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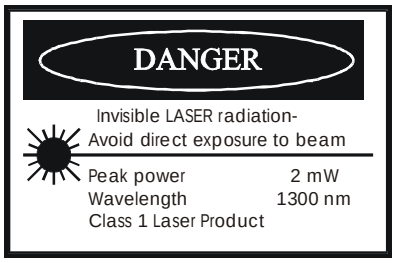
IRT Eurocard Types

DVT-3610
Fibre Optic Laser Transmitter for SMPTE 292M Signals
&
DVR-3610
Fibre Optic Receiver for SMPTE 292M Signals



Designed and manufactured in Australia

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

DVT-3610 & DVR-3610

Serial Digital Fibre Optic Link for SMPTE 292M Signals

Instruction Manual

Table of Contents

This instruction manual applies to DVT-3610 assembly 804557 and DVR-3610 assembly 804563 units later than S/N 0110001.

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.

Description

The IRT DVT-3610 and DVR-3610 are transmit and receive modules designed principally for use as a SMPTE292M 1.485 Gb/s serial digital video Fibre Optic transmission link, using 9/125 single mode fibre for path lengths with path attenuation of 20 dB or less. This enables the use of space saving fibre optic cable for reliable transmission of digital video signals over lengths greater than can be provided with coaxial cable. The transmit / receive system specifications apply to all signal conditions, including the SMPTE 292M pathological test sequence.

The DVT-3610 transmitter features an input circuit with automatic cable equalisation for Belden 8281 coaxial cable followed by a 1300nm LASER transmitter.

The DVR-3610 receiver uses a PIN photodiode detector preamplifier module, signal conditioning and a reclocking circuit for the 1.485 Gb/s data rate, with bypass of the PLL reclocking circuit for other data rates which allows the link to be used for the 270 Mb/s SDI and ASI signals. Two serial digital outputs are provided from the transmission link, one in phase output on the rear and one inverted signal monitoring output on the front panel of the receiver.

On the DVT-3610 transmitter LED indicators on the front panel indicate the presence of signal, end of cable equaliser range, loss of laser power and presence of +5V DC power. A relay contact output for remote indication will indicate failure of the laser operation.

On the DVR-3610 receiver LED indicators on the front panel indicate PLL lock at 1.485Gb/s, PLL bypass for 270 Mb/s operation, signal presence and presence of +5V DC power. A relay contact output for remote indication will indicate loss of signal.

Applications

The DVT-3610/DVR-3610 Serial Digital Fibre Optic transmission system is intended to be used where reliable signal transmission of 1.485 Gb/s data is required over distances greater than 100 metres, or where the space saving and immunity to electromagnetic interference of optical fibre cable is required. The system is intended for use with 9/125 single mode fibre which typically has an attenuation of less than 0.4 dB/km giving a typical maximum link length of 45km when allowing for safety margin. The DVT-3610/DVR-3610 is designed to work reliably over the full 0 to 20dB optical path range and will pass the pathological test sequence at both 1.485Gb/s and 270Mb/s data rates.

Technical Specifications

DVT-3610 Serial digital to Optical transmitter

Serial digital input:

Input impedance	75Ω.
Input return loss	>15dB 5 MHz to 1.5 GHz.
Input serial data signal	SMPTE/EBU 1.485Gb/s or 270 Mb/s.
Input circuit cable compensation	Automatic, up to 100 metres of Belden 8281 or equivalent cable at 1.485 Gb/s and 270 Mb/s.

Optical output:

Optical output power	0dBm +0, –1dB.
Optical rise/fall time	<250ps.
Optical wavelength	1310nm ± 30nm.
Spectral width	3nm typically.

Connectors:

Serial digital input	BNC on. bracket attached to module.
Optical output	SC/PC on bracket attached to module.
Alarm/Control connections	4 pin plug and socket with screw terminals for wire terminations.
Alarm outputs	One relay energised in the normal condition to indicate loss of DC power, signal or laser power. Relay circuit is wired with contacts normally closed (or open) as set by a link on the circuit board.
Control input	Grounding contact for laser disable.

Indicators:

Serial digital signal present	LED (green) for signal present.
Cable Equaliser at maximum range	LED (yellow) for input cable >100m Belden 8281 or equivalent.
Laser power	LED (red) for laser failure or disabled.
DC power	LED (green) for +5V.

Power requirement:

Voltage	28 Vac CT (14-0-14 Vac) or ±16 Vdc.
Consumption	1.7 VA (60 mA).

General:

Operating temperature		0 to 50° C ambient.
Mechanical		Suitable for mounting in IRT 19" rack chassis with input, output and power connections to the rear.
Size		6 HP x 3U Extended Eurocard (220 mm x 100 mm).
Weight		With rear assembly 400g.
Finish:	Front panel	Grey, black lettering & red IRT logo.
	Rear assembly	Detachable PCB with connectors to Eurocard and external signals.
Standard accessories:		Rear connector panel (supplied with module).

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

DVR-3610 Optical to Serial digital receiver

Optical input:

Optical input power	-21dBm min. , 0dBm max.
Optical wavelength	1310nm.

