

# LTC2654: Quad 16-Bit/12-Bit Rail-To-Rail SPI DACs with 10ppm/°C Max Reference

## DESCRIPTION

Demonstration circuit 1678A features the LTC2654 Quad 16-bit/12-bit DAC. The LTC2654 is a family of 16-bit/12-bit rail-to-rail DACs with integrated 10ppm/°C maximum reference. The LTC2654 advances performance standards

for output drive, crosstalk and load regulation in single supply, voltage-output multiple DACs.

**Design files for this circuit board are available at <http://www.linear.com/demo>**

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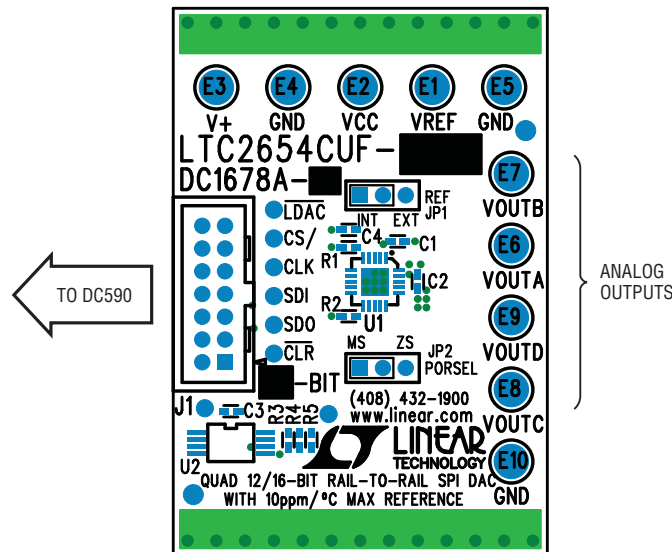


Figure 1. Connection Diagram

Table 1. LTC2654 Demo board variations

DEMO BOARD TYPE	LTC2654 VARIATION	FULL-SCALE VOLTAGE
DC1678A-A	LTC2654CUF-L16	2.5V
DC1678A-B	LTC2654CUF-H16	4.096V
DC1678A-C	LTC2654CUF-L12	2.5V
DC1678A-D	LTC2654CUF-H12	4.096V

## QUICK START PROCEDURE

Connect the DC1678A to a DC590 USB serial controller using the supplied 14 conductor ribbon cable. Connect the DC590 to a host PC with a standard USB A/B cable. Run the QuikEval evaluation software supplied with the DC590

or download it from [www.linear.com](http://www.linear.com). The correct control panel will be loaded automatically. To update DAC value, fill in corresponding text box.

