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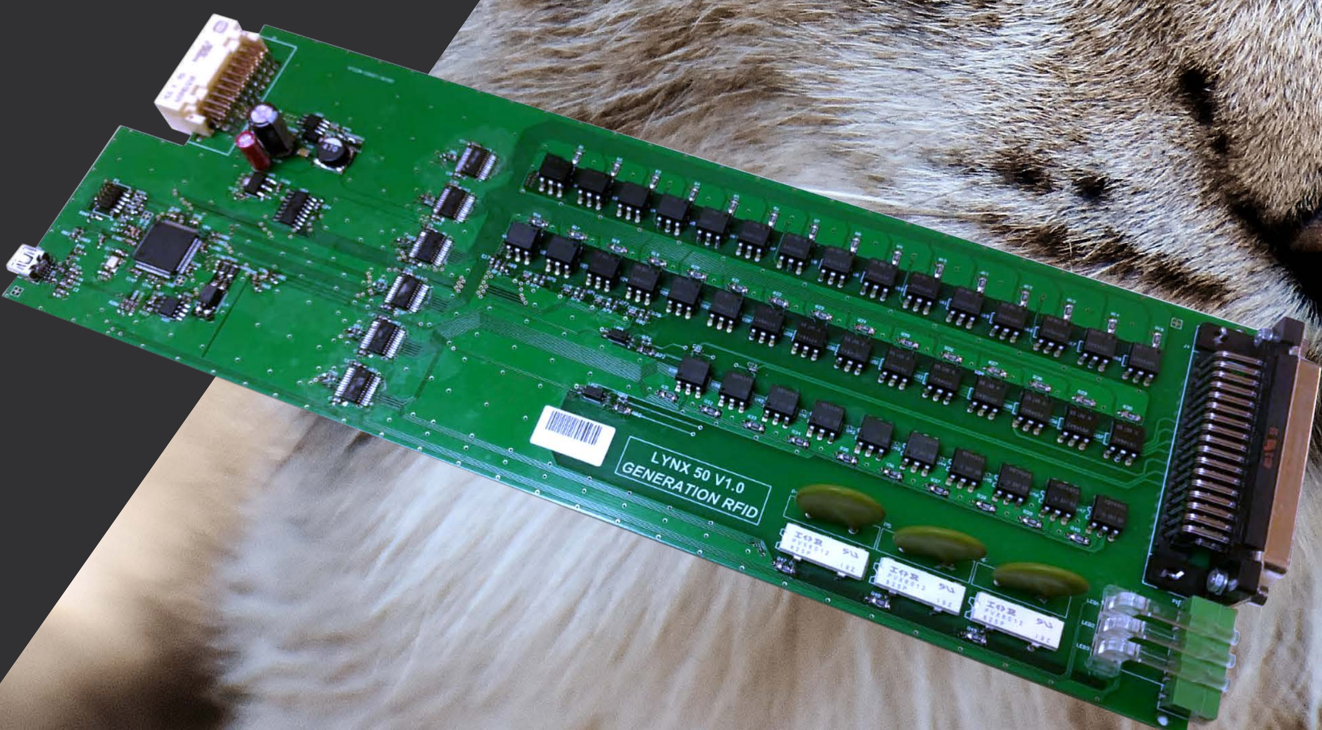
lynx50

Test board for automotive products

24 channel switch matrix for EOL
and impedance measurements.



