

FCC PART 15, SUBPART B and C
TEST REPORT
for
WHEEL TORQUE SENSOR TRANSMITTER
MODEL: 90439

Prepared for

SENSOR DEVELOPMENTS INC.
1050 W. SILVER BELL ROAD
ORION, MI 48359

Prepared by: 

EDGAR VALENCIA

Approved by: 

KYLE FUJIMOTO

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DATE: DECEMBER 12, 2016

	REPORT BODY	APPENDICES					TOTAL
		<i>A</i>	<i>B C</i>		<i>D</i>	<i>E</i>	
PAGES	15	2	2 2		10	27	58

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TABLE OF CONTENTS

Section / Title	PAGE
GENERAL REPORT SUMMARY	4
SUMMARY OF TEST RESULTS	5
1. PURPOSE	6
2. ADMINISTRATIVE DATA	7
2.1 Location of Testing	7
2.2 Traceability Statement	7
2.3 Cognizant Personnel	7
2.4 Date Test Sample was Received	7
2.5 Disposition of the Test Sample	7
2.6 Abbreviations and Acronyms	7
3. APPLICABLE DOCUMENTS	8
4. DESCRIPTION OF TEST CONFIGURATION	9
4.1 Description of Test Configuration - Emissions	9
4.1.1 Cable Construction and Termination	9
5. LISTS OF EUT, ACCESSORIES AND TEST EQUIPMENT	10
5.1 EUT and Accessory List	10
6. TEST SITE DESCRIPTION	12
6.1 Test Facility Description	12
6.2 EUT Mounting, Bonding and Grounding	12
7. TEST PROCEDURES	13
7.1 RF Emissions	13
7.1.1 Radiated Emissions Test	13
7.1.2 RF Emissions Test Results	14
8. CONCLUSIONS	15

LIST OF APPENDICES

APPENDIX	TITLE
A	Laboratory Accreditations and Recognitions
B	Modifications to the EUT
C	Additional Models Covered Under This Report
D	Diagrams and Charts • Test Setup Diagrams • Antenna and Effective Gain Factors
E	Data Sheets

LIST OF FIGURES

FIGURE	TITLE
1	Layout of the Semi-Anechoic Test Chamber

GENERAL REPORT SUMMARY

This electromagnetic emission test report is generated by Compatible Electronics Inc., which is an independent testing and consulting firm. The test report is based on testing performed by Compatible Electronics personnel according to the measurement procedures described in the test specifications given below and in the "Test Procedures" section of this report.

The measurement data and conclusions appearing herein relate only to the sample tested and this report may not be reproduced without the written permission of Compatible Electronics, unless done so in full.

This report must not be used to claim product certification, approval or endorsement by NVLAP, NIST or any agency of the federal government.

Device Tested: Wheel Torque Sensor Transmitter
Model: 90439
S/N: N/A

Product Description: The EUT is a transmitter used in a torque telemetry system.

Modifications: The EUT was not modified in order to meet the specifications.

Customer: Sensor Development Inc.
1050 W. Silver Bell Road
Orion, MI 48359

Test Dates: November 21, 2016

Test Procedure: ANSI C63.4, ANSI C63.10

Test Specifications covered by accreditation:



Test Specifications:

Emissions requirements

CFR Title 47, Part 15, Subpart B; and Subpart C,
sections 15.205, 15.209, and 15.249

SUMMARY OF TEST RESULTS

TEST	DESCRIPTION	RESULTS
1	Spurious Radiated RF Emissions, 10 kHz – 9300 MHz (Transmitter and Digital portion)	Complies with the Class B limits of CFR Title 47, Part 15 Subpart B; and the limits of CFR Title 47, Part 15, Subpart C, section 15.205, 15.209 and 15.249
2	Conducted RF Emissions, 150 kHz to 30 MHz	This test was not performed because the EUT operates on battery power and does not connect to the AC mains.

1. PURPOSE

This document is a qualification test report based on the emissions tests performed on the Wheel Torque Sensor Transmitter, Model: 90439. The emissions measurements were performed according to the measurement procedure described in ANSI C63.4 and ANSI C63.10. The tests were performed in order to determine whether the electromagnetic emissions from the equipment under test, referred to as EUT hereafter, are within the Class B specification limits defined by CFR Title 47, Part 15, Subpart B; and Subpart C, sections 15.205, 15.209, and 15.249.



2. ADMINISTRATIVE DATA

2.1 Location of Testing

The emissions tests described herein were performed at the test facility of Compatible Electronics, 114 Olinda Drive, Brea, California 92823.

2.2 Traceability Statement

The calibration certificates of all test equipment used during the test are on file at the location of the test. The calibration is traceable to the National Institute of Standards and Technology (NIST).

2.3 Cognizant Personnel

Sensor Developments Inc.

Rick West

Electronic Design Manager

Compatible Electronics Inc.

Kyle Fujimoto

Test Engineer

Edgar Valencia

Lab Technician

2.4 Date Test Sample was Received

The test sample was received on November 20, 2016.

2.5 Disposition of the Test Sample

The test sample has not been returned to Sensor Developments Inc. as of the date of this test report.

2.6 Abbreviations and Acronyms

The following abbreviations and acronyms may be used in this document.

RF	Radio Frequency
EMI	Electromagnetic Interference
EUT	Equipment Under Test
P/N	Part Number
S/N	Serial Number
HP	Hewlett Packard
ITE	Information Technology Equipment
CML	Corrected Meter Limit
LISN	Line Impedance Stabilization Network
N/A	Not Applicable
DNF	Do Not Fit
URC	Universal Remote Control

3. APPLICABLE DOCUMENTS

The following documents are referenced or used in the preparation of this emissions Test Report.

SPEC	TITLE
FCC Title 47, Part 15 Subpart C	FCC Rules – Radio frequency devices (including digital devices) – Intentional Radiators
FCC Title 47, Part 15 Subpart B	FCC Rules – Radio frequency devices (including digital devices) – Unintentional Radiators
ANSI C63.4 2014	American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz
ANSI C63.10 2013	American National Standard for Testing Unlicensed Wireless Devices

4.1 Description of Test Configuration - Emissions

The Transmitter, Model: 90439 (EUT) was connected to two accessory Resistance Temperature Sensors and one accessory Wheel Sensor.

The EUT was continuously transmitting at the low, middle, or high channel.

The X orientation is when the EUT is parallel to the ground. The Y orientation is when the EUT is perpendicular to the ground mounted vertically. The Z orientation is when the EUT is perpendicular to the ground mounted horizontally. The final radiated data for the EUT was taken in the mode described

The final radiated data for the EUT as was taken in the mode described above. Please see Appendix E for the data sheets.

4.1.1 Cable Construction and Termination

Cable 1

This is 1-meter cable connecting the EUT to two accessory Resistance Temperature Sensors and one accessory Wheel Sensor. The cable is hard wired to each sensor and has an 8-pin LEMO connector at the EUT end.

5. LISTS OF EUT, ACCESSORIES AND TEST EQUIPMENT**5.1 EUT and Accessory List**

EQUIPMENT	MANUFACTURER	MODEL NUMBER	SERIAL NUMBER	FCC ID
WHEEL TORQUE SENSOR TRANSMITTER	SENSOR DEVELOPMENTS INC.	90439	N/A	NF690439
WHEEL TORQUE SENSOR RECEIVER	SENSOR DEVELOPMENTS INC.	90438	N/A	N/A
(2) RESISTANCE TEMPERATURE SENSORS	SENSOR DEVELOPMENTS INC.	N/A	N/A	N/A
WHEEL SENSOR	SENSOR DEVELOPMENTS INC.	N/A	N/A	N/A

5.2 Emissions Test Equipment

EQUIPMENT TYPE	MANU-FACTURER	MODEL NUMBER	SERIAL NUMBER	CALIBRATION DATE	CAL. CYCLE
GENERAL TEST EQUIPMENT					
TDK TestLab	TDK RF Solutions, Inc.	9.22	700145	N/A	N/A
Computer	Hewlett Packard	p6716f	MXX1030PX0	N/A	N/A
LCD Monitor	Hewlett Packard	52031a	3CQ046N3MG	N/A	N/A
EMI Receiver	Keysight	N9038A	MY51210150	December 29, 2015	1 Year
RF RADIATED EMISSIONS TEST EQUIPMENT					
CombiLog Antenna	Com-Power	AC-220	61060	September 3, 2015	2 Year
Preamplifier	Com-Power	PA-118	551024	March 6, 2015	2 Year
Loop Antenna	Com-Power	AL-130	17089	February 6, 2015	2 Year
Horn Antenna	Com-Power	AH-118	071175	February 26, 2016	2 Year
Antenna Mast	Com Power	AM-100	N/A	N/A	N/A
System Controller	Sunol Sciences Corporation	SC110V	112213-1	N/A	N/A
Turntable	Sunol Sciences Corporation	2011VS	N/A	N/A	N/A
Antenna-Mast	Sunol Sciences Corporation	TWR95-4	112213-3	N/A	N/A

6. TEST SITE DESCRIPTION

6.1 Test Facility Description

Please refer to section 2.1 and 7.1 of this report for emissions test location.

6.2 EUT Mounting, Bonding and Grounding

For frequencies 1 GHz and below: The EUT was mounted on a 1.0 by 1.5 meter non-conductive table 0.8 meters above the ground plane.

For frequencies above 1 GHz: The EUT was mounted on a 1.0 by 1.5 meter non-conductive table 1.5 meters above the ground plane.

The EUT was not grounded.

7. TEST PROCEDURES

The following sections describe the test methods and the specifications for the tests. Test results are also included in this section.

7.1 RF Emissions

7.1.1 Radiated Emissions Test

The EMI Receiver was used as the measuring meter. A built-in, internal preamplifier was used to increase the sensitivity of the instrument. The EMI Receiver was initially used with the Analyzer mode feature activated. In this mode, the EMI receiver can then record the actual frequency to be measured. This final reading is then taken accurately in the EMI Receiver mode, which takes into account the cable loss, amplifier gain and antenna factors, so that a true reading is compared to the true limit.

For frequencies above 1 GHz, the readings were averaged by using an average detector.

The measurement bandwidths and transducers used for the radiated emissions test were:

FREQUENCY RANGE	EFFECTIVE MEASUREMENT BANDWIDTH	TRANSDUCER
9 kHz to 150 kHz	200 Hz	Loop Antenna
150 kHz to 30 MHz	9 kHz	Loop Antenna
30 MHz to 1 GHz	120 kHz	Combilog Antenna
1 GHz to 9.3 GHz	1 MHz	Horn Antenna

The EMI test chamber of Compatible Electronics, Inc. was used for radiated emissions testing. This test site is in full compliance with ANSI C63.4. Please see section 6.2 of this report for mounting, bonding and grounding of the EUT. The turntable supporting the EUT is remote controlled using a motor. The turntable permits EUT rotation of 360 degrees in order to maximize emissions. Also, the antenna mast allows height variation of the antenna from 1 meter to 4 meters. Data was collected in the worst case (highest emission) configuration of the EUT. At each reading, the EUT was rotated 360 degrees and the antenna height was varied from 1 to 4 meters (for E field radiated field strength). The gunsight method was used when measuring with the horn antenna in order to ensure accurate results.

