Keywords: MAX2160, tuner, ISDB-T

REFERENCE DESIGN 4172 INCLUDES: √Tested Circuit √Board Available √Description √Test Data

MAX2160 ISDB-T Reference Design

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Abstract: This reference design for the MAX2160 tuner plus demodulator IC demonstrates a compact daughter-board solution for the ISDB-T standard (single-segment). This design converts UHF band signals (470MHz to 770MHz) to a MPEG-2 transport stream. The solution is intended for portable applications, such as cell-phone TVs and PDAs.

More Information
- Wireless Home
- Application Notes and Tutorials
- EV Kit Software
- Technical Support

Click here for an overview of the wireless components used in a typical radio transceiver.

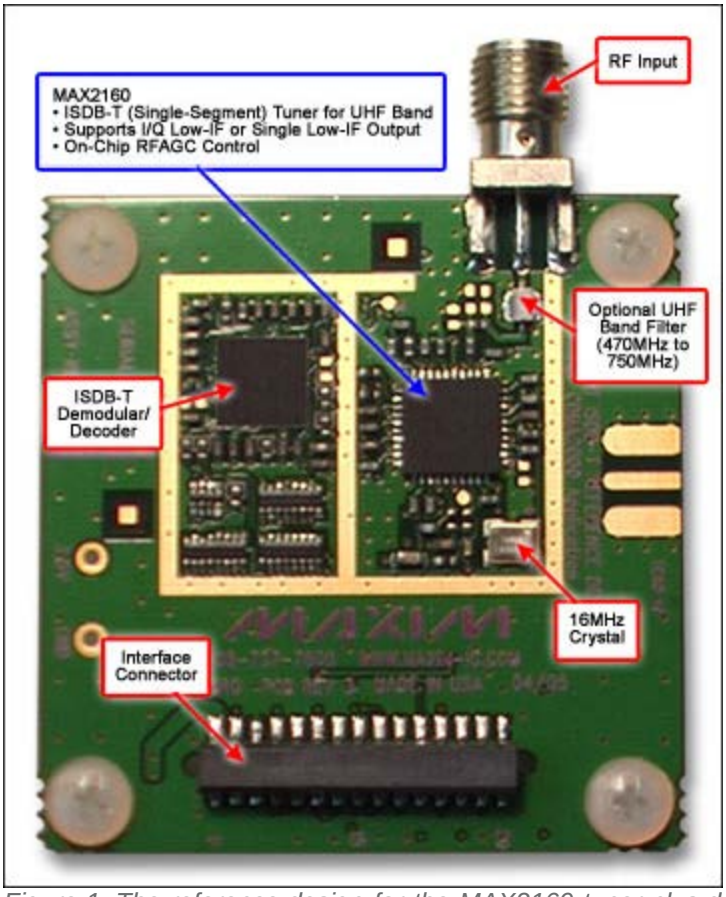

Figure 1. The reference design for the MAX2160 tuner plus demodulator.