INTRODUCTION

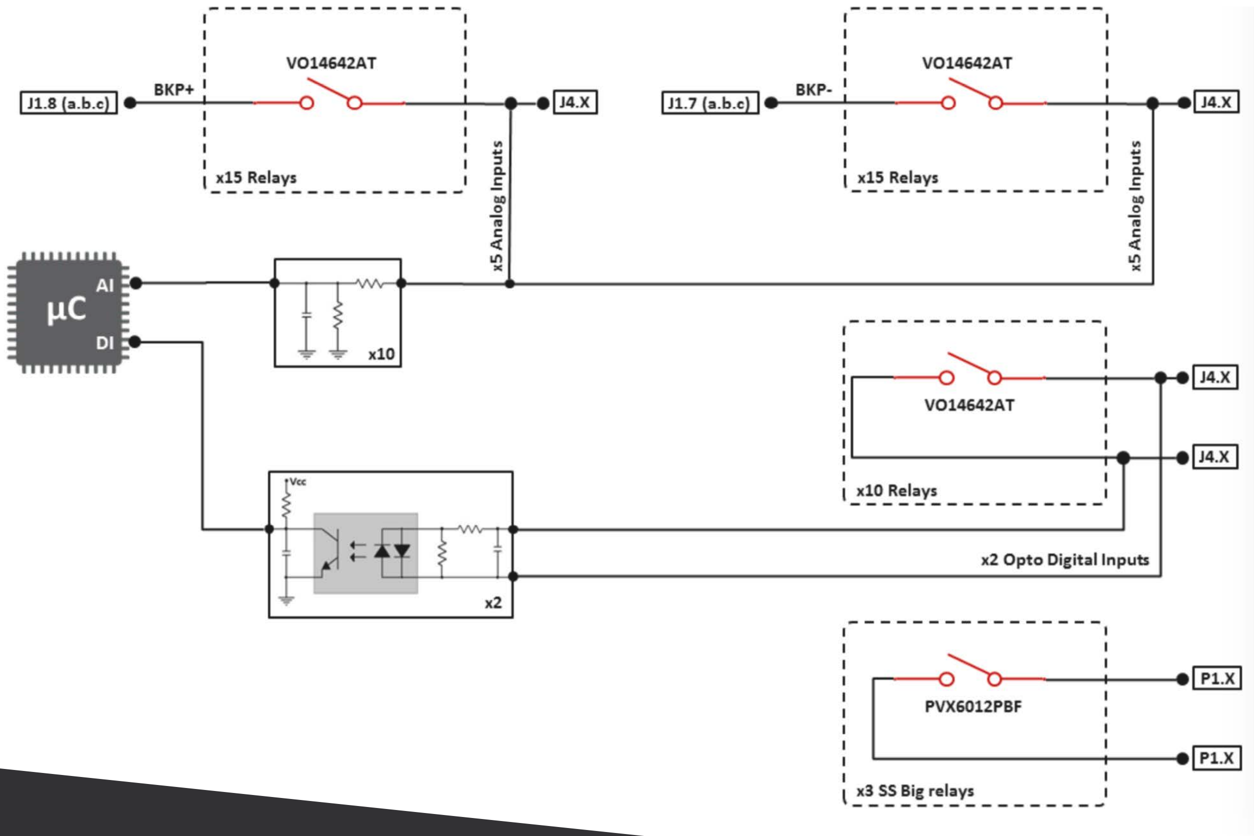
Lynx50 is a high speed CAN controlled solid state relay (SSR) multiplexer used to switch differential signals. It is suited to supply multiple boards in a sequential way, or to multiplex CAN control signals, so that test cost and complexity are reduced. Due to its internal design, each DUT pin can be addressed to any of the following contacts:

· Backplane +
· Backplane –
· Bypass from PIN to PIN at the same connector.
· Analog input.
· Digital input.

FEATURES

- TEXT Board size: 295 x 100 mm.
- Rackable board for 19" subracks.
- Expandable when combined with Lynx backplanes.
- CAN and USB controlled.
- Compatible with Lynx Test Scheduler software.
- 40 low voltage solid state relays for addressing up to 43 pins as follows:
  1. 15 Pins to Backplane+.
  2. 15 Pins to Backplane -
  3. 10 Pins for bypassing
- 3 high voltage solid state relays protected with polyswitch for addressing 3 bypassing pins.
- 2 optocoupled digital inputs.
- 10 analog inputs.
- Maximum driving capability: 2A per low voltage relay (VO14642AT - 60V).
- Maximum driving capability: 1A per high voltage relay (PVX6012PBF - 400V).
- Main markets: automotive and industrial.
- Power supply ranging from +6.8V to +30V.

