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EMC Test Report

Application for Grant of Equipment Authorization

Industry Canada RSS-Gen Issue 3 / RSS 210 Issue 8
FCC Part 15 Subpart C

Model: D32-2/4CU

FCC ID:	YETD24CU
APPLICANT:	Nextivity Inc. 12230 World Trade Drive Suite 250 San Diego, CA 92128
TEST SITE(S):	National Technical Systems - Silicon Valley 41039 Boyce Road. Fremont, CA. 94538-2435
IC SITE REGISTRATION #:	2845B-3; 2845B-4, 2845B-5, 2845B-7
REPORT DATE:	April 22, 2014
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A2LA ACCREDITED
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REVISION HISTORY

Rev#	Date	Comments	Modified By
-	April 22, 2014	First release	

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SCOPE

An electromagnetic emissions test has been performed on the Nextivity Inc. model D32-2/4CU, pursuant to the following rules:

Industry Canada RSS-Gen Issue 3
RSS 210 Issue 8 "Low-power Licence-exempt Radiocommunication Devices (All Frequency Bands): Category I Equipment"
FCC Part 15 Subpart C

Conducted and radiated emissions data has been collected, reduced, and analyzed within this report in accordance with measurement guidelines set forth in the following reference standards and as outlined in National Technical Systems - Silicon Valley test procedures:

ANSI C63.10-2009
FCC DTS Measurement Guidance KDB558074

The intentional radiator above has been tested in a simulated typical installation to demonstrate compliance with the relevant Industry Canada performance and procedural standards.

Final system data was gathered in a mode that tended to maximize emissions by varying orientation of EUT, orientation of power and I/O cabling, antenna search height, and antenna polarization.

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

OBJECTIVE

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

Prior to marketing in the USA, all unlicensed transmitters and transceivers require certification. Receive-only devices operating between 30 MHz and 960 MHz are subject to either certification or a manufacturer's declaration of conformity, with all other receive-only devices exempt from the technical requirements.

Prior to marketing in Canada, Class I transmitters, receivers and transceivers require certification. Class II devices are required to meet the appropriate technical requirements but are exempt from certification requirements.

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

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

Testing was performed only on model D32-2/4CU.

STATEMENT OF COMPLIANCE

The tested sample of Nextivity Inc. model D32-2/4CU complied with the requirements of the following regulations:

Industry Canada RSS-Gen Issue 3
RSS 210 Issue 8 "Low-power Licence-exempt Radiocommunication Devices (All Frequency Bands): Category I Equipment"
FCC Part 15 Subpart C

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

The test results recorded herein are based on a single type test of Nextivity Inc. model D32-2/4CU and therefore apply only to the tested sample. The sample was selected and prepared by Michiel Lotter of Nextivity Inc..

DEVIATIONS FROM THE STANDARDS

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

TEST RESULTS SUMMARY

DIGITAL TRANSMISSION SYSTEMS (5725 –5850 MHz)

FCC Rule Part	RSS Rule Part	Description	Measured Value / Comments	Limit / Requirement	Result
15.247(a)	RSS 210 A8.2	Digital Modulation	Systems uses OFDM techniques	System must utilize a digital transmission technology	Complies
15.247 (a) (2)	RSS 210 A8.2 (1)	6 dB Bandwidth	CU: 28.8 MHz	>500 kHz	Complies
15.247 (b)	RSS 210 A8.2 (4)	Output Power (multipoint systems)	CU: 17.7 dBm Note 1 (58.6 mW) EIRP = 233.3 W	1 Watt, EIRP limited to 4 Watts.	Complies
15.247(d)	RSS 210 A8.2 (2)	Power Spectral Density	CU: -6.4 dBm/100 kHz	Maximum permitted is 8 dBm/3 kHz	Complies
15.247(c)	RSS 210 A8.5	Antenna Port Spurious Emissions 30 MHz – 40 GHz	All measurements performed radiated	< -20 dBc < -30 dBc Note 2	Complies
15.247(c) / 15.209	RSS 210 A8.5 Table 2, 3	Radiated Spurious Emissions 30MHz – 40 GHz	35.6 dBµV/m @ 38.77 MHz (-4.4 dB)	15.207 in restricted bands, all others < -20 dBc <-30 dBc Note 2	Complies

Note 1: Conducted power calculated using antenna gain of 6 dBi from measured highest EIRP
Note 2: Limit of -30 dBc used because the power was measured using the UNII test procedure (maximum power averaged over a transmission burst).

GENERAL REQUIREMENTS APPLICABLE TO ALL BANDS

FCC Rule Part	RSS Rule part	Description	Measured Value / Comments	Limit / Requirement	Result (margin)
15.203	-	RF Connector	Integral antennas	Unique or integral antenna required	Complies
15.207	RSS GEN Table 4	AC Conducted Emissions	CU: 27.1 dBµV @ 3.535 MHz (-18.9 dB)	Refer to page 17	Complies (- 18.9 dB)
15.109	RSS GEN 7.2.3 Table 1	Receiver spurious emissions	N/A	Refer to page 18	N/A
15.247 (b) (5) 15.407 (f)	RSS 102	RF Exposure Requirements	Refer to MPE calculations in separate exhibit, RSS 102 declaration and User Manual statements.	Refer to OET 65, FCC Part 1 and RSS 102	Excluded from scope of this report
-	RSP 100 RSS GEN 7.1.3	User Manual		Statement required regarding non-interference	Excluded from scope of this report
-	RSP 100 RSS GEN 7.1.2	User Manual		Statement for products with detachable antenna	Excluded from scope of this report
-	RSP 100 RSS GEN 4.6.1	99% Bandwidth		Information only	N/A

MEASUREMENT UNCERTAINTIES

ISO/IEC 17025 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report. The measurement uncertainties given below are based on a 95% confidence level and were calculated in accordance with UKAS document LAB 34.

Measurement Type	Measurement Unit	Frequency Range	Expanded Uncertainty
RF power, conducted (power meter)	dBm	25 to 7000 MHz	± 0.52 dB
RF power, conducted (Spectrum analyzer)	dBm	25 to 7000 MHz	± 0.7 dB
Conducted emission of transmitter	dBm	25 to 26500 MHz	± 0.7 dB
Conducted emission of receiver	dBm	25 to 26500 MHz	± 0.7 dB
Radiated emission (substitution method)	dBm	25 to 26500 MHz	± 2.5 dB
Radiated emission (field strength)	dBµV/m	25 to 1000 MHz	± 3.6 dB
		1000 to 40000 MHz	± 6.0 dB
Conducted Emissions (AC Power)	dBµV	0.15 to 30 MHz	± 2.4 dB

EQUIPMENT UNDER TEST (EUT) DETAILS

GENERAL

The Nextivity Inc. model D32-2/4CU is part of the NU & CU System which is a WCDMA/LTE Cellular Repeater for indoor residential use. The system is composed of two units, the Network Unit (D32-2/4NU) and the Coverage Unit (D32-2/4CU) that connect wirelessly over a full-duplex wireless link in the RLAN band using a mixed OFDM and muxed cellular signal (up to three 5 MHz cellular channels) over a 30 MHz and 40 MHz channel in each direction.
NU transmits in only U-NII bands, CU transmits in both U-NII and DTS bands.
The sample was received on March 10, 2014 and tested on March 10, 11, 12, 13, 14, 16, 17 and 24, 2014. The EUT consisted of the following component(s):

Company	Model	Description	Serial Number	FCC ID
Nextivity Inc.	D32-2/4CU	Coverage Unit	175406000142	-
Nextivity Inc.	WRG20F-120A	Power Supply	20120815	-

FREQUENCY LIST OF EUT

EUT	Tx frequency (MHz)	Band	Rule	DFS flag
NU	5207	5150 to 5250 MHz	U-NII-1	non-DFS
NU	5220	5150 to 5250 MHz	U-NII-1	non-DFS
NU[1]	5240	5150 to 5250 MHz	U-NII-1+ U-NII-2A	DFS
NU[1]	5260	5250 to 5350 MHz	U-NII-1+ U-NII-2A	DFS
NU	5280	5250 to 5350 MHz	U-NII-2A	DFS
NU	5293	5250 to 5350 MHz	U-NII-2A	DFS
CU	5525	5470 to 5725 MHz	U-NII-2C	DFS
CU	5540	5470 to 5725 MHz	U-NII-2C	DFS
CU	5560	5470 to 5725 MHz	U-NII-2C	DFS
CU	5580	5470 to 5725 MHz	U-NII-2C	DFS
CU[2]	5600	5470 to 5725 MHz	EUT does not operate. Terminal Doppler Weather Radars (TDWR)	
CU[2]	5620	5470 to 5725 MHz		
CU[2]	5640	5470 to 5725 MHz		
CU[2]	5660	5470 to 5725 MHz		
CU	5680	5470 to 5725 MHz	U-NII 2C	DFS
CU[3]	5715	5479 to 5725 MHz	U-NII-2C + U-NII-3	DFS
CU[3]	5735	5480 to 5725 MHz	U-NII-2C + U-NII-3	DFS
CU	5765	5725 to 5850 MHz	DTS	non-DFS
CU	5785	5726 to 5850 MHz	DTS	non-DFS
CU	5805	5727 to 5850 MHz	DTS	non-DFS
CU	5825	5728 to 5850 MHz	DTS	non-DFS
Note 1:	Emission Bandwidths of Center frequency of 5240 and 5260 MHz channels extend across 5250 MHz band edge for U-NII-2A, therefore measurements are performed per KDB 644545 D01 v01r02. DFS requirements also apply for these channels			
Note 2:	The operation of this frequency range is blocked per FCC KDB 443999 D01 Approval of DFS UNII Devices v01; Device will not transmit on channels which overlap the 5600 - 5650 MHz band to avoid Terminal Doppler Weather Radars (TDWR)			
Note 3:	Emission Bandwidths of Center frequency of 5715 and 5735 MHz channels extend across 5725 MHz band edge for U-NII 2C, therefore FCC 15.407 U-NII band rules apply for these channels per KDB 644545 D01 v01r02. DFS requirements also apply for these channels			

ANTENNA SYSTEM

The antennas are integral to the device.

ENCLOSURE

The D32-2/4CU enclosure is primarily constructed of plastic. It measures approximately 160 mm H x 150 mm W x 70 mm D.

MODIFICATIONS

No modifications were made to the EUT during the time the product was at NTS Silicon Valley.

SUPPORT EQUIPMENT

No support equipment was used during testing. A DELL Latitude D830 Laptop and Nextivity Chart Interface (V:2.0.0.2) software was used to configure the EUT's. The laptop was not connected during the tests.

EUT INTERFACE PORTS

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

Port	Connected To	Cable(s)		
		Description	Shielded or Unshielded	Length(m)
DC Power	External pwr supply out	2 wire	Unshielded	2
External pwr supply in	AC Mains	Direct plug-in	NA	NA

EUT OPERATION

The EUT's were configured per the frequency list detailed in the EUT description with maximum rated RF power

TEST SITE

GENERAL INFORMATION

Final test measurements were taken at the test sites listed below. Pursuant to section 2.948 of the FCC's Rules and section 3.3 of RSP-100, construction, calibration, and equipment data has been filed with the Commission and with industry Canada.

Site	Designation / Registration Numbers		Location
	FCC	Canada	
Chamber 5	US0027	2845B-5	41039 Boyce Road Fremont, CA 94538-2435
Chamber 7	US0027	2845B-7	

ANSI C63.4 recommends that ambient noise at the test site be at least 6 dB below the allowable limits. Ambient levels are below this requirement. The test site(s) contain separate areas for radiated and conducted emissions testing. Considerable engineering effort has been expended to ensure that the facilities conform to all pertinent requirements of ANSI C63.4.

CONDUCTED EMISSIONS CONSIDERATIONS

Conducted emissions testing is performed in conformance with ANSI C63.10. Measurements are made with the EUT connected to the public power network through a nominal, standardized RF impedance, which is provided by a line impedance stabilization network, known as a LISN. A LISN is inserted in series with each current-carrying conductor in the EUT power cord.

RADIATED EMISSIONS CONSIDERATIONS

The FCC has determined that radiation measurements made in a shielded enclosure are not suitable for determining levels of radiated emissions. Radiated measurements are performed in an open field environment or in a semi-anechoic chamber. The test sites are maintained free of conductive objects within the CISPR defined elliptical area incorporated in ANSI C63.4 guidelines and meet the Normalized Site Attenuation (NSA) requirements of ANSI C63.4.

MEASUREMENT INSTRUMENTATION

RECEIVER SYSTEM

An EMI receiver as specified in CISPR 16-1-1 is used for emissions measurements. The receivers used can measure over the frequency range of 9 kHz up to 2000 MHz. These receivers allow both ease of measurement and high accuracy to be achieved. The receivers have Peak, Average, and CISPR (Quasi-peak) detectors built into their design so no external adapters are necessary. The receiver automatically sets the required bandwidth for the CISPR detector used during measurements. If the repetition frequency of the signal being measured is below 20Hz, peak measurements are made in lieu of Quasi-Peak measurements.

For measurements above the frequency range of the receivers, a spectrum analyzer is utilized because it provides visibility of the entire spectrum along with the precision and versatility required to support engineering analysis. Average measurements above 1000MHz are performed on the spectrum analyzer using the linear-average method with a resolution bandwidth of 1 MHz and a video bandwidth of 10 Hz, unless the signal is pulsed in which case the average (or video) bandwidth of the measuring instrument is reduced to onset of pulse desensitization and then increased.

INSTRUMENT CONTROL COMPUTER

The receivers utilize either a Rohde & Schwarz EZM Spectrum Monitor/Controller or contain an internal Spectrum Monitor/Controller to view and convert the receiver measurements to the field strength at an antenna or voltage developed at the LISN measurement port, which is then compared directly with the appropriate specification limit. This provides faster, more accurate readings by performing the conversions described under Sample Calculations within the Test Procedures section of this report. Results are printed in a graphic and/or tabular format, as appropriate. A personal computer is used to record all measurements made with the receivers.

The Spectrum Monitor provides a visual display of the signal being measured. In addition, the controller or a personal computer run automated data collection programs which control the receivers. This provides added accuracy since all site correction factors, such as cable loss and antenna factors are added automatically.

LINE IMPEDANCE STABILIZATION NETWORK (LISN)

Line conducted measurements utilize a 50 µH Line Impedance Stabilization Network as the monitoring point. The LISN used also contains a 250 µH CISPR adapter. This network provides for calibrated radio frequency noise measurements by the design of the internal low pass and high pass filters on the EUT and measurement ports, respectively.

FILTERS/ATTENUATORS

External filters and precision attenuators are often connected between the receiving antenna or LISN and the receiver. This eliminates saturation effects and non-linear operation due to high amplitude transient events.

ANTENNAS

A loop antenna is used below 30 MHz. For the measurement range 30 MHz to 1000 MHz either a combination of a biconical antenna and a log periodic or a bi-log antenna is used. Above 1000 MHz, horn antennas are used. The antenna calibration factors to convert the received voltage to an electric field strength are included with appropriate cable loss and amplifier gain factors to determine an overall site factor, which is then programmed into the test receivers or incorporated into the test software.

ANTENNA MAST AND EQUIPMENT TURNTABLE

The antennas used to measure the radiated electric field strength are mounted on a non-conductive antenna mast equipped with a motor-drive to vary the antenna height. Measurements below 30 MHz are made with the loop antenna at a fixed height of 1m above the ground plane.

ANSI C63.10 specifies that the test height above ground for table mounted devices shall be 80 centimeters. Floor mounted equipment shall be placed on the ground plane if the device is normally used on a conductive floor or separated from the ground plane by insulating material from 3 to 12 mm if the device is normally used on a non-conductive floor as specified in ANSI C63.4. During radiated measurements, the EUT is positioned on a motorized turntable in conformance with this requirement.

INSTRUMENT CALIBRATION

All test equipment is regularly checked to ensure that performance is maintained in accordance with the manufacturer's specifications. All antennas are calibrated at regular intervals with respect to tuned half-wave dipoles. An exhibit of this report contains the list of test equipment used and calibration information.

TEST PROCEDURES

EUT AND CABLE PLACEMENT

The regulations require that interconnecting cables be connected to the available ports of the unit and that the placement of the unit and the attached cables simulate the worst case orientation that can be expected from a typical installation, so far as practicable. To this end, the position of the unit and associated cabling is varied within the guidelines of ANSI C63.10, and the worst-case orientation is used for final measurements.

CONDUCTED EMISSIONS

Conducted emissions are measured at the plug end of the power cord supplied with the EUT. Excess power cord length is wrapped in a bundle between 30 and 40 centimeters in length near the center of the cord. Preliminary measurements are made to determine the highest amplitude emission relative to the specification limit for all the modes of operation. Placement of system components and varying of cable positions are performed in each mode. A final peak mode scan is then performed in the position and mode for which the highest emission was noted on all current carrying conductors of the power cord.

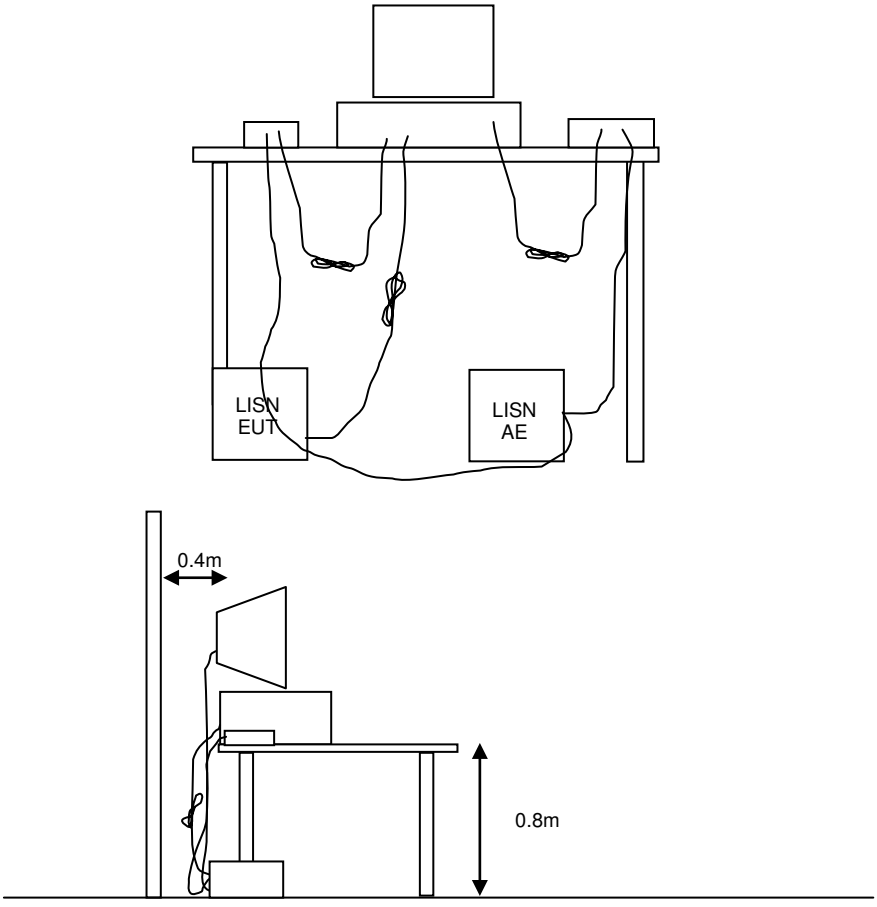


Figure 1 Typical Conducted Emissions Test Configuration

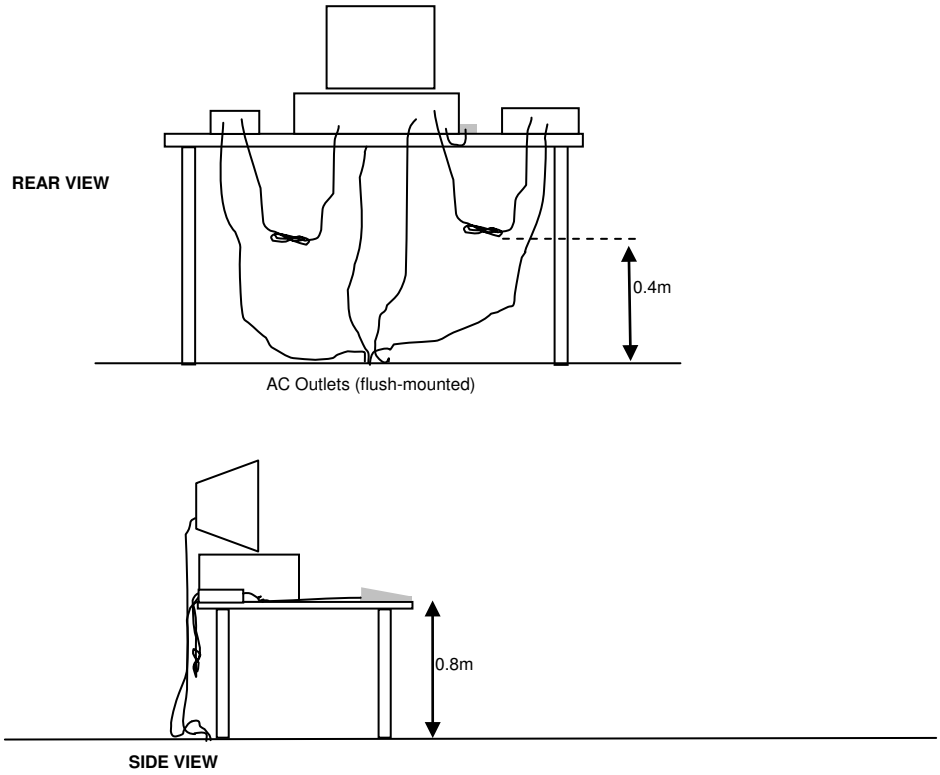
RADIATED EMISSIONS

A preliminary scan of the radiated emissions is performed in which all significant EUT frequencies are identified with the system in a nominal configuration. At least two scans are performed, one scan for each antenna polarization (horizontal and vertical; loop parallel and perpendicular to the EUT). During the preliminary scans, the EUT is rotated through 360˚, the antenna height is varied (for measurements above 30 MHz) and cable positions are varied to determine the highest emission relative to the limit. Preliminary scans may be performed in a fully anechoic chamber for the purposes of identifying the frequencies of the highest emissions from the EUT.

