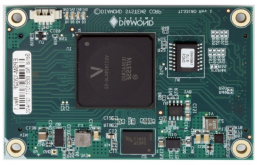

DIAMOND SYSTEMS EPSM-12G2F Epsilon Ethernet Switch Module User Guide

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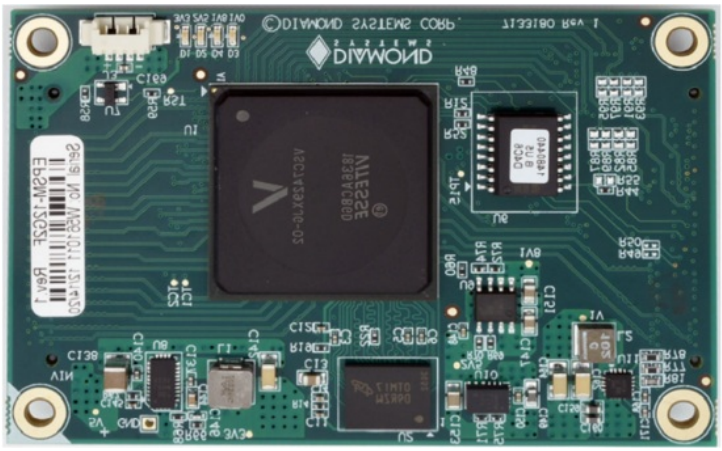


Contents

DESCRIPTION

This document is intended as a guide for designing a custom system baseboard for EPSM-12G2F is a compact, rugged Gigabit Ethernet Switch based on the Microsemi VSC7429 24+2 port switch provides both copper and optical interfaces.
The main board provides VSC7429 Switch+ VSC8522 PHY in Com express mini form factor. The main board mounts on a daughterboard. The main board is on top and has heat sink and heat spreader cooling options. The daughter board mounts on the bottom and requires no thermal solution since it has no active components.

Functions

- Microsemi VSC7429-02 Ethernet Switch with a built-in 416MHz MIPS CPU and gigabit PHYs switch with a built-in 12 + 3 QSGMII ports + 2 × 1G/2.5G .
- 12x GbE + 2 SFI sockets on SerDes interface for plugging-in optical SFI modules; Enhanced 10G on 2 ports. SFI sockets are on daughter board.
- Status LEDs on daughter board.
- Two high speed mating connector for daughter board.

Mechanical, Electrical, Environmental

- COM Express mini form factor, 2.165”W x 3.307”H; single board total height ~0.6”; dual board total height ~2.0
- Heatsink / heat spreader options for cooling
- -40°C to +85°C ambient operating temperature without a fan
- 5-36VDC input range.

BLOCK DIAGRAM

Figure 1 provides an overview of the key functional blocks of the EPSM-12G2F switch. It shows the division of features between the main board and daughter board.
EPSM-12G2F System Block Diagram

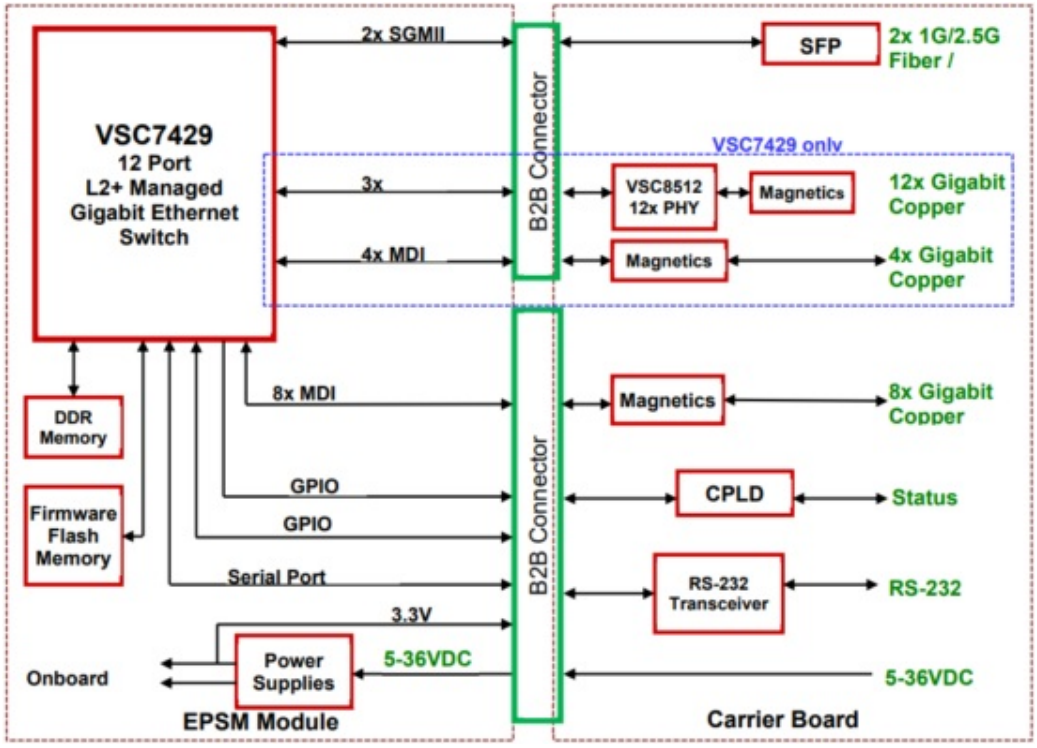


Figure 1: EPSM-12G2F Block Diagram

MECHANICAL DRAWINGS

Component Placement

The figures below show the locations of key components and I/O connectors.

The main board has a High-speed connector on the bottom side for mating with the optional daughterboard. The daughterboard contains a mating connector on its top side. The two boards are mated back to back so that the heat

generating components and heat sinks are on Main board top side the outer sides of both boards when mated together.

