



User Manual

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This instruction book applies to units fitted with firmware \geq Revision 2.0.

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.

DANGER



Invisible LASER radiation-
Avoid direct exposure to beam

Peak power 2 mW
Wavelength 1270–1610nm

Class 1 LASER Product

IRT-6644-DDT & IRT-6644-DDR

openGear® INTRODUCTION

Developed by Ross Video, openGear® is a standard where various manufacturers can design their equipment to fit a common frame allowing the end user to mix and match the various openGear® cards available in the market place together in one frame. This allows a single frame to be used instead of multiple different vendor's frames that each would otherwise be using their own proprietary standard.

A simple to use monitoring and control software called DashBoard™ is a free program downloadable from the openGear® website (www.opengear.tv) that allows the user to remotely monitor and control an openGear® type card fitted within an openGear® frame that meets the openGear® standard for DashBoard™ control. A link is also supplied via the I.R.T. Communications' website (www.irtcommunications.com) under the openGear® navigation section.

I.R.T. Communications' openGear® cards are designed to meet the openGear® standard for mounting within the openGear® OGX-FR frame and its earlier version OG3-FR and DFR-8300 frames, and is fully compliant with DashBoard™ control.

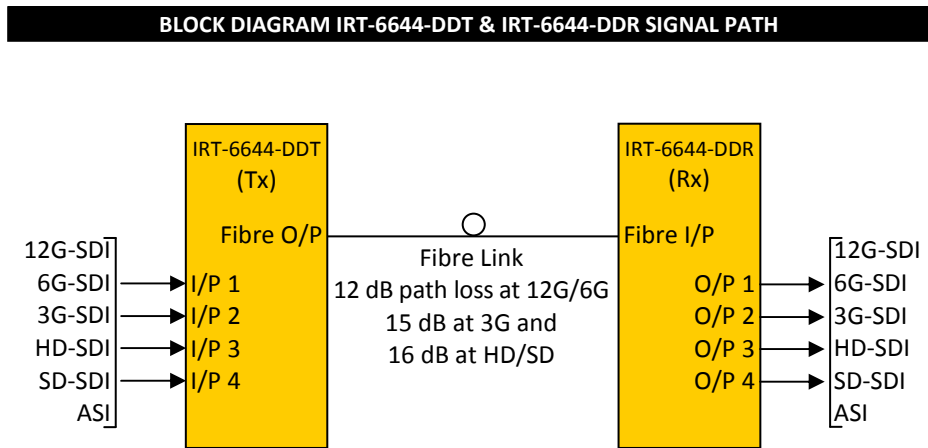
The openGear® frame manual, DashBoard™ control software and information regarding the frame's power supplies, controller card and frame accessories are available for download at the openGear® website.

The term openGear® is a registered trade mark of Ross Video Limited.

DashBoard software Control™ is a trade mark of Ross Video Limited.

IRT-6644-DDT & IRT-6644-DDR

GENERAL DESCRIPTION



With the advent of 4K/UHD television, distribution of higher data rate video signals up to 11.88 Gb/s (12G-SDI) has become necessary which can't always be achieved via coaxial cable.

The IRT-6644-DDT and IRT-6644-DDR are quad transmit and receive modules designed principally for use as a serial data fibre optic transmission link for 12G-SDI, 6G-SDI, 3G-SDI, HD-SDI or SD-SDI applications conforming to SMPTE standards 2082-1, 2081-1, 424M, 292M and 259M-C using 9/125 μ m single mode fibre. This enables the use of space saving fibre optic cable for reliable transmission of digital video signals over lengths greater than can be achieved with coaxial cable.

In addition, the link may be used for ASI transport streams for use with MPEG compressed video streams or other 270 Mb/s type data.

The transmitter uses a pair of dual lasers at different wavelengths that are optically combined to a single optical output. Inputs 1 to 4 are independent from each other allowing a mix of signal rates.

The receiver uses a pair of dual PIN detectors with signal conditioning and reclocking circuits. The data rates are automatically set to match the 12G-SDI, 6G-SDI, 3G-SDI, HD-SDI or SD-SDI/ASI rates dependent on the actual input data rates to the transmitter. For extended transmission length, APD receivers are available upon request by currently only support 3G-SDI, HD-SDI or SD-SDI/ASI rates.

