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# Report On

FCC and IC Testing of the CBRSYS6500 in accordance with FCC CFR 47 Part 2 and FCC CFR 47 Part 27

COMMERCIAL-IN-CONFIDENCE

FCC ID: 2AQSOCBRSYS6500

PREPARED BY

liktorov

Nikolai Viktorov Test Personnel October 2018

APPROVED BY

DATED

Drysdale

Scott Drysdale Authorised Signatory

December 18, 2018

Page 1 of 37

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**SECTION 1** 

**REPORT INFORMATION** 



#### 1.1 REPORT DETAILS

Manufacturer	Octasic inc.
Address	300-401 Molson St, Montreal, QC, H1Y 3L1
Product Name	CBRSYS6500 (CBRRFE6400+CBRSYS6000)
Product Number	CBRSYS6000 - CBRSYS6008-RE-3E CBRRFE6400 - CBRRFE6407-NC100-EE1
Serial Number(s)	CBRSYS6000 – F-00190 CBRRFE6400 – K-15468
Hardware Version	CBRSYS6000 - 3.0 CBRRFE6400 - 3.1
Test Specification/Issue/Date	FCC CFR 47 Part 2: 2016 FCC CFR 47 Part 27: 2016
Start of Test	October 12, 2018
Finish of Test	December 17, 2018
Name of Test Personnel(s)	Scott Drysdale and Nikolai Viktorov
Related Document(s)	KDB 971168 D01 v02r02 KDB 662911 D01 v02r01



#### 1.2 BRIEF SUMMARY OF RESULTS

A brief summary of results for each configuration, in accordance with FCC CFR 47 Part 2 and FCC CFR 47 Part 27 is shown below.

		Specification Clause		
Section	FCC CFR 47 Part 2	FCC CFR 47 Part 27	Test Description	Result
2.1	2.1046	27.50	Maximum Peak Output Power, ERP, and Peak to Average Ratio - Conducted	Pass
2.2	2.1049	27.53	Occupied Bandwidth	Pass
2.3	2.1051	27.53 (h)	Band Edge	Pass
2.4	2.1051	27.53 (h)	Transmitter Spurious Emissions	Pass
2.5	2.1055	27.54	Frequency Stability	Pass
-	-	15.111	Receiver Spurious Emissions	N/A <sup>1</sup>

 $N/A^1$  – Not Applicable, as this is a transceiver.



#### 1.3 CONFIGURATION DESCRIPTION

The CBRSYS6500 supports Single Mode operation from a single port configuration.

The CBRSYS6500 supports UMTS in Band 4 (2110 MHz - 2155 MHz).

TX test cases: Maximum Conducted Output Power, Spurious Emissions at Antenna Terminals ( $\pm$ 1MHz) and Conducted Spurious Emissions, measurements were performed on the RF Port. The test limits shown are representative of the worst case. All testing was performed with the EUT transmitting at maximum RF power unless as designated setting by client, otherwise stated.

The EUT was powered via a 120V 60Hz power supply.

#### UMTS B4 (2110 MHz – 2155 MHz) Channel Configurations

All tests

RAT	No. of	Carrier Bandwidth	Carrier Fre	equency Configuration	(MHz)
RA1	Carriers	(MHz)	Bottom (BRFBW)	Middle (MRFBW)	Top (TRFBW)
U	1	5	2352.5	2355	2357.5



#### 1.4 DECLARATION OF BUILD STATUS

	MAIN EUT						
MANUFACTURING DESCRIPTION	CBRSYS6500						
MANUFACTURER	Octasic inc.						
ТҮРЕ	Portable Base Station Unit with Transportable Amplification Unit						
PART NUMBER	CBRSYS6000 - CBRSYS6008-RE-3E CBRRFE6400 - CBRRFE6407-NC100-EE1						
SERIAL NUMBER	CBRSYS6000 – F-00190 CBRRFE6400 – K-15468						
HARDWARE VERSION	CBRSYS6000 - 3.0 CBRRFE6400 - 3.1						
TRANSMITTER OPERATING RANGE	B4 2110 – 2155 MHz						
RECEIVER OPERATING RANGE	B4 1710 – 1755 MHz						
COUNTRY OF ORIGIN	CBRSYS6000 - India CBRRFE6400 - Canada						
EMISSION DESIGNATOR(S): (i.e. G1D, GXW)	UMTS: G7W						
MODULATION TYPES: (i.e. GMSK, QPSK)	UMTS: QPSK						
HIGHEST INTERNALLY GENERATED FREQUENCY	2155 MHz						
OUTPUT POWER (W or dBm)	20W						
FCC ID	2AQSOCBRSYS65000						
TECHNICAL DESCRIPTION (a brief description of the intended use and operation)	The Transportable Amplification Unit (TAU) is a powerful multiband RF front-end (RFE) designed for use as a Transportable Amplification Unit (TAU) in conjunction with a Portable Base station Unit (PBU). The EUT fits in a standard 19" 6U rack.						



#### 1.5 PRODUCT INFORMATION

#### 1.5.1 Technical Description

The Equipment Under Test (EUT) operates from a 120V 60Hz supply.

The CBRRFE6400 Transportable Amplification Unit (TAU) is a powerful multiband RF front-end (RFE) designed for use as a Transportable Amplification Unit (TAU) in conjunction with a Portable Base station Unit (PBU) such as the CBRSYS6000. The TAU ships in a ruggedized case and fits in a standard 19" 6U rack.

