Si2185

Hybrid DVB-T/C and Analog TV Receiver

Description

The Si2185 hybrid TV receiver integrates a complete hybrid tuner, a DVB-T/C digital demodulator, and an analog TV demodulator supporting all worldwide analog TV standards into a single, monolithic, CMOS mixed-signal IC.

Leveraging Silicon Labs' proven 3rd-generation digital low-IF tuner architecture, the Si2185 delivers superior ATV picture quality and a higher number of received channels in real-world crowded spectrum conditions without the need for external LNAs, tracking filters, or SAW filters.

An enhanced version of the proven DVB-T/C demodulator technology from Silicon Labs' Si2165 has been incorporated into the Si2185 to deliver superior performance under a wide variety of field conditions. Both the analog and digital demodulators use sophisticated on-chip algorithms to ensure optimal reception even under difficult transmission conditions. In addition, the Si2185 offers on-chip Blindscan and Blindlock scanning algorithms for DVB-C as well as DSP-assisted DVB-T fast channel scanning.

By combining hybrid tuner and demodulator functions in a single device, the Si2185 enables a full TV receiver solution in a very small PCB footprint and with minimal external components. The Si2185 contains an on-chip crystal oscillator and only requires the connection of a standard 24 MHz crystal or a reference clock. For dual-receiver applications, the primary Si2185 can provide a reference clock on its XOUT pin directly to the XTAL_I pin of the secondary Si2185, thus saving the cost of one crystal. The Si2185 programmable Transport Stream interface provides both serial and parallel modes and is fully compatible with all MPEG decoders and conditional access modules (CI/CI+) to support any customer application.

Features

- Hybrid Analog and Digital TV tuner
    - 42–870 MHz frequency range
    - No alignment, tuning or calibration
- Analog TV (ATV) demodulator
    - PAL/SECAM, NTSC
- Digital TV (DTV) demodulator and FEC decoder
    - DVB-T (ETSI EN 300 744)
    - DVB-C (ETSI EN 300 429)
    - ITU J.83 Annex A/C
- Supports all DVB-T modes
- Supports DVB-C symbol rates from 1 to 7.2 MBaud
    - Advanced echo equalizer
- Best-in-class real-world reception
- Compliance with NorDig 2.1, D-Book, C-Book, EN55020 specifications
- Highly integrated, lowest BOM
    - No SAW filters required
    - Integrated LNAs and complete tracking filters
- Customizable channel select filters
- Flexible output interface to AV processor
    - CVBS + SIF/AF
    - Serial or parallel TS output
- Single die in standard CMOS process
- 3.3 and 1.8 V power supplies
- 7x7 mm, 48-pin QFN package, RoHS compliant

Applications

- iDTV (Integrated Digital TV)
- Hybrid PVR and DVD recorder
- Hybrid full-NIM
- Hybrid portable TV
- Hybrid PC-TV card and USB dongle
- Hybrid terrestrial or cable STB
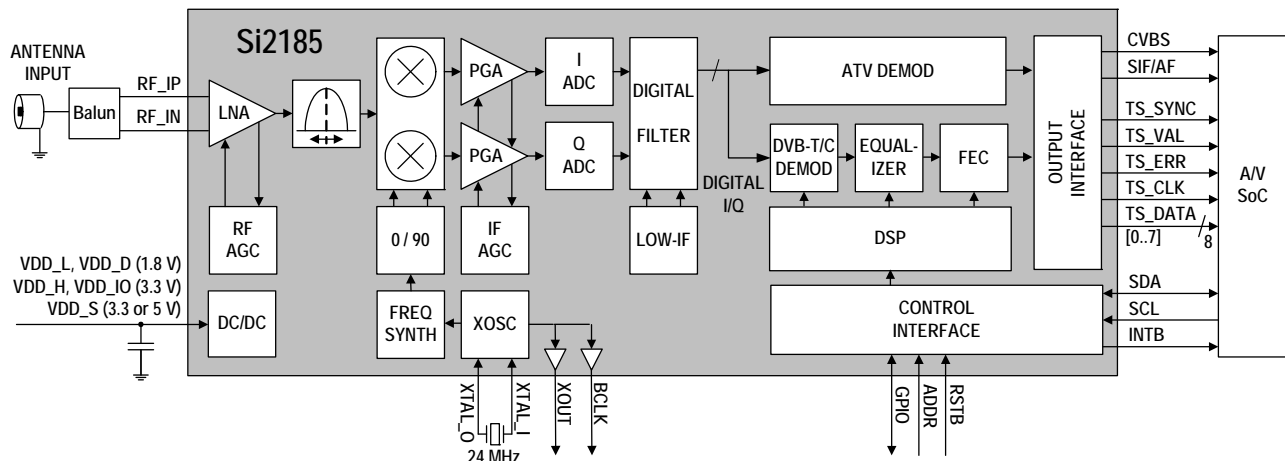
Selected Electrical Specifications

