

QL-EOS-S3 breakout

Variant: [No Variations]

8/13/2020

RevA

Release Candidate

Page	Index	Page	Index	Page	Index
1	COVER PAGE	11	.....	21	.....
2	BLOCK DIAGRAM	12	.....	22	.....
3	MICROCONTROLLER	13	.....	23	.....
4	.....	14	.....	24	.....
5	.....	15	.....	25	.....
6	.....	16	.....	26	.....
7	.....	17	.....	27	.....
8	.....	18	.....	28	.....
9	.....	19	.....	29	.....
10	.....	20	.....	30	.....

DESIGN CONSIDERATIONS

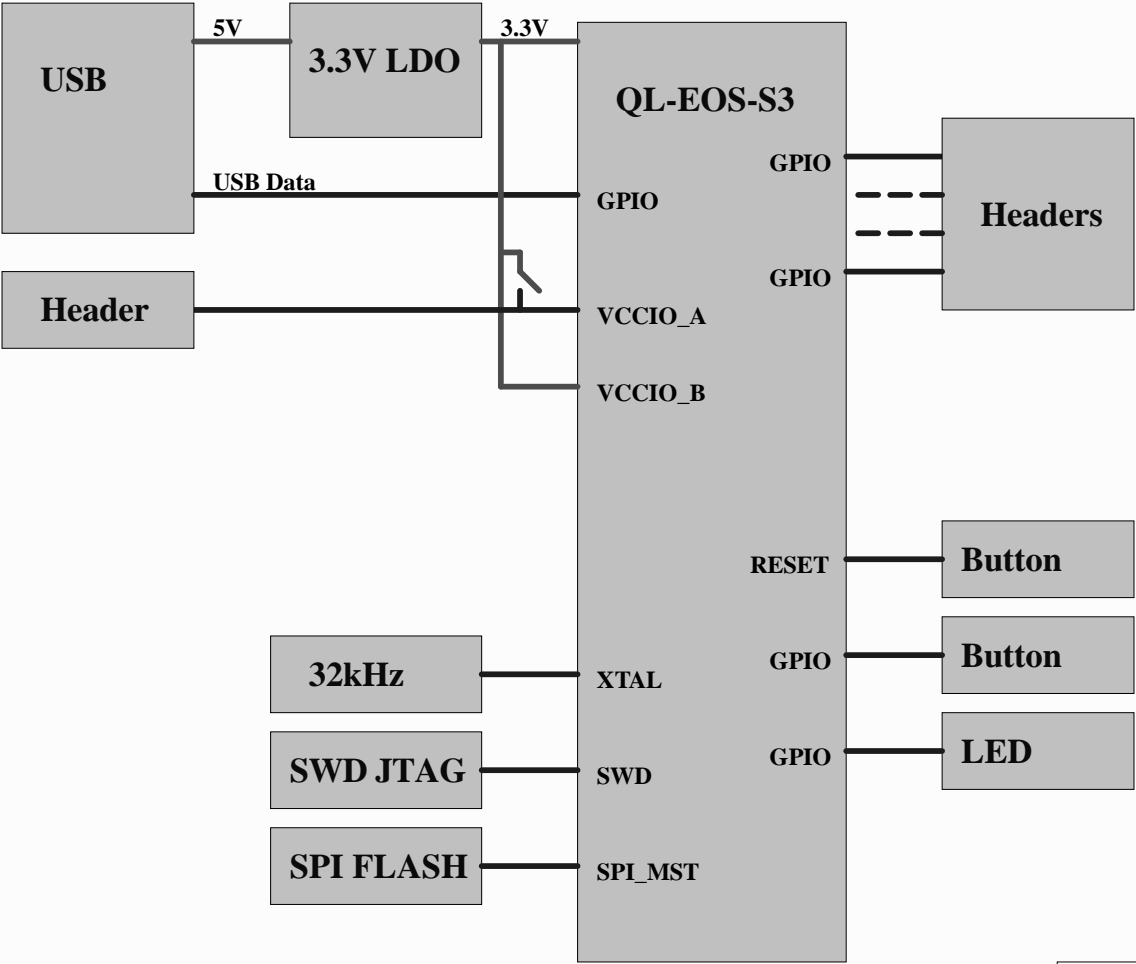
DESIGN NOTE:
Example text for informational
design notes .

DESIGN NOTE:
Example text for critical
design notes.