Serial digital outputs:

Number of outputs	2 data reclocked at 1.485 Gb/s and non-reclocked at other rates e.g. 270 Mb/s. AC coupled.
Output level	800 mV ±5% into 75 Ω.
Output impedance	75 Ω.
Output return loss	>15dB 5 MHz to 1.5 GHz.
Output rise/fall time	200ps nominal.
Residual jitter	<0.15UI at 1.485Gb/s reclocked. <0.1UI at 270Mb/s non-reclocked.

Connectors:

Serial digital outputs	1, BNC on. bracket attached to module. 1, BNC on front panel.
Optical input	SC/PC on bracket attached to module.
Alarm/Control connections	4 pin plug and socket with screw terminals for wire terminations.
Alarm outputs	One relay energised in the normal condition to indicate loss of DC power or signal. Relay circuit is wired with contacts normally closed (or open) as set by a link on the circuit board.
Control input	Grounding contact for non-reclocked operation.

Indicators:

Serial digital signal present and locked	LED (green) for signal locked at 1.485Gb/s.
PLL bypassed	LED (yellow) for non-reclocked operation.
Signal present	LED (green) for signal present, (red) for loss.
Power	LED (green) for +5V.

Power requirement:

Voltage	28 Vac CT (14-0-14 Vac) or ±16 Vdc.
Consumption	2.8 VA (100 mA).

General:

Operating temperature	0 to 50° C ambient.
Mechanical	Suitable for mounting in IRT 19" rack chassis with input, output and power connections to the rear.
Size	6 HP x 3U Extended Eurocard (220x100 mm).
Weight	With rear assembly 410g.
Finish: Front panel	Grey, black lettering & red IRT logo.
Rear assembly	Detachable PCB with connectors to Eurocard and external signals.
Standard accessories:	Rear connector panel (supplied with module).

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

Circuit Description

DVT-3610:

The DVT-3610 circuit consists of U1 a GS1504 input circuit that provides automatic cable equalisation for up to 100 metres of Belden 8281 cable and detection of input signal. Comparator U6 monitors the carrier detect output to provide a indication of the presence of input signal, and comparator U7 monitoring of the cable length indicator output enables indication of the point at which the cable equaliser circuit reaches maximum compensation. An optional circuit adjustment using RV1, of the point at which the maximum cable length equalisation is reached can be included by closing LK1. Maximum equalisation of 100 metres of Belden 8281 or equivalent cable is provided if LK1 is left open. The signal is then processed by U2 a MAX3261 laser diode driver circuit which with feedback from the photo-diode in the laser diode package provides automatic power control of the laser output power. Monitoring of the current in the photo-diode circuit gives an indication of the laser output power, this signal is amplified by U4 and a threshold detected by comparator U5 to indicate loss of laser power if this signal falls below the threshold. Comparator U3 is used to provide the entry point of a control signal to ground which can be used to disable U2 and thus turn the laser off, this control lead is brought out on the control connector SK2 on the rear panel. A alarm relay circuit provides a contact set also brought out on SK2 which will indicate the failure or switching off of the laser. Added alarm functions can be added to this circuit by optional links on the board, LK5 when closed will add loss of input signal to the alarm circuit and LK6 will add cable length equalisation at maximum to the alarm circuit. The signal and fibre connectors are mounted on a bracket attached to the module. The dual AC inputs are rectified by diode bridges DB1 and DB2 , and then regulated in a switch mode regulator module to provide the +5V operating voltage for the unit.

The front panel indicators are as follows:

LD1 (green) DC power indicator, will light when +5V DC power is present.

LD2 (red) Alarm indicator, will light if the laser output fails or is switched off.
Will light on the end if life indication from the laser driver circuit if LK3 is closed.
Will light on the loss of input signal if LK5 is closed.
Will light if the input cable equaliser circuit indicates that the maximum cable length is reached if LK6 is closed.

LD3 (yellow) Cable equaliser indicator, will light when the input cable equaliser circuit reaches maximum compensation. This is a voltage from the input circuit which is monitored by U7 comparator circuit against a reference set by RV2.

LD4 (green) Signal present indicator, will light when the input circuit indicates the presence of signal. This indication is not dependant on the input signal data rate.

Circuit Description

DVR-3610:

The optical input signal is detected in U1 a FRM3Z231 PIN photodiode and integral preamplifier module, the resulting electrical signal is amplified by U2 a MAX3264 limiting amplifier. U2 includes a loss of signal indicator circuit and a mute circuit on loss of signal, the loss of signal threshold is adjusted using RV1. Comparator U7 is used to drive the indicator and alarm circuit for the presence or loss of signal. The output from U2 is applied to U3 which together with U4 forms a PLL reclocking system working at 1.485Gb/s. U3 provides a PLL lock indication which is used to drive indicator LD4. U6 is used to provide an isolated entry point for a control signal from SK3 on the rear panel to enable the PLL bypass circuit of U3 when the system is used for data rates other than 1.485Gb/s. U5 is driven by the output of U3 and provides two isolated outputs from the module. The output on the rear panel is the in phase signal output and the monitor output on the front panel is the inverted output from the cable driver circuit. A alarm relay circuit provides a contact set also brought out on SK3 which will indicate the failure of signal at limiting amplifier U2. The dual AC inputs are rectified by diode bridges DB1 and DB2 , and then regulated in a switch mode regulator module to provide the +5V operating voltage for the unit. A second dc-dc converter is used together with linear regulators U8 and U9 to provide the +9V bias and –5.2V operating voltages for U1 the optical detector module.

