Atmel ATPL210A

PRIME compliant Power Line Communications SoC

SUMMARY DATASHEET

Features

- Core
  - ADD8051C3A enhanced 8051 core
  - Speedups up to x5 vs. standard 8051 microcontroller
- Modem
  - Power Line Carrier Modem for 50 and 60 Hz mains
  - 97-carrier OFDM PRIME compliant
  - Baud rate Selectable: 21400 to 128600 bps
  - Differential BPSK, QPSK, 8-PSK modulations
- Memories
  - 32Kbytes on-chip SRAM
  - Up to 256Kbytes external SRAM
- In-circuit serial flash programming
- Auto boot-loading program from serial flash
- Automatic Gain Control and signal amplitude tracking
- Embedded on-chip DMAs
- Automatic code encryption during boot loading
- Media Access Control
  - Viterbi decoding and CRC PRIME compliant
  - 128-bit AES encryption
  - Channel sensing and collision pre-detection
- Peripherals
  - Two 2-wire UARTs
  - Two SPI. SPI to serial flash and External RTC. Buffered SPI to external metering IC
  - Programmable Watchdog
  - Up to 14 I/O lines
- Package
  - 120-lead LQFP, 14 x 14 mm, pitch 0.4 mm
  - Pb-free and RoHS compliant
- Typical Applications
  - Automated Meter Reading (AMR) & Advanced Meter Management (AMM)
  - Street lighting
  - Home Automation

Description

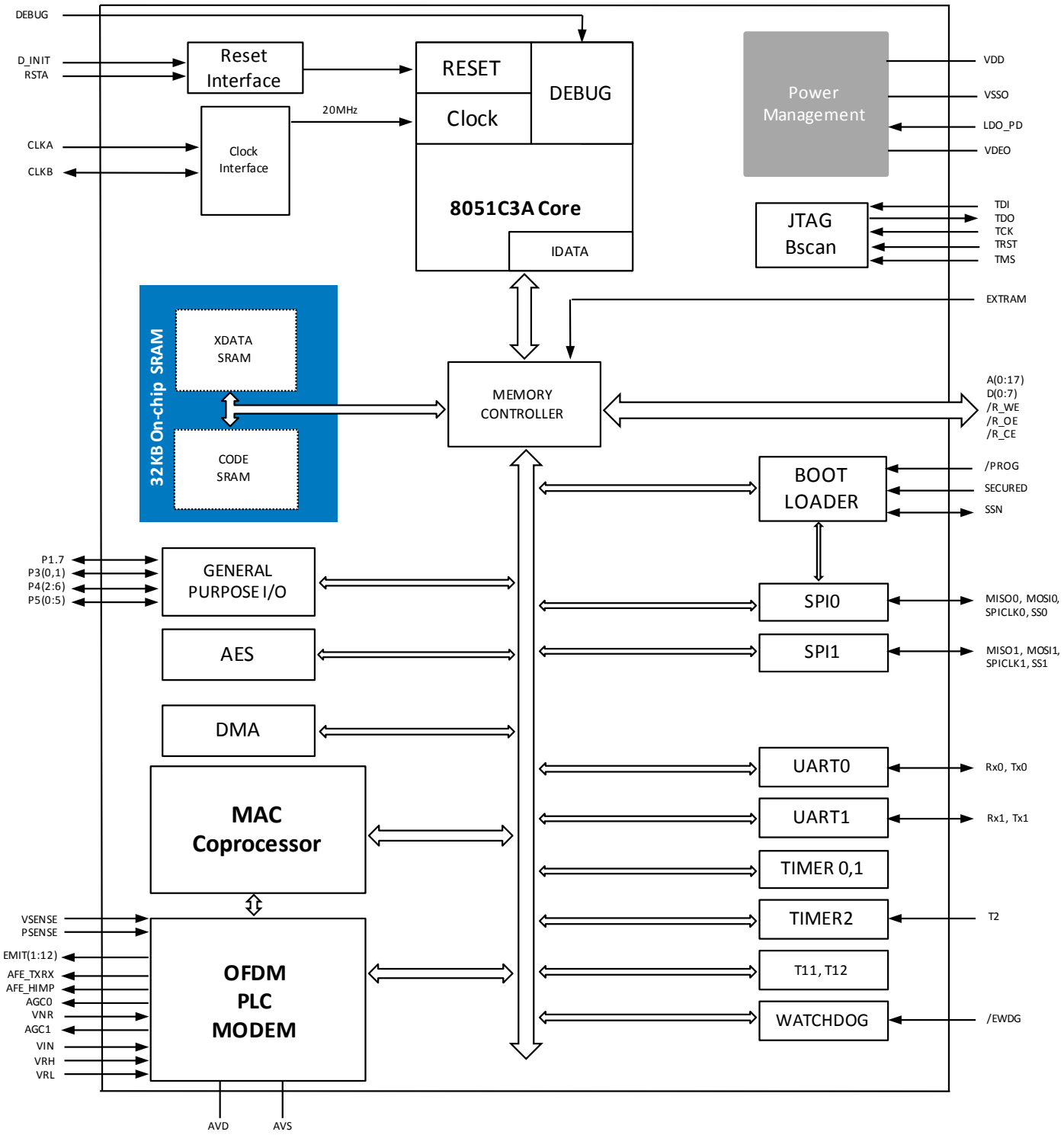
The ATPL210 is a Power Line Communications System on Chip, which implements a full PRIME compliant PLC modem. It includes an enhanced 8051 microcontroller (IP core ADD8051C3A), a Medium Access Controller (MAC) (IP core ADD1221) and a Modem circuit (IP core ADD1321) for power line medium using OFDM modulation compatible with PRIME specifications.