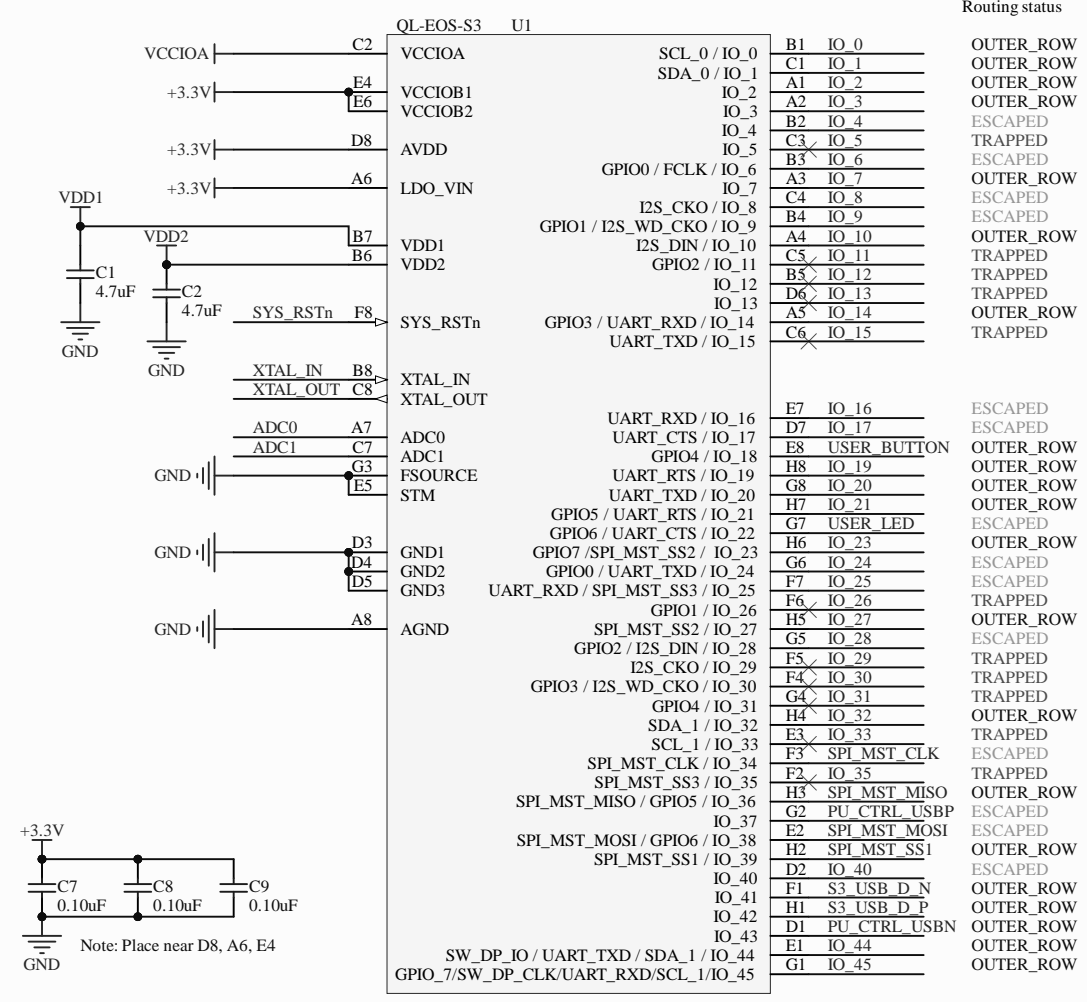
DESIGN NOTE:
Example text for cautionary
design notes.

LAYOUT NOTE:
Example text for critical
layout guidelines.

QL-EOS-S3 breakout



MCU/FPGA



QL-EOS-S3 breakout

Design intent:

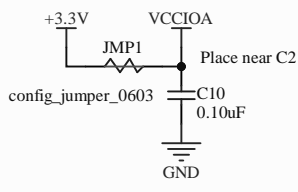
- Low-cost, minimum viable ARM+FPGA design that is breadboard compatable
- Footprint, power, UART pin compatibility with Teensy 3.2.
- All pins on Bank A placed in a group, because they can have their IO voltage set with a reference
- Bootstrap, SPI flash, and reset pins placed in non-breadboardable location to avoid inadvertant interference with application circuit
- Pins with multiple IO functions preferred over FPGA only pins
- Pins in ascending order by FPGA IO number when possible

Useful connections:

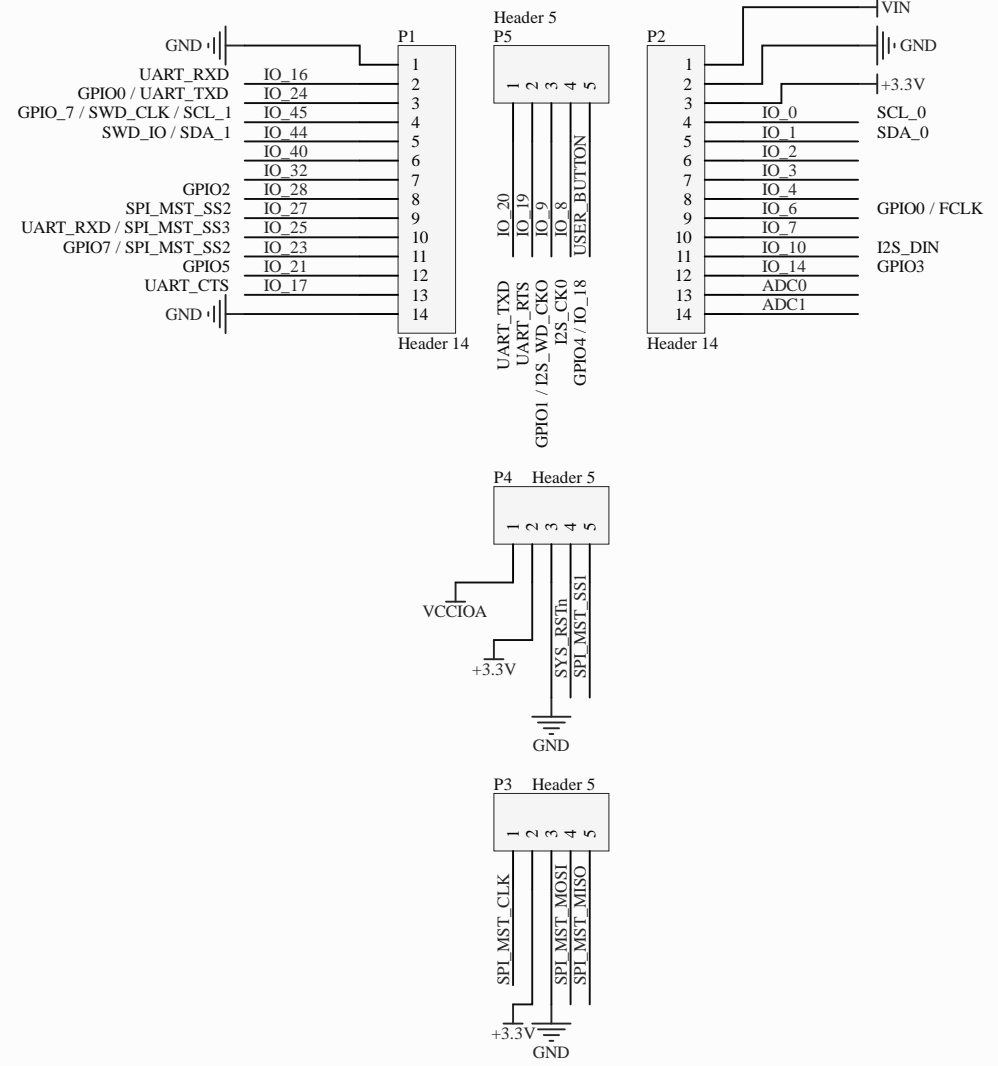
- Jumper VCCIOA to 3.3V if the connection was cut
- Jumper SYS_RSTn to GND to put processor in reset for external SPI Flash programming
- Jumper IO_19 to 3.3V to enable JTAG SWD on boot

I/O Bank A reference voltage

Cut jumper JMP1 and provide 1.2-3.3V (?) reference voltage on VCCIOA pin

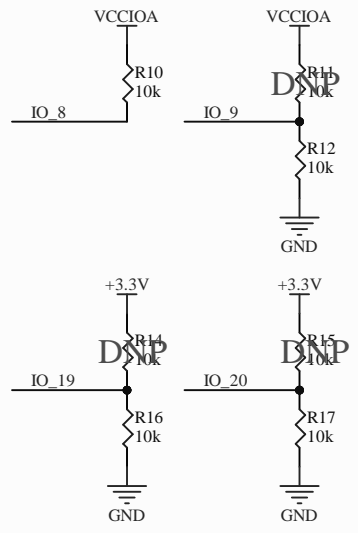


I/O Pins



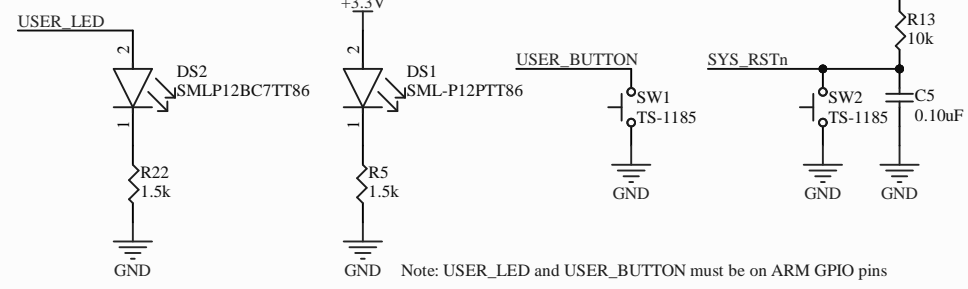
Bootstrap Configuration

IO_8: SWD pin assignment: pull down for 14/15 (default), up for 44/45
IO_8/IO_9: High speed oscillator selection; both pulled up for external oscillator, otherwise internal oscillator
IO_19: Enable SWD: pull down to disable, up to enable
IO_20: Boot mode: pull down for host (boot from SPI flash), pull up for companion (boot from ???)