The front panel indicators are as follows:

LD1 (green) DC power indicator, will light when +5V DC power is present.

LD2 (green/red) Received SIGNAL indicator, will light green when sufficient signal is present at the input to the limiting amplifier U2 and light red when insufficient signal is present and the amplifier mutes.

LD3 (yellow) PLL BYPASS indicator, will light when the PLL locking loop for 1.485Gb/s is disabled for operation at other data rates such as 270 Mb/s.

LD4 (green) PLL LOCKED indicator, will light when the 1.485Gb/s PLL is operating at and is locked to 1.485Gb/s.

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:

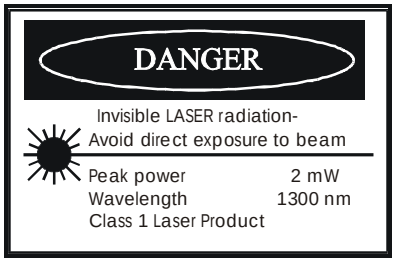
The earth path is dependent on the type of frame selected. In every case particular care should be taken to ensure that the frame is connected to earth for safety reasons. See frame manual for details.

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.

Installation



Connection to the digital and fibre interfaces are to connectors mounted on a bracket attached to the rear of the module, care must be taken when inserting the module in a rack frame. Rear connections must be released before a module is removed from the rack frame.

The DVT-3610 and DVR-3610 are set up to operate at **1.485 Gb/s** and do not require any adjustment prior to use. There are no external controls on the unit and the internal signal mute control RV1 has been set for maximum sensitivity.

For 270 MB/s operation the PLL lock circuit of the DVR-3610 will need to be disabled by closing link **LK2** on the circuit board or by connecting SK2 pin 1 to SK2 pin 4 on the rear panel. Note when using the external control, LK6 on the board must be closed to enable the external control circuit.

The DVR-3610 provides an extra signal output on the front panel for monitoring of the received signal.

The external alarm contact and control connections are made to the 4 pin connectors on the rear panel.

The connections are:

DVT-3610 SK2
- pin 1 ground
- pin 2 alarm relay common.
- pin 3 alarm relay make or break - contact as set by LK8.
- pin 4 laser disable control

(operate by grounding to pin 1).

DVR-3610 SK3
- pin 1 ground
- pin 2 alarm relay common.
- pin 3 alarm relay make or break - contact as set by LK5.
- pin 4 PLL lock bypass control

(operate by grounding to pin 1).

DVT-3610:

The DVT-3610 will operate at 1.485 Gb/s and 270 Mb/s data rate without circuit changes.

Link options are provided as follows:

LK1 When closed enables adjustment of the maximum amount of cable to be equalised by the input circuit U1. The output of U1 is muted when maximum cable length is reached. Leave this link open normally for maximum cable length compensation of 100 metres of Belden 8281 or equivalent cable.

LK2 When closed the output from U1 the input equaliser circuit is always enabled and the carrier fail circuit is disabled.

LK3 When closed will add the laser end of life indication from the laser driver circuit to the alarm relay circuit operation.

LK5 When closed add input signal loss to the alarm relay circuit operation.

LK6 When closed will add the maximum cable length indication as set by RV2 to the alarm relay circuit operation.

LK7 When closed will enable the remote shut-down of the laser driver output by the connection of SK2 pin 4 to SK2 pin 4 on the rear panel.

LK8 Selects the normally closed or normally open contact set from the alarm relay to SK2 pins 2 and 3 on the rear panel. The connections are marked on the circuit board.

DVR-3610:

The DVR-3610 normally operates at 1.485 Gb/s but requires a link change for use at 270 Mb/s. This can be done by closing LK2 on the circuit board or by using the remote connection of SK3 pin 4 to pin 1 on the rear panel.

Link options are provided as follows:

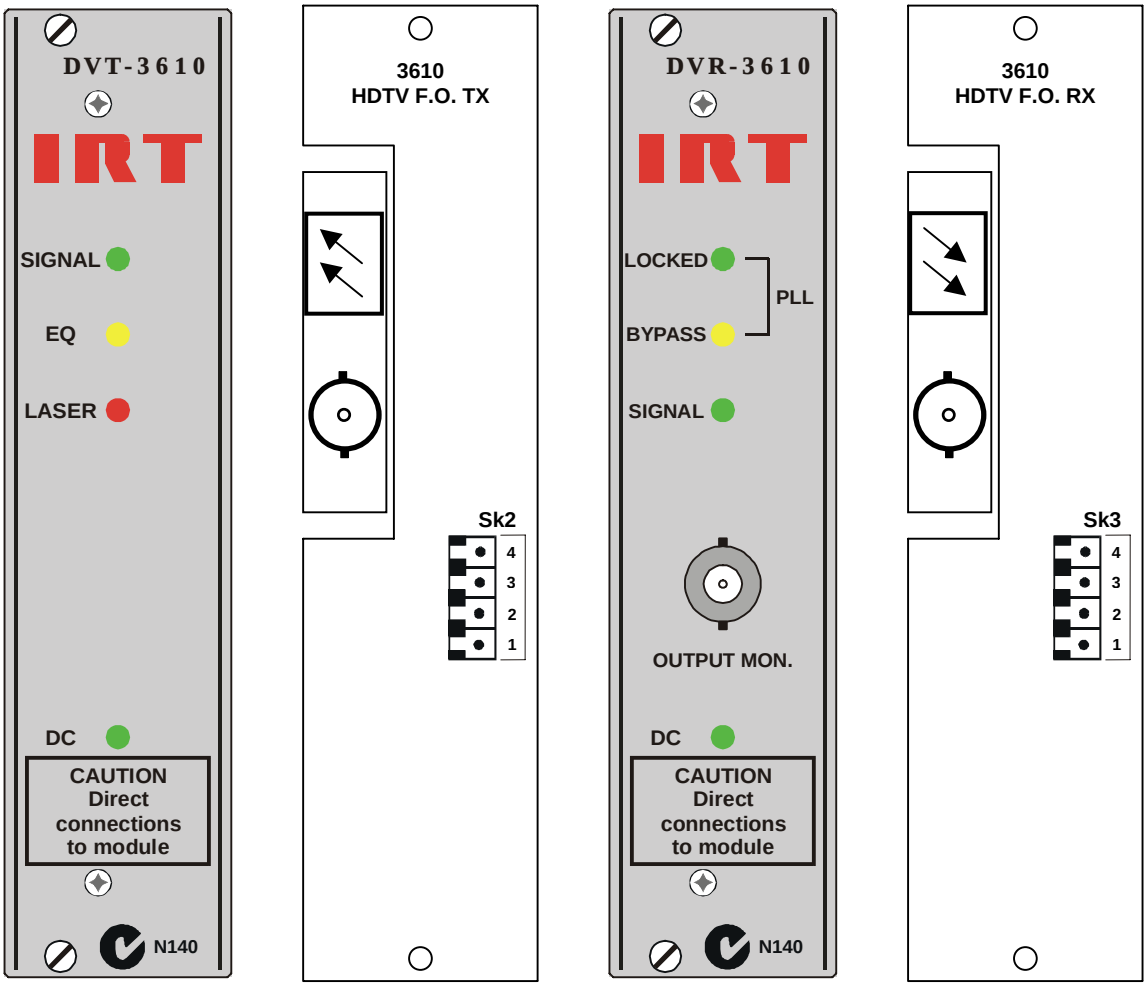
LK2 When closed bypasses the PLL lock circuit of the reclocking circuit U2 to enable the transmission of signals at data rates other than 1.485 Gb/s. This mode of operation will cause the PLL bypass indicator LD3 on the front panel to light.

LK5 Selects the normally closed or normally open contact set from the alarm relay to SK3 pins 2 and 3 on the rear panel. The connections are marked on the circuit board.

LK6 When closed will enable the remote bypass of the PLL locking circuit of U3, thus enabling this function without disturbing the installed module physically. LK2 must be open for the remote bypass function to work.

