5Mp ISP with Anti-Shake, JPEG, and Dual-Camera Support

MT9S311

For the product data sheets, refer to Micron's Web site: www.micron.com

Features

- Support for dual cameras and resolutions up to 5Mp
- Anti-shake control for reduced motion blur
- Integrated real-time JPEG encoder with embedded thumbnail
- Data interfaces: parallel or serial
  - CCP2-compliant, sub-low-voltage, differential signaling (sub-LVDS)
  - One- or two-lane mobile industry processor interface (MIPI
- Flexible support for external auto focus, optical zoom, and mechanical shutter
- Internal master clock generated by on-die phase-lock loop (PLL) oscillator
- Advanced image flow processor (IFP) with superior color processing algorithms
- Automatic image correction and enhancement
- Selectable output data format: YCbCr, 565RGB, 555RGB, 444RGB, JPEG 4:2:2, JPEG 4:2:0, and processed Bayer
- Output FIFO for data rate equalization
- Programmable I/O slew rate
- Xenon and LED flash support with fast exposure adaptation
- Configurable gamma correction based on scene brightness
- Arbitrary image scaling with anti-aliasing
- Two-wire serial interface slave providing access to registers and microcontroller memory
- Two-wire serial interface master controller providing control of supporting components
- Programmable image overlay

Applications

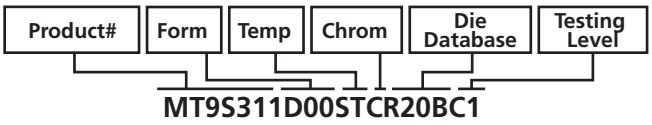
- Cellular phones
- PC cameras
- PDAs

Order Information

Wafer: MT9S311W00STCR20BC1

Die Database R20B

- Die outline, see Figure 2 on page 12
- Die size (stepping interval): 5,420.65µm x 5,420.65µm
- Bond Pad Location and Identification Tables, see pages 6–11



Options

- Form
  - Wafer – 200mm (8in) W
- Testing
  - Standard (level 1) probe C1

General Physical Specifications

- Wafer thickness: 750µm ±25µm *(Consult factory for other die thickness)*
- Backside die surface of bare silicon
- Typical metal 2 thickness: 3.1kÅ
- Typical metal 3 thickness: 3.1kÅ
- Typical metal 4 thickness: 4.15kÅ
- Metallization composition: 99.5 percent Al and 0.5 percent Cu over Ti
- Typical topside passivation: 2.2kÅ nitride over 5.0kÅ of undoped oxide
- Passivation openings (MIN): 75µm x 90µm

Key Performance Parameters

- Primary camera interface: dual-lane MIPI, CCP2 Class-2, 12-bit parallel at 99 MHz (shared)
- Primary camera input format: Bayer8, Bayer10, Bayer12, CCP2 compressed Bayer12, CCP2 compressed Bayer10, Bayer8 + 2
- Secondary camera interface: single-lane MIPI, CCP2 Class-2, 12-bit parallel at 99 MHz (shared)

Key Performance Parameters (continued)

- Secondary camera input format: Bayer8, Bayer10, Bayer12, CCP2 compressed Bayer12, CCP2 compressed Bayer10, Bayer8 + 2, YCbCr (ITU-R BT.601 progressive)
- Output interface: single-lane MIPI, CCP2 Class-2, 8-bit parallel
- Output format: YCbCr, 565RGB, 555RGB, 444RGB, JPEG 4:2:2, JPEG 4:2:0, processed Bayer
- Maximum resolution: 2592 x 1944 pixels
- Input clock frequency: 6–54 MHz
- Maximum frame rate: 15 frames per second (fps) at full resolution, 60 fps at 720p
- Maximum output clock frequency: 96 MHz
- Maximum color processing frequency: 85.3 Mp/s
- Supply voltage: Analog 2.5–3.1V, Digital 1.7–1.95V, I/O 1.7–3.1V, PLL 2.5–3.1V, Serial 1.7–1.95V
- Power consumption: TBD at 15 fps, full resolution; TBD at 30 fps, preview mode; after preview mode, 20µA standby at +70°C
- Operating temperature: –30°C to +70°C (at junction)

General Description

The MT9S311 is Micron's standalone image signal processor with best-in-class image processing functions. The image signal processor can support image resolutions up to 5Mp and can interface with industry-standard CMOS imager sensors. The MT9S311 can process full-resolution images at 15 fps and includes real-time JPEG compression with embedded thumbnails.

