1/3.2-Inch 8Mp BSI CMOS Digital Image Sensor Die

AR0832E Die Data Sheet

For the latest data sheet, refer to Aptina's Web site: www.aptina.com

Features

- Low dark current
- Simple two-wire serial interface
- Auto black level calibration
- Support for external mechanical shutter
- Support for external LED or xenon flash
- High frame rate preview mode with arbitrary down-size scaling from maximum resolution
- Programmable controls: gain, horizontal and vertical blanking, auto black level offset correction, frame size/rate, exposure, left–right and top–bottom image reversal, window size, and panning
- Data interfaces: parallel or single/dual lanes serial mobile industry processor interface (MIPI)
- On-die phase-locked loop (PLL) oscillator
- Bayer pattern down-size scaler
- Superior low-light performance
- On-chip lens shading correction
- 11.5 Kb one-time programmable memory (OTPM) for storing shading correction coefficients of three light sources and module information
- Extended Flash duration that is up to start of frame readout
- On-chip VCM driver

General Physical Specifications

- Die thickness: 200µm ±12µm (Consult factory for other thickness)
- Backside wafer surface of bare silicon
- Bond pad metallization composition: 10000A Al over Cu
- Typical topside passivation: 2.2kÅ nitride over 6.0kÅ of undoped oxide
- Passivation openings (MIN): 75µm x 90µm

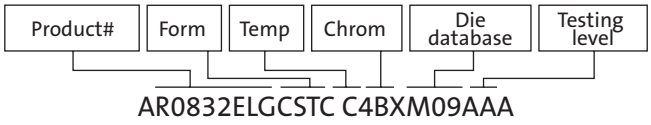
Order Information

AR0832ELGCSTC ES C4BXM09AAA

Die Database

- Die outline, see Figure 3 on page 11
- Singulated die size
  - 6626 ± 25µm x 6244.4 ± 25µm
- Bond Pad Identification Tables, see pages 6–10

Options	Designator
• Form	
– Die	D
• Testing	
– Standard (level 1) probe	C1



Note: Consult die distributor or factory before ordering to verify long-term availability of these die products.

Key Performance Parameters

- Optical format: 1/3.2-inch (4:3)
- Active imager size: 4.57mm x 3.43mm: 5.71mm diagonal
- Active pixels: 3264H x 2448V
- Pixel size: 1.4µm x 1.4µm
- Color filter array: RGB Bayer pattern
- Shutter type
  - Electronic rolling shutter (ERS) with Global reset release (GRR)
- Maximum data rate/master clock
  - MIPI: 800 Mbps/lane (2000 Mbps with 2 lanes)
  - Parallel: 100 MHz
- Frame rate
  - Full resolution at 15 fps using 2-lane MIPI
- ADC resolution: 10-bit, on-die
- Responsivity: TBD
- Dynamic range: TBD
- SNR MAX: TBD

Draft 11/23/2011

Key Performance Parameters (continued)

- Supply voltage
  - Digital I/O: 1.8V nominal
  - Digital Core: 1.2V nominal
  - Analog: 2.65–3.1V (2.8V nominal)
  - Digital PHY: 1.7–1.9V (1.8V nominal)
- Power consumption:
  - Full resolution (parallel): 290mW (estimate, not including I/O power) at 55°C (TYP)
  - Full resolution (MIPI): MIPI: 290mW (estimate, not including I/O power) at 55°C (TYP)
  - Hardware standby/shutdown: 15µA (estimate, not including I/O power) (by XSHUTDOWN pin). No state retention.
- Operating temperature: –30°C to +70°C (at junction)

General Description

The Aptina AR0832E is a 1/3.2-inch CMOS active-pixel digital image sensor with a pixel array of 3264H x 2448V (3280H x 2464V including border pixels). It incorporates sophisticated on-chip camera functions such as windowing, mirroring, column and row skip modes, and snapshot mode. It is programmable through a simple two-wire serial interface and has very low power consumption.

The AR0832E digital image sensor features Aptina's breakthrough low-noise CMOS imaging technology that achieves near-CCD image quality (based on signal-to-noise ratio and low-light sensitivity) while maintaining the inherent size, cost, and integration advantages of CMOS.

The AR0832E sensor can generate full resolution image at up to 15 frames per second (fps). An on-chip analog-to-digital converter (ADC) generates a 10-bit value for each pixel.

Die Testing Procedures

Aptina imager die products are tested with a standard probe (C1) test level. Wafer probe is performed at an elevated temperature to ensure product functionality in Aptina's standard package. Because the package environment is not within Aptina's control, the user must determine the necessary heat sink requirements to ensure that the die junction temperature remains within specified limits.

