IEEE 802.11ac VHT40           NUMERIA SPECTRON AND/VECTOR SPECTRON OF THE SPE	IEEE 802.11ac VHT80
Aligns Spectrum Analyzer - Occupied BW         (2016) 5140         ALIGNATIO         (0757500PMM/077,2028           R to rear F - 4 000 PDD C FL-         Control Early 5 19990000 0H-         Daily 544 March         Frequency	Anilant Spactrum Analyzer - Occupied RW
Leftler Freq 5.19000000 GHZ       Trig: Fresting and output of the state and the state a	Ref Offset 8.6 dB     Center Freq 5.21000000 GHz     Radio Device BT     Frequency       10 dB/div     Ref Offset 8.6 dB     Radio Device BT     Ref Offset 8.6 dB     Ref Offset 8.6 dB       10 dB/div     Ref Offset 8.6 dB     Center Freq 5.21000000 GHz     Ref Offset 8.6 dB     Ref Offset 8.6 dB       10 dB/div     Ref Offset 8.6 dB     Center Freq 5.2100000 GHz     Ref Offset 8.6 dB     Ref Offset 8.6 dB       10 dB/div     Ref Offset 8.6 dB     Center Freq 5.21000000 GHz     Ref Offset 8.6 dB     Center Freq 5.21000000 GHz       00     Image: Set 10 dB/div     Ref Offset 8.6 dB     Center Freq 5.21000000 GHz     Center Freq 5.21000000 GHz       00     Image: Set 10 dB/div     Ref Offset 8.6 dB     Center Freq 5.21000000 GHz     Center Freq 5.21000000 GHz       00     Image: Set 10 dB/div     Image: Set 10 dB/div     Center Freq 5.21000000 GHz     Center Freq 5.21000000 GHz       00     Image: Set 10 dB/div     Image: Set 10 dB/div     Set 10 dB/div     CF Step 16.00000 GHz       00     Image: Set 10 dB/div     Image: Set 10 dB/div     Set 10 dB/div     Man       00     Image: Set 10 dB/div     Image: Set 10 dB/div     Man       00     Image: Set 10 dB/div     Image: Set 10 dB/div     Man       00     Image: Set 10 dB/div     Image: Set 10 dB/div     Image: Set 10 dB/div       00
Transmit Freq Error     -41.510 kHz     OBW Power     99.00 %     0 Hz       x dB Bandwidth     41.05 MHz     x dB     -26.00 dB	Transmit Freq Error         24.321 kHz         OBW Power         99.00 %         0 Hz           x dB Bandwidth         81.13 MHz         x dB         -26.00 dB         -2
	Mag Caratus
Channel 38 / 5190 MHz	Channel 42 / 5210 MHz
Addent Synctrum Analyzer         Occupied BW           Rt         10         10000000 GHz         Calibration         Radio Stat Margor, 2020         Prequency           Certer Freq 5.230000000 GHz         Operational Analyzer         Calibrational Analyzer         Radio Stat Margor, 2020         Prequency           Image: Stat Margor, 2020         Image: Stat Margor, 2020         Radio Stat Margor, 2020         Prequency           Image: Stat Margor, 2020         Image: Stat Margor, 2020         Radio Stat Margor, 2020         Prequency           Image: Stat Margor, 2020         Image: Stat Margor, 2020         Radio Stat Margor, 2020         Prequency           Image: Stat Margor, 2020         Image: Stat Margor, 2020         Radio Stat Margor, 2020         Prequency           Image: Stat Margor, 2020         Image: Stat Margor, 2020         Radio Stat Margor, 2020         Prequency           Image: Stat Margor, 2020           Image: Stat Margor, 2020         Image: Stat Margor, 2020         Image: Stat Margor, 2020         Image: Stat Margor, 2020         Image: Stat Margor, 2020           Image: Stat Margor, 2020         Image: Stat Margor, 2020         Image: Stat Margor, 2020         Image: Stat Margor, 2020         Image: Stat Margor, 2020         Image: Stat Ma	



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IEEE 802.11ac VHT40       IEEE 802.11ac VHT80       IEEE 802.11ac VHT80 </th <th colspan="5">99% and 26dB Occupied Bandwidth-ant 1</th> <th></th>	99% and 26dB Occupied Bandwidth-ant 1						
Decision of a local data data data data data data data da	IEEE 8	802.11ac VHT40	)	IE	EE 802.11ac	VHT80	
Image: Characteristic State     Image: State	Aglent Spectrum Analyzer - Decupied INV           Ref 2000 AC           Center Freq 5.190000000 GHz           Center Freq 5.190000000 GHz           If Gaint.ow           Ref 00ffset 8.6 dB           Log didiu           Ref 00ffset 8.6 dB           Log didiu           Ref 00ffset 8.6 dB           Log didiu           Colspan="2">Colspan="2"Co	SENCENTIS     ALSHAUTO     ICC:4       instrat Free Rin     Radio     Radio       instration of the sencence     AvgHold: 1/1     Radio       instration of the sencence     Instration of the sencence     Instration of the sencence       #VBW 1.2 MHz     S       Total Power     4.43 dBrr       Z     OBW Power     99.00 %       z     x dB     -26.00 dE	22 PM May 08, 2018 Stat: None Device: BTS Center Freq 5. 19000000 GHz Span 80 MHz Sweep 1 ms CF Step 8.00000 MHz Auto Man Freq Offset 0 Hz	Aglinit Spectrum Analyzer, Occupied BW           R1         87         50.0         40           Center Freq 5.210000000 GHz         #Feat         #Feat         #Feat           10         Bits         Ref Offiset 8.6 dB         Bits         #Feat           10         Bits         Ref Offiset 8.6 dB         Bits         #Feat           10         Bits         Ref Offiset 8.6 dB         Bits         #Feat           100         Bits         Bits         #Feat         #Feat         #Feat           100         Bits         Bits         #Feat         #Feat         #Feat         #Feat           100         Bits         Bits         #Feat         #Feat <t< td=""><td>Conter Free Run Avgitole: Atten: 30 dB Atten: 30 dB #VBW 2.4 MHz #VBW 2.4 MHz Total Power 8 MHz 2.795 kHz OBW Power 31.60 MHz x dB</td><td>Aldivario 102-65:26 FM May 02, 2018 Radio Std: None 111 Radio Device: BTS</td><td>Frequency Center Freq 5.21000000 GHz 16.000000 MHz Auto Man Freq Offset 0 Hz</td></t<>	Conter Free Run Avgitole: Atten: 30 dB Atten: 30 dB #VBW 2.4 MHz #VBW 2.4 MHz Total Power 8 MHz 2.795 kHz OBW Power 31.60 MHz x dB	Aldivario 102-65:26 FM May 02, 2018 Radio Std: None 111 Radio Device: BTS	Frequency Center Freq 5.21000000 GHz 16.000000 MHz Auto Man Freq Offset 0 Hz
Channel 38 / 5190 MHz     Channel 42 / 5210 MHz       Channel 42 / 5210 MHz       Channel 42 / 5210 MHz       Center Freq 5.23000000 GHz     Frequency       Center Freq 5.23000000 GHz     Center Freq 5.23000000 GHz     Center Freq 5.23000000 GHz       Center Freq 5.23000000 GHz     Center Freq 5.23000000 GHz       Center Freq 5.23000000 GHz       To delive M ref 2.0.00 dBm       Center 5.23 GHz       grad with the to the to the tot tot tot tot tot tot tot tot tot to	MSG	<b>K</b> STATUS		MSG		10 STATUS	
Address       Adjust/0       Correct Freq       Subury/0       Correct Freq       Subury/0       Correct Freq       Frequency         Officience       Main: 30 dB       Main: 30 dB       Radio Set None       Frequency         Ind       General Freq       Subury/0       Correct Freq       Subury/0       Correct Freq       Subury/0       Correct Freq         Ind       General Freq       Subury/0       Correct Freq       Subury/0       Correct Freq       Subury/0       Correct Freq         Ind       General Freq       Subury/0       General Freq       Subury/0       Correct Freq       Subury/0       Correct Freq         Ind       General Freq       Subury/0       General Freq       Subury/0       Correct Freq       Subury/0       Correct Freq         Ind       General Freq       Subury/0       General Freq       Subury/0       Correct Freq       Subury/0       Subury/0       Subury/0	Channel 38 / 5190 MHz		Ch	annel 42 / 52 î	10 MHz		
	Adjent Spectrum Analyzer         Occupied IN         Issoce ALSI         ALIGNATIO         IC22/07PLMAg8(), 2088         Frequency           Image: Center Freq 5,23000000 GHz         Center Freq 5,23000000 GHz         Radio Std: None         Radio Std: None         Frequency           Image: Center Freq 5,23000000 GHz         Gener Freq 5,23000000 GHz         Radio Std: None         Radio Std: None           Image: Center Freq 5,23000000 GHz         Gener Freq 5,23000000 GHz         Radio Std: None         Frequency           Image: Center Freq 5,2300000 GHz         Gener Freq 5,23000000 GHz         Radio Device: BTS         Center Freq 5,23000000 GHz           Image: Center Freq 5,230 GHz         Frequency         Frequency         Span 80 MHz         Span 80 MHz           Image: Center 5,23 GHz         #VBW 1.2 MHz         Span 80 MHz         Span 80 MHz         Addo           Image: Center 5,23 GHz         #VBW 1.2 MHz         Span 80 MHz         Addo         Maddo           Image: Center 5,23 GHz         #VBW 1.2 MHz         Span 80 MHz         Addo         Maddo           Image: Center 5,23 GHz         #VBW 1.2 MHz         Span 80 MHz         Addo         Maddo           Image: Center 5,23 GHz         #VBW 1.2 MHz         Span 80 MHz         Addo         Maddo           Image: Center 5,23 GHz         #VBW 1.2 MHz						

# 5.5. 6dB Occupied Bandwidth Measurement

## 5.5.1. Standard Applicable

Within the 5.725-5.85 GHz band, the minimum 6 dB bandwidth of U-NII devices shall be at least 500 kHz.

## 5.5.2. Measuring Instruments and Setting

Please refer to equipment list in this report. The following table is the setting of the Spectrum Analyzer.

Spectrum Parameter	Setting
Attenuation	Auto
Span	> 26dB Bandwidth
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

## 5.5.3. Test Procedures

- 1. The transmitter output (antenna port) was connected to the spectrum analyzer in peak hold mode.
- 2. The resolution bandwidth of 100 KHz and the video bandwidth of 300 KHz were used.
- 3. Measured the spectrum width with power higher than 6dB below carrier.

