

REPORT

For

Dali Wireless, Inc.

535 Middlefield Road, Suite 280 Menlo Park, CA 94025

Date: 07 August 2020

Report No.: 18280-6E

Revision No.: 0

Project No.: 18280

Equipment: Advanced Digital Distributed Antenna System

Model No.: hd37-3-PS-ABC-21-1N-D0 FCC ID: HCOHD373PSABC21A

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Date Issued: 07 August 2020

Project No.: 18280

Client: Dali Wireless, Inc. Report No.: 18280-6E Revision No.: 0

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TEST REPORT_FCC Part 90							
Р	Private Land Mobile Services						
Report Reference No	18280-6E						
Report Revision History:	✓ Rev. 0 07 Aug	ust 2020					
Compiled by (+ signature)	Daniel Lee Jeremy Lee						
Approved by (+ signature)	Jeremy Lee	2000					
Date of issue:	07 August 2020						
Total number of pages	82						
FCC Site Registration No.:	CA5970						
IC Site Registration No.:	5970A-2						
Testing Laboratory:	LabTest Certification Inc.						
Address:	Unit 3128-20800 Westminster HWY, Richmond, B.C. V6V 2W3 Canada						
Applicant's name:	Dali Wireless, Inc.						
Address:	535 Middlefield Road, Suite 280, Menlo Park, CA 94025						
Manufacture's Name:	Dali Wireless (Canada) Inc.					
Address:	8618 Commerce Cour	t, Burnaby, B.C. V5A 4N6, Canada					
Test specification:							
Standards:	FCC Part 2; 2020FCC Part 90; 202	0					
Test procedure:	: ➤ FCC KDB 935210 D05 Indus Booster Basic Meas v01r04: April 03, 2020 ➤ ANSI/TIA-603- E-2016 ➤ ANSI C63.4:2014						
Non-standard test method:	N/A						
Test Report Form(s) Originator:	.: Jeremy Lee						
Master TRF:	1036_Rev2 - RF Repo	ort Template					
Test item description:							
	Trade Mark hd37™						
Trade Mark:	hd37™						

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Serial Number	10911114E02B9A007
FCC ID:	HCOHD373PSABC21A
Possible test case verdicts:	
- test case does not apply to the test object:	N/A
- test object does meet the requirement:	P (Pass)
- test object does not meet the requirement:	F (Fail)
Testing:	
Date of receipt of test item:	01 June 2020
Date (s) of performance of tests:	08 June and 15 July 2020

Revision History

Revision	Date	Reason For Change	Author(s)	
0	07 August 2020	Initial Data	Daniel Lee	

Device Under Test Description

Application for:	PS 900/800/700 Remote Unit, Tri Band Medium Power DAS
Passing Transmit Frequency::	935 MHz – 940 MHz 851 MHz – 861 MHz
	769 MHz – 775 MHz
	935 MHz – 940 MHz
Operating Transmit Frequency	851 MHz – 861 MHz
FCC:	758 MHz – 768 MHz
	769 MHz – 775 MHz
Passing Passive Fraguency	896 MHz – 901 MHz
Passing Receive Frequency	806 MHz – 816 MHz
	788 MHz – 805 MHz
	896 MHz – 901 MHz
Operating Receive Frequency	806 MHz – 816 MHz
FCC	788 MHz – 798 MHz
	799 MHz – 805 MHz
Number of Channels:	Up to 64 channels
Rated RF Output(e.i.r.p.):	37 dBm

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Modulation Type:	P25 Phase I C4FM, CQPSK; P25 Phase II HDQPSK on full band of Band 900 and Band 800; FM on Band 800 between 851 MHz – 854 MHz only; P25 Phase I C4FM, CQPSK; P25 Phase II HDQPSK on Band 700 between 769 MHz – 775 MHz			
Equipment mobility:	Fixed			
Operating condition:	-40 to +50 °C			
Mass of equipment (g)::	< 27,700g			
Dimension(W X D X H)	410 mm X 230 mm X 696 mm			
Nominal Voltages for:	48 V stand-alone equipment			
	48 V combined (or host) equipment			
Supply Voltage:	AC Amps			
	<u>48V</u> DC <u>7.083</u> Amps			
If DC Power:	Internal Power Supply			
	√ External Power Supply			
	Battery			
	☐ Nickel Cadmium			
	☐ Alkaline			
	☐ Nickel-Metal Hydride			
	☐ Lithium-Ion			
	☐ Other			

Program details

Testing	Testing Facility by procedure:				
	Radiated Measurement	LabTest Certification Inc.			
Testing I	ocation/ address:	Unit 3128-20800 Westminster HWY, Richmond, B.C. V6V 2W3 Canada			
	Conducted Measurement:	LabTest Certification Inc.			
Testing location/ address		Unit 3128-20800 Westminster HWY, Richmond, B.C. V6V 2W3 Canada			

Summary of testing:	
Tests performed (name of test and test clause): Conducted Measurement Radiated Emissions on Enclosure	Testing location: Bench top, Richmond In SAC, Richmond

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The tests indicated in Test Summary were performed on the product constructed as described below. The test sections are the verbatim text from the actual data sheets used during the investigation. These test sections include the test name, the specified test Method, a list of the actual Test Equipment Used, documentation Photos, Results and raw Data. No additions, deviations, or exclusions have been made from the standard(s) unless specifically noted.

Based on the results of our investigation, we have concluded the product tested complies with the requirements of the standard(s) indicated. The results obtained in this test report pertain only to the item(s) tested. LabTest does not make any claims of compliance for samples or variants which were not tested.

Description of Equipment Under Test and Variant Models

Description:

The hd37 /900PS/800PS/700 PS is a tri-band remote unit that provides at least 5 W of output power on each band. The tri-band unit supports up to 3 bands in a sealed type 2 chassis for Class A operation.

On the downlink path the hd37 PS remote receives an aggregated stream of digitized RF signals from an airHost PS, which it then converts into analog RF signals. Depending on the frequency band, the signal is amplified in the RF module and then sent out through simplex RF ports to an external filter.

On the UL path the hd37 PS remote receives analog RF signals for the RF band, from an external filter. The RF signals are converted into a digital data stream and then delivered over optical fiber to an airHost PS. The hd37 PS remote also accommodates a 1 Gbps Ethernet backhaul for transporting the data from nearby IP devices such as security cameras and Wi-Fi access points.

The intentional transmitter only exists in the downlink path and hence the EMC tests in this report dedicated to the downlink emission.

In order to build up a complete signal booster system, the air/Host was connected as the Auxiliary device. The airHost does not have anntenna port, where the signal was injected and ejected via coaxial cables.



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Variant Models:

The following variant models were not tested as part of this evaluation, but they have been identified by the manufacturer as being electrically identical models, depopulated models, or with reasonable similarity to the model(s) tested. Labtest does not make any claims of compliance for samples or variants which were not tested.

hd37-3-PS-ABC-21-1N-D0 - tri band 900PS 800PS 700PS model as tested

Tri Band

- 1. hd37-3-PS-ABC-21-1N-D0 (hd37 with 700,800,900PS)
- 2. hd33-3-PS-ABC-21-1N-D0 (hd33 with 700,800,900PS)

Dual Band:

- 1. hd37-2-PS-AB-21-1N-D0 (hd37 with 700,800PS)
- 2. hd33-2-PS-AB-21-1N-D0 (hd33 with 700,800PS)
- 3. hd37-2-PS-AC-21-1N-D0 (hd37 with 700,900PS)
- 4. hd33-2-PS-AC-21-1N-D0 (hd33 with 700,900PS)
- 5. hd37-2-PS-FB-21-1N-D0 (hd37 with 800,900PS)
- 6. hd33-2-PS-FB-21-1N-D0 (hd33 with 800,900PS)

Single Band:

- hd37-1-PS-A-21-1N-D0 (hd37 with 700PS) 1.
- 2. hd33-1-PS-A-21-1N-D0 (hd33 with 700PS)
- hd37-1-PS-B-21-1N-D0 (hd37 with 800PS) 3.
- hd33-1-PS-B-21-1N-D0 (hd33 with 800PS) 4.
- hd37-1-PS-C-21-1N-D0 (hd37 with 900PS) 5.
- hd33-1-PS-C-21-1N-D0 (hd33 with 900PS) 6.

Client Equipment Used During Test

Use*	Product Type	Manufacturer	Model	Comments
EUT	hd37, 700PS, 800PS, 900PS	Dali Wireless Inc.	hd37-3-PS- ABC-21-1N-D0	EUT where the RF (I/O) antenna attached via duplexers/multiplexer when necessary.
AE1	airHost, 700PS, 800PS, 900PS	Dali Wireless Inc.	AH37-3-PS- ABC-21-3N-D0	Auxiliary equipment, which is the front end of signal booster system air interfaced to donor Base Station.
AE2	Dali Matrix Console	Dali Wireless Inc.	hdCNSL-1-8-4- 120G-AC	Auxiliary equipment provides the configuration and control interface to <i>air</i> Host and <i>hd</i> 37.
AE3	Power Supply	MeanWell	HGL-480H-48	AC to DC Converter, I/P: 120VAC, 60Hz, 5.5A O/P: +48VDC, 480W

Abbreviations:

EUT - Equipment Under Test,

AE - Auxiliary/Associated Equipment, or

SIM - Simulator (Not Subjected to Test)

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Software and Firmware

Use*	Description	Version
EUT	Software installed	5.0.0-0.5413
AE1	Software installed	5.0.0-0.5415
AE2	Software installed	5.0.0704

Abbreviations:

EUT - Equipment Under Test,

AE - Auxiliary/Associated Equipment, or SIM - Simulator (Not Subjected to Test)

Input/Output Ports

Port #	Name	Type*	Cable Max. >3m	Cable Shielded	Comments
1	DC Power Port	DC	No	No	Dual feed 48 VDC Assembly
2	3 * RF Input/Output Ports	I/O	No	No	N-Type Coaxial
3	4 * Optical Fibre I/O Ports	I/O	No	No	LC/UPC Duplex
4	2 * TP	TP	No	No	RJ-45

^{*}Note: AC = AC Power Port DC = DC Power Port N/E = Non-Electrical

I/O = Signal Input or Output Port (Not Involved in Process Control)

TP = Telecommunication Ports

Power Interface

Mode #	Voltage (V)	Current (A)	Power (W)	Frequency (DC/AC-Hz)	Phases (#)	Comments
1	48	-	-	DC	-	

EUT Operation Modes

Mode #	Description
1	UL and DL transmission and receiving ON

EUT Configuration Modes

Mode #	Description
1	airHost maximum input threshold set to -55 dBm, uplink attenuation set to 0dB; hd37 uplink and downlink attenuation set to 0dB.

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Test Equipment Verified for function

Model #	Description	Checked Function	Results
N9038A	Spectrum Analyzer	Frequency and Amplitude	Connected 50MHz and -20 dBm Ref_siganl and checked OK.
SAS-540	Antenna, 30 to 300MHz	Checked structure	Normal – no damage.
VUSLP9 111B	Antenna, 300 to 1,000MHz	Checked structure	Normal – no damage.
SAS-571	Antenna, 1 to 18GHz	Checked structure	Normal – no damage.
JB1	Antenna, 30 to 2000MHz	Checked structure	Normal – no damage.
AL-130	Antenna, 9kHz to 30MHz	Checked structure	Normal – no damage.
8449B	Pre-Amplifier	Gain	In Tolerance
KT- N5172B	Signal Generator, up to 6GHz	Frequency, Amplitude and Modulation	Within MFR Specs
KT- N9010A	Spectrum Analyzer	Frquency and Amplitude	Within MFR Specs

Test Station Cables and Loads

Model #	Manufacture	Description
4 * TM8-N1S1-59	MegaPhase	N male to SMA male coaxial cable in 60 inches
1 * 49-30-34	Aeroflex	30dB 150W attenuators

Test Station Insertion Loss

	Band 700	Band 800	Band 900
DL Transmitter	31.09 dB	31.19 dB	31.21 dB
DL Receiver	31.08 dB	31.16 dB	31.24 dB

Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests:

Parameter	Uncertainty
Radio Frequency	±1 ppm
Total RF Power: Conducted	±1 dB
RF Power Density: Conducted	±2.75 dB
Spurious Emissions: Conducted	±3 dB
Temperature	±1 °C
Humidity	±5 %
DC and Low Frequency Voltages	±3 %
Radiated Emission, 30 to 6,000MHz	± 4.95 dB

Uncertainty figures are valid to a confidence level of 95%.

