



LEOPARD IMAGING INC

Rev 1.0

LI-JETSON-CB-IMX274M12-X

Data Sheet

Key Features

- Compatible with Nvidia Jetson TX1/TX2 (TX1/TX2 SOM not included)
- MIPI CSI-2 interface
- Support up to six cameras
- Two carrier board options
 - LI-TX1-CB
 - Includes three 4-lane interface
 - Support 4K@60fps
 - LI-TX1-CB-6CAM
 - Includes six 2-lane interface
 - Support 4K@30fps
- Sony Diagonal 7.20 mm (Type 1/2.5) CMOS Image Sensor IMX274
- Active pixels: 3864H x 2196V
- Pixel size: 1.62 μm x 1.62 μm
- Color camera
- I-PEX cable part#: FAW-1233-03
- Length of the I-PEX cable: 300mm
- Support multiple length cables
- Support M12 lens
- Provide customization services
- Part#:
 - (1 cam) LI-JETSON-CB-IMX274M12
 - (2 cam) LI-JETSON-CB-IMX274M12-D
 - (3 cam) LI-JETSON-CB-IMX274M12-T
 - (6 cam) LI-JETSON-CB-IMX274M12-H



Lens Spec

- Model: SYD1201A
- Focal length: 3.7 mm
- Aperture, F/#: 2.8 +/- 5%
- Built in 650nm IR cut filter
- FOV (D/H/V): 92 °/ 83 °/53 °
- TV Distortion: -1.0 %
- Mount: M12 x P0.5

BOM

Nvidia TX1/TX2 SOM not included

#	Items	QTY
1	LI-TX1-CB or LI-TX1-CB-6CAM	1
2	LI-IMX274-MIPI-M12	1,2,3 or 6
3	FAW-1233-03 cable	1,2,3 or 6
4	DC 12V power supply	1
5	USB 2.0 Type A - Micro B cable	1



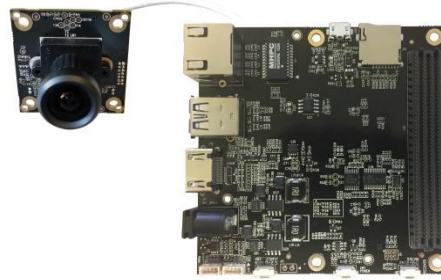
Leopard Imaging Inc.

48820 Kato Rd, Suite 100B, Fremont, CA 94538, USA
Phone: +1-408-263-0988
Fax: +1-408-217-1960
Email: sales@leopardimaging.com
Website: www.leopardimaging.com

LI-JETSON-CB-IMX274M12

BOM

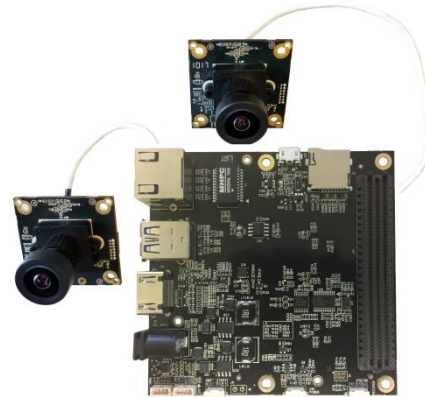
#	Items	QTY
1	LI-TX1-CB	1
2	LI-IMX274-MIPI-M12	1
3	FAW-1233-03 cable	1
4	DC 12V power supply	1
5	USB 2.0 Micro B cable	1



LI-JETSON-CB-IMX274M12-D

BOM

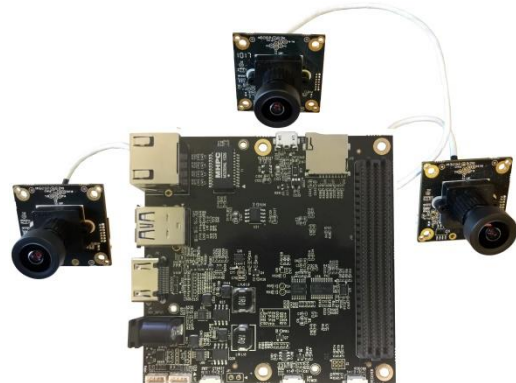
#	Items	QTY
1	LI-TX1-CB	1
2	LI-IMX274-MIPI-M12	2
3	FAW-1233-03 cable	2
4	DC 12V power supply	1
5	USB 2.0 Micro B cable	1



LI-JETSON-CB-IMX274M12-T

BOM

#	Items	QTY
1	LI-TX1-CB	1
2	LI-IMX274-MIPI-M12	3
3	FAW-1233-03 cable	3
4	DC 12V power supply	1
5	USB 2.0 Micro B cable	1



LI-JETSON-CB-IMX274M12-H

BOM

#	Items	QTY
1	LI-TX1-CB-6CAM	1
2	LI-IMX274-MIPI-M12	6
3	FAW-1233-03 cable	6
4	DC 12V power supply	1
5	USB 2.0 Micro B cable	1

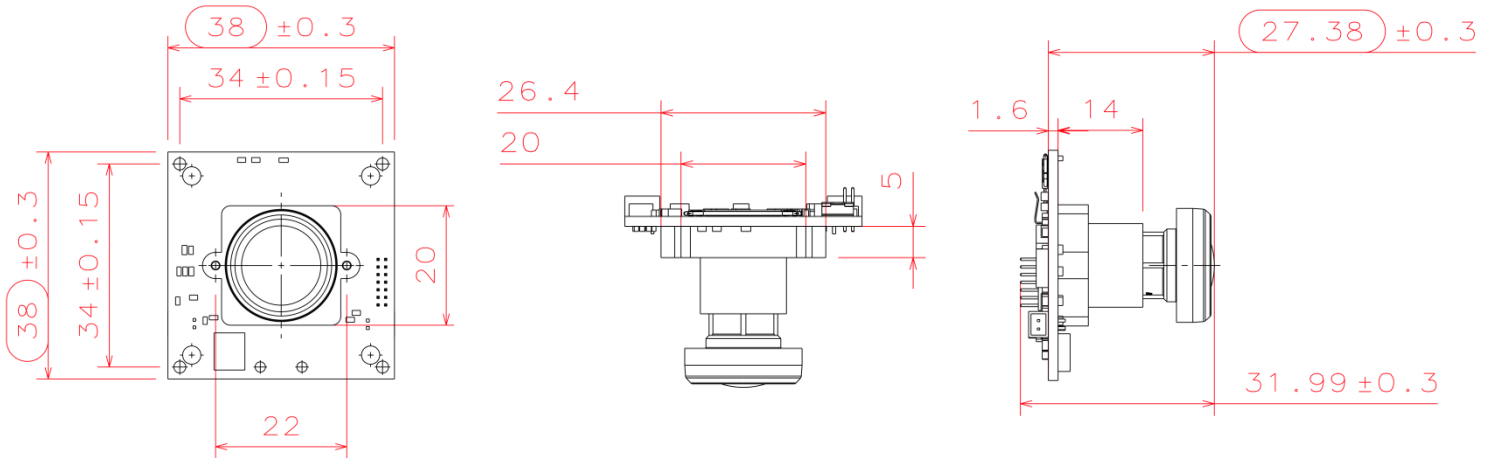


Leopard Imaging Inc.

