iC-LFH EVAL LFH1D
EVALUATION BOARD DESCRIPTION

ORDERING INFORMATION

Type	Order Designation	Description Options
Evaluation Board	iC-LFH EVAL LFH1D	iC-LFH Evaluation Board
iC-LFH320	iC-LFH320 EVAL LFH1M	iC-LFH Sensor Module with iC-LFH320
iC-LFH640	iC-LFH640 EVAL LFH1M	iC-LFH Sensor Module with iC-LFH640
iC-LFH960	iC-LFH960 EVAL LFH1M	iC-LFH Sensor Module with iC-LFH960
iC-LFH1024	iC-LFH1024 EVAL LFH1M	iC-LFH Sensor Module with iC-LFH1024

LFH1D BOARD AND TERMINAL DESCRIPTION

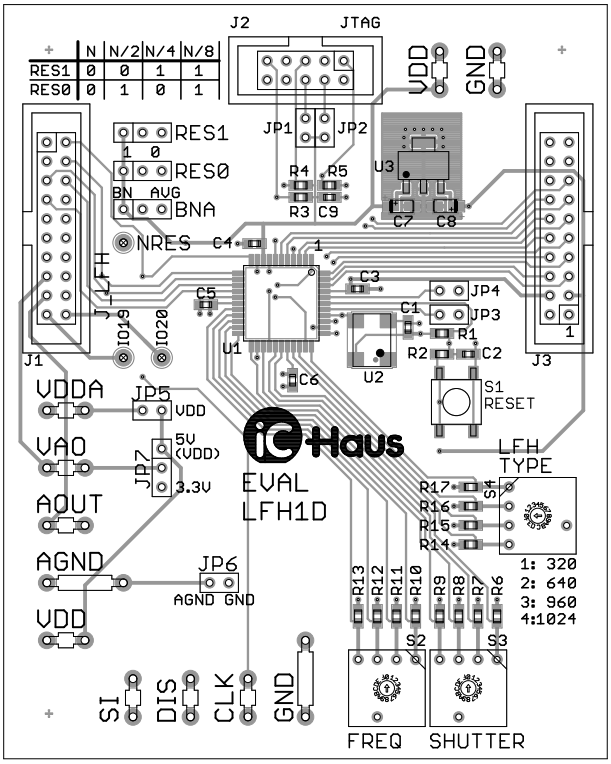

Figure 1: Component top (size 100 mm x 80 mm)

TERMINAL	DESCRIPTION
VDD	5 V Power Supply (both terminals internally connected)
GND	Ground (both terminals internally connected)
J1	Sensor Connector
J2	Programming Connector (not assembled)
J3	Not Used
VDDA	Analog 5 V Power Supply (can be connected to VDD with JP5)
VAO	Analog Output Supply Voltage (can be connected to VDD or 3.3 V with JP7)
AOUT	Analog Pixel Output
AGND	Analog Ground
SI	Start of Integration
CLK	Pixel Clock
DIS	Global Shutter

GETTING STARTED

1. Connect the sensor module to connector J1.
2. Set switch S4 according to the connected sensor module.
3. Select the desired pixel frequency and shutter time using S2 and S3.
4. Connect an oscilloscope probe to "SI"; select this signal as trigger source (level 2.5 V).
5. Connect an oscilloscope probe to "AOUT" (use "AGND" next to "AOUT" as ground).
6. When reduced resolution is required set up jumpers JP8 to JP10 accordingly. For more details see chapter "JUMPER DESCRIPTION"
7. Connect a 5 V power supply.

You should see the analog pixel output voltage at "AOUT". To adjust the output signal you can change either the pixel frequency "CLK" and/or the shutter time ("DIS") using switches S2 and S3.

