

## DESCRIPTION

Demonstration circuit 590B is a USB-based controller with generic serial peripheral interface (SPI) and integrated circuit (I<sup>2</sup>C) ports. It is designed to mate with Linear Technology's family of QuikEval™ demonstration boards. The demo board is fully isolated from the host PC's ground, and in many cases no external power source is required. The evaluation software automatically detects which demo board is connected and loads the appropriate control screen.

The QuikEval system provides a quick and easy way to evaluate the performance of a wide variety of Linear Technology's products, including ADCs, DACs, SMBus power control products and many others.

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

LT, LTIC, LTM, Linear Technology and the Linear logo are registered trademarks and QuikEval and PScope are trademarks of Linear Technology Corporation. All other trademarks are the property of their respective owners.

## BOARD PHOTO

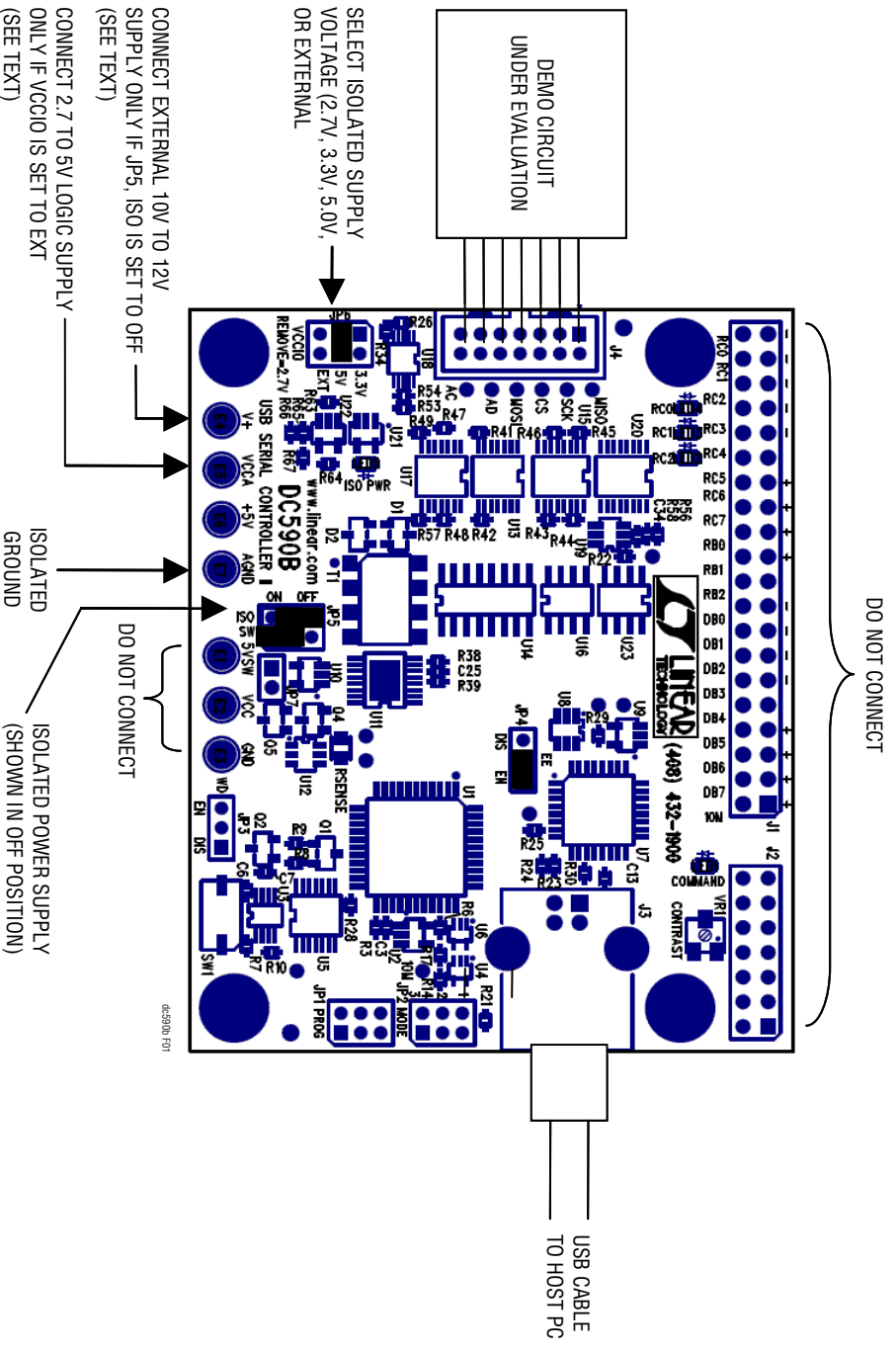


Figure 1. DC590B Connection Diagram

## QUICK START PROCEDURE

For proper equipment setup, use the following procedure:

1. Do NOT plug in DC590B before running the installation program.
2. Download the QuikEval installation program from <http://www.linear.com/software/>
3. Run the QuikEval installation program and follow the onscreen instructions.

