# Si2115/13/11

## Digital TV Receiver for DVB-T/C

## Description

The Si2115/13/11 digital TV receiver integrates a complete digital TV tuner and a DVB-T and/or DVB-C digital demodulator into a single, monolithic, CMOS mixed-signal IC.

Leveraging Silicon Labs' proven 3rd-generation digital low-IF tuner architecture, the Si2115/13/11 delivers 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 Si2115/13/11 to deliver superior performance under a wide variety of field conditions. The digital demodulator uses sophisticated on-chip algorithms to ensure optimal reception even under difficult transmission conditions. In addition, the Si2115/13/11 offers on-chip Blindscan and Blindlock scanning algorithms for DVB-C as well as DSP-assisted DVB-T fast channel scanning.

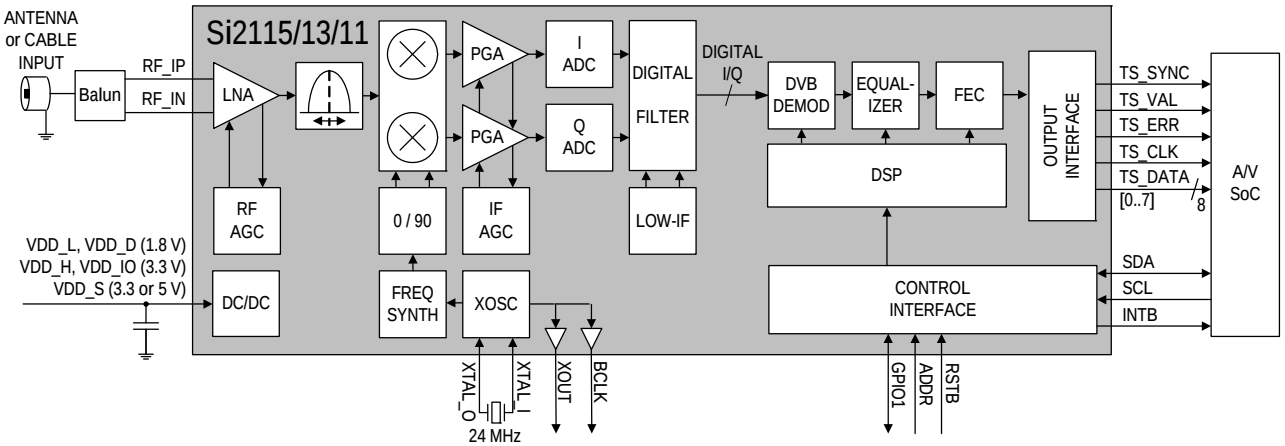
By combining digital tuner and demodulator functions in a single device, the Si2115/13/11 enables a full TV receiver solution in a very small PCB footprint and with minimal external components. The Si2115/13/11 contains an on-chip crystal oscillator and only requires the connection of a standard 24 MHz crystal or a reference clock. For dual-receiver applications, the primary Si2115/13/11 can provide a reference clock on its XOUT pin directly to the XTAL_I pin of the secondary Si2115/13/11, thus saving the cost of one crystal. The Si2115/13/11 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

- Digital TV tuner
  - 42–870 MHz frequency range
  - No alignment, tuning or calibration
- Digital TV (DTV) demodulator and FEC decoder
  - DVB-T (ETSI EN 300 744)(Si2115 and Si2111 only)
  - DVB-C (ETSI EN 300 429)(Si2115 and Si2113 only)
  - ITU J.83 Annex A/C (Si2115 and Si2113 only)
- 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, and C-Book 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
  - Serial or parallel TS output
  - Low IF output to optional external demodulator
- Single die in standard CMOS process
- 3.3 and 1.8 V power supplies
- 7x7 mm, 48-pin QFN package, RoHS compliant

## Applications

- Digital terrestrial or cable STB
- Digital PVR and DVD recorder
- Digital TV
- Digital PC TV card and USB dongle
- Digital full-NIM tuner module

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## 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)

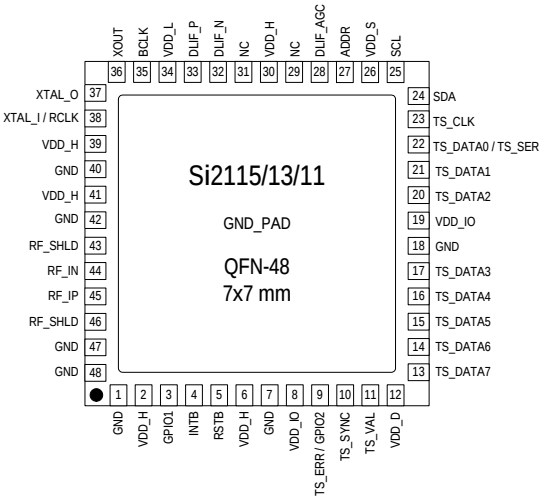
| Parameter | Test Condition | Typ | Unit |
|---|---|---|---|
| Supply Voltage | | 1.8 and 3.3 | V |
| Total Power Consumption | DVB-T mode | 1.1 | W |
| RF Input Frequency Range | | 42 to 870 | MHz |
| Noise Figure[1] | Max gain | 4.0 | dB |
| Wideband IIP3[1] | N±18,±36; max RF gain | +18 | dBm |
| 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 |
| 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 Si2115/13/11 reference design and includes all front-end circuit losses.
2. Measured at Quasi Error Free conditions (BER = 2 x $10^{-4}$).

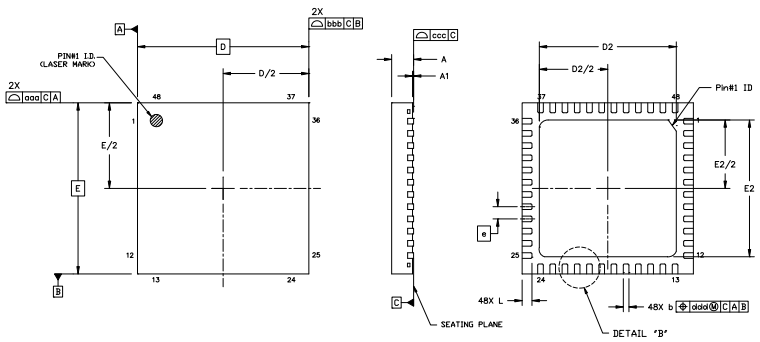
## Selection Guide

| Part # | Description |
|---|---|
| Si2115 | Digital TV receiver for DVB-T/C |
| Si2113 | Digital TV Receiver for DVB-C |
| Si2111 | Digital TV Receiver for DVB-T |

## 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 |

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