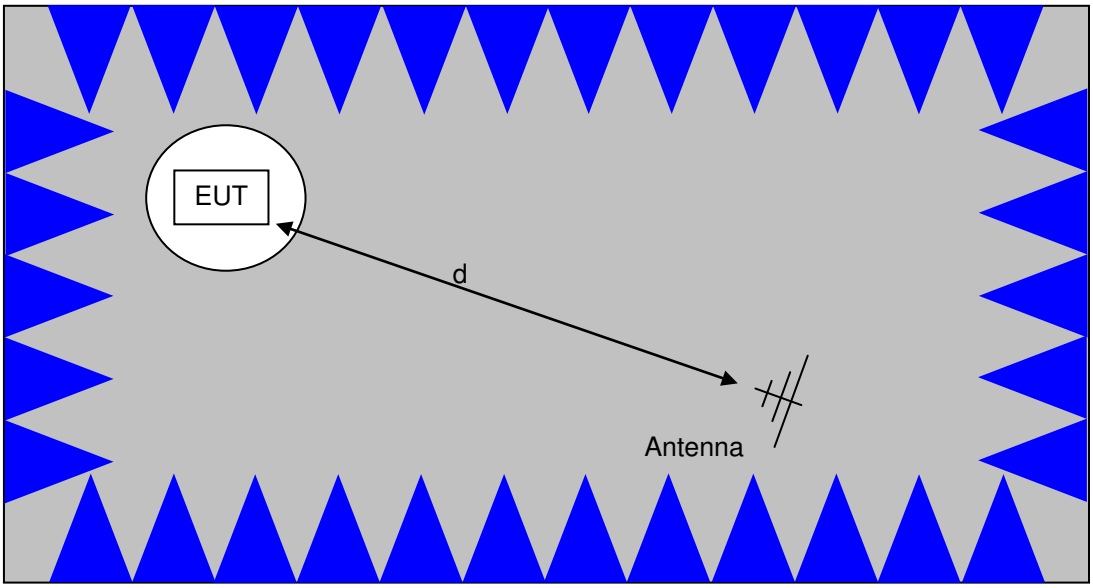
A speaker is provided in the receiver to aid in discriminating between EUT and ambient emissions. Other methods used during the preliminary scan for EUT emissions involve scanning with near field magnetic loops, monitoring I/O cables with RF current clamps, and cycling power to the EUT.

Final maximization is a phase in which the highest amplitude emissions identified in the spectral search are viewed while the EUT azimuth angle is varied from 0 to 360 degrees relative to the receiving antenna. The azimuth, which results in the highest emission is then maintained while varying the antenna height from one to four meters (for measurements above 30 MHz, measurements below 30 MHz are made with the loop antenna at a fixed height of 1m). The result is the identification of the highest amplitude for each of the highest peaks. Each recorded level is corrected in the receiver using appropriate factors for cables, connectors, antennas, and preamplifier gain.

When testing above 18 GHz, the receive antenna is located at 1meter from the EUT and the antenna height is restricted to a maximum of 2.5 meters.

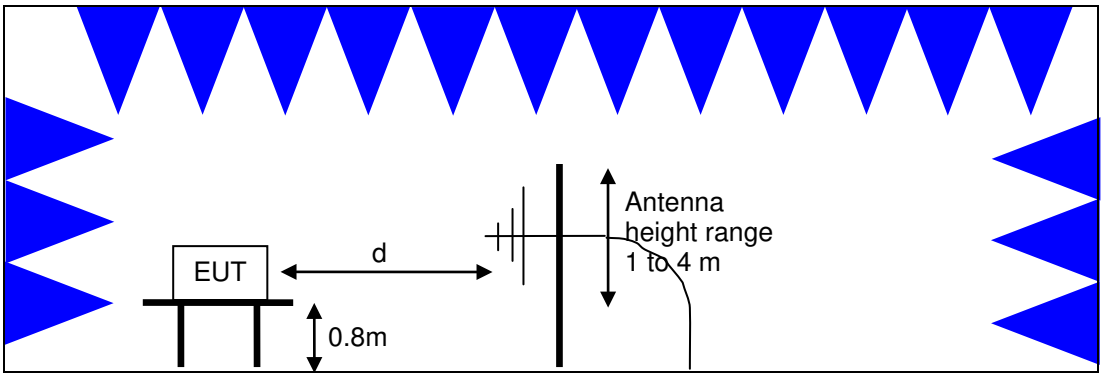


Typical Test Configuration for Radiated Field Strength Measurements



The anechoic materials on the walls and ceiling ensure compliance with the normalized site attenuation requirements of CISPR 16 / CISPR 22 / ANSI C63.4 for an alternate test site at the measurement distances used.

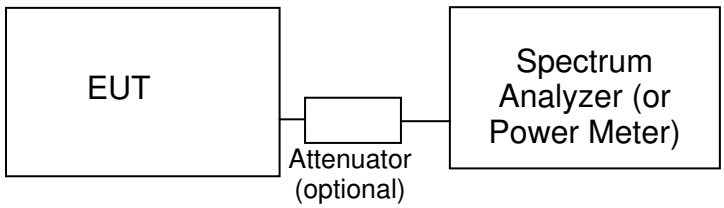
Floor-standing equipment is placed on the floor with insulating supports between the unit and the ground plane.



Test Configuration for Radiated Field Strength Measurements
Semi-Anechoic Chamber, Plan and Side Views

CONDUCTED EMISSIONS FROM ANTENNA PORT

Direct measurements of power, bandwidth and power spectral density are performed, where possible, with the antenna port of the EUT connected to either the power meter or spectrum analyzer via a suitable attenuator and/or filter. These are used to ensure that the front end of the measurement instrument is not overloaded by the fundamental transmission.



Test Configuration for Antenna Port Measurements

Measurement bandwidths (video and resolution) are set in accordance with the relevant standards and NTS Silicon Valley's test procedures for the type of radio being tested. When power measurements are made using a resolution bandwidth less than the signal bandwidth the power is calculated by summing the power across the signal bandwidth using either the analyzer channel power function or by capturing the trace data and calculating the power using software. In both cases the summed power is corrected to account for the equivalent noise bandwidth (ENBW) of the resolution bandwidth used.

If power averaging is used (typically for certain digital modulation techniques), the EUT is configured to transmit continuously. Power averaging is performed using either the built-in function of the analyzer or, if the analyzer does not feature power averaging, using external software. In both cases the average power is calculated over a number of sweeps (typically 100). When the EUT cannot be configured to continuously transmit then either the analyzer is configured to perform a gated sweep to ensure that the power is averaged over periods that the device is transmitting or power averaging is disabled and a max-hold feature is used.

If a power meter is used to make output power measurements the sensor head type (peak or average) is stated in the test data table.

BANDWIDTH MEASUREMENTS

The 6dB, 20dB, 26dB and/or 99% signal bandwidth are measured using the bandwidths recommended by ANSI C63.10 and RSS GEN.

SPECIFICATION LIMITS AND SAMPLE CALCULATIONS

The limits for conducted emissions are given in units of microvolts, and the limits for radiated emissions are given in units of microvolts per meter at a specified test distance. Data is measured in the logarithmic form of decibels relative to one microvolt, or dB microvolts (dBµV). For radiated emissions, the measured data is converted to the field strength at the antenna in dB microvolts per meter (dBµV/m). The results are then converted to the linear forms of µV and µV/m for comparison to published specifications.

For reference, converting the specification limits from linear to decibel form is accomplished by taking the base ten logarithm, then multiplying by 20. These limits in both linear and logarithmic form are as follows:

CONDUCTED EMISSIONS SPECIFICATION LIMITS: FCC 15.207; FCC 15.107(a), RSS GEN

The table below shows the limits for the emissions on the AC power line from an intentional radiator and a receiver.

Frequency (MHz)	Average Limit (dBµV)	Quasi Peak Limit (dBµV)
0.150 to 0.500	Linear decrease on logarithmic frequency axis between 56.0 and 46.0	Linear decrease on logarithmic frequency axis between 66.0 and 56.0
0.500 to 5.000	46.0	56.0
5.000 to 30.000	50.0	60.0

GENERAL TRANSMITTER RADIATED EMISSIONS SPECIFICATION LIMITS

The table below shows the limits for the spurious emissions from transmitters that fall in restricted bands[1] (with the exception of transmitters operating under FCC Part 15 Subpart D and RSS 210 Annex 9), the limits for all emissions from a low power device operating under the general rules of RSS 310 (tables 3 and 4), RSS 210 (table 2) and FCC Part 15 Subpart C section 15.209.

Frequency Range (MHz)	Limit (μV/m)	Limit (dBμV/m @ 3m)
0.009-0.490	$2400/F_{KHz}$ @ 300m	$67.6-20*\log_{10}(F_{KHz})$ @ 300m
0.490-1.705	$24000/F_{KHz}$ @ 30m	$87.6-20*\log_{10}(F_{KHz})$ @ 30m
1.705 to 30	30 @ 30m	29.5 @ 30m
30 to 88	100 @ 3m	40 @ 3m
88 to 216	150 @ 3m	43.5 @ 3m
216 to 960	200 @ 3m	46.0 @ 3m
Above 960	500 @ 3m	54.0 @ 3m

RECEIVER RADIATED SPURIOUS EMISSIONS SPECIFICATION LIMITS

The table below shows the limits for the spurious emissions from receivers as detailed in FCC Part 15.109, RSS 210 Table 2, RSS GEN Table 1 and RSS 310 Table 3. Note that receivers operating outside of the frequency range 30 MHz – 960 MHz are exempt from the requirements of 15.109.

Frequency Range (MHz)	Limit (μV/m @ 3m)	Limit (dBμV/m @ 3m)
30 to 88	100	40
88 to 216	150	43.5
216 to 960	200	46.0
Above 960	500	54.0

[1] The restricted bands are detailed in FCC 15.203, RSS 210 Table 1 and RSS 310 Table 2

OUTPUT POWER LIMITS – DIGITAL TRANSMISSION SYSTEMS

The table below shows the limits for output power and output power density. Where the signal bandwidth is less than 20 MHz the maximum output power is reduced to the power spectral density limit plus 10 times the log of the bandwidth (in MHz).

Operating Frequency (MHz)	Output Power	Power Spectral Density
902 – 928	1 Watt (30 dBm)	8 dBm/3kHz
2400 – 2483.5	1 Watt (30 dBm)	8 dBm/3kHz
5725 – 5850	1 Watt (30 dBm)	8 dBm/3kHz

The maximum permitted output power is reduced by 1dB for every dB the antenna gain exceeds 6dBi. Fixed point-to-point applications using the 5725 – 5850 MHz band are not subject to this restriction.

TRANSMIT MODE SPURIOUS RADIATED EMISSIONS LIMITS – FHSS and DTS SYSTEMS

The limits for unwanted (spurious) emissions from the transmitter falling in the restricted bands are those specified in the general limits sections of FCC Part 15 and RSS 210. All other unwanted (spurious) emissions shall be at least 20dB below the level of the highest in-band signal level (30dB if the power is measured using the sample detector/power averaging method).

SAMPLE CALCULATIONS - CONDUCTED EMISSIONS

Receiver readings are compared directly to the conducted emissions specification limit (decibel form) as follows:

$$R_r - S = M$$

where:

R_r = Receiver Reading in dBµV

S = Specification Limit in dBµV

M = Margin to Specification in +/- dB

SAMPLE CALCULATIONS - RADIATED EMISSIONS

Receiver readings are compared directly to the specification limit (decibel form). The receiver internally corrects for cable loss, preamplifier gain, and antenna factor. The calculations are in the reverse direction of the actual signal flow, thus cable loss is added and the amplifier gain is subtracted. The Antenna Factor converts the voltage at the antenna coaxial connector to the field strength at the antenna elements.

A distance factor, when used for electric field measurements above 30MHz, is calculated by using the following formula:

$$F_d = 20*LOG_{10} (D_m/D_s)$$

where:

F_d = Distance Factor in dB

D_m = Measurement Distance in meters

D_s = Specification Distance in meters

For electric field measurements below 30 MHz the extrapolation factor is either determined by making measurements at multiple distances or a theoretical value is calculated using the formula:

$$F_d = 40*LOG_{10} (D_m/D_s)$$

Measurement Distance is the distance at which the measurements were taken and Specification Distance is the distance at which the specification limits are based. The antenna factor converts the voltage at the antenna coaxial connector to the field strength at the antenna elements.

The margin of a given emission peak relative to the limit is calculated as follows:

$$R_c = R_r + F_d$$

and

$$M = R_c - L_s$$

where:

R_r = Receiver Reading in dBµV/m

F_d = Distance Factor in dB

R_c = Corrected Reading in dBµV/m

L_s = Specification Limit in dBµV/m

M = Margin in dB Relative to Spec

SAMPLE CALCULATIONS - FIELD STRENGTH TO EIRP CONVERSION

Where the radiated electric field strength is expressed in terms of the equivalent isotropic radiated power (eirp), or where a field strength measurement of output power is made in lieu of a direct measurement, the following formula is used to convert between eirp and field strength at a distance of d (meters) from the equipment under test:

$$E = \frac{1000000 \sqrt{30 P}}{d} \quad \text{microvolts per meter}$$

where P is the eirp (Watts)

For a measurement at 3m the conversion from a logarithmic value for field strength (dBuV/m) to an eirp power (dBm) is -95.3 dB.

Appendix A Test Equipment Calibration Data

Manufacturer	Description	Model	Asset #	Cal Due
Radiated Emissions, Power, PSD, 99% BW, and Peak Excursion, 10-Mar-14				
EMCO	Antenna, Horn, 1-18GHz	3115	868	6/19/2014
Rohde & Schwarz	EMI Test Receiver, 20 Hz-7 GHz	ESIB7	1538	12/14/2014
Radiated Emissions, Power, PSD, 99% BW, Peak Excursion, 26dB BW, and 20dB BW 11-Mar-14				
EMCO	Antenna, Horn, 1-18GHz	3115	868	6/19/2014
Rohde & Schwarz	EMI Test Receiver, 20 Hz-7 GHz	ESIB7	1538	12/14/2014
Radiated Emissions, Power, PSD, 99% BW, Peak Excursion, 26dB BW, and 20dB BW, 12-Mar-14				
EMCO	Antenna, Horn, 1-18GHz	3115	868	6/19/2014
Rohde & Schwarz	EMI Test Receiver, 20 Hz-7 GHz	ESIB7	1538	12/14/2014
Radiated Emissions, 1000 - 18,000 MHz, 12-Mar-14				
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	785	10/31/2014
EMCO	Antenna, Horn, 1-18GHz	3115	868	6/19/2014
Hewlett Packard	SpecAn 30 Hz -40 GHz, SV (SA40) Red	8564E (84125C)	1148	9/14/2014
Rohde & Schwarz	EMI Test Receiver, 20 Hz-7 GHz	ESIB7	1538	12/14/2014
Micro-Tronics	Band Reject Filter, 5150-5350 MHz	BRC50703-02	2239	9/18/2014
Radiated Emissions, 1,000 - 12,000 MHz, 13-Mar-14				
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	785	10/31/2014
EMCO	Antenna, Horn, 1-18GHz	3115	868	6/19/2014
Hewlett Packard	SpecAn 30 Hz -40 GHz, SV (SA40) Red	8564E (84125C)	1148	9/14/2014
Micro-Tronics	Band Reject Filter, 5150-5350 MHz	BRC50703-02	2239	9/18/2014
Micro-Tronics	Band Reject Filter, 5470-5725 MHz	BRC50704-02	2240	9/18/2014
Micro-Tronics	Band Reject Filter, 5725-5875 MHz	BRC50705-02	2241	9/18/2014
Radiated Emissions, 1,000 - 18,000 MHz, 14-Mar-14				
EMCO	Antenna, Horn, 1-18GHz	3115	868	6/19/2014
Hewlett Packard	High Pass filter, 8.2 GHz (Blu System)	P/N 84300-80039 (84125C)	1392	5/14/2014
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	2199	2/20/2015
Micro-Tronics	Band Reject Filter, 5470-5725 MHz	BRC50704-02	2240	9/18/2014
Micro-Tronics	Band Reject Filter, 5725-5875 MHz	BRC50705-02	2241	9/18/2014
Hewlett Packard	SpecAn 9 kHz - 40 GHz, (SA40) Purple	8564E (84125C)	2415	2/27/2015
Radiated Emissions, 1000 - 40,000 MHz, 14-Mar-14				
EMCO	Antenna, Horn, 1-18GHz	3115	868	6/19/2014
Hewlett Packard	High Pass filter, 8.2 GHz (Blu System)	P/N 84300-80039 (84125C)	1392	5/14/2014
Hewlett Packard	Head (Inc W1-W4, 1946 , 1947) Purple	84125C	1772	6/18/2014
A. H. Systems	Red System Horn, 18-40GHz	SAS-574, p/n: 2581	2161	6/10/2014

Manufacturer	Description	Model	Asset #	Cal Due
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	2199	2/20/2015
Hewlett Packard	SpecAn 9 kHz - 40 GHz, (SA40) Purple	8564E (84125C)	2415	2/27/2015
Radiated Emissions, 30 - 1,000 MHz, 16-Mar-14				
Rohde & Schwarz	EMI Test Receiver, 20 Hz-7 GHz	ESIB7	1538	12/14/2014
Sunol Sciences	Biconilog, 30-3000 MHz	JB3	1657	6/4/2014
Com-Power	Preamplifier, 30-1000 MHz	PA-103	2465	9/13/2014
Radiated Emissions, 17-Mar-14				
EMCO	Antenna, Horn, 1-18GHz	3115	868	6/19/2014
Hewlett Packard	High Pass filter, 8.2 GHz (Blu System)	P/N 84300-80039 (84125C)	1392	5/14/2014
Rohde & Schwarz	EMI Test Receiver, 20 Hz-7 GHz	ESIB7	1538	12/14/2014
Hewlett Packard	Head (Inc W1-W4, 1946 , 1947) Purple	84125C	1772	6/18/2014
A. H. Systems	Red System Horn, 18-40GHz	SAS-574, p/n: 2581	2161	6/10/2014
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	2199	2/20/2015
Hewlett Packard	SpecAn 9 kHz - 40 GHz, (SA40) Purple	8564E (84125C)	2415	2/27/2015
Radiated Emissions, Power, PSD and BW, 24-Mar-14				
EMCO	Antenna, Horn, 1-18GHz	3115	868	6/19/2014
Rohde & Schwarz	EMI Test Receiver, 20 Hz-40 GHz	ESIB40 (1088.7490.40)	2493	1/11/2015

Appendix B Test Data

T94720 Pages 25 - 61

Client:	Nextivity Inc	Job Number:	J94664
Model:	D32-2/4NU and D32-2/4CU	T-Log Number:	T94720
		Account Manager:	Christine Krebill
Contact:	Michiel Lotter		-
Emissions Standard(s):	FCC Part 15.247, Part 15.407 and RSS 210	Class:	-
Immunity Standard(s):	-	Environment:	-

EMC Test Data

For The

Nextivity Inc

Model

D32-2/4NU and D32-2/4CU

Date of Last Test: 3/24/2014

Client:	Nextivity Inc	Job Number:	J94664
Model:	D32-2/4NU and D32-2/4CU	T-Log Number:	T94720
		Account Manager:	Christine Krebill
Contact:	Michiel Lotter		
Standard:	FCC Part 15.247, Part 15.407 and RSS 210	Class:	N/A

RSS-210 and FCC 15.247 (DTS)

Power, PSD, Peak Excursion and Bandwidth

Test Specific Details

Objective: The objective of this test session is to perform final qualification testing of the EUT with respect to the specification listed above.

Date of Test: 3/11/2014, 3/12/14, 3/24/2014
Test Engineer: J. Liu/ R. Varelas/ D. Demirci
Test Location: FT Chamber #7/Chamber #5

Config. Used: 1
Config Change: None
EUT Voltage: 120V/60Hz

Summary of Results

Run #	Test Performed	Limit	Pass / Fail	Result / Margin
1c	Power, 5725 - 5850 MHz	15.247	Pass	17.7 dBm (58.6 mW)
1d	PSD, 5725 - 5850 MHz	15.247	Pass	-6.4 dBm/100 kHz
1c	6 dB Bandwidth	15.247	Pass	28.8 MHz
1c	99% Bandwidth (DTS)	RSS 210	N/A	37.2 MHz

General Test Configuration

The EUT was located on the turntable for radiated spurious emissions testing. DELL Latitude D830 Laptop and Nextivity Chart Interface (V:2.0.0.2) software was used to configure the EUT. The laptop was not connected during the tests.
The EUT was radiating through its internal antenna. The emission was maximized, & EIRP was measured as described in the notes.
For radiated emissions testing the measurement antenna was located 3 meters from the EUT.

Ambient Conditions:

Temperature: 21-24 °C
Rel. Humidity: 30-45 %

Modifications Made During Testing

No modifications were made to the EUT during testing

Deviations From The Standard

No deviations were made from the requirements of the standard.

Client:	Nextivity Inc	Job Number:	J94664
Model:	D32-2/4NU and D32-2/4CU	T-Log Number:	T94720
		Account Manager:	Christine Krebill
Contact:	Michiel Lotter		
Standard:	FCC Part 15.247, Part 15.407 and RSS 210	Class:	N/A

Run #1: Bandwidth, Output Power and Power Spectral Density - Single Chain Systems

Note 1:	Radiated output power measured using a spectrum analyzer (see plots below). RBW=1 MHz, VB=3 MHz, RMS detector, Sweep Time Auto, 100 sweeps, Trigger, Free run, and power integration over 50 and 60 MHz. EUT is operating at 100% duty cycle. (UNII method SA-1 of KDB 789033 D01 v01r03 and DTS method AVGSA-1 of 558074 D01 v03r01)
Note 3:	DTS Power Spectral Density measured using a spectrum analyzer (see plots below). RBW=100 kHz, VB=300 kHz, RMS detector, Sweep Time Auto, 100 sweeps, Trigger, Free run. EUT is operating at 100% duty cycle. (DTS method AVGPSD-1 of 558074 D01 v03r01)
Note 4:	99% Bandwidth measured in accordance with RSS GEN - RB > 1% of span and VB >=3xRB
Note 5:	Measurements are performed with radiated emission method. Conducted power and PSD are calculated by subtracting the antenna gain from measured radiated values
Note 6:	Emission Bandwidths of 5715 and 5735 MHz channels intentionally extend into the 5.725-5.825 GHz band, therefore FCC 15.407 U-NII band rules apply for these channels per KDB 644545 D01 v01r02. See U-NII test report for details.

