SWISS PRECISION

DIMETIX
LASER DISTANCE SENSORS

Evaluation Board for ELM4 / LSM4

Technical Reference Manual

V 1.1

31.03.2016

To prevent damage by electrostatic discharge (ESD), hold this *Evaluation-Board* at the edges only. You must be properly grounded before handling this sensitive product.
No warranty will be granted on improper handling and/or ESD caused problems!

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Table of content

1 Introduction

The *Evaluation Board* is an interface board for the ELM4 and LSM4 modules.

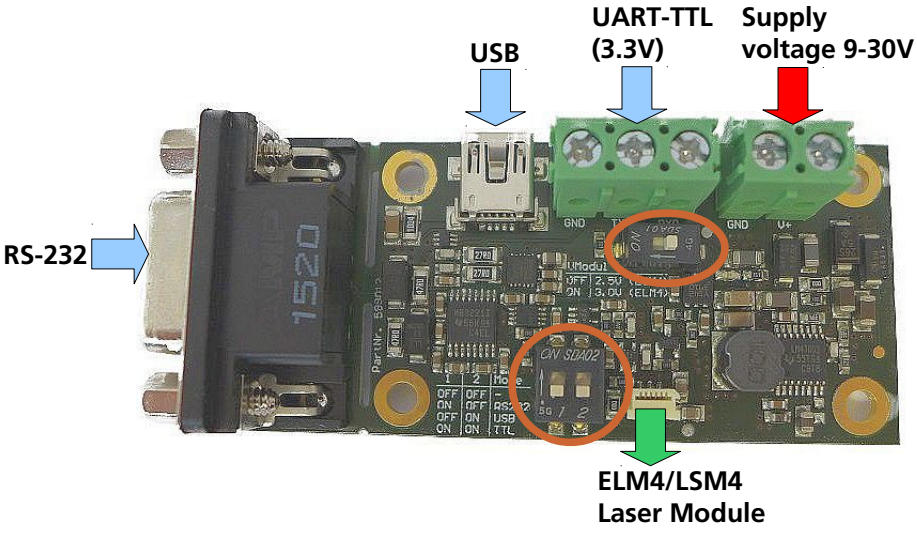
Key features

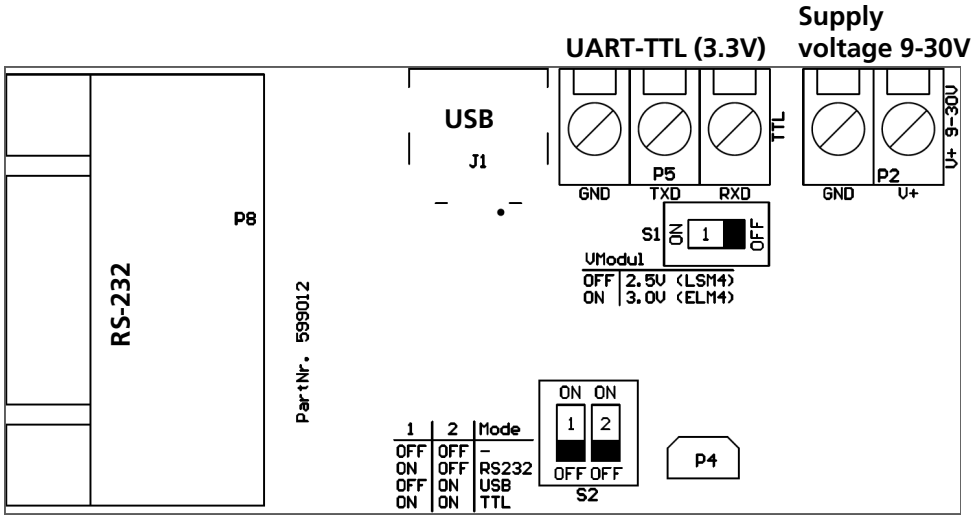
- Supply voltage 9V to 30V DC
- Mini USB interface
- RS-232 interface
- UART-TTL (3.3V) interface
- Selectable supply voltage for the LSM4 (2.5V) / ELM4 (3.0V) modules

1.1 Product identification

The product is identified by the part number 599012 which can be found on the *Evaluation Board*.

