

DAC161S055EVM Booster Pack User's Guide

The DAC161S055EVM is a demonstration kit for the DAC161S055, a 16-bit, 1-channel, 5 μ s settling time, Serial Interface digital-to-analog converter. The EVM allows users to evaluate the operation and performance of the DAC161S055 data converter. The EVM features a small size layout that directly connects onto the MSP430F5529 LaunchPad board.

Topic	Page
1 DAC161S055 BoosterPack Components	2
2 Software Installation.....	3
3 DAC161S055 BoosterPack Setup and Operation	7
4 Board Layout.....	10
5 Bill of Materials	14

1 DAC161S055 BoosterPack Components

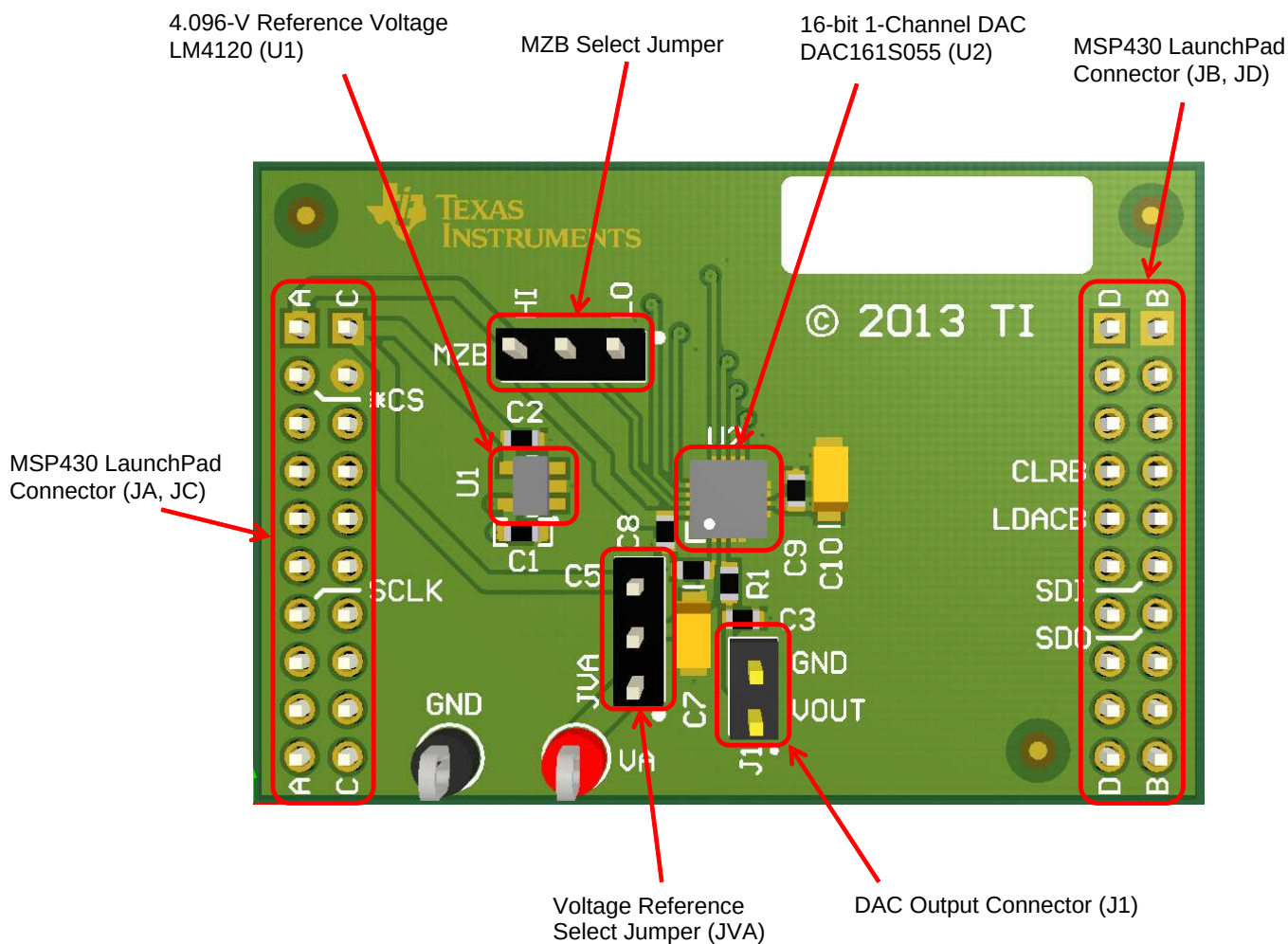


Figure 1. DAC161S055EVM Evaluation Board

Table 1. Device and Package Configurations

DEVICE	IC	PACKAGE
U1	LM4120IM5-4.1	SOT-23
U2	DAC161S055CISQ	WQFN-16

2 Software Installation

2.1 Graphical User Interface (GUI)

To use the DAC161S055EVM, install the DAC161S055 software:

1. The DAC161S055 software is located on the [product page](#). Go to the product page, scroll down to the software section, and download the latest evaluation software.
2. Unzip the downloaded file into a known directory, and run the “setup.exe” file located in [Unzip location]\DAC161S055\GUI\DAC161S055_Installer.zip\DAC161S055_Installer\Installer\Volume. Follow the popup-screen instructions by clicking the Next button to install the software.



