

QUICK START GUIDE FOR DEMONSTRATION CIRCUIT 590

USB SERIAL CONTROLLER FOR LINEAR TECHNOLOGY QUICK EVAL™ DEMO BOARDS

DESCRIPTION

Demonstration circuit 590 is a USB-based digital controller with generic Serial Peripheral Interface (SPI) and Inter Integrated Circuit (I²C™) ports. It is designed to mate with Linear Technology's family of QuickEval™ 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.

This system facilitates quick performance evaluation of a variety of products, including ADCs, DACs, SMBus power control products, and others.

Figure 1 shows a block diagram of DC590. Power and digital signal connections are made via a 14-conductor ribbon cable. In many cases the controller can provide power for the demonstration circuit as well as digital signals. The demonstration circuit connections are fully isolated from the host PC's ground (earth ground.) Four of the fourteen ribbon-cable conductors are referred to earth ground. Thus the isolation barrier is not designed to withstand large potential differences.

QuickEval is a trademark of Linear Technology Corporation; I²C is a trademark of Philips Electronics N.V.; Adobe is a trademark of Adobe Systems, Inc.

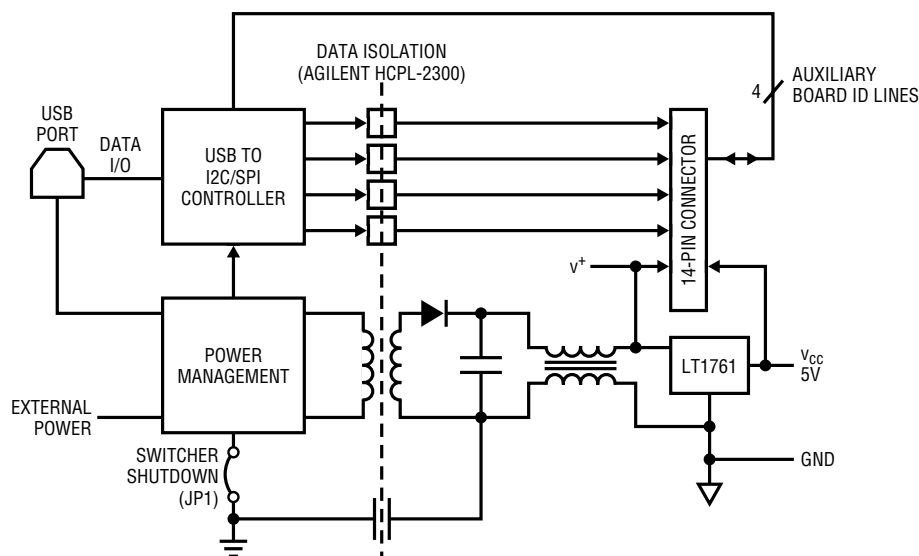


Figure 1. Block Diagram of Demonstration Circuit 590

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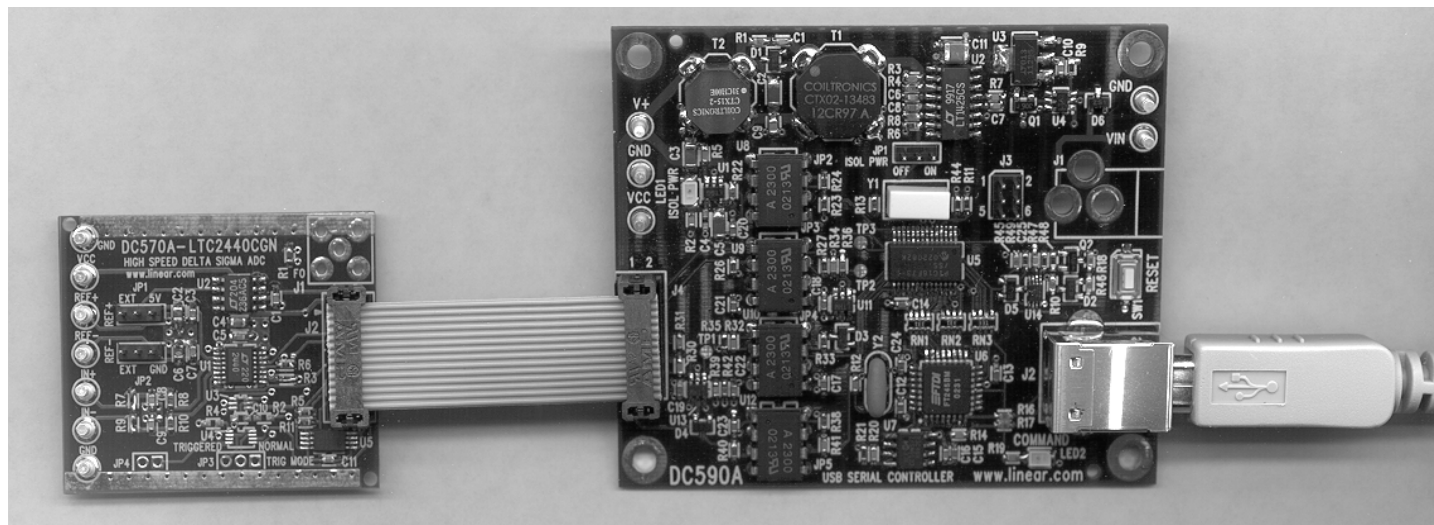


