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IRT Eurocard

Type MFC-3540

SPI(204 byte) to ASI(188 byte) Converter

Designed and manufactured in Australia

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

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SPI(204 byte) to ASI(188 byte) Converter

Instruction Book

Table of Contents

This instruction book applies to units later than S/N 9907000.

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.

General description

The MFC-3540 is part of a family of data transcoders for converting between the MPEG2 Transport Stream formats commonly used in the broadcast industry for program distribution.

Any SPI input data rate within the range of 1.5 to 50 Mb/s will be converted to the corresponding rate within a 270 Mb/s ASI stream by the MFC-3540.

The SPI (Synchronous Parallel Interface MPEG2) format is convenient for data manipulation, but is not suited to transporting signal over more than a few metres.

The ASI (Asynchronous Serial Interface 270 Mb/s) format can easily carry data over several hundred meters on coaxial cable and many kilometres on a fibre optic cable.

The MFC-3540 does not perform any signal correction or alter the format of the MPEG2 transport stream other than the transport stream electrical format and converting from a 204 to 188 Byte packed stream. It does by discarding the RS check words. If the input signal is already a 188 Byte packet stream the only conversion that takes place is a straight SPI to ASI.

The MFC-3540 is primarily intended for use with IRT's QPSK encoding system where an input signal packet of 188 Bytes is used and it is desired to keep the output signal's packet information in the same format.

ASI:

ASI MPEG data is transported in a 270 Mb/s signal regardless of the underlying data rate. It is a convenient and relatively inexpensive way of transporting data. ASI signals may be transported over good quality 75 Ohm coaxial cable for distances of up to 300 m, but it is recommended that in actual practice cable lengths be kept to less than 100 m.

Where greater distances are involved, distribution amplifiers may be used to re-equalise the signal at intervals along the path.

SPI:

The SPI interface is a ten bit wide parallel interface with a synchronous clock signal. Each of the eleven signals is sent using LVDS drivers (Low Voltage Differential Signalling). This results in a word (or byte) parallel signal at less than a $1/10^{th}$ the bit rate of ASI, making it ideal for processing, but is not suitable for use with anything other than very short cable connections. For practical purposes 5 metres is suggested as a maximum. Where longer distances are involved, the SPI signal should be converted to ASI and run using coaxial cable or fibre links.

The MFC-3540 module should therefore be located as close as possible to the connected SPI equipment, rather than the ASI equipment.

Standard features:

- **Transparent ASI to SPI conversion.**
- **One module covers data rates from 1.5 Mb/s to 50 Mb/s.**
- **Block length indication (188/204).**

Applications:

- **Primarily for use with QPSK decoder where conversion for 204 to 188 Byte packet conversion required.**
- **Interfacing various MPEG2 TS formats.**
- **Block length indication and error detection.**
- **Connections to modulators or test equipment.**
- **Signal monitoring for remote alarm indications.**

Technical specifications
IRT Eurocard module
Type MFC-3540

Input:

Type	1 x SPI(188 or 204 byte).
Electrical characteristics	LVDS receivers.
Connector	25 pin 'D' female.

Outputs:

Type	1 x ASI-C (188 byte).
Impedance	75 ohm.
Level	800 mVp-p.
Connector	BNC.

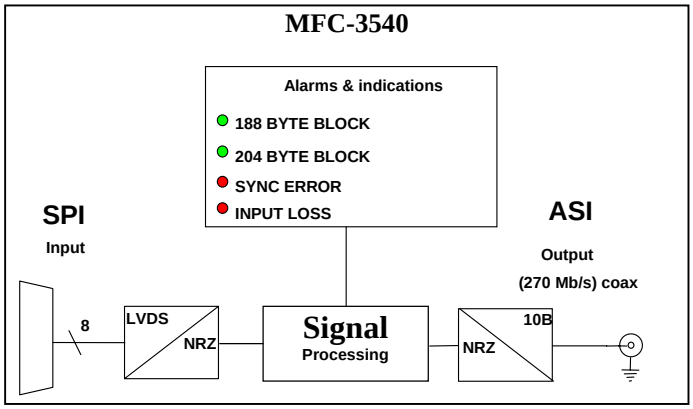
Power Requirements	28 Vac CT (14-0-14) or ± 16 Vdc.
Power consumption	<5 VA.

Other:

Temperature range		0 - 50° C ambient
Mechanical		Mounts in IRT's family of frames with input and output connections on the rear panel.
Finish:	Front panel	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
Supplied accessories		Rear connector assembly.
Related products		DDC-3335 – ASI to SPI convertor MFT/R-3510 QPSK encoding
Optional accessories		TME-6 module extender card.

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

Technical description



LED Indicators.

INPUT Illuminates red if the input clock is missing.