Image quality is verified through various imaging tests. The probe functional test flow provides test coverage for the on-die ADC, logic, serial interface bus, and pixel array. Test conditions, margins, limits, and test sequence are determined by individual product yields and reliability data.

Aptina retains a wafer map of each wafer as part of the probe records, along with a lot summary of wafer yields for each lot probed. Aptina reserves the right to change the probe program at any time to improve the reliability, packaged device yield, or performance of the product.

Die users may experience differences in performance relative to Aptina's data sheets. This is due to differences in package capacitance, inductance, resistance, and trace length.

Functional Specifications

These specifications are provided for reference only. For target functional and parametric specifications, refer to the product data sheet found on Aptina's Web site.

Bonding Instructions

The AR0832E imager die has 101 bond pads. Refer to Table 1 and Table 2 on pages 6–10 for a complete list of bond pads and coordinates.

The AR0832E imager die does not require the user to determine bond option features.

The die also has several pads defined as "do not use." These pads are used for engineering purposes and should not be used. Bonding these pads could result in a nonfunctional die.

Figure 3 on page 11 shows the AR0832E typical die connections. For low-noise operation, the AR0832E die requires separate supplies for analog and digital power. Power supply rails should be decoupled to ground using capacitors. The use of inductance filters is not recommended.

All DGND pads must be tied together, as must all AGND pads, all VDD_IO pads, and all VDD pads. Doing so will minimize risk of damage to the sensor in an ESD event.

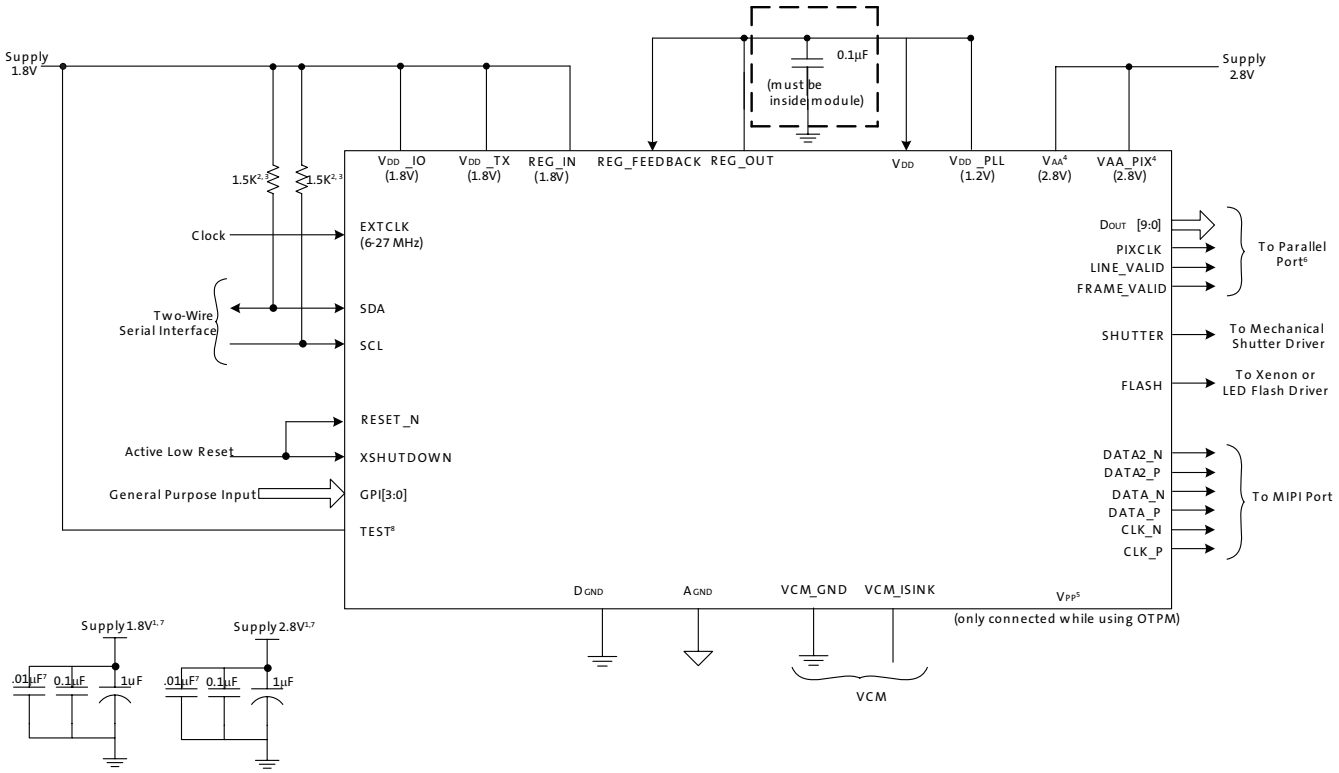
Storage Requirements

Aptina die products are packaged in a cleanroom environment for shipping. Upon receipt, the customer should transfer the die to a similar environment for storage. Aptina recommends the die be maintained in a filtered nitrogen atmosphere until removed for assembly. The moisture content of the storage facility should be maintained at 30 percent relative humidity ±10 percent. ESD damage precautions are necessary during handling. The die must be in an ESD-protected environment at all times for inspection and assembly.

