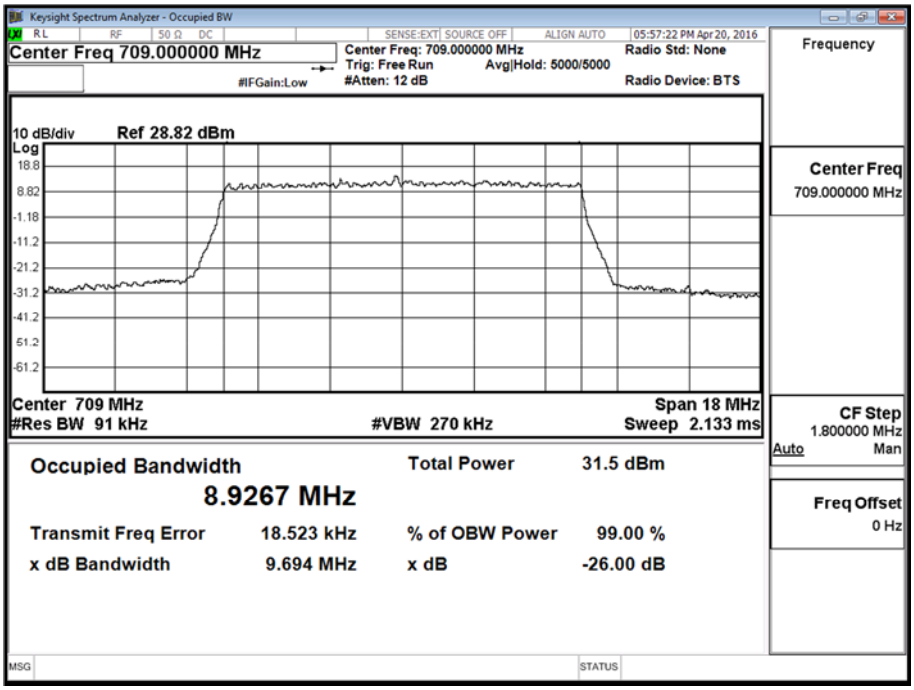
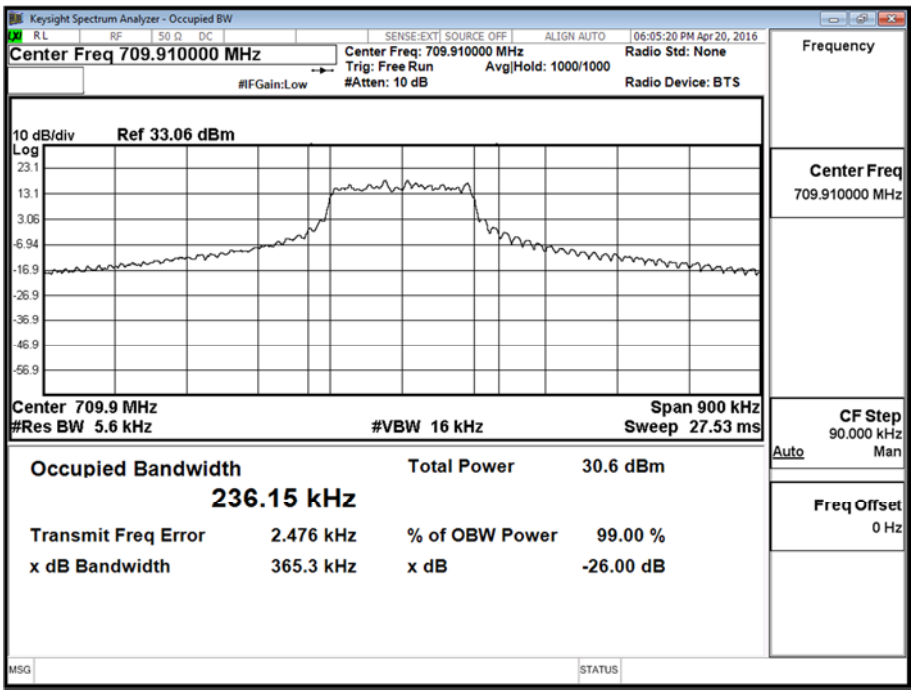
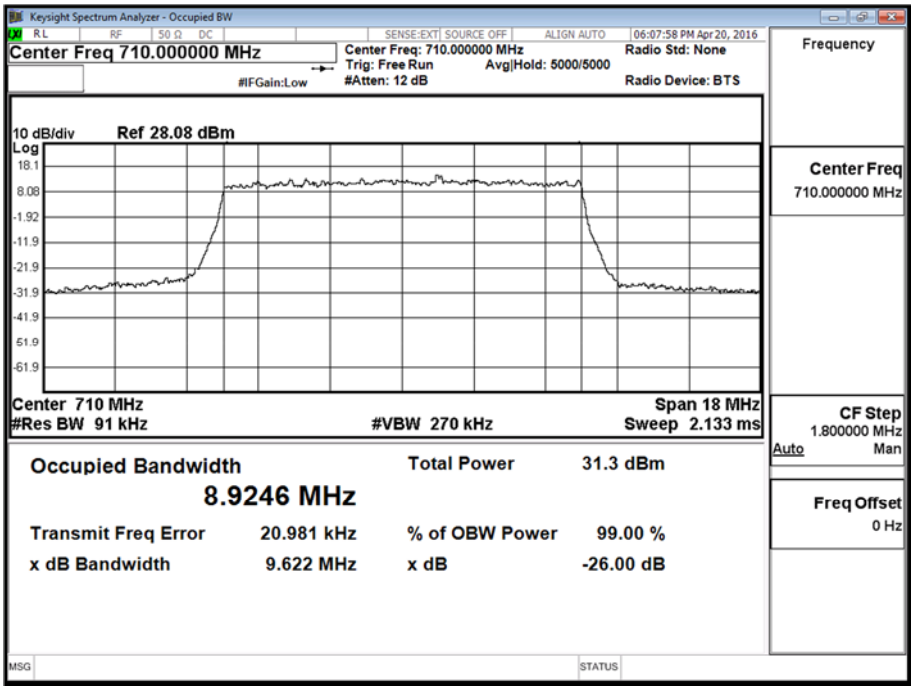
709 MHz - All Resource Blocks