The MT9S311 can receive input data from two cameras through dedicated ports for MIPI CSI-2 and SMIA CCP2, and a shared port for 12-bit parallel input. The MIPI input for the primary camera implements dual-lane support. The MT9S311 can output with a SMIA CCP2 or MIPI CSI-2 serial interface or an 8-bit parallel data output interface with programmable I/O slew rate to minimize EMI and an output FIFO to eliminate output data bursts. JPEG format can be output on both the MIPI and the parallel data output interfaces.

Die Testing Procedures

Micron 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 Micron's characterization package. Because the package environment is not within Micron's control, the user must determine the necessary heat sink requirements to ensure that the die junction temperature remains within specified limits.

Micron 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. Micron 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 Micron's data sheets. This is due to differences in package capacitance, inductance, resistance, and trace length.

Functional Specifications

The specifications provided in this document are for reference only. For target functional and parametric specifications, refer to the product data sheet found on Micron's Web site.

Bonding Instructions

The MT9S311 die has 108 bond pads. Refer to Tables 1 and 2 on pages 6–11 for a complete list of bond pads and coordinates.

Bond pad 32 (TEST_EN) selects serial output configuration. It must be grounded for CCP2 device functionality and tied to VDD for MIPI device functionality.

All GND pads must be tied together, as must all GND_IO pads, all VDD pads, and all VDD_IO pads.

Wafer-Level Processing

Customer should post-process the wafer as needed for their application. This includes adding extra passivation or metal layers or bumping of the bond pads. For these customers, the street widths are provided in the die outline. Also, a reference from the center of bond pad 1 to the center of the intersection of two streets is provided for easy alignment.

Storage Requirements

Micron die products are packaged for shipping in a cleanroom environment. Upon receipt, the customer should transfer the wafers to a similar environment for storage. Micron recommends the wafers 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.

