DEKRA Certification, Inc.
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DEKRA

ACCREDITED
Test Lab
Cert 2764.01

FCC LISTED, REGISTRATION NUMBER: 2764.01

ISED LISTED REGISTRATION NUMBER: 23595-1

Test report No:
2569ERM.003A3

Test report

REFERENCE STANDARD:
USA FCC Part 24
CANADA ISED RSS-133

Identification of item tested	Cellular communication module
Trademark	Sequans Communications
Model and /or type reference	SKY66430
Other identification of the product	FCC ID: 2AAGM66430 IC: 12732A-66430
Features	LTE-M, 3GPP E-UTRA Release 13 compliant
Manufacturer	SKYWORKS SOLUTIONS INC 20 SYLVAN RD, WOBURN, MA 01801, USA
Test method requested, standard	USA FCC Part 24 10-1-18 Edition CANADA IC RSS-133 Issue 6, Jan. 2013 (Amendment January 2018); Measurement Guidance 971168 D01 v02r02 for certification of Licensed Digital Transmitters. 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: 2019.11.26 14:23:01 -05'00'
Date of issue	11-25-2019
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 item under test established in this document.

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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 SKY66430 is a multi-band module supporting cellular LTE-M/NB-IoT (half-duplex FDD) platforms

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
2569.003	Cellular Module (LTE Cat M Radio)	SKY66430	SKY-19-16-0014	6/27/2019
2569.005	Antenna	90200	62844	6/27/2019
2569.010	Connector (for DC power)	-	-	6/27/2019

1. Sample S/01 was used for the following test(s).

   All conducted and radiated tests indicated in appendix A.

Test sample description

Ports…… :	Port name and description	Cable			
		Specified max length [m]	Attached during test	Shielded	Coupled to patient(3)
	USB port X	2	☒	☐	☐
	USB port Y		☐	☐	☐
Supplementary information to the ports…… :	No Data provided				

Rated power supply.....:	Voltage and Frequency		Reference poles			
			L1	L2	L3	N	PE
	☐	AC:	☐	☐	☐	☐	☐
	☐	AC:	☐	☐	☐	☐	☐
	☒	DC: 5V USB port					
	☐	DC:					

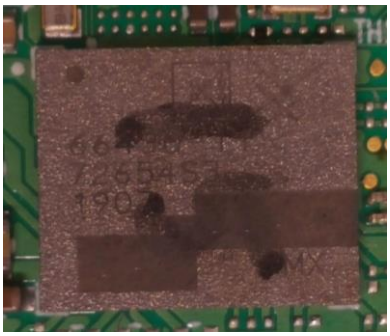
Rated Power.....:	No Data provided
Clock frequencies .....:	No Data provided
Other parameters .....:	No Data provided
Software version.....:	5.2.1.0(42790)
Hardware version .....:	SKY66430-11
Dimensions in cm (W x H x D).....:	No Data provided

Mounting position .....:	☒	Table top equipment
	☐	Wall/Ceiling mounted equipment
	☐	Floor standing equipment
	☐	Hand-held equipment
	☐	Other: Car Equipment

Modules/parts.....:	Module/parts of test item	Type	Manufacturer
	SKY66430 EK	Eval Kit	Skyworks

Accessories (not part of the test item) .....:	Description	Type	Manufacturer
	USB cable		
	Antenna http://www.aaronia.com/Datasheets/Antennas/Aaronia_Broadband_Antenna_OmniLOG_90200_datasheet.pdf		
Documents as provided by the applicant .....:	Description	File name	Issue date
	FDT30_15 Data Declaration Equipment Data	FDT30_15 Declaration Equipment Data v1.1-SKY66430	
	EK User Manual	SKY66430-11_205375A_AN_EVB_User_Manual.pdf	May 6 2019

Copy of marking plate:



Identification of the client

SEQUANS COMMUNICATIONS

55 Boulevard Charles de Gaulle, 92700 Colombes

Testing period and place

Test Location	DEKRA Certification, Inc.
Date (start)	07-01-2019
Date (finish)	11-14-2019

Document history

Report number	Date	Description
2569ERM.003	09-20-2019	First release
2569ERM.003A1	10-10-2019	Second release
2569ERM.003A2	11-15-2019	Third release
2569ERM.003A3	11-25-2019	Fourth release

Modifications to the reference test report

It was introduced the following modifications in respect to the test report number 2569ERM.003A2 related with the same samples, in the next clauses and sub-clauses:

Clauses/ Sub-Clauses	Modification	Justification
TEST A.6: Spurious Emissions at antenna terminals at Block Edges	All plots were replaced	To comply with RB configuration requirement

This modification test report cancels and replaces the test report 2569ERM.003A2

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 Poojitha Bhattu.

Testing verdicts

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

Summary

FCC PART 24 /IC RSS-133 PARAGRAPH					
Report Section	**FCC 24 Spec Clause**	**RSS Spec Clause**	**Test Description**	**Verdict**	**Remark**
A.1	§2.1046 and §24.232	RSS-133 Clause 6.4	RF Output power	P	N/A
A.2	§2.1047	RSS-133 Clause 6.2	Modulation characteristics	P	N/A
A.3	§2.1055 and § 24.235	RSS-133 Clause 6.3	Frequency stability	P	N/A
A.4	§ 2.1049	RSS-133 Clause 2.3	Occupied Bandwidth	P	N/A
A.5	§2.1051 and §24.238	RSS-133 Clause 6.5	Spurious emissions at antenna terminals	P	N/A
A.6	§24.238	RSS-133 Clause 6.5	Spurious emissions at antenna terminals at Block edges	P	N/A
A.7	§2.1053 and §24.238	RSS-133 Clause 6.5	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	Signal analyzer Rohde & Schwarz FSV40	2018/03	2020/03
1149	Wideband Radio Communication Tester Rohde & Schwarz CMW 500	2018/07	2020/07
1041	EMI Test Receiver Rohde & Schwarz ESR 7	2017/04	2019/10
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
1064	BiconicalLog antenna ETS LINDGREN 3142E	2017/03	2020/03
1057	Double-ridge Waveguide Horn antenna 1-18 GHz	2017/03	2020/03
1056	Double-ridge Waveguide Horn antenna 18-40 GHz	2017/03	2020/03
1012	Spectrum analyzer Rohde & Schwarz ESR26	2018/09	2020/09
1014	Spectrum analyzer Rohde & Schwarz FSV40	2019/04	2021/04
1015,1017, 1019, 1020	Rohde & Schwarz EMC32 software	N/A	N/A

Appendix A:
Test Results for FCC Part 24 / IC RSS-133

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 2: 1850-1910 MHz Band 25: 1850-1915 MHz
- Nominal Channel Bandwidth	Band 2: 5 / 10 / 15 / 20 MHz Band 25: 5 / 10 / 15 / 20 MHz
Extreme operating conditions	
- Temperature range	T_{nom} = +15 to + 35 T_{min} = -30 T_{max} = +50
Antenna type	Radial Isotropic Antenna.
Antenna gain	2 dBi
Nominal Voltage	
- Supply Voltage	3.8 Vdc
- Type of power source	DC Power supply

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 2</td><td>
<u>Power supply (V):</u>
$V_{nominal}$ = 3.8 Vdc
<u>Test Frequencies for Conducted tests:</u>
<u>5 MHz Bandwidth</u>:
-Lowest Channel: 18625(1852.5 MHz)
-Middle Channel: 18900(1880.0 MHz)
-Highest Channel: 19175(1907.5 MHz)
<u>10 MHz Bandwidth</u>:
-Lowest Channel: 18650(1855.0 MHz)
-Middle Channel: 18900(1880.0 MHz)
-Highest Channel: 19150(1905.0 MHz)
<u>15 MHz Bandwidth</u>:
-Lowest Channel: 18675(1857.5 MHz)
-Middle Channel: 18900(1880.0 MHz)
-Highest Channel: 19125(1902.5 MHz)
<u>20 MHz Bandwidth</u>:
-Lowest Channel: 18700(1860.0 MHz)
-Middle Channel: 18900(1880.0 MHz)
-Highest Channel: 19100(1900.0 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>1850 to 1910 MHz</td><td>1857.5 MHz
1880.0 MHz
1902.5 MHz</td><td>15 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>

<table>
<tr><th>TEST CONDITIONS</th><th>DESCRIPTION</th></tr>
<tr><td>TC#02
LTE Band 25</td><td>
<u>Power supply (V):</u>
$V_{nominal}$ = 3.8 Vdc
<u>Test Frequencies for Conducted tests:</u>

<u>5 MHz Bandwidth</u>:
-Lowest Channel: 26065(1852.5 MHZ)
-Middle Channel: 26365(1882.5 MHz)
-Highest Channel: 26665(1912.5 MHz)

<u>10 MHz Bandwidth</u>:
-Lowest Channel: 26090(1855 MHZ)
-Middle Channel: 26365(1882.5 MHz)
-Highest Channel: 26640(1910 MHz)

<u>15 MHz Bandwidth</u>:
-Lowest Channel: 26115(1857.5 MHZ)
-Middle Channel: 26365(1882.5 MHz)
-Highest Channel: 26615(1907.5 MHz)

<u>20 MHz Bandwidth</u>:
-Lowest Channel: 26140(1860 MHZ)
-Middle Channel: 26365(1882.5 MHz)
-Highest Channel: 26590(1905 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>1850 to 1915 MHz</td><td>1860 MHz
1882.5 MHz
1905 MHz</td><td>20 MHz</td><td>QPSK</td><td>6 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 A.1: RF OUTPUT POWER

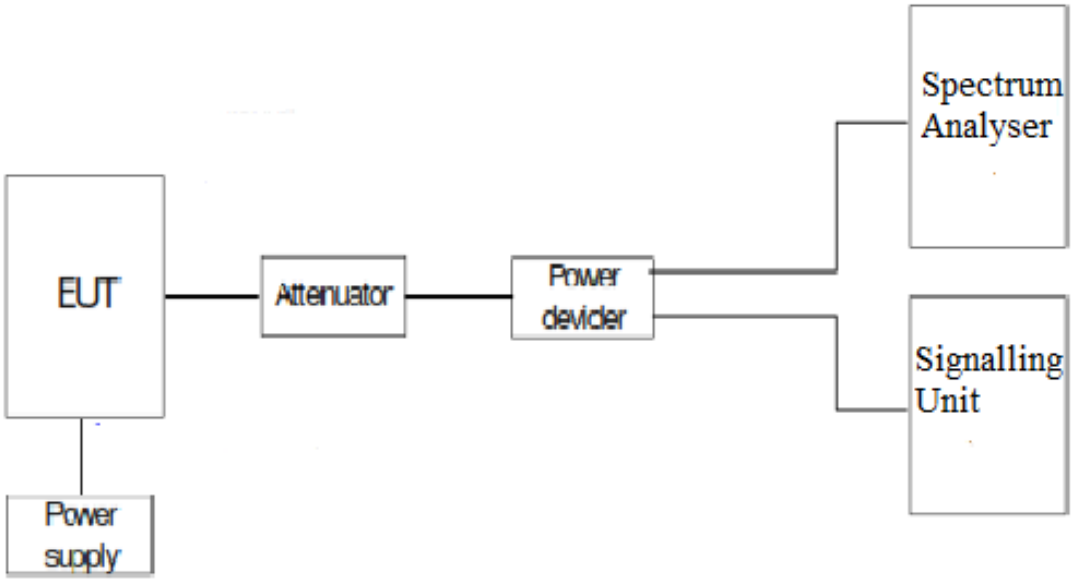
LIMITS:	Product standard:	FCC Part 24 / IC RSS-133
	Test standard:	FCC §2.1046 and §24.232. RSS-133 Clause 6.4

LIMITS

Fixed. mobile. and portable (hand-held) stations are limited to 2-watt EIRP (30 dBm). Fixed stations are limited to a maximum antenna height of 10 meters above ground. Mobile and portable stations operating in these bands must employ a means for limiting power to the minimum necessary for successful communications.
The peak-to-average ratio (PAR) of the transmission shall not exceed 13 dB.

RSS-133 Clause 6.4
The equivalent isotropically radiated power (e.i.r.p.) for transmitters shall not exceed the limits given in SRSP-510. In addition, the transmitter's peak-to-average power ratio (PAPR) 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 = 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	23.27	2.0	25.27	11.51
Middle	22.93	2.0	24.93	11.59
Highest	22.88	2.0	24.88	6.46

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	22.78	2.0	24.78	6.38
Middle	22.92	2.0	24.92	7.57
Highest	22.89	2.0	24.89	8.67

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	23.06	2.0	25.06	5.48
Middle	22.98	2.0	24.98	6.58
Highest	22.86	2.0	24.86	5.10

LTE QPSK AND 16QAM MODULATION. Bandwidth = 20 MHz

Channel	Average power at antenna port (dBm)	Maximum declared antenna gain (dBi)	Maximum E.I.R.P. average power (dBm)	PAPR (dB)
Lowest	22.85	2.0	24.85	8.75
Middle	22.97	2.0	24.97	7.91
Highest	23.10	2.0	25.10	10.52
Measurement uncertainty (dB)			<±0.95	

TEST RESULTS (Cont):

Band	Channel / Freq. (MHz)	Modulation	RB No.	RB offset	Conducted Output Power (dBm)	PAPR
5 MHz	Lowest (18625 /1852.5 MHz)	QPSK	1	0	23.27	7.22
			6	0	21.78	
		16-QAM	1	0	22.45	11.51
			1	5	22.50	
			5	0	20.86	
			5	1	20.81	
	Middle (18900 /1880.0 MHz)	QPSK	1	0	22.93	11.59
			6	0	21.93	
		16-QAM	1	0	22.73	10.75
			1	5	22.70	
			5	0	20.99	
			5	1	20.97	
	Highest (19175 /1907.5 MHz)	QPSK	1	0	22.88	5.36
			6	0	21.93	
		16-QAM	1	0	22.57	6.46
			1	5	22.62	
			5	0	20.96	
			5	1	20.97	

TEST RESULTS (Cont):

Band	Channel / Freq. (MHz)	Modulation	RB No.	RB offset	Conducted Output Power (dBm)	PAPR
10 MHz	Lowest (18650 /1855.0 MHz)	QPSK	1	0	22.78	6.38
			6	0	21.88	
		16-QAM	1	0	22.65	4.61
			1	5	22.73	
			5	0	21.76	
			5	1	21.83	
	Middle (18900 /1880.0 MHz)	QPSK	1	0	22.92	4.26
			6	0	21.94	
		16-QAM	1	0	22.89	7.57
			1	5	22.92	
			5	0	21.89	
			5	1	21.90	
	Highest (19150 /1905.0 MHz)	QPSK	1	0	22.88	4.52
			6	0	21.98	
		16-QAM	1	0	22.89	8.67
			1	5	22.89	
			5	0	21.83	
			5	1	21.81	

TEST RESULTS (Cont):	

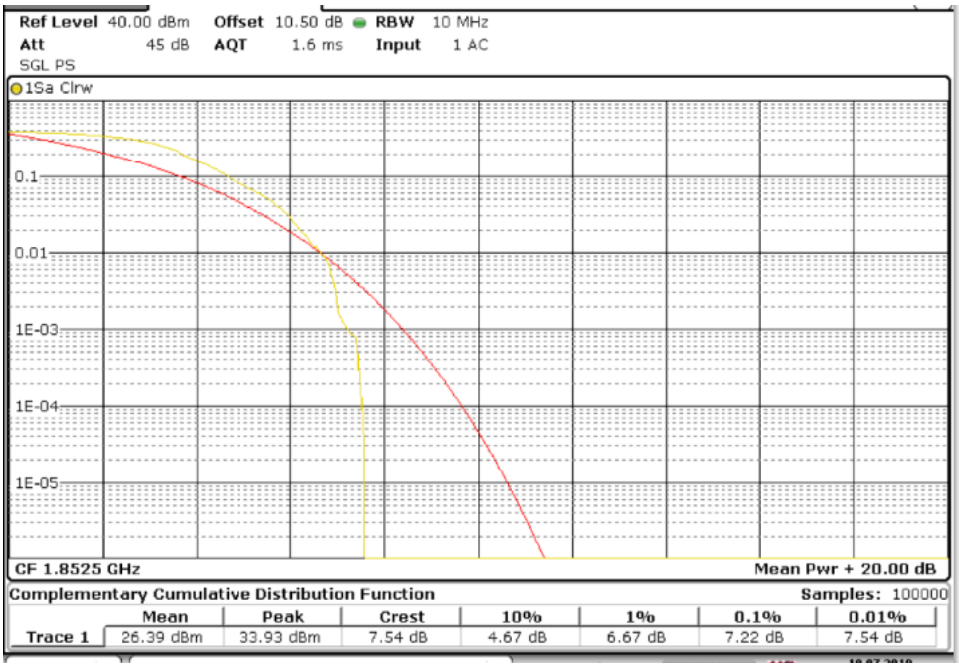
Band	Channel / Freq. (MHz)	Modulation	RB No.	RB offset	Conducted Output Power (dBm)	PAPR
15 MHz	Lowest (18675 /1857.5 MHz)	QPSK	1	0	23.06	3.91
			6	0	22.92	
		16-QAM	1	0	22.78	5.48
			1	5	22.75	
			5	0	22.79	
			5	1	22.78	
	Middle (18900 /1880.0 MHz)	QPSK	1	0	22.97	4.06
			6	0	22.98	
		16-QAM	1	0	22.92	6.58
			1	5	22.87	
			5	0	22.91	
			5	1	22.93	
	Highest (19125 /1902.5 MHz)	QPSK	1	0	22.86	4.38
			6	0	22.85	
		16-QAM	1	0	22.81	5.10
			1	5	22.84	
			5	0	22.68	
			5	1	22.68	

