

DT9853/DT9854

Isolated, Low Cost D/A Modules for USB

DT9853/DT9854 Features

- **4 or 8 analog output channels** with 16-bit resolution – ideal for process control, control loop, and test applications
- **8 dedicated** digital input lines and 8 dedicated digital output lines
- **Interrupt on change** support on up to 7 digital inputs – great for monitoring and controlling critical signals
- **Output ranges** of 0-10V, +/- 10V, and 0-20mA for maximum flexibility
- **Scalable design** – easily connect multiple modules together for high-channel count applications
- **Compatible** with 8 to 36 VDC external excitation for current drive
- **Configurable digital input state** – choose either pull-up or pull-down to suit your application needs
- **Calibration utility** provided for tuning the analog output circuitry
- **Many software options:** from VB.NET to full no programming Measure Foundry applications.

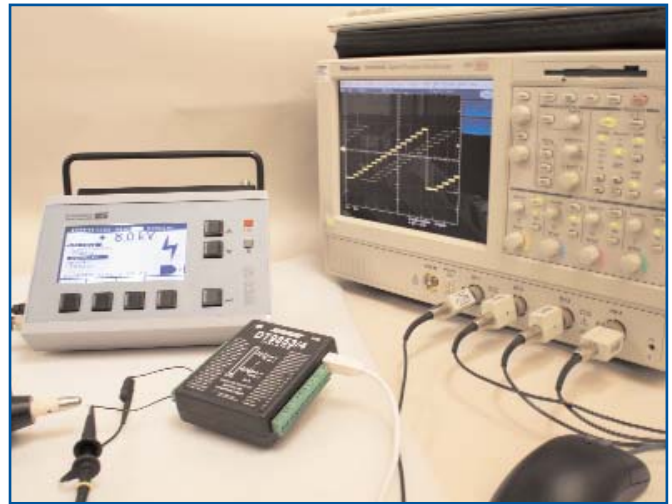


Figure 1. The DT9853/54 can withstand an 8,000V spike directly to any pin without disrupting the module operation. The scope output above shows such a test. (See Figure 3. for a more in-depth explanation.)

- **Fully isolated to +/- 300V** to protect your computer and maintain signal integrity
- **Compact, rugged enclosure** with standard screw terminal connections for easy wiring

Overview

The DT9853 and DT9854 modules, are low-cost analog output and digital I/O modules for the USB bus. They provide 4 or 8 analog outputs at 16-bit resolution in a compact enclosure. These low cost modules are ideal for applications requiring stable and accurate output signals.

Available Models

| Model# | # of Channels | Resolution (bits) | Digital I/O C/T | Output Range | Isolation |
|----------|---------------|-------------------|-----------------|-----------------------|-----------|
| DT9853 | 4 | 16 | 16/1 | 0-10V, +/-10V | +/-300V |
| DT9853-M | 4 | 16 | 16/1 | 0-10V, +/-10V, 0-20mA | +/-300V |
| DT9854 | 8 | 16 | 16/1 | 0-10V, +/-10V | +/-300V |
| DT9854-M | 8 | 16 | 16/1 | 0-10V, +/-10V, 0-20mA | +/-300V |