Radiated Emissions Test (Continued)

The EUT was tested at a 3-meter test distance from 10 kHz to 9.3 GHz.

Test Results:

The EUT complies with the **Class B** limits of CFR Title 47, Part 15, Subpart B; and the limits of CFR Title 47, Part 15, Subpart C, Sections 15.209 and 15.249 for radiated emissions. Please see Appendix E for the data sheets.

7.1.2 RF Emissions Test Results

Table 1.0 RADIATED EMISSION RESULTS
Wheel Torque Sensor Transmitter, Model: 90439

Frequency MHz	Corrected Reading* dBuV/m	Specification Limit dBuV/m	Delta (Cor. Reading – Spec. Limit) dB
1824.74 (H) (Z-Axis)	53.38	53.97	-0.59
921.37 (H) (X-Axis)	93.03	93.97	-0.94
1824.74 (V) (Y-Axis)	52.41	53.97	-1.56
912.37 (H) (Z-Axis)	91.41	93.97	-2.57
2737.11 (H) (X-Axis)	50.22	53.97	-3.75
921.37 (V) (Y-Axis)	89.81	93.97	-4.16

Notes:

(H) Horizontal
(V) Vertical

* The complete emissions data is given in Appendix E of this report.

8. CONCLUSIONS

The Wheel Torque Sensor Transmitter, Model: 90439 (EUT), as tested, meets all of the specification limits defined in FCC Title 47, Part 15, Subpart B; and Subpart C, sections 15.205, 15.209, and 15.249.



APPENDIX A

LABORATORY ACCREDITATIONS AND RECOGNITIONS

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114 Olinda Drive
Brea, CA 92823
(714) 579-0500

Agoura Division
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Agoura, CA 91301
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Silverado Division
19121 El Toro Road
Silverado, CA 92676
(949) 589-0700

Lake Forest Division
20621 Pascal Way
Lake Forest, CA 92630
(949) 587-0400

LABORATORY ACCREDITATIONS AND RECOGNITIONS



NVLAP LAB CODE 200528-0

For US, Canada, Australia/New Zealand, Japan, Taiwan, Korea, and the European Union, Compatible Electronics is currently accredited by NVLAP to ISO/IEC 17025.

For the most up-to-date version of our scopes and certificates please visit

<http://celectronics.com/quality/scope/>

Quote from ISO-ILAC-IAF Communiqué on 17025:

"A laboratory's fulfilment of the requirements of ISO/IEC 17025:2005 means the laboratory meets both the technical competence requirements and management system requirements that are necessary for it to consistently deliver technically valid test results and calibrations. The management system requirements in ISO/IEC 17025:2005 (Section 4) are written in language relevant to laboratory operations and meet the principles of ISO 9001:2008 Quality Management Systems — Requirement



APPENDIX B

MODIFICATIONS TO THE EUT

MODIFICATIONS TO THE EUT

The modifications listed below were made to the EUT to pass FCC Subpart B and FCC 15.249 specifications.

All the rework described below was implemented during the test in a method that could be reproduced in all the units by the manufacturer.

No modifications were made to the EUT during the testing.



APPENDIX C

***ADDITIONAL MODELS COVERED
UNDER THIS REPORT***

ADDITIONAL MODELS COVERED UNDER THIS REPORT

USED FOR THE PRIMARY TEST

Wheel Torque Sensor Transmitter
Model: 90439
S/N: N/A

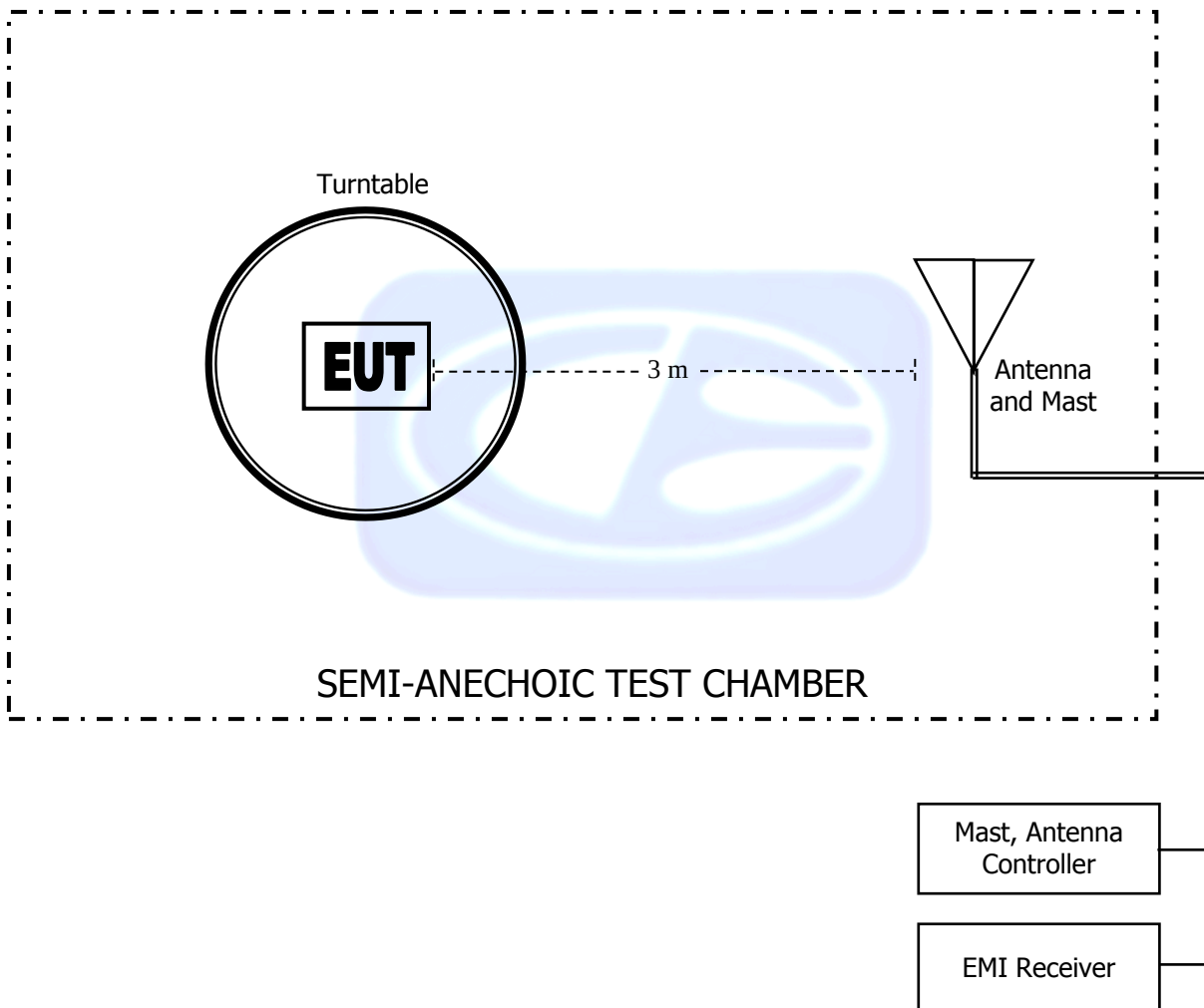
There are no additional models covered under this report.



APPENDIX D

DIAGRAMS AND CHARTS

FIGURE 1: LAYOUT OF THE SEMI-ANECHOIC TEST CHAMBER



COM-POWER AL-130**LOOP ANTENNA**

S/N: 17089

CALIBRATION DATE: FEBRUARY 6, 2015

FREQUENCY (MHz)	MAGNETIC (dB/m)	ELECTRIC (dB/m)
0.009	-33.18	18.32
0.01	-34.10	17.40
0.02	-38.65	12.85
0.03	-39.28	12.22
0.04	-40.09	11.41
0.05	-40.85	10.65
0.06	-40.88	10.62
0.07	-41.07	10.43
0.08	-41.04	10.46
0.09	-41.19	10.31
0.1	-41.20	10.30
0.2	-41.52	9.98
0.3	-41.53	9.97
0.4	-41.42	10.08
0.5	-41.53	9.97
0.6	-41.53	9.97
0.7	-41.43	10.07
0.8	-41.23	10.27
0.9	-41.13	10.37
1	-41.14	10.36
2	-40.80	10.70
3	-40.66	10.84
4	-40.61	10.89
5	-40.33	11.17
6	-40.53	10.97
7	-40.47	11.03
8	-40.48	11.02
9	-39.93	11.57
10	-39.81	11.69
15	-43.35	8.15
20	-39.16	12.34
25	-40.24	11.26
30	-43.18	8.32

COM-POWER AC-220

COMBILOG ANTENNA

S/N: 61060

CALIBRATION DATE: SEPTEMBER 3, 2015

FREQUENCY (MHz)	FACTOR (dB)	FREQUENCY (MHz)	FACTOR (dB)
30	24.00	200	13.00
35	24.30	250	15.30
40	25.40	300	18.20
45	21.50	350	17.90
50	22.50	400	18.60
60	15.40	450	19.80
70	12.70	500	21.60
80	11.10	550	22.40
90	13.40	600	23.70
100	13.80	650	24.30
120	15.40	700	24.00
125	15.40	750	24.50
140	13.10	800	24.30
150	17.20	850	26.30
160	13.20	900	26.90
175	14.20	950	26.00
180	14.30	1000	25.60

