets the circuit so that when the power fails a ground is applied to SK2 pin 4.

Circuit Description

DVR-3210:

The optical input signal is detected in a PIN photodiode and integral pre-amp module, the resulting electrical signal is amplified by U1 and U3 operating as a wideband limiter circuit with DC feedback stabilisation provided by U2. RV1 is used to adjust the bias point of U1 to set the limiter operation at low signal levels.

The output of the limiter stage is coupled to U4 a CLC016 data re-timing PLL set to operate at 270Mb/s. The carrier detect and mute circuit of U4 together with gating circuit U10 is used to mute the output when no signal is present. U4 has a low residual output jitter of less than 200 ps p-p at 270 Mb/s and is insensitive to the pathological patterns that can be present in the serial digital video signal.

The output of the CLC016 re-timing stage is coupled to cable driver circuit, U5 a CLC007 to provide two isolated outputs from the DVR-3210.

U10D gates the carrier detect and search signals from U4 to provide a indication of the presence of locked signal, this signal is used to mute the output of U4 under no signal condition. U9 detects the PLL lock condition of U4 and will gate the output of U10C which feeds the alarm indicator circuit Q1, RL1. This output from U10C is used to power after inversion by Q1 a **signal present** LED indicator LD2 on the front panel, and to enable relay RL1 when signal is present.

The contact of RL1 is wired to pin 2 of both SK5 and SK6 on the rear panel.

Connecting LK1 pins 1-2 sets the circuit so that when the input signal is present a ground is applied to SK5 pin 2. Connecting LK1 pins 2-3 sets the circuit so that when the input signal is not present a ground is applied to SK5 pin 2.

Link LK4 can be used to disable the search signal from U4 to U10D/B the mute circuit, this will prevent muting of the output of U4 at very small signal levels (i.e. signals from greater than 26 dB link path attenuation).

The current in the optical detector bias circuit is monitored by a difference amplifier circuit U6, U7. The output voltage of U6, which is present at test point TP1 on the front panel, is an indication of the received signal strength and will vary from 0V for no signal to -3V for maximum received signal from a DVT-3210 Transmitter as set by RV2 on test with a direct fibre patch lead connecting the transmitter and receiver.

The contact of RL2 is wired to pin 3 of both SK5 and SK6 on the rear panel.

Connecting LK2 pins 1-2 sets the circuit so that when there is insufficient optical input signal a ground is applied to SK5 pin 3.

Connecting LK2 pins 2-3 sets the circuit so that when sufficient optical input signal a ground is applied to SK5 pin 3.

The dual AC inputs are rectified by D1 to D8, and then regulated in CONV1 a switch mode regulator module to provide the -5V operating voltage for the unit. A further small converter module CONV3 is used to generate the +12 volts for the positive supply of U2, 6 and 7.

A front panel **DC** LED indicator LD1 and relay RL3 are powered from the -5 volt supply to indicate the presence of DC power in the module.

The contact of RL3 is wired to pin 4 of both SK5 and SK6 on the rear panel.

Connecting LK3 pins 1-2 sets the circuit so that when power is present a ground is applied to SK5 pin 4. Connecting LK3 pins 2-3 sets the circuit so that when the power fails a ground is applied to SK5 pin 4.

Pre-installation:

Handling:

This equipment may contain or be connected to static sensitive devices and proper static free handling precautions should be observed.

Where individual circuit cards are stored, they should be placed in antistatic bags. Proper antistatic procedures should be followed when inserting or removing cards from these bags.

Power:

AC mains supply:	Ensure that operating voltage of unit and local supply voltage match and that correct rating fuse is installed for local supply.
DC supply:	Ensure that the correct polarity is observed and that DC supply voltage is maintained within the operating range specified.

Earthing:

The earth path is dependent on the type of frame selected. In every case particular care should be taken to ensure that the frame is connected to earth for safety reasons. See frame manual for details.

Signal earth: For safety reasons a connection is made between signal earth and chassis earth. No attempt should be made to break this connection.

Installation

Installation in frame or chassis:

See details in separate manual for selected frame type.

The DVT-3210, DVT-3211 and DVR-3210 are set up to operate at **270 MB/s** and do not require any adjustment prior to use. There are no external controls on the front panel of the units.

For 360 MB/s operation the alarm on the PLL lock indicator circuit will need to be set for 360 MB/s detection by moving **LK5** to the 360 position.