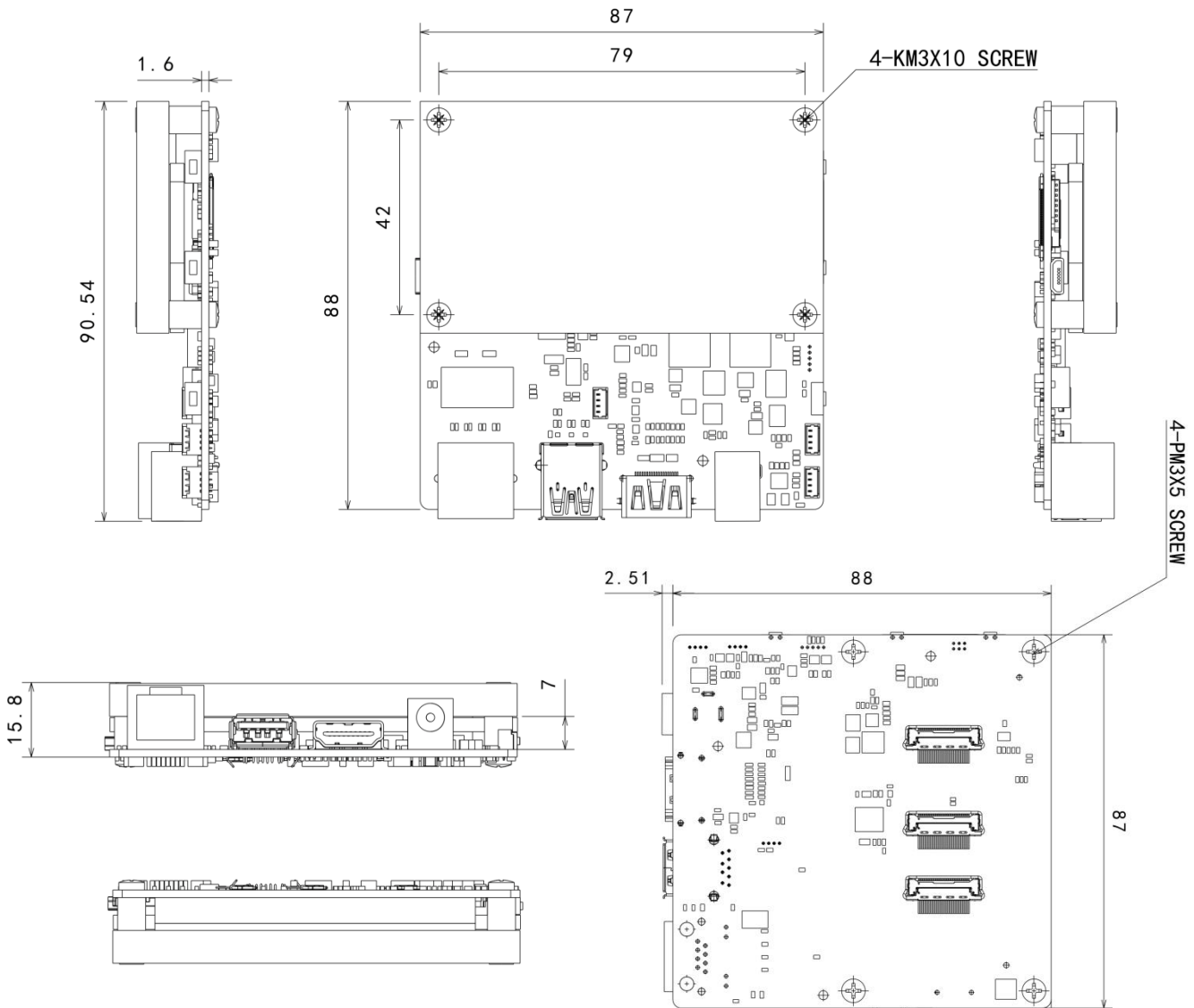
48820 Kato Rd, Suite 100B, Fremont, CA 94538, USA
Phone: +1-408-263-0988
Fax: +1-408-217-1960
Email: sales@leopardimaging.com
Website: www.leopardimaging.com

Dimensions

LI-IMX274-MIPI-M12



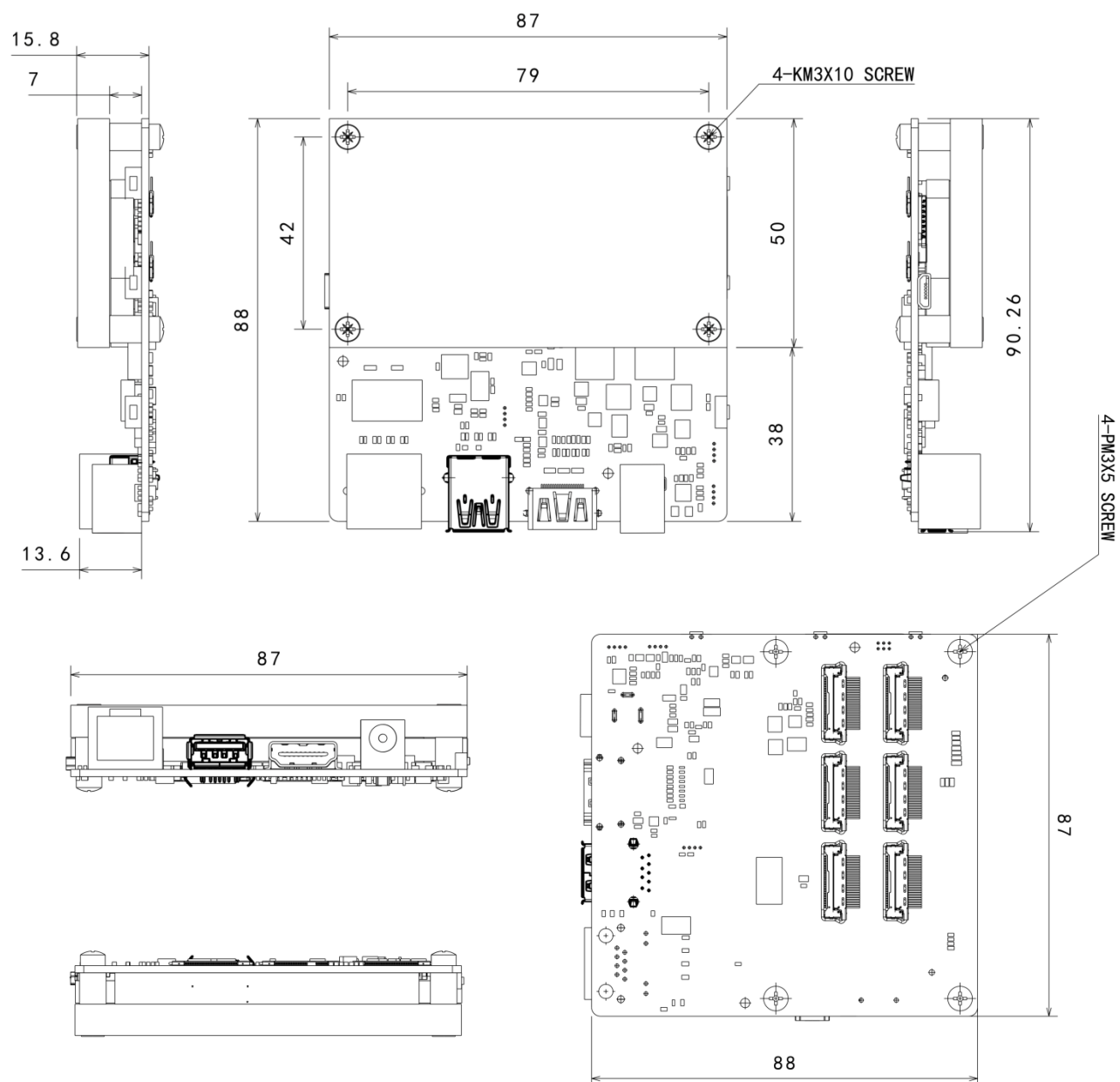
LI-TX1-CB



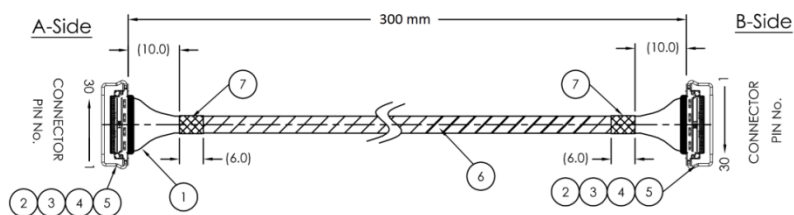
Leopard Imaging Inc.