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Result Summary

The Compliance Status is a judgment based on the direct measurements and calculated highest emissions to appropriate standard limits. Measurement uncertainty values, provided on calibration certificates, were not be used in the judgment of the final status of compliance.

FCC Part Measurement Method Test Type Regulation Result FCC KDB 935210 D05, AGC Threshold ANSI TIA-603- E-2016 PASS v01r04, Section 4.2 FCC KDB 935210 D05. Out of Band Rejection ANSI TIA-603- E-2016 PASS v01r04, Section 4.3 Input-versus-output FCC KDB 935210 D05, PASS ANSI TIA-603- E-2016 v01r04, Section 4.4 Signal Comparison Input/output Power and FCC KDB 935210 D05. ANSI TIA-603- E-2016 PASS Amplifier/Booster Gain v01r04, Section 4.5 FCC KDB 935210 D05, Noise Figure ANSI TIA-603- E-2016 PASS v01r04, Section 4.6 Measuring out-ofband/out-of-block FCC KDB 935210 D05, (including ANSI TIA-603- E-2016 **PASS** v01r04, Section 4.7 intermodulation) and spurious emissions FCC KDB 935210 D05, Frequency stability ANSI TIA-603- E-2016 **PASS** v01r04, Section 4.8 Spurious emissions FCC KDB 935210 D05, ANSI C63.4:2014 **PASS** v01r04, Section 4.9 radiated measurements

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AGC Threshold

Governing Doc	FCC Part 2 2.1046(a) FCC Part 90.219(d)	Room Temperature (°C)				23.6		
Test Procedure	ANSI/TIA-603- E-2016; FCC KDB 935210 D05, v01r04;			Relative Humidity (%)			39.9	
Test Location	Richmond	Bar	ometric Pressure	e (kPa)	102.1			
Test Engineer	Jeremy Lee		Dat	e		1	5 July 2020	
EUT Voltage	⊠ +48VDC			120VAC @ 60)Hz			
Test Equipment Used	Manufacturer	Manufacturer Model			Calibration date		Calibration due	
Signal Generator	Keysight	N5172B		MY53050270	06/12/19		06/12/21	
Spectrum Analyzer	Keysight N9010A MY50520285 07/29/						07/23/21	
Frequency Range:	⊠ 935 MHz – 940 MHz	; ⊠ 851	МН	z – 861 MHz: 🛭	☑ 769 MH	z – 7	75 MHz	
Detector:	⊠ Peak							
Type of Facility:								
Distance:	□ Direct							
Arrangement of EUT:	⊠ Table-top only [☐ Floor-s	stand	ding only	☐ Rack I	Mour	nted	
Output Power is less than 37.3 dBm in band 800, less than 37.7 dBm in band 700, and less than 37.0 dBm in band 150.								
Compliant ⊠	Non-Compliar	nt 🗆		Not Appli	cable 🗆			

Test setup

Description of test set-up:

Output power is measured by connecting a spectrum analyzer to RF output connector of EUT via 30dB Attenuator. With a nominal input power and the amplifier properly adjusted the RF output is measured.

The EUT was set to Operation Mode #1 with configuration Mode #1.

The maximum output power is measured when the Automatic Level Control (ALC) starting to compress the power and hold to a constant level.



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Results - Output Power FCC Requirement

Frequency Range (MHz)	Frequency (MHz)	Input Power Trip ALC (dBm)	Output Power (dBm)	Output Power (Watt)
	935.025	-54.1	37	5.012
935 - 940	937.5	-54.7	37.2	5.25
	939.975	-55	37.7	5.89
	851.0125	-55.7	37.3	5.37
851 -861	856	-55.2	37.4	5.49
	860.9875	-53.5	37.5	5.62
	769.0125	-54.5	36.9	4.9
769 - 775	772	-53.4	37.1	5.13
	774.9875	-51.9	37.4	5.49

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Occupied Bandwidth

Governing Doc	FCC Part 2 2.1049	Room Temperatu	23.6				
Test Procedure	ANSI/TIA-603- E-2016; F 935210 D05, v01r04	Relative Humidity	39.9				
Test Location	Richmond		Barometric Press	102.1			
Test Engineer	Jeremy Lee	Date		15 July 2020			
EUT Voltage	⊠ +48VDC		120VAC @ 60)Hz			
Test Equipment Used	Manufacturer	Model	Serial Number	Calibration date	Calibration due		
Signal Generator	Keysight	N5172B	MY53050270	06/12/19	06/12/21		
Spectrum Analyzer Keysight N9010A			MY50520285 07/29/19 07/29/21				
Frequency Range:	⊠ 935 MHz – 940 MHz; ⊠ 851 MHz – 861 MHz: ⊠ 769 MHz – 775 MHz						
Detector:							
Type of Facility:							
Distance:	□ Direct						
Arrangement of EUT:	□ Table-top only □	□ Floor-stan	ding only	☐ Rack Mour	nted		
Output signal has an occupied channel bandwidth less than the designated channel bandwidth on any location on the operating band. - C4FM < 12.5 kHz - CQPSK < 6.25 kHz - HDQPSK < 12.5 kHz - 4 kHz FM with 1kHz deviation < 12.5 kHz							
Compliant ⊠	Non-Compliar	nt 🗆	Not Appl	icable 🗆			

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Test setup

Description of test set-up:

Occupied Bandwidth is measured by connecting a Spectrum Analyzer to the RF output connector via 30dB attenuator. The required measurement resolution bandwidth (RBW) is 1% of the emission bandwidth. 99% energy rule was applied to measure the occupied channel bandwidth. The emission bandwidth is measured as the width of the signal between two frequency points on the channel edge, outside of which the transmission power is attenuated at least 26dB below the transmitter output power

The EUT was set to Operation Mode #1 with configuration Mode #1.

The occupied bandwidth of DL output is measured under one input conditions:

Nominal: with input 0.5dB below AGC threshold

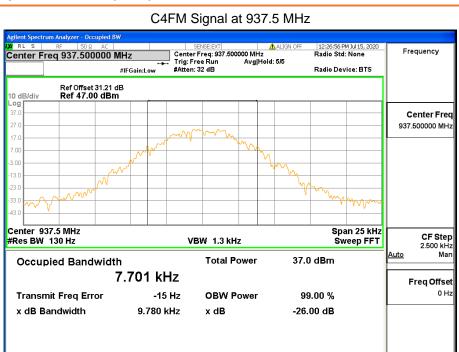


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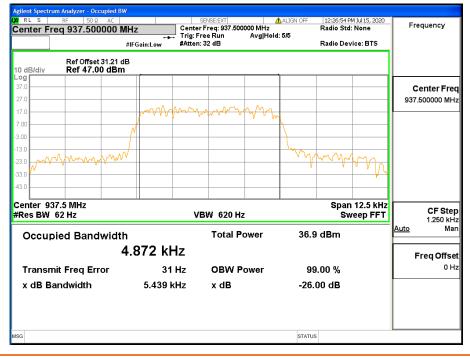
Client: Dali Wireless, Inc.

Results - Occupied Bandwidth (OBW)



CQPSK Signal at 937.5 MHz

STATUS

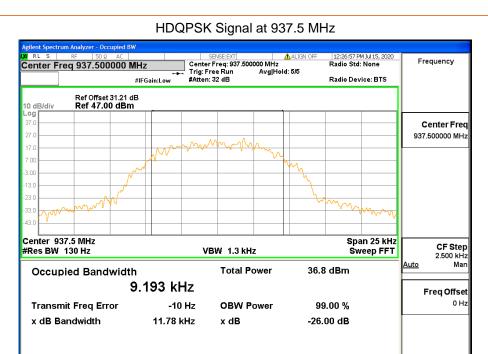


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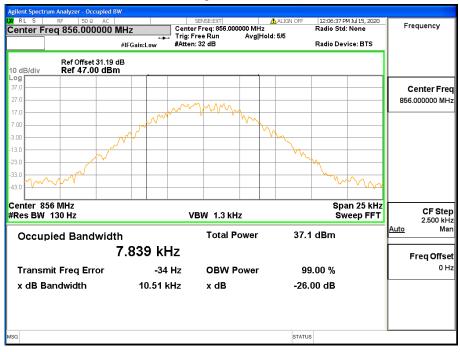
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C4FM Signal at 856.0 MHz

STATUS

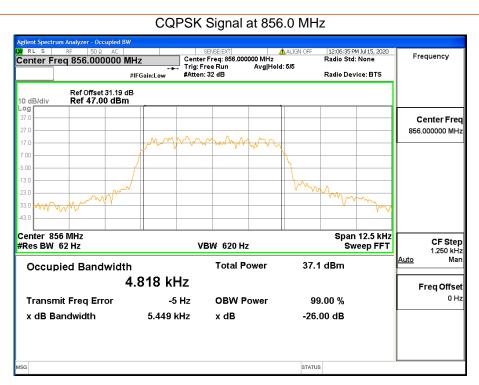


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HDQPSK Signal at 856.0 MHz



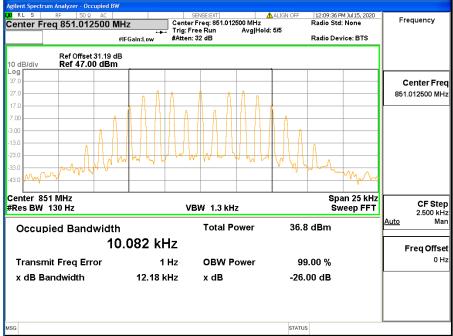
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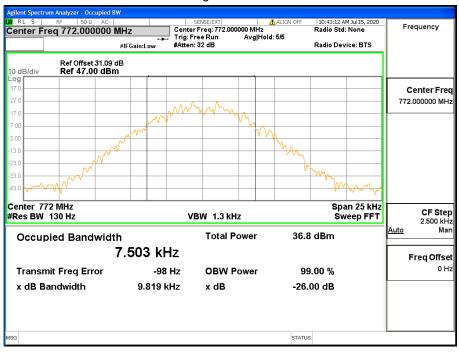
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FM Signal at 851.0125 MHz



C4FM Signal at 772.0 MHz

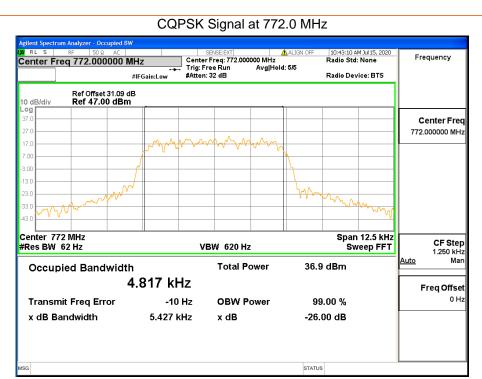


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HDQPSK Signal at 772.0 MHz



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Out of Band Rejection

FCC Part 2 2.1046(a) FCC Part 90.219(d)			oom Tempe	23.6		
ANSI/TIA-603- E; FCC KDB 935210 D05, v01r04			elative Humi	39.9		
Richmond			arometric Pr	essure (kPa)	102.1	
Jeremy Lee			ate		15 July 2020	
⊠ +48VDC	12	20VAC @ 60)Hz			
Manufacturer Model S		Seri	ial Number	Calibration date	Calibration due	
Keysight	N5172B	MY	MY53050270 06/12/19		08/12/21	
Keysight	N9010A	MY	′50520285	08/23/21		
	250%					
⊠ Peak						
□ 1 to 5% of the EUT p	assband / ≥	3 X F	RBW			
⊠ Tabletop						
Non-Compliar	nt 🗆		Not Applicable □			
	FCC Part 90.219(d) ANSI/TIA-603- E; FCC KDB 935210 D05, v Richmond Jeremy Lee	FCC Part 90.219(d) ANSI/TIA-603- E; FCC KDB 935210 D05, v01r04 Richmond Jeremy Lee ☑ +48VDC Manufacturer Model Keysight N5172B Keysight N9010A ☑ Product Passband ± 250% ☑ Peak ☑ 1 to 5% of the EUT passband / ≥ ☑ Tabletop	FCC Part 90.219(d) ANSI/TIA-603- E; FCC KDB 935210 D05, v01r04 Richmond B Jeremy Lee □ Le □ +48VDC □ 1: Manufacturer Model Ser Keysight N5172B MY Keysight N9010A MY □ Product Passband ± 250% □ Peak □ 1 to 5% of the EUT passband / ≥ 3 X I □ Tabletop □ Direct	FCC Part 90.219(d) ANSI/TIA-603- E; FCC KDB 935210 D05, v01r04 Richmond Barometric Pr Jeremy Lee □ 120VAC @ 60 Manufacturer Model Serial Number Keysight N5172B MY53050270 Keysight N9010A MY50520285 □ Product Passband ± 250% □ 1 to 5% of the EUT passband / ≥ 3 X RBW □ Tabletop □ Direct	FCC Part 90.219(d) ANSI/TIA-603- E; FCC KDB 935210 D05, v01r04 Richmond Barometric Pressure (kPa) Jeremy Lee □ 120VAC @ 60Hz Manufacturer Model Serial Number Calibration date Keysight N5172B My53050270 06/12/19 Keysight N9010A My50520285 07/29/19 □ Product Passband ± 250% □ Peak □ 1 to 5% of the EUT passband / ≥ 3 X RBW □ Tabletop □ Direct	

Test setup

Description of test set-up:

The procedure used was ANSI/TIA-603-E-2016 and FCC KDB 935210 D05 Indus Booster Basic Meas v01r04. The signal booster was set to maximum gain. A swept CW signal was set to the range of ±250 % of the product pass band. The CW ampltitude was set to 3 dB below the AGC threshold so that the ALC should not activate throughout the test.