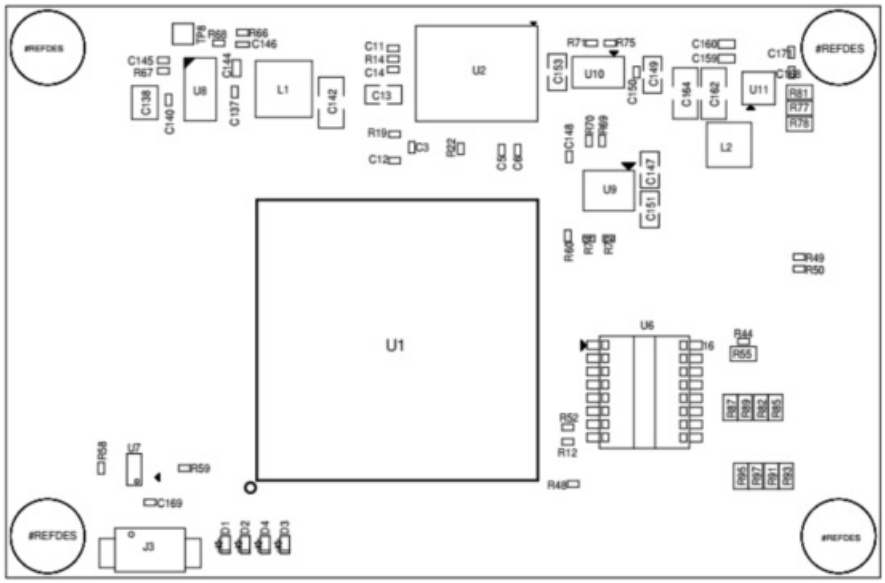


Figure 2: Top view

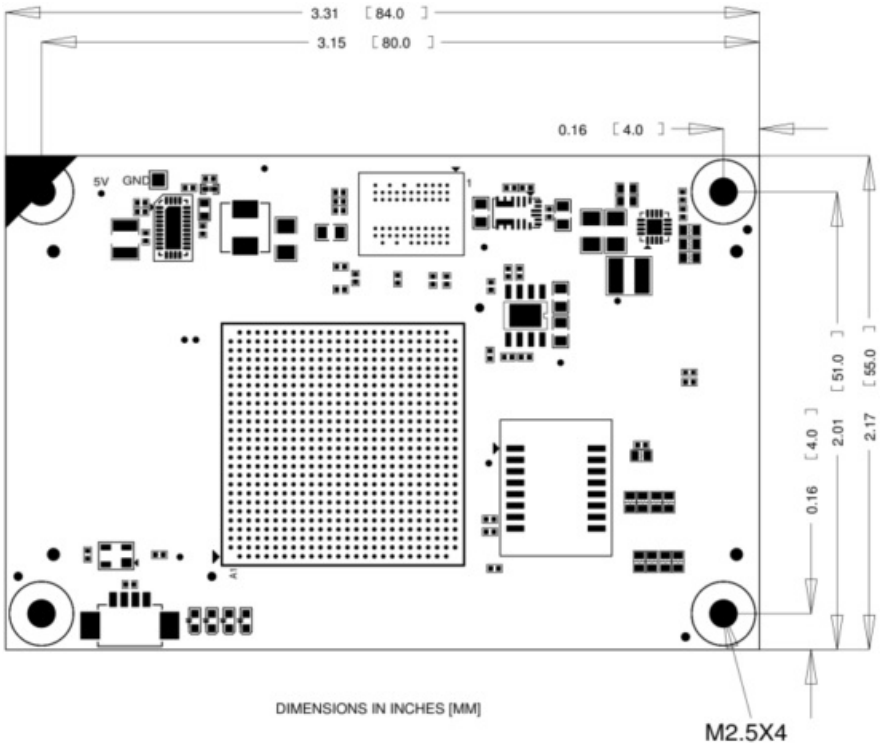


Figure 3: Top side dimension

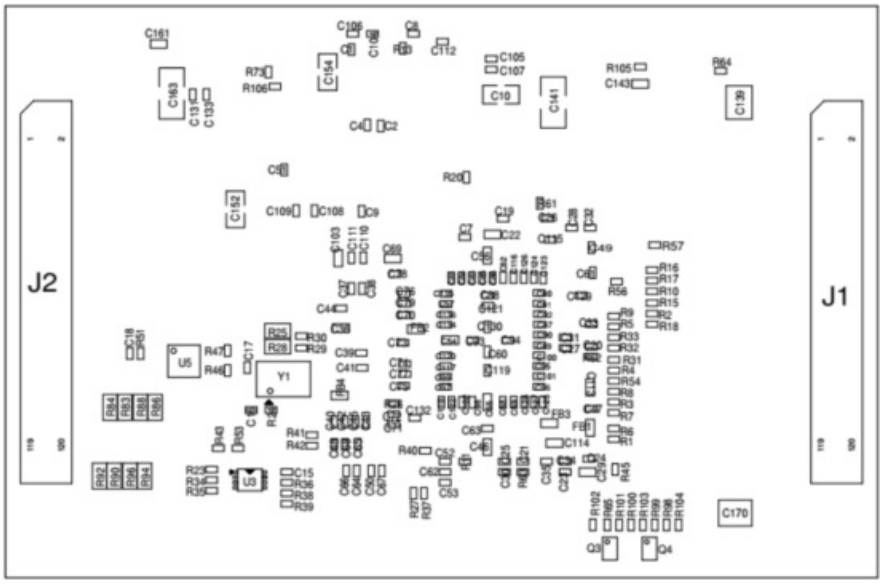


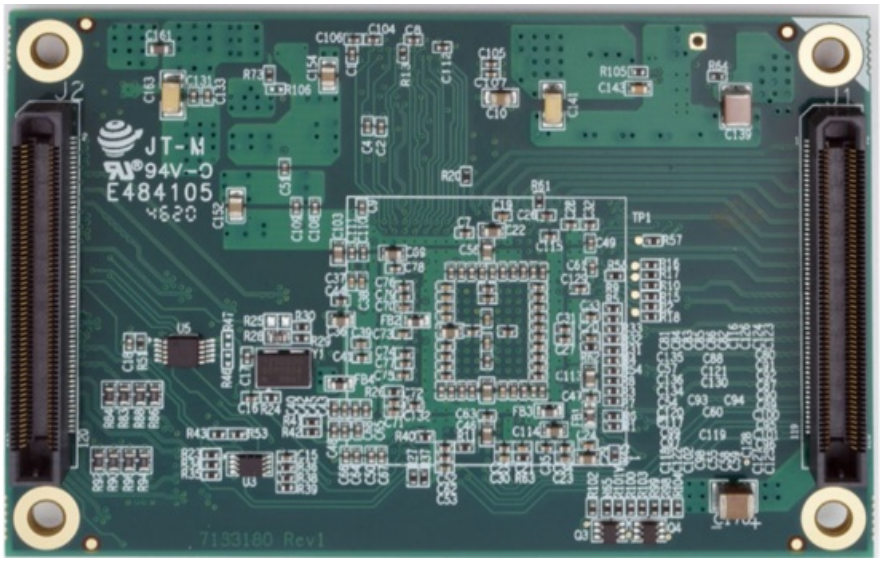
Figure 4: Bottom view

Figure 5: Bottom side dimensions

BOARD IMAGES

Figure 6 Top View

Figure 7 Bottom View



FEATURE DESCRIPTION

Ethernet Switch

Epsilon-12G2F is based on the Microsemi VSC7429 fully integrated 26-port Ethernet switch with 12 Gigabit Ethernet (GE) copper PHYs in a single package. In conjunction with the VSC8522 12-port PHY, 24/26-port switch. The chip contains 1G/2.5G SERDES lanes interface for 2 SFIs. 416MHz MIPS processor 32-bit CPU with DDR2 SDRAM controller.

A single-board model with just the VSC7429 +VSC8522 PHY chip is available for 2 ×1G/2.5G SFI ports+ 12 1G ports+ 3 × QSGMII ports. The VSC8522 PHY may be installed to provide 12 additional ports on the single daughter board. For the 24+2 port version, a daughterboard is installed on the bottom. Power and communication between the two boards is achieved via a pair of high speed board to board connectors.

SFP

Epsilon-12G2F offers support for two SFP sockets. The SFP interface is directly from the VSC7429 switch controller.
Of the two SFP ports one ports supports 1G/2.5G speed and the other port supports only 1G speed.