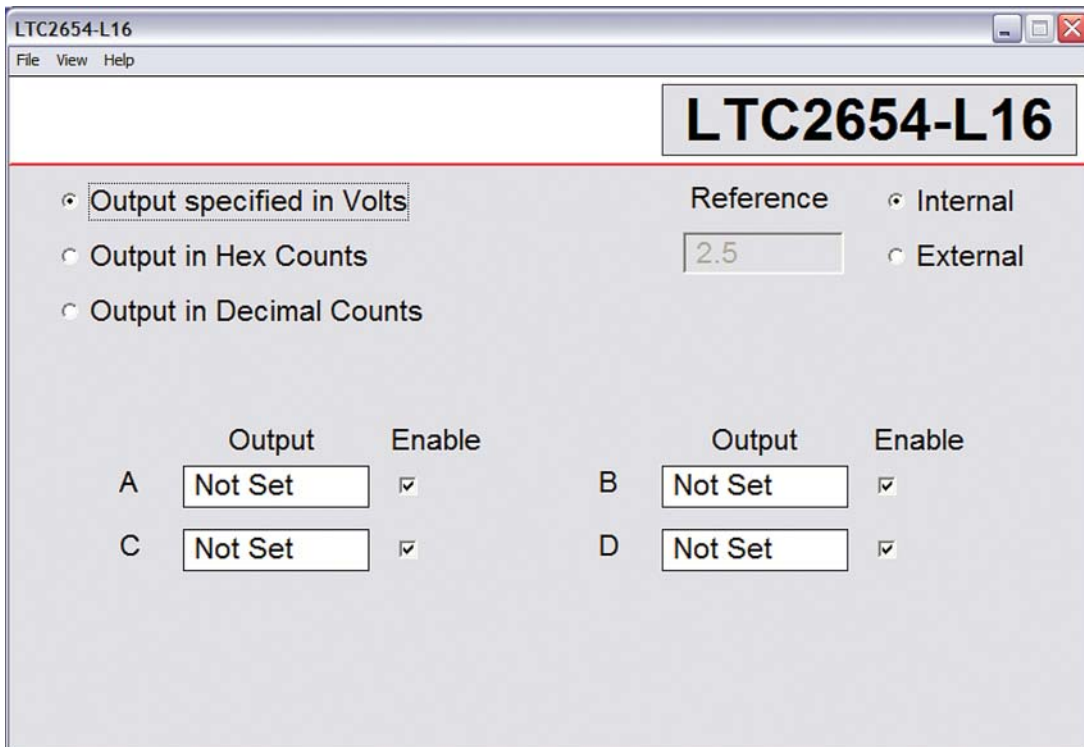


Figure 1. Demo Board Setup

## QUICK START PROCEDURE

### HARDWARE SET-UP

#### Jumpers

REF –  $V_{REF}$  Select. This jumper selects which mode the LTC2654 powers up in: External reference (EXT) or Internal reference (INT).

PORSEL – Power Up Mode. The LTC2654 can be set to either power up in Mid Scale or Zero Scale.

#### Analog Connections

DAC outputs – The 4 DAC outputs from the LTC2654 are brought out to turrets labeled VOUTA through VOUTD. These may be connected to external instruments or other circuitry.

NOTE: DAC outputs are not in alphabetical order on the circuit board.

$V_{REF}$  – The  $V_{REF}$  turret is connected directly to the reference terminals of the LTC2654. The on-chip reference may be turned off, allowing the DAC reference pin to be driven from this turret. Alternatively, when the on-chip reference is on and active, the voltage can be monitored at this turret.

$V^+$  – Unregulated 10V is present here when a DC590 is connected. This turret is provided for monitoring purposes only and should not be connected to any other turrets on the board.

### Grounding and Power Connections

Power ( $V_{CC}$ ) – Normally the DC1678A is powered by the DC590 controller.  $V_{CC}$  can be supplied to this turret, however the power supply on DC590 must be disabled. Refer to DC590 Quick Start Guide for more details on this mode of operation.

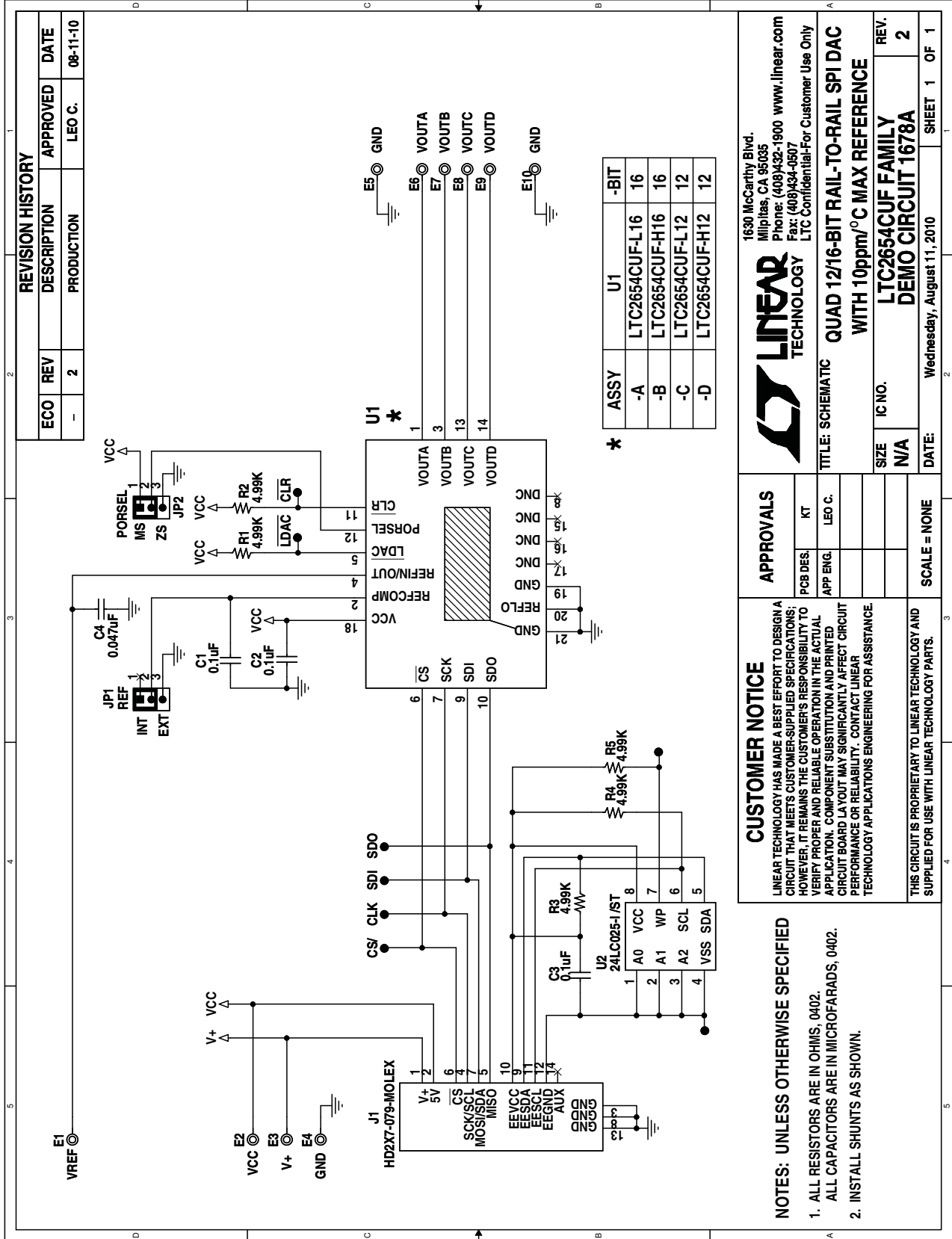
Grounding – There are 3 ground turrets provided (labeled GND), as well as ground strips on the top and the bottom of the board.

