Terms

This section describes the terms used in this document.

Term	Description
SPAD pixel	A SPAD pixel is the smallest configuration pixel size. It corrresponds to a single photon avalanche diode (SPAD).
Element	An element based on three shared SPAD pixels
Macro pixel	A Macro pixel is an array of SPAD pixels that can be read out simultaneously. The valid Macro pixel horizontal size is between 3[SPAD pixel] and 21[SPAD pixel] (columns). The valid Macro pixel vertical size is between 3[SPAD pixel] and 6[SPAD pixel] (rows).

1. Description

The IMX479 is a diagonal 15.8 mm (Type 1/1") diagonal Single Photon Avalanche Diode (SPAD) ToF Depth Sensor with signal-amplifying pixels. This chip features line-scanning mode. By arraying a large number of SPADs and summing their outputs, the sensor achieves a measurement distance of up to 300 m. It is a high-precision distance sensor that measures with 5 cm range resolution from short-range to long-range distances, thereby contributing to improved LiDAR detection and recognition performance. The sensor light emission timing control function is able to compensate for the delay in timing between laser emission and reception. The sensor ambient light reduction function ensures that it does not saturate even under sunlight and can achieve distance measurements with a high dynamic range. Equipped with echo and peak detection functions, ranging data output modes, digital signal processing, and more, the sensor is optimized to meet the performance and functionality required by LiDARs.

2. Features and Functions

- Single Photon Avalanche Diode (SPAD) with signal-amplifying pixels
- Single Photon Avalanche Diode with signal-amplifying pixels
- Number of effective pixels
  - 105 (H) ×1560 (V) approx. 164K SPAD pixels
- CRA: 0 degrees
- Input frequencies: 16, 18, 20, 24, 25, 27, 30MHz
- External communication interfaces
  - I2C communication
  - SPI communication
- Output interface
  - MIPI CSI-2 serial output (4 lanes)
- Readout modes
  - Line type scanning system
- Output formats
  - Ranging mode
    (RAW12,RAW8, ToF width: 2,024 bins, gray scale width: 10 bits)
  - Echo mode
    (RAW12,RAW8, ToF width: 2,024 bins, gray scale width: 10 bits)
  - Histogram mode
    (RAW12,RAW8, ToF width: 2,024 bins, gray scale width: 10 bits)
- Synchronous control
- Active SPAD-pixel control
- Laser drive timing signal generation
- Signal processing timing control
- SPAD-pixel signal reading
- Macro-pixel size selection
- Sampling
- SPAD-pixel binning
- V-direction area setting
- Histogram generation
- Context switching
- Normal operation
- Metadata generation
- Ambient light acquisition
- AEC-Q100 Grade 2 qualified
- ASIL B supported

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3. Element Structure

- ◆ SPAD depth sensor
- ◆ Image size: Diagonal 15.8 mm (Type 1/1)
- ◆ SPAD Pixel unit cell size: 10.08 µm (H) × 10.08 µm (V)
- ◆ Macro Pixel size 3 (H) ~21 (H) × 3 (V) or 6 (V) SPAD pixels
- ◆ Number of physical active SPAD Pixels *1: 105 (H) x 1572 (V) Approx. 164K SPAD Pixels
- ◆ Number of effective SPAD Pixels: 105 (H) x 1560 (V) Approx. 163K SPAD Pixels
- ◆ Substrate material Silicon

4. Absolute Maximum Ratings

Table 4-1 Absolute Maximum Rating

Item	Symbol	Min.	Max.	Unit	Remarks
SPAD breakdown voltage power supply	VOP *1	-26.0	+0.3	V	-
SPAD excess voltage power supply	Vex1 *2	-0.3	4.0	V	-
Digital power supply	VDDD *3	-0.3	1.5	V	-
Analog power supply	VDDA *4	-0.3	4.0	V	-
I/O power supply	VDDIO *5	-0.3	2.5	V	-

*1 VOP: VRLD
*2 Vex1: VDDHPF
*3 VDDD: VDDLSC, VDDLPL1, VDDLPL2, VDDLIF
*4 VDDA :VDDHAN
*5 VDDIO: VDDMIO, VDDMIF

5. Recommended Driving Conditions

Table 5-1 Recommended Driving Conditions

Item	Symbol	Min.	Typ.	Max.	Unit	Remarks
SPAD breakdown voltage power supply	VOP *1	-24.0	-20.5	-17.0	V	
SPAD excess voltage power supply	Vex1 *2	3.15	3.30	3.60	V	
Digital power supply	VDDD *3	1.050	1.125	1.200	V	
Analog power supply	VDDA *4	3.0	3.3	3.6	V	
I/O power supply	VDDIO *5	1.7	1.8	1.9	V	
Operating temperature	Topr	Ta = -40 to + 105 Tj = -40 to + 125			℃	
Storage temperature	Tstg	Ta = -40 to + 125			℃	

*1 VOP: VRLD
*2 Vex1: VDDHPF
*3 VDDD: VDDLSC, VDDLPL1, VDDLPL2, VDDLIF
*4 VDDA :VDDHAN
*5 VDDIO: VDDMIO, VDDMIF

6. Precautions when Using the Products Described in this Manual

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