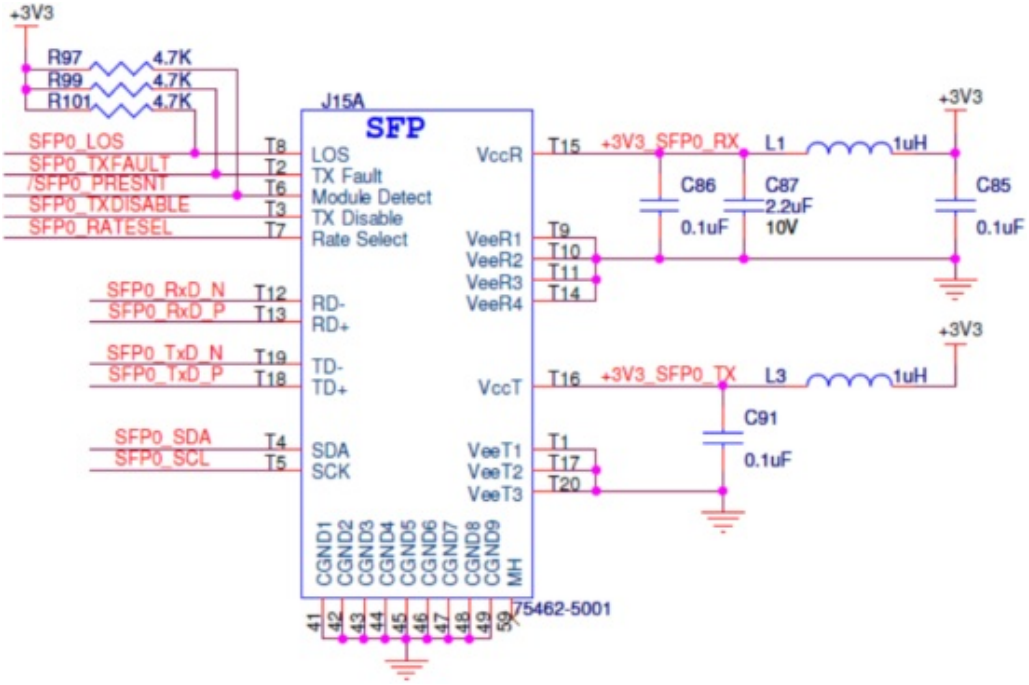


Figure 8 SFP connector on carrier board

Gigabit Ethernet switch magnetic

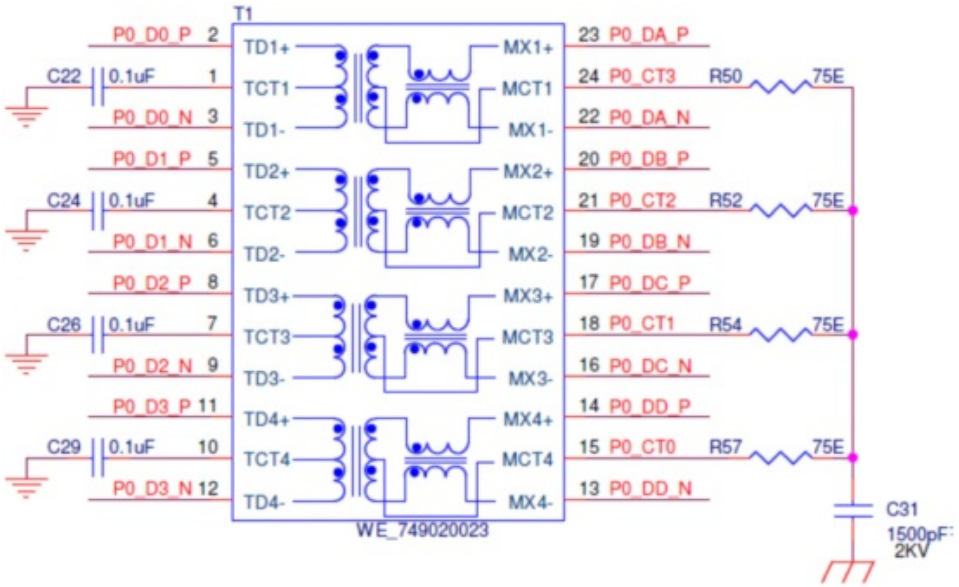


Figure 9 GigE Magnetic on carrier board

Power Supply

EPSM-12G2F Powered by a 5VDC of input voltage. 5V/4.3A

Serial interface

The VSC7429 switch offers a serial port function also controlled by the management software using GPIO lines. These lines need to be connected to a transceiver on the carrier board to provide RS-232 connection for alternate connection to the management features of the switch. Only TX and RX signals are required and provided. The serial interface is provided on a J2 connector.

RS232_RXD	PIN 109
RS232_TXD	PIN 111

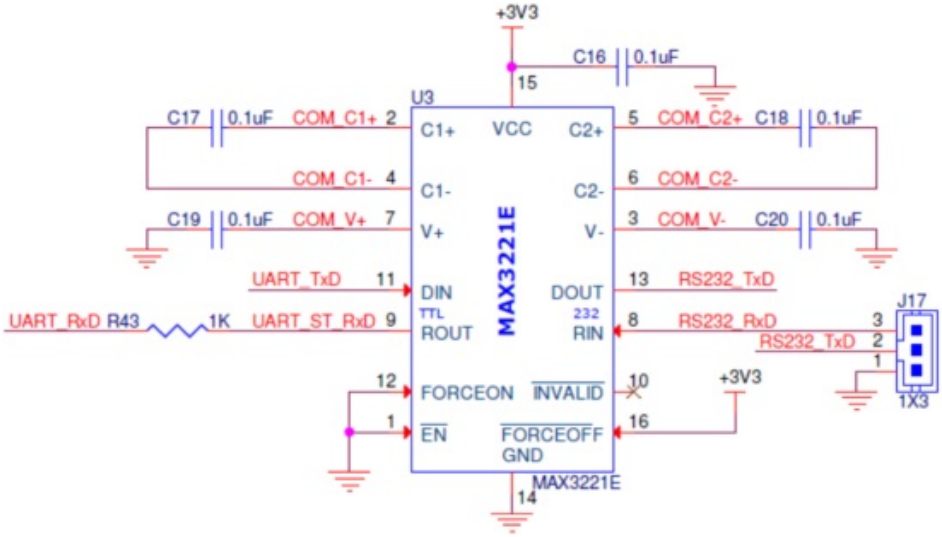
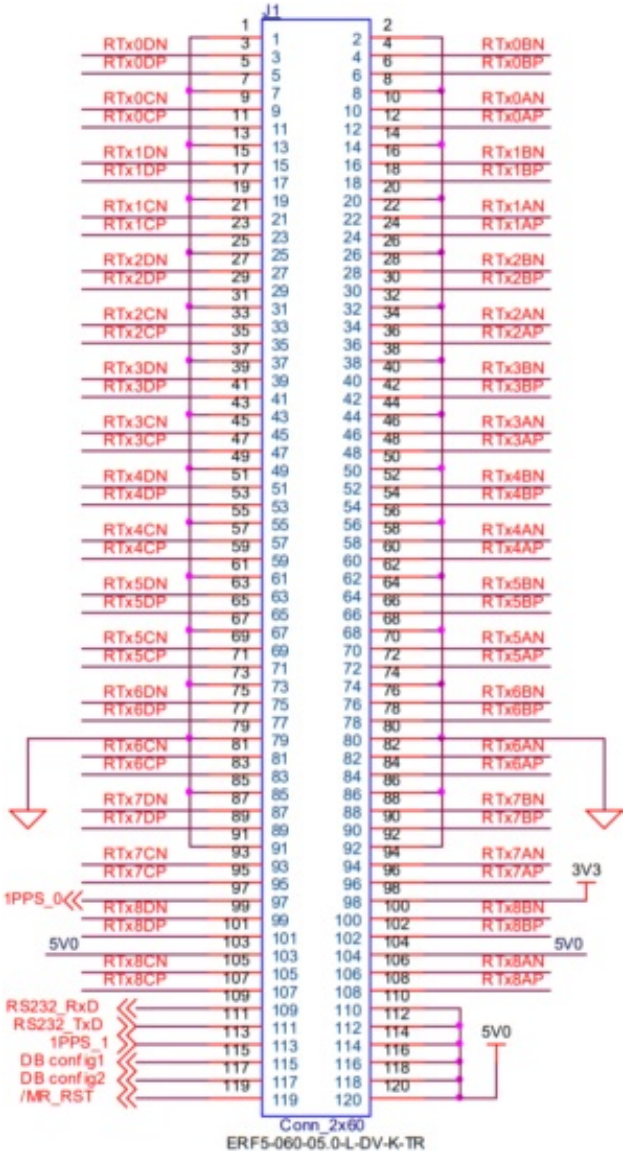


