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Evaluation Board for Universal Frequency-to-Digital Converters UFDC-1 and UFDC-1M-16

EVAL-UFDC-1/UFDC-1M-16

FEATURES

- Full-Featured Evaluation Board for the Universal Frequency-to-Digital Converters UFDC-1 and UFDC-1M-16
- On-Board Frequency Reference (Quartz Crystal Oscillator)
- Operation in industrial temperature range from -40° C to +85° C
- Operation from 8 to 14 V AC/DC
- Various Linking Options

APPLICATIONS

- Digital sensors and sensor systems
- Smart and Intelligent sensors systems
- Data Acquisition for frequency-time parameters of electric signals
- Frequency counters
- Tachometers and tachometric systems
- Virtual instruments
- Educational process in sensors and measurements
- Remote laboratories and distance education

GENERAL DESCRIPTION

The EVAL-UFDC-1/UFDC-1M-16 is a simple evaluation board that allows users to quickly evaluate the performance of the Universal Frequency-to-Digital Converters UFDC-1 and UFDC-1M-16 without the need for external components. This 2-channel Evaluation Board lets use such ICs in 16 frequency-time parameters measuring modes, one generation (for a calibration purpose) mode and build various digital sensors and sensor systems including smart, self-adaptation and self-identification sensor systems. All existing frequency, period, duty-cycle, time interval, pulse-width modulated, pulse number and phase-shift output sensors and transducers can be directly interfaced to this evaluation board. The user can connect TTL-compatible sensors' outputs to the Evaluation Board, measure any output frequency-time parameters, and test out the sensor systems functions.

Using the accompanying software, the EVAL-UFDC-1/UFDC-1M-16 evaluation board can be interfaced to any personal computer running Windows XP or later, via one of the serial computer's com port RS232 or USB port (with an additional USB to Serial (9-pin) DB9 RS232

adapter cable, for example, EMINENT USB to Serial Converter).

Four holes are provided for mechanical attachment of the Evaluation Board to users' applications.

CIRCUIT DESCRIPTION

This section gives a brief description of the EVAL-UFDC-1/UFDC-1M-16 evaluation board. Further information can be found in the 'UFDC-1 Specification and Application Notes' document on the CD.

The component placement drawing, a photograph of the EVAL-UFDC-1/UFDC-1M-16 evaluation board and circuit diagram are shown in Figures 1, 2 and 3 respectively.

The RS232 interfacing chip MAX232CSE offers a serial communication between the UFDC-1/UFDC-1M-16 and, for instance, a personal computer or external (master) microcontroller. A 16 MHz crystal completes the on-chip oscillator of the UFDC. The LM7805CT voltage regulator provides the +5 V, DC supply voltages for the integrated circuit.

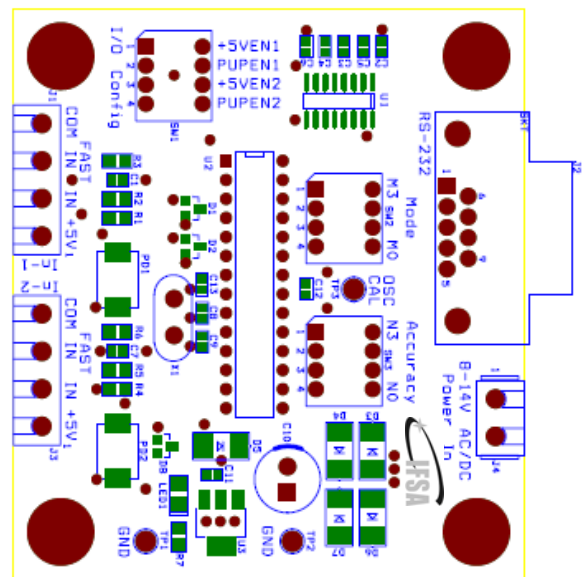


Figure 1. EVAL-UFDC-1/UFDC-1M-16 Evaluation Board component placement drawing (Top view).