TEST RESULTS (Cont):	

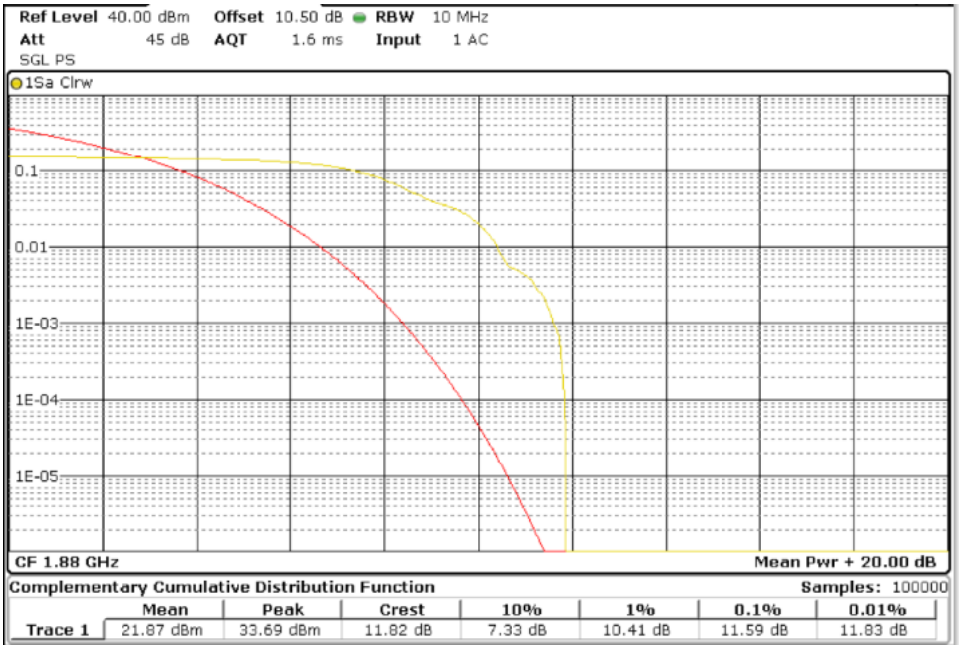
Band	Channel / Freq. (MHz)	Modulation	RB No.	RB offset	Conducted Output Power (dBm)	PAPR
20 MHz	Lowest (18700 /1860.0 MHz)	QPSK	1	0	22.85	6.90
			6	0	22.81	
		16-QAM	1	0	22.68	8.75
			1	5	22.70	
			5	0	22.65	
			5	1	22.65	
	Middle (18900 /1880.0 MHz)	QPSK	1	0	22.91	7.91
			6	0	22.97	
		16-QAM	1	0	22.89	7.36
			1	5	22.96	
			5	0	22.85	
			5	1	22.84	
	Highest (19100 /1900.0 MHz)	QPSK	1	0	23.03	5.57
			6	0	23.10	
		16-QAM	1	0	23.04	10.52
			1	5	23.05	
			5	0	22.97	
			5	1	22.97	

TEST RESULTS (Cont):	

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

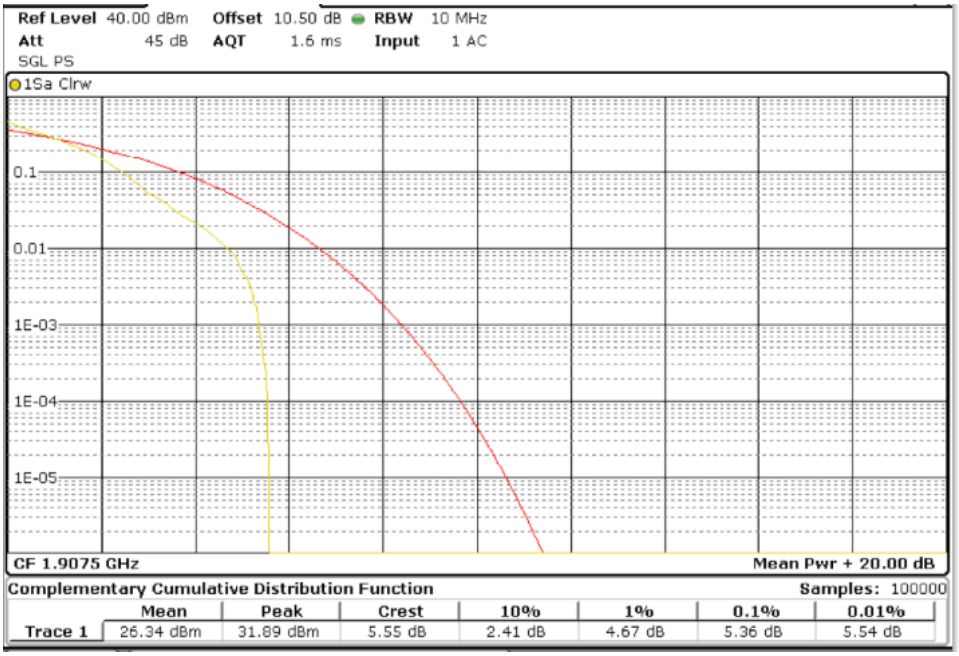


Middle channel



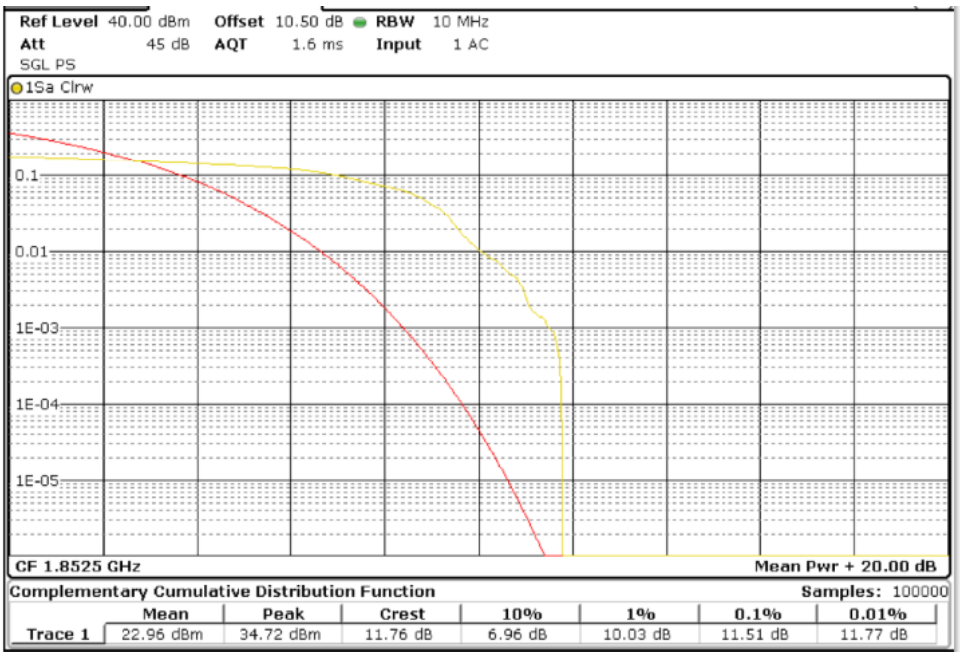
TEST RESULTS (Cont):	

Highest channel



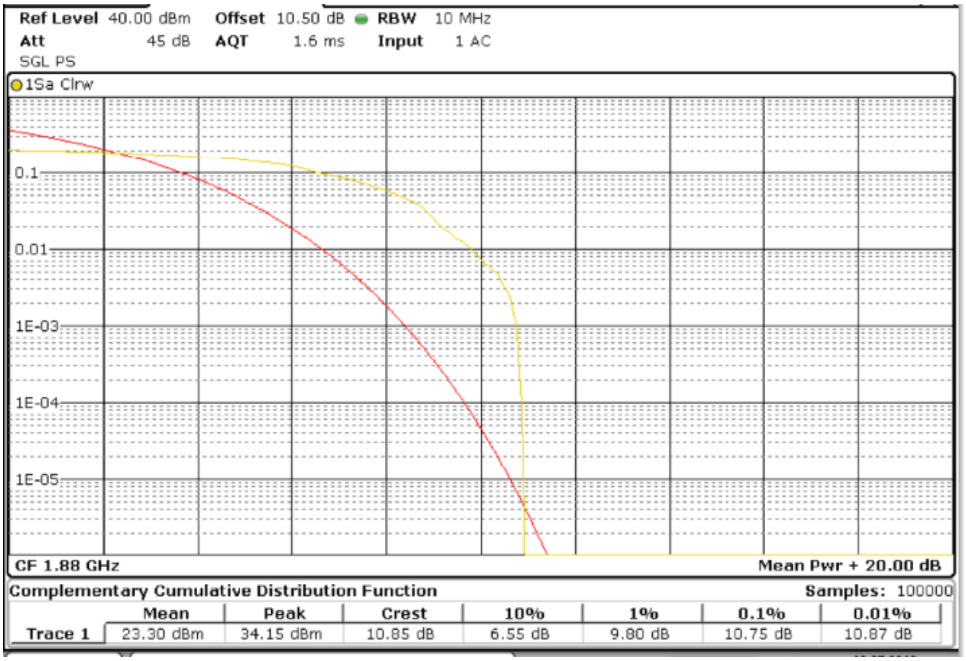
Bandwidth = 5 MHz. Modulation 16QAM. RB Size: 1. RB Offset: 0.

Lowest channel

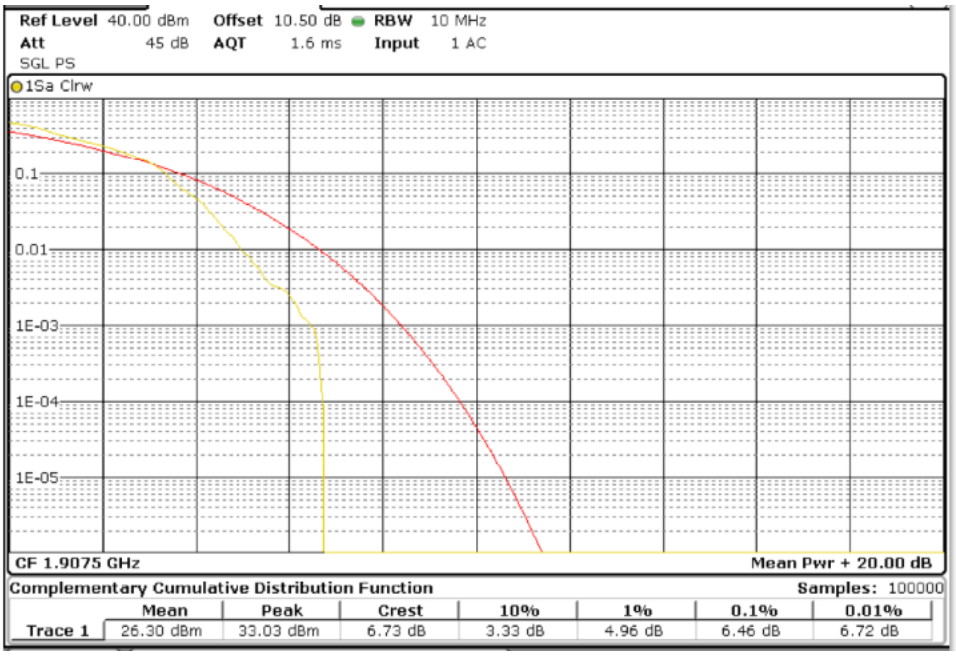


TEST RESULTS (Cont):	

Middle channel



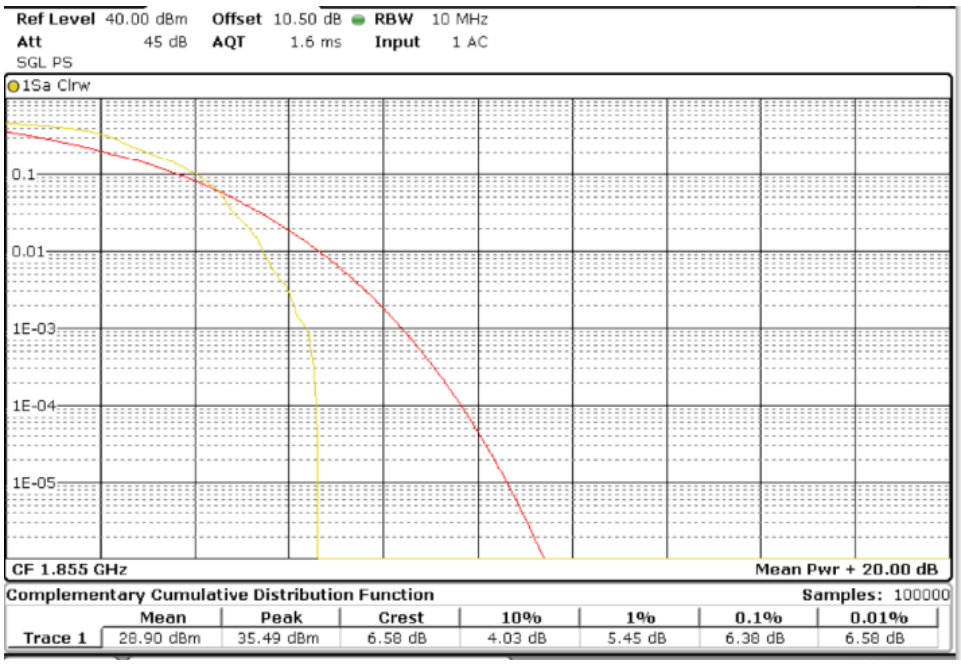
Highest channel



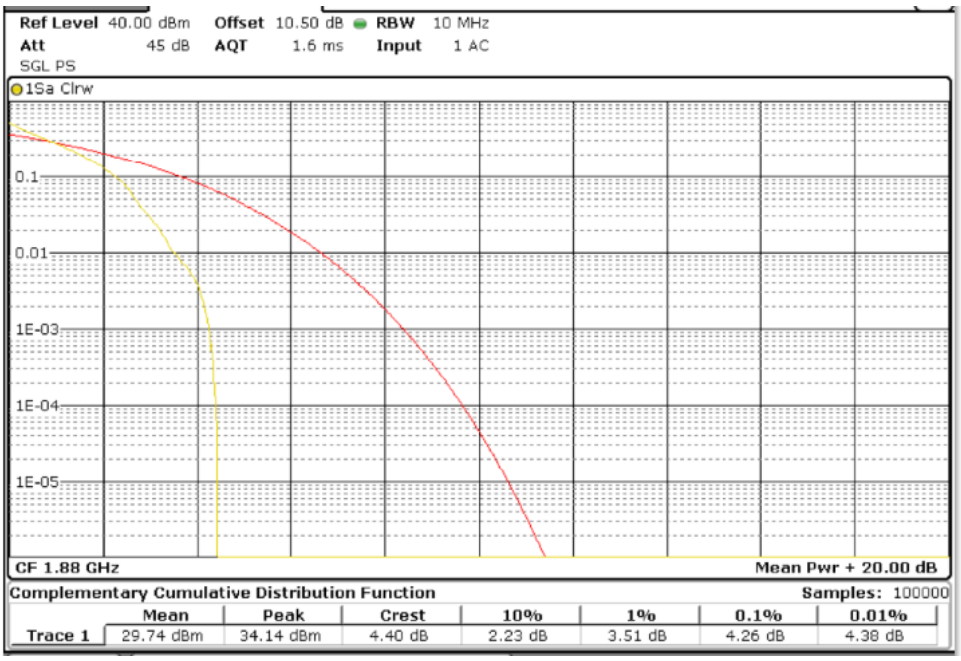
TEST RESULTS (Cont):	