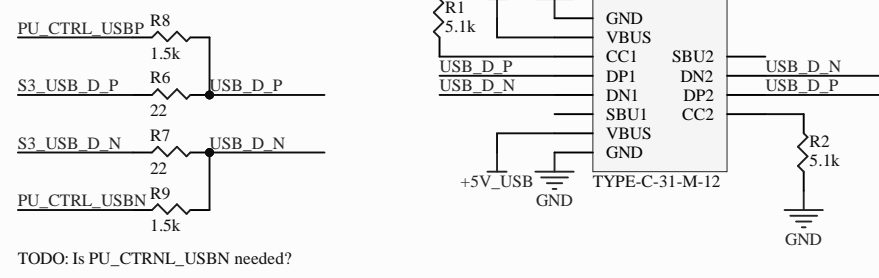
Status indication and feedback

Press USER_BUTTON during boot for bootloadaer



USB connection

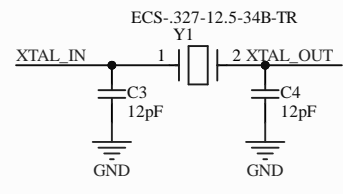
USB is implemtented as an FPGA soft core



TODO: Is PU_CTRLN_USBN needed?

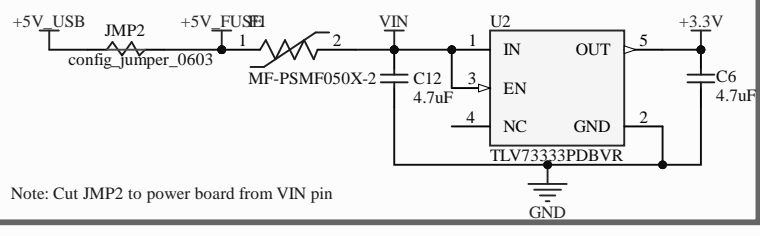
32.768k oscillator

Used for RTC and as a reference for the main clock



3.3V regulator

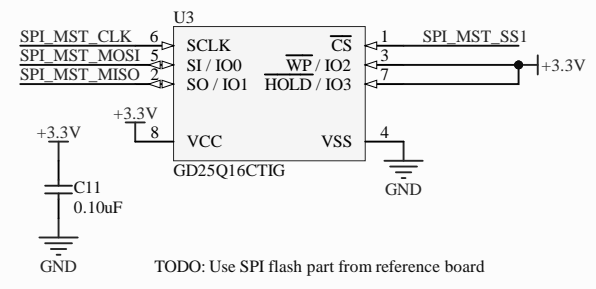
???mA max



Note: Cut JMP2 to power board from VIN pin

SPI Flash

Program memory loaded from SPI flash at boot



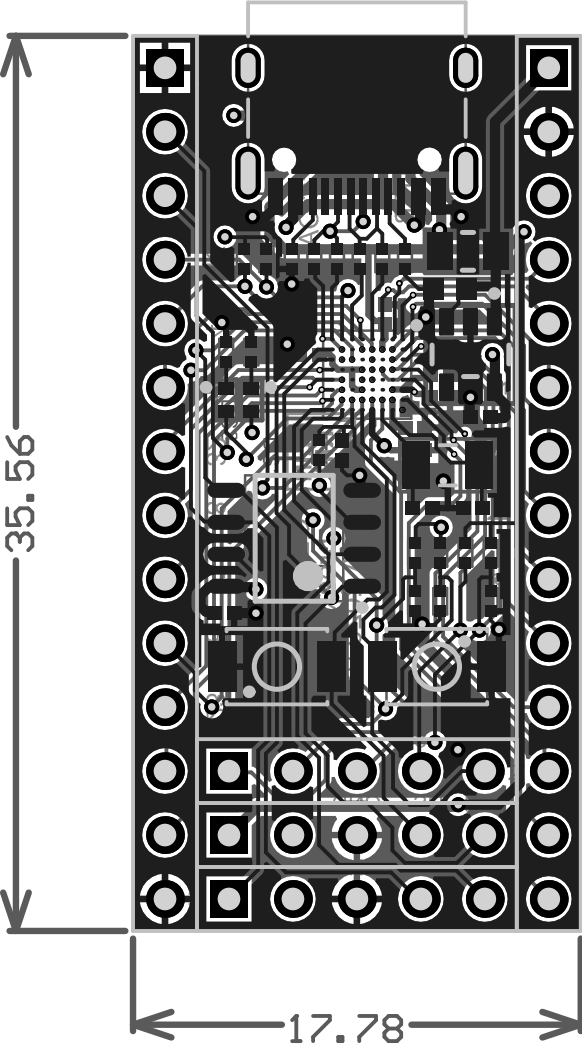
TODO: Use SPI flash part from reference board