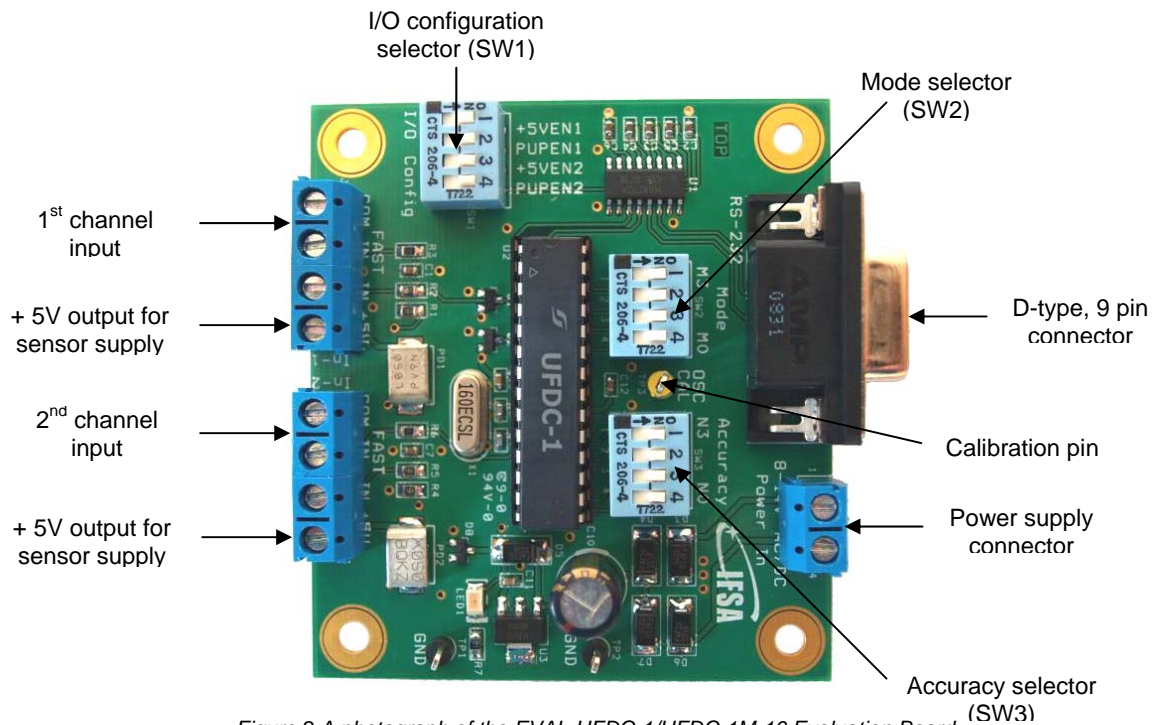


Figure 2 A photograph of the EVAL-UFDC-1/UFDC-1M-16 Evaluation Board.

The evaluation board can be used for all functions of the UFDC integrated circuits. The setting of one from 16 measuring mode and accuracy is performed by the PC or microcontroller in a slave communication mode or by external switches SW2 and SW3 respectively in the master communication mode. The I/O configuration selector (SW1) lets to chose +5V for powering external sensors (1 & 3 switches) and 10 K pull-up resistors for open collector sensor outputs (2 & 4 switches). The pin 2 in each of channel input connector should be used for more "tolerant" but "slower" input signals; the pin 3 is for faster signals.

EVALUATION BOARD SOFTWARE

The software allows the EVAL-UFDC-1/UFDC-1M-16 Evaluation board's functions to be controlled from a PC via an easy-to-use interface operating under Windows XP or higher. There are many ways to display evaluated results, such as the terminal programs for Windows, LabView and special software supplied with the Evaluation Board.

TERMINAL V1.9b SOFTWARE

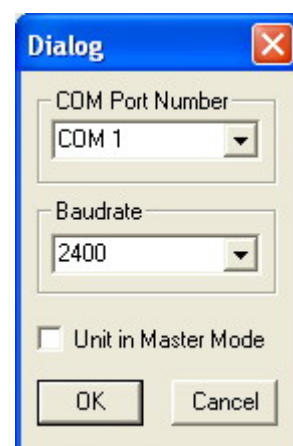
A terminal program for Windows, for example, **Terminal V1.9b**, can easily display the measurement results and accept the programming commands for measuring modes, accuracy selections, etc. via the serial port of the PC. The initial configuration of **Terminal V1.9b** must be the following: Baud rate 2400; 8 data bit, 1 stop bit and No parity error check and handshaking. Once the communication between

the UFDC and the PC is actuated you will see the invitation sing ">" in the Receive window of **Terminal V1.9b** after press the <Enter> key. The baudrate can be changed by the appropriate UFDC-1 command and by the option in the Terminal V1.9b software window at the same time.

The Terminal V1.9b software does not need any installation. Please copy the Terminal.exe file from CD into an appropriate folder in your PC's hard disc and run it.

