



LEOPARD IMAGING INC

LI-OV4689-MIPI

Data Sheet

Key Features

- OmniVision 1/3" CMOS 4M Image Sensor OV4689
- Optical format: 1/3"
- Active pixels: 2688H x 1520V
- Pixel size: 2.0 um x 2.0 um
- Output format: 10-bit RAW
- Color camera
- sensitivity: 1900 mV/Lux-sec
- Support M12 lens
- Module Size: 26mm x 18mm
- Weight: 2 g
- Part#: **LI-OV4689-MIPI**



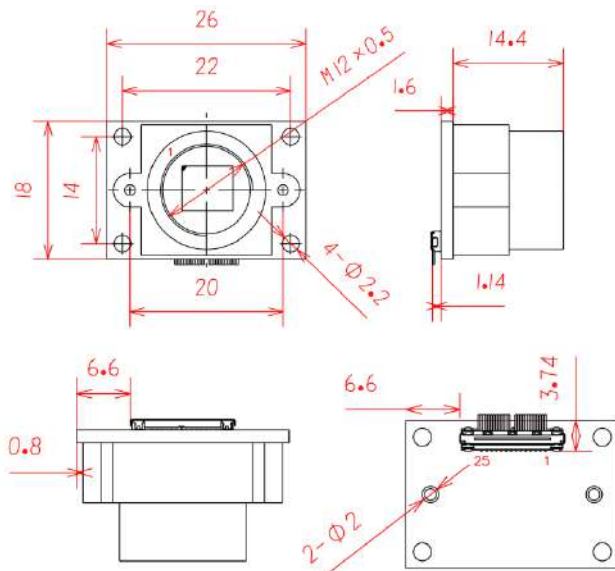
Interface

- Part#: 20498-026E-41
- Number of Positions: 26
- Shell Plating: Sn
- Vacuum Clip: With

Default Lens Spec

- Part#: YC-155N
- Sensor size: 1/3"
- Focal Length: 2.8 mm
- Aperture, F/#: 2.0
- Built in 650 nm IR cut filter
- FOV (D/H/V): 109 °/88 °/72 °
- TV Distortion: < 12%
- TTL: 23.07 mm
- BFL/MBFL: 5.81 mm/ 5.61 mm
- Mount: M12

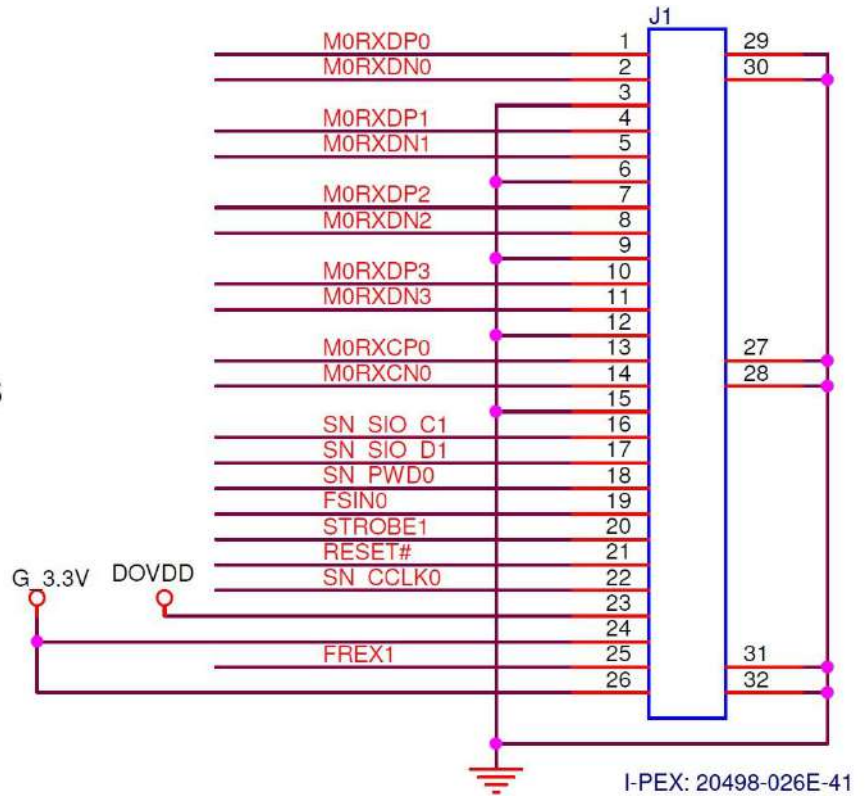
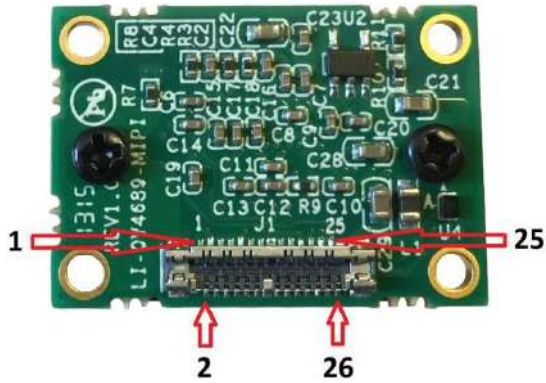
Dimensions