BLOCK DIAGRAM



NOMENCLATURE

- DUT: Device Under Test.
- SSR: Solid State Relay.
- FID: Function Injection Device (device used to activate any DUT IO pin a certain signal with the objective to
- validate the associated function, e.g. digital input, analog input or power output).
- BKP: Backplane.
- DDM: Digital multimeter.
- DI: Digital input.
- AI: Analog input.

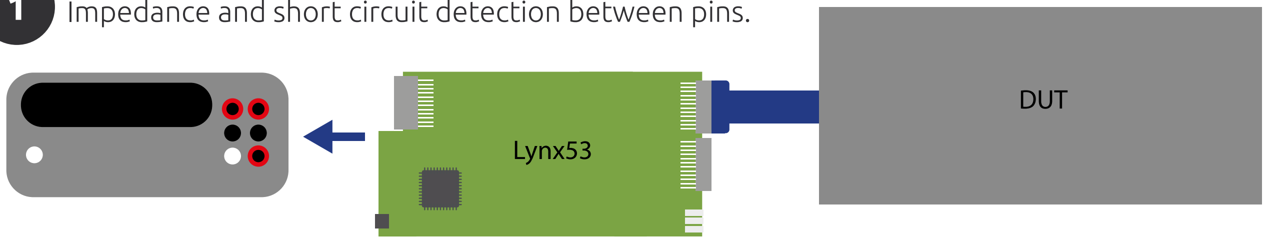
APPLICATIONS

Lynx50 is a good choice for the ICT testing of low input/output DUT circuits for any of the markets listed below:

- Automotive.
- Industrial.
- Telecommunications.
- Medical devices.
- PLC emulation.
- Automation.
- Control for visual inspection systems.

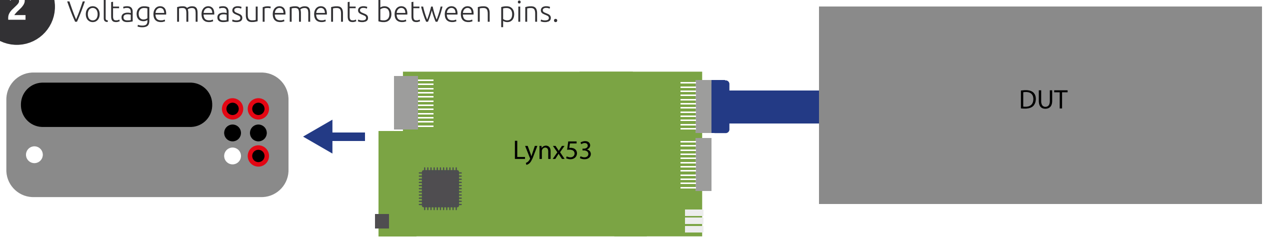
APPLICATION EXAMPLES

1 Impedance and short circuit detection between pins.



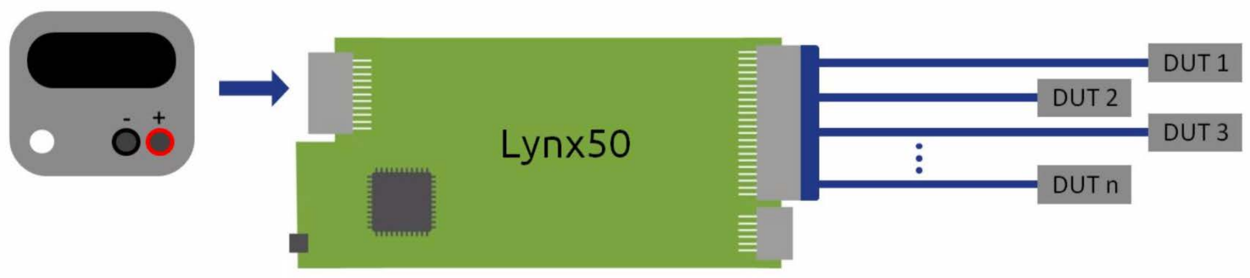
When a DMM is connected to the backplane, the impedance between DUT pins can be measured. Its flexibility allows the measurement between pins or in regards of the GND pin.

