

FCC Test Report (Part 22)

Report No.: RF161214C23-7

FCC ID: Q3N-MR00002

Test Model: RS31

Series Model: BHT-1600 (refer to item 3.1 for more details)

Received Date: Nov. 30, 2016

Test Date: Dec. 20, 2016 ~ Jan. 25, 2017

Issued Date: Feb. 06, 2017

Applicant: CIPHERLAB CO., LTD

Address: 12F, 333 Dunhua S. Rd., Sec. 2 Taipei, Taiwan 106

Issued By: Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch

Lab Address: No. 47-2, 14th Ling, Chia Pau Vil., Lin Kou Dist., New Taipei City, Taiwan (R.O.C.)

Test Location: No. 19, Hwa Ya 2nd Rd., Wen Hwa Vil., Kwei Shan Dist., Taoyuan City 33383, TAIWAN (R.O.C.)



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Release Control Record

Issue No.	Description	Date Issued
RF161214C23-7	Original release	Feb. 06, 2017

1 Certificate of Conformity

Product: Mobile Computer

Brand: CIPHERLAB, DENSO (refer to item 3.1 for more details)

Test Model: RS31

Series Model: BHT-1600 (refer to item 3.1 for more details)

Sample Status: Engineering sample

Applicant: CIPHERLAB CO., LTD

Test Date: Dec. 20, 2016 ~ Jan. 25, 2017

Standards: FCC Part 22, Subpart H

The above equipment 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 : Celine Chou , **Date:** Feb. 06, 2017
Celine Chou / Specialist

Approved by : Bruce Chen , **Date:** Feb. 06, 2017
Bruce Chen / Project Engineer

2 Summary of Test Results

Applied Standard: FCC Part 22 & Part 2			
FCC Clause	Test Item	Result	Remarks
2.1046 22.913 (a)	Effective radiated power	Pass	Meet the requirement of limit.
---	Peak To Average Ratio	Pass	Meet the requirement of limit.
2.1055 22.355	Frequency Stability	Pass	Meet the requirement of limit.
2.1049	Occupied Bandwidth	Pass	Meet the requirement of limit.
22.917	Band Edge Measurements	Pass	Meet the requirement of limit.
2.1051 22.917	Conducted Spurious Emissions	Pass	Meet the requirement of limit.
2.1053 22.917	Radiated Spurious Emissions	Pass	Meet the requirement of limit. Minimum passing margin is -8.10dB at 1648.80MHz.

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	Expanded Uncertainty (k=2) ($\pm$)
Radiated Emissions up to 1 GHz	30MHz ~ 200MHz	3.63 dB
	200MHz ~ 1000MHz	3.64 dB
Radiated Emissions above 1 GHz	1GHz ~ 18GHz	2.29 dB
	18GHz ~ 40GHz	2.29 dB

2.2 Test Site and Instruments

Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
Test Receiver KEYSIGHT	N9038A	MY55420137	Feb. 06, 2016	Feb. 05, 2017
Spectrum Analyzer ROHDE & SCHWARZ	FSP40	100269	Apr. 19, 2016	Apr. 18, 2017
BILOG Antenna SCHWARZBECK	VULB9168	9168-148	Dec. 28, 2015	Dec. 27, 2016
			Dec. 28, 2016	Dec. 27, 2017
HORN Antenna SCHWARZBECK	BBHA 9120 D	9120D-1169	Dec. 27, 2015	Dec. 26, 2016
			Dec. 27, 2016	Dec. 26, 2017
HORN Antenna SCHWARZBECK	BBHA 9170	BBHA9170241	Dec. 14, 2016	Dec. 13, 2017
Loop Antenna	EM-6879	269	Aug. 11, 2016	Aug. 10, 2017
Preamplifier Agilent	8449B	3008A01911	Aug. 09, 2016	Aug. 08, 2017
Preamplifier Agilent	8447D	2944A10638	Aug. 09, 2016	Aug. 08, 2017
RF signal cable HUBER+SUHNER	SUCOFLEX 104	CABLE-CH9-02 (309222 +248780)	Aug. 09, 2016	Aug. 08, 2017
RF signal cable HUBER+SUHNER	SUCOFLEX 104	CABLE-CH9-03 (274092)	Aug. 09, 2016	Aug. 08, 2017
RF signal cable Woken	8D-FB	Cable-CH9-01	Aug. 09, 2016	Aug. 08, 2017
Software BV ADT	ADT_Radiated_ V7.6.15.9.4	NA	NA	NA
Antenna Tower EMCO	2070/2080	512.835.4684	NA	NA
Turn Table EMCO	2087-2.03	NA	NA	NA
Antenna Tower & Turn BV ADT	AT100	AT93021705	NA	NA
Turn Table BV ADT	TT100	TT93021705	NA	NA
Turn Table Controller BV ADT	SC100	SC93021705	NA	NA
WIT Standard Temperature And Humidity Chamber	TH-4S-C	W981030	Jun. 08, 2016	Jun. 07, 2017
Mini-Circuits Power Splitter	ZN2PD-9G	NA	Jun. 09, 2016	Jun. 08, 2017
JFW 20dB attenuation	50HF-020-SMA	NA	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 9.
3. The horn antenna and preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
4. The FCC Site Registration No. is 215374.
5. The IC Site Registration No. is IC 7450F-9.

3 General Information

3.1 General Description of EUT

Product	Mobile Computer
Brand	CIPHERLAB, DENSO (refer to note for more details)
Test Model	RS31
Series Model	BHT-1600
Model Difference	Refer to note as below
Sample Status	Engineering sample
Power Supply Rating	3.85Vdc (Battery) 5Vdc (Adapter)
Modulation Type	GSM, GPRS: GMSK EDGE: 8PSK WCDMA: BPSK, QPSK HSDPA: BPSK HSUPA: QPSK
Operating Frequency	GSM: 824.2MHz ~ 848.8MHz WCDMA: 826.4MHz ~ 846.6MHz
Max. ERP Power	GSM: 512.861mW (27.10dBm) WCDMA: 53.703mW (17.30dBm)
Antenna Type	Main: PIFA antenna with -1.54dBi gain Aux: PIFA antenna with -2.43dBi gain
Antenna Connector	Patch
Accessory Device	Adapter, Battery
Data Cable Supplied	1m shielded USB cable without core 1.6m non-shielded snapon cable with one core

Note:

1. All models and brands are listed as below. Model RS31 is the representatives for final test.

Brand	Model	Difference
CIPHERLAB	RS31	All models are electrically identical, different colors, model names and brand names are for marketing purpose.
DENSO	BHT-1600	

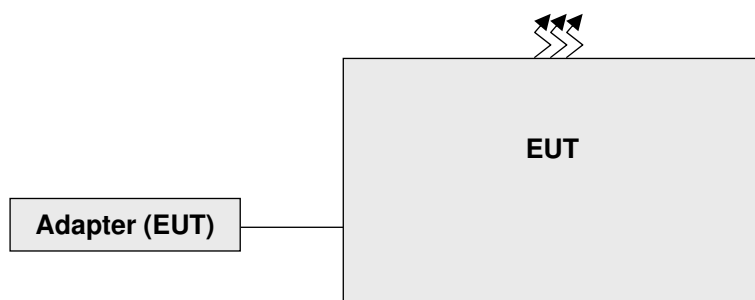
2. The EUT uses following adapter and battery.

Adapter	
Brand	Sunny COMPUTER TECHNOLOGY CO., LTD.
Model	SYS1561-1005
Input Power	100-240Vac, 1.0A MAX 50-60Hz
Output Power	+5Vdc, 2A

Battery	
Brand	CIPHERLAB, DENSO
Model	BA-0093A0
Rating	3.85Vdc, 2960mAh, 11.40Wh

3.2 Configuration of System Under Test

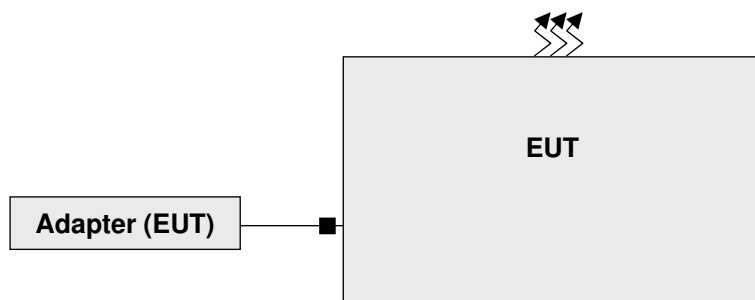
Test Mode A



Remote site



Test Mode B



Remote site



3.2.1 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.

ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A.	Universal Radio Communication Tester	R&S	CMU200	123112	NA	-

Note:

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

3.3 Test Mode Applicability and Tested Channel Detail

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. The worst case was found when positioned on Z-plane. Following channel(s) was (were) selected for the final test as listed below:

Test results are presented in the report as below.

Test Mode	Test Condition
A	EUT + USB Cable + Adapter + Battery
B	EUT + Snapon Cable + Adapter + Battery

GSM Mode

EUT Configure Mode	Test Item	Available Channel	Tested Channel	Mode
A	ERP	128 to 251	128, 189, 251	GSM
A	Frequency Stability	128 to 251	189	GSM
A	Occupied Bandwidth	128 to 251	128, 189, 251	GSM, GPRS, EDGE
A	Band Edge	128 to 251	128, 251	GSM, GPRS, EDGE
A	Peak To Average Ratio	128 to 251	128, 189, 251	GSM, GPRS, EDGE
A	Conducted Emission	128 to 251	128, 189, 251	GSM, GPRS, EDGE
A, B	Radiated Emission Below 1GHz	128 to 251	128, 189, 251	GSM
A	Radiated Emission Above 1GHz	128 to 251	128, 189, 251	GSM

WCDMA Mode

EUT Configure Mode	Test Item	Available Channel	Tested Channel	Mode
A	ERP	4132 to 4233	4132, 4182, 4233	WCDMA
A	Frequency Stability	4132 to 4233	4182	WCDMA
A	Occupied Bandwidth	4132 to 4233	4132, 4182, 4233	WCDMA, HSDPA, HSUPA
A	Band Edge	4132 to 4233	4132, 4233	WCDMA, HSDPA, HSUPA
A	Peak To Average Ratio	4132 to 4233	4132, 4182, 4233	WCDMA, HSDPA, HSUPA
A	Conducted Emission	4132 to 4233	4132, 4182, 4233	WCDMA, HSDPA, HSUPA
A, B	Radiated Emission Below 1GHz	4132 to 4233	4132, 4182, 4233	WCDMA
A	Radiated Emission Above 1GHz	4132 to 4233	4132, 4182, 4233	WCDMA

Test Condition:

Test Item	Environmental Conditions	Input Power	Tested By
ERP	24deg. C, 64%RH	120Vac, 60Hz	Match Tsui
Frequency Stability	24deg. C, 64%RH	3.85Vdc	Match Tsui
Occupied Bandwidth	24deg. C, 64%RH	120Vac, 60Hz	Match Tsui
Band Edge	24deg. C, 64%RH	120Vac, 60Hz	Match Tsui
Peak To Average Ratio	24deg. C, 64%RH	120Vac, 60Hz	Match Tsui
Conducted Emission	24deg. C, 64%RH	120Vac, 60Hz	Match Tsui
Radiated Emission	24deg. C, 51%RH 25deg. C, 69%RH 20deg. C, 69%RH	120Vac, 60Hz	Bond Tseng Tank Wu

3.4 EUT Operating Conditions

The EUT makes a call to the communication simulator. The communication simulator station system controlled a EUT to export maximum output power under transmission mode and specific channel frequency

3.5 General Description of Applied Standards

The EUT is a RF 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 22

KDB 971168 D01 Power Meas License Digital Systems v02r02

ANSI/TIA/EIA-603-D 2010

All test items have been performed and recorded as per the above standards.

Note: The EUT has been verified to comply with the requirements of FCC Part 15, Subpart B, Class B (DoC).
The test report has been issued separately.

4 Test Types and Results

4.1 Output Power Measurement

4.1.1 Limits of Output Power Measurement

Mobile / Portable station are limited to 7 watts e.r.p.

4.1.2 Test Procedures

EIRP / ERP Measurement:

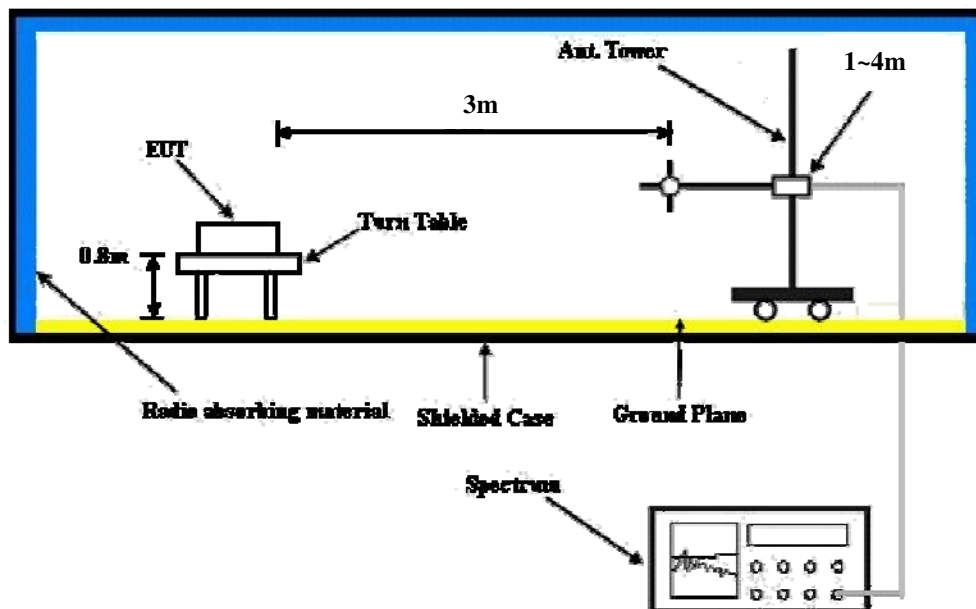
- All measurements were done at low, middle and high operational frequency range. RBW and VBW is 1MHz for GSM and 5MHz for WCDMA mode.
- Substitution method is used for E.I.R.P measurement. In the semi-anechoic chamber, EUT placed on the 0.8m height of Turn Table, rotated the table around 360 degrees 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.
- The substitution horn 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
- $EIRP = \text{Output power level of S.G} - \text{TX cable loss} + \text{Antenna gain of substitution horn}$. E.R.P power can be calculated form E.I.R.P power by subtracting the gain of dipole, $E.R.P \text{ power} = E.I.R.P \text{ power} - 2.15\text{dBi}$.

Conducted Power Measurement:

The EUT was set up for the maximum power with GSM, WCDMA link data modulation and link up with simulator. Set the EUT to transmit under low, middle and high channel and record the power level shown on simulator.

4.1.3 Test Setup

EIRP / ERP Measurement:



For the actual test configuration, please refer to the attached file (Test Setup Photo).

Conducted Power Measurement:



For the actual test configuration, please refer to the attached file (Test Setup Photo).

4.1.4 Test Results

Conducted Output Power (dBm)

Band	GSM850		
Channel	128	189	251
Frequency	824.2	836.4	848.8
GSM	32.71	32.73	32.69
GPRS 8	32.69	32.71	32.67
GPRS 10	32.04	32.06	32.02
GPRS 11	30.29	30.31	30.27
GPRS 12	29.22	29.24	29.20
GPRS 30	32.66	32.68	32.64
GPRS 31	32.02	32.04	32.00
GPRS 32	30.11	30.13	30.09
GPRS 33	29.21	29.23	29.19
EDGE 8 (MCS9)	26.65	26.67	26.63
EDGE 10 (MCS9)	25.61	25.63	25.59
EDGE 11 (MCS9)	23.67	23.69	23.65
EDGE 12 (MCS9)	22.56	22.58	22.54
EDGE 30 (MCS9)	26.63	26.65	26.61
EDGE 31 (MCS9)	25.60	25.62	25.58
EDGE 32 (MCS9)	23.65	23.67	23.63
EDGE 33 (MCS9)	22.53	22.55	22.51

Band	WCDMA V		
Channel	4132	4182	4233
Frequency	826.4	836.4	846.6
RMC 12.2K	23.46	23.42	23.57
HSDPA Subtest-1	21.46	21.42	21.57
HSDPA Subtest-2	21.49	21.45	21.60
HSDPA Subtest-3	21.50	21.46	21.61
HSDPA Subtest-4	21.48	21.44	21.59
HSUPA Subtest-1	20.40	20.36	20.51
HSUPA Subtest-2	20.41	20.37	20.52
HSUPA Subtest-3	21.41	21.37	21.52
HSUPA Subtest-4	19.90	19.86	20.01
HSUPA Subtest-5	21.83	21.79	21.94

ERP Power
GSM Mode

NEW MODE

MODE		TX channel 128					
Antenna Polarity & Test Distance: Horizontal at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	ERP (dBm)	Limit (dBm)	Margin (dB)
1	824.20	-11.10	16.50	3.90	20.40	38.50	-18.10
Antenna Polarity & Test Distance: Vertical at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	ERP (dBm)	Limit (dBm)	Margin (dB)
1	824.20	-6.90	21.40	3.90	25.30	38.50	-13.20

MODE		TX channel 189					
Antenna Polarity & Test Distance: Horizontal at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	ERP (dBm)	Limit (dBm)	Margin (dB)
1	836.40	-13.80	13.70	3.80	17.50	38.50	-21.00
Antenna Polarity & Test Distance: Vertical at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	ERP (dBm)	Limit (dBm)	Margin (dB)
1	836.40	-4.80	23.30	3.80	27.10	38.50	-11.40

MODE		TX channel 251					
Antenna Polarity & Test Distance: Horizontal at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	ERP (dBm)	Limit (dBm)	Margin (dB)
1	848.80	-16.70	11.00	3.40	14.40	38.50	-24.10
Antenna Polarity & Test Distance: Vertical at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	ERP (dBm)	Limit (dBm)	Margin (dB)
1	848.80	-6.80	21.30	3.40	24.70	38.50	-13.80

Note: ERP (dBm) = S.G Power Value (dBm) + Correction Factor (dB).

WCDMA Mode

MODE		TX channel 4132					
Antenna Polarity & Test Distance: Horizontal at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	ERP (dBm)	Limit (dBm)	Margin (dB)
1	826.40	-21.20	6.40	3.90	10.30	38.50	-28.20
Antenna Polarity & Test Distance: Vertical at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	ERP (dBm)	Limit (dBm)	Margin (dB)
1	826.40	-19.60	8.80	3.90	12.70	38.50	-25.80

MODE		TX channel 4182					
Antenna Polarity & Test Distance: Horizontal at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	ERP (dBm)	Limit (dBm)	Margin (dB)
1	836.40	-19.60	7.80	3.80	11.60	38.50	-26.90
Antenna Polarity & Test Distance: Vertical at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	ERP (dBm)	Limit (dBm)	Margin (dB)
1	836.40	-14.60	13.50	3.80	17.30	38.50	-21.20

MODE		TX channel 4233					
Antenna Polarity & Test Distance: Horizontal at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	ERP (dBm)	Limit (dBm)	Margin (dB)
1	846.60	-20.30	7.30	3.40	10.70	38.50	-27.80
Antenna Polarity & Test Distance: Vertical at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	ERP (dBm)	Limit (dBm)	Margin (dB)
1	846.60	-18.80	9.40	3.40	12.80	38.50	-25.70

Note: ERP (dBm) = S.G Power Value (dBm) + Correction Factor (dB).