1c 5725- 5850 MHz Band 30 MHz Bandwidth (DTS)

Frequency (MHz)	Software Setting	Output Power[1] dBm EIRP (Measured)	PSD[2] dBm / 100 kHz EIRP (Measured)
5765	-	22.6	-0.4
5785	-	22.8	-1.0
5825	-	22.7	-1.5

Antenna Gain (dBi): 6 EIRP: 191.4 mW 22.8 dBm

Frequency (MHz)	Software Setting	Bandwidth 6 dB	Bandwidth 99%[4]	Output Power[1] dBm Calculated[5]	Output Power[1] dBm Limit	Power (Watts)	PSD[3] dBm / 100 kHz Calculated[5]	PSD[3] dBm / 100 kHz FCC Limit	PSD[3] dBm / 100 kHz RSS Limit	Result
5765	-	28.9	28.9	16.6	30.0	0.045	**-6.4**	8.0	8.0	Pass
5785	-	28.9	28.9	16.8	30.0	0.048	-7.0	8.0	8.0	Pass
5825	-	28.8	28.9	16.7	30.0	0.046	-7.5	8.0	8.0	Pass

1c 5725- 5850 MHz Band 40 MHz Bandwidth (DTS)

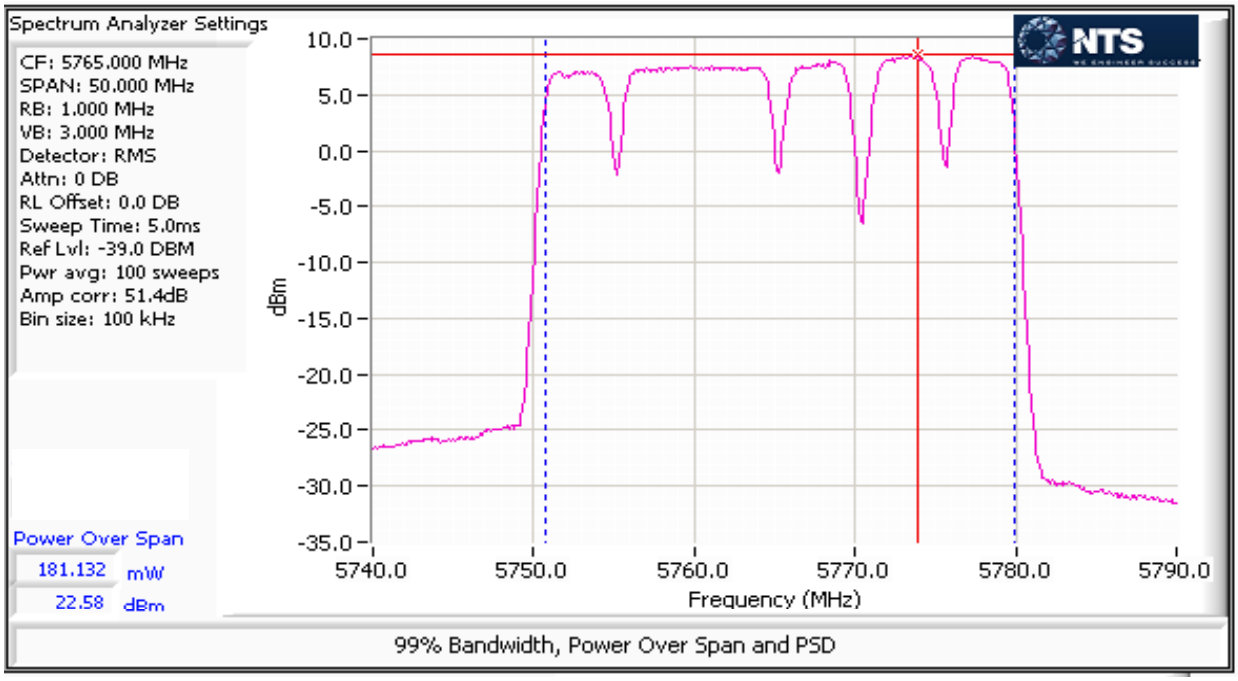
Frequency (MHz)	Software Setting	Output Power[1] dBm EIRP (Measured)	PSD[2] dBm / 100 kHz EIRP (Measured)
5765	-	23.7	-1.3
5785	-	23.1	-1.9
5825	-	21.9	-3.1

Antenna Gain (dBi): 6 EIRP: 233.3 mW 23.7 dBm

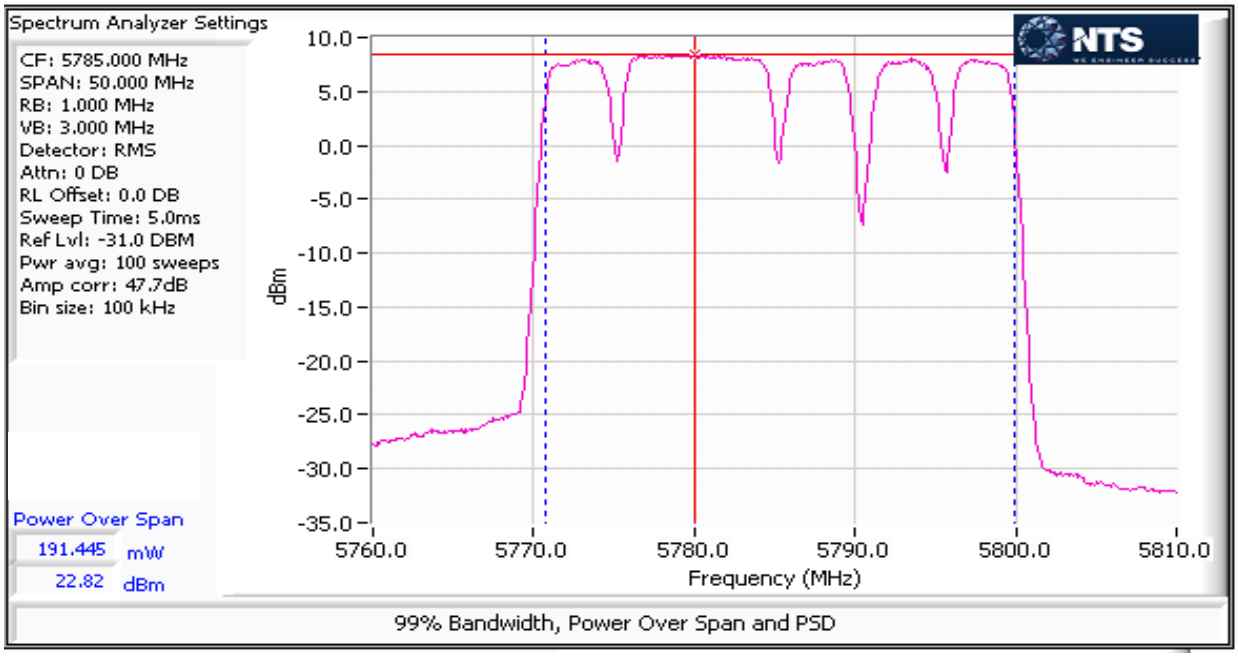
Frequency (MHz)	Software Setting	Bandwidth 6 dB	Bandwidth 99%[4]	Output Power[1] dBm Calculated[5]	Output Power[1] dBm Limit	Power (Watts)	PSD[3] dBm / 100 kHz Calculated[5]	PSD[3] dBm / 100 kHz FCC Limit	PSD[3] dBm / 100 kHz RSS Limit	Result
5765	-	37.2	37.1	**17.7**	30.0	0.059	-7.3	8.0	8.0	Pass
5785	-	37.3	**37.2**	17.1	30.0	0.051	-7.9	8.0	8.0	Pass
5825	-	37.3	37.1	15.9	30.0	0.039	-9.1	8.0	8.0	Pass

Client:	Nextivity Inc	Job Number:	J94664
Model:	D32-2/4NU and D32-2/4CU	T-Log Number:	T94720
		Account Manager:	Christine Krebill
Contact:	Michiel Lotter		
Standard:	FCC Part 15.247, Part 15.407 and RSS 210	Class:	N/A

CU Ch Freq 5765 MHz @ 30 MHz Bandwidth

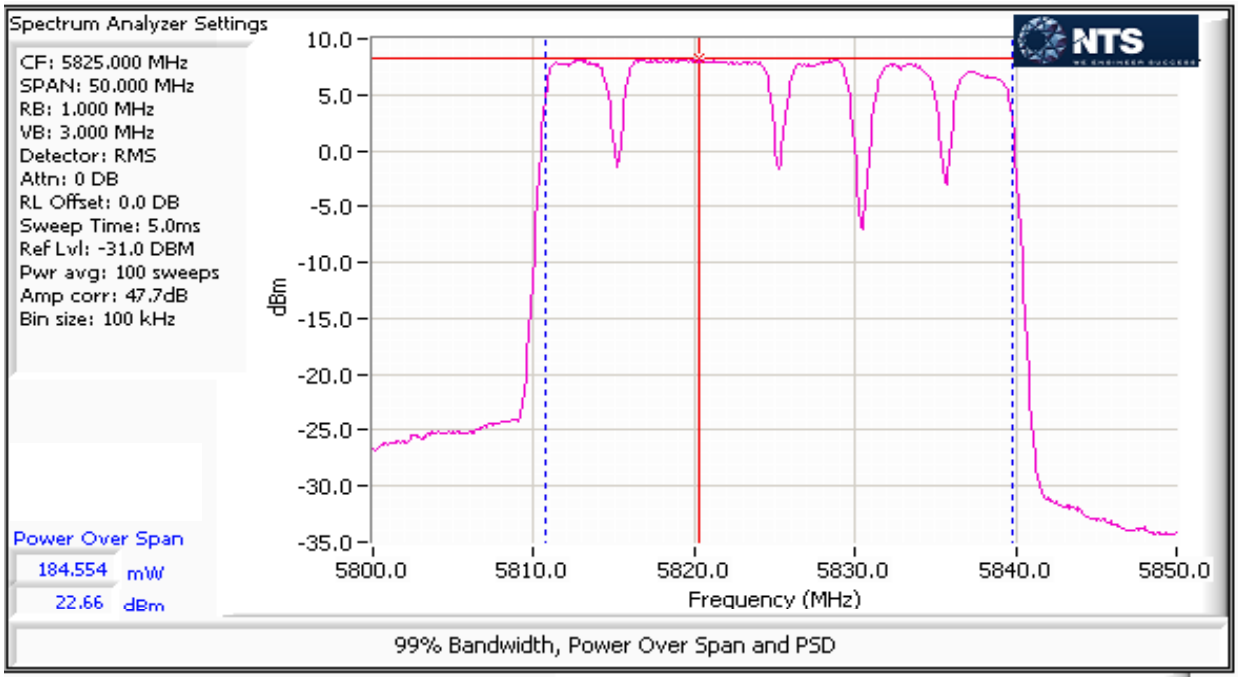


CU Ch Freq 5785 MHz @ 30 MHz Bandwidth

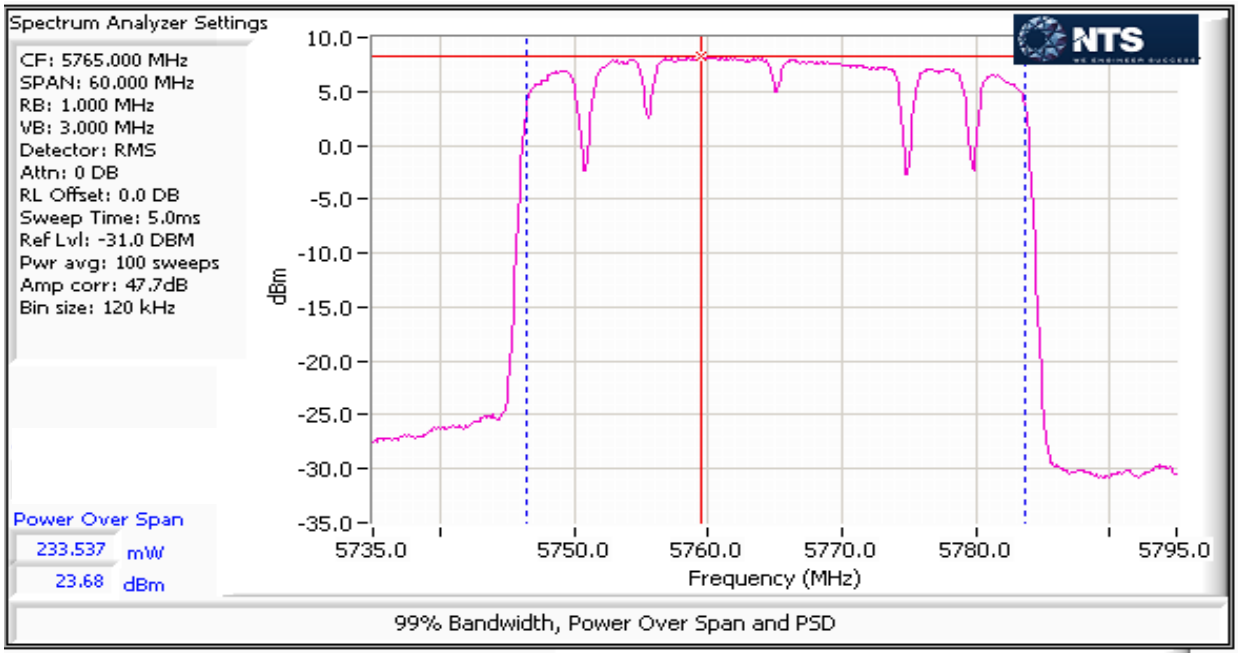


Client:	Nextivity Inc	Job Number:	J94664
Model:	D32-2/4NU and D32-2/4CU	T-Log Number:	T94720
		Account Manager:	Christine Krebill
Contact:	Michiel Lotter		
Standard:	FCC Part 15.247, Part 15.407 and RSS 210	Class:	N/A

CU Ch Freq 5825 MHz @ 30 MHz Bandwidth

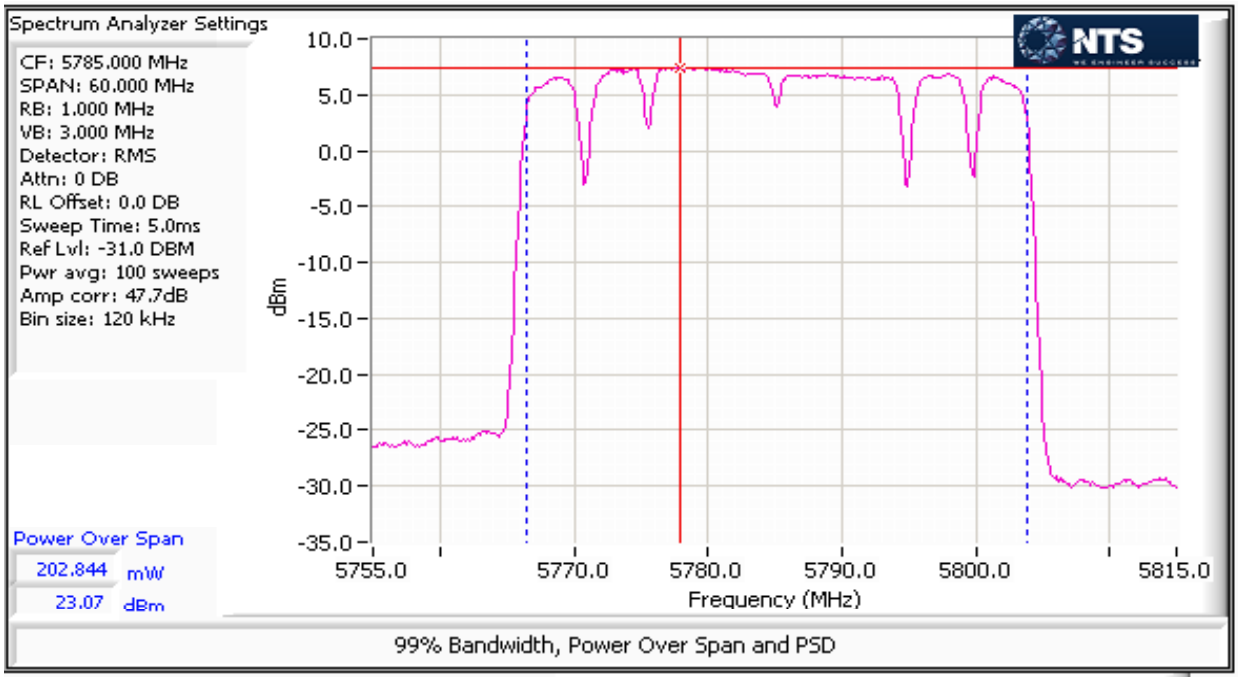


CU Ch Freq 5765 MHz @ 40 MHz Bandwidth



Client:	Nextivity Inc	Job Number:	J94664
Model:	D32-2/4NU and D32-2/4CU	T-Log Number:	T94720
		Account Manager:	Christine Krebill
Contact:	Michiel Lotter		
Standard:	FCC Part 15.247, Part 15.407 and RSS 210	Class:	N/A

CU Ch Freq 5785 MHz @ 40 MHz Bandwidth



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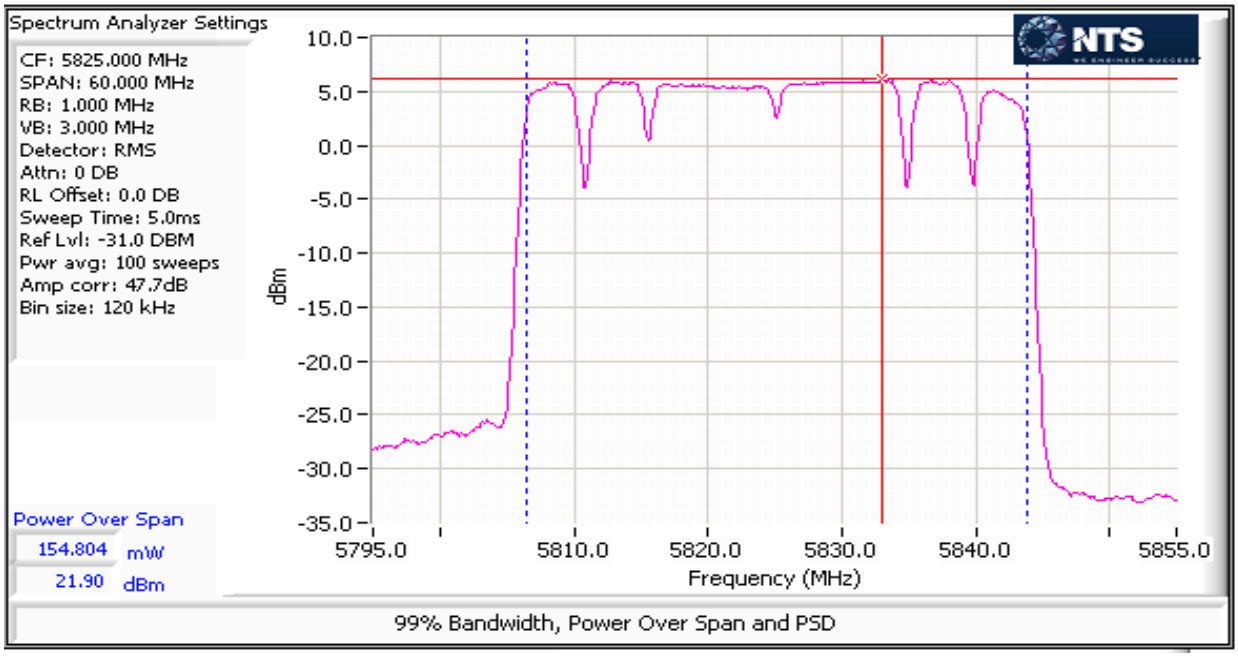
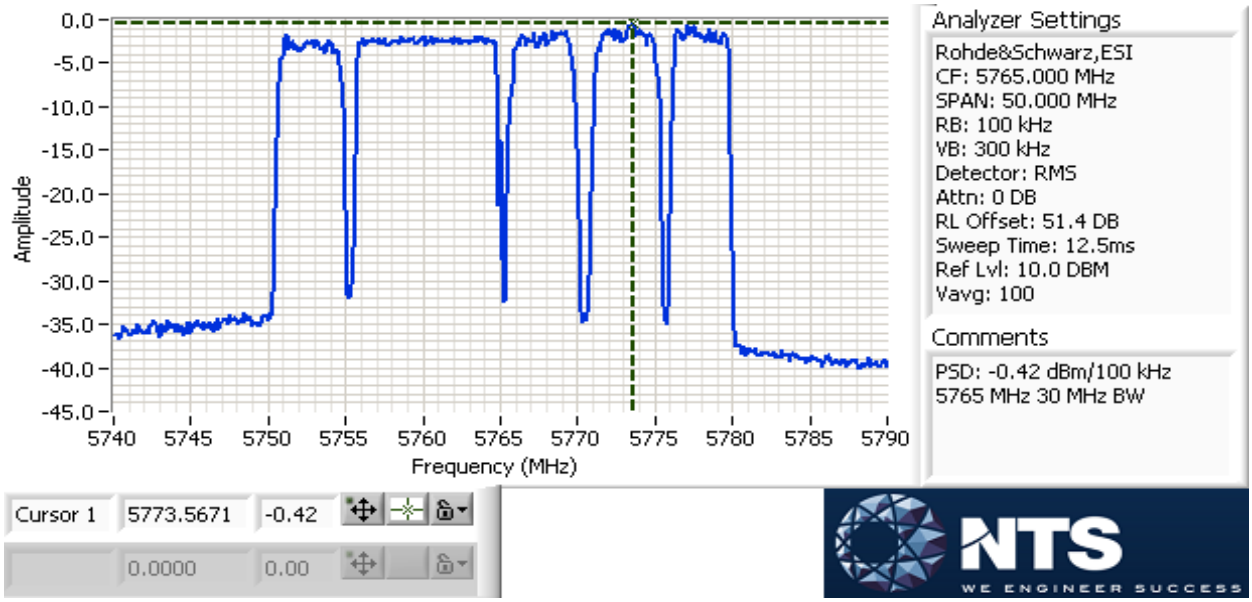
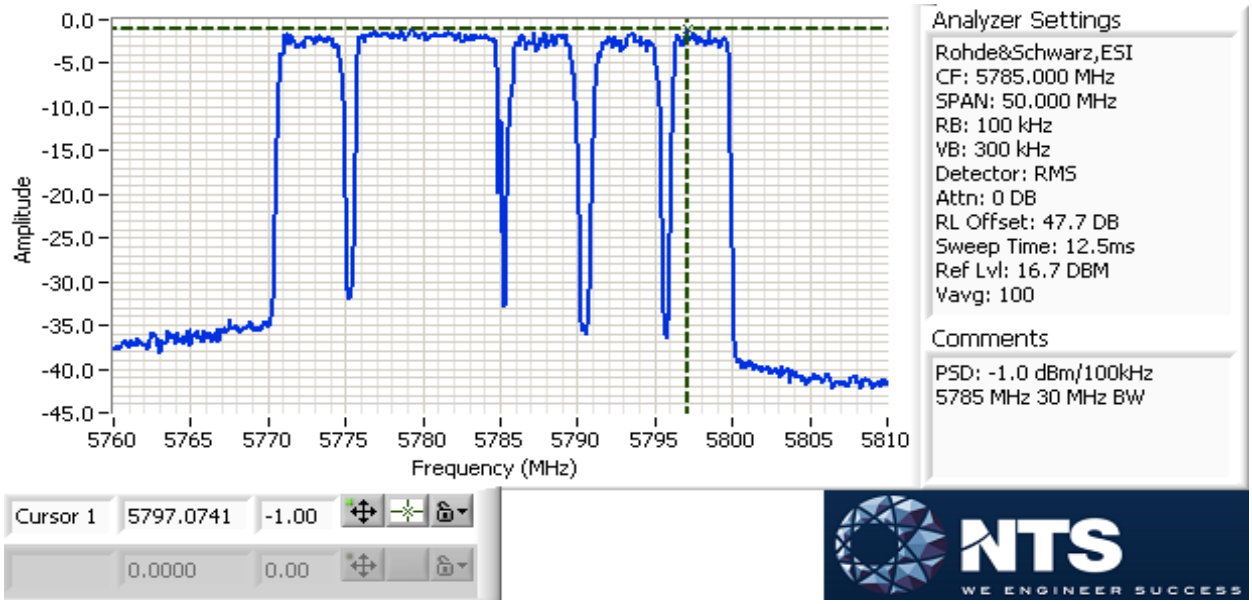