48820 Kato Rd, Suite 100B, Fremont, CA 94538, USA
Phone: +1-408-263-0988
Fax: +1-408-217-1960
Email: sales@leopardimaging.com
Website: www.leopardimaging.com

LI-TX1-CB-6CAM

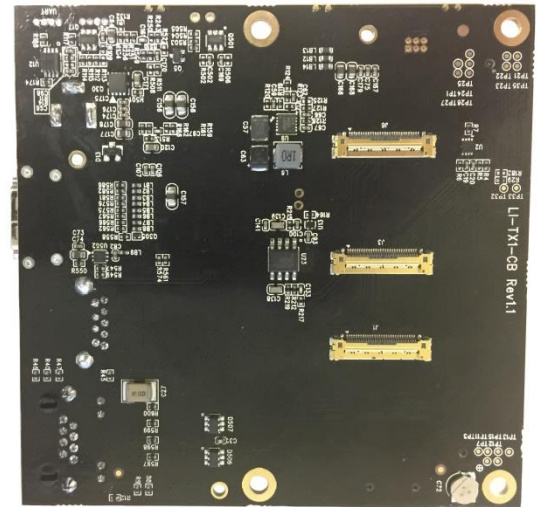
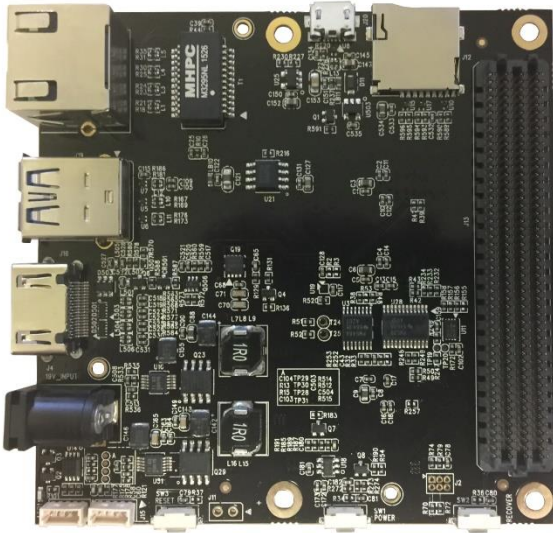


FAW-1233-03



Leopard Imaging Inc.

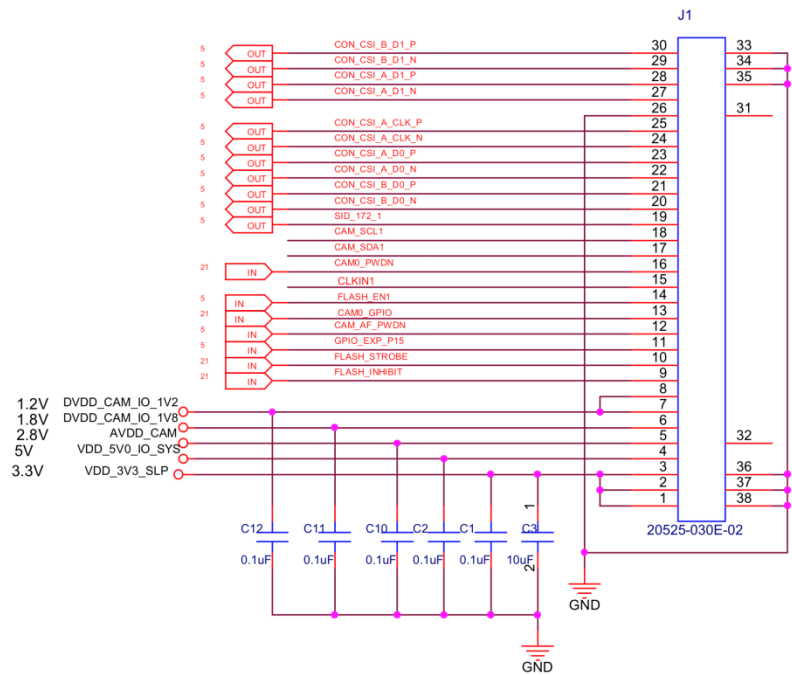
48820 Kato Rd, Suite 100B, Fremont, CA 94538, USA
Phone: +1-408-263-0988
Fax: +1-408-217-1960
Email: sales@leopardimaging.com
Website: www.leopardimaging.com



Camera Interfaces

Interface J1

- Part#: 20525-030E-02C
- Number of Positions: 30
- Pitch: 0.4mm
- Mating I-PEX cable: FAW-1233-03 (300mm)

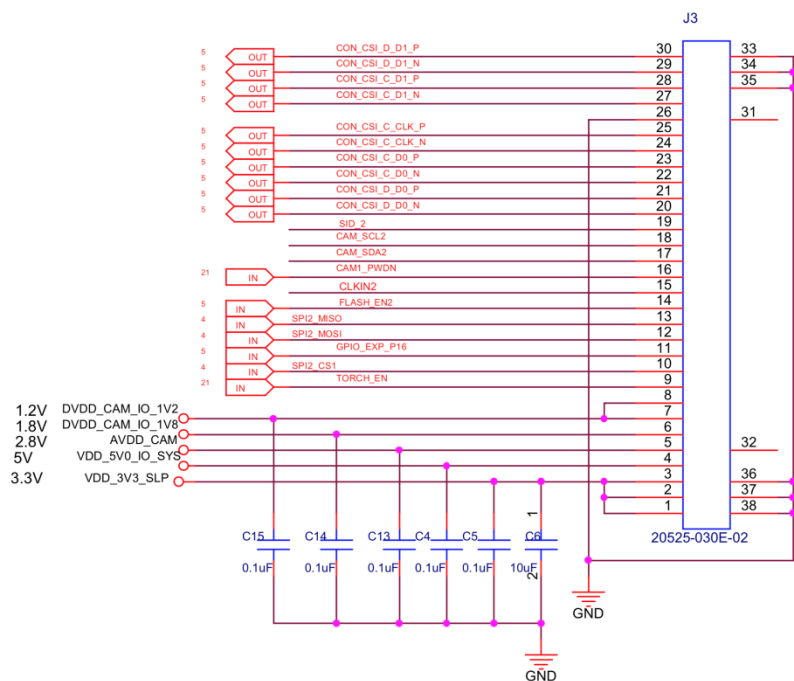


Leopard Imaging Inc.

