NTS Test Report No. PR034821 Rev. 1



Radio Test Report

Application for Grant of Equipment Authorization

FCC Part 27 Subpart C IC RSS-130 Issue 1 718MHz - 728MHz and 729MHz - 745MHz

FCC ID:

IC:	661W-FRBG
Model:	FRBG
Product Name:	Flexi Multiradio BTS
APPLICANT:	Nokia Solutions and Networks
	6000 Connection Drive
	Irving, TX 75039
TEST SITE(S):	National Technical Systems - Plano
	1701 E Plano Pkwy #150
	Plano, TX 75074
REPORT DATE:	May 26, 2015

VBNFRBG-01

FINAL TEST DATES: **TOTAL NUMBER OF PAGES:**

Feb 5 – Apr 14, 2015

71

Prepared By:

If E dunk

Yunus E. Faziloglu Wireless Manager

Reviewed By:

John Ngo **General Manager**

This report and the information contained herein represent the results of testing test articles identified and selected by the client performed to specifications and/or procedures selected by the client. National Technical Systems (NTS) makes no representations, expressed or implied, that such testing is adequate (or inadequate) to demonstrate efficiency, performance, reliability, or any other characteristic of the articles being tested, or similar products. This report should not be relied upon as an endorsement or certification by NTS of the equipment tested, nor does it represent any statement whatsoever as to its merchantability or fitness of the test article, or similar products, for a particular purpose. This report shall not be reproduced except in full.

Approved By:

Kimberly Zavala Quality Assurance Manager

REVISION HISTORY

Rev#	Date	Comments	Modified By
0	Apr 15, 2015	1 st release	Yunus Faziloglu
1	May 26, 2015	To address TCB comments	Yunus Faziloglu

TABLE OF CONTENTS

REVISION HISTORY	2
TABLE OF CONTENTS	3
SCOPE	4
OBJECTIVE	
STATEMENT OF COMPLIANCE	
DEVIATIONS FROM THE STANDARDS	
TEST RESULTS	
FCC PART 27 SUBPART C AND RSS-130 ISSUE 1 (BASE STATIONS OPERATING IN 718MHz-728MHz BAND)	
FCC PART 27 SUBPART C AND RSS-130 ISSUE 1 (BASE STATIONS OPERATING IN 729MHz-745MHz BAND)	
EXTREME CONDITIONS	
MEASUREMENT UNCERTAINTIES	
EQUIPMENT UNDER TEST (EUT) DETAILS	
GENERAL	
ENCLOSURE	
AUXILLARY EQUIPMENT	
SUPPORT EQUIPMENT	
EUT INTERFACE PORTS	
EUT OPERATION	
EUT FIRMWARE/SOFTWARE	
MODIFICATIONS	.12
TESTING	.13
GENERAL INFORMATION	.13
MEASUREMENT PROCEDURES	
TEST EQUIPMENT	
APPENDIX A TEST DATA	
RF OUTPUT POWER	
EMISSION BANDWIDTHS (26DB AND 99%)	
ANTENNA PORT CONDUCTED BANDEDGE	
TRANSMITTER ANTENNA PORT CONDUCTED SPURIOUS EMISSIONS	
TRANSMITTER RADIATED SPURIOUS EMISSIONS	
FREQUENCY STABILITY	
END OF REPORT	

SCOPE

Tests have been performed on Nokia Solutions and Networks product Flexi Multiradio BTS RRH Model FRBG, pursuant to the relevant requirements of the following standard(s) in order to obtain device certification against the regulatory requirements of the Federal Communications Commission.

- Code of Federal Regulations (CFR) Title 47 Part 2
- CFR Title 47 Part 27 Subpart C
- RSS-Gen Issue 4 November 2014
- RSS-130 Issue 1 October 2013

Conducted and radiated emissions data has been collected, reduced, and analyzed within this report in accordance with measurement guidelines set forth in the following reference standards:

ANSI C63.4-2009 ANSI TIA-603-C FCC KDB 971168 D01 v02r02

The intentional radiator above has been tested in a simulated typical installation to demonstrate compliance with the relevant FCC requirements.

Every practical effort was made to perform an impartial test using appropriate test equipment of known calibration. All pertinent factors have been applied to reach the determination of compliance.

The test results recorded herein are based on a single type test of Nokia Solutions and Networks product Flexi Multiradio BTS RRH Model FRBG and therefore apply only to the tested sample. The sample was selected and prepared by Hobert Smith of Nokia Solutions and Networks.

OBJECTIVE

The primary objective of the manufacturer is compliance with the regulations outlined in the previous section.

Prior to marketing in the USA, the device requires certification. Prior to marketing in Canada, Class I transmitters, receivers and transceivers require certification.

Certification is a procedure where the manufacturer submits test data and technical information to a certification body and receives a certificate or grant of equipment authorization upon successful completion of the certification body's review of the submitted documents. Once the equipment authorization has been obtained, the label indicating compliance must be attached to all identical units, which are subsequently manufactured.

Maintenance of compliance is the responsibility of the manufacturer. Any modification of the product which may result in increased emissions should be checked to ensure compliance has been maintained (i.e., printed circuit board layout changes, different line filter, different power supply, harnessing or I/O cable changes, etc.).

Testing was performed only on Model FRBG. No additional models were described or supplied for testing.

STATEMENT OF COMPLIANCE

The tested sample of Nokia Solutions and Networks product Flexi Multiradio BTS RRH Model FRBG complied with the requirements of the standards and frequency bands declared in the scope of this test report.

Maintenance of compliance is the responsibility of the manufacturer. Any modifications to the product should be assessed to determine their potential impact on the compliance status of the device with respect to the standards detailed in this test report.

DEVIATIONS FROM THE STANDARDS

No deviations were made from the published requirements listed in the scope of this report.

TEST RESULTS

FCC	IC	Description	Measured	Limit	Resul
Transmitter N	Iodulation, outj	out power and other	r characteristics		
§27.5(c)	RSS-130 Section 4.2	Frequency range(s)	720.5MHz - 725.5MHz (5M LTE) 723.0MHz - 723.0MHz (10M LTE)	718MHz - 728MHz	Pass
§2.1033(c)(4)	RSS-130 Section 4.1	Modulation Type	QPSK, 16QAM, 64QAM (5M and 10M for each)	Digital	Pass
§27.50(c)	RSS-130 Section 4.4	Output Power	Conducted Output Power (Highest on Port 3) RMS: 45.3Bm ERP will depend on antenna gain (unknown)	1000W ERP	Pass
N/A Informational	RSS-130 Section 4.4	Peak to Average Ratio	10.79dB highest	13dB	Pass
§2.1049	RSS-Gen Section 6.6	Emission Bandwidth (99%)	4.502MHz (5M LTE) 8.997MHz (10M LTE)	Remain in Block	Pass
N/A Informational	N/A Informational	Emission Bandwidth (26dB)	4.885MHz (5M LTE) 9.764MHz (10M LTE)	Remain in Block	Pass
Transmitter s	purious emissio	ns ¹	·		
527 52(A)	RSS-130	At the antenna terminals	<-16.02dBm	-16.02 dBm (per TX chain)	Pass
§27.53(f)	Section 4.6	Field strength	39.7dBuV/m at 3m Eq. to -55.5dBm EIRP	-13 dBm EIRP	Pass
N/A Informational	N/A Informational	Limitations within 1559MHz -1610MHz band	Conducted measurements on Port 3. No emissions observed above the instrumentation noise floor.	-70 dBW/MHz EIRP (wideband) -80 dBW/MHz EIRP (discrete)	Pass
Other details					
§27.54	RSS-130 Section 4.3	Frequency stability	0.0006ppm	Remain in Block	Pass
§1.1310	RSS-102 Issue 5	RF Exposure	N/A		Pass ²
Notes Note 1 – Based o has been used.	on 100kHz RBW.	in 100kHz bands imme	diately outside and adjacent to the f	requency block 30kHz	RBW

has been used. Note 2 – Applicant's declaration on a separate exhibit based on hypothetical antenna gains.

	Emission Designators							
	LTE-0	QPSK	LTE-1	LTE-16QAM		4QAM		
	FCC	IC	FCC	IC	FCC	IC		
5M	4M88F9W	4M49F9W	4M87F9W	4M49F9W	4M89F9W	4M50F9W		
10M	9M73F9W	8M98F9W	9M71F9W	9M00F9W	9M76F9W	8M99F9W		

Note: FCC based on 26dB emission bandwidth, IC based on 99% emissions bandwidth.

FCC	IC	Description	Measured	Limit	Result
Transmitter M	Iodulation, out	out power and other			
§27.5(c)	RSS-130 Section 4.2	Frequency range(s)	731.5MHz - 742.5MHz (5M LTE) 734.0MHz - 740.0MHz (10M LTE)	729MHz - 745MHz	Pass
§2.1033(c)(4)	RSS-130 Section 4.1	Modulation Type	QPSK, 16QAM, 64QAM (5M and 10M for each)	Digital	Pass
§27.50(c)	RSS-130 Section 4.4	Output Power	Conducted Output Power (Equal on Ports 1 and 2) RMS: 45.81Bm ERP will depend on antenna gain (unknown)	1000W ERP	Pass
N/A Informational	RSS-130 Section 4.4	Peak to Average Ratio	10.93dB highest	13dB	Pass
§2.1049	RSS-Gen Section 6.6	Emission Bandwidth (99%)	4.506MHz (5M LTE) 9.004MHz (10M LTE)	Remain in Block	Pass
N/A Informational	N/A Informational	Emission Bandwidth (26dB)	4.891MHz (5M LTE) 9.759MHz (10M LTE)	Remain in Block	Pass
Transmitter s	purious emissio	ns ¹			
827 52(A	RSS-130 Section 4.6	At the antenna terminals	<-16.02dBm	-16.02 dBm (per TX chain)	Pass
§27.53(f)		Field strength	39.1dBuV/m at 3m Eq. to -56.1dBm EIRP	-13 dBm EIRP	Pass
N/A Informational	N/A Informational	Limitations within 1559MHz -1610MHz band	Conducted measurements on Port 2. No emissions observed above the instrumentation noise floor.	-70 dBW/MHz EIRP (wideband) -80 dBW/MHz EIRP (discrete)	Pass
Other details	1			1	
§27.54	RSS-130 Section 4.3	Frequency stability	0.0008ppm	Remain in Block	Pass
§1.1310	RSS-102 Issue 5	RF Exposure	N/A		Pass ²
has been used.			diately outside and adjacent to the f	requency block 30kHz	z RBW

FCC Part 27 Subpart C and RSS-130 Issue 1 (Base Stations Operating in 729MHz-745MHz band)

Note 2 – Applicant's declaration on a separate exhibit based on hypothetical antenna gains.

	Emission Designators						
	LTE-QPSK LTE-16QAM LTE-64QAM					4QAM	
	FCC	IC	FCC	FCC IC		IC	
5M	4M88F9W	4M49F9W	4M87F9W	4M49F9W	4M89F9W	4M51F9W	
10M	9M73F9W	9M00F9W	9M73F9W	9M00F9W	9M76F9W	9M00F9W	

Note: FCC based on 26dB emission bandwidth, IC based on 99% emissions bandwidth.

EXTREME CONDITIONS

Frequency stability is determined over extremes of temperature and voltage. The extremes of voltage were 85 to 115 percent of the nominal value.

The extremes of temperature were -30° C to $+50^{\circ}$ C as specified in FCC §2.1055(a)(1).

MEASUREMENT UNCERTAINTIES

Measurement uncertainties of the test facility based on a 95% confidence level are as follows,

Test	Uncertainty
Radio frequency	± 0.2ppm
RF power conducted	±1.2 dB
RF power radiated	±3.3 dB
RF power density conducted	±1.2 dB
Spurious emissions conducted	±1.2 dB
Adjacent channel power	±0.4 dB
Spurious emissions radiated	±4 dB
Temperature	±1°C
Humidity	±1.6 %
Voltage (DC)	±0.2 %
Voltage (AC)	±0.3 %

EQUIPMENT UNDER TEST (EUT) DETAILS

GENERAL

The equipment under test (EUT) is a Nokia Solutions and Networks Flexi Multiradio Base Transceiver Station (BTS) Remote Radio Head (RRH) module, model FRBG which operates over 3GPP frequency band 12 (729-745 MHz) and band 29 (718-728 MHz). The FRBG has four co-located transmitters with each transmit port supporting 40 watts maximum rated RF output power. The FRBG can be operated as MIMO or as non-MIMO. Multi-carrier operation is supported.

The FRBG is multi-standard capable (GSM/EDGE/WCDMA/LTE), but for this effort only the LTE mode is tested. The FRBG supports three downlink modulation types for LTE (QPSK, 16QAM and 64QAM). The FRBG supports two LTE channel bandwidths (5 MHz and 10 MHz).

The FRBG has external interfaces including DC power, ground, TX/RX (Ant), RX monitor (RXO), external alarm (EAC), optical OBSAI (OPT) and remote electrical tilt (RET). The RRH with applicable installation kit may be pole or wall mounted.

	Downlink EARFCN	Downlink Frequency	LTE Channe	el Bandwidth	
		(MHz)	5 MHz	10 MHz	
	9670	718.0	Bandedge	Bandedge	
14)	9695	720.5	Bottom Ch		
anc					
Band 29 (Ant 3 and 4)	9720	723.0	Middle Ch	Bottom Ch Middle Ch Top Channel	
d 2					
Bai	9745	725.5	Top Channel		
	9770	728.0	Bandedge	Bandedge	
	5010	729.0	Bandedge	Bandedge	
	5035	731.5	Bottom Ch		
5					
pu	5060	734.0		Bottom Ch	
: 1 a					
Ant	5090	737.0	Middle Ch	Middle Ch	
12 (
Band 12 (Ant 1 and 2)	5120	740.0		Top Channel	
B					
	5145	742.5	Top Channel		
ľ	5170	745	Bandedge	Bandedge	

The FRBG LTE channel numbers and frequencies are as follows:

FRBG Downlink LTE Frequency Channels

The sample was received on Feb 5, 2015 and tested on Feb 5 - Apr 14, 2015. The EUT consisted of the following component(s):

Company	Model	Description	Part/Serial Number	FCC ID/IC Number
Nokia Solutions	FRBG	Flexi Multiradio BTS	Part#: 473188A.x11	FCC ID: VBNFRBG-01
and Networks		RRH	Serial#: YK144100004	IC: 661W-FRBG

ENCLOSURE

The EUT enclosure is made of heavy duty aluminum and measures approximately $12(W) \times 7(D) \times 24(H)$ inches.

AUXILLARY EQUIPMENT

Company	Model	Description	Part/Serial Number	FCC ID/IC Number
Nokia Solutions	FOSH	6GHz SFP Module	Part#: 472579A.101	N/A
and Networks		(Plugs into RRH Opt	(2 units per RRH)	
		Ports 1&2)	Serial#: CE30LC5Z2	
			and CE30LCCBA	

SUPPORT EQUIPMENT

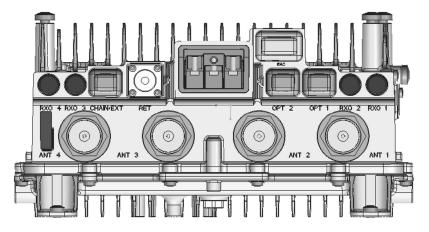
Company	Model	Description	Part/Serial Number	FCC ID/IC Number
Nokia Solutions and Networks	FSMF	Flexi System Module	Part#: 472181A.103	N/A
Nokia Solutions and Networks	FBBA	Baseband Extension Module	Part#: 472182A.101 (2 units per FSMF)	N/A
HP	Elite Book 6930p	Laptop PC	N/A	N/A

EUT INTERFACE PORTS

The I/O cabling configuration during testing was as follows:

Cable	Туре	Shield	Length	Used in Test	Quantity	Termination
Power Input	Power	No	$\sim 3 \text{ m}$	Yes	1	Power Supply
Earth	Earth	No	$\sim 1 \text{ m}$	Yes	1	Lab earth ground
Antenna	RF	Yes	$\sim 3 m$	Yes	4	50Ω Load
RX monitor	RF	Yes	$\sim 2 \ m$	Yes	2	50Ω Load
External Alarm	Signal	Yes	$\sim 3 \text{ m}$	Yes	1	Un-terminated
Remote Electrical Tilt	Signal	Yes	~ 3 m	Yes	1	Un-terminated
Multimode Optical	Optical	No	>6 m	Yes	2	System Module

The connector layout for FRBG is provided below:



FRBG External Interfaces:

Name	Qty	Connector Type	Purpose (and Description)
DC In	1	Screw Terminal	3-port Power Input -48 VDC, up to AWG 4 cable
GND	1	Screw lug (2xM5/1xM8)	Ground
ANT	4	7/16	RF signal for Transmitter/Receiver (50 Ohm)
RXO	4	QMA	RX output for monitoring/location services
Unit	1	LED	Unit Status LED
LMP	1	Card edge	Local Management/Test Port (Ethernet 10Base- T/100Base-Tx and others, not field accessible)
EAC	1	MDR14	External Alarm Interface (4 alarms)
OPT	3	SFP+ cage	Optical OBSAI Interface up to 6 Gps.
RET	1	8-pin circular connector conforming to IEC 60130-9 – Ed.3.0	AISG 2.0 to external devices

EUT OPERATION

During testing, the EUT was transmitting continuously with 100% duty-cycle at full power on all chains.