2 Voltage measurements between pins.



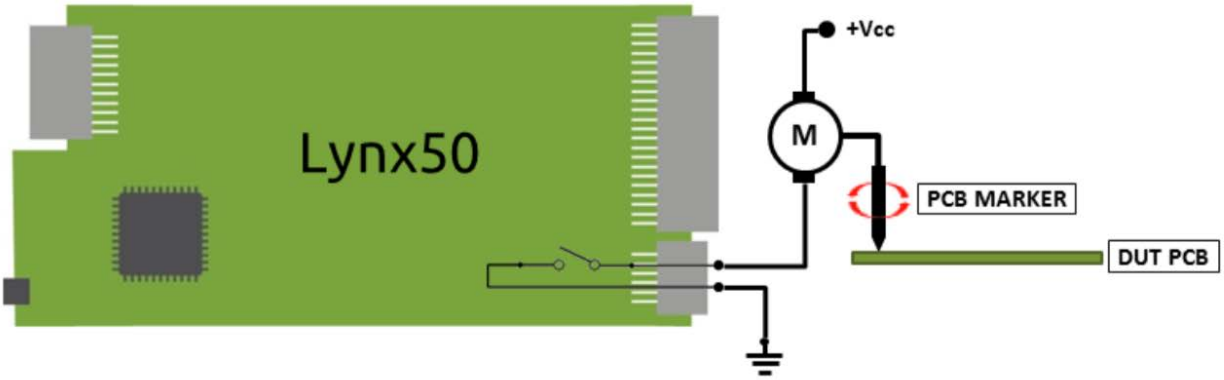
When a DMM is connected to the backplane, the voltage between DUT pins can be measured.

3 Supply multiple boards in a sequential way.



When a power supply is connected to the backplane we can supply multiple DUT's in a sequential way.

4 External devices activation.



Any external device can be activated to execute a desired action. In the example a DC motor is activated for marking the DUT PCB.

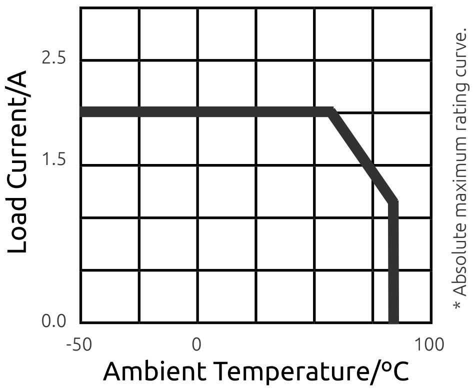
ELECTRICAL CHARACTERISTICS

ABSOLUTE MAXIMUM RATINGS (Tamb = 25 °C, unless otherwise specified)				
PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
INPUT				
Power supply			12	V
Current consumption			0,65	A
Absolute maximum rating curve lowe voltage relay (*)				
DC or peak AC load voltage (*)		V_L	60	V
Load current (DC Only) (*)		I_L	2	A
Peak load current (AC/DC) (*)	t = 10 ms	I_{LPK}	3.6	A
Output Ron max per channel (*)		R_{ON}	0.3	Ω
Per each output, the following derating applies (*)	25ºC	Pdiss	250	mW
Absolute maximum rating curve high voltage relay (**)				
Transient overvoltage protection (**)			600	V (DC or AC peak)
Operating Voltage (**)			0-300	V (DC)
Maximum Load Current (**)			1.0	A (DC)
Analog Inputs measure range			0 to 30	V
Digital inputs low range			0 to 1	V
Digital inputs high range			2 to 30	V
Ambient temperature range			-25 to +85	ºC

