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CNAS L0310



FCC

RF Test Report

Product Name: HUAWEI MateBook

Model Number: HZ-W29

Report No: SYBH(Z-RF)010052016-2004

FCC ID: QISHZ-W29

Reliability Laboratory of Huawei Technologies Co., Ltd.

(Global Compliance and Testing Center of Huawei Technologies Co., Ltd)

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Notice

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2. The laboratory has passed the accreditation by The American Association for Laboratory Accreditation (A2LA). The accreditation number is 2174.01 & 2174.02 & 2174.03.
3. The laboratory has been listed by the US Federal Communications Commission to perform electromagnetic emission measurements. The site recognition number is 97456.
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5. The laboratory (Reliability Lab of Huawei Technologies Co., Ltd) is also named “Global Compliance and Testing Center of Huawei Technologies Co., Ltd”, the both names have coexisted since 2009.
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Applicant: Huawei Technologies Co., Ltd.
Address: Administration Building, Headquarters of Huawei Technologies Co., Ltd.,
Bantian, Longgang District, Shenzhen, 518129, P.R.C

Date of Receipt Sample: 2016-05-31
Start Date of Test: 2016-06-01
End Date of Test: 2016-06-06

Test Result: Pass

Approved by Senior	2016-06-06	Roger Zhang	<i>Roger Zhang</i>
Engineer:	Date	Name	Signature

Prepared by:	2016-06-06	Mao Wenli	<i>Mao Wenli</i>
	Date	Name	Signature

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1 General Information

1.1 Applied Standard

Applied Rules: 47 CFR FCC Part 2, Subpart J 2014
 47 CFR FCC Part 15, Subpart C 2014
 47 CFR FCC Part 15, Subpart E 2014

Test Method: KDB 789033 D02 General UNII Test Procedures New Rules v01r01
 FCC KDB 558074 D01 DTS Meas Guidance v03r04
 FCC KDB 662911 D01 Multiple Transmitter Output v02

1.2 Test Location

Test Location : Reliability Laboratory of Huawei Technologies Co., Ltd.
Address: Administration Building, Headquarters of Huawei Technologies Co., Ltd., Bantian, Longgang
 District, Shenzhen, 518129, P.R.C

1.3 Test Environment Condition

Temperature: 19.5 to 25 °C (Ambient)
Relative Humidity: 40 to 55 % (Ambient)
Atmospheric Pressure: Not applicable

2 Test Summary

2.1 Measurement Technical Requirements

2.1.1 U-NII (5150-5250, 5250-5350, 5470-5725 5725-5850 MHz)

Test Item	Band	FCC Rule	Requirements	Test Result	Verdict
Emission Bandwidth	5150-5250	15.403(i) 15.407(a)(1)	No limit.	Appendix A	SYBH(Z-RF)033022016-2004
	5250-5350	15.403(i) 15.407(a)(2)			
	5470-5725	15.403(i) 15.407(a)(2)			
	5725-5850	15.403(i) 15.407(e)	≥ 500 kHz.		
Occupied Bandwidth	5150-5250 5250-5350 5470-5725 5725-5850	KDB 789033 §D	No limit	Appendix B	SYBH(Z-RF)033022016-2004
Duty Cycle	5150-5850	--	No limit.	Appendix C	SYBH(Z-RF)033022016-2004
Maximum Conducted Output Power	5150-5250	15.407(a)(1) 15.407(a)(4)	< 250mW (avg during transmission)	Appendix D	SYBH(Z-RF)033022016-2004
	5250-5350	15.407(a)(2) 15.407(a)(4)	<MIN{250mW,11dBm+10*Ig(EBW)} (avg during transmission)		
	5470-5725	15.407(a)(2) 15.407(a)(4)	<MIN{250mW,11dBm+10*Ig(EBW)} (avg during transmission)		
	5725-5850	15.407(a)(3)	< 1W (avg during transmission)		
Peak Power Spectral Density	5150-5250	15.407(a)(1) 15.407(a)(4)	<11dBm/MHz (avg during transmission)	Appendix E	SYBH(Z-RF)033022016-2004
	5250-5350	15.407(a)(2) 15.407(a)(4)	<11dBm/MHz (avg during transmission)		
	5470-5725	15.407(a)(2) 15.407(a)(4)	<11dBm/MHz (avg during transmission)		
	5725-5850	15.407(a)(3) 15.407(a)(4)	<30dBm/500KHz (avg during transmission)		
Unwanted Emissions	5150-5250	15.407(b)(1) 15.407(b)(6) 15.407(b)(7)	- F<1GHz: §15.209/§7.2.5 limit (QP). - F≥1GHz & out-restricted:	Appendix F	SYBH(Z-RF)033022016-2004

