

CERTIFICATION TEST REPORT

Applicant:	DEI HEADQUARTERS INC. 1 VIPER WAY Vista, CA 92081
Equipment Under Test (EUT):	MAIN MODULE
Model: Serial Number:	3807A, 3808A 6
FCC ID: IC:	EZSDEI3807 1513A-3807
In Accordance With:	FCC Part 15 Subpart C, 15.247 IC RSS-210 Issue 8 December 2010 IC RSS-Gen Issue 3 December 2010
Authorized By:	Nemko USA Inc. 11696 Sorrento Valley Road, Suite F San Diego, CA 92121
Tested By:	Alan Laudani, EMC/RF Test Engineer
Date: Report Number: Project Number: Nex Number: Total Number of Pages:	AUGUST 25, 2011 2011 08182479 FCC 1023309 182479 31

Report Number: 2011 08182479 FCC Specification: FCC Part 15 Subpart C, 15.247

Section 1. Summary of Test Results

1.1 General

All measurements are traceable to national standards

These tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with Part 15; Subpart C and RSS-210, Issue 8 December 2010. Radiated tests were conducted is accordance with ANSI C63.4-2003. Radiated emissions are made on an open area test site. A description of the test facility is on file with the FCC and IC.

The assessment summary is as follows:

Apparatus Assessed:	3807A 3808A was not assessed as difference is software not relating to RF functions.
Specifications:	FCC Part 15 Subpart C, 15.247 IC RSS-210 Issue 8 December 2010
Date Received in Laboratory:	August 5, 2011 to August 24, 2011
Compliance Status:	Complies
Exclusions:	None
Non-compliances:	None

1.2 Report Release History:

REVISION	DATE	COMMENTS	
-	August 25, 2011	Prepared By:	Alan Laudani
-	AUGUST 25, 2011	Initial Release:	Alan Laudani

Note that the results contained in this report relate only to the items tested and were obtained in the period between the date of initial receipt of samples and the date of issue of the report.

This test report has been completed in accordance with the requirements of ISO/IEC 17025.

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TESTED BY:

_____Date: August 25, 2011 Alan Laudani, EMC Test Engineer

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Section 2: Equipment Under Test

2.1 Product Identification

DEVICE	MANUFACTURER MODEL # SERIAL #	POWER CABLE
EUT - Main Module	DEI Headquarters Inc. Model: 3807A Serial #: 6	5 VDC from power supply or Battery

Connection	I/O Cable
Vehicle cables	Directed Electronics

2.2 Theory of Operation

The 3807A Is a Main Module. Its function is to arm/disarm vehicle systems. The EUT was exercised by powering leads to change set test modes.

The EUT's performance during test was evaluated against the performance criterion specified by applicable test standards. Performance results are detailed in the test results section of this report.

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2.3 Technical Specifications of the EUT			
Manufacturer:	DEI Headquarters Inc.		
Operating Frequency:	909.440 to 918.500 MHz in the 902-928 MHz Band		
Number of Operating Frequencies:	25		
Output Power:	0.0049 W		
Modulation:	FSK		
Antenna Data:	Integral antenna trace on circuit board Or Antenna		
Antenna Connector:	None		
Power Source:	12.5 V vehicle battery or vehicle bus		

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Section 3: Test Conditions

3.1 Specifications

The apparatus was assessed against the following specifications:

FCC Part 15 Subpart C, 15.247 Operation within the bands 902-928 MHz, 2400-2483.5 MHz, 5725-5850 MHz and 24.0-24.25 GHz bands.