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Pin Assignment



Absolute Maximum Ratings

parameter	absolute maximum rating ^a	
ambient storage temperature	-40°C to +125°C	
supply voltage (with respect to ground)	V _{DD-A}	4.5V
	V _{DD-D}	3V
	V _{DD-IO}	4.5V
electro-static discharge (ESD)	human body model	2000V
	machine model	200V
all input/output voltages (with respect to ground)	-0.3V to V _{DD-IO} + 1V	
I/O current on any input or output pin	± 200 mA	
peak solder temperature (10 second dwell time)	245°C	

- a. exceeding the absolute maximum ratings shown above invalidates all AC and DC electrical specifications and may result in permanent damage to the device. Exposure to absolute maximum rated conditions for extended periods may affect device reliability.



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DC characteristics (-30 °C < T_J < 85 °C)

symbol	parameter	min	typ	max ^a	unit
supply					
V _{DD-A}	supply voltage (analog)	2.6	2.8	3.0	V
V _{DD-IO}	supply voltage (digital I/O)	1.7	1.8	3.0	V
V _{DD-D}	supply voltage (digital core for 4-lane MIPI up to 1000 Mbps/lane)	1.1	1.2	1.3	V
I _{DD-A}	active (operating) current ^b		40	45	mA
I _{DD-IO}			3	7	mA
I _{DD-D}			120	150	mA
I _{DDS-SCCB-A}	standby (SCCB) current ^c		10	20	μA
I _{DDS-SCCB-IO}			50	70	μA
I _{DDS-SCCB-D}			1	20	mA
I _{DDS-PWDNB-A}	standby (PWDNB) current ^c		10	20	μA
I _{DDS-PWDNB-IO}			20	30	μA
I _{DDS-PWDNB-D}			0.2	20	mA
I _{DDS-XSHUTDOWN-A}	standby (XSHUTDOWN) current ^c		0.3	2	μA
I _{DDS-XSHUTDOWN-IO}			0.3	2	μA
I _{DDS-PWDNB-D}			0.2	20	mA
I _{DDS-XSHUTDOWN-A}	standby (XSHUTDOWN) current ^c		0.3	2	μA
I _{DDS-XSHUTDOWN-IO}			0.3	2	μA
I _{DDS-XSHUTDOWN-D}			2	8	μA
digital inputs (typical conditions: AVDD = 2.8V, DVDD = 1.2V, DOVDD = 1.8V)					
V _{IL}	input voltage LOW			V _{DD-IO} × 0.3	V
V _{IH}	input voltage HIGH	V _{DD-IO} × 0.7			V
C _{IN}	input capacitor			10	pF
digital outputs (standard loading 25 pF)					
V _{OH}	output voltage HIGH	V _{DD-IO} × 0.9			V
V _{OL}	output voltage LOW			V _{DD-IO} × 0.1	V
serial interface inputs					
V _{IL} ^d	SIOC and SIOD	-0.5	0	0.54	V
V _{IH}	SIOC and SIOD	1.28	1.8	3.0	V