NOTE: The QuikEval demo software requires a PC that is running Windows XP (or later), and has an available USB port.

4. Connect the demonstration circuit to be evaluated to the DC590B using the supplied 14-conductor ribbon cable. The demo software detects the circuit and starts the appropriate control screen.

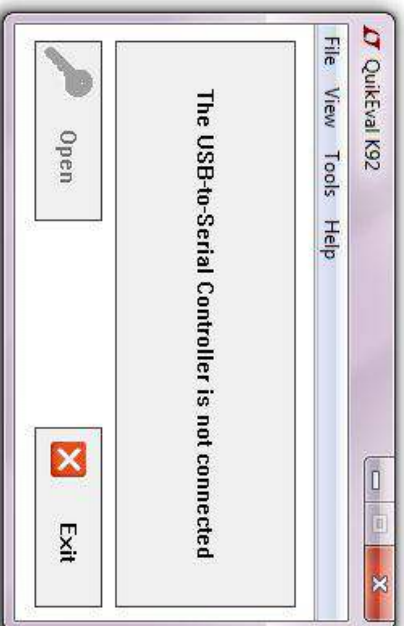
Each demonstration board also comes with a Quick Start guide similar to this one. For usage details relevant to a particular circuit, refer to its Quick Start Guide.

### To update the software (requires Internet connection):

- Choose Update from the Tools menu. This automatically updates the main program and drivers for individual demo circuits.

### To view the DC590B Demo Manual:

- Choose Quick Start Guide from the View menu.



dc590b r02

Figure 2. QuikEval Software

## CONNECTIONS TO THE DC590B

Figure 1 shows the connections to the DC590B. In most cases, DC590B and the demonstration circuit under evaluation can operate from available USB power, and thus require nothing more than a USB connection to the host PC and a ribbon connecting DC590B to the demo circuit under evaluation. The DC590B offers several other power options, as described in the following text.

### Isolated Supply Options

An LT3439 low noise switching power supply provides isolated power to the demonstration circuit under evaluation and to the isolation circuitry. This is adequate in many cases, however an external power supply is recommended to reduce the load on the host computer's USB port or to reduce power supply noise in the circuit under test.

The LT3439 switching power supply is enabled by default but may be disabled by moving jumper JP5 (ISO, to the left) to the OFF position. This allows the isolated side of the board and the demonstration circuit under evaluation to be powered separately. This is recommended when testing precision components such as high resolution ADCs and DACs. After moving JP5 ISO to the OFF position, apply a clean, regulated power supply from 7V to 10V to the V+ and AGND turret posts.

### Isolated Digital Supply

The signal levels on the digital interface are determined by the VCCA voltage. The onboard regulator can be set to 5V, 3.3V and 2.7V, by installing JP6 in the appropriate position (remove jumper for 2.7V). Selecting EXT shuts the regulator down, and an external supply between 2.7V and 5V must be applied to the VCCA turret post.

The +5V turret is the digital supply for the isolated portion of DC590B. Do not draw current from this point.

### LED Indicators

Two LED indicators are provided. The ISO PWR LED is lit when either the onboard switching power supply is running or external power is applied to the isolated side of the board.

The COMMAND LED indicates that a command has been sent to the board by the host PC and is waiting to be executed. The LED may not appear to be blinking in some cases, as the duty cycle may be very short.

### Jumper Summary

Some jumpers on the DC590B board are for future use and **MUST** be left in the default positions.

JUMPER	POSITION	FUNCTION
JP1	PROG	Microcontroller in-circuit programming header. Do NOT install jumper; make no connections
JP2	MODE	Do NOT install jumper; make no connections
JP3	Watchdog Enable	Do NOT install jumper; make no connections
JP4	EE	Jumper MUST be in the EN position
JP5	SW (Right-hand side)	MUST be in the ON Position. See Connections section.
	ISO (Left-hand side)	Controls the isolated supply. See Connections section.
JP6	VCCA Control	See Connections section

# DEMO MANUAL DC590B

---

## TROUBLESHOOTING GUIDE

PROBLEM	SOLUTION
<p>The DC590B is plugged in, but the QuikEval screen still says “USB Serial Controller Not Connected”</p>	<p>The most likely cause is improper installation of the USB drivers, which causes Windows to recognize DC590B as an “Unknown Device.” Open the Windows Control Panel, open “System” and click the “Device Manager” tab. Open the “Other Devices” item and look for USB SERIAL CONTROLLER. Select this item and click the remove button. Unplug the DC590B, re-install the QuikEval software, and follow the onscreen instructions.</p>
<p>The demo board software loads properly but will not run, or displays “Device Not Accessible” errors</p>	<p>Verify that the demo board is properly powered up. This Demo Manual lists the basic power connections to the DC590B. Some demo boards may have additional requirements; refer to the demo board’s Quick Start guide for details.</p>
<p>After connecting the demo board to DC590B with the supplied 14-pin ribbon cable, QuikEval software still displays “Evaluation Board is Not Connected”</p>	<p>Contact Linear Technology Applications Engineering.</p>