Figure 10 Serial port transceiver on carrier board

I/O CONNECTORS

Two High-speed B2B connectors (J1, J2)
The Main board contains 2x 120 pin 0.5mm pitch High speed connector, which accommodates the 12x 1Gbps copper ports, 6x QSGMII ports, 2x 10G ports, Power and other side band signals. These connectors mates with the carrier board.
Connector Number: Samtec ERF5-060-05.0-L-DV-K-TR
Mating Connector: Samtec ERM5-060-05.0-L-DV

J1 High-speed B2B connectors

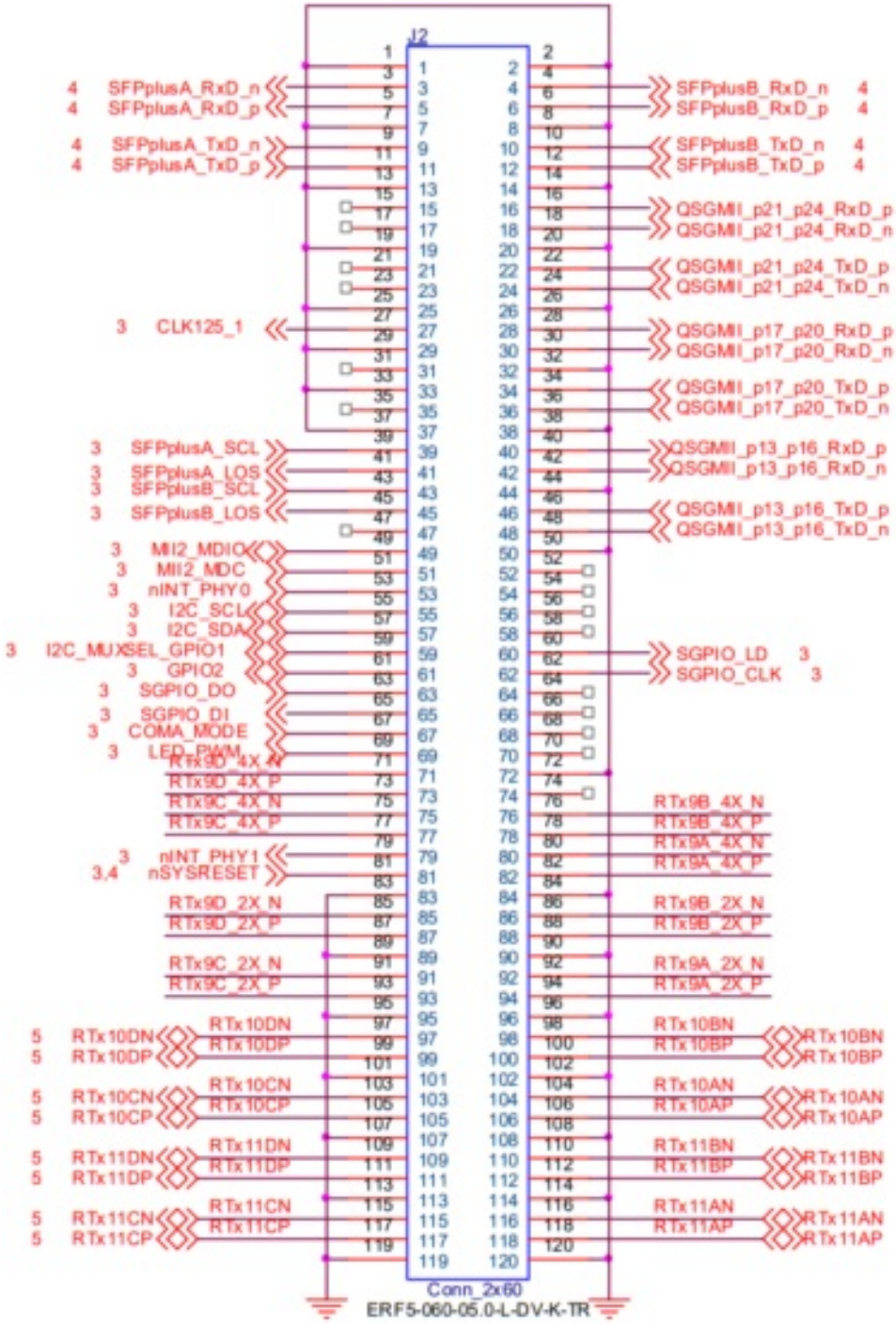


J1 High-speed B2B connector					
Description	**Net Name**	**PIN**	**PIN**	**Net Name**	**Description**
Ground	GND	1	2	GND	Ground
Port 0 Data pair D Connect to RJ45 pin through a magnetics.	RTX0DN	3	4	RTX0BN	Port 0 Data pair BConnect to RJ45 pin through a magnetics.
	RTX0DP	5	6	RTX0BP	
Ground	GND	7	8	GND	Ground
Port 0 Data pair C Connect to RJ45 pin through a magnetics.	RTX0CN	9	10	RTX0AN	Port 0 Data pair A Connect to RJ45 pin through a magnetics.
	RTX0CP	11	12	RTX0AP	
Ground	GND	13	14	GND	Ground
Port 1 Data pair D Connect to RJ45 pin through a magnetics.	RTX1DN	15	16	RTX1BN	Port 1 Data pair BConnect to RJ45 pin through a magnetics.
	RTX1DP	17	18	RTX1BP	
Ground	GND	19	20	GND	Ground
Port 1 Data pair C Connect to RJ45 pin through a magnet	RTX1CN	21	22	RTX1AN	Port 1 Data pair A Connect to R