UFDC EVAL SOFTWARE V1.14

The UFDC Eval Software V1.14 also does not need any installation. Please copy the UFDC_Eval.exe file from CD into an appropriate folder in your PC's hard disc and run it. The main window of the software is shown in Fig. 4. At first, click on the Communication Menu and chose the COM Port from the pull down menu. The following communication dialog window will appear:



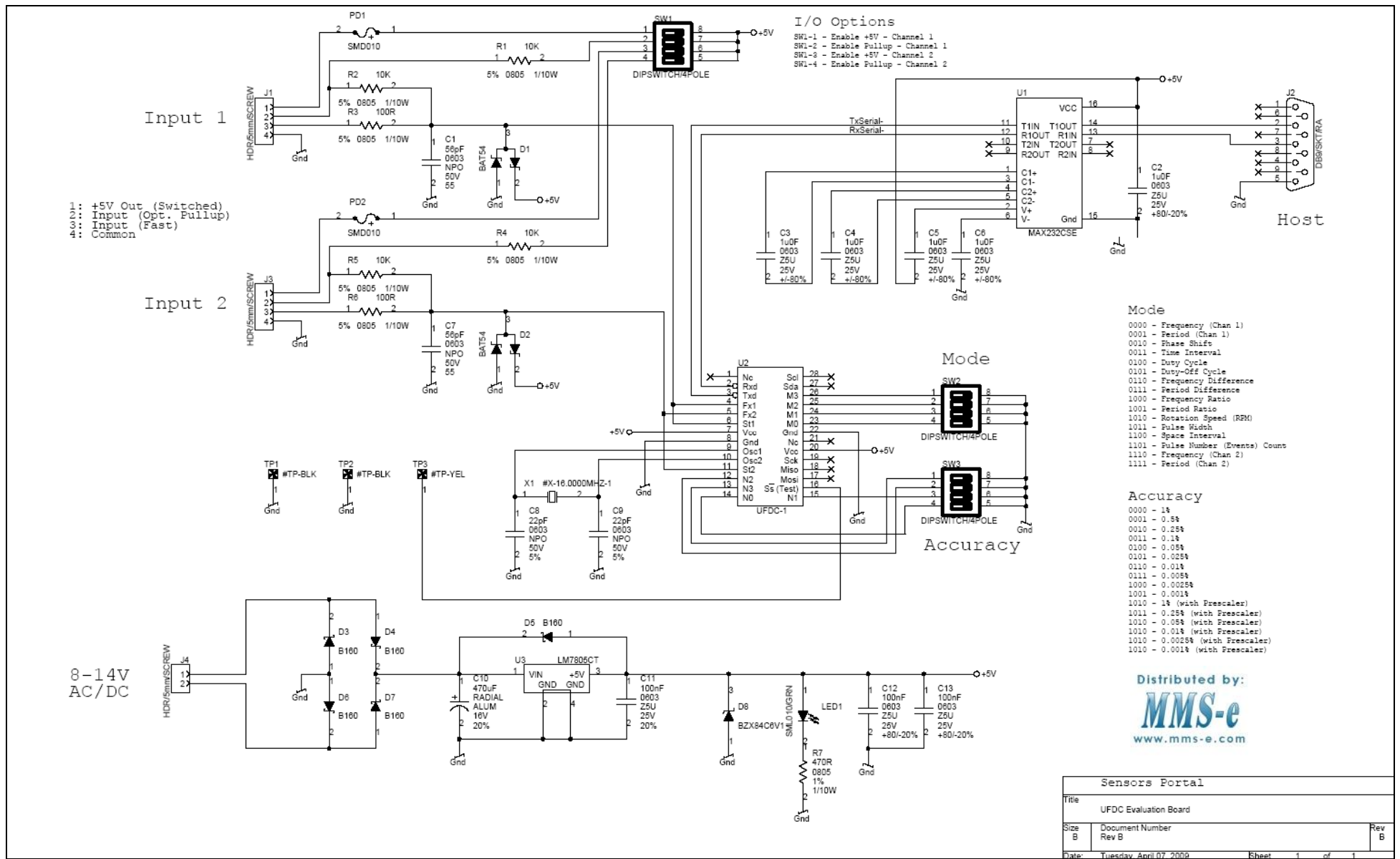


Figure 3 EVAL-UFDC-1/UFDC-1M-16 Evaluation Board circuit diagram.

Select an appropriate COM port number available on your PC and confirm your choice by OK button. Then switch power on for the evaluation board. The evaluation board is ready to operate in the Slave communication mode at 2400 baudrate. You can now select an appropriate measuring mode and relative error by choosing the appropriate values from the pull down menus and confirm it by pressing proper 'Set' button. A 'Get' button returns current value.