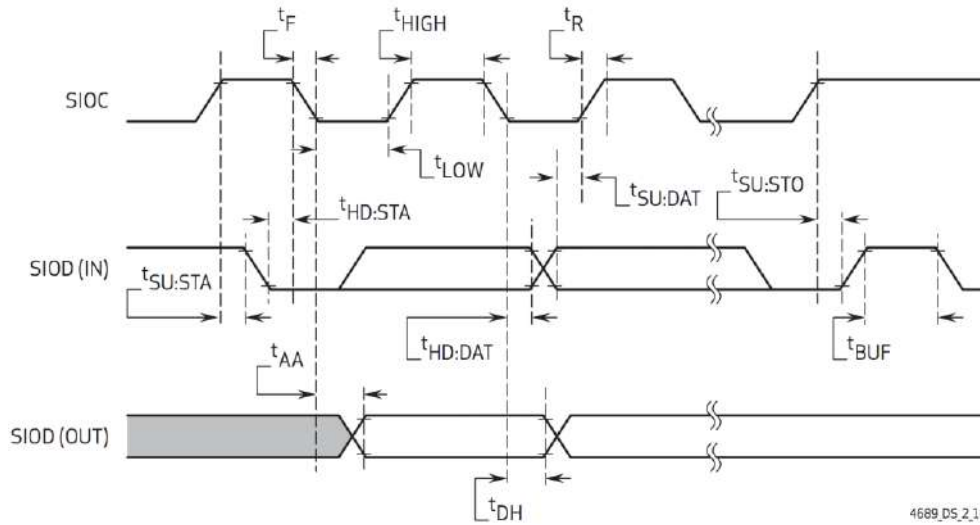
- maximum active current is measured under typical supply voltage
- DVDD is provided by external regulator for lower power consumption. DVDD and EVDD are tied together. DOVDD = 1.8V
- standby current is measured at room temperature with external clock off
- based on DOVDD = 1.8V



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SCCB interface timing



symbol	parameter	min	typ	max	unit
f_{SIOC}	clock frequency			400	kHz
t_{LOW}	clock low period	1.3			μs
t_{HIGH}	clock high period	0.6			μs
t_{AA}	SIOC low to data out valid	0.1		0.9	μs
t_{BUF}	bus free time before new start	1.3			μs
$t_{HD:STA}$	start condition hold time	0.6			μs
$t_{SU:STA}$	start condition setup time	0.6			μs
$t_{HD:DAT}$	data in hold time	0			μs
$t_{SU:DAT}$	data in setup time	0.1			μs
$t_{SU:STO}$	stop condition setup time	0.6			μs
t_R, t_F	SCCB rise/fall times			0.3	μs
t_{DH}	data out hold time	0.05			μs

- SCCB timing is based on 400kHz mode
- timing measurement shown at the beginning of the rising edge and/or of the falling edge signifies 30%, timing measurement shown in the middle of the rising/falling edge signifies 50%, timing measurement shown at the beginning of the rising edge and/or of the falling edge signifies 70%



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Timing characteristics

symbol	parameter	min	typ	max	unit
oscillator and clock input					
f_{OSC}	frequency (EXTCLK) ^a	6	24	64	MHz
t_r, t_f	clock input rise/fall time			(see footnote ^b)	ns
	clock input duty cycle	45	50	55	%

a. for input clock range 6~64MHz, the OV4689 can tolerate input clock period jitter up to 600ps peak-to-peak

