DEKRA Certification, Inc.
405 Glenn Dr. Suite 12,
Sterling, VA 20164
United States of America

DEKRA

ACCREDITED
Test Lab
Cert 2764.01

FCC LISTED, REGISTRATION NUMBER: 2764.01

ISED LISTED REGISTRATION NUMBER: 23595-1

Test report No:
2416ERM.002

Test report

REFERENCE STANDARD: USA FCC Part 22 & CANADA ISED RSS-132

Identification of item tested	Cat1 Module Supporting B2/B5/B12/B25/B26
Trademark	Sequans Communications
Model and /or type reference	SP150Q
Other identification of the product	FCC ID: 2AAGMSP150Q IMEI TAC:35199610
Features	Sequans SP150Q module includes Calliope Category 1 baseband, a complete triple band RF front end, memory and required circuitry to meet 3GPP E-UTRA (Long Term Evolution - LTE, Release 10 set of specifications). - Operates on LTE bands 25, 26, 2, 5, 12 - Ultra-small 22.5 x 22.5 x 1.5 mm LGA module - Single or dual antenna - Based on Sequans' Calliope LTE Cat 1 platform 3GPP Release 10; software-upgradable to Release 11 - PTCRB compliant - Category 1 throughput (10Mbps DL/ 5 Mbps UL) - Multi-band FDD and TDD capable - Embedded IMS clients
Manufacturer	Sequans Communications S.A. 15-55 Boulevard Charles de Gaulle, Colombes, 92700, France.
Test method requested, standard	USA FCC Part 22 10-1-18 Edition CANADA IC RSS-132 Issue 3, Jan 2013. KDB 971168 D01 v03r01 Measurement guidance for certification of licensed digital transmitters. KDB 971168 D02 v02r01 for Miscellaneous and basic review and approval items for transmitting equipment used in licensed radio services. ANSI C63.26 – 2015.
Summary	IN COMPLIANCE
Approved by (name / position & signature)	Domingo Galvez EMC&RF Lab Manager Digitally signed by Domingo Galvez DN: cn=Domingo Galvez, o=DEKRA Certification Inc., ou=Regulatory Lab, email=dgalvez@dekra.com, c=US Date: 2019.04.16 22:36:47 -04'00'
Date of issue	04-15-2019
Report template No	FDT08_21

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Competences and guarantees

DEKRA Certification Inc. is a testing laboratory accredited by A2LA (The American Association for Laboratory Accreditation), to perform the tests indicated in the Certificate 2764.01.

DEKRA Certification Inc. is a testing laboratory competent to carry out the tests described in this report.

In order to assure the traceability to other national and international laboratories, DEKRA Certification Inc. has a calibration and maintenance program for its measurement equipment.

DEKRA Certification Inc. guarantees the reliability of the data presented in this report, which is the result of the measurements and the tests performed to the item under test on the date and under the conditions stated on the report and, it is based on the knowledge and technical facilities available at DEKRA Certification at the time of performance of the test.

DEKRA Certification Inc. is liable to the client for the maintenance of the confidentiality of all information related to the item under test and the results of the test.

The results presented in this Test Report apply only to the particular item under test established in this document.

IMPORTANT: No parts of this report may be reproduced or quoted out of context, in any form or by any means, except in full, without the previous written permission of DEKRA Certification Inc.

General conditions

1. This report is only referred to the item that has undergone the test.
2. This report does not constitute or imply on its own an approval of the product by the Certification Bodies or competent Authorities.
3. This document is only valid if complete; no partial reproduction can be made without previous written permission of DEKRA Certification Inc.
4. This test report cannot be used partially or in full for publicity and/or promotional purposes without previous written permission of DEKRA Certification Inc. and the Accreditation Bodies.

Uncertainty

Uncertainty (factor k=2) was calculated according to the DEKRA Certification internal document PODT000.

Frequency (MHz)	U(k=2)	Units
30-180	3.82	dB
180-1000	2.61	dB
1000-18000	2.92	dB
18000-40000	2.15	dB

Data provided by the client

The SP150Q is a complete LTE module including base-band, RF and memory, for the design of connected consumer electronics devices, tablet and laptop computers, machine-to-machine devices, and other devices with embedded LTE connectivity. SP150Q is based on Sequans' Calliope platform.

DEKRA declines any responsibility with respect to the information provided by the client and that may affect the validity of results.

Usage of samples

Samples undergoing test have been selected by: The client.

Sample S/01 is composed of the following elements:

Control Nº	Description	Model	Serial Nº	Date of reception
2416.02	Sequans SP150Q	SP150Q	IMEI:351996100001464	02/19/2019
2416.04	Radial isotropic Antenna	OmniLogo 90200	1868A-A38927180014	02/19/2019
2416.05	Radial isotropic Antenna	OmniLogo 90200	1RR0100174TLB	02/19/2019
2416.08	USB cable	C15332	-	02/19/2019

1. Sample S/01 has undergone following test(s):

   All conducted and radiated tests indicated in appendix A.

Test sample description

Ports…… :	Port name and description	Cable				
		Specified length [m]	Attached during test	Shielded		
	USB	2	☒	☐		
	UART0		☐	☐		
	UART2		☐	☐		
	UART3		☐	☐		
	PWR		☐	☐		
	SIM		☐	☐		
Supplementary information to the ports…… :	Insert 1 SIM card in one of SIM -2FF or SIM-3FF holder. Do not insert SIM in both SIM-2FF and SIM-3FF at the same time					
Rated power supply .....:	Voltage and Frequency		Reference poles			
			L1	L2	L3	N	PE
	☐	AC: 230Vac / 50Hz.	☐	☐	☐	☐	☐
	☐	AC:	☐	☐	☐	☐	☐
	☐	DC:					
	☒	5V from USB 2.0 port					
Rated Power .....:	5V from USB 2.0 port						
Clock frequencies .....:	USB 2.0						
Other parameters.....:	No Data provided						
Software version .....:	4.3.4.3						
Hardware version.....:	SP150 EVT1						
Dimensions in cm (L x W x D) ....:	17 x 24 mm						
Mounting position.....:	☒	Table top equipment					
	☐	Wall/Ceiling mounted equipment					
	☐	Floor standing equipment					
	☐	Hand-held equipment					
	☐	Other:					
Modules/parts .....:	Module/parts of test item		Type	Manufacturer		
	HWPT-003-B		interface board	Sequans		
Accessories (not part of the test item) .....:	Description	Type		Manufacturer		
	USB wire	cable				
	OmniLOG 90200	antenna		Omnilog		
Documents as provided by the applicant.....:	Description	File name		Issue date		
	Equipment declaration data	FDT30_14 Declaration Equipment Data		2018/12/28		

Copy of marking plate:

Identification of the client

Sequans Communications S.A.

15-55 Boulevard Charles de Gaulle, Colombes, 92700, France

Testing period and place

Test Location	DEKRA Certification, Inc.
Date (start)	02-21-2019
Date (finish)	04-11-2019

Document history

Report number	Date	Description
2416ERM.002	04-15-2019	First release

Environmental conditions

In the control chamber, the following limits were not exceeded during the test:

Temperature	Min. = 15 ºC Max. = 35 ºC
Relative humidity	Min. = 30 % Max. = 75 %
Air pressure	Min. = 860 mbar Max. = 1060 mbar

In the semi anechoic chamber, the following limits were not exceeded during the test.

Temperature	Min. = 15 ºC Max. = 35 ºC
Relative humidity	Min. = 30 % Max. = 75 %
Air pressure	Min. = 860 mbar Max. = 1060 mbar

In the chamber for conducted measurements, the following limits were not exceeded during the test:

Temperature	Min. = 15 ºC Max. = 35 ºC
Relative humidity	Min. = 30 % Max. = 60 %
Air pressure	Min. = 860 mbar Max. = 1060 mbar

Remarks and comments

The tests have been performed by the technical personnel: Sravani Gollamudi and Koji Nishimoto.