# DEMO MANUAL DCC590B

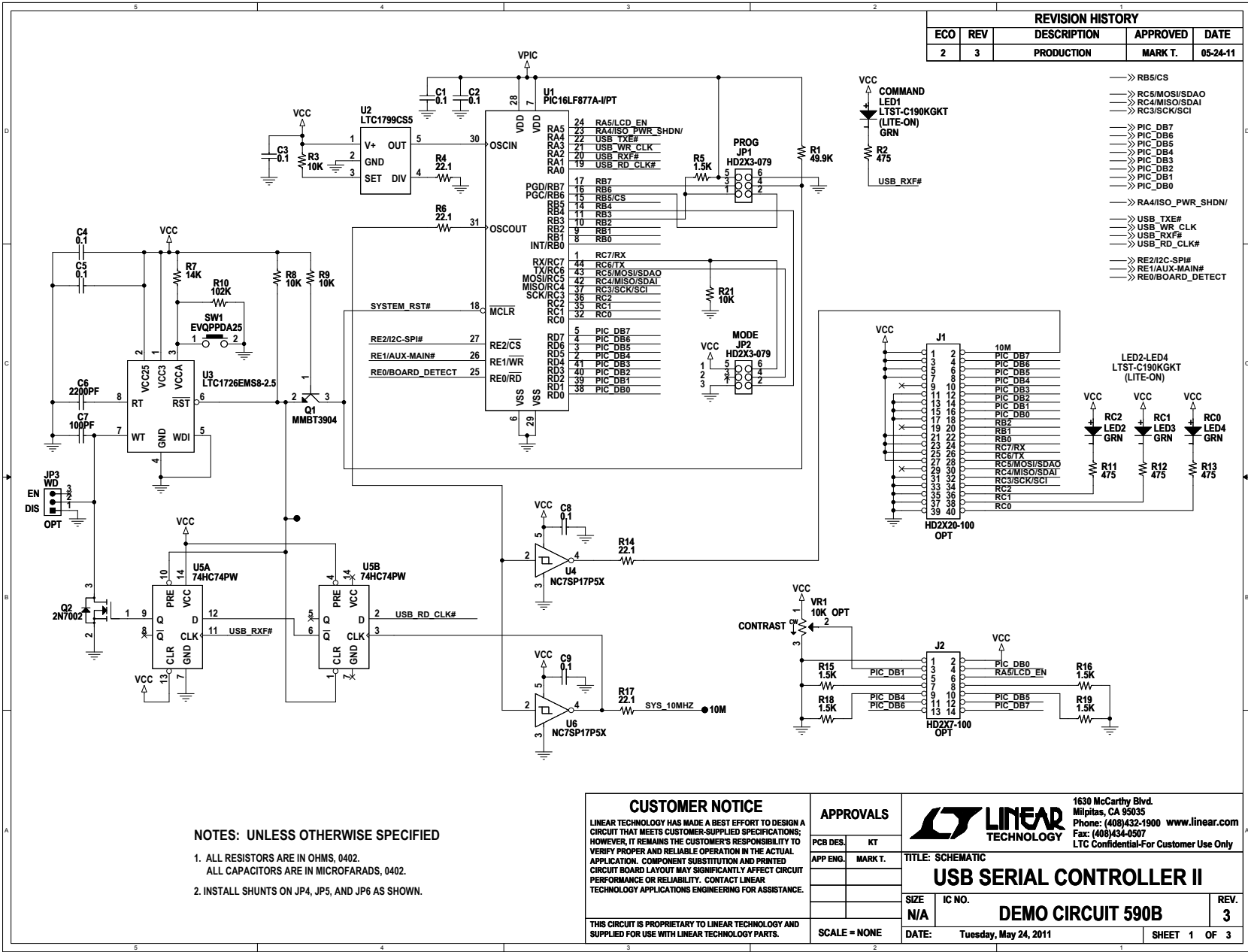
## PARTS LIST

ITEM	QTY	REFERENCE	PART DESCRIPTION	MANUFACTURER/PART NUMBER
1	27	C1-C5, C8-C10, C12-C19, C23, C26, C27, C30-C37	CAP., X5R, 0.1 $\mu$ F, 10V, 10%, 0402	AVX, 0402ZD104KAT
2	1	C6	CAP., X7R, 2200pF, 100V, 10%, 0402	AVX, 04025C222KAT2A
3	1	C7	CAP., NPO, 100pF, 50V, 10%, 0402	AVX, 04025A101KAT2A
4	7	C11, C21, C24, C38, C40, C41, C42	CAP., X5R, 10 $\mu$ F, 6.3V, 20%, 0805	TDK, C2012X5R0J106M
5	1	C20	CAP., X5R, 100 $\mu$ F, 6.3V, 20%, 1210	TDK, C3225X5R0J107M
6	3	C22, C28, C39	CAP., X7R, 0.01 $\mu$ F, 16V, 10%, 0402	AVX, 0402YC103KAT2A
7	1	C25	CAP., X7R, 330pF, 100V, 10%, 0402	AVX, 04025C331KAT2A
8	1	C29	CAP., X7R, 2.2nF, 1000V, 1206	AVX, 1206AC222KAT1A
9	2	C43, C44	CAP., NPO, 47pF, 50V, 10%, 0402	AVX, 04025A470KAT2A
10	2	D1, D2	DIODE, SCHOTTKY, SOT23	DIODES INC., BAT54S-7-F
11	7	E1, E2, E3, E4, E5, E6, E7	TESTPOINT, TURRET, 0.064"	MILL-MAX, 2308-2-00-80-00-00-07-0
12	4	JP1, JP2, JP5, JP6	JMP, 2x3, 0.079"	SAMTEC, TMM-103-02-L-D
13	0	JP3	JMP, 3-PIN, 1 ROW, 0.079"	OPT.
14	1	JP4	JMP, 3-PIN, 1 ROW, 0.079"	SAMTEC, TMM-103-02-L-S
15	0	JP7	JMP, 2-PIN, 1 ROW, 0.079"	OPT.
16	4	SHUNTS ON JP4 (1 AND 2), JP5 (1 AND 3, 2 AND 4), JP6 (3 AND 4)	SHUNT, 0.079" CENTER	SAMTEC, 2SN-BK-G
17	0	J1	JMP, 2x20, 0.100"	OPT.
18	0	J2	JMP, 2x7, 0.100"	OPT.
