NB7NPQ7021MMUGAEVB

NB7NPQ7021MMUGAEVB Evaluation Board User's Manual

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EVAL BOARD USER'S MANUAL

Introduction

The NB7NPQ7021MMUGAEVB evaluation board was developed to provide a convenient platform to quickly verify the operation of the NB7NPQ7021M redriver in a USB type−A system environment.

This evaluation board manual contains:

- Information on the NB7NPQ7021M Evaluation Board
- Board Schematics
- Bill of Materials

Demo Board

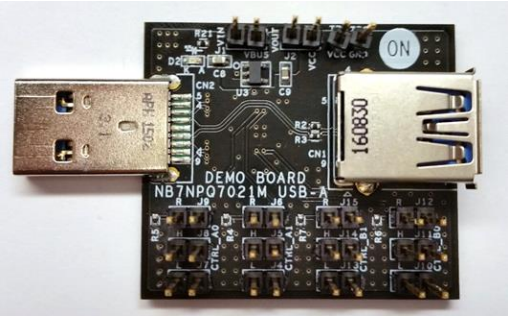

Figure 1. Kit Contents

Board Features

- Accommodates the Functional Evaluation of the NB7NPQ7021M
- Acts as a Reference Design that Can Easily be Modified for Active Cables, UFP (Upstream Facing Port), DFP (Downstream Facing Port), and DRP (Dual Role Port) Applications
- Type−A Plug and Receptacle to Easily Place in the Existing System Environment
- On Board Control Pins for Adjusting Settings without Compromising Form Factor

Part Description

The NB7NPQ7021M is a 3.3 V dual channel, linear redriver for USB 3.1 applications that supports both 5 and 10 Gbps data rates. Signal integrity degrades from PCB traces and transmission cables which may cause inter−symbol interference (ISI). The NB7NPQ7021M compensates for these losses by engaging varying levels of equalization at the input receiver. The output transmitter circuitry provides user selectable flat gain settings to create the best eye openings for the outgoing data signals. The flexibility of this part allows it to fit into many system applications.

After power up, the NB7NPQ7021M periodically checks both of the TX output pairs for a SuperSpeed USB receiver. When the receiver is detected, the RX termination becomes enabled and the NB7NPQ7021M is set to perform the redriver function.

The NB7NPQ7021M comes in a small 3 mm x 3 mm UQFN−16 package and is specified to operate across the entire industrial temperature range, –40°C to 85°C.

This manual should be used in conjunction with the device datasheet which contains full technical details on the device specifications and operation.

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BOARD MAP AND FUNCTIONAL SUMMARY