1.2 Components





2 Technical data

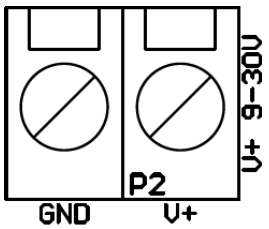
Voltage requirements	
V+ / GND	9V to 30V DC
USB	USB specification
RS-232	RS-232 specification
UART-TTL (3.3V)	Limit of voltage level: 0 to 3.3V Input low level max: 0.8V Input high level min: 2.4V
Typ. current consumption @ 24V DC (V+ / GND)	
No module connected	1.2mA
ELM4 (sensor tracking: command td)	35mA
LSM4 (sensor tracking: command td)	35mA
Typ. current consumption @ 9V DC (V+ / GND)	
No module connected	3.0mA
ELM4 (sensor tracking: command td)	85mA
LSM4 (sensor tracking: command td)	80mA
Dimensions	
L x W x H	70 x 32 x 15mm

3 Configuration

3.1 Supply voltage

Connect a supply voltage to the V+ / GND dual screw-connector P2 (see the picture below for an extract of the *Evaluation Board* and the connection of the supply voltage). The supply voltage has to be in a range of 9V to 30V DC.

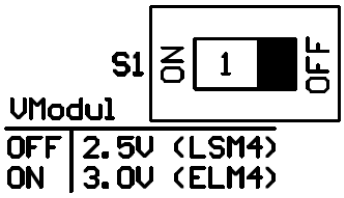
Wrong connection or voltage can damage the *Evaluation Board*.



3.2 Selection of module voltage

Chose the corresponding module voltage with the single DIP-Switch S1. For the LSM4 (2.5V) module choose the position OFF and for the ELM4 (3.0V) module choose the position ON. See the picture below for an extract of the *Evaluation Board* and the selection of the module voltage.

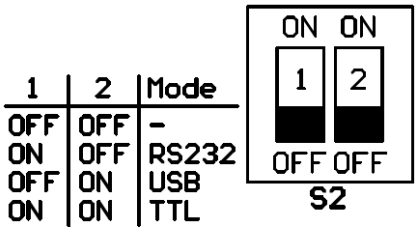
Single DIP-Switch	
1	**Module Voltage**
OFF	LSM4 (2.5V)
ON	ELM4 (3.0V)



3.3 Interface mode

It is possible to use the *Evaluation Board* with USB, RS-232 or UART-TTL (3.3V). To chose your favorite interface use the dual DIP-Switch S2. See the picture below for an extract of the *Evaluation Board* and the selection of the interfaces.

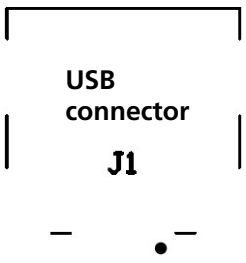
Dual DIP-Switch		
1	**2**	**Mode**
OFF	OFF	-
ON	OFF	RS-232
OFF	ON	USB
ON	ON	UART-TTL (3.3V)



3.3.1 USB

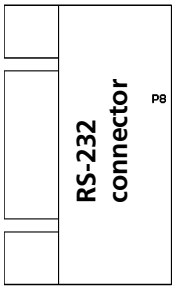
Connect the supply voltage to V+ / GND (P2) afterward connect the *Evaluation Board* with a mini USB cable on connector J1 with a computer. The computer should now install the USB driver for the FT234 (USB – RS-232 converter) automatically. If the computer does not find the correct driver please go to http://www.dimetix.com/lnk/Eval_16/ and install it manually.

After the computer installed the correct USB driver for the *Evaluation Board* a virtual COM port is available on your computer. It will be listed in the device manager in the category "Ports (COM & LPT)" (as an example see the right picture below). This COM port number will be used to build the communication in chapter 3.4.



3.3.2 RS-232

Connect the supply voltage to V+ / GND (P2) afterward connect the *Evaluation Board* with a RS-232 cable to the connector P8. See the picture below for an extract of the *Evaluation Board*.

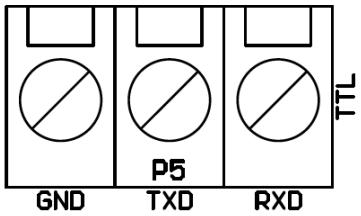


3.3.3 UART-TTL 3.3V

Connect the supply voltage to V+ / GND (P2). Now connect the *Evaluation Board* with UART-TTL signals to the connector P5 (see the picture below for an extract of the *Evaluation Board* and the connection of the UART-TTL interface). To work with the UART-TTL interface be sure that the voltage level of the UART-TTL signals are 0V to 3.3V. The high level input has a minimum of 2.4V and the low level input has a maximum of 0.8V.