COM POWER AH-118

HORN ANTENNA

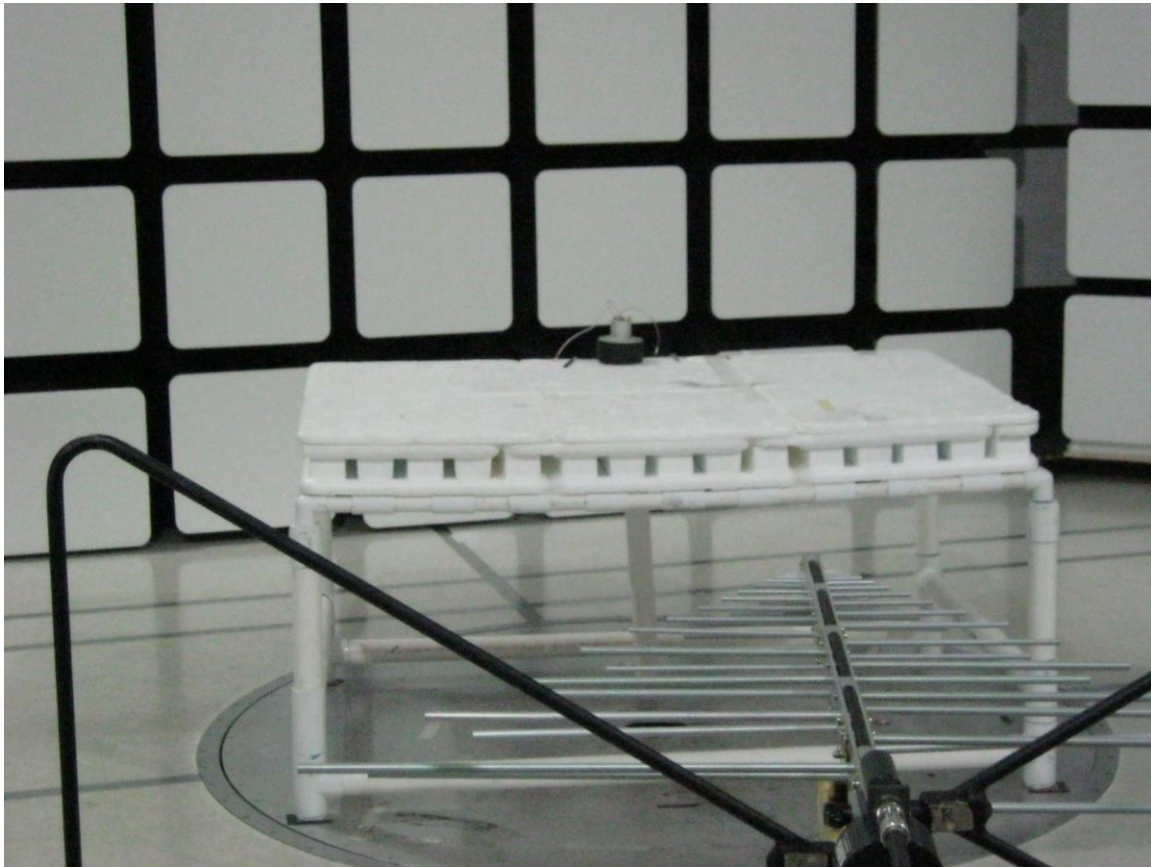
S/N: 071175

CALIBRATION DATE: FEBRUARY 26, 2016

FREQUENCY (GHz)	FACTOR (dB)	FREQUENCY (GHz)	FACTOR (dB)
1.0	23.93	10.0	39.33
1.5	25.54	10.5	39.64
2.0	28.09	11.0	41.04
2.5	30.21	11.5	44.29
3.0	30.15	12.0	41.22
3.5	30.17	12.5	41.50
4.0	31.90	13.0	41.62
4.5	33.51	13.5	40.63
5.0	33.87	14.0	39.94
5.5	35.08	14.5	41.84
6.0	34.81	15.0	42.69
6.5	34.26	15.5	39.03
7.0	36.33	16.0	39.07
7.5	37.03	16.5	41.40
8.0	37.56	17.0	43.18
8.5	40.07	17.5	47.01
9.0	38.92	18.0	46.48
9.5	38.21		

COM-POWER PA-118**PREAMPLIFIER****S/N: 551024****CALIBRATION DATE: MARCH 6, 2015**

FREQUENCY (GHz)	FACTOR (dB)	FREQUENCY (GHz)	FACTOR (dB)
1.0	39.76	6.0	38.77
1.1	40.46	6.5	38.46
1.2	40.05	7.0	38.27
1.3	40.58	7.5	38.77
1.4	39.50	8.0	39.25
1.5	39.92	8.5	38.63
1.6	40.40	9.0	39.58
1.7	40.10	9.5	42.12
1.8	40.49	10.0	38.53
1.9	38.86	11.0	40.21
2.0	41.53	12.0	41.15
2.5	41.05	13.0	40.51
3.0	40.29	14.0	40.32
3.5	40.82	15.0	39.47
4.0	40.88	16.0	39.88
4.5	41.37	17.0	39.79
5.0	40.73	18.0	40.61
5.5	39.05		