IC RSS-210 Issue 8 December 2010 Low-power Licence-exempt Radio-communication Devices (All Frequency Bands): Category I Equipment. Annex 8 - Frequency Hopping and Digital Modulation Systems Operating in the Bands 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz

IC RSS-Gen Issue 3 December 2010 General Requirements and Information for the Certification of Radio-communication Equipment

3.3 Test Environment

All tests were performed under the following environmental conditions:

Temperature range	15.6 – 23.3 ^o C
Humidity range	26 - 65 %
Pressure range	86 - 106 kPa
Power supply range	+/- 1% of rated voltages

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3.4 Test Equipment

Nemko ID	Device	Manufacturer	Model	Serial Number	Cal Date	Cal Due Date	8
110	Antenna, LPA	Electrometrics	LPA-25	1217	4/1/2011	4/1/2013	WW.
116	Antenna, Bicon	EMCO	3104	3020	9/28/2010	9/28/2011	ner
317	Preamplifier	HP	8449A	2749A00167	5/16/2011	5/16/2012	пко
529	Antenna, Ridge Guide	EMCO	3115	2505	10/18/2010	10/18/2012	
815	Multimeter	Fluke	111	78130066	8/4/2010	9/4/2011	3
835	Spectrum Analyzer	Rohde & Schwarz	RHDFSEK	829058/005	7/22/2011	7/22/2012	
NA	DC Power Supply	GW Instek	GPS-303000	NA	NCR	NCR	
901	Preamplifier	Sonoma	310 N	130607	1/7/2011	1/7/2012	
911	Spectrum Analyzer	Agilent	E4440A	US41421266	10/26/2010	10/26/2011	

Registration of the Emissions Chamber is on file with the Federal Communications Commission, and is also registered with Industry Canada under Site Number 2040B-3.

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Section 4: Observations

4.1 Modifications Performed During Assessment

No modifications were performed during assessment.

4.2 Record Of Technical Judgments

No technical judgements were made during the assessment.

4.3 EUT Parameters Affecting Compliance

The user of the apparatus could not alter parameters that would affect compliance.

4.4 Deviations From Laboratory Test Procedures

No deviations from Laboratory Test Procedure

4.5 Test Deleted

No Tests were deleted from this assessment.

4.6 Additional Observations

There were no additional observations made during this assessment.

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Section 5: Results Summary

This section contains the following:

Test Results

The column headed "Required" indicates whether the associated clauses were invoked for the apparatus under test. The following abbreviations are used:

- N No: not applicable / not relevant
- Y Yes: Mandatory i.e. the apparatus shall conform to these test.
- N/T Not Tested, mandatory but not assessed. (See section 4.4 Test deleted)

The results contained in this section are representative of the operation of the apparatus as originally submitted.

Part 15	RSS-210	Test Description	Required	Result
15.207 (a)	RSS-Gen 7.2.2	Conducted Emission Limit	Y	Pass
15.247 a1i	A8.1(c)	20dB & 99% Bandwidth	Y	Pass
12.247a1	A8.1(c)	Channel Separation Average time of occupancy	Y	Pass
15.247a1i	A8.1(c)	Number of Hopping Channels	Y	Pass
15.247 b1	A8.4	Peak Output Power	Y	Pass
15.209 a 15.247c	A8.5	Radiated Emissions within Restricted Bands	Y	Pass
15.247c	A8.5	Bandedge	Y	Pass
15.109	RSS-GEN 4.10	Receiver Spurious Emissions	NA	Pass

5.1 Test Results

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Appendix A: Test Results

Power Line Conducted Emissions

15.207(a) Except as shown in paragraphs (b) and (c) of this section, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50 μ H/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

Frequency of omission (MHz)	Conducted limit (dBµV)		
r requercy or emission (winz)	Quasi-peak	Average	
0.15–0.5	66 to 56*	56 to 46*	
0.5–5	56	46	
5–30	60	50	

*Decreases with the logarithm of the frequency.

