FCC Part 24 & 27 Test Report

Product Name	:	Module
Trade Name	:	AirPrime
Model No.	:	HL7748
FCC ID	:	N7NHL7748

Applicant	:	Sierra Wireless Inc.
Address	:	13811 Wireless Way, Richmond, BC, V6V 3A4 Canada

Date of Receipt	:	Aug. 21, 2017
Issued Date	:	Nov. 12, 2017
Report No.	:	1780384R-HPUSP55V00
Report Version	:	V4.0

Testing Laboratory
3024

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Test Report Certification

Issued Date : Nov. 12, 2017
Report No. : 1780384R-HPUSP55V00

Product Name	:	Module
Applicant	:	Sierra Wireless Inc.
Address	:	13811 Wireless Way, Richmond, BC, V6V 3A4 Canada
Manufacturer	:	Sierra Wireless Inc.
Model No.	:	HL7748
FCC ID	:	N7NHL7748
EUT Voltage	:	DC 3.8V
Testing Voltage	:	DC 3.8V
Trade Name	:	AirPrime
Applicable Standard	:	FCC CFR Title 47 Part 24 Subpart E FCC CFR Title 47 Part 27 Subpart L&F FCC CFR Title 47 Part 2 ANSI C63.26-2015 KDB 971168 D01 Power Meas License Digital Systems v03
Test Lab	:	Hsin Chu Laboratory
Address	:	No.372-2, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County 310, Taiwan, R.O.C. TEL: +886-3-582-8001 / FAX: +886-3-582-8958
Test Result	:	Complied

Documented By : Carol Tsai

(Carol Tsai / Engineering Adm. Assistant)

Tested By : Max Chang

(Max Chang / Engineer)

Approved By : Roy Wang

(Roy Wang / Director)

Revision History

Report No.	Version	Description	Issued Date
1780384R-HPUSP55V00	V4.0	Initial issue of report	Nov. 12, 2017

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1. General Information

1.1. EUT Description

Product Name	Module
Model No.	HL7748
Trade Name	AirPrime
Tx Frequency Range/ Channel number	LTE Band 2: 1850 MHz~1910MHz LTE Band 4: 1710 MHz~1755 MHz LTE Band 12: 699 MHz~716 MHz
Rx Frequency Range/ Channel number	LTE Band 2: 1930 MHz~1990MHz LTE Band 4: 2110 MHz~2155 MHz LTE Band 12: 729MHz~ 746MHz
HW Version	1.0
SW Version	AHL77xx_NQ.01.00.45_0.6.1
IMEI No.	355272080004780

Note:

1. This Module supports LTE CAT-M1 with Band 2/4/12.
2. Regarding frequency band operation, the lowest, middle and highest frequency of channel were selected to perform the test, and the details were shown on this report.

1.2. Mode of Operation

DEKRA has verified the construction and function in typical operation. All the test modes were carried out with the EUT in normal operation, which was shown in this test report and defined as:

Test Mode
Mode 1: LTE_CAT-M1_Band 2_QPSK_Link
Mode 2: LTE_CAT-M1_Band 2_16-QAM_Link
Mode 3: LTE_CAT-M1_Band 4_QPSK_Link
Mode 4: LTE_CAT-M1_Band 4_16-QAM_Link
Mode 5: LTE_CAT-M1_Band 12_QPSK_Link
Mode 6: LTE_CAT-M1_Band 12_16-QAM_Link

