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EMC Test Report

Application for FCC Grant of Equipment Authorization

FCC Part 15 Subpart C

Model: KET-001

FCC ID:	2AFEOSE2
APPLICANT:	Kinsa Health 535 Mission St. 18th Floor San Francisco, CA 94105
TEST SITE(S):	National Technical Systems 41039 Boyce Road. Fremont, CA. 94538-2435
PROJECT NUMBER:	PR073348
REPORT DATE:	May 4, 2018
FINAL TEST DATES:	December 14, 2017 and January 4 and February 6, 2018
TOTAL NUMBER OF PAGES:	61

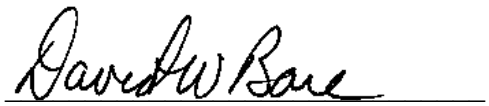
A2LA ACCREDITED
Testing Cert #0214.26

VALIDATING SIGNATORIES

PROGRAM MGR

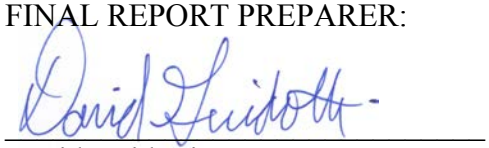
David W. Bare
Chief Engineer

TECHNICAL REVIEWER:



David W. Bare
Chief Engineer

FINAL REPORT PREPARER:



David Guidotti
Senior Technical Writer

QUALITY ASSURANCE DELEGATE

Gary Izard
Technical Writer

REVISION HISTORY

Rev#	Date	Comments	Modified By
-	May 4, 2018	First release	

TABLE OF CONTENTS

SCOPE

An electromagnetic emissions test has been performed on the Kinsa Health model KET-001, pursuant to the following rules:

FCC Part 15 Subpart C

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

ANSI C63.10-2013
FCC DTS Measurement Guidance KDB558074

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

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

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

National Technical Systems is accredited by the A2LA, certificate number 0214.26, to perform the test(s) listed in this report, except where noted otherwise.

OBJECTIVE

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

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

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

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

STATEMENT OF COMPLIANCE

The tested sample of Kinsa Health model KET-001 complied with the requirements of the following regulations:

FCC Part 15 Subpart C

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

The test results recorded herein are based on a single type test of Kinsa Health model KET-001 and therefore apply only to the tested sample. The sample was selected and prepared by David Gal of Kinsa Health.

DEVIATIONS FROM THE STANDARDS

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

TEST RESULTS SUMMARY

DIGITAL TRANSMISSION SYSTEMS (2400 – 2483.5MHz)

FCC Rule Part	Description	Measured Value / Comments	Limit / Requirement	Result
15.247(a)	Digital Modulation	Systems uses GFSK modulation	System must utilize a digital transmission technology	Complies
15.247 (a) (2)	6dB Bandwidth	0.52 MHz	>500kHz	Complies
15.247 (b) (3)	Output Power (multipoint systems)	-0.4 dBm (0.00091 Watts) EIRP = 0.0013 W Note 1	1Watt, EIRP limited to 4 Watts.	Complies
15.247(e)	Power Spectral Density	-0.4 dBm	8dBm/3kHz	Complies
15.247(d)	Antenna Port Spurious Emissions 30MHz – 25 GHz	All emissions > 20 dB below the fundamental	< -20dBc	Complies
15.247(d) / 15.209	Radiated Spurious Emissions 30MHz – 25 GHz	53.4 dBµV/m @ 4880.0 MHz (-0.6 dB)	Refer to the limits section (p17) for restricted bands, all others < -20dBc	Complies
15.247(d) / 15.209	Radiated Spurious Emissions 30 kHz - 30MHz	No emissions observed and thus any were more than 20 dB below the limits	Refer to the limits section (p17) for restricted bands, all others < -20dBc	Complies
Note 1: EIRP calculated using antenna gains of 1.5 dBi for the highest EIRP system.				

GENERAL REQUIREMENTS APPLICABLE TO ALL BANDS

FCC Rule Part	Description	Measured Value / Comments	Limit / Requirement	Result (margin)
15.203	RF Connector	integral antenna	Unique or integral antenna required	Complies
15.407 (b) (6)	AC Conducted Emissions	N/A – EUT is battery powered		
15.247 (i) 15.407 (f)	RF Exposure Requirements	Refer to SAR exclusion report and RSS 102 declaration	Refer to OET 65, FCC Part 1 and RSS 102	Complies

MEASUREMENT UNCERTAINTIES

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

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

EQUIPMENT UNDER TEST (EUT) DETAILS

GENERAL

The Kinsa Health model KET-001 thermometer is a Bluetooth low energy enabled thermometer that is designed to measure human body temperature. Since the EUT could be placed in any position during operation, the EUT was treated as tabletop equipment during testing to simulate the end-user environment. The electrical rating of the EUT is 3.3V Volts DC from a replaceable battery.

