

FCC PART 15 SUBPART B & SUBPART C SECTION 15.247

&

RSS 247, RSS GEN TEST REPORT

for

NSC ZIGBEE COMBO SMOKE CO SENSOR**MODEL: C-SMKTCO1-B**

Prepared for

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(949) 587-0400DATE: OCTOBER 10th, 2017

	REPORT BODY	APPENDICES					TOTAL
		A	B	C	D	E	
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1	Plot Map and Layout of Test Site Below 1GHz
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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 in any form unless done so in full with the written permission of Compatible Electronics.

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: NSC Zigbee Combo Smoke CO Sensor
Model: C-SMKTCO1-B
S/N: None

Product Description: The EUT is a Combination Photoelectric Smoke and Carbon Monoxide Alarm. The EUT is battery powered with an expected battery life of approximately 5 years. The alarm also contains a Zigbee transceiver and can be included in a Zigbee based mesh network. It operates in the 2400MHz band from channel 11;2405 to channel 25;2475 MHz.

Modifications: The EUT was not modified in order to comply with specifications.

Manufacturer: Nortek Security & Control, LLC.
1950 Camino Vida Roble, Suite 150
Carlsbad, CA 92008

Test Dates: October 2, 4, 5, 6, 10, & 30th, 2017

Test Specifications Covered by Accreditation:



EMI requirements

CFR Title 47, Part 15 Subpart B Sections 15.107, 15.109, & Subpart C Sections 15.205, 15.207, 15.209, & 15.247.
RSS 247 & RSS GEN

Test Procedure: ANSI C63.4 & C63.10, and KDB 558074 D01 v04.



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SUMMARY OF TEST RESULTS

TEST	DESCRIPTION	RESULTS
1	Conducted RF Emissions, 150 kHz - 30 MHz	The EUT is a battery-operated device; therefore, this test was deemed unnecessary and thus was not performed.
2	Radiated RF Emissions & Harmonics, 9 kHz – 25,000 MHz	Complies with the limits of CFR Title 47 Part 15 Subpart B Section 15.109 and Subpart C Sections 15.205, 15.209, and RSS GEN
3	DTS Bandwidth	Complies with CFR Title 47 Part 15 Subpart C Section 15.247 and RSS 247
4	Maximum Peak Conducted Output Power	Complies with CFR Title 47 Part 15 Subpart C Section 15.247 and RSS 247
5	Maximum Peak Power Spectral Density Level In The Fundamental Emission	Complies with CFR Title 47 Part 15 Subpart C Section 15.247 and RSS 247
6	Emissions in Non-Restricted Frequency Bands (in 100kHz Bandwidth)	Complies with CFR Title 47 Part 15 Subpart C Section 15.247 and RSS 247
7	Emissions in the Restricted Bands	Complies with CFR Title 47 Part 15 Subpart C Section 15.205, 15.247 and RSS 247
8	Occupied Bandwidth	Complies with RSS 247 & RSS GEN



1. PURPOSE

This document is a qualification test report based on the Electromagnetic Interference (EMI) tests performed on the NSC Zigbee Combo Smoke CO Sensor Model: C-SMKTCO1-B. The EMI measurements were performed according to the measurement procedure described in ANSI C63.10 & C63.4. The tests were performed in order to determine whether the electromagnetic emissions from the equipment under test, referred to as EUT (equipment under test) hereafter, are within the specification limits defined by the Code of Federal Regulations Title 47, Part 15 Subpart B sections 15.107, 15.109, & Part 15 Subpart C sections 15.205, 15.207, 15.209, 15.247, RSS GEN, and RSS 247.



2. ADMINISTRATIVE DATA

2.1 Location of Testing

The tests described herein were performed at the test facility of Compatible Electronics, 20621 Pascal Way Lake Forest, California 92630.

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

Nortek Security & Control, LLC.

Josh Hansen

Compatible Electronics Inc.

Torey Oliver
Jorge Reyes
Matt Harrison

Test Engineer
Advanced Project Engineer
Lab Manager

2.4 Date Test Sample was Received

The test sample was received on October 2nd, 2017.

2.5 Disposition of the Test Sample

The test sample remains at Compatible Electronics 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
NVLAP	National Voluntary Laboratory Accreditation Program
CFR	Code of Federal Regulations
PCB	Printed Circuit Board
TX	Transmit
RX	Receive



3. APPLICABLE DOCUMENTS

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

SPEC	TITLE
CFR Title 47, Part 15	FCC Rules – Radio frequency devices (including digital devices)
ANSI C63.4 2014	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
KDB 558074 D01 v04	Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247
ICES-003 Issue 6	Information Technology Equipment (Including Digital Apparatus) — Limits and Methods of Measurement
RSS 247	Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and Licence-Exempt Local Area Network (LE-LAN) Devices
RSS GEN	General Requirements for Compliance of Radio Apparatus



4. DESCRIPTION OF TEST CONFIGURATION

4.1 Description of Test Configuration

The NSC Zigbee Combo Smoke CO Sensor Model: C-SMKTCO1-B (EUT) was setup in a standalone configuration. The EUT was continuously transmitting a data stream during transmit tests and continuously receiving during receiver tests. The EUT was checked in all axes. The EUT has two antennas which do not transmit simultaneously and were both tested in full. A laptop was used intermittently to program the device. The X Axis was the worst case orientation.

The EUT was tested with new batteries.

It was determined that the emissions were at their highest level when the EUT was transmitting in the configuration described above for Radiated Emissions. The final radiated data was taken in the above configuration. Please see Appendix E for the test data.

4.1.1 Photograph Test Configuration (X-Axis Shown)



4.1.2 *Cable Construction and Termination*

Cable 1

This is a 0.2 meter, unshielded, cable that connect the EUT to the Laptop (for programming only). The cable has a USB Type-A connector at the Laptop end and has an 8-pin plastic ribbon cable connector at the EUT end of the cable. The cable was not bundled. The shield of the cable was terminated at the Laptop end of the cable only.



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

#	EQUIPMENT TYPE	MANU-FACTURER	MODEL	SERIAL NUMBER
1	NSC ZIGBEE COMBO SMOKE CO SENSOR(EUT)	NORTEK	C-SMKTCO1-B	For Radiated Emissions: 0607171000008GBB For Conducted Emissions: 0607171000008GIB
2	LAPTOP (PROGRAMMING ONLY)	LENOVO	THINKPAD T430	101-2037
3	LAPTOP POWER SUPPLY	LENOVO	92P1156	11S92P1156Z1ZDXN01L1ND



5.2 EMI Test Equipment

EQUIPMENT TYPE	MANUFACTURER	MODEL NUMBER	SERIAL NUMBER	CAL. DATE	CAL. DUE DATE
Computer	Compatible Electronics	NONE	NONE	N/A	N/A
EMI Receiver	Rohde & Schwarz	ESIB40	100172	3/15/2017	3/15/2018
Antenna, Loop	Com Power	AL-130	121049	2/9/2017	2/9/2018
Antenna, CombiLog	Com Power	AC-220	003	5/19/2016	5/19/2018
Antenna, Horn 1-18GHz	Com Power	AH-118	071250	5/17/2016	5/16/2018
Antenna, Horn 18-26 GHz	Com Power	AH-826	081033	NCR	NCR
Pre-Amp, 1-18GHz	Com Power	PAM-118A	551033	5/16/2016	5/17/2018
Pre-Amp, 18-40GHz	Com Power	PA-840	181289	6/16/2016	6/16/2018
High Pass Filter	AMTI Microwave Circuits	H3G020G4	481230	6/4/2016	6/4/2018
Mast, Antenna Positioner	Sunol Science Corporation	TWR 95-4	020808-3	N/A	N/A
Antenna Mast	Sunol Science Corporation	TWR 95-4	020808-3	N/A	N/A
Turntable	Sunol Science Corporation	FM 2001	N/A	N/A	N/A
Mast and Turntable Controller	Sunol Science Corporation	SC104V	020808-1	N/A	N/A



6. TEST SITE DESCRIPTION

6.1 Test Facility Description

Please refer to section 2.1 and the figures in Appendix D of this report for test location.

6.2 EUT Mounting, Bonding and Grounding

For testing below 1 GHz the EUT was mounted on a 1.0 by 1.5 by 0.8 meters high non-conductive table, which was placed on the ground plane.

For testing above 1 GHz the EUT was mounted 1.5 meter above the ground plane.

The EUT was not grounded.

6.3 Facility Environmental Characteristics

When applicable refer to the data sheets in Appendix E for the relative humidity, air temperature, and barometric pressure.

6.4 Measurement Uncertainty

“Compatible Electronics’ U_{lab} value is less than U_{cispr} , thus based on this – compliance is deemed to occur if no measured disturbance exceeds the disturbance limit.

$$u_c(y) = \sqrt{\sum_i c_i^2 u^2(x_i)}$$

Measurement		U_{cispr}	$U_{lab} = 2 u_c(y)$
Conducted disturbance (mains port)	(150 kHz – 30 MHz)	4,0 dB	2.88
Radiated disturbance (electric field strength on an open area test site or alternative test site)	(30 MHz – 1 000 MHz)	5,2 dB	3.53



7. CHARACTERISTICS OF THE TRANSMITTER

7.1 Channel Number and Frequencies

The EUT was programmed to be in the ZigBee Mode. There is a total of 16 channels. The low channel is at 2405 MHz, mid channel is at 2445 MHz, and the high channel is at 2475 MHz. There is approximately 5 MHz separation between channels and the EUT uses OQPSK, DSSS modulation.

Channel 11	2405 MHz
Channel 12	2410 MHz
Channel 13	2415 MHz
Channel 14	2420 MHz
Channel 15	2425 MHz
Channel 16	2430 MHz
Channel 17	2435 MHz
Channel 18	2440 MHz
Channel 19	2445 MHz
Channel 20	2450 MHz
Channel 21	2455 MHz
Channel 22	2460 MHz
Channel 23	2465 MHz
Channel 24	2470 MHz
Channel 25	2475 MHz



7.2 Antenna

The antennas are PCB mounted stamped metal antennas. Max antenna gain of 2.3dBi.

7.3 Software

10016717 Ver. F013 Stored on a local Server, located at NSC headquarters.



8. TEST PROCEDURES

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

8.1 RF Emissions

8.1.1 Conducted Emissions Test

Test Results:

The EUT is a battery-operated device; therefore, this test was deemed unnecessary and thus was not performed.

The EUT complies. The EMI receiver was used as a measuring meter. A quasi-peak and/or average reading was taken only where indicated in the data sheets. The LISN output was measured using the EMI receiver. The output of the second LISN was terminated by a 50-ohm termination. The effective measurement bandwidth used for this test was 9 kHz.

Please see section 6.2 of this report for mounting, bonding, and grounding of the EUT. The EUT received its power through the LISN, which was bonded to the ground plane. The EUT was set up with the minimum distances from any conductive surfaces as specified in ANSI. The excess power cord was wrapped in a figure eight pattern to form a bundle not exceeding 0.4 meters in length.

The conducted emissions from the EUT were maximized for operating mode as well as cable placement. The final data was collected under program control by the computer software. The final qualification data is located in Appendix E.



8.1.2 Radiated Emissions (Spurious and Harmonics) Test

The R&S receiver was used as a measuring meter. The receiver was used in the peak detect mode with the "Max Hold" feature activated. In this mode, the receiver records the highest measured reading over all the sweeps. Amplifiers were used to increase the sensitivity of the instrument. A Preamplifier used for frequencies above 1 GHz.

For spurious emissions, the quasi-peak detector was used for frequencies below 1GHz and the average detector was used for frequencies above 1 GHz.

For the radiated Harmonic emissions, a linear average detector was used.

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

FREQUENCY RANGE (MHz)	TRANSDUCER	EFFECTIVE MEASUREMENT BANDWIDTH
.009 to .150	Active Loop Antenna	200 Hz
.150 to 30	Active Loop Antenna	9 kHz
30 to 1000	Combilog Antenna	100 kHz (120kHz for QP Measurements)
1000 to 25000	Horn Antenna	1 MHz

The TDK FAC-3 shielded test chamber of Compatible Electronics, Inc. was used for radiated emissions testing. This test site is in full compliance with ANSI, EN 50147-2, and CISPR 22. 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 in both vertical and horizontal polarizations (for E field radiated field strength).

Test Results:

The EUT complies with the limits of CFR Title 47 Part 15 Subpart B section 15.109 & Subpart C sections 15.205, 15.209, 15.247, RSS 247, and RSS GEN.



8.1.3 *DTS Bandwidth*

The DTS Bandwidth was measured directly connected to the EMI Receiver using a RBW of 100 kHz and a VBW of 300 kHz. A peak detector and a max hold trace were used with auto sweep time. The trace was allowed to fully maximize. We measured the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission. The automatic bandwidth measurement capability of the EMI Receiver was employed using the n dB bandwidth mode with n set to 6 dB. The final qualification data sheets are located in Appendix E.

Test Results:

The EUT complies with Part 15, Subpart C, Section 15.247 and RSS 247.

8.1.4 *Maximum Peak Conducted Output Power*

The maximum peak conducted output power was measured using a spectrum analyzer. The spectrum analyzer used a resolution bandwidth of 2 MHz which is greater than the DTS bandwidth and a video bandwidth greater than 3 x RBW. The final qualification data sheets are located in Appendix E.

Test Results:

The EUT complies with Part 15, Subpart C, Section 15.247 and RSS 247.

8.1.5 *Maximum Peak Power Spectral Density Level in The Fundamental Emission*

The Maximum Peak Power Spectral Density Level in the Fundamental Emission was measured directly connected to the EMI Receiver. Tuned to the center frequency of the DTS channel and set the span to 1.5 times the DTS bandwidth. RBW was set to minimum of 3 kHz but not greater than 100kHz and VBW 3 * RBW. A peak detector was used with the sweep time set to auto. A max hold trace was used and allowed to fully stabilize. The peak marker function was used to determine the maximum amplitude level within the RBW. The final qualification data sheets are located in Appendix E.

Test Results:

The EUT complies with Part 15, Subpart C, Section 15.247 and RSS 247.



8.1.6 Emissions in Non-Restricted Frequency Bands (in 100kHz Bandwidth)

The Emissions in Non-Restricted Frequency Bands (in 100kHz Bandwidth) measurements were performed using the EMI Receiver directly connected to the EUT. A reference level was established by setting the instrument center frequency to DTS channel center frequency. The span was set to ≥ 1.5 times the DTS bandwidth. The RBW was 100 kHz and VBW 300 kHz. A peak detector was used with a sweep time set to auto. A max hold trace was used and allowed to fully stabilize. The peak marker function was used to determine the level and 20dB below that was the reference level. For Emission Level Measurement, the center frequency and span were set to encompass the frequency range to be measured. RBW was set to 100 kHz and VBW to 300 kHz. A peak detector was used with a sweep time set to auto. The number of measurement points were greater than span/RBW. A max hold trace was used and allowed to fully stabilize. The peak marker function was used to determine the maximum amplitude level. The final qualification data sheets are located in Appendix E.

Test Results:

The EUT complies with Part 15, Subpart C, Section 15.247 and RSS 247.

8.1.7 Emissions in the Restricted Bands (Radiated)

The Emissions in the Restricted Bands measurement was performed using the EMI Receiver at a 3-meter test distance to obtain the final test data. The final qualification data sheets are located in Appendix E.

Test Results:

The EUT complies with Part 15 Subpart C, Section 15.205 and RSS GEN.

8.1.8 Emissions Radiated Outside of the Fundamental Frequency Band

The Band Edge measurement was performed using the EMI Receiver at a 3-meter test distance to obtain the final test data. The low and high channels were tuned to during the low and high band edge tests. The final qualification data sheets are located in Appendix E.

Test Results:

The EUT complies with Part 15, Subpart C, Section 15.247 and RSS 247.



9. TEST PROCEDURE DEVIATIONS

There were no deviations from the test procedure.

10. CONCLUSIONS

The NSC Zigbee Combo Smoke CO Sensor Model: C-SMKTCO1-B meets all of the relevant specification requirements defined in the Code of Federal Regulations Title 47, Part 15 Subpart B sections 15.107, 15.109, & Subpart C sections 15.205, 15.207, 15.209, 15.247, RSS GEN & RSS 247.



APPENDIX A***LABORATORY ACCREDITATIONS AND
RECOGNITIONS***

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LABORATORY ACCREDITATIONS AND RECOGNITIONS



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 — Requirements."

IC OAT's Test Site Registration Numbers: 2154C-1 & 2154C-5



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APPENDIX B***MODIFICATIONS TO THE EUT***

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MODIFICATIONS TO THE EUT

There were no modifications made during testing.



APPENDIX C
***ADDITIONAL MODELS COVERED
UNDER THIS REPORT***

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ADDITIONAL MODELS COVERED UNDER THIS REPORT

USED FOR THE PRIMARY TEST

NSC Zigbee Combo Smoke CO Sensor
Model: C-SMKTCO1-B
S/N: None

No additional models were tested.



APPENDIX D***DIAGRAMS, FACTORS, CHARTS, AND PHOTOS***

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FIGURE 1: PLOT MAP AND LAYOUT OF TEST SITE BELOW 1GHZ

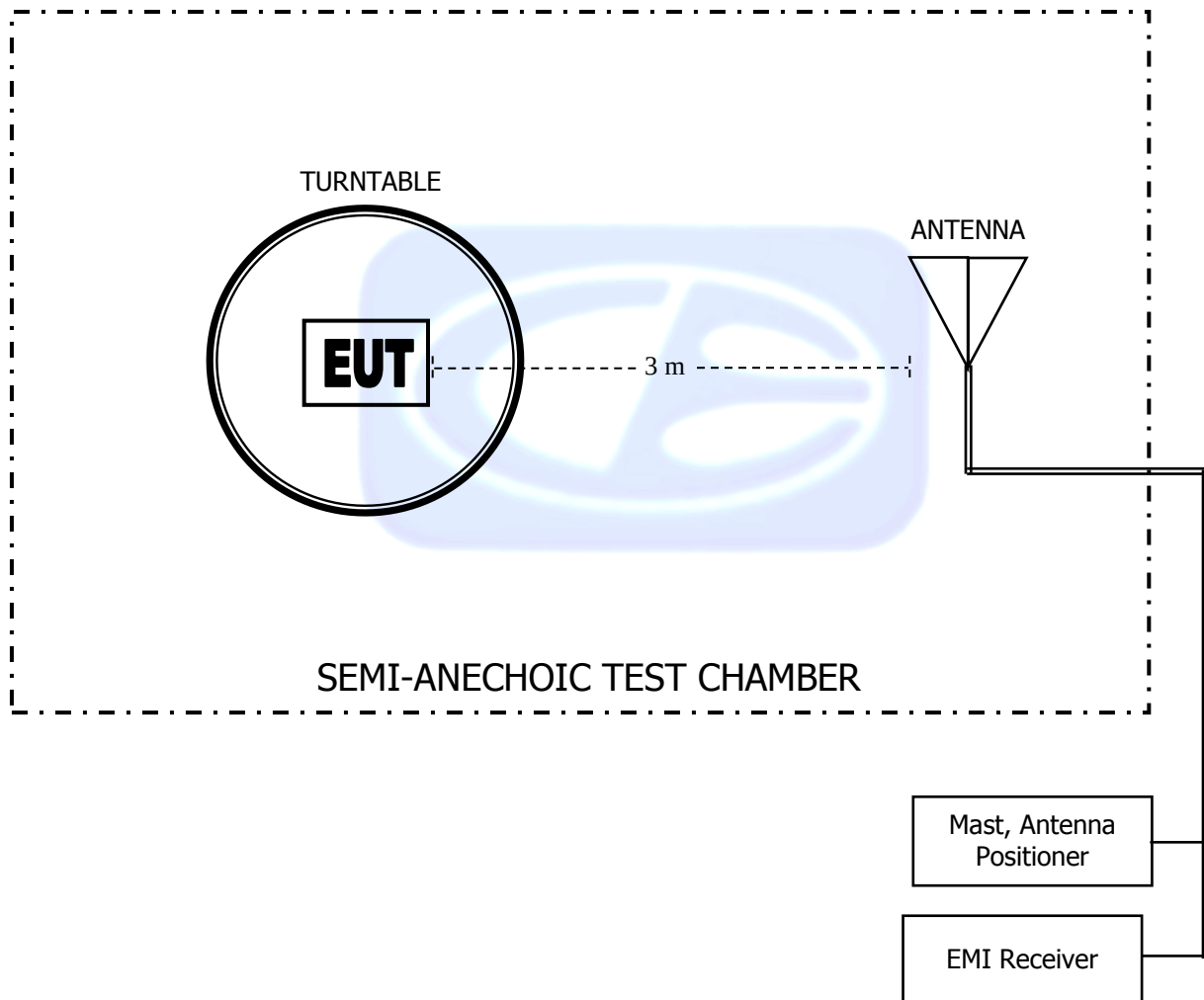
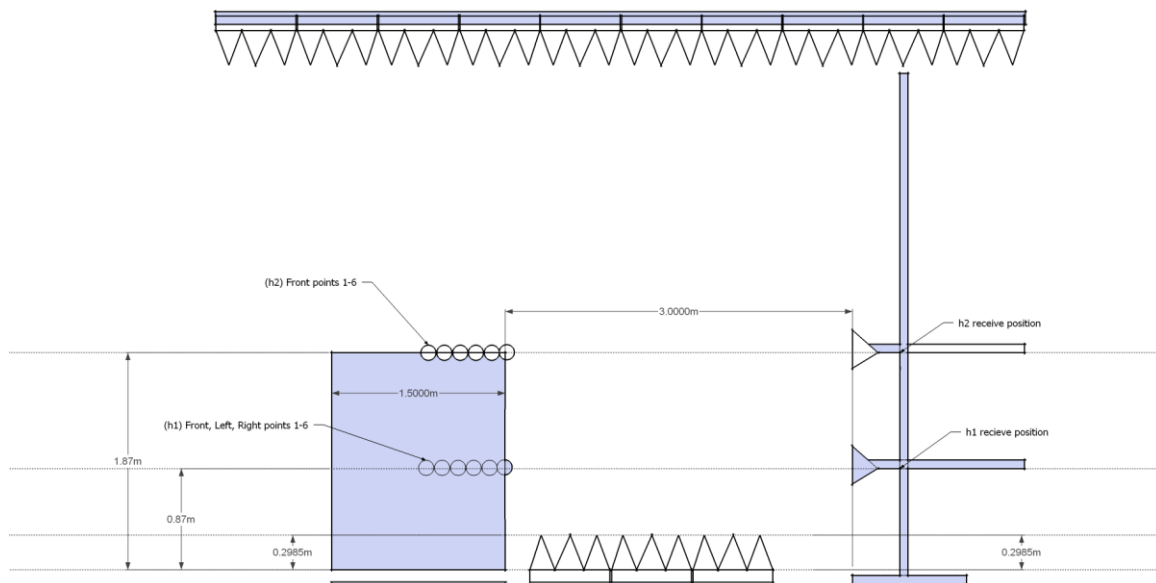