19	1	J3	CON, USB-B, 4 PINS, SINGLE THR. HOLE	MILL-MAX, 897-43-004-90-000
20	1	J4	HEADER, 2x7 PIN, 0.079"	MOLEX, 87831-1420
21	5	LED1-LED5	LED, GND, 0603	LITE ON, LIST-C190KGKT
22	1	Q1	TRANS, NPN, MMBT3904, SOT23	DIODES INC., MMBT3904-7-F
23	2	Q2, Q5	XSTOR, N-CH, SOT23	VISHAY, 2N7002-T1-E3
24	1	Q4	MOSFET, N-CH, DS, SOT23	VISHAY, S12306DS-T1-E3
25	1	RSENSE	RES., CHIP, 0.1 $\Omega$ , 1%, 0805	VISHAY, WSL0805R1000F
26	4	R1, R49, R57, R64	RES., CHIP, 49.9K, 1/16W, 1%, 0402	AAQ, CR05-4992FWM
27	5	R2, R11, R12, R13, R20	RES., CHIP, 475, 1/16W, 1%, 0402	AAQ, CR05-4750FWM
28	19	R3, R8, R9, R21, R27, R28, R30, R31, R33, R35, R39, R43-R48, R63, R68	RES., CHIP, 10K, 1/16W, 5%, 0402	AAQ, CR05-103JM
29	7	R4, R6, R14, R17, R23, R24, R29	RES., CHIP, 22.1, 1/16W, 1%, 0402	AAQ, CR05-22R1FM
30	13	R5, R15, R16, R18, R19, R22, R25, R51, R52, R56, R58, R59, R62	RES., CHIP, 1.5K, 1/16W, 5%, 0402	AAQ, CR05-152JM
31	1	R7	RES., CHIP, 14K, 1/16W, 1%, 0402	AAQ, CR05-1402FM
32	2	R10, R66	RES., CHIP, 102K, 1/16W, 1%, 0402	AAQ, CR05-1023FM
33	1	R26	RES., CHIP, 6.34K, 1/16W, 1%, 0402	AAQ, CR05-6341FM
34	1	R32	RES., CHIP, 2.21K, 1/16W, 1%, 0402	AAQ, CR05-2211FM
35	4	R34, R36, R37, R40	RES., CHIP, 100, 1/16W, 5%, 0402	AAQ, CR05-101JM
36	1	R38	RES., CHIP, 16.9K, 1/16W, 1%, 0402	VISHAY, CRCW040216K9FKED