The sample was received on December 14, 2017 and tested on December 14, 2017 and January 4 and February 6, 2018. The EUT consisted of the following component(s):

Company	Model	Description	Serial Number	FCC ID
Kinsa Inc.	KET-001	Thermometer	EVTFCC1	2AFEOSE2

ANTENNA SYSTEM

The antenna system consists of integral PCB antenna.

ENCLOSURE

The EUT enclosure is primarily constructed of plastic. It measures approximately 4.5 cm wide by 15 cm deep by 4 cm high.

MODIFICATIONS

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

SUPPORT EQUIPMENT

No support equipment was used during testing.

EUT INTERFACE PORTS

None

EUT OPERATION

During emissions testing the EUT was set to transmit a continuous modulated signal on the channel and at the power level programmed into the samples.

TEST SITE

GENERAL INFORMATION

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

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

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

CONDUCTED EMISSIONS CONSIDERATIONS

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

RADIATED EMISSIONS CONSIDERATIONS

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

MEASUREMENT INSTRUMENTATION

RECEIVER SYSTEM

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

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

INSTRUMENT CONTROL COMPUTER

Software is used to view and convert receiver measurements to the field strength at an antenna or voltage developed at the LISN measurement port, which is then compared directly with the appropriate specification limit. This provides faster, more accurate readings by performing the conversions described under Sample Calculations within the Test Procedures section of this report. Results are printed in a graphic and/or tabular format, as appropriate. A personal computer is used to record all measurements made with the receivers. The software used for radiated and conducted emissions measurements is NTS EMI Test Software (rev 2.10)

FILTERS/ATTENUATORS

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

ANTENNAS

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

ANTENNA MAST AND EQUIPMENT TURNTABLE

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

ANSI C63.10 specifies that the test height above ground for table mounted devices shall be 80 centimeters for testing below 1 GHz and 1.5m for testing above 1 GHz. Floor mounted equipment shall be placed on the ground plane if the device is normally used on a conductive floor or separated from the ground plane by insulating material from 3 to 12 mm if the device is normally used on a non-conductive floor as specified in ANSI C63.4. During radiated measurements, the EUT is positioned on a motorized turntable in conformance with this requirement.