After the max-hold sweep trace was completed, a marker was set to the peak amplitude, and a 20dB bandwidth was measured between two additional markers fall 20 dB from the peak.

The EUT was set to Operation Mode #1 with configuration Mode #1.

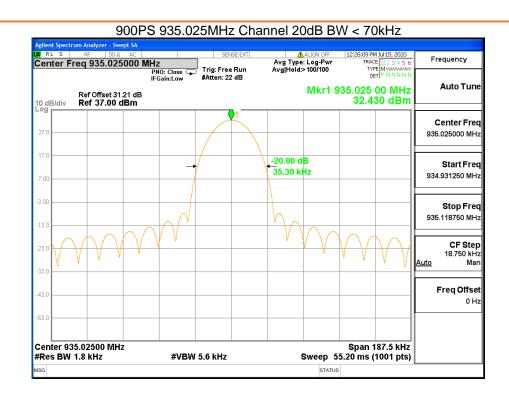


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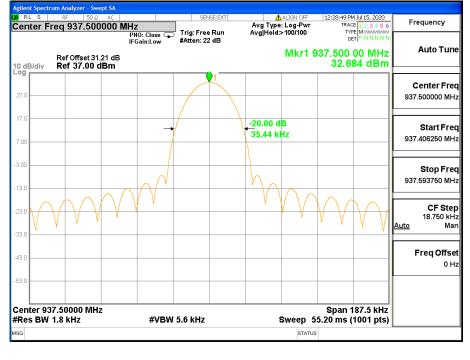
Report No.: 18280-6E Project No.: 18280 Revision No.: 0

Client: Dali Wireless, Inc.

Results



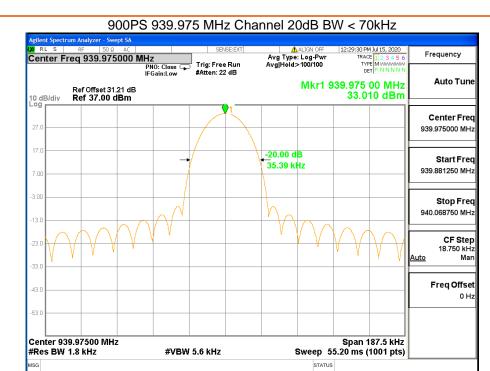
900PS 937.5 MHz Channel 20dB BW < 70kHz

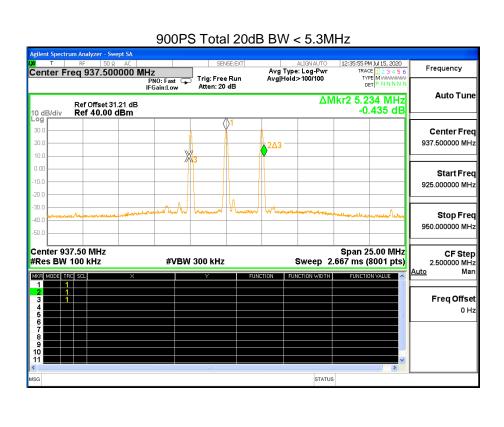


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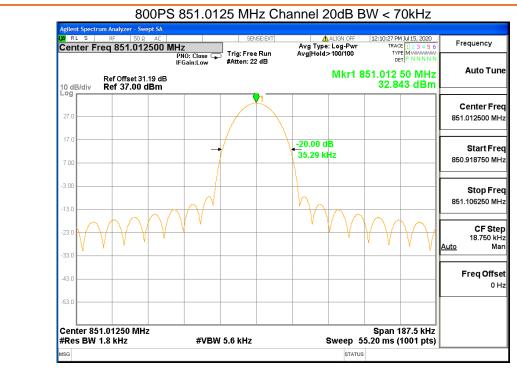


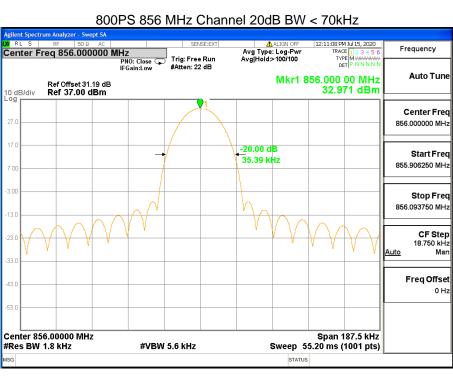


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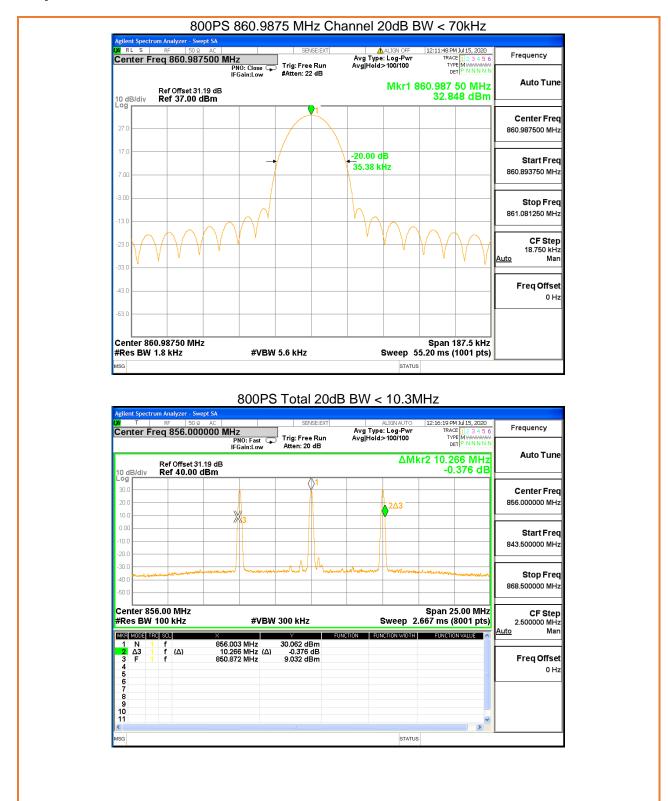




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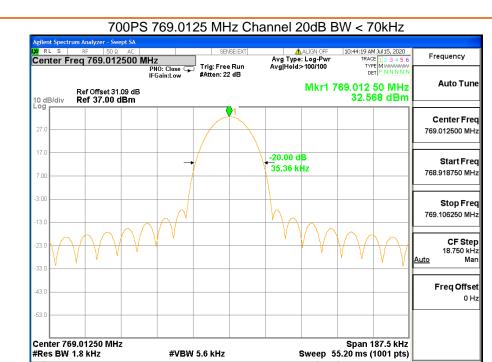
Report No.: 18280-6E Project No.: 18280 Revision No.: 0

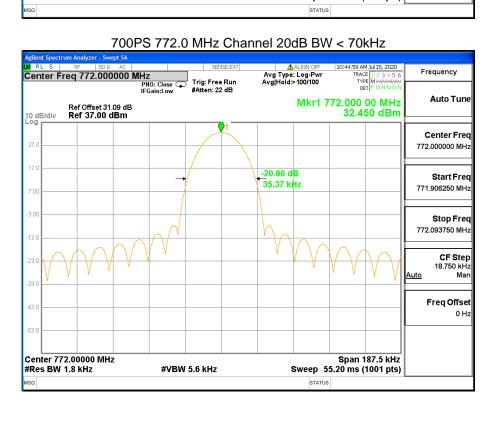


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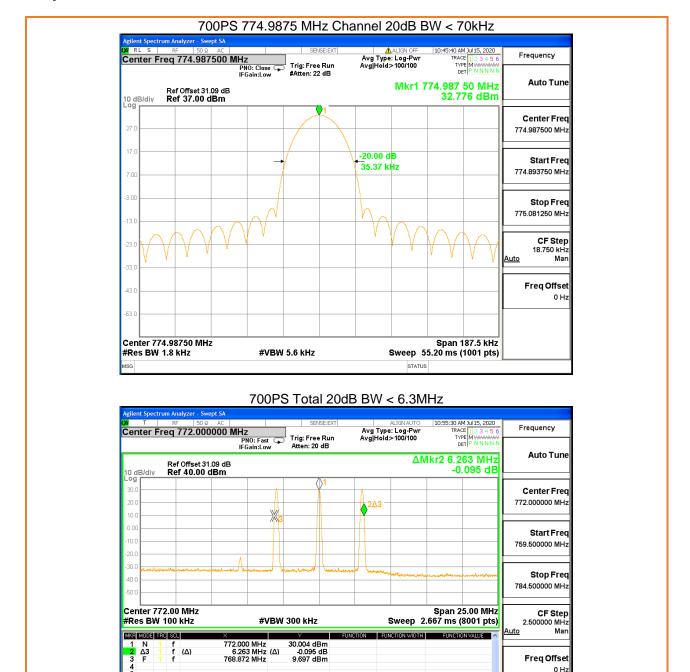




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Client: Dali Wireless, Inc.

Input-Versus-Output Signal Comparison

Governing Doc	FCC Part 90.210 (j) (h) (e)	Room Tempe	Room Temperature (°C)				
Test Procedure	ANSI/TIA-603- E; FCC KDB 935210 D05, v	v01r04	Relative Hum	Relative Humidity (%)			
Test Location	Richmond		Barometric P	Barometric Pressure (kPa)			
Test Engineer	Jeremy Lee	Date		15 July 2020			
EUT Voltage	⊠ +48VDC		120VAC @ 6	0Hz			
Test Equipment Used	Manufacturer	Model	Serial Number	Calibration date	Calibration due		
Signal Generator	Keysight	N5172B	MY53050270	06/12/19	06/12/21		
Spectrum Analyzer	Keysight	N9010A	MY50520285	MY50520285 07/29/19 07/23/21			
Frequency Range:	requency Range: ⊠ 935 MHz – 940 MHz; ⊠ 851 MHz – 861 MHz: ⊠ 769 MHz – 775 MHz						
Detector:	⊠ Peak						
RBW/VBW:	⊠100 Hz						
Type of Facility:	⊠ Testbench						
Distance:							
Arrangement of EUT:	⊠ Table-top only [☐ Floor-stand	ding only 🛭 Ra	ack Mounted			
Based on FCC Part90.210, transmitters without audio low pass filter used in frequency band 769 - 775 MHz must comply to emission mask C; 851 - 854 MHz must comply to emission mask H; 854 - 861 MHz must comply to emission mask D; 935 - 940 MHz must comply to emission mask J; Signal of all types of modulation is contained within the emission mask.							
Compliant ⊠	Non-Compliar	nt 🗆	Not Appl	icable 🗆			

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Client: Dali Wireless, Inc. Report No.: 18280-6E Revision No.: 0

Test setup

Description of test set-up:

Spectrum Emission Mask is measured by connecting a Spectrum Analyzer to the RF output connector. The input power was adjusted to produce maximum output power on the antenna port. The reference level was measured with integrated BW of the designated channel BW. The emission was measured with RBW 100 Hz.

The EUT was set to Operation Mode #1 with configuration Mode #1.