Testing verdicts

Not applicable :	N/A
Pass :	P
Fail :	F
Not measured :	N/M

Summary

FCC PART 22 / IC RSS-132 PARAGRAPH					
Report Section	**FCC Spec Clause**	**RSS Spec Clause**	**Test Description**	**Verdict**	**Remark**
A.1	§2.1046 and §22.913	RSS-132 Clause 5.4	RF Output power	P	N/A
A.2	§2.1047	RSS-132 Clause 5.2	Modulation characteristics	P	N/A
A.3	§2.1055 and §22.355	RSS-132 Clause 5.3	Frequency stability	P	N/A
A.4	§2.1049	RSS-132 Clause 5.1	Occupied Bandwidth	P	N/A
A.5	§2.1051 and §22.917	RSS-132 Clause 5.5	Spurious emissions at antenna terminals	P	N/A
A.6	§22.917	RSS-132 Clause 5.5	Spurious emissions at antenna terminals at Block edges	P	N/A
A.7	§2.1053 and §22.917	RSS-132 Clause 5.5	Radiated emissions	P	N/A
Supplementary information and remarks: N/A					

List of equipment used during the test

Conducted Measurements

CONTROL NUMBER	DESCRIPTION	LAST CALIBRATION	NEXT CALIBRATION
1039	Spectrum analyzer Rohde & Schwarz FSV40	2018/10	2020/10
1149	Wideband Radio Communication Tester Rohde & Schwarz CMW 500	2018/07	2020/07
1041	EMI Test Receiver Rohde & Schwarz ESR 7	2017/04	2019/03
101	Climatic chamber Espec	2019/10	2020/10

Radiated Measurements

CONTROL NUMBER	DESCRIPTION	LAST CALIBRATION	NEXT CALIBRATION
1179	Semi anechoic Absorber Lined Chamber Frankonia SAC 3 plus “L”	N/A	N/A
1065	BiconicalLog antenna ETS LINDGREN 3142E	2017/03	2020/03
1058	Double-ridge Waveguide Horn antenna 1-18 GHz	2017/03	2020/03
1059	Double-ridge Waveguide Horn antenna 18-40 GHz	2017/03	2020/03
1039	Spectrum analyzer Rohde & Schwarz FSV40	2018/10	2020/10
0980	RF pre-amplifier 30 MHz-6 GHz Bonn Elektronik BLMA 0360-01N	2017/05	2019/05
0981	RF pre-amplifier 1-18 GHz Bonn Elektronik BLMA 0118-2A	2018/10	2020/10
1015,1017, 1019, 1020	Rohde & Schwarz EMC32 software	N/A	N/A

Appendix A: Test Results for

FCC Part 22/ IC RSS-132

Appendix A Content

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PRODUCT INFORMATION

The following information is provided by the client

Information	Description
Modulation	QPSK, QAM
Maximum RF Output Power	23 dBm
Operation mode:	
- Operating Frequency Range	Band 26: 824-849 MHz
- Nominal Channel Bandwidth	Band 26: 1.4 / 3 / 5 / 10 / 15 MHz
Extreme operating conditions	
- Temperature range	T_{nom} = +15 to + 35 T_{min} = -30 T_{max} = +50
Antenna type	Radial Isotropic
Antenna gain	0 dBi
Nominal Voltage	
- Supply Voltage	5 Vdc
- Type of power source	USB 2.0 port
Equipment type	LTE module CAT1

DESCRIPTION OF TEST CONDITIONS

The worst case was found when positioned as the table below. Following channel(s) was (were selected for the final test as listed below:

<table>
<tr><th>TEST CONDITIONS</th><th>DESCRIPTION</th></tr>
<tr><td>TC#01
LTE Band 26</td><td>
<u>Power supply (V):</u>
$V_{nominal}$ = 5 Vdc
<u>Test Frequencies for Conducted tests:</u>
<u>1.4 MHz Bandwidth</u>:
-Lowest Channel: 26797(824.7 MHZ)
-Middle Channel: 26915(836.5 MHz)
-Highest Channel: 27033(848.3 MHz)
<u>3 MHz Bandwidth</u>:
-Lowest Channel: 26805(825.5 MHZ)
-Middle Channel: 26915(836.5 MHz)
-Highest Channel: 27025(847.5 MHz)
<u>5 MHz Bandwidth</u>:
-Lowest Channel: 26815(826.5 MHZ)
-Middle Channel: 26915(836.5 MHz)
-Highest Channel: 27015(846.5 MHz)
<u>10 MHz Bandwidth</u>:
-Lowest Channel: 26840(829 MHZ)
-Middle Channel: 26915(836.5 MHz)
-Highest Channel: 26990(844 MHz)
<u>15 MHz Bandwidth</u>:
-Lowest Channel: 26865(831.5 MHZ)
-Middle Channel: 26915(836.5 MHz)
-Highest Channel: 26965(841.5 MHz)
<u>Test Frequencies for Radiated tests:</u>
<table>
<tr><th>Available Frequencies</th><th>Tested Frequency</th><th>Channel Bandwidth</th><th>Modulation</th><th>Mode</th></tr>
<tr><td>824 to 849 MHz</td><td>824.7 MHz
836.5 MHz
848.3 MHz</td><td>1.4 MHz</td><td>QPSK</td><td>1 RB</td></tr>
</table>
Note: This device was tested under all bandwidths, RB configurations and modulations. The worst case found in QPSK modulation.
</td></tr>
</table>

TEST CONDITIONS	DESCRIPTION
TC#02 LTE Band 26	Power supply (V): $V_{nominal}$ = 5 Vdc Test Frequencies for Conducted tests: 1.4 MHz Bandwidth: - Channel: 26790 (824.0 MHZ) 3 MHz Bandwidth: - Channel: 26790 (824.0 MHZ) 5 MHz Bandwidth: - Channel: 26790 (824.0 MHZ) 10 MHz Bandwidth: - Channel: 26790 (824.0 MHz) 15 MHz Bandwidth: - Channel: 26790 (824.0 MHZ)

TEST A.1: RF OUTPUT POWER

LIMITS:	Product standard:	FCC Part 22 / IC RSS-132
	Test standard:	FCC §2.1046 and §22.913. RSS-132 Clause 5.4

LIMITS

The ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 Watts.

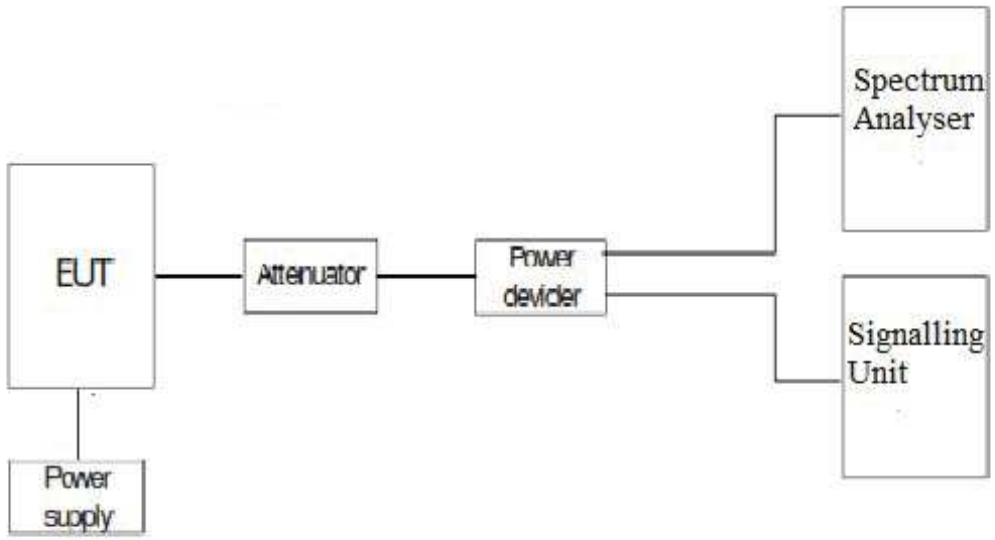
The peak-to-average ratio (PAR) of the transmission shall not exceed 13 dB.

RSS-132 Clause 5.4

The transmitter output power shall be measured in terms of average power. The equivalent isotropically radiated power (e.i.r.p.) for mobile equipment shall not exceed 11.5 watts. Refer to SRSP-503 for base station e.i.r.p. limits.

In addition, the peak-to-average power ratio (PAPR) of the transmitter shall not exceed 13 dB for more than 0.1% of the time using a signal corresponding to the highest PAPR during periods of continuous transmission

TEST SETUP



TESTED SAMPLES:	S/01
TESTED CONDITIONS MODES:	TC#01
TEST RESULTS:	PASS

LTE QPSK AND 16QAM MODULATION. Bandwidth = 1.4 MHz

Channel	Average power at antenna port (dBm)	Maximum declared antenna gain (dBi)	Maximum E.I.R.P. average power (dBm)	PAPR (dB)
Lowest	20.78	0.0	20.78	7.19
Middle	20.89	0.0	20.89	7.30
Highest	20.86	0.0	20.86	6.23

LTE QPSK AND 16QAM MODULATION. Bandwidth = 3 MHz

Channel	Average power at antenna port (dBm)	Maximum declared antenna gain (dBi)	Maximum E.I.R.P. average power (dBm)	PAPR (dB)
Lowest	20.48	0.0	20.48	7.57
Middle	20.69	0.0	20.69	7.59
Highest	20.75	0.0	20.75	6.64

LTE QPSK AND 16QAM MODULATION. Bandwidth = 5 MHz

Channel	Average power at antenna port (dBm)	Maximum declared antenna gain (dBi)	Maximum E.I.R.P. average power (dBm)	PAPR (dB)
Lowest	20.36	0.0	20.36	7.10
Middle	20.64	0.0	20.64	7.86
Highest	20.4	0.0	20.4	7.01

LTE QPSK AND 16QAM MODULATION. Bandwidth = 10 MHz

Channel	Average power at antenna port (dBm)	Maximum declared antenna gain (dBi)	Maximum E.I.R.P. average power (dBm)	PAPR (dB)
Lowest	20.27	0.0	20.27	6.67
Middle	20.62	0.0	20.62	7.07
Highest	20.69	0.0	20.69	6.64