ics.	RTX1CP	23	24	RTX1AP	J45 pin through a magnetics
Ground	GND	25	26	GND	Ground
Port 2 Data pair D Connect to RJ45 pin through a magnetics.	RTX2DN	27	28	RTX2BN	Port 2 Data pair BConnect to RJ45 pin through a magnetics.
	RTX2DP	29	30	RTX2BP	
Ground	GND	31	32	GND	Ground
Port 2 Data pair C Connect to RJ45 pin through a magnetics.	RTX2CN	33	34	RTX2AN	Port 2 Data pair A Connect to RJ45 pin through a magnetics
	RTX2CP	35	36	RTX2AP	
Ground	GND	37	38	GND	Ground
Port 3 Data pair D Connect to RJ45 pin through a magnetics.	RTX3DN	39	40	RTX3BN	Port 3 Data pair BConnect to RJ45 pin through a magnetics.
	RTX3DP	41	42	RTX3BP	
Ground	GND	43	44	GND	Ground
Port 3 Data pair C Connect to RJ45 pin through a magnetics.	RTX3CN	45	46	RTX3AN	Port 3 Data pair A Connect to RJ45 pin through a magnetics
	RTX3CP	47	48	RTX3AP	
Ground	GND	49	50	GND	Ground
Port 4 Data pair D Connect to RJ45 pin through a magnetics.	RTX4DN	51	52	RTX4BN	Port 4 Data pair BConnect to RJ45 pin through a magnetics.
	RTX4DP	53	54	RTX4BP	
Ground	GND	55	56	GND	Ground
Port 4 Data pair CConnect to RJ45 pin through a magnetics.	RTX4CN	57	58	RTX4AN	Port 4 Data pair AConnect to RJ45 pin through a magnetics
	RTX4CP	59	60	RTX4AP	
Ground	GND	61	62	GND	Ground
Port 5 Data pair DC connect to RJ45 pin through a magnetics.	RTX5DN	63	64	RTX5BN	Port 5 Data pair B Connect to RJ45 pin through a magnetics.
	RTX5DP	65	66	RTX5BP	
Ground	GND	67	68	GND	Ground
Port 5 Data pair C Connect to RJ45 pin through a magnetics.	RTX5CN	69	70	RTX5AN	Port 5 Data pair A Connect to RJ45 pin through a magnetics
	RTX5CP	71	72	RTX5AP	
Ground	GND	73	74	GND	Ground
Port 6 Data pair D Connect to RJ45 pin through a magnetics.	RTX6DN	75	76	RTX6BN	Port 6 Data pair B Connect to RJ45 pin through a magnetics.
	RTX6DP	77	78	RTX6BP	
Ground	GND	79	80	GND	Ground
Port 6 Data pair C Connect to RJ45 pin through a magnetics.	RTX6CN	81	82	RTX6AN	Port 6 Data pair A Connect to RJ45 pin through a magnetics
	RTX6CP	83	84	RTX6AP	
Ground	GND	85	86	GND	Ground

Port 7 Data pair D Connect to RJ45 pin through a magnetics.	RTX7DN	87	88	RTX7BN	Port 7 Data pair B Connect to RJ45 pin through a magnetics.
	RTX7DP	89	90	RTX7BP	
Ground	GND	91	92	GND	Ground
Port 7 Data pair C Connect to RJ45 pin through a magnetics.	RTX7CN	93	94	RTX7AN	Port 7 Data pair A Connect to RJ45 pin through a magnetics
	RTX7CP	95	96	RTX7AP	
PTP0 Input to EPSM. Leave no connect if unused	1PPS_0	97	98	3V3	3.3V/0.6A OUTPUT. Leave no connect if unused
Port 8 Data pair D Connect to RJ45 pin through a magnetics.	RTX8DN	99	100	RTX8BN	Port 8 Data pair B Connect to RJ45 pin through a magnetics.
Port 8 Data pair C Connect to RJ45 pin through a magnetics.	RTX8DP	101	102	RTX8BP	
	5V0	103	104	5V0	Power Input to EPSM
	RTX8CN	105	106	RTX8AN	Port 8 Data pair AC connect to RJ45 pin through a magnetics.
UART_RXD Data input	RTX8CP	107	108	RTX8AP	Power Input to EPSM
	RS232_RXD	109	110	5V0	
UART_TXD Data output	RS232_TXD	111	112	5V0	
No connect	APPS_1	113	114	5V0	
carrier board select config 1 Input to EPSM	DB CONFIG 1	115	116	5V0	
carrier board select config 2 Input to EPSM	DBCONFIG2	117	118	5V0	
Global device reset, active low Input to EPSM	/MR_RST	119	120	5V0	

J2 High-speed B2B connectors



Description	Net Name	PIN	PIN	Net Name	Description
Ground	GND	1	2	GND	Ground
SFP Di ffereni al data inputs. 1G	SFPPLUSA_RXD_N	3	4	SFPPLUSB_FOCD_N	SFP Differential data inputs. 2.5G/1G
	SFPPLUSA RXD_P	5	6	SFPPLUSB_RXD_P	
Ground	GND	7	8	GPM	Ground
SFP Differential data outputs .10	SFPPLUSPLTXD_N	9	10	SFPPLUSB_TXD_N	SFP Differential data outputs 2.5Gi1G
	SFPPLUSA TXD_P	11	12	SFPPLUSB_TXD_P	

