



# CMOS MT9D111 AF Camera Module 1/3.2-Inch 2-Megapixel Module User Guide

Rev 2.1, Janr 2015

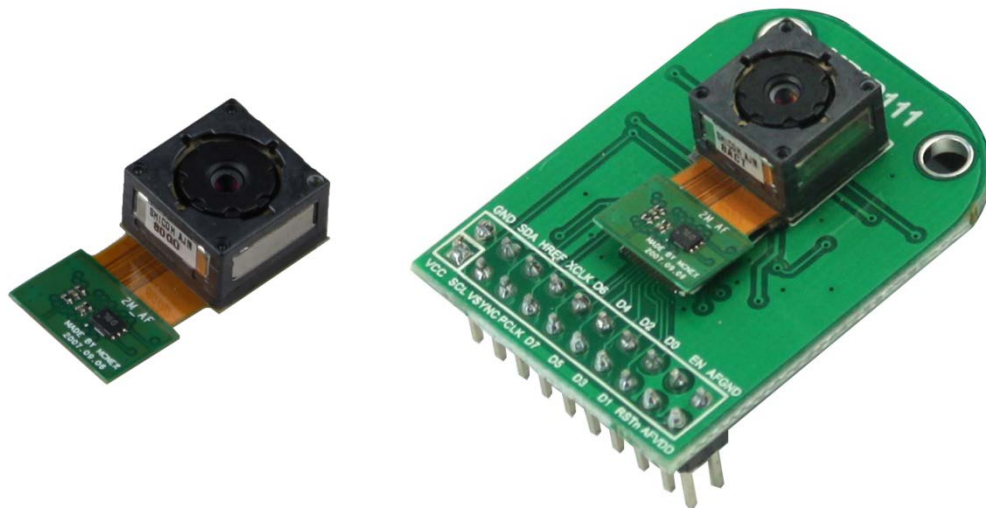
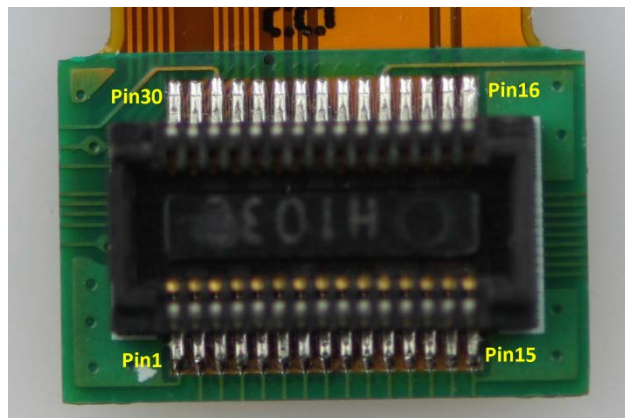


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## 1. Pin out

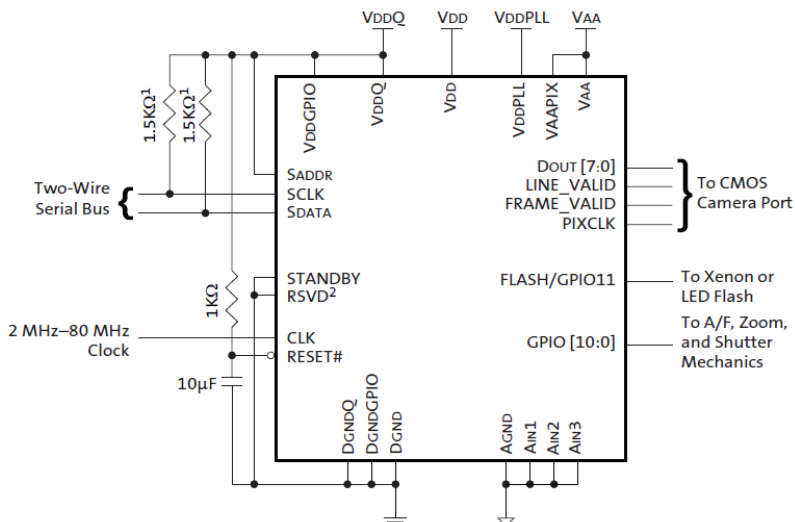
Following picture is the pin from the bottom view. The I2C slave address is dedicate to connected to GND, so the I2C slave address for the module is 0x90.