EUT FIRMWARE/SOFTWARE

The laptop PC connects to the FSMF System Module over the LMP (Ethernet) port. The system module controls the FRBG RRH via the optical (OBSAI) interface. The laptop is used for changing configuration settings, monitoring tests and controlling the BTS. The following software versions are used for the FRBG testing:

- (1) RRH Unit Software: FRM3401R10_FRBEFG
- (2) System Module Software: FB_PS_REL_2013_09_016

MODIFICATIONS

No modifications were made to the EUT during testing.

TESTING

GENERAL INFORMATION

Antenna port measurements were taken at NTS Plano branch located at 1701 E Plano Pkwy #150 Plano, TX 75074.

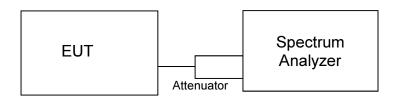
Radiated spurious emissions measurements were taken at the NTS Plano Anechoic Chamber listed below. The sites conform to the requirements of ANSI C63.4-2009 *American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz and CISPR 16-1-4:2007 - Specification for radio disturbance and immunity measuring apparatus and methods Part 1-4: Radio disturbance and immunity measuring apparatus Ancillary equipment Radiated disturbances. They are on file with the FCC and Industry Canada.*

C:ta	Registratio	n Numbers	Location	
Site	FCC	Canada	Location	
Chamber 1	A2LA Accredited Designation Number US1077	IC 4319A	1701 E Plano Pkwy #150 Plano, TX 75074.	

Considerable engineering effort has been expended to ensure that the facilities conform to all pertinent requirements.

MEASUREMENT PROCEDURES

Output power, emission bandwidth, conducted spurious, conducted bandedge and carrier frequency stability measurements were all performed via a spectrum analyzer connected to the individual RF chains via a 40dB attenuator and an RF cable. The EUT was operating in 2x2 MIMO configuration in each frequency band at full power for all tests. While measuring one transmit chain, others were terminated with termination blocks. All measurements were corrected for the insertion loss of the attenuator and cable inserted between the RF port of the EUT and the spectrum analyzer. Simple test diagram is shown below.



Test Configuration for Antenna Port Measurements

26dB emission bandwidth was measured in accordance with Section 4.1 of FCC KDB 971168 D01 v02r02. 99% occupied bandwidth was measured in accordance with Section 6.6 of RSS-Gen Issue 4. For both measurements an NTS custom software tool was used. Spectrum analyzer settings are shown on their corresponding plots in test results section.

Emissions at the band-edges were also captured with an NTS custom software tool with settings described in the corresponding sections of the FCC and IC rules. Spectrum analyzer settings are shown on their corresponding plots in test results section.

Peak and average output power measurements were performed in accordance with FCC KDB 971168 D01 v02r02. An NTS custom software tool was used for power integration to compensate for resolution bandwidth limitations of the spectrum analyzer and settings are shown on their corresponding plots in test results section.

Peak to average power ratio was calculated in accordance with Section 5.7.2 of FCC KDB 971168 D01 v02r02.

Conducted spurious emissions were captured with TILE6 software which corrected the readings for cable loss and attenuator loss across the 9kHz-8GHz frequency span. Settings of the spectrum analyzer are described in the corresponding test result section.

For frequency stability, the EUT was placed inside a temperature chamber with all support and test equipment located outside of the chamber. Temperature was varied across the specified range in 10 degree increments and EUT was allowed enough time to stabilize at each temperature step. A signal analyzer as detailed in the test equipment section has been used for précised frequency error measurements.

Transmitter radiated spurious emissions measurements were made in accordance with ANSI C63.4-2009 by measuring the field strength of the emissions from the device at 3m

test distance. The eirp limit as specified in the relevant rule part(s) is converted to a field strength at the test distance and the emissions from the EUT are then compared to that Only emissions within 20dB of this limit are subjected to a substitution limit. measurement in accordance with TIA-603-C-2004. Both preliminary and final measurements were performed at the same FCC listed test chamber. Preliminary scans were performed with TILE6 software. This software corrected the measurements for antenna factors, cable losses and pre-amplifier gains. Both polarizations of the receiving antenna were scanned from 30MHz to 8GHz with a peak detector (RBW=100kHz, VBW=300kHz, with trace max hold over multiple sweeps). Based on the preliminary scan results, frequencies of interest have been maximized via rotating the EUT 360 degrees and varying the height of the test antenna (1m to 4m). Final measurements were also taken with the peak detector as described above. A biconilog antenna was used for 30MHz-1GHz range. A double ridged waveguide horn antenna was used for 1-8GHz range. The antennas used to measure the radiated electric field strength are mounted on a non-conductive antenna mast equipped with a motor-drive to vary the antenna height. EUT was placed on a non-conductive RF transparent structure to provide 80cm height from the ground floor. A motorized turntable allowed it to be rotated during testing to determine the angle with the highest level of emissions.

NTS	Description	Manufacturer	Model	Calibration	Calibration
Equipment #	-			Duration	Due Date
E1529P	PSA	Agilent	E4446A	12 Months	2/14/2015
E1481P	PSA	Agilent	E4440A	12 Months	7/24/2015
E1508P	PSA	Agilent	E4440A	12 Months	4/7/2015
E1554P	PreAmp (1GHz-40GHz)	MITEQ	JS32-00104000- 62-5P	12 Months	5/14/2015
E1365P	PreAmp (30MHz- 1GHz)	MITEQ	AM-1431-N- 1197SC	12 Months	7/22/2015
E1502P	Biconilog Antenna (30MHz-1GHz)	ETS Lindgren	3142D	12 Months	12/10/2015
E1149P	Horn Antenna (1GHz-18GHz)	EMCO	3115	12 Months	12/10/2015
E1447P	RMS Multimeter	Fluke	87V	12 Months	5/20/2015
D1131P	Data Acquisition Switch Unit	Agilent	34970A	12 Months	7/2/2015
ENV1195P	Climatic Chamber	Thermotron	SE-300-2-2	N/A	NCR
* NM04508	MXA Signal Analyzer	Agilent	N9020A	24 Months	1/27/2017

Test Equipment

* Test equipment supplied by the customer for LTE frequency error measurements

Appendix A Test Data

RF Output Power

RF output power has been measured in both Peak and RMS Average terms in both frequency bands for each transmit chain at the center channel for all modulations and bandwidth modes. Peak to average ratio (PAR) has been calculated as described in Section 5.7.2 of KDB971168 D01 v02r02 and all results are presented in tabular form below.

			LTE - QPSK			LTE - 16QAM			LTE - 64QAM		
		Peak	Average	PAR	Peak	Average	PAR	Peak	Average	PAR	
		(dBm)	(dBm)	(dB)	(dBm)	(dBm)	(dB)	(dBm)	(dBm)	(dB)	
Port 3	5M	55.25	45.3	9.95	55.91	45.17	10.74	55.13	45.3	9.83	
Center Ch	10M	55.36	45.25	10.11	55.94	45.15	10.79	55.24	45.19	10.05	
Port 4	5M	55.23	45.24	9.99	55.88	45.18	10.7	55.11	45.27	9.84	
Center Ch	10M	55.39	45.23	10.16	55.87	45.11	10.76	55.17	45.12	10.05	
Combined	5M	58.25	48.28	9.97	58.91	48.19	10.72	58.13	48.3	9.83	
Center Ch	10M	58.39	48.25	10.14	58.92	48.14	10.78	58.22	48.17	10.05	

Results for 718MHz – 728MHz band:

Based on the results above, Port 3 had the highest RMS average power and therefore it was selected for all the remaining antenna port tests on the product.

Subsequently output power levels on lowest and highest channels in 5MHz channel bandwidth mode were tested only at Port 3 and results presented below. 10MHz channel bandwidth mode had only 1 channel of operation at the center.

			LTE - QPSK			LTE - 16QAM			LTE - 64QAM		
		Peak	Average	PAR	Peak	Average	PAR	Peak	Average	PAR	
		(dBm)	(dBm)	(dB)	(dBm)	(dBm)	(dB)	(dBm)	(dBm)	(dB)	
Port 3											
Low Ch	5M	55.39	45.28	10.11	56.01	45.23	10.78	55.16	45.28	9.88	
Port 3											
High Ch	5M	55.09	45.04	10.05	55.84	45.09	10.75	54.99	45.06	9.93	

All corresponding plots included on the following pages. Total path loss of 40.4dB (Attenuator Loss: 40dB, RF cable loss: 0.4dB) accounted in via reference level offset to the spectrum analyzer.

Results for 729MHz – 745MHz band:

			LTE - QPSK			LTE - 16QAM			LTE - 64QAM		
		Peak	Average	PAR	Peak	Average	PAR	Peak	Average	PAR	
		(dBm)	(dBm)	(dB)	(dBm)	(dBm)	(dB)	(dBm)	(dBm)	(dB)	
Port 1	5M	55.8	45.77	10.03	56.45	45.81	10.64	55.65	45.79	9.86	
Center Ch	10M	55.86	45.68	10.18	56.46	45.67	10.79	55.72	45.67	10.05	
Port 2	5M	55.84	45.78	10.06	56.47	45.62	10.85	55.66	45.8	9.86	
Center Ch	10M	55.95	45.81	10.14	56.47	45.73	10.74	55.77	45.69	10.08	
Combined	5M	58.83	48.79	10.04	59.47	48.73	10.74	58.67	48.81	9.86	
Center Ch	10M	58.92	48.76	10.16	59.48	48.71	10.77	58.76	48.69	10.07	

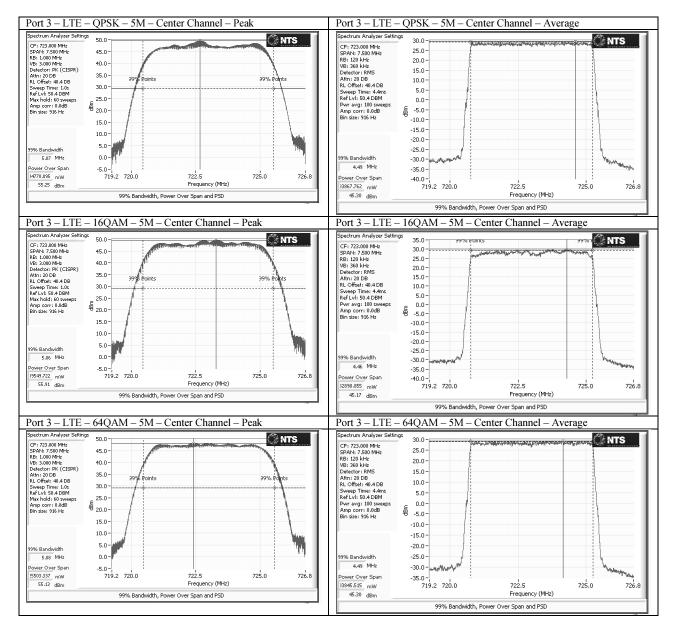
Based on the results above, Port 2 had both the highest Peak power and the highest RMS average power and therefore it was selected for all the remaining antenna port tests on the product.

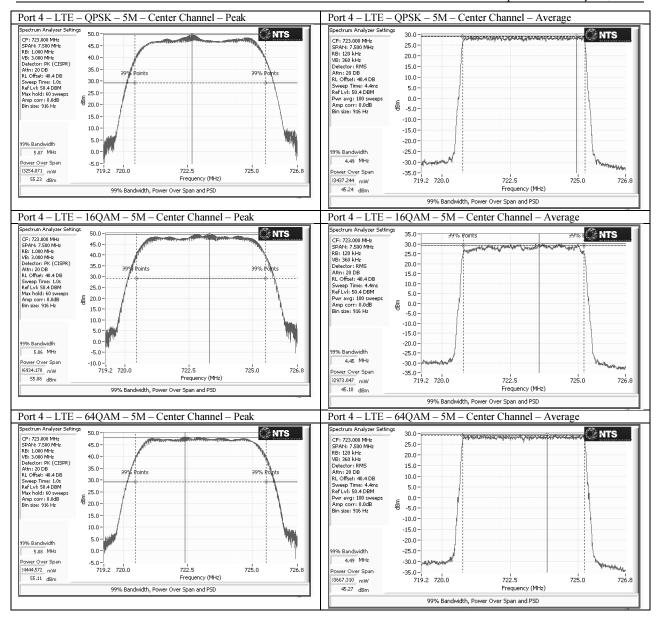
Subsequently output power levels on lowest and highest channels in 5MHz and 10MHz channel bandwidth modes were tested only at Port 2 and results presented below.

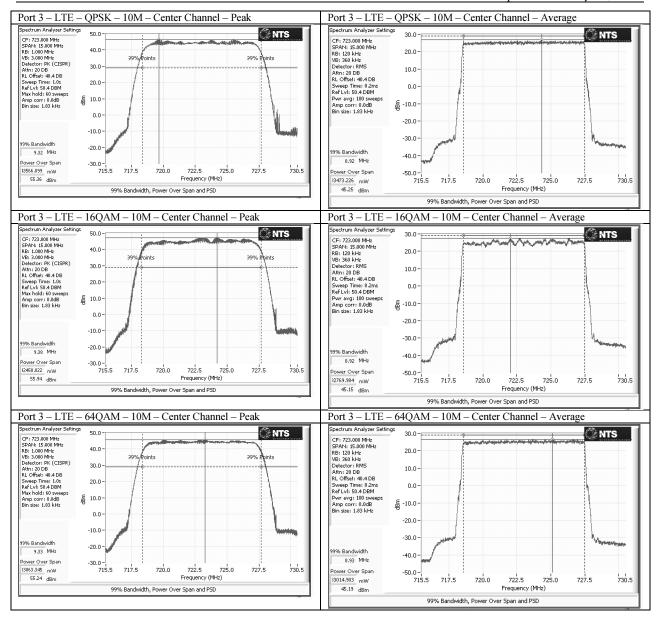
		LTE - QPSK			L	LTE - 16QAM			LTE - 64QAM		
		Peak (dBm)	Average (dBm)	PAR (dB)	Peak (dBm)	Average (dBm)	PAR (dB)	Peak (dBm)	Average (dBm)	PAR (dB)	
Port 2	5M	55.4	45.33	10.07	56.14	45.44	10.7	55.61	45.61	10	
Low Ch	10M	55.92	45.75	10.17	56.46	45.53	10.93	55.56	45.47	10.09	
Port 2	5M	55.74	45.62	10.12	56.31	45.54	10.77	55.59	45.62	9.97	
High Ch	10M	55.82	45.48	10.34	56.4	45.66	10.74	55.64	45.46	10.18	

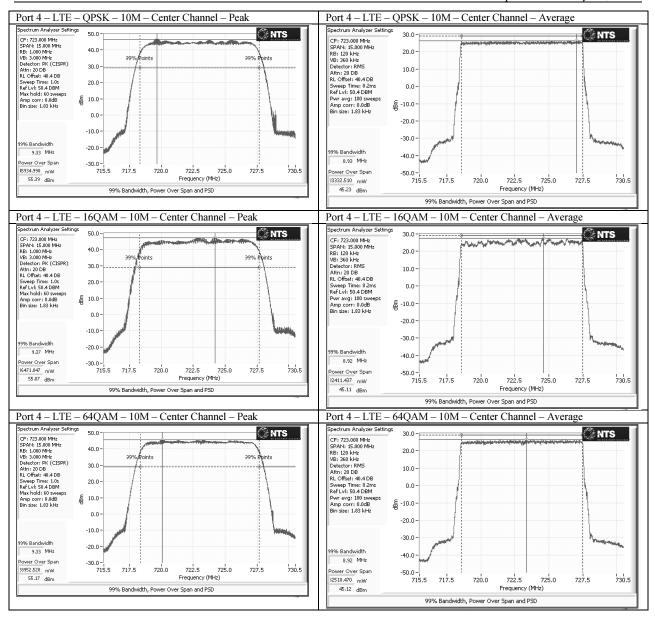
All corresponding plots included on the following pages. Total path loss of 40.4dB (Attenuator Loss: 40dB, RF cable loss: 0.4dB) accounted in via reference level offset to the spectrum analyzer.