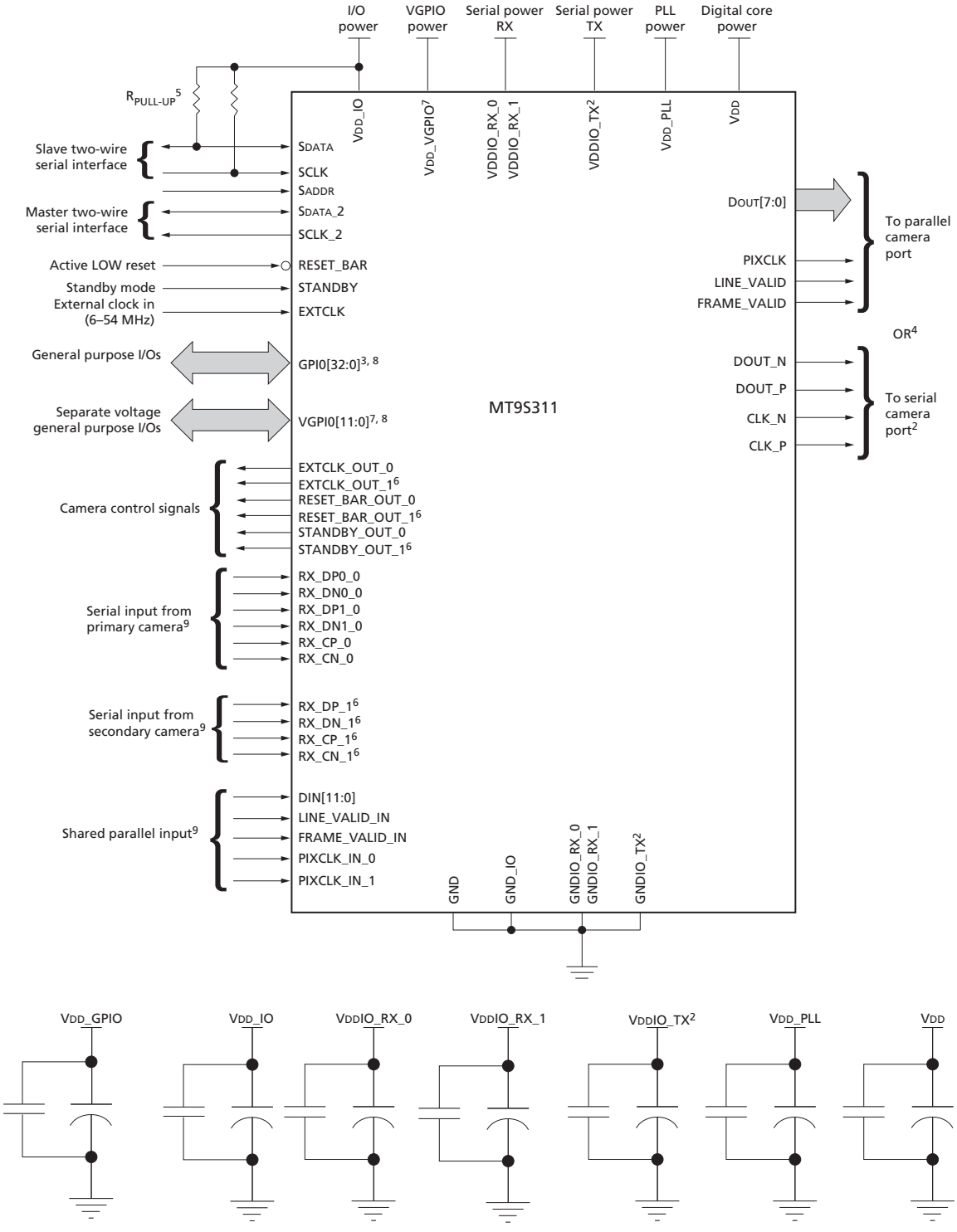
Product Reliability Monitors

Reliability of all packaged products is monitored by ongoing reliability evaluations. Micron's QRA department continually samples product families for reliability studies. These samples are subjected to a battery of tests known as the "Accelerated Life" and "Environmental Stress" tests. During these tests, devices are stressed for many hours under conditions designed to simulate years of normal field use. A summary of these product family evaluations is published on a regular basis.

Typical Connections

Figure 1 shows typical MT9S311 device connections. Power supply rails must be decoupled from ground using capacitors as close as possible to the die. The use of inductance filters is not recommended on the power supplies or output signals.

Figure 1: Typical Configuration (connection)
Note 1



Notes:
1. This typical configuration shows only one scenario out of multiple possible variations.
2. If a serial output interface is not required, the following pads must be left floating: DOUT_P, DOUT_N, CLK_P, CLK_N, and VDDIO_TX, and GNDIO_TX.

3. The GPIO pads can serve multiple features that can be reconfigured. The function and direction will vary by applications.
4. Only one of the output modes (serial or parallel) can be used at any time.
5. A resistor value of 1.5kΩ to VDD_IO is recommended for the two-wire serial interface RPULL-UP; however, greater values may be used for slower transmission speed.
6. If the second serial input is not required, the following signals must be tied to ground: RX_DP_1, RX_DN_1, RX_CP_1, RX_CN_1. The following signals can be configured as VGPIOs in this case: EXTCLK_OUT_1, RESET_BAR_OUT_1, and STANDBY_OUT_1.
7. If external peripherals requiring VGPIO control are not present, the following pads can be floating: VDD_VGPIO, and VGPIO[11:0].
8. GPIOs and VGPIOs are shared with other signals, and their availability may vary by application.
9. At most, two input interfaces may be connected. Only one input will be passed through the IFP at a time.
10. A resistor value of 10kΩ to VDD_IO is recommended for RESET_BAR_OUT_0 and RESET_BAR_OUT_1 if connected to an external sensor.
11. A resistor value of 10kΩ to GND_IO is recommended for STANDBY_OUT_0, STANDBY_OUT_1, EXTCLK_OUT_0, and EXTCLK_OUT_1 if connected to an external sensor.
12. Micron recommends that 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.

The MT9S311 also supports different digital core (VDD/GND), serial output power (VDDIO_TX/GNDIO_TX), serial input power (VDDIO_RX_0/GNDIO_RX_0, VDDIO_RX_1/GNDIO_RX_1), and two banks of I/O power (VDD_IO/GND_IO and VDD_VGPIO/GND_IO) that can be at different voltages. The PLL requires a clean power source (VDD_PLL).