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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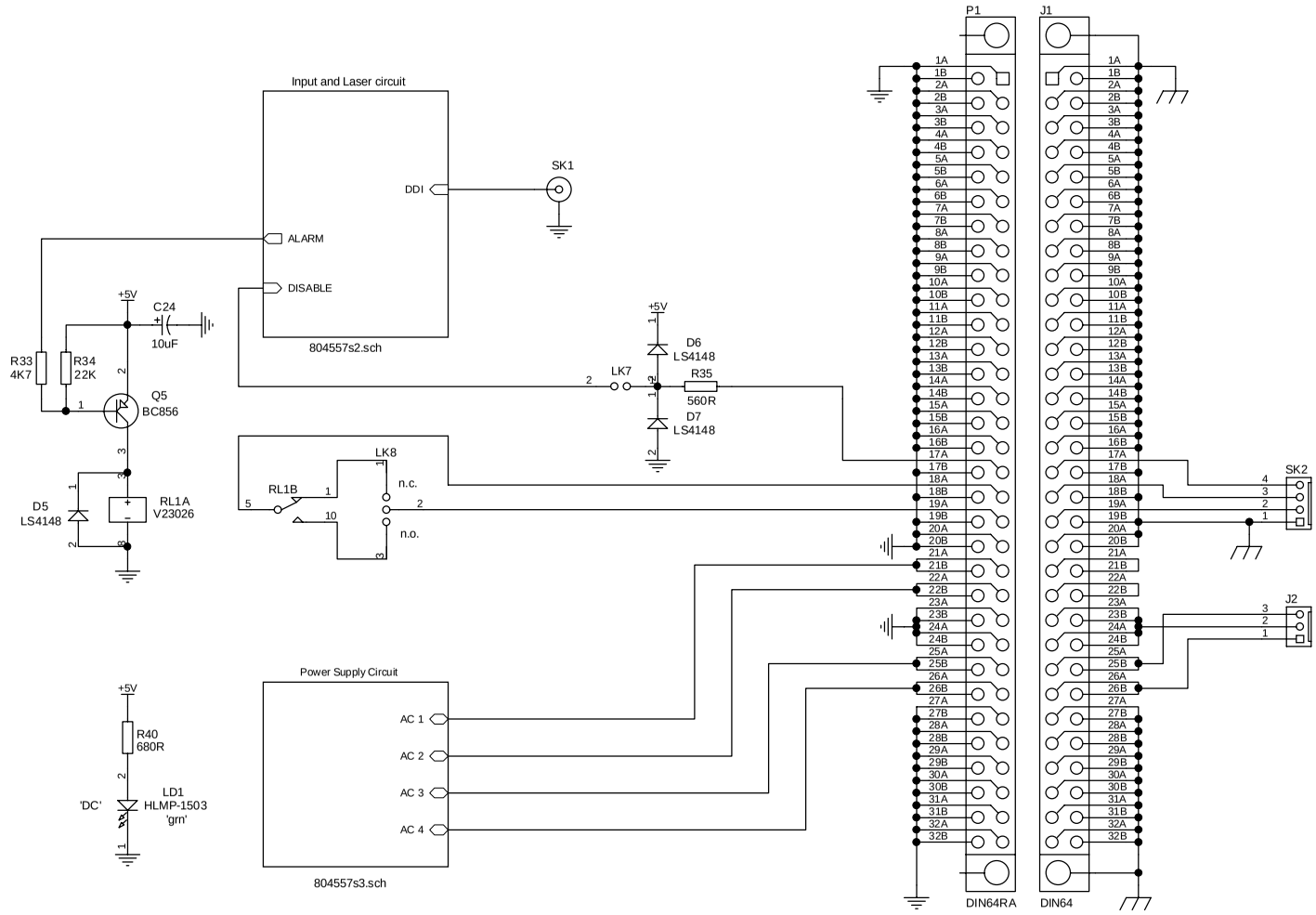

PCB 804558

J2 optional power in
(used when fitted to FRU-1030 frame)

1	01-10-01
2	10-10-01 ECR1263
3	14-11-01 ECR1282

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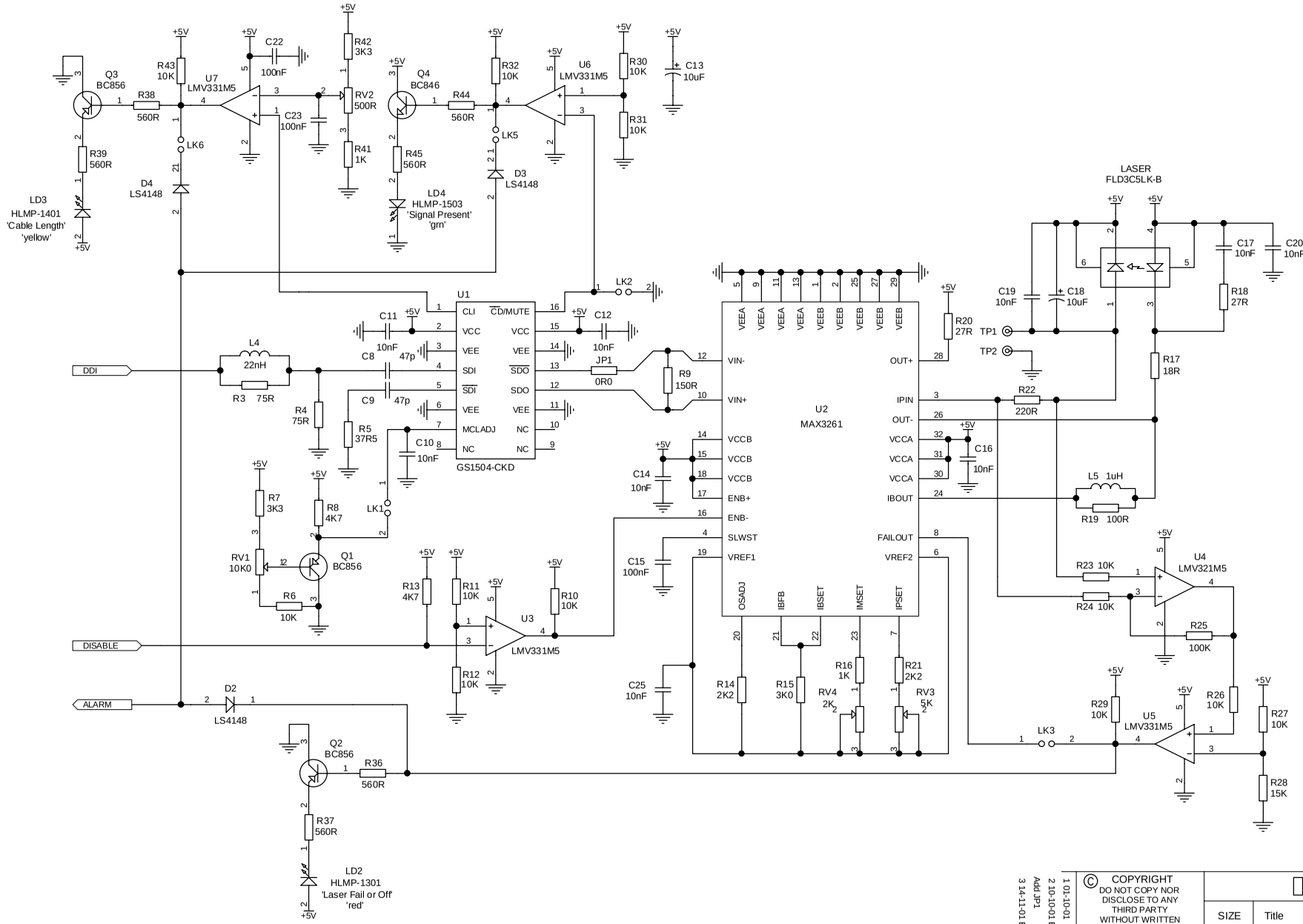

