# IRT Eurocard Type

# DDA-4006
# 270 Mb/s ASI/SDI 8 O/P
# Non-Reclocking Distribution Amplifier

**Designed and manufactured in Australia**

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

# DDA-4006

## 270 Mb/s ASI/SDI 8 O/P
## Non-Reclocking Distribution Amplifier

## Instruction Manual

### Table of Contents

This instruction manual applies to DDA-4006 later than S/N 0806101

## 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.

# DDA-4006

## 270 Mb/s ASI/SDI 8 O/P
## Non-Reclocking Distribution Amplifier

## General Description
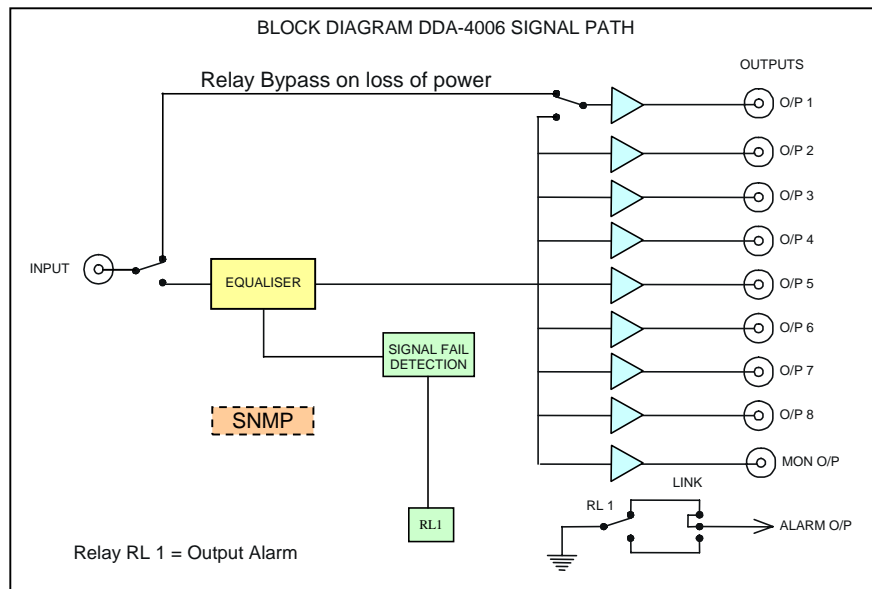


The DDA-4006 270 Mb/s serial digital video distribution amplifier provides the user with a single standard module to cover a wide range of distribution and monitoring functions for ASI or SDI signals.

Due to the fact that standard loop through techniques used in the analogue domain are unsuitable to the digital domain most digital equipment comes with no facility to route the input signal to other locations. As a result a DA is required at almost every point in the digital chain.

Serial digital signals also suffer severe deterioration over relatively short cable distances. The DDA-4006 provides a means of extending the working distances that can be achieved by equalising and re-transmitting the data mid route.

The DDA-4006 may also be used to provide input equalisation for devices not having this feature, as most unequalised inputs will only support cable lengths of less than 20 metres.

Frequent re-clocking of serial digital signals can lead to serious increases in jitter with resultant data errors. The DDA-4006 does not include re-clocking so as to minimise these errors, leaving re-clocking to be done by the receiving device. For applications requiring reclocking the DDA-4007 should be used.

The rear assembly now includes a bypass relay, to switch the Input (SK1) to Output 1 (SK2) in the event of a power failure, as standard.

An optional Simple Network Management Protocol (SNMP) plug-in module is available for remote monitoring of input status and alarm state.

The DDA-4006 is designed to fit IRT's Standard Eurocard frame as well as IRT's 4000 series frame for use with IRT's SNMP system and may be used alongside any other of IRT's analogue or digital Eurocards.