LTE QPSK AND 16QAM MODULATION. Bandwidth = 15 MHz

Channel	Average power at antenna port (dBm)	Maximum declared antenna gain (dBi)	Maximum E.I.R.P. average power (dBm)	PAPR (dB)
Lowest	20.57	0.0	20.57	7.04
Middle	20.32	0.0	20.32	7.62
Highest	20.65	0.0	20.65	7.83`
Measurement uncertainty (dB)			<±0.95	

TEST RESULTS (Cont):	

Bandwidth (MHz)	Channel Location Frequency (MHz) Channel Number	Modulation	Resource Block Size	Resource Block Offset	Average power at antenna port (dBm)	PAPR (dB)
1.4	Lowest (26797 (824.7 MHz))	QPSK	1	0	20.78	6.14
			1	5	20.59	
			3	0	20.6	
			3	2	20.54	
			6	0	19.65	
		16-QAM	1	0	19.83	7.19
			1	5	19.71	
			3	0	19.55	
			3	2	19.49	
			6	0	18.67	
	Middle (26915 (836.5 MHz))	QPSK	1	0	20.89	6.14
			1	5	20.81	
			3	0	20.78	
			3	2	20.75	
			6	0	19.85	
		16-QAM	1	0	20	7.30
			1	5	19.93	
			3	0	19.83	
			3	2	19.84	
			6	0	18.88	
	Highest (27033 (848.3 MHz))	QPSK	1	0	20.86	5.36
			1	5	20.55	
			3	0	20.65	
			3	2	20.56	
			6	0	19.7	
		16-QAM	1	0	19.9	6.23
			1	5	19.72	
			3	0	19.66	
			3	2	19.57	
			6	0	18.67	

TEST RESULTS (Cont):

Bandwidth (MHz)	Channel Location Frequency (MHz) Channel Number	Modulation	Resource Block Size	Resource Block Offset	Average power at antenna port (dBm)	PAPR (dB)
3	Lowest (26805 (825.5 MHz))	QPSK	1	0	20.48	6.0
			1	14	20.31	
			8	0	19.31	
			8	7	19.22	
			15	0	19.22	
		16-QAM	1	0	19.57	7.57
			1	14	19.49	
			8	0	18.34	
			8	7	18.26	
			15	0	18.25	
	Middle (26915 (836.5 MHz))	QPSK	1	0	20.69	6.64
			1	14	20.61	
			8	0	19.64	
			8	7	19.6	
			15	0	19.58	
		16-QAM	1	0	19.66	7.59
			1	14	19.66	
			8	0	18.72	
			8	7	18.7	
			15	0	18.65	
	Highest (27025 (847.5 MHz))	QPSK	1	0	20.75	5.68
			1	14	20.43	
			8	0	19.75	
			8	7	19.52	
			15	0	19.61	
		16-QAM	1	0	19.76	6.64
			1	14	19.55	
			8	0	18.87	
			8	7	18.61	
			15	0	18.61	

TEST RESULTS (Cont):

Bandwidth (MHz)	Channel Location Frequency (MHz) Channel Number	Modulation	Resource Block Size	Resource Block Offset	Average power at antenna port (dBm)	PAPR (dB)
5	Lowest (26815 (826.5 MHz))	QPSK	1	0	20.36	6.06
			1	24	20.35	
			12	0	19.17	
			12	11	19.13	
			25	0	19.15	
		16-QAM	1	0	19.32	7.10
			1	24	19.35	
			12	0	18.16	
			12	11	18.15	
			25	0	20.11	
	Middle (26915 (836.5 MHz))	QPSK	1	0	20.64	6.26
			1	24	20.5	
			12	0	19.51	
			12	11	19.48	
			25	0	19.48	
		16-QAM	1	0	19.73	7.86
			1	24	19.67	
			12	0	18.53	
			12	11	18.53	
			25	0	20.38	
	Highest (27015 (846.5 MHz))	QPSK	1	0	20.4	5.71
			1	24	20.39	
			12	0	19.55	
			12	11	19.57	
			25	0	19.53	
		16-QAM	1	0	19.43	7.01
			1	24	19.52	
			12	0	18.6	
			12	11	18.6	
			25	0	19.75	

TEST RESULTS (Cont):

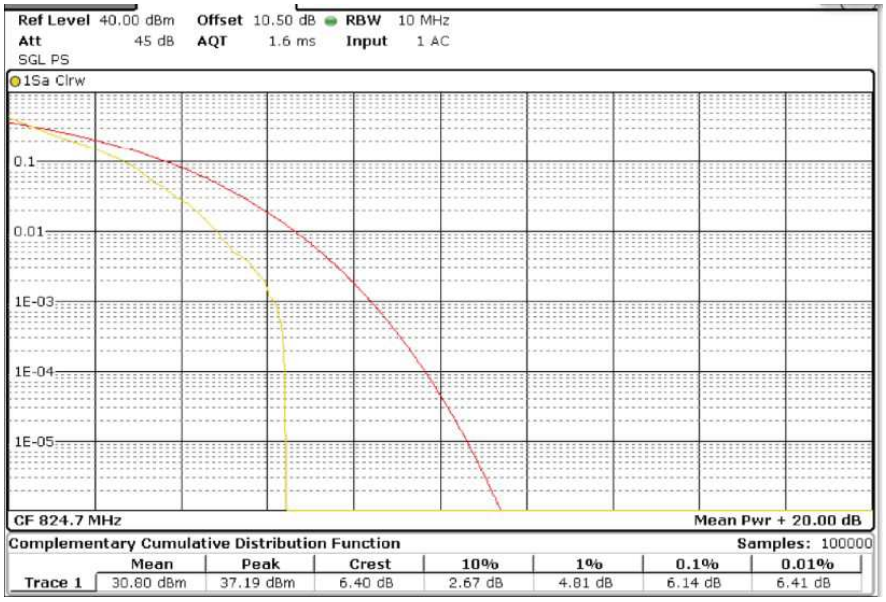
Bandwidth (MHz)	Channel Location Frequency (MHz) Channel Number	Modulation	Resource Block Size	Resource Block Offset	Average power at antenna port (dBm)	PAPR (dB)
10	Lowest (26840 (829 MHz))	QPSK	1	0	20.27	6.29
			1	49	20.21	
			25	0	19.02	
			25	24	19.22	
			50	0	19.12	
		16-QAM	1	0	19.1	6.67
			1	26	18.89	
			27	0	19.57	
	Middle (26915 (836.5 MHz))	QPSK	1	0	20.62	6.32
			1	49	20.08	
			25	0	19.43	
			25	24	19.38	
			50	0	19.36	
		16-QAM	1	0	19.39	7.07
			1	26	19.39	
			27	0	19.15	
	Highest (26990 (844 MHz))	QPSK	1	0	20.69	5.97
			1	49	20.28	
			25	0	19.46	
			25	24	19.43	
			50	0	19.23	
		16-QAM	1	0	19.67	6.64
			1	26	19.58	
			27	0	20.03	

TEST RESULTS (Cont):

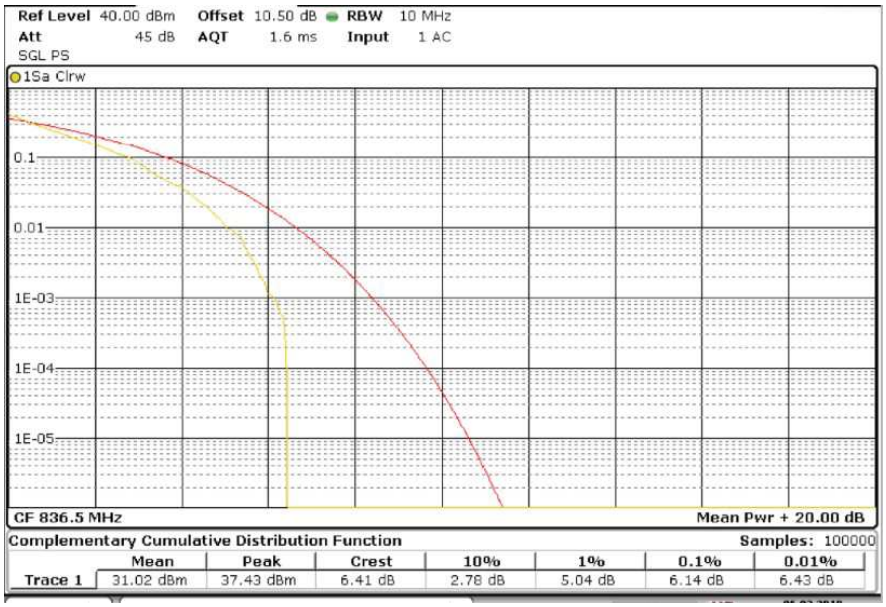
Bandwidth (MHz)	Channel Location Frequency (MHz) Channel Number	Modulation	Resource Block Size	Resource Block Offset	Average power at antenna port (dBm)	PAPR (dB)
15	Lowest (26865 (831.5 MHz))	QPSK	1	0	20.21	5.71
			1	74	20.57	
			36	0	19.03	
			36	37	19.31	
			75	0	20.28	
		16-QAM	1	0	19.09	7.04
			1	26	19.35	
			27	0	19.5	
	Middle (26915 (836.5 MHz))	QPSK	1	0	20.07	6.41
			1	74	20.32	
			36	0	19.19	
			36	37	19.22	
			75	0	20.15	
		16-QAM	1	0	19.14	7.62
			1	26	19.59	
			27	0	19.37	
	Highest (26965 (841.5 MHz))	QPSK	1	0	20.65	6.29
			1	74	20.56	
			36	0	19.32	
			36	37	19.27	
			75	0	20.15	
		16-QAM	1	0	19.56	7.83
			1	26	19.81	
			27	0	19.67	

