FCC Test Report (PART 24)

Report No.:	RF131029E03H-3
FCC ID:	MQT-T103WIFI3GT
Test Model:	xAPT-103WiFi.3G
Series Model:	xCE_T103WiFi.3G
Received Date:	Oct. 29, 2013
Test Date:	Nov. 05 to 15, 2013; Nov. 16, 2016
Issued Date:	Dec. 07, 2016
Applicant:	XAC AUTOMATION CORP.
Address:	4F, No. 30, INDUSTRY E. RD. IX, SCIENCE-BASED INDUSTRIAL PARK,HSINCHU,TAIWAN
Issued By:	Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch Hsin Chu Laboratory
Lab Address:	E-2, No.1, Li Hsin 1st Road, Hsinchu Science Park, Hsinchu City 300, Taiwan R.O.C.
Test Location (1):	E-2, No.1, Li Hsin 1st Road, Hsinchu Science Park, Hsinchu City 300, Taiwan R.O.C.
Test Location (2):	No. 49, Ln. 206, Wende Rd., Shangshan Tsuen, Chiung Lin Hsiang, Hsin Chu Hsien 307, Taiwan R.O.C.

Testing Laboratory
2022

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Release Control Record

Issue No.	Description	Date Issued
RF131029E03H-3	Original release.	Dec. 07, 2016

1 Certificate of Conformity

Product:	Terminal
Brand:	XAC
Test Model:	xAPT-103WiFi.3G
Series Model:	xCE_T103WiFi.3G
Sample Status:	MASS-PRODUCTION
Applicant:	XAC AUTOMATION CORP.
Test Date:	Nov. 05 to 15, 2013; Nov. 16, 2016
Standards:	FCC Part 24

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 : _____ , **Date:** Dec. 07, 2016

Wendy Wu / Specialist

Approved by : _____ , **Date:** Dec. 07, 2016

May Chen / Manager

2 Summary of Test Results

Applied Standard: FCC Part 24 & Part 2			
FCC Clause	Test Item	Result	Remarks
2.1046 24.232	Equivalent Isotropically Radiated Power	PASS	Meet the requirement of limit.
2.1046 24.232(d)	Peak to Average Ratio	PASS	Meet the requirement of limit.
2.1055 24.235	Frequency Stability	PASS	Meet the requirement of limit.
2.1049 24.238(b)	Occupied Bandwidth	PASS	Meet the requirement of limit.
24.238(b)	Band Edge Measurements	PASS	Meet the requirement of limit.
2.1051 24.238	Conducted Spurious Emissions	PASS	Meet the requirement of limit.
2.1053 24.238	Radiated Spurious Emissions	PASS	Meet the requirement of limit. Minimum passing margin is -20.72dB at 16920MHz.

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) (±)
Radiated Emissions up to 1 GHz	30MHz ~ 1GHz	5.31 dB
Radiated Emissions above 1 GHz	1GHz ~ 6GHz	3.40 dB
	6GHz ~ 18GHz	3.73 dB
	18GHz ~ 40GHz	4.11 dB

2.2 Test Site and Instruments

For radiated spurious emissions

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver Agilent	N9038A	MY50010156	Aug. 18, 2016	Aug. 17, 2017
Pre-Amplifier(*) EMCI	EMC001340	980142	Jan. 20, 2016	Jan. 19, 2018
Loop Antenna(*) Electro-Metrics	EM-6879	264	Dec. 16, 2014	Dec. 15, 2016
RF Cable	NA	LOOPCAB-001 LOOPCAB-002	Jan. 18, 2016	Jan. 17, 2017
Pre-Amplifier Mini-Circuits	ZFL-1000VH2B	AMP-ZFL-05	May 07, 2016	May 06, 2017
Trilog Broadband Antenna SCHWARZBECK	VULB 9168	9168-156	Jan. 04, 2016	Jan. 03, 2017
RF Cable	8D	966-3-1 966-3-2 966-3-3	Apr. 02, 2016	Apr. 01, 2017
Fixed attenuator Mini-Circuits	UNAT-5+	PAD-3m-3-01	Oct. 05, 2016	Oct. 04, 2017
Horn_Antenna SCHWARZBECK	BBHA9120-D	9120D-406	Jan. 20, 2016	Jan. 19, 2017
Pre-Amplifier Agilent	8449B	3008A02465	Apr. 05, 2016	Apr. 04, 2017
RF Cable	EMC104-SM-SM-2000 EMC104-SM-SM-5000 EMC104-SM-SM-5000	150317 150321 150322	Mar. 30, 2016	Mar. 29, 2017
Spectrum Analyzer Keysight	N9030A	MY54490520	July 29, 2016	July 28, 2017
Pre-Amplifier EMCI	EMC184045	980143	Jan. 15, 2016	Jan. 14, 2017
Horn_Antenna SCHWARZBECK	BBHA 9170	BBHA9170608	Jan. 08, 2016	Jan. 07, 2017
RF Cable	SUCOFLEX 102	36432/2 36441/2	Jan. 16, 2016	Jan. 15, 2017
Software	ADT_Radiated_V8.7.08	NA	NA	NA
Antenna Tower & Turn Table Max-Full	MF-7802	MF780208406	NA	NA
Boresight Antenna Fixture	FBA-01	FBA-SIP01	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 calibration interval of the above test instruments is 24 months and the calibrations are traceable to NML/ROC and NIST/USA.
3. The test was performed in 966 Chamber No. 3.
4. The FCC Site Registration No. is 147459
5 Loop antenna was used for all emissions below 30 MHz.
6. The CANADA Site Registration No. is 20331-1
7 Tested Date:Nov. 16, 2016

For other test items:

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Spectrum Analyzer R&S	FSP 40	100036	Jan. 21, 2013	Jan. 20, 2014
Spectrum Analyzer Agilent	E4446A	MY48250253	Aug. 28, 2013	Aug. 27, 2014
Power meter Anritsu	ML2495A	0824006	May 20, 2013	May 19, 2014
Power sensor Anritsu	MA2411B	0738172	May 20, 2013	May 19, 2014
AC Power Source EXTECH Electronics	6205	1440452	NA	NA
Temperature & Humidity Chamber GIANTFORCE	GTH-150-40-SP-AR	MAA0812-008	Jan. 17, 2013	Jan. 16, 2014
DC Power Supply Topward	6603D	795558	NA	NA
ESG Vector signal generator Agilent	E4438C	MY47271330 506 602 UNJ	Apr. 30, 2013	Apr. 29, 2014
ESG Vector signal generator Agilent	E4438C	MY45094468/0 05 506 602 UK6 UNJ	Dec. 14, 2012	Dec. 13, 2013
Digital Multimeter FLUKE	87III	73680266	Nov. 09, 2012	Nov. 08, 2013

NOTE: 1. The test was performed in Oven room B.
2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
3. Tested Date: Nov. 05, 2013

3 General Information

3.1 General Description of EUT

Product	Terminal	
Brand	XAC	
Test Model	xAPT-103WiFi.3G	
Series Model	xCE_T103WiFi.3G	
Status of EUT	MASS-PRODUCTION	
Power Supply Rating	DC 12V from power adapter	
Modulation Type	GPRS	GMSK
	EDGE	8PSK
	WCDMA, HSDPA, HSUPA	BPSK
Operating Frequency	GPRS, EDGE	1850.2MHz ~1909.8MHz
	WCDMA, HSDPA, HSUPA	1852.4MHz ~1907.6MHz
Max. EIRP Power	GPRS	1548.8mW
	EDGE	707.9mW
	WCDMA	354.8mW
Emission Designator	GPRS	248KGXW
	EDGE	246KG7W
	WCDMA	4M16F9W
Antenna Type	Refer to Note	
Antenna Connector	Refer to Note	
Accessory Device	Adapter (Optional) x 1	
Data Cable Supplied	NA	

Note:

1. All models are listed as below.

Brand	Model	Difference
XAC	xAPT-103WiFi.3G	For marketing requirement
	xCE_T103WiFi.3G	

From the above models, model: **xAPT-103WiFi.3G** was selected as representative model for the test and its data was recorded in this report.