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

Lowest channel

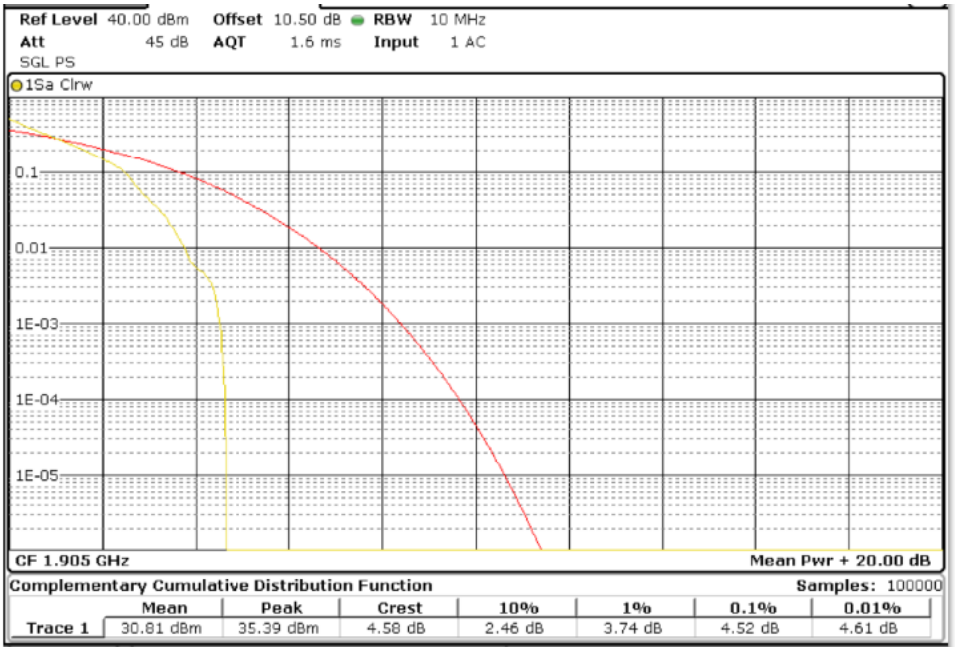


Middle channel



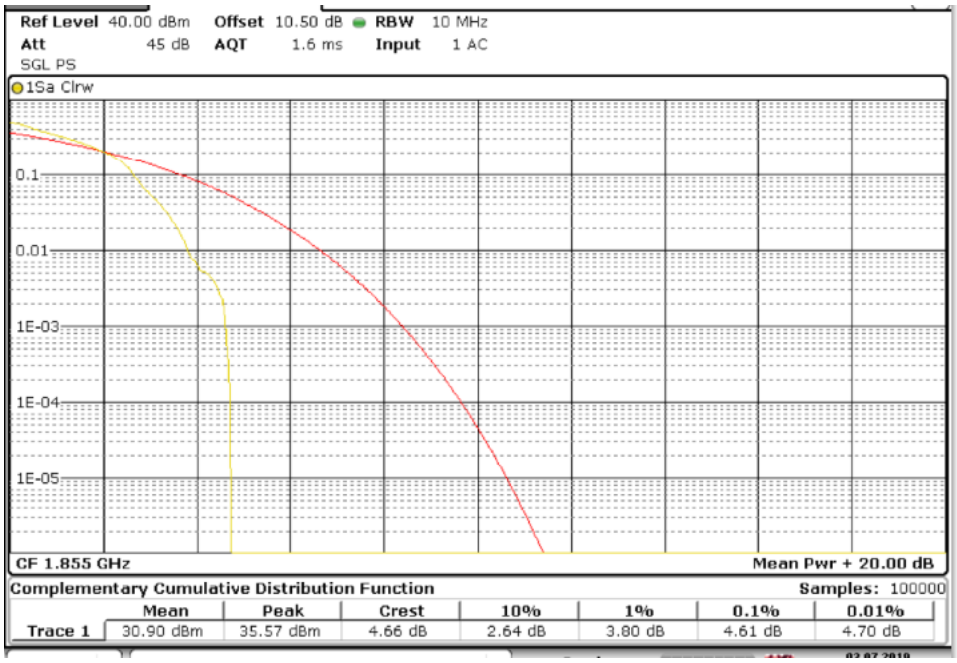
TEST RESULTS (Cont):	

Highest channel



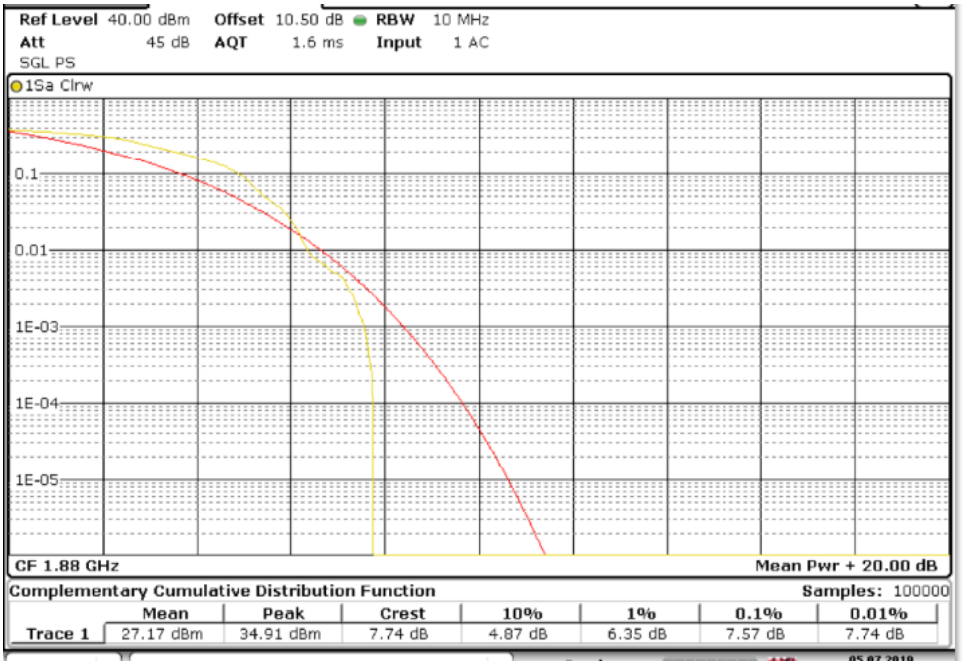
Bandwidth = 10 MHz. Modulation 16QAM. RB Size: 1. RB Offset: 0.

Lowest channel

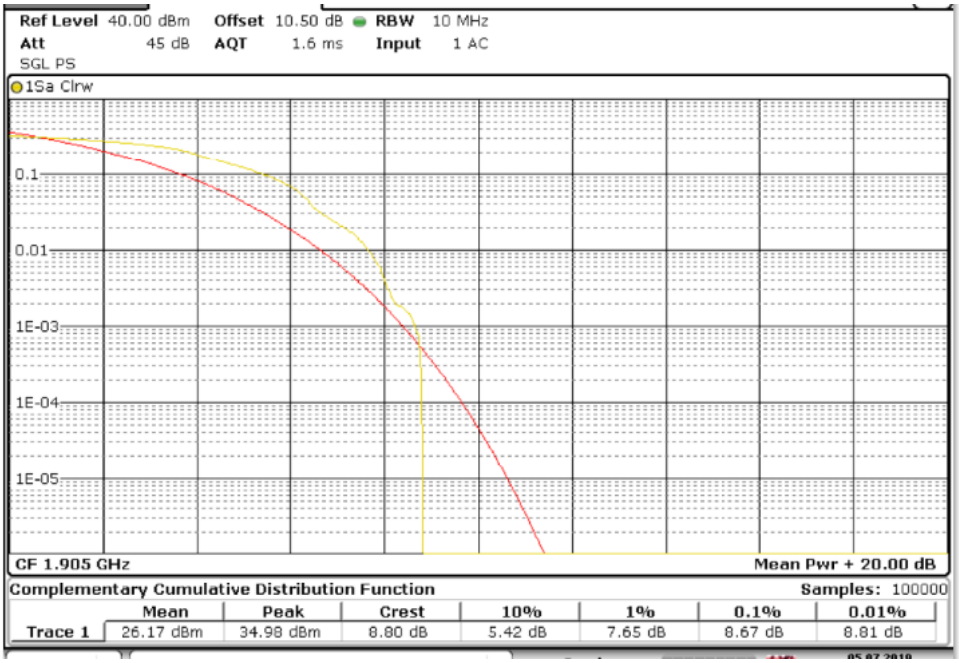


TEST RESULTS (Cont):	

Middle channel



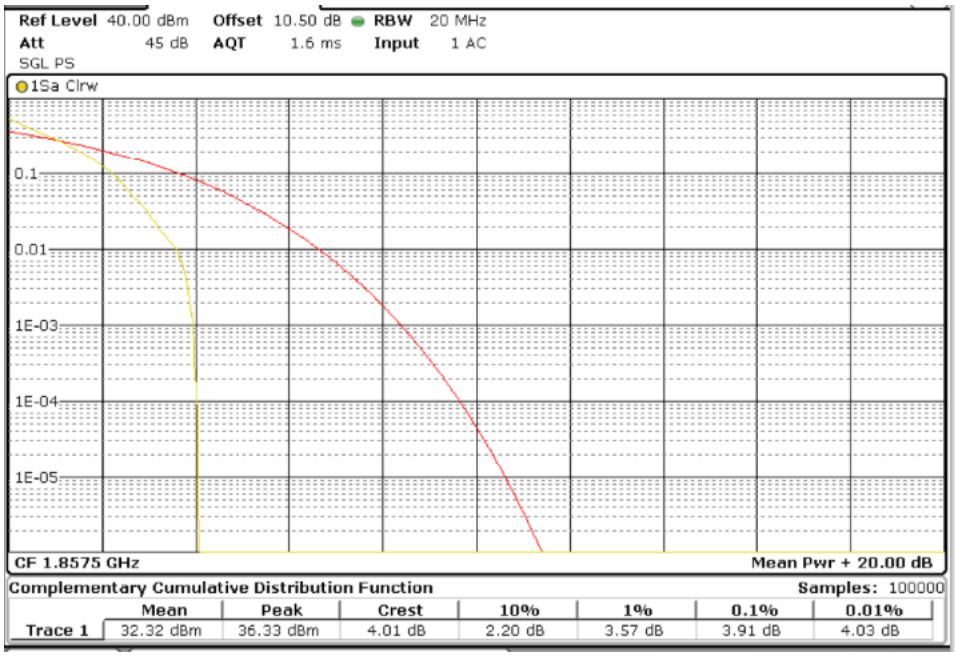
Highest channel



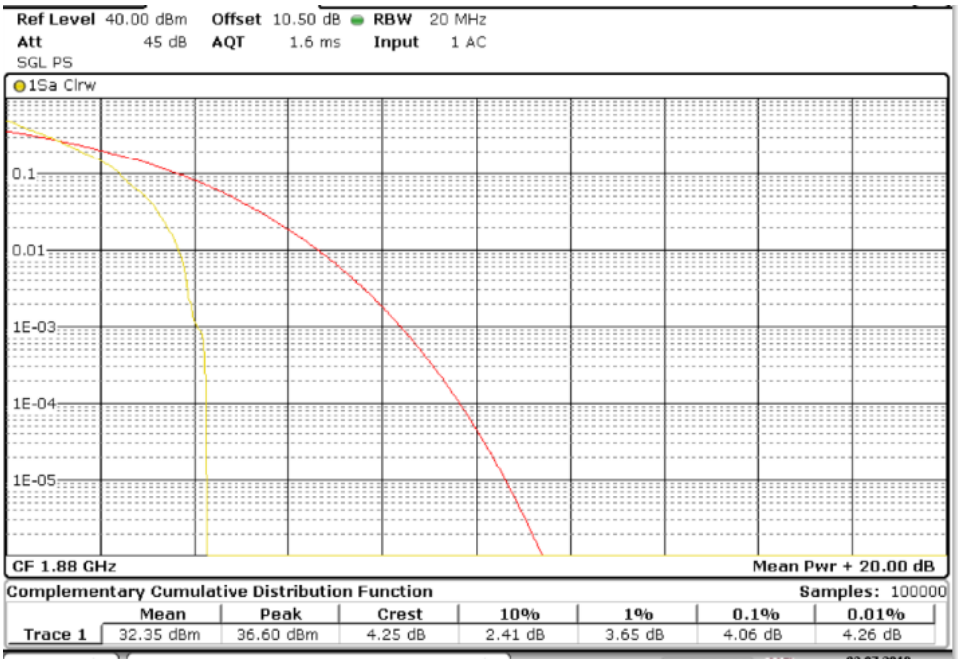
TEST RESULTS (Cont):	

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

Lowest channel

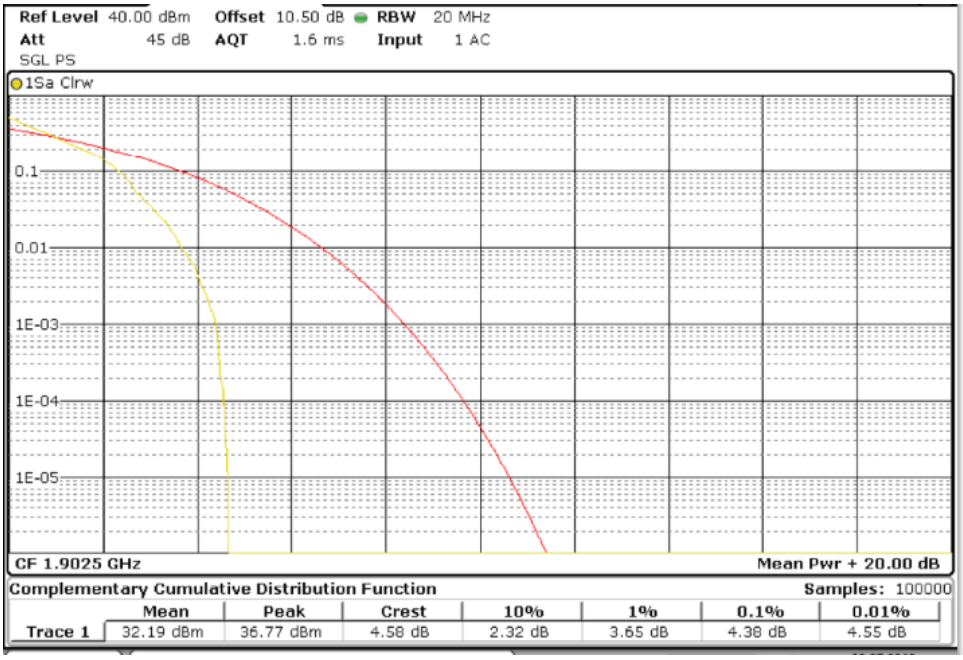


Middle channel



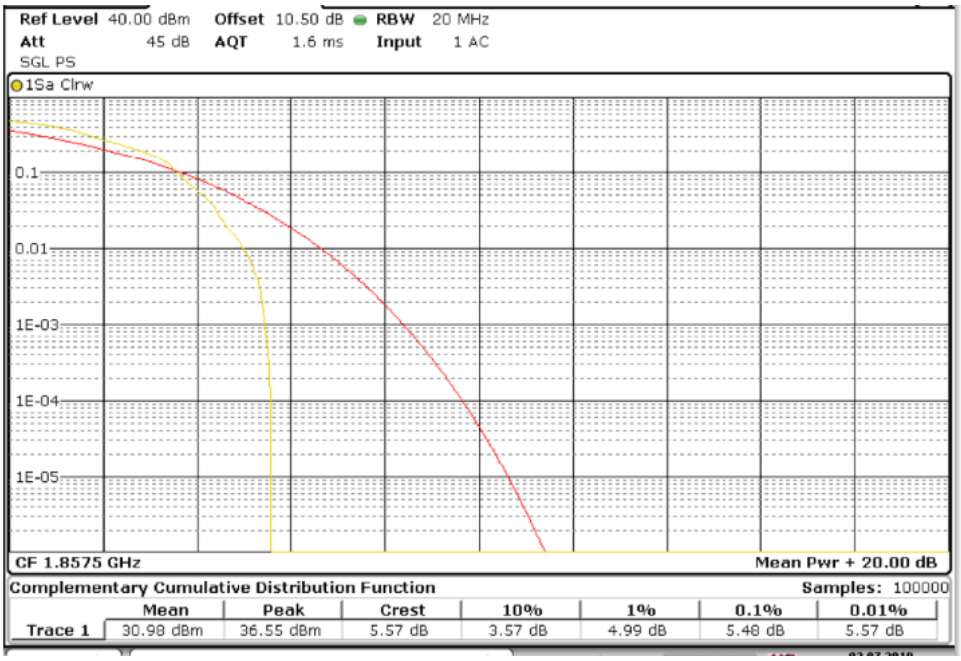
TEST RESULTS (Cont):	