Figure 2. DAC161S055 Installation Directory

3. When the installation is finished, click Finish button.

2.2 LaunchPad Firmware Upgrade

The MSP430F5529 LaunchPad board can be purchased at www.ti.com/tool/msp-exp430f5529lp.

2.2.1 MSP430 Firmware Upgrade Application Installation

1. Navigate to www.ti.com/tool/msp430usbdevpack, and click Get Software.
2. Scroll down to the end of the page to find the USB Collateral Installers section.
3. Click on MSP430_USB_Firmware_Upgrade_Example-x-x-x-Setup.exe to download the tool; the page redirects to a submission form.
4. Complete the information requested and submit the form; if approved, a download button appears.
5. Run the installation file and follow the on-screen instructions until completion. When asked about the setup type, select Application Only. Click Finish when done.

2.2.2 Firmware Upgrade

1. Open the MSP430 USB Firmware Upgrade application. By default, the application can be launched from Start >> Programs >> Texas Instruments >> MSP430 USB Firmware Upgrade Example.
2. Click Next to proceed on the first prompt; read and accept the license agreement, and click Next to continue.

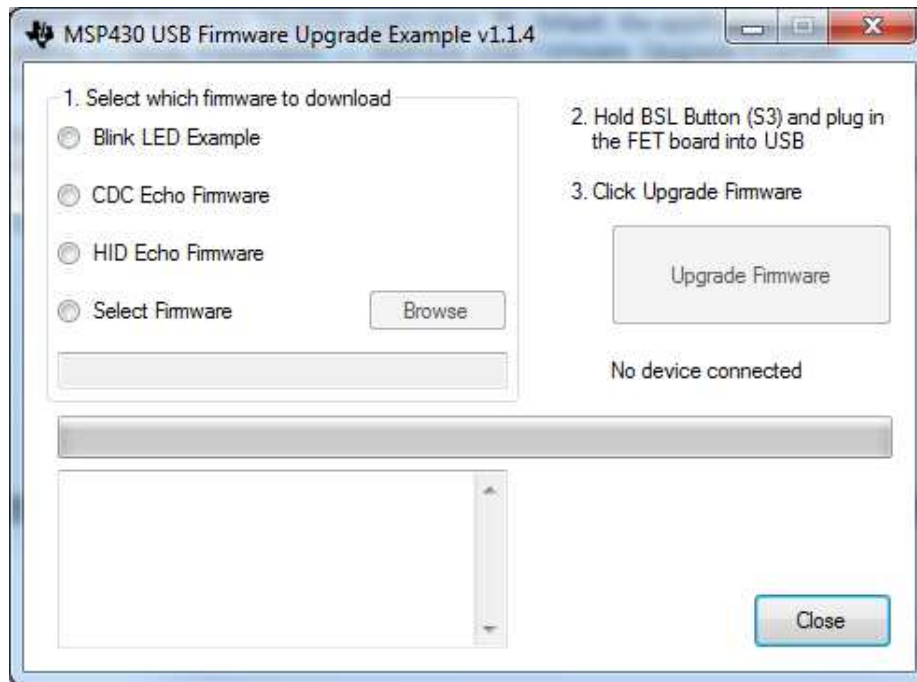


Figure 3. USB Firmware Upgrade Window

3. Enable the Select Firmware button and browse to open the downloaded firmware "dac161s055_fw-v0.89.txt".
4. Press the BSL button on the MSP430 LaunchPad and connect to the PC with a USB cable; if detected, the text on the Firmware Upgrade tool will change from No device connected to Found 1 device.
5. Click the Upgrade Firmware button to program the LaunchPad. Close the application when done.

2.3 Update USB Driver

1. Before launching the DAC161S055 software, connect the DAC161S055EVM board to a USB port of your PC. Go to Device Manager and find "MSP430-USB Example". Right-click and select Update Driver Software.

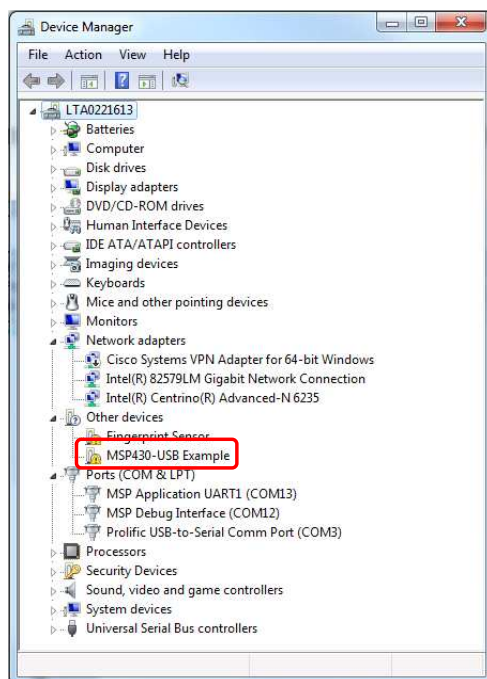


Figure 4. Driver Not Installed

2. On the next screen, select the Browse my computer for driver software option and go to the directory of your install files and select the TI_ADC_DAC_EVMS_Driver.inf file.
3. If prompted with a warning window, select Install this Driver Anyway. Close the installation window when it is done. The device manager should now display a TI_ADC_DAC_EVMS item followed by a COM port number.