FIGURE 2: PLOT MAP AND LAYOUT OF TEST SITE ABOVE 1GHZ



COM-POWER AL-130**LOOP ANTENNA****S/N: 121049****CALIBRATION DUE: FEBRUARY 9, 2018**

FREQUENCY (MHz)	MAGNETIC (dB/m)	ELECTRIC (dB/m)	FREQUENCY (MHz)	MAGNETIC (dB/m)	ELECTRIC (dB/m)
0.009	-34.68	16.82	0.8	-37.44	14.06
0.01	-35.54	15.96	0.9	-37.34	14.16
0.02	-37.22	14.28	1.0	-37.34	14.16
0.03	-36.44	15.06	2.0	-37.03	14.47
0.04	-36.90	14.60	3.0	-37.02	14.48
0.05	-37.56	13.94	4.0	-37.12	14.38
0.06	-37.45	14.05	5.0	-36.92	14.58
0.07	-37.55	13.95	6.0	-37.12	14.38
0.08	-37.46	14.04	7.0	-37.02	14.48
0.09	-37.56	13.94	8.0	-36.81	14.69
0.1	-37.56	13.94	9.0	-36.81	14.69
0.2	-37.75	13.75	10.0	-36.70	14.80
0.3	-37.75	13.75	15.0	-37.08	14.42
0.4	-37.65	13.85	20.0	-36.60	14.90
0.5	-37.75	13.75	25.0	-38.62	12.88
0.6	-37.75	13.75	30.0	-38.92	12.58
0.7	-37.64	13.86			



COM-POWER AC-220**LAB P - COMBILOG ANTENNA****S/N: 003****CALIBRATION DUE: MAY 19, 2018**

FREQUENCY (MHz)	FACTOR (dB)	FREQUENCY (MHz)	FACTOR (dB)
30	23.6	160	13.5
35	23.7	180	14.4
40	23.9	200	14.5
45	24.2	250	15.7
50	22.6	300	19.1
60	19.1	400	20.2
70	13.8	500	21.6
80	12.9	600	23.4
90	14.6	700	26.1
100	14.4	800	25.4
120	16.2	900	27.1
140	16.0	1000	28.1



COM-POWER AH-118**HORN ANTENNA****S/N: 071250****CALIBRATION DUE: MAY 17, 2018**

FREQUENCY (MHz)	FACTOR (dB)	FREQUENCY (MHz)	FACTOR (dB)
1000	24.40	9500	39.11
1500	25.61	10000	39.38
2000	28.71	10500	39.55
2500	29.09	11000	39.66
3000	30.24	11500	40.28
3500	30.94	12000	40.26
4000	31.77	12500	40.64
4500	32.29	13000	41.33
5000	33.70	13500	41.74
5500	34.28	14000	41.52
6000	34.83	14500	41.80
6500	35.07	15000	43.51
7000	36.79	15500	41.03
7500	37.45	16000	40.88
8000	37.67	16500	40.18
8500	37.75	17000	42.59
9000	38.15	17500	44.49
		18000	45.27



COM-POWER PAM-118A**1-18GHz - PREAMPLIFIER****S/N: 551033****CALIBRATION DUE: MAY 16, 2018**

FREQUENCY (MHz)	FACTOR (dB)	FREQUENCY (MHz)	FACTOR (dB)
500	41.06	5500	40.63
1000	41.06	6000	40.18
1100	41.12	6500	40.33
1200	41.09	7000	39.97
1300	41.20	7500	40.45
1400	41.28	8000	39.83
1500	41.34	8500	39.79
1600	41.37	9000	39.71
1700	41.43	9500	39.80
1800	41.47	10000	41.07
1900	41.53	11000	40.05
2000	41.59	12000	40.21
2500	41.87	13000	40.61
3000	42.13	14000	39.09
3500	42.21	15000	39.36
4000	42.22	16000	38.32
4500	41.53	17000	38.32
5000	41.16	18000	36.85



COM-POWER PA-840**18-40 GHz PREAMPLIFIER****S/N: 181289****CALIBRATION DUE: JUNE 16, 2018**

FREQUENCY (MHz)	FACTOR (dB)	FREQUENCY (MHz)	FACTOR (dB)
18000	29.4	31500	28.2
19000	28.8	32000	28.6
20000	30.5	32500	28.8
21000	31.4	33000	28.2
22000	31.2	33500	27.7
23000	30.1	34000	27.2
24000	30.3	34500	28.2
25000	29.8	35000	27.3
26000	30.5	35500	27.2
26500	30.7	36000	27.2
27000	30.8	36500	27.5
27500	30.2	37000	27.0
28000	30.1	37500	26.7
28500	30.2	38000	26.2
29000	30.1	38500	26.5
29500	29.8	39000	26.3
30000	29.2	39500	26.9
30500	28.4	40000	27.6
31000	29.8		



**FRONT VIEW**

NORTEK
NSC ZIGBEE COMBO SMOKE CO SENSOR
MODEL: C-SMKTCO1-B
FCC SUBPART C - RADIATED EMISSIONS < 1GHZ

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

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

Agoura Division
2337 Troutdale Drive
Agoura, CA 91301
(818) 597-0600

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

**REAR VIEW**

NORTEK
NSC ZIGBEE COMBO SMOKE CO SENSOR
MODEL: C-SMKTCO1-B
FCC SUBPART C - RADIATED EMISSIONS < 1GHZ

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

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(949) 589-0700

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

**FRONT VIEW**

NORTEK
NSC ZIGBEE COMBO SMOKE CO SENSOR
MODEL: C-SMKTCO1-B
FCC SUBPART C - RADIATED EMISSIONS > 1GHZ

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



REAR VIEW

NORTEK

NSC ZIGBEE COMBO SMOKE CO SENSOR

MODEL: C-SMKTCO1-B

FCC SUBPART C - RADIATED EMISSIONS > 1GHZ

PHOTOGRAPH SHOWING THE EUT CONFIGURATION FOR MAXIMUM EMISSIONS



Brea Division
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APPENDIX E***RADIATED EMISSIONS DATA SHEETS******ANTENNA 1***

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

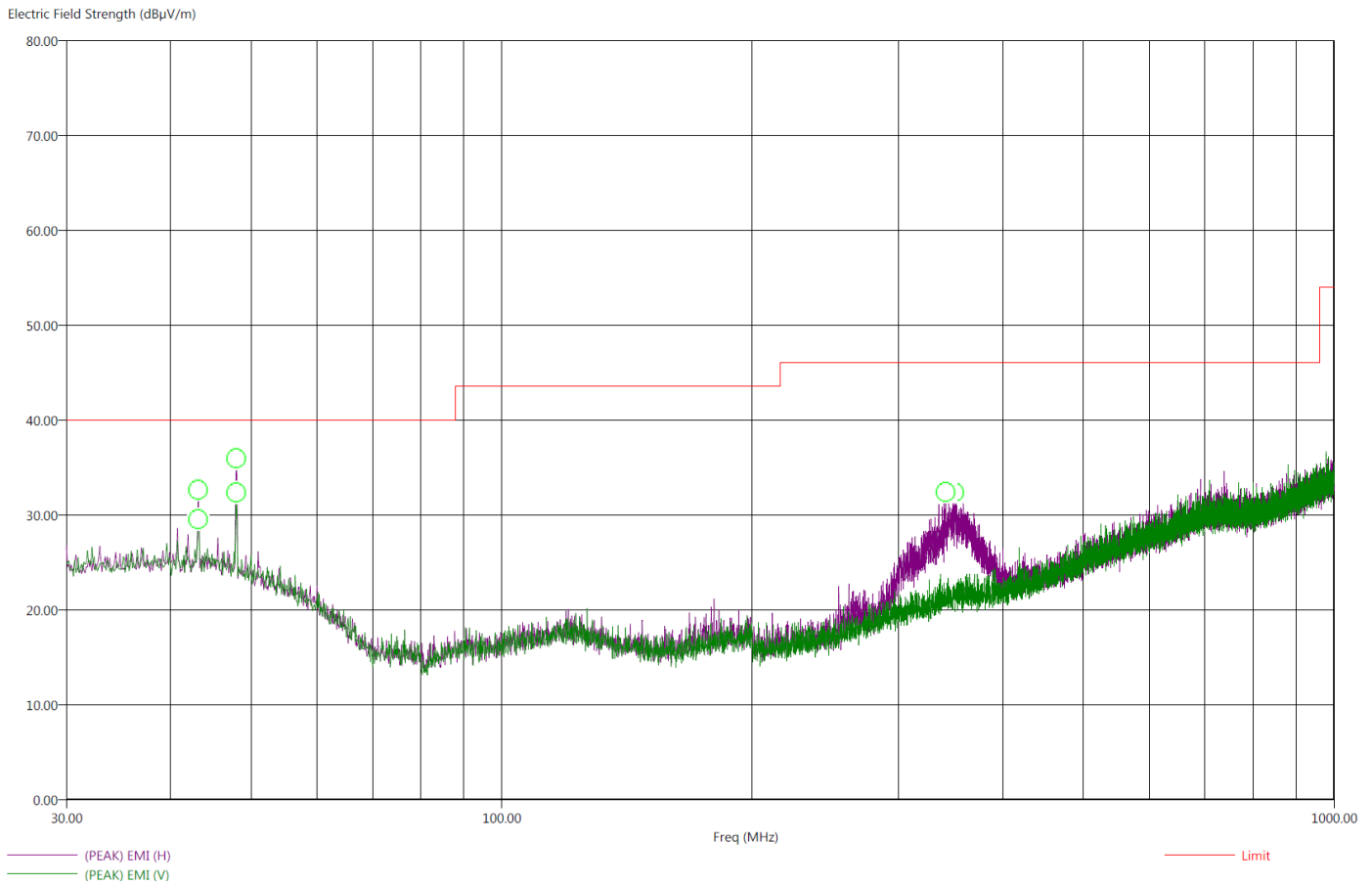
Agoura Division
2337 Troutdale Drive
Agoura, CA 91301
(818) 597-0600

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

Title: FCC 15.209
File: Radiated Pre-Scan 30-1000Mhz.set
Operator: Jorge Reyes
EUT Type: Zigbee Smoke & CO
EUT Condition: Transmitting ZigBee @ 2445MHz.
Comments: Antenna 1
X-Axis.
Temp: 73f
Hum: 49%
Battery Operated

10/10/2017 8:49:26 AM
Sequence: Preliminary Scan

Compatible Electronics, Inc. FAC-3 (Lab P)

This was worst case for all modes and channels

There were no radiated emissions besides the fundamental and harmonics found between 9kHz-30 MHz or 1GHz-25GHz.



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

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

Title: FCC 15.209
File: Radiated Final 30-1000Mhz.set
Operator: Jorge Reyes
EUT Type: Zigbee Smoke & CO
EUT Condition: Transmitting ZigBee @ 2445MHz.
Comments: Antenna 1
X-Axis.
Temp: 73f
Hum: 49%
Battery Operated

10/10/2017 9:00:23 AM
Sequence: Final Measurements

Compatible Electronics, Inc. FAC-3 (Lab P)

Freq (MHz)	(QP) Margin (dB)	(QP) EMI (dBµV/m)	(PEAK) EMI (dBµV/m)	Limit (dBµV/m)	Pol	Ttbl Agl (deg)	Twr Ht (cm)	Transducer(dB)	Cable(dB)
43.20	-14.20	25.80	30.39	40.00	H	131.00	182.29	24.10	0.54
43.20	-14.48	25.52	30.36	40.00	V	329.25	283.17	24.09	0.54
48.00	-10.39	29.61	32.49	40.00	H	109.75	236.82	23.22	0.61
48.00	-8.61	31.39	34.44	40.00	V	-0.25	389.00	23.22	0.61
341.70	-19.08	26.92	32.09	46.00	H	268.75	104.29	18.91	1.70
349.90	-17.84	28.16	33.30	46.00	H	108.00	106.41	19.06	1.73

This was worst case for all modes and channels

There were no radiated emissions besides the fundamental and harmonics found between 9kHz-30 MHz or 1GHz-25GHz.



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***DTS BANDWIDTH
DATA SHEETS***

ANTENNA 1



Brea Division
114 Olinda Drive
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Lake Forest Division
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(949) 587-0400

DTS BANDWIDTH

FCC 15.247

Company: Nortek
EUT: Zigbee Smoke & CO Detector
Model: C-SMKTCO1-B
Antenna: 1

Date: 10/4/2017
Lab: P
Test Eng.: J. Reyes

Compatible Electronics, Inc. FAC-3 (Lab P)

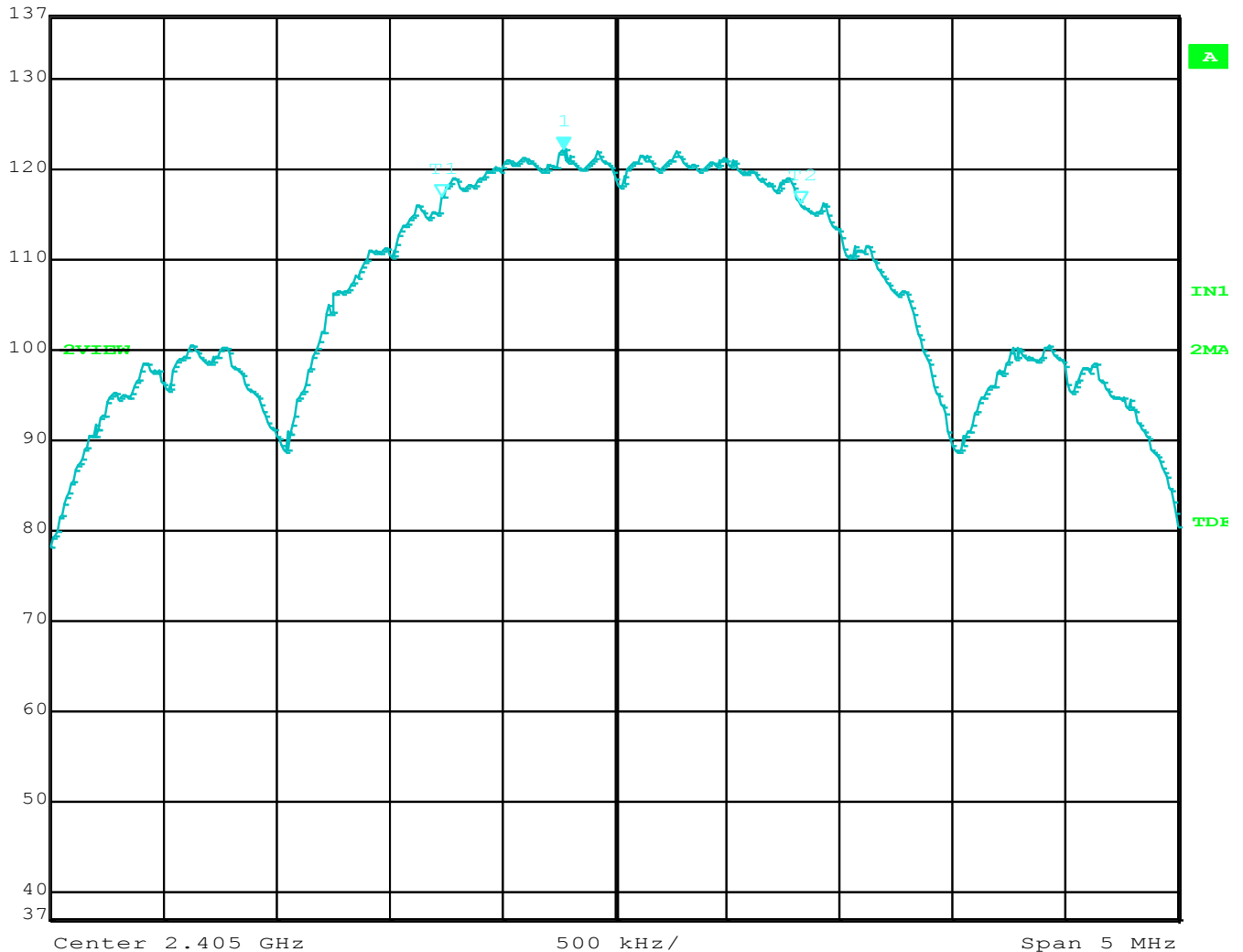
DTS Bandwidth

Freq. (MHz)	Measured BW (kHz)	Limit (Min) (kHz)	Margin (kHz)	Peak / QP / Avg	Comments
2405	1593.19	500.00	1093.19	Peak	
2445	1583.17	500.00	1083.17	Peak	
2475	1583.17	500.00	1083.17	Peak	





Ref Lvl 137 dB μ V
Marker 1 [T2 ndB] 6.00 dB
BW 1.59318637 MHz
RBW 100 kHz
VBW 300 kHz
RF Att 40 dB
SWT 5 ms
Unit dB μ V



Comment A: DTS Bandwidth 2405 MHz



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Lake Forest Division
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Ref Lvl

Marker 1 [T2 ndB]

RBW

100 kHz

RF Att

40 dB

ndB

6.00 dB

VBW

300 kHz

30 dBm

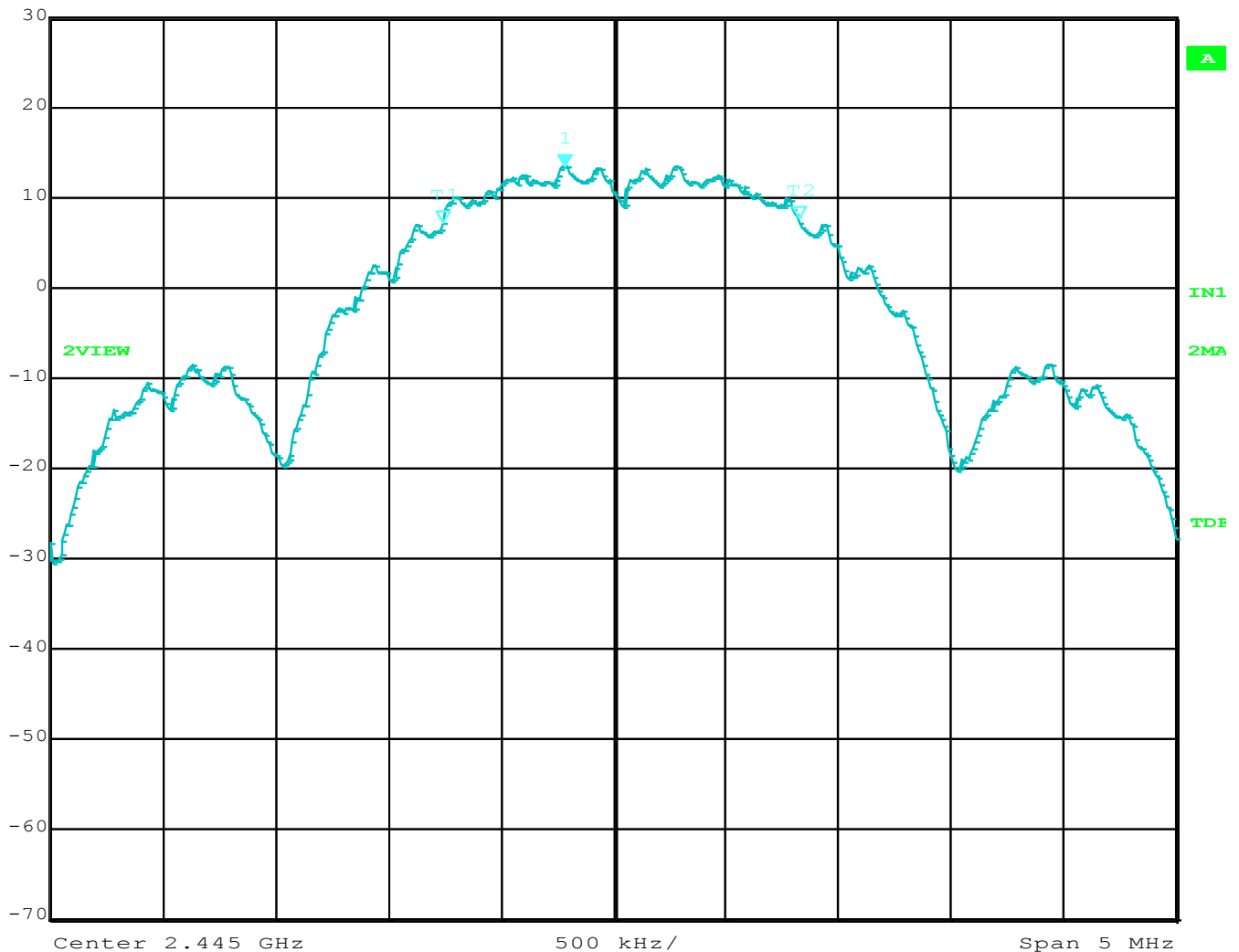
BW 1.58316633 MHz

SWT

5 ms

Unit

dBm



Comment A: DTS Bandwidth 2445 MHz



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Ref Lvl

Marker 1 [T2 ndB]

RBW

100 kHz

RF Att

40 dB

ndB

6.00 dB

VBW

300 kHz

30 dBm

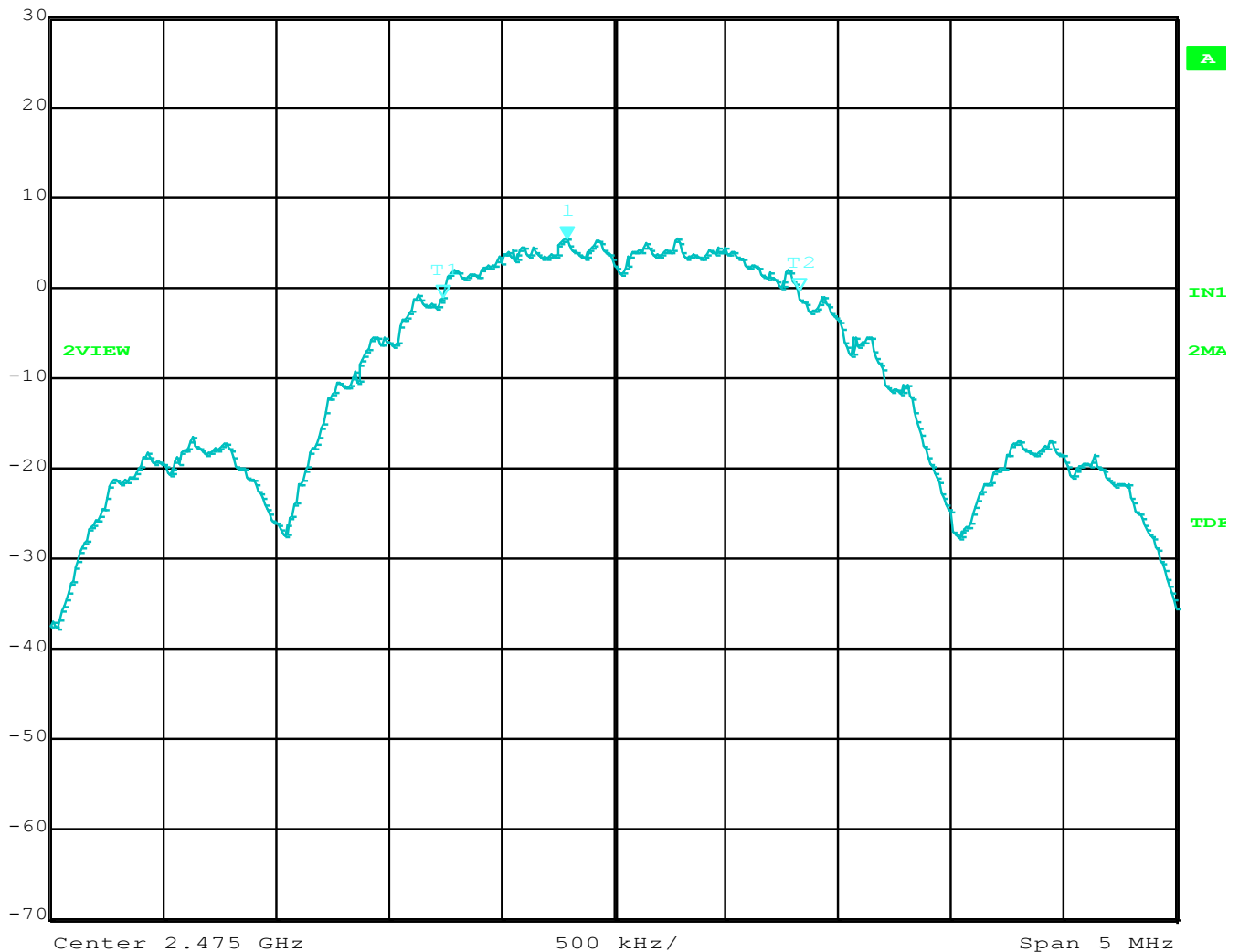
BW 1.58316633 MHz

SWT

5 ms

Unit

dBm



Comment A: DTS Bandwidth 2475 MHz

1



Brea Division
114 Olinda Drive
Brea, CA 92823
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MAXIMUM PEAK CONDUCTED OUTPUT POWER***DATA SHEETS******ANTENNA 1***

