LT3746
32-Channel LED Driver

DESCRIPTION

Demonstration circuit 1406A features the LT®3746, 32-channel 20mA 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 LT3746's are connected in series to control 32 RGB LEDs stuffed on the demo board. Each IC drives a separate color. The evaluation software installed in a host computer communicates with the DC1406A via the interface board DC590B, an USB serial controller.

The LT3746 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 1406A.

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

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}	Pre-Charge Voltage (Red)			3.0		V
V_{OUT-G}	Pre-Charge Voltage (Green)			4.2		V
V_{OUT-B}	Pre-Charge Voltage (Blue)			4.2		V
f_S	Free-Running Switching Frequency			400		kHz

QUICK START PROCEDURE

Demonstration circuit 1406A is easy to set up to evaluate the performance of the LT3746. 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 LEDRelease 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 DC1406A input.
8. Run LTcolorLEDarray.exe in the LEDRelease folder.
9. The initial start-up screen appears, at this point, none of the LEDs should light up. Proceed with board evaluation.

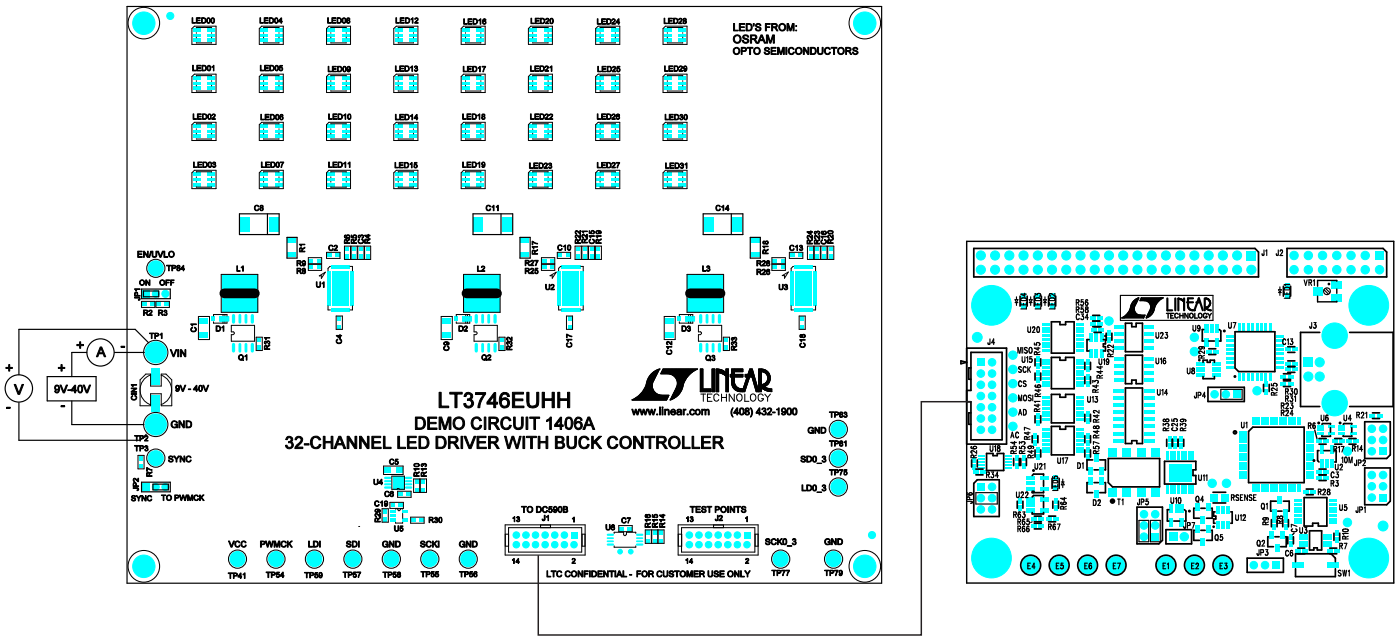


Figure 1. Proper Measurement Equipment Setup

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 32 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."