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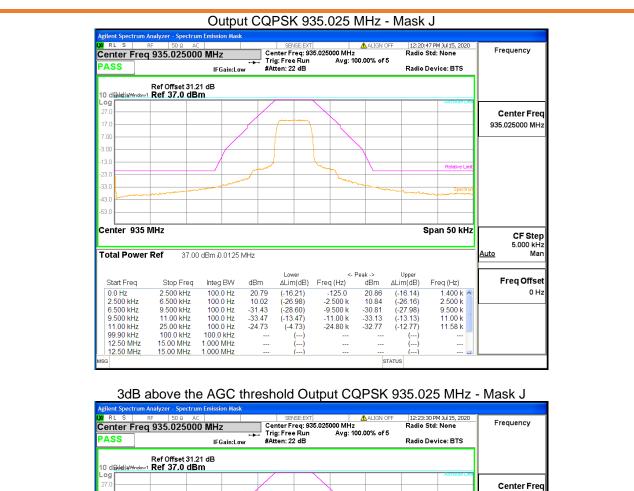
Results



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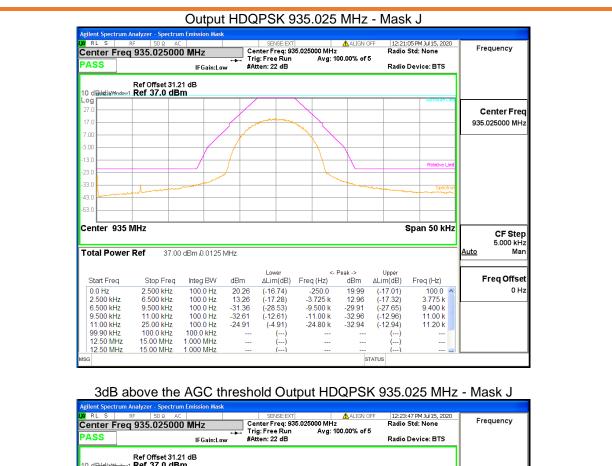


935.025000 MH; Center 935 MHz Span 50 kHz **CF Step** 37.00 dBm .0.0125 MHz Total Power Ref Freq Offset ALim(dB) Freq (Hz) Start Freq Stop Freq Intea BW dBm dBm ∆Lim(dB) Freq (Hz) 0.0 Hz 2.500 kHz 100.0 Hz 20.95 (-16.05)-1.725 k 21.31 (-15.69) 250.0 0 H 2.500 kHz 6.500 kHz 6.500 kHz 9.500 kHz 100.0 Hz 100.0 Hz 10.19 -31.20 (-26.81) (-28.37) -2.500 k -9.500 k 10.74 -31.16 (-26.26) (-28.33) 2.500 k 9.500 k 9.500 kHz 11.00 kHz 100.0 Hz -33.27 (-13.27) -11.00 k -33.44 (-13.44) 11.00 k 11.15 k 11.00 kHz 99.90 kHz 25.00 kHz 100.0 kHz 100.0 Hz 100.0 kHz (-12.91) 12.50 MHz 12.50 MHz 15.00 MHz 1.000 MHz 15.00 MHz 1.000 MHz STATUS

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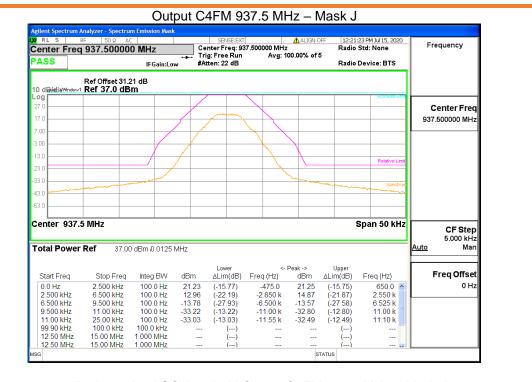
Revision No.: 0

Ref Offset 31.21 dB Ref 37.0 dBm 10 d**Bád**i¥Windov Center Fred 935.025000 MH; Center 935 MHz Span 50 kHz **CF Step** Total Power Ref 37.00 dBm .0.0125 MHz Freq Offset ALim(dB) Freq (Hz) Start Freq Stop Freq Intea BW dBm dBm ∆Lim(dB) Freq (Hz) (-17.05) 0.0 Hz 2.500 kHz 100.0 Hz 20.09 (-16.91)-25.00 19.95 525.0 0 H 2.500 kHz 6.500 kHz 6.500 kHz 9.500 kHz 100.0 Hz 100.0 Hz 10.48 (-17.68) (-27.95) -4.175 k -9.425 k 9.736 -30.51 (-17.24) (-27.82) 4.400 k 9.475 k 9.500 kHz 11.00 kHz 100.0 Hz -32.88 (-12.88) -11.00 k -32.72 (-12.72) 11.00 k 11.03 k 11.00 kHz 99.90 kHz 25.00 kHz 100.0 kHz 100.0 Hz 100.0 kHz 12.50 MHz 12.50 MHz 15.00 MHz 1.000 MHz 15.00 MHz 1.000 MHz STATUS

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Client: Dali Wireless, Inc.

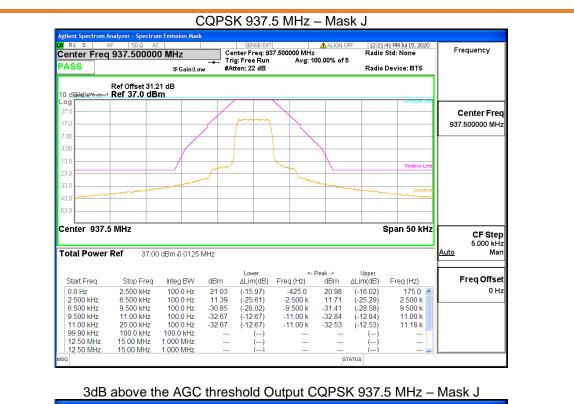
Revision No.: 0

3dB above the AGC threshold Output C4FM 937.5 MHz – Mask J 24:05 PM Jul 15, 2020 Center Freq: 937.500000 MHz Trig: Free Run Avg: 10 #Atten: 22 dB Frequency Center Freq 937.500000 MHz Radio Std: None Avg: 100.00% of 5 PASS Radio Device: BTS IFGain:Low Ref Offset 31.21 dB 10 dBookliaWindow1 Ref 37.0 dBm Center Fred 937.500000 MHz Center 937.5 MHz Span 50 kHz **CF Step** Total Power Ref 37.00 dBm .0.0125 MHz Auto Upper ΔLim(dB) ΔLim(dB) Freq (Hz) Freq Offset Start Freq Stop Freq Integ BW dBm Freq (Hz) dBm 0.0 Hz 2.500 kHz 100.0 Hz (-15.70) -675.0 (-15.81) 525.0 2.500 kHz 6 500 kHz 100 0 Hz 14 96 (-22.04) -2 500 k 14 24 (-21.97) 2 650 k 6.500 kHz 9.500 kHz 9.500 kHz 11.00 kHz 100.0 Hz 100.0 Hz -13.64 -32.67 (-27.65) (-12.67) -6.525 k -11.00 k -13.48 -32.92 (-27.63) (-12.92) 6.500 k 11.00 k 11.00 kHz 99.90 kHz 12.50 MHz 25.00 kHz 100.0 kHz 15.00 MHz 100.0 Hz -32.67 (-12.67) -11.00 k -32.85 (-12.85)11.25 k 100.0 Hz 1.000 MHz 12.50 MHz 15.00 MHz 1.000 MHz STATUS

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Client: Dali Wireless, Inc.

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Center Freq: 937.500000 MHz Trig: Free Run Avg: 10 #Atten: 22 dB Frequency Center Freq 937.500000 MHz Radio Std: None Avg: 100.00% of 5 PASS Radio Device: BTS IFGain:Low Ref Offset 31.21 dB Ref 37.0 dBm Center Fred 937.500000 MHz Center 937.5 MHz Span 50 kHz CF Step 5.000 kHz Total Power Ref 37 00 dBm 0 0125 MHz

				Lower	<-	Peak ->	Upper			
Start Freq	Stop Freq	Integ BW	dBm	ΔLim(dB)	Freq (Hz)	dBm	∆Lim(dB)	Freq (Hz)		Freq Offse
0.0 Hz	2.500 kHz	100.0 Hz	21.02	(-15.98)	-1.325 k	21.05	(-15.95)	975.0	l	0 H
2.500 kHz	6.500 kHz	100.0 Hz	10.97	(-26.03)	-2.500 k	10.43	(-26.57)	2.500 k		
6.500 kHz	9.500 kHz	100.0 Hz	-30.89	(-28.77)	-9.375 k	-31.55	(-28.72)	9.500 k		
9.500 kHz	11.00 kHz	100.0 Hz	-33.40	(-13.40)	-11.00 k	-33.21	(-13.21)	11.00 k		
11.00 kHz	25.00 kHz	100.0 Hz	-32.93	(-12.93)	-11.25 k	-32.81	(-12.81)	11.23 k		
99.90 kHz	100.0 kHz	100.0 kHz		()			()			
12.50 MHz	15.00 MHz	1.000 MHz		()			()			
12.50 MHz	15.00 MHz	1.000 MHz		()			()			
ISG						s	TATUS			

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99.90 kHz

12.50 MHz 12.50 MHz 100.0 kHz

15.00 MHz 15.00 MHz 100.0 kHz

1.000 MHz 1.000 MHz

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99.90 kHz 12.50 MHz

12.50 MHz

100.0 kHz 15.00 MHz

15.00 MHz

100.0 kHz 1.000 MHz

1.000 MHz

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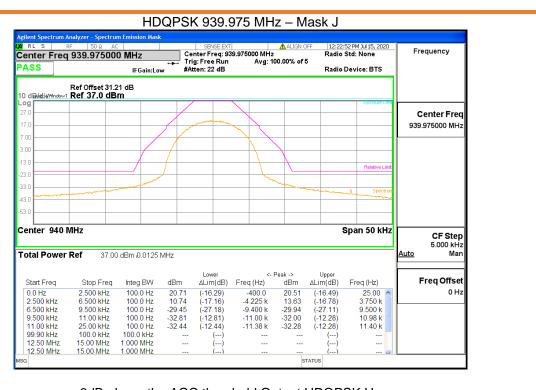


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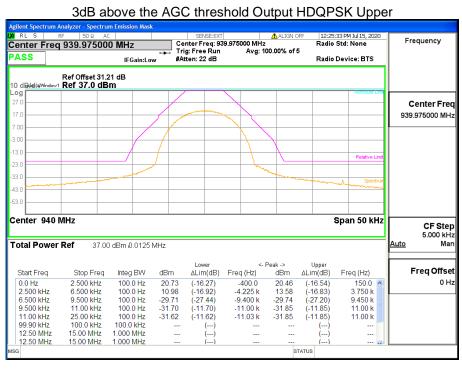
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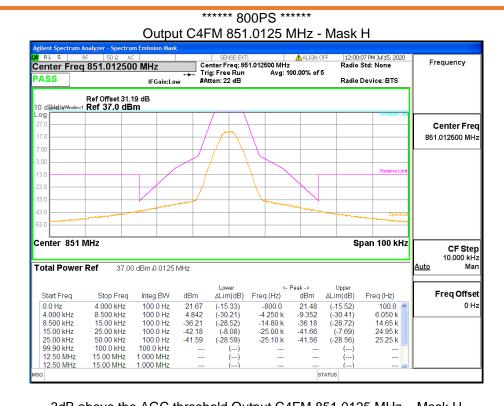


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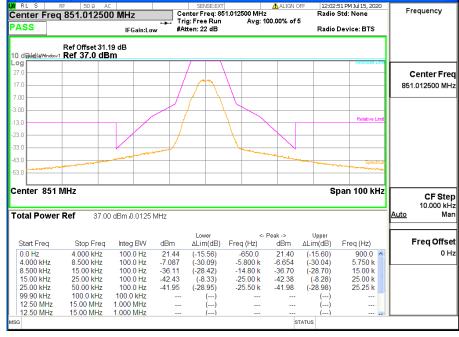
Date Issued: 07 August 2020

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Client: Dali Wireless, Inc. Report No.: 18280-6E Revision No.: 0



3dB above the AGC threshold Output C4FM 851.0125 MHz – Mask H at Spectrum Analyzer - Spectrum Emission Mask



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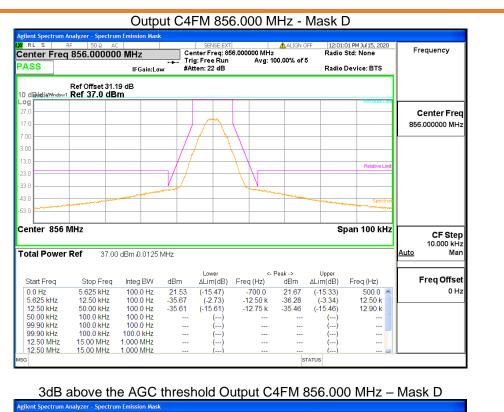
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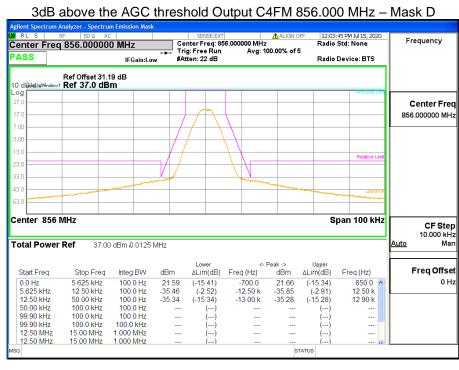
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99.90 kHz 99.90 kHz

