FCC TEST REPORT

(PART 27)

REPORT NO.: RF110616C18

MODEL NO.: M-PRO-V72-235I

FCC ID: PIDASMAX2300

RECEIVED: Jun. 16, 2011

TESTED: Jul. 06 ~ Nov. 17, 2011

ISSUED: Nov. 17, 2011

APPLICANT: Airspan Networks Inc.

ADDRESS: 777 Yamato Rd Suite 310, Boca Raton, Florida, United States, 33431

ISSUED BY: Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch

LAB ADDRESS: No. 47, 14th Ling, Chia Pau Tsuen, Lin Kou Hsiang, Taipei Hsien 244, Taiwan, R.O.C.

TEST LOCATION: No. 19, Hwa Ya 2nd Rd, Wen Hwa Tsuen, Kwei Shan Hsiang, Taoyuan Hsien 333, Taiwan, R.O.C.

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RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
Original release	N/A	Nov. 17, 2011

1 CERTIFICATION

PRODUCT: WiMAX ODU CPE
MODEL: M-PRO-V72-235I
BRAND: Airspan
APPLICANT: Airspan Networks Inc.
TESTED: Jul. 06 ~ Nov. 17, 2011
TEST SAMPLE: ENGINEERING SAMPLE
TEST STANDARDS: FCC Part 27, Subpart C & D

The above equipment (Model: M-PRO-V72-235I) has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch,** and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

PREPARED BY : _____ , DATE : Nov. 17, 2011
Pettie Chen / Specialist

APPROVED BY : _____ , DATE : Nov. 17, 2011
Gary Chang / Technical Manager

2 SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

STANDARD SECTION FCC Part 27 & Part 2	TEST TYPE AND LIMIT	RESULT	REMARK
2.1046 27.50(h)(2)	Maximum Peak Output Power Limit: max. 20 Watt	PASS	Meet the requirement of limit. Minimum passing margin is 42.8dBm.
2.1055 27.54	Frequency Stability Stay with the authorized bands of operation	PASS	Meet the requirement of limit.
2.1049 27.53(m)(6)	Emission Bandwidth	PASS	Meet the requirement of limit.
27.50(d)(5)	Peak to Average Ratio	PASS	Meet the requirement of limit.
2.1051 27.53(m)(4)(6)	Band Edge Measurements	PASS	Meet the requirement of limit.
2.1051 27.53(m)(4)(6)	Conducted Spurious Emissions	PASS	Meet the requirement of limit.
2.1053 27.53(m)(4)(6)	Radiated Spurious Emissions	PASS	Meet the requirement of limit. Minimum passing margin is -1.1dB at 6950.25MHz.

2.1 MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

MEASUREMENT	FREQUENCY	UNCERTAINTY
Conducted emissions	9kHz~30MHz	2.44 dB
Radiated emissions	30MHz ~ 200MHz	3.19 dB
	200MHz ~1000MHz	3.21 dB
	1GHz ~ 18GHz	2.26 dB
	18GHz ~ 40GHz	1.94 dB

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k = 2.

3 GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

EUT	WiMAX ODU CPE	
MODEL NO.	M-PRO-V72-235I	
FCC ID	PIDASMAX2300	
NOMINAL VOLTAGE	48Vdc	
CODED TYPE/MODULATION/ CODING RATE	UL	QPSK: 1/2, 3/4
		16QAM: 1/2, 3/4
	DL	QPSK: 1/2, 3/4
		16QAM: 1/2, 3/4
		64QAM: 1/2, 2/3, 3/4, 5/6
MODULATION TECHNOLOGY	OFDMA	
DUPLEX METHOD	TDD	
OPERATING RANGE	2305MHz ~ 2320MHz, 2345MHz ~ 2360MHz	
CHANNEL BANDWIDTH	3.5MHz	
MAX. AVERAGE EIRP	34.51 dBm (2.824W)	
MAX PEAK EIRP	42.80 dBm (19.055W)	
ANTENNA TYPE	Patch antenna with 13dBi gain	
ANTENNA CONNECTOR	NA	
OPERATION TEMPERATURE RANGE	-40°C ~ 70°C	
DATA CABLE	1.7m shielded RJ45 cable without core	
I/O PORTS	Refer to user's manual	
ACCESSORY DEVICES	POE, Filter	

NOTE:

1. The EUT consumes power from the following POEs.

POE 1	
BRAND:	PowerDsine™ 3001
MODEL:	PD-3001/AC
INPUT:	100-250Vac, 50/60Hz, 0.5A
OUTPUT:	48Vdc, 0.35A

POE 2	
BRAND:	PHIHONG
MODEL:	POE16U-480
INPUT:	100-240Vac, 50/60Hz, 0.4A
OUTPUT:	48Vdc, 0.32A

2. The EUT can supports different UL / DL ratio, max transmit ratio is up to 16 (UL): 31 (DL). After pretesting of output power and spurious emission, 16 (UL): 31 (DL) was found to be worst case and was selected for the final test configuration.

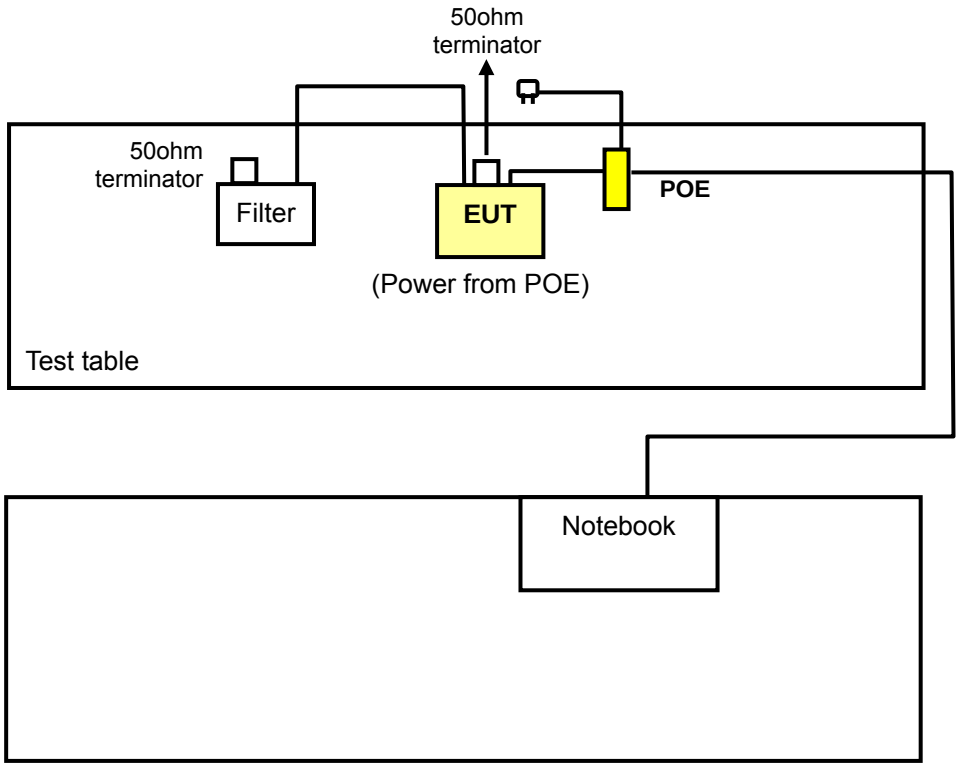
3. For the EUT with modulation type and coding rate, after pre-testing in test items of output power and spurious emissions, QPSK 1/2 was found to be worst case and was selected for the final test configuration.
4. The above EUT information is declared by manufacturer and for more detailed feature description please refers to the manufacturer's specifications or User's Manual.

3.2 DESCRIPTION OF TEST MODES

Two channels of each channel bandwidth had been tested.

CHANNEL BANDWIDTH: 3.5 MHz
Frequency (MHz)
2316.75MHz
2348.25MHz

3.2.1 CONFIGURATION OF SYSTEM UNDER TEST



3.2.2 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL

EUT CONFIGURE MODE	APPLICABLE TO								DESCRIPTION
	OP	FS	EB	PA	BE	CSE	RE<1G	RE≥1G	
A	√	√	√	√	√	√	√	√	Power from PoE 1
B	-	-	-	-	-	-	√	-	Power from PoE 2

Where **OP:** Output power **FS:** Frequency stability
EB: Emission bandwidth **PA:** Peak to Average Ratio
BE: Band edge **CSE**: Conducted spurious emissions
RE<1G: Radiated emission below 1GHz **RE≥1G:** Radiated emission above 1GHz

NOTE: "-": Means no effect.

OUTPUT POWER MEASUREMENT:

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
☒ Following channel(s) was (were) selected for the final test as listed below.

EUT CONFIGURE MODE	TESTED CHAN. FREQ. (MHz)	MODULATION TECHNOLOGY	CHANNEL BANDWIDTH	MODULATION TYPE	CODING RATE
A	2316.75	OFDMA	3.5MHz	QPSK/16QAM	1/2
A	2348.25	OFDMA	3.5MHz	QPSK/16QAM	1/2

FREQUENCY STABILITY MEASUREMENT:

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, coding rate, and antenna ports (if EUT with antenna diversity architecture).
☒ Following channel(s) was (were) selected for the final test as listed below.

EUT CONFIGURE MODE	TESTED CHAN. FREQ. (MHz)	MODULATION TECHNOLOGY	CHANNEL BANDWIDTH	MODULATION TYPE	CODING RATE
A	2348.25	OFDMA	3.5MHz	QPSK	1/2

EMISSION BANDWIDTH MEASUREMENT:

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, coding rate, and antenna ports (if EUT with antenna diversity architecture).
☒ Following channel(s) was (were) selected for the final test as listed below.

EUT CONFIGURE MODE	TESTED CHAN. FREQ. (MHz)	MODULATION TECHNOLOGY	CHANNEL BANDWIDTH	MODULATION TYPE	CODING RATE
A	2316.75	OFDMA	3.5MHz	QPSK/16QAM	1/2
A	2348.25	OFDMA	3.5MHz	QPSK/16QAM	1/2

PEAK TO AVERAGE RATIO:

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, coding rate, and antenna ports (if EUT with antenna diversity architecture).
☒ Following channel(s) was (were) selected for the final test as listed below.

EUT CONFIGURE MODE	TESTED CHANNEL (MHz)	MODULATION TECHNOLOGY	CHANNEL BANDWIDTH	MODULATION TYPE	CODING RATE
A	2316.75	OFDMA	3.5MHz	QPSK/16QAM	1/2
A	2348.25	OFDMA	3.5MHz	QPSK/16QAM	1/2

BAND EDGE MEASUREMENT:

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, coding rate, and antenna ports (if EUT with antenna diversity architecture).
☒ Following channel(s) was (were) selected for the final test as listed below.

EUT CONFIGURE MODE	TESTED CHAN. FREQ. (MHz)	MODULATION TECHNOLOGY	CHANNEL BANDWIDTH	MODULATION TYPE	CODING RATE
A	2316.75	OFDMA	3.5MHz	QPSK/16QAM	1/2
A	2348.25	OFDMA	3.5MHz	QPSK/16QAM	1/2

CONDUCTED SPURIOUS EMISSIONS MEASUREMENT:

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, coding rate, and antenna ports (if EUT with antenna diversity architecture).
☒ Following channel(s) was (were) selected for the final test as listed below.

EUT CONFIGURE MODE	TESTED CHAN. FREQ. (MHz)	MODULATION TECHNOLOGY	CHANNEL BANDWIDTH	MODULATION TYPE	CODING RATE
A	2316.75	OFDMA	3.5MHz	QPSK/16QAM	1/2
A	2348.25	OFDMA	3.5MHz	QPSK/16QAM	1/2

RADIATED EMISSION MEASUREMENT (BELOW 1 GHz):

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, coding rate, and antenna ports (if EUT with antenna diversity architecture).
☒ Following channel(s) was (were) selected for the final test as listed below.

EUT CONFIGURE MODE	TESTED CHAN. FREQ. (MHz)	MODULATION TECHNOLOGY	CHANNEL BANDWIDTH	MODULATION TYPE	CODING RATE
A, B	2316.75	OFDMA	3.5MHz	QPSK	1/2
A, B	2348.25	OFDMA	3.5MHz	QPSK	1/2

RADIATED EMISSION MEASUREMENT (ABOVE 1 GHz):

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates, XYZ axis and antenna ports (if EUT with antenna diversity architecture).

☒ Following channel(s) was (were) selected for the final test as listed below.

EUT CONFIGURE MODE	TESTED CHAN. FREQ. (MHz)	MODULATION TECHNOLOGY	CHANNEL BANDWIDTH	MODULATION TYPE	CODING RATE
A	2316.75	OFDMA	3.5MHz	QPSK	1/2
A	2348.25	OFDMA	3.5MHz	QPSK	1/2

TEST CONDITION:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
OP	27deg. C, 67%RH	120Vac, 60Hz	Long Chen
FS	27deg. C, 67%RH	120Vac, 60Hz	Long Chen
EB	27deg. C, 67%RH	120Vac, 60Hz	Long Chen
BE	27deg. C, 67%RH	120Vac, 60Hz	Long Chen
CSE	27deg. C, 67%RH	120Vac, 60Hz	Long Chen
RE≥1G	26deg. C, 65%RH	120Vac, 60Hz	Sun Lin
RE<1G	26deg. C, 65%RH	120Vac, 60Hz	Sun Lin

3.3 GENERAL DESCRIPTION OF APPLIED STANDARDS

The EUT is a WiMAX product. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

FCC 47 CFR Part 2

FCC 47 CFR Part 27

ANSI/TIA/EIA-603-C-2004

NOTE: The EUT is also considered as a kind of computer peripheral, because the connection to computer is necessary for typical use. It has been verified to comply with the requirements of FCC Part 15, Subpart B, Class B (DoC). The test report has been issued separately.

3.4 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

NO.	PRODUCT	BRAND	MODEL NO.	SERIAL NO.	FCC ID
1	NOTEBOOK	HP	NC6000	CNU4110Y6Q	E2K24CLNS

NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	10m RJ45 cable

NOTE:

1. All power cords of the above support units are non shielded (1.8m).
2. Item 1 act as a communication partner to transfer data.

4 TEST TYPES AND RESULTS

4.1 OUTPUT POWER MEASUREMENT

4.1.1 LIMITS OF OUTPUT POWER MEASUREMENT

For fixed customer premises equipment (CPE) stations transmitting in the 2305–2320 MHz band or in the 2345–2360 MHz band, the peak EIRP must not exceed 20 watts within any 5 megahertz of authorized bandwidth. For WCS CPE using TDD technology, the duty cycle must not exceed 38 percent”

4.1.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
Spectrum analyzer	E4446A	MY43360128	Jul. 14, 2011	Jul. 13, 2012

NOTE:

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

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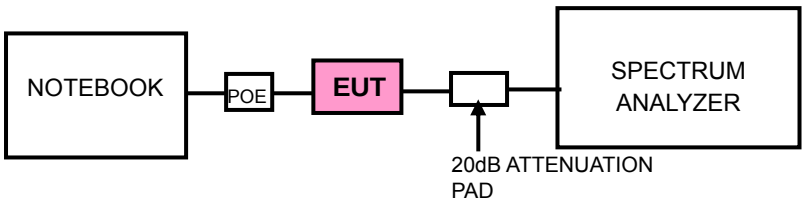
4.1.3 TEST PROCEDURES

OUTPUT POWER

1. Connect the DUT transmitter output to the spectrum analyzer via coaxial cable while ensuring proper impedance matching.
2. Tune the analyzer to the nominal center frequency of the emission bandwidth (EBW).
3. Set the span to twice the nominal EBW (span = 2 x EBW).
4. Set the resolution bandwidth (RBW) to approximately 1% of EBW.
5. Set the video bandwidth (VBW) to 3 x RBW.
6. Select the average power (RMS) display detector.
7. Set the number of measurement points to ≥ 601.
8. Use auto-coupled sweep time.
9. Perform measurement over an interval of time when the transmission is continuous and at its maximum power level.
10. Use the Band/Channel Power function to determine the integrated power over the full EBW.
11. Record the band power level.
12. Adjust the recorded level by applying appropriate correction factors for the measurement set-up.
13. Determine the EIRP by adding the effective antenna gain to the adjusted power level.

4.1.4 TEST SETUP



4.1.5 EUT OPERATING CONDITIONS

Executes telnet program to send commands via RJ45 cable to control EUT to transmit at specific modulation, coding rate, frequency and output power level.

4.1.6 TEST RESULTS

MODULATION: QPSK

AVERAGE CONDUCTED POWER AND EIRP

FREQ. (MHz)	SPECTRUM READING (dBm)	C.F (dB)	AVERAGE CONDUCTED POWER(dBm)	ANTENNA GAIN (dBi)	AVERAGE EIRP (dBm)
2316.75	0.31	21.0	21.31	13	34.31
2348.25	0.51	21.0	21.51	13	34.51

REMARKS: 1. Output Power (dBm) = Raw Value (dBm) + Correction Factor (dB).
2. Correction Factor (dB) = Cable Loss (dB) + 20dB Attenuator.

PEAK CONDUCTED POWER AND EIRP

FREQ. (MHz)	AVERAGE CONDUCTED POWER(dBm)	CCDF(dB)	PEAK CONDUCTED POWER(dBm)	ANTENNA GAIN (dBi)	PEAK EIRP (dBm)
2316.75	21.31	8.37	29.68	13.00	42.68
2348.25	21.51	8.29	29.80	13.00	42.80

MODULATION: 16QAM

AVERAGE CONDUCTED POWER AND EIRP

FREQ. (MHz)	SPECTRUM READING (dBm)	C.F (dB)	AVERAGE CONDUCTED POWER(dBm)	ANTENNA GAIN (dBi)	AVERAGE EIRP (dBm)
2316.75	0.20	21.0	21.20	13.00	34.20
2348.25	0.43	21.0	21.43	13.00	34.43

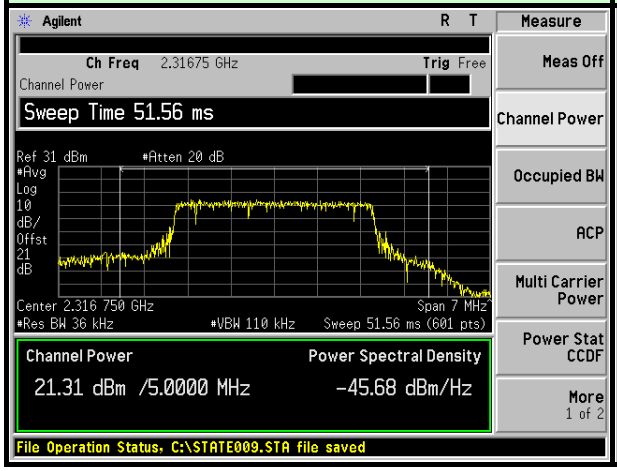
REMARKS: 1. Output Power (dBm) = Raw Value (dBm) + Correction Factor (dB).
2. Correction Factor (dB) = Cable Loss (dB) + 20dB Attenuator.

PEAK CONDUCTED POWER AND EIRP

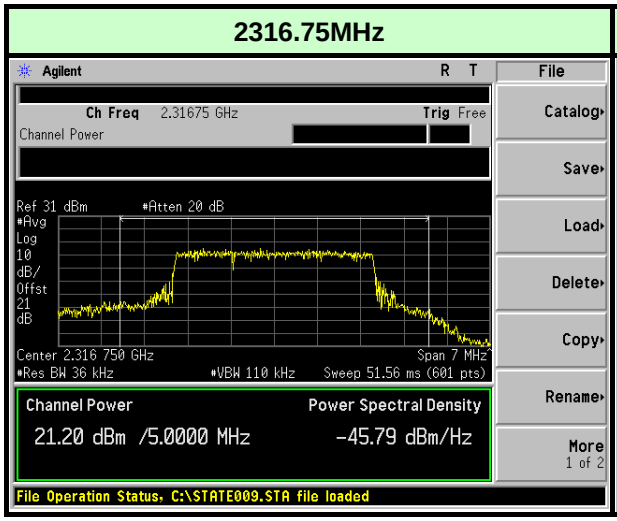
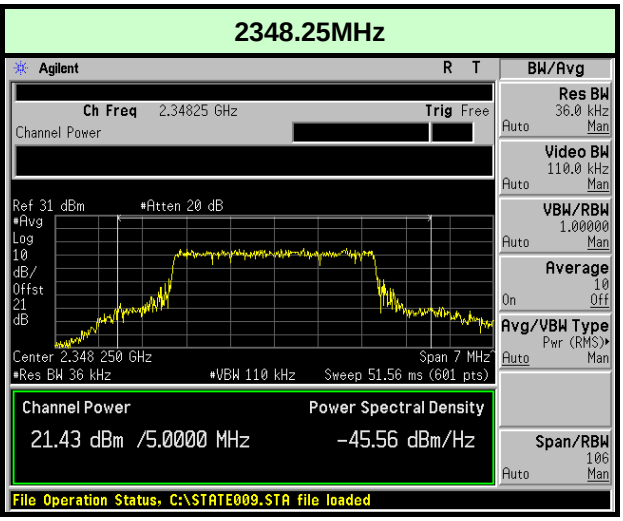
FREQ. (MHz)	AVERAGE CONDUCTED POWER(dBm)	CCDF(dB)	PEAK CONDUCTED POWER(dBm)	ANTENNA GAIN (dBi)	PEAK EIRP (dBm)
2316.75	21.20	8.14	29.34	13.00	42.34
2348.25	21.43	8.28	29.71	13.00	42.71

CONDUCTED POWER

MODULATION: QPSK

2316.75MHz	2348.25MHz
	

MODULATION: 16QAM

2316.75MHz	2348.25MHz
	

4.2 FREQUENCY STABILITY MEASUREMENT

4.2.1 LIMITS OF FREQUENCY STABILIITY MEASUREMENT

According to the FCC part 2.1055 shall be tested the frequency stability. The rule is defined that" The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block." The test extreme voltage is according to the 2.1055(d)(1) Vary primary supply voltage from 85 to 115 percent of the nominal value for other than hand carried battery equipment and the extreme temperature rule is comply with specification of EUT -40℃ ~ 70℃.

4.2.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
Spectrum Analyzer Agilent	E4446A	MY44360124	Dec. 29, 2010	Dec. 28, 2011
RF cable	SUCOFLEX 104	329751/4	Jan. 27, 2011	Jan. 26, 2012
WIT Standard Temperature & Humidity Chamber	TH-4S-C	W981030	Jun. 15, 2011	Jun. 14, 2012

NOTE: The calibration interval of the above test instruments is 12 months. And the calibrations are traceable to NML/ROC and NIST/USA.

4.2.3 TEST PROCEDURE

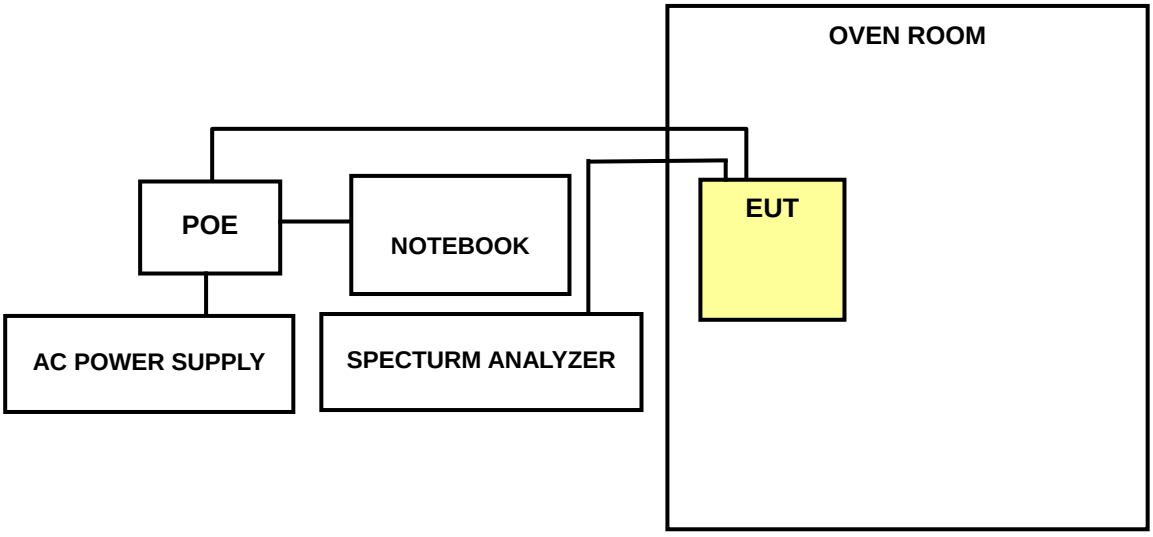
a. Power must be removed when changing from one temperature to another or one voltage to another voltage. Power warm up is at least 15 min and power applied should perform before recording frequency error.

b. EUT is connected the external power supply to control the AC input power. The various Volts from the minimum 93.5 Volts to 126.5 Volts. Each step shall be record the frequency error rate.

c. The temperature range step is 10 degrees in this test items. All temperature levels shall be hold the ±0.5℃ during the measurement testing.

d. The each temperature step shall be at least 0.5 hours, consider the EUT could be test under the stability condition.

4.2.4 TEST SETUP



4.2.5 EUT OPERATING CONDITIONS

Same as 4.1.5

4.2.6 TEST RESULTS

CHANNEL BANDWIDTH: 3.5MHz			
AFC FREQUENCY ERROR VS. VOLTAGE			
VOLTAGE (Volts)	TEMP. (℃)	FREQUENCY (MHz)	FREQUENCY ERROR (ppm)
93.5	20	2348.250862	0.367
110.0	20	2348.250684	0.291
126.5	20	2348.250805	0.343

AFC FREQUENCY ERROR VS. TEMP.			
VOLTAGE (Volts)	TEMP. (℃)	FREQUENCY (MHz)	FREQUENCY ERROR (ppm)
110.0	70	2348.250897	0.382
110.0	60	2348.251497	0.637
110.0	50	2348.250687	0.293
110.0	40	2348.251072	0.457
110.0	30	2348.250774	0.330
110.0	20	2348.250684	0.291
110.0	10	2348.251435	0.611
110.0	0	2348.250743	0.316
110.0	-10	2348.251346	0.573
110.0	-20	2348.250376	0.160
110.0	-30	2348.250867	0.369
110.0	-40	2348.250806	0.343
CARRIER FREQUENCY: 2348.25MHz			

4.3 EMISSION BANDWIDTH MEASUREMENT

4.3.1 LIMITS OF EMISSION BANDWIDTH MEASUREMENT

According to FCC 27.53(m)(6) specified that emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26dB below the transmitter power.

4.3.2 TEST INSTRUMENTS

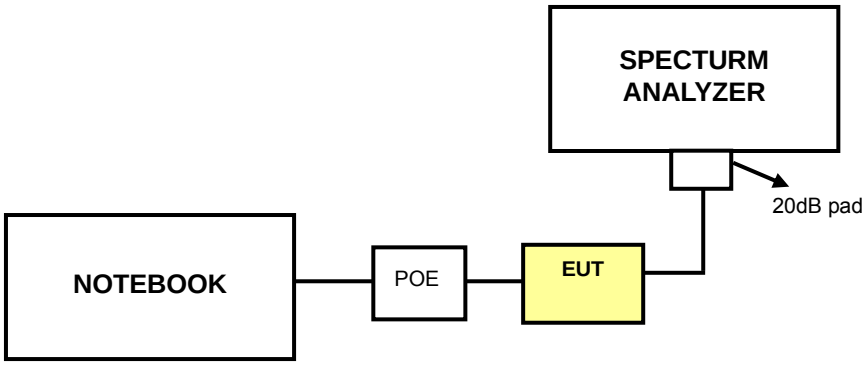
DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
Spectrum analyzer	E4446A	MY43360128	Jul. 14, 2011	Jul. 13, 2012
RF cable	SUCOFLEX 104	329751/4	Jan. 27, 2011	Jan. 26, 2012
DC-6GHz 20dB 50W Fixed attenuator Woken	MDC9331N-20	0724	May 13, 2011	May 12, 2012

NOTE: The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

4.3.3 TEST PROCEDURE

The transmitter output was connected to the spectrum analyzer through an attenuator. The bandwidth of the fundamental frequency was measured by spectrum analyzer with RBW = 36kHz, VBW = 110kHz. The 26dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 26dB.

4.3.4 TEST SETUP



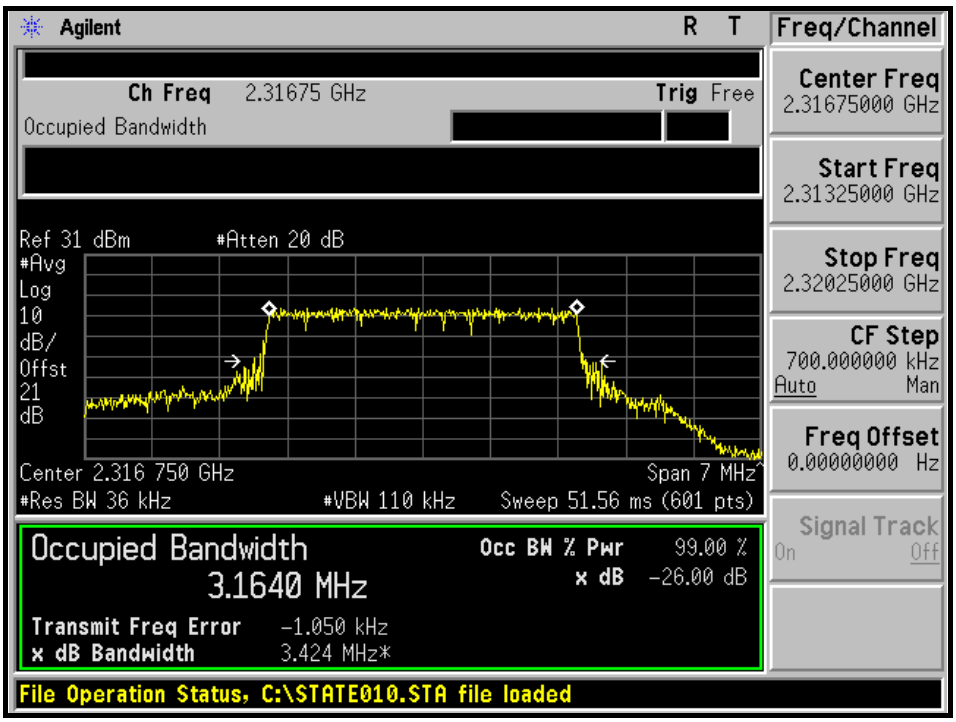
4.3.5 EUT OPERATING CONDITIONS

Same as 4.1.5

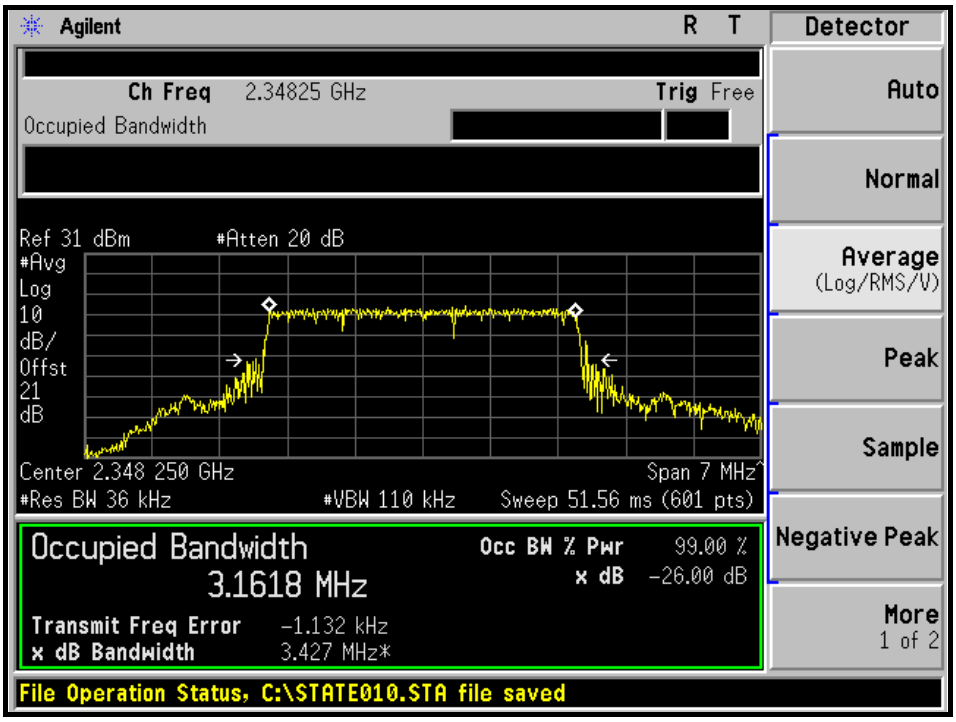
4.3.6 TEST RESULTS

MODULATION: QPSK	
CHANNEL BANDWIDTH: 3.5MHz	
FREQ. (MHz)	-26dBc BANDWIDTH (MHz)
2316.75	3.1640
2348.25	3.1618

2316.75MHz

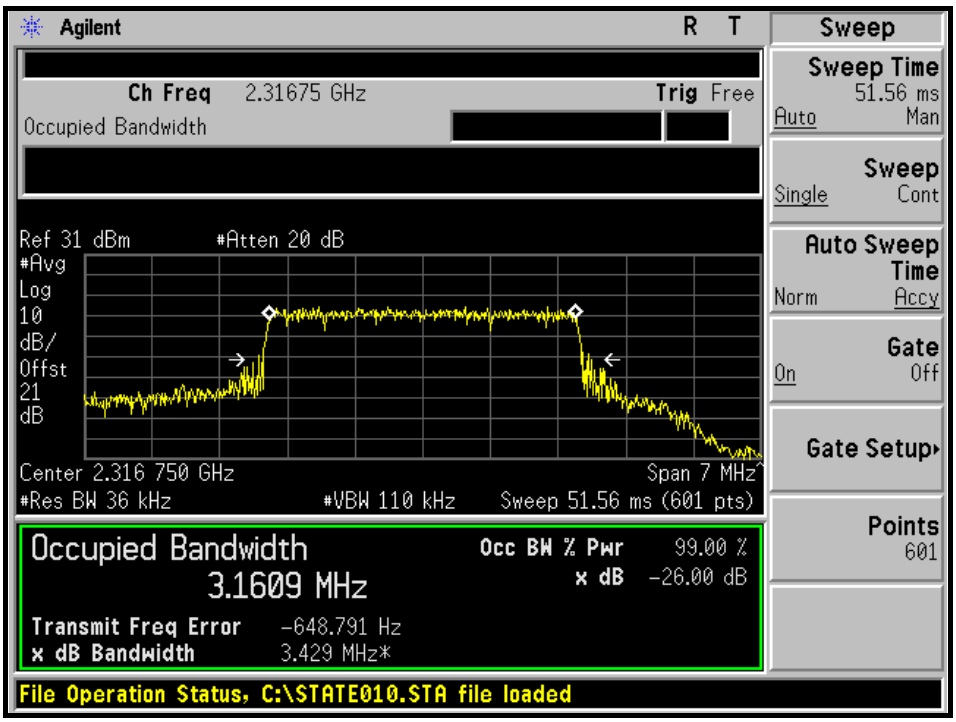


2348.25MHz

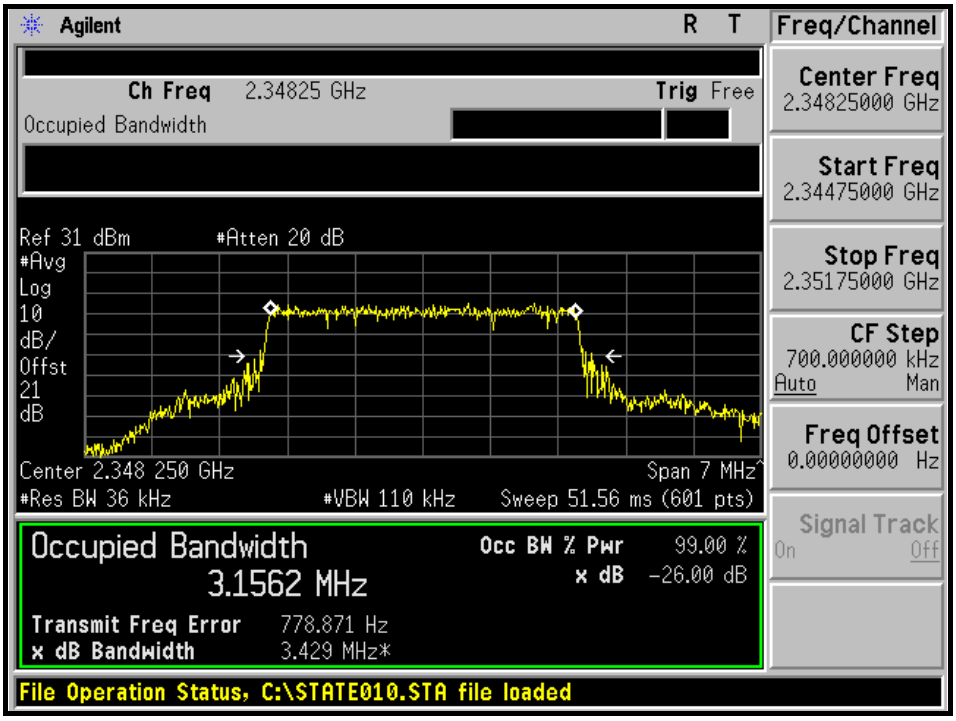


MODULATION: 16QAM	
CHANNEL BANDWIDTH: 3.5MHz	
FREQ. (MHz)	-26dBc BANDWIDTH (MHz)
2316.75	3.1609
2348.25	3.1562

2316.75MHz



2348.25MHz



4.4 PEAK TO AVERAGE RATIO

4.4.1 LIMITS OF PEAK TO AVERAGE RATIO MEASUREMENT

The peak to-average ratio (PAR) of the transmission may not exceed 13 dB.

4.4.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
JFW 20dB attenuation	50HF-020-SMA	NA	NA	NA
RF cable	SUCOFLEX 104	329751/4	Jan. 27, 2011	Jan. 26, 2012
Spectrum analyzer	E4446A	MY43360128	Jul. 14, 2011	Jul. 13, 2012

NOTE: The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

4.4.3 TEST PROCEDURES

1. Set resolution/measurement bandwidth ≥ signal's occupied bandwidth;
2. Set the number of counts to a value that stabilizes the measured CCDF curve;
3. Record the maximum PAPR level associated with a probability of 0.1%.

4.4.4 TEST SETUP

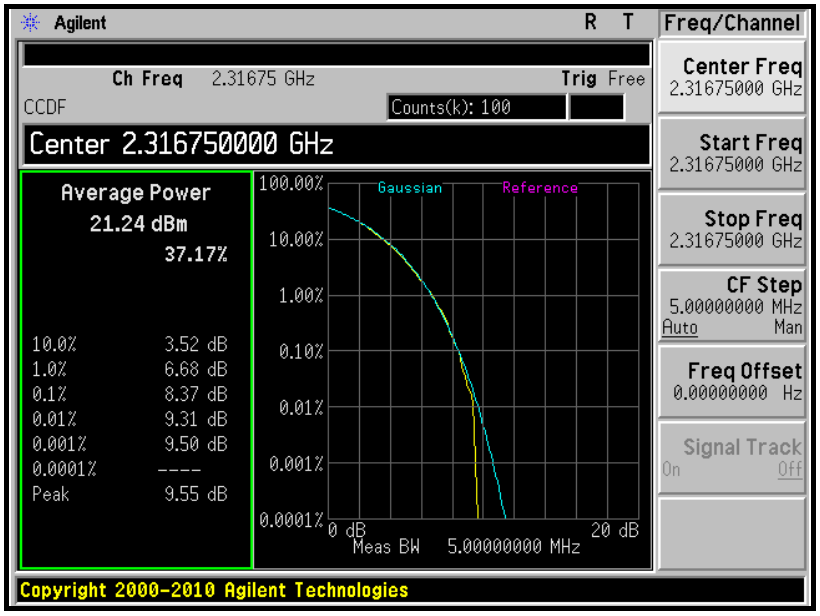
Same as Item 4.2.4 (Conducted Power Setup)

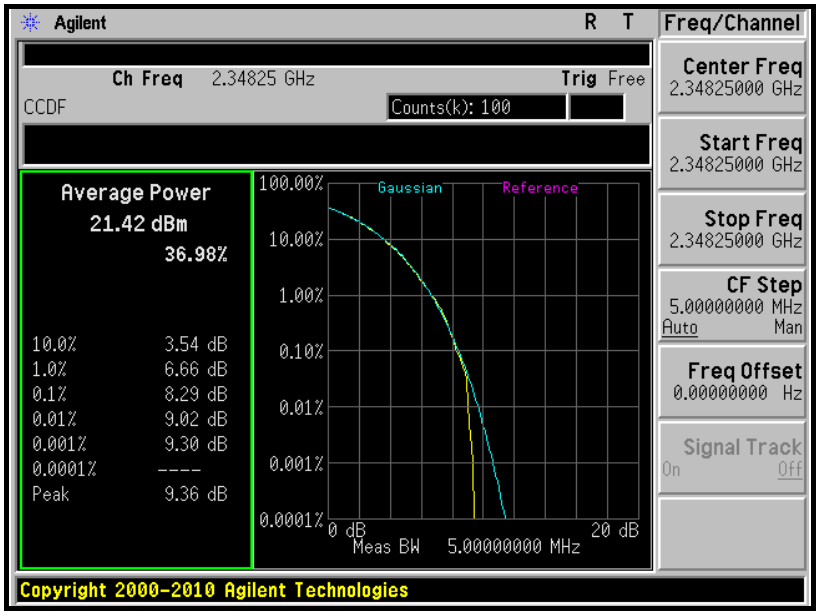
4.4.5 EUT OPERATING CONDITION

Same as Item 4.1.5

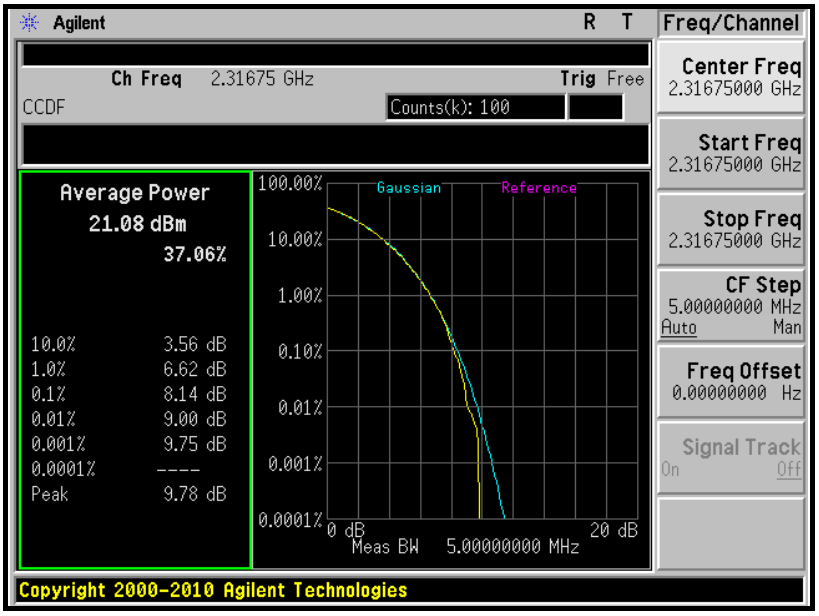
4.4.6 TEST RESULTS

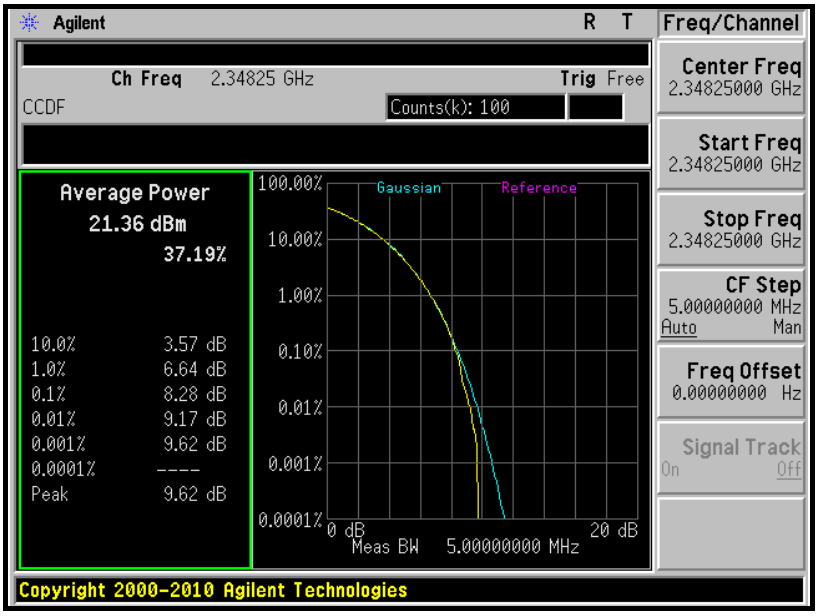
MODULATION: QPSK	
CHANNEL BANDWIDTH: 3.5MHz	
CHANNEL FREQUENCY (MHz)	PEAK TO AVERAGE RATIO (dB)
2316.75	8.37
2348.25	8.29





MODULATION: 16QAM	
CHANNEL BANDWIDTH: 3.5MHz	
CHANNEL FREQUENCY (MHz)	PEAK TO AVERAGE RATIO (dB)
2316.75	8.14
2348.25	8.28





4.5 BAND EDGE MEASUREMENT

4.5.1 LIMITS OF BAND EDGE MEASUREMENT

For fixed customer premises equipment (CPE) stations operating in the 2305–2320 MHz band and the 2345–2360 MHz band transmitting with more than 2 watts per 5 megahertz average EIRP:

(i) By a factor of not less than: 43 + 10 log (P) dB on all frequencies between 2305 and 2320 MHz and on all frequencies between 2345 and 2360 MHz that are outside the licensed band of operation, and not less than 75 + 10 log (P) dB) on all frequencies between 2320 and 2345 MHz.

(ii) By a factor of not less than: 43 + 10 log (P) dB) at 2305 MHz, 70 + 10 log (P) dB at 2300 MHz, 72 + 10 log (P) dB at 2287.5 MHz, and 75 + 10 log (P) dB below 2285 MHz;

(iii) By a factor of not less than: 43 + 10 log (P) dB at 2360 MHz, 55 + 10 log (P) dB at 2362.5 MHz, 70 + 10 log (P) dB at 2365 MHz, 72 + 10 log (P) dB at 2367.5 MHz, and 75 + 10 log (P) dB) above 2370 MHz.

4.5.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
Spectrum analyzer	E4446A	MY43360128	Jul. 14, 2011	Jul. 13, 2012
RF cable	SUCOFLEX 104	329751/4	Jan. 27, 2011	Jan. 26, 2012
WIT Standard Temperature & Humidity Chamber	TH-4S-C	W981030	Jun. 15, 2011	Jun. 14, 2012

NOTE: The calibration interval of the above test instruments is 12 months. And the calibrations are traceable to NML/ROC and NIST/USA.

4.5.3 TEST SETUP

Same as Item 4.3.4

4.5.4 TEST PROCEDURES

a. The EUT was set up for the rated peak power. The power was measured with Spectrum Analyzer. All measurements were done at 2 channels: 2316.75MHz & 2348.25MHz operational frequency.

b. The center frequency of spectrum is the band edge frequency and span is 1.5MHz. RBW of the spectrum is 36kHz. VBW of the spectrum is 110kHz.

c. Record the max trace plot into the test report.

4.5.5 EUT OPERATING CONDITION

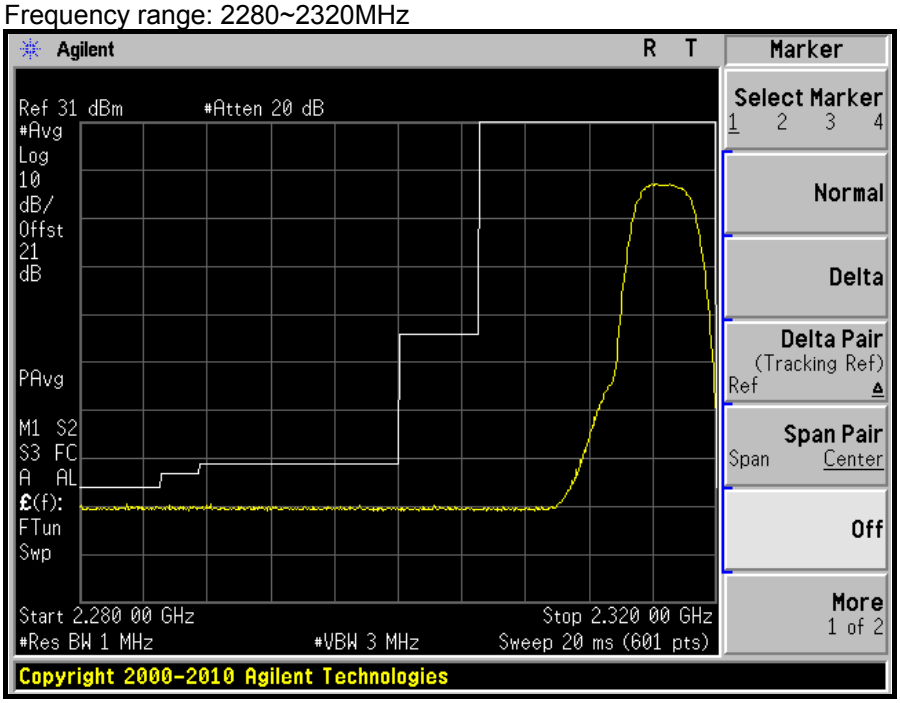
Same as 4.1.5

4.5.6 TEST RESULTS

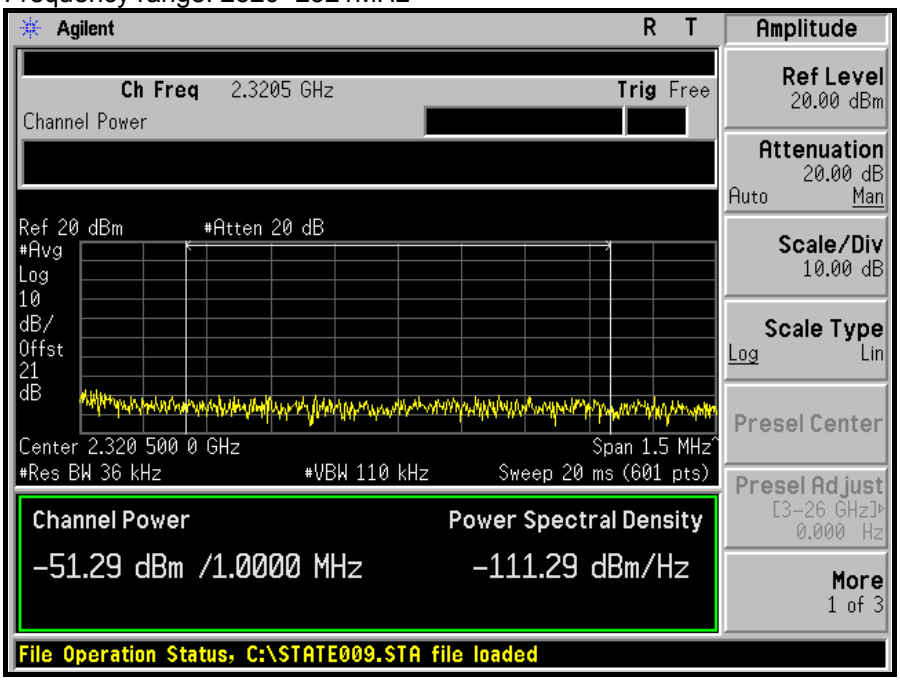
MODULATION: QPSK

TEST FREQUENCY: 2316.75MHz

Frequency range: 2280~2320MHz

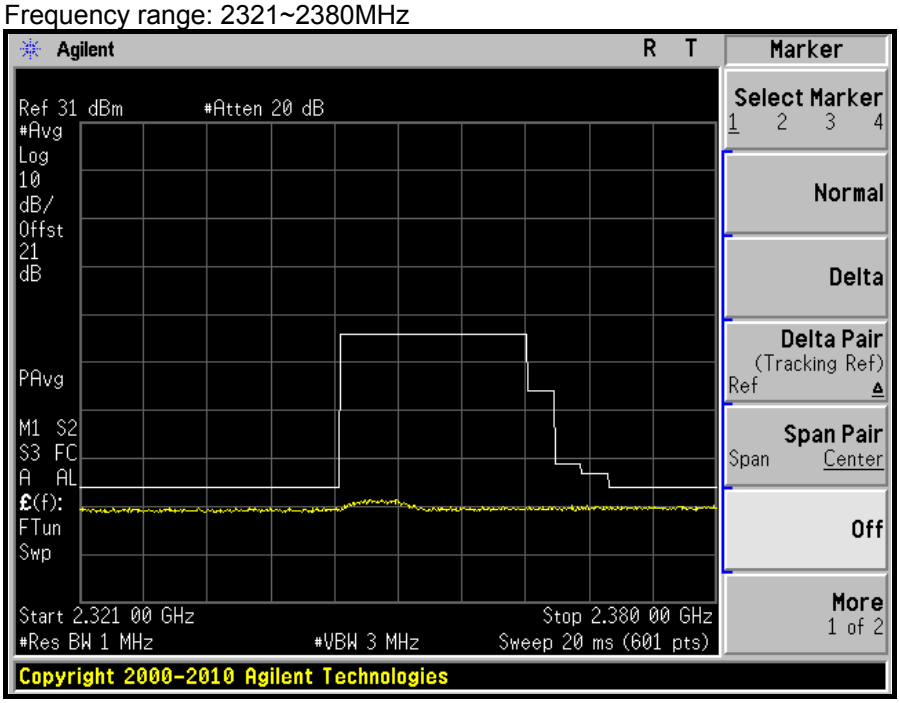


Frequency range: 2320~2321MHz



NOTE: Due to instrument noise floor limitation, the full investigating range is subdivided into 3 to 4 plots

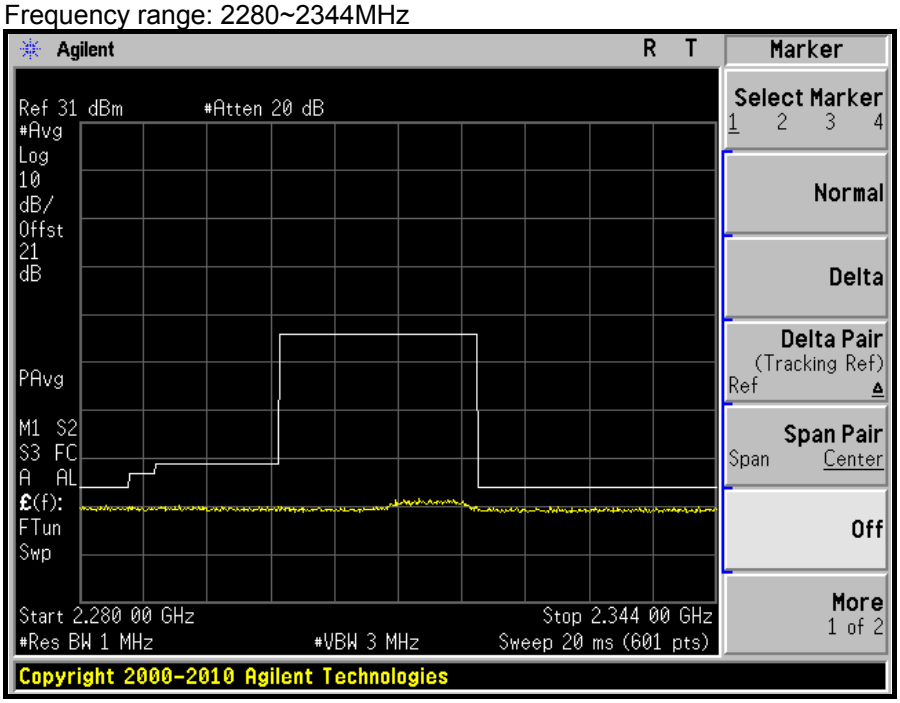
Frequency range: 2321~2380MHz



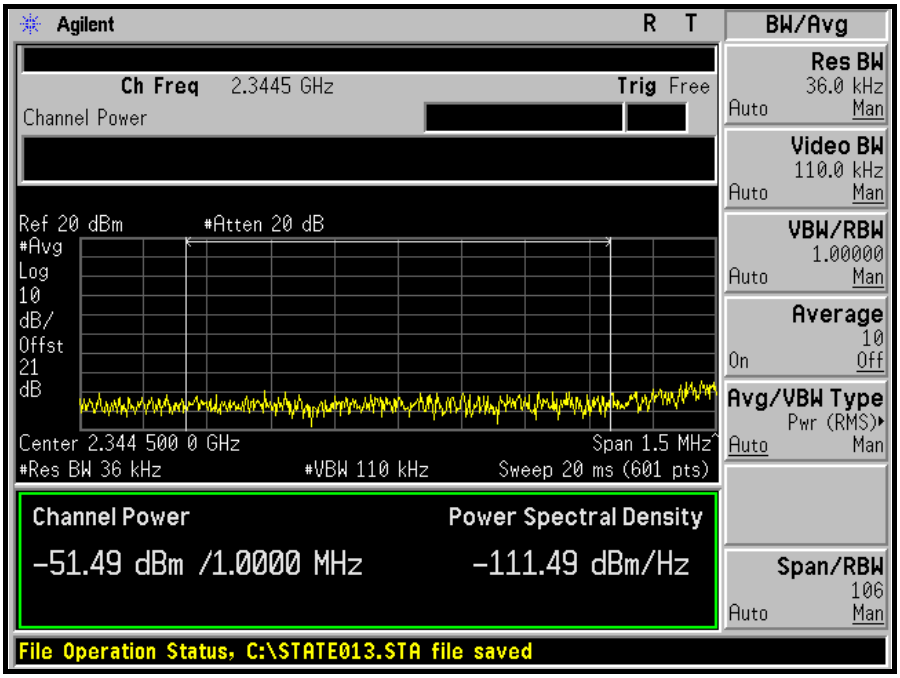
MODULATION: QPSK

TEST FREQUENCY: 2348.25MHz

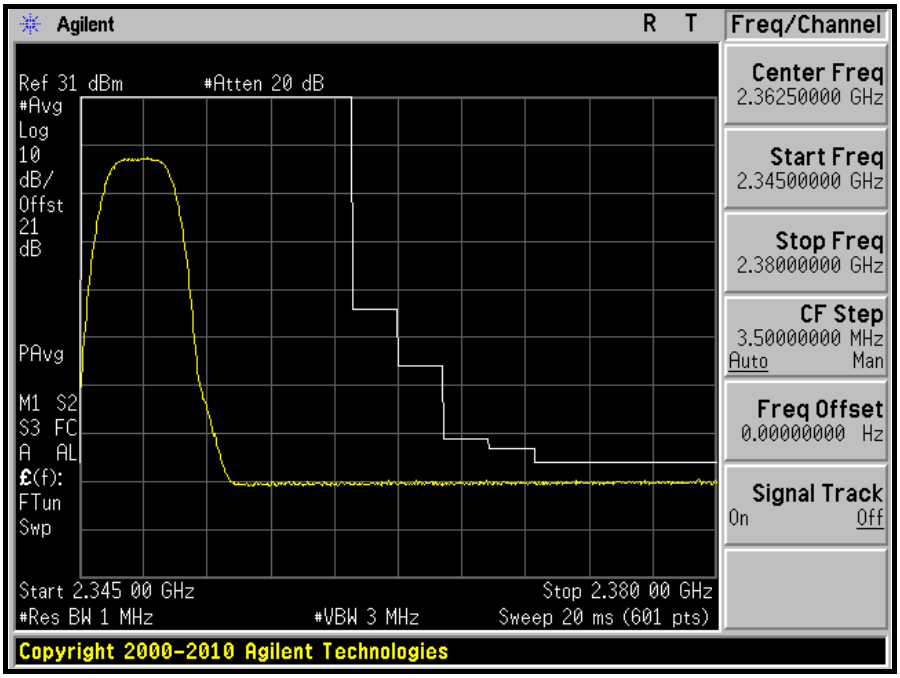
Frequency range: 2280~2344MHz



Frequency range: 2344~2345MHz



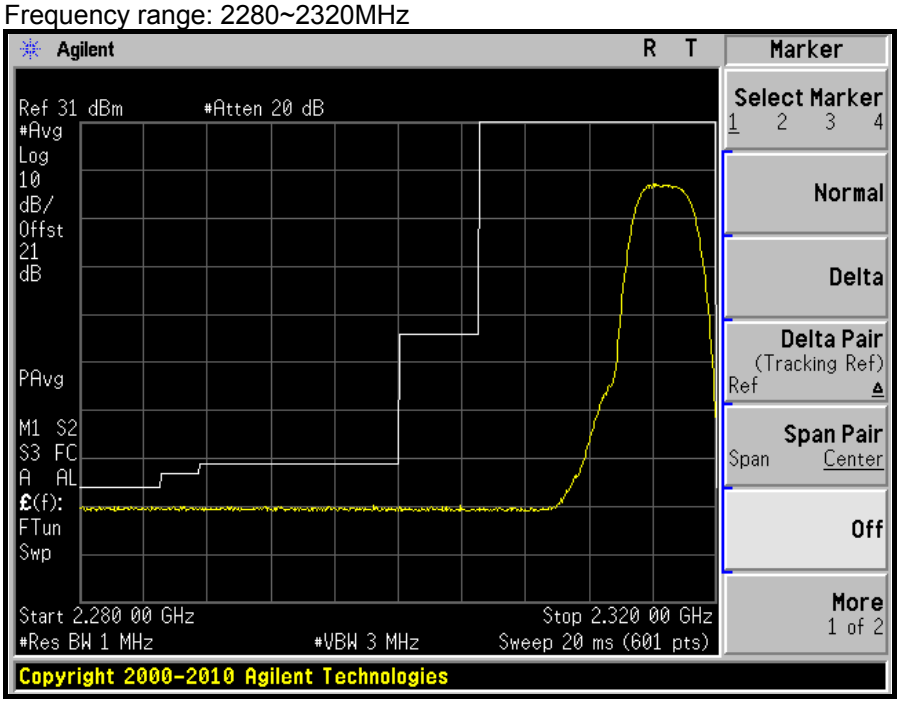
Frequency range: 2345~2380MHz



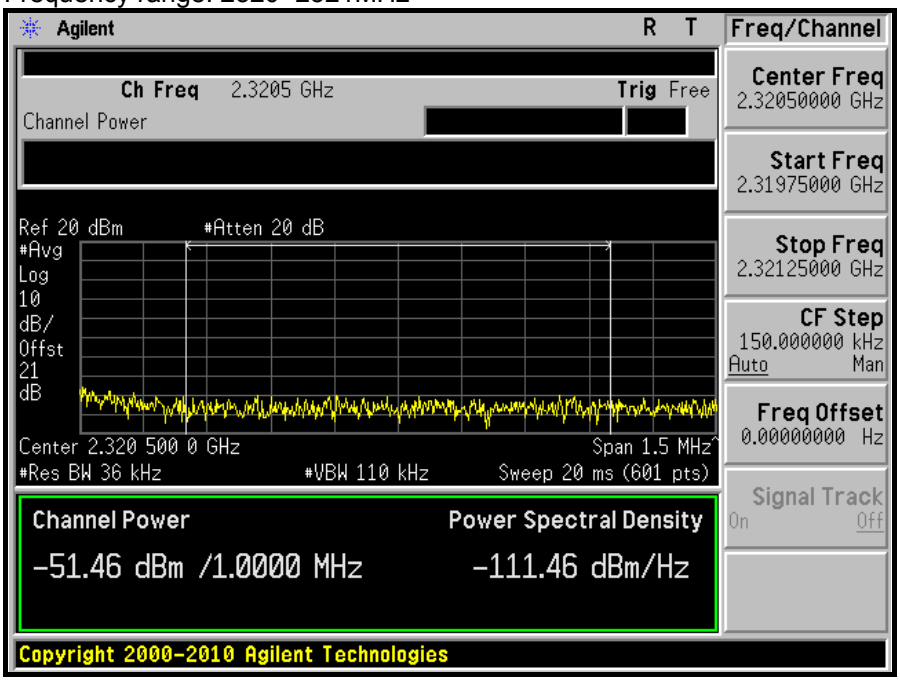
MODULATION: 16QAM

TEST FREQUENCY: 2316.75MHz

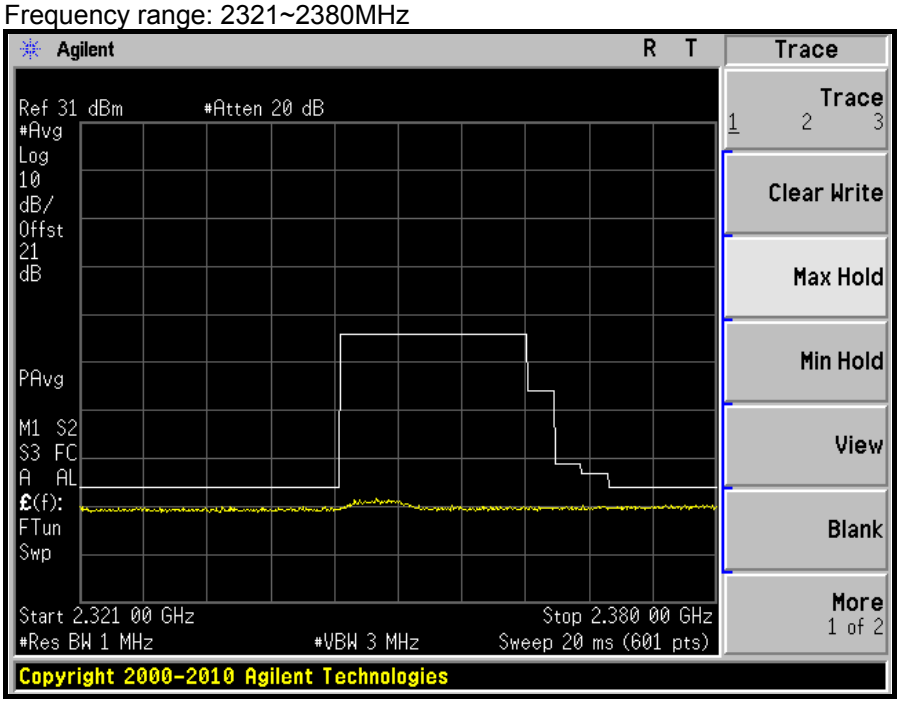
Frequency range: 2280~2320MHz



Frequency range: 2320~2321MHz



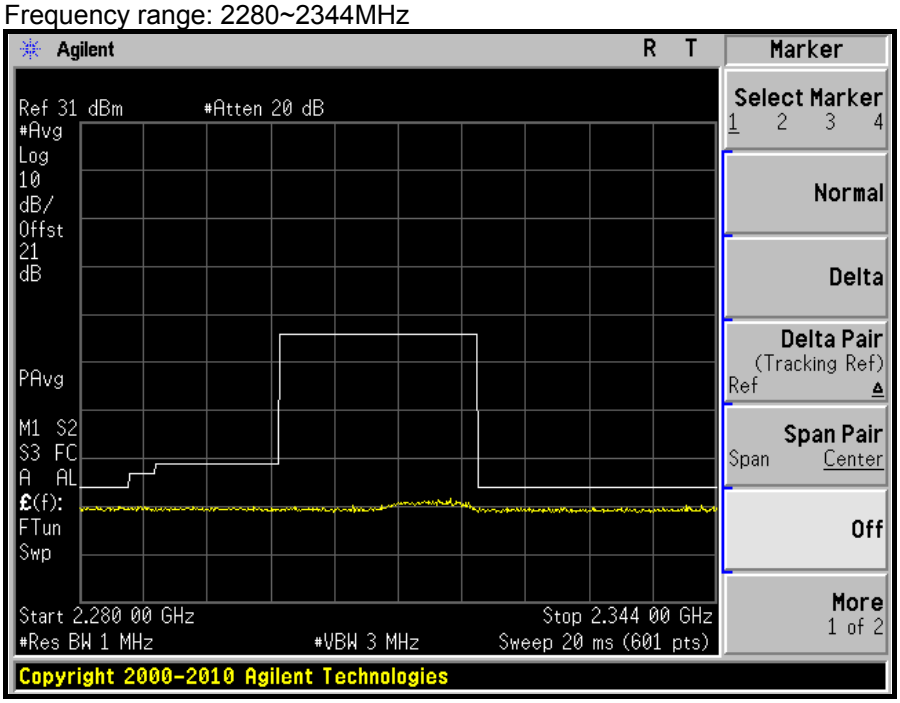
Frequency range: 2321~2380MHz



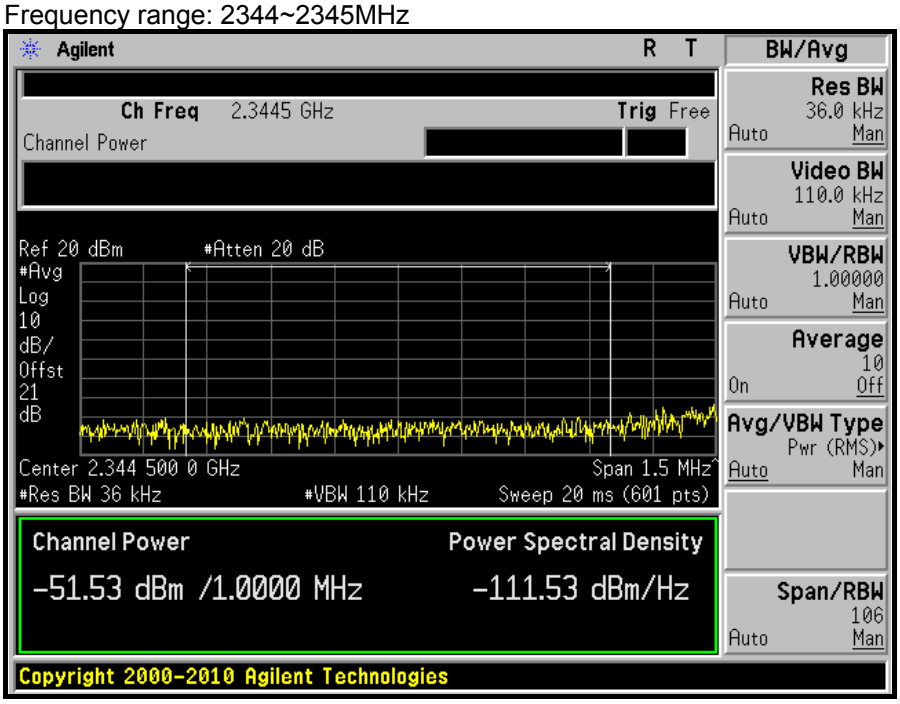
MODULATION: 16QAM

TEST FREQUENCY: 2348.25MHz

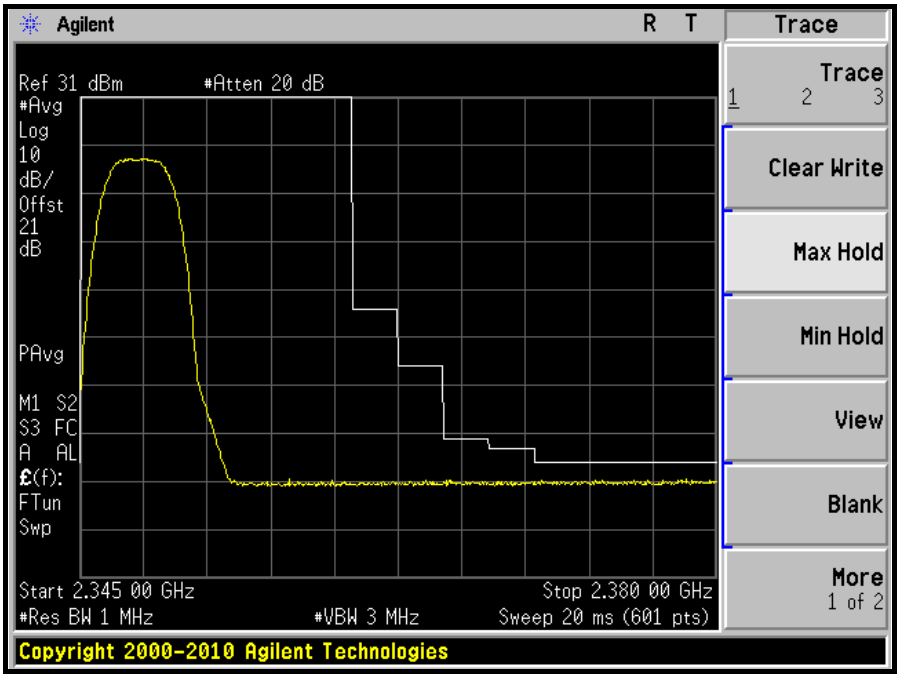
Frequency range: 2280~2344MHz



Frequency range: 2344~2345MHz



Frequency range: 2345~2380MHz



4.6 CONDUCTED SPURIOUS EMISSIONS

4.6.1 LIMITS OF CONDUCTED SPURIOUS EMISSIONS MEASUREMENT

In the FCC 27.53(m)(4), On any frequency outside a licensee's frequency block, the power of any emission shall be attenuated below the transmitter power (P) by at least 55 +10 log (P)dB. The limit of emission equal to –25dBm.

4.6.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
Spectrum Analyzer Agilent	E4446A	MY44360124	Dec. 29, 2010	Dec. 28, 2011
RF cable	SUCOFLEX 104	329751/4	Jan. 27, 2011	Jan. 26, 2012
DC-6GHz 20dB 50W Fixed attenuator Woken	MDC9331N-20	0724	May 13, 2011	May 12, 2012
Wainwright Instruments High Pass Filter	WHKX4.5/18G-10SS	NA	NA	NA

NOTE: The calibration interval of the above test instruments is 12 months. And the calibrations are traceable to NML/ROC and NIST/USA.

4.6.3 TEST PROCEDURE

a. All measurements were done at 2 channels: 2316.75MHz & 2348.25MHz operational frequency.

b. When the spectrum scanned from 30MHz to 24GHz, it shall be connected to the 20dB pad attenuated the carried frequency. The spectrum set RB = 1MHz, VB = 3MHz.

4.6.4 TEST SETUP

Same as 4.3.4

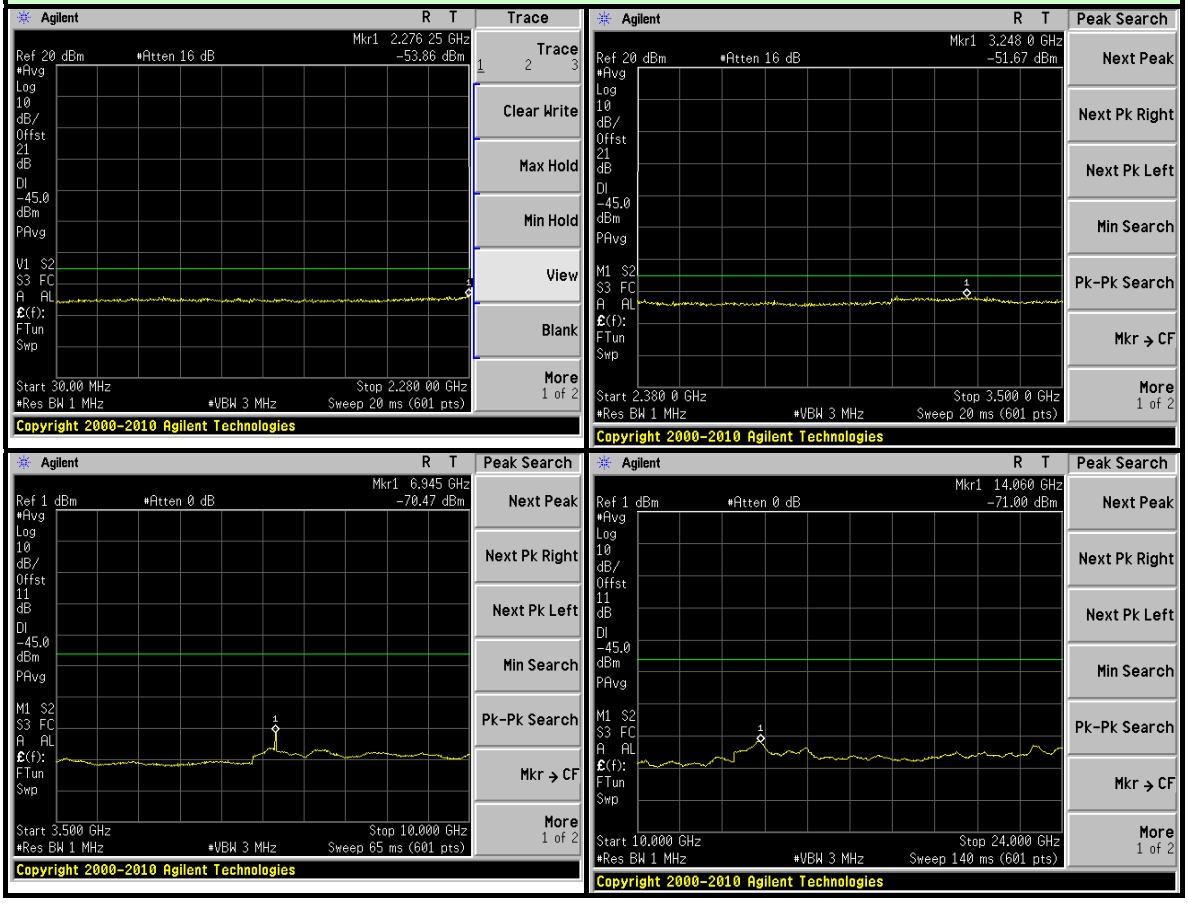
4.6.5 EUT OPERATING CONDITIONS

Same as 4.1.5

4.6.6TEST RESULTS

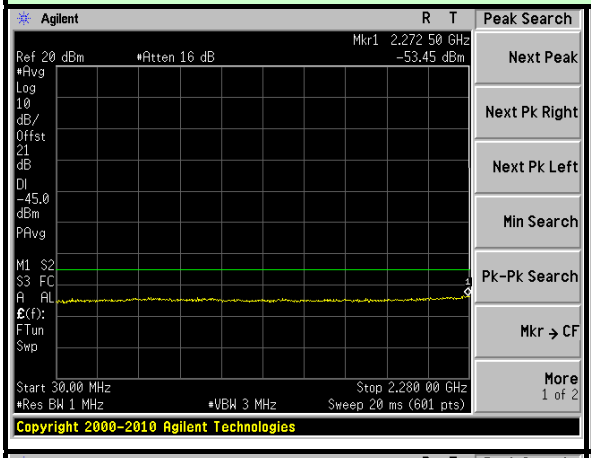
MODULATION: QPSK

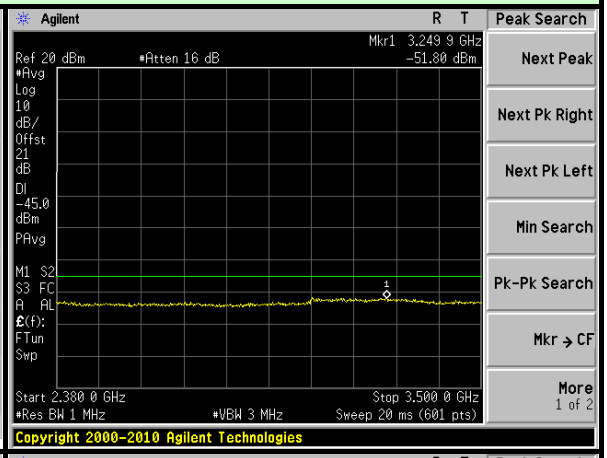
2316.75MHz

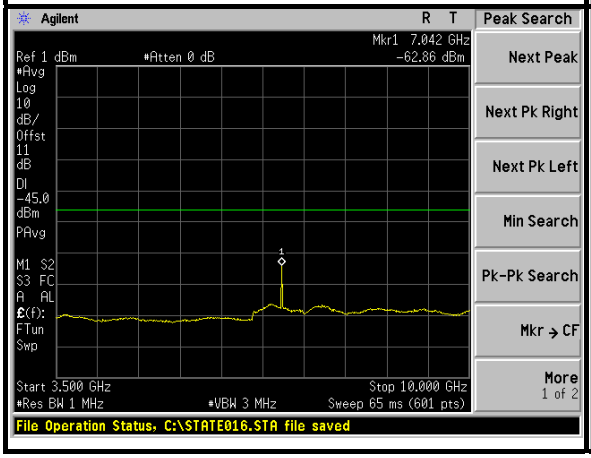


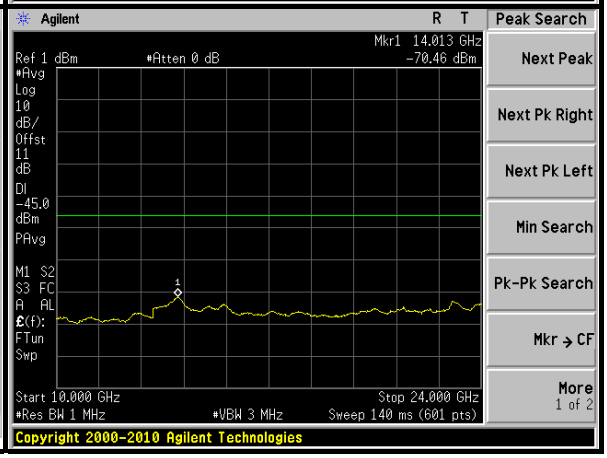
MODULATION: QPSK

2348.25MHz



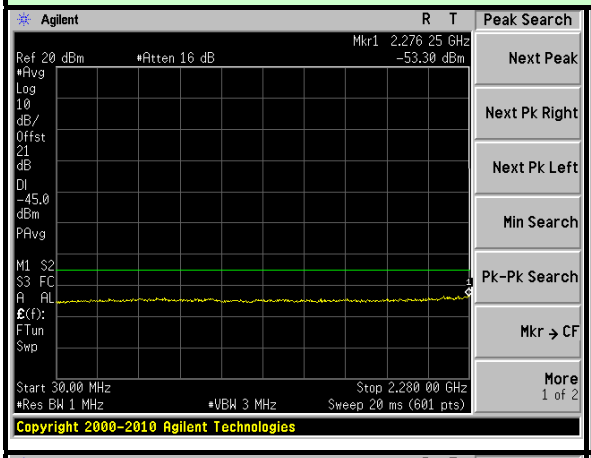


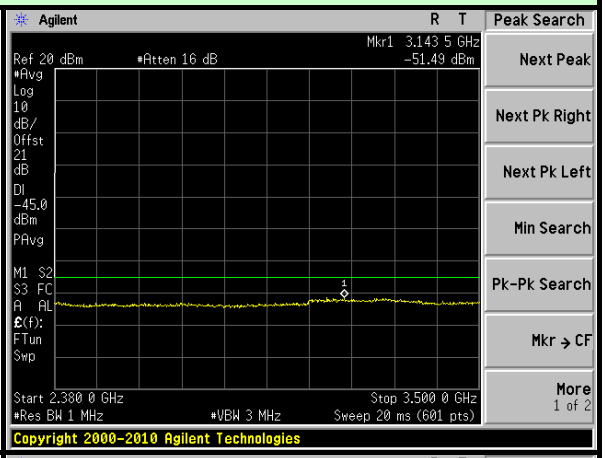


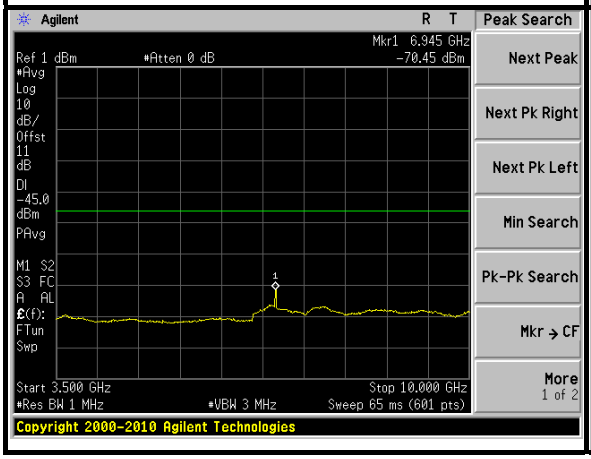


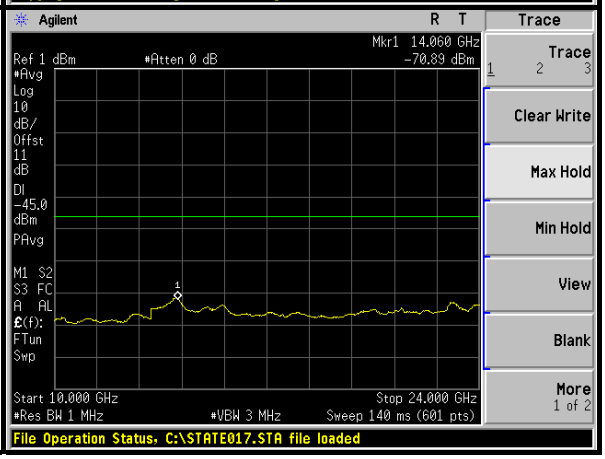
MODULATION: 16QAM

2316.75MHz



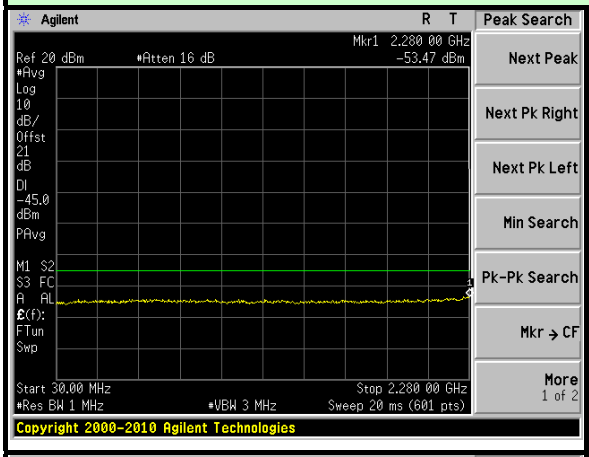


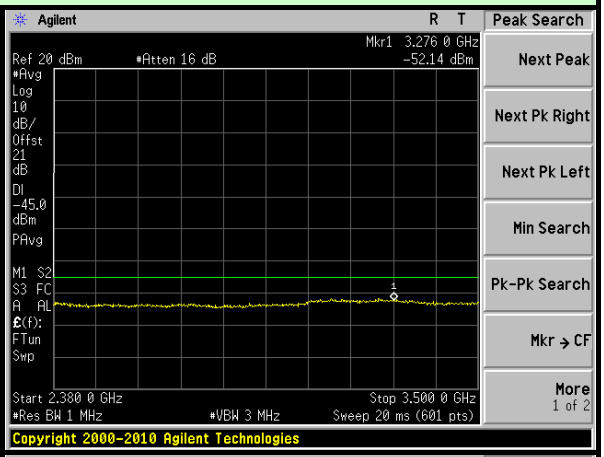


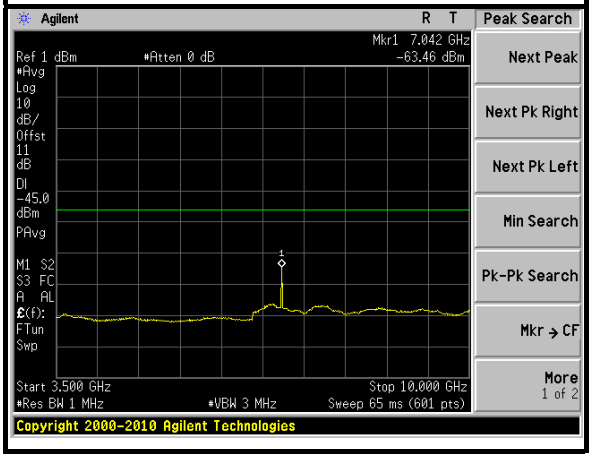


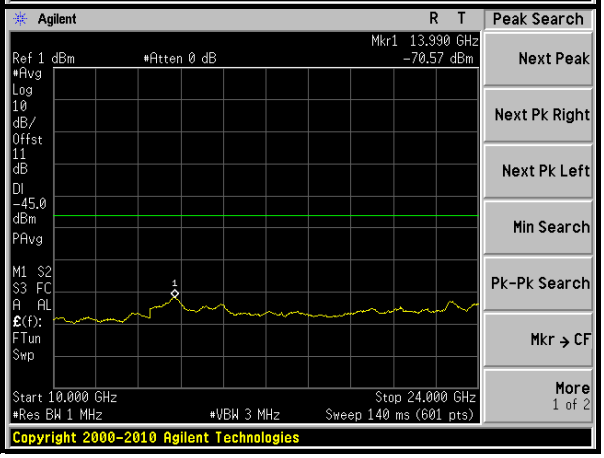
MODULATION: 16QAM

2348.25MHz









4.7 RADIATED EMISSION MEASUREMENT (BELOW 1GHz)

4.7.1LIMITS OF RADIATED EMISSION MEASUREMENT

In the FCC 27.53(m) (4), On any frequency outside a licensee's frequency block the power of any emission shall be attenuated below the transmitter power (P) by at least 55 +10 log (P)dB. The limit of emission equal to –45dBm.

NOTE: The following formula is used to convert the equipment radiated power to field strength.

$$E = [1000000\sqrt{(30P)}] / 3 \text{ uV/m, where P is Watts.}$$

4.7.2TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
Test Receiver ROHDE & SCHWARZ	ESI7	838496/016	Dec. 27, 2010	Dec. 26, 2011
Spectrum Analyzer ROHDE & SCHWARZ	FSP40	100039	Feb. 23, 2011	Feb. 22, 2012
BILOG Antenna SCHWARZBECK	VULB9168	9168-155	Apr. 12, 2011	Apr. 11, 2012
HORN Antenna SCHWARZBECK	BBHA 9120D	9120D-408	Jan. 06, 2011	Jan. 05, 2012
HORN Antenna SCHWARZBECK	BBHA 9170	BBHA9170243	Dec. 27, 2010	Dec. 26, 2011
Preamplifier Agilent	8449B	3008A01961	Oct. 29, 2011	Oct. 28, 2012
Preamplifier Agilent	8447D	2944A10738	Oct. 29, 2011	Oct. 28, 2012
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	250792/4	Aug. 19, 2011	Aug. 18, 2012
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	283397/4	Aug. 19, 2011	Aug. 18, 2012
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	295012/4	Aug. 19, 2011	Aug. 18, 2012
Software ADT.	ADT_Radiated_ V7.6.15.9.2	NA	NA	NA
Antenna Tower inn-co GmbH	MA 4000	010303	NA	NA
Antenna Tower Controller inn-co GmbH	CO2000	019303	NA	NA
Turn Table ADT.	TT100.	TT93021704	NA	NA
Turn Table Controller ADT.	SC100.	SC93021704	NA	NA

NOTE: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

2. The test was performed in HwaYa Chamber 4.

3. The horn antenna and HP preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.

4. The FCC Site Registration No. is 988962.

5. The IC Site Registration No. is IC7450F-4.

4.7.3TEST PROCEDURES

a. The power was measured with R&S Spectrum Analyzer. All measurements were done at 2 channels (2316.75MHz & 2348.25MHz operational frequency)

b. Substitution method is used for E.I.R.P measurement. In the semi-anechoic chamber, EUT placed on the 0.8m height of Turn Table, rotated the table around 360 degrees to search the maximum radiation power and receiver antenna shall be rotated vertical and horizontal polarization and moved height from 1m to 4m to find the maximum polar radiated power. The “Read Value” is the spectrum reading the maximum power value.

c. The substitution antenna is substituted for EUT at the same position and signals generator export the CW signal to the substitution antenna via a TX cable. Rotated the Turn Table and moved receiving antenna to find the maximum radiation power. Adjust output power level of S.G to get a Value of spectrum reading equal to “Read Value“ of step b. Record the power level of S.G

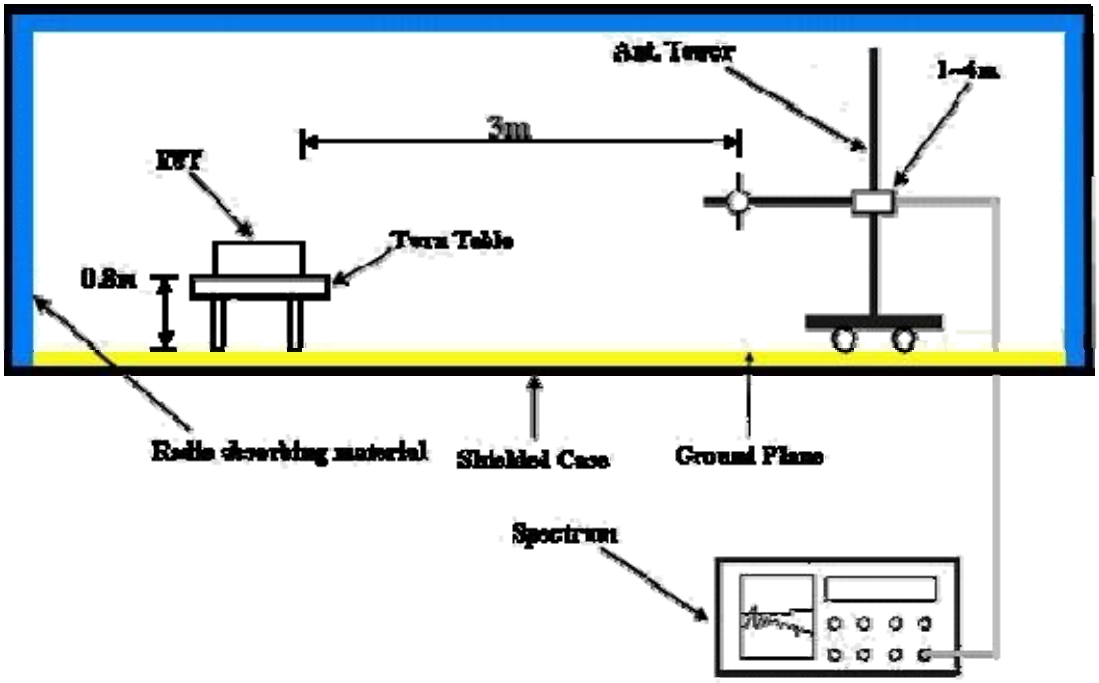
d. EIRP = Output power level of S.G – TX cable loss + Antenna gain of substitution antenna.

NOTE: The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1MHz/3MHz

4.7.4DEVIATION FROM TEST STANDARD

No deviation

4.7.5TEST SETUP



For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

4.7.6EUT OPERATING CONDITIONS

Same as 4.1.5

4.7.7TEST RESULTS

BELOW 1GHz WORST-CASE DATA

FREQUENCY	2316.75MHz	CHANNEL BANDWIDTH	3.5MHz
TEST MODE	A		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 m						
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV)	LIMIT (dBm)	S.G POWER VALUE (dBm)	CORRECTION FACTOR (dB)	POWER VALUE (dBm)
1	43.61	33.6	-45.0	-53.2	-7.7	-60.9
2	72.77	36.5	-45.0	-50.3	-7.7	-58.0
3	103.87	38.4	-45.0	-48.5	-7.7	-56.2
4	164.13	34.7	-45.0	-52.3	-7.7	-60.0
5	249.66	26.9	-45.0	-60.1	-7.7	-67.8
6	280.76	33.8	-45.0	-53.3	-7.7	-61.0
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 m						
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV)	LIMIT (dBm)	S.G POWER VALUE (dBm)	CORRECTION FACTOR (dB)	POWER VALUE (dBm)
1	41.66	43.0	-45.0	-43.9	-7.7	-51.6
2	53.33	43.9	-45.0	-42.5	-7.7	-50.2
3	101.92	41.3	-45.0	-45.5	-7.7	-53.2
4	140.80	29.4	-45.0	-57.6	-7.7	-65.3
5	280.76	27.6	-45.0	-59.2	-7.7	-66.9
6	459.60	26.1	-45.0	-60.3	-7.8	-68.1

REMARKS:
1. Emission level(dBuV/m)=Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.

FREQUENCY	2348.25MHz	CHANNEL BANDWIDTH	3.5MHz
TEST MODE	A		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 m						
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV)	LIMIT (dBm)	S.G POWER VALUE (dBm)	CORRECTION FACTOR (dB)	POWER VALUE (dBm)
1	41.66	35.8	-45.0	-51.3	-7.7	-59.0
2	72.77	36.3	-45.0	-50.0	-7.7	-57.7
3	105.81	37.8	-45.0	-48.8	-7.7	-56.5
4	164.13	34.8	-45.0	-51.5	-7.7	-59.2
5	183.57	33.9	-45.0	-52.8	-7.7	-60.5
6	292.42	35.2	-45.0	-51.5	-7.7	-59.2
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 m						
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV)	LIMIT (dBm)	S.G POWER VALUE (dBm)	CORRECTION FACTOR (dB)	POWER VALUE (dBm)
1	51.38	44.7	-45.0	-42.2	-7.7	-49.9
2	72.77	41.5	-45.0	-45.5	-7.7	-53.2
3	101.92	41.9	-45.0	-45.2	-7.7	-52.9
4	144.69	28.5	-45.0	-57.8	-7.7	-65.5
5	288.54	28.2	-45.0	-58.5	-7.7	-66.2
6	350.74	26.1	-45.0	-60.9	-7.8	-68.7

REMARKS: 1. Emission level(dBuV/m)=Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.

FREQUENCY	2316.75MHz	CHANNEL BANDWIDTH	3.5MHz
TEST MODE	B		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 m						
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV)	LIMIT (dBm)	S.G POWER VALUE (dBm)	CORRECTION FACTOR (dB)	POWER VALUE (dBm)
1	51.38	33.7	-45.0	-52.8	-7.7	-60.5
2	70.82	34.9	-45.0	-51.7	-7.7	-59.4
3	103.87	40.6	-45.0	-46.6	-7.7	-54.3
4	160.24	34.0	-45.0	-53.2	-7.7	-60.9
5	290.48	32.7	-45.0	-53.8	-7.7	-61.5
6	424.61	24.7	-45.0	-62.4	-7.8	-70.2
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 m						
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV)	LIMIT (dBm)	S.G POWER VALUE (dBm)	CORRECTION FACTOR (dB)	POWER VALUE (dBm)
1	53.33	44.2	-45.0	-42.5	-7.7	-50.2
2	72.77	40.7	-45.0	-45.9	-7.7	-53.6
3	98.04	42.5	-45.0	-44.0	-7.7	-51.7
4	140.8	29.3	-45.0	-57.3	-7.7	-65.0
5	160.24	28.7	-45.0	-58.3	-7.7	-66.0
6	290.48	30.4	-45.0	-55.9	-7.7	-63.6

REMARKS: 1. Emission level(dBuV/m)=Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.

FREQUENCY	2348.25MHz	CHANNEL BANDWIDTH	3.5MHz
TEST MODE	B		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 m						
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV)	LIMIT (dBm)	S.G POWER VALUE (dBm)	CORRECTION FACTOR (dB)	POWER VALUE (dBm)
1	51.38	34.3	-45.0	-52.1	-7.7	-59.8
2	72.77	36.0	-45.0	-50.9	-7.7	-58.6
3	101.92	41.8	-45.0	-44.7	-7.7	-52.4
4	181.62	34.1	-45.0	-52.6	-7.7	-60.3
5	292.42	34.5	-45.0	-51.6	-7.7	-59.3
6	350.74	26.1	-45.0	-60.6	-7.8	-68.4
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 m						
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV)	LIMIT (dBm)	S.G POWER VALUE (dBm)	CORRECTION FACTOR (dB)	POWER VALUE (dBm)
1	51.38	45.0	-45.0	-41.8	-7.7	-49.5
2	101.92	43.2	-45.0	-43.1	-7.7	-50.8
3	160.24	29.2	-45.0	-58.2	-7.7	-65.9
4	249.66	25.3	-45.0	-61.1	-7.7	-68.8
5	292.42	30.0	-45.0	-57.1	-7.7	-64.8
6	350.74	25.3	-45.0	-61.2	-7.8	-69.0

REMARKS:
1. Emission level(dBuV/m)=Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.

4.8 RADIATED EMISSION MEASUREMENT (ABOVE 1GHz)

4.8.1LIMITS OF RADIATED EMISSION MEASUREMENT

In the FCC 27.53(m) (4), On any frequency outside a licensee's frequency block, the power of any emission shall be attenuated below the transmitter power (P) by at least 55 +10 log (P)dB. The limit of emission equal to –45dBm.

4.8.2 TEST INSTRUMENTS

Same as 4.6.2

4.8.3TEST PROCEDURES

a. The power was measured with R&S Spectrum Analyzer. All measurements were done at 2 channels (2316.75MHz & 2348.25MHz operational frequency)

b. Substitution method is used for E.I.R.P measurement. In the semi-anechoic chamber, EUT placed on the 0.8m height of Turn Table, rotated the table around 360 degrees to search the maximum radiation power and receiver antenna shall be rotated vertical and horizontal polarization and moved height from 1m to 4m to find the maximum polar radiated power. The "Read Value" is the spectrum reading the maximum power value.

c. The substitution antenna is substituted for EUT at the same position and signals generator export the CW signal to the substitution antenna via a TX cable. Rotated the Turn Table and moved receiving antenna to find the maximum radiation power. Adjust output power level of S.G to get a Value of spectrum reading equal to "Read Value" of step b. Record the power level of S.G

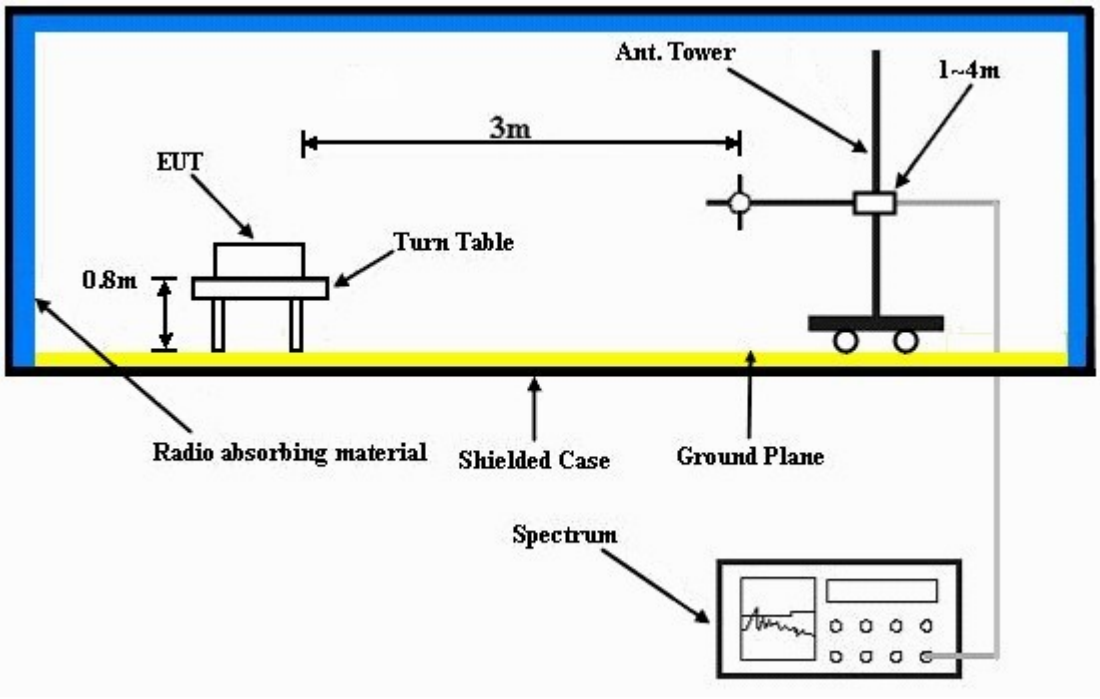
d. EIRP = Output power level of S.G – TX cable loss + Antenna gain of substitution antenna.

NOTE: The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1MHz/3MHz

4.8.4DEVIATION FROM TEST STANDARD

No deviation

4.8.5 TEST SETUP



For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

4.8.6EUT OPERATING CONDITIONS

Same as 4.6.6.

4.8.7TEST RESULTS

ABOVE 1GHz DATA

FREQUENCY	2316.75MHz	CHANNEL BANDWIDTH	3.5MHz
TEST MODE	A		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 m						
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV)	LIMIT (dBm)	S.G POWER VALUE (dBm)	CORRECTION FACTOR (dB)	POWER VALUE (dBm)
1	4633.50	38.1	-45.0	-66.4	9.6	-56.8
2	**6950.25**	**48.7**	**-45.0**	**-54.1**	**8.0**	**-46.1**
3	9267.00	48.9	-45.0	-54.0	7.5	-46.5
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 m						
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV)	LIMIT (dBm)	S.G POWER VALUE (dBm)	CORRECTION FACTOR (dB)	POWER VALUE (dBm)
1	4633.50	40.6	-45.0	-63.9	9.6	-54.3
2	6950.25	48.3	-45.0	-54.5	8.0	-46.5
3	9267.00	48.8	-45.0	-54.1	7.5	-46.6

NOTE: Power Value (dBum) = S.G Power Value (dBm) + Correction Factor (dB).

FREQUENCY	2348.25MHz	**CHANNEL BANDWIDTH**	3.5MHz
TEST MODE	**A**		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 m						
NO.	**FREQ. (MHz)**	**EMISSION LEVEL (dBuV)**	**LIMIT (dBm)**	**S.G POWER VALUE (dBm)**	**CORRECTION FACTOR (dB)**	**POWER VALUE (dBm)**
1	4696.50	37.8	-45.0	-66.6	9.6	-57.0
2	7044.75	48.2	-45.0	-54.5	8.0	-46.5
3	9393.00	49.0	-45.0	-53.9	7.5	-46.4
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 m						
NO.	**FREQ. (MHz)**	**EMISSION LEVEL (dBuV)**	**LIMIT (dBm)**	**S.G POWER VALUE (dBm)**	**CORRECTION FACTOR (dB)**	**POWER VALUE (dBm)**
1	4696.50	41.3	-45.0	-63.1	9.6	-53.5
2	7044.75	47.7	-45.0	-55.0	8.0	-47.0
3	9393.00	49.1	-45.0	-53.8	7.5	-46.3

NOTE: Power Value (dBum) = S.G Power Value (dBm) + Correction Factor (dB).

5 PHOTOGRAPHS OF THE TEST CONFIGURATION

Please refer to the attached file (Test Setup Photo).

6 INFORMATION ON THE TESTING LABORATORIES

We, Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch, were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are accredited and approved according to ISO/IEC 17025.

Copies of accreditation certificates of our laboratories obtained from approval agencies can be downloaded from our web site: www.adt.com.tw/index.5.phtml. If you have any comments, please feel free to contact us at the following:

Linko EMC/RF Lab:
Tel: 886-2-26052180
Fax: 886-2-26051924

Hsin Chu EMC/RF Lab:
Tel: 886-3-5935343
Fax: 886-3-5935342

Hwa Ya EMC/RF/Safety/Telecom Lab:
Tel: 886-3-3183232
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Email: service.adt@tw.bureauveritas.com
Web Site: www.adt.com.tw

The address and road map of all our labs can be found in our web site also.

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