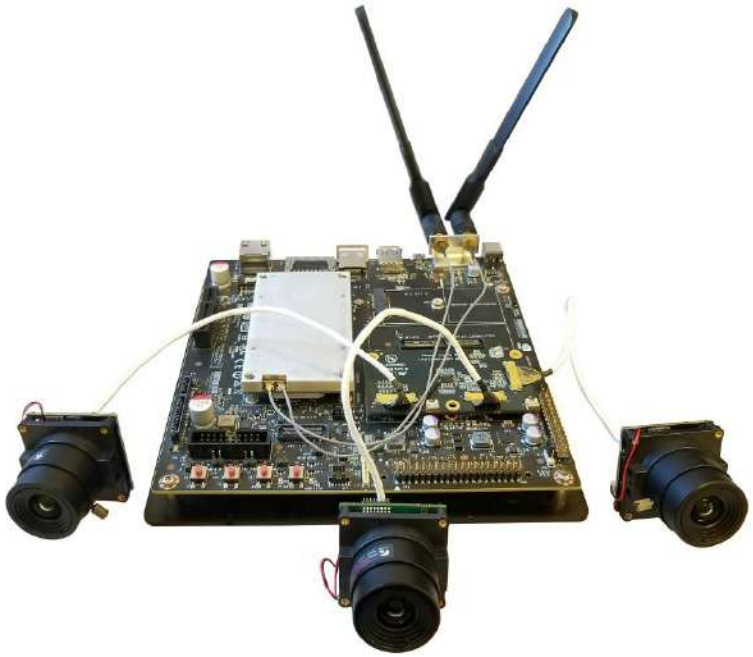
LEOPARD IMAGING INC
Rev 1.0

LI-JETSON-KIT-IMX377CS-X Data Sheet



Key Features

- Compatible with Nvidia Jetson TX1/TX2 Development Kit
- MIPI CSI-2 interface
- Support up to three cameras
- Adapter board:
  LI-JTX1-MIPI-ADPT
  Includes three 4-lane interface
  Support 13M@30fps
- Sony Diagonal 7.81 mm (Type 1/2.3) CMOS Image Sensor IMX377CQT
- Active pixels: 4024H x 3036V
- Pixel size: 1.55 um x 1.55 um
- Color camera
- I-PEX cable part#: FAW-1233-03
- Length of the I-PEX cable: 300mm
- Support multiple length cables
- Connector Part#: 20525-030E-02C
- Support IR cut switch
- Support CS lens
- Provide customization services
- Part#:

(1 cam) LI-JETSON-KIT-IMX377CS
(2 cam) LI-JETSON-KIT-IMX377CS-D
(3 cam) LI-JETSON-KIT-IMX377CS-T

Lens Spec

- Model: ES0522F.IR
- Focal length: 5.0 mm
- Aperture, F/#: 2.2
- FOV (D/H/V): 87° / 76° /43°
- TV Distortion: < -8%
- Mount Type: CS

BOM

Nvidia TX1/TX2 Development Kit not included

#	Items	QTY
1	LI-JTX1-MIPI-ADPT	1
2	LI-IMX377-MIPI-CS	1,2 or 3
3	FAW-1233-03 cable	1,2 or 3

Leopard Imaging Inc.
1130 Cadillac Ct., Milpitas, CA 95035, USA
Phone: +1-408-263-0988
Fax: +1-408-217-1960
Email: sales@leopardimaging.com
Website: www.leopardimaging.com