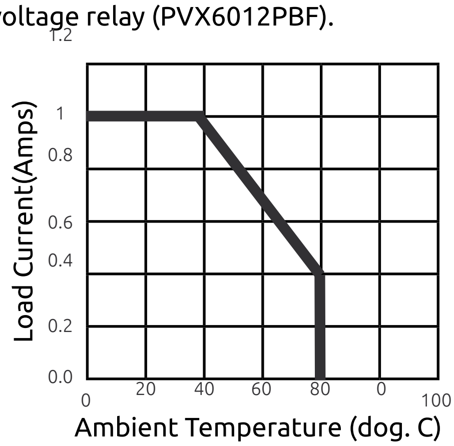
(**) Electrical characteristics for high voltaje relay (PVX6012PB

(*) Electrical characteristics for low voltaje relay (VO14642AT)

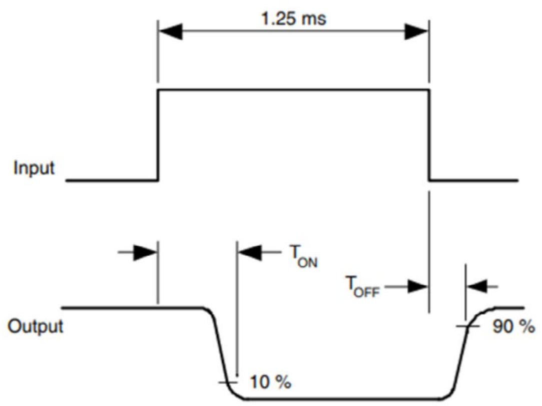
(*) Absolute maximum rating curve low voltage relay (VO14642AT).



(**) Absolute maximum rating curve high voltage relay (PVX6012PBF).



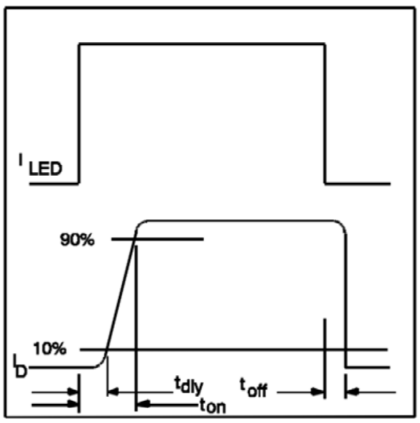
SWITCHING CHARACTERISTICS						
PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
Maximum Turn-on time	IF=10mA, VL=16V, IL=100mA	t_{on}	-	370	800	µs
Maximum Turn-off time	IF=10mA, VL=16V, IL=100mA	t_{off}	-	50	800	µs



(*) Absolute maximum rating curve.

SWITCHING CHARACTERISTICS						
PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
Maximum Turn-on time	@TA =+25°C 7 ms For 1A, 300 VDC load, 5mA Control	t_{on}	-	7	-	ms
Maximum Turn-off time	@TA =+25°C) 1 ms For 1A, 300 VDC load, 5mA Control	t_{off}	-	1	-	ms

