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IRT Eurocard

Type DAC-3421

AES/EBU Rate Converter

Designed and manufactured in Australia

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

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Type DAC-3421

AES/EBU Rate Converter

Instruction Book

Table of Contents

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-3421
AES/EBU Rate Converter

GENERAL DESCRIPTION

The DAC-3421 is an AES/EBU 24 bit rate converter. It is suitable for applications requiring different data rates than those supplied, such as broadcasting requirements, which require a 48 kHz signal as opposed to a CD, for example, which has a data rate of 44.1 kHz.

All input, output and reference connections are link selectable for either 75Ω (unbalanced) or 110Ω (balanced) operation.

The DAC-3421 accepts a 24 bit 32 kHz to 55 kHz stereo AES/EBU input audio stream and resamples it to the same rate as the reference signal. The reference signal can be any AES/EBU audio stream in the range of 32 kHz to 55 kHz.

When no reference signal is applied, the DAC-3421 automatically resamples the input signal to 48 kHz, which is the broadcasting standard for AES/EBU audio signals.
Front panel LED's indicate the presence of an AES/EBU input signal and a valid reference signal.

The DAC-3421 is fabricated in IRT's standard Eurocard format and may be housed in all of IRT's 1RU and 3RU standard frames alongside other standard modules.

Standard features:

- Conversion of AES/EBU rate.
- 24 bit operation.
- Accepts input and reference rates from 32 to 55 kHz.
- Output rate equal to reference input rate.
- 48 kHz output rate with no reference input.
- Link selectable 75Ω or 110Ω on input, output and reference input.

TECHNICAL SPECIFICATIONS

IRT Eurocard modules
Type DAC-3421

Input :		AES/EBU (75Ω unbalanced or 110Ω balanced)
Input Level		200 mV p-p minimun.
Format		AES3-1992 standard.
Sample Rate		25kHz to 55kHz
Input Cable Length		>500m 75Ω (Belden 8281). >200m 110Ω(AES digital high quality shielded pair)
Reference Input:		AES/EBU (75Ω unbalanced or 110Ω balanced)
Input Level		200 mV p-p minimun.
Format		AES3-1992 standard.
Sample Rate		32 kHz to 55 kHz
Input Cable Length		>500m 75Ω (Belden 8281). >200m 110Ω(AES digital high quality shielded pair
Output:		AES/EBU (75Ω unbalanced or 110Ω balanced)
Output Level		200 mV p-p minimun.
Format		AES3-1992 standard.
Sample Rate		Equal to reference input sample rate, 48 kHz nominal – no reference input.
Alarm:		N/O, N/C, Common relay contacts for a valid/invalid AES/EBU signal present/absent
Output:		AES/EBU (75Ω unbalanced or 110Ω balanced)
Output Level		200 mV p-p minimun.
Format		AES3-1992 standard.
Sample Rate		Equal to reference input sample rate, 48 kHz nominal – no reference input.
Connectors:	Balanced	Phoenix 3 terminal plug-in blocks.
	Unbalanced	BNC 75Ω.
	Alarm	Phoenix 4 terminal plug-in blocks
Power Requirements:		28 Vac CT (14-0-14) or ±16 Vdc
Power consumption		100 mA (all outputs loaded in 75 Ω).
Connectors:		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 escutcheon	Grey enamel, 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
Standard accessories		Rear connector assembly.
Optional accessories		TME-6 module extender card.

CIRCUIT DESCRIPTION

The DAC-3421 accepts either 75 Ω unbalanced BNC or 110 Ω balanced Phoenix style screw terminal block AES/EBU signals on each of the input, output and reference input ports via its rear assembly.

Links LK1 and LK2 set the input impedance by connecting the input transformer, T2, to either the 75 Ω (Position B) unbalanced BNC or to the 110 Ω (Position A) balanced phoenix input port. This transformer coupled input signal is fed to IC3, which acts as a resampler whose output feeds the output transformer, T1. Links LK4 and LK5 connect the transformer coupled output to either the 75 Ω (Position B) unbalanced BNC or to the 110 Ω (Position A) balanced phoenix output port.

Links LK3 and LK6 set the reference-input impedance by connecting the reference-input transformer, T3, to either the 75 Ω (Position B) unbalanced BNC or to the 110 Ω (Position A) balanced phoenix reference-input port. If a reference signal is detected on the reference inputs the signal is re-clocked to match the frequency of the reference. The reference input sample rate may be between the frequencies of 32 to 55 kHz. If the reference input sample rate falls outside these specifications the unit may fail to lock onto the signal. This transformer coupled reference-input signal is fed to an AES receiver chip, IC7. The reference-input's clock signal is recovered and fed to IC6.