Test Item	Band	FCC Rule	Requirements	Test Result	Verdict
		15.209	<-27dBm/MHz PK e.i.r.p. (exl. 5.15-5.35 GHz). F≥1GHz & in-restricted: §15.209/§7.2.5 limit (AV&PK).		
	5250-5350	15.407(b)(2) 15.407(b)(6) 15.407(b)(7) 15.209	- F<1GHz: §15.209/§7.2.5 limit (QP). - F≥1GHz & out-restricted: <-27dBm/MHz PK e.i.r.p. (exl. 5.25-5.35 GHz). - F≥1GHz & in-restricted: §15.209/§7.2.5 limit (AV&PK).		
	5470-5725	15.407(b)(3) 15.407(b)(6) 15.407(b)(7) 15.209	- F<1GHz: §15.209/§7.2.5 limit (QP). - F≥1GHz & out-restricted: <-27dBm/MHz PK e.i.r.p. (exl. 5.47-5.725 GHz). - F≥1GHz & in-restricted: §15.209/§7.2.5 limit (AV&PK).		
	5725-5850	15.407(b)(4) 15.407(b)(6) 15.407(b)(7) 15.209	- F<1GHz: §15.209/§7.2.5 limit (QP) - F≥1GHz & out-restricted: <-17dBm/MHz PK e.i.r.p.(from the edge to 10 MHz above or below the band edge); <-27dBm/MHz PK e.i.r.p(for frequencies 10 MHz or greater above or below the band edge) (exl. 5725-5850 GHz). - F≥1GHz & in-restricted: §15.209/§7.2.5 limit (AV&PK).		
Frequency Stability	5150-5250 5250-5350 5470-5725 5725-5850	15.407(g)	FCC Part 15.407(g)	Appendix G	SYBH(Z-RF)033022016-2004

3 Description of the Equipment under Test (EUT)

3.1 General Description

The HUAWEI MateBook (MateBook for short) is a 12-inch laptop that incorporates a 6th Gen Intel® Core™ m processor and supports high-speed Wi-Fi Internet. The MateBook has a slim metallic body that is 6.9 mm thick, making it both stylish and easy to carry. The MateBook has an IPS display with a 2160 x 1440 pixel LCD screen, NTSC 85% color gamut, and brightness of 400 nits. The screen-to-body ratio is 84%, and the viewing angle can reach an impressive 160 degrees. It is also equipped with a 5 MP front camera. The MateBook is a smart work assistant, supporting Office 2016 and 4K video playback. The MateBook adopts a USB Type-C charging port that enables the cable to be inserted with either side facing up. The MateBook offers a seamless office experience based on the Microsoft Windows 10 operating system..

The differences between HZ-W09 and HZ-W29

	HZ-W09	HZ-W29
PCB	the same	the same
WIFI/BT 2.4G	the same	the same
WIFI 5G	the same	the same
CPU	Different (2.2GHz)	Different (3.1 GHz)

NOTE: We do not test the 5G WIFI of HZ-W29, all the data refer to NO. SYBH(Z-RF)033022016-2004 of HZ-W09 report.

3.2 EUT Identity

NOTE: Unless otherwise noted in the report, the functional boards installed in the units shall be selected from the below list, but not means all the functional boards listed below shall be installed in one unit.