Connect the cables as followed:

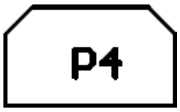
UART-TTL 3.3V		
Connector	**Direction**	**Cable**
GND	-	GND
TXD	Output	TXD (Eval. Board data output)
RXD	Input	RXD (Eval. Board data input)



3.3.4 Module connector

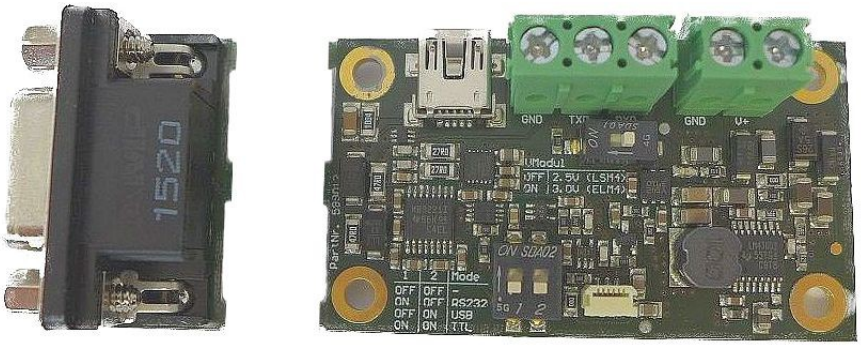
Connect the LSM4 / ELM4 module with a cable to the connector P4. Therefore use a flat flexible cable (FFC) with 0.5mm pitch and 6 conductors. See the picture below for an extract of the *Evaluation Board*.

Be sure that the blank side of the cable is correct plugged into the module connector. Otherwise it can damage the module and the *Evaluation Board*. Also ensure that the cable length is less than 10cm.



3.3.5 Remove RS-232 connector

Sometimes it is necessary to have a smaller interface board. For that reason it is possible to remove the RS-232 connector part from the board. Therefore two milled cuts show the line to brake the board in two pieces. Be careful at this process. As an example see the picture below.



3.4 Connection with a computer

1) Choose the corresponding interface mode with the dual DIP-Switch S2 (see chapter 3.3)
2) Choose the corresponding module voltage with the single DIP-Switch S1 (see chapter 3.2)
3) Connect the supply voltage (9 to 30V DC) to the connector P2 (see chapter 3.1)

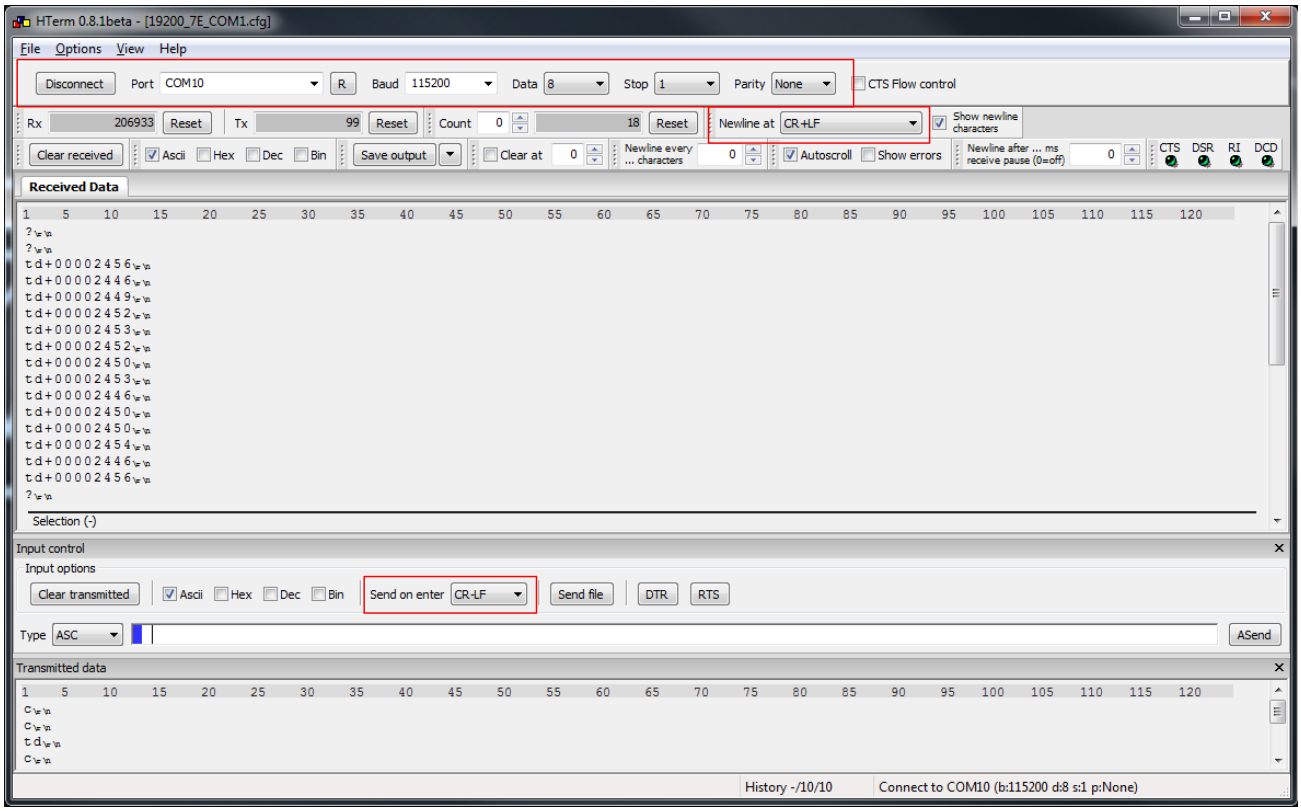
An easy way to start the communication with the modules (LSM4 / ELM4) is to use a terminal program. For example HTerm, HyperTerminal or PuTTY.

