



## 9. Peak Output Power (ESMR)

### 9.1 Test Specification

FCC Rule Part 20.21

### 9.2 Test Procedure

(Temperature (22°C)/ Humidity (38%RH))

The E.U.T. antenna terminal was connected to the Spectrum Analyzer through an external attenuator and an appropriate coaxial cable (loss = 31.0 dB). The E.U.T. RF output was modulated with W-CDMA, GSM and LTE 64QAM. Special attention was taken to prevent Spectrum Analyzer RF input overload.

### 9.3 Test Results

Modulation	Operation Frequency	Reading
	(MHz)	(dBm)
LTE 64QAM	864.5	16.4
	866.5	16.7
GSM	863.2	15.7
	867.8	16.4
W-CDMA	864.5	16.2
	866.5	16.7

Figure 61 Peak Output Power ESMR

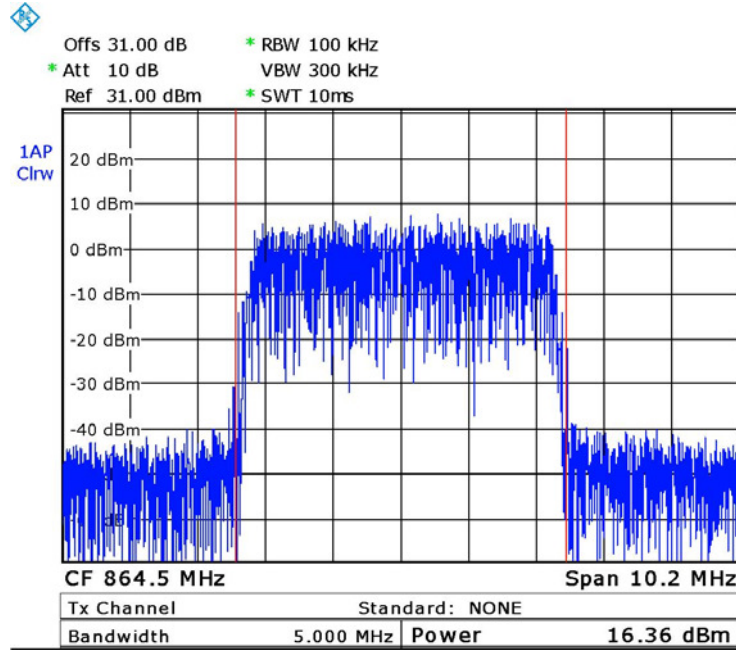
JUDGEMENT: Passed

See additional information in *Figure 62* to *Figure 67*.



## Peak Output Power (ESMR)

E.U.T Description ONE - Optical Network Evolution DAS  
Type RAU-5 Remote Antenna Unit  
Serial Number: 05144900098



Date: 17.JUL.2016 08:27:15

Figure 62. — 864.5 MHz – LTE 64QAM

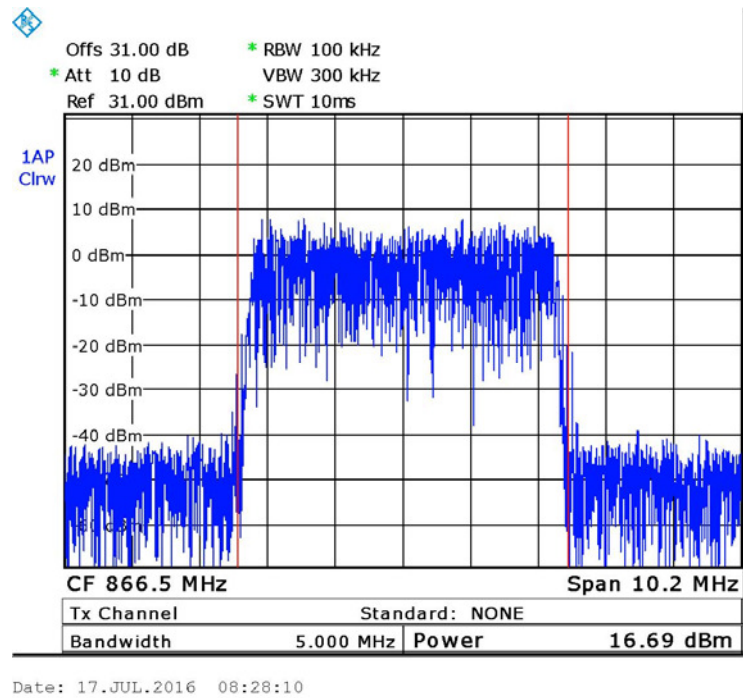


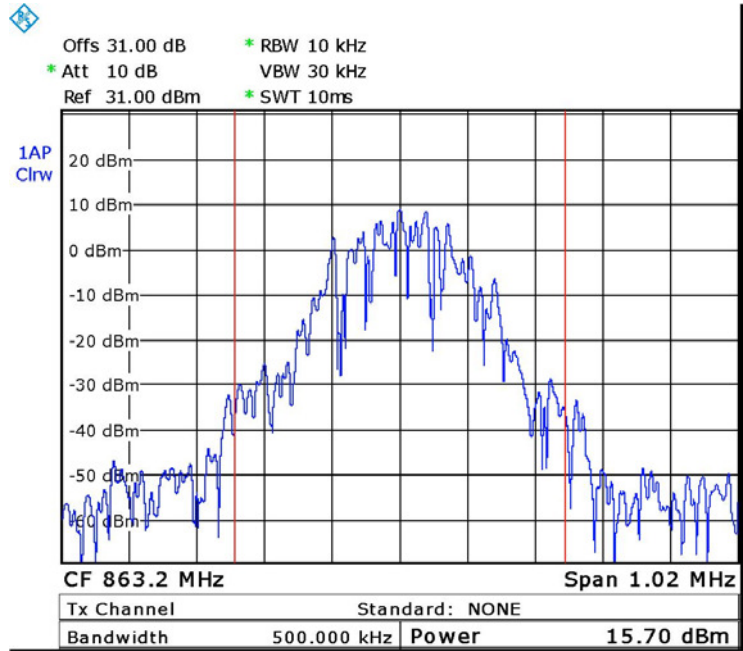
Figure 63. — 866.5 MHz – LTE 64QAM



# Peak Output Power (ESMR)

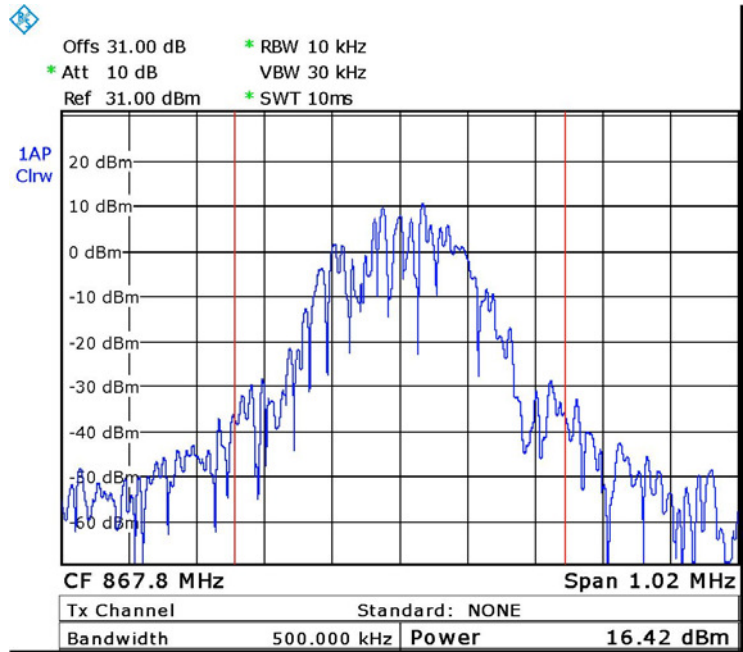
E.U.T Description ONE - Optical Network Evolution DAS  
Type RAU-5 Remote Antenna Unit

Serial Number: 05144900098



Date: 17.JUL.2016 08:32:22

Figure 64. — 863.2 MHz – GSM



Date: 17.JUL.2016 08:33:11

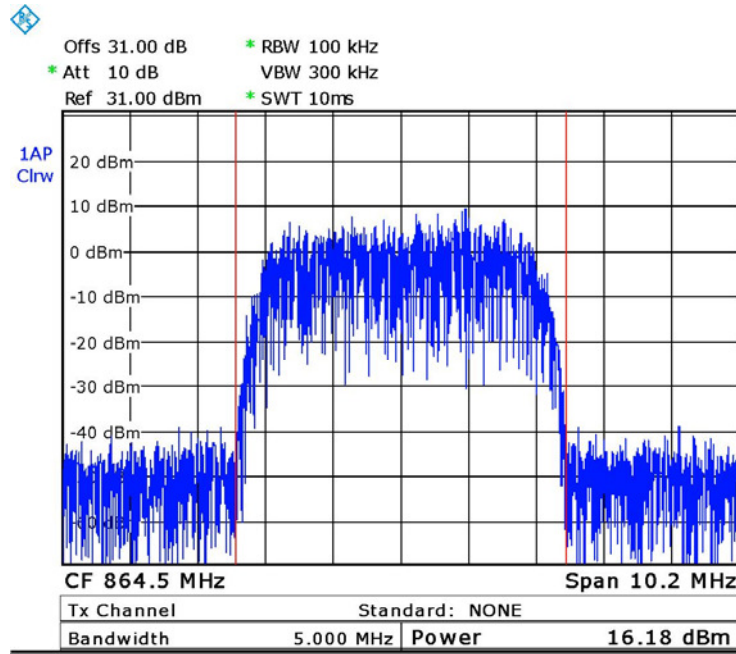
Figure 65. — 867.8 MHz – GSM



## Peak Output Power (ESMR)

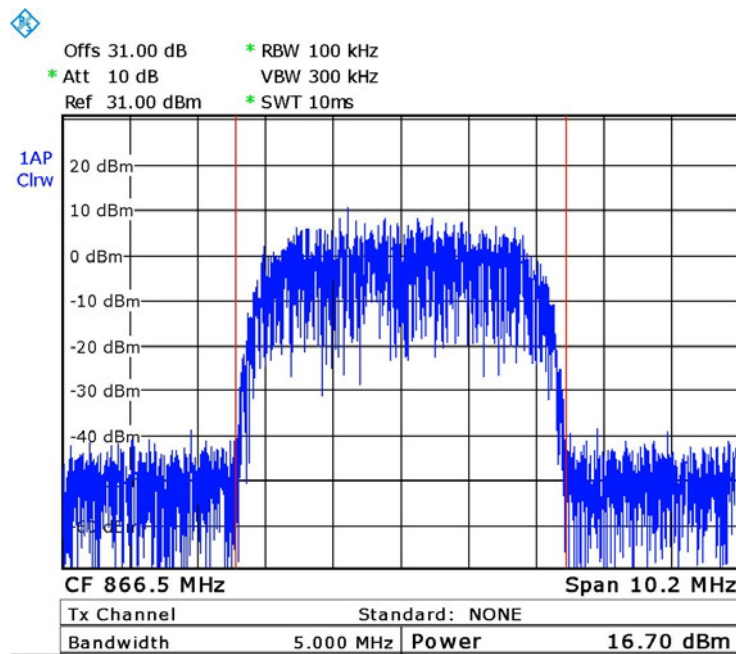
E.U.T Description ONE - Optical Network Evolution DAS  
Type RAU-5 Remote Antenna Unit

Serial Number: 05144900098



Date: 17.JUL.2016 08:30:43

Figure 66.—864.5 MHz – WCDMA



Date: 17.JUL.2016 08:30:05

Figure 67.— 866.5 MHz – WCDMA



**9.4 Test Equipment Used; Peak Power (ESMR)**

Instrument	Manufacturer	Model	Serial Number	Calibration	
				Last Calibration Date	Next Calibration Due
Spectrum Analyzer	R&S	FSL6	100194	February 29, 2016	March 1, 2017
Vector Signal Generator	Agilent	N5172B	MY51350584	July 1, 2016	July 1, 2017
30 dB Attenuator	MCL	BW-S30W5	533	July 5, 2016	July 5, 2017

**Figure 68 Test Equipment Used Peak Output Power (ESMR)**



## 10. Occupied Bandwidth (ESMR)

### 10.1 Test Specification

FCC Parts 2.1049; 90.2.09

### 10.2 Test Procedure

(Temperature (22°C)/ Humidity (38%RH))

The E.U.T. antenna terminal was connected to the spectrum analyzer through an external attenuator and an appropriate coaxial cable (loss=31.0 dB). The spectrum analyzer was set to proper resolution B.W.

OBW function (99%) was employed for this evaluation

Occupied bandwidth measured was repeated in the input terminal of the E.U.T.

### 10.3 Test Limit

N/A

### 10.4 Test Results

Modulation	Port	Operating Frequency	Reading
	(Input/ Output)	(MHz)	(MHz)
LTE 64QAM	Input	864.5	4.5
	Output	864.5	4.5
	Input	866.5	4.5
	Output	866.5	4.5
W-CDMA	Input	864.5	4.1
	Output	864.5	4.1
	Input	866.5	4.1
	Output	866.5	4.1
GSM	Input	863.2	0.2
	Output	863.2	0.2
	Input	867.8	0.2
	Output	867.8	0.2

**Figure 69 Occupied Bandwidth Test Results Table**

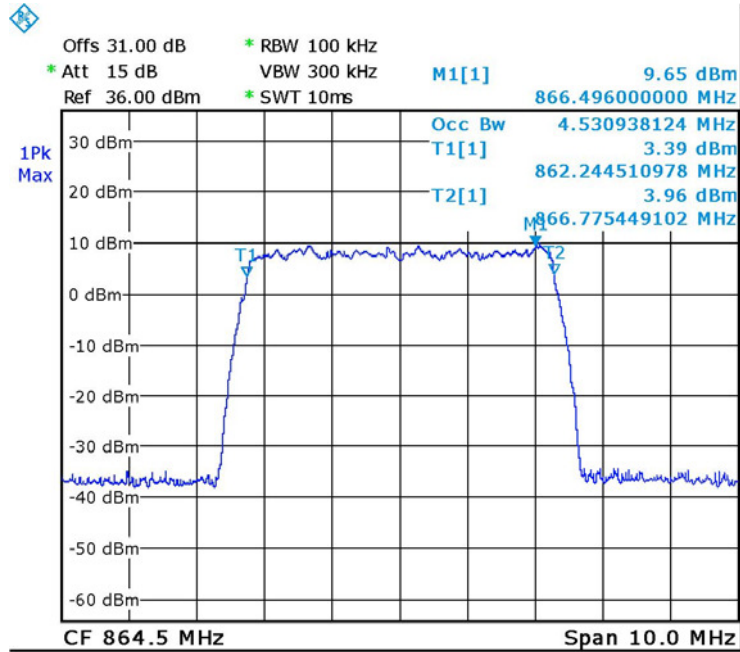
See additional information in *Figure 70* to *Figure 81*.



# Occupied Bandwidth (ESMR)

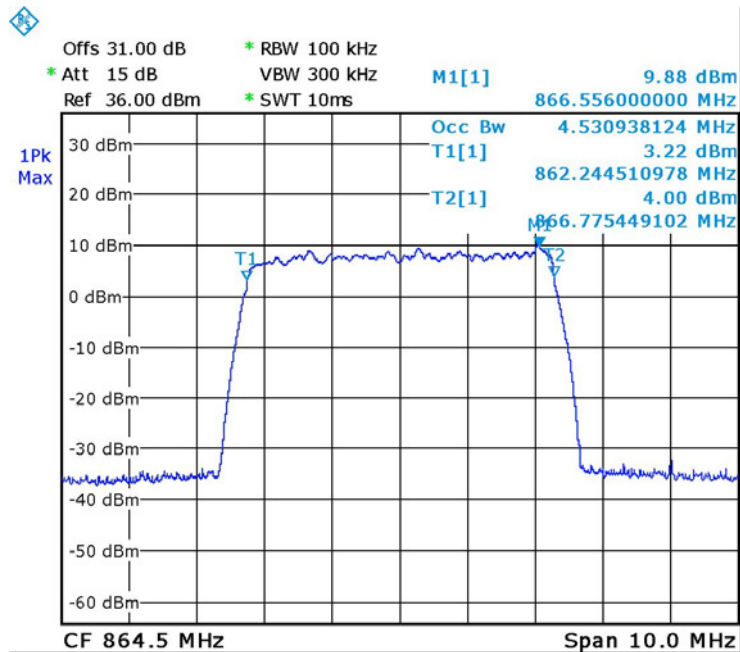
E.U.T Description ONE - Optical Network Evolution DAS  
Type RAU-5 Remote Antenna Unit

Serial Number: 05144900098



Date: 17.JUL.2016 08:50:42

Figure 70. — 864.5MHz LTE 64QAM Input



Date: 17.JUL.2016 08:41:51

Figure 71. — 864.5MHz LTE 64QAM Output

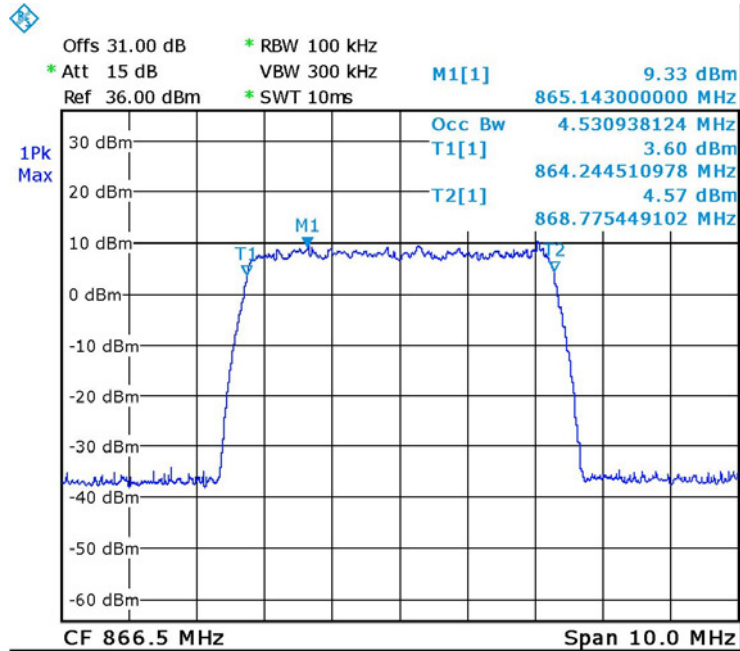




# Occupied Bandwidth (ESMR)

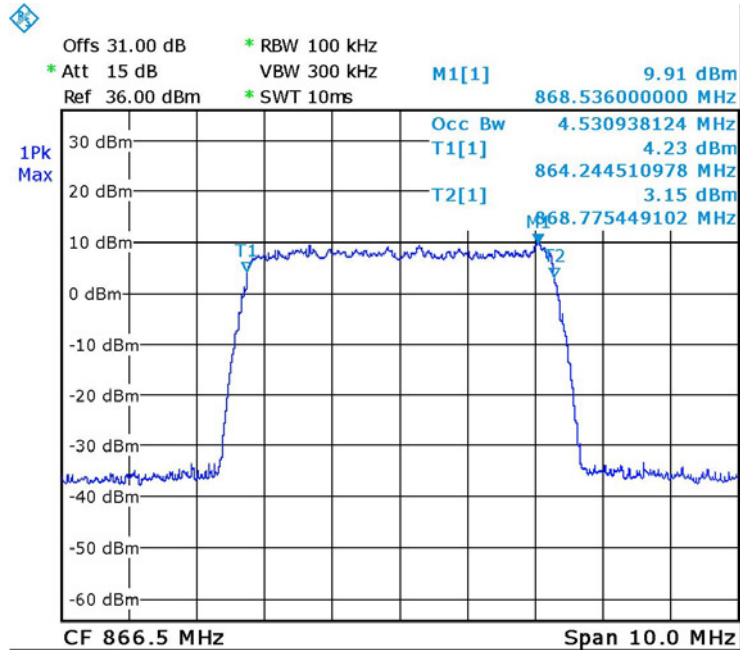
E.U.T Description ONE - Optical Network Evolution DAS  
Type RAU-5 Remote Antenna Unit

Serial Number: 05144900098



Date: 17.JUL.2016 08:49:51

Figure 72. — 866.5MHz LTE 64QAM Input



Date: 17.JUL.2016 08:42:26

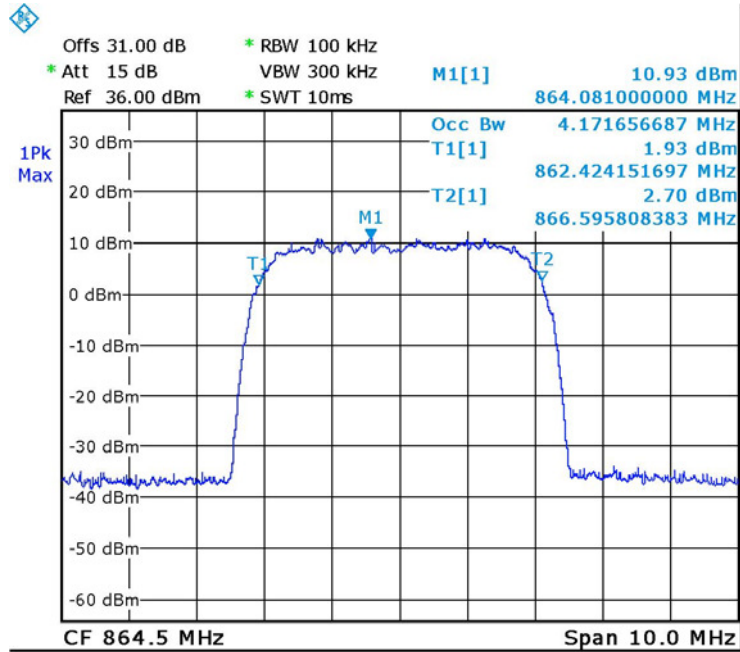
Figure 73. — 866.5MHz LTE 64QAM Output



# Occupied Bandwidth (ESMR)

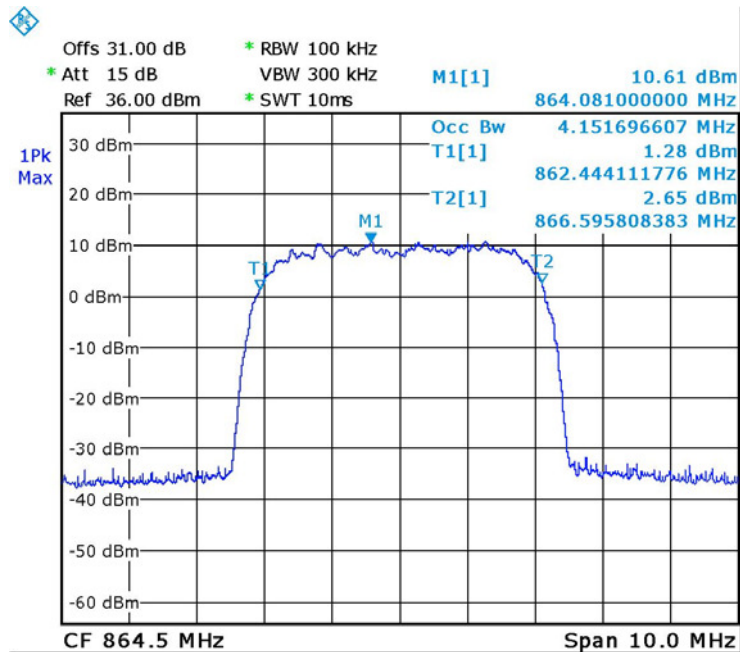
E.U.T Description ONE - Optical Network Evolution DAS  
Type RAU-5 Remote Antenna Unit

Serial Number: 05144900098



Date: 17.JUL.2016 08:48:31

Figure 74. — 864.5MHz WCDMA Input



Date: 17.JUL.2016 08:45:00

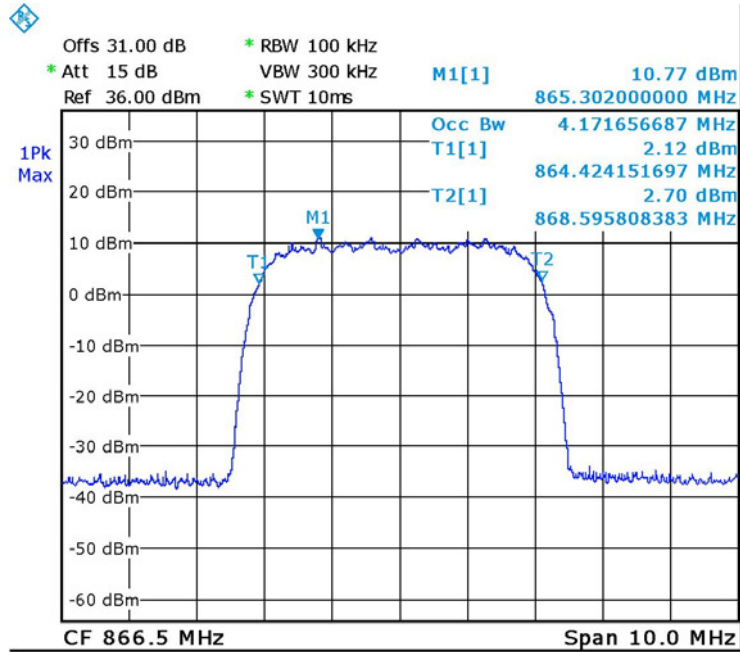
Figure 75. — 864.5MHz WCDMA Output



# Occupied Bandwidth (ESMR)

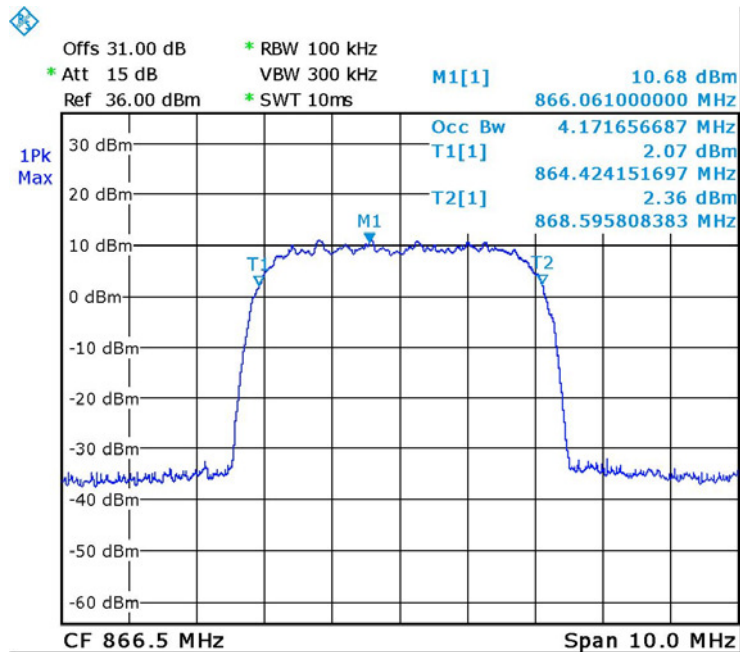
E.U.T Description ONE - Optical Network Evolution DAS  
Type RAU-5 Remote Antenna Unit

Serial Number: 05144900098



Date: 17.JUL.2016 08:49:10

Figure 76. — 866.5MHz WCDMA Input



Date: 17.JUL.2016 08:44:04

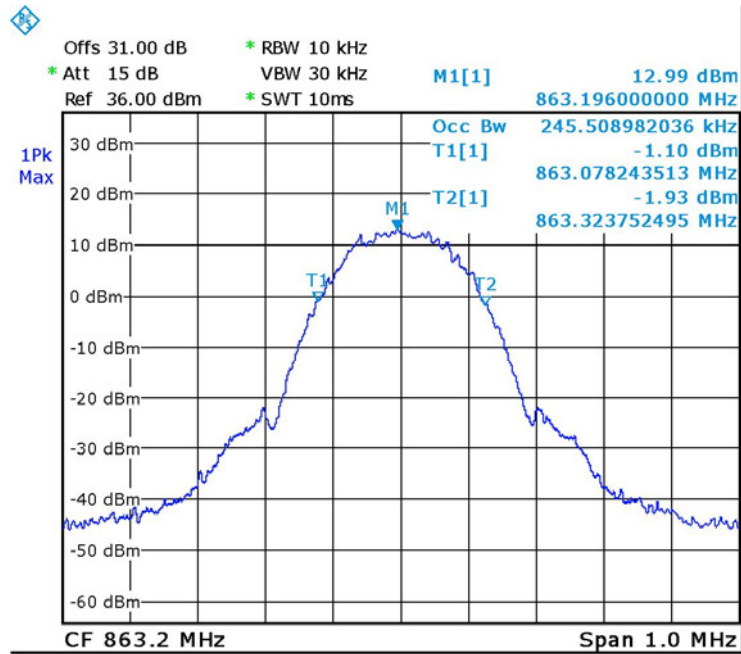
Figure 77. — 866.5MHz WCDMA Output



# Occupied Bandwidth (ESMR)

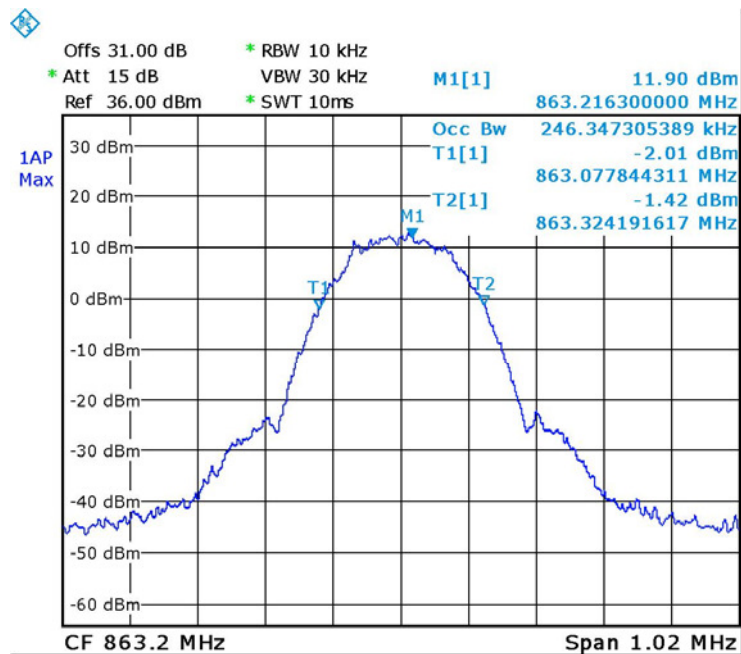
E.U.T Description ONE - Optical Network Evolution DAS  
Type RAU-5 Remote Antenna Unit

Serial Number: 05144900098



Date: 17.JUL.2016 08:52:09

Figure 78. — 863.2MHz GSM Input



Date: 17.JUL.2016 08:38:49

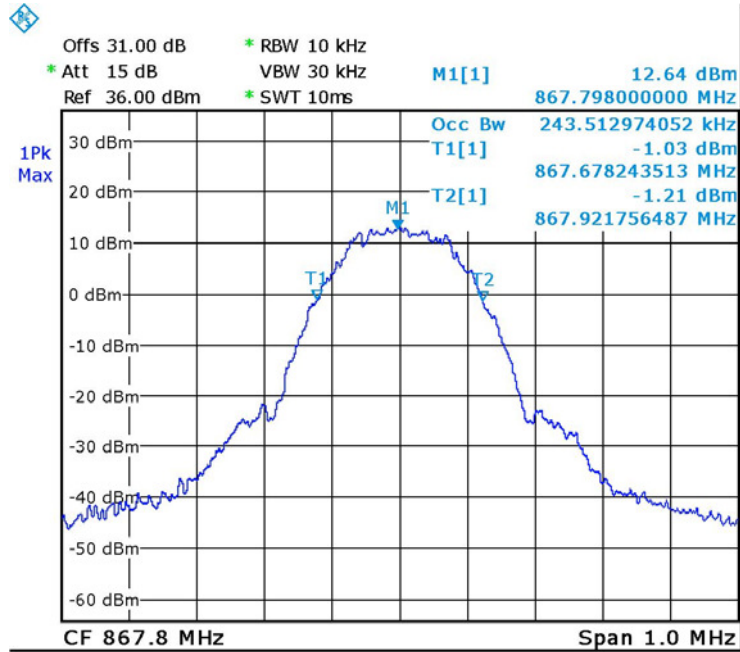
Figure 79. — 863.2MHz GSM Output



# Occupied Bandwidth (ESMR)

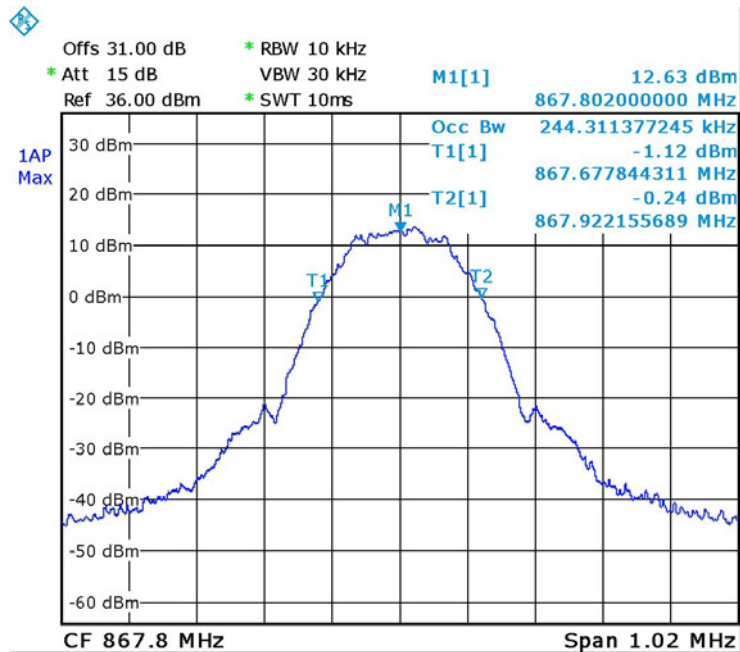
E.U.T Description ONE - Optical Network Evolution DAS  
Type RAU-5 Remote Antenna Unit

Serial Number: 05144900098



Date: 17.JUL.2016 08:52:48

Figure 80. — 867.8MHz GSM Input



Date: 17.JUL.2016 08:38:02

Figure 81. — 867.8MHz GSM Output



**10.5 Test Equipment Used; Occupied Bandwidth (ESMR)**

Instrument	Manufacturer	Model	Serial Number	Calibration	
				Last Calibration Date	Next Calibration Due
Spectrum Analyzer	R&S	FSL6	100194	February 29, 2016	March 1, 2017
Vector Signal Generator	Agilent	N5172B	MY51350584	July 1, 2016	July 1, 2017
30 dB Attenuator	MCL	BW-S30W5	533	July 5, 2016	July 5, 2017

**Figure 82 Test Equipment Used Occupied Bandwidth (ESMR)**



## 11. Spurious Emissions at Antenna Terminals (ESMR)

### 11.1 Test Specification

FCC Part 90, Section 90.210

### 11.2 Test Procedure

(Temperature (22°C)/ Humidity (35%RH))

The E.U.T. antenna terminal was connected to the spectrum analyzer through an external attenuator and an appropriate coaxial cable (max Loss= 31.5 dB).

The resolution bandwidth was set to 1.0 kHz for the frequency range 9 kHz – 1 MHz, 100 kHz for the frequency range 1 MHz to 1 GHz, and 1 MHz in the frequency range 1.0 – 10.0 GHz.

### 11.3 Test Limit

The power of any emission outside of the authorized operating frequency ranges(862-867MHz) must be attenuated below the transmitting power (P) by a factor of at least  $43 + \log (P)$  dB, yielding  $-13\text{dBm}$ .

### 11.4 Test Results

JUDGEMENT: Passed

See additional information in *Figure 83* to *Figure 88*.



# Spurious Emissions at Antenna Terminals (ESMR)

E.U.T Description      ONE - Optical Network Evolution DAS  
 Type                      RAU-5 Remote Antenna Unit  
 Serial Number:         05144900098

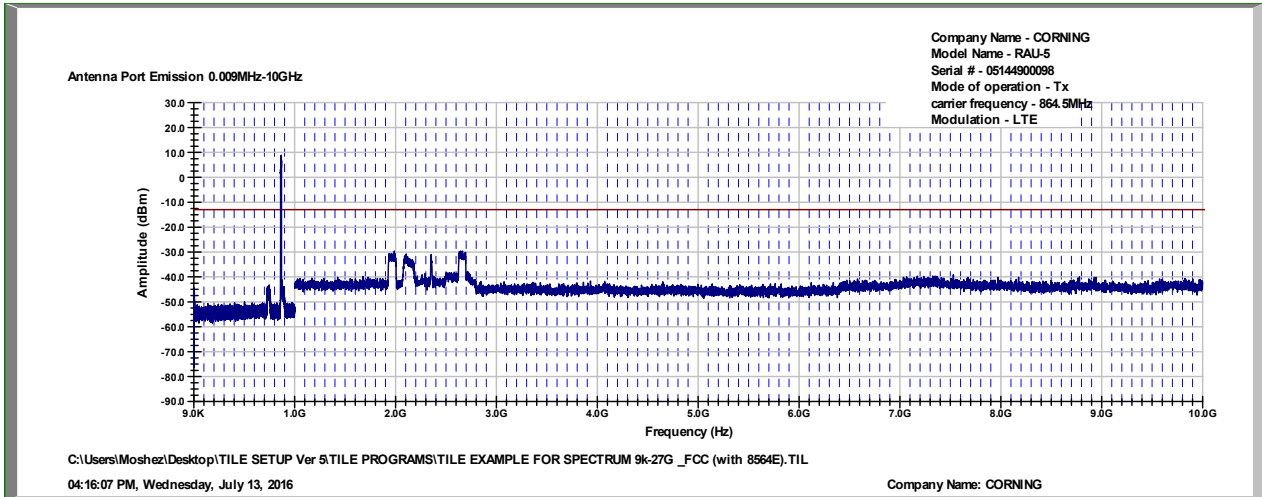


Figure 83. — 864.5 LTE 64QAM

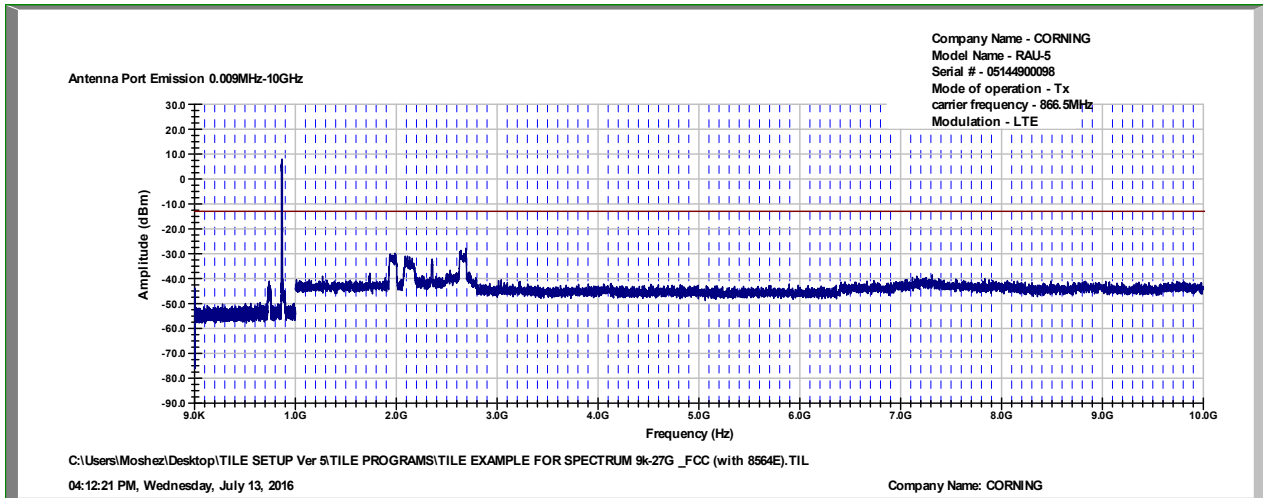


Figure 84. — 866.5 LTE 64QAM





# Spurious Emissions at Antenna Terminals (ESMR)

E.U.T Description      ONE - Optical Network Evolution DAS  
Type                      RAU-5 Remote Antenna Unit  
  
Serial Number:         05144900098

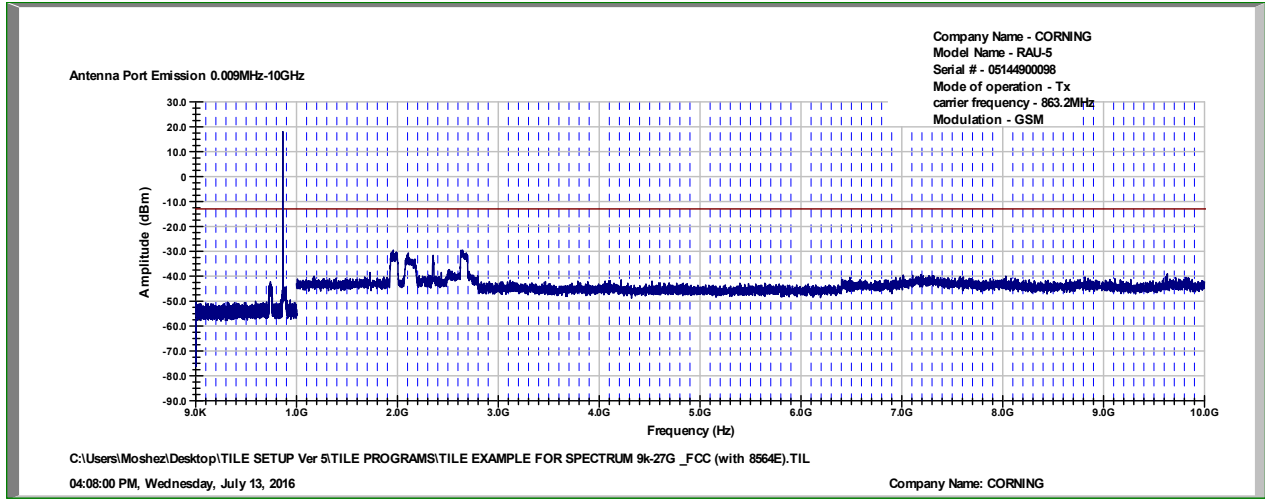


Figure 85. — 863.2 GSM

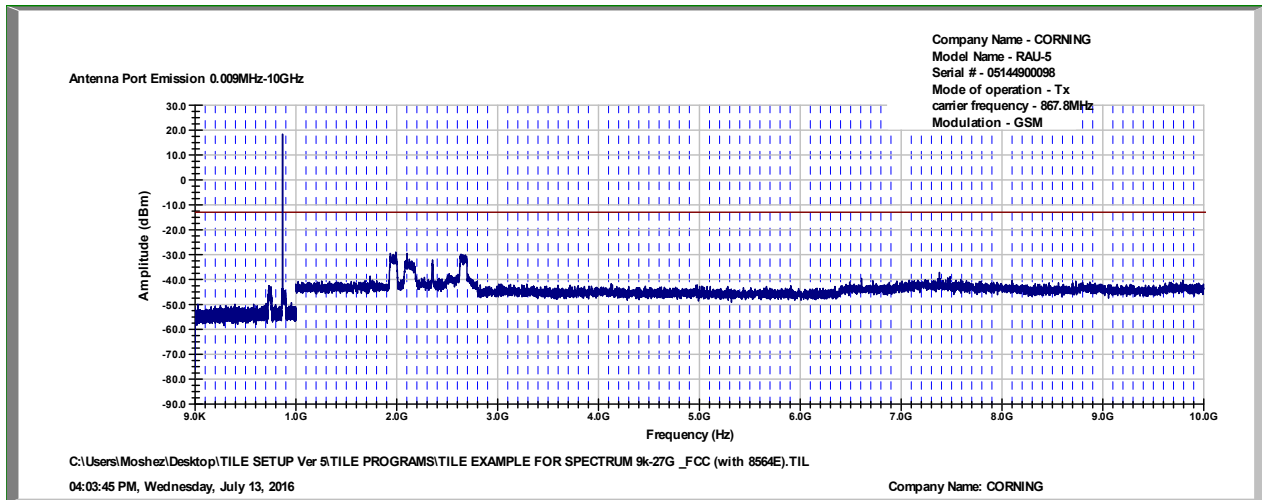


Figure 86. — 867.8 GSM



# Spurious Emissions at Antenna Terminals (ESMR)

E.U.T Description      ONE - Optical Network Evolution DAS  
Type                      RAU-5 Remote Antenna Unit  
  
Serial Number:         05144900098

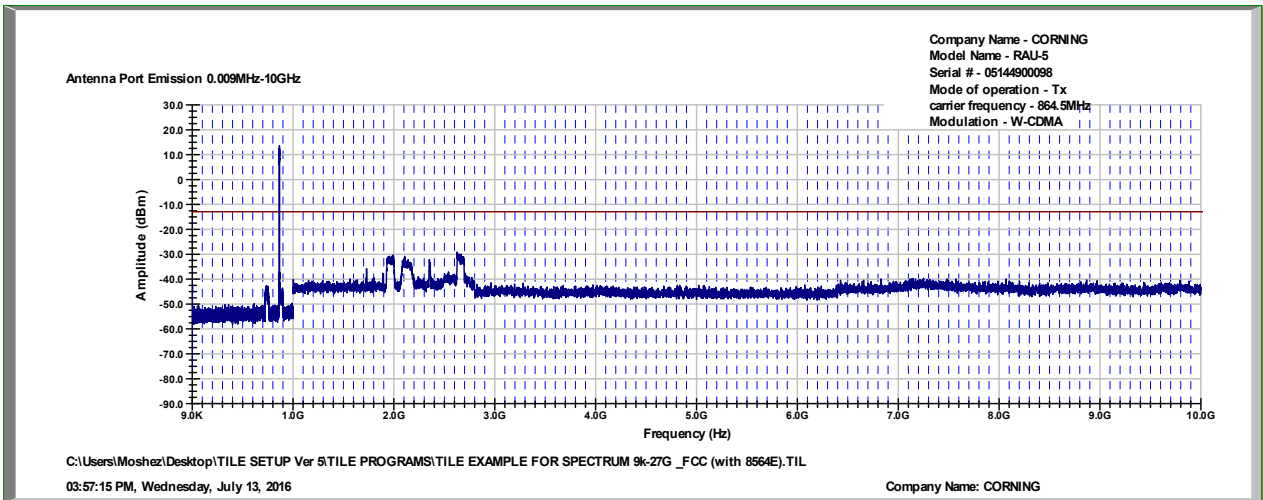


Figure 87. — 864.5 WCDMA

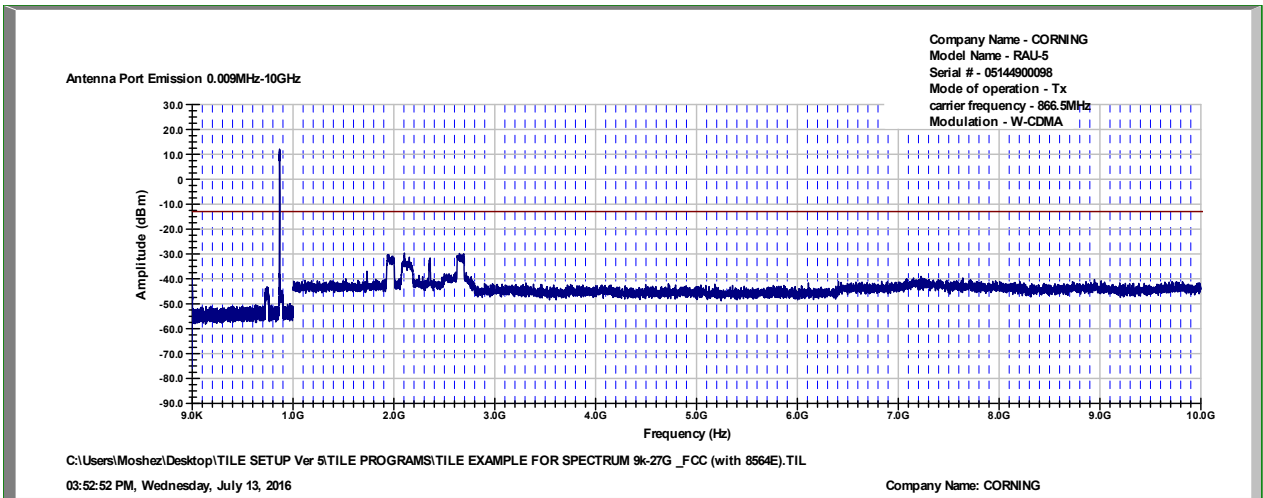


Figure 88. — 866.5 WCDMA



**11.5 Test Equipment Used; Spurious Emissions at Antenna Terminals (ESMR)**

Instrument	Manufacturer	Model	Serial Number	Calibration	
				Last Calibration Date	Next Calibration Due
Spectrum Analyzer	R&S	FSL6	100194	February 29, 2016	March 1, 2017
Vector Signal Generator	Agilent	N5172B	MY51350584	July 1, 2016	July 1, 2017
30 dB Attenuator	MCL	BW-S30W5	533	July 5, 2016	July 5, 2017

**Figure 89 Test Equipment Used**



## 12. Band Edge Spectrum ESMR

### 12.1 Test Specification

FCC Part 2.1051

### 12.2 Test Procedure

(Temperature (22°C)/ Humidity (38%RH))

The E.U.T. antenna terminal was connected to the spectrum analyzer through an external attenuator and an appropriate coaxial cable (31.0 dB). The spectrum analyzer was set to 100 kHz R.B.W.

### 12.3 Test Limit

The power of any emission outside of the authorized operating frequency ranges (862 - 869MHz) must be attenuated below the transmitting power (P) by a factor of at least  $43 + \log (P)$  dB, yielding  $-13\text{dBm}$ .

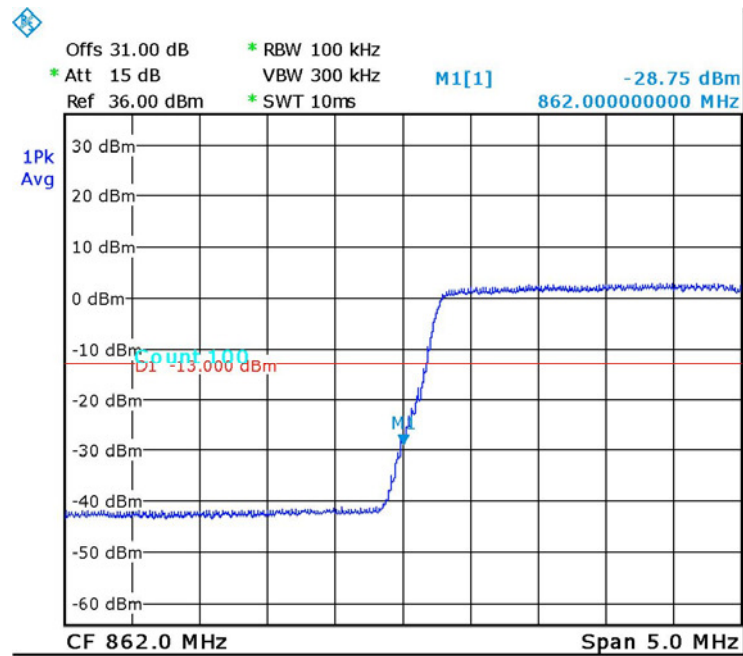
### 12.4 Test Results

Modulation	Operation Frequency	Band Edge Frequency	Reading	Limit	Margin
	(MHz)	(MHz)	(dBm)	(dBm)	(dB)
LTE 64QAM	864.5	862.0	-28.7	-13.0	-15.7
	866.5	869.0	-27.2	-13.0	-14.2
GSM	863.2	862.0	-37.0	-13.0	-24.0
	867.8	869.0	-34.5	-13.0	-21.5
W-CDMA	864.5	862.0	-35.8	-13.0	-22.8
	866.5	869.0	-33.3	-13.0	-20.3

**Figure 90 Band Edge Spectrum Results ESMR**

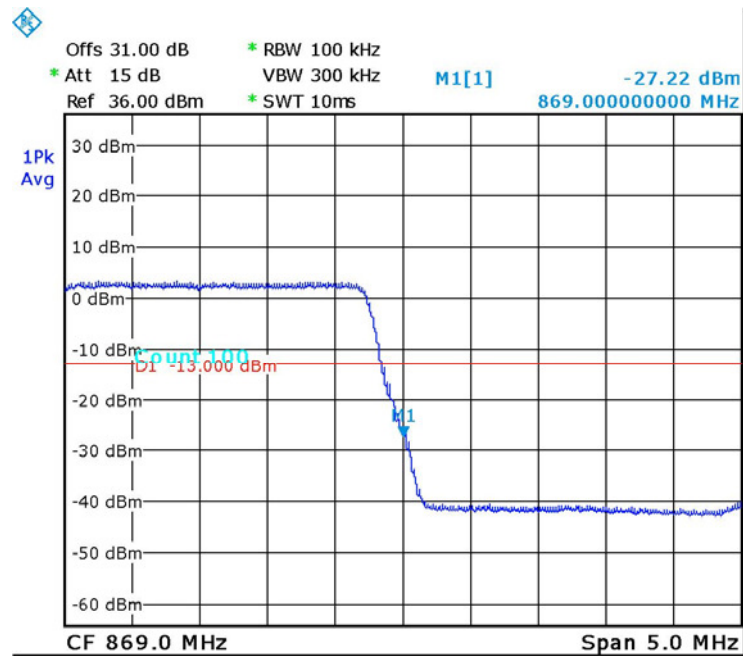
JUDGEMENT: Passed by 14.2 dB

See additional information in *Figure 91* to *Figure 96*.



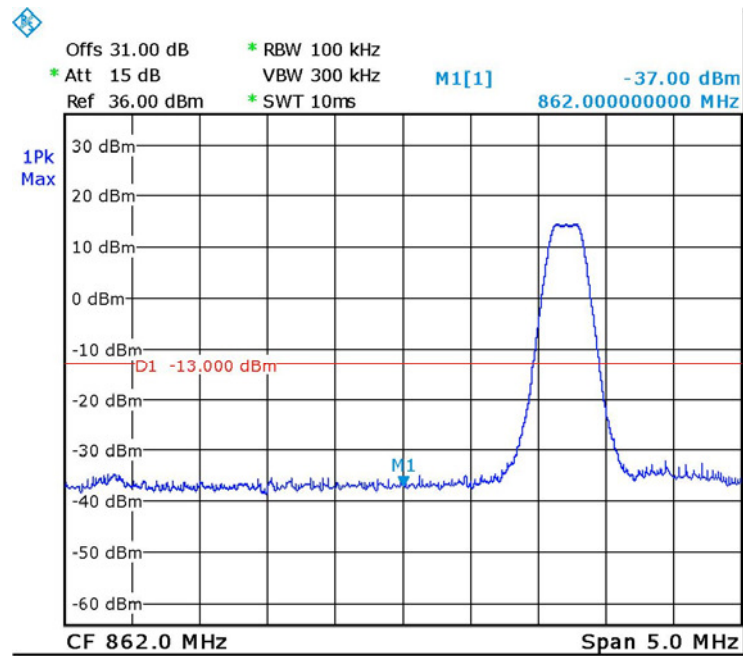
Date: 17.JUL.2016 09:26:03

Figure 91. — LTE 64QAM 864.5MHz



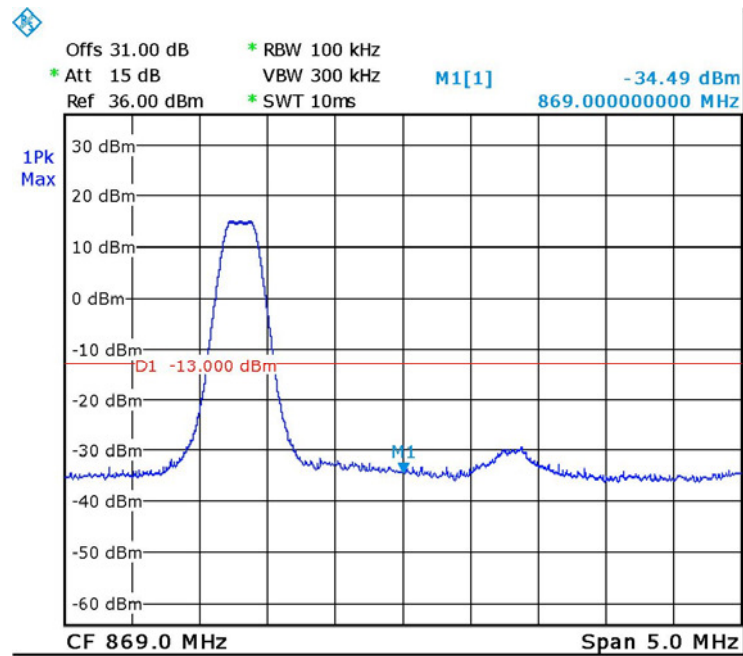
Date: 17.JUL.2016 09:25:27

Figure 92. — LTE 64QAM 866.5 MHz



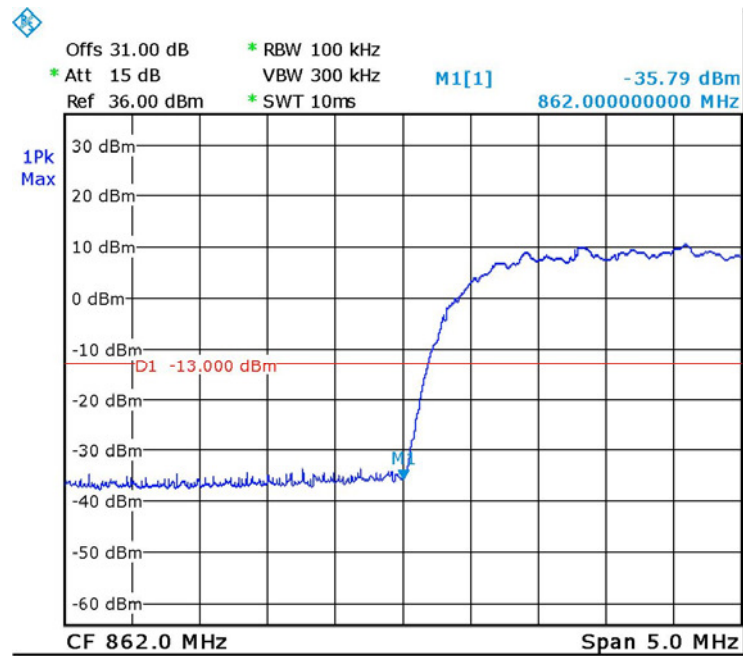
Date: 17.JUL.2016 09:21:08

Figure 93. — GSM - 863.2MHz



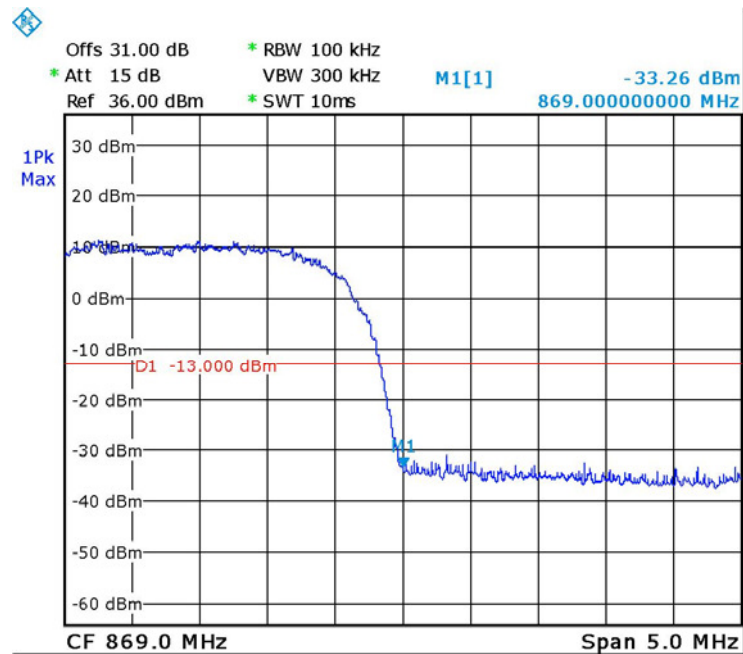
Date: 17.JUL.2016 09:20:26

Figure 94. — GSM - 867.8 MHz



Date: 17.JUL.2016 09:27:48

Figure 95. — W-CDMA - 864.5 MHz



Date: 17.JUL.2016 09:28:31

Figure 96. — W-CDMA - 866.5 MHz



### 12.5 Test Equipment Used; Band Edge Spectrum ESMR

Instrument	Manufacturer	Model	Serial Number	Calibration	
				Last Calibration Date	Next Calibration Due
Spectrum Analyzer	R&S	FSL6	100194	February 29, 2016	March 1, 2017
Vector Signal Generator	Agilent	N5172B	MY51350584	July 1, 2016	July 1, 2017
30 dB Attenuator	MCL	BW-S30W5	533	July 5, 2016	July 5, 2017

Figure 97 Test Equipment Used





## 13. Spurious Emissions (Radiated) (ESMR)

### 13.1 Test Specification

FCC, Part 90, Section 90.210

### 13.2 Test Procedure

(Temperature (23°C)/ Humidity (47%RH))

The test method was based on ANSI/TIA-603-D: 2010, Section 2.2.12

Unwanted Emissions: Radiated Spurious.

#### **For measurements between 0.009MHz-30MHz:**

The E.U.T was tested inside the shielded room at a distance of 3 meters and the E.U.T was placed on a non-metallic table, 1.5 meters above the ground. The frequency range 0.009MHz-30MHz was scanned. The readings were maximized by the turntable azimuth between 0-360°, and the antenna polarization. The emissions were measured at a distance of 3 meters.

#### **For measurements between 30.0MHz-1.0GHz:**

A preliminary measurement to characterize the E.U.T was performed inside the shielded room at a distance of 3 meters, using peak detection mode and broadband antennas. The preliminary measurements produced a list of the highest emissions. The E.U.T was then transferred to the open site, and placed on a remote-controlled turntable. The E.U.T was placed on a non-metallic table, 0.8 meters above the ground. The frequency range 30.0MHz -1.0GHz was scanned and the list of the highest emissions was verified and updated accordingly.

The readings were maximized by adjusting the antenna height between 1-4 meters, the turntable azimuth between 0-360°, and the antenna polarization.

The emissions were measured at a distance of 3 meters.

#### **For measurements between 1.0GHz-10.0GHz:**

The E.U.T was tested inside the shielded room at a distance of 3 meters and the E.U.T was placed on a non-metallic table, 1.5 meters above the ground. The frequency range 1.0GHz -10.0GHz was scanned. The readings were maximized by the turntable azimuth between 0-360°, and the antenna polarization. The emissions were measured at a distance of 3 meters.

The E.U.T. was replaced by a substitution antenna (dipole 30MHz-1GHz, Horn Antenna above 1GHz) driven by a signal generator. The height was readjusted for maximum reading. The signal generator level was adjusted to obtain the same reading on the EMI receiver as in step (a).

The signals observed in step (a) were converted to radiated power using:

$$P \text{ (dBm)} = P_g \text{ (dBm)} - \text{Cable Loss (dB)} + \text{Substitution Antenna Gain (dBd)}$$

P = Equivalent Isotropic Radiated Power.

P<sub>g</sub> = Signal Generator Output Level.



A Peak detector was used for this test.

The test was performed in 3 operation frequencies: low, mid and high.

Testing was performed when the RF port was connected to 50 Ω termination.

The table below describe only results with the highest radiation.

### 13.3 Test Results

JUDGEMENT: Passed 30.0 dB

The E.U.T met the requirements of the FCC, Part 90, Section 90.210 specifications.

Channel	Freq.	Antenna Pol.	Maximum Peak Level	Signal Generator RF Output	Cable Loss	Antenna Gain	Effective Radiated Power Level	Limit.	Margin
(MHz)	(MHz)	(V/H)	(dBμV/m)	(dBm)	(dB)	(dBd)	(dBm)	(dBm)	(dB)
863.2	1726.4	V	50.4	-50.2	0.5	7.0	-43.7	-13.0	-30.7
	1726.4	H	50.5	-49.5	0.5	7.0	-43.0	-13.0	-30.0
867.8	1735.9	V	50.5	-50.2	0.5	7.0	-43.7	-13.0	-30.7
	1735.9	H	50.5	-49.5	0.5	7.0	-43.0	-13.0	-30.0

Figure 98 Spurious Emission (Radiated) (ESMR) Test Results Table



**13.4 Test Equipment Used; Spurious Emissions (Radiated) (ESMR)**

Instrument	Manufacturer	Model	Serial Number	Calibration	
				Last Calibration Date	Next Calibration Due
EMI Receiver	HP	85422E	3906A00276	March 3, 2016	March 3, 2017
RF Filter Section	HP	85420E	3705A00248	March 3, 2016	March 3, 2017
EMI Receiver	R&S	ESCI7	100724	February 29, 2016	March 1, 2017
Spectrum Analyzer	HP	8593EM	3536A00120ADI	March 10, 2016	March 10, 2017
Active Loop Antenna	EMCO	6502	9506-2950	November 5, 2015	November 30, 2016
Antenna Biconical	EMCO	3110B	9912-3337	March 24, 2016	March 24, 2018
Antenna Log Periodic	EMCO	3146	9505-4081	April 23, 2016	April 23, 2017
Horn Antenna 1G-18G	ETS	3115	29845	May 19, 2015	May 19, 2018
Horn Antenna 18G-26G	ARA	SWH-28	1007	March 30, 2014	September 30, 2016
Low Noise Amplifier	Narda	LNA-DBS-0411N313	013	March 1, 2015	September 30, 2016
Low Noise Amplifier	Sophia Wireless	LNA 28-B	232	March 1, 2015	September 30, 2016
MXG Vector Signal Generator	Agilent	N5182A	MY49060440	July 1, 2016	July 1, 2017
Semi Anechoic Civil Chamber	ETS	S81	SL 11643	N/A	N/A
Antenna Mast	ETS	2070-2	-	N/A	N/A
Turntable	ETS	2087	-	N/A	N/A
Mast & Table Controller	ETS/EMCO	2090	9608-1456	N/A	N/A

**Figure 99 Test Equipment Spurious Emissions (Radiated) (ESMR)**



# 14. Intermodulation Conducted

## 14.1 Test Procedure

(Temperature (22°C)/ Humidity (37%RH))

The E.U.T. antenna terminal was connected to the spectrum analyzer through an external attenuator and an appropriate coaxial cable (max loss = 40.0dB). The spectrum analyzer was set to 1 kHz resolution BW for the frequency range 9.0-150.0 kHz, 10 kHz for the frequency range 150 kHz–1.0 MHz, 100 kHz for the frequency range 1.0 MHz – 30 MHz, and 1MHz for the frequency range 30 MHz - 24GHz.

6 input signals were sent simultaneously to the E.U.T. as follows:

- LTE band: 742.0 MHz, 0 dBm
- CELL&ESMR band: 878.0 MHz, 0 dBm
- PCS band: 1962.5 MHz, 0 dBm
- AWS band: 2132.5 MHz, 0 dBm
- WCS band: 2355.0MHz, 0 dBm
- TDD 2.5G band: 2593.0MHz, 0 dBm

The frequency range of 9 kHz – 24.0 GHz was scanned for unwanted signals.

## 14.2 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, yielding -13dBm.

## 14.3 Test Results

JUDGEMENT: Passed

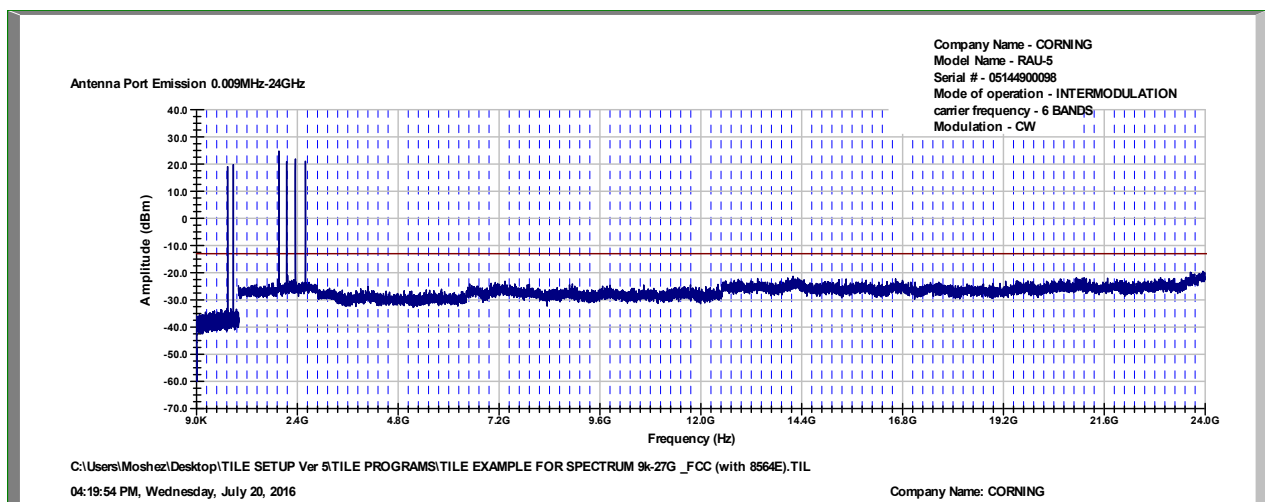


Figure 100 Intermodulation Conducted



**14.4 Test Equipment Used; Intermodulation Conducted**

Instrument	Manufacturer	Model	Serial Number	Calibration	
				Last Calibration Date	Next Calibration Due
Spectrum Analyzer	HP	8564E	3442A00275	March 10, 2016	March 10, 2017
EXG Vector Signal Generator	Agilent	N5172B	TE4384	July 1, 2016	July 1, 2017
EXG Vector Signal Generator	Agilent	N5172B	MY513500584	July 1, 2016	July 1, 2017
MXG Vector Signal Generator	Agilent	N5182A	MY48180244	July 1, 2016	July 1, 2017
MXG Vector Signal Generator	Agilent	N5182A	MY49060440	July 1, 2016	July 1, 2017
Signal Generator	HP	E4432B	GB40050998	July 1, 2016	July 1, 2017
ESG Vector Signal Generator	Agilent	E4438C	MY45094064	July 1, 2016	July 1, 2017
30 dB Attenuator	MCL	BW-S30W5	533	July 5, 2016	July 5, 2017
6 dB Attenuator	Weinschel Associates	WA 40-6-34	568	July 6, 2016	July 6, 2017

**Figure 101 Test Equipment Used**



## 15. Intermodulation Radiated

### 15.1 Test Procedure

(Temperature (23°C)/ Humidity (47%RH))

The test method was based on ANSI/TIA-603-D: 2010, Section 2.2.12 Unwanted Emissions: Radiated Spurious.

#### **For measurements between 0.009MHz-30MHz:**

The E.U.T was tested inside the shielded room at a distance of 3 meters and the E.U.T was placed on a non-metallic table, 1.5 meters above the ground. The frequency range 0.009MHz-30MHz was scanned. The readings were maximized by the turntable azimuth between 0-360°, and the antenna polarization.

The emissions were measured at a distance of 3 meters.

#### **For measurements between 30.0MHz-1.0GHz:**

A preliminary measurement to characterize the E.U.T was performed inside the shielded room at a distance of 3 meters, using peak detection mode and broadband antennas. The preliminary measurements produced a list of the highest emissions.

The E.U.T was then transferred to the open site, and placed on a remote-controlled turntable. The E.U.T was placed on a non-metallic table, 0.8 meters above the ground. The frequency range 30.0MHz -1.0GHz was scanned and the list of the highest emissions was verified and updated accordingly.

The readings were maximized by adjusting the antenna height between 1-4 meters, the turntable azimuth between 0-360°, and the antenna polarization.

The emissions were measured at a distance of 3 meters.

#### **For measurements between 1.0GHz-24.0GHz:**

The E.U.T was tested inside the shielded room at a distance of 3 meters and the E.U.T was placed on a non-metallic table, 1.5 meters above the ground. The frequency range 1.0GHz -24.0GHz was scanned. The readings were maximized by the turntable azimuth between 0-360°, and the antenna polarization.

The emissions were measured at a distance of 3 meters.

The E.U.T. was replaced by a substitution antenna (dipole 30MHz-1GHz, Horn Antenna above 1GHz) driven by a signal generator. The height was readjusted for maximum reading. The signal generator level was adjusted to obtain the same reading on the EMI receiver as in step (a).

The signals observed in step (a) were converted to radiated power using:

$$P_d(\text{dBm}) = P_g(\text{dBm}) - \text{Cable Loss (dB)} + \text{Substitution Antenna Gain (dBd)}$$

$P_d$  = Dipole equivalent power (result).

$P_g$  = Signal generator output level.



6 input signals were sent simultaneously to the E.U.T. as follows:

LTE band: 742.0 MHz, 0 dBm

CELL band: 878.0 MHz, 0 dBm

PCS band: 1962.5 MHz, 0 dBm

AWS band: 2132.5 MHz, 0 dBm

WCS band: 2355.0MHz, 0 dBm

TDD 2.5G band: 2593.0MHz, 0 dBm

A Peak detector was used for this test.

The test was performed in 3 operation frequencies: low, mid and high.

Testing was performed when the RF port was connected to 50  $\Omega$  termination.

The table below describe only results with the highest radiation.

### **15.2 Test Limit**

The power of any emission outside of the authorized operating frequency ranges (728-758; 869-894; 1930-1990; 2110-2155 MHz;2350-2360MHz) must be attenuated below the transmitting power (P) by a factor of at least  $43 + 10 \log (P)$  dB, yielding  $-13$ dBm.

### **15.3 Test Results**

JUDGEMENT: Passed



Freq.	Antenna Pol.	Maximum Peak Level	Signal Generator RF Output	Cable Loss	Antenna Gain	Effective Radiated Power Level	Limit	Margin
(MHz)	(V/H)	(dB $\mu$ V/m)	(dBm)	(dB)	(dBd)	(dBm)	(dBm)	(dB)
1792.5	V	51.9	-48.7	0.5	7.0	-42.2	-13.0	-29.2
1792.5	H	52.5	-47.5	0.5	7.0	-41.0	-13.0	-28.0
2219.0	V	54.6	-46.1	0.5	7.0	-39.6	-13.0	-26.6
2219.0	H	54.5	-45.5	0.5	7.0	-39.0	-13.0	-26.0
3223.5	V	56.1	-48.8	0.5	10.0	-39.3	-13.0	-26.3
3223.5	H	56.1	-48.4	0.5	10.0	-38.9	-13.0	-25.9
3854.0	V	56.3	-42.8	0.5	9.5	-33.8	-13.0	-20.8
3854.0	H	56.4	-42.3	0.5	9.5	-33.3	-13.0	-20.3
3978.5	V	56.3	-42.8	0.5	9.5	-33.8	-13.0	-20.8
3978.5	H	56.3	-42.3	0.5	9.5	-33.3	-13.0	-20.3
4104.0	V	56.3	-42.8	0.5	9.5	-33.8	-13.0	-20.8
4104.0	H	56.2	-42.3	0.5	9.5	-33.3	-13.0	-20.3
4201.0	V	56.4	-42.6	0.5	9.5	-33.6	-13.0	-20.6
4201.0	H	56.5	-42.3	0.5	9.5	-33.3	-13.0	-20.3
4308.0	V	56.2	-42.6	0.5	9.5	-33.6	-13.0	-20.6
4308.0	H	56.4	-42.3	0.5	9.5	-33.3	-13.0	-20.3
4439.0	V	56.3	-42.8	0.5	9.5	-33.8	-13.0	-20.8
4439.0	H	56.4	-42.3	0.5	9.5	-33.3	-13.0	-20.3
5445.0	V	57.1	-46.2	0.5	10.8	-35.9	-13.0	-22.9
5445.0	H	57.0	-45.0	0.5	10.8	-34.7	-13.0	-21.7

Figure 102 Intermodulation Radiated Results





**15.4 Test Instrumentation Used; Radiated Measurements Intermodulation**

Instrument	Manufacturer	Model	Serial Number	Calibration	
				Last Calibration Date	Next Calibration Due
EMI Receiver	HP	85422E	3906A00276	March 3, 2016	March 3, 2017
RF Filter Section	HP	85420E	3705A00248	March 3, 2016	March 3, 2017
EMI Receiver	R&S	ESCI7	100724	February 29, 2016	March 1, 2017
Spectrum Analyzer	HP	8593EM	3536A00120ADI	March 10, 2016	March 10, 2017
Active Loop Antenna	EMCO	6502	9506-2950	November 5, 2015	November 30, 2016
Antenna Biconical	EMCO	3110B	9912-3337	March 24, 2016	March 24, 2018
Antenna Log Periodic	EMCO	3146	9505-4081	April 23, 2016	April 23, 2017
Horn Antenna 1G-18G	ETS	3115	29845	May 19, 2015	May 19, 2018
Horn Antenna 18G-26G	ARA	SWH-28	1007	March 30, 2014	September 30, 2016
Low Noise Amplifier	Narda	LNA-DBS-0411N313	013	March 1, 2015	September 30, 2016
Low Noise Amplifier	Sophia Wireless	LNA 28-B	232	March 1, 2015	September 30, 2016
Signal Generator	Marconi	2022D	119196015	March 1, 2016	March 1, 2017
Signal Generator	HP	8648C	3623A04126	February 29, 2016	March 1, 2017
Signal Generator	HP	ESG-4000A/E4422 A	US36220118	February 29, 2016	March 1, 2017
MXG Vector Signal Generator	Agilent	N5182A	MY49060440	July 1, 2016	July 1, 2017
ESG Vector Signal Generator	Agilent	E4438C	MY45094064	July 1, 2016	July 1, 2017
Signal Generator	Agilent	E4432B	GB40050998	July 1, 2016	July 1, 2017
Semi Anechoic Civil Chamber	ETS	S81	SL 11643	N/A	N/A
Antenna Mast	ETS	2070-2	-	N/A	N/A
Turntable	ETS	2087	-	N/A	N/A
Mast & Table Controller	ETS/EMCO	2090	9608-1456	N/A	N/A

**Figure 103 Test Equipment Used**

## 16. Out-of-Band Rejection (CELL&ESMR)

### 16.1 Test Specification

KDB 935210 D05 v01r01, Section 3.3

### 16.2 Test Procedure

(Temperature (21°C)/ Humidity (35%RH))

The E.U.T. antenna terminal was connected to the spectrum analyzer through an external attenuator and an appropriate coaxial cable (max Loss= 31.0 dB).

The signal and spectrum analyzer frequency range was set to  $\pm 250\%$  of the passband, Dwell time set to approximately 10msec.

RBW was set between 1% to 5% of the E.U.T passband and VBW set to  $\geq 3 \cdot RBW$ .

The test was done both for CELL and ESMR bands because they are consecutive bands.

### 16.3 Test Limit

N/A

### 16.4 Test Results

JUDGEMENT: Passed

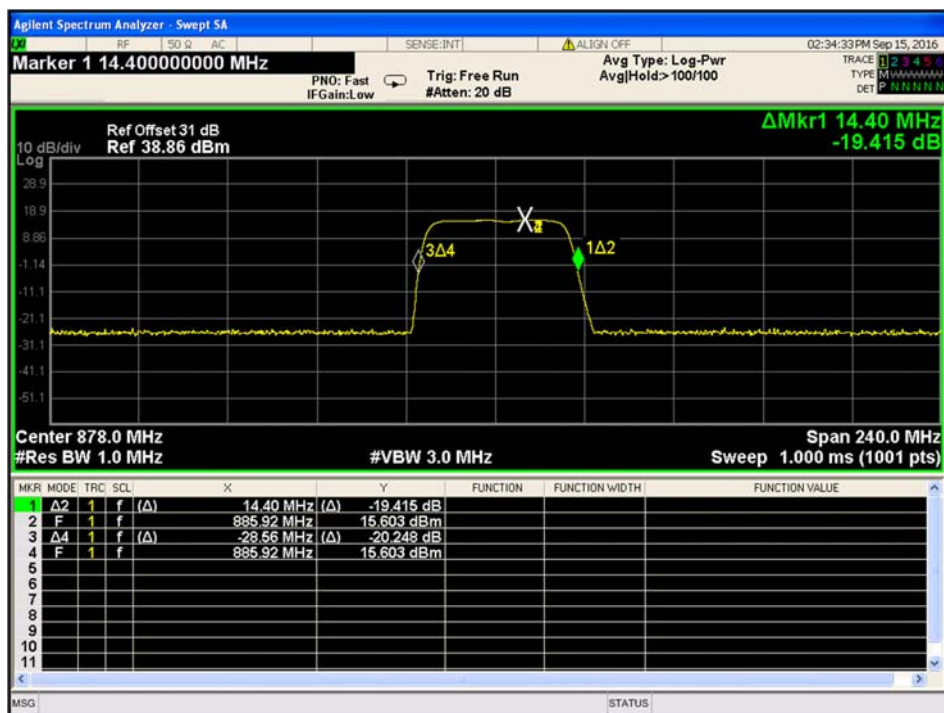


Figure 104. — Out-of-Band Rejection Plot



### 16.5 Test Equipment Used; Out-of-Band Rejection

Instrument	Manufacturer	Model	Serial Number	Calibration	
				Last Calibration Date	Next Calibration Date
EXA Spectrum Analyzer	Agilent	N9010A	MY48030391	March 16, 2016	March 16, 2018
EXG Vector Signal Generator	Agilent	N5172B	MY49060440	November 19, 2014	November 19, 2017
30 dB Attenuator	Itl:1776	BW-S30W5	533	July 5, 2016	July 5, 2017

Figure 105 Test Equipment Used



## 17. APPENDIX A - CORRECTION FACTORS

### 17.1 Correction factors for *RF OATS Cable 35m* *ITL #1784*

Frequency ( MHz)	Cable loss (dB)
10.0	0.3
20.0	0.2
50.0	-0.1
100.0	-0.6
200.0	-1.2
500.0	-2.3
1000.0	-3.6



**17.2 Correction factors for RF OATS Cable 10m**  
**ITL #1794**

Frequency(MHz)	Cable loss(dB)
10.0	-0.3
20.0	-0.3
50.0	-0.5
100.0	-0.7
200.0	-1.1
500.0	-1.8
1000.0	-2.7



**17.3 Correction factors for**

**Horn Antenna  
Model: SWH-28  
at 1 meter range.**

<b>FREQUENCY (GHz)</b>	<b>APE (dB /m)</b>	<b>Gain (dB1)</b>
18.0	40.3	16.1
19.0	40.3	16.3
20.0	40.3	16.1
21.0	40.3	16.3
22.0	40.4	16.8
23.0	40.5	16.4
24.0	40.5	16.6
25.0	40.5	16.7
26.0	40.6	16.4



**17.4 Correction factors for Horn ANTENNA**  
**Model: 3115**  
**Antenna serial number: 29845**  
**3 meter range**

f(GHz)	AF(dB/m)	GA(dB)
0.75	25	3
1G	23.5	7
1.5G	26	8
2G	29	7
2.5G	27.5	10
3G	30	10
3.5G	31.5	10
4G	32.5	9.5
4.5G	32.5	10.5
5G	33	10.5
5.5G	35	10.5
6G	36.5	9.5
6.5G	36.5	10
7G	37.5	10
7.5G	37.5	10
8G	37.5	11
8.5G	38	11
9G	37.5	11.5
9.5G	38	11.5
10G	38.5	11.5
10.5G	38.5	12
11G	38.5	12.5
11.5G	38.5	13
12G	38	13.5
12.5G	38.5	13
13G	40	12
13.5G	41	12
14G	40	13
14.5G	39	14
15G	38	15.5
15.5G	37.5	16
16G	37.5	16
16.5G	39	15
17G	40	15
17.5G	42	13.5
18G	42.5	13



**17.5 Correction factors for Log Periodic Antenna  
EMCO, Model 3146,  
Serial #9505-4081**

Frequency [MHz]	AF [dB/m]
200.0	11.47
250.0	12.06
300.0	14.77
400.0	15.77
500.0	18.01
600.0	18.84
700.0	20.93
800.0	21.27
900.0	22.44
1000.0	24.10





**17.6 Correction factors for Biconical Antenna  
EMCO, Model 3110B,  
Serial #9912-3337**

Frequency [MHz]	AF [dB/m]
30.0	14.18
35.0	13.95
40.0	12.84
45.0	11.23
50.0	11.10
60.0	10.39
70.0	9.34
80.0	9.02
90.0	9.31
100.0	8.95
120.0	11.53
140.0	12.20
160.0	12.56
180.0	13.49
200.0	15.27



**17.7 Correction factors for ACTIVE LOOP ANTENNA**  
**Model 6502**  
**S/N 9506-2950**

f(MHz)	MAF(dBs/m)	AF(dB/m)
0.01	-33.1	18.4
0.02	-37.2	14.3
0.03	-38.2	13.3
0.05	-39.8	11.7
0.1	-40.1	11.4
0.2	-40.3	11.2
0.3	-40.3	11.2
0.5	-40.3	11.2
0.7	-40.3	11.2
1	-40.1	11.4
2	-40	11.5
3	-40	11.5
4	-40.1	11.4
5	-40.2	11.3
6	-40.4	11.1
7	-40.4	11.1
8	-40.4	11.1
9	-40.5	11
10	-40.5	11
20	-41.5	10
30	-43.5	8