Application Note

LMK0033x PCI Express Compliance Report

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ABSTRACT

Enterprise systems are demanding cleaner clocks since data centers are using higher data rates. This report demonstrates PCI Express (PCIe) compliance for the LMK0033x family of buffers, which verify these devices can be used in such systems.

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Trademarks

1 Introduction

This document presents a test report of PCI Express (PCIe) reference clock compliance for the LMK0033x family. The report contains the test setup, test procedure, TI's PCIe Compliance Tool explanation, and the test results demonstrating PCIe compliance. The test setup was arranged to obtain both the phase noise and time domain analysis required for PCIe compliance. Then, the test procedure was followed to obtain the results. The data from this test is then uploaded onto TI's PCIe Compliance Tool within TICS Pro to determine PCIe compliance.

2 Test Setup

TI's PCIe Compliance Reports display the analysis of a device's phase noise or jitter in regards to meeting PCIe requirements. This PCIe compliance report displays test results under typical conditions. For the LMK0033x family the operating temperature is at 25°C and the supply voltage is at 3.3V.

The hardware setup consists of a device under test, power supply, signal generator, attenuators, limiter, balun (for frequency domain measurement only), thermal force unit, test load board, and phase noise analyzer (PNA, for frequency domain measurement) or oscilloscope (for time domain measurement). The device receives an input clock from an SMA100B signal generator, which outputs a sine wave. However, because TI's clocking parts expect a square wave at a specific amplitude and slew rate for the reference input, the output of the SMA100B is passed through several attenuators and a limiter. The LMK0033x family of parts require a slew rate of 3.5V/ns and peak-to-peak swing of 1.6Vpp, which was achieved with said setup.

Note

Adding attenuators and a limiter is not required for the reference clock to any of TI's clocking devices and does not need to be included in a system. Instead, the reference clock for a TI clocking device needs to be a square wave with the required amplitude and slew rate specified on the data sheet of the device.

For the frequency domain measurements, the differential outputs of the device are connected to a balun to convert them to a single-ended signal and then route that signal to a PNA, as shown on Figure 2-1.

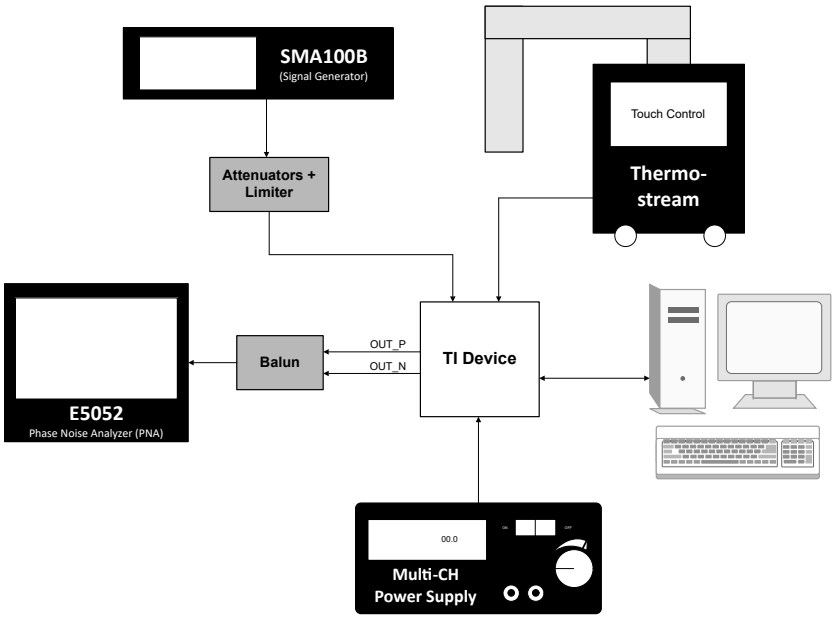

Figure 2-1. TI's PCIe Compliance Test Hardware Setup for Frequency Domain Measurements

For time domain measurements, the differential outputs (both positive and negative pins) of the device are routed directly to an oscilloscope, as shown on Figure 2-2. Also, when obtaining data for the time domain measurements, the PCIe test load is a 15dB loss trace at 4GHz.

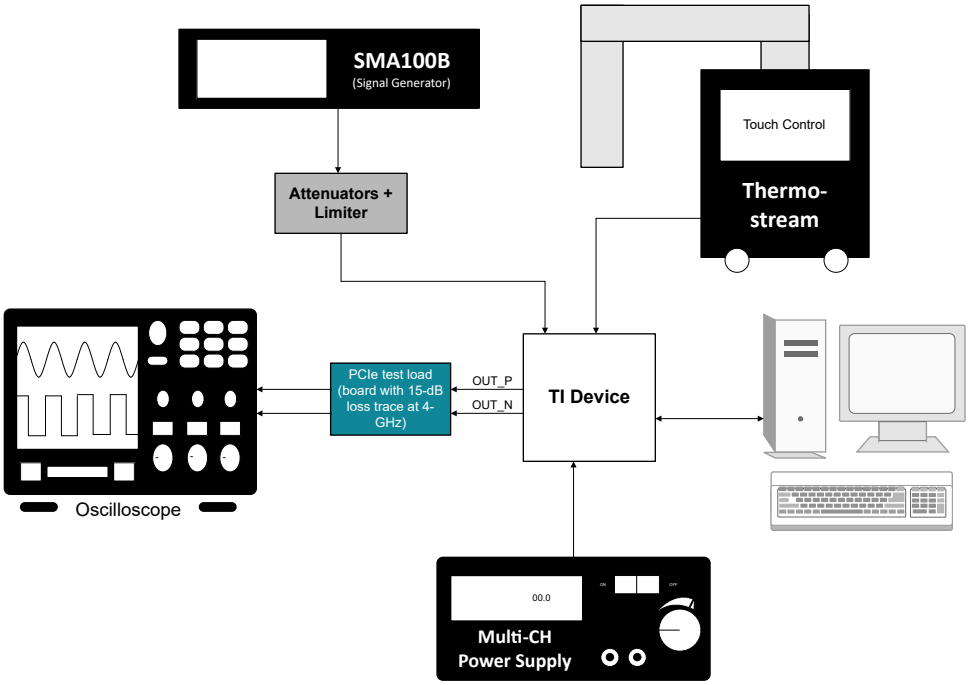

Figure 2-2. TI's PCIe Compliance Test Hardware Setup for Time Domain Measurements

3 Test Procedure

Test procedure used to obtain LMK0033x's PCIe compliance report results is as follows:

1. After powering up the device, the differential outputs are connected directly to an oscilloscope for time domain measurements, or to a PNA through a balun for frequency domain measurements.
2. An output trace file is captured from the PNA or oscilloscope. Note that the oscilloscope capture requires both the positive and negative traces, so two output trace files from the oscilloscope are required.
3. The file/files generated is/are run through TI's PCIe Compliance Tool (Section 4 contains more information about this tool).

4 Explanation of TI's PCIe Compliance Tool

TI's PCIe Compliance Tool can be found within TI's TICS Pro Software. To access the tool, first download TI's TICS Pro Software. Under the *Tools* tab, select *PCIe Report Generator* (steps shown in Figure 4-1). After a few seconds, the tool appears, as shown on Figure 4-2, which can then be used to analyze frequency domain traces (such as Figure 4-3) and time domain traces (such as Figure 4-4) to determine PCIe compliance.