12.50 MHz

12.50 MHz

100.0 kHz 100.0 kHz

15 00 MHz

15.00 MHz

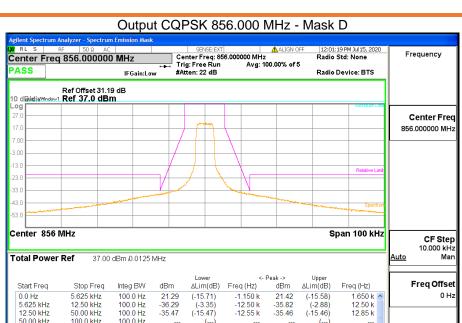
100.0 Hz 100.0 kHz

1 000 MHz

1.000 MHz

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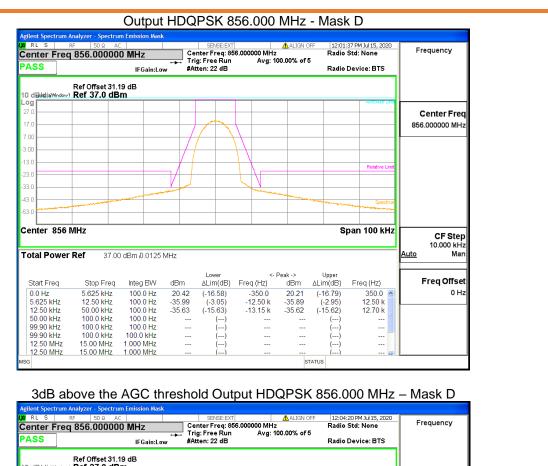
Revision No.: 0

3dB above the AGC threshold Output CQPSK 856.000 MHz - Mask D Frequency Center Freq: 856.000000 MHz Trig: Free Run Avg: 10 #Atten: 22 dB Center Freq 856.000000 MHz Radio Std: None Avg: 100.00% of 5 PASS Radio Device: BTS IFGain:Low Ref Offset 31.19 dB Ref 37.0 dBm Center Fred 856.000000 MHz Center 856 MHz Span 100 kHz CF Step 10.000 kHz Total Power Ref 37.00 dBm .0.0125 MHz <u>Auto</u> Mar Freq Offset Start Freq Stop Freq Integ BW dBm ΔLim(dB) Freq (Hz) dBm ΔLim(dB) Freq (Hz) 0.0 Hz 5.625 kHz 12.50 kHz 50.00 kHz 5.625 kHz 12.50 kHz 100.0 Hz 100.0 Hz 21.28 -35.67 21.55 -35.52 1.450 k 12.50 k (-15.72) -1.850 k (-15.45) 0 Hz (-3.10) (-15.15) -12.45 k (-2.58) (-15.47) 50.00 kHz 100 0 Hz -35.15 -12.50 k -35.47 12.50 k 99.90 kHz 100.0 kHz 100.0 Hz 99.90 kHz 12.50 MHz 100.0 kHz 15.00 MHz 100.0 kHz 1.000 MHz 12.50 MHz 15.00 MHz 1.000 MHz STATUS

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Client: Dali Wireless, Inc.

Revision No.: 0

Ref Offset 31.19 dB Ref 37.0 dBm 10 d**B√edia**Window Center Fred 856,000000 MHz Center 856 MHz Span 100 kHz **CF Step** 10.000 kH Total Power Ref 37.00 dBm .0.0125 MHz Freq Offset ALim(dB) Freq (Hz) ΔLim(dB) Frea (Hz) Start Freq Stop Freq Intea BW dBm dBm 0.0 Hz 5.625 kHz 100.0 Hz 20.74 (-16.26) -200.0 20.65 (-16.35) 650.0 0 H 5.625 kHz 12.50 kHz 12.50 kHz 50.00 kHz 100.0 Hz 100.0 Hz (-2.93) (-15.41) 12.50 k 12.70 k -35.57 (-15.57) -12.50 k -35.41 50.00 kHz 100.0 kHz 100.0 Hz 99.90 kHz 99.90 kHz 100.0 kHz 100.0 kHz 100.0 Hz 100.0 kHz 12.50 MHz 12.50 MHz 15.00 MHz 1.000 MHz 15.00 MHz 1.000 MHz STATUS

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Center 861 MHz

Total Power Ref

Start Freq

5.625 kHz 12.50 kHz

50.00 kHz 99.90 kHz

99.90 kHz

12.50 MHz 12.50 MHz

0.0 Hz

37.00 dBm .0.0125 MHz

Integ BW

100.0 Hz 100.0 Hz

100.0 Hz

100.0 Hz 100.0 Hz

100.0 kHz

1.000 MHz 1.000 MHz dBm

22.10 -35.88

-35.22

Stop Freq

5.625 kHz

12.50 kHz 50.00 kHz

100.0 kHz 100.0 kHz

100.0 kHz

15.00 MHz 15.00 MHz

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Span 100 kHz

Freq (Hz)

1.000 k 12.50 k

13.00 k

CF Step

Freq Offset

Mar

0 Hz

Auto

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ΔLim(dB) Freq (Hz)

-700.0

-12.90 k

(-14.90)

(-2.94) (-15.22) <- Peak ->

dBm

22.00 -35.42

-35.36

ΔLim(dB)

(-15.00)

(-2.48) (-15.36)

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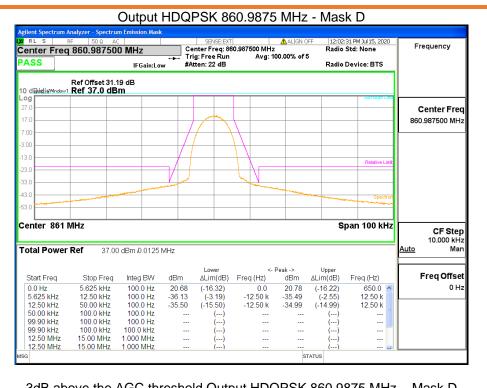
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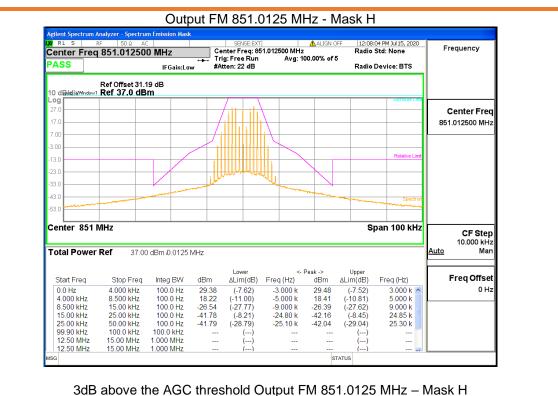
Revision No.: 0

3dB above the AGC threshold Output HDQPSK 860.9875 MHz - Mask D Frequency Center Freq: 860.987500 MHz Trig: Free Run Avg: 10 #Atten: 22 dB Center Freq 860.987500 MHz Radio Std: None Avg: 100.00% of 5 PASS Radio Device: BTS IFGain:Low Ref Offset 31.19 dB Ref 37.0 dBm Center Fred 860.987500 MHz Center 861 MHz Span 100 kHz CF Step 10.000 kHz Total Power Ref 37.00 dBm .0.0125 MHz <u>Auto</u> Mar Freq Offset Start Freq Stop Freq Integ BW dBm ΔLim(dB) Freq (Hz) dBm ΔLim(dB) Freq (Hz) 0.0 Hz 5.625 kHz 12.50 kHz 50.00 kHz 5.625 kHz 12.50 kHz 100.0 Hz 100.0 Hz 20.81 -35.41 20.85 -36.12 650.0 ^ 12.50 k (-16.19) 0.0 (-16.15) 0 Hz (-3.18)50.00 kHz 100 0 Hz -35.25 (-15.25) -12.75 k -34.90 (-14.90) 12.55 k 99.90 kHz 100.0 kHz 100.0 Hz 99.90 kHz 12.50 MHz 100.0 kHz 15.00 MHz 100.0 kHz 1.000 MHz 12.50 MHz 15.00 MHz 1.000 MHz STATUS

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Client: Dali Wireless, Inc.

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3dB above the AGC threshold Output FM 851.0125 MHz - Mask H Frequency Center Freq: 851.012500 MHz Trig: Free Run Avg: 10 #Atten: 22 dB Center Freq 851.012500 MHz Radio Std: None Avg: 100.00% of 5 PASS Radio Device: BTS IFGain:Low Ref Offset 31.19 dB Ref 37.0 dBm Center Fred 851.012500 MHz Center 851 MHz Span 100 kHz CF Step 10.000 kHz Total Power Ref 37.00 dBm .0.0125 MHz Auto Mar <- Peak -> Freq Offset Start Freq Stop Freq Integ BW dBm ΔLim(dB) Freq (Hz) dBm ΔLim(dB) Freq (Hz) 100.0 Hz 100.0 Hz 29.38 18.23 (-7.62) (-10.99) -3.000 k -5.000 k (-7.52) (-10.81) 3.000 k 5.000 k 0.0 Hz 4 000 kHz 29 48 0 Hz 4.000 kHz 8.500 kHz 18.41 -26.84 -42.35 -42.06 (-28.07) (-8.25) (-29.06) -26.34 -42.65 -42.08 8 500 kHz 15 00 kHz 100 0 Hz -9 000 k (-27.57)9 000 k 15.00 kHz 25.00 kHz 25.00 kHz 50.00 kHz 100.0 Hz 100.0 Hz -25.00 k -25.35 k (-8.68) (-29.08) 24.95 k 25.70 k 99.90 kHz 12.50 MHz 100 0 kHz 100 0 kHz 15.00 MHz 12.50 MHz 15.00 MHz 1.000 MHz

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Center 856 MHz Span 100 kHz CF Step 10.000 kHz Total Power Ref 37.00 dBm .0.0125 MHz <u>Auto</u> Mar <- Peak -> Uppe Freq Offset Start Freq Stop Freq Integ BW dBm ΔLim(dB) Freq (Hz) dBm ΔLim(dB) Freq (Hz) 5.625 kHz 12.50 kHz 50.00 kHz (-7.44) (-3.35) 100.0 Hz 100.0 Hz 29.45 -35.86 (-7.55) (-2.92) -3.000 k -12.50 k 29.56 -35.92 3.000 k 12.45 k 0.0 Hz 0 Hz 5.625 kHz 12.50 kHz 100.0 Hz -35.74 (-15.74)-12.55 k -35.66(-15.66)12.65 k 50.00 kHz 99.90 kHz 100.0 kHz 100.0 kHz 100.0 Hz 100.0 Hz 99.90 kHz 100.0 kHz 100.0 kHz 15.00 MHz 15.00 MHz 1.000 MHz 1.000 MHz 12.50 MHz 12.50 MHz

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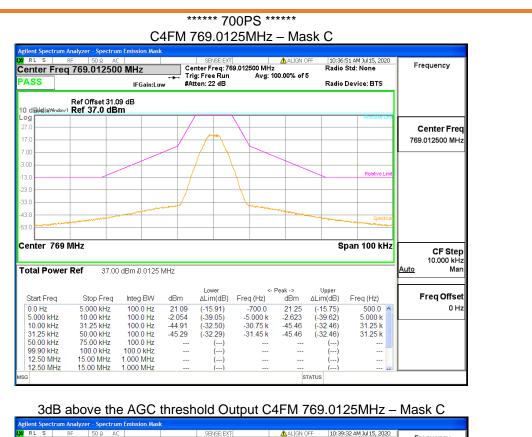


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SENSE:EXT ALIGN OFF Center Freq: 769.012500 MHz Trig: Free Run Avg: 100.00% of 5 #Atten: 22 dB 10:39:32 AM Jul 15, 2020 Radio Std: None Center Freq 769.012500 MHz PASS Radio Device: BTS IFGain:Low Ref Offset 31.09 dB Ref 37.0 dBm Center Freq 769.012500 MH: Center 769 MHz Span 100 kHz CF Step 10.000 kHz Man Total Power Ref 37.00 dBm 0.0125 MHz Freq Offset Start Freq Stop Freq Integ BW dBm ΔLim(dB) Freq (Hz) dBm ∆Lim(dB) Freq (Hz) 500.0 0.0 Hz 5 000 kHz 100 0 Hz 20.93 (-16.07)-100.0 21.35 (-15.65) 0 H 10.00 kHz 31.25 kHz -4.887 -45.02 5.050 k 31.05 k 5.000 kHz 10.00 kHz 100.0 Hz (-32.38)-30.95 k -45.25 (-32.49)31.25 kHz 50.00 kHz 50.00 kHz 75.00 kHz 100.0 Hz -45.32 (-32.32) -31.45 k -45.46 (-32.46) 31.70 k 100.0 Hz 100 0 kHz 100 0 kHz 99.90 kHz 15.00 MHz 15.00 MHz 1.000 MHz 1.000 MHz 12.50 MHz 12.50 MHz STATUS

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12.50 MHz

12.50 MHz

15.00 MHz

15.00 MHz

1,000 MHz

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Client: Dali Wireless, Inc.