Title: SOC	Revision: RevA
Project: QL-EOS-S3-breakout.Prj	Sheet 3 of 4
Date: 8/13/2020 Time: 11:58:12 AM	



	1	2	3	4
A	<div>Designator</div> <div>[01] cover page.SchDoc</div> 	<div>Designator</div> <div>[02] Block Diagram.SchDoc</div> 	<div>Designator</div> <div>[03] SOC.SchDoc</div> 	
B				
C				
D				<div> <div>Title: *</div> <div>Project: QL-EOS-S3-breakout.PrjPcbRevision: RevA</div> <div>Date: 8/13/2020Time: 11:58:13 AMSheet 4 of 4</div> <div>BLINKINLABS</div> </div>
	1	2	3	4



Layer	Name	Material	Thickness	Constant
	Top Overlay			
	Top Solder	SM-001	0.013mm	4
1	Top Layer	Copper	0.035mm	
	Dielectric 2	PP-022	0.200mm	4.6
2	Layer 1	Copper	0.018mm	
	Dielectric 3	Core-039	0.665mm	4.8
3	Layer 2	Copper	0.018mm	
	Dielectric 4	PP-022	0.200mm	4.6
4	Bottom Layer	Copper	0.035mm	
	Bottom Solder	SM-001	0.013mm	4
	Bottom Overlay			

Total board thickness: 1.195mm

Design Rules Verification Report

Filename : C:\Users\matt\Blinkinlabs-Repos\QL-EOS-S3-breakout\pcb\QL-EOS-S3-breako

Warnings 0
Rule Violations 331

Warnings	
Total	0

Rule Violations	
Clearance Constraint (Gap=0.152mm) (All),(All)	0
Clearance Constraint (Gap=0.127mm) (istrack or ((ObjectKind = 'Via') And (AsMils(ViaDiameter)	0
Clearance Constraint (Gap=0.152mm) (InComponent('JMP1') or	0
Short-Circuit Constraint (Allowed=No) (All),(All)	0
Short-Circuit Constraint (Allowed=Yes) (InComponent('JMP1') or	0
Un-Routed Net Constraint ((All))	0
Modified Polygon (Allow modified: No), (Allow shelved: No)	0
Width Constraint (Min=0.152mm) (Max=0.406mm) (Preferred=0.254mm) (All)	0
Power Plane Connect Rule(Relief Connect)(Expansion=0.508mm) (Conductor Width=0.254mm)	0
Hole Size Constraint (Min=0.025mm) (Max=2.54mm) (All)	0
Hole To Hole Clearance (Gap=0.25mm) (All),(All)	0
Minimum Solder Mask Sliver (Gap=0.254mm) (All),(All)	281
Silk To Solder Mask (Clearance=0.254mm) (IsPad),(All)	44
Silk to Silk (Clearance=0.254mm) (All),(All)	5
Net Antennae (Tolerance=0mm) (All)	1
Room [03] SOC (Bounding Region = (144.78mm, 45.72mm, 172.72mm, 86.36mm)	0
Height Constraint (Min=0mm) (Max=25.4mm) (Preferred=12.7mm) (All)	0
Total	331

[illegible]

Thursday 13 Aug 2020 11:58:17 AM

[illegible][illegible]

Minimum Solder Mask Sliver (Gap=0.254mm) (All),(All)

[illegible]

Minimum Solder Mask Sliver (Gap=0.254mm) (All),(All)

[illegible]

[illegible]

