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EMC Test Report

Application for FCC Grant of Equipment Authorization
Canada Certification

Innovation, Science and Economic Development Canada
RSS-Gen Issue 4 / RSS 247 Issue 2
FCC Part 15 Subpart C

Model: C052-XD1 and C054-XD1

IC CERTIFICATION #:	457A-C05XXD1
FCC ID:	AL8-C05XXD1
APPLICANT:	Plantronics Inc. P.O. Box 635 Santa Cruz, CA 95061-0635
TEST SITE(S):	National Technical Systems - Silicon Valley 41039 Boyce Road. Fremont, CA. 94538-2435
IC SITE REGISTRATION #:	2845B-4
REPORT DATE:	September 13, 2017
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FINAL TEST DATES:	August 1, 2, 10, 11 and 18, 2017
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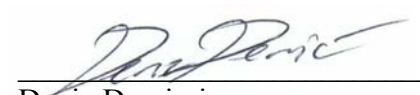
VALIDATING SIGNATORIES

PROGRAM MGR



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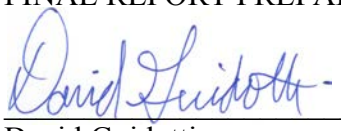

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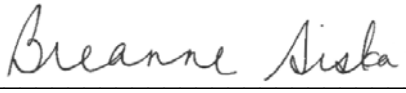
QUALITY ASSURANCE DELEGATE



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REVISION HISTORY

Rev#	Date	Comments	Modified By
-	September 13, 2017	First release	-
1	September 15, 2017	Typos corrected.	Deniz Demirci
2	September 26, 2017	Dates and version numbers added to undated reference standards. Revised to clarify below 30 MHz measurements. Clarified the EUT height above 1 GHz radiated emission measurements.	Deniz Demirci
3	December 5, 2017	Revised report to update model number	David Guidotti

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SCOPE

An electromagnetic emissions test has been performed on the Plantronics Inc. model C052-XD1 and C054-XD1, pursuant to the following rules:

RSS-Gen Issue 4 "General Requirements for Compliance of Radio Apparatus"
RSS 247 Issue 2 "Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSS) and Licence-Exempt Local Area Network (LE-LAN) Devices"
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 C63.10-2013
FCC DTS Measurement Guidance KDB558074 D01 v04 (April 5, 2017)

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.).

STATEMENT OF COMPLIANCE

The tested sample of Plantronics Inc. model C052-XD1 and C054-XD1 complied with the requirements of the following regulations:

RSS-Gen Issue 4 "General Requirements for Compliance of Radio Apparatus"
RSS 247 Issue 2 "Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSS) and Licence-Exempt Local Area Network (LE-LAN) Devices"
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 Plantronics Inc. model C052-XD1 and C054-XD1 and therefore apply only to the tested samples. The samples were selected and prepared by Bill Jones of Plantronics Inc..

C052-XD and C054-XD are electrically identical except the cradle (charger) shape. The radiated and AC conducted emission tests were performed for both samples and the results are presented for C054-XD (Helios Base) as worst case.

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 (902 – 928 MHz)

FCC Rule Part	RSS Rule Part	Description	Measured Value / Comments	Limit / Requirement	Result
15.247(a)	RSS 247 5.2	Digital Modulation	Systems uses DSSS techniques	System must utilize a digital transmission technology	Complies
15.247 (a) (2)	RSS 247 5.2 (1)	6 dB Bandwidth	0.885 MHz	> 500 kHz	Complies
15.247 (b) (3)	RSS 247 5.4 (4)	Output Power, 902 – 928 MHz	18.3 dBm (0.068 Watts) EIRP = 0.112 W Note 1	1 Watt, EIRP limited to 4 Watts.	Complies
15.247(e)	RSS 210 5.2 (2)	Power Spectral Density	4 dBm/3 kHz	8 dBm/3 kHz	Complies
15.247(d)	RSS 247 5.5	Antenna Port Spurious Emissions 890 MHz – 940 MHz	-30 dBc	< -20 dBc	Complies
15.247(d) / 15.209	RSS 247 5.5	Radiated Spurious Emissions 9 kHz – 10 GHz	46.9 dBµV/m @ 3936.3 MHz (-7.1 dB)	Refer to the limits section (p18) for restricted bands, all others < -20 dBc	Complies
Note 1: EIRP calculated using antenna gain of 2.2 dBi for the highest EIRP system.					

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 antenna	Unique or integral antenna required	Complies
15.407 (b) (6)	RSS-Gen Table 3	AC Conducted Emissions	34.6 dBµV @ 2.283 MHz (-21.4 dB)	Refer to page 17	Complies
15.247 (i) 15.407 (f)	RSS 102	RF Exposure Requirements	Refer to SAR exclusion calculation in separate exhibit and RSS 102 declaration.	Refer to OET 65, FCC Part 1 and RSS 102	Complies
-	RSS-Gen 8.3	User Manual	Integral antenna	Statement for products with detachable antenna	Complies
-	RSS-Gen 8.4	User Manual	Refer to the User Manual	Statement for all products	Complies
-	RSP-100 RSS-Gen 6.6	Occupied Bandwidth	1.218 MHz	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	± 0.5 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
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 Plantronics Inc. model C052-XD1 and C054-XD1 are base units for Plantronics phone headsets.
The samples were received on August 1, 2017 and tested on August 1, 2, 10, 11 and 18, 2017. The EUT consisted of the following component(s):

Company	Model	Description	Serial Number	FCC ID
Plantronics	C052-XD1 C054-XD1	Base unit for WH300 and WH350 Base unit for W500-XD	MBZ Base 4	AL8-C05XXD1
Plantronics	SSA-5W 090050	AC/DC power supply	-	-

OTHER EUT DETAILS

The EUT has Tx diversity antenna. The EUT selects the antenna based on receiver quality. The radiated spurious emissions pre-scans were performed with manual selection of the antennas and the auto antenna mode. Automated antenna selection results were selected for compliance measurements as worse case.
The EUT has TDD air interface protocol with maximum of 7 % source based duty cycle.

ANTENNA SYSTEM

Integral antennas.

ENCLOSURE

The EUT enclosure measures approximately 10 x 10 x 10 cm. It is primarily constructed of plastic.

MODIFICATIONS

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

SUPPORT EQUIPMENT

The following equipment was used as support equipment for testing:

Company	Model	Description	Serial Number	FCC ID
Plantronics	-	Call indication	-	-
Lucent	-	Phone	0821	-
Plantronics	Hermit/Helios	Headsets (Remote)	-	-

EUT INTERFACE PORTS

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

Port	Connected To	Cable(s)		
		Description	Shielded or Unshielded	Length(m)
Call indication	Call indicator	LED	Unshielded	0.8
Phone line	Phone	Phone cable	Unshielded	2.0
DC power	AC/DC power supply	DC power	Unshielded	0.8

EUT OPERATION

During testing, the EUT was transmitting with full power for each test cases detailed in the test report.

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 4	US0027	2845B-4	41039 Boyce Road Fremont, CA 94538-2435

ANSI C63.4-2014 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 C63.4-2014.

CONDUCTED EMISSIONS CONSIDERATIONS

Conducted emissions testing is performed in conformance with ANSI C63.10-2013. 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 C63.4-2014 guidelines and meet the Normalized Site Attenuation (NSA) requirements of ANSI C63.4-2014.

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 20 Hz, 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 1000 MHz 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

Software is used to view and convert 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 software used for radiated and conducted emissions measurements is NTS EMI Test Software (rev 2.10)

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 C63.10-2013 specifies that the test height above ground for table mounted devices shall be 0.8 m for below 1 GHz measurements and 1.5 m for above 1 GHz measurements. 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 C63.4-2014. 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 C63.10-2013, 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.

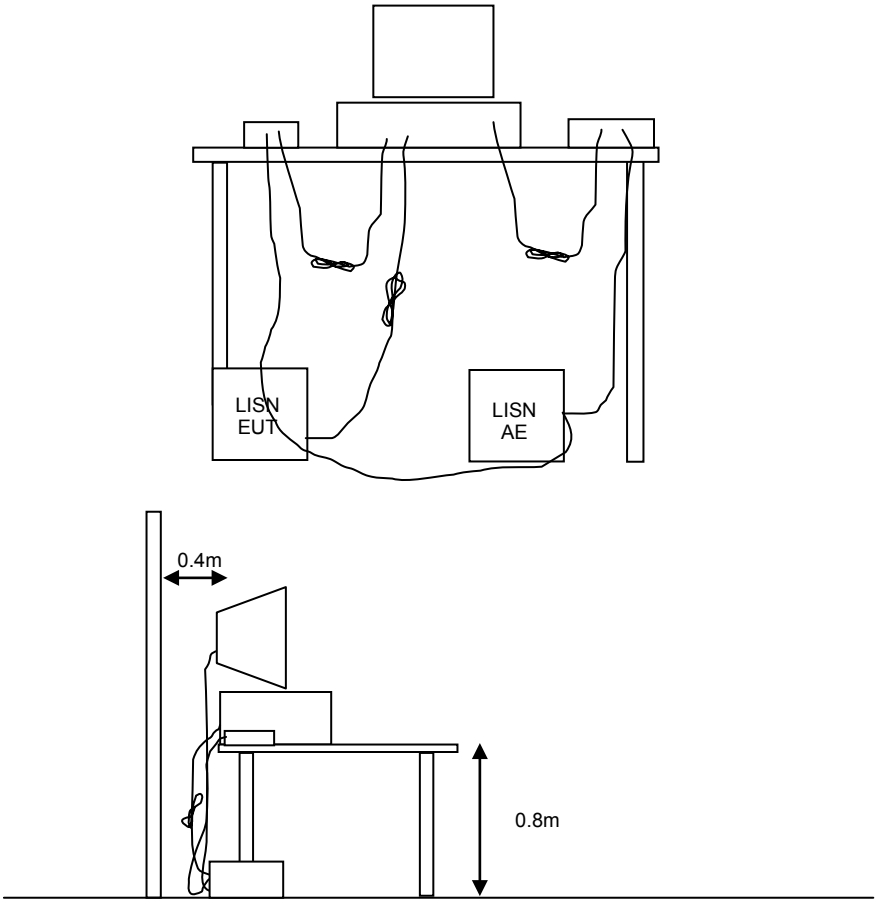


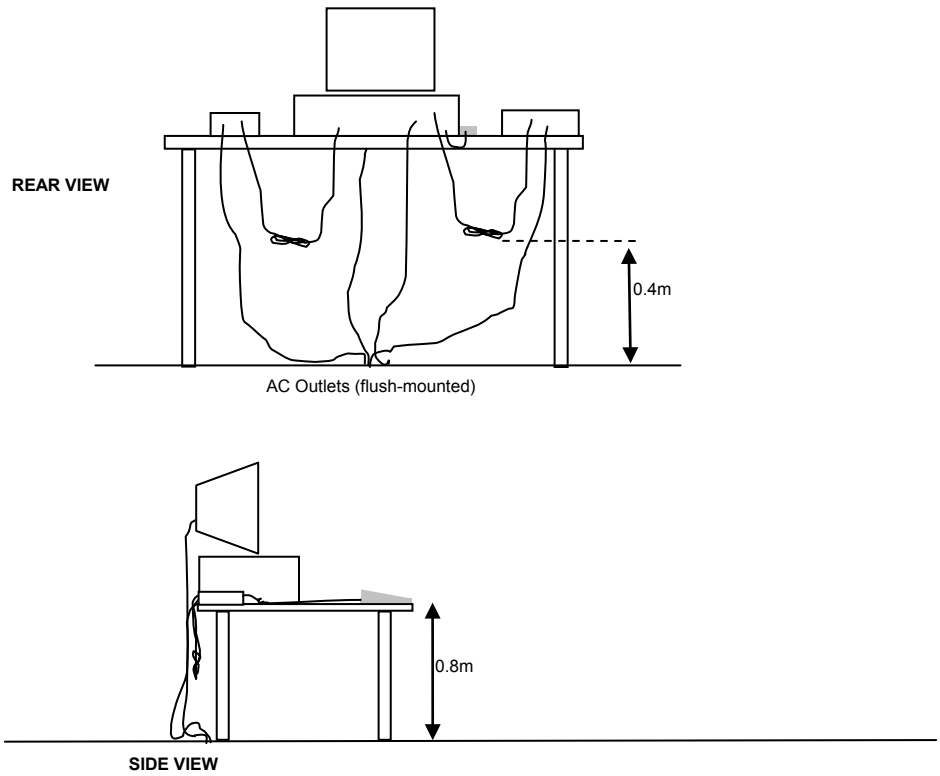
Figure 1 Typical Conducted Emissions Test Configuration

RADIATED EMISSIONS

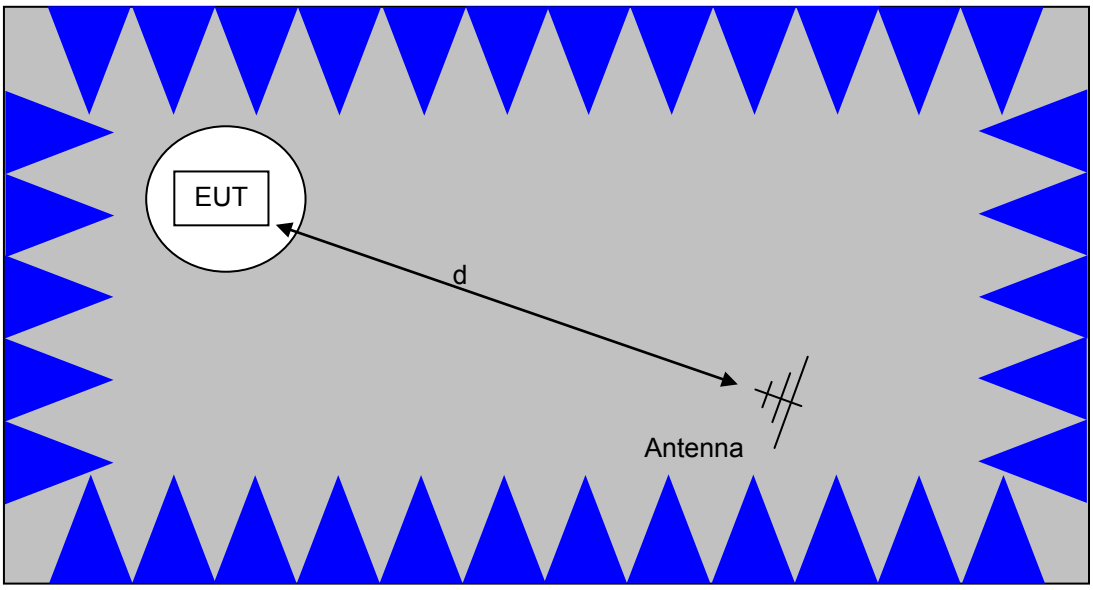
A preliminary scan of the radiated emissions is performed in which all significant EUT frequencies are identified with the system in a nominal configuration. At least two scans are performed, one scan for each antenna polarization (horizontal and vertical; loop parallel and perpendicular to the EUT). 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 1 m). 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.