## 5.5.4. Test Setup Layout



## 5.5.5. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

## 5.5.6. Test Result of 6dB Occupied Bandwidth

## 5.5.6.1 UNII Band 3

Tost Modo	Channel	Frequency	6dB Bandwidth (MHz)		Limits	Vordict
I EST MODE	Channel	(MHz)	Chain0	Chain1	(MHz)	Verdict
	149	5745	15.07	15.13		
IEEE 802.11a	157	5785	15.44	16.32	≥0.500	Complies
	163	5825	13.93	15.10		-
IEEE 002 11p	149	5745	15.10	13.41		
	157	5785	15.37	15.15	≥0.500	Complies
11120	163	5825	13.59	13.82		-
IEEE 802.11n	151	5755	35.18	33.86	>0 500	Complies
HT40	159	5795	32.69	35.18	20.300	Complies
	149	5745	13.02	14.75		
	157	5785	16.67	17.18	≥0.500	Complies
	165	5825	15.72	15.07		
IEEE 802.11	151	5755	35.09	35.10	>0 500	Complias
ac VHT40	159	5795	33.92	35.22	≥0.500	Complies
IEEE 802.11 ac VHT80	155	5775	75.28	75.29	≥0.500	Complies

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- 1. Measured 6dB bandwidth at difference data rate for each mode and recorded worst case for each mode.
- 2. Test results including cable loss;
- 3. Worst case data at 6Mbps at IEEE 802.11a; MCS0 at IEEE 802.11n HT20, IEEE 802.11n HT40, IEEE 802.11ac VHT20, IEEE 802.11ac VHT40, IEEE 802.11ac VHT80;
- 4. Please refer to following test plots;

6dB Occupied Bandwidth-ant 0				
IEEE 802.11a	IEEE 802.11n HT20			
Agilent Spectrum Analyzer - Occupied BW	Agilent Spectrum Analyzer - Occupied IIW			
B         C         B         B         C         B         C         B         C         C         D         C         D <thd< th=""> <thd< th=""> <thd< th=""> <thd< th=""></thd<></thd<></thd<></thd<>	M         RL         IF         Store PLASE         ALSHAUD         G650:20 PMM avg/s and BATE         BATE         And BATE         BATE         ALSHAUD         G650:20 PMM avg/s and BATE         BATE         BATE <t< th=""></t<>			
Center Freq         Center Freq         Center Freq         Center Freq         C.450         Center Freq         C.450         Center Freq         C.74500000 GHz         C.7450000 GHz         C.74500000 GHz         C.74500000 G	10 deal         Ref 20.00 dBm           Log         Center Freq           000			
Center 5.745 GHz Span 40 MHz Span 40 MHz CF Step 4.00000 MHz 4.000000 MHz 4.00000 MHz 4.000000 MHz 4.0000000 MHz 4.000000 MHz 4.000000 MHz 4.000000 MHz 4.000000 MHz 4.0000000 MHZ 4.00000000000 MHZ 4.000000 MHZ 4.0000000000000000 MHZ 4.000000000000000000000000000000000000	Center 5.745 GHz Span 40 MHz #Res BW 100 kHz #VBW 300 kHz Sweep 3.867 ms 4.000000 MHz			
Occupied Bandwidth     Total Power     4.34 dBm     Auto     Man       17.583 MHz     Freq Offset       Transmit Freq Error     -30.704 kHz     OBW Power     99.00 %     0 Hz       x dB Bandwidth     15.07 MHz     x dB     -6.00 dB	Occupied Bandwidth     Total Power     6.36 dBm     Auto     Man       17.602 MHz     Freq Offset       Transmit Freq Error     -33.509 kHz     OBW Power     99.00 %     0 Hz       x dB Bandwidth     15.10 MHz     x dB     -6.00 dB     0			
MSC Contraction	ма			
Channel 149 / 5745 MHz	Channel 149 / 5745 MHz			
Alter Spectrum Analyzer - Docupied BV         Frequency           Alter Spectrum Analyzer - Docupied BV         Alter Spectrum Analyzer - Docupied BV         Frequency           Alter Spectrum Analyzer - Docupied BV         <td colspan="</th> <th>Applent System         Applent System System         Applent System System         Applent System</th>	Applent System         Applent System System         Applent System System         Applent System			
10 dBdiv         Ref 20.00 dBm         Center Freq           Log	10 dB/div         Ref 20.00 dBm           Log         Center Freq           100         S78500000 GHz			
Center 5.785 GHz         Span 40 MHz         CF Step           #Res BW 100 kHz         #VBW 300 kHz         Sweep 3.867 ms         CO0000 MHz           Occupied Bandwidth         Total Power         6.81 dBm         Auto         Man           17.617 MHz         Freq Offset         Freq Offset         0 Hz         V/A           X dB Bandwidth         15.44 MHz         x dB         -6.00 dB         0 Hz	Center         5.785 GHz         Span 40 MHz         CF Step           #Res BW         100 kHz         #VBW         300 kHz         Sweep         3.867 ms         4.00000 MHz           Occupied Bandwidth         Total Power         6.81 dBm         Aufa         Man           17.601 MHz         Freq Offset         Freq Offset         0 Hz         0 Hz           x dB Bandwidth         15.37 MHz         x dB         -6.00 dB         0 Hz			
esa Contrarus	uso Contrato			
Channel 157 / 5785 MHz	Channel 157 / 5785 MHz			
Adilent Spectrum Analyzer - Decupied RW           20         RL         RE         RE         S0.0         #C         S0.0         #C         Reduct State         Reduct State         Reduct State         Reduct State         Reduct State         Reduct State         Frequency         Frequency         Frequency         Frequency         Frequency         Frequency         Reduct State	Agitant Spectrum Analyzer Occupied BW BL RL RF Sign Act Street A			
10 delaiv Ref 20.00 dBm	10 dB/div Ref 20.00 dBm Log 100 100 100 100 100 100 100 10			
Center 5.825 GHz Span 40 MHz #Res BW 100 kHz #VBW 300 kHz Sweep 3.867 ms 4.00000 MHz Description 2 and 14 th Table Description 6.46 dB 40 data	Center 5.825 GHz #VBW 300 kHz Sweep 3.867 ms 4.00000 MHz #VBW 300 kHz Sweep 3.867 ms 4.00000 MHz 4.000000 MHz 4.000000 MHz 4.000000 MHz 4.000000 MHz 4.000000 MHz 4.00000 MHz 4.000000 MHz 4.000000 MHz 4.00000 MHz 4.000000 MHz 4.000000 MHz 4.000000 MHz 4.000000 MHz 4.000000 MHz 4.000000 MHz 4.0000000 MHz 4.000000 MHZ 4.0000000 MHZ 4.0000000 MHZ 4.0000000 MHZ 4.0000000 MHZ 4.0000000 MHZ 4.0000000 MHZ 4.000000000000000000000000000000000000			
Occupied Bandwidth     Freq Offset       17.611 MHz     Freq Offset       Transmit Freq Error     -43.378 kHz     OBW Power     99.00 %     0 Hz       x dB Bandwidth     13.93 MHz     x dB     -6.00 dB     -6.00 dB	Occupied Bandwidth     Total Power     6.38 dBm       17.610 MHz     Freq Offset       Transmit Freq Error     -42.133 kHz     OBW Power     99.00 %       x dB Bandwidth     13.59 MHz     x dB     -6.00 dB			
ASIQ MISO MISO				
Channel 165 / 5825 MHz	Channel 165 / 5825 MHz			