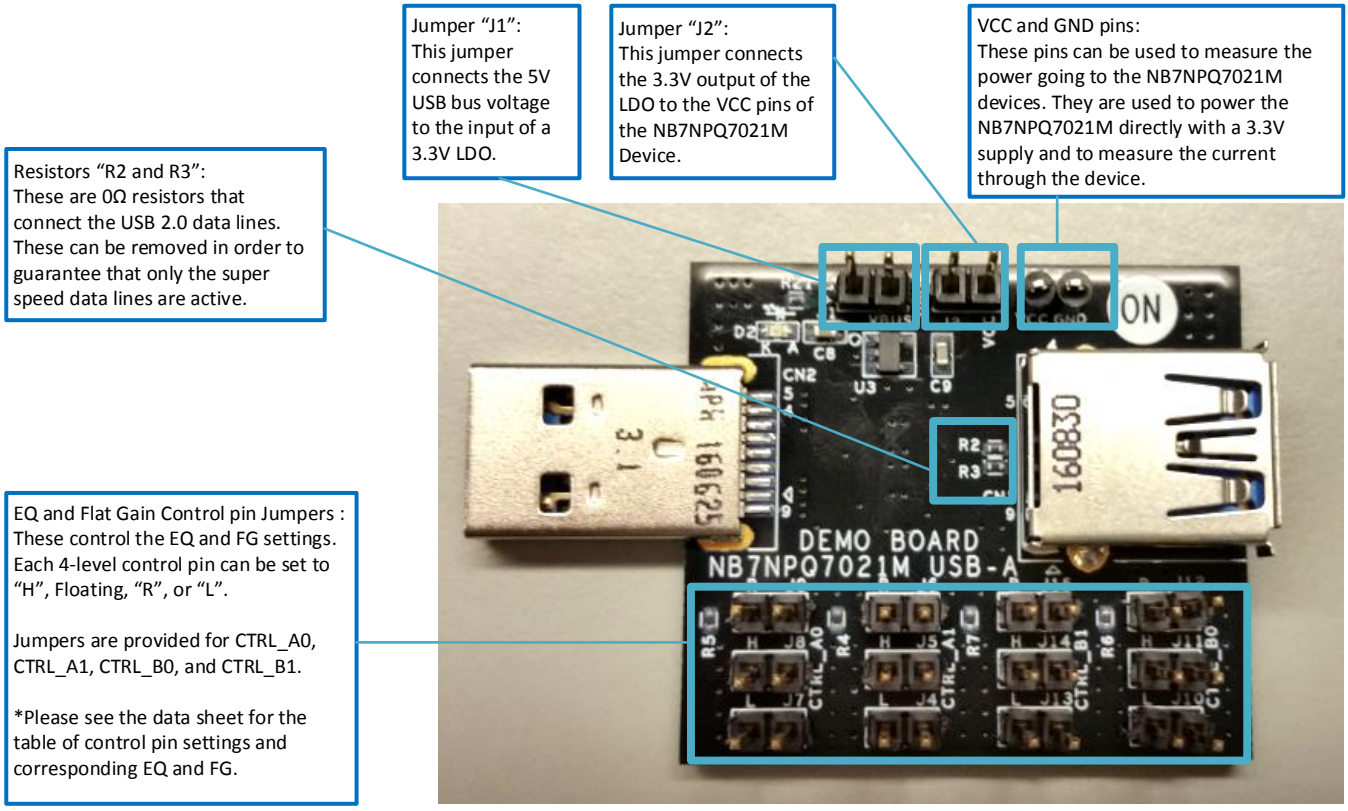


Figure 2. NB7NPQ7021M Evaluation Board Important Connection Information

External Power Supply Instructions

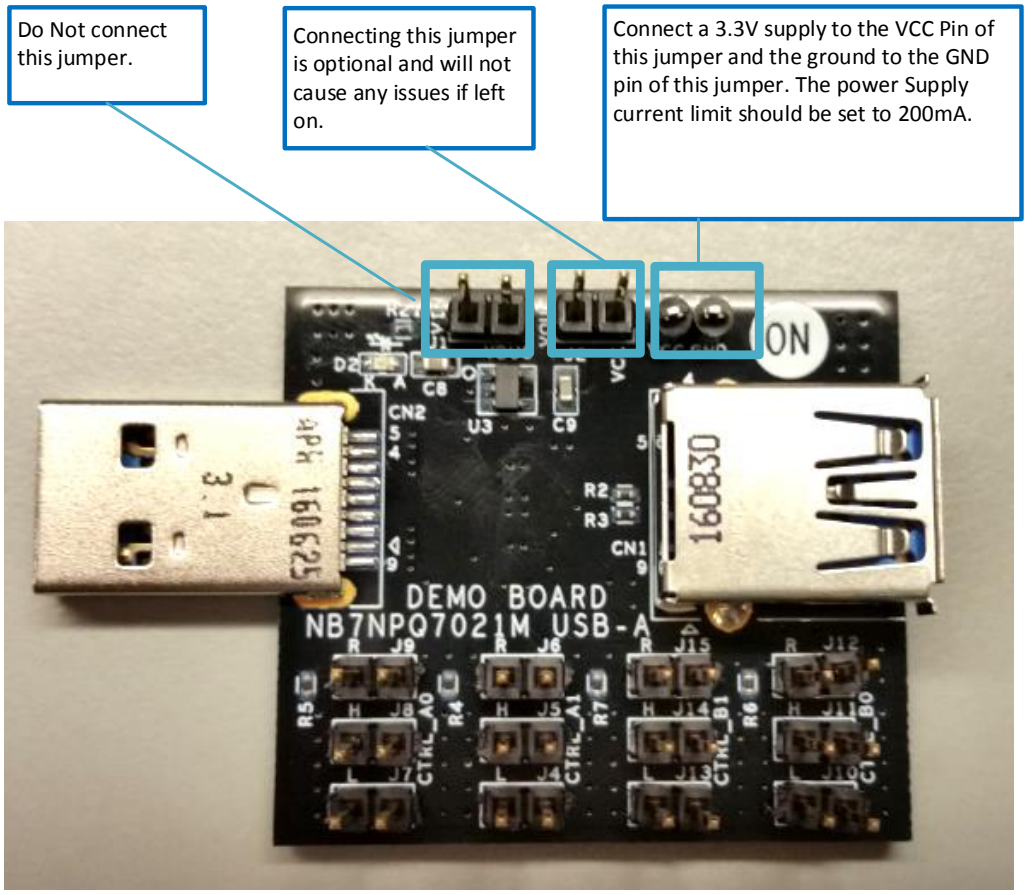


Figure 3. NB7NPQ7021M Evaluation Board – Connecting to an External Power Supply

Select Power Source

The NB7NPQ7021MMUGAEVB has the flexibility to be powered through USB's VBUS, or an external power supply. Table 1 and Figure 3 describe the jumper settings for each of the configurations:

Monitoring Current / Power

There are two easy ways to monitor the current consumed by the redriver. If you are using an external power supply, you can simply use the current meter commonly found on the power supplies. If you would like to use a current probe, simply solder the probe between the VCC pin and the power supply. This will allow monitoring of the NB7PQ7021M's current consumption.

Step 4: USB 2.0 Data Lines

The USB 2.0 lines can be disconnected by removing the 0Ω resistors R2 and R3 on the D+ and D− lines. This is useful if you cannot easily tell whether the downstream facing port has acknowledged a super speed (+) connection with the inserted loss, or if it stepped down to high speed data rates. When a receiver is detected through RxDetect, the DFP will initialize link training. It will send a test signal out at the highest data rate and expect to see the same signal sent back by the UFP. If the signals do not match due to ISI (or any other connection issues) then it will drop down the data rate to USB 2.0 speeds.

On Windows machines, an easy way to tell that a super speed connection was not established is to look for a pop−up in the task bar letting the user know that "This device can perform faster". A disk benchmarking tool like Crystal Disk Mark that lets you test read and write speeds to a peripheral storage can also be used.