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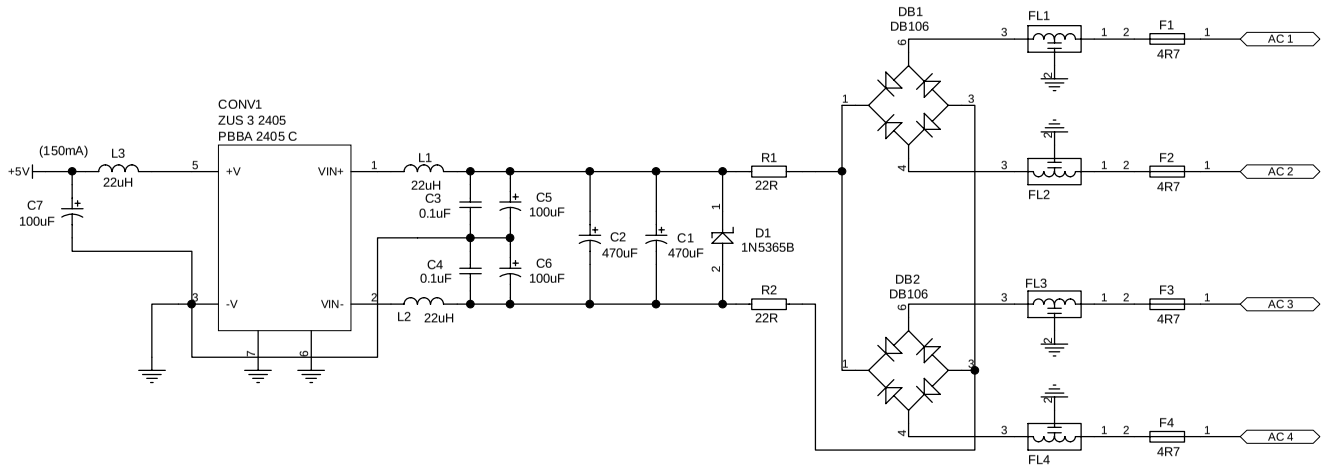

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SIZE A3

Title DVT-3610
HDTV F.O. TX
Power Supply

SCALE N.T.S.