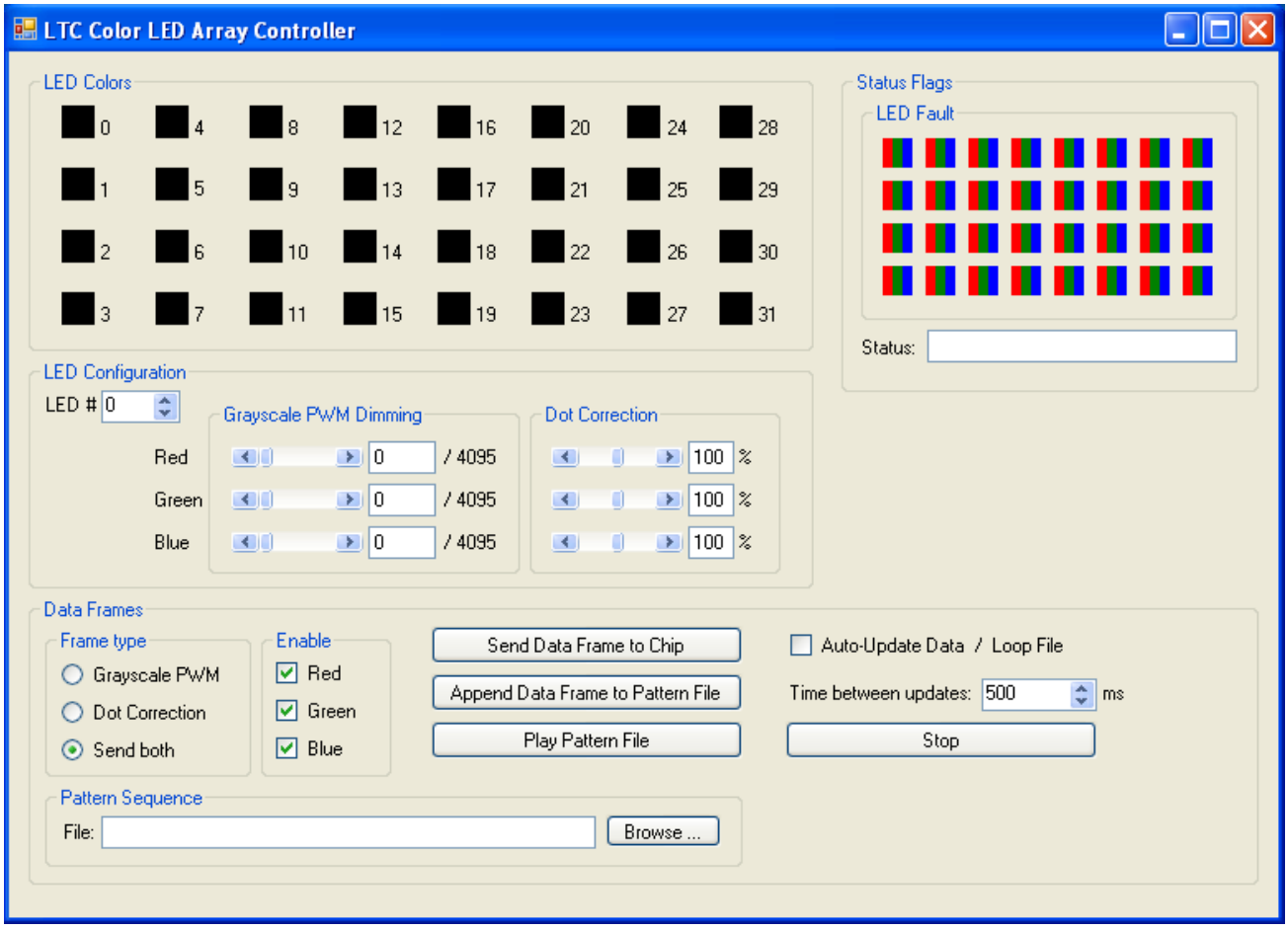
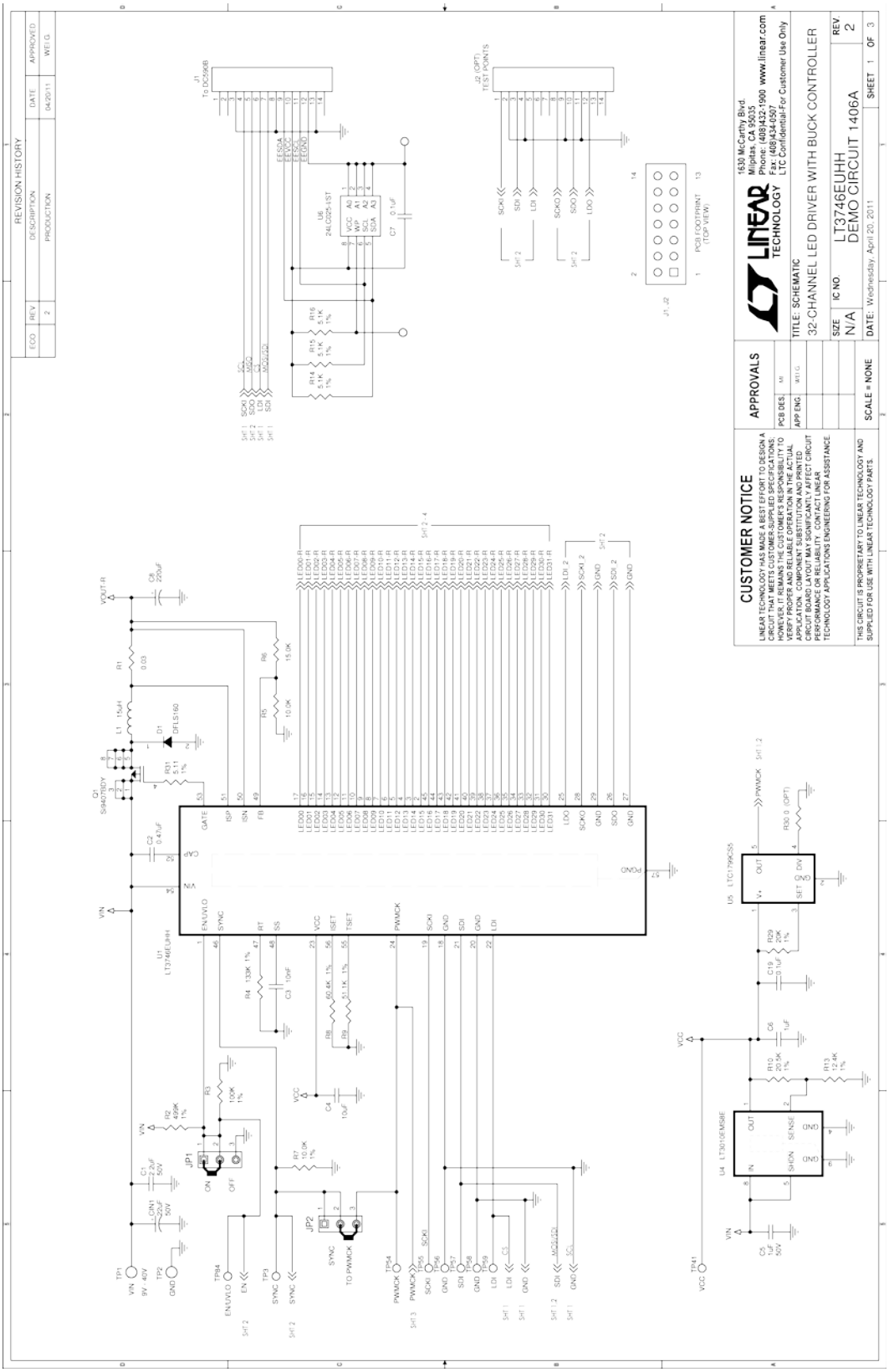


