Embedded Artists'

LPC4088 OEM Board DS rev A DS

The Art of Embedded Systems Development – **made Easy™**

Document status: Preliminary

LPC4088-32 OEM Board Feature Highlights

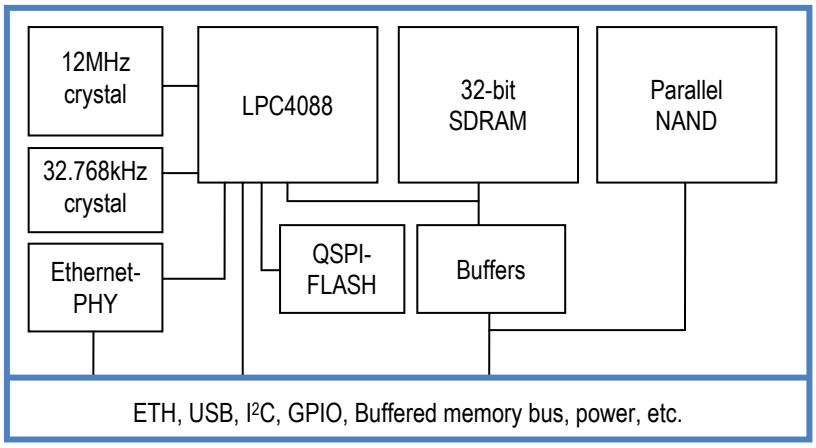
The LPC4088-32 OEM Board provides a quick and easy solution for implementing a high-performance ARM Cortex-M4 based design around the LPC4088 from NXP.

- Build around NXP's ARM Cortex-M4 LPC4088 microcontroller with 512Kbyte internal FLASH and 96Kbyte internal SRAM
- 32MByte external SDRAM, via 32-bit databus
- 128 Mbyte NAND FLASH
- 32 Mbit QSPI flash
- 100/10Mbps Ethernet interface based on SMSC LAN8720
- 12.000 MHz and 32.768 kHz crystals for LPC4088
- Buffered 32-bit data bus
- +3.3V powering
- 200 pos expansion connector
  (as defined in popular SO-DIMM industry standard), 0.6mm pitch
- Compact design with dimensions: 68 x 50 mm

Support Highlights

- Access to Embedded Artists support page containing
  - Schematics
  - User's Manual
  - Sample software applications
  - OEM Board Integration Guide
- Supported by Developer's Kit, see picture to right
- Volume discount available
- Customization service available for optimized high-volume design

Block Diagram of LPC4088-32 OEM Board



NXP Partner

Embedded Artists is a partner of NXP. Together we give engineers an excellent base to work from when creating advanced embedded systems. We have a close co-operation and know everything there is to know about the NXP processors. Take advantage of our unique knowledge! For further information, please contact: support@EmbeddedArtists.com

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Absolute Maximum Ratings

Parameter	Rating
VDD to GND (Supply voltage)	-0.5V to +3.6V
General for Digital/Analog Input/Output Voltage +5V tolerant pins on LPC4088	-0.5V to VDD+0.5V -0.5V to +6.0V (see LPC4088 DS for details)
Storage temperature	-40°C to 100°C

Stress above these limits may cause permanent damage to the board.