3.4.1 Serial port configuration

COM port number	Chose the right COM port number (check in the device manager the category "Ports (COM & LPT)")
Baud rate	115200
Data bits	8
Stop bits	1
Parity	None
Commend termination	CR-LF

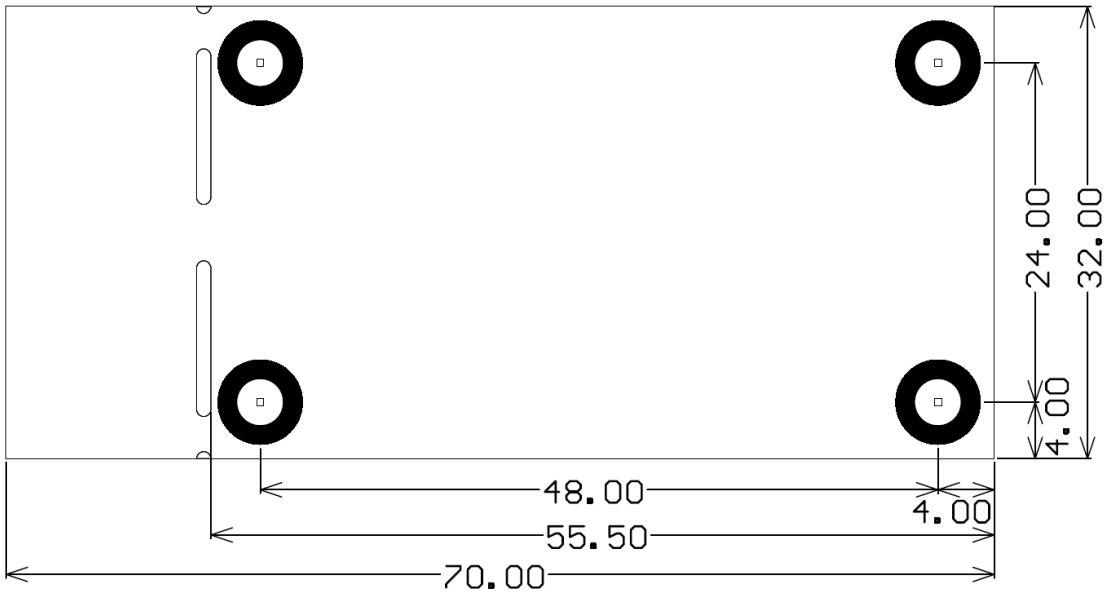
3.4.2 Example with HTerm

The picture below shows a configuration example with the terminal program HTerm.