IC5, in conjunction with crystal oscillator X1, forms a 12.288 MHz oscillator (256 x 48 kHz) and is fed to both IC4 and IC6. IC6 is a NAND gate array. When no valid reference-input exists, the local 12.288 MHz is fed to IC3. When a valid reference-input exists, the recovered clock from IC7 is fed to IC3.

IC4 is a micro-controller, which interfaces with the resampler and reference receiver chips as well as generating LED driver signals for operating the front panel LEDs and relay alarm. Front panel LEDs indicate the presence of a valid AES/EBU input signal and a valid reference signal.

A relay alarm outputs normally open (N/O), normally closed (N/C) and common (COM) contacts to the rear assembly unit. When a valid input is present, N/O to COM becomes a short circuit and N/C to COM becomes an open circuit. When there is no power or no valid input signal, N/O to COM becomes an open circuit and N/C to COM becomes a short circuit.

IC2 in conjunction with switch, SW1, interface with the micro-controller and perform no user functions. They are included for future design use.

All chips operate from a +5 Vdc power supply and is generated by IC1, which is a switch mode power supply. The card operates from either 14-0-14 Vac centre tapped supply or by ± 16Vdc.

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.

Audio connections:

The DAC-3421 accepts either 75 Ω unbalanced BNC or 110 Ω balanced Phoenix style screw terminal block AES/EBU signals on each of the input, output and reference input ports. On board links set the relevant port's impedance path. All ports and their associated link settings are independent of each other allowing any combination of 75 Ω unbalanced or 110 Ω balanced connections.

Link settings:

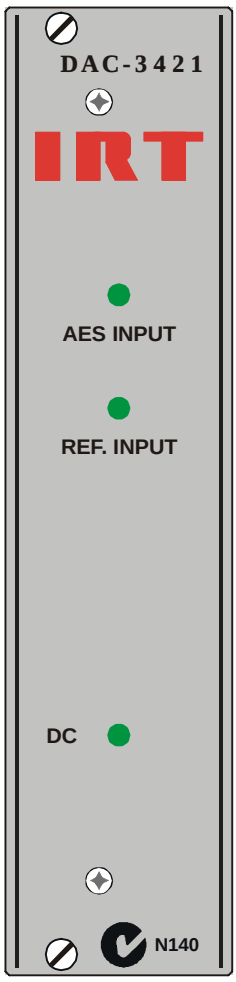
Input	**75 Ω**	Links	LK1B & LK2B.
	110 Ω	Links	LK1A & LK1B.
Output	**75 Ω**	Links	LK4B & LK5B.
	110 Ω	Links	LK4A & LK5A.
Reference	**75 Ω**	Links	LK3B & LK6B.
	110 Ω	Links	LK3A & LK6A.

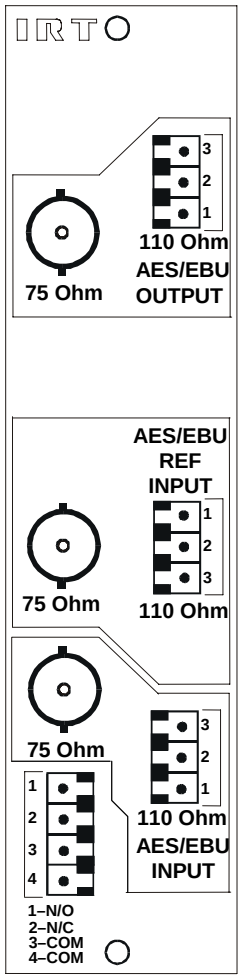
Alarm output:

Normally Open (N/O), Normally Closed (N/C) and Common (COM) alarm relay contacts are available via a 4 pin Phoenix style of connector on the rear assembly unit. N/O appears on pin 1, N/C appears on pin 2 and COM appears on both pins 3 & 4.

