ISL59605IRZ-EVALZ Evaluation Board Operation

Description

The ISL59605IRZ-EVALZ board is designed to allow evaluation of the ISL5960x ("MegaQ™") family of parts, as well as provide the reference schematic and PCB layout of a typical MegaQ™ application.

Power Connections

The power connectors are at the middle of the top of the evaluation board. The board requires a 5V power supply capable of supplying at least 110mA. Because of the high amount of high-frequency gain required to equalize long cables, excessive noise on the power supply may introduce noise on the output signal or cause difficulty locking at longer distances. Power supplies with linear regulators are preferable to switching regulators, however, switching supplies may work acceptably well if they are adequately filtered.

Input Connections

Unshielded twisted pair (UTP) signals arrive via the RJ-45 Cat 5 connector on the left. The input signal can arrive on any arbitrary combination of pins, though it would typically be one of the standard Cat x pairs of 1 and 2, 3 and 6, 4 and 5, or 7 and 8. The 3x8 jumper block to the right of the RJ-45 jack is used to assign which Cat x pin goes to the positive MegaQ™ input (in the photo, it's pin 8), and which goes to the negative input (pin 7). The "Termination" switch to the lower right of the jumper block

should be switched to "CAT5" (it's set to "COAX" in the photo). Do not attach a coax cable while trying to receive a signal over Cat x.

Coax signals are connected through the "COAX IN" BNC connector on the upper left. When using coax signals, set the "Termination" switch to "COAX" and ensure that no Cat x cables are attached to the RJ45 connector.

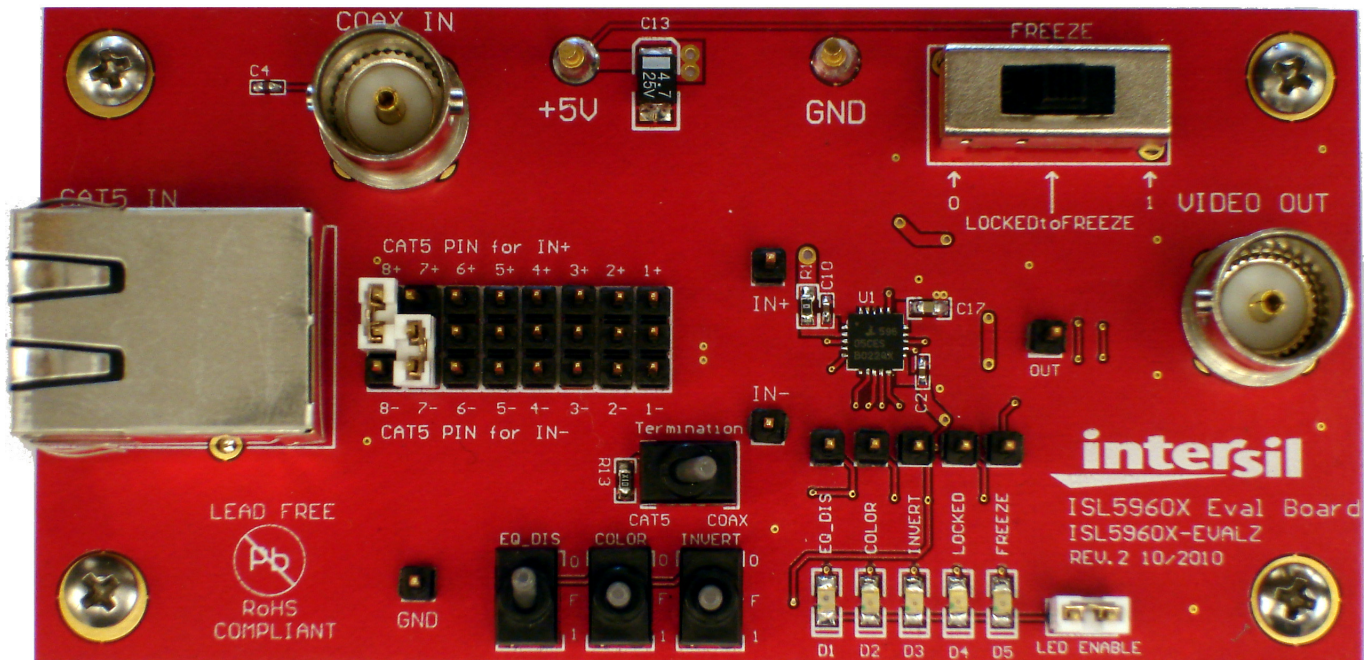The IN+ and IN- test points near U1 can be used to view the input signals at the input to the MegaQ™ chip.