Figure 2. Basic Connection

QUICK START PROCEDURE

For proper equipment setup, follow the procedure below:

1. Do not plug in DC590 before running the installation program.
2. Download the QuickEval installation program from <http://www.linear.com/software/>.
3. Run the QuickEval installation program and follow the on-screen instructions.

NOTE: The QuickEval demo software requires a PC that is running Windows 98 (or later), and has an available USB port.

4. Connect the demonstration circuit to be evaluated to DC590 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.

USEFUL SOFTWARE TOOLS

The QuickEval Demo software includes tools for automatic software updates and for quickly retrieving relevant documentation from the World Wide Web.

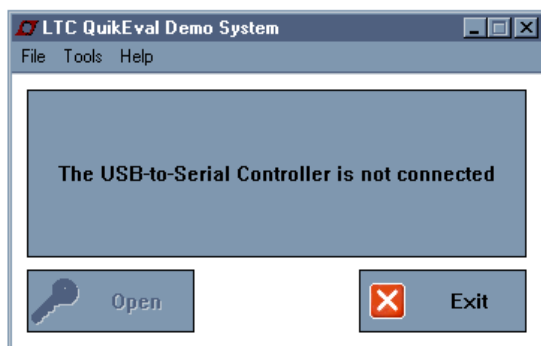
The Download Datasheets feature is particularly useful to laptop users, who can use this feature to download the data sheets and Quick Start guides in one step, thus making them available even when the laptop is not connected to the internet.

NOTE: Adobe Acrobat reader is required to view the documents and is available at <http://www.adobe.com>.

To use the tools:

- ☐ Quit the demonstration circuit software or disconnect the USB cable.

The main control panel appears.



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 Quick Start Guide:

- ☐ Choose Quick Start Guide from the Tools menu.

To retrieve data sheets (requires internet connection):

- ☐ Choose Download Datasheets from the Tools menu.

All datasheets and Quick Start guides for all products in the QuickEval family are downloaded to the QuickEval program folder and placed in the dsheets folder.

OPTIONAL CONNECTIONS TO THE DC590

In most cases DC590 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 DC590 to the demo circuit under evaluation. Figure 2 shows this basic connection.

DC590 offers several other power options, described below.

Isolated supply options

An external power supply is recommended to reduce the load on the host computer's USB port, especially in the event of faults or short circuits.

An LT1425 switching power supply provides isolated power to the demonstration circuit under evaluation and to the isolation circuitry.

The LT1425 switching power supply is enabled by default but may be disabled by moving jumper JP1 (ISOL PWR) to the OFF position. This allows the isolated side

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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.

Figure 3 shows how to connect an external supply to the isolated side of the controller and the board under

evaluation. After disabling the switching supply, apply 7V–9V between the GND and V+ posts. These posts are the in, out, and ground terminals of an LT1761 LDO regulator. The demonstration circuit under evaluation may draw up to 100mA from V_{CC} .