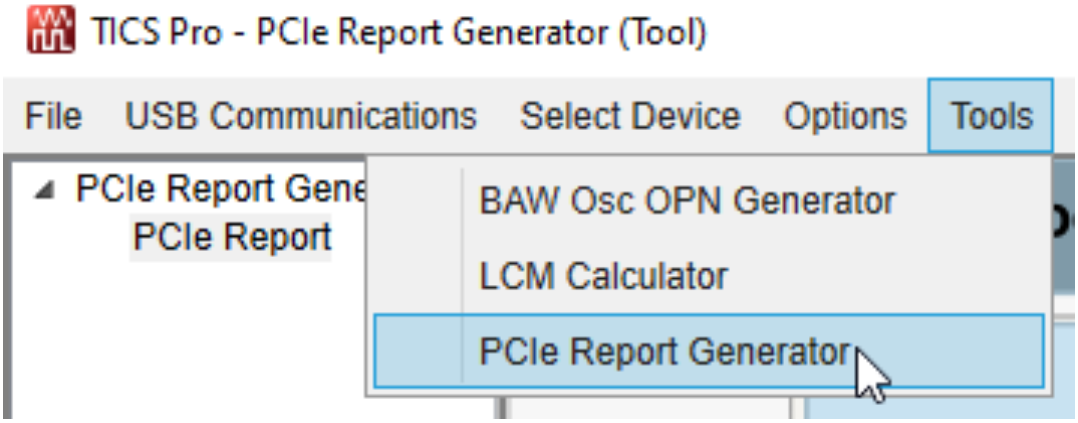

Figure 4-1. TICS Pro Steps to Access the PCIe Reference Clock Analysis Tool

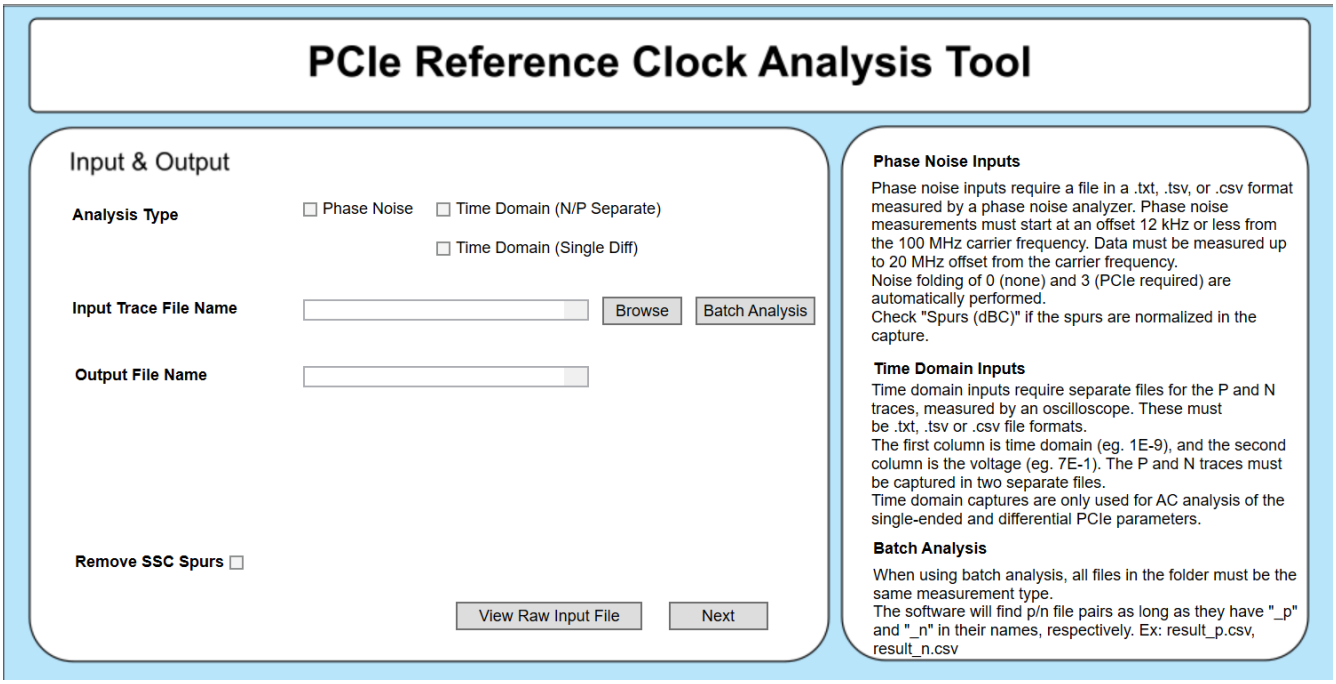

Figure 4-2. PCIe Tool Home Page

For frequency domain data analysis, the tool runs frequency domain input traces through PCIe filters, taking other parameters such as PCIe generation, clock architecture, noise fold, and presence of SSC into considerations to determine if the trace meets PCIe requirements. Then, the tool assign a PASS, FAIL, or N/A status based on the results.

For time domain data analysis, the tool runs time domain input traces, and takes into account Vcross, period, duty cycle, and other parameters specified by PCIe standards to determine and assign a PASS/FAIL to the traces being analyzed.

Figure 4-3. Example of PNA Plot

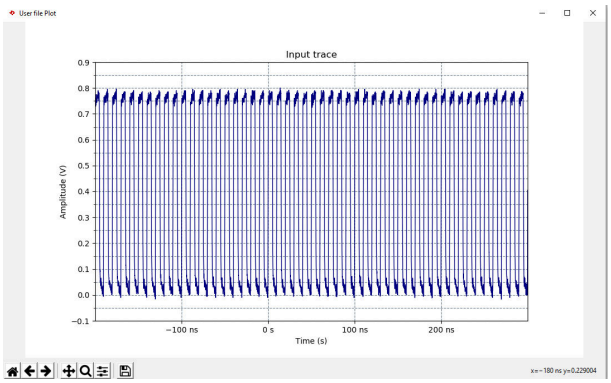

Figure 4-4. Example of Time Domain Plot

5 LMK0033x Test Results

The LMK0033x PCIe Compliance test results are detailed in this section.

5.1 LMK0033x Test Results Summary

Table 5-1 is the PCIe compliance results summary for the LMK0033x phase noise analysis, which demonstrates the jitter compliance of the device for PCIe Gen 1 through 7, noise folds 0 and 3, and clock architectures Common Clock (CC) and Separate Reference No Spread (SRNS).

A PCIe jitter spec or time domain calculation can have one of the following statuses:

- PASS: within specifications/limits
- FAIL: outside specifications/limits
- N/A: no specifications/limits available

Table 5-1. LMK0033x PCIe Tool Test Results Summary - Frequency Domain

Jitter Filter	Clock Arch.	Noise Fold	Min (fs)	Max (fs)	Limit (fs)	Status
PCIe1	CC	0	0.0	96.3	86,000	PASS
		3	0.0	112	86,000	PASS
	SRNS	0	N/A	N/A	N/A	N/A
		3	N/A	N/A	N/A	N/A
PCIe2	CC	0	28.3	86.1	3,100	PASS
		3	33.1	102	3,100	PASS
	SRNS	0	37.9	96.4	N/A	N/A
		3	43.5	111	N/A	N/A
PCIe3	CC	0	9.19	25.7	1,000	PASS
		3	10.9	30.5	1,000	PASS
	SRNS	0	10.9	29.4	N/A	N/A
		3	12.7	34.5	N/A	N/A
PCIe4	CC	0	9.19	25.7	500.0	PASS
		3	10.9	30.5	500.0	PASS
	SRNS	0	10.9	29.4	N/A	N/A
		3	12.7	34.5	N/A	N/A
PCIe5	CC	0	2.07	10.6	150.0	PASS
		3	2.49	12.8	150.0	PASS
	SRNS	0	2.38	11.9	N/A	N/A
		3	2.79	14.0	N/A	N/A
PCIe6	CC	0	0	6.53	100.0	PASS
		3	2.73	7.78	100.0	PASS
	SR	0	3.21	9.06	N/A	N/A
		3	3.71	10.5	N/A	N/A
PCIe7	CC	0	1.60	4.58	67.0	PASS
		3	1.91	5.46	67.0	PASS
	SR	0	2.24	6.37	N/A	N/A
		3	2.60	7.37	N/A	N/A

Table 5-2 is the PCIe compliance summary for the LMK0033x time domain analysis which demonstrates the time domain compliance of the device.

Table 5-2. LMK0033x PCIe Tool Test Results Summary - Time Domain

Calculation	Min	Avg	Max	Limit	Status
V_{cross}	330.09mV	343.67mV	357.31mV	250mV to 550mV	PASS
V_{high}	758.527mV	758.527mV		150mVmV	PASS
V_{low}		–42.394mV	–42.394mV	–150mVmV	PASS
Period	9.971ns	10.0ns	10.022ns	9.847ns to 10.203ns	PASS
Duty Cycle	49.441%	49.624%	49.825%	40% to 60%	PASS
Overshoot Voltage		72.83mV	91.34mV	300mV	PASS
Undershoot Voltage		–57.47mV	–70.69mV	–300mV	PASS
Rising Edge Rate	2.14V/ns	2.419V/ns	2.718V/ns	0.6V/ns to 4.0V/ns	PASS
Falling Edge Rate	2.24V/ns	2.508V/ns	2.818V/ns	0.6V/ns to 4.0V/ns	PASS

5.2 PCIe Tool Input File Waveforms for the LMK0033x Family

Figure 5-1 illustrates the output phase noise curve of the LMK00338 with a reference input of 100MHz, slew rate = 3.5V/ns, and peak-to-peak swing = 1.6Vpp. Figure 5-2 illustrates the output time domain trace waveform. All of these waveforms are inputted into TI's PCIe Compliance Tool (found within TI's TICS Pro Software, more information in Section 4) to determine PCIe compliance. These results and waveforms apply for all LMK0033x devices.

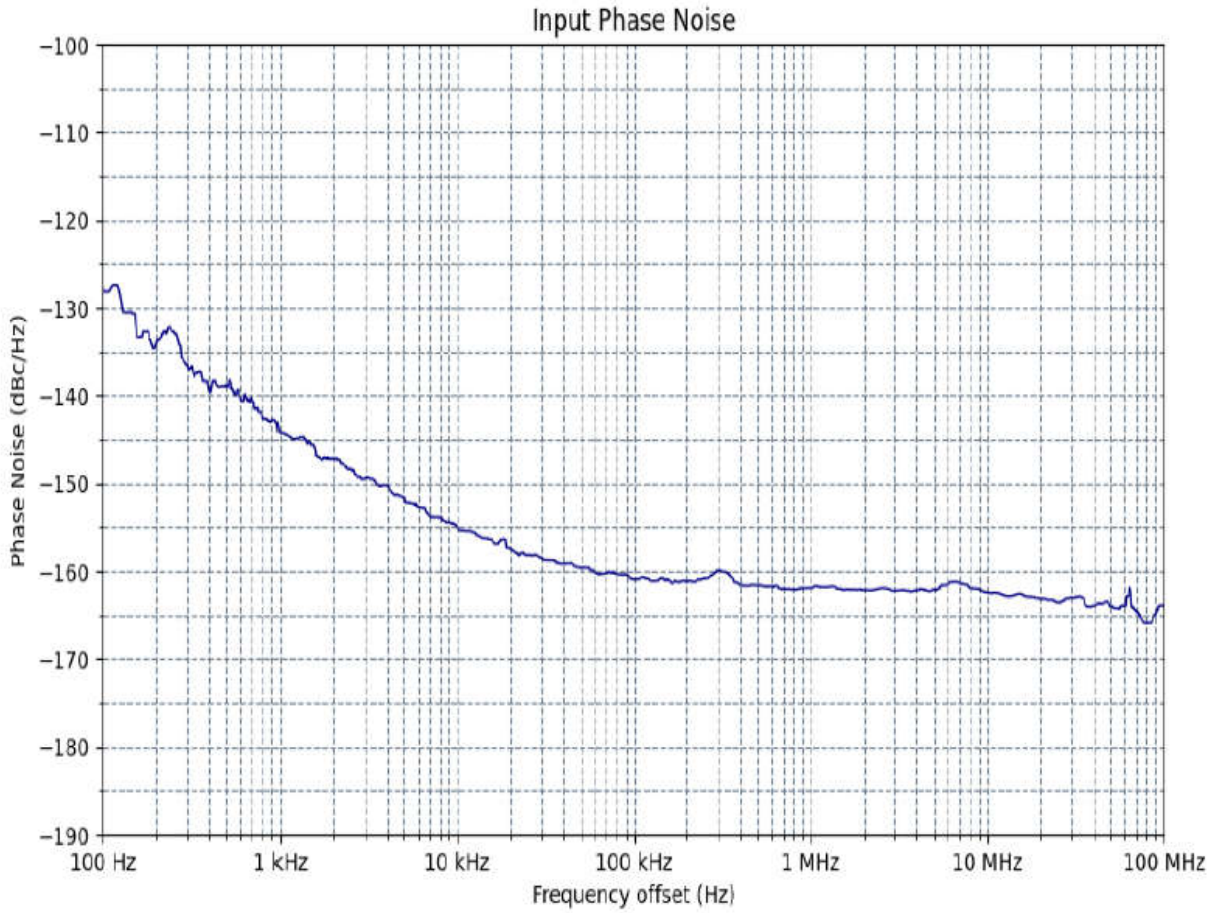

Figure 5-1. Output Phase Noise Curve From the LMK00338 Having a 100MHz Reference Input Signal Into the LMK00338 Device With Slew Rate = 3.5V/ns and Peak-to-Peak Swing = 1.6Vpp