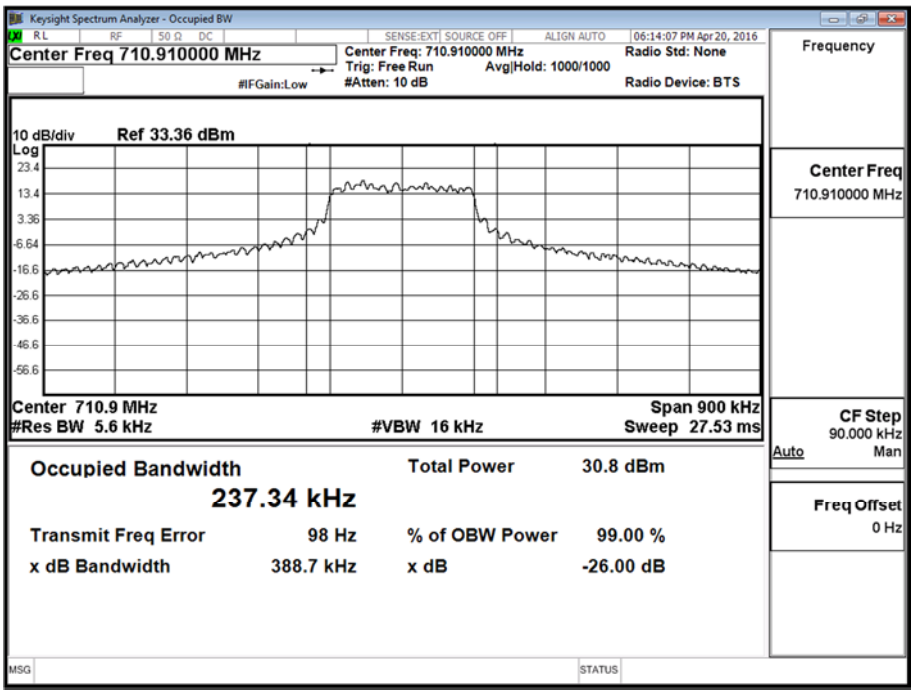
710 MHz - 1 Resource Block - Middle



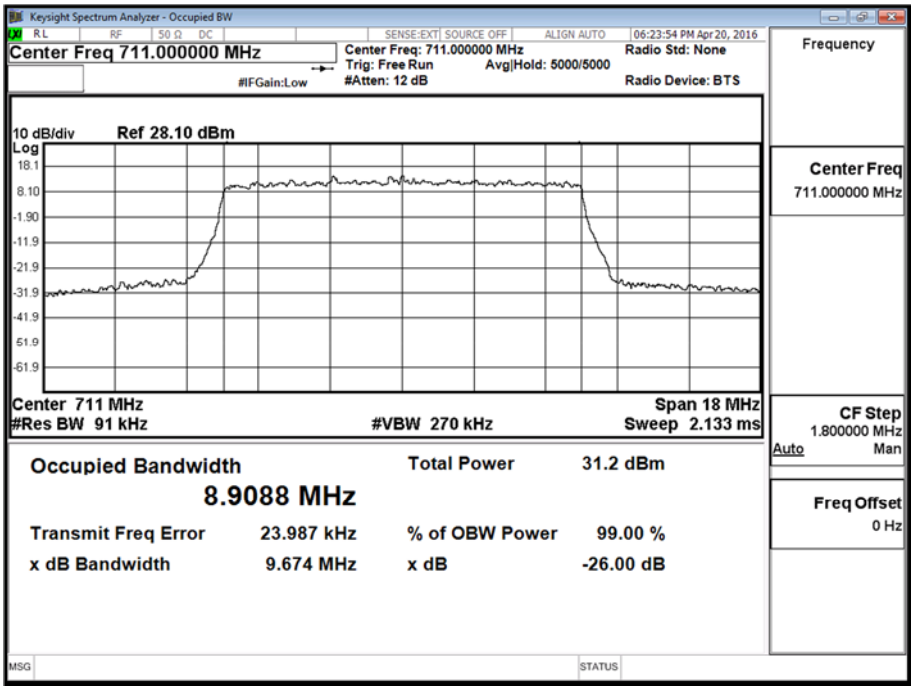
710 MHz - All Resource Blocks



711 MHz - 1 Resource Block - Middle



711 MHz - All Resource Blocks

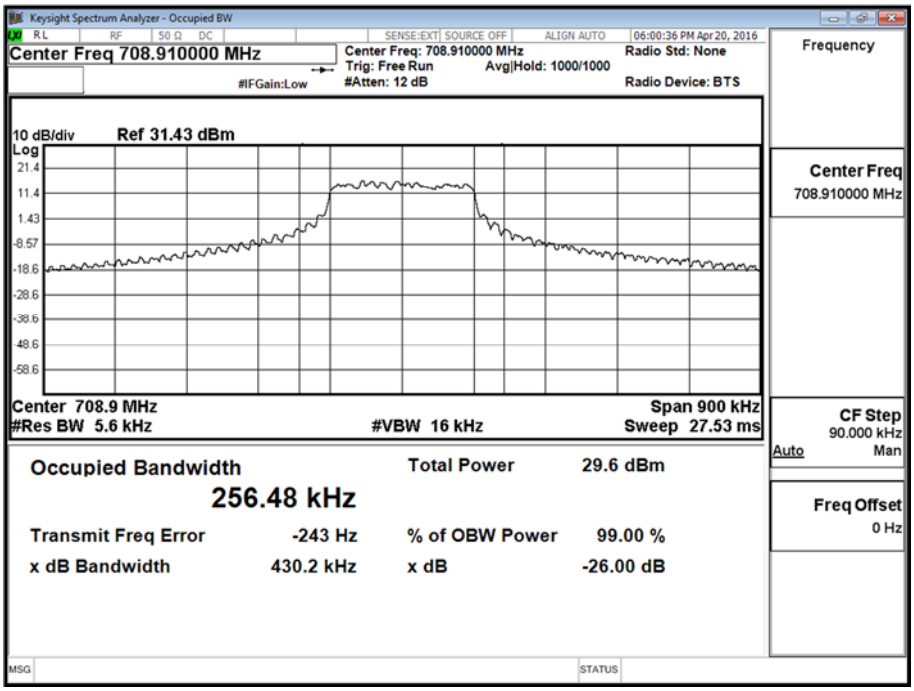


Product Service

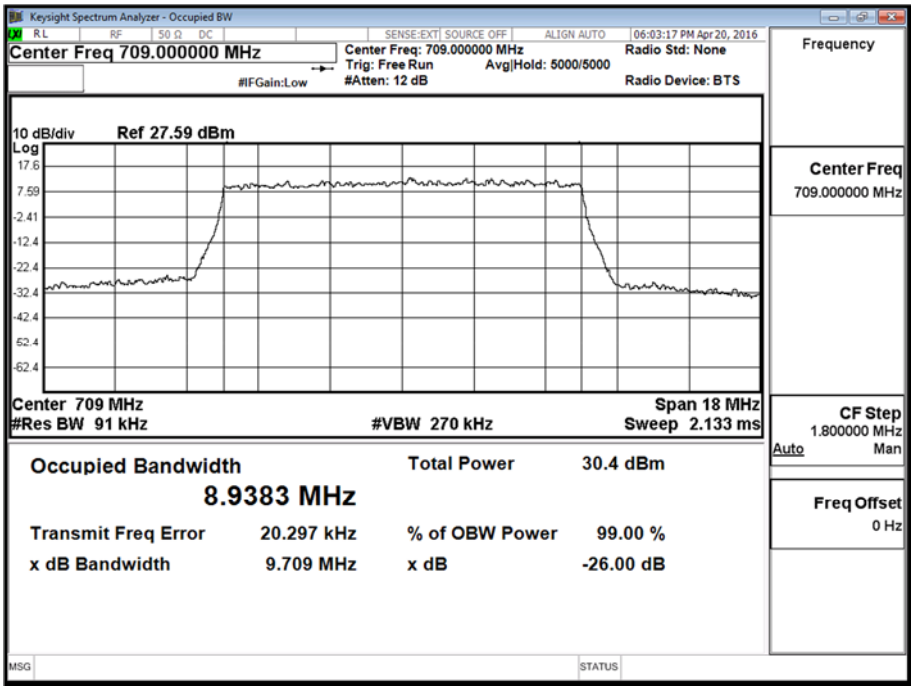
10.0 MHz Bandwidth - 16-QAM

26 dB Bandwidth (kHz)											
709.0 MHz				710.0 MHz				711.0 MHz			
1 Resource Block			All Resource Blocks	1 Resource Block			All Resource Blocks	1 Resource Block			All Resource Blocks
Low	Mid	High		Low	Mid	High		Low	Mid	High	
N/T	430.2	N/T	9708.6	N/T	422.4	N/T	9604.5	N/T	402.6	N/T	9661.8

