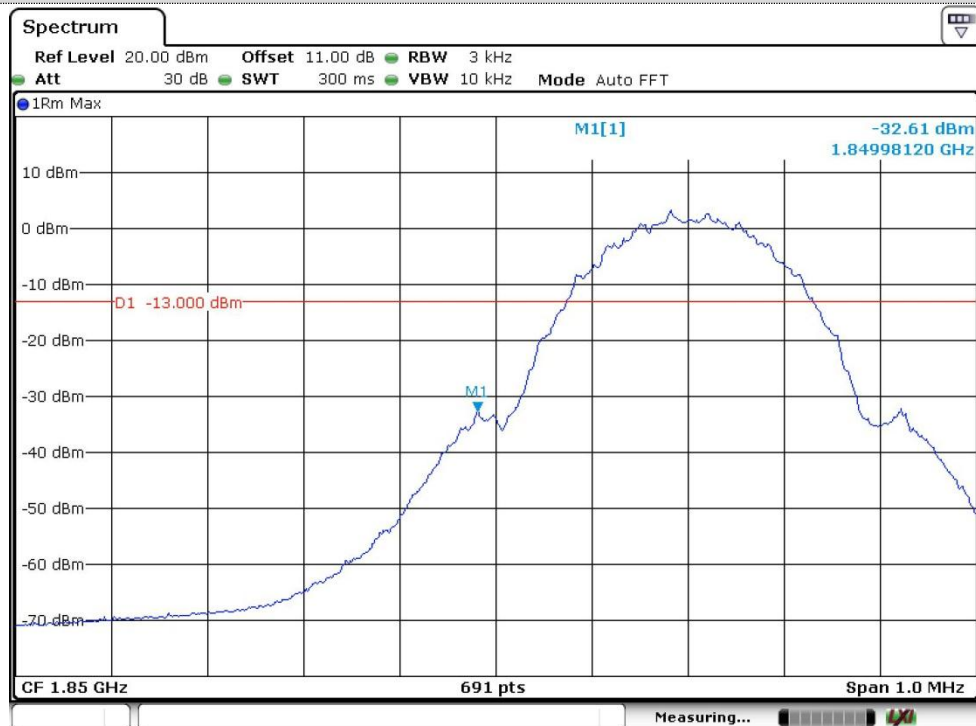


## EGPRS1900

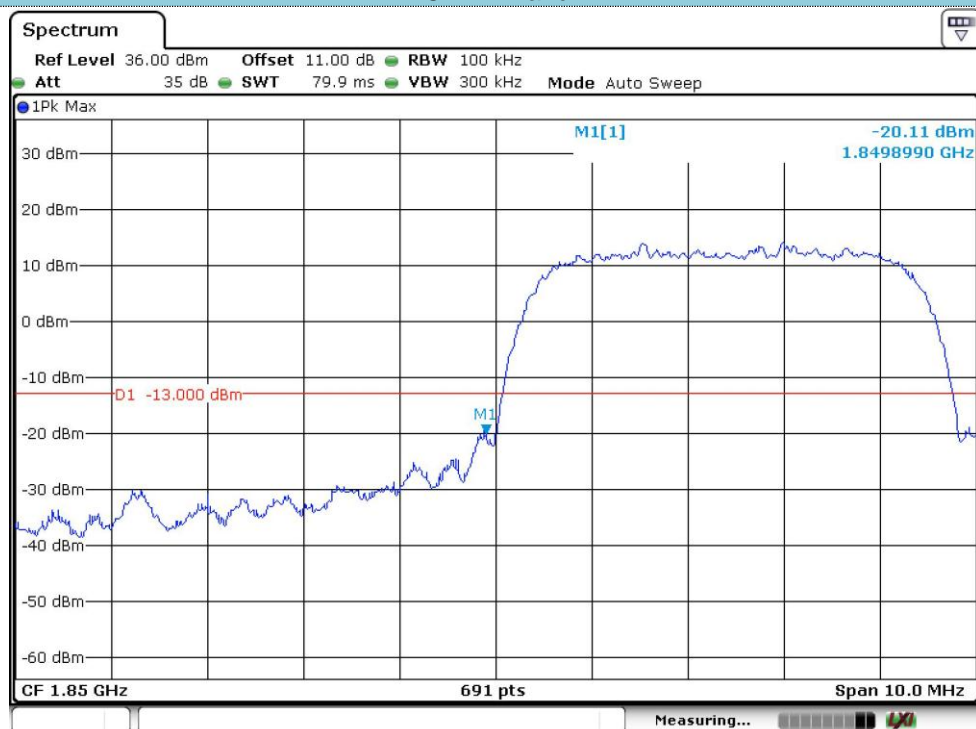


## Channel 512

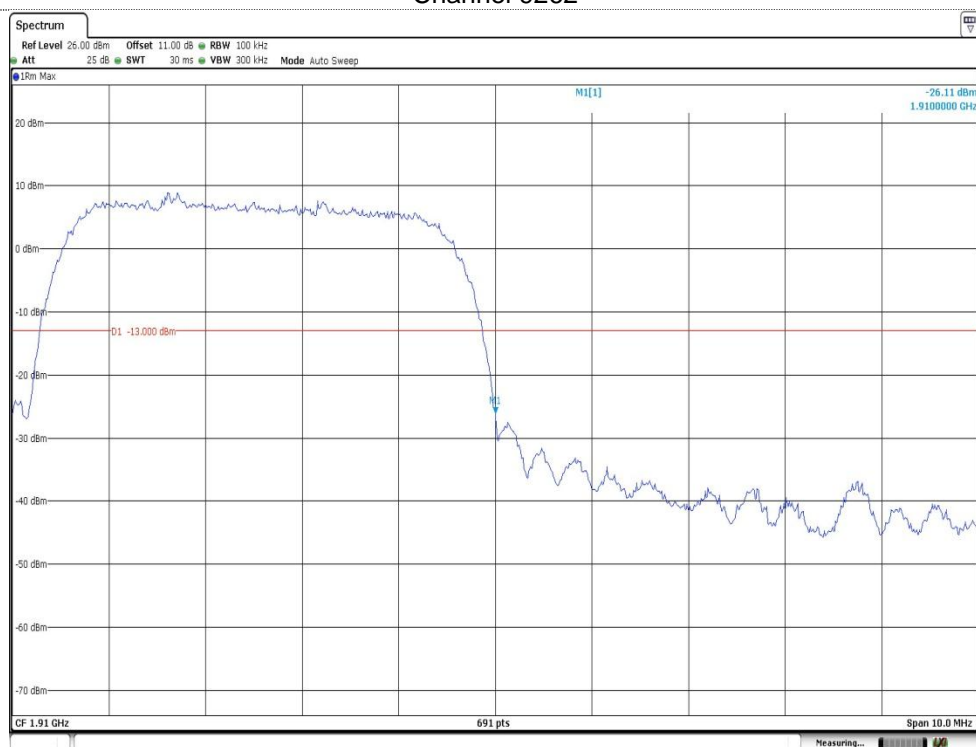


## Channel 810

## WCDMA Band II

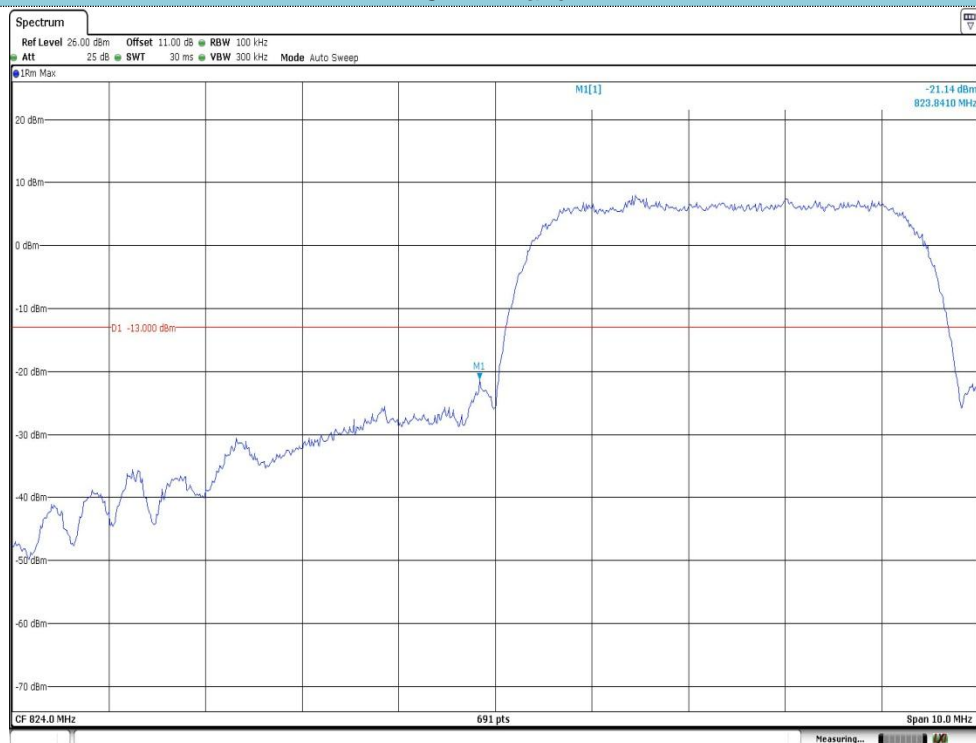


## Channel 9262

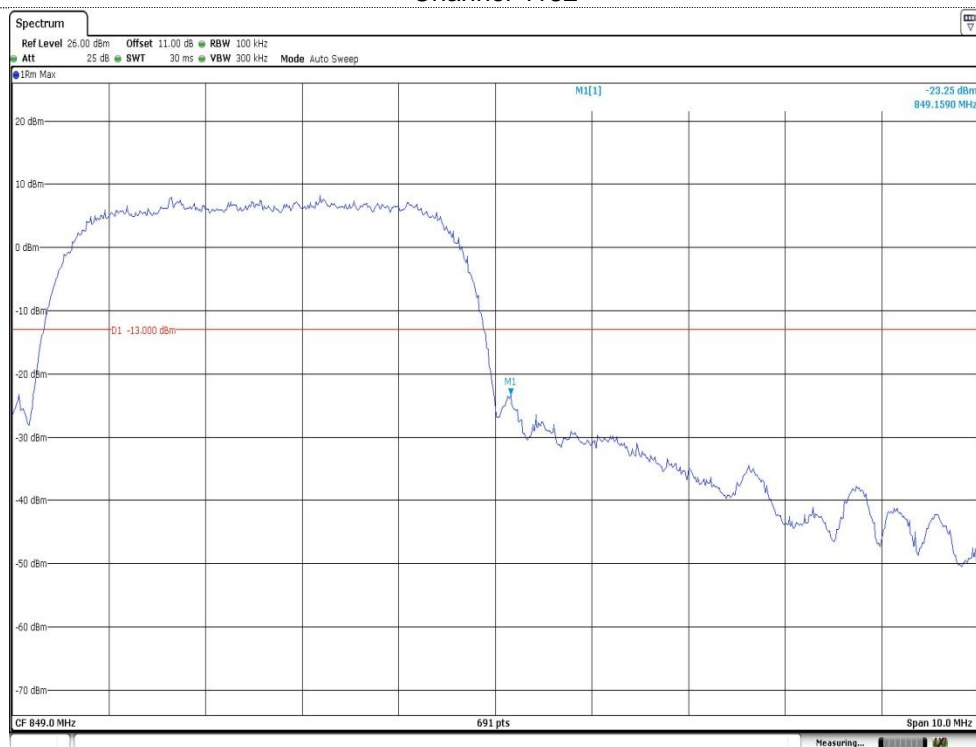


## Channel 9538

## WCDMA Band V



## Channel 4132



## Channel 4233

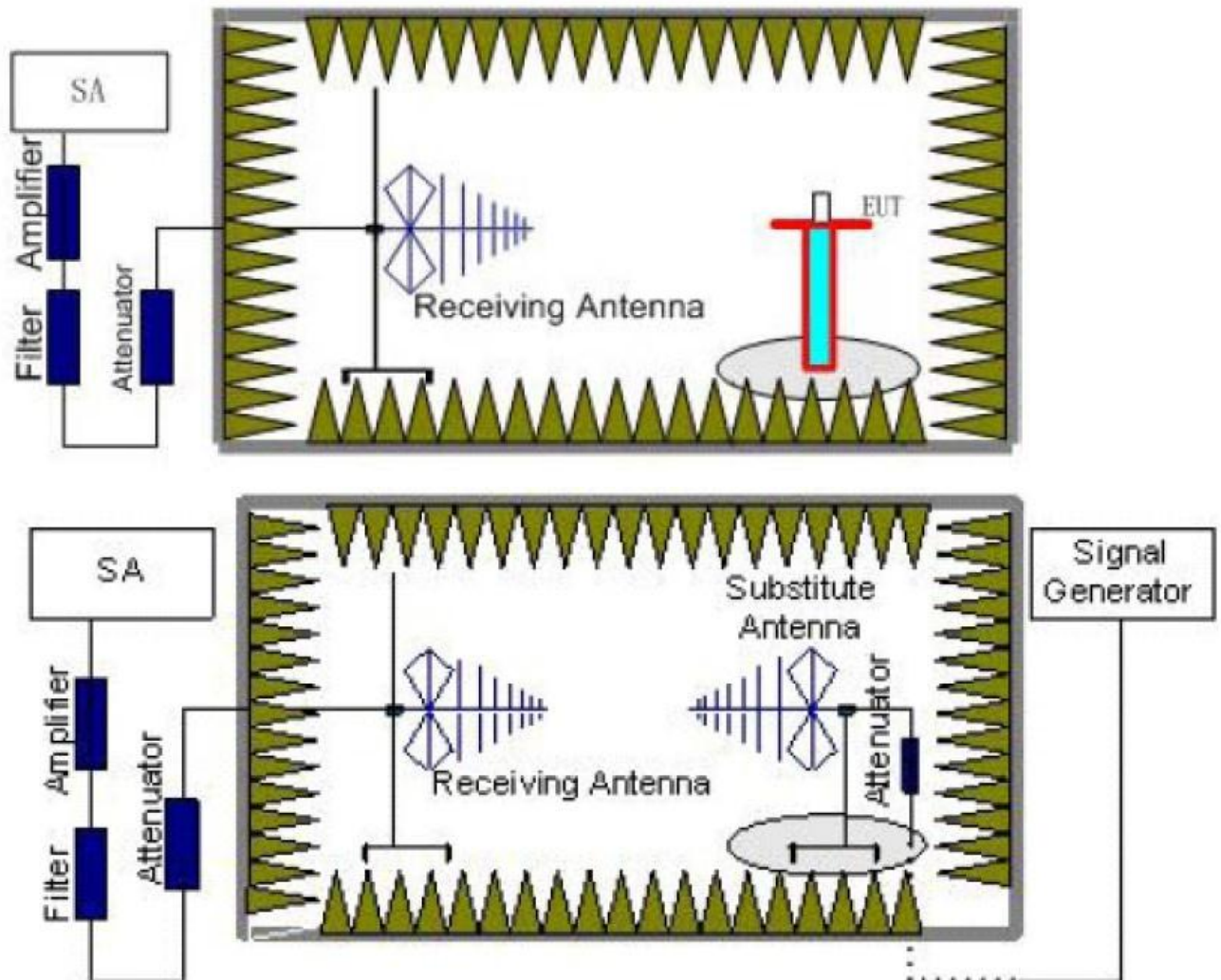
## 5.5. ERP and EIRP

### LIMIT

GSM850/WCDMA Band V: 7W ERP

PCS1900/WCDMA Band II: 2W EIRP

### TEST CONFIGURATION



### TEST PROCEDURE

1. EUT was placed on a 0.8 meter high non-conductive stand at a 3 meter test distance from the receive antenna. A receiving antenna was placed on the antenna mast 3 meters from the EUT for emission measurements. The height of receiving antenna is 1.0m. Detected emissions were maximized at each frequency by rotating the EUT through 360° and adjusting the receiving antenna polarization. The radiated emission measurements of all transmit frequencies in three channels (High, Middle, Low) were measured with peak detector.
2. A log-periodic antenna or double-ridged waveguide horn antenna shall be substituted in place of the EUT. The log-periodic antenna will be driven by a signal generator and the level will be adjusted till the same power value on the spectrum analyzer or receiver. The level of the spurious emissions can be calculated through the level of the signal generator, cable loss, the gain of the substitution antenna and the reading of the spectrum analyzer or receiver.
3. The EUT is then put into continuously transmitting mode at its maximum power level during the test. Set Test Receiver or Spectrum RBW=1MHz, VBW=3MHz for above 1GHz and RBW=100kHz, VBW=300kHz for 30MHz to 1GHz, And the maximum value of the receiver should be recorded as (Pr).
4. The EUT shall be replaced by a substitution antenna. In the chamber, an substitution antenna for the frequency band of interest is placed at the reference point of the chamber. An RF Signal source for the frequency band of interest is connected to the substitution antenna with a cable that has been constructed

to not interfere with the radiation pattern of the antenna. A power (PMea) is applied to the input of the substitution antenna, and adjust the level of the signal generator output until the value of the receiver reach the previously recorded (Pr). The power of signal source (PMea) is recorded. The test should be performed by rotating the test item and adjusting the receiving antenna polarization.

5. A amplifier should be connected to the Signal Source output port. And the cable should be connect between the Amplifier and the Substitution Antenna. The cable loss (Pcl) ,the Substitution Antenna Gain (Ga) and the Amplifier Gain (PAg) should be recorded after test.
6. The measurement results are obtained as described below:  
 $\text{Power(EIRP)} = \text{PMea} - \text{PAg} - \text{Pcl} + \text{Ga}$   
 We used SMF100A microwave signal generator which signal level can up to 33dBm,so we not used power Amplifier for substitution test; The measurement results are amend as described below:  
 $\text{Power(EIRP)} = \text{PMea} - \text{Pcl} + \text{Ga}$
7. This value is EIRP since the measurement is calibrated using an antenna of known gain (2.15 dBi) and known input power.  
 ERP can be calculated from EIRP by subtracting the gain of the dipole,  $\text{ERP} = \text{EIRP} - 2.15\text{dBi}$ .

### **TEST MODE:**

Please refer to the clause 3.3

### **TEST RESULTS**

☒ **Passed**      ☐ **Not Applicable**

Mode	Channel	Antenna Pol.	ERP	Limit (dBm)	Result
GSM850	128	V	29.73	38.45	Pass
		H	24.87		
	190	V	29.16		
		H	24.75		
	251	V	29.31		
		H	25.17		
GPRS850	128	V	29.74	38.45	Pass
		H	24.82		
	190	V	29.13		
		H	24.69		
	251	V	29.28		
		H	25.15		
EGPRS850	128	V	29.65	38.45	Pass
		H	24.74		
	190	V	29.08		
		H	24.32		
	251	V	29.22		
		H	25.12		

Mode	Channel	Antenna Pol.	EIRP	Limit (dBm)	Result
PCS1900	512	V	28.86	33.00	Pass
		H	23.95		
	661	V	27.14		
		H	23.25		
	810	V	27.45		
		H	22.58		
GPRS1900	512	V	28.81	33.00	Pass
		H	23.65		
	661	V	27.25		
		H	23.15		
	810	V	27.35		
		H	22.51		
EGPRS1900	512	V	28.25	33.00	Pass
		H	23.91		
	661	V	27.25		
		H	23.11		
	810	V	27.32		
		H	22.43		

Mode	Channel	Antenna Pol.	EIRP	Limit (dBm)	Result
WCDMA Band II	9262	V	22.05	33.00	Pass
		H	14.78		
	9400	V	22.05		
		H	14.52		
	9538	V	21.78		
		H	14.25		

Mode	Channel	Antenna Pol.	ERP	Limit (dBm)	Result
WCDMA Band V	4132	V	22.05	38.45	Pass
		H	14.52		
	4183	V	22.35		
		H	14.76		
	4233	V	21.58		
		H	13.52		

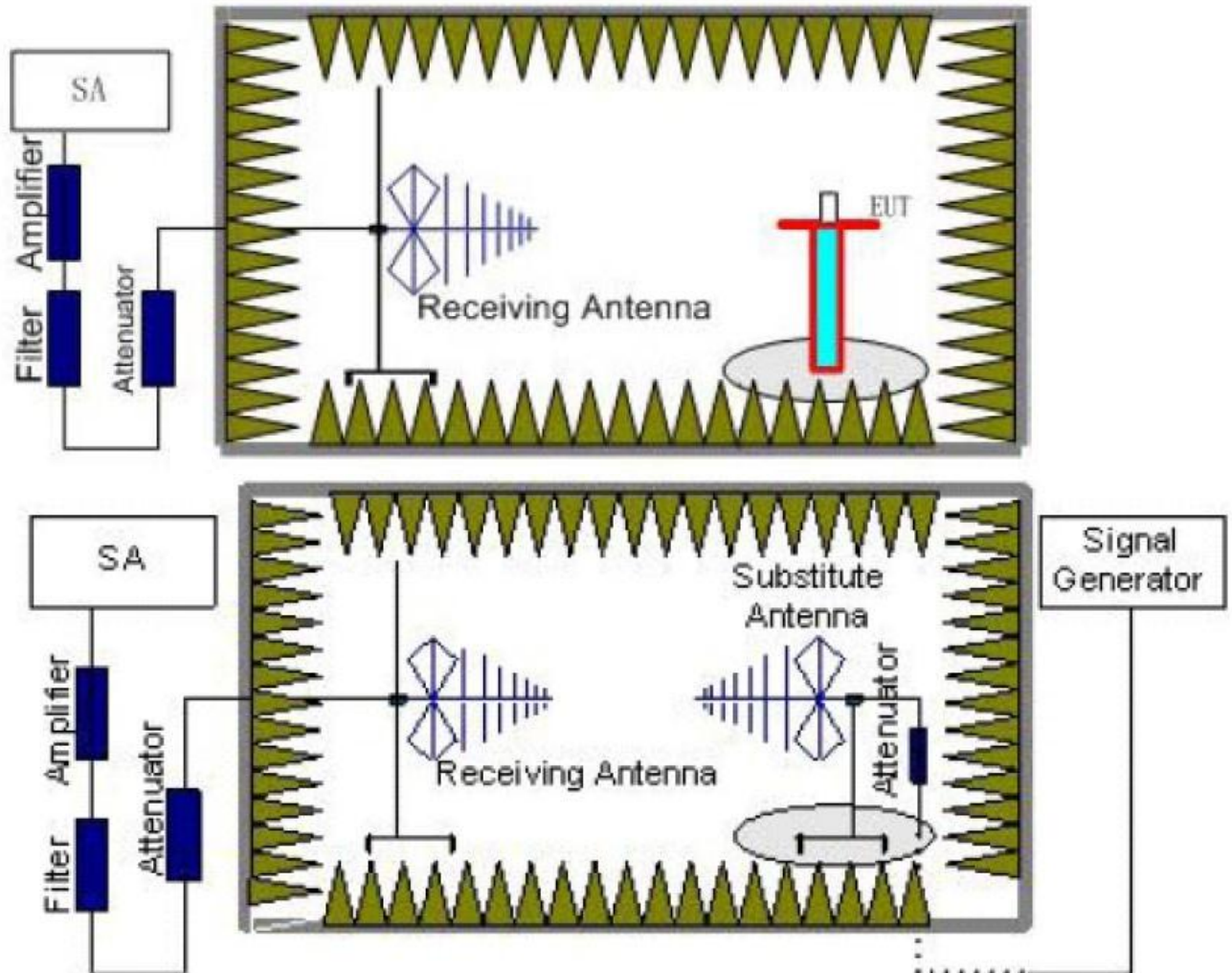


## 5.6. Radiated Spurious Emission

### LIMIT

-13dBm

### TEST CONFIGURATION



### TEST RESULTS

1. EUT was placed on a 0.8 meter high non-conductive stand at a 3 meter test distance from the receive antenna. A receiving antenna was placed on the antenna mast 3 meters from the EUT for emission measurements. The height of receiving antenna is 1.0m. Detected emissions were maximized at each frequency by rotating the EUT through 360° and adjusting the receiving antenna polarization. The radiated emission measurements of all transmit frequencies in three channels (High, Middle, Low) were measured with peak detector.
2. A log-periodic antenna or double-ridged waveguide horn antenna shall be substituted in place of the EUT. The log-periodic antenna will be driven by a signal generator and the level will be adjusted till the same power value on the spectrum analyzer or receiver. The level of the spurious emissions can be calculated through the level of the signal generator, cable loss, the gain of the substitution antenna and the reading of the spectrum analyzer or receiver.
3. The EUT is then put into continuously transmitting mode at its maximum power level during the test. Set Test Receiver or Spectrum RBW=1MHz, VBW=3MHz for above 1GHz and RBW=100kHz, VBW=300kHz for 30MHz to 1GHz, And the maximum value of the receiver should be recorded as (Pr).
4. The EUT shall be replaced by a substitution antenna. In the chamber, an substitution antenna for the frequency band of interest is placed at the reference point of the chamber. An RF Signal source for the frequency band of interest is connected to the substitution antenna with a cable that has been constructed to not interfere with the radiation pattern of the antenna. A power (PMea) is applied to the input of the substitution antenna, and adjust the level of the signal generator output until the value of the receiver

reach the previously recorded (Pr). The power of signal source (PMea) is recorded. The test should be performed by rotating the test item and adjusting the receiving antenna polarization.

5. A amplifier should be connected to the Signal Source output port. And the cable should be connect between the Amplifier and the Substitution Antenna. The cable loss (Pcl) ,the Substitution Antenna Gain (Ga) and the Amplifier Gain (PAg) should be recorded after test.
6. The measurement results are obtained as described below:  
Power(EIRP)=PMea- PAg - Pcl + Ga  
We used SMF100A micowave signal generator which signal level can up to 33dBm,so we not used power Amplifier for substitution test; The measurement results are amend as described below:  
Power(EIRP)=PMea- Pcl + Ga
7. This value is EIRP since the measurement is calibrated using an antenna of known gain (2.15 dBi) and known input power.  
ERP can be calculated from EIRP by subtracting the gain of the dipole, ERP = EIRP-2.15dBi.

**TEST MODE:**

Please refer to the clause 3.3

**TEST RESULTS**

☒ **Passed**      ☐ **Not Applicable**

Note: Worst case at GSM850/PCS1900



GSM850					
Channel	Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
		Polarization	Level (dBm)		
128	182.21	Vertical	-63.81	-13.00	Pass
	259.91	V	-58.04		
	1648.51	V	-45.28		
	2472.57	V	-47.28		
	5069.12	V	-52.30		
	8924.21	V	-45.24		
	182.21	Horizontal	-66.32	-13.00	Pass
	259.91	H	-58.78		
	1648.51	H	-43.97		
	2592.17	H	-40.99		
	4113.73	H	-52.27		
	9567.58	H	-43.86		
190	182.21	Vertical	-63.58	-13.00	Pass
	259.91	V	-57.52		
	1444.89	V	-55.50		
	2440.18	V	-49.93		
	5076.48	V	-52.30		
	8606.45	V	-45.68		
	130.01	Horizontal	-71.28	-13.00	Pass
	259.91	H	-57.91		
	1674.06	H	-49.00		
	2475.28	H	-50.27		
	5017.92	H	-50.66		
	10933.20	H	-40.95		
251	41.61	Vertical	-69.81	-13.00	Pass
	414.90	V	-62.51		
	1895.33	V	-47.54		
	2547.01	V	-44.86		
	4113.73	V	-52.63		
	10007.53	V	-43.90		
	41.61	Horizontal	-73.91	-13.00	Pass
	259.91	H	-59.49		
	1698.14	H	-47.78		
	2580.81	H	-45.22		
	5017.92	H	-50.38		
	9978.55	H	-43.52		

## Remark:

1. The emission behaviour belongs to narrowband spurious emission.
2. The emission levels of not record in the report are very lower than the limit and not show in test report.

PCS1900					
Channel	Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
		Polarization	Level (dBm)		
512	41.46	Vertical	-61.93	-13.00	Pass
	182.21	V	-63.40		
	1643.08	V	-51.09		
	2058.11	V	-47.75		
	4179.88	V	-60.41		
	8519.52	V	-48.45		
	41.46	Horizontal	-67.93	-13.00	Pass
	259.91	H	-65.47		
	1641.28	H	-49.36		
	1954.54	H	-49.96		
	5618.90	H	-56.38		
	8121.39	H	-48.08		
661	41.61	Vertical	-62.37	-13.00	Pass
	259.91	V	-60.79		
	1672.22	V	-49.27		
	2589.33	V	-24.12		
	5792.66	V	-55.40		
	9863.45	V	-46.73		
	182.21	Horizontal	-68.60	-13.00	Pass
	259.91	H	-59.83		
	1672.22	H	-49.19		
	2087.72	H	-47.26		
	5767.51	H	-55.35		
	8744.84	H	-47.51		
810	41.61	Vertical	-64.34	-13.00	Pass
	414.90	V	-62.59		
	1701.87	V	-49.80		
	2586.49	V	-44.85		
	5263.91	V	-56.31		
	11653.60	V	-39.56		
	200.36	Horizontal	-66.94	-13.00	Pass
	233.89	H	-68.18		
	1448.07	H	-52.17		
	1701.87	H	-45.73		
	5150.64	H	-57.40		
	8681.66	H	-47.67		

## Remark:

1. The emission behaviour belongs to narrowband spurious emission.
2. The emission levels of not record in the report are very lower than the limit and not show in test report.

WCDMA Band II					
Channel	Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
		Polarization	Level (dBm)		
9262	41.31	Vertical	-61.34	-13.00	Pass
	245.69	V	-64.00		
	1933.18	V	-43.95		
	2519.18	V	-46.82		
	5562.15	V	-49.70		
	8544.26	V	-45.60		
	41.31	Horizontal	-61.34	-13.00	Pass
	266.39	H	-60.36		
	1418.16	H	-53.91		
	1933.18	H	-44.98		
	5562.15	H	-47.26		
	7412.26	H	-44.46		
9400	41.46	Vertical	-63.01	-13.00	Pass
	266.39	V	-62.20		
	1364.66	V	-54.71		
	2830.31	V	-49.13		
	3759.98	V	-53.33		
	5635.22	V	-46.64		
	139.97	Horizontal	-76.78	-13.00	Pass
	693.28	H	-72.20		
	1357.19	H	-54.82		
	2467.14	H	-50.25		
	4666.94	H	-54.11		
	5643.40	H	-47.03		
9538	88.93	Vertical	-78.21	-13.00	Pass
	266.39	V	-66.51		
	1260.88	V	-53.69		
	2519.18	V	-46.49		
	3814.91	V	-44.61		
	5725.84	V	-44.05		
	41.46	Horizontal	-76.26	-13.00	Pass
	266.39	H	-66.51		
	1147.20	H	-55.03		
	2519.18	H	-46.49		
	3814.91	H	-50.89		
	5725.84	H	-43.64		

## Remark:

1. The emission behaviour belongs to narrowband spurious emission.
2. The emission levels of not record in the report are very lower than the limit and not show in test report.

WCDMA Band V					
Channel	Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
		Polarization	Level (dBm)		
4132	41.46	Vertical	-64.55	-13.00	Pass
	214.96	V	-74.86		
	1655.77	V	-35.13		
	2143.49	V	-44.33		
	3299.90	V	-51.84		
	4137.66	V	-51.06		
	89.87	Horizontal	-72.62	-13.00	Pass
	266.39	H	-60.68		
	1655.77	H	-34.63		
	2143.49	H	-44.02		
	3309.48	H	-49.29		
	8606.45	H	-45.85		
4183	41.31	Vertical	-65.82	-13.00	Pass
	266.39	V	-62.53		
	1670.38	V	-34.77		
	2592.17	V	-45.92		
	3338.41	V	-51.85		
	8027.71	V	-46.61		
	184.14	Horizontal	-68.84	-13.00	Pass
	266.39	H	-59.71		
	1672.22	H	-36.48		
	2586.49	H	-31.26		
	4755.76	H	-53.00		
	9949.65	H	-42.83		
4233	41.46	Vertical	-60.11	-13.00	Pass
	414.90	V	-64.87		
	1690.69	V	-33.66		
	1887.02	V	-29.29		
	3382.26	V	-50.27		
	9609.30	V	-44.19		
	184.14	Horizontal	-70.36	-13.00	Pass
	266.39	H	-61.44		
	1690.69	H	-35.03		
	1891.17	H	-37.16		
	4107.77	H	-53.40		
	8531.88	H	-45.00		

## Remark:

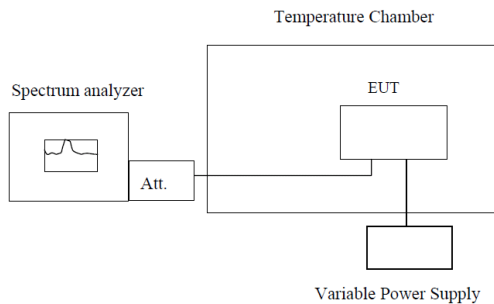
1. The emission behaviour belongs to narrowband spurious emission.
2. The emission levels of not record in the report are very lower than the limit and not show in test report.

## 5.7. Frequency stability V.S. Temperature measurement

### LIMIT

2.5ppm

### TEST CONFIGURATION



**Note :** Measurement setup for testing on Antenna connector

### TEST PROCEDURE

1. The equipment under test was connected to an external DC power supply and input rated voltage.
2. RF output was connected to a frequency counter or spectrum analyzer via feed through attenuators.
3. The EUT was placed inside the temperature chamber.
4. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and measure EUT 25°C operating frequency as reference frequency.
5. Turn EUT off and set the chamber temperature to -30°C. After the temperature stabilized for approximately 30 minutes recorded the frequency.
6. Repeat step measure with 10°C increased per stage until the highest temperature of +50°C reached.

### TEST MODE:

Please refer to the clause 3.3

### TEST RESULTS

☒ **Passed**      ☐ **Not Applicable**

Note: Worst case at GSM850/PCS1900/WCDMA B2/B5 mid channel

Reference Frequency: GSM850 Middle channel=190 channel=836.6MHz					
Power supplied (Vdc)	Temperature (°C)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
3.80	-30	12	0.014	2.50	Pass
	-20	15	0.018		
	-10	8	0.010		
	0	5	0.006		
	10	4	0.005		
	20	7	0.008		
	30	11	0.013		
	40	3	0.004		
	50	20	0.024		
Reference Frequency: PCS1900 Middle channel=661 channel=1880MHz					
Power supplied (Vdc)	Temperature (°C)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
3.80	-30	22	0.012	2.50	Pass
	-20	25	0.013		
	-10	27	0.014		
	0	20	0.011		
	10	12	0.006		
	20	15	0.008		
	30	23	0.012		
	40	18	0.010		
	50	6	0.003		

Reference Frequency: WCDMA Band II Middle channel=9400 channel=1880MHz					
Power supplied (Vdc)	Temperature (°C)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
3.80	-30	5	0.003	2.50	Pass
	-20	11	0.006		
	-10	13	0.007		
	0	8	0.004		
	10	5	0.003		
	20	8	0.004		
	30	8	0.004		
	40	15	0.008		
	50	22	0.012		
Reference Frequency: WCDMA Band VMiddle channel=4183 channel=836.6MHz					
Power supplied (Vdc)	Temperature (°C)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
3.80	-30	23	0.027	2.50	Pass
	-20	11	0.013		
	-10	15	0.018		
	0	20	0.024		
	10	3	0.004		
	20	24	0.029		
	30	5	0.006		
	40	11	0.013		
	50	7	0.008		

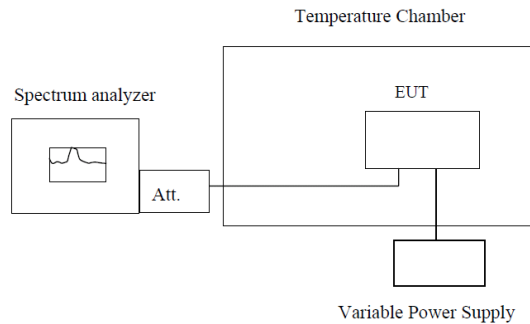


## 5.8. Frequency stability V.S. Voltage measurement

### LIMIT

2.5ppm

### TEST CONFIGURATION



**Note :** Measurement setup for testing on Antenna connector

### TEST PROCEDURE

1. Set chamber temperature to 25°C. Use a variable DC power source to power the EUT and set the voltage to rated voltage.
2. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and record the frequency.
3. Reduce the input voltage to specified extreme voltage variation (+/- 15%) and endpoint, record the maximum frequency change.

### TEST MODE:

Please refer to the clause 3.3

### TEST RESULTS

☒ **Passed**      ☐ **Not Applicable**

Note: Worst case at GSM850/PCS1900/WCDMA B2/B5 mid channel

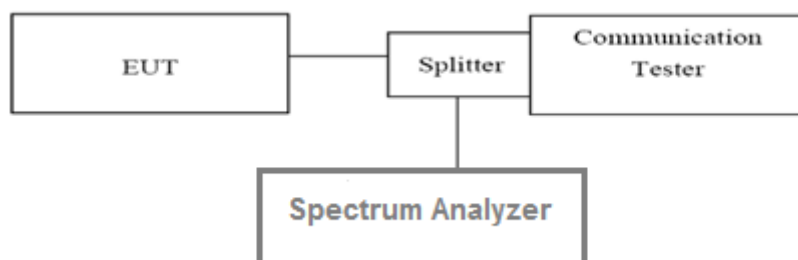
Reference Frequency: GSM850 (GSM link) Middle channel=190 channel=836.6MHz					
Temperature (°C)	Power supplied (Vdc)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
25	4.35	20	0.024	2.50	Pass
	3.80	3	0.004		
	3.60	10	0.012		
Reference Frequency: PCS1900 (GSM link) Middle channel=661 channel=1880MHz					
Temperature (°C)	Power supplied (Vdc)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
25	4.35	13	0.007	2.50	Pass
	3.80	5	0.003		
	3.60	8	0.004		
Reference Frequency: WCDMA Band II Middle channel=9400 channel=1880MHz					
Temperature (°C)	Power supplied (Vdc)	Frequency error		Limit (ppm)	
		Hz	ppm	Result	
25	4.35	11	0.006	2.50	Pass
	3.80	7	0.004		
	3.60	8	0.004		
Reference Frequency: WCDMA Band VMiddle channel=4183 channel=836.6MHz					
Temperature (°C)	Power supplied (Vdc)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
25	4.35	21	0.025	2.50	Pass
	3.80	27	0.032		
	3.60	14	0.017		

## 5.9. Peak-Average Ratio

### LIMIT

13dB

### TEST CONFIGURATION



### TEST PROCEDURE

According with KDB 971168

1. The signal analyzer's CCDF measurement profile is enabled
2. Frequency = carrier center frequency
3. Measurement BW > Emission bandwidth of signal
4. The signal analyzer was set to collect one million samples to generate the CCDF curve
5. The measurement interval was set depending on the type of signal analyzed. For continuous signals (>98% duty cycle), the measurement interval was set to 1ms. For burst transmissions, the spectrum analyzer is set to use an internal "RF Burst" trigger that is synced with an incoming pulse and the measurement interval is set to less than the duration of the "on time" of one burst to ensure that energy is only captured during a time in which the transmitter is operating at maximum power

### TEST MODE:

Please refer to the clause 3.3

### TEST RESULTS

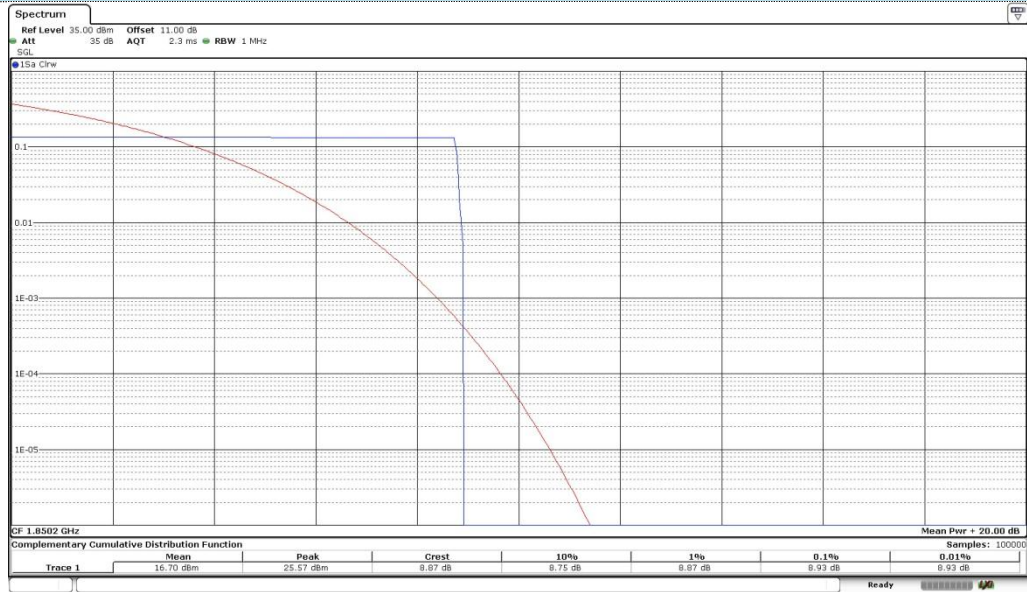
☒ **Passed**      ☐ **Not Applicable**

Note: Worst case PCS1900, WCDMA BAND1900

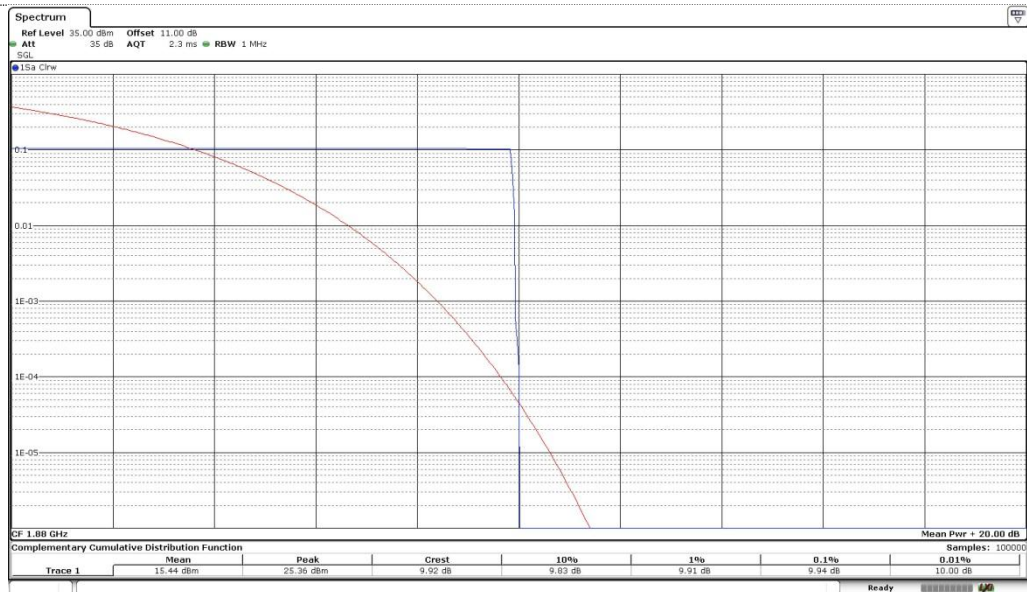
Band	Channel	Frequency(MHz)	PAR	Limit(dB)	Result
PCS1900	512	1850.2	8.93	13.00	Pass
	661	1880.0	9.94	13.00	Pass
	810	1909.8	9.25	13.00	Pass

Band	Channel	Frequency(MHz)	PAR	Limit(dB)	Result
WCDMA BAND II	9262	1852.4	3.22	13.00	Pass
	9400	1880.0	3.28	13.00	Pass
	9538	1907.6	3.16	13.00	Pass

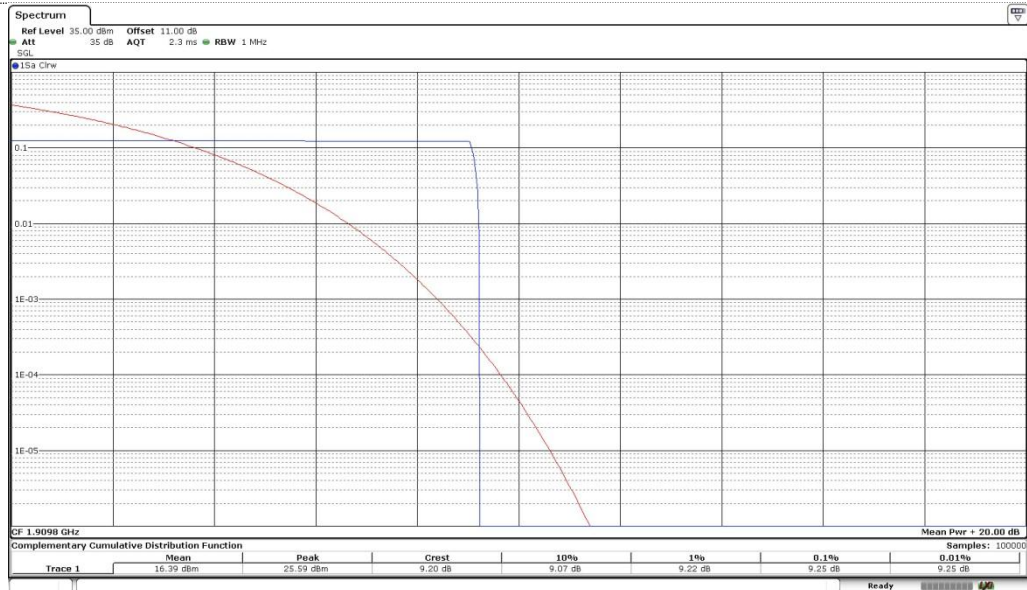
## PCS1900



## Channel 512

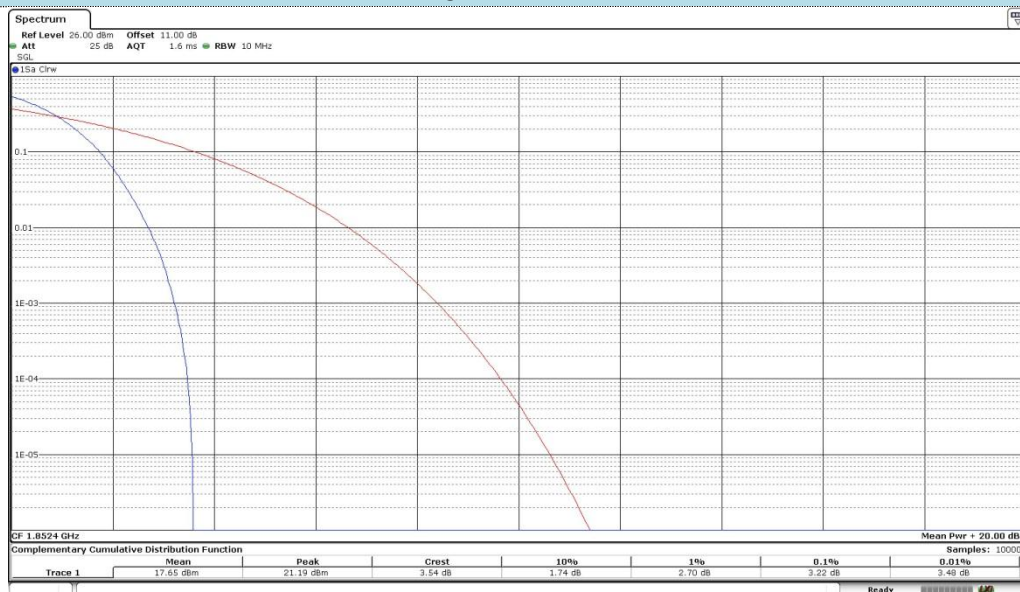


## Channel 661

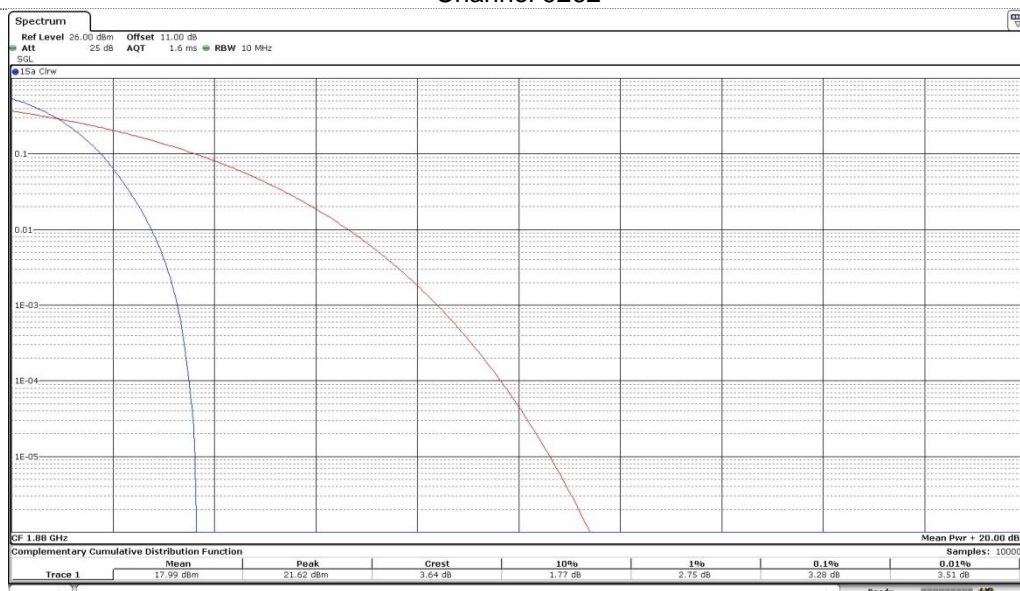


## Channel 810

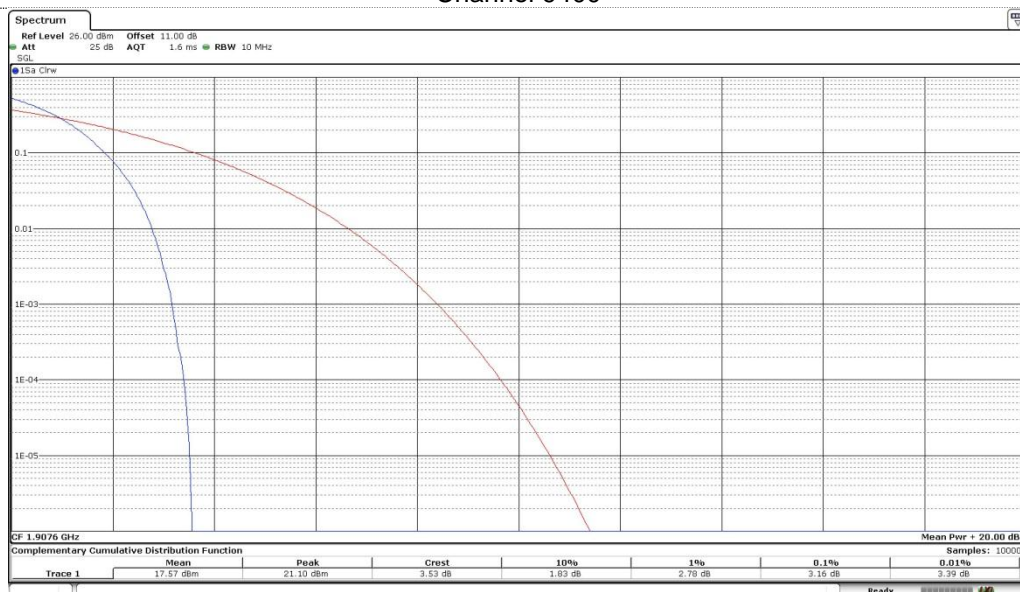
## WCDMA BAND II



## Channel 9262



## Channel 9400

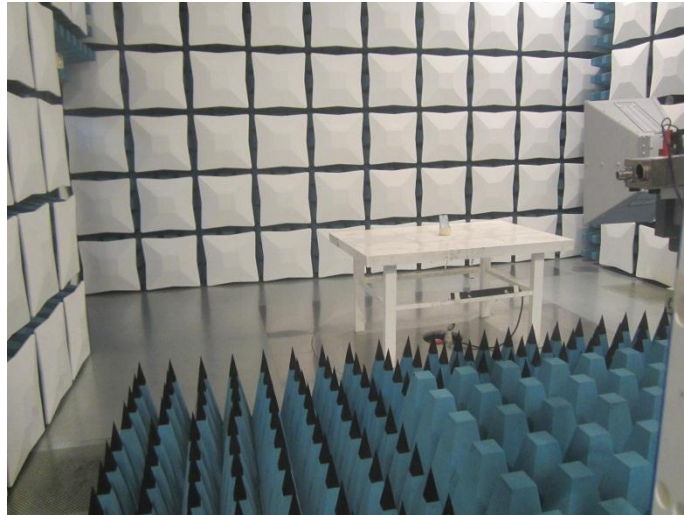


## Channel 9538



## 6. Test Setup Photos of the EUT

Radiated emission:



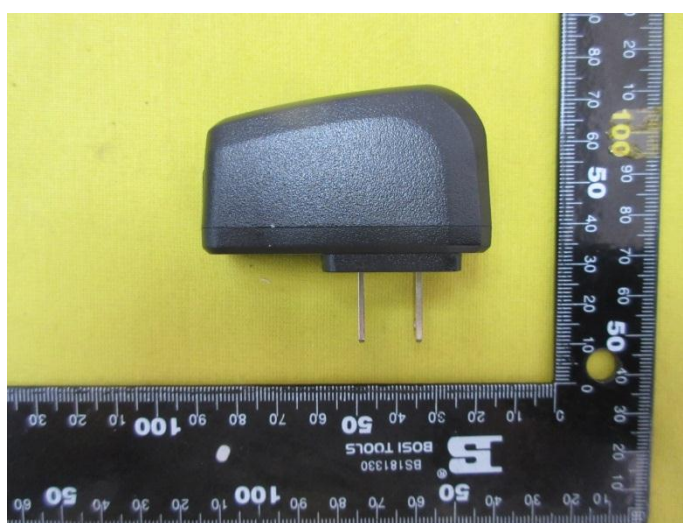


## 7. External and Internal Photos of the EUT

### External photos of the EUT

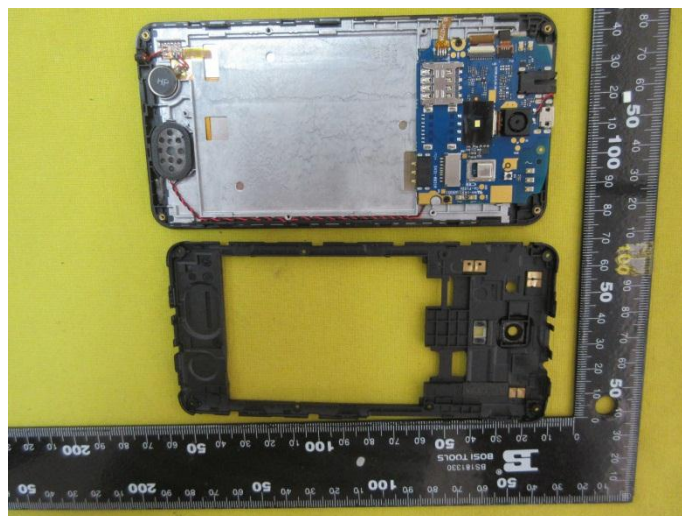
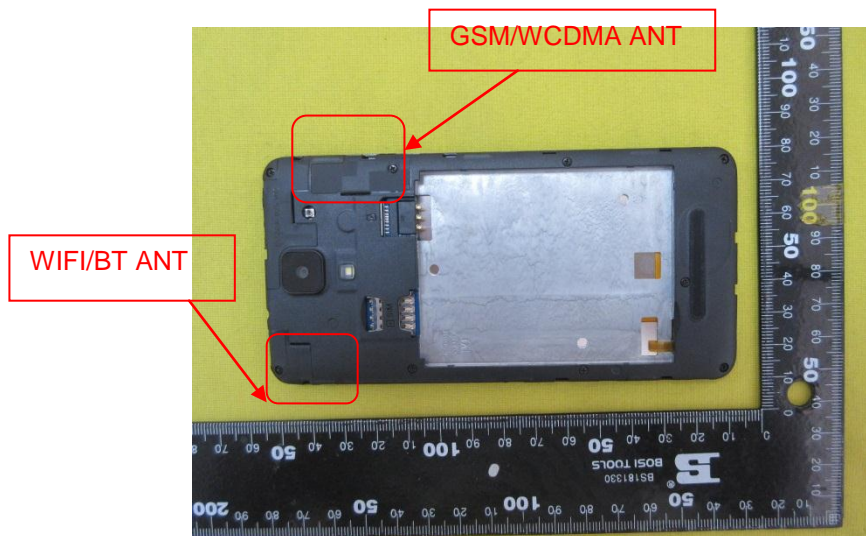


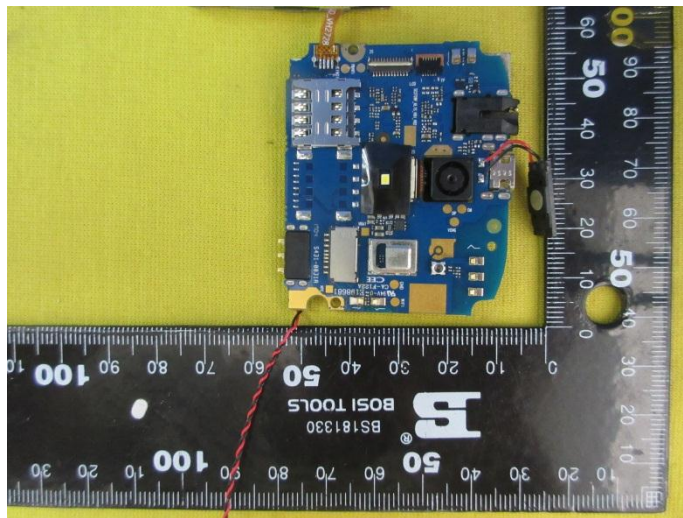




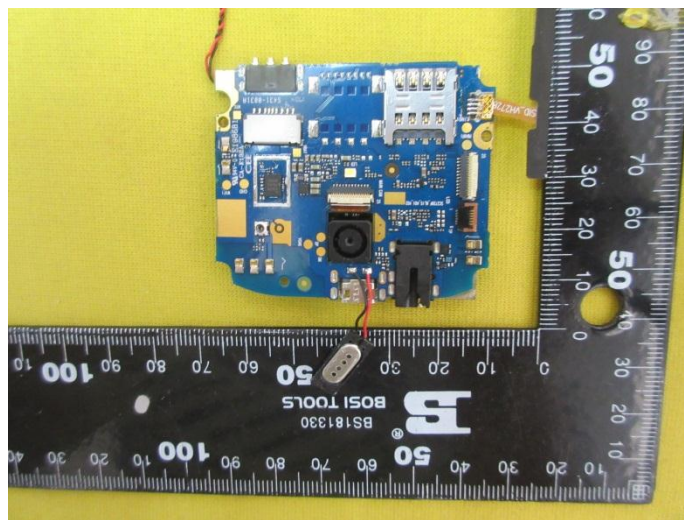
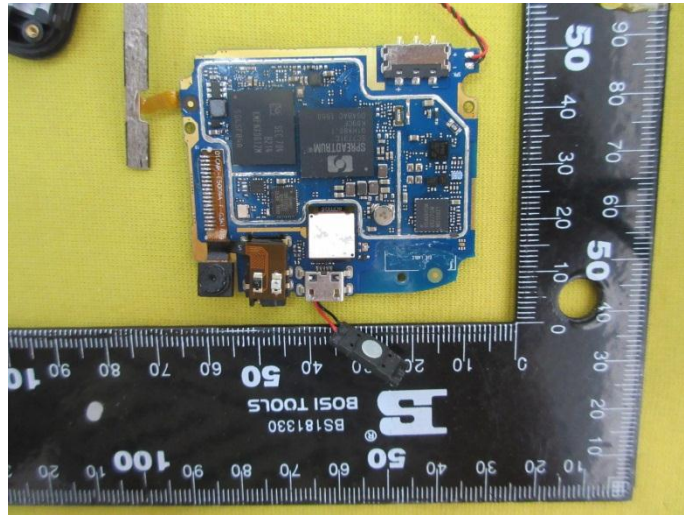


### Internal photos of the EUT









.....End of Report.....