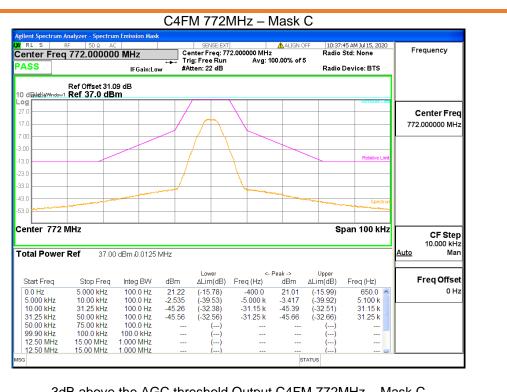


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3dB above the AGC threshold Output C4FM 772MHz – Mask C Frequency Center Freq: 772.000000 MHz Trig: Free Run Avg: 10 #Atten: 22 dB Center Freq 772.000000 MHz Radio Std: None Avg: 100.00% of 5 PASS Radio Device: BTS IFGain:Low Ref Offset 31.09 dB Ref 37.0 dBm Center Fred 772.000000 MHz Center 772 MHz Span 100 kHz CF Step 10.000 kHz Total Power Ref 37.00 dBm .0.0125 MHz <u>Auto</u> Mar Freq Offset Start Freq Stop Freq Integ BW dBm ΔLim(dB) Freq (Hz) dBm ΔLim(dB) Freq (Hz) 0.0 Hz 5.000 kHz 100.0 Hz 100.0 Hz 21.13 -4.173 21.77 -2.488 950.0 5.050 k 5.000 kHz (-15.87) -100.0 (-15.23) 0 Hz 10.00 kHz (-39.67)-5.300 k (-39.24)10.00 kHz 31.25 kHz 50.00 kHz 31.25 kHz 100.0 Hz -45.28 (-32 28) -31 25 k -45.32 (-32.38) 31 20 k 50.00 kHz -45.24 (-32.24) -32.25 k (-32.39) 31.45 k 75.00 kHz 100.0 Hz 99.90 kHz 12.50 MHz 100.0 kHz 15.00 MHz 100.0 kHz 1.000 MHz 12.50 MHz 15.00 MHz 1.000 MHz STATUS

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STATUS

100.0 Hz

100.0 kHz 1.000 MHz

1.000 MHz

100.0 kHz 15.00 MHz

15.00 MHz

99.90 kHz 12.50 MHz

12.50 MHz

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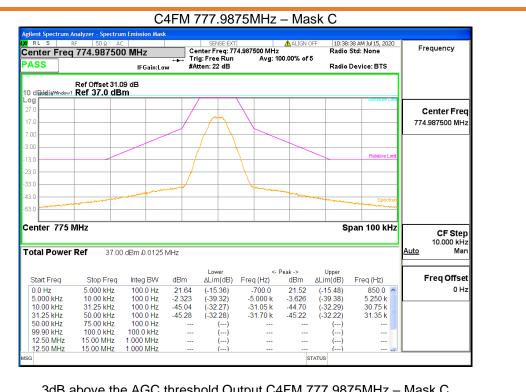
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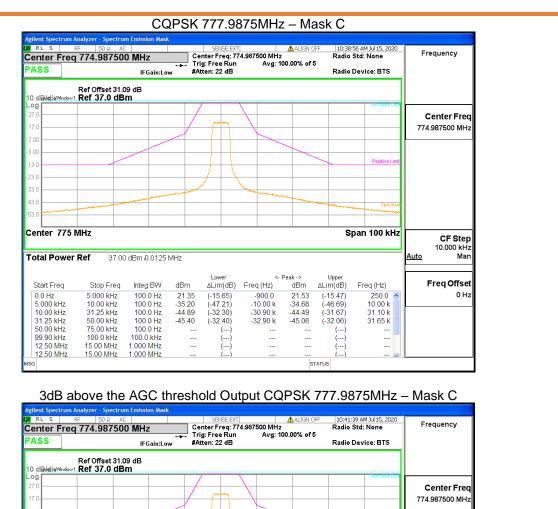
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3dB above the AGC threshold Output C4FM 777.9875MHz – Mask C Frequency Center Freq: 774.987500 MHz Trig: Free Run Avg: 10 #Atten: 22 dB Center Freq 774.987500 MHz Radio Std: None Avg: 100.00% of 5 PASS Radio Device: BTS IFGain:Low Ref Offset 31.09 dB Ref 37.0 dBm Center Fred 774.987500 MHz Center 775 MHz Span 100 kHz CF Step 10.000 kHz Total Power Ref 37.00 dBm .0.0125 MHz Auto Mar <- Peak -> Freq Offset Start Freq Stop Freq Integ BW dBm ΔLim(dB) Freq (Hz) dBm ΔLim(dB) Freq (Hz) 0.0 Hz 5.000 kHz 100.0 Hz 100.0 Hz 21.46 -2.605 (-15.54) (-39.60) -900.0 -5.000 k 21.96 -2.567 (-15.04) (-39.07) 800.0 ^ 5.100 k 5 000 kHz 0 Hz 10.00 kHz 10.00 kHz 31.25 kHz 50.00 kHz 31.25 kHz 100 0 Hz -44 96 (-32.20) (-32.16) -31 05 k -4475(-32.11)30.95 k 50.00 kHz 75.00 kHz 100.0 Hz 100.0 Hz -45.16 (-31.77) 31.70 k 99.90 kHz 12.50 MHz 100 0 kHz 100 0 kHz 15.00 MHz 12.50 MHz 15.00 MHz 1.000 MHz STATUS

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Center 775 MHz Span 100 kHz CF Step 10.000 kHz Total Power Ref 37 00 dBm 0 0125 MHz <- Peak -> dBm Upper ΔLim(dB) Lower ΔLim(dB) Freq (Hz) Freq Offset Start Freq Stop Freq Integ BW dBm Freq (Hz) 21.25 -34.64 -44.68 -45.28 5.000 kHz 100.0 Hz (-15.75) -450.0 21.54 (-15.46) 100.0 0.0 Hz 10.00 kHz 31.25 kHz 50.00 kHz 5 000 kHz 100 0 Hz (-47.40)-9 850 k -34 82 (-47.08) 9 950 k 10.00 kHz 31.25 kHz 100.0 Hz (-32.33) (-31.94) 100.0 Hz (-32.28)-32.60 k -44.94 31.35 k 50.00 kHz 99.90 kHz 12.50 MHz 75.00 kHz 100.0 kHz 100.0 Hz 100.0 kHz 15 00 MHz 1 000 MHz 12.50 MHz 15.00 MHz 1.000 MHz STATUS

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Input/output Power and Amplifier/Booster Gain

FCC Part 90.219		Room Temperature (°C)		23.6		
ANSI/TIA-603- E; FCC KDB 935210 D05, v01r04		Relative Humidity (%)		39.9		
Richmond		Barometric Pro	Barometric Pressure (kPa)			
Jeremy Lee		Date	Date			
⊠ +48VDC □		120VAC @ 6	120VAC @ 60Hz			
Manufacturer	Model	Identifier	Calibration date	Calibration due		
Keysight	N5172B	MY53050270	06/12/19	06/12/21		
Keysight N9010A		MY50520285	07/29/19	07/23/21		
⊠ Max Gain Frequency ± 1500kHz						
⊠ Peak						
⊠100k Hz/ 300 kHz						
⊠ Tabletop						
□ Direct						
Maximum booster gain is 92.6 dB.						
Non-Compl	iant 🗆	Not App	olicable 🗆			
	ANSI/TIA-603- E; FCC D05, v01r04 Richmond Jeremy Lee	ANSI/TIA-603- E; FCC KDB 935210 D05, v01r04 Richmond Jeremy Lee	ANSI/TIA-603- E; FCC KDB 935210 D05, v01r04 Richmond Barometric Pro Jeremy Lee Date H48VDC Manufacturer Model Identifier Keysight N5172B MY53050270 Keysight N9010A MY50520285 Max Gain Frequency ± 1500kHz Peak 100k Hz/ 300 kHz Tabletop Direct is 92.6 dB.	ANSI/TIA-603- E; FCC KDB 935210 D05, v01r04 Richmond Barometric Pressure (kPa) Jeremy Lee Date H48VDC D120VAC @ 60Hz Manufacturer Model Keysight N5172B My53050270 My50520285 My5052028		

Test setup

Description of test set-up:

The procedure used was ANSI/TIA-603-E-2016 and FCC KDB 935210 D05 Indus Booster Basic Meas v01r04:. A CW tone was input at the frequency where the system gain is the maximum in the pass band, with the nominal input power level -55.2 dBm. The spectrum analyzer was connected to the output RF port via a 50 Ohm 30 dB attenuator. The maximum hold trace and peak detector was used to capture the output power. The output power minus the input power (-55.2 dBm) equals to the booster gain in dB.

The EUT was set to Operation Mode #1 with configuration Mode #1.



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Results

Test Band	Frequency (MHz)	Input Power (dBm)	Output Power (dBm)	Gain (dB)
900PS	937.5	-54.7	37.2	91.6
800PS	856	-55.2	37.4	92.6
700PS	772	-53.4	37.1	90.5

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Noise Figure

Governing Doc	FCC Part 90.219	Room Temperature (°C)		23.6		
Test Procedure	ANSI/TIA-603- E; FCC KDB 935210 D05, v01r04		Relative Humidity (%)		39.9	
Test Location	Richmond		Barometric Pressure		102.1	
Test Engineer	Jeremy Lee	Date		15 July 2020		
EUT Voltage	⊠ DC	0VAC @ 60Hz				
Test Equipment Used	Manufacturer	Model	Serial Number	Calibration date	n Calibration due	
Spectrum Analyzer	Keysight	07/23/21				
Frequency Range:	□ 2 times of the passband on each band					
Detector:	⊠ Average					
RBW:	⊠ 910 kHz					
Type of Facility:	⊠ Tabletop					
Distance:	⊠ Direct					
Noise Figure on each band is less than the 9 dB required.						
Compliant ⊠	Non-Compliant \square Not Applicable \square					

Test setup

Description of test set-up: Based on FCC KDB 935210 D05 Indus Booster Basic Meas v01r04: 2020, the system maximum gain and the noise density is measured. Measurements were performed within the EUT's passband. The noise figure is then calculated by NF = NP - Gain + KTB Noise; where NP is in band noise power per Herz, Gain is measured at the maximum noise frequence with -60 dBm input signal in UL. KTB Noise is 174dB/Hz at room temperature. The EUT was set to Operation Mode #1 with configuration Mode #1. 50 Ω Spectrum hdHost EUT Analyzer Terminator

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Results

Test Band	Link	Gain (dB)	kTB (dBm/Hz)	Measured Value (dBm/Hz)	Noise Figure (dB)
900PS	DownLink	91.8	-174	-75.42	6.78
800PS	DownLink	92.5	-174	-73.25	8.25
700PS	DownLink	90.6	-174	-75.42	7.98

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Client: Dali Wireless, Inc.

