

# FCC Radio Test Report

## FCC ID: 2ALJ8-CTL001A

This report concerns (check one): Original Grant Class II Change

**Project No.** : 1702C003  
**Equipment** : WCDMA/GPRS Wireless Data Terminal  
**Test Model** : CTL-001A  
**Series Model** : CTL-001  
**Applicant** : Cathay Tri-Tech.,Inc  
**Address** : 3-24-5,Shinyokohama Kohoku-ku,Yokohama  
222-0033,Japan

**Date of Receipt** : Feb. 05, 2017  
**Date of Test** : Feb. 05, 2017 ~ Apr. 07, 2017  
**Issued Date** : Apr. 10, 2017  
**Tested by** : BTL Inc.

**Technical Engineer** : Shawn Xiao  
(Shawn Xiao)

**Authorized Signatory** : Steven Lu  
(Steven Lu)

## B T L I N C .

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**Table of Contents**

	<b>Page</b>
<b>REPORT ISSUED HISTORY</b>	<b>5</b>
<b>1 . CERTIFICATION</b>	<b>6</b>
<b>2 . SUMMARY OF TEST RESULTS</b>	<b>7</b>
<b>2.1 TEST FACILITY</b>	<b>8</b>
<b>2.2 MEASUREMENT UNCERTAINTY</b>	<b>8</b>
<b>3 . GENERAL INFORMATION</b>	<b>9</b>
<b>3.1 GENERAL DESCRIPTION OF EUT</b>	<b>9</b>
<b>3.2 DESCRIPTION OF TEST MODES AND TEST CONDITION</b>	<b>10</b>
<b>3.3 BLOCKDIAGRAMSHOWINGTHECONFIGURATIONOFSYSTEMTESTED FOR RADIATED</b>	<b>11</b>
<b>3.4 DESCRIPTION OF SUPPORT UNITS</b>	<b>11</b>
<b>4 . TEST RESULT</b>	<b>12</b>
<b>4.1 OUTPUT POWER MEASUREMENT</b>	<b>12</b>
<b>4.1.1 LIMIT</b>	<b>12</b>
<b>4.1.2 TEST PROCEDURE</b>	<b>12</b>
<b>4.1.3 TESTSETUP LAYOUT</b>	<b>12</b>
<b>4.1.4 TEST DEVIATION</b>	<b>12</b>
<b>4.1.5 TEST RESULTS</b>	<b>12</b>
<b>4.2 OCCUPIED BANDWIDTH MEASUREMENT</b>	<b>13</b>
<b>4.2.1 TEST PROCEDURE</b>	<b>13</b>
<b>4.2.2 TEST SETUP LAYOUT</b>	<b>13</b>
<b>4.2.3 TEST DEVIATION</b>	<b>13</b>
<b>4.2.4 TEST RESULTS</b>	<b>13</b>
<b>4.3 CONDUCTED EMISSIONS MEASUREMENT</b>	<b>14</b>
<b>4.3.1 LIMIT</b>	<b>14</b>
<b>4.3.2 TEST PROCEDURES</b>	<b>14</b>
<b>4.3.3 TESTSETUP LAYOUT</b>	<b>14</b>
<b>4.3.4 TESTDEVIATION</b>	<b>14</b>
<b>4.3.5 TEST RESULTS</b>	<b>14</b>
<b>4.4 RADIATED EMISSIONS MEASUREMENT</b>	<b>15</b>
<b>4.4.1 LIMIT</b>	<b>15</b>
<b>4.4.2 TEST PROCEDURES</b>	<b>15</b>
<b>4.4.3 TESTSETUP LAYOUT</b>	<b>15</b>
<b>4.4.4 TESTDEVIATION</b>	<b>15</b>
<b>4.4.5 TEST RESULTS</b>	<b>15</b>
<b>4.5 BAND EDGE MEASUREMENT</b>	<b>16</b>
<b>4.5.1 LIMIT</b>	<b>16</b>

Table of Contents	Page
4.5.2 TEST PROCEDURES	16
4.5.3 TESTSETUP LAYOUT	16
4.5.4 TESTDEVIATION	16
4.5.5 TEST RESULTS	16
4.6 PEAK TO AVERAGE RATIO MEASUREMENT	17
4.6.1 LIMIT	17
4.6.2 TEST PROCEDURES	17
4.6.3 TESTSETUP LAYOUT	17
4.6.4 TESTDEVIATION	17
4.6.5 TEST RESULTS	17
4.7 FREQUENCY STABILITY MEASUREMENT	18
4.7.1 LIMIT	18
4.7.2 TEST PROCEDURES	18
4.7.3 TESTSETUP LAYOUT	18
4.7.4 TESTDEVIATION	18
4.7.5 TEST RESULTS	18
<b>5. LIST OF MEASUREMENT EQUIPMENTS</b>	<b>19</b>
<b>5 . EUT TEST PHOTO</b>	<b>21</b>
<b>ATTACHMENT A - OUTPUT POWER</b>	<b>24</b>
<b>ATTACHMENT B - OCCUPIED BANDWIDTH</b>	<b>27</b>
<b>ATTACHMENT C - CONDUCTED EMISSIONS</b>	<b>32</b>
<b>ATTACHMENT D - RADIATED EMISSION</b>	<b>36</b>
<b>ATTACHMENT E - BAND EDGE</b>	<b>57</b>
<b>ATTACHMENT F - PEAK TO AVERAGE RATIO</b>	<b>60</b>
<b>ATTACHMENT G - FREQUENCY STABILITY</b>	<b>64</b>

**REPORT ISSUED HISTORY**

Issued No.	Description	Issued Date
BTL-FCCP-1-1702C003	Original Issue.	Apr. 10, 2017

## 1. CERTIFICATION

Equipment : WCDMA/GPRS Wireless Data Terminal  
Brand Name : Cathay Tri-Tech.,Inc  
Test Model : CTL-001A  
Series Model : CTL-001  
Applicant : Cathay Tri-Tech.,Inc  
Manufacturer : Cathay Tri-Tech.,Inc  
Address : 3-24-5,Shinyokohama Kohoku-ku,Yokohama 222-0033,Japan  
Factory : Shanghai Simcom Wireless Solutions Limited  
Address : SIM Technology Building, No.633 Jinzhong Road, Changning District, Shanghai P.R.China 200335  
Date of Test : Feb. 05, 2017 ~ Apr. 07, 2017  
Test Sample : Engineering Sample  
Standard(s) : 47 CFR FCC Part 22 Subpart H  
47 CFR FCC Part 2  
ANSI/TIA-603-D-2010  
KDB 971168 D01 Power Meas License Digital Systems v02r02

The above equipment has been tested and found compliance with the requirement of the relative standards by BTL Inc.

The test data, data evaluation, and equipment configuration contained in our test report (Ref No. BTL-FCCP-1-1702C003) were obtained utilizing the test procedures, test instruments, test sites that has been accredited by the Authority of TAF according to the ISO-17025 quality assessment standard and technical standard(s).

**Test result included in this report is only for the GSM850, WCDMA Band 5 part.**

## 2. SUMMARY OF TEST RESULTS

Test procedures according to the technical standard(s):

FCC Part 22 Subpart H & Part 2			
Standard(s) Section	Test Item	Judgment	Tested By
2.1046 22.913(a)	Radiated power	PASS	Paul Li
2.1046 22.913(a)	Conducted Output Power	PASS	Paul Li
2.1049(h) 22.917(a)	Occupied Bandwidth	PASS	Paul Li
2.1051 22.917(a)	Conducted Spurious Emissions	PASS	Paul Li
2.1053 22.917(a)	Radiated Spurious Emissions	PASS	Paul Li
22.917(a)	Band Edge Measurements	PASS	Paul Li
-	Peak To Average Ratio	PASS	Paul Li
2.1055 22.355	Frequency Stability	PASS	Paul Li

NOTE:

(1)" N/A" denotes test is not applicable to this device.

## 2.1 TEST FACILITY

The test facilities used to collect the test data in this report is at the location of No.3, Jinshagang 1st Road, Shixia, Dalang Town, Dongguan, Guangdong, China.  
BTL's test firm number for FCC: 319330

## 2.2 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. The BTL measurement uncertainty is less than the CISPR 16-4-2  $U_{cisp}$  requirement.

The reported uncertainty of measurement  $y \pm U$ , where expanded uncertainty  $U$  is based on a standard uncertainty multiplied by a coverage factor of  $k=2$ , providing a level of confidence of approximately 95%.

### A. Radiated Measurement :

Test Site	Method	Measurement Frequency Range	Ant. H / V	$U$ ,(dB)
DG-CB03 (3m)	CISPR	9KHz ~ 30MHz	V	3.79
		9KHz ~ 30MHz	H	3.57
		30MHz ~ 200MHz	V	3.82
		30MHz ~ 200MHz	H	3.78
		200MHz ~ 1,000MHz	V	4.10
		200MHz ~ 1,000MHz	H	4.06

Test Site	Method	Measurement Frequency Range	Ant. H / V	$U$ ,(dB)
DG-CB03 (3m)	CISPR	1GHz ~ 18GHz	V	3.12
		1GHz ~ 18GHz	H	3.68

Test Site	Method	Measurement Frequency Range	Ant. H / V	$U$ ,(dB)
DG-CB03 (1m)	CISPR	18GHz ~ 40GHz	V	4.15
		18GHz ~ 40GHz	H	4.14

Note: Unless specifically mentioned, the uncertainty of measurement has not been taken into account to declare the compliance or non-compliance to the specification.

### 3. GENERAL INFORMATION

#### 3.1 GENERAL DESCRIPTION OF EUT

Equipment	WCDMA/GPRS Wireless Data Terminal						
Brand Name	Cathay Tri-Tech.,Inc						
Test Model	CTL-001A						
Model Name	CTL-001						
Model Difference	Only differ in model name.						
Modulation Type	GRPS	GMSK					
	EDGE	GMSK, 8PSK					
	WCDMA	Uplink: BPSK Downlink: QPSK					
	WCDMA(HSDPA)	16QAM/64QAM					
Operation Frequency	EDGE/GPRS	824.2 ~ 848.8 MHz					
	WCDMA Band 5	826.4 ~ 846.6 MHz					
Max. ERP Power	GRPS/EDGE	GMSK	30.93	dBm			
	EDGE	8PSK	24.00	dBm			
	WCDMA	BPSK	19.90	dBm			
	WCDMA_HSDPA	16QAM	19.82	dBm			
Antenna Type	External Antenna						
Antenna Gain	GSM 850 & WCDMA Band 5	-0.97dBi					
IMEI No.	014682000628106						
Power Source	DC Voltage Supplied from AC/DC Adapter.						
Power Rating	I/P: 100-240Vac, 50/60Hz 0.35A O/P: 5V - - 2A						

Note:

1. For a more detailed features description, please refer to the manufacturer's specifications or the user's manual.

### 3.2 DESCRIPTION OF TEST MODES AND TEST CONDITION

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

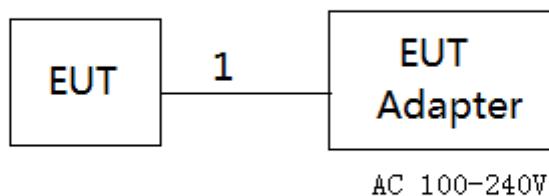
GSM MODE			
Test Item	Available Channel	Tested Channel	Mode
ERP	128 to 251	128, 190, 251	GPRS, EDGE
Conducted Output Power	128 to 251	128, 190, 251	GPRS, EDGE
Occupied Bandwidth	128 to 251	128, 190, 251	GPRS, EDGE
Conducted Emission	128 to 251	190	GPRS, EDGE
Radiated Emission	128 to 251	251	GPRS
	128 to 251	128	EDGE
Band Edge	128 to 251	128, 251	GPRS, EDGE
Peak to Average Ratio	128 to 251	128, 190, 251	GPRS, EDGE
Frequency Stability	128 to 251	190	GPRS, EDGE

WCDMA MODE			
Test Item	Available Channel	Tested Channel	Mode
ERP	4132 to 4233	4132, 4182, 4233	WCDMA, HSDPA,
Conducted Output Power	4132 to 4233	4132, 4182, 4233	WCDMA, HSDPA,
Conducted Emission	4132 to 4233	4182	WCDMA, HSDPA,
Radiated Emission	4132 to 4233	4312	WCDMA, HSDPA,
Band Edge	4132 to 4233	4132, 4233	WCDMA, HSDPA,
Peak to Average Ratio	4132 to 4233	4132, 4182, 4233	WCDMA, HSDPA,
Frequency Stability	4132 to 4233	4182	WCDMA, HSDPA,

## EUT TEST CONDITIONS:

Test Item	Environmental Conditions	Test Voltage
ERP	25°C, 60%RH	AC 120V/60Hz
Conducted Output Power	25°C, 65%RH	AC 120V/60Hz
Occupied Bandwidth	25°C, 65%RH	AC 120V/60Hz
Conducted Emission	25°C, 65%RH	AC 120V/60Hz
Radiated Emission	25°C, 60%RH	AC 120V/60Hz
Band Edge	25°C, 65%RH	AC 120V/60Hz
Peak to Average Ratio	25°C, 65%RH	AC 120V/60Hz
Frequency Stability	25°C, 65%RH	AC 120V/60Hz

### 3.3 BLOCKDIAGRAMSHOWINGTHECONFIGURATIONOFSYSTEMTESTEDFORRADIATED



### 3.4 DESCRIPTION OF SUPPORT UNITS

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

Item	Equipment	Mfr/Brand	Model/Type No.	FCC ID	Series No.
-	-		-	-	-

Item	Shielded Type	Ferrite Core	Length	Note
1	NO	NO	1.5m	AC Cable

Note:-

(1) For detachable type I/O cable should be specified the length in m in 「Length」 column.

## 4. TEST RESULT

### 4.1 OUTPUT POWER MEASUREMENT

#### 4.1.1 LIMIT

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

#### 4.1.2 TEST PROCEDURE

##### EIRP/ERP:

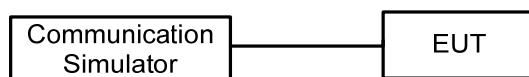
1. EIRP= Conducted Power +Antenan gain  
ERP power=EIPR power-2.15dBi.

##### Conducted Power:

The EUT was set up for the maximum power with GSM, GPRS, EDGE, WCDMA and LTE 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 TESTSETUP LAYOUT

##### Conducted Power Measurement



#### 4.1.4 TEST DEVIATION

No deviation

#### 4.1.5 TEST RESULTS

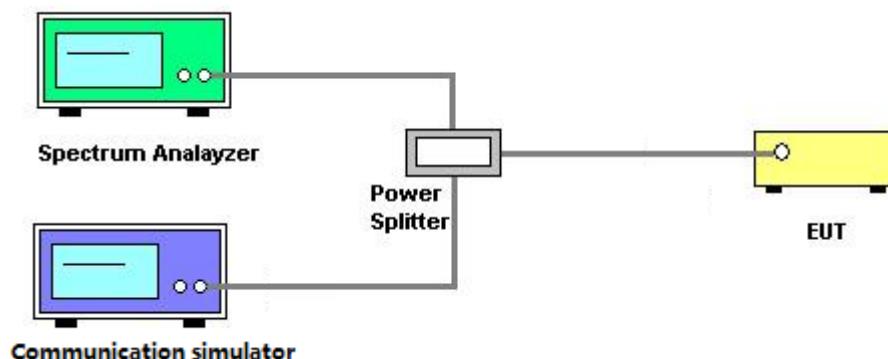
Please refer to the Attachment A.

## 4.2 OCCUPIED BANDWIDTH MEASUREMENT

### 4.2.1 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 and 26dB bandwidth.

### 4.2.2 TEST SETUP LAYOUT



### 4.2.3 TEST DEVIATION

No deviation

### 4.2.4 TEST RESULTS

Please refer to the Attachment B.

## 4.3 CONDUCTED EMISSIONS MEASUREMENT

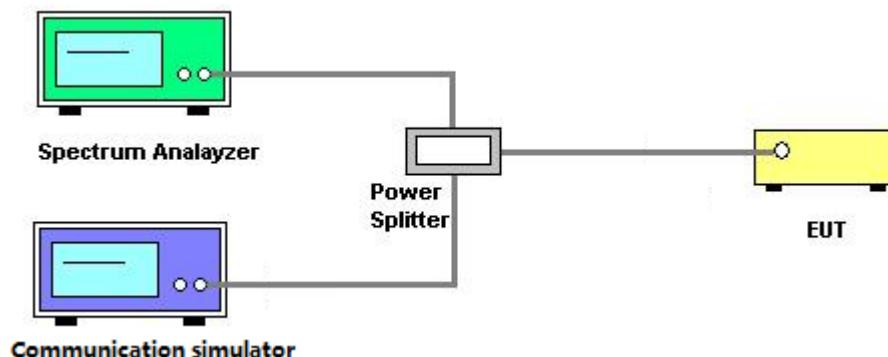
### 4.3.1 LIMIT

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.

### 4.3.2 TEST PROCEDURES

1. The testing follows FCC KDB 971168 v02r02 Section 6.0.
2. The EUT was connected to spectrum analyzer and system simulator via a power divider.
3. The band edges of low and high channels for the highest RF powers were measured. Set  $RBW >= 1\% EBW$  in the 1MHz band immediately outside and adjacent to the band edge.
4. Set spectrum analyzer with RMS detector.
5. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
6. The limit line is derived from  $43 + 10 \log(P)$  dB below the transmitter power P(Watts)  
 $= P(W) - [43 + 10 \log(P)](\text{dB})$   
 $= [30 + 10 \log(P)](\text{dBm}) - [43 + 10 \log(P)](\text{dB})$   
 $= -13\text{dBm}$

### 4.3.3 TESTSETUP LAYOUT



### 4.3.4 TESTDEVIATION

No deviation

### 4.3.5 TEST RESULTS

Please refer to the Attachment C.

## 4.4 RADIATED EMISSIONS MEASUREMENT

### 4.4.1 LIMIT

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.

### 4.4.2 TEST PROCEDURES

1. 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.
2. 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
3. EIRP = Output power level of S.G – TX cable loss + Antenna gain of substitution horn.
4. E.R.P power can be calculated form E.I.R.P power by subtracting the gain of dipole, E.R.P power = E.I.P.R power - 2.15dBi.
5. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1MHz/3MHz.

### 4.4.3 TESTSETUP LAYOUT

This test setup layout is the same as that shown in **section 4.1.3**.

### 4.4.4 TESTDEVIATION

No deviation

### 4.4.5 TEST RESULTS

Please refer to the Attachment D.

## 4.5 BAND EDGE MEASUREMENT

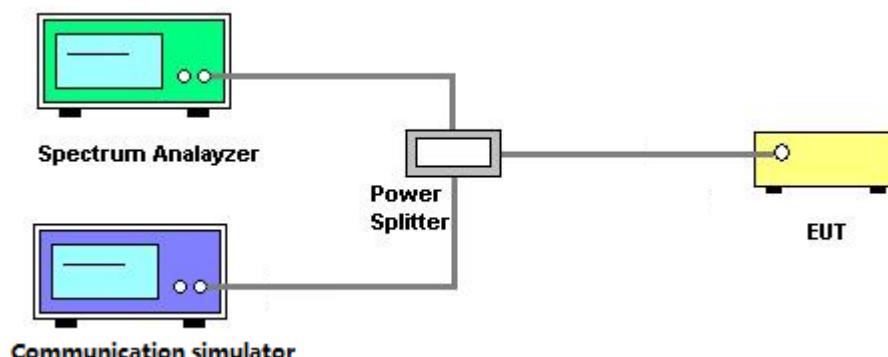
### 4.5.1 LIMIT

A 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.

### 4.5.2 TEST PROCEDURES

1. All measurements were done at low and high operational frequency range.
2. The center frequency of spectrum is the band edge frequency and span is 1MHz. RB of the spectrum is 3kHz and VB of the spectrum is 10kHz (GSM/GPRS/EDGE).
3. The center frequency of spectrum is the band edge frequency and span is 5MHz. RB of the spectrum is 100kHz and VB of the spectrum is 300kHz (WCDMA).
4. Record the max trace plot into the test report.

### 4.5.3 TESTSETUP LAYOUT



### 4.5.4 TESTDEVIATION

No deviation

### 4.5.5 TEST RESULTS

Please refer to the Attachment E.

## 4.6 PEAK TO AVERAGE RATIO MEASUREMENT

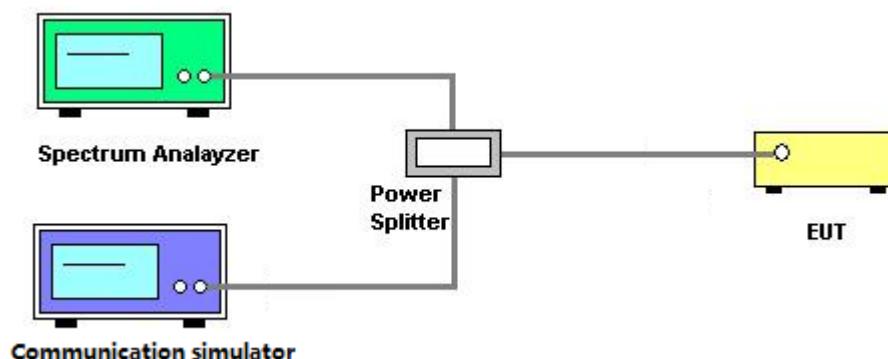
### 4.6.1 LIMIT

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.

### 4.6.2 TEST PROCEDURES

1. Set resolution/measurement bandwidth  $\geq$  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%.

### 4.6.3 TESTSETUP LAYOUT



### 4.6.4 TESTDEVIATION

No deviation

### 4.6.5 TEST RESULTS

Please refer to the Attachment F.

## 4.7 FREQUENCY STABILITY MEASUREMENT

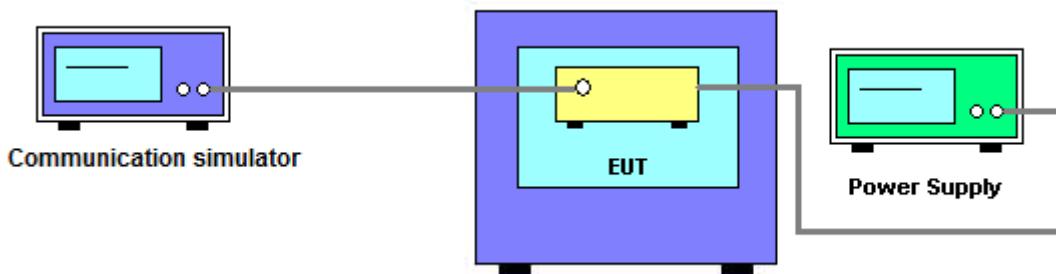
### 4.7.1 LIMIT

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

### 4.7.2 TEST PROCEDURES

1. 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.
2. 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.
3. 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.
4. The frequency error was recorded frequency error from the communication simulator.

### 4.7.3 TESTSETUP LAYOUT



### 4.7.4 TESTDEVIATION

No deviation

### 4.7.5 TEST RESULTS

Please refer to the Attachment G.

## 5. LIST OF MEASUREMENT EQUIPMENTS

Radiated Emission Measurement					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Test receiver	R&S	ESU26	100387	Jul. 21, 2017
2	LOOP Antennas(9kHz-30M Hz)	R&S	HFH2-Z2	100263	Apr. 29, 2017
3	Spectrum analyzer	R&S	FSU3	200474	May 24, 2017
4	Spectrum analyzer	R&S	FSU43	100144	Jun. 02, 2017
5	Trilog Broadband Antenna (30M~3GHz)	SCHWARZBECK	VULB 9163	9163-521	Apr. 07, 2018
6	Double-Ridged Waveguide Horn Antenna (1G~18GHz)	R&S	HF907	100304	Apr. 29, 2017
7	Pyramidal Horn Antenna(18GHz-26.5 GHz)	ETS-Lindgren	Sep-60	5140299	Jul. 14, 2017
8	Radio Communication Tester	R&S	CMU200	3608082535	Mar. 29, 2018
9	Radio Communication Tester	Anritsu	MT8820C	A110518805	May 23, 2017

Conducted Emission & Band Edge & Occupied Bandwidth Measurement					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Wireless Communication Test SET	Agilent	E5515C	MY48364183	Mar. 26, 2018
2	EXA Spectrum Analyzer	Agilent	N9010A	MY50520044	Mar. 26, 2018
3	Spectrum Analyzer	R&S	FSP40	100185	Sep. 04, 2017
4	POWER SPLITTER	Mini-Circuits	ZFRSC-123-S+	331000910-1	Feb. 25, 2018
5	wideband radio communication tester	R&S	CMW500	152372	Mar. 26, 2018
6	Cable	N/A	RG316(0.3m)	N/A	Jul. 06, 2017
7	Cable	N/A	RG316(0.3m)	N/A	Jul. 06, 2017

Frequency Stability Measurement					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Wireless Communication Test SET	Agilent	E5515C	MY48364183	Mar. 26, 2018
2	DC power supply	GW Insteck	GPC-3030DN	EK880675	Oct. 13, 2017
3	POWER SPLITTER	Mini-Circuits	ZFRSC-123-S+	331000910-1	Feb. 25, 2018
4	wideband radio communication tester	R&S	CMW500	152372	Mar. 26, 2018
5	Const Temp,& Humidity Chamber	Giant?Force	ITH-225-20-S	IAB0309-001	Sep. 04, 2017
6	Cable	N/A	RG316(0.3m)	N/A	Jul. 06, 2017

Remark: "N/A" denotes no model name, serial no. or calibration specified.

All calibration period of equipment list is one year.

## 5. EUT TEST PHOTO

### Radiated Measurement Photos

9KHz to 30MHz



## Radiated Measurement Photos

30MHz to 1000MHz



## Radiated Measurement Photos

### Above 1GHz



## ATTACHMENT A - OUTPUT POWER

## Conducted Power:

GSM850 (Capsensor Off)	Burst Conducted Power (dBm)		
	128CH	190CH	251CH
	824.2MHz	836.6MHz	848.8MHz
GPRS/EDGE (GMSK)	33.87	33.94	34.05
	29.80	30.05	30.32
	28.80	29.02	29.25
	30.63	30.86	31.12
EDGE (8PSK)	27.12	26.74	27.01
	25.98	26.20	26.42
	25.03	25.15	25.39
	23.91	24.10	24.34

Modulation	Band	WCDMA V(Capsensor Off)		
	Tx Channel	4132CH	4182CH	4233CH
	Rx Channel	4357CH	4407CH	4458CH
	Frequency	826.4MHz	836.4MHz	846.6MHz
BPSK	RMC 12.2K	23.02	22.44	22.88
	RMC 64K	22.91	22.41	22.90
	RMC 144K	21.98	22.53	22.74
	RMC 384K	22.83	22.34	22.83
16QAM	HSDPA Subtest-1	22.48	22.54	22.94
	HSDPA Subtest-2	22.52	22.64	22.61
	HSDPA Subtest-3	22.50	22.66	22.57
	HSDPA Subtest-4	22.47	22.65	22.58

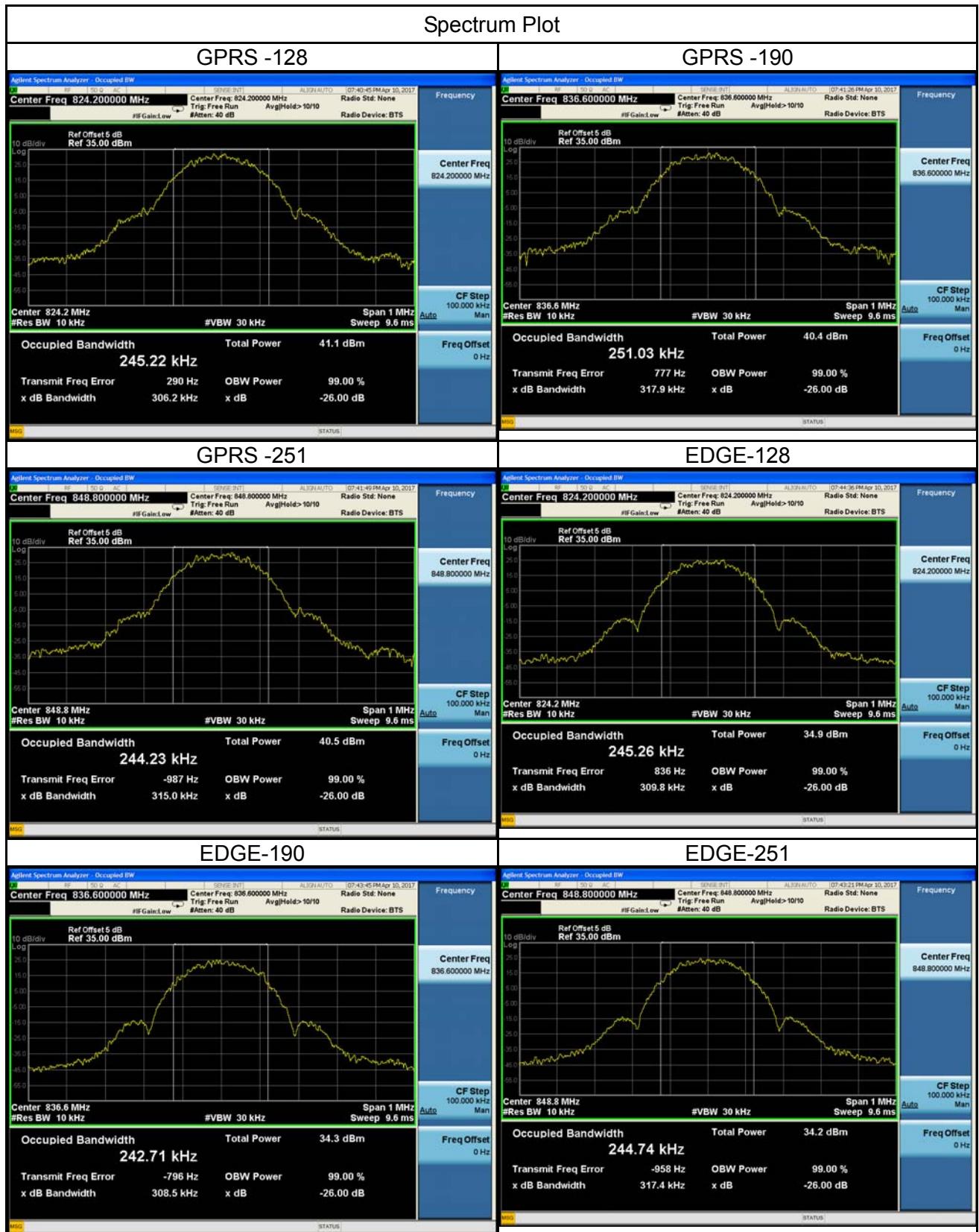
## ERP Power:

GSM850 (Capsensor Off)	ERP Power (dBm)		
	128CH	190CH	251CH
	824.2MHz	836.6MHz	848.8MHz
GPRS/EDGE (GMSK)	30.75	30.82	30.93
	26.68	26.93	27.20
	25.68	25.90	26.13
	27.51	27.74	28.00
EDGE (8PSK)	24.00	23.62	23.89
	22.86	23.08	23.30
	21.91	22.03	22.27
	20.79	20.98	21.22

Modulation	Band	WCDMA V(Capsensor Off)		
	Tx Channel	4132CH	4182CH	4233CH
	Rx Channel	4357CH	4407CH	4458CH
	Frequency	826.4MHz	836.4MHz	846.6MHz
BPSK	RMC 12.2K	19.90	19.32	19.76
	RMC 64K	19.79	19.29	19.78
	RMC 144K	18.86	19.41	19.62
	RMC 384K	19.71	19.22	19.71
16QAM	HSDPA Subtest-1	19.36	19.42	19.82
	HSDPA Subtest-2	19.40	19.52	19.49
	HSDPA Subtest-3	19.38	19.54	19.45
	HSDPA Subtest-4	19.35	19.53	19.46

## ATTACHMENT B - OCCUPIED BANDWIDTH

GSM850					
GPRS			EDGE		
GMSK			8PSK		
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)	Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)
128	824.2	0.245	128	824.2	0.245
190	836.6	0.251	190	836.6	0.243
251	848.8	0.244	251	848.8	0.245
Channel	Frequency (MHz)	26dB Bandwidth (MHz)	Channel	Frequency (MHz)	26dB Bandwidth (MHz)
128	824.2	0.306	128	824.2	0.310
190	836.6	0.318	190	836.6	0.309
251	848.8	0.315	251	848.8	0.317



WCDMA Band V					
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)	Channel	Frequency (MHz)	26dB Bandwidth (MHz)
4132	826.4	4.1692	4132	826.4	4.684
4182	836.4	4.1692	4182	836.4	4.689
4233	846.6	4.1684	4233	846.6	4.685

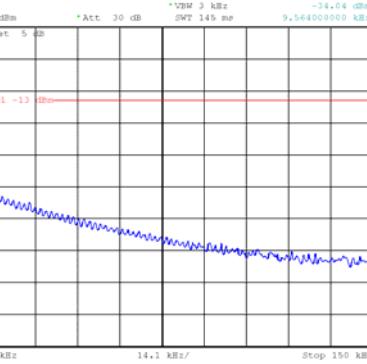
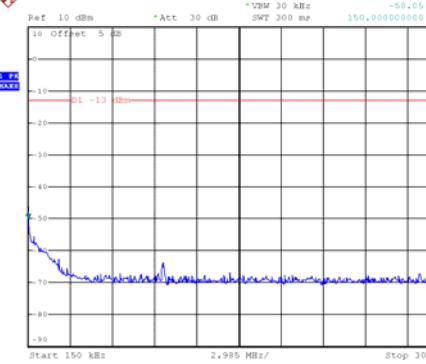
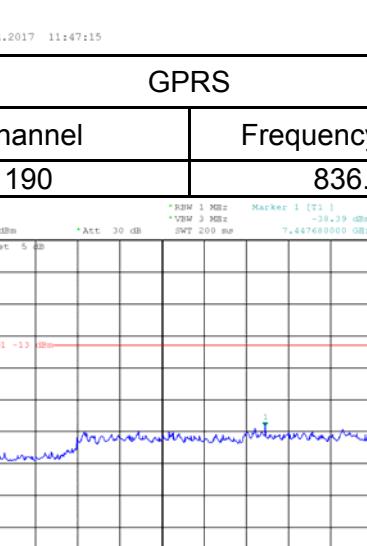
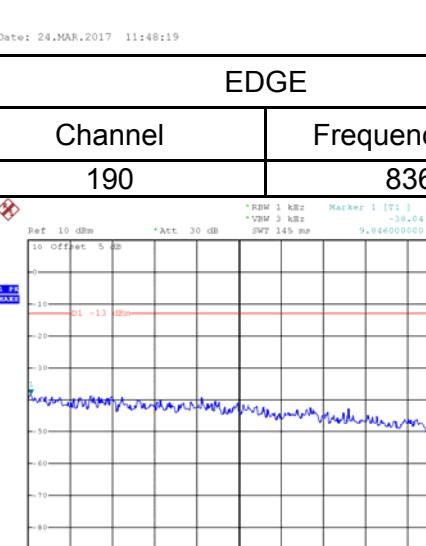
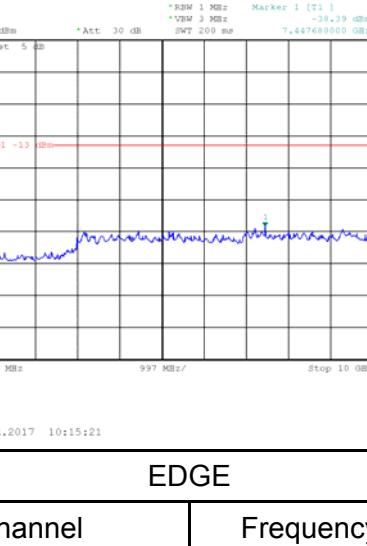
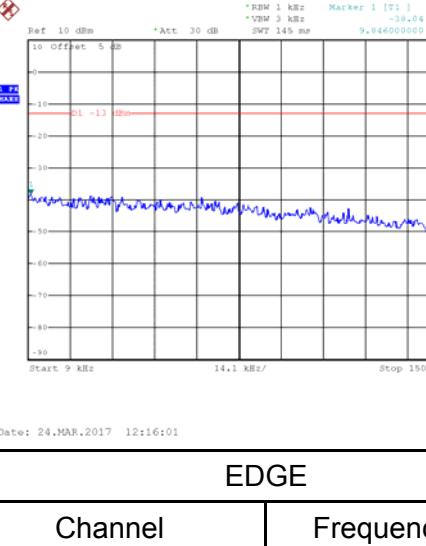
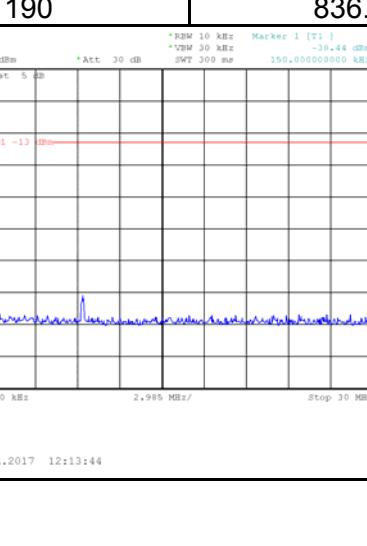
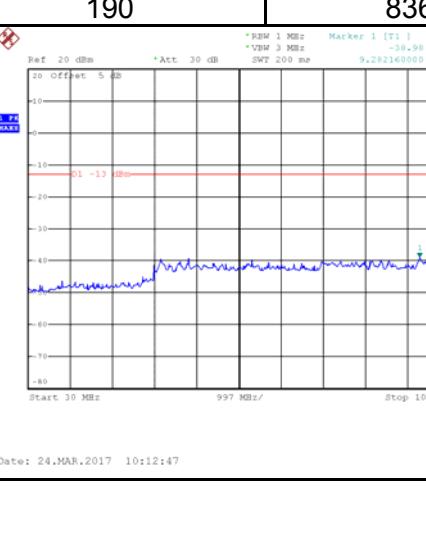
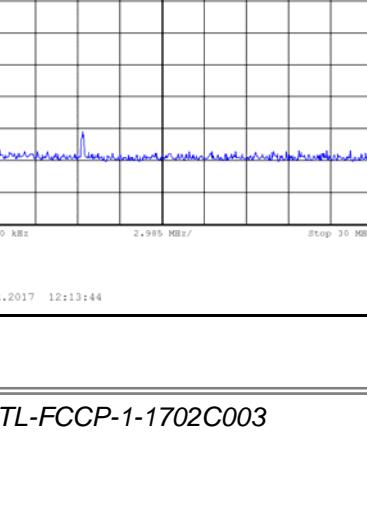


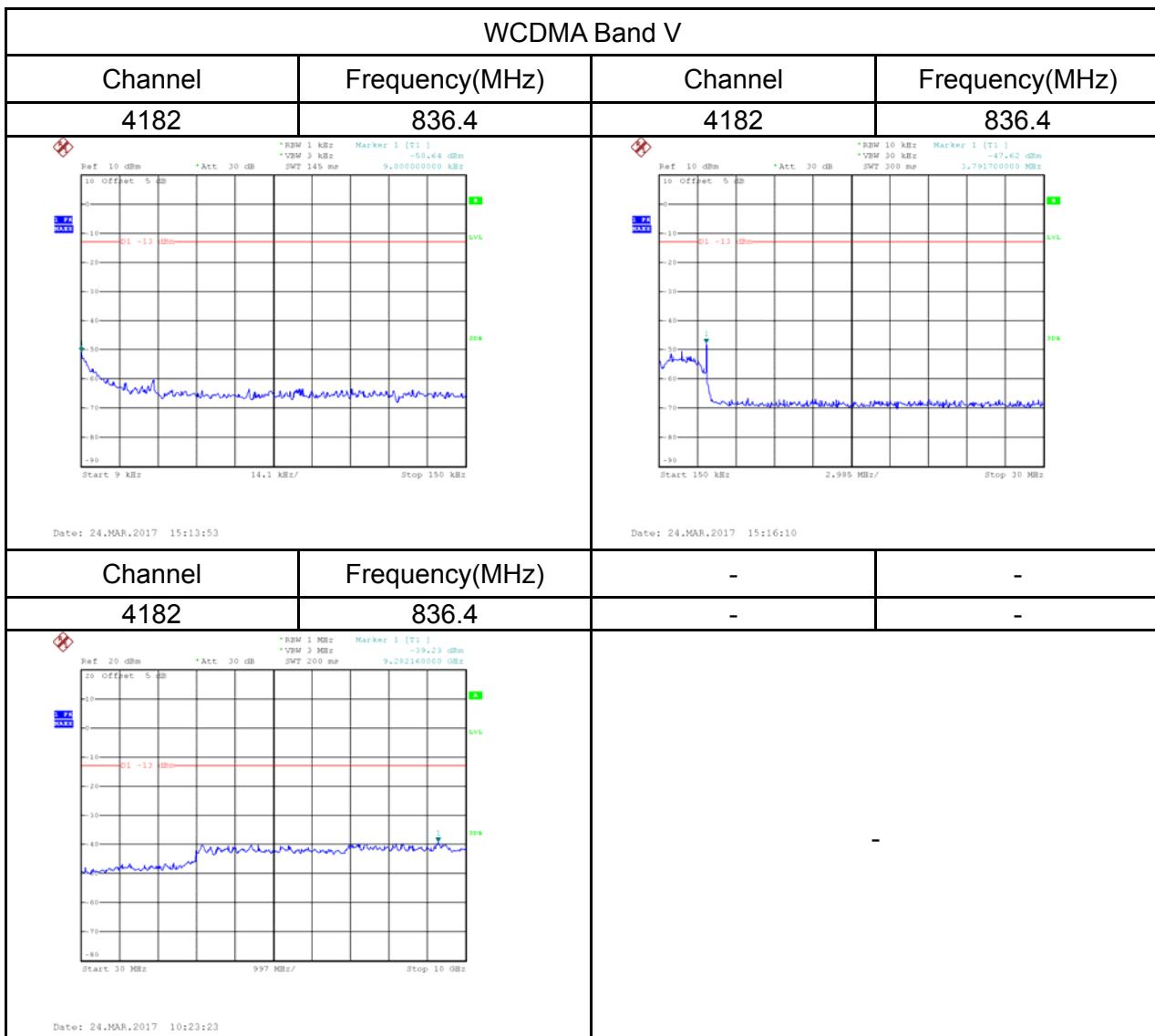
WCDMA_HSDPA Band V					
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)	Channel	Frequency (MHz)	26dB Bandwidth (MHz)
4132	826.4	4.1190	4132	826.4	4.681
4182	836.4	4.1313	4182	836.4	4.681
4233	846.6	4.1094	4233	846.6	4.672

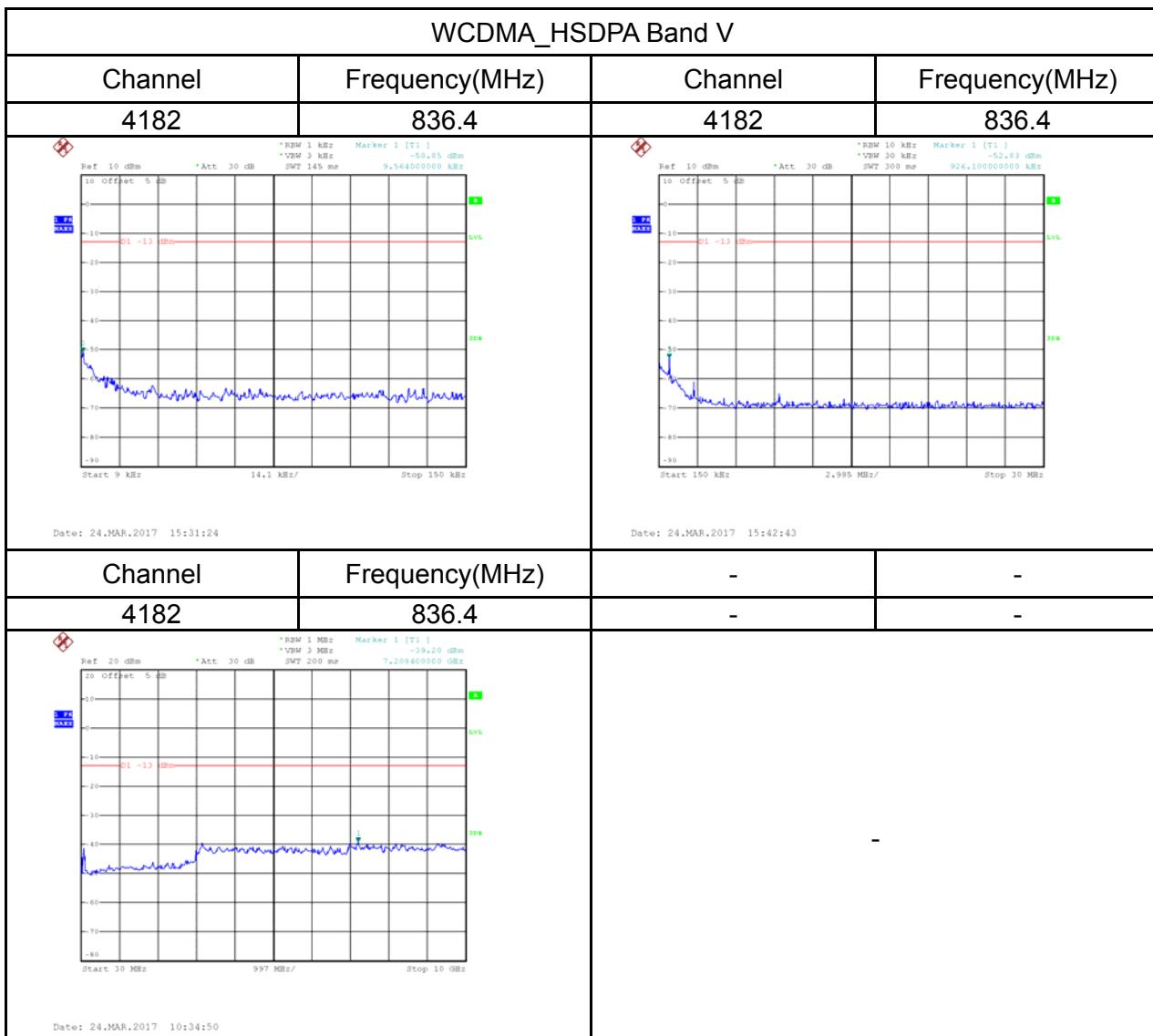


## ATTACHMENT C - CONDUCTED EMISSIONS

**GSM850**

GPRS		GPRS	
Channel	Frequency(MHz)	Channel	Frequency(MHz)
190	836.6	190	836.6
			
Date: 24.MAR.2017 11:47:15		Date: 24.MAR.2017 11:48:19	
GPRS		EDGE	
Channel	Frequency(MHz)	Channel	Frequency(MHz)
190	836.6	190	836.6
			
Date: 24.MAR.2017 10:15:21		Date: 24.MAR.2017 12:16:01	
EDGE		EDGE	
Channel	Frequency(MHz)	Channel	Frequency(MHz)
190	836.6	190	836.6
			
Date: 24.MAR.2017 12:13:44		Date: 24.MAR.2017 10:12:47	

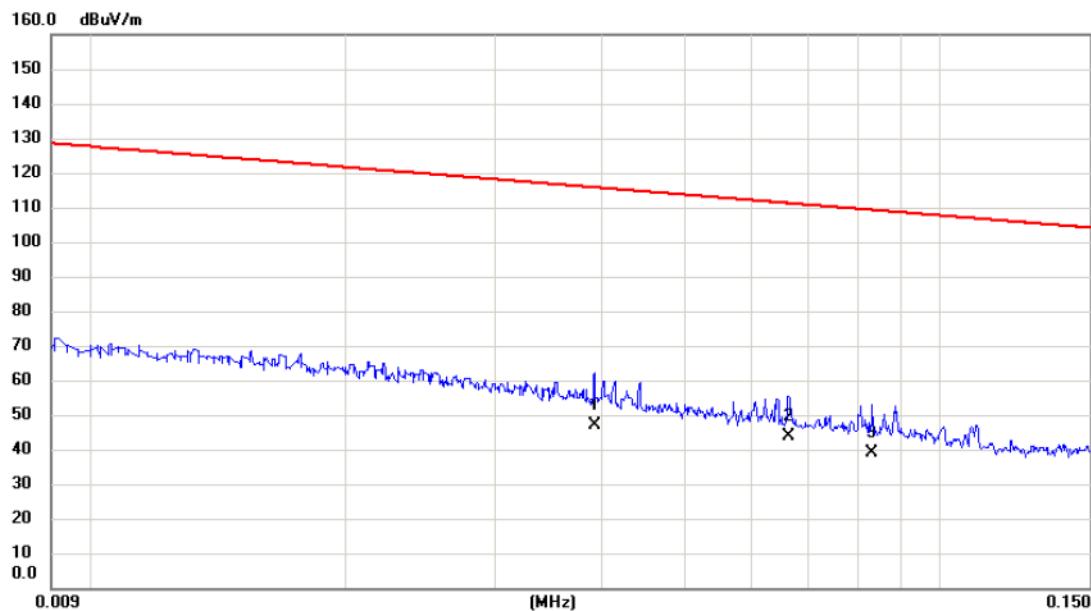




## ATTACHMENT D - RADIATED EMISSION

Test Mode: TX Mode

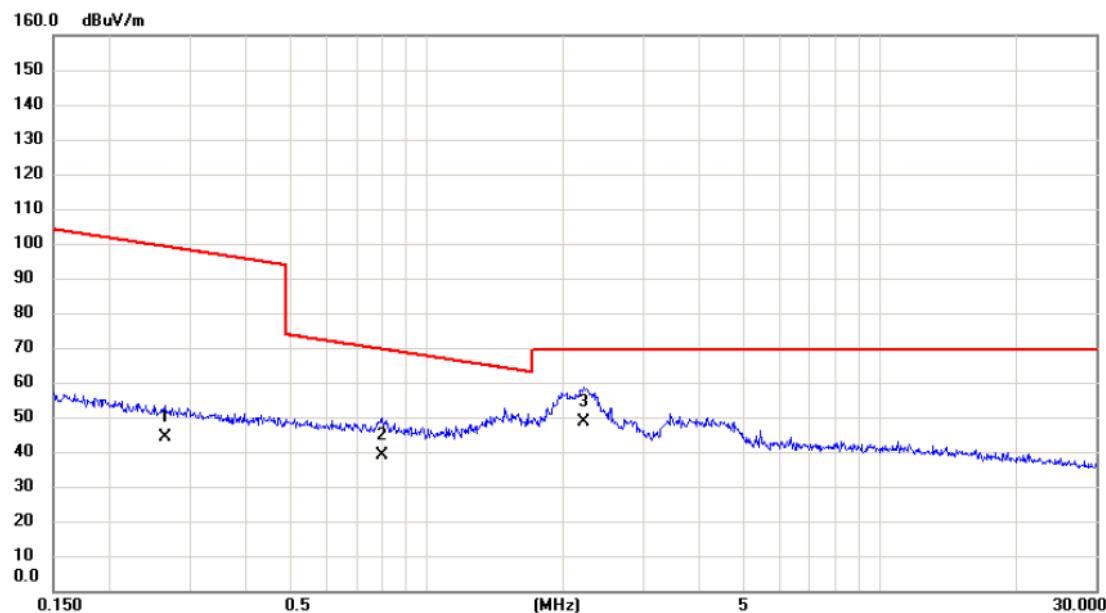
Ant 0°



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Margin	Detector	Comment
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB		
1		0.0393	26.03	21.14	47.17	115.72	-68.55	AVG	
2	*	0.0663	24.06	19.63	43.69	111.17	-67.48	AVG	
3		0.0831	20.03	19.17	39.20	109.21	-70.01	AVG	

Test Mode: TX Mode

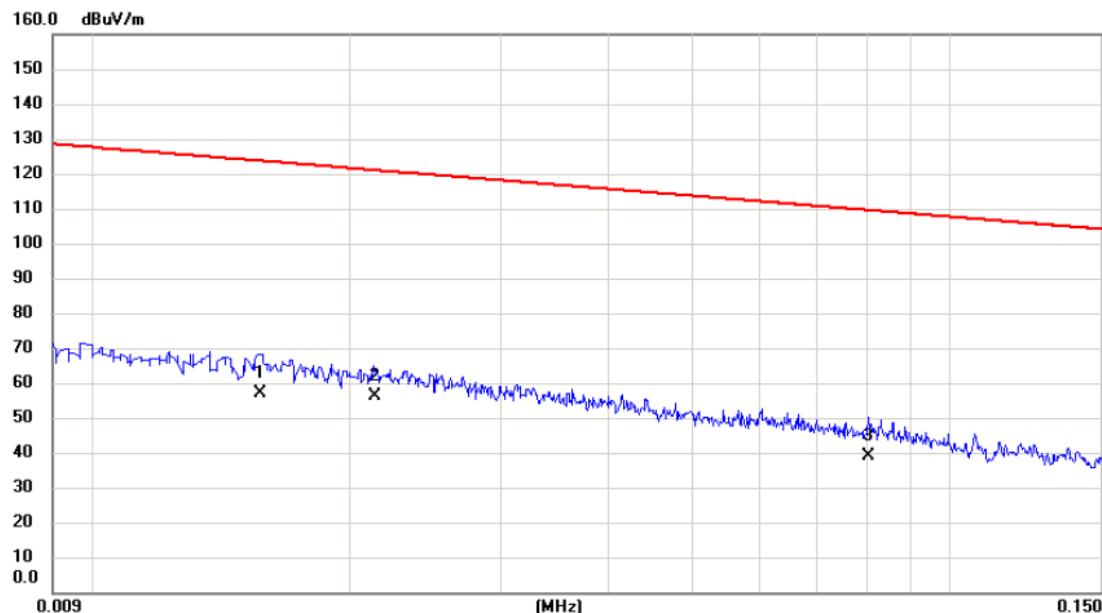
Ant 0°



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Margin							
							MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		0.2644	25.60	18.63	44.23	99.16	-54.93	AVG						
2		0.7960	20.70	18.33	39.03	69.59	-30.56	QP						
3	*	2.2250	31.06	17.62	48.68	69.54	-20.86	QP						

Test Mode: TX Mode

Ant 90°



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Margin	
		MHz	dBuV	dB	dBuV/m	dB	Detector	Comment
1		0.0157	33.39	23.78	57.17	123.69	-66.52	AVG
2	*	0.0214	32.79	23.35	56.14	121.00	-64.86	AVG
3		0.0803	19.60	19.30	38.90	109.51	-70.61	AVG

Test Mode: TX Mode

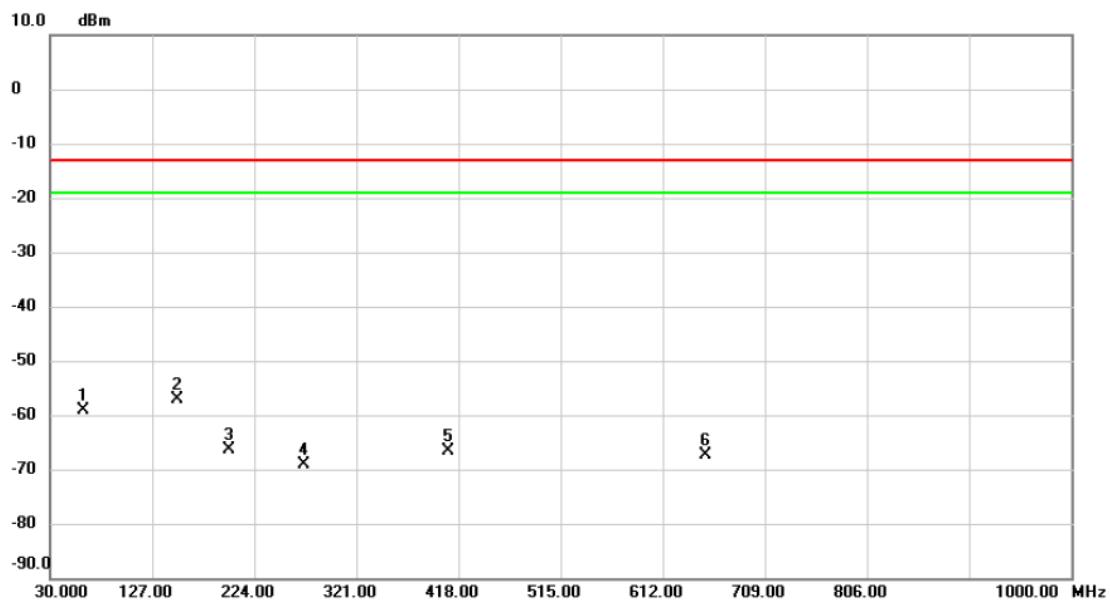
Ant 90°



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1		0.1815	24.90	18.71	43.61	102.43	-58.82	AVG	
2	*	2.2486	32.11	17.59	49.70	69.54	-19.84	QP	
3		4.4305	27.50	17.87	45.37	69.54	-24.17	QP	

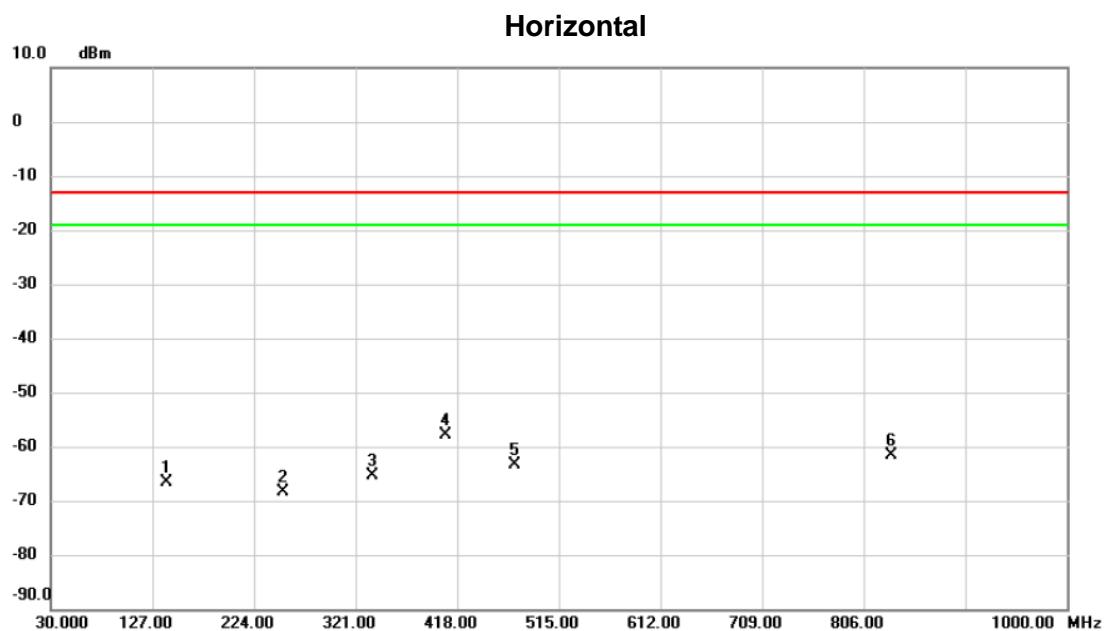
Test Mode: GSM850\_TX CH251\_GPRS

## Vertical



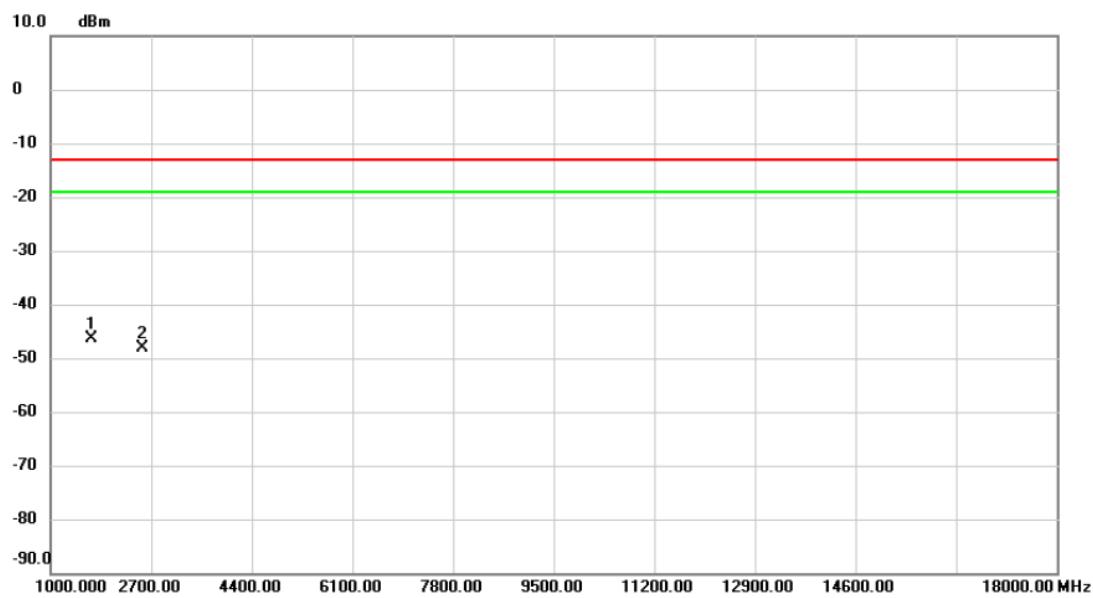
No.	Mk.	Freq. MHz	Reading Level dBm	Correct Factor dB	Measure- ment dBm	Limit dBm	Margin dB	Detector	Comment
1	62.010	62.010	-59.85	0.73	-59.12	-13.00	-46.12	peak	
2 *	150.280	150.280	-60.23	3.15	-57.08	-13.00	-44.08	peak	
3	199.750	199.750	-63.97	-2.30	-66.27	-13.00	-53.27	peak	
4	270.560	270.560	-71.37	2.22	-69.15	-13.00	-56.15	peak	
5	408.300	408.300	-70.88	4.33	-66.55	-13.00	-53.55	peak	
6	652.740	652.740	-77.60	10.14	-67.46	-13.00	-54.46	peak	

Test Mode: GSM850\_TX CH251\_GPRS



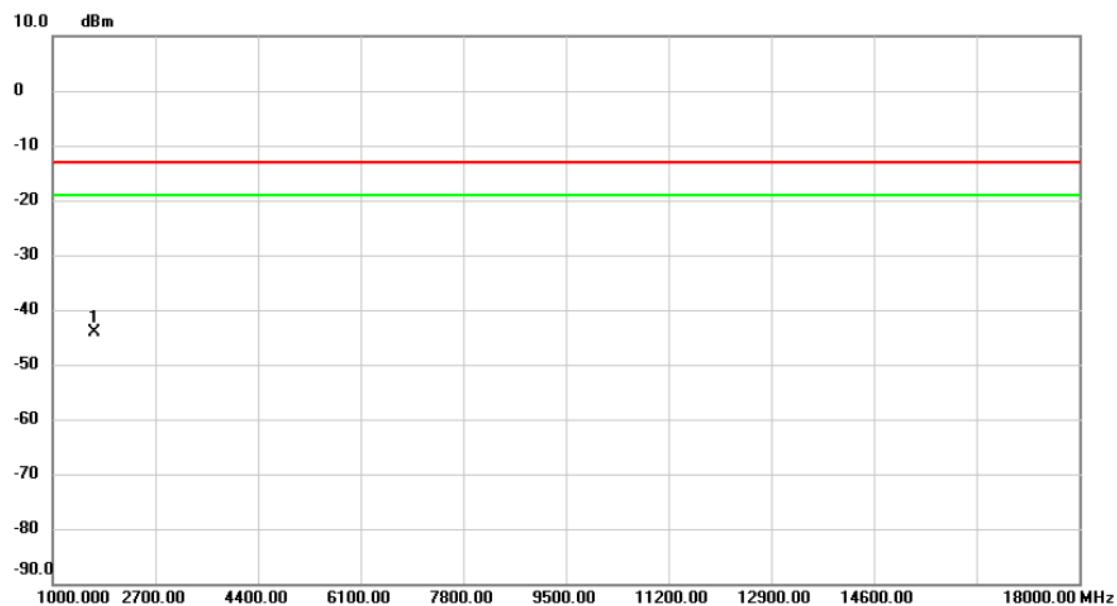
No. Mk.	Freq. MHz	Reading Level	Correct Factor	Measure- ment	Limit	Margin	Detector	Comment
		dBm	dB	dBm	dB			
1	140.580	-69.84	3.19	-66.65	-13.00	-53.65	peak	
2	251.160	-70.14	1.88	-68.26	-13.00	-55.26	peak	
3	336.520	-67.75	2.49	-65.26	-13.00	-52.26	peak	
4 *	407.330	-64.21	6.25	-57.96	-13.00	-44.96	peak	
5	472.320	-69.62	6.26	-63.36	-13.00	-50.36	peak	
6	832.190	-73.52	11.91	-61.61	-13.00	-48.61	peak	

Test Mode:	GSM850_TX CH251_GPRS
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**Vertical**

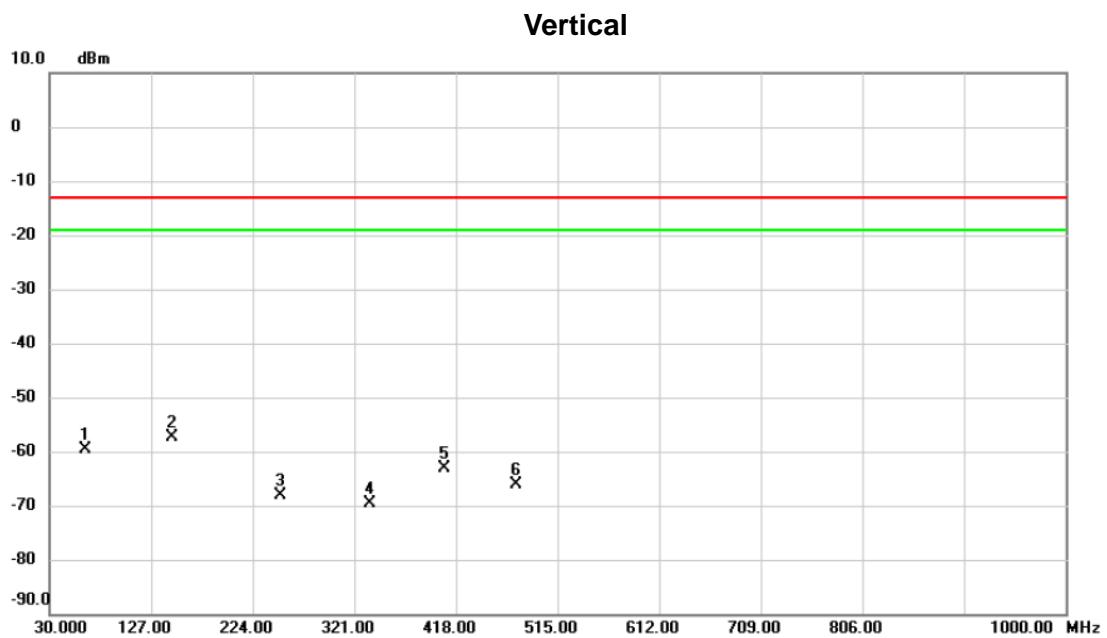
No.	Mk.	Reading Freq. MHz	Correct Level dBm	Measure- ment dB	Limit dBm	Margin dB	Detector	Comment
1	*	1697.000	-53.23	6.82	-46.41	-13.00	-33.41	peak
2		2547.000	-60.38	12.22	-48.16	-13.00	-35.16	peak

Test Mode:	GSM850_TX CH251_GPRS
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**Horizontal**

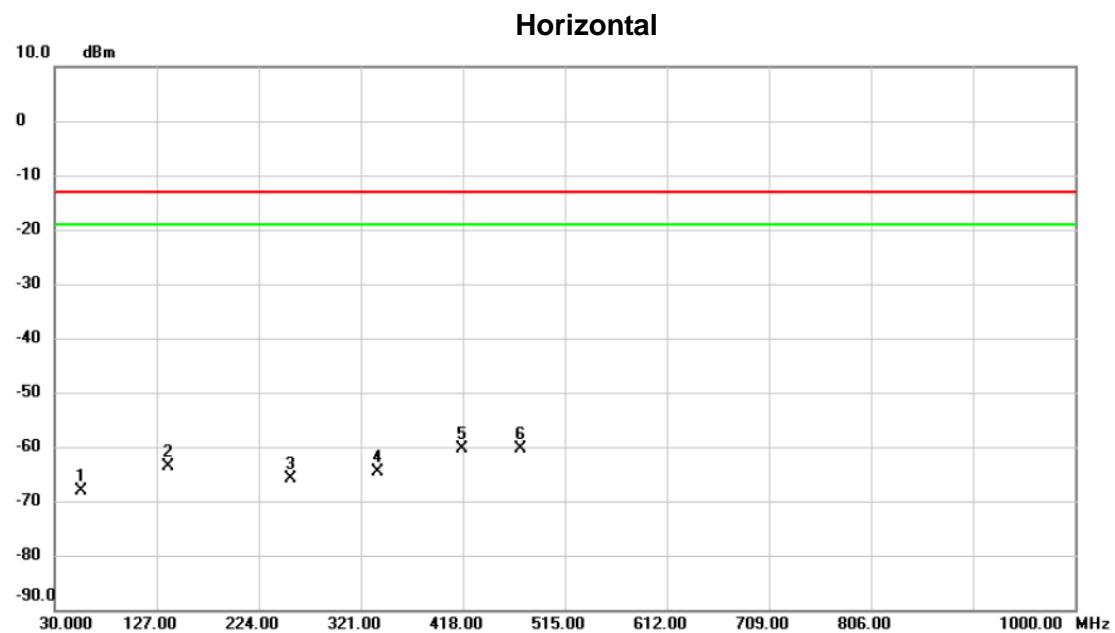
No. Mk.	Freq. MHz	Reading Level	Correct Factor	Measure- ment	Limit	Margin	Detector	Comment
		dBm	dB	dBm	dBm	dB		
1 *	1697.000	-52.17	8.17	-44.00	-13.00	-31.00	peak	

Test Mode: GSM850\_TX CH128\_EDGE



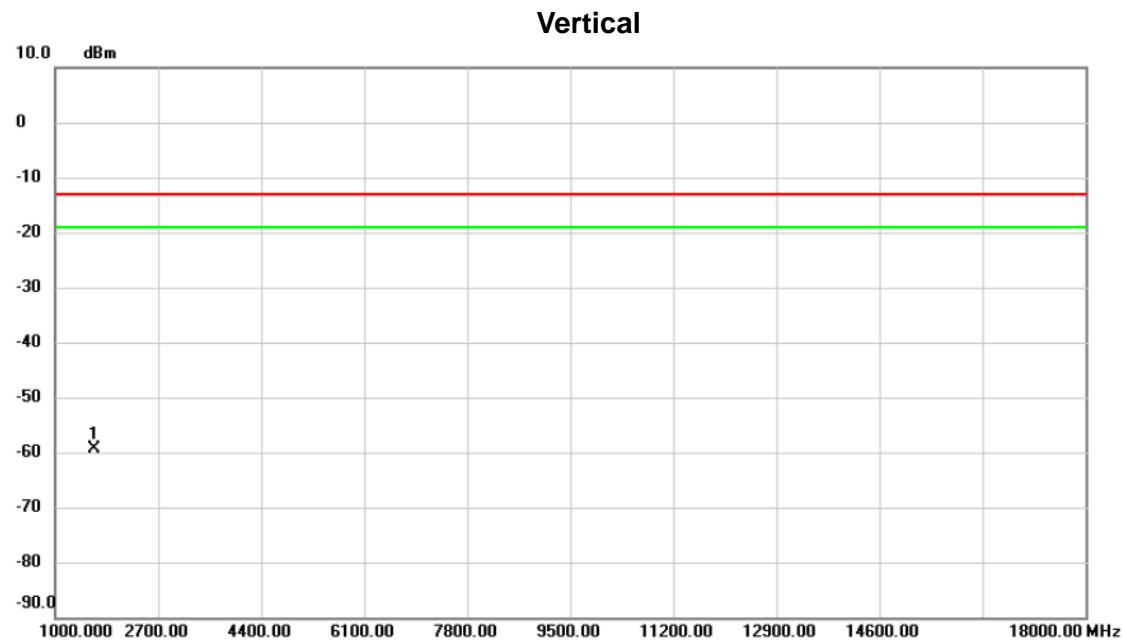
No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Margin	
		MHz	dBm	dB	dBm	dBm	dB	Detector Comment
1		63.950	-60.67	0.98	-59.69	-13.00	-46.69	peak
2	*	147.370	-60.14	2.89	-57.25	-13.00	-44.25	peak
3		250.190	-68.36	0.16	-68.20	-13.00	-55.20	peak
4		335.550	-71.10	1.42	-69.68	-13.00	-56.68	peak
5		407.330	-67.47	4.31	-63.16	-13.00	-50.16	peak
6		475.230	-72.50	6.26	-66.24	-13.00	-53.24	peak

Test Mode: GSM850 TX CH128 EDGE



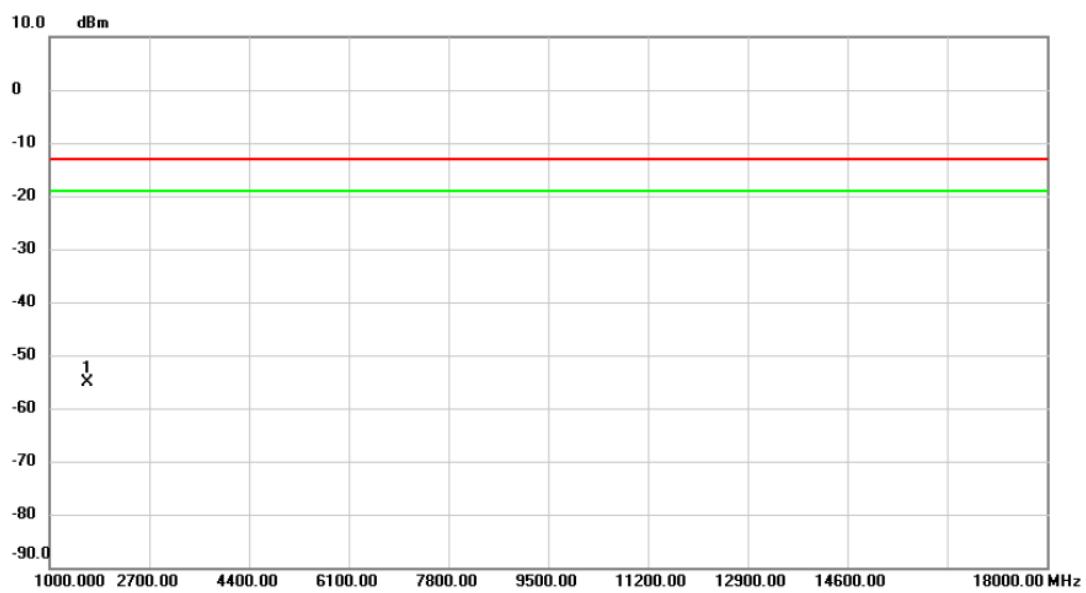
No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin					
							MHz	dBm	dB	dBm	dB	Detector
1		55.220	-70.73	2.53	-68.20	-13.00	-55.20			peak		
2		138.640	-66.22	2.61	-63.61	-13.00	-50.61			peak		
3		254.070	-67.86	1.89	-65.97	-13.00	-52.97			peak		
4		336.520	-66.99	2.49	-64.50	-13.00	-51.50			peak		
5 *		417.030	-67.09	6.73	-60.36	-13.00	-47.36			peak		
6		473.290	-66.67	6.31	-60.36	-13.00	-47.36			peak		

Test Mode:	GSM850_TX CH128_EDGE
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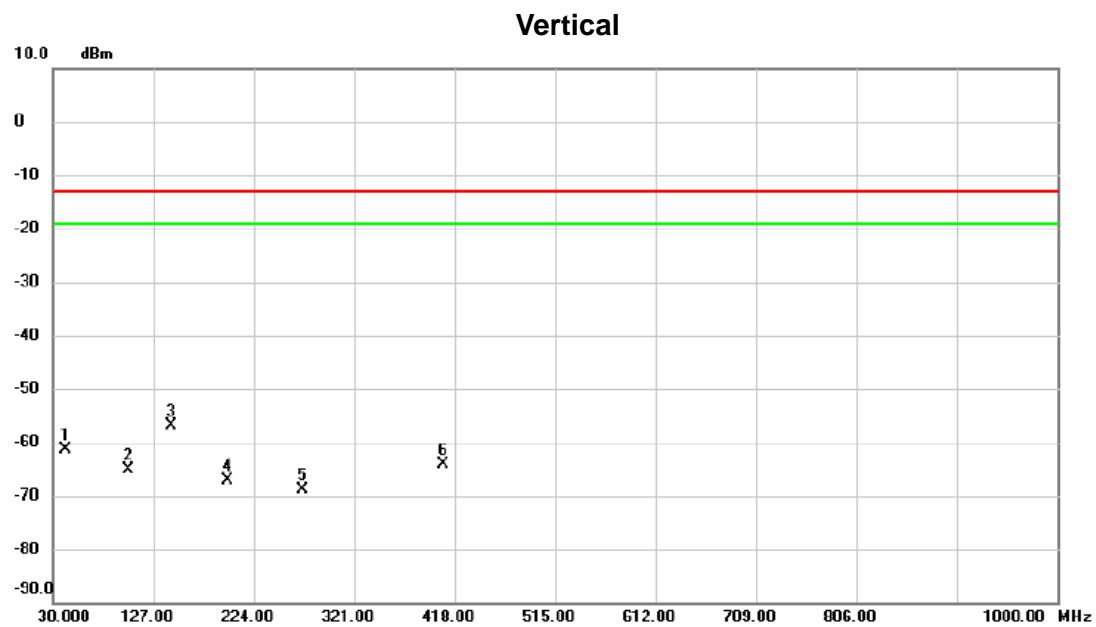
No.	Mk.	Reading Freq. MHz	Correct Level dBm	Measure- ment Factor dB	Limit dBm	Margin dB	Detector	Comment
1	*	1646.000	-65.61	6.12	-59.49	-13.00	-46.49	peak

Test Mode:	GSM850_TX CH128_EDGE
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**Horizontal**

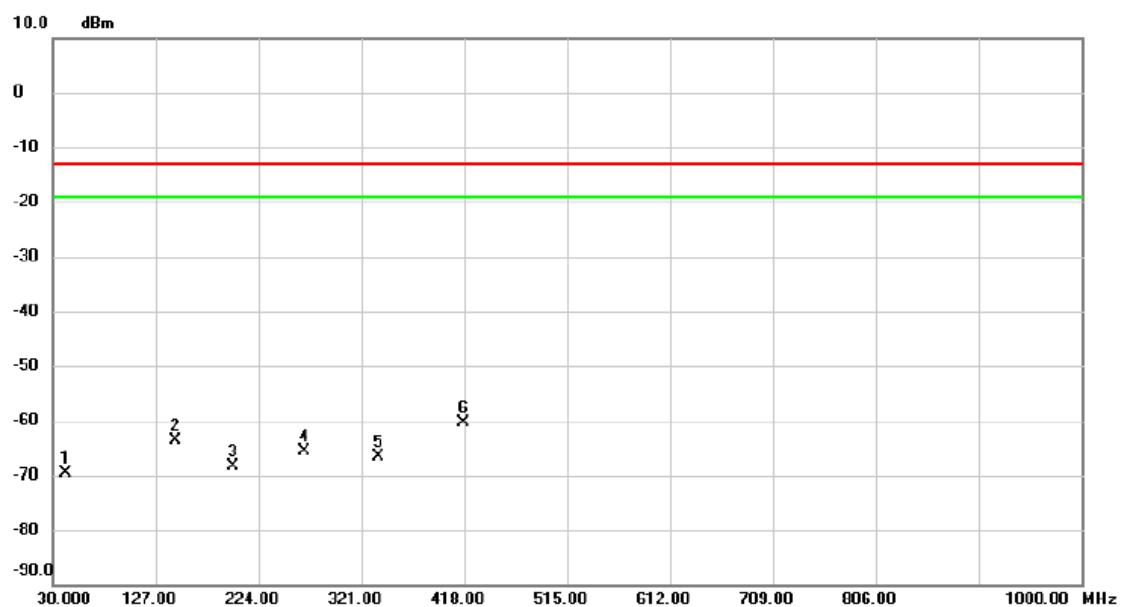
No.	Mk.	Reading Level	Correct Factor	Measure- ment	Limit	Margin	
	MHz	dBm	dB	dBm	dBm	dB	Detector Comment
1	*	1646.000	-63.35	8.15	-55.20	-13.00	-42.20 peak

Test Mode: WCDMA Band V\_TX CH4132



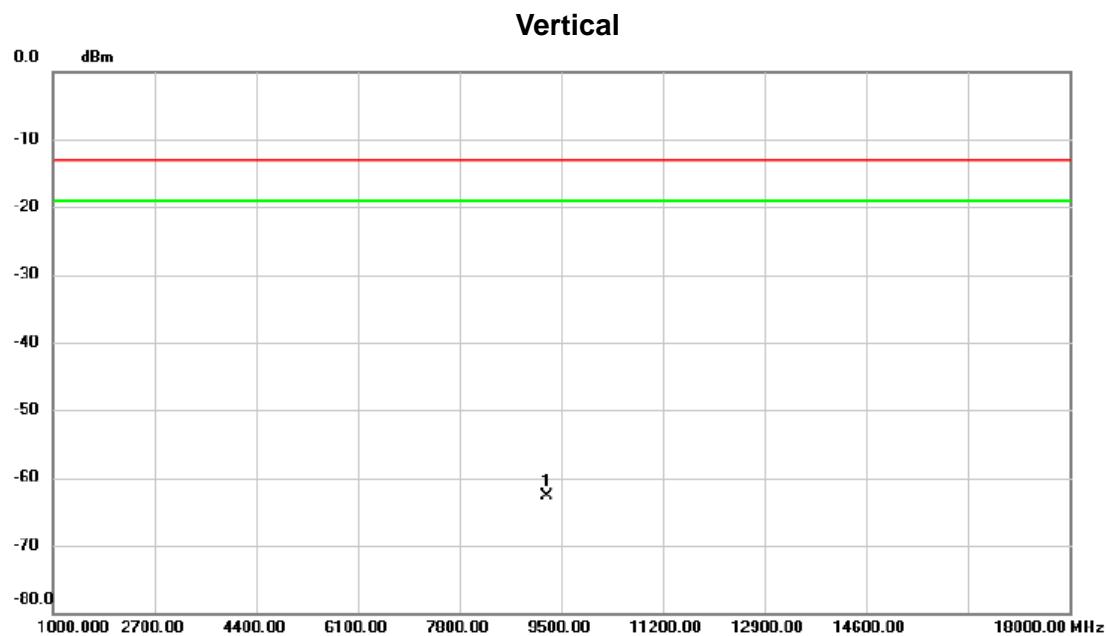
No.	Mk.	Freq. MHz	Reading Level dBm	Correct Factor dB	Measure- ment dBm	Limit dBm	Margin dB	Detector	Comment
1		41.640	-63.54	2.06	-61.48	-13.00	-48.48	peak	
2		102.750	-63.92	-1.28	-65.20	-13.00	-52.20	peak	
3 *		144.460	-59.59	2.60	-56.99	-13.00	-43.99	peak	
4		198.780	-64.76	-2.25	-67.01	-13.00	-54.01	peak	
5		270.560	-71.09	2.22	-68.87	-13.00	-55.87	peak	
6		407.330	-68.47	4.31	-64.16	-13.00	-51.16	peak	

Test Mode: WCDMA Band V\_TX CH4132

**Horizontal**

No.	Mk.	Freq.	Reading	Correct	Measure-	Limit	Margin	Detector	Comment
			Level	Factor	ment				
		MHz	dBm	dB	dBm	dBm	dB		
1		41.640	-71.99	2.40	-69.59	-13.00	-56.59	peak	
2		145.430	-67.42	3.73	-63.69	-13.00	-50.69	peak	
3		199.750	-66.57	-1.90	-68.47	-13.00	-55.47	peak	
4		267.650	-68.49	2.76	-65.73	-13.00	-52.73	peak	
5		336.520	-68.99	2.49	-66.50	-13.00	-53.50	peak	
6 *		417.030	-67.09	6.73	-60.36	-13.00	-47.36	peak	

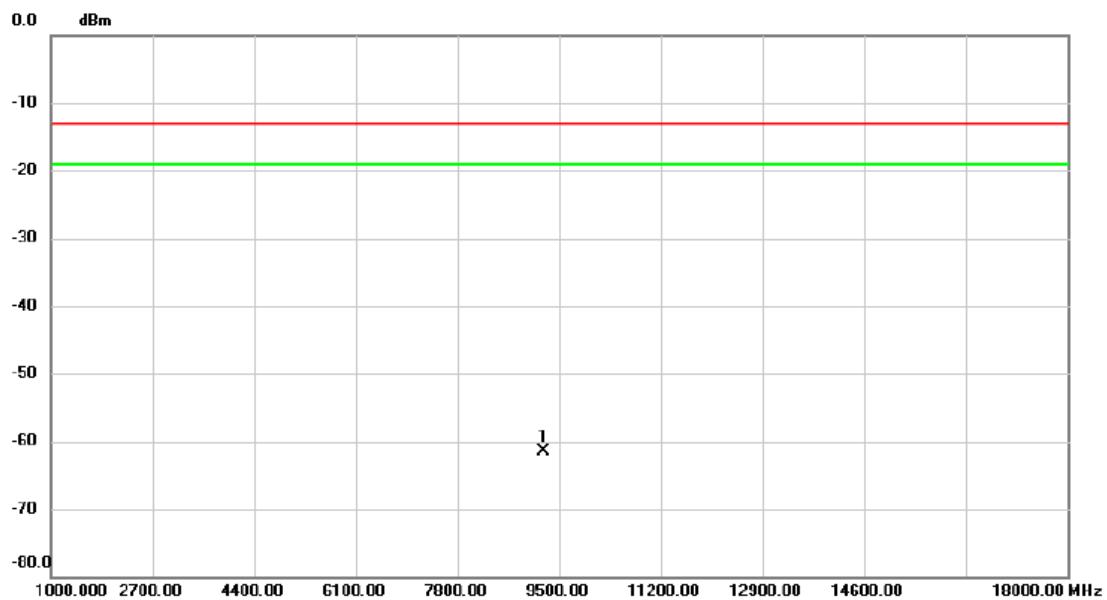
Test Mode: WCDMA Band V\_TX CH4132



No.	Mk.	Reading		Correct Factor	Measure- ment	Limit	Margin	
		Freq.	Level					
		MHz	dBm	dB	dBm	dB	Detector	Comment
1	*	9255.550	-81.87	19.17	-62.70	-13.00	-49.70	peak

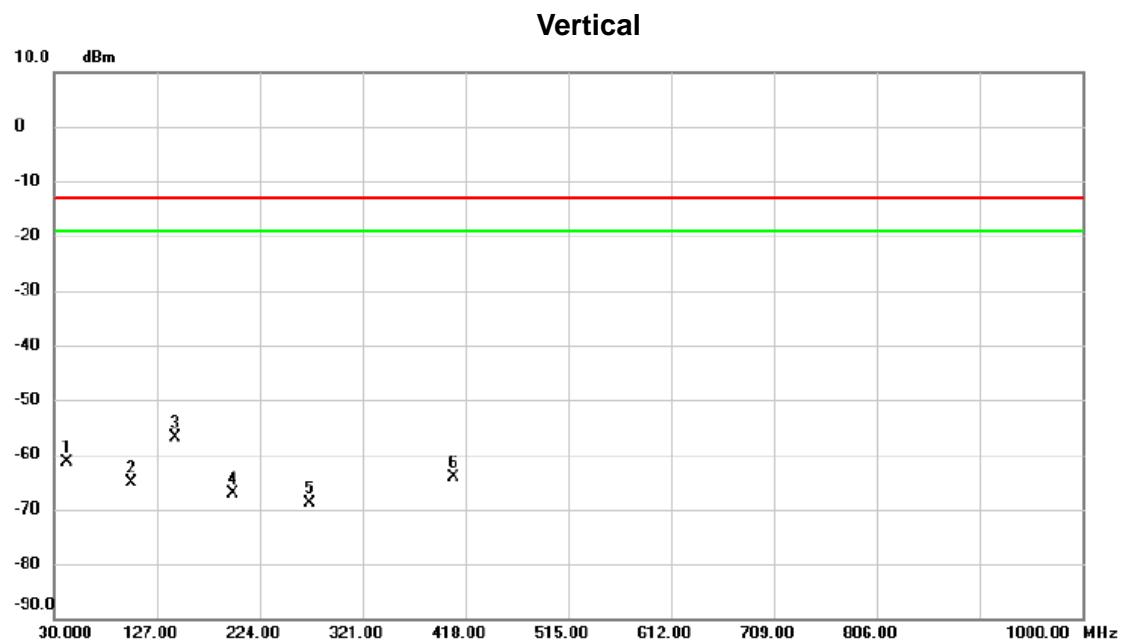
Test Mode: WCDMA Band V\_TX CH4132

**Horizontal**



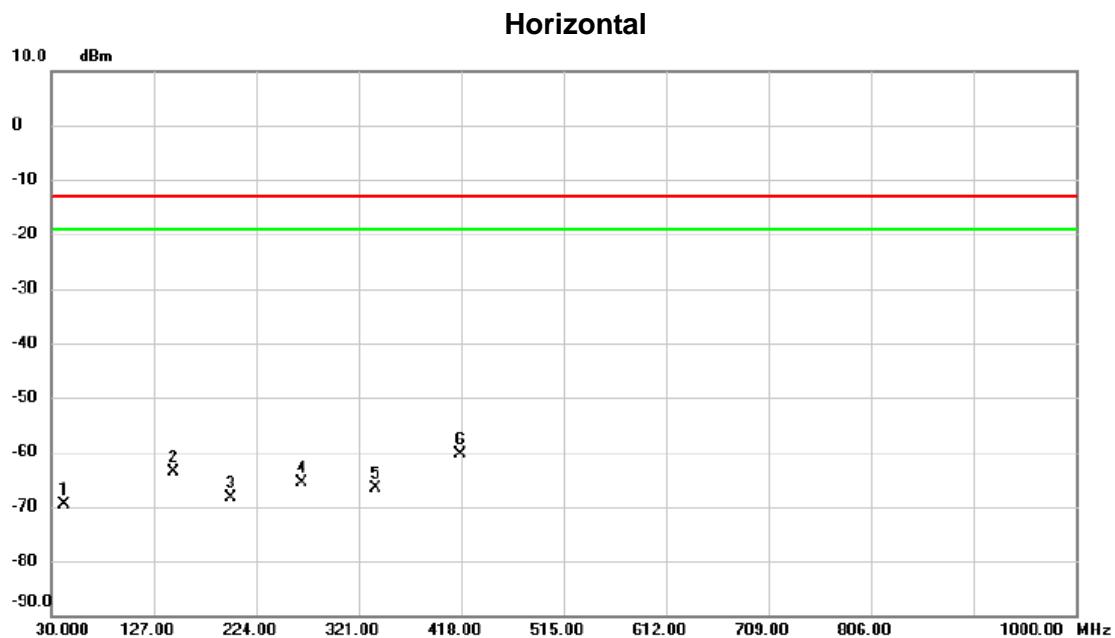
No.	Mk.	Reading		Correct Factor	Measure- ment	Limit	Margin	Detector	Comment
		Freq.	Level						
		MHz	dBm	dB	dBm	dBm	dB		
1 *		9245.060	-81.87	20.38	-61.49	-13.00	-48.49	peak	

Test Mode: WCDMA Band V\_TX CH4132\_HSDPA



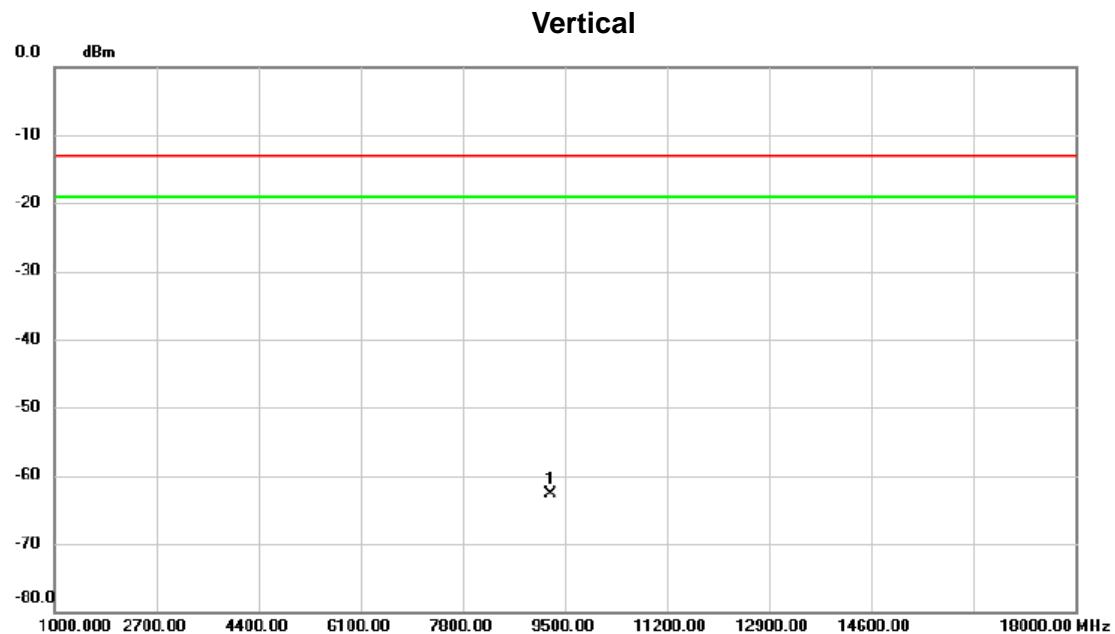
No.	Mk.	Freq.	Reading	Correct	Measure-	Limit	Margin	Detector	Comment
			Level	Factor	ment				
1		41.640	-63.54	2.06	-61.48	-13.00	-48.48	peak	
2		102.750	-63.92	-1.28	-65.20	-13.00	-52.20	peak	
3 *		144.460	-59.59	2.60	-56.99	-13.00	-43.99	peak	
4		198.780	-64.76	-2.25	-67.01	-13.00	-54.01	peak	
5		270.560	-71.09	2.22	-68.87	-13.00	-55.87	peak	
6		407.330	-68.47	4.31	-64.16	-13.00	-51.16	peak	

Test Mode: WCDMA Band V\_TX CH4132\_HSDPA



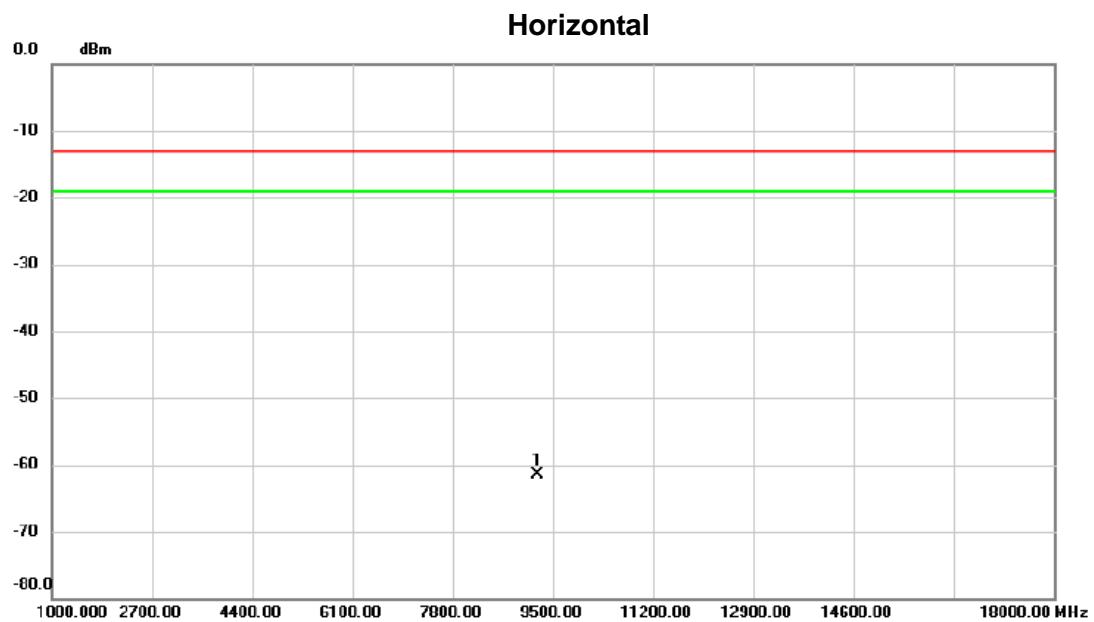
No.	Mk.	Freq. MHz	Reading Level dBm	Correct Factor dB	Measure- ment dBm	Limit dBm	Margin dB	Detector	Comment
1		41.640	-71.99	2.40	-69.59	-13.00	-56.59	peak	
2		145.430	-67.42	3.73	-63.69	-13.00	-50.69	peak	
3		199.750	-66.57	-1.90	-68.47	-13.00	-55.47	peak	
4		267.650	-68.49	2.76	-65.73	-13.00	-52.73	peak	
5		336.520	-68.99	2.49	-66.50	-13.00	-53.50	peak	
6	*	417.030	-67.09	6.73	-60.36	-13.00	-47.36	peak	

Test Mode: WCDMA Band V\_TX CH4132\_HSDPA



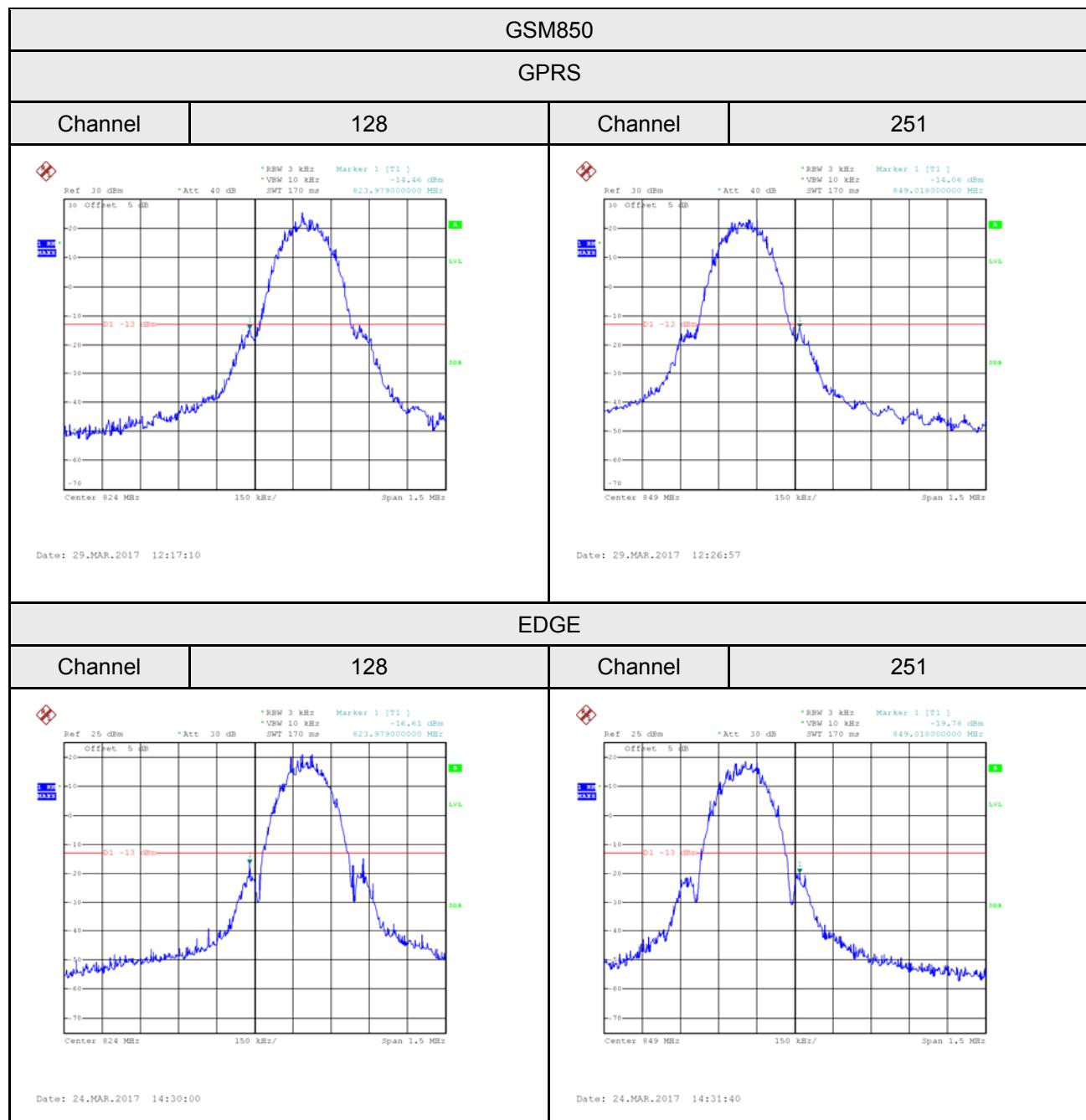
No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Margin
		MHz	dBm	dB	dBm	dB	Detector Comment
1	*	9255.550	-81.87	19.17	-62.70	-13.00	-49.70 peak

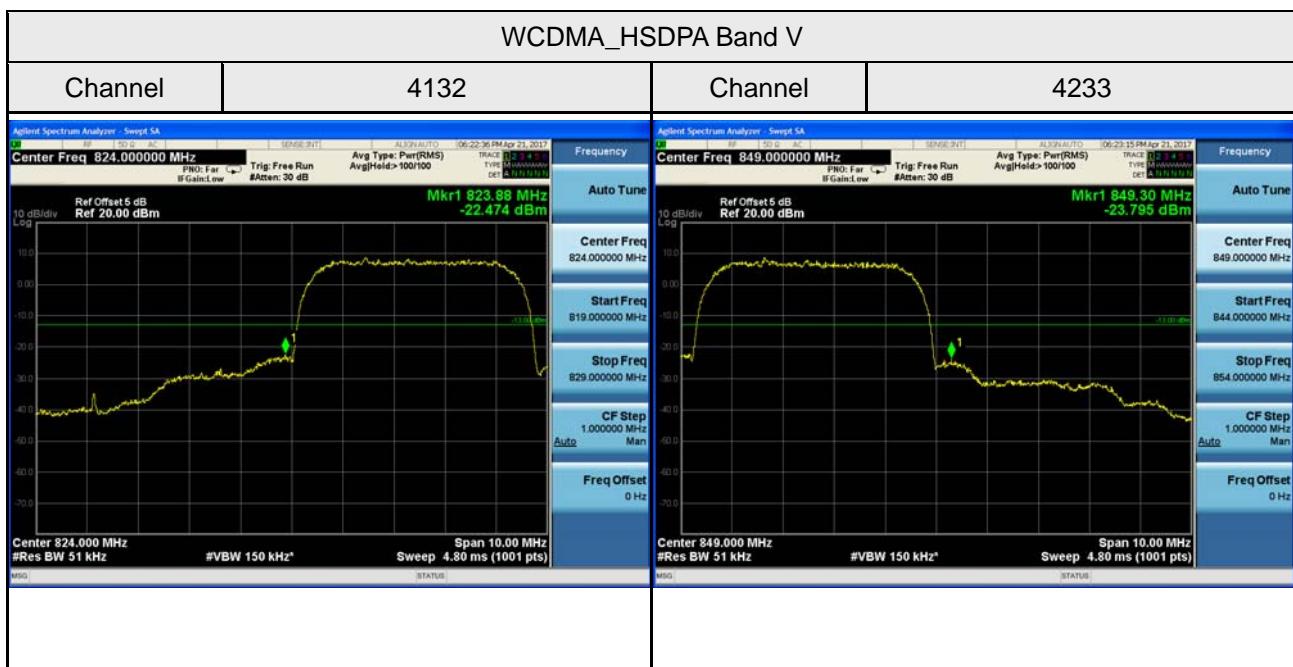
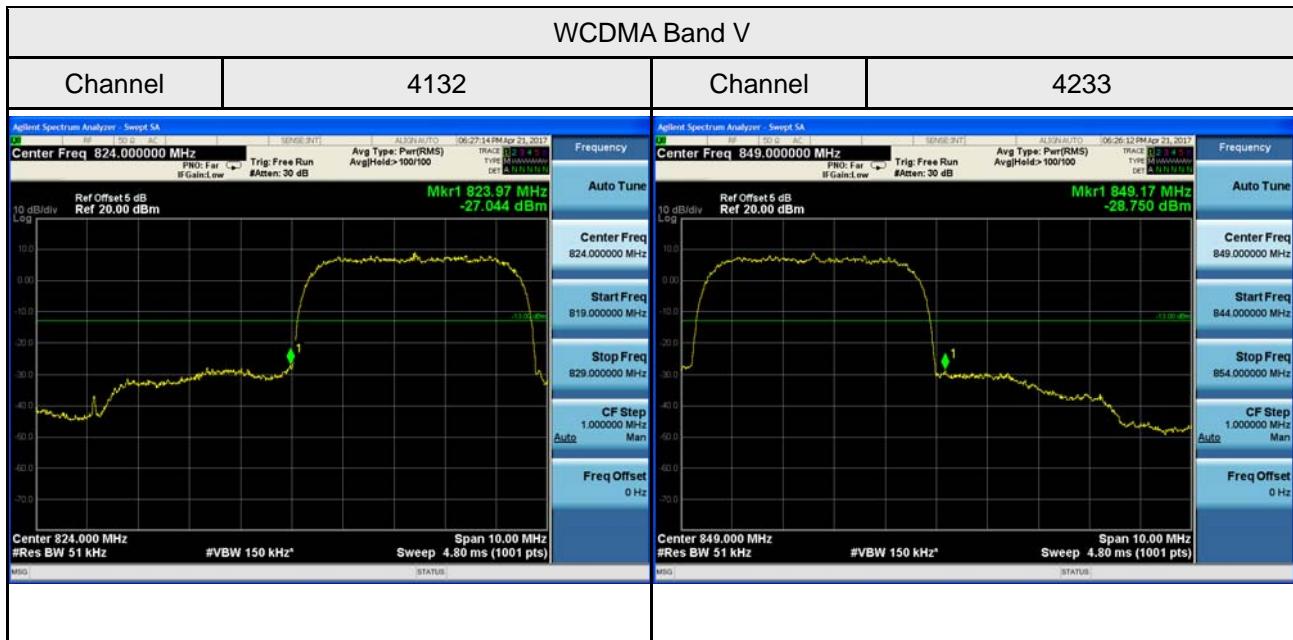
Test Mode:	WCDMA Band V_TX CH4132_HSDPA
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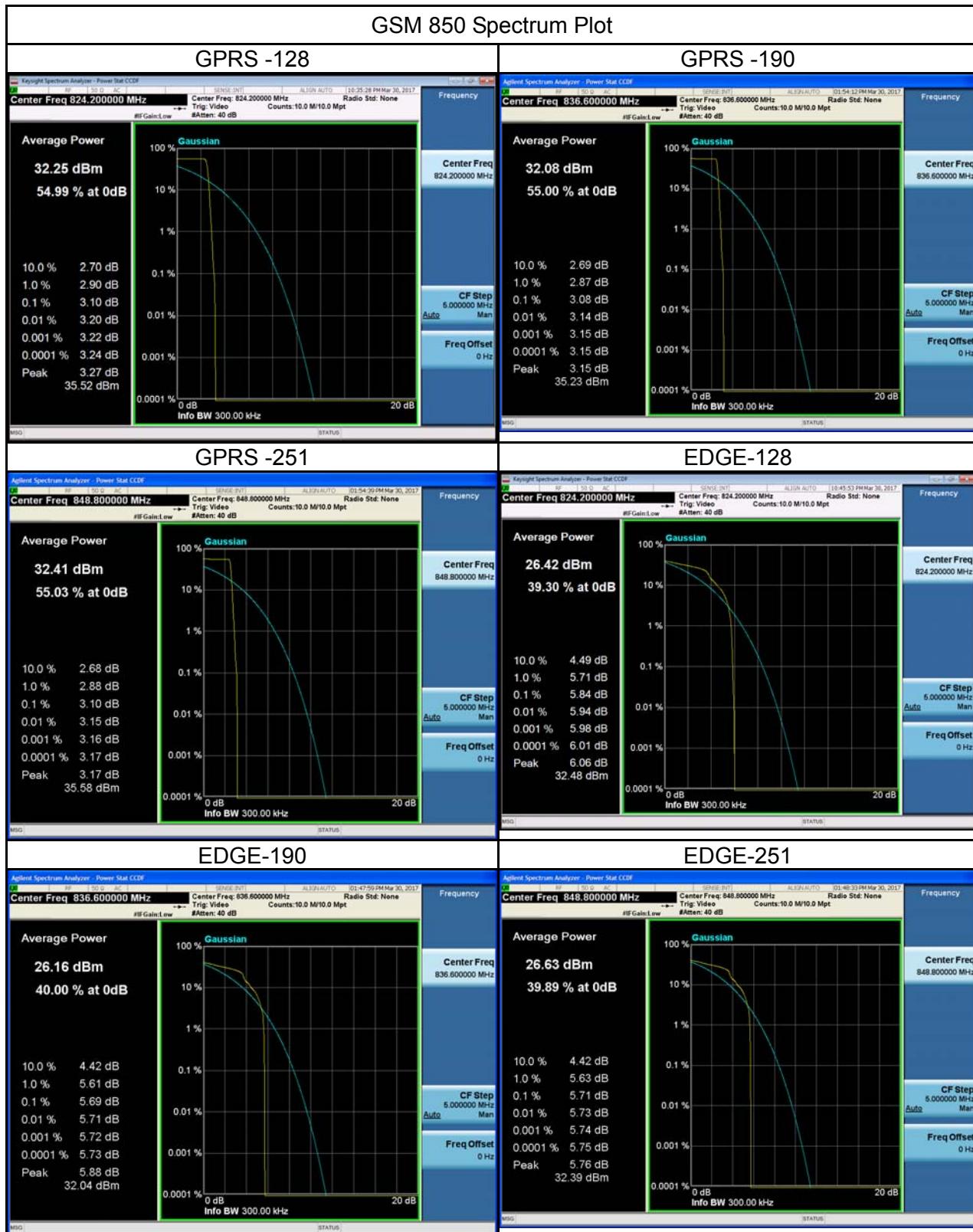
No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Margin	
		MHz	dBm	dB	dBm	dB	Detector	Comment
1 *		9245.060	-81.87	20.38	-61.49	-13.00	-48.49	peak

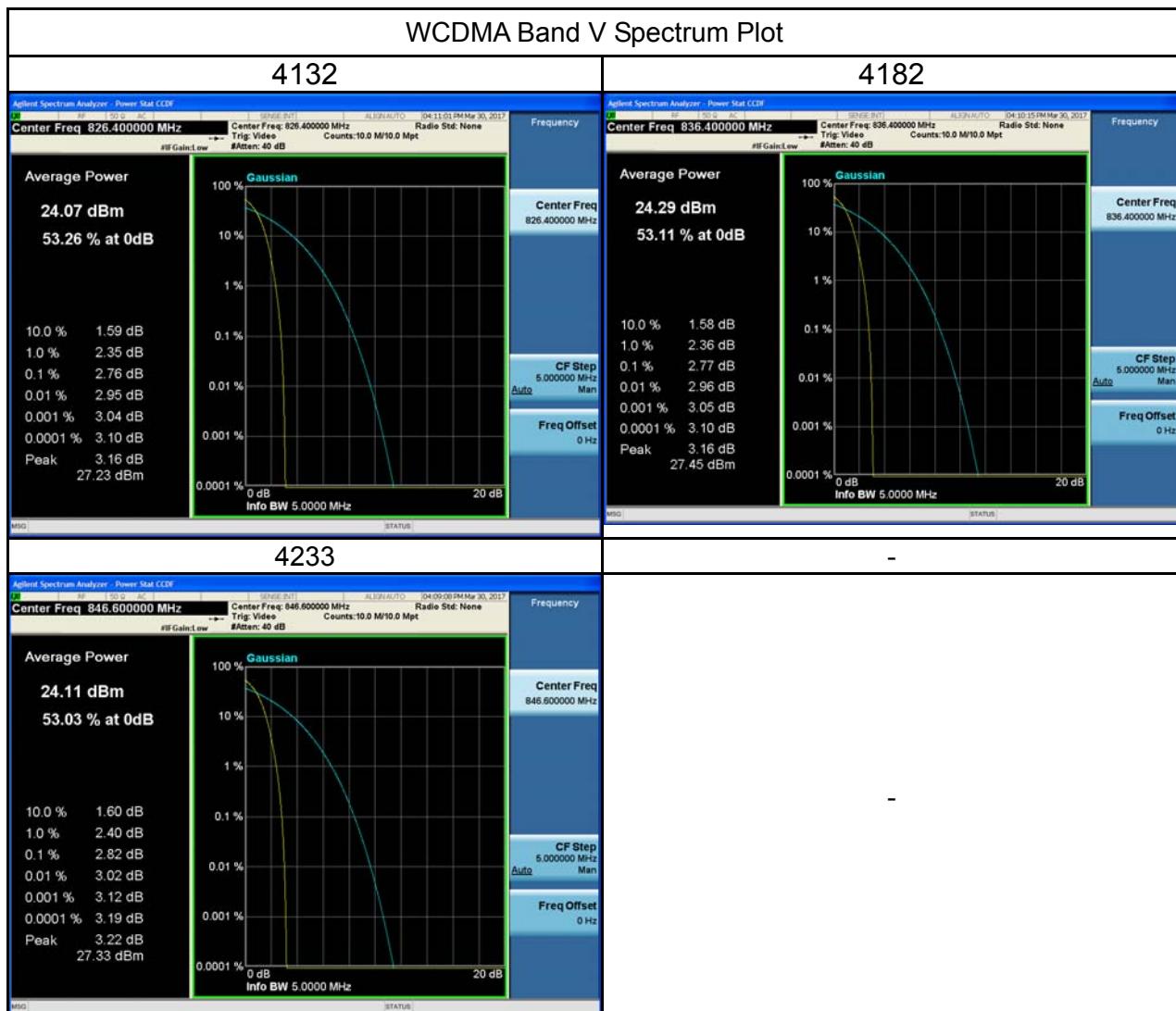
## ATTACHMENT E - BAND EDGE

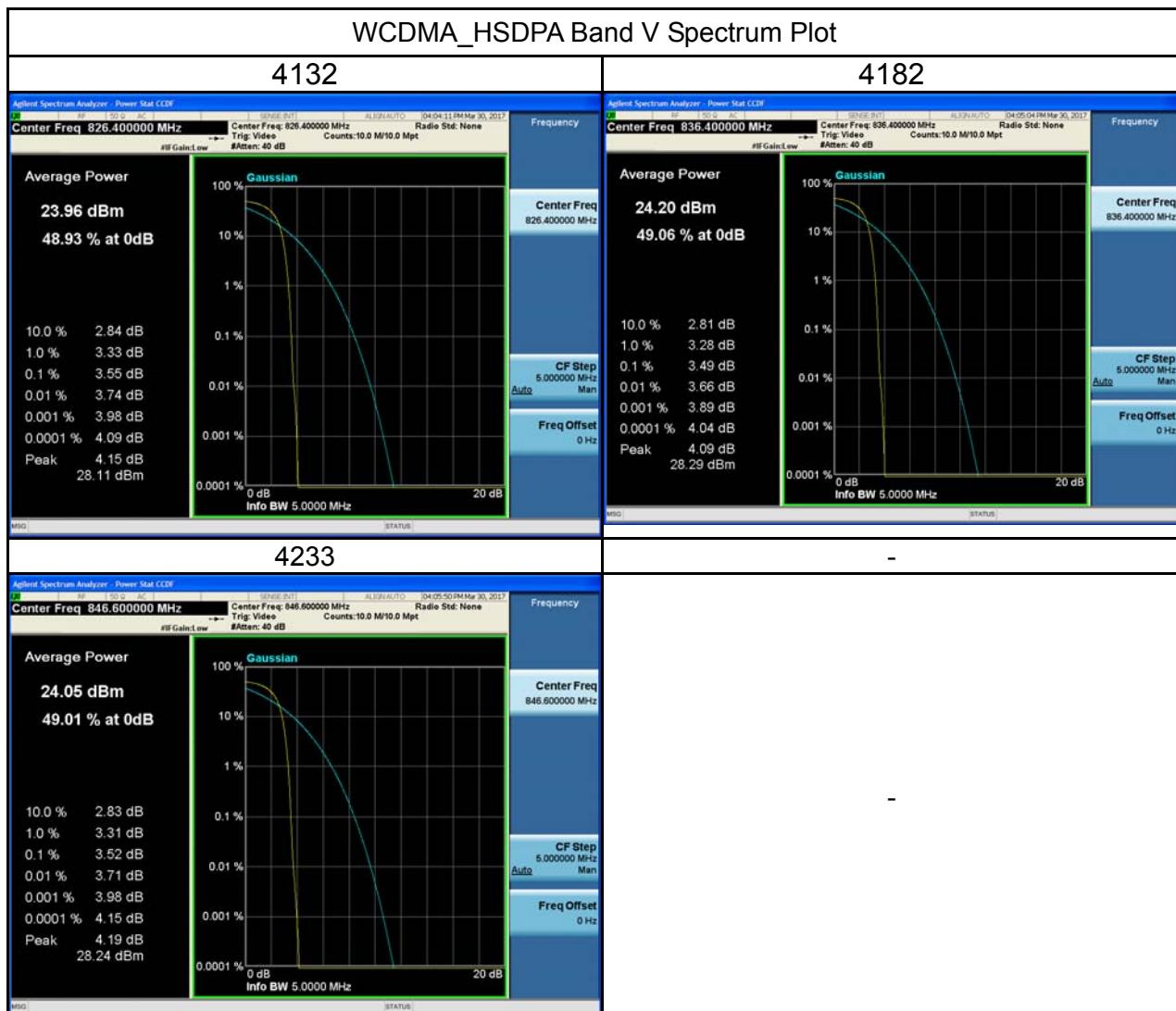




## ATTACHMENT F - PEAK TO AVERAGE RATIO







## ATTACHMENT G - FREQUENCY STABILITY

Test Mode:	GSM850_CH190
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### Temperature vs. Frequency Stability

Temperature(°C)	Frequency Error (Hz)	Frequency Error (ppm)	Limit(ppm)
-20	8.46	0.010264499	2.5
-10	7.17	0.008699345	2.5
0	3.84	0.004659063	2.5
10	5.69	0.006903664	2.5
20	7.32	0.008881339	2.5
30	8.06	0.00977918	2.5
40	5.51	0.006685271	2.5
50	8.44	0.010240233	2.5
60	6.12	0.007425382	2.5
Max. Deviation (ppm)	<b>8.46</b>	<b>0.010264499</b>	2.5

### Voltage vs. Frequency Stability

Voltage(Volts)	Frequency Error (Hz)	Frequency Error (ppm)	Limit(ppm)
Low	2.46	0.002984712	2.5
Middle	4.51	0.005471973	2.5
High	3.93	0.00476826	2.5
Max. Deviation (ppm)	<b>4.51</b>	<b>0.005471973</b>	2.5

Test Mode:	WCDMA Band 5_CH4182
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### Temperature vs. Frequency Stability

Temperature(°C)	Frequency Error (Hz)	Frequency Error (ppm)	Limit(ppm)
-20	8.34	0.009971306	2.5
-10	7.43	0.008883309	2.5
0	8.44	0.010090866	2.5
10	7.54	0.009014825	2.5
20	8.93	0.01067671	2.5
30	7.29	0.008715925	2.5
40	7.98	0.00954089	2.5
50	6.66	0.007962697	2.5
60	8.27	0.009887614	2.5
Max. Deviation (ppm)	<b>8.93</b>	<b>0.01067671</b>	2.5

### Voltage vs. Frequency Stability

Voltage(Volts)	Frequency Error (Hz)	Frequency Error (ppm)	Limit(ppm)
Low	9.27	0.011083214	2.5
Middle	7.54	0.009014825	2.5
High	8.81	0.010533238	2.5
Max. Deviation (ppm)	<b>9.27</b>	<b>0.011083214</b>	2.5