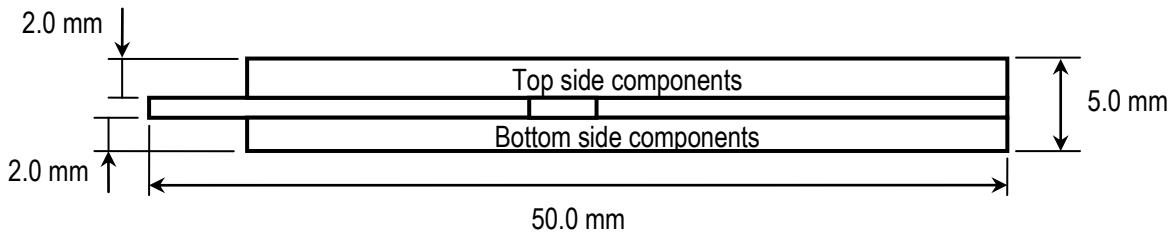
Technical Data

Parameter	Min	Typical	Max
Supply voltage (VDD to GND) Ripple with frequency contents < 100kHz Ripple with frequency contents ≥ 100kHz	3.10V	3.30V	3.50V 50mV 10mV
Supply current - idle, 32kHz RTC active - low-power mode - executing from internal flash (120MHz) - executing from external sdram (120MHz) - Ethernet+usb active		 TBD[2] TBD[2] TBD[2] TBD[2] TBD[2]	Max observed
VBAT current		TBD[2]	
Operating temperature[1]		TBD[2]	
Relative Humidity (RH) 0°C < T_A ≤ 50°C, non-condensing 50°C < T_A ≤ 60°C, non-condensing 60°C < T_A ≤ 70°C, non-condensing	 5% 5% 5%		 80% 50% 35%

[1] Extended temperature range can be supplied on request. Subject to minimum order volume.
[2] Will be defined after a characterization process.

Mechanical Dimensions

Board width according to SO-DIMM standard: 67.6 mm.
Board height and depth according to picture below:



ESD CAUTION

ESD (electrostatic discharge) sensitive device. Charged devices and circuit boards can discharge without detection. Although this product features ESD protection damages may occur on devices subjected to high energy ESD. Therefore, proper ESD precaution should be taken to avoid performance degradation or loss of functionality.

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Pin Information

SO-DIMM pins	I/O, Application Details	Connected to
1	A, Ethernet TXP	Ethernet-PHY
2	A, Ethernet RXP	Ethernet-PHY
3	A, Ethernet TXN	Ethernet-PHY
4	A, Ethernet RXP	Ethernet-PHY
5	P, VDD3_3A	
6	P, GND	
7	OD, ETH-LED1	Ethernet-PHY
8	OD, ETH-LED2	Ethernet-PHY
9	P, VBAT-IN	LPC4088, vbat
10	O, RTC-ALARM	LPC4088, rtc-alarm
11	I, RESET-IN	LPC4088, rst-in
12	O, RESET-OUT	LPC4088, rst-out
13	NC	
14	B, GPIO	LPC4088, P5.0
15	O, TCK/SWDCLK	LPC4088, tck/swdclk
16	B, GPIO	LPC4088, P5.4
17	I, TRST	LPC4088, trst
18	B, TMS/SWDIO	LPC4088, tms/swdio
19	I, TDI	LPC4088, tdi
20	O, TDO/SWO	LPC4088, tdo/swo
21	P, V3A	LPC4088, v3a
22	P, VREF	LPC4088, vref
23	P, VSSA	LPC4088, vssa
24	P, GND	
25	B, GPIO	LPC4088, P2.0
26	B, GPIO	LPC4088, P2.1
27	B, GPIO	LPC4088, P2.2
28	B, GPIO	LPC4088, P2.3
29	B, GPIO	LPC4088, P2.4
30	B, GPIO	LPC4088, P2.5
31	B, GPIO	LPC4088, P2.6
32	B, GPIO	LPC4088, P0.10
33	B, GPIO	LPC4088, P2.8
34	B, GPIO	LPC4088, P2.9
35	B, GPIO	LPC4088, P2.10
36	B, GPIO	LPC4088, P2.11
37	P, VCC	
38	P, GND	
39	P, VCC	
40	P, GND	
41	A, USB1-DP	LPC4088, USB-D+1
42	A, USB2-DP	LPC4088, USB-D+2
43	A, USB1-DM	LPC4088, USB-D-1
44	A, USB2-DM	LPC4088, USB-D-2
45	B, GPIO	LPC4088, P2.12
46	B, GPIO	LPC4088, P2.13
47	B, GPIO	LPC4088, P0.0
48	B, GPIO	LPC4088, P0.1
49	B, GPIO	LPC4088, P0.2
50	B, GPIO	LPC4088, P0.3
51	B, GPIO	LPC4088, P0.4
52	B, GPIO	LPC4088, P0.5
53	B, GPIO	LPC4088, P0.6