48820 Kato Rd, Suite 100B, Fremont, CA 94538, USA
 Phone: +1-408-263-0988
 Fax: +1-408-217-1960
 Email: sales@leopardimaging.com
 Website: www.leopardimaging.com

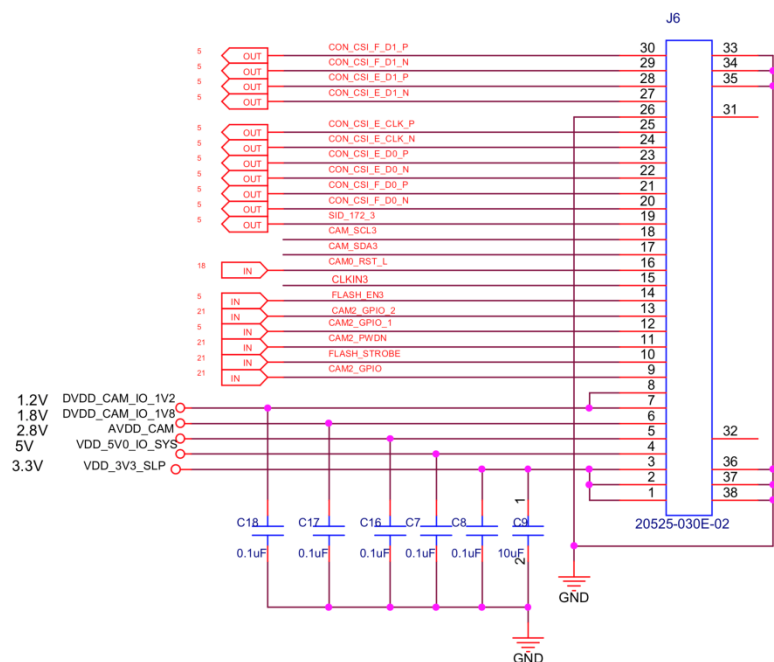
Interface J3

- Part#: 20525-030E-02C
- Number of Positions: 30
- Pitch: 0.4mm
- Mating I-PEX cable: FAW-1233-03 (300mm)



Interface J6

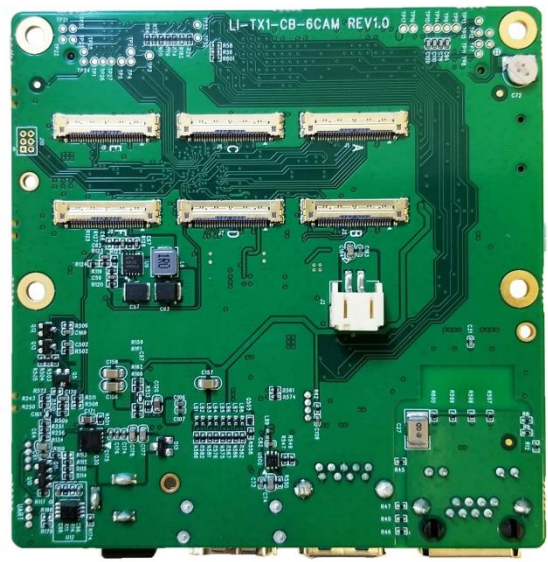
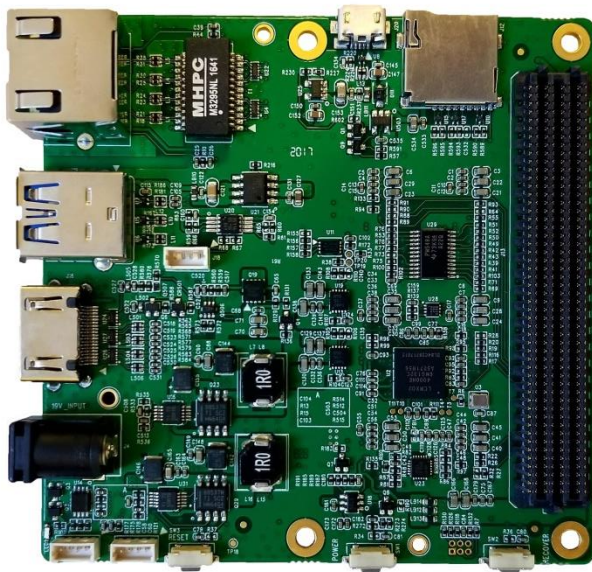
- Part#: 20525-030E-02C
- Number of Positions: 30
- Pitch: 0.4mm
- Mating I-PEX cable: FAW-1233-03 (300mm)



Leopard Imaging Inc.

48820 Kato Rd, Suite 100B, Fremont, CA 94538, USA
 Phone: +1-408-263-0988
 Fax: +1-408-217-1960
 Email: sales@leopardimaging.com
 Website: www.leopardimaging.com

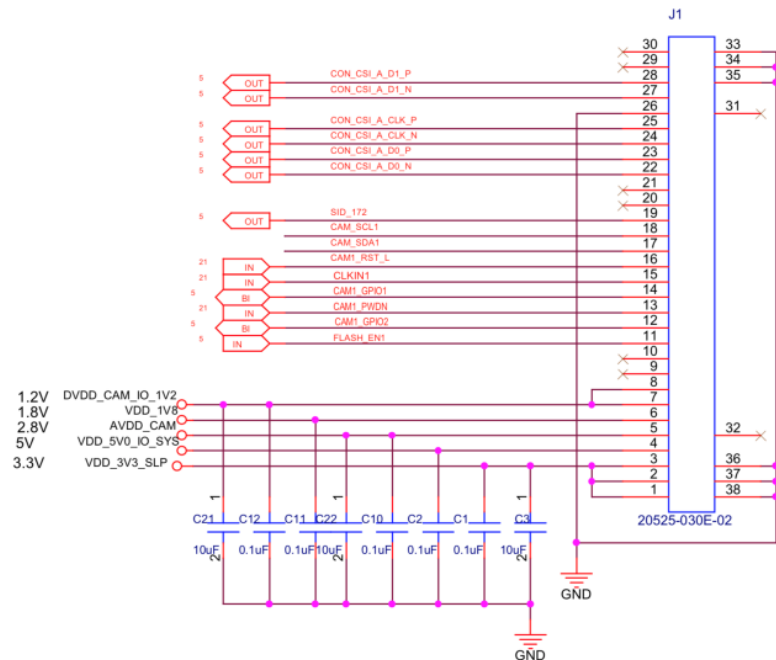
LI-TX1-CB-6CAM



Camera Interfaces

Interface J1 (camera channel A)

- Part#: 20525-030E-02C
- Number of Positions: 30
- Pitch: 0.4mm
- Mating I-PEX cable:
FAW-1233-03 (300mm)

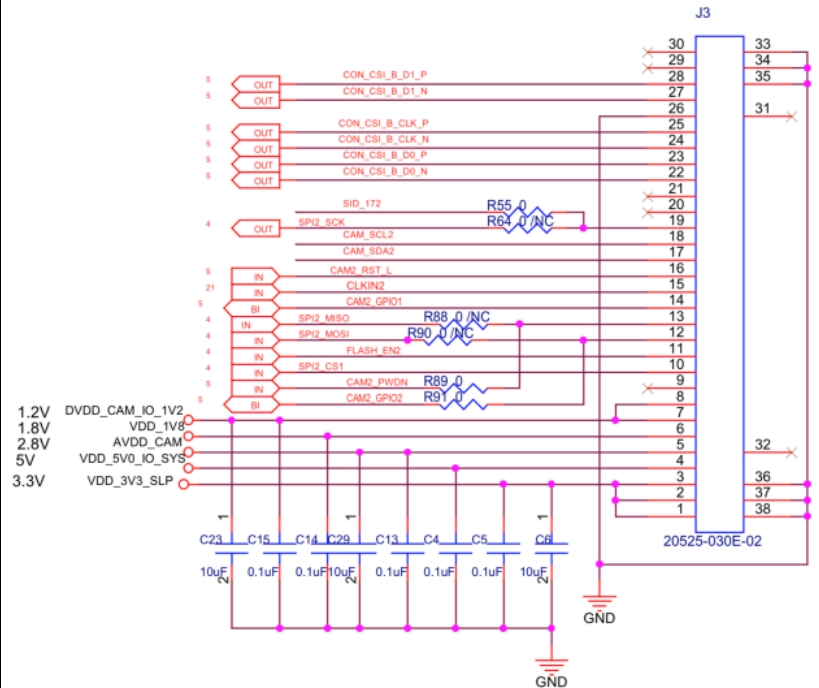


Leopard Imaging Inc.