Bond Pad Location and Identification Tables

Table 1: MT9S311 Bond Pad Location From Center of Pad 1

Pad Number	Pad Name	"X"[1] Microns	"Y"[1] Microns	"X"[1] Inches	"Y"[1] Inches
1	GND	0.000	0.000	0.0000000	0.0000000
2	GNDIO_TX	278.980	157.170	0.0109835	0.0061878
3	VDDIO_TX	429.180	157.170	0.0168969	0.0061878
4	CLK_N	690.795	157.170	0.0271967	0.0061878
5	CLK_P	920.795	157.170	0.0362518	0.0061878
6	DOUT_N	1150.800	157.170	0.0453071	0.0061878
7	DOUT_P	1380.800	157.170	0.0543622	0.0061878
8	VDD_PLL	1608.900	157.170	0.0633425	0.0061878
9	RX_D1N_0	1806.805	157.170	0.0711341	0.0061878
10	RX_D1P_0	2064.085	157.170	0.0812632	0.0061878
11	RX_D0N_0	2322.425	157.170	0.0914341	0.0061878
12	RX_D0P_0	2579.705	157.170	0.1015632	0.0061878
13	RX_CN_0	2837.980	157.170	0.1117315	0.0061878
14	RX_CP_0	3095.260	157.170	0.1218606	0.0061878
15	VDDIO_RX_1	3334.400	157.170	0.1312756	0.0061878
16	GNDIO_RX_1	3484.600	157.170	0.1371890	0.0061878
17	RX_DN_1	3697.045	157.170	0.1455530	0.0061878
18	RX_DP_1	3954.325	157.170	0.1556821	0.0061878
19	RX_CN_1	4212.600	157.170	0.1658504	0.0061878
20	RX_CP_1	4469.880	157.170	0.1759795	0.0061878
21	VDDIO_RX_0	4709.030	157.170	0.1853949	0.0061878
22	GNDIO_RX_0	4859.220	157.170	0.1913079	0.0061878
23	GND	5009.430	157.170	0.1972217	0.0061878
24	VDD	5166.600	–334.615	0.2034094	–0.0131738
25	SDATA	5166.600	–508.630	0.2034094	–0.0200248
26	SCLK	5166.600	–679.150	0.2034094	–0.0267382
27	STANDBY	5166.600	–828.790	0.2034094	–0.0326295
28	RESET_BAR	5166.600	–978.430	0.2034094	–0.0385209
29	VDD_IO	5166.600	–1131.550	0.2034094	–0.0445492
30	EXTCLK	5166.600	–1284.670	0.2034094	–0.0505776
31	SADDR	5166.600	–1434.310	0.2034094	–0.0564689
32	TEST_EN	5166.600	–1583.950	0.2034094	–0.0623602
33	GND_IO	5166.600	–1733.010	0.2034094	–0.0682287
34	VDD_IO	5166.600	–1883.230	0.2034094	–0.0741429
35	PIXCLK_IN_0	5166.600	–2033.450	0.2034094	–0.0800571
36	PIXCLK_IN_1	5166.600	–2196.265	0.2034094	–0.0864671
37	LINE_VALID_IN	5166.600	–2385.510	0.2034094	–0.0939177

Table 1: MT9S311 Bond Pad Location From Center of Pad 1 (continued)

Pad Number	Pad Name	"X"[1] Microns	"Y"[1] Microns	"X"[1] Inches	"Y"[1] Inches
38	FRAME_VALID_IN	5166.600	–2535.150	0.2034094	–0.0998091
39	GND_IO	5166.600	–2686.530	0.2034094	–0.1057689
40	VDD_IO	5166.600	–2843.130	0.2034094	–0.1119343
41	DIN11	5166.600	–2993.350	0.2034094	–0.1178484
42	DIN10	5166.600	–3142.990	0.2034094	–0.1237398
43	DIN9	5166.600	–3318.730	0.2034094	–0.1306587
44	DIN8	5166.600	–3468.370	0.2034094	–0.1365500
45	DIN7	5166.600	–3618.010	0.2034094	–0.1424413
46	VDD_IO	5166.600	–3790.850	0.2034094	–0.1492461
47	GND_IO	5166.600	–3942.230	0.2034094	–0.1552059
48	DIN6	5166.600	–4072.150	0.2034094	–0.1603209
49	DIN5	5166.600	–4221.790	0.2034094	–0.1662122
50	DIN4	5166.600	–4395.790	0.2034094	–0.1730626
51	DIN3	5166.600	–4545.430	0.2034094	–0.1789539
52	VDD_IO	5166.600	–4695.650	0.2034094	–0.1848681
53	GND	5166.600	–4852.260	0.2034094	–0.1910339
54	DIN2	4866.780	–5009.430	0.1916055	–0.1972217
55	DIN1	4706.535	–5009.430	0.1852967	–0.1972217
56	DIN0	4533.115	–5009.430	0.1784691	–0.1972217
57	GND_IO	4383.060	–5009.430	0.1725614	–0.1972217
58	VDD	4101.815	–5009.430	0.1614888	–0.1972217
59	VDD_IO	3951.540	–5009.430	0.1555724	–0.1972217
60	RESET_BAR_OUT_1	3770.995	–5009.430	0.1484644	–0.1972217
61	STANDBY_OUT_1	3597.575	–5009.430	0.1416368	–0.1972217
62	EXTCLK_OUT_1	3424.155	–5009.430	0.1348093	–0.1972217
63	VDD_IO	3272.360	–5009.430	0.1288331	–0.1972217
64	GND_IO	3122.140	–5009.430	0.1229189	–0.1972217
65	RESET_BAR_OUT_0	2970.345	–5009.430	0.1169427	–0.1972217
66	STANDBY_OUT_0	2776.295	–5009.430	0.1093030	–0.1972217
67	EXTCLK_OUT_0	2600.305	–5009.430	0.1023742	–0.1972217
68	SDATA_2	2419.180	–5009.430	0.0952433	–0.1972217
69	SCLK_2	2227.780	–5009.430	0.0877079	–0.1972217
70	VDD_IO	2070.020	–5009.430	0.0814969	–0.1972217
71	VDD	1788.775	–5009.430	0.0704242	–0.1972217
72	VDD_VGPIO	1638.500	–5009.430	0.0645079	–0.1972217
73	GND_IO	1488.280	–5009.430	0.0585937	–0.1972217
74	VGPIO11	1338.225	–5009.430	0.0526860	–0.1972217
75	VGPIO10	1167.375	–5009.430	0.0459596	–0.1972217
76	VGPIO9	993.955	–5009.430	0.0391321	–0.1972217