SO-DIMM pins	I/O, Application Details	Connected to
101	P, GND	
102	P, GND	
103	NC	
104	NC	
105	NC	
106	NC	
107	B, GPIO	LPC4088, P5.4
108	B, GPIO	LPC4088, P5.3
109	B, GPIO	LPC4088, P5.2
110	NC	
111	B, GPIO	LPC4088, P1.16
112	NC	
113	O, Buffered CS1 (internal NAND)	LPC4088, P4.31 via buffer
114	B, GPIO	LPC4088, P4.30
115	B, GPIO	LPC4088, P1.16
116	B, GPIO	LPC4088, P2.14
117	B, GPIO	LPC4088, P2.15
118	B, GPIO	LPC4088, P2.19
119	B, GPIO	LPC4088, P2.21
120	B, GPIO	LPC4088, P2.22
121	B, GPIO	LPC4088, P2.23
122	B, GPIO	LPC4088, P2.25
123	B, GPIO	LPC4088, P2.26
124	B, GPIO	LPC4088, P2.27
125	NC	
126	NC	
127	NC	
128	NC	
129	P, GND	
130	P, GND	
131	O, Buffered Address bus 15	LPC4088, P4.15 via buffer
132	O, Buffered CS2	LPC4088, P2.14 via buffer
133	O, Buffered Address bus 14	LPC4088, P4.14 via buffer
134	O, Buffered CS0	LPC4088, P4.30 via buffer
135	O, Buffered Address bus 13	LPC4088, P4.13 via buffer
136	O, Buffered BLS3	LPC4088, P4.29 via buffer
137	O, Buffered Address bus 12	LPC4088, P4.12 via buffer
138	O, Buffered BLS2	LPC4088, P4.28 via buffer
139	O, Buffered Address bus 11	LPC4088, P4.11 via buffer
140	O, Buffered BLS1	LPC4088, P4.27 via buffer
141	O, Buffered Address bus 10	LPC4088, P4.10 via buffer
142	O, Buffered BLS0	LPC4088, P4.26 via buffer
143	O, Buffered Address bus 9	LPC4088, P4.9 via buffer
144	O, Buffered WE	LPC4088, P4.25 via buffer
145	O, Buffered Address bus 8	LPC4088, P4.8 via buffer
146	O, Buffered OE	LPC4088, P4.24 via buffer
147	O, Buffer Address bus 7	LPC4088, P4.7 via buffer
148	O, Buffer Address bus 23	LPC4088, P4.23 via buffer
149	O, Buffer Address bus 6	LPC4088, P4.6 via buffer
150	O, Buffer Address bus 22	LPC4088, P4.22 via buffer
151	O, Buffer Address bus 5	LPC4088, P4.5 via buffer
152	O, Buffer Address bus 21	LPC4088, P4.21 via buffer
153	O, Buffer Address bus 4	LPC4088, P4.4 via buffer

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54	B, GPIO	LPC4088, P0.7
55	B, GPIO	LPC4088, P0.8
56	B, GPIO	LPC4088, P0.9
57	B, GPIO	LPC4088, P4.22
58	B, GPIO	LPC4088, P4.23
59	B, GPIO	LPC4088, P0.12
60	B, GPIO	LPC4088, P0.13
61	B, GPIO	LPC4088, P0.14
62	B, GPIO	LPC4088, P5.2
63	B, GPIO	LPC4088, P5.3
64	B, GPIO	LPC4088, P5.1
65	B, GPIO	LPC4088, P5.0
66	B, GPIO	LPC4088, P0.19
67	B, GPIO	LPC4088, P0.20
68	B, GPIO	LPC4088, P0.21
69	B, SPIFI-CLK	LPC4088, P0.22
70	B, GPIO	LPC4088, P0.23
71	B, GPIO	LPC4088, P0.24
72	B, GPIO	LPC4088, P0.25
73	B, GPIO	LPC4088, P0.26
74	B, I2C-SDA	LPC4088, P0.27
75	B, I2C-SCL	LPC4088, P0.28
76	P, GND	
77	P, GND	
78	B, GPIO	LPC4088, P1.2
79	B, GPIO	LPC4088, P1.3
80	B, GPIO	LPC4088, P1.5
81	B, GPIO	LPC4088, P1.6
82	B, GPIO	LPC4088, P1.7
83	B, GPIO	LPC4088, P1.11
84	B, GPIO	LPC4088, P1.12
85	B, GPIO	LPC4088, P1.13
86	B, GPIO	LPC4088, P1.18
87	B, GPIO	LPC4088, P1.19
88	B, GPIO	LPC4088, P1.20
89	B, GPIO	LPC4088, P1.21
90	B, GPIO	LPC4088, P1.22
91	B, GPIO	LPC4088, P1.23
92	B, GPIO	LPC4088, P1.24
93	B, GPIO	LPC4088, P1.25
94	B, GPIO	LPC4088, P1.26
95	B, GPIO	LPC4088, P1.27
96	B, GPIO	LPC4088, P1.28
97	B, GPIO	LPC4088, P1.29
98	B, GPIO	LPC4088, P1.30
99	B, GPIO	LPC4088, P1.31
100	OD, NandFlashRdy	Internal NAND flash