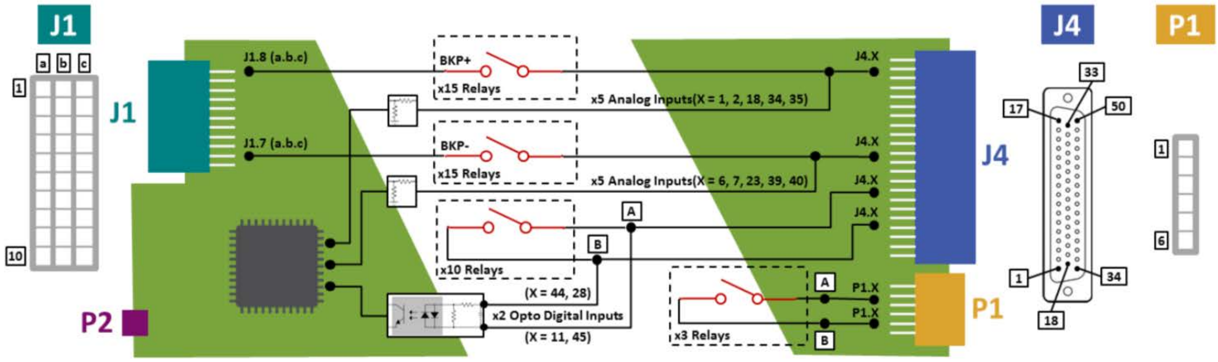
(*) Absolute maximum rating curve.



PINOUT

PINOUT: Lynx53 has 4 connectors.

- J1: Connection with the standard interfaces of the Lynx Tester backplane modules.
- J2: Use this connector for injection of primary signals used for the EOL test.
- J3. USB standard connector.
- J4: Use this connector to connect with the DUT.



J4

J4.17	GPIO_FIDA_17	J4.33	GPIO_FIDA_33	J4.50	GPIO_FIDB_50
J4.16	GPIO_FIDB_16	J4.32	GPIO_FIDB_32	J4.49	GPIO_FIDA_49
J4.15	GPIO_FIDA_15	J4.31	GPIO_FIDA_31	J4.48	GPIO_FIDB_48
J4.14	GPIO_FIDB_14	J4.30	GPIO_FIDB_30	J4.47	GPIO_FIDA_47
J4.13	GPIO_FIDA_13	J4.29	GPIO_FIDA_29	J4.46	GPIO_FIDB_46
J4.12	GPIO_FIDB_12	J4.28	GPIO_FIDB_28 /DI	J4.45	GPIO_FIDA_45/DI
J4.11	GPIO_FIDA_11/DI	J4.27	GPIO_DUT_27	J4.44	GPIO_FIDB_44 /DI
J4.10	GPIO_DUT_10	J4.26	GPIO_DUT_26	J4.43	GPIO_DUT_43
J4.9	GPIO_DUT_9	J4.25	GPIO_DUT_25	J4.42	GPIO_DUT_42
J4.8	GPIO_DUT_8	J4.24	GPIO_DUT_24	J4.41	GPIO_DUT_41
J4.7	GPIO_DUT_7 /AI	J4.23	GPIO_DUT_23 /AI	J4.40	GPIO_DUT_40 /AI
J4.6	GPIO_DUT_6 /AI	J4.22	GPIO_DUT_22	J4.39	GPIO_DUT_39 /AI
J4.5	GPIO_DUT_5	J4.21	GPIO_DUT_21	J4.38	GPIO_DUT_38
J4.4	GPIO_DUT_4	J4.20	GPIO_DUT_20	J4.37	GPIO_DUT_37
J4.3	GPIO_DUT_3	J4.19	GPIO_DUT_19	J4.36	GPIO_DUT_36
J4.2	GPIO_DUT_2 /AI	J4.18	GPIO_DUT_18 /AI	J4.35	GPIO_DUT_35 /AI
J4.1	GPIO_DUT_1 /AI			J4.34	GPIO_DUT_34 /AI

A	11	45	29	13	47	31	15	49	33	17
B	44	28	12	46	30	14	48	32	16	50

J1

J1.1a	CAN CTRL H	J1.1b	CAN CTRL L	J1.1c	-
J1.2a	-	J1.2b	-	J1.2c	-
J1.3a	GND	J1.3b	GND	J1.3c	GND
J1.4a	Vsupply Ctrl	J1.4b	Vsupply Ctrl	J1.4c	Vsupply Ctrl
J1.5a	-	J1.5b	-	J1.5c	-
J1.6a	-	J1.6b	-	J1.6c	-
J1.7a	BKP-	J1.7b	BKP-	J1.7c	BKP-
J1.8a	BKP+	J1.8b	BKP+	J1.8c	BKP+
J1.9a	-	J1.9b	-	J1.9c	-
J1.10a	-	J1.10b	-	J1.10c	-