Output Connections

Standard 75Ω composite video is available at the "VIDEO OUT" BNC connector on the right, as well as the "OUT" test pin between U1 and the BNC output.

Switch Settings

There are several switches on the evaluation board that can be used to put MegaQ™ in its different operational modes:

- "EQ DIS" (EQ Enable): This can be used to disable the EQ so that an external source can drive a signal over the cable. This switch should be set to 0 for normal operation (switch in "up" position). Note: The switch used may have a middle "open" position, but it should always be set low or high.

- COLOR: The Color signal can be an input or an output (see datasheet for more information). The default position for automatic color detection is the middle position ("F" for floating, not 0 or 1).

CAUTION: These devices are sensitive to electrostatic discharge; follow proper IC Handling Procedures.
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- INVERT: The Invert signal can be an input or an output (see datasheet for more info). The default position for automatic inversion detection and correction is the middle position ("F" for floating - not 0 or 1).

- FREEZE: The "FREEZE" switch determines the operational mode. The recommended mode is "Lock Until Reset", which is the middle ("LOCKEDtoFREEZE") position. Slide the switch left to the "0" position to put the part in Automatic Update mode. The "1" position freezes the equalizer in its current state. See the datasheet for more detailed information on the locking modes.

LEDs

There are 5 LEDs at the bottom right of the board that indicate the current state of the EQ_DIS, COLOR, INVERT, LOCKED, and FREEZE signals, as well as test pins for that signal directly above. The LEDs are only enabled when the LED ENABLE jumper is in place. When the LEDs are illuminated, they will draw additional supply current from the 5V supply. To accurately measure the supply current of the ISL5960x without any LED current, remove the jumper to turn off all the LEDs.
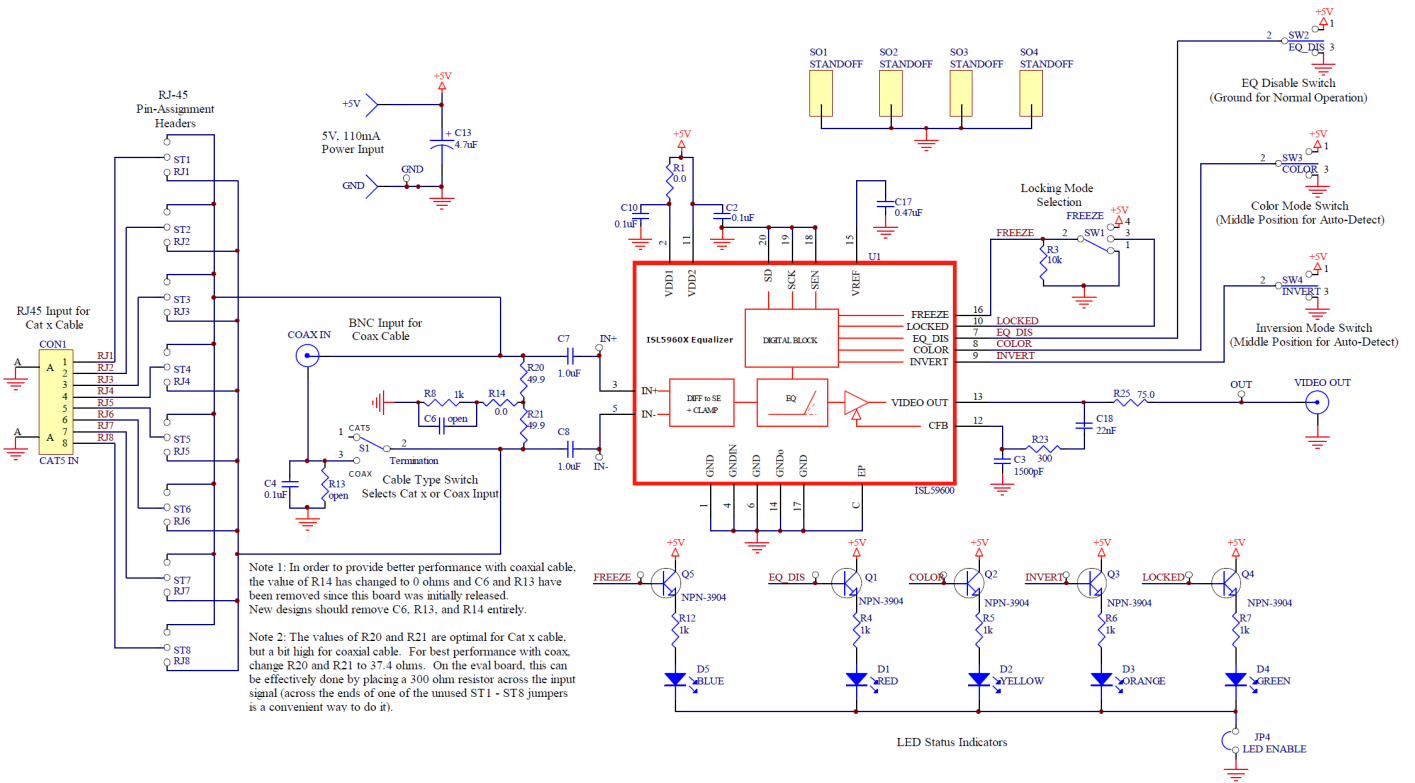
Related Documents

