LT3745
16-Channel LED Driver

DESCRIPTION

Demonstration circuit 1608A features the LT®3745, 16-channel 50mA LED driver with buck controller and serial interface. Each channel has an individually adjustable 12-bit (4096-step) grayscale PWM dimming control and a 6-bit (64-step) dot correction current adjustment. Both dimming control and current adjustment are accessible via a 30MHz cascadable serial data interface. Individual open/short LED and overtemperature flags are sent back during status read back.

Three LT3745's are connected in series to control 16 RGB LEDs stuffed on the demo board. Each IC drives a separate color. The evaluation software installed in a host computer communicates with the DC1608A via the interface board DC590B, an USB serial controller.

The LT3745 data sheet gives a complete description of the part, its operation and application information. The datasheet must be read in conjunction with this quick start guide for working on or modifying the demo circuit 1608A.

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

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PERFORMANCE SUMMARY

Specifications are at T_A = 25°C.

SYMBOL	PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
V_{IN}	Input Supply Range		9		40	V
V_{OUT-R}	Precharge Voltage (Red)			3.4		V
V_{OUT-G}	Precharge Voltage (Green)			4.2		V
V_{OUT-B}	Precharge Voltage (Blue)			4.2		V
f_S	Free-Running Switching Frequency			400		kHz

QUICK START PROCEDURE

Demonstration circuit 1608A is easy to set up to evaluate the performance of the LT3745. Refer to Figure 1 for proper measurement equipment setup and follow the procedure below:

1. Install the QuikEval™ System software on the host computer. The software can be downloaded from http://www.linear.com/designtools/software/quick_eval.jsp
2. Install Microsoft .NET framework. The software can be downloaded from http://www.microsoft.com/NET/
3. Copy LT3745Release folder to the host computer. Run vcredist_x86.exe. You may need to restart the computer.
4. Place jumpers in the following positions:

   JP1 On

   JP2 TO PWMCK
5. Connect the demo board to DC590B as shown in Figure 1.
6. With power off, connect the input power supply to V_{IN} and GND.
7. Apply 9V to 40V to DC1608A input.
8. Run LTcolorLEDarray.exe in the LT3745Release folder.
9. The initial start-up screen appears, at this point, none of the LEDs should light up. Proceed with board evaluation.