P1

P1.1	GPIO_FIDA_1
P1.2	GPIO_FIDB_2
P1.3	GPIO_FIDA_3
P1.4	GPIO_FIDB_4
P1.5	GPIO_FIDB_5
P1.6	GPIO_FIDA_6

A	6	3	1
B	5	4	2

RELAY SWITCH MATRIX

The following table indicates the way the relays are internally connected. Some examples are described below to understand the table:

- J4:1 is a channel which is connected with the DUT.
- U2 connects the J4:1 signal to the pin BKP+ (J1:8).
- U20 connects the J4:6 signal to the pin BKP- (J1:7).
- U38 bypasses the signal from the pin J4:44 to the pin J4:11.
- U48 bypasses the signal from the pin P1:1 to the pin P1:2.
- AI1 is an analog input connected to the pin J4.34.
- DI1 is a digital output connected to the pins J4.44 and J4.11.

DI	AI	BKP+	BKP-	Bypass	Pin
-	AI2	U2	-	-	J4.1 ★
-	AI5	U5	-	-	J4.2 ★
-	-	U8	-	-	J4.3
-	-	U11	-	-	J4.4
-	-	U17	-	-	J4.5
-	AI7	-	U20	-	J4.6 ★
-	A10	-	U25	-	J4.7 ★
-	-	-	U29	-	J4.8
-	-	-	U32	-	J4.9
-	-	-	U36	-	J4.10
-	-	-	-	U40	J4.12 / J4.29
-	-	-	-	U43	J4.14 / J4.31
-	-	-	-	U46	J4.16 / J4.33
-	AI3	U3	-	-	J4.18 ★
-	-	U6	-	-	J4.19
-	-	U9	-	-	J4.20
-	-	U15	-	-	J4.21
-	-	U18	-	-	J4.22
-	AI8	-	U23	-	J4.23 ★
-	-	-	U26	-	J4.24
-	-	-	U30	-	J4.25
-	-	-	U34	-	J4.26

DI	AI	BKP+	BKP-	Bypass	Pin
-	-	-	U37	-	J4.27
DI2	-	-	-	U39	J4.28 ★ / J4.45 ★
-	-	-	-	U42	J4.30 / J4.47
-	-	-	-	U45	J4.32 / J4.49
-	AI1	U1	-	-	J4.34 ★
-	AI4	U4	-	-	J4.35 ★
-	-	U7	-	-	J4.36
-	-	U10	-	-	J4.37
-	-	U16	-	-	J4.38
-	AI6	-	U19	-	J4.39 ★
-	AI9	-	U24	-	J4.40 ★
-	-	-	U28	-	J4.41
-	-	-	U31	-	J4.42
-	-	-	U35	-	J4.43
DI1	-	-	-	U38	J4.44 ★ / J4.11 ★
-	-	-	-	U41	J4.46 / J4.13
-	-	-	-	U44	J4.48 / J4.15
-	-	-	-	U47	J4.50 / J4.17
-	-	-	-	U48	P1.1 / P1.2
-	-	-	-	U49	P1.3 / P1.4
-	-	-	-	U50	P1.5 / P1.6

★ These pins can be used as analog inputs.
★ These pins can be used as digital inputs.