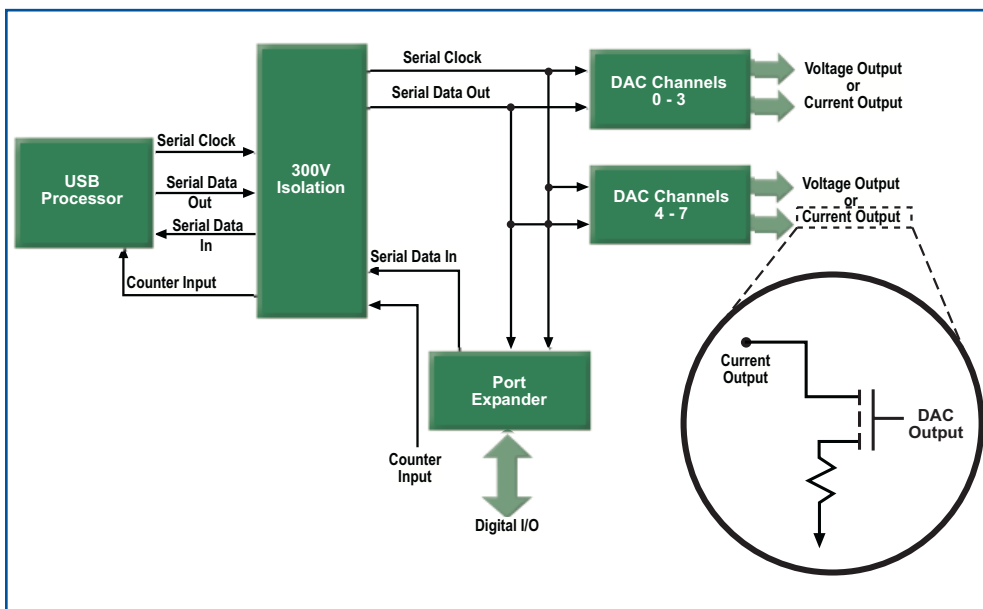


Figure 2. The voltage and current output for each DAC channel are available in parallel on the -M versions. The current output circuit is shown providing 0 to 20mA through a constant current configuration.

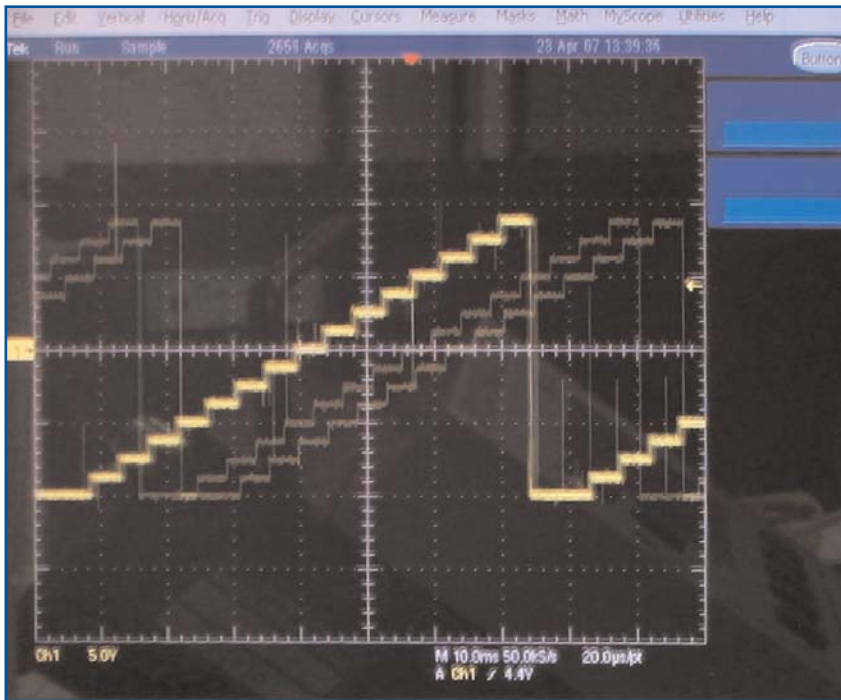


Figure 3. Screen shot of a digital scope trace from Figure 1 shows an analog output waveform updated for all 8 channels at 100Hz each. The module is being subjected to 8000V ESD discharges directly on the D/A output. The module keeps operating to specification, but the scope mis-triggers as a result of the discharge. This performance, despite the high voltage noise, shows that USB measurements can be performed reliably in hostile environments. This measurement integrity is due to shielding in the enclosure and galvanic isolation back to the host PC.

