USB 2.0 Certification Report

Customer:
Nordic Semiconductors ASA
Otto Nielsensvei 12
N-7004 Trondheim
Norway

Device:
nRD24V1
USBD0669
TID 10003682

Supplier:

Professional Multimedia Test Centre
Wetenschapspark 7
B-3590 Diepenbeek

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1 Customer

Nordic Semiconductors ASA
Otto Nielsensvei 12
N-7004 Trondheim
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2 Supplied Hardware and Software

2.1 Assets

Description	Manufacturer	Model	Serial #
Device Under test	Nordic Semiconductors	nRD24V1	EP4606.131404-092
Application board V3.0	Nordic Semiconductors	nRF24L01-VHR1	EP4506.131362-062

2.2 Software

Description	Version
N.A.	N.A.

2.3 Test Procedures

Low/Full Speed Test Procedure	High Speed Test Procedure
1.3	N/A

3 Used measurement equipment by PMTC

Description	Manufacture	Identity	Serial NR	Calibration date	Calibration due date
Current Probe	Tektronix	TCP202	B019512	16-Feb-2006	16-Feb-2007
Probe	Tektronix	P6205	2600BCK	16-Feb-2006	16-Feb-2007
Probe	Tektronix	P6205	2600BCJ	16-Feb-2006	16-Feb-2007
Probe	Tektronix	P6205	2600BCC	16-Feb-2006	16-Feb-2007
Digital real-time Oscilloscope	Tektronix	TDS654C	B020448	14-Aug-2006	14-Aug-2007
Digital Multimeter	Agilent	34401A	US36046603	17-Feb-2006	17-Feb-2007

4 Summary of the performed test

Electrical Legacy

Signal Quality	***Pass***
Inrush	***Pass***
Back Voltage	***Pass***

Device Framework

USBCV 1.3Beta Chapter 9	***Pass***
USBCV 1.3Beta HID	***Pass***

Power Measurements

Power consumption Windows XP SP2 Media Center	***Waiver***

Gold Tree

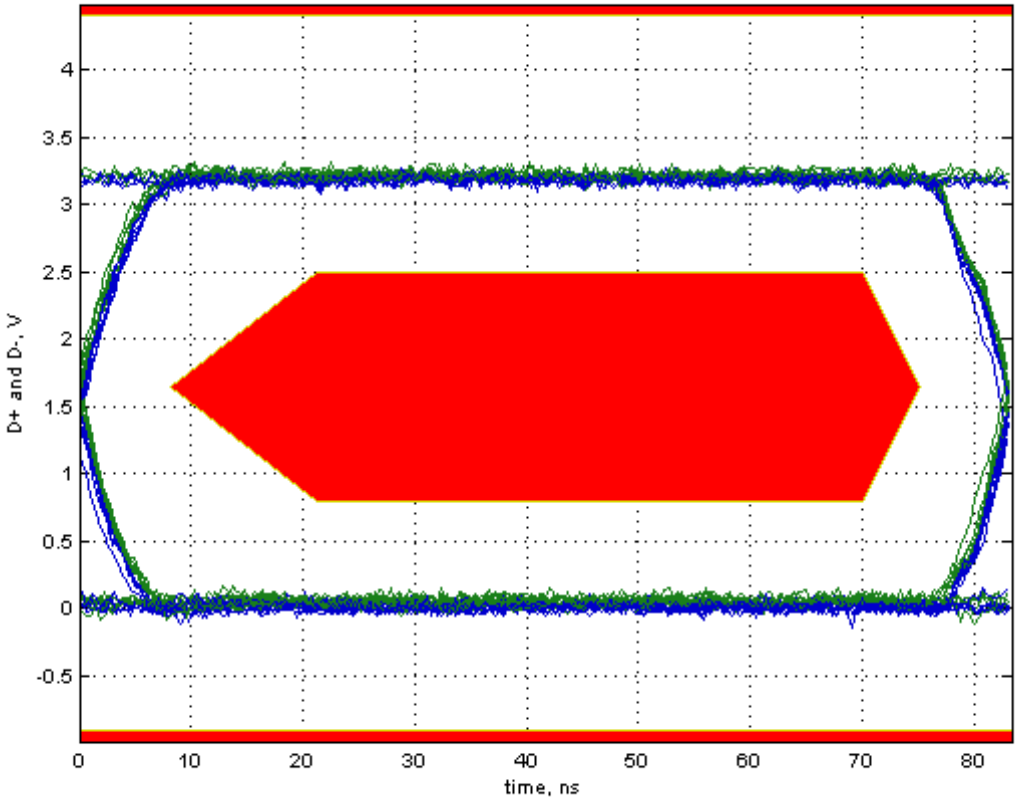
Interoperability Windows XP SP2 Media Center	***Pass***

5 Results

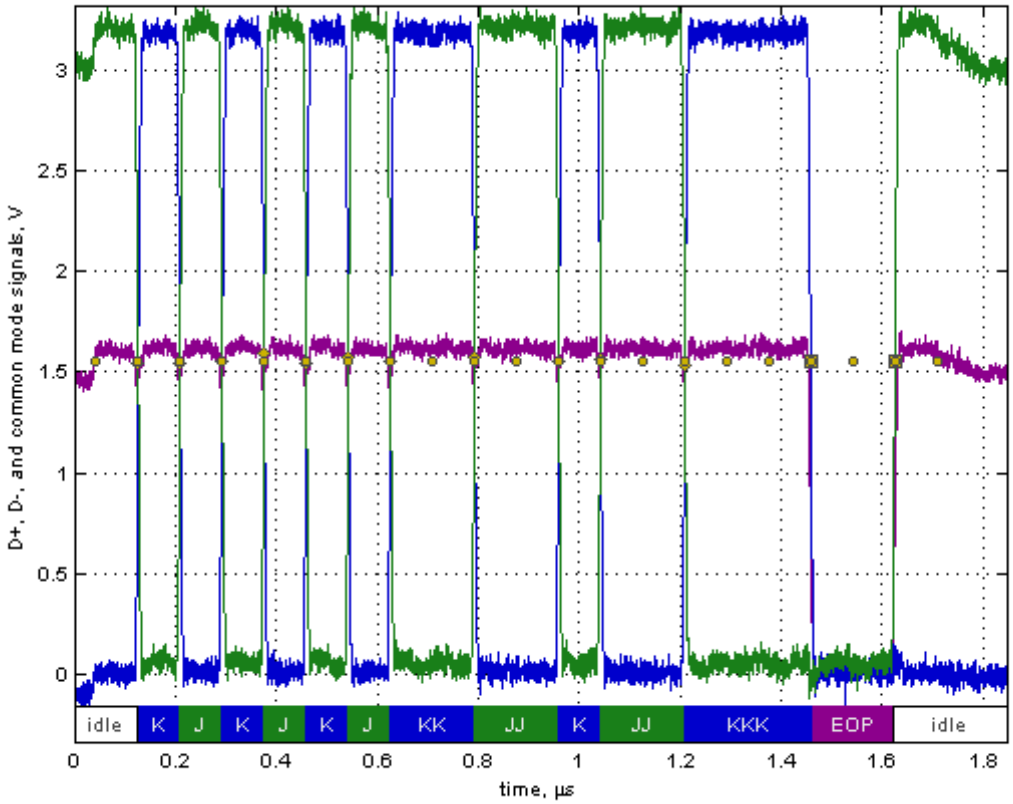
5.1 Electrical

5.1.1 Upstream Full Speed Signal Quality

The nRD24V1 passed the Full Speed Upstream Signal Quality test in Bus Powered mode.



Signal Eye



Data and Common Mode Voltage

Comments:

Overall result: pass!

Signal eye:

eye passes

EOP width: 166.99ns

EOP width passes

Receivers: reliable operation on tier 6

receivers pass

Measured signaling rate: 11.9933MHz

signal rate passes

Crossover voltage range: 1.53V to 1.59V, mean crossover 1.56V
(first crossover at 1.54V, 10 other differential crossovers checked)

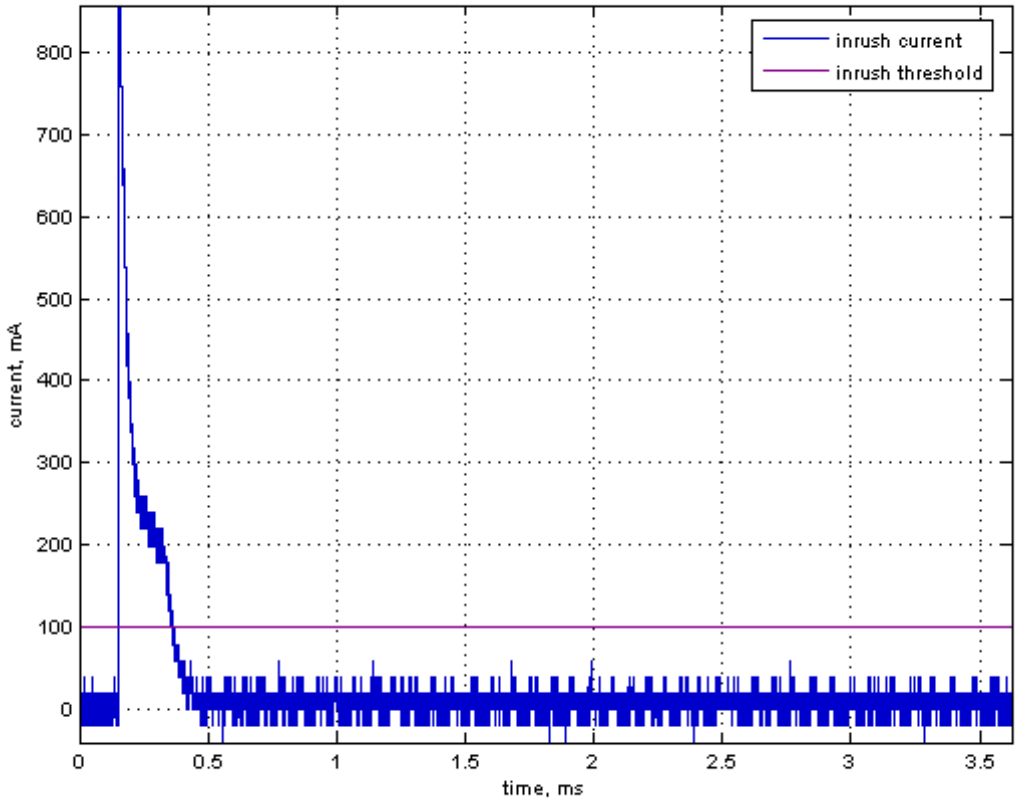
crossover voltages pass

Consecutive jitter range: -464.692ps to 348.828ps, RMS jitter 239.715ps
Paired JK jitter range: -28.645ps to 169.684ps, RMS jitter 126.556ps
Paired KJ jitter range: 35.841ps to 146.422ps, RMS jitter 112.610ps

jitter passes

5.1.2 Inrush Current

The measured Inrush current of the nRD24V1 is 41.85µC. The USB spec allows up to 10µF to be hard started, which represents an allowed load of approximately 50µC. With a measured load of 41.85µC, the nRD24V1 received a waiver for the Inrush current test.



Inrush Current

5.2 Device Framework

The following tests where performed using the USBCV 1.3Beta test tool.

5.2.1 USBCV Chapter 9

The nRD24V1 Passed the Chapter 9 test of USBCV 1.3Beta.

Chapter 9

Description	Value
Vendor ID	1915
Product ID	e
CFG 's	1
Interfaces	4
USB Spec.	1.10 *
Max. Power	100 mA
Result	Pass

Comments:

* Correct use of version 2.0 in the bcdUSB field of the device descriptor.

Background: There has been confusion over when 0200 should be used in the bcdUSB field in the device descritor. Many people have assumed that 0200 is somehow associated with high speed peripherals and that full speed or low speed peripherals should not use it for their bcdUSB value. This is not correct. Any peripheral designed to the USB 2.0 specification should use 0200 as the bcdUSB value.

Change: Page 261, Section 9.6.1, 3rd paragraph. Change paragraph to the following:

"The DEVICEdescriptor of a high-speed capable device has a version number of 2.0 (0200H). Full speed and low speed only devices designed to this specification should also use version number 2.0 (0200H). If the device is full-speed or low-speed only this version number indicates that it will erespond correctly to a request for the device_qualifier descriptor (i.e., it will respond with a request error)."

5.2.2 USBCV HID

The nRD24V1 passed the HID test of USBCV 1.3Beta

5.3 Power Measurements

5.3.1 Windows XP SP2 Media Center Power Measurement

The nRD24V1 get a waiver for the power measurement tests.

5.3.1.1 Bus Powered mode

Device State	Measurement	Status
Unconfigured State	16.43 mA	**Pass**
Configured State	18.91 mA	**Pass**
Operating State	25.29 mA	**Pass**
Suspended State	1190 µA	**Waiver**
Suspend support		**Yes**

Comments:
The maximum allowed current in suspend state is 500µA.
Waiver granted for Suspend current of 1190µA. WAIVER ID: 17

5.4 Back Voltage

The nRD24V1 passed the Back Voltage test

	DC Voltage Before enumeration	DC Voltage after enumeration and removal
Vbus	0 mV	0 mV
D+	0 mV	0 mV
D-	0 mV	0 mV

5.5 Gold Tree (Interoperability)

For more information about the test guides used by PMTC, please see the document that can be found at http://www.usb.org/developers/docs.

5.5.1 Windows XP SP2 Media Center Interoperability

The nRD24V1 passed for the Gold Tree test.

Test No.	Test description	Result
1	Enumeration and driver installation test on EHCI	Pass
2	DUT demonstrates correct operation using default drivers	Pass
3	Update driver	N/A
4	Install software	N/A
5	Demonstrates functionality with updated driver and/or application	N/A
6	Interoperability (operate all the devices in Gold Tree)	Pass
7	Hot Detach & Reattach	Pass
8	Warm boot	Pass
9	Inactive S1 Suspend (Remote wake-up test)	N/A
10	Inactive S1 Resume (Remote wake-up test)	N/A
11	Active S3 Suspend	Pass
12	Active S3 Resume	Pass
13	UHCI Root port test	Pass
14	Active S4 Suspend (Hibernate)	Pass
15	Active S4 Resume (Hibernate)	Pass
16	Topology change UHCI	Pass
17	Topology change OHCI	Pass

Driver information:

Microsoft Windows XP SP2 Media Center HID Class drivers

Microsoft Windows XP SP2 Media Center Audio Class drivers

6 Other PMTC services

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- Localisation Testing
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- Consultancy

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- Firewire IEEE1394 Certification
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- USB
- DLNA
- Serial-ATA
- Ethernet
- PCI-Express
- HDMI, DVI
- Bluetooth
- WIFI
- …

Tools:
- Ch8ck tool
- Traffic Lab

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