Thursday 13 Aug 2020 11:58:17 AM

Minimum Solder Mask Sliver (Gap=0.254mm) (All),(All)
Minimum Solder Mask Sliver Constraint: (0.047mm < 0.254mm) Between Pad U1-G5(8.3mm,21.9mm) on Top Layer And Pac
Minimum Solder Mask Sliver Constraint: (0.212mm < 0.254mm) Between Pad U1-G5(8.3mm,21.9mm) on Top Layer And Pac
Minimum Solder Mask Sliver Constraint: (0.047mm < 0.254mm) Between Pad U1-G5(8.3mm,21.9mm) on Top Layer And Pac
Minimum Solder Mask Sliver Constraint: (0.212mm < 0.254mm) Between Pad U1-G5(8.3mm,21.9mm) on Top Layer And Pac
Minimum Solder Mask Sliver Constraint: (0.047mm < 0.254mm) Between Pad U1-G6(8.3mm,21.5mm) on Top Layer And Pac
Minimum Solder Mask Sliver Constraint: (0.212mm < 0.254mm) Between Pad U1-G6(8.3mm,21.5mm) on Top Layer And Pac
Minimum Solder Mask Sliver Constraint: (0.047mm < 0.254mm) Between Pad U1-G6(8.3mm,21.5mm) on Top Layer And Pac
Minimum Solder Mask Sliver Constraint: (0.212mm < 0.254mm) Between Pad U1-G6(8.3mm,21.5mm) on Top Layer And Pac
Minimum Solder Mask Sliver Constraint: (0.047mm < 0.254mm) Between Pad U1-G7(8.3mm,21.1mm) on Top Layer And Pac
Minimum Solder Mask Sliver Constraint: (0.212mm < 0.254mm) Between Pad U1-G7(8.3mm,21.1mm) on Top Layer And Pac
Minimum Solder Mask Sliver Constraint: (0.047mm < 0.254mm) Between Pad U1-G7(8.3mm,21.1mm) on Top Layer And Pac
Minimum Solder Mask Sliver Constraint: (0.212mm < 0.254mm) Between Pad U1-G7(8.3mm,21.1mm) on Top Layer And Pac
Minimum Solder Mask Sliver Constraint: (0.047mm < 0.254mm) Between Pad U1-G7(8.3mm,21.1mm) on Top Layer And Pac
Minimum Solder Mask Sliver Constraint: (0.212mm < 0.254mm) Between Pad U1-G7(8.3mm,21.1mm) on Top Layer And Pac
Minimum Solder Mask Sliver Constraint: (0.212mm < 0.254mm) Between Pad U1-G8(8.3mm,20.7mm) on Top Layer And Pac
Minimum Solder Mask Sliver Constraint: (0.047mm < 0.254mm) Between Pad U1-G8(8.3mm,20.7mm) on Top Layer And Pac
Minimum Solder Mask Sliver Constraint: (0.047mm < 0.254mm) Between Pad U1-H1(7.9mm,23.5mm) on Top Layer And Pac
Minimum Solder Mask Sliver Constraint: (0.047mm < 0.254mm) Between Pad U1-H2(7.9mm,23.1mm) on Top Layer And Pac
Minimum Solder Mask Sliver Constraint: (0.047mm < 0.254mm) Between Pad U1-H3(7.9mm,22.7mm) on Top Layer And Pac
Minimum Solder Mask Sliver Constraint: (0.047mm < 0.254mm) Between Pad U1-H4(7.9mm,22.3mm) on Top Layer And Pac
Minimum Solder Mask Sliver Constraint: (0.047mm < 0.254mm) Between Pad U1-H5(7.9mm,21.9mm) on Top Layer And Pac
Minimum Solder Mask Sliver Constraint: (0.047mm < 0.254mm) Between Pad U1-H6(7.9mm,21.5mm) on Top Layer And Pac
Minimum Solder Mask Sliver Constraint: (0.047mm < 0.254mm) Between Pad U1-H7(7.9mm,21.1mm) on Top Layer And Pac

Silk To Solder Mask (Clearance=0.254mm) (IsPad),(All)