TEST RESULTS (Cont):	

PAPR
Bandwidth = 1.4 MHz. Modulation QPSK. RB Size: 1. RB Offset: 0.
Lowest channel

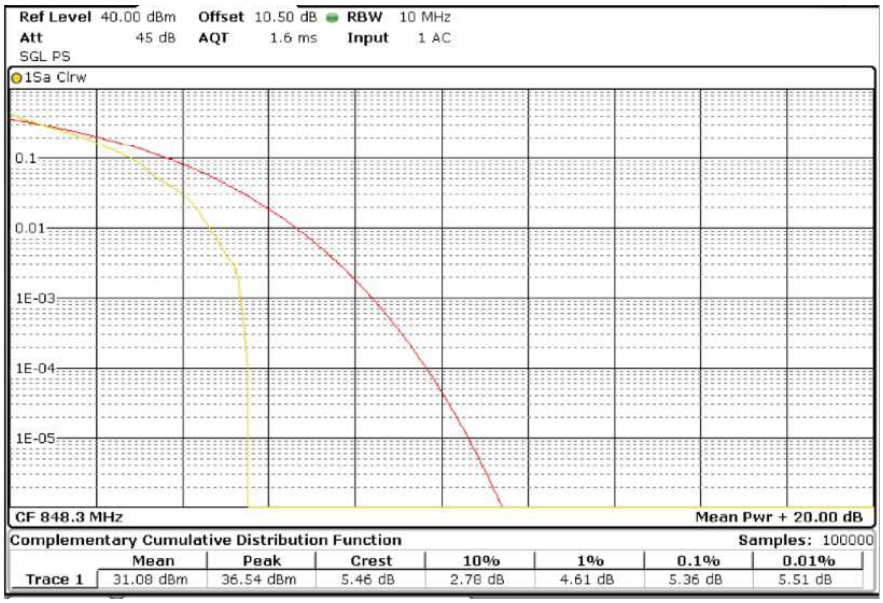


Middle channel

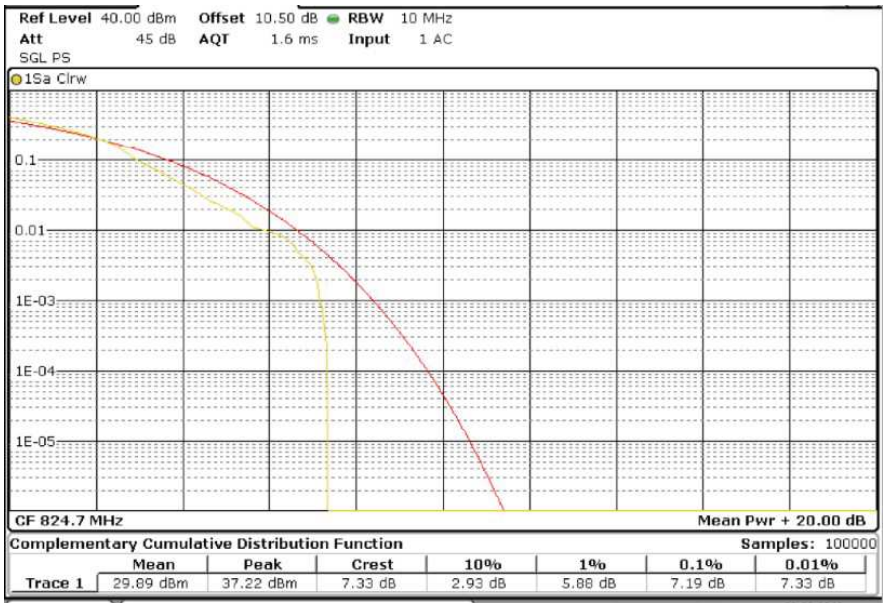


TEST RESULTS (Cont):	

Highest channel



PAPR
Bandwidth = 1.4 MHz. Modulation 16QAM. RB Size: 1. RB Offset: 0.
Lowest channel



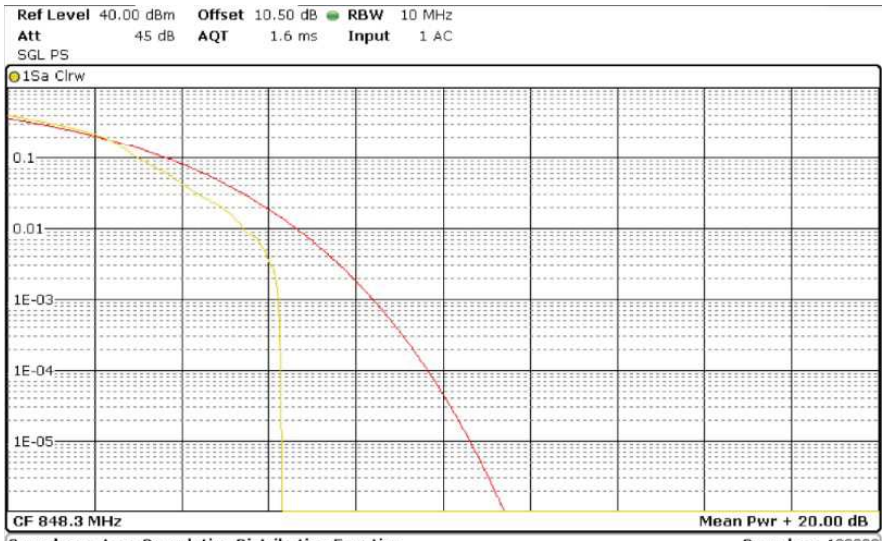
TEST RESULTS (Cont):	

Middle channel

Complementary Cumulative Distribution Function — Samples: 100000

	Mean	Peak	Crest	10%	1%	0.1%	0.01%
Trace 1	30.27 dBm	37.79 dBm	7.51 dB	2.81 dB	5.83 dB	7.30 dB	7.57 dB

Highest channel

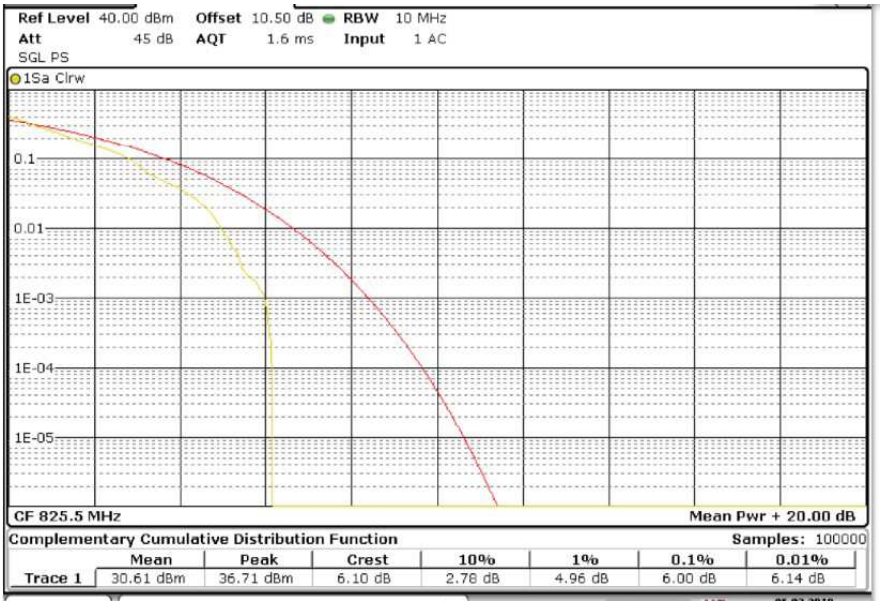


Complementary Cumulative Distribution Function — Samples: 100000

	Mean	Peak	Crest	10%	1%	0.1%	0.01%
Trace 1	30.40 dBm	36.67 dBm	6.27 dB	2.99 dB	5.42 dB	6.23 dB	6.32 dB

TEST RESULTS (Cont):	

PAPR
Bandwidth = 3 MHz. Modulation QPSK. RB Size: 1. RB Offset: 0.
Lowest channel

