

MT9V024/D

1/3-Inch Wide VGA CMOS Digital Image Sensor

Description

The MT9V024 is a 1/3-inch wide-VGA format CMOS active-pixel digital image sensor with global shutter and high dynamic range (HDR) operation. The sensor has specifically been designed to support the demanding interior and exterior automotive imaging needs, which makes this part ideal for a wide variety of imaging applications in real-world environments.

Table 1. KEY PERFORMANCE PARAMETERS

Parameter	Value
Optical Format	1/3-inch
Active Imager Size	4.51 mm (H) x 2.68 mm (V) 5.35 mm Diagonal
Active Pixels	752 H x 480 V
Pixel Size	6.0 μ m x 6.0 μ m
Color Filter Array	Monochrome or Color RGB Bayer or RCCC Pattern
Shutter Type	Global Shutter
Maximum Data Rate Master Clock	27 Mp/s 27 MHz
Full Resolution	752 x 480
Frame Rate	60 fps (at Full Resolution)
ADC Resolution	10-bit Column-Parallel
Responsivity	4.8 V/lux-sec (550 nm)
Dynamic Range	> 55 dB Linear; > 100 dB in HDR Mode
Supply Voltage	3.3 V $\pm$ 0.3 V (All Supplies)
Power Consumption	< 160 mW at Maximum Data Rate (LVDS Disabled); 120 μ W Standby Power at 3
Operating Temperature	-40°C to + 105°C
Packaging	52-ball IBGA, Automotive-qualified; Wafer or Die

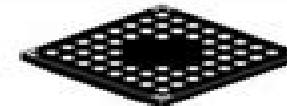
Features

- Array Format: Wide-VGA, Active 752 H x 480 V (360,960 pixels)
- Global Shutter Photodiode Pixels; Simultaneous Integration and Readout
- RGB Bayer, Monochrome, or RCCC: NIR Enhanced Performance for Use with Non-visible NIR Illumination
- Readout Modes: Progressive or Interlaced
- Shutter Efficiency: >99%
- Simple Two-Wire Serial Interface
- Real-Time Exposure Context Switching-Dual Register Set
- Register Lock Capability



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IBGA52
CASE 503AA

ORDERING INFORMATION

See detailed ordering and shipping information on page 2 of this data sheet.

Features (continued)

- Window Size: User Programmable to Any Smaller Format (QVGA, CIF, QCIF). Data Rate Can Be Maintained Independent of Window Size
- Binning: 2 x 2 and 4 x 4 of The Full Resolution
- ADC: On-Chip, 10-bit Column-Parallel (Option to Operate in 12-bit to 10-bit Companding Mode)
- Automatic Controls: Auto Exposure Control (AEC) and Auto Gain Control (AGC); Variable Regional and Variable Weight AEC/AGC
- Support for Four Unique Serial Control Register IDs to Control Multiple Imagers on the Same Bus
- Data Output Formats:
 - Single Sensor Mode:
 - 10-bit Parallel/Stand-Alone
 - 8-bit or 10-bit Serial LVDS
 - Stereo Sensor Mode: Interspersed 8-bit Serial LVDS
- High Dynamic Range (HDR) Mode

1 4 Inch Vga Cmos Digital Image Sensor

Camilla Rothe



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Optoelectronics in Machine Vision-Based Theories and Applications Rivas-Lopez, Moises, Sergiyenko, Oleg, Flores-Fuentes, Wendy, Rodríguez-Quinonez, Julio Cesar, 2018-08-17 Sensor technologies play a large part in modern life as they are present in things like security systems digital cameras smartphones and motion sensors While these devices are always evolving research is being done to further develop this technology to help detect and analyze threats perform in depth inspections and perform tracking services Optoelectronics in Machine Vision Based Theories and Applications provides innovative insights on theories and applications of optoelectronics in machine vision based systems It also covers topics such as applications of unmanned aerial vehicle autonomous and mobile robots medical scanning industrial applications agriculture and structural health monitoring This publication is a vital reference source for engineers technology developers academicians researchers and advanced level students seeking emerging research on sensor technologies and machine vision

CMOS Analog and Mixed-Signal Circuit Design Arjuna Marzuki, 2020-05-12 The purpose of this book is to provide a complete working knowledge of the Complementary Metal Oxide Semiconductor CMOS analog and mixed signal circuit design which can be applied for System on Chip SOC or Application Specific Standard Product ASSP development It begins with an introduction to the CMOS analog and mixed signal circuit design with further coverage of basic devices such as the Metal Oxide Semiconductor Field Effect Transistor MOSFET with both long and short channel operations photo devices fitting ratio etc Seven chapters focus on the CMOS analog and mixed signal circuit design of amplifiers low power amplifiers voltage regulator reference data converters dynamic analog circuits color and image sensors and peripheral oscillators and Input Output I O circuits and Integrated Circuit IC layout and packaging Features Provides practical knowledge of CMOS analog and mixed signal circuit design Includes recent research in CMOS color and image sensor technology Discusses sub blocks of typical analog and mixed signal IC products Illustrates several design examples of analog circuits together with layout Describes integrating based CMOS color circuit