3.2.1 Board

Board		
Description	Hardware Version	Software Version
Main Board	S1	HZ-W09C001B016

3.2.2 Sub-Assembly

Sub-Assembly			
Sub-Assembly Name	Model	Manufacturer	Description
Adapter	HW-59C200UHPQ1	Huawei Technologies Co., Ltd.	Input Voltage: 100V~240V AC, 50Hz/60Hz Output Voltage: 5VDC,2A OR 9VDC,2A OR 12VDC,2A
Li-ion	HB25B7N4EBC	Huawei Technologies Co., Ltd.	Rated capacity: 4300 mAh Nominal Voltage:  +7.6V Charging Voltage:  +8.7V
Cable	-	Huawei Technologies Co., Ltd.	USB-C Data Charger Cable
Cable	-	Huawei Technologies Co., Ltd.	USB-C to Micro-USB Cable
Micro-USB to USB-A Adaptor	-	Huawei Technologies Co., Ltd.	Micro-USB to USB-A Adaptor
MatePen	AF61	Huawei Technologies Co., Ltd.	-
Portfolio Keyboard	AF20	Huawei Technologies Co., Ltd.	-
MateDock	AD10	Huawei Technologies Co., Ltd.	-

3.3 Technical Description

Characteristics	Description	
IEEE 802.11 WLAN Mode Supported	☒ 802.11a (20 MHz channel bandwidth), ☒ 802.11n (20 MHz channel bandwidth), ☒ 802.11n (40 MHz channel bandwidth), ☒ 802.11ac (20 MHz channel bandwidth), ☒ 802.11ac (40 MHz channel bandwidth), ☒ 802.11ac (80 MHz channel bandwidth),	
TX/RX Operating Range	All	$f_c = 5000 \text{ MHz} + N * 5 \text{ MHz}$, where: - f_c = "Operating Frequency" in MHz, - N = "Channel Number".
	5150-5250 MHz (U-NII)	$N = 36$ to 48 with step of 4 for the 20 MHz channel bandwidth. $N = 38$ to 46 with step of 4 for the 40 MHz channel bandwidth. $N = 42$ for the 80 MHz channel bandwidth.
	5250-5350 MHz (U-NII)	$N = 52$ to 64 with step of 4 for the 20 MHz channel bandwidth. $N = 54$ to 62 with step of 4 for the 40 MHz channel bandwidth. $N = 58$ for the 80 MHz channel bandwidth.
	5470-5725 MHz (U-NII)	$N = 100$ to 140 with step of 4 for the 20 MHz channel bandwidth. $N = 102$ to 134 with step of 4 for the 40 MHz channel bandwidth. $N = 106$ for the 80 MHz channel bandwidth.
	5725-5850 MHz (U-NII)	$N = 149$ to 165 with step of 4 for the 20 MHz channel bandwidth. $N = 151$ to 159 with step of 4 for the 40 MHz channel bandwidth. $N = 155$ for the 80 MHz channel bandwidth.
Modulation Type	BPSK/QPSK/16QAM/64QAM (OFDM).	
Emission Designator	U-NII(5150-5250, 5250-5350, 5470-5725,)	22M5G7D (for 802.11a mod), 22M9G7D (for 802.11n 20 MHz mode), 41M6G7D (for 802.11n 40 MHz mode), 22M9G7D (for 802.11ac 20 MHz mode) 41M5G7D (for 802.11ac 40 MHz mode) 84M1G7D (for 802.11ac 80 MHz mode)
	U-NII(5725-5850)	16M4G7D (for 802.11a mod), 17M6G7D (for 802.11n 20 MHz mode), 36M4G7D (for 802.11n 40 MHz mode), 17M6G7D (for 802.11ac 20 MHz mode) 36M4G7D (for 802.11ac 40 MHz mode) 76M1G7D (for 802.11ac 80 MHz mode)
TPC	☐ Supported, ☒ Not Supported	
Antenna	Type	☐ External, ☒ Integrated
	Ports	☒ Ant 1, ☒ Ant 2, ☐ Ant 3, ☐ Ant 4
	Smart System	☒ SISO (for 802.11a/n/ac), ☒ MIMO (for 802.11n/ac), ☐ Diversity (for 802.11a) : Tx & Rx
	Gain	ANT1:1.5dBi (per antenna port, max.) ANT2:1.5 dBi(per antenna port, max.)