Out-Of-Band / Out-Of-Block Intermodulation and Spurious Emissions

	Of Blook intermode		. ораново			
Governing Doc	FCC Part 90.219		Room Temperature (°C)		23.6	
Test Procedure	ANSI/TIA-603- E; FCC KDB 935210 D05, v01r04		Relative Humidity (%)		39.9	
Test Location	Richmond		Barometric Pressure (kPa)		102.1	
Test Engineer	Jeremy Lee		Date		15 July 2020	
EUT Voltage	⊠ +48VDC □		120VAC @ 60Hz			
Test Equipment Used	Manufacturer	Model	Serial Number	Calibration date	Calibration due	
Signal Generator	Keysight	N5172B	MY53050270	06/12/19	06/12/21	
Spectrum Analyzer	Keysight	N9010A	MY50520285	07/29/19	07/29/21	
Frequency Range:	⊠ Max Gain Frequency ± 50kHz					
Detector:	⊠ Average					
RBW/VBW:	⊠100/910Hz					
Type of Facility:	⊠ Tabletop					
Distance:	⊠ Direct					
On 800 band, 700 band and 150 band: The intermodulation product of 2 tone is below the -13dBm emission limit with input power - 0.5dBm below AGC threshold and - 3 dB above AGC threshold						
Compliant ⊠	Non-Compliant □ Not Applicable □					

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Test setup

Description of test set-up:

The procedure used was ANSI/TIA-603-E-2016. Two tones (CW) method was used. The input power to the amplifier was set at maximum drive level by combining the two tones. The two tones were chosen in such a way (1) the third order intermodulation product frequencies are located within the pass band of the DUT and (2) they produce the worst-case emissions out of band. All signals were modulated.

Based on FCC KDB 935210 D05 Indus Booster Basic Meas v01r04: 2020, the two tone was located on either side of the maximum gain frequence in the passing band, and separated with the available spacing, which is 12.5kHz.

Measurements were performed with modulated -tone at identical input amplitude which produced integrated maximum rated output power.

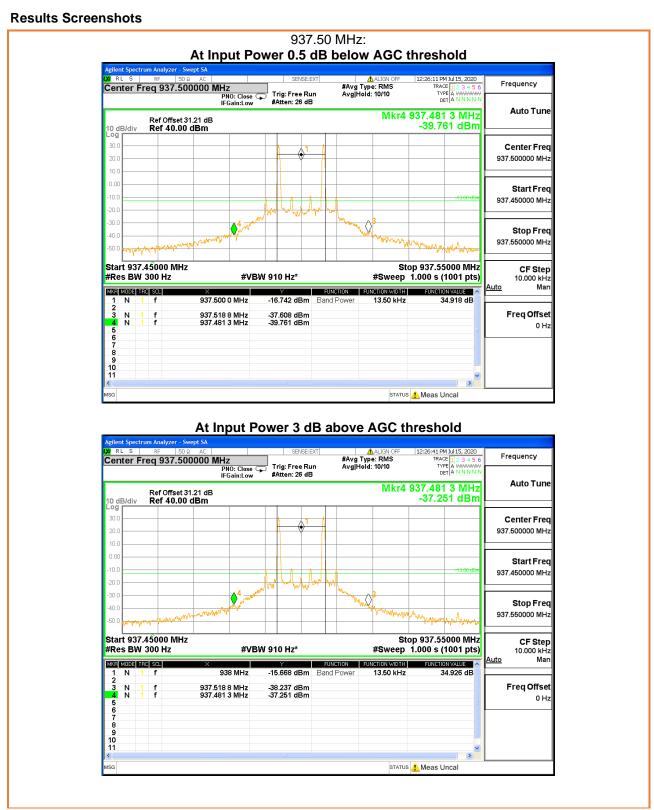
The EUT was set to Operation Mode #1 with configuration Mode #1.



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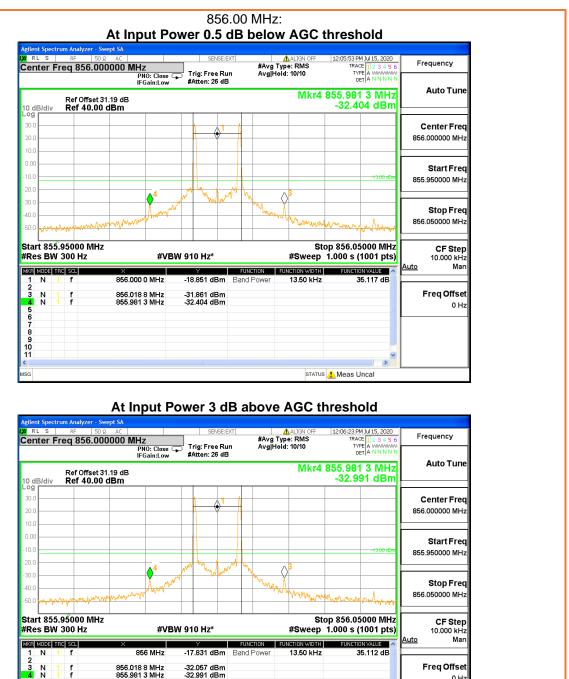
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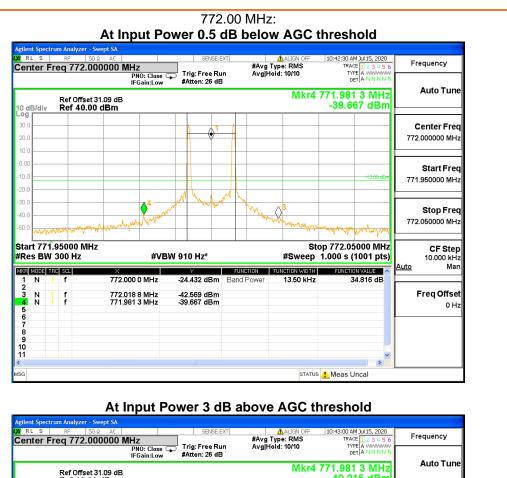
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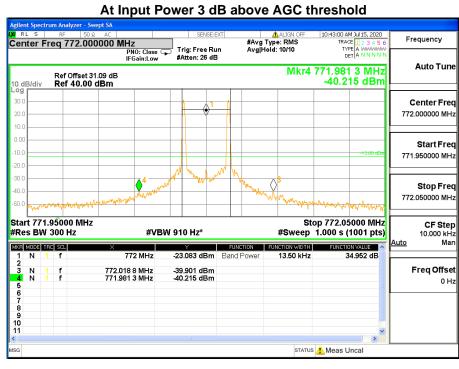
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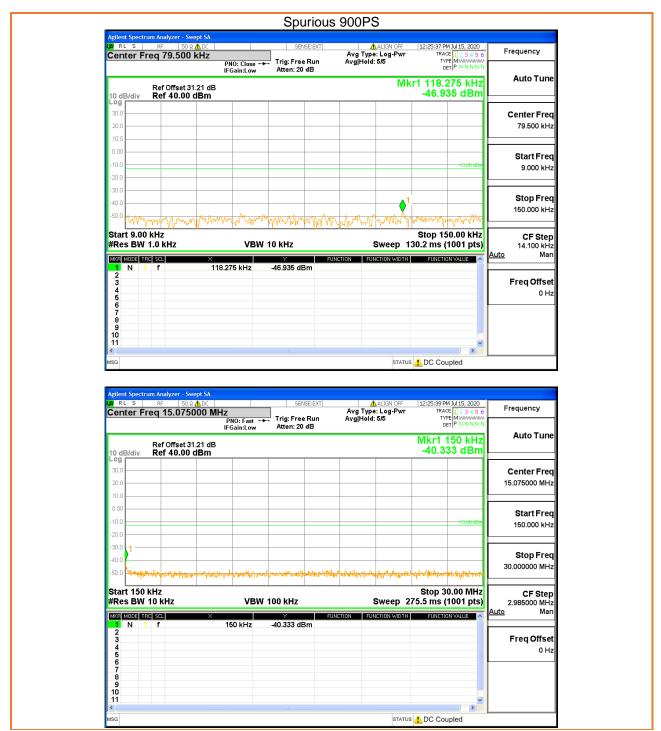


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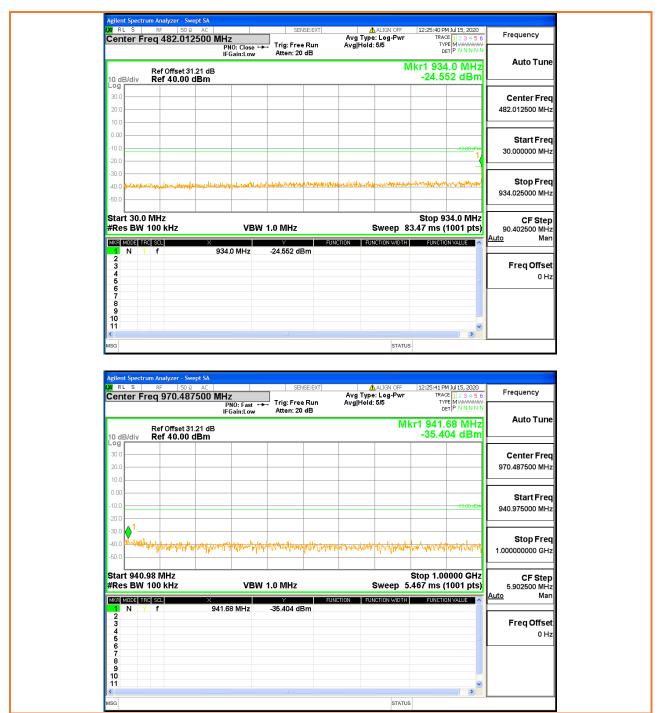


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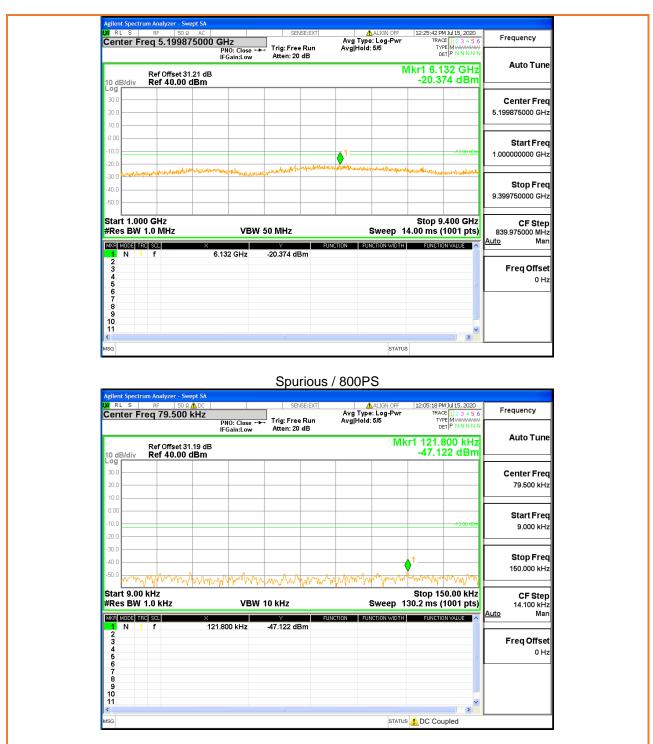
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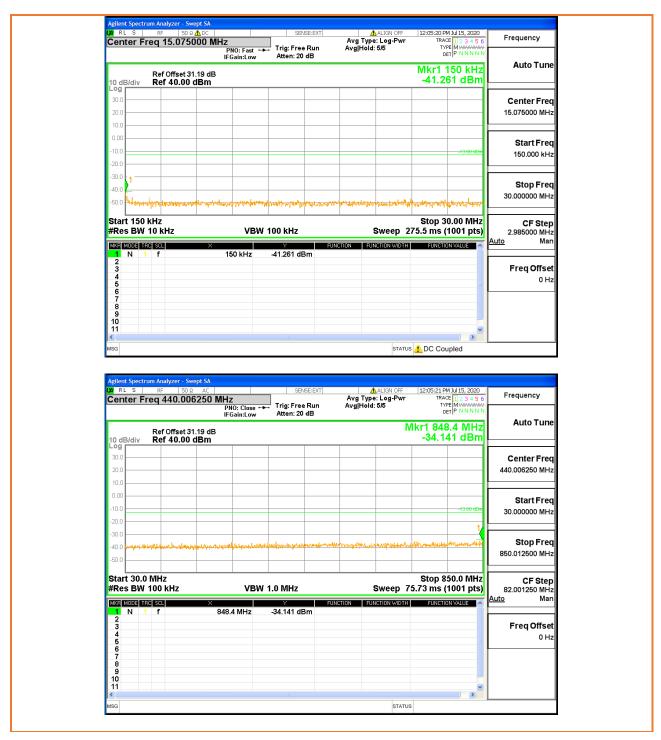
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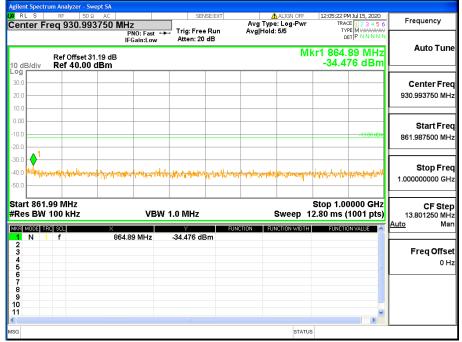