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114 Olinda Drive
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Lake Forest Division
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Lake Forest, CA 92630
(949) 587-0400

MAXIMUM PEAK CONDUCTED OUTPUT POWER

FCC 15.247

Company: Nortek
EUT: Zigbee Smoke & CO Detector
Model: C-SMKTCO1-B
Mode: Zigbee
Antenna: 1

Date: 10/6/2017
Lab: P
Test ENG: J. Reyes

Compatible Electronics, Inc. FAC-3 (Lab P)

Freq. (MHz)	Level (dBm)	Limit (dBm)	Margin (dB)	Peak / QP / Avg	Comments
2405	20.13	30.00	-9.87	Peak	
2445	18.35	30.00	-11.65	Peak	
2475	10.41	30.00	-19.59	Peak	



***MAXIMUM PEAK POWER SPECTRAL DENSITY LEVEL IN THE
FUNDAMENTAL EMISSION***

DATA SHEETS

ANTENNA 1



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

Agoura Division
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Agoura, CA 91301
(818) 597-0600

Silverado Division
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(949) 589-0700

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

POWER SPECTRAL DENSITY

FCC 15.247

Company: Nortek
EUT: Zigbee Smoke & CO Detector
Model: C-SMKTCO1-B
Antenna: 1

Date: 10/6/2017
Lab: P
Test ENG: J. Reyes

Compatible Electronics, Inc. FAC-3 (Lab P)

DTS Bandwidth

Freq. (MHz)	Peak (dBm)	Limit (dBm)	Margin (dB)	Peak / QP / Avg	Comments
2405	4.93	8.00	-3.07	Peak	
2445	2.44	8.00	-5.56	Peak	
2475	-6.75	8.00	-14.75	Peak	





Marker 1 [T2]

RBW 3 kHz RF Att 40 dB

Ref Lvl 4.93 dBm

VBW 10 kHz

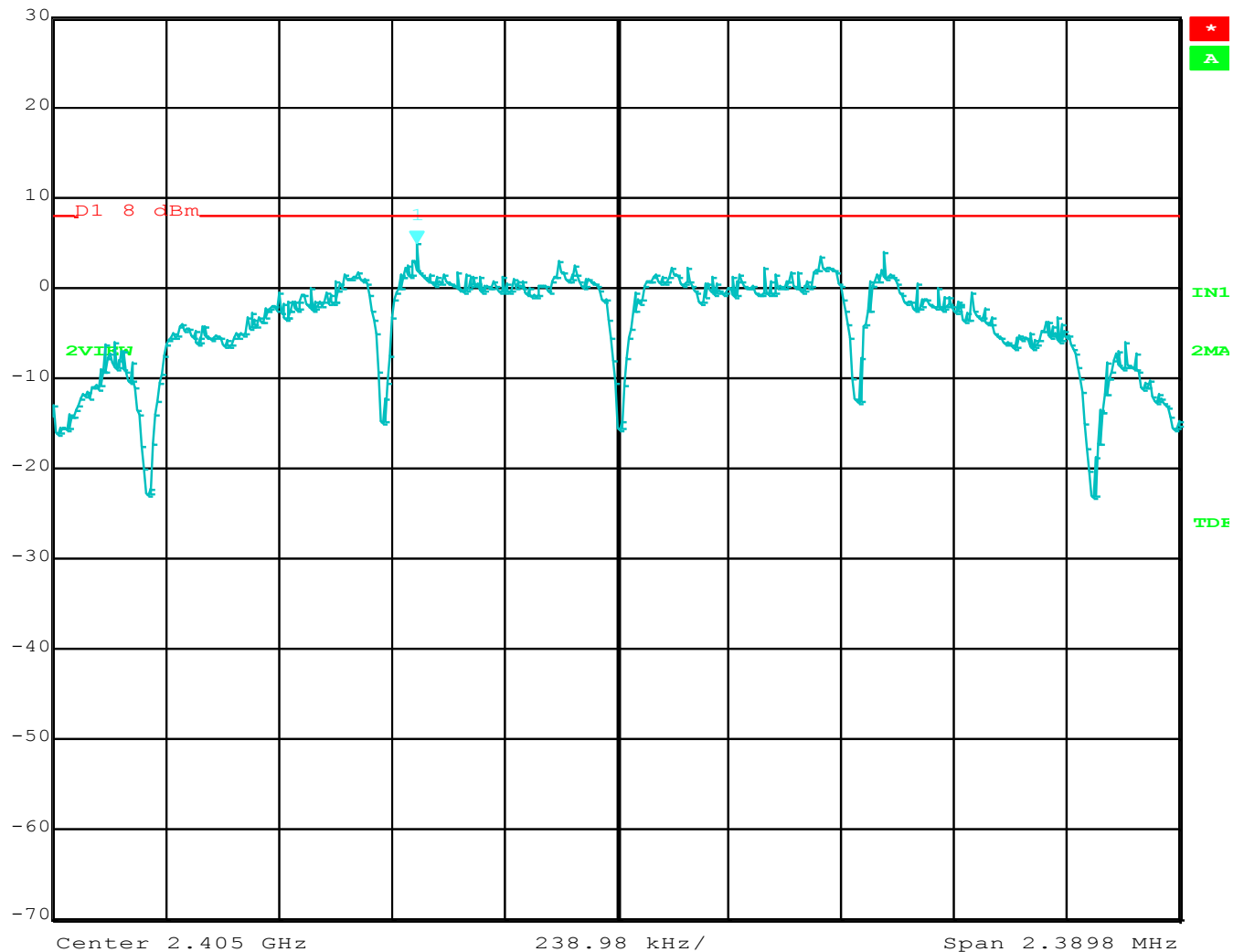
30 dBm

2.40457616 GHz

SWT 680 ms

Unit

dBm



Comment A: Power Spectral Density 2405 MHz

Date: 1 JAN 2007 04:05:00



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114 Olinda Drive
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(949) 589-0700

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



Marker 1 [T2]

RBW 3 kHz RF Att 40 dB

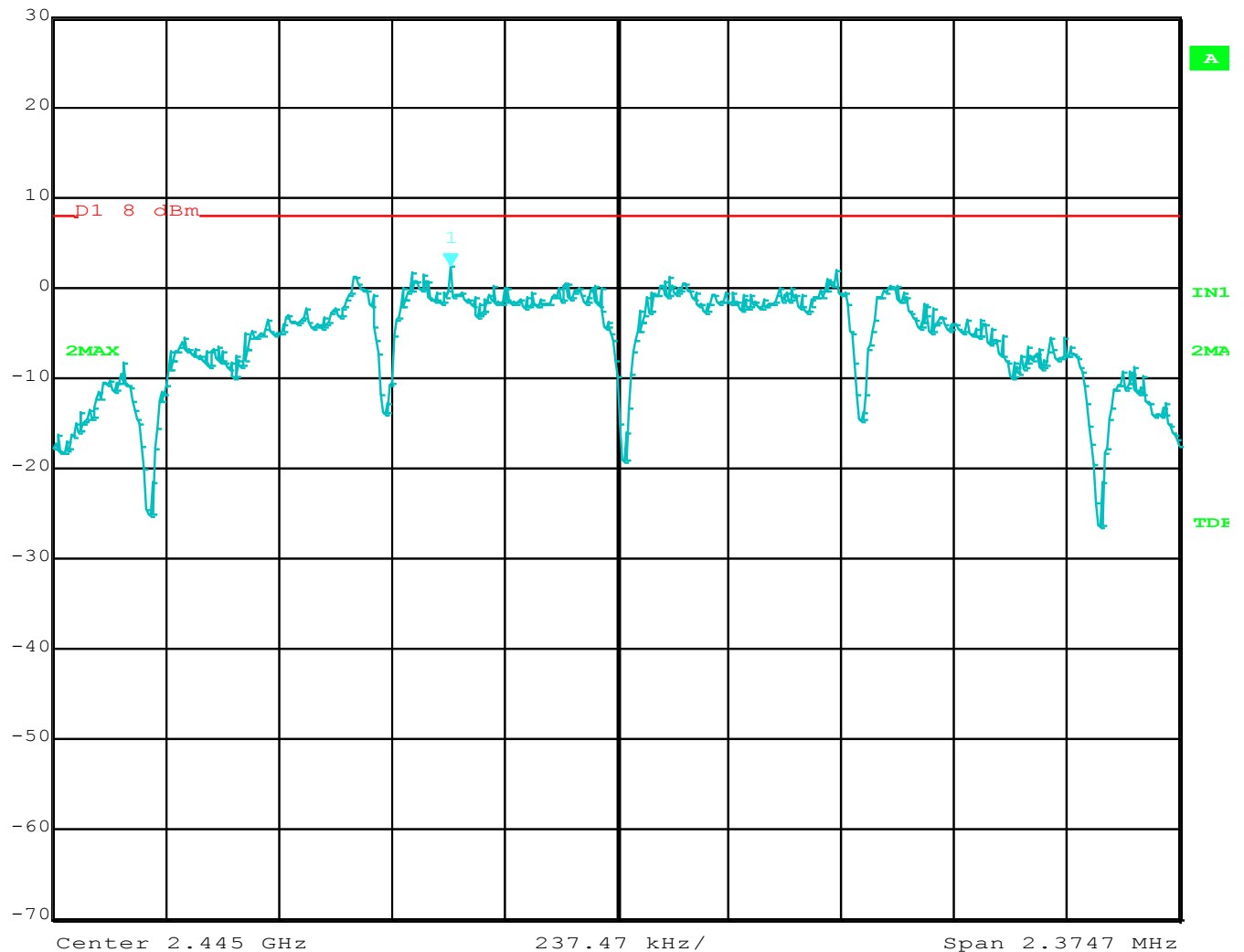
Ref Lvl 2.44 dBm

VBW 10 kHz

30 dBm 2.44465022 GHz

SWT 660 ms

Unit dBm



Comment A: Power Spectral Density 2445 MHz

Date: 1 JAN 2007 04:00:00



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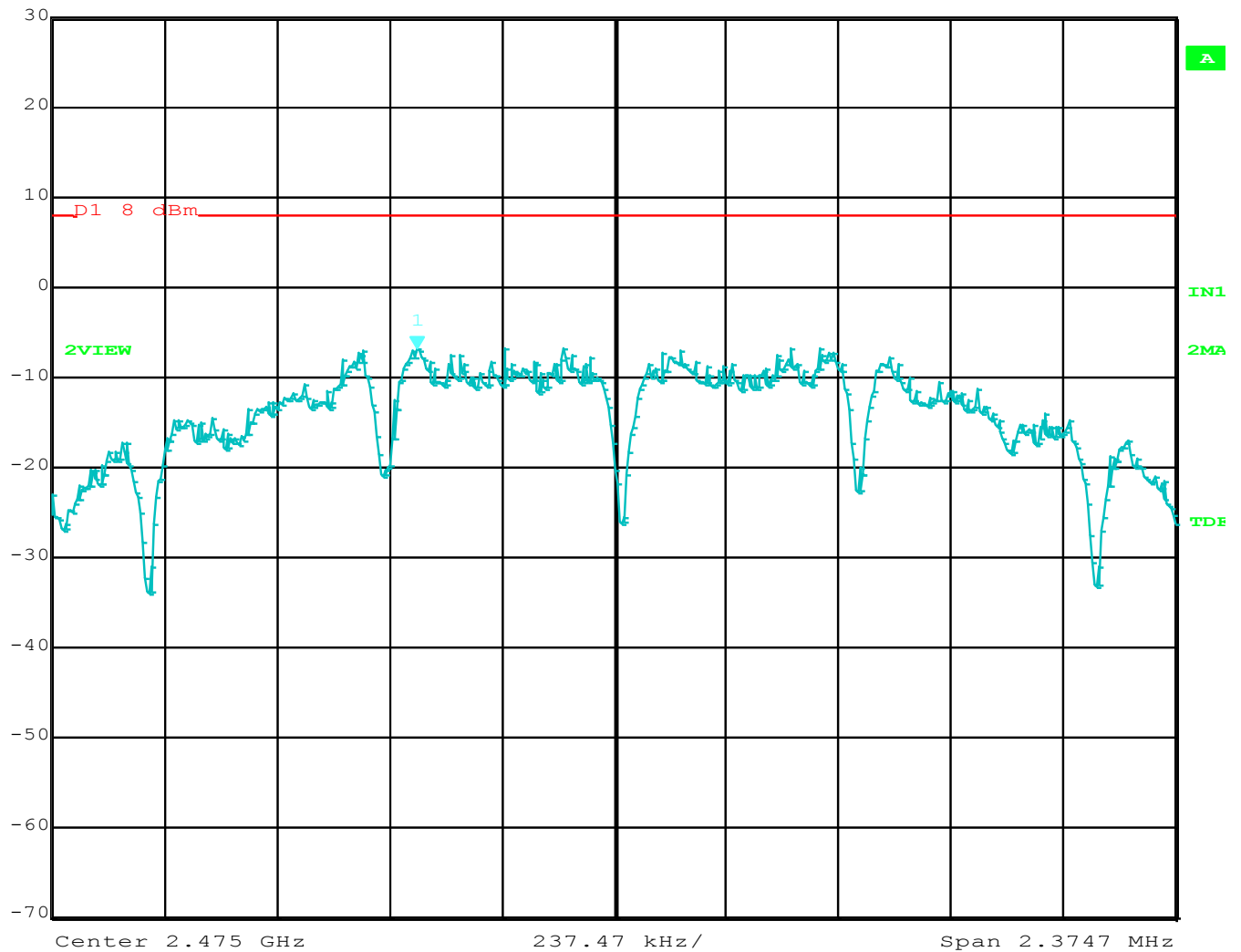
Agoura Division
2337 Troutdale Drive
Agoura, CA 91301
(818) 597-0600

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

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



Marker 1 [T2] RBW 3 kHz RF Att 40 dB
Ref Lvl -6.75 dBm VBW 10 kHz
30 dBm 2.47458359 GHz SWT 660 ms Unit dBm



Comment A: Power Spectral Density 2475 MHz



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***EMISSIONS IN NON-RESTRICTED FREQUENCY BANDS (IN
100KHZ BANDWIDTH) / CONDUCTED***

DATA SHEETS

ANTENNA 1



Brea Division
114 Olinda Drive
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Agoura Division
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Lake Forest Division
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EMISSIONS IN NON-RESTRICTED FREQUENCY BANDS

FCC 15.247

Company: Nortek
EUT: Zigbee Smoke & CO Detector
Model: C-SMKTCO1-B
Mode: Zigbee
Antenna: 1

Date: 10/2/2017
Lab: P
Test ENG: Jorge Reyes

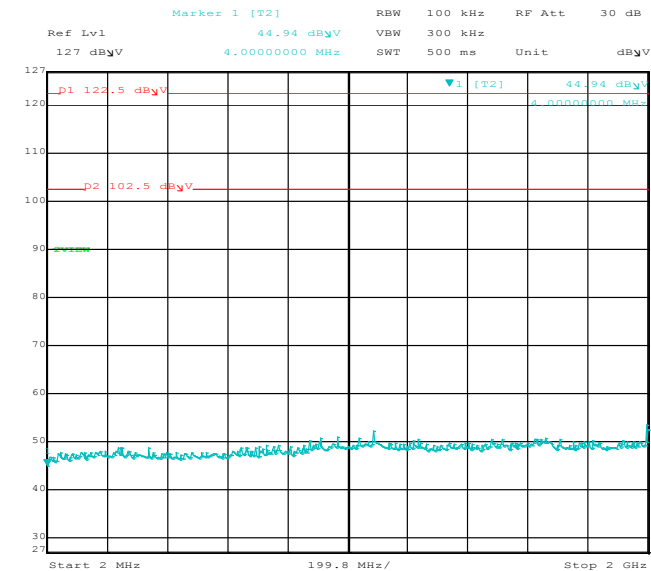
Compatible Electronics, Inc. FAC-3 (Lab P)

Freq. (MHz)	Level (dBm)	Limit (dBm)	Margin (dB)	Peak / QP / Avg	Comments
7215.00	-46.95	-4.50	-42.45	Peak	Low Channel
14430.00	-46.38	-4.50	-41.88	Peak	Low Channel
16835.00	-50.52	-4.50	-46.02	Peak	Low Channel

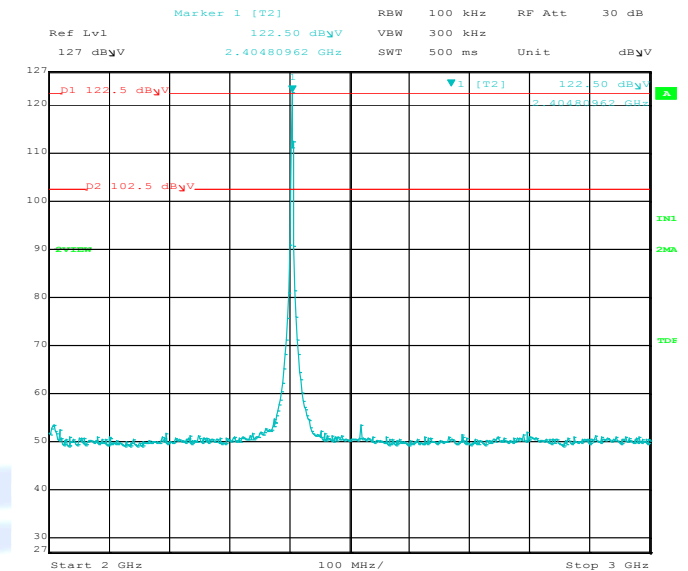
All Channels were checked and the emissions shown were the worst case.
The only emissions found in the non-restricted band were on the low channel.



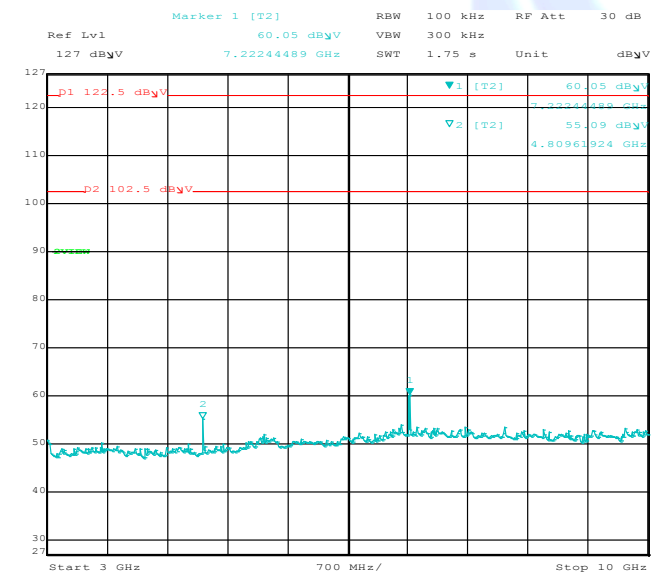
EMISSIONS IN NON-RESTRICTED FREQUENCY BANDS LOW CHANNEL



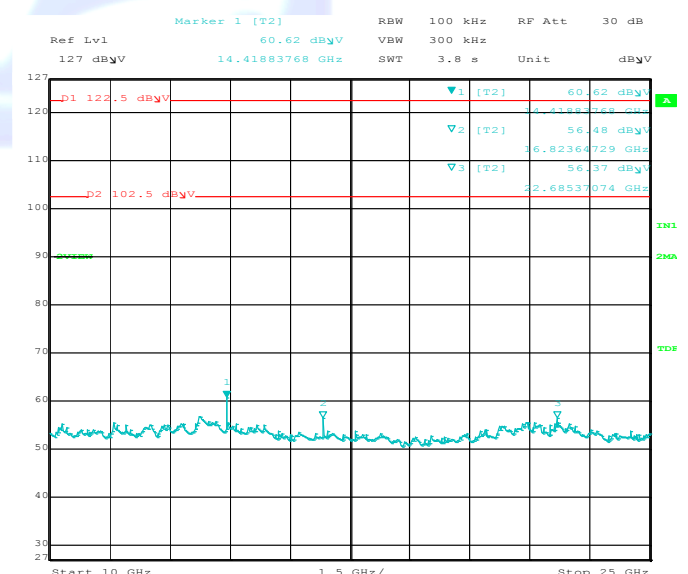
Comment A: Conducted Spurious Emissions



Comment A: Conducted Spurious Emissions



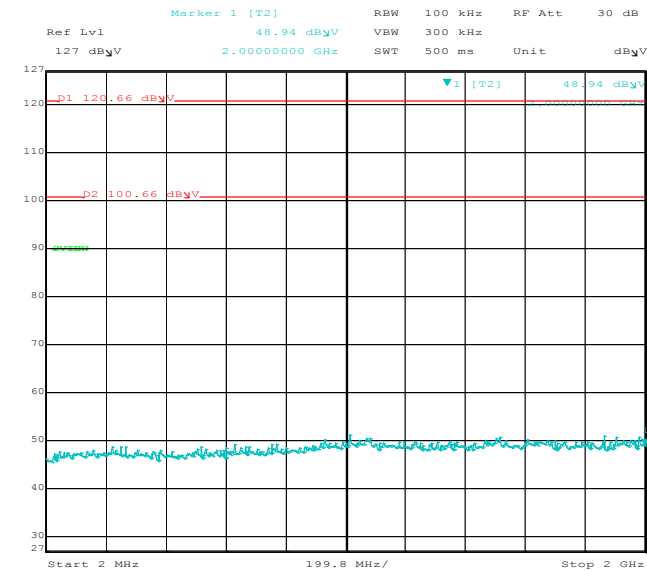
Comment A: Conducted Spurious Emissions



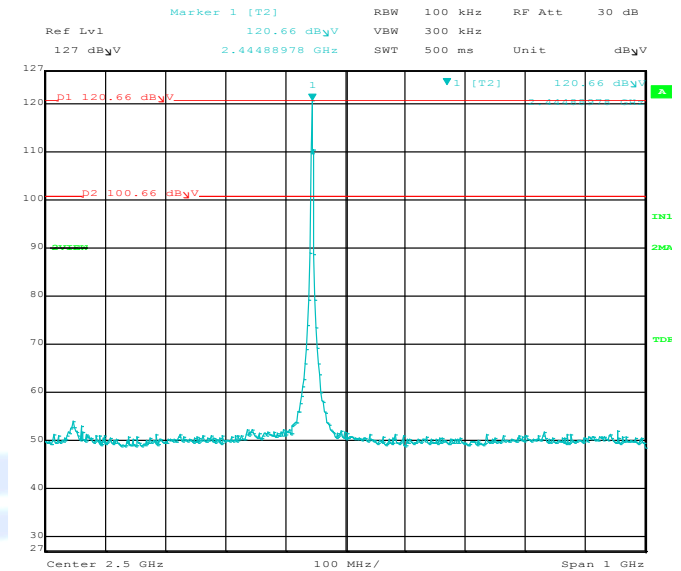
Comment A: Conducted Spurious Emissions



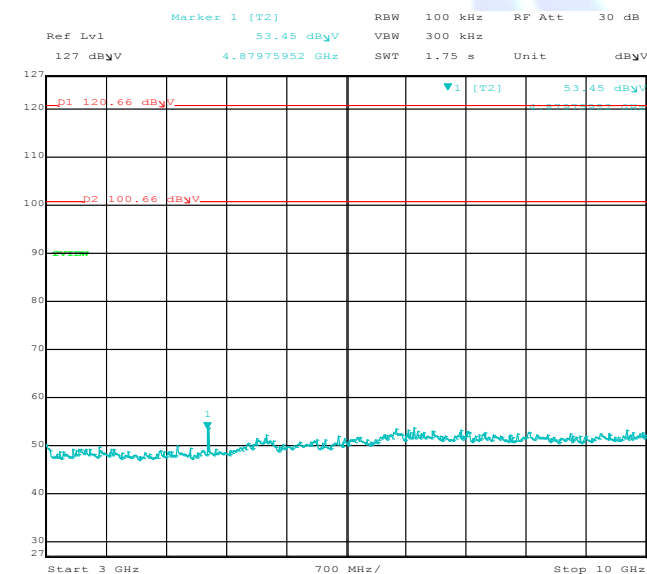
EMISSIONS IN NON-RESTRICTED FREQUENCY BANDS MID CHANNEL



