Application Note 44

RCC700A Interfacing and Layout Considerations

This application note provides interfacing and layout considerations for interfacing the RCC700A to fiber optic transceivers and copper cables/printed circuits.

The RCC700A provides a current mode differential driver output at DOUT, $\overline{\text{DOUT}}$ pins. Hence, it needs an external differential resistor across the output. The nominal serial current output is 8 mA. Hence a 100 ohms across DOUT, $\overline{\text{DOUT}}$ provides a 800 mV peak differential swing. 100 ohms provides a convenient source termination for 50 ohms stripline or 50 ohms coax cable.

Interfacing RCC700A to a Fiber Optic Transceiver

Figure 1 shows the termination conditions of RCC700A for interfacing to a fiber optic transceiver.

On the transmit interface, the only requirement is to have an external 100 ohms resistor across DOUT, $\overline{\text{DOUT}}$ of the RCC700A. The transmitter output voltage is nominally 3 Volts for LOW and 3.8 Volts for HIGH at VCC voltage of 5 Volts. On the receive side, the termination requirement is to have a Thevenin equivalent resistance of 50 ohms to 3 Volts. The receive power supply of the fiber optic transceiver is isolated from the other supplies through an inductive PI filter as shown in the figure.

RCC700A Interfacing to DC Coupled Copper Medium

There are two coupling methods for RCC700A interfacing to copper cables/printed circuit traces. The direct coupling is used for printed circuit traces and short copper cables. Also, it is recommended that direct coupled lines are differential to avoid any common mode noise from affecting the performance of the serial link. If the cable length is long, or if there is excessive common mode potential due to ground difference or noise, it is advisable to use AC coupling (either transformer or capacitor). In the case of AC coupling, it is possible to have single ended cables as long as it is well-shielded. In some cases, the two ends of the link may be connected to different power mains and the AC coupling component should be able to withstand the difference in potential between the two power systems.

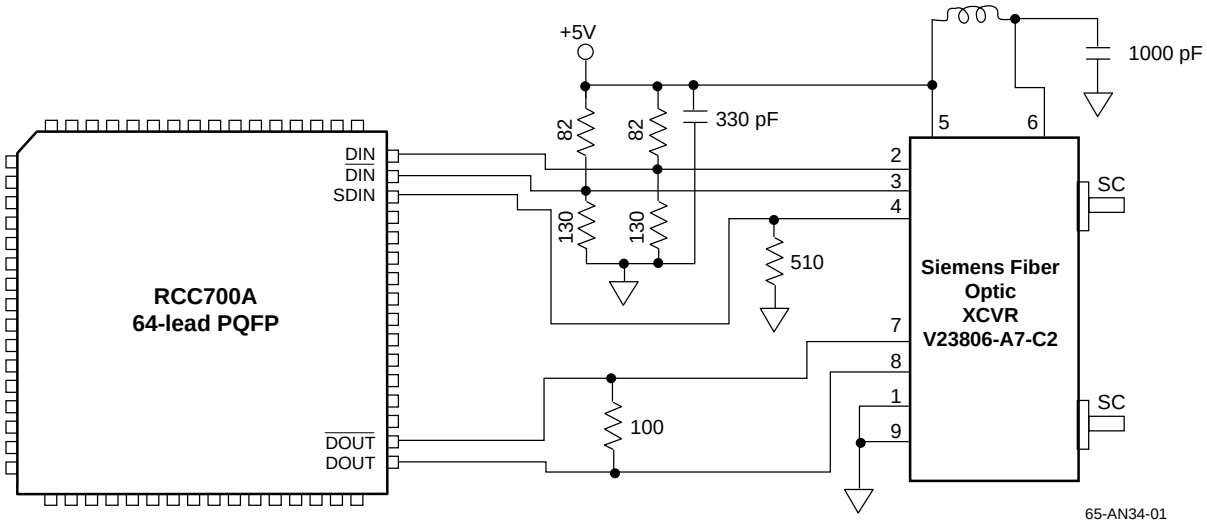

Figure 1. RCC700A Interconnection to a Fiber Optic Transceiver

In the case of direct coupled differential connections, 100 ohms is connected across the serial outputs, DOUT, $\overline{\text{DOUT}}$ of RCC700A. At the receiving end, for a 50 ohms cable/PC trace, a 50 ohms Thevenin resistance to 3 Volts should be connected. This is achieved by connecting 82 ohms to 5 volts and 130 ohms to ground. Figure 2 shows the direct coupling interconnection of the RCC700A to coax cable.