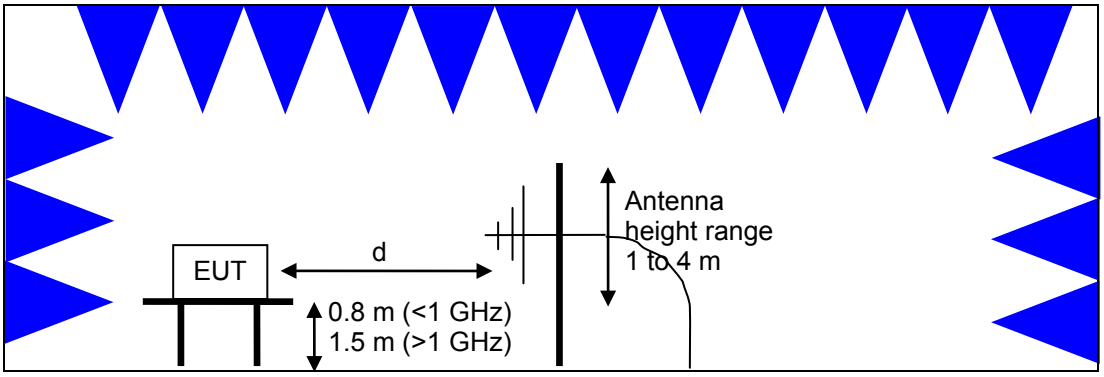


Typical Test Configuration for Radiated Field Strength Measurements



The anechoic materials on the walls and ceiling ensure compliance with the normalized site attenuation requirements of CISPR 16 / CISPR 22 / ANSI C63.4-2014 for an alternate test site at the measurement distances used.

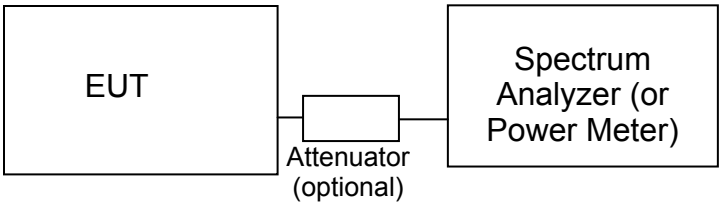
Floor-standing equipment is placed on the floor with insulating supports between the unit and the ground plane.



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 6 dB, 20 dB, 26 dB and/or 99% signal bandwidth are measured using the bandwidths recommended by ANSI C63.10-2013 and RSS GEN Issue 4.

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].

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 and RSS GEN Table 2. Note that receivers operating outside of the frequency range 30 MHz – 960 MHz are exempt from the requirements of 15.109 and receivers that are not stand-alone are exempt from the ISED Canada requirements per RSS-GEN.

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 15.205 and RSS-Gen Table 6

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/3 kHz
2400 – 2483.5	1 Watt (30 dBm)	8 dBm/3 kHz
5725 – 5850	1 Watt (30 dBm)	8 dBm/3 kHz

The maximum permitted output power is reduced by 1 dB for every dB the antenna gain exceeds 6 dBi.

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 247. All other unwanted (spurious) emissions shall be at least 20 dB below the level of the highest in-band signal level (30 dB 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 30 MHz, 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

Appendix A Test Equipment Calibration Data

Manufacturer	Description	Model	Asset #	Calibrated	Cal Due
Radiated Emissions, 9 kHz - 10,000 MHz, 01-Aug-17					
National Technical Systems	NTS EMI Software (rev 2.10)	N/A	0		N/A
National Technical Systems	NTS Capture Analyzer Software (rev 3.8)	N/A	0		N/A
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	785	10/5/2016	10/5/2017
EMCO	Antenna, Horn, 1-18 GHz (SA40-Red)	3115	1142	9/29/2016	9/29/2018
Hewlett Packard	Spectrum Analyzer (SA40) Red 30 Hz -40 GHz	8564E (84125C)	1148	10/31/2016	11/1/2017
Hewlett Packard	High Pass filter, 1.5 GHz (Blu System)	P/N 84300-80037 (84125C)	1389	9/9/2016	9/9/2017
Sunol Sciences	Biconilog, 30-3000 MHz	JB3	1548	10/12/2016	10/12/2018
Com-Power	Preamplifier, 30-1000 MHz	PA-103	1632	3/8/2017	3/8/2018
Rohde & Schwarz	EMI Test Receiver, 20 Hz-7 GHz	ESIB 7	1756	7/8/2017	7/8/2018
EMCO	Magnetic Loop Antenna, 9 kHz-30 MHz	AL-130	3003	8/9/2016	8/9/2018
Radiated Emissions, 1,000 - 10,000 MHz, 02-Aug-17					
National Technical Systems	NTS EMI Software (rev 2.10)	N/A	0		N/A
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	785	10/5/2016	10/5/2017
EMCO	Antenna, Horn, 1-18 GHz (SA40-Red)	3115	1142	9/29/2016	9/29/2018
Hewlett Packard	Spectrum Analyzer (SA40) Red 30 Hz -40 GHz	8564E (84125C)	1148	10/31/2016	11/1/2017
Hewlett Packard	High Pass filter, 1.5 GHz (Blu System)	P/N 84300-80037 (84125C)	1389	9/9/2016	9/9/2017
AC Power Line Conducted Emissions, 10-Aug-17					
National Technical Systems	NTS EMI Software (rev 2.10)	N/A	0		N/A
Rohde & Schwarz	Pulse Limiter	ESH3 Z2	1401	2/3/2017	2/3/2018
Rohde & Schwarz	EMI Test Receiver, 20 Hz-7 GHz	ESIB 7	1756	7/8/2017	7/8/2018
Fischer Custom Comm	LISN, 25A, 150kHz to 30MHz, 25 Amp,	FCC-LISN-50-25-2-09	2000	9/26/2016	9/26/2017
Radiated Emissions, 1,000 - 10,000 MHz, 10-Aug-17					
National Technical Systems	NTS EMI Software (rev 2.10)	N/A	0		N/A
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	785	10/5/2016	10/5/2017
EMCO	Antenna, Horn, 1-18 GHz	3115	786	12/21/2015	12/21/2017
Hewlett Packard	Spectrum Analyzer (SA40) Red 30 Hz -40 GHz	8564E (84125C)	1148	10/31/2016	11/1/2017
Antenna port measurements, 11-Aug-17					
National Technical Systems	NTS Capture Analyzer Software (rev 3.8)	N/A	0		N/A
Rohde & Schwarz	Power Meter, Single Channel	NRVS	1422	3/10/2017	3/10/2018

Manufacturer	Description	Model	Asset #	Calibrated	Cal Due
Rohde & Schwarz	Peak Power Sensor 100 uW - 2 Watts (w/ 20 dB pad, SN BJ5155)	NRV-Z32	1536	4/19/2017	4/21/2018
Agilent Technologies	USB Average Power Sensor	U2001A	2442	1/5/2017	1/5/2018
Agilent Technologies	3Hz -44GHz PSA Spectrum Analyzer	E4446A	2796	5/22/2017	5/22/2018
Radiated Emissions, 30 - 10,000 MHz, 18-Aug-17					
National Technical Systems	NTS EMI Software (rev 2.10)	N/A	0		N/A
National Technical Systems	NTS Capture Analyzer Software (rev 3.8)	N/A	0		N/A
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	785	10/5/2016	10/5/2017
EMCO	Antenna, Horn, 1-18 GHz (SA40-Red)	3115	1142	9/29/2016	9/29/2018
Hewlett Packard	Spectrum Analyzer (SA40) Red 30 Hz -40 GHz	8564E (84125C)	1148	10/31/2016	11/1/2017
Hewlett Packard	High Pass filter, 1.5 GHz (Blu System)	P/N 84300-80037 (84125C)	1389	9/9/2016	9/9/2017
Sunol Sciences	Biconilog, 30-3000 MHz	JB3	1548	10/12/2016	10/12/2018
Com-Power	Preamplifier, 30-1000 MHz	PA-103	1632	3/8/2017	3/8/2018
Rohde & Schwarz	EMI Test Receiver, 20 Hz-7 GHz	ESIB 7	1756	7/8/2017	7/8/2018

Appendix B Test Data

T105585 Pages 24 - 52

Client:	Plantronics Inc.	Job Number:	JD105563
Product	C052-XD1 and C054-XD1, 900 MHz Cordless Base	T-Log Number:	T105585
System Configuration:		Project Manager:	Christine Krebill
Contact:	Bill Jones	Project Coordinator:	
Emissions Standard(s):	FCC 15.247 / RSS-247	Class:	B
Immunity Standard(s):		Environment:	

EMC Test Data

For The

Plantronics Inc.

Product

C052-XD1 and C054-XD1, 900 MHz Cordless Base Units

Date of Last Test: 9/15/2017

Client:	Plantronics Inc.	Job Number:	JD105563
Model:	C052-XD1 and C054-XD1, 900 MHz Cordless Base Units	T-Log Number:	T105585
		Project Manager:	Christine Krebill
Contact:	Bill Jones	Project Coordinator:	-
Standard:	FCC 15.247 / RSS-247	Class:	N/A

RSS-247 and FCC 15.247 (DTS) Antenna Port Measurements

Power, PSD, Bandwidth and 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.

Date of Test: 8/11/2017
Test Engineer: Deniz Demirci
Test Location: Fremont EMC Lab #4A

Config. Used: 1
Config Change: None
EUT Voltage: 4 Vdc

General Test Configuration

The EUT was connected to the spectrum analyzer or power meter via a suitable attenuator. All measurements were made on a single chain.

All measurements have been corrected to allow for the external attenuators used.

Ambient Conditions:

Temperature: 20-22 °C
Rel. Humidity: 38-40 %

Summary of Results

Run #	Pwr setting	Avg Pwr	Test Performed	Limit	Pass / Fail	Result / Margin
1	Max		Output Power	15.247(b)	Pass	18.3 dBm
2	Max		Power spectral Density (PSD)	15.247(d)	Pass	4.0 dBm/3 kHz
3	Max		Minimum 6 dB Bandwidth	15.247(a)	Pass	0.885 MHz
3	Max		99% Bandwidth	RSS GEN	-	1.218 MHz
4	Max		Spurious emissions	15.247(b)	Pass	-30 dBc

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.

Sample Notes

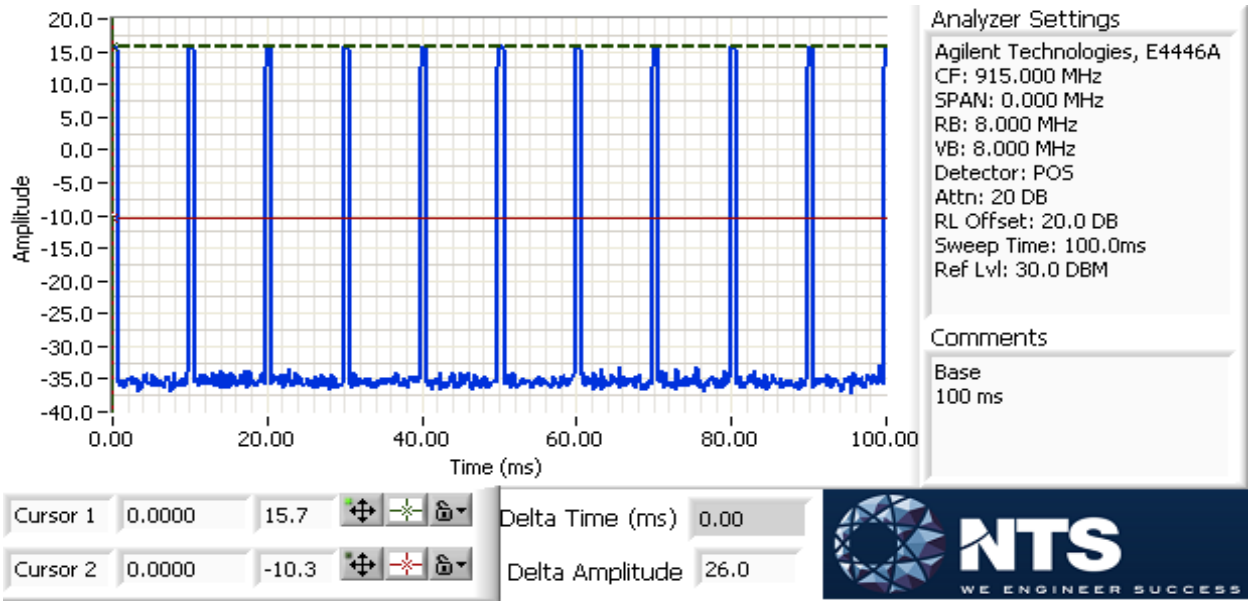
Sample S/N: MBZ
Driver: Ver19.50

Client:	Plantronics Inc.	Job Number:	JD105563
Model:	C052-XD1 and C054-XD1, 900 MHz Cordless Base Units	T-Log Number:	T105585
		Project Manager:	Christine Krebill
Contact:	Bill Jones	Project Coordinator:	-
Standard:	FCC 15.247 / RSS-247	Class:	N/A

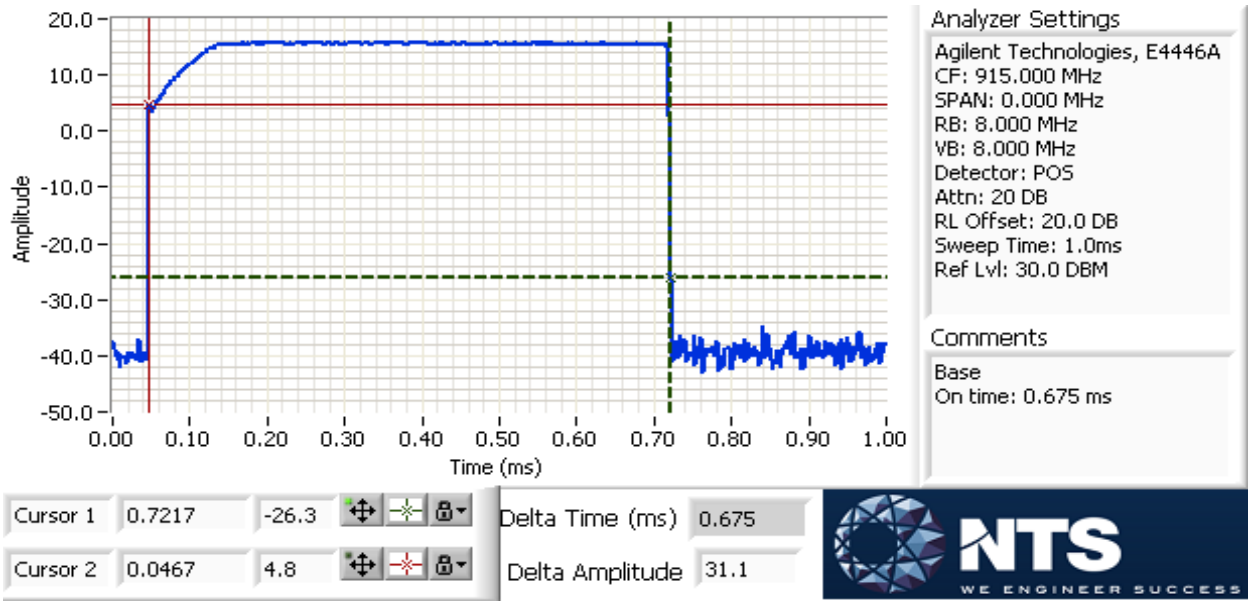
Procedure Comments:

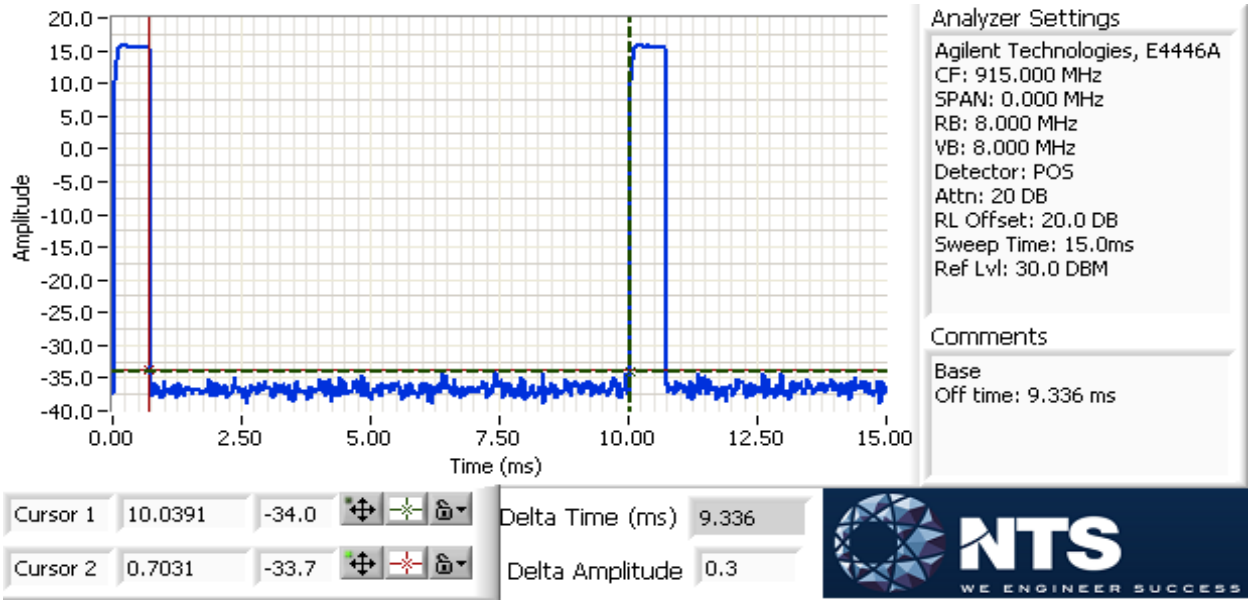
Measurements performed in accordance with FCC KDB 558074

Mode	Data Rate	Duty Cycle (x)	Constant DC?	T (ms)	Pwr Cor Factor*	Lin Volt Cor Factor**	Min VBW for FS (Hz)
Tx	-	0.07	Yes	0.675	-	-	-



Client:	Plantronics Inc.	Job Number:	JD105563
Model:	C052-XD1 and C054-XD1, 900 MHz Cordless Base Units	T-Log Number:	T105585
		Project Manager:	Christine Krebill
Contact:	Bill Jones	Project Coordinator:	-
Standard:	FCC 15.247 / RSS-247	Class:	N/A





Client:	Plantronics Inc.	Job Number:	JD105563
Model:	C052-XD1 and C054-XD1, 900 MHz Cordless Base Units	T-Log Number:	T105585
		Project Manager:	Christine Krebill
Contact:	Bill Jones	Project Coordinator:	-
Standard:	FCC 15.247 / RSS-247	Class:	N/A

Run #1: Output Power

Peak power

Power Setting	Frequency (MHz)	Output Power (dBm) [1]	Output Power mW	Antenna Gain (dBi)	Result	EIRP dBm	EIRP W	Output Power (dBm) [3]	Output Power mW
Max	902.850	18.3	67.6	2.2	Pass	20.5	0.112		
Max	915.000	15.9	38.9	2.2	Pass	18.1	0.065		
Max	927.125	15.0	31.6	2.2	Pass	17.2	0.052		

Note 1:	Output power measured using a peak power meter, spurious limit is -20 dBc.

Average power (During Tx on)- For information only

Power Setting	Frequency (MHz)	Output Power (dBm) [1]	Output Power mW	Antenna Gain (dBi)	Result	EIRP dBm	EIRP W	Output Power (dBm) [3]	Output Power mW
Max	902.850	17.4	54.95	2.2	Pass	19.6	0.091		
Max	915.000	15.0	31.62	2.2	Pass	17.2	0.052		
Max	927.125	14.1	25.70	2.2	Pass	16.3	0.043		

Note 1:	Output power measured using a gated average power meter

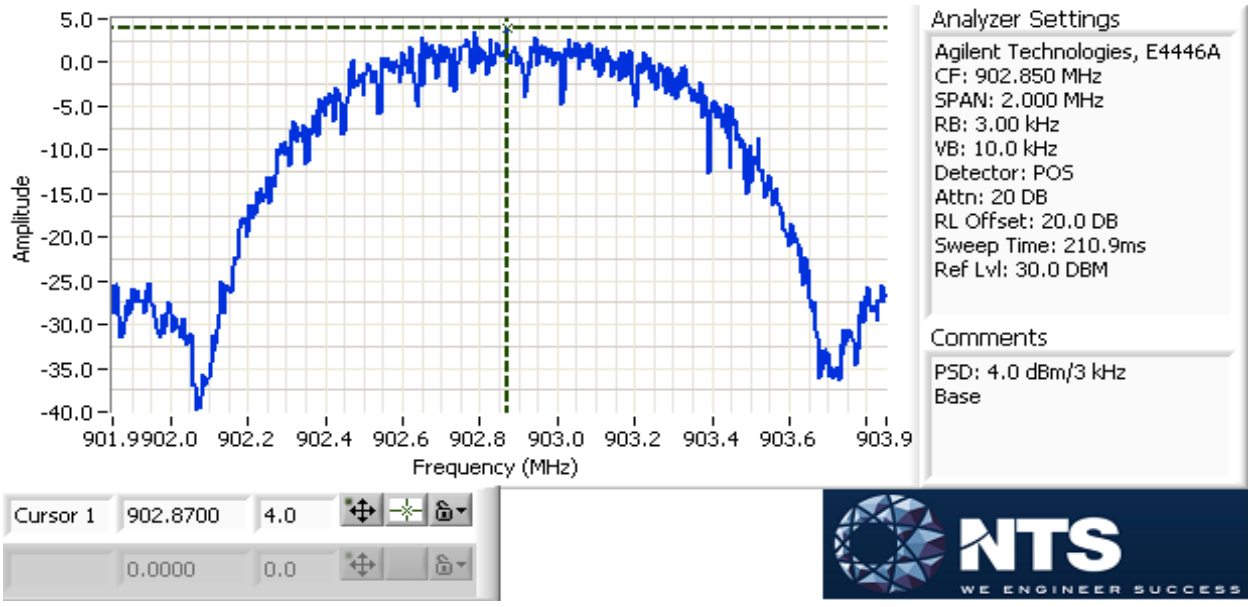
Client:	Plantronics Inc.	Job Number:	JD105563
Model:	C052-XD1 and C054-XD1, 900 MHz Cordless Base Units	T-Log Number:	T105585
		Project Manager:	Christine Krebill
Contact:	Bill Jones	Project Coordinator:	-
Standard:	FCC 15.247 / RSS-247	Class:	N/A

Run #2: Power spectral Density

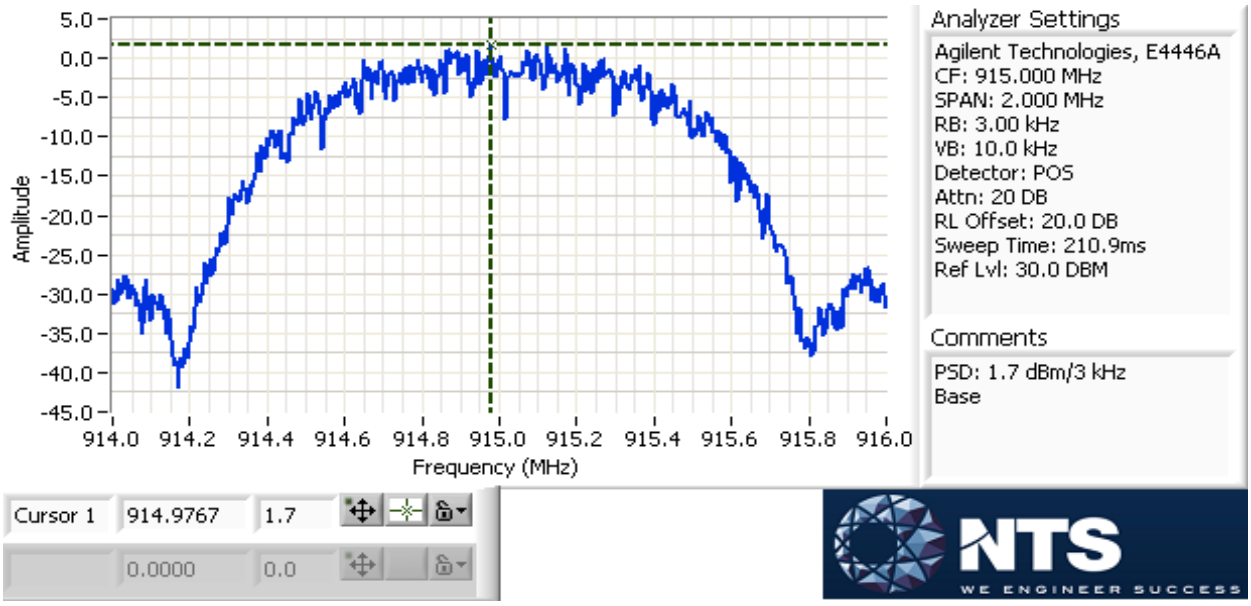
Mode: Tx

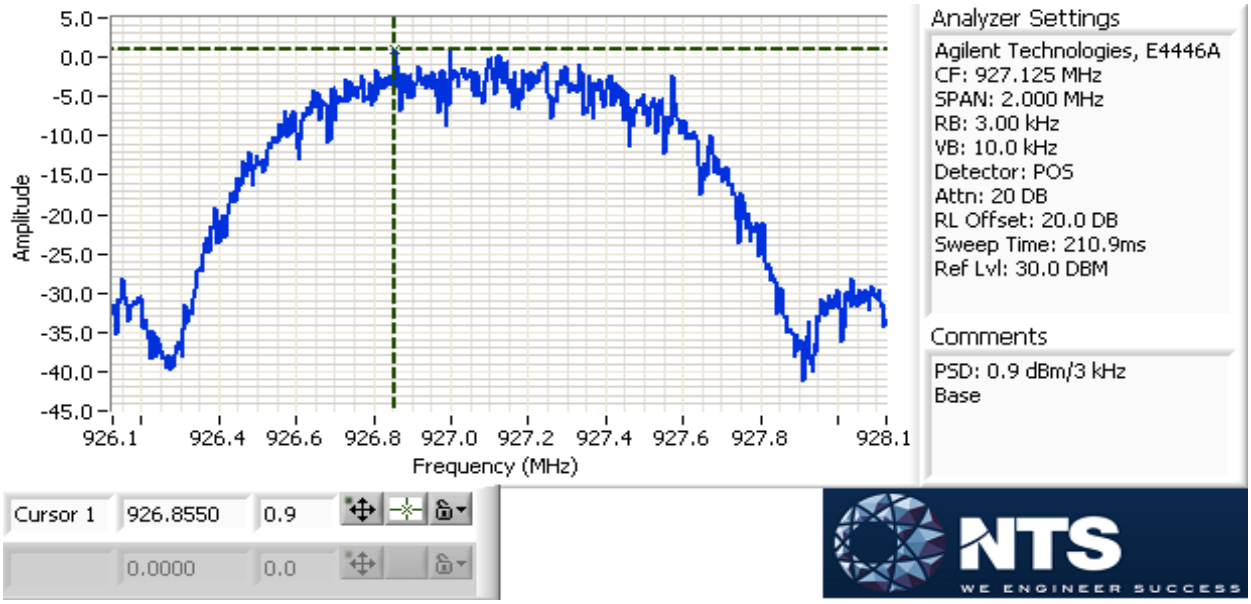
Power Setting	Frequency (MHz)	PSD (dBm/3 kHz) Note 1	Limit dBm/3 kHz	Result
Max	902.850	4.0	8.0	Pass
Max	915.000	1.7	8.0	Pass
Max	927.125	0.9	8.0	Pass

Note 1:	Test performed per method PKSPD, in KDB 558074. Power spectral density measured using: 3kHz ≤ RBW ≤ 100kHz, VBW=3*RBW, peak detector, span = 1.5*DTS BW, auto sweep time, max hold.