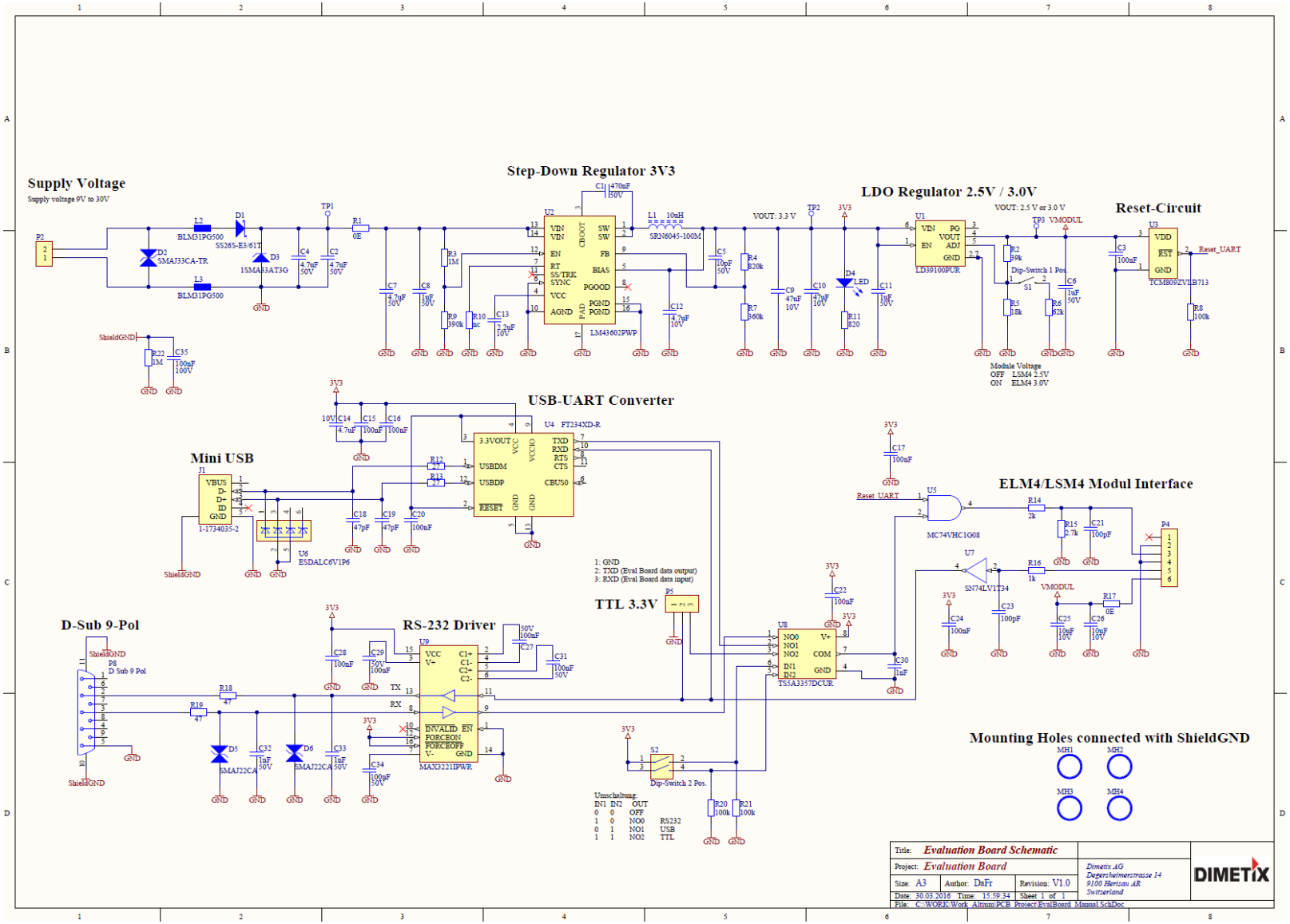


4 Hardware

4.1 Dimensions



4.2 Schematic



4.3 Bill of materials

Designator	Comment	Description	Manufacturer	Footprint	Value	Voltage	Quantity
C1	C	Capacitor		0603_C	470nF	50V	1
C2, C4, C7	C	Capacitor		1206_C	4.7uF	50V	3
C3, C15, C16, C17, C20, C22, C24, C27, C28, C29, C31, C34	C	Capacitor		0603_C	100nF	50V	12
C5	C	Capacitor		0603_C	10pF	50V	1
C6, C8, C11	C	Capacitor		0603_C	1uF	50V	3
C9, C10	C	Capacitor		1206_C	47uF	10V	2
C12, C14	C	Capacitor		0805_C	4.7uF	10V	2
C13	C	Capacitor		0603_C	2.2uF	10V	1
C18, C19	C	Capacitor		0603_C	47pF	50V	2
C21, C23	C	Capacitor		0603_C	100pF	50V	2
C25, C26	C	Capacitor		0805_C	10uF	10V	2
C30, C32, C33	C	Capacitor		0603_C	1nF	50V	3
C35	C	Capacitor		1206_C	100nF	100V	1
D1	SS26S-E3/61T	Schottky Diode	Vishay Semiconductor	SMA			1
D2	SMAJ33CA-TR	Bidirectional TVS Diode	ST Microelectronics	SMA		33V	1
D3	1SMA33AT3G	Zener Diode	ON Semiconductor	SMA		33V	1
D4	LG L29K-G2J1-24-Z	LED Green	OSRAM Opto Semiconductors Inc.	0603			1
D5, D6	SMAJ22CA	Bidirectional TVS Diode	Bourns Inc.	SMA		22V	2
J1	1-1734035-2	USB 2.0, Right Angle, SMT, USB mini B Type, Receptacle, 5 Position	TE Connectivity	1734035-2			1
L1	SRN6045-100M	Inductor Semi-Shielded	Bourns Inc.	SRN6045	10uH		1
L2, L3	BLM31PG500SN1L	Ferrite Bead	Murata Electronics	1206			2
P2	1935161	TERM BLOCK PCB 2POS 5.0MM GREEN	Phoenix Contact	PHDR1x2_5mm			1
P4	04 6244 406 011 800+	FFC/FPC Connector, 6-Pol	AVX	FPC6244			1
P5	1935174	TERM BLOCK PCB 3POS 5.0MM GREEN	Phoenix Contact	PHDR1x3_5mm			1
