

am^u Mira016

Datasheet

Published by ams-OSRAM AG

Tobelbader Strasse 30, 8141 Premstaetten, Austria

Phone +43 3136 500-0

ams-osram.com

© All rights reserved

am^u OSRAM

Table of contents

- 1 General description 3
- 2 Specifications & special features 3
- 3 Applications 5
- 4 Block diagram 5
- 5 Ordering information 6
- 6 Revision information 7
- 7 Legal information 8

Mira016 0.16 MP NIR-enhanced global shutter image sensor

1 General description

Mira016 is a compact 0.16 MP NIR-enhanced global shutter image sensor designed for 2D and 3D consumer and industrial machine vision applications. The sensor has a small 2.79 μm pixel size with high sensitivity made possible by a state of the art BSI technology. The sensor has a MIPI CSI-2 interface to allow easy interfacing with a plethora of processors and FPGAs. Due to its small size, configurability and high sensitivity both in visual as well as NIR, the Mira016 is well suited for 2D and 3D applications, which include Active Stereo Vision, Structured Light Vision and AR/VR. High sensitivity in NIR enables increased measurement range and allows overall system power consumption optimization which is key for battery powered consumer and industrial applications.

2 Specifications & special features

Table 1: Key specifications

Parameter	Value	Remark
Active pixels	400 (H) x 400 (V)	
Pixel	2.79 μm x 2.79 μm	BSI stacked technology with high NIR sensitivity and QE coupled with low noise and low cross talk
Optical format	1/11.6"	
Package size (CSP)	1.79mm x 1.79mm	Active area 62% of die size
Shutter type	Voltage domain pipelined global shutter	Supports pipelined exposure and image readout
Quantum efficiency (QE)	95 / 56 / 36%	550 / 850 / 940nm Mono
Supported lens chief ray angle (CRA)	0° to 27°	Also, without shifted microlens available
ADC modes	8-bit 8-bit HS 10-bit 10-bit HS 12-bit	
Max frames	360 fps in 10-bit mode	At full resolution
	200 fps in 12-bit mode	Higher fps settings upon request
	730 fps in 8-bit mode 640 fps in 10-bit mode	Special high-speed mode Limited to 400x300 resolution

Parameter	Value	Remark
Programmable gain	Analog: 1x 2x 4x 8x 16x in 8-bit mode 1x 2x 4x in 10-bit mode 1x 2x in 12-bit mode Digital: in 1/16 th increments	Higher analog gains and finer gain tuning are available upon request
Data interface	MIPI CSI-2 v1.3 DPHY v1.2 1 Data lane 1 Clock lane	1.5 Gbps with data scrambling support

Table 2: Special features

Features	Benefits
High sensitivity and NIR enhanced pixel	High sensitivity and compact pixel size achieved via state-of-the-art BSI technology with NIR enhancement allowing to use lower power illuminators
Context switching	Two register contexts for on-the-fly configuration changes to exposure and readout settings without interrupting the video stream
On-chip processing	- Defect pixel detection and correction on-chip - Image statistics histogram can be output - Event detection - In-pixel background light cancellation - Digital pixel binning - Black sun protection - Flexible ROI selection (incl. mirroring, flipping, cropping & subsampling) - Automatic black level calibration
On-chip advanced power management	Smart powering of on-chip blocks with respect to frame rate and exposure time resulting in extended battery life
On-chip temperature sensor	Accurate temperature reading on junction temperature
Illumination synchronization trigger	Accurate timing between illumination and actual exposure
Fast ADC with analog and digital CDS	Low column FPN, low 1/f noise and high fps