Client:	Plantronics Inc.	Job Number:	JD105563
Model:	C052-XD1 and C054-XD1, 900 MHz Cordless Base Units	T-Log Number:	T105585
		Project Manager:	Christine Krebill
Contact:	Bill Jones	Project Coordinator:	-
Standard:	FCC 15.247 / RSS-247	Class:	N/A





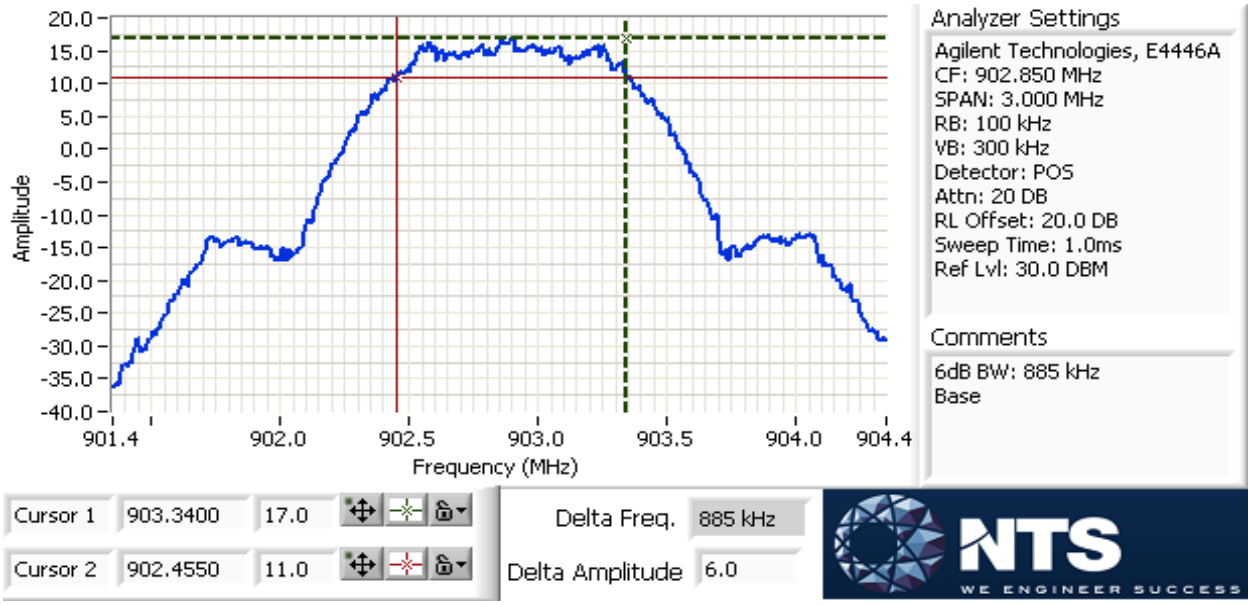
Client:	Plantronics Inc.	Job Number:	JD105563
Model:	C052-XD1 and C054-XD1, 900 MHz Cordless Base Units	T-Log Number:	T105585
		Project Manager:	Christine Krebill
Contact:	Bill Jones	Project Coordinator:	-
Standard:	FCC 15.247 / RSS-247	Class:	N/A

Run #3: Signal Bandwidth

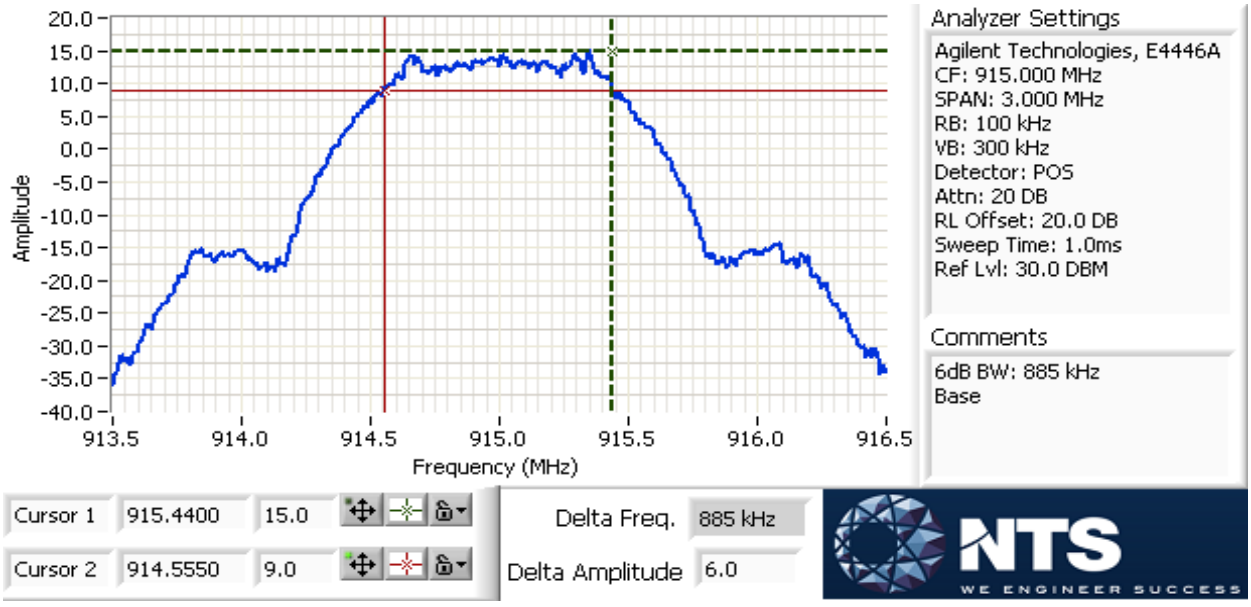
Mode: TX

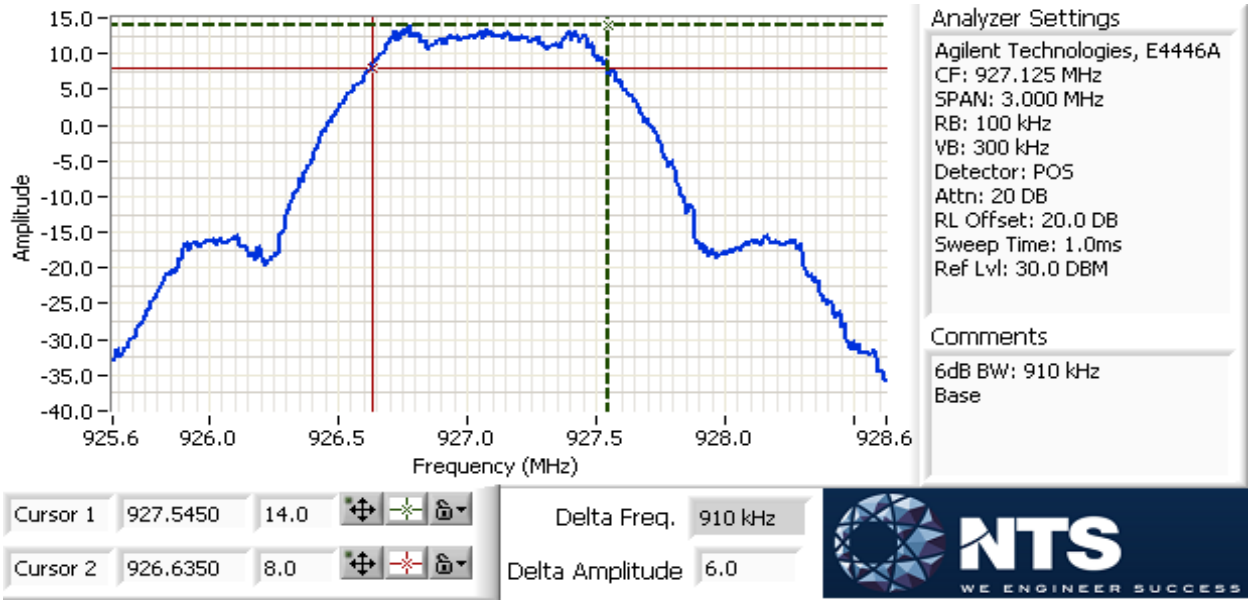
Power Setting	Frequency (MHz)	Bandwidth (MHz)		RBW Setting (kHz)	
		6 dB	99%	6 dB	99%
Max	902.850	0.885	1.218	100	51
Max	915.000	0.885	1.218	100	51
Max	927.125	0.910	1.218	100	51

Note 1:	DTS BW: RBW=100 kHz, VBW ≥ 3*RBW, peak detector, max hold, auto sweep time, Span 2-5 times measured BW. 99% BW: RBW=1-5% of 99%BW, VBW ≥ 3*RBW, peak detector, max hold, auto sweep time. Span 1.5-5 times OBW.

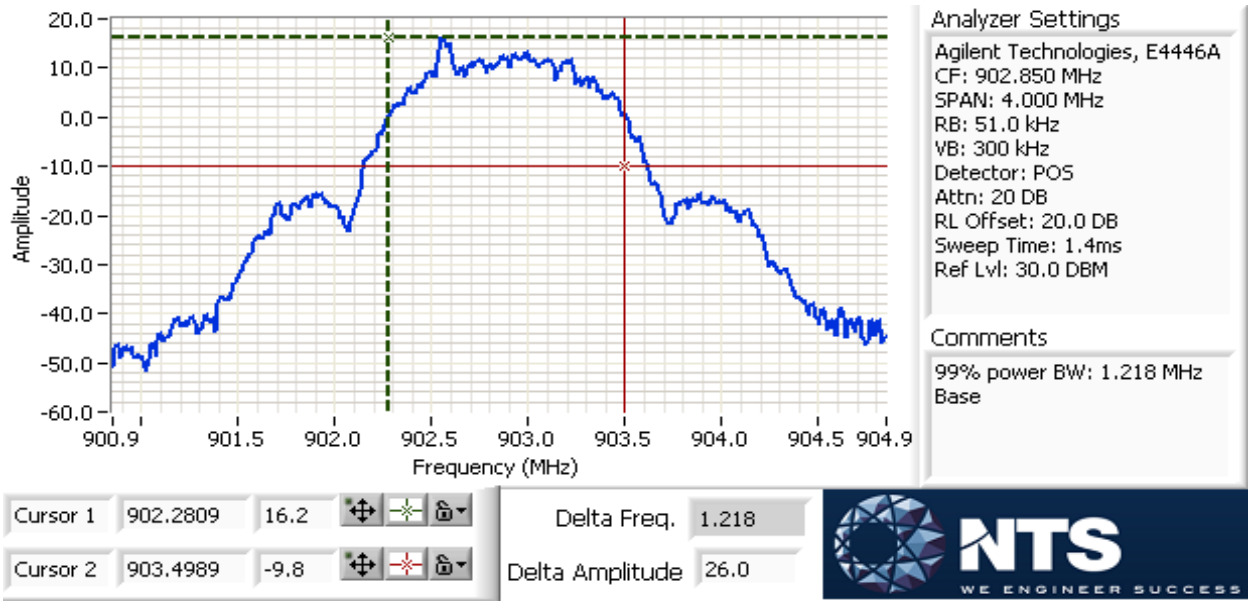


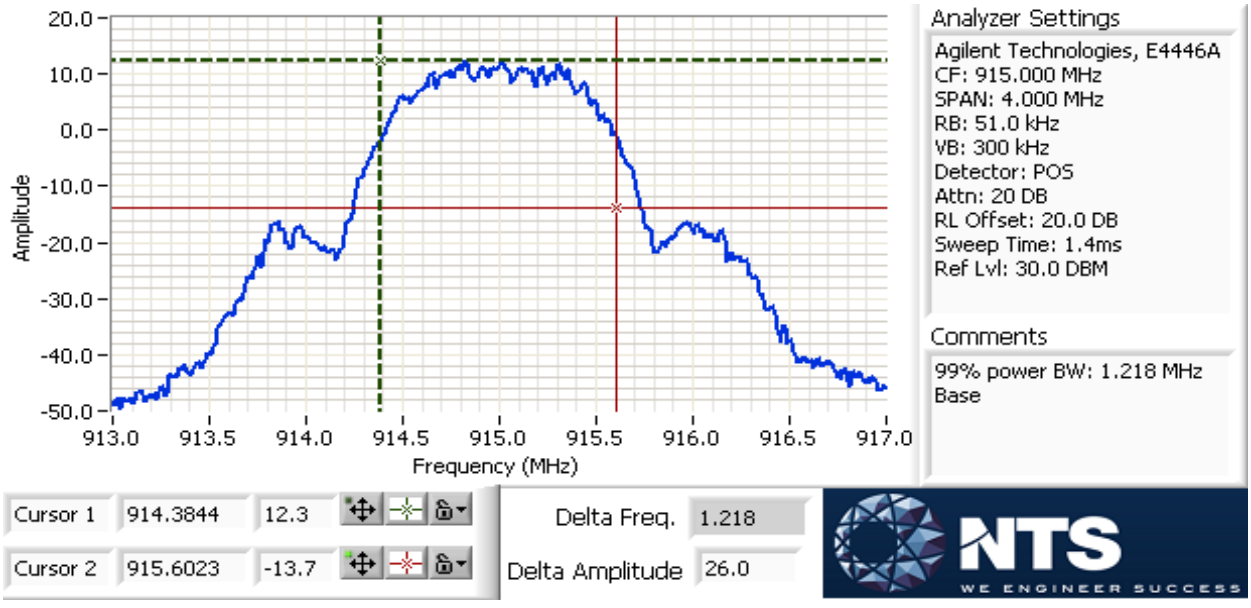
Client:	Plantronics Inc.	Job Number:	JD105563
Model:	C052-XD1 and C054-XD1, 900 MHz Cordless Base Units	T-Log Number:	T105585
		Project Manager:	Christine Krebill
Contact:	Bill Jones	Project Coordinator:	-
Standard:	FCC 15.247 / RSS-247	Class:	N/A



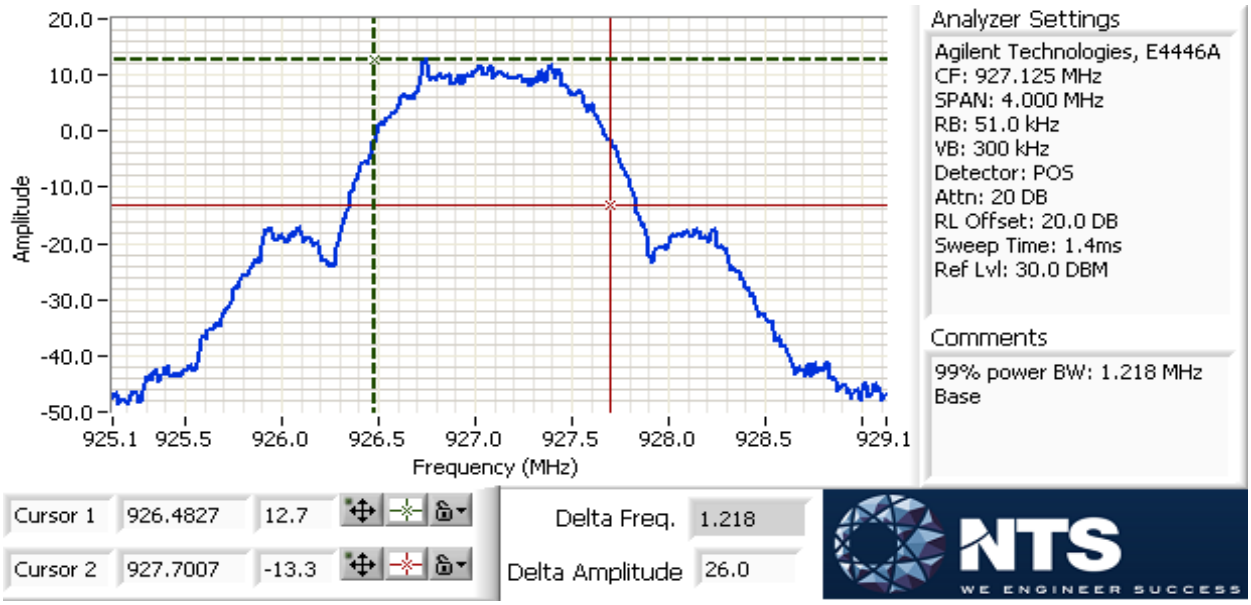


Client:	Plantronics Inc.	Job Number:	JD105563
Model:	C052-XD1 and C054-XD1, 900 MHz Cordless Base Units	T-Log Number:	T105585
		Project Manager:	Christine Krebill
Contact:	Bill Jones	Project Coordinator:	-
Standard:	FCC 15.247 / RSS-247	Class:	N/A





Client:	Plantronics Inc.	Job Number:	JD105563
Model:	C052-XD1 and C054-XD1, 900 MHz Cordless Base Units	T-Log Number:	T105585
		Project Manager:	Christine Krebill
Contact:	Bill Jones	Project Coordinator:	-
Standard:	FCC 15.247 / RSS-247	Class:	N/A