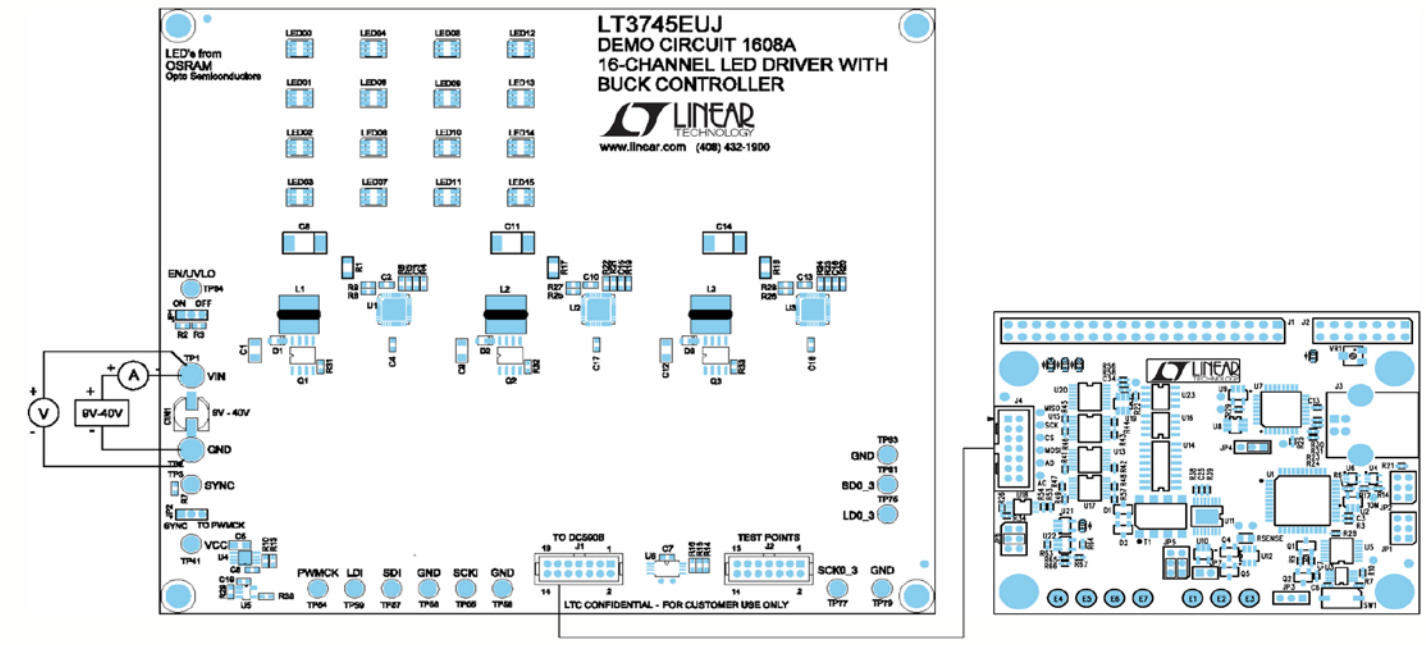


Figure 1. Proper Measurement Equipment Setup

OPERATING THE CONTROL SCREEN

Figure 2 is the initial start-up screen that appears when the program is launched.

1. Send Data Frame to Chip.

   Double-click one of the black squares in the "LED Colors" grid. The standard color selector dialog box appears. Select a color and click "OK." Or select the LED number in the "LED Configuration" grid, adjust the LED color by moving the sliding bars.

   Click the command button labeled "Send Data Frame to Chip." Verify that the LEDs light up in corresponding colors.

2. Play Pattern File.

   Click the "Browse" button and pick the file "test". Click the command button labeled "Play Pattern File." Verify that all 16 RGB LEDs light up in red, green, blue and white in sequence.

   Check the "Auto-Update Data/Loop File" option. Click the command button labeled "Play Pattern File." Click the "stop" button at any time to stop.

3. Append Data Frame to Pattern File.

   Create a blank text file. Click the "Browse" button and pick this new file. Create and then add the first data frame to the file by clicking the "Append Data Frame to Pattern File" button. Create the second data frame and add it to the file by clicking the "Append" button. Repeat until all the data frames are added to the file. Click the command button labeled "Play Pattern File."