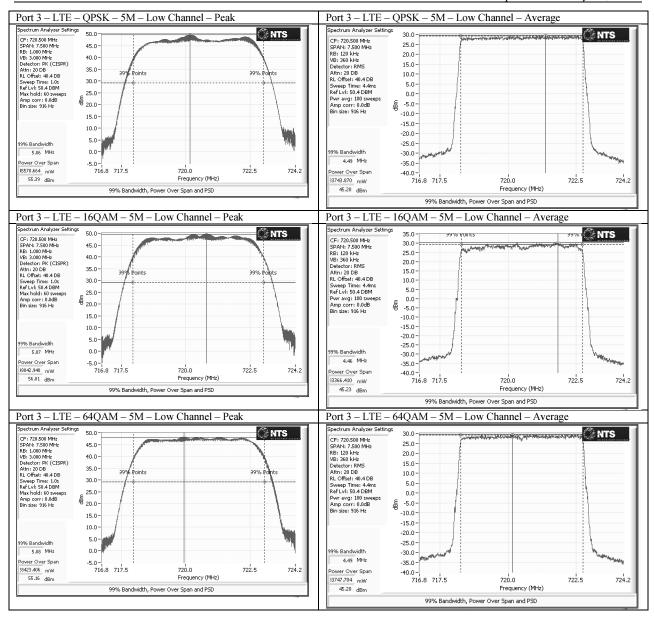
Plots for 718MHz – 728MHz band:

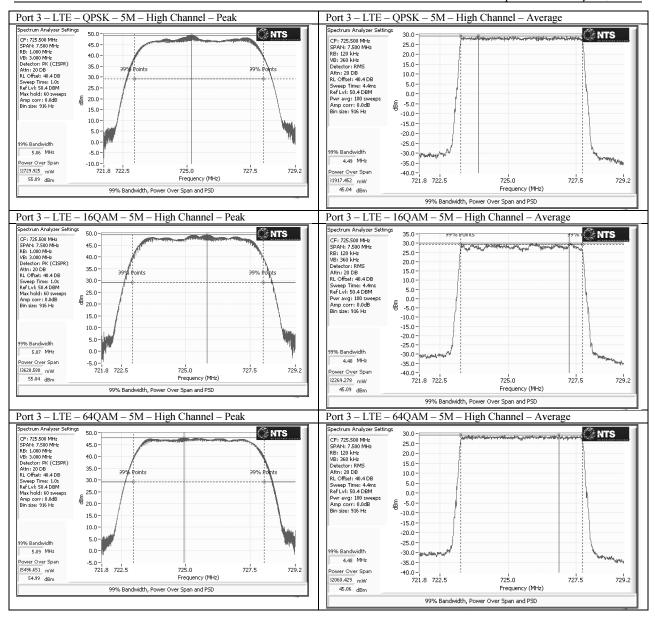




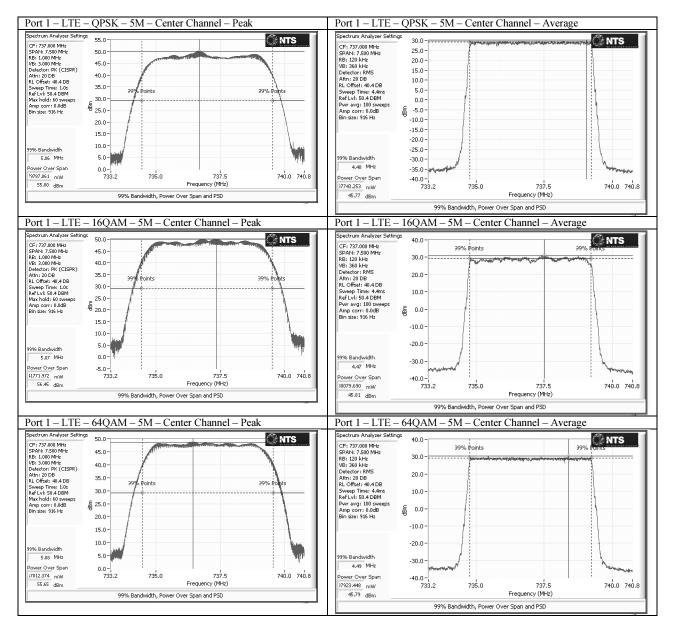








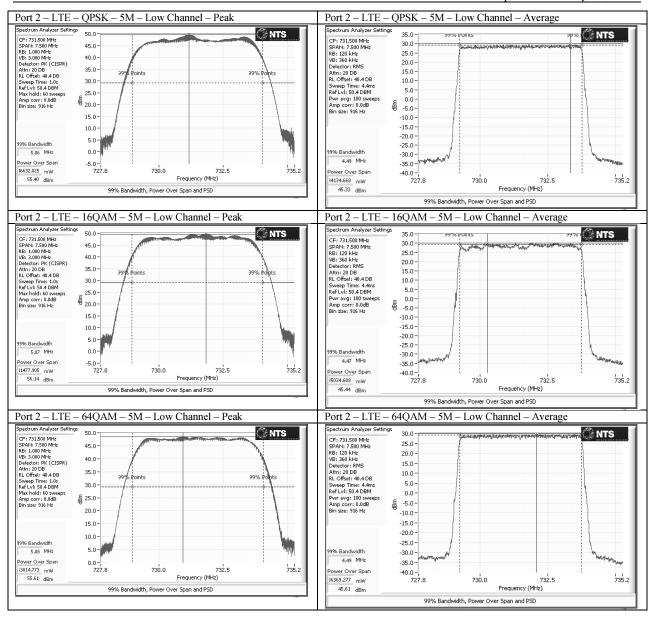
Plots for 729MHz - 745MHz band:



Port 2 – LTE – QPS	K – 5M – Center Channel – Peak		Port 2 – LTE	- QPSK - 5M	- Center Char	nnel – Average	
Spectrum Analyzer Settings 55.0 -r		ি মাহ	Spectrum Analyzer Setti	ngs or o			Panere I
CF: 737.000 MHz		NIS NIS	CF: 737.000 MHz		a 40 MOLITICS	99,	m 🤇 NTS
SPAN: 7.500 MHz 50.0 RB: 1.000 MHz			SPAN: 7.500 MHz	30.0		ang separah pangkan pangkan pangkan separah separah separah separah separah separah separah separah separah se	****Č
VB: 3.000 MHz 45.0 -	and the second se		RB: 120 kHz VB: 360 kHz	25.0 -			
Detector: PK (CISPR)			Detector: RMS	20.0 -	ß		
Attn: 20 DB 40.0 - RL Offset: 40.4 DB			Attn: 20 DB	15.0-			
Sweep Time: 1.0s 35.0 -	99% Points	99% Points	RL Offset: 40.4 DB	10.0-			
Ref Lvl: 50.4 DBM Max hold: 60 sweeps	55% 0 POINS	99 % HOLICS	Sweep Time: 4.4ms Ref Lvl: 50.4 DBM	5.0-			
	1	* 1	Pwr avg: 100 sweeps	_ 0.0-			
Amp corr: 0.0dB Bin size: 916 Hz 25.0 -			Amp corr: 0.0dB	-5.0-			
20.0-			Bin size: 916 Hz	-10.0 -			
15.0 -				-15.0 -			
15.0-				-20.0 -			
99% Bandwidth 10.0 -		La Labora		-25.0 -			
5.07 MHz 5.0-		1.0	99% Bandwidth		1 1		
	n la		4,49 MHz	-30.0-			. When
Power Over Span 0.0 - 34071.191 mW 733	3.2 735.0 737.5	740.0 740.8		-35.0 -			ALL
34071.191 mW 733 55.84 dBm	3.2 735.0 737.5 Frequency (MHz)	/40.0 /40.8	Power Over Span	-40.0 -	1. I.	1	1
55.84 dBm			37840.747 mW	733.2	735.0	737.5	740.0 740.8
	99% Bandwidth, Power Over Span and PSD		45.78 dBm		Fre	equency (MHz)	
				99% Ban	dwidth, Power Over Sp	oan and PSD	
Port 2 – LTE – 16Q	AM – 5M – Center Channel – Pe	ak	Port 2 – LTE	– 16QAM – 5M	A – Center Ch	nannel – Average	e
Spectrum Analyzer Settings 50.0 -r		ি মার্চ	Spectrum Analyzer Setti	ngs 40.0 -			ी ताम
CF: 737.000 MHz	The state of the second st		CF: 737.000 MHz		9% Points	394	
SPAN: 7.500 MHz 45.0 - RB: 1.000 MHz			SPAN: 7.500 MHz	30.0	5 70 i on cs		
VB: 3.000 MHz 40.0-	/	1	RB: 120 kHz VB: 360 kHz	30.0	The shares and	and the second s	N.
Detector: PK (CISPR) Attn: 20 DB	l f	2	Detector: RMS	20.0 -	(3
RL Offset: 40.4 DB 35.0 -	99% Points	99% Points	Attn: 20 DB	20.0	1		- 8
Sweep Time: 1.0s	55 TO ROLLS	9976 (Olives	RL Offset: 40.4 DB Sweep Time: 4.4ms	10.0-			
Max holds 60 success		·····	Ref Lvl: 50.4 DBM	10.0-			
Amp corr: 0.0dB			Pwr avg: 100 sweeps Amp corr: 0.0dB	틊 0.0-	- (1		
Bin size: 916 Hz 20.0 -			Bin size: 916 Hz	튭 0.0-	11		
				-10.0 -			
15.0 -				-10.0			
10.0-				-20.0 -			
99% Bandwidth				-20.0 -	1		
5.07 MHz 5.0-		14L	9996 Bandwidth	-30.0 - 4	1		
Power Over Span 0.0 -	199		4.46 MHz	-30.0- millionstal			San and a second
13772.838 mW 733	3.2 735.0 737.5	740.0 740.8	Power Over Span	-40.0 -			- address
56.47 dBm	Frequency (MHz)		36443.632 mW	733.2	735.0	737.5	740.0 740.8
	99% Bandwidth, Power Over Span and PSD		45.62 dBm	700.2		equency (MHz)	/10.0 /10.0
	55% ballomout, rowel ovel span and rsb		dBm	99% Ban	dwidth, Power Over Sp		
Port 2 – LTE – 64Q	AM – 5M – Center Channel – Pe	ak	Port 2 – LTE			annel – Average	
Spectrum Anabizer Settings	1 for -1 control channel -1 con		Spectrum Analyzer Setti	,			14
CF: 737.000 MHz 50.0 -	and the second second second		CF: 737.000 MHz	30.0		a parta a factor de la calegra de la cale	🔤 💭 NTS
SPAN: 7,500 MHz 45.0-			SPAN: 7.500 MHz	25.0 -	1		
RB: 1.000 MHz		N	RB: 120 kHz	20.0-			1
Detector: PK (CISPR) 40.0-			VB: 360 kHz Detector: RMS	15.0 -			
Attn: 20 DB RL Offset: 40.4 DB 35.0 -			Attn: 20 DB	10.0 -			- E
Sweep Time: 1.0s	99% Points	99% Points	RL Offset: 40.4 DB				- 8
Ref Lvl: 50.4 DBM 30.0 -			Sweep Time: 4.4ms Ref Lvl: 50.4 DBM	5.0-			
Max hold: 60 sweeps Amp corr: 0.0dB 25.0 -			ReFLVI: 50.4 DBM Pwr avg: 100 sweeps	0.0-	11		-11
Bin size: 916 Hz			Amp corr: 0.0dB	튧 -5.0-	()		
20.0 -			Bin size: 916 Hz	^{10.0}	ſ		
15.0-				-15.0 -			
				-20.0 -			
10.0-		Automa .					
99% Bandwidth			0001 D 1 1 1 1	-25.0 -	/ :		
5100 100 10	Print I	1.1.1.	99% Bandwidth	-30.0 -	4		
Power Over Span 0.0 -			4,49 MHz	-35.0 -			""""""""""""""""""""""""""""""""""""""
38121.766 mW 733		740.0 740.8	Power Over Span	-40.0 -			
55.66 dBm	Frequency (MHz)		37975.616 mW	733.2	735.0	737.5	740.0 740.8
	99% Bandwidth, Power Over Span and PSD		45.80 dBm		Fre	equency (MHz)	
				99% Ban	dwidth, Power Over Sp	oan and PSD	

ort 1 – LTE – QPSK – 10M – Center Channel – Peak	Port 1 – LTE – QPSK – 10M – Center Channel – Average
sctrum Analyzer Settings 50.0-	Spectrum Analyzer Settings 30.0
: 737,000 MHz	CE: 737.000 MHz
AN: 15.000 MHz 45.0 -	SPAN: 15.000 MHz 25.0-
8: 1.000 MHz 40.0	RB: 120 kHz 20.0-
stector: PK (CISPR) 35.0 - 39% Points 39% Points	VB: 360 kHz Detector: RMS 15.0-
tn: 20 DB	
Unset Holy DB	RL Offset: 40.4 DB
veep Time: 1.0s 25.0 - /	Sweep Time: 8.2ms 5.0-
ax hold: 60 sweeps 20.0 -	Ref Lvl: 50.4 DBM 0.0-
np corr: 0.0dB	Pwr avg: 100 sweeps Amp corr: 0.0dB
1 Size: 1.65 KHz	Bin size: 1.83 kHz -10.0-
10.0-	-10.0
5.0-	-15.0-
0.0-	-20.0 -
Bandwidth -5.0 -	-25.0 -
and the second sec	99% Bandwidth -30.0 -
	the second
ver Over Span -15.0 -	-33.0
19.994 mW 729.5 732.5 735.0 737.5 740.0 742.5 744.5	Power Over Span -40.0 -
55.86 dBm Frequency (MHz)	37011.357 mW 729.5 732.5 735.0 737.5 740.0 742.5
99% Bandwidth, Power Over Span and PSD	45.68 dBm Frequency (MHz)
	99% Bandwidth, Power Over Span and PSD
rt 1 – LTE – 16QAM – 10M – Center Channel – Peak	Port 1 – LTE – 16QAM – 10M – Center Channel – Average
trum Analyzer Settings 50.0-	Spectrum Analyzer Settings 30.0
: 737.000 MHz	CF: 737,000 MHz
N: 15.000 MHz 45.0 -	SPAN: 15.000 MHz 25.0 -
1.000 MHz 40.0 -	RB: 120 kHz 20.0-
ector: PK (CISPR) 35.0 - 99% Points 99% Points	VB: 360 kHz Detector: RMS 15.0 -
20 DB	Attn: 20 DB 10.0 -
	RL Offset: 40.4 DB
Lvi: 50.4 DBM 25.0	Sweep Time: 8.2ms 5.0-
bold: 60 suseeps 20.0 -	Ref Lvl: 50.4 DBM 0.0 -
ster 1.83 kHz	Pwr avg: 100 sweeps Amp corr: 0.0dB
Size: 1.65 KHz	
10.0-	-16.0
5.0-	-15.0-
0.0-	-20.0 -
Bandwidth -5.0 -	-25.0-
ver Over Span -15.0 -	8.92 MHz -35.0 -
96.956 mW 729.5 732.5 735.0 737.5 740.0 742.5 744.5	Power Over Span -40.0 -
56.46 dBm Frequency (MHz)	36897.612 mW 729.5 732.5 735.0 737.5 740.0 742.5
99% Bandwidth, Power Over Span and PSD	45.67 dBm Frequency (MHz)
99% banuwiput, Power Over Span and PSD	99% Bandwidth, Power Over Span and PSD
rt 1 – LTE – 640AM – 10M – Center Channel – Peak	Port 1 – LTE – 64OAM – 10M – Center Channel – Average
737 000 MHz	CF: 737.000 MHz 30.0
N: 15.000 MHz 45.0-	SPAN: 15.000 MHz 25.0 -
1.000 MHz 40.0 -	RB: 120 kHz 20.0-
3.000 MHz 10.0 actor: PK (CISPR) 35.0 - 39%/Points 39% Points	VB: 360 kHz
20 DB	
Offset: 40.4 DB 30.0	Attn: 20 DB 10.0 - RL Offset: 40.4 DB
ep Time: 1.0s 25.0 - /	Sweep Time: 8.2ms 5.0 -
hold: 60 sweeps _ 20.0 -	Ref Lvl: 50.4 DBM 0.0-
o corr: 0.0dB &	Pwr avg: 100 sweeps
1261 1.65 KHZ	Amp corr: 0.0dB -5.0 - Bin size: 1.83 kHz 10.0 -
10.0-	-10.0
	-15.0-
5.0-	-20.0 -
0.0-	
0.0	-25.0-
0.0-	-25.0
0.0- Bandwidth -5.0- 9.34 MHz -10.0-MHMM	99% Bandwidth -30.0-
0.0- 9.34 MHz -10.0- er Over Span -15.0-	9996 Bandwidth -30.0 -
Bandwidth -5.0- 9.34 MHz -10.0- 10.0- 2.38 mW 725.5 732.5 735.0 737.5 740.0 742.5 744.5	99% Bandwidth -30.0 -
Bandwidth -5.0-	99% Bandwidth -30.0 8.93 MHz -35.0 Power Over Span -40.0 16907.946 mW 729.5 732.5 735.0 737.5 740.0 742.5
6 Bandwidth -5.0 - 9.34 MHz -10.0 - wer Over Span -15.0 - 18.238 mW 729.5 732.5 735.0 737.5 740.0 742.5 744.5	99% Bandwidth -30.0 -