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IEEE 802.11n HT40         IEEE 802.11ac VH720           Image: State in the s	6dB Occupied Bandwidth-ant 0				
Control of the second of the	IEEE 802.11n HT40	IEEE 802.11ac VHT20			
Barrier 10000000 CH       Description Barrier 10000000 CH       Description Barrier 10000000 CH       Description Barrier 10000000 CH       Description Barrier 1000000 CH       Description Barrier 10000000 CH       Description Barrier 1000000 CH       Description Barrier 10000000 CH       Description Barrier 1000000000 CH       Description Barrier 10000000000 CH       Description Barrier 1000000000000000000000000000000000000	Agilent Spectrum Analyzer - Occupied BW	Agilent Spectrum Analyzer - Occupied BW			
Control 151 / 5755 MHz Channel 152 / 5758 MHz Channel 152 / 5785 MHz Cha	B         RL         RF         S30 2: AC         ISSESSOUND (GR.233)         AUSIAUTO         DS3ESSOPMAngr/2018         Frequency           Center Freq 5.755000000 GHz         Center Freq 5.755000000 GHz         Trig Free Run MIFGainci ow         Trig Free Run Mattern: 30 dB         Radio Std: None         Frequency           Image: State St	Image: Name         Alge/ADD         Alge/ADD			
Image: Note:       Press 2000 mm       S.0 dBm       Description       Press 2000 mm       Description       Press 2000 mm       Description       Description <thdescription< th=""> <thdescription< th=""></thdescription<></thdescription<>	Log 100 100 100 100 100 100 100 10	Log         Center Freq           100			
Occupied Bandwidth     Train Prog Error     15.28 Bin     Train Prog Error     15.28 Bin     Freq Origon       Image: Solid Bandwidth     35.18 Bin     edb     4.00 Bin     Freq Origon       Image: Solid Bandwidth     35.18 Bin     edb     4.00 Bin     Freq Origon       Image: Solid Bandwidth     35.18 Bin     edb     4.00 Bin     Freq Origon       Image: Solid Bandwidth     35.18 Bin     edb     4.00 Bin     Freq Origon       Image: Solid Bandwidth     35.18 Bin     edb     4.00 Bin     Freq Origon       Image: Solid Bandwidth     Solid Bin     Freq Origon     Image: Solid Bandwidth     Freq Origon       Image: Solid Bandwidth     Solid Bin     Freq Origon     Image: Solid Bandwidth     Freq Origon       Image: Solid Bandwidth     Solid Bin     Freq Origon     Image: Solid Bandwidth     Freq Origon       Image: Solid Bandwidth     Freq Origon     Freq Origon     Freq Origon     Freq Origon       Image: Solid Bandwidth     Freq Origon     Freq Origon     Freq Origon     Freq Origon       Image: Solid Bandwidth     Solid Bandwidth     Freq Origon     Freq Origon     Freq Origon       Image: Solid Bandwidth     Solid Bandwidth     Freq Origon     Freq Origon     Freq Origon       Image: Solid Bandwidth     Solid Bandwidth     Freq	#Res BW 100 kHz #VBW 300 kHz Sweep 7.667 ms at the second	#Res BW 100 kHz #VBW 300 kHz Sweep 3.867 ms 4.000000 Mag			
Control 150 / 5795 MHz Channel 150 / 5795 MHz	Occupied Bandwidth     Total Power     6.50 dBm       35.965 MHz     Freq Offset       Transmit Freq Error     -15.248 kHz     OBW Power     99.00 %     0 Hz       x dB Bandwidth     35.18 MHz     x dB     -6.00 dB	Occupied Bandwidth     Total Power     5.40 dBm       17.610 MHz     Freq Offset       Transmit Freq Error     -31.928 kHz     OBW Power     99.00 %       x dB Bandwidth     13.02 MHz     x dB     -6.00 dB			
Channel 151/5755 MHz     Channel 149/5745 MHz       Image: State S	MSG Costatus	MSG Contraction			
Participant And Part States         Part Part of the States	Channel 151 / 5755 MHz	Channel 149 / 5745 MHz			
Center Far Stronger Concepted Bandwidth 38.592 MHz Transmit Freq Error 39.305 MHz Channel 159 / 5795 MHz	Agitent Spectrum Analyzer         Decupied BV         ESPEC PL/SE         AL301A/TO         062/451PM/Mm07/2038         Frequency           W RL         RF         87 500 A/C         Center Freq 5.7950000000 GHz         Radio Std: None         Frequency           Center Freq 5.7950000000 GHz         Center Freq 5.7950000000 GHz         Radio Std: None         Frequency           HTG Sinckow         HtG Sinckow         HtG Sinckow         Radio Device: BTS         Frequency           Ref Office1 6.3 dB         Ref 20.00 dBm         GBM         Radio Device: BTS         Frequency	Algilent Spectrum Analyzer - Docupied HW           Algilent Spectrum Analyzer - Docupied HW         ESECENTIC         ALGIAUTO         10:30:33 AMIM/98, 2018         Frequency           Center Freq.5,7850000000 GHz         Center Freq.5,785000000 GHz         Center Freq.5,785000000 GHz         Radio Std: None         Frequency           If Galaxies         #Frequency         #Atten: 30 dB         Radio Device: BTS         Red Offset 8.43 dB         Ref 20.00 dBm			
Cecupied Bandwidth     Total Power     7.67 dBm     Server 7.478 dBm     Freq C       Cocupied Bandwidth     35.952 MHz     OBW Power     98.00 %     Server 7.478 dBm     Server 7.478 dBm     Freq C       Transmit Freq Error     33.308 MHz     OBW Power     98.00 %     Server 7.478 dBm     Server 7.478 dBm     Freq C       Image: Server 3.5288 MHz     OBW Power     98.00 %     Server 3.5288 MHz     OBW Power     98.00 %     Server 3.5288 MHz     Server 3.528 MHz     Serv	Log 100 100 100 100 100 100 100 10	Log 100 100 100 100 100 100 100 10			
Occupied Bandwidth       Total Power       7.67 dBm       Mail       Mail       Total Power       7.18 dBm       Mail         Transmit Freq Error       33.990 HHz       X dB       OBW Power       99.00 %,       Transmit Freq Error       33.269 MHz       X dB       -6.00 dB       Freq Offset       If 7.602 MHz       Transmit Freq Error       33.288 HHz       OBW Power       99.00 %,       X dB       Bandwidth       18.67 MHz       X dB       -6.00 dB       Freq Offset       Image: Comparison of the comparison	Center 5.795 GHz Span 80 MHz CF Step 80 00 MHz Sweep 7.667 ms 800000 MHz 8000000 MHz Sweep 7.667 ms 8000000 MHz	Center 5.785 GHz #Res BW 100 kHz #VBW 300 kHz Sweep 3.867 ms 4.000000 MHz			
Image: Channel 159 / 5795 MHz       Channel 157 / 5785 MHz         Image: Channel 159 / 5795 MHz       Channel 157 / 5785 MHz         Image: Channel 159 / 5795 MHz       Image: Channel 157 / 5785 MHz         Image: Channel 159 / 5795 MHz       Image: Channel 157 / 5785 MHz         Image: Channel 159 / 5795 MHz       Image: Channel 157 / 5785 MHz         Image: Channel 159 / 5795 MHz       Image: Channel 157 / 5785 MHz         Image: Channel 159 / 5795 MHz       Image: Channel 157 / 5785 MHz         Image: Channel 159 / 5795 MHz       Image: Channel 157 / 5785 MHz         Image: Channel 159 / 5795 MHz       Image: Channel 157 / 5785 MHz         Image: Channel 159 / 5795 MHz       Image: Channel 157 / 5785 MHz         Image: Channel 159 / 5795 MHz       Image: Channel 157 / 5785 MHz         Image: Channel 159 / 5795 MHz       Image: Channel 157 / 5785 MHz         Image: Channel 159 / 5795 MHz       Image: Channel 157 / 5785 MHz         Image: Channel 159 / 5795 MHz       Image: Channel 157 / 5785 MHz         Image: Channel 159 / 5785 MHz       Image: Channel 159 / 5785 MHz         Image: Channel 159 / 5785 MHz       Image: Channel 159 / 5785 MHz         Image: Channel 159 / 5785 MHz       Image: Channel 159 / 5785 MHz         Image: Channel 159 / 5785 MHz       Image: Channel 159 / 5785 MHz         Image: Channel 159 / 5785 MHz       Image: Channel 159 / 5	Occupied Bandwidth         Total Power         7.67 dBm         Auto         Man           35.952 MHz         Freq Offset         Freq Offset         Freq Offset         0 Hz           Transmit Freq Error         -39.309 kHz         OBW Power         99.00 %         0 Hz           x dB Bandwidth         32.69 MHz         x dB         -6.00 dB         0 Hz	Occupied Bandwidth     Total Power     7.18 dBm       17.602 MHz     Freq Offset       Transmit Freq Error     -35.288 kHz     OBW Power     99.00 %       x dB Bandwidth     16.67 MHz     x dB     -6.00 dB			
Image: Channel 159 / 5795 MHz       Channel 157 / 5785 MHz         Channel 159 / 5795 MHz       Channel 157 / 5785 MHz         Image: Conter Freq 58250000 GHz       Conter Freq 5825000 GHz       Conter Freq 582500 G	ana filirana	no filorona			
Channel 159 / 5795 MHz Channel 159 / 5795 MHz	ana <b>Ko</b> anna				
Addition Spectrum Analyses - Bocqued Int Addition Spectrum Analyses - Bocqued Int Center Free Science See Science - Free Free Stand Angletide Int Radio Dark Issues Radio Dark Iss	Channel 159 / 5795 MHz	Channel 157 / 5785 MHz			
Ingent Act 2000 data       Internet Act 2000 data       Internet Act 2000 data       Internet Act 2000 data         Ingent Act 2000 data       Internet Act 2000 data       Internet Act 2000 data       Internet Act 2000 data       Internet Act 2000 data         Ingent Act 2000 data       Internet Act 2000 data         Internet Act 2000 data <th></th> <th>Agilant Spectrum Analyzer         Occupied INV         ESDEE PLASE         AL39/AUTO         07:95:11PM Mgr07, 2019         Frequency           If AL         #F         150:0         #C         Center Freq: 5.825000000 GHz         Canter Freq: 5.82500000 GHz         Radio 5td: None         Frequency           Center Freq: 5.825000000 GHz         Center Freq: 5.82500000 GHz         Radio 5td: None         Frequency           If GainLow         #Mten: 30 dB         Radio Device: BTS         Ref Offset 8.43 dB         Ref 20 00 dBm</th>		Agilant Spectrum Analyzer         Occupied INV         ESDEE PLASE         AL39/AUTO         07:95:11PM Mgr07, 2019         Frequency           If AL         #F         150:0         #C         Center Freq: 5.825000000 GHz         Canter Freq: 5.82500000 GHz         Radio 5td: None         Frequency           Center Freq: 5.825000000 GHz         Center Freq: 5.82500000 GHz         Radio 5td: None         Frequency           If GainLow         #Mten: 30 dB         Radio Device: BTS         Ref Offset 8.43 dB         Ref 20 00 dBm			
000       0		Log Center Freq			
100       1		00         6.82500000 GHz           100			
Center 5.825 GHz Span 40 MHz Sweep 3.867 ms #Res BW 100 kHz #VBW 300 kHz Sweep 3.867 ms Occupied Bandwidth Total Power 6.47 dBm 17.601 MHz Freq Cror -31.382 kHz OBW Power 99.00 % x dB Bandwidth 15.72 MHz x dB -6.00 dB		500			
Occupied Bandwidth     Total Power     6.47 dBm       17.601 MHz     Freq O       Transmit Freq Error     -31.382 kHz     OBW Power     99.00 %       x dB Bandwidth     15.72 MHz     x dB     -6.00 dB		Center 5.825 GHz #VBW 300 kHz Span 40 MHz CF Step #Res BW 100 kHz #VBW 300 kHz Sweep 3.867 ms 4 00000 MHz			
x dB Bandwidth 15.72 MHz x dB -6.00 dB		Occupied Bandwidth         Total Power         6.47 dBm         Auto         Man           17.601 MHz         Freq Offset         Freq Offset         174           Transmit Freq Error         -31.382 kHz         OBW Power         99.00 %         0 Hz			
Leven a		x dB Bandwidth 15.72 MHz x dB -6.00 dB			
		luso			
Channel 165 / 5825 MHz		Channel 165 / 5825 MHz			

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6dB Occupied Bandwidth-ant 0			
IEEE 802.11ac VHT40	IEEE 802.11ac VHT80		
Agiteri Spectrum Analyzer - Occupied BW         ISDES PALSE         ALIGUATION         D08.02-45/FM Am(07, 2018)           RL         85         90.0         #C         ISDES PALSE         ALIGUATION         08.02-45/FM Am(07, 2018)           Center Freq 5.755000000 GHz         Center Freq 5.755000000 GHz         Radio Std: None         Radio Std: None           If Galact.ow         #If Galact.ow         Center Freq 5.755000000 GHz         Radio Device: BTS           Id dB/div         Ref Offset 8.43 dB         Ref 20.00 dBm         Ref 20.00 dBm         Ref 20.00 dBm           Ido         Good         Geneter Action         Geneter Action         Geneter Action         Geneter Action           Ido         B/doi         Ref 0ffset 8.43 dB         Geneter Action         Geneter Action         Geneter Action           Ido         Geneter Action         Geneter Action         Geneter Action         Geneter Action         Geneter Action           Ido         Geneter Action	Agilent Spectrum Analyzer/ Occupied IN/ R RL RF 1000 AC         Spectrum Spectrum Analyzer/ Occupied IN/ Ref Offert 8.3 d/B 10 dB/div Ref 20.00 dBm 10 g         Spectrum Analyzer/ Occupied IN/ Ref Offert 8.3 d/B 10 dB/div Ref 20.00 dBm 10 g         Center Freq 5.775000000 GHz Ref Offert 8.3 d/B 10 dB/div Ref 20.00 dBm 10 g         Center Freq 5.77500000 GHz 10 g         Center Freq 5.77500000 GHz           000         10 g         10 g		
200     Span 80 MHz       Center 5.755 GHz     #VBW 300 kHz       #Res BW 100 kHz     #VBW 300 kHz       Occupied Bandwidth     Total Power       35.989 MHz       Transmit Freq Error     -12.913 kHz       OBW Power     99.00 %       x dB Bandwidth     35.09 MHz       x dB     -6.00 dB	CF Step 8.000000 Mirz Auto         Span 160 Mirz WBR         CF Step 16.00000 Mirz Man           Freq Offset 0 Hz         0 Ccupied Bandwidth         Total Power         6.15 dBm           Transmit Freq Error         3.808 kHz         OBW Power         99.00 %           x dB Bandwidth         75.214 MHz         Freq Offset 0 Hz         Freq Offset		
Channel 151 / 5755 MHz	Channel 155 / 5775 MHz		
Applent Spectrum Analyzer - Occupied Bit         (SPEE PA.S)         (AUXIANTO         (SPEE PA.S)         (AUXIANTO         (SPEE OF SPECIAL SPEC	Center Freq           5.795000000 GHz           8.00000 MHz           Autio           Freq Offset           0 Hz		
Channel 159 / 5795 MHz			