Characteristics	Description		
	Remark	When the EUT is put into service, the practical maximum antenna gain should NOT exceed the value as described above.	
Power Supply	Type	☒ AC/DC Adapter	☐ PoE: ☐ Other:

4 General Test Conditions / Configurations

4.1 Test Modes

NOTE: Worst cases for each IEEE 802.11 mode are selected to perform tests.

Test Mode	Test Modes Description
11A	IEEE 802.11a with data rate of 6 Mbps using SISO mode.
11N20	IEEE 802.11n with data rate of MCS0 and bandwidth of 20 MHz using SISO mode.
11N20m	IEEE 802.11n with data rate of MCS8 and bandwidth of 20 MHz using MIMO mode.
11N40	IEEE 802.11n with data rate of MCS0 and bandwidth of 40 MHz using SISO mode.
11N40m	IEEE 802.11n with data rate of MCS8 and bandwidth of 40 MHz using MIMO mode.
11AC20	IEEE 802.11ac with data rate of MCS0 and bandwidth of 20 MHz using SISO mode.
11AC20m	IEEE 802.11ac with data rate of MCS8 and bandwidth of 20 MHz using SISO mode.
11AC40	IEEE 802.11ac with data rate of MCS0 and bandwidth of 40 MHz using SISO mode.
11AC40m	IEEE 802.11ac with data rate of MCS8 and bandwidth of 40 MHz using MIMO mode.
11AC80	IEEE 802.11ac with data rate of MCS0 and bandwidth of 80 MHz using SISO mode.
11AC80m	IEEE 802.11ac with data rate of MCS8 and bandwidth of 80 MHz using MIMO mode.

4.2 EUT Configurations

4.2.1 General Configurations

Configuration	Description
Test Antenna Ports	Until otherwise specified, - All TX tests are performed at all TX antenna ports of the EUT, and - All RX tests are performed at all RX antenna ports of the EUT.
Multiple RF Sources	Other than the tested RF source of the EUT, other RF source(s) are disabled or shutdown during measurements.

4.2.2 Customized Configurations

4.2.2.1 U-NII

Test Mode	Antenna Port	TX Freq. [MHz]	Power Conf., per Port	Duty cycle [%]
11A	Ant 1	5150-5250 5250-5350	11.5	95
11A	Ant 2	5150-5250 5250-5350	11.5	95
11A	Ant 1	5470-5725 5725-5850	10	95
11A	Ant 2	5470-5725 5725-5850	10	95
11N20	Ant 1	5150-5250 5250-5350	11.5	95
11N20	Ant 2	5150-5250 5250-5350	11.5	95
11N20	Ant 1	5470-5725 5725-5850	10	95
11N20	Ant 2	5470-5725 5725-5850	10	95
11N20M	Ant 1	5150-5250 5250-5350	8.5	95
11N20M	Ant 2	5150-5250 5250-5350	8.5	95
11N20M	Ant 1	5470-5725 5725-5850	7	95
11N20M	Ant 2	5470-5725 5725-5850	7	95
11N40	Ant 1	5150-5250 5250-5350	11.5	91
11N40	Ant 2	5150-5250 5250-5350	11.5	91
11N40	Ant 1	5470-5725 5725-5850	10	91
11N40	Ant 2	5470-5725 5725-5850	10	91
11N40M	Ant 1	5150-5250 5250-5350	8.5	91
11N40M	Ant 2	5150-5250 5250-5350	8.5	91