48820 Kato Rd, Suite 100B, Fremont, CA 94538, USA
Phone: +1-408-263-0988
Fax: +1-408-217-1960
Email: sales@leopardimaging.com
Website: www.leopardimaging.com

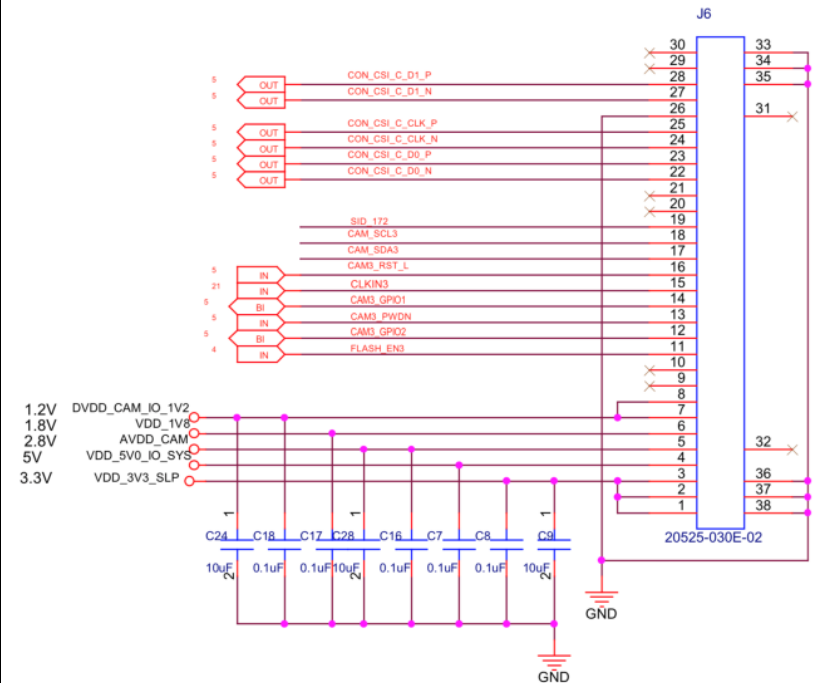
Interface J3 (camera channel B)

- Part#: 20525-030E-02C
- Number of Positions: 30
- Pitch: 0.4mm
- Mating I-PEX cable:
FAW-1233-03 (300mm)



Interface J6 (camera channel C)

- Part#: 20525-030E-02C
- Number of Positions: 30
- Pitch: 0.4mm
- Mating I-PEX cable:
FAW-1233-03 (300mm)

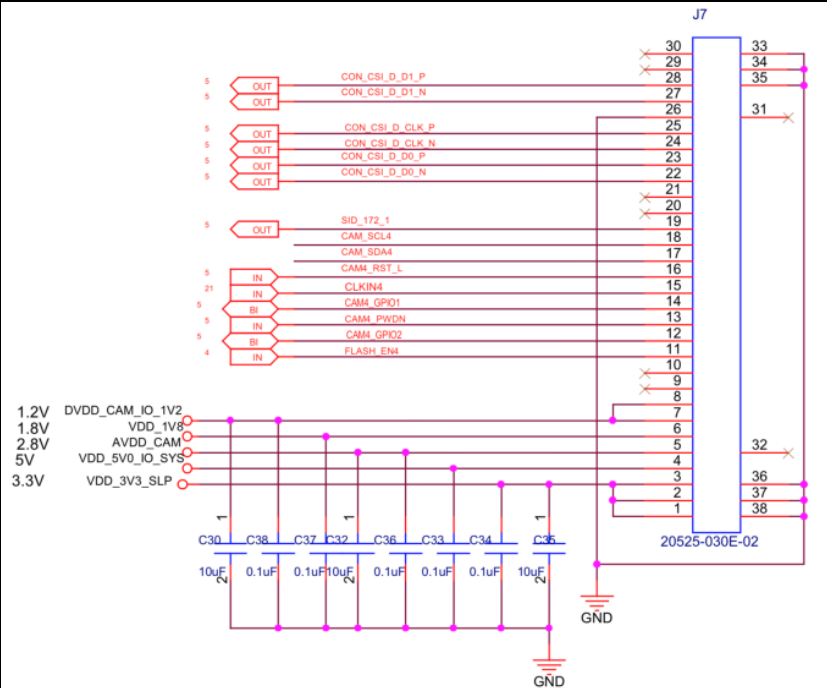


Leopard Imaging Inc.

48820 Kato Rd, Suite 100B, Fremont, CA 94538, USA
 Phone: +1-408-263-0988
 Fax: +1-408-217-1960
 Email: sales@leopardimaging.com
 Website: www.leopardimaging.com

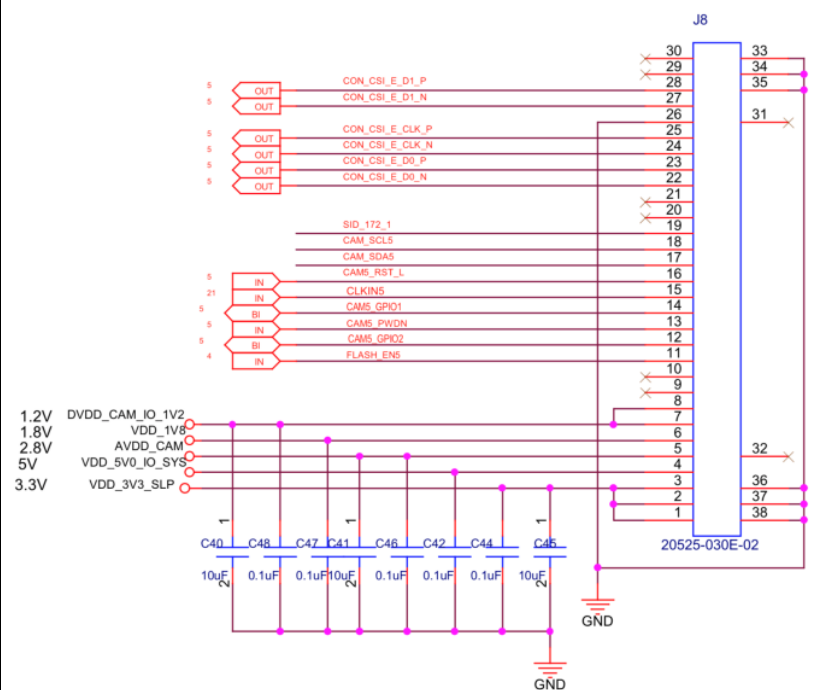
Interface J7 (camera channel D)

- Part#: 20525-030E-02C
- Number of Positions: 30
- Pitch: 0.4mm
- Mating I-PEX cable:
FAW-1233-03 (300mm)



Interface J8 (camera channel E)

- Part#: 20525-030E-02C
- Number of Positions: 30
- Pitch: 0.4mm
- Mating I-PEX cable:
FAW-1233-03 (300mm)

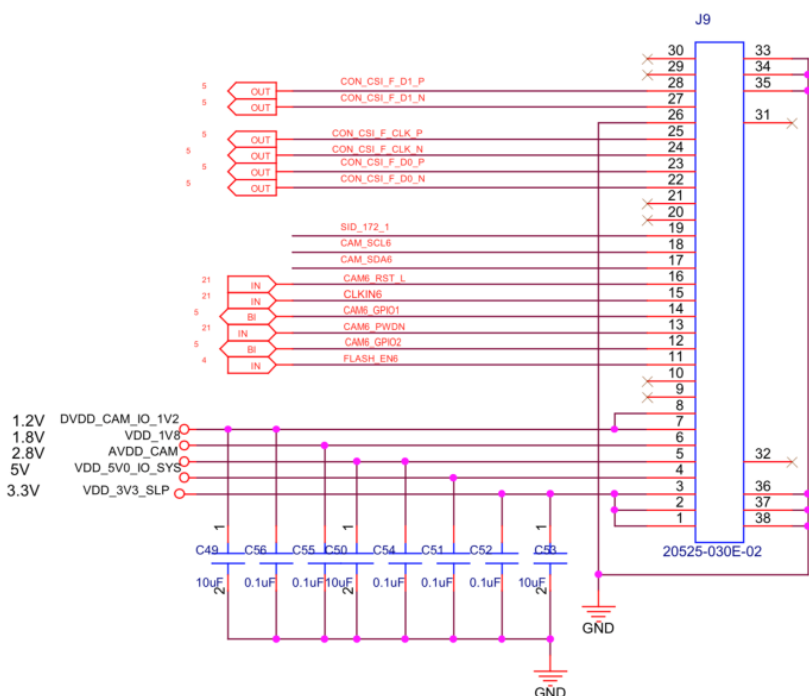


Leopard Imaging Inc.