4.2 Frequency Stability Measurement

4.2.1 Limits of Frequency Stability Measurement

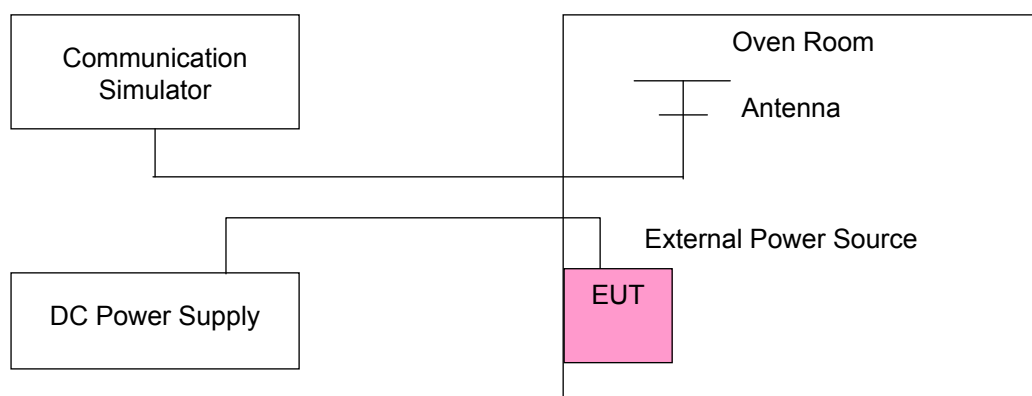
1.5 ppm is for base and fixed station. 2.5 ppm is for mobile station.

4.2.2 Test Procedure

- Device is placed at the oven room. The oven room could control the temperatures and humidity. Power warm up is at least 15 min and power applied should perform before recording frequency error.
- EUT is connected the external power supply to control the DC input power. The test voltage range is from minimum to maximum working voltage. Each step shall be record the frequency error rate.
- The temperature range step is 10 degrees in this test items. All temperature levels shall be hold the $\pm 0.5^{\circ}\text{C}$ during the measurement testing. The each temperature step shall be at least 0.5 hours, consider the EUT could be test under the stability condition.

NOTE: The frequency error was recorded frequency error from the communication simulator.

4.2.3 Test Setup



4.2.4 Test Results

Frequency Error vs. Voltage

Voltage (Volts)	Frequency Error (ppm)		Limit (ppm)
	GSM	WCDMA	
4.35	-0.015	-0.015	2.5
3.85	-0.015	-0.013	2.5
3.60	-0.015	-0.014	2.5

Note: The applicant defined the normal working voltage is from 3.60Vdc to 4.35Vdc.

Frequency Error vs. Temperature.

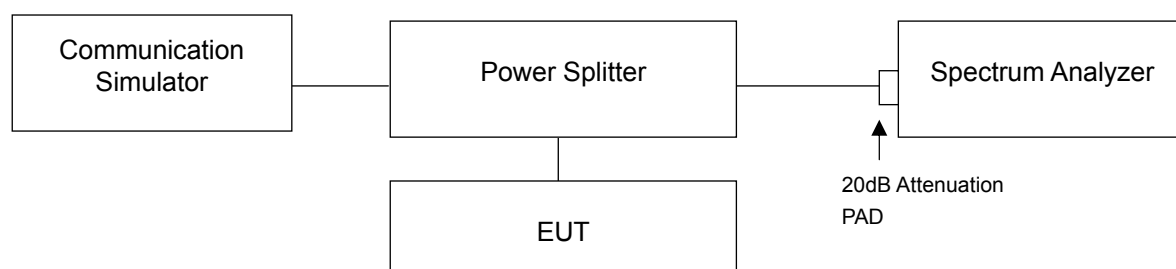
Temp. (°C)	Frequency Error (ppm)		Limit (ppm)
	GSM	WCDMA	
50	-0.016	-0.014	2.5
40	-0.016	-0.014	2.5
30	-0.015	-0.013	2.5
20	-0.015	-0.013	2.5
10	-0.014	-0.014	2.5
0	-0.016	-0.015	2.5
-10	-0.018	-0.015	2.5
-20	-0.020	-0.018	2.5

4.3 Occupied Bandwidth Measurement

4.3.1 Test Procedure

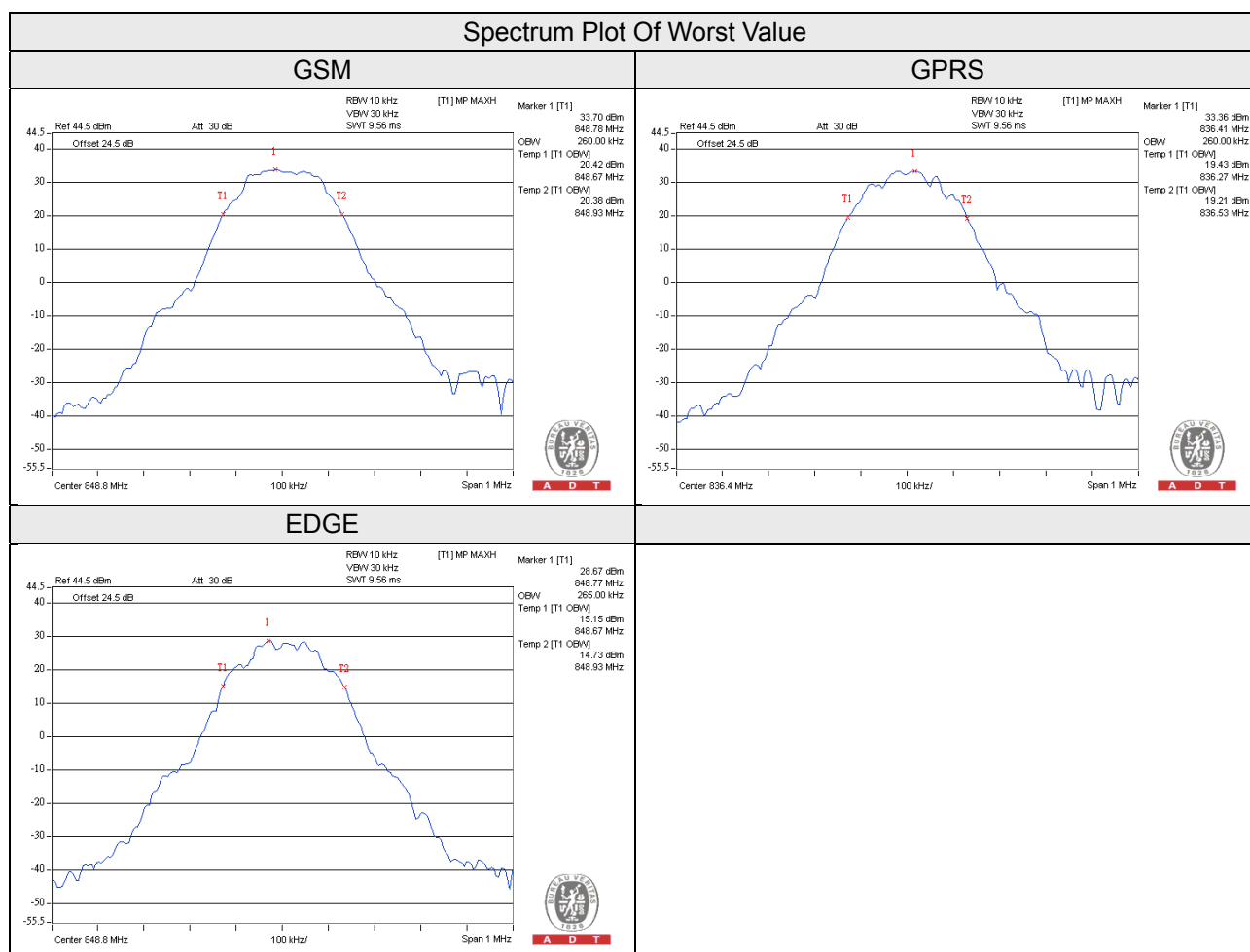
The EUT makes a call to the communication simulator. All measurements were done at low, middle and high operational frequency range. The communication simulator station system controlled a EUT to export maximum output power under transmission mode and specific channel frequency. Use OBW measurement function of Spectrum analyzer to measure 99 % occupied bandwidth.

4.3.2 Test Setup

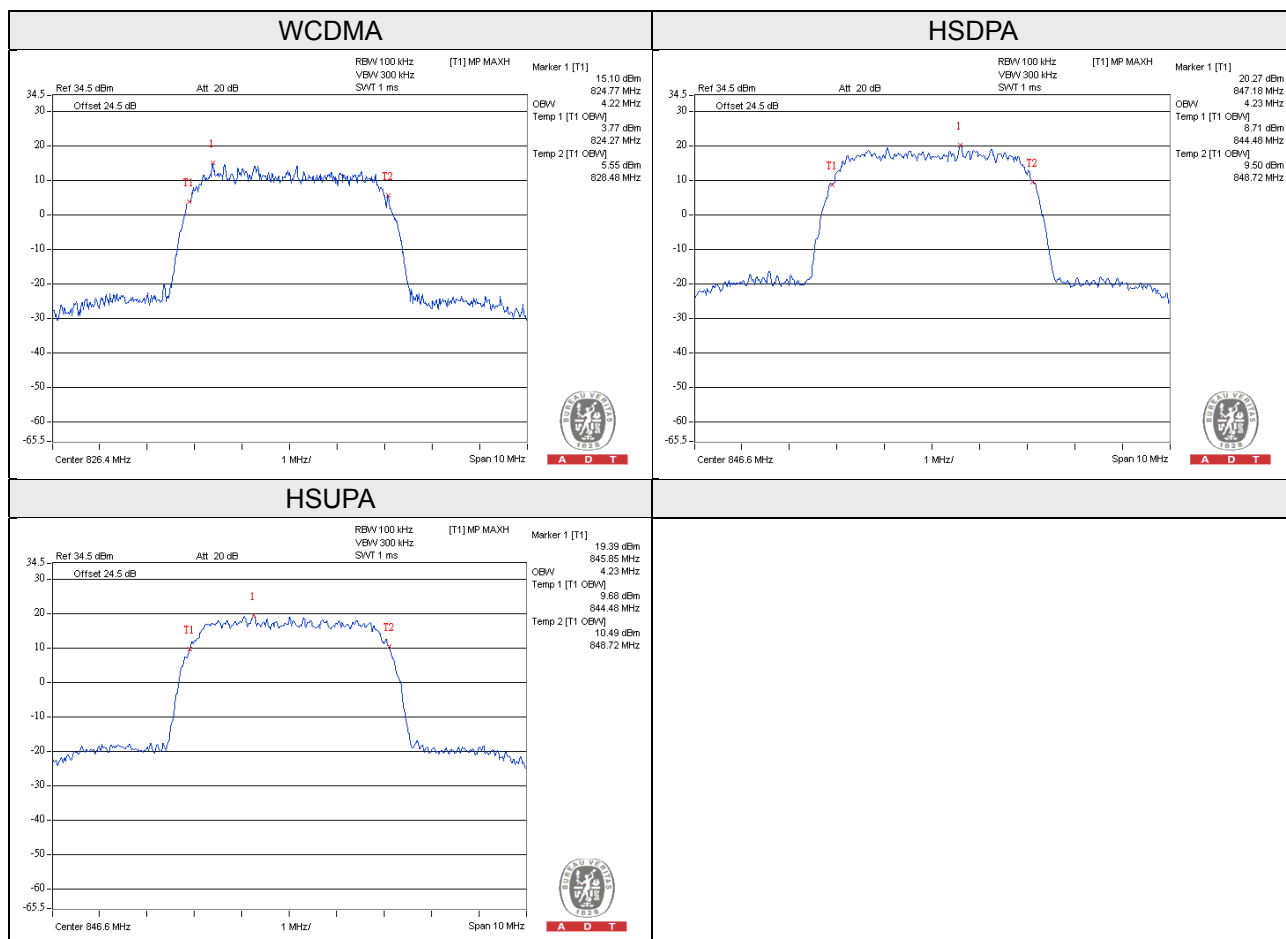


4.3.3 Test Result

Channel	Frequency (MHz)	99% Occupied Bandwidth (kHz)		
		GSM	GPRS	EDGE
128	824.2	255	250	250
189	836.4	255	260	250
251	848.8	260	255	265



Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)		
		WCDMA	HSDPA	HSUPA
4132	826.4	4.22	4.23	4.22
4182	836.4	4.20	4.23	4.20
4233	846.6	4.20	4.23	4.23

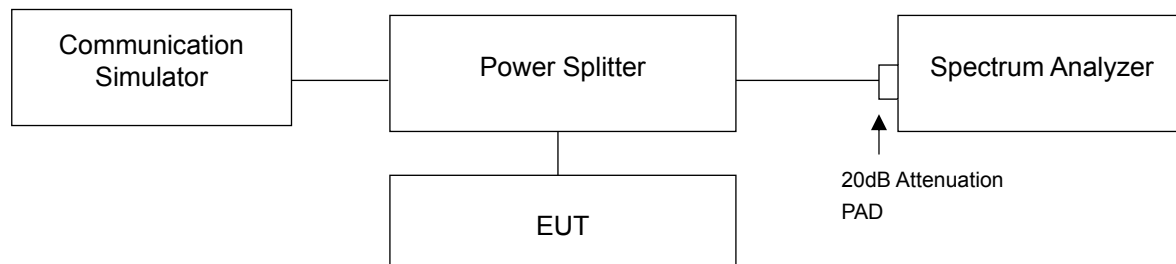


4.4 Band Edge Measurement

4.4.1 Limits of Band Edge Measurement

Power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB. In the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed.

4.4.2 Test Setup

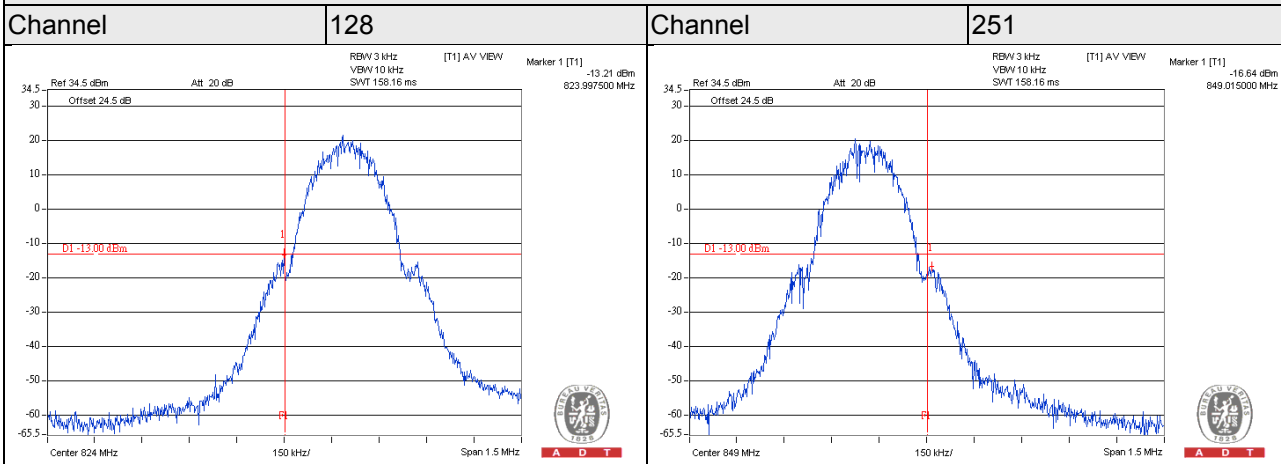


4.4.3 Test Procedures

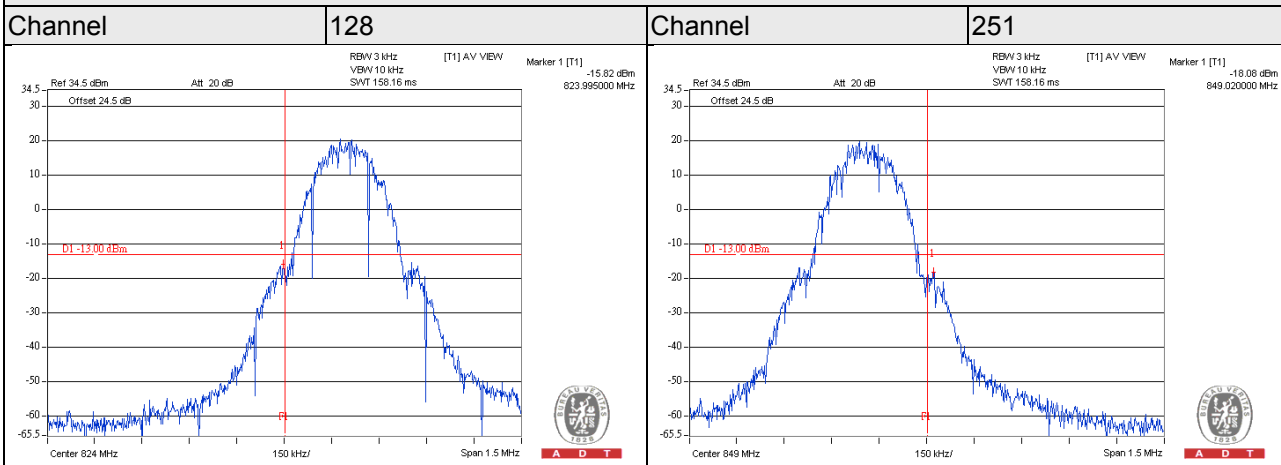
- All measurements were done at low and high operational frequency range.
- The center frequency of spectrum is the band edge frequency and span is 1.5MHz. RB of the spectrum is 3kHz and VB of the spectrum is 10kHz (GSM / GPRS / EDGE).
- The center frequency of spectrum is the band edge frequency and span is 1.5MHz. RB of the spectrum is 100kHz and VB of the spectrum is 300kHz (WCDMA / HSDPA / HSUPA).
- Record the max trace plot into the test report.