Client:	Nextivity Inc	Job Number:	J94664
Model:	D32-2/4NU and D32-2/4CU	T-Log Number:	T94720
		Account Manager:	Christine Krebill
Contact:	Michiel Lotter		
Standard:	FCC Part 15.247, Part 15.407 and RSS 210	Class:	N/A

PSD CU Ch Freq 5765 MHz @ 30 MHz Bandwidth



PSD CU Ch Freq 5785 MHz @ 30 MHz Bandwidth



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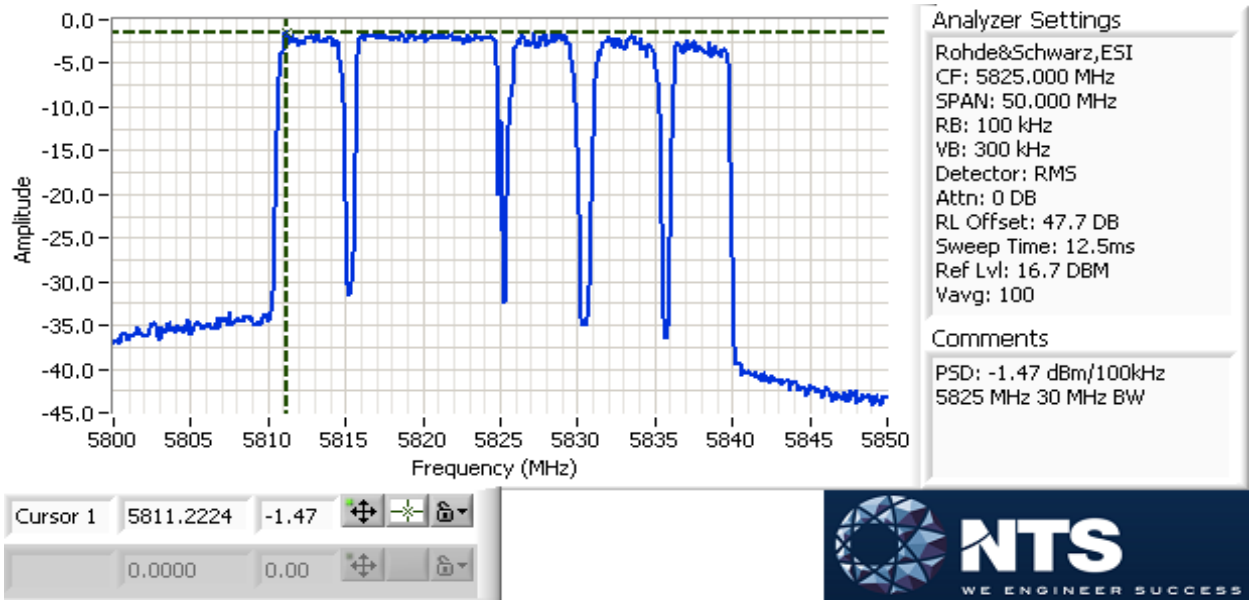
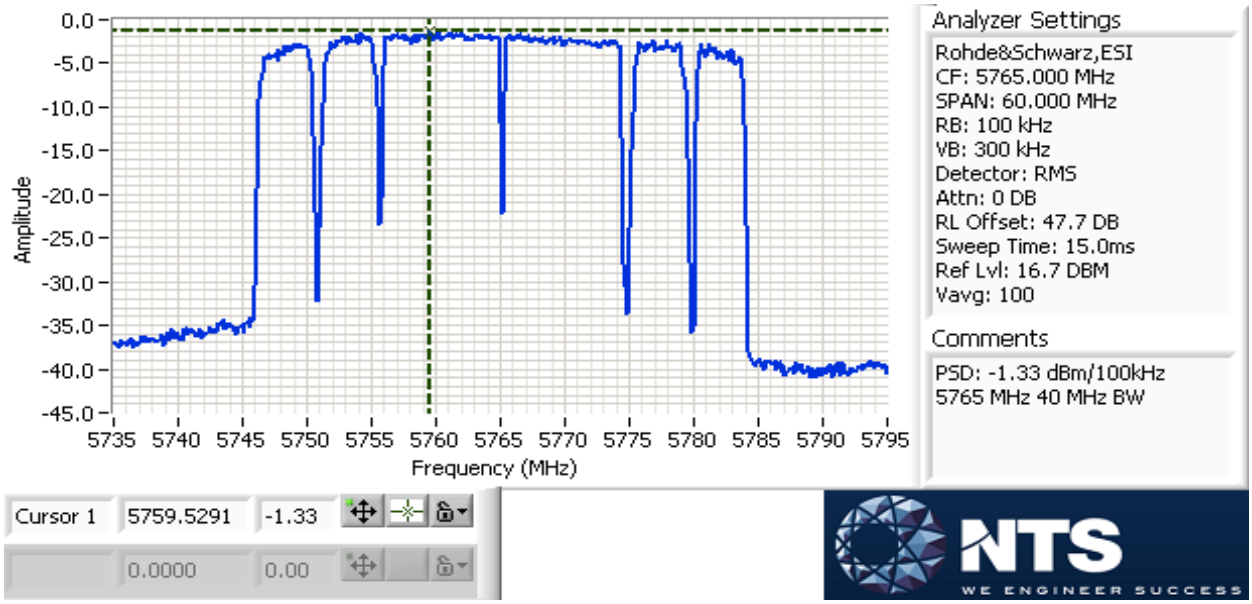
Model:	D32-2/4NU and D32-2/4CU	T-Log Number:	T94720
		Account Manager:	Christine Krebill
Contact:	Michiel Lotter		
Standard:	FCC Part 15.247, Part 15.407 and RSS 210	Class:	N/A

PSD CU Ch Freq 5825 MHz @ 30 MHz Bandwidth

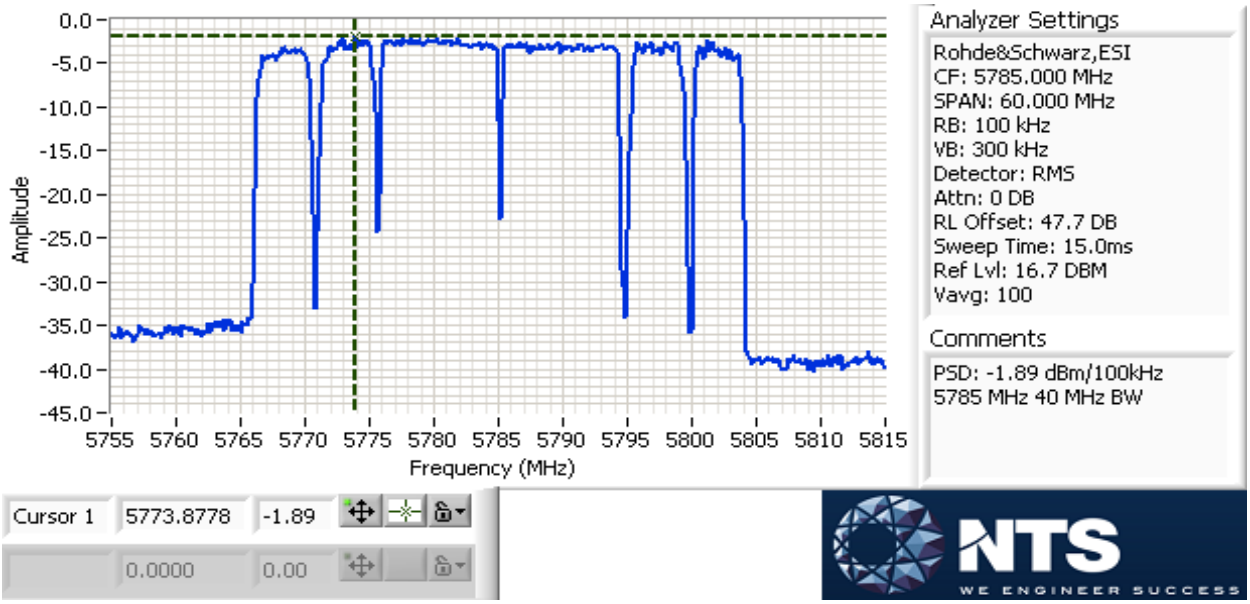


PSD CU Ch Freq 5765 MHz @ 40 MHz Bandwidth



Client:	Nextivity Inc	Job Number:	J94664
Model:	D32-2/4NU and D32-2/4CU	T-Log Number:	T94720
		Account Manager:	Christine Krebill
Contact:	Michiel Lotter		
Standard:	FCC Part 15.247, Part 15.407 and RSS 210	Class:	N/A

PSD CU Ch Freq 5785 MHz @ 40 MHz Bandwidth



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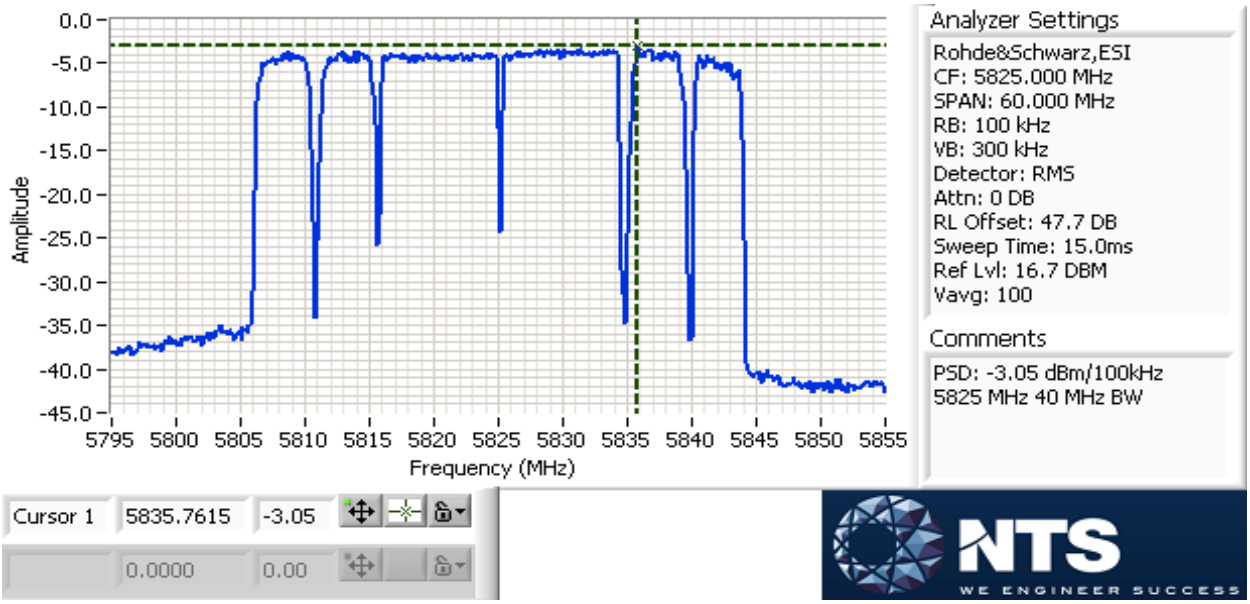

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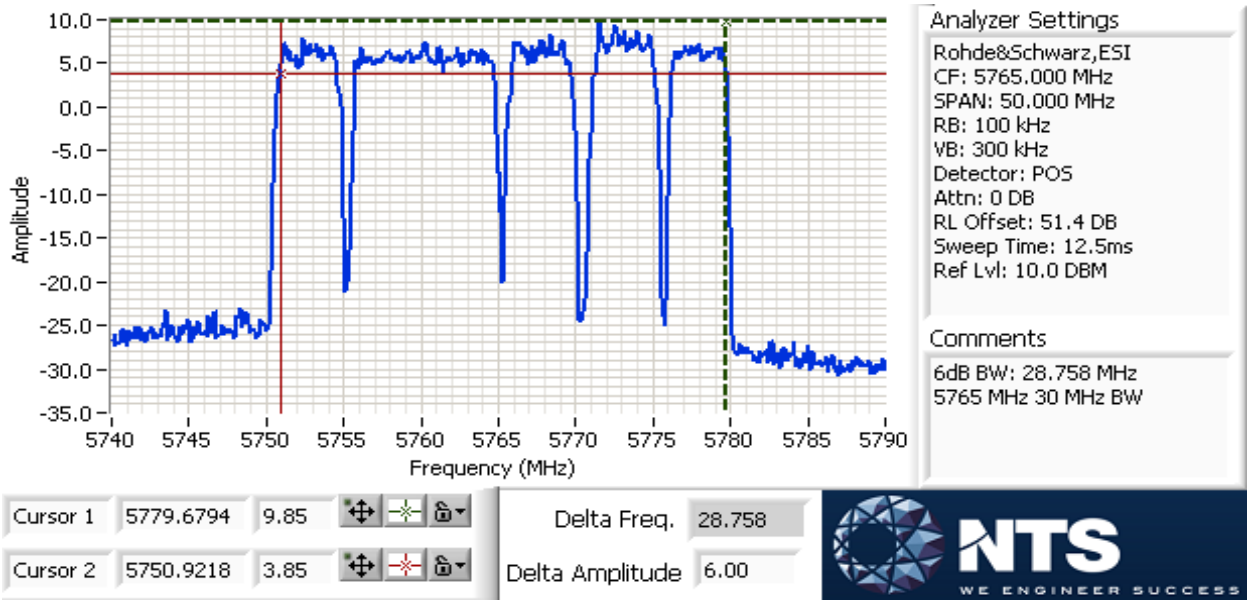
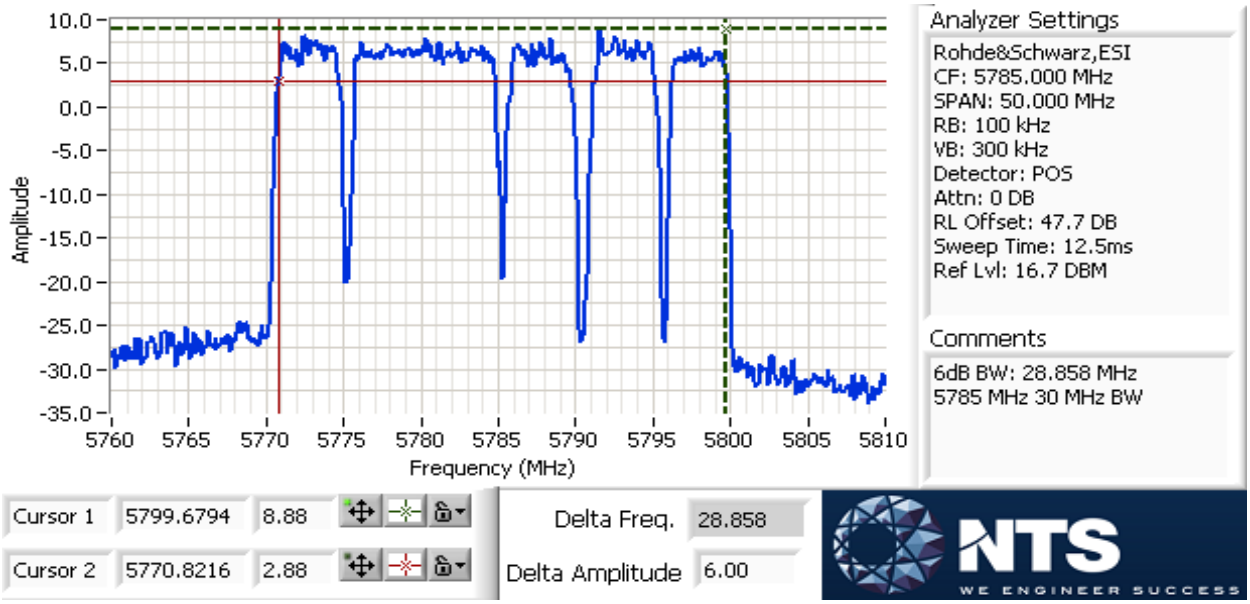
Model:	D32-2/4NU and D32-2/4CU	T-Log Number:	T94720
		Account Manager:	Christine Krebill
Contact:	Michiel Lotter		
Standard:	FCC Part 15.247, Part 15.407 and RSS 210	Class:	N/A

CU Ch Freq 5765 MHz @ 30 MHz Bandwidth



CU Ch Freq 5785 MHz @ 30 MHz Bandwidth



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Model:	D32-2/4NU and D32-2/4CU	T-Log Number:	T94720
		Account Manager:	Christine Krebill
Contact:	Michiel Lotter		
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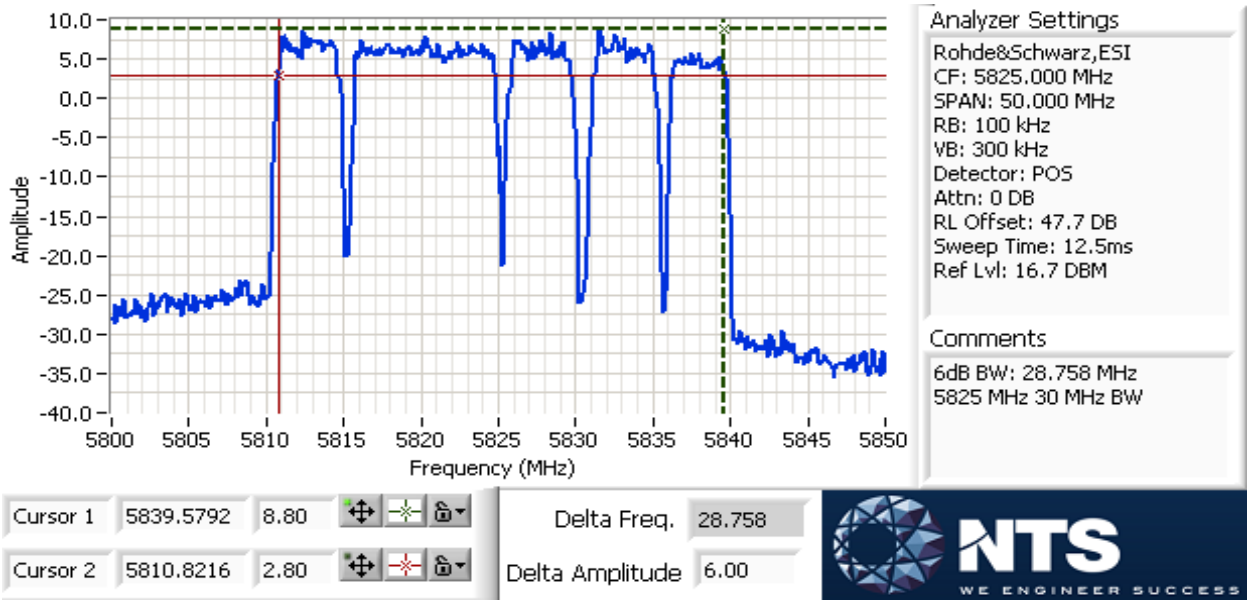
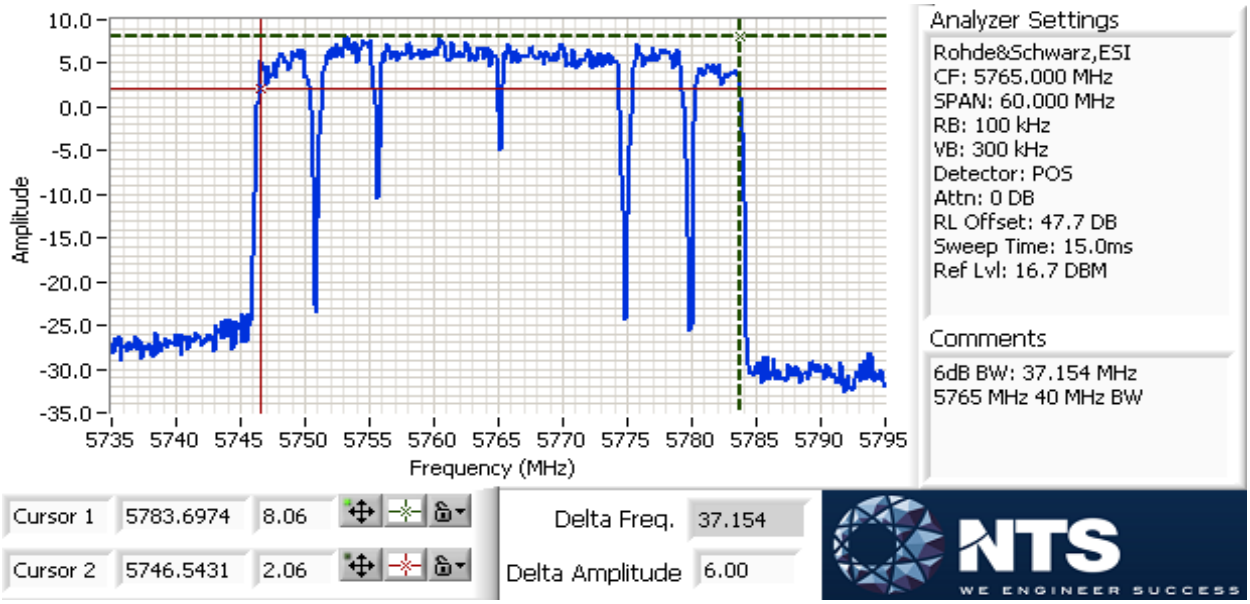
CU Ch Freq 5825 MHz @ 30 MHz Bandwidth