Typical Connections

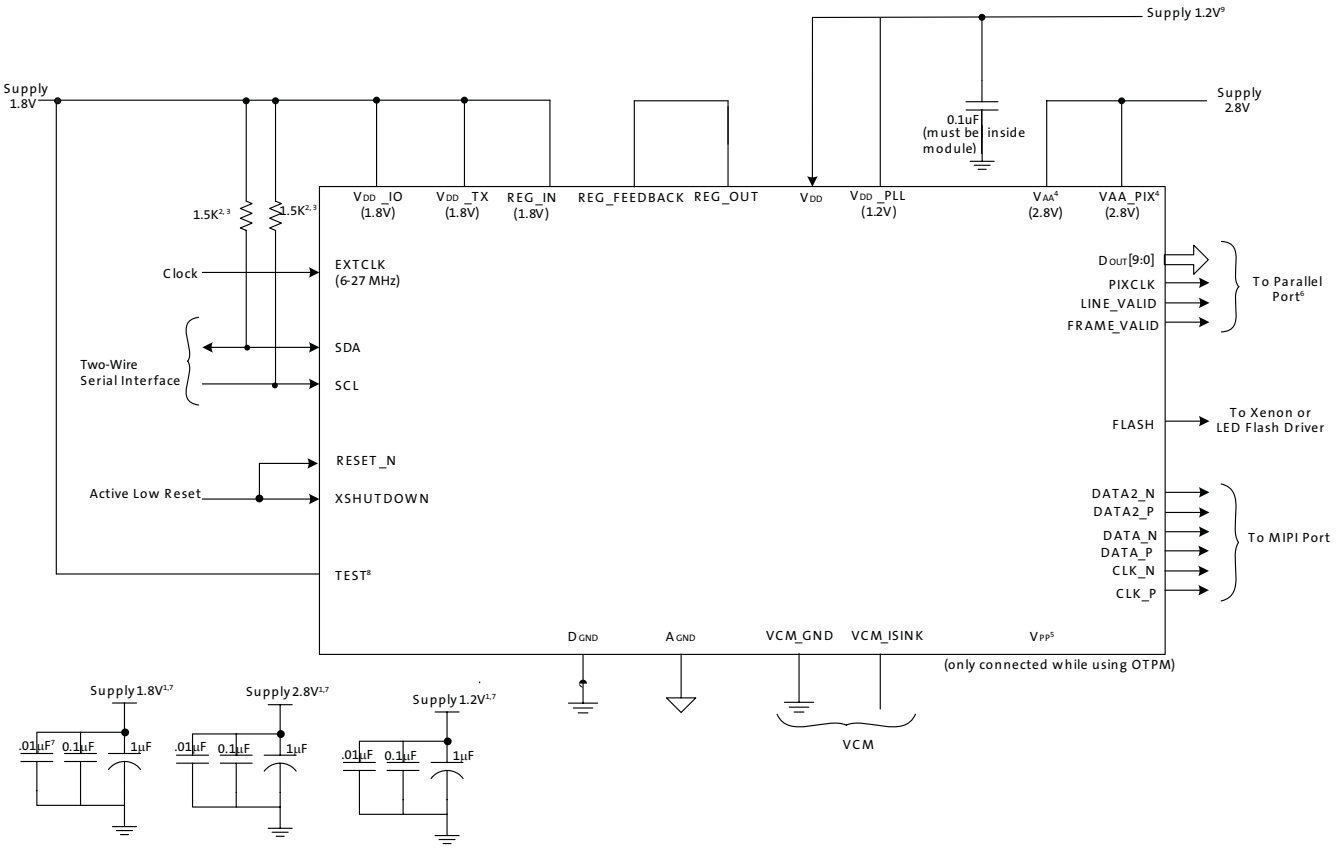
Figure 1 and Figure 2 show the typical AR0832E connections.