RCC700A interfacing to AC coupled Differential Copper medium

In the case of AC coupled differential connections, at the source end 100 ohms is connected across the serial outputs, DOUT, $\overline{\text{DOUT}}$ of RCC700A. At the receiving end, for a 50 ohms cable, a 50 ohms Thevenin resistance to 3.7 Volts should be connected. This is achieved by connecting 68 ohms to 5 volts and 190 ohms to ground. Figure 3 shows the AC coupling of RCC700A to differential coax cable.

RCC700A interfacing to AC coupled Single-ended Copper medium

In the case of single-ended copper cables interfacing to RCC700A through AC coupled capacitors or transformers, the receiving end is terminated with the Thevenin resistance of 50 ohms to ground. This is achieved by connecting 68 ohms to 5 volts and 190 ohms to ground. At the transmitting end, the serial outputs, DOUT, $\overline{\text{DOUT}}$ of RCC700A are connected with 100 ohms. In the case of capacitive coupling, the unused transmitting output is connected through a 0.1uF capacitor to 50 ohms. This will provide balanced termination across DOUT and $\overline{\text{DOUT}}$. Figure 4 shows the AC coupling interconnection of RCC700A to single-ended coax cable.

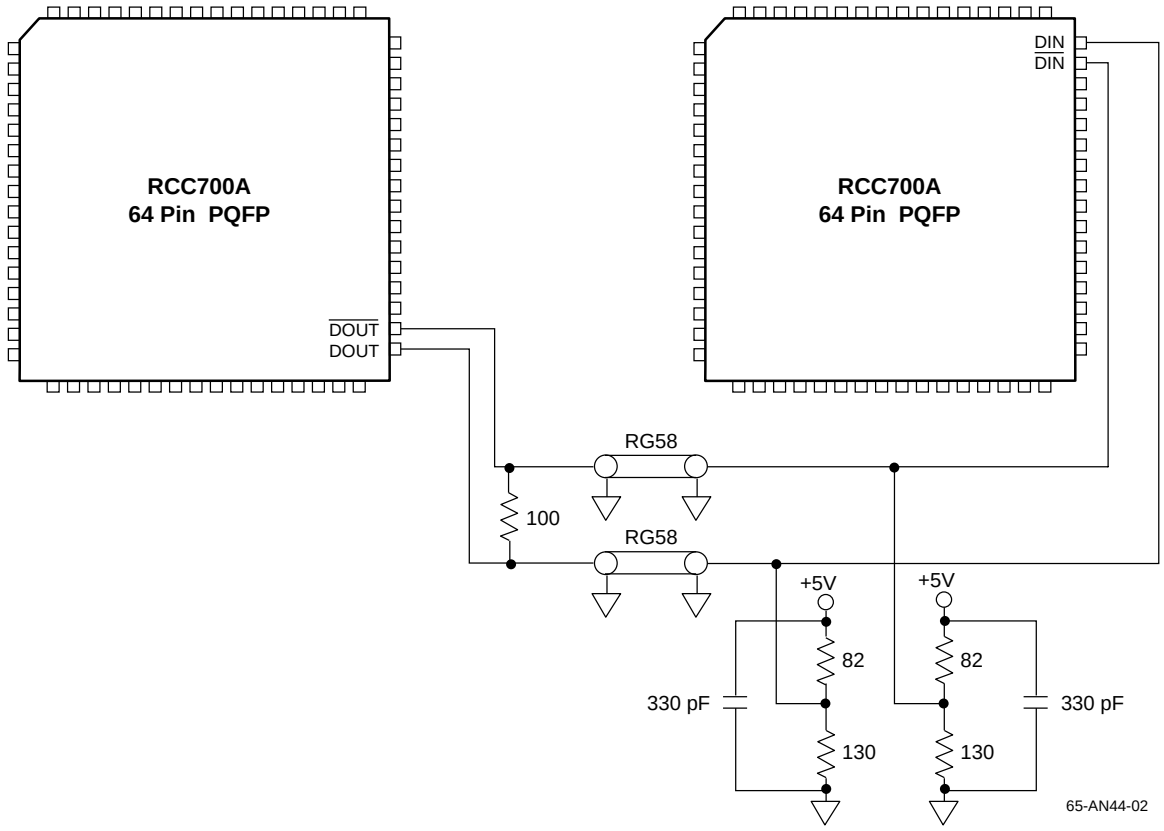

Figure 2. RCC700A Direct Coupling Interconnection to Coax Cable

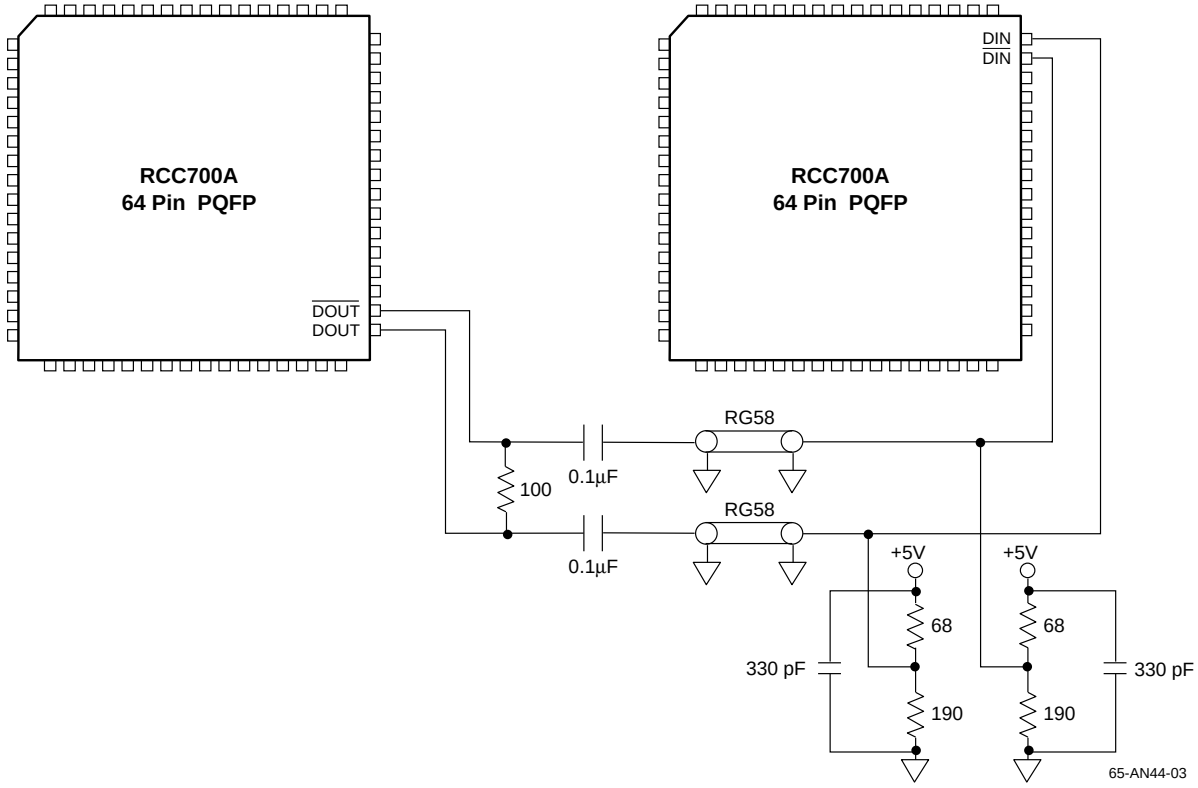