ATPL210 is oriented to high performance & robust AMR systems. The ATPL210 is designed to be used by meter manufacturers to provide a low cost and compact solution for AMR & AMM systems using narrow band power line communications.

This device has been developed to reduce CPU computational load in PLC systems running PRIME protocols. ATPL210 includes all necessary resources to be used as main controller in metering applications, and allows an external device to communicate according to PLC PRIME specifications.

1. Block Diagram

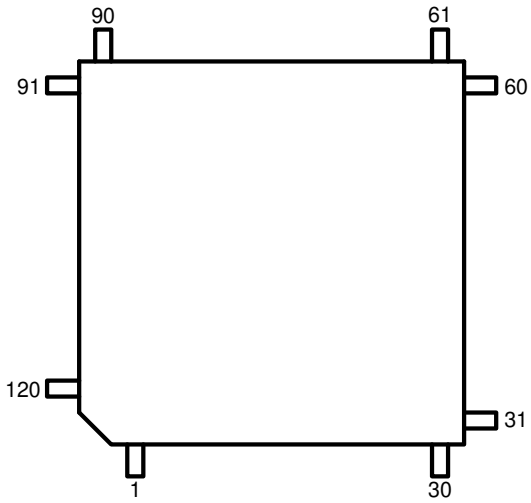
Figure 1-1. ATPL210A 120-pin Block Diagram



2. Package and Pinout

2.1 120-Lead LQFP Package Outline

Figure 2-1. Orientation of the 120-Lead Package



2.2 120-Lead LQFP Pinout

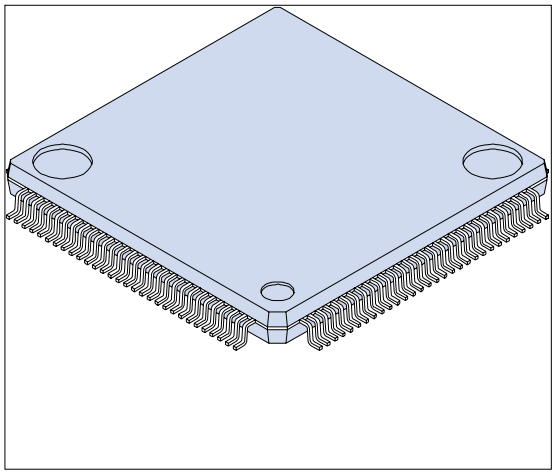
Table 2-1. ATPL210A 120-Lead LQFP pinout