To change the current 2400 baudrate please make the following:

- 1) Select new baudrate from the pull down menu in the main window;
- 2) Click on "Set Baudrate". In the Info Box you should get the following message: "Set Baudrate - Success";
- 3) Click on Communication Menu, and select the same baudrate to let application know you are now communicating with different COM port settings.

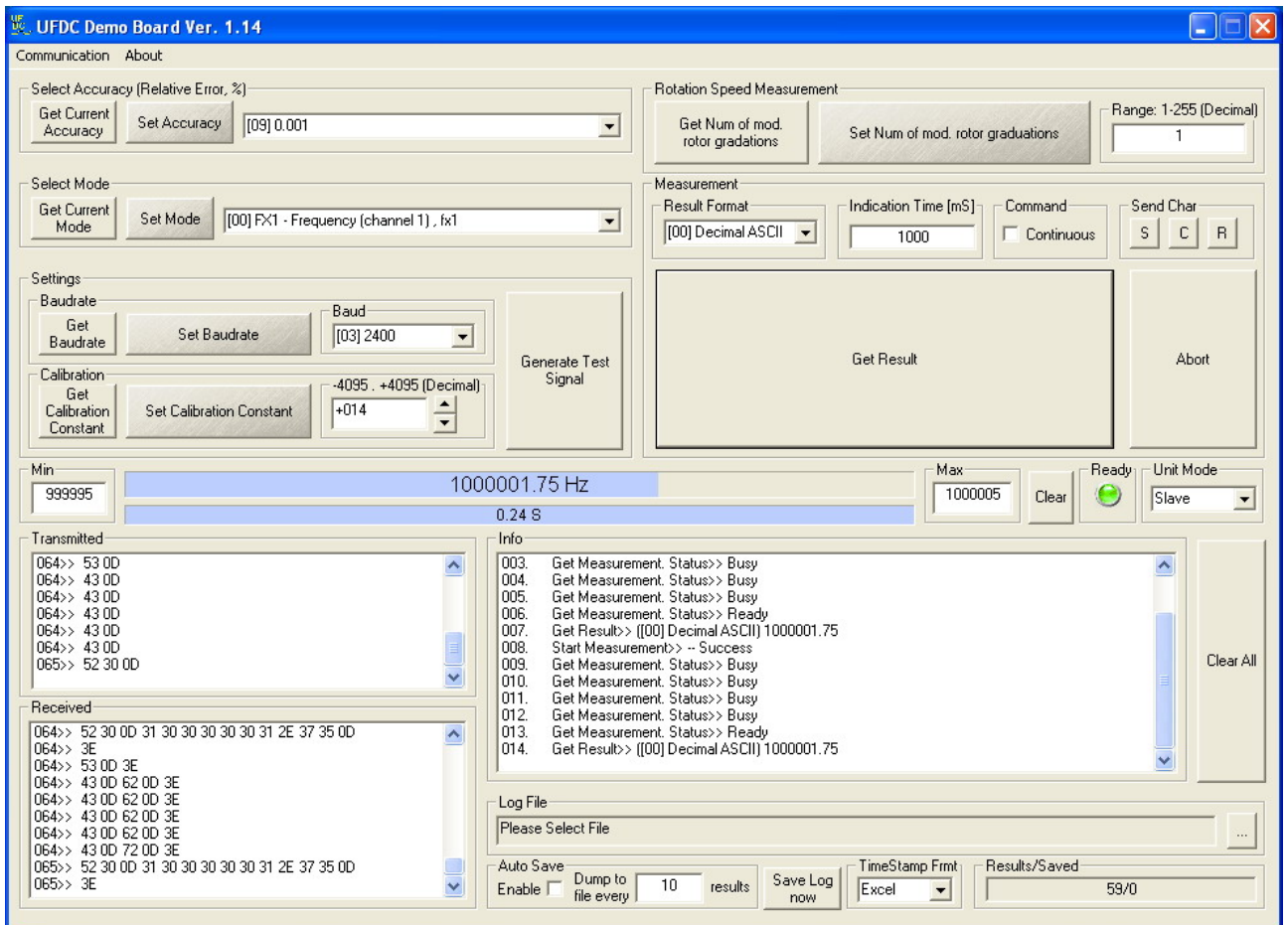
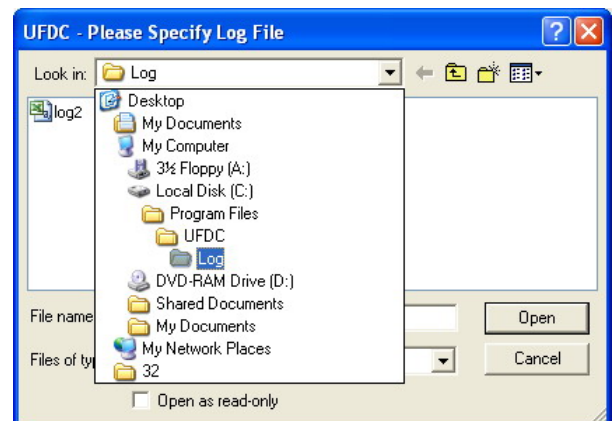