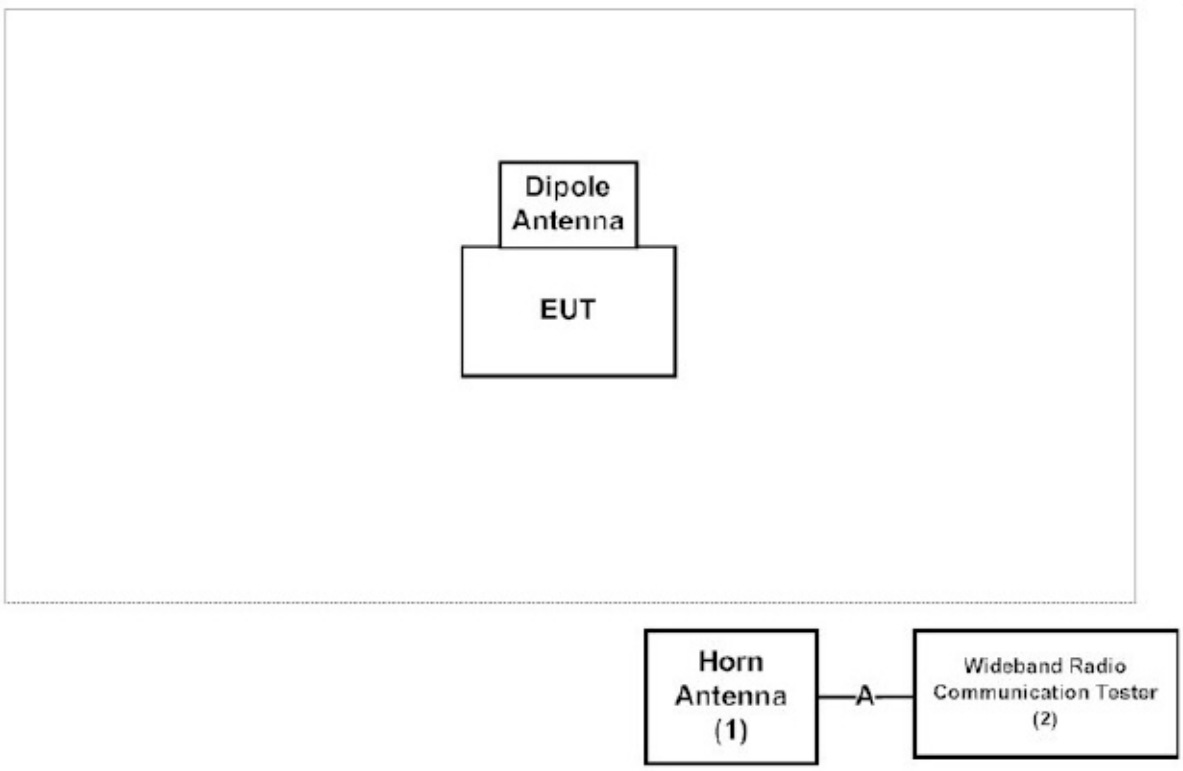
1.3. Tested System Details

The types for all equipment, plus descriptions of all cables used in the tested system (including inserted cards) are:

Product		Manufacturer	Model No.	Serial No.	Power Cord
1	Horn Antenna	Schwarzbeck	BBHA 9120D	639	--
2	Wideband Radio Communication Tester	R&S	CMW500	150246	--
3	Dipole Antenna (2dBi)	SIERRA	--	--	--

1.4. Configuration of Tested System

Connection Diagram



Signal Cable Type		Signal cable Description
A	RF Cable	Shielded, 2m.

1.5. EUT Exercise Software

1	Setup the EUT and simulators as shown on 1.4.
2	Turn on the power of all equipment.
3	The EUT will continue receive the signal from LTE Cat-M1 function.
4	Repeat the above procedure (3)

2. Technical Test

2.1. Summary of Test Result

☒ No deviations from the test standards

☐ Deviations from the test standards as below description:

(FCC CFR Title 47 Part 24 Subpart E)

Performed Item	FCC Rule	Limit	Result	Test Site
Peak Output Power	FCC Part 24.232(b) FCC Part 2.1046	Band2: 2 Watts(EIRP)	Pass	3
Occupied Bandwidth	FCC Part 2.1049 FCC Part 24.238(b)	N/A	Pass	3
Spurious Emission At Antenna Terminals (+/- 1MHz)	FCC Part 24.238(a) FCC Part 2.1049	< -13 dBm	Pass	3
Spurious Emission	FCC Part 2.1051 FCC Part 2.1053	< -13 dBm	Pass	2
Frequency Stability Under Temperature & Voltage Variations	FCC Part 24.235 FCC Part 2.1055	< 2.5 ppm	Pass	3

Note: Test site information refers to Laboratory Information.