1	A17	31	P4.4/MOSI1	61	TDI	91	P5.4/RxD1
2	A9	32	P4.3/SPICLK1	62	TMS	92	P5.5/TxD1
3	GND	33	P4.2/SS1	63	TDO	93	NC
4	VCC	34	P3.0/RxD0	64	GND	94	P4.6/T2/AGC1
5	/R_WE	35	P3.1/TxD0	65	GND	95	AGC0
6	D4	36	VCC	66	VCC	96	GND
7	D3	37	GND	67	TRST	97	VCC
8	D5	38	EMIT.1	68	TCK	98	AVS2
9	D2	39	EMIT.2	69	RSTA	99	AVD2
10	D6	40	EMIT.3	70	D_INIT	100	AVS1
11	D1	41	EMIT.4	71	GND	101	AVD1
12	D7	42	VCC	72	VCC	102	VRH
13	D0	43	GND	73	GND	103	VIN
14	VCC	44	EMIT.5	74	VDD	104	VRL
15	GND	45	EMIT.6	75	LDO_PD	105	GND
16	VDD	46	EMIT.7	76	VSS0	106	VCC
17	/R_OE	47	EMIT.8	77	VDE0	107	P5.0/SS0
18	/R_CE	48	VCC	78	VDE0	108	P5.3/MISO0
19	A8	49	GND	79	GND	109	P5.2/MOSI0
20	A0	50	EMIT.9	80	GND	110	P5.1/SPICLK0
21	A7	51	EMIT.10	81	VCC	111	P1.7/SSN
22	A1	52	EMIT.11	82	CLKEA	112	A13
23	A6	53	EMIT.12	83	GND	113	A14
24	A2	54	VCC	84	CLKEB	114	GND
25	A5	55	GND	85	VCC	115	VCC
26	GND	56	AFE_HIMP	86	/EWDG	116	A12
27	VCC	57	AFE_TXRX	87	DEBUG	117	A15
28	A3	58	VSENSE	88	EXTRAM	118	A11
29	A4	59	PSENSE	89	/PROG	119	A16
30	P4.5/MISO1	60	VNR	90	SECURED	120	A10