Test Mode	Antenna Port	TX Freq. [MHz]	Power Conf., per Port	Duty cycle [%]
11N40M	Ant 1	5470-5725 5725-5850	7	91
11N40M	Ant 2	5470-5725 5725-5850	7	91
11AC20	Ant 1	5150-5250 5250-5350	11.5	98
11AC20	Ant 2	5150-5250 5250-5350	11.5	98
11AC20	Ant 1	5470-5725 5725-5850	10	98
11AC20	Ant 2	5470-5725 5725-5850	10	98
11AC20M	Ant 1	5150-5250 5250-5350	8.5	98
11AC20M	Ant 2	5150-5250 5250-5350	8.5	98
11AC20M	Ant 1	5470-5725 5725-5850	7	98
11AC20M	Ant 2	5470-5725 5725-5850	7	98
11AC40	Ant 1	5150-5250 5250-5350	11.5	97
11AC40	Ant 2	5150-5250 5250-5350	11.5	97
11AC40	Ant 1	5470-5725 5725-5850	10	97
11AC40	Ant 2	5470-5725 5725-5850	10	97
11AC40M	Ant 1	5150-5250 5250-5350	8.5	97
11AC40M	Ant 2	5150-5250 5250-5350	8.5	97
11AC40M	Ant 1	5470-5725 5725-5850	7	97
11AC40M	Ant 2	5470-5725 5725-5850	7	97
11AC80	Ant 1	5150-5250 5250-5350	11.5	94
11AC80	Ant 2	5150-5250 5250-5350	11.5	94
11AC80	Ant 1	5470-5725	10	94

Test Mode	Antenna Port	TX Freq. [MHz]	Power Conf., per Port	Duty cycle [%]
		5725-5850		
11AC80	Ant 2	5470-5725 5725-5850	10	94
11AC80M	Ant 1	5150-5250 5250-5350	8.5	94
11AC80M	Ant 2	5150-5250 5250-5350	8.5	94
11AC80M	Ant 1	5470-5725 5725-5850	7	94
11AC80M	Ant 2	5470-5725 5725-5850	7	94

4.3 Test Environments

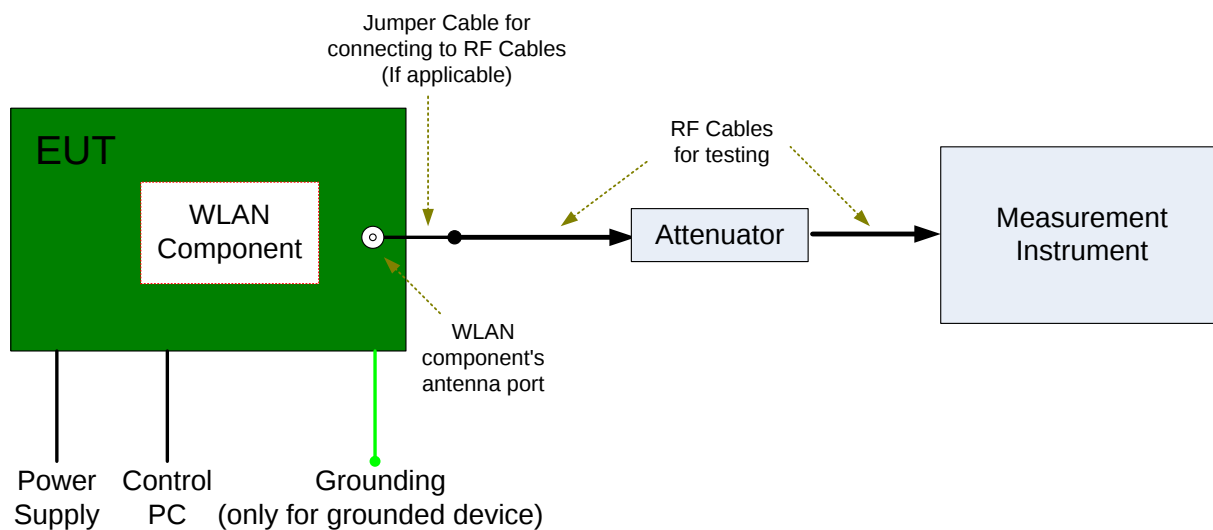
Environment Parameter	Selected Values During Tests	
Relative Humidity	Ambient	
Temperature	TN	Ambient
Voltage	VL	7.2V
	VN	7.6V
	VH	8.7V

NOTE: VL= lower extreme test voltage
VN= nominal voltage
VH= upper extreme test voltage
TN= normal temperature

4.4 Test Setups

4.4.1 Test Setup 1

The WLAN component's antenna ports(s) of the EUT are connected to the measurement instrument per an appropriate attenuator. The EUT is controlled by PC/software to emit the specified signals for the purpose of measurements.