Figure 5. Driver Authentication Warning

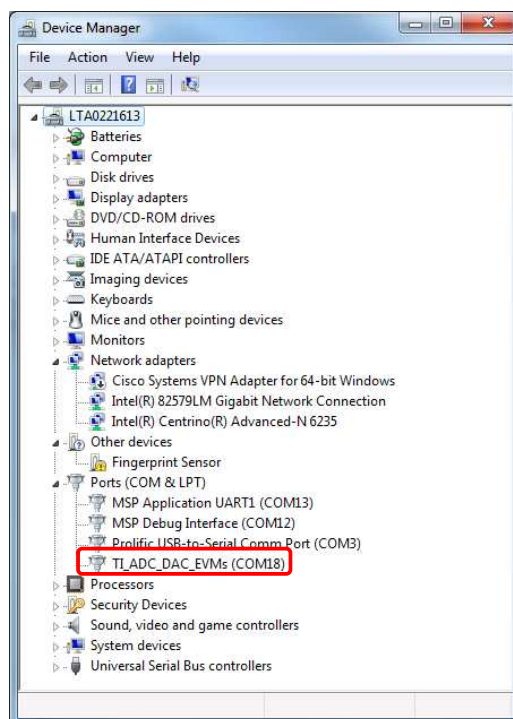


Figure 6. Driver Installed

3 DAC161S055 BoosterPack Setup and Operation

3.1 Connections

1. Attach the DAC161S055EVM BoosterPack onto the MSP430 LaunchPad using connectors, JA, JB, JC, and JD. The proper orientation of the LaunchPad and DAC161S055EVM is when the text “LaunchPad” and “2013 TI” are in the same direction.

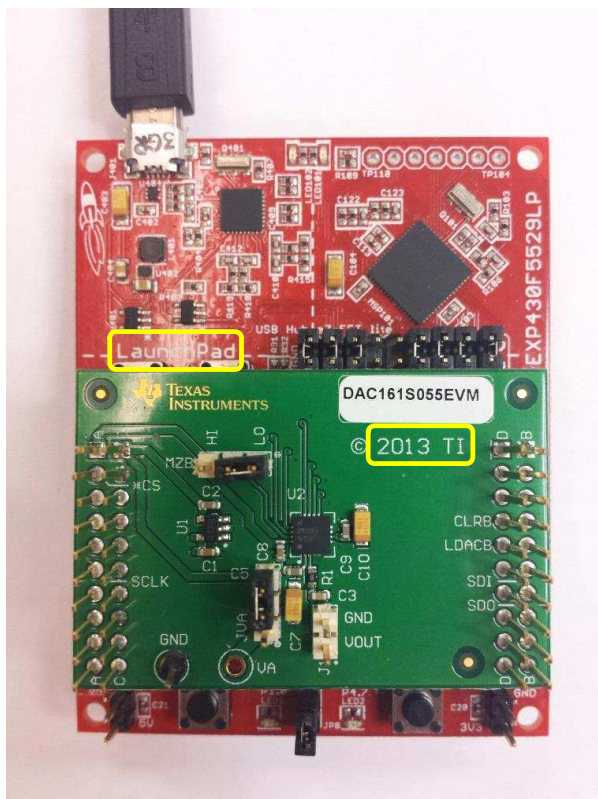


Figure 7. DAC161S055EVM Attached to MSP430

2. Connect the USB cable from the LaunchPad to the PC.

3.2 Launching the Software

1. The DAC161S055 GUI software can be run by clicking on Start >> All Program >> DAC161S055. After running the GUI, select DAC161S055.