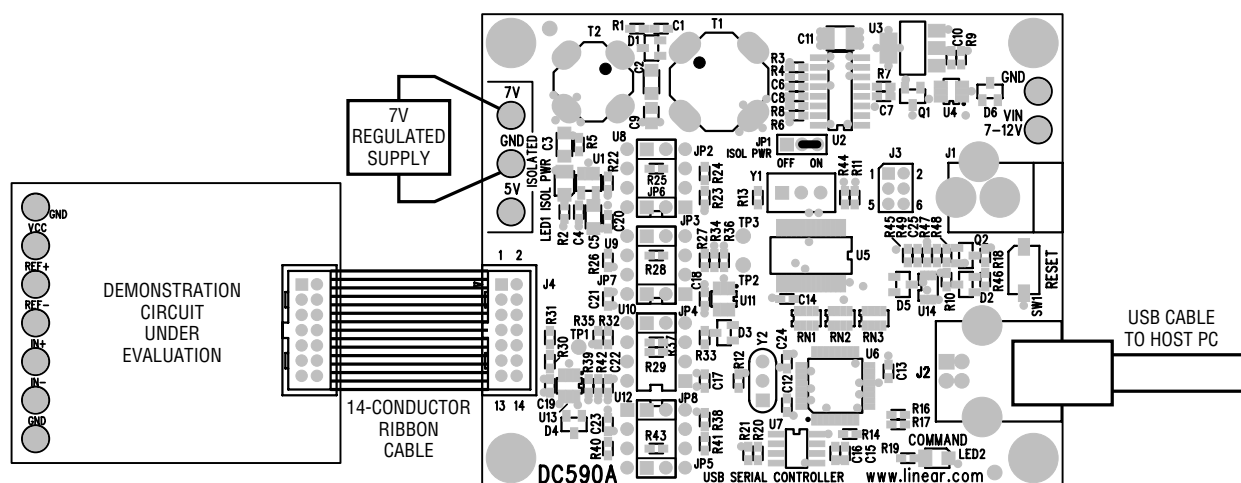


Figure 3. Connecting an external supply to the isolated side of the controller

Another option is to supply power to the isolated side of the controller (see Figure 4) back through the board under evaluation. The LT1761 regulator is reverse-current protected. This allows any convenient 5V $\pm 10\%$ regu-

lated supply to be used. In this case, the isolation circuitry on DC590 is also powered from this source. worst-case current draw by DC590 is 50mA.

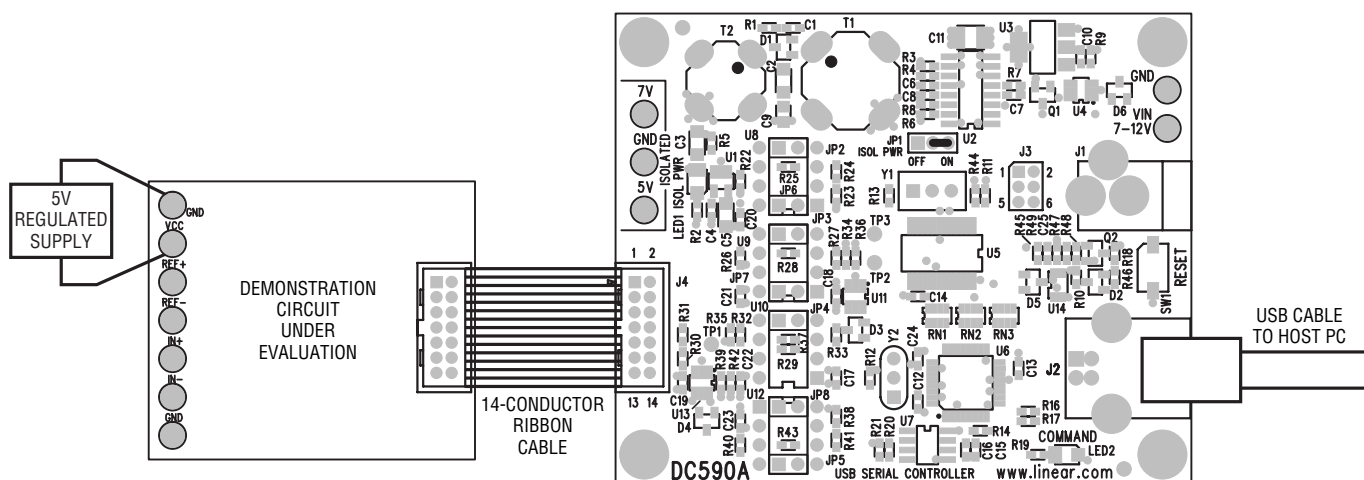


Figure 4. Supplying power to the controller through the board under evaluation

LED INDICATORS

Two LED indicators are provided. The “ISOL 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.