Pin	Definition	Pin	Definition
1	GND	16	Motor+
2	NC	17	VDDQ
3	NC	18	VDDPLL/VAA/VAAPIX
4	D0	19	NC
5	D1	20	NC
6	D2	21	LINE_VALID
7	D3	22	FRAME_VALID
8	D4	23	RESET_BAR
9	D5	24	CLK
10	D6	25	VDD
11	D7	26	PIXCLK
12	NC	27	STANDBY
13	GPIO10	28	SCLK
14	NC	29	SDATA
15	GND	30	FLASH

Note: Motor+ is the power input to the VCM(Voice Control Motor), it should be connected to 3.3V.

## 2. Typical Connection



**Table 3: Signal Description**

Name	Type	Description	Note
CLKIN	Input	Master clock signal (can either drive the on-chip PLL or bypass it).	
RESET#	Input	Master reset signal, active LOW.	
STANDBY	Input	Controls sensor's standby mode.	
RSVD	Input	Reserved for factory test. Tie to digital ground during normal operation.	
AIN1	Input	Analog sampling and test. During normal operation, can be used to feed an external analog signal to an ADC in the sensor core, in order to have the signal sampled during horizontal blanking times and stored in a register.	
AIN2	Input	Analog sampling and test. Can be used like AIN1 during normal operation.	
AIN3	Input	Analog sampling and test. Can be used like AIN1 during normal operation.	
SCLK	Input	Two-wire serial interface clock.	
SADDR	Input	Selects device address for the two-wire serial interface. The address is 0x90 when SADDR is tied LOW, 0xBA if tied HIGH. See also R0x0D:0[10].	
DOUT0-DOUT7	Input	Eight-bit image data output or most significant bits (MSB) of 10-bit sensor bypass mode.	1
FRAME_VALID	Input	Identifies rows in the active image.	1
LINE_VALID	Input	Identifies lines in the active image.	1
PIXCLK	Input	Pixel clock. To be used for sampling DOUT, FRAME_VALID, and LINE_VALID.	1
SDATA	I/O	Two-wire serial interface data.	
GPIO[7:0]	I/O	General purpose digital I/O. Each bit can be independently configured as an input or output. Outputs are controlled by register-programmable waveform generator or by writing to registers GPIO_DATA_L and GPIO_DATA_H. Inputs can be sensed by reading the same registers.	1
FLASH/GPIO11	I/O	GPIO11 or signal to control Xenon or LED flash.	1
GPIO10/STROBE	I/O	GPIO10 or signal to control mechanical shutter.	1
GPIO9/DOUT_LSB	I/O	GPIO9 during normal IFP operation or data bit 1 in 10-bit sensor bypass mode.	1
GPIO8/DOUT_LSB0	I/O	GPIO8 during normal IFP operation or data bit 0 in 10-bit sensor bypass mode.	1
VDD	Supply	Digital power (1.8V).	
VDDPLL	Supply	PLL power (2.8V).	
VAA	Supply	Analog power (2.8V).	
VAAPIX	Supply	Pixel array power (2.8V).	
VDDQ	Supply	I/O power (nominal 1.8V or 2.8V).	
VDDGPIO	Supply	I/O power for GPIO (nominal 1.8V or 2.8V).	
AGND	Supply	Analog ground.	
DGND	Supply	Digital, I/O, and PLL ground.	
NC	—	No connect.	

Note: 1. See "Standby Hardware Configuration" on page 153.

### 3. Auto Focus

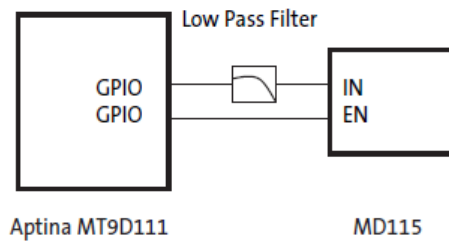
The auto focus mechanics (AFM) drivers are included in the firmware of the MT9D111 image sensor. These drivers encapsulate all firmware code developed to date by Aptina to support AF function in cameras built around our sensors.

Following table lists the lens actuator and associated driver IC currently supported, in this module we use MD115 PWM driver to control the Lens Actuator.