Port 2 – LTE – QPSK – 10M – Center Channel – Peak	Port 2 – LTE – QPSK – 10M – Center Channel – Average
Port 2 - LTE - OPSK - TOW - Center Channel - Peak Spectrum Analyzer Settings 50.0 CF1727000 MHz 45.0 RB: 1000 MHz 45.0 Atm 20 DB 35.0 Atm 20 DB 30.0 RL Offset 40 A0B 30.0 Sweep Time: 1.05 25.0 Ref Lvit 50.4 06M 20.0 Bin size: 1.38 kHz 10.0	Spectrum Analyzer Settings 30.0 CF: 737.00 MHz 25.0 VB: 300 MHz 25.0 Percent: NMS 15.0 Atm: 30 DB 10.0 Rt/1x 100 MBz 5.0 Bruse: 100 Sweepp 5.0 Pur avgl: 100 Sweepp -5.0 Bin 30: 138 MHz -10.0
5.0- 0.0- 93% Bandwidth -5.0- 9.34 MHz -10.0- 9.34 MHz -10.0- 93% Bandwidth -15.0- 10.0- -15.0- 10.0- -15.0- 15.0- -15.0- 15.0- -15.0- 15.0- -15.0- 55.35 dBm -15.0- 99% Bandwidth, Power Over Span and PSD	-15.0 -20.0 -25.5 -25.0 -25.5 -25.0 -25.5
Port 2 – LTE – 16QAM – 10M – Center Channel – Peak	Port 2 – LTE – 16QAM – 10M – Center Channel – Average
Spectrum Analyzer Settings 50.0 CF: 737,200 MHz 50.0 Spectrum Analyzer Settings 50.0 VB: 3.000 MHz 45.0 VB: 3.000 MHz 40.0 VB: 3.000 MHz 40.0 VB: 3.000 MHz 35.0 Atm: 30 DB 30.0 RL Offset: 40.4 DB 30.0 RL Offset: 40.4 DB 25.0 Ret LVIS 0.4 DBM 20.0 Amp corr: 0.0dB 15.0 Bin see: 1.03 R-te: 15.0 0.0 0.0	Spectrum Analyzer Settings 30.0 CF 737.000 MHz SSPAN: ISS00 MHz SSPAN: ISS00 MHz SSS NTS SPAN: ISS00 MHz 25.0 25.0 25.0 25.0 NTS VB: 30 kHz 20.0 25.0 25.0 25.0 NTS Delector: RMS 15.0 20.0 0.0 25.0 20.0 20.0 20.0 <
99%5 Bandwidth -5.0 938 MHz Power Over Span 58.47 dBm 99% Bandwidth, Power Over Span and PSD 99% Bandwidth, Power Over Span and PSD	-25.0 99% Bandwidth -30.0 8.32 Mil: -35.0 Power Over Span -40.0 17493.975 mW 729.5 732.5 735.0 737.5 740.0 742.5 744.5 Frequency (MHz)
	99% Bandwidth, Power Over Span and PSD
Port 2 – LTE – 64QAM – 10M – Center Channel – Peak	Port 2 – LTE – 64QAM – 10M – Center Channel – Average
	Construction Annalyzer California
GF: 727 2000 MHz 50.0 SDAN: 1.55 000 MHz 45.0 RB: 1000 MHz 40.0 VB: 3.000 MHz 40.0 VB: 3.000 MHz 50.0 VB: 3.000 MHz 50.0 VB: 3.000 MHz 50.0 Swept Time: 105 25.0 Rel LUBS AVARPS 20.0 Amp corr: 0.05D 15.0 Dim tee: 1.43 SHz 10.0 5.0 0.0	Spectrum Analyzer Settings 30.0 CF: 737.000 MHz 25.0 SPAN: 15.00 MHz 25.0 Mit: 20 KHz 20.0 Delector: RMS 15.0 Athr: 20 AD BB 5.0 Ref. Lvi 50.4 DBB 5.0 Pur avgi: 100 sweeps 5.0 Pur avgi: 100 sweeps
99% Bandwidth -5.0 -	-25.0 - 99% Bandwidth -30.0
9.34 MHz -10.0 - 10.0 -	8.33 MHz -35.0-
9.34 MHz -10.0- Power Over Span -15.0-	-33.0



Port 2 – LTE – QPSK – 5M – High Channel – Peak	Port 2 – LTE – QPSK – 5M – High Channel – Average
Port 2 - LTE - QPSK - 5M - High Channel - Peak Spectrum Analyzer Settings: Spectrum Analyzer Setings: Spectrum Analyzer Set	Port 2 - LTE - QPSK - 5M - High Channel - Average Spectrum Analyzer Setting: 30.0 CF: 742.50 MHz 25.0 SpAin: 50 MHz 20.0 VB: 360 HHz 20.0 Detector: RMS 15.0 Atm: 20 DB 5.0 R. Offset: 40.4 DB 5.0 Bin size: 316 Hz 0.0 Bin size: 316 Hz 0.0 99% Bandwidth -0.0 4.49 MHz -35.0 Power Over Span 40.0 Power Over Span 40.0 735.8 740.0 742.5 745.0 745.0
99% Bandwidth, Power Over Span and PSD	35510.214 mW 738.8 740.0 742.5 745.0 746.2 45.62 dBm Frequency (MHz)
	99% Bandwidth, Power Over Span and PSD
Port 2 – LTE – 16QAM – 5M – High Channel – Peak	Port 2 – LTE – 16QAM – 5M – High Channel – Average
Spectrum Analyzer Settings 50.0 -	Spectrum Analyzer Settings 40.0-
CF: 742.500 MHz SPANT. 2500 MHz 45.0 RB: 1.000 MHz 40.0 Detector: PK (CISPR) 35.0 35.0	CF: 742.500 MHz 10.0 SPAN: 500 MHz 30.0 VB: 360 HHz 30.0 VB: 360 HHz 20.0 Attn: 20 DB 20.0 RL: Offset: 40.4 DB 10.0 RefL: VI: S0.4 DEM 10.0 PWr avgl: 00 sweeps Amp corr: 0.0dB Bin size: 316 Hz -10.0
93% Bandwidth 5.0	-20.0 - 99% Bandwidth -30.0 - 4.47 MHz -30.0 - 15833.981 mW 738.8 740.0 742.5 745.0 746.2 Frequency (MHz)
55 % ballometri, romet over span allo rob	99% Bandwidth, Power Over Span and PSD
Port 2 – LTE – 64QAM – 5M – High Channel – Peak	Port 2 – LTE – 64QAM – 5M – High Channel – Average
	Canada and Analyzan California
GF: 742.200 MHz 50.0 SPAN: 7.500 MHz 45.0 SW: 300 MHz 40.0 Alm: 2005 35.0 Binste: 104 30.0 Amz clock 30.0 Amz clock 30.0 Max hold: 60 Weeps Amp corr: 0.0dB § 25.0 Bin size: 916 Hz 20.0 15.0 10.0	Spectral R 44/267 Settings 35.0 - 99 % FOUNDS 99 % FOUNDS<
5.08 MHz 5.0-	9996 Bandwidth -30.0 -
Power Over Span 0.0	4.49 MHz -35.0
55.59 dBm Frequency (MHz)	Power Over Span -40.0
99% Bandwidth, Power Over Span and PSD	45.62 dBm Frequency (MHz)
	99% Bandwidth, Power Over Span and PSD

ort 2 – LTE – QPSK – 10M – Low Channel – Peak	Port 2 – LTE – QPSK – 10M – Low Channel – Average
ectrum Analyzer Settings 50.0-	Spectrum Analyzer Settings 30.0
F: 734,000 MHz	CF: 734,000 MHz
PAN: 15.000 MHz 45.0 -	5PAN, 15,000 Minz
B: 3,000 MHz	VB: 360 kHz
stector: PK (CISPR) 35.0 - 99% Points stector: PK (CISPR) 39.0 -	Detector: RMS 15.0 -
Offset: 40,4 DB	Attn: 20 DB 10.0 - RL Offset: 40.4 DB
veep Time: 1.0s 25.0 - /	Sweep Time: 8.2ms 5.0 -
af Lvl: 50.4 DBM 20.0 - /	Ref Lvl: 50.4 DBM 0.0-
mp corr: 0.0dB 🖉 🚡 15.0 –	Pwr avg: 100 sweeps
in size: 1.83 kHz 10.0-	
5.0-	-10.0
0.0-	-15.0-
-5.0-	-20.0-
% Bandwidth -10.0-	-25.0 -
9.33 MHz -15.0-	9996 Bandwidth -30.0 -
wer Over Span -20.0 -	8.93 MHz -35.0
706.417 mW 726.5 730.0 732.5 735.0 737.5 740.0 741.5	
55.92 dBm Frequency (MHz)	37581.446 mW 726.5 730.0 732.5 735.0 737.5 740.0 741
	45.75 dBm Frequency (MHz)
99% Bandwidth, Power Over Span and PSD	99% Bandwidth, Power Over Span and PSD
ort 2 – LTE – 16QAM – 10M – Low Channel – Peak	Port 2 – LTE – 16QAM – 10M – Low Channel – Average
actrum Analyzer Settings	Spectrum Analyzer Settings
-: 734.000 MHz	30.0
AN: 15.000 MHz 45.0 -	SPAN: 15.000 MHz
3 3.000 MHz	RB: 120 kHz 20.0 -
tector: PK (CISPR) 35.0 - 39% Points 39% Points	Data day DMC
n: 20 DB 30.0	Attn: 20 DB
veep Time: 1.0s 25.0 -	RL Offset: 40.4 DB
FLvl: 50.4 DBM 20.0 -	Sweep Time: 8.2ms 0.0 -
ax hold: 60 sweeps 2000 np corr: 0.0dB 🚡 15.0-	Pwr arra: 100 sweeps
n size: 1.83 kHz 10.0 -	Amp corr: 0.0dB 🛱 -10.0 -
5.0-	Bin size: 1.83 kHz
0.0-	-20.0-
-5.0	-30.0 -
and the second se	99% Bandwidth
-13.0	8.91 MHz -40.0-
wer Over Span -20.0 -	
212.582 mW 726.5 730.0 732.5 735.0 737.5 740.0 741.5 56.46 dBm Frequency (MHz)	
	25695.203 mW 726.5 730.0 732.5 735.0 737.5 740.0 741
99% Bandwidth, Power Over Span and PSD	45.53 dBm Frequency (MHz)
	99% Bandwidth, Power Over Span and PSD
	Port 2 – LTE – 64QAM – 10M – Low Channel – Average
trum Analyzer Settings 50.0-	Spectrum Analyzer Settings 30.0 -
trum Analyzer Settings 50.0	
trum Analyzer Settings 1724 1000 MHz 15 000 MHz 1000 MHz 1000 1045 1000 1045	Spectrum Analyzer Settings 30.0- CF: 734.000 MHz 25.0- SPAN: 15.000 MHz 25.0- RB: 120 HHz 20.0-
trum Analyzer Settings 50.0 1734.000 MHz 45.0 ANI IS 500 MHz 45.0 3.300 MHz 40.0 3.300 MHz 40.0 99% (Points 99% Points 99% Points	Spectrum Analyzer Settings 30.0 Control NTS CF: 734.000 MHz 25.0 Control NTS RB: 120 kHz 20.0 Control NTS
ctrum Analyzer Settings 1 734.000 MHs Ani IS000 MHs 45.0 – 1.000 MHs 40.0 – 3000 MHs Hectori PK (CISPR) 35.0 – 390% Punts 99% Punts	Spectrum Analyzer Settings 0.0 - 0
Analyzer Settings 50.0 1734.000 MHz 45.0 Ani IS Solo MHz 45.0 1.3000 MHz 40.0 3.3000 MHz 40.0 3.3000 MHz 40.0 99% Points 99% Points 17 20 DB 30.0	Spectrum Analyzer Settings 30.0 - CF: 734.000 MHz 25.0 - SpArt: IS/000 MHz 25.0 - VB: 360 kHz 20.0 - VB: 360 kHz 20.0 - Attn: 20 BB 15.0 - Attn: 20 BB 10.0 -
Analyzer Settings 50.0 1734.000 MHz 50.0 1.000 MHz 45.0 1.000 MHz 45.0 2.000 MHz 30.0 extor IPK (CISPR) 35.0 99% Points 99% Points 99% Points 99% Points	Spectrum Analyzer Settings 30.0 - Control NTS (CF: 734.000 MHz 25.0 - Control NTS Control NTS (SPAH) 15.000 MHz 25.0 - Control NTS Control NTS (Pit Spatial State Stat
Strum Analyzer Settings S0.0 1724.000 MHz 50.0 1.000 MHz 45.0 1.000 MHz 40.0 3.000 MHz 40.0 3.000 MHz 40.0 3.000 MHz 40.0 3.000 MHz 40.0 Store MHZ 50.0 Offset (4) ADB 30.0 Offset (4) ADB 25.0 Util 50 ADBM 20.0 Void (60 Weeps) 20.0	Spectrum Analyzer Settings 30.0 - CF: 734.000 MHz 25.0 - NTS Spectrum K15000 MHz 25.0 - -
Analyzer Settings S0.0 1734.000 MHz 50.0 1.000 MHz 45.0 1.000 MHz 40.0 3.000 MHz 350.0 extorr IPK (CLSPR) 350.0 OFfanti 49.400 30.0 OFfanti 49.400 30.0 VIII S0.40 EMR 30.0 VIII S0.40 EMR 30.0 very Time 1.0s 250.0 VIII S0.40 EMR 20.0 v hold is 60 sweeps § 15.0	Spectrum Analyzer Settings 30.0 CF: 734.000 MHz 25.0 SPARt: IS/000 MHz 25.0 VB: 360 kHz 20.0 VB: 360 kHz 20.0 VB: 360 kHz 15.0 Attn: 20 DB 10.0 Ref Loftst 40.4 DB 5.0 Sweep Time: 8.2ms 5.0 PWr avg: 100 sweeps 6.0 Amount: 0.0 B 0.0
Strum Analyzer Settings S0.0 1724.000 MHz 45.0 1.000 MHz 45.0 1.000 MHz 45.0 1.000 MHz 45.0 99% Points 35.0 99% Points 39% Points	Spectrum Analyzer Settings 30.0 - CF: 734.000 MHz 25.0 - NTS Spectrum K15000 MHz 25.0 - -
ctrum Analyzer Settings 1 724.000 MHz 4 50.0 1 0000 MHz 4 50.0 1 0000 MHz 4 0.0 3 0000 MHz 4 0.0 3 0000 MHz 4 0.0 3 0000 MHz 4 0.0 9 0% Roints 9 0%	Spectrum Analyzer Settings 30.0 CF: 734.000 MHz 25.0 SPArt: IS X000 MHz 25.0 VB: 360 kHz 20.0 VB: 360 kHz 20.0 VB: 360 kHz 15.0 Attn: 20 DB 10.0 Re (LVI 50.4 DB 5.0 Sweep Time: 8.2ms 5.0 Re (LVI 50.4 DB 0.0 Pur avg: 100 sweeps 65.0 Bin size: 1.83 kHz 5.0 -10.0 -
Analyzer Settings 50.0 1734.000 MHz 45.0 1.000 MHz 45.0 3.000 MHz 45.0 1.000 MHz 50.0 Analyzer Settings 50.0 South MHz 45.0 Analyzer Settings 50.0 Officities 35.0 State 35.0 Officities 35.0 State 35.0 State 15.0 State 15.0 State 15.0 State 15.0 State 16.0 State 0.0	Spectrum Analyzer Settings 0.0 - CF: 734.00 MHz 25.0 - SPACH IS 500 MHz 25.0 - RB: 120 kHz 20.0 - Detector: RMS 15.0 - RL: Offsat: 40.4 DB 10.0 - Sweep Time: 8.2ms 5.0 - Ref. U/I S0.4 DBM 0.0 - Sweep Time: 8.2ms 5.0 - Bin ster: 1.83 kHz - -10.0 - -
Strum Analyzer Settings S0.0 1724.000 MHz 45.0 1.000 MHz 45.0 1.000 MHz 55.0 3000 MHz 55.0 actor IP (CISPR) 35.0 90% Prints 39% Prints 000 Mmz 30.0 90% Prints 39% Prints 90% Prints 30.0	Spectrum Analyzer Settings 0.0.0 CF: 734:00 MHz 25.0 RB: 120 kHz 20.0 VB: So KHz 20.0 Athrow DB 10.0 RL: Offsat: 404 ADB 5.0 Ref. Lvit So ADBM 0.0 Sweep Time: 3.2ms 5.0 Amp. corr: 0.0dB 5.0 Bin size: 1.83 kHz 0.0 -15.0 -15.0
1724-000 MHz 45.00 MHz 1000 MHZ 1	Spectrum Analyzer Settings 30.0 CF: 724.000 MHz 25.0 RB: 120 kHz 20.0 Detector: RMS 15.0 Attr: 30 DB 10.0 RV: 10 State 5.0 Sweep Time: 92ms 5.0 Sweep Time: 92ms 5.0 Bin ster: 1.63 kHz 0.0 -10.0 -10.0 -15.0 -20.0 -20.0 -20.0
Strum Analyzer Settings S0.0 1724.000 MHz 45.0 1.000 MHz 45.0 1.000 MHz 55.0 3000 MHz 55.0 actor IP (CISPR) 35.0 90% Prints 39% Prints 000 Mmz 30.0 90% Prints 39% Prints 90% Prints 30.0	Spectrum Analyzer Settings 30.0 CF: 734:00 MHz 25.0 Spectrum K15000 MHz 25.0 RB: 120 kHz 20.0 VB: 506 kHz 20.0 Detector: RMS 15.0 RL: Offset: 40.4 DB 10.0 Sweep Time: 8.2ms 5.0 Ref. UVI: 50.4 DBM 0.0 Sweep Time: 8.2ms 5.0 Ref. UVI: 50.4 DBM 0.0 Pur arg: 100 sweep 5.0 Bin size: 1.83 kHz -10.0 99% Bandwidth -30.0
Bandwidh Ston 39% Points 1:800 MHz 45.0 99% Points 1:000 MHz 40.0 99% Points 1:000 MHz 40.0 99% Points 1:000 MHz 40.0 99% Points 99% Points 99% Points 99% Points 90 Mit State 10.0 10.0 1:00 First 1:83 kHz 50.0 10.0 3:00 - 0 0.0 - 9:8 andwidh - 10.0 3:30 MHz - - 9:8 andwidh - 10.0 - - - 9:33 MHz - - 9:33 MHz - - 9:33 MHz - - - - -	Spectrum Analyzer Settings 0.0.0 CF: 734:00 MHz 25.0 RB: 120 kHz 20.0 VB: 500 MHz 25.0 RB: 120 kHz 20.0 VB: 500 MHz 25.0 RB: 120 kHz 20.0 VB: 500 KHz 20.0 RV: Offsat: 40 40 B 15.0 RV: Offsat: 40 40 B 5.0 Ref Lvit 50.4 0EM 0.0 Povr avg: 100 sweeps
Bandwidth 50.0 Status 1.000 MHz 45.0 45.0 1.000 MHz 45.0 45.0 1.000 MHz 45.0 99% Points 99% Points 30.0 99% Points 99% Points 99% Points 99% Points 99% Points 99% Points 99% Points 900 900 90% Points 900 90% Points 99% Points 900 90% Points 90% Points 900 90% Points 90% Points 900	Spectrum Analyzer Settings 0.0.0 CF: 734:00 MHz 25.0 RB: 120 kHz 20.0 VB: 500 MHz 25.0 RB: 120 kHz 20.0 VB: 500 MHz 25.0 RB: 120 kHz 20.0 VB: 500 KHz 20.0 RV: Offsat: 40 40 B 15.0 RV: Offsat: 40 40 B 5.0 Ref Lvit 50.4 0EM 0.0 Povr avg: 100 sweeps
trum Analyzer Settings 734.000 MHz 1.000 M	Spectrum Analyzer Settings 30.0 CF: 734:00 MHz 25.0 Spectrum K15000 MHz 25.0 RB: 120 kHz 20.0 VB: 50 kHz 20.0 Detector: RMS 15.0 RL: Offset: 40.4 DB 5.0 Sweep Time: 8.2ms 5.0 Ref. Uvi 50.4 DBM 0.0 Sweep Time: 8.2ms 5.0 Bin ster: 1.83 kHz 10.0 93% Bandwidth -30.0 9.33 MHz -35.0
trum Analyzer Settings 734.000 MHz 1.000 M	Spectrum Analyzer Settings 30.0 CF: 734.000 MHz 25.0 RB: 120 kHz 20.0 VP: 50 kHz 20.0 RB: 120 kHz 20.0 Spectrum Analyzer Settings 5.0 RL Offsat 40 AD B 5.0 Ref Uvit 50.40 BM 0.0 Pow roj: 100 sweeps 5.0 Amp corr: 0.04B 5.0 Bin stei: 1.63 kHz -10.0 -15.0 -20.0 -20.0 -25.0 -20.0 -25.0 -20.0 -25.0 -20.0 -25.0 -20.0 -25.0 -23.0 -20.0 -25.0 -20.0 -23.0 -20.0 -23.0 -20.0 -23.0 -20.0 -23.0 -20.0 -20.0 -20.0 -20.0 -20.0 -20