CIRCUIT DETAILS

Schematics for the isolated power supply and optical signal isolation are attached to the end of this Quick Start Guide. Example microcontroller code is device-specific, and may be included in the Quick Start Guide for the demonstration circuit under evaluation.

OPTICAL ISOLATION

The optical isolation scheme based on the Agilent HCPL 2300 high speed opto isolator and is designed to allow bidirectional SPI and I²C communications. Isolation

schemes that are designed for only SPI or I²C will differ slightly. Contact Linear Technology Applications Engineering for more information.

SWITCHING POWER SUPPLY

The onboard switching supply is based on the LT1425 flyback regulator. Feedback is taken from the primary side of T1, eliminating the need for optical feedback. T2 and C9 provide common mode filtering. Refer to the LT1425 data sheet for details of operation.

TROUBLESHOOTING GUIDE

Problem: DC590 is plugged in, but QuickEval screen still says “USB Serial Controller Not Connected”

Solution: The most likely cause is improper installation of the USB drivers, which causes Windows to recognize DC590 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 DC590, Re-install the QuickEval software, and follow the on-screen instructions.

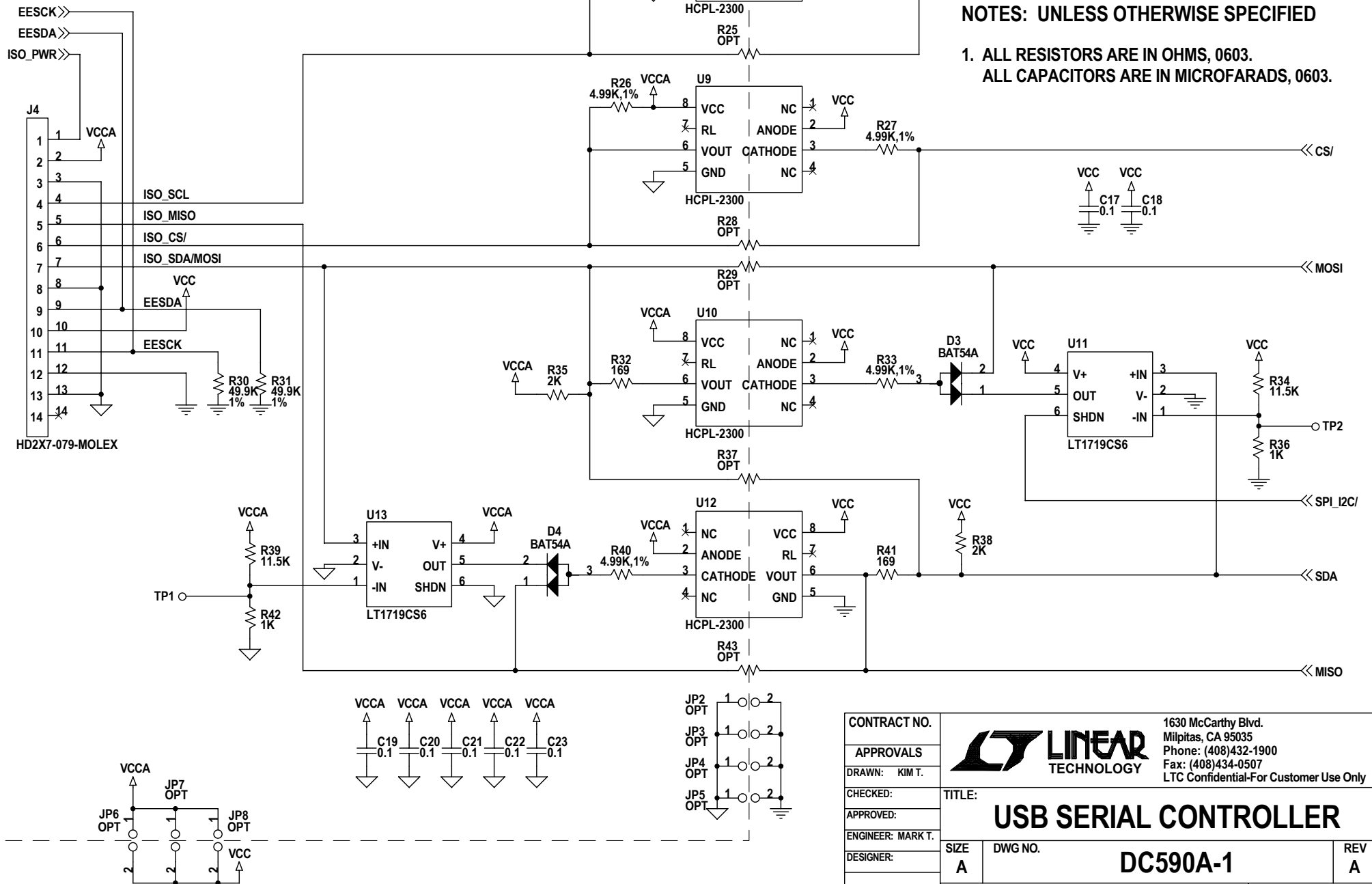
Problem: Demo board software loads properly, but will not run or gives “Device Not accessible” errors.