3. Mechanical Characteristics

Figure 3-1. 120-lead LQFP Package Mechanical Drawing

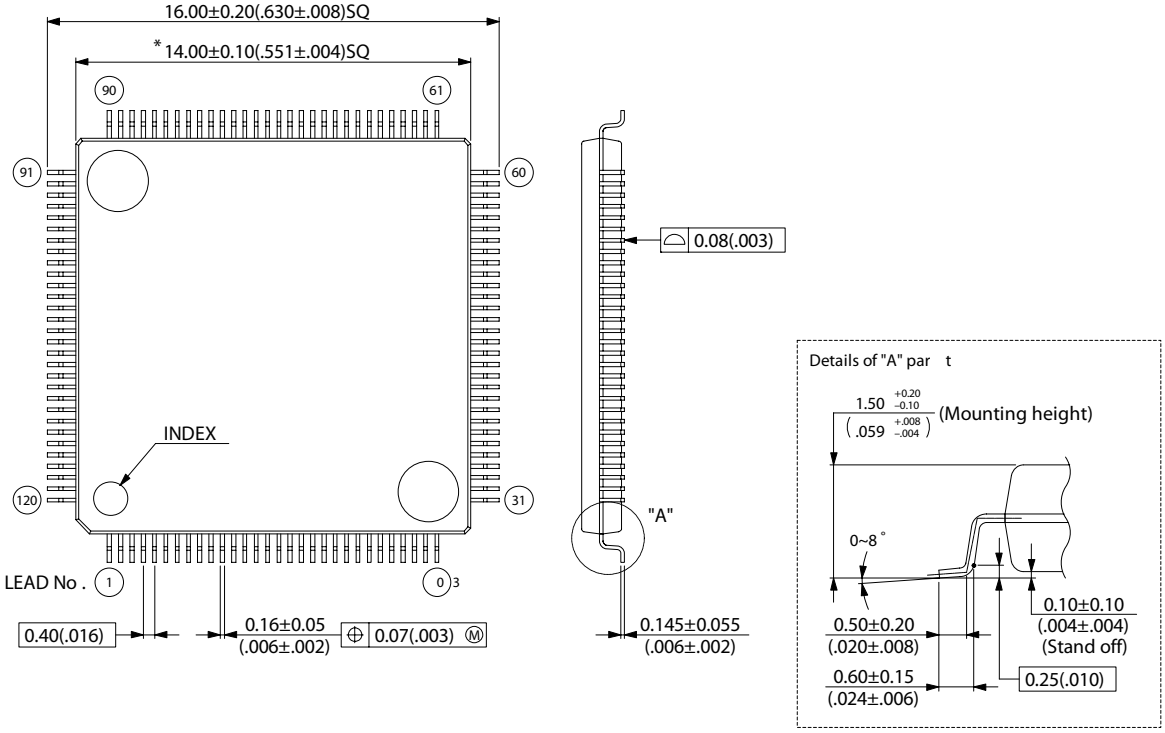
120-pin plastic LQFP



Lead pitch	0.40 mm
Pa ckage width · package length	14.0 mm · 14.0 mm
Lead shape	Gullwing
Sealing method	Plastic mold
Mounting height	1.70 mm MAX
Code (Ref erence)	P-LFQFP120-14 · 14-0.4 0

120-pin plastic LQFP

Note 1) * : These dimensions do not include resin protrusion.
Note 2) Pins width and pins thickness include plating thickness.
Note 3) Pins width do not include tie bar cutting remainder.



Dimensions in mm (inches).
Note: The values in parentheses are reference values.

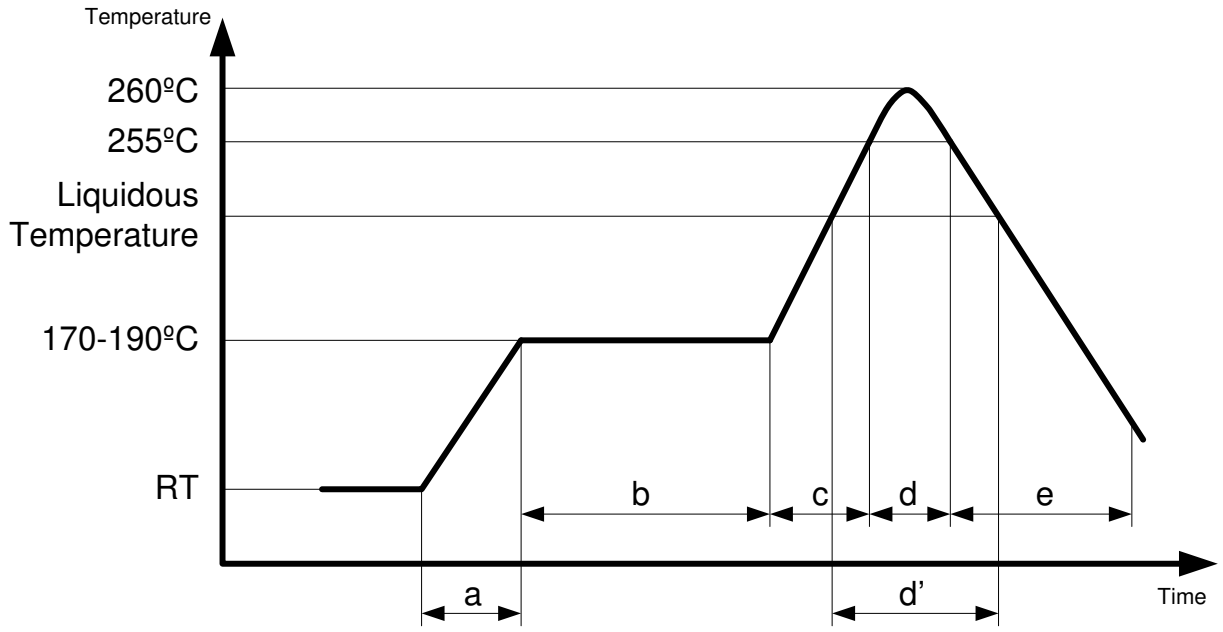
4. Recommended mounting conditions

4.1 Conditions of Standard Reflow

Table 4-1. Conditions of standard Reflow

Items	Contents	
Method	IR(Infrared Reflow)/Convection	
Times	2	
Floor Life	Before unpacking	Please use within 2 years after production
	From unpacking to second reflow	Within 8 days
	In case over period of floor life	Baking with 125ºC +/- 3ºC for 24hrs +2hrs/-0hrs is required. Then please use within 8 days. (please remember baking is up to 2 times)
Floor Life Condition	Between 5ºC and 30ºC and also below 70%RH required. (It is preferred lower humidity in the required temp range.)	