# DEMO MANUAL DC590B

## PARTS LIST

ITEM	QTY	REFERENCE	PART DESCRIPTION	MANUFACTURER/PART NUMBER
37	8	R41, R42, R50, R53, R54, R55, R60, R61	RES, CHIP, 4.99K, 1/16W, 1%, 0402	AAG, CR05-4991FM
38	1	R65	RES, CHIP, 26.7K, 1/16W, 1%, 0402	VISHAY, CRCW040226K7FKED
39	1	R67	RES, CHIP, 41.2K, 1/16W, 1%, 0402	AAG, CR05-4122FM
40	1	R69	RES, CHIP, 0, 1/8W, 1206	VISHAY, CRCW1206000020EA
41	1	SW1	SW, LIGHT TOUCH, EVQPPDA25	PANASONIC, EVQPPDA25
42	1	T1	XFMR, PA0510, TRANS-PA0510	PULSE, PA0510MLT
43	1	U1	I.C., PIC16LF877A-I/PT, QFP44	MICROCHIP, PIC16LF877A-I/PT
44	1	U2	I.C., LTC1799CS5#PBF, TSOT23-5	LINEAR TECHNOLOGY, LTC1799CS5#PBF
45	1	U3	I.C., LTC1726EMS8-2.5#PBF, MS8	LINEAR TECHNOLOGY, LTC1726EMS8-2.5#PBF
46	2	U6, U4	I.C., NCTSP17P5X, SC70-5	FAIRCHILD SEMI., NCTSP17P5X
47	1	U5	I.C., 74HC74PW, TSSOP14	PHILIPS SEMI., 74HC74PW
48	1	U7	I.C., FT245BL, LQFP32	FUTURE TECHNOLOGY, FT245BL
49	1	U8	I.C., 93LC46BT-I/OT, SOT23-6	MICROCHIP, 93LC46BT-I/OT
50	1	U9	I.C., LTC6905CS5-96#TRPBF, TSOT23-5	LINEAR TECHNOLOGY, LTC6905CS5-96#TRPBF
51	1	U10	I.C., LT1761ESS-3.3#TRPBF, SOT23-5	LINEAR TECHNOLOGY, LT1761ESS-3.3#TRPBF
52	1	U11	I.C., LT3439EFE#PBF, TSSOP16FE	LINEAR TECHNOLOGY, LT3439EFE#PBF
53	1	U12	I.C., LTC4210-1CS6#PBF, TSOT23-6	LINEAR TECHNOLOGY, LTC4210-1CS6#PBF
54	2	U13, U17	I.C., 74VHC125MTC, TSSOP14	FAIRCHILD SEMI., 74VHC125MTCX
55	1	U14	I.C., OPT0-COUPLER, HQPL-092L-000E, SOT16-NB	AVAGO/AGILENT, HQPL-092L-000E
56	2	U15, U20	I.C., 74VHC4052MTC, TSSOP16	FAIRCHILD SEMI., 74VHC4052MTC
57	2	U23, U16	I.C., OPT0-COUPLER, MOCDD207M, S08	FAIRCHILD SEMI., MOCDD207M-NL
58	1	U18	I.C., LTC4302CMS-2#PBF, MS10	LINEAR TECHNOLOGY, LTC4302CMS-2#PBF
59	1	U19	I.C., LT1719CS6#TRPBF, SOT23-6	LINEAR TECHNOLOGY, LT1719CS6#TRPBF
60	1	U21	I.C., LT1761ESS-5#TRPBF, SOT23-5	LINEAR TECHNOLOGY, LT1761ESS-5#TRPBF
61	1	U22	I.C., LT1761ESS-SD#PBF, SOT23-5	LINEAR TECHNOLOGY, LT1761ESS-SD#PBF
62	0	VR1	RPOT, 10K, 1 TURN, RPOT-3313J	OPT.
63	4	MH1-MH4	STAND-OFF, NYLON (SNAP-ON), 0.25" TALL	KEYSTONE, 8831 (SNAP-ON)



REVISION HISTORY				
ECO	REV	DESCRIPTION	APPROVED	DATE
2	3	PRODUCTION	MARK T.	05-24-11

- RB5/CS
- RC5/MOSI/SDAO
- RC4/MISO/SDAI
- RC3/SCK/SCI
- PIC\_DB7
- PIC\_DB6
- PIC\_DB5
- PIC\_DB4
- PIC\_DB3
- PIC\_DB2
- PIC\_DB1
- PIC\_DB0
- RA4/ISO\_PWR\_SHDN/
- USB\_TXE#
- USB\_W#\_CLK
- USB\_RXF#
- USB\_RD\_CLK#
- RE2/I2C-SPI#
- RE1/AUX-MAIN#
- RE0/BOARD\_DETECT

**NOTES: UNLESS OTHERWISE SPECIFIED**

1. ALL RESISTORS ARE IN OHMS, 0402.  
ALL CAPACITORS ARE IN MICROFARADS, 0402.
2. INSTALL SHUNTS ON JP4, JP5, AND JP6 AS SHOWN.