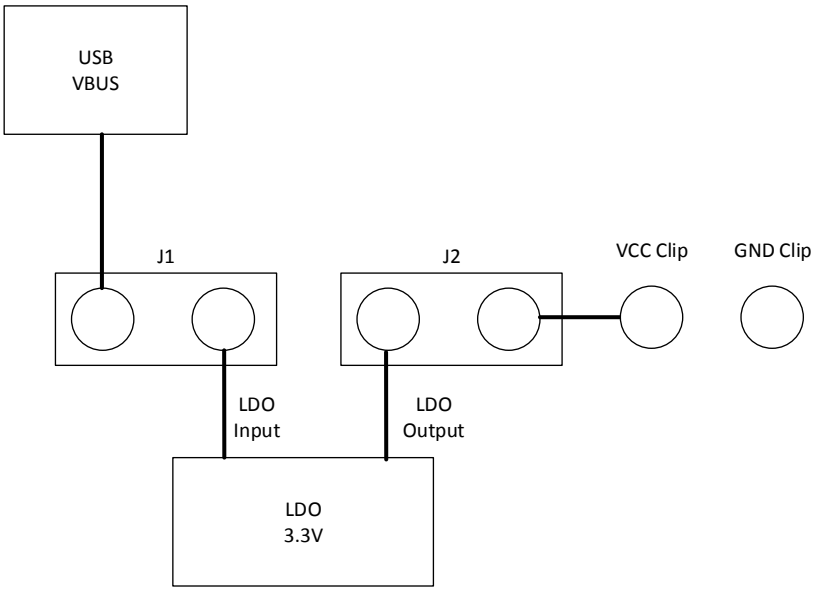
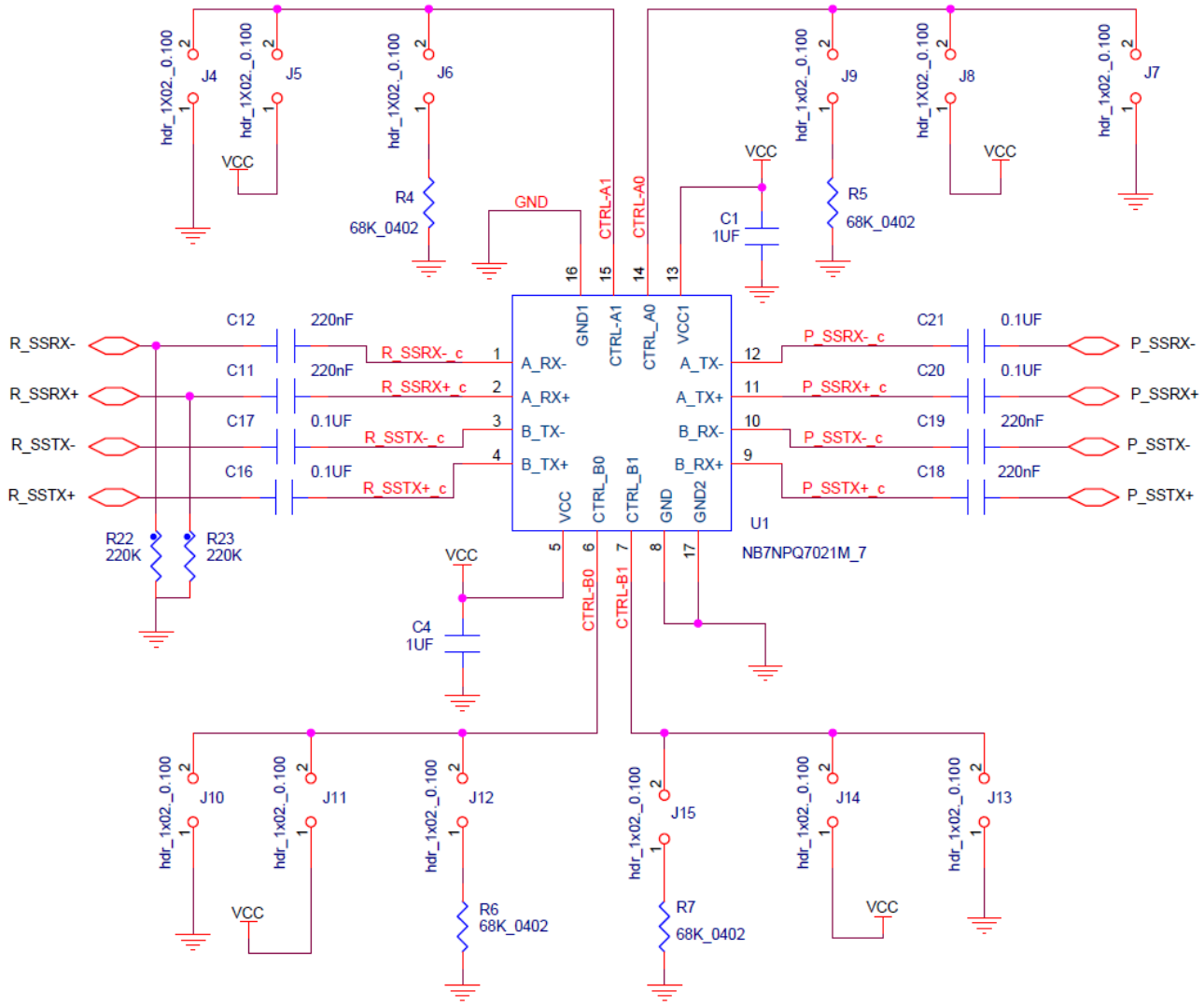


Figure 4. Power Source Selection

Table 1. Selecting a Power Source	
USB VBUS	Place jumper on J1 and a Jumper on J2
External Supply	Open J1 and connect positive lead of external supply to VCC and apply 3.3 V. Ensure that GND is connected to ground and that current limit is set to 200mA.