Link LK4 if closed will decrease the sensitivity of the U4 output mute circuit, the default is open.

Optical connections are made to the panel adapter mounted on a bracket at the rear of the modules. Care must be taken to provide a clean surface on the optical connectors and in inserting the plug on the external fibre to prevent damage to the alignment ferrule of the panel adapter.

The serial digital signal connections are made to the BNC connectors on the rear panel.

The external alarm contact connections are made to the 4 pin parallel wired connectors at the bottom of the rear panel.

The connections are:	DVT-3210 DVT-3211	SK2/3 pin 1 pin 2 pin 3 pin 4	ground digital signal fail laser fail dc power fail
	DVR-3210	SK5/6 pin 1 pin 2 pin 3 pin 4	ground digital signal fail optical signal fail dc power fail

The presence of the internal DC supply voltage is indicated by the front panel DC LED (green).

Front & rear panel diagrams

The following front panel and rear assembly drawings are not to scale and are intended to show relative positions of connectors, indicators and controls only.



Maintenance & storage

Maintenance:

No regular maintenance is required.

Care however should be taken to ensure that all connectors are kept clean and free from contamination of any kind. This is especially important in fibre optic equipment where cleanliness of optical connections is critical to performance.

Storage:

If the equipment is not to be used for an extended period, it is recommended the whole unit be placed in a sealed plastic bag to prevent dust contamination. In areas of high humidity a suitably sized bag of silica gel should be included to deter corrosion.

Where individual circuit cards are stored, they should be placed in antistatic bags. Proper antistatic procedures should be followed when inserting or removing cards from these bags.

Warranty & service

Equipment is covered by a limited warranty period of three years from date of first delivery unless contrary conditions apply under a particular contract of supply. For situations when "**No Fault Found**" for repairs, a minimum charge of \$A120.00 will apply, whether the equipment is within the warranty period or not.

Equipment warranty is limited to faults attributable to defects in original design or manufacture. Warranty on components shall be extended by IRT only to the extent obtainable from the component supplier.

Equipment return:

Before arranging service, ensure that the fault is in the unit to be serviced and not in associated equipment. If possible, confirm this by substitution.

Before returning equipment contact should be made with IRT or your local agent to determine whether the equipment can be serviced in the field or should be returned for repair.

The equipment should be properly packed for return observing antistatic procedures.

The following information should accompany the unit to be returned:

- 1. A fault report should be included indicating the nature of the fault
- 2. The operating conditions under which the fault initially occurred.
- 3. Any additional information, which may be of assistance in fault location and remedy.
- 4. A contact name and telephone and fax numbers.
- 5. Details of payment method for items not covered by warranty.
- 6. Full return address.
- 7. For situations when "**No Fault Found**" for repairs, a minimum charge of \$A120.00 will apply, whether the equipment is within the warranty period or not.

Please note that all freight charges are the responsibility of the customer.

The equipment should be returned to the agent who originally supplied the equipment or, where this is not possible, to IRT direct as follows.

Equipment Service IRT Electronics Pty Ltd 26 Hotham Parade ARTARMON N.S.W. 2064 AUSTRALIA

Phone:61 2 9439 3744Fax:61 2 9439 7439Email:service@irtelectronics.com

Drawing List Index

Drawing #	Sheet #	Description
804020	1	DVT-3210 serial digital fibre optic transmitter schematic diagram.
804020	2	DVT-3210 serial digital fibre optic transmitter schematic diagram.
804024	1	DVR-3210 serial digital fibre optic receiver schematic diagram.
804024	2	DVR-3210 serial digital fibre optic receiver schematic diagram.
804404	1	DVT-3211 serial digital fibre optic transmitter schematic diagram.
804404	2	DVT-3211 serial digital fibre optic transmitter schematic diagram.









NOTE: ALL CAPACITORS 🕂 ARE 10nF (1206)

PCB 804021







SDI INPUT AND LASER DRIVER

5a,b 6a,b

L1/RA

žQ SDLIN

(J1/P1) 1a,b 2a,b 3a,b 4a,b

14a,b 15a,b 16a,b



H-5VA ۶¦

ĒČ

DC POWER

304404s2.sch

27a,b 28a,b

22uH

C29 220uF)|+-

> ╢ -lle

C30

-lle

ı ال

+



N4004

Ŧ 4R7

> ιŖ

26a,b

J2/RA optional power in on rear panel (used when fitted to FR-722 or FRU-1030 frame).