CONTROL COMMANDS

- ISO 14229-1 (UDS services) for diagnostic and control.
- ISO 15765-2 (ISO-TP) for transport and network.
- Baud rate: 500Kb.
- Data link layer: 11 bits for the ID.
- For Tx frames, ID is calculated by adding 1000d to the last 2 digits of the SN of the board.
- For Rx frames, ID is calculated by adding 1100d to the last 2 digits of the SN of the board.
- DLC: 8 Bytes

Byte 0	Byte 1	Byte 2	Byte 3	Byte 4... Byte n
DLC	SID	DID		DATA

DID LIST

#	DID	Description	Format
1	0x F7 01 (WRITE 0x2E)	Enable relay	0x 2E F7 01 **1D** => 0x1D means 0d29, The relay Number 29. The NumberRelay Parameter goes from 0x01 until 0x2B (0d43). Returns [110 , 247 , 1 ,] => OK
2	0x F7 00 (WRITE 0x2E)	Disable relay	0x 2E F7 00 **2A** => 0x2A means 0d42, The relay Number 42. The NumberRelay Parameter goes from 0x01 until 0x2B (0d43). Returns [110 , 247 , 0 ,] => OK
3	0x F7 0B (WRITE)	Turn on the light	To develop
4	0x F7 0C (WRITE)	Turn off the light	To develop
5	0x F7 05 0x F7 06 0x F7 07 0x F7 08 0x F7 09 0x F7 0A (READ 0x22)	Get Analog Input Voltage (Instantaneous) Get Analog Input Voltage (Average) Get Analog Micro Voltage (Instantaneous) Get Analog Micro Voltage (Average) Get Analog Tick Count (Instantaneous) Get Analog Tick Count (Average)	0x 22 F7 05 **05** Return Example: [98 , 247 , 5 , => OK + DID 0 , 0 , 15 , 32 , 5, 54 , 48 , 242 , 15 , 43 , 5 , 54 , 48 , 196 , 0 , 0 , 15 , 66 , 5 , 60 ,] Where values mean: **[MSB, LSB]** for each Input: Input 1, Input 2, Input 3, Input 4, Input 5, Input 6, Input 7, Input 8, Input 9, Input 10 (48 , 242) would mean: (**48** * 256^1) + (**242** * 256^0) = 12.530 mV

6	0x F7 04 (READ)	Get optoisolated Digital input values	[98 , 247 , 4 , 3 ,] Where the number means: 0 = In1=> ON, In2=> ON // 1 = In1=> OFF, In2=> ON 2 = In1=> ON, In2=> OFF // 3 = In1=> OFF, In2=> OFF
7	0x F7 02 (READ)	Get Relays State	Return Example: [98, 247, 2, 255 , 255 , 255 , 255 , 255 , 255 , 255 , 251 , 255 , 255 , 252 ,] where Relay states are represented following the sequence: RelayState(0-3), RS(4-7), RS(8-11), RS(12-15), RS(16-19), RS(20-23), RS(24-27), RS(28-31), RS(32-35), RS(36-39), RS(40-43*) *Relé number 43 (beginning from 0, otherwise it would be nº 44) is NOT USED. Then its state is returned as 00 but we ought not read it. And the bits correspond to: 251 = 0x 1111 1011 => 11 means OFF; 10 means ON Relay(31)=11; Relay(30)=11; Relay(29)=10; Relay(28)=11;

EXAMPLE

- ID: Tx ID: 1055 (0x41F) / Rx ID: 1155 (0x483)
- Goal is to close relay 25
    - ID: 0x41F an Message:

DLC	SID	DID	Data Bytes
0x04	0x02E	0xF7 0x01	0x19

CONTACT INFORMATION

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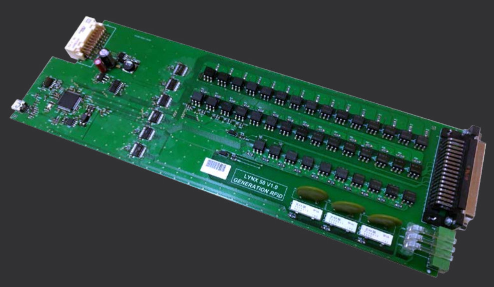

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