6dB Occupied Bandwidth-ant 1				
IEEE 802.11a	IEEE 802.11n HT20			
Agilent Spectrum Analyzer - Occupied BW	Agilent Spectrum Analyzer - Occupied BW			
Image: State	M         RL         RF         1500         AC         Rest (0,2,2)         AL301AUTO         11:39:29 AM Mar(00,2038)         Frequency           Center Freq 5.745000000 GHz         Center Freq 5.745000000 GHz         Radio Stat: None         Frequency           #FFGain:Low         #Refain:Low         Atten: 30 dB         Radio Device: BTS         Frequency			
Ref Offset 8.43 dB 10 dB/div Ref 20.00 dBm	Ref Offset 8.43 dB 10 dB/div Ref 20.00 dBm			
100 Center Freq	100 Center Freq			
0.00 5.74500000 GHz	0.00 5.745000000 GHz			
20.0 colleworkentersterling with where the function	20.0			
300 400	40.0			
500 marshall the second s	50.0 mm/halling and ministry			
-800	70.0			
Center 5.745 GHz Span 40 MHz CE Sten	Center 5.745 GHz CE Sten			
#Res BW 100 kHz #VBW 300 kHz Sweep 3.867 ms 4.000000 MHz Auto Man	#Res BW 100 kHz #VBW 300 kHz Sweep 3.867 ms 4.000000 MHz 4.00000 MHz Auto Man			
Occupied Bandwidth Total Power 6.02 dBm	Occupied Bandwidth Total Power 5.99 dBm			
Freq Offset	FreqOffset			
x dB Bandwidth 15.13 MHz x dB -6.00 dB	x dB Bandwidth 13.41 MHz x dB -6.00 dB			
MSG Distatus	MSG Costatus			
Channel 149 / 5745 MHz	Channel 149 / 5745 MHz			
Aglient Spectrum Analyzer - Occupied BW	Agilent Spectrum Analyzer - Occupied IW			
Dr.         RL         RF         S0.0         AC         SB/SE/PU/SE         ALIGNAUTO         11:28:24 AMMsy08, 2018         Frequency           Center Freq 5.785000000 GHz         Center Freq 5.785000000 GHz         Radio Std: None         Frequency	M         RL         RF         SD 0.         AC         SD/SE-RUSE         ALIGNAUTO         11:42:10 AMMay(8, 2018         Frequency           Center Freq 5.785000000 GHz         Center Freq 5.785000000 GHz         Radio Std: None         Frequency			
Ing: Free Run Avg Hold: 1/1 #IFGain:Low #Atten: 30 dB Radio Device: BTS	#IFGain:Low #Atten: 30 dB Radio Device: BTS			
Ref Offset 8.43 dB 10 dB/div Ref 20.00 dBm	Ref Offset 8.43 dB 10 dB/div Ref 20.00 dBm			
Log 100 Center Freq	Log			
0.00 5.785000000 GHz	0.00 5.785000000 GHz			
-100	-100			
300	300			
-00 mbay water	400 Viley Vi			
-500	1300			
-70.0	-70.0			
Center 5.785 GHz Span 40 MHz CF Step	Center 5.785 GHz Span 40 MHz CF Step			
#VEW 500 KH2 SWEEP 5.00 / His 4.000000 MH2	4.000000 MHz 4.000000 MHz Auto Man			
Occupied Bandwidth Total Power 6.29 dBm	17 589 MHz			
Transmit Freg Error -33.914 kHz OBW Power 99.00 % 0 Hz	Transmit Freg Error -35.296 kHz OBW Power 99.00 % 0 Hz			
x dB Bandwidth 16.32 MHz x dB -6.00 dB	x dB Bandwidth 15.15 MHz x dB -6.00 dB			
NSO <b>Eb</b> erarus				
Channel 157 / 5785 MHz	Channel 157 / 5785 MHz			
Aglient Spectrum Analyzer - Occupied BW 20 RL 8F ST0 AC SPICEPULSE ALL'OLAUTO 11:20:54 AM Marine 2018	Agilent Spectrum Analyzer - Occupied BW           U         R.L         SFISE-PLLSE         ALIGNAUTO         11:43:25 AM Mar/R, 2018			
Center Freq 5.825000000 GHz Center Freq 5.825000000 GHz Radio Std: None Frequency	Center Freq 5.825000000 GHz Center Freq: 5.825000000 GHz Radio Std: None Frequency			
#IFGaintLow #Atten: 30 db Radio Device: BTS	#FGain:Low #Atten: 30 db Radio Device: BTS			
10 dB/div Ref 20.00 dBm	10 dB/div Ref 20.00 dBm			
100 Center Freq	Center Freq			
100	-10.0			
300				
-0.0	400 Martin Martin			
500 John Martin Martin Contraction	500 January (1997)			
-70.0	70.0			
Center 5.825 GHz Span 40 MHz CF Sten	Center 5.825 GHz Span 40 MHz CE Sten			
#WES BW 100 KHZ #VBW 300 KHZ Sweep 3.867 ms 4.000000 MHz Auto Man	HRCES BW 100 KHZ #VBW 300 KHZ Sweep 3.867 ms 4.00000 HHZ Auto Man			
Occupied Bandwidth Total Power 6.10 dBm	Occupied Bandwidth Total Power 6.17 dBm			
Transmit Freq Error -44.841 kHz ORW Power 99.00 % 0Hz	Transmit Freq Error -31.510 kHz ORW Power 99.00 % 0 Hz			
x dB Bandwidth 15.10 MHz x dB -6.00 dB	x dB Bandwidth 13.82 MHz x dB -6.00 dB			
Channel 165 / 5825 MHz	Channel 165 / 5825 MHz			

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6dB Occupied Bandwidth-ant 1				
, IEEE 802.11n HT40	IEEE 802.11ac VHT20			
Agilent Spectrum Analyzer - Occupied BW	Agilent Spectrum Analyzer - Occupied BW			
RL RF ISD AC SEPERALE ALIGNATIO [11:51:43 AMMar(86, 2018]     Center Freq 5.755000000 GHz Citer Freq 5.75500000 GHz     Frequency     #IfGeint.ow Avg Hold: 1/1     #IfGeint.ow	ØRL         RF         S0.0         AC         ISIDEFALSE         ALISTANTO         022:557 PM May 08, 2018         Frequency           Center Freq 5.745000000 GHz         Center Freq 5.745000000 GHz         Radio Stdt None         Frequency           #IFGeint.ew         #Atten: 30 dB         Radio Device: BTS         Radio Device: BTS			
Ref Offset 8.43 dB 10 dB/div Ref 20.00 dBm	Ref Offset 8.43 dB 10 dB/div Ref 20.00 dBm			
100 Center Fin	conter Freq			
300				
100 500 Harahashiy magada ta maraka	400			
800				
Center 5.755 GHz Span 80 MHz CF Stu #Res BW 100 kHz #VBW 300 kHz Sween 7 667 ms CF Stu	Center 5.745 GHz Span 40 MHz P #Res BW 100 kHz Sween 3 867 ms CF Step			
Occupied Bandwidth Total Power 5.13 dBm	in Occupied Bandwidth Total Power 6.62 dBm			
35.934 MHz FreqOffs	et 17.590 MHz Freq Offset			
Transmit Freq Error -12.617 kHz OBW Power 99.00 %	Izz         Transmit Freq Error         -30.456 kHz         OBW Power         99.00 %         0 Hz           -         -         -         -         -         -         6.00 dP         -			
	x ub banuwidun 14.75 winz x ub =0.00 ub			
MSG 🖏 STATUS	MSG 🗞 STATUS			
Channel 151 / 5755 MHz	Channel 149 / 5745 MHz			
Aglent Spectrum Analyzer - Occupied BW	Aglent Spectrum Anstyzer - Occupied BW BL RL RF 50.0 AC SENSE AUGMAUTO (02-28-29 FM May 06, 2018)			
Center Freq 5.795000000 GHz Center Freq 5.795000000 GHz Radio Std: None Trig: Freq 5.795000000 GHz Genter Freq 5.795000000 GHz Radio Std: None Trig: Freq 5.79500000 GHz Radio Std: None Trig: Freq 5.795000000 GHz Radio Std: None Trig: Freq 5.7950000000 GHz Radio Std: None Trig: Freq 5.795000000000000 GHz Radio Std: None Trig: Freq 5.79500000000000000000000000000000000000	Center Freq 5.785000000 GHz Center Freq 5.78500000 GHz Radio Std: None Trig: Free Run Avg Hold: 1/1 #FGaimLow #Atten: 30 dB Radio Device: BTS			
Ref Offset 8.43 dB 10 dB/div Ref 20.00 dBm	Ref Offset 8.43 dB			
100 Center Fin	Log Center Freq			
0.00 5.795000000 G	12 0.00 5.78500000 GHz			
200 to the second secon	30.0			
400 500	-00			
000 white we will not the second seco	600			
Center 5.795 GHz Span 80 MHz	Center 5.785 GHz Span 40 MHz			
#Res BW 100 kHz #VBW 300 kHz Sweep 7.667 ms 8.000000 M Auto M	P #Res BW 100 kHz #VBW 300 kHz Sweep 3.867 ms 4.000000 MHz 4.000000 MHz Man			
35.930 MHz	- Occupied Bandwidth Total Power 6.57 dBm			
Transmit Freq Error -35.394 kHz OBW Power 99.00 %	Transmit Freq Error -31.456 kHz OBW Power 99.00 %			
x dB Bandwidth 35.18 MHz x dB -6.00 dB	x dB Bandwidth 17.18 MHz x dB -6.00 dB			
usa 🖌	MSG 🕼 STATUS			
Channel 159 / 5795 MHz	Channel 157 / 5785 MHz			
	Aglent Spectrum Antilyzer - Occupied BW BL RL RF SD 0. AC SEVERALSE ALIGNAUTO (02-22:56 PM May/66, 2018)			
	Center Freq 5.825000000 GHz Center Freq 5.825000000 GHz Radio Std: None Trig: Freq Std: Std: None #IFGaint.ow #Atten: 30 dB Radio Device: BTS			
	Ref Offset 8.43 dB 10 dB/div Ref 20.00 dBm			
	Log Center Freq			
	10.0 5.82500000 GHz			
	40.0			
	80.0			
	Center 5.825 GHz Span 40 MHz			
	#Res BW 100 kHz #VBW 300 kHz Sweep 3.867 ms CF Step 4.0000000 MHz Auto Man			
	17.598 MHz			
	Transmit Freq Error -34.470 kHz OBW Power 99.00 % 0Hz			
	x dB Bandwidth 15.07 MHz x dB -6.00 dB			
	MSG GTATUS			
	Channel 165 / 5825 MHz			

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6dB Occupied Bandwidth-ant 1				
IEEE 802.11ac VHT40	IEEE 802.11ac VHT80			
Aglent Spectrum Analyzer - Occupied BW         Allow AC         Image: Content Freq 5.755000000 GHz         Allow AC         Image: Content Freq 5.755000000 GHz         Content Freq 5.755000000 GHz         Radio Stat: None           Center Freq 5.755000000 GHz         Content Freq 5.755000000 GHz         Content Freq 5.75500000 GHz         Radio Stat: None           Image: Center Freq 5.755000000 GHz         Content Freq 5.75500000 GHz         Content Freq 5.7550000 GHz         Radio Stat: None           Image: Center Freq 5.755 GHz         Ref Offset 8.43 dB         Content Freq 5.755 GHz         Content Freq 5.755 GHz         Span 80 MHz           Image: Center 5.755 GHz         Span 80 MHz         Span 80 MHz         Span 80 MHz           Image: Center 5.755 GHz         Span 80 MHz         Span 80 MHz         Span 80 MHz           Image: Center 5.755 GHz         Span 80 MHz         Span 80 MHz         Span 80 MHz           Image: Center 5.755 GHz         Span 80 MHz         Span 80 MHz         Span 80 MHz           Image: Center 5.755 GHz         Span 80 MHz         Span 80 MHz         Span 80 MHz           Image: Center 5.755 GHz         Span 80 MHz         Span 80 MHz         Span 80 MHz	Bit Frequency         Alight Spectrum Andrew - Decuged BW OR R.         Frequency         Adjust More - Decuged BW OR R.         Frequency         Radio Stat. None Radio Device: BTS         Frequency           Center Freq 5.75500000 GHz 300         Center Freq 5.775 GM 2         Ref 20.00 GBm Log         Center Freq 5.775 GH         Center 5.7750           S         CF Step 8.000000 MHz Auto         Center 5.775 GH 2         #VBW 300 kHz         Span 160 MHz Sweep 15.33 m         16.00           Occupied Bandwidth         Total Power         4.29 dBm         Mato         Auto         Auto	ter Freq 0000 GHz CF Step 0000 MHz Man		
35.942 MHz Transmit Freq Error -9.581 kHz OBW Power 99.00 % x dB Bandwidth 35.10 MHz x dB -6.00 dB	Freq Offset     75.264 MHz     Free       0 Hz     Transmit Freq Error     -28.430 kHz     OBW Power     99.00 %       x dB Bandwidth     75.29 MHz     x dB     -6.00 dB	q Offset 0 Hz		
MSG Contraction	uso 🕼 status			
Channel 151 / 5755 MHz	Channel 155 / 5775 MHz			
Allert Spectram Analyzer         Occupied BW         ISERENCE         ALSAUDTO         IO2-4211 BMM(00, 2018)           Center Freq 5.795000000 GHz         Center Freq 5.795000000 GHz         Center Freq 5.795000000 GHz         Radio Std: Nene           Image: Std: Std: Std: Std: Std: Std: Std: Std	Frequency Center Freq 5.75600000 GHz B.000000 MHz Auto Man Freq Offset 0 Hz			
MBG <b>Ko</b> tanus				
Channel 159 / 5795 MHz				