Drawing No. 804557

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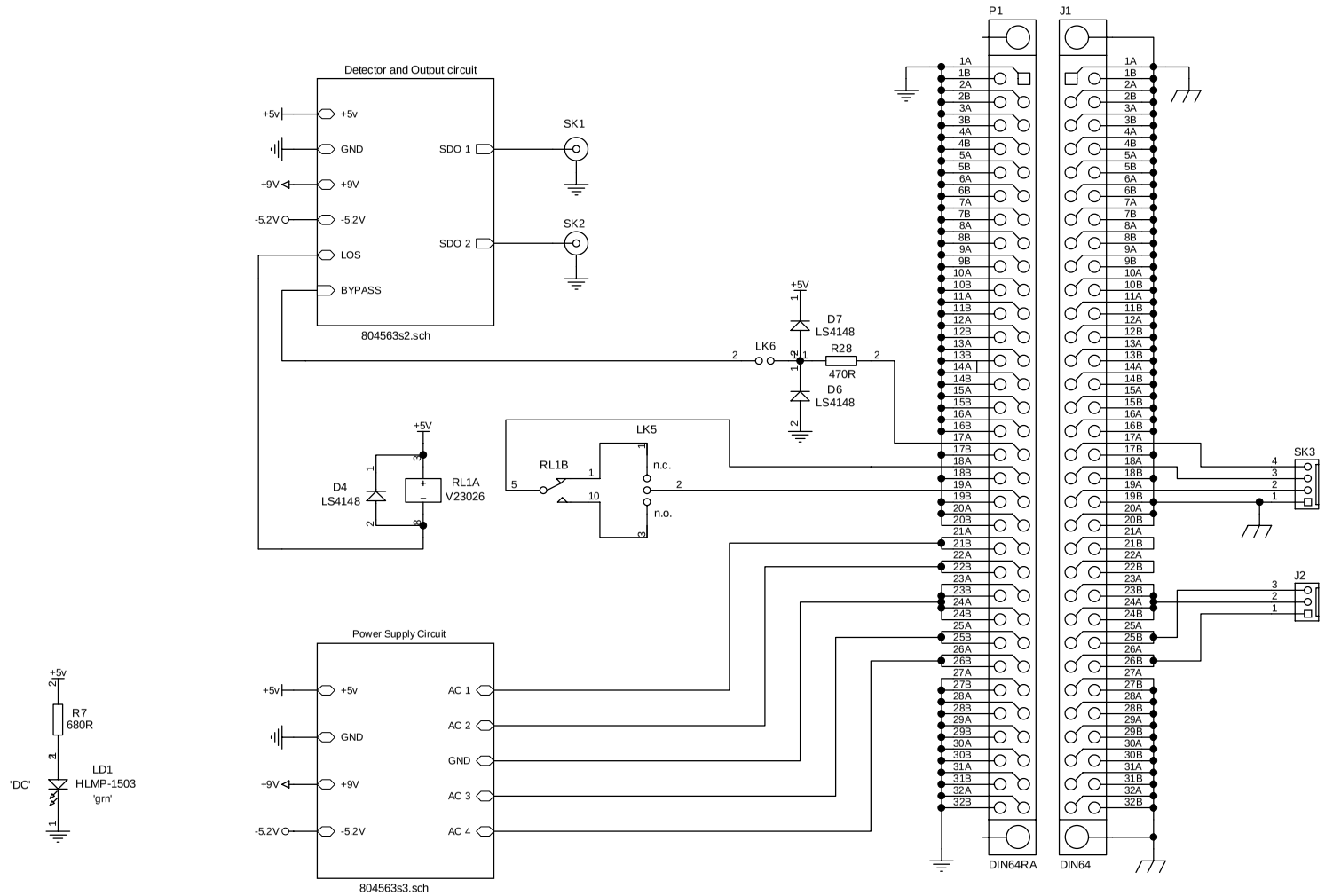

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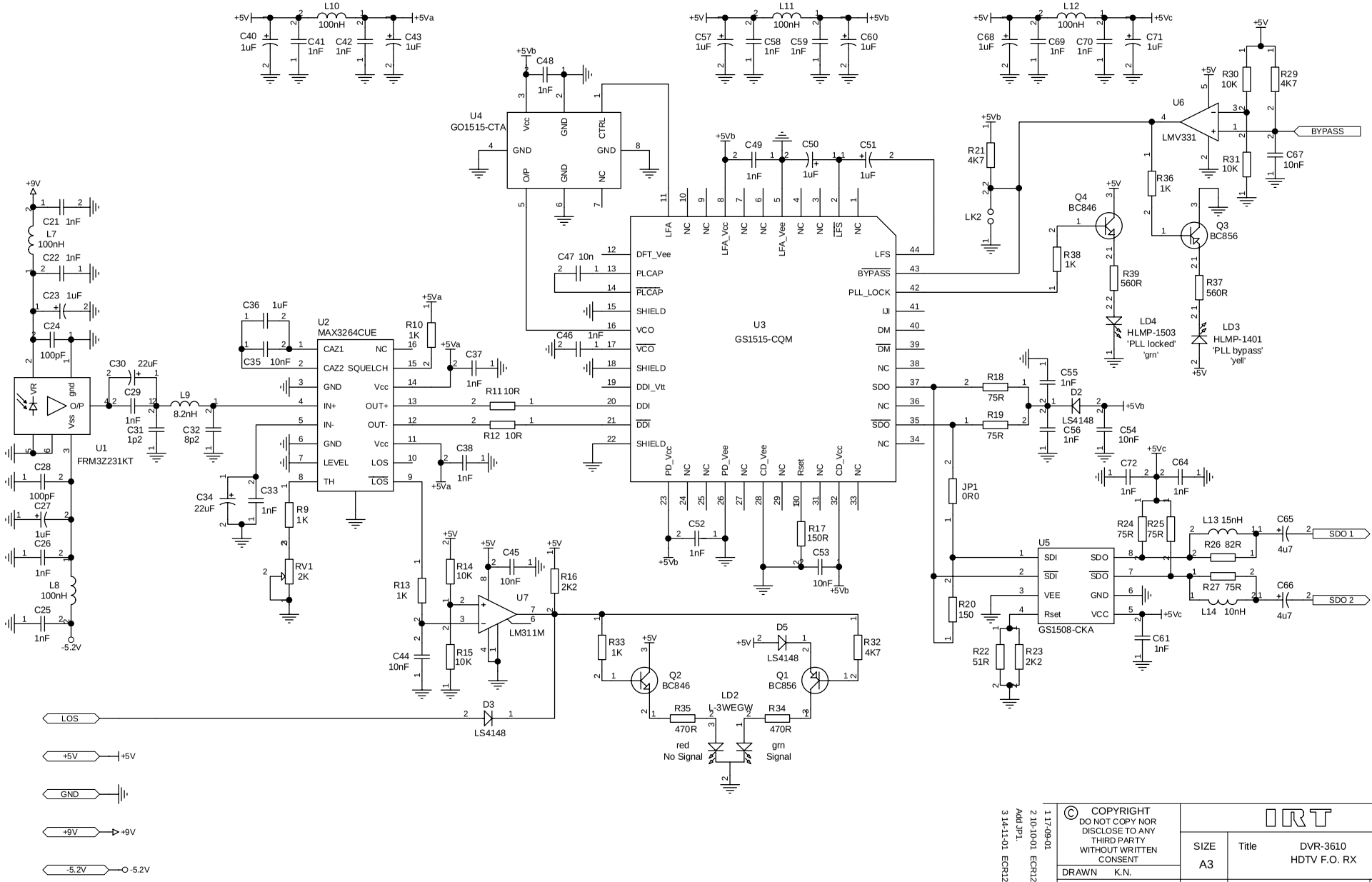