**Features:**

- **For use as buffer or distribution amplifier.**

- **8 in-phase 270 Mb/s ASI or SDI reclocked outputs.**

- **Automatic input equalisation to 250 metres.**

- **Automatic output muting on no input.**

- **Relay bypass on loss of power.**

- **Front panel indicators provide monitoring of presence of input signal at 270 Mb/s.**

- **Optional plug-in SNMP monitoring module.**

# Technical Specifications
# DDA-4006

## Input:
Number                  1.
Impedance               75 Ohm.
Return loss             >15 dB 5 MHz to 270 MHz.
                        Equalisation        Automatic, better than 250 metres at 270 Mb/s for Belden 8281 or
                        equivalent cable (reduces to approx. 200m when LK2 is closed).

## Outputs:
Number                  8 ASI or SDI plus one front panel monitoring output.
Signal level            800 mV ± 10%.
Impedance               75 Ohm.
Return loss             >15 dB 5 MHz to 270 MHz.
DC offset               Nil.

## Performance:
Output rise time        <1 ns, (700 ps typically).
Residual Jitter         <0.1 UI (measured with up to 300m of Belden 8281 or equivalent cable).

## Connectors:          BNC.

## Indicators:
Power                   LED (green) for +5 Vdc.
Signal present          LED (green) when signal present.

## Power requirement:
Voltage                 28 Vac CT (14-0-14) or ±16 Vdc.
Consumption             2.0 VA.

## General:
Temperature range       0 - 50° C ambient.
Mechanical              Suitable for mounting in IRT 19" rack chassis with input, output and power
                        connections on the rear panel.
Dimensions              6 HP x 3U Extended Eurocard (220 mm x 100 mm).
Weight                  With rear assembly 340g.
Finish:  Front panel    Grey background, silk-screened black lettering & red IRT logo.
         Rear assembly  Detachable silk-screened PCB with direct mount connectors to Eurocard and external
                        signals.

Supplied accessories    Rear connector assembly with matching connector for alarm outputs.
Optional accessories    SMU-4000 SNMP plug-in module for use with 4000 series frame fitted with SNMP
                        "Agent".

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

# 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.

### 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 in frame or chassis:

See details in separate manual for selected frame type.

### Link Settings:

LK1 is factory set for a contact make to ground on signal failure at SK10 pin 2 on the rear panel, move LK1 from the normally closed (N/C) to the normally open (N/O) position for a break to ground on signal or power loss.

Link LK2 closed reduces the input equalisation to 200m for use in noisy environments or when a short input cable is used.

### Digital Video Connections:

Input and outputs are 75 Ω BNC type for connection with high quality 75 Ω coaxial cable. Input is self-terminating.

### Front Panel Indicators:

The presence of 270 Mb/s locked signal is indicated by the 'SIGNAL PRESENT' front panel LED (green).

The presence of the internal +5 Vdc supply is indicated by the front panel LED (green).

## SMU-4000 Installation

The SMU-4000 plug-in SNMP management controller module can only be fitted to IRT's 4000 series modules that are capable of being SNMP upgradeable. To determine whether a module is SNMP upgradeable, a square section on the main PCB is silk screened and fitted with three multipin sockets – as shown below:
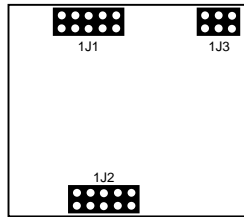


This is where the SMU-4000 plug-in SNMP management controller module is fitted. The three sets of multipins on the underside of the SMU-4000 line up with the three sets of multipin sockets on the main PCB module. Align all pins and then gently press the SMU-4000 all the way down into place.

If the SMU-4000 is not already programmed with the correct firmware to match the module that it is being plugged into, it then needs to be programmed via the pins on the topside of the SMU-4000.

Note that installation will generally be done by IRT Electronics at the time of ordering.