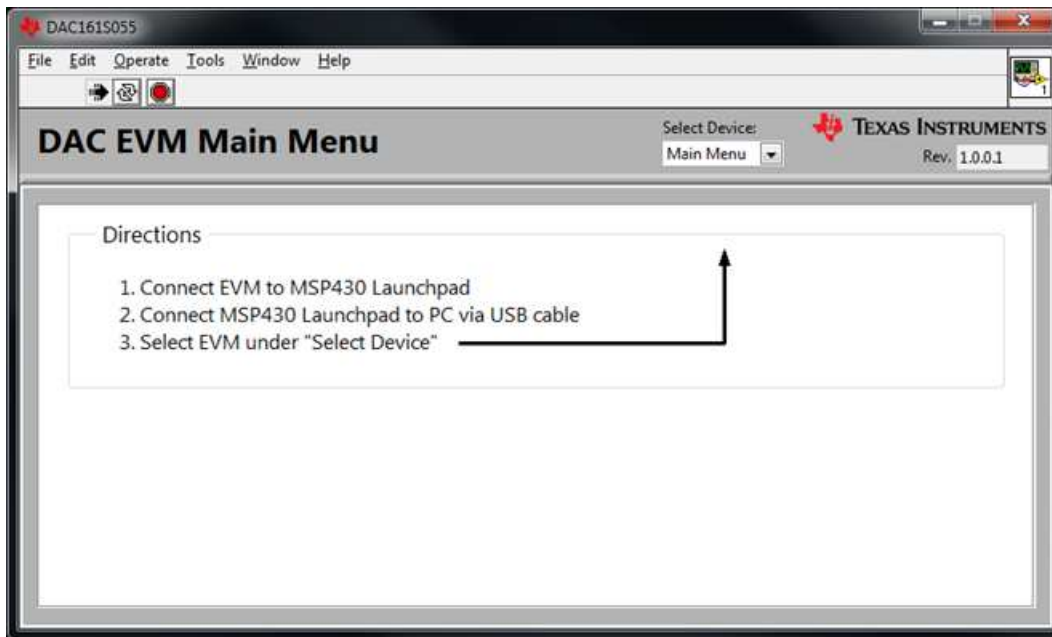


Figure 8. Part Select

2. GUI descriptions:
 - Command[7:0]: These 8 bits control different write modes, channel selects, and special operation modes. See the DAC161S055 [data sheet](#) for more details.
 - Data[15:0]: These 16 bits are for setting the DAC output codes or channel outputs.

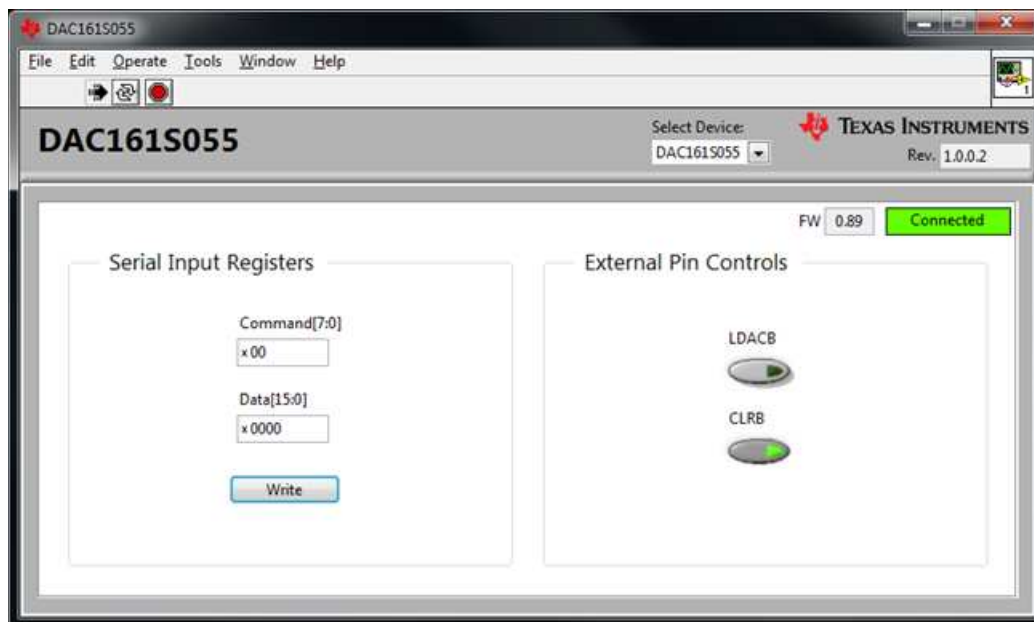


Figure 9. Selectable Fields in GUI

3. Quick start:
 - (a) Write 01 to Command[7:0] and press the Write button to assert the CLR command. This command

clears the internal registers and returns the part to its power-up default state. The Data[15:0] field are don't cares when the CLR command is written.

- (b) Write 10 to Command[7:0] which asserts the WRUP command. The WRUP command will update the DACREG and PREREG registers regardless of the WRITE BLOCK or WRITE THROUGH settings. Next specify 8000 to Data[15:0] to set the 16-bit DAC to output $V_{ref}/2$. Next press the Write button. The output should be $V_{ref}/2$ or 2.049 V.

NOTE: The DAC161S0855 is a 1-channel device, but its register map allows up to 8 channels to be selected. The part only outputs to channel 0.