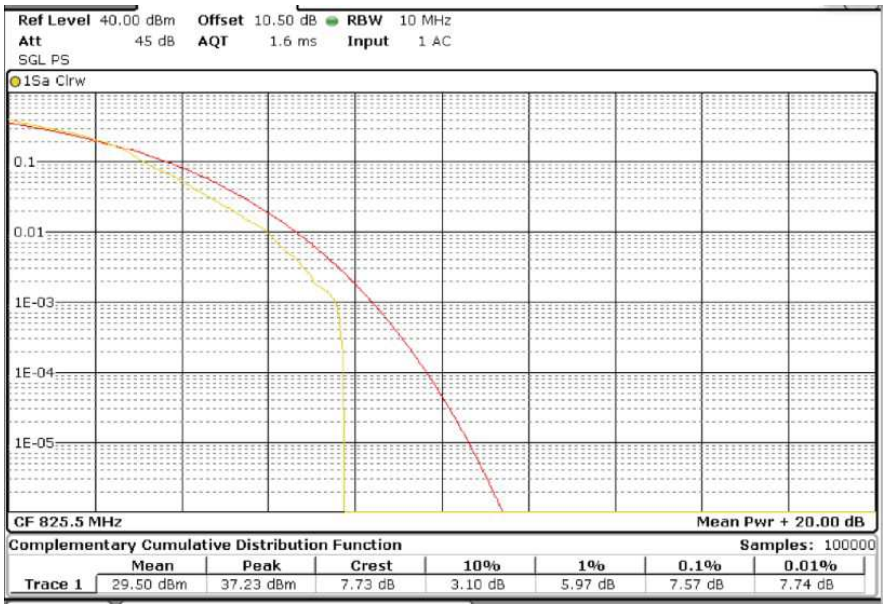


Middle channel

TEST RESULTS (Cont):	

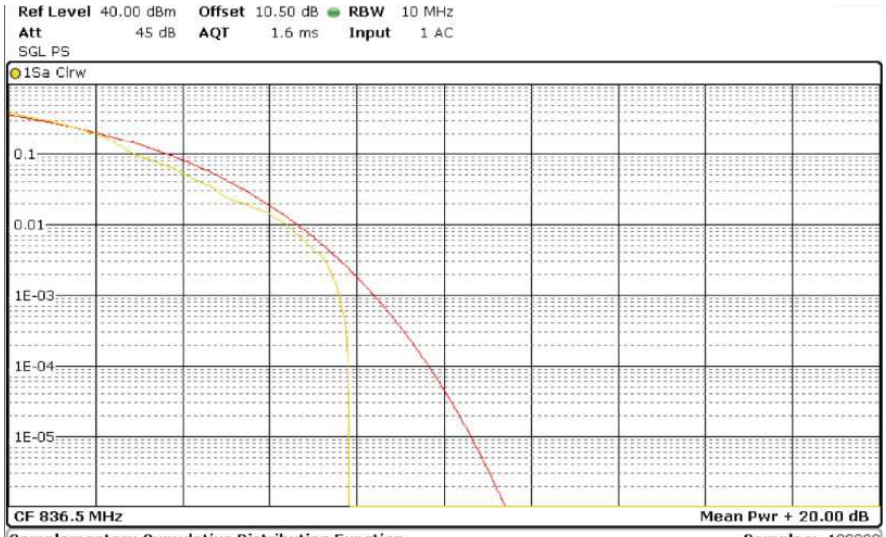
Highest channel

PAPR
Bandwidth = 3 MHz. Modulation 16QAM. RB Size: 1. RB Offset: 0.
Lowest channel



TEST RESULTS (Cont):	

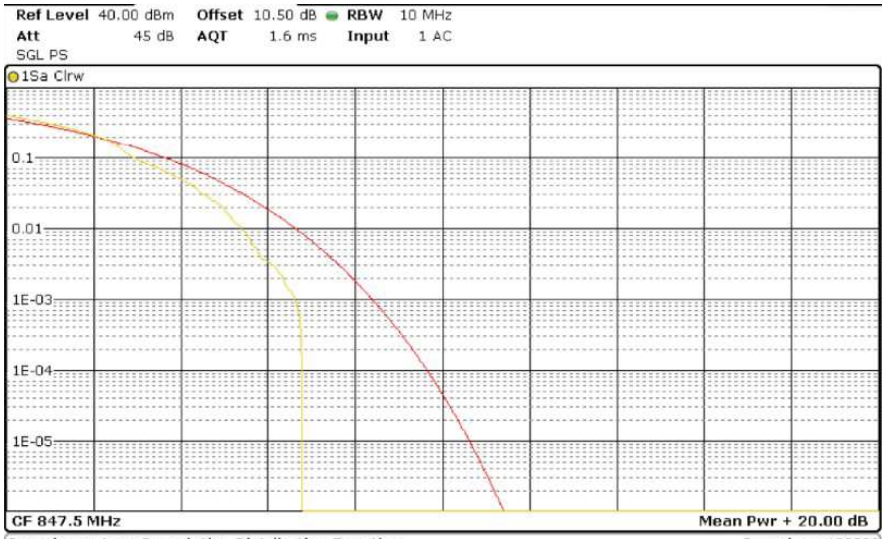
Middle channel



Complementary Cumulative Distribution Function — Samples: 100000

	Mean	Peak	Crest	10%	1%	0.1%	0.01%
Trace 1	29.83 dBm	37.59 dBm	7.76 dB	2.90 dB	6.41 dB	7.59 dB	7.80 dB

Highest channel

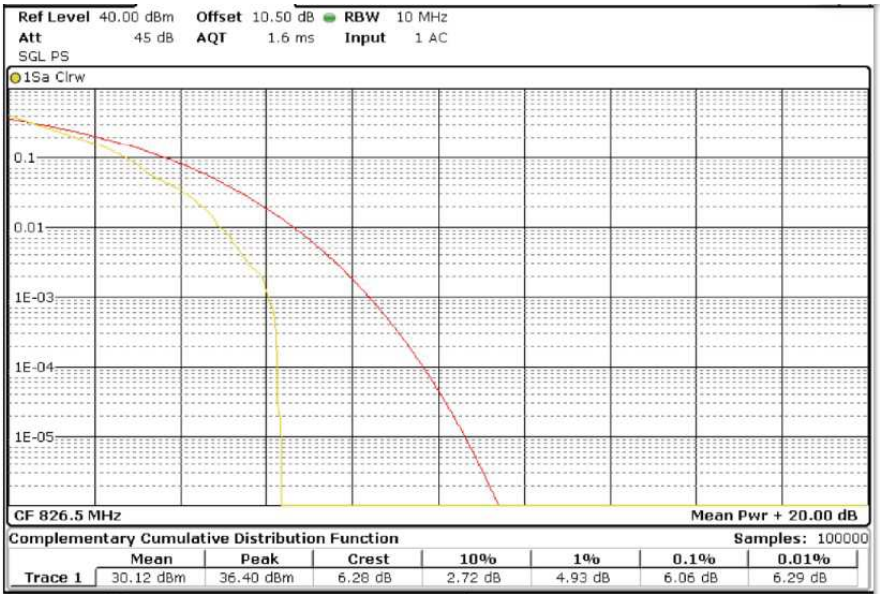


Complementary Cumulative Distribution Function — Samples: 100000

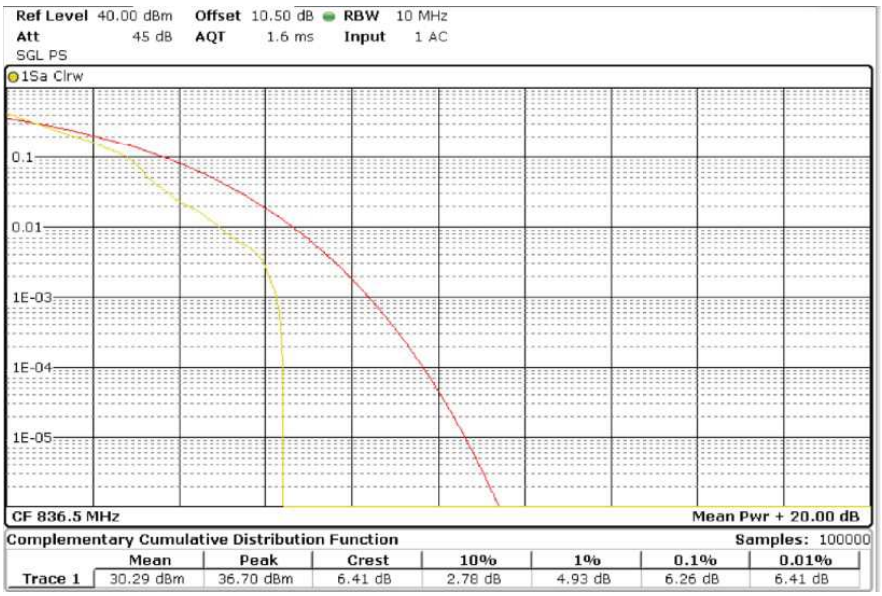
	Mean	Peak	Crest	10%	1%	0.1%	0.01%
Trace 1	30.00 dBm	36.77 dBm	6.77 dB	2.93 dB	5.42 dB	6.64 dB	6.78 dB

TEST RESULTS (Cont):	

PAPR
Bandwidth = 5 MHz. Modulation QPSK. RB Size: 1. RB Offset: 0.
Lowest channel



