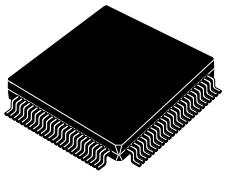
ST7590

Narrow-band OFDM power line networking PRIME compliant system-on-chip

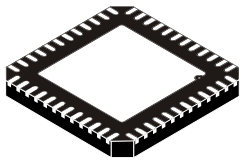
Data brief

Features

- Fully integrated narrow-band power line networking system on chip
- High performing DSP engine with embedded turnkey firmware featuring:
  - OFDM modulation:
  - 97 sub-carriers in CENELEC A band
  - BPSK, QPSK, 8PSK differential programmable modulation
  - Programmable baud up to 128 kbps
  - Convolutional coding and Viterbi decoding
  - Signal to noise ratio and channel quality estimation
  - Full PRIME compliant PHY
- Programmable 8051 protocol engine with embedded PRIME compliant MAC and IEC 61334-4-32 data link layer
- On chip peripherals:
  - Host controller UART/SPI interface
  - I2C/SPI external data memory interface
  - High speed SRAM controller for optional external SRAM program code execution
  - Watchdog timer
  - 3 programmable 16 bit timers
  - Up to 10 lines GPIO
  - JTAG debugging
- On chip 128-bit AES encryption HW block
- Fully integrated analog front end:
  - ADC and DAC
  - High sensitivity receiver
  - High linearity transmitter with intelligent gain control
- Fully integrated single-ended power amplifier for line driving
  - Up to 1 A rms, 14 Vpp single ended
  - Configurable active filtering topology
  - Very high linearity
  - Embedded temperature sensor
  - Current control feature



TQFP 100



QFN-48
(7 x 7 mm)

- 3.3 V or 5V I/O digital I/O supply
- 8 V to 18 V power amplifier supply
- Integrated 5 V and 1.8 V linear regulators for AFE and digital core supply
- Suitable for applications compliant with EN50065 and FCC part 15 specifications
- -40 °C to +80 °C temperature range
- QFN48 7x7 and TQFP 100 14x14 exposed pad package options

Applications

PRIME compliant smart metering and smart grids applications

Description

Made using a multi-power technology with state-of-the-art VLSI CMOS lithography, the ST7590 is based on dual core architecture to guarantee outstanding communication performance with a very high level of flexibility and programmability for either open standard or fully customized implementations.

1 Device description

The ST7590 comes with FW implementing PRIME[a] compliant PHY and MAC layers and IEC 61334-4-32 data link layer, mainly developed for smart metering and smart grid applications.

An HW 128-bit AES encryption block with turnkey management is available on chip when secure communication is requested.

The on chip analog front end featuring AD and DA conversion, automatic gain control and embedding a power line driver delivering up to 1 A rms output current, make the ST7590 a unique single chip SoC for power line communication. Line coupling network design is also extremely simplified leading to a very low cost BOM.

Safe and performing operations are guaranteed while keeping power consumption and distortion levels very low.

a. Power-line intelligent metering evolution (open protocol specification)

