APPLICATION NOTE

RELEASED 6/21/11

AN-SPW-006-001

Decoupling Techniques for the UT200SpW4RTR

Table 1: Cross Reference of Applicable Products

Product Name:	Manufacturer Part Number	SMD #	Device Type	Internal PIC
200 Mbps 4-port SpaceWire router	UT200SpW4RTR	5962-08244	01	WD41

1.0 Overview

The purpose of this application note is to review recommended decoupling techniques for the UT200SpW4RTR SpaceWire router. With all the possible system variations such as power supply voltage, temperature, operating frequency, and other configuration variations the system designer is cautioned to perform a thorough analysis to verify the decoupling scheme works for system specific requirements.

Information contained in this application note is a recommended decoupling scheme for the UT200SpW4RTR. The decoupling scheme discussed below has been shown to work over the temperature range of -40°C to +105°C, during compliance testing (ECSS-E-ST-50-12C), general use of the device, and power supply variations I/O supply: V_{DD} = 3.3V± 0.3V, Core supply: V_{DDC} = 2.5V ± 0.2V.

2.0 Capacitor Selection

As a rule of thumb for every five power supply pins a 0.01μF and a 0.1μF pair should be used to properly decouple the UT200SpW4RTR device. Tantalum capacitors in the range of 47μF are recommended.

There are 19 V_{DDC} (2.5V) pins and 27 V_{DD} (3.3V) pins on the 4-port SpaceWire Router device. Table 2 details the power and ground connections for the WD41. V_{DDC} should have approximately four 0.01μF and a 0.1μF pairs and at least one 47μF. V_{DD} should have approximately six 0.01μF and a 0.1μF pairs and at least one 47μF. This termination scheme is a recommended scheme; the system designer should perform the proper calculations to ensure that this termination scheme meets specific system requirements.

Table 2. Power and ground connections for WD41

Pin Name	Pin Number	Description
V_{DD}	T11, T5, N8, P11, N9, P14, N13, M7, K15, M10, J4, K3, J13, G3, H4, E7, H13, E10, G13, C11, G15, C14, D8, A5, D9, D13, A11	I/O and LVDS supply voltage, 3.3V
V_{DDC}	T8, R1, P8, N4, M15, L6, L11,K5,K12,H1,G5, G12, F6, F11, E15, D4, C8, B1, A8	Core supply voltage, 2.5V
V_{SS}	T1, N14, T14, L5, R8, L13, R11, L15, P3, J15, M1, H15, M5, F5, M8, F13, M9, F15, M12, D14, L7, L8, L9, L10, K6, K7, K8, K9, K10, K11,J1, J5, J6, J7, J8, J9, J10, J11, J12, H5, H6, H7, H8, H9, H10, H11, H12, G6, G7, G8, G9, G10, G11, F7, F8, F9, F10, E1, E5, E8, E9, E12, C3, B8, B11, A2, A14, R7, P5, P6,P7, P9, P10, N5, N6, N7, N10, N11, N12, M4, M6, M11, L4, K4, H2, G4, F4	I/O and Core supply ground, 0.0V

3.0 UT200SpW4RTR-EVB Example Decoupling Scheme

Figure 1 shows the decoupling scheme used for the UT200SpW4RTR on the UT200SpW4RTR-EVB Evaluation board. This decoupling scheme has been proven at 200Mbps, as well as 10Mbps operation, at temperature and voltage extremes.

APPLICATION NOTE

RELEASED 6/21/11

AN-SPW-006-001

Decoupling Techniques for the UT200SpW4RTR

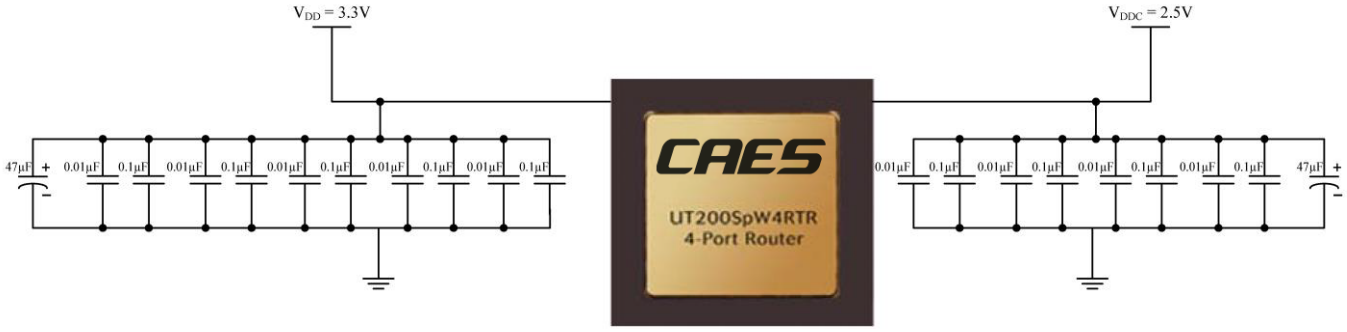

Figure 1. Example Decoupling Scheme

4.0 Summary

Selecting the proper decoupling capacitors for the UT200SpW4RTR device prevents power supply droop during times when the router draws increased current. This application note is intended to provide the system designer with a recommended decoupling scheme from which to start designing from.