Silk To Solder Mask Clearance Constraint: (0.25mm < 0.254mm) Between Arc (13.165mm,11.5mm) on Top Overlay And Pa
Silk To Solder Mask Clearance Constraint: (0.25mm < 0.254mm) Between Arc (2.9mm,21.6mm) on Top Overlay And Pa
Silk To Solder Mask Clearance Constraint: (0.25mm < 0.254mm) Between Arc (4.615mm,9.5mm) on Top Overlay And Pa
Silk To Solder Mask Clearance Constraint: (0.211mm < 0.254mm) Between Arc (5.461mm,21.603mm) on Top Overlay An
Silk To Solder Mask Clearance Constraint: (0.225mm < 0.254mm) Between Pad C12-1(13.25mm,25.5mm) on Top Layer Anc
Silk To Solder Mask Clearance Constraint: (0.242mm < 0.254mm) Between Pad C5-1(8.3mm,18.71mm) on Top Layer Anc
Silk To Solder Mask Clearance Constraint: (0.242mm < 0.254mm) Between Pad C5-1(8.3mm,18.71mm) on Top Layer Anc
Silk To Solder Mask Clearance Constraint: (0.233mm < 0.254mm) Between Pad P1-12(1.27mm,6.35mm) on Multi-Layer Anc
Silk To Solder Mask Clearance Constraint: (0.233mm < 0.254mm) Between Pad P1-13(1.27mm,3.81mm) on Multi-Layer Anc
Silk To Solder Mask Clearance Constraint: (0.234mm < 0.254mm) Between Pad P1-14(1.27mm,1.27mm) on Multi-Layer Anc
Silk To Solder Mask Clearance Constraint: (0.219mm < 0.254mm) Between Pad P2-12(16.51mm,6.35mm) on Multi-Layer Anc
Silk To Solder Mask Clearance Constraint: (0.215mm < 0.254mm) Between Pad P2-13(16.51mm,3.81mm) on Multi-Layer Anc
Silk To Solder Mask Clearance Constraint: (0.211mm < 0.254mm) Between Pad P2-14(16.51mm,1.27mm) on Multi-Layer Anc
Silk To Solder Mask Clearance Constraint: (0.2mm < 0.254mm) Between Pad P3-1(3.81mm,1.27mm) on Multi-Layer And Tex
Silk To Solder Mask Clearance Constraint: (0.201mm < 0.254mm) Between Pad P3-1(3.81mm,1.27mm) on Multi-Layer Anc
Silk To Solder Mask Clearance Constraint: (0.236mm < 0.254mm) Between Pad P3-2(6.35mm,1.27mm) on Multi-Layer Anc
Silk To Solder Mask Clearance Constraint: (0.237mm < 0.254mm) Between Pad P3-3(8.89mm,1.27mm) on Multi-Layer Anc
Silk To Solder Mask Clearance Constraint: (0.249mm < 0.254mm) Between Pad P3-4(11.43mm,1.27mm) on Multi-Layer Anc
Silk To Solder Mask Clearance Constraint: (0.236mm < 0.254mm) Between Pad P3-5(13.97mm,1.27mm) on Multi-Layer Anc
Silk To Solder Mask Clearance Constraint: (0.249mm < 0.254mm) Between Pad P3-5(13.97mm,1.27mm) on Multi-Layer Anc
Silk To Solder Mask Clearance Constraint: (0.2mm < 0.254mm) Between Pad P4-1(3.81mm,3.81mm) on Multi-Layer And Tex
Silk To Solder Mask Clearance Constraint: (0.201mm < 0.254mm) Between Pad P4-1(3.81mm,3.81mm) on Multi-Layer Anc
Silk To Solder Mask Clearance Constraint: (0.201mm < 0.254mm) Between Pad P4-1(3.81mm,3.81mm) on Multi-Layer Anc
Silk To Solder Mask Clearance Constraint: (0.22mm < 0.254mm) Between Pad P4-2(6.35mm,3.81mm) on Multi-Layer Anc
Silk To Solder Mask Clearance Constraint: (0.236mm < 0.254mm) Between Pad P4-2(6.35mm,3.81mm) on Multi-Layer Anc
Silk To Solder Mask Clearance Constraint: (0.246mm < 0.254mm) Between Pad P4-3(8.89mm,3.81mm) on Multi-Layer Anc
Silk To Solder Mask Clearance Constraint: (0.237mm < 0.254mm) Between Pad P4-3(8.89mm,3.81mm) on Multi-Layer Anc
Silk To Solder Mask Clearance Constraint: (0.249mm < 0.254mm) Between Pad P4-4(11.43mm,3.81mm) on Multi-Layer Anc
Silk To Solder Mask Clearance Constraint: (0.25mm < 0.254mm) Between Pad P4-4(11.43mm,3.81mm) on Multi-Layer Anc
Silk To Solder Mask Clearance Constraint: (0.237mm < 0.254mm) Between Pad P4-5(13.97mm,3.81mm) on Multi-Layer Anc
Silk To Solder Mask Clearance Constraint: (0.239mm < 0.254mm) Between Pad P4-5(13.97mm,3.81mm) on Multi-Layer Anc
Silk To Solder Mask Clearance Constraint: (0.234mm < 0.254mm) Between Pad P4-5(13.97mm,3.81mm) on Multi-Layer Anc
Silk To Solder Mask Clearance Constraint: (0.205mm < 0.254mm) Between Pad P5-1(3.81mm,6.35mm) on Multi-Layer Anc
Silk To Solder Mask Clearance Constraint: (0.2mm < 0.254mm) Between Pad P5-1(3.81mm,6.35mm) on Multi-Layer And Tex
Silk To Solder Mask Clearance Constraint: (0.201mm < 0.254mm) Between Pad P5-1(3.81mm,6.35mm) on Multi-Layer Anc
Silk To Solder Mask Clearance Constraint: (0.25mm < 0.254mm) Between Pad P5-2(6.35mm,6.35mm) on Multi-Layer Anc
Silk To Solder Mask Clearance Constraint: (0.22mm < 0.254mm) Between Pad P5-2(6.35mm,6.35mm) on Multi-Layer Anc
Silk To Solder Mask Clearance Constraint: (0.252mm < 0.254mm) Between Pad P5-3(8.89mm,6.35mm) on Multi-Layer Anc
Silk To Solder Mask Clearance Constraint: (0.246mm < 0.254mm) Between Pad P5-3(8.89mm,6.35mm) on Multi-Layer Anc
Silk To Solder Mask Clearance Constraint: (0.253mm < 0.254mm) Between Pad P5-4(11.43mm,6.35mm) on Multi-Layer Anc
Silk To Solder Mask Clearance Constraint: (0.245mm < 0.254mm) Between Pad P5-4(11.43mm,6.35mm) on Multi-Layer Anc
Silk To Solder Mask Clearance Constraint: (0.241mm < 0.254mm) Between Pad P5-5(13.97mm,6.35mm) on Multi-Layer Anc
Silk To Solder Mask Clearance Constraint: (0.24mm < 0.254mm) Between Pad P5-5(13.97mm,6.35mm) on Multi-Layer Anc
Silk To Solder Mask Clearance Constraint: (0.253mm < 0.254mm) Between Pad P5-5(13.97mm,6.35mm) on Multi-Layer Anc