Depending on band configuration it can support up to 8 bands. It has a high sensitivity multiband receiver and an interference mitigation and suppression mechanism to maintain sensitivity in the presence of interference. The transmitter can transmit up to 100W peak per band.

The TAU has automatic RF power control per band for coverage optimization and a standby mode to optimize power consumption.

The CBRSYS6000 Portable Base station Unit (PBU) is multi-channel, software-defined radio (SDR) based base station system for wireless applications like Network in a Box (NIB). It is designed to fit in a standard 19" 3U rack-two PBUs can be fit in a standard 3U rack and ships in a ruggedized 3U rackmount case.

The PBU has a basic RF front end that internally combines the TX signals and splits the RX signals of each SDR. It can be coupled with a high-power RF front end Transportable Amplification Unit (TAU) such as the CBRRFE6400 for a complete system. The PBU is controlled over wired Ethernet and has a USB service port for maintenance access to the serial ports of each SDR. The PBU has built-in fans for thermal management.

The Equipment Under Test (EUT) is shown in the photograph below. A full technical description can be found in the Manufacturer's documentation.

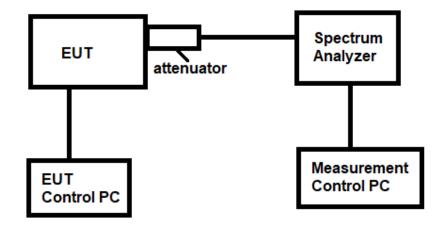


Equipment Under Test





#### 1.6 TEST SETUP





#### 1.7 TEST CONDITIONS

For all tests, the EUT was set up in accordance with the relevant test standard and to represent typical operating conditions. Tests were applied with the EUT situated in a shielded enclosure, test laboratories or a chamber as appropriate.

The EUT was powered from a 120V 60Hz supply.

FCC Measurement Facility Accreditation Designation Number: CA6845 - TUV SUD Canada (Laval)

#### 1.8 DEVIATION FROM THE STANDARD

No deviations from the applicable test standards or test plan were made during testing.

#### 1.9 MODIFICATION RECORD

No modifications were made to the EUT during testing.

#### 1.10 ALTERNATIVE TEST SITE

Under our Accreditation, TÜV SÜD Canada, Laval conducted the following tests at the TÜV SÜD Canada, Ottawa location.

#### 1.11 ADDITIONAL INFORMATION

The CBRSYS6000 Portable Base station Unit (PBU) is multi-channel, software-defined radio (SDR) based base station system for wireless applications like Network in a Box (NIB). It is designed to fit in a standard 19" 3U rack-two PBUs can be fit in a standard 3U rack and ships in a ruggedized 3U rackmount case.

Depending on band configuration it can support up to 8 bands. It has a high sensitivity multiband receiver and an interference mitigation and suppression mechanism to maintain sensitivity in the presence of interference. The transmitter can transmit up to 100W peak per band.



SECTION 2 TEST DETAILS



#### 1.12 MAXIMUM PEAK OUTPUT POWER AND PEAK TO AVERAGE RATIO - CONDUCTED

#### 1.12.1 Specification Reference

FCC CFR 47 Part 2, Clause 2.1046 FCC CFR 47 Part 27, Clause 27.50

#### 1.12.2 Date of Test and Modification State

Novemeber 20, 2018 - Modification State 0

#### 1.12.3 Test Equipment Used

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

#### 1.12.4 Environmental Conditions

Ambient Temperature21°CRelative Humidity30%

#### 1.12.5 Test Method

All measurements were made in accordance with FCC KDB 971168 D01, clause 5.2.1 and summed in accordance with FCC KDB 662911 D01.

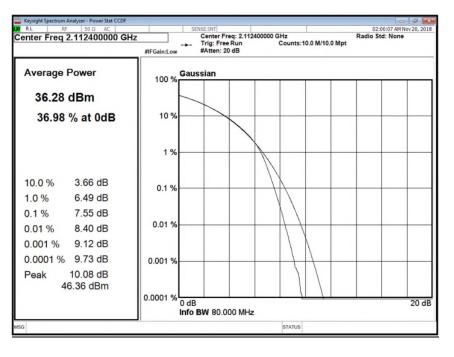
#### 1.12.6 Test Results



#### Maximum Target Output Power 40 dBm

	Antenna			Peak to Average Ratio (PAR) / Output Power			
		UMTS Modulation	UMTS Carrier Bandwidth	Channel Position B			
					Average Power		
				PAR (dB)	dBm	dBm/MHz	
	А	QPSK	5.0 MHz	7.55	36.28	31.01	

UMTS Modulation QPSK - UMTS Carrier Bandwidth 5.0 MHz - Antenna A

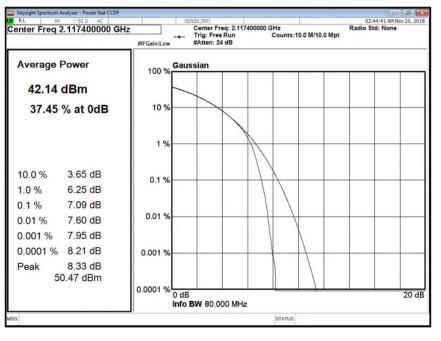




#### Maximum Target Output Power 43 dBm

		UMTS Carrier Bandwidth	Peak to Average Ratio (PAR) / Output Power			
Antenna	UMTS Modulation		Channel Position B2			
				Average Power		
			PAR (dB)	dBm	dBm/MHz	
A	QPSK	5.0 MHz	7.09	42.25	36.85	