Front & rear panel connector diagrams

The following front panel and rear assembly drawings are not to scale and are intended to show connection order and approximate layout 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 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

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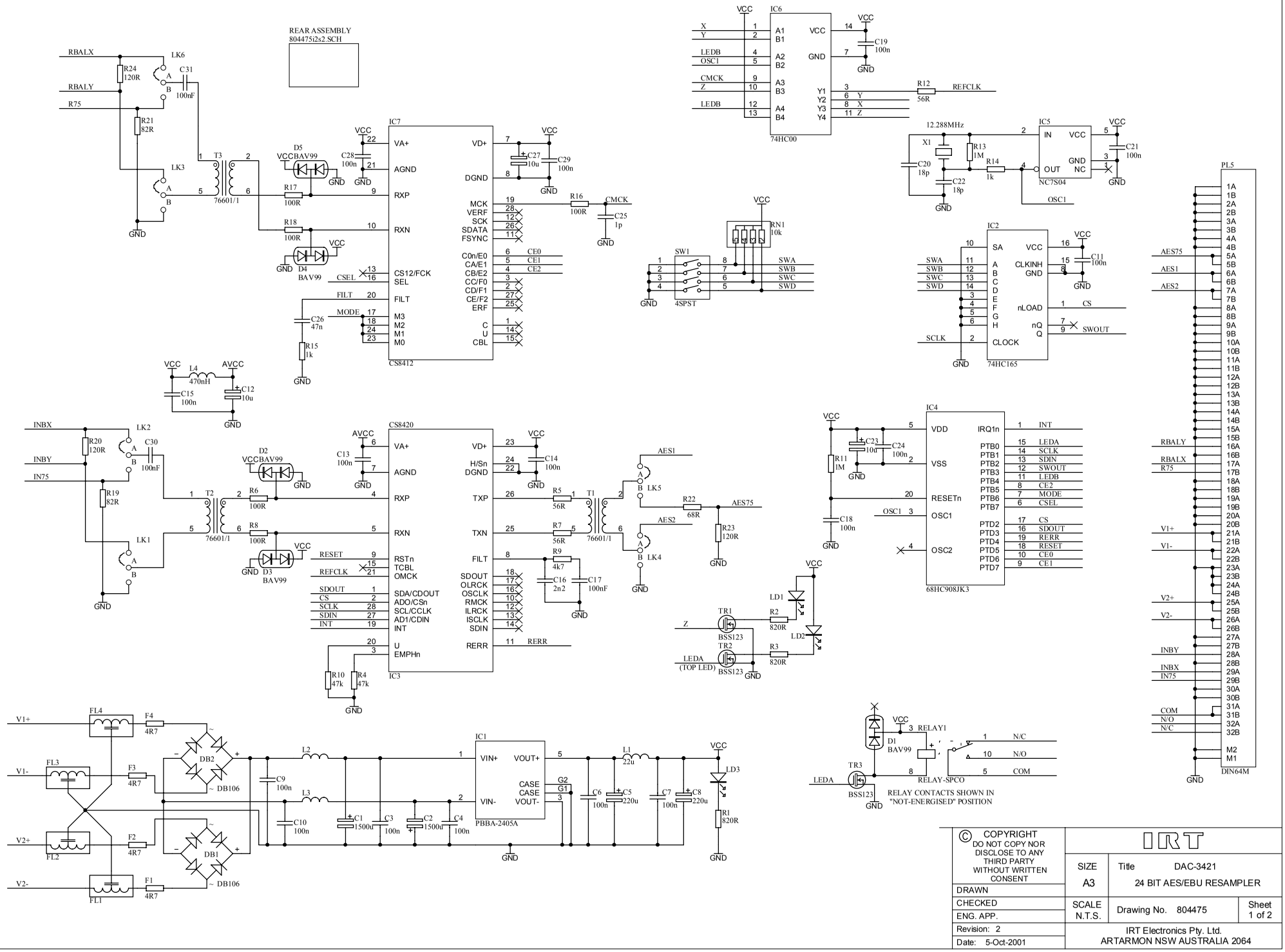
804475	1	DAC-3421 24 Bit AES/EBU resampler circuit schematic, sheet 1.
804475	2	DAC-3421 24 Bit AES/EBU resampler circuit schematic, sheet 2.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804475i2s2.SCH
RBALX
RBALY
R75
LK6
R24 120R
C31 100nF
R21 82R
LK3
T3
76601/1
D5 BAV99
C28 100n
R17 100R
R18 100R
D4 BAV99
CSEL
FILT
MODE
C26 47n
R15 1k
IC7
CS8412
VA+
AGND
RXP
RXN
CS12/FCK
SEL
FILT
M3
M2
M1
M0
VD+
DGND
MCK
VERF
SCK
SDATA
FSYNC
C0n/E0
CA/E1
CB/E2
CC/F0
CD/F1
CE/F2
ERF
C
U
CBL
C27 10u
C29 100n
R16 100R
CMCK
C25 1p
CE0
CE1
CE2
VCC
GND
L4 470nH
AVCC
C15 100n
C12 10u
INBX
INBY
IN75
LK2
R20 120R
C30 100nF
R19 82R
LK1
T2
76601/1
D2 BAV99
R6 100R
R8 100R
D3 BAV99
RESET
REFCLK
SDOUT
CS
SCLK
SDIN
INT
IC3
CS8420
AVCC
C13 100n
VA+
AGND
RXP
RXN
RSTn
TCBL
OMCK
SDA/CDOUT
ADO/CSn
SCL/CCLK
AD1/CDIN
INT
U
EMPHn
VD+
H/Sn
DGND
TXP
TXN
FILT
SDOUT
OLRCK
OSCLK
RMCK
ILRCK
ISCLK
SDIN
RERR
C14 100n
R5 56R
R7 56R
T1
76601/1
R9 4k7
C16 2n2
C17 100nF
R10 47k
R4 47k
AES1
AES2
LK5
LK4
R22 68R