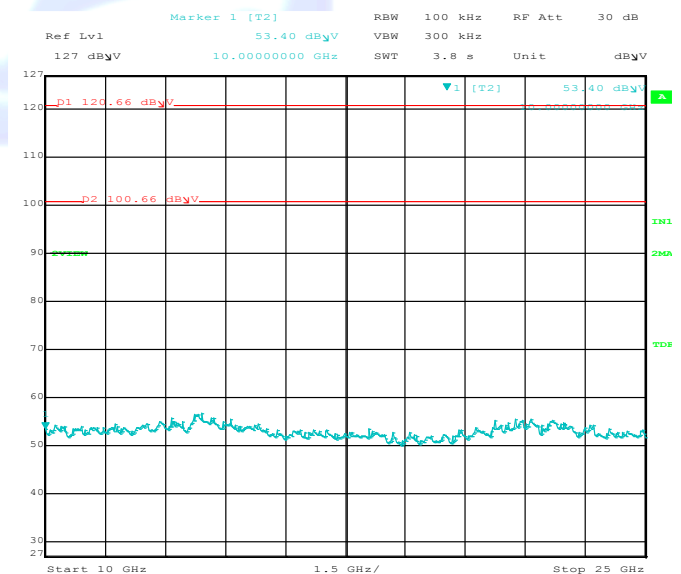
Comment A: Conducted Spurious Emissions



Comment A: Conducted Spurious Emissions



Comment A: Conducted Spurious Emissions



Comment A: Conducted Spurious Emissions



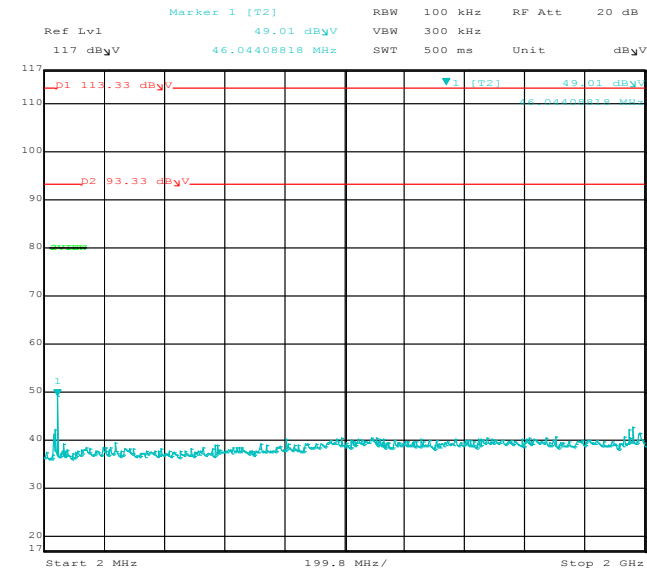
Brea Division
114 Olinda Drive
Brea, CA 92823
(714) 579-0500

Agoura Division
2337 Troutdale Drive
Agoura, CA 91301
(818) 597-0600

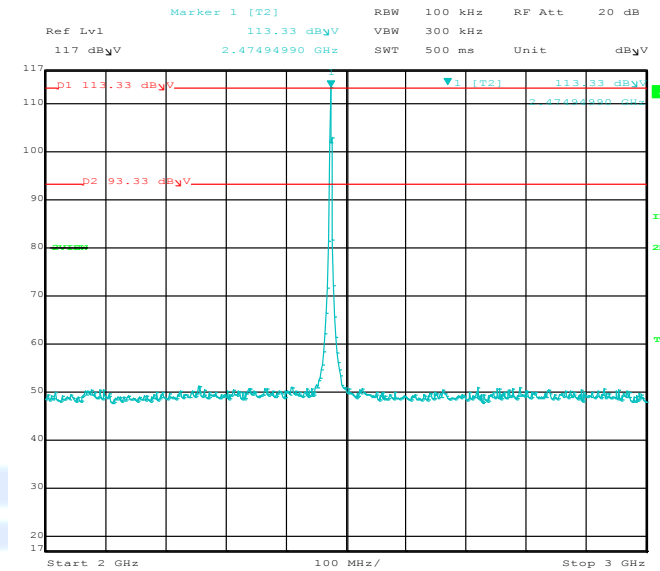
Silverado Division
19121 El Toro Road
Silverado, CA 92676
(949) 589-0700

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

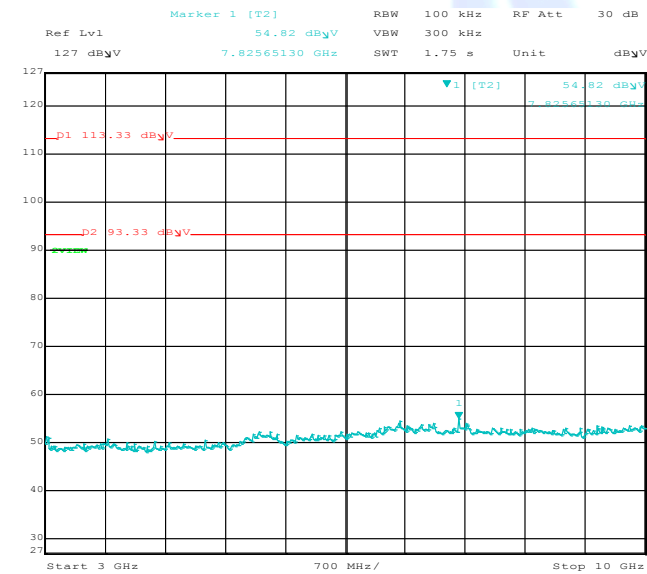
EMISSIONS IN NON-RESTRICTED FREQUENCY BANDS HIGH CHANNEL



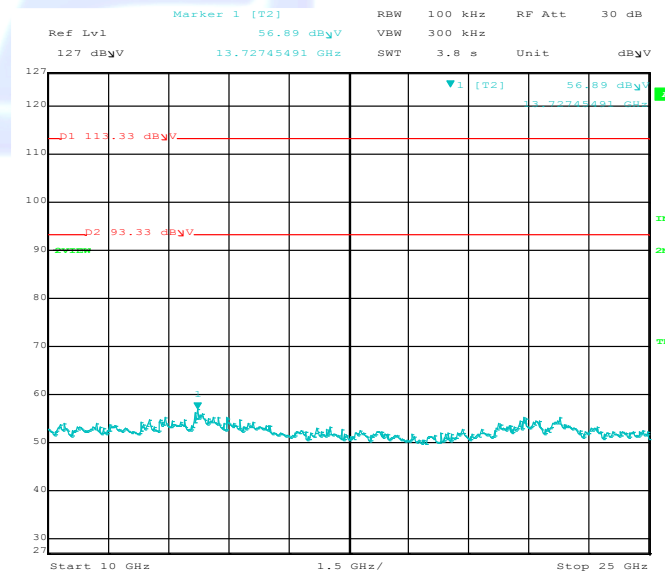
Comment A: Conducted Spurious Emissions



Comment A: Spurious Reference Level



Comment A: Conducted Spurious Emissions



Comment A: Conducted Spurious Emissions



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EMISSIONS IN RESTRICTED FREQUENCY BANDS (RADIATED FIELD STRENGTH)

DATA SHEETS

ANTENNA 1



Brea Division
114 Olinda Drive
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HARMONIC EMISSIONS IN RESTRICTED FREQUENCY BANDS

Low Channel, Horizontal

FCC 15.247

Company: Nortek
EUT: Zigbee Smoke & CO Detector
Model: C-SMKTCO1-B
Antenna: 1

Date: 10/2/2017
Lab: P
Test ENG: J. Reyes

Compatible Electronics, Inc. FAC-3 (Lab P)

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit (dBuV/m)	Margin (dB)	Peak / QP / Avg	Ant. Height (m)	Table Angle (deg)	Comments
4810.00	55.85	H	73.98	-18.13	Peak	1.26	220	In Restricted Band
4810.00	47.57	H	53.98	-6.41	Avg	1.26	220	
12025.00	51.73	H	73.98	-22.25	Peak	1.30	90	In Restricted Band
12025.00	39.72	H	53.98	-14.26	Avg	1.30	90	
19240.00	--	H	73.98	--	Peak	--	--	In Restricted Band
19240.00	--	H	53.98	--	Avg	--	--	No Emissions Found

Test distance
3 meter



Brea Division
114 Olinda Drive
Brea, CA 92823
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Agoura Division
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Lake Forest Division
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(949) 587-0400

HARMONIC EMISSIONS IN RESTRICTED FREQUENCY BANDS

Low Channel, Vertical

FCC 15.247

Company: Nortek
EUT: Zigbee Smoke & CO Detector
Model: C-SMKTCO1-B
Antenna: 1

Date: 10/2/2017
Lab: P
Test ENG: J. Reyes

Compatible Electronics, Inc. FAC-3 (Lab P)

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit (dBuV/m)	Margin (dB)	Peak / QP / Avg	Ant. Height (m)	Table Angle (deg)	Comments
4810.00	54.91	V	73.98	-19.07	Peak	1.01	318	In Restricted Band
4810.00	46.63	V	53.98	-7.35	Avg	1.01	318	
12025.00	53.43	V	73.98	-20.55	Peak	1.00	280	In Restricted Band
12025.00	42.56	V	53.98	-11.42	Avg	1.00	280	
19240.00	--	V	73.98	--	Peak	--	--	In Restricted Band
19240.00	--	V	53.98	--	Avg	--	--	No Emissions Found

Test distance
3 meter



HARMONIC EMISSIONS IN RESTRICTED FREQUENCY BANDS

Mid Channel, Horizontal

FCC 15.247

Company: Nortek
EUT: Zigbee Smoke & CO Detector
Model: C-SMKTCO1-B
Antenna: 1

Date: 10/2/2017
Lab: P
Test ENG: J.Reyes

Compatible Electronics, Inc. FAC-3 (Lab P)

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit (dBuV/m)	Margin (dB)	Peak / QP / Avg	Ant. Height (m)	Table Angle (deg)	Comments
4890.00	58.93	H	73.98	-15.05	Peak	1.55	93	In Restricted Band
4890.00	51.00	H	53.98	-2.98	Avg	1.55	93	
7335.00	59.39	H	73.98	-14.59	Peak	1.00	182	In Restricted Band
7335.00	51.82	H	53.98	-2.16	Avg	1.00	182	
12225.00	48.95	H	73.98	-25.03	Peak	1.00	320	In Restricted Band
12225.00	35.94	H	53.98	-18.04	Avg	1.00	320	
19560.00	--	H	73.98	--	Peak	--	--	In Restricted Band
19560.00	--	H	53.98	--	Avg	--	--	No Emissions Found

Test distance
3 meter



Brea Division
114 Olinda Drive
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(714) 579-0500

Agoura Division
2337 Troutdale Drive
Agoura, CA 91301
(818) 597-0600

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

HARMONIC EMISSIONS IN RESTRICTED FREQUENCY BANDS

Mid Channel, Vertical

FCC 15.247

Company: Nortek
EUT: Zigbee Smoke & CO Detector
Model: C-SMKTCO1-B
Antenna: 1

Date: 10/2/2017
Lab: P
Test ENG: J. Reyes

Compatible Electronics, Inc. FAC-3 (Lab P)

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit (dBuV/m)	Margin (dB)	Peak / QP / Avg	Ant. Height (m)	Table Angle (deg)	Comments
4890.00	56.90	V	73.98	-17.08	Peak	1.00	317	In Restricted Band
4890.00	48.73	V	53.98	-5.25	Avg	1.00	317	
7335.00	59.12	V	73.98	-14.86	Peak	1.00	222	In Restricted Band
7335.00	51.63	V	53.98	-2.35	Avg	1.00	222	
12225.00	49.60	V	73.98	-24.38	Peak	1.20	235	In Restricted Band
12225.00	36.04	V	53.98	-17.94	Avg	1.20	235	
19560.00	--	V	73.98	--	Peak	--	--	In Restricted Band
19560.00	--	V	53.98	--	Avg	--	--	No Emissions Found

Test distance
3 meter



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

HARMONIC EMISSIONS IN RESTRICTED FREQUENCY BANDS

High Channel, Horizontal

FCC 15.247

Company: Nortek
EUT: Zigbee Smoke & CO Detector
Model: C-SMKTCO1-B
Antenna: 1

Date: 10/2/2017
Lab: P
Test ENG: J.Reyes

Compatible Electronics, Inc. FAC-3 (Lab P)

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit (dBuV/m)	Margin (dB)	Peak / QP / Avg	Ant. Height (m)	Table Angle (deg)	Comments
4950.00	52.67	H	73.98	-21.31	Peak	1	90	In Restricted Band
4950.00	43.44	H	53.98	-10.54	Avg	1	90	
7425.00	50.47	H	73.98	-23.51	Peak	1.03	280	In Restricted Band
7425.00	36.82	H	53.98	-17.16	Avg	1.03	280	
12375.00	58.81	H	73.98	-15.17	Peak	1.05	160	In Restricted Band
12375.00	45.20	H	53.98	-8.78	Avg	1.05	160	
19800.00	--	H	73.98	--	Peak	--	--	In Restricted Band
19800.00	--	H	53.98	--	Avg	--	--	No Emissions Found
22275.00	--	H	73.98	--	Peak	--	--	In Restricted Band
22275.00	--	H	53.98	--	Avg	--	--	No Emissions Found

Test distance
3 meter



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HARMONIC EMISSIONS IN RESTRICTED FREQUENCY BANDS

High Channel, Vertical

FCC 15.247

Company: Nortek
EUT: Zigbee Smoke & CO Detector
Model: C-SMKTCO1-B
Antenna: 1

Date: 10/2/2017
Lab: P
Test ENG: J.Reyes

Compatible Electronics, Inc. FAC-3 (Lab P)

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit (dBuV/m)	Margin (dB)	Peak / QP / Avg	Ant. Height (m)	Table Angle (deg)	Comments
4950.00	52.12	V	73.98	-21.86	Peak	1	58	In Restricted Band
4950.00	42.64	V	53.98	-11.34	Avg	1	58	
7425.00	51.30	V	73.98	-22.68	Peak	1.02	220	In Restricted Band
7425.00	38.01	V	53.98	-15.97	Avg	1.02	220	
12375.00	58.81	V	73.98	-15.17	Peak	1.04	60	In Restricted Band
12375.00	45.20	V	53.98	-8.78	Avg	1.04	60	
19800.00	--	V	73.98	--	Peak	--	--	In Restricted Band
19800.00	--	V	53.98	--	Avg	--	--	No Emissions Found
22275.00	--	V	73.98	--	Peak	--	--	In Restricted Band
22275.00	--	V	53.98	--	Avg	--	--	No Emissions Found

Test distance
3 meter



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20621 Pascal Way
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***EMISSIONS RADIATED OUTSIDE OF THE FUNDAMENTAL
FREQUENCY BAND AT BAND EDGES***

DATA SHEETS

ANTENNA 1



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Lake Forest Division
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BAND EDGES- HORIZONTAL

FCC 15.247

Company: Nortek
EUT: Zigbee Smoke and CO Detector
Model: C-SMKTCO1-B
Antenna: 1

Date: 10/2/2017
Lab: P
Test ENG: J. Reyes

Compatible Electronics, Inc. FAC-3 (Lab P)

Freq. (MHz)	Level (dBµV/m)	Pol	Limit (dBµV/m)	Margin (dB)	Peak / QP / Avg	Ant. Height (m)	Table Angle (deg)	Comments
2405.00	114.38	H	--	--	Peak	2.00	140	Fundamental of Low Channel
2400.00	77.49	H	94.38	-16.89	Delta	2.00	140	From Peak
2389.52	59.07	H	73.98	-14.91	Peak	2.00	140	No Marker Delta Method Used
2389.52	50.20	H	53.98	-3.78	Avg	2.00	140	
2475.00	109.16	H	--	--	Peak	1.10	135	Fundamental of High Channel
2483.50	62.98	H	73.98	-11.00	Peak	1.10	135	No Marker Delta Method Used
2483.50	52.52	H	53.98	-1.46	Avg	1.10	135	
								Gain = -11*

Test Distance
3 Meters



BAND EDGES- VERTICAL

FCC 15.247

Company: Nortek
EUT: Zigbee Smoke and CO Detector
Model: C-SMKTCO1-B
Antenna: 1

Date: 10/2/2017
Lab: P
Test ENG: Jorge Reyes

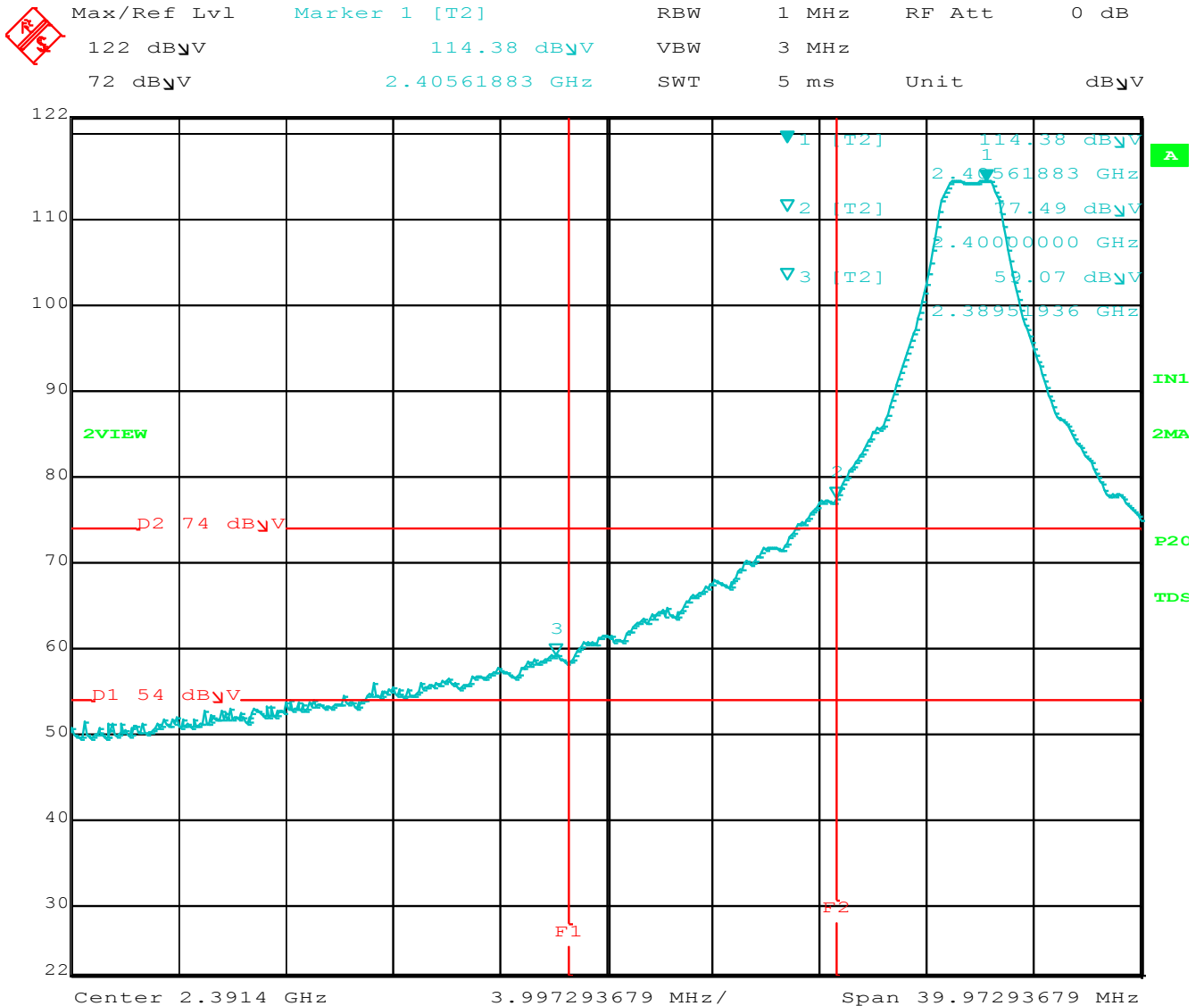
Compatible Electronics, Inc. FAC-3 (Lab P)

Freq. (MHz)	Level (dB μ V/m)	Pol	Limit (dB μ V/m)	Margin (dB)	Peak / QP / Avg	Ant. Height (m)	Table Angle (deg)	Comments
2405.00	108.73	V	--	--	Peak	1.04	25	Fundamental of Low Channel
2399.52	69.57	V	88.73	-19.16	Delta	1.04	25	From Peak
2389.20	54.38	V	73.98	-19.60	Peak	1.04	25	No Marker Delta Method Used
2389.20	42.96	V	53.98	-11.02	Avg	1.04	25	
2475.00	99.04	V	--	--	Peak	1.20	85	Fundamental of High Channel
2483.50	58.78	V	73.98	-15.20	Peak	1.20	85	No Marker Delta Method Used
2483.50	47.00	V	53.98	-6.98	Avg	1.20	85	
								Gain = -11*