- ISL5960x Datasheet (FN6739)

- ISL59605-SPI-EVALZ Evaluation Board (with Serial Interface) Operation (AN1588)

Troubleshooting

1. Make sure all the switches are in the correct default position as described previously.

2. Verify that there is 5V across the power supply pins, and that the board is drawing ~70mA of current. If you are seeing less current, the EQ_DIS switch may be set to the wrong position.

3. Probe the IN+ and IN- pins for a video signal. For Cat x inputs, you should see a signal on both inputs (with IN- being the inverse of the signal on IN+). For coax inputs, you should see a signal on IN+ and a DC voltage on IN-. If you do not see the expected signals, inspect your cables, video sources, etc. For Cat x signals, verify that the jumpers in the jumper block are set correctly. If you are not certain which pair of Cat x wires is carrying the signal, you can probe the middle row of 8 pins in the jumper block, where you should see the signal on 2 of them.

4. If you see the correct input signal on IN+ and IN- but are still not seeing a valid output signal, toggle the INVERT switch high and low and then back to the center position to reset the chip.

5. Probe the OUT test pin with a scope to see if there is a video signal. If you see a composite video signal, inspect your cables, video receiver, etc.

ISL59605IRZ-EVALZ Evaluation Board Schematic

RJ-45 Pin-Assignment Headers

RJ45 Input for Cat x Cable

CON1
A 1 RJ1
2 RJ2
3 RJ3
A 4 RJ4
5 RJ5
6 RJ6
7 RJ7
A 8 RJ8
CAT5 IN

ST1 RJ1
ST2 RJ2
ST3 RJ3
ST4 RJ4
ST5 RJ5
ST6 RJ6
ST7 RJ7
ST8 RJ8

5V, 110mA Power Input
+5V
GND
+ C13 4.7uF
GND

BNC Input for Coax Cable
COAX IN

R8 1k   R14 0.0
C6 open
R13 open
C4 0.1uF
S1
CAT5
Termination
COAX
Cable Type Switch Selects Cat x or Coax Input

R20 49.9   C7 1.0uF   IN+   3
R21 49.9   C8 1.0uF   IN-   5

Note 1: In order to provide better performance with coaxial cable, the value of R14 has changed to 0 ohms and C6 and R13 have been removed since this board was initially released. New designs should remove C6, R13, and R14 entirely.

Note 2: The values of R20 and R21 are optimal for Cat x cable, but a bit high for coaxial cable. For best performance with coax, change R20 and R21 to 37.4 ohms. On the eval board, this can be effectively done by placing a 300 ohm resistor across the input signal (across the ends of one of the unused ST1 - ST8 jumpers is a convenient way to do it).