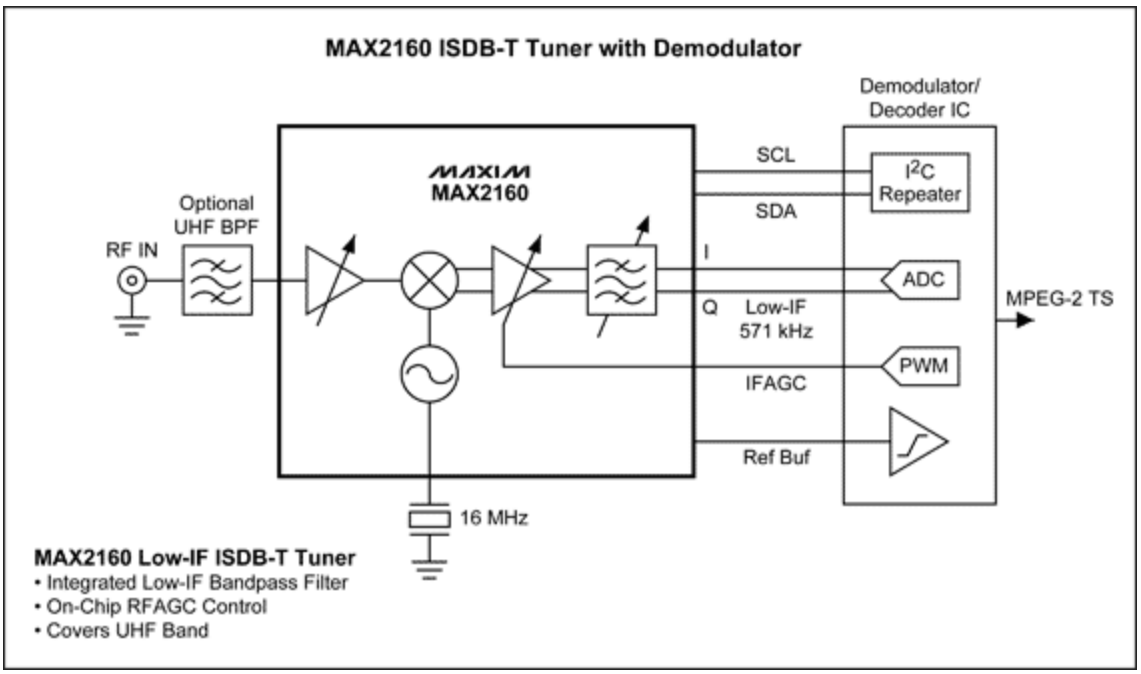

Figure 2. System block diagram.

Lab Measurements

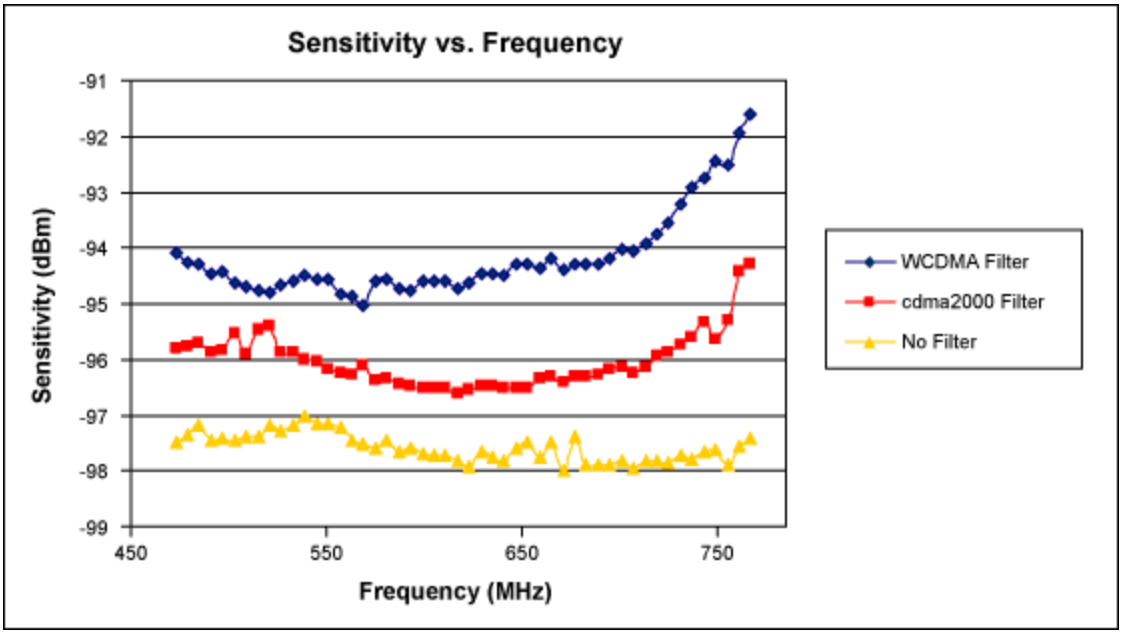

Figure 3. Sensitivity measures better than -97dBm. The tradeoff in sensitivity is also shown when an optional WCDMA or cdma2000® rejection filter is added at the RF input.