b. for clock input rise/fall time, max is 27% of whole clock period

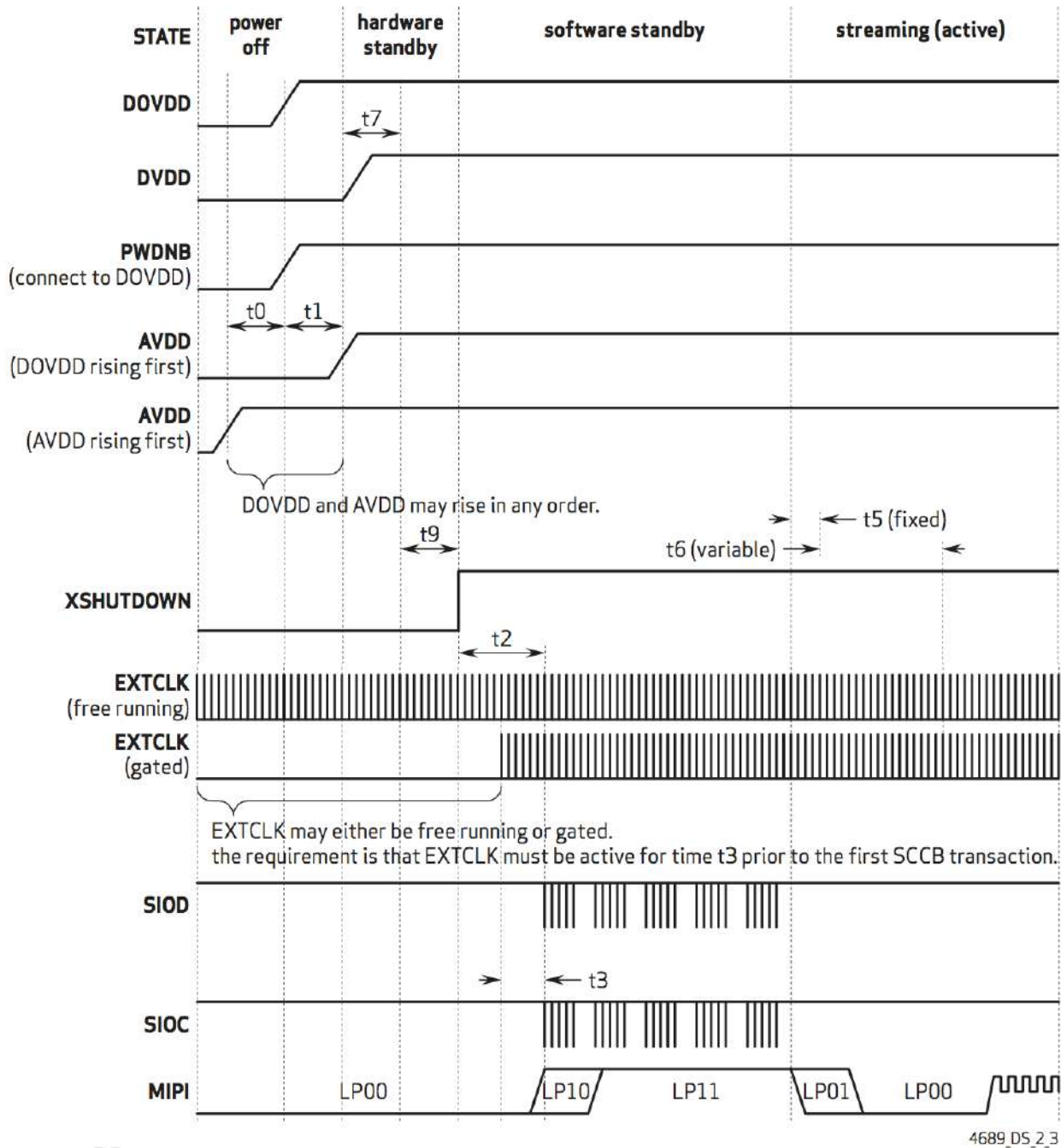
Power up sequence

case	XSHUTDOWN	PWDNB	power up sequence requirement
1	GPIO	DOVDD	Refer to figure 2-3 1. DOVDD rising must occur before DVDD rising 2. AVDD rising can occur before or after DOVDD rising 3. AVDD must occur before DVDD 4. XSHUTDOWN rising must occur after AVDD, DOVDD and DVDD are stable
2	DOVDD	GPIO	Refer to figure 2-4 1. AVDD rising occurs before DOVDD rising 2. DOVDD rising occurs before DVDD 3. PWDNB rising occurs after DVDD rising

constraint	label	min	max	unit
AVDD rising – DOVDD rising	t0	0	∞	ns
DOVDD rising – AVDD rising	t1			ns
XSHUTDOWN rising – first SCCB transaction	t2	8192		EXTCLK cycles
minimum number of EXTCLK cycles prior to the first SCCB transaction	t3	8192		EXTCLK cycles
entering streaming mode – first frame start sequence (fixed part)	t5		10	ms
entering streaming mode – first frame start sequence (variable part)	t6	delay is the exposure time value		lines
AVDD or DOVDD, whichever is last – DVDD	t7	0	∞	ns
DVDD – PWDNB rising	t8	0	∞	ns
DVDD – XSHUTDOWN rising	t9	0	∞	ns