# 5.6. Radiated Emissions Measurement

## 5.6.1. Standard Applicable

15.205 (a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090-0.110 \1\ 0.495-0.505 2.1735-2.1905 4.125-4.128 4.17725-4.17775 4.20725-4.20775 6.215-6.218 6.26775-6.26825 6.31175-6.31225 8.291-8.294 8.362-8.366 8.37625-8.38675 8.41425-8.41475 12.29-12.293. 12.51975-12.52025 12.57675 12.57725	16.42-16.423 16.69475-16.69525 16.80425-16.80475 25.5-25.67 37.5-38.25 73-74.6 74.8-75.2 108-121.94 123-138 149.9-150.05 156.52475-156.52525 156.7-156.9 162.0125-167.17 167.72-173.2 240-285 222.255	399.9-410 608-614 960-1240 1300-1427 1435-1626.5 1645.5-1646.5 1660-1710 1718.8-1722.2 2200-2300 2310-2390 2483.5-2500 2690-2900 3260-3267 3332-3339 3345.8-3358 2600-4400	4.5-5.15 5.35-5.46 7.25-7.75 8.025-8.5 9.0-9.2 9.3-9.5 10.6-12.7 13.25-13.4 14.47-14.5 15.35-16.2 17.7-21.4 22.01-23.12 23.6-24.0 31.2-31.8 36.43-36.5
13.36-13.41	022 000. <del>1</del>	0000	(12)

11 Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.

\2\ Above 38.6

For transmitters operating in the 5.15-5.25 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz (68.2dBuV/m at 3m).

For transmitters operating in the 5.725-5.85 GHz band:

All emissions shall be limited to a level of -27 dBm/MHz(68.2 dBuV/m at 3m) at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz(105.2 dBuV/m at 3m) at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6(110.8 dBuV/m at 3m) dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz(122.2 dBuV/m at 3m) at the band edge

In addition, In case the emission fall within the restricted band specified on 15.205(a), then the 15.209(a) limit in the table below has to be followed.

Frequencies	Field Strength	Measurement Distance
(MHz)	(microvolts/meter)	(meters)
0.009~0.490	2400/F(KHz)	300
0.490~1.705	24000/F(KHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
Above 960	500	3

## 5.6.2. Measuring Instruments and Setting

Please refer to equipment list in this report. The following table is the setting of spectrum analyzer and receiver.

Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	1000 MHz
Stop Frequency	10 <sup>th</sup> carrier harmonic
RB / VB (Emission in restricted band)	1MHz / 1MHz for Peak, 1 MHz / 1/B kHz for Average
RB / VB (Emission in non-restricted band)	1MHz / 1MHz for Peak, 1 MHz / 1/B kHz for Average

Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RB 200Hz for QP/AVG
Start ~ Stop Frequency	150kHz~30MHz / RB 9kHz for QP/AVG
Start ~ Stop Frequency	30MHz~1000MHz / RB 100kHz for QP

#### 5.6.3. Test Procedures

## 1) Sequence of testing 9 kHz to 30 MHz

## Setup:

--- The equipment was set up to simulate a typical usage like described in the user manual or described by manufacturer.

- --- If the EUT is a tabletop system, a rotatable table with 0.8 m height is used.
- --- If the EUT is a floor standing device, it is placed on the ground.
- --- Auxiliary equipment and cables were positioned to simulate normal operation conditions.
- --- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.
- --- The measurement distance is 3 meter.
- --- The EUT was set into operation.

## **Premeasurement:**

- --- The turntable rotates from 0° to 315° using 45° steps.
- --- The antenna height is 0.8 meter.

--- At each turntable position the analyzer sweeps with peak detection to find the maximum of all emissions

## **Final measurement:**

--- Identified emissions during the premeasurement the software maximizes by rotating the turntable position (0° to 360°) and by rotating the elevation axes (0° to 360°).

--- The final measurement will be done in the position (turntable and elevation) causing the highest emissions with QPK detector.

--- The final levels, frequency, measuring time, bandwidth, turntable position, correction factor, margin to the limit and limit will be recorded. Also a plot with the graph of the premeasurement and the limit will be stored.

#### 2) Sequence of testing 30 MHz to 1 GHz

#### Setup:

--- The equipment was set up to simulate a typical usage like described in the user manual or described by manufacturer.

- --- If the EUT is a tabletop system, a table with 0.8 m height is used, which is placed on the ground plane.
- --- If the EUT is a floor standing device, it is placed on the ground plane with insulation between both.
- --- Auxiliary equipment and cables were positioned to simulate normal operation conditions
- --- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.
- --- The measurement distance is 3 meter.
- --- The EUT was set into operation.

#### **Premeasurement:**

- --- The turntable rotates from 0° to 315° using 45° steps.
- --- The antenna is polarized vertical and horizontal.
- --- The antenna height changes from 1 to 3 meter.

--- At each turntable position, antenna polarization and height the analyzer sweeps three times in peak to find the maximum of all emissions.

#### Final measurement:

--- The final measurement will be performed with minimum the six highest peaks.

--- According to the maximum antenna and turntable positions of premeasurement the software maximize the peaks by changing turntable position ( $\pm$  45°) and antenna movement between 1 and 4 meter.

--- The final measurement will be done with QP detector with an EMI receiver.

--- The final levels, frequency, measuring time, bandwidth, antenna height, antenna polarization, turntable angle, correction factor, margin to the limit and limit will be recorded. Also a plot with the graph of the premeasurement with marked maximum final measurements and the limit will be stored.

#### 3) Sequence of testing 1 GHz to 18 GHz

#### Setup:

--- The equipment was set up to simulate a typical usage like described in the user manual or described by manufacturer.

- --- If the EUT is a tabletop system, a rotatable table with 1.5 m height is used.
- --- If the EUT is a floor standing device, it is placed on the ground plane with insulation between both.
- --- Auxiliary equipment and cables were positioned to simulate normal operation conditions
- --- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.
- --- The measurement distance is 3 meter.
- --- The EUT was set into operation.

#### **Premeasurement:**

- --- The turntable rotates from 0° to 315° using 45° steps.
- --- The antenna is polarized vertical and horizontal.
- --- The antenna height scan range is 1 meter to 2.5 meter.

--- At each turntable position and antenna polarization the analyzer sweeps with peak detection to find the maximum of all emissions.

#### Final measurement:

--- The final measurement will be performed with minimum the six highest peaks.

--- According to the maximum antenna and turntable positions of premeasurement the software maximize the peaks by changing turntable position ( $\pm$  45°) and antenna movement between 1 and 4 meter. This procedure is repeated for both antenna polarizations.

--- The final measurement will be done in the position (turntable, EUT-table and antenna polarization) causing the highest emissions with Peak and Average detector.

--- The final levels, frequency, measuring time, bandwidth, turntable position, EUT-table position, antenna polarization, correction factor, margin to the limit and limit will be recorded. Also a plot with the graph of the premeasurement with marked maximum final measurements and the limit will be stored.

#### 4) Sequence of testing above 18 GHz

#### Setup:

--- The equipment was set up to simulate a typical usage like described in the user manual or described by manufacturer.

- --- If the EUT is a tabletop system, a rotatable table with 1.5 m height is used.
- --- If the EUT is a floor standing device, it is placed on the ground plane with insulation between both.
- --- Auxiliary equipment and cables were positioned to simulate normal operation conditions
- --- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.
- --- The measurement distance is 1 meter.
- --- The EUT was set into operation.

#### **Premeasurement:**

--- The antenna is moved spherical over the EUT in different polarizations of the antenna.

#### Final measurement:

--- The final measurement will be performed at the position and antenna orientation for all detected emissions that were found during the premeasurements with Peak and Average detector.

--- The final levels, frequency, measuring time, bandwidth, correction factor, margin to the limit and limit will be recorded. Also a plot with the graph of the premeasurement and the limit will be stored.

#### 5.6.4. Test Setup Layout

For radiated emissions below 30MHz



Above 1GHz

Above 18 GHz shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade form 3m to 1m.

Distance extrapolation factor = 20 log (specific distanc [3m] / test distance [1.5m]) (dB);

Limit line = specific limits (dBuV) + distance extrapolation factor [6 dB].

5.6.5. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

This report shall not be reproduced except in full, without the written approval of Shenzhen LCS Compliance Testing Laboratory Ltd. Page 57 of 88 5.6.6. Results of Radiated Emissions (9 KHz~30MHz)

Temperature	<b>22.6</b> ℃	Humidity	52.8%
Test Engineer	Tom Liu	Configurations	IEEE 802.11a/n/ac

Freq.	Level	Over Limit	Over Limit	Remark
(MHz)	(dBuV)	(dB)	(dB)	
-	-	-	-	See Note

### Note:

The amplitude of spurious emissions which are attenuated by more than 20 dB below the permissible value has no need to be reported.

Distance extrapolation factor = 40 log (specific distance / test distance) (dB);

Limit line = specific limits (dBuV) + distance extrapolation factor.

5.6.7. Results of Radiated Emissions (30MHz~1GHz)

## Test result for IEEE 802.11ac VHT20(High channel:5240MHz)

Vertical



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Horizontal



\*\*\*Note:

Pre-scan all mode and recorded the worst case results in this report (IEEE 802.11ac VHT20 mode (High Channel:5240MHz)).

Emission level  $(dBuV/m) = 20 \log Emission level (uV/m)$ .

Corrected Reading: Antenna Factor + Cable Loss + Read Level = Level.

Only recorded the worst test case data in this report.

# 5.6.8. Results for Radiated Emissions (Above 1GHz)

Note: Only recorded the worst test result in this report.

5.6.8.1 UNII Band 1

IEEE 802.11a-ant 0

Channel 36 / 5180 MHz

Freq. GHz	Reading Level dBuV	Ant. Fac. dB/m	Pre. Fac. dB	Cab. Loss dB	Measured dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol.
10.36	45.62	33.21	35.82	9.52	52.53	74.00	-21.47	Peak	Horizontal
10.36	34.90	33.21	35.82	9.52	41.81	54.00	-12.19	Average	Horizontal
10.36	46.53	32.82	35.82	9.52	53.05	74.00	-20.95	Peak	Vertical
10.36	35.29	32.82	35.82	9.52	41.81	54.00	-12.19	Average	Vertical

#### Channel 40 / 5200 MHz

Freq. GHz	Reading Level dBuV	Ant. Fac. dB/m	Pre. Fac. dB	Cab. Loss dB	Measured dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol.
10.44	46.02	33.21	35.82	9.52	52.93	74.00	-21.07	Peak	Horizontal
10.44	35.23	33.21	35.82	9.52	42.14	54.00	-11.86	Average	Horizontal
10.44	47.10	32.82	35.82	9.52	53.62	74.00	-20.38	Peak	Vertical
10.44	35.70	32.82	35.82	9.52	42.22	54.00	-11.78	Average	Vertical

#### Channel 48 / 5240 MHz

Freq. GHz	Reading Level dBuV	Ant. Fac. dB/m	Pre. Fac. dB	Cab. Loss dB	Measured dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol.
10.48	46.43	33.21	35.82	9.52	53.34	74.00	-20.66	Peak	Horizontal
10.48	35.72	33.21	35.82	9.52	42.63	54.00	-11.37	Average	Horizontal
10.48	47.74	32.82	35.82	9.52	54.26	74.00	-19.74	Peak	Vertical
10.48	36.15	32.82	35.82	9.52	42.67	54.00	-11.33	Average	Vertical