Figure 1: Parallel/MIPI Typical Connections (Using Internal Regulator for VDD and Sensor-Connected PLL)



Note:
1. All power supplies must be adequately decoupled.
2. Aptina recommends using a resistor value of 1.5kΩ, but a greater value can be used for slower two-wire speed.
3. This pull-up resistor is not required if the controller drives a valid logic level on SCL at all times.
4. VAA and VAA_PIX must be tied together.
5. VPP, 6-7V, is used for programming OTPM. This pad is left unconnected during normal operation.
6. The parallel interface output pads can be left unconnected if the serial output interface is used.
7. Aptina recommends that 0.01µF, 0.1µF, and 1µF decoupling capacitors for each power supply are mounted as close as possible to the pad. Actual values and results may vary depending on layout and design considerations.
8. For MIPI configuration, TEST must be tied to VDD_IO. For CCP2, TEST must be tied to GND.
9. ATEST1_TOP, ATEST2_TOP, ATEST1_BTM, and ATEST2_BTM should be floating.
10. A dedicated I^2C line specific to AR0832E should be used for best performance.

Figure 2: Parallel/MIPI Typical Connections (Not Using Internal Regulator)



Note:
1. All power supplies must be adequately decoupled.
2. Aptina recommends using a resistor value of 1.5kΩ, but a greater value can be used for slower two-wire speed.
3. This pull-up resistor is not required if the controller drives a valid logic level on SCLK at all times.
4. VAA and VAA_PIX must be tied together.
5. VPP, 6-7V, is used for programming OTPM. This pad is left unconnected during normal operation.
6. The parallel interface output pads can be left unconnected if the serial output interface is used.
7. Aptina recommends that 0.01µF, 0.1µF, and 1µF decoupling capacitors for each power supply are mounted as close as possible to the pad. Actual values and results may vary depending on layout and design considerations.
8. For MIPI configuration, TEST must be tied to VDD_IO. For CCP2, TEST must be tied to GND.
9. ATEST1_TOP, ATEST2_TOP, ATEST1_BTM, and ATEST2_BTM should be floating.
10. A dedicated I^2C line specific to AR0832E should be used for best performance.

Bond Pad Identification Tables

Table 1: Bond Pad Location and Identification with Reference to the UPPERLEFT Center

Pad	AR0832E	"X" [1] Microns	"Y" [1] Microns	"X"[1] Inches	"Y"[1] Inches
1	GND12	0	0	0	0
2	VDD6	295.88	272.12	0.011648819	0.010713386
3	DOUT5	442.16	272.12	0.017407874	0.010713386
4	DOUT4	624.8	272.12	0.024598425	0.010713386
5	VDD_IO8	771.08	272.12	0.03035748	0.010713386
6	GND11	921.2	272.12	0.036267716	0.010713386
7	DOUT6	1067.48	272.12	0.042026772	0.010713386
8	DOUT3	1250.12	272.12	0.049217323	0.010713386
9	VDD_IO7	1396.4	272.12	0.054976378	0.010713386
10	GND10	1546.52	272.12	0.060886614	0.010713386
11	DOUT7	1692.8	272.12	0.066645669	0.010713386
12	DOUT2	1875.44	272.12	0.07383622	0.010713386
13	VDD_IO6	2021.72	272.12	0.079595276	0.010713386
14	GND9	2171.84	272.12	0.085505512	0.010713386
15	VDD5	2321.96	272.12	0.091415748	0.010713386
16	DOUT8	2468.24	272.12	0.097174803	0.010713386
17	DOUT1	2650.88	272.12	0.104365354	0.010713386
18	VDD_IO5	2797.16	272.12	0.110124409	0.010713386
19	GND8	2947.28	272.12	0.116034646	0.010713386
20	DOUT0	3093.56	272.12	0.121793701	0.010713386
21	DOUT9	3276.2	272.12	0.128984252	0.010713386
22	VDD_IO4	3422.48	272.12	0.134743307	0.010713386
23	GND7	3572.6	272.12	0.140653543	0.010713386
24	PIXCLK	3723.32	272.12	0.146587401	0.010713386
25	FRAME_VALID	3897.08	272.12	0.153428346	0.010713386
26	LINE_VALID	4079.72	272.12	0.160618897	0.010713386
27	VDD4	4226	272.12	0.166377953	0.010713386
28	VDD_IO3	4376.12	272.12	0.172288189	0.010713386
29	GND6	4526.24	272.12	0.178198425	0.010713386
30	GPI3	4676.36	272.12	0.184108661	0.010713386
31	GPI2	4826.48	272.12	0.190018897	0.010713386
32	GPI1	4976.6	272.12	0.195929134	0.010713386
33	GPI0	5126.72	272.12	0.20183937	0.010713386
34	RESET_BAR	5276.84	272.12	0.207749606	0.010713386
35	SCLK	5426.96	272.12	0.213659842	0.010713386
36	SDATA	5577.08	272.12	0.219570079	0.010713386
37	EXTCLK	5727.2	272.12	0.225480315	0.010713386
38	VDD_IO2	5877.32	272.12	0.231390551	0.010713386
39	GND5	6027.44	272.12	0.237300787	0.010713386
40	SHUTTER	6178.16	272.12	0.243234645	0.010713386
41	FLASH	6439.6	6.24	0.253527559	0.000245669
42	TEST	6439.6	-135.72	0.253527559	-0.005343307
43	GND4	6439.6	-294.48	0.253527559	-0.011593701