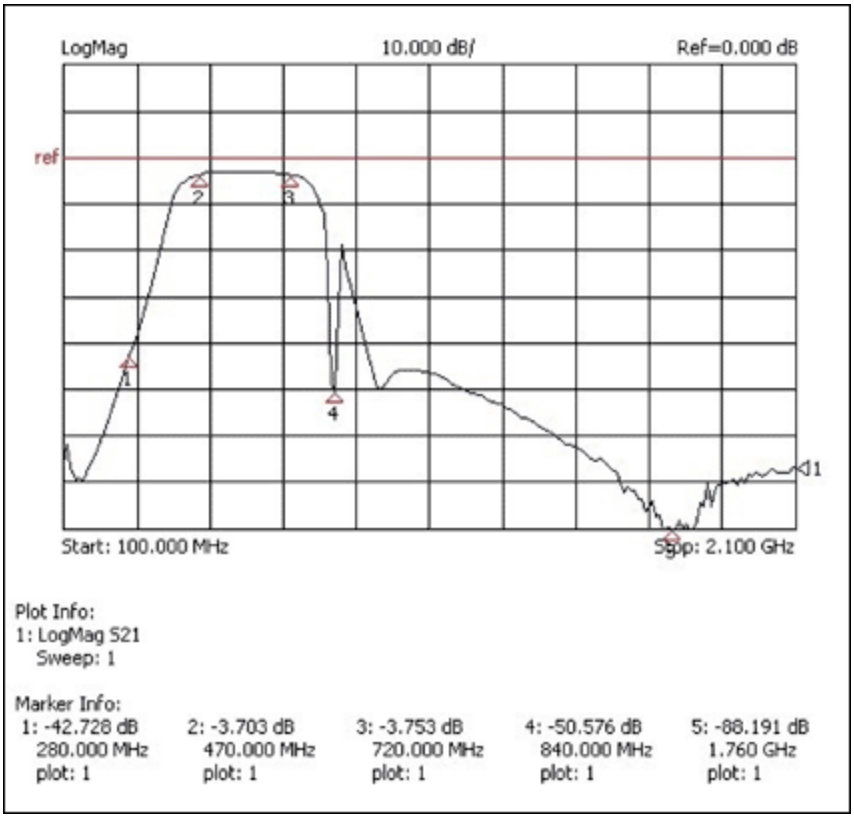

Figure 4. A WCDMA blocker rejection filter response. To implement on-board coexistence of ISDB-T with a WCDMA system, additional input filtering is required to reject the cellular transmit-band frequencies. The optional reference-design filtering is a combination of two filters, which provide approximately 47dB of attenuation at the cellular transmit band (marker 4).