Middle channel



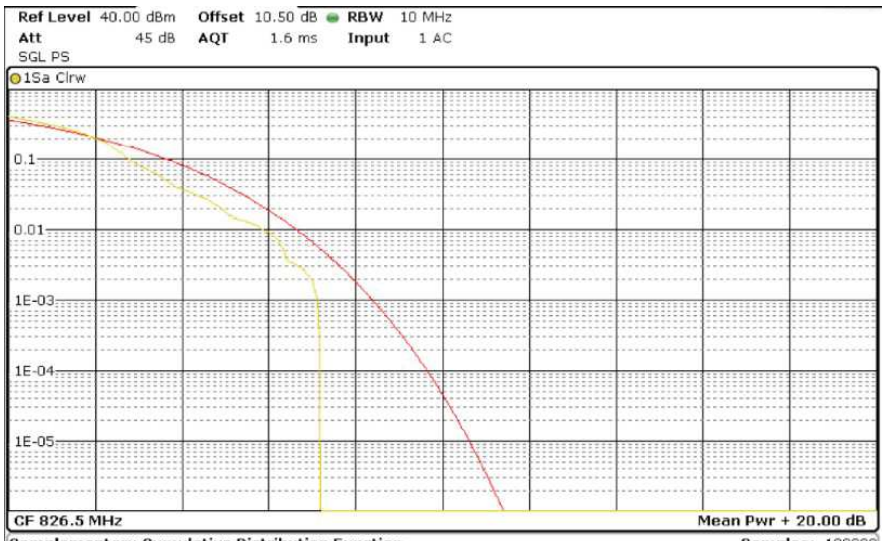
TEST RESULTS (Cont):	

Highest channel

Complementary Cumulative Distribution Function — Samples: 100000

	Mean	Peak	Crest	10%	1%	0.1%	0.01%
Trace 1	30.03 dBm	36.03 dBm	6.00 dB	2.81 dB	4.90 dB	5.71 dB	6.00 dB

Bandwidth = 5 MHz. Modulation 16QAM. RB Size: 1. RB Offset: 0.
Lowest channel

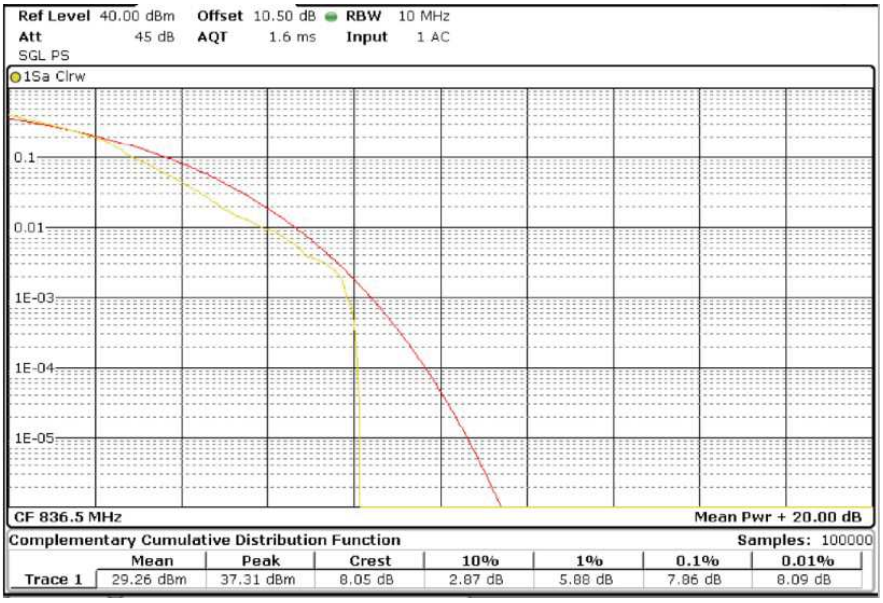


Complementary Cumulative Distribution Function — Samples: 100000

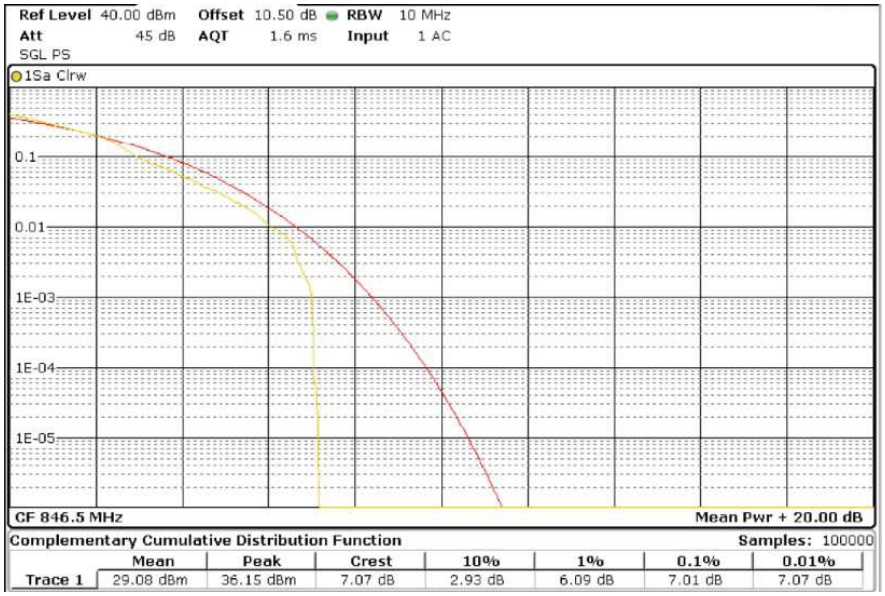
	Mean	Peak	Crest	10%	1%	0.1%	0.01%
Trace 1	29.31 dBm	36.49 dBm	7.18 dB	2.75 dB	5.86 dB	7.10 dB	7.19 dB

TEST RESULTS (Cont):	

Middle channel



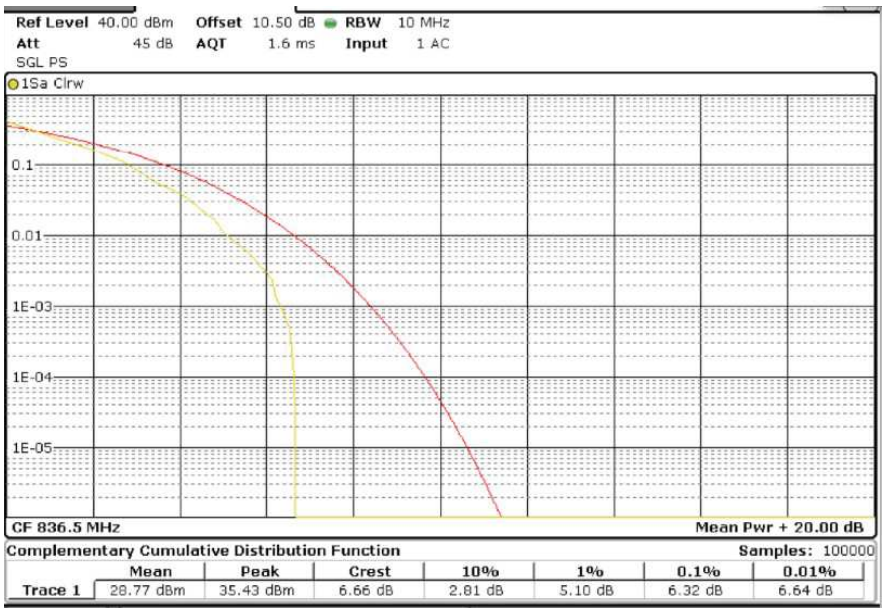
Highest channel



TEST RESULTS (Cont):	

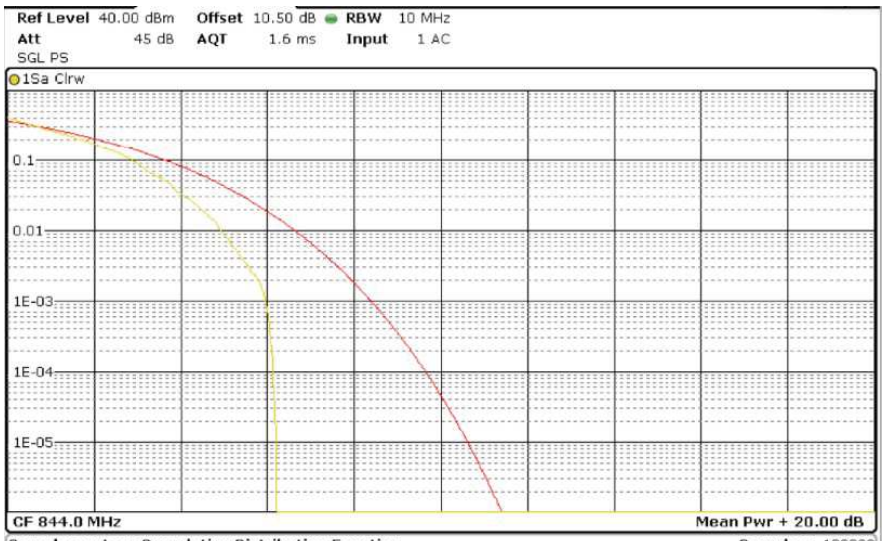
Bandwidth = 10 MHz. Modulation QPSK. RB Size: 1. RB Offset: 0.
Lowest channel

