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IRT Eurocard

AES/EBU Digital to Analogue Converter

Type DAC-4412

Designed and manufactured in Australia

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

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Instruction Manual

Table of Contents

This instruction book applies to units later than S/N 0908001.

Operational Safety:

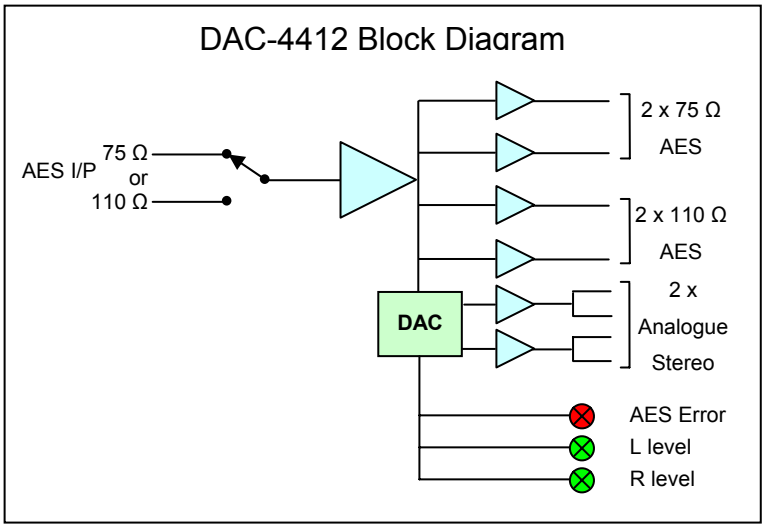
WARNING

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.

IRT Eurocard
Type DAC-4412
AES/EBU Digital to Analogue Converter

General Description



The DAC-4412 is designed to provide AES/EBU digital audio conversion to analogue stereo format. Four AES outputs are provided for through signal and monitoring purposes.

The DAC-4412 may be used with AES digital signals at 48 kHz.

The digital circuitry of the DAC-4412 restores the signal rise and fall times and output level without the need to manually adjust gain and compensation controls.

The digital converter monitors the AES signal for errors, and lights an alarm indication on the front panel.

LEDs are also provided to indicate the analogue output level. These are user adjustable, but factory set to a -40 dBFS threshold.

Link settings allow the analogue audio output to be muted on loss of digital input.

Individual rear assemblies are available for 75 Ohm or 110 Ohm use. No changes are required to the main DA to convert between the two output types.

Additional rear assemblies of either type may be ordered separately. Both types include both 110 and 75 Ohm input connectors and balanced analogue stereo output connectors. The required input is selected by links on the main PCB.

The DAC-4412 is designed to fit IRT's standard Eurocard frames 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.

Standard features:

- **4 AES and 2 analogue stereo outputs.**
- **24 bit digital to analogue processing.**
- **75 and 110 Ohm inputs.**
- **Front panel digital monitoring output.**
- **Front panel audio level and AES error indications.**
- **All inputs and outputs transformer coupled.**
- **Digital circuit re-shapes output and restores level.**
- **No cable compensation adjustments required.**
- **Optional plug-in SNMP monitoring module.**

Technical Specifications

IRT Eurocard module
Type DAC-4412

Inputs:

Number	2.
Type	1 x 110 Ω balanced, or 1 x 75 Ω unbalanced, selected by link on PCB.
Format	AES3-1992 standard.
Input level	200 mVp-p minimum.
Cable length	>500 m 75 Ω (Belden 8281), >200 m 110 Ω (AES digital high quality shielded pair).

Outputs:

AES/EBU:

Number	4.
Type	2 x 75 Ω unbalanced > 1 Vp-p, and 2 x 110 Ω balanced > 3 Vp-p.
Monitoring	1 x 75 Ω unbalanced.
Format	AES3-1992 standard.

Analogue:

Number	2 stereo, mutable by link settings on loss of input.
Type	40 Ω balanced.

Performance:

Frequency	48 kHz.
Rise & fall times	<20 ns.
Level for full code	+24 dBu (variable by internal factory preset).
Frequency response	±0.1 dB 50 Hz to 15 kHz. ±0.2 dB 15 kHz to 20 kHz.
THD+N	<0.025%
Noise	-100 dBFS ('A' weighted with idle channel, digital input all zeros).
Linearity	<±0.5 dB at -90 dBFS.
De-emphasis	automatic from channel status.
Mute level	60dB down from peak output.
Power requirements	28 Vac CT (14-0-14) or ± 16 Vdc.
Power consumption	<6 VA.

Connectors:

	Balanced	Phoenix 3 terminal plug-in blocks.
	Unbalanced	BNC.

Other:

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.
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.
Dimensions		6 HP x 3 U x 220 mm IRT Eurocard.
Supplied accessories		Rear connector assembly including matching plugs for balanced connections.
Optional accessories		SMU-4000 plug in SNMP Management Information Base (MIB) module.

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.

Signal Connections

Signal connections are made to the connectors on the rear panel of the DAC-4412.