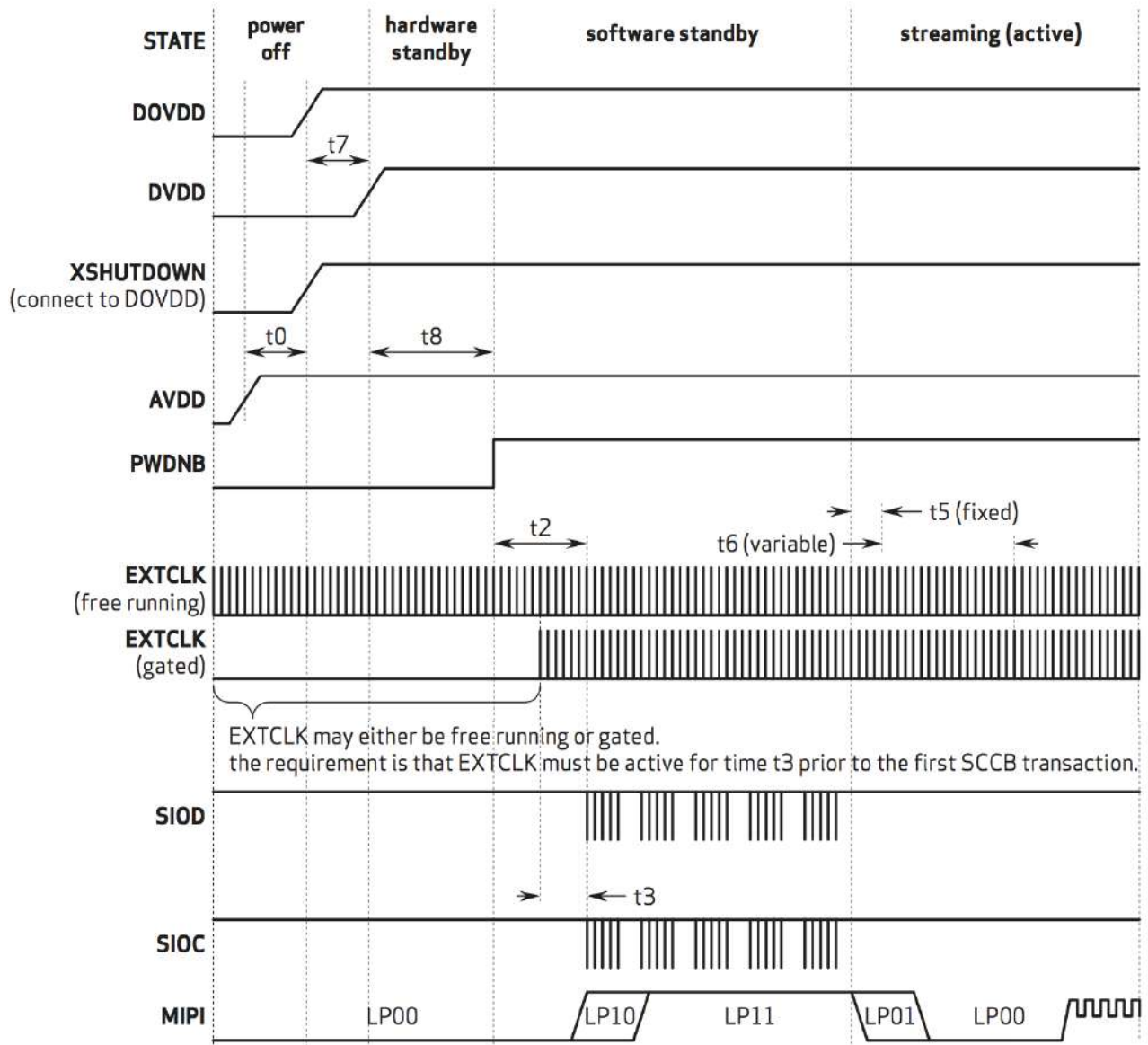
Case 1 (figure2-3)



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Case 2 (figure2-4)