Figure 2. GUI Control Panel Start-Up Screen

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 1.0A	Diodes Inc. DFLS160
10	32	LED00-LED31	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 0.03Ω 1% 1/8W	IRC LR1206LF-01-R030-F
14	1	R2	Resistor, 0603 499kΩ 1% 1/10W	Vishay CRCW0603499KFKEA
15	1	R3	Resistor, 0603 100kΩ 1% 1/10W	NIC NRC06F1003TRF
16	3	R4, R19, R20	Resistor, 0603 133kΩ 1% 1/10W	Vishay CRCW0603133KFKEA
17	4	R5, R7, R21, R23	Resistor, 0603 10.0kΩ 1% 1/10W	Vishay CRCW060310K0FKED
18	1	R6	Resistor, 0603 15.0kΩ 1% 1/10W	YAGEO RC0603FR-0715KL
19	3	R8, R25, R26	Resistor, 0603 60.4kΩ 1% 1/10W	Vishay CRCW060360K4FKEA
10	3	R9, R27, R28	Resistor, 0603 51.1kΩ 1% 1/10W	NIC NRC06F5112TRF
21	1	R10	Resistor, 0603 20.5kΩ 1% 1/10W	Vishay CRCW060320K5FKED
22	1	R13	Resistor, 0603 12.4kΩ 1% 1/10W	Vishay CRCW060312K4FKED
23	3	R14, R15, R16	Resistor, 0603 5.1kΩ 1% 1/10W	Vishay CRCW06035K10FKED
24	2	R22, R24	Resistor, 0603 24.9kΩ 1% 1/10W	NIC NRC06F2492TRF
25	1	R29	Resistor, 0603 20kΩ 1% 1/10W	Vishay CRCW060320K0FKEA
26	3	R31, R32, R33	Resistor, 0603 5.11Ω 1% 1/10W	AAC CR16-R11FM
27	3	U1, U2, U3	IC, LT3746EUHH	Linear Technology LT3746EUHH
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	Sanyo 50CE22BS
2	0	R30	Resistor, 0603 0Ω Jumper Option	Vishay CRCW06030000Z0ED Option
Hardware				
1	2	TP1, TP2	Turrets	Mill-Max 2501-2-00-80-00-00-07-0
2	14	TP3, TP41, TP54-TP59, TP75, TP77, TP79, TP81, TP83, TP84	Turrets	Mill-Max 2308-2-00-80-00-00-07-0
3	2	JP1, JP2	Header, 3-Pin, 2mm	Samtec TMM-103-02-L-S
4	1	J1	Header, 2×7 2mm	MOLEX 87831-1420
5	0	J2	Header, 2×7 2mm Option	MOLEX 87831-1420 Option
6	2	JP1, JP2	Shunt, 2mm	Samtec 2SN-BK-G
7	4		Standoff, Snap-On	Keystone_8831