(V_{DD_H} = 3.3 V, V_{DD_L} = 1.8 V, V_{DD_D} = 1.8 V, T_A = 25 °C)

| Parameter	Test Condition	Typ	Unit
Supply Voltage		1.8 and 3.3	V
Total Power Consumption	ATV Mode | DVB-T Mode	0.98 | 1.1	W
RF Input Frequency Range		42 to 870	MHz
Noise Figure[1]	Max gain	4.0	dB
Wideband IIP3[1]	N±18,±36; max RF gain	+18	dBm
Inband IIP3[1]	N±1,±2; max RF gain	−5	dBm
LO Phase Noise at 860 MHz	125 Hz | 250 Hz | 1 kHz | 10 kHz | 100 kHz	−83 | −91 | −96 | −95 | −104	dBc/Hz
	Integrated DSB: 125 Hz to 4 MHz	0.4 (−43)	°rms (dBc)
Adjacent Channel Attenuation	N±1; RF input[1] to DLIF output	80	dB
ATV Sensitivity	30 dB video SNR; M/N | B/G, D/K | I | L/L'	−67.5 | −67 | −66 | −68	dBm
ATV Unweighted Video SNR	+1 dBm input level; M/N | B/G, D/K | I | L/L'	55.5 | 55 | 53.5 | 56.5	dB
DVB-T Sensitivity[2]	8K, 64-QAM, 2/3CR, Gaussian Channel	−84	dBm
DVB-T Carrier to Noise Ratio[2]	8K, 64-QAM, 2/3CR, Gaussian Channel	17	dB

Notes:
1. Measured at the F-connector input of the Si2185 reference design and includes all front-end circuit losses.
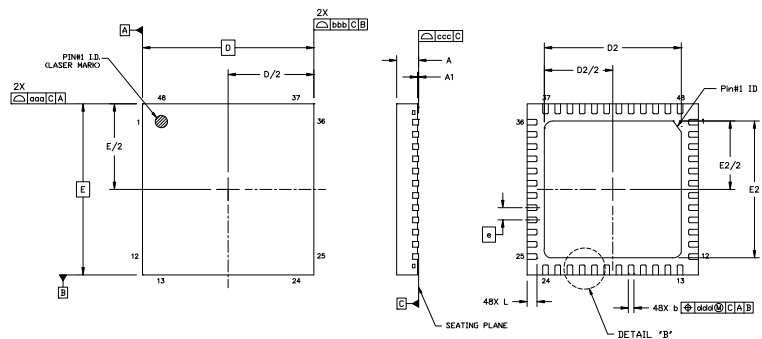2. Measured at Quasi Error Free conditions (BER = 2 x 10^{-4}).

Selection Guide

Part #	Description
Si2185	Hybrid Digital and Analog TV Receiver for DVB-T/C, PAL/SECAM, NTSC

Pin Assignments
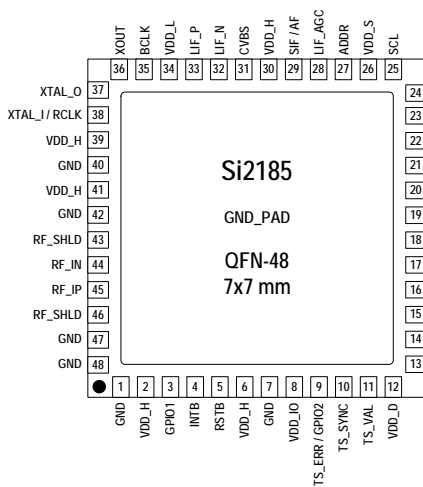
7x7 mm QFN-48 Package Information

Symbol	Min	Nom	Max	Unit
A	0.80	0.85	0.90	mm
D, E	7.00 BSC			mm
e	0.50 BSC			mm