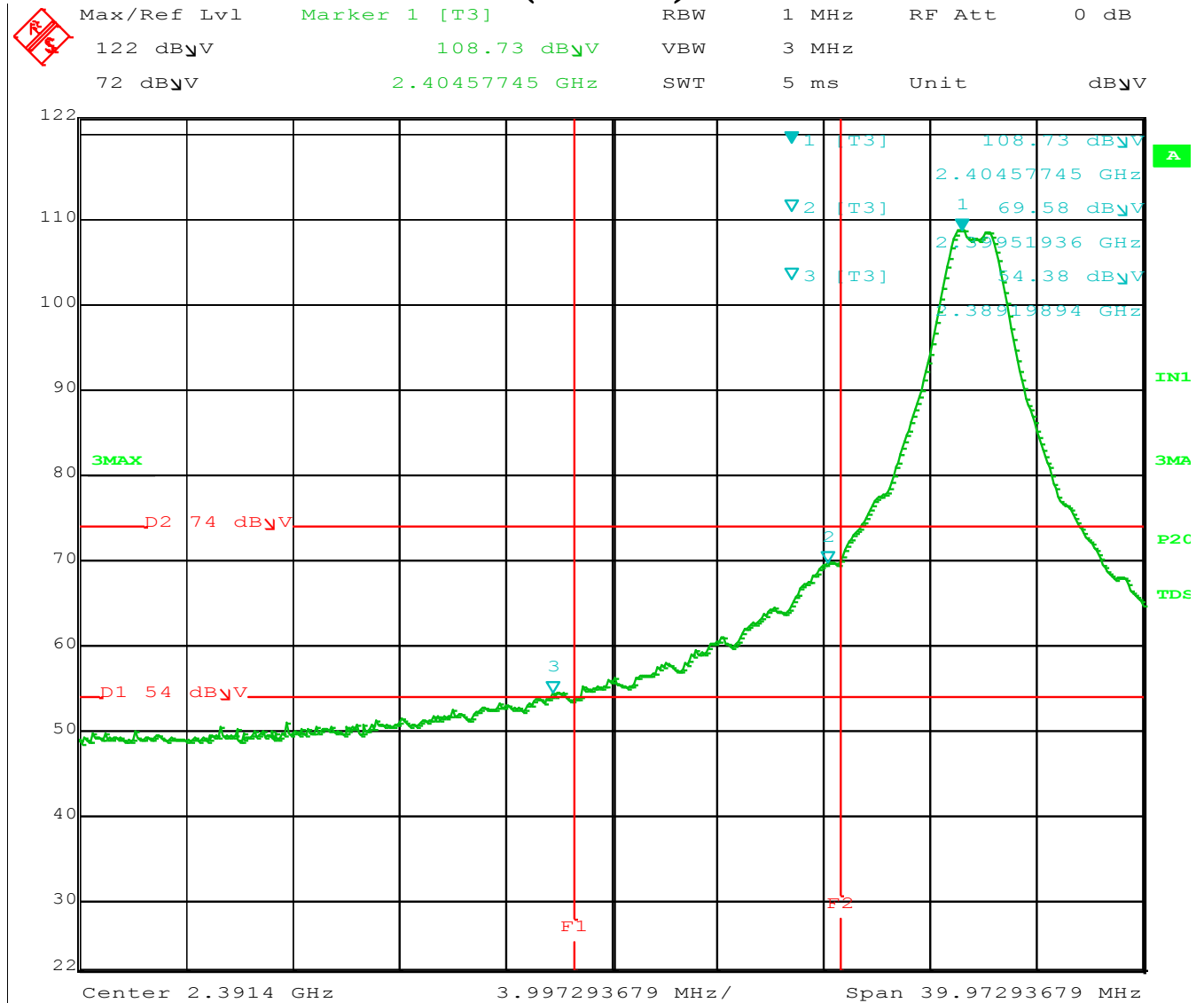
Test Distance
3 Meters



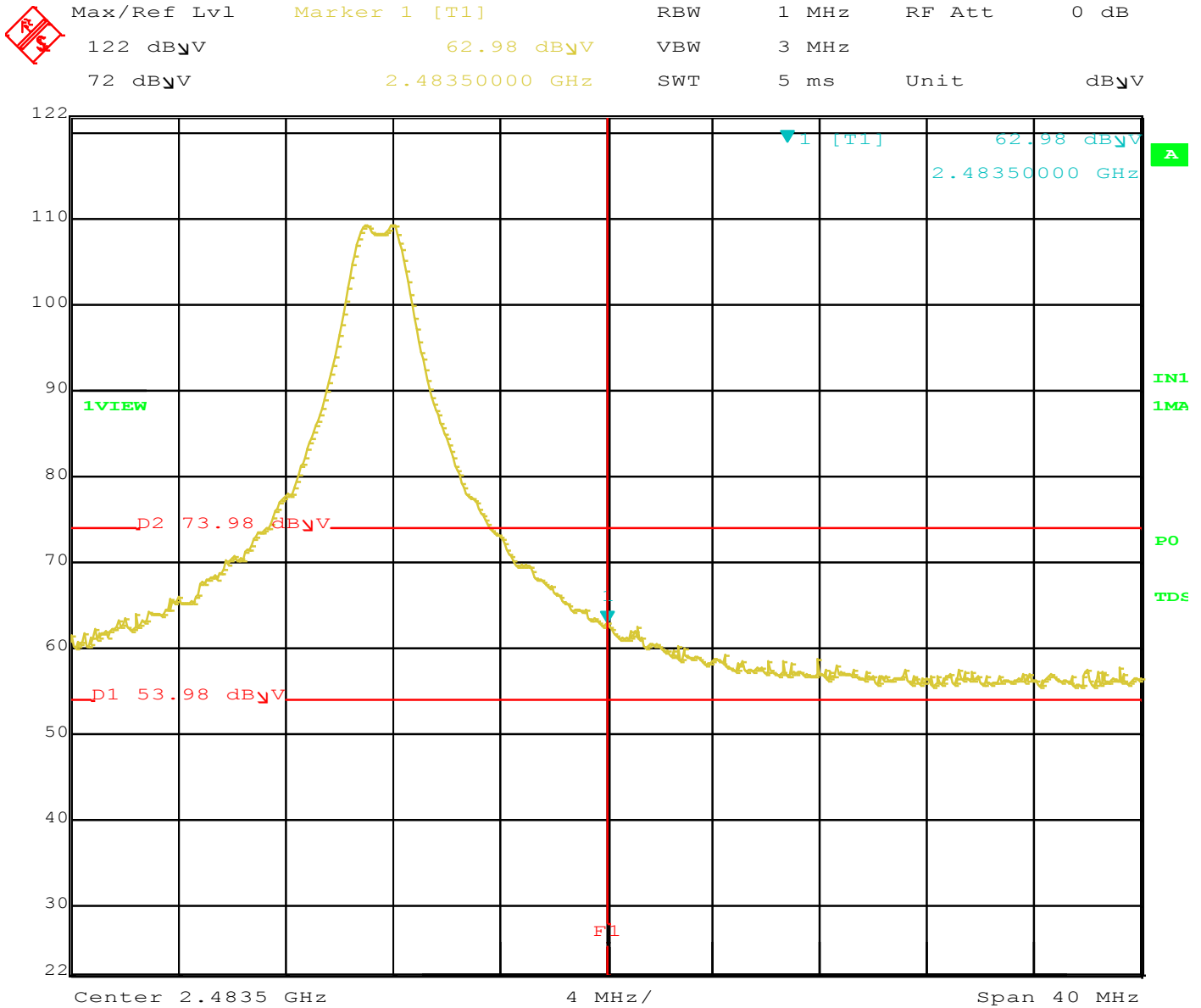
LOWER BAND EDGE (Horizontal)



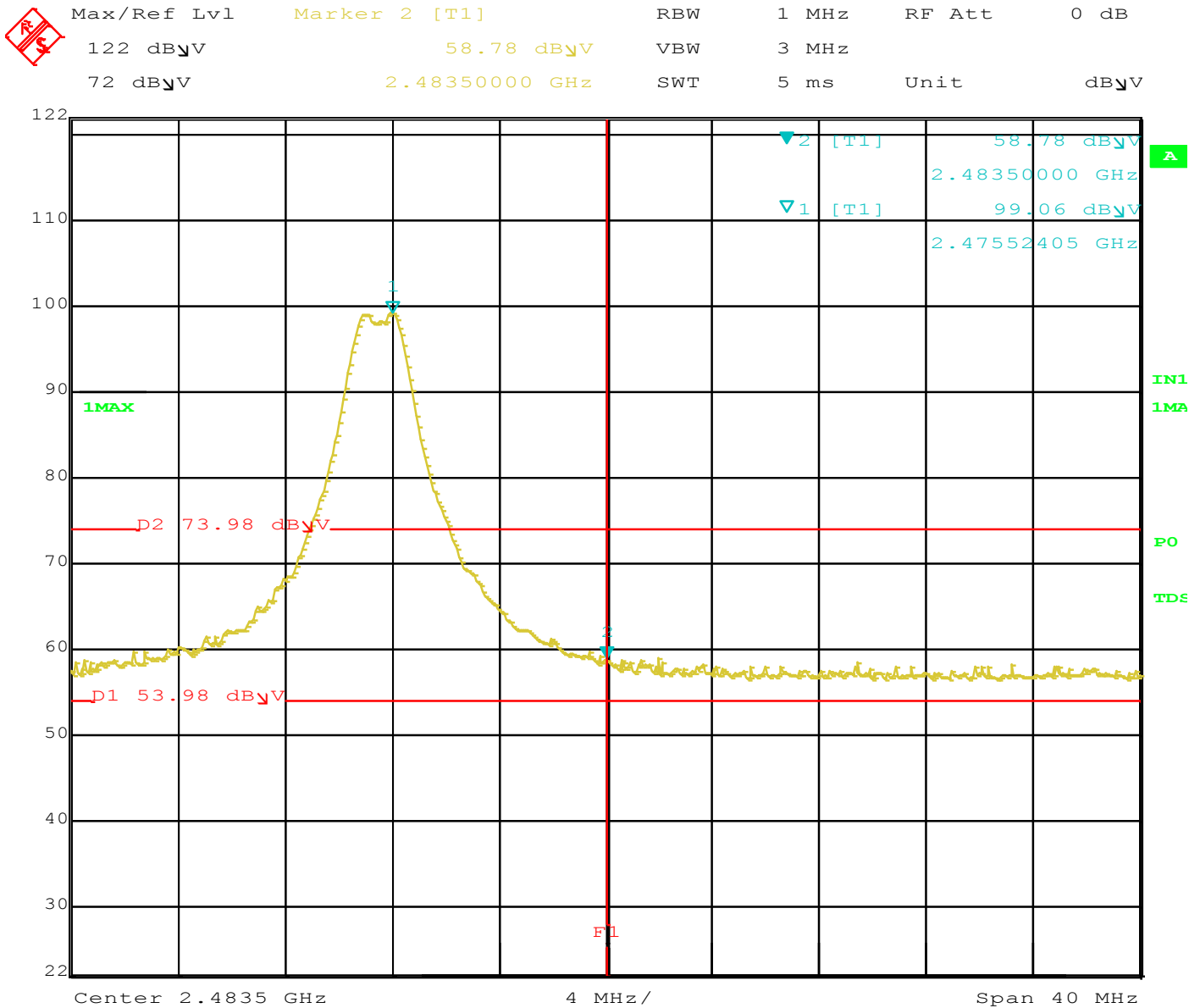
LOWER BAND EDGE (Vertical)



UPPER BAND EDGE (Horizontal)



UPPER BAND EDGE (Vertical)



OCCUPIED BANDWIDTH



IC BANDWIDTH

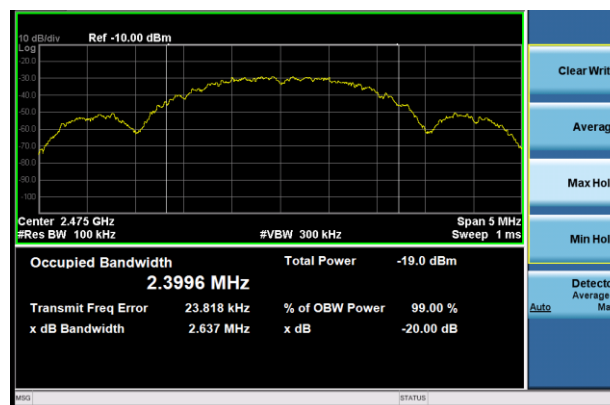
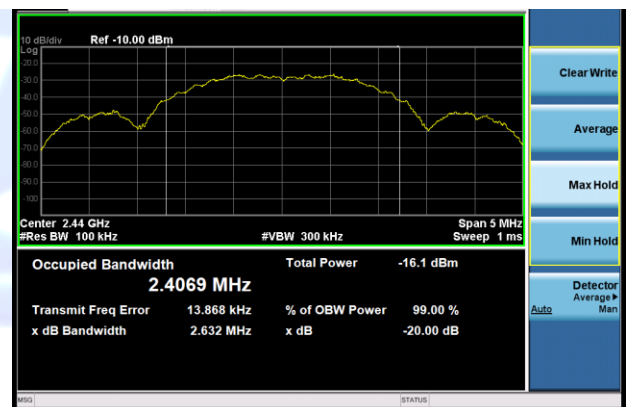
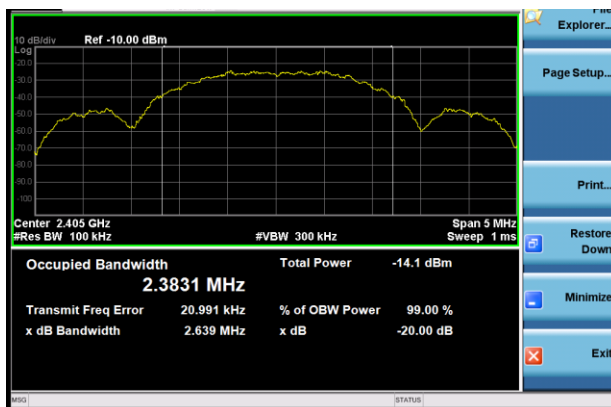
RSS GEN

Company: Nortek
EUT: Zigbee Smoke & CO Sensor
Model: C-SMKTCO1-B
Antenna: 1

Date: 10/30/2017
Lab: P
Test ENG: Jorge Reyes

Compatible Electronics, Inc. FAC-3 (Lab P)

Freq. (MHz)	Measured BW (MHz)	Comments
2405	2.3831	99%
2445	2.4069	99%
2475	2.3996	99%

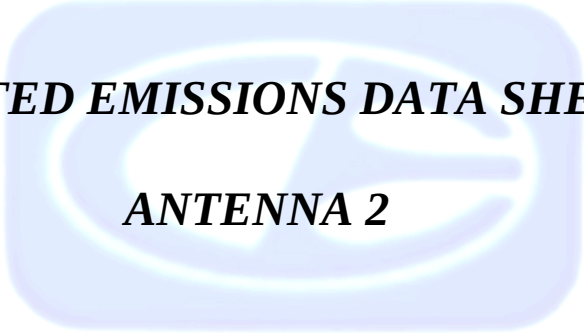


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RADIATED EMISSIONS DATA SHEETS

ANTENNA 2



Brea Division
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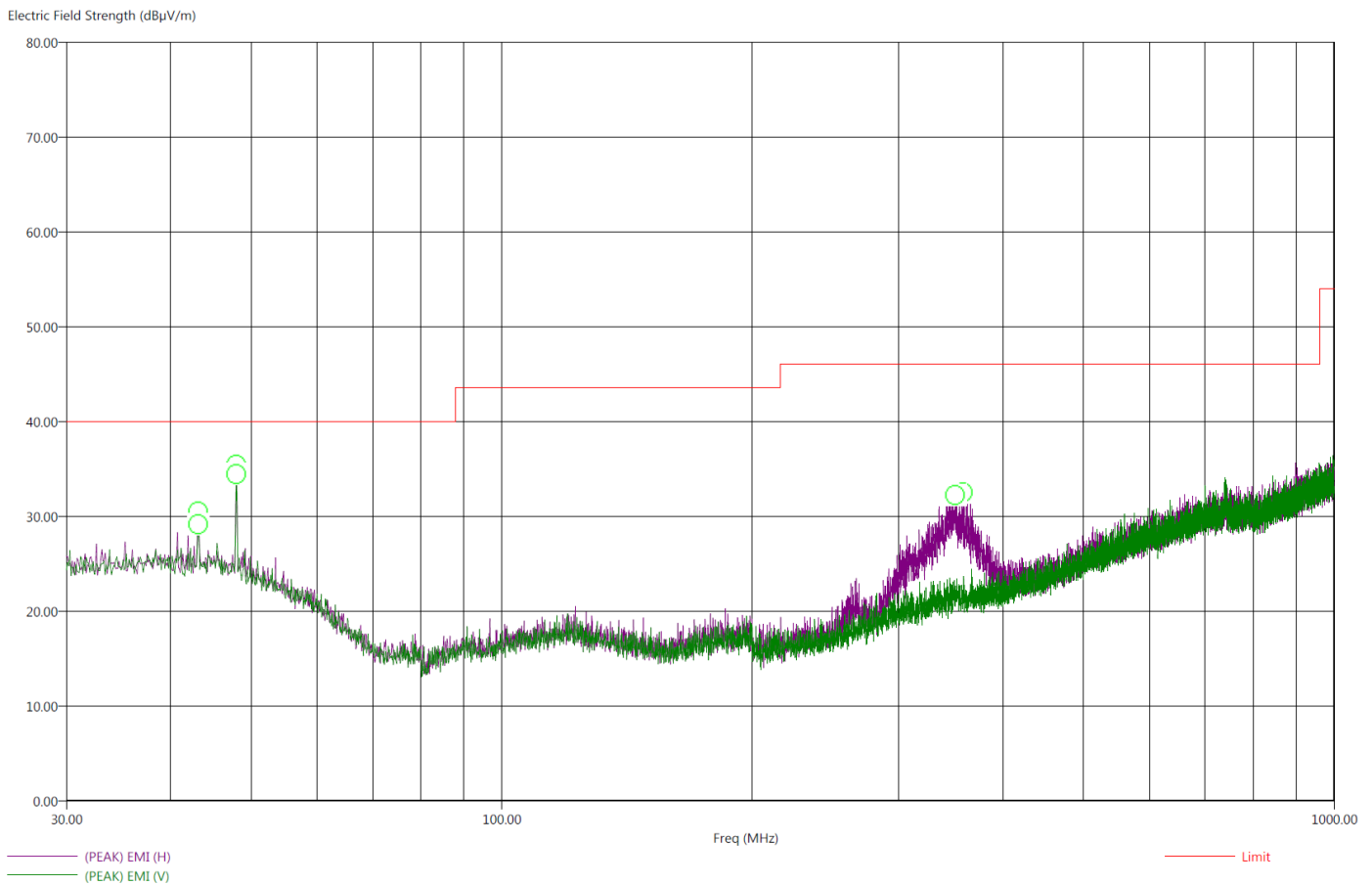
Agoura Division
2337 Troutdale Drive
Agoura, CA 91301
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Silverado Division
19121 El Toro Road
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(949) 589-0700

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

Title: FCC 15.209
File: Radiated Pre-Scan 30-1000Mhz.set
Operator: Jorge Reyes
EUT Type: Zigbee Smoke & CO
EUT Condition: Transmitting ZigBee @ 2405MHz.
Comments: Antenna 2
X-Axis.
Temp: 73f
Hum: 49%
Battery Operated

10/10/2017 9:22:17 AM
Sequence: Preliminary Scan

Compatible Electronics, Inc. FAC-3 (Lab P)

This was worst case for all modes and channels

There were no radiated emissions besides the fundamental and harmonics found between 9kHz-30 MHz or 1GHz-25GHz.



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

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

Title: FCC 15.209
File: Radiated Final 30-1000Mhz.set
Operator: Jorge Reyes
EUT Type: Zigbee Smoke & CO
EUT Condition: Transmitting ZigBee @ 2405MHz.
Comments: Antenna 2
X-Axis.
Temp: 73f
Hum: 49%
Battery Operated

10/10/2017 9:32:45 AM
Sequence: Final Measurements

Compatible Electronics, Inc. FAC-3 (Lab P)

Freq (MHz)	(QP) Margin (dB)	(QP) EMI (dBµV/m)	(PEAK) EMI (dBµV/m)	Limit (dBµV/m)	Pol	Ttbl Agl (deg)	Twr Ht (cm)	Transducer(dB)	Cable(dB)
43.20	-13.80	26.20	30.30	40.00	H	3.25	156.82	24.10	0.54
43.20	-14.08	25.92	30.57	40.00	V	287.75	337.00	24.10	0.54
48.00	-7.84	32.16	34.84	40.00	H	209.50	254.70	23.22	0.61
48.00	-8.36	31.64	34.09	40.00	V	360.00	108.94	23.23	0.61
350.60	-18.13	27.87	33.12	46.00	H	90.75	107.35	19.08	1.73
358.30	-26.58	19.42	24.92	46.00	H	0.00	101.70	19.21	1.74

This was worst case for all modes and channels

There were no radiated emissions besides the fundamental and harmonics found between 9kHz-30 MHz or 1GHz-25GHz.