Figure 3. RCC700A AC Coupling Interconnection to Differential Coax Cable

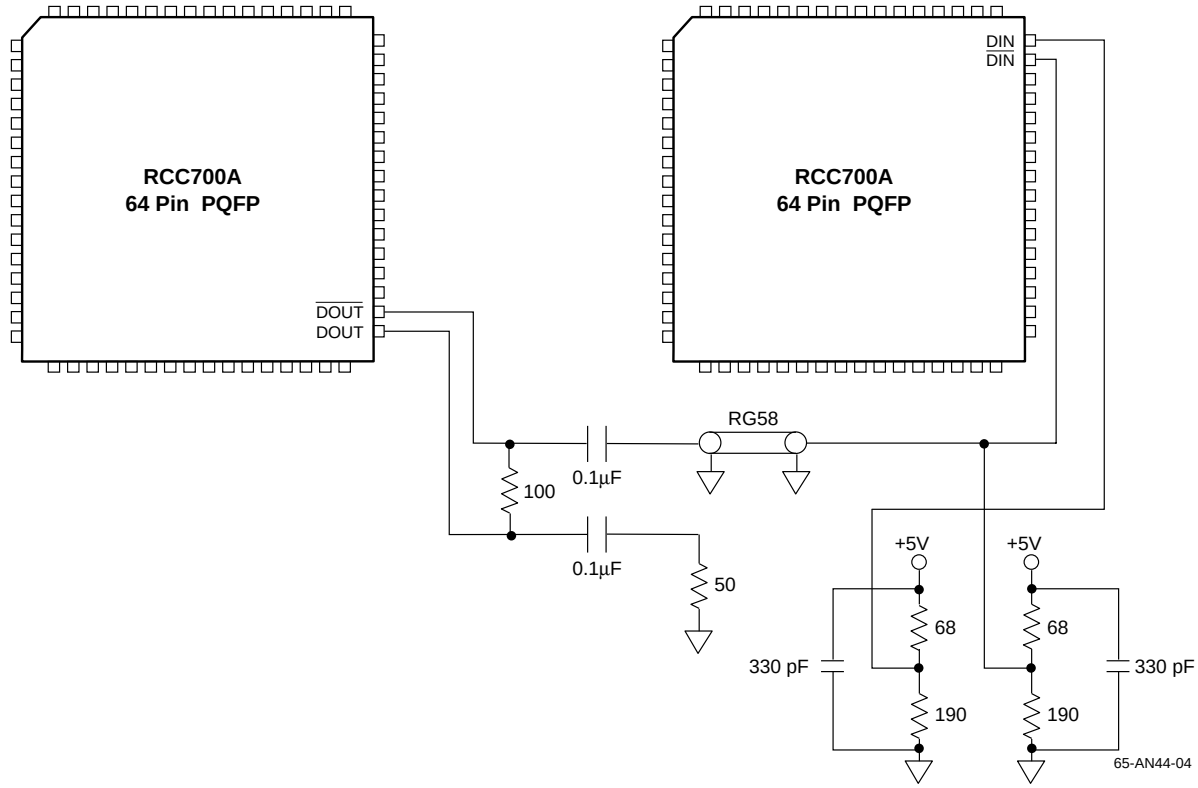

Figure 4. RCC700A AC coupled to single-ended coax cable

Layout Guidelines

It is preferable to have a dedicated VCC and ground planes. The VCC pins should have a 0.1 uF power supply decoupling capacitors connected to the ground plane. The decoupling capacitor should be connected very close to the pin. The via from the VCC pin to the VCC plane should be after the capacitor. A sample schematics and layout are shown for RCC700A Fibre Channel demo card in Figures 5, 6, and 7. The part list is summarized in Figure 8. This layout includes connections to fiber optic transceiver.