**CUSTOMER NOTICE**  
 LINEAR TECHNOLOGY HAS MADE A BEST EFFORT TO DESIGN A CIRCUIT THAT MEETS CUSTOMER-SUPPLIED SPECIFICATIONS; HOWEVER, IT REMAINS THE CUSTOMER'S RESPONSIBILITY TO VERIFY PROPER AND RELIABLE OPERATION IN THE ACTUAL APPLICATION. COMPONENT SUBSTITUTION AND PRINTED CIRCUIT BOARD LAYOUT MAY SIGNIFICANTLY AFFECT CIRCUIT PERFORMANCE OR RELIABILITY. CONTACT LINEAR TECHNOLOGY APPLICATIONS ENGINEERING FOR ASSISTANCE.

THIS CIRCUIT IS PROPRIETARY TO LINEAR TECHNOLOGY AND SUPPLIED FOR USE WITH LINEAR TECHNOLOGY PARTS.

APPROVALS		TITLE: SCHEMATIC	
PCB DES.	KT	<b>USB SERIAL CONTROLLER II</b>	
APP ENG.	MARK T.		
SCALE = NONE		SIZE	IC NO.
		N/A	<b>DEMO CIRCUIT 590B</b>
		DATE: Tuesday, May 24, 2011	REV. <b>3</b>
		SHEET 1 OF 3	

1630 McCarthy Blvd.  
 Milpitas, CA 95135  
 Phone: (408)432-1900 www.linear.com  
 Fax: (408)434-0507  
 LTC Confidential-For Customer Use Only