The IRT-6644-DDT and IRT-6644-DDR are designed to fit the openGear® standard 2RU frames which allow a mixture of cards from various manufacturers to be mounted within the same frame.

Remote monitoring is possible via openGear's DashBoard® control software, which is available as a free download.

Standard features:

- **Transports up to four 12G-SDI, 6G-SDI, 3G-SDI, HD-SDI, SD-SDI or ASI signal rates.**
- **Suitable for 4K/UHD video.**
- **4 Individual optical interfaces or optional CWDM to combine multiple channels onto one fibre**
- **Path lengths up to 16 dB¹ optical path loss using 9/125 μ m single mode fibre.**
- **DashBoard™ software monitoring and control.**

NOTE: 1 16 dB path loss at HD/SD, 16 dB at 3G and 10 dB at 12G/6G. Fitted with PIN detector.

IRT-6644-DDT & IRT-6644-DDR

TECHNICAL SPECIFICATIONS

IRT-6644-DDT:

Input serial data signal	11.88 Gb/s (12G-SDI) to SMPTE 2082-1 (except APD versions); 5.94 Gb/s (6G-SDI) to SMPTE 2081-1 (except APD versions); 2.97 Gb/s (3G-SDI) to SMPTE 424M; 1.485 Gb/s (HD-SDI) to SMPTE 292M; 270 Mb/s (SD-SDI) to SMPTE 259M-C and DVB-ASI.
Input impedance	75 Ω.
Input return loss	> 15 dB 5 MHz to 1.5 GHz; > 10 dB 1.5 GHz to 2.97 GHz.
Automatic cable compensation	> 50m at 11.88 Gb/s (12G-SDI) with RG6/U; > 100m at 5.94 Gb/s (6G-SDI) with RG6/U; > 150 m at 2.97 Gb/s (3G-SDI) with Belden 1694A; > 150 m at 1.485 Gb/s (HD-SDI) with Belden 1694A; > 300 m at 270 Mb/s (SD-SDI/ASI) with Belden 8281.
Input connector	4 x BNC on rear assembly.

IRT-6644-DDR:

Number of outputs	4 data relocked, AC coupled.
Output level	800 mV ± 10%.
Output impedance	75 Ω.
Output return loss	> 15 dB 5 MHz to 1.5 GHz; > 10 dB 1.5 GHz to 2.97 GHz.
Output rise and fall time	< 135 ps at 2.97 Gb/s and 1.485 Gb/s; > 0.4 ns and < 1.5 ns at 270 Mb/s.
Intrinsic jitter	< 0.3 UI at 2.97 Gb/s relocked; < 0.2 UI at 1.485 Gb/s relocked; < 0.1 UI at 270 Mb/s relocked.
Output connector	4 x BNC on rear assembly.

Optical:

IRT-6644-DDT optical output	Each channel 0 dBm +5/-0 dB DFB laser. 4 x for optically combined CWDM.
IRT-6644-DDR optical input	PIN detectors, (0 dBm to) -10 dBm at 12G-SDI, -16 dBm at 6G/3G/HD/SD-SDI.
Available wavelengths	CWDM DFB laser pairs - 1510nm/1530nm & 1550nm/1570nm (standard).
Optical path loss	0 to 10 dB at 12G-SDI, 16 dB at 6G/3G/HD/SD-SDI & ASI. (Optical path loss = Laser O/P power – Detector I/P power)
Optical fibre	Designed for use with 9/125 µm single mode fibre.
Optical connector	4 x LC/PC or 1 x SC/PC (CWDM) on rear – direct connection to main card.

Power Requirements:

Voltage	+ 12 Vdc.
Power consumption	< 5 VA.

Other:

Temperature range	0 - 50° C ambient.
Mechanical	Suitable for mounting in an openGear® 2RU rack chassis.
Dimensions (openGear® standard)	33.6 mm x 2U x 325 mm.
Supplied accessories	Rear connector assembly.