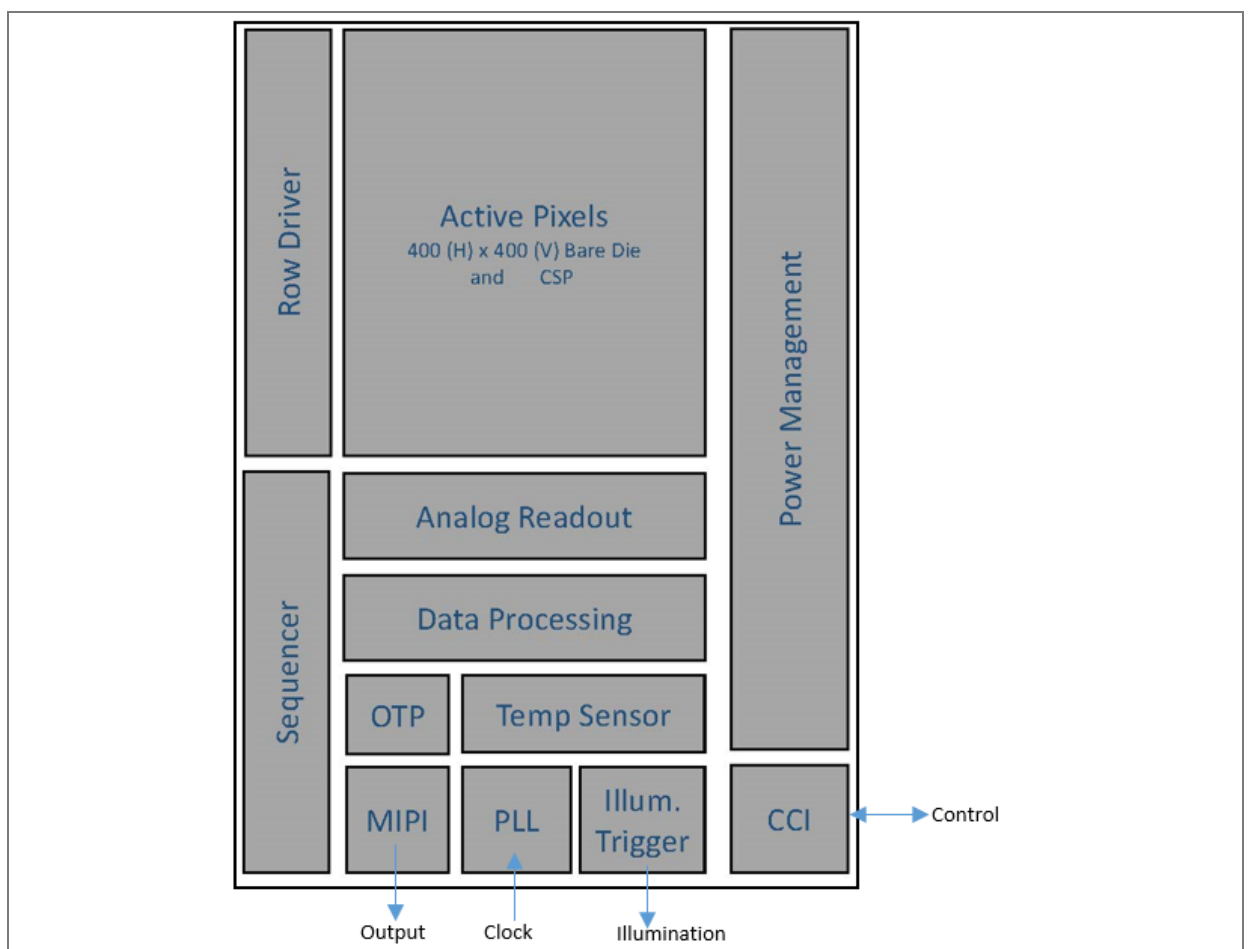
3 Applications

- Facial authentication for mobile devices and points of payments.
- Active stereo and structured light vision (Robotics and other applications).
- Eye, head, hand, environment tracking for AR/VR.

4 Block diagram

The functional blocks of this device are shown below:

Figure 1: Functional blocks of Mira016



5 Ordering information

Product code	Ordering code	Package	Delivery form	Color filter	Delivery quantity
Mira016-3QM1WB FT SE	Q65113A7951	CSP	Reel	Mono	2000 pcs/reel
Mira016-3QM2WB FT SE	Q65113A7962	CSP	Reel	Mono	2000 pcs/reel
Mira016-3QM1D0 RW	Q65113A8228	Bare die	RW		

6 Revision information

Document status	Product status	Definition
Product Preview	Pre-development	Information in this datasheet is based on product ideas in the planning phase of development. All specifications are design goals without any warranty and are subject to change without notice
Preliminary Datasheet	Pre-production	Information in this datasheet is based on products in the design, validation or qualification phase of development. The performance and parameters shown in this document are preliminary without any warranty and are subject to change without notice
Datasheet	Production	Information in this datasheet is based on products in ramp-up to full production or full production which conform to specifications in accordance with the terms of ams-OSRAM AG standard warranty as given in the General Terms of Trade

Other definitions

Draft / Preliminary:
The draft / preliminary status of a document indicates that the content is still under internal review and subject to change without notice. ams-OSRAM AG does not give any warranties as to the accuracy or completeness of information included in a draft / preliminary version of a document and shall have no liability for the consequences of use of such information.