Figure 3. DC590B USB Serial Controller

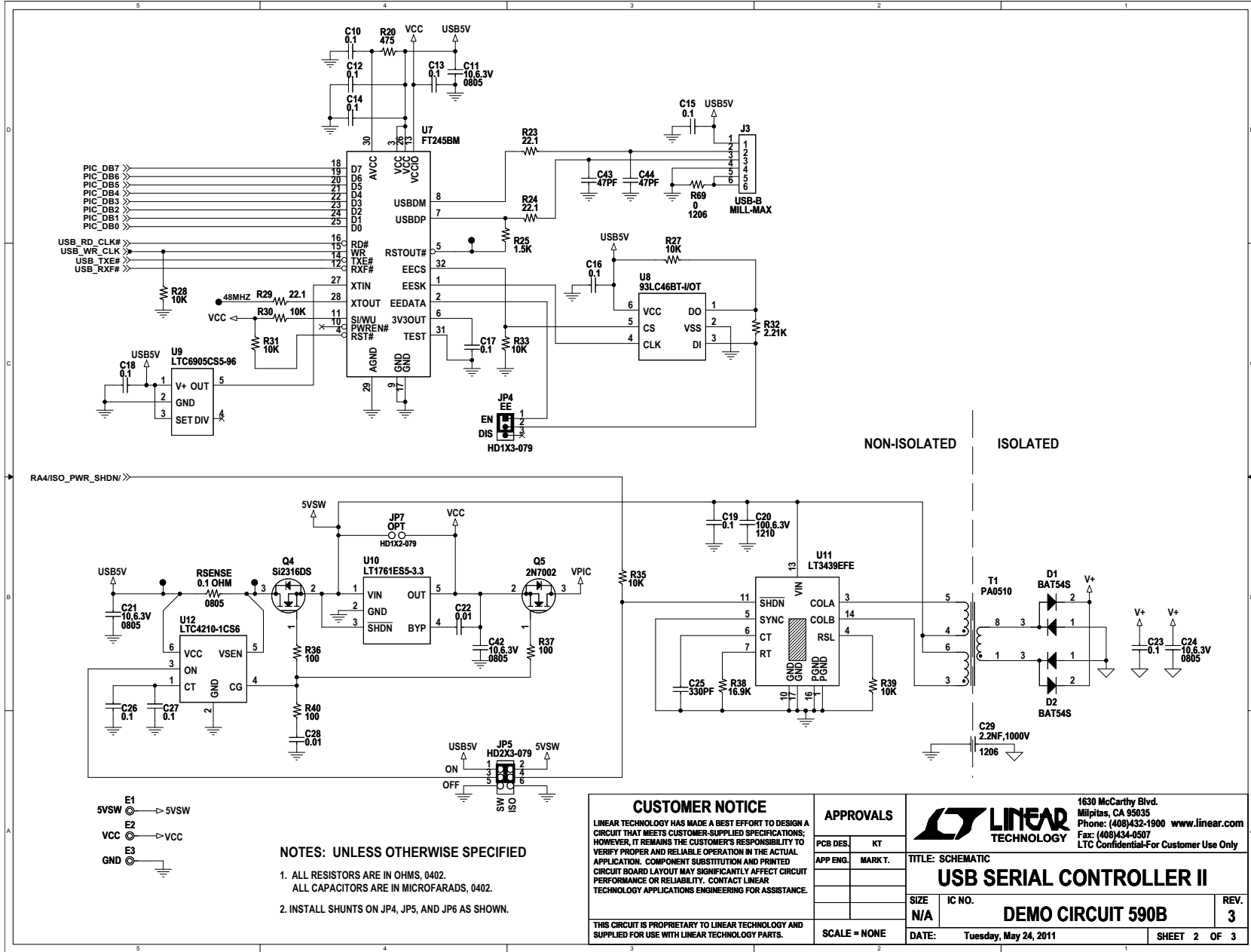
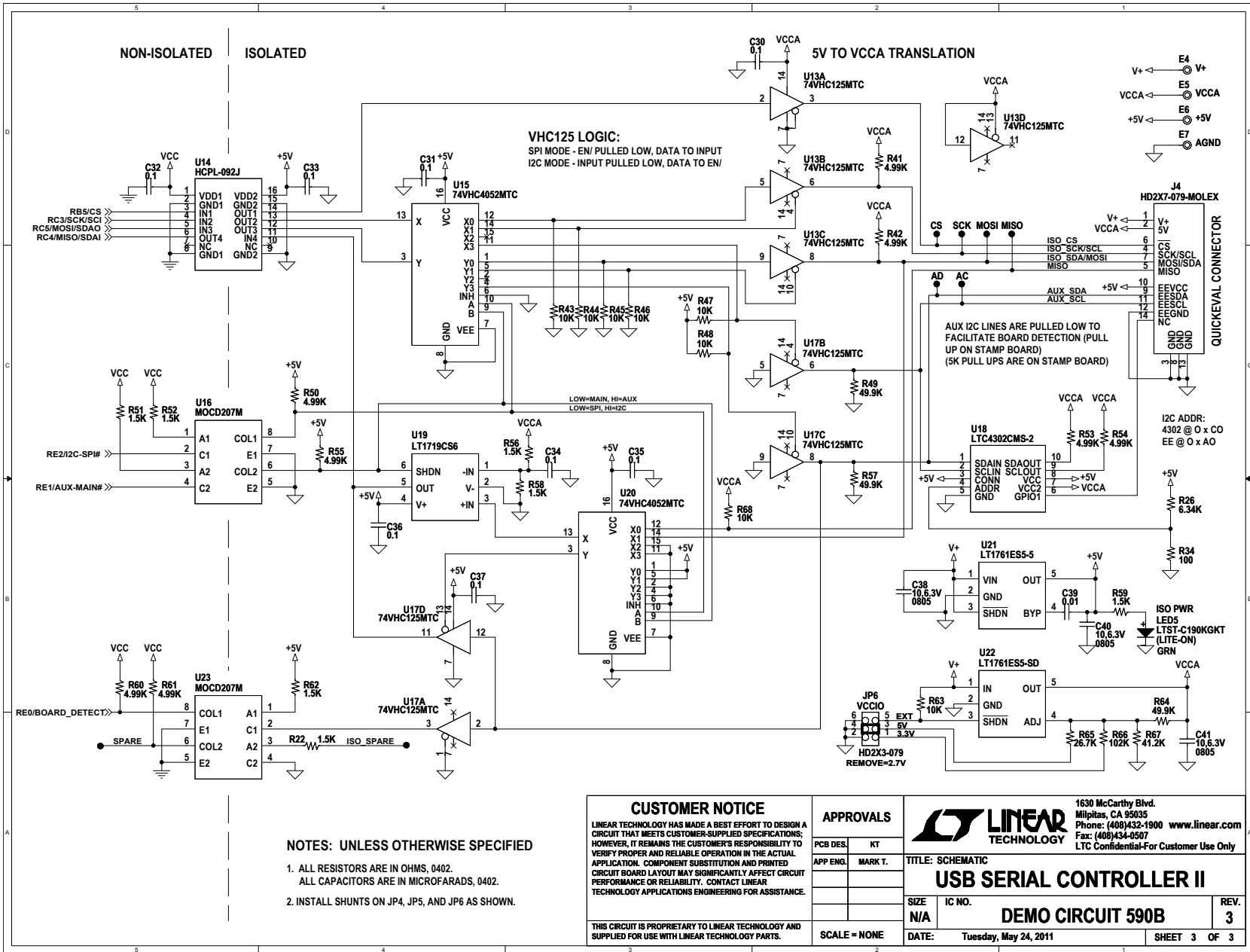


Figure 4. DC590B USB Serial Controller





**NOTES: UNLESS OTHERWISE SPECIFIED**

- ALL RESISTORS ARE IN OHMS, 0402.  
ALL CAPACITORS ARE IN MICROFARADS, 0402.
- INSTALL SHUNTS ON JP4, JP5, AND JP6 AS SHOWN.