Solution: Verify that the demo board is properly powered up. This Quick Start Guide lists the basic power connections to DC590. Some demo boards may have additional requirements; refer to the demo board’s Quick Start guide for details.

Problem: After connecting the demo board to DC590 with the supplied 14 pin ribbon cable, QuickEval software still displays “Evaluation Board is not Connected.”

Solution: Contact Linear Technology Applications Engineering.

ISOLATED SECTION



CONTRACT NO.		 LINEAR TECHNOLOGY		1630 McCarthy Blvd. Milpitas, CA 95035 Phone: (408)432-1900 Fax: (408)434-0507 LTC Confidential-For Customer Use Only	
APPROVALS					
DRAWN: KIM T.		TITLE: USB SERIAL CONTROLLER			
CHECKED:					
APPROVED:					
ENGINEER: MARK T.					
DESIGNER:					
SIZE A		DWG NO. DC590A-1		REV A	
DATE: Wednesday, December 18, 2002		SHEET 3 OF 3			

Linear Technology Corporation

USB SERIAL CONTROLLER

ENG: MARK THOREN (25-30)

BILL OF MATERIALS

DC590A-1

QTY-525

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Item	Qty	Reference	Part Description	Manufacture / Part #
1	2	C1,C6	CAP., NPO 220PF 50V 10%	AVX, 06035A221KAT1A
2	2	C2,C5	CAP., X5R 2.2UF 16V 10%	AVX, 1206YC225KAT1A
3	1	C3	CAP., X7R 4.7UF 16V, 20%, 1206	TAIYO YUDEN, EMK316BJ475MLT
4	0	C4	CAP., 0603	OPT
5	2	C7,C25	CAP., X7R 1000PF 100V 10%	AVX, 06035C102KAT1A
6	14	C8,C10,C12-C15,C17-C24	CAP., X7R 0.1UF 16V 10%	AVX, 0603YC104KAT1A
7	1	C9	CAP., X7R 0.1UF 50V 10%	AVX, 08055C104KAT1A
8	1	C11	CAP., X7R 22UF 6.3V, 20%, 1210	TAIYO YUDEN, JMK325BJ226MMT
9	1	C16	CAP., X7R 0.01UF 100V 10%	AVX, 06031C103KAT1A
10	2	D1,D6	DIODE, SCHOTTKY BAT,SOT23	ZETEX, ZHCS1000
11	4	D2,D3,D4,D5	DIODE,SCHOTTKY, SOT23	DIODES INC., BAT54A-7
12	5	E1,E2,E3,E4,E5	TESTPOINT, TURRET, 0.064"	MILL-MAX, 2308-2
13	1	JP1	JMP, 3PIN 1 ROW .079CC	COMM-CON, 2802S-03-G1
14	1	SHUNTS FOR JP1	SHUNT, .079" CENTER	COMM-CON CCIJ2MM-138G
15	0	JP2-JP8	JMP, 2PIN 1 ROW .100CC	COMM-CON, 3801S-02-G1
16	1	J1	CONN, DC PWR JACK,2.00mm	CUI-STACK, PJ-002A
17	1	J2	CON, USB-B, 4 PINS, SINGLE THR. HOLE	MILL-MAX, 897-30-004-90-000
18	1	J3	HEADER, 2X3PIN, 0.079CC	COMM CON, 2202S-06G2
19	1	J4	HEADER, 2X7PIN, 0.079CC	MOLEX, 87331-1420
20	2	LED1,LED2	LED, GREEN, 1206	PANASONIC, LN1351C-(TR)
21	1	Q1	MOSFET, P-CH, SOT3	FAIRCHILD SEMI., FDN306P
22	1	Q2	TRANS, NPN, MMBT3904, SOT23	DIODES, MMBT3904
23	3	RN1,RN2,RN3	RES, 2X4 ARRAY, 330 OHM, CONVEX-SQ	AAC, CRN16-4V-331JCM
24	2	R1,R4	RES., Chip 75 1/16W 5%,0603	AAC, CR16-750JM
25	3	R2,R14,R19	RES., Chip 1.5K 1/16W 5%,0603	AAC, CR16-152JM
26	1	R3	RES., Chip 17.8K 1/16W 1%,0603	AAC, CR16-1782FM
27	2	R5,R18	RES., Chip 100K 1/16W 1%,0603	AAC, CR16-1003FM
28	1	R6	RES., Chip 20K 1/16W 5%,0603	AAC, CR16-203JM
29	1	R7	RES., Chip 3.01K 1/16W 1%,0603	AAC, CR16-3011FM
30	1	R8	RES., Chip 15K 1/16W 1%,0603	AAC, CR16-1502FM
31	7	R9,R11,R21,R44,R47,R48,R49	RES., Chip 10K 1/16W 1% ,0603	AAC, CR16-1002FM
32	5	R10,R36,R42,R45,R46	RES., Chip 1K 1/16W 5%,0603	AAC, CR16-102JM
33	1	R12	RES., Chip 470 1/16W 5%,0603	AAC, CR16-471JM
34	4	R13,R22,R35,R38	RES., Chip 2K 1/16W 5%,0603	AAC, CR16-202JM
35	2	R16,R17	RES., Chip 10 1/16W 5%,0603	AAC, CR16-100JM
36	1	R20	RES., Chip 2.2K 1/16W 5%,0603	AAC, CR16-222JM
37	6	R23,R24,R26,R27,R33,R40	RES., Chip 4.99K 1/16W 1%,0603	AAC, CR16-4992FM