4 Board Layout

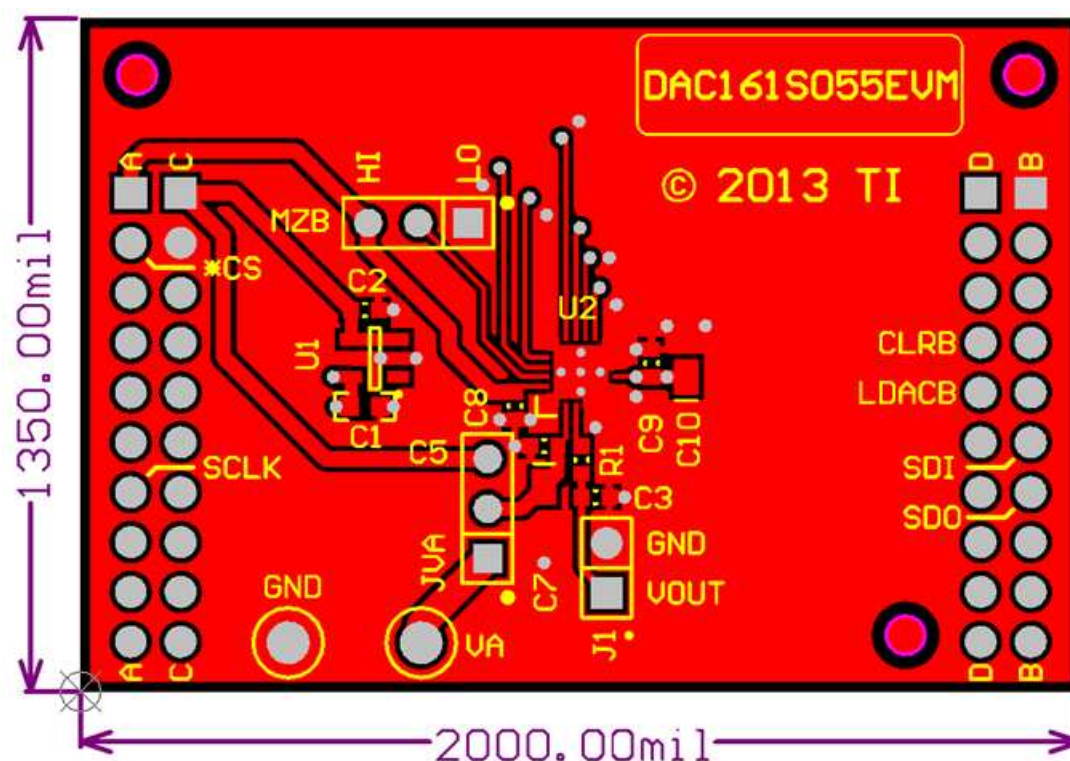


Figure 10. Top Assembly Layer

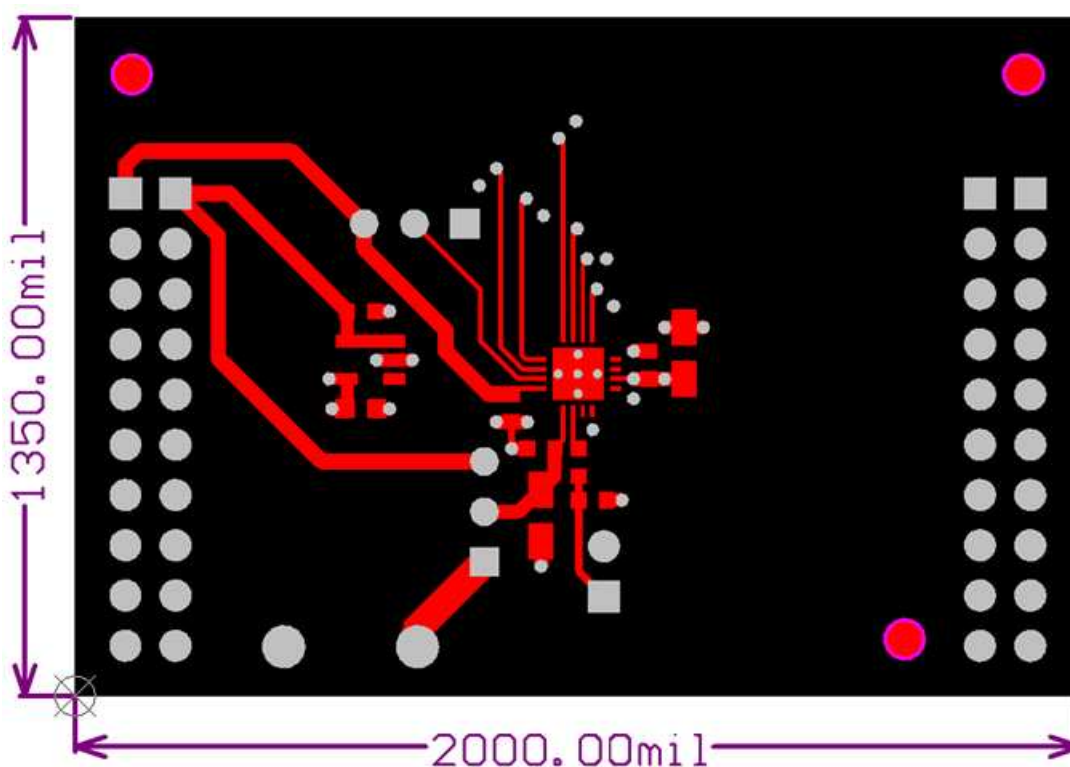


Figure 11. Top Layer Routing