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***DTS BANDWIDTH
DATA SHEETS***

ANTENNA 2



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DTS BANDWIDTH

FCC 15.247

Company: Nortek
EUT: Zigbee Smoke & CO Detector
Model: C-SMKTCO1-B
Antenna: 2

Date: 10/6/2017
Lab: P
Test Eng.: J. Reyes

Compatible Electronics, Inc. FAC-3 (Lab P)

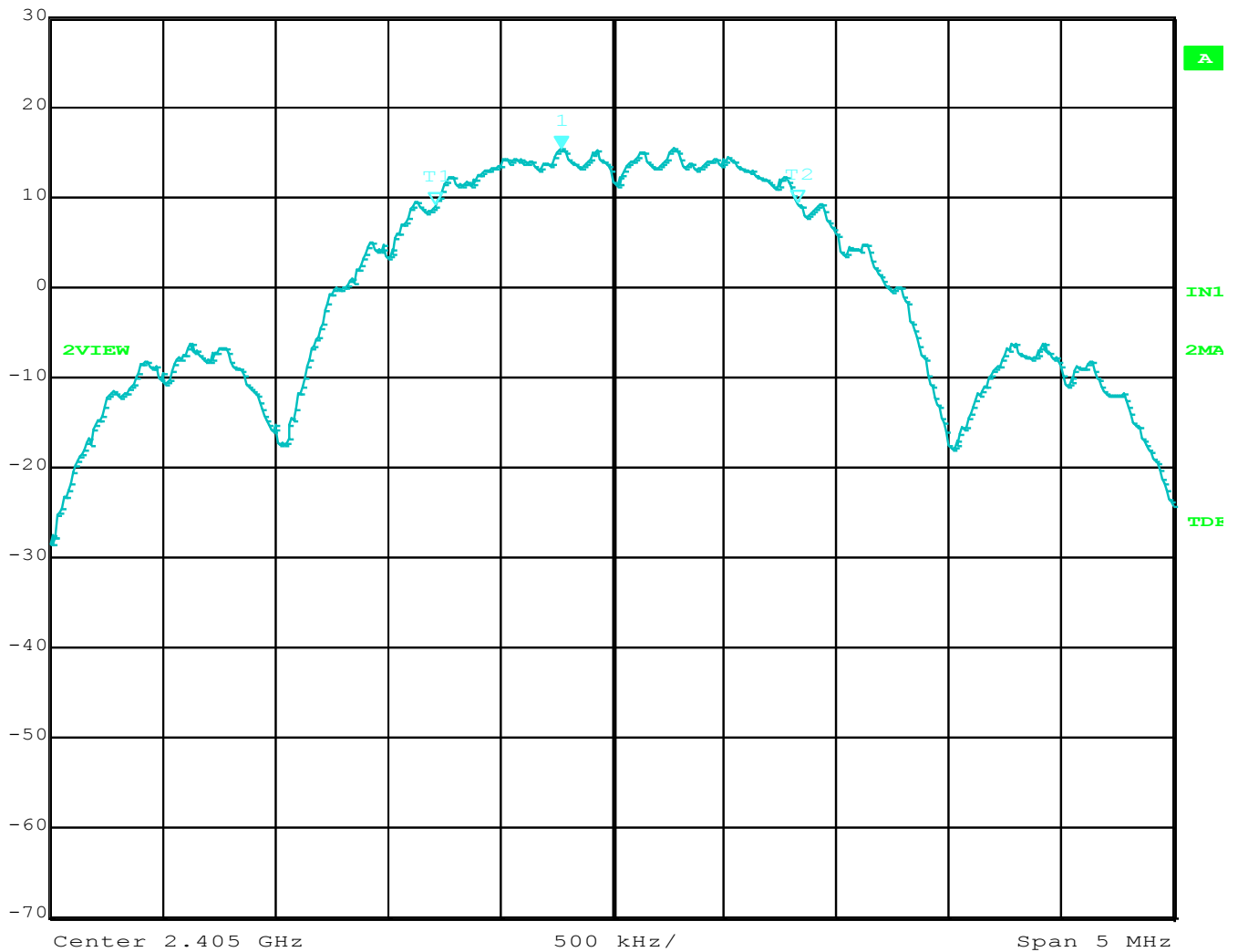
DTS Bandwidth

Freq. (MHz)	Measured BW (kHz)	Limit (Min) (kHz)	Margin (kHz)	Peak / QP / Avg	Comments
2405	1613.23	500.00	1113.23	Peak	
2445	1583.17	500.00	1083.17	Peak	
2475	1583.17	500.00	1083.17	Peak	





Marker 1 [T2 ndB] RBW 100 kHz RF Att 40 dB
Ref Lvl ndB 6.00 dB VBW 300 kHz
30 dBm BW 1.61322645 MHz SWT 5 ms Unit dBm



Comment A: DTS Bandwidth 2405 MHz



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Ref Lvl

30 dBm

Marker 1 [T2 ndB]

ndB 6.00 dB

BW 1.58316633 MHz

RBW

100 kHz

VBW

300 kHz

SWT

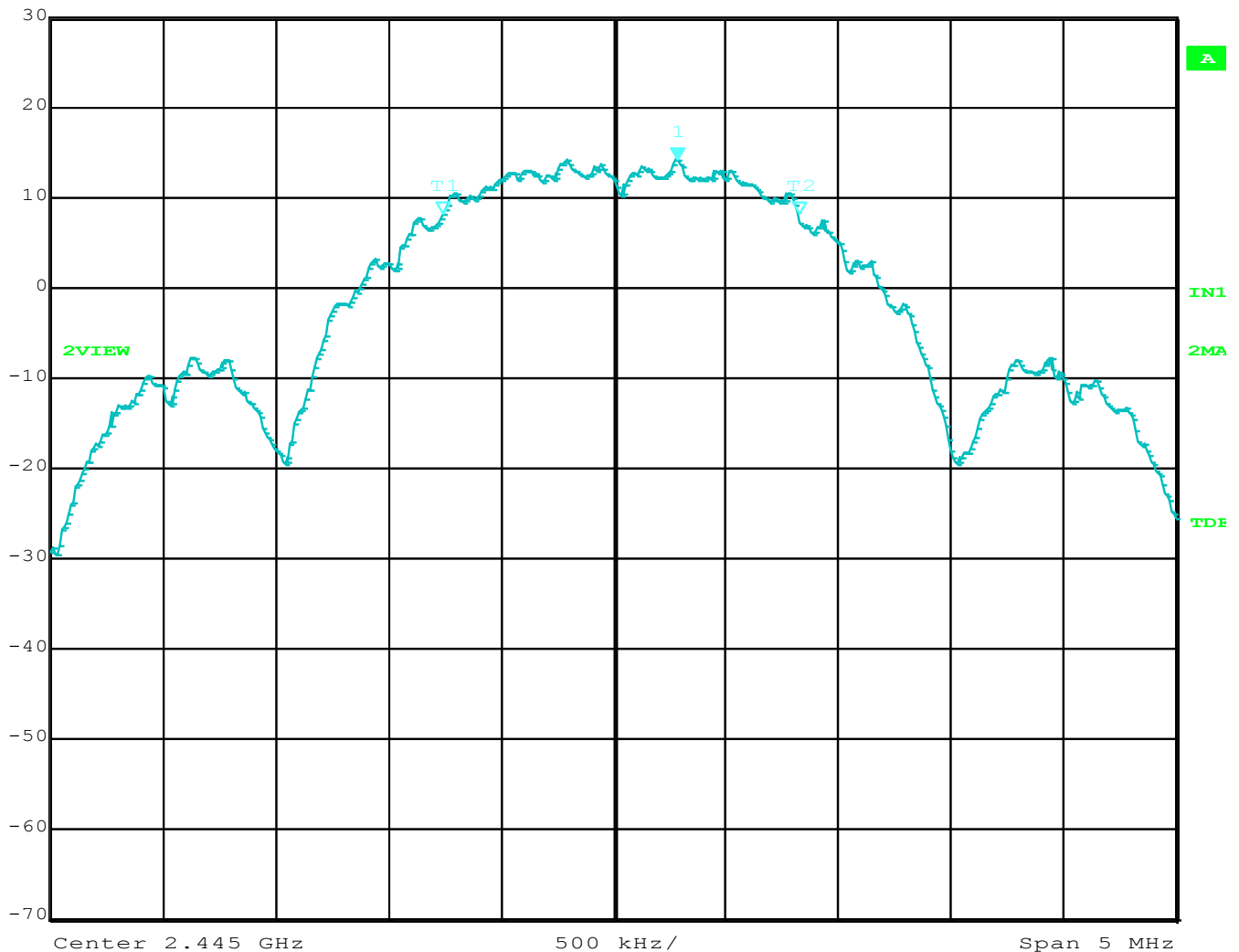
5 ms

RF Att

40 dB

Unit

dBm



Comment A: DTS Bandwidth 2445 MHz



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Ref Lvl

Marker 1 [T2 ndB]

RBW

100 kHz

RF Att

40 dB

ndB

6.00 dB

VBW

300 kHz

30 dBm

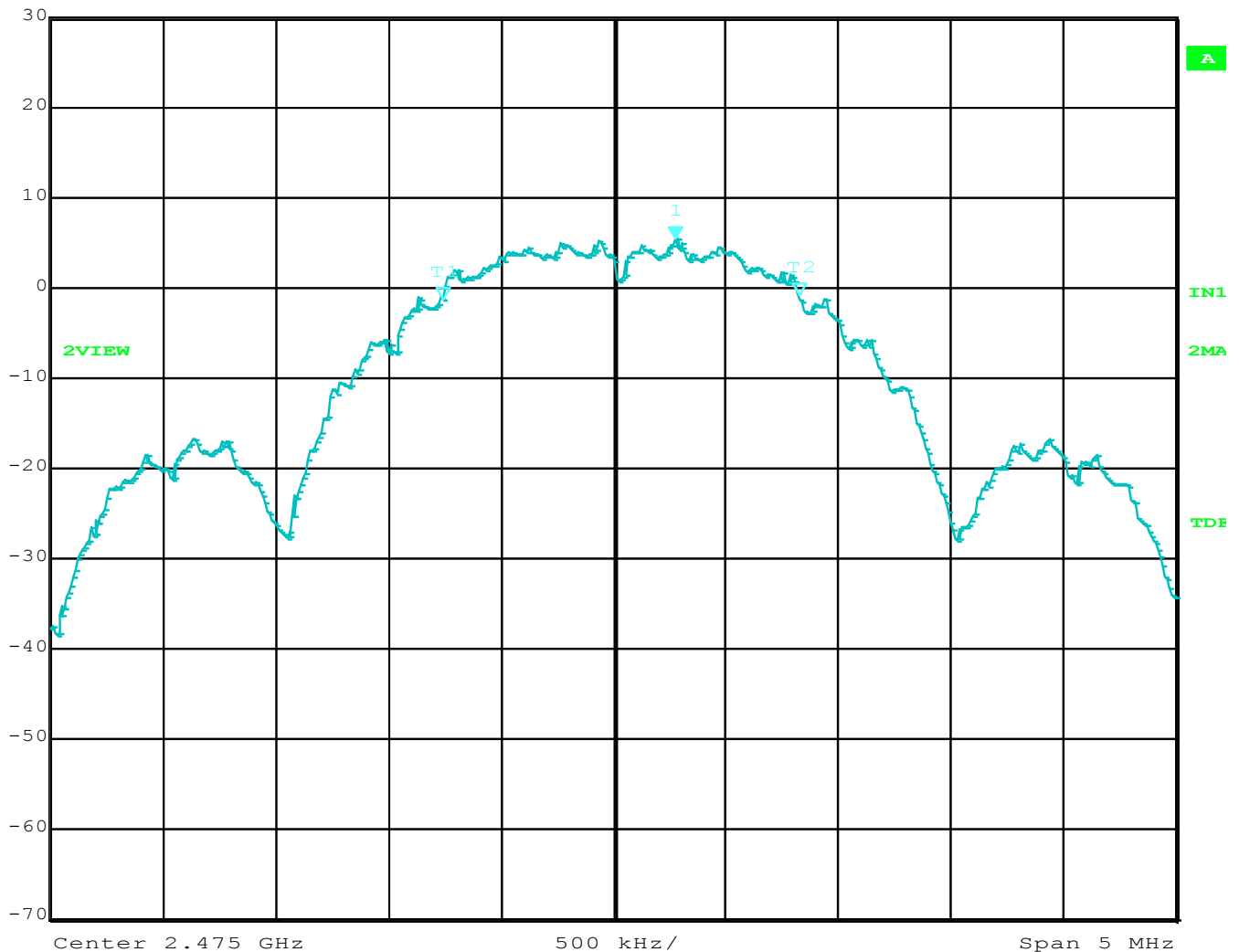
BW 1.58316633 MHz

SWT

5 ms

Unit

dBm



Comment A: DTS Bandwidth 2475 MHz

6



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MAXIMUM PEAK CONDUCTED OUTPUT POWER***DATA SHEETS******ANTENNA 2***

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(949) 589-0700

Lake Forest Division
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(949) 587-0400

MAXIMUM PEAK CONDUCTED OUTPUT POWER

FCC 15.247

Company: Nortek
EUT: Zigbee Smoke & CO Detector
Model: C-SMKTCO1-B
Mode: Zigbee
Antenna: 2

Date: 10/6/2017
Lab: P
Test ENG: J. Reyes

Compatible Electronics, Inc. FAC-3 (Lab P)

Freq. (MHz)	Level (dBm)	Limit (dBm)	Margin (dB)	Peak / QP / Avg	Comments
2405	20.25	30.00	-9.75	Peak	
2445	18.82	30.00	-11.18	Peak	
2475	10.14	30.00	-19.86	Peak	



***MAXIMUM PEAK POWER SPECTRAL DENSITY LEVEL IN THE
FUNDAMENTAL EMISSION***

DATA SHEETS

ANTENNA 2



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(949) 589-0700

Lake Forest Division
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POWER SPECTRAL DENSITY

FCC 15.247

Company: Nortek
EUT: Zigbee Smoke & CO Detector
Model: C-SMKTCO1-B
Antenna: 2

Date: 10/6/2017
Lab: P
Test ENG: J. Reyes

Compatible Electronics, Inc. FAC-3 (Lab P)

DTS Bandwidth

Freq. (MHz)	Peak (dBm)	Limit (dBm)	Margin (dB)	Peak / QP / Avg	Comments
2405	3.46	8.00	-4.54	Peak	
2445	3.42	8.00	-4.58	Peak	
2475	-5.60	8.00	-13.60	Peak	





Marker 1 [T2]

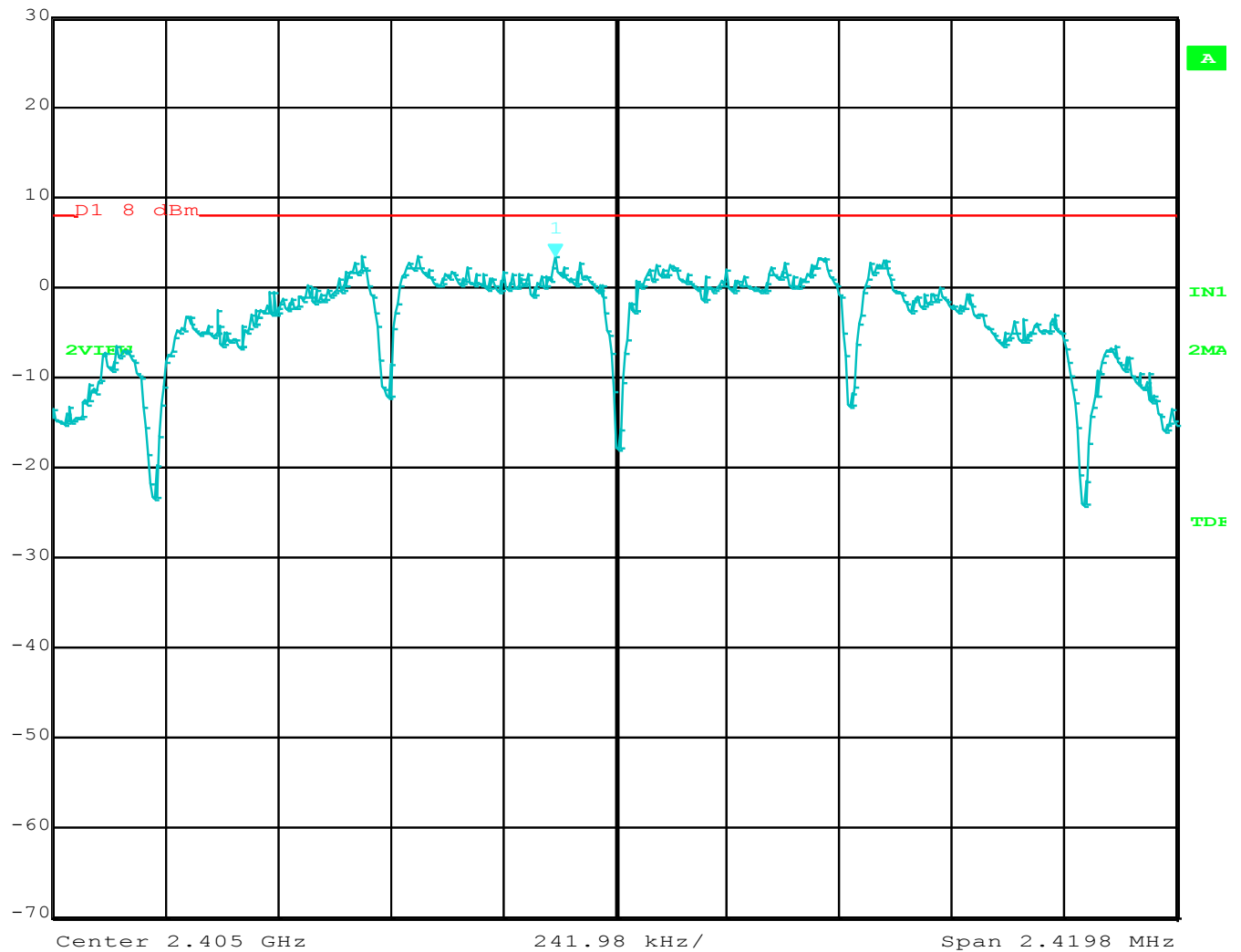
RBW 3 kHz RF Att 40 dB

Ref Lvl 3.46 dBm

VBW 10 kHz

30 dBm 2.40487149 GHz

SWT 680 ms Unit dBm



Comment A: Power Spectral Density 2405 MHz

Date: 1 JAN 2007 05:02:51

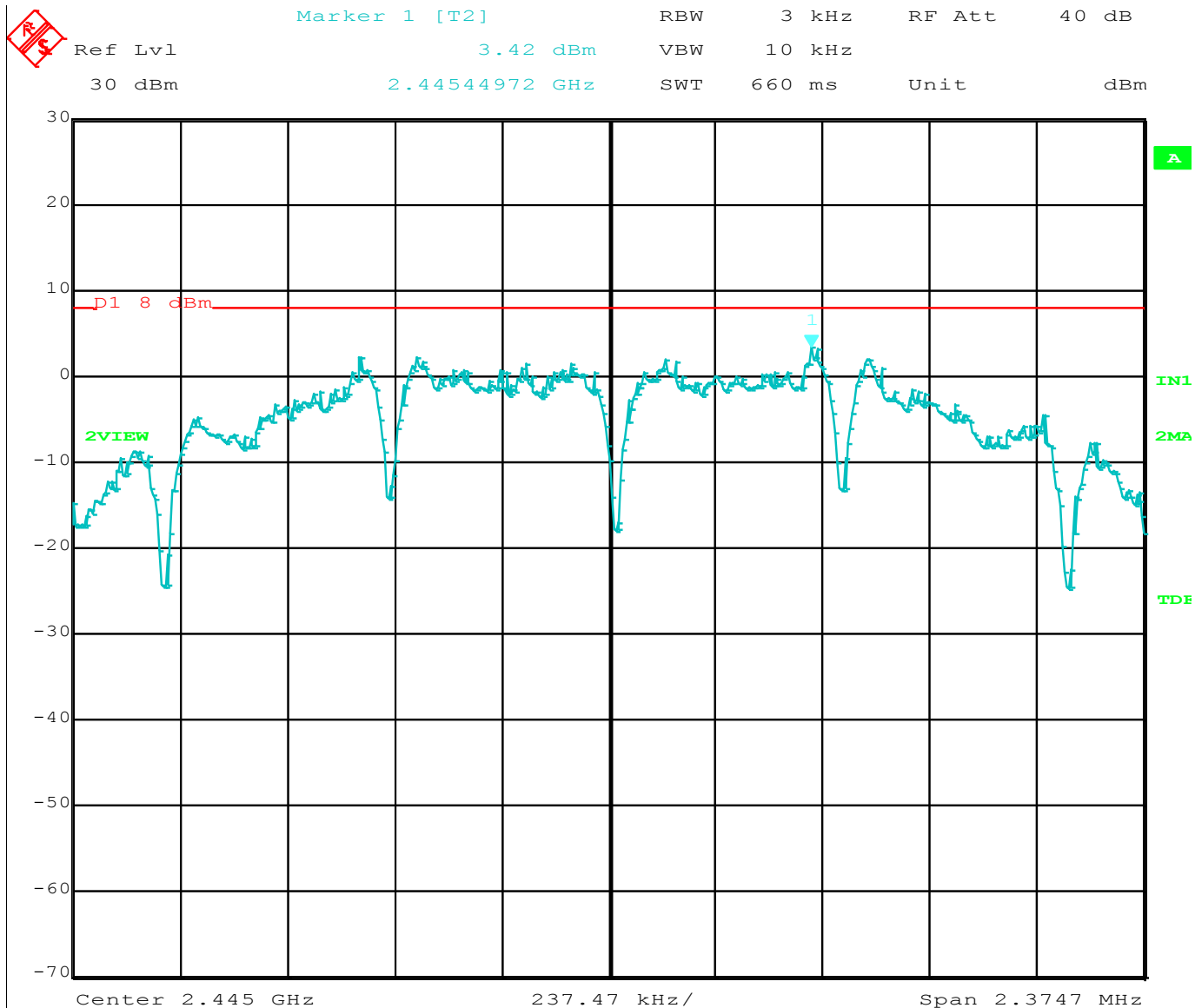


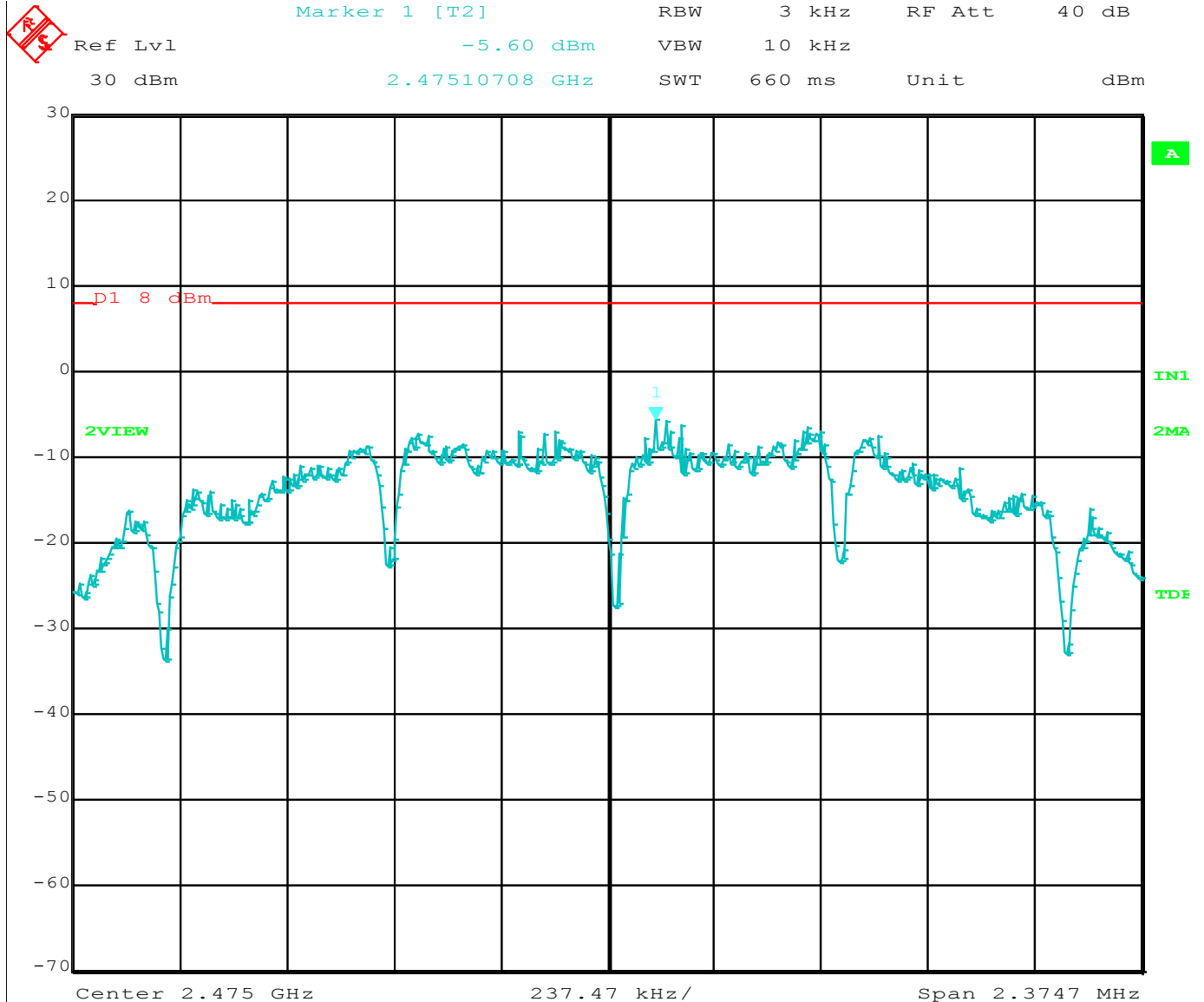
Brea Division
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(949) 589-0700

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





***EMISSIONS IN NON-RESTRICTED FREQUENCY BANDS (IN
100KHZ BANDWIDTH) / CONDUCTED***

DATA SHEETS

ANTENNA 2



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

Agoura Division
2337 Troutdale Drive
Agoura, CA 91301
(818) 597-0600

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

EMISSIONS IN NON-RESTRICTED FREQUENCY BANDS

FCC 15.247

Company: Nortek
EUT: Zigbee Smoke & CO Detector
Model: C-SMKTCO1-B
Mode: Zigbee
Antenna: 2

Date: 10/2/2017
Lab: P
Test ENG: Jorge Reyes

Compatible Electronics, Inc. FAC-3 (Lab P)

Freq. (MHz)	Level (dBm)	Limit (dBm)	Margin (dB)	Peak / QP / Avg	Comments
14430.00	-48.45	-4.45	-44.00	Peak	Low Channel

The only harmonics emissions found in the non-restricted band were on the low channel.