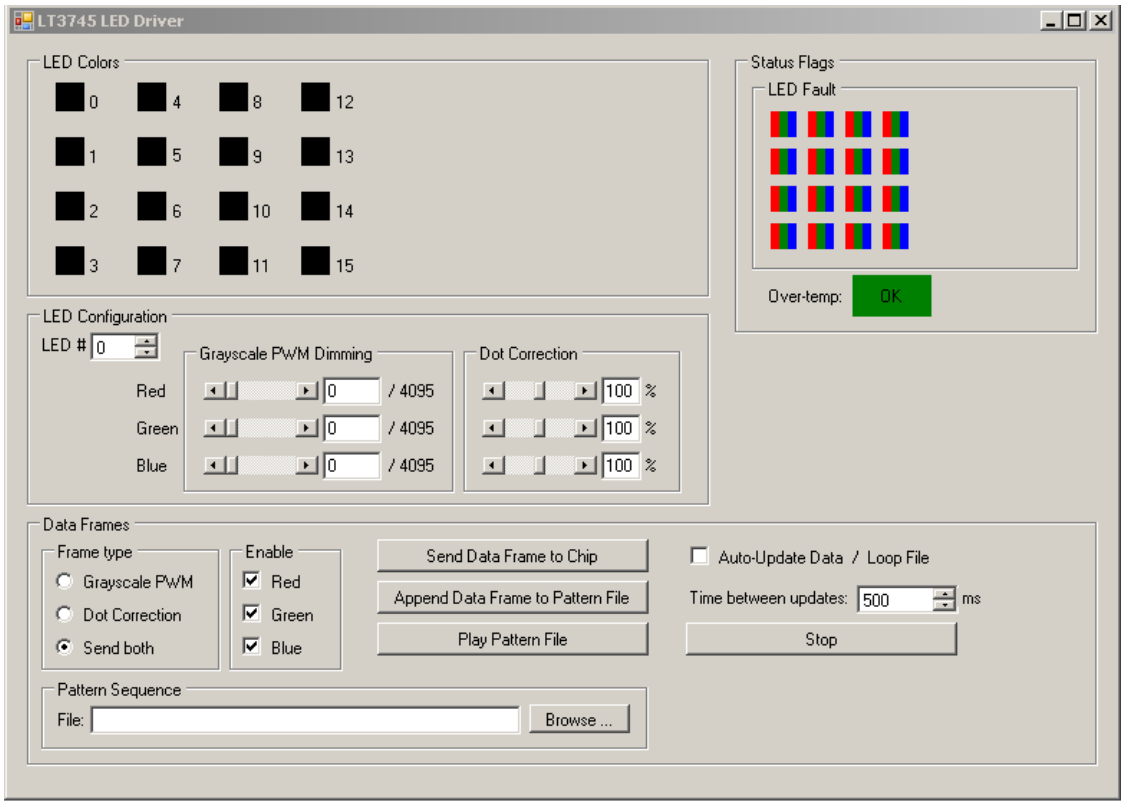
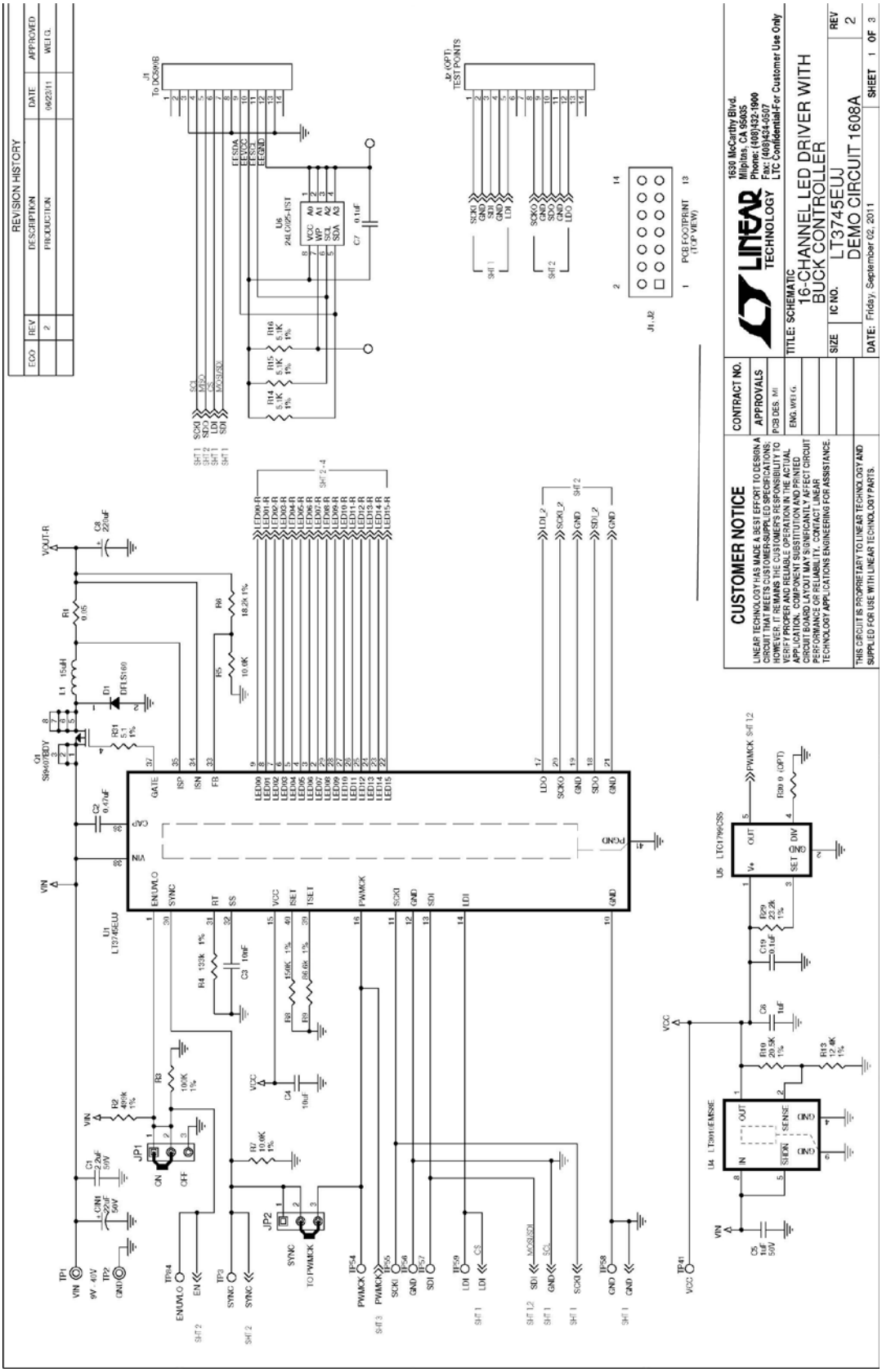