CU Ch Freq 5765 MHz @ 40 MHz Bandwidth



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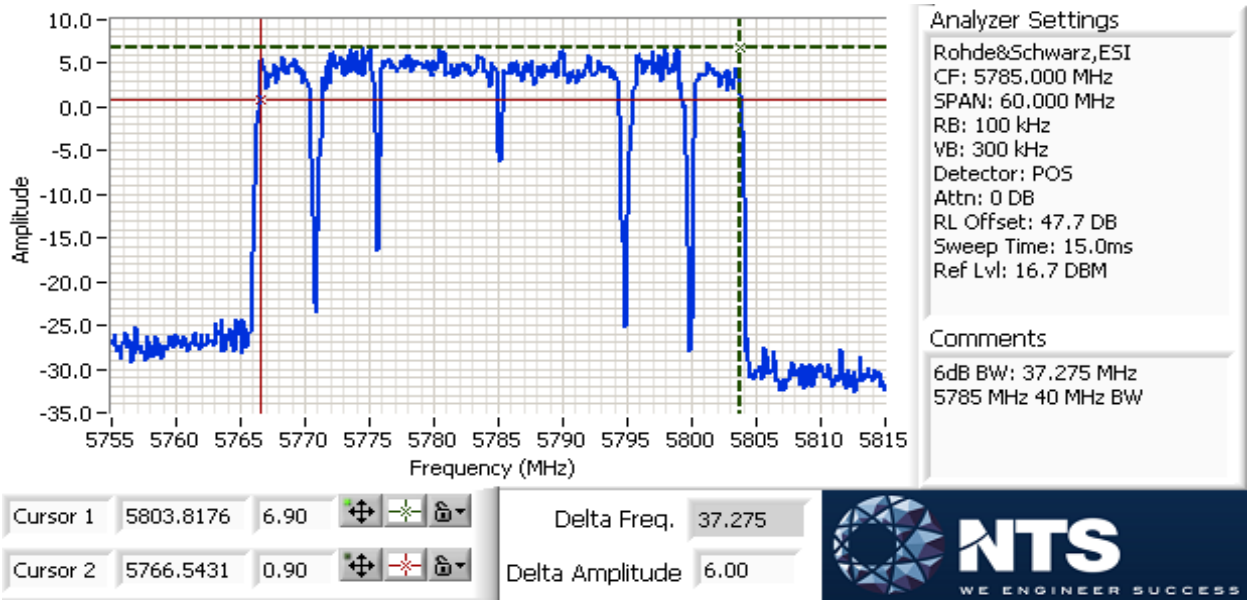
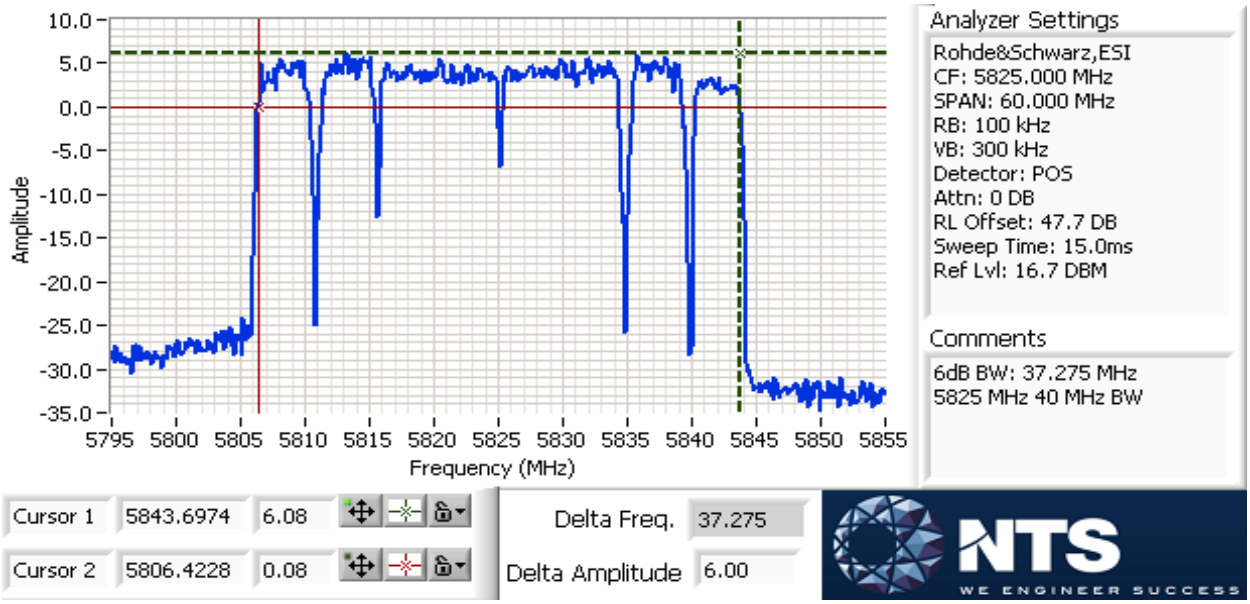


CU Ch Freq 5825 MHz @ 40 MHz Bandwidth



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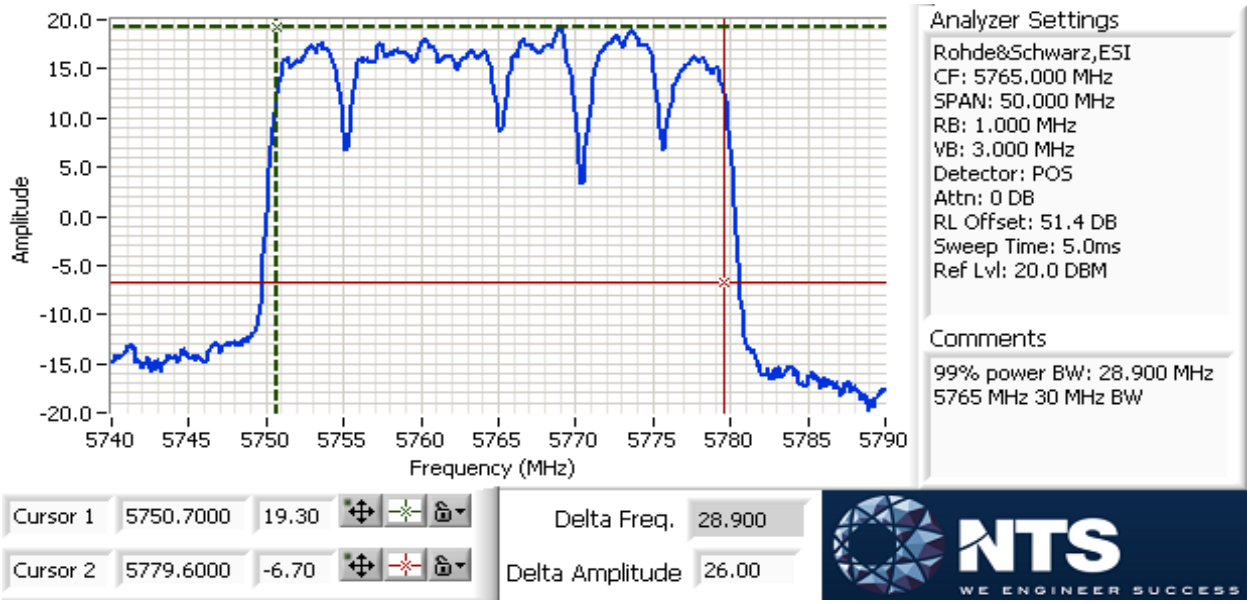
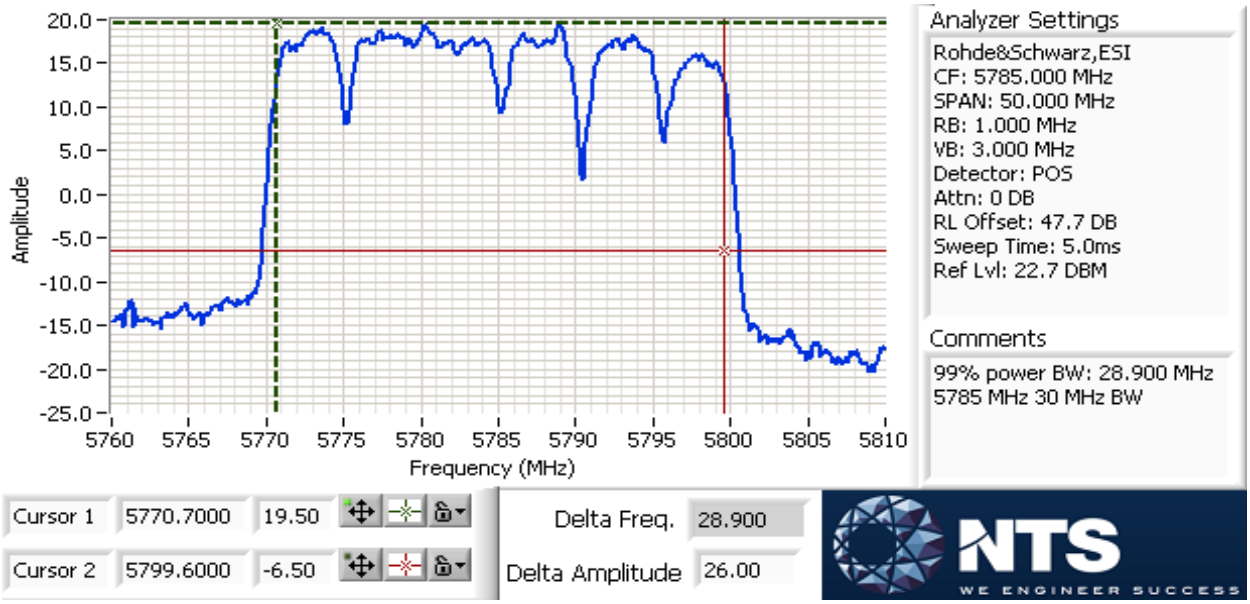
CU Ch Freq 5765 MHz @ 30 MHz Bandwidth

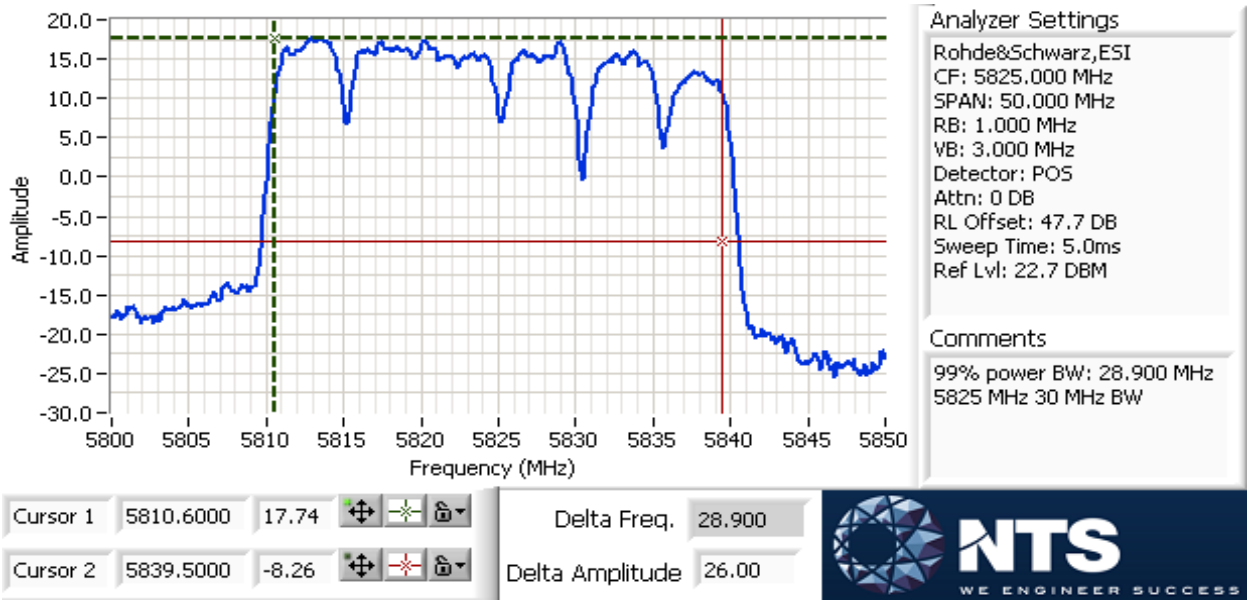


CU Ch Freq 5785 MHz @ 30 MHz Bandwidth

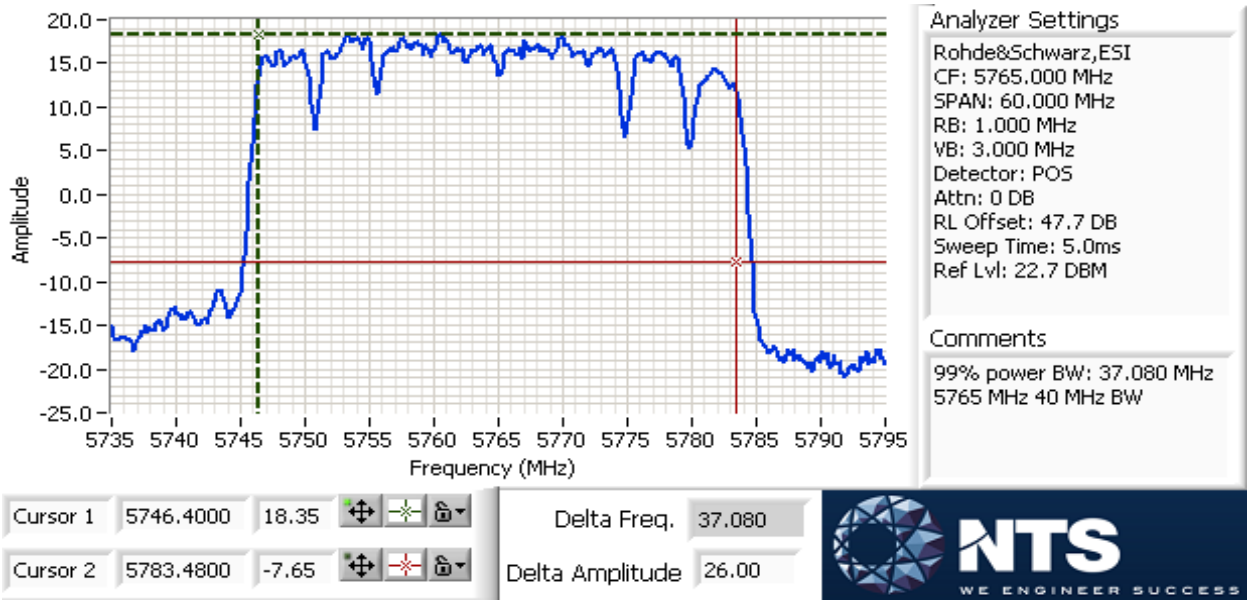


Client:	Nextivity Inc	Job Number:	J94664
Model:	D32-2/4NU and D32-2/4CU	T-Log Number:	T94720
		Account Manager:	Christine Krebill
Contact:	Michiel Lotter		
Standard:	FCC Part 15.247, Part 15.407 and RSS 210	Class:	N/A

CU Ch Freq 5825 MHz @ 30 MHz Bandwidth



CU Ch Freq 5765 MHz @ 40 MHz Bandwidth



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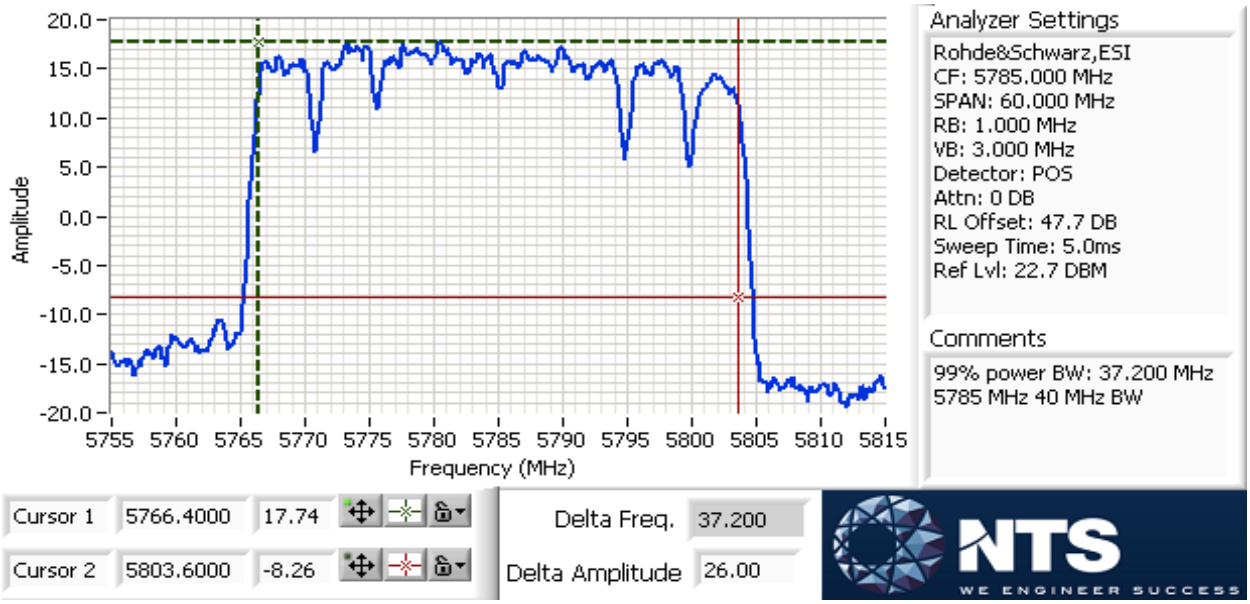
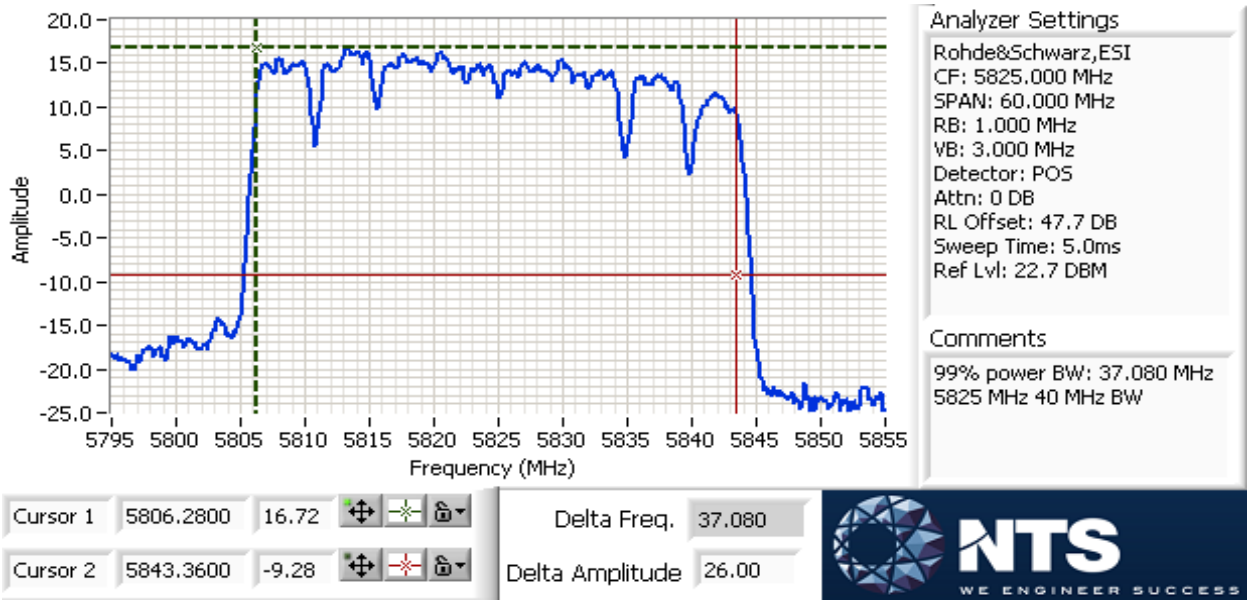
Model:	D32-2/4NU and D32-2/4CU	T-Log Number:	T94720
		Account Manager:	Christine Krebill
Contact:	Michiel Lotter		
Standard:	FCC Part 15.247, Part 15.407 and RSS 210	Class:	N/A

CU Ch Freq 5785 MHz @ 40 MHz Bandwidth



CU Ch Freq 5825 MHz @ 40 MHz Bandwidth



Client:	Nextivity Inc	Job Number:	J94664
Model:	D32-2/4NU and D32-2/4CU	T-Log Number:	T94720
		Account Manager:	Christine Krebill
Contact:	Michiel Lotter		
Standard:	FCC Part 15.247, Part 15.407 and RSS 210	Class:	N/A

RSS 210 and FCC 15.247 (DTS) Radiated Spurious Emissions

Test Specific Details

Objective: The objective of this test session is to perform final qualification testing of the EUT with respect to the specification listed above.