	Port 2 – LTE – QPSK – 10M – High Channel – Average
schum Analyzer Settings 50.0-	Spectrum Analyzer Settings 30.0
	CF: 740,000 MHz
1.000 MHz 40.0-	SPAN: 15.000 MHz 25.0 - RB: 120 kHz 20.0 -
:: 3.000 MHz tector: PK (CISPR) 35.0 - 99% Points 99% Points	VB: 360 kHz
nector: PK (CLSPR) 30.0	Detector: RMS 15.0-
Offset: 40.4 DB	Attn: 20 DB 10.0 - RL Offset: 40.4 DB
	Sweep Time: 8.2ms 5.0-
ax hold: 60 sweeps	RefLvl: 50.4 DBM 0.0-
np corr: 0.0dB	Pwr avg: 100 sweeps Amp corr: 0.0dB & -5.0-
n size: 1.83 kHz 10.0 -	Bin size: 1.83 kHz -10.0 -
5.0-	
0.0-	-15.0 -
-5.0-	-20.0-
6 Bandwidth -10.0 - William	-25.0 -
9.34 MHz -15.0-	99% Bandwidth -30.0 -
wer Over Span -20.0 -	8.93 MHz -35.0-
727.139 mW 732.5 735.0 737.5 740.0 742.5 745.0 747.5	Power Over Span -40.0 -
55.82 dBm Frequency (MHz)	85333.365 mW 732.5 735.0 737.5 740.0 742.5 745.0 747
99% Bandwidth, Power Over Span and PSD	45.48 dBm Frequency (MHz)
99% bandwiddi, Power Over Span and PSD	99% Bandwidth, Power Over Span and PSD
rt 2 – LTE – 16QAM – 10M – High Channel – Peak	Port 2 – LTE – 16QAM – 10M – High Channel – Average
50.0 XIS	
AN: 15.000 MHz 45.0 -	CF: 740.000 MHz SPAN: 15.000 MHz 25.0 -
1.000 MHz 40.0-	RB: 120 kHz 20.0-
3.000 MHz	VB: 360 kHz
120 DB	Detector (NID
Offset: 40.4 DB 30.0	RL Offset: 40.4 DB
eep Time: 1.0s 25.0 -	Sweep Time: 8.2ms 5.0-
x hold: 60 stateops 20.0 -	Ref Lvl: 50.4 DBM 0.0 -
n com 0.048	Amp corr: 0.0dB
10.0-	Bin size: 1.83 kHz -10.0 -
5.0-	
	-15.0-
0.0-	-20.0-
6 Bandwidth -5.0-	-25.0 -
9,39 MHz -10.0 -	9996 Bandwidth -30.0 -
ver Over Span -15.0 -	8.92 MHz -35.0 -
188.832 mW 732.5 735.0 737.5 740.0 742.5 745.0 747.5	Power Over Span -40.0 -
56.40 dBm Frequency (MHz)	36841.176 mW 732.5 735.0 737.5 740.0 742.5 745.0 741
99% Bandwidth, Power Over Span and PSD	45.66 dBm Frequency (MHz)
5777 Balawaa, Tower Over Spantanet SD	99% Bandwidth, Power Over Span and PSD
rt 2 – I TE – 640AM – 10M – High Channel – Peak	
	Port 2 – LTE – 64QAM – 10M – High Channel – Average
trum Analyzer Settings 50.0	Port 2 – LTE – 64QAM – 10M – High Channel – Average
trum Analyzer Settings 50.0	Port 2 – LTE – 64QAM – 10M – High Channel – Average
trum Analyzer Settings 50.0- 740 000 MHz 45.0- 1.000 MHz 45.0-	Port 2 – LTE – 64QAM – 10M – High Channel – Average Spectrum Analyzer Settings GF: 74.000 MHz SPAN: 15.000 MHz 25.0 Productable Analyzer (Statement of Statement of
trum Analyzer Settings 50.0- 740.000 MH: 45.0- Ni 15.000 MH: 45.0- 3.000 MH: 40.0- 3.000 MH: 35.0- 39%/Points 39% Puints	Port 2 – LTE – 64QAM – 10M – High Channel – Average
7 40.000 MHz 45.0 - 1.000 MHz 40.0 - 3.000 MHz 30.0 - actor: PK (CISPR) 35.0 - 39% Points 39% Points 39% Points	Port 2 - LTE - 64QAM - 10M - High Channel - Average Spectrum Analyzer Settings 30.0 CF-77.000 MHz 25.0 RB-120 HHz 25.0 VBIS MHz 20.0 VBIS MHz 10.0
trum Analyser Settings 50.0	Port 2 - LTE - 64QAM - 10M - High Channel - Average Spectrum Analyzer Settings 30.0 CF: 740.000 MHz 25.0 PR: 15.000 MHz 25.0 VB: 380 kHz 20.0 VB: 380 kHz 15.0 Attn: 20 DB 10.0 R. Offsit 400-00 B 10.0
trum Analyzer Settings 50.0	Port 2 - LTE - 64QAM - 10M - High Channel - Average Spectrum Analyzer Settings 30.0 CF: 740.000 MHz 25.0 PRB: 15.000 MHz 25.0 VB: 360 kHz 20.0 VB: 360 kHz 15.0 Detector: RMS 15.0 Atm 20 0.4 DB 5.0 Sweep Time: 82ms 5.0
trum Analyzer Settings 50.0- 740 000 MHz 45.0- 1.000 MHz 45.0- 1.000 MHz 40.0- 3000 MHz 40.0- 3000 MHz 50.0- 1.001 MHz 50.0- 99% Points 99% Points 99% Points 99% Points 100 Points	Port 2 - LTE - 64QAM - 10M - High Channel - Average Spectrum Analyzer Settings 30.0 CF: 740.000 MHz 25.0 PR: 15.000 MHz 25.0 PR: 15.001 MHz 25.0 PR: 15.001 MHz 25.0 Press of Hz 20.0 VB: 350 Hz 10.0 Put 15.00 10.0 Put 15.01 DB 10.0 Ref. LVB 504 DBM 0.0 Pwr avg. 100 Sweep 0.0
trum Analyzer Settings 50.0	Port 2 - LTE - 64QAM - 10M - High Channel - Average Spectrum Analyzer Setting: 30.0 CF: 740.000 MHz 25.0 Spack: 15.000 MHz 25.0 VB: 350 kHz 20.0 VB: 350 kHz 15.0 Delector: RMS 15.0 Attn: 20 DB 10.0 R. U. Offst: 404 ADB 0.0 Ref UK 50 ADBM 0.0 Pwr avg: 100 sweeps 5.0 Ame corr 0.0dB 5.0
rum Analyzer Setting: 740:000 MHz 1000 MHz 1000 MHz 45:00- 1000 MHz 40:00- 399% Print 10 30:00 Hz 1000	Port 2 - LTE - 64QAM - 10M - High Channel - Average Spectrum Analyzer Settings 30.0 CF: 740.000 MHz 25.0 SpAth: 15.000 MHz 25.0 RB: 120 HHz 20.0 W1500 MHz 25.0 RB: 120 HHz 20.0 W1500 MHz 25.0 RB: 120 HHz 0.0 Ref. 120 HHz 10.0 Ref. 120 HHz 0.0 Ref. 120 HHZ 0.0 Ref. 120 HHZ 0.0
trum Analyzer Settings 50.0- 740,000 MHz 45.0- 1.000 MHz 40.0- 3.000 MHz 40.0- 3.000 MHz 40.0- 3.000 MHz 50.0- 3.000 MHz 40.0- setor: PK (CISDR) 35.0- 3.00 - 99% Points 39% Puints 39% Puints 39% Puints 30% Puint	Port 2 - LTE - 64QAM - 10M - High Channel - Average Spectrum Analyzer Settings 30.0 CF: 740.000 MHz 25.0 SpAN: 15.000 MHz 25.0 VB: 380 kHz 15.0 Delector: RMS 10.0 Re Liz 0 DB 10.0 Re Liz 05 4 DEM 0.0 Pwr avg: 100 sweeps 5.0 Amc cori 0.0dB 5.0 Bin size: 1.83 kHz 5.0
trum Analyzer Settings 740.000 MHz 1.000 MHz 1.000 MHz 45.000	Port 2 - LTE - 64QAM - 10M - High Channel - Average Spectrum Analyzer Settings 30.0 CF: 740.000 MHz 25.0 BB: Sol Har 20.0 Delector: RMS 15.0 Attin: 20 DB 10.0 Ref. vkl 50.4 BM 0.0 Devector: RMS 5.0 Ref. vkl 50.4 BM 0.0 Diswept 100 Sweept 5.0 Ref. vkl 50.4 DBM 0.0 Diswept 100 Sweept 0.0 Jin size: 1.83 kHz 5.0 In size: 1.83 kHz -10.0
trum Analyzer Settings 740:000 MHz 1000 MHz 1000 MHz 40:00- 3000 MHz 40:00- 3000 MHz 40:00- 39%/Points 30%/Points 3	Port 2 - LTE - 64QAM - 10M - High Channel - Average CF: 740.00 MHz 30.0 Spectrum Analyzer Settings 30.0 CF: 740.00 MHz 25.0 Bit 20 KHz 20.0 VB: 360 KHz 15.0 Detector IMMS 15.0 Atm 20 DB 10.0 Ref LVI 50.4 DBM 0.0 Port 2 - 1.8 KHz 5.0 Ref LVI 50.4 DBM 0.0 Port 31.8 KHz 5.0 Bit size 1.83 KHz 5.0 -15.0 -15.0 -20.0 -0.0
trum Analyzer Settings 740,000 MHz 1000 MHz 1000 MHz 45.0 - 1000 MHz 40.0 - 3000 MHz 40.0 - 3000 MHz 40.0 - 3000 Hz 40.0 - 3000 - 99% Points 99% Points 90% Po	Port 2 - LTE - 64QAM - 10M - High Channel - Average Spectrum Analyzer Settings 30.0 CF: 740.00 MHz 25.0 SpAN: 15.000 MHz 20.0 VB: 360 kHz 15.0 Detector: RMS 10.0 Re Lub S4 bz 5.0 Sweep Time: 8.2ms 5.0 Bin site: 1.83 kHz 5.0 -10.0 -15.0 -20.0 -25.0
trum Analyzer Settings 740.000 MHz 1.000 MHz 40.0- 3000 MHz 40.0- 3000 MHz 40.0- 3000 MHz 40.0- 3000 MHz 40.0- 3000 MHz 40.0- 39% Points 39% Points 30% Points	Port 2 - LTE - 64QAM - 10M - High Channel - Average Spectrum Analyzer Settings 30.0 CF: 740.000 MHz 25.0 Spectrum Spe
trum Analyzer Settings 70:000 MHz 10:00 MHz 10:00 MHz 40:0 - 30:00 MHz 40:0 - 40:00 MHZ 40:0 - 40:00 MHZ 40:0 - 40:00 MHZ 40:0 - 40:00 MHZ 40:0 - 40:00 MHZ 40:0 - 40:00 MHZ 40:0 - 40:0 -	Port 2 - LTE - 64QAM - 10M - High Channel - Average Spectrum Analyzer Settings 30.0 CF: 740.000 MHz 25.0 PR LOB KHz 20.0 VB: 360 KHz 15.0 Detector: RMS 15.0 Attn: 20 DB 10.0 Re LUB 54 DE 0.0 Pwr avg: 100 tweeps 5.0 Amr. 20 DB 10.0 Re LUB 54 DE 0.0 Pwr avg: 100 tweeps 5.0 Amr. 20 All SHZ 0.0 Pwr avg: 100 tweeps 5.0 Amr. 20 - 10.0 -10.0 Pwr avg: 100 tweeps -5.0 -20.0 -20.0 -20.0 -20.0
trum Analyzer Setting: 740.000 MHz 1000 MHz	Port 2 - LTE - 64QAM - 10M - High Channel - Average Spectrum Analyzer Settings 30.0 CF: 740.000 MHz 25.0 BB: 25 MHz 20.0 Visit 5000 MHz 25.0 BB: 20 MHz 20.0 Visit 5000 MHz 25.0 BB: 20 HHz 20.0 Visit 5000 MHz 25.0 BB: 20 HHz 20.0 Visit 50.4 DBM 10.0 Ref Lvit 50.4 DBM 0.0 Bin size: 1.83 kHz 5.0 -15.0 -10.0 -20.0 -25.0 -20.0 -25.0 -30.0 -35.0
tum Analyzer Setting: 50.0 740.000 MHz 45.0 15.000 MHz 45.0 16.000 MHz 45.0 16.000 MHz 40.0 20 DB 30.0 764.000 MHz 40.0 20 DB 30.0 764.000 MHz 40.0 20 DB 30.0 765.0 30.0 99%/Broints 399% Brints 30.0 50.0 10.0 50.0 50.0 10.0 50.0 10.0 50.0 0.0 93.4 MHz 15.0 10.0 50.0 0.0 - 93.4 MHz 15.0 - - - - - - - - - - - - - - - - - - - - - -	Port 2 - LTE - 64QAM - 10M - High Channel - Average Spectrum Analyzer Settings 30.0 CF: 740.00 MHz 25.0 Span: 15.00 MHz 20.0 VB: 360 kHz 15.0 Detector: RMS 10.0- Re Liz 054 bHz 0.0- Port average 50- Sweep Time: 82ms 5.0- Ref Liv 50.4 DEM 0.0- Porr avg: 100 sweeps 5.0- Am; cori 0.0dB 5.0- Bin stee: 1.83 kHz 5.0- 99% Bandwidth -30.0- -20.0- -25.0- -20.0- -20.0- -25.0- -0- 99% Bandwidth -30.0- 99% Bandwidth -30.0-
rum Analyzer Setting: 740.000 MHz 1000 MHz 1000 MHz 1000 MHz 000 MHz	Port 2 - LTE - 64QAM - 10M - High Channel - Average Spectrum Analyzer Settings 30.0 CF: 740.00 MHz 25.0 SpAN: 15.000 MHz 25.0 VB: 360 kHz 15.0 Detector: RMS 10.0 Re Luis 04 bHz 0.0 Powr avg: 100 sweeps 5.0 Atm: 20 DB 10.0 Re Luis 04 DEB 0.0 Pwr avg: 100 sweeps 5.0 Atm: 20 JB 0.0 Pwr avg: 100 sweeps 5.0 Atm: 20 JB 0.0 Pwr avg: 100 sweeps 5.0 Bin site: 1.83 kHz 5.0 99% Bandwidth -30.0 99% Bandwidth -30.0 99% Bandwidth -30.0 90.0 -40.0

Emission Bandwidths (26dB and 99%)

Results for 718MHz – 728MHz band (Port 3):

Emissions bandwidths were measured on low and high channels in 5MHz channel bandwidth mode and on center channel in 10MHz channel bandwidth mode for all modulations and results presented below.