SYNC Reserved.

188 Indicates that the input stream has 188 bytes per packet.

204 Indicates that the output stream has 204 bytes per packet.

SPI connectors

The SPI uses 25 pin 'D' connector. Cable connectors are male and equipment connectors are female. Interconnecting cables and connectors must be shielded. Logic levels are LVDS.

Pin	Signal line	Pin	Signal line
1	Clock A	14	Clock B
2	System Gnd	15	System Gnd
3	Data 7 A(MSB)	16	Data 7 B
4	Data 6 A	17	Data 6 B
5	Data 5 A	18	Data 5 B
6	Data 4 A	19	Data 4 B
7	Data 3 A	20	Data 3 B
8	Data 2 A	21	Data 2 B
9	Data 1 A	22	Data 1 B
10	Data 0 A	23	Data 0 B
11	DVALID A	24	DVALID B
12	PSYNC A	25	PSYNC B
13	Cable Shield		

Circuit Description

The MFC-3540 accepts an SPI input signal via the D25 connector on the rear assembly unit. This feeds U6, U7 and U8, which are SPI receiver chips. This parallel signal is then fed into U5, which is a field programmable gate array (FPGA) chip where processing of the signal takes place

Internal adjustments

The MFC-3540 has no user internal adjustments. RV2 and RV3 are factory set and should not be adjusted.

Configuration

The MFC-3540 has no user configurable adjustments.

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.

Connections:

ASI:

ASI MPEG data is transported in a 270 Mb/s signal regardless of the underlying data rate. Therefore, all cabling and connectors should be of high quality and have a true 75 Ohm characteristic impedance.

ASI signals may be transported over good quality 75 Ohm coaxial cable for distances of up to 300 m, but again it is recommended that in actual practice cable lengths be kept to less than 100 m.
Where greater distances are involved, distribution amplifiers may be used to re-equalise the signal at intervals along the path.
Alternatively, consideration should be given to using the IRT DVT-3210 / DVR-3210 fibre optic link, which will transport ASI signals over single mode fibre optic cable for distances up to 60 Km (dependent on fibre losses).

Electrical characteristics ASI:

Transmitter output characteristics:

Output voltage	800 mVp-p ±10%.
Deterministic jitter	<10% p-p.
Random jitter	<8% p-p.
Rise/fall time (20-80%)	<1.2 ns.

Receiver input characteristics:

Minimum sensitivity (D21.5 idle pattern)	200 mV
Maximum input voltage	880 mVp-p
s_{11} (range: 0.1 to 1.0 x bit rate)	-17 dB
Minimum discrete connector return loss	15 dB (5 MHz - 270 MHz)

Coaxial link:

Impedance	75 Ohm.
Equipment connector	BNC female.

(Electrical measurements made with 75 Ohm resistive termination.)

SPI:

The SPI interface is a ten bit wide parallel interface with a synchronous clock signal. Each signal is sent using LVDS drivers (Low Voltage Differential Signalling).
This means that a balanced pair is required for each signal, entailing a total of twenty two signal wires plus at least one ground connection. A twenty five pin 'D' connector is standard for this system.

The SPI interface is not suitable for use with anything other than very short cable connections. For practical purposes 5 metres is suggested as a maximum. Where longer distances are involved, the SPI signal should be converted to ASI and run using coaxial cable or fibre links.
The DDC-3330 module should therefore be located as close as possible to the connected SPI equipment, rather than the ASI equipment.

Good quality cable and connectors must be used. For EMC it is necessary to use only 'D' connectors with full metal shells and the cable outer screen should be properly connected to the shell. Unshielded cables must not be used at all.
The 'D' connectors should have their securing screws firmly screwed down to ensure a continuous earth shroud is maintained. These screws are not simply to ensure that the connector does not become unplugged, they are an integral part of the EMC screening and signal connection.

Electrical characteristics SPI:

Line Driver Characteristics (Source)