Short datasheet:
A short datasheet is intended for quick reference only, it is an extract from a full datasheet with the same product number(s) and title. For detailed and full information always see the relevant full datasheet. In case of any inconsistency or conflict with the short datasheet, the full datasheet shall prevail.

Changes from previous version to current revision v1-00	Page
Initial production version	
- Page and figure numbers for the previous version may differ from page and figure numbers in the current revision. - Correction of typographical errors is not explicitly mentioned.	

7 Legal information

Copyright & disclaimer

Copyright ams-OSRAM AG, Tobelbader Strasse 30, 8141 Premstaetten, Austria-Europe. Trademarks Registered. All rights reserved. The material herein may not be reproduced, adapted, merged, translated, stored, or used without the prior written consent of the copyright owner.

Devices sold by ams-OSRAM AG are covered by the warranty and patent indemnification provisions appearing in its General Terms of Trade. ams-OSRAM AG makes no warranty, express, statutory, implied, or by description regarding the information set forth herein. ams-OSRAM AG reserves the right to change specifications and prices at any time and without notice. Therefore, prior to designing this product into a system, it is necessary to check with ams-OSRAM AG for current information. This product is intended for use in commercial applications. Applications requiring extended temperature range, unusual environmental requirements, or high reliability applications, such as military, medical life-support or life-sustaining equipment are specifically not recommended without additional processing by ams-OSRAM AG for each application. This product is provided by ams-OSRAM AG "AS IS" and any express or implied warranties, including, but not limited to the implied warranties of merchantability and fitness for a particular purpose are disclaimed.

ams-OSRAM AG shall not be liable to recipient or any third party for any damages, including but not limited to personal injury, property damage, loss of profits, loss of use, interruption of business or indirect, special, incidental or consequential damages, of any kind, in connection with or arising out of the furnishing, performance or use of the technical data herein. No obligation or liability to recipient or any third party shall arise or flow out of ams-OSRAM AG rendering of technical or other services.

Product and functional safety devices/applications or medical devices/applications:

ams-OSRAM AG components are not developed, constructed or tested for the application as safety relevant component or for the application in medical devices. ams-OSRAM AG products are not qualified at module and system level for such application.

In case buyer – or customer supplied by buyer – considers using ams-OSRAM AG components in product safety devices/applications or medical devices/applications, buyer and/or customer has to inform the local sales partner of ams-OSRAM AG immediately and ams-OSRAM AG and buyer and /or customer will analyze and coordinate the customer-specific request between ams-OSRAM AG and buyer and/or customer.

ams OSRAM RoHS and REACH compliance statements for semiconductor products

RoHS compliant: The term "RoHS compliant" means that semiconductor products from ams OSRAM fully comply with current RoHS directives, and China RoHS. Our semiconductor products do not contain any chemicals for all 6 substance categories plus additional 4 substance categories (per amendment [EU2015/863](#)) above the defined threshold limit in the Annex II.

REACH compliant: Semiconductor products from ams OSRAM are free of Substances of Very High Concern (SVHC) according Article 33 of the [REACH Regulation 2006/1907/EC](#); please refer to the Candidate List of Substances of ECHA [here](#).

Important information: The information provided in this statement represents ams OSRAM knowledge and belief as of the date that it is provided. ams OSRAM bases its knowledge and belief on information provided by third parties, and makes no representation or warranty as to the accuracy of such information. We are undertaking efforts to better integrate information from third parties. ams OSRAM has taken and will continue to take reasonable steps to provide representative and accurate information but may not have conducted destructive testing or chemical analysis on incoming materials and chemicals. ams OSRAM and its suppliers consider certain information to be proprietary, and thus CAS numbers and other limited information may not be available for release.

Headquarters

ams-OSRAM AG
Tobelbader Strasse 30
8141 Premstaetten
Austria, Europe
Tel: +43 (0) 3136 500 0

Please visit our website at ams-osram.com

For information about our products go to [Products](#)

For technical support use our [Technical Support Form](#)

For feedback about this document use [Document Feedback](#)

For sales offices and branches go to [Sales Offices / Branches](#)

For distributors and sales representatives go to [Channel Partners](#)