Quick Start Guide
SPRUGO1–July 2009

TMS320VC5505 DSP Medical Development Kit (MDK)

MEDICAL DEVELOPMENT KIT (MDK) WARNINGS, RESTRICTIONS AND DISCLAIMER

Not for Diagnostic Use: For Feasibility Evaluation Only in Laboratory/Development Environments.

The MDK must not be used for diagnostic purposes.

This MDK is intended solely for evaluation and development purposes. It is not intended for diagnostic use and may not be used as all or part of an end-equipment product.

This MDK should be used solely by qualified engineers and technicians who are familiar with the risks associated with handling electrical and mechanical components, systems and subsystems.

ECG EVALUATION BOARD/KIT/MODULE (MDK) WARNINGS, RESTRICTIONS AND DISCLAIMER

Not for Diagnostic Use: Not for Use with a Defibrillator: For Feasibility Evaluation Only in Laboratory/Development Environments.

The MDK must not be used for diagnostic purposes.

The MDK must not be used with a defibrillator or other equipment that produces high voltages in excess of the output supply provided by the AC adapter provided with this ECG device.

This MDK is intended solely for evaluation and development purposes. It is not intended for use and may not be used as all or part of an end-equipment product.

This MDK should be used solely by qualified engineers and technicians who are familiar with the risks associated with handling electrical and mechanical components, systems and subsystems.

Your Obligations and Responsibilities.

Please consult the *TMS320VC5505 DSP Medical Development Kit (MDK) Quick Start Guide* (this document) prior to using the MDK. Any use of the MDK outside of the specified operating range may cause danger to the users and/or produce unintended results, inaccurate operation, and permanent damage to the MDK and associated electronics. You acknowledge and agree that:

- You are responsible for compliance with all applicable Federal, State and local regulatory requirements (including but not limited to Food and Drug Administration regulations, UL, CSA, VDE, CE, RoHS and WEEE) that relate to your use (and that of your employees, contractors or designees) of the MDK for evaluation, testing and other purposes.
- You are responsible for the safety of you and your employees and contractors when using or handling the MDK. Further, you are responsible for ensuring that any contacts or interfaces between the MDK and any human body are designed to be safe and to avoid the risk of electrical shock.
- You will defend, indemnify and hold TI, its licensors and their representatives harmless from and against any and all claims, damages, losses, expenses, costs and liabilities (collectively, "Claims") arising out of or in connection with any use of the MDK that is not in accordance with the terms of this agreement. This obligation shall apply whether Claims arise under the law of tort or contract or any other legal theory, and even if the MDK fails to perform as described or expected.

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MDK Overview

A number of emerging medical applications such as Electrocardiogram (ECG), Digital Stethoscope, and Pulse Oximeter require DSP processing performance at very low power. The TMS320VC5505 DSP is ideally suited for such applications, as it provides high-processing performance at very low power. In order to enable the development of a broad range of medical applications, Texas Instruments has developed a Medical Development Kit (MDK) based on the VC5505 DSP.

Figure 1 shows the complete MDK hardware, consisting of individual analog front-end (FE) boards (ECG, Digital Stethoscope, and Pulse Oximeter), and the VC5505 EVM.

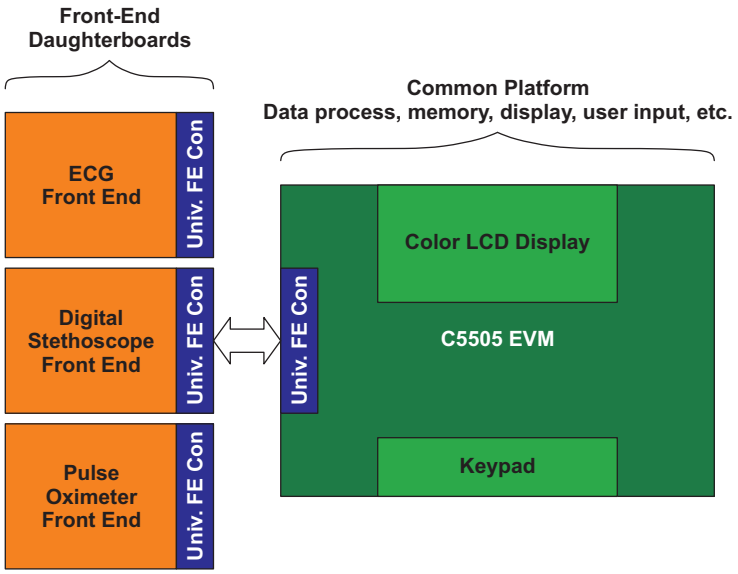

Figure 1. MDK Overview

The MDK has been designed to support development of complete medical applications. The MDK includes the following components:

- Front-end boards specific to key target medical applications (ECG, Digital Stethoscope, and Pulse Oximeter).
- VC5505 DSP EVM.
- Medical applications software including example demonstrations.
- Sensors and other accessories.