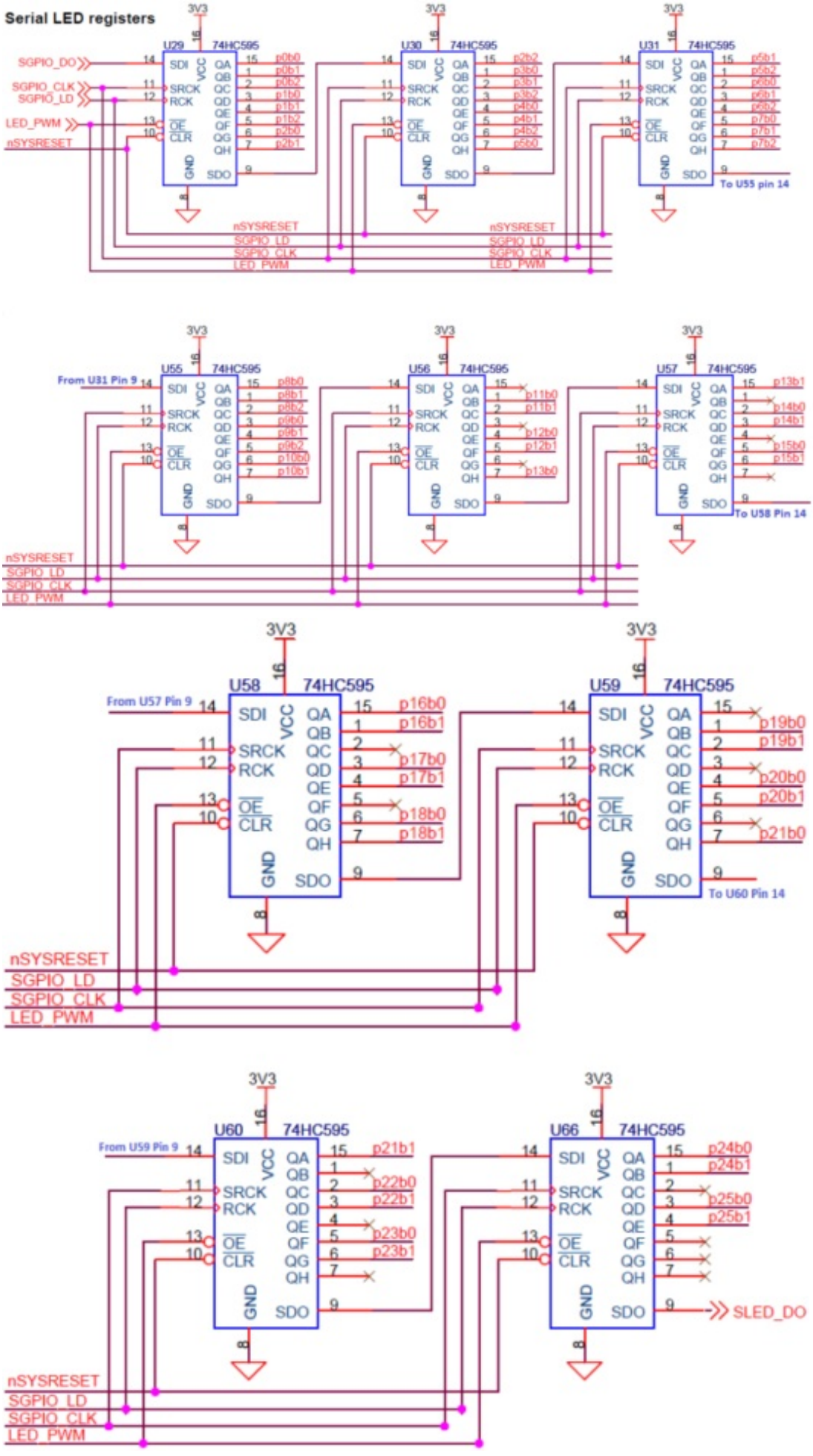
Ground	GND	13	14	GND	Ground
•		15	18	OSGMII_P21_P24_FtXD_P	Differentia data inputs.O.SGM1102.5G/1G
		17	18	CISGIAII_P21_P24_FOD_N	
Ground	910	19	20	GND	Ground
		21	22	OSGMII_P21_P24 TXD_P	Differenial data ouhuts.0SGM110/2.5G/1G
		23	24	OSGMII_P21_P24 TXD_N	
Ground	GND	25	26	GND	Ground
Referent one input to VSC7429. Leave unconnected if not used	CLK125_1	27	28	OSGMILP17_P2O_RXD_P	Differential data Inputs.OSCM1102.5G/1G
Ground	GND	29	30	0SGMII_P17_P20_FOCD_N	
		31	32	GND	Ground
Ground	(3413	33	34	OSGMII_P17_P20 TXD_P	Wormed data oulputs.CISGM110/2.56/16
		35	38	OSGMII_P17_P20 TXD_N	
Ground	GND	37	38	910	Ground
SFP PLUS A and Input to VSC7429	SFPPLUSA_SCL	39	40	OSGMILP13_P16_RXD_P	Differential data lputs.OSGM1102.5G/1G
SFP PLUS A loss nut to VSC7429	SFPPLUSA_LOS	41	42	OSGMII_P13_P16_RXD_N	
SFP PLUS 8 select input to VSC7429	SFPFLUSB_SCL	43	44	CND	
SFP PLUS B loss Input to VSC7429	SFPPLUSA_LOS	45	46	OSGMII_P 13_P 16 TXD_P	Differemlial dma oulputs.OSGM110/2.5G/1G
		47	48	OSGMII_P13_P16 TXD_N	
MIIM data input Output Jed VSC7429	MI12M010	49	50	GND	Ground
MOM clock for VSC7429	MI12_MDC	51	52		

IFt00 IN	NINT_FHY0	53	54		
VSC7429 I2C Clock	12C_SCL	55	56		
VSC7429 I2C Data	I2C_SDA	57	58		
12C_MUXSEL_GP101	GPO1	59	60	SGP102_10	SIO load data output
GP102	GP102	61	€2	SGP102 CI. K	SIO clock output
SIO data output	SGP102_1:10	63	64		
SIO data int	SGP102_1:11	65	68		
gni:brain VSC8512	COMA_MODE	67	68		
ESLED1_Pube Tan VSC8512	LED_PWM	69	70		
Patti Data pair C&D Gamed to RJ45 dn trough a magnetics.Leave unconnected	RTX9DN	71	72	GND	Ground
	RTX9DP	73	74		
	RTX9CN	75	76	RTX98N	Pon 9 Data par A& B Connect to RJ4 5 pin through a magnetics.Leave unconnected
	RTX9CP	77	78	RTX9BP	
IRO1 IN	NINT_PHY1	79	80	RTX9AN	
Device reset, active low nut to EPSM. Leave no comect if not used	NSYSRESET	81	82	RTX9AP	
Ground	GND	83	84	GND	Ground
Pat 9 Data pair D	RTX9D 2X N	85	88	RTX98 2X N	Port 9 Data par B

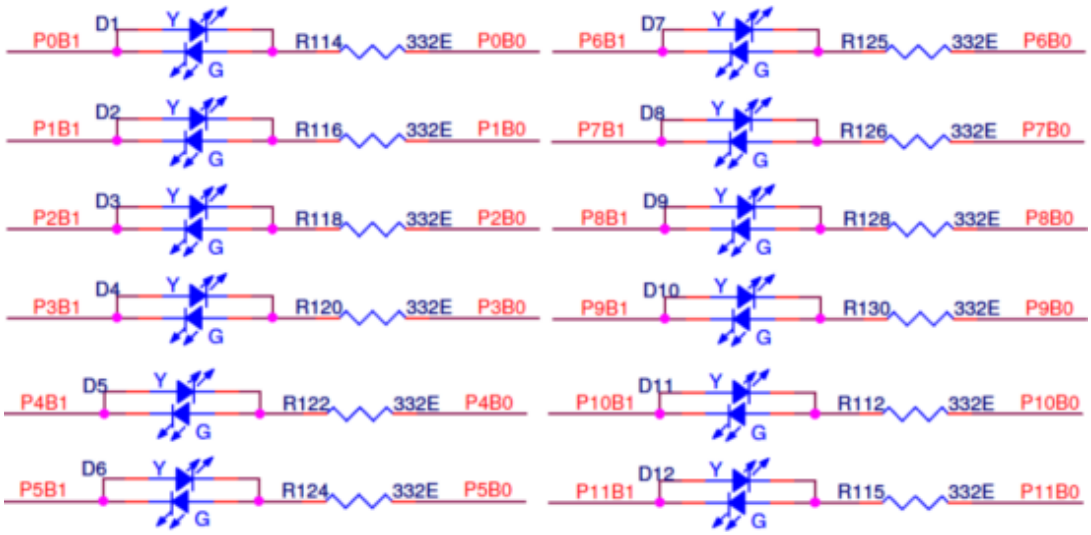
Connect to RJ45 pin through amagnetics.	RTX9D_2X_P	87	88	RTX9B_2X_P	Connect to RJ45 pin through amagnetics.
Ground	GND	89	90	GND	Ground
Port 9 Data pair C Connect to RJ45 pin through amagnetics.	RTX9C_2X_N	91	92	RTX9A_2X_N	Port 9 Data pair A Connect to RJ45 pin through amagnetics.
	RTX9C_2X_P	93	94	RTX9A_2X_P	
Ground	GND	95	96	GND	Ground
Port 10 Data pair D Connect to RJ45 pin through amagnetics.	RTX10DN	97	98	RTX10BN	Port 10 Data pair B Connect to RJ45 pin through amagnetics.
	RTX10DP	99	100	RTX10BP	
Ground	GND	101	102	GND	Ground
Port 10 Data pair C Connect to RJ45 pin through amagnetics.	RTX10CN	103	104	RTX10AN	Port 10 Data pair A Connect to RJ45 pin through amagnetics.
	RTX10CP	105	106	RTX10AP	
Ground	GND	107	108	GND	
Port 11 Data pair D Connect to RJ45 pin through amagnetics.	RTX11DN	109	110	RTX11BN	Port 11 Data pair B Connect to RJ45 pin through amagnetics.
	RTX11DP	111	112	RTX11BP	
Ground	GND	113	114	GND	Ground
Port 11 Data pair C Connect to RJ45 pin through amagnetics.	RTX11CN	115	116	RTX11AN	Port 11 Data pair A Connect to RJ45 pin through amagnetics.
	RTX11CP	117	118	RTX11AP	
Ground	GND	119	120	GND	Ground