48820 Kato Rd, Suite 100B, Fremont, CA 94538, USA
 Phone: +1-408-263-0988
 Fax: +1-408-217-1960
 Email: sales@leopardimaging.com
 Website: www.leopardimaging.com

Interface J9 (camera channel F)

- Part#: 20525-030E-02C
 - Number of Positions: 30
 - Pitch: 0.4mm
- Mating I-PEX cable:
FAW-1233-03 (300mm)



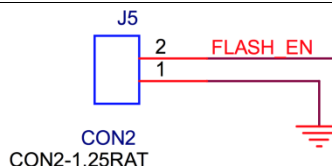
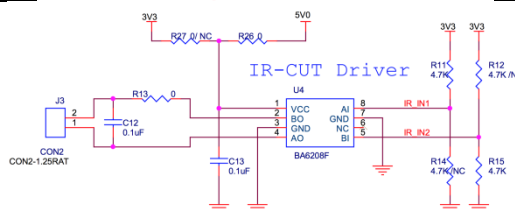
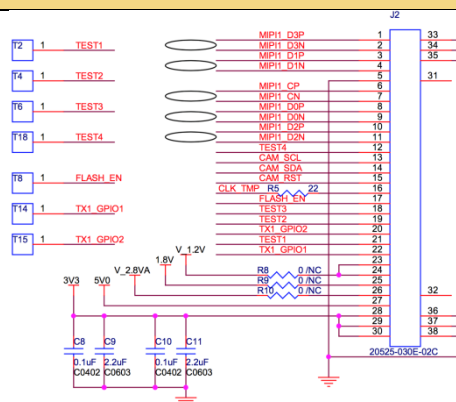
Leopard Imaging Inc.

48820 Kato Rd, Suite 100B, Fremont, CA 94538, USA
 Phone: +1-408-263-0988
 Fax: +1-408-217-1960
 Email: sales@leopardimaging.com
 Website: www.leopardimaging.com

LI-IMX274-MIPI-M12



Camera Spec	
Image Sensor	Sony Diagonal 7.20 mm (Type 1/2.5) CMOS Image Sensor IMX274
Optical format	1/2.5"
Number of active pixels	3864 (H) x 2196 (V)
Pixel size	1.62um (H) x 1.62um (V)
Color or Mono	Color
Interface	MIPI interface
Lens mount	M12
Weight	14 g
Interfaces	
Interface J2:	- Part#: 20525-030E-02C - Number of Positions: 30 - Pitch: 0.4mm - Mating I-PEX cable: FAW-1233-03 (300mm)
Interface J3:	- Part#: 1734829-2 - Number of Positions: 2 - Pitch: 1.25mm
Interface J5:	- Part#: 1734829-2 - Number of Positions: 2 - Pitch: 1.25mm



Leopard Imaging Inc.

48820 Kato Rd, Suite 100B, Fremont, CA 94538, USA
 Phone: +1-408-263-0988
 Fax: +1-408-217-1960
 Email: sales@leopardimaging.com
 Website: www.leopardimaging.com

Absolute Maximum Ratings

Item	Symbol	Ratings	Unit
Supply voltage (Analog)	V_{ADD}^{*1}	-0.3 to +3.3	V
Supply voltage (Digital 1)	V_{DDD1}^{*2}	-0.5 to +2.0	V
Supply voltage (Digital 2)	V_{DDD2}^{*3}	-0.5 to +3.3	V
Input voltage (Digital)	V_I	-0.3 to $V_{DDD2} + 0.3$	V
Output voltage (Digital)	V_O	-0.3 to $V_{DDD2} + 0.3$	V
Guaranteed operating temperature	T_{OPR}	-30 to +75	°C
Storage guarantee temperature	T_{STG}	-30 to +80	°C
Performance guarantee temperature	T_{SPEC}	-10 to +60	°C

Recommended Operating Conditions

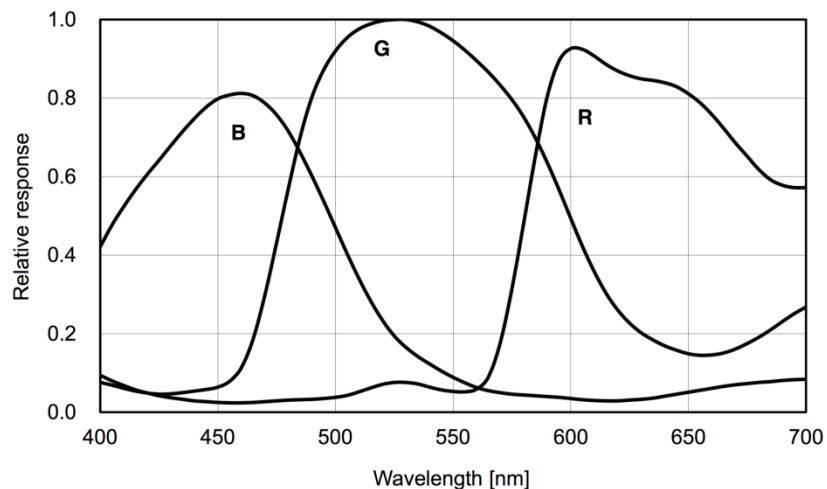
Item	Symbol	Rating	Unit
Supply voltage (Analog)	V_{ADD}^{*1}	2.8 ± 0.1	V
Supply voltage (Digital 1)	V_{DDD1}^{*2}	1.2 ± 0.1	V
Supply voltage (Digital 2)	V_{DDD2}^{*3}	1.8 ± 0.1	V
Input voltage (Digital)	V_I	-0.1 to $V_{DDD2} + 0.1$	V

*1 V_{ADD} : V_{DDSUB} , V_{DDHCM} , V_{DDHPX} , V_{DDHDA} , V_{DDHCP} (2.8 V power supply)

*2 V_{DDD1} : V_{DDLSCN} , V_{DDLSC1} to 2, V_{DDLPA} , V_{DDLPL1} , V_{DDLPL2} to 3, V_{DDLIF} (1.2 V power supply)

*3 V_{DDD2} : V_{DDMIO} , V_{DDMIF} (1.8 V power supply)

Spectral Sensitivity Characteristics



Leopard Imaging Inc.