	LTE - QPSK			LTE - 16QAM				LTE - 64QAM				
	Lo	Low High		Low H		gh Lo		w Hi		gh		
	26dB (MHz)	99% (MHz)	26dB (MHz)	99% (MHz)	26dB (MHz)	99% (MHz)	26dB (MHz)	99% (MHz)	26dB (MHz)	99% (MHz)	26dB (MHz)	99% (MHz)
5M	4.876	4.491	4.876	4.492	4.866	4.482	4.858	4.487	4.859	4.501	4.885	4.502

	LTE-	QPSK	LTE - "	I6QAM	LTE - 64QAM			
	Center		Cei	nter	Center			
	26dB (MHz) 99% (MHz)		26dB (MHz) 99% (MHz)		26dB (MHz)	99% (MHz)		
10M	9.725	8.982	9.708	8.997	9.764	8.987		

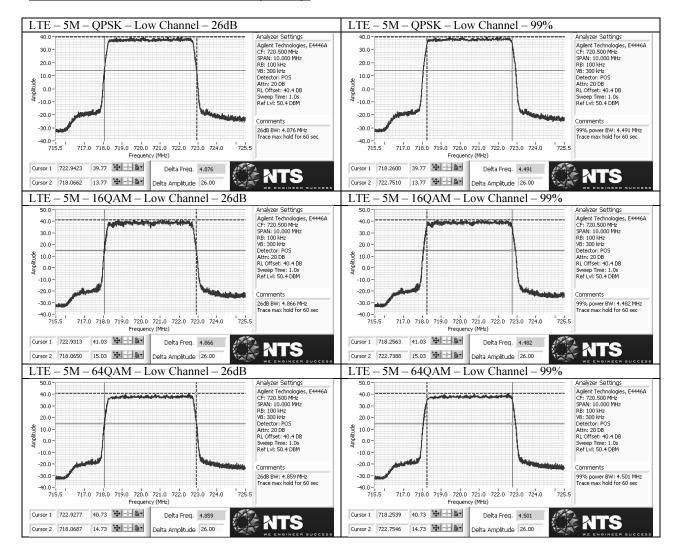
Results for 729MHz – 745MHz band (Port 2):

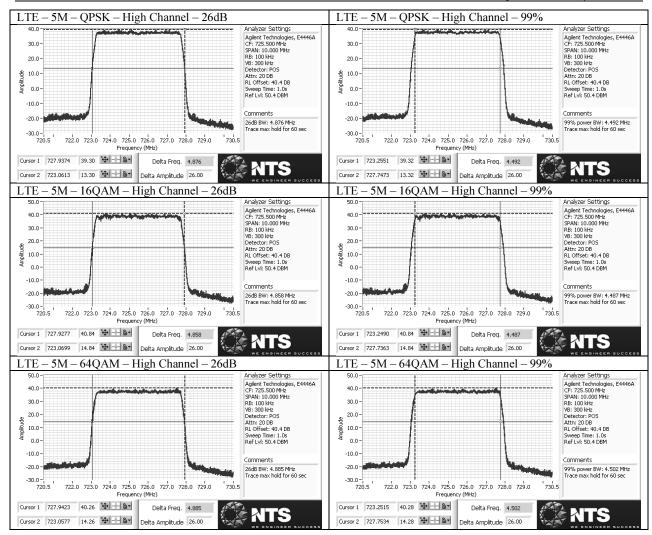
Emissions bandwidths were measured on low and high channels in both 5MHz and 10MHz channel bandwidth modes for all modulations and results presented below.

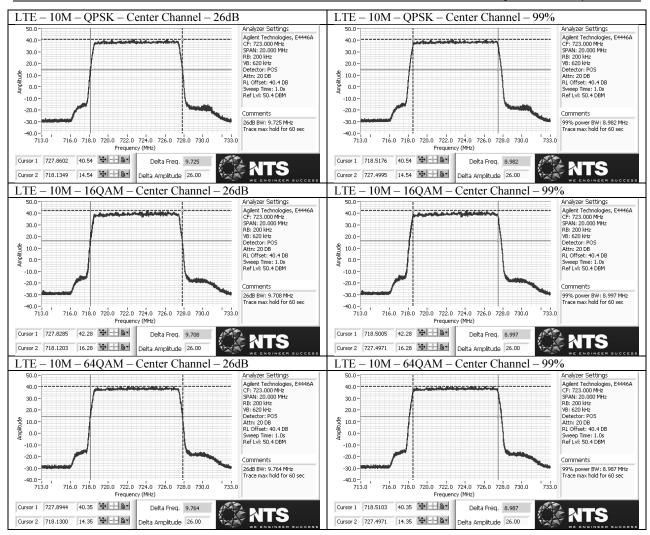
	LTE - QPSK				LTE - 16QAM				LTE - 64QAM			
	Low High		Low		High		Low		High			
	26dB (MHz)	99% (MHz)	26dB (MHz)	99% (MHz)	26dB (MHz)	99% (MHz)	26dB (MHz)	99% (MHz)	26dB (MHz)	99% (MHz)	26dB (MHz)	99% (MHz)
5M	4.882	4.49	4.882	4.491	4.865	4.486	4.865	4.486	4.885	4.503	4.891	4.506
10M	9.718	8.992	9.728	8.997	9.725	9.001	9.73	9.004	9.752	8.997	9.759	9.001

Corresponding plots included on the following pages.

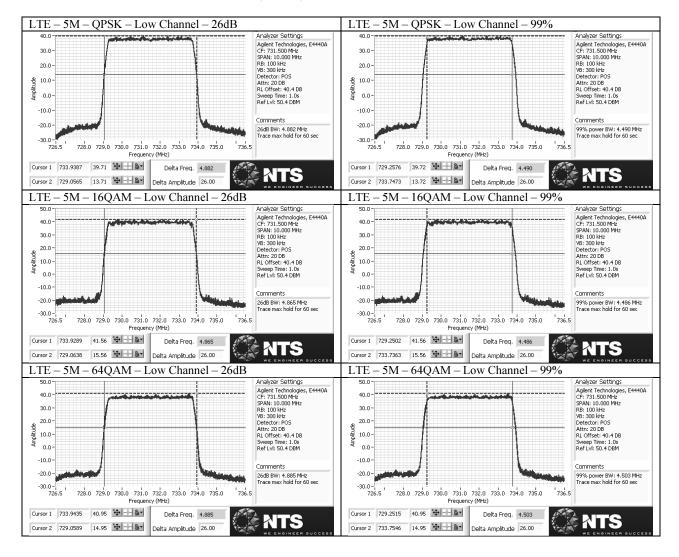
Plots for 718MHz – 728MHz band (Port 3):

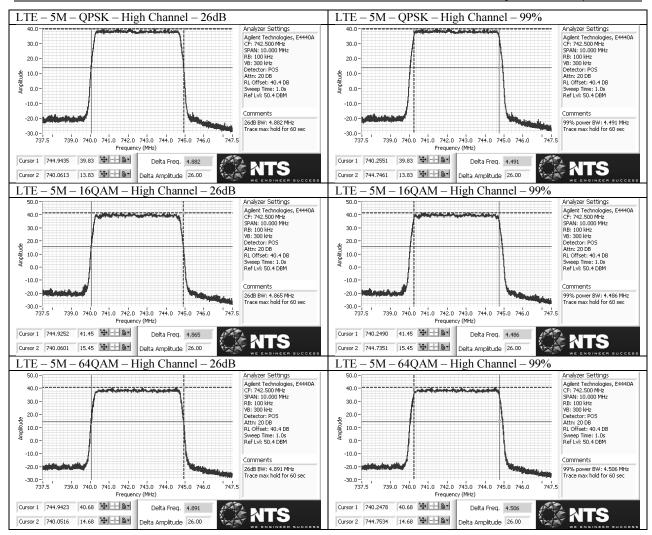


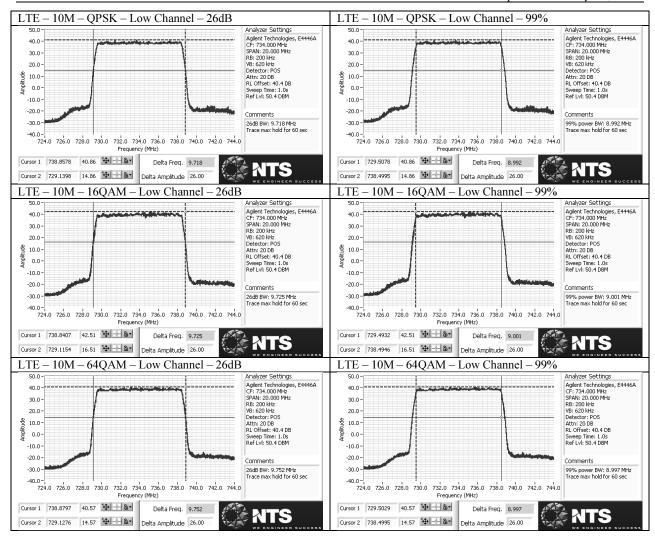


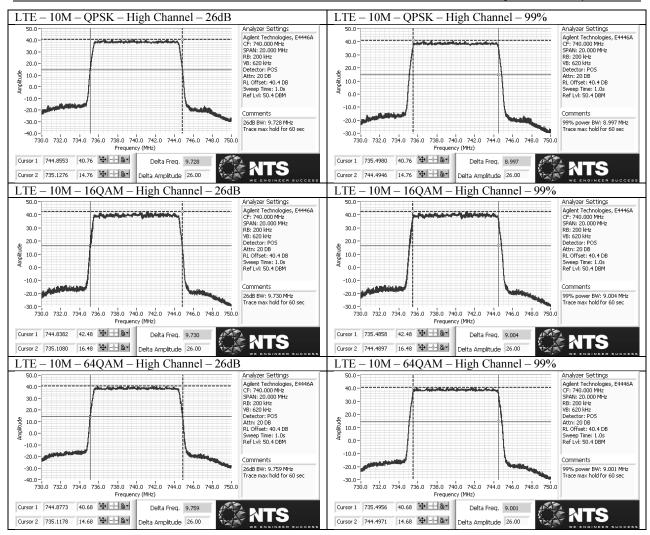


Plots for 729MHz - 745MHz band (Port 2):









Antenna Port Conducted Bandedge

<u>718MHz – 728MHz band (Port 3)</u>:

Limit is -13dBm per §27.53(f) and is further reduced by 10*log(2) per FCC KDB 662911D01 v02r01 due to 2x2 MIMO operation, which brings it down to -16.02dBm.

In 5MHz channel bandwidth mode, low and high channels as well as dual carrier mode (low channel + high channel) configurations were tested. In 10MHz channel bandwidth mode, unit can only operate in single carrier mode at the center channel.

Results summary:

	LTE - QPSK		LTE - 1	I6QAM	LTE - 64QAM	
	Low	High	Low	High	Low	High
5M	-27.41	-27.61	-27.9	-27.56	-28.4	-27.4
10M	-24.2	-24.03	-24.72	-23.67	-24.47	-24.41
5M Dual	-30.17	-29.84	-30.65	-30.36	-30.74	-29.32

All corresponding plots are included on the following pages.

Measurements performed in RMS average mode with 100kHz RBW and 300kHz VBW over 100 traces. In 100kHz bands immediately outside and adjacent to the frequency block, resolution bandwidth has been reduced to 30kHz as allowed in §27.53(f).

Total path loss of 40.4dB accounted in via reference level offset to the spectrum analyzer.

<u>729MHz – 745MHz band (Port 2)</u>:

Limit is -13dBm per §27.53(f) and is further reduced by 10*log(2) per FCC KDB 662911D01 v02r01 due to 2x2 MIMO operation, which brings it down to -16.02dBm.

In 5MHz channel bandwidth mode, low and high channels as well as dual carrier mode (low channel + high channel) configurations were tested.

In 10MHz channel bandwidth mode low and high channels were tested.

Results summary:

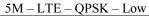
	LTE - QPSK		LTE - 1	16QAM	LTE - 64QAM		
	Low	High	Low	High	Low	High	
5M	-28.39	-27.74	-28.34	-27.68	-28.24	-27.38	
10M	-23.61	-24.7	-23.58	-23.88	-23.33	-25.82	
5M Dual	-25.36	-29.23	-30.2	-30.34	-29.19	-30.05	

All corresponding plots are included on the following pages.

Measurements performed in RMS average mode with 100kHz RBW and 300kHz VBW over 100 traces. In 100kHz bands immediately outside and adjacent to the frequency block, resolution bandwidth has been reduced to 30kHz as allowed in §27.53(f).

Total path loss of 40.4dB accounted in via reference level offset to the spectrum analyzer.

Plots for 718MHz – 728MHz band (Port 3):



-35.0 - , 717.90

718.00 Frequency (MHz) 718.05

Delta Freq. 145 kHz

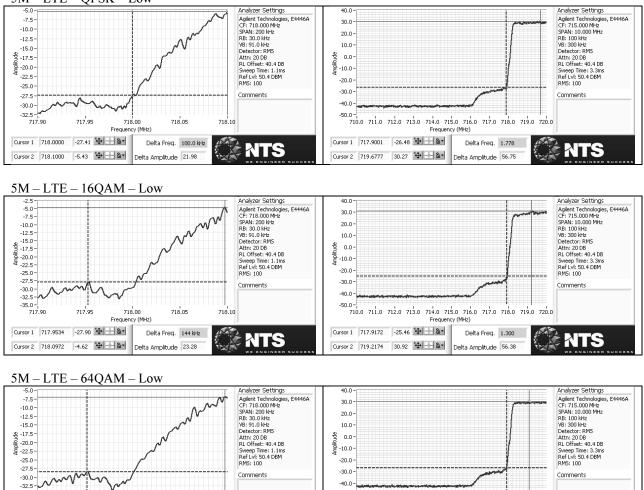
718.10

NTS

717.95

Cursor 2 718.0975 -6.94 🛧 🗟 Delta Amplitude 21.46

Cursor 1 717.9523 -28.40 🕁 🕸



-50.0

Cursor 1 717.9099 -26.99 🕁 🕸

Cursor 2 719.0868 30.13 🔶 🛧 💩 🕇

710.0 711.0 712.0 713.0 714.0 715.0 716.0 717.0 718.0 719.0 720.0 Frequency (MHz)