4.5 Test Conditions

4.5.1 U-NII

Test Case	Test Conditions		
	Configuration	Description	
Emission Bandwidth (EBW)	Meas. Method	FCC KDB 789033 §C).	
	Test Env.	NTNV	
	Test Setup	Test Setup 1	
	EUT Conf.	All EUT conf. with Tx modes.	
Occupied Bandwidth (OBW)	Meas. Method	FCC KDB 789033 §D).	
	Test Env.	NTNV	
	Test Setup	Test Setup 1	
	EUT Conf.	All EUT conf. with Tx modes.	
Maximum Conducted Output Power	Meas. Method	FCC KDB 789033 §E)d)	
	Test Env.	NTNV	
	Test Setup	Test Setup 1	
	EUT Conf.	All EUT conf. with Tx modes.	
Peak Power Spectral Density	Meas. Method	FCC KDB 789033 §F).	
	Test Env.	NTNV	
	Test Setup	Test Setup 1	
	EUT Conf.	All EUT conf. with Tx modes.	
Unwanted Emissions (Cond.)	Meas. Method	FCC KDB 789033 §G), Conducted (antenna-port). NOTE: Antenna-port conducted measurements (Cond.) are acceptable as an alternative to radiated measurements (Rad.) for demonstrating compliance to the limits in the restricted frequency bands. If conducted measurements are performed, then proper impedance matching must be ensured and an additional radiated test (Rad-a) for cabinet/case emissions will also be required.	
	Test Env.	NTNV	
	Test Setup	Test Setup 1	
	EUT Conf.	5150-5250	All EUT Test Mode 20 MHz bandwidth: Ch.36, Ch.48 40 MHz bandwidth: Ch.38, Ch.46 80 MHz bandwidth: Ch.42
		5250-5350	All EUT Test Mode 20 MHz bandwidth: Ch.52, Ch.64 40 MHz bandwidth: Ch.54, Ch.62 80 MHz bandwidth: Ch.58
		5470-5725	All EUT Test Mode 20 MHz bandwidth: Ch.100, Ch.140 40 MHz bandwidth: Ch.102, Ch.134

Test Case	Test Conditions		
	Configuration	Description	
			80 MHz bandwidth: Ch.106
		5725-5850	All EUT Test Mode
			20 MHz bandwidth: Ch.149, Ch.165
			40 MHz bandwidth: Ch.151, Ch.159
Frequency Stability	Meas. Method	15.407(g) Frequency Stability	
	Test Env.	(1)VL, VN and VH of Rated Voltage at Ambient Climate. (2) -5 °C,5°C,15°C,-25°C,35°C,45°C,50°C	
	Test Setup	Test Setup 1	
	EUT Conf.	Ch.36,Ch.165	

5 Main Test Instruments

NOTE: Unless otherwise specified, the calibration intervals for test instruments were Annual (per year). The other intervals, if applicable, are marked with (##y), which denotes ## years calibration interval.

Equipment Name	Manufacturer	Model	Serial Number	Cal Date	Cal-Due
Power supply	KEITHLEY	2303	1342889	2015-09-16	2017-09-15
Wireless Communication Test set	Agilent	N4010A	MY49081592	2015-10-30	2016-10-29
Spectrum Analyzer	Agilent	N9020A	MY52090652	2015-07-08	2016-07-07
Spectrum Analyzer	Agilent	E4440A	MY48250119	2015-07-08	2016-07-07
Signal Analyzer	R&S	FSQ31	200021	2015-10-30	2016-10-29
Spectrum Analyzer	Agilent	N9030A	MY49431698	2015-10-30	2016-10-29
Temperature Chamber	WEISS	WKL64	5624600294001 0	2016-01-21	2017-01-20
Signal generator	Agilent	E8257D	MY49281095	2015-10-30	2016-10-29
Vector Signal Generator	R&S	SMU200A	104162	2015-10-30	2016-10-29

END