4689_DS_2_4



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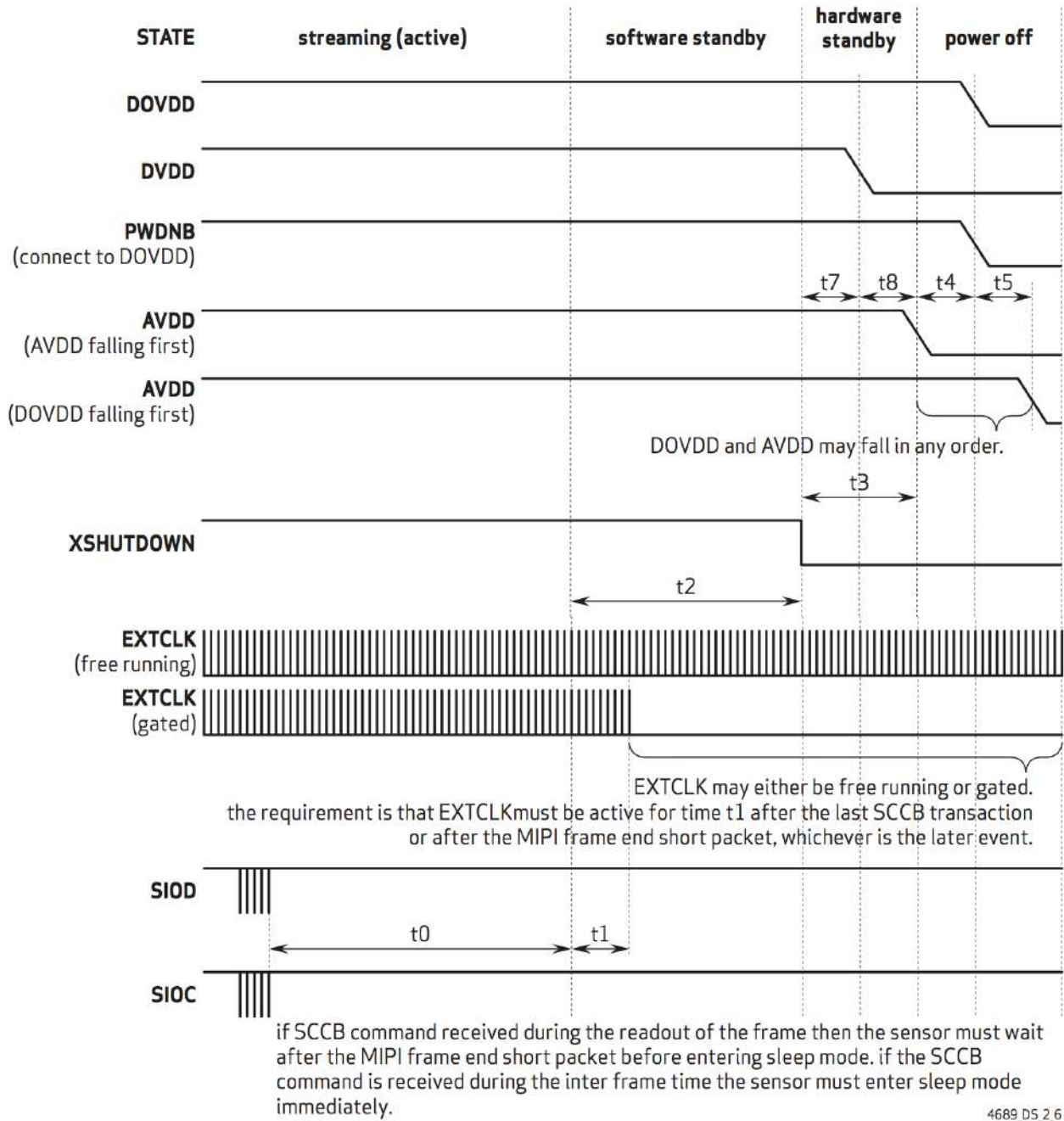
Power down sequence

case	XSHUTDOWN	PWDNB	power down sequence requirement
1	GPIO	DOVDD	Refer to figure 2-6 1. software standby recommended 2. pull XSHUTDOWN low for minimum power consumption 3. cut off DVDD 4. pull AVDD and DOVDD low in any order
2	DOVDD	GPIO	Refer to figure 2-7 1. software standby is needed 2. pull PWDNB low for low power consumption 3. cut off DVDD 4. pull DOVDD low (XSHUTDOWN connected to DOVDD) 5. pull AVDD low

constraint	label	min	max	unit
enter software standby SCCB command device in software standby mode	t0			
			when a frame of MIPI data is output, wait for the MIPI end code before entering the software for standby; otherwise, enter the software standby mode immediately	
minimum of EXTCLK cycles after the last SCCB transaction or MIPI frame end	t1	512		EXTCLK cycles
last SCCB transaction or MIPI frame end, XSHUTDOWN falling	t2	512		EXTCLK cycles
XSHUTDOWN falling – AVDD falling or DOVDD falling whichever is first	t3	0.0		ns
AVDD falling – DOVDD falling	t4		AVDD and DOVDD may fall in any order, the falling separation can vary from 0 ns to infinity	ns
DOVDD falling – AVDD falling	t5			ns
PWDNB falling – DOVDD falling	t6	0.0		ns
XSHUTDOWN falling – DVDD falling	t7	0.0		ns
DVDD falling – AVDD falling or DOVDD falling whichever is first	t8	0.0		ns
PWDNB falling – DVDD falling	t9	0.0		ns