2 Block diagram and pin connection

Figure 1. ST7590 block diagram

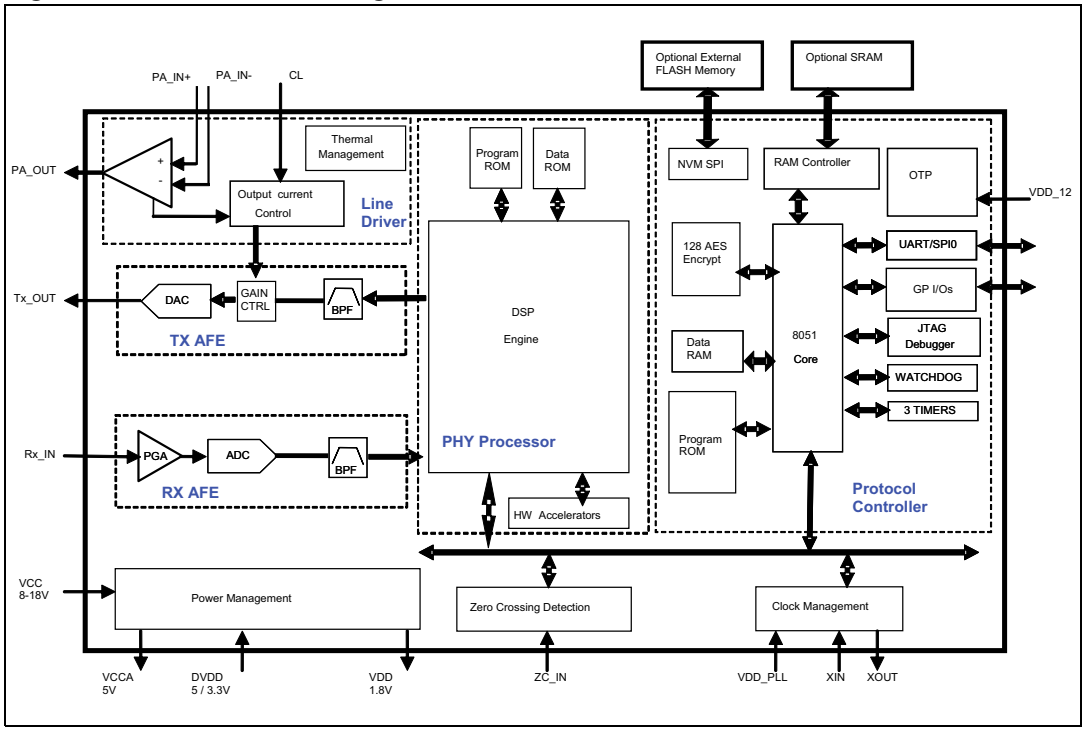
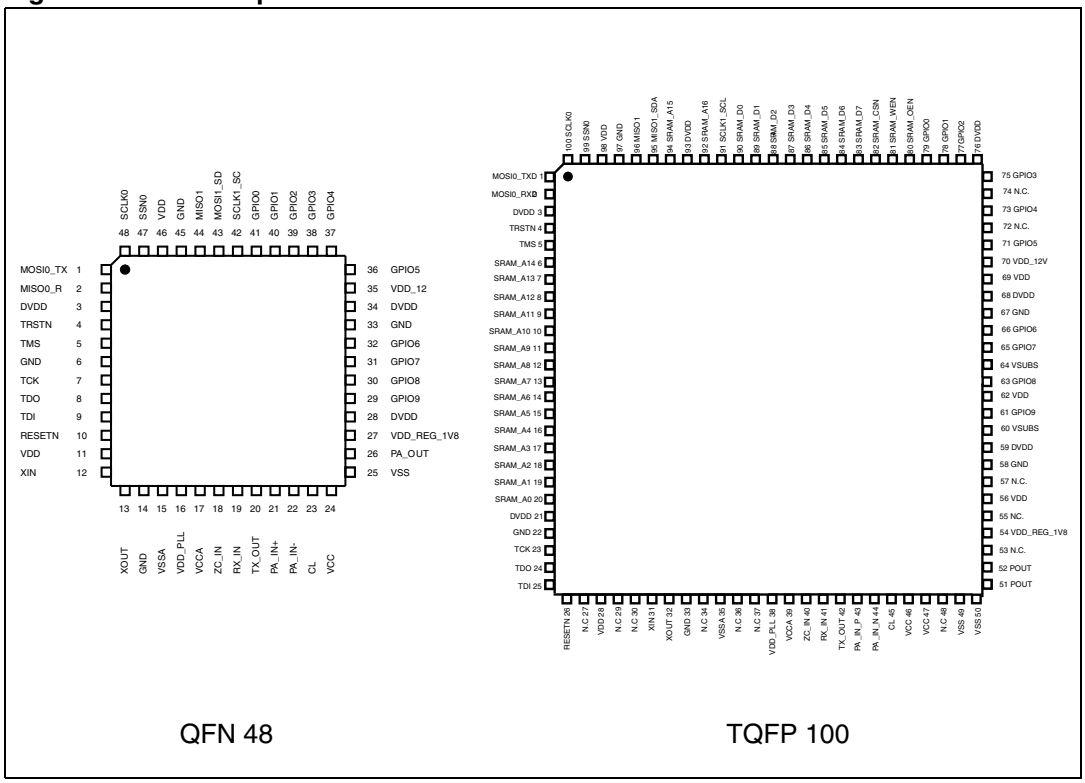


Figure 2. ST7590 pin connection



QFN 48 TQFP 100

3 Package mechanical data

In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK® packages, depending on their level of environmental compliance. ECOPACK® specifications, grade definitions and product status are available at: www.st.com. ECOPACK is an ST trademark.