154	O, Buffer Address bus 20	LPC4088, P4.20 via buffer
155	O, Buffer Address bus 3	LPC4088, P4.3 via buffer
156	O, Buffer Address bus 19	LPC4088, P4.19 via buffer
157	O, Buffer Address bus 2	LPC4088, P4.2 via buffer
158	O, Buffer Address bus 18	LPC4088, P4.18 via buffer
159	O, Buffer Address bus 1	LPC4088, P4.1 via buffer
160	O, Buffer Address bus 17	LPC4088, P4.17 via buffer
161	O, Buffer Address bus 0	LPC4088, P4.0 via buffer
162	O, Buffer Address bus 16	LPC4088, P4.16 via buffer
163	O, Buffered CS3	LPC4088, P2.15 via buffer
164	I, ABUF_EN	Connected to GND on board
165	P, Buffer-VCC	
166	P, GND	
167	B, Buffer Data bus 15	LPC4088, P3.15 via buffer
168	B, Buffer Data bus 31	LPC4088, P3.31 via buffer
169	B, Buffer Data bus 14	LPC4088, P3.14 via buffer
170	B, Buffer Data bus 30	LPC4088, P3.30 via buffer
171	B, Buffer Data bus 13	LPC4088, P3.13 via buffer
172	B, Buffer Data bus 29	LPC4088, P3.29 via buffer
173	B, Buffer Data bus 12	LPC4088, P3.12 via buffer
174	B, Buffer Data bus 28	LPC4088, P3.28 via buffer
175	B, Buffer Data bus 11	LPC4088, P3.11 via buffer
176	B, Buffer Data bus 27	LPC4088, P3.27 via buffer
177	B, Buffer Data bus 10	LPC4088, P3.10 via buffer
178	B, Buffer Data bus 26	LPC4088, P3.26 via buffer
179	B, Buffer Data bus 9	LPC4088, P3.9 via buffer
180	B, Buffer Data bus 25	LPC4088, P3.25 via buffer
181	B, Buffer Data bus 8	LPC4088, P3.8 via buffer
182	B, Buffer Data bus 24	LPC4088, P3.24 via buffer
183	B, Buffer Data bus 7	LPC4088, P3.7 via buffer
184	B, Buffer Data bus 23	LPC4088, P3.23 via buffer
185	B, Buffer Data bus 6	LPC4088, P3.6 via buffer
186	B, Buffer Data bus 22	LPC4088, P3.22 via buffer
187	B, Buffer Data bus 5	LPC4088, P3.5 via buffer
188	B, Buffer Data bus 21	LPC4088, P3.21 via buffer
189	B, Buffer Data bus 4	LPC4088, P3.4 via buffer
190	B, Buffer Data bus 20	LPC4088, P3.20 via buffer
191	B, Buffer Data bus 3	LPC4088, P3.3 via buffer
192	B, Buffer Data bus 19	LPC4088, P3.19 via buffer
193	B, Buffer Data bus 2	LPC4088, P3.2 via buffer
194	B, Buffer Data bus 18	LPC4088, P3.18 via buffer
195	B, Buffer Data bus 1	LPC4088, P3.1 via buffer
196	B, Buffer Data bus 17	LPC4088, P3.17 via buffer
197	B, Buffer Data bus 0	LPC4088, P3.0 via buffer
198	B, Buffer Data bus 16	LPC4088, P3.16 via buffer
199	P, Buffer-VCC	
200	P, GND	

I/O legend

O: output
I: input
B: Bidirectional
P: Power
A: Analog
OD: Open-drain output
GPIO: General purpose I/O
GPI: General purpose input
GPO: General purpose output

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