Highest channel



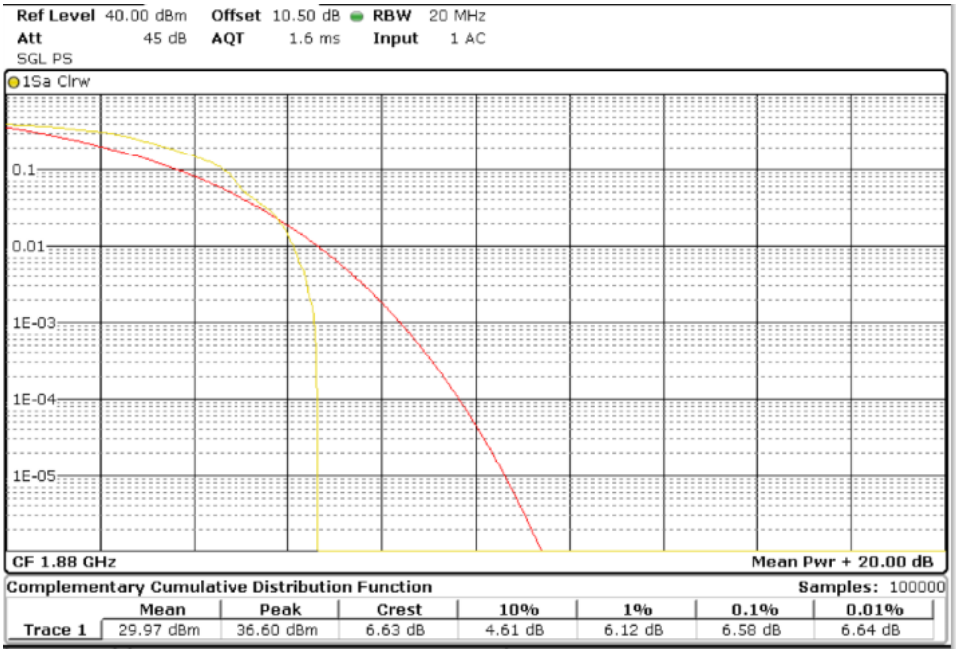
Bandwidth = 15 MHz. Modulation 16QAM. RB Size: 1. RB Offset: 0.

Lowest channel

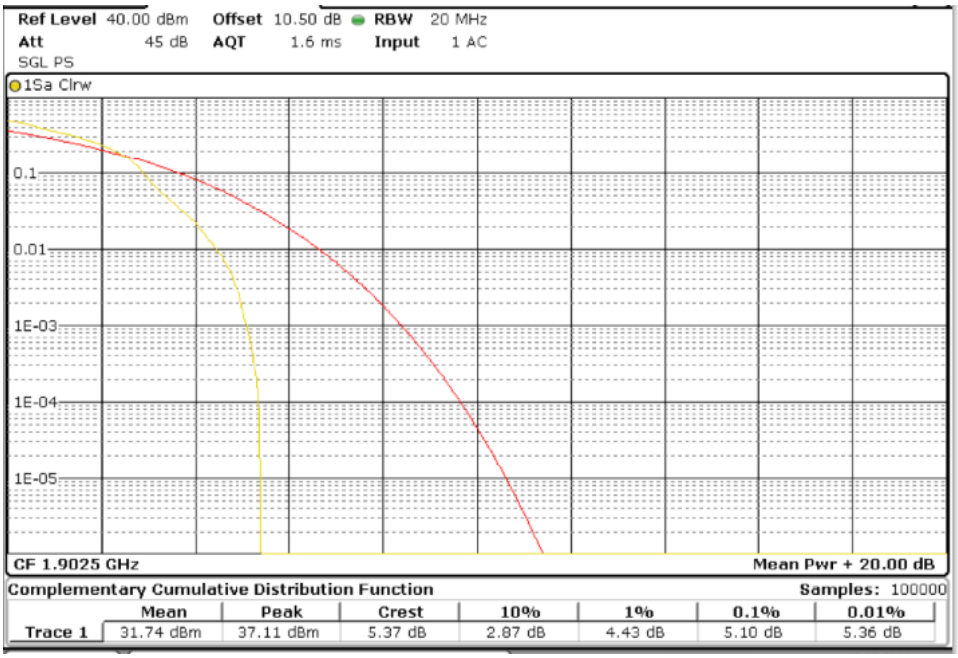


TEST RESULTS (Cont):	

Middle channel



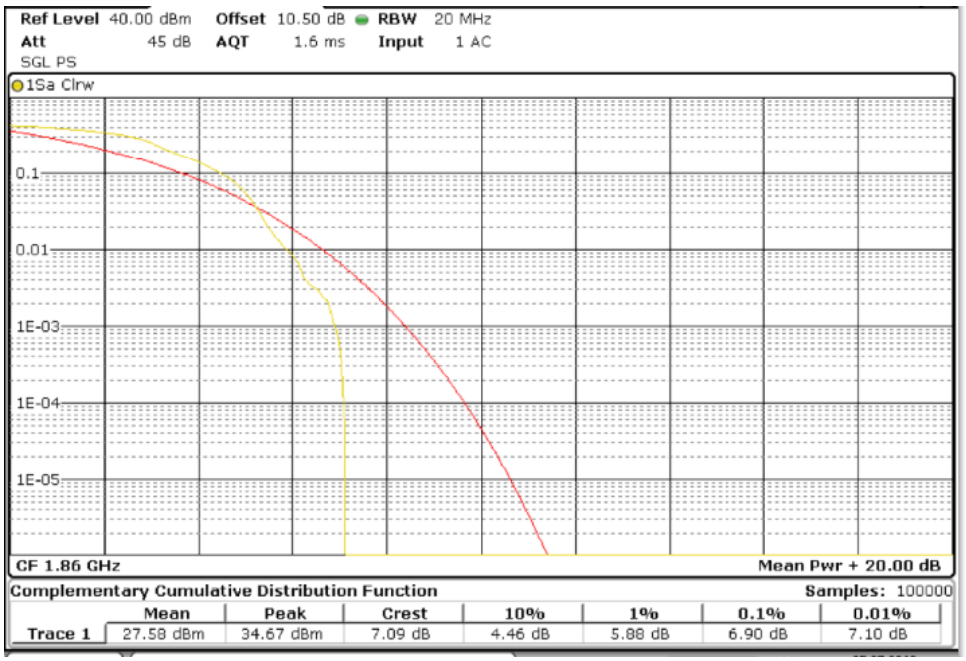
Highest channel



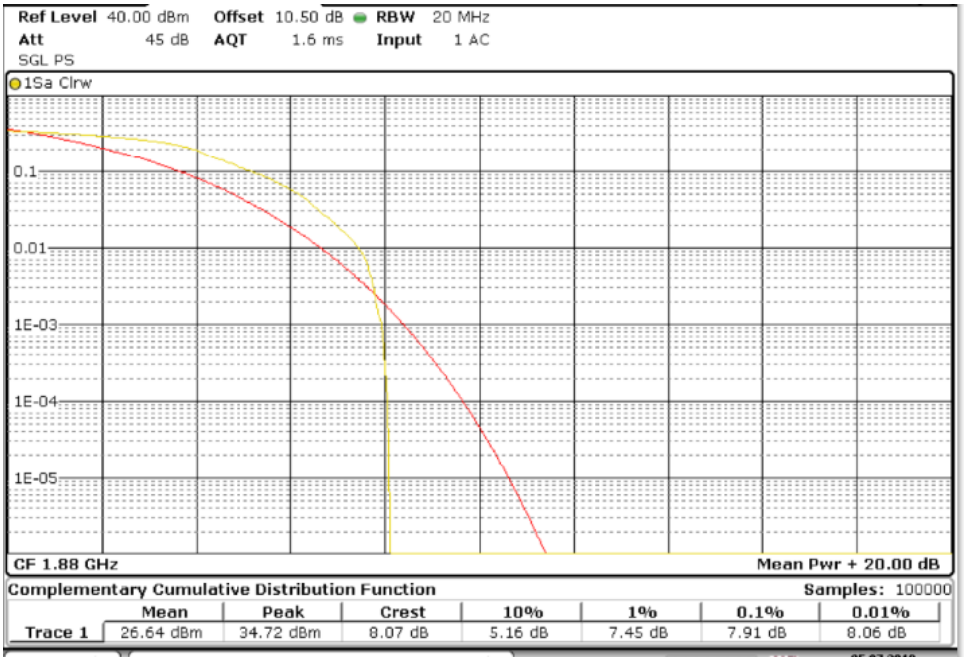
TEST RESULTS (Cont):	

Bandwidth = 20 MHz. Modulation QPSK. RB Size: 1. RB Offset: 0.

Lowest channel

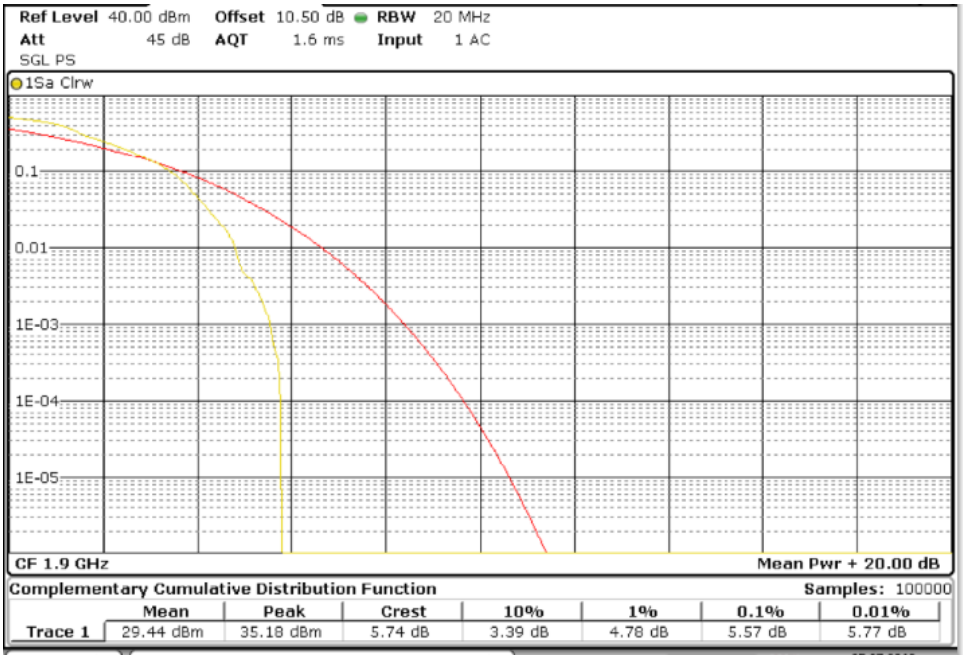


Middle channel



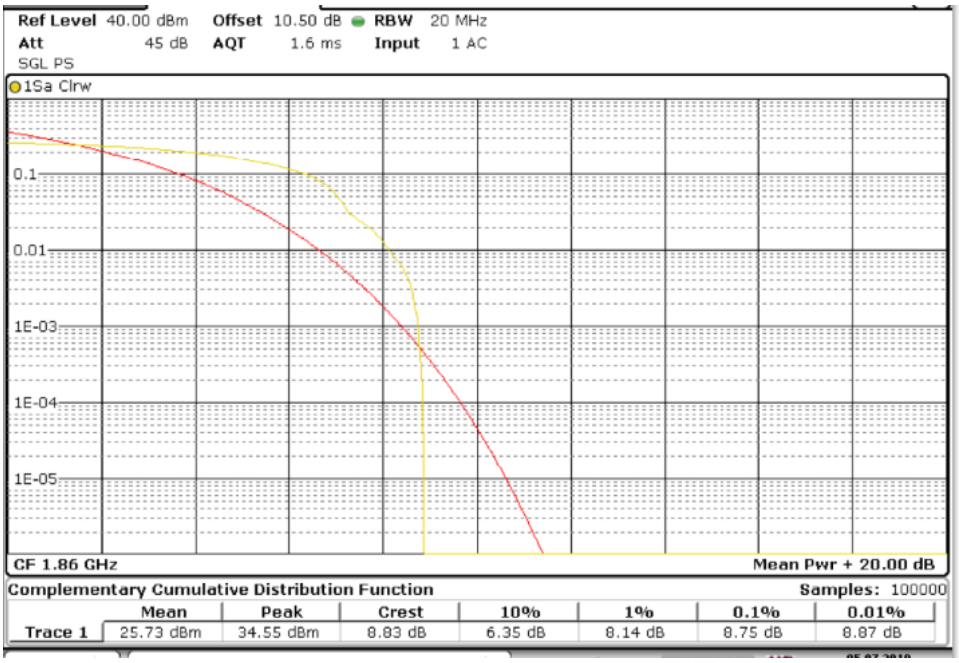
TEST RESULTS (Cont):	

Highest channel



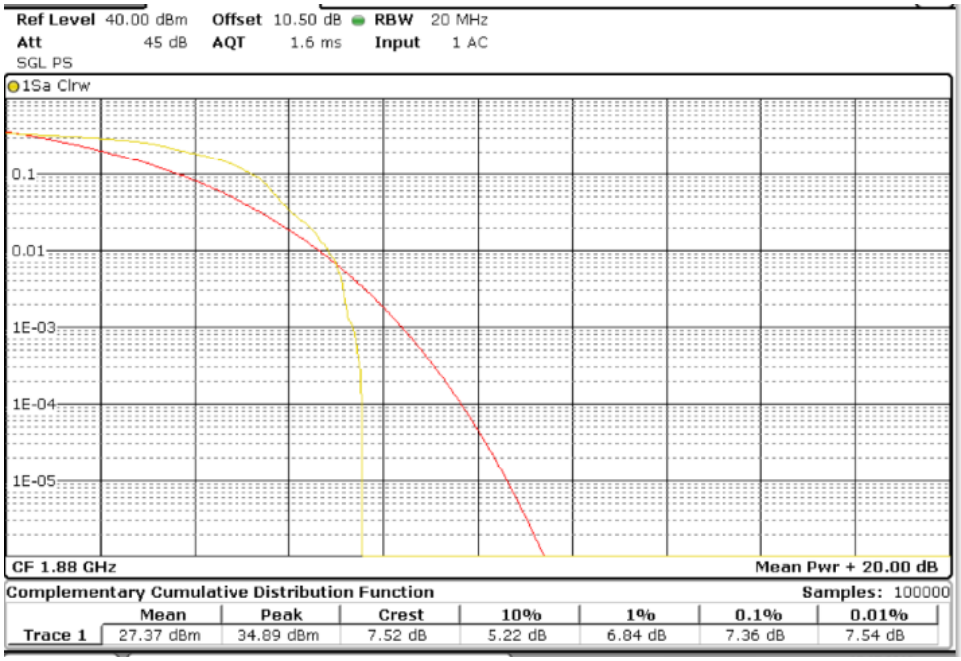
Bandwidth = 20 MHz. Modulation 16QAM. RB Size: 1. RB Offset: 0.