SO1 STANDOFF   SO2 STANDOFF   SO3 STANDOFF   SO4 STANDOFF

+5V
R1 0.0
C10 0.1uF   C2 0.1uF
VDD1 VDD2   SD SCK SEN   VREF
11   20 19 18   15   C17 0.47uF   U1

ISL5960X Equalizer   DIGITAL BLOCK
IN+   DIFF to SE + CLAMP   EQ
IN-
FREEZE   16 LOCKED
LOCKED   10 EQ_DIS
EQ_DIS   7 COLOR
COLOR   8 INVERT
INVERT   9
VIDEO OUT 13
CFB   12

GND GNDIN GND GNDo   EP
1   4   6   14 17   C
ISL59600

Locking Mode Selection
FREEZE   2 SW1 4   +5V
R3 10k   3 1   FREEZE
GND

EQ Disable Switch (Ground for Normal Operation)
+5V
2 SW2 1
EQ_DIS 3

Color Mode Switch (Middle Position for Auto-Detect)
+5V
2 SW3 1
COLOR 3

Inversion Mode Switch (Middle Position for Auto-Detect)
+5V
2 SW4 1
INVERT 3

R25 75.0   OUT   VIDEO OUT
C18 22nF
R23 300
C3 1500pF

LED Status Indicators
FREEZE Q5 NPN-3904   R12 1k   D5 BLUE
EQ_DIS Q1 NPN-3904   R4 1k   D1 RED
COLOR   Q2 NPN-3904   R5 1k   D2 YELLOW
INVERT Q3 NPN-3904   R6 1k   D3 ORANGE
LOCKED Q4 NPN-3904   R7 1k   D4 GREEN
+5V
JP4 LED ENABLE