(FCC CFR Title 47 Part 27 Subpart L&F)

Performed Item	FCC Rule	Limit	Result	Test Site
RF Output Power	FCC PART 2.1046 and Part 27.50(a)(2)	Band4: 1 Wat(EIRP) Band12: 3 Watts(ERP)	Pass	3
Occupied Bandwidth	FCC Part 2.1049	N/A	Pass	3
Peak To Average Ratio	FCC Part 27.50	< 13 dBm	Pass	3
Spurious Emission at Antenna Terminal	FCC Part 2.1051 and Part 27.53(a)(3)	< -13 dBm	Pass	2
Frequency Stability Under Temperature & Voltage Variations	FCC Part 2.1055(a)(l) and Part 27.54	< 2.5 ppm	Pass	3

Note: Test site information refers to Laboratory Information.

2.2. Test Environment

Items	Required (IEC 68-1)	Actual
Temperature (°C)	15-35	23
Humidity (%RH)	25-75	52
Barometric pressure (mbar)	860-1060	950-1000

Note: Test site information refers to Laboratory Information.

The related certificate for our laboratories about the test site and management system can be downloaded from DEKRA Testing and Certification Co., Ltd. Web Site:
http://www.dekra.com.tw/english/about/certificates.aspx?bval=5
The address and introduction of DEKRA Testing and Certification Co., Ltd. laboratories can be founded in our Web site : http://www.dekra.com.tw/index_en.aspx

If you have any comments, Please don't hesitate to contact us. Our test sites as below:

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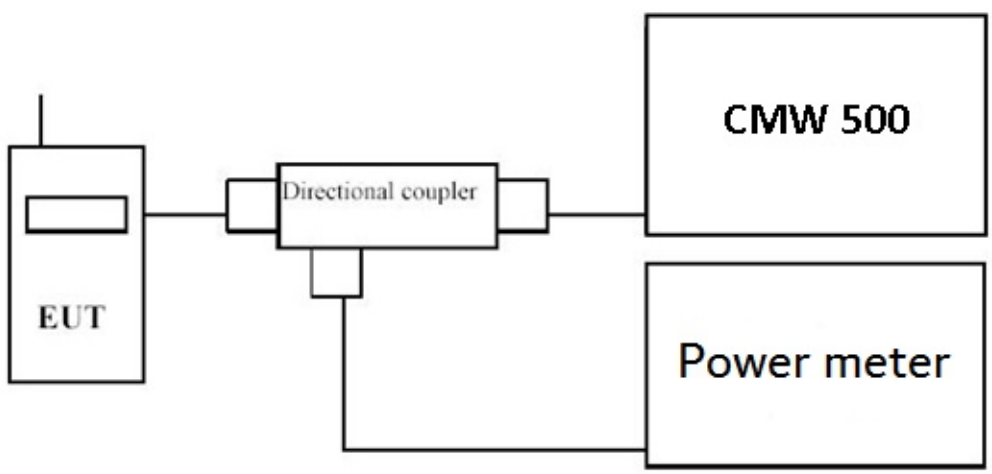
3. RF Output Power

3.1. Test Equipment

RF Output Power / SR10-H

Instrument	Manufacturer	Model No.	Serial No.	Cal. Date	Next Cal. Date
High Speed Peak Power Meter Dual Input	Anritsu	ML2496A	1602004	2017/01/20	2018/01/19
Wideband Radio Communication Tester	R&S	CMW500	150246	2017/04/19	2018/04/18
Directional Coupler	Agilent	778D	20402	2017/10/05	2018/10/04

3.2. Test Setup



3.3. Test Procedure

a) The RF output of the transmitter was connected to base station simulator.
b) The RF output of EUT was connected to the power meter by RF cable and attenuator. The path loss was compensated to the results for each measurement.
c) Set EUT at maximum average power by base station emulator.
d) Measure lowest, middle, and highest channels for each bandwidth and different modulation.

Effective Isotropic Radiated Power= Conducted Power(dBm) + Antenna Gain(dBi)

Effective Radiated Power= Conducted Power(dBm) + Antenna Gain(dBi)-2.15dB

3.4. Test Method

KDB 971168 D01 Power Meas License Digital Systems v03 sub-clause5.2.4
ANSI C63.26-2015 Sub-clause 5.2.4.2

3.5. Uncertainty

The measurement uncertainty is defined as ± 1.27dB.