Table 1: Bond Pad Location and Identification with Reference to the UPPERLEFT Center (continued)

Pad	AR0832E	"X" [1] Microns	"Y" [1] Microns	"X"[1] Inches	"Y"[1] Inches
44	VDD3	6439.6	-443.34	0.253527559	-0.017454331
45	VDD_TX	6439.6	-593.28	0.253527559	-0.02335748
46	CLK_P	6439.6	-772.92	0.253527559	-0.030429921
47	CLK_N	6439.6	-1092.24	0.253527559	-0.043001575
48	DATA_P	6439.6	-1341.36	0.253527559	-0.052809449
49	DATA_N	6439.6	-1660.68	0.253527559	-0.065381102
50	DATA2_P	6439.6	-2023.56	0.253527559	-0.079667716
51	DATA2_N	6439.6	-2342.88	0.253527559	-0.09223937
52	VDD2	6439.6	-2539.98	0.253527559	-0.099999212
53	GND3	6439.6	-2688.84	0.253527559	-0.105859842
54	GND2	6439.6	-4148.165	0.253527559	-0.163313583
	REG_FEEDBAC	6439.6	-4401.06	0.253527559	-0.173270079
56	REG_OUT	6439.6	-4551.06	0.253527559	-0.17917559
57	REG_IN	6439.6	-4761.91	0.253527559	-0.187476771
58	VDD_PLL	6439.6	-4911.91	0.253527559	-0.193382283
59	XSHUTDOWN	6439.6	-5056.56	0.253527559	-0.199077165
60	VPP0	6439.6	-5272.2	0.253527559	-0.207566929
61	GND1	6439.6	-5436.72	0.253527559	-0.214044094
62	VDD_IO1	6439.6	-5586.84	0.253527559	-0.21995433
63	VDD1	6439.6	-5722.56	0.253527559	-0.225297638
64	VCM_GND	0	-5671.555	0	-0.223289567
65	VCM_ISINK	0	-5317.54	0	-0.209351968
66	VAA1	0	-5135.04	0	-0.202166929
67	VAA2	0	-4984.92	0	-0.196256693
68	ATEST1_BTM	0	-4874.76	0	-0.191919685
69	AGND1	0	-4758.12	0	-0.187327559
70	ATEST2_BTM	0	-4647.96	0	-0.182990551
71	AGND2	0	-4537.8	0	-0.178653543
72	VAA3	0	-4387.68	0	-0.172743307
73	AGND3	0	-4237.56	0	-0.166833071
74	VAA4	0	-4087.44	0	-0.160922834
75	AGND4	0	-3937.32	0	-0.155012598
76	VAA5	0	-3787.2	0	-0.149102362
77	AGND5	0	-3637.08	0	-0.143192126
78	VAA6	0	-3486.96	0	-0.13728189
79	AGND6	0	-3336.84	0	-0.131371653
80	VAA7	0	-3186.72	0	-0.125461417
81	VAA_PIX1	0	-3036.6	0	-0.119551181
82	VAA_PIX2	0	-2886.48	0	-0.113640945
83	VAA_PIX3	0	-2736.36	0	-0.107730709
84	AGND7	0	-2586.24	0	-0.101820472
85	VAA8	0	-2436.12	0	-0.095910236
86	AGND8	0	-2286	0	-0.09
87	VAA9	0	-2135.88	0	-0.084089764
88	AGND9	0	-1985.76	0	-0.078179527

Table 1: Bond Pad Location and Identification with Reference to the UPPERLEFT Center (continued)

Pad	AR0832E	"X" [1] Microns	"Y" [1] Microns	"X"[1] Inches	"Y"[1] Inches
89	VAA10	0	-1835.64	0	-0.072269291
90	AGND10	0	-1685.52	0	-0.066359055
91	VAA11	0	-1535.4	0	-0.060448819
92	AGND11	0	-1385.28	0	-0.054538583
93	VAA12	0	-1235.16	0	-0.048628346
94	AGND12	0	-1085.04	0	-0.04271811
95	ATEST2_TOP	0	-974.88	0	-0.038381102
96	AGND13	0	-864.72	0	-0.034044094
97	ATEST1_TOP	0	-754.56	0	-0.029707087
98	VAA13	0	-644.4	0	-0.025370079
99	VAA14	0	-494.28	0	-0.019459842
100	AGND14	0	-344.16	0	-0.013549606
101	VDD_IO9	0	-150.12	0	-0.005910236

Note: 1. Reference to center of each bond pad from center of bond pad 1.
2. DNU = do not use. See "Bonding Instructions" on page 3.
3. ATEST1_TOP, ATEST2_TOP, ATEST1_BTM, and ATEST2_BTM should be floating.