Delta Freq. 1.177

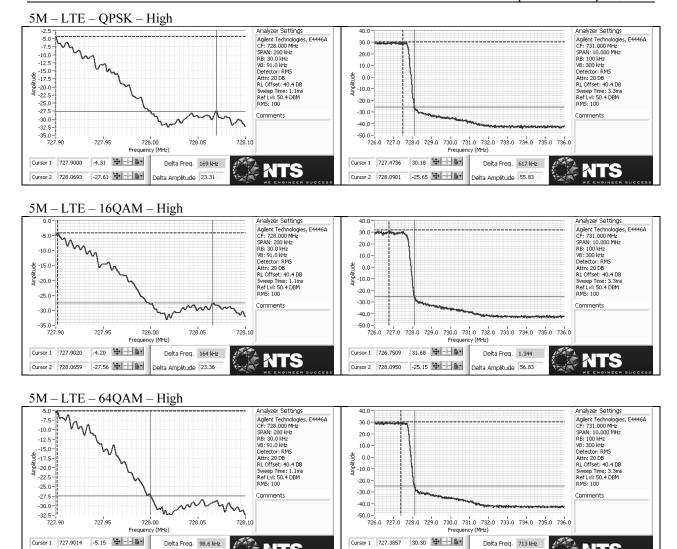
Delta Amplitude 57.12

RΠ

Cursor 2 728,0000

-27.40 🕁 🕂 🗟 🗸

Delta Amplitude 22.25



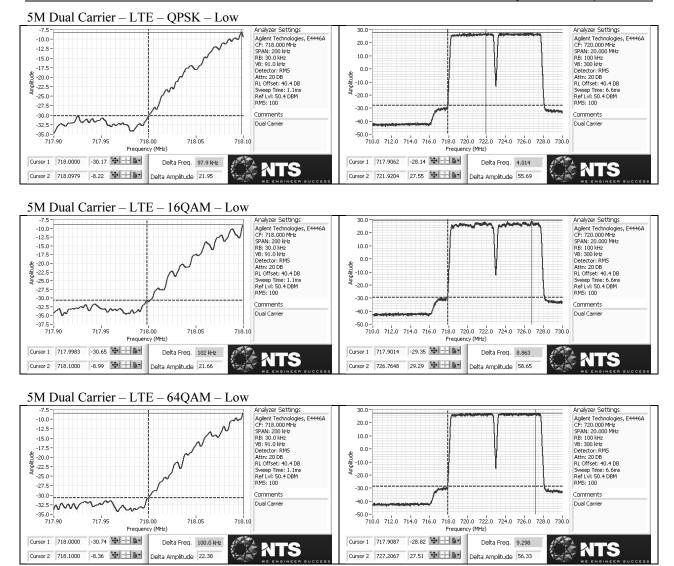
Cursor 2 728.0986 -24.95 🕁 📥

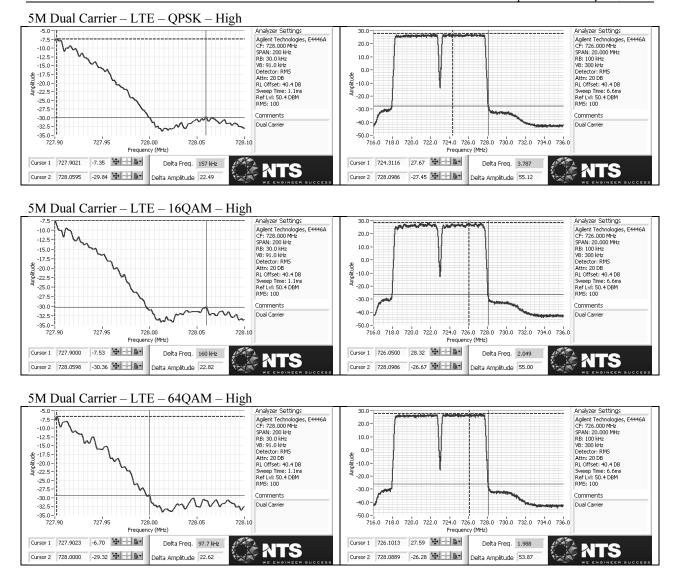
NTS

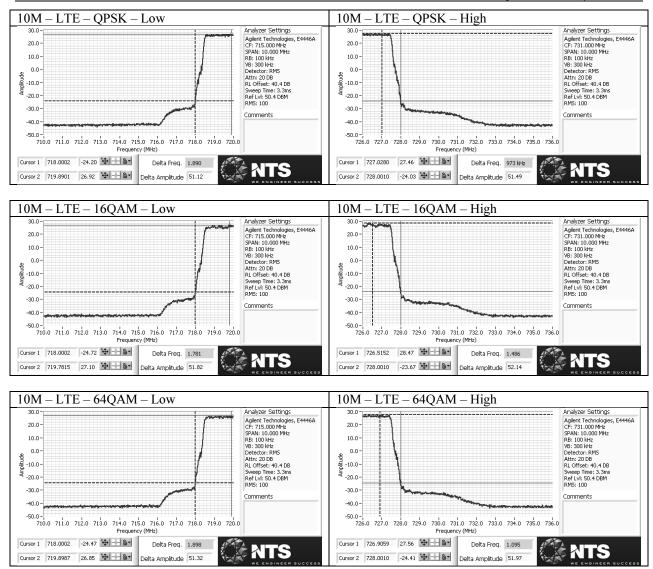
A

Delta Amplitude 55.25

NTS

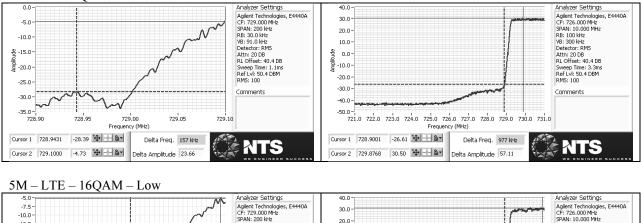


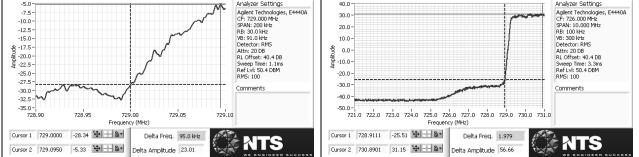




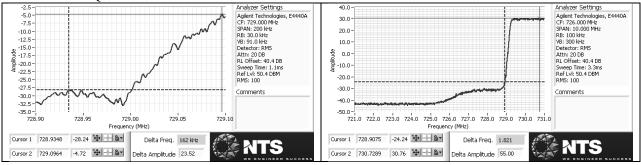
Plots for 729MHz – 745MHz band (Port 2):

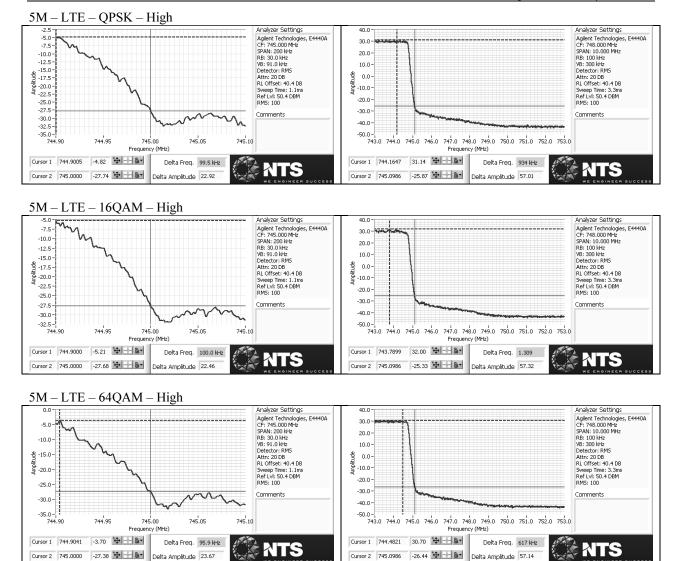
5M - LTE - QPSK - Low

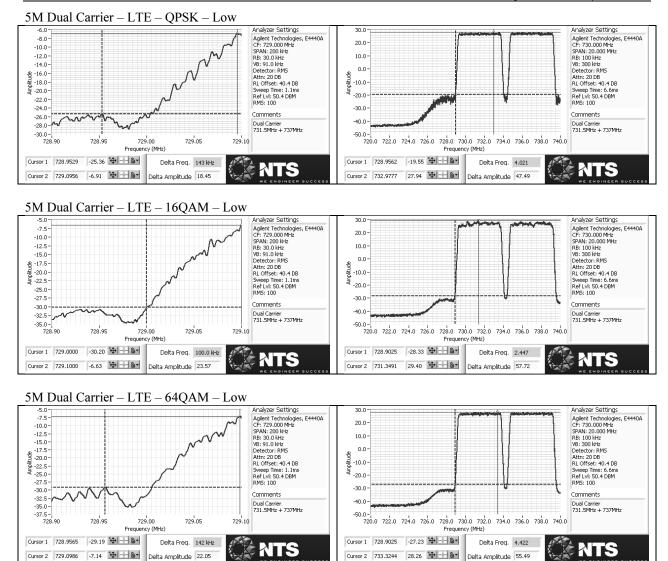


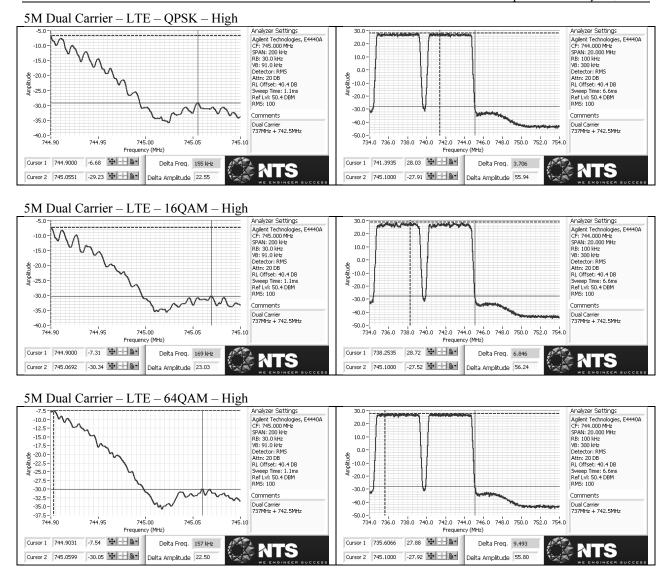


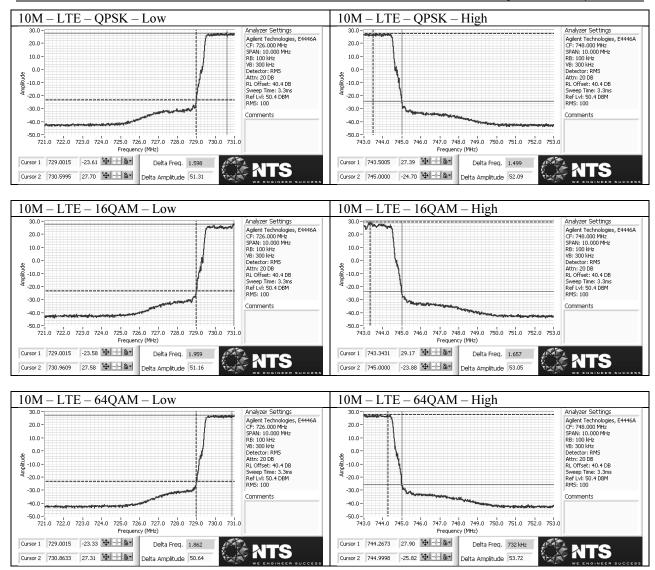
5M-LTE-64QAM-Low











Transmitter Antenna Port Conducted Spurious Emissions

Tests performed on both frequency bands at center channel for all modulations and bandwidth modes. Due to 2x2 MIMO operation, limit is -16.02dBm (-13dBm - 10*log(2)) per FCC KDB 662911D01 v02r01.

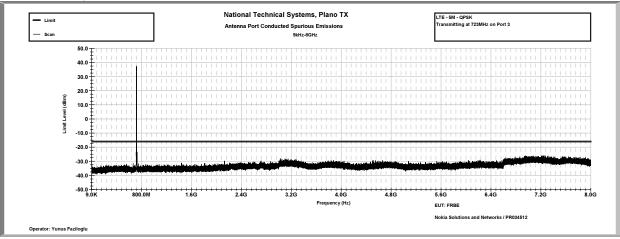
	1 1 • / /•	· · · · · · · · · · · · · · · · · · ·
III E6 measurement software was us	d during festing	with the following settings.
TILE6 measurement software was use	a aumg cosmig	with the following settings.

Frequency Range	RBW	VBW	Number of data points	Divided into	Detector	Sweep Time	Max hold over
9kHz-150kHz	1kHz	3kHz	8000	1 segment	Peak	Auto	50 sweeps
150kHz-8GHz	100kHz	300kHz	8000	12 segments	Peak	Auto	50 sweeps

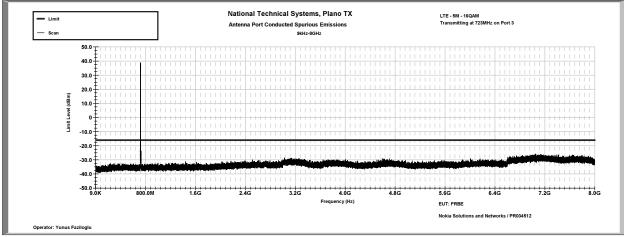
Corresponding plots are included on the following pages.

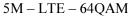
Plots for 718MHz – 728MHz band (Port 3):

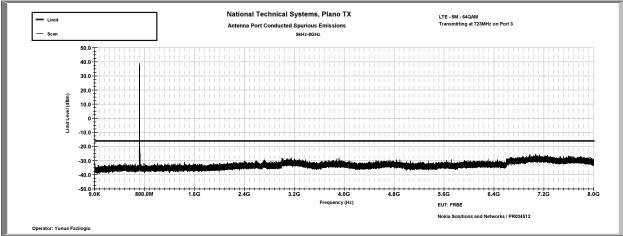
5M - LTE - QPSK



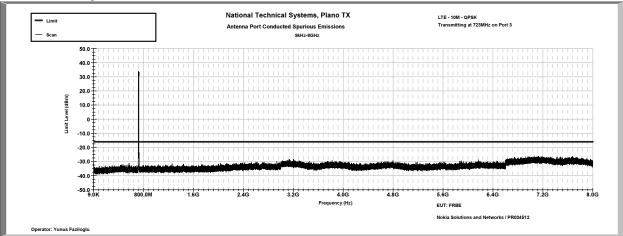
5M - LTE - 16QAM

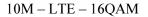


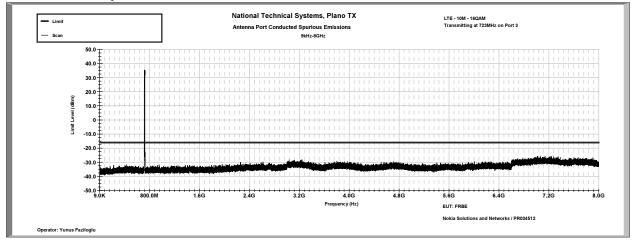


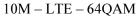


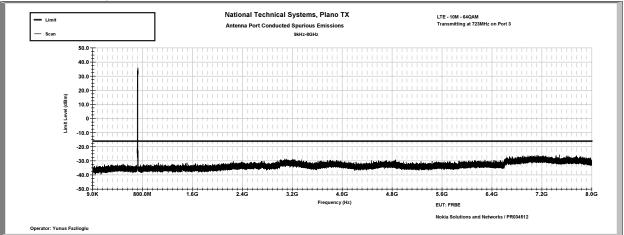
10M - LTE - QPSK











27.53(e):

This section is informational only for 718MHz - 728MHz band (Port 3)

Limit: -40dBm/MHz EIRP for wideband emissions, -50dBm/MHz EIRP for discrete emissions

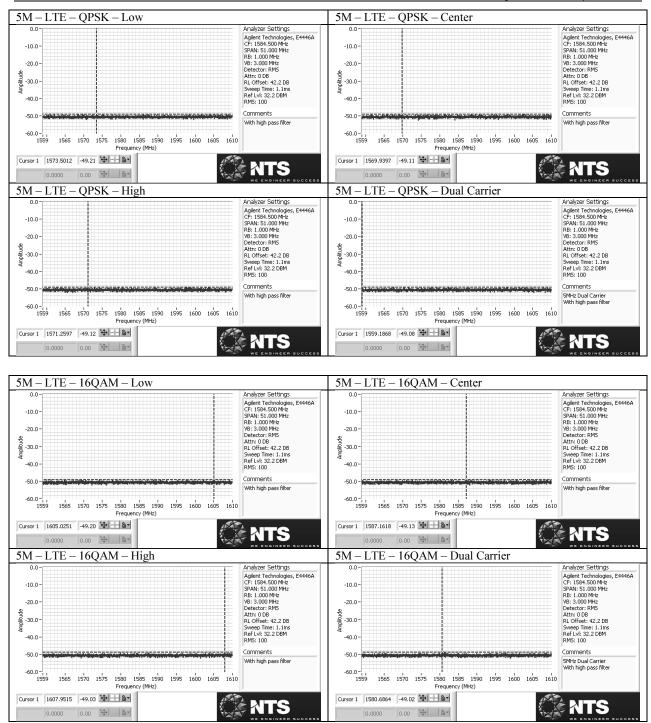
Results summary:

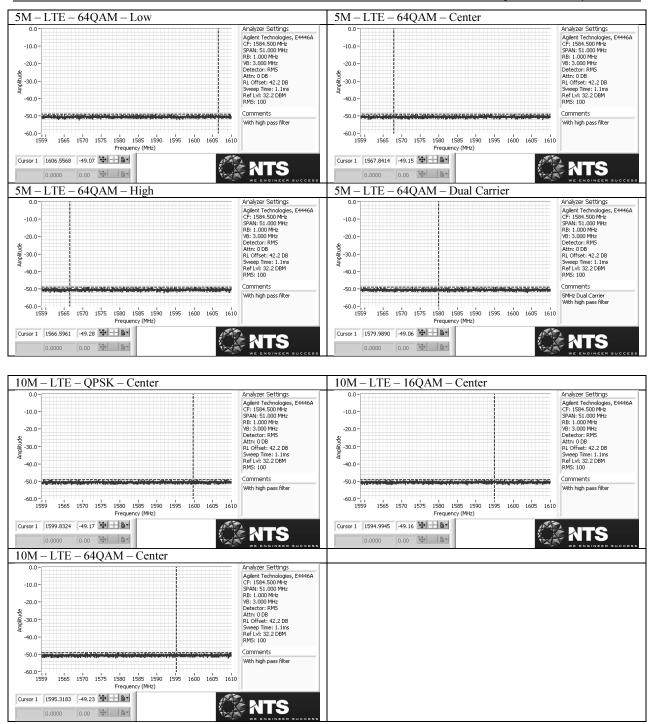
	LTE-QPSK			LTE-16QAM			LTE-64QAM		
	Low	Center	High	Low	Center	High	Low	Center	High
5M	-49.21	-49.11	-49.12	-49.2	-49.13	-49.03	-49.07	-49.15	-49.28
10M	-49.17		-49.16			-49.23			
5M Dual	-49.08			-49.02			-49.06		

Measurements performed conducted at the antenna port in RMS average mode with 1MHz RBW and 3MHz VBW over 100 traces. All readings were at the instrumentation noise floor.