# DEMO MANUAL DC1678A

## PARTS LIST

ITEM	QTY	REFERENCE	PART DESCRIPTION	MANUFACTURER/PART NUMBER
<b>Required Circuit Components</b>				
1	3	C1,C2,C3	Capacitor, X7R, 0.1 $\mu$ F 16V, 0402	TDK, C1005X7R1C104K
2	1	C4	Capacitor, X7R, 0.047 $\mu$ F 16V, 0402	TDK, C1005X7R1C473K
3	10	E1-E10	TP, Turret, 0.064"	Mill-Max, 2308-2-00-80-00-00-07-0
4	2	JP1,JP2	Jumper, 3-Pin 1 Row 0.079CC	Samtec, TMM-103-02-L-S
5	1	J1	Header, 2X7 Pin, 0.079CC	Molex, 87831-1420
6	5	R1,R2,R3,R4,R5	Resistor, Chip 4.99k 1/16W 1%, 0402	NIC, NRC04F4991TRF
7	1	U2	IC, Serial EEPROM, TSSOP8	Microchip, 24LC025-I /ST
8	2	Shunts as Shown on Assy Dwg	Shunt, 0.079" Center	Samtec, 2SN-BK-G
		U1-A	IC, LTC2654CUF-L16, QFN20UF 4mm $\times$ 4mm	Linear Technology, LTC2654CUF-L16
		U1-B	IC, LTC2654CUF-H16, QFN20UF 4mm $\times$ 4mm	Linear Technology, LTC2654CUF-H16
		U1-C	IC, LTC2654CUF-L12, QFN20UF 4mm $\times$ 4mm	Linear Technology, LTC2654CUF-L12
		U1-D	IC, LTC2654CUF-H12, QFN20UF 4mm $\times$ 4mm	Linear Technology, LTC2654CUF-H12

SCHEMATIC DIAGRAM



REVISION HISTORY				
ECO	REV	DESCRIPTION	APPROVED	DATE
-	2	PRODUCTION	LEO C.	08-11-10

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**TITLE: SCHEMATIC QUAD 12/16-BIT RAIL-TO-RAIL SPI DAC WITH 10ppm/°C MAX REFERENCE**

SIZE: N/A IC NO.: LTC2654CUF FAMILY  
 REV.: 2  
 DEMO CIRCUIT 1678A

DATE: Wednesday, August 11, 2010 SHEET 1 OF 1

APPROVALS	
PCB DES.	KT
APP ENG.	LEO C.
SCALE = NONE	

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- NOTES: UNLESS OTHERWISE SPECIFIED**
- ALL RESISTORS ARE IN OHMS, 0402.  
ALL CAPACITORS ARE IN MICROFARADS, 0402.
  - INSTALL SHUNTS AS SHOWN.

# DEMO MANUAL DC1678A

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