Middle channel



TEST RESULTS (Cont):	

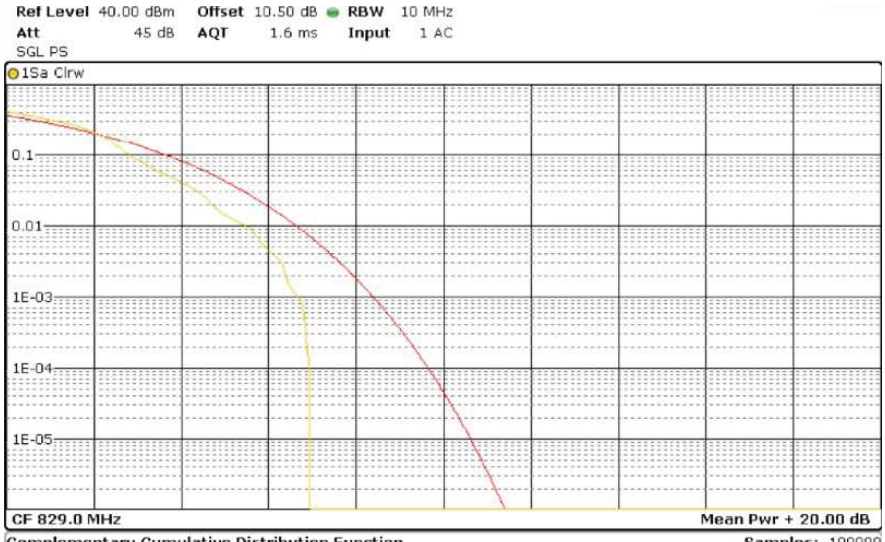
Highest channel



Complementary Cumulative Distribution Function — Samples: 100000

	Mean	Peak	Crest	10%	1%	0.1%	0.01%
Trace 1	29.31 dBm	35.47 dBm	6.16 dB	2.87 dB	4.93 dB	5.97 dB	6.14 dB

Bandwidth = 10 MHz. Modulation 16QAM. RB Size: 1. RB Offset: 0.
Lowest channel



Complementary Cumulative Distribution Function — Samples: 100000

	Mean	Peak	Crest	10%	1%	0.1%	0.01%
Trace 1	28.30 dBm	35.23 dBm	6.93 dB	2.81 dB	5.48 dB	6.67 dB	6.93 dB

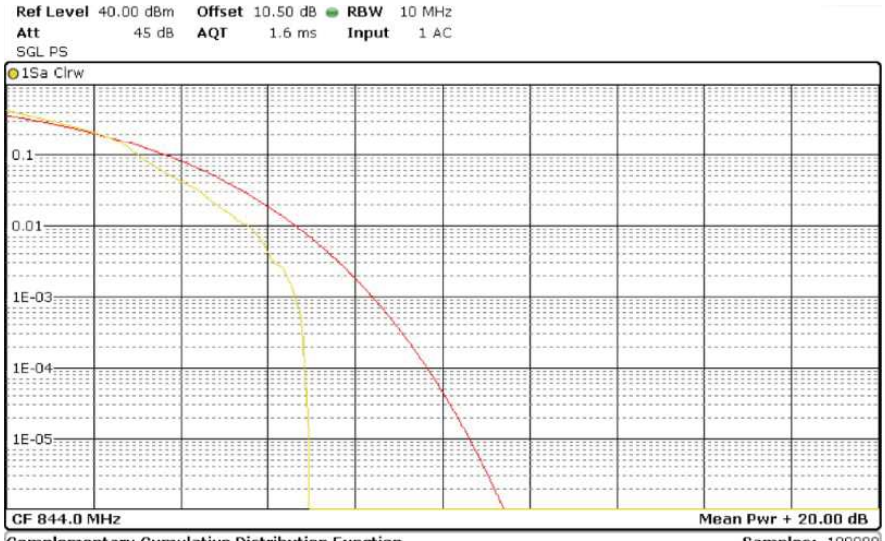
TEST RESULTS (Cont):	

Middle channel

Complementary Cumulative Distribution Function — Samples: 100000

	Mean	Peak	Crest	10%	1%	0.1%	0.01%
Trace 1	27.97 dBm	35.16 dBm	7.19 dB	2.81 dB	6.12 dB	7.07 dB	7.19 dB

Highest channel



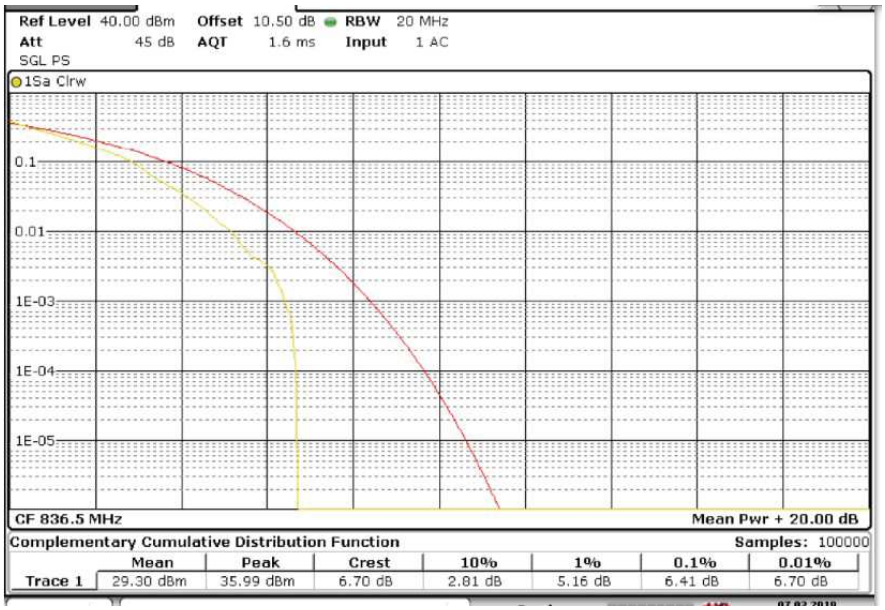
Complementary Cumulative Distribution Function — Samples: 100000

	Mean	Peak	Crest	10%	1%	0.1%	0.01%
Trace 1	28.13 dBm	35.01 dBm	6.88 dB	3.01 dB	5.54 dB	6.64 dB	6.87 dB

TEST RESULTS (Cont):	

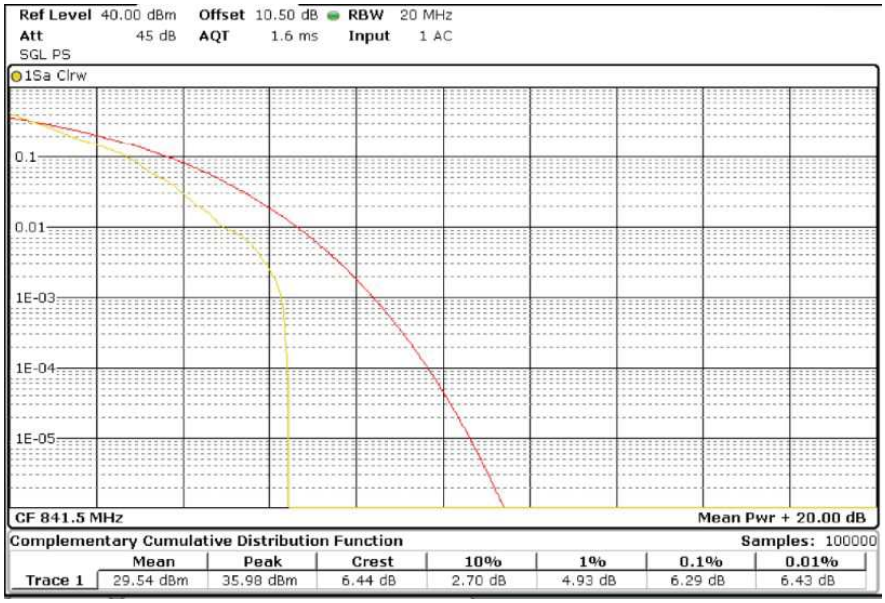
PAPR
Bandwidth = 15 MHz. Modulation QPSK. RB Size: 1. RB Offset: 0.
Lowest channel

Middle channel



TEST RESULTS (Cont):	

Highest channel

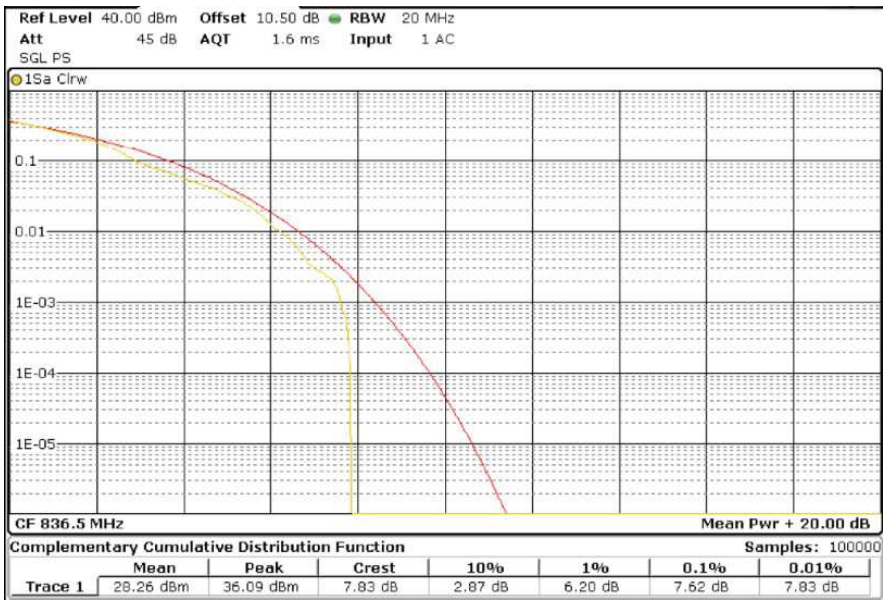


Bandwidth = 15 MHz. Modulation 16QAM. RB Size: 1. RB Offset: 0.