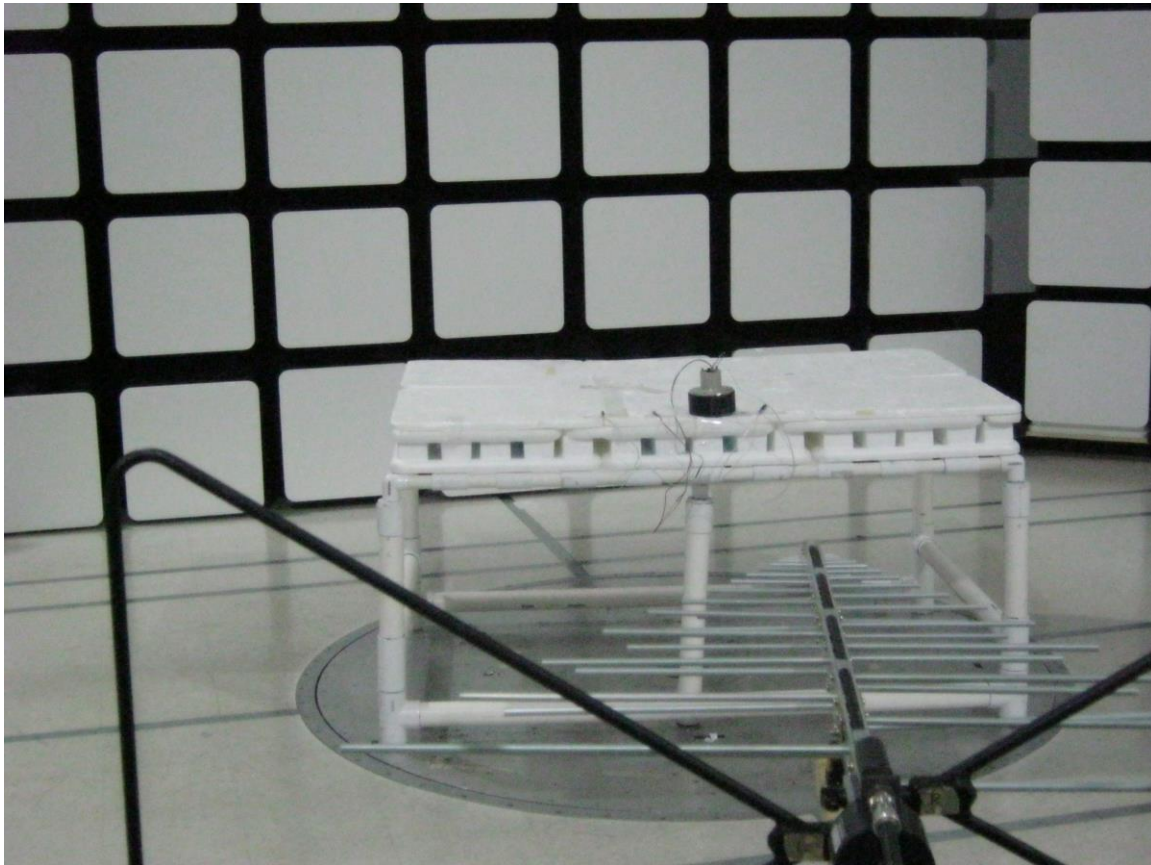


FRONT VIEW

SENSOR DEVELOPMENTS INC.
WHEEL TORQUE SENSOR TRANSMITTER
MODEL: 90439

FCC SUBPART B AND C – RADIATED EMISSIONS – BELOW 1 GHz

**PHOTOGRAPH SHOWING THE EUT CONFIGURATION
FOR MAXIMUM EMISSIONS**

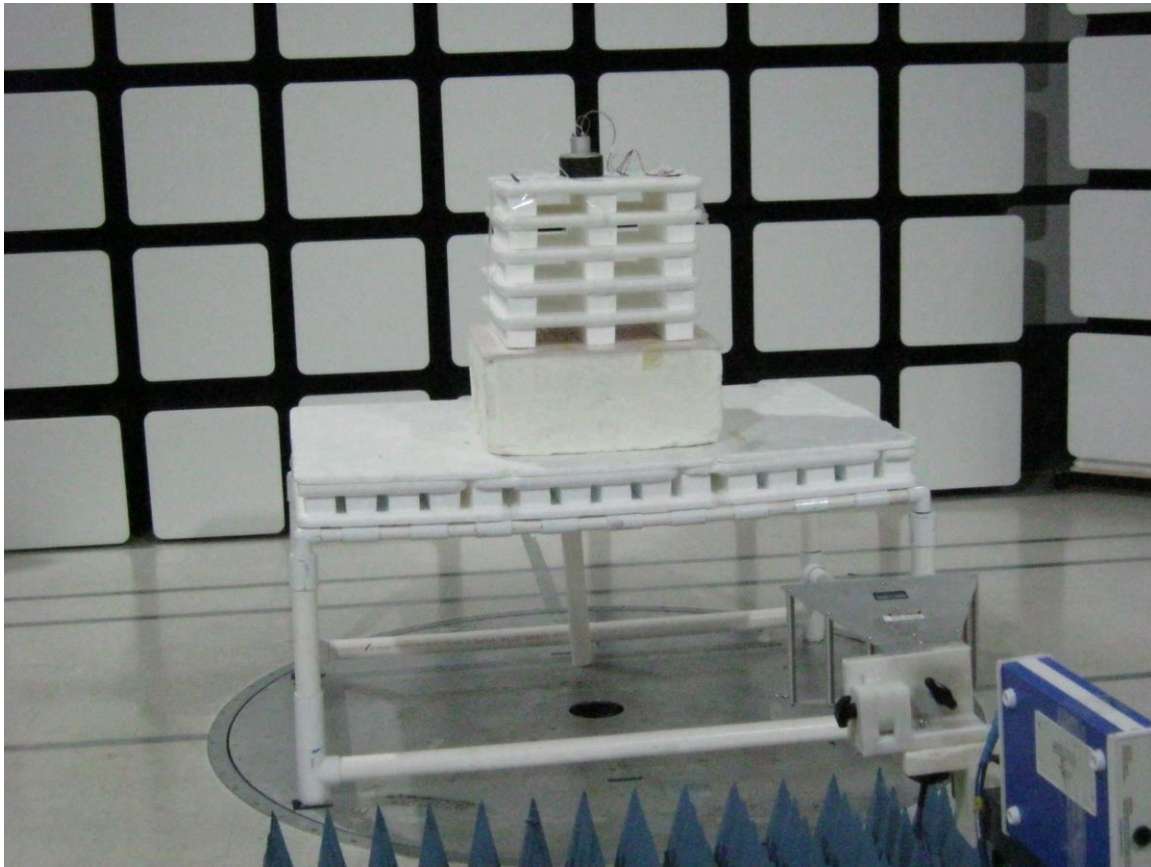


REAR VIEW

SENSOR DEVELOPMENTS INC.
WHEEL TORQUE SENSOR TRANSMITTER
MODEL: 90439

FCC SUBPART B AND C – RADIATED EMISSIONS – BELOW 1 GHz

**PHOTOGRAPH SHOWING THE EUT CONFIGURATION
FOR MAXIMUM EMISSIONS**

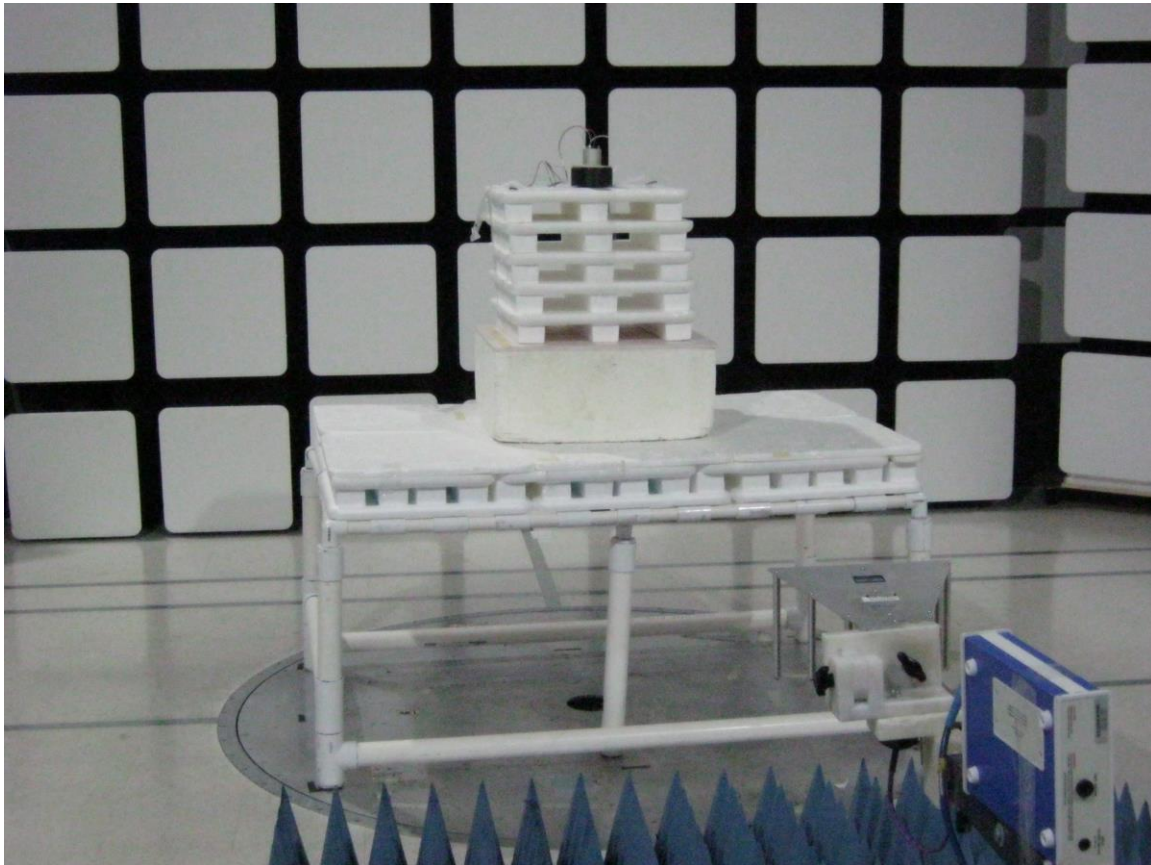


FRONT VIEW

SENSOR DEVELOPMENTS INC.
WHEEL TORQUE SENSOR TRANSMITTER
MODEL: 90439

FCC SUBPART B AND C – RADIATED EMISSIONS – ABOVE 1 GHz

**PHOTOGRAPH SHOWING THE EUT CONFIGURATION
FOR MAXIMUM EMISSIONS**



REAR VIEW

SENSOR DEVELOPMENTS INC.
WHEEL TORQUE SENSOR TRANSMITTER
MODEL: 90439

FCC SUBPART B AND C – RADIATED EMISSIONS – ABOVE 1 GHz

**PHOTOGRAPH SHOWING THE EUT CONFIGURATION
FOR MAXIMUM EMISSIONS**

APPENDIX E

DATA SHEETS

***RADIATED EMISSIONS
DATA SHEETS***

FCC 15.249

Sensor Developments, Inc.
Wheel Torque Sensor Transmitter
Model: 90439

Date: 11/21/2016
Lab: D
Tested By: Kyle Fujimoto

Low Channel - X-Axis
Transmit Mode

Freq. (MHz)	Level (dBuV/m)	Poi (v/h)	Limit	Margin	Peak / QP / Avg	Table Angle (deg)	Ant. Height (cm)	Comments
903.37	86.55	V	93.97	-7.43	Peak	140.75	151.25	
1806.74	42.89	V	73.97	-31.08	Peak	96.25	143.43	
1806.74	39.44	V	53.97	-14.53	Avg	96.25	143.43	
2710.11	47.28	V	73.97	-26.69	Peak	348.00	112.80	
2710.11	44.44	V	53.97	-9.53	Avg	348.00	112.80	
3613.48	46.19	V	73.97	-27.78	Peak	13.50	128.38	
3613.48	41.63	V	53.97	-12.34	Avg	13.50	128.38	
4516.85	47.31	V	73.97	-26.66	Peak	0.00	159.43	
4516.85	42.78	V	53.97	-11.19	Avg	0.00	159.43	
5420.22	41.92	V	73.97	-32.05	Peak	295.25	127.37	
5420.22	31.37	V	53.97	-22.60	Avg	295.25	127.37	
6323.59		V	73.97		Peak			No Emission
6323.59		V	53.97		Avg			Detected
7226.96		V	73.97		Peak			No Emission
7226.96		V	53.97		Avg			Detected
8130.33		V	73.97		Peak			No Emission
8130.33		V	53.97		Avg			Detected
9033.70		V	73.97		Peak			No Emission
9033.70		V	53.97		Avg			Detected

FCC 15.249

Sensor Developments, Inc.
Wheel Torque Sensor Transmitter
Model: 90439

Date: 11/21/2016
Lab: D
Tested By: Kyle Fujimoto

**Low Channel - X-Axis
Transmit Mode**

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Table Angle (deg)	Ant. Height (cm)	Comments
903.37	88.68	H	93.97	-5.30	Peak	50.25	162.89	
1806.74	47.92	H	73.97	-26.05	Peak	311.25	143.55	
1806.74	46.09	H	53.97	-7.88	Avg	311.25	143.55	
2710.11	47.60	H	73.97	-26.37	Peak	49.25	127.31	
2710.11	44.90	H	53.97	-9.07	Avg	49.25	127.31	
3613.48	44.15	H	73.97	-29.82	Peak	328.00	127.31	
3613.48	37.19	H	53.97	-16.78	Avg	328.00	127.31	
4516.85	46.40	H	73.97	-27.57	Peak	287.50	223.67	
4516.85	41.19	H	53.97	-12.78	Avg	287.50	223.67	
5420.22	46.49	H	73.97	-27.48	Peak	292.25	127.31	
5420.22	39.69	H	53.97	-14.28	Avg	292.25	127.31	
6323.59		H	73.97		Peak			No Emission
6323.59		H	53.97		Avg			Detected
7226.96		H	73.97		Peak			No Emission
7226.96		H	53.97		Avg			Detected
8130.33		H	73.97		Peak			No Emission
8130.33		H	53.97		Avg			Detected
9033.70		H	73.97		Peak			No Emission
9033.70		H	53.97		Avg			Detected

FCC 15.249

Sensor Developments, Inc.
Wheel Torque Sensor Transmitter
Model: 90439

Date: 11/21/2016
Lab: D
Tested By: Kyle Fujimoto

**Middle Channel - X-Axis
Transmit Mode**

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Table Angle (deg)	Ant. Height (cm)	Comments
912.37	86.14	V	93.97	-7.83	Peak	159.25	212.44	
1824.74	50.29	V	73.97	-23.68	Peak	250.25	160.62	
1824.74	48.92	V	53.97	-5.05	Avg	250.25	160.62	
2737.11	47.69	V	73.97	-26.28	Peak	23.75	128.38	
2737.11	44.70	V	53.97	-9.27	Avg	23.75	128.38	
3649.48	46.25	V	73.97	-27.72	Peak	16.50	144.38	
3649.48	41.88	V	53.97	-12.09	Avg	16.50	144.38	
4561.85	49.46	V	73.97	-24.51	Peak	51.00	128.98	
4561.85	45.91	V	53.97	-8.06	Avg	51.00	128.98	
5474.22	44.53	V	73.97	-29.44	Peak	296.50	241.40	
5474.22	36.12	V	53.97	-17.85	Avg	296.50	241.40	
6386.59		V	73.97		Peak			No Emission
6386.59		V	53.97		Avg			Detected
7298.96		V	73.97		Peak			No Emission
7298.96		V	53.97		Avg			Detected
8211.33		V	73.97		Peak			No Emission
8211.33		V	53.97		Avg			Detected
9123.70		V	73.97		Peak			No Emission
9123.70		V	53.97		Avg			Detected

FCC 15.249

Sensor Developments, Inc.
Wheel Torque Sensor Transmitter
Model: 90439

Date: 11/21/2016
Lab: D
Tested By: Kyle Fujimoto

**Middle Channel - X-Axis
Transmit Mode**

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Table Angle (deg)	Ant. Height (cm)	Comments
912.37	88.01	H	93.97	-5.96	Peak	231.25	222.05	
1824.74	49.26	H	73.97	-24.71	Peak	276.50	143.61	
1824.74	47.76	H	53.97	-6.21	Avg	276.50	143.61	
2737.11	51.75	H	73.97	-22.22	Peak	24.50	251.73	
2737.11	50.22	H	53.97	-3.75	Avg	24.50	251.73	
3649.48	43.79	H	73.97	-30.18	Peak	330.25	113.22	
3649.48	37.20	H	53.97	-16.77	Avg	330.25	113.22	
4561.85	46.91	H	73.97	-27.06	Peak	301.25	128.44	
4561.85	42.12	H	53.97	-11.85	Avg	301.25	128.44	
5474.22	45.40	H	73.97	-28.57	Peak	298.00	128.68	
5474.22	38.29	H	53.97	-15.68	Avg	298.00	128.68	
6386.59		H	73.97		Peak			No Emission
6386.59		H	53.97		Avg			Detected
7298.96		H	73.97		Peak			No Emission
7298.96		H	53.97		Avg			Detected
8211.33		H	73.97		Peak			No Emission
8211.33		H	53.97		Avg			Detected
9123.70		H	73.97		Peak			No Emission
9123.70		H	53.97		Avg			Detected