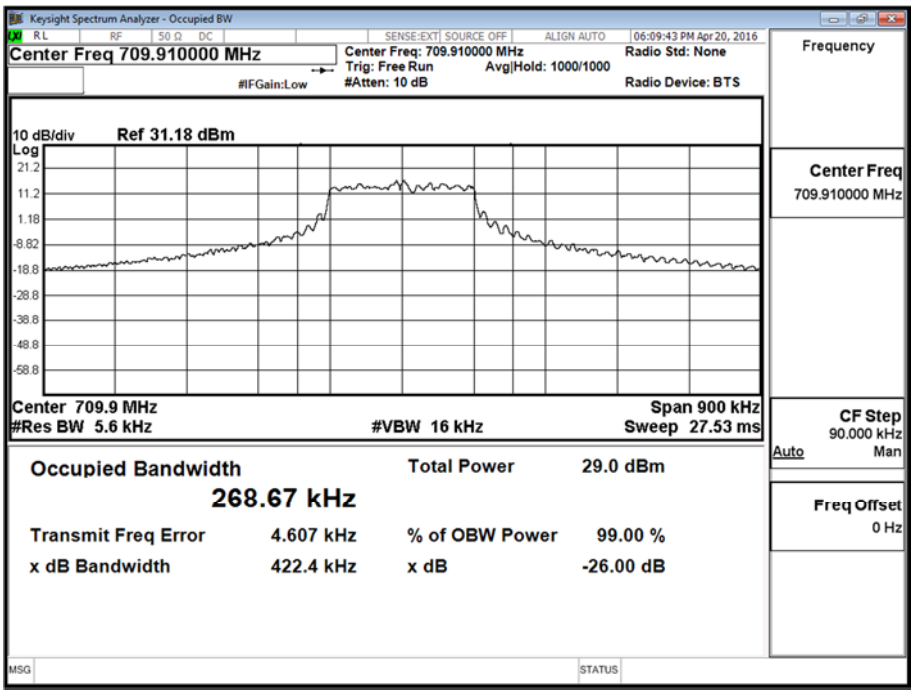
709 MHz - 1 Resource Block - Middle



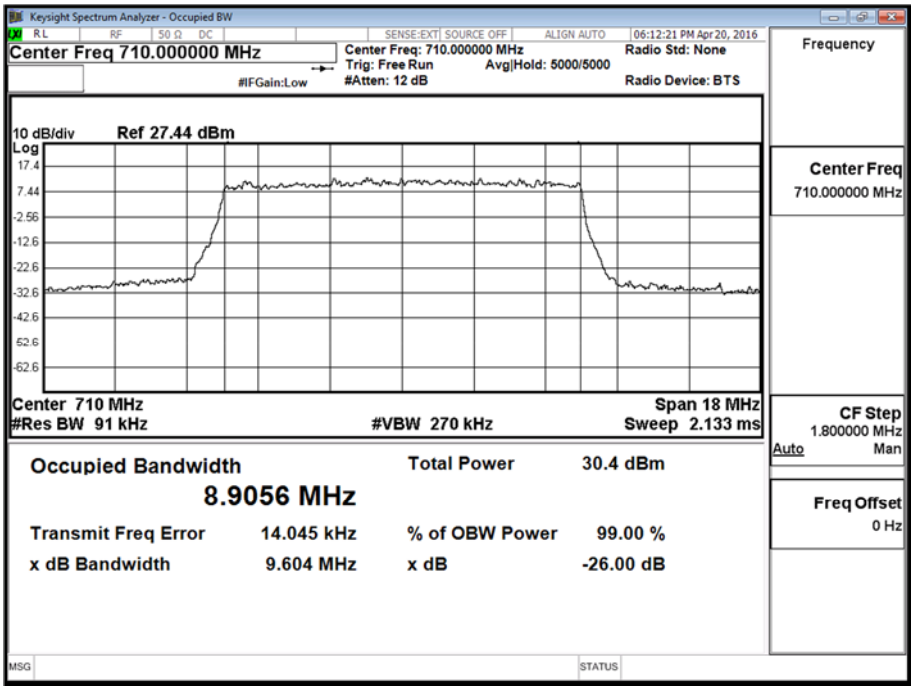
709 MHz - All Resource Blocks



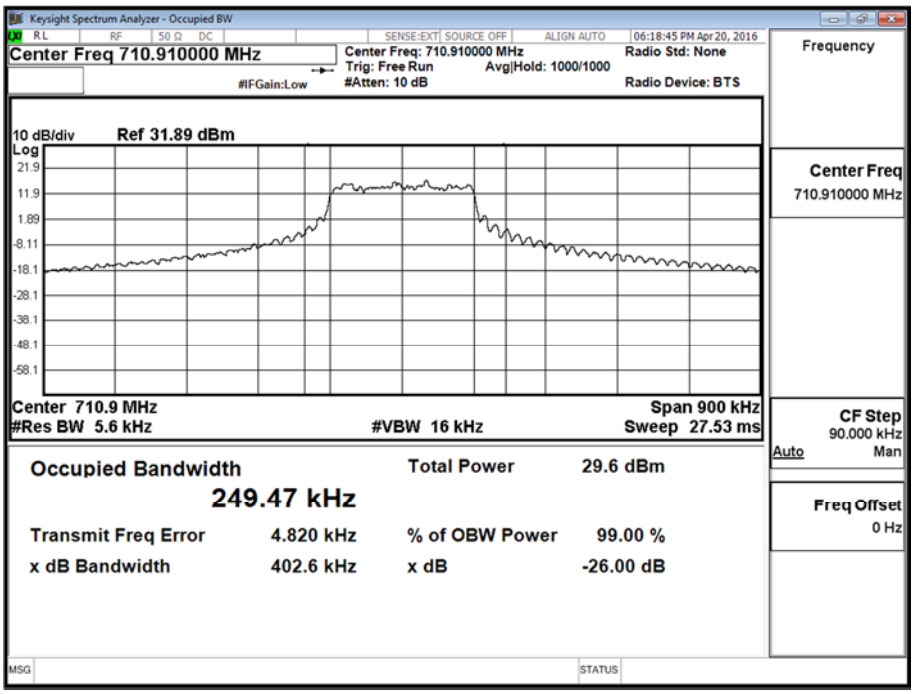
710 MHz - 1 Resource Block - Middle



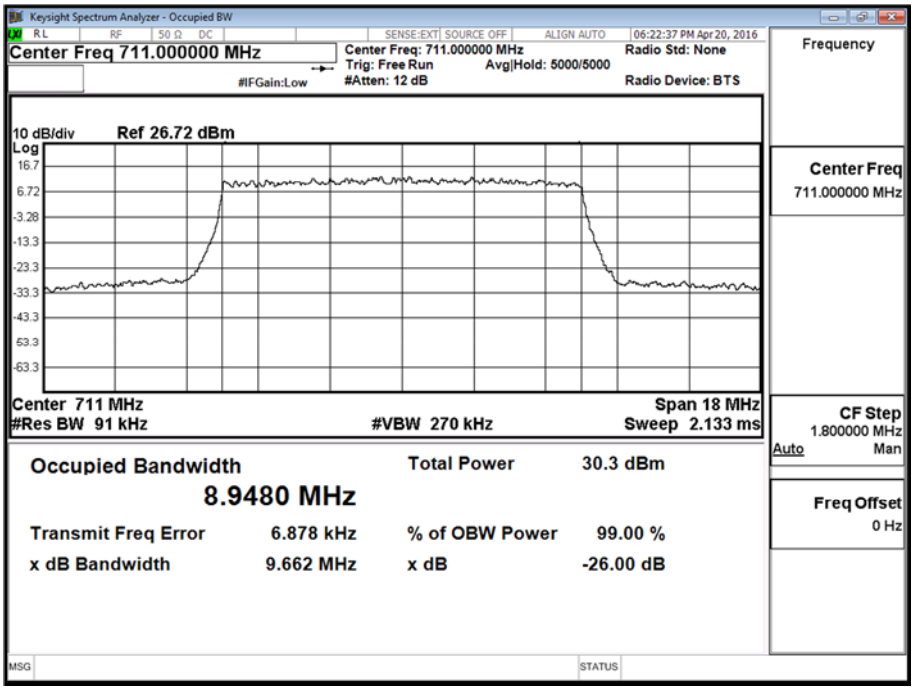
710 MHz - All Resource Blocks



711 MHz - 1 Resource Block - Middle



711 MHz - All Resource Blocks



FCC 47 CFR Part 27, Limit Clause

None specified

2.6 FREQUENCY STABILITY

2.6.1 Specification Reference

FCC 47 CFR Part 27, Clause 27.54
FCC 47 CFR Part 2, Clause 2.1055

2.6.2 Equipment Under Test and Modification State

S/N: IMEI 004401115744563 - Modification State 0

2.6.3 Date of Test

27 April 2016

2.6.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.6.5 Test Procedure

This test was performed in accordance with FCC 47 CFR Part 2, clause 2.1055.

Remarks

The CMW500 frequency measurement function was used to measure the frequency error using a nominal uplink frequency of 710.0 MHz,

2.6.6 Environmental Conditions

Ambient Temperature	22.5°C
Relative Humidity	25.5%

2.6.7 Test Results

4.0 V DC Supply