LED LOGIC

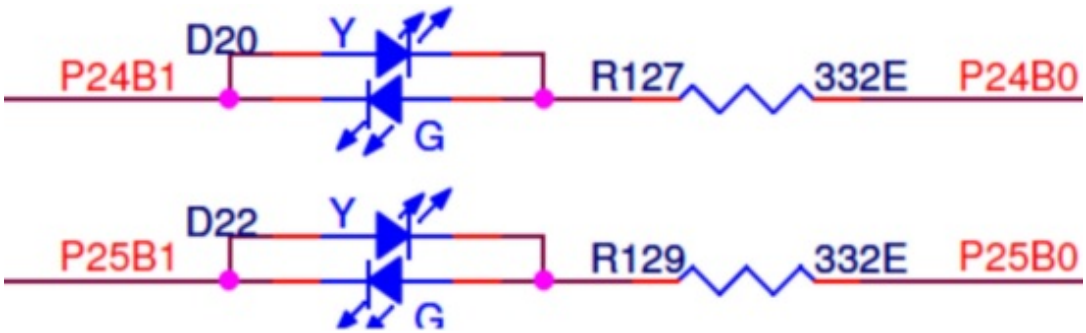
This below section shows the implementation of LED logic on the carrier board. This logic can be implemented inside a CPLD