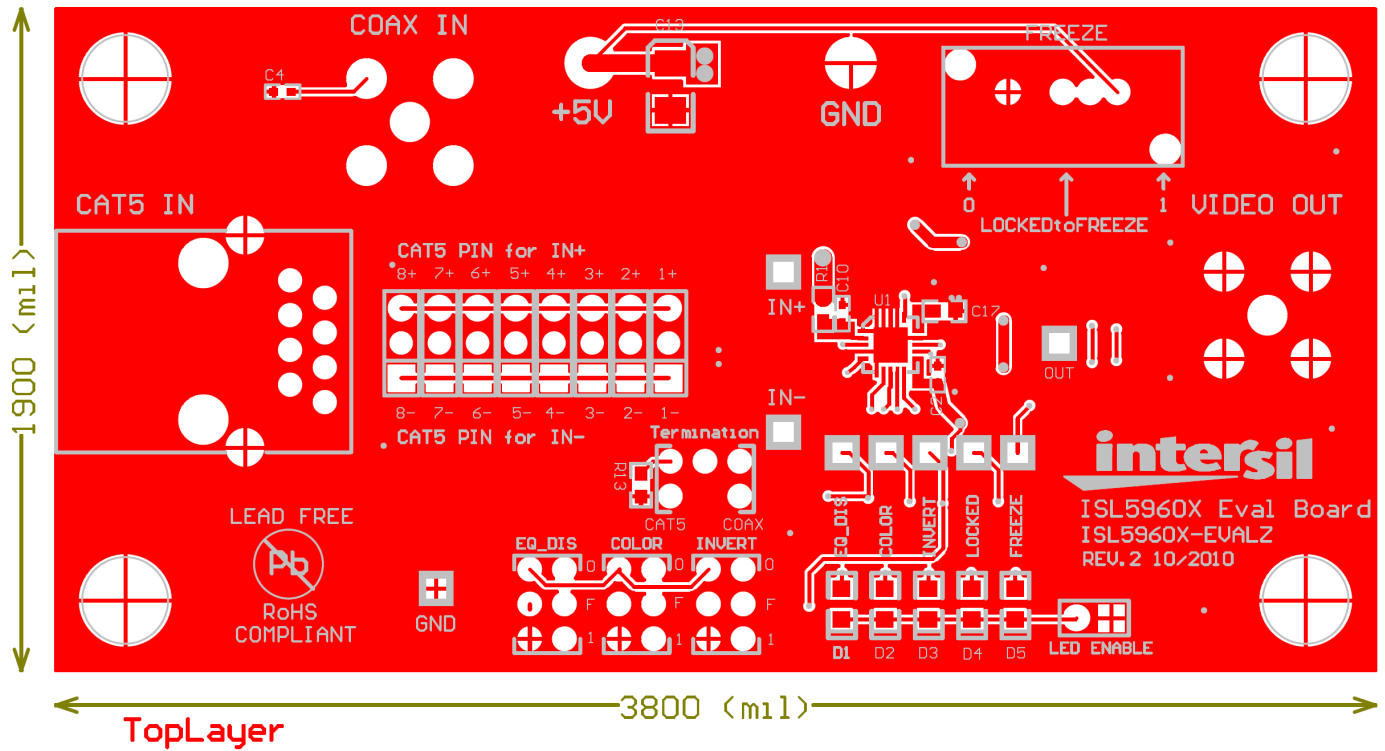## ISL59605IRZ-EVALZ Board Layout
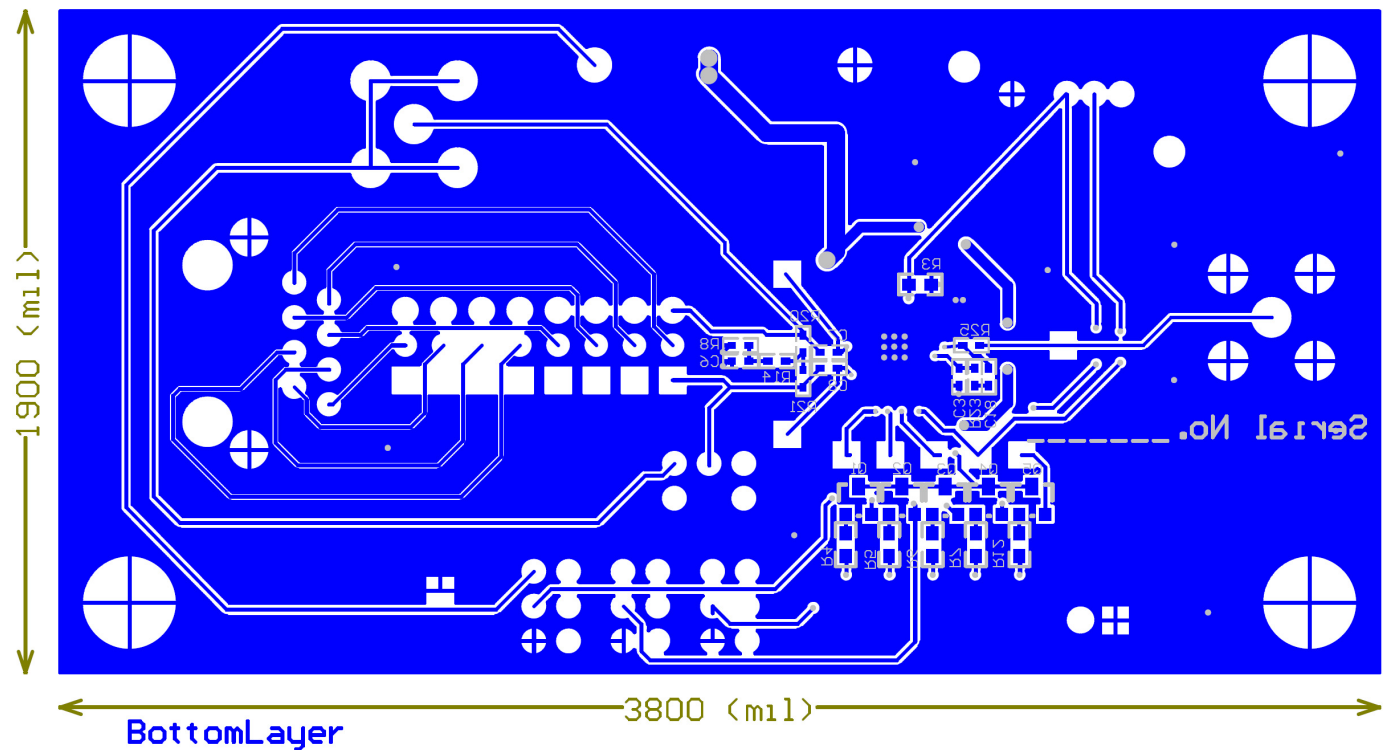