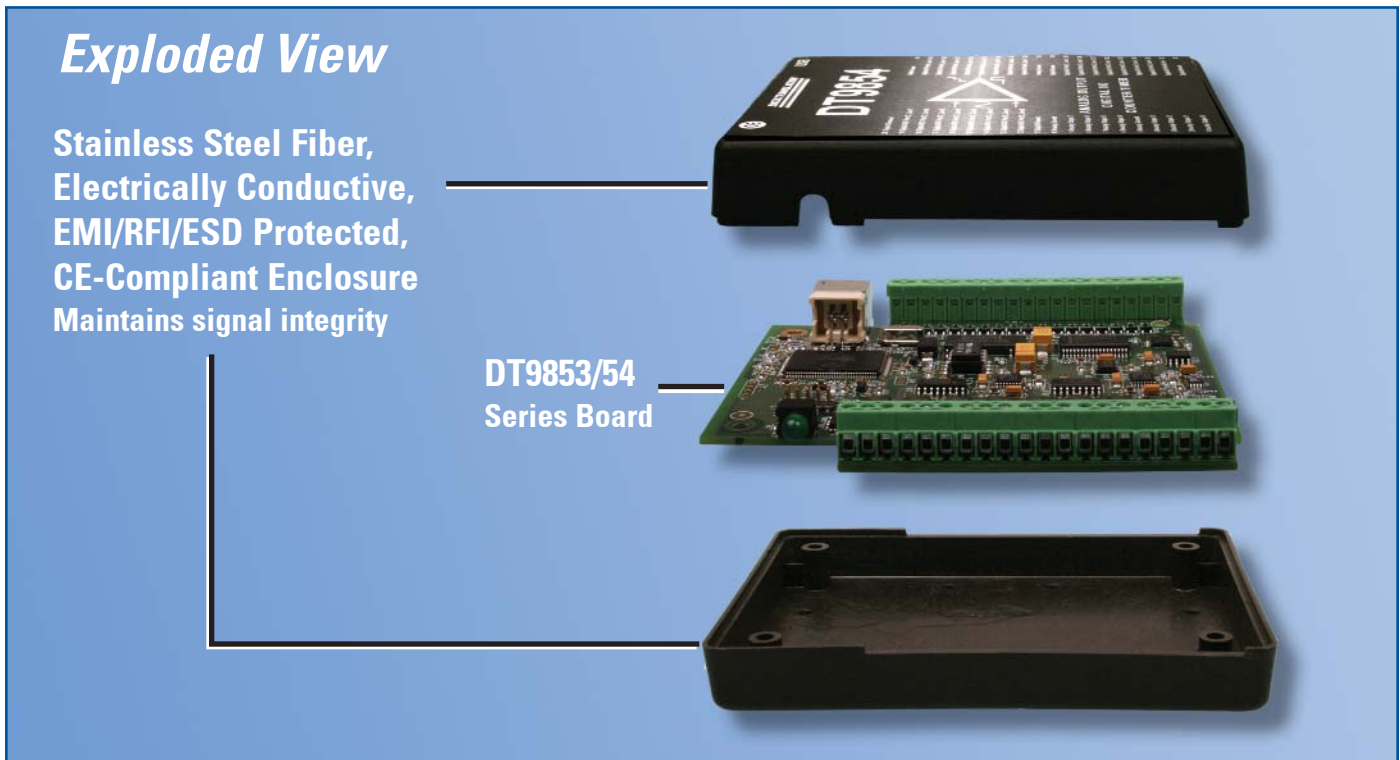


Figure 4. The DT9853/54 boards are encased in a rugged enclosure to ensure CE-compliance and maintain signal integrity.

Analog Output Subsystem

The DT9853 provides 4 analog outputs with 16-bit resolution and 16 digital I/O lines with an analog output range of 0-10V or +/-10V.