Figure 2. GUI Control Panel Start-Up Screen

PARTS LIST

ITEM	QUANTITY	REFERENCE-DESCRIPTION	DESCRIPTION	MANUFACTURER'S PART NUMBER
Required Circuit Components				
1	3	C1, C9, C12	Capacitor, 1206, 2.2µF, 10%, 50V, X5R	Murata GRM31CR71H225KA88L
2	3	C2, C10, C13	Capacitor, 0603, 0.47µF, 10%, 16V, X7R	TDK C1608X7R1C474KT
3	3	C3, C15, C16	Capacitor, 0603, 10nF, 10%, 50V, X7R	AVX 06035C103KAT2A
4	3	C4, C17, C18	Capacitor, 0603, 10µF, 10%, 6.3V, X5R	Murata GRM188R60J106ME47D
5	1	C5	Capacitor, 0805 1µF, 10%, 50V, X7R	Murata GRM21BR71H105KA12L
6	1	C6	Capacitor, 0603, 1µF, 10%, 16V, X7R	TDK C1608X7R1C105K
7	2	C7, C19	Capacitor, 0603, 0.1µF, 10%, 50V, X7R	TDK C1608X7R1H104K
8	3	C8, C11, C14	Capacitor, 7343 220µF, 20%, 6.3V, POSCAP	SANYO POSCAP 6TPE220ML
9	3	D1, D2, D3	Diode, Rectifier, Barrier, Schottky, 1A	Diodes Inc. DFLS160
10	16	LED00-LED15	LED, Top, 6-Lead	OSRAM LRTB-G6TG
11	3	L1, L2, L3	Inductor, 15µH	Würth 744778115
12	3	Q1, Q2, Q3	XSTR, P-channel MOSFET	Vishay Si9407BDY
13	3	R1, R17, R18	Resistor, 1206, 0.05Ω, 1%, 1/8W	SUSUMU RL32R-R050-F
14	1	R2	Resistor, 0603, 499k, 1%, 1/10W	Vishay CRCW0603499KFKEA
15	1	R3	Resistor, 0603, 100k, 1%, 1/10W	Vishay CRCW0603100KFKEA
16	3	R4, R19, R20	Resistor, 0603, 133k, 1%, 1/10W	Vishay CRCW0603133KFKEA
17	4	R5, R7, R21, R23	Resistor, 0603, 10k, 1%, 1/10W	Vishay CRCW060310K0FKED
18	1	R6	Resistor, 0603, 18.2k, 1%, 1/10W	Vishay CRCW060318K2FKEA
19	3	R8, R25, R26	Resistor, 0603, 150k, 1%, 1/10W	Vishay CRCW0603150KFKEA
10	3	R9, R27, R28	Resistor, 0603, 86.6k, 1%, 1/10W	Vishay CRCW060386K6FKEA
21	1	R10	Resistor, 0603, 20.5k, 1%, 1/10W	Vishay CRCW060320K5FKED
22	1	R13	Resistor, 0603, 12.4k, 1%, 1/10W	Vishay CRCW060312K4FKED
23	3	R14, R15, R16	Resistor, 0603, 5.1k, 1%, 1/10W	Vishay CRCW06035K10FKED
24	2	R22, R24	Resistor, 0603, 24.9k, 1%, 1/10W	Vishay CRCW060324K9FKED
25	1	R29	Resistor, 0603, 23.2k, 1%,, 1/10W	Vishay CRCW060323K2FKED
26	3	R31, R32, R33	Resistor, 0603, 5.1Ω, 1%, 1/10W	Vishay CRCW06035R10FNEA
27	3	U1, U2, U3	IC, 16-Channel LED Driver	Linear Technology LT3745EUJ
28	1	U4	IC, LT3010EMS8E	Linear Technology LT3010EMS8E
29	1	U5	IC, LTC1799CS5	Linear Technology LTC1799CS5
30	1	U6	IC, 24LC025-I/ST	Microchip Tech. 24LC025-I/ST
Additional Demo Board Circuit Components				
1	1	CIN1	Capacitor, 22µF, 20%, 50V	Sun Elect. 50CE22BS
2	0	R30	Resistor, 0603, 0Ω, Jumper Option	Vishay CRCW06030000Z0ED Option
Hardware				
1	2	JP1, JP2	Header, 3-Pin, 2mm	Samtec TMM-103-02-L-S
2	1	J1	Header, 2×7 2mm	Molex 87831-1420
3	0	J2	Header, 2×7 2mm Option	Molex 87831-1420 Option
4	2	TP1, TP2	Turrets	Mill-Max 2501-2-00-80-00-00-07-0
5	14	TP3, TP41, TP54-TP59, TP75, TP77, TP79, TP81, TP83, TP84	Turrets	Mill-Max 2308-2-00-80-00-00-07-0
6	2	JP1, JP2	Shunt, 2mm	Samtec 2SN-BK-G
7	4		Standoff, Snap-On	Keystone 8831

