Decoupling techniques for the UT200SpW4RTR

Table 1: Cross Reference of Applicable Products

| Product Name: 200 Mbps 4-port SpaceWire router | Manufacturer Part Number: UT200SpW4RTR | SMD # Number: 5962-08244 | Device Type: 01 | Internal PIC Type: 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: \( V_{DD} = 3.3V \pm 0.3V \), Core supply: \( V_{DDC} = 2.5V \pm 0.2V \).

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

<table>
<thead>
<tr>
<th>Pin Name</th>
<th>Pin Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>( V_{DD} )</td>
<td>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</td>
<td>I/O and LVDS supply voltage, 3.3V</td>
</tr>
<tr>
<td>( V_{DDC} )</td>
<td>T8, R1, P8, N4, M15, L6, L11, K5, K12, H1, G5, G12, F6, F11, E15, D4, C8, B1, A8</td>
<td>Core supply voltage, 2.5V</td>
</tr>
</tbody>
</table>
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.

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.