UMTS Modulation QPSK - UMTS Carrier Bandwidth 5.0 MHz - Antenna A

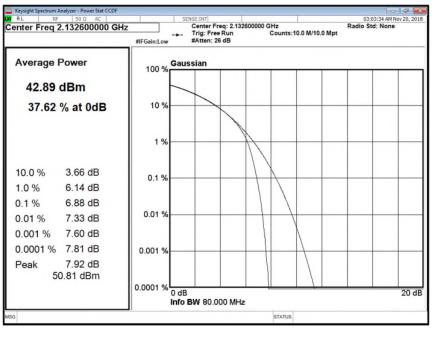




#### Maximum Target Output Power 43 dBm

			Peak to Average Ratio (PAR) / Output Power			
Antenna	UMTS Modulation	UMTS Carrier Bandwidth	Channel Position M			
				Average Power		
			PAR (dB)	dBm	dBm/MHz	
A	QPSK	5.0 MHz	6.88	42.98	37.63	

UMTS Modulation QPSK - UMTS Carrier Bandwidth 5.0 MHz - Antenna A



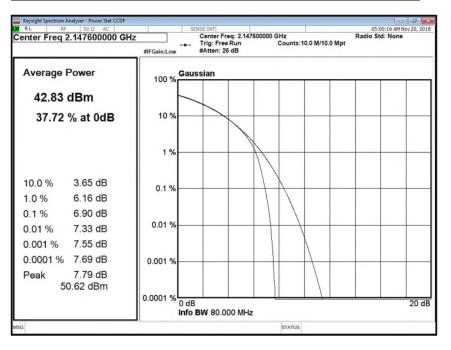
#### UM 15 Modulation QPSK - UM 15 Carrier Bandwidth 5.0 MHz - Antenna



#### Maximum Target Output Power 43 dBm

		UMTS Carrier Bandwidth	Peak to Average Ratio (PAR) / Output Power			
Antenna	UMTS Modulation		Channel Position T2			
				Average Power		
			PAR (dB)	dBm	dBm/MHz	
A	QPSK	5.0 MHz	6.9	42.96	37.69	

#### UMTS Modulation QPSK - UMTS Carrier Bandwidth 5.0 MHz - Antenna A

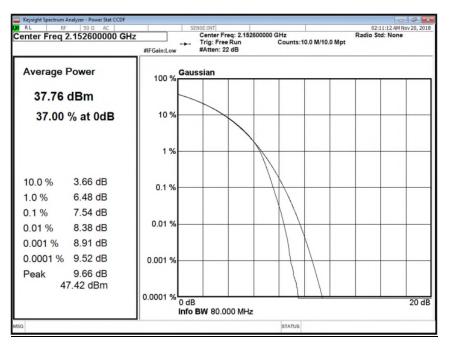




#### Maximum Target Output Power 40 dBm

Antenna		UMTS Carrier Bandwidth	Peak to Average Ratio (PAR) / Output Power			
	UMTS Modulation		Channel Position T			
				Average Power		
			PAR (dB)	dBm	dBm/MHz	
A	QPSK	5.0 MHz	7.54	37.84	32.49	

#### UMTS Modulation QPSK - UMTS Carrier Bandwidth 5.0 MHz - Antenna A



Limit	
Peak to Average Ratio	13 dB



#### 1.13 OCCUPIED BANDWIDTH

#### 1.13.1 Specification Reference

FCC CFR 47 Part 2, Clause 2.1049 FCC CFR 47 Part 27, Clause 27.53

#### 1.13.2 Date of Test and Modification State

November 20, 2018 - Modification State 0

#### 1.13.3 Test Equipment Used

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

#### 1.13.4 Environmental Conditions

Ambient Temperature21°CRelative Humidity30%

#### 1.13.5 Test Method

All measurements were made in accordance with FCC KDB 971168 D01.

#### 1.13.6 Test Results

Maximum Target Output Power B:40dBm M:43dBm T:40dBm

	Antenna UMTS Modulation Bandwidth	Result (KHz)						
Antenna			Channel F	Position B	Channel F	Position M	Channel	Position T
		Occupied Bandwidth	-26 dB Bandwidth	Occupied Bandwidth	-26 dB Bandwidth	Occupied Bandwidth	-26 dB Bandwidth	
A	QPSK	5.0 MHz	4167.09	4670.76	4171.75	4683.79	4165.32	4662.32



### Antenna A - Bandwidth QPSK - Channel B

Keysight Spectrum Analyzer - Occupied BW RL RF 50 Ω AC		SENSE:INT		02:01:21 AM Nov 20, 20
enter Freq 2.112400000	GHz #IFGain:Low	Center Freq: 2.112400000 Trig: Free Run #Atten: 20 dB	GHz Avg Hold: 50/50	Radio Std: None Radio Device: BTS
dB/div Ref 34.06 dBm	i TI		Ů	
.1				
9			- h.	
9	~			mon
.9				
enter 2.112 GHz tes BW 51 kHz		#VBW 160 kHz		Span 10 M Sweep 16.67
Occupied Bandwidtl 4.	h 1671 MHz	Total Power	36.3 dBm	
Transmit Freq Error	-6.722 kHz	% of OBW Power	99.00 %	
x dB Bandwidth	4.671 MHz	x dB	-26.00 dB	
5			STATUS	