FIGURE 1. PCB TOP LAYER WITH SILKSCREEN

FIGURE 2. PCB BOTTOM LAYER WITH SILKSCREEN

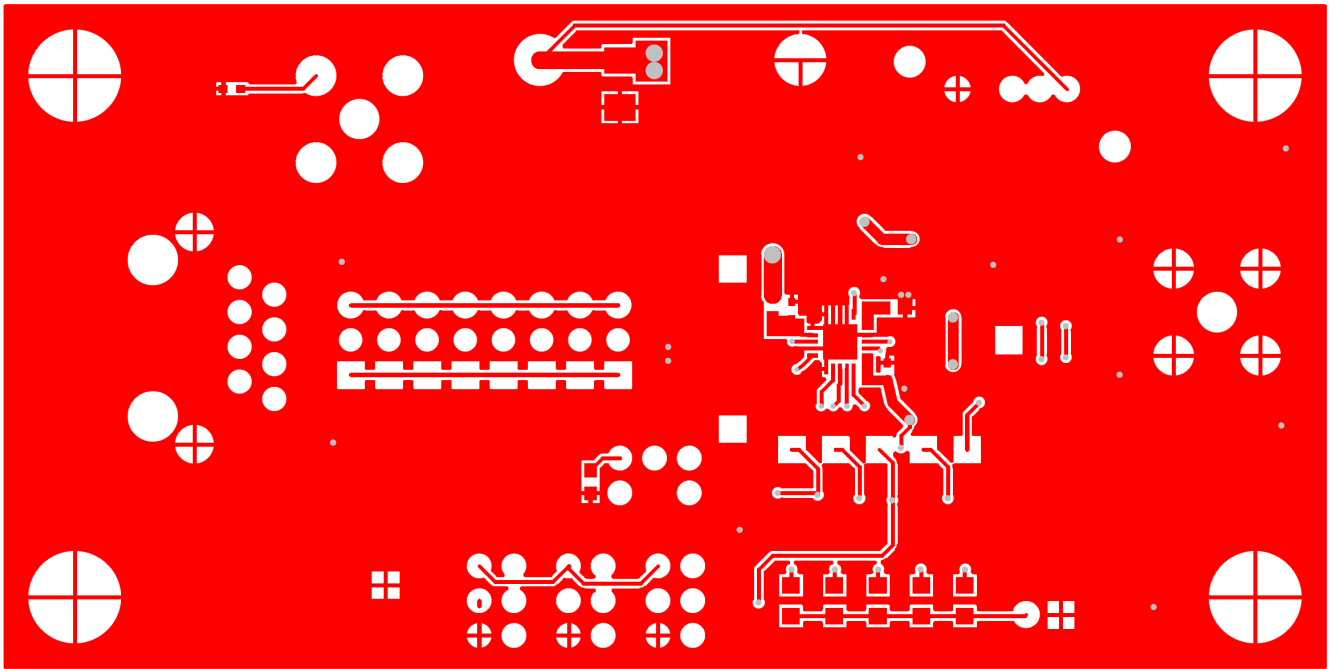## ISL59605IRZ-EVALZ Board Layout (Continued)
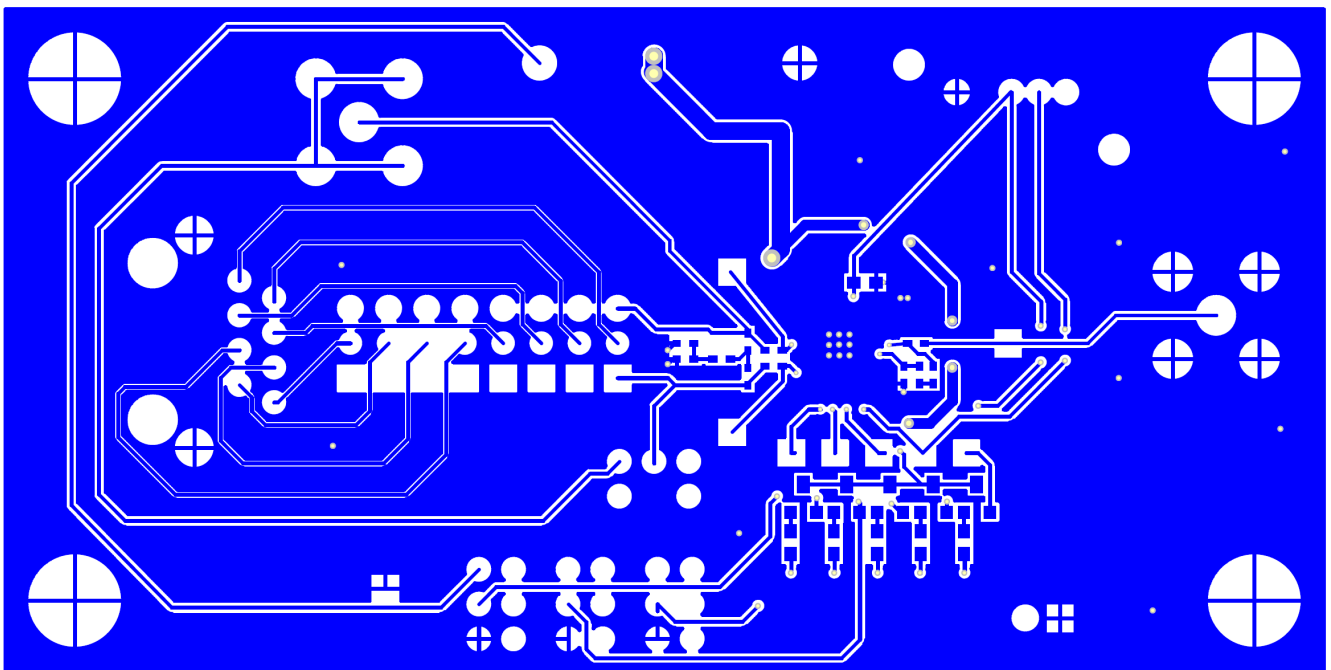