In order to reduce the measurement instrumentation noise floor a 1GHz high pass filter has been used to block the fundamental. Total path loss of 42.2dB accounted in via reference level offset to the spectrum analyzer.

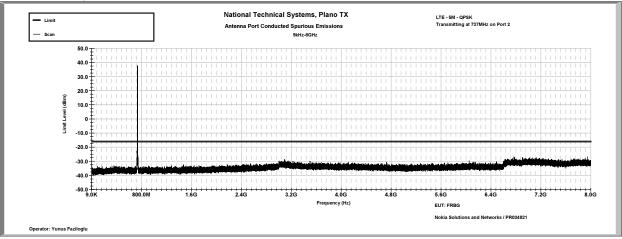
All corresponding plots are included on the following pages.



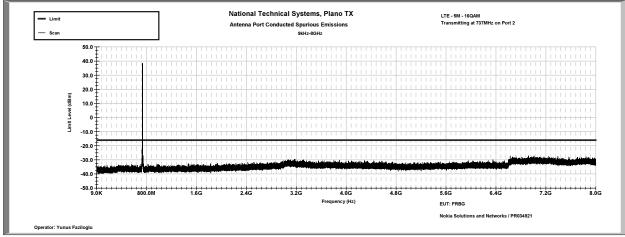


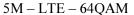
Plots for 729MHz – 745MHz band (Port 2):

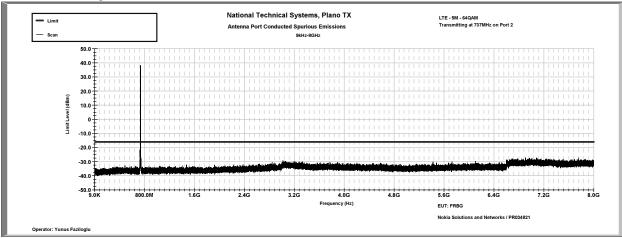
5M - LTE - QPSK



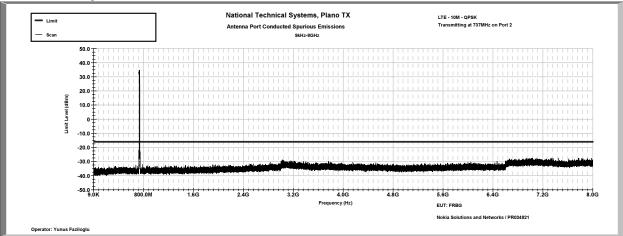
5M - LTE - 16QAM

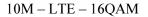


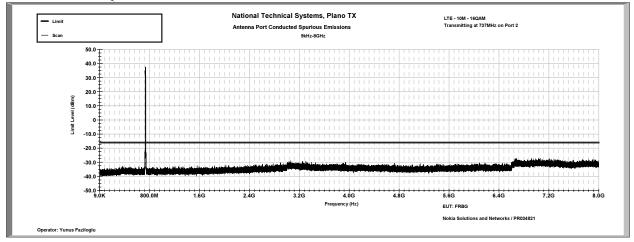


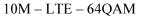


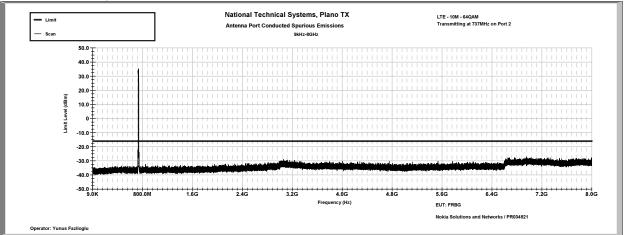
10M - LTE - QPSK











27.53(e):

This section is informational only for 729MHz - 745MHz band (Port 2)

Limit: -40dBm/MHz EIRP for wideband emissions, -50dBm/MHz EIRP for discrete emissions

Results summary:

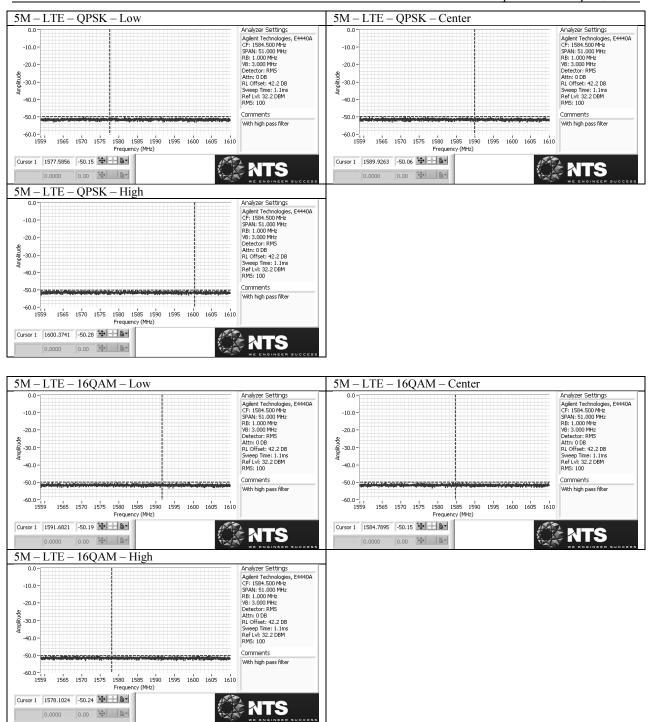
	LTE-QPSK			LTE-16QAM			LTE-64QAM		
	Low	Center	High	Low	Center	High	Low	Center	High
5M	-50.15	-50.06	-50.28	-50.19	-50.15	-50.24	-50.13	-50.09	-50.19
10M	-49.05	-50.26	-49.11	-49.06	-50.22	-49.03	-49.02	-50.06	-49.23
5M Dual	-50.13		-50.07	-50.08		-50.07	-50.25		-50.29

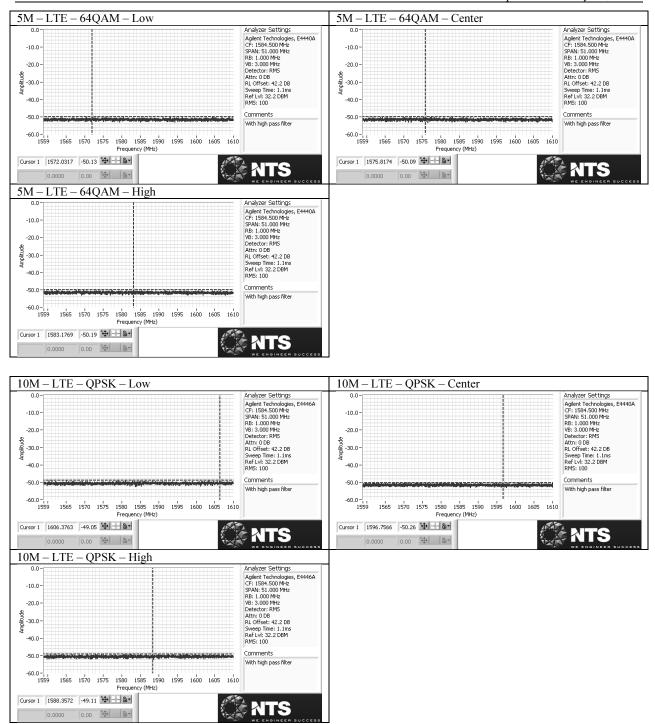
Note: 5M Dual Low = 731.5MHz + 737MHz, 5M Dual High = 737MHz + 742.5MHz

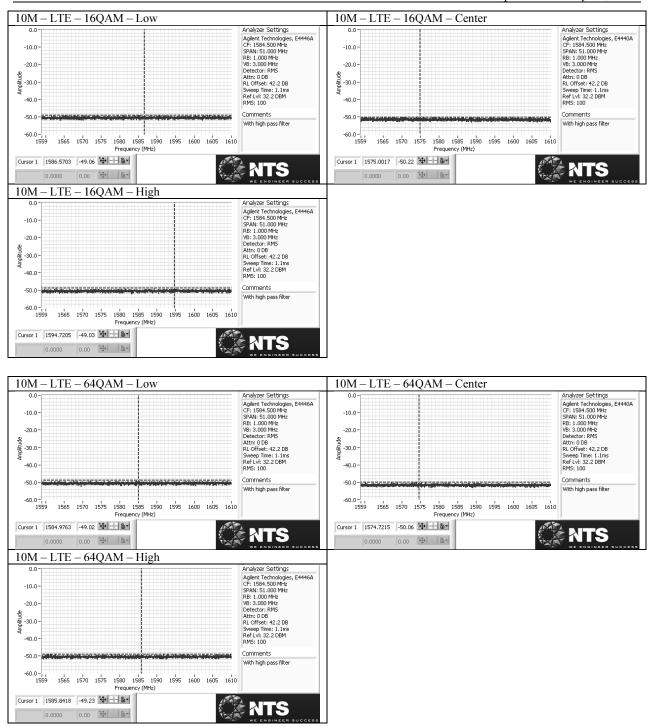
Measurements performed conducted at the antenna port in RMS average mode with 1MHz RBW and 3MHz VBW over 100 traces. All readings were at the instrumentation noise floor.

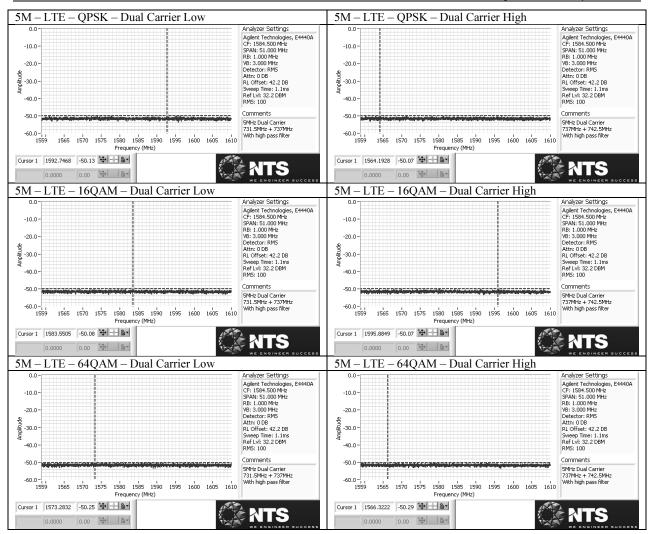
In order to reduce the measurement instrumentation noise floor a 1GHz high pass filter has been used to block the fundamental. Total path loss of 42.2dB accounted in via reference level offset to the spectrum analyzer.

All corresponding plots are included on the following pages.









Transmitter Radiated Spurious Emissions

Antenna port conducted spurious emissions tests produced similar results for all modulations and channel bandwidth modes. Preliminary scans for radiated spurious emissions were performed in 30MHz – 8GHz frequency range in the following configuration:

Transmitting in 5MHz-64QAM-LTE mode at center channel (737MHz) on ports 1 and 2. Transmitting in 5MHz-64QAM-LTE mode at center channel (723MHz) on ports 3 and 4.

Final maximized peak radiated emissions were measured in these modes. During testing all 4 antenna ports of the base station were terminated with 50ohm termination blocks and unit was transmitting on all of its ports at full power as described above.

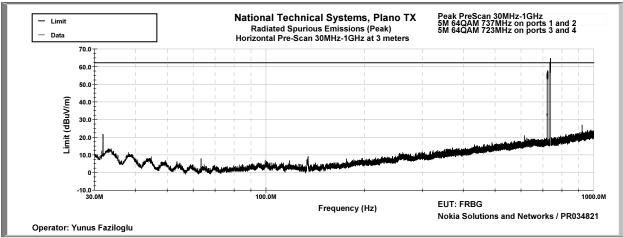
Frequency (MHz)	Polarity (H/V)	Raw Reading at 3m (dBuV)		Antenna Factor (dB/m)	Cable Loss (dB)	Corrected Field Strength at 3m (dBuV/m)	Limit at 3m (dBuV/m)	Margin (dB)
921.6	V	45.2	-38.3	24.9	3.8	35.6	82.2	-46.6
921.6	Н	42.1	-38.3	24.9	3.8	32.5	82.2	-49.7
1000	V	38.5	-37.5	25.2	4	30.2	82.2	-52
1000	Н	37.2	-37.5	25.2	4	28.9	82.2	-53.3
1228.8	V	46.2	-49.4	25.5	3.4	25.7	82.2	-56.5
1228.8	Н	44.6	-49.4	25.5	3.4	24.1	82.2	-58.1
2457.6	V	47.1	-48.2	28.4	4.4	31.7	82.2	-50.5
2457.6	Н	43.1	-48.2	28.4	4.4	27.7	82.2	-54.5
7920 (NF)	V	39.3	-45.4	37	7.9	38.8	82.2	-43.4
7920 (NF)	Н	39.6	-45.4	37	7.9	39.1	82.2	-43.1
Corrected Fiel	Corrected Field Strength = Raw Reading + Amplifier Gain + Antenna Factor + Cable Loss							
Negative marg	Negative margin indicates a passing result.							
Detector: Pea	k, RBW=100	kHz, VBW=30	00kHz, Max-ho	old				
NF: Noise Floo	or							

Highest noise floor of the measurement instrumentation was more than 20dB below the 82.2dBuV/m at 3m limit (equivalent to -13dBm EIRP).

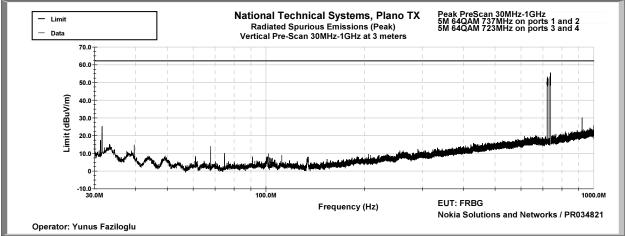
Since all maximized readings were more than 20dB below the 82.2dBuV/m at 3m limit (equivalent to -13dBm EIRP), substitution measurements were not performed.

TILE software was used for all prescans and plots included on the following pages. The limit shown on the plots is 20dB below the 82.2dBuV/m at 3m limit.

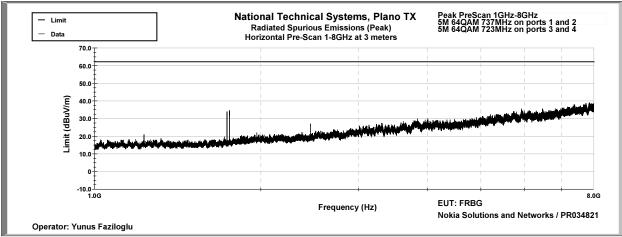
30MHz - 1GHz Peak Prescan at 3m - H



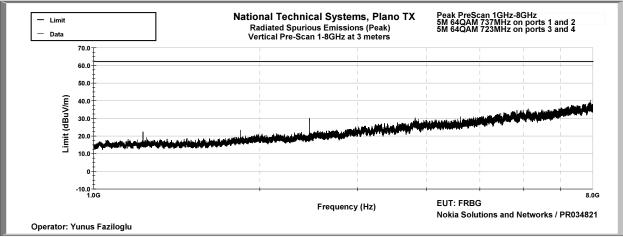




1GHz – 8GHz Peak Prescan at 3m – H



1GHz – 8GHz Peak Prescan at 3m – V



Frequency Stability

In order to demonstrate carrier frequency stability at extreme temperatures and voltages, frequency error was measured in the following configuration:

Transmitting in 10MHz-64QAM-LTE mode at center channel (737MHz) on port 2. Transmitting in 10MHz-64QAM-LTE mode at center channel (723MHz) on port 3.

Nominal operating voltage of the product is declared as 48VDC.

Frequency error results are listed below for extreme voltages and temperatures.

Extreme Voltages

	723MHz	737MHz
20C	Freq. Error (mHz)	Freq. Error (mHz)
40.8VDC	451	548
55.2VDC	435	378

Extreme Temperatures

	723MHz	737MHz
48VDC	Freq. Error (mHz)	Freq. Error (mHz)
-30	259	512
-20	325	358
-10	271	414
0	267	520
10	238	593
20	278	528
30	412	505
40	256	562
50	362	497

Based on the results above, highest recorded frequency error is equivalent to 0.0008ppm, which ensures that the transmitted signal remains in its authorized frequency block at extreme voltages and temperatures.

Results above are deemed sufficient to demonstrate carrier frequency stability for all other channel bandwidth modes and modulations since all carriers are controlled by the same frequency stabilization circuitry that was subjected to the extreme conditions under this test.

End of Report

This page is intentionally blank and marks the last page of this test report.