Lowest channel

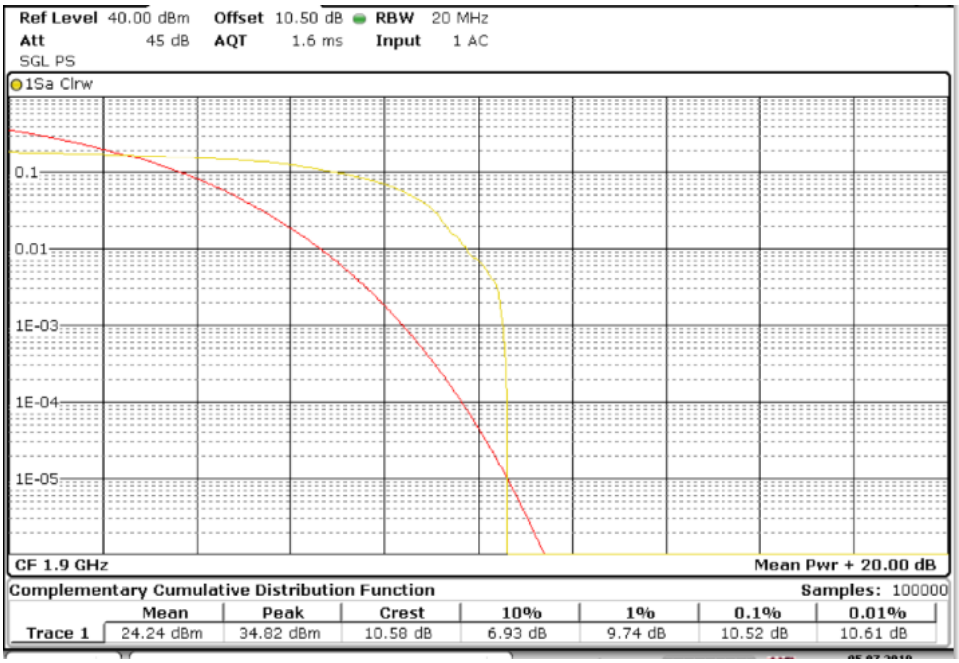


TEST RESULTS (Cont):	

Middle channel



Highest channel



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

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	18.36	2.0	20.36	6.52
Middle	23.22	2.0	25.22	9.83
Highest	23.38	2.0	25.38	7.83

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	23.13	2.0	25.13	9.54
Middle	23.34	2.0	25.34	8.81
Highest	22.57	2.0	24.57	8.00

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	23.01	2.0	25.01	7.83
Middle	23.07	2.0	25.07	10.32
Highest	23.69	2.0	25.69	10.17

LTE QPSK AND 16QAM MODULATION. Bandwidth = 20 MHz

Channel	Average power at antenna port (dBm)	Maximum declared antenna gain (dBi)	Maximum E.I.R.P. average power (dBm)	PAPR (dB)
Lowest	23.26	2.0	25.26	8.35
Middle	23.87	2.0	25.87	10.93
Highest	23.55	2.0	25.55	8.64
Measurement uncertainty (dB)			<±0.95	

TEST RESULTS (Cont):

Band	Channel / Freq. (MHz)	Modulation	RB No.	RB offset	Conducted Output Power (dBm)	PAPR
5 MHz	Lowest (26065 (1852.5 MHz))	QPSK	1	0	18.36	6.17
			6	0	17.52	
		16-QAM	1	0	18.29	6.52
			1	5	18.28	
			5	0	16.27	
			5	1	16.34	
	Middle (26365 (1882.5 MHz))	QPSK	1	0	21.96	9.83
			6	0	21.20	
		16-QAM	1	0	19.84	5.68
			1	5	22.83	
			5	0	23.22	
			5	1	22.82	
	Highest (26665 (1912.5 MHz))	QPSK	1	0	23.38	7.83
			6	0	22.41	
		16-QAM	1	0	23.37	7.33
			1	5	22.56	
			5	0	22.79	
			5	1	22.75	

TEST RESULTS (Cont):

Band	Channel / Freq. (MHz)	Modulation	RB No.	RB offset	Conducted Output Power (dBm)	PAPR
10 MHz	Lowest (26090 (1855 MHz))	QPSK	1	0	22.75	6.93
			6	0	22.78	
		16-QAM	1	0	22.81	9.54
			1	5	22.76	
			5	0	22.78	
			5	1	23.13	
	Middle (26365 (1882.5 MHz))	QPSK	1	0	23.34	8.81
			6	0	22.98	
		16-QAM	1	0	23.16	7.01
			1	5	23.01	
			5	0	22.99	
			5	1	22.98	
	Highest (26640 (1910 MHz))	QPSK	1	0	22.56	6.67
			6	0	22.57	
		16-QAM	1	0	22.56	8.00
			1	5	22.57	
			5	0	22.56	
			5	1	22.56	

TEST RESULTS (Cont):

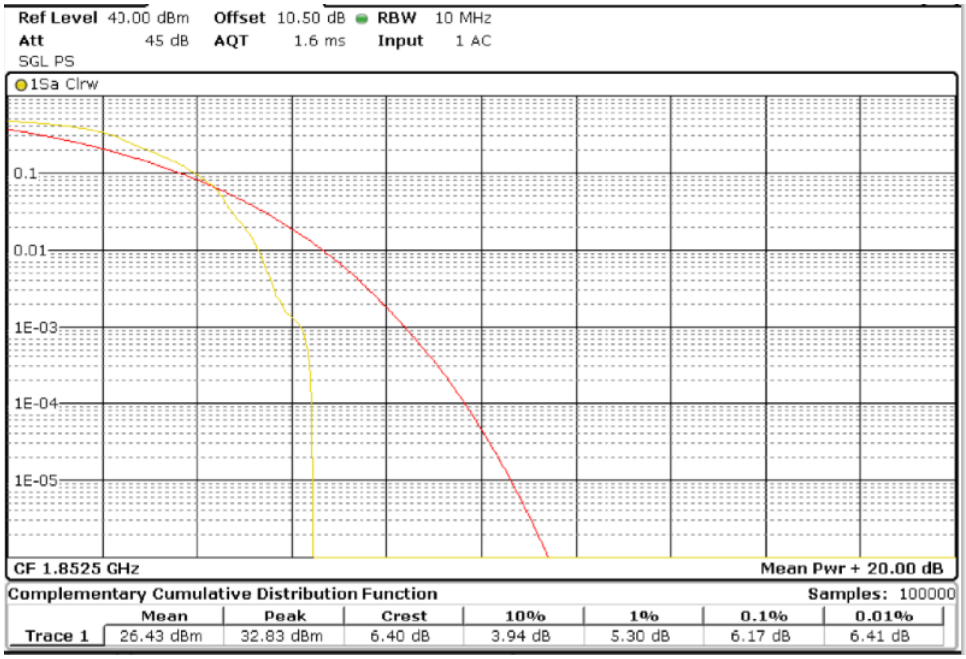
Band	Channel / Freq. (MHz)	Modulation	RB No.	RB offset	Conducted Output Power (dBm)	PAPR
15 MHz	Lowest (26115 (1857.5 MHz))	QPSK	1	0	23.01	7.83
			6	0	22.97	
		16-QAM	1	0	22.96	5.10
			1	5	22.97	
			5	0	22.98	
			5	1	22.97	
	Middle (26365 (1882.5 MHz))	QPSK	1	0	23.07	10.32
			6	0	23.03	
		16-QAM	1	0	23.01	9.65
			1	5	22.88	
			5	0	23.05	
			5	1	23.06	
	Highest (26615 (1907.5 MHz))	QPSK	1	0	22.97	9.33
			6	0	23.69	
		16-QAM	1	0	22.61	10.17
			1	5	22.60	
			5	0	22.57	
			5	1	22.67	

TEST RESULTS (Cont):	

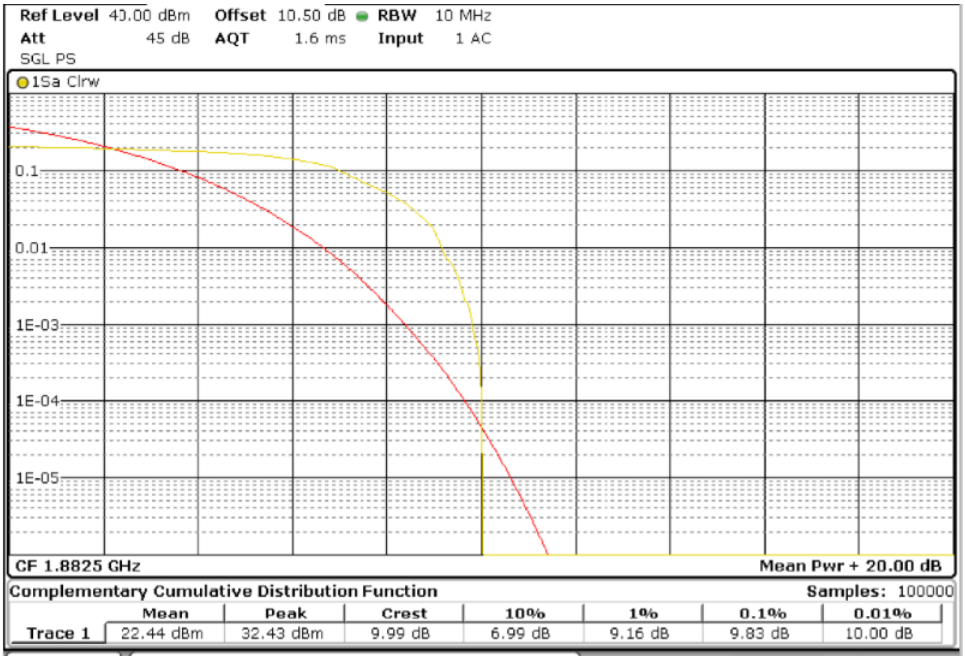
Band	Channel / Freq. (MHz)	Modulation	RB No.	RB offset	Conducted Output Power (dBm)	PAPR
20 MHz	Lowest (26140 (1860 MHz))	QPSK	1	0	23.25	8.35
			6	0	22.90	
		16-QAM	1	0	23.26	7.71
			1	5	23.05	
			5	0	23.18	
			5	1	23.10	
	Middle (26365 (1882.5 MHz))	QPSK	1	0	23.14	9.57
			6	0	23.87	
		16-QAM	1	0	23.09	10.93
			1	5	23.13	
			5	0	23.11	
			5	1	23.10	
	Highest (26590 (1905 MHz))	QPSK	1	0	23.55	8.64
			6	0	22.59	
		16-QAM	1	0	23.33	5.68
			1	5	22.78	
			5	0	23.55	
			5	1	23.54	

TEST RESULTS (Cont):	

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

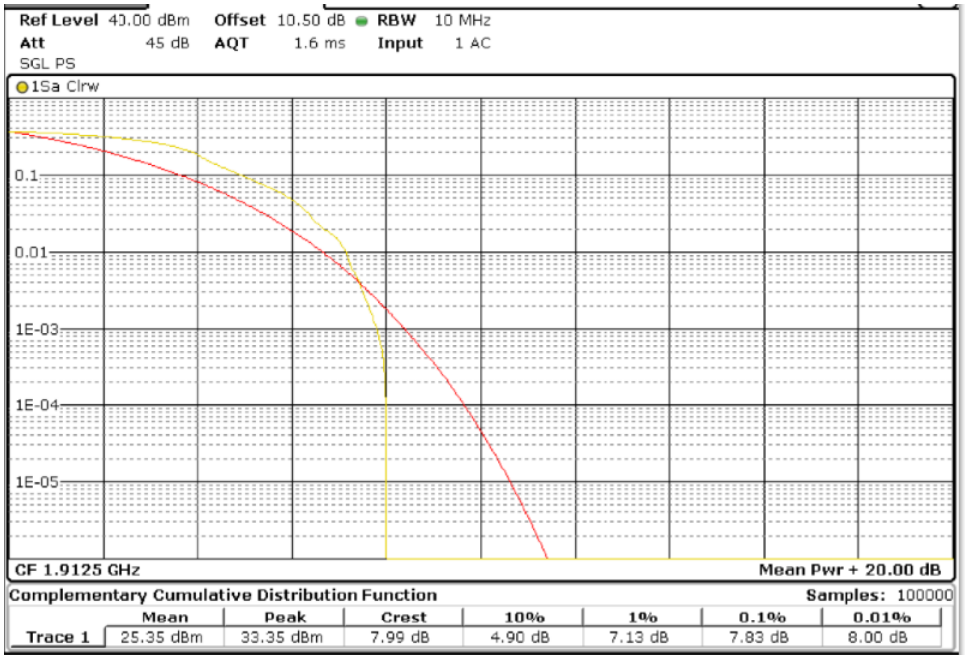


Middle channel



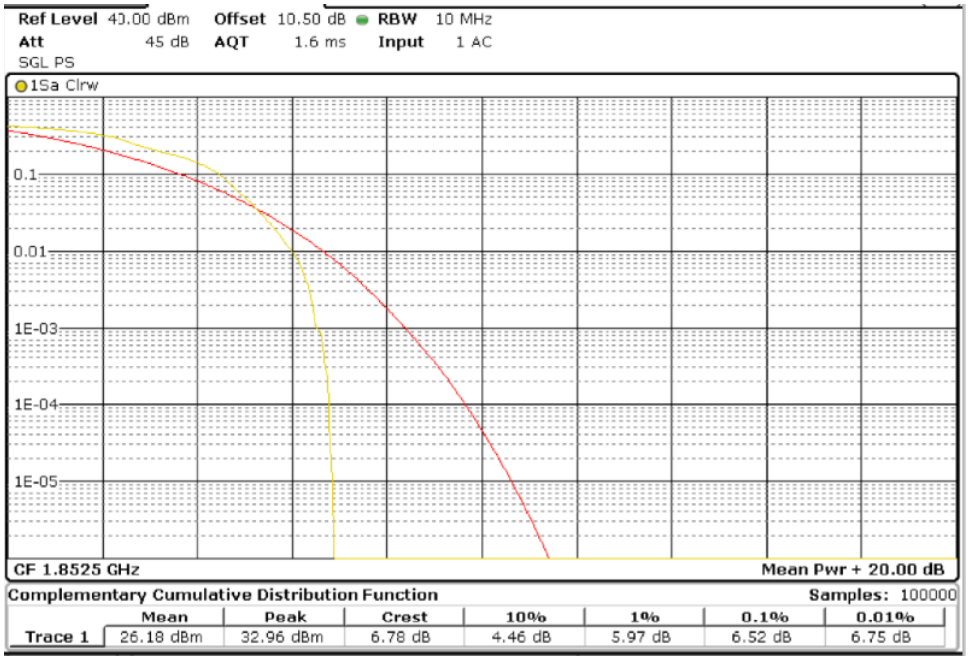
TEST RESULTS (Cont):	

Highest channel



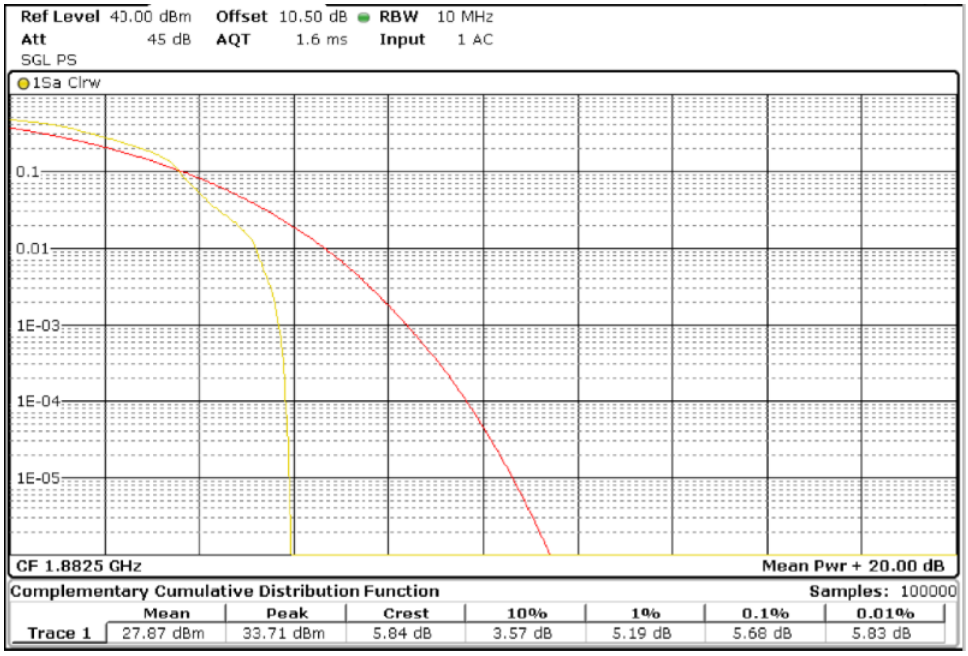
Bandwidth = 5 MHz. Modulation 16QAM. RB Size: 1. RB Offset: 0.