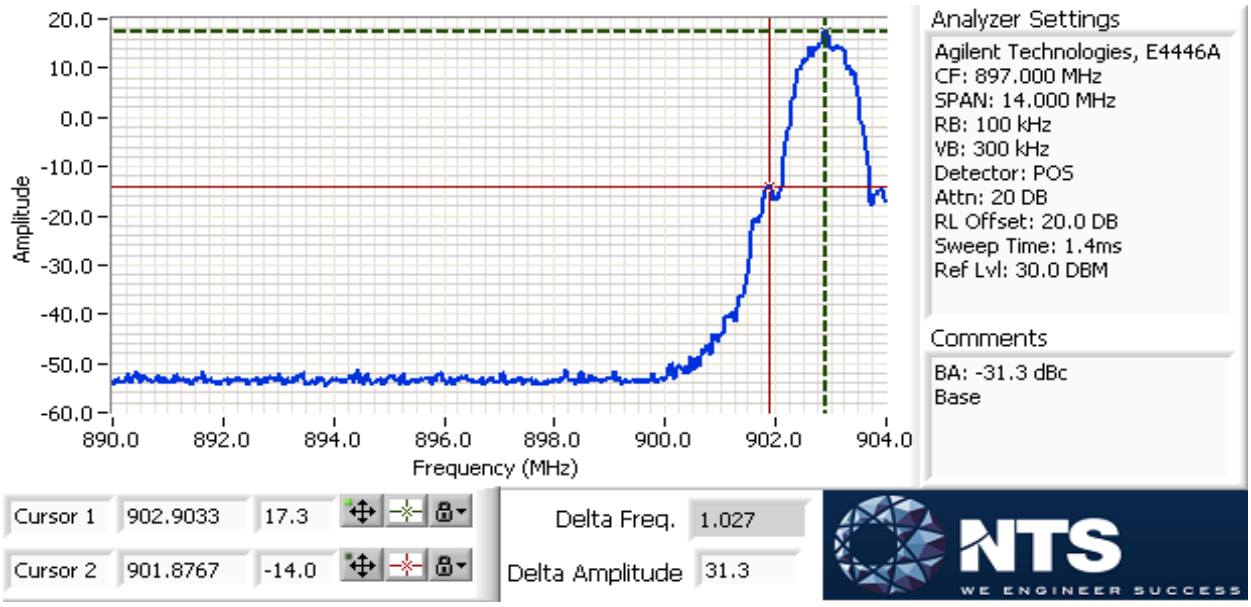
Client:	Plantronics Inc.	Job Number:	JD105563
Model:	C052-XD1 and C054-XD1, 900 MHz Cordless Base Units	T-Log Number:	T105585
		Project Manager:	Christine Krebill
Contact:	Bill Jones	Project Coordinator:	-
Standard:	FCC 15.247 / RSS-247	Class:	N/A

Run #4: Out of Band Spurious Emissions

Frequency (MHz)	Power Setting	Mode	Limit	Result
902.850	Max	Tx	-20 dBc	Pass -31.3 dBc
927.125	Max	Tx	-20 dBc	Pass -30.0 dBc

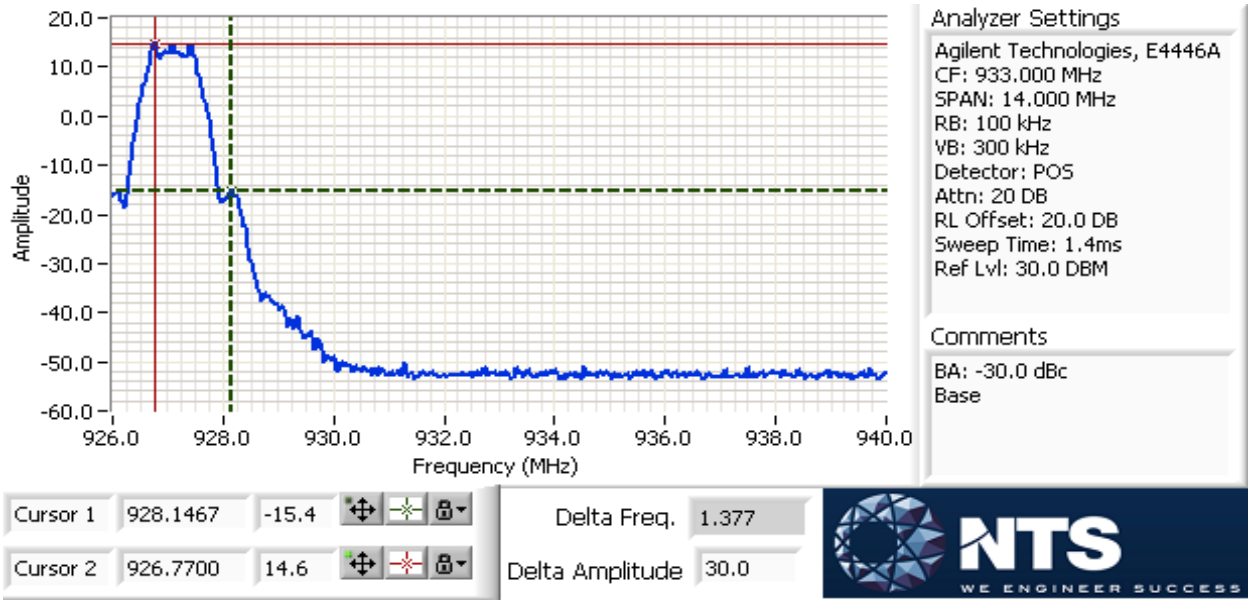
RBW = 100 kHz and VBW = 300 kHz for all plots.
Plots showing compliance with -20 dBc limit for 902 and 928 MHz band edges

Plot for low channel



Client:	Plantronics Inc.	Job Number:	JD105563
Model:	C052-XD1 and C054-XD1, 900 MHz Cordless Base Units	T-Log Number:	T105585
		Project Manager:	Christine Krebill
Contact:	Bill Jones	Project Coordinator:	-
Standard:	FCC 15.247 / RSS-247	Class:	N/A

Plot for high channel



Client:	Plantronics Inc.	Job Number:	JD105563
Model:	C052-XD1 and C054-XD1, 900 MHz Cordless Base Units	T-Log Number:	T105585
		Project Manager:	Christine Krebill
Contact:	Bill Jones	Project Coordinator:	-
Standard:	FCC 15.247 / RSS-247	Class:	N/A

RSS-247 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, unless otherwise noted.

Ambient Conditions:

Temperature: 22-24 °C
Rel. Humidity: 35-40 %

Summary of Results - Device Operating in the 902 - 928 MHz Band

Run #	Mode	Channel	Target Power	Power Setting	Test Performed	Limit	Result / Margin
1	Tx Antenna 1	915.000 MHz	-	Max	Radiated Emissions, 9 kHz - 10 GHz	FCC Part 15.209 / 15.247(c)	45.6 dBµV/m @ 3936.3 MHz (-7.6 dB)
	Tx Antenna 2	915.000 MHz	-	Max	Radiated Emissions, 9 kHz - 10 GHz	FCC Part 15.209 / 15.247(c)	44.6 dBµV/m @ 3936.3 MHz (-9.4 dB)
	Tx Ant. Auto	915.000 MHz	-	Max	Radiated Emissions, 9 kHz - 10 GHz	FCC Part 15.209 / 15.247(c)	46.9 dBµV/m @ 3936.3 MHz (-7.1 dB)
	Tx Ant. Auto	902.850 MHz	-	Max	Radiated Emissions, 9 kHz - 10 GHz	FCC Part 15.209 / 15.247(c)	46.6 dBµV/m @ 3936.3 MHz (-7.4 dB)
	Tx Ant. Auto	927.125 MHz	-	Max	Radiated Emissions, 9 kHz - 10 GHz	FCC Part 15.209 / 15.247(c)	46.9 dBµV/m @ 3936.3 MHz (-7.1 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.

Sample Notes

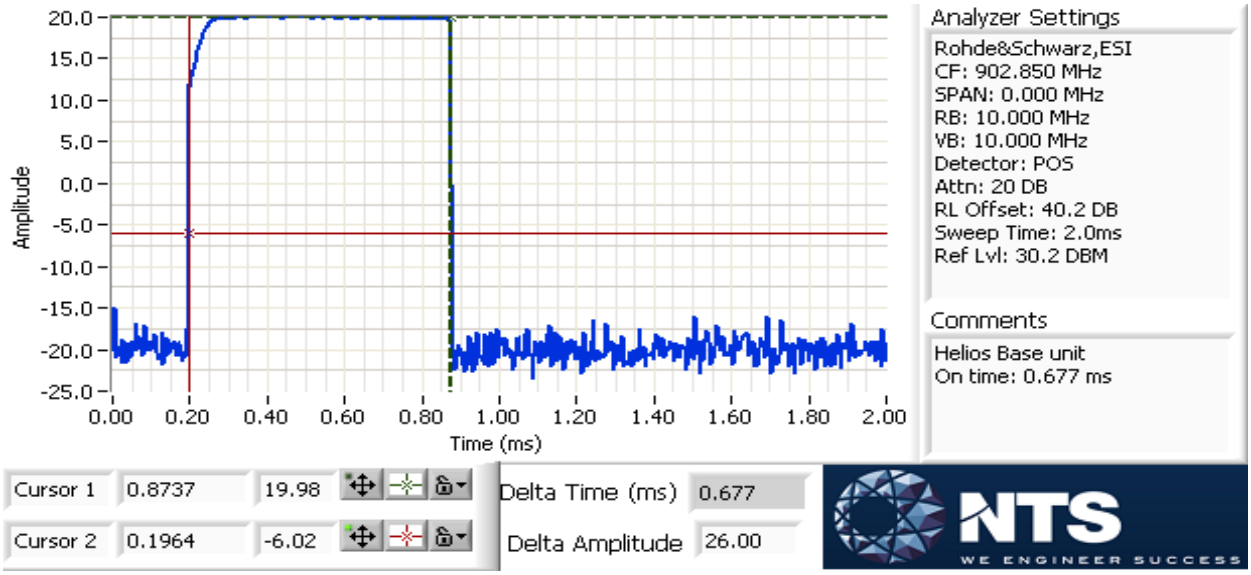
Sample S/N: Helios Base #2

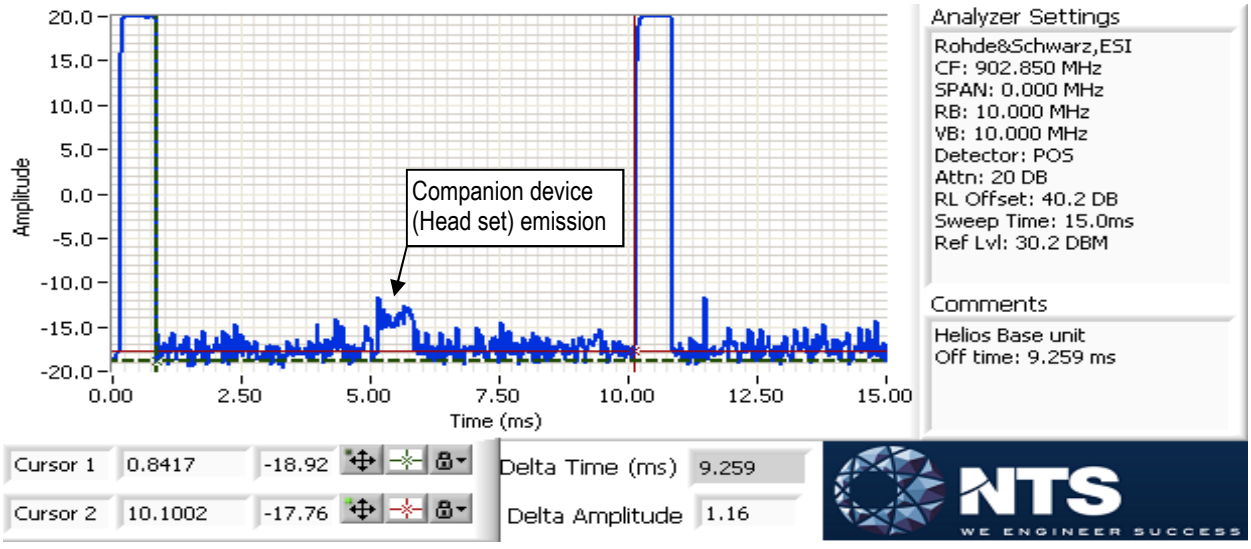
Client:	Plantronics Inc.	Job Number:	JD105563
Model:	C052-XD1 and C054-XD1, 900 MHz Cordless Base Units	T-Log Number:	T105585
		Project Manager:	Christine Krebill
Contact:	Bill Jones	Project Coordinator:	-
Standard:	FCC 15.247 / RSS-247	Class:	N/A

Procedure Comments:

Measurements performed in accordance with FCC KDB 558074, ANSI C63.10 and ANSI C63.4

Mode	Data Rate	Duty Cycle (x)	Constant DC?	T (ms)	Pwr Cor	Lin Volt Cor	Min VBW for FS (Hz)
		0.07	Yes	0.677	-	-	-





Client:	Plantronics Inc.	Job Number:	JD105563
Model:	C052-XD1 and C054-XD1, 900 MHz Cordless Base Units	T-Log Number:	T105585
		Project Manager:	Christine Krebill
Contact:	Bill Jones	Project Coordinator:	-
Standard:	FCC 15.247 / RSS-247	Class:	N/A

Run #1: Radiated Spurious Emissions, 30 MHz - 10 GHz.