Table 2: Bond Pad Location and Identification from Center of Die

Pad	AR0832E	"X" [1] Microns	"Y" [1] Microns	"X"[1] Inches	"Y"[1] Inches
1	GND12	-3219.8	2756.88	-0.126763779	0.108538583
2	VDD6	-2923.92	3029	-0.115114961	0.119251968
3	DOUT5	-2777.64	3029	-0.109355905	0.119251968
4	DOUT4	-2595	3029	-0.102165354	0.119251968
5	VDD_IO8	-2448.72	3029	-0.096406299	0.119251968
6	GND11	-2298.6	3029	-0.090496063	0.119251968
7	DOUT6	-2152.32	3029	-0.084737008	0.119251968
8	DOUT3	-1969.68	3029	-0.077546457	0.119251968
9	VDD_IO7	-1823.4	3029	-0.071787402	0.119251968
10	GND10	-1673.28	3029	-0.065877165	0.119251968
11	DOUT7	-1527	3029	-0.06011811	0.119251968
12	DOUT2	-1344.36	3029	-0.052927559	0.119251968
13	VDD_IO6	-1198.08	3029	-0.047168504	0.119251968
14	GND9	-1047.96	3029	-0.041258268	0.119251968
15	VDD5	-897.84	3029	-0.035348031	0.119251968
16	DOUT8	-751.56	3029	-0.029588976	0.119251968
17	DOUT1	-568.92	3029	-0.022398425	0.119251968
18	VDD_IO5	-422.64	3029	-0.01663937	0.119251968
19	GND8	-272.52	3029	-0.010729134	0.119251968
20	DOUT0	-126.24	3029	-0.004970079	0.119251968
21	DOUT9	56.4	3029	0.002220472	0.119251968
22	VDD_IO4	202.68	3029	0.007979528	0.119251968
23	GND7	352.8	3029	0.013889764	0.119251968
24	PIXCLK	503.52	3029	0.019823622	0.119251968
25	FRAME_VALID	677.28	3029	0.026664567	0.119251968

Table 2: Bond Pad Location and Identification from Center of Die (continued)

Pad	AR0832E	"X" [1] Microns	"Y" [1] Microns	"X"[1] Inches	"Y"[1] Inches
26	LINE_VALID	859.92	3029	0.033855118	0.119251968
27	VDD4	1006.2	3029	0.039614173	0.119251968
28	VDD_IO3	1156.32	3029	0.045524409	0.119251968
29	GND6	1306.44	3029	0.051434646	0.119251968
30	GPI3	1456.56	3029	0.057344882	0.119251968
31	GPI2	1606.68	3029	0.063255118	0.119251968
32	GPI1	1756.8	3029	0.069165354	0.119251968
33	GPI0	1906.92	3029	0.07507559	0.119251968
34	RESET_BAR	2057.04	3029	0.080985827	0.119251968
35	SCLK	2207.16	3029	0.086896063	0.119251968
36	SDATA	2357.28	3029	0.092806299	0.119251968
37	EXTCLK	2507.4	3029	0.098716535	0.119251968
38	VDD_IO2	2657.52	3029	0.104626772	0.119251968
39	GND5	2807.64	3029	0.110537008	0.119251968
40	SHUTTER	2958.36	3029	0.116470866	0.119251968
41	FLASH	3219.8	2763.12	0.126763779	0.108784252
42	TEST	3219.8	2621.16	0.126763779	0.103195275
43	GND4	3219.8	2462.4	0.126763779	0.096944882
44	VDD3	3219.8	2313.54	0.126763779	0.091084252
45	VDD_TX	3219.8	2163.6	0.126763779	0.085181102
46	CLK_P	3219.8	1983.96	0.126763779	0.078108661
47	CLK_N	3219.8	1664.64	0.126763779	0.065537008
48	DATA_P	3219.8	1415.52	0.126763779	0.055729134
49	DATA_N	3219.8	1096.2	0.126763779	0.04315748
50	DATA2_P	3219.8	733.32	0.126763779	0.028870866
51	DATA2_N	3219.8	414	0.126763779	0.016299213
52	VDD2	3219.8	216.9	0.126763779	0.00853937
53	GND3	3219.8	68.04	0.126763779	0.00267874
54	GND2	3219.8	-1391.285	0.126763779	-0.054775
	REG_FEEDBAC	3219.8	-1644.18	0.126763779	-0.064731496
56	REG_OUT	3219.8	-1794.18	0.126763779	-0.070637008
57	REG_IN	3219.8	-2005.03	0.126763779	-0.078938189
58	VDD_PLL	3219.8	-2155.03	0.126763779	-0.084843701
59	XSHUTDOWN	3219.8	-2299.68	0.126763779	-0.090538583
60	VPP0	3219.8	-2515.32	0.126763779	-0.099028346
61	GND1	3219.8	-2679.84	0.126763779	-0.105505512
62	VDD_IO1	3219.8	-2829.96	0.126763779	-0.111415748
63	VDD1	3219.8	-2965.68	0.126763779	-0.116759055
64	VCM_GND	-3219.8	-2914.675	-0.126763779	-0.114750984
65	VCM_ISINK	-3219.8	-2560.66	-0.126763779	-0.100813386
66	VAA1	-3219.8	-2378.16	-0.126763779	-0.093628346
67	VAA2	-3219.8	-2228.04	-0.126763779	-0.08771811
68	ATEST1_BTM	-3219.8	-2117.88	-0.126763779	-0.083381102
69	AGND1	-3219.8	-2001.24	-0.126763779	-0.078788976
70	ATEST2_BTM	-3219.8	-1891.08	-0.126763779	-0.074451968