Table 1: MT9S311 Bond Pad Location From Center of Pad 1 (continued)

Pad Number	Pad Name	"X"[1] Microns	"Y"[1] Microns	"X"[1] Inches	"Y"[1] Inches
77	VGPIO8	820.535	–5009.430	0.0323045	–0.1972217
78	VGPIO7	647.115	–5009.430	0.0254770	–0.1972217
79	VGPIO6	473.695	–5009.430	0.0186494	–0.1972217
80	VDD_VGPIO	307.400	–5009.430	0.0121024	–0.1972217
81	GND	157.170	–5009.430	0.0061878	–0.1972217
82	VGPIO5	0.000	–4711.725	0.0000000	–0.1855010
83	VGPIO4	0.000	–4538.305	0.0000000	–0.1786734
84	VGPIO3	0.000	–4364.885	0.0000000	–0.1718459
85	VGPIO2	0.000	–4191.465	0.0000000	–0.1650183
86	VGPIO1	0.000	–4018.045	0.0000000	–0.1581907
87	VGPIO0	0.000	–3844.625	0.0000000	–0.1513632
88	VDD_VGPIO	0.000	–3675.450	0.0000000	–0.1447028
89	VDD	0.000	–3365.205	0.0000000	–0.1324884
90	GND_IO	0.000	–3214.930	0.0000000	–0.1265720
91	VDD_IO	0.000	–3058.330	0.0000000	–0.1204067
92	FRAME_VALID	0.000	–2910.845	0.0000000	–0.1146002
93	LINE_VALID	0.000	–2734.855	0.0000000	–0.1076715
94	GND_IO	0.000	–2587.370	0.0000000	–0.1018650
95	PIXCLK	0.000	–2423.645	0.0000000	–0.0954191
96	VDD_IO	0.000	–2273.590	0.0000000	–0.0895114
97	DOUT7	0.000	–2123.535	0.0000000	–0.0836037
98	DOUT6	0.000	–1952.685	0.0000000	–0.0768774
99	DOUT5	0.000	–1756.065	0.0000000	–0.0691364
100	DOUT4	0.000	–1582.645	0.0000000	–0.0623089
101	VDD_IO	0.000	–1432.590	0.0000000	–0.0564012
102	GND_IO	0.000	–1275.990	0.0000000	–0.0502358
103	DOUT3	0.000	–1125.025	0.0000000	–0.0442923
104	DOUT2	0.000	–951.605	0.0000000	–0.0374648
105	DOUT1	0.000	–754.985	0.0000000	–0.0297238
106	DOUT0	0.000	–581.565	0.0000000	–0.0228963
107	VDD_IO	0.000	–431.510	0.0000000	–0.0169886
108	VDD	0.000	–150.265	0.0000000	–0.0059159

Notes: 1. Reference to center of each bond pad from center of bond pad 1.
2. To ensure proper device operation, all power supply bond pads must be bonded.

Table 2: Bond Pad Location and Identification from Center of Die (0,0)