Note also that an SMU-4000 will only be functionally operational when the main module that it is plugged into is fitted into an IRT 4000 series frame fitted with a CDM-4000 SNMP agent and being interrogated by a suitable Network Management System.
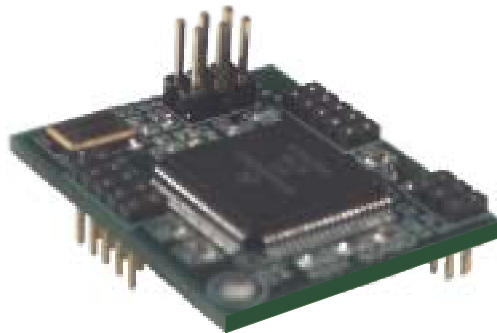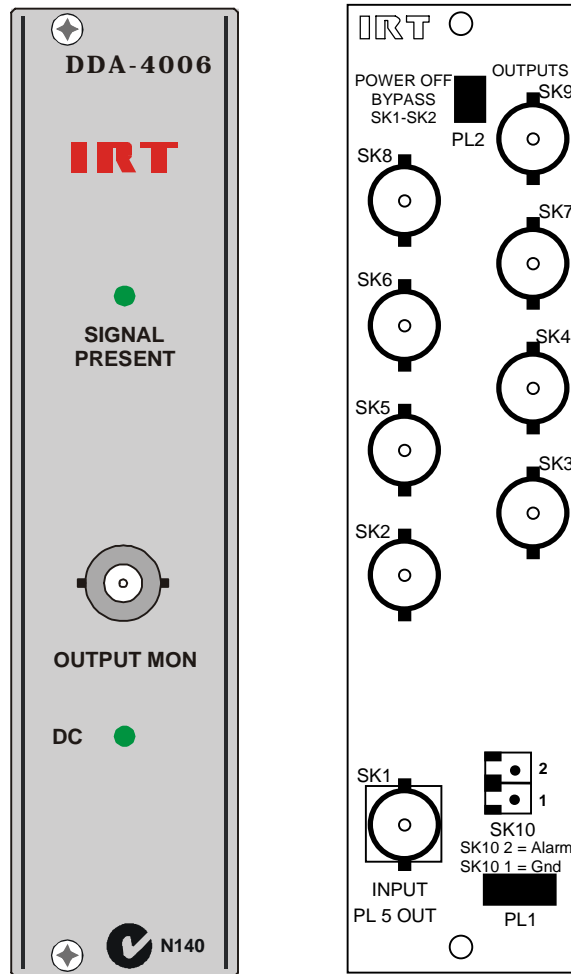


Figure 1: SMU-4000 module

## Front & rear panel connector 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.

# SNMP

## What Is It?

SNMP stands for Simple Network Management Protocol. It is an application layer protocol for managing IP (Internet Protocol) based systems. SNMP enables system administrators to manage system performance, and to find and solve system problems. SNMP runs over UDP (User Datagram Protocol), which in turn runs over IP.

Three types of SNMP exist: SNMP version 1 (SNMPv1), SNMP version 2 (SNMPv2) and SNMP version 3 (SNMPv3). It is not the intention here to discuss the differences between various versions, only to bring attention to the fact that IRT Electronics modules, fitted with SNMP capability, use SNMPv1.

An SNMP managed network consists of three key components: Network Management Systems (*NMS*), *agents*, and *managed devices*.

An *NMS* is the console through which the network administrator performs network management functions, such as monitoring status (e.g. alarm states) and remote controlling, of a set of managed devices. One or more *NMS*s must exist on any managed network. Generally the *NMS* is a computer running third party SNMP control software. There are a number of third party SNMP software applications currently available on the market.

An *NMS* polls, or communicates with, an *agent*. An *agent* is a network management software module that resides in a *managed device*. An *agent* has local knowledge of management information and translates that information into a form compatible with SNMP. The *agent*, therefore, acts as an interface between the *NMS* and the managed devices. The *NMS* sends a request message, and control commands for the managed devices, to the *agent*, which in turn sends a response message, containing information about the *managed devices*, back to the *NMS*.

A *managed device* contains an SNMP *agent* and resides on a managed network. *Managed devices* collect and store management information and make this information available to *NMS*s using SNMP.