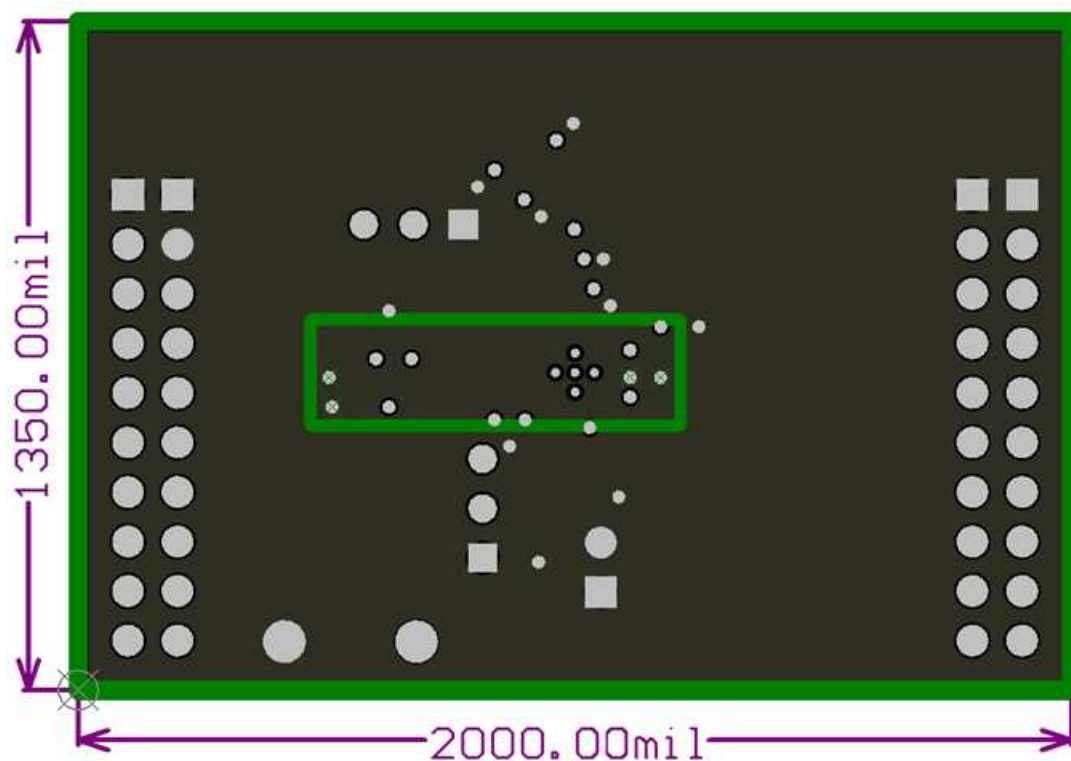


Figure 12. Power Layer Routing

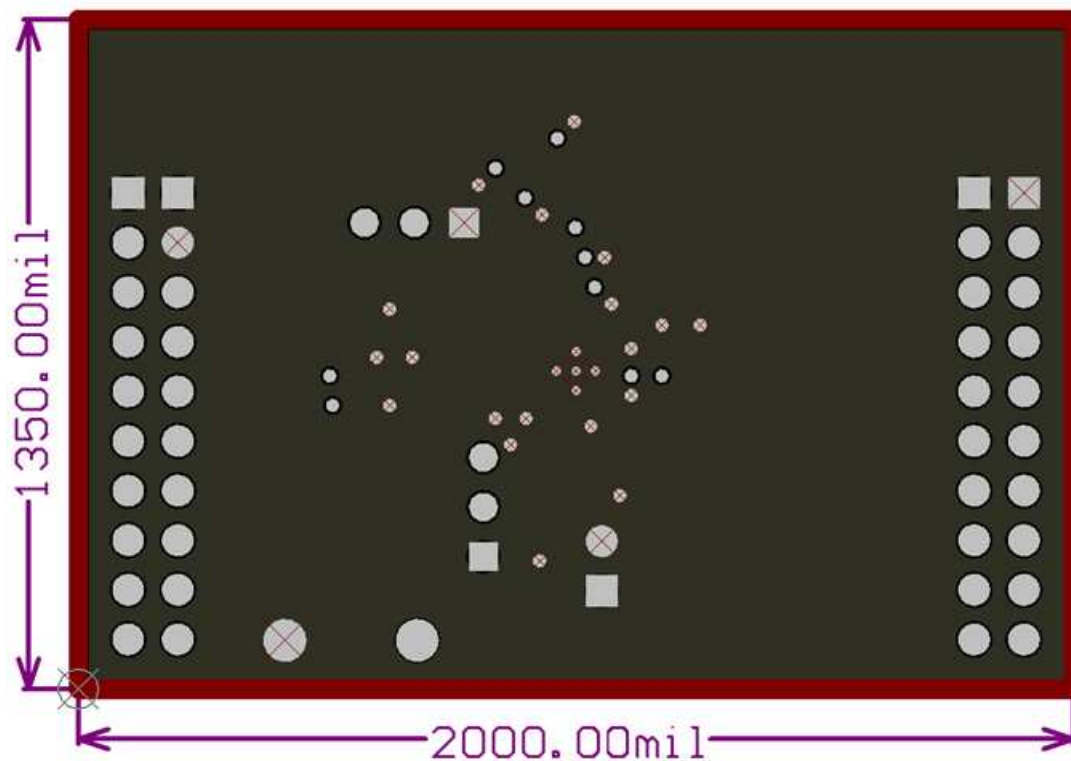


Figure 13. Ground Layer Routing