P8	1734354-1	D-Sub rectangular, 9-Pin, 12.5mm	TE Connectivity AMP Connectors	D_Sub_9Pol			1
R1, R17	R	Resistor		0805	0E		2
R2	R	Resistor		0603	39k		1
R3	R	Resistor		0603	1M		1
R4	R	Resistor		0603	820k		1
R5	R	Resistor		0603	18k		1
R6	R	Resistor		0603	62k		1
R7	R	Resistor		0603	360k		1
R8, R20, R21	R	Resistor		0603	100k		3
R9	R	Resistor		0603	390k		1
R11	R	Resistor		0603	820		1
R12, R13	R	Resistor		1206	27		2
R14	R	Resistor		0603	2k		1
R15	R	Resistor		0603	2.7k		1
R16	R	Resistor		0603	1k		1
R18, R19	R	Resistor		1206	47		2
R22	R	Resistor		1206	1M		1
S1	SDA01H1SBD	SWITCH DIP TAPE SEALED 1POS 24V	C&K Components	Dip_Switch_1_Pos.			1
S2	SDA02H1SBD	SWITCH DIP TOP SLIDE 2POS 24V	C&K Components	Dip_Switch_2_Pos.			1
U1	LD39100PUR	IC REG LDO ADJ 1A 6DFN	STMicroelectronics	DFN-6 (3x3 mm)			1
U2	LM43602PWP	Synchronous Step-Down Voltage Converter	Texas Instruments	HTSSOP-16			1
U3	TCM809ZVNB713	IC RESET MONITOR 2.32V SOT23B-3	Microchip Technology	SOT-23-3_N			1
U4	FT234XD-R	IC USB Serial Basic Uart 12DFN	FTDI, Future Technology Devices International Ltd	DFN-12			1
U5	MC74VHC1G08	Single 2-Input AND Gate	On Semiconductor	SC70-5			1
U6	ESDALC6V1P6	ESD protection for high speed interface	ST Microelectronics	SOT-666IP			1
U7	SN74LV1T34	Single Power Supply Single Buffer Logic Level Shifter	Texas Instruments	SC70-5			1
U8	TS5A3357DCUR	Multiplexer 3:1 Analog Switch	Texas Instruments	SC70-8			1
U9	MAX3221IPWR	RS-232 Line Driver and Receiver 3V to 5.5V	Texas Instruments	TSSOP-16			1