SCHEMATIC DIAGRAMS



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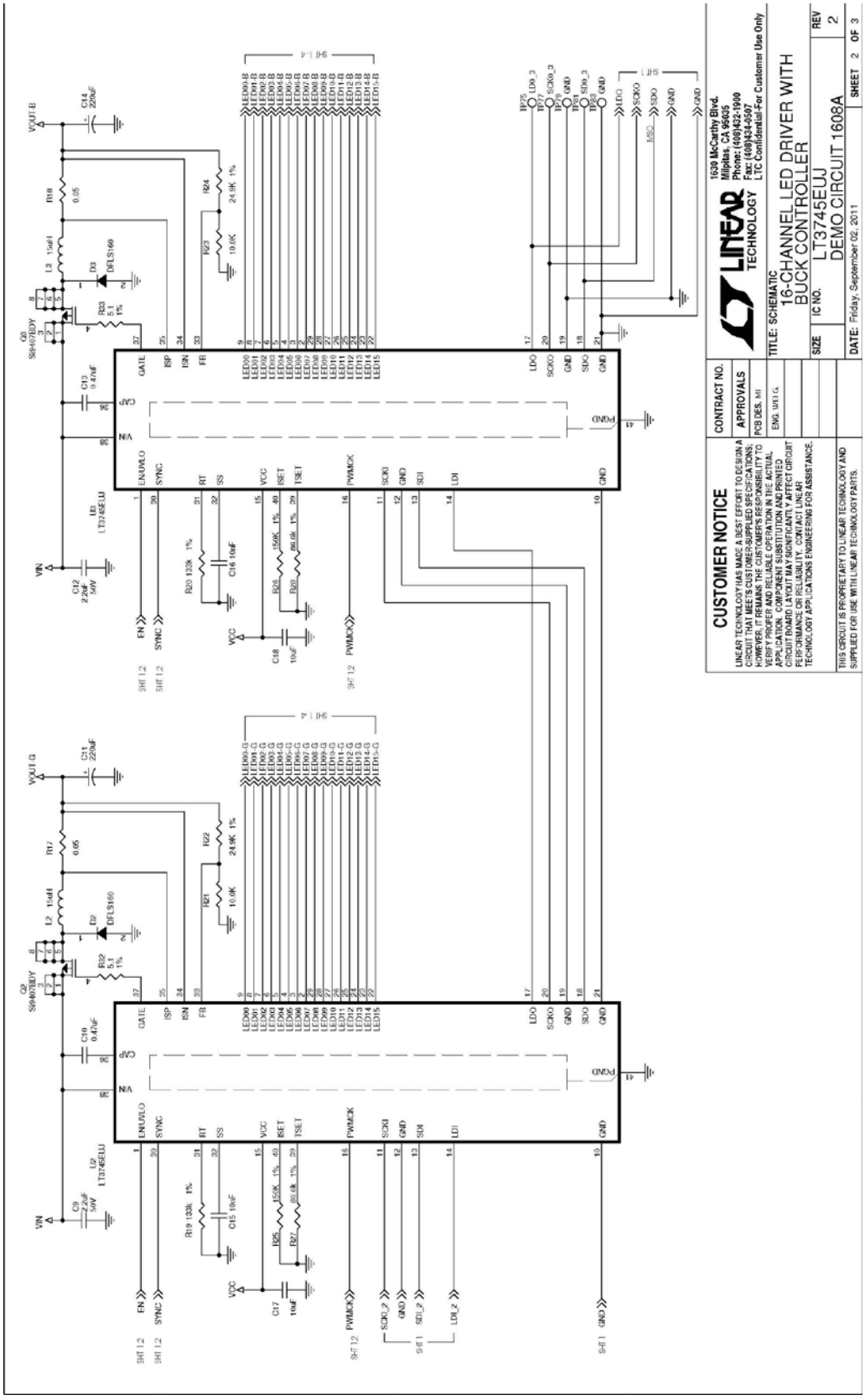