Figure 4-1. Temperature Profile



Note: H rank: 260ºC Max

a: Average ramp-up rate: 1ºC/s to 4ºC/s

b: Preheat & Soak: 170ºC to 190ºC, 60s to 180s

c: Average ramp-up rate: 1ºC/s to 4ºC

d: Peak temperature: 260ºC Max, up to 255ºC within 10s

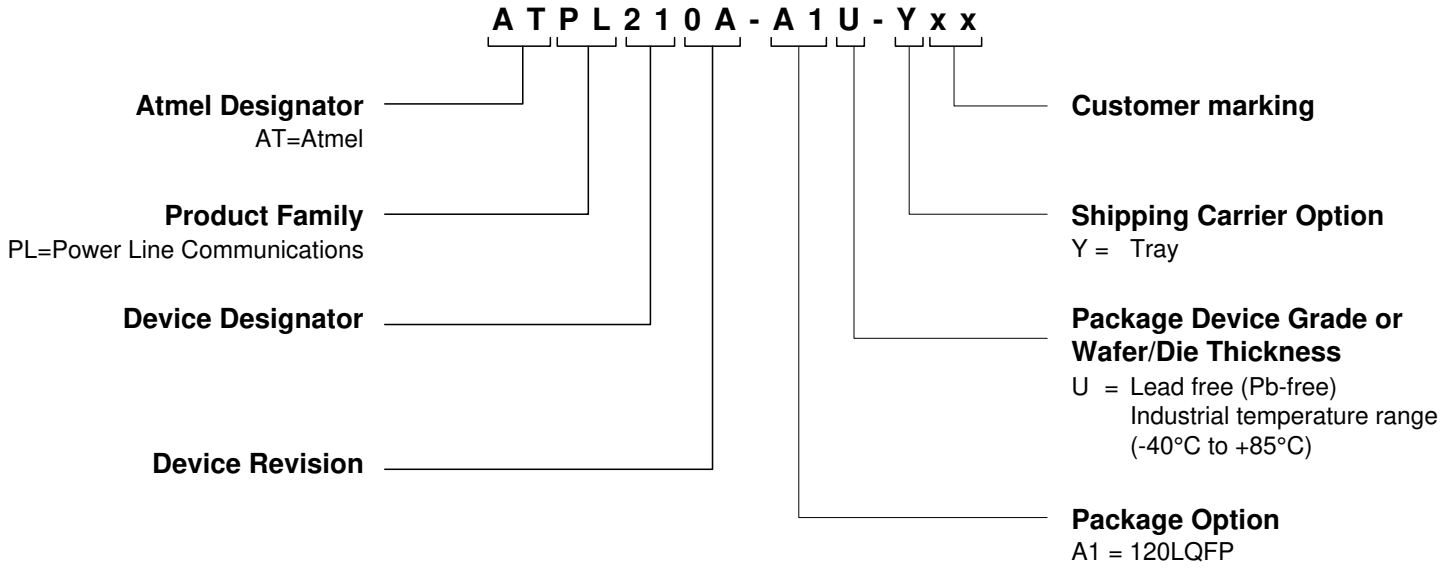
d': Liquidous temperature: Up to 230ºC within 40s or
Up to 225ºC within 60s or
Up to 220ºC within 80s

e: Cooling: Natural cooling or forced cooling

5. Ordering Information

Table 5-1. Atmel ATPL210A Ordering Codes

Atmel Ordering Code	Package	Package Type	Temperature Range
ATPL210A-A1U-Y	120 LQFP	Pb-Free	Industrial (-40ºC to 85º)



6. Revision History

Doc. Rev.	Date	Comments
1.00	30/03/2012	Initial release

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