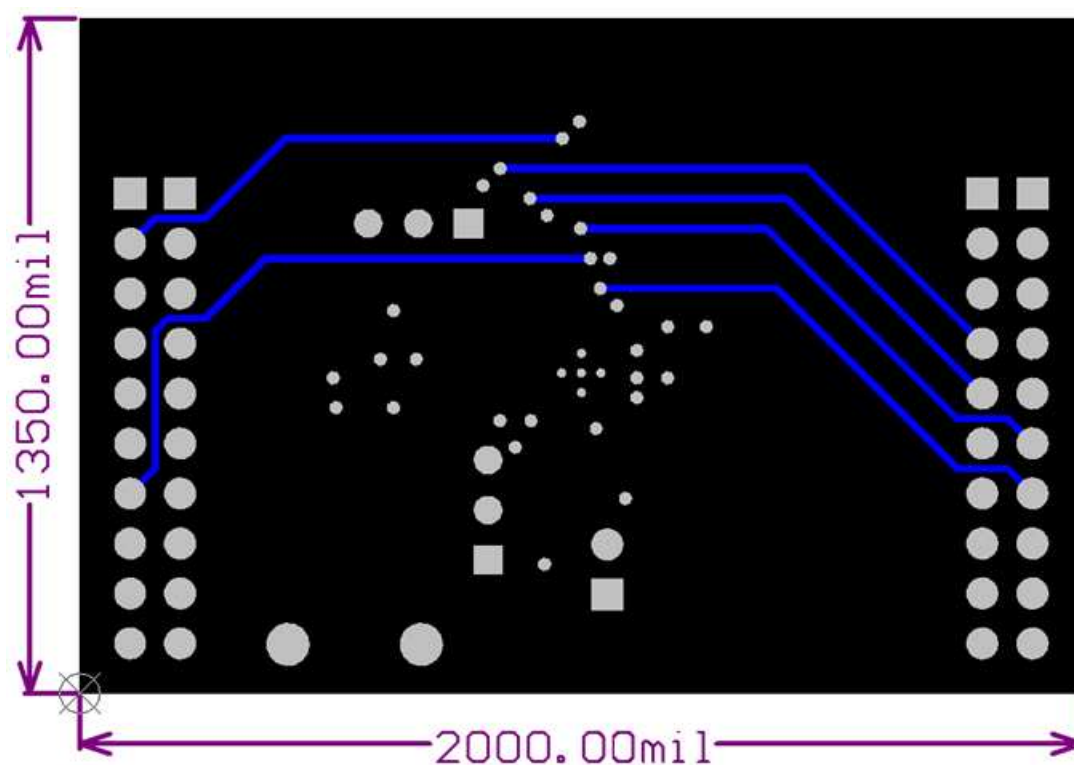


Figure 14. Bottom Layer Routing

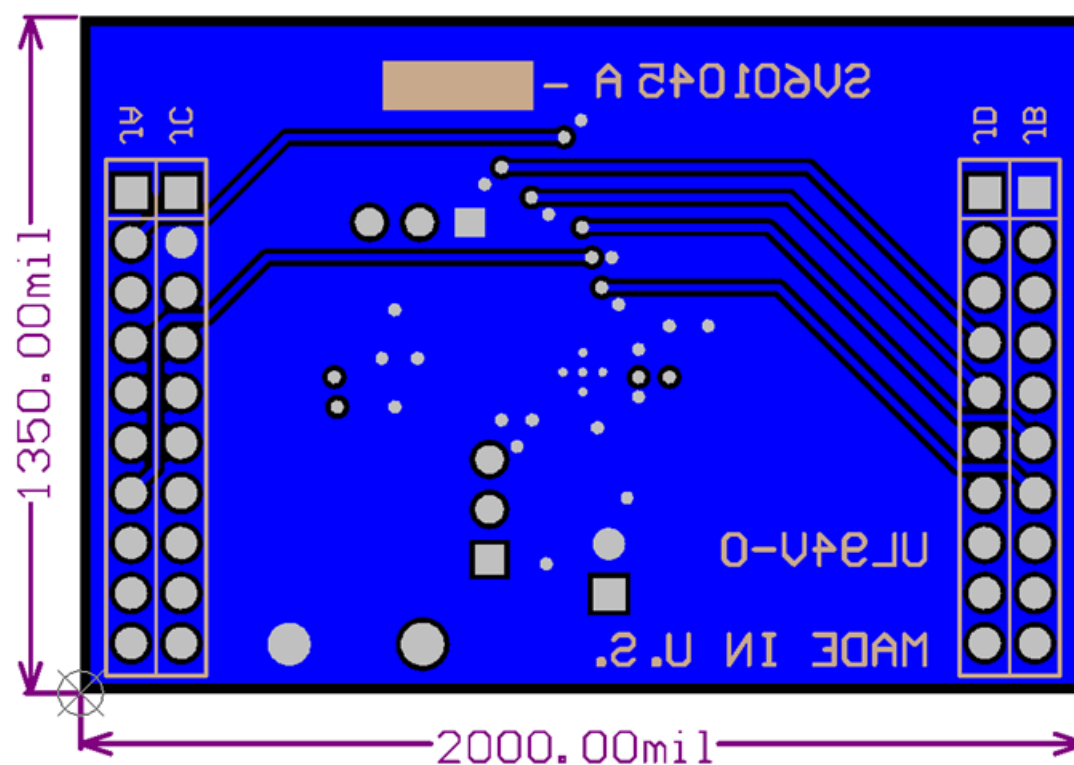
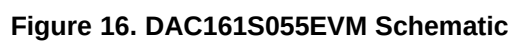