*Managed device agent* variables are organised in a tree structure known as a Management Information Base (*MIB*). Within the *MIB* are parameters pertaining to the *managed device*. An Object Identifier (OID) number within the *MIB* defines the managed device type. This is a unique number specific to the model of *managed device*. Other information relating to the device is also stored, information such as alarm states, controllable settings, etc. The *MIB* tree is organised in such a way that there will be no two *MIB* files with conflicting placements.

Normally an *NMS* polls an *agent* for information relating to the *MIB* in a managed device to be sent back to the *NMS*. When certain conditions are met within the *MIB*, such as major alarm conditions, for example, the *agent* automatically sends what is known as a *trap* to the *NMS* without any prompting from the *NMS*. This allows automatic notification of a predetermined event.

### SNMP Block Diagram
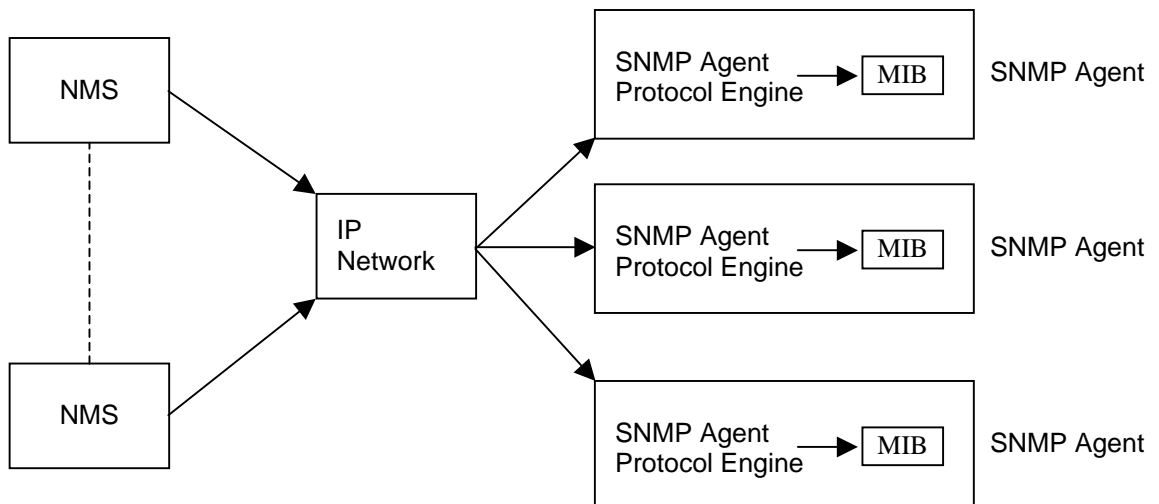
## SNMP with IRT Products

IRT Electronics currently employs SNMPv1 with its 4000 series frame. The frame acts as an *agent* when fitted with a CDM-4000 module. This module has its own designated slot next to the power supply so as to not affect the number of modules that the frame will take. Communication between the *NMS*, the frame and its loaded modules are via this CDM-4000 module. Note that the *NMS* software is third party and not supplied by IRT Electronics.

Ethernet connection for SNMP operation is via an RJ45 connector on the rear of the frame, below the mains inlet. Ethernet rate runs at either 10 baseT or 100 baseT.

Frame parameters, such as Name, Address and Location, are set via an RS232 interface, a D9 connector on the rear of the frame below the mains inlet. A software terminal emulator, such as Tera Term or HyperTerminal, is used for setting and reading the parameters of the frame.

IRT modules that are SNMP compatible need a plug-in SMU-4000 module with a program relevant to the module that it is plugged into. Depending on the module, besides the module identification, parameters such as alarm states, inputs and controls etc. are communicated to the CDM-4000 *agent* via a data bus on the rear of the frame. Thus the CDM-4000 collects information on what is loaded within the frame, what positions they occupy, and their current status for communication to the *NMS* when the *NMS* sends a request for information.