Lowest channel

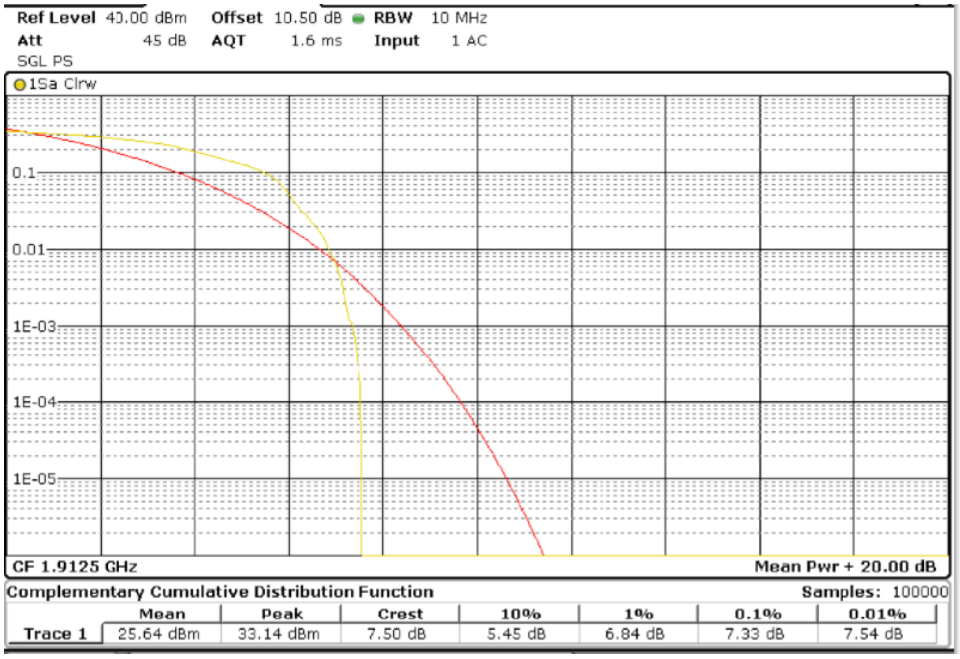


TEST RESULTS (Cont):	

Middle channel



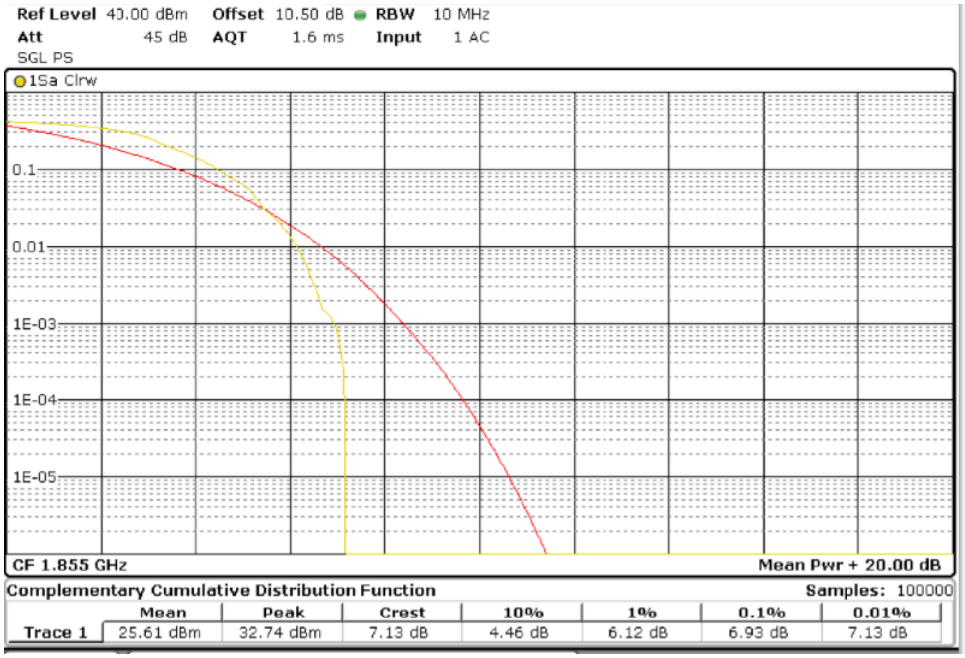
Highest channel



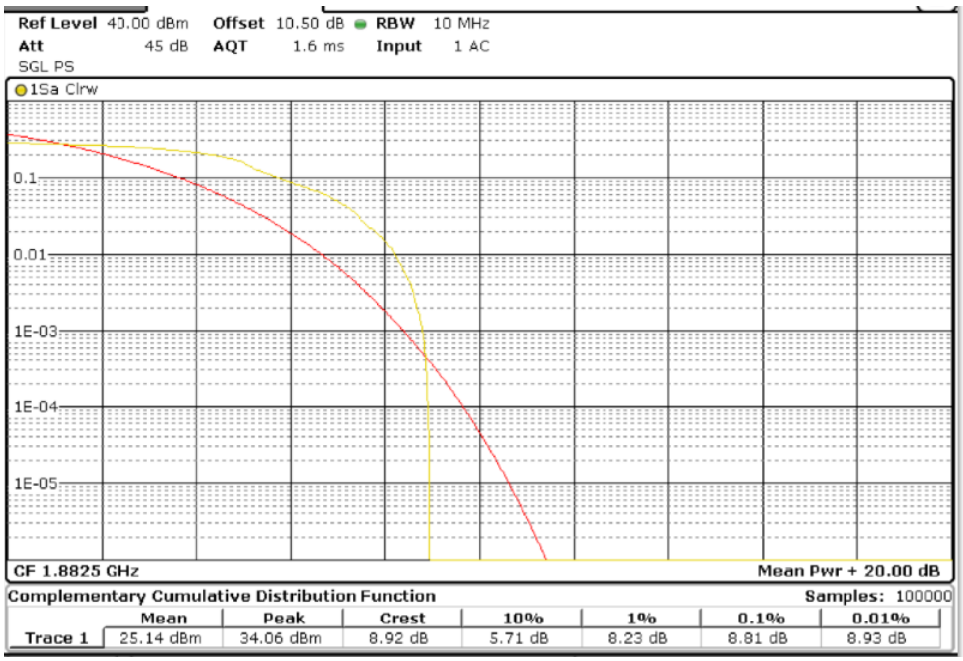
TEST RESULTS (Cont):	

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

Lowest channel

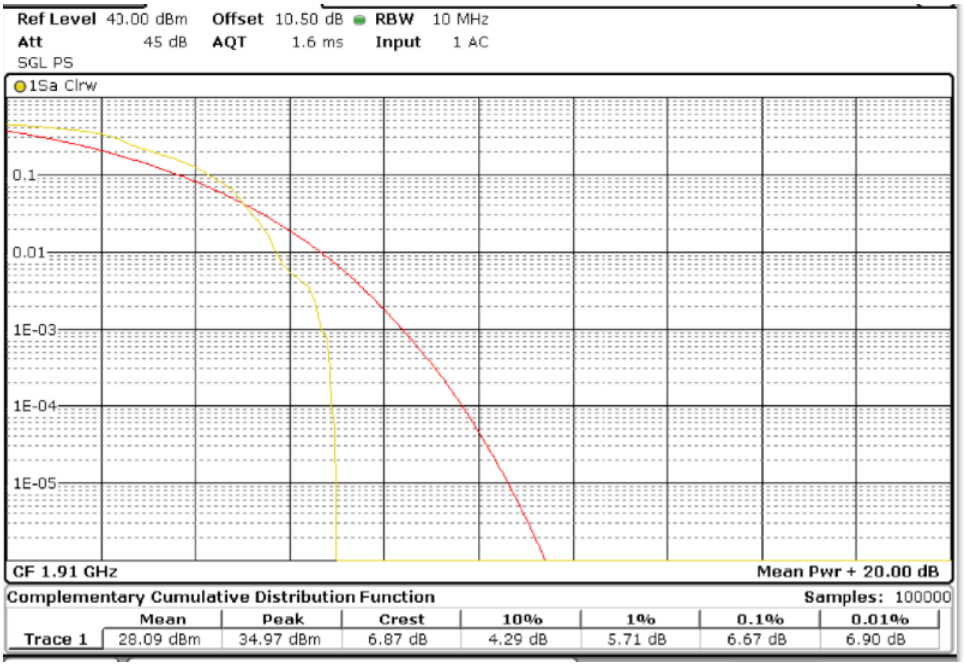


Middle channel



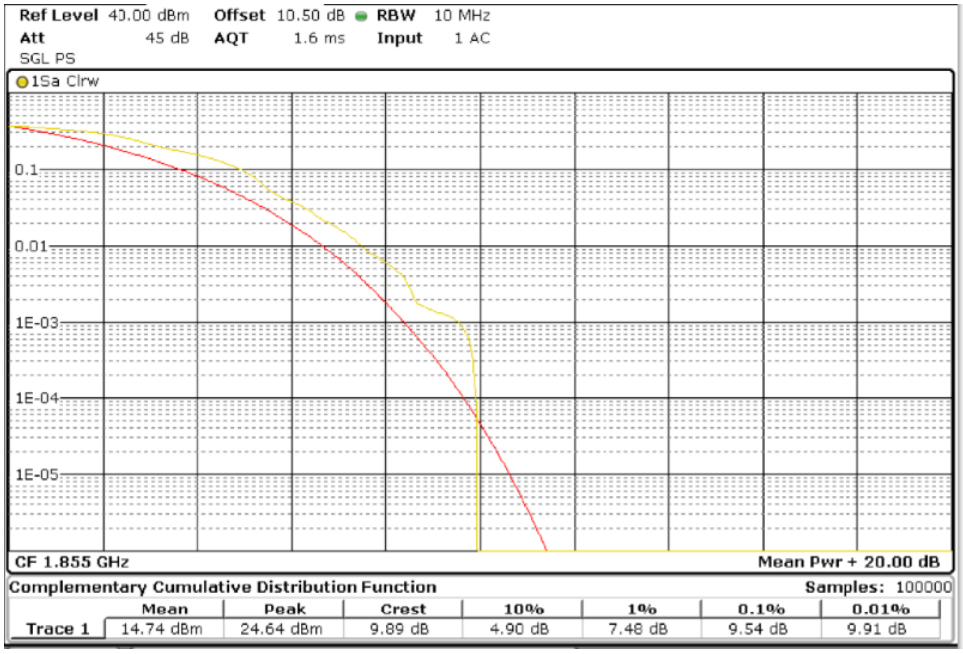
TEST RESULTS (Cont):	

Highest channel



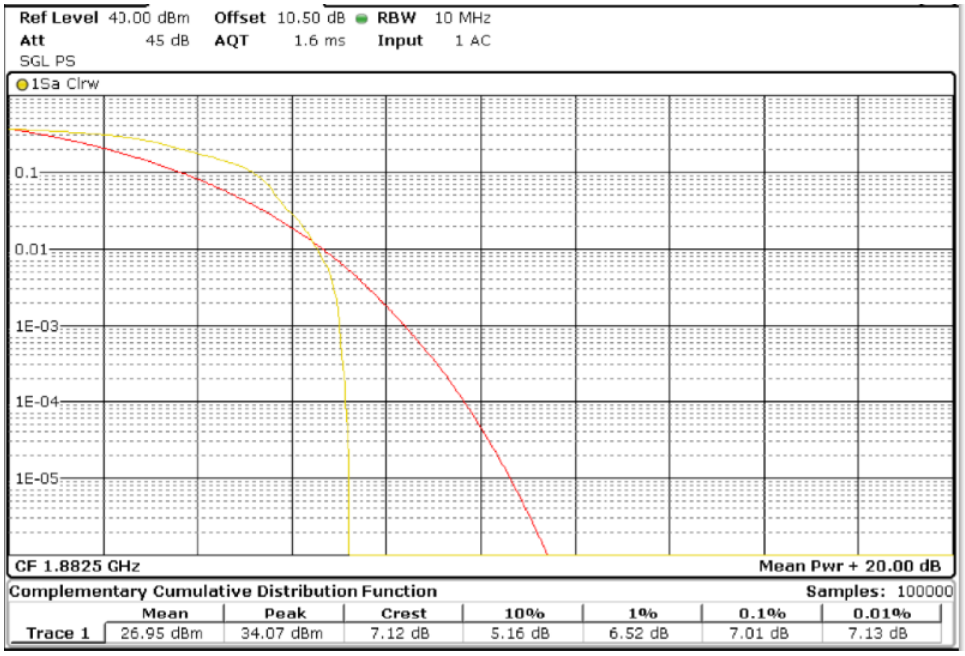
Bandwidth = 10 MHz. Modulation 16QAM. RB Size: 1. RB Offset: 0.

Lowest channel

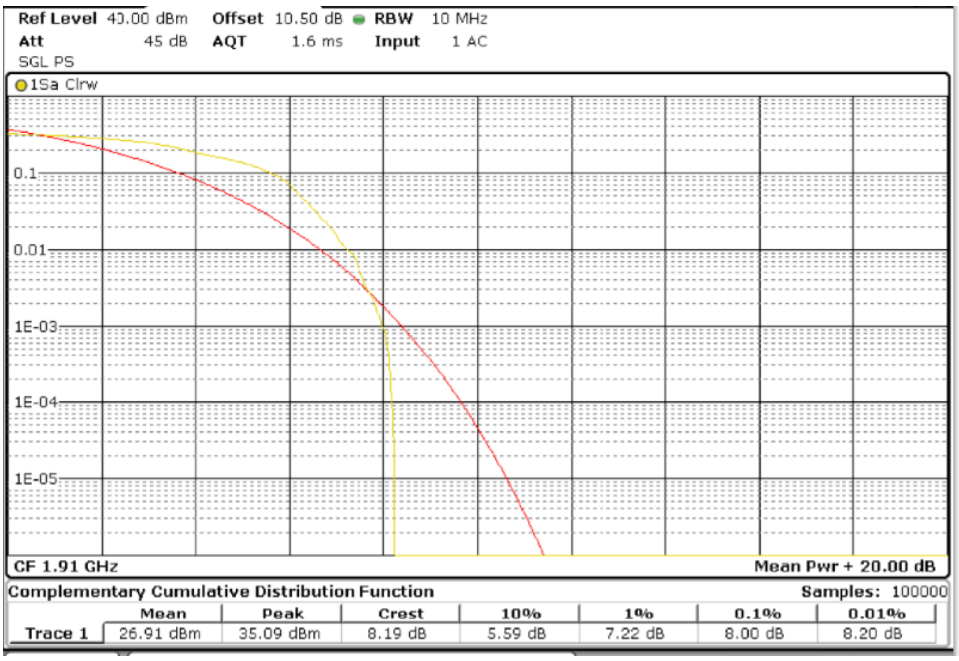


TEST RESULTS (Cont):	