FCC 15.249

Sensor Developments, Inc.
Wheel Torque Sensor Transmitter
Model: 90439

Date: 11/21/2016
Lab: D
Tested By: Kyle Fujimoto

**High Channel - X-Axis
Transmit Mode**

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Table Angle (deg)	Ant. Height (cm)	Comments
921.37	84.63	V	93.97	-9.34	Peak	273.50	101.01	
1842.74	44.55	V	73.97	-29.42	Peak	284.50	143.31	
1842.74	41.55	V	53.97	-12.42	Avg	284.50	143.31	
2764.11	50.98	V	73.97	-22.99	Peak	22.25	249.95	
2764.11	48.96	V	53.97	-5.01	Avg	22.25	249.95	
3685.48	45.17	V	73.97	-28.80	Peak	320.25	127.43	
3685.48	39.80	V	53.97	-14.17	Avg	320.25	127.43	
4606.85	48.64	V	73.97	-25.33	Peak	13.50	127.37	
4606.85	44.27	V	53.97	-9.70	Avg	13.50	127.37	
5528.22	46.07	V	73.97	-27.90	Peak	359.50	159.31	
5528.22	39.39	V	53.97	-14.58	Avg	359.50	159.31	
6449.59		V	73.97		Peak			No Emission
6449.59		V	53.97		Avg			Detected
7370.96		V	73.97		Peak			No Emission
7370.96		V	53.97		Avg			Detected
8292.33		V	73.97		Peak			No Emission
8292.33		V	53.97		Avg			Detected
9213.70		V	73.97		Peak			No Emission
9213.70		V	53.97		Avg			Detected

FCC 15.249

Sensor Developments, Inc.
 Wheel Torque Sensor Transmitter
 Model: 90439

Date: 11/21/2016
 Lab: D
 Tested By: Kyle Fujimoto

High Channel - X-Axis
Transmit Mode

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Table Angle (deg)	Ant. Height (cm)	Comments
921.37	93.20	H	113.97	-20.77	Peak	52.00	100.00	
921.37	93.03	H	93.97	-0.94	QP	52.00	100.00	
1842.74	46.57	H	73.97	-27.40	Peak	12.25	127.67	
1842.74	44.52	H	53.97	-9.45	Avg	12.25	127.67	
2764.11	48.39	H	73.97	-25.58	Peak	0.00	145.10	
2764.11	45.99	H	53.97	-7.98	Avg	0.00	145.10	
3685.48	46.72	H	73.97	-27.25	Peak	7.75	113.22	
3685.48	42.68	H	53.97	-11.29	Avg	7.75	113.22	
4606.85	47.10	H	73.97	-26.87	Peak	270.25	113.04	
4606.85	42.48	H	53.97	-11.49	Avg	270.25	113.04	
5528.22	45.13	H	73.97	-28.84	Peak	292.50	129.10	
5528.22	37.21	H	53.97	-16.76	Avg	292.50	129.10	
6449.59		H	73.97		Peak			No Emission
6449.59		H	53.97		Avg			Detected
7370.96		H	73.97		Peak			No Emission
7370.96		H	53.97		Avg			Detected
8292.33		H	73.97		Peak			No Emission
8292.33		H	53.97		Avg			Detected
9213.70		H	73.97		Peak			No Emission
9213.70		H	53.97		Avg			Detected

FCC 15.249

Sensor Developments, Inc.
Wheel Torque Sensor Transmitter
Model: 90439

Date: 11/21/2016
Lab: D
Tested By: Kyle Fujimoto

**Low Channel - Y-Axis
Transmit Mode**

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Table Angle (deg)	Ant. Height (cm)	Comments
903.37	88.96	V	93.97	-5.01	Peak	230.50	101.00	
1806.74	45.00	V	73.97	-28.97	Peak	245.50	209.04	
1806.74	42.30	V	53.97	-11.67	Avg	245.50	209.04	
2710.11	50.50	V	73.97	-23.47	Peak	19.25	127.31	
2710.11	48.62	V	53.97	-5.35	Avg	19.25	127.31	
3613.48	45.92	V	73.97	-28.05	Peak	50.75	127.49	
3613.48	41.25	V	53.97	-12.72	Avg	50.75	127.49	
4516.85	50.00	V	73.97	-23.97	Peak	322.50	111.37	
4516.85	47.29	V	53.97	-6.68	Avg	322.50	111.37	
5420.22	45.39	V	73.97	-28.58	Peak	39.50	111.37	
5420.22	38.27	V	53.97	-15.70	Avg	39.50	111.37	
6323.59		V	73.97		Peak			No Emission
6323.59		V	53.97		Avg			Detected
7226.96		V	73.97		Peak			No Emission
7226.96		V	53.97		Avg			Detected
8130.33		V	73.97		Peak			No Emission
8130.33		V	53.97		Avg			Detected
9033.70		V	73.97		Peak			No Emission
9033.70		V	53.97		Avg			Detected

FCC 15.249

Sensor Developments, Inc.
Wheel Torque Sensor Transmitter
Model: 90439

Date: 11/21/2016
Lab: D
Tested By: Kyle Fujimoto

**Low Channel - Y-Axis
Transmit Mode**

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Table Angle (deg)	Ant. Height (cm)	Comments
903.37	87.77	H	93.97	-6.20	Peak	55.75	167.61	
1806.74	42.93	H	73.97	-31.04	Peak	129.25	110.95	
1806.74	35.65	H	53.97	-18.32	Avg	129.25	110.95	
2710.11	49.15	H	73.97	-24.82	Peak	329.00	113.04	
2710.11	44.09	H	53.97	-9.88	Avg	329.00	113.04	
3613.48	48.26	H	73.97	-25.71	Peak	50.50	177.16	
3613.48	37.76	H	53.97	-16.21	Avg	50.50	177.16	
4516.85	51.18	H	73.97	-22.79	Peak	225.00	111.49	
4516.85	43.03	H	53.97	-10.94	Avg	225.00	111.49	
5420.22	51.25	H	73.97	-22.72	Peak	49.50	249.63	
5420.22	40.42	H	53.97	-13.55	Avg	49.50	249.63	
6323.59		H	73.97		Peak			No Emission
6323.59		H	53.97		Avg			Detected
7226.96		H	73.97		Peak			No Emission
7226.96		H	53.97		Avg			Detected
8130.33		H	73.97		Peak			No Emission
8130.33		H	53.97		Avg			Detected
9033.70		H	73.97		Peak			No Emission
9033.70		H	53.97		Avg			Detected

FCC 15.249

Sensor Developments, Inc.
Wheel Torque Sensor Transmitter
Model: 90439

Date: 11/21/2016
Lab: D
Tested By: Kyle Fujimoto

**Middle Channel - Y-Axis
Transmit Mode**

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Table Angle (deg)	Ant. Height (cm)	Comments
912.37	88.07	V	93.97	-5.90	Peak	224.50	112.38	
1824.74	53.33	V	73.97	-20.64	Peak	153.00	129.04	
1824.74	52.41	V	53.97	-1.56	Avg	153.00	129.04	
2737.11	50.10	V	73.97	-23.87	Peak	312.75	129.10	
2737.11	47.96	V	53.97	-6.01	Avg	312.75	129.10	
3649.48	46.46	V	73.97	-27.51	Peak	330.25	144.44	
3649.48	42.25	V	53.97	-11.72	Avg	330.25	144.44	
4561.85	50.17	V	73.97	-23.80	Peak	250.50	128.50	
4561.85	47.35	V	53.97	-6.62	Avg	250.50	128.50	
5474.22	45.70	V	73.97	-28.27	Peak	274.00	113.22	
5474.22	38.91	V	53.97	-15.06	Avg	274.00	113.22	
6386.59		V	73.97		Peak			No Emission
6386.59		V	53.97		Avg			Detected
7298.96		V	73.97		Peak			No Emission
7298.96		V	53.97		Avg			Detected
8211.33		V	73.97		Peak			No Emission
8211.33		V	53.97		Avg			Detected
9123.70		V	73.97		Peak			No Emission
9123.70		V	53.97		Avg			Detected

FCC 15.249

Sensor Developments, Inc.
Wheel Torque Sensor Transmitter
Model: 90439

Date: 11/21/2016
Lab: D
Tested By: Kyle Fujimoto

**Middle Channel - Y-Axis
Transmit Mode**

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Table Angle (deg)	Ant. Height (cm)	Comments
912.37	86.93	H	93.97	-7.05	Peak	178.25	120.38	
1824.74	49.96	H	73.97	-24.01	Peak	310.50	145.04	
1824.74	48.49	H	53.97	-5.48	Avg	310.50	145.04	
2737.11	47.13	H	73.97	-26.84	Peak	69.75	129.10	
2737.11	43.77	H	53.97	-10.20	Avg	69.75	129.10	
3649.48	41.97	H	73.97	-32.00	Peak	351.75	128.92	
3649.48	33.92	H	53.97	-20.05	Avg	351.75	128.92	
4561.85	47.00	H	73.97	-26.97	Peak	154.00	112.88	
4561.85	42.54	H	53.97	-11.43	Avg	154.00	112.88	
5474.22	42.26	H	73.97	-31.71	Peak	215.00	194.35	
5474.22	31.53	H	53.97	-22.44	Avg	215.00	194.35	
6386.59		H	73.97		Peak			No Emission
6386.59		H	53.97		Avg			Detected
7298.96		H	73.97		Peak			No Emission
7298.96		H	53.97		Avg			Detected
8211.33		H	73.97		Peak			No Emission
8211.33		H	53.97		Avg			Detected
9123.70		H	73.97		Peak			No Emission
9123.70		H	53.97		Avg			Detected