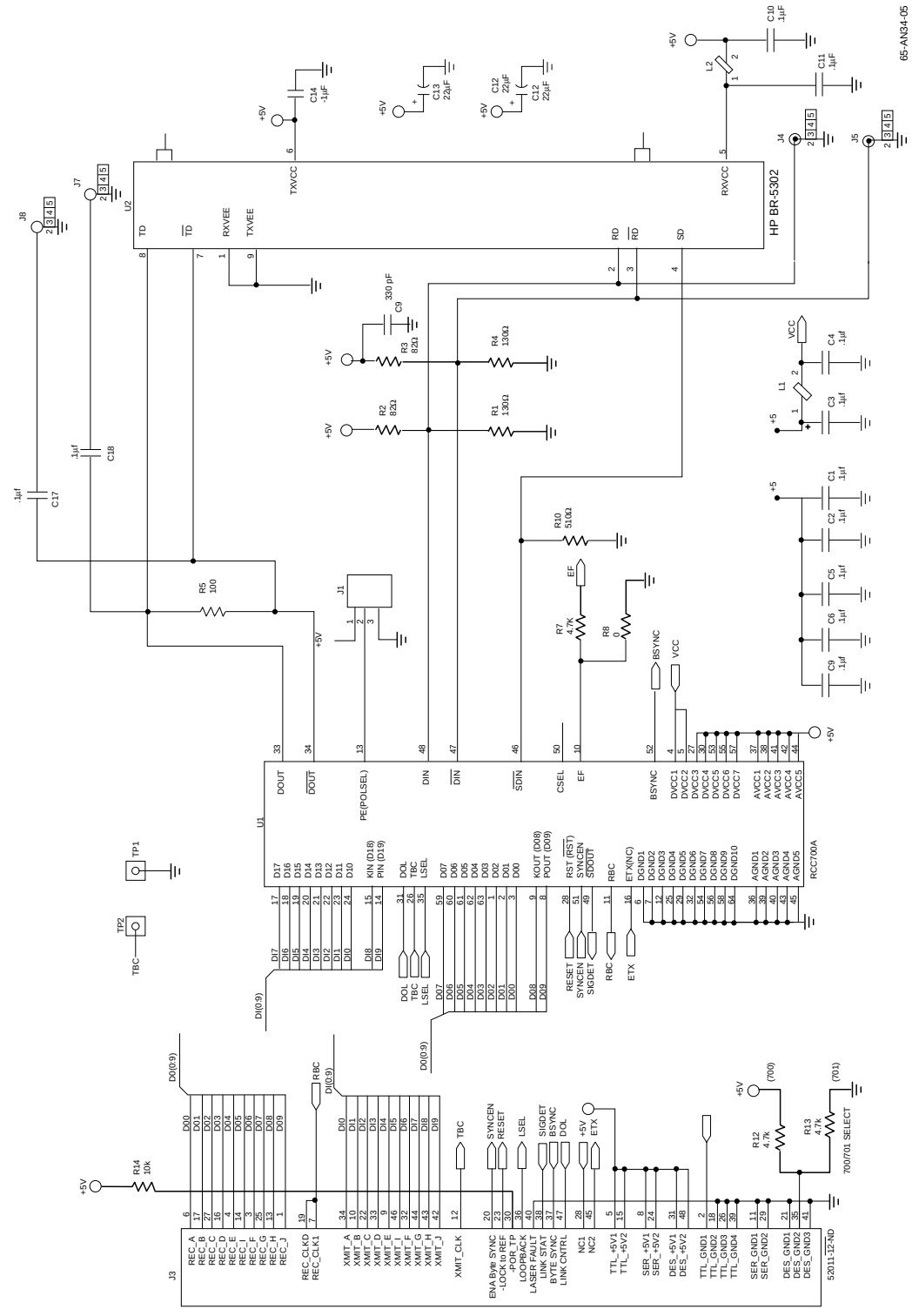

Figure 5. Raytheon RCC700A Fibre Channel Demo Board

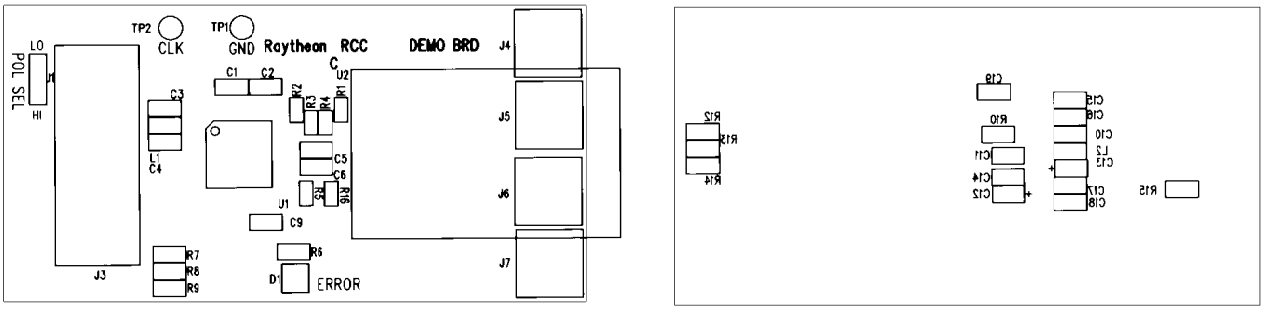

Figure 6. RCC700A Demo Card Silkscreen

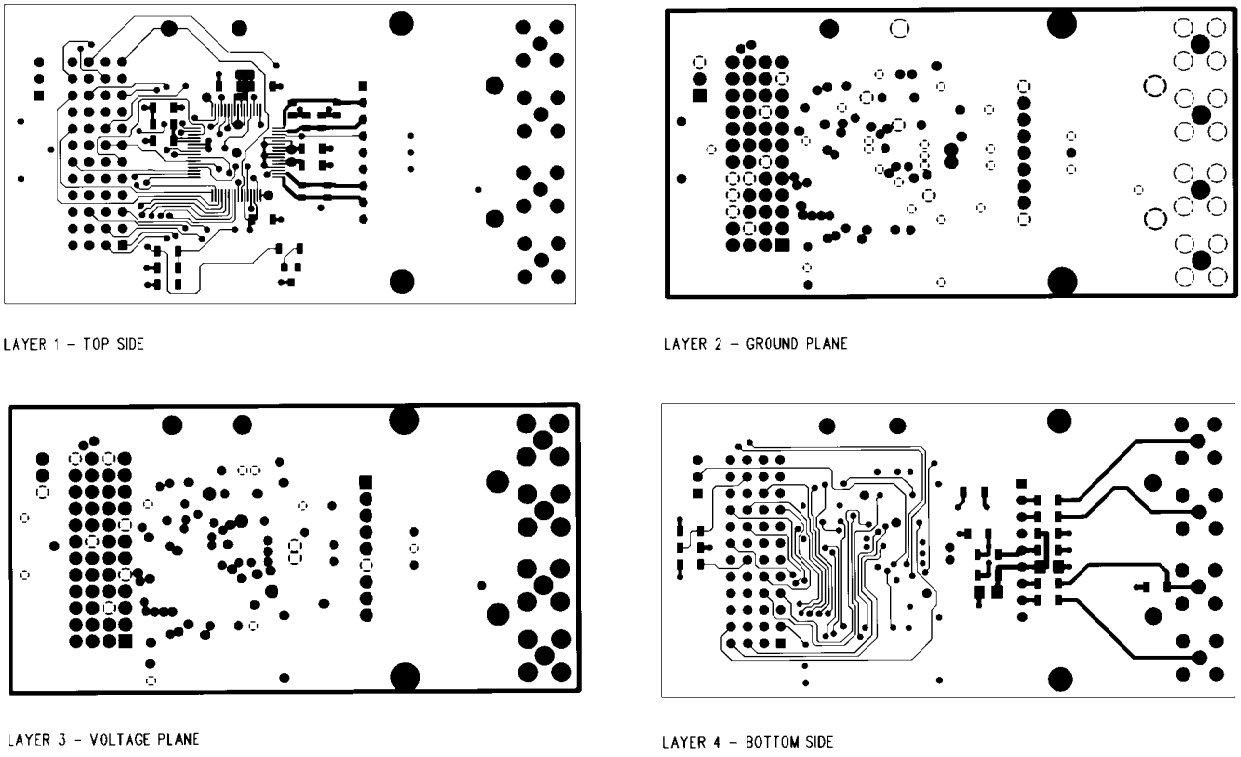

Figure 7. RCC700A Demo Card Layout

Reference	Value	Mfr/Disti	Part #	Description	Qty
U1		Raytheon	RCC700AKA	Fibre Channel Transceiver	1
U2		HP	BR-5302	Fiber Optic Transceiver Module	
C1-6	0.1uF	NOVA	1206Z500NT	Monolithic Chip Capacitor, 1206 package	12
C9-C11, C14					
C17-C18					
C12-13	22uF			Tantalum Capacitor, 16V, A-Case	2
C19	330pF			Monolithic Chip capacitor, 0805 package	1
J1		Digikey	S1111-3-ND	Header, 3 x 1, 100 mil spacing	1
J3		Digikey	S2011-12-ND	48 pin Connector	1
J4-J7		Digikey	J501-ND	PC Mount Right angled SMA connector	4
L1-2		TDK	CB50-1206	Ferrite Beads, 1206 package	2
R1, R3	130 ohm	BOURNS	CR0805JVC	Chip Resistor, 1/10watt 5%, 0805 package	2
R2, R4	82 ohm	BOURNS	CR0805JVC	Chip Resistor, 1/10watt 5%, 0805 package	2
R5	100 ohm	BOURNS	CR0805JVC	Chip Resistor, 1/10watt 5%, 0805 package	1
R7, R12	4.7K ohm	ROHM	MCR18PZHJX	Chip Resistor, 1/10watt 5%, 1206 package	3
R13					
R14	4.7K ohm	ROHM	MCR18PZHJX	Chip Resistor, 1/10watt 5%, 1206 package	1
TP1-2				Test Point	

Figure 8. Raytheon's RCC700A Fibre Channel Demo Board Parts List

Notes:

LIFE SUPPORT POLICY:

Raytheon's products are not designed for use in life support applications, wherein a failure or malfunction of the component can reasonably be expected to result in personal injury. The user of Raytheon components in life support applications assumes all risk of such use and indemnifies Raytheon Company against all damages

Raytheon Electronics
Semiconductor Division
350 Ellis Street
Mountain View CA 94043
415 968 9211
FAX 415 966 7742

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