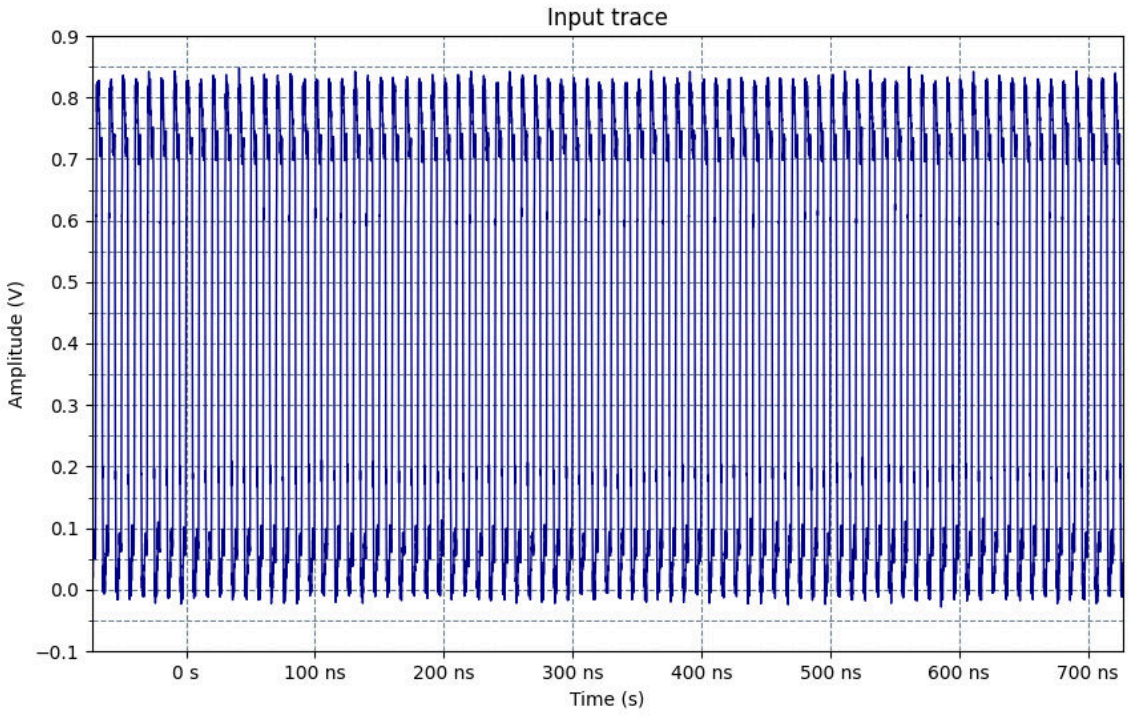

Figure 5-2. Output Time Domain Plot From the LMK00338 Having a 100MHz Reference Input Signal Into the LMK0033x Device With Slew Rate = 3.5V/ns and Peak-to-Peak Swing = 1.6Vpp

5.3 LMK0033x Detailed Jitter Measurements

Table 5-3 outlines specific jitter measurement results for PCIe generations 1 through 6 with noise folds 0 and 3 and clock architectures Common Clock (CC) and Separate Reference No Spread (SRNS).

Table 5-3. LMK0033x Detailed Jitter Measurements

PCIe Gen	Clock Arch.	Noise Fold	Filter Comb	PLL1 f1	PLL1 zeta 1	PLL2 f2	PLL2 zeta 2	CDR f3	Value (fs)	Limit (fs)	Status
1	CC	0	1	1.50E+06	0.54	1.50E+06	0.54	1.50E+06	47.631458	86,000	PASS
1	CC	0	2	1.50E+06	0.54	2.20E+07	0.54	1.50E+06	626.8123833	86,000	PASS
1	CC	0	3	2.20E+07	0.54	1.50E+06	0.54	1.50E+06	626.8123833	86,000	PASS
1	CC	0	4	2.20E+07	0.54	2.20E+07	0.54	1.50E+06	503.8823545	86,000	PASS
1	CC	0	5	1.50E+06	14	2.20E+07	0.54	1.50E+06	0	86,000	PASS
1	CC	0	6	1.50E+06	0.54	2.20E+07	0.54	1.50E+06	0	86,000	PASS
1	CC	0	7	2.20E+07	14	2.20E+07	0.54	1.50E+06	0	86,000	PASS
1	CC	0	8	2.20E+07	0.54	2.20E+07	0.54	1.50E+06	0	86,000	PASS
1	CC	0	9	1.50E+06	14	2.20E+07	0.54	1.50E+06	0	86,000	PASS
1	CC	0	10	1.50E+06	0.54	2.20E+07	0.54	1.50E+06	0	86,000	PASS
1	CC	0	11	2.20E+07	14	2.20E+07	0.54	1.50E+06	0	86,000	PASS
1	CC	0	12	2.20E+07	0.54	2.20E+07	0.54	1.50E+06	0	86,000	PASS
1	CC	0	13	1.50E+06	14	2.20E+07	0.54	1.50E+06	0	86,000	PASS
1	CC	0	14	1.50E+06	0.54	2.20E+07	0.54	1.50E+06	0	86,000	PASS
1	CC	0	15	2.20E+07	14	2.20E+07	0.54	1.50E+06	0	86,000	PASS
1	CC	0	16	2.20E+07	0.54	2.20E+07	0.54	1.50E+06	0	86,000	PASS
1	CC	0	17	1.50E+06	14	2.20E+07	0.54	1.50E+06	0	86,000	PASS
1	CC	0	18	1.50E+06	0.54	2.20E+07	0.54	1.50E+06	0	86,000	PASS
1	CC	0	19	2.20E+07	14	2.20E+07	0.54	1.50E+06	0	86,000	PASS
1	CC	0	20	2.20E+07	0.54	2.20E+07	0.54	1.50E+06	0	86,000	PASS

Table 5-3. LMK0033x Detailed Jitter Measurements (continued)