General Test Configuration

The EUT and all local support equipment were located on the turntable for radiated spurious emissions testing.

For radiated emissions testing the measurement antenna was located 3 meters from the EUT.

Ambient Conditions:

Temperature: 21-24 °C
Rel. Humidity: 30-45 %

Summary of Results (DTS bands)

Run #	Mode	Channel	Power Setting	Measured Power	Test Performed	Limit	Result / Margin
2a DTS 5725-5850	Proprietary 30 MHz BW	Low 5765 MHz	-	-	Band Edge 5725 MHz	15.209	Pass/ -37.9dBc
				-	Radiated Emissions, 30 MHz - 40 GHz	FCC 15.209 / 15.247	35.5 dBµV/m @ 38.84 MHz (-4.5 dB)
		Center 5785 MHz	-	-	Radiated Emissions, 1 - 40 GHz	FCC 15.209 / 15.247	44.2[1] dBµV/m @ 11505.2 MHz (-9.8 dB)
		High 5825 MHz	-	-	Band Edge 5850 MHz	15.247	Pass/ -37.8dBc
				-	Radiated Emissions, 1 - 40 GHz	FCC 15.209 / 15.247	44.2[1] dBµV/m @ 11506.4 MHz (-9.8 dB)
2b DTS 5725-5850	Proprietary 40 MHz BW	Low 5765 MHz	-	-	Band Edge 5725 MHz	15.209	Pass/ -35.8dBc
				-	Radiated Emissions, 30 MHz - 40 GHz	FCC 15.209 / 15.247	35.6 dBµV/m @ 38.77 MHz (-4.4 dB)
		Center 5785 MHz	-	-	Radiated Emissions, 1 - 40 GHz	FCC 15.209 / 15.247	44.2[1] dBµV/m @ 11505.6 MHz (-9.8 dB)
		High 5825 MHz	-	-	Band Edge 5850 MHz	15.247	Pass/ -36.25dBc
				-	Radiated Emissions, 1 - 40 GHz	FCC 15.209 / 15.247	44.1[1] dBµV/m @ 11503.6 MHz (-9.9 dB)

Note 1: Highest noise floor reading

Client:	Nextivity Inc	Job Number:	J94664
Model:	D32-2/4NU and D32-2/4CU	T-Log Number:	T94720
		Account Manager:	Christine Krebill
Contact:	Michiel Lotter		
Standard:	FCC Part 15.247, Part 15.407 and RSS 210	Class:	N/A

Modifications Made During Testing

No modifications were made to the EUT during testing

Deviations From The Standard

No deviations were made from the requirements of the standard.

Test Procedure Comments:

U-NII Bands

Unless otherwise noted, average measurements above 1 GHz were performed as documented in FCC KDB 789033 D01 v01r03 H) 1) c) and H) 2) c) for U-NII band measurements. Per H) 1) d), E(dBµ V/m) = EIRP(dBm) + 95.2 for 3 meters radiated emission measurements

DTS Bands

Unless otherwise noted, average measurements above 1 GHz were performed as documented in FCC KDB 558074 D01 v03r01 11 and 13.3.4 for DTS band measurements

Antenna: Connected. Integral antenna

Duty Cycle: 100%

The EUT was located on the turntable for radiated spurious emissions testing. DELL Latitude D830 Laptop and Nextivity Chart Interface (V:2.0.0.2) software was used to configure the EUT. The laptop was not connected during the tests.

Client:	Nextivity Inc	Job Number:	J94664
Model:	D32-2/4NU and D32-2/4CU	T-Log Number:	T94720
		Account Manager:	Christine Krebill
Contact:	Michiel Lotter		
Standard:	FCC Part 15.247, Part 15.407 and RSS 210	Class:	N/A

Run #2a: Low Channel @ 5765 MHz 30 MHz BW (DTS)

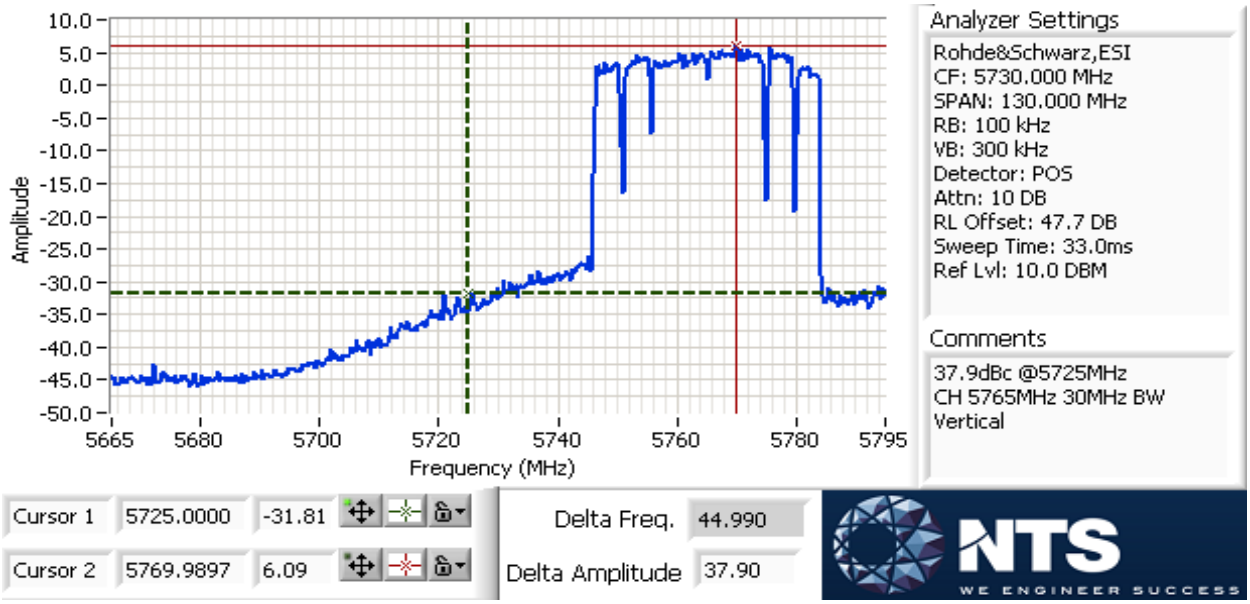
Date of Test: 3/12/2014
Test Engineer: Jack Liu
Test Location: FT Chamber #7

Band Edge at 5725 MHz

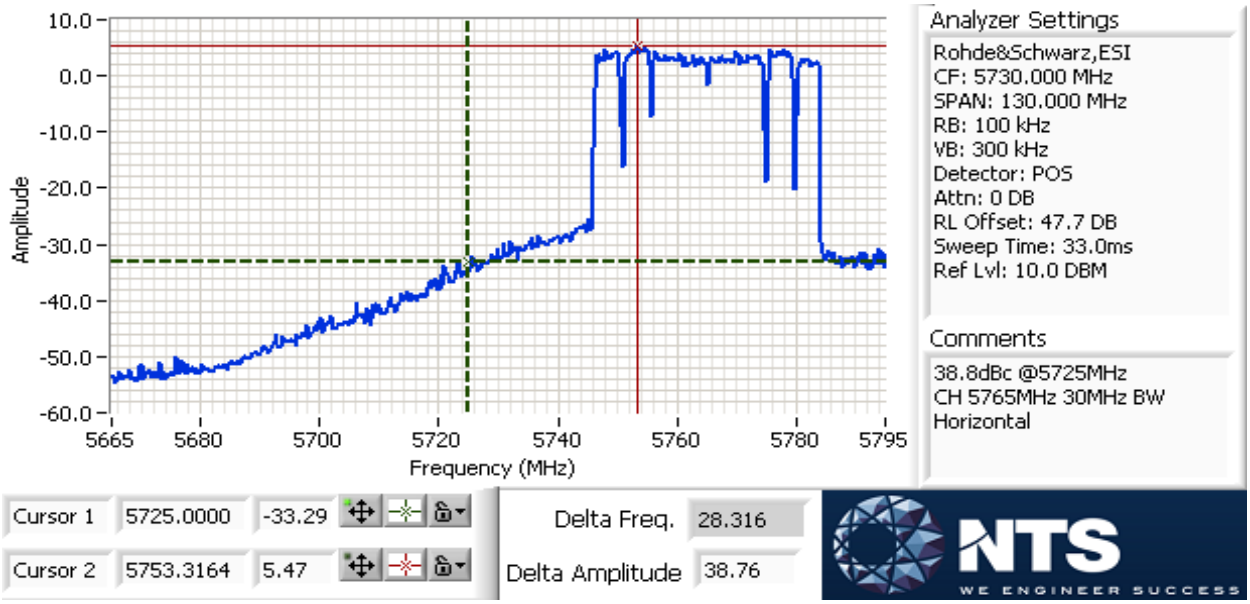
Carrier frequency	Carrier level	Spurious frequency	Spurious Level	Spurious Level	Limit	Margin	Detector	Comments
MHz	dBm	MHz	dBm	dBc	dBc	dB	Pk/QP/Avg	
5769.990	6.1	5721.100	-31.8	-37.9	-30.0	-7.9	Pk	RB: 100 kHz, VB: 300 kHz ; V
5753.320	5.5	5723.350	-33.3	-38.8	-30.0	-8.8	Pk	RB: 100 kHz, VB: 300 kHz ; H
Note 1:	Maximum average output power was used to demonstrate compliance hence peak power in any 100 kHz bandwidth outside of the authorized frequency band shall be attenuated by at least 30 dB relative to the maximum in-band peak PSD level in 100 kHz							

Client:	Nextivity Inc	Job Number:	J94664
Model:	D32-2/4NU and D32-2/4CU	T-Log Number:	T94720
		Account Manager:	Christine Krebill
Contact:	Michiel Lotter		
Standard:	FCC Part 15.247, Part 15.407 and RSS 210	Class:	N/A

5765 MHz, 30 MHz BW, Vertical polarity



5765 MHz, 30 MHz BW, Horizontal polarity



Client:	Nextivity Inc	Job Number:	J94664
Model:	D32-2/4NU and D32-2/4CU	T-Log Number:	T94720
		Account Manager:	Christine Krebill
Contact:	Michiel Lotter		
Standard:	FCC Part 15.247, Part 15.407 and RSS 210	Class:	N/A

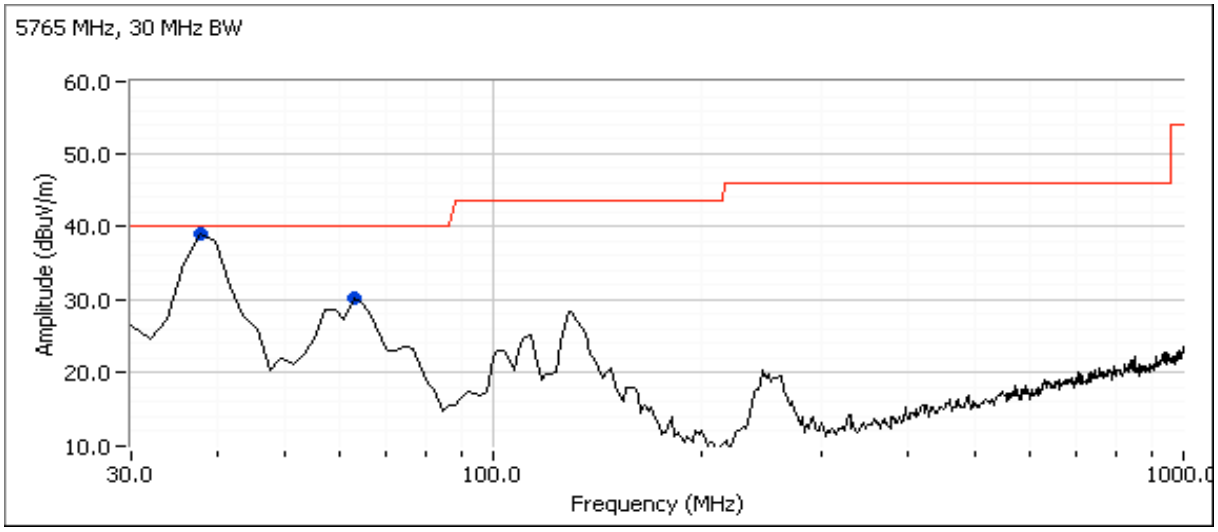
Date of Test: 3/13/14 & 3/14/14, 3/17/14
Test Engineer: Jack Liu, Deniz Demirci
Test Location: FT Chamber #7

Low Channel @ 5765 MHz 30 MHz BW
Spurious Radiated Emissions:

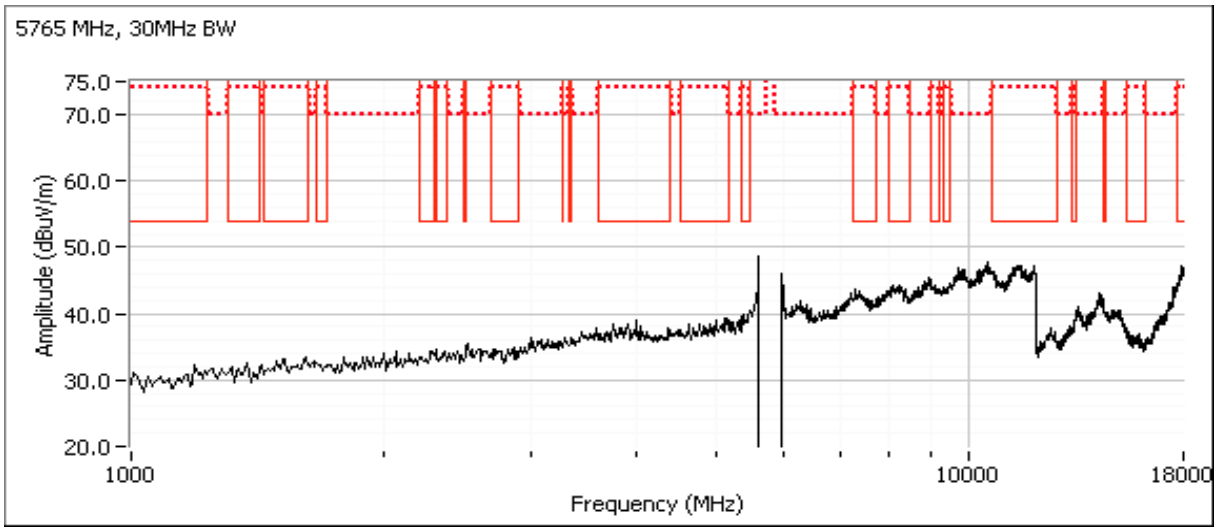
Frequency	Level	Pol	FCC 15.209		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
38.837	35.5	V	40.0	-4.5	QP	293	1.0	QP (1.00s)
63.408	31.2	V	40.0	-8.8	QP	173	1.0	QP (1.00s)
31427.570	24.0	H	54.0	-30.0	AVG	105	1.2	Noise floor reading

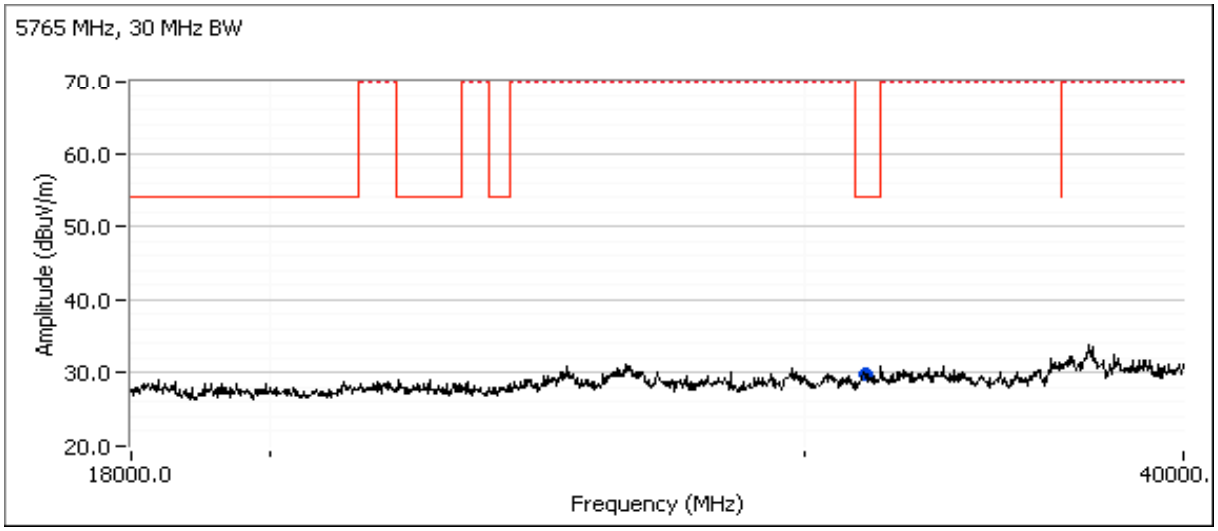
Note 1: Emissions in the 30-1000 MHz range are not radio related, they are the same regardless of channel.

Note 2: Scans made between 18 - 40 GHz with the measurement antenna moved around the card and its antennas 20-50 cm from the device indicated there were no significant emissions in this frequency range



Client:	Nextivity Inc	Job Number:	J94664
Model:	D32-2/4NU and D32-2/4CU	T-Log Number:	T94720
		Account Manager:	Christine Krebill
Contact:	Michiel Lotter		
Standard:	FCC Part 15.247, Part 15.407 and RSS 210	Class:	N/A





Client:	Nextivity Inc	Job Number:	J94664
Model:	D32-2/4NU and D32-2/4CU	T-Log Number:	T94720
		Account Manager:	Christine Krebill
Contact:	Michiel Lotter		
Standard:	FCC Part 15.247, Part 15.407 and RSS 210	Class:	N/A

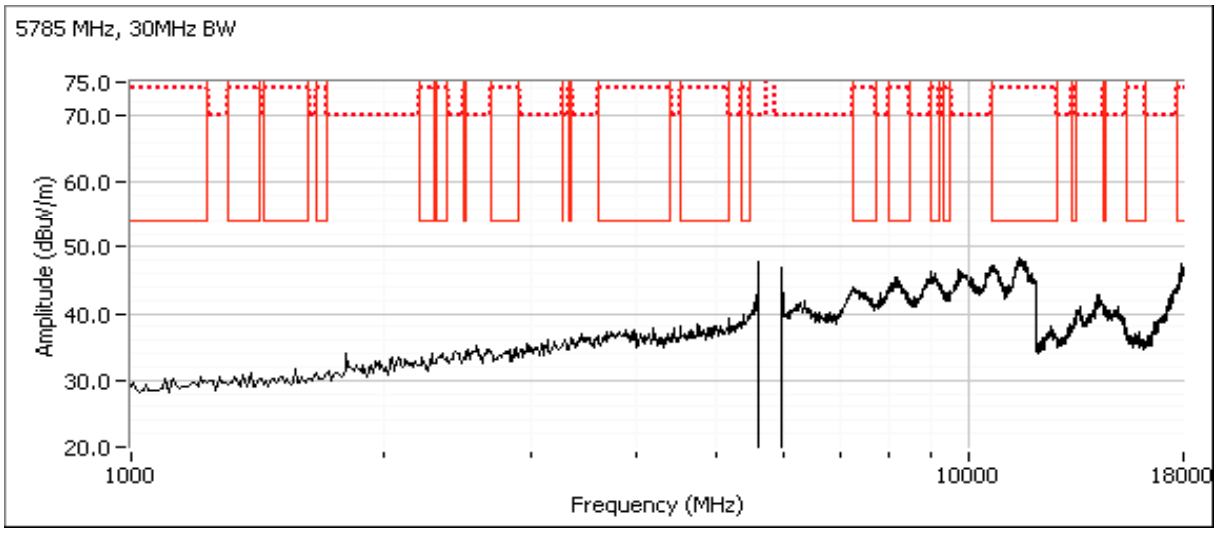
Run #2b: Center Channel @ 5785 MHz 30 MHz BW

Date of Test: 3/14/2014
Test Engineer: Jack Liu
Test Location: FT Chamber #7

Spurious Radiated Emissions:

Frequency	Level	Pol	FCC 15.209		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
11505.160	44.2	H	54.0	-9.8	AVG	32	2.5	Maximum noise floor reading

Note 1:	Scans made between 18 - 40 GHz with the measurement antenna moved around the card and its antennas 20-50 cm from the device indicated there were no significant emissions in this frequency range



Client:	Nextivity Inc	Job Number:	J94664
Model:	D32-2/4NU and D32-2/4CU	T-Log Number:	T94720
		Account Manager:	Christine Krebill
Contact:	Michiel Lotter		
Standard:	FCC Part 15.247, Part 15.407 and RSS 210	Class:	N/A