Figure 15. Bottom Assembly Layer



5 Bill of Materials

Table 2. DAC161S055EVM Bill of Materials

Designator	Quantity	Value	Description	PartNumber	Manufacturer
!PCB	1		Printed Circuit Board	SV601045	Any
C1	1	0.047uF	CAP, CERM, 0.047 μ F, 25 V, +/- 5%, X7R, 0603	06033C473JAT2A	AVX
C2, C5, C8, C9	4	0.1uF	CAP, CERM, 0.1uF, 10V, +/-10%, X7R, 0603	C0603C104K8RACTU	Kemet
C3	1	0.01uF	CAP, CERM, 0.01uF, 25V, +/-10%, X7R, 0603	GRM188R71E103KA01D	MuRata
C7, C10	2	10uF	CAP, TA, 10uF, 10V, +/-10%, 0.9 ohm, SMD	TPSA106K010R0900	AVX
J1	1		Header, TH, 100mil, 2x1, Gold plated, 230 mil above insulator	TSW-102-07-G-S	Samtec
JA, JB, JC, JD	4		Connector, Receptacle, 100mil, 10x1, Gold plated, TH	SSW-110-23-F-S	Samtec
JVA, MZB	2		Header, 100mil, 3x1, Tin plated, TH	PEC03SAAN	Sullins Connector Solutions
LBL1	1		Thermal Transfer Printable Labels, 0.650" W x 0.200" H - 10,000 per roll	THT-14-423-10	Brady
R1	1	200	RES, 200 ohm, 1%, 0.1W, 0603	CRCW0603200RFKEA	Vishay-Dale
SH-JVA_2-3, SH-MZB_1-2	2	1x2	Shunt, 100mil, Gold plated, Black	382811-6	AMP
U1	1		Precision Micropower Low Dropout Voltage Reference, 5-pin SOT-23, Pb-Free	LM4120IM5-4.1/NOPB	Texas Instruments
U2	1		Precision 16-Bit, Buffered Voltage-Output DAC, RGH0016A	DAC161S055CISQ/NO PB	Texas Instruments
FID1, FID2, FID3	0		Fiducial mark. There is nothing to buy or mount.	N/A	N/A
GND	0	Black	Test Point, TH, Multipurpose, Black	5011	Keystone Electronics
VA	0	Red	Test Point, TH, Multipurpose, Red	5010	Keystone Electronics

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- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Industry Canada Compliance (English)

For EVMs Annotated as IC – INDUSTRY CANADA Compliant:

This Class A or B digital apparatus complies with Canadian ICES-003.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

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This device complies with Industry Canada licence-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

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Under Industry Canada regulations, this radio transmitter may only operate using an antenna of a type and maximum (or lesser) gain approved for the transmitter by Industry Canada. To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (e.i.r.p.) is not more than that necessary for successful communication.

This radio transmitter has been approved by Industry Canada to operate with the antenna types listed in the user guide with the maximum permissible gain and required antenna impedance for each antenna type indicated. Antenna types not included in this list, having a gain greater than the maximum gain indicated for that type, are strictly prohibited for use with this device.

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Cet appareil numérique de la classe A ou B est conforme à la norme NMB-003 du Canada

Les changements ou les modifications pas expressément approuvés par la partie responsable de la conformité ont pu vider l'autorité de l'utilisateur pour actionner l'équipement.

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Conformément à la réglementation d'Industrie Canada, le présent émetteur radio peut fonctionner avec une antenne d'un type et d'un gain maximal (ou inférieur) approuvé pour l'émetteur par Industrie Canada. Dans le but de réduire les risques de brouillage radioélectrique à l'intention des autres utilisateurs, il faut choisir le type d'antenne et son gain de sorte que la puissance isotrope rayonnée équivalente (p.i.r.e.) ne dépasse pas l'intensité nécessaire à l'établissement d'une communication satisfaisante.

Le présent émetteur radio a été approuvé par Industrie Canada pour fonctionner avec les types d'antenne énumérés dans le manuel d'usage et ayant un gain admissible maximal et l'impédance requise pour chaque type d'antenne. Les types d'antenne non inclus dans cette liste, ou dont le gain est supérieur au gain maximal indiqué, sont strictement interdits pour l'exploitation de l'émetteur.

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1. Use EVMs in a shielded room or any other test facility as defined in the notification #173 issued by Ministry of Internal Affairs and Communications on March 28, 2006, based on Sub-section 1.1 of Article 6 of the Ministry's Rule for Enforcement of Radio Law of Japan,
2. Use EVMs only after user obtains the license of Test Radio Station as provided in Radio Law of Japan with respect to EVMs, or
3. Use of EVMs only after user obtains the Technical Regulations Conformity Certification as provided in Radio Law of Japan with respect to EVMs. Also, do not transfer EVMs, unless user gives the same notice above to the transferee. Please note that if user does not follow the instructions above, user will be subject to penalties of Radio Law of Japan.

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