LTE FDD17, Frequency Stability Results

Under Temperature Variations

10 MHz Bandwidth - QPSK

Frequency Error (Hz)		
710.0 MHz		
Supply Voltage	Temperature Interval ºC	All Resource Blocks
3.7 V DC	+20	13.96
4.0 V DC	-30	10.44
4.0 V DC	-20	9.07
4.0 V DC	-10	8.17
4.0 V DC	0	8.75
4.0 V DC	+10	9.36
4.0 V DC	+20	14.49
4.0 V DC	+30	17.27
4.0 V DC	+40	-8.03
4.0 V DC	+50	-7.42

10 MHz Bandwidth - 16-QAM

Frequency Error (Hz)		
710.0 MHz		
Supply Voltage	Temperature Interval ºC	All Resource Blocks
3.7 V DC	+20	10.23
4.0 V DC	-30	8.11
4.0 V DC	-20	8.73
4.0 V DC	-10	8.57
4.0 V DC	0	8.74
4.0 V DC	+10	7.71
4.0 V DC	+20	8.01
4.0 V DC	+30	-8.31
4.0 V DC	+40	7.17
4.0 V DC	+50	-7.61

FCC 47 CFR Part 27, Limit Clause 27.54

The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorised bands of operation.

Product Service

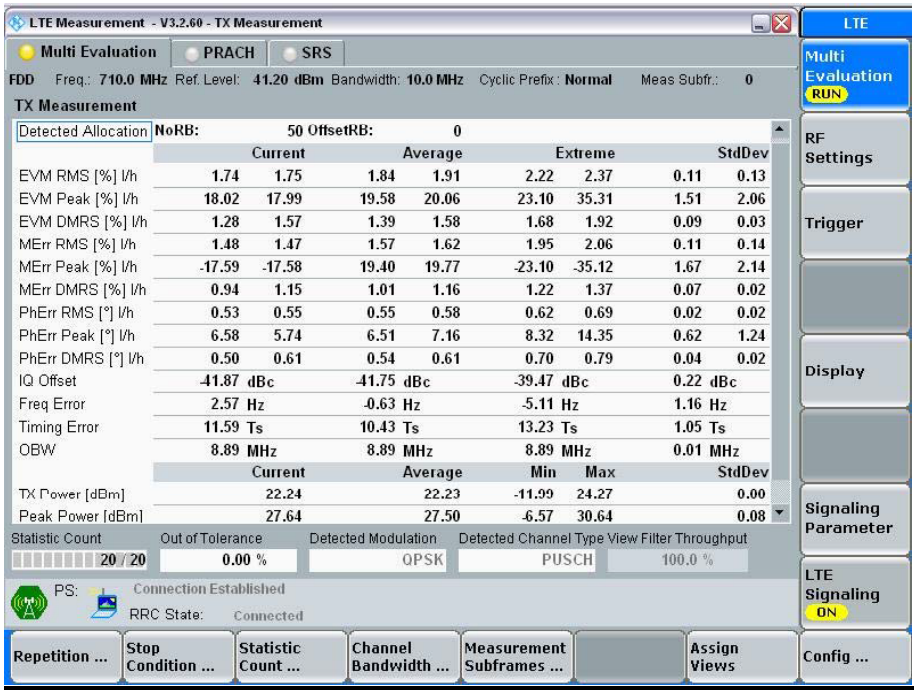
2.7 MODULATION CHARACTERISTICS

2.7.1 Specification Reference

FCC 47 CFR Part 2, Clause 2.1047 (d)

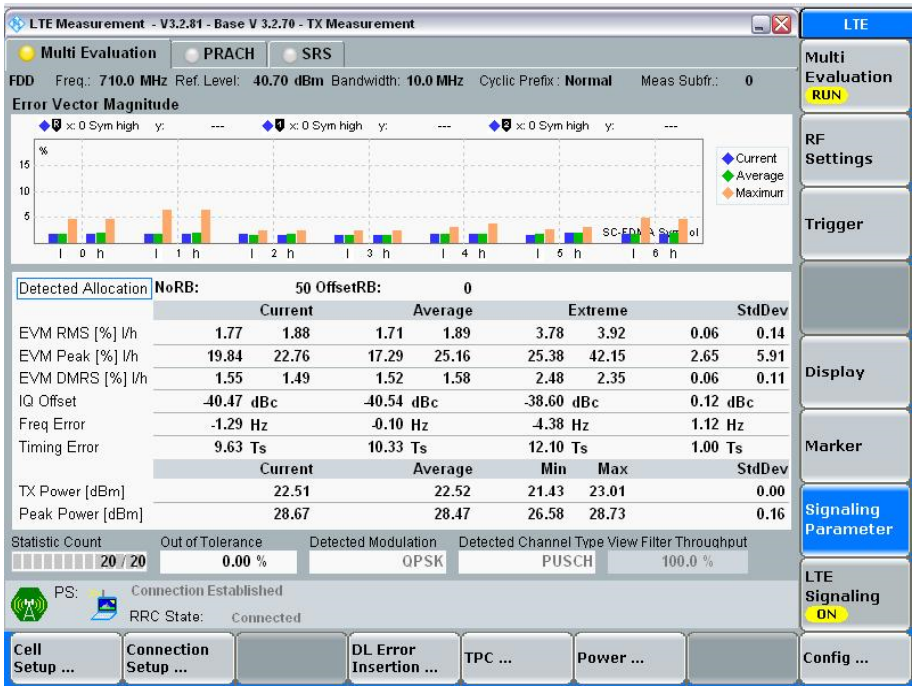
2.7.2 Test Results

LTE FDD17, 10.0 MHz Bandwidth, QPSK, Transmitter Summary, Modulation Characteristic Plot