LFH1D CIRCUIT DESCRIPTION

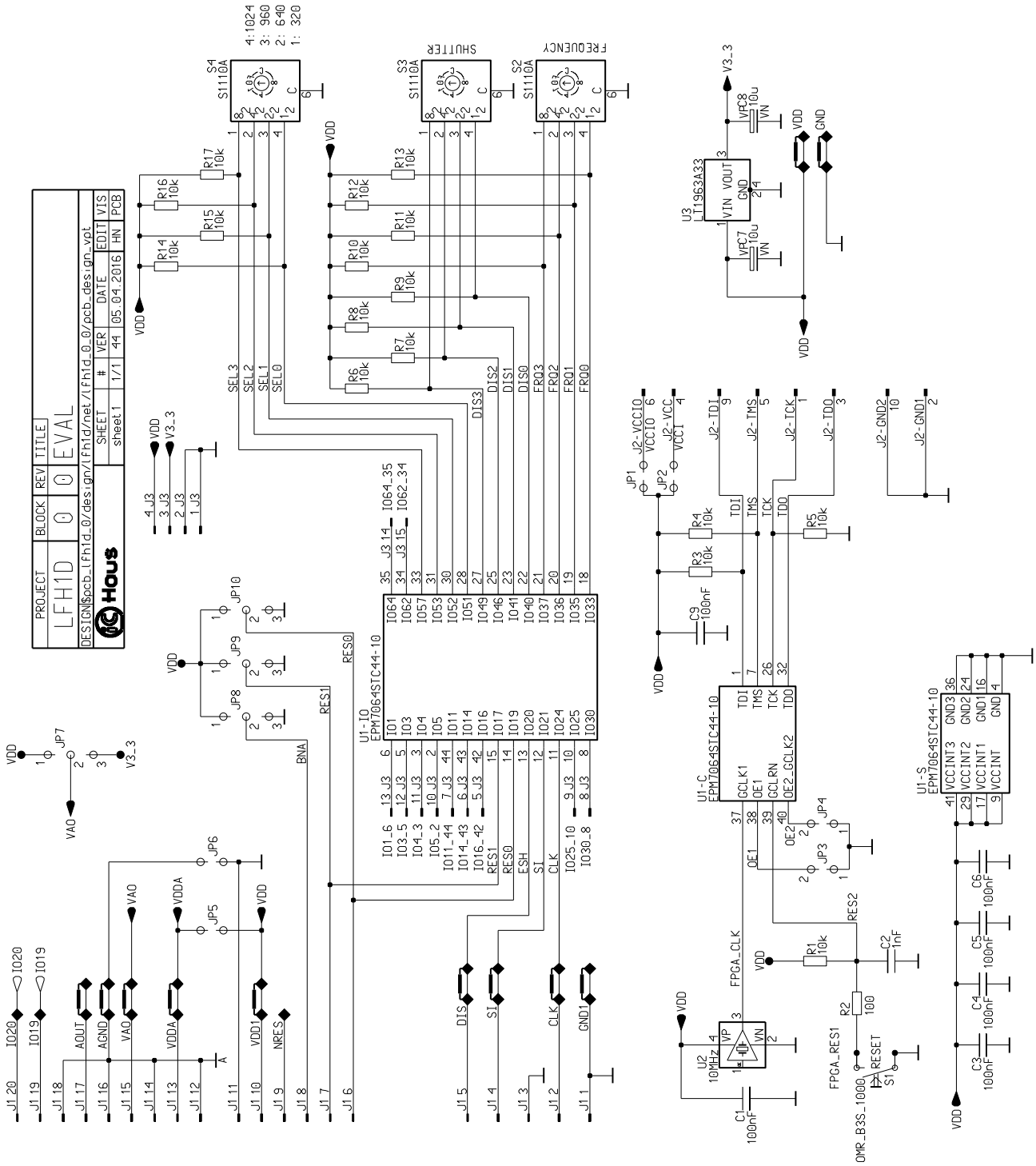

Figure 2: Circuit diagram

BOARD AND CONNECTOR PINOUT

J1: LFH1D Sensor Connector
20-pin Connector - male

PIN	Name	Function
1	GND	Digital Ground
2	CLK	Pixel Clock
3	GND	Digital Ground
4	SI	Start of Integration
5	DIS	Enable Shutter
6	RES0	Select Resolution Bit 0
7	RES1	Select Resolution Bit 1
8	BNA	Select Binning/Averaging
9	NRES	Power-Down Reset Output
10	VDD	+5 V Digital Supply
11	GND	Digital Ground
12	AGND	Analog Ground
13	VDDA	+5 V Analog Supply
14	AGND	Analog Ground
15	VAO	Pixel Output Supply Voltage
16	AGND	Analog Ground
17	AOUT	Analog Pixel Output
18	AGND	Analog Ground
19	IO19	
20	IO20	

Table 1: LFH1D Sensor Connector.