SCHEMATIC DIAGRAMS



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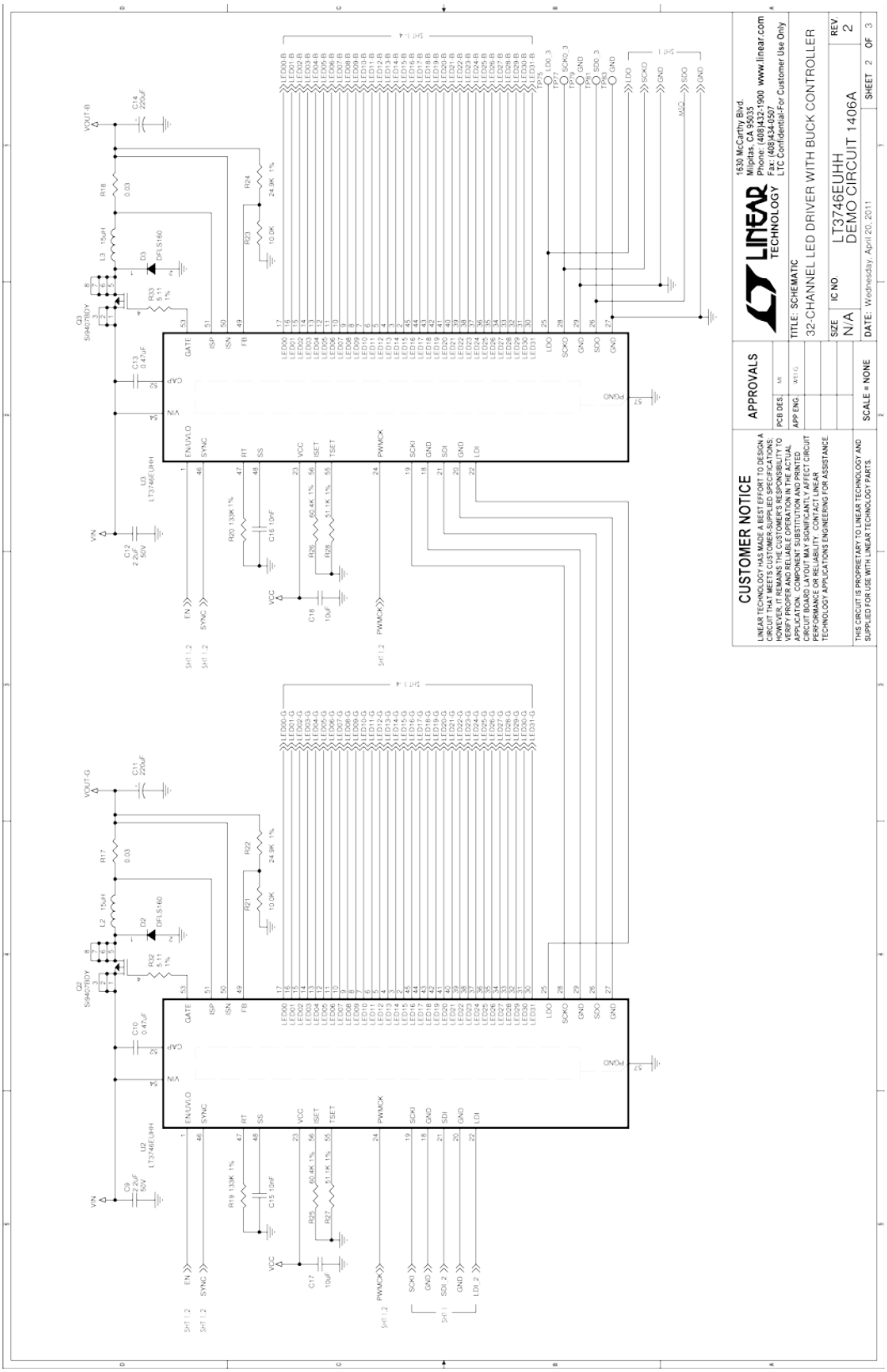