LI-JETSON-KIT-IMX377CS

BOM

#	Items	QTY
1	LI-JTX1-MIPI-ADPT	1
2	LI-IMX377-MIPI-CS	1
3	FAW-1233-03 cable	1

LI-JETSON-KIT-IMX377CS-D

BOM

#	Items	QTY
1	LI-JTX1-MIPI-ADPT	1
2	LI-IMX377-MIPI-CS	2
3	FAW-1233-03 cable	2

LI-JETSON-KIT-IMX377CS-T

BOM

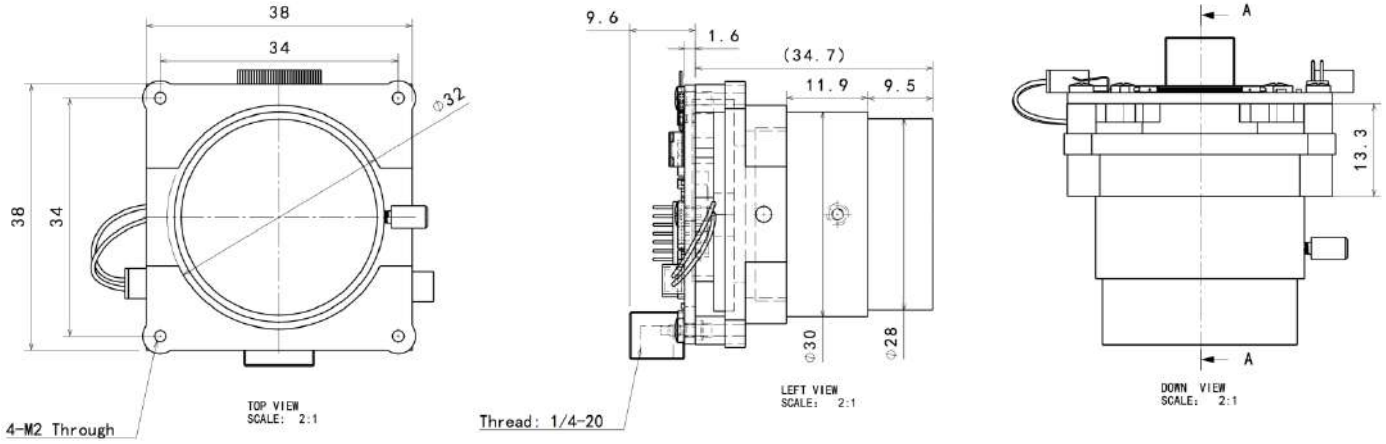
#	Items	QTY
1	LI-JTX1-MIPI-ADPT	1
2	LI-IMX377-MIPI-CS	3
3	FAW-1233-03 cable	3

Leopard Imaging Inc.

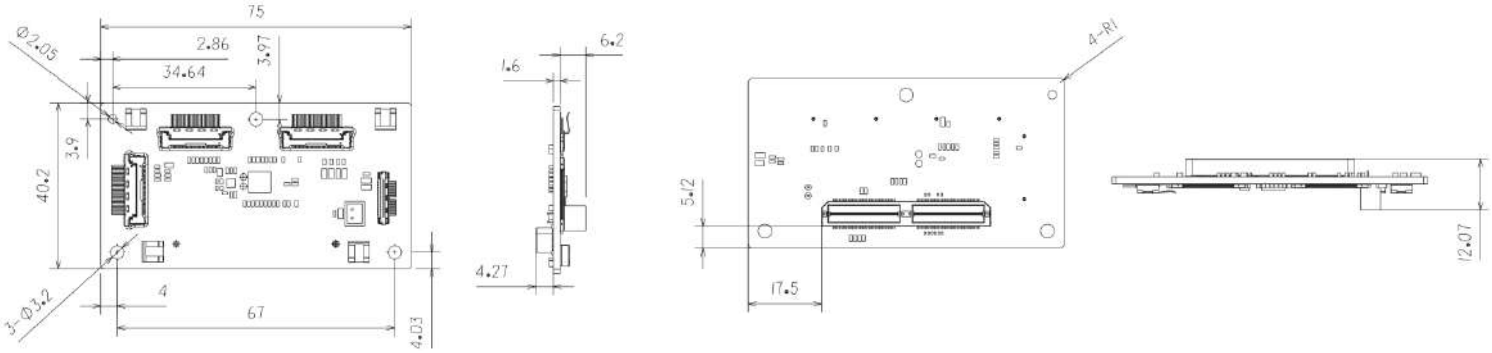
1130 Cadillac Ct., Milpitas, CA 95035, USA
Phone: +1-408-263-0988
Fax: +1-408-217-1960
Email: sales@leopardimaging.com
Website: www.leopardimaging.com