Linear Technology Corporation

USB SERIAL CONTROLLER

ENG: MARK THOREN (25-30)

BILL OF MATERIALS

DC590A-1

QTY-525

11/9/2004 11:18 AM

Item	Qty	Reference	Part Description	Manufacture / Part #
38	0	R25,R28,R29,R37,R43	RES., 0603	OPT
39	2	R30,R31	RES., Chip 49.9K 1/16W 1%,0603	AAC, CR16-4992FM
40	2	R32,R41	RES., Chip 169 1/16W 1%,0603	AAC, CR16-1690FM
41	2	R34,R39	RES., Chip 11.5K 1/16W 1%,0603	AAC, CR16-1152FM
42	1	SW1	SWITCH, LIGHT TOUCH, 2 PINS	PANASONIC, EVQPPDA25
43	0	TP1,TP2,TP3	TP, .070" SMT	OPT
44	1	T1	TRANSFORMER, OCTA-PAC	COILTRONICS, CTX02-13483
45	1	T2	TRANSFORMER, OCTA-PAC	COINTRONICS, CTX8-1
46	1	U1	I.C., LT1761ES5-5, SOT23-5	LINEAR TECH., LT1761ES5-5
47	1	U2	I.C., LT1425CS, SO16	LINEAR TECH., LT1425CS
48	1	U3	I.C., LT1129CST-5, SOT223	LINEAR TECH., LT1129CST-5
49	1	U4	I.C., LTC4412ES6, SOT23-6	LINEAR TECH., LTC4412ES6
50	1	U5	I.C., PIC16F76, SSOP28G	MICROCHIP, PIC16F76
51	1	U6	I.C., FT245BM, LQFP32	FUTURE TECH., FT245BM
52	1	U7	I.C., 93C46BSM, SO8	MICROCHIP, 93C46BSM
53	4	U8,U9,U10,U12	I.C., HCPL-2300, DIP8	AGILENT TECH., HCPL-2300
54	2	U11,U13	I.C., LT1719CS6, SOT23-6	LINEAR TECH., LT1719CS6
55	1	U14	I.C., NL17SZ74US, US8	ON SEMI., NL17SZ74US
56	1	Y1	RESONATOR, 10MHz, Y-PANA-EFOMC	PANASONICS, EFOMC1005T4
57	1	Y2	RESONATOR, 6MHz, CSTLS6M00G	MURATA, CSTLS6M00G
		NOTES: UNLESS OTHERWISE SPECIFIED		
		1. ALL RESISTORS ARE IN OHMS.		
		2. INSTALL SHUNT ON JP1 PIN 2 AND 3.		