Table Actuators Supported

Driver IC	Interface Protocol	Lens Actuator	Patch Needed?	Actuator Performance
HD80 (One Limited)	I <sup>2</sup> C (8-bit)	Helimorph	No	Simple configuration, less power consumption, but poor precision, and bad shock resistance.
AD5398 (Analog Device)	I <sup>2</sup> C (10-bit)	VCM	No	
AD5398 (Analog Device)	I <sup>2</sup> C (10-bit)	MEMS	No	Excellent precision, good optical performance, but complicated configuration.
LB1935T (Sanyo)	Stepper	Stepper	No	Better optical performance and precision, but more power consumption and complicated configuration.
LB1935CL (Sanyo)	Stepper	Stepper	No	
LV8071LP (Sanyo)	Stepper Like	Piezo	Yes	Simple configuration, less power consumption, but poor precision, and bad shock resistance.
MD115 (Silicon Touch)	PWM	VCM	Yes	Low cost, and simple configuration, but poor precision and loud noise.
ID9701 (Interpion)	PWM	VCM	Yes	

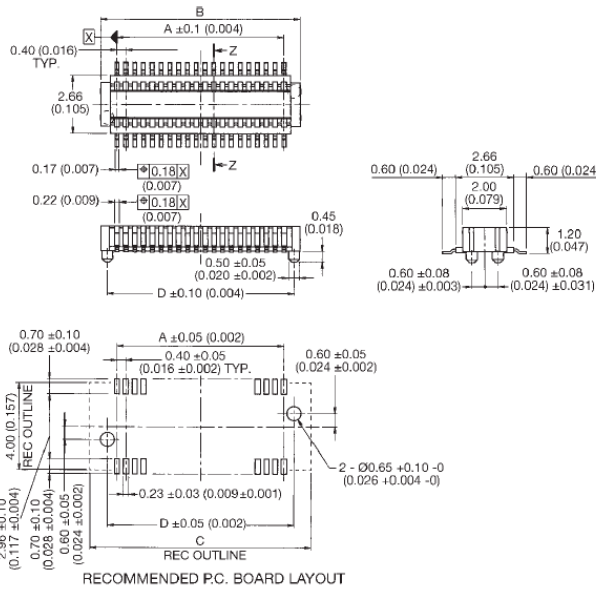
Configuration Schematic



# 4. Mating Connector

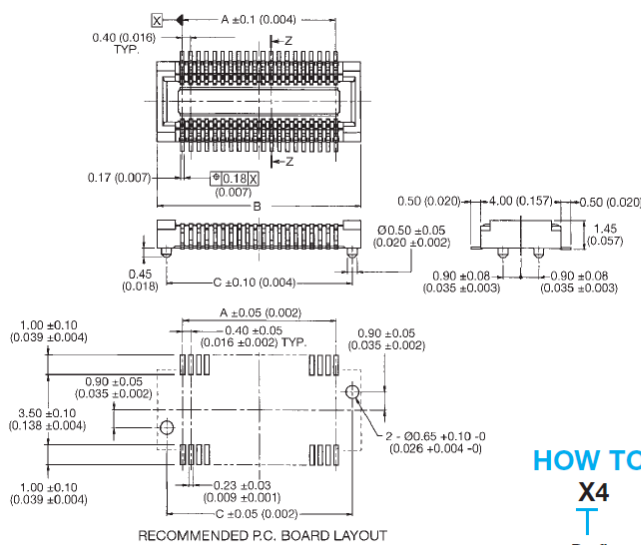
The mating connector for the module is AVX 145602-030000-829 (PLUG)

## PLUG



No. of Pos.	Dimension			
	A	B	C	D
020	3.6 (0.142)	5.1 (0.201)	6.1 (0.205)	4.5 (0.177)
024	4.4 (0.173)	5.9 (0.232)	6.9 (0.272)	5.3 (0.209)
030	5.6 (0.220)	7.1 (0.280)	8.1 (0.319)	6.5 (0.256)
034	6.4 (0.252)	7.9 (0.311)	8.9 (0.350)	7.3 (0.287)
040	7.6 (0.705)	9.1 (0.358)	10.1 (0.571)	8.5 (0.335)
050	9.6 (0.378)	11.1 (0.437)	12.1 (0.478)	10.5 (0.413)
060	11.6 (0.457)	13.1 (0.516)	14.1 (0.555)	12.5 (0.492)
070	13.6 (0.535)	15.1 (0.594)	16.1 (0.634)	14.5 (0.571)
080	15.6 (0.614)	17.1 (0.673)	18.1 (0.713)	16.5 (0.650)