Dimensions

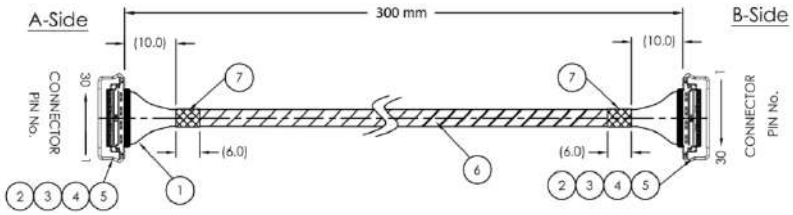
LI-IMX377-MIPI-CS



LI-JTX1-MIPI-ADPT



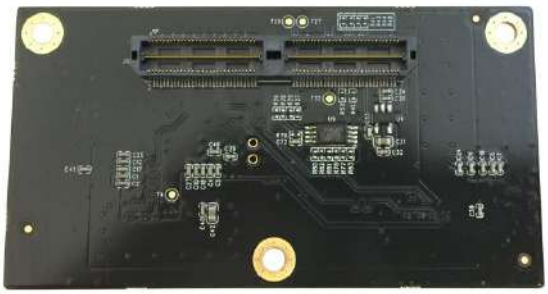
FAW-1233-03



Leopard Imaging Inc.

1130 Cadillac Ct., Milpitas, CA 95035, USA
Phone: +1-408-263-0988
Fax: +1-408-217-1960
Email: sales@leopardimaging.com
Website: www.leopardimaging.com