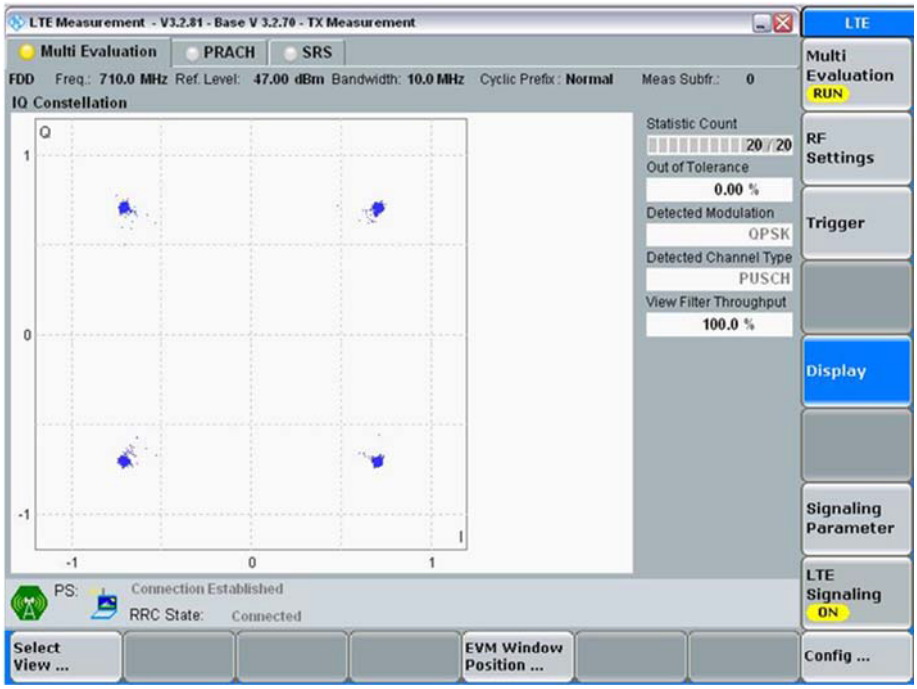


Product Service

LTE FDD17, 10.0 MHz Bandwidth, QPSK, EVM, Modulation Characteristic Plot

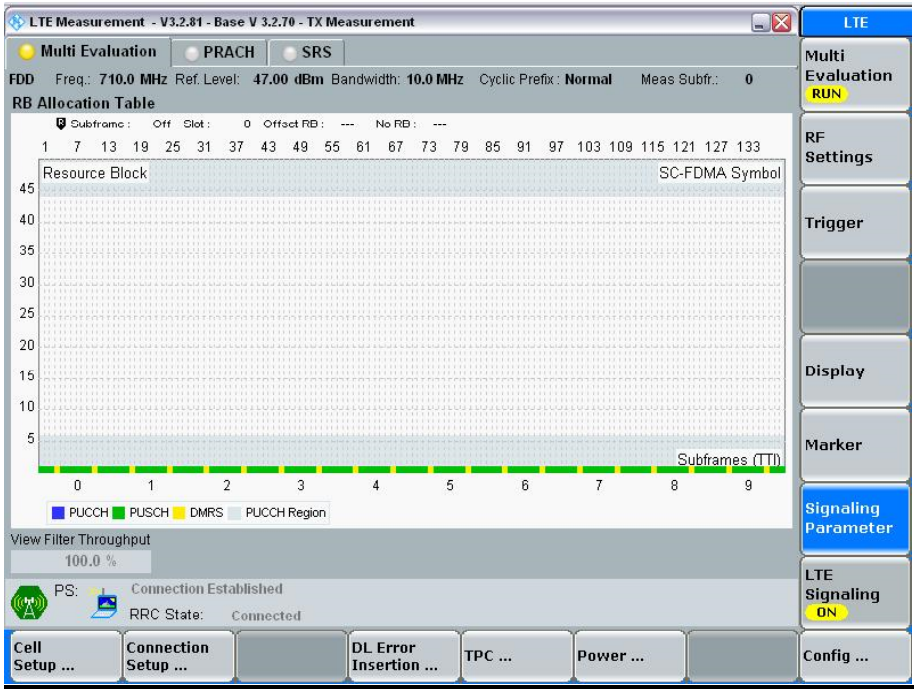


LTE FDD17, 10.0 MHz Bandwidth, QPSK, IQ Constellation, Modulation Characteristic Plot