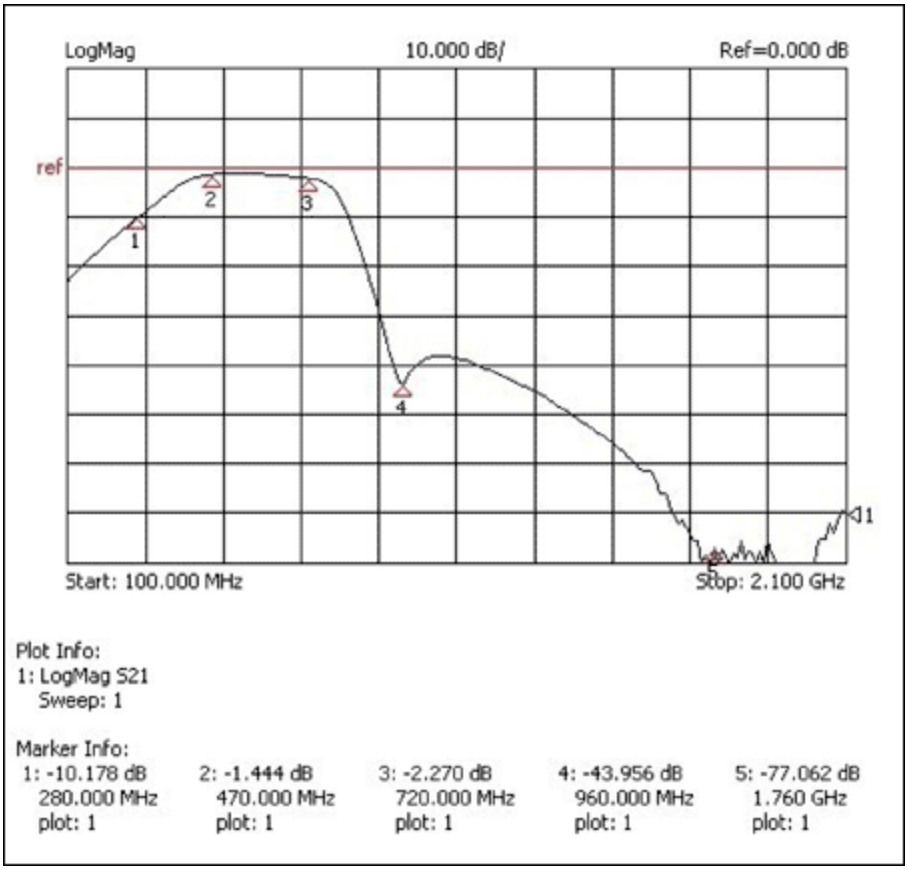

Figure 5. CDMA-2000 blocker rejection filter response. To implement on-board coexistence of ISDB-T with a cdma2000 system in a handheld application, additional input filtering is required to reject the cellular transmit-band frequencies. The optional reference-design filter provides approximately 42dB of attenuation at cdma2000 transmit frequencies (marker 4).

Additional Measurements

Parameter	Conditions	Target	Measured	Units
Maximum Input	UHF: Ch. 13, Ch. 33, Ch. 52	0	8.9, 8.2, 7.3	dBm
Adjacent Channel Selectivity (Desired: -70dBm)	UHF: Ch. 13, Ch. 33, Ch. 52	35	45, 47, 45	dBc
WCDMA Blocker Performance	UHF: Ch. 13, Ch. 33, Ch. 52	24	23.5, 24, 24	dBm
cdma2000 Blocker Performance	UHF: Ch. 13, Ch. 33, Ch. 52	10	21, 21, 21	dBm

ISDB-T Frequency Plan

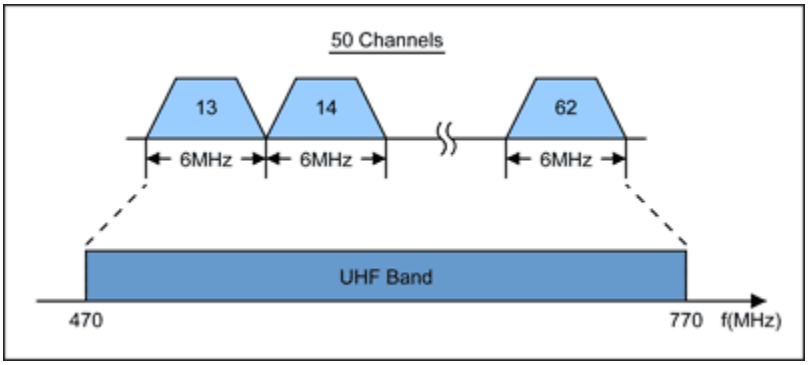

Figure 6. The ISDB-T RF signal is broadcast in the UHF band, as shown above. The channel spacing is 6MHz.

Detailed Description

The MAX2160/MAX2160EGB tuner ICs are designed for use in Japanese mobile digital-TV (ISDB-T single-segment) applications. The devices directly convert UHF band signals to a low-IF by using a broadband I/Q downconverter. The operating frequency range extends from 470MHz to 770MHz.

The MAX2160/MAX2160EBG support both I/Q low-IF interfaces and single low-IF interfaces. The devices are thus universal tuners for various digital demodulator implementations.

The MAX2160/MAX2160EBG integrate LNA, RF and low-IF variable-gain amplifiers (VGAs), I and Q downconverting mixers, and bandpass filters providing in excess of 42dB of image rejection. The parts operate with either high-side or low-side local oscillator (LO) injection. The devices' VGAs provide in excess of 100dB of gain-control range.

The MAX2160/MAX2160EBG also have fully monolithic VCOs and tank circuits, and a complete frequency synthesizer. A XTAL oscillator and separate TCXO input buffer are also included. The devices operate with XTAL/TCXO oscillators from 13MHz to 26MHz, which enable the shared use of a VC-TCXO in cellular handset applications. Additionally, a divider is provided for the XTAL/TCXO oscillator, thus allowing for a simple and low-cost interface to various channel decoders.

cdma2000 is a registered certification mark and registered service mark of the Telecommunications Industry Association.

Related Parts	
MAX2160	ISDB-T Single-Segment Low-IF Tuners

More Information
For Technical Support: http://www.maximintegrated.com/support
For Samples: http://www.maximintegrated.com/samples
Other Questions and Comments: http://www.maximintegrated.com/contact

Application Note 4172: http://www.maximintegrated.com/an4172

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