AmIware Satyen Mukherjee, Emile Aarts, Raf Roovers, Frans Widdershoven, Martin Ouwerkerk, 2006-06-29 Ambient Intelligence is one of the new paradigms in the development of information and communication technology which has attracted much attention over the past years The aim is the to integrate technology into people environment in such a way that it improves their daily lives in terms of well being creativity and productivity Ambient Intelligence is a multidisciplinary concept which heavily builds on a number of fundamental breakthroughs that have been achieved in the development of new hardware concepts over the past years New insights in nano and micro electronics packaging and interconnection technology large area electronics energy scavenging devices wireless sensors low power electronics and computing platforms enable the realization of the heaven of ambient intelligence by overcoming the hell of physics Based on contributions from leading technical experts this book presents a number of key topics on novel hardware developments thus providing the reader a good insight into the physical basis of

ambient intelligence It also indicates key research challenges that must be addressed in the future

Smart Sensor Systems Gerard Meijer, Kofi Makinwa, Michiel Pertijs, 2014-04-02 With contributions from an internationally renowned group of experts this book uses a multidisciplinary approach to review recent developments in the field of smart sensor systems covering important system and design aspects It examines topics over the whole range of sensor technology from the theory and constraints of basic elements physics and electronics up to the level of application orientated issues Developed as a complementary volume to Smart Sensor Systems Wiley 2008 which introduces the basics of smart sensor systems this volume focuses on emerging sensing technologies and applications including State of the art techniques for designing smart sensors and smart sensor systems including measurement techniques at system level such as dynamic error correction calibration self calibration and trimming Circuit design for sensor systems such as the design of precision instrumentation amplifiers Impedance sensors and the associated measurement techniques and electronics that measure electrical characteristics to derive physical and biomedical parameters such as blood viscosity or growth of micro organisms Complete sensor systems on a chip such as CMOS optical imagers and microarrays for DNA detection and the associated circuit and micro fabrication techniques Vibratory gyroscopes and the associated electronics employing mechanical and electrical signal amplification to enable low power angular rate sensing Implantable smart sensors for neural interfacing in bio medical applications Smart combinations of energy harvesters and energy storage devices for autonomous wireless sensors Smart Sensor Systems Emerging Technologies and Applications will greatly benefit final year undergraduate and postgraduate students in the areas of electrical mechanical and chemical engineering and physics Professional engineers and researchers in the microelectronics industry including microsystem developers will also find this a thorough and useful volume

Image Sensors and Signal Processing for Digital Still Cameras Junichi Nakamura, 2017-12-19 Shrinking pixel sizes along with improvements in image sensors optics and electronics have elevated DSCs to levels of performance that match and have the potential to surpass that of silver halide film cameras Image Sensors and Signal Processing for Digital Still Cameras captures the current state of DSC image acquisition and signal processing technology and takes an all inclusive look at the field from the history of DSCs to future possibilities The first chapter outlines the evolution of DSCs their basic structure and their major application classes The next few chapters discuss high quality optics that meet the requirements of better image sensors the basic functions and performance parameters of image sensors and detailed discussions of both CCD and CMOS image sensors The book then discusses how color theory affects the uses of DSCs presents basic image processing and camera control algorithms and examples of advanced image processing algorithms explores the architecture and required performance of signal processing engines and explains how to evaluate image quality for each component described The book closes with a look at future technologies and the challenges that must be overcome to realize them With contributions from many active DSC experts Image Sensors and Image Processing for Digital Still Cameras offers

unparalleled real world coverage and opens wide the door for future innovation International Conference on Sensors and Control Techniques (ICSC 2000) Desheng Jiang, Anbo Wang, 2000 This volume contains the proceedings of the International Conference on Sensors and Control Techniques held in Wuhan China on 19-21 June 2000 *Essential Principles of Image Sensors* Takao Kuroda, 2017-12-19 Providing a succinct introduction to the systemization noise sources and signal processes of image sensor technology *Essential Principles of Image Sensors* discusses image information and its four factors space light intensity wavelength and time Featuring clarifying and insightful illustrations this must have text Explains how image sensors convert optical image information into image signals Treats space wavelength and time as digitized built in coordinate points in image sensors and systems Details the operational principles pixel technology and evolution of CCD MOS and CMOS sensors with updated technology Describes sampling theory presenting unique figures demonstrating the importance of phase Explores causes for the decline of image information quality In a straightforward manner suitable for beginners and experts alike *Essential Principles of Image Sensors* covers key topics related to digital imaging including semiconductor physics component elements necessary for image sensors silicon as a sensitive material noises in sensors and more *Popular Photography* ,2008-09 **Final Program and Proceedings** ,2006 **Asian Sources Telecom Products** ,2005 **Asia Electronics Industry** ,2004 **Asian Sources Electronics** ,2005 **Popular Photography** ,2010 **Design News** , *Dealerscope Consumer Electronics Marketplace* ,1999 **Selected Papers on CCD and CMOS Imagers** Moon Gi Kang, 2003 Imaging systems that employ CCD and CMOS sensors are now almost universal for certain scientific medical and consumer electronic purposes This volume covers CCD and CMOS technological development including approaches to overcoming the technology's intrinsic physical limitations **British Journal of Photography** ,2009 **Index to IEEE Publications** Institute of Electrical and Electronics Engineers, 1994 **Liverpool and Manchester Photographic Journal** ,2000 Global Sources Electronic Components ,2007