Silk to Silk (Clearance=0.254mm) (All),(All)

Silk To Silk Clearance Constraint: (0.178mm < 0.254mm) Between Text "BLIN

KIN**LABS" (9.12mm,20.55mm) on Bottom Overlay And Track (6.12mm,17.55mm)(6.12mm,20.55mm) on E**

Silk to Silk (Clearance=0.254mm) (All),(All)

Silk To Silk Clearance Constraint: (0.247mm < 0.254mm) Between Text "BLIN"

KIN**LABS" (9.12mm,20.55mm) on Bottom Overlay And Track (6.12mm,17.55mm)(9.12mm,17.55mm) on E****Silk to Silk (Clearance=0.254mm) (All),(All)**

Silk To Silk Clearance Constraint: (0.107mm < 0.254mm) Between Text "BLIN"

KIN**LABS" (9.12mm,20.55mm) on Bottom Overlay And Track (6.12mm,20.55mm)(9.12mm,20.55mm) on E****Silk to Silk (Clearance=0.254mm) (All),(All)**

Silk To Silk Clearance Constraint: (0.19mm < 0.254mm) Between Text "BLIN"

KIN**LABS" (9.12mm,20.55mm) on Bottom Overlay And Track (9.12mm,17.55mm)(9.12mm,20.55mm) on E****Silk to Silk (Clearance=0.254mm) (All),(All)**

Silk To Silk Clearance Constraint: (0.251mm < 0.254mm) Between Text "CLK" (4.658mm,2.155mm) on Bottom Overlay And

Net Antennae (Tolerance=0mm) (All)

Net Antennae: Track (6.235mm,32.385mm)(7.735mm,32.385mm) on Bottom Layer

Electrical Rules Check Report

Class	Document	Message
Error	[03] SOC.SchDoc	+3.3V contains Output Pin and Power Pin objects (Pin U2-5, Pin U1-A6, Pin U1-D8, Pin U1-E4, Pin U1-E6, Pin U3-8).
Warning	[03] SOC.SchDoc	Component DS1 SML-P12PTT86 at 5300mil,4000mil: Can't perform revision status validation: The server name could not be resolved..
Warning	[03] SOC.SchDoc	Component DS1 SML-P12PTT86: Can't perform revision status validation: The server name could not be resolved..
Warning	[03] SOC.SchDoc	Component DS2 SMLP12BC7TT86 at 4100mil,4000mil: Can't perform revision status validation: The server name could not be resolved..
Warning	[03] SOC.SchDoc	Component DS2 SMLP12BC7TT86: Can't perform revision status validation: The server name could not be resolved..
Warning	[03] SOC.SchDoc	Component F1 MF-PSMF050X-2 at 12400mil,3900mil: Can't perform revision status validation: The server name could not be resolved..
Warning	[03] SOC.SchDoc	Component F1 MF-PSMF050X-2: Can't perform revision status validation: The server name could not be resolved..
Warning	[03] SOC.SchDoc	Component U2 TLV73333PDBVR at 13600mil,3900mil: Can't perform revision status validation: The server name could not be resolved..
Warning	[03] SOC.SchDoc	Component U2 TLV73333PDBVR: Can't perform revision status validation: The server name could not be resolved..
Warning	[03] SOC.SchDoc	Component Y1 ECS-.327-12.5-34B-TR at 9800mil,3600mil: Can't perform revision status validation: The server name could not be resolved..
Warning	[03] SOC.SchDoc	Component Y1 ECS-.327-12.5-34B-TR: Can't perform revision status validation: The server name could not be resolved..
Warning	[03] SOC.SchDoc	Net SPI_MST_CLK has no driving source (Pin P3-1, Pin U1-F3, Pin U3-6)
Warning	[03] SOC.SchDoc	Net SPI_MST_SS1 has no driving source (Pin P4-5, Pin U1-H2, Pin U3-1)
Warning	[03] SOC.SchDoc	Net SYS_RSTn has no driving source (Pin C5-2, Pin P4-4, Pin R13-2, Pin SW2-2, Pin U1-F8)
Warning	[03] SOC.SchDoc	Net XTAL_IN has no driving source (Pin C3-2, Pin U1-B8, Pin Y1-1)
Warning	[03] SOC.SchDoc	Un-Designated Part L?