Date of Test: 8/1/2017, 8/2/2017, 8/18/2017 Config. Used: 1
Test Engineer: Deniz Demirci Config Change: None
Test Location: FT Ch #4 EUT Voltage: 120 V/ 60 Hz

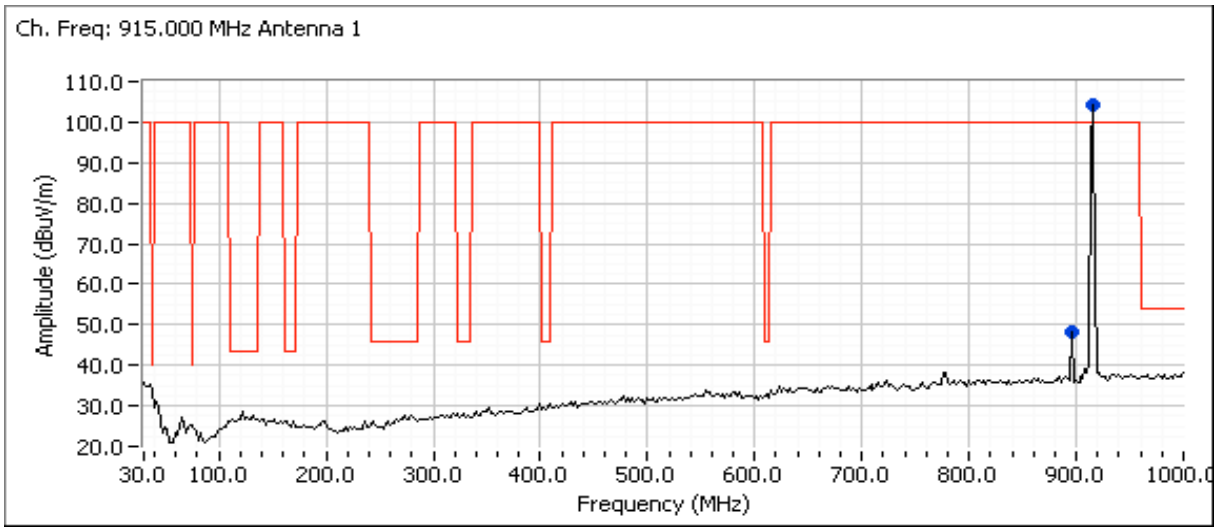
Run #1a: Center Channel

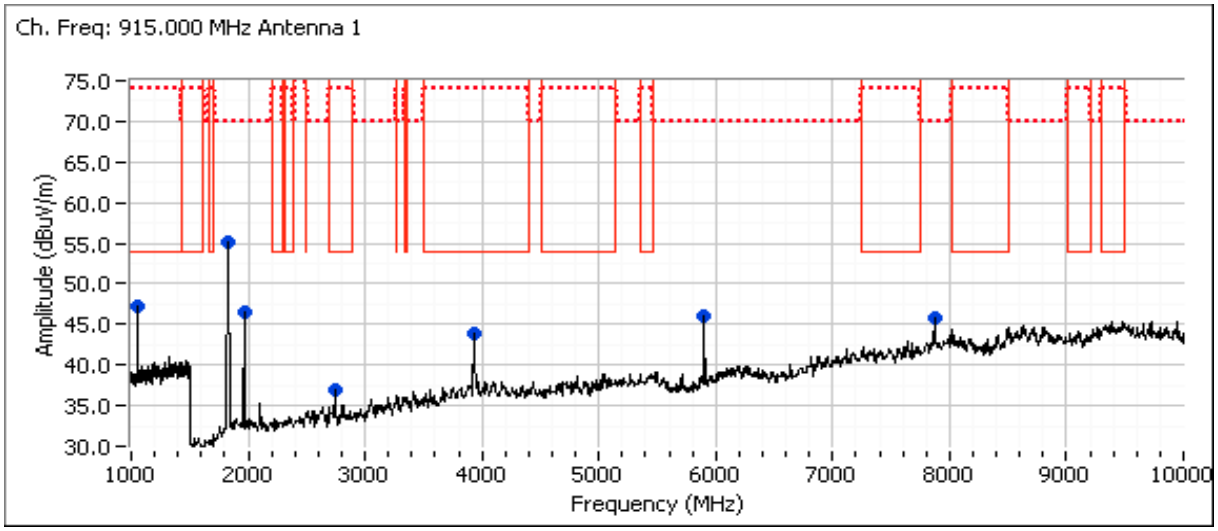
Channel: 915.000 MHz Mode: -
Tx Chain: Antenna 1 Data Rate: -

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
894.178	50.3	H	86.6	-36.3	PK	313	1.6	RB 100 kHz; VB: 300 kHz
915.025	106.6	H	-	-	PK	352	1.0	Fundamental RB 100 kHz;VB 300 kH
1052.750	53.7	V	74.0	-20.3	PK	59	2.3	RB 1 MHz;VB 3 MHz;Peak
1052.750	33.7	V	74.0	-40.3	AVG	59	2.3	Note 2
1830.700	56.1	V	86.6	-30.5	PK	76	1.8	RB 100 kHz;VB 300 kHz;Peak
1968.170	49.9	V	86.6	-36.7	PK	196	1.7	RB 100 kHz;VB 300 kHz;Peak
2744.140	45.4	V	74.0	-28.6	PK	323	1.8	RB 1 MHz;VB 3 MHz;Peak
2744.140	25.4	V	54.0	-28.6	AVG	323	1.8	RB 1 MHz;VB 3 MHz;Peak
3936.340	46.4	V	54.0	-7.6	AVG	178	1.9	Note 1 - RB 1 MHz;VB 10 Hz;Peak
3936.330	51.4	V	74.0	-22.6	PK	178	1.9	RB 1 MHz;VB 3 MHz;Peak
5904.430	51.5	V	86.6	-35.1	PK	160	1.0	RB 100 kHz;VB 300 kHz;Peak
7872.700	45.2	V	86.6	-41.4	PK	58	2.1	RB 100 kHz;VB 300 kHz;Peak

Note 1:	Emission has 100% duty cycle
Note 2:	Duty cycle correction factor of -20 dB (20*Log(0.68/9.94)) was used to calculate average value from peak measurement per the rule part FCC 15.35(c) and RSS-Gen 6.10
Note 3:	Pre-scan measurements were performed between 9 kHz and 30 MHz with the fixed measurement antenna height of 1 m. There were no significant emissions observed in this frequency range.

Client:	Plantronics Inc.	Job Number:	JD105563
Model:	C052-XD1 and C054-XD1, 900 MHz Cordless Base Units	T-Log Number:	T105585
		Project Manager:	Christine Krebill
Contact:	Bill Jones	Project Coordinator:	-
Standard:	FCC 15.247 / RSS-247	Class:	N/A





Client:	Plantronics Inc.	Job Number:	JD105563
Model:	C052-XD1 and C054-XD1, 900 MHz Cordless Base Units	T-Log Number:	T105585
		Project Manager:	Christine Krebill
Contact:	Bill Jones	Project Coordinator:	-
Standard:	FCC 15.247 / RSS-247	Class:	N/A

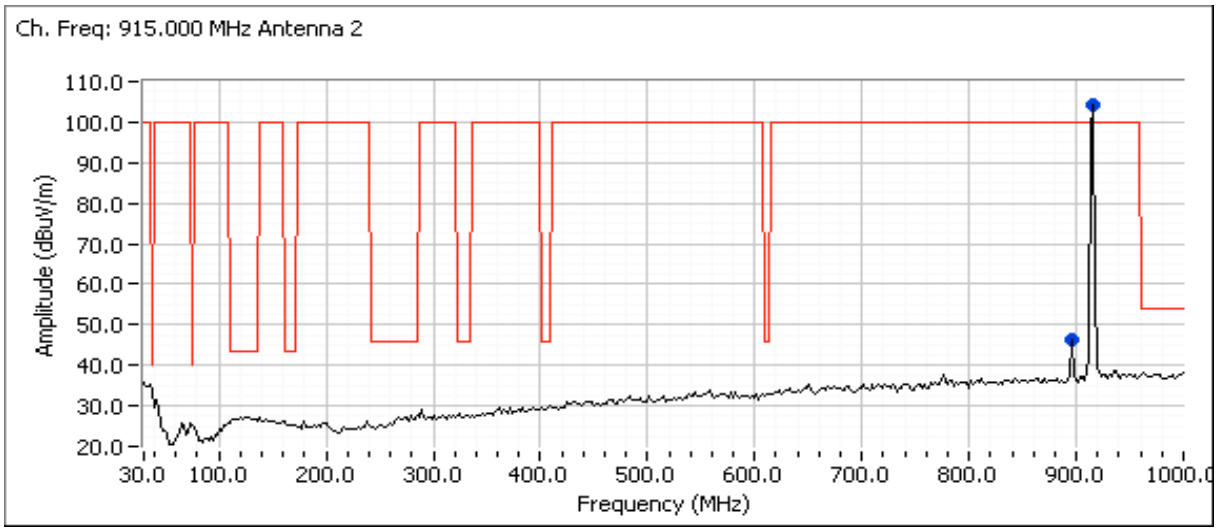
Run #1b: Center Channel

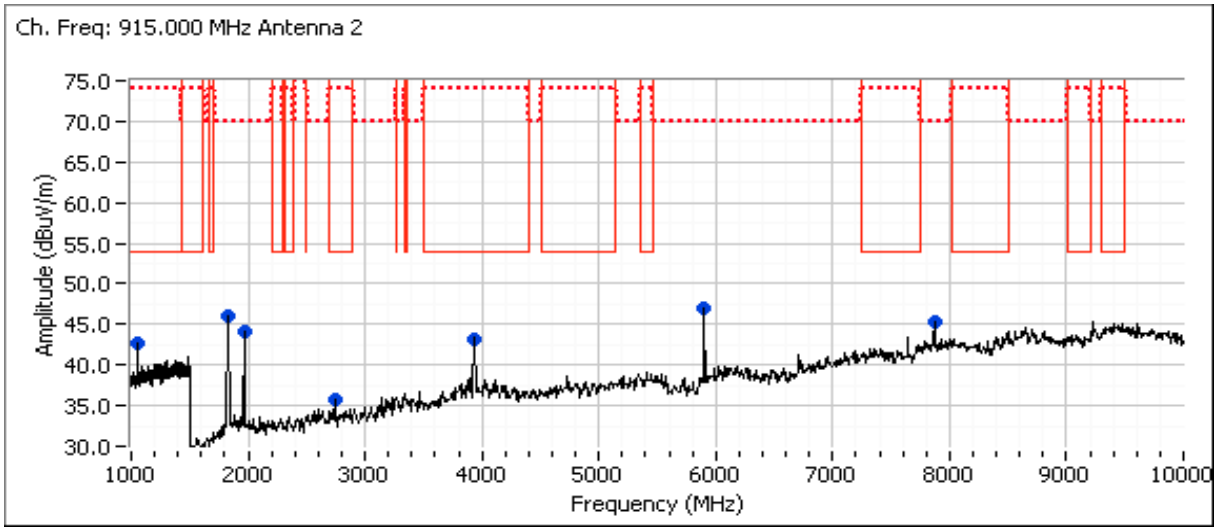
Channel: 915.000 MHz Mode: -
Tx Chain: Antenna 2 Data Rate: -

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
894.119	48.6	H	85.9	-37.3	PK	212	3.0	RB 100 kHz; VB: 300 kHz
915.061	105.9	H	-	-	PK	78	1.6	Fundamental RB 100 kHz;VB 300 kH
3936.320	44.6	V	54.0	-9.4	AVG	180	2.2	Note 2
1052.860	49.9	V	74.0	-24.1	PK	48	2.0	RB 1 MHz;VB 3 MHz;Peak
1052.860	29.9	V	54.0	-24.1	AVG	48	2.0	Note 2
1830.660	45.6	H	85.9	-40.3	PK	100	1.8	RB 100 kHz;VB 300 kHz;Peak
1968.090	45.5	V	85.9	-40.4	PK	167	1.9	RB 100 kHz;VB 300 kHz;Peak
2744.030	44.3	V	74.0	-29.7	PK	307	1.6	RB 1 MHz;VB 3 MHz;Peak
2744.030	24.3	V	54.0	-29.7	AVG	307	1.6	Note 2
3936.320	44.6	V	54.0	-9.4	AVG	180	2.2	Note 2
3936.400	51.8	V	74.0	-22.2	PK	180	2.2	RB 1 MHz;VB 3 MHz;Peak
5904.280	48.5	V	85.9	-37.4	PK	170	1.8	RB 100 kHz;VB 300 kHz;Peak
7872.770	44.6	V	85.9	-41.3	PK	60	2.0	RB 100 kHz;VB 300 kHz;Peak

Note 1:	Emission has 100% duty cycle
Note 2:	Duty cycle correction factor of -20 dB (20*Log(0.68/9.94)) was used to calculate average value from peak measurement per the rule part FCC 15.35(c) and RSS-Gen 6.10
Note 3:	Pre-scan measurements were performed between 9 kHz and 30 MHz with the fixed measurement antenna height of 1 m. There were no significant emissions observed in this frequency range.

Client:	Plantronics Inc.	Job Number:	JD105563
Model:	C052-XD1 and C054-XD1, 900 MHz Cordless Base Units	T-Log Number:	T105585
		Project Manager:	Christine Krebill
Contact:	Bill Jones	Project Coordinator:	-
Standard:	FCC 15.247 / RSS-247	Class:	N/A





Client:	Plantronics Inc.	Job Number:	JD105563
Model:	C052-XD1 and C054-XD1, 900 MHz Cordless Base Units	T-Log Number:	T105585
		Project Manager:	Christine Krebill
Contact:	Bill Jones	Project Coordinator:	-
Standard:	FCC 15.247 / RSS-247	Class:	N/A

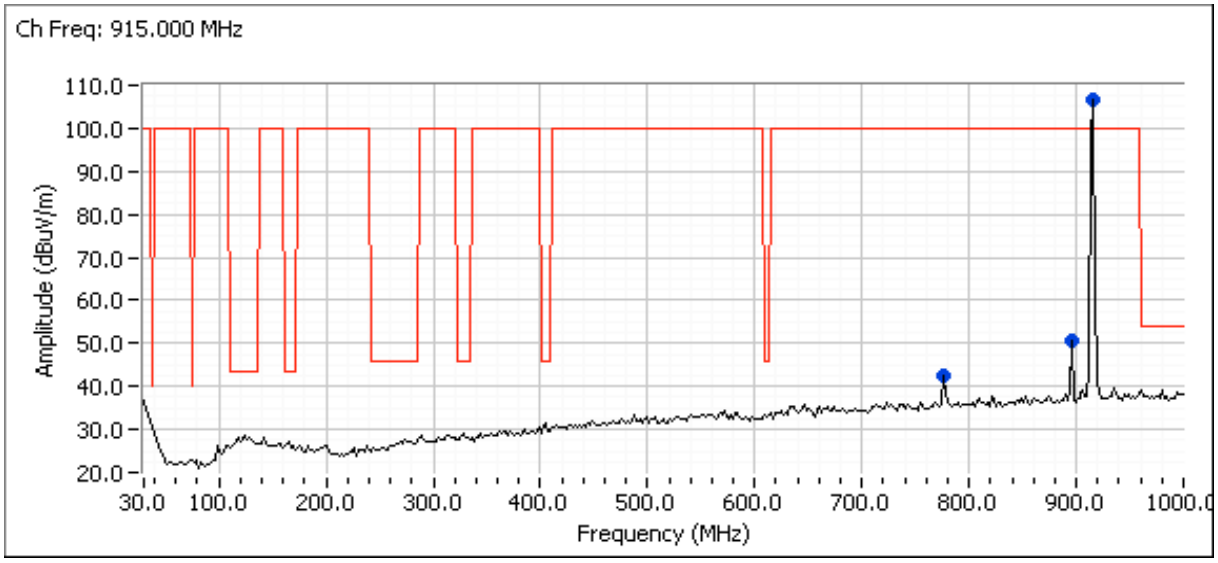
Run #1c: Center Channel

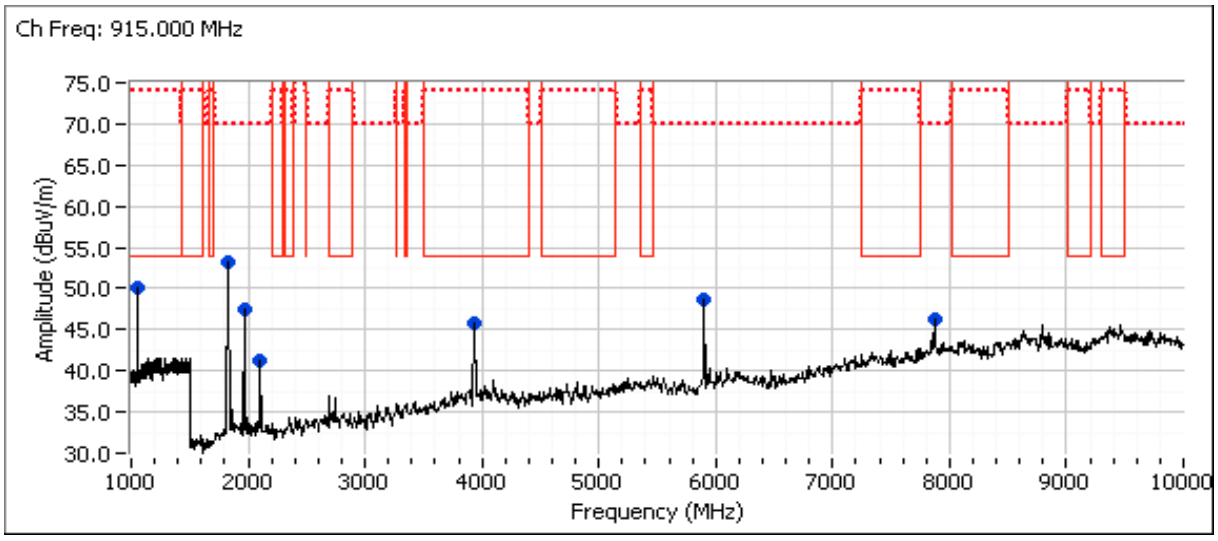
Channel: 915.000 MHz Mode: -
Tx Chain: Auto Data Rate: -