4.4.4 Test Results

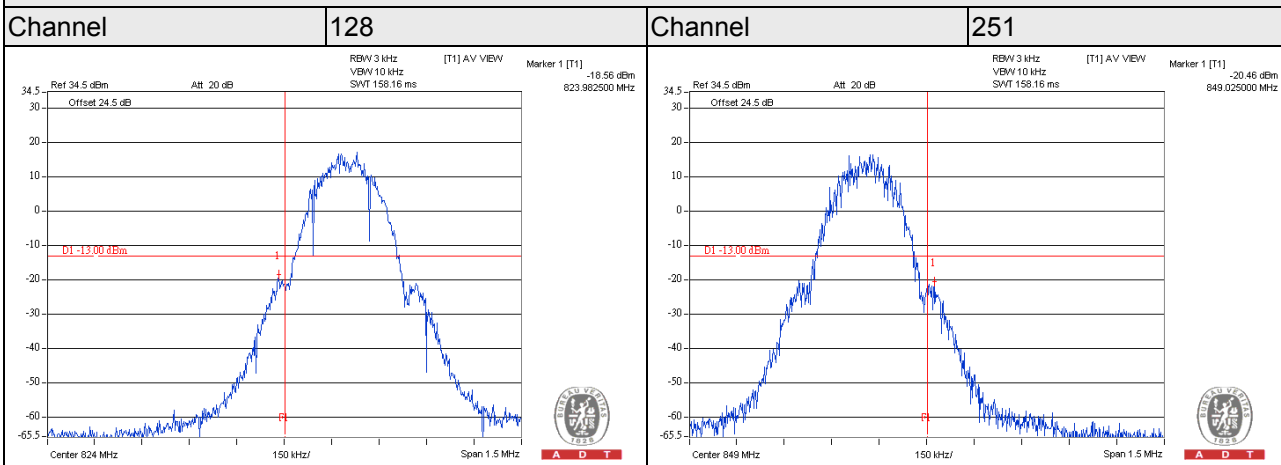
GSM



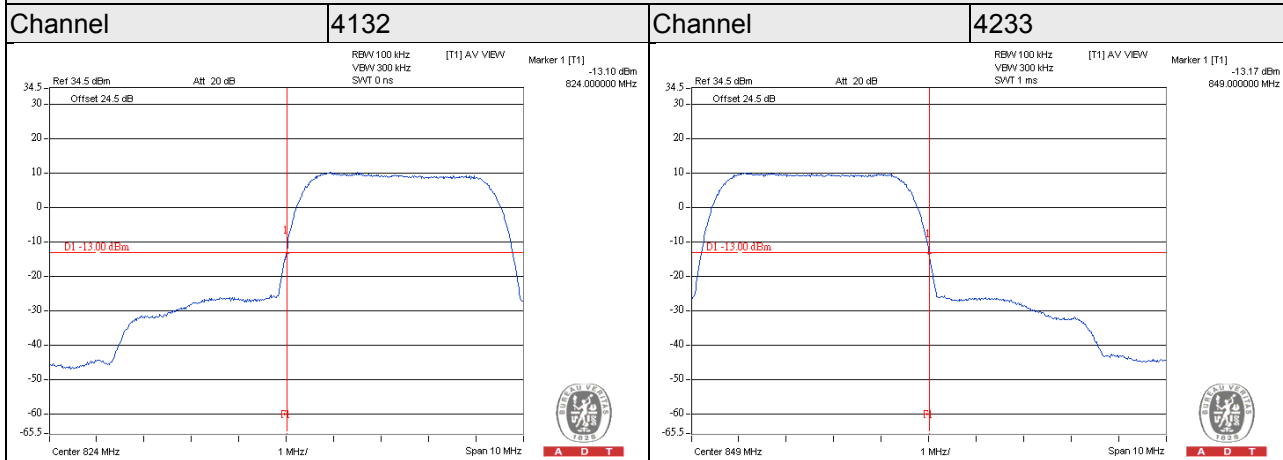
GPRS



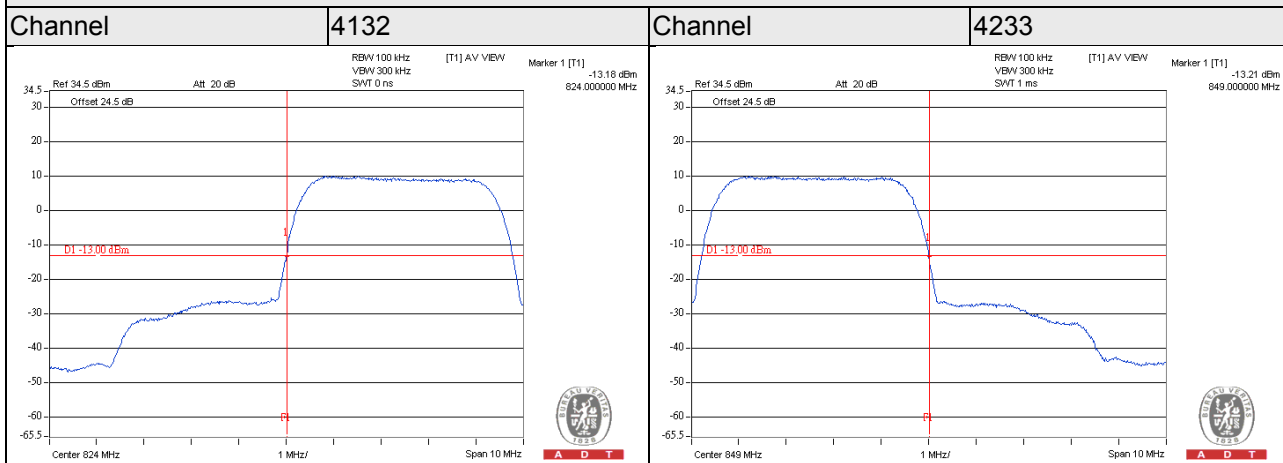
EDGE



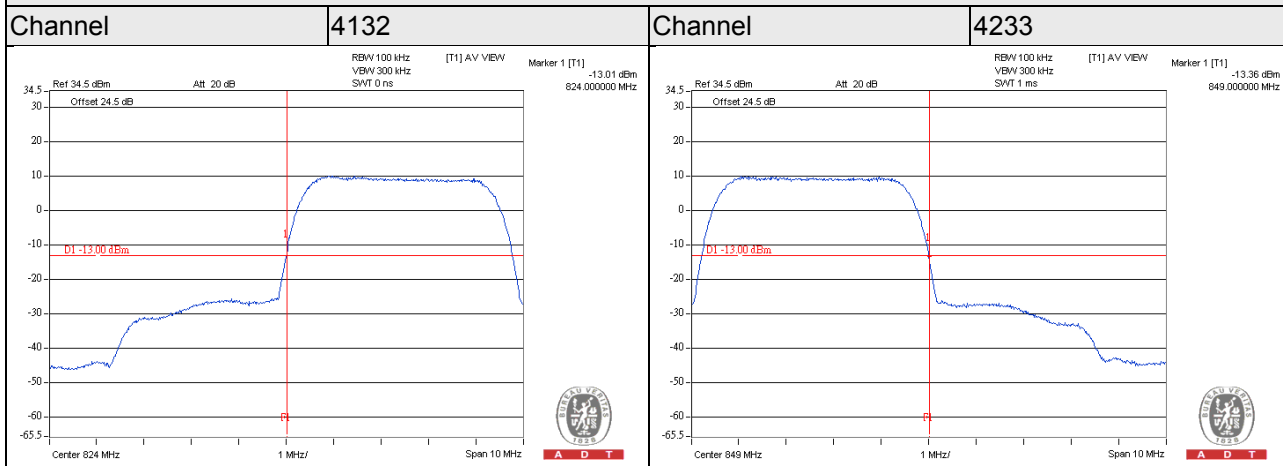
WCDMA



HSDPA



HSUPA

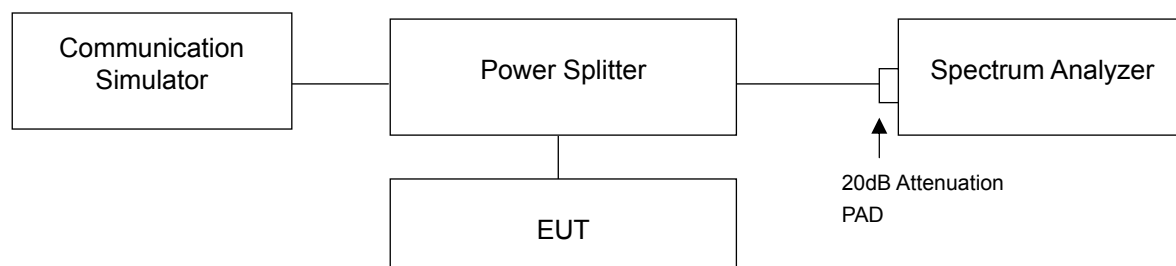


4.5 Peak To Average Ratio

4.5.1 Limits of Peak To Average Ratio Measurement

In measuring transmissions in this band using an average power technique, the peak to-average ratio (PAR) of the transmission may not exceed 13 dB

4.5.2 Test Setup

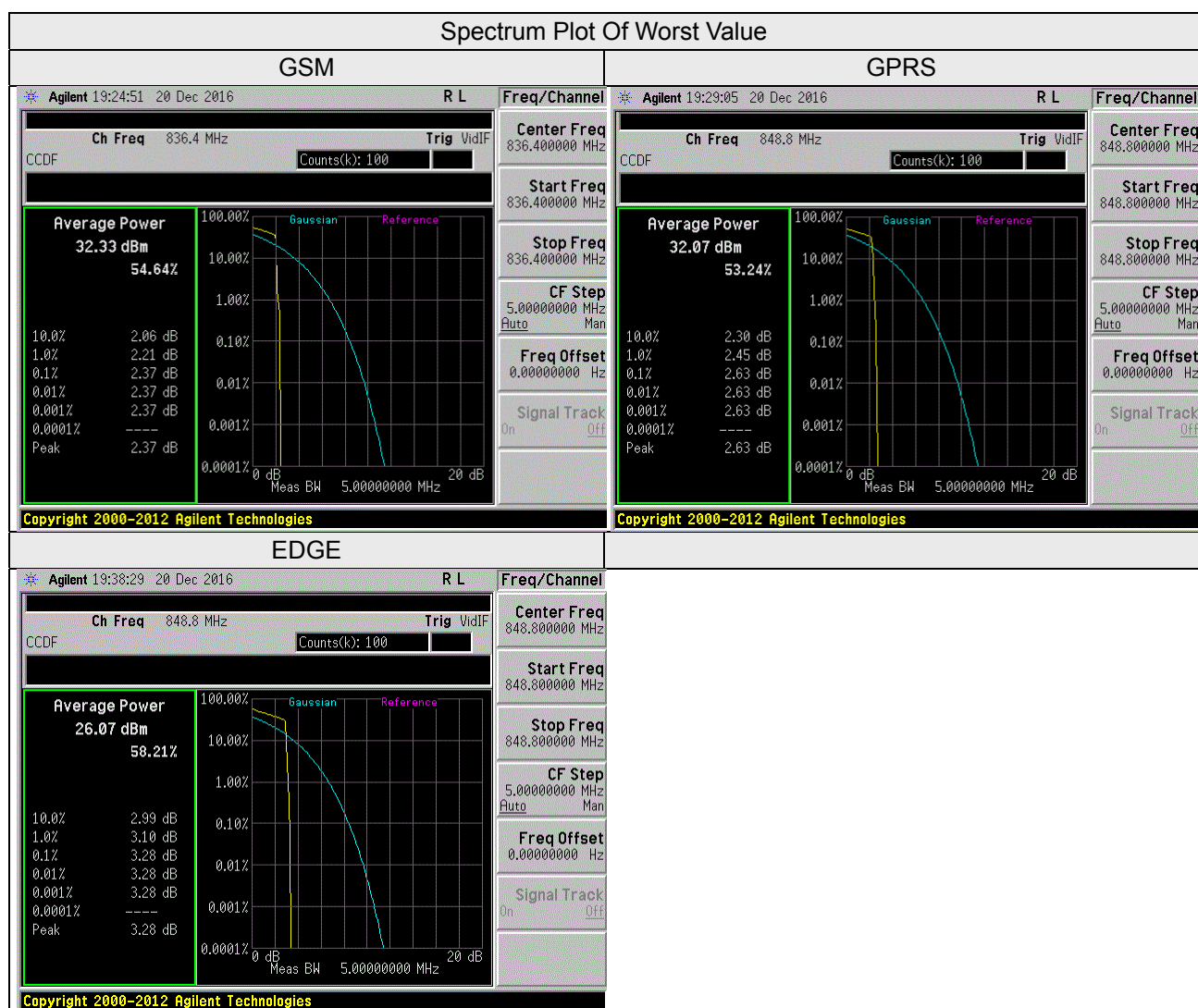


4.5.3 Test Procedures

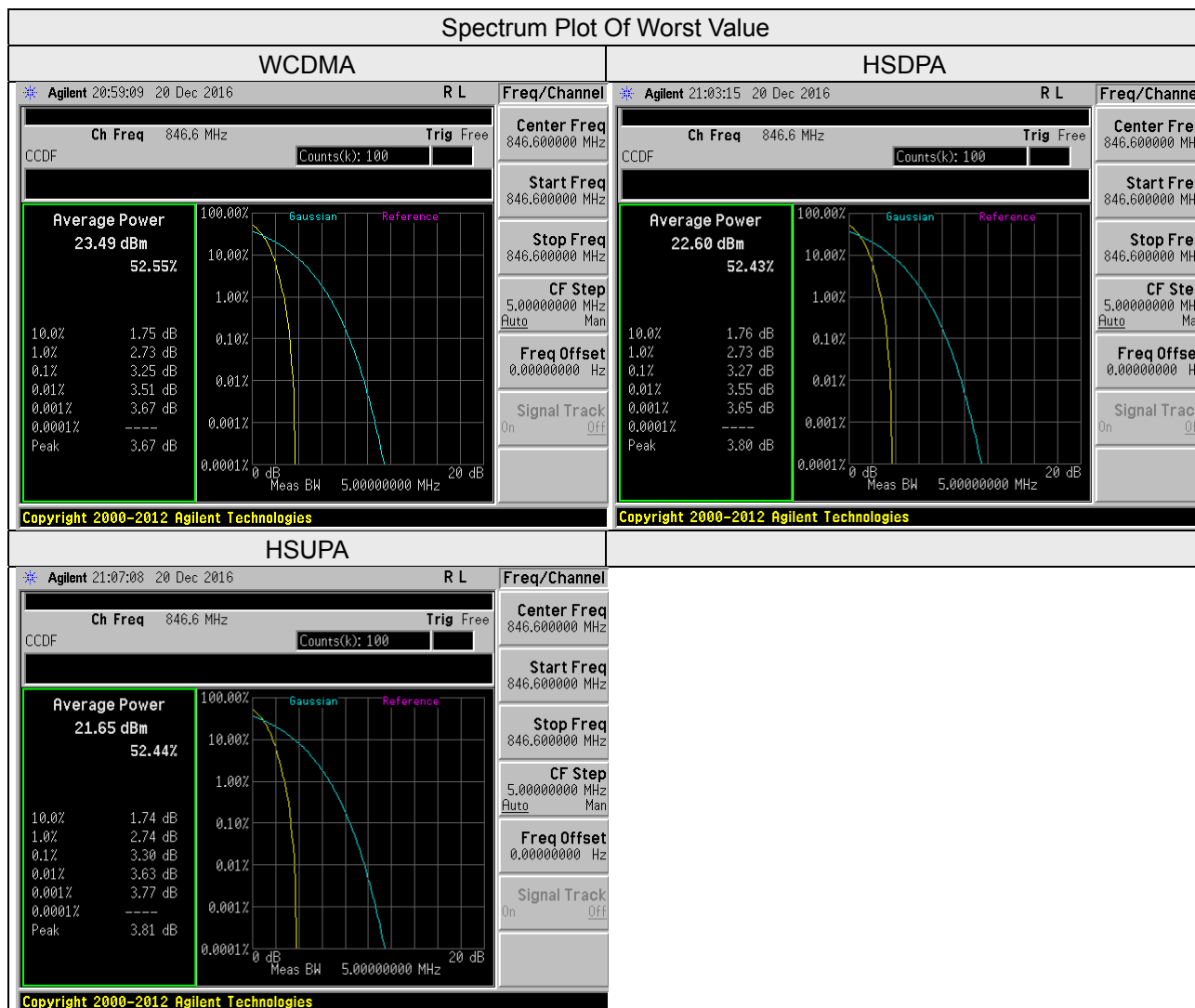
- Set resolution/measurement bandwidth $\geq$ signal's occupied bandwidth;
- Set the number of counts to a value that stabilizes the measured CCDF curve;
- Record the maximum PAPR level associated with a probability of 0.1%.

4.5.4 Test Results

Channel	Frequency (MHz)	Peak To Average Ratio (dB)		
		GSM	GPRS	EDGE
128	824.2	1.27	2.51	1.42
189	836.4	2.37	2.49	1.99
251	848.8	2.27	2.63	3.28



Channel	Frequency (MHz)	Peak To Average Ratio (dB)		
		WCDMA	HSDPA	HSUPA
4132	826.4	3.25	3.27	3.29
4182	836.4	3.25	3.24	3.27
4233	846.6	3.25	3.27	3.30

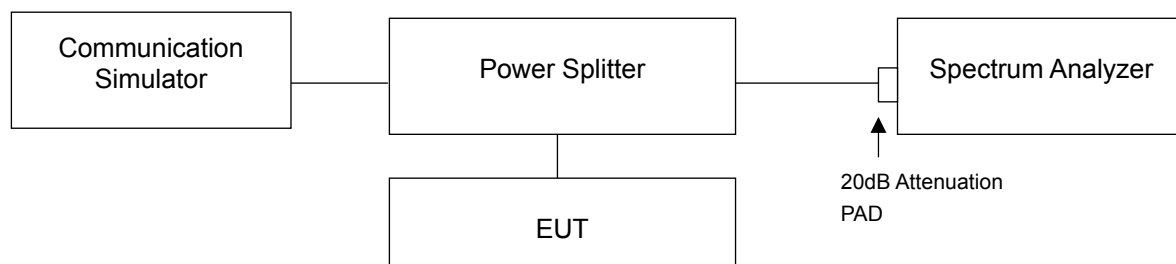


4.6 Conducted Spurious Emissions

4.6.1 Limits of Conducted Spurious Emissions Measurement

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB. The emission limit equal to -13dBm .

4.6.2 Test Setup



4.6.3 Test Procedure

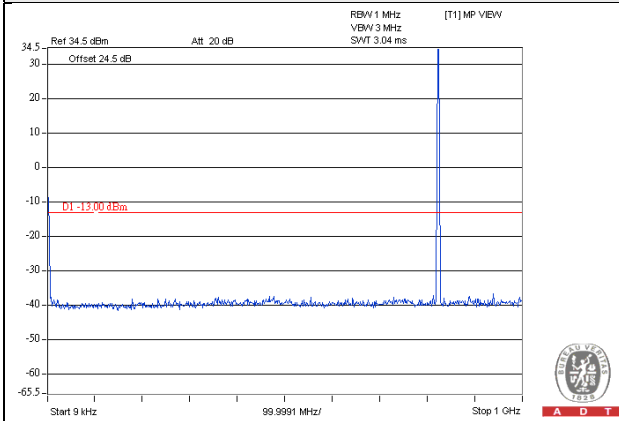
- The EUT makes a phone call to the communication simulator. All measurements were done at low, middle and high operational frequency range.
- Measuring frequency range is from 9 kHz to 9GHz. 20dB attenuation pad is connected with spectrum. RBW=1MHz and VBW=3MHz is used for conducted emission measurement.

4.6.4 Test Results

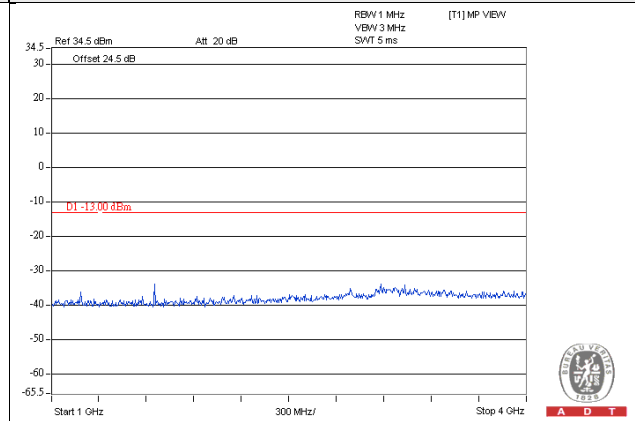
GSM

Channel 128

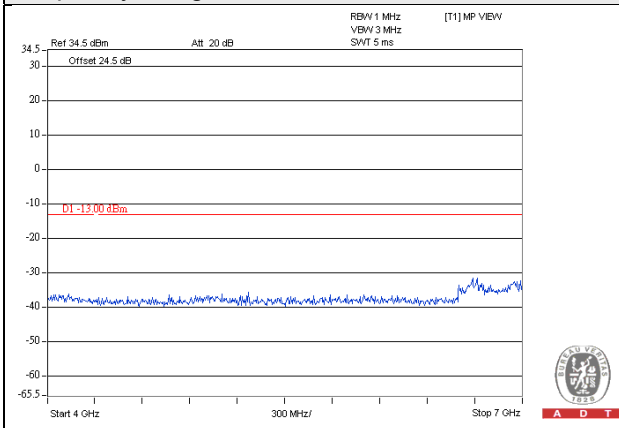
Frequency Range : 9kHz~1GHz



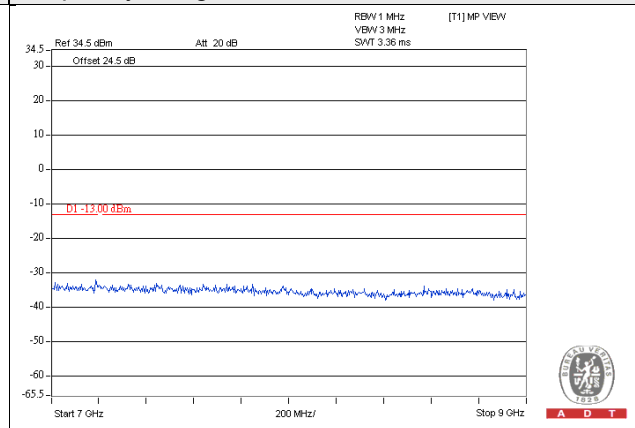
Frequency Range : 1GHz~4GHz



Frequency Range : 4GHz~7GHz



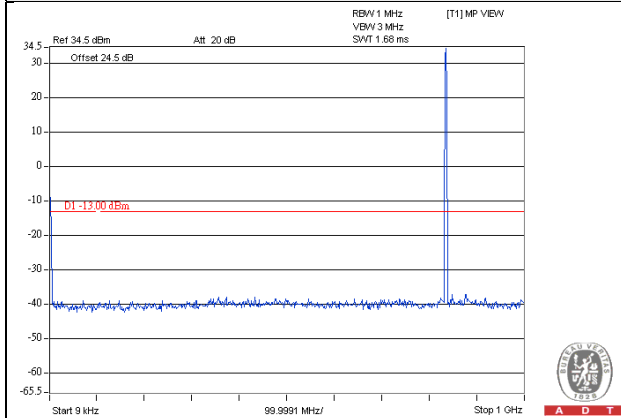
Frequency Range : 7GHz~9GHz



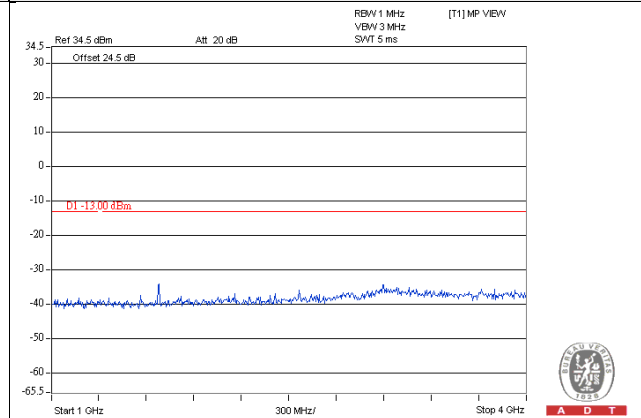
GSM

Channel 189

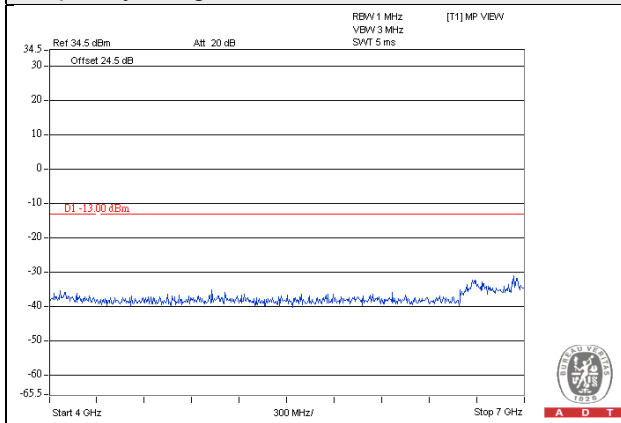
Frequency Range : 9kHz~1GHz



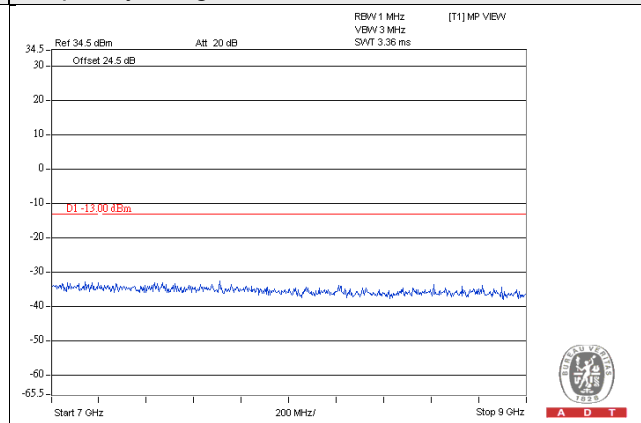
Frequency Range : 1GHz~4GHz



Frequency Range : 4GHz~7GHz



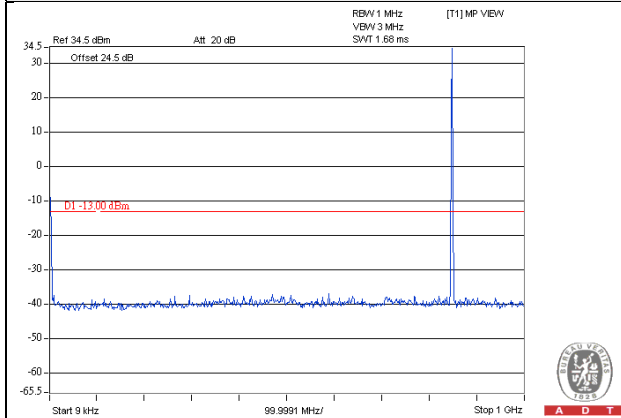
Frequency Range : 7GHz~9GHz



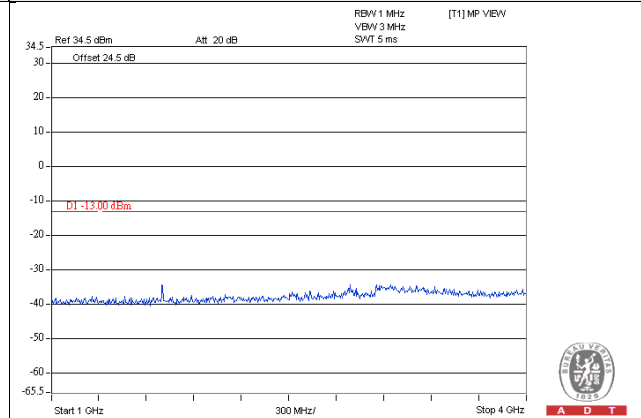
GSM

Channel 251

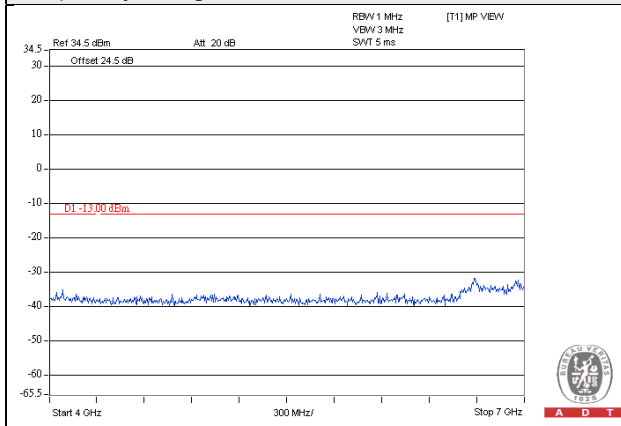
Frequency Range : 9kHz~1GHz



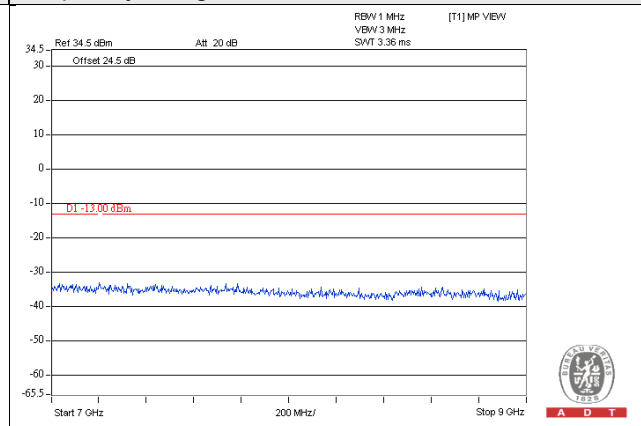
Frequency Range : 1GHz~4GHz



Frequency Range : 4GHz~7GHz



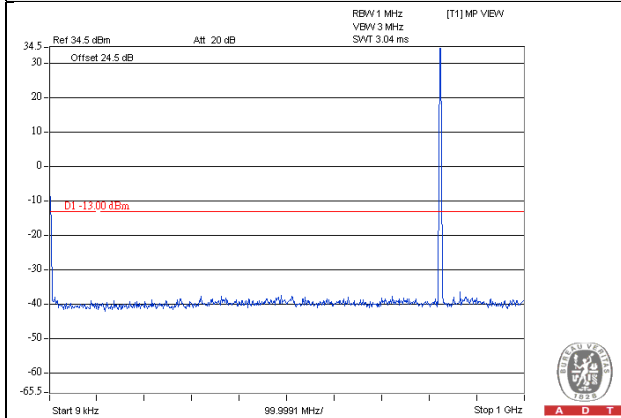
Frequency Range : 7GHz~9GHz



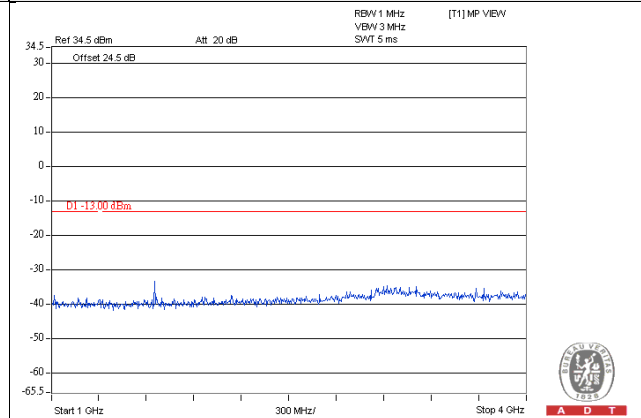
GPRS

Channel 128

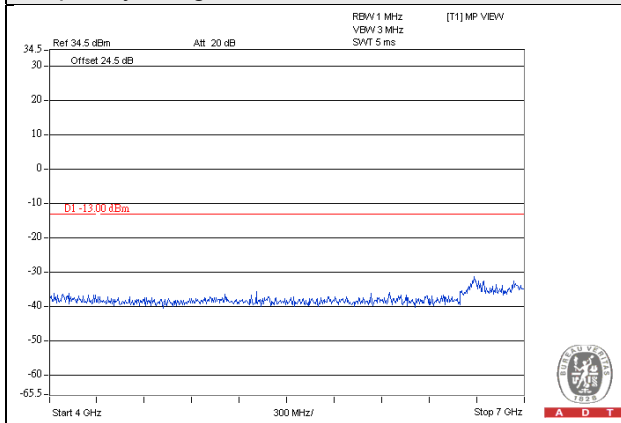
Frequency Range : 9kHz~1GHz



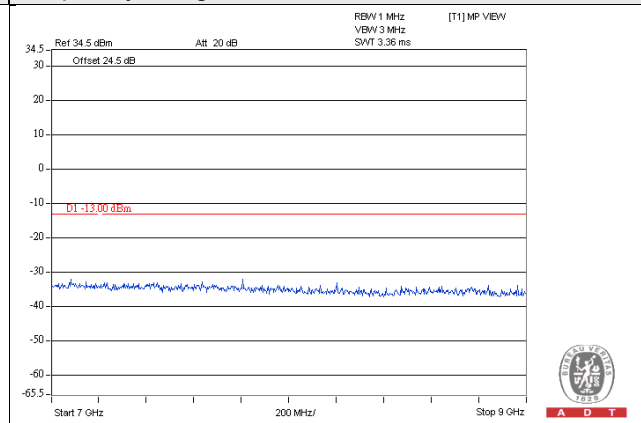
Frequency Range : 1GHz~4GHz



Frequency Range : 4GHz~7GHz



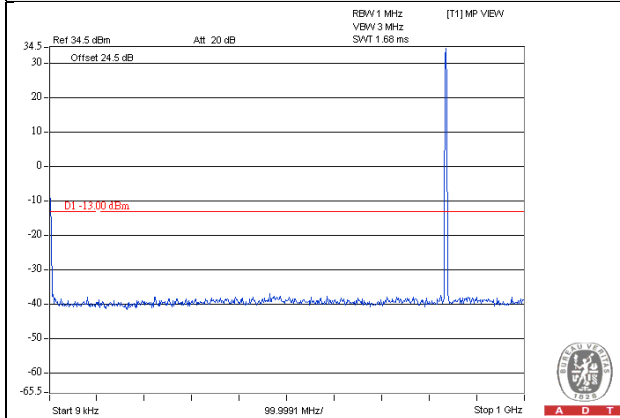
Frequency Range : 7GHz~9GHz



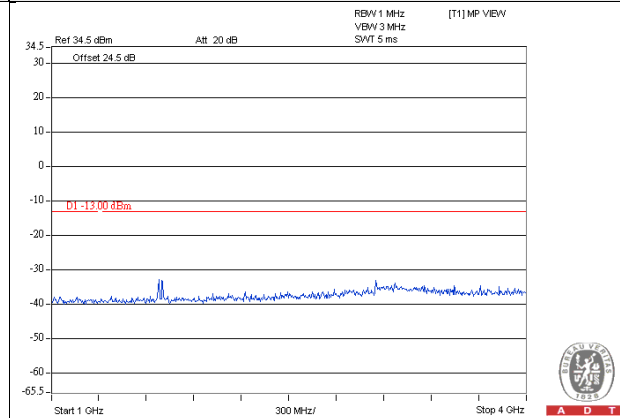
GPRS

Channel 189

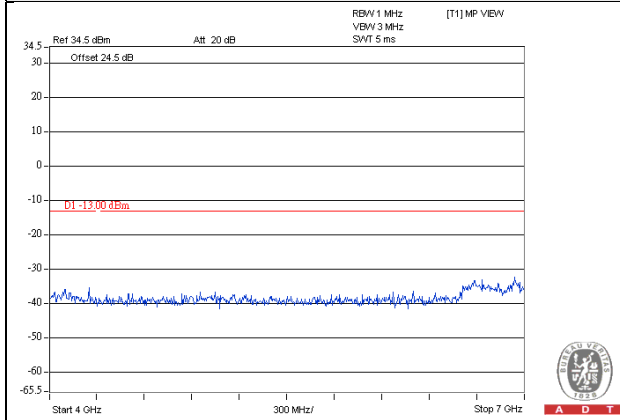
Frequency Range : 9kHz~1GHz



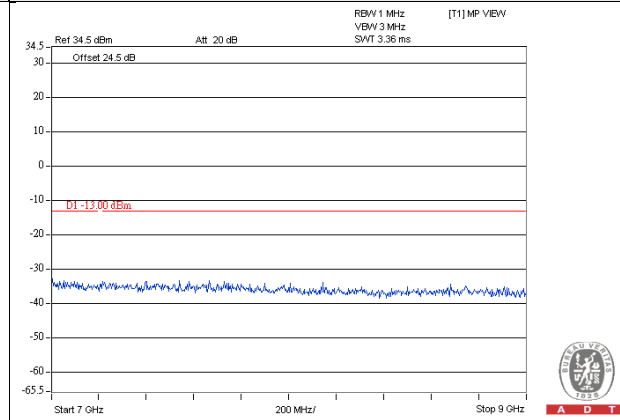
Frequency Range : 1GHz~4GHz



Frequency Range : 4GHz~7GHz



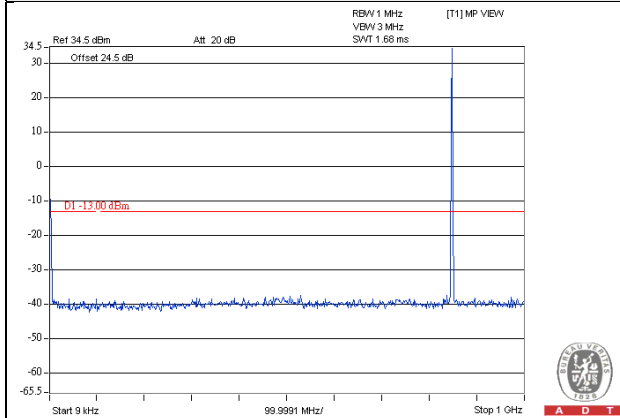
Frequency Range : 7GHz~9GHz



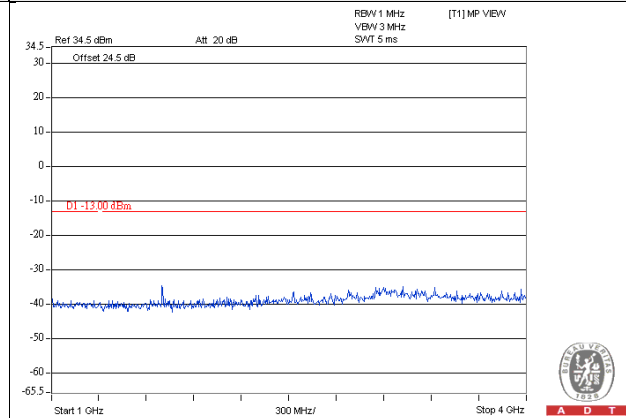
GPRS

Channel 251

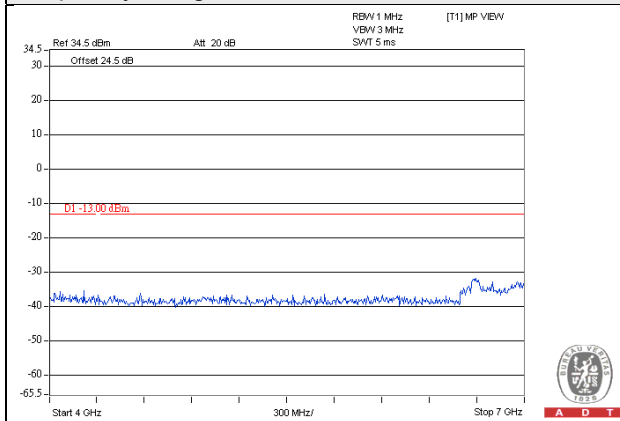
Frequency Range : 9kHz~1GHz



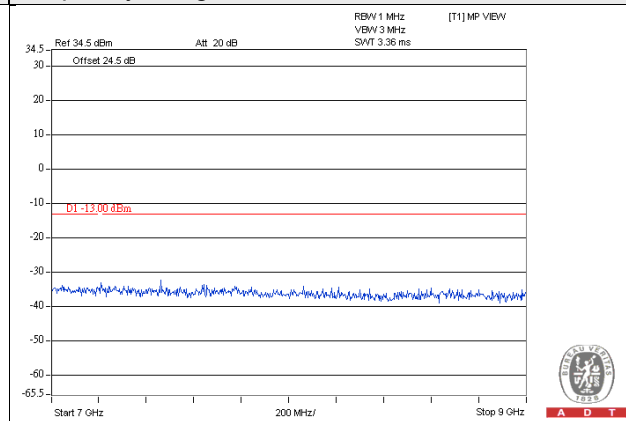
Frequency Range : 1GHz~4GHz



Frequency Range : 4GHz~7GHz



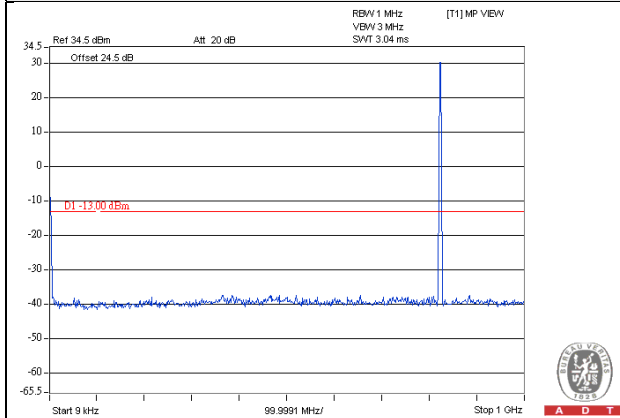
Frequency Range : 7GHz~9GHz



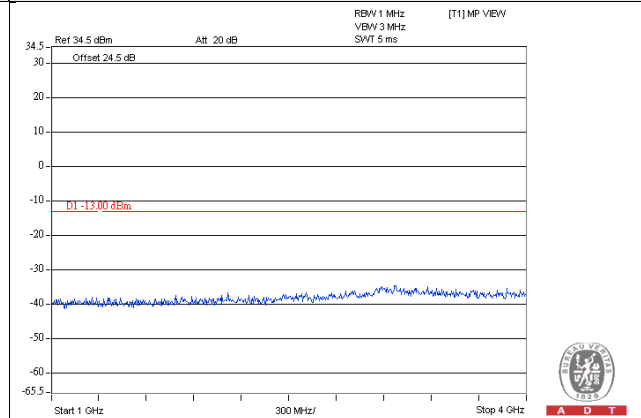
EDGE

Channel 128

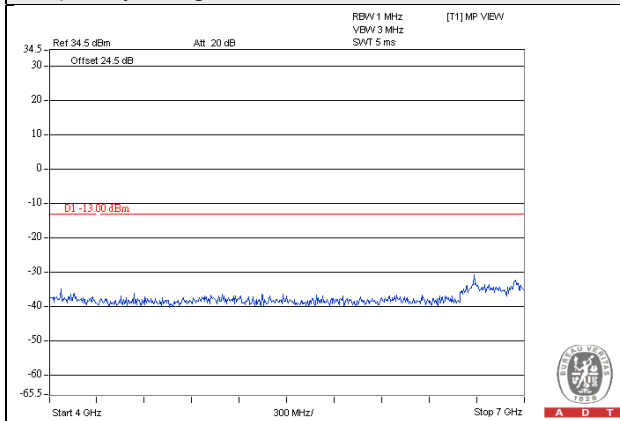
Frequency Range : 9kHz~1GHz



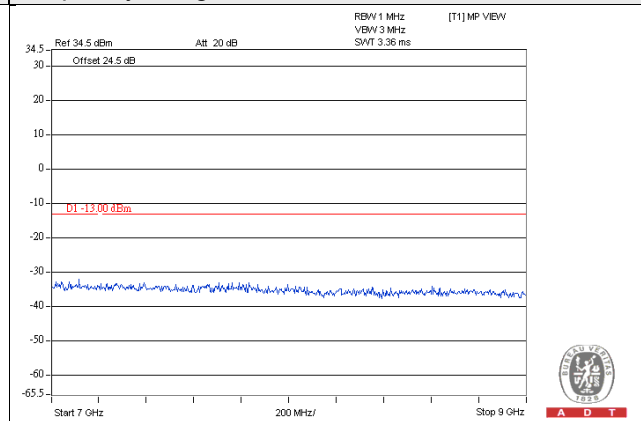
Frequency Range : 1GHz~4GHz



Frequency Range : 4GHz~7GHz



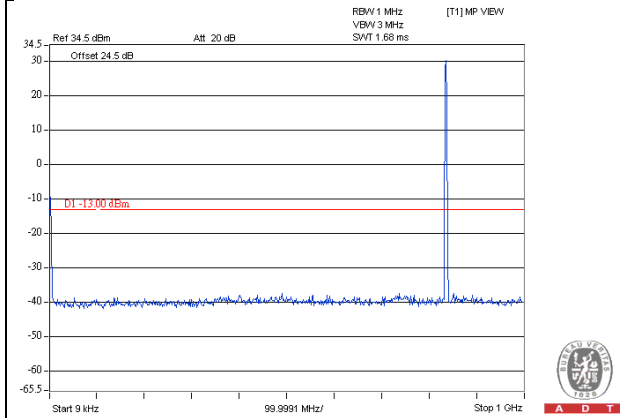
Frequency Range : 7GHz~9GHz



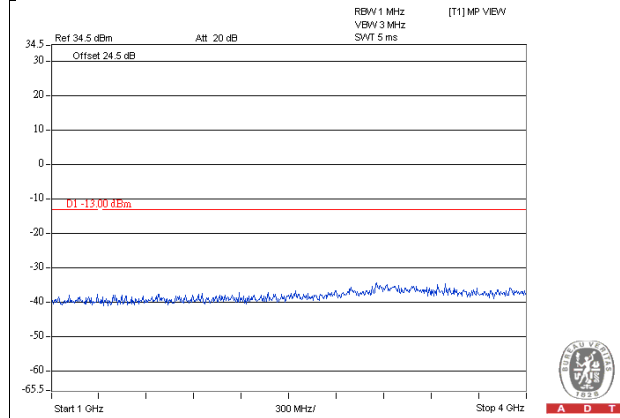
EDGE

Channel 189

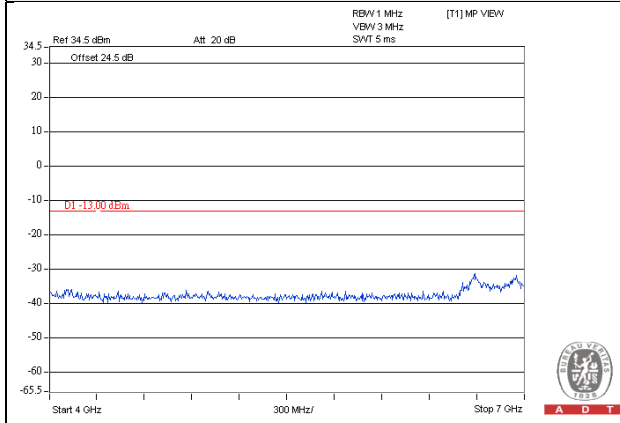
Frequency Range : 9kHz~1GHz



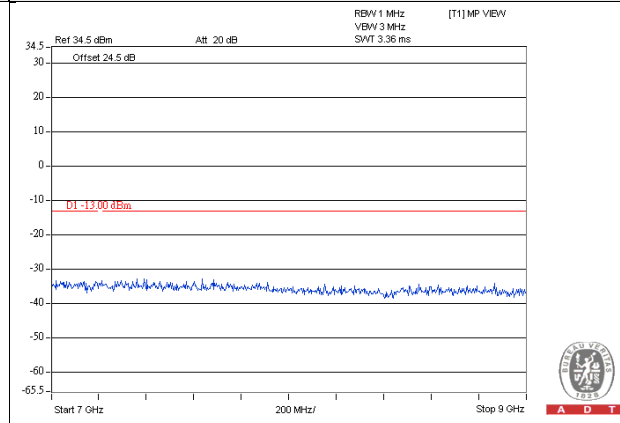
Frequency Range : 1GHz~4GHz



Frequency Range : 4GHz~7GHz



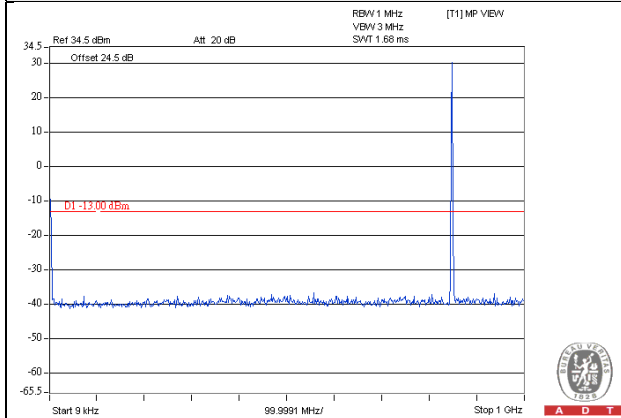
Frequency Range : 7GHz~9GHz



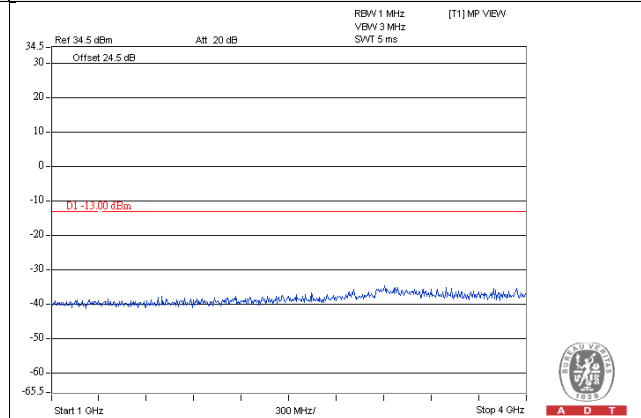
EDGE

Channel 251

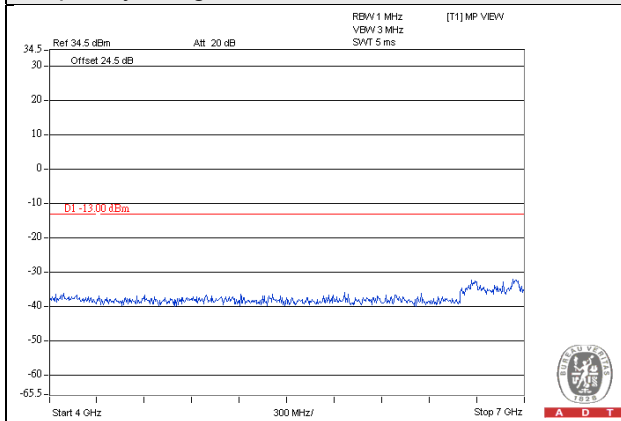
Frequency Range : 9kHz~1GHz



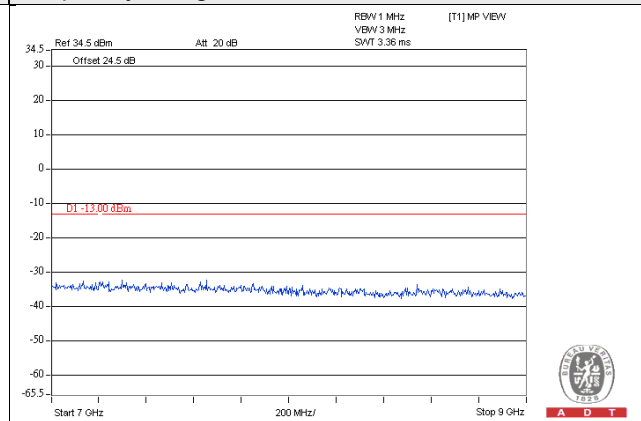
Frequency Range : 1GHz~4GHz



Frequency Range : 4GHz~7GHz



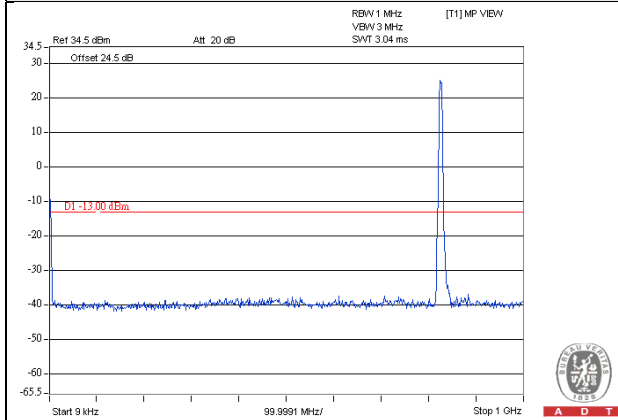
Frequency Range : 7GHz~9GHz



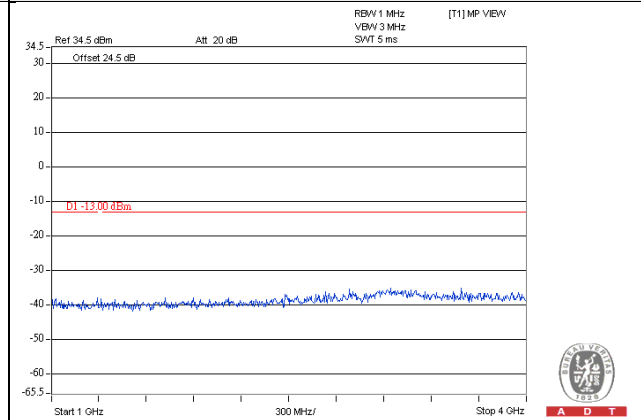
WCDMA

Channel 4132

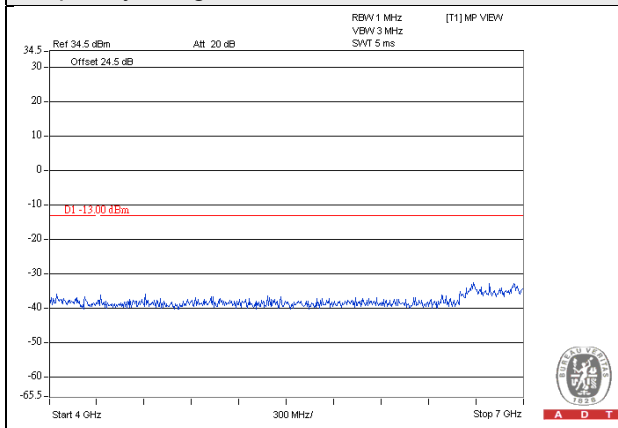
Frequency Range : 9kHz~1GHz



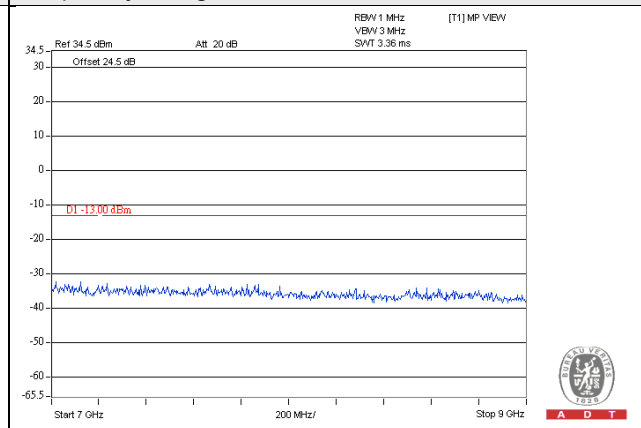
Frequency Range : 1GHz~4GHz



Frequency Range : 4GHz~7GHz



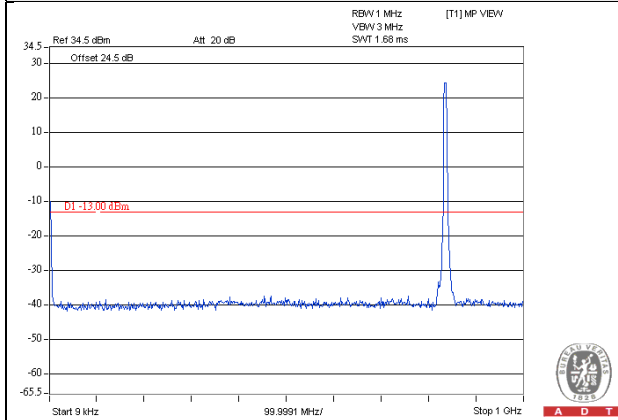
Frequency Range : 7GHz~9GHz



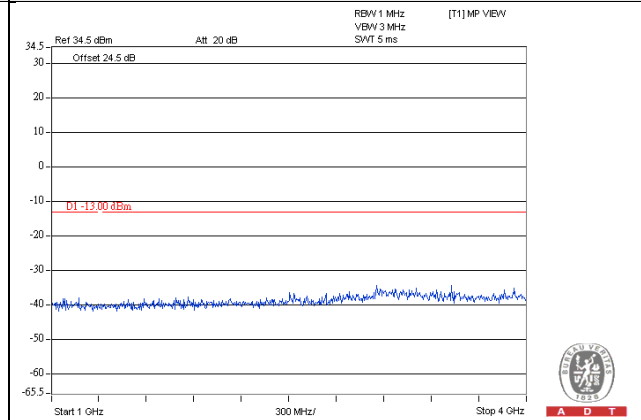
WCDMA

Channel 4182

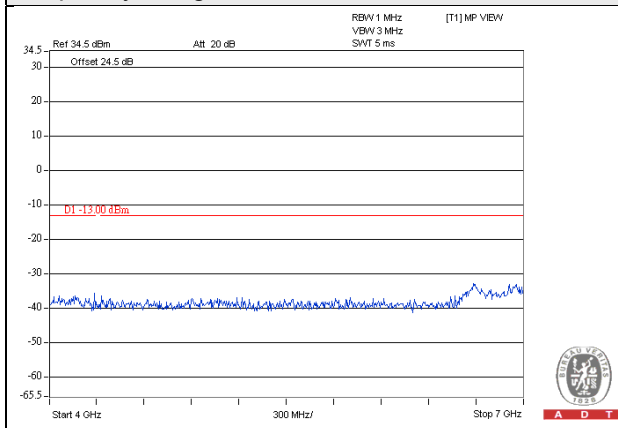
Frequency Range : 9kHz~1GHz



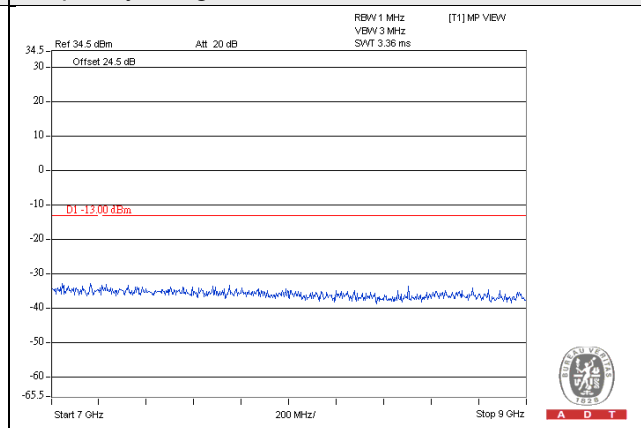
Frequency Range : 1GHz~4GHz



Frequency Range : 4GHz~7GHz



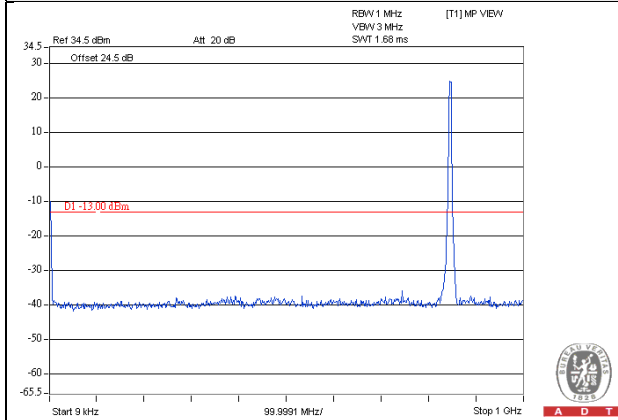
Frequency Range : 7GHz~9GHz



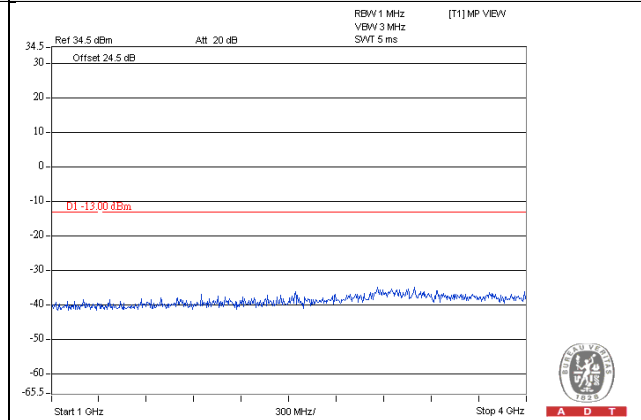
WCDMA

Channel 4233

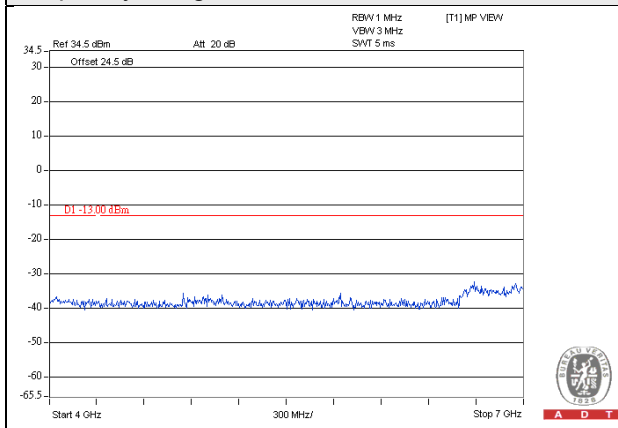
Frequency Range : 9kHz~1GHz



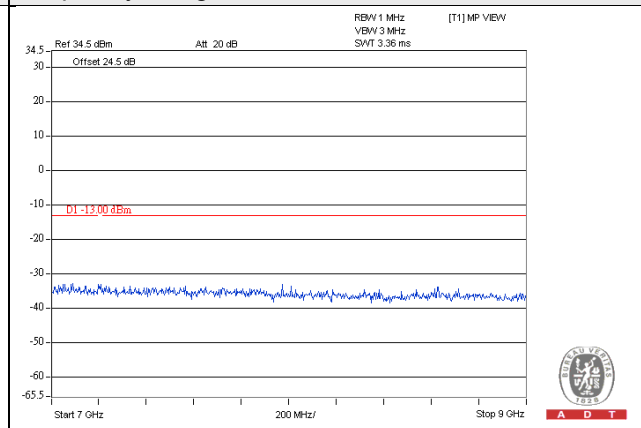
Frequency Range : 1GHz~4GHz



Frequency Range : 4GHz~7GHz



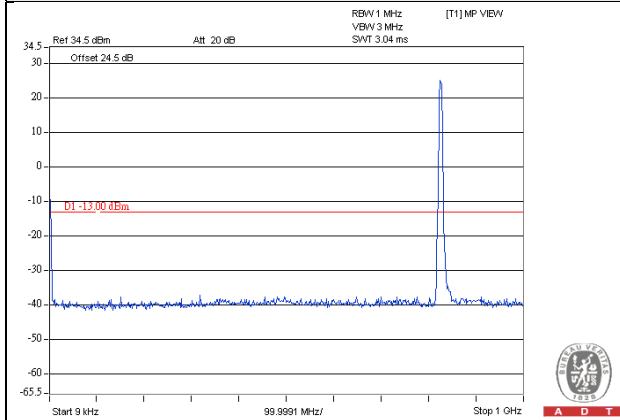
Frequency Range : 7GHz~9GHz



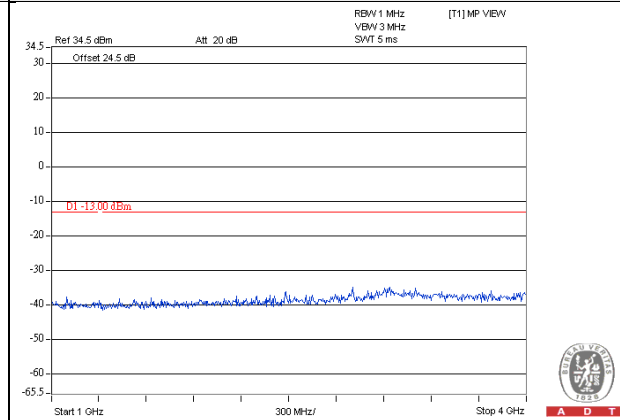
HSDPA

Channel 4132

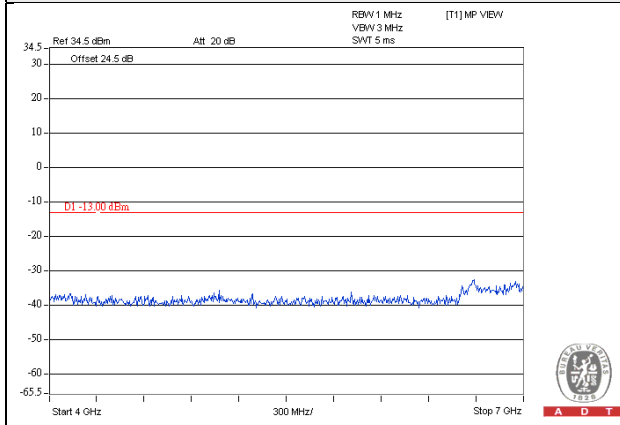
Frequency Range : 9kHz~1GHz



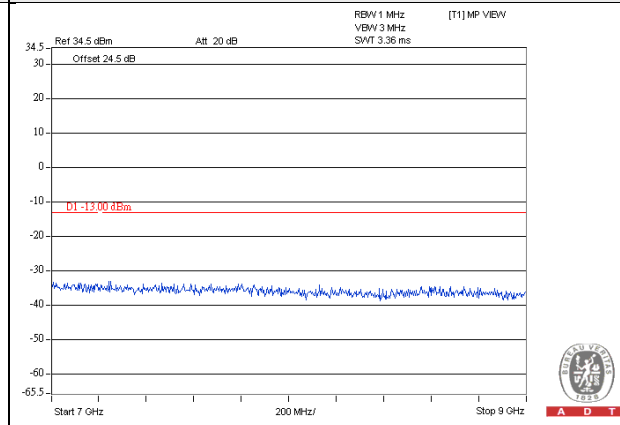
Frequency Range : 1GHz~4GHz



Frequency Range : 4GHz~7GHz



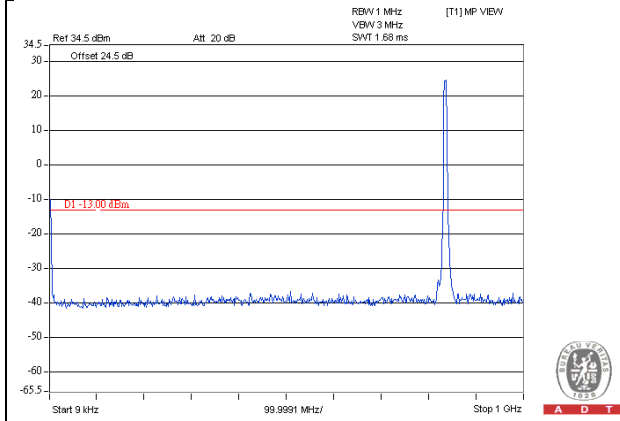
Frequency Range : 7GHz~9GHz



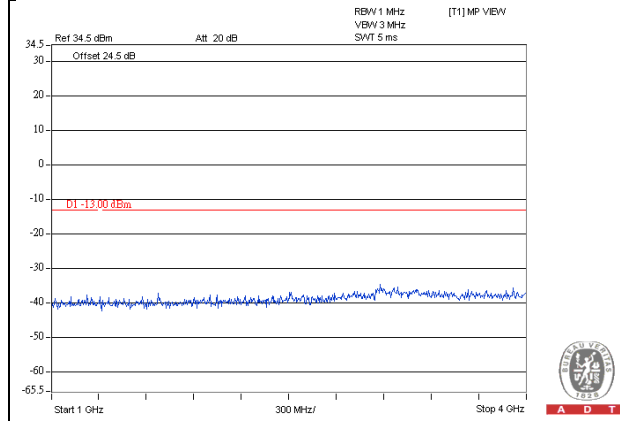
HSDPA

Channel 4182

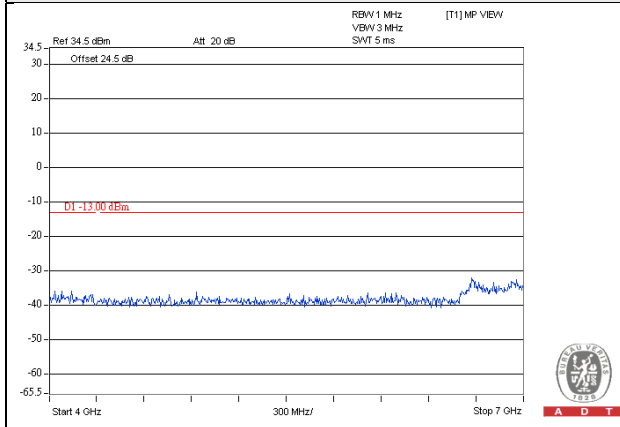
Frequency Range : 9kHz~1GHz



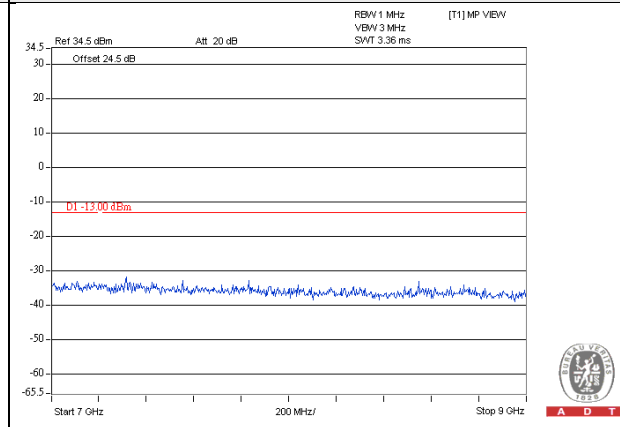
Frequency Range : 1GHz~4GHz



Frequency Range : 4GHz~7GHz



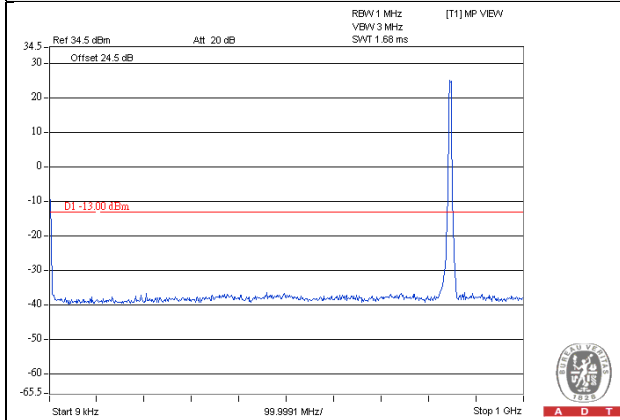
Frequency Range : 7GHz~9GHz



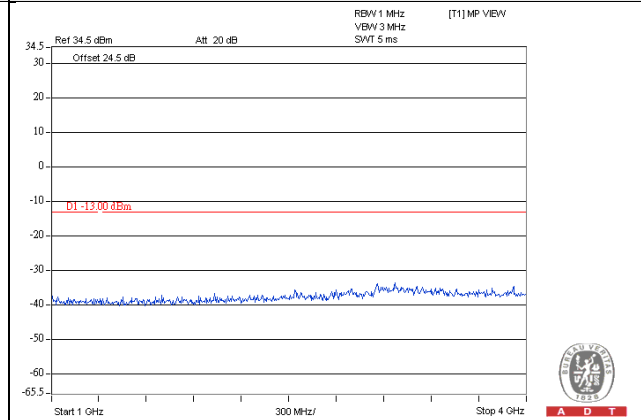
HSDPA

Channel 4233

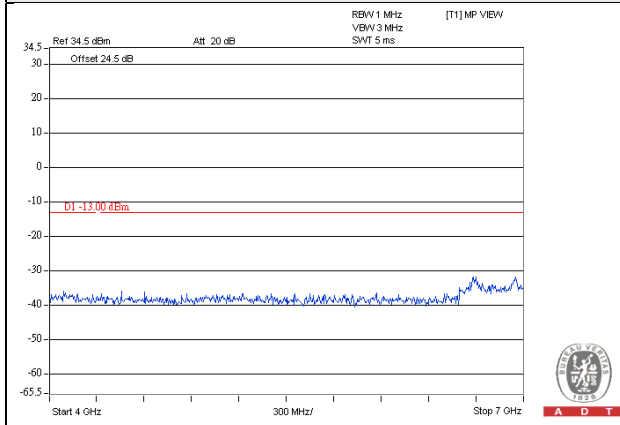
Frequency Range : 9kHz~1GHz



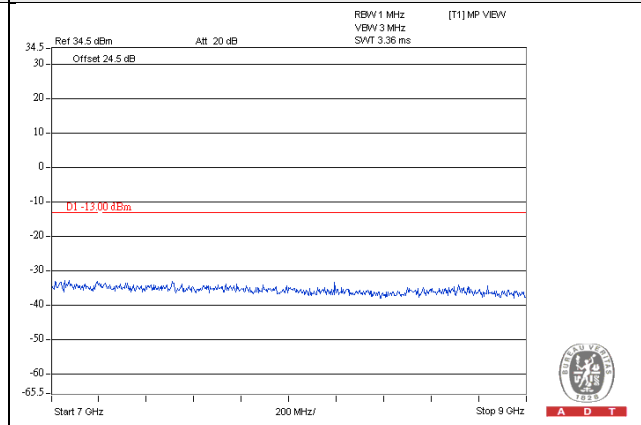
Frequency Range : 1GHz~4GHz



Frequency Range : 4GHz~7GHz



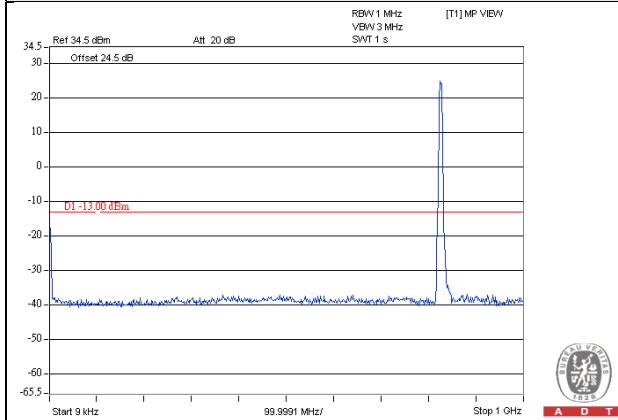
Frequency Range : 7GHz~9GHz



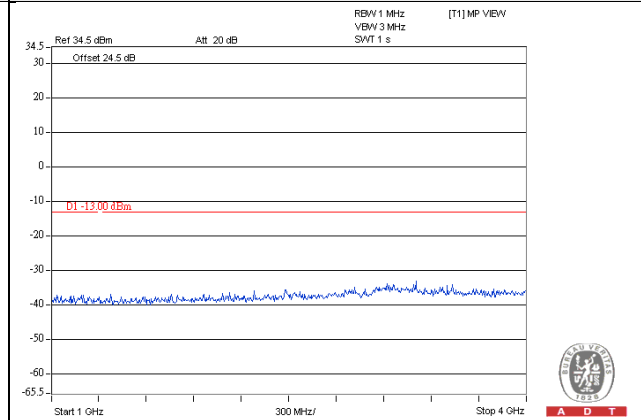
HSUPA

Channel 4132

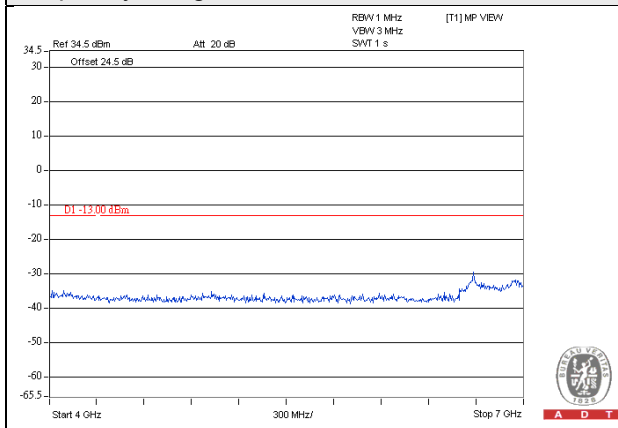
Frequency Range : 9kHz~1GHz



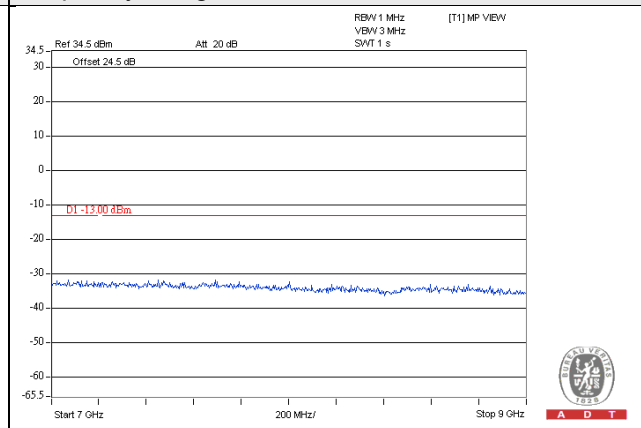
Frequency Range : 1GHz~4GHz



Frequency Range : 4GHz~7GHz



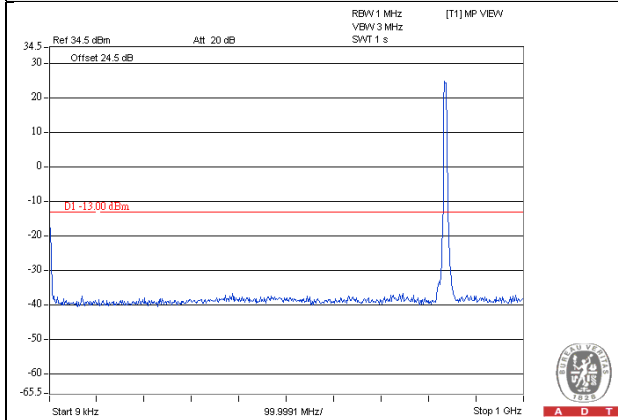
Frequency Range : 7GHz~9GHz



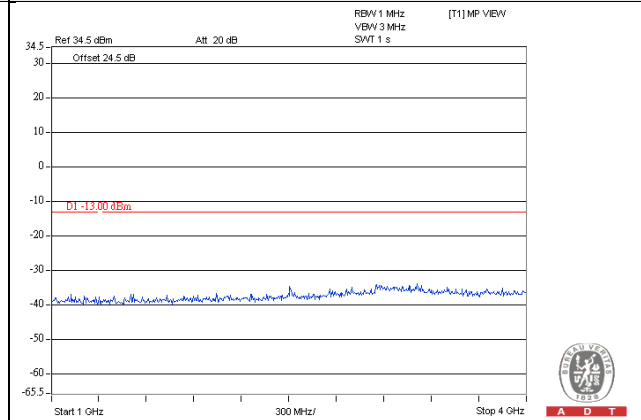
HSUPA

Channel 4182

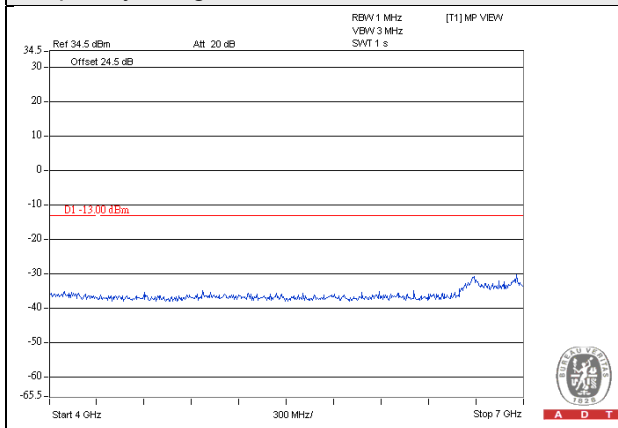
Frequency Range : 9kHz~1GHz



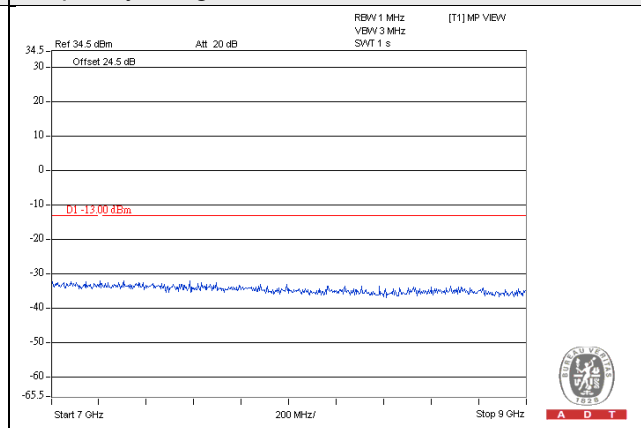
Frequency Range : 1GHz~4GHz



Frequency Range : 4GHz~7GHz



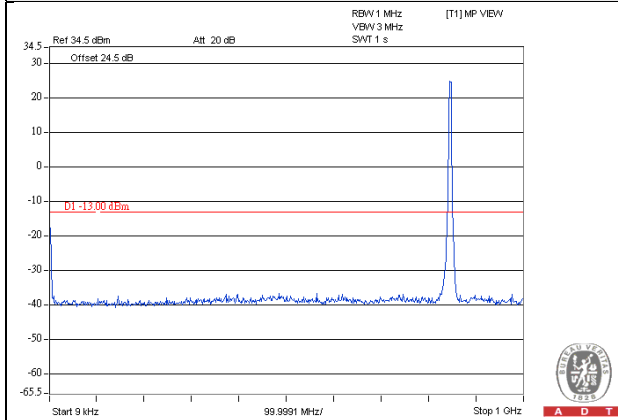
Frequency Range : 7GHz~9GHz



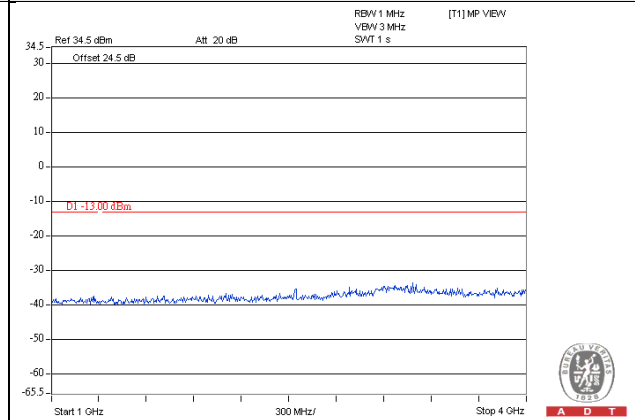
HSUPA

Channel 4233

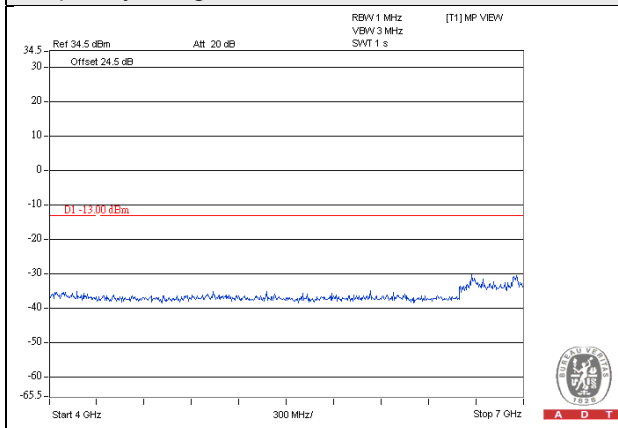
Frequency Range : 9kHz~1GHz



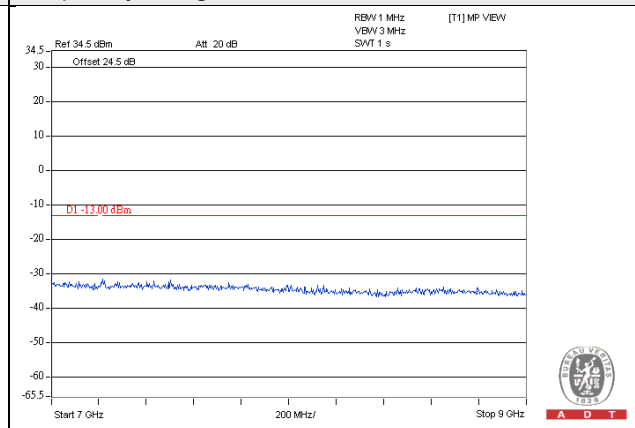
Frequency Range : 1GHz~4GHz



Frequency Range : 4GHz~7GHz



Frequency Range : 7GHz~9GHz



4.7 Radiated Emission Measurement

4.7.1 Limits of Radiated Emission Measurement

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB. The emission limit equal to -13dBm .

4.7.2 Test Procedure

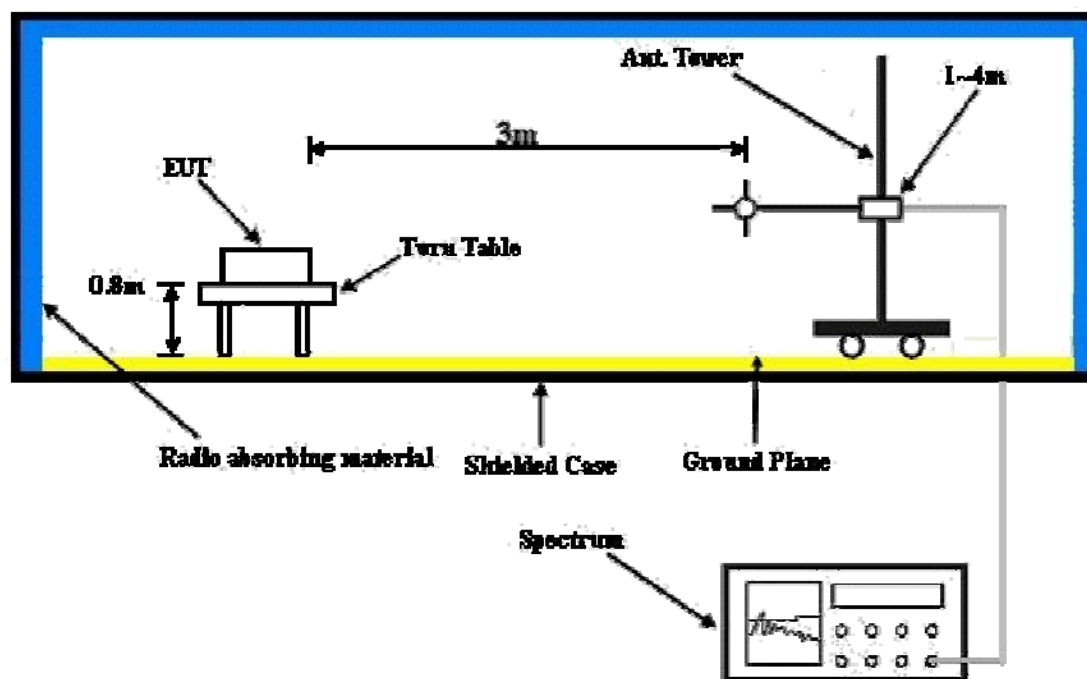
- a. Substitution method is used for E.I.R.P measurement. In the semi-anechoic chamber, EUT placed on the 0.8m height of Turn Table, rotated the table around 360 degrees to search the maximum radiation power and receiver antenna shall be rotated vertical and horizontal polarization and moved height from 1m to 4m to find the maximum polar radiated power. The "Read Value" is the spectrum reading the maximum power value.
- b. The substitution horn 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 a. Record the power level of S.G
- c. $\text{EIRP} = \text{Output power level of S.G} - \text{TX cable loss} + \text{Antenna gain of substitution horn}$.
- d. E.R.P power can be calculated form E.I.R.P power by subtracting the gain of dipole, $\text{E.R.P power} = \text{E.I.R.P power} - 2.15\text{dBi}$.

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

4.7.3 Deviation from Test Standard

No deviation.

4.7.4 Test Setup



For the actual test configuration, please refer to the attached file (Test Setup Photo).

4.7.5 Test Results

Below 1GHz

GSM Mode

Mode	TX channel 128	Frequency Range	Below 1000 MHz
Environmental Conditions	25deg. C, 69%RH	Input Power	120Vac, 60Hz
Tested By	Tank Wu	Test Mode	A

Antenna Polarity & Test Distance: Horizontal at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	ERP (dBm)	Limit (dBm)	Margin (dB)
1	31.94	-35.50	-16.00	-18.30	-34.30	-13.00	-21.30
2	84.32	-51.50	-60.00	0.40	-59.60	-13.00	-46.60
3	161.92	-51.60	-56.30	-2.90	-59.20	-13.00	-46.20
4	191.02	-50.70	-58.50	-2.70	-61.20	-13.00	-48.20
5	288.02	-51.50	-55.50	-1.80	-57.30	-13.00	-44.30
6	976.72	-61.90	-58.80	3.60	-55.20	-13.00	-42.20
Antenna Polarity & Test Distance: Vertical at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	ERP (dBm)	Limit (dBm)	Margin (dB)
1	31.94	-30.10	-24.40	-18.30	-42.70	-13.00	-29.70
2	84.32	-44.10	-51.70	0.40	-51.30	-13.00	-38.30
3	165.80	-53.90	-56.40	-3.00	-59.40	-13.00	-46.40
4	191.02	-54.90	-56.20	-2.70	-58.90	-13.00	-45.90
5	282.20	-57.40	-55.00	-1.70	-56.70	-13.00	-43.70
6	992.24	-61.90	-57.50	3.40	-54.10	-13.00	-41.10

Remarks:

1. Output Power (dBm) = S.G Value (dBm) + Correction Factor (dB).
2. Correction Factor (dB) = Substitution Antenna Gain (dB) + Cable Loss (dB).

Mode	TX channel 189	Frequency Range	Below 1000 MHz
Environmental Conditions	25deg. C, 69%RH	Input Power	120Vac, 60Hz
Tested By	Tank Wu	Test Mode	A

Antenna Polarity & Test Distance: Horizontal at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	ERP (dBm)	Limit (dBm)	Margin (dB)
1	31.94	-44.00	-24.40	-18.30	-42.70	-13.00	-29.70
2	84.32	-50.50	-59.00	0.40	-58.60	-13.00	-45.60
3	161.92	-50.90	-55.60	-2.90	-58.50	-13.00	-45.50
4	192.96	-51.50	-59.40	-2.60	-62.00	-13.00	-49.00
5	293.84	-53.10	-56.70	-1.80	-58.50	-13.00	-45.50
6	953.44	-62.00	-59.50	3.80	-55.70	-13.00	-42.70
Antenna Polarity & Test Distance: Vertical at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	ERP (dBm)	Limit (dBm)	Margin (dB)
1	31.94	-33.40	-27.70	-18.30	-46.00	-13.00	-33.00
2	76.56	-43.40	-51.60	0.30	-51.30	-13.00	-38.30
3	161.92	-54.70	-56.80	-2.90	-59.70	-13.00	-46.70
4	196.84	-56.60	-57.10	-2.50	-59.60	-13.00	-46.60
5	280.26	-58.00	-55.40	-1.60	-57.00	-13.00	-44.00
6	994.18	-62.00	-57.40	3.40	-54.00	-13.00	-41.00

Remarks:

1. Output Power (dBm) = S.G Value (dBm) + Correction Factor (dB).
2. Correction Factor (dB) = Substitution Antenna Gain (dB) + Cable Loss (dB).

Mode	TX channel 251	Frequency Range	Below 1000 MHz
Environmental Conditions	25deg. C, 69%RH	Input Power	120Vac, 60Hz
Tested By	Tank Wu	Test Mode	A

Antenna Polarity & Test Distance: Horizontal at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	ERP (dBm)	Limit (dBm)	Margin (dB)
1	30.00	-41.00	-19.70	-19.40	-39.10	-13.00	-26.10
2	86.26	-51.30	-60.40	0.10	-60.30	-13.00	-47.30
3	161.92	-49.90	-54.60	-2.90	-57.50	-13.00	-44.50
4	191.02	-50.80	-58.60	-2.70	-61.30	-13.00	-48.30
5	295.78	-52.80	-56.00	-1.80	-57.80	-13.00	-44.80
6	972.84	-61.40	-58.50	3.70	-54.80	-13.00	-41.80
Antenna Polarity & Test Distance: Vertical at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	ERP (dBm)	Limit (dBm)	Margin (dB)
1	31.94	-31.80	-26.10	-18.30	-44.40	-13.00	-31.40
2	84.32	-51.40	-58.90	0.40	-58.50	-13.00	-45.50
3	169.68	-52.60	-55.20	-2.80	-58.00	-13.00	-45.00
4	191.02	-56.20	-57.50	-2.70	-60.20	-13.00	-47.20
5	282.20	-58.50	-56.20	-1.70	-57.90	-13.00	-44.90
6	992.24	-62.00	-57.70	3.40	-54.30	-13.00	-41.30

Remarks:

1. Output Power (dBm) = S.G Value (dBm) + Correction Factor (dB).
2. Correction Factor (dB) = Substitution Antenna Gain (dB) + Cable Loss (dB).

Mode	TX channel 128	Frequency Range	Below 1000 MHz
Environmental Conditions	25deg. C, 69%RH	Input Power	120Vac, 60Hz
Tested By	Tank Wu	Test Mode	B

Antenna Polarity & Test Distance: Horizontal at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	ERP (dBm)	Limit (dBm)	Margin (dB)
1	31.94	-42.60	-20.90	-18.30	-39.20	-13.00	-26.20
2	68.80	-45.40	-51.20	-0.80	-52.00	-13.00	-39.00
3	146.40	-54.90	-56.70	-3.00	-59.70	-13.00	-46.70
4	202.66	-51.20	-57.10	-2.10	-59.20	-13.00	-46.20
5	338.46	-55.30	-62.90	4.10	-58.80	-13.00	-45.80
6	939.86	-68.00	-63.40	3.70	-59.70	-13.00	-46.70
Antenna Polarity & Test Distance: Vertical at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	ERP (dBm)	Limit (dBm)	Margin (dB)
1	30.00	-40.00	-30.50	-19.40	-49.90	-13.00	-36.90
2	53.28	-39.60	-40.30	-6.20	-46.50	-13.00	-33.50
3	142.52	-46.70	-45.80	-3.10	-48.90	-13.00	-35.90
4	198.78	-53.90	-52.50	-2.40	-54.90	-13.00	-41.90
5	260.86	-55.70	-53.20	-1.50	-54.70	-13.00	-41.70
6	945.68	-66.70	-61.20	3.80	-57.40	-13.00	-44.40

Remarks:

1. Output Power (dBm) = S.G Value (dBm) + Correction Factor (dB).
2. Correction Factor (dB) = Substitution Antenna Gain (dB) + Cable Loss (dB).

Mode	TX channel 189	Frequency Range	Below 1000 MHz
Environmental Conditions	25deg. C, 69%RH	Input Power	120Vac, 60Hz
Tested By	Tank Wu	Test Mode	B

Antenna Polarity & Test Distance: Horizontal at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	ERP (dBm)	Limit (dBm)	Margin (dB)
1	33.88	-47.10	-27.10	-17.10	-44.20	-13.00	-31.20
2	68.80	-44.10	-49.90	-0.80	-50.70	-13.00	-37.70
3	123.12	-50.10	-54.50	-3.10	-57.60	-13.00	-44.60
4	204.60	-47.40	-53.40	-2.00	-55.40	-13.00	-42.40
5	344.28	-54.80	-62.20	4.00	-58.20	-13.00	-45.20
6	980.60	-67.70	-62.40	3.50	-58.90	-13.00	-45.90
Antenna Polarity & Test Distance: Vertical at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	ERP (dBm)	Limit (dBm)	Margin (dB)
1	31.94	-34.30	-26.50	-18.30	-44.80	-13.00	-31.80
2	55.22	-42.20	-43.70	-5.40	-49.10	-13.00	-36.10
3	144.46	-46.00	-45.00	-3.20	-48.20	-13.00	-35.20
4	196.84	-53.50	-51.90	-2.50	-54.40	-13.00	-41.40
5	260.86	-56.40	-53.90	-1.50	-55.40	-13.00	-42.40
6	901.06	-64.10	-59.30	3.50	-55.80	-13.00	-42.80

Remarks:

1. Output Power (dBm) = S.G Value (dBm) + Correction Factor (dB).
2. Correction Factor (dB) = Substitution Antenna Gain (dB) + Cable Loss (dB).

Mode	TX channel 251	Frequency Range	Below 1000 MHz
Environmental Conditions	25deg. C, 69%RH	Input Power	120Vac, 60Hz
Tested By	Tank Wu	Test Mode	B

Antenna Polarity & Test Distance: Horizontal at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	ERP (dBm)	Limit (dBm)	Margin (dB)
1	30.00	-45.30	-21.90	-19.40	-41.30	-13.00	-28.30
2	68.80	-43.30	-49.10	-0.80	-49.90	-13.00	-36.90
3	167.74	-51.30	-55.10	-2.90	-58.00	-13.00	-45.00
4	204.60	-47.50	-53.50	-2.00	-55.50	-13.00	-42.50
5	338.46	-54.90	-62.50	4.10	-58.40	-13.00	-45.40
6	949.56	-68.10	-63.50	3.70	-59.80	-13.00	-46.80
Antenna Polarity & Test Distance: Vertical at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	ERP (dBm)	Limit (dBm)	Margin (dB)
1	30.00	-33.80	-24.30	-19.40	-43.70	-13.00	-30.70
2	53.28	-40.20	-40.90	-6.20	-47.10	-13.00	-34.10
3	125.06	-42.50	-45.40	-3.20	-48.60	-13.00	-35.60
4	200.72	-53.50	-52.40	-2.30	-54.70	-13.00	-41.70
5	260.86	-56.70	-54.20	-1.50	-55.70	-13.00	-42.70
6	994.18	-68.70	-62.00	3.40	-58.60	-13.00	-45.60

Remarks:

1. Output Power (dBm) = S.G Value (dBm) + Correction Factor (dB).
2. Correction Factor (dB) = Substitution Antenna Gain (dB) + Cable Loss (dB).

WCDMA Mode

Mode	TX channel 4132	Frequency Range	Below 1000 MHz
Environmental Conditions	20deg. C, 69%RH	Input Power	120Vac, 60Hz
Tested By	Tank Wu	Test Mode	A

Antenna Polarity & Test Distance: Horizontal at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	ERP (dBm)	Limit (dBm)	Margin (dB)
1	31.94	-53.60	-34.10	-18.30	-52.40	-13.00	-39.40
2	127.00	-58.40	-63.70	-3.30	-67.00	-13.00	-54.00
3	161.92	-56.60	-61.30	-2.90	-64.20	-13.00	-51.20
4	245.34	-55.10	-62.60	-1.60	-64.20	-13.00	-51.20
5	293.84	-58.50	-62.10	-1.80	-63.90	-13.00	-50.90
6	982.54	-62.60	-59.50	3.50	-56.00	-13.00	-43.00
Antenna Polarity & Test Distance: Vertical at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	ERP (dBm)	Limit (dBm)	Margin (dB)
1	31.94	-33.40	-27.70	-18.30	-46.00	-13.00	-33.00
2	123.12	-45.30	-50.80	-3.10	-53.90	-13.00	-40.90
3	243.40	-51.10	-53.20	-1.40	-54.60	-13.00	-41.60
4	276.38	-56.40	-53.70	-1.60	-55.30	-13.00	-42.30
5	322.94	-52.50	-59.00	4.10	-54.90	-13.00	-41.90
6	994.18	-63.00	-58.40	3.40	-55.00	-13.00	-42.00

Remarks:

1. Output Power (dBm) = S.G Value (dBm) + Correction Factor (dB).
2. Correction Factor (dB) = Substitution Antenna Gain (dB) + Cable Loss (dB).

Mode	TX channel 4182	Frequency Range	Below 1000 MHz
Environmental Conditions	20deg. C, 69%RH	Input Power	120Vac, 60Hz
Tested By	Tank Wu	Test Mode	A

Antenna Polarity & Test Distance: Horizontal at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	ERP (dBm)	Limit (dBm)	Margin (dB)
1	31.94	-46.50	-27.00	-18.30	-45.30	-13.00	-32.30
2	134.76	-56.10	-61.10	-3.20	-64.30	-13.00	-51.30
3	163.86	-52.00	-57.30	-2.90	-60.20	-13.00	-47.20
4	260.86	-51.40	-56.80	-1.50	-58.30	-13.00	-45.30
5	288.02	-55.50	-59.40	-1.80	-61.20	-13.00	-48.20
6	998.06	-62.50	-59.00	3.30	-55.70	-13.00	-42.70
Antenna Polarity & Test Distance: Vertical at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	ERP (dBm)	Limit (dBm)	Margin (dB)
1	45.52	-31.60	-31.70	-10.40	-42.10	-13.00	-29.10
2	125.06	-44.50	-49.50	-3.20	-52.70	-13.00	-39.70
3	163.86	-47.00	-49.40	-2.90	-52.30	-13.00	-39.30
4	243.40	-51.00	-53.10	-1.40	-54.50	-13.00	-41.50
5	278.32	-56.10	-53.40	-1.60	-55.00	-13.00	-42.00
6	992.24	-62.50	-58.20	3.40	-54.80	-13.00	-41.80

Remarks:

1. Output Power (dBm) = S.G Value (dBm) + Correction Factor (dB).
2. Correction Factor (dB) = Substitution Antenna Gain (dB) + Cable Loss (dB).

Mode	TX channel 4233	Frequency Range	Below 1000 MHz
Environmental Conditions	20deg. C, 69%RH	Input Power	120Vac, 60Hz
Tested By	Tank Wu	Test Mode	A

Antenna Polarity & Test Distance: Horizontal at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	ERP (dBm)	Limit (dBm)	Margin (dB)
1	33.88	-51.40	-33.50	-17.10	-50.60	-13.00	-37.60
2	161.92	-56.80	-61.50	-2.90	-64.40	-13.00	-51.40
3	253.10	-55.00	-61.60	-1.40	-63.00	-13.00	-50.00
4	293.84	-59.10	-62.60	-1.80	-64.40	-13.00	-51.40
5	786.60	-55.10	-56.10	4.00	-52.10	-13.00	-39.10
6	1000.00	-62.10	-58.40	3.20	-55.20	-13.00	-42.20
Antenna Polarity & Test Distance: Vertical at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	ERP (dBm)	Limit (dBm)	Margin (dB)
1	33.88	-35.90	-31.50	-17.10	-48.60	-13.00	-35.60
2	125.06	-45.60	-50.70	-3.20	-53.90	-13.00	-40.90
3	249.22	-50.10	-51.10	-1.40	-52.50	-13.00	-39.50
4	276.38	-57.40	-54.60	-1.60	-56.20	-13.00	-43.20
5	334.58	-53.80	-60.50	4.00	-56.50	-13.00	-43.50
6	937.92	-56.50	-53.40	3.80	-49.60	-13.00	-36.60

Remarks:

1. Output Power (dBm) = S.G Value (dBm) + Correction Factor (dB).
2. Correction Factor (dB) = Substitution Antenna Gain (dB) + Cable Loss (dB).

Mode	TX channel 4132	Frequency Range	Below 1000 MHz
Environmental Conditions	20deg. C, 69%RH	Input Power	120Vac, 60Hz
Tested By	Tank Wu	Test Mode	B

Antenna Polarity & Test Distance: Horizontal at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	ERP (dBm)	Limit (dBm)	Margin (dB)
1	37.76	-60.60	-44.80	-14.70	-59.50	-13.00	-46.50
2	156.10	-63.60	-67.50	-2.90	-70.40	-13.00	-57.40
3	189.08	-58.70	-66.40	-2.80	-69.20	-13.00	-56.20
4	241.46	-56.00	-63.60	-1.40	-65.00	-13.00	-52.00
5	282.20	-58.70	-63.40	-1.70	-65.10	-13.00	-52.10
6	994.18	-62.60	-59.20	3.40	-55.80	-13.00	-42.80
Antenna Polarity & Test Distance: Vertical at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	ERP (dBm)	Limit (dBm)	Margin (dB)
1	31.94	-44.10	-38.40	-18.30	-56.70	-13.00	-43.70
2	165.80	-53.60	-56.10	-3.00	-59.10	-13.00	-46.10
3	241.46	-53.50	-55.80	-1.40	-57.20	-13.00	-44.20
4	272.50	-50.50	-48.70	-1.50	-50.20	-13.00	-37.20
5	305.48	-52.80	-58.60	3.80	-54.80	-13.00	-41.80
6	957.32	-61.80	-58.40	3.80	-54.60	-13.00	-41.60

Remarks:

1. Output Power (dBm) = S.G Value (dBm) + Correction Factor (dB).
2. Correction Factor (dB) = Substitution Antenna Gain (dB) + Cable Loss (dB).

Mode	TX channel 4182	Frequency Range	Below 1000 MHz
Environmental Conditions	20deg. C, 69%RH	Input Power	120Vac, 60Hz
Tested By	Tank Wu	Test Mode	B

Antenna Polarity & Test Distance: Horizontal at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	ERP (dBm)	Limit (dBm)	Margin (dB)
1	31.94	-39.10	-19.60	-18.30	-37.90	-13.00	-24.90
2	57.16	-50.50	-51.50	-4.70	-56.20	-13.00	-43.20
3	127.00	-55.40	-60.70	-3.30	-64.00	-13.00	-51.00
4	194.90	-52.00	-60.00	-2.60	-62.60	-13.00	-49.60
5	280.26	-54.80	-59.70	-1.60	-61.30	-13.00	-48.30
6	984.48	-61.80	-58.70	3.50	-55.20	-13.00	-42.20
Antenna Polarity & Test Distance: Vertical at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	ERP (dBm)	Limit (dBm)	Margin (dB)
1	30.00	-29.30	-22.00	-19.40	-41.40	-13.00	-28.40
2	123.12	-48.00	-53.50	-3.10	-56.60	-13.00	-43.60
3	196.84	-56.40	-56.90	-2.50	-59.40	-13.00	-46.40
4	256.98	-44.20	-44.40	-1.50	-45.90	-13.00	-32.90
5	338.46	-57.40	-64.10	4.10	-60.00	-13.00	-47.00
6	1000.00	-62.80	-58.00	3.20	-54.80	-13.00	-41.80

Remarks:

1. Output Power (dBm) = S.G Value (dBm) + Correction Factor (dB).
2. Correction Factor (dB) = Substitution Antenna Gain (dB) + Cable Loss (dB).

Mode	TX channel 4233	Frequency Range	Below 1000 MHz
Environmental Conditions	20deg. C, 69%RH	Input Power	120Vac, 60Hz
Tested By	Tank Wu	Test Mode	B

Antenna Polarity & Test Distance: Horizontal at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	ERP (dBm)	Limit (dBm)	Margin (dB)
1	31.94	-61.90	-42.30	-18.30	-60.60	-13.00	-47.60
2	150.28	-63.90	-67.70	-3.00	-70.70	-13.00	-57.70
3	192.96	-53.90	-61.80	-2.60	-64.40	-13.00	-51.40
4	278.32	-58.10	-63.20	-1.60	-64.80	-13.00	-51.80
5	414.12	-62.80	-68.50	3.40	-65.10	-13.00	-52.10
6	994.18	-62.80	-59.30	3.40	-55.90	-13.00	-42.90
Antenna Polarity & Test Distance: Vertical at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	ERP (dBm)	Limit (dBm)	Margin (dB)
1	31.94	-36.50	-30.80	-18.30	-49.10	-13.00	-36.10
2	125.06	-48.50	-53.60	-3.20	-56.80	-13.00	-43.80
3	196.84	-57.00	-57.50	-2.50	-60.00	-13.00	-47.00
4	256.98	-53.00	-53.10	-1.50	-54.60	-13.00	-41.60
5	321.00	-57.60	-64.00	4.00	-60.00	-13.00	-47.00
6	998.06	-62.80	-58.20	3.30	-54.90	-13.00	-41.90

Remarks:

1. Output Power (dBm) = S.G Value (dBm) + Correction Factor (dB).
2. Correction Factor (dB) = Substitution Antenna Gain (dB) + Cable Loss (dB).

Above 1GHz
GSM Mode

Mode	TX channel 128	Frequency Range	Above 1000MHz
Environmental Conditions	25deg. C, 69%RH	Input Power	120Vac, 60Hz
Tested By	Tank Wu		

Antenna Polarity & Test Distance: Horizontal at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	ERP (dBm)	Limit (dBm)	Margin (dB)
1	1648.80	-33.10	-25.40	0.90	-24.50	-13.00	-11.50
2	2473.20	-53.20	-46.90	0.10	-46.80	-13.00	-33.80
3	3297.60	-56.80	-51.40	1.00	-50.40	-13.00	-37.40
Antenna Polarity & Test Distance: Vertical at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	ERP (dBm)	Limit (dBm)	Margin (dB)
1	1648.80	-29.40	-22.00	0.90	-21.10	-13.00	-8.10
2	2473.20	-51.00	-47.00	0.10	-46.90	-13.00	-33.90
3	3297.60	-56.80	-51.00	1.00	-50.00	-13.00	-37.00

Remarks:

1. Output Power (dBm) = S.G Value (dBm) + Correction Factor (dB).
2. Correction Factor (dB) = Substitution Antenna Gain (dB) + Cable Loss (dB).

Mode	TX channel 189	Frequency Range	Above 1000MHz
Environmental Conditions	25deg. C, 69%RH	Input Power	120Vac, 60Hz
Tested By	Tank Wu		

Antenna Polarity & Test Distance: Horizontal at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	ERP (dBm)	Limit (dBm)	Margin (dB)
1	1672.80	-34.10	-26.50	0.80	-25.70	-13.00	-12.70
2	2509.20	-50.00	-43.70	0.20	-43.50	-13.00	-30.50
3	3345.60	-56.80	-51.00	1.20	-49.80	-13.00	-36.80
Antenna Polarity & Test Distance: Vertical at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	ERP (dBm)	Limit (dBm)	Margin (dB)
1	1672.80	-32.60	-25.30	0.80	-24.50	-13.00	-11.50
2	2509.20	-46.20	-42.30	0.20	-42.10	-13.00	-29.10
3	3345.60	-56.50	-50.70	1.20	-49.50	-13.00	-36.50

Remarks:

1. Output Power (dBm) = S.G Value (dBm) + Correction Factor (dB).
2. Correction Factor (dB) = Substitution Antenna Gain (dB) + Cable Loss (dB).

Mode	TX channel 251	Frequency Range	Above 1000MHz
Environmental Conditions	25deg. C, 69%RH	Input Power	120Vac, 60Hz
Tested By	Tank Wu		

Antenna Polarity & Test Distance: Horizontal at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	ERP (dBm)	Limit (dBm)	Margin (dB)
1	1697.60	-36.00	-28.50	0.70	-27.80	-13.00	-14.80
2	2546.40	-52.50	-46.40	0.20	-46.20	-13.00	-33.20
3	3395.20	-56.10	-49.60	1.20	-48.40	-13.00	-35.40
Antenna Polarity & Test Distance: Vertical at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	ERP (dBm)	Limit (dBm)	Margin (dB)
1	1697.60	-35.00	-27.70	0.70	-27.00	-13.00	-14.00
2	2546.40	-53.00	-49.00	0.20	-48.80	-13.00	-35.80
3	3395.20	-56.80	-50.60	1.20	-49.40	-13.00	-36.40

Remarks:

1. Output Power (dBm) = S.G Value (dBm) + Correction Factor (dB).
2. Correction Factor (dB) = Substitution Antenna Gain (dB) + Cable Loss (dB).

WCDMA Mode

Mode	TX channel 4132	Frequency Range	Above 1000MHz
Environmental Conditions	20deg. C, 69%RH	Input Power	120Vac, 60Hz
Tested By	Tank Wu		

Antenna Polarity & Test Distance: Horizontal at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	ERP (dBm)	Limit (dBm)	Margin (dB)
1	1652.80	-54.00	-46.30	0.90	-45.40	-13.00	-32.40
2	2479.20	-55.70	-49.30	0.10	-49.20	-13.00	-36.20
Antenna Polarity & Test Distance: Vertical at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	ERP (dBm)	Limit (dBm)	Margin (dB)
1	1652.80	-47.90	-40.70	0.90	-39.80	-13.00	-26.80
2	2479.20	-58.00	-54.00	0.10	-53.90	-13.00	-40.90

Remarks:

- Output Power (dBm) = S.G Value (dBm) + Correction Factor (dB).
- Correction Factor (dB) = Substitution Antenna Gain (dB) + Cable Loss (dB).

Mode	TX channel 4182	Frequency Range	Above 1000MHz
Environmental Conditions	20deg. C, 69%RH	Input Power	120Vac, 60Hz
Tested By	Tank Wu		

Antenna Polarity & Test Distance: Horizontal at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	ERP (dBm)	Limit (dBm)	Margin (dB)
1	1672.80	-53.80	-46.20	0.80	-45.40	-13.00	-32.40
2	2509.20	-52.30	-46.00	0.20	-45.80	-13.00	-32.80
Antenna Polarity & Test Distance: Vertical at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	ERP (dBm)	Limit (dBm)	Margin (dB)
1	1672.80	-49.50	-42.20	0.80	-41.40	-13.00	-28.40
2	2509.20	-51.20	-47.30	0.20	-47.10	-13.00	-34.10

Remarks:

- Output Power (dBm) = S.G Value (dBm) + Correction Factor (dB).
- Correction Factor (dB) = Substitution Antenna Gain (dB) + Cable Loss (dB).

Mode	TX channel 4233	Frequency Range	Above 1000MHz
Environmental Conditions	20deg. C, 69%RH	Input Power	120Vac, 60Hz
Tested By	Tank Wu		

Antenna Polarity & Test Distance: Horizontal at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	ERP (dBm)	Limit (dBm)	Margin (dB)
1	1693.20	-53.20	-45.70	0.70	-45.00	-13.00	-32.00
2	2539.80	-54.50	-48.30	0.20	-48.10	-13.00	-35.10
Antenna Polarity & Test Distance: Vertical at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	ERP (dBm)	Limit (dBm)	Margin (dB)
1	1693.20	-48.20	-40.90	0.70	-40.20	-13.00	-27.20
2	2539.80	-56.40	-52.30	0.20	-52.10	-13.00	-39.10

Remarks:

1. Output Power (dBm) = S.G Value (dBm) + Correction Factor (dB).
2. Correction Factor (dB) = Substitution Antenna Gain (dB) + Cable Loss (dB).

5 Pictures of Test Arrangements

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

Appendix – 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.

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/Telecom Lab

Tel: 886-3-6668565

Fax: 886-3-6668323

Hwa Ya EMC/RF/Safety Lab

Tel: 886-3-3183232

Fax: 886-3-3270892

Email: service.adt@tw.bureauveritas.com

Web Site: www.bureauveritas-adt.com

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

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