PCIe Gen	Clock Arch.	Noise Fold	Filter Comb	PLL1 f1	PLL1 zeta 1	PLL2 f2	PLL2 zeta 2	CDR f3	Value (fs)	Limit (fs)	Status
1	CC	3	1	1.50E+06	0.54	1.50E+06	0.54	1.50E+06	38.6877925	86,000	PASS
1	CC	3	2	1.50E+06	0.54	2.20E+07	0.54	1.50E+06	709.7042912	86,000	PASS
1	CC	3	3	2.20E+07	0.54	1.50E+06	0.54	1.50E+06	709.7042912	86,000	PASS
1	CC	3	4	2.20E+07	0.54	2.20E+07	0.54	1.50E+06	605.1056421	86,000	PASS
1	CC	3	5	1.50E+06	14	2.20E+07	0.54	1.50E+06	0	86,000	PASS
1	CC	3	6	1.50E+06	0.54	2.20E+07	0.54	1.50E+06	0	86,000	PASS
1	CC	3	7	2.20E+07	14	2.20E+07	0.54	1.50E+06	0	86,000	PASS
1	CC	3	8	2.20E+07	0.54	2.20E+07	0.54	1.50E+06	0	86,000	PASS
1	CC	3	9	1.50E+06	14	2.20E+07	0.54	1.50E+06	0	86,000	PASS
1	CC	3	10	1.50E+06	0.54	2.20E+07	0.54	1.50E+06	0	86,000	PASS
1	CC	3	11	2.20E+07	14	2.20E+07	0.54	1.50E+06	0	86,000	PASS
1	CC	3	12	2.20E+07	0.54	2.20E+07	0.54	1.50E+06	0	86,000	PASS
1	CC	3	13	1.50E+06	14	2.20E+07	0.54	1.50E+06	0	86,000	PASS
1	CC	3	14	1.50E+06	0.54	2.20E+07	0.54	1.50E+06	0	86,000	PASS
1	CC	3	15	2.20E+07	14	2.20E+07	0.54	1.50E+06	0	86,000	PASS
1	CC	3	16	2.20E+07	0.54	2.20E+07	0.54	1.50E+06	0	86,000	PASS
1	CC	3	17	1.50E+06	14	2.20E+07	0.54	1.50E+06	0	86,000	PASS
1	CC	3	18	1.50E+06	0.54	2.20E+07	0.54	1.50E+06	0	86,000	PASS
1	CC	3	19	2.20E+07	14	2.20E+07	0.54	1.50E+06	0	86,000	PASS
1	CC	3	20	2.20E+07	0.54	2.20E+07	0.54	1.50E+06	0	86,000	PASS
2	CC	0	10	5.00E+06	14	5.00E+06	14	5.00E+06	20.14990315	3,100	PASS
2	CC	0	11	5.00E+06	14	5.00E+06	0.54	5.00E+06	23.17411154	3,100	PASS
2	CC	0	12	5.00E+06	14	1.60E+07	14	5.00E+06	46.84650419	3,100	PASS
2	CC	0	13	5.00E+06	14	1.60E+07	0.54	5.00E+06	46.19310476	3,100	PASS
2	CC	0	14	5.00E+06	1.16	5.00E+06	14	5.00E+06	20.79660802	3,100	PASS
2	CC	0	15	5.00E+06	1.16	5.00E+06	0.54	5.00E+06	19.73541601	3,100	PASS
2	CC	0	16	5.00E+06	1.16	1.60E+07	14	5.00E+06	47.70910004	3,100	PASS
2	CC	0	17	5.00E+06	1.16	1.60E+07	0.54	5.00E+06	48.4853524	3,100	PASS
2	CC	0	18	1.60E+07	14	5.00E+06	14	5.00E+06	46.84650419	3,100	PASS
2	CC	0	19	1.60E+07	14	5.00E+06	0.54	5.00E+06	49.42728539	3,100	PASS
2	CC	0	20	1.60E+07	14	1.60E+07	14	5.00E+06	49.53157218	3,100	PASS
2	CC	0	21	1.60E+07	14	1.60E+07	0.54	5.00E+06	60.29507034	3,100	PASS
2	CC	0	22	1.60E+07	1.16	5.00E+06	14	5.00E+06	45.39817977	3,100	PASS
2	CC	0	23	1.60E+07	1.16	5.00E+06	0.54	5.00E+06	49.33479028	3,100	PASS
2	CC	0	24	1.60E+07	1.16	1.60E+07	14	5.00E+06	52.47068363	3,100	PASS
2	CC	0	25	1.60E+07	1.16	1.60E+07	0.54	5.00E+06	55.49289225	3,100	PASS
2	CC	3	10	5.00E+06	14	5.00E+06	14	5.00E+06	24.35390067	3,100	PASS
2	CC	3	11	5.00E+06	14	5.00E+06	0.54	5.00E+06	26.93456881	3,100	PASS
2	CC	3	12	5.00E+06	14	1.60E+07	14	5.00E+06	55.66305513	3,100	PASS
2	CC	3	13	5.00E+06	14	1.60E+07	0.54	5.00E+06	53.14943276	3,100	PASS
2	CC	3	14	5.00E+06	1.16	5.00E+06	14	5.00E+06	24.78459655	3,100	PASS
2	CC	3	15	5.00E+06	1.16	5.00E+06	0.54	5.00E+06	23.05121022	3,100	PASS
2	CC	3	16	5.00E+06	1.16	1.60E+07	14	5.00E+06	56.34507378	3,100	PASS
2	CC	3	17	5.00E+06	1.16	1.60E+07	0.54	5.00E+06	55.47872276	3,100	PASS
2	CC	3	18	1.60E+07	14	5.00E+06	14	5.00E+06	55.66305513	3,100	PASS
2	CC	3	19	1.60E+07	14	5.00E+06	0.54	5.00E+06	57.79162262	3,100	PASS
2	CC	3	20	1.60E+07	14	1.60E+07	14	5.00E+06	61.67006825	3,100	PASS
2	CC	3	21	1.60E+07	14	1.60E+07	0.54	5.00E+06	71.38626971	3,100	PASS
2	CC	3	22	1.60E+07	1.16	5.00E+06	14	5.00E+06	53.55993673	3,100	PASS
2	CC	3	23	1.60E+07	1.16	5.00E+06	0.54	5.00E+06	57.21218379	3,100	PASS

Table 5-3. LMK0033x Detailed Jitter Measurements (continued)

PCIe Gen	Clock Arch.	Noise Fold	Filter Comb	PLL1 f1	PLL1 zeta 1	PLL2 f2	PLL2 zeta 2	CDR f3	Value (fs)	Limit (fs)	Status
2	CC	3	24	1.60E+07	1.16	1.60E+07	14	5.00E+06	64.23220998	3,100	PASS
2	CC	3	25	1.60E+07	1.16	1.60E+07	0.54	5.00E+06	65.78996905	3,100	PASS
2	SRNS	0	10	5.00E+06	14	5.00E+06	14	5.00E+06	32.30536183	N/A	N/A
2	SRNS	0	11	5.00E+06	14	5.00E+06	0.54	5.00E+06	28.0008018	N/A	N/A
2	SRNS	0	12	5.00E+06	14	1.60E+07	14	5.00E+06	48.81251194	N/A	N/A
2	SRNS	0	13	5.00E+06	14	1.60E+07	0.54	5.00E+06	58.25986316	N/A	N/A
2	SRNS	0	14	5.00E+06	1.16	5.00E+06	14	5.00E+06	30.95794231	N/A	N/A
2	SRNS	0	15	5.00E+06	1.16	5.00E+06	0.54	5.00E+06	27.25480625	N/A	N/A
2	SRNS	0	16	5.00E+06	1.16	1.60E+07	14	5.00E+06	47.39786277	N/A	N/A
2	SRNS	0	17	5.00E+06	1.16	1.60E+07	0.54	5.00E+06	57.10230745	N/A	N/A
2	SRNS	0	18	1.60E+07	14	5.00E+06	14	5.00E+06	48.81251194	N/A	N/A
2	SRNS	0	19	1.60E+07	14	5.00E+06	0.54	5.00E+06	45.14697637	N/A	N/A
2	SRNS	0	20	1.60E+07	14	1.60E+07	14	5.00E+06	64.00740358	N/A	N/A
2	SRNS	0	21	1.60E+07	14	1.60E+07	0.54	5.00E+06	68.21118499	N/A	N/A
2	SRNS	0	22	1.60E+07	1.16	5.00E+06	14	5.00E+06	51.16813886	N/A	N/A
2	SRNS	0	23	1.60E+07	1.16	5.00E+06	0.54	5.00E+06	47.37132644	N/A	N/A
2	SRNS	0	24	1.60E+07	1.16	1.60E+07	14	5.00E+06	65.00318377	N/A	N/A
2	SRNS	0	25	1.60E+07	1.16	1.60E+07	0.54	5.00E+06	70.73342401	N/A	N/A
2	SRNS	3	10	5.00E+06	14	5.00E+06	14	5.00E+06	36.67921599	N/A	N/A
2	SRNS	3	11	5.00E+06	14	5.00E+06	0.54	5.00E+06	31.73472385	N/A	N/A
2	SRNS	3	12	5.00E+06	14	1.60E+07	14	5.00E+06	56.5792607	N/A	N/A
2	SRNS	3	13	5.00E+06	14	1.60E+07	0.54	5.00E+06	65.59031551	N/A	N/A
2	SRNS	3	14	5.00E+06	1.16	5.00E+06	14	5.00E+06	35.11243437	N/A	N/A
2	SRNS	3	15	5.00E+06	1.16	5.00E+06	0.54	5.00E+06	30.81479841	N/A	N/A
2	SRNS	3	16	5.00E+06	1.16	1.60E+07	14	5.00E+06	55.00716411	N/A	N/A
2	SRNS	3	17	5.00E+06	1.16	1.60E+07	0.54	5.00E+06	64.26363197	N/A	N/A
2	SRNS	3	18	1.60E+07	14	5.00E+06	14	5.00E+06	56.5792607	N/A	N/A
2	SRNS	3	19	1.60E+07	14	5.00E+06	0.54	5.00E+06	52.51228963	N/A	N/A
2	SRNS	3	20	1.60E+07	14	1.60E+07	14	5.00E+06	74.35443341	N/A	N/A
2	SRNS	3	21	1.60E+07	14	1.60E+07	0.54	5.00E+06	77.69864153	N/A	N/A
2	SRNS	3	22	1.60E+07	1.16	5.00E+06	14	5.00E+06	58.72452689	N/A	N/A
2	SRNS	3	23	1.60E+07	1.16	5.00E+06	0.54	5.00E+06	54.46880208	N/A	N/A
2	SRNS	3	24	1.60E+07	1.16	1.60E+07	14	5.00E+06	75.08425981	N/A	N/A
2	SRNS	3	25	1.60E+07	1.16	1.60E+07	0.54	5.00E+06	80.24070553	N/A	N/A
3	CC	0	1	2.00E+06	14	2.00E+06	14	1.00E+07	7.473947897	1,000	PASS
3	CC	0	2	2.00E+06	14	2.00E+06	1.15	1.00E+07	7.290098264	1,000	PASS
3	CC	0	3	2.00E+06	14	5.00E+06	14	1.00E+07	16.5636283	1,000	PASS
3	CC	0	4	2.00E+06	14	5.00E+06	1.15	1.00E+07	14.25616694	1,000	PASS
3	CC	0	5	2.00E+06	0.73	2.00E+06	14	1.00E+07	7.267502979	1,000	PASS
3	CC	0	6	2.00E+06	0.73	2.00E+06	1.15	1.00E+07	6.193246745	1,000	PASS
3	CC	0	7	2.00E+06	0.73	5.00E+06	14	1.00E+07	17.08076602	1,000	PASS
3	CC	0	8	2.00E+06	0.73	5.00E+06	1.15	1.00E+07	14.9341335	1,000	PASS
3	CC	0	9	4.00E+06	14	2.00E+06	14	1.00E+07	13.46486059	1,000	PASS
3	CC	0	10	4.00E+06	14	2.00E+06	1.15	1.00E+07	13.69261529	1,000	PASS
3	CC	0	11	4.00E+06	14	5.00E+06	14	1.00E+07	17.10582012	1,000	PASS
3	CC	0	12	4.00E+06	14	5.00E+06	1.15	1.00E+07	15.49378	1,000	PASS
3	CC	0	13	4.00E+06	0.73	2.00E+06	14	1.00E+07	9.936395096	1,000	PASS
3	CC	0	14	4.00E+06	0.73	2.00E+06	1.15	1.00E+07	9.761661562	1,000	PASS
3	CC	0	15	4.00E+06	0.73	5.00E+06	14	1.00E+07	17.67243228	1,000	PASS
3	CC	0	16	4.00E+06	0.73	5.00E+06	1.15	1.00E+07	15.10415368	1,000	PASS

Table 5-3. LMK0033x Detailed Jitter Measurements (continued)