Ordering:

IRT-6644-DDT/xxxx/xxxx/xxxx/xxxx	IRT-6644-DDT fitted with xxxx wavelength lasers for each channel and quad LC optical outputs
IRT-6644-DDT/WDM	IRT-6644-DDT fitted with 1510, 1530, 1570 & 1590 nm lasers. SC/PC optical output
IRT-6644-DDR	IRT-6644-DDR fitted with PIN detectors and quad LC optical inputs
IRT-6644-DDR/APD	IRT-6644-DDR fitted with APD detectors and quad LC optical inputs (3G/HD/SD/ASI rates only)
IRT-6644-DDR/WDM	IRT-6644-DDR fitted with PIN detectors. 1510, 1530, 1570 & 1590nm CWDM and SC/PC optical input
IRT-6644-DDR/APD/WDM	IRT-6644-DDR fitted with APD detectors. 1510, 1530, 1570 & 1590nm CWDM and SC/PC optical input (3G/HD/SD/ASI rates only)
Available Laser Wavelengths xxxx nm	1270, 1290, 1310, 1330, 1350, 1370, 1390, 1410, 1430, 1450, 1470, 1490, 1510, 1530, 1550, 1570, 1590, 1610 (1310nm & 1550nm standard) (1510nm, 1530nm, 1550nm, 1570nm WDM) Other wavelength combinations available upon request

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

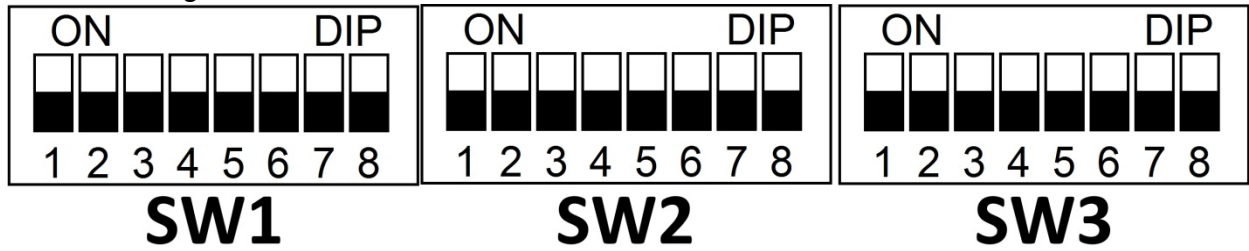
Due to our policy of continuing development, these specifications are subject to change without notice.

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IRT-6644-DDT & IRT-6644-DDR

CONFIGURATION

DIP Switch settings:



IRT-6644-DDT & DDR:

SW1-1	Ch1	Local/Dashboard Control	Off = Dashboard	On = local
SW1-2	Ch1	SDI rate	Off = enabled	On = disabled
SW1-3	Ch1	HD rate	Off = enabled	On = disabled
SW1-4	Ch1	3G rate	Off = enabled	On = disabled
SW1-5	Ch1	6G rate	Off = enabled	On = disabled
SW1-6	Ch1	12G rate	Off = enabled	On = disabled
SW1-7	Ch2	Local/Dashboard Control	Off = Dashboard	On = local
SW2-8	Ch2	SDI rate	Off = enabled	On = disabled
SW2-1	Ch2	HD rate	Off = enabled	On = disabled
SW2-2	Ch2	3G rate	Off = enabled	On = disabled
SW2-3	Ch2	6G rate	Off = enabled	On = disabled
SW2-4	Ch2	12G rate	Off = enabled	On = disabled
SW2-5	Ch3	Local/Dashboard Control	Off = Dashboard	On = local
SW2-6	Ch3	SDI rate	Off = enabled	On = disabled
SW2-7	Ch3	HD rate	Off = enabled	On = disabled
SW2-8	Ch3	3G rate	Off = enabled	On = disabled
SW3-1	Ch3	6G rate	Off = enabled	On = disabled
SW3-2	Ch3	12G rate	Off = enabled	On = disabled
SW3-3	Ch4	Local/Dashboard Control	Off = Dashboard	On = local
SW3-4	Ch4	SDI rate	Off = enabled	On = disabled
SW3-5	Ch4	HD rate	Off = enabled	On = disabled
SW3-6	Ch4	3G rate	Off = enabled	On = disabled
SW3-7	Ch4	6G rate	Off = enabled	On = disabled
SW3-8	Ch4	12G rate	Off = enabled	On = disabled

IRT-6644-DDT & IRT-6644-DDR

INSTALLATION

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.