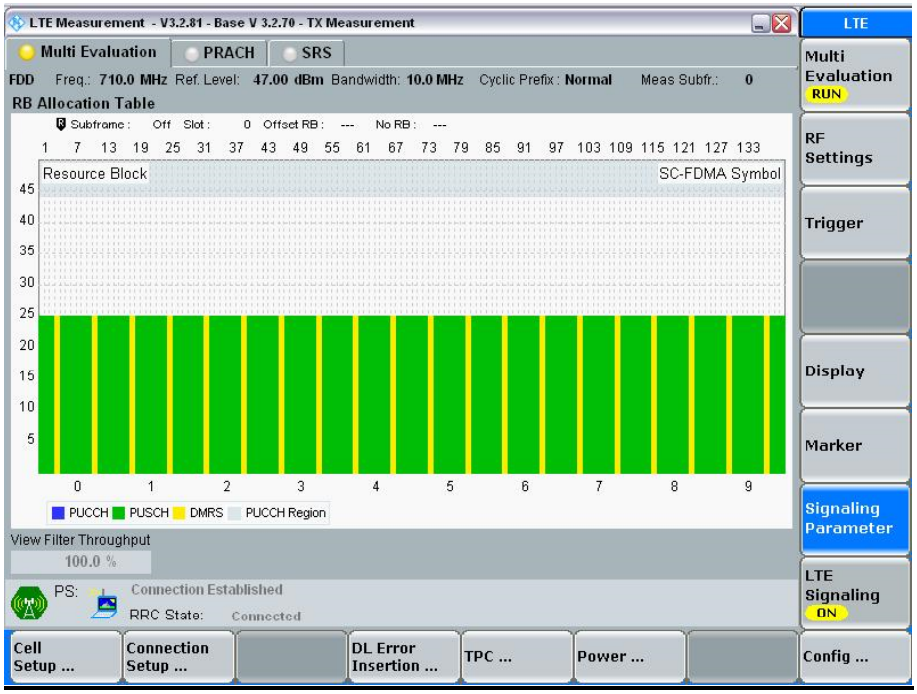


Product Service

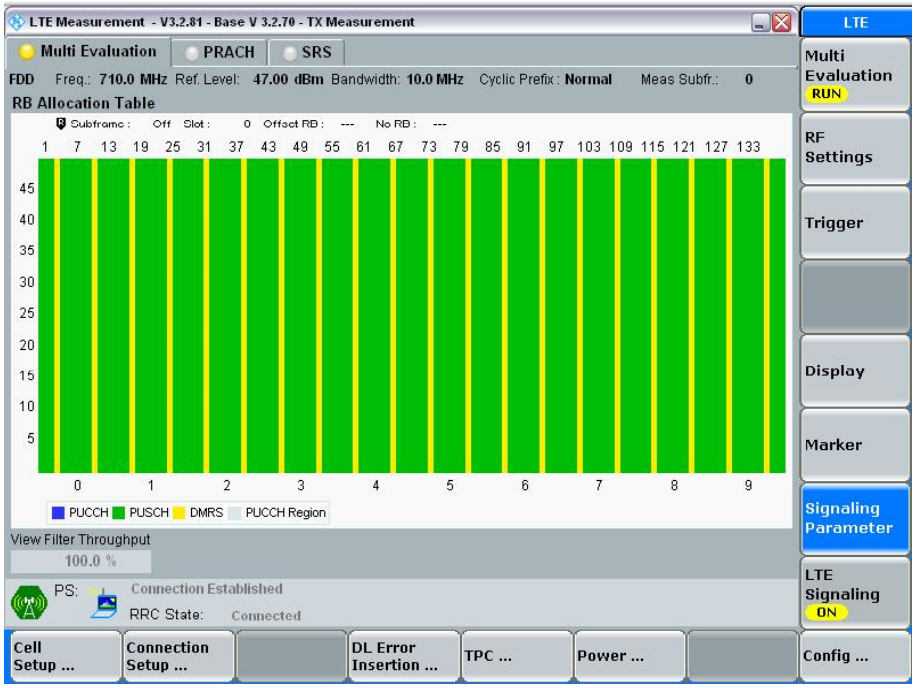
LTE FDD17, 10.0 MHz Bandwidth, QPSK, 1 Resource Block Allocation, Modulation Characteristic Plot



LTE FDD17, 10.0 MHz Bandwidth, QPSK, 25 Resource Block Allocation, Modulation Characteristic Plot

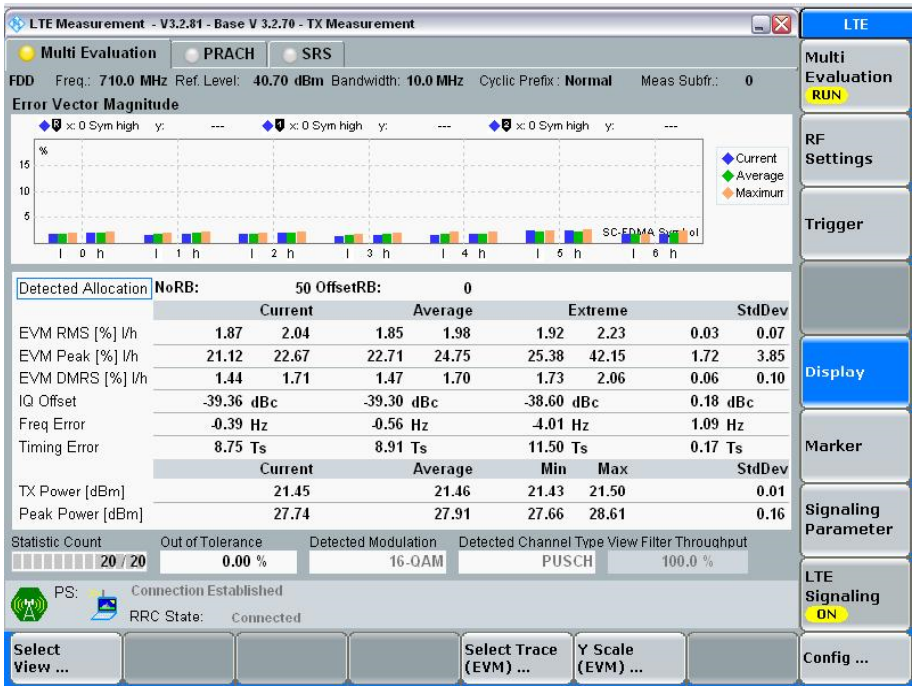


LTE FDD17, 10.0 MHz Bandwidth, QPSK, 50 Resource Block Allocation, Modulation Characteristic Plot

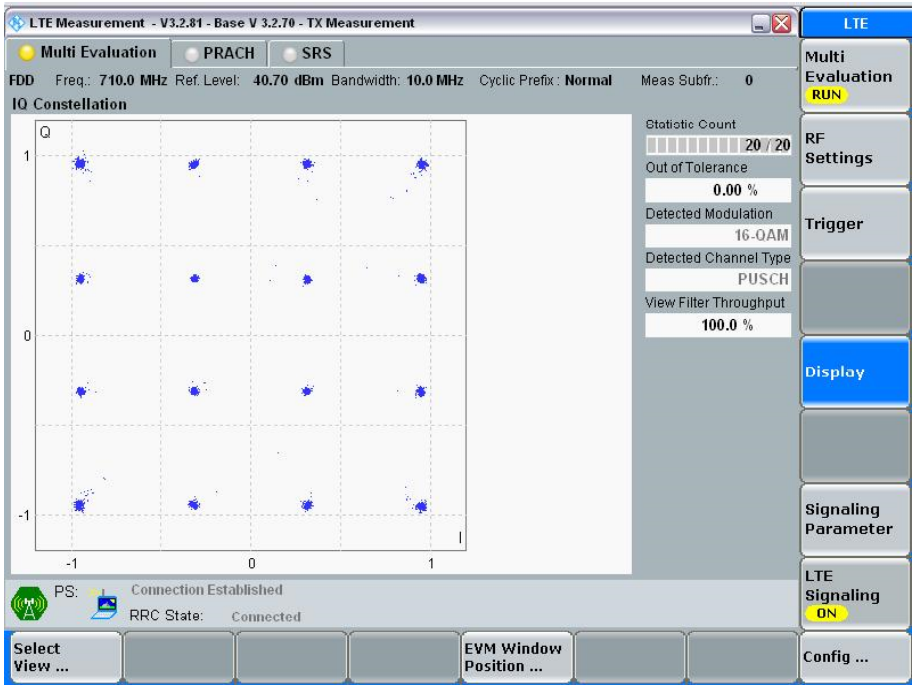


LTE FDD17, 10.0 MHz Bandwidth, 16-QAM, Transmitter Summary, Modulation Characteristic Plot

LTE FDD17, 10.0 MHz Bandwidth, 16-QAM, EVM, Modulation Characteristic Plot

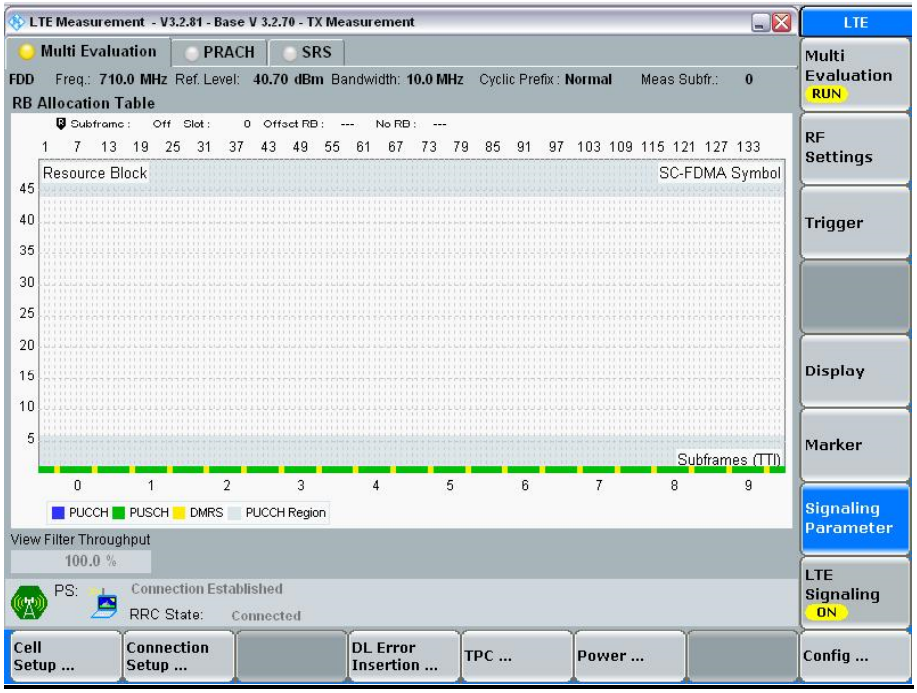


LTE FDD17, 10.0 MHz Bandwidth, 16-QAM, IQ Constellation, Modulation Characteristic Plot