J2: LFH1D Programming Connector
10-pin Connector - male

PIN	Name	Function
1	TCK	Test Clock
2	GND1	Ground 1
3	TDO	Test Data Out
4	VCC	5 V Supply Voltage
5	TMS	Test Mode Select
6	VCCIO	5 V Supply Voltage
7	n.c.	Not used
8	n.c.	Not used
9	TDI	Test Data Out
10	GND2	Ground 2

Table 2: JTAG interface

JUMPER DESCRIPTION

Jumper	Description
JP1	Connects VCC of the JTAG interface to VDD
JP2	Connects VCCIO of the JTAG interface to VDD
JP5	Connects VDD and VDDA when closed; allows to drive the iC-LFH with a dedicated analog voltage
JP6	Connects AGND to GND
JP7	Sets the output voltage of the AOUT signal to VDD (typ. 5 V) or 3.3 V
JP8	Selects between VDD (= 1) and GND (= 0) for the BNA signal (details see table 5)
JP9	Selects between VDD (= 1) and GND (= 0) for the RES1 signal (details see table 4)
JP10	Selects between VDD (= 1) and GND (= 0) for the RES0 signal (details see table 4)

Table 3: Jumper functions

Jumper 9 and 10 select the the values for the RES0 and RES1 signals, which configure the resolution. See Table 4 for details.

RES1	RES0	Pixels	Resolution
0	0	N	2000 DPI
0	1	N/2	1000 DPI
1	0	N/4	500 DPI
1	1	N/8	250 DPI
	N = 320/640/960/1024		

Table 4: RES0/1 configuration

The resolution can be reduced in two ways: binning or averaging. With binning, the overall sensitivity increases. Jumper 8 (BNA signal) selects the respective mode. See Table 5 for details.

RES1/0	Pixels	Sensitivity ratio	
		BNA = 1	BNA = 0
0/0	N	1	1
0/1	N/2	1.87	1
1/0	N/4	3.27	1
1/1	N/8	5.14	1
	N = 320/640/960/1024		

Table 5: RES0/1 configuration

SWITCH DESCRIPTION

Switch	Description
S1	Reset
S2	Pixel Clock Frequency
S3	Exposure Time
S4	LFH type

Table 6: Description of the switches

Pixel Clock Frequency
S2 sets the pixel clock frequency. The 16 positions set the frequency between 100 kHz and 5 MHz.

Pos.	Frequency	Pos.	Frequency
0	100 kHz	8	625 kHz
1	200 kHz	9	714.3 kHz
2	312.5 kHz	A	833 kHz
3	384.6 kHz	B	1 MHz
4	416.7 kHz	C	1.25 MHz
5	454.5 kHz	D	1.67 MHz
6	500 kHz	E	2.5 MHz
7	555.6 kHz	F	5 MHz

Table 7: Frequency selection

Exposure Time
S3 sets the length of the asynchronous, global shutter, which is used to set shorter exposure times than defined by the pixel clock alone. With switch S3 at position 0 no shutter signal will be generated. Please note that a shutter time of N/8 in combination with a iC-LFH320 configured with resolution divider of 8 results in a illegal configuration (Shutter opens after 5 clock cycles. Minimum required: 9 clock cycles).

Pos.	shutter time
0	no shutter signal
1	N/2
2	N/4
3	N/8
N = 320/640/960/1024 x resolution_divider	

Table 8: Shutter length selection

LFH type
S4 needs to be set to the used iC-LFH model.

Pos.	Module
1	iC-LFH320
2	iC-LFH640
3	iC-LFH960
4	iC-LFH1024

Table 9: Chip configuration