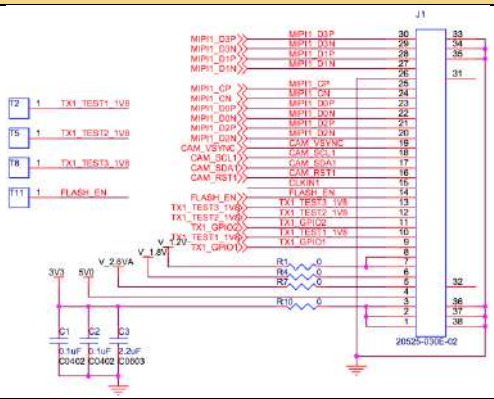
LI-JTX1-MIPI-ADPT



Interfaces

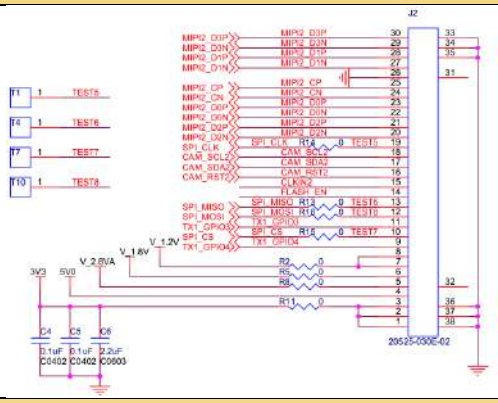
Interface J1

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



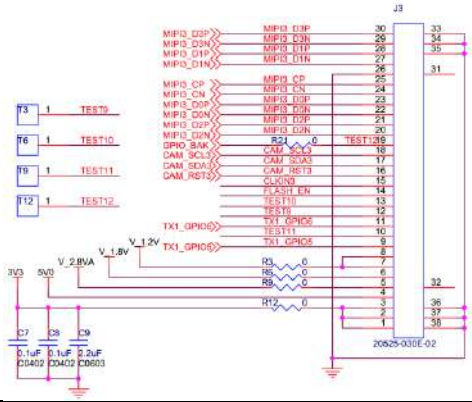
Interface J2

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



Interface J3

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

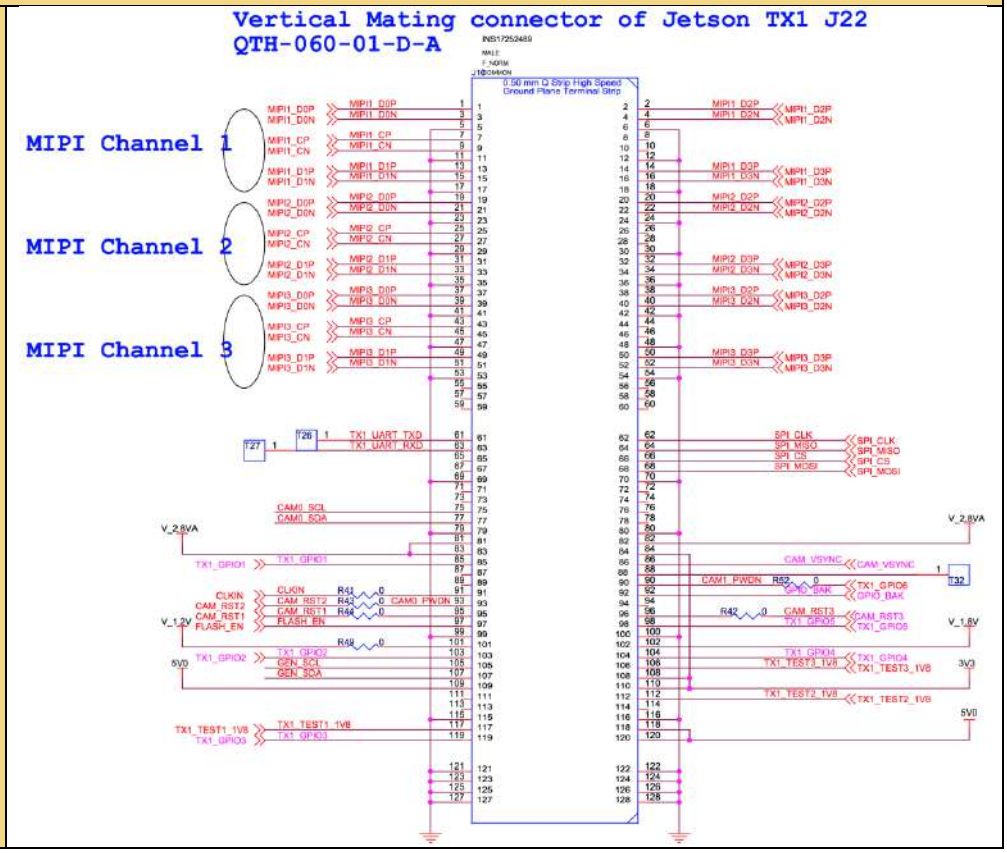


Leopard Imaging Inc.

1130 Cadillac Ct., Milpitas, CA 95035, USA
Phone: +1-408-263-0988
Fax: +1-408-217-1960
Email: sales@leopardimaging.com
Website: www.leopardimaging.com

Interface J10

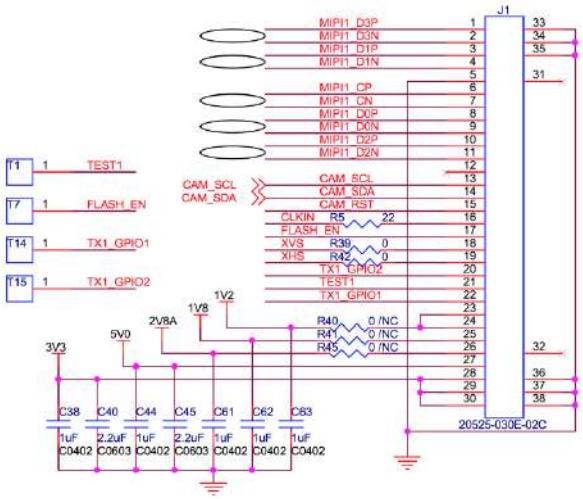
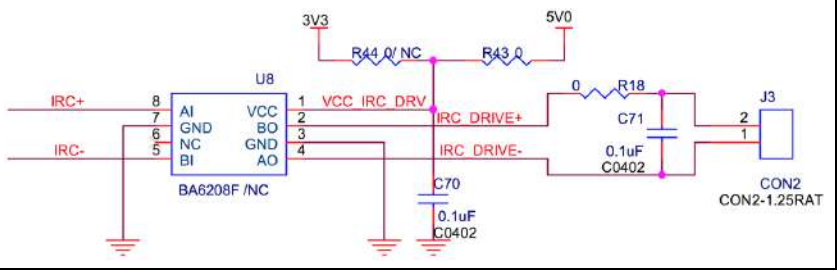
- Part#: QTH-060-01-L-D-A
- Number of Positions: 120
- Number of Rows: 2
- Pitch: 0.5 mm



Leopard Imaging Inc.