AES75
R23 120R
IC6
74HC00
X
Y
LEDB
OSC1
CMCK
Z
LEDB
A1
B1
A2
B2
A3
B3
A4
B4
Y1
Y2
Y3
Y4
C19 100n
R12 56R
REFCLK
12.288MHz
X1
C20 18p
C22 18p
R13 1M
R14 1k
IC5
NC7S04
IN
OUT
NC
C21 100n
OSC1
SW1
4SPST
RN1 10k
SWA
SWB
SWC
SWD
IC2
74HC165
SA
A
B
C
D
E
F
G
H
SCLK
CLOCK
CLKINH
nLOAD
nQ
Q
C11 100n
CS
SWOUT
IC4
68HC908JK3
VDD
VSS
RESETn
OSC1
OSC2
IRQ1n
PTB0
PTB1
PTB2
PTB3
PTB4
PTB5
PTB6
PTB7
PTD2
PTD3
PTD4
PTD5
PTD6
PTD7
R11 1M
C23 10u
C24 100n
C18 100n
INT
LEDA
SCLK
SDIN
SWOUT
LEDB
CE2
MODE
CSEL
CS
SDOUT
RERR
RESET
CE0
CE1
LD1
LD2
TR1
TR2
BSS123
R2 820R
R3 820R
Z
LEDA
(TOP LED)
PL5
DIN64M
AES75
AES1
AES2
RBALY
RBALX
R75
V1+
V1-
V2+
V2-
INBY
INBX
IN75
COM
N/O
N/C
M2
M1
FL4
FL3
FL2
FL1
F4 4R7
F3 4R7
F2 4R7
F1 4R7
DB2
DB1
DB106
L2
L3
C9 100n
C10 100n
C1 1500u
C3 100n
C2 1500u
C4 100n
IC1
PBBA-2405A
VIN+
VIN-
VOUT+
VOUT-
CASE
CASE
G2
G1
L1 22u
C6 100n
C5 220u
C7 100n
C8 220u
LD3
R1 820R
D1 BAV99
RELAY1
RELAY-SPCO
TR3
BSS123
LEDA
N/C
N/O
COM
RELAY CONTACTS SHOWN IN
"NOT-ENERGISED" POSITION
© COPYRIGHT
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Revision: 2
Date: 5-Oct-2001
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N.T.S.
Drawing No. 804475
Sheet
1 of 2
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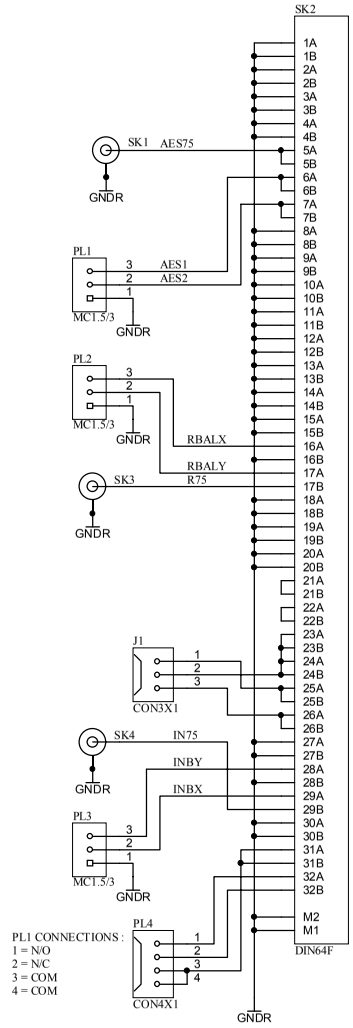
ARTARMON NSW AUSTRALIA 2064



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