48820 Kato Rd, Suite 100B, Fremont, CA 94538, USA
Phone: +1-408-263-0988
Fax: +1-408-217-1960
Email: sales@leopardimaging.com
Website: www.leopardimaging.com

DC Characteristics

Current Consumption and Gain Vatriable Range

($V_{ADD} = 2.9\text{ V}$, $V_{DDD1} = 1.3\text{ V}$, $V_{DDD2} = 1.9\text{ V}$, $T_j = 60\text{ }^{\circ}\text{C}$, Reference Gain (0 dB)

All pixel scan mode (MODE0), 29.97 frame/s)

Item	Symbol	Min.	Typ.	Max	Unit	Remarks
Current consumption (Analog)	I_{ADD}	—	—	62	mA	
Current consumption (Digital 1)	I_{DDD1}	—	—	190	mA	
Current consumption (Digital 2)	I_{DDD2}	—	—	1	mA	
Standby current (Analog)	I_{ADDSTB}	—	—	35	μA	In the dark
Standby current (Digital 1)	$I_{DDD1STB}$	—	—	13	mA	In the dark
Standby current (Digital 2)	$I_{DDD2STB}$	—	—	20	μA	In the dark
PGA gain variable range	PGAG	0	—	27	dB	

Supply Voltage and I/O Voltage

Item		Pins	Symbol	Min.	Typ.	Max.	Unit
Supply voltage	Analog	V_{DDSUB} , V_{DDHCM} , V_{DDHPX} , V_{DDHDA} , V_{DDHCP}	V_{ADD}	2.70	2.80	2.90	V
	Digital 1	$V_{DDL CN}$, V_{DDLSC1} to 2, V_{DDLPL1} , V_{DDLPA} , V_{DDLPL2} to 3, V_{DDLIF}	V_{DDD1}	1.10	1.20	1.30	V
	Digital 2	V_{DDMIO} , V_{DDMIF}	V_{DDD2}	1.70	1.80	1.90	V
Digital input voltage	SDA, SCL		V_{IH1}	$0.7 \times V_{DDD2}$	—	1.9	V
			V_{IL1}	−0.3	—	$0.3 \times V_{DDD2}$	V
	XCLR, INCK		V_{IH2}	$0.65 \times V_{DDD2}$	—	$V_{DDD2} + 0.3$	V
			V_{IL2}	−0.3	—	$0.35 \times V_{DDD2}$	V
Digital output voltage	XHS, XVS		V_{HVOUT}	—	V_{DDD2}	—	V

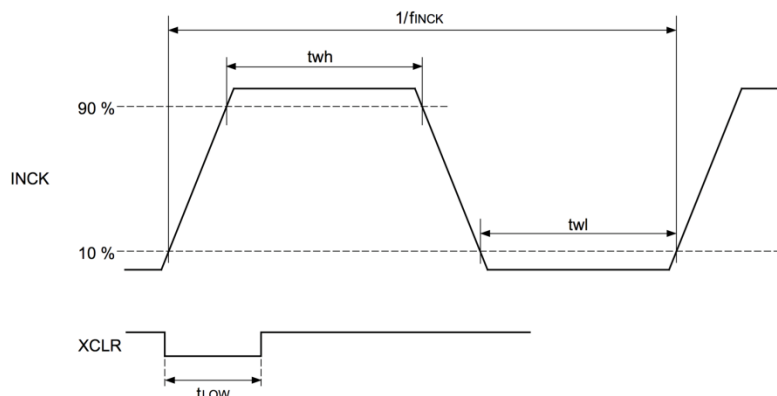


Leopard Imaging Inc.

48820 Kato Rd, Suite 100B, Fremont, CA 94538, USA
 Phone: +1-408-263-0988
 Fax: +1-408-217-1960
 Email: sales@leopardimaging.com
 Website: www.leopardimaging.com

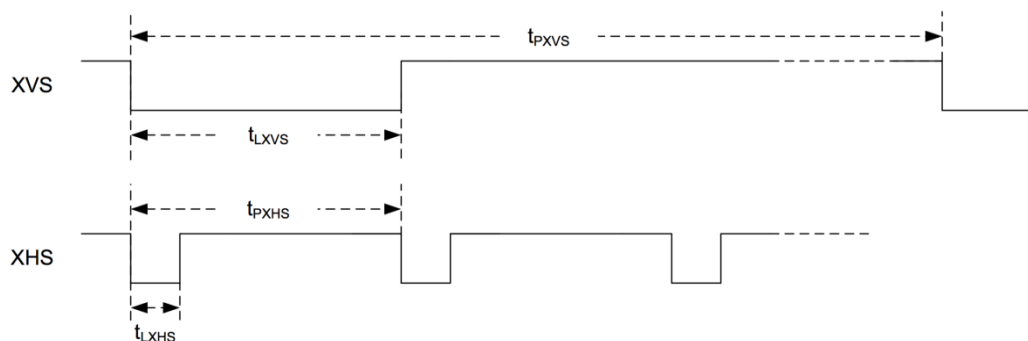
AC Characteristics

INCK, XCLR



Item	Symbol	Min.	Typ.	Max.	Unit
INCK clock frequency	f_{INCK}	6	—	27	MHz
INCK Low level pulse width	t_{wl}	5	—	—	ns
INCK High level pulse width	t_{wh}	5	—	—	ns
Clock duty	—	40	50	60	%
XCLR Low level pulse width	t_{LOW}	100	—	—	ns

XHS, XVS (Output)



Item	Symbol	Min.	Typ.	Max.	Unit	Remarks
XHS Low level pulse width	t_{LXHS}		222		ns	16 clk@72MHz
XHS pulse period	t_{PXHS}		$HMAX^{*1}$		clk@72MHz	
XVS Low level pulse width	t_{LXVS}		t_{PXHS}		clk@72MHz	
XVS pulse period	t_{PXVS}		$HMAX^{*1} \times VMAX^{*2}$		clk@72MHz	

*1 The value set as HMAX (address 30F6h, bit [7:0] and address 30F7h, bit [7:0])

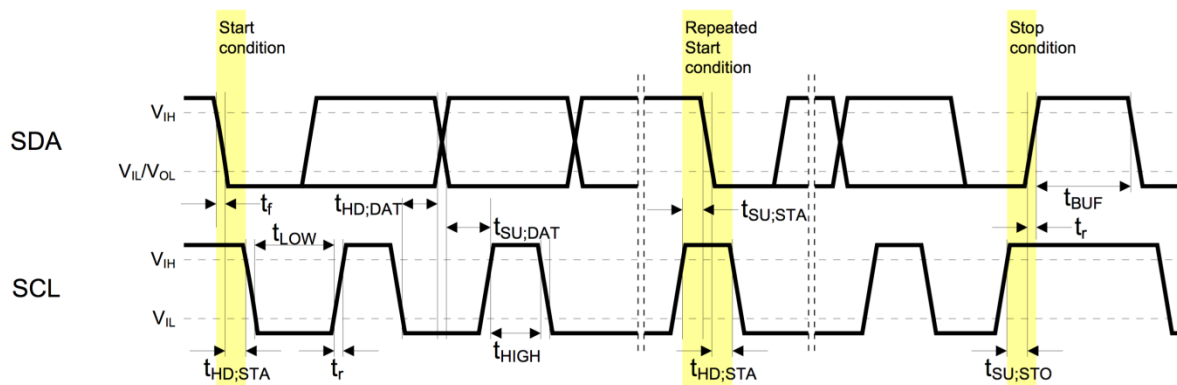
*2 The value set as VMAX (address 30F8h, bit [7:0], address 30F9h, bit [7:0] and address 30FAh, bit [3:0]).



Leopard Imaging Inc.