The input signal can be either 75 ohms unbalanced terminating or 110 ohms balanced terminating, the **input selection** is done be links **SW1, SW2 on the module pcb** near pin 32 of the input connector. Move the links provided to the 75 or 110 positions marked on the board as required. The input signal is then connected to the appropriate input connector on the rear panel.

Two unbalanced 75 ohms output circuits and two balanced 110 ohm output circuits are both provided on the rear panel assembly.

The presence of AES signal at the output of the rear assembly can be monitored using the front panel monitoring BNC socket provided.

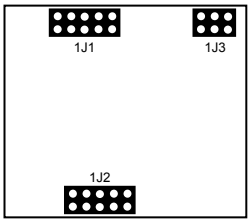
RV1 and RV2 the analogue audio gain controls are factory preset to give a audio output level of +24 dBu for a 0 dBFS AES digital input signal.

RV101 sets the threshold for the audio presence indicator LEDs on the front panel. The factory setting is for a - 40 dBFS digital input signal.

Audio Mute:
With links LK6 and LK7 IN, right and left analogue outputs respectively are muted on loss of digital AES input.

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.

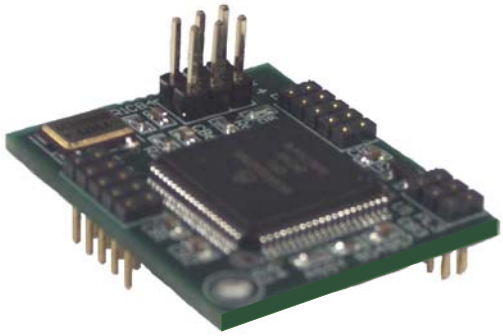
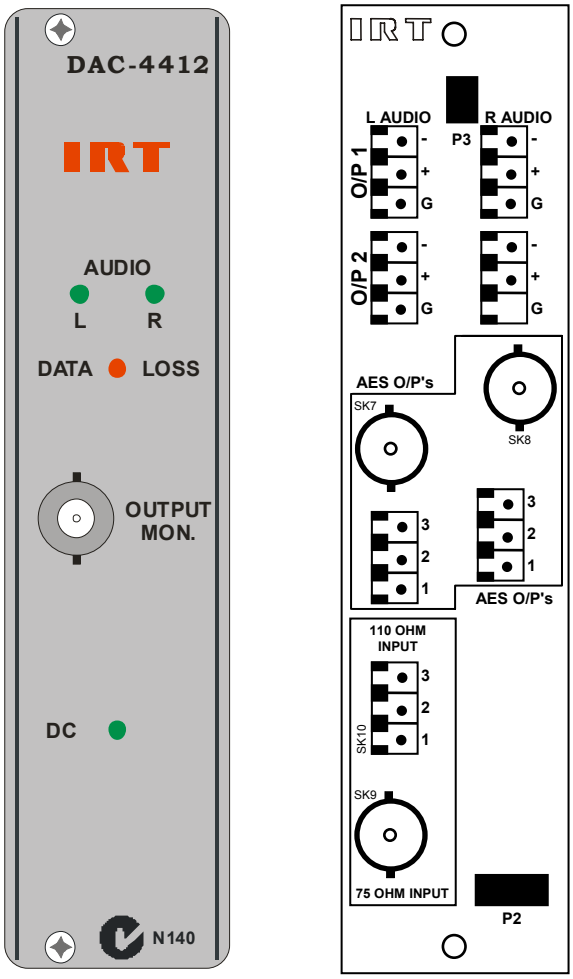


Figure 1: SMU-4000 module

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.

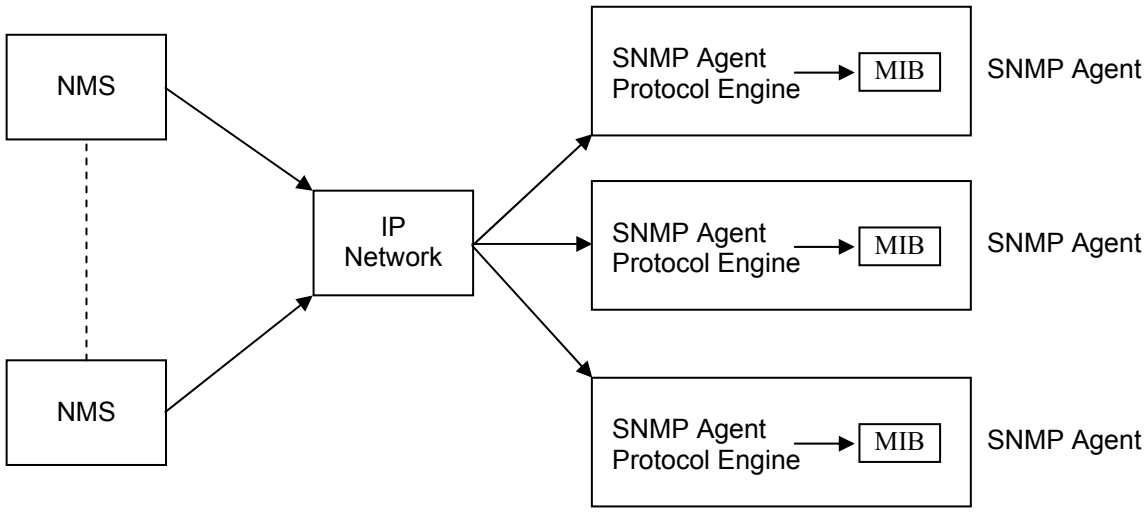
An *NMS* polls, or communicates with, an *agent*. An *agent* is a network management software module that resides in a *managed device*. An *agent* has local knowledge of management information and translates that information into a form compatible with SNMP. The *agent*, therefore, acts as an interface 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:

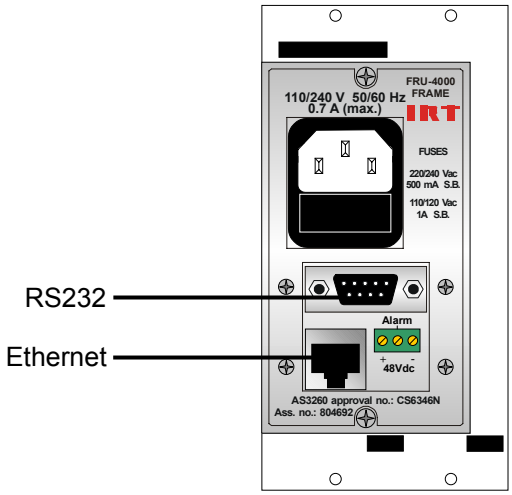
IRT Electronics currently employs SNMPv1 with its 4000 series frame. The frame acts as an *agent* when fitted with a CDM-4000 module. This module has its own designated slot next to the power supply so as to not affect the number of modules that the frame will take. Communication between the *NMS*, the 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.

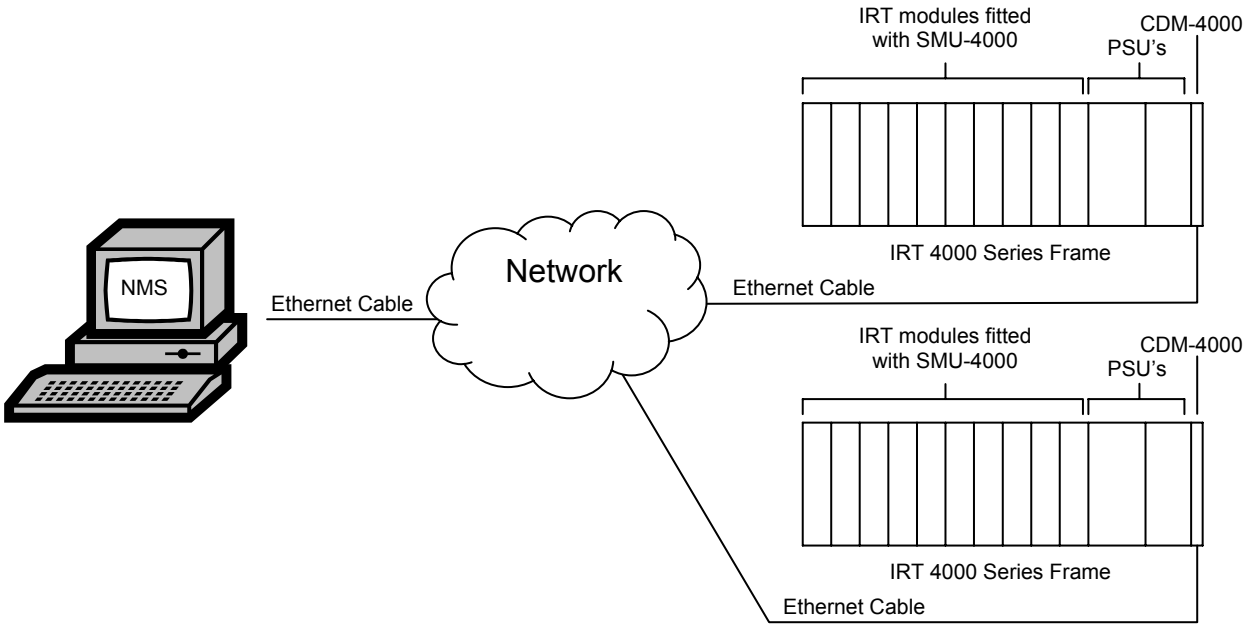
Frame parameters, such as Name, Address and Location, are set via an RS232 interface, a D9 connector on the rear of the frame below the mains inlet. A software terminal emulator, such as Tera Term or HyperTerminal, is used for setting and reading the parameters of the frame.

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

DAC-4412 SNMP Functions:

With the DAC-4412 fitted with the optional plug-in SMU-4000 SNMP module, programmed with the firmware to suit and installed in an IRT 4000 series frame with SNMP capability, the unit can be interrogated by an SNMP Network Management System (NMS).

The following SNMP functions are capable of being monitored by an NMS:

An indication of the sample rate of the input signal;
An indication of an error state – Validity, Parity, Bi-Phase, Confidence or PLL lock errors;
Whether "Trap" function is enabled;
Trap automatically sent, if enabled, on error alarm;
Trap automatically sent, if enabled, if error alarm clears; and
Unit reset control.

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
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