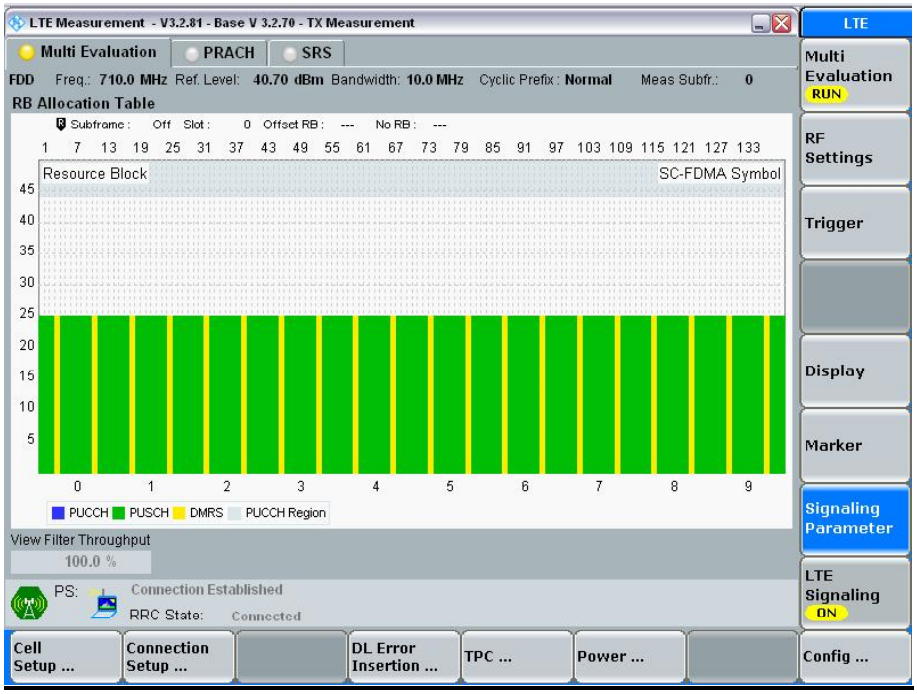


Product Service

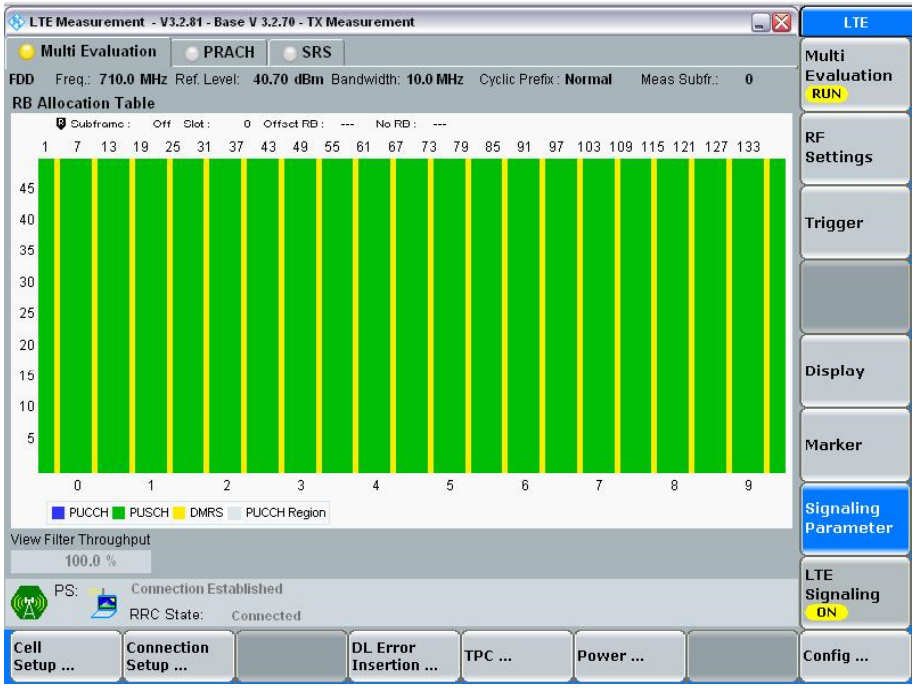
LTE FDD17, 10.0 MHz Bandwidth, 16-QAM, 1 Resource Block Allocation, Modulation Characteristic Plot



LTE FDD17, 10.0 MHz Bandwidth, 16-QAM, 25 Resource Block Allocation, Modulation Characteristic Plot



LTE FDD17, 10.0 MHz Bandwidth, 16-QAM, 50 Resource Block Allocation, Modulation Characteristic Plot



FCC 47 CFR Part 27, Limit Clause 2.1047 (d)

A curve or equivalent data which shows that the equipment will meet the modulation requirements of the rules under which the equipment is to be licensed.

Product Service

SECTION 3

TEST EQUIPMENT USED

Product Service

3.1 TEST EQUIPMENT USED

List of absolute measuring and other principal items of test equipment.