## RECEPTACLE

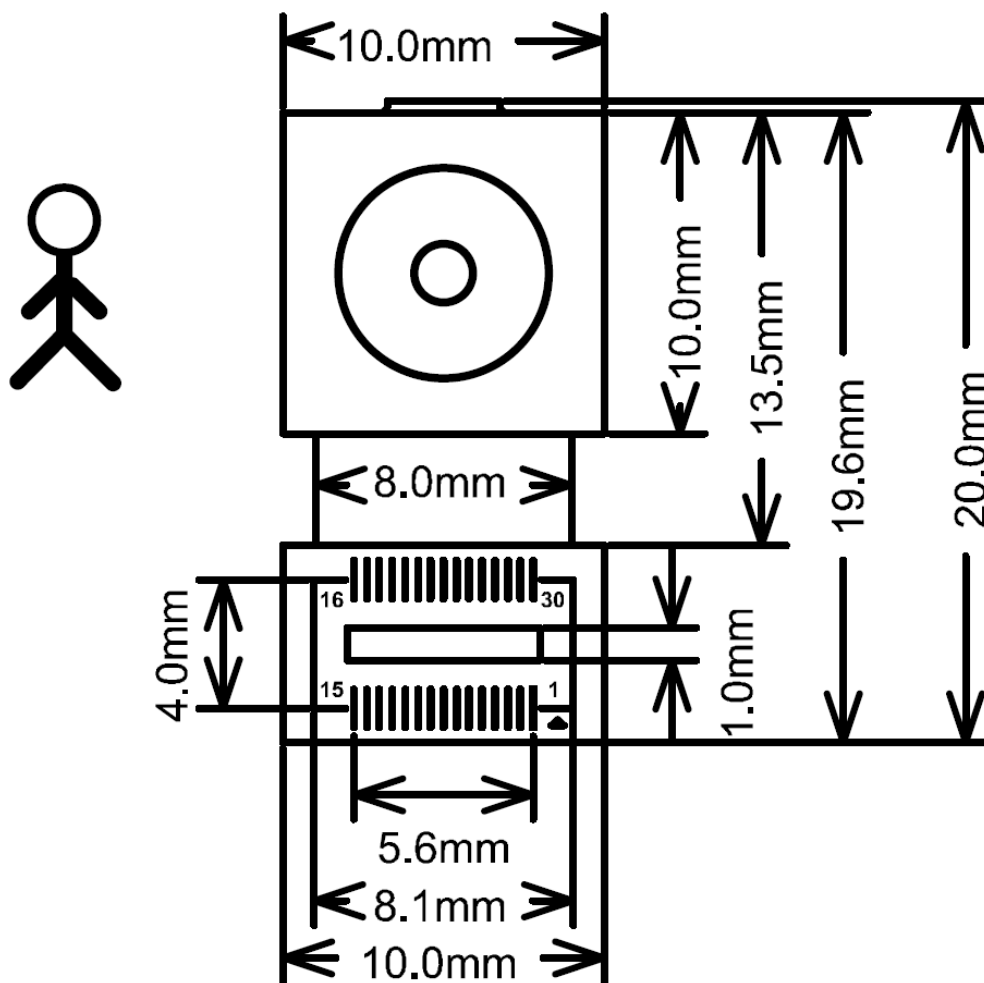


No. of Pos.	Dimension		
	A	B	C
020	3.6 (0.142)	6.1 (0.240)	5.2 (0.20)
024	4.4 (0.173)	6.9 (0.272)	6.0 (0.236)
030	5.6 (0.220)	8.1 (0.319)	7.2 (0.283)
034	6.4 (0.260)	8.9 (0.350)	8.0 (0.315)
040	7.6 (0.705)	10.1 (0.571)	9.2 (0.709)
050	9.6 (0.378)	12.1 (0.476)	11.2 (0.441)
060	11.6 (0.457)	14.1 (0.555)	13.2 (0.520)
070	13.6 (0.535)	16.1 (0.634)	15.2 (0.598)
080	15.6 (0.614)	18.1 (0.713)	17.2 (0.677)

## HOW TO ORDER

**X4**      **5602**      **XXX**      **00X**      **829**  
 |            |            |            |            |  
 Prefix    Series    Number of    Variation Code    Finish  
 14 = Plug    Number    Positions    0 = Without Strain Relief    Code

### 5. Dimension



## 6. Reference Design