1130 Cadillac Ct., Milpitas, CA 95035, USA
Phone: +1-408-263-0988
Fax: +1-408-217-1960
Email: sales@leopardimaging.com
Website: www.leopardimaging.com

LI-IMX377-MIPI-CS

Camera Spec	
Image Sensor	Sony Diagonal 7.81 mm (Type 1/2.3) CMOS Image Sensor IMX377CQT
Optical format	1/2.3”
Number of active pixels	4024 (H) x 3036 (V)
Pixel size	1.55um (H) x 1.55um (V)
Color or Mono	Color
Interface	MIPI interface
Lens mount	CS
IR switcher	Support
Weight	56 g
Interfaces	
Interface J1: ▪ 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	

Leopard Imaging Inc.

1130 Cadillac Ct., Milpitas, CA 95035, USA
Phone: +1-408-263-0988
Fax: +1-408-217-1960
Email: sales@leopardimaging.com
Website: www.leopardimaging.com

Absolute Maximum Ratings

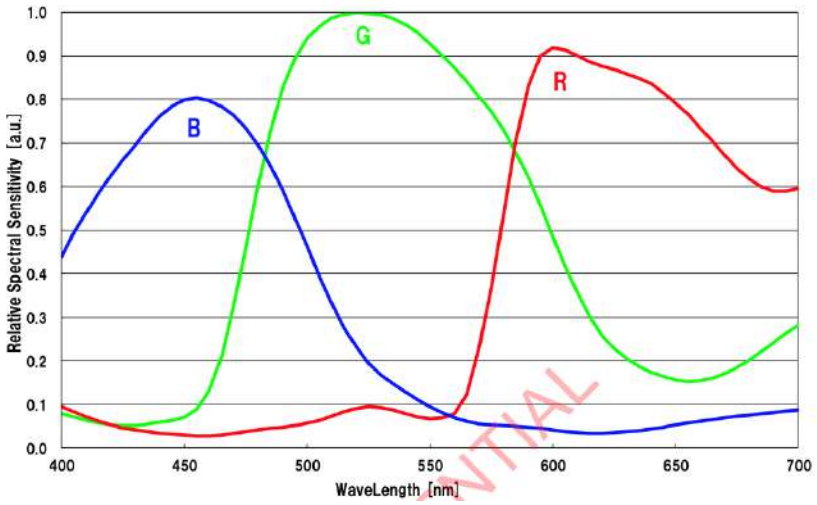
◆ Supply voltage (Analog)	V_{ADD} *1	–0.3 to +3.3	V
◆ Supply voltage (Digital 1)	V_{DDD1} *2	–0.5 to +2.0	V
◆ Supply voltage (Digital 2)	V_{DDD2} *3	–0.5 to +3.3	V
◆ Input voltage (Digital)	V_I	–0.3 to V_{DDD2} + 0.3	V
◆ Output voltage (Digital)	V_O	–0.3 to V_{DDD2} + 0.3	V
◆ Guaranteed operating temperature	T_{OPR}	–10 to +75	˚C
◆ Storage guarantee temperature	T_{STG}	–30 to +80	˚C
◆ Performance guarantee temperature	T_{SPEC}	–10 to +60	˚C

Recommended Operating Conditions

◆ 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
◆ Output voltage (Digital)	V_O	–0.1 to V_{DDD2} + 0.1	V

*1 V_{ADD}: V_{DD}SUB, V_{DD}HCM, V_{DD}HPX, V_{DD}HDA, V_{DD}HCP (2.8 V power supply)
*2 V_{DDD1}: V_{DD}LCN1 to 2, V_{DD}LSC1 to 2, V_{DD}LPL1 to 3, V_{DD}LIF1 to 2 (1.2 V power supply)
*3 V_{DDD2}: V_{DD}MIO (1.8 V power supply)

Spectral Sensitivity Characteristics



Leopard Imaging Inc.
1130 Cadillac Ct., Milpitas, CA 95035, 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 Variable Range