Installation in openGear® frame:

See details in separate manual downloadable from the openGear® website (www.opengear.tv).

Signal Connections:

IRT-6644-DDT:

The default setting of the IRT-6644-DDT is to automatically operate at either **11.88 Gb/s 12G-SDI** , **5.94 Gb/s 6G-SDI**, **2.97 Gb/s 3G-SDI**, **1.485 Gb/s HD-SDI**, or Divide-by-1.001 Sub-Rates or **270 Mb/s SD-SDI / ASI** signals and do not require any adjustment prior to use, with the exception of DIP switch options described in the *Configuration* section of this manual that also allow selective data rates.

Four serial digital signal connections are made to the BNC connectors on the rear panel labelled CH-1 to CH-4.

IRT-6644-DDR:

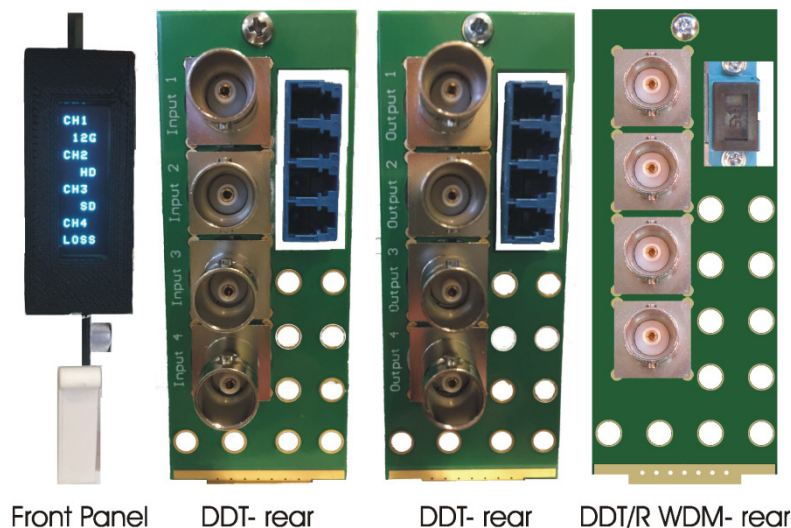
The default setting of the IRT-6644-DDR is to automatically operate at either **11.88 Gb/s 12G-SDI** , **5.94 Gb/s 6G-SDI**, **2.97 Gb/s 3G-SDI**, **1.485 Gb/s HD-SDI**, or Divide-by-1.001 Sub-Rates or **270 Mb/s SD-SDI / ASI** signals and do not require any adjustment prior to use, with the exception of DIP switch options described in the *Configuration* section of this manual that also allow selective data rates.

Four serial digital signal connections are made to the BNC connectors on the rear panel, labelled as CH-1 to CH-8, and correspond to the four inputs of the corresponding transmitter.

Fibre Optic Connection:

Optical connection is made via 4 LC/PC or one SC/PC for CWDM versions. The optical connector is on a bracket at the rear of both the IRT-6644-DDT & IRT-6644-DDR modules and directly connected to the module. Care must be taken to provide a clean surface on the optical connector and in inserting the plug of the external fibre to prevent damage to the alignment ferrule of the panel adapter. Type of fibre used must be single mode type.

Note that for path lengths ≤ 5 dB for APD detectors an optical attenuator must be used to avoid over driving and damaging the detectors on the IRT-6644-DDR.



IRT-6644-DDT & IRT-6644-DDR

OPERATION

The IRT-6644-DDT is an 4-channel electrical to optical transmitter with two separate dual laser drivers on the one card that are individually available on the quad LC/PC optical connector on the rear assembly of optically multiplexed together by an on-board course wave division multiplexer (CWDM) to output to a single SC/PC (standard) optical connector for transmission on a single mode optical cable.