48820 Kato Rd, Suite 100B, Fremont, CA 94538, USA
 Phone: +1-408-263-0988
 Fax: +1-408-217-1960
 Email: sales@leopardimaging.com
 Website: www.leopardimaging.com

I²C Communication



I²C Specification

Item	Symbol	Min.	Typ.	Max.	Unit	Remarks
Low level input voltage	V_{IL}	-0.3	—	$0.3 \times V_{DD2}$	V	
High level input voltage	V_{IH}	$0.7 \times V_{DD2}$	—	1.9	V	
Low level output voltage	V_{OL}	0	—	$0.2 \times V_{DD2}$	V	$V_{DD2} < 2V$, Sink 3 mA
Output fall time	t_{of}	—	—	250	ns	Load 10 pF to 400 pF, $0.7 \times V_{DD2}$ to $0.3 \times V_{DD2}$
Input current (SCL, SDA, XCLR, INCK)	I_i	-10	—	10	μA	$0.1 \times V_{DD2}$ to $0.9 \times V_{DD2}$
Input capacitance of SCL / SDA	C_i	—	—	10	pF	

I²C AC Characteristics

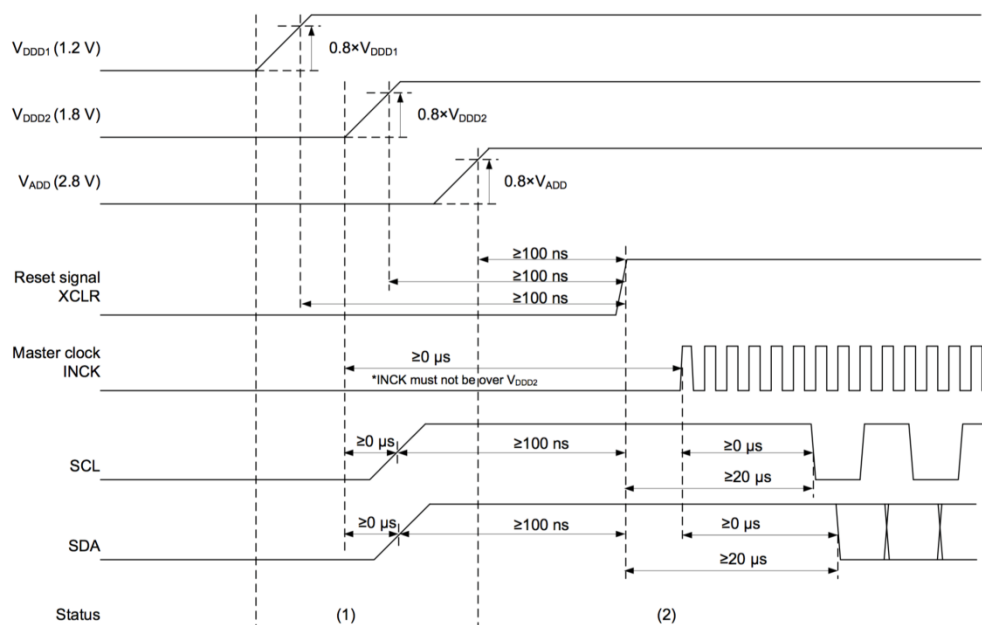
Item	Symbol	Min.	Typ.	Max.	Unit
SCL clock frequency	f_{SCL}	0	—	400	kHz
Hold time (Start Condition)	$t_{HD;STA}$	0.6	—	—	μs
Low period of the SCL clock	t_{LOW}	1.3	—	—	μs
High period of the SCL clock	t_{HIGH}	0.6	—	—	μs
Set-up time (Repeated Start Condition)	$t_{SU;STA}$	0.6	—	—	μs
Data hold time	$t_{HD;DAT}$	0	—	0.9	μs
Data set-up time	$t_{SU;DAT}$	100	—	—	ns
Rise time of both SDA and SCL signals	t_R	—	—	300	ns
Fall time of both SDA and SCL signals	t_F	—	—	300	ns
Set-up time (Stop Condition)	$t_{SU;STO}$	0.6	—	—	μs
Bus free time between a STOP and START Condition	t_{BUF}	1.3	—	—	μs



Leopard Imaging Inc.

48820 Kato Rd, Suite 100B, Fremont, CA 94538, USA
 Phone: +1-408-263-0988
 Fax: +1-408-217-1960
 Email: sales@leopardimaging.com
 Website: www.leopardimaging.com

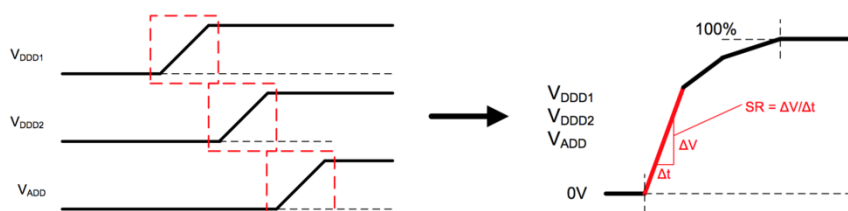
Power-on Sequence



Period name	Remarks
(1) Power stabilization period	All input signals are set to Low level. There are no constraints of the power-on sequence with V_{ADD} , V_{DD1} , and V_{DD2} .
(2) Register communication period for standby cancel	Wait 100 ns after the last power supply in V_{ADD} , V_{DD1} and V_{DD2} . Then set $XCLR$ to "H" and start the standby cancel sequence.

Slew Rate Limitation of Power-on Sequence

Conform to the slew rate limitation shown below when power supply change 0 V to each voltage (0 % to 100 %) in power-on sequence.



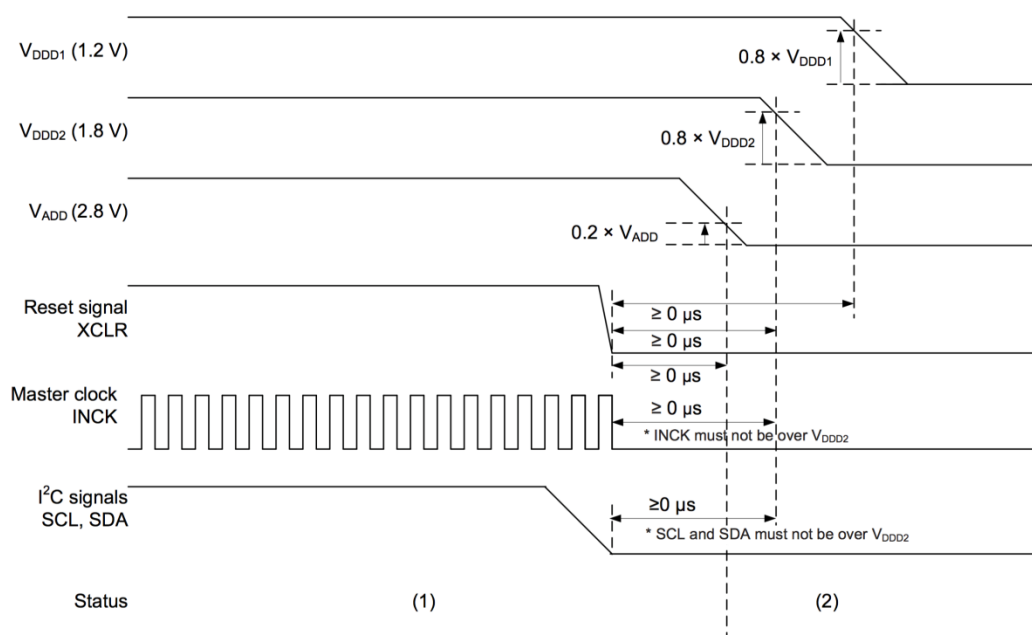
Item	Symbol	Power supply	Min.	Max.	Unit	Remarks
Slew rate	SR	V_{DD1} (1.2 V)	—	25	mV/us	
		V_{DD2} (1.8 V)	—	25	mV/us	
		V_{ADD} (2.8 V)	—	25	mV/us	



Leopard Imaging Inc.

48820 Kato Rd, Suite 100B, Fremont, CA 94538, USA
 Phone: +1-408-263-0988
 Fax: +1-408-217-1960
 Email: sales@leopardimaging.com
 Website: www.leopardimaging.com

Power-off Sequence



Period name	Remarks
(1) Pixel output period	Pixel signal output period
(2) Power-off period	Turn the power supplies off after all input signals are set to "Low" level except SCL and SDA. Set SCL and SDA to "Low" level at the same time with turning off the power supply of V_{DD2}. There are no constraints of the power-off sequence with V_{ADD}, V_{DD1}, and V_{DD2}.



Leopard Imaging Inc.

48820 Kato Rd, Suite 100B, Fremont, CA 94538, USA
 Phone: +1-408-263-0988
 Fax: +1-408-217-1960
 Email: sales@leopardimaging.com
 Website: www.leopardimaging.com