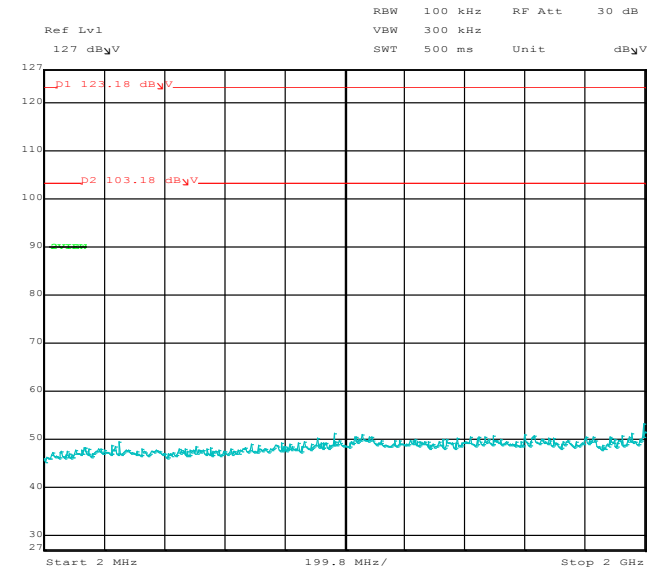
Brea Division
114 Olinda Drive
Brea, CA 92823
(714) 579-0500

Agoura Division
2337 Troutdale Drive
Agoura, CA 91301
(818) 597-0600

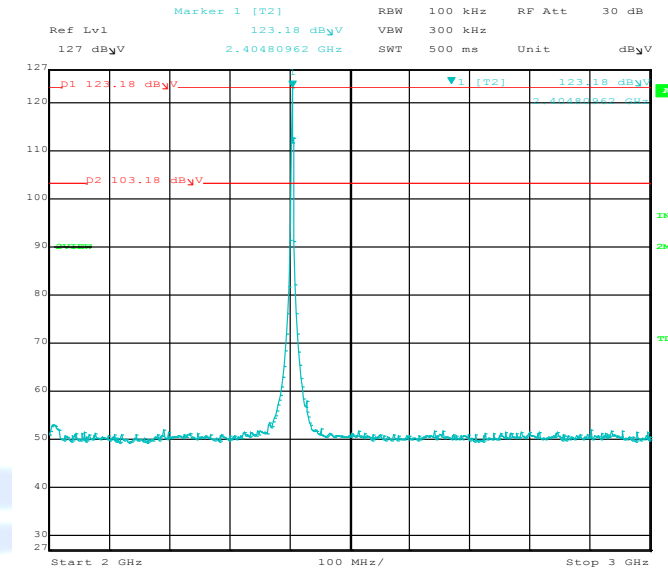
Silverado Division
19121 El Toro Road
Silverado, CA 92676
(949) 589-0700

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

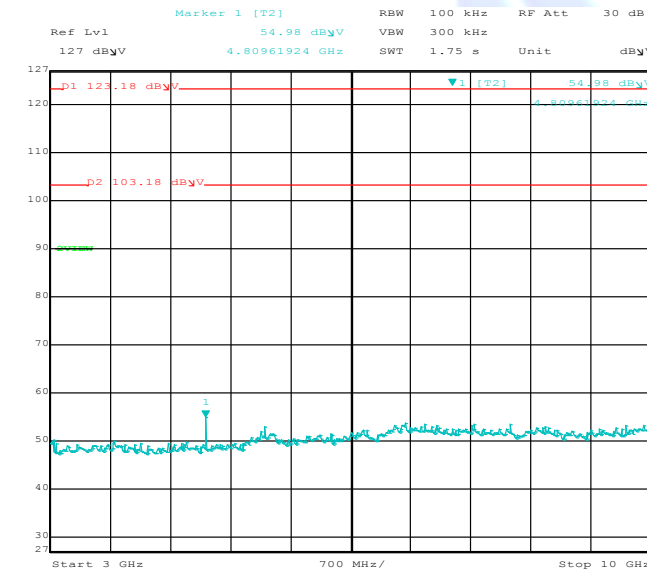
EMISSIONS IN NON-RESTRICTED FREQUENCY BANDS LOW CHANNEL



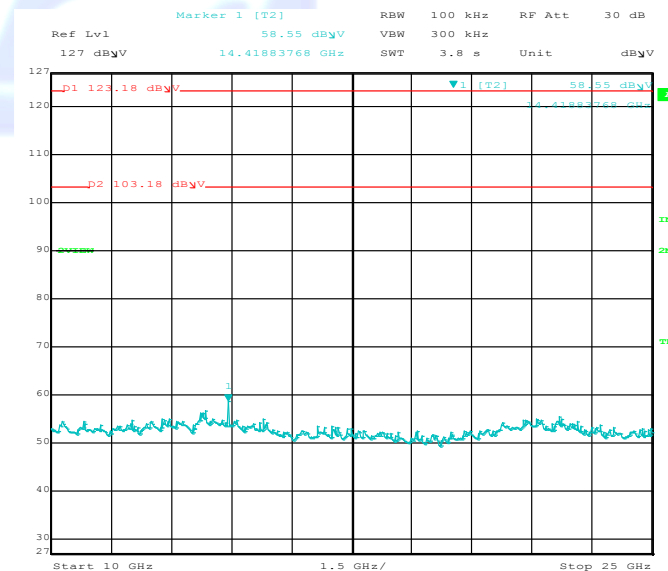
Comment A: Conducted Spurious Emissions



Comment A: Conducted Spurious Emissions



Comment A: Conducted Spurious Emissions



Comment A: Conducted Spurious Emissions



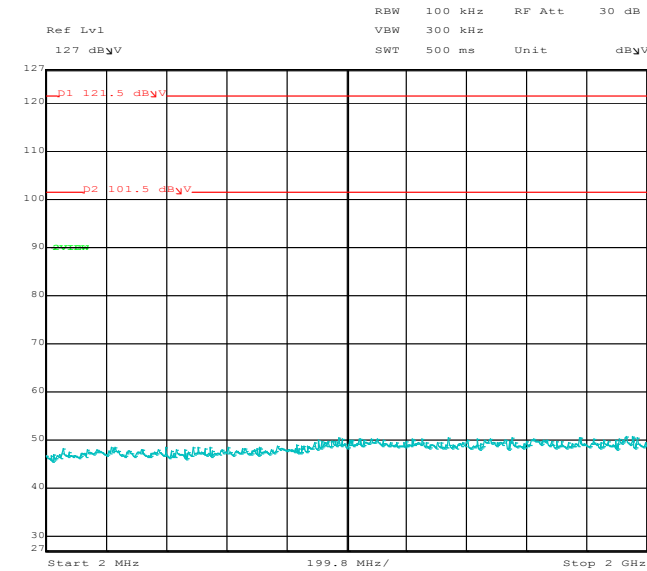
Brea Division
114 Olinda Drive
Brea, CA 92823
(714) 579-0500

Agoura Division
2337 Troutdale Drive
Agoura, CA 91301
(818) 597-0600

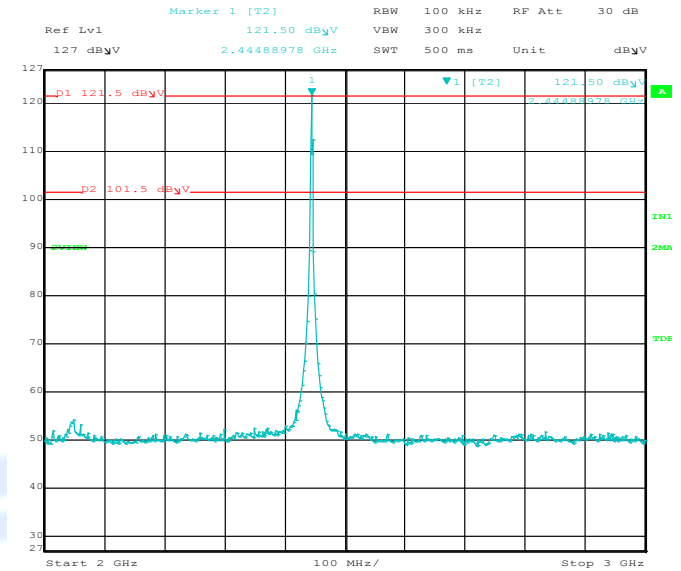
Silverado Division
19121 El Toro Road
Silverado, CA 92676
(949) 589-0700

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

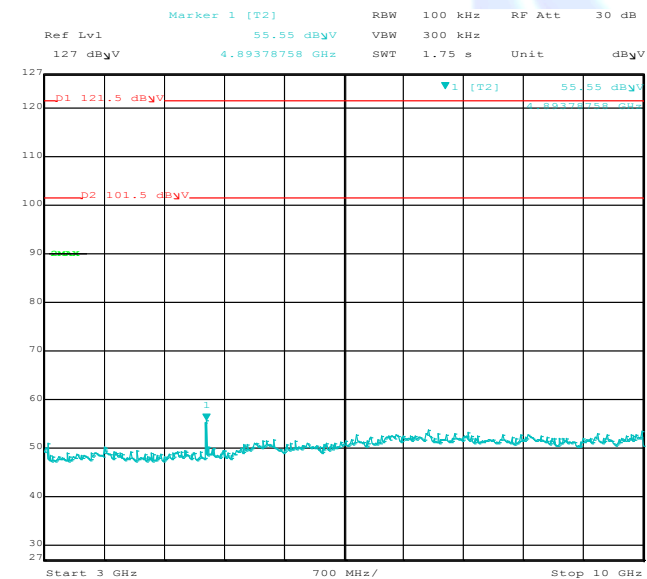
EMISSIONS IN NON-RESTRICTED FREQUENCY BANDS MID CHANNEL



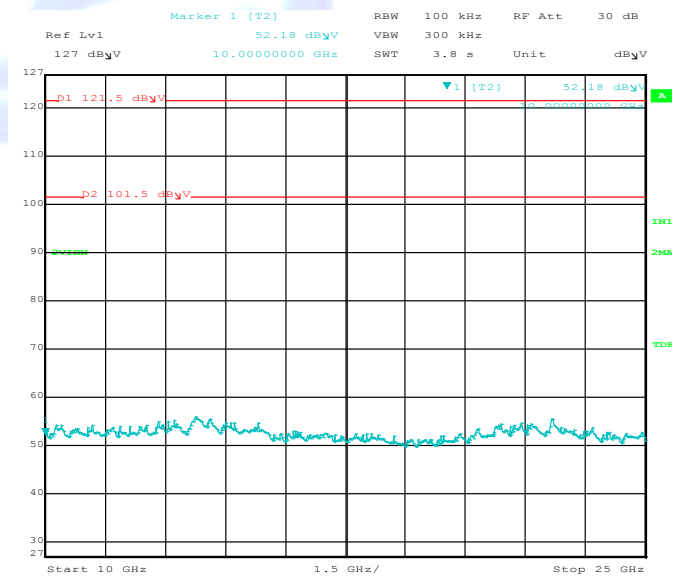
Comment A: Conducted Spurious Emissions



Comment A: Conducted Spurious Emissions



Comment A: Conducted Spurious Emissions



Comment A: Conducted Spurious Emissions



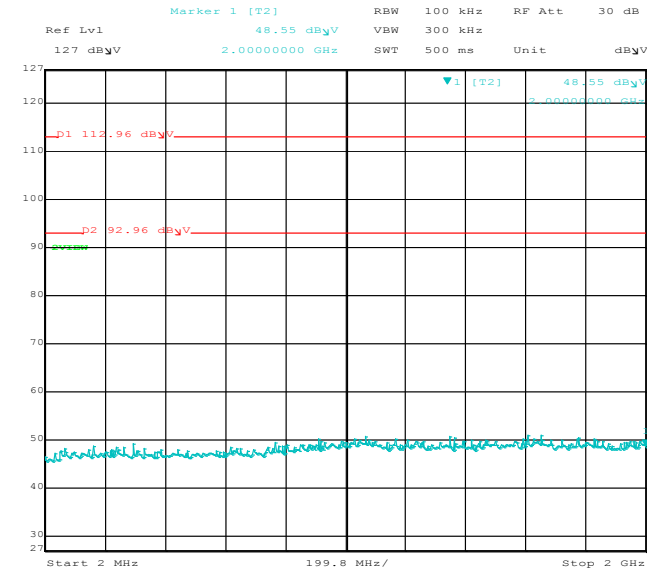
Brea Division
114 Olinda Drive
Brea, CA 92823
(714) 579-0500

Agoura Division
2337 Troutdale Drive
Agoura, CA 91301
(818) 597-0600

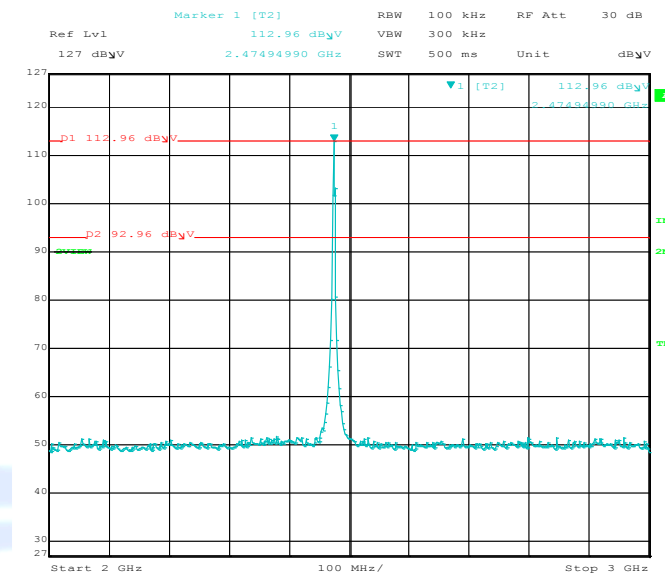
Silverado Division
19121 El Toro Road
Silverado, CA 92676
(949) 589-0700

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

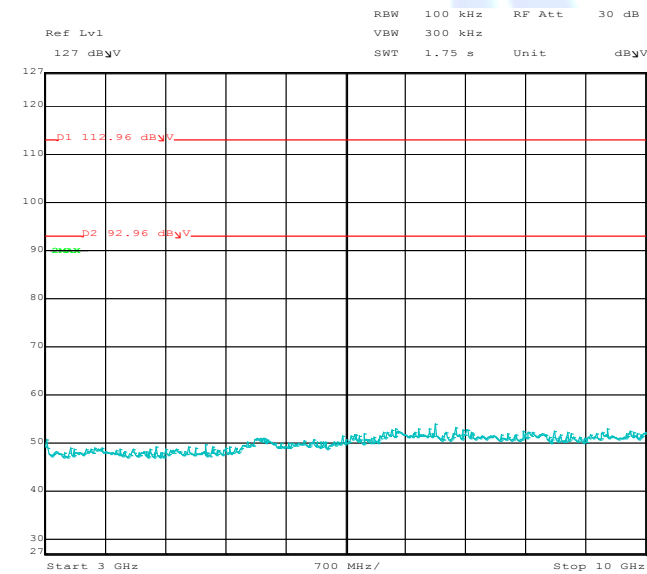
EMISSIONS IN NON-RESTRICTED FREQUENCY BANDS HIGH CHANNEL



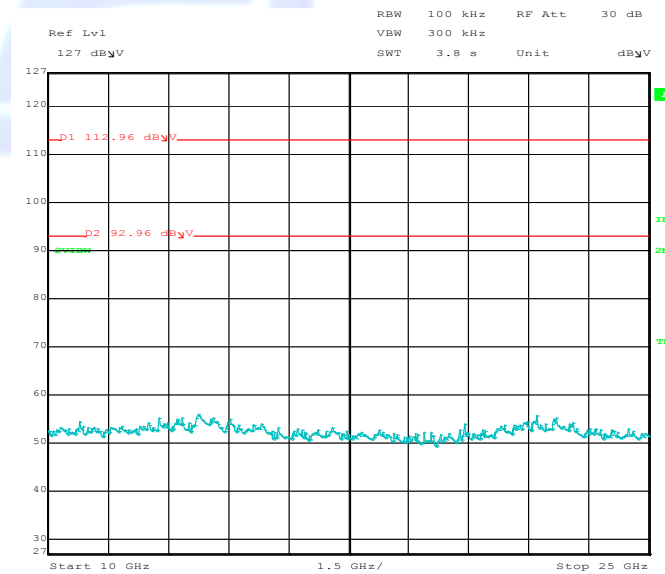
Comment A: Conducted Spurious Emissions



Comment A: Conducted Spurious Emissions



Comment A: Conducted Spurious Emissions



Comment A: Conducted Spurious Emissions



Brea Division
114 Olinda Drive
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Lake Forest Division
20621 Pascal Way
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(949) 587-0400

***EMISSIONS IN RESTRICTED FREQUENCY BANDS (RADIATED
FIELD STRENGTH)***

DATA SHEETS

ANTENNA 2



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

Agoura Division
2337 Troutdale Drive
Agoura, CA 91301
(818) 597-0600

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

HARMONIC EMISSIONS IN RESTRICTED FREQUENCY BANDS

Low Channel, Horizontal

FCC 15.247

Company: Nortek
EUT: Zigbee Smoke & CO Detector
Model: C-SMKTCO1-B
Antenna: 2

Date: 10/10/2017
Lab: P
Test ENG: J. Reyes

Compatible Electronics, Inc. FAC-3 (Lab P)

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit (dBuV/m)	Margin (dB)	Peak / QP / Avg	Ant. Height (m)	Table Angle (deg)	Comments
4810.00	60.67	H	73.98	-13.31	Peak	1.55	203	In Restricted Band
4810.00	52.79	H	53.98	-1.19	Avg	1.55	203	
12025.00	--	H	73.98	--	Peak	--	--	In Restricted Band
12025.00	--	H	53.98	--	Avg	--	--	No Emissions Found
19240.00	--	H	74.93	--	Peak	--	--	In Restricted Band
19240.00	--	H	54.93	--	Avg	--	--	No Emissions Found

Test distance
3 meter



HARMONIC EMISSIONS IN RESTRICTED FREQUENCY BANDS

Low Channel, Vertical

FCC 15.247

Company: Nortek
EUT: Zigbee Smoke & CO Detector
Model: C-SMKTCO1-B
Antenna: 2

Date: 10/4/2017
Lab: P
Test ENG: J. Reyes

Compatible Electronics, Inc. FAC-3 (Lab P)

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit (dBuV/m)	Margin (dB)	Peak / QP / Avg	Ant. Height (m)	Table Angle (deg)	Comments
4810.00	57.26	V	73.98	-16.72	Peak	1.02	300	In Restricted Band
4810.00	49.21	V	53.98	-4.77	Avg	1.02	300	
12025.00	--	V	73.98	--	Peak	--	--	In Restricted Band
12025.00	--	V	53.98	--	Avg	--	--	No Emissions Found
19240.00	--	V	73.98	--	Peak	--	--	In Restricted Band
19240.00	--	V	53.98	--	Avg	--	--	No Emissions Found

Test distance
3 meter



HARMONIC EMISSIONS IN RESTRICTED FREQUENCY BANDS

Mid Channel, Horizontal

FCC 15.247

Company: Nortek
EUT: Zigbee Smoke & CO Detector
Model: C-SMKTCO1-B
Antenna: 2

Date: 10/4/2017
Lab: P
Test ENG: J.Reyes

Compatible Electronics, Inc. FAC-3 (Lab P)

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit (dBuV/m)	Margin (dB)	Peak / QP / Avg	Ant. Height (m)	Table Angle (deg)	Comments
4890.00	59.06	H	73.98	-14.92	Peak	1.54	97	In Restricted Band
4890.00	51.11	H	53.98	-2.87	Avg	1.54	97	
7335.00	47.82	H	73.98	-26.16	Peak	1.05	80	In Restricted Band
7335.00	39.90	H	53.98	-14.08	Avg	1.05	80	
12225.00	--	H	73.98	--	Peak	--	--	In Restricted Band
12225.00	--	H	53.98	--	Avg	--	--	No Emissions Found
19560.00	--	H	73.98	--	Peak	--	--	In Restricted Band
19560.00	--	H	53.98	--	Avg	--	--	No Emissions Found

Test distance
3 meter



Brea Division
114 Olinda Drive
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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

HARMONIC EMISSIONS IN RESTRICTED FREQUENCY BANDS

Mid Channel, Vertical

FCC 15.247

Company: Nortek
EUT: Zigbee Smoke & CO Detector
Model: C-SMKTCO1-B
Antenna: 2

Date: 10/4/2017
Lab: P
Test ENG: J. Reyes

Compatible Electronics, Inc. FAC-3 (Lab P)

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit (dBuV/m)	Margin (dB)	Peak / QP / Avg	Ant. Height (m)	Table Angle (deg)	Comments
4890.00	60.80	V	73.98	-13.18	Peak	1.00	300	In Restricted Band
4890.00	52.90	V	53.98	-1.08	Avg	1.00	300	
7335.00	48.48	V	73.98	-25.50	Peak	1.15	234	In Restricted Band
7335.00	40.89	V	53.98	-13.09	Avg	1.15	234	
12225.00	--	V	73.98	--	Peak	--	--	In Restricted Band
12225.00	--	V	53.98	--	Avg	--	--	No Emissions Found
19560.00	--	V	73.98	--	Peak	--	--	In Restricted Band
19560.00	--	V	53.98	--	Avg	--	--	No Emissions Found

Test distance
3 meter



HARMONIC EMISSIONS IN RESTRICTED FREQUENCY BANDS

High Channel, Horizontal

FCC 15.247

Company: Nortek
EUT: Zigbee Smoke & CO Detector
Model: C-SMKTCO1-B
Antenna: 2

Date: 10/5/2017
Lab: P
Test ENG: J.Reyes

Compatible Electronics, Inc. FAC-3 (Lab P)

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit (dBuV/m)	Margin (dB)	Peak / QP / Avg	Ant. Height (m)	Table Angle (deg)	Comments
4950.00	52.64	H	73.98	-21.34	Peak	1.00	131	In Restricted Band
4950.00	43.84	H	53.98	-10.14	Avg	1.00	131	
7425.00	--	H	73.98	--	Peak	--	--	In Restricted Band
7425.00	--	H	53.98	--	Avg	--	--	No Emissions Found
12375.00	--	H	73.98	--	Peak	--	--	In Restricted Band
12375.00	--	H	53.98	--	Avg	--	--	No Emissions Found
19800.00	--	H	73.98	--	Peak	--	--	In Restricted Band
19800.00	--	H	53.98	--	Avg	--	--	No Emissions Found
22275.00	--	H	73.98	--	Peak	--	--	In Restricted Band
22275.00	--	H	53.98	--	Avg	--	--	No Emissions Found