FCC 15.249

Sensor Developments, Inc.
Wheel Torque Sensor Transmitter
Model: 90439

Date: 11/21/2016
Lab: D
Tested By: Kyle Fujimoto

**High Channel - Y-Axis
Transmit Mode**

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Table Angle (deg)	Ant. Height (cm)	Comments
921.37	89.81	V	93.97	-4.16	Peak	216.25	112.68	
1842.74	48.46	V	73.97	-25.51	Peak	30.75	177.40	
1842.74	46.81	V	53.97	-7.16	Avg	30.75	177.40	
2764.11	50.45	V	73.97	-23.52	Peak	247.75	128.92	
2764.11	48.57	V	53.97	-5.40	Avg	247.75	128.92	
3685.48	46.19	V	73.97	-27.78	Peak	258.00	113.04	
3685.48	41.96	V	53.97	-12.01	Avg	258.00	113.04	
4606.85	49.34	V	73.97	-24.63	Peak	185.00	113.10	
4606.85	46.08	V	53.97	-7.89	Avg	185.00	113.10	
5528.22	42.89	V	73.97	-31.08	Peak	259.75	129.22	
5528.22	31.72	V	53.97	-22.25	Avg	259.75	129.22	
6449.59		V	73.97		Peak			No Emission
6449.59		V	53.97		Avg			Detected
7370.96		V	73.97		Peak			No Emission
7370.96		V	53.97		Avg			Detected
8292.33		V	73.97		Peak			No Emission
8292.33		V	53.97		Avg			Detected
9213.70		V	73.97		Peak			No Emission
9213.70		V	53.97		Avg			Detected

FCC 15.249

Sensor Developments, Inc.
Wheel Torque Sensor Transmitter
Model: 90439

Date: 11/21/2016
Lab: D
Tested By: Kyle Fujimoto

**High Channel - Y-Axis
Transmit Mode**

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Table Angle (deg)	Ant. Height (cm)	Comments
921.37	87.40	H	93.97	-6.57	Peak	325.75	274.59	
1842.74	41.05	H	73.97	-32.92	Peak	4.75	144.92	
1842.74	36.62	H	53.97	-17.35	Avg	4.75	144.92	
2764.11	43.38	H	73.97	-30.59	Peak	197.75	209.40	
2764.11	38.01	H	53.97	-15.96	Avg	197.75	209.40	
3685.48	41.71	H	73.97	-32.26	Peak	265.75	129.04	
3685.48	33.17	H	53.97	-20.80	Avg	265.75	129.04	
4606.85	45.50	H	73.97	-28.47	Peak	116.00	111.00	
4606.85	39.94	H	53.97	-14.03	Avg	116.00	111.00	
5528.22	42.09	H	73.97	-31.88	Peak	291.50	113.16	
5528.22	31.68	H	53.97	-22.29	Avg	291.50	113.16	
6449.59		H	73.97		Peak			No Emission
6449.59		H	53.97		Avg			Detected
7370.96		H	73.97		Peak			No Emission
7370.96		H	53.97		Avg			Detected
8292.33		H	73.97		Peak			No Emission
8292.33		H	53.97		Avg			Detected
9213.70		H	73.97		Peak			No Emission
9213.70		H	53.97		Avg			Detected

FCC 15.249

Sensor Developments, Inc.
Wheel Torque Sensor Transmitter
Model: 90439

Date: 11/21/2016
Lab: D
Tested By: Kyle Fujimoto

**Low Channel - Z-Axis
Transmit Mode**

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Table Angle (deg)	Ant. Height (cm)	Comments
903.37	87.32	V	93.97	-6.65	Peak	345.25	149.46	
1806.74	34.40	V	73.97	-39.57	Peak	53.00	191.49	
1806.74	23.89	V	53.97	-30.08	Avg	53.00	191.49	
2710.11	48.38	V	73.97	-25.59	Peak	359.75	111.43	
2710.11	46.02	V	53.97	-7.95	Avg	359.75	111.43	
3613.48	43.36	V	73.97	-30.61	Peak	95.25	127.19	
3613.48	36.90	V	53.97	-17.07	Avg	95.25	127.19	
4516.85	46.09	V	73.97	-27.88	Peak	0.00	111.61	
4516.85	41.36	V	53.97	-12.61	Avg	0.00	111.61	
5420.22	46.15	V	73.97	-27.82	Peak	5.50	143.37	
5420.22	39.79	V	53.97	-14.18	Avg	5.50	143.37	
6323.59		V	73.97		Peak			No Emission
6323.59		V	53.97		Avg			Detected
7226.96		V	73.97		Peak			No Emission
7226.96		V	53.97		Avg			Detected
8130.33		V	73.97		Peak			No Emission
8130.33		V	53.97		Avg			Detected
9033.70		V	73.97		Peak			No Emission
9033.70		V	53.97		Avg			Detected

FCC 15.249

Sensor Developments, Inc.
Wheel Torque Sensor Transmitter
Model: 90439

Date: 11/21/2016
Lab: D
Tested By: Kyle Fujimoto

**Low Channel - Z-Axis
Transmit Mode**

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Table Angle (deg)	Ant. Height (cm)	Comments
903.37	89.27	H	93.97	-4.70	Peak	284.25	100.89	
1806.74	45.91	H	73.97	-30.27	Peak	311.00	143.31	
1806.74	43.70	H	53.97	-53.97	Avg	311.00	143.31	
2710.11	48.94	H	73.97	-25.03	Peak	51.50	159.19	
2710.11	46.85	H	53.97	-7.12	Avg	51.50	159.19	
3613.48	45.79	H	73.97	-28.18	Peak	351.50	143.43	
3613.48	41.08	H	53.97	-12.89	Avg	351.50	143.43	
4516.85	45.77	H	73.97	-28.20	Peak	50.25	239.85	
4516.85	41.43	H	53.97	-12.54	Avg	50.25	239.85	
5420.22	44.33	H	73.97	-29.64	Peak	235.50	143.19	
5420.22	36.16	H	53.97	-17.81	Avg	235.50	143.19	
6323.59		H	73.97		Peak			No Emission
6323.59		H	53.97		Avg			Detected
7226.96		H	73.97		Peak			No Emission
7226.96		H	53.97		Avg			Detected
8130.33		H	73.97		Peak			No Emission
8130.33		H	53.97		Avg			Detected
9033.70		H	73.97		Peak			No Emission
9033.70		H	53.97		Avg			Detected

FCC 15.249

Sensor Developments, Inc.
Wheel Torque Sensor Transmitter
Model: 90439

Date: 11/21/2016
Lab: D
Tested By: Kyle Fujimoto

**Middle Channel - Z-Axis
Transmit Mode**

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Table Angle (deg)	Ant. Height (cm)	Comments
912.37	84.86	V	93.97	-9.11	Peak	186.25	194.00	
1824.74	50.96	V	73.97	-23.01	Peak	67.00	127.37	
1824.74	49.65	V	53.97	-4.32	Avg	67.00	127.37	
2737.11	49.99	V	73.97	-23.98	Peak	355.50	111.37	
2737.11	47.72	V	53.97	-6.25	Avg	355.50	111.37	
3649.48	43.05	V	73.97	-30.92	Peak	144.75	111.55	
3649.48	35.58	V	53.97	-18.39	Avg	144.75	111.55	
4561.85	45.91	V	73.97	-28.06	Peak	359.75	127.49	
4561.85	40.31	V	53.97	-13.66	Avg	359.75	127.49	
5474.22	45.27	V	73.97	-28.70	Peak	7.50	111.55	
5474.22	38.03	V	53.97	-15.94	Avg	7.50	111.55	
6386.59		V	73.97		Peak			No Emission
6386.59		V	53.97		Avg			Detected
7298.96		V	73.97		Peak			No Emission
7298.96		V	53.97		Avg			Detected
8211.33		V	73.97		Peak			No Emission
8211.33		V	53.97		Avg			Detected
9123.70		V	73.97		Peak			No Emission
9123.70		V	53.97		Avg			Detected

FCC 15.249

Sensor Developments, Inc.
Wheel Torque Sensor Transmitter
Model: 90439

Date: 11/21/2016
Lab: D
Tested By: Kyle Fujimoto

**Middle Channel - Z-Axis
Transmit Mode**

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Table Angle (deg)	Ant. Height (cm)	Comments
912.37	91.41	H	93.97	-2.57	Peak	207.25	132.14	
1824.74	54.29	H	73.97	-19.68	Peak	359.75	143.19	
1824.74	53.38	H	53.97	-0.59	Avg	359.75	143.19	
2737.11	50.87	H	73.97	-23.10	Peak	49.50	127.55	
2737.11	48.95	H	53.97	-5.02	Avg	49.50	127.55	
3649.48	45.16	H	73.97	-28.81	Peak	344.50	143.31	
3649.48	40.44	H	53.97	-13.53	Avg	344.50	143.31	
4561.85	47.71	H	73.97	-26.26	Peak	0.75	127.31	
4561.85	43.80	H	53.97	-10.17	Avg	0.75	127.31	
5474.22	46.38	H	73.97	-27.59	Peak	359.75	175.67	
5474.22	38.97	H	53.97	-15.00	Avg	359.75	175.67	
6386.59		H	73.97		Peak			No Emission
6386.59		H	53.97		Avg			Detected
7298.96		H	73.97		Peak			No Emission
7298.96		H	53.97		Avg			Detected
8211.33		H	73.97		Peak			No Emission
8211.33		H	53.97		Avg			Detected
9123.70		H	73.97		Peak			No Emission
9123.70		H	53.97		Avg			Detected

FCC 15.249

Sensor Developments, Inc.
Wheel Torque Sensor Transmitter
Model: 90439

Date: 11/21/2016
Lab: D
Tested By: Kyle Fujimoto

**High Channel -Z-Axis
Transmit Mode**

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Table Angle (deg)	Ant. Height (cm)	Comments
921.37	85.12	V	93.97	-8.85	Peak	180.75	142.77	
1842.74	49.86	V	73.97	-24.11	Peak	124.00	160.98	
1842.74	48.39	V	53.97	-5.58	Avg	124.00	160.98	
2764.11	49.31	V	73.97	-24.66	Peak	55.50	129.04	
2764.11	46.90	V	53.97	-7.07	Avg	55.50	129.04	
3685.48	46.19	V	73.97	-27.78	Peak	335.75	145.04	
3685.48	41.64	V	53.97	-12.33	Avg	335.75	145.04	
4606.85	45.00	V	73.97	-28.97	Peak	10.50	145.04	
4606.85	39.02	V	53.97	-14.95	Avg	10.50	145.04	
5528.22	42.84	V	73.97	-31.13	Peak	268.50	126.71	
5528.22	31.65	V	53.97	-22.32	Avg	268.50	126.71	
6449.59		V	73.97		Peak			No Emission
6449.59		V	53.97		Avg			Detected
7370.96		V	73.97		Peak			No Emission
7370.96		V	53.97		Avg			Detected
8292.33		V	73.97		Peak			No Emission
8292.33		V	53.97		Avg			Detected
9213.70		V	73.97		Peak			No Emission
9213.70		V	53.97		Avg			Detected