Run #2c: High Channel @ 5825 MHz 30 MHz BW

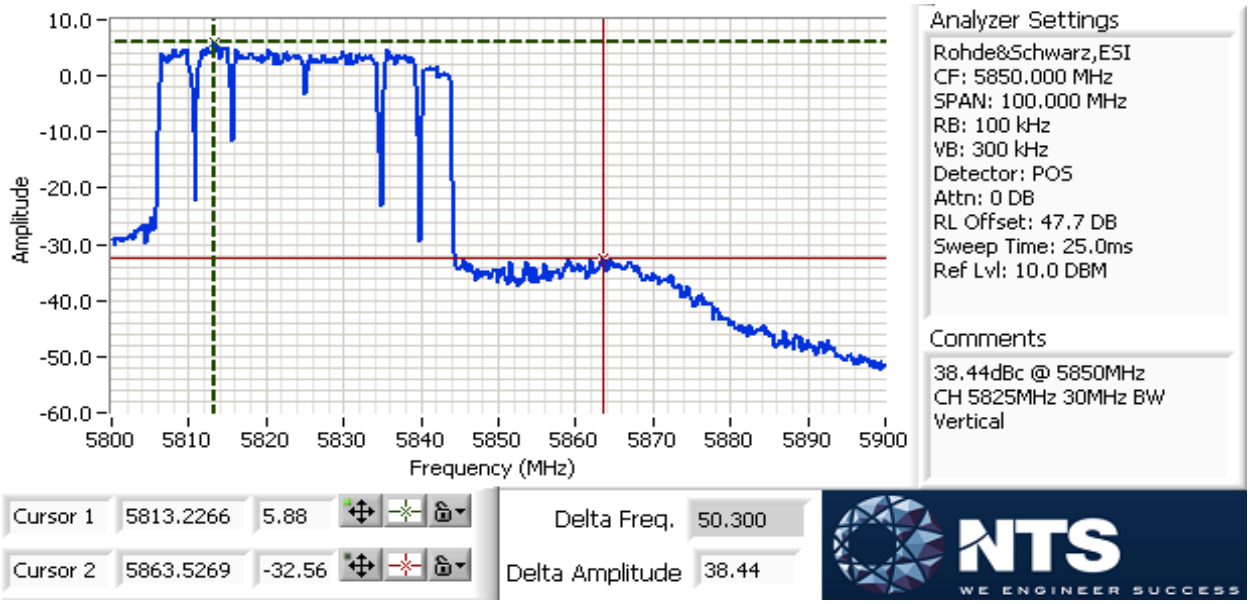
Date of Test: 3/12/2014
Test Engineer: Jack Liu
Test Location: FT Chamber #7

Band Edge at 5850 MHz

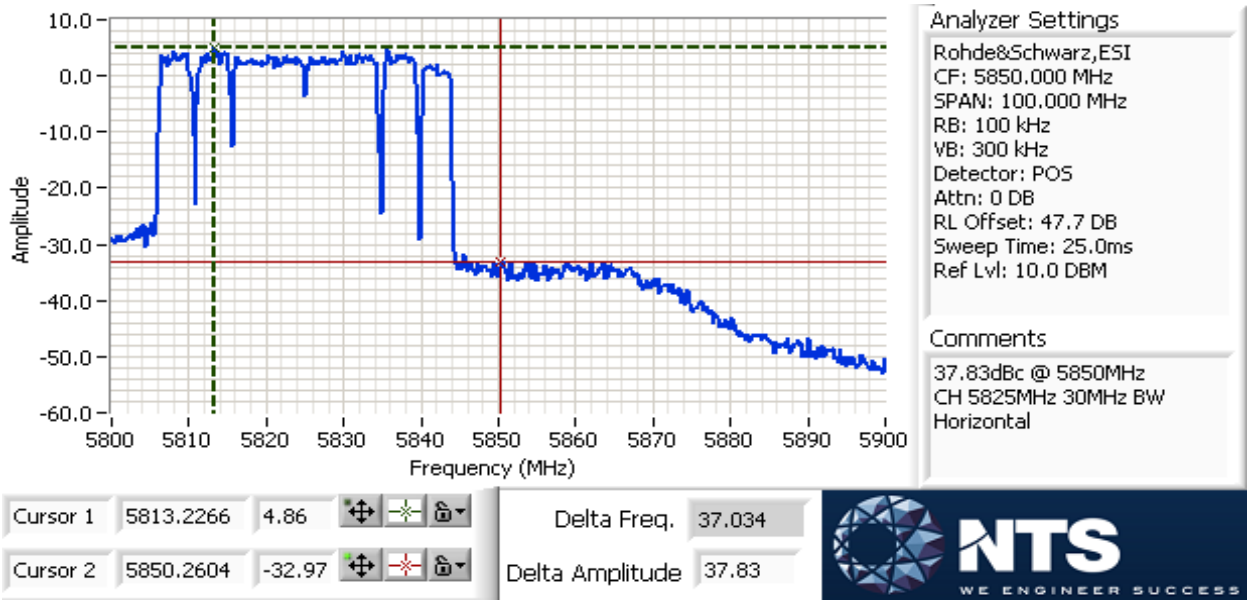
Carrier frequency	Carrier level	Spurious frequency	Spurious Level	Spurious Level	Limit	Margin	Detector	Comments
MHz	dBm	MHz	dBm	dBc	dBc	dB	Pk/QP/Avg	
5813.230	5.88	5863.53	-32.56	-38.44	-30.00	-8.44	Pk	RB: 100 kHz, VB: 300 kHz ; V
5813.230	4.86	5850.26	-32.97	-37.83	-30.00	-7.83	Pk	RB: 100 kHz, VB: 300 kHz ; H
Note 1:	Maximum average output power was used to demonstrate compliance hence peak power in any 100 kHz bandwidth outside of the authorized frequency band shall be attenuated by at least 30 dB relative to the maximum in-band peak PSD level in 100 kHz							

Client:	Nextivity Inc	Job Number:	J94664
Model:	D32-2/4NU and D32-2/4CU	T-Log Number:	T94720
		Account Manager:	Christine Krebill
Contact:	Michiel Lotter		
Standard:	FCC Part 15.247, Part 15.407 and RSS 210	Class:	N/A

5850 MHz, 30 MHz BW, Vertical polarity



5850 MHz, 30 MHz BW, Horizontal polarity



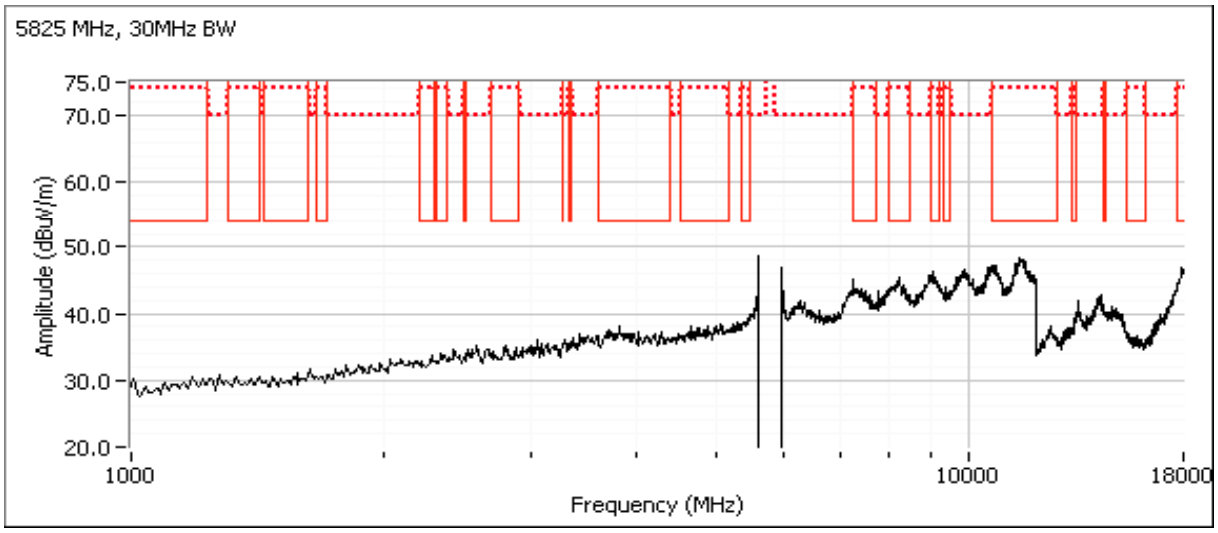
Client:	Nextivity Inc	Job Number:	J94664
Model:	D32-2/4NU and D32-2/4CU	T-Log Number:	T94720
		Account Manager:	Christine Krebill
Contact:	Michiel Lotter		
Standard:	FCC Part 15.247, Part 15.407 and RSS 210	Class:	N/A

Date of Test: 3/14/2014
Test Engineer: Jack Liu
Test Location: FT Chamber #7

High Channel @ 5825 MHz 30 MHz BW
Spurious Radiated Emissions:

Frequency	Level	Pol	FCC 15.209		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
11506.420	44.2	V	54.0	-9.8	AVG	14	1.0	Maximum noise floor reading

Note 1: Scans made between 18 - 40 GHz with the measurement antenna moved around the card and its antennas 20-50 cm from the device indicated there were no significant emissions in this frequency range



Client:	Nextivity Inc	Job Number:	J94664
Model:	D32-2/4NU and D32-2/4CU	T-Log Number:	T94720
		Account Manager:	Christine Krebill
Contact:	Michiel Lotter		
Standard:	FCC Part 15.247, Part 15.407 and RSS 210	Class:	N/A

Run #2b: Low Channel @ 5765 MHz 40 MHz BW (DTS)

Date of Test: 3/12/2014
Test Engineer: Rafael Varelas
Test Location: FT Chamber #7

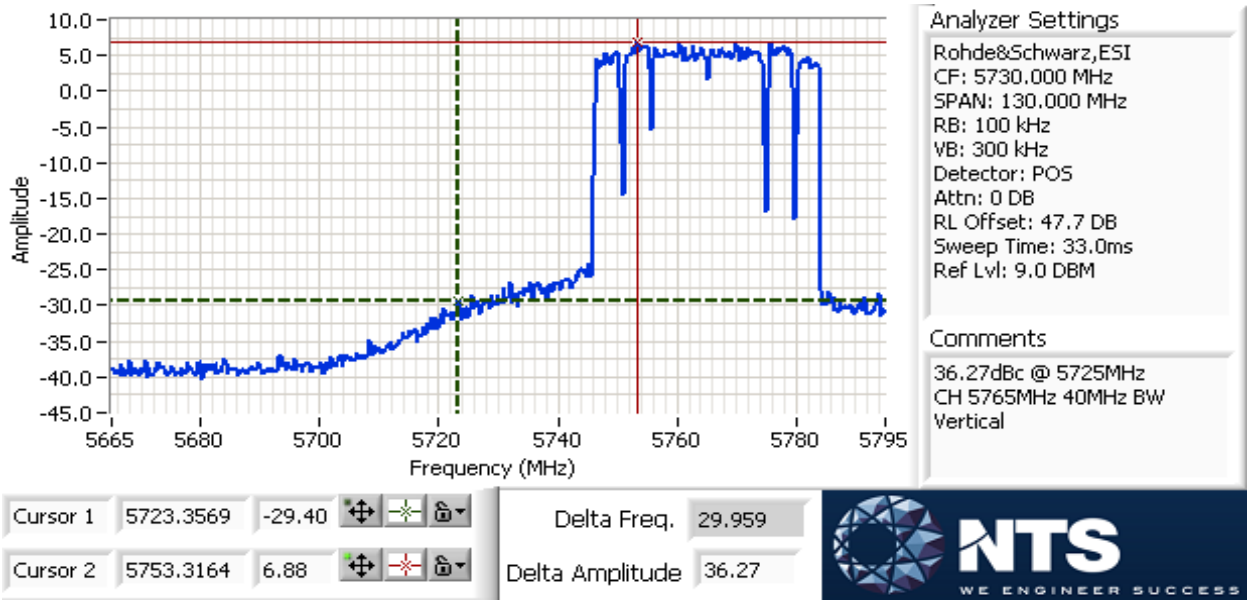
Band Edge at 5725 MHz

Carrier frequency	Carrier level	Spurious frequency	Spurious Level	Spurious Level	Limit	Margin	Detector	Comments
MHz	dBm	MHz	dBm	dBc	dBc	dB	Pk/QP/Avg	
5753.316	6.88	5723.3569	-29.40	-36.27	-30.00	-6.27	Pk	RB: 100 kHz, VB: 300 kHz ; V
5775.722	6.44	5723.3569	-29.36	-35.80	-30.00	-5.80	Pk	RB: 100 kHz, VB: 300 kHz ; H

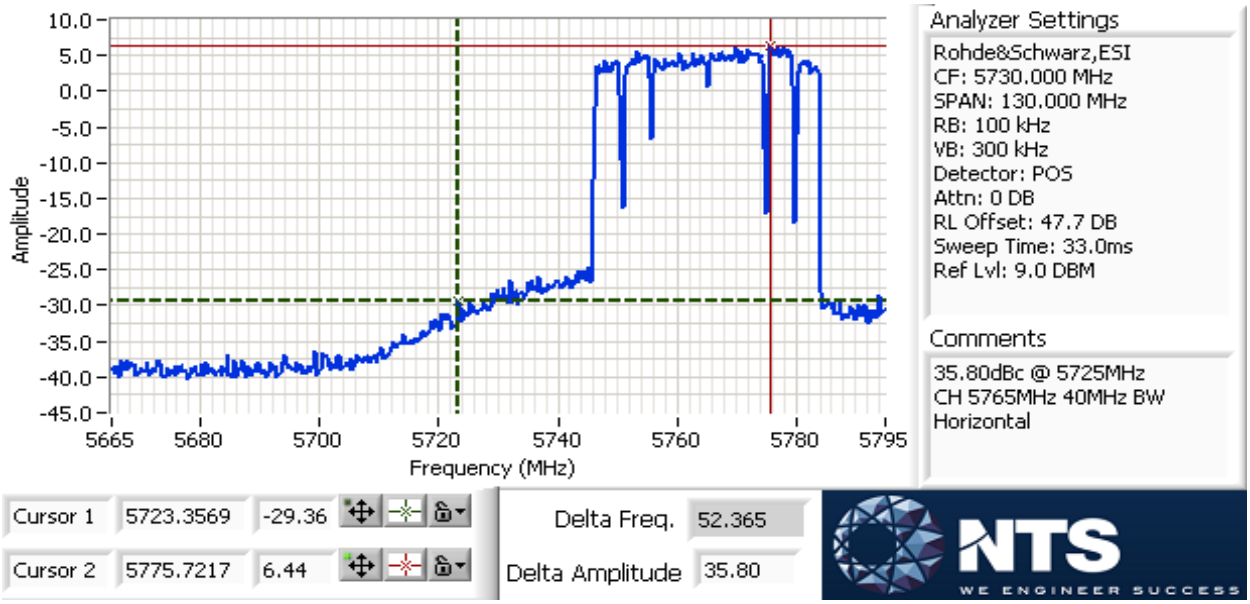
Note 1: Maximum average output power was used to demonstrate compliance hence peak power in any 100 kHz bandwidth outside of the authorized frequency band shall be attenuated by at least 30 dB relative to the maximum in-band peak PSD level in 100 kHz

Client:	Nextivity Inc	Job Number:	J94664
Model:	D32-2/4NU and D32-2/4CU	T-Log Number:	T94720
		Account Manager:	Christine Krebill
Contact:	Michiel Lotter		
Standard:	FCC Part 15.247, Part 15.407 and RSS 210	Class:	N/A

5765 MHz, 40 MHz BW, Vertical polarity



5765 MHz, 40 MHz BW, Horizontal polarity



Client:	Nextivity Inc	Job Number:	J94664
Model:	D32-2/4NU and D32-2/4CU	T-Log Number:	T94720
		Account Manager:	Christine Krebill
Contact:	Michiel Lotter		
Standard:	FCC Part 15.247, Part 15.407 and RSS 210	Class:	N/A

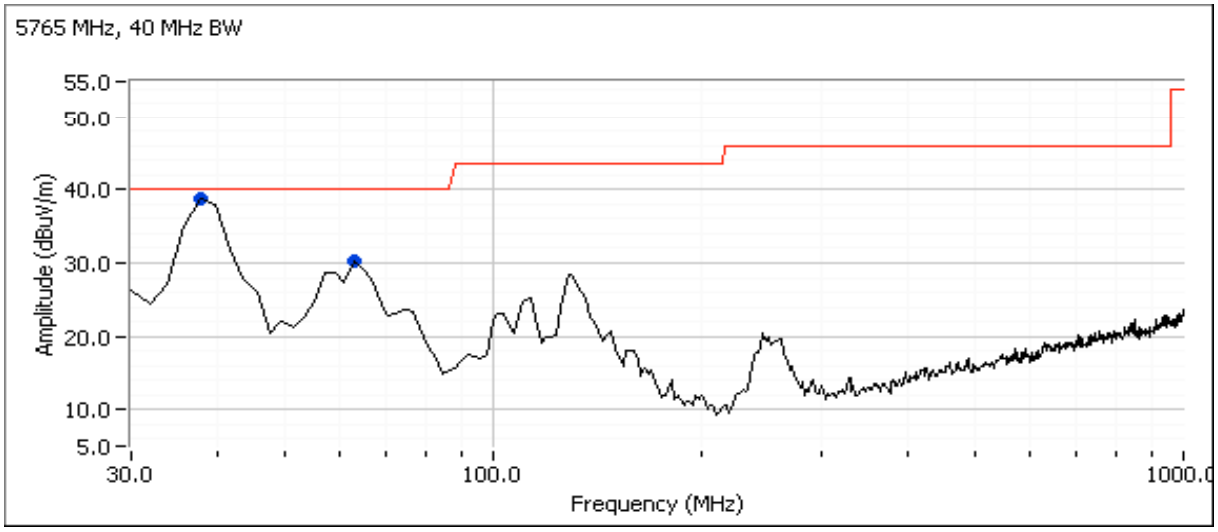
Low Channel @ 5765 MHz 40 MHz BW

Date of Test: 3/14/2014, 3/17/14
Test Engineer: Jack Liu / R. varelas, Deniz Demirci
Test Location: FT Chamber #7

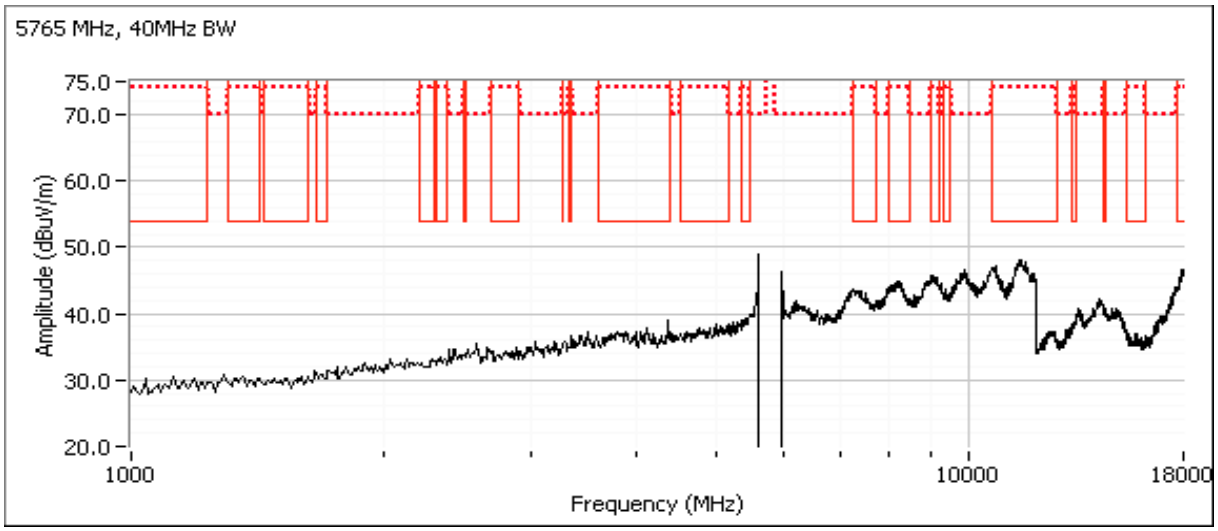
Spurious Radiated Emissions:

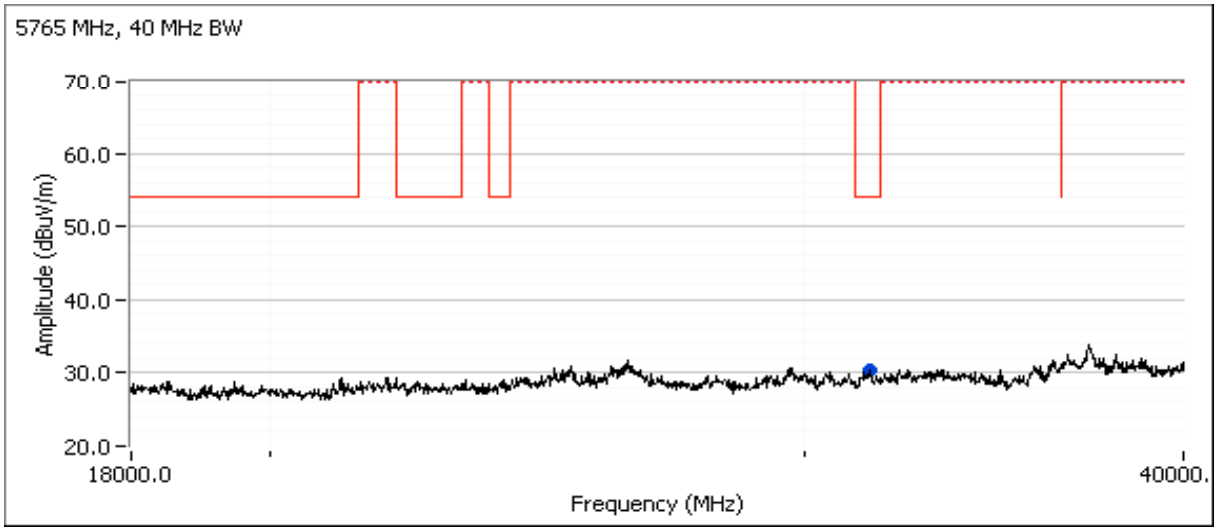
Frequency	Level	Pol	FCC 15.209		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
38.767	35.6	V	40.0	-4.4	QP	298	1.0	QP (1.00s)
64.154	31.3	V	40.0	-8.7	QP	192	1.0	QP (1.00s)
31540.680	24.0	H	54.0	-30.0	AVG	332	1.2	Noise floor reading

Note 1:	Emissions in the 30-1000 MHz range are not radio related, they are the same regardless of channel.
Note 2:	Scans made between 18 - 40 GHz with the measurement antenna moved around the card and its antennas 20-50 cm from the device indicated there were no significant emissions in this frequency range



Client:	Nextivity Inc	Job Number:	J94664
Model:	D32-2/4NU and D32-2/4CU	T-Log Number:	T94720
		Account Manager:	Christine Krebill
Contact:	Michiel Lotter		
Standard:	FCC Part 15.247, Part 15.407 and RSS 210	Class:	N/A





Client:	Nextivity Inc	Job Number:	J94664
Model:	D32-2/4NU and D32-2/4CU	T-Log Number:	T94720
		Account Manager:	Christine Krebill
Contact:	Michiel Lotter		
Standard:	FCC Part 15.247, Part 15.407 and RSS 210	Class:	N/A