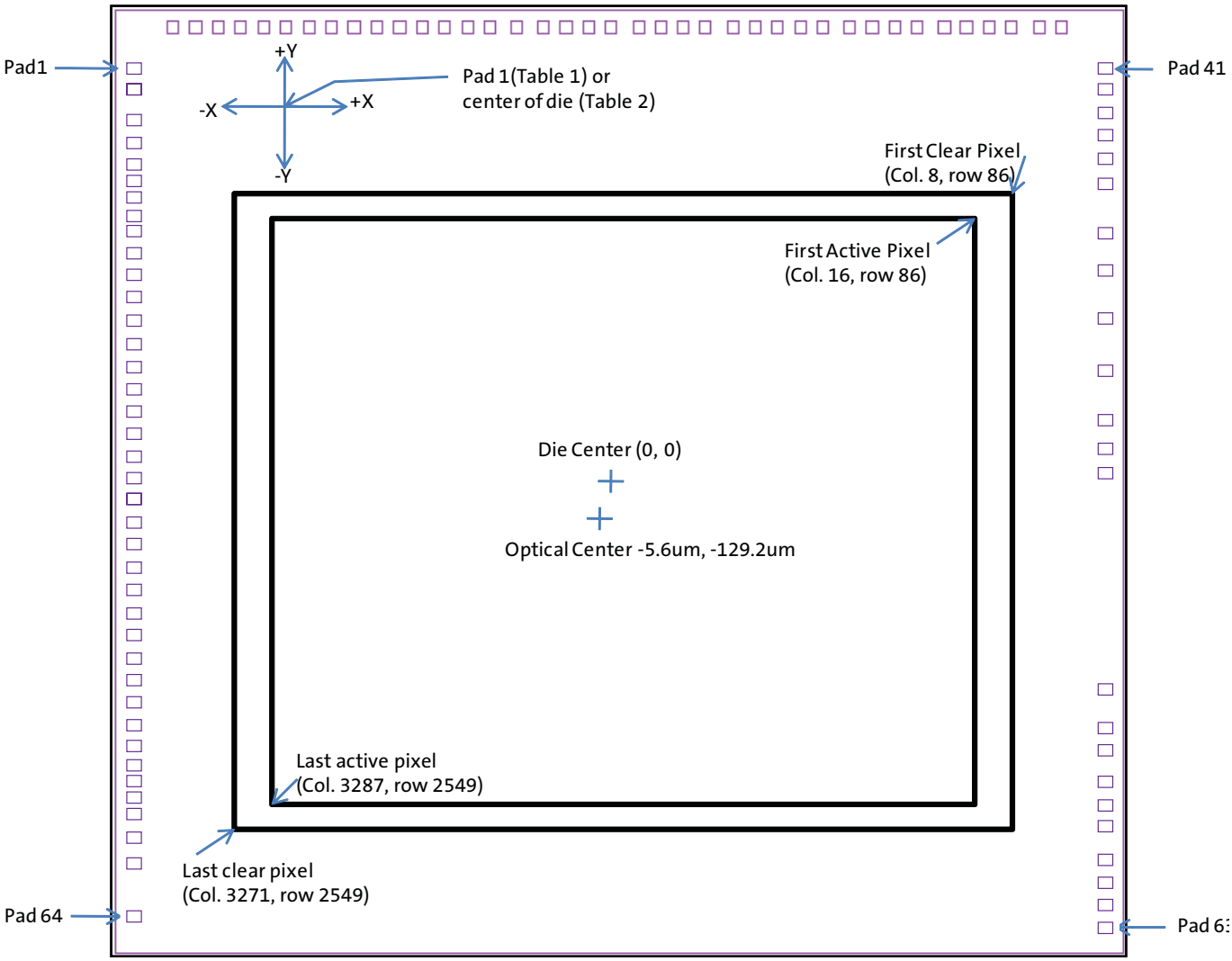
Table 2: Bond Pad Location and Identification from Center of Die (continued)

