



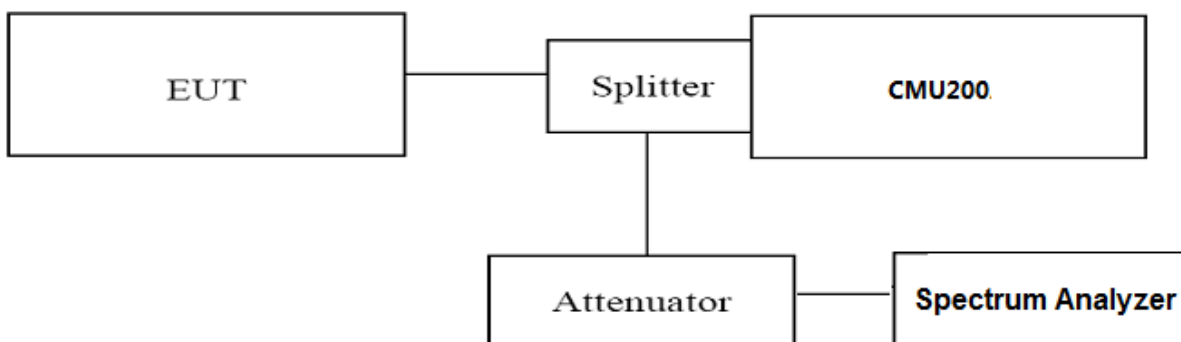
## 4.5 Spurious Emission on Antenna Port

### TEST APPLICABLE

The following steps outline the procedure used to measure the conducted emissions from the EUT.

1. Determine frequency range for measurements: the spectrum should be investigated from the lowest radio frequency generated in the equipment up to at least the 10<sup>th</sup> harmonic of the carrier frequency. For the equipment of WCDMA band II data taken from 9 KHz to 20 GHz. For WCDMA Band V, data taken from 9 KHz to 9 GHz. WCDMA band I V data taken from 9 KHz to 20 GHz.
2. The sweep time is set automatically by instrument itself. That should be the optimal sweep time for the span and the RBW. If the sweep time is too short, that is sweep is too fast, the sweep result is not accurate; if the sweep time is too long, that is sweep is too low, some frequency components may be lost. The instrument will give an optimal sweep time according the selected span and RBW.
3. The procedure to get the conducted spurious emission is as follows:  
The trace mode is set to MaxHold to get the highest signal at each frequency;  
Wait 25 seconds; Get the result.
4. Determine EUT transmit frequencies: below outlines the band edge frequencies pertinent to conducted emissions testing.

### TEST CONFIGURATION



### TEST PROCEDURE

1. The EUT was set up for the max output power with pseudo random data modulation;
2. These measurements were done at 3 frequencies (low, middle and high of operational frequency range) of each band.

### TEST 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 specification that emissions shall be attenuated below the transmitter power (P) by at least  $43 + 10 \log(P)$  dB, translates in the relevant power range (1 to 0.001 W) to -13 dBm. At 1 W the specified minimum attenuation becomes 43 dB and relative to a 30 dBm (1 W) carrier becomes a limit of -13 dBm. At 0.001 W (0 dBm) the minimum attenuation is 13 dB, which again yields a limit of -13 dBm. In this way a translation of the specification from relative to absolute terms is carried out.

### TEST RESULTS

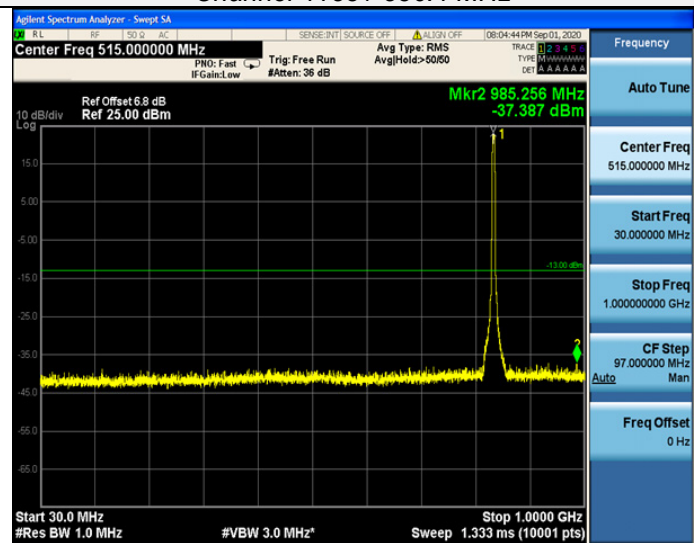
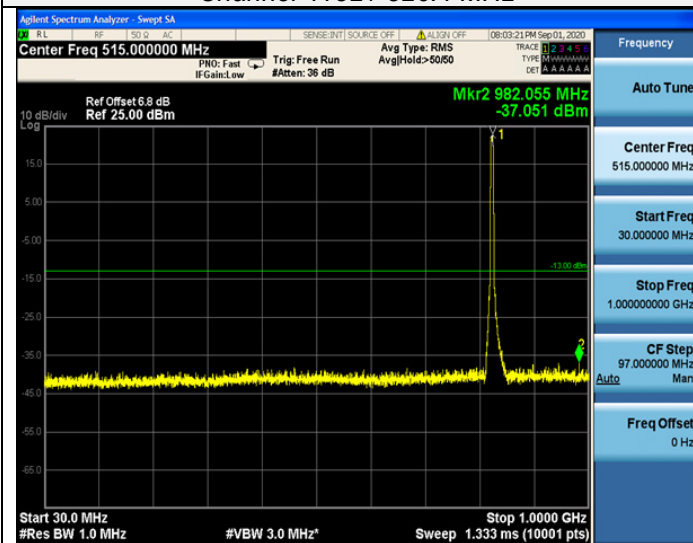
Test Mode	Channel	Frequency (MHz)	Spurious RF Conducted Emission (dBm)	Limits (dBm)	Verdict
UMTS/TM1/WCDMA Band V	4132	826.40	<-13dBm	-13dBm	PASS
	4183	836.40	<-13dBm	-13dBm	
	4233	846.60	<-13dBm	-13dBm	
UMTS/TM1/WCDMA Band II	9262	1852.40	<-13dBm	-13dBm	PASS
	9400	1880.00	<-13dBm	-13dBm	
	9538	1907.60	<-13dBm	-13dBm	
UMTS/TM1/WCDMA Band IV	1312	1712.4	<-13dBm	-13dBm	PASS
	1413	1732.6	<-13dBm	-13dBm	
	1513	1752.6	<-13dBm	-13dBm	



### Spurious Emission on Antenna Port UMTS/TM1/WCDMA Band V

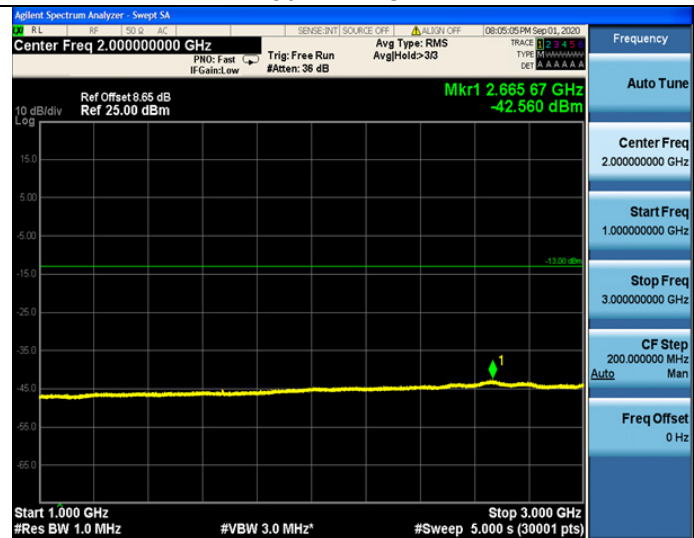
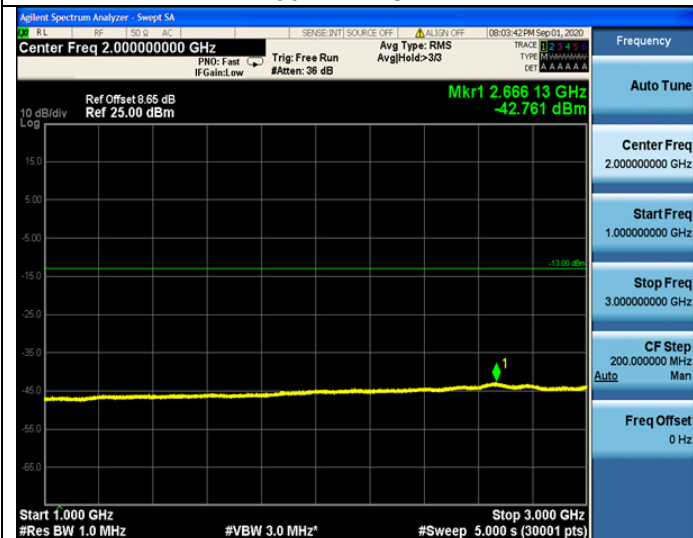
Channel 4132 / 826.4 MHz

Channel 4183 / 836.4 MHz



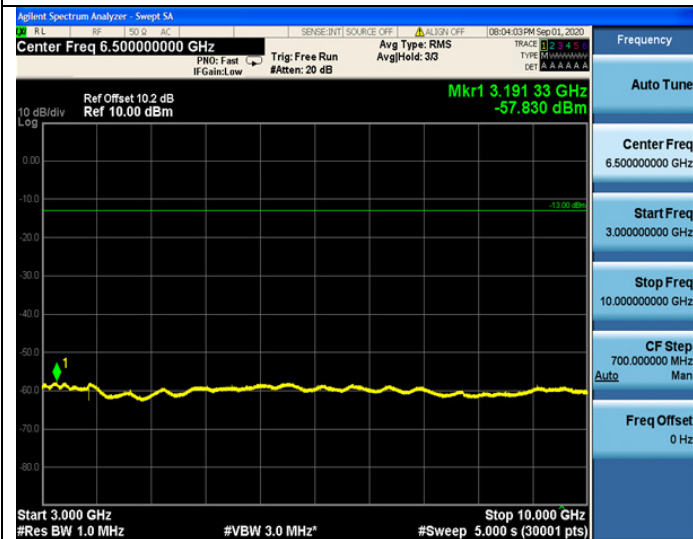
30MHz-1GHz

30MHz-1GHz



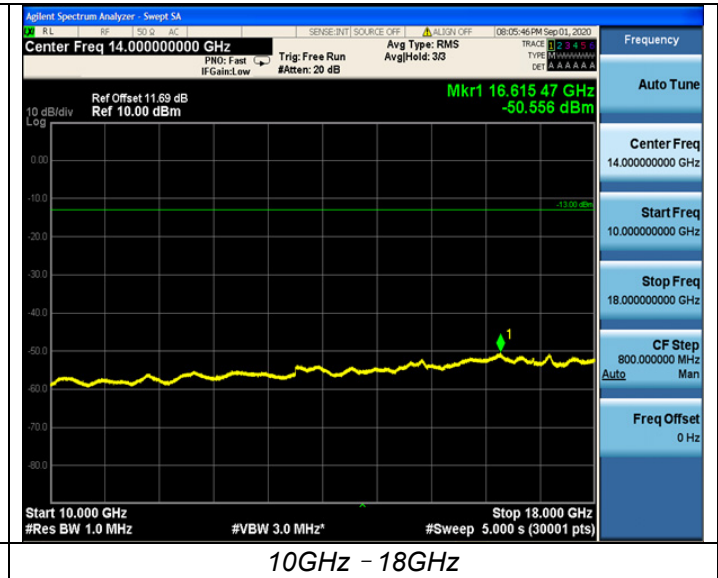
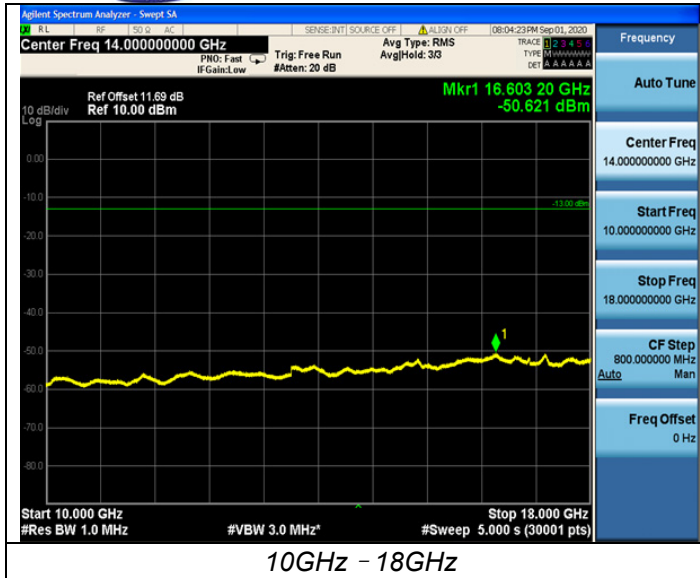
1GHz-3GHz

1GHz-3GHz



3GHz-10GHz

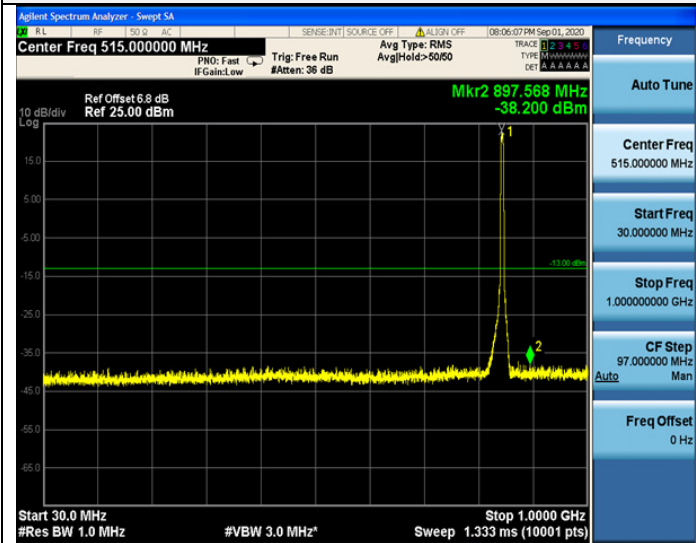
3GHz-10GHz





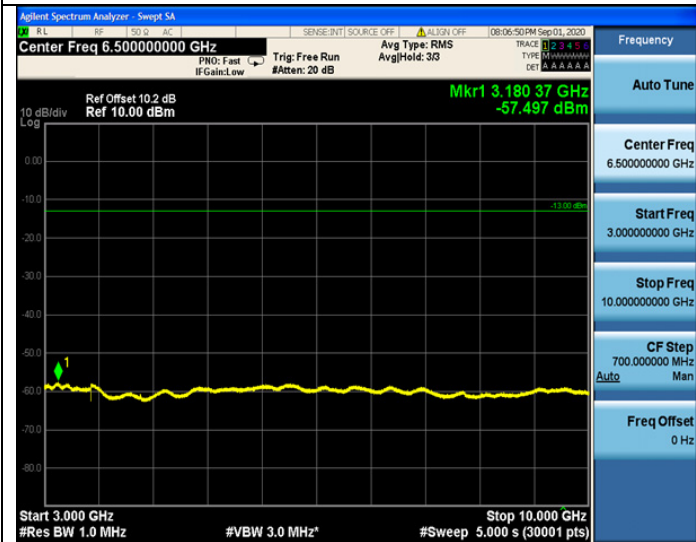
UMTS/TM1/WCDMA Band V

Channel 4233 / 846.6 MHz



30MHz-1GHz

1GHz-3GHz



3GHz-10GHz

10GHz-18GHz

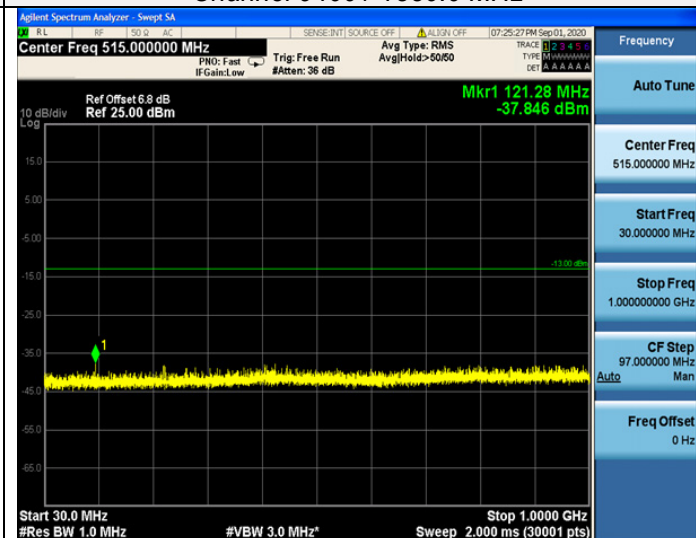
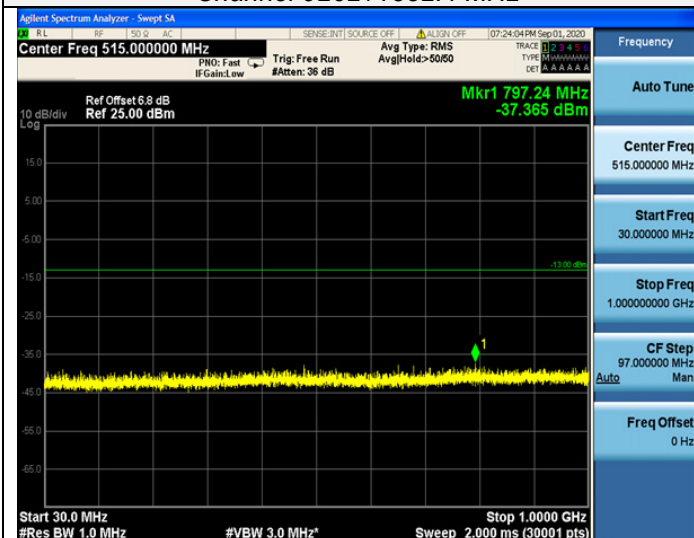




### Spurious Emission on Antenna Port UMTS/TM1/WCDMA Band II

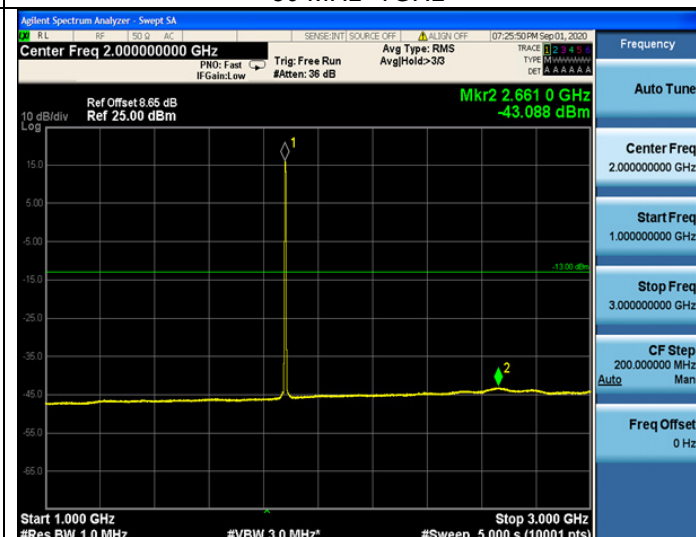
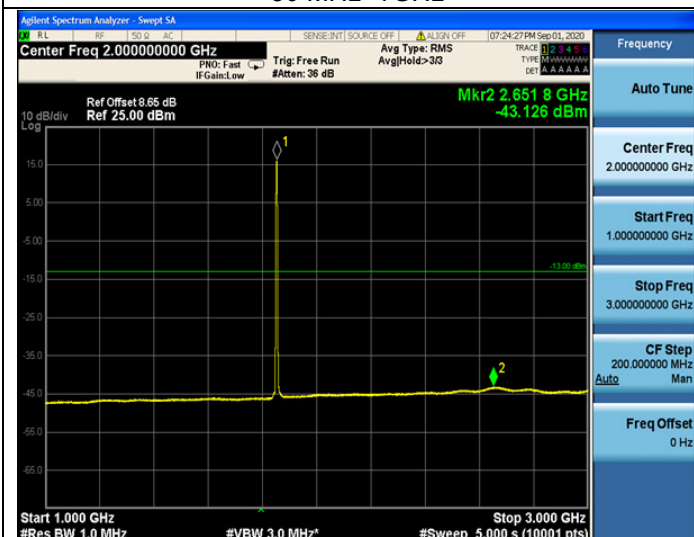
Channel 9262 /1852.4 MHz

Channel 9400 / 1880.0 MHz



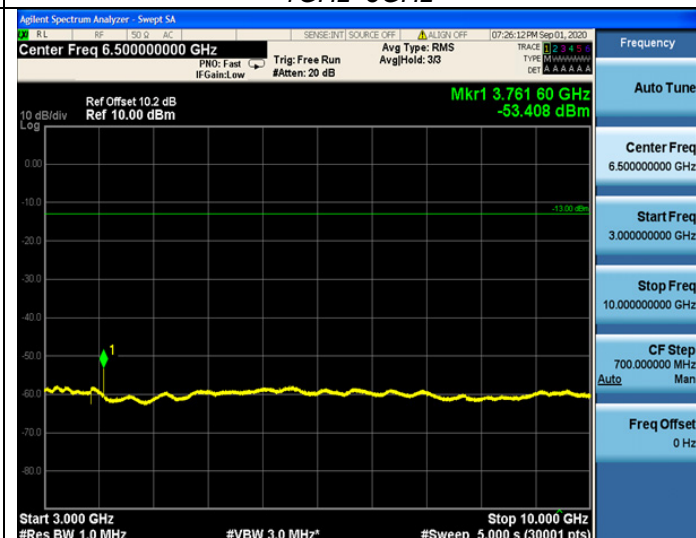
30 MHz-1GHz

30 MHz-1GHz



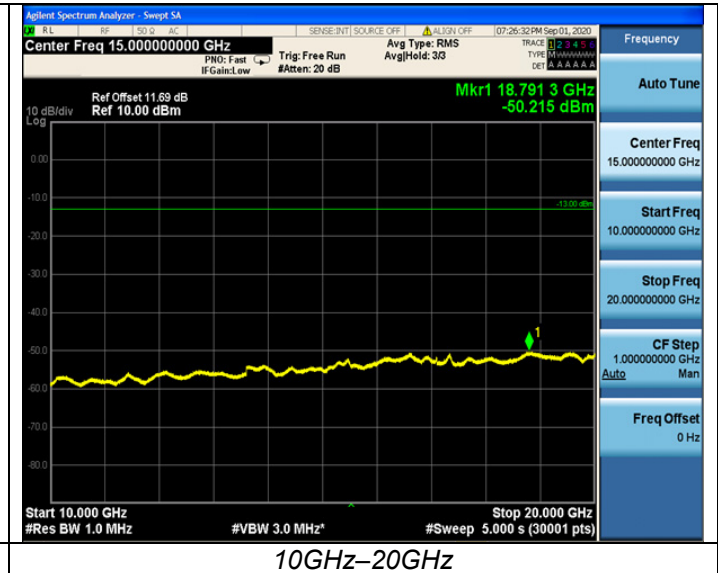
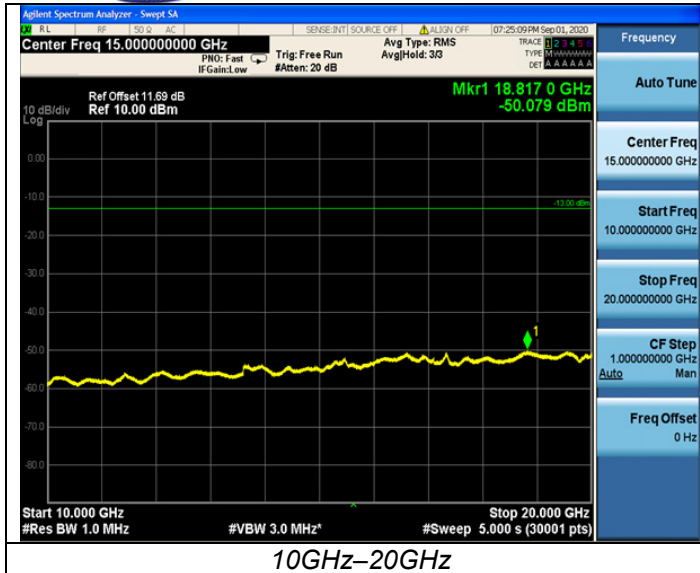
1GHz-3GHz

1GHz-3GHz



3GHz-10GHz

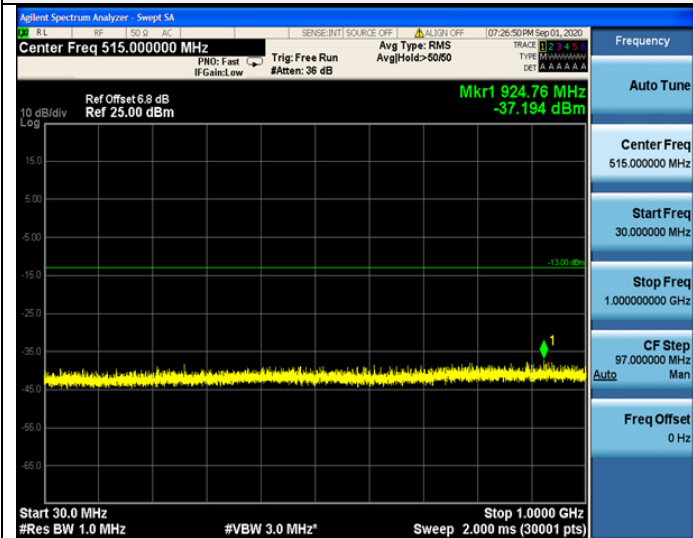
3GHz-10GHz





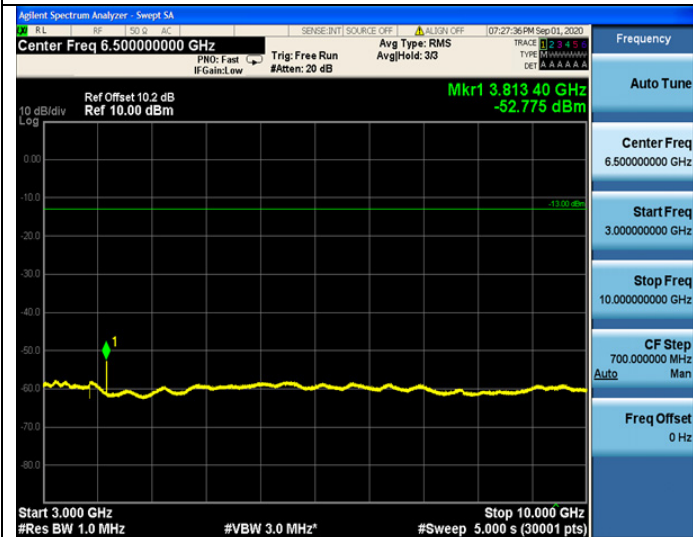
UMTS/TM1/WCDMA Band II

Channel 9538 / 1907.6 MHz



30 MHz-1GHz

1GHz-3GHz



3GHz-10GHz

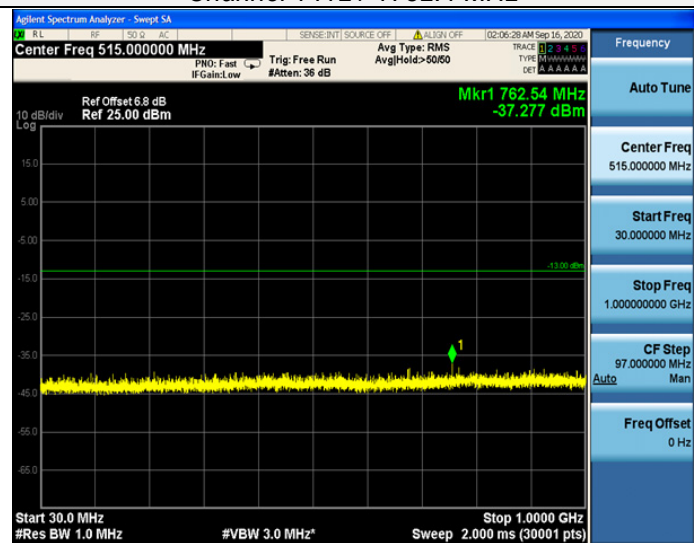
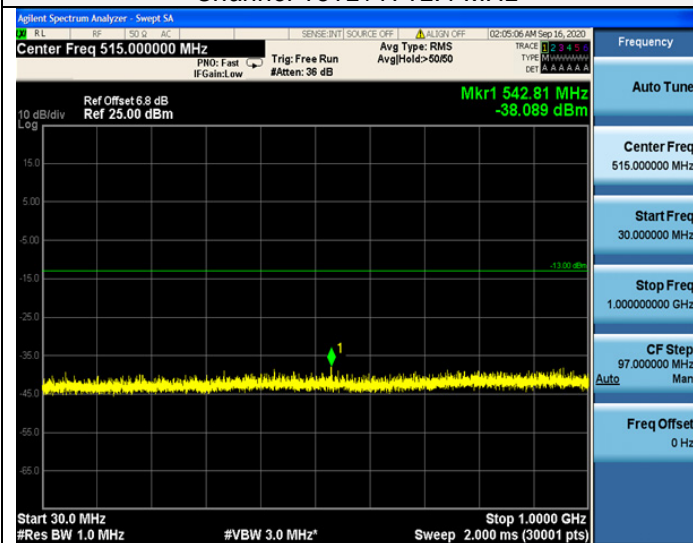
10GHz-20GHz



### Spurious Emission on Antenna Port UMTS/TM1/WCDMA Band IV

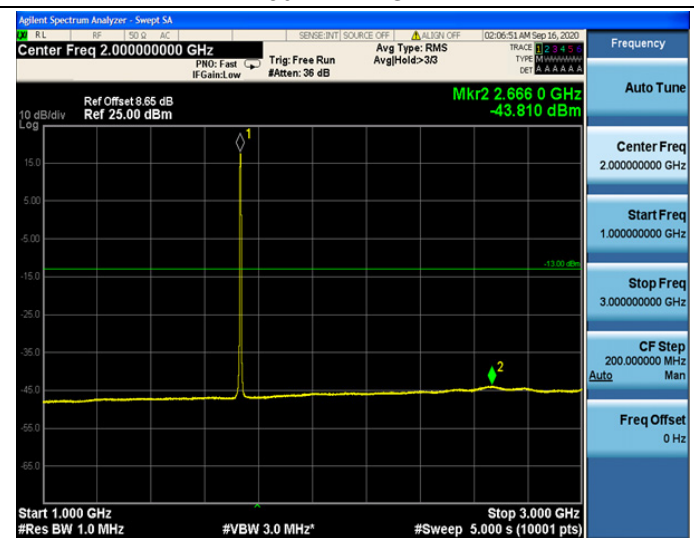
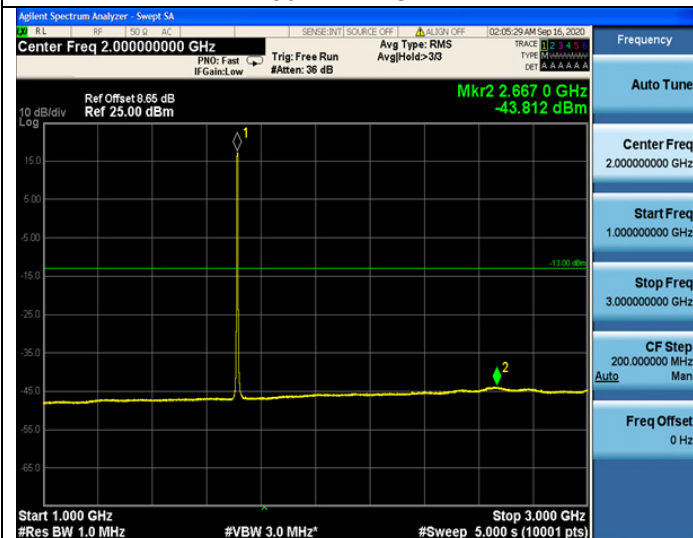
Channel 1312 /1712.4 MHz

Channel 1412 / 1732.4 MHz



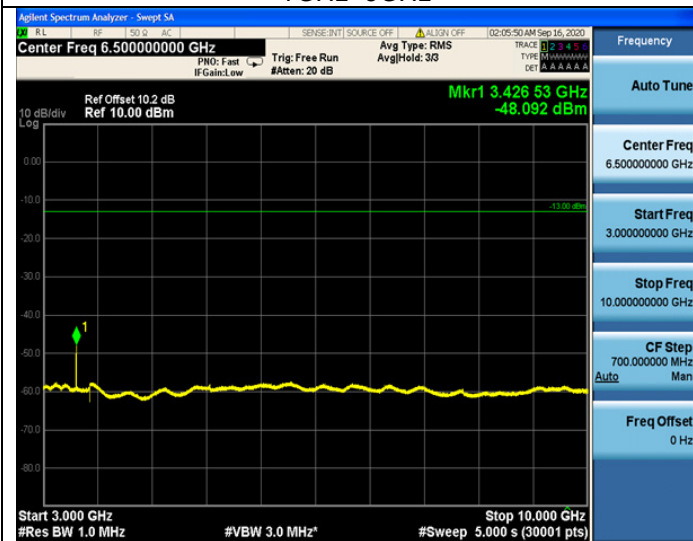
30 MHz-1GHz

30 MHz-1GHz



1GHz-3GHz

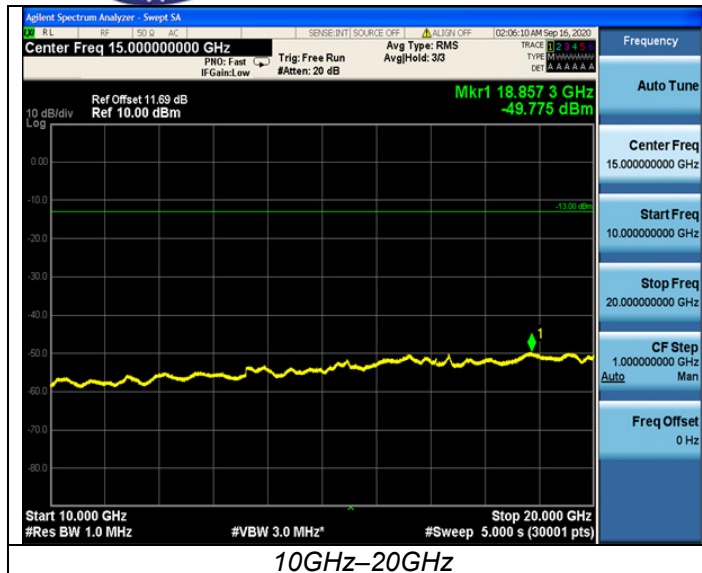
1GHz-3GHz



3GHz-10GHz

3GHz-10GHz

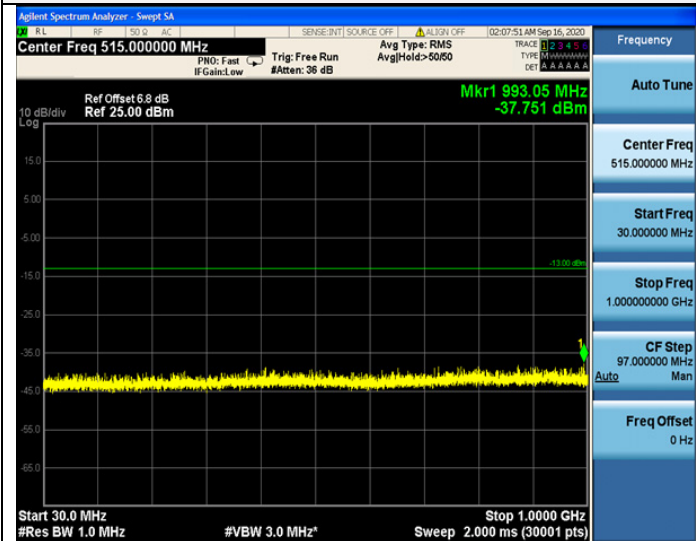






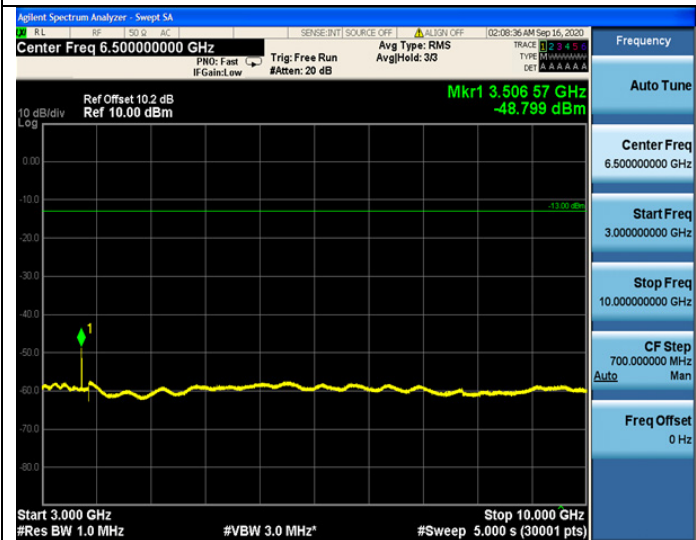
UMTS/TM1/WCDMA Band IV

Channel 1513 / 1752.6 MHz



30 MHz-1GHz

1GHz-3GHz



3GHz-10GHz

10GHz-20GHz



## 4.6 Frequency Stability Test

### TEST APPLICABLE

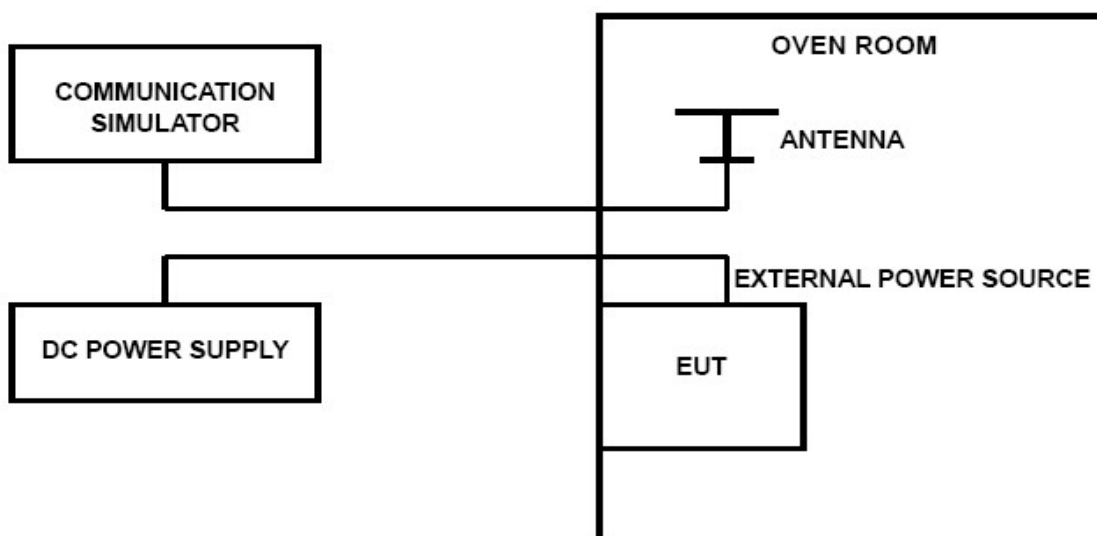
1. According to FCC Part 2 Section 2.1055 (a)(1), the frequency stability shall be measured with variation of ambient temperature from  $-30^{\circ}\text{C}$  to  $+50^{\circ}\text{C}$  centigrade.
2. According to FCC Part 2 Section 2.1055 (E) (2), for battery powered equipment, the frequency stability shall be measured with reducing primary supply voltage to the battery operating end point, which is specified by the manufacture.
3. Vary primary supply voltage from 85 to 115 percent of the nominal value for other than hand carried voltage equipment and the end voltage point was 3.40V.

### TEST PROCEDURE

In order to measure the carrier frequency under the condition of AFC lock, it is necessary to make measurements with the EUT in a "call mode". This is accomplished with the use of R&S CMU200 DIGITAL RADIO COMMUNICATION TESTER.

1. Measure the carrier frequency at room temperature;
2. Subject the EUT to overnight soak at  $-30^{\circ}\text{C}$ ;
3. With the EUT, powered via nominal voltage, connected to the CMU200 and in a simulated call on middle channel of WCDMA Band V, measure the carrier frequency. These measurements should be made within 2 minutes of Powering up the EUT, to prevent significant self-warming;
4. Repeat the above measurements at  $10^{\circ}\text{C}$  increments from  $-30^{\circ}\text{C}$  to  $+50^{\circ}\text{C}$ . Allow at least 0.5 hours at each temperature, unpowered, before making measurements;
5. Remeasure carrier frequency at room temperature with nominal voltage. Vary supply voltage from minimum voltage to maximum voltage, in 0.1Volt increments remeasuring carrier frequency at each voltage. Pause at nominal voltage for 0.5 hours unpowered, to allow any self-heating to stabilize, before continuing;
6. Subject the EUT to overnight soak at  $+50^{\circ}\text{C}$ ;
7. With the EUT, powered via nominal voltage, connected to the CMU200 and in a simulated call on the centre channel, measure the carrier frequency. These measurements should be made within 2 minutes of Powering up the EUT, to prevent significant self-warming;
8. Repeat the above measurements at  $10^{\circ}\text{C}$  increments from  $+50^{\circ}\text{C}$  to  $-30^{\circ}\text{C}$ . Allow at least 0.5 hours at each temperature, unpowered, before making measurements;
9. At all temperature levels hold the temperature to  $\pm 0.5^{\circ}\text{C}$  during the measurement procedure;

### TEST CONFIGURATION



### TEST LIMITS

#### ***For Hand carried battery powered equipment***

According to the JTC standard the frequency stability of the carrier shall be accurate to within 0.1 ppm of the received frequency from the base station. This accuracy is sufficient to meet Sec. 24.235, Frequency Stability. The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized



frequency block. As this transceiver is considered "Hand carried, battery powered equipment" Section 2.1055(d)(2) applies. This requires that the lower voltage for frequency stability testing be specified by the manufacturer. This transceiver is specified to operate with an input voltage of between 3.40VDC and 4.20VDC, with a nominal voltage of 3.80DC. Operation above or below these voltage limits is prohibited by transceiver software in order to prevent improper operation as well as to protect components from overstress. These voltages represent a tolerance of -10 % and +12.5 %. For the purposes of measuring frequency stability these voltage limits are to be used.

***For equipment powered by primary supply voltage***

According to the JTC standard the frequency stability of the carrier shall be accurate to within 0.1 ppm of the received frequency from the base station. This accuracy is sufficient to meet Sec. 24.235, Frequency Stability. The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block. For this EUT section 2.1055(d)(1) applies. This requires varying primary supply voltage from 85 to 115 percent of the nominal value for other than hand carried battery equipment.

**TEST RESULTS**

UMTS/TM1/WCDMA Band II					
DC Power	Temperature (°C)	Frequency error(Hz)	Frequency error(ppm)	Limit (ppm)	Verdict
3.42	20	-12.25	-0.006517	2.50	PASS
3.8	20	-4.58	-0.002435	2.50	PASS
4.18	20	-6.58	-0.003498	2.50	PASS
3.8	-30	-6.90	-0.003669	2.50	PASS
3.8	-20	-13.55	-0.007207	2.50	PASS
3.8	-10	-2.90	-0.001542	2.50	PASS
3.8	0	-6.70	-0.003563	2.50	PASS
3.8	10	-6.20	-0.003295	2.50	PASS
3.8	20	-4.41	-0.002346	2.50	PASS
3.8	30	-12.36	-0.006479	2.50	PASS
3.8	40	3.20	0.001680	2.50	PASS
3.8	50	2.55	0.001336	2.50	PASS

UMTS/TM1/WCDMA Band V					
DC Power	Temperature (°C)	Frequency error(Hz)	Frequency error(ppm)	Limit (ppm)	Verdict
3.42	20	4.67	0.005582	2.50	PASS
3.8	20	5.63	0.006732	2.50	PASS
4.18	20	3.81	0.004561	2.50	PASS
3.8	-30	6.41	0.007662	2.50	PASS
3.8	-20	4.44	0.005309	2.50	PASS
3.8	-10	-0.90	-0.001076	2.50	PASS
3.8	0	3.59	0.004287	2.50	PASS
3.8	10	0.92	0.001095	2.50	PASS
3.8	20	5.68	0.006787	2.50	PASS
3.8	30	6.09	0.007191	2.50	PASS
3.8	40	4.32	0.005101	2.50	PASS
3.8	50	5.58	0.006597	2.50	PASS





UMTS/TM1/WCDMA Band IV					
DC Power	Temperature (°C)	Frequency error(Hz)	Frequency error(ppm)	Limit (ppm)	Verdict
3.42	20	-5.33	-0.003110	2.50	PASS
3.8	20	-4.81	-0.002807	2.50	PASS
4.18	20	-2.30	-0.001346	2.50	PASS
3.8	-30	0.92	0.000528	2.50	PASS
3.8	-20	-2.61	-0.001506	2.50	PASS
3.8	-10	-9.48	-0.005469	2.50	PASS
3.8	0	-3.16	-0.001823	2.50	PASS
3.8	10	-5.36	-0.003091	2.50	PASS
3.8	20	-5.94	-0.003426	2.50	PASS
3.8	30	-1.77	-0.001022	2.50	PASS
3.8	40	-9.58	-0.005531	2.50	PASS
3.8	50	-10.35	-0.005971	2.50	PASS

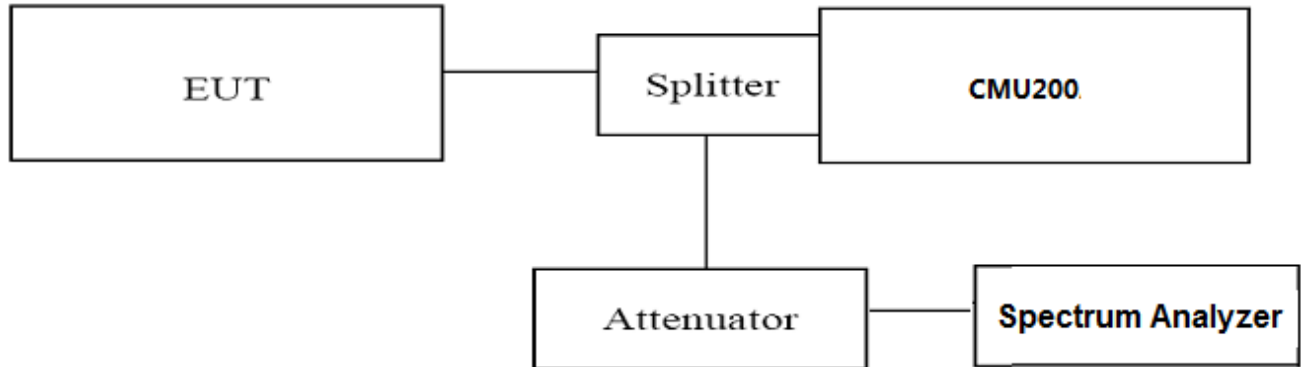


## 4.7 Peak-to-Average Ratio (PAR)

### LIMIT

The Peak-to-Average Ratio (PAR) of the transmission may not exceed 13 dB.

### TEST CONFIGURATION



### TEST PROCEDURE

1. Refer to instrument's analyzer instruction manual for details on how to use the power statistics/CCDF function;
2. Set resolution/measurement bandwidth  $\geq$  signal's occupied bandwidth;
3. Set the number of counts to a value that stabilizes the measured CCDF curve;
4. Set the measurement interval as follows:
  - 1). for continuous transmissions, set to 1 ms,
  - 2). for burst transmissions, employ an external trigger that is synchronized with the EUT burst timing sequence, or use the internal burst trigger with a trigger level that allows the burst to stabilize and set the measurement interval to a time that is less than or equal to the burst duration.
5. Record the maximum PAPR level associated with a probability of 0.1%.

### TEST RESULTS

Test Mode	Channel	Frequency (MHz)	PAPR Value (dB)	Limits (dB)	Verdict
UMTS/TM1/WCDMA Band II	9262	1852.40	2.95	13.0	PASS
	9400	1880.00	2.99	13.0	PASS
	9538	1907.60	2.96	13.0	PASS
UMTS/TM1/WCDMA Band V	4132	826.40	2.99	13.0	PASS
	4183	836.40	2.92	13.0	PASS
	4233	846.60	3.01	13.0	PASS
UMTS/TM1/WCDMA Band IV	1312	1712.40	2.98	13.0	PASS
	1412	1732.40	2.95	13.0	PASS
	1513	1752.60	2.94	13.0	PASS

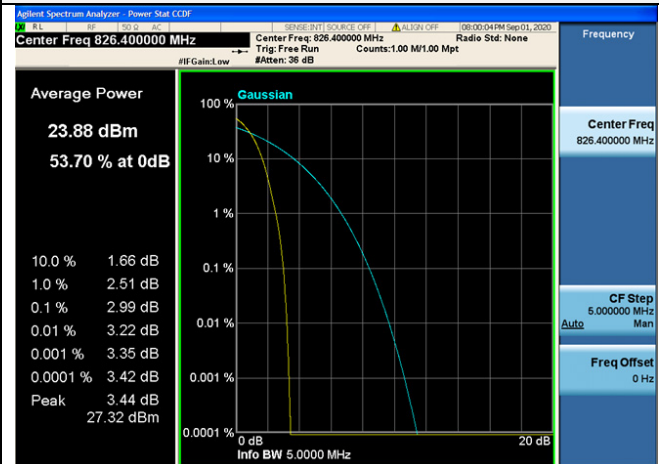
Remark:

1. Test results including cable loss;
2. please refer to following plots;



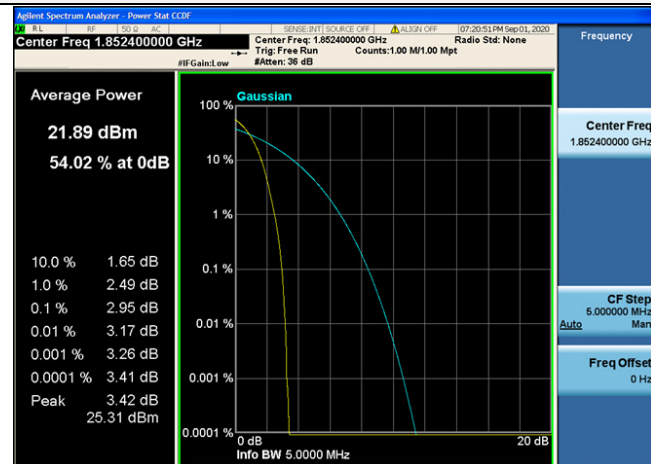
### Peak-to-Average Ratio (PAR)

#### UMTS/TM1/ WCDMA Band V

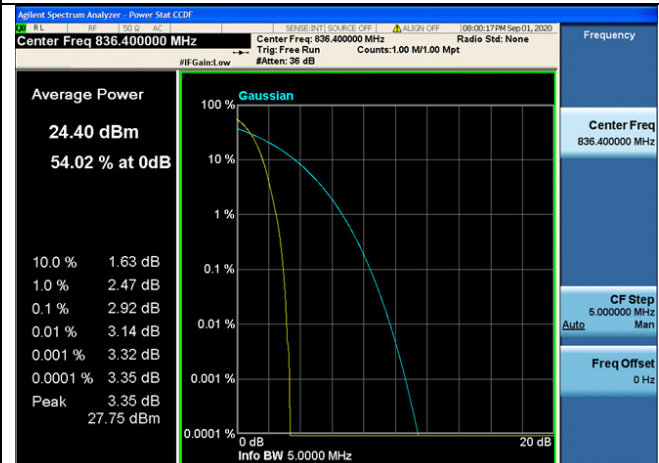


Channel 4132 / 826.4 MHz

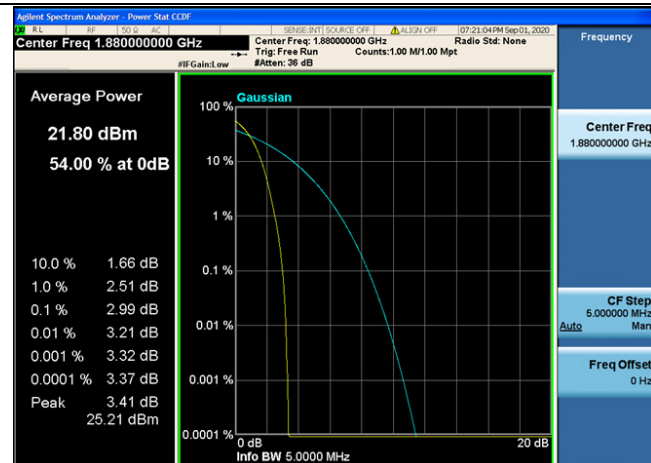
#### UMTS/TM1/ WCDMA Band II



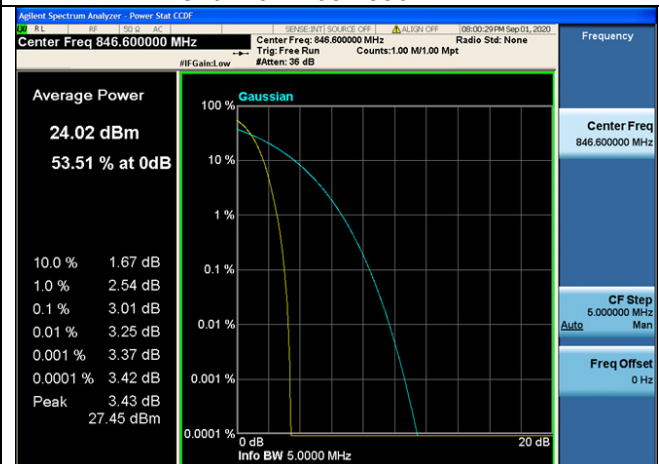
Channel 9262 / 1852.4 MHz



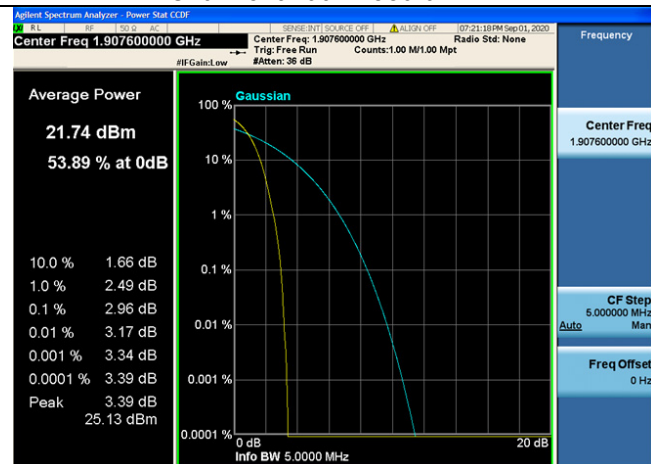
Channel 4183 / 836.4 MHz



Channel 9400 / 1880.0 MHz



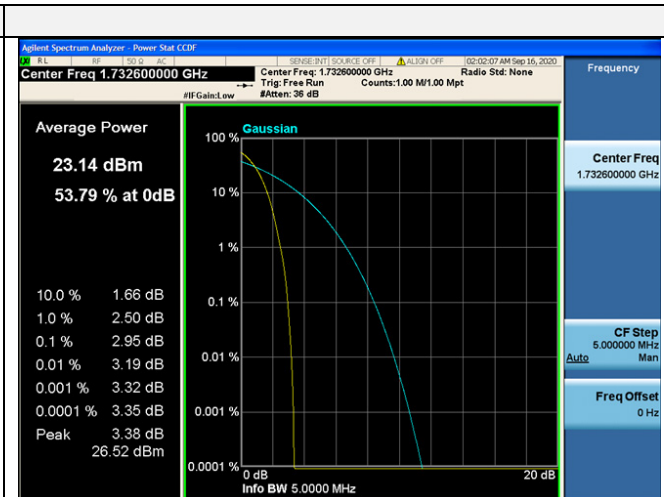
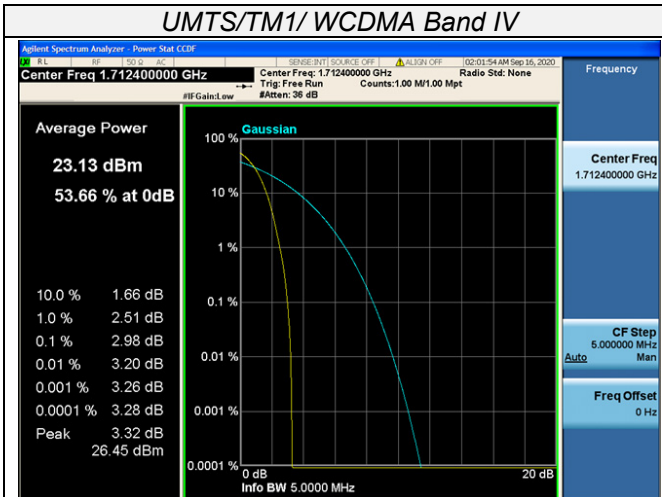
Channel 4233 / 846.6 MHz



Channel 9538 / 1907.6 MHz

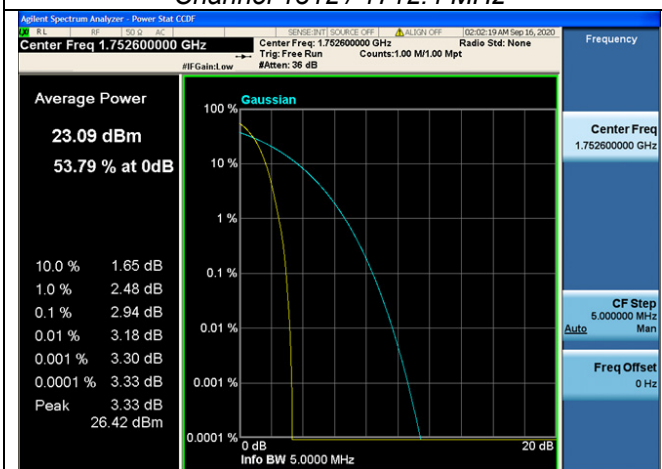


### UMTS/TM1/WCDMA Band IV

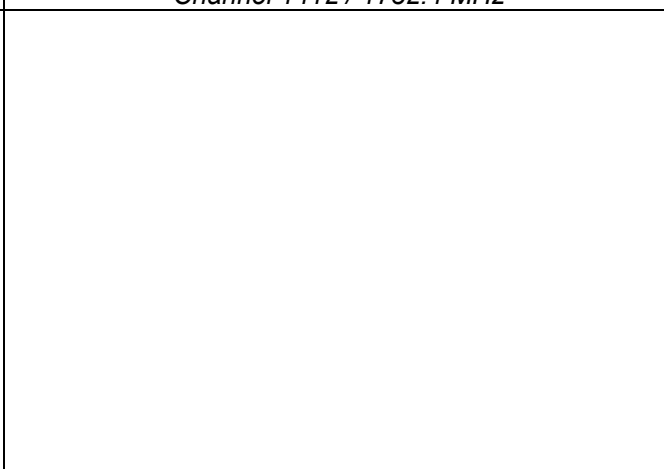


Channel 1312 / 1712.4 MHz

Channel 1412 / 1732.4 MHz



Channel 1513 / 1752.6 MHz







## **5 Test Setup Photos of the EUT**

See the attached test photos

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