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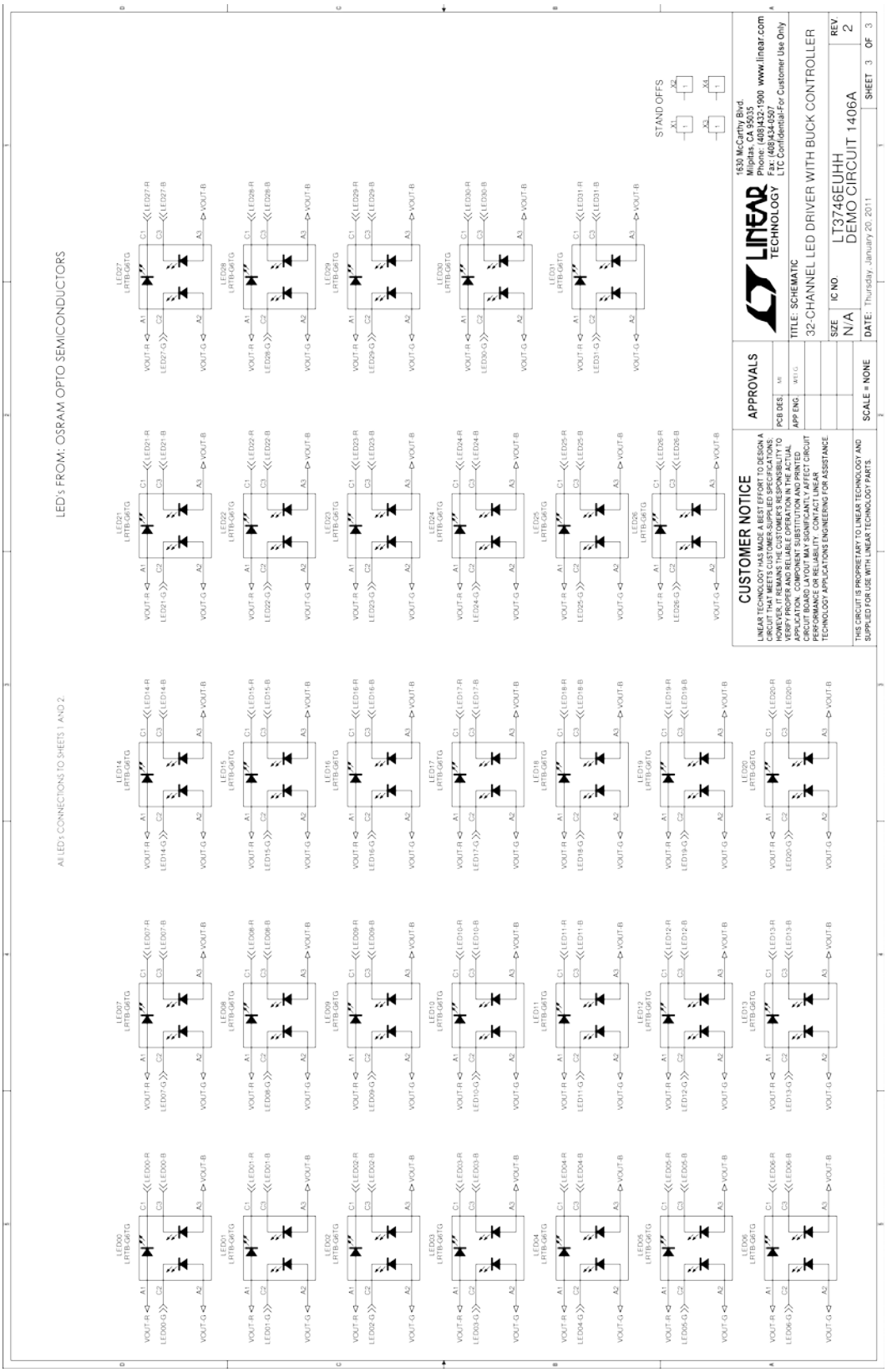

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