Antenna A - Bandwidth QPSK - Channel M

Keysight Spectrum Analyzer - Occupied BV RL RF 50 Ω AC	V	SENSE:INT		03:04:32 AM Nov 20, 20
Center Freq 2.132600000	GHz #IFGain:Low	Center Freq: 2.132600000	GHz Avg Hold: 50/50	Radio Std: None Radio Device: BTS
0 dB/div Ref 40.42 dBn	n		11	1 1
0.4	and the second		manne	
20				
58 denerginanter and a second denerginal denergina				and an and a second and a second
9.6				
9.6				
enter 2.133 GHz Res BW 51 kHz		#VBW 160 kHz		Span 10 M Sweep 16.67 r
Occupied Bandwidt 4.	<sup>h</sup> 1717 MHz	Total Power	42.9 dBm	
Transmit Freq Error	-200.89 kHz	% of OBW Power	99.00 %	
x dB Bandwidth	4.684 MHz	x dB	-26.00 dB	
G			STATUS	



### Antenna A - Bandwidth QPSK - Channel T

RL RL	trum Analyzer - Occupied BW RF 50 Ω AC		SENSE:INT		02:12:06 AM Nov 20, 2
	eq 2.152600000	GHz	Center Freq: 2.152600000	GHz Avg Hold: 50/50	Radio Std: None
		#IFGain:Low	#Atten: 22 dB	-	Radio Device: BTS
dB/div	Ref 35.64 dBm				
g .6					
6		manne		-	
14		1		N	
6		1			
4					
4		$\sim$		N.	
4 mar	mummerent				Margan margan
4					
4					
~					
enter 2.1 tes BW	153 GHz 51 kHz		#VBW 160 kHz		Span 10 M Sweep 16.67
Occup	ied Bandwidt	h	Total Power	37.8 dBm	
	4.	1653 MHz			
	nit Freq Error	-8.649 kHz	% of OBW Power	99.00 %	
Transm		4.662 MHz	x dB	-26.00 dB	
	andwidth	4.002 MHZ	X db	-20.00 00	
	andwidth	4.002 MHZ	Xub	-20.00 00	



#### 1.14 BAND EDGE

#### 1.14.1 Specification Reference

FCC CFR 47 Part 2, Clause 2.1051 FCC CFR 47 Part 27, Clause 27.53 (h)

#### 1.14.2 Date of Test and Modification State

November 20, 2018- Modification State 0

#### 1.14.3 Test Equipment Used

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

#### 1.14.4 Environmental Conditions

Ambient Temperature21°CRelative Humidity30%

#### 1.14.5 Test Method

All measurements were made in accordance with FCC KDB 971168 D01 Clause 6. The EUT was connected to a Spectrum Analyser via an attenuator and switching box. The path loss between the EUT and the Spectrum Analyser was measured using a Network Analyser. The measured path loss was entered as a Reference Level Offset in the Spectrum Analyser. The Spectrum Analyser RBW was adjusted to be at least 1% of the measured 26dB Bandwidth. Using an RMS detector, the frequency spectrum up to 1MHz away from the Band Edge was Investigated.

The EUT has one transmit port, testing was performed on this port with a test limit of  $43+10\log(P) = -13 \text{ dBm}$ .

#### 1.14.6 Test Results

Maximum Target Output Power T:40dBm B:40dBm

Antonno	UMTS Modulation	UMTS Carrier	Band Edge (MHz)		
Antenna	UNITS MODULATION	Bandwidth	Channel Position B	Channel Position T	
A	QPSK	5.0 MHz	2112.4	2152.6	



Keysight Spectrum Analyzer	- Swept SA 50 Ω AC	SENSE:	INT			02:02:53 AM Nov 20, 20
arker 2 2.10900	0000000 GHz	Wide Tri	g: Free Run tten: 14 dB	Avg Type	RMS	TRACE 1 2 3 4 1 TYPE WWWW
Ref Offse dB/div Ref 34.5					Mkr Band Po	2 2.109 000 GH wer -13.20 dB
4.5			_			
1,5						
50						
.5	2		M			DL1 -13.00
.5						
5				-		
5						
enter 2.110000 G Res BW 51 kHz	Hz	#VBW 13	0 kHz*		#Swee	Span 5.000 M 5.000 s (1001 p
R MODE TRC SCL	X 2.110 000 GHz	-18,71 dBm		FUNCTION WIDTH 50.00 kHz	EUN	-17.86 de
N 1 f	2.109 000 GHz	-25,76 dBm	Band Power	1.000 MHz		-13.20 di
6 7 8						

Antenna A - UMTS Modulation QPSK - Channel T, 5MHz

Keysight Spectrum Anal	lyzer - Swept SA 50 Ω AC	SENSE:	int I			02:13:54 AM Nov 20, 2
	000000000 GHz	Wide Tri	g: Free Run tten: 18 dB	Avg Type	RMS	TRACE 1 2 3 4 TYPE WWWW DET A N N N
dB/div Ref 3	fset 36.5 dB 8.50 dBm					/kr2 2.156 000 GF Power -13.35 dB
9g			M			
8.5		-				
1.50						
.50						
15			1			DL1 -13.00 (
1.5			h		2	
1.5				~	X	
1.5						
1.5						
1.5						
enter 2.155000 Res BW 51 kHz		#VBW 13	0 kHz*		#Sv	Span 5.000 M veep 5.000 s (1001 p
GRIMODE TRC SCL	2,155 000 GHz	19.36 dBm	FUNCTION Band Power	50.00 kHz		FUNCTION VALUE -17.12 dE
2 N 1 f	2.156 000 GHz	-25.83 dBm	Band Power	1.000 MHz		-13.35 dE
3						
6						
7 8						
9						
9 0 1						
9				STATUS		,