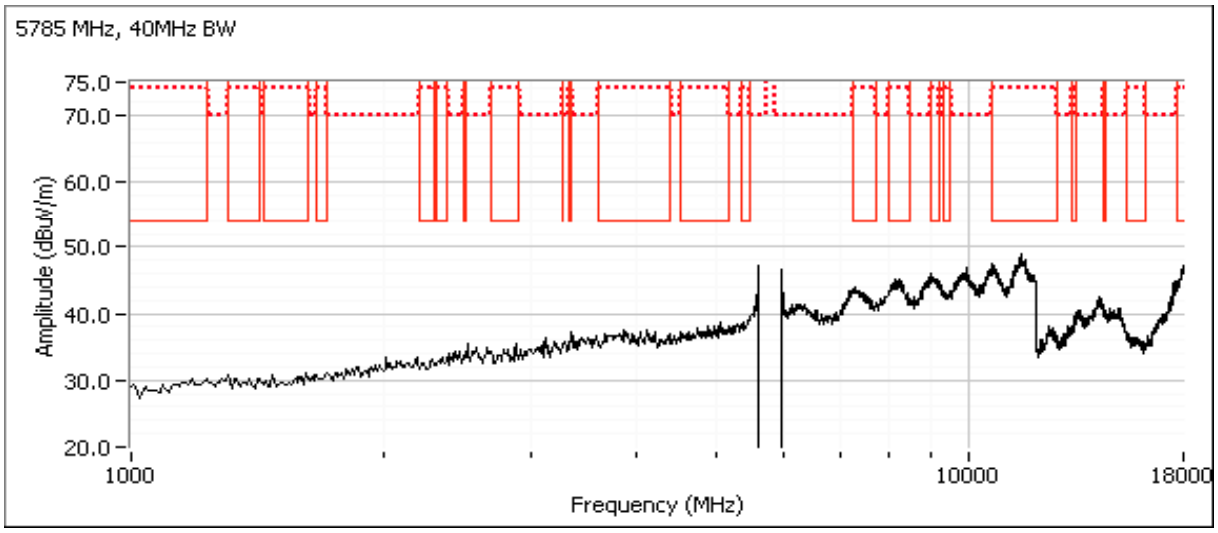
Run #2b: Center Channel @ 5785 MHz 40 MHz BW

Date of Test: 3/14/2014
Test Engineer: Jack Liu / R. varelas
Test Location: FT Chamber #7

Spurious Radiated Emissions:

Frequency	Level	Pol	FCC 15.209		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
11505.550	44.2	V	54.0	-9.8	AVG	14	1.0	Maximum noise floor reading

Note 1:	Scans made between 18 - 40 GHz with the measurement antenna moved around the card and its antennas 20-50 cm from the device indicated there were no significant emissions in this frequency range



Client:	Nextivity Inc	Job Number:	J94664
Model:	D32-2/4NU and D32-2/4CU	T-Log Number:	T94720
		Account Manager:	Christine Krebill
Contact:	Michiel Lotter		
Standard:	FCC Part 15.247, Part 15.407 and RSS 210	Class:	N/A

Run #2b: High Channel @ 5825 MHz 40 MHz BW

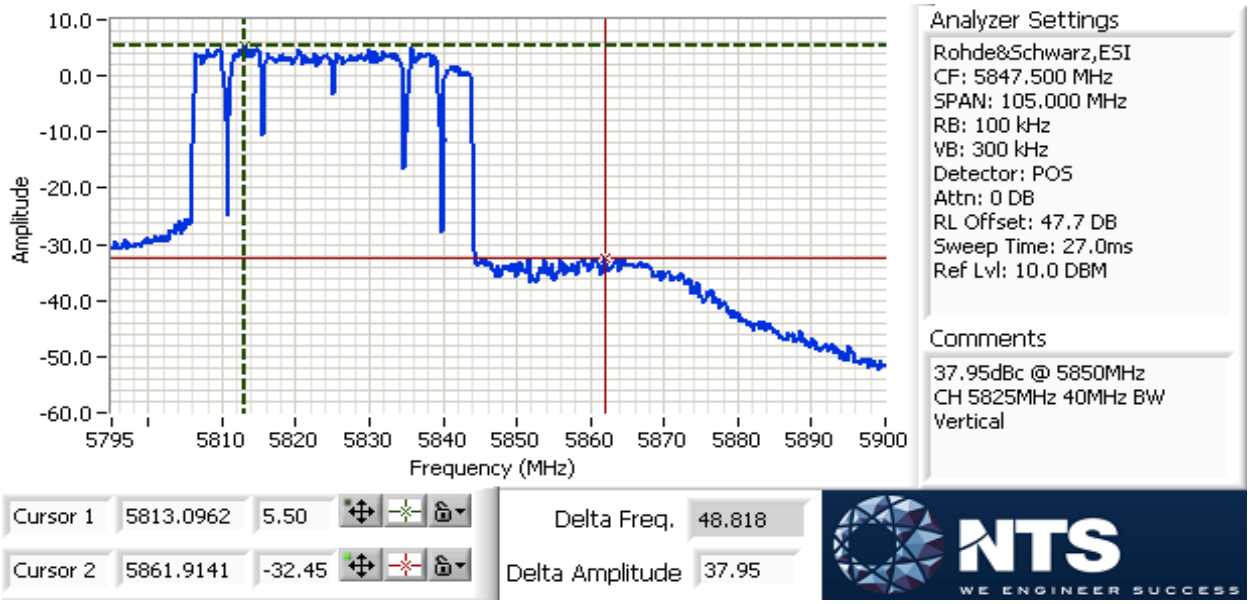
Date of Test: 3/12/2014
Test Engineer: Jack Liu / Rafael Varelas
Test Location: FT Chamber #7

Band Edge at 5850 MHz

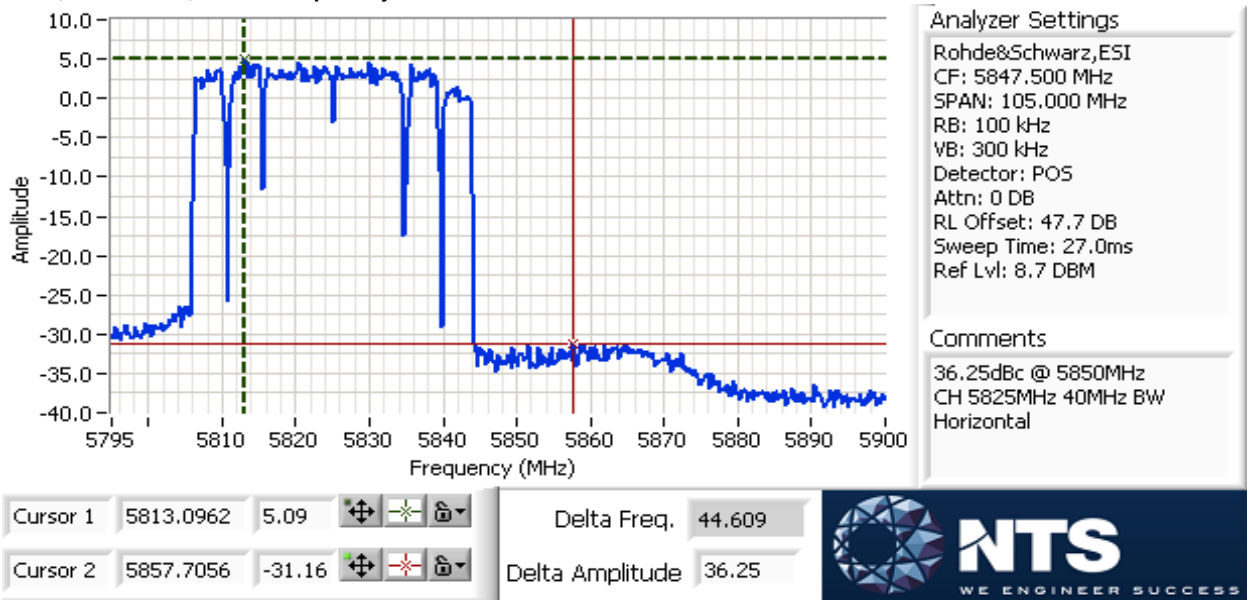
Carrier frequency	Carrier level	Spurious frequency	Spurious Level	Spurious Level	Limit	Margin	Detector	Comments
MHz	dBm	MHz	dBm	dBc	dBc	dB	Pk/QP/Avg	
5813.100	5.50	5861.91	-32.45	-37.95	-30.00	-7.95	Pk	RB: 100 kHz, VB: 300 kHz ; V
5813.096	5.09	5857.7056	-31.16	-36.25	-30.00	-6.25	Pk	RB: 100 kHz, VB: 300 kHz ; H
Note 1:	Maximum average output power was used to demonstrate compliance hence peak power in any 100 kHz bandwidth outside of the authorized frequency band shall be attenuated by at least 30 dB relative to the maximum in-band peak PSD level in 100 kHz							

Client:	Nextivity Inc	Job Number:	J94664
Model:	D32-2/4NU and D32-2/4CU	T-Log Number:	T94720
		Account Manager:	Christine Krebill
Contact:	Michiel Lotter		
Standard:	FCC Part 15.247, Part 15.407 and RSS 210	Class:	N/A

5825 MHz, 40 MHz BW, Vertical polarity



5825 MHz, 40 MHz BW, Horizontal polarity



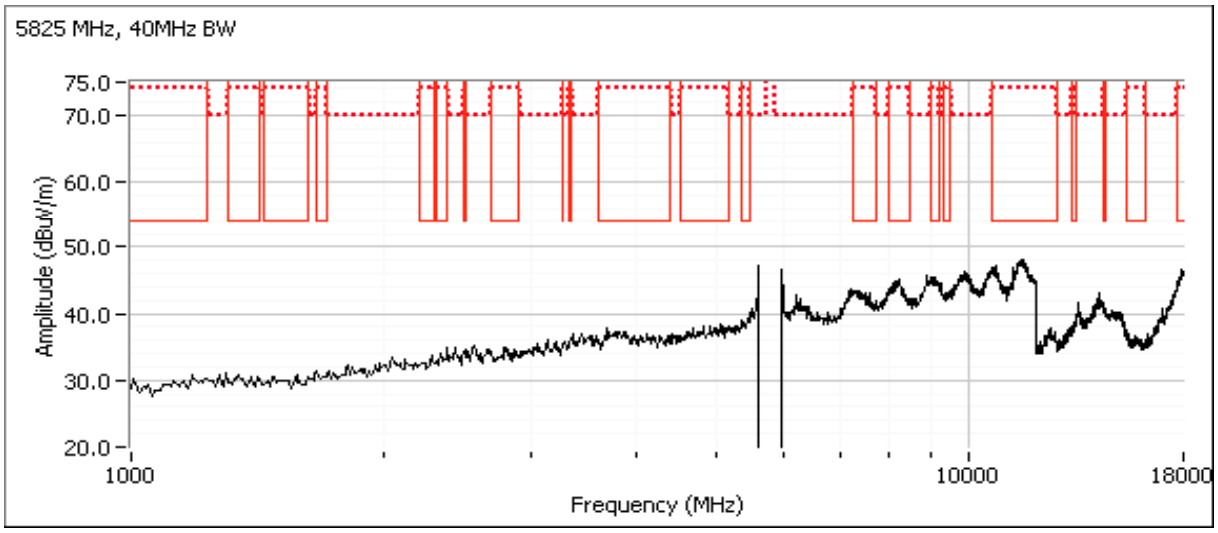
Client:	Nextivity Inc	Job Number:	J94664
Model:	D32-2/4NU and D32-2/4CU	T-Log Number:	T94720
		Account Manager:	Christine Krebill
Contact:	Michiel Lotter		
Standard:	FCC Part 15.247, Part 15.407 and RSS 210	Class:	N/A

Date of Test: 3/14/2014
Test Engineer: Jack Liu / R. varelas
Test Location: FT Chamber #7

High Channel @ 5825 MHz 40 MHz BW
Spurious Radiated Emissions:

Frequency	Level	Pol	FCC 15.209		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
11503.610	44.1	V	54.0	-9.9	AVG	14	1.0	Maximum noise floor reading

Note 1:	Scans made between 18 - 40 GHz with the measurement antenna moved around the card and its antennas 20-50 cm from the device indicated there were no significant emissions in this frequency range



Client:	Nextivity Inc	Job Number:	J94664
Model:	D32-2/4NU and D32-2/4CU	T-Log Number:	T94720
		Project Manager:	Christine Krebill
Contact:	Michiel Lotter	Project Coordinator:	-
Standard:	FCC Part 15.247, Part 15.407 and RSS 210	Class:	B

Conducted Emissions

(Elliott Laboratories Fremont Facility, Semi-Anechoic Chamber)

Test Specific Details

Objective: The objective of this test session is to perform final qualification testing of the EUT with respect to the specification listed above.

Date of Test: 3/19/2014
Test Engineer: Deniz Demirci
Test Location: Fremont Chamber #7

Config. Used: 1
Config Change: None
EUT Voltage: 120V/60Hz

General Test Configuration

For tabletop equipment, the EUT was located on a wooden table inside the semi-anechoic chamber, 40 cm from a vertical coupling plane and 80 cm from the LISN. A second LISN was used for all local support equipment. Remote support equipment was located outside of the semi-anechoic chamber. Cables running to remote support equipment where routed through metal conduit and passed through a ferrite clamp upon exiting the chamber.

Ambient Conditions:

Temperature: 21-23 °C
Rel. Humidity: 30-45 %

Summary of Results

Run #	Test Performed	Limit	Result	Margin
1	Coverage Unit CE, AC Power,120V/60Hz	Class B	Pass	27.1 dBµV @ 3.535 MHz (-18.9 dB)

Modifications Made During Testing

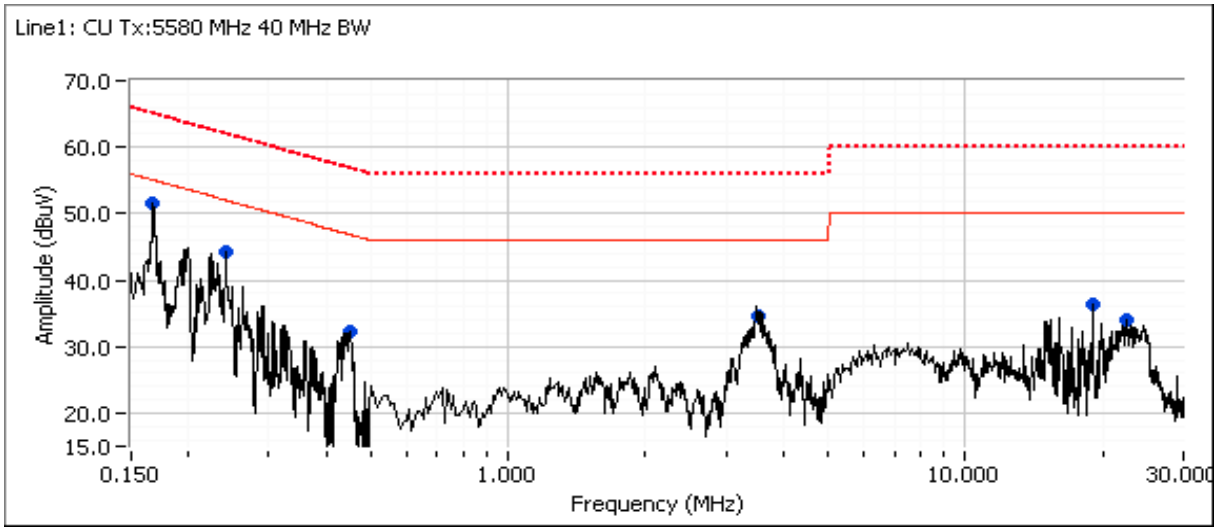
No modifications were made to the EUT during testing

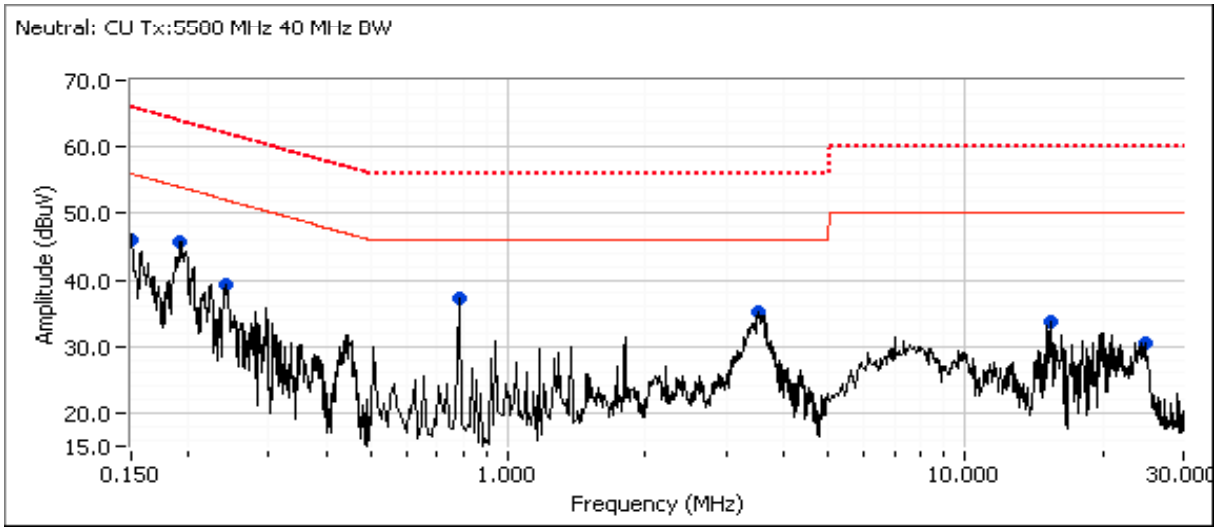
Deviations From The Standard

No deviations were made from the requirements of the standard.

Client:	Nextivity Inc	Job Number:	J94664
Model:	D32-2/4NU and D32-2/4CU	T-Log Number:	T94720
		Project Manager:	Christine Krebill
Contact:	Michiel Lotter	Project Coordinator:	-
Standard:	FCC Part 15.247, Part 15.407 and RSS 210	Class:	B

Run #1: AC Power Port Conducted Emissions, 0.15 - 30MHz, 120V/60Hz





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Preliminary peak readings captured during pre-scan (peak readings vs. average limit)

Frequency	Level	AC	Class B		Detector	Comments
MHz	dBµV	Line	Limit	Margin	QP/Ave	
0.168	*51.5*	*Line 1*	*55.1*	*-3.6*	*Peak*	
0.242	*44.2*	*Line 1*	*52.0*	*-7.8*	*Peak*	
0.450	*32.2*	*Line 1*	*46.9*	*-14.7*	*Peak*	
3.539	*34.6*	*Line 1*	*46.0*	*-11.4*	*Peak*	
18.978	*36.4*	*Line 1*	*50.0*	*-13.6*	*Peak*	
22.435	*34.1*	*Line 1*	*50.0*	*-15.9*	*Peak*	
0.151	*45.9*	*Neutral*	*56.0*	*-10.1*	*Peak*	
0.192	*45.6*	*Neutral*	*53.9*	*-8.3*	*Peak*	
0.241	*39.2*	*Neutral*	*52.1*	*-12.9*	*Peak*	
0.780	*37.2*	*Neutral*	*46.0*	*-8.8*	*Peak*	
3.539	*35.2*	*Neutral*	*46.0*	*-10.8*	*Peak*	
15.321	*33.7*	*Neutral*	*50.0*	*-16.3*	*Peak*	
24.739	*30.4*	*Neutral*	*50.0*	*-19.6*	*Peak*	

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Standard:	FCC Part 15.247, Part 15.407 and RSS 210	Class:	B

Final quasi-peak and average readings

Frequency	Level	AC	Class B		Detector	Comments
MHz	dBµV	Line	Limit	Margin	QP/Ave	
3.535	**27.1**	Neutral	46.0	**-18.9**	AVG	AVG (0.10s)
0.167	36.1	Line 1	55.1	-19.0	AVG	AVG (0.10s)
3.542	26.9	Line 1	46.0	-19.1	AVG	AVG (0.10s)
0.191	44.8	Neutral	64.0	-19.2	QP	QP (1.00s)
0.242	42.6	Neutral	62.0	-19.4	QP	QP (1.00s)
0.151	46.4	Neutral	65.9	-19.5	QP	QP (1.00s)
0.191	34.4	Neutral	54.0	-19.6	AVG	AVG (0.10s)
0.167	45.3	Line 1	65.1	-19.8	QP	QP (1.00s)
0.151	34.7	Neutral	55.9	-21.2	AVG	AVG (0.10s)
3.535	33.3	Neutral	56.0	-22.7	QP	QP (1.00s)
3.542	33.1	Line 1	56.0	-22.9	QP	QP (1.00s)
0.449	23.7	Line 1	46.9	-23.2	AVG	AVG (0.10s)
0.242	36.9	Line 1	62.0	-25.1	QP	QP (1.00s)
0.449	31.2	Line 1	56.9	-25.7	QP	QP (1.00s)
0.242	26.0	Line 1	52.0	-26.0	AVG	AVG (0.10s)
0.242	25.7	Neutral	52.0	-26.3	AVG	AVG (0.10s)
22.388	22.2	Line 1	50.0	-27.8	AVG	AVG (0.10s)
0.783	27.9	Neutral	56.0	-28.1	QP	QP (1.00s)
15.328	30.4	Neutral	60.0	-29.6	QP	QP (1.00s)
24.725	19.0	Neutral	50.0	-31.0	AVG	AVG (0.10s)
22.388	28.7	Line 1	60.0	-31.3	QP	QP (1.00s)
19.014	27.5	Line 1	60.0	-32.5	QP	QP (1.00s)
0.783	12.0	Neutral	46.0	-34.0	AVG	AVG (0.10s)
24.725	25.8	Neutral	60.0	-34.2	QP	QP (1.00s)
19.014	13.9	Line 1	50.0	-36.1	AVG	AVG (0.10s)
15.328	13.1	Neutral	50.0	-36.9	AVG	AVG (0.10s)

End of Report

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