INSTRUMENT CALIBRATION

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

TEST PROCEDURES

EUT AND CABLE PLACEMENT

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

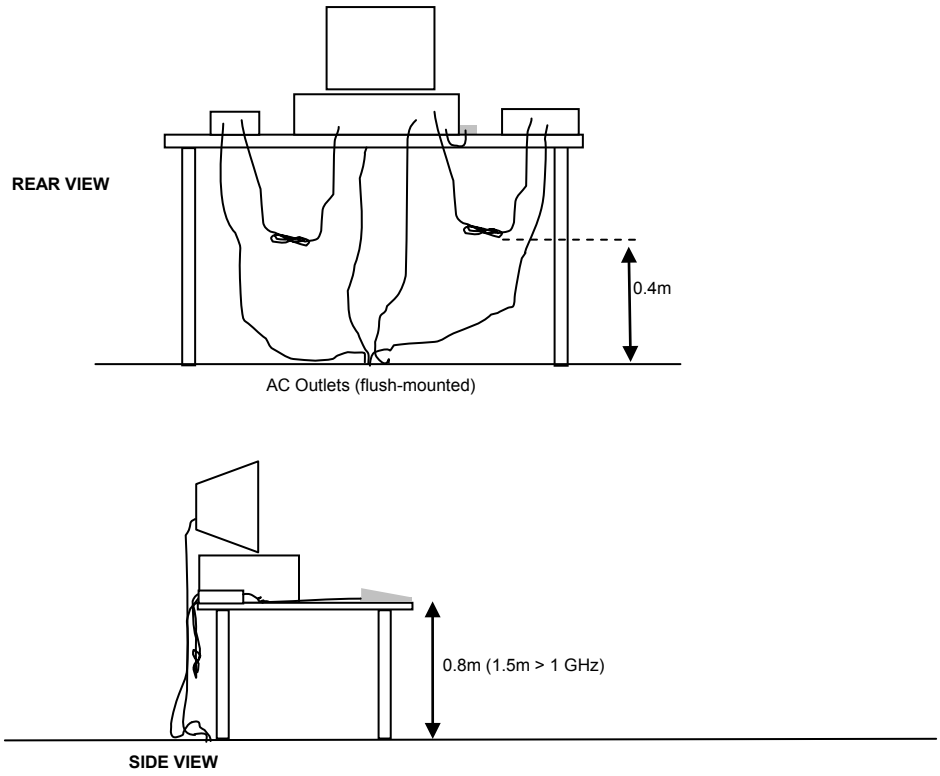
RADIATED EMISSIONS

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

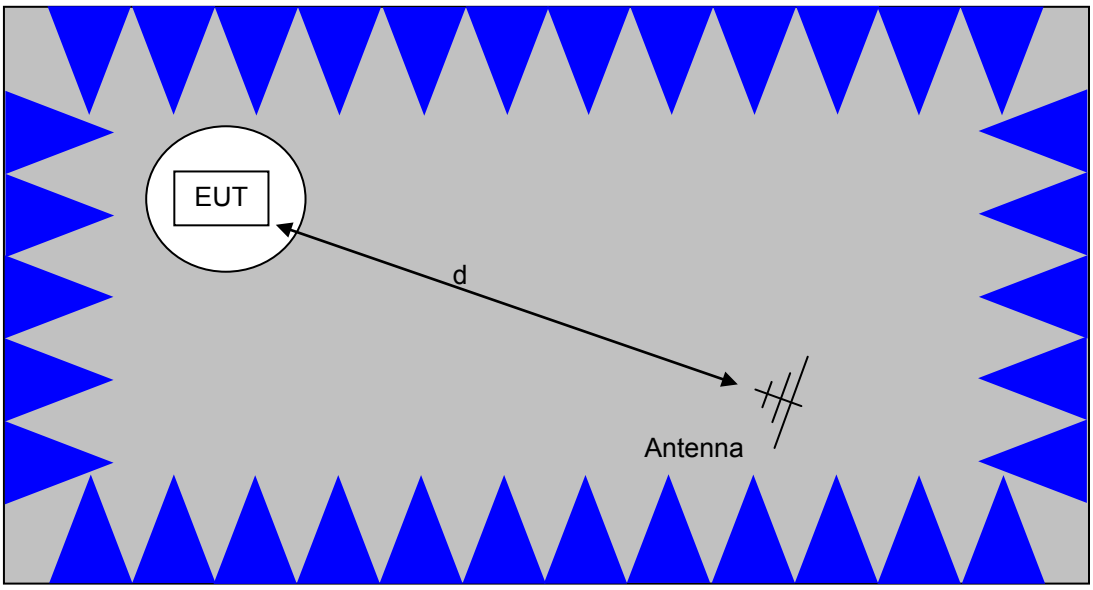
A speaker is provided in the receiver to aid in discriminating between EUT and ambient emissions. Other methods used during the preliminary scan for EUT emissions involve scanning with near field magnetic loops, monitoring I/O cables with RF current clamps, and cycling power to the EUT.

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

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

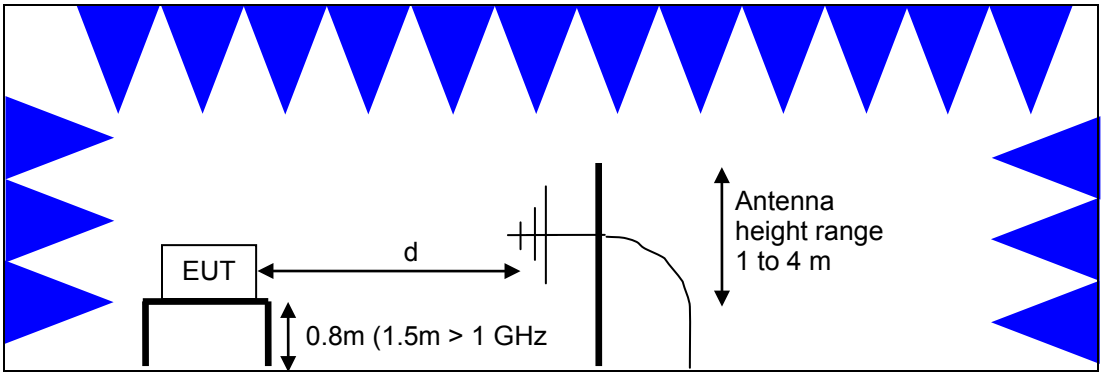


Typical Test Configuration for Radiated Field Strength Measurements



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

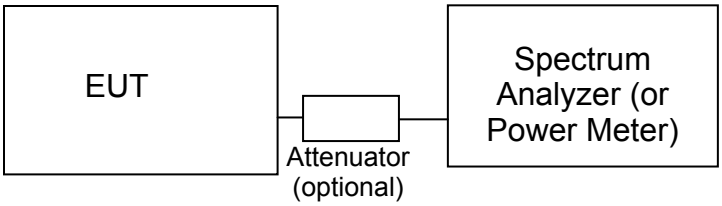
Floor-standing equipment is placed on the floor with insulating supports between the unit and the ground plane.



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

CONDUCTED EMISSIONS FROM ANTENNA PORT

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



Test Configuration for Antenna Port Measurements

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

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

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

BANDWIDTH MEASUREMENTS

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

SPECIFICATION LIMITS AND SAMPLE CALCULATIONS

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

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

GENERAL TRANSMITTER RADIATED EMISSIONS SPECIFICATION LIMITS

The table below shows the limits for the spurious emissions from transmitters that fall in restricted bands[1].

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

[1] The restricted bands are detailed in FCC 15.205 and RSS-Gen Table 6

OUTPUT POWER LIMITS – DIGITAL TRANSMISSION SYSTEMS

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

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

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

TRANSMIT MODE SPURIOUS RADIATED EMISSIONS LIMITS – FHSS and DTS SYSTEMS

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

SAMPLE CALCULATIONS - RADIATED EMISSIONS

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

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

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

where:

F_d = Distance Factor in dB
D_m = Measurement Distance in meters
D_s = Specification Distance in meters

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

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

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

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

$$R_c = R_r + F_d$$

and

$$M = R_c - L_s$$

where:

R_r = Receiver Reading in dBuV/m
F_d = Distance Factor in dB
R_c = Corrected Reading in dBuV/m
L_s = Specification Limit in dBuV/m
M = Margin in dB Relative to Spec

SAMPLE CALCULATIONS - FIELD STRENGTH TO EIRP CONVERSION

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

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

where P is the eirp (Watts)

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

Appendix A Test Equipment Calibration Data

Radiated Emissions, >1GHz, 14-Dec-17

Manufacturer	Description	Model	Asset #	Calibrated	Cal Due
National Technical Systems	NTS EMI Software (rev 2.10)	N/A	0		N/A
Hewlett Packard	Spectrum Analyzer (SA40) Red 30 Hz -40 GHz	8564E (84125C)	1148	10/14/2017	10/14/2018
Hewlett Packard	High Pass filter, 3.5 GHz	P/N 84300-80038	1157	6/6/2017	6/6/2018
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	2199	8/30/2017	8/30/2018
EMCO	Antenna, Horn, 1-18 GHz	3115	2870	8/24/2017	8/24/2019

Radio Antenna Port (Power and Spurious Emissions), 04-Jan-18

Agilent Technologies	3Hz -44GHz PSA Spectrum Analyzer	E4446A	2796	5/22/2017	5/22/2018

Radiated Emissions, 06-Feb-18

Hewlett Packard	Spectrum Analyzer (SA40) Blue 9 kHz - 40 GHz	8564E (84125C)	1393	08-Dec-17	12/8/2018
Sunol Sciences	Biconilog, 30-3000 MHz	JB3	1549	30-May-17	5/30/2019
EMCO	Antenna, Horn, 1-18 GHz	3115	1561	08-Jul-16	7/8/2018
HP / Miteq	SA40 B Head HF preAmplifier, 18-40 GHz (w/1393)	TTA1840-45-5P-HG-S	1620	09-Jan-18	1/9/2019
A. H. Systems	Purple System Horn, 18-40GHz	SAS-574, p/n: 2581	2160	18-Aug-17	8/18/2018
Com-Power	Preamplifier, 1-1000 MHz	PAM-103	2885	30-Aug-17	8/30/2018
Compower	Magnetic Loop Antenna, 9 kHz-30 MHz	AL-130	3003	09-Aug-16	8/9/2018
Rohde & Schwarz	EMI Test Receiver, 20 Hz-7 GHz	ESIