

FCC TEST REPORT FCC 47 CFR Part 27 MISCELLANEOUS WIRELESS COMMUNICATIONS SERVICES ISED RSS-130, Issue 1 Mobile Broadband Services (MBS) Equipment Operating in the Frequency Bands 698-756 MHz and 777-787 MHz ISED RSS-139, Issue 3 Advanced Wireless Services (AWS) Equipment Operating in the Bands 1710-1780 MHz and 2110-2180 MHz	
Report Reference No.	G0M-1809-7680-TFC227UL-V02
Testing Laboratory	Eurofins Product Service GmbH
Address	Storkower Str. 38c 15526 Reichenwalde Germany
Accreditation	    FCC Test Firm Designation Number: DE0008 IC Testing Laboratory site: 3470A-2
Applicant's name	BIOTRONIK SE & Co. KG
Address	Woermannkehe 1 12359 Berlin GERMANY
Test specification:	
Standard	47 CFR Part 27 RSS-130, Issue 1 : 2013-10, RSS-139, Issue 3 : 2015-07 RSS-Gen, Issue 4, 2014-11, ANSI C63.26
Test scope	partial Radio compliance test
Equipment under test (EUT):	
Product description	CardioMessenger Smart
Model No.	CardioMessenger Smart 4G
Additional Model(s)	None
Brand Name(s)	BIOTRONIK
Hardware version	CardioMessenger Smart 4G mit LP, best.LP1/Telex Smart 4G Rev. B
Firmware / Software version	Modem-FW: 30.00.102 FCC-ID: QRI-CMSMART4GNA IC: N/A
Test result	Passed

Possible test case verdicts:

- neither assessed nor tested: N/N
- required by standard but not appl. to test object: N/A
- required by standard but not tested: N/T
- not required by standard for the test object: N/R
- test object does meet the requirement.....: P (Pass)
- test object does not meet the requirement: F (Fail)

Testing:

Test Lab Temperature: 20 – 23 °C

Test Lab Humidity: 32 – 38 %

Date of receipt of test item: 2018-09-24

Date (s) of performance of tests: 2018-09-24 - 2019-02-26

Compiled by: Burkhard Pudell

Tested by (+ signature).....: Burkhard Pudell
(Responsible for Test) 

Approved by (+ signature): Christian Weber
(Head of Lab) 

Date of issue.....: 2019-03-21

Total number of pages.....: 29

General remarks:

The test results presented in this report relate only to the object tested.

The results contained in this report reflect the results for this particular model and serial number. It is the responsibility of the manufacturer to ensure that all production models meet the intent of the requirements detailed within this report.

This report shall not be reproduced, except in full, without the written approval of the Issuing testing laboratory.

Additional comments:

Test case reduction on radiated measurements only is based on the requirements for host integration for full modular approved transmitter modules (KDB 996369 D02) used by the EUT. The EUT uses a module with full modular approval according to FCC and IC rules. For details about the radio module see EUT description in section 1.

Version History

Version	Issue Date	Remarks	Revised by
01	2018-10-19	Initial Release	
02	2019-03-21	Insert add. Result for Modulation 16-QAM	B. Pudell

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1 Equipment (Test item) Description

Description	CardioMessenger Smart		
Model	CardioMessenger Smart 4G		
Additional Model(s)	None		
Brand Name(s)	BIOTRONIK		
Serial number	None		
Hardware version	CardioMessenger Smart 4G mit LP, best.LP1/Telex Smart 4G Rev. B		
Software / Firmware version	Modem-FW: 30.00.102		
PMN	n/a		
HVIN	n/a		
FVIN	n/a		
HMN	n/a		
FCC-ID	QRI-CMSMART4GNA		
IC	n/a		
Equipment type	End product		
Equipment classification	Portable Device (Human Body distance < 20 cm)		
Radio type	Transceiver		
Radio technology	LTE Cat-M1		
Operating frequency range	LTE 12 : TX = 699 - 716 MHz, RX = 729 - 746 MHz LTE 4 : TX = 1710 - 1755 MHz, RX = 2110 - 2155 MHz		
Assigned frequency band	FCC/ISED: 698 - 746MHz FCC/ISED: 1710 - 1755 MHz		
Main test frequencies LTE FDD 12	F _{LOW}	CH : 23025 UL: 700.5 MHz	CH : 5025 DL: 730.5 MHz
	F _{MID}	CH : 23095 UL: 707.5 MHz	CH : 5095 DL: 737.5 MHz
	F _{HIGH}	CH : 23165 UL: 714.5 MHz	CH : 5165 DL: 744.5 MHz
Main test frequencies LTE FDD 4	F _{LOW}	CH : 19965 UL: 1711.5 MHz	CH : 1965 DL: 2111.5 MHz
	F _{MID}	CH : 20175 UL: 1732.5 MHz	CH : 2175 DL: 2132.5 MHz
	F _{HIGH}	CH : 20385 UL: 1753.5 MHz	CH : 2385 DL: 2153.5 MHz
Supported transmission modes	Packet switched		
Modulations	LTE : QPSK, 16-QAM		
Number of antennas	1x TX/RX		

Radio module	Type	4G module
	Model	ME910C1-NA
	Manufacturer	TELIT COMMUNICATIONS
	HW Version	0.0
	SW Version	30.00.102
	FCC-ID	RI7ME910C1NA
	IC	5131A-ME910C1NA
Antenna	Type	integrated
	Model	PCB antenna
	Manufacturer	BIOTRONIK SE & Co.KG
	Gain	(B4) 3.9 dBi; (B12) 1.1 dBi
Manufacturer	BIOTRONIK SE & Co. KG Woermannkehre 1 12359 Berlin GERMANY	
Power supply	V _{NOM}	3.7 VDC (Lithium Battery)
	V _{MIN}	N/A
	V _{MIN}	N/A
AC/DC-Adaptor	Model	FW7520/05
	Vendor	FRIWO Gerätebau GmbH
	Input	110 - 240 V AC
	Output	5V DC

1.4 Supporting Equipment Used During Testing

Product Type*	Device	Manufacturer	Model No.	Comments
SIM	Network	R&S	CMW500	LTE -Tester
*Note: Use the following abbreviations: AE : Auxiliary/Associated Equipment, or SIM : Simulator (Not Subjected to Test) CABL : Connecting cables				

1.5 Test Modes

Mode #	Description	
LTE FDD Cat-M1 QPSK	General conditions:	EUT powered by battery with connected AC/DC-adapter. Active call to communication tester.
	Radio conditions:	Mode = TX mode (eMTC) Connection = RMC Half Duplex Modulation = QPSK Configuration = Cell BW = 3 MHz, RB6, NB low Power level = Maximum
LTE FDD Cat-M1 16-QAM	General conditions:	EUT powered by battery with connected AC/DC-adapter. Active call to communication tester.
	Radio conditions:	Mode = TX mode (eMTC) Connection = RMC Half Duplex Modulation = 16-QAM Configuration = Cell BW = 3 MHz, RB3, NB low Power level = Maximum
LTE - RX	General conditions:	EUT powered by battery with connected AC/DC-adapter. Active call to communication tester.
	Radio conditions:	Mode = TX mode (eMTC) Connection = RMC Half Duplex Modulation = QPSK Configuration = Cell BW = 3 MHz, RB 0 UL / 0 DL

1.6 Test Equipment Used During Testing

Measurement Software			
Description	Manufacturer	Name	Version
EMC Test Software	Dare Instruments	Radimation	15.2.4

Radiated power					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Fully-anechoic chamber	Frankonia	AC 3	EF00199	-	-
Spectrum Analyzer	R&S	FSIQ 26	EF00151	2018-07	2019-07
LPD Antenna	R&S	HL 223	EF00187	2016-05	2019-05
Horn Antenna	R&S	BBHA 9120D	EF01153	2018-09	2019-09

Radiated spurious emissions					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Semi-anechoic chamber	Frankonia	AC 1	EF00062	-	-
Spectrum Analyzer	R&S	FSIQ 26	EF00242	2018-07	2019-07
Biconical Antenna	R&S	HK 116	EF00186	2018-03	2020-03
LPD Antenna	R&S	HL 223	EF00202	2018-03	2020-03
Horn Antenna	R&S	BBHA 9120D	EF01153	2018-09	2019-09

1.7 Sample emission level calculation

The following is a description of terms and a sample calculation, as appears in the radiated emissions data table. The numbers used in the calculation are for example only. There is no direct correlation to the specific data taken for the product described in this document:

Reading:

This is the reading obtained on the spectrum analyzer in dB μ V. Any external preamplifiers used are taken into account through internal analyzer settings.

A.F.:

This is the antenna factor for the receiving antenna. It is a conversion factor, which converts electric fields strengths to voltages, which can be measured directly on the spectrum analyzer. It is treated as a loss in dB. Cable losses have been included with the A.F. to simplify the calculations. The antenna factor is used in calculations as follows:

$$\text{Reading on Analyzer (dB}\mu\text{V)} + \text{A.F. (dB/m)} = \text{Net field strength (dB}\mu\text{V/m)}$$

Net:

This is the net field strength measurement (as shown above).

Limit:

This is the FCC Class B radiated emission limit (in units of dB μ V/m). The FCC limits are given in units of μ V/m. The following formula is used to convert the units of μ V/m to dB μ V/m:

$$\text{Limit (dB}\mu\text{V/m)} = 20 \cdot \log (\mu\text{V/m})$$

Margin:

This is the margin of compliance below the FCC limit. The units are given in dB. A negative margin indicates the emission was below the limit. A positive margin indicates that the emission exceeds the limit.

Example only:

$$\begin{array}{rclcl} \text{Reading} & + & \text{AF} & = & \text{Net Reading} & : & \text{Net reading - FCC limit} & = & \text{Margin} \\ 21.5 \text{ dB}\mu\text{V} & + & 26 \text{ dB/m} & = & 47.5 \text{ dB}\mu\text{V/m} & : & 47.5 \text{ dB}\mu\text{V/m} - 57.0 \text{ dB}\mu\text{V/m} & = & -9.5 \text{ dB}\mu\text{V/m} \end{array}$$

2 Result Summary

FCC 47 CFR Part 27, ISED RSS-130, ISED RSS-139				
Product Specific Standard Section	Requirement – Test	Reference Method	Result	Remarks
FCC § 2.1049 ISED RSS-130 3.1 ISED RSS-139 3.1 ISED RSS-Gen 6.6	Occupied Bandwidth	RSS-Gen 6.6 ANSI C63.26		Informational only
FCC § 2.1055 FCC § 27.54 ISED RSS-130 4.3 ISED RSS-139 6.4	Frequency stability	FCC § 27.54 ISED RSS-130 4.3 ISED RSS-139 6.4 ANSI C63.26	N/R	
FCC § 27.50 (b)(10)	Effective radiated power	ANSI C63.26	PASS	
FCC § 27.50 (d)(4) ISED RSS-130 4.4 ISED RSS-139 6.5	Equivalent isotropic radiated power	ANSI C63.26	PASS	
FCC § 27.50 (d)(5) ISED RSS-130 4.4 ISED RSS-139 6.5	Peak to average ratio	ANSI C63.26	N/R	
FCC § 27.53(c) FCC § 27.53(h) ISED RSS-130 4.6 ISED RSS-139 6.6	Band-edge compliance	ANSI C63.26	N/R	
FCC § 27.53(c) FCC § 27.53(h) ISED RSS-130 4.6 ISED RSS-139 6.6	Conducted out-of-band emissions	ANSI C63.26	N/R	
FCC § 27.53(c) FCC § 27.53(h) ISED RSS-130 4.6 ISED RSS-139 6.6	Radiated out-of-band emissions	ANSI C63.26	PASS	
RSS-130 3.1 RSS-139 3.1 ISED RSS-Gen 7.1	Receiver radiated spurious emissions	ISED RSS-Gen 7.1	PASS	
Remarks:				

3 Test Conditions and Results

3.1 Test Conditions and Results – Occupied Bandwidth

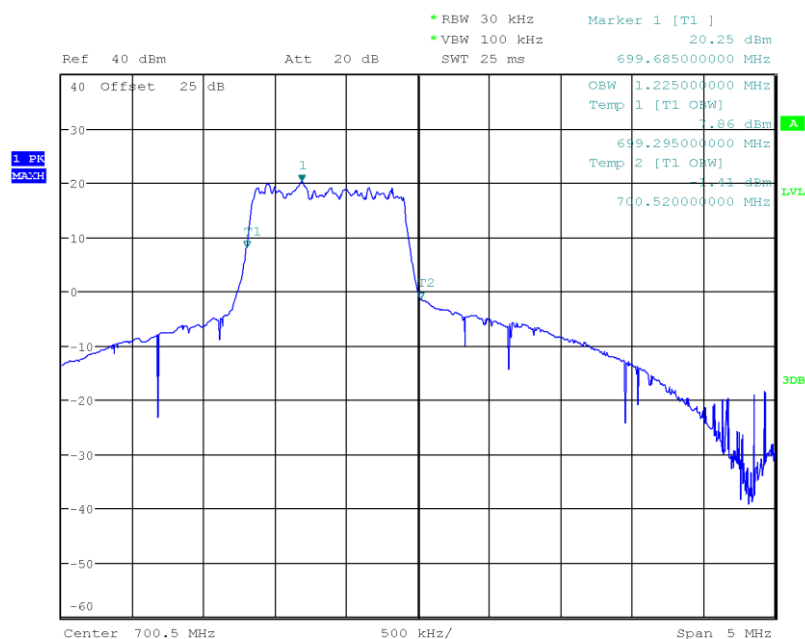
Occupied Bandwidth acc. to FCC 2.1046, ISED RSS-130, ISED RSS-139			
Test according to measurement reference	Reference Method		
	ANSI C63.26 / RSS-Gen 6.6		
Test frequency range	Tested frequencies		
	F _{LOW} / F _{MID} / F _{HIGH}		
Limits			
None (Informational only)			
Test setup			
Spectrum Analyzer EUT			
Test procedure			
1. EUT set to test mode (Communication tester is used if needed) 2. Span set to at least twice the emission spectrum 3. Resolution bandwidth set to 1 % of span 4. Occupied Bandwidth (99 %) measurement with spectrum analyzer built in measurement function			
Test results – LTE FDD 12 Cat-M1			
Channel	Frequency [MHz]	Mode	Occupied Bandwidth [MHz]
F _{LOW}	700.5	QPSK	1.225
F _{MID}	707.5	QPSK	1.160
F _{HIGH}	714.5	QPSK	1.185
F _{LOW}	700.5	16-QAM	0.555
F _{MID}	707.5	16-QAM	0.543
F _{HIGH}	714.5	16-QAM	0.555

Test results – LTE FDD 4 Cat-M1			
Channel	Frequency [MHz]	Mode	Occupied Bandwidth [MHz]
F _{LOW}	1711.5	QPSK	1.225
F _{MID}	1732.5	QPSK	1.240
F _{HIGH}	1753.5	QPSK	1.220
F _{LOW}	1711.5	16-QAM	0.585
F _{MID}	1732.5	16-QAM	0.570
F _{HIGH}	1753.5	16-QAM	0.561
Comments:			

Occupied Bandwidth – LTE FDD 12 F_{LOW} - QPSK

Occupied Bandwidth

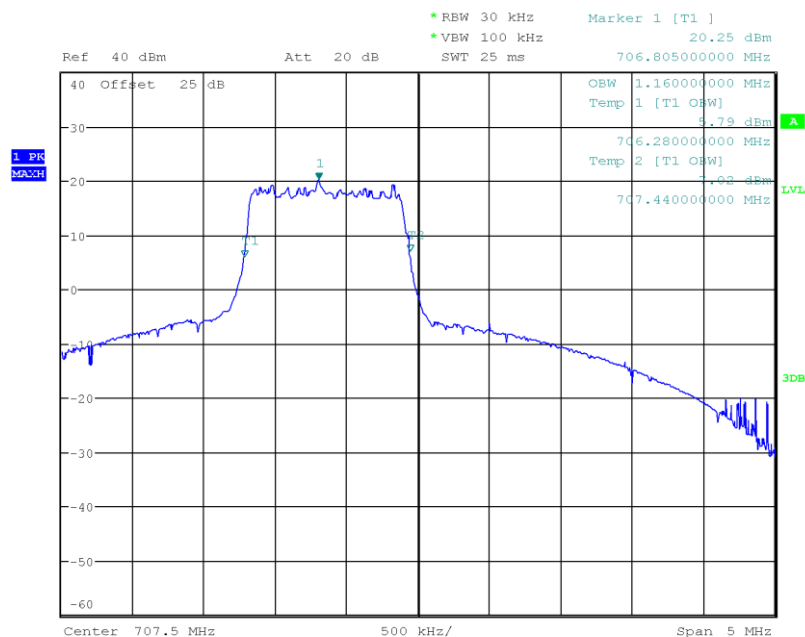
Project Number: G0M-1809-7680
 Applicant: BIOTRONIK SE & Co. KG
 Model Description: CardioMessenger Smart
 Model: CardioMessenger Smart 4G
 Test Sample ID: 20497
 Reference Standards: RSS-Gen
 Reference Method: ANSI C63.26:2015, Section 5.4.4
 Operating Frequency: 700.5 MHz
 Operating Conditions: Tnom/Vnom
 Operator: B. Pudell
 Test Site: Eurofins Product Service GmbH
 Test Date: 2018-10-15
 Note: LTE FDD12 Cat-M1; QPSK; RB6
 Occupied Bandwidth [kHz]: 1225.0



Occupied Bandwidth – LTE FDD 12 F_{MID} - QPSK

Occupied Bandwidth

Project Number: G0M-1809-7680
Applicant: BIOTRONIK SE & Co. KG
Model Description: CardioMessenger Smart
Model: CardioMessenger Smart 4G
Test Sample ID: 20497
Reference Standards: RSS-Gen
Reference Method: ANSI C63.26:2015, Section 5.4.4
Operating Frequency: 707.5 MHz
Operating Conditions: Tnom/Vnom
Operator: B. Pudell
Test Site: Eurofins Product Service GmbH
Test Date: 2018-10-15
Note: LTE FDD12 Cat-M1; QPSK; RB6
Occupied Bandwidth [kHz]: 1160.0



Date: 15.OCT.2018 09:56:58

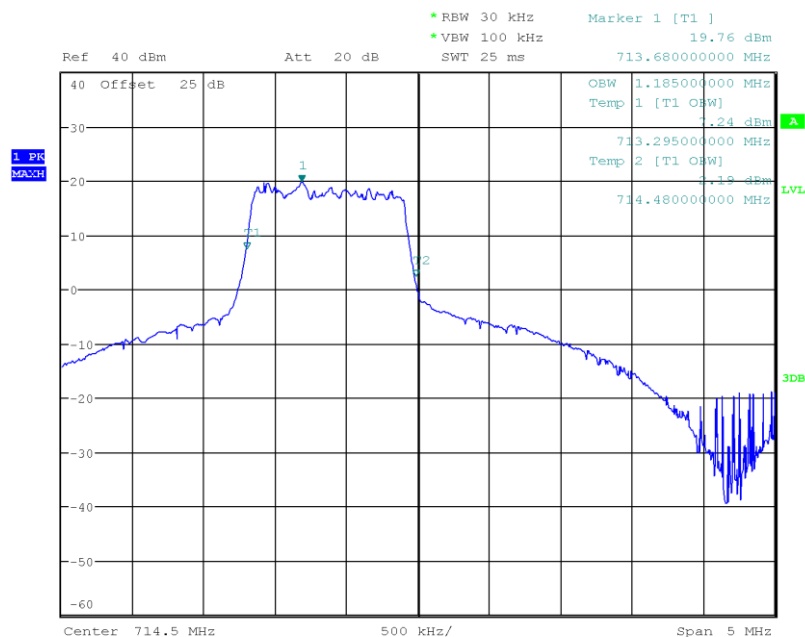
Test Report No.: G0M-1809-7680-TFC227UL-V02

Eurofins Product Service GmbH
Storkower Str. 38c, D-15526 Reichenwalde, Germany

Occupied Bandwidth – LTE FDD 12 F_{HIGH} - QPSK

Occupied Bandwidth

Project Number: G0M-1809-7680
Applicant: BIOTRONIK SE & Co. KG
Model Description: CardioMessenger Smart
Model: CardioMessenger Smart 4G
Test Sample ID: 20497
Reference Standards: RSS-Gen
Reference Method: ANSI C63.26:2015, Section 5.4.4
Operating Frequency: 714.5 MHz
Operating Conditions: Tnom/Vnom
Operator: B. Pudell
Test Site: Eurofins Product Service GmbH
Test Date: 2018-10-15
Note: LTE FDD12 Cat-M1; QPSK; RB6
Occupied Bandwidth [kHz]: 1185.0



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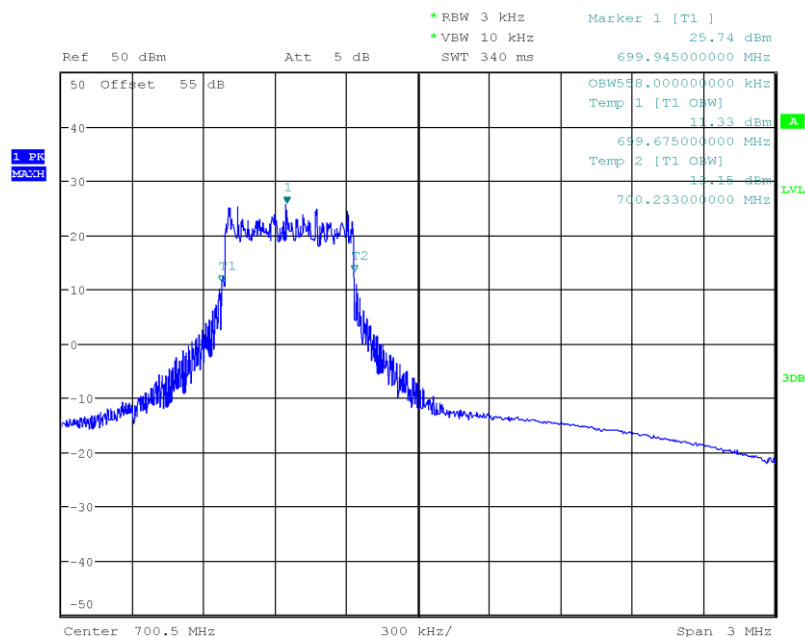
Test Report No.: G0M-1809-7680-TFC227UL-V02

Eurofins Product Service GmbH
Storkower Str. 38c, D-15526 Reichenwalde, Germany

Occupied Bandwidth – LTE FDD 12 F_{Low} - 16-QAM

Occupied Bandwidth

Project Number: G0M-1809-7680
 Applicant: Biotronik SE & Co. KG
 Model Description: CardioMessenger Smart
 Model: CardioMessenger Smart 4G
 Test Sample ID: 20465
 Reference Standards: RSS-Gen
 Reference Method: ANSI C63.26:2015, Section 5.4.4
 Operating Frequency: 700.5 MHz
 Operating Conditions: Tnom/Vnom
 Operator: Burkhard Pudell
 Test Site: Eurofins Product Service GmbH
 Test Date: 2019-02-21
 Note: LTE FDD 12_CH: 230255 ; 16-QAM; RB3
 Occupied Bandwidth [kHz]: 555.0

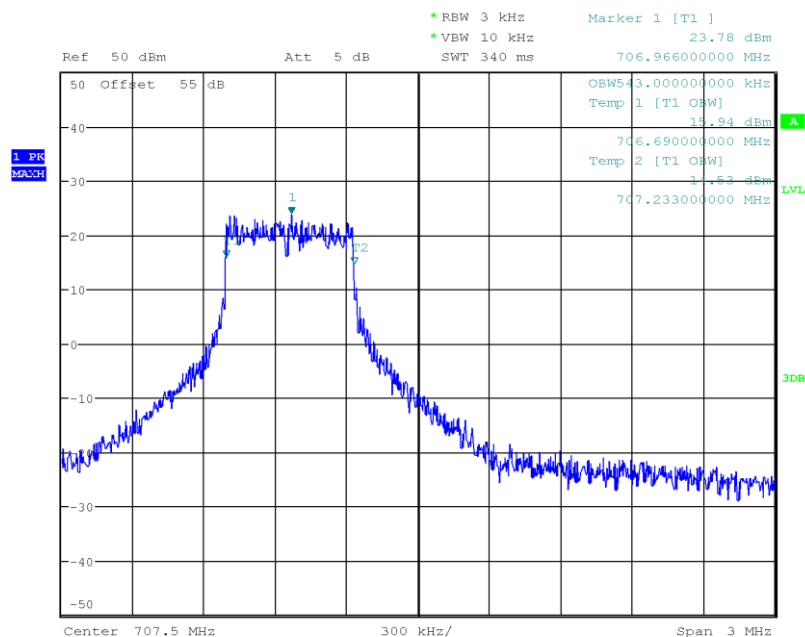


Date: 21.FEB.2019 12:17:11

Occupied Bandwidth – LTE FDD 12 F_{MID} - 16-QAM

Occupied Bandwidth

Project Number: G0M-1809-7680
Applicant: Biotronik SE & Co. KG
Model Description: CardioMessenger Smart
Model: CardioMessenger Smart 4G
Test Sample ID: 20465
Reference Standards: RSS-Gen
Reference Method: ANSI C63.26:2015, Section 5.4.4
Operating Frequency: 707.5 MHz
Operating Conditions: Tnom/Vnom
Operator: Burkhard Pudell
Test Site: Eurofins Product Service GmbH
Test Date: 2019-02-21
Note: LTE FDD 12_CH: 23095 ; 16-QAM; RB3
Occupied Bandwidth [kHz]: 543.0

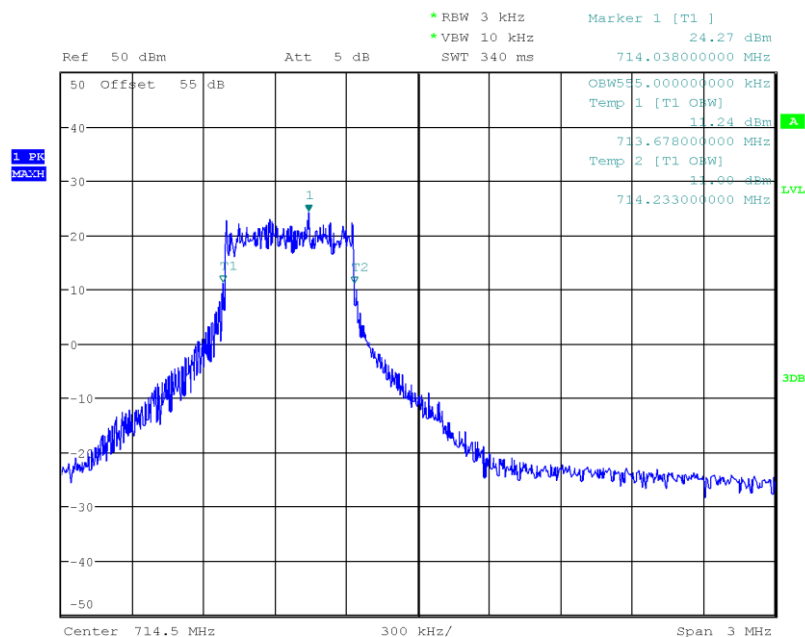


Date: 21.FEB.2019 12:05:46

Occupied Bandwidth – LTE FDD 12 F_{HIGH} - 16-QAM

Occupied Bandwidth

Project Number: G0M-1809-7680
 Applicant: Biotronik SE & Co. KG
 Model Description: CardioMessenger Smart
 Model: CardioMessenger Smart 4G
 Test Sample ID: 20465
 Reference Standards: RSS-Gen
 Reference Method: ANSI C63.26:2015, Section 5.4.4
 Operating Frequency: 714.5 MHz
 Operating Conditions: Tnom/Vnom
 Operator: Burkhard Pudell
 Test Site: Eurofins Product Service GmbH
 Test Date: 2019-02-21
 Note: LTE FDD 12_CH: 23165 ; 16-QAM; RB3
 Occupied Bandwidth [kHz]: 555.0

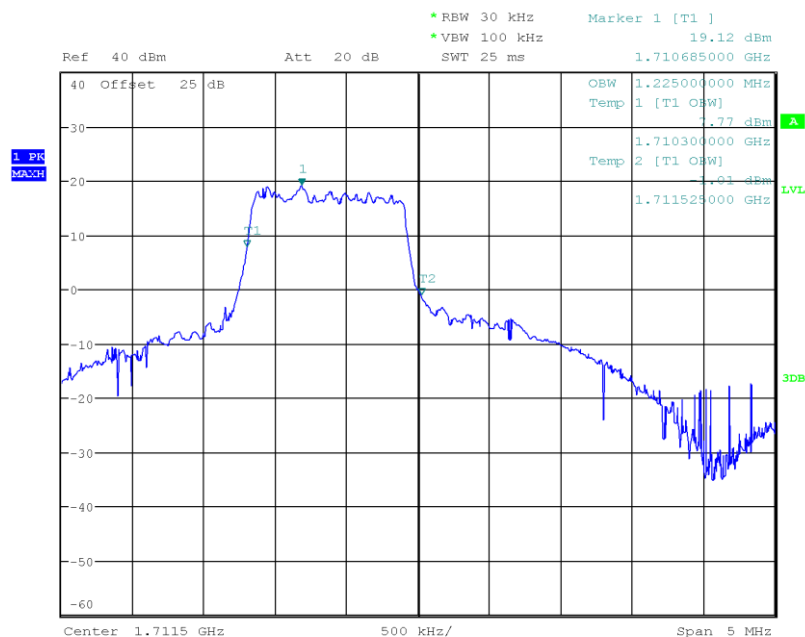


Date: 21.FEB.2019 12:14:34

Occupied Bandwidth – LTE FDD 4 F_{Low} - QPSK

Occupied Bandwidth

Project Number: G0M-1809-7680
Applicant: BIOTRONIK SE & Co. KG
Model Description: CardioMessenger Smart
Model: CardioMessenger Smart 4G
Test Sample ID: 20497
Reference Standards: RSS-Gen
Reference Method: ANSI C63.26:2015, Section 5.4.4
Operating Frequency: 1711.5 MHz
Operating Conditions: Tnom/Vnom
Operator: B. Pudell
Test Site: Eurofins Product Service GmbH
Test Date: 2018-10-15
Note: LTE FDD4 Cat-M1; QPSK; RB6
Occupied Bandwidth [kHz]: 1225.0

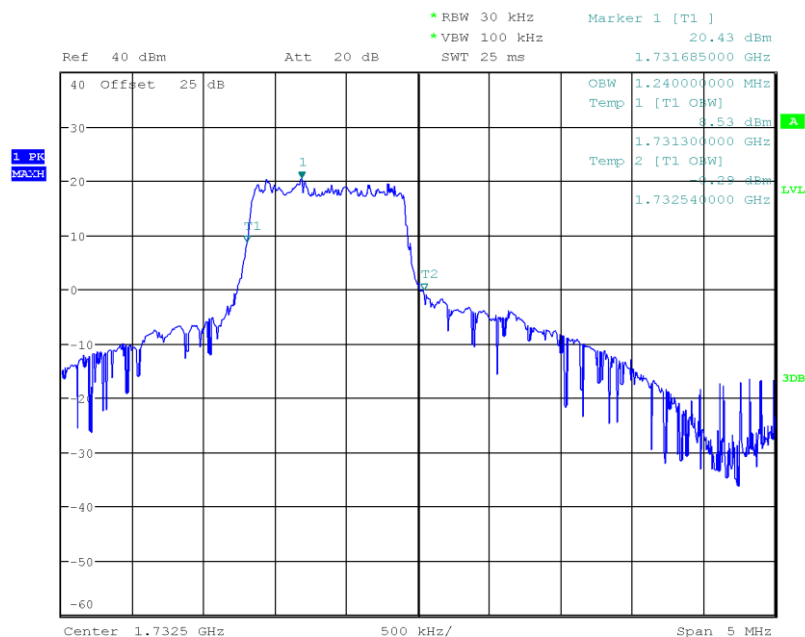


Date: 15.OCT.2018 09:46:09

Occupied Bandwidth – LTE FDD 4 F_{MID} - QPSK

Occupied Bandwidth

Project Number: G0M-1809-7680
 Applicant: BIOTRONIK SE & Co. KG
 Model Description: CardioMessenger Smart
 Model: CardioMessenger Smart 4G
 Test Sample ID: 20497
 Reference Standards: RSS-Gen
 Reference Method: ANSI C63.26:2015, Section 5.4.4
 Operating Frequency: 1732.5 MHz
 Operating Conditions: Tnom/Vnom
 Operator: B. Pudell
 Test Site: Eurofins Product Service GmbH
 Test Date: 2018-10-15
 Note: LTE FDD4 Cat-M1; QPSK; RB6
 Occupied Bandwidth [kHz]: 1240.0

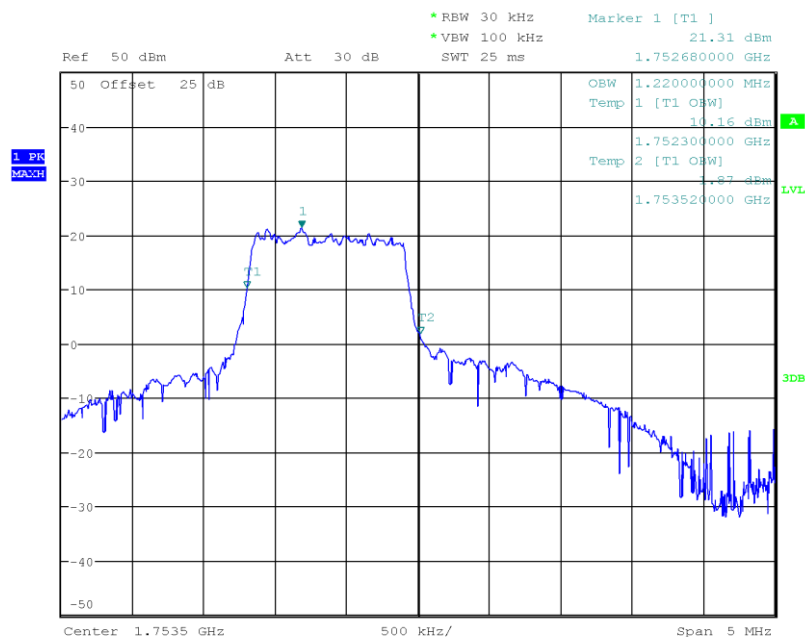


Date: 15.OCT.2018 09:53:23

Occupied Bandwidth – LTE FDD 4 F_{HIGH} - QPSK

Occupied Bandwidth

Project Number: G0M-1809-7680
Applicant: BIOTRONIK SE & Co. KG
Model Description: CardioMessenger Smart
Model: CardioMessenger Smart 4G
Test Sample ID: 20497
Reference Standards: RSS-Gen
Reference Method: ANSI C63.26:2015, Section 5.4.4
Operating Frequency: 1753.5 MHz
Operating Conditions: Tnom/Vnom
Operator: B. Pudell
Test Site: Eurofins Product Service GmbH
Test Date: 2018-10-15
Note: LTE FDD4 Cat-M1; QPSK; RB6
Occupied Bandwidth [kHz]: 1220.0

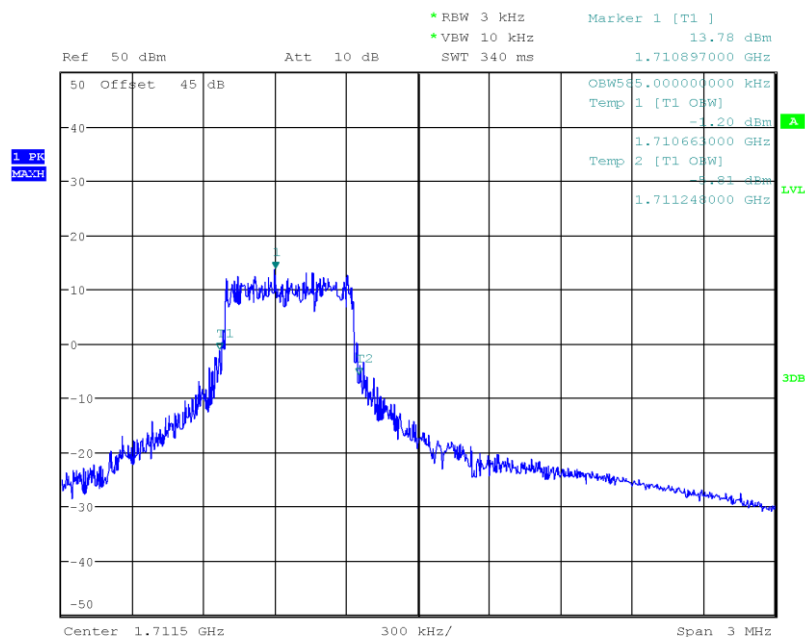


Date: 15.OCT.2018 09:41:34

Occupied Bandwidth – LTE FDD 4 F_{LOW} - 16-QAM

Occupied Bandwidth

Project Number:	G0M-1809-7680
Applicant:	Biotronik SE & Co. KG
Model Description:	CardioMessenger Smart
Model:	CardioMessenger Smart 4G
Test Sample ID:	20465
Reference Standards:	RSS-Gen
Reference Method:	ANSI C63.26:2015, Section 5.4.4
Operating Frequency:	1711.5 MHz
Operating Conditions:	Tnom/Vnom
Operator:	Burkhard Pudell
Test Site:	Eurofins Product Service GmbH
Test Date:	2019-02-21
Note:	LTE FDD 4_CH: 19965 ; 16-QAM; RB3
Occupied Bandwidth [kHz]:	585.0

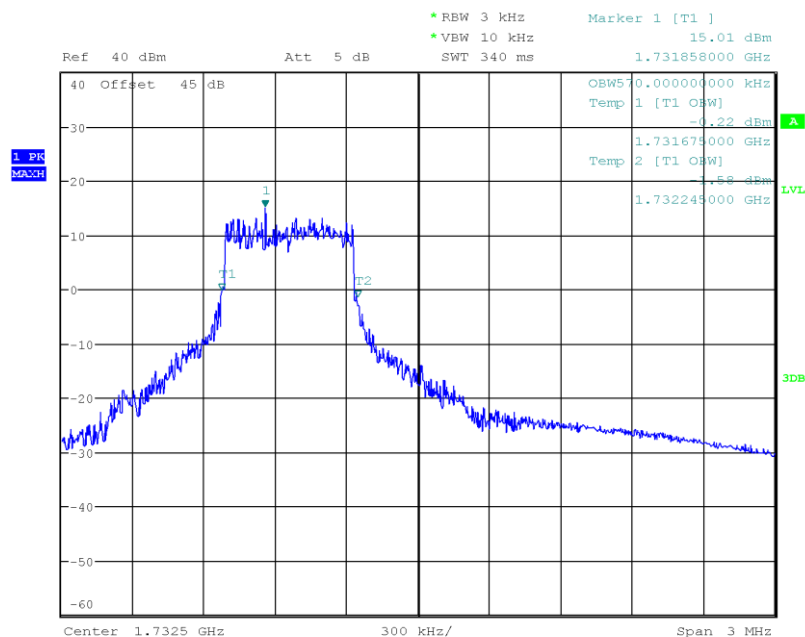


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Occupied Bandwidth – LTE FDD 4 F_{MID} - 16-QAM

Occupied Bandwidth

Project Number: GOM-1809-7680
 Applicant: Biotronik SE & Co. KG
 Model Description: CardioMessenger Smart
 Model: CardioMessenger Smart 4G
 Test Sample ID: 20465
 Reference Standards: RSS-Gen
 Reference Method: ANSI C63.26:2015, Section 5.4.4
 Operating Frequency: 1732.5 MHz
 Operating Conditions: Tnom/Vnom
 Operator: Burkhard Pudell
 Test Site: Eurofins Product Service GmbH
 Test Date: 2019-02-21
 Note: LTE FDD 4_CH: 20175 ; 16-QAM; RB3
 Occupied Bandwidth [kHz]: 570.0

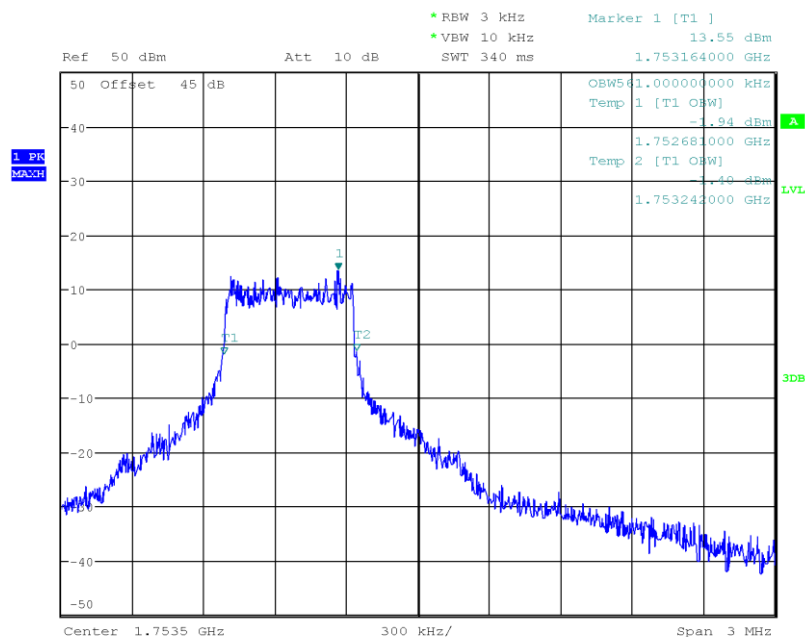


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Occupied Bandwidth – LTE FDD 4 F_{HIGH} - 16-QAM

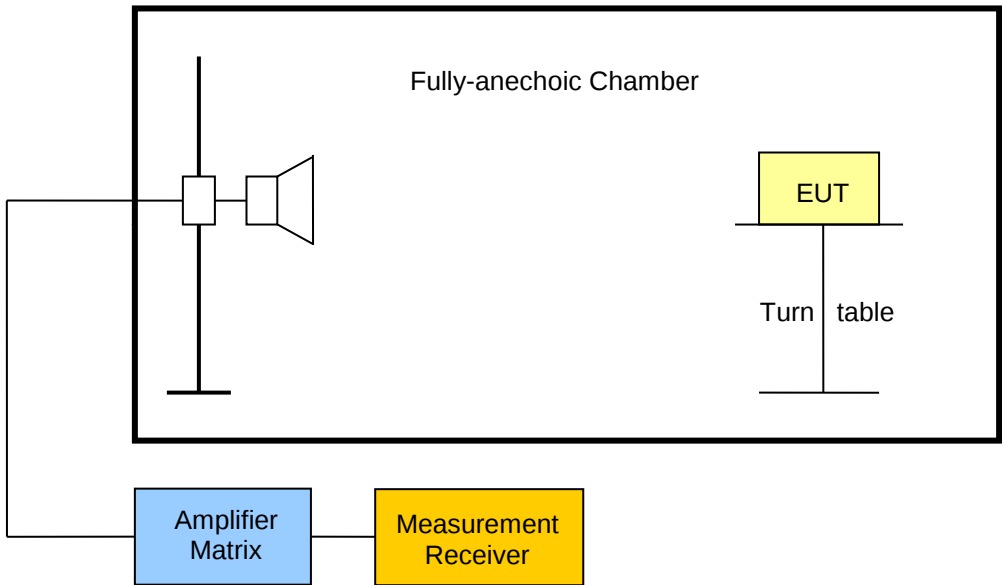
Occupied Bandwidth

Project Number: G0M-1809-7680
 Applicant: Biotronik SE & Co. KG
 Model Description: CardioMessenger Smart
 Model: CardioMessenger Smart 4G
 Test Sample ID: 20465
 Reference Standards: RSS-Gen
 Reference Method: ANSI C63.26:2015, Section 5.4.4
 Operating Frequency: 1753.5 MHz
 Operating Conditions: Tnom/Vnom
 Operator: Burkhard Pudell
 Test Site: Eurofins Product Service GmbH
 Test Date: 2019-02-21
 Note: LTE FDD 4_CH: 20385 ; 16-QAM; RB3
 Occupied Bandwidth [kHz]: 561.0



Date: 21.FEB.2019 15:29:47

3.2 Test Conditions and Results – Effective radiated power / Equivalent isotropic radiated power

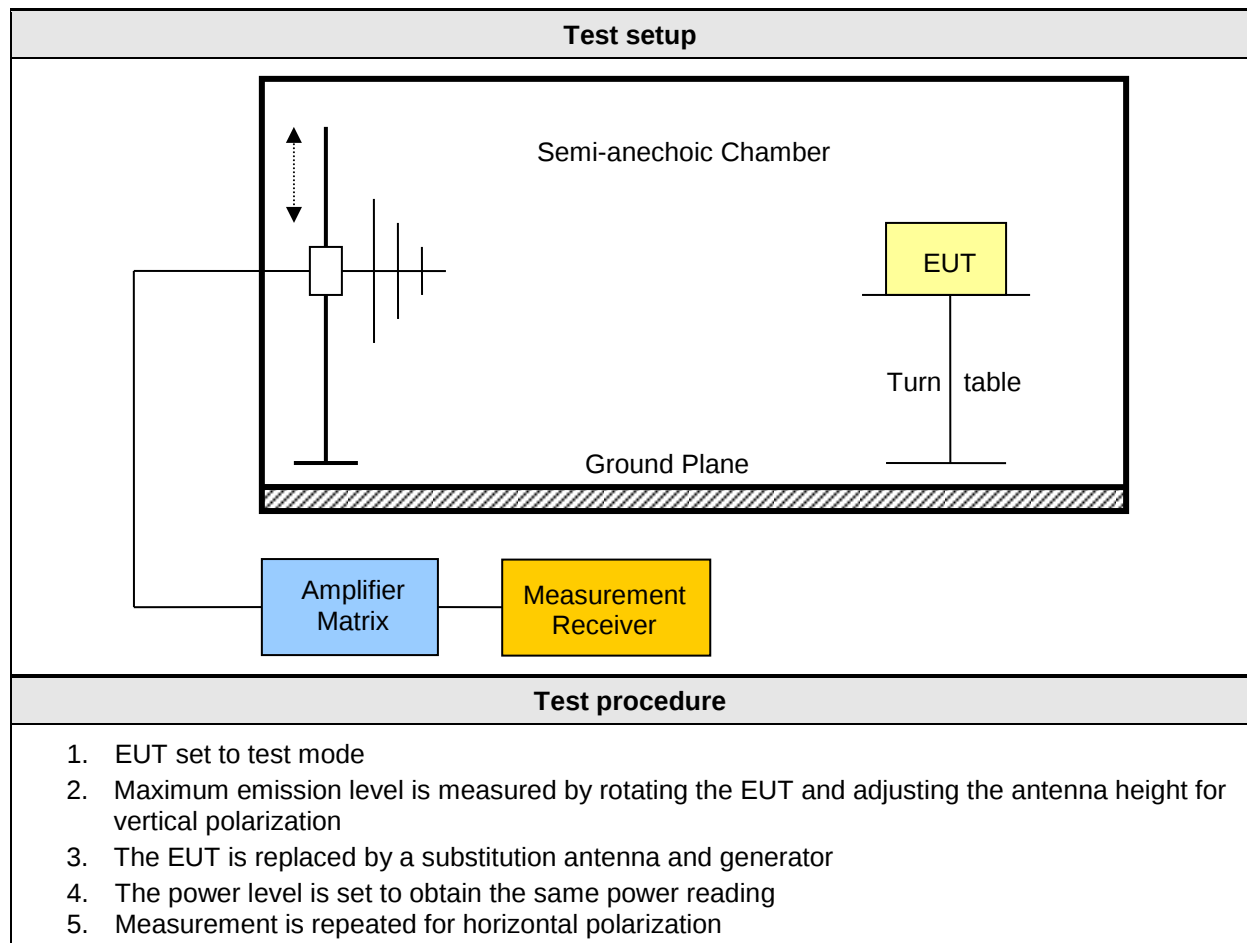
Radiated power acc. to FCC 27 / IC RSS-130 / ISED RSS-139			Verdict: PASS
EUT requirement rule parts and clause	Reference		
	FCC § 27.50(b)(10) / FCC § 27.50(d)(4) ISED RSS-130 4.4 / ISED RSS-139 6.5		
Test according to measurement reference	Reference Method		
	ANSI C63.26		
Test frequency range	Tested frequencies		
	F _{LOW} / F _{MID} / F _{HIGH}		
Limits			
Carrier Frequency range	Equipment type	Power limit	
699-716 MHz	Mobile transmitter	FCC : 3 Watts (34.77 dBm) e.i.r.p. ISED : 5 Watts (36.99 dBm) e.i.r.p.	
1710-1755 MHz	Mobile transmitter	FCC : 1 Watts (30 dBm) e.i.r.p. ISED : 1 Watts (30 dBm) e.i.r.p.	
Test setup			
			
Test procedure			
1. EUT set to test mode 2. The radiated power is measured with a measurement antenna in ver + hor polarization 3. To obtain maximum level the EUT is rotated 4. The EUT is replaced with a half-wave dipole and the power to the dipole is adjusted to obtain same radiated power measurement value			

Test results – LTE FDD 12 Cat-M1 E.R.P.							
Channel	Frequency [MHz]	Mode	Pol.	Power [dBm e.r.p]	Limit [dBm e.r.p]	Margin [dB]	Result
F _{LOW}	700.5	QPSK	ver	26.3	34.77	-8.47	PASS
F _{MID}	707.5	QPSK	ver	26.6	34.77	-8.17	PASS
F _{HIGH}	714.5	QPSK	ver	26.7	34.77	-8.07	PASS
F _{LOW}	700.5	16-QAM	ver	26.6	34.77	-8.17	PASS
F _{MID}	707.5	16-QAM	ver	26.8	34.77	-7.97	PASS
F _{HIGH}	714.5	16-QAM	ver	26.7	34.77	-8.07	PASS
Test results – LTE FDD 12 Cat-M1 E.I.R.P.							
Channel	Frequency [MHz]	Mode	Pol.	Power [dBm e.i.r.p]	Limit [dBm e.i.r.p]	Margin [dB]	Result
F _{LOW}	700.5	QPSK	ver	28,45	36.99	-8.54	PASS
F _{MID}	707.5	QPSK	ver	28.75	36.99	-8.24	PASS
F _{HIGH}	714.5	QPSK	ver	28.85	36.99	-8.14	PASS
F _{LOW}	700.5	16-QAM	ver	28.75	36.99	-8.24	PASS
F _{MID}	707.5	16-QAM	ver	28.95	36.99	-8.04	PASS
F _{HIGH}	714.5	16-QAM	ver	28.85	36.99	-8.14	PASS
Comments:							

Test results – LTE FDD 4 Cat-M1 E.I.R.P.							
Channel	Frequency [MHz]	Mode	Pol.	Power [dBm e.i.r.p]	Limit [dBm e.i.r.p]	Margin [dB]	Result
F _{LOW}	1712.4	QPSK	ver	29.0	30	-1.0	PASS
F _{MID}	1732.6	QPSK	ver	29.2	30	-0.8	PASS
F _{HIGH}	1752.4	QPSK	ver	27.6	30	-2.4	PASS
F _{LOW}	1712.4	16-QAM	ver	30.0	30	0.0	PASS
F _{MID}	1732.6	16-QAM	ver	29.9	30	-1.6	PASS
F _{HIGH}	1752.4	16-QAM	ver	28.0	30	-2.1	PASS
Comments:							

3.3 Test Conditions and Results – Transmitter radiated emissions

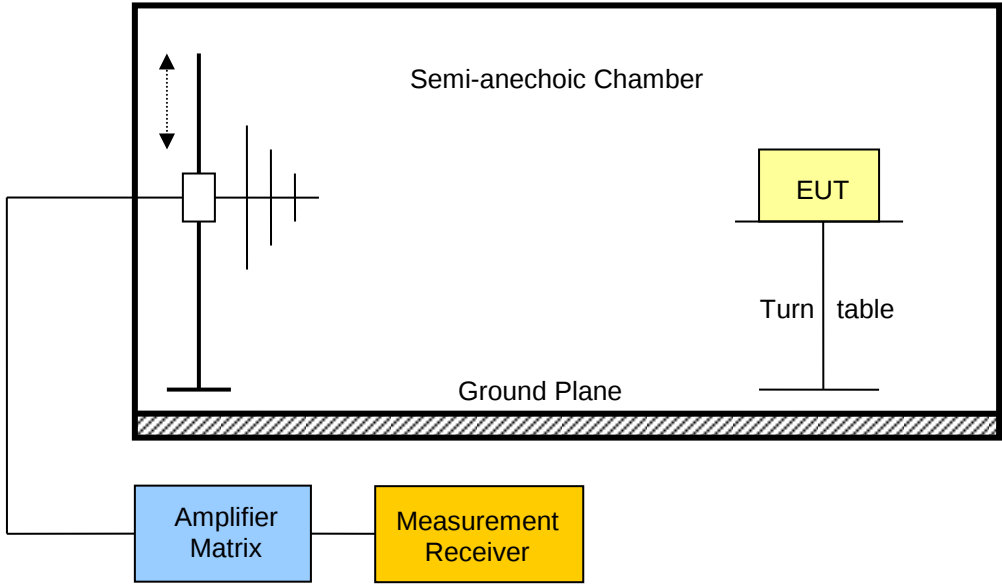
Transmitter radiated power acc. to FCC 27 / ISSED RSS-130 / ISSED RSS-139					Verdict: PASS
Test according referenced standards		Reference Method			
		FCC § 27.53(g), FCC § 27.53(h) ISED RSS-130 4.6, ISSED RSS-139 6.6			
Test according to measurement reference		Reference Method			
		ANSI C63.26			
Test frequency range		Tested frequencies			
		30 MHz – 10 th Harmonic			
Limits					
Region	Operating Frequency range [MHz]	Type	Frequency Range [MHz]	Bandwidth [kHz]	Limit [dBm]
FCC ISED	698-746	Mobile	10 – 697.9	100	43 + 10 · log ₁₀ (P) [dB] = -13
			697.9 - 698	< 30	43 + 10 · log ₁₀ (P) [dB] = -13
			746 – 746.1	< 30	43 + 10 · log ₁₀ (P) [dB] = -13
			746.1 – 1000	100	43 + 10 · log ₁₀ (P) [dB] = -13
			1000 – 10 th harmonic	1000	43 + 10 · log ₁₀ (P) [dB] = -13
FCC ISED	1710-1755	Mobile	10 – 1000	100	43 + 10 · log ₁₀ (P) [dB] = -13
			1000 – 1709	1000	43 + 10 · log ₁₀ (P) [dB] = -13
			1709 – 1710	1 % of EBW	43 + 10 · log ₁₀ (P) [dB] = -13
			1755 – 1756	1 % of EBW	43 + 10 · log ₁₀ (P) [dB] = -13
			1756 - 10 th harmonic	1000	43 + 10 · log ₁₀ (P) [dB] = -13



Test results – LTE FDD 12 Cat-M1							
Channel	Frequency [MHz]	Mode	Emission [MHz]	Level [dbm]	Pol.	Limit [dBm]	Margin [dB]
F _{LOW}	700,5	QPSK	692.014	-27.6	ver	-13	-14.6
F _{LOW}	700,5	QPSK	709	-24.7	ver	-13	-11.7
F _{MID}	707,5	QPSK	697.004	-25.9	ver	-13	-12.9
F _{MID}	707,5	QPSK	715	-27.5	ver	-13	-14.5
F _{HIGH}	714,5	QPSK	699.95	-27.4	ver	-13	-14.4
F _{HIGH}	714,5	QPSK	722.116	-28.5	ver	-13	-15.5
Comments:							

Test results – LTE FDD 4 Cat-M1							
Channel	Frequency [MHz]	Mode	Emission [MHz]	Level [dbm]	Pol.	Limit [dBm]	Margin [dB]
F _{LOW}	1711,5	QPSK	1701	-16.7	hor	-13	-3.7
F _{LOW}	1711,5	16-QAM	1696	-21.2	hor	-13	-8.2
F _{LOW}	1711,5	16-QAM	1710	-24.3	ver	-13	-11.3
F _{MID}	1732,5	No significant spurious emissions					
F _{HIGH}	1753,5	QPSK	1710	-17.2	ver	-13	-4.2
F _{HIGH}	1753,5	QPSK	1755	-19.2	ver	-13	-6.1
F _{HIGH}	1753,5	QPSK	1764	-23.6	hor	-13	-10.6
Comments:							

3.4 Test Conditions and Results – Receiver radiated emissions

Receiver radiated emissions acc. to ISED RSS-130 / ISED RSS-139				Verdict: PASS
Test according referenced standards	Reference Method			
	ISED RSS-Gen 7.1			
Test according to measurement reference	Reference Method			
	ANSI C63.4			
Test frequency range	Tested frequencies			
	30 MHz – 5 th Harmonic			
EUT test mode	Receive			
Limits				
Frequency range [MHz]	Detector	Limit [μV/m]	Limit [dBμV/m]	Limit Distance* [m]
30 – 88	Quasi-Peak	100	40	3
88 – 216	Quasi-Peak	150	43.5	3
216 – 960	Quasi-Peak	200	46	3
960 – 1000	Quasi-Peak	500	54	3
> 1000	Average	500	54	3
Test setup				
				

Test procedure							
1. EUT set to receive mode (Communication tester is used if needed) 2. Span it set according to measurement range 3. Resolution bandwidth below 1GHz is set according to CISPR 16 with peak/quasi-peak detector and RBW of 1MHz with peak/average detector is used above 1GHz 4. Markers are set to peak emission levels							
Test results							
Channel	Frequency [MHz]	Emission [MHz]	Emission Level [db μ V/m]	Emission Level [μ V/m]	Det.	Limit [μ V/m]	Margin [μ V/m]
F _{MID} FDD 12	737.5	10700	45.09	180	pk	500	-320
F _{MID} FDD 4	2132.5	10980	44.83	170	pk	500	-330
Comments: * Physical distance between EUT and measurement antenna. ** Emission level corresponds to ambient noise floor							