Pad Number	Pad Name	"X"[1] Microns	"Y"[1] Microns	"X"[1] Inches	"Y"[1] Inches
1	GND	–2583.300	2426.130	–0.1017047	0.0955169
2	GNDIO_TX	–2304.320	2583.300	–0.0907213	0.1017047
3	VDDIO_TX	–2154.120	2583.300	–0.0848079	0.1017047
4	CLK_N	–1892.505	2583.300	–0.0745081	0.1017047
5	CLK_P	–1662.505	2583.300	–0.0654530	0.1017047
6	DOUT_N	–1432.500	2583.300	–0.0563976	0.1017047
7	DOUT_P	–1202.500	2583.300	–0.0473425	0.1017047
8	VDD_PLL	–974.400	2583.300	–0.0383622	0.1017047
9	RX_D1N_0	–776.495	2583.300	–0.0305707	0.1017047
10	RX_D1P_0	–519.215	2583.300	–0.0204415	0.1017047
11	RX_D0N_0	–260.875	2583.300	–0.0102707	0.1017047
12	RX_D0P_0	–3.595	2583.300	–0.0001415	0.1017047
13	RX_CN_0	254.680	2583.300	0.0100268	0.1017047
14	RX_CP_0	511.960	2583.300	0.0201559	0.1017047
15	VDDIO_RX_1	751.100	2583.300	0.0295709	0.1017047
16	GNDIO_RX_1	901.300	2583.300	0.0354843	0.1017047
17	RX_DN_1	1113.745	2583.300	0.0438482	0.1017047
18	RX_DP_1	1371.025	2583.300	0.0539774	0.1017047
19	RX_CN_1	1629.300	2583.300	0.0641457	0.1017047
20	RX_CP_1	1886.580	2583.300	0.0742748	0.1017047
21	VDDIO_RX_0	2125.730	2583.300	0.0836902	0.1017047
22	GNDIO_RX_0	2275.920	2583.300	0.0896031	0.1017047
23	GND	2426.130	2583.300	0.0955169	0.1017047
24	VDD	2583.300	2091.515	0.1017047	0.0823431
25	SDATA	2583.300	1917.500	0.1017047	0.0754921
26	SCLK	2583.300	1746.980	0.1017047	0.0687787
27	STANDBY	2583.300	1597.340	0.1017047	0.0628874
28	RESET_BAR	2583.300	1447.700	0.1017047	0.0569961
29	VDD_IO	2583.300	1294.580	0.1017047	0.0509677
30	EXTCLK	2583.300	1141.460	0.1017047	0.0449394
31	SADDR	2583.300	991.820	0.1017047	0.0390480
32	TEST_EN	2583.300	842.180	0.1017047	0.0331567
33	GND_IO	2583.300	693.120	0.1017047	0.0272882
34	VDD_IO	2583.300	542.900	0.1017047	0.0213740
35	PIXCLK_IN_0	2583.300	392.680	0.1017047	0.0154598
36	PIXCLK_IN_1	2583.300	229.865	0.1017047	0.0090498
37	LINE_VALID_IN	2583.300	40.620	0.1017047	0.0015992
38	FRAME_VALID_IN	2583.300	–109.020	0.1017047	–0.0042921
39	GND_IO	2583.300	–260.400	0.1017047	–0.0102520
40	VDD_IO	2583.300	–417.000	0.1017047	–0.0164173
41	DIN11	2583.300	–567.220	0.1017047	–0.0223315
42	DIN10	2583.300	–716.860	0.1017047	–0.0282228
43	DIN9	2583.300	–892.600	0.1017047	–0.0351417
44	DIN8	2583.300	–1042.240	0.1017047	–0.0410331
45	DIN7	2583.300	–1191.880	0.1017047	–0.0469244

Table 2: Bond Pad Location and Identification from Center of Die (0,0) (continued)