Table 1. TQFP 100 package mechanical data

Dim.	(mm)		
	Min.	Typ.	Max.
A			1.6
A1	0.05		0.15
A2	1.35	1.4	1.45
B	0.17	0.22	0.27
C	0.09		0.2
D		16	
D1		14	
D3		12	
e		0.5	
E		16	
E1		14	
E3		12	
H		9.85	
L	0.45	0.6	0.75
L1		1	
S	8.8		
S1	8.8		
K	0° (min.), 3.5° (typ.), 7°(max.)		
ccc		0.08	

Figure 3. TQFP 100 package outline

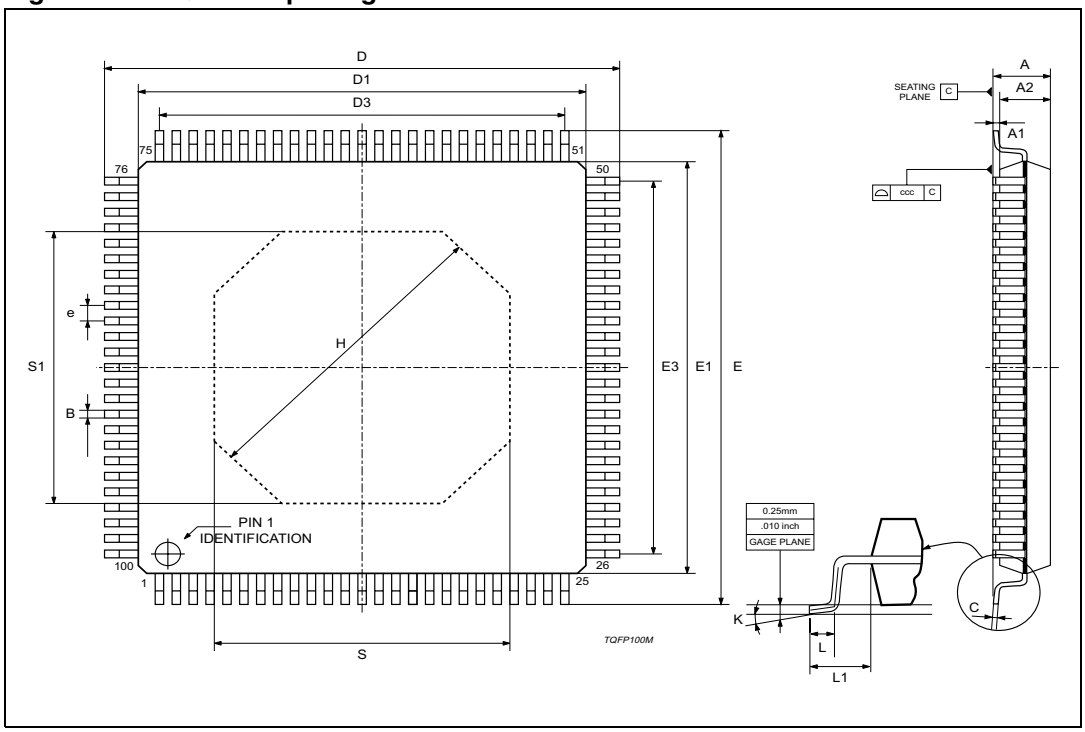
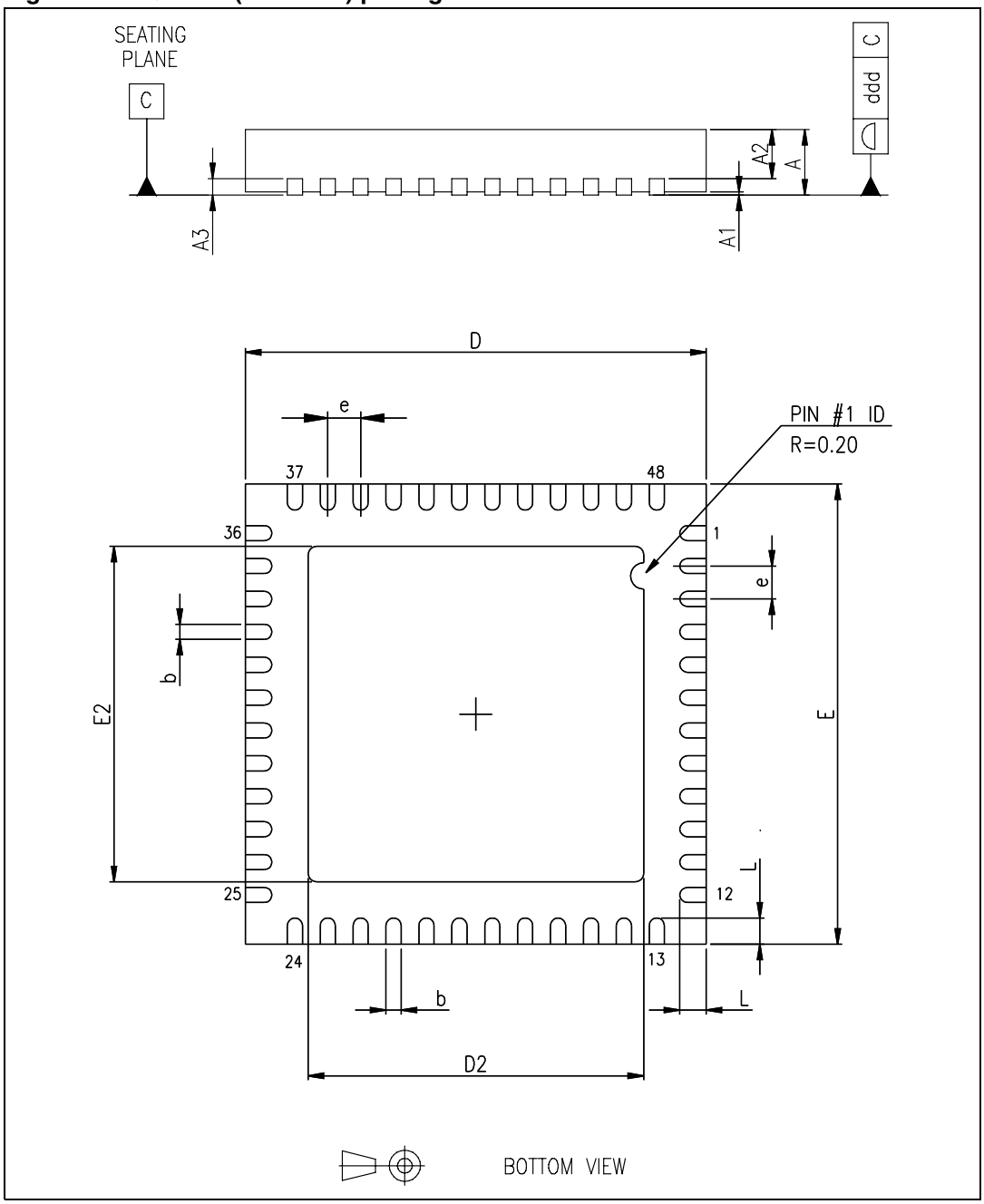


Table 2. QFN-48 (7 x 7 mm) package mechanical data

Dim.	(mm)		
	Min.	Typ.	Max.
A	0.80	0.90	1.00
A1		0.02	0.05
A2		0.65	1.00
A3		0.25	
b	0.18	0.23	0.30
D	6.85	7.00	7.15
D2	2.25	4.70	5.25
E	6.85	7.00	7.15
E2	2.25	4.70	5.25
e	0.45	0.50	0.55
L	0.30	0.40	0.50
ddd			0.08

Figure 4. QFN-48 (7 x 7 mm) package outline



4 Revision history

Table 3. Document revision history

Date	Revision	Changes
29-Sep-2009	1	Initial release.
16-Nov-2009	2	Added TQFP 100 mechanical data

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