### IEEE 802.11n HT20-combined ant 0 & ant 1

## Channel 36 / 5180 MHz

Freq. GHz	Reading Level dBuV	Ant. Fac. dB/m	Pre. Fac. dB	Cab. Loss dB	Measured dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol.
10.36	45.33	33.21	35.82	9.52	52.24	74.00	-21.76	Peak	Horizontal
10.36	34.45	33.21	35.82	9.52	41.36	54.00	-12.64	Average	Horizontal
10.36	46.39	32.82	35.82	9.52	52.91	74.00	-21.09	Peak	Vertical
10.36	34.93	32.82	35.82	9.52	41.45	54.00	-12.55	Average	Vertical

#### Channel 40 / 5200 MHz

Freq. GHz	Reading Level dBuV	Ant. Fac. dB/m	Pre. Fac. dB	Cab. Loss dB	Measured dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol.
10.44	45.79	33.21	35.82	9.52	52.70	74.00	-21.30	Peak	Horizontal
10.44	34.84	33.21	35.82	9.52	41.75	54.00	-12.25	Average	Horizontal
10.44	47.11	32.82	35.82	9.52	53.63	74.00	-20.37	Peak	Vertical
10.44	35.44	32.82	35.82	9.52	41.96	54.00	-12.04	Average	Vertical

## <u>Channel 48 / 5240 MHz</u>

Freq. GHz	Reading Level dBuV	Ant. Fac. dB/m	Pre. Fac. dB	Cab. Loss dB	Measured dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol.
10.48	46.50	33.21	35.82	9.52	53.41	74.00	-20.59	Peak	Horizontal
10.48	35.48	33.21	35.82	9.52	42.39	54.00	-11.61	Average	Horizontal
10.48	47.38	32.82	35.82	9.52	53.90	74.00	-20.10	Peak	Vertical
10.48	35.82	32.82	35.82	9.52	42.34	54.00	-11.66	Average	Vertical

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#### IEEE 802.11n HT40-combined ant 0 & ant 1

## Channel 38 / 5190 MHz

Freq. GHz	Reading Level dBuV	Ant. Fac. dB/m	Pre. Fac. dB	Cab. Loss dB	Measured dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol.
10.38	45.86	33.21	35.82	9.52	52.77	74.00	-21.23	Peak	Horizontal
10.38	35.07	33.21	35.82	9.52	41.98	54.00	-12.02	Average	Horizontal
10.38	47.08	32.82	35.82	9.52	53.60	74.00	-20.40	Peak	Vertical
10.38	35.77	32.82	35.82	9.52	42.29	54.00	-11.71	Average	Vertical

#### Channel 46 / 5230 MHz

Freq. GHz	Reading Level dBuV	Ant. Fac. dB/m	Pre. Fac. dB	Cab. Loss dB	Measured dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol.
10.46	46.18	33.21	35.82	9.52	53.09	74.00	-20.91	Peak	Horizontal
10.46	35.54	33.21	35.82	9.52	42.45	54.00	-11.55	Average	Horizontal
10.46	47.16	32.82	35.82	9.52	53.68	74.00	-20.32	Peak	Vertical
10.46	35.78	32.82	35.82	9.52	42.30	54.00	-11.70	Average	Vertical

## IEEE 802.11ac VHT20-combined ant 0 & ant 1

#### Channel 36 / 5180 MHz

Freq. GHz	Reading Level dBuV	Ant. Fac. dB/m	Pre. Fac. dB	Cab. Loss dB	Measured dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol.
10.36	45.43	33.21	35.82	9.52	52.34	74.00	-21.66	Peak	Horizontal
10.36	34.63	33.21	35.82	9.52	41.54	54.00	-12.46	Average	Horizontal
10.36	46.42	32.82	35.82	9.52	52.94	74.00	-21.06	Peak	Vertical
10.36	34.89	32.82	35.82	9.52	41.41	54.00	-12.59	Average	Vertical

### Channel 40 / 5200 MHz

Freq. GHz	Reading Level dBuV	Ant. Fac. dB/m	Pre. Fac. dB	Cab. Loss dB	Measured dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol.
10.44	45.73	33.21	35.82	9.52	52.64	74.00	-21.36	Peak	Horizontal
10.44	35.18	33.21	35.82	9.52	42.09	54.00	-11.91	Average	Horizontal
10.44	47.19	32.82	35.82	9.52	53.71	74.00	-20.29	Peak	Vertical
10.44	35.48	32.82	35.82	9.52	42.00	54.00	-12.00	Average	Vertical

#### Channel 48 / 5240 MHz

Freq. GHz	Reading Level dBuV	Ant. Fac. dB/m	Pre. Fac. dB	Cab. Loss dB	Measured dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol.
10.48	46.54	33.21	35.82	9.52	53.45	74.00	-20.55	Peak	Horizontal
10.48	35.43	33.21	35.82	9.52	42.34	54.00	-11.66	Average	Horizontal
10.48	47.42	32.82	35.82	9.52	53.94	74.00	-20.06	Peak	Vertical
10.48	35.96	32.82	35.82	9.52	42.48	54.00	-11.52	Average	Vertical

IEEE 802.11ac VHT40-combined ant 0 & ant 1

### Channel 38 / 5190 MHz

Freq. GHz	Reading Level dBuV	Ant. Fac. dB/m	Pre. Fac. dB	Cab. Loss dB	Measured dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol.
10.38	45.54	33.21	35.82	9.52	52.45	68.20	-15.75	Peak	Horizontal
10.38	34.82	33.21	35.82	9.52	41.73	54.00	-12.27	Average	Horizontal
10.38	46.65	32.82	35.82	9.52	53.17	68.20	-15.03	Peak	Vertical
10.38	35.08	32.82	35.82	9.52	41.60	54.00	-12.40	Average	Vertical

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Onani											
Freq. GHz	Reading Level dBuV	Ant. Fac. dB/m	Pre. Fac. dB	Cab. Loss dB	Measured dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol.		
10.46	45.71	33.21	35.82	9.52	52.62	68.20	-15.58	Peak	Horizontal		
10.46	35.19	33.21	35.82	9.52	42.10	54.00	-11.90	Average	Horizontal		
10.46	47.33	32.82	35.82	9.52	53.85	68.20	-14.35	Peak	Vertical		
10.46	35.57	32.82	35.82	9.52	42.09	54.00	-11.91	Average	Vertical		

#### Channel 46 / 5230 MHz

IEEE 802.11ac VHT80-combined ant 0 & ant 1

#### Channel 42 / 5210 MHz

Freq. GHz	Reading Level dBuV	Ant. Fac. dB/m	Pre. Fac. dB	Cab. Loss dB	Measured dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol.
10.42	45.00	33.21	35.82	9.52	51.91	68.20	-16.29	Peak	Horizontal
10.42	34.44	33.21	35.82	9.52	41.35	54.00	-12.65	Average	Horizontal
10.42	46.42	32.82	35.82	9.52	52.94	68.20	-15.26	Peak	Vertical
10.42	34.73	32.82	35.82	9.52	41.25	54.00	-12.75	Average	Vertical

## Notes:

1). Measuring frequencies from 9 KHz ~ 40 GHz, No emission found between lowest internal used/generated frequency to 30MHz.

- 2). Radiated emissions measured in frequency range from 9 KHz ~ 40 GHz were made with an instrument using Peak detector mode.
- 3). 18~40GHz at least have 20dB margin. No recording in the test report.
- 4). Worst case data at 6Mbps at IEEE 802.11a; MCS0 at IEEE 802.11n HT20, IEEE 802.11n HT40, IEEE 802.11ac VHT20, IEEE 802.11ac VHT40, IEEE 802.11ac VHT80;
- 5). Data of measurement within this frequency range shown "---" in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

## 5.6.8.2 UNII Band 3

## IEEE 802.11a-ant 0

## Channel 149 / 5745 MHz

Freq. GHz	Reading Level dBuV	Ant. Fac. dB/m	Pre. Fac. dB	Cab. Loss dB	Measured dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol.
11.49	47.06	33.92	36.09	10.26	55.15	74.00	-18.85	Peak	Horizontal
11.49	36.46	33.92	36.09	10.26	44.55	54.00	-9.45	Average	Horizontal
11.49	48.28	33.99	35.99	10.26	56.54	74.00	-17.46	Peak	Vertical
11.49	36.73	33.99	35.99	10.26	44.99	54.00	-9.01	Average	Vertical

#### Channel 157 / 5785 MHz

Freq. GHz	Reading Level dBuV	Ant. Fac. dB/m	Pre. Fac. dB	Cab. Loss dB	Measured dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol.
11.57	46.74	33.92	36.09	10.26	54.83	74.00	-19.17	Peak	Horizontal
11.57	35.82	33.92	36.09	10.26	43.91	54.00	-10.09	Average	Horizontal
11.57	47.79	33.99	35.99	10.26	56.05	74.00	-17.95	Peak	Vertical
11.57	36.39	33.99	35.99	10.26	44.65	54.00	-9.35	Average	Vertical

## Channel 163 / 5825 MHz

Freq. GHz	Reading Level dBuV	Ant. Fac. dB/m	Pre. Fac. dB	Cab. Loss dB	Measured dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol.
11.65	46.37	33.92	36.09	10.26	54.46	74.00	-19.54	Peak	Horizontal
11.65	35.69	33.92	36.09	10.26	43.78	54.00	-10.22	Average	Horizontal
11.65	47.46	33.99	35.99	10.26	55.72	74.00	-18.28	Peak	Vertical
11.65	36.07	33.99	35.99	10.26	44.33	54.00	-9.67	Average	Vertical

## IEEE 802.11n HT20-combined ant 0 & ant 1

## Channel 149 / 5745 MHz

Freq. GHz	Reading Level dBuV	Ant. Fac. dB/m	Pre. Fac. dB	Cab. Loss dB	Measured dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol.
11.49	46.81	33.92	36.09	10.26	54.90	74.00	-19.10	Peak	Horizontal
11.49	36.11	33.92	36.09	10.26	44.20	54.00	-9.80	Average	Horizontal
11.49	47.86	33.99	35.99	10.26	56.12	74.00	-17.88	Peak	Vertical
11.49	36.73	33.99	35.99	10.26	44.99	54.00	-9.01	Average	Vertical

## Channel 157 / 5785 MHz

Freq. GHz	Reading Level dBuV	Ant. Fac. dB/m	Pre. Fac. dB	Cab. Loss dB	Measured dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol.
11.57	46.89	33.92	36.09	10.26	54.98	74.00	-19.02	Peak	Horizontal
11.57	36.51	33.92	36.09	10.26	44.60	54.00	-9.40	Average	Horizontal
11.57	47.91	33.99	35.99	10.26	56.17	74.00	-17.83	Peak	Vertical
11.57	36.74	33.99	35.99	10.26	45.00	54.00	-9.00	Average	Vertical

## Channel 163 / 5825 MHz

Freq. GHz	Reading Level dBuV	Ant. Fac. dB/m	Pre. Fac. dB	Cab. Loss dB	Measured dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol.
11.65	46.50	33.92	36.09	10.26	54.59	74.00	-19.41	Peak	Horizontal
11.65	35.99	33.92	36.09	10.26	44.08	54.00	-9.92	Average	Horizontal
11.65	47.71	33.99	35.99	10.26	55.97	74.00	-18.03	Peak	Vertical
11.65	36.34	33.99	35.99	10.26	44.60	54.00	-9.40	Average	Vertical

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### IEEE 802.11n HT40-combined ant 0 & ant 1

Freq. GHz	Reading Level dBuV	Ant. Fac. dB/m	Pre. Fac. dB	Cab. Loss dB	Measured dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol.		
11.51	50.03	33.92	36.09	10.26	58.12	74.00	-15.88	Peak	Horizontal		
11.51	39.22	33.92	36.09	10.26	47.31	54.00	-6.69	Average	Horizontal		
11.51	50.93	33.99	35.99	10.26	59.19	74.00	-14.81	Peak	Vertical		
11.51	39.62	33.99	35.99	10.26	47.88	54.00	-6.12	Average	Vertical		

# Channel 151 / 5755 MHz

### Channel 159 / 5795 MHz

Freq. GHz	Reading Level dBuV	Ant. Fac. dB/m	Pre. Fac. dB	Cab. Loss dB	Measured dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol.
11.59	49.57	33.92	36.09	10.26	57.66	74.00	-16.34	Peak	Horizontal
11.59	38.93	33.92	36.09	10.26	47.02	54.00	-6.98	Average	Horizontal
11.59	50.61	33.99	35.99	10.26	58.87	74.00	-15.13	Peak	Vertical
11.59	39.26	33.99	35.99	10.26	47.52	54.00	-6.48	Average	Vertical

IEEE 802.11ac VHT20-combined ant 0 & ant 1

#### Channel 149 / 5745 MHz

Freq. GHz	Reading Level dBuV	Ant. Fac. dB/m	Pre. Fac. dB	Cab. Loss dB	Measured dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol.
11.49	49.72	33.92	36.09	10.26	57.81	74.00	-16.19	Peak	Horizontal
11.49	38.71	33.92	36.09	10.26	46.80	54.00	-7.20	Average	Horizontal
11.49	50.64	33.99	35.99	10.26	58.90	74.00	-15.10	Peak	Vertical
11.49	39.35	33,99	35,99	10.26	47.61	54.00	-6.39	Average	Vertical

#### Channel 157 / 5785 MHz

Freq. GHz	Reading Level dBuV	Ant. Fac. dB/m	Pre. Fac. dB	Cab. Loss dB	Measured dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol.
11.57	49.36	33.92	36.09	10.26	57.45	74.00	-16.55	Peak	Horizontal
11.57	38.84	33.92	36.09	10.26	46.93	54.00	-7.07	Average	Horizontal
11.57	50.33	33.99	35.99	10.26	58.59	74.00	-15.41	Peak	Vertical
11.57	39.35	33.99	35.99	10.26	47.61	54.00	-6.39	Average	Vertical

#### Channel 163 / 5825 MHz

Freq. GHz	Reading Level dBuV	Ant. Fac. dB/m	Pre. Fac. dB	Cab. Loss dB	Measured dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol.
11.65	48.97	33.92	36.09	10.26	57.06	74.00	-16.94	Peak	Horizontal
11.65	38.38	33.92	36.09	10.26	46.47	54.00	-7.53	Average	Horizontal
11.65	50.21	33.99	35.99	10.26	58.47	74.00	-15.53	Peak	Vertical
11.65	39.18	33.99	35.99	10.26	47.44	54.00	-6.56	Average	Vertical

IEEE 802.11ac VHT40-combined ant 0 & ant 1

### Channel 151 / 5755 MHz

Freq. GHz	Reading Level dBuV	Ant. Fac. dB/m	Pre. Fac. dB	Cab. Loss dB	Measured dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol.
11.51	49.32	33.92	36.09	10.26	57.41	74.00	-16.59	Peak	Horizontal
11.51	38.82	33.92	36.09	10.26	46.91	54.00	-7.09	Average	Horizontal
11.51	50.49	33.99	35.99	10.26	58.75	74.00	-15.25	Peak	Vertical
11.51	38.98	33.99	35.99	10.26	47.24	54.00	-6.76	Average	Vertical

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Channel	159 / 5795 MHZ	

Freq. GHz	Reading Level dBuV	Ant. Fac. dB/m	Pre. Fac. dB	Cab. Loss dB	Measured dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol.
11.59	49.09	33.92	36.09	10.26	57.18	74.00	-16.82	Peak	Horizontal
11.59	38.39	33.92	36.09	10.26	46.48	54.00	-7.52	Average	Horizontal
11.59	49.88	33.99	35.99	10.26	58.14	74.00	-15.86	Peak	Vertical
11.59	38.78	33.99	35.99	10.26	47.04	54.00	-6.96	Average	Vertical

IEEE 802.11ac VHT80-combined ant 0 & ant 1

#### Channel 155 / 5775 MHz

Freq. GHz	Reading Level dBuV	Ant. Fac. dB/m	Pre. Fac. dB	Cab. Loss dB	Measured dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol.
11.51	49.27	33.92	36.09	10.26	57.36	74.00	-16.64	Peak	Horizontal
11.51	38.73	33.92	36.09	10.26	46.82	54.00	-7.18	Average	Horizontal
11.51	50.35	33.99	35.99	10.26	58.61	74.00	-15.39	Peak	Vertical
11.51	38.97	33.99	35.99	10.26	47.23	54.00	-6.77	Average	Vertical

### Notes:

- 1). Measuring frequencies from 9 KHz ~ 40 GHz, No emission found between lowest internal used/generated frequency to 30MHz.
- 2). Radiated emissions measured in frequency range from 9 KHz ~ 40 GHz were made with an instrument using Peak detector mode.
- 3). 18~40GHz at least have 20dB margin. No recording in the test report.
- 4). Worst case data at 6Mbps at IEEE 802.11a; MCS0 at IEEE 802.11n HT20, IEEE 802.11n HT40, IEEE 802.11ac VHT20, IEEE 802.11ac VHT40, IEEE 802.11ac VHT80;
- 5). Data of measurement within this frequency range shown "---" in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

# 5.7. Power line conducted emissions

## 5.7.1 Standard Applicable

According to §15.207 (a): For an intentional radiator which is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed 250 microvolts (The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz). The limits at specific frequency range are listed as follows:

Frequency Range	Limits (dBµV)					
(MHz)	Quasi-peak	Average				
0.15 to 0.50	66 to 56*	56 to 46*				
0.50 to 5	56	46				
5 to 30	60	50				

## \* Decreasing linearly with the logarithm of the frequency

## 5.7.2 Block Diagram of Test Setup



## 5.7.3 Test Results

## PASS.

The test data please refer to following page.



AC Conducted Emission of power by adapter @ AC 120V/60Hz @ IEEE 802.11ac VHT20 (worst case)

\*\*\*Note: Pre-scan all modes and recorded the worst case results in this report (IEEE 802.11acVHT20).

32.64

18.62

-27.36

-31.38

QP

Average

60.00

50.00

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10.00

10.00

The emission levels that are 20dB below the official

9.97

9.97

2.

11

12

12.84

-1.18

9.72

9.72

limit are not reported.

0.08

0.08

Remarks: 1. Measured = Reading + LISNFac + Cable Loss + Aux2 Fac.

# 5.8 Undesirable Emissions Measurement

### 5.8.1 Limit

According to  $\xi$ 15.407 (b) Undesirable emission limits. Except as shown in paragraph (b) (7) of this section, the maximum emissions outside of the frequency bands of operation shall be attenuated in accordance with the following limits:

- (a) For transmitters operating in the 5.15-5.25 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz.
- (b) For transmitters operating in the 5.25-5.35 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz.
- (c) For transmitters operating in the 5.47-5.725 GHz band: All emissions outside of the 5.47-5.725 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz.
- (d) For transmitters operating in the 5.725-5.85 GHz band:
  - (i) All emissions shall be limited to a level of −27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.
  - (ii) Devices certified before March 2, 2017 with antenna gain greater than 10 dBi may demonstrate compliance with the emission limits in §15.247(d), but manufacturing, marketing and importing of devices certified under this alternative must cease by March 2, 2018. Devices certified before March 2, 2018 with antenna gain of 10 dBi or less may demonstrate compliance with the emission limits in §15.247(d), but manufacturing, marketing and importing of devices certified under this alternative must cease before March 2, 2018.
- (e) The emission measurements shall be performed using a minimum resolution bandwidth of 1 MHz. A lower resolution bandwidth may be employed near the band edge, when necessary, provided the measured energy is integrated to show the total power over 1 MHz.
- (f) Unwanted emissions below 1 GHz must comply with the general field strength limits set forth in §15.209. Further, any U-NII devices using an AC power line are required to comply also with the conducted limits set forth in §15.207.
- (g) The provisions of §15.205 apply to intentional radiators operating under this section.
- (h) When measuring the emission limits, the nominal carrier frequency shall be adjusted as close to the upper and lower frequency band edges as the design of the equipment permits.

5.8.2 Test Configuration



## 5.8.3 Test Procedure

According to KDB789033 D02 General UNII Test Procedures New Rules Section G: Unwanted Emission Measurement

- 1. Unwanted Emissions in the Restricted Bands
- a) For all measurements, follow the requirements in section II.G.3. "General Requirements for Unwanted Emissions Measurements."
- b) At frequencies below 1000 MHz, use the procedure described in section II.G.4. "Procedure for Unwanted Emissions Measurements below 1000 MHz."
- c) At frequencies above 1000 MHz, measurements performed using the peak and average measurement procedures described in sections II.G.5. and II.G.6, respectively, must satisfy the respective peak and average limits. If all peak measurements satisfy the average limit, then average measurements are not required.
- d) For conducted measurements above 1000 MHz, EIRP shall be computed as specified in section II.G.3.b) and then field strength shall be computed as follows (see KDB Publication 412172):
  - i) E[dBµV/m] = EIRP[dBm] 20 log (d[meters]) + 104.77, where E = field strength and d = distance at which field strength limit is specified in the rules;

This report shall not be reproduced except in full, without the written approval of Shenzhen LCS Compliance Testing Laboratory Ltd. Page 68 of 88 ii)  $E[dB\mu V/m] = EIRP[dBm] + 95.2$ , for d = 3 meters

- e) For conducted measurements below 1000 MHz, the field strength shall be computed as specified in d), above, and then an additional 4.7 dB shall be added as an upper bound on the field strength that would be observed on a test range with a ground plane for frequencies between 30 MHz and 1000 MHz, or an additional 6 dB shall be added for frequencies below 30 MHz.
- 2. Unwanted Emissions that fall Outside of the Restricted Bands
- a) For all measurements, follow the requirements in section II.G.3. "General Requirements for Unwanted Emissions Measurements."
- b) At frequencies below 1000 MHz, use the procedure described in section II.G.4. "Procedure for Unwanted Emissions Measurements below 1000 MHz."
- c) At frequencies above 1000 MHz, use the procedure for maximum emissions described in section II.G.5., "Procedure for Unwanted Maximum Unwanted Emissions Measurements Above 1000 MHz."
- d) Section 15.407(b) (1-3) specifies the unwanted emissions limit for the U-NII-1 and 2 bands. As specified, emissions above 1000 MHz that are outside of the restricted bands are subject to a peak emission limit of -27 dBm/MHz. However, an out-of-band emission that complies with both the average and peak limits of Section 15.209 is not required to satisfy the -27 dBm/MHz dBm/MHz peak emission limit.
  - i) Section 15.407(b) (4) specifies the unwanted emissions limit for the U-NII-3 band. A band emissions mask is specified in Section 15.407(b) (4) (i). An alternative to the band emissions mask is specified in Section 15.407(b) (4) (ii). The alternative limits are based on the highest antenna gain specified in the filing. There are also marketing and importation restrictions for the alternative limit.
- e) If radiated measurements are performed, field strength is then converted to EIRP as follows:
   i) EIRP = ((Exd) ^2) / 30
  - Where:
  - E is the field strength in V/m;
  - d is the measurement distance in meters;
  - EIRP is the equivalent isotopically radiated power in watts;
    - ii) Working in dB units, the above equation is equivalent to: EIRP [dBm] = E [dB $\mu$ V/m] + 20 log (d [meters]) - 104.77
    - iii) Or, if d is 3 meters:
      - $EIRP [dBm] = E [dB\mu V/m] 95.23$
- 3) Radiated versus Conducted Measurements.
  - The unwanted emission limits in both the restricted and non-restricted bands are based on radiated measurements; however, as an alternative, antenna-port conducted measurements in conjunction with cabinet emissions tests will be permitted to demonstrate compliance provided that the following steps are performed:
- (i) Cabinet emissions measurements. A radiated test shall be performed to ensure that cabinet emissions are below the emission limits. For the cabinet-emission measurements the antenna may be replaced by a termination matching the nominal impedance of the antenna.
- (ii) Impedance matching. Conducted tests shall be performed using equipment that matches the nominal impedance of the antenna assembly used with the EUT.
- (iii) EIRP calculation. A value representative of an upper bound on out-of-band antenna gain (in dBi) shall be added to the measured antenna-port conducted emission power to compute EIRP within the specified measurement bandwidth. (For emissions in the restricted bands, additional calculations are required to convert EIRP to field strength at the specified distance.) The upper bound on antenna gain for a device with a single RF output shall be selected as the maximum in-band gain of the antenna across all operating bands or 2 dBi, whichever is greater.3 However, for devices that operate in multiple bands using the same transmit antenna, the highest gain of the antenna within the operating band nearest to the out-of-band frequency being measured may be used in lieu of the overall highest gain when measuring emissions at frequencies within 20% of the absolute frequency at the nearest edge of that band, but in no case shall a value less than 2 dBi be selected.
- (iv) EIRP adjustments for multiple outputs. For devices with multiple outputs occupying the same or overlapping frequency ranges in the same band (e.g., MIMO or beamforming devices), compute the total EIRP as follows:
  - Compute EIRP for each output, as described in (iii), above.
  - Follow the procedures specified in KDB Publication 662911 for summing emissions across the outputs or adjusting emission levels measured on individual outputs by 10 log (NANT), where NANT is the number of outputs.
  - Add the array gain term specified in KDB Publication 662911 for out-of-band and spurious signals.
     (v) Direction of maximum emission.

For all radiated emissions tests, measurements shall correspond to the direction of maximum emission level for each measured emission (see ANSI C63.10 for guidance).

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### 5.8.4 Test Results

#### 5.8.4.1 UNII Band 1

	IEEE 802.11a												
Frequency (MHz)	Conducted Power (dBm)		Antenna Ground Gain Factor		Convert Radia 3m (dł	ated E Level At BuV/m)	Detector	Limit (dBuV/m)	Verdict				
~ /	chain 0	chain 1	(dBi)	(dB)	chain 0	chain 1							
4500.000	-50.25	-50.43	5.00	0.00	49.98	49.80	Peak	74.00	PASS				
4500.000	-60.05	-60.26	5.00	0.00	40.18	39.97	Average	54.00	PASS				
5150.000	-48.46	-47.42	5.00	0.00	51.77	52.81	Peak	74.00	PASS				
5150.000	-58.09	-58.05	5.00	0.00	42.14	42.18	Average	54.00	PASS				
5350.000	-49.41	-49.73	5.00	0.00	50.82	50.50	Peak	74.00	PASS				
5350.000	-59.66	-59.68	5.00	0.00	40.57	40.55	Average	54.00	PASS				
5460.000	-50.50	-50.36	5.00	0.00	49.72	49.87	Peak	74.00	PASS				
5460.000	-60.49	-60.53	5.00	0.00	39.74	39.69	Average	54.00	PASS				

					IE	EEE 802.11n HT20						
Frequency (MHz)	Conducted Power (dBm)		Antenna Gain(dBi)	Directional Gain(dBi)	Ground Reflection Factor	Convert Radiated E Level At 3m (dBuV/m)		Detector	Limit (dBuV/m)	Verdict		
	chain 0	chain 1	Sum			(dB)	chain 0 chain 1 Sum					
4500.000	-50.09	-50.98	-47.08	5.00	8.01	0.00	50.14	49.25	56.16	Peak	74.00	PASS
4500.000	-60.08	-60.20	-57.07	5.00	8.01	0.00	40.15	40.03	46.17	Average	54.00	PASS
5150.000	-48.43	-49.29	-45.42	5.00	8.01	0.00	51.80	50.94	57.82	Peak	74.00	PASS
5150.000	-58.06	-57.98	-55.05	5.00	8.01	0.00	42.16	42.25	48.19	Average	54.00	PASS
5350.000	-48.50	-49.52	-45.49	5.00	8.01	0.00	51.73	50.71	57.75	Peak	74.00	PASS
5350.000	-59.61	-59.66	-56.60	5.00	8.01	0.00	40.61	40.57	46.64	Average	54.00	PASS
5460.000	-49.75	-49.78	-46.74	5.00	8.01	0.00	50.48	50.44	56.50	Peak	74.00	PASS
5460.000	-60.45	-60.53	-57.44	5.00	8.01	0.00	39.78	39.70	45.80	Average	54.00	PASS

IEEE 802.11n HT40													
Frequency (MHz)	Conducted Power (dBm)			Antenna Directional Gain(dBi) Gain(dBi)		Ground Reflection Factor	Convert Radiated E Level At 3m (dBuV/m)			Detector	Limit (dBuV/m)	Verdict	
	chain 0	chain 1	Sum			(dB)	chain 0	chain 1	Sum				
4500.000	-49.50	-50.74	-46.49	5.00	8.01	0.00	50.73	49.49	56.75	Peak	74.00	PASS	
4500.000	-60.05	-60.18	-57.04	5.00	8.01	0.00	40.17	40.05	46.20	Average	54.00	PASS	
5150.000	-47.47	-48.67	-44.46	5.00	8.01	0.00	52.76	51.56	58.78	Peak	74.00	PASS	
5150.000	-57.96	-58.32	-54.95	5.00	8.01	0.00	42.27	41.91	48.29	Average	54.00	PASS	
5350.000	-48.35	-49.73	-45.34	5.00	8.01	0.00	51.88	50.49	57.90	Peak	74.00	PASS	
5350.000	-59.39	-59.67	-56.38	5.00	8.01	0.00	40.84	40.56	46.86	Average	54.00	PASS	
5460.000	-49.94	-50.01	-46.93	5.00	8.01	0.00	50.29	50.22	56.31	Peak	74.00	PASS	
5460.000	-60.17	-60.32	-57.16	5.00	8.01	0.00	40.05	39.91	46.08	Average	54.00	PASS	

IEEE 802.11ac VHT20													
Frequency (MHz)	Conducted Power (dBm)			Antenna Gain(dBi)	Directional Gain(dBi)	Ground Reflection Factor	Convert Radiated E Level At 3m (dBuV/m)			Detector	Limit (dBuV/m)	Verdict	
	chain 0	chain 1	Sum			(dB)	chain 0	chain 1	Sum				
4500.000	-50.69	-49.94	-47.68	5.00	8.01	0.00	49.54	50.28	55.56	Peak	74.00	PASS	
4500.000	-60.08	-60.14	-57.07	5.00	8.01	0.00	40.15	40.09	46.17	Average	54.00	PASS	
5150.000	-48.61	-49.00	-45.60	5.00	8.01	0.00	51.62	51.23	57.64	Peak	74.00	PASS	
5150.000	-57.91	-57.96	-54.90	5.00	8.01	0.00	42.32	42.27	48.34	Average	54.00	PASS	
5350.000	-48.76	-49.68	-45.75	5.00	8.01	0.00	51.47	50.55	57.49	Peak	74.00	PASS	
5350.000	-59.52	-59.59	-56.51	5.00	8.01	0.00	40.71	40.64	46.73	Average	54.00	PASS	
5460.000	-49.21	-49.99	-46.20	5.00	8.01	0.00	51.02	50.24	57.04	Peak	74.00	PASS	
5460.000	-60.45	-60.47	-57.44	5.00	8.01	0.00	39.78	39.76	45.80	Average	54.00	PASS	

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IEEE 802.11ac VHT40													
Frequency (MHz)	Conducted Power (dBm)			Antenna Directio Gain(dBi) Gain(d	Directional Gain(dBi)	Ground Directional Reflection Gain(dBi) Factor	Convert Radiated E Level At 3m (dBuV/m)			Detector	Limit (dBuV/m)	Verdict	
	chain 0	chain 1	Sum			(dB)	chain 0	chain 1	Sum				
4500.000	-50.05	-50.58	-47.04	5.00	8.01	0.00	50.18	49.65	56.20	Peak	74.00	PASS	
4500.000	-60.03	-60.10	-57.02	5.00	8.01	0.00	40.20	40.12	46.22	Average	54.00	PASS	
5150.000	-48.38	-48.83	-45.37	5.00	8.01	0.00	51.85	51.40	57.87	Peak	74.00	PASS	
5150.000	-57.68	-58.28	-54.67	5.00	8.01	0.00	42.55	41.95	48.57	Average	54.00	PASS	
5350.000	-48.67	-49.68	-45.66	5.00	8.01	0.00	51.56	50.55	57.58	Peak	74.00	PASS	
5350.000	-59.35	-59.62	-56.34	5.00	8.01	0.00	40.88	40.61	46.90	Average	54.00	PASS	
5460.000	-50.44	-50.05	-47.43	5.00	8.01	0.00	49.79	50.18	55.81	Peak	74.00	PASS	
5460.000	-60.13	-60.24	-57.12	5.00	8.01	0.00	40.10	39.99	46.12	Average	54.00	PASS	

IEEE 802.11ac VHT80												
Frequency (MHz)	Conducted Power (dBm)			Antenna Gain(dBi)	Directional Gain(dBi)	Ground Reflection Factor	Convert Ra	Radiated E Level At 3m (dBuV/m)		Detector	Limit (dBuV/m)	Verdict
	chain 0	chain 1	Sum			(dB)	chain 0	chain 1	Sum			
4500.000	-50.76	-50.64	-47.75	5.00	8.01	0.00	49.47	49.59	55.49	Peak	74.00	PASS
4500.000	-60.08	-60.15	-57.07	5.00	8.01	0.00	40.15	40.08	46.17	Average	54.00	PASS
5150.000	-47.96	-48.64	-44.95	5.00	8.01	0.00	52.27	51.59	58.29	Peak	74.00	PASS
5150.000	-57.67	-58.44	-54.66	5.00	8.01	0.00	42.56	41.79	48.58	Average	54.00	PASS
5350.000	-49.69	-49.58	-46.68	5.00	8.01	0.00	50.53	50.65	56.56	Peak	74.00	PASS
5350.000	-58.91	-59.33	-55.90	5.00	8.01	0.00	41.32	40.90	47.34	Average	54.00	PASS
5460.000	-49.67	-49.89	-46.66	5.00	8.01	0.00	50.56	50.34	56.58	Peak	74.00	PASS
5460.000	-59.68	-59.83	-56.67	5.00	8.01	0.00	40.55	40.40	46.57	Average	54.00	PASS

## Remark:

- 1. Measured Undesirable emission at difference data rate for each mode and recorded worst case for each mode.
- 2. Test results including cable loss;
- 3. Worst case data at 6Mbps at IEEE 802.11a; MCS0 at IEEE 802.11n HT20, IEEE 802.11n HT40, IEEE 802.11ac VHT20, IEEE 802.11ac VHT40, IEEE 802.11ac VHT80;
- 4. Covert Radiated E Level At 3m = Conducted average power + Directional Gain + 104.77-20\*log(3);
- 5. Please refer to following test plots;



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