Note: This kit contains only the application-specific front-end board and medical application demo software required for setting up the demo. For information and purchase of other components required for the demo but not available in this kit, see the *Reference Documents and Links* section and Table 2 of the this document.

MDK Out-of-the-Box Content

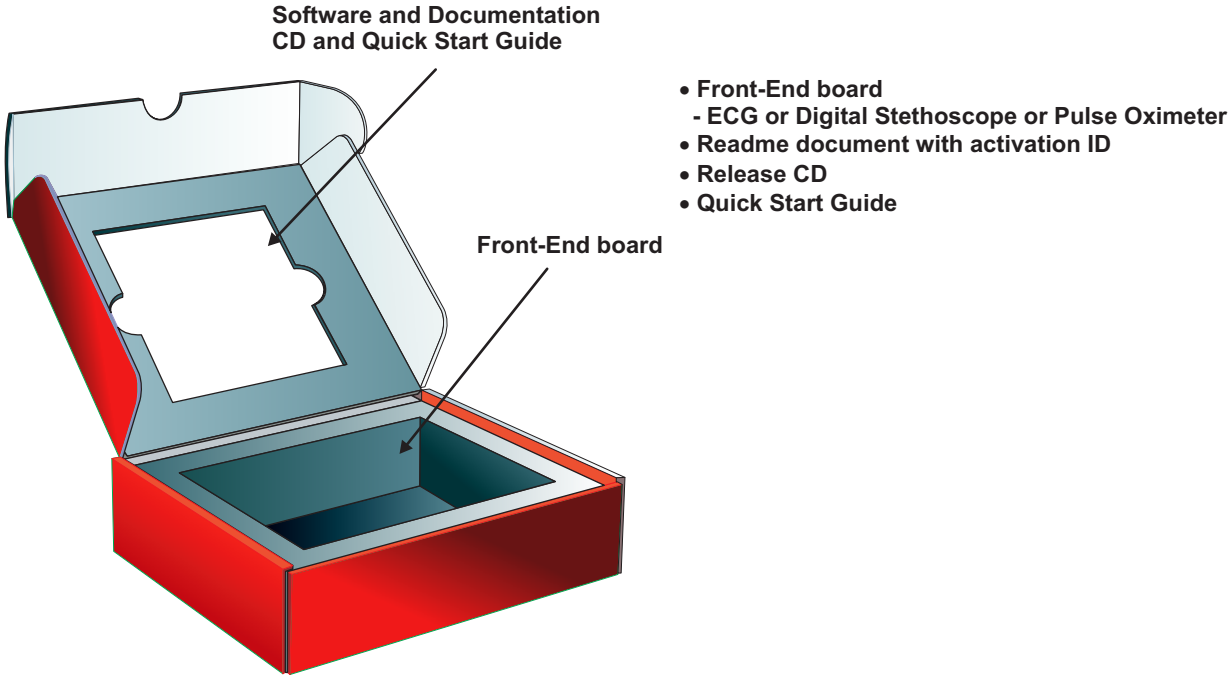

Figure 2. MDK Out-of-the-Box Content

Front-End Board

This kit contains one of the application-specific FE boards shown in Figure 3, Figure 4, and Figure 5. The FE board contains the necessary circuitry for capturing analog signals from the sensors connected at the input, and amplifying and digitizing these signals as required. The digital signals are then sent to the VC5505 DSP EVM for further processing, analysis, and display.

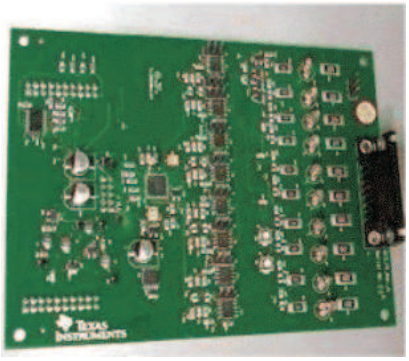

Figure 3. ECG FE

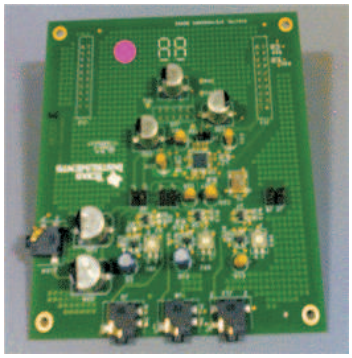

Figure 4. Digital Stethoscope FE

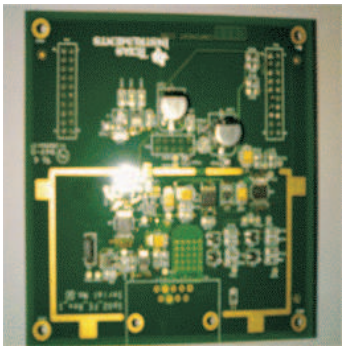

Figure 5. Pulse Oximeter FE

Readme Document

The readme document describes how to access the TI site for downloading related software and updates. The activation ID is provided on the CD cover supplied with this kit.