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web overview this course offers the theoretical training to prospective artisans via the nated programme n1 is the foundation level in this 3 level engineering programme mathematics science and drawing form the basis of all engineering trades

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web part 1 n1 n3 theory subjects done on campus this part is compulsory students are required to complete all their n1 n3 theory subjects to attain their national certificate n1 level n2 level n3 level fitting machining theory mathematics engineering science engineering drawings fitting machining theory mathematics

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web student finance enquire now register now fitter and turner courses this programme offers an ntc bridging course and n1 n3 qualifications in fitting and turning you will gain a theoretical understanding of the techniques used in manufacturing fitting and assembling parts for machinery courses technical courses fitter and turner courses

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web the national certificates n1 to n3 in the mechanical engineering programme caters for students who would like to study any of the following engineering subjects motor diesel mechanic or fitter and turner admission requirements what do i need to have completed before i can apply to study this course

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web fitting turning this subject teaches learners how to operate and monitor drilling machines milling machines surface grinding machines and lathes it also includes welding joining of metals heat exchangers and maintenance

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web this subject focuses on the manufacturing and machining of machine parts using processes such as lathe turning milling

cutting shaping fitting of keys couplings bushes shafts bearings hydraulics and pneumatics

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web on completion of fitting and turning level 3 the student should have covered the following topics topic 1 bearings topic 2 couplings topic 3 brakes and clutches topic 4 belt drives fitting and turning level 3 subject guidelines january 2014 national certificate vocational

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web national certificate n3 engineering studies fitting and turning subject assessment task mark allocation content coverage study programme 1 mechano technology n3 assignment 1 100 subject assessment task mark allocation content coverage study

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web this n3 engineering studies course builds on the knowledge and skills gained at the previous levels and prepares you for a career as a fitter and turner this course will teach you the technical aspects of working with machinery and facets of industrial planning and entrepreneurship

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web part time distance occupational student services about us shop a mechanical fitter and turner is a highly skilled craftsman who can manufacture construct assemble and fit components for machinery

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web fitting and turning subjects course modules mathematics n1 n3 engineering science n1 n3 fitting and machining theory n1 n2 mechanotechnology n3 engineering drawings n1 n3 assessment and duration there are two types of assessments the internal assessment conducted by the college and the national assessment which is the

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web course requirements n2 engineering studies or grade 12 with mathematics science and drawing or an equivalent qualification nqf level status saqa id 67491 nqf level 3 subjects course modules mathematics n3 engineering science n3 mechanotechnology n3 engineering drawing n3 assessment and duration

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web national certificate n3 mechanical studies fitter and turner certificate fet description duration career fields certification admission requirements during your studies you will learn some theories in kinematics angular motion dynamics modulus and other engineering science components

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web the subjects are mathematics engineering science mechanotechnics mechanical draughting entry requirements grade 12 pass with mathematics and science grade 11s pass may be accepted into n3 level career opportunities maintenance engineer fitter and turner motor diesel mechanic mechanical draughtsman tool and die maker

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web mechanical engineering n1 to n3 caters for students interested in becoming a motor diesel mechanic or fitter and turner or serves as an entry level if you want to do your national n diploma once you have completed your

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web this course provides theoretical training to artisans and is offered via the nated programme n2 is the intermediate level in this 3 level engineering programme learn the skills and techniques to manufacture construct assemble and fit components for machinery vehicles installations and other apparatus or articles

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web the national certificate vocational for fitting turning comprises four engineering subjects including practical assessments in the fitting turning workshop fitters turners are highly skilled artisans who manufacture and construct components for machinery and use tools such as lathes milling and drilling machines

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web the compulsory subjects for fitting and turning n1 n3 are mathematics engineering science and engineering drawing and for n1 n2 you need to do fitting and machining however in n3 fitting and machining is replaced by mechanotechnology

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web these objectives are to create an integrated national framework for learning achievements facilitate access to and progression within education training and career paths enhance the quality of education and training redress unfair discrimination and past imbalances and thereby accelerate employment opportunities contribute to