Lowest channel

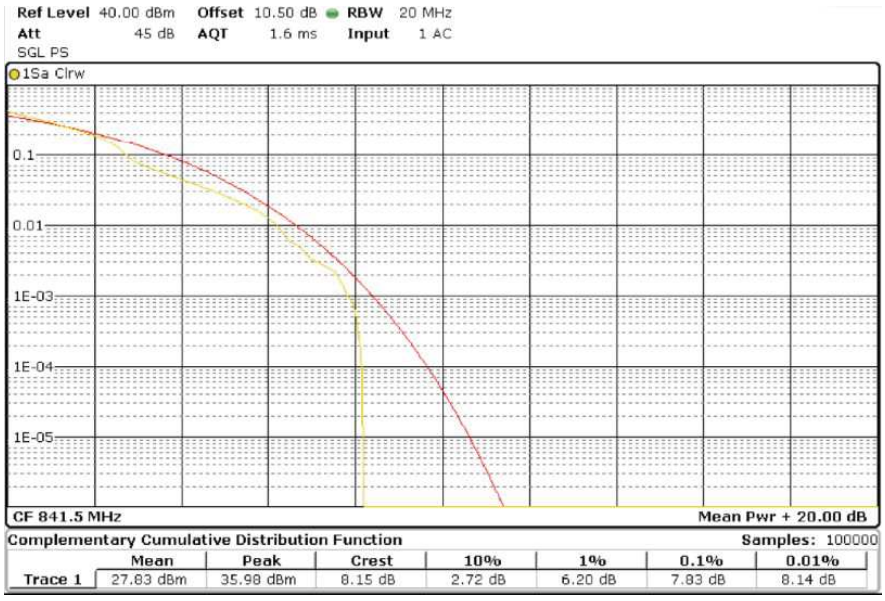
TEST RESULTS (Cont):	

Middle channel



	Mean	Peak	Crest	10%	1%	0.1%	0.01%
Trace 1	28.26 dBm	36.09 dBm	7.83 dB	2.87 dB	6.20 dB	7.62 dB	7.83 dB

Highest channel



	Mean	Peak	Crest	10%	1%	0.1%	0.01%
Trace 1	27.83 dBm	35.98 dBm	8.15 dB	2.72 dB	6.20 dB	7.83 dB	8.14 dB

TESTED SAMPLES:	S/01
TESTED CONDITIONS MODES:	TC#02
TEST RESULTS:	PASS

LTE QPSK AND 16QAM MODULATION. Bandwidth = 1.4 MHz

Channel	Average power at antenna port (dBm)	Maximum declared antenna gain (dBi)	Maximum E.I.R.P. average power (dBm)
26790	22.35	0.0	22.35
Measurement uncertainty (dB)			<±0.95

LTE QPSK AND 16QAM MODULATION. Bandwidth = 3 MHz

Channel	Average power at antenna port (dBm)	Maximum declared antenna gain (dBi)	Maximum E.I.R.P. average power (dBm)
26790	22.38	0.0	22.38
Measurement uncertainty (dB)			<±0.95

LTE QPSK AND 16QAM MODULATION. Bandwidth = 5 MHz

Channel	Average power at antenna port (dBm)	Maximum declared antenna gain (dBi)	Maximum E.I.R.P. average power (dBm)
26790	22.58	0.0	22.58
Measurement uncertainty (dB)			<±0.95

LTE QPSK AND 16QAM MODULATION. Bandwidth = 10 MHz

Channel	Average power at antenna port (dBm)	Maximum declared antenna gain (dBi)	Maximum E.I.R.P. average power (dBm)
26790	22.86	0.0	22.86
Measurement uncertainty (dB)			<±0.95

LTE QPSK AND 16QAM MODULATION. Bandwidth = 15 MHz

Channel	Average power at antenna port (dBm)	Maximum declared antenna gain (dBi)	Maximum E.I.R.P. average power (dBm)
26790	22.62	0.0	22.62
Measurement uncertainty (dB)			<±0.95

TEST RESULTS (Cont):

CHANNEL FREQUENCY (MHz)	BANDWIDTH (MHz)	MODULATION	RB SIZE	RB OFFSET	AVERAGE POWER (dBm)
26790 824.0	1.4	QPSK	1	0	22.35
			1	2	22.29
			1	5	22.28
			3	0	22.26
			3	1	22.26
			3	2	22.24
			6	0	21.20
		16-QAM	1	0	21.38
			1	2	21.35
			1	5	21.41
			3	0	21.36
			3	1	21.32
			3	2	21.31
			6	0	20.22
	3	QPSK	1	0	22.38
			1	7	22.32
			1	14	22.21
			8	0	21.31
			8	4	21.20
			8	7	21.29
			15	0	21.30
		16-QAM	1	0	21.74
			1	7	21.62
			1	14	21.53
			8	0	20.40
			8	4	20.25
			8	7	20.27
			15	0	20.21
	5	QPSK	1	0	22.58
			1	12	22.45
			1	24	22.32
			12	0	21.50
			12	6	21.33
			12	11	21.22
			25	0	21.42
		16-QAM	1	0	21.59
			1	12	21.54
			1	24	21.41
			12	0	20.50
			12	6	20.32
			12	11	20.25
			25	0	22.29

TEST RESULTS (Cont):

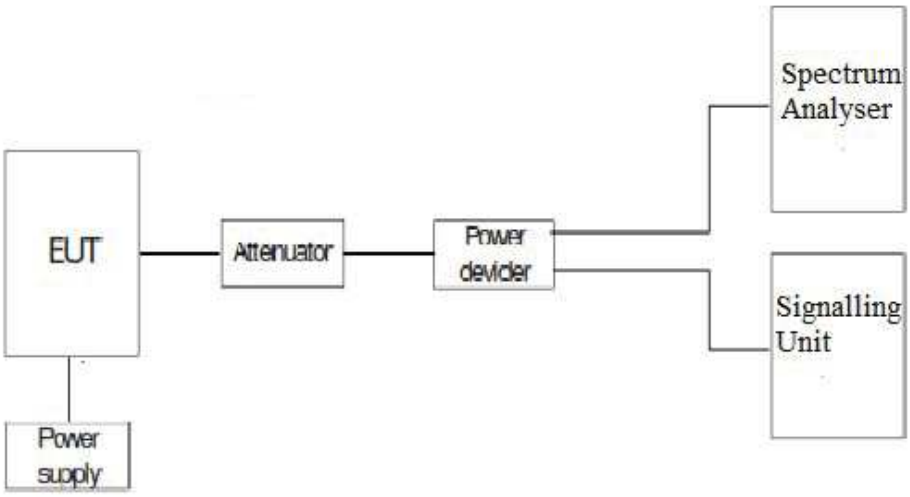
CHANNEL FREQUENCY (MHz)	BANDWIDTH (MHz)	MODULATION	RB SIZE	RB OFFSET	AVERAGE POWER (dBm)
26790 824.0	10	QPSK	1	0	22.86
			1	24	22.33
			1	49	21.86
			25	0	21.63
			25	12	21.40
			25	24	21.30
			50	0	21.52
		16-QAM	1	0	22.06
			1	24	21.40
			1	49	Not supported
			25	0	10.66
			25	12	Not supported
			25	24	Not supported
			50	0	Not supported
	15	QPSK	1	0	22.62
			1	37	22.59
			1	74	22.19
			36	0	21.53
			36	18	21.49
			36	37	21.21
			75	0	16.24
		16-QAM	1	0	21.37
			1	37	21.53
			1	74	21.26
			36	0	Not supported
			36	18	Not supported
			36	37	Not supported
			75	0	Not supported

TEST A.2: MODULATION CHARACTERISTICS

LIMITS:	Product standard:	FCC Part 22 / IC RSS-132
	Test standard:	FCC §2.1047 and RSS-132 Clause 5.2

LIMITS

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.

TEST SETUP

For LTE the EUT operates with QPSK and 16QAM modulation modes in which the information is digitized and coded into a bit stream. The RF transmission is multiplexed using Orthogonal Frequency Division Multiplexing (OFDM) using different possible arrangement of subcarriers (Resource Blocks RB).