FIGURE 3. PCB TOP LAYER

FIGURE 4. PCB BOTTOM LAYER

Bill of Materials

QUANTITY	COMPONENT NAME	VALUE	FOOTPRINT
1	U1	ISL59600	QFN20 4MM
4	C2, C4, C6, C10	0.1µF	402
1	C3	1500pF	402
2	C7, C8	1.0µF	402
1	C13	4.7µF	3528
1	C17	0.47µF	603
1	C18	22nF	402
1	CON1	RJ-45	Modular-8S
1	D1	RED	LED-0805
1	D2	YELLOW	LED-0805
1	D3	ORANGE	LED-0805
1	D4	GREEN	LED-0805
1	D5	BLUE	LED-0805
2	J1 J4	POST	POWERPOST
9	J5, J6, J7, J11, J12, J13, J14, J15, J16	TEST POINTS	HEADER-1 PIN
1	JP4	3 PIN JUMPER	JUMPER-2PIN
2	P1, P2	BNC	BNC
5	Q1, Q2, Q3, Q4, Q5	NPN-3904	SOT-23
1	R1	0	603
1	R3	10k	603
5	R4, R5, R6, R7, R12	1k	603
1	R8	1k	402
1	R13	10	603
1	R14	50	402
2	R20, R21	49.9	402
1	R23	300	402
1	R25	75	402
1	S1	Termination	SWITCH-TOGGLE-GT11MCKE
4	SO1, SO2, SO3, SO4	STANDOFF	STANDOFF
8	ST1, ST2, ST3, ST4, ST5, ST6, ST7, ST8	3 PIN JUMPER	JUMPER-3PIN
1	SW1	SP3T SWITCH	SWITCH SP3T SLIDE-TH
3	SW2, SW3, SW4	SP2T SWITCH	SWITCH-TOGGLE-GT21MCKE

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