Pad Number	Pad Name	"X"[1] Microns	"Y"[1] Microns	"X"[1] Inches	"Y"[1] Inches
46	VDD_IO	2583.300	–1364.720	0.1017047	–0.0537291
47	GND_IO	2583.300	–1516.100	0.1017047	–0.0596890
48	DIN6	2583.300	–1646.020	0.1017047	–0.0648039
49	DIN5	2583.300	–1795.660	0.1017047	–0.0706953
50	DIN4	2583.300	–1969.660	0.1017047	–0.0775457
51	DIN3	2583.300	–2119.300	0.1017047	–0.0834370
52	VDD_IO	2583.300	–2269.520	0.1017047	–0.0893512
53	GND	2583.300	–2426.130	0.1017047	–0.0955169
54	DIN2	2283.480	–2583.300	0.0899008	–0.1017047
55	DIN1	2123.235	–2583.300	0.0835919	–0.1017047
56	DIN0	1949.815	–2583.300	0.0767644	–0.1017047
57	GND_IO	1799.760	–2583.300	0.0708567	–0.1017047
58	VDD	1518.515	–2583.300	0.0597841	–0.1017047
59	VDD_IO	1368.240	–2583.300	0.0538677	–0.1017047
60	RESET_BAR_OUT_1	1187.695	–2583.300	0.0467596	–0.1017047
61	STANDBY_OUT_1	1014.275	–2583.300	0.0399321	–0.1017047
62	EXTCLK_OUT_1	840.855	–2583.300	0.0331045	–0.1017047
63	VDD_IO	689.060	–2583.300	0.0271283	–0.1017047
64	GND_IO	538.840	–2583.300	0.0212142	–0.1017047
65	RESET_BAR_OUT_0	387.045	–2583.300	0.0152380	–0.1017047
66	STANDBY_OUT_0	192.995	–2583.300	0.0075982	–0.1017047
67	EXTCLK_OUT_0	17.005	–2583.300	0.0006695	–0.1017047
68	SDATA_2	–164.120	–2583.300	–0.0064614	–0.1017047
69	SCLK_2	–355.520	–2583.300	–0.0139969	–0.1017047
70	VDD_IO	–513.280	–2583.300	–0.0202079	–0.1017047
71	VDD	–794.525	–2583.300	–0.0312805	–0.1017047
72	VDD_VGPIO	–944.800	–2583.300	–0.0371969	–0.1017047
73	GND_IO	–1095.020	–2583.300	–0.0431110	–0.1017047
74	VGPIO11	–1245.075	–2583.300	–0.0490187	–0.1017047
75	VGPIO10	–1415.925	–2583.300	–0.0557451	–0.1017047
76	VGPIO9	–1589.345	–2583.300	–0.0625726	–0.1017047
77	VGPIO8	–1762.765	–2583.300	–0.0694002	–0.1017047
78	VGPIO7	–1936.185	–2583.300	–0.0762278	–0.1017047
79	VGPIO6	–2109.605	–2583.300	–0.0830553	–0.1017047
80	VDD_VGPIO	–2275.900	–2583.300	–0.0896024	–0.1017047
81	GND	–2426.130	–2583.300	–0.0955169	–0.1017047
82	VGPIO5	–2583.300	–2285.595	–0.1017047	–0.0899841
83	VGPIO4	–2583.300	–2112.175	–0.1017047	–0.0831565
84	VGPIO3	–2583.300	–1938.755	–0.1017047	–0.0763289
85	VGPIO2	–2583.300	–1765.335	–0.1017047	–0.0695014
86	VGPIO1	–2583.300	–1591.915	–0.1017047	–0.0626738
87	VGPIO0	–2583.300	–1418.495	–0.1017047	–0.0558463
88	VDD_VGPIO	–2583.300	–1249.320	–0.1017047	–0.0491858
89	VDD	–2583.300	–939.075	–0.1017047	–0.0369715
90	GND_IO	–2583.300	–788.800	–0.1017047	–0.0310551

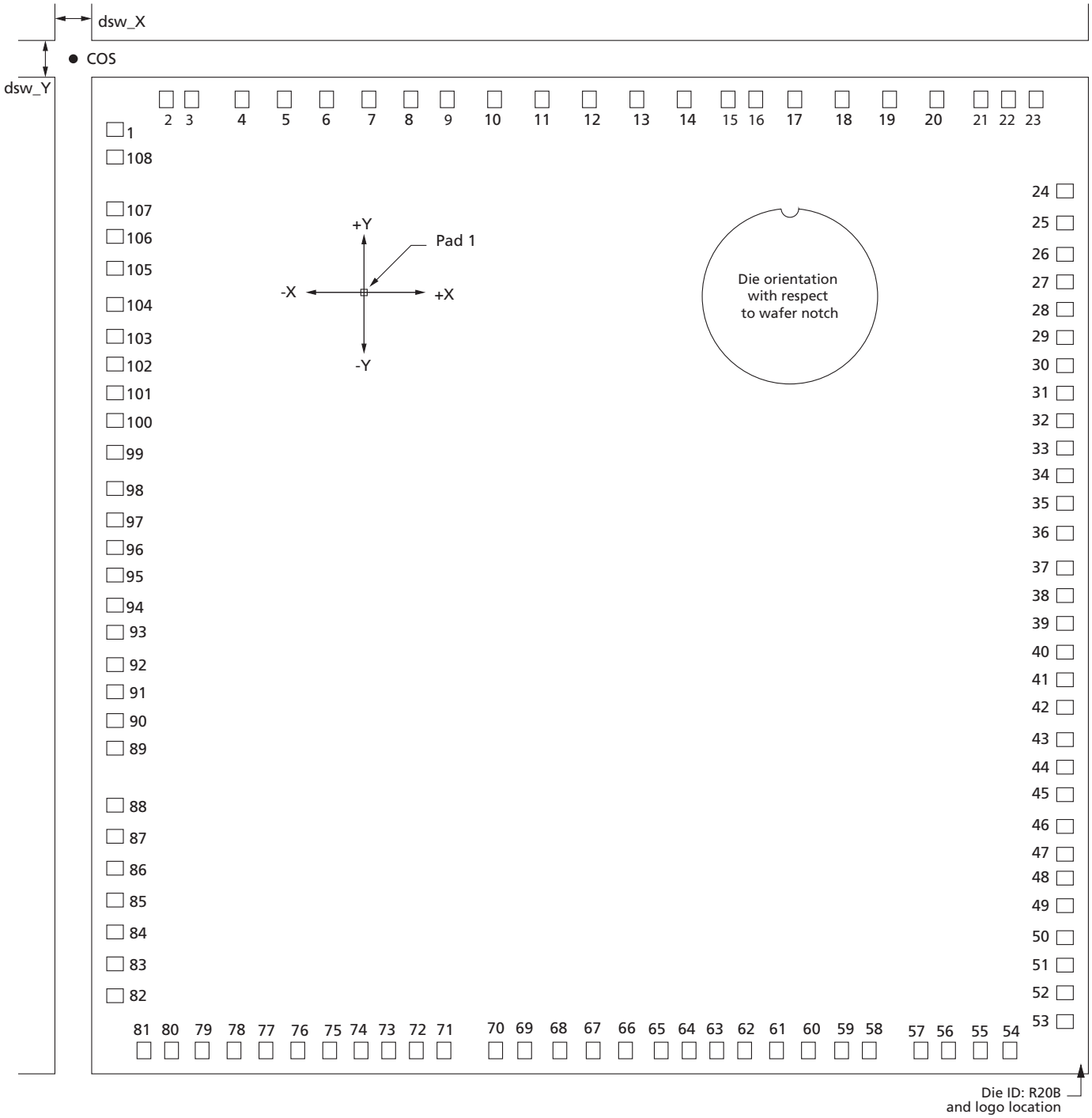
Table 2: Bond Pad Location and Identification from Center of Die (0,0) (continued)