The DT9854 provides 8 analog outputs with 16-bit resolution and 16 digital I/O lines with an analog output range of 0-10V or +/-10V.

A unique feature of this series provides double-buffering of the digital data on each analog output channel to prevent spurious outputs.

Current Output Option

Unlike the DT9853 and DT9854 modules, which support voltage output only, the DT9853-M and DT9854-M modules support both voltage and current output for each channel. Output ranges of 0 -10V, +/-10V, and 0 - 20mA are provided. Because current outputs do not degrade over distance (no IR drop), they are ideal for industrial settings where your PC may be remotely located from the devices you are driving.

The D/A converter on the module controls the output on each channel pair. Therefore, when a value is written to a channel, both the current output signal and the voltage output signal of the associated channel are updated. How the analog output channels are wired determines how they are used.

The value that is output on the channel depends on the output range that is selected for the subsystem and the current load. For example, if specifying a range of ±10 V, writing a code of 0000 to the analog output channel corresponds to -10 V or 0 mA (depending on the load), while writing a code of FFFF to the channel corresponds to +10 V or 20 mA, (depending on the load).

Analog Output Operation Modes

DT9853 and DT9854 modules provide multiple operation modes to match different application needs. The user can perform the following analog output operations with any of the modules:

- Single-value on one analog output channel
- Simultaneous single-value operations on multiple analog output channels of a single module
- Simultaneous single-value operations on multiple DT9850 Series modules

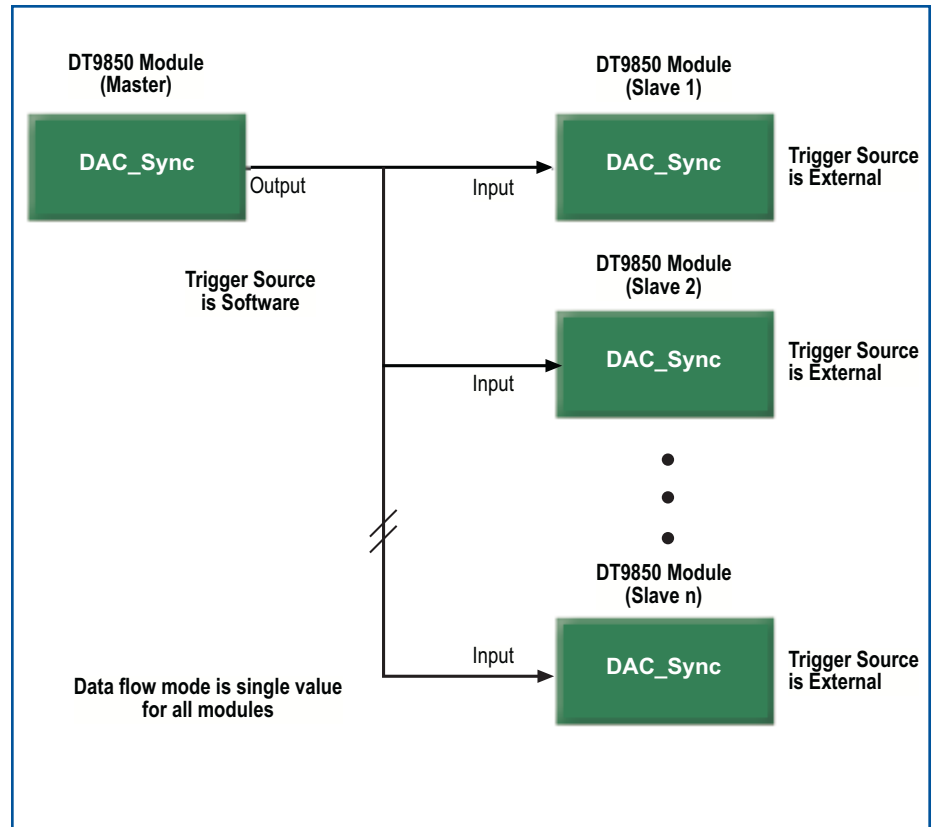


Figure 5. This diagram illustrates how to configure a system to simultaneously update all analog output channels on one or multiple modules.