<p><b>CUSTOMER NOTICE</b></p> <p>LINEAR TECHNOLOGY HAS MADE A BEST EFFORT TO DESIGN A CIRCUIT THAT MEETS CUSTOMER-SUPPLIED SPECIFICATIONS; HOWEVER, IT REMAINS THE CUSTOMER'S RESPONSIBILITY TO VERIFY PROPER AND RELIABLE OPERATION IN THE ACTUAL APPLICATION. COMPONENT SUBSTITUTION AND PRINTED CIRCUIT BOARD LAYOUT MAY SIGNIFICANTLY AFFECT CIRCUIT PERFORMANCE OR RELIABILITY. CONTACT LINEAR TECHNOLOGY APPLICATIONS ENGINEERING FOR ASSISTANCE.</p>		<p><b>APPROVALS</b></p> <table border="1"> <tr> <td>PCB DES</td> <td>KT</td> </tr> <tr> <td>APP ENG</td> <td>MARK T.</td> </tr> </table>		PCB DES	KT	APP ENG	MARK T.	<p>1630 McCarthy Blvd.              Milpitas, CA 95035              Phone: (408)432-1900 www.linear.com              Fax: (408)434-0507              LTC Confidential-For Customer Use Only</p>	
PCB DES	KT								
APP ENG	MARK T.								
<p>THIS CIRCUIT IS PROPRIETARY TO LINEAR TECHNOLOGY AND SUPPLIED FOR USE WITH LINEAR TECHNOLOGY PARTS.</p>		<p><b>TITLE: SCHEMATIC</b></p> <p><b>USB SERIAL CONTROLLER II</b></p>		<p>SIZE: N/A IC NO.: <b>DEMO CIRCUIT 590B</b> REV. <b>3</b></p>					
<p>SCALE = NONE</p>		<p>DATE: Tuesday, May 24, 2011</p>		<p>SHEET 3 OF 3</p>					

Figure 5. DC590B USB Serial Controller

# DEMO MANUAL DC590B

---

## DEMONSTRATION BOARD IMPORTANT NOTICE

Linear Technology Corporation (LTC) provides the enclosed product(s) under the following **AS IS** conditions:

This demonstration board (DEMO BOARD) kit being sold or provided by Linear Technology is intended for use for **ENGINEERING DEVELOPMENT OR EVALUATION PURPOSES ONLY** and is not provided by LTC for commercial use. As such, the DEMO BOARD herein may not be complete in terms of required design-, marketing-, and/or manufacturing-related protective considerations, including but not limited to product safety measures typically found in finished commercial goods. As a prototype, this product does not fall within the scope of the European Union directive on electromagnetic compatibility and therefore may or may not meet the technical requirements of the directive, or other regulations.

If this evaluation kit does not meet the specifications recited in the DEMO BOARD manual the kit may be returned within 30 days from the date of delivery for a full refund. **THE FOREGOING WARRANTY IS THE EXCLUSIVE WARRANTY MADE BY THE SELLER TO BUYER AND IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED, IMPLIED, OR STATUTORY, INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE, EXCEPT TO THE EXTENT OF THIS INDENMNITY, NEITHER PARTY SHALL BE LIABLE TO THE OTHER FOR ANY INDIRECT, SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES.**

The user assumes all responsibility and liability for proper and safe handling of the goods. Further, the user releases LTC from all claims arising from the handling or use of the goods. Due to the open construction of the product, it is the user's responsibility to take any and all appropriate precautions with regard to electrostatic discharge. Also be aware that the products herein may not be regulatory compliant or agency certified (FCC, UL, CE, etc.).

No license is granted under any patent right or other intellectual property whatsoever. **LTC assumes no liability for applications assistance, customer product design, software performance, or infringement of patents or any other intellectual property rights of any kind.**

LTC currently services a variety of customers for products around the world, and therefore this transaction is **not exclusive**.

**Please read the DEMO BOARD manual prior to handling the product.** Persons handling this product must have electronics training and observe good laboratory practice standards. **Common sense is encouraged.**

This notice contains important safety information about temperatures and voltages. For further safety concerns, please contact a LTC application engineer.

### Mailing Address:

Linear Technology  
1630 McCarthy Blvd.  
Milpitas, CA 95035

Copyright © 2004, Linear Technology Corporation

---

**10** Linear Technology Corporation  
1630 McCarthy Blvd., Milpitas, CA 95035-7417  
(408) 432-1900 • FAX: (408) 434-0507 • [www.linear.com](http://www.linear.com)

LT 0912 - PRINTED IN USA  
 LINEAR TECHNOLOGY CORPORATION 2012

dc590bf