In the event of a major alarm from any of the SNMP compatible modules, or power supplies, a *trap* is automatically sent by the CDM-4000 *agent* to the *NMS* without any prompting by the *NMS*. This alerts the operator to any fault conditions that may exist that need immediate attention.
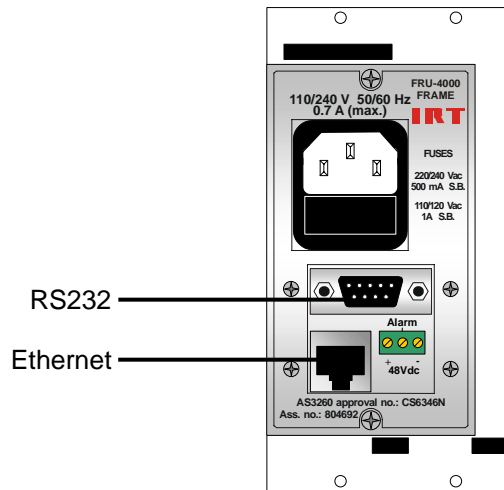


**IRT SNMP Connections**
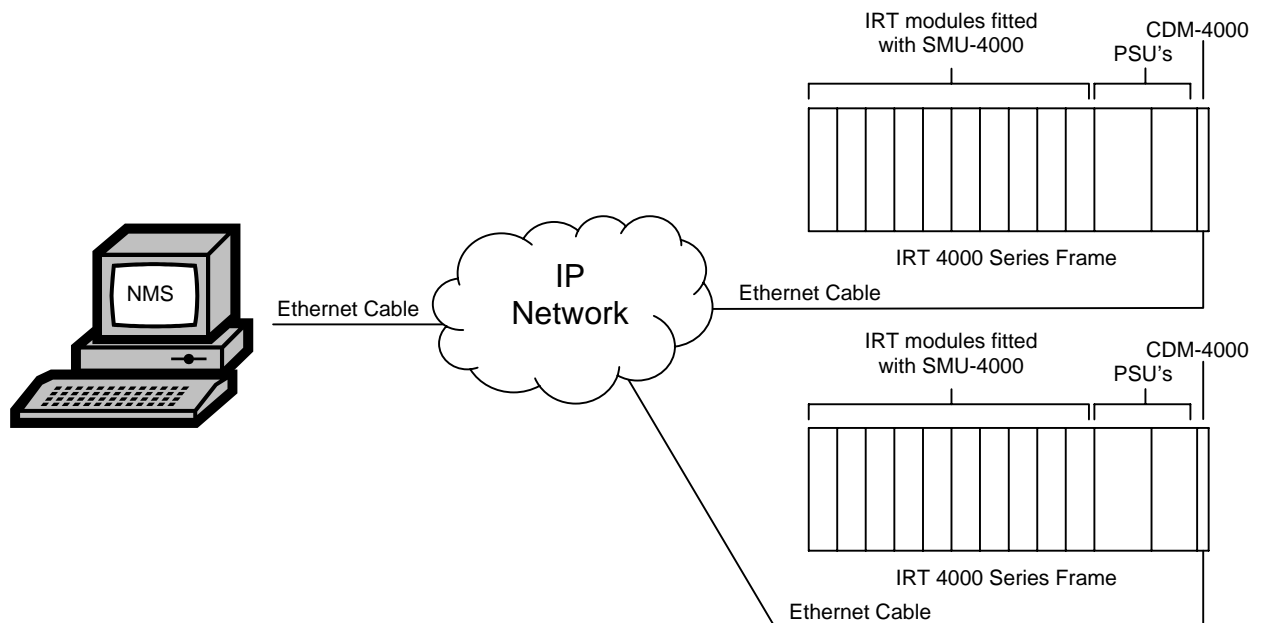


**IRT 4000 Series SNMP Setup**

## DDA-4006 SNMP Functions:

With the DDA-4006 fitted with the optional plug-in SMU-4000 SNMP module, programmed with firmware to suit, and installed in an IRT 4000 series frame with SNMP capability, it is possible to remotely monitor the presence of an input and the state of the urgent alarm using an NMS. Traps can also be set for whenever an urgent alarm occurs or clears.