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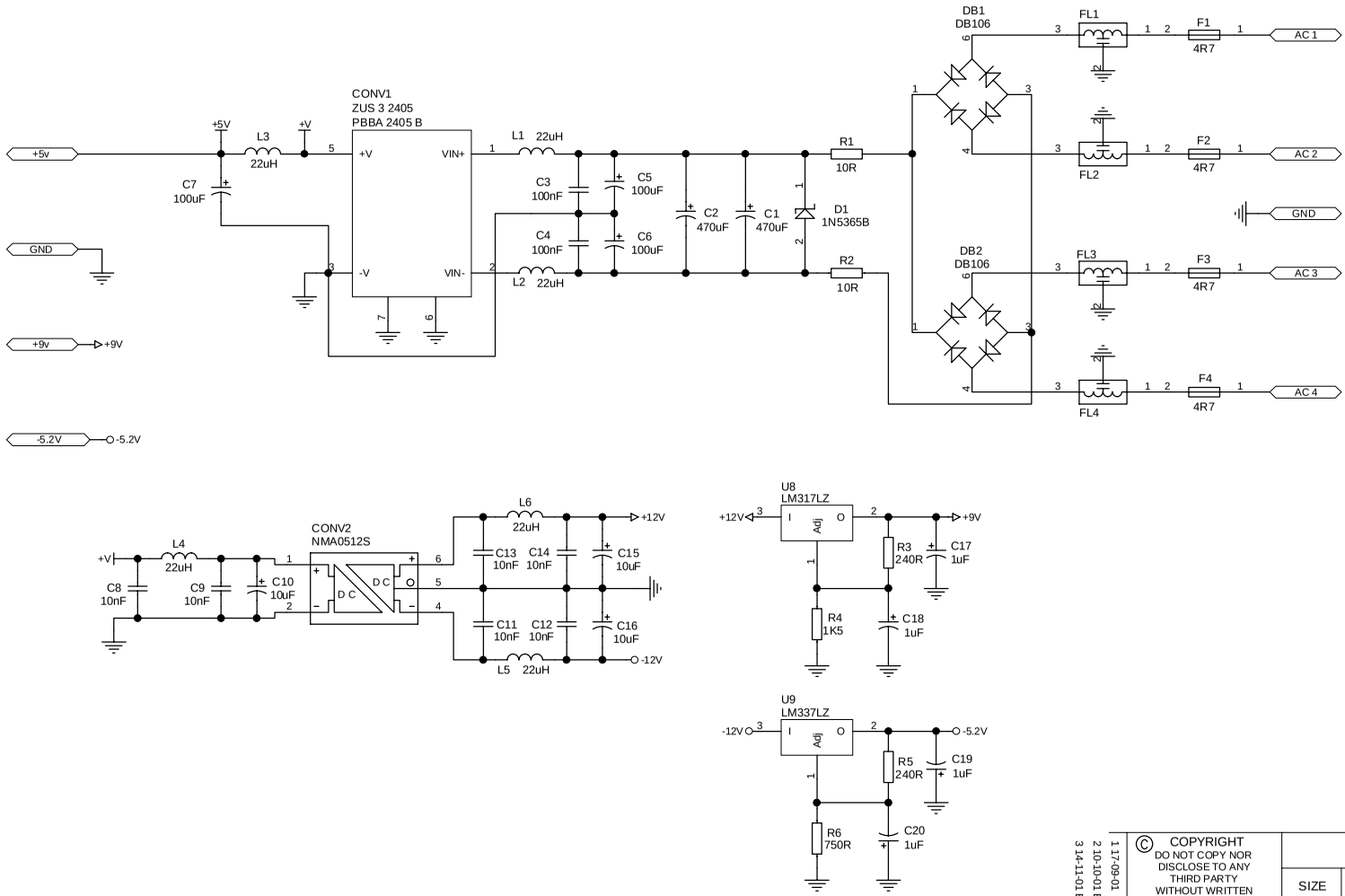

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