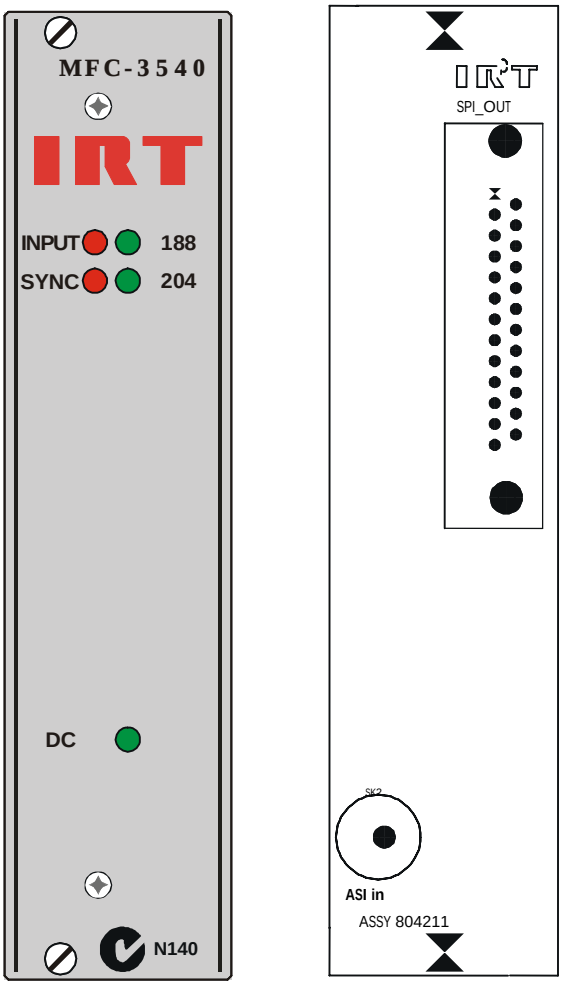
Output impedance	100 Ω maximum
Common mode voltage	1.125 V to 1.375 V
Signal amplitude	247 mV to 454 mV
Rise and fall times	< T/7, measured between the 20% and 80% amplitude points, with a 100 Ω resistive load. The difference between rise and fall times shall not exceed T/20.

Line Receiver Characteristics (Destination)

Input impedance	90 Ω to 132 Ω
Maximum input signal	2.0 Vp-p
Minimum input signal	100 mVp-p

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.



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

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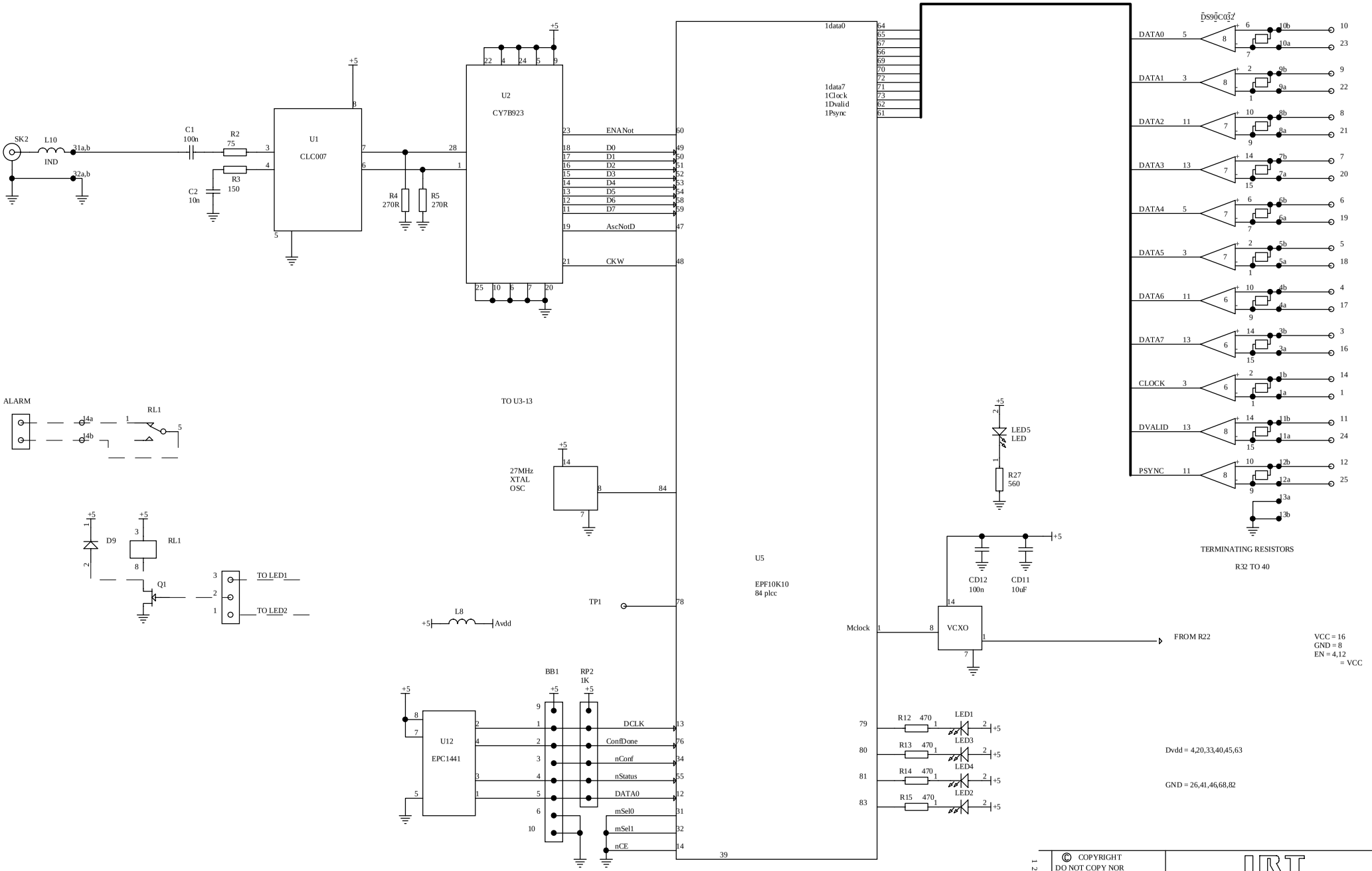