### Maximum Target Output Power T2:43dBm B2:43dBm

Antonno	LINTE Medulation	UMTS Carrier	Band Edge (MHz)		
Antenna	UMTS Modulation	Bandwidth	Channel Position B2	Channel Position T2	
A	QPSK	5.0 MHz	2117.4	2147.6	

#### Antenna A - UMTS Modulation QPSK - Channel B2, 5MHz

RL	m Analyzer - Swept SA RF 50 Ω AC		SENSE:1	NT	1		02:47:26 AM Nov 20, 20
nd Span	1.00000000	PNO:		g: Free Run ten: 22 dB	Avg Type	RMS	TYPE WWWWA DET A NNN
	ef Offset 36.5 d ef 42.50 dBn					Band F	/kr2 2.109 00 GH Power -20.72 dB
9							
5							
.5							
50							
50							
							DL1 -13 00 d
5			2	1			
5			9	man from the			
.5							
5							
nter 2.110 es BW 51			#VBW 13	0 kHz*		#Swe	Span 10.00 M eep 5.000 s (1001 p
R MODE TRC S		x	Y		FUNCTION WIDTH		UNCTION VALUE
	f	2.110 00 GHz 2.109 00 GHz	-30.83 dBm -33,40 dBm	Band Power Band Power	50.00 kHz 1.000 MHz		-30.67 dB -20.72 dB
N 1 1	r						
N 1							
				ш			•

#### Antenna A - UMTS Modulation QPSK - Channel T2, 5MHz

larker 2 2.156	50 Ω AC 00000000 GHz	SENSE:		Avg Typ	e: RMS		38 AM Nov 20, 2018 TRACE 1 2 3 4 5 6 TYPE WWWWW
			g: Free Run tten: 22 dB				DETANNNN
dB/div Ref 4	ffset 36.5 dB 2.50 dBm				Band	Mkr2 2.1	56 00 GHz 0.93 dBm
2.6							
22.5							
2.5							
2.50							
7.50							
17.5	N					-	DL1 -13.00 dBm
27.5		man	1	2			
37.5							_
17.5							
47.5							
enter 2.155000		#VBW 13	0 kHz*		#5		n 10.00 MHz
Center 2.155000 Res BW 51 kHz	2	#VBW 13		FUNCTION MOTH	#S	weep 5.000	s (1001 pts)
Center 2.155000 Res BW 51 kHz	2 2.155 000 GHz	-31,35 dBm	FUNCTION Band Power	FUNCTION WIDTH 50.00 kHz	#S		s (1001 pts)
Center 2.155000 Res BW 51 kHz 1 N 1 f 2 N 1 f 3	X	-31,35 dBm	FUNCTION		#S	weep 5.000	s (1001 pts)
Center 2.155000 Res BW 51 kHz 1 N 1 f 2 N 1 f 3 4	2 2.155 000 GHz	-31,35 dBm	FUNCTION Band Power	50.00 kHz	#S	weep 5.000	s (1001 pts)
Center 2.155000 Res BW 51 kH; M002 IRC Set 1 N 1 f 2 N 1 f 3 4 5 6	2 2.155 000 GHz	-31,35 dBm	FUNCTION Band Power	50.00 kHz	#S	weep 5.000	s (1001 pts)
Center 2.155000 Res BW 51 kHz Model rate Set 1 N 1 f 2 N 1 f 4 5 5 5 6 7 8	2 2.155 000 GHz	-31,35 dBm	FUNCTION Band Power	50.00 kHz	#S	weep 5.000	s (1001 pts)
Center 2.155000 Res BW 51 kHz MODE Re Sca 1 N 1 f 2 N 1 f 3 4 5 6 7 8 9 10	2 2.155 000 GHz	-31,35 dBm	FUNCTION Band Power	50.00 kHz	#S	weep 5.000	s (1001 pts)
Center 2.155000 Res BW 51 kHz Model rate Set 1 N 1 f 2 N 1 f 4 5 5 5 6 7 8	2 2.155 000 GHz	-31,35 dBm	FUNCTION Band Power	50.00 kHz	#\$	weep 5.000	s (1001 pts)
Center 2.155000 Res BW 51 kH; 201 M001 HR 53 1 N 1 f 3 V 1 f 3 6 6 6 7 8 9 9	2 2.155 000 GHz	-31,35 dBm	EUNCTION Band Power Band Power	50.00 kHz	#\$	weep 5.000	s (1001 pts)
Center 2.155000 Res BW 51 kH2 28 1006 EC 201 1 N 1 f 2 N 1 f 3	2 2.155 000 GHz	-31,35 dBm	EUNCTION Band Power Band Power	50.00 kHz 1.000 MHz	#s	Weep 5.000	s (1001 pts)



#### 1.15 TRANSMITTER SPURIOUS EMISSIONS

#### 1.15.1 Specification Reference

FCC CFR 47 Part 2, Clause 2.1051 FCC CFR 47 Part 27, Clause 27.53 (h)

#### 1.15.2 Date of Test and Modification State

November 20, 2018- Modification State 0

#### 1.15.3 Test Equipment Used

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

#### 1.15.4 Environmental Conditions

Ambient Temperature21°CRelative Humidity30%

#### 1.15.5 Test Method

All measurements were made in accordance with FCC KDB 971168 D01 Clause 6. The EUT was connected to a Spectrum Analyser via an attenuator and switching box. Prior to testing, a Network Analyser was used to calibrate the path loss between the EUT and the Spectrum Analyser. The worst-case path loss in the measured ranges was entered as a reference level offset. Over the measured ranges, the RBW was set to 1MHz with a VBW of 3MHz. All measurement results are specified as average with an RMS detector being used in conjunction with a trace setting of Max Hold. Measurements were performed in configurations of the EUT as reported below.

Testing was performed on this port with a test limit of  $43+10\log(P) = -13$  dBm.

#### 1.15.6 Test Results

Maximum Target Output Power B:40dBm, M:43dBm, T:40dBm UMTS 5 MHz Bandwidth setting



#### Antenna A - UMTS Modulation QPSK - Channel B

enter F	req 2.00000	4500 GHz	PNO: Fast	SENSE:INT Trig: Free #Atten: 20	Run	#Avg Type: RMS	S	02:03:22 AM Nov 20, 20 TRACE 1 2 3 4 TYPE WWWW DET A N N N
	Ref Offset 36.	5 dB	IFGain:Low	#Atten: 20	dB		Mkr	1 2.111 8 GH
dB/div g	Ref 46.17 d	Bm			•			30.78 dB
5.2								
5.2								
5.2			_					
17								
83			_					
3.8								DL1 -13.00 d
9.8								
8.8								
					M			in the state of a
	1	مار بمالطبه من	المجمعة الاللمية الدرو	a she way to	last laster	in the part of the second second second		Station of the state
3				BW 3.0 MHz		STATUS 🤔 Cha	#Sweep & racterize Noise	
Keysight Sp R L	pectrum Analyzer - Swe RF 50 Ω	AC		SENSE:INT]			racterize Noise	Floor required
Keysight Sp R L		AC	PNO: Fast → IFGain:Low		Run	STATUS 🦺 Char #Avg Type: RMS	racterize Noise	Floor required
Keysight Sp R L enter F	RF 50 Ω Freq 8.00000 Ref Offset 37,	AC 0000 GHz NFE 5 dB	PNO: Fast	SENSE:INT	Run		racterize Noise	Floor required
Keysight Sp RL enter F	RF 50Ω Freq 8.00000	AC 0000 GHz NFE 5 dB	PNO: Fast	SENSE:INT	Run		racterize Noise	
enter F	RF 50 Ω Freq 8.00000 Ref Offset 37,	AC 0000 GHz NFE 5 dB	PNO: Fast	SENSE:INT	Run		racterize Noise	Floor required
Keysight Sp RL enter F	RF 50 Ω Freq 8.00000 Ref Offset 37,	AC 0000 GHz NFE 5 dB	PNO: Fast	SENSE:INT	Run		racterize Noise	Floor required
Keysight Sp RL enter F	RF 50 Ω Freq 8.00000 Ref Offset 37,	AC 0000 GHz NFE 5 dB	PNO: Fast	SENSE:INT	Run		racterize Noise	Floor required
Benter F	RF 50 Ω Freq 8.00000 Ref Offset 37,	AC 0000 GHz NFE 5 dB	PNO: Fast	SENSE:INT	Run		racterize Noise	Floor required
dB/div	RF 50 Ω Freq 8.00000 Ref Offset 37,	AC 0000 GHz NFE 5 dB	PNO: Fast	SENSE:INT	Run		racterize Noise	Eleor required
dB/div g 0.0 0.0 0.0 0.0	RF 50 Ω Freq 8.00000 Ref Offset 37,	AC 0000 GHz NFE 5 dB	PNO: Fast	SENSE:INT	Run		racterize Noise	Eleor required
RL RL enter F	RF 50 Ω Freq 8.00000 Ref Offset 37,	AC 0000 GHz NFE 5 dB	PNO: Fast	SENSE:INT	Run		racterize Noise	Eleor required
Keysight Sp RL enter F 0 dB/div 99 0.0 0.0	RF 50 Ω Freq 8.00000 Ref Offset 37,	AC 0000 GHz NFE 5 dB	PNO: Fast	SENSE:INT	Run		racterize Noise	Eleor required
Reysight Sp RL enter F od B/div og	RF 50 Ω Freq 8.00000 Ref Offset 37,	AC 0000 GHz NFE 5 dB	PNO: Fast	SENSE:INT	Run		racterize Noise	Eleor required
Kondight Sp           RL           Penter F           dB/div           00           00           00           00           00           00           00           00           00           00           00           00           00           00	RF 50 Ω Freq 8.00000 Ref Offset 37,	AC 0000 GHz NFE 5 dB	PNO: Fast	SENSE:INT	Run		racterize Noise	Eleor required
Konight Sp           RL           Denter F           dB/div           00           00           00           00           00           00           00           00           00           00           00           00           00	RF 50 Ω Freq 8.00000 Ref Offset 37,	AC 0000 GHz NFE 5 dB	PNO: Fast	SENSE:INT	Run		racterize Noise	Eleor required
Keysight Sp           RL           enter F           0.0           0.0           0.0           0.0           0.0	RF 50 Ω Freq 8.00000 Ref Offset 37,	AC 0000 GHz NFE 5 dB	PNO: Fast	SENSE:INT	Run		racterize Noise	Eleor required
Keysight Space           RL           enter F           0           0           0           0           0           0           0           0           0           0           0           0           0           0           0           0	Ref Offset 37	AC 0000 GHz NFE 5 dB	PNO: Fast	SENSE:INT	Run		s Mkr	Eleor required

STATUS L Characterize Noise Floor required



	RF 50 Ω A			SENSE:INT					AM Nov 20, 201
enter Fred	15.000000	NFE P	NO: Fast	Trig: Free #Atten: 10		#Avg Type:	RMS		TYPE WWWW DET ANNN
	ef Offset 38.51 ef 20.00 dBr						N	1kr1 16.0 -43	04 8 GH 2.19 dB
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tart 12.000								Stop	18.000 GH
Res BW 1.0	MHz		#VB	W 3.0 MHz	*		#Swee	p 12.00 s	

Keysight Sp R L	ectrum Analyzer - Swept RF 50 Ω	AC	T T	SENSE:INT	1			02:04:3	8 AM Nov 20, 2016
	req 22.25000		PNO: Fast	Teles Free		#Avg Type	RMS	т	RACE 1 2 3 4 5 TYPE WWWWW DET A NNNN
0 dB/div	Ref Offset 18.5 Ref 18.50 de						P	4kr1 25.7 -5	95 5 GH 6.22 dBn
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tart 18.0	000 GHz 1.0 MHz		#VR	W 3.0 MHz	*		#5.000	Stop: ep 17.00 s	26.500 GH
sg						STATUS 🦺		Noise Floor	



RL	ectrum Analyzer - S RF 50	Ω ADC	1	SENSE:INT		T			03:05:0	7 AM Nov 20, 20
		04500 GHz					#Avg Type:	RMS	т	RACE 1 2 3 4 5
	•	NFE	PNO: Fast IFGain:Low	Atten: 20						DET A NNN
0 dB/div	Ref Offset 3 Ref 46.50								Mkr1 2.1 3	32 8 GH 7.28 dBi
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tart 9 ki Res BW	IZ 1.0 MHz		#VE	BW 3.0 MHz	*			#Swe	Stop eep 8.000	4.000 GI s (8000 p
G							STATUS 1	Characterize	Noise Floor	equired

Keysight Spi	ectrum Analyzer - Swept SA RF 50 Ω A			SENSE:INT				03-05-30	AM Nov 20, 201
	req 8.000000	NFE NFE	PNO: Fast	Trig: Free # #Atten: 14		#Avg Type:	RMS	TR	ACE 1 2 3 4 5 TYPE WWWWW DET A NNNN
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Start 4.00 #Res BW			#VB	W 3.0 MHz*	*			p 16.00 s	
ISG						STATUS	Characterize	Noise Floor n	equired



Keys RL	sight Spectrum Analyze RF	- Swept SA 50 Ω AC		SENSE:INT				03:05:54	AM Nov 20, 201
ent	ter Freq 15.0		PNO: Fast			#Avg Type:	RMS	TF	DET A NNNN
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tart	12.000 GHz							Stop	8.000 GH
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SG						STATUS 🔔	Characterize	Noise Floor n	equired

Keysight Sp	RF 50		- T - T	SENSE:INT				02:06:2	3 AM Nov 20, 2018
		0000000 GH	Z PNO: Fast -+	Teles Free		#Avg Type:	RMS	т	RACE 1 2 3 4 5 6 TYPE WWWWWW DET A NNNN
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Start 18.0		Ī						Stop	26.500 GHz
#Res BW	1.0 MHz		#VE	3W 3.0 MHz	*	STATUS 🔔		ep 17.00 s Noise Floor	



nter F	req 2.0000045	NFE	PNO: Fast IFGain:Low	Trig: Free Ru #Atten: 20 dl	un B	#Avg Type: RM	S	TR	AM Nov 20, 2 ACE 1 2 3 4 TYPE WWWW DET A N N N
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es BW	1.0 MHz	000 GHz		SENSE:INT]	un	STATUS 🔔 Cha #Avg Type: RM	racterize No	02:15:21	AM Nov 20, 2
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eysight Spi RL nter F	1.0 MHz ectrum Analyzer - Swept S RF 50 Q A	NFE	PNO: Fast	SENSE:INT]			racterize No S	02:15:21 TR Ikr1 6.4	AM Nov 20, 2 AM Nov 20, 2 ACCE   1 2 3 4 TYPE WWWW DET A NN N 58 2 GI
es BW	1.0 MHz	NFE	PNO: Fast	SENSE:INT]			racterize No S	02:15:21 TR Ikr1 6.4	AM Nov 20, 2 AM Nov 20, 2 ACCE   1 2 3 4 TYPE WWWW DET A NN N 58 2 GI
es BW	1.0 MHz	NFE	PNO: Fast	SENSE:INT]			racterize No S	02:15:21 TR Ikr1 6.4	AM Nov 20, 2 AM Nov 20, 2 ACE 1 2 3 4 TYPE WWWW DET A N N N
eysight Spr RL   IB/div	1.0 MHz	NFE	PNO: Fast	SENSE:INT]			racterize No S	02:15:21 TR Ikr1 6.4	AM Nov 20, 2 AM Nov 20, 2 ACE 1 2 3 4 TYPE WWWW BETA N NN 58 2 GI 0.17 dB
eysight Spr RL IB/div	1.0 MHz	NFE	PNO: Fast	SENSE:INT]			racterize No S	02:15:21 TR Ikr1 6.4	AM Nov 20, 2 AM Nov 20, 2 ACCE   1 2 3 4 TYPE WWWW DET A NN N 58 2 GI
IB/div	1.0 MHz	NFE	PNO: Fast	SENSE:INT]			racterize No S	02:15:21 TR Ikr1 6.4	AM Nov 20, 2 AM Nov 20, 2 ACE 1 2 3 4 TYPE WWWW BETA N NN 58 2 GI 0.17 dB
RL Black	1.0 MHz	NFE	PNO: Fast	SENSE:INT]			racterize No S	02:15:21 TR Ikr1 6.4	AM Nov 20, 2 AM Nov 20, 2 ACE 1 2 3 4 TYPE WWWW BETA N NN 58 2 GI 0.17 dB
es BW	1.0 MHz	NFE	PNO: Fast IFGain:Low	SENSE:INT]			racterize No S	02:15:21 TR Ikr1 6.4	AM Nov 20, 2 AM Nov 20, 2 ACE 1 2 3 4 TYPE WWWW BETA N NN 58 2 GI 0.17 dB
RL Black	1.0 MHz	NFE	PNO: Fast IFGain:Low	SENSE:INT]			racterize No S	02:15:21 TR Ikr1 6.4	AM Nov 20, 2 AM Nov 20, 2 ACE 1 2 3 4 TYPE WWWW BETA N NN 58 2 GI 0.17 dB
IB/div	1.0 MHz	NFE	PNO: Fast IFGain:Low	SENSE:INT]			racterize No S	02:15:21 TR Ikr1 6.4	AM Nov 20, 2 AM Nov 20, 2 ACE 1 2 3 4 TYPE WWWW BETA N NN 58 2 GI 0.17 dB
B/div	1.0 MHz	NFE	PNO: Fast IFGain:Low	SENSE:INT]			racterize No S	02:15:21 TR Ikr1 6.4	AM Nov 20, 2 AM Nov 20, 2 ACE 1 2 3 4 TYPE WWWW BETA N NN 58 2 GI 0.17 dB

STATUS L Characterize Noise Floor required



Keysight Spectrum Analyzer - Swept SA     RL RF 50 Ω AC	SENSE	tort		02:15:46 AM Nov 20, 201
enter Freq 15.000000		ig: Free Run Atten: 10 dB	#Avg Type: RMS	TRACE 1 2 3 4 5 TYPE WWWWW DET A NNNN
Ref Offset 38.51 dE 0 dB/div Ref 20.00 dBm				Mkr1 17.689 0 GH -42.12 dBi
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tart 12.000 GHz				Stop 18.000 GH
Res BW 1.0 MHz	#VBW 3.	0 MHz*		weep 12.00 s (12000 pt rize Noise Floor required

	req 22.2500	NFE	PNO: Fast IFGain:Low	<ul> <li>Trig: Free #Atten: 1</li> </ul>	e Run 0 dB				DET A N N N
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t 18.0	00 GHz							Stop	26.500 G
	1.0 MHz		#V	BW 3.0 MH	Z*			eep 17.00 s	(17000 p
						STATUS	s 🔔 Characteriz	e Noise Floor	required



#### 1.16 FREQUENCY STABILITY

#### 1.16.1 Specification Reference

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

#### 1.16.2 Date of Test and Modification State

October 12 and 15th, 2018 - Modification State 0

#### 1.16.3 Test Equipment Used

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

#### 1.16.4 Environmental Conditions

Ambient Temperature23°CRelative Humidity36%

#### 1.16.5 Test Method

All measurements were made in accordance with FCC KDB 971168 D01.

#### 1.16.6 Test Results

Maximum Target Output Power 43 dBm

Tamparatura	Veltere	Frequency Error (Hz)		
Temperature	Voltage	Channel Position M		
-30°C	120V AC	EUT non-operational		
-20°C	120V AC	EUT non-operational		
-10°C	120V AC	0		
0°C	120V AC	5		
+10°C	120V AC	0		
+20°C	99V AC	0		
+20°C	120V AC	5		
+20°C	135V AC	0		
+30°C	120V AC	0		
+40°C	120V AC	0		
+50°C	120V AC	0		

Limit +/- 1 ppm
-----------------



**SECTION 3** 

TEST EQUIPMENT USED



#### 2.1 **TEST EQUIPMENT USED**

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

Instrument	Manufacturer	Туре No.	Serial No	Calibration Period (months)	Calibration Due
PXA Signal Analyzer	Keysight	N9030A	MY53310519	12	2019-07-17

N/A – Not Applicable O/P Mon – Output Monitored with Calibrated Equipment



#### 2.2 MEASUREMENT UNCERTAINTY

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

Test Discipline	Frequency / Parameter	MU
Conducted Maximum Peak Output Power	30 MHz to 20 GHz Amplitude	± 0.1 dB
Conducted Emissions	30 MHz to 20 GHz Amplitude	± 2.3 dB
Frequency Stability	30 MHz to 2 GHz	± 5.0 Hz
Occupied Bandwidth	Up to 20 MHz Bandwidth	± 1.1 Hz
Band Edge	30 MHz to 20 GHz Amplitude	± 2.3 dB



**SECTION 5** 

ACCREDITATION, DISCLAIMERS AND COPYRIGHT



#### 3.1 ACCREDITATION, DISCLAIMERS AND COPYRIGHT



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

This report does not imply product endorsement by any government, accreditation agency, or TÜV SÜD Canada Inc.

Opinions or interpretations expressed in this report, if any, are outside the scope of TÜV SÜD Canada Inc. accreditations. Any opinions expressed do not necessarily reflect the opinions of TÜV SÜD Canada Inc., unless otherwise stated.

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