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
776.453	42.5	H	86.6	-44.1	PK	157	1.0	RB 100 kHz;VB 300 kHz;Peak
895.030	50.5	V	86.6	-36.1	PK	147	2.5	RB 100 kHz;VB 300 kHz;Peak
915.000	106.6	H	-	-	PK	313	1.0	Fundamental RB 100 kHz;VB 300 kH
1052.330	55.0	V	74.0	-19.0	PK	24	1.3	RB 1 MHz;VB 3 MHz;Peak
1052.330	35.0	V	54.0	-19.0	PK	24	1.3	Note 2
1829.320	56.2	V	86.6	-30.4	PK	323	1.0	RB 100 kHz;VB 300 kHz;Peak
1968.110	50.8	V	86.6	-35.8	PK	360	1.8	RB 100 kHz;VB 300 kHz;Peak
2106.120	41.2	V	86.6	-45.4	PK	333	1.9	RB 100 kHz;VB 300 kHz;Peak
3936.340	46.9	V	54.0	-7.1	AVG	162	1.6	Note 1 - RB 1 MHz;VB 10 Hz;Peak
3936.130	52.2	V	74.0	-21.8	PK	162	1.6	Note 1 - RB 1 MHz;VB 3 MHz;Peak
5904.490	50.5	V	86.6	-36.1	PK	166	1.7	RB 100 kHz;VB 300 kHz;Peak
7872.300	46.0	V	86.6	-40.6	PK	116	1.5	RB 100 kHz;VB 300 kHz;Peak

Note 1:	Emission has 100% duty cycle
Note 2:	Duty cycle correction factor of -20 dB (20*Log(0.68/9.94)) was used to calculate average value from peak measurement per the rule part FCC 15.35(c) and RSS-Gen 6.10
Note 3:	Antenna Auto setting has the worst spurious emission results. Remaining tests were performed with this setting.
Note 4:	Pre-scan measurements were performed between 9 kHz and 30 MHz with the fixed measurement antenna height of 1 m. There were no significant emissions observed in this frequency range.

Client:	Plantronics Inc.	Job Number:	JD105563
Model:	C052-XD1 and C054-XD1, 900 MHz Cordless Base Units	T-Log Number:	T105585
		Project Manager:	Christine Krebill
Contact:	Bill Jones	Project Coordinator:	-
Standard:	FCC 15.247 / RSS-247	Class:	N/A





Client:	Plantronics Inc.	Job Number:	JD105563
Model:	C052-XD1 and C054-XD1, 900 MHz Cordless Base Units	T-Log Number:	T105585
		Project Manager:	Christine Krebill
Contact:	Bill Jones	Project Coordinator:	-
Standard:	FCC 15.247 / RSS-247	Class:	N/A

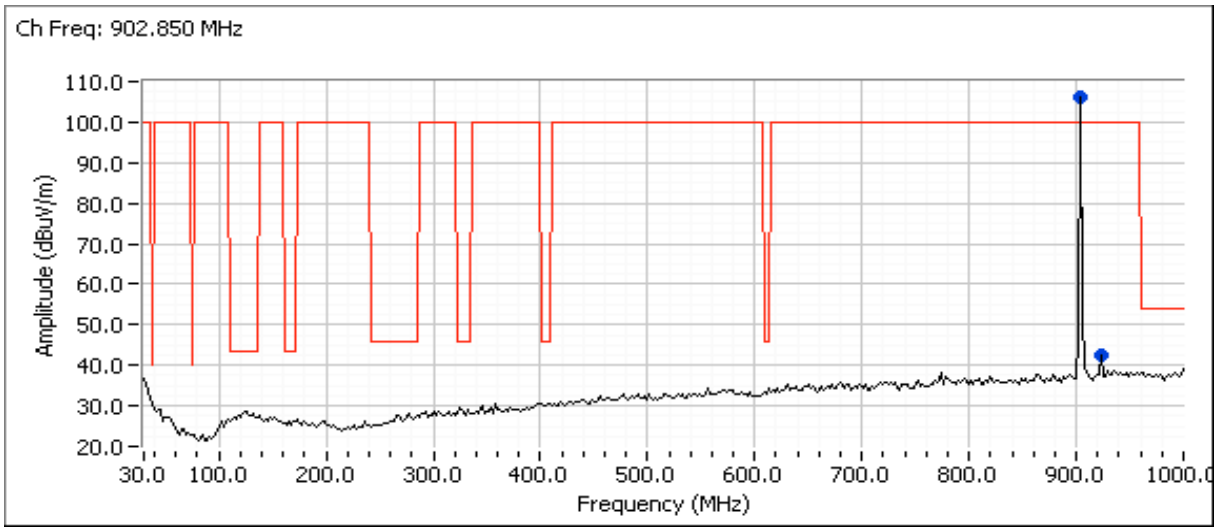
Run #1d: Low Channel

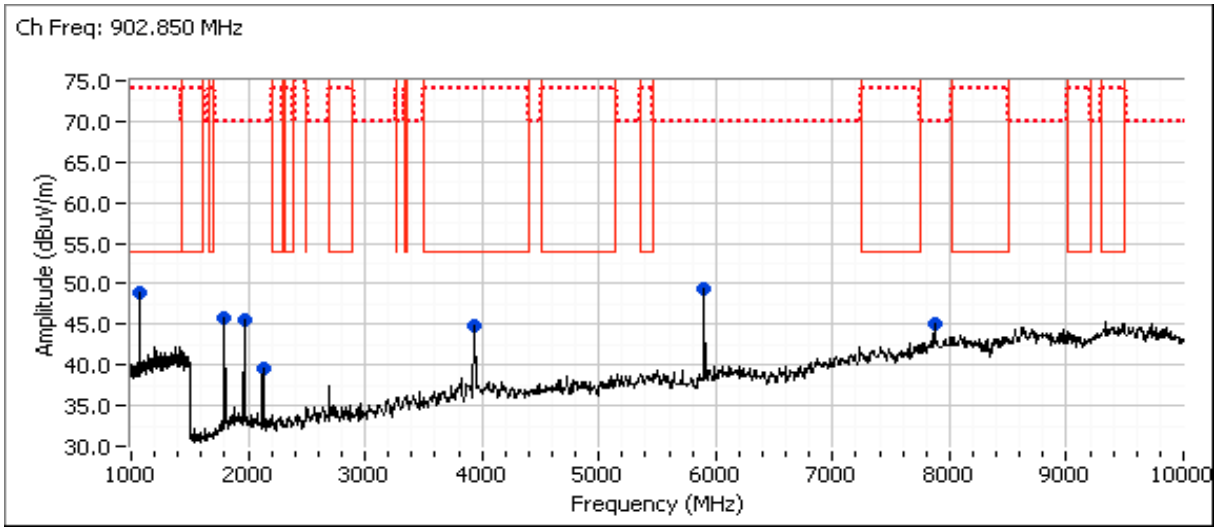
Channel: 902.850 MHz Mode: -
Tx Chain: - Data Rate: -

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
902.850	106.1	V	-	-	PK	95	1.0	Fundamental RB 100 kHz;VB 300 kH
924.188	42.4	H	86.1	-43.7	PK	233	1.5	RB 100 kHz;VB 300 kHz;Peak
1065.300	54.2	V	74.0	-19.8	PK	159	2.0	RB 1 MHz;VB 3 MHz;Peak
1065.300	34.2	V	54.0	-19.8	AVG	159	2.0	Note 2
1805.170	49.1	V	86.1	-37.0	PK	196	1.6	RB 100 kHz;VB 300 kHz;Peak
1968.100	51.5	V	86.1	-34.6	PK	171	1.8	RB 100 kHz;VB 300 kHz;Peak
2130.020	37.7	V	86.1	-48.4	PK	320	1.9	RB 100 kHz;VB 300 kHz;Peak
3936.300	46.6	V	54.0	-7.4	AVG	163	1.8	Note 1 - RB 1 MHz;VB 10 Hz;Peak
3936.130	51.5	V	74.0	-22.5	PK	163	1.8	Note 1 - RB 1 MHz;VB 3 MHz;Peak
5904.390	50.9	V	86.1	-35.2	PK	166	1.7	RB 100 kHz;VB 300 kHz;Peak
7872.430	46.7	V	86.1	-39.4	PK	132	2.4	RB 100 kHz;VB 300 kHz;Peak

Note 1:	Emission has 100% duty cycle
Note 2:	Duty cycle correction factor of -20 dB (20*Log(0.68/9.94)) was used to calculate average value from peak measurement per the rule part FCC 15.35(c) and RSS-Gen 6.10
Note 3:	Pre-scan measurements were performed between 9 kHz and 30 MHz with the fixed measurement antenna height of 1 m. There were no significant emissions observed in this frequency range.

Client:	Plantronics Inc.	Job Number:	JD105563
Model:	C052-XD1 and C054-XD1, 900 MHz Cordless Base Units	T-Log Number:	T105585
		Project Manager:	Christine Krebill
Contact:	Bill Jones	Project Coordinator:	-
Standard:	FCC 15.247 / RSS-247	Class:	N/A





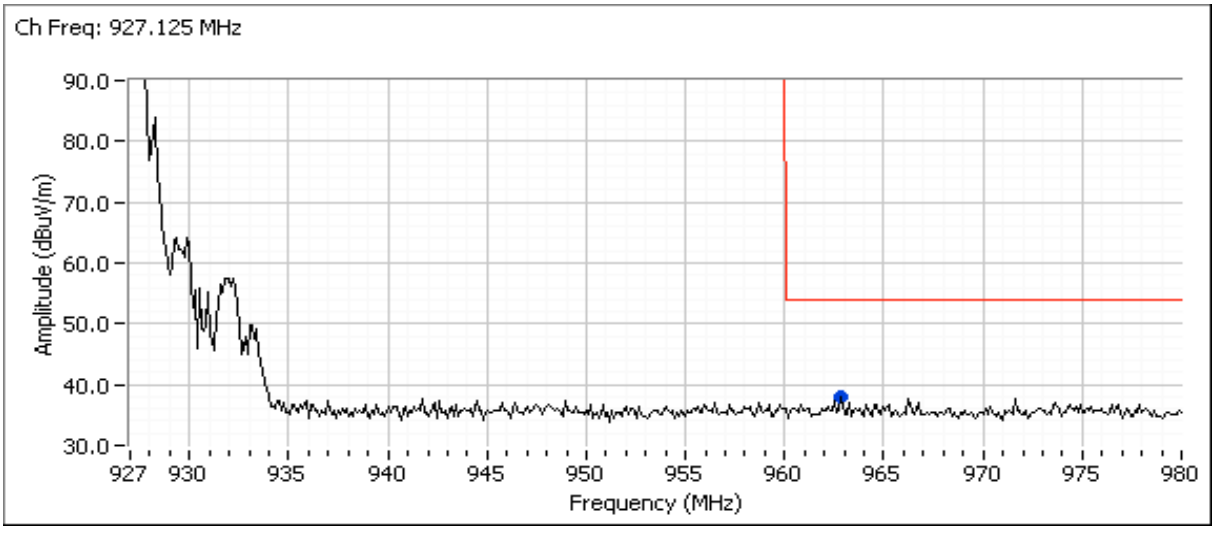
Client:	Plantronics Inc.	Job Number:	JD105563
Model:	C052-XD1 and C054-XD1, 900 MHz Cordless Base Units	T-Log Number:	T105585
		Project Manager:	Christine Krebill
Contact:	Bill Jones	Project Coordinator:	-
Standard:	FCC 15.247 / RSS-247	Class:	N/A

Run #1e: High Channel

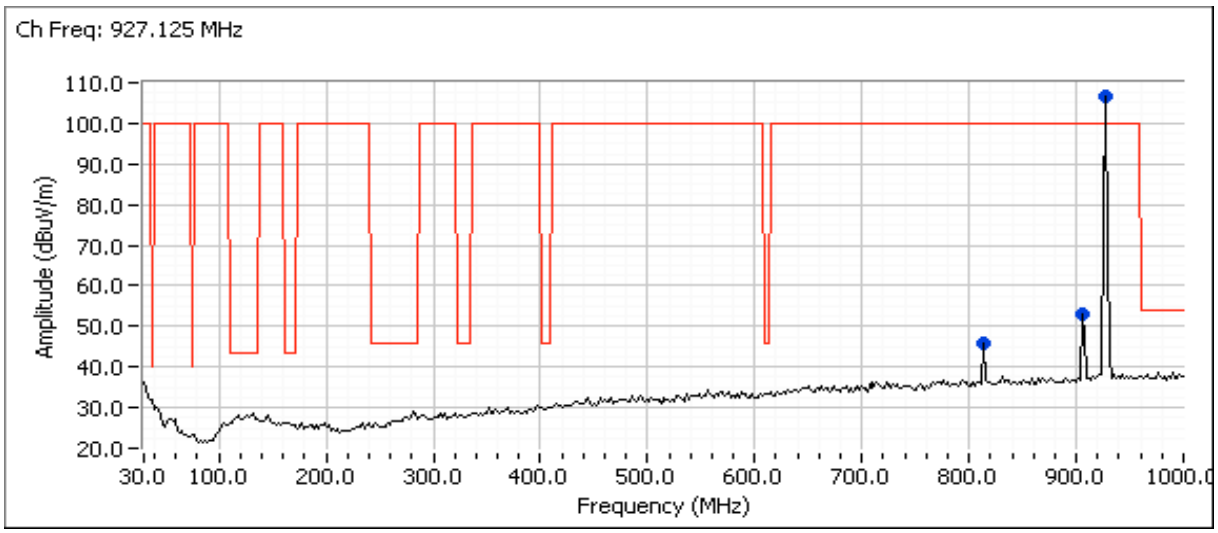
Channel: 927.125 MHz Mode: -
Tx Chain: - Data Rate: -