# 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 direct as follows.

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

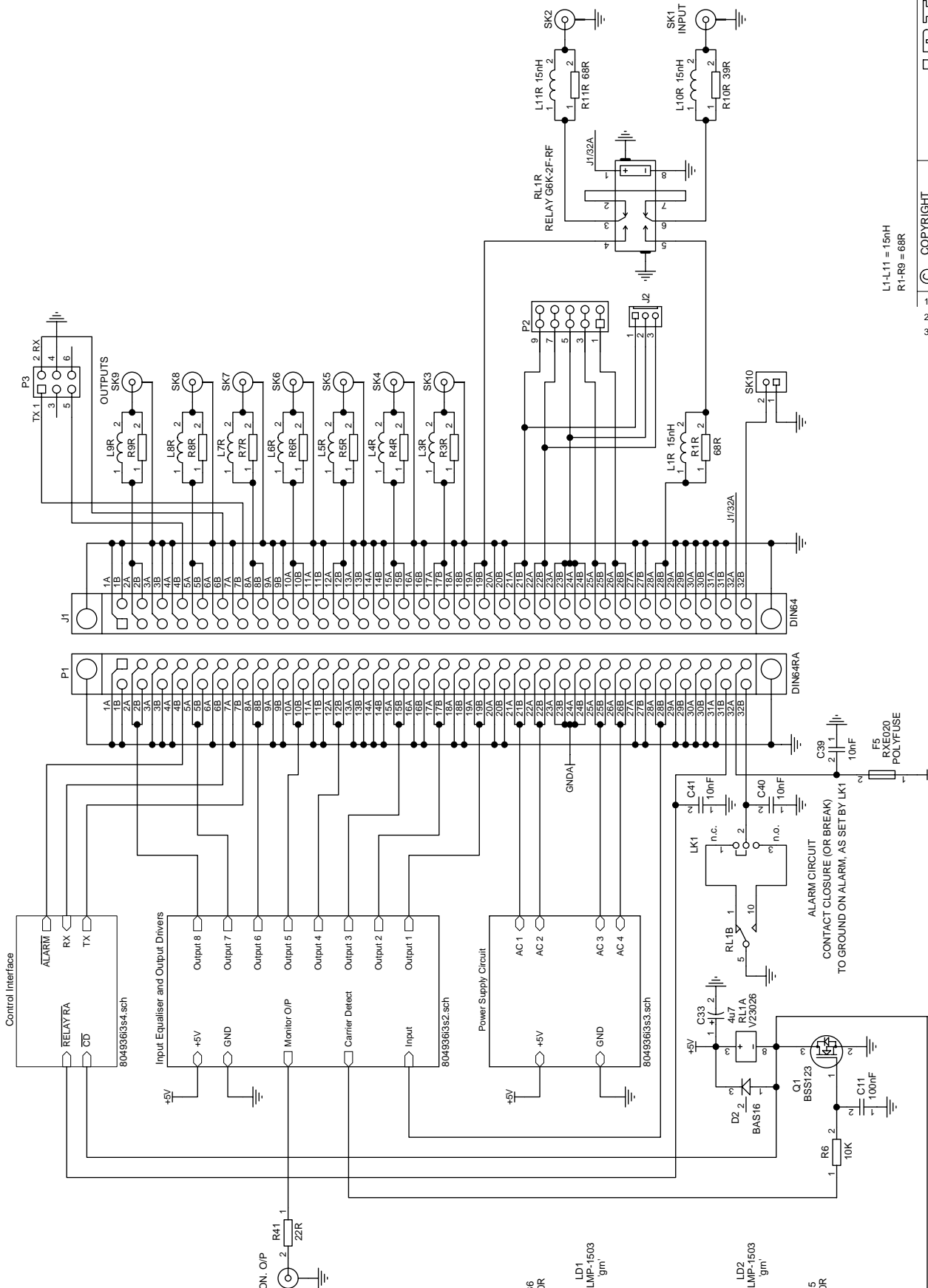Phone:    61 2 9439 3744              Fax:    61 2 9439 7439
Email:    service@irtelectronics.com

