

AN1906

MC92600 WarpLink Quad Configuring Unused Channels to Minimize Power

Prepared by: Bob Garvey
Design Engineer

INTRODUCTION

This application note details how to configure an unused WarpLink Channel to minimize power consumption of this device.

Warning: WarpLink is designed to allow word synchronization (32 bit alignment) for all 4 channels. If a channel is not used then word synchronization is not supported for the remaining channels.

1.1 Configuration Requirements

When configuring unused channels for minimizing power consumption, all outputs associated with an unused channel should be left unconnected. All inputs (other than Receiver Link Inputs) should be tied to ground. The Receiver Link Inputs (RLINK_n_N and RLINK_n_P) should be terminated as shown in Figure 1.

Lower values of R_1 and R_2 improve noise margin (AC power) at the expense of DC power. Higher values of R_1 and R_2 reduce noise margin but save DC power. R_1 and R_2 must be selected such that $V_{inp} - V_{inm} \geq 35\text{mV}$. This is the minimum voltage difference necessary to maintain adequate noise margins. The best values for R_1 and R_2 are: $R_1 = R_2 = 2.2\text{k}$ ohms. This achieves $V_{inp} - V_{inm} = 38\text{mV}$.

Other values will work with slightly more power being drawn as long as the following relationships are met:

$$\frac{V_{dd}}{2} \leq V_{cm} \leq \frac{2 \cdot V_{dd}}{3}$$

$$\frac{R_2}{2} \leq R_1 \leq R_2$$

$$R_1 + R_2 \leq 4.4\text{k}$$

It does not matter which signal is pulled down. The important point is that the other should be pulled up. RLINK_n_P may be pulled down and RLINK_n_N pulled up. RLINK_n_N may be pulled down and RLINK_n_P pulled up.

Multiple links may share the same R_1 and R_2 (in parallel) by adjusting R_1 and R_2 according to:

$$R_{1\text{new}} = \frac{R_1}{x} \quad R_{2\text{new}} = \frac{R_2}{x}$$

where "x" is the number of links sharing R_1 and R_2 .

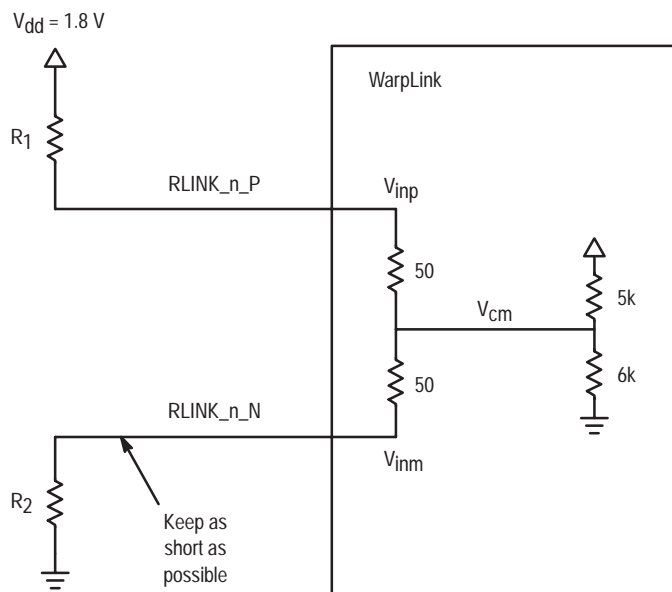


Figure 1. Unused RLINK Termination

Table 1 lists the connections for the inputs and outputs of each unused channel to minimize power. All unused channels must be connected as shown.

Table 1: WarpLink Pinout and Termination

WarpLink Pinout *	Input/Output	Disposition
XMIT_n_0	I	GND
XMIT_n_1	I	GND
XMIT_n_2	I	GND
XMIT_n_3	I	GND
XMIT_n_4	I	GND
XMIT_n_5	I	GND
XMIT_n_6	I	GND
XMIT_n_7	I	GND
XMIT_n_K	I	GND
XMIT_n_IDLE_B	I	GND
XLINK_n_P	O (link)	N/C
XLINK_n_N	O (link)	N/C
RECV_n_0	O	N/C
RECV_n_1	O	N/C
RECV_n_2	O	N/C
RECV_n_3	O	N/C
RECV_n_4	O	N/C
RECV_n_5	O	N/C
RECV_n_6	O	N/C
RECV_n_7	O	N/C
RECV_n_K	O	N/C
RECV_n_9	O	N/C
RECV_n_IDLE	O	N/C
RECV_n_ERR	O	N/C
RECV_n_RCLK	O	N/C
RLINK_n_P	I (link)	See Figure 1
RLINK_n_N	I (link)	See Figure 1

* "n" is a placeholder for the channel identifier "A" through "D".

1.2 Power Consumption Estimates

Tables 2 and 3 contain estimated power consumption for various WarpLink configurations assuming the guidelines defined in Section 1.1 of this document are followed.

Table 2: Power Estimates (mW) for 8b10b Mode

Supply	Condition*	1 active channel	2 active channels	3 active channels	4 active channels
3.3V	Typical	41	82	123	164
1.8V	Typical	391	519	648	777
Total	Typical	432	601	771	941
3.3V	Worst Case	49	98	147	196
1.8V	Worst Case	453	603	753	902
Total	Worst Case	502	701	900	1098

Table 3: Power Estimates (mW) for 10 bit Mode


Supply	Condition*	1 active channel	2 active channels	3 active channels	4 active channels
3.3V	Typical	48	96	144	192
1.8V	Typical	391	519	648	777
Total	Typical	439	615	792	969
3.3V	Worst Case	57	114	171	228
1.8V	Worst Case	453	603	753	902
Total	Worst Case	510	737	924	1130

* Typical power conditions for 3.3V logic is 3.3V, 40°C, and typical process

Typical power conditions for 1.8V logic is 1.8V, 40°C, and typical process

Worst Case power conditions for 3.3V logic is 3.6V, 105°C, and best case process

Worst Case power conditions for 1.8V logic is 1.95V, 105°C, and best case process

Motorola reserves the right to make changes without further notice to any products herein. Motorola makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does Motorola assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation consequential or incidental damages. "Typical" parameters which may be provided in Motorola data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. Motorola does not convey any license under its patent rights nor the rights of others. Motorola products are not designed, intended, or authorized for use as components in systems intended for surgical implant into the body, or other applications intended to support or sustain life, or for any other application in which the failure of the Motorola product could create a situation where personal injury or death may occur. Should Buyer purchase or use Motorola products for any such unintended or unauthorized application, Buyer shall indemnify and hold Motorola and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that Motorola was negligent regarding the design or manufacture of the part. Motorola and  are registered trademarks of Motorola, Inc. Motorola, Inc. is an Equal Opportunity/Affirmative Action Employer.

How to reach us:

USA/EUROPE/Locations Not Listed: Motorola Literature Distribution;
P.O. Box 5405, Denver, Colorado 80217. 1-303-675-2140 or 1-800-441-2447

JAPAN: Motorola Japan Ltd.; SPS, Technical Information Center, 3-20-1,
Minami-Azabu, Minato-ku, Tokyo 106-8573 Japan. 81-3-3440-3569

Technical Information Center: 1-800-521-6274

ASIA/PACIFIC: Motorola Semiconductors H.K. Ltd.; Silicon Harbour Centre,
2, Dai King Street, Tai Po Industrial Estate, Tai Po, N.T., Hong Kong.
852-26668334

HOME PAGE: <http://www.motorola.com/semiconductors/>

**MOTOROLA**

**For More Information On This Product,
Go to: www.freescale.com**

AN1906/D