Release CD

The contents of this CD are as listed in Table 1.

Table 1.

Root Folder Contents	Sub-Folders	Files
Software Files	PC Application	Source files and .exe file
	VC5505 Software	Code Composer Studio™(CCStudio) project and files, .out and .gel
Hardware Files	BOM	BOM
	Schematics	Schematics in PDF format
	Layout	Gerber file
Documentation	-	Release note
		Application report (PDF)
Quick Start Guide PDF	-	-

For sensor and accessories details, see Table 2.

Medical Development Kit Elements

The following components and accessories are required for the MDK Installation and Demo:

- VC5505 EVM
- Front-end board
- CCStudio v3.3 installation for debug mode
- DSP software and PC monitor application, available in release CD
- Compatible sensors for connecting to FE board
- Accessories

Hardware Installation

1. Mount the application-specific FE board on the VC5505 EVM at connectors J20, J21, and J22. Ensure firm connection of the FE on the VC5505 EVM.
2. Connect the serial cable (UART) to the DB9 connector (J13) of the VC5505 EVM and the other end to the PC serial port.
3. Connect the specific sensors and accessories, as outlined in the hardware installation section of the application report.
4. Connect the power supply at power jack J7 on the VC5505 EVM.
5. For further information, see the application-specific application report.

Software Installation

1. Copy the contents of the release CD to the PC.
2. Copy the vc5505evm.gel file from the CD to <CCS installation dir>/CC/GEL/.
3. Before installing the PC application from the CD, ensure that .NET 2.0 framework is installed. Download the .NET 2.0 redistributable framework from the link below: http://www.microsoft.com/downloads/details.aspx?FamilyID=0856EACB-4362-4B0D-8EDD-AAB15C5E04F5&displaylang=en
4. Open the PCApplication folder and double-click on the msi file for installing the PC application. To proceed with the installation, follow the steps below:
   a. Click Next on the welcome screen.
   b. Browse to the folder where this application has to be installed. Select the installation mode for everyone or self and click Next.
   c. Click Next on the confirmation screen. This installs the application into the specified folder.
   d. After the installation completes, click Close to finish the installation.

Running the Demo Application

1. Place the sensors on the simulator or subject at specific positions, as detailed in the application-specific application report.
2. Power on the VC5505 EVM.
3. Observe the application-specific output on the EVM's LCD screen.
4. If the EVM is connected to the PC using a UART cable and the PC application is running, the output can also be viewed on the PC monitor.
5. For further details and sample output snapshots, see the application-specific application report.

Reference Documents and Links

- *ECG Implementation on the VC5505 DSP Medical Development Kit (MDK)* application report (SPRAB36)
- *Pulse Oximeter Implementation on the VC5505 DSP Medical Development Kit (MDK)* application report (SPRAB37)
- *Digital Stethoscope Implementation on the VC5505 DSP Medical Development Kit (MDK)* application report (SPRAB38)

To purchase the VC5505 EVM, contact your local TI sales representative or go to the following link:

http://focus.ti.com/docs/toolsw/folders/print/tmdxevm5505.html

Table 2. Accessories and Compatible Sensors

Application	Compatible Sensor	Accessories for Demo
Digital Stethoscope	Any acoustic stethoscope chest piece (http://www.stethoscope-gallery.com/main/home.aspx) connected to a Panasonic Condenser Microphone (WM-64C or compatible) (http://parts.digikey.com/1/parts/858-microphone-omni-direct-6mm-w-cap-wm-64c.html)(1)	Stereo headphone, with 2.5-mm plug(2)
ECG	Sensor - Ag/AgCl solid-gel ECG electrode (http://www.biometriccables.com)(1) Cables - HP/Philips/Agilent 10-lead ECG cable(3) (http://www.biometriccables.com/index.php?productID=692)(1)	RS232 isolator with minimum 1.5-KV isolation (http://www.moxa.com)(1) Medical-grade power supply (5 V, 4 A) with 4-KV isolation and compatible power connector to the EVM (http://www.slpower.com)(1)
Pulse Oximeter	SpO2 finger probe - (http://www.biometriccables.com)(1)	RS232 isolator with minimum 1.5-KV isolation (http://www.moxa.com)(1)

(1) These are reference links for details and purchase of the parts. Further details or part numbers can be obtained from the appendix of the application report provided with this kit.
(2) For a 3.5-mm plug, use the 3.5-mm-to-2.5-mm reducer provided with the kit.
(3) The ECG cable drawing for checking compatibility can be found in the appendix of the *ECG Implementation on the VC5505 DSP Medical Development Kit (MDK)* application report (SPRAB36)

WARNING

To minimize the risk of electric shock hazard, use only the following power supplies for the EVM module:

Medical Development Applications: SL Power AULT Model MW173KB0503F01.

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