Pad	AR0832E	"X" [1] Microns	"Y" [1] Microns	"X"[1] Inches	"Y"[1] Inches
71	AGND2	-3219.8	-1780.92	-0.126763779	-0.070114961
72	VAA3	-3219.8	-1630.8	-0.126763779	-0.064204724
73	AGND3	-3219.8	-1480.68	-0.126763779	-0.058294488
74	VAA4	-3219.8	-1330.56	-0.126763779	-0.052384252
75	AGND4	-3219.8	-1180.44	-0.126763779	-0.046474016
76	VAA5	-3219.8	-1030.32	-0.126763779	-0.040563779
77	AGND5	-3219.8	-880.2	-0.126763779	-0.034653543
78	VAA6	-3219.8	-730.08	-0.126763779	-0.028743307
79	AGND6	-3219.8	-579.96	-0.126763779	-0.022833071
80	VAA7	-3219.8	-429.84	-0.126763779	-0.016922835
81	VAA_PIX1	-3219.8	-279.72	-0.126763779	-0.011012598
82	VAA_PIX2	-3219.8	-129.6	-0.126763779	-0.005102362
83	VAA_PIX3	-3219.8	20.52	-0.126763779	0.000807874
84	AGND7	-3219.8	170.64	-0.126763779	0.00671811
85	VAA8	-3219.8	320.76	-0.126763779	0.012628346
86	AGND8	-3219.8	470.88	-0.126763779	0.018538583
87	VAA9	-3219.8	621	-0.126763779	0.024448819
88	AGND9	-3219.8	771.12	-0.126763779	0.030359055
89	VAA10	-3219.8	921.24	-0.126763779	0.036269291
90	AGND10	-3219.8	1071.36	-0.126763779	0.042179528
91	VAA11	-3219.8	1221.48	-0.126763779	0.048089764
92	AGND11	-3219.8	1371.6	-0.126763779	0.054
93	VAA12	-3219.8	1521.72	-0.126763779	0.059910236
94	AGND12	-3219.8	1671.84	-0.126763779	0.065820472
95	ATEST2_TOP	-3219.8	1782	-0.126763779	0.07015748
96	AGND13	-3219.8	1892.16	-0.126763779	0.074494488
97	ATEST1_TOP	-3219.8	2002.32	-0.126763779	0.078831496
98	VAA13	-3219.8	2112.48	-0.126763779	0.083168504
99	VAA14	-3219.8	2262.6	-0.126763779	0.08907874
100	AGND14	-3219.8	2412.72	-0.126763779	0.094988976
101	VDD_IO9	-3219.8	2606.76	-0.126763779	0.102628346

Note:
1. Reference to center of each bond pad from center of die.
2. DNU = do not use. See “Bonding Instructions” on page 3.
3. ATEST1_TOP, ATEST2_TOP, ATEST1_BTM, and ATEST2_BTM should be floating.

Die Features

Figure 3: Die Outline (Top View)



Physical Specifications

Table 3: Physical Dimensions

Feature	Dimensions
Wafer diameter	200mm (8 inches)
Die thickness	200µm ± 12µm
Singulated die size (after wafer saw) Width (X dimension): Length (Y dimension):	 6626 ± 25µm 6244.4 ± 25µm
Bond pad size (MIN)	85µm x 100µm
Passivation openings (MIN)	75µm x 90µm
Minimum bond pad pitch	150µm
Optical array Optical center from die center: Optical center from center of pad 2:	 –5.6µm, –129.2µm –2963.96µm, 3158.2µm
First clear pixel From die center: From center of pad 2:	 2301.02µm, 1596.25µm 5259.38µm, –1432.75µm
Last clear pixel From die center: From center of pad 2:	 –2289.83µm, –1851.78µm 668.53µm, –4880.78µm

Revision History

Rev. A **11/23/11**

- Initial release

10 Eunos Road 8 13-40, Singapore Post Center, Singapore 408600 prodmktg@aptina.com www.aptina.com

Preliminary: This data sheet contains initial characterization limits that are subject to change upon full characterization of production devices.