FCC 15.249

Sensor Developments, Inc.
Wheel Torque Sensor Transmitter
Model: 90439

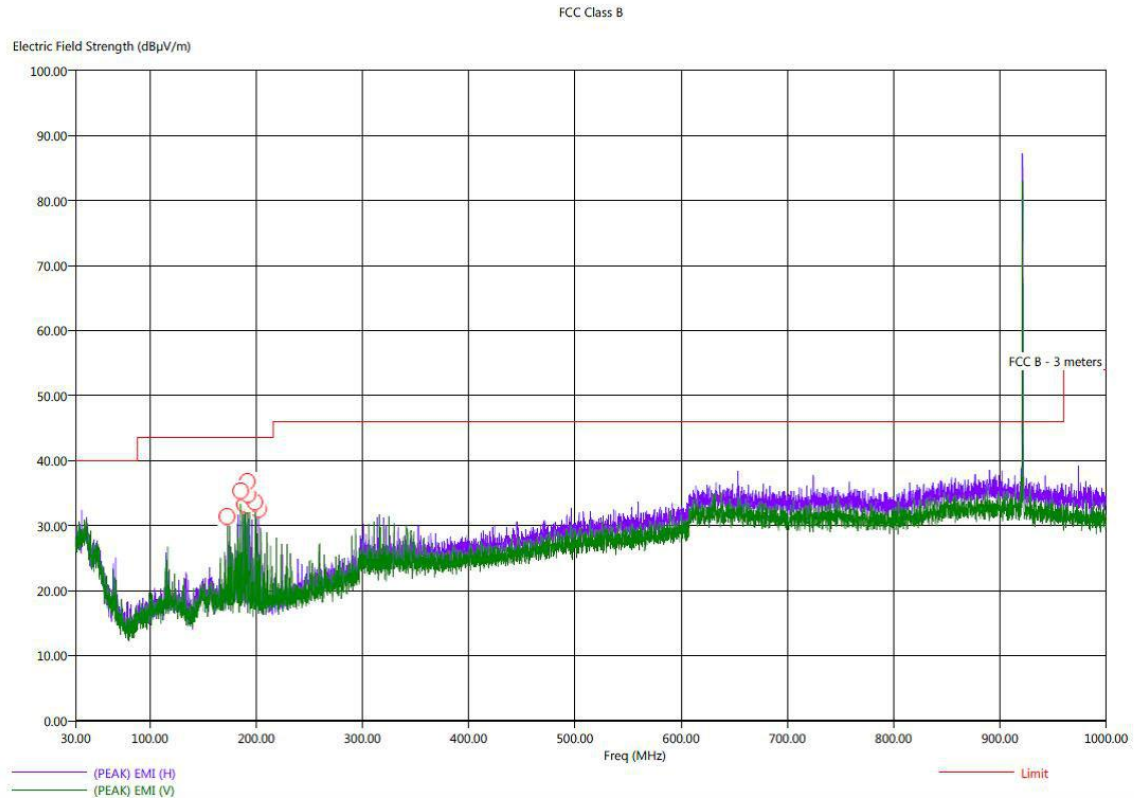
Date: 11/21/2016
Lab: D
Tested By: Kyle Fujimoto

**High Channel - Z-Axis
Transmit Mode**

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Table Angle (deg)	Ant. Height (cm)	Comments
921.37	88.70	H	93.97	-5.27	Peak	309.50	183.79	
1842.74	44.85	H	73.97	-29.12	Peak	10.50	160.92	
1842.74	41.54	H	53.97	-12.43	Avg	10.50	160.92	
2764.11	49.02	H	73.97	-24.95	Peak	284.00	128.98	
2764.11	46.68	H	53.97	-7.29	Avg	284.00	128.98	
3685.48	42.98	H	73.97	-30.99	Peak	289.75	177.16	
3685.48	36.28	H	53.97	-17.69	Avg	289.75	177.16	
4606.85	46.04	H	73.97	-27.93	Peak	26.25	128.98	
4606.85	39.88	H	53.97	-14.09	Avg	26.25	128.98	
5528.22	42.60	H	73.97	-31.37	Peak	319.00	178.47	
5528.22	32.09	H	53.97	-21.88	Avg	319.00	178.47	
6449.59		H	73.97		Peak			No Emission
6449.59		H	53.97		Avg			Detected
7370.96		H	73.97		Peak			No Emission
7370.96		H	53.97		Avg			Detected
8292.33		H	73.97		Peak			No Emission
8292.33		H	53.97		Avg			Detected
9213.70		H	73.97		Peak			No Emission
9213.70		H	53.97		Avg			Detected

Title: Pre-Scan - 30-1000 MHz - FCC Class B
File: Agilent - Pre-Scan - FCC Class B - 30 MHz to 1000 MHz - Y-Axis.set
Operator: Kyle Fujimoto
EUT Type: *Wheel Torque Sensor Transmitter*
EUT Condition: The EUT is continuously transmitting at the high channel - Y-Axis
Comments: Customer: Sensor Developments, Inc.
Model: 90439

11/21/2016 4:43:16 PM
Sequence: Preliminary Scan



Y-axis is the worst case axis. The peak that is shown above the FCC B limit is the fundamental and is subject to the limits of FCC 15.249 instead.

No additional spurious emissions were found between 10 kHz – 30 MHz and 1 GHz – 9.3 GHz

Title: Radiated Final - FCC Class B
File: Agilent - Final Scan - FCC Class B - 30 MHz to 1000 MHz - Y-Axis.set
Operator: Kyle Fujiimoto
EUT Type: **Wheel Torque Sensor Transmitter**
EUT Condition: The EUT is continuously transmitting at the high channel - Y-Axis
Comments: Company: Sensor Developments, Inc.
Model: 90439

11/21/2016 4:57:01 PM
Sequence: Final Measurements

FCC Class B										
Freq (MHz)	Pol	(PEAK) EMI (dBµV/m)	(QP) EMI (dBµV/m)	(PEAK) Margin (dB)	(QP) Margin (dB)	Limit (dBµV/m)	Transducer (dB)	Cable (dB)	Ttbl Aql (dea)	Twr Ht (cm)
172.70	V	33.03	28.67	-10.47	-14.83	43.50	14.05	0.71	191.00	126.47
185.40	V	38.65	33.25	-4.85	-10.25	43.50	13.93	0.66	299.75	127.13
188.90	H	36.02	30.23	-7.48	-13.27	43.50	13.70	0.64	149.50	142.65
191.70	V	40.06	35.73	-3.44	-7.77	43.50	13.52	0.63	305.25	127.13
192.40	V	38.81	34.39	-4.69	-9.11	43.50	13.48	0.63	301.25	111.37
198.70	V	29.34	24.14	-14.16	-19.36	43.50	13.08	0.60	0.00	143.13
202.20	H	26.73	20.26	-16.77	-23.24	43.50	13.12	0.54	259.75	206.95

Y-axis is the worst case axis. The peak that is shown above the FCC B limit is the fundamental and is subject to the limits of FCC 15.249 instead.

No additional spurious emissions were found between 10 kHz – 30 MHz and 1 GHz – 9.3 GHz

