



## Product Brief

Intel® CE 9523 DVB-T  
TNIM Reference Design

Consumer Electronics

### Applications

- DVB-T portable set top boxes
- DVB-T portable integrated digital TV
- PC DVB-T receiver cards

# Diversity-Enabled DVB-T Solution with Thomson\* Tuner



### Product Overview

The Intel® CE 9523 TNIM reference design is a complete two-stage diversity-enabled DVB-T digital terrestrial receiver. It cascades two Intel® CE 6354 NorDig Unified DVB-T COFDM demodulators to significantly improve the front-end carrier-to-noise performance compared to single-channel designs. The reference design enables true portable TV using small low-gain portable TV aerials. Two Thomson\* DTT 73000 series mini-tuners\* are used, providing a compact layout for space-constrained designs, without compromising performance.

This reference design is specifically designed for digital terrestrial network interface modules (TNIMs) or "on-motherboard" set top box/iDTV implementation. It allows customers to quickly and cost-effectively evaluate and implement DVB-T diversity-enhanced TV performance. Software is supported directly by Intel and each reference design is accompanied by comprehensive documentation and test results.

### Intel® CE 9523 DVB-T Reference Design with Thomson\* Mini-tuner

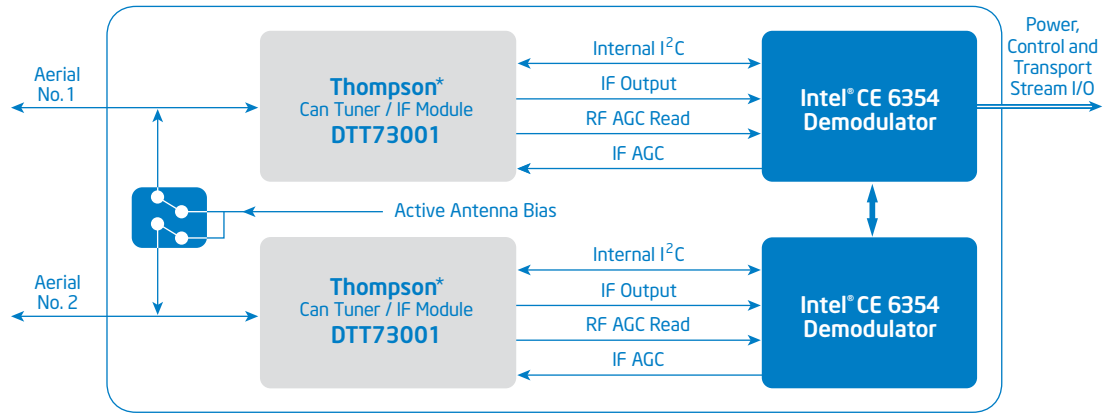
The Intel® CE 9523 DVB-T front-end reference design addresses the needs of the portable digital TV market segment. The two Intel® CE 6354 DVB-T COFDM demodulators are cascaded together. This builds on the performance of the single-channel NorDig Unified Intel® CE 6353/5 demodulators by offering significant carrier-to-noise improvement. This performance enhancement enables the use of small antennas in portable TV applications.

Received digital terrestrial signals are down-converted via each Thomson tuner to the "on-board" Intel CE 6354 DVB-T COFDM demodulators for channel coding to MPEG transport stream output. One Intel CE 6354 COFDM demodulator is designated as the primary demodulator and the other Intel CE 6354 COFDM is the secondary demodulator. Each Intel CE 6354 COFDM demodulator contains a diversity processor functional block between the channel coding and the forward error correction sections of the chip. In the case of the secondary Intel CE 6354 COFDM demodulator, this block outputs the transport stream to the processor of the primary demodulator for diversity performance enhancement.

The Intel CE 9523 DVB-T TNIM reference design kit is supplied with an Intel® CE 9594 interface board, which only requires a single +5 V supply, all other power rails are generated on board. The Intel CE 9523 DVB-T reference design front-end solution is optimized for real in-field terrestrial environmental conditions.

For further information on the Thomson DTT 73000 series tuner+ /IF please contact [tuners@thomson.net](mailto:tuners@thomson.net)

Application Diagram



Product Features

Intel® CE 9523 DVB-T TNIM Reference Design

- Diversity-enabled DVB-T and NorDig Unified performance
- Excellent blind-channel scan times
  - UHF 2 K only—9 digital with 5 analog channels present—less than 12 seconds
  - UHF 2 K/8 K—9 digital with 5 analog channels present—less than 18 seconds

- On-chip automatic:
  - Lost signal re-acquisition (no external programming required)
  - Co-channel and adjacent-channel interference suppression
  - Impulse noise protection
- Excellent single-frequency network support
- Single SAW bandwidth for 6/7/8 MHz channel operation
- Low power consumption (<2.4 W)
- Hardware and software power-down mode for PC cards
- Compact 2-layer FR4 PCB, single-sided component application board reference design
- Includes serial bus to PC adapter, via Intel CE 9594 interface card
- Support material available:
  - Schematics and layout artwork
  - Intel® CE 6354 DVB-T COFDM data sheet and design manual
  - Hardware user manuals
  - Full software package
  - Performance test results

Intel® CE 9523 DVB-T TNIM Application Board Performance Summary

Parameter	Value (typ)	Units
RF frequency range	174 to 862	MHz
RF signal range	-3 to -82	dBm
Co-channel analog interference	2.0	dB
N±1 adjacent channel protection	42 (PAL) 33 (DVB-T)	dB
N±2 to X non-adjacent channel protection	>48 (PAL) >39 (DVB-T)	dB
Image channel protection	45 (PAL) 31 (DVB-T)	dB
Carrier to noise	18.8 (single channel) 15.6 (diversity)	dB
Power consumption	2.4 (operational) 1.8 (standby)	W
Blind-scan time—UHF mode	12 (2 K mode)	sec
9 digital with 5 analog channels present	18 (2/8 K mode)	

Note: 64QAM, 3/4 code rate, 1/4 guard band, 8K mode

Customer Support

- The Intel CE 9523 DVB-T TNIM reference design is available to qualified customers.

For more information, visit the Intel Consumer Electronics home page at: [www.intel.com/go/consumerelectronics](http://www.intel.com/go/consumerelectronics)

Information in this document is provided in connection with Intel products. No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document. Except as provided in Intel's terms and conditions of sale for such products, Intel assumes no liability whatsoever, and Intel disclaims any express or implied warranty, relating to sale and/or use of Intel products including liability or warranties relating to fitness for a particular purpose, merchantability, or infringement of any patent, copyright or other intellectual property right. Intel products are not intended for use in medical, life saving, or life sustaining applications. Intel may make changes to specifications and product descriptions at any time, without notice.

©2006 Intel Corporation. Intel, the Intel logo, Intel. Leap ahead. and the Intel. Leap ahead. logo are trademarks or registered trademarks of Intel Corporation or its subsidiaries in the United States and other countries. All rights reserved.

\*Other names and brands may be claimed as the property of others.