(V_{ADD} = 2.9 V, V_{DDD1} = 1.3 V, V_{DDD2} = 1.9 V, Tj = 60 ˚C, Reference Gain (0 dB), approximately 12.35 M pixels readout (MODE0), 34.97 frame/s)

Item	Symbol	Min.	Typ.	Max.	Unit	Remarks
Current consumption (Analog)	I_{ADD}	—	—	91	mA	
Current consumption (Digital 1)	I_{DDD1}	—	—	256	mA	
Current consumption (Digital 2)	I_{DDD2}	—	—	1	mA	
Standby current (Analog)	I_{ADDSTB}	—	—	150	μA	In the dark
Standby current (Digital 1)	$I_{DDD1STB}$	—	—	40	mA	In the dark
Standby current (Digital 2)	$I_{DDD2STB}$	—	—	50	μA	In the dark
PGA gain variable range	PGAG	0	—	27	dB	

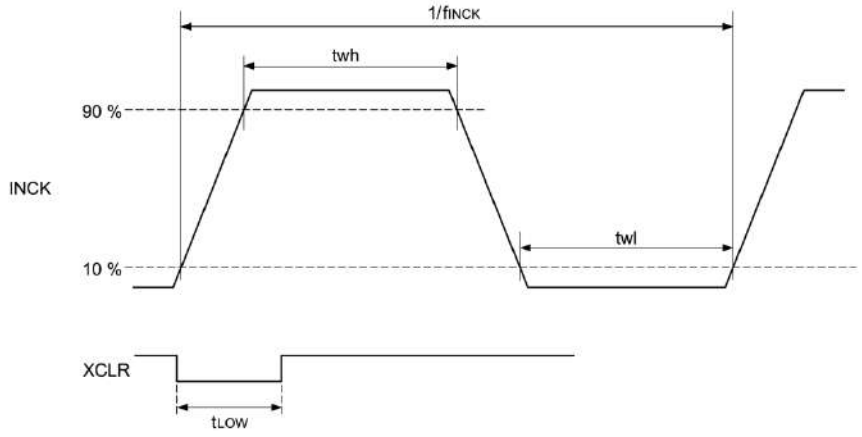
Supply Voltage and I/O Voltage

Item		Pins	Symbol	Min.	Typ.	Max.	Unit
Supply voltage	Analog	V_{DD}SUB, V_{DD}HCM, V_{DD}HPX, V_{DD}HDA, V_{DD}HCP	V_{ADD}	2.70	2.80	2.90	V
	Digital 1	V_{DD}LCN1 to 2, V_{DD}LSC1 to 2, V_{DD}LPL1 to 3, V_{DD}LIF1 to 2	V_{DDD1}	1.10	1.20	1.30	V
	Digital 2	V_{DD}MIO	V_{DDD2}	1.70	1.80	1.90	V
Digital input voltage		SDA, SCL	V_{IH1}	0.7 × V_{DDD2}	—	1.9	V
			V_{IL1}	–0.3	—	0.3 × V_{DDD2}	V
		XCLR, INCK	V_{IH2}	0.65 × V_{DDD2}	—	V_{DDD2} + 0.3	V
			V_{IL2}	–0.3	—	0.35 × V_{DDD2}	V

1130 Cadillac Ct., Milpitas, CA 95035, USA
Phone: +1-408-263-0988
Fax: +1-408-217-1960
Email: sales@leopardimaging.com
Website: www.leopardimaging.com