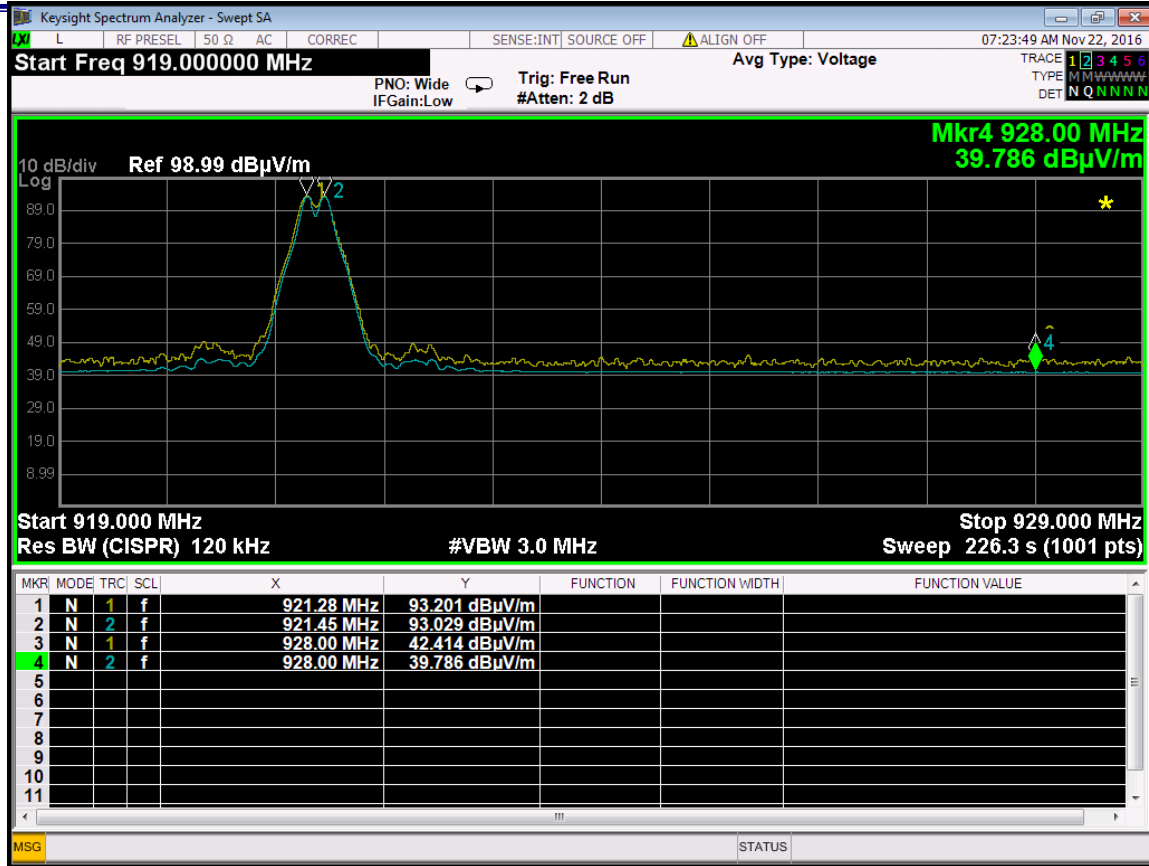
FCC 15.249

Sensor Developments, Inc.
Wheel Torque Sensor Transmitter
Model: 90439

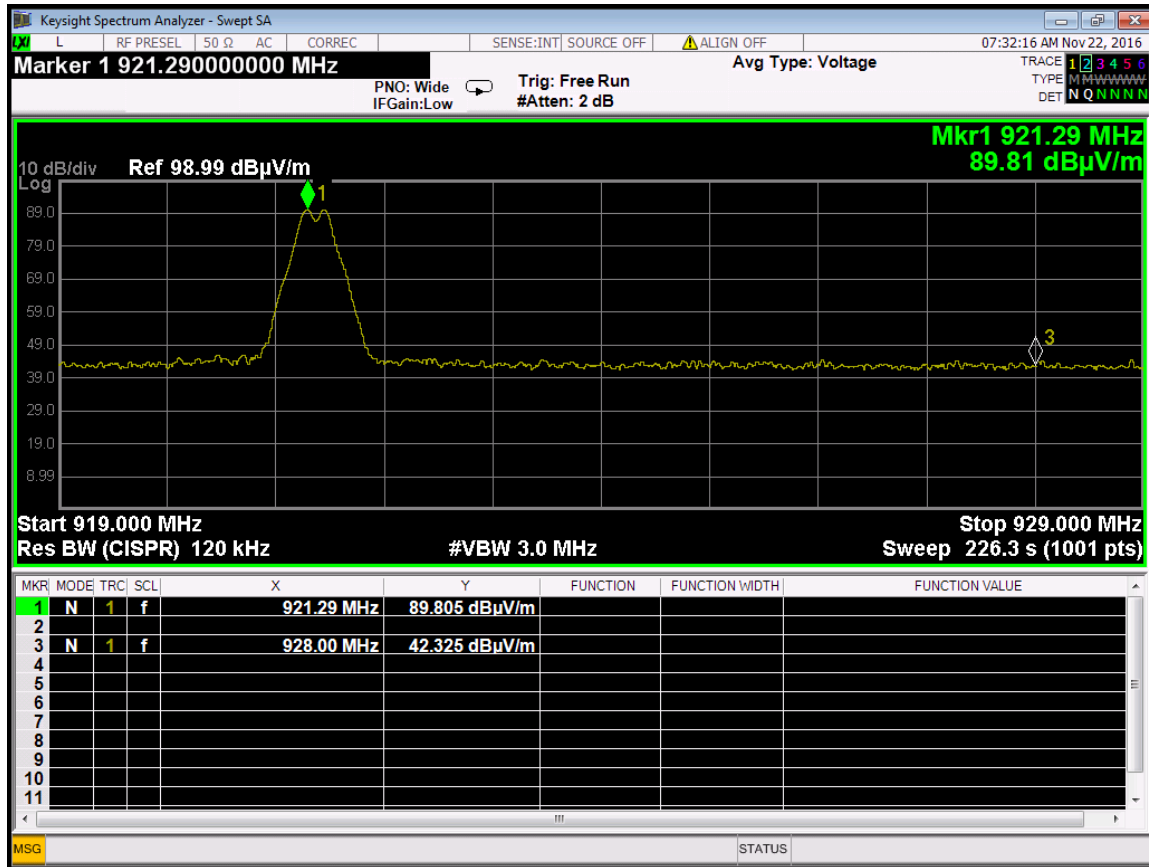
Date: 11/21/2016
Lab: D
Tested By: Kyle Fujimoto

**Band Edges
Transmit Mode**

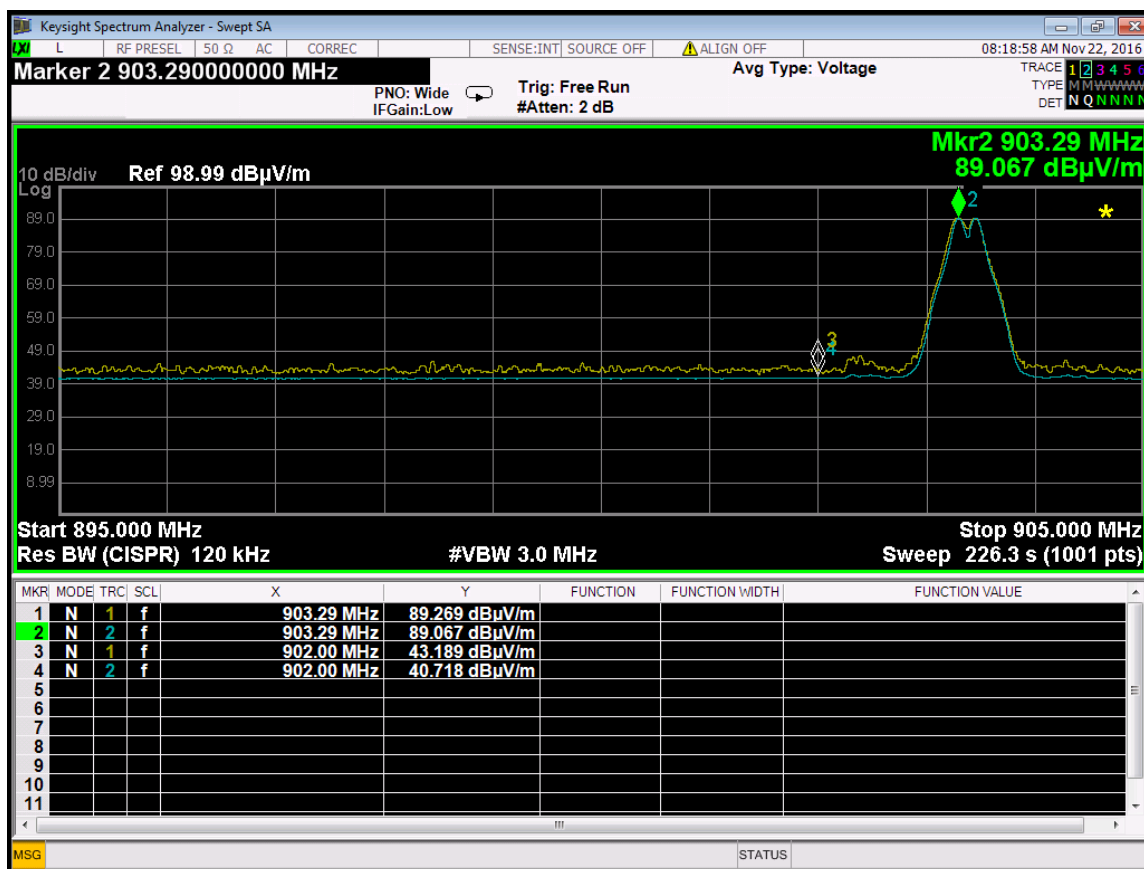
Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Table Angle (deg)	Ant. Height (cm)	Comments
903.37	89.27	H	113.97	-24.70	Peak	284.25	100.89	Fundamental
903.37	89.07	H	93.97	-4.90	QP	284.25	100.89	of Low Ch. - Z-Axis
902.00	43.19	H	66.00	-22.81	Peak	284.25	100.89	Lower Band Edge
902.00	40.72	H	46.00	-5.28	QP	284.25	100.89	Z-Axis
903.37	88.96	V	93.97	-5.01	Peak	230.50	101.00	Fundamental
								of Low Ch. - Y-Axis
902.00	42.29	V	46.00	-3.71	Peak	230.50	101.00	Lower Band Edge
								Y-Axis
921.37	93.20	H	113.97	-20.77	Peak	52.00	100.00	Fundamental
921.37	93.03	H	93.97	-0.94	QP	52.00	100.00	of High Ch. - X-Axis
928.00	42.41	H	66.00	-23.59	Peak	52.00	100.00	Upper Band Edge
928.00	39.79	H	46.00	-6.21	QP	52.00	100.00	Z-Axis
921.37	89.81	V	93.97	-4.16	Peak	216.25	112.68	Fundamental
								of High Ch. - Y-Axis
928.00	42.33	V	46.00	-3.68	Peak	216.25	112.68	Upper Band Edge
								Y-Axis



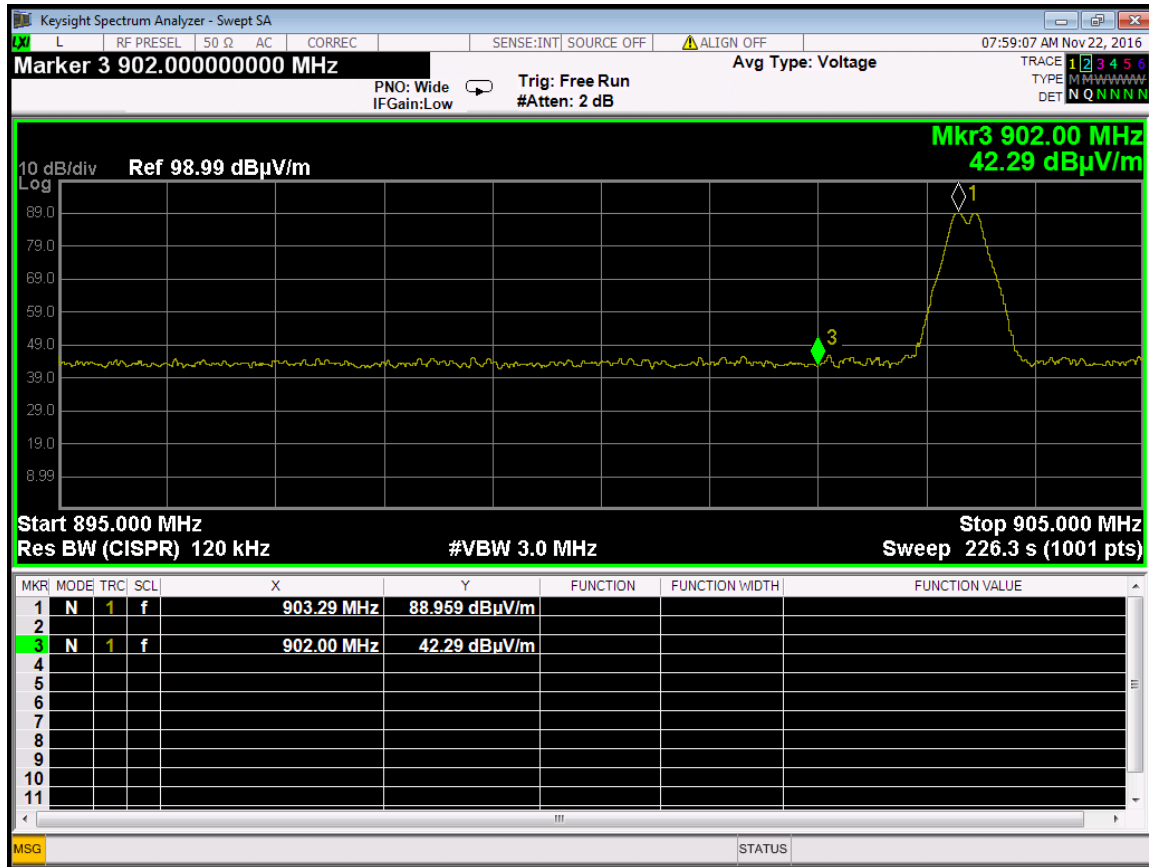
Band Edge – High Channel – Horizontal – X-Axis



Band Edge – High Channel – Vertical – Y-Axis



Band Edge – Low Channel –Horizontal – Z-Axis



Band Edge – Low Channel –Vertical – Y-Axis