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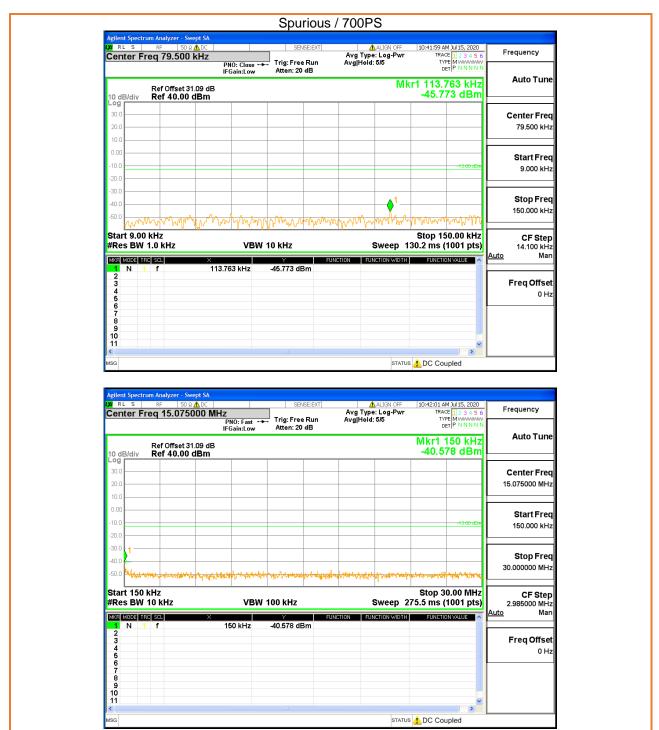


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Frequency Stability

The airHost and hd37 are sychronized to the same reference clock. Therefore there is no frequency error after down and up frequency conversion are performed.

The frequency stability check is not applicable to the EUT.

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Spurious emissions radiated measurements

Governing Doc	FCC Part 2.1053, FCC Part 90.210 & FCC Part 90.219	Room Ten	Room Temperature (°C)		23.6 to 23.9		
Test Procedure	ANSI C63.4 Relative Hum		umidity (%)	nidity (%)		38.1 to 39.9	
Test Location	Richmond	Barometrio	Pressure (k			1 to 102.2	
Test Engineer	Daniel Lee	Date		` '		lune 2020	
EUT Voltage							
Test Equipment Used	Manufacturer	Model	Identifier		Calibration Calibrat date due		
EMC Analyzer	KeySight	N9038A	702	27-M	ay-2020	27-May-2021	
Broadband Antenna	Sunol	JB1	967	12-C	ct-2018	12-Oct-2020	
LPDA Antenna	Schwarzbeck Mess	VUSLP9111B	996	26-M	lar-2019	26-Mar-2021	
BiCon Antenna	A.H Systems	SAS-540	1115	29-A	pr-2019	29-Apr-2021	
Horn Antenna	A.H Systems	SAS-571	227C	18-C	ct-2018	18-Oct-2020	
Motion Controller	Sunol	SC104V	235A	IHC ¹		IHC ¹	
Antenna Tower	Sunol	TWR95-4	235B	IHC ¹		IHC ¹	
Turn Table	Sunol	SM46C	235C	IHC ¹		IHC ¹	
EMC Shielded Enclosure	USC	USC-26	374	IHC ¹		IHC ¹	
RF Cable	MRO	n/a	n/a	IHC ²		IHC ²	
RF Preamplifier	Agilent	8449B	273	IHC ² IHC		IHC ²	
AC Power Source	California Instruments	5001i	059	IHC ³		IHC ³	
Used Software	⊠ Tile 7! v7.3.0.6						
_FCC_RadEmi_30-300MHz_Final_20190716 Used Template							
Note1) In House Calibration Ref. # 4 Note2) In House Calibration Ref. # 6 Note3) In House Calibration Ref. # 7							
Frequency Range:	⊠ 9kHz-30MHz						
Detector:	□ Peak (for Prescan)	k (for Prescan) ⊠ Quasi-Peak(for Formal)) ⊠ Average(for Formal)					
RBW/VBW:	⊠ 9/30kHz	☑ 120/300kHz					
Type of Facility:	⊠ SAC	⊠ FSOATS	☑ FSOATS ☐ in-situ				
Distance:		☐ 10meter	☐ 10meter		☐ 1meter		
Arrangement of EUT:	⊠ Table-top only	□ Floor-standi	ng only	□ Rac	k Mounte	d	
Compliant ⊠	Non-Compliant □ Not Applicable □						

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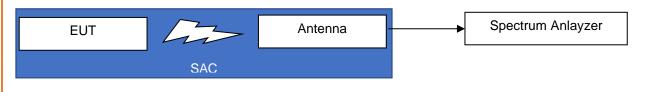
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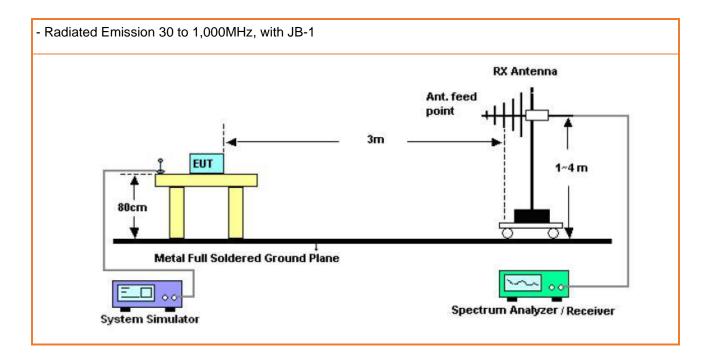
Test setup

Description of test set-up:

The EUT was placed on a nonconducting platform (i.e., an "EUT support table"), of nominal size 1 m by 1.5 m, whose top surface is nominally 80 cm above the reference ground plane. The EUT was set up on 3 meters away from the EUT. The EUT was set continually on its Radio, 5W Max., which was downlinked from airHost. And the output of RF was terminated via 30dB attenuator, for rejecting the high power of carrier. The lowest, middle and highest channels were used for measuring of all radiated spurious emisions.

The EUT was set to Operation Mode #1 with configuration Mode #1.

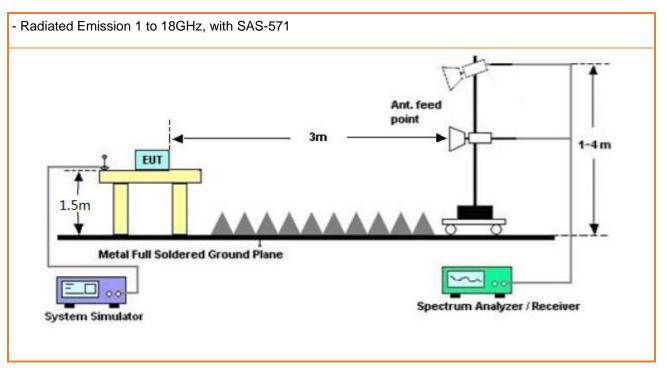




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Measurement Procedure

Testing was performed in accordance with the test standard(s) referenced in the test summary section of this report. The Equipment Under Test (EUT) was configured based upon the requirements of the applicable test standard. Initially, the primary emission frequencies are identified by positioning a broadband receive antenna three meter from the EUT.

Scans were made with an EMC Analyzer, controlled by EMC Test Software, Tile7!, from 30kHz to 10GHz with the receiver in the peak mode. The receiver IF bandwidth was 9kHz,120 kHz or 1MHz as appropriate for the frequency and scan step was about 30kHz. To ensure that the maximum emission at each discrete frequency of interest is observed, the receive antenna is varied in height from one to four meters and rotated to produce horizontal and vertical polarities while the turntable is rotated to determine the worst emitting configuration. Under 30MHz was only tested at 1meter height and Antenna was changed both polarization, Horizontal and Vertical. Measurements were then made using CISPR quasi peak when the peak readings were within 10dB of the limit line. The numerical results are included herein to demonstrate compliance.

Test Result

The output of EUT was set to 5 Watts(\pm 37dBm), the PASS level of Spurious is: 43 \pm 10log(P) = 43 \pm 10log(5) = 50dB attenuation = -13dBm Since of radiated measurement was performed at 3 meters, the limit line was converted to dBuV/m using the formulas ad outlined in KDB 971168: -13 dBm ERP = 84.38 dBuV/m at 3 meters. Spurious Emission level (dBuV/m) = Detected level (dBuV) + Path Loss(dB) + Antenna Factor (dB/m) - Preamplifier's Gain (dB)

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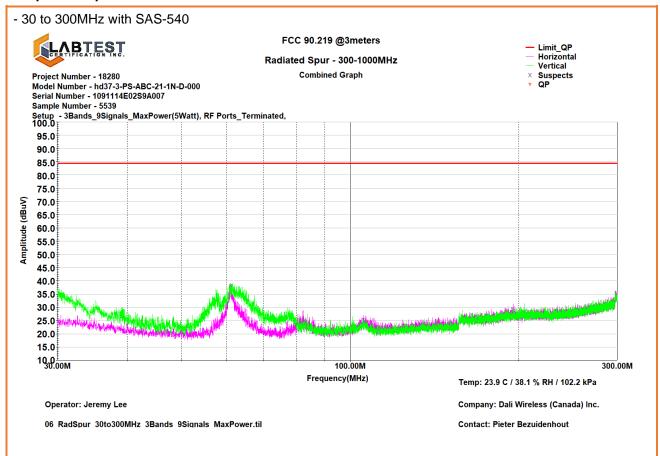
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Graphical Representation for Emission - Radiated 30kHz to 30MHz

Spectrum was scanned manually from 30kHz to 30MHz. No automated plot is available for this frequency range. No spurious emissions from the product were detectable

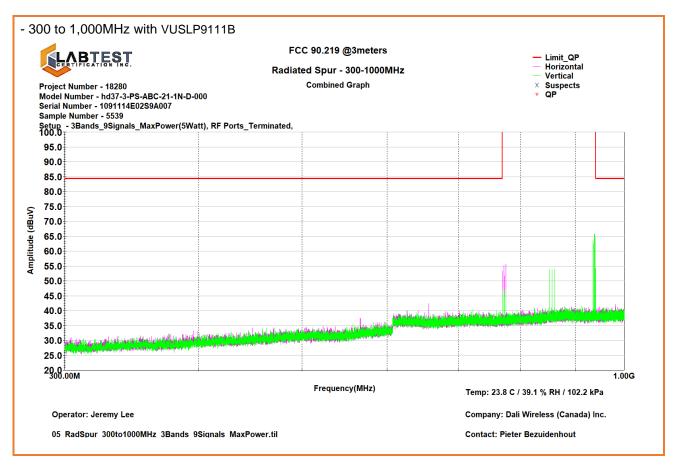
Graphical Representation for Emission - Radiated 30MHz to 1GHz



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Graphical Representation for Emission - Radiated 1 to 10GHz

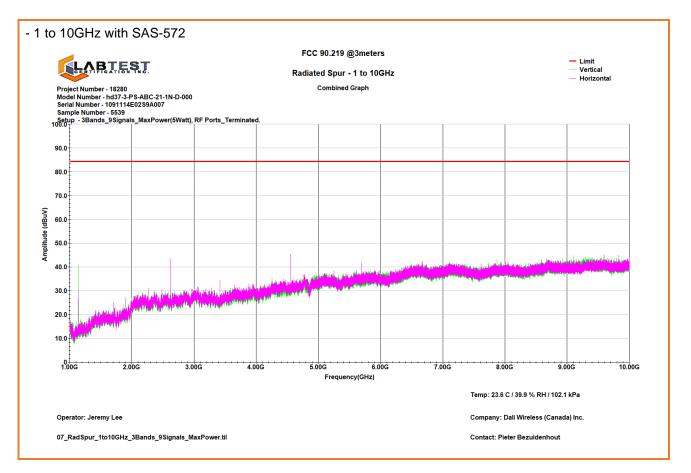


Table Representation for Emission - Radiated 30MHz to 10GHz

No Emissions were measured. All emissions detected, other than the fundamental, were related to the Digital Mode circuitry. No Transmitter Spurious Emissions were detectable and are greater than 20dB below the limit line.

END OF REPORT