Updating All Analog Output Channels of One Module Simultaneously

All the analog output channels of one module can be updated simultaneously by setting the data flow mode to single value and using either a software or external trigger. The user specifies the values to write to the analog output channels. When the operation starts (by issuing a software command), the module simultaneously updates all the analog output channels with the specified values.

Updating the Analog Output Channels of Multiple Modules Simultaneously

The user can simultaneously update all the analog output channels of multiple modules by connecting them together through their DAC_Sync pins, setting their data flow mode to single value, and configuring their trigger sources appropriately. Figure 3 illustrates how this works.

In this configuration, the DAC_Sync pin of one module (called the master module) is configured as an output - the trigger source is set to software. The DAC_Sync pins of the other connected modules (called slave modules) are configured as inputs - their trigger sources are set to external. When the operation is started, the master module automatically sends a low-to-high signal from its DAC_Sync pin to the other connected modules; the analog output channels of all connected modules are updated simultaneously with the values specified.

Options for Solution Development for DT9853/DT9854

Vista Compatible

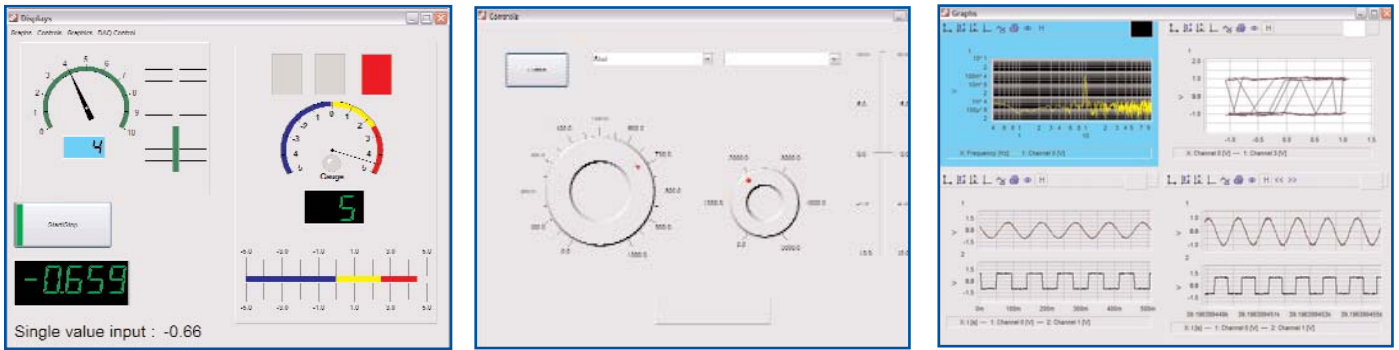


Figure 6. Measure Foundry controls, displays, and graphs can be used for test and measurement applications. No programming is needed to build application specific solutions that fully support the DT9853 and DT9854.