AC Characteristics

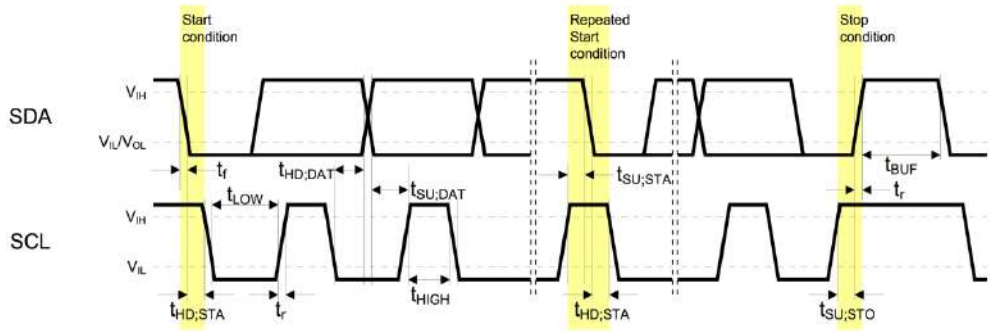
INCK, XCLR



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

1130 Cadillac Ct., Milpitas, CA 95035, USA
Phone: +1-408-263-0988
Fax: +1-408-217-1960
Email: sales@leopardimaging.com
Website: www.leopardimaging.com

I²C Communication



I²C Specification

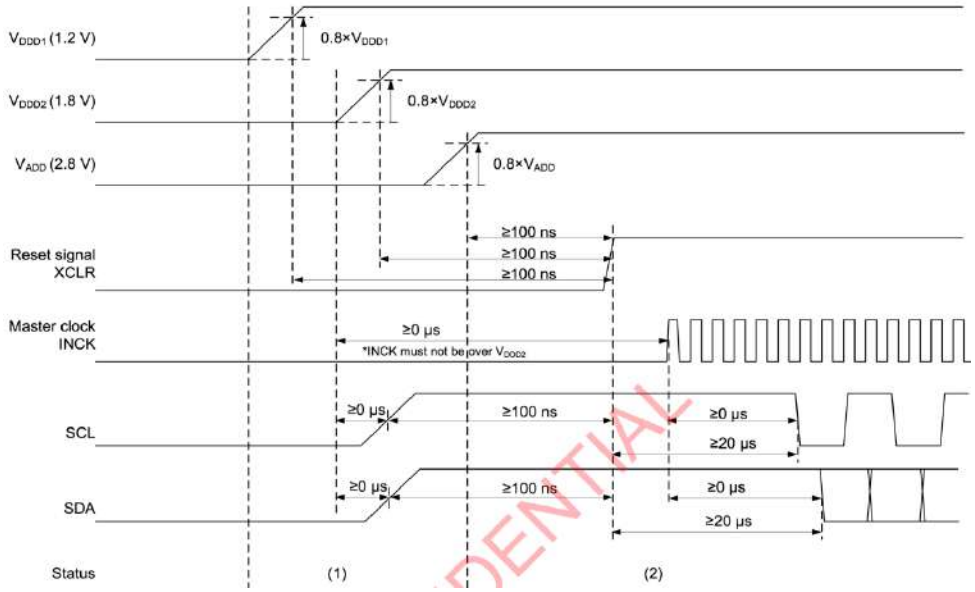
Item	Symbol	Min.	Typ.	Max.	Unit	Remarks
Low level input voltage	V_{IL}	-0.3	—	0.3 × V_{DDD2}	V	
High level input voltage	V_{IH}	0.7 × V_{DDD2}	—	1.9	V	
Low level output voltage	V_{OL}	0	—	0.2 × V_{DDD2}	V	V_{DDD2} < 2 V,Sink 3 mA
Output fall time	tof	—	—	250	ns	Load 10 pF to 400 pF, 0.7 × V_{DDD2} to 0.3 × V_{DDD2}
Input current	Ii	-10	—	10	μA	0.1 × V_{DDD2} to 0.9 × V_{DDD2}
Input capacitance of SCL / SDA	Ci	—	—	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

1130 Cadillac Ct., Milpitas, CA 95035, USA
Phone: +1-408-263-0988
Fax: +1-408-217-1960
Email: sales@leopardimaging.com
Website: www.leopardimaging.com