Test Conditions:

Sample Number:	3807A	Temperature:	
Date:		Humidity:	
Modification State:	Low ,Mid and High Channel	Tester:	Alan Laudani
		Laboratory:	

Test Results: EUT is installed in motorized vehicles therefore Power Line Conducted Emissions do not apply

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20 dB/ 99% Bandwidth

Clause 15.247(a)(1)(i)

(i) For frequency hopping systems operating in the 902-928 MHz band: if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period; if the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping frequencies and the average time of occupancy on any frequencies due to the average time of occupancy on any frequencies and the average time of occupancy on any frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 10 second period. The maximum allowed 20 dB bandwidth of the hopping channel is 500kHz.

Test Conditions:

Sample Number:	3807A	Temperature:	20°C
Date:	August 5, 2011	Humidity:	52 %
Modification State:	Lo/Mid/High Channels	Tester:	Alan Laudani
		Laboratory.	Nemko Ground Plane

Test Results: EUT complies

- This was a conducted test.
- The Spectrum Analyzer RES BW was set to 100 kHz.
- For each RF output channel investigated, the spectrum analyzer center frequency was set to the channel carrier.
- A PEAK output reading was taken, a DISPLAY line was drawn 20 dB lower than PEAK level. The 20 dB bandwidth was determined from where the channel output spectrum intersected the display line.
- Span is wide enough to capture the channel transmission
- RBW is 1% of the span
- VBW is 3X RBW, Sweep is auto, Detector is Peak, Trace is Max Hold
- 99% bandwidth: Used Spectrum Analyzer's programmed function.
- Observed maximum 20 dB BW is 322 kHz (low channel).
- Observed maximum 20 dB BW is 276 kHz (high channel).
- 909.440 MHz (322/2) kHz = 909.279 MHz (within the frequency band)
- 918.500 MHz + (276/2) kHz = 918.638 MHz (within the frequency band)

Channel Range	20dB Bandwidth	99% Bandwidth
Low (909.440 MHz)	320 kHz	321 kHz
Mid (914.196 MHz)	266 kHz	914 kHz
High (918.500 MHz)	284 kHz	918 kHz

Equipment Used: 835

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Mid Channel



Date: 1.JAN.1997 00:16:45

Date: 1.JAN.1997 00:18:20

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Frequency hopping systems operating in the 902-928 MHz band

Clause 15.247(a)(1)(i) For frequency hopping systems operating in the 902-928 MHz band: if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period; if the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 10 second period. The maximum allowed 20 dB bandwidth of the hopping channel is 500 kHz.

Test Conditions:

Sample Number:	3807A	Temperature:	20°C
Date:	3-24-2011	Humidity:	31 %
Modification State:	Lo/Mid/High Channels	Tester:	Alan Laudani
		Laboratory:	Nemko

Test Results:

The EUT was placed <1m from the receiving antenna to allow a representative signal to fill the display > 30dB from the noise floor. The Spectrum Analyzer RES BW was set to 1 MHz. The test sample was set to hopping mode and the frequency span was set zero. The sweep was set to 10 seconds.

2 occurrences in 10 seconds x 50.5 ms = 101 ms which is less than 400 ms EUT complies.

Duty Cycle Factor Calculation

Since there is an emission for each channel 40.5ms in 200 ms and no repeat for 4.6 seconds, one could conclude that a duty cycle exists 50.5ms per 100 ms or 50.5%. Duty cycle factor is 20 x Log(duty cycle) = $20 \times \log (.505) = -5.93$.

Round to -5.9 as measurements are to nearest 0.1. Actual duty cycle would be less: Use of a Keyfob transmitter for remote control devices like garage door openers, automobile alarm systems, etc. imply intermittent use over time.

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Time of Occupancy

This channel was on twice in 10 seconds 4.6 seconds apart. Other emissions are reflections of adjacent channels.



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Channel Separation

Clause 15.247(a)(1) Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW. The system shall hop to channel frequencies that are selected at the system hopping rate from a pseudo randomly ordered list of hopping frequencies. Each frequency must be used equally on the average by each transmitter. The system receivers shall have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shall shift frequencies in synchronization with the transmitted signals.

Test Conditions:

Sample Number:	3807A	Temperature:	20°C
Date:	Aug. 24, 2011	Humidity:	31 %
Modification State:	Lo/Mid/High Channels	Tester:	Alan Laudani
		Laboratory:	Nemko

Test Results: EUT Complies

- The Spectrum Analyzer RES BW was set to 10 kHz.
- Detector was peak, max hold.
- The test sample was set to hopping mode and the frequency span was set to a value to capture two or more hopping channels.
- Marker delta shows frequency separation.

Equipment Used: 835

Channel Separation equal to the 20 dB bandwidth: 300 kHz

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Frequency Plan

Clause 15.247(a)(1) Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW. The system shall hop to channel frequencies that are selected at the system hopping rate from a pseudo randomly ordered list of hopping frequencies. Each frequency must be used equally on the average by each transmitter. The system receivers shall have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shall shift frequencies in synchronization with the transmitted signals.

Test Conditions:

Sample Number:	3807A	Temperature:	20°C
Date:		Humidity:	31 %
Modification State:	Lo/Mid/High Channels	Tester:	Alan Laudani
		Laboratory:	Nemko

Test Results:

The Frequency Plan is discussed in the Technical Description exhibit and was reviewed by this test engineer and was found to comply.

- 25 channels: channel 0 at 909.440 to channel 24 at 918.500
- Psuedo-Random Hopping Sequence: 0,5,12,10,6,3,8,1,2,9,15,22,16,18,23,20,19,17,24,21,14,7,13,11,4

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Number of Hopping Channels

Clause 15.247(a)(1)(i) For frequency hopping systems operating in the 902-928 MHz band: if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period; if the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 10 second period. The maximum allowed 20 dB bandwidth of the hopping channel is 500 kHz.

Test Conditions:

kHz or greater, the system shall use at least 25 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 10 second period. The maximum allowed 20 dB bandwidth of the hopping channel is 500 kHz.				all not kHz.
Test Conditions:				
Sample Number: 3807A Temperature: 22°C				
Date:	August 5, 2011	Humidity:	52 %	
Modification State: Lo/Mid/High Channels Tester: Alan Laudani				
Laboratory: Nemko				

Test Results: 25 Channels, EUT complies.

- This is a conducted test •
- The Spectrum Analyzer RES BW was set to 10 kHz to discriminate channels.



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Radiated Emissions within Restricted Bands

Clause 15.209(a) Except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table: Field Strength (uV/meter) Frequency (MHz) Measurement Distance (meter) 2400/F (kHz) 0.009-0.490 300 0.490-1.705 24000/F (kHz) 30 1.705-30.0 30 3 30-88 100 3 88-216 150 3 3 216-960 200 Above 960 500 3

15.247 (d) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in Sec. 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Sec. 15.205(a) must also comply with the radiated emission limits specified in Sec. 15.205(c)).

Test Conditions:

Sample Number:	3807A	Temperature:	22°C
Date:	August 5, 2011	Humidity:	52 %
Modification State:	Lo/Mid/High Channels	Tester:	Alan Laudani
		Laboratory:	Chamber

Test Results:

See Scans Below.

Additional Observations:

The Spectrum was searched from 30 MHz to the 10th Harmonic.

There are no emissions found that apply to the restricted bands defined in FCC Part 15 Subpart C, 15.205.

Peak scans, horizontal and vertical, from 30 MHz to 1000 MHz show no emissions within 20 dB of the limits. RBW = 100 kHz, VBW = 300 kHz. Measurements below 1GHz were performed at 3m with a Quasi-Peak detector while Peak and Average detectors were used above 1GHz. As the emission is pulsing, a duty cycle factor was introduced to spurious harmonics. See calculation in section on Time of Occupancy.

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Spurious Radiated Emissions in Restricted Bands: 1000 MHz to 10th Harmonic

No emissions found within 20 dB of the limit.

Radiated Emissions 30 MHz to 1000 MHz: Low Channel, Continuous TX Mode



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Conducted Spurious Emissions

15.247 (d) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in Sec. 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Sec. 15.205(a) must also comply with the radiated emission limits specified in Sec. 15.209(a) (see Sec. 15.205(c)).

Test Conditions:

Sample Number:	3807A	Temperature:	22°C
Date:	August 5, 2011 & August 24, 2011	Humidity:	52%
Modification State:	Lo/Mid/High Channels	Tester:	Alan Laudani
		Laboratory:	SOATS

Test Results: EUT complies

See plots below.

Additional Observations:

- Conducted Emissions: The peak level reading was taken at the carrier frequency 7 dBm then a display line was drawn 20 dBc below this level (-13 dBm) which will be the limit for this test.
- RBW is 100 kHz: VBW is 3X RBW, Sweep is auto.
- Detector is Peak, Trace is Max Hold
- A 2.5 dB cable loss was noted between the input of the Spectrum Analyzer and the EUT's antenna port.
- Emissions were searched from 30 MHz to 902 MHz and from 928 MHz to 9500 MHz: no emissions within 20 dB of the limit were detected.
- Transmit Continuous Test Mode on Low, Middle and High Channels.
- Radiated Emission Band Edge: 3m, maximized for Peak emissions, RBW =120 kHz, VBW = 300 kHz.: Max Hold Peak is showing no emissions to measure at band edges in Hopping and Non-Hopping modes.

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Worst emission: 2726 MHz -47.6 dBm





Worst emission: 1828 MHz -48.4 dBm

High Channel Transmit





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Bandedge Measurements

3m Radiated Emissions, Max Peak hold.



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Peak Output Power Clause 15.247(b)(2) For frequency hopping systems operating in the 902-928 MHz band: 1 watt for systems employing at least 50 hopping channels; and, 0.25 watts for systems employing less than 50 hopping channels, but at least 25 hopping channels, as permitted under paragraph (a)(1)(i) of this section.

Sample Number:	3807A	Temperature:	22°C
Date:	August 5, 2011	Humidity:	52 %
Modification State:	Lo/Mid/High Channels	Tester:	Alan Laudani
		Laboratory:	Nemko

Test Results: EUT complies.

Plots below

RBW = 1 MHz > OBW, VBW = 3 MHz > RBW

Max hold peak detector

Input power provided by power supply monitored by multimeter # 815 and input voltage was varied +/- 15 % of 12 VDC and no varying of output noted.

Conducted Peak Output Power:

Channel	Frequency	Peak	Calculated
		Output Power	Output Power
		dBm	(W)
Low	909.440 MHz	6.61	0.0046
Mid	914.196 MHz	6.95	0.0049
High	918.500 MHz	6.31	0.0043

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Receiver Spurious Emissions

The following receiver spurious emission limits shall be complied with: (a) If a radiated measurement is made, all spurious emissions shall comply with the limits of Table 1.

Table 1 - Spurious Emission Limits for Receivers

Spurious Frequency (MHz)	Field Strength (microvolt/m at 3 meters)
30-88	100
88-216	150
216-960	200
Above 960	500

Test Conditions:

Sample Number:	3807A	Temperature:	21°C
Date:	August 5, 2011	Humidity:	39 %
Modification State:	Recieve	Tester:	A. Laudani
		Laboratory:	SOATS

Test Results: See attached test result.

Additional Observations:

- The Spectrum was searched from 30MHz to 5000 MHz.
- EUT operated on "test receive mode".
- Conducted Scan was Max Peak Hold with RBW = 100 kHz. Should an emission become evident below 1GHz, measurements are measured using CISPR quasi-peak detector while above 1GHz are measured using average detector with 1MHz RBW.
- No Radiated Emissions detected. within 20 dB of the limit were detected.

Conducted Emissions



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