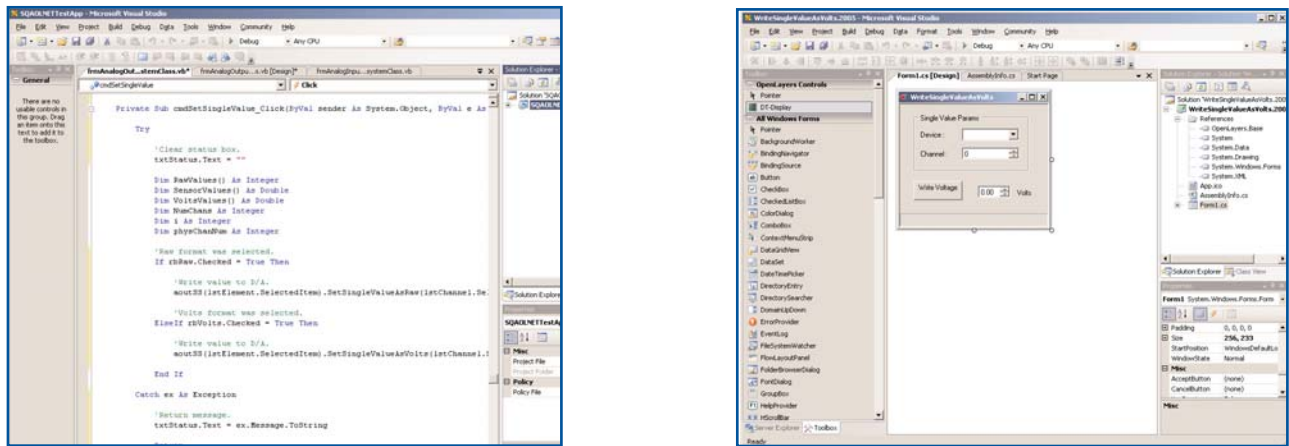


Figure 7. xxxxxxxx

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|---|---|--|--|--|---|
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| <p>DT-Open Layers for .NET Native .NET Class Library for programming in Visual Basic .NET or Visual C#</p> | <p>DTx-EZ or DT-Display Visual Studio Development Tools for displaying signals</p> | <p>DAQ Adapter for MATLAB® Access the visualization and analysis capabilities of MATLAB with our hardware</p> | <p>LV-Link Access the power of our boards through LabVIEW</p> | <p>quickDAQ Acquire, plot, analyze, and save data to disk at up to 2 MHz per channel ... without writing any code</p> | <p>Measure Foundry Open, powerful application builder for test and measurement systems without programming</p> |
| <p>FREE</p> | | | | | |

Figure 8. There are many software choices available for application development. Each option offers development capability at different levels. Choose from ready-to-measure applications to full graphical programming with Measure Foundry.

Trigger Sources

The DT9853 and DT9854 provide a bi-directional signal that allows simultaneous update of the values of the analog output channels. This signal can be used in the following ways:

- Configure the trigger source for the module as external, the signal is configured as an input. When a low-to-high transition is detected, all the analog outputs of the module are updated simultaneously.
- Configure the trigger source for the module as software, the signal is configured as an output. When an operation is started (using a software command), the module outputs a signal. Use this signal to synchronize multiple modules so that all the analog output channels on each device are updated simultaneously.

Digital I/O Lines

The DT9853 and DT9854 modules support 16 digital I/O lines. These lines are divided into two ports of eight. The user can specify the digital I/O line to read or write.

[Click here for full specifications:](#)

■ **DT9853/DT9854**

[Click here for pin assignments:](#)

[Click here for full specifications:](#)

Two operating modes are support for the digital I/O lines.

- Single-value digital I/O operations
- Continuous digital input operations

Interrupts

The DT9853 and DT9854 modules can generate an interrupt when a digital input line changes state. This feature is useful for monitoring critical signals or when the user wants to signal the host computer to transfer data to or from the module.

Counter/Timer Features

The DT9853 and DT9854 modules provide one 32-bit counter/timer that accepts a counter input signal with a frequency of 1 MHz. The module counts the number of rising edges that occur on the counter input signal. A maximum of 4,294,967,296 events can be counted before the counter rolls over to 0 and starts counting again.

Ordering Summary

All Data Translation hardware products are covered by a 1-year warranty. For pricing information, see a current price list, visit our web site, or contact your local reseller.

- **DT9853** – 4-Channel USB analog output module.
- **DT9853-M** – 4-Channel USB analog output with current.
- **DT9854** – 8-channel USB analog output module.
- **DT9854-M** – 8-channel USB analog output module with current.

Software

All software and documentation is provided on the Omni CD that ships with the module and can be downloaded from the web site.

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04/2007