Middle channel



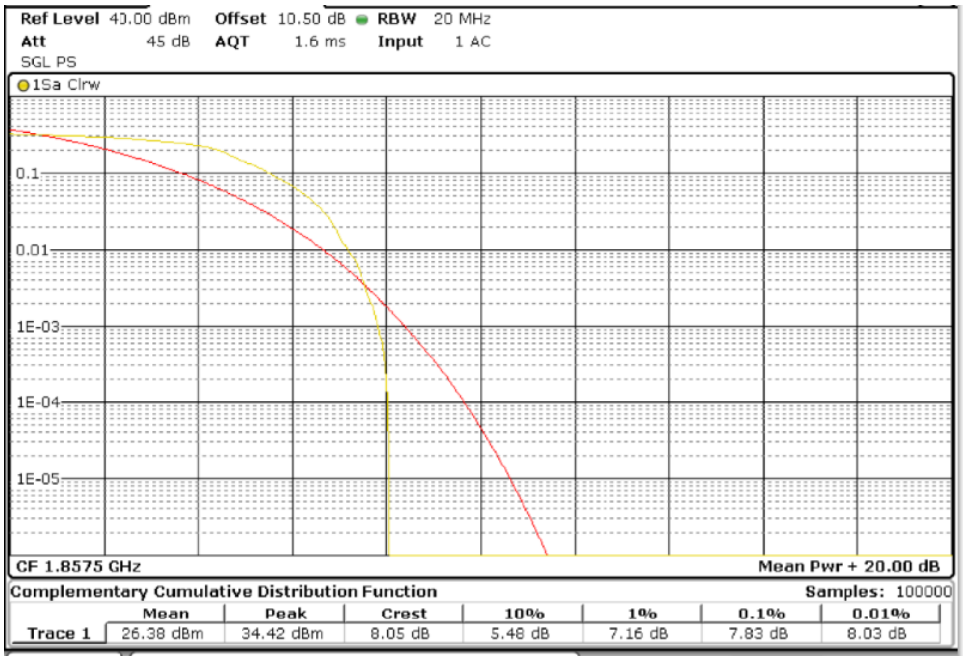
Highest channel



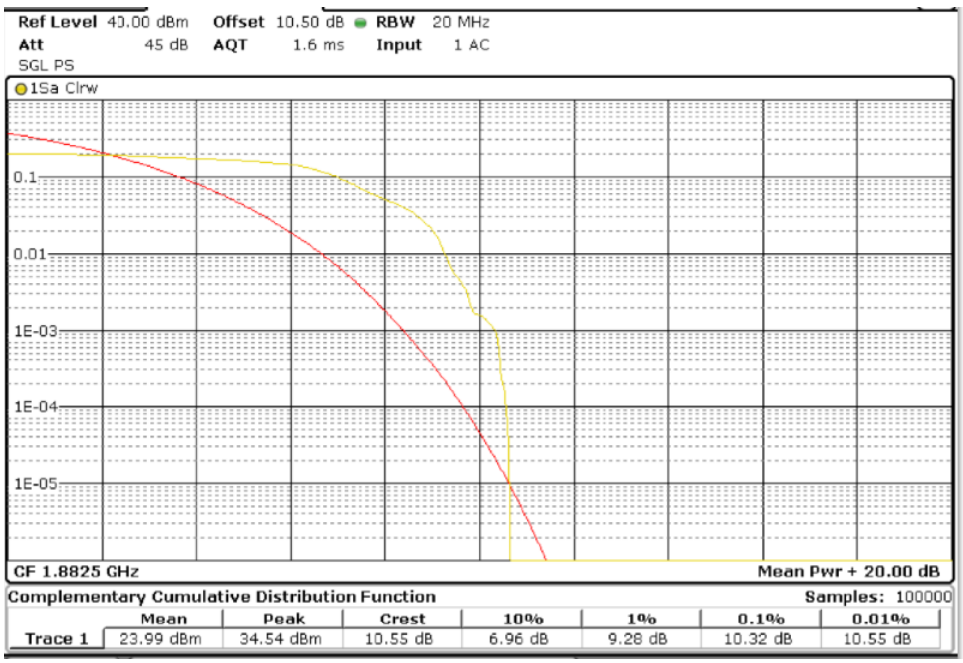
TEST RESULTS (Cont):	

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

Lowest channel

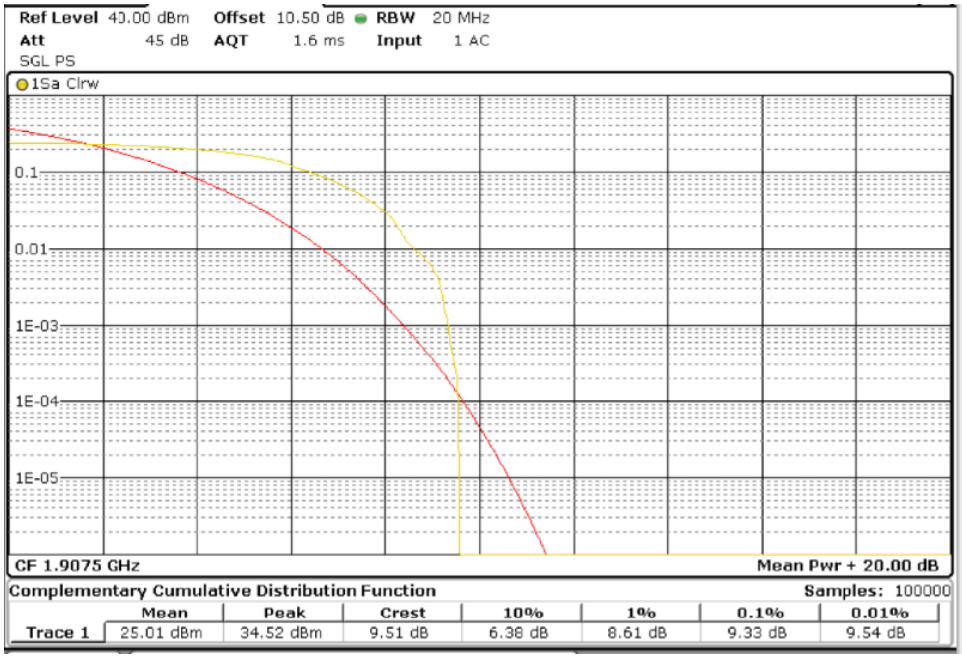


Middle channel



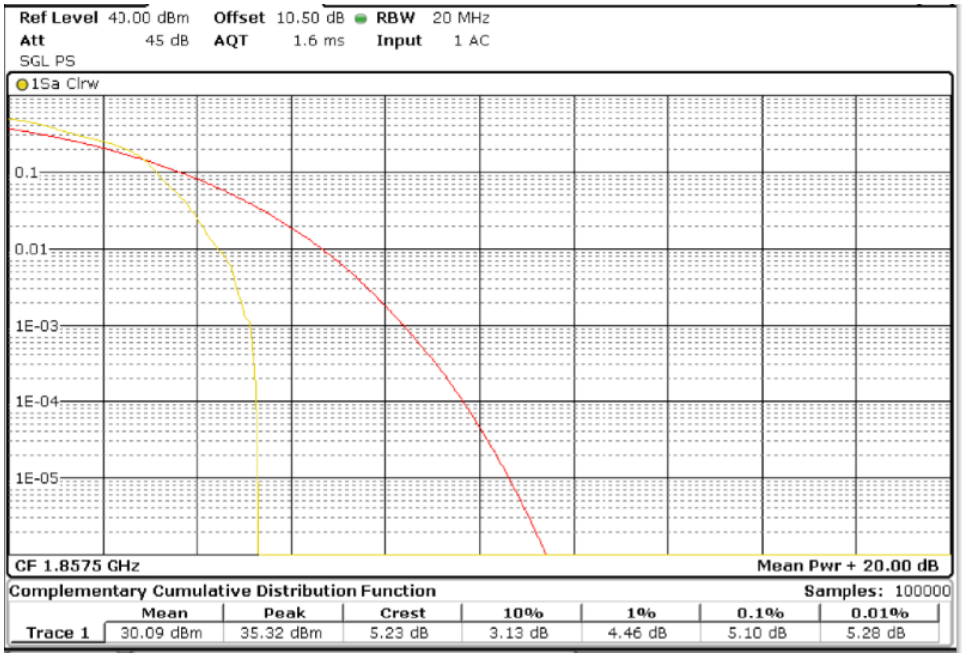
TEST RESULTS (Cont):	

Highest channel



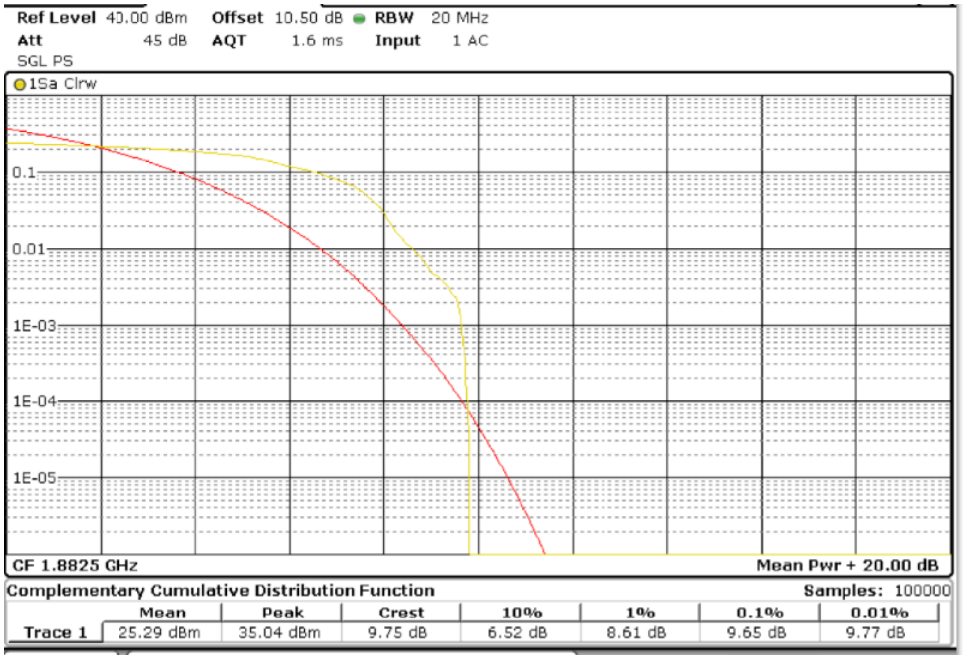
Bandwidth = 15 MHz. Modulation 16QAM. RB Size: 1. RB Offset: 0.

Lowest channel

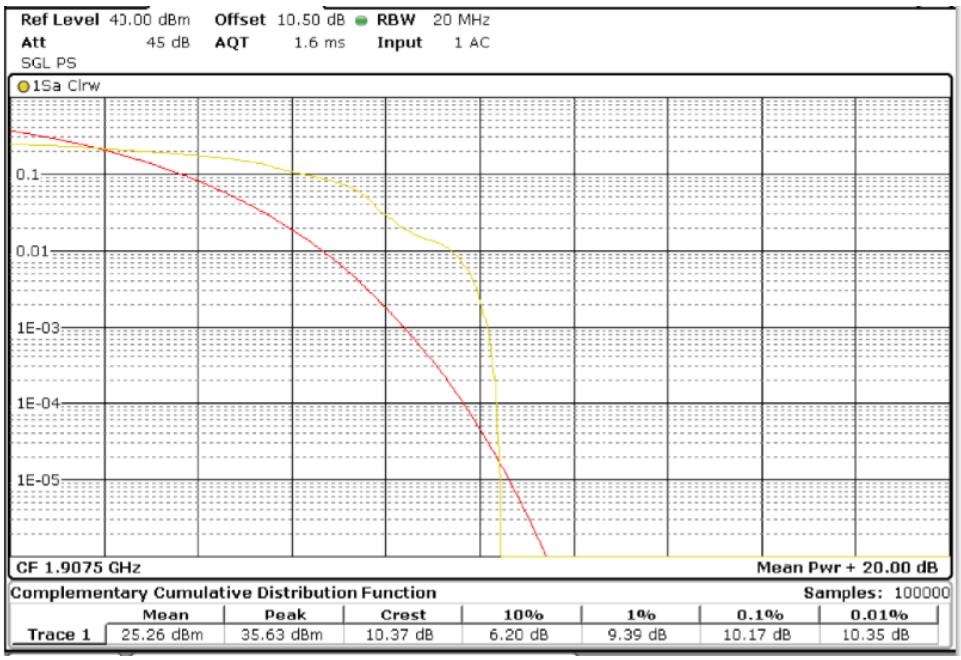


TEST RESULTS (Cont):	

Middle channel



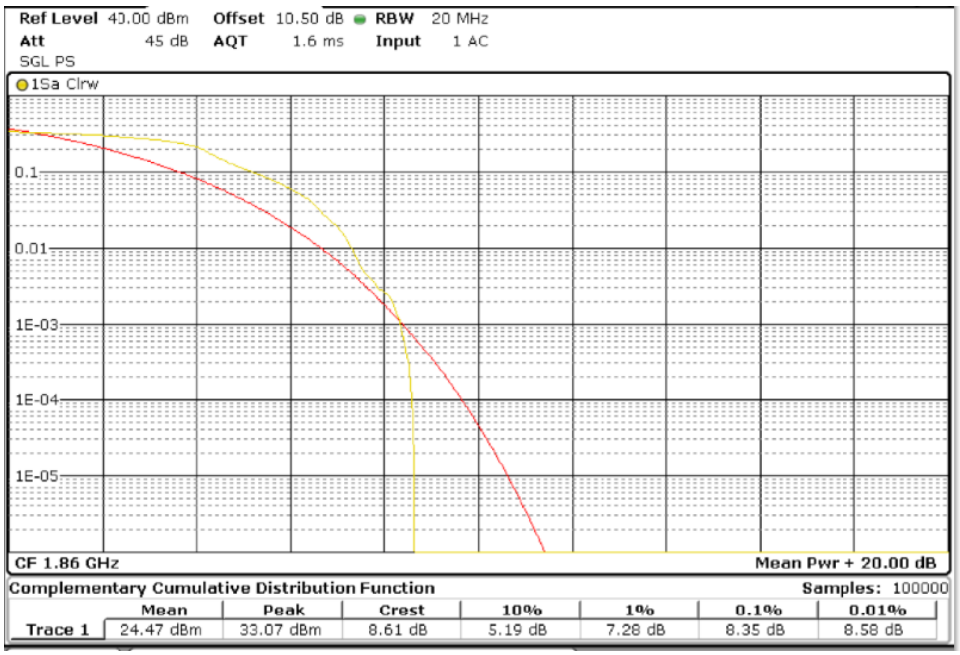
Highest channel



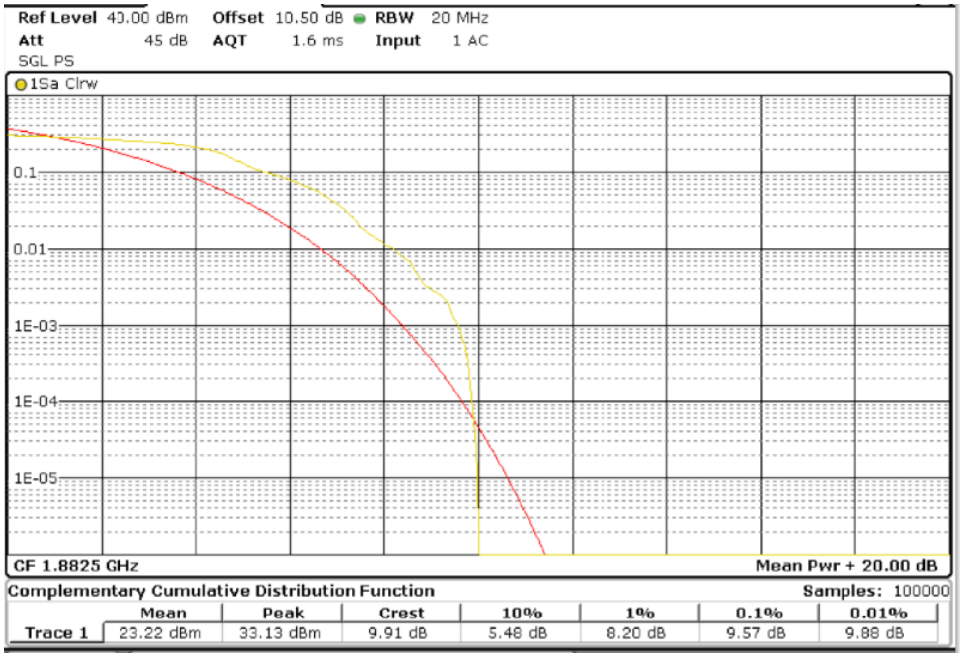
TEST RESULTS (Cont):	

Bandwidth = 20 MHz. Modulation QPSK. RB Size: 1. RB Offset: 0.