Each laser driver is fed with its own independent single channel. The standard laser wavelengths are 1310nm for quad channels with independent outputs or if combined using CWDM 1510 nm (corresponding to input 1), 1530 nm (corresponding to input 2), 1550 nm (corresponding to input 3), 1570 nm (corresponding to input 4).

Likewise the IRT-6644-DDR is an 8-channel optical to electrical receiver with two separate dual optical detectors on the one card. Each optical detector is independent in its operation from the other and outputs its own independent single channel. The detector types available are either dual PIN (standard) or APD. The APD detector allows a greater optical path loss, which allows a farther distance optical path, compared to PIN detectors. However, for optical path lengths less than 5dB for APD detectors an optical attenuator is required so as to not overload the detectors, else damage to the detectors themselves may also occur.

With the data rate set for bypassed mode, the reclocker is bypassed allowing signals other than 3G-SDI, HD-SDI or SD-SDI to pass through. If the data rate does not match that of 3G-SDI, HD-SDI or SD-SDI the corresponding front edge signal presence LED will flash to indicate that an unknown data rate has been detected. Likewise an 'unknownPresent' data rate is reported via Dashboard™.

It is possible to individually disable the individual channels on either the IRT-6644-DDT or IRT-6644-DDR locking out an end user's functionality should this be desired. When a channel has been disabled, should an electrical signal be present, the corresponding channel LED will flash - not to be confused with situation where the data rate does not match the set data rate as described above.

If any data rates are disabled, the IRT-6644-DDT or IRT-6644-DDR will not pass standard rate. If all rates are enabled, then the IRT-6644-DDT or IRT-6644-DDR will pass the non standard data rate non-reclocked.

Front Edge OLED display and onboard LEDs

The front panel OLED display shows the measured data rate for each of the channels. Applying a disabled data rate will display the channel as muted.

LED 3 is a Green/Red which shows green when communications with the frame Network card or Red if there is no communication.

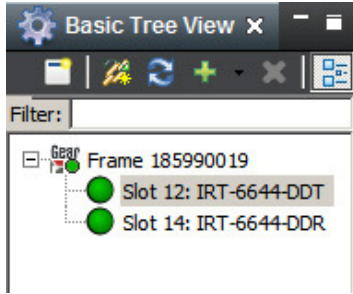
IRT-6644-DDT & IRT-6644-DDR

DashBoard™ SOFTWARE CONTROL

The DashBoard™ Control and Monitoring System is a free application designed for remote control and monitoring of the openGear® platform. This is a free application downloadable from the openGear® website (www.opengear.tv). As such, configuration of the DashBoard™ program will not be described here. The DashBoard™ manual is also downloadable from the openGear® website.

IRT-6644-DDT DashBoard™ Screenshots:

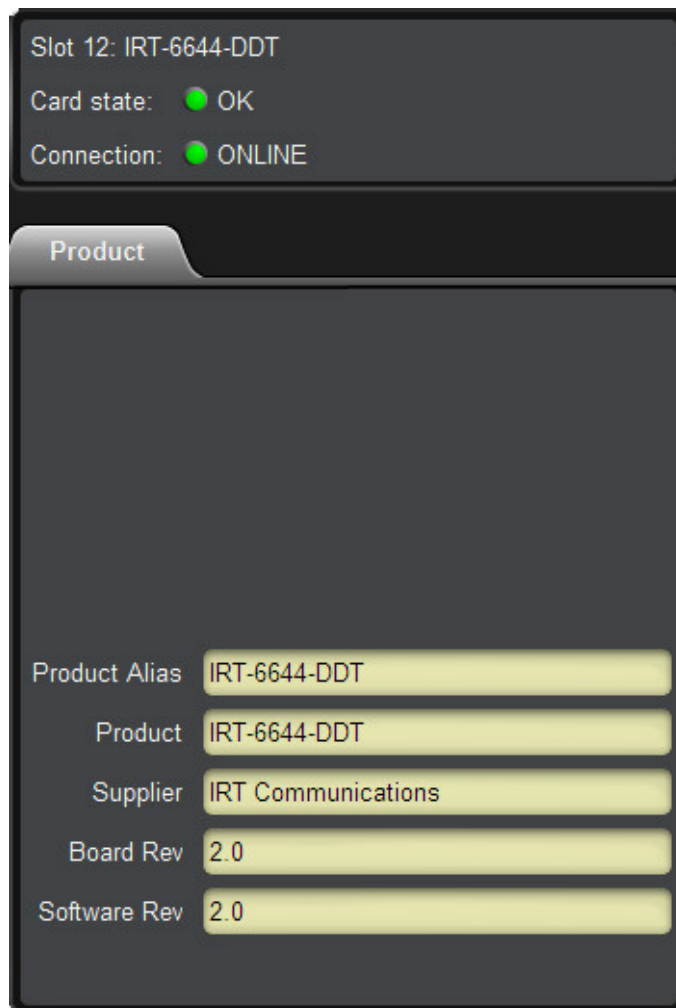
Basic Tree View:



On the left the basic tree view shows the frame. With the tree structure expanded a list of cards within the frame is shown. In this example, slot position 12 is IRT-6644-DDT and slot position 14 is IRT-6644-DDR. When selected, all sections and tabs to the right of the basic tree view now relate to the card in slot position 12. The name of the card, in this case IRT-6644-DDT, can be set under its Configuration TAB setting.

Product TAB:

Self explanatory. Note that the Product Alias field can be set under the Configuration TAB setting.



IRT-6644-DDT & IRT-6644-DDR

Config TAB:

Under the Configuration TAB the parameter Product Alias (name) can be user set. Click computer mouse into the field to change and type new name. Also, SNMP TRAPs can be enabled or disabled if the frame is fitted with SNMP control.

Alarms such as I/O Alarm and SFP laser alarms can be monitored as well as wavelengths corresponding to the channels 1-4. Video signal type per channel is also monitored.

HEO and VEO fields correspond to Horizontal Eye Opening and Vertical Eye Opening respectively. They give an indication as to the eye pattern of the signal in numerical form. These are relevant to signals above the 3G-SDI rate only. HEO is expressed as a percentage of UI (unit interval) and VEO is expressed as a voltage height in millivolts. For rates below 3G-SDI, the values shown do not mean anything. Therefore it is possible to hide the HEO and VEO readings by clicking on the HIDE button.

The screenshot displays the configuration interface for the IRT-6644-DDT & IRT-6644-DDR device. The interface is organized into several sections:

- Product Alias:** A text field containing "IRT-6644-DDT".
- Device:** A button labeled "RESET".
- SNMP Traps:** Radio buttons for "Enable" and "Disable".
- I/O Alarm:** A green indicator light and a yellow bar labeled "OK".
- OPTICAL OUTPUT:** A table with columns for SFP, SFP Wavelength(nm) CH1+3, Optical Link CH1+3, SFP Wavelength(nm) CH2+4, and Optical Link CH2+4.

SFP	SFP Wavelength(nm) CH1+3	Optical Link CH1+3	SFP Wavelength(nm) CH2+4	Optical Link CH2+4
SFP1: Dual Transmitter	1510	OK	1530	OK
SFP2: Dual Transmitter	1550	OK	1570	OK
- VIDEO INPUT:** A table with columns for Video Input, Video Input Alias, HEO(UI%)(>3G Only), and VEO(mV)(>3G Only).

Video Input	Video Input Alias	HEO(UI%)(>3G Only)	VEO(mV)(>3G Only)
IN1: 3G	CHANNEL 1	82	459
IN2: 3G	CHANNEL 2	92	487
IN3: 3G	CHANNEL 3	87	506
IN4: 3G	CHANNEL 4	73	550
- HEO-VEO Display/Hide:** A button labeled "Hide".

IRT-6644-DDT & IRT-6644-DDR

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 1 hour’s labour, at IRT’s current labour charge rate, 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 1 hour’s labour will apply, whether the equipment is within the warranty period or not. Contact IRT for current hourly rate.

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 directly. Details of IRT’s direct address can be found at I.R.T. Communications’ website.

Web address: www.irtcommunications.com

Email: sales@irtcommunications.com