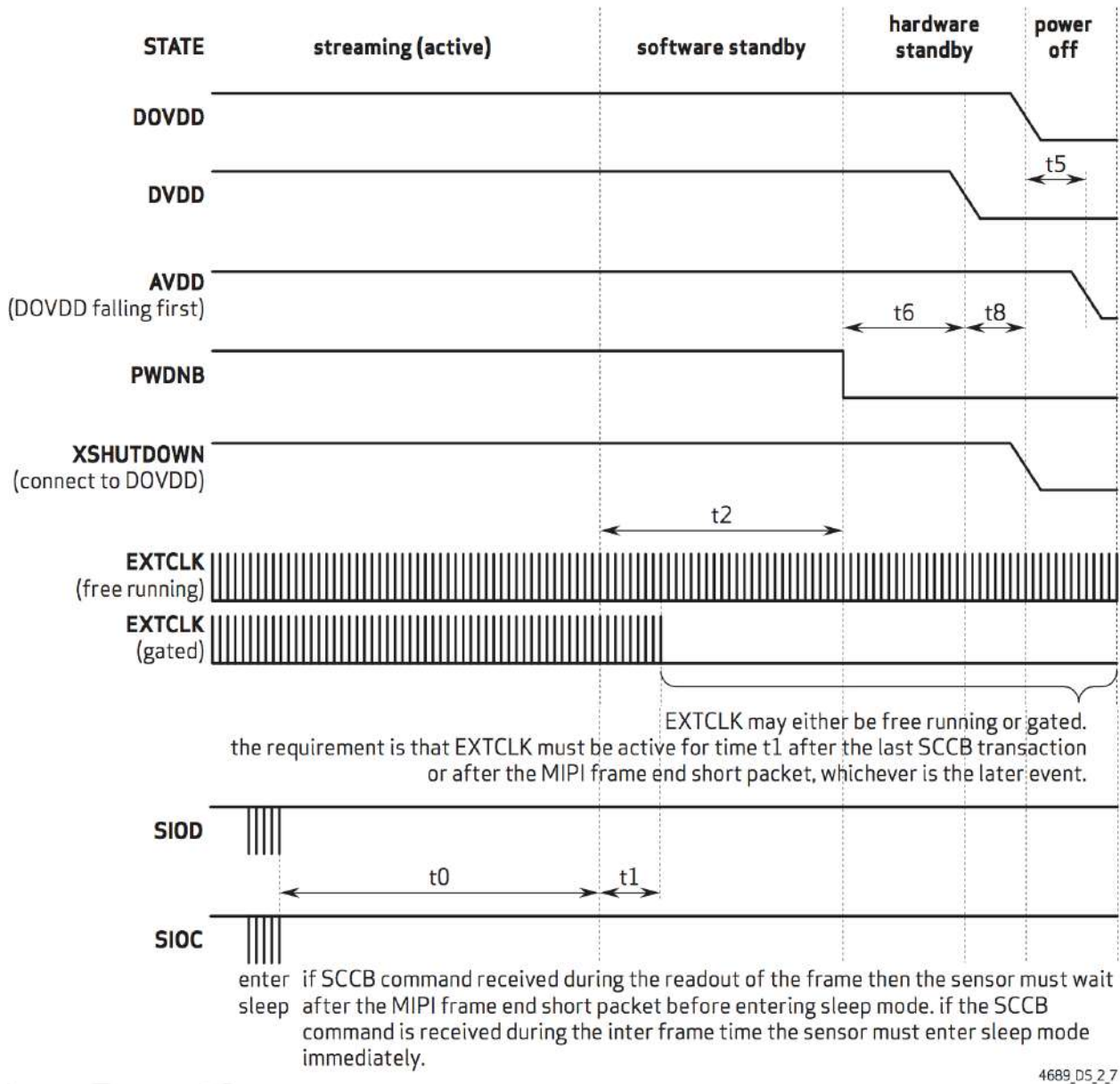
Case 1 (figure2-5)



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Case 2 (figure2-6)



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