# Drawing Index

Note: Components marked n/c on the diagrams are optional and are not included on standard production units. They are shown to assist with interpretation of additional or optional functions, which may be included or are necessary for factory set-up procedures.

SK2
L11R 15nH
R11R 68R

SK1 INPUT
L10R 15nH
R10R 39R

L1-L11 = 15nH
R1-R9 = 68R

RL1R G6K-2F-RF
RELAY G6K-2F-RF
J1/32A

P3
2 RX
4
6
TX 1
3
5

OUTPUTS
SK9  L9R  R9R
SK8  L8R  R8R
SK7  L7R  R7R
SK6  L6R  R6R
SK5  L5R  R5R
SK4  L4R  R4R
SK3  L3R  R3R

P2
9 7 5 3 1
J2
1 2 3

L1R 15nH
R1R 68R

SK10

J1  DIN64
1A 1B 2A 2B 3A 3B 4A 4B 5A 5B 6A 6B 7A 7B 8A 8B 9A 9B 10A 10B 11A 11B 12A 12B 13A 13B 14A 14B 15A 15B 16A 16B 17A 17B 18A 18B 19A 19B 20A 20B 21A 21B 22A 22B 23A 23B 24A 24B 25A 25B 26A 26B 27A 27B 28A 28B 29A 29B 30A 30B 31A 31B 32A 32B

P1  DIN64RA
1A 1B 2A 2B 3A 3B 4A 4B 5A 5B 6A 6B 7A 7B 8A 8B 9A 9B 10A 10B 11A 11B 12A 12B 13A 13B 14A 14B 15A 15B 16A 16B 17A 17B 18A 18B 19A 19B 20A 20B 21A 21B 22A 22B 23A 23B 24A 24B 25A 25B 26A 26B 27A 27B 28A 28B 29A 29B 30A 30B 31A 31B 32A 32B

GNDA

J1/32A

C39 10nF
F5 RXE020 POLYFUSE
+5V

C41 10nF
C40 10nF

LK1
n.c. 2 n.o.

ALARM CIRCUIT
CONTACT CLOSURE (OR BREAK)
TO GROUND ON ALARM, AS SET BY LK1

RL1B 1
5  10

Control Interface
ALARM
RX
TX
RELAY RA
CD
TX
80493613s4.sch
+5V

Input Equaliser and Output Drivers
Output 8
Output 7
Output 6
Output 5
Output 4
Output 3
Output 2
Output 1
+5V
GND
Monitor O/P
Carrier Detect
Input
80493613s2.sch
+5V

Power Supply Circuit
AC 1
AC 2
AC 3
AC 4
+5V
GND
80493613s3.sch
+5V

C33 4u7
RL1A V23026
D2 BAS16
Q1 BSS123
C11 100nF
R6 10K

MON. O/P
R41 22R
SK101

+5V  R36 680R  LD1 HLMP-1503 'gm'  'DC'

+5V  LD2 HLMP-1503 'gm'  R35 680R  'SIGNAL'

PCB 804937

IRT
SIZE A3
Title SDI/ASI Distribution Amplifier
DDA-4006
Drawing No. 804936
Sheet 1 of 4
SCALE N.T.S.
IRT Electronics Pty. Ltd.
ARTARMON NSW AUSTRALIA 2064

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DRAWN  K.N.
CHECKED
ENG. APP.
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Date: 10-Sep-2008

1 15-04-2004
2 03-04-2008 ECR1853
3 26-06-2008 ECR1863