Instrument	Manufacturer	Type No.	TE No.	Calibration Period (months)	Calibration Due
Section 2.1 - Maximum Conducted Output Power					
Multimeter	White Gold	WG022	190	12	24-Nov-2016
Radio Communications Test Set	Rohde & Schwarz	CMU 200	442	12	18-Jan-2017
Attenuator (20dB/ 2W)	Pasternack	PE7004-20	489	12	30-Oct-2016
Power Supply	Hewlett Packard	6104A	1948	-	TU
Programmable Power Supply	Iso-tech	IPS 2010	2437	-	O/P Mon
Hygrometer	Rotronic	I-1000	3220	12	19-Aug-2016
Network Analyser	Rohde & Schwarz	ZVA 40	3548	12	2-Sep-2016
Combiner/Splitter	Weinschel	1506A	3878	12	2-Jun-2016
P-Series Power Meter	Agilent Technologies	N1911A	3981	12	25-Sep-2016
50 MHz-18 GHz Wideband Power Sensor	Agilent Technologies	N1921A	3983	12	25-Sep-2016
Calibration Unit	Rohde & Schwarz	ZV-Z54	4368	12	7-Sep-2016
2 metre SMA Cable	Florida Labs	SMS-235SP-78.8-SMS	4517	12	16-Feb-2017
Wideband Radio Test Set	Rohde & Schwarz	CMW500	4546	12	3-Feb-2017
PXA Signal Analyser	Keysight Technologies	N9030A	4653	12	8-Oct-2016
Section 2.2 - Emission Limitations					
Turntable Controller	Inn-Co GmbH	CO 1000	1606	-	TU
Antenna (Bilog)	Chase	CBL6143	2904	24	11-Jun-2017
Signal Generator (10MHz to 40GHz)	Rohde & Schwarz	SMR40	3171	12	28-Sep-2016
EMI Test Receiver	Rohde & Schwarz	ESU40	3506	12	2-Nov-2016
Tilt Antenna Mast	maturo Gmbh	TAM 4.0-P	3916	-	TU
Mast Controller	maturo Gmbh	NCD	3917	-	TU
Double Ridged Waveguide Horn Antenna	ETS-Lindgren	3117	4722	12	29-Dec-2016
Section 2.3 - Spurious Emissions at Antenna Terminals					
Multimeter	White Gold	WG022	190	12	24-Nov-2016
Attenuator 10dB/25W	Weinschel	46-10-43	400	12	18-Jun-2016
Radio Communications Test Set	Rohde & Schwarz	CMU 200	442	12	18-Jan-2017
Power Splitter	Weinschel	1506A	607	12	31-Mar-2017
Rubidium Standard	Rohde & Schwarz	XSRM	1316	6	3-Sep-2016
Power Supply	Hewlett Packard	6104A	1948	-	TU
High Pass Filter (7GHz)	Lorch	9HP7-7000-SR	2246	0	Class 1 (Int)
Multimeter	Iso-tech	IDM101	2424	12	29-Sep-2016
Programmable Power Supply	Iso-tech	IPS 2010	2436	-	O/P Mon
Programmable Power Supply	Iso-tech	IPS 2010	2437	-	O/P Mon
Filter	Daden Anthony Ass	MH-1500-7SS	2778	12	5-Feb-2017
Attenuator (20dB, 2W)	Pasternack	PE7004-20	2943	12	4-Apr-2017
Hygrometer	Rotronic	I-1000	3220	12	19-Aug-2016
Network Analyser	Rohde & Schwarz	ZVA 40	3548	12	2-Sep-2016
Calibration Unit	Rohde & Schwarz	ZV-Z54	4368	12	7-Sep-2016
Frequency Standard	Spectracom	Secure Sync 1200-0408-0601	4393	6	3-Sep-2016
PXA Signal Analyser	Agilent Technologies	N9030A PXA	4409	12	8-Mar-2017
Suspended Substrate Highpass Filter	Advance Power Components	11SH10-3000/X18000-O/O	4411	12	23-Mar-2017
Wideband Radio Test Set	Rohde & Schwarz	CMW500	4546	12	3-Feb-2017

Product Service

Instrument	Manufacturer	Type No.	TE No.	Calibration Period (months)	Calibration Due
Section 2.4 - Spurious Emissions at Band Edge					
Attenuator 10dB/25W	Weinschel	46-10-43	400	12	18-Jun-2016
Radio Communications Test Set	Rohde & Schwarz	CMU 200	442	12	18-Jan-2017
Power Splitter	Weinschel	1506A	607	12	31-Mar-2017
Rubidium Standard	Rohde & Schwarz	XSRM	1316	6	3-Sep-2016
Power Supply	Hewlett Packard	6104A	1948	-	TU
Multimeter	Iso-tech	IDM101	2424	12	29-Sep-2016
Programmable Power Supply	Iso-tech	IPS 2010	2436	-	O/P Mon
Attenuator (20dB, 2W)	Pasternack	PE7004-20	2943	12	4-Apr-2017
Hygrometer	Rotronic	I-1000	3220	12	19-Aug-2016
Network Analyser	Rohde & Schwarz	ZVA 40	3548	12	2-Sep-2016
Calibration Unit	Rohde & Schwarz	ZV-Z54	4368	12	7-Sep-2016
Frequency Standard	Spectracom	Secure Sync 1200-0408-0601	4393	6	3-Sep-2016
PXA Signal Analyser	Agilent Technologies	N9030A PXA	4409	12	8-Mar-2017
Section 2.5 - 26 dB Bandwidth					
Multimeter	White Gold	WG022	190	12	24-Nov-2016
Attenuator 10dB/25W	Weinschel	46-10-43	400	12	18-Jun-2016
Radio Communications Test Set	Rohde & Schwarz	CMU 200	442	12	18-Jan-2017
Directional Coupler	Hewlett Packard	11692D	451	12	13-Oct-2016
Attenuator (20dB/ 2W)	Pasternack	PE7004-20	489	12	30-Oct-2016
Power Splitter	Weinschel	1506A	607	12	31-Mar-2017
Rubidium Standard	Rohde & Schwarz	XSRM	1316	6	3-Sep-2016
Power Supply	Hewlett Packard	6104A	1948	-	TU
Multimeter	Iso-tech	IDM101	2424	12	29-Sep-2016
Programmable Power Supply	Iso-tech	IPS 2010	2436	-	O/P Mon
Programmable Power Supply	Iso-tech	IPS 2010	2437	-	O/P Mon
Attenuator (20dB, 2W)	Pasternack	PE7004-20	2943	12	4-Apr-2017
Hygrometer	Rotronic	I-1000	3220	12	19-Aug-2016
Network Analyser	Rohde & Schwarz	ZVA 40	3548	12	2-Sep-2016
Combiner/Splitter	Weinschel	1506A	3878	12	2-Jun-2016
Calibration Unit	Rohde & Schwarz	ZV-Z54	4368	12	7-Sep-2016
Frequency Standard	Spectracom	Secure Sync 1200-0408-0601	4393	6	3-Sep-2016
PXA Signal Analyser	Agilent Technologies	N9030A PXA	4409	12	8-Mar-2017
Wideband Radio Test Set	Rohde & Schwarz	CMW500	4546	12	3-Feb-2017
PXA Signal Analyser	Keysight Technologies	N9030A	4653	12	8-Oct-2016
Section 2.6 - Frequency Stability					
Multimeter	White Gold	WG022	190	12	24-Nov-2016
Temperature Chamber	Montford	2F3	467	-	O/P Mon
Rubidium Standard	Rohde & Schwarz	XSRM	1316	6	3-Sep-2016
Power Supply	Iso-tech	IPS 2010	2440	-	O/P Mon
Frequency Standard	Spectracom	Secure Sync 1200-0408-0601	4393	6	3-Sep-2016
Wideband Radio Test Set	Rohde & Schwarz	CMW500	4546	12	3-Feb-2017

TU – Traceability Unscheduled
O/P MON – Output Monitored with Calibrated Equipment

3.2 MEASUREMENT UNCERTAINTY

For a 95% confidence level, the measurement uncertainties for defined systems are:-

Test Discipline	MU
Modulation Characteristics	-
Spurious Emissions at Antenna Terminals	± 3.454 dB
26 dB Bandwidth	1 Resource Block: ± 8.59 kHz All Resource Blocks: ± 84.51 kHz
Emission Limitations	Radiated Emissions ; 30 MHz to 1 GHz ; ± 5.1 dB Radiated Emissions ; 1 GHz to 40 GHz ; 6.2 dB ERP / EIRP ; ± 3.0 dB
Frequency Stability	± 37.73 Hz
Spurious Emissions at Band Edge	± 2.20 dB
Maximum Conducted Output Power	± 0.7 dB

Product Service

SECTION 4

ACCREDITATION, DISCLAIMERS AND COPYRIGHT

4.1 ACCREDITATION, DISCLAIMERS AND COPYRIGHT

This report relates only to the actual item/items tested.

Our UKAS Accreditation does not cover opinions and interpretations and any expressed are outside the scope of our UKAS Accreditation.

Results of tests not covered by our UKAS Accreditation Schedule are marked NUA (Not UKAS Accredited).