Test distance
3 meter



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

Agoura Division
2337 Troutdale Drive
Agoura, CA 91301
(818) 597-0600

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

HARMONIC EMISSIONS IN RESTRICTED FREQUENCY BANDS

High Channel, Vertical

FCC 15.247

Company: Nortek
EUT: Zigbee Smoke & CO Detector
Model: C-SMKTCO1-B
Antenna: 2

Date: 10/5/2017
Lab: P
Test ENG: J.Reyes

Compatible Electronics, Inc. FAC-3 (Lab P)

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit (dBuV/m)	Margin (dB)	Peak / QP / Avg	Ant. Height (m)	Table Angle (deg)	Comments
4950.00	51.96	V	73.98	-22.02	Peak	1	50	In Restricted Band
4950.00	43.05	V	53.98	-10.93	Avg	1	50	
7425.00	--	V	73.98	--	Peak	--	--	In Restricted Band
7425.00	--	V	53.98	--	Avg	--	--	No Emissions Found
12375.00	--	V	73.98	--	Peak	--	--	In Restricted Band
12375.00	--	V	53.98	--	Avg	--	--	No Emissions Found
19800.00	--	V	73.98	--	Peak	--	--	In Restricted Band
19800.00	--	V	53.98	--	Avg	--	--	No Emissions Found
22275.00	--	V	73.98	--	Peak	--	--	In Restricted Band
22275.00	--	V	53.98	--	Avg	--	--	No Emissions Found

Test distance
3 meter



***EMISSIONS RADIATED OUTSIDE OF THE FUNDAMENTAL
FREQUENCY BAND AT BAND EDGES***

DATA SHEETS

ANTENNA 2



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

Agoura Division
2337 Troutdale Drive
Agoura, CA 91301
(818) 597-0600

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

BAND EDGES- HORIZONTAL

FCC 15.247

Company: Nortek
EUT: Zigbee Smoke and CO detector
Model: C-SMKTCO1-B
Antenna: 2

Date: 1/3/2018
Lab: P
Test ENG: J. Reyes

Compatible Electronics, Inc. FAC-3 (Lab P)

Freq. (MHz)	Level (dBμV/m)	Pol	Limit (dBμV/m)	Margin (dB)	Peak / QP / Avg	Ant. Height (m)	Table Angle (deg)	Comments
2405.00	114.18	H	--	--	Peak	1.00	182	Fundamental of Low Channel
2400.00	76.97	H	94.18	-17.21	Delta	1.00	182	From Peak
2389.67	61.55	H	73.98	-12.43	Peak	1.00	182	No Marker Delta Method Used
2389.67	48.30	H	53.98	-5.68	Avg	1.00	182	
2475.52	108.87	H	--	--	Peak	1.17	269	Fundamental of High Channel
2483.50	60.00	H	73.98	-13.98	Peak	1.17	269	No Marker Delta Method Used
2483.50	49.86	H	53.98	-4.12	Avg	1.17	269	Gain = -11*

Test Distance
3 Meters



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

Agoura Division
2337 Troutdale Drive
Agoura, CA 91301
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19121 El Toro Road
Silverado, CA 92676
(949) 589-0700

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

BAND EDGES- VERTICAL

FCC 15.247

Company: Nortek
EUT: Zigbee Smoke and CO Detector
Model: C-SMKTCO1-B
Antenna: 2

Date: 10/6/2017
Lab: P
Test ENG: J. Reyes

Compatible Electronics, Inc. FAC-3 (Lab P)

Freq. (MHz)	Level (dBμV)	Pol	Limit (dBμV)	Margin (dB)	Peak / QP / Avg	Ant. Height (m)	Table Angle (deg)	Comments
2405.00	109.75	V	--	--	Peak	1.42	255	Fundamental of Low Channel
2400.00	68.25	V	89.75	-21.50	Delta	1.42	255	From Peak
2389.91	51.20	V	73.98	-22.78	Peak	1.42	255	No Marker Delta Method Used
2389.91	39.90	V	53.98	-14.08	Avg	1.42	255	Gain = -2*
2474.56	99.76	V	--	--	Peak	1.35	90	Fundamental of High Channel
2483.74	54.24	V	73.98	-19.74	Peak	1.35	90	No Marker Delta Method Used
2483.74	41.85	V	53.98	-12.13	Avg	1.35	90	Gain = -11*

Test Distance
3 Meters



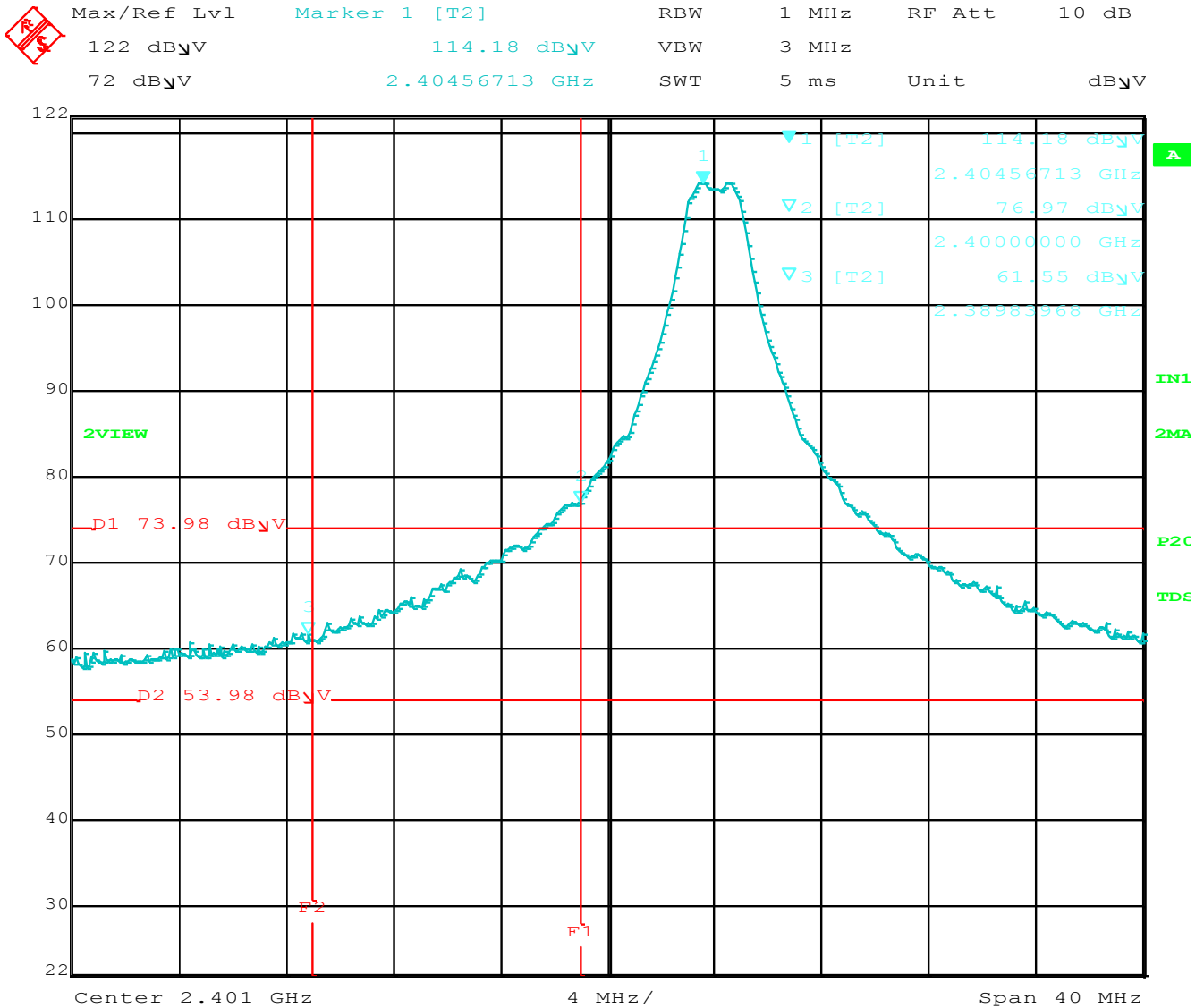
Brea Division
114 Olinda Drive
Brea, CA 92823
(714) 579-0500

Agoura Division
2337 Troutdale Drive
Agoura, CA 91301
(818) 597-0600

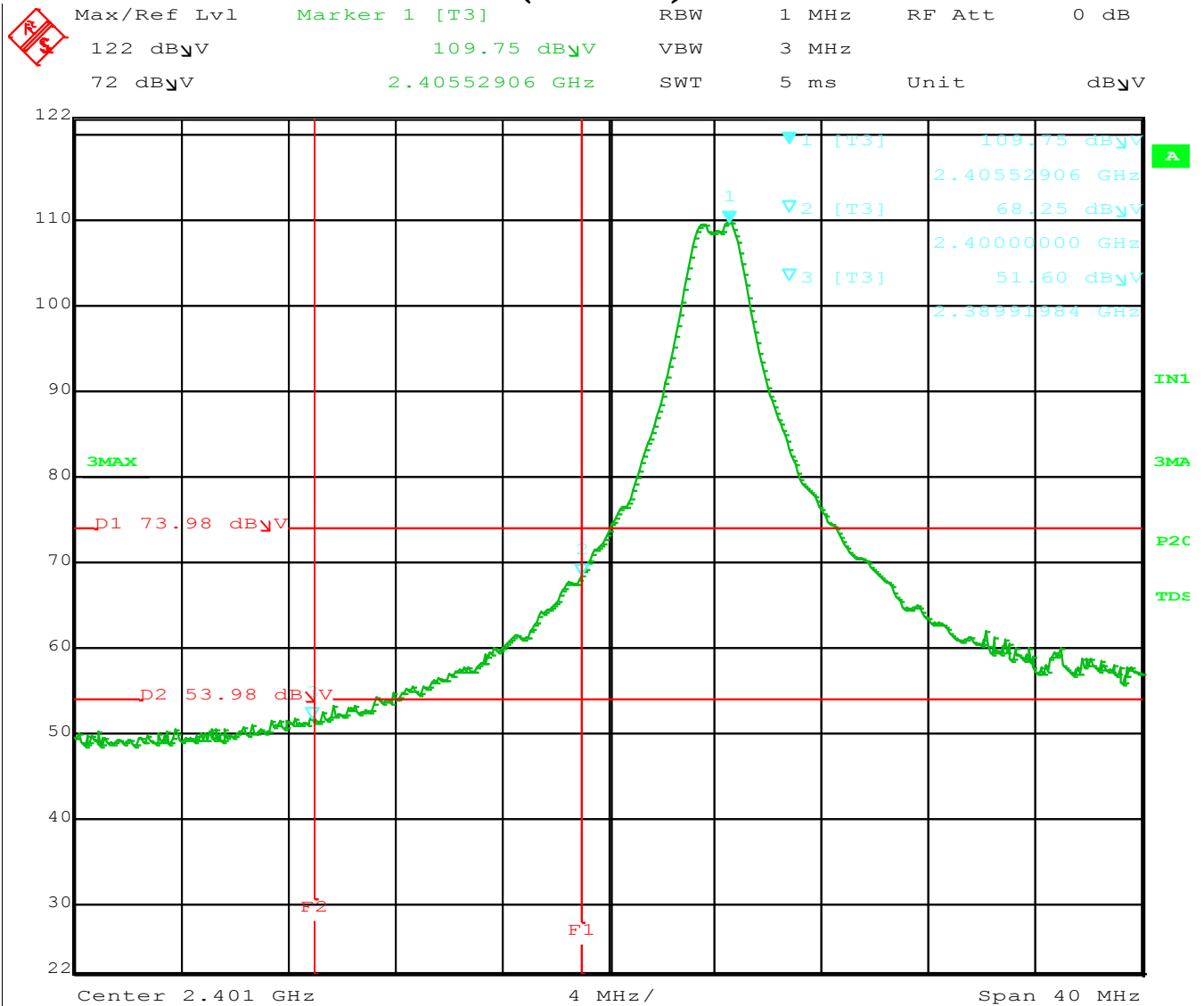
Silverado Division
19121 El Toro Road
Silverado, CA 92676
(949) 589-0700

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

LOWER BAND EDGE (Horizontal)



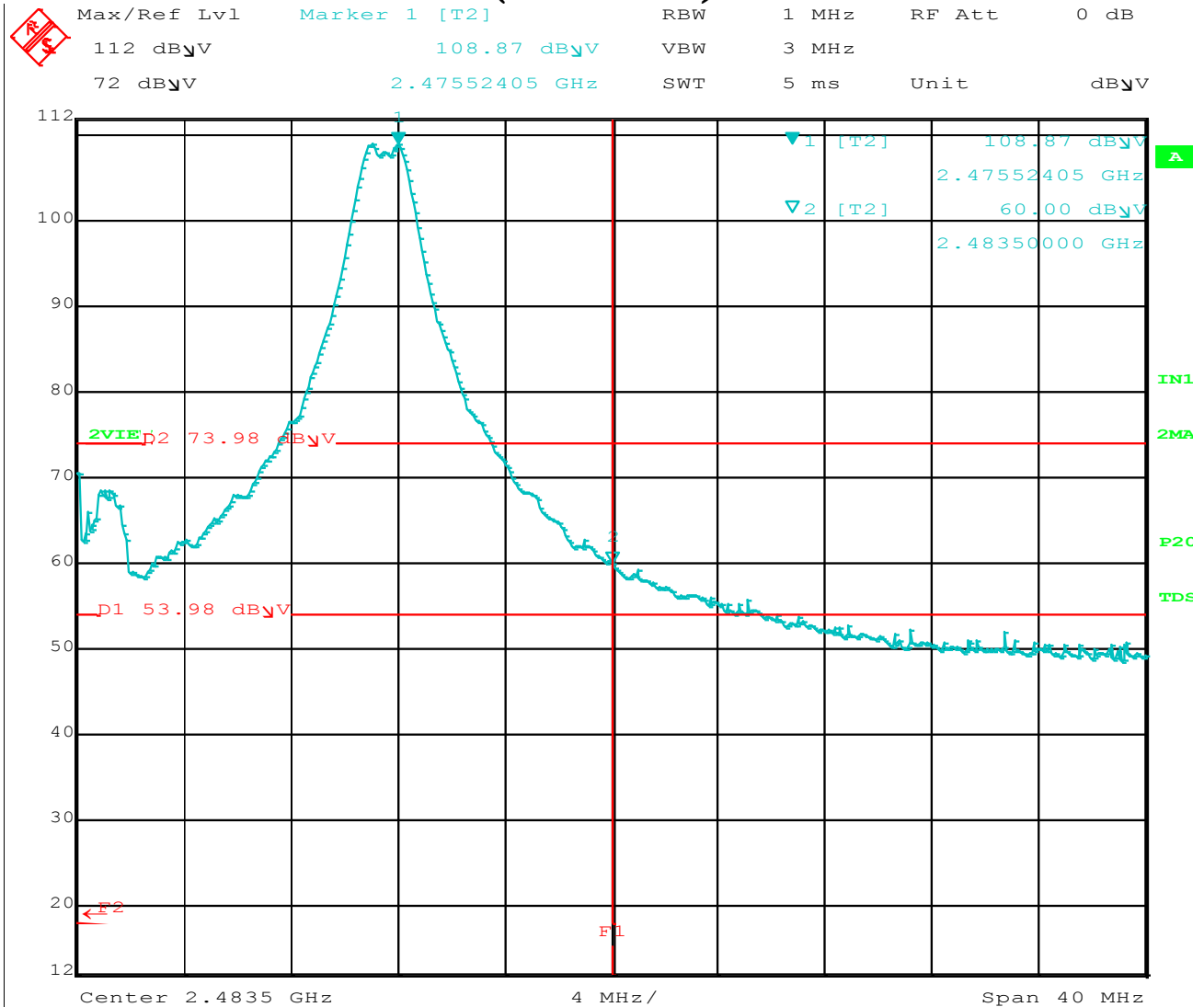
LOWER BAND EDGE (Vertical)



Comment A: Lower Band Edge Vertical



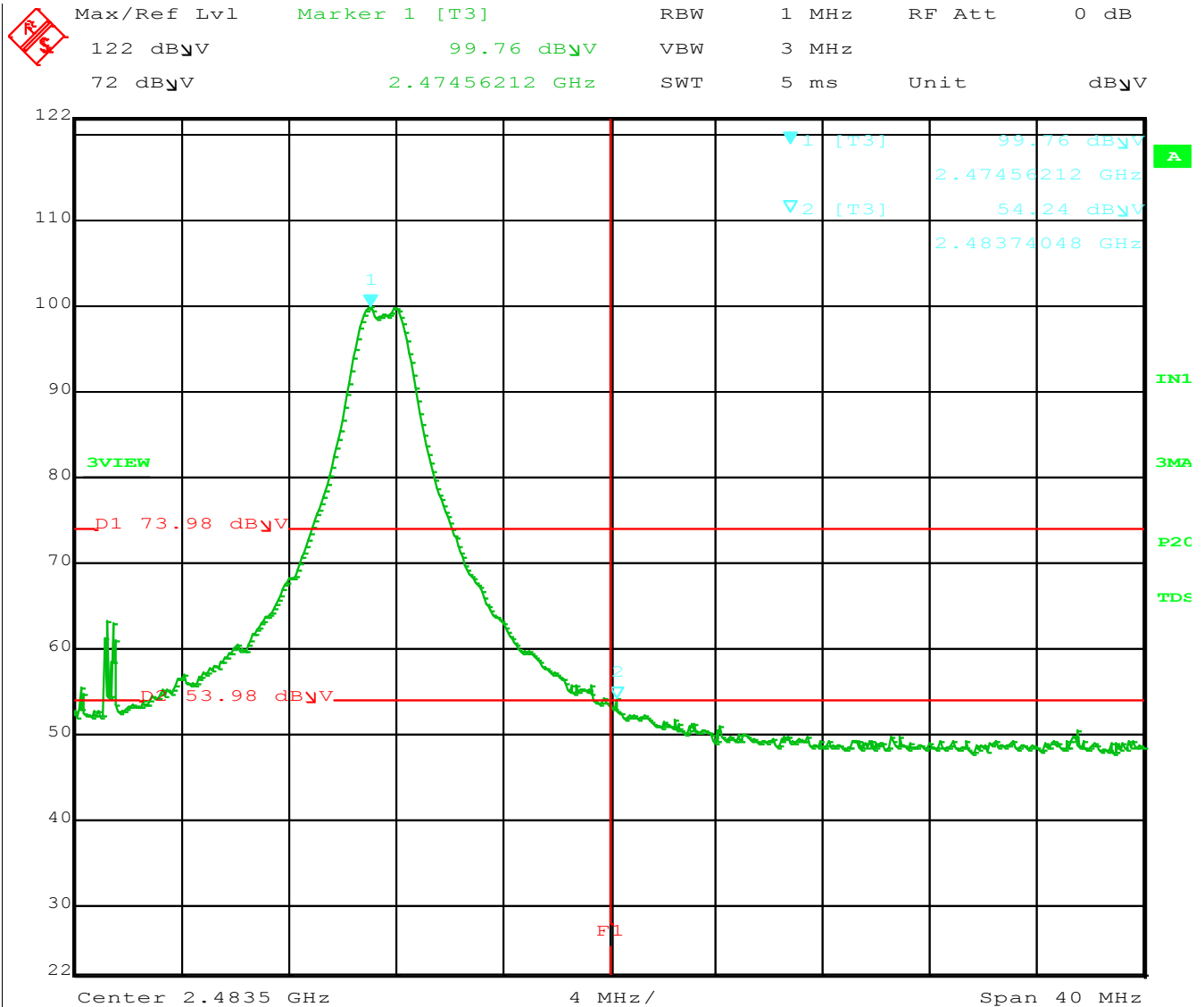
UPPER BAND EDGE (Horizontal)



Comment A: Higher Band Edge Horizontal

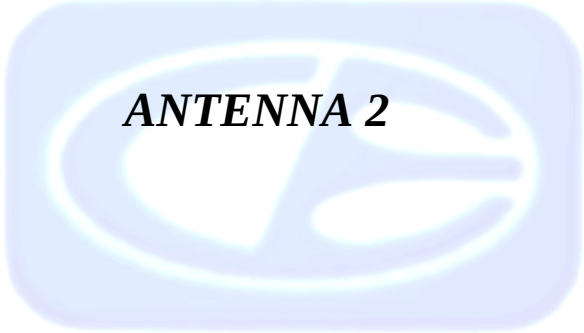


UPPER BAND EDGE (Vertical)



OCCUPIED BANDWIDTH

ANTENNA 2



Brea Division
114 Olinda Drive
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IC BANDWIDTH

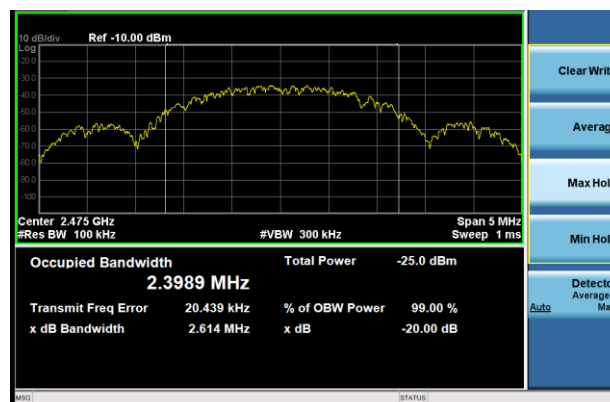
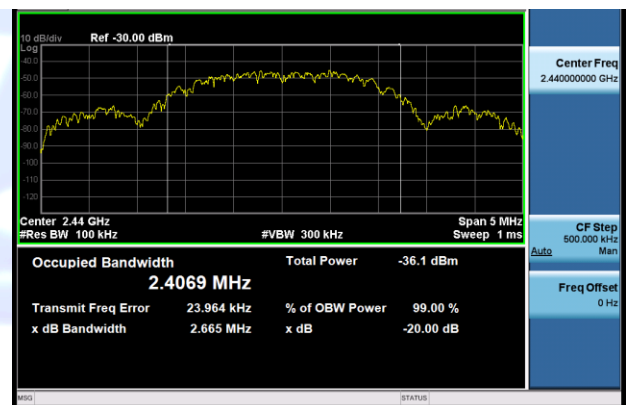
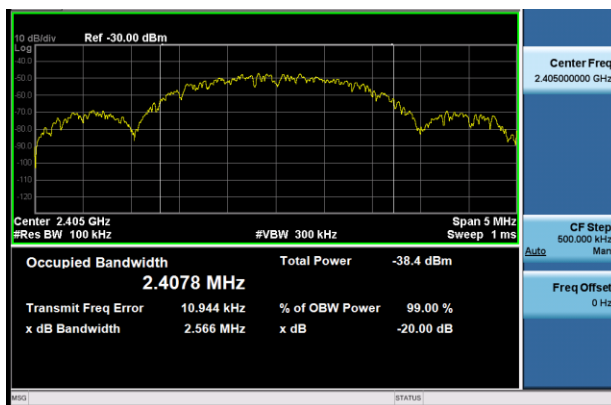
RSS GEN

Company: Nortek
EUT: Zigbee Smoke & CO Sensor
Model: C-SMKTCO1-B
Antenna: 2

Date: 10/30/2017
Lab: R
Test ENG: Jorge Reyes

Compatible Electronics, Inc. FAC-3 (Lab P)

Freq. (MHz)	Measured BW (MHz)	Comments
2405	2.4078	99%
2445	2.4069	99%
2475	2.3989	99%



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