2. The EUT is a WLAN, RFID, GSM and WCDMA device.
3. WLAN, RFID, GSM and WCDMA technology cannot transmit at same time.
4. The EUT power needs to be supplied from one power adapter, the information is as below table:

Brand:	DELTA
Model No.:	ADP-36PH B
Input power :	AC100-240V, 1A, 50-60Hz AC input cable (Unshielded, 1.75m)
Output power :	DC 12V, 3A DC output cable (Unshielded, 0.9 m with one core)

5. The antennas provided to the EUT, please refer to the following table:

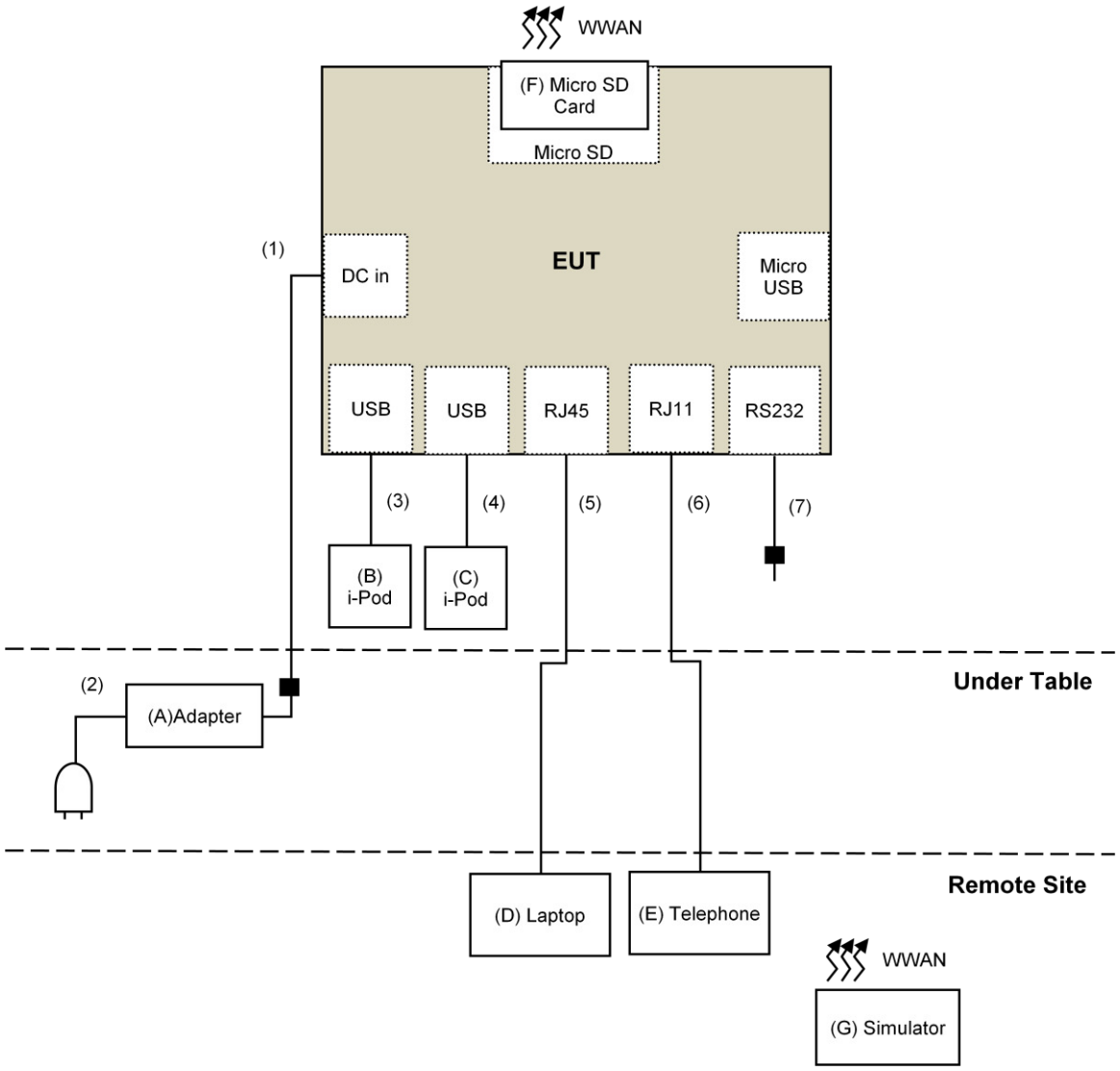
RFID Antenna Spec.					
Brand	Model No.	Antenna Type	Antenna Connector	Gain(dBi)	Frequency (MHz)
XAC	PCB ENIG ANT BOARD (W/KEY) 8006(ROHS)	Loop Antenna	NA	13	13.56

GPRS / WCDMA(UMTS) / HSDPA / EDGE Antenna Spec.					
Brand	Model No.	Antenna Type	Antenna Connector	Gain(dBi)	Frequency (MHz)
Ethertronics Inc.	T-000084-01	FPCB	NA	0.14	850
				2.57	1900

WLAN Antenna Spec.					
Brand	Model No.	Antenna Type	Antenna Connector	Antenna Gain(dBi) <Including cable loss>	Frequency (MHz)
ACX	AT3216-T2R4 PAA	Chip	NA	1.5	2400-2500

6. The above EUT information is declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications or user's manual.

3.2 Configuration of System under Test



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.

No.	Product	Brand	Model No.	Serial No.	FCC ID	Remark
A	Adapter	DELTA	ADP-36PH B	NA	NA	Supplied by Client
B	iPod shuffle	Apple	MC749TA/A	CC4DN25WDFDM	NA	Provided by Lab
C	iPod shuffle	Apple	MD778TA/A	CC4JMA9KF4T1	NA	Provided by Lab
D	Notebook Computer	DELL	E6420	482T3R1	FCC DoC	Provided by Lab
E	Telephone	WONDER	WD-303	7C17KA 05211	NA	Provided by Lab
F	Simulator	R&S	CMU200	121040	NA	Provided by Lab

Note:

All power cords of the above support units are non-shielded (1.8m).

ID	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1	DC Cable	1	0.9	No	1	Supplied by client
2	AC Cable	1	1.75	No	0	Supplied by client
3	USB Cable	1	0.1	Yes	0	Provided by Lab
4	USB Cable	1	0.1	Yes	0	Provided by Lab
5	RJ-45 Cable	1	10	No	0	Provided by Lab
6	RJ-11 Cable	1	10	No	0	Provided by Lab
7	Console Cable	1	1.5	No	1	Supplied by client

Note: The core(s) is(are) originally attached to the cable(s).

3.3 Test Mode Applicability and Tested Channel Detail

GSM1900 MODE

Test Item	Available Channel	Tested Channel	Mode
EIRP	512 to 810	512, 661, 810	GPRS, EDGE
Frequency Stability	512 to 810	661	GPRS
Occupied Bandwidth	512 to 810	512, 661, 810	GPRS, EDGE
Band Edge	512 to 810	512, 810	GPRS, EDGE
Peak to Average Ratio	512 to 810	512, 661, 810	GPRS, EDGE
Conducted Emission	512 to 810	661	GPRS, EDGE
Radiated Emission Below 1GHz	512 to 810	661	GPRS, EDGE
Radiated Emission Above 1GHz	512 to 810	661	GPRS, EDGE

WCDMA II MODE

Test Item	Available Channel	Tested Channel	Mode
EIRP	9262 to 9538	9262, 9400, 9538	WCDMA
Frequency Stability	9262 to 9538	9400	WCDMA
Occupied Bandwidth	9262 to 9538	9262, 9400, 9538	WCDMA
Band Edge	9262 to 9538	9262, 9538	WCDMA
Peak to Average Ratio	9262 to 9538	9262, 9400, 9538	WCDMA
Conducted Emission	9262 to 9538	9400	WCDMA
Radiated Emission Below 1GHz	9262 to 9538	9400	WCDMA
Radiated Emission Above 1GHz	9262 to 9538	9400	WCDMA

Test Condition:

Test Item	Environmental Conditions	Input Power	Tested By
EIRP	25deg. C, 63%RH	120Vac, 60Hz	Robert Cheng
Frequency Stability	25deg. C, 63%RH	120Vac, 60Hz	Robert Cheng
Occupied Bandwidth	25deg. C, 63%RH	120Vac, 60Hz	Robert Cheng
Band Edge	25deg. C, 63%RH	120Vac, 60Hz	Robert Cheng
Peak to Average Ratio	25deg. C, 63%RH	120Vac, 60Hz	Robert Cheng
Condcudeted Emission	25deg. C, 63%RH	120Vac, 60Hz	Robert Cheng
Radiated Emission Below 1GHz	25deg. C, 67%RH	120Vac, 60Hz	Weiwei Lo
Radiated Emission Above 1GHz	25deg. C, 67%RH	120Vac, 60Hz	Weiwei Lo

3.4 EUT Operating Conditions

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 24

KDB 971168 D01 Power Meas License Digital Systems v02r02

ANSI/TIA/EIA-603-D 2010

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

4 Test Types and Results

4.1 Output Power Measurement

4.1.1 Limits of Output Power Measurement

Mobile / Portable station are limited to 2 watts e.i.r.p.

4.1.2 Test Procedures

ERP / EIRP Measurement:

a. All measurements were done at low, middle and high operational frequency range. Set the RBW ≥OBW and VBW≥3xRBW.

b. Substitution method is used for EIRP 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.

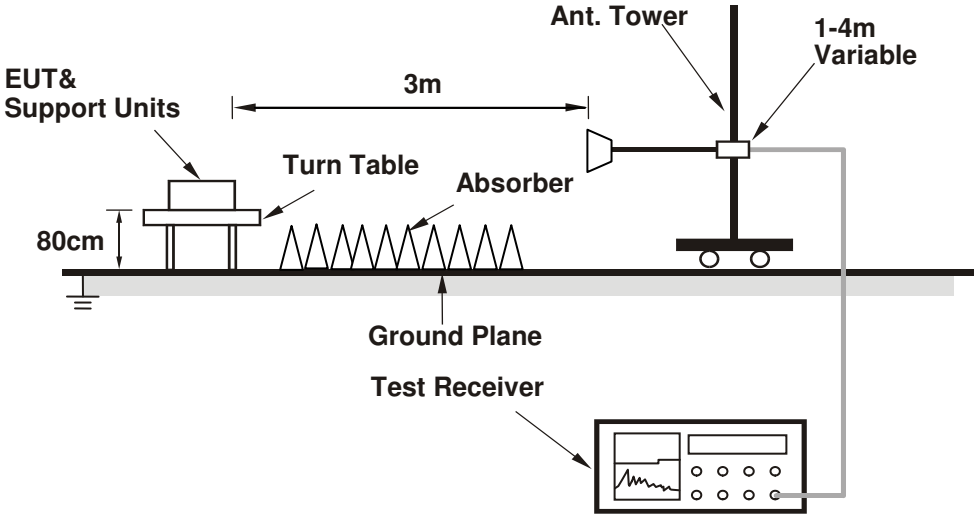
Conducted Power Measurement:

The EUT was set up for the maximum power with GPRS, EDGE, 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.

Note: The worst case vertical or horizontal polarization have been investigated and reported in this report.

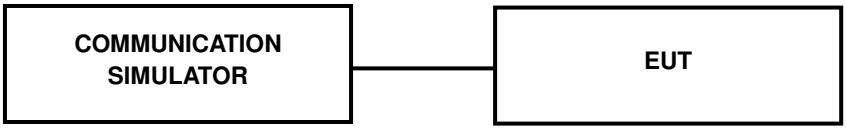
4.1.3 Test Setup

ERP / EIRP MEASUREMENT:



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

CONDUCTED POWER MEASUREMENT:



4.1.4 Test Results

CONDUCTED OUTPUT POWER (dBm)

Band	GPRS1900		
Channel	512	661	810
Frequency (MHz)	1850.2	1880.0	1909.8
GPRS 8	28.9	28.8	29.4
GPRS 10	26.0	25.9	26.3
GPRS 11	24.2	24.0	24.4
GPRS 12	22.9	22.8	23.1
EDGE 8 (MCS9)	24.9	24.7	25.0
EDGE 10 (MCS9)	22.6	22.4	22.5
EDGE 11 (MCS9)	20.3	20.1	20.3
EDGE 12 (MCS9)	18.9	19.0	19.3

Band	WCDMA II		
Channel	9262	9400	9538
Frequency (MHz)	1852.4	1880.0	1907.6
RMC	23.8	23.6	23.5
HSDPA Subtest-1	23.6	23.1	22.9
HSDPA Subtest-2	23.3	23.1	23.0
HSDPA Subtest-3	23.4	23.2	23.1
HSDPA Subtest-4	23.5	22.7	22.8
HSUPA Subtest-1	23.6	22.3	22.7
HSUPA Subtest-2	23.5	22.2	22.6
HSUPA Subtest-3	23.7	22.3	22.7
HSUPA Subtest-4	23.5	22.4	22.5
HSUPA Subtest-5	23.3	22.4	22.3

EIRP POWER (dBm)

GPRS

Channel	Frequency (MHz)	Antenna Polarization	LVL (dBm)	Correction Factor(dB)	EIRP(dBm)	EIRP(mW)
512	1850.2	H	25.1	6.6	31.7	1479.1
661	1880.0	H	25.1	6.7	31.8	1513.6
810	1909.8	H	25.2	6.7	31.9	1548.8

EDGE

Channel	Frequency (MHz)	Antenna Polarization	LVL (dBm)	Correction Factor(dB)	EIRP(dBm)	EIRP(mW)
512	1850.2	H	21.5	6.6	28.1	645.7
661	1880.0	H	21.5	6.7	28.2	660.7
810	1909.8	H	21.8	6.7	28.5	707.9

WCDMA

Channel	Frequency (MHz)	Antenna Polarization	LVL (dBm)	Correction Factor(dB)	EIRP(dBm)	EIRP(mW)
9262	1852.4	H	17.9	6.6	24.5	281.8
9400	1880.0	H	18.8	6.7	25.5	354.8
9538	1907.6	H	18.7	6.7	25.4	346.7

REMARKS: 1. EIRP Output Power (dBm) = SPA Reading (dBm) + Correction Factor (dB).

2. ERP power = EIPR power - 2.15dBi.

3. Correction factor (dB) = Free Space Loss + Antenna Factor + Cable Loss.

4.2 Frequency Stability Measurement

4.2.1 Limits of Frequency Stabiliity Measurement

The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

4.2.2 Test Procedure

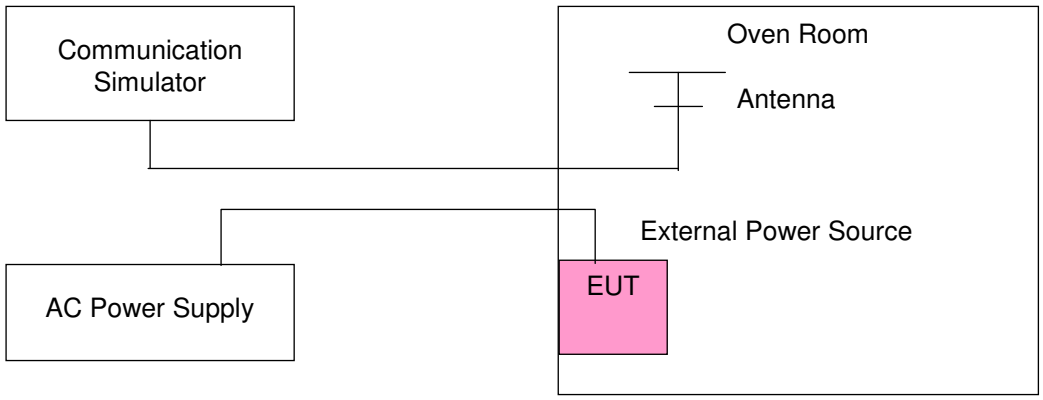
a. Device is placed at the oven room. The oven room could control the temperatures and humidity. Power warm up is at least 15 min and power applied should perform before recording frequency error.

b. EUT is connected the external power supply to control the AC input power. The test voltage range is from minimum to maximum working voltage. 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. 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)
	GPRS	EDGE	WCDMA	
102	0.006	0.007	0.008	2.5
138	0.006	0.006	0.007	2.5

Frequency Error vs. Temperature.

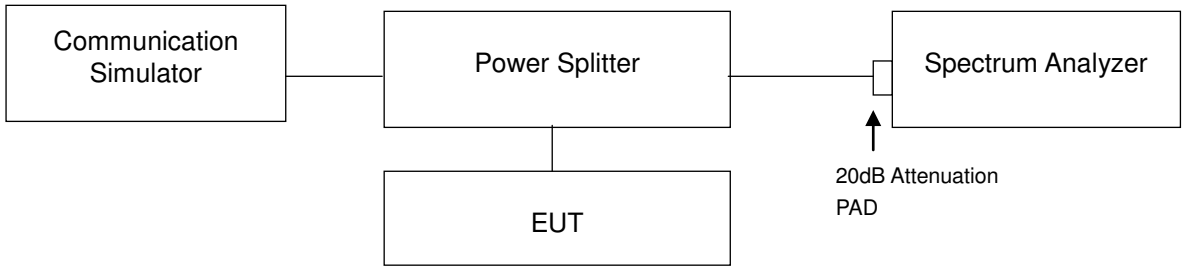
TEMP. (℃)	Frequency Error (ppm)			Limit (ppm)
	GPRS	EDGE	WCDMA	
50	0.011	0.013	0.011	2.5
40	0.011	0.013	0.010	2.5
30	0.008	0.011	0.010	2.5
20	0.007	0.011	0.009	2.5
10	0.007	0.010	0.009	2.5
0	0.011	0.010	0.010	2.5
-10	0.012	0.013	0.012	2.5
-20	0.014	0.014	0.013	2.5
-30	0.016	0.016	0.014	2.5

4.3 Occupied Bandwidth Measurement

4.3.1 Test Procedure

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

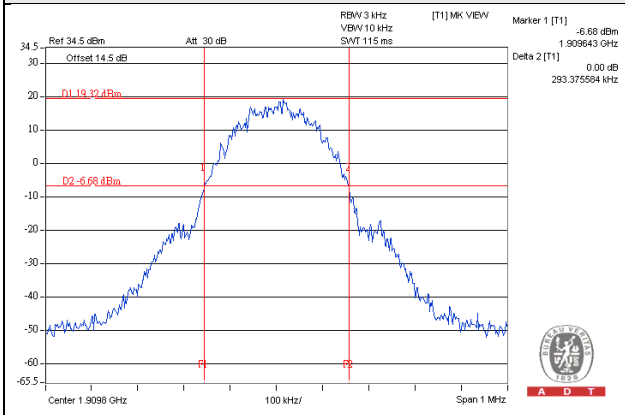


4.3.3 Test Result (-26dB Bandwidth)

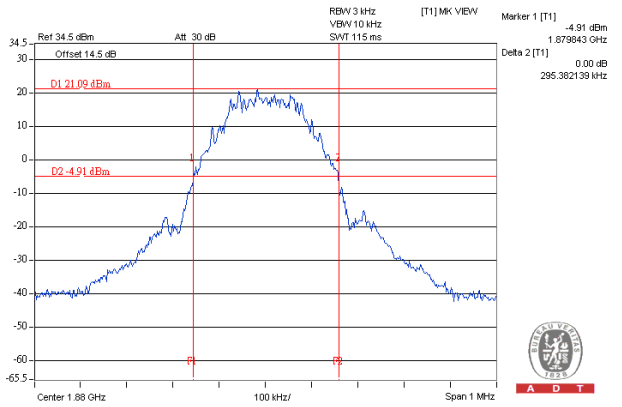
Channel	Frequency (MHz)	-26dB Bandwidth (kHz)		Channel	FREQ. (MHz)	-26dB Bandwidth (MHz)
		GPRS	EDGE			WCDMA
512	1850.2	291	283	9262	1852.4	4.67
661	1880.0	292	295	9400	1880.0	4.68
810	1909.8	293	291	9538	1907.6	4.67

Spectrum Plot Of Worst Value

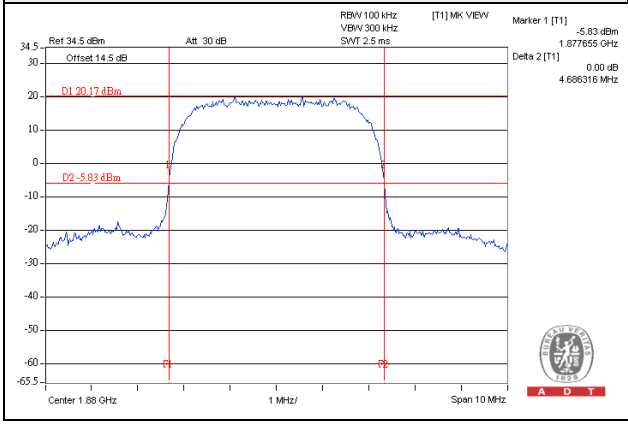
GPRS



EDGE



WCDMA

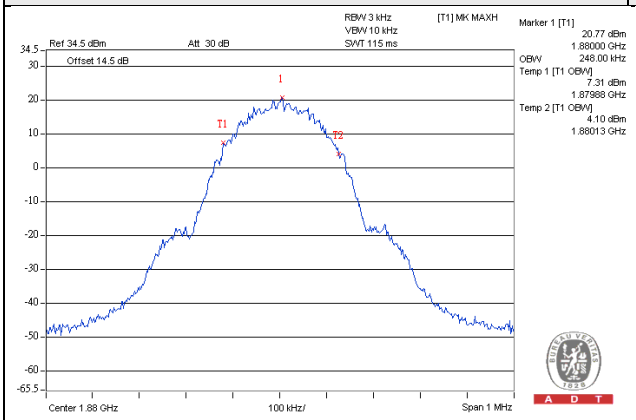


4.3.4 Test Result (Occupied Bandwidth)

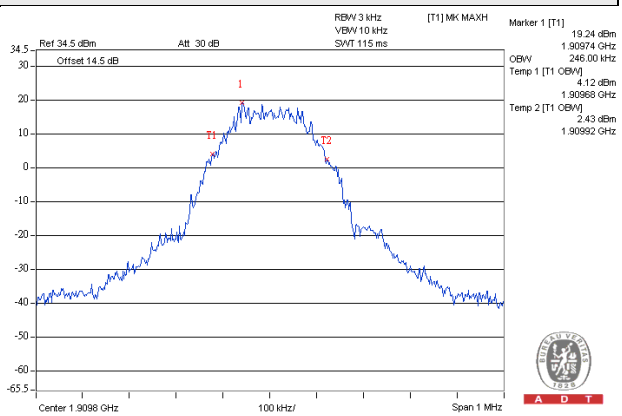
Channel	Frequency (MHz)	99% Occupied Bandwidth (kHz)		Channel	FREQ. (MHz)	99% Occupied Bandwidth (MHz)
		GPRS	EDGE			WCDMA
512	1850.2	242.0	244.0	9262	1852.4	4.16
661	1880.0	248.0	238.0	9400	1880.0	4.16
810	1909.8	244.0	246.0	9538	1907.6	4.16

Spectrum Plot Of Worst Value

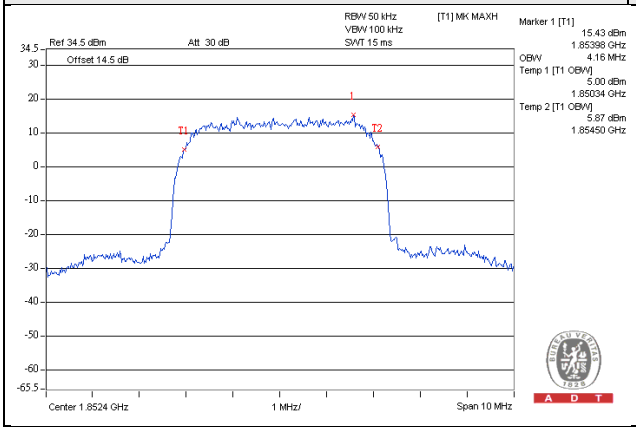
GPRS



EDGE



WCDMA

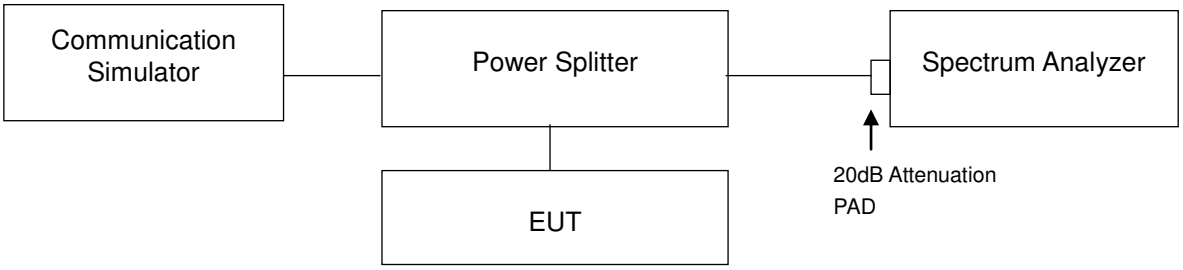


4.4 Band Edge Measurement

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.

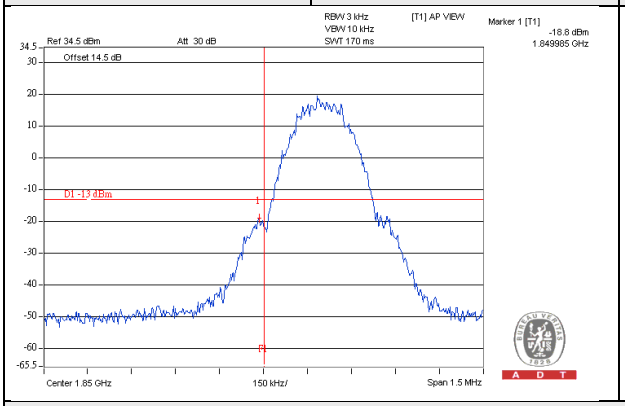
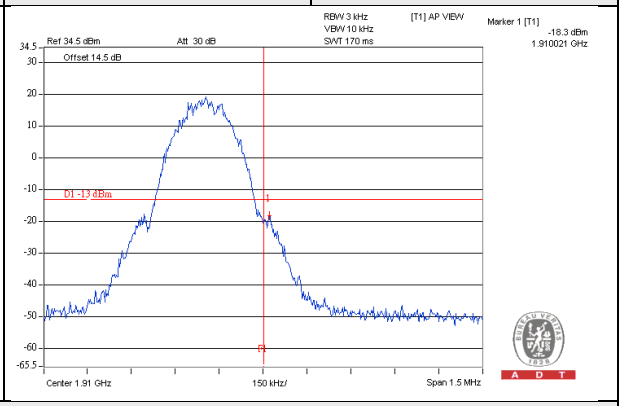
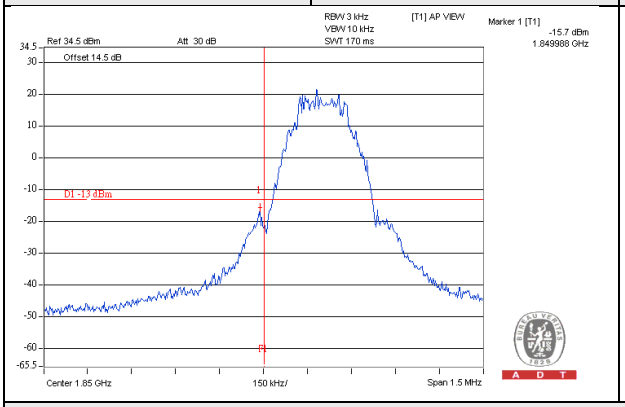
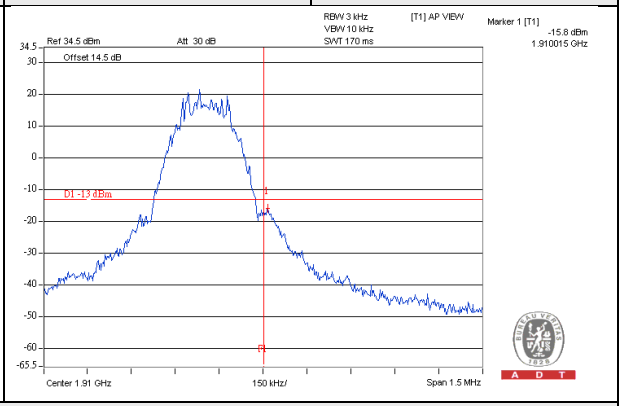
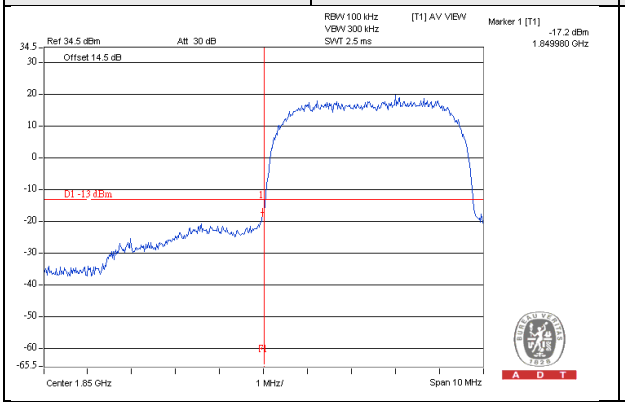
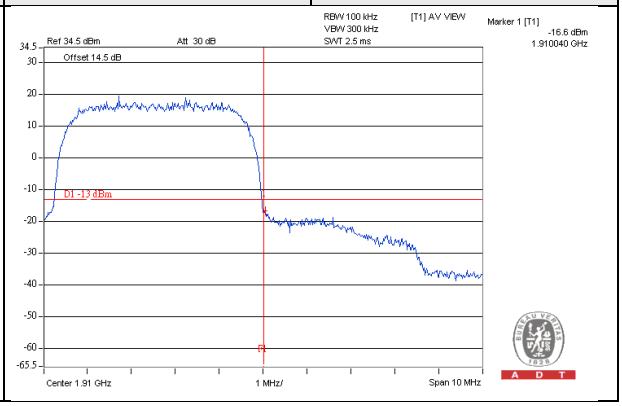
4.4.2 Test Setup



4.4.3 Test Procedures

a. All measurements were done at low and high operational frequency range.
b. The center frequency of spectrum is the band edge frequency and s RB of the spectrum is >1% EMISSION BANDWIDTH and VB of the spectrum is ≧ 3*RB.
c. Record the max trace plot into the test report.

4.4.4 Test Results

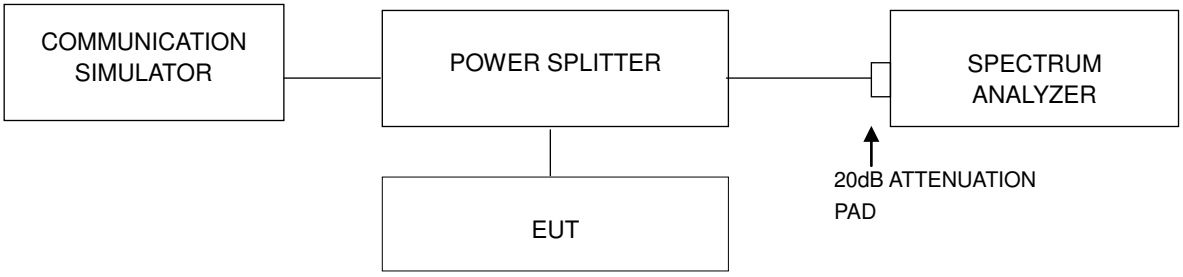
GPRS			
Channel	512	Channel	810
			
EDGE			
Channel	512	Channel	810
			
WCDMA			
Channel	9262	Channel	9538
			

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

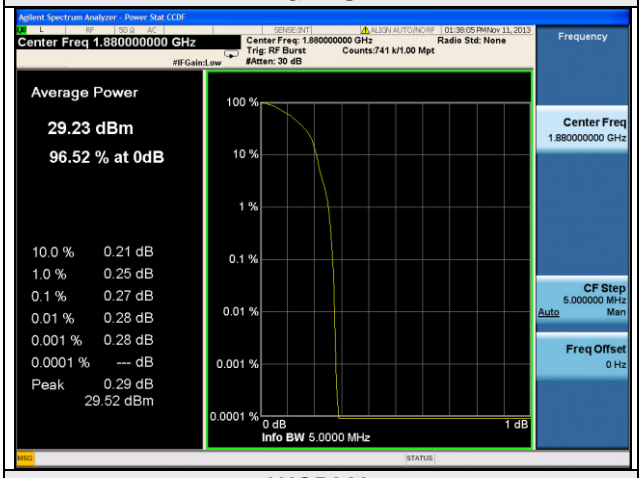
1. Set resolution/measurement bandwidth ≥ signal's occupied bandwidth;
2. Set the number of counts to a value that stabilizes the measured CCDF curve;
3. Record the maximum PAPR level associated with a probability of 0.1%.

4.5.4 Test Results

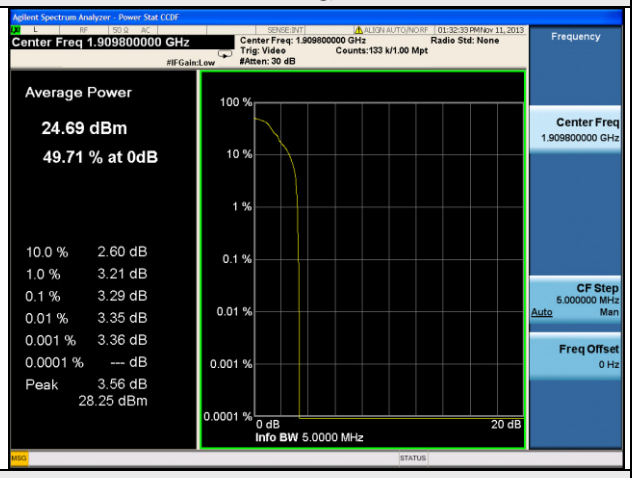
Channel	Frequency (MHz)	Peak to Average Ratio (dB)		Channel	Freq. (MHz)	Peak to Average Ratio (dB)
		GPRS	EDGE			WCDMA
512	1850.2	0.2	3.2	9262	1852.4	3.13
661	1880.0	0.27	3.27	9400	1880	3.09
810	1909.8	0.27	3.29	9538	1907.6	3.07

Spectrum Plot Of Worst Value

GPRS



EDGE



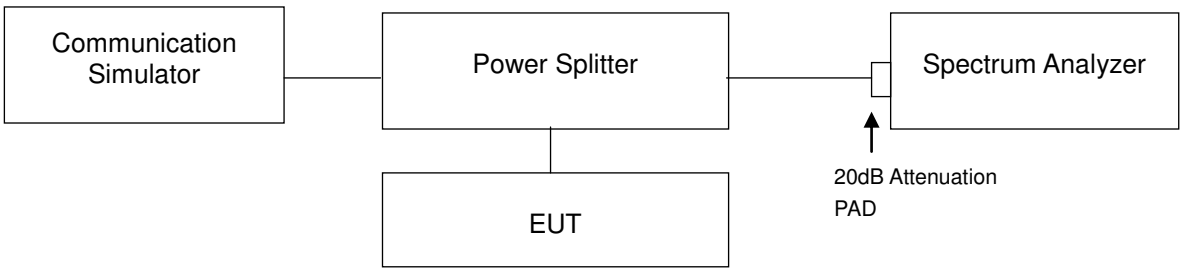
WCDMA

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.

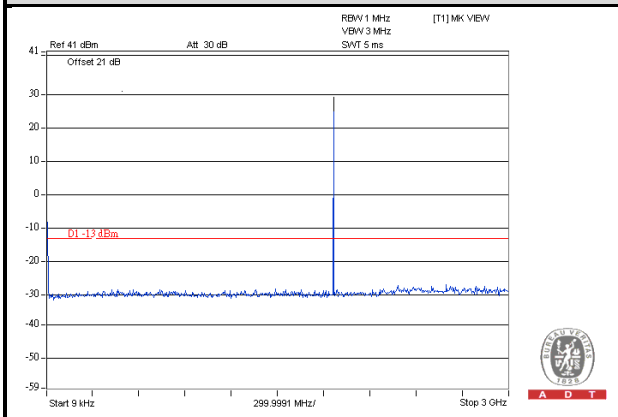
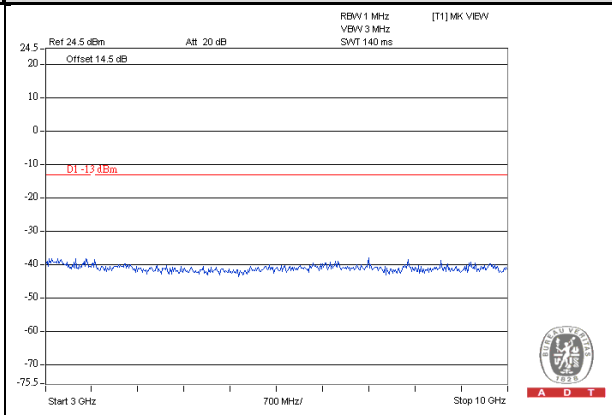
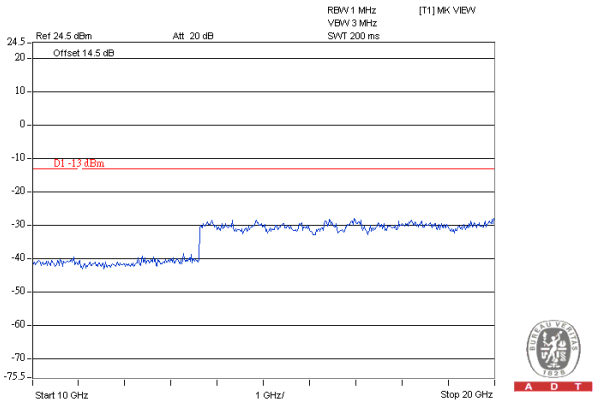
4.6.2 Test Setup



4.6.3 Test Procedure

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

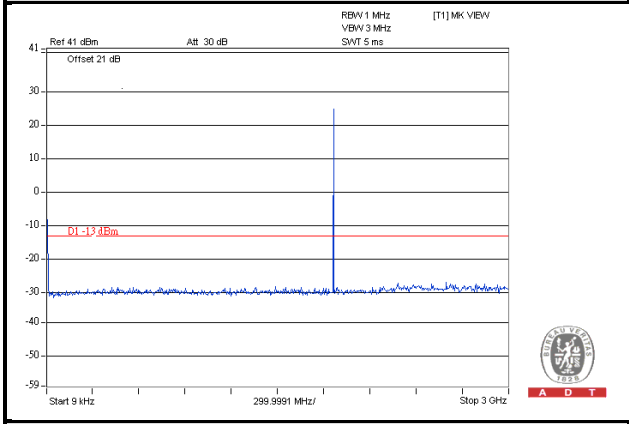
4.6.4 Test Results

GPRS	
CHANNEL 661	
FREQUENCY RANGE : 9kHz~3GHz	FREQUENCY RANGE : 3GHz~10GHz
	
FREQUENCY RANGE : 10GHz~20GHz	
	

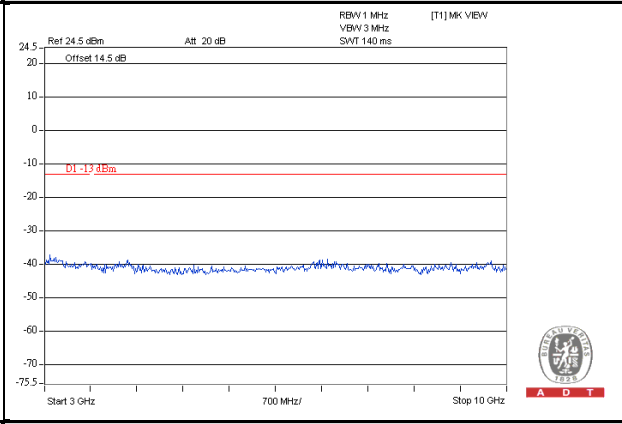
EDGE

CHANNEL 661

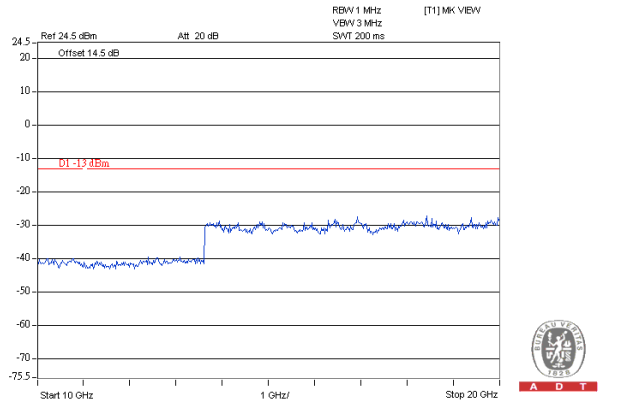
FREQUENCY RANGE : 9kHz~3GHz

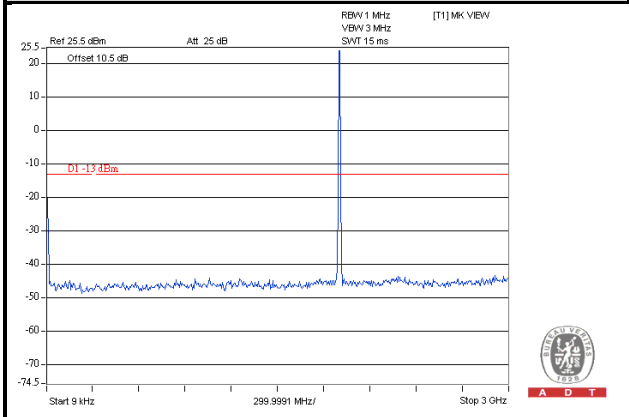
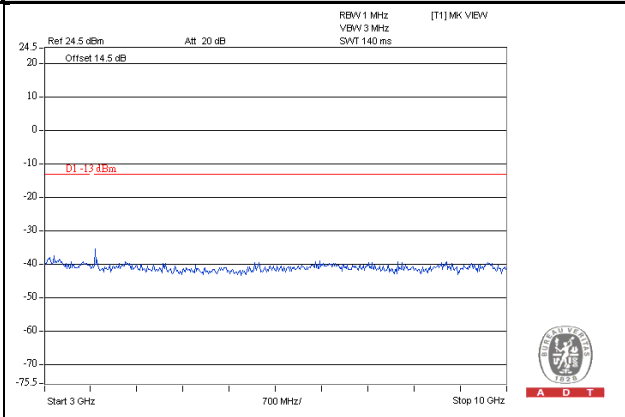
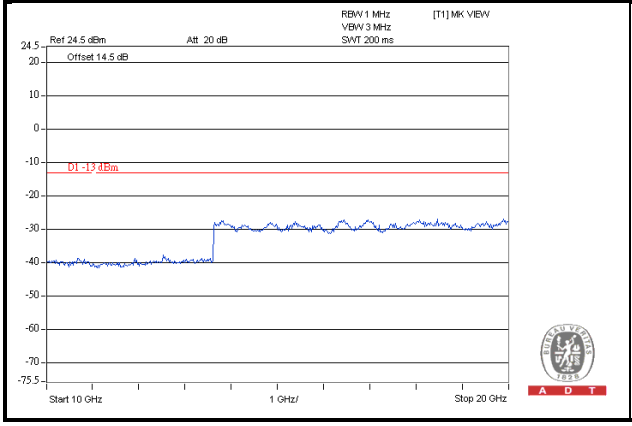


FREQUENCY RANGE : 3GHz~10GHz



FREQUENCY RANGE : 10GHz~20GHz



WCDMA	
CHANNEL 9400	
FREQUENCY RANGE : 9kHz~3GHz	FREQUENCY RANGE : 3GHz~10GHz
	
FREQUENCY RANGE : 10GHz~20GHz	
	

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. The power was measured with Spectrum Analyzer. All measurements were done at 3 channels (low, middle and high channel of operational frequency range.)

b. Substitution method is used for EIRP 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.

e. ERP power can be calculated form EIRP power by subtracting the gain of dipole, ERP power = EIPR power - 2.15dBi.

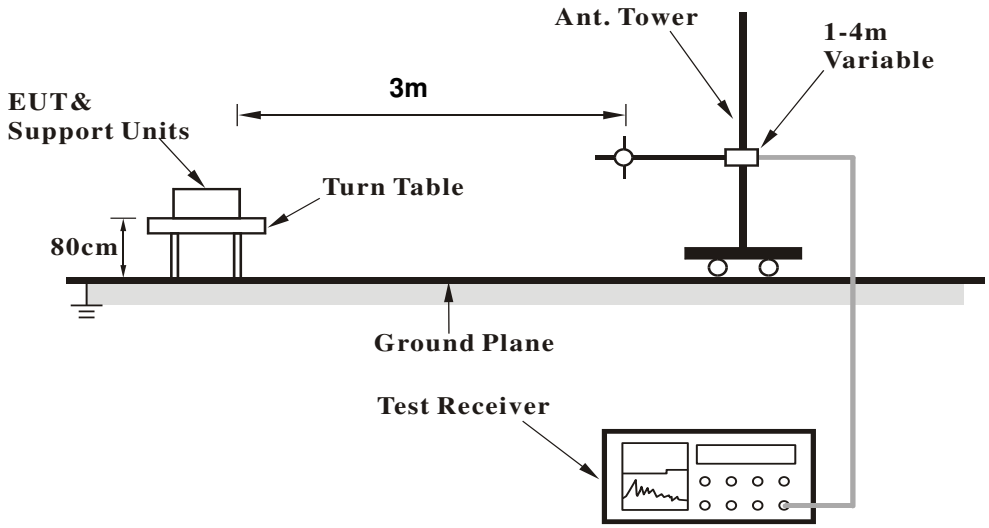
NOTE: The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1MHz/3MHz.

4.7.3 Deviation from Test Standard

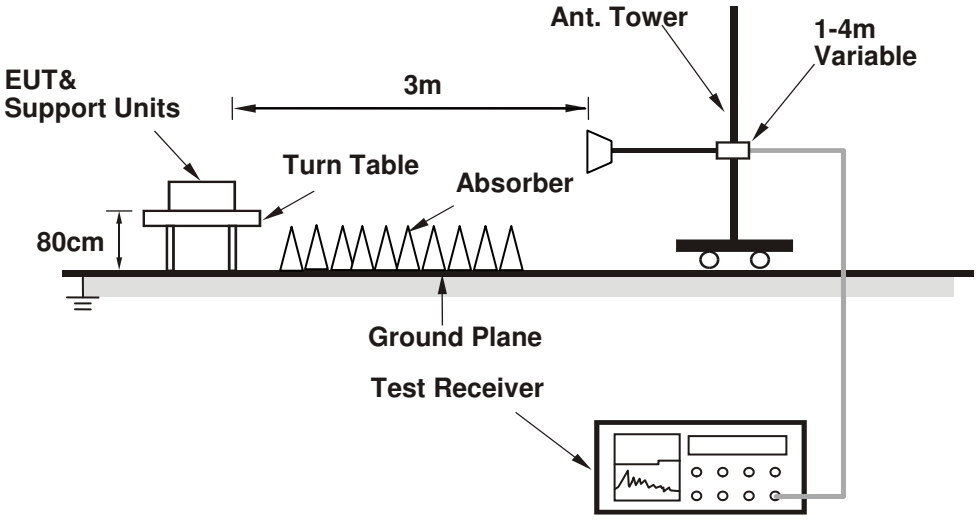
No deviation.

4.7.4 Test Setup

For Below 1GHz



For Above 1GHz:



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

4.7.5 Test Results

BELOW 1GHz

GPRS:

Mode	TX channel 661	Frequency Range	Below 1000 MHz

Antenna Polarity & Test Distance: Horizontal at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	Emission Value (dBm)	Limit (dBm)	Margin (dB)
1	92.64	39.73	-52.21	-1.05	-53.26	-13	-40.26
2	237.24	39.22	-56.14	3.85	-52.29	-13	-39.29
3	289.21	36.39	-59.07	3.78	-55.28	-13	-42.28
4	345.83	36.46	-61.23	3.60	-57.63	-13	-44.63
5	471.6	39.14	-57.93	2.84	-55.09	-13	-42.09
6	736.41	34.94	-61.42	1.03	-60.39	-13	-47.39
Antenna Polarity & Test Distance: Vertical at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	Emission Value (dBm)	Limit (dBm)	Margin (dB)
1	69.37	37.50	-50.24	-4.86	-55.10	-13	-42.10
2	94.11	36.60	-55.09	-0.97	-56.05	-13	-43.05
3	130.25	32.18	-59.64	-1.25	-60.89	-13	-47.89
4	238.15	35.88	-59.48	3.84	-55.64	-13	-42.64
5	509.86	37.06	-58.34	2.82	-55.53	-13	-42.53
6	609.28	37.50	-57.19	1.78	-55.41	-13	-42.41

Remarks:
1. Emission Value (dBm) = S.G Value (dBm) + Correction Factor (dB).
2. Correction Factor (dB) = Substitution Antenna Gain (dB) + Cable Loss (dB).

EDGE:

Mode	TX channel 661	Frequency Range	Below 1000 MHz

Antenna Polarity & Test Distance: Horizontal at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	Emission Value (dBm)	Limit (dBm)	Margin (dB)
1	92.34	39.63	-52.36	-1.07	-53.43	-13	-40.43
2	237.85	39.87	-55.49	3.84	-51.65	-13	-38.65
3	290	37.07	-58.41	3.78	-54.63	-13	-41.63
4	346.19	37.52	-60.19	3.60	-56.58	-13	-43.58
5	469.69	39.34	-57.84	2.84	-55.00	-13	-42.00
6	736.14	35.12	-61.24	1.04	-60.21	-13	-47.21
Antenna Polarity & Test Distance: Vertical at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	Emission Value (dBm)	Limit (dBm)	Margin (dB)
1	69.16	37.71	-49.90	-4.92	-54.83	-13	-41.83
2	95.1	37.05	-54.47	-0.91	-55.37	-13	-42.37
3	128.76	32.32	-59.18	-1.24	-60.42	-13	-47.42
4	237.36	34.97	-60.39	3.85	-56.54	-13	-43.54
5	509.12	36.12	-59.29	2.82	-56.47	-13	-43.47
6	610.01	37.71	-56.99	1.78	-55.20	-13	-42.20

Remarks:
1. Emission Value (dBm) = S.G Value (dBm) + Correction Factor (dB).
2. Correction Factor (dB) = Substitution Antenna Gain (dB) + Cable Loss (dB).

WCDMA:

Mode	TX channel 9400	Frequency Range	Below 1000 MHz

Antenna Polarity & Test Distance: Horizontal at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	Emission Value (dBm)	Limit (dBm)	Margin (dB)
1	91.79	40.09	-51.99	-1.10	-53.09	-13	-40.09
2	235.98	39.37	-56.00	3.87	-52.13	-13	-39.13
3	288.59	37.52	-57.92	3.79	-54.13	-13	-41.13
4	347.54	36.50	-61.26	3.60	-57.66	-13	-44.66
5	471.03	39.27	-57.84	2.84	-54.99	-13	-41.99
6	737.48	34.17	-62.20	1.02	-61.18	-13	-48.18
Antenna Polarity & Test Distance: Vertical at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	Emission Value (dBm)	Limit (dBm)	Margin (dB)
1	67.97	37.31	-49.59	-5.27	-54.86	-13	-41.86
2	95.14	37.18	-54.33	-0.91	-55.24	-13	-42.24
3	129.94	32.40	-59.36	-1.25	-60.60	-13	-47.60
4	237.76	34.92	-60.44	3.84	-56.60	-13	-43.60
5	509.28	36.04	-59.37	2.82	-56.55	-13	-43.55
6	609.86	37.47	-57.22	1.78	-55.44	-13	-42.44

Remarks:
1. Emission Value (dBm) = S.G Value (dBm) + Correction Factor (dB).
2. Correction Factor (dB) = Substitution Antenna Gain (dB) + Cable Loss (dB).

ABOVE 1GHz

GPRS:

Mode	TX channel 661	Frequency Range	Above 1000MHz

Antenna Polarity & Test Distance: Horizontal at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	Emission Value (dBm)	Limit (dBm)	Margin (dB)
1	3760	44.73	-60.07	7.42	-52.64	-13	-39.64
2	5640	47.9	-56.24	6.19	-50.05	-13	-37.05
3	7520	53.97	-48.65	4.20	-44.45	-13	-31.45
4	9400	53.51	-48.52	3.50	-45.03	-13	-32.03
5	11280	56.64	-44.67	4.38	-40.29	-13	-27.29
6	13160	57.64	-40.01	3.42	-36.59	-13	-23.59
7	15040	58.15	-40.90	3.00	-37.90	-13	-24.90
8	16920	62.94	-37.43	3.72	-33.72	-13	-20.72
9	18800	64.72	-46.99	4.12	-42.86	-13	-29.86
Antenna Polarity & Test Distance: Vertical at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	Emission Value (dBm)	Limit (dBm)	Margin (dB)
1	3760	39.12	-65.68	7.42	-58.25	-13	-45.25
2	5640	46.08	-58.06	6.19	-51.87	-13	-38.87
3	7520	51.96	-50.66	4.20	-46.46	-13	-33.46
4	9400	51.85	-50.18	3.50	-46.69	-13	-33.69
5	11280	54.18	-47.13	4.38	-42.75	-13	-29.75
6	13160	58.91	-38.74	3.42	-35.32	-13	-22.32
7	15040	57.56	-41.49	3.00	-38.49	-13	-25.49
8	16920	61.19	-39.18	3.72	-35.47	-13	-22.47
9	18800	65.39	-46.32	4.12	-42.19	-13	-29.19

Remarks:

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

EDGE:

Mode	TX channel 661	Frequency Range	Above 1000MHz

Antenna Polarity & Test Distance: Horizontal at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	Emission Value (dBm)	Limit (dBm)	Margin (dB)
1	3760	40.09	-64.67	7.41	-57.26	-13	-44.26
2	5640	45.05	-59.09	6.10	-52.99	-13	-39.99
3	7520	51.32	-51.32	4.21	-47.10	-13	-34.10
4	9400	51.37	-50.56	3.41	-47.15	-13	-34.15
5	11280	53.78	-47.37	4.40	-42.96	-13	-29.96
6	13160	57.44	-40.02	3.60	-36.42	-13	-23.42
7	15040	57.49	-41.68	2.95	-38.74	-13	-25.74
8	16920	60.32	-40.15	3.77	-36.37	-13	-23.37
9	18800	64.54	-48.09	4.16	-43.93	-13	-30.93
Antenna Polarity & Test Distance: Vertical at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	Emission Value (dBm)	Limit (dBm)	Margin (dB)
1	3760	44	-60.76	7.41	-53.35	-13	-40.35
2	5640	48.8	-55.34	6.10	-49.24	-13	-36.24
3	7520	52.92	-49.72	4.21	-45.50	-13	-32.50
4	9400	53.43	-48.50	3.41	-45.09	-13	-32.09
5	11280	56.13	-45.02	4.40	-40.61	-13	-27.61
6	13160	58.88	-38.58	3.60	-34.98	-13	-21.98
7	15040	58.14	-41.03	2.95	-38.09	-13	-25.09
8	16920	62.66	-37.81	3.77	-34.03	-13	-21.03
9	18800	63.88	-48.75	4.16	-44.59	-13	-31.59

Remarks:

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

WCDMA:

Mode	TX channel 9400	Frequency Range	Above 1000MHz

Antenna Polarity & Test Distance: Horizontal at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	Emission Value (dBm)	Limit (dBm)	Margin (dB)
1	3760	50.03	-54.69	7.39	-47.30	-13	-34.30
2	5640	47.55	-56.59	6.01	-50.58	-13	-37.58
3	7520	54.22	-48.45	4.22	-44.23	-13	-31.23
4	9400	52.09	-50.31	3.34	-46.97	-13	-33.97
5	11280	53.66	-47.32	4.42	-42.90	-13	-29.90
6	13160	56.45	-40.82	3.78	-37.05	-13	-24.05
7	15040	56.56	-42.74	2.89	-39.84	-13	-26.84
8	16920	62.84	-37.73	3.83	-33.89	-13	-20.89
9	18800	63.01	-50.54	4.19	-46.35	-13	-33.35
Antenna Polarity & Test Distance: Vertical at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	Emission Value (dBm)	Limit (dBm)	Margin (dB)
1	3760	47.92	-56.80	7.39	-49.41	-13	-36.41
2	5640	47.24	-56.90	6.01	-50.89	-13	-37.89
3	7520	52	-50.67	4.22	-46.45	-13	-33.45
4	9400	52.44	-49.96	3.34	-46.62	-13	-33.62
5	11280	54.04	-46.94	4.42	-42.52	-13	-29.52
6	13160	59.16	-38.11	3.78	-34.34	-13	-21.34
7	15040	57.93	-41.37	2.89	-38.47	-13	-25.47
8	16920	61.53	-39.04	3.83	-35.20	-13	-22.20
9	18800	63.77	-49.78	4.19	-45.59	-13	-32.59

Remarks:
1. Emission Value (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:

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

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