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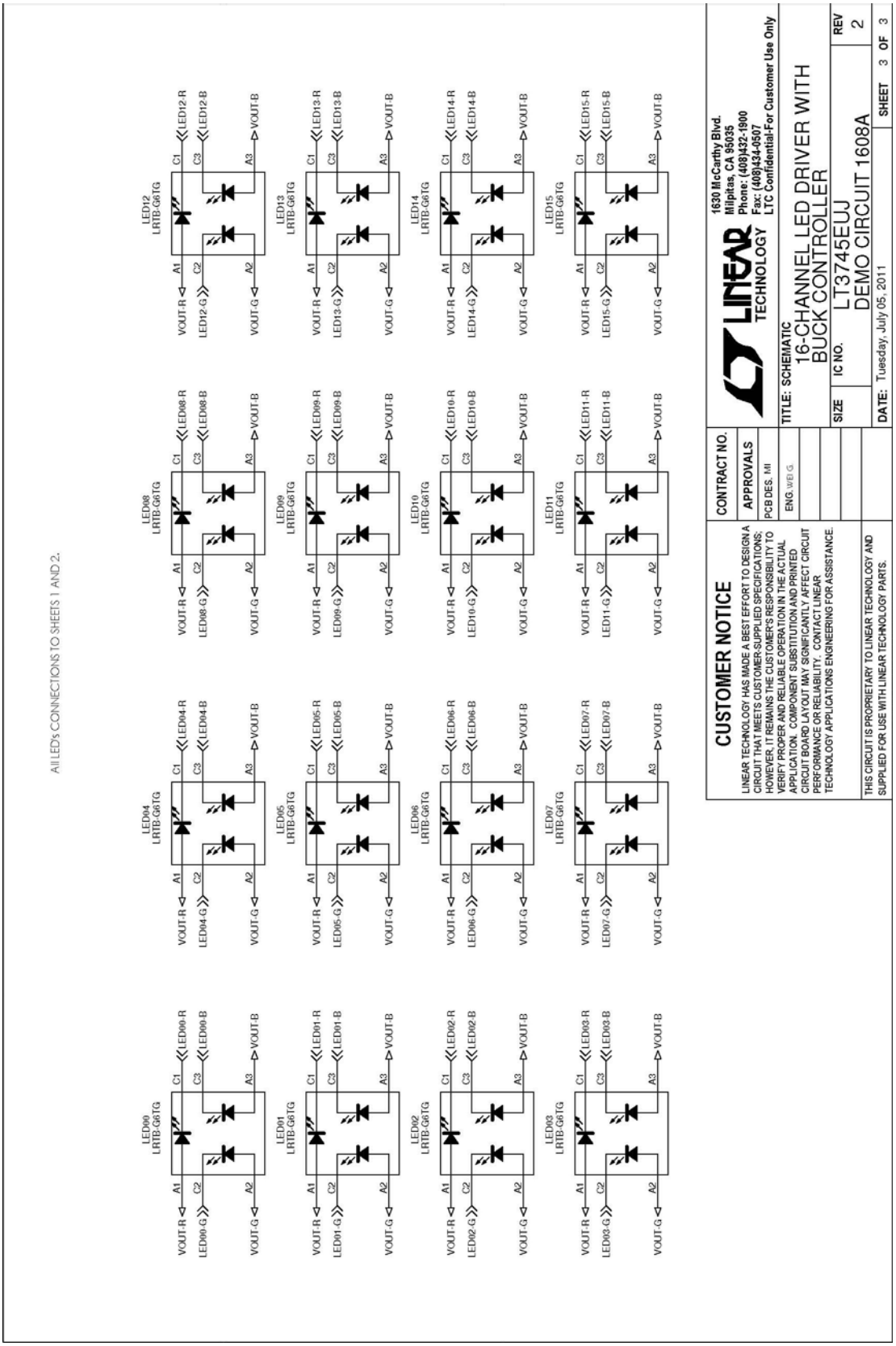

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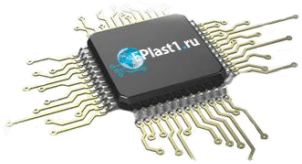

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