3.6. Test Result

Product	Module		
Test Item	RF Output Power		
Test Mode	Mode 1: LTE_CAT-M1_Band 2_QPSK_Link Mode 2: LTE_CAT-M1_Band 2_16-QAM_Link		
Date of Test	2017/11/10	Test Site	SR10-H

LTE Band 2_QPSK				
Frequency (MHz)	Average Power			Limit (dBm) EIRP
	Reading Level (dBm)	Antenna Gain (dBi) (note2)	Measure Level (dBm) EIRP	
1850.7	23.66	9	32.66	33
1878.3	23.58	9	32.58	33
1909.3	23.44	9	32.44	33

Note:

1. Measure Level (EIRP)= Reading Level + Antenna Gain
2. The usable maximum antenna gain is 9 dBi.

LTE Band 2_16-QAM				
Frequency (MHz)	Average Power			Limit (dBm) EIRP
	Reading Level (dBm)	Antenna Gain (dBi) (note2)	Measure Level (dBm) EIRP	
1850.7	23.09	9	32.09	33
1878.3	23.27	9	32.27	33
1909.3	23.36	9	32.36	33

Note:

1. Measure Level (EIRP)= Reading Level + Antenna Gain
2. The usable maximum antenna gain is 9 dBi.

Product	Module		
Test Item	RF Power Output		
Test Mode	Mode 3: LTE_CAT-M1_Band 4_QPSK_Link Mode 4: LTE_CAT-M1_Band 4_16-QAM_Link		
Date of Test	2017/11/10	Test Site	SR10-H

LTE Band 4_QPSK				
Frequency (MHz)	Average Power			Limit (dBm) EIRP
	Reading Level (dBm)	Antenna Gain (dBi) (note2)	Measure Level (dBm) EIRP	
1710.7	23.39	6	29.39	30
1730.8	23.78	6	29.78	30
1754.3	23.68	6	29.68	30

Note:

1. Measure Level (EIRP)= Reading Level + Antenna Gain
2. The usable maximum antenna gain is 6 dBi.

LTE Band 4_16-QAM				
Frequency (MHz)	Average Power			EIRP Limit (dBm)
	Reading Level (dBm)	Antenna Gain (dBi) (note2)	Measure Level (dBm) EIRP	
1710.7	23.32	6	29.32	30
1730.8	23.56	6	29.56	30
1754.3	23.45	6	29.45	30

Note:

1. Measure Level (EIRP)= Reading Level + Antenna Gain
2. The usable maximum antenna gain is 6 dBi.

Product	Module		
Test Item	RF Power Output		
Test Mode	Mode 5: LTE_CAT-M1_Band 12_QPSK_Link Mode 6: LTE_CAT-M1_Band 12_16-QAM_Link		
Date of Test	2017/11/10	Test Site	SR10-H

LTE Band12_QPSK					
Frequency (MHz)	Average Power				Limit (W) ERP
	Reading Level (dBm)	Antenna Gain (dBi) (note2)	Measure Level (dBm) ERP	Measure Level (W) ERP	
699.7	24.14	6	27.99	0.63	3
705.7	24.16	6	28.01	0.63	3
715.3	23.96	6	27.81	0.60	3

Note:

1. Measure Level (ERP) = Reading Level (dBm) + Antenna Gain (dBi) - 2.15dB

2. The usable maximum antenna gain is 6 dBi.

LTE Band12_16-QAM					
Frequency (MHz)	Average Power				Limit (W) ERP
	Reading Level (dBm)	Antenna Gain (dBi) (note2)	Measure Level (dBm) ERP	Measure Level (W) ERP	
777.7	23.49	6	27.34	0.54	3
780.3	23.58	6	27.43	0.55	3
786.3	23.69	6	27.54	0.57	3

Note:

1. Measure Level (ERP) = Reading Level (dBm) + Antenna Gain (dBi) - 2.15dB

2. The usable maximum antenna gain is 6 dBi.