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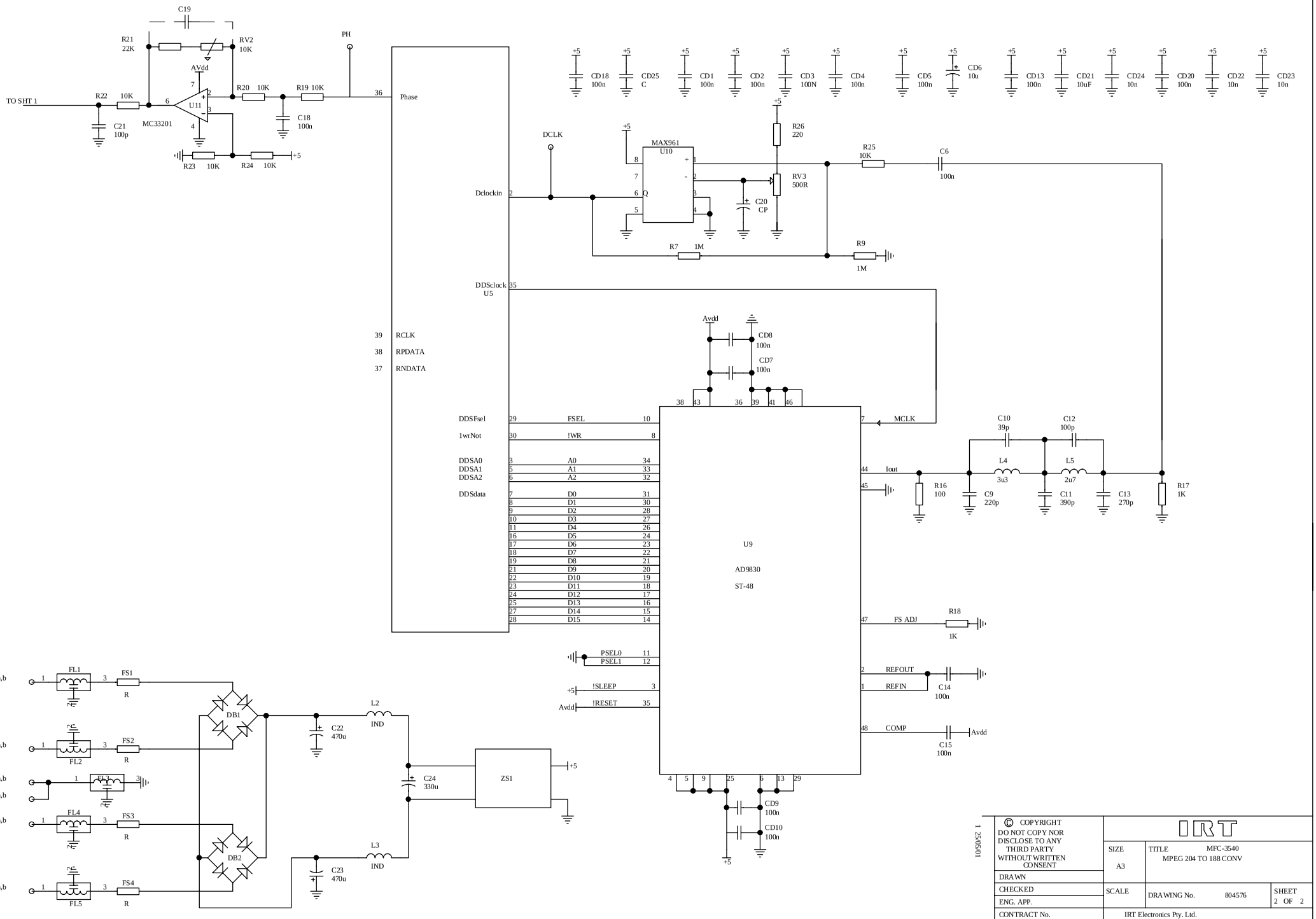

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