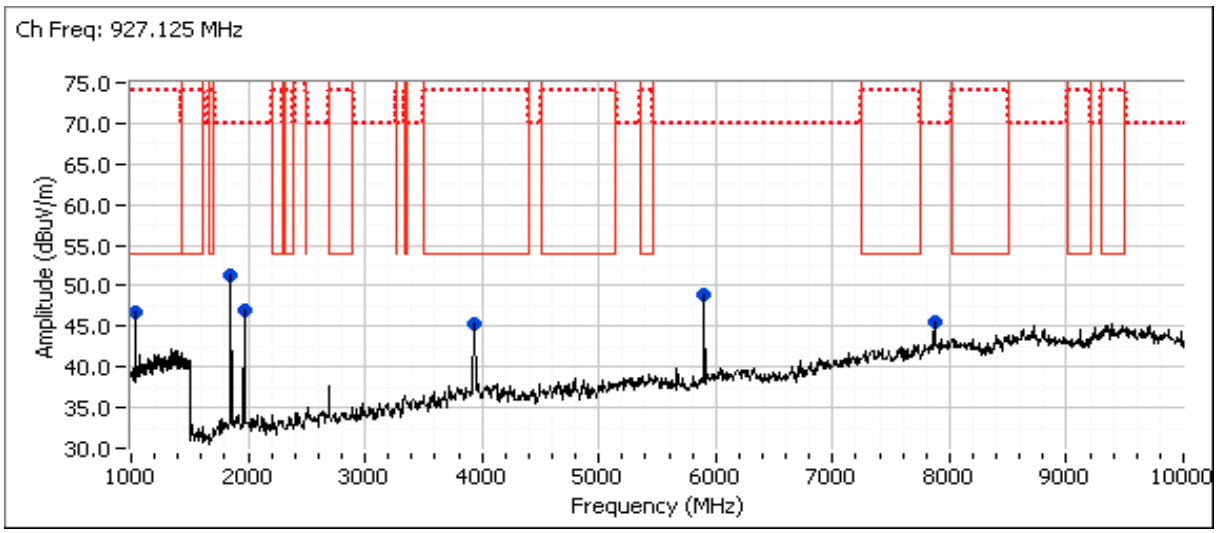
Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
813.387	45.8	H	86.8	-41.0	PK	191	1.0	RB 100 kHz;VB 300 kHz;Peak
906.693	52.9	V	86.8	-33.9	PK	64	2.0	RB 100 kHz;VB 300 kHz;Peak
927.125	106.8	H	-	-	PK	325	2.0	Fundamental RB 100 kHz;VB 300 kH
962.794	38.0	H	54.0	-16.0	PK	294	1.0	Restricted band edge noise floor.
1041.770	52.9	V	74.0	-21.1	PK	13	1.3	RB 1 MHz;VB 3 MHz;Peak
1041.770	32.9	V	54.0	-21.1	AVG	13	1.3	Note 2
1853.540	56.1	V	86.8	-30.7	PK	360	1.4	RB 100 kHz;VB 300 kHz;Peak
1968.180	47.4	V	86.8	-39.4	PK	298	1.1	RB 100 kHz;VB 300 kHz;Peak
3936.290	46.9	V	54.0	-7.1	AVG	164	1.7	Note 1 - RB 1 MHz;VB 10 Hz;Peak
3936.280	51.6	V	74.0	-22.4	PK	164	1.7	Note 1 - RB 1 MHz;VB 3 MHz;Peak
5904.410	50.4	V	86.8	-36.4	PK	162	1.6	RB 100 kHz;VB 300 kHz;Peak
7872.410	45.7	V	86.8	-41.1	PK	114	1.4	RB 100 kHz;VB 300 kHz;Peak

Note 1:	Emission has 100% duty cycle
Note 2:	Duty cycle correction factor of -20 dB (20*Log(0.68/9.94)) was used to calculate average value from peak measurement per the rule part FCC 15.35(c) and RSS-Gen 6.10
Note 3:	Pre-scan measurements were performed between 9 kHz and 30 MHz with the fixed measurement antenna height of 1 m. There were no significant emissions observed in this frequency range.



Client:	Plantronics Inc.	Job Number:	JD105563
Model:	C052-XD1 and C054-XD1, 900 MHz Cordless Base Units	T-Log Number:	T105585
		Project Manager:	Christine Krebill
Contact:	Bill Jones	Project Coordinator:	-
Standard:	FCC 15.247 / RSS-247	Class:	N/A





Client:	Plantronics Inc.	Job Number:	JD105563
Model:	C052-XD1 and C054-XD1, 900 MHz Cordless Base Units	T-Log Number:	T105585
		Project Manager:	Christine Krebill
Contact:	Bill Jones	Project Coordinator:	-
Standard:	FCC 15.247 / RSS-247	Class:	B

Conducted Emissions

(NTS Silicon Valley, 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: 8/10/2017
Test Engineer: Deniz Demirci
Test Location: Fremont Chamber #4
Config. Used: 1
Config Change: None
EUT Voltage: 120V/60Hz

General Test Configuration

For tabletop equipment, the EUT and support equipment were located on a table inside the semi-anechoic chamber, 40 cm from a vertical coupling plane and 80 cm from the LISN.

Ambient Conditions:

Temperature: 20-22 °C
Rel. Humidity: 38-40 %

Summary of Results

Run #	Test Performed	Limit	Result	Margin
1	CE, AC Power, 120 V/60 Hz	Class B	Pass	34.6 dBµV @ 2.283 MHz (-21.4 dB)

Modifications Made During Testing

No modifications were made to the EUT during testing

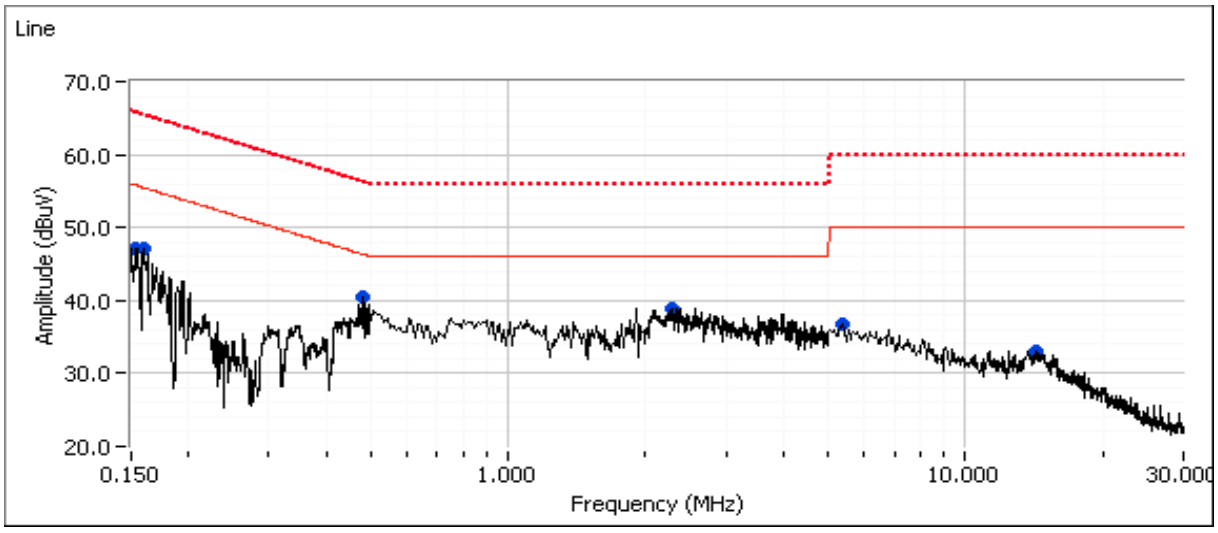
Deviations From The Standard

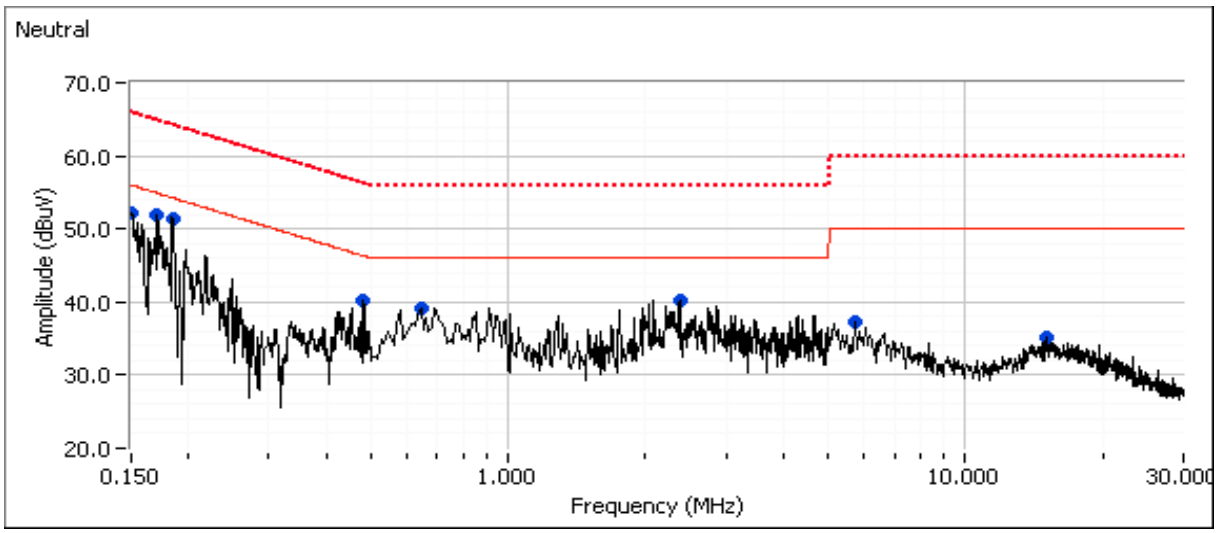
No deviations were made from the requirements of the standard.

Client:	Plantronics Inc.	Job Number:	JD105563
Model:	C052-XD1 and C054-XD1, 900 MHz Cordless Base Units	T-Log Number:	T105585
		Project Manager:	Christine Krebill
Contact:	Bill Jones	Project Coordinator:	-
Standard:	FCC 15.247 / RSS-247	Class:	B

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

EUT and Test Configuration Details:
Binaural headset and Base set to transmit at high channel. Headset is charging. Call indicator attached and active. Phone line is connected.





Client:	Plantronics Inc.	Job Number:	JD105563
Model:	C052-XD1 and C054-XD1, 900 MHz Cordless Base Units	T-Log Number:	T105585
		Project Manager:	Christine Krebill
Contact:	Bill Jones	Project Coordinator:	-
Standard:	FCC 15.247 / RSS-247	Class:	B

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	
0.154	*47.1*	*Line 1*	*55.8*	*-8.7*	*Peak*	
0.159	*47.2*	*Line 1*	*55.5*	*-8.3*	*Peak*	
0.480	*40.4*	*Line 1*	*46.3*	*-5.9*	*Peak*	
2.295	*39.0*	*Line 1*	*46.0*	*-7.0*	*Peak*	
5.401	*36.7*	*Line 1*	*50.0*	*-13.3*	*Peak*	
5.401	*36.7*	*Line 1*	*50.0*	*-13.3*	*Peak*	
14.218	*33.0*	*Line 1*	*50.0*	*-17.0*	*Peak*	
0.151	*52.3*	*Neutral*	*56.0*	*-3.7*	*Peak*	
0.171	*52.0*	*Neutral*	*54.9*	*-2.9*	*Peak*	
0.185	*51.5*	*Neutral*	*54.3*	*-2.8*	*Peak*	
0.483	*40.2*	*Neutral*	*46.3*	*-6.1*	*Peak*	
0.644	*39.1*	*Neutral*	*46.0*	*-6.9*	*Peak*	
2.376	*40.3*	*Neutral*	*46.0*	*-5.7*	*Peak*	
5.752	*37.4*	*Neutral*	*50.0*	*-12.6*	*Peak*	
15.120	*35.1*	*Neutral*	*50.0*	*-14.9*	*Peak*	

Final quasi-peak and average readings

Frequency	Level	AC	Class B		Detector	Comments
MHz	dBµV	Line	Limit	Margin	QP/Ave	
2.283	34.6	Line 1	56.0	-21.4	QP	QP (1.00s)
0.658	34.0	Neutral	56.0	-22.0	QP	QP (1.00s)
0.482	32.3	Line 1	56.3	-24.0	QP	QP (1.00s)
0.151	41.1	Neutral	65.9	-24.8	QP	QP (1.00s)
0.153	40.7	Line 1	65.8	-25.1	QP	QP (1.00s)
2.375	30.9	Neutral	56.0	-25.1	QP	QP (1.00s)
2.283	20.4	Line 1	46.0	-25.6	AVG	AVG (0.10s)
2.375	20.1	Neutral	46.0	-25.9	AVG	AVG (0.10s)
0.658	20.0	Neutral	46.0	-26.0	AVG	AVG (0.10s)
0.161	39.2	Line 1	65.4	-26.2	QP	QP (1.00s)
15.151	23.0	Neutral	50.0	-27.0	AVG	AVG (0.10s)
0.171	37.9	Neutral	64.9	-27.0	QP	QP (1.00s)
0.483	29.3	Neutral	56.3	-27.0	QP	QP (1.00s)
0.184	36.6	Neutral	64.3	-27.7	QP	QP (1.00s)
0.482	18.4	Line 1	46.3	-27.9	AVG	AVG (0.10s)
14.189	21.0	Line 1	50.0	-29.0	AVG	AVG (0.10s)
5.458	20.1	Line 1	50.0	-29.9	AVG	AVG (0.10s)

Client:	Plantronics Inc.	Job Number:	JD105563
Model:	C052-XD1 and C054-XD1, 900 MHz Cordless Base Units	T-Log Number:	T105585
		Project Manager:	Christine Krebill
Contact:	Bill Jones	Project Coordinator:	-
Standard:	FCC 15.247 / RSS-247	Class:	B

Cont - Final quasi-peak and average readings

Frequency	Level	AC	Class B		Detector	Comments
MHz	dBµV	Line	Limit	Margin	QP/Ave	
5.458	29.9	Line 1	60.0	-30.1	QP	QP (1.00s)
0.483	15.7	Neutral	46.3	-30.6	AVG	AVG (0.10s)
5.741	19.2	Neutral	50.0	-30.8	AVG	AVG (0.10s)
15.151	29.1	Neutral	60.0	-30.9	QP	QP (1.00s)
5.741	28.5	Neutral	60.0	-31.5	QP	QP (1.00s)
14.189	27.5	Line 1	60.0	-32.5	QP	QP (1.00s)
0.171	19.3	Neutral	54.9	-35.6	AVG	AVG (0.10s)
0.161	18.5	Line 1	55.4	-36.9	AVG	AVG (0.10s)
0.184	13.3	Neutral	54.3	-41.0	AVG	AVG (0.10s)
0.153	14.7	Line 1	55.8	-41.1	AVG	AVG (0.10s)
0.151	14.8	Neutral	55.9	-41.1	AVG	AVG (0.10s)

End of Report

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