Figure 4 UFDC Eval software main window.

The software also lets to calibrate the converters and put a calibration constant into the converter's memory (see "UFDC-1 Specification and Application Notes" on the CD).

results to a log file. It is possible to choose the *.txt or *.csv log file extension in the Log File dialog window:

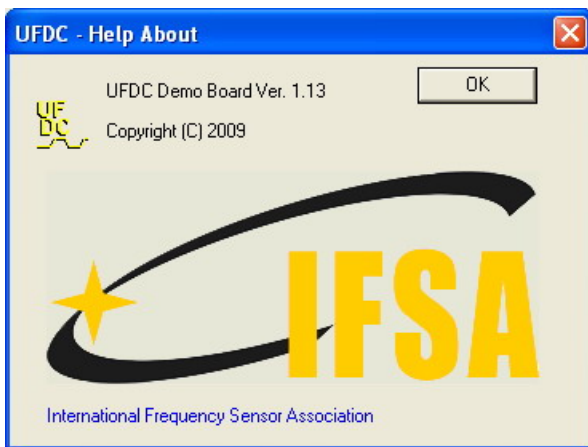
The Min and Max values in appropriate fields of the main window are relevant to how the result progress bar behind the displayed result would "zoom in" to those limits, and give you a better visual indication of the measuring signal. For example, if you are monitoring a signal that is always between 100 and 105 Hz, setting the Min to 100, and Max to 105 will display a progress bar between these 2 points.



When monitoring either the UFDC-1 or the UFDC-1M-16 converters, you can log the measuring

The log file contains the following fields: Time Stamp in the Unix or Excel format (It can be selected in the TimeStampFrmt pull down menu in the main window); RxDelay (s); Accuracy; Mode; Baudrate; Calibration Constant; Result Format (can be selected in the appropriate pull down menu in the main window); Indication Time (ms); Modulation Rotor Gradation Number (for rotation speed measurement mode only); Result of measurement and Units (Hz, μ s, rpm, %, etc.). The RxDelay represents the time between start the measurement command 'S' and received result of measurement after the read command 'R'.

The About menu item shows the current version of the software:



The Evaluation Board can be working also in the Master communication mode. In this case the appropriate measuring mode and accuracy should be chosen with the help of external switches SW2 and SW3 respectively on the evaluation board (see the 'UFDC-1 Specification and Application Notes' document or Fig.3 for code combinations). The Master communication mode option 'Unit in Master Mode' can be selected in the communication dialog window and from the Unit Mode pull down menu in the main window. At communication modes changing the power supply for Evaluation Board must be switch off.

In cases when measuring signal is disconnected from the evaluation board, a shaft is stopped in

rotation speed measurement mode; a wrong port number selected or input signal is out of range, for example, less than 0.05 Hz, the appropriate message after 40 s delay will be indicated under the result indicator.

The Evaluation Board can work in single and continuous measuring modes. At the first mode the 'Get Result' button must be pressed every time to obtain measuring result. In the continuous measuring mode the 'Continuous' option in the Command field in the main window must be checked. For continuous measurement, the indication time can be chosen from 1 ms to 10000 ms.

DEVELOPMENT KIT PACKAGE CONTENTS

The development kit package contains the following items:

- This document
- The EVAL-UFDC-1/UFDC-1M-16 evaluation board
- Evaluation board software on CD
- One UFDC-1 or UFDC-1M-16 integrated circuit in 28-leads PDIP package
- UFDC-1 Specification and Application Note

ORDERING INFORMATION

Model Description

EVAL UFDC-1/UFDC-1M-16	
Evaluation Board	
UFDC-1*	IC
UFDC-1M-16*	IC

*ICs are available in 28-lead PDIP, 32-lead TQFP and 32-pad MLF packages.

Order online at:

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