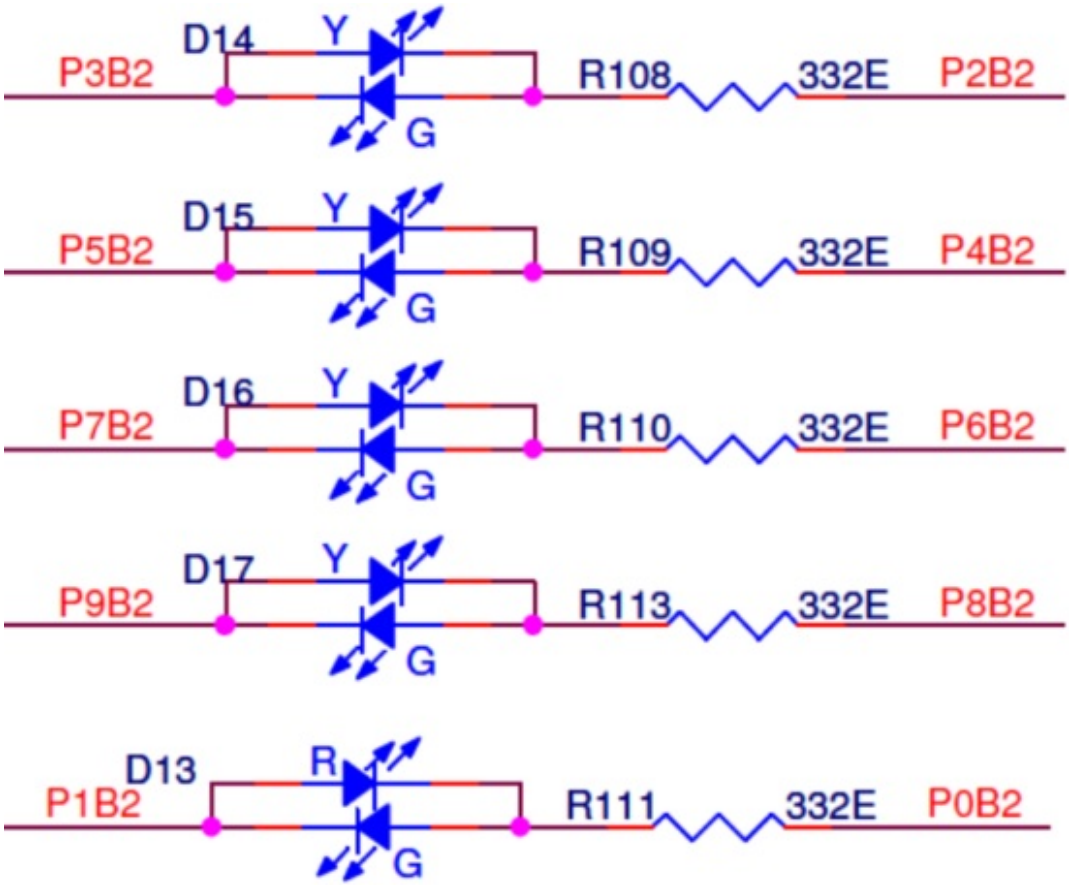
Ethernet port 1-12 LEDs



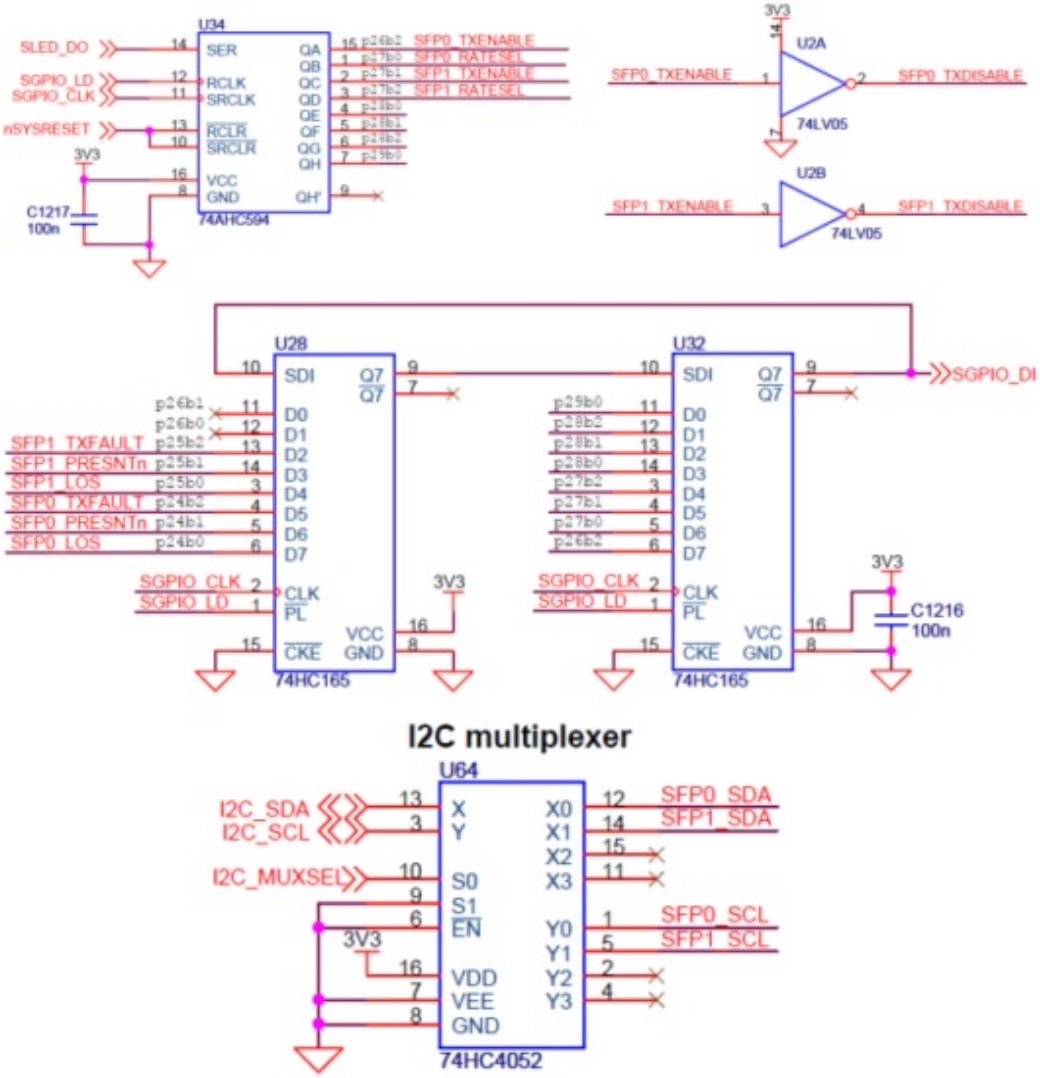
SFP port 1&2 LEDs



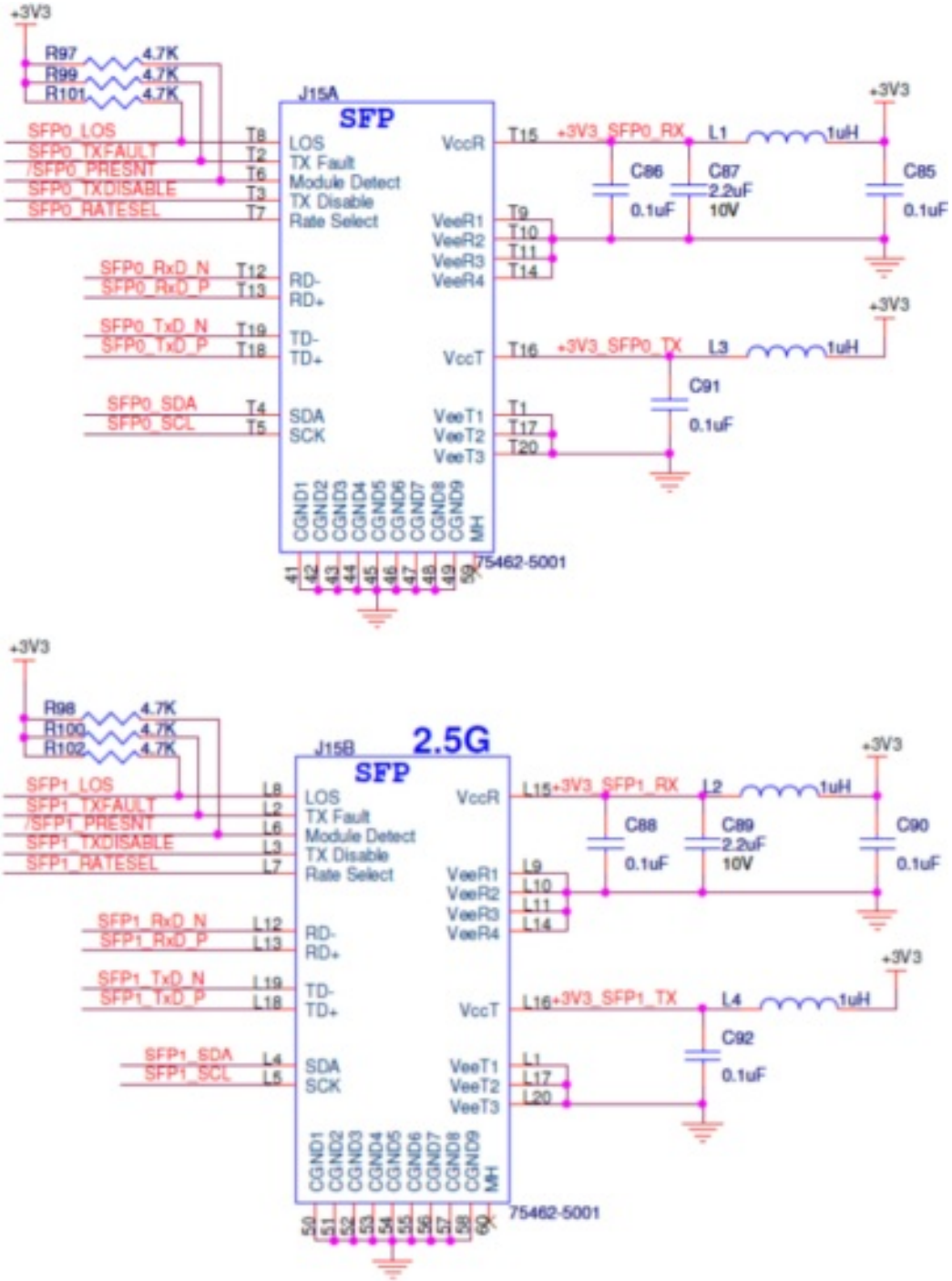
Board Status LEDs



SFP LOGIC



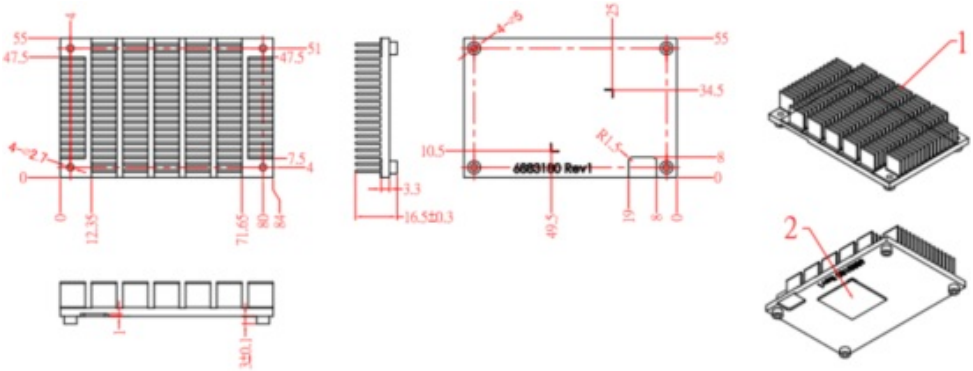
I2C multiplexer



HEAT SINK ACCESSORY

The EPSM-12G2F card comes standard with an aluminum heat sink in the same shape as the board and mounts to the top of the board via the four corner COM express mini board mounting holes. The heat sink contains built in riser blocks that bring the metal close to the surface of all the heat generating components. Thermal pads fill in the gap between the metal and the component top surfaces.

EPSM-12G2F Module with Heat sink attached



Mechanical Dimension of the Heatsink

Documents / Resources

	DIAMOND SYSTEMS EPSM-12G2F Epsilon Ethernet Switch Module [pdf] User Guide EPSM-12G2F Epsilon Ethernet Switch Module, EPSM-12G2F, Epsilon Ethernet Switch Module, Ethernet Switch Module, Switch Module, Module

References

- User Manual