Complete Board Schematics



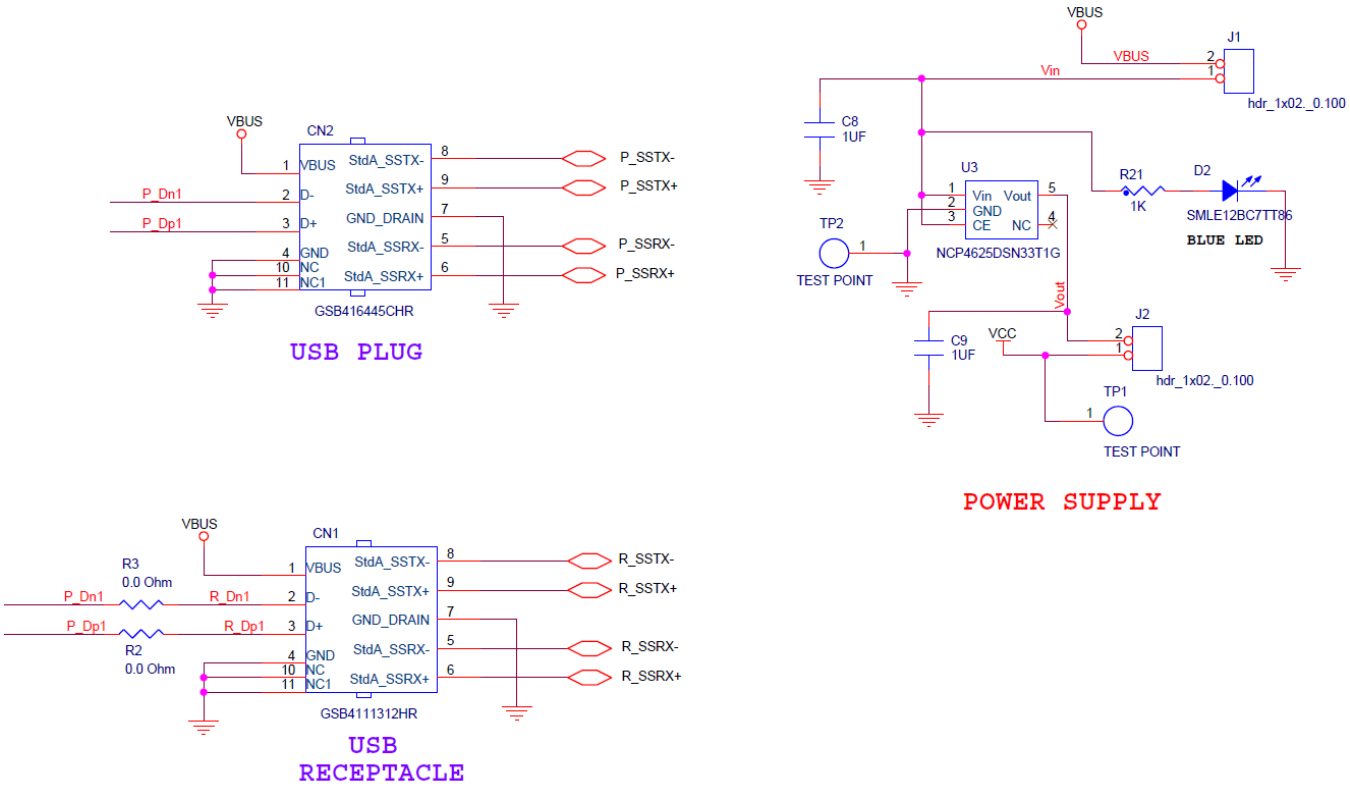


Figure 5. NB7NPQ7021M USB Type-A Evaluation Board Schematics

BILL OF MATERIAL

Table 2. BILL OF MATERIALS

Quantity	Description	Reference	Manufacturer	Manufacturer PN#
1	USB 3.1 Redriver	U1	ON Semiconductor	NB7NPQ7021M
1	USB Type-A Receptacle	CN1	Amphenol Commercial Products	GSB4111312HR
1	USB Type-A Plug	CN2	Amphenol Commercial Products	GSB416445CHR
4	Capacitor 1UF (0603)	C1,C4,C8,C9		
8	Capacitor 0.1UF (0402)	C11,C12,C16,C17, C18,C19,C20,C21		
1	Blue LED	D2	Rohm Semiconductor	SMLE12BC7TT86
1	Header, 0.100"	J1	Amphenol FCI	68001-203HLF
13	Header, 0.100"	J2,J4,J5,J6,J7,J8,J 9,J10,J11,J12,J13, J14,J15	Samtec Inc	TSW-150-14-G-S
2	Resistor 0.0 Ohm (0402)	R2,R3		
4	Resistor 68K (0402)	R4,R5,R6,R7		
1	Resistor 1 K (0402)	R21		
2	TEST POINT	TP1,TP2		
2	Resistor 220K (0402)	R22, R23		
1	3.3V Voltage Regulator	U3	ON Semiconductor	NCP4625DSN33T1G

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