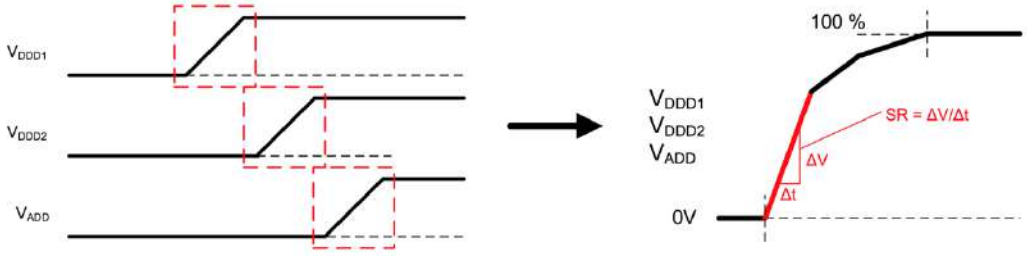
Power-on Sequence



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_{DDD1} and V_{DDD2}.
(2) Register communication period for standby cancel	Wait 100 ns after the last power supply in V_{ADD}, V_{DDD1} and V_{DDD2}. Then set XCLR to "H" and start the standby cancel sequence.

Slew Rate Limitation of Power-on Sequence

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



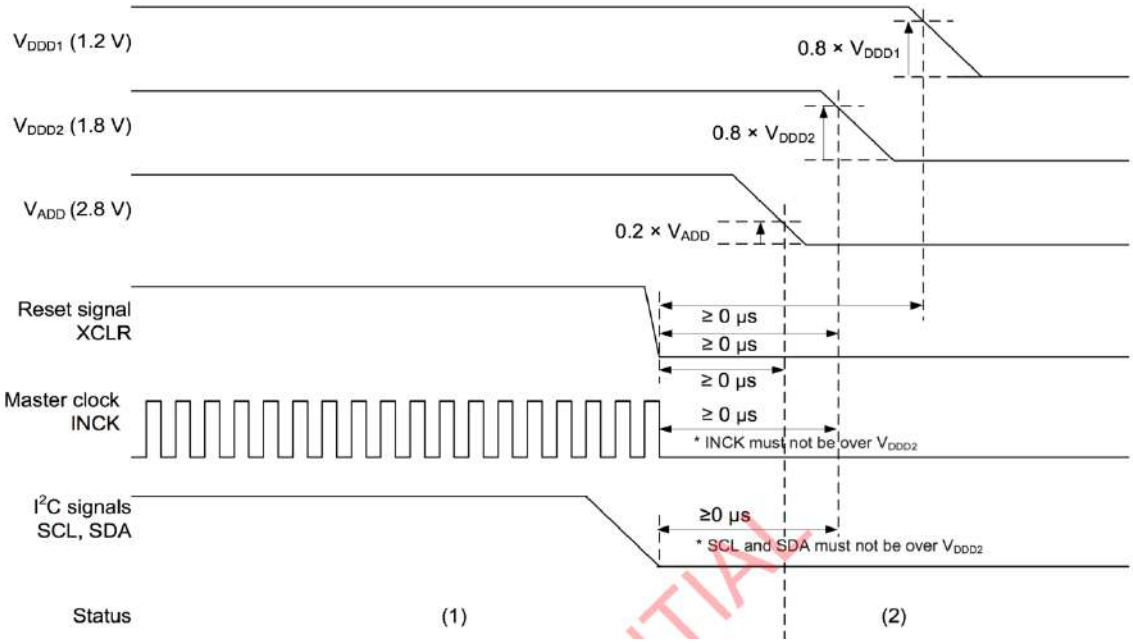
Slew rate of power supply

Item	Symbol	Power supply	Min.	Max.	Unit	Remarks
Slew rate	SR	V_{DDD1} (1.2 V)	—	25	mV/µs	
		V_{DDD2} (1.8 V)	—	25	mV/µs	
		V_{ADD} (2.8 V)	—	25	mV/µs	

Leopard Imaging Inc.
1130 Cadillac Ct., Milpitas, CA 95035, USA
Phone: +1-408-263-0988
Fax: +1-408-217-1960
Email: sales@leopardimaging.com
Website: www.leopardimaging.com

Power-off Sequence

Make sure that all input signals are set to LOW level in the area of (2).



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_{DDD2}. There are no constraints of the power-off sequence with V_{ADD}, V_{DDD1}, and V_{DDD2}.

1130 Cadillac Ct., Milpitas, CA 95035, USA
Phone: +1-408-263-0988
Fax: +1-408-217-1960
Email: sales@leopardimaging.com
Website: www.leopardimaging.com