Pad Number	Pad Name	"X"[1] Microns	"Y"[1] Microns	"X"[1] Inches	"Y"[1] Inches
91	VDD_IO	–2583.300	–632.200	–0.1017047	–0.0248898
92	FRAME_VALID	–2583.300	–484.715	–0.1017047	–0.0190833
93	LINE_VALID	–2583.300	–308.725	–0.1017047	–0.0121545
94	GND_IO	–2583.300	–161.240	–0.1017047	–0.0063480
95	PIXCLK	–2583.300	2.485	–0.1017047	0.0000978
96	VDD_IO	–2583.300	152.540	–0.1017047	0.0060055
97	DOUT7	–2583.300	302.595	–0.1017047	0.0119132
98	DOUT6	–2583.300	473.445	–0.1017047	0.0186396
99	DOUT5	–2583.300	670.065	–0.1017047	0.0263805
100	DOUT4	–2583.300	843.485	–0.1017047	0.0332081
101	VDD_IO	–2583.300	993.540	–0.1017047	0.0391157
102	GND_IO	–2583.300	1150.140	–0.1017047	0.0452811
103	DOUT3	–2583.300	1301.105	–0.1017047	0.0512246
104	DOUT2	–2583.300	1474.525	–0.1017047	0.0580522
105	DOUT1	–2583.300	1671.145	–0.1017047	0.0657931
106	DOUT0	–2583.300	1844.565	–0.1017047	0.0726207
107	VDD_IO	–2583.300	1994.620	–0.1017047	0.0785283
108	VDD	–2583.300	2275.865	–0.1017047	0.0896010

Notes: 1. Reference to center of each bond pad from center of die (0, 0).
2. To ensure proper device operation, all power supply bond pads must be bonded.

Die Features

Figure 2: Die Outline (Top View)



Notes:
1. Figure 2 represents physical orientation of the die only.
2. Die street widths are not drawn to scale.

Physical Specifications

Table 3: Physical Dimensions

Feature	Dimensions
Wafer diameter	200mm (8in)
Wafer thickness	750µm ±25µm
Die size (stepping interval)	5,420.65µm x 5,420.65µm
Street width along X-axis (dsw_X)	127µm
Street width along Y-axis (dsw_Y)	127µm
Center of streets (COS) (relative to center of bond pad 1)	X = 127µm, Y = 284.17µm
Bond pad size (MIN)	85µm x 100µm
Passivation openings (MIN)	75µm x 90µm
Minimum bond pad pitch *Between any two bond pads:*	150µm
Die offset *From center of wafer to center of die (wafer notch at top):*	X = 0mm, Y = 0mm

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Revision History

Rev. A 8/2007

- Initial release