Lowest channel

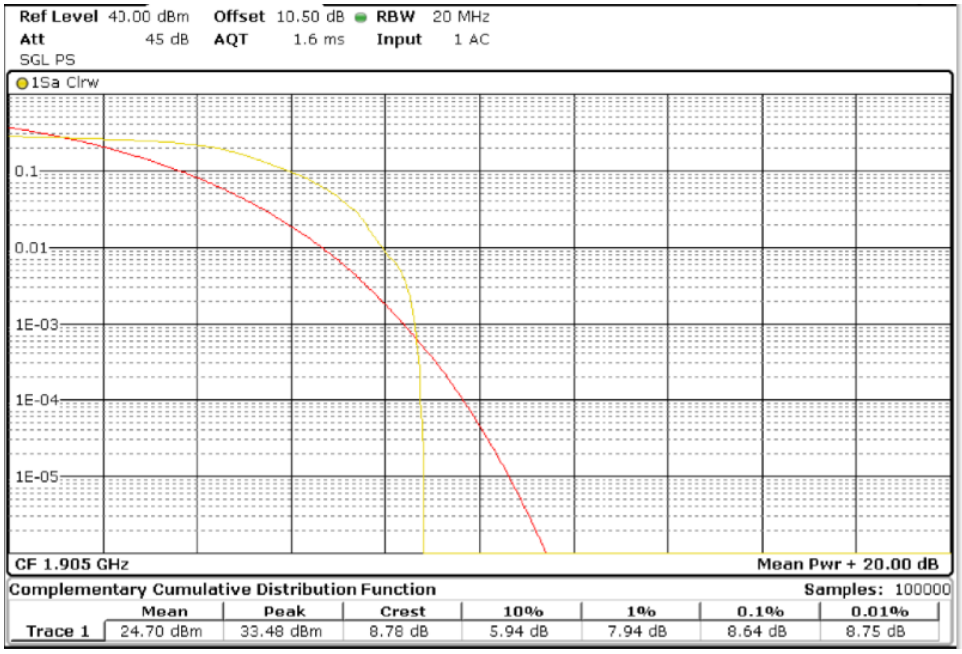


Middle channel



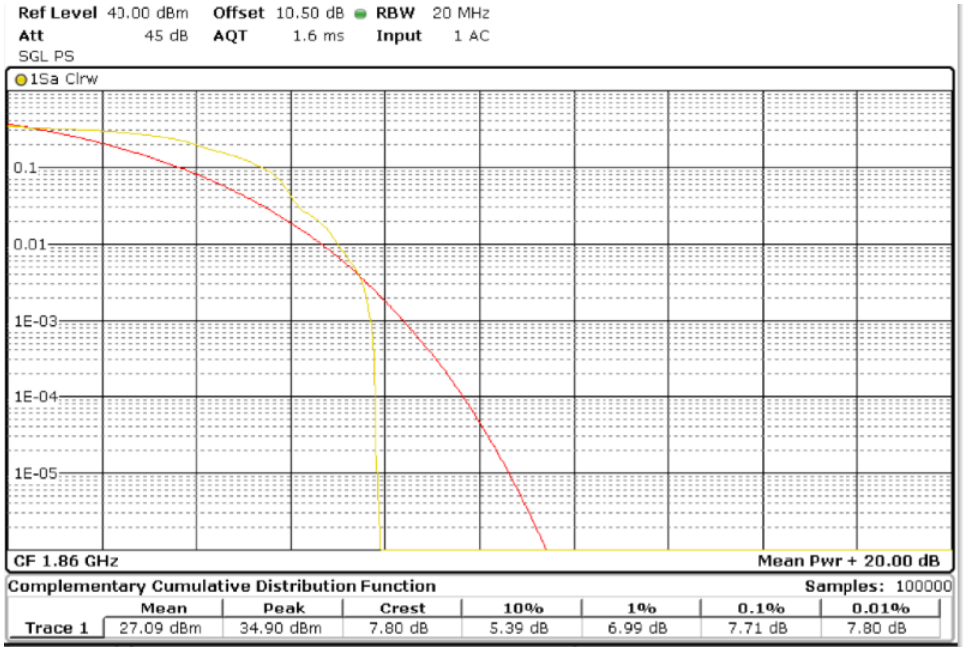
TEST RESULTS (Cont):	

Highest channel



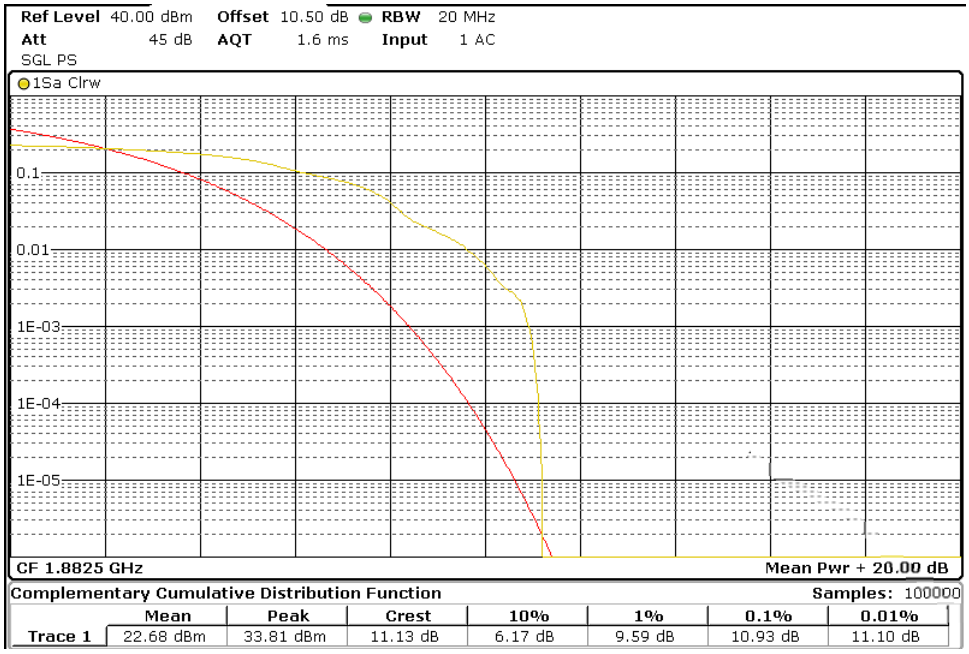
Bandwidth = 20 MHz. Modulation 16QAM. RB Size: 1. RB Offset: 0.

Lowest channel

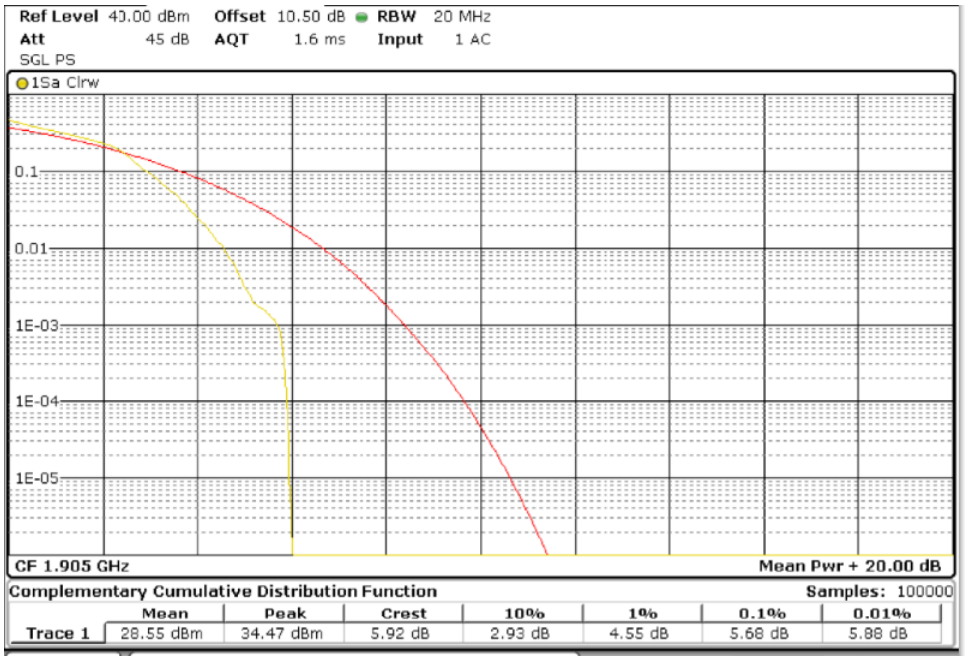


TEST RESULTS (Cont):	

Middle channel



Highest channel



TEST A.2: MODULATION CHARACTERISTICS

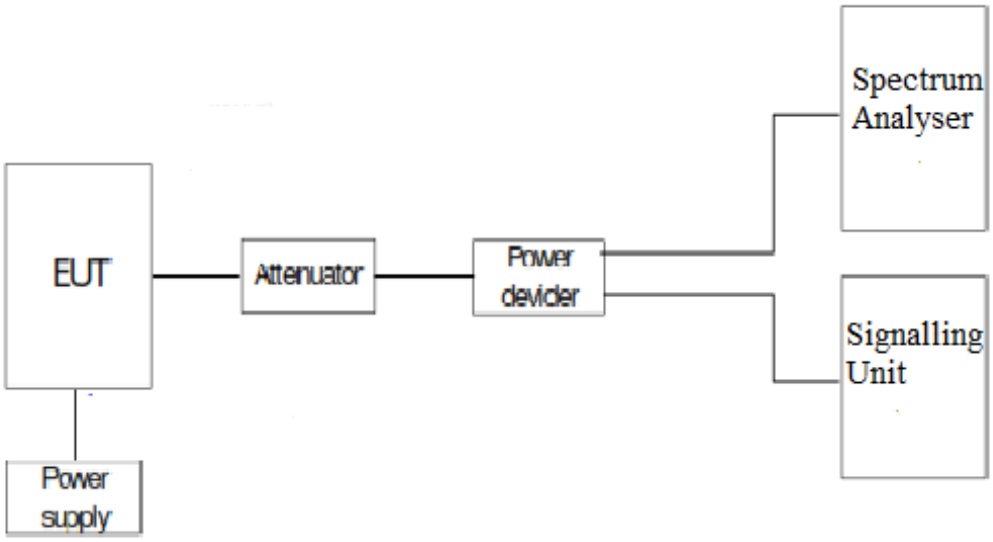
LIMITS:	Product standard:	FCC Part 24 / IC RSS-133
	Test standard:	FCC §2.1047 and §24.236. RSS-133 Clause 6.3

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.

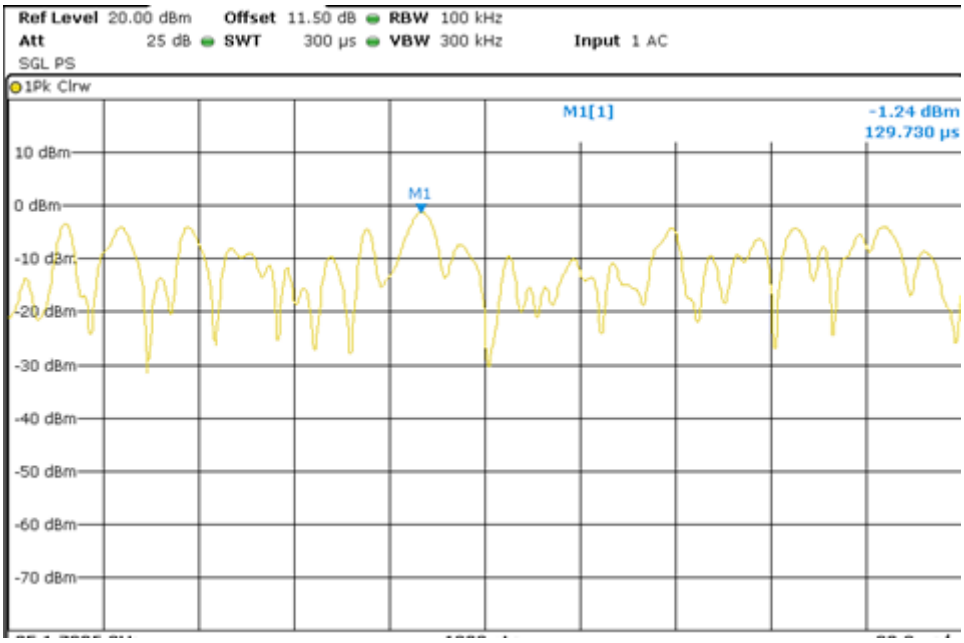
TEST SETUP

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).

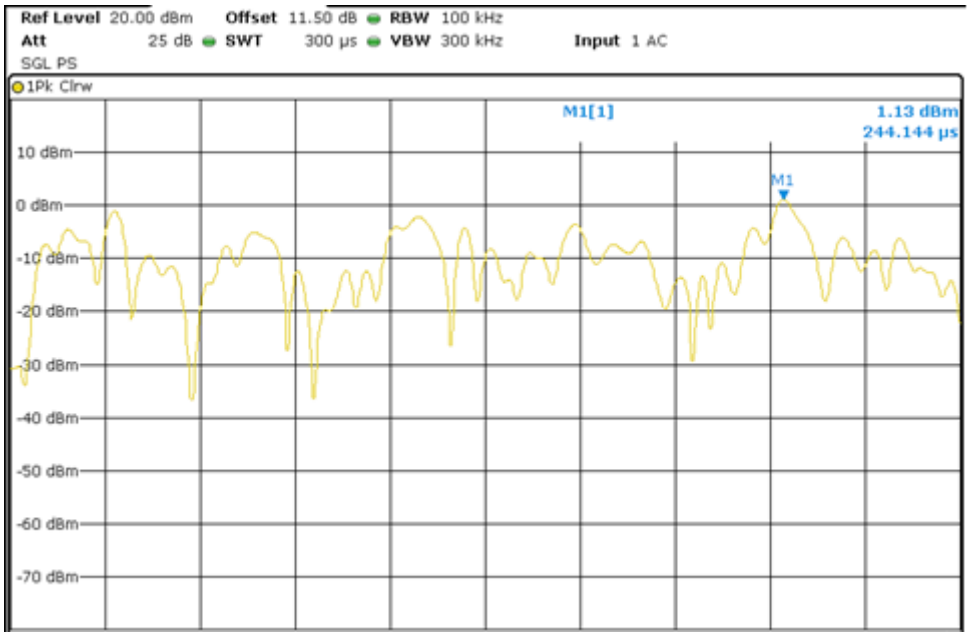


TESTED SAMPLES:	S/01
TESTED CONDITIONS MODES:	TC#01
TEST RESULTS:	PASS

QPSK Modulation



16QAM Modulation



TEST A.3: FREQUENCY STABILITY

LIMITS:	Product standard:	FCC Part 24 / IC RSS-133
	Test standard:	FCC §2.1055 and § 24.235/ RSS-133 Clause 6.5

LIMITS

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

TEST SETUP	

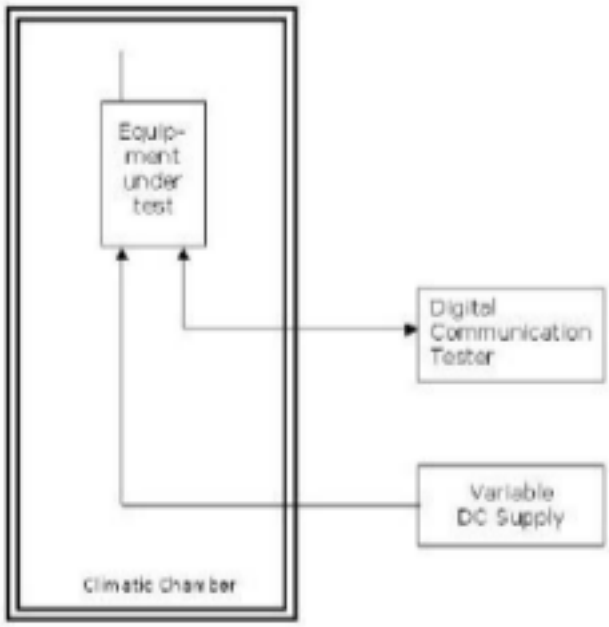
The frequency tolerance measurements over temperature variations were made over the temperature range of

–30ºC to +50ºC. The EUT was placed inside a climatic chamber and the temperature was raised hourly in 10ºC steps from –30ºC up to +50ºC.

The supply voltage was varied between 85% and 115% of nominal voltage.

The EUT was set in “call mode” in the middle channel using the Universal Radio Communication tester R&S CMW500 and the maximum frequency error was measured using the built-in calibrated frequency meter.

For LTE mode the QPSK modulation was used for the test as it is the worst case for conducted power.



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

LTE QPSK MODULATION. BW = 15 MHz

Frequency stability over temperature variations

Temperature (ºC)	Frequency Error (Hz)	Frequency Error (ppm)	Frequency Error (%)
50	-3.76	-0.0020	-0.00000020
40	-0.1	-0.0001	-0.00000001
30	-2.17	-0.0012	-0.00000012
20	2.53	0.0013	0.00000013
10	1.82	0.0010	0.00000010
0	2.78	0.0015	0.00000015
-10	-11.01	-0.0059	-0.00000059
-20	-8.5	-0.0045	-0.00000045
-30	0.37	0.0002	0.00000002

Frequency stability over voltage variations

Battery Supply voltage	Voltage (V)	Frequency Error (Hz)	Frequency Error (ppm)	Frequency Error (%)
Vmax	4.37	0.69	0.0004	0.00000004
Vmin	3.23	5.01	0.0027	0.00000027