PCIe Gen	Clock Arch.	Noise Fold	Filter Comb	PLL1 f1	PLL1 zeta 1	PLL2 f2	PLL2 zeta 2	CDR f3	Value (fs)	Limit (fs)	Status
3	CC	3	1	2.00E+06	14	2.00E+06	14	1.00E+07	9.108821356	1,000	PASS
3	CC	3	2	2.00E+06	14	2.00E+06	1.15	1.00E+07	8.811804619	1,000	PASS
3	CC	3	3	2.00E+06	14	5.00E+06	14	1.00E+07	19.58534068	1,000	PASS
3	CC	3	4	2.00E+06	14	5.00E+06	1.15	1.00E+07	16.91282569	1,000	PASS
3	CC	3	5	2.00E+06	0.73	2.00E+06	14	1.00E+07	8.691298099	1,000	PASS
3	CC	3	6	2.00E+06	0.73	2.00E+06	1.15	1.00E+07	7.470827551	1,000	PASS
3	CC	3	7	2.00E+06	0.73	5.00E+06	14	1.00E+07	19.96911842	1,000	PASS
3	CC	3	8	2.00E+06	0.73	5.00E+06	1.15	1.00E+07	17.46337906	1,000	PASS
3	CC	3	9	4.00E+06	14	2.00E+06	14	1.00E+07	16.01236749	1,000	PASS
3	CC	3	10	4.00E+06	14	2.00E+06	1.15	1.00E+07	16.16140783	1,000	PASS
3	CC	3	11	4.00E+06	14	5.00E+06	14	1.00E+07	20.78246547	1,000	PASS
3	CC	3	12	4.00E+06	14	5.00E+06	1.15	1.00E+07	18.85363954	1,000	PASS
3	CC	3	13	4.00E+06	0.73	2.00E+06	14	1.00E+07	11.93132189	1,000	PASS
3	CC	3	14	4.00E+06	0.73	2.00E+06	1.15	1.00E+07	11.64453467	1,000	PASS
3	CC	3	15	4.00E+06	0.73	5.00E+06	14	1.00E+07	20.99700858	1,000	PASS
3	CC	3	16	4.00E+06	0.73	5.00E+06	1.15	1.00E+07	18.05722374	1,000	PASS
3	SRNS	0	1	2.00E+06	14	2.00E+06	14	1.00E+07	10.02539061	N/A	N/A
3	SRNS	0	2	2.00E+06	14	2.00E+06	1.15	1.00E+07	9.319436146	N/A	N/A
3	SRNS	0	3	2.00E+06	14	5.00E+06	14	1.00E+07	17.72974777	N/A	N/A
3	SRNS	0	4	2.00E+06	14	5.00E+06	1.15	1.00E+07	16.15275828	N/A	N/A
3	SRNS	0	5	2.00E+06	0.73	2.00E+06	14	1.00E+07	8.690884817	N/A	N/A
3	SRNS	0	6	2.00E+06	0.73	2.00E+06	1.15	1.00E+07	7.900541184	N/A	N/A
3	SRNS	0	7	2.00E+06	0.73	5.00E+06	14	1.00E+07	16.99123359	N/A	N/A
3	SRNS	0	8	2.00E+06	0.73	5.00E+06	1.15	1.00E+07	15.32570622	N/A	N/A
3	SRNS	0	9	4.00E+06	14	2.00E+06	14	1.00E+07	15.18411162	N/A	N/A
3	SRNS	0	10	4.00E+06	14	2.00E+06	1.15	1.00E+07	14.70090165	N/A	N/A
3	SRNS	0	11	4.00E+06	14	5.00E+06	14	1.00E+07	21.21948628	N/A	N/A
3	SRNS	0	12	4.00E+06	14	5.00E+06	1.15	1.00E+07	19.85344334	N/A	N/A
3	SRNS	0	13	4.00E+06	0.73	2.00E+06	14	1.00E+07	12.39561431	N/A	N/A
3	SRNS	0	14	4.00E+06	0.73	2.00E+06	1.15	1.00E+07	11.84030677	N/A	N/A
3	SRNS	0	15	4.00E+06	0.73	5.00E+06	14	1.00E+07	19.00112388	N/A	N/A
3	SRNS	0	16	4.00E+06	0.73	5.00E+06	1.15	1.00E+07	17.65429776	N/A	N/A
3	SRNS	3	1	2.00E+06	14	2.00E+06	14	1.00E+07	11.53533247	N/A	N/A
3	SRNS	3	2	2.00E+06	14	2.00E+06	1.15	1.00E+07	10.72033646	N/A	N/A
3	SRNS	3	3	2.00E+06	14	5.00E+06	14	1.00E+07	20.4990665	N/A	N/A
3	SRNS	3	4	2.00E+06	14	5.00E+06	1.15	1.00E+07	18.61571105	N/A	N/A
3	SRNS	3	5	2.00E+06	0.73	2.00E+06	14	1.00E+07	9.997071395	N/A	N/A
3	SRNS	3	6	2.00E+06	0.73	2.00E+06	1.15	1.00E+07	9.081757781	N/A	N/A
3	SRNS	3	7	2.00E+06	0.73	5.00E+06	14	1.00E+07	19.65363232	N/A	N/A
3	SRNS	3	8	2.00E+06	0.73	5.00E+06	1.15	1.00E+07	17.66662477	N/A	N/A
3	SRNS	3	9	4.00E+06	14	2.00E+06	14	1.00E+07	17.51928081	N/A	N/A
3	SRNS	3	10	4.00E+06	14	2.00E+06	1.15	1.00E+07	16.96505079	N/A	N/A
3	SRNS	3	11	4.00E+06	14	5.00E+06	14	1.00E+07	24.52289345	N/A	N/A
3	SRNS	3	12	4.00E+06	14	5.00E+06	1.15	1.00E+07	22.89935103	N/A	N/A
3	SRNS	3	13	4.00E+06	0.73	2.00E+06	14	1.00E+07	14.24855815	N/A	N/A
3	SRNS	3	14	4.00E+06	0.73	2.00E+06	1.15	1.00E+07	13.60624246	N/A	N/A
3	SRNS	3	15	4.00E+06	0.73	5.00E+06	14	1.00E+07	21.95808325	N/A	N/A
3	SRNS	3	16	4.00E+06	0.73	5.00E+06	1.15	1.00E+07	20.33577639	N/A	N/A
4	CC	0	1	2.00E+06	14	2.00E+06	14	1.00E+07	7.473947897	500	PASS
4	CC	0	2	2.00E+06	14	2.00E+06	1.15	1.00E+07	7.290098264	500	PASS

Table 5-3. LMK0033x Detailed Jitter Measurements (continued)

PCIe Gen	Clock Arch.	Noise Fold	Filter Comb	PLL1 f1	PLL1 zeta 1	PLL2 f2	PLL2 zeta 2	CDR f3	Value (fs)	Limit (fs)	Status
4	CC	0	3	2.00E+06	14	5.00E+06	14	1.00E+07	16.5636283	500	PASS
4	CC	0	4	2.00E+06	14	5.00E+06	1.15	1.00E+07	14.25616694	500	PASS
4	CC	0	5	2.00E+06	0.73	2.00E+06	14	1.00E+07	7.267502979	500	PASS
4	CC	0	6	2.00E+06	0.73	2.00E+06	1.15	1.00E+07	6.193246745	500	PASS
4	CC	0	7	2.00E+06	0.73	5.00E+06	14	1.00E+07	17.08076602	500	PASS
4	CC	0	8	2.00E+06	0.73	5.00E+06	1.15	1.00E+07	14.9341335	500	PASS
4	CC	0	9	4.00E+06	14	2.00E+06	14	1.00E+07	13.46486059	500	PASS
4	CC	0	10	4.00E+06	14	2.00E+06	1.15	1.00E+07	13.69261529	500	PASS
4	CC	0	11	4.00E+06	14	5.00E+06	14	1.00E+07	17.10582012	500	PASS
4	CC	0	12	4.00E+06	14	5.00E+06	1.15	1.00E+07	15.49378	500	PASS
4	CC	0	13	4.00E+06	0.73	2.00E+06	14	1.00E+07	9.936395096	500	PASS
4	CC	0	14	4.00E+06	0.73	2.00E+06	1.15	1.00E+07	9.761661562	500	PASS
4	CC	0	15	4.00E+06	0.73	5.00E+06	14	1.00E+07	17.67243228	500	PASS
4	CC	0	16	4.00E+06	0.73	5.00E+06	1.15	1.00E+07	15.10415368	500	PASS
4	CC	3	1	2.00E+06	14	2.00E+06	14	1.00E+07	9.108821356	500	PASS
4	CC	3	2	2.00E+06	14	2.00E+06	1.15	1.00E+07	8.811804619	500	PASS
4	CC	3	3	2.00E+06	14	5.00E+06	14	1.00E+07	19.58534068	500	PASS
4	CC	3	4	2.00E+06	14	5.00E+06	1.15	1.00E+07	16.91282569	500	PASS
4	CC	3	5	2.00E+06	0.73	2.00E+06	14	1.00E+07	8.691298099	500	PASS
4	CC	3	6	2.00E+06	0.73	2.00E+06	1.15	1.00E+07	7.470827551	500	PASS
4	CC	3	7	2.00E+06	0.73	5.00E+06	14	1.00E+07	19.96911842	500	PASS
4	CC	3	8	2.00E+06	0.73	5.00E+06	1.15	1.00E+07	17.46337906	500	PASS
4	CC	3	9	4.00E+06	14	2.00E+06	14	1.00E+07	16.01236749	500	PASS
4	CC	3	10	4.00E+06	14	2.00E+06	1.15	1.00E+07	16.16140783	500	PASS
4	CC	3	11	4.00E+06	14	5.00E+06	14	1.00E+07	20.78246547	500	PASS
4	CC	3	12	4.00E+06	14	5.00E+06	1.15	1.00E+07	18.85363954	500	PASS
4	CC	3	13	4.00E+06	0.73	2.00E+06	14	1.00E+07	11.93132189	500	PASS
4	CC	3	14	4.00E+06	0.73	2.00E+06	1.15	1.00E+07	11.64453467	500	PASS
4	CC	3	15	4.00E+06	0.73	5.00E+06	14	1.00E+07	20.99700858	500	PASS
4	CC	3	16	4.00E+06	0.73	5.00E+06	1.15	1.00E+07	18.05722374	500	PASS
4	SRNS	0	1	2.00E+06	14	2.00E+06	14	1.00E+07	10.02539061	N/A	N/A
4	SRNS	0	2	2.00E+06	14	2.00E+06	1.15	1.00E+07	9.319436146	N/A	N/A
4	SRNS	0	3	2.00E+06	14	5.00E+06	14	1.00E+07	17.72974777	N/A	N/A
4	SRNS	0	4	2.00E+06	14	5.00E+06	1.15	1.00E+07	16.15275828	N/A	N/A
4	SRNS	0	5	2.00E+06	0.73	2.00E+06	14	1.00E+07	8.690884817	N/A	N/A
4	SRNS	0	6	2.00E+06	0.73	2.00E+06	1.15	1.00E+07	7.900541184	N/A	N/A
4	SRNS	0	7	2.00E+06	0.73	5.00E+06	14	1.00E+07	16.99123359	N/A	N/A
4	SRNS	0	8	2.00E+06	0.73	5.00E+06	1.15	1.00E+07	15.32570622	N/A	N/A
4	SRNS	0	9	4.00E+06	14	2.00E+06	14	1.00E+07	15.18411162	N/A	N/A
4	SRNS	0	10	4.00E+06	14	2.00E+06	1.15	1.00E+07	14.70090165	N/A	N/A
4	SRNS	0	11	4.00E+06	14	5.00E+06	14	1.00E+07	21.21948628	N/A	N/A
4	SRNS	0	12	4.00E+06	14	5.00E+06	1.15	1.00E+07	19.85344334	N/A	N/A
4	SRNS	0	13	4.00E+06	0.73	2.00E+06	14	1.00E+07	12.39561431	N/A	N/A
4	SRNS	0	14	4.00E+06	0.73	2.00E+06	1.15	1.00E+07	11.84030677	N/A	N/A
4	SRNS	0	15	4.00E+06	0.73	5.00E+06	14	1.00E+07	19.00112388	N/A	N/A
4	SRNS	0	16	4.00E+06	0.73	5.00E+06	1.15	1.00E+07	17.65429776	N/A	N/A
4	SRNS	3	1	2.00E+06	14	2.00E+06	14	1.00E+07	11.53533247	N/A	N/A
4	SRNS	3	2	2.00E+06	14	2.00E+06	1.15	1.00E+07	10.72033646	N/A	N/A
4	SRNS	3	3	2.00E+06	14	5.00E+06	14	1.00E+07	20.4990665	N/A	N/A
4	SRNS	3	4	2.00E+06	14	5.00E+06	1.15	1.00E+07	18.61571105	N/A	N/A

Table 5-3. LMK0033x Detailed Jitter Measurements (continued)

PCIe Gen	Clock Arch.	Noise Fold	Filter Comb	PLL1 f1	PLL1 zeta 1	PLL2 f2	PLL2 zeta 2	CDR f3	Value (fs)	Limit (fs)	Status
4	SRNS	3	5	2.00E+06	0.73	2.00E+06	14	1.00E+07	9.997071395	N/A	N/A
4	SRNS	3	6	2.00E+06	0.73	2.00E+06	1.15	1.00E+07	9.081757781	N/A	N/A
4	SRNS	3	7	2.00E+06	0.73	5.00E+06	14	1.00E+07	19.65363232	N/A	N/A
4	SRNS	3	8	2.00E+06	0.73	5.00E+06	1.15	1.00E+07	17.66662477	N/A	N/A
4	SRNS	3	9	4.00E+06	14	2.00E+06	14	1.00E+07	17.51928081	N/A	N/A
4	SRNS	3	10	4.00E+06	14	2.00E+06	1.15	1.00E+07	16.96505079	N/A	N/A
4	SRNS	3	11	4.00E+06	14	5.00E+06	14	1.00E+07	24.52289345	N/A	N/A
4	SRNS	3	12	4.00E+06	14	5.00E+06	1.15	1.00E+07	22.89935103	N/A	N/A
4	SRNS	3	13	4.00E+06	0.73	2.00E+06	14	1.00E+07	14.24855815	N/A	N/A
4	SRNS	3	14	4.00E+06	0.73	2.00E+06	1.15	1.00E+07	13.60624246	N/A	N/A
4	SRNS	3	15	4.00E+06	0.73	5.00E+06	14	1.00E+07	21.95808325	N/A	N/A
4	SRNS	3	16	4.00E+06	0.73	5.00E+06	1.15	1.00E+07	20.33577639	N/A	N/A
5	CC	0	1	5.00E+05	14	5.00E+05	14	2.00E+07	1.918867979	150	PASS
5	CC	0	2	5.00E+05	14	5.00E+05	0.73	2.00E+07	1.704404244	150	PASS
5	CC	0	3	5.00E+05	14	1.80E+06	14	2.00E+07	5.710155308	150	PASS
5	CC	0	4	5.00E+05	14	1.80E+06	0.73	2.00E+07	4.013147186	150	PASS
5	CC	0	5	5.00E+05	0.73	5.00E+05	14	2.00E+07	1.704404244	150	PASS
5	CC	0	6	5.00E+05	0.73	5.00E+05	0.73	2.00E+07	1.343949572	150	PASS
5	CC	0	7	5.00E+05	0.73	1.80E+06	14	2.00E+07	5.744066817	150	PASS
5	CC	0	8	5.00E+05	0.73	1.80E+06	0.73	2.00E+07	4.040101855	150	PASS
5	CC	0	9	1.80E+06	14	5.00E+05	14	2.00E+07	5.710155308	150	PASS
5	CC	0	10	1.80E+06	14	5.00E+05	0.73	2.00E+07	5.744066817	150	PASS
5	CC	0	11	1.80E+06	14	1.80E+06	14	2.00E+07	6.871539864	150	PASS
5	CC	0	12	1.80E+06	14	1.80E+06	0.73	2.00E+07	6.277780793	150	PASS
5	CC	0	13	1.80E+06	0.73	5.00E+05	14	2.00E+07	4.013147186	150	PASS
5	CC	0	14	1.80E+06	0.73	5.00E+05	0.73	2.00E+07	4.040101855	150	PASS
5	CC	0	15	1.80E+06	0.73	1.80E+06	14	2.00E+07	6.277780793	150	PASS
5	CC	0	16	1.80E+06	0.73	1.80E+06	0.73	2.00E+07	4.840158112	150	PASS
5	CC	3	1	5.00E+05	14	5.00E+05	14	2.00E+07	2.382591982	150	PASS
5	CC	3	2	5.00E+05	14	5.00E+05	0.73	2.00E+07	2.100597509	150	PASS
5	CC	3	3	5.00E+05	14	1.80E+06	14	2.00E+07	6.836106024	150	PASS
5	CC	3	4	5.00E+05	14	1.80E+06	0.73	2.00E+07	4.851924269	150	PASS
5	CC	3	5	5.00E+05	0.73	5.00E+05	14	2.00E+07	2.100597509	150	PASS
5	CC	3	6	5.00E+05	0.73	5.00E+05	0.73	2.00E+07	1.668612842	150	PASS
5	CC	3	7	5.00E+05	0.73	1.80E+06	14	2.00E+07	6.823207284	150	PASS
5	CC	3	8	5.00E+05	0.73	1.80E+06	0.73	2.00E+07	4.827763641	150	PASS
5	CC	3	9	1.80E+06	14	5.00E+05	14	2.00E+07	6.836106024	150	PASS
5	CC	3	10	1.80E+06	14	5.00E+05	0.73	2.00E+07	6.823207284	150	PASS
5	CC	3	11	1.80E+06	14	1.80E+06	14	2.00E+07	8.538549126	150	PASS
5	CC	3	12	1.80E+06	14	1.80E+06	0.73	2.00E+07	7.710452629	150	PASS
5	CC	3	13	1.80E+06	0.73	5.00E+05	14	2.00E+07	4.851924269	150	PASS
5	CC	3	14	1.80E+06	0.73	5.00E+05	0.73	2.00E+07	4.827763641	150	PASS
5	CC	3	15	1.80E+06	0.73	1.80E+06	14	2.00E+07	7.710452629	150	PASS
5	CC	3	16	1.80E+06	0.73	1.80E+06	0.73	2.00E+07	6.009079697	150	PASS
5	SRNS	0	1	5.00E+05	14	5.00E+05	14	2.00E+07	2.383109136	N/A	N/A
5	SRNS	0	2	5.00E+05	14	5.00E+05	0.73	2.00E+07	2.058907452	N/A	N/A
5	SRNS	0	3	5.00E+05	14	1.80E+06	14	2.00E+07	6.125339072	N/A	N/A
5	SRNS	0	4	5.00E+05	14	1.80E+06	0.73	2.00E+07	4.583363841	N/A	N/A
5	SRNS	0	5	5.00E+05	0.73	5.00E+05	14	2.00E+07	2.058907452	N/A	N/A
5	SRNS	0	6	5.00E+05	0.73	5.00E+05	0.73	2.00E+07	1.676483569	N/A	N/A

Table 5-3. LMK0033x Detailed Jitter Measurements (continued)

PCIe Gen	Clock Arch.	Noise Fold	Filter Comb	PLL1 f1	PLL1 zeta 1	PLL2 f2	PLL2 zeta 2	CDR f3	Value (fs)	Limit (fs)	Status
5	SRNS	0	7	5.00E+05	0.73	1.80E+06	14	2.00E+07	6.008428606	N/A	N/A
5	SRNS	0	8	5.00E+05	0.73	1.80E+06	0.73	2.00E+07	4.422078755	N/A	N/A
5	SRNS	0	9	1.80E+06	14	5.00E+05	14	2.00E+07	6.125339072	N/A	N/A
5	SRNS	0	10	1.80E+06	14	5.00E+05	0.73	2.00E+07	6.008428606	N/A	N/A
5	SRNS	0	11	1.80E+06	14	1.80E+06	14	2.00E+07	8.345889583	N/A	N/A
5	SRNS	0	12	1.80E+06	14	1.80E+06	0.73	2.00E+07	7.25324351	N/A	N/A
5	SRNS	0	13	1.80E+06	0.73	5.00E+05	14	2.00E+07	4.583363841	N/A	N/A
5	SRNS	0	14	1.80E+06	0.73	5.00E+05	0.73	2.00E+07	4.422078755	N/A	N/A
5	SRNS	0	15	1.80E+06	0.73	1.80E+06	14	2.00E+07	7.25324351	N/A	N/A
5	SRNS	0	16	1.80E+06	0.73	1.80E+06	0.73	2.00E+07	6.030098843	N/A	N/A
5	SRNS	3	1	5.00E+05	14	5.00E+05	14	2.00E+07	2.775684045	N/A	N/A
5	SRNS	3	2	5.00E+05	14	5.00E+05	0.73	2.00E+07	2.3977996	N/A	N/A
5	SRNS	3	3	5.00E+05	14	1.80E+06	14	2.00E+07	7.153204405	N/A	N/A
5	SRNS	3	4	5.00E+05	14	1.80E+06	0.73	2.00E+07	5.337144995	N/A	N/A
5	SRNS	3	5	5.00E+05	0.73	5.00E+05	14	2.00E+07	2.3977996	N/A	N/A
5	SRNS	3	6	5.00E+05	0.73	5.00E+05	0.73	2.00E+07	1.951537075	N/A	N/A
5	SRNS	3	7	5.00E+05	0.73	1.80E+06	14	2.00E+07	7.017164375	N/A	N/A
5	SRNS	3	8	5.00E+05	0.73	1.80E+06	0.73	2.00E+07	5.149309846	N/A	N/A
5	SRNS	3	9	1.80E+06	14	5.00E+05	14	2.00E+07	7.153204405	N/A	N/A
5	SRNS	3	10	1.80E+06	14	5.00E+05	0.73	2.00E+07	7.017164375	N/A	N/A
5	SRNS	3	11	1.80E+06	14	1.80E+06	14	2.00E+07	9.746506724	N/A	N/A
5	SRNS	3	12	1.80E+06	14	1.80E+06	0.73	2.00E+07	8.464669661	N/A	N/A
5	SRNS	3	13	1.80E+06	0.73	5.00E+05	14	2.00E+07	5.337144995	N/A	N/A
5	SRNS	3	14	1.80E+06	0.73	5.00E+05	0.73	2.00E+07	5.149309846	N/A	N/A
5	SRNS	3	15	1.80E+06	0.73	1.80E+06	14	2.00E+07	8.464669661	N/A	N/A
5	SRNS	3	16	1.80E+06	0.73	1.80E+06	0.73	2.00E+07	7.021230257	N/A	N/A
6	CC	0	1	5.00E+05	14	5.00E+05	14	1.00E+07	2.232848296	100	PASS
6	CC	0	2	5.00E+05	14	5.00E+05	0.73	1.00E+07	2.036406183	100	PASS
6	CC	0	3	5.00E+05	14	1.00E+06	14	1.00E+07	4.009418208	100	PASS
6	CC	0	4	5.00E+05	14	1.00E+06	0.73	1.00E+07	2.832999909	100	PASS
6	CC	0	5	5.00E+05	0.73	5.00E+05	14	1.00E+07	2.036406183	100	PASS
6	CC	0	6	5.00E+05	0.73	5.00E+05	0.73	1.00E+07	1.564275297	100	PASS
6	CC	0	7	5.00E+05	0.73	1.00E+06	14	1.00E+07	4.1228743	100	PASS
6	CC	0	8	5.00E+05	0.73	1.00E+06	0.73	1.00E+07	2.789050322	100	PASS
6	CC	0	9	1.00E+06	14	5.00E+05	14	1.00E+07	4.009418208	100	PASS
6	CC	0	10	1.00E+06	14	5.00E+05	0.73	1.00E+07	4.1228743	100	PASS
6	CC	0	11	1.00E+06	14	1.00E+06	14	1.00E+07	4.456269608	100	PASS
6	CC	0	12	1.00E+06	14	1.00E+06	0.73	1.00E+07	4.137758815	100	PASS
6	CC	0	13	1.00E+06	0.73	5.00E+05	14	1.00E+07	2.832999909	100	PASS
6	CC	0	14	1.00E+06	0.73	5.00E+05	0.73	1.00E+07	2.789050322	100	PASS
6	CC	0	15	1.00E+06	0.73	1.00E+06	14	1.00E+07	4.137758815	100	PASS
6	CC	0	16	1.00E+06	0.73	1.00E+06	0.73	1.00E+07	3.129064798	100	PASS
6	CC	3	1	5.00E+05	14	5.00E+05	14	1.00E+07	2.681563163	100	PASS
6	CC	3	2	5.00E+05	14	5.00E+05	0.73	1.00E+07	2.423580474	100	PASS
6	CC	3	3	5.00E+05	14	1.00E+06	14	1.00E+07	4.714288005	100	PASS
6	CC	3	4	5.00E+05	14	1.00E+06	0.73	1.00E+07	3.377571825	100	PASS
6	CC	3	5	5.00E+05	0.73	5.00E+05	14	1.00E+07	2.423580474	100	PASS
6	CC	3	6	5.00E+05	0.73	5.00E+05	0.73	1.00E+07	1.878457089	100	PASS
6	CC	3	7	5.00E+05	0.73	1.00E+06	14	1.00E+07	4.790512222	100	PASS
6	CC	3	8	5.00E+05	0.73	1.00E+06	0.73	1.00E+07	3.28116958	100	PASS

Table 5-3. LMK0033x Detailed Jitter Measurements (continued)

PCIe Gen	Clock Arch.	Noise Fold	Filter Comb	PLL1 f1	PLL1 zeta 1	PLL2 f2	PLL2 zeta 2	CDR f3	Value (fs)	Limit (fs)	Status
6	CC	3	9	1.00E+06	14	5.00E+05	14	1.00E+07	4.714288005	100	PASS
6	CC	3	10	1.00E+06	14	5.00E+05	0.73	1.00E+07	4.790512222	100	PASS
6	CC	3	11	1.00E+06	14	1.00E+06	14	1.00E+07	5.353172449	100	PASS
6	CC	3	12	1.00E+06	14	1.00E+06	0.73	1.00E+07	4.915403236	100	PASS
6	CC	3	13	1.00E+06	0.73	5.00E+05	14	1.00E+07	3.377571825	100	PASS
6	CC	3	14	1.00E+06	0.73	5.00E+05	0.73	1.00E+07	3.28116958	100	PASS
6	CC	3	15	1.00E+06	0.73	1.00E+06	14	1.00E+07	4.915403236	100	PASS
6	CC	3	16	1.00E+06	0.73	1.00E+06	0.73	1.00E+07	3.757457287	100	PASS
6	SRNS	0	1	5.00E+05	14	5.00E+05	14	1.00E+07	3.336076581	N/A	N/A
6	SRNS	0	2	5.00E+05	14	5.00E+05	0.73	1.00E+07	2.88118539	N/A	N/A
6	SRNS	0	3	5.00E+05	14	1.00E+06	14	1.00E+07	5.238725807	N/A	N/A
6	SRNS	0	4	5.00E+05	14	1.00E+06	0.73	1.00E+07	4.068337143	N/A	N/A
6	SRNS	0	5	5.00E+05	0.73	5.00E+05	14	1.00E+07	2.88118539	N/A	N/A
6	SRNS	0	6	5.00E+05	0.73	5.00E+05	0.73	1.00E+07	2.342978214	N/A	N/A
6	SRNS	0	7	5.00E+05	0.73	1.00E+06	14	1.00E+07	4.959874495	N/A	N/A
6	SRNS	0	8	5.00E+05	0.73	1.00E+06	0.73	1.00E+07	3.70525652	N/A	N/A
6	SRNS	0	9	1.00E+06	14	5.00E+05	14	1.00E+07	5.238725807	N/A	N/A
6	SRNS	0	10	1.00E+06	14	5.00E+05	0.73	1.00E+07	4.959874495	N/A	N/A
6	SRNS	0	11	1.00E+06	14	1.00E+06	14	1.00E+07	6.621487451	N/A	N/A
6	SRNS	0	12	1.00E+06	14	1.00E+06	0.73	1.00E+07	5.727298172	N/A	N/A
6	SRNS	0	13	1.00E+06	0.73	5.00E+05	14	1.00E+07	4.068337143	N/A	N/A
6	SRNS	0	14	1.00E+06	0.73	5.00E+05	0.73	1.00E+07	3.70525652	N/A	N/A
6	SRNS	0	15	1.00E+06	0.73	1.00E+06	14	1.00E+07	5.727298172	N/A	N/A
6	SRNS	0	16	1.00E+06	0.73	1.00E+06	0.73	1.00E+07	4.688045366	N/A	N/A
6	SRNS	3	1	5.00E+05	14	5.00E+05	14	1.00E+07	3.786087859	N/A	N/A
6	SRNS	3	2	5.00E+05	14	5.00E+05	0.73	1.00E+07	3.269733687	N/A	N/A
6	SRNS	3	3	5.00E+05	14	1.00E+06	14	1.00E+07	5.947182033	N/A	N/A
6	SRNS	3	4	5.00E+05	14	1.00E+06	0.73	1.00E+07	4.616612073	N/A	N/A
6	SRNS	3	5	5.00E+05	0.73	5.00E+05	14	1.00E+07	3.269733687	N/A	N/A
6	SRNS	3	6	5.00E+05	0.73	5.00E+05	0.73	1.00E+07	2.658588864	N/A	N/A
6	SRNS	3	7	5.00E+05	0.73	1.00E+06	14	1.00E+07	5.630845853	N/A	N/A
6	SRNS	3	8	5.00E+05	0.73	1.00E+06	0.73	1.00E+07	4.204395825	N/A	N/A
6	SRNS	3	9	1.00E+06	14	5.00E+05	14	1.00E+07	5.947182033	N/A	N/A
6	SRNS	3	10	1.00E+06	14	5.00E+05	0.73	1.00E+07	5.630845853	N/A	N/A
6	SRNS	3	11	1.00E+06	14	1.00E+06	14	1.00E+07	7.517204797	N/A	N/A
6	SRNS	3	12	1.00E+06	14	1.00E+06	0.73	1.00E+07	6.501402061	N/A	N/A
6	SRNS	3	13	1.00E+06	0.73	5.00E+05	14	1.00E+07	4.616612073	N/A	N/A
6	SRNS	3	14	1.00E+06	0.73	5.00E+05	0.73	1.00E+07	4.204395825	N/A	N/A
6	SRNS	3	15	1.00E+06	0.73	1.00E+06	14	1.00E+07	6.501402061	N/A	N/A
6	SRNS	3	16	1.00E+06	0.73	1.00E+06	0.73	1.00E+07	5.319514125	N/A	N/A
7	CC	0	1	3.50E+05	14	3.50E+05	14	1.00E+07	2.290559	67	PASS
7	CC	0	2	3.50E+05	14	3.50E+05	0.73	1.00E+07	2.056663	67	PASS
7	CC	0	3	3.50E+05	14	7.00E+05	14	1.00E+07	3.996368	67	PASS
7	CC	0	4	3.50E+05	14	7.00E+05	0.73	1.00E+07	2.873522	67	PASS
7	CC	0	5	3.50E+05	0.73	3.50E+05	14	1.00E+07	2.056663	67	PASS
7	CC	0	6	3.50E+05	0.73	3.50E+05	0.73	1.00E+07	1.603986	67	PASS
7	CC	0	7	3.50E+05	0.73	7.00E+05	14	1.00E+07	4.050219	67	PASS
7	CC	0	8	3.50E+05	0.73	7.00E+05	0.73	1.00E+07	2.783514	67	PASS
7	CC	0	9	7.00E+05	14	3.50E+05	14	1.00E+07	3.996368	67	PASS
7	CC	0	10	7.00E+05	14	3.50E+05	0.73	1.00E+07	4.050219	67	PASS

Table 5-3. LMK0033x Detailed Jitter Measurements (continued)

PCIe Gen	Clock Arch.	Noise Fold	Filter Comb	PLL1 f1	PLL1 zeta 1	PLL2 f2	PLL2 zeta 2	CDR f3	Value (fs)	Limit (fs)	Status
7	CC	0	11	7.00E+05	14	7.00E+05	14	1.00E+07	4.57702	67	PASS
7	CC	0	12	7.00E+05	14	7.00E+05	0.73	1.00E+07	4.155186	67	PASS
7	CC	0	13	7.00E+05	0.73	3.50E+05	14	1.00E+07	2.873522	67	PASS
7	CC	0	14	7.00E+05	0.73	3.50E+05	0.73	1.00E+07	2.783514	67	PASS
7	CC	0	15	7.00E+05	0.73	7.00E+05	14	1.00E+07	4.155186	67	PASS
7	CC	0	16	7.00E+05	0.73	7.00E+05	0.73	1.00E+07	3.208195	67	PASS
7	CC	3	1	3.50E+05	14	3.50E+05	14	1.00E+07	2.729776	67	PASS
7	CC	3	2	3.50E+05	14	3.50E+05	0.73	1.00E+07	2.441216	67	PASS
7	CC	3	3	3.50E+05	14	7.00E+05	14	1.00E+07	4.714512	67	PASS
7	CC	3	4	3.50E+05	14	7.00E+05	0.73	1.00E+07	3.413202	67	PASS
7	CC	3	5	3.50E+05	0.73	3.50E+05	14	1.00E+07	2.441216	67	PASS
7	CC	3	6	3.50E+05	0.73	3.50E+05	0.73	1.00E+07	1.911511	67	PASS
7	CC	3	7	3.50E+05	0.73	7.00E+05	14	1.00E+07	4.748386	67	PASS
7	CC	3	8	3.50E+05	0.73	7.00E+05	0.73	1.00E+07	3.284411	67	PASS
7	CC	3	9	7.00E+05	14	3.50E+05	14	1.00E+07	4.714512	67	PASS
7	CC	3	10	7.00E+05	14	3.50E+05	0.73	1.00E+07	4.748386	67	PASS
7	CC	3	11	7.00E+05	14	7.00E+05	14	1.00E+07	5.454991	67	PASS
7	CC	3	12	7.00E+05	14	7.00E+05	0.73	1.00E+07	4.928858	67	PASS
7	CC	3	13	7.00E+05	0.73	3.50E+05	14	1.00E+07	3.413202	67	PASS
7	CC	3	14	7.00E+05	0.73	3.50E+05	0.73	1.00E+07	3.284411	67	PASS
7	CC	3	15	7.00E+05	0.73	7.00E+05	14	1.00E+07	4.928858	67	PASS
7	CC	3	16	7.00E+05	0.73	7.00E+05	0.73	1.00E+07	3.823271	67	PASS
7	SRNS	0	1	3.50E+05	14	3.50E+05	14	1.00E+07	3.200093	N/A	N/A
7	SRNS	0	2	3.50E+05	14	3.50E+05	0.73	1.00E+07	2.762948	N/A	N/A
7	SRNS	0	3	3.50E+05	14	7.00E+05	14	1.00E+07	5.041039	N/A	N/A
7	SRNS	0	4	3.50E+05	14	7.00E+05	0.73	1.00E+07	3.898068	N/A	N/A
7	SRNS	0	5	3.50E+05	0.73	3.50E+05	14	1.00E+07	2.762948	N/A	N/A
7	SRNS	0	6	3.50E+05	0.73	3.50E+05	0.73	1.00E+07	2.2439	N/A	N/A
7	SRNS	0	7	3.50E+05	0.73	7.00E+05	14	1.00E+07	4.774724	N/A	N/A
7	SRNS	0	8	3.50E+05	0.73	7.00E+05	0.73	1.00E+07	3.548417	N/A	N/A
7	SRNS	0	9	7.00E+05	14	3.50E+05	14	1.00E+07	5.041039	N/A	N/A
7	SRNS	0	10	7.00E+05	14	3.50E+05	0.73	1.00E+07	4.774724	N/A	N/A
7	SRNS	0	11	7.00E+05	14	7.00E+05	14	1.00E+07	6.373906	N/A	N/A
7	SRNS	0	12	7.00E+05	14	7.00E+05	0.73	1.00E+07	5.507591	N/A	N/A
7	SRNS	0	13	7.00E+05	0.73	3.50E+05	14	1.00E+07	3.898068	N/A	N/A
7	SRNS	0	14	7.00E+05	0.73	3.50E+05	0.73	1.00E+07	3.548417	N/A	N/A
7	SRNS	0	15	7.00E+05	0.73	7.00E+05	14	1.00E+07	5.507591	N/A	N/A
7	SRNS	0	16	7.00E+05	0.73	7.00E+05	0.73	1.00E+07	4.489047	N/A	N/A
7	SRNS	3	1	3.50E+05	14	3.50E+05	14	1.00E+07	3.701738	N/A	N/A
7	SRNS	3	2	3.50E+05	14	3.50E+05	0.73	1.00E+07	3.196024	N/A	N/A
7	SRNS	3	3	3.50E+05	14	7.00E+05	14	1.00E+07	5.83219	N/A	N/A
7	SRNS	3	4	3.50E+05	14	7.00E+05	0.73	1.00E+07	4.508883	N/A	N/A

Table 5-3. LMK0033x Detailed Jitter Measurements (continued)

PCIe Gen	Clock Arch.	Noise Fold	Filter Comb	PLL1 f1	PLL1 zeta 1	PLL2 f2	PLL2 zeta 2	CDR f3	Value (fs)	Limit (fs)	Status
7	SRNS	3	5	3.50E+05	0.73	3.50E+05	14	1.00E+07	3.196024	N/A	N/A
7	SRNS	3	6	3.50E+05	0.73	3.50E+05	0.73	1.00E+07	2.595459	N/A	N/A
7	SRNS	3	7	3.50E+05	0.73	7.00E+05	14	1.00E+07	5.524192	N/A	N/A
7	SRNS	3	8	3.50E+05	0.73	7.00E+05	0.73	1.00E+07	4.104345	N/A	N/A
7	SRNS	3	9	7.00E+05	14	3.50E+05	14	1.00E+07	5.83219	N/A	N/A
7	SRNS	3	10	7.00E+05	14	3.50E+05	0.73	1.00E+07	5.524192	N/A	N/A
7	SRNS	3	11	7.00E+05	14	7.00E+05	14	1.00E+07	7.374367	N/A	N/A
7	SRNS	3	12	7.00E+05	14	7.00E+05	0.73	1.00E+07	6.37177	N/A	N/A
7	SRNS	3	13	7.00E+05	0.73	3.50E+05	14	1.00E+07	4.508883	N/A	N/A
7	SRNS	3	14	7.00E+05	0.73	3.50E+05	0.73	1.00E+07	4.104345	N/A	N/A
7	SRNS	3	15	7.00E+05	0.73	7.00E+05	14	1.00E+07	6.37177	N/A	N/A
7	SRNS	3	16	7.00E+05	0.73	7.00E+05	0.73	1.00E+07	5.192312	N/A	N/A

6 Summary

This application note outlines TI's PCIe Compliance Tool, how the test results are obtained, and demonstrates PCIe compliance based on the results in Section 5.1. This report demonstrates that the LMK0033x buffer family of devices is an excellent choice for PCIe clocking in enterprise systems.

7 References

- Texas Instruments, *LMKDB1120 and LMKDB1108 Ultra-Low Jitter PCIe Gen 1 to Gen 6 LP-HCSL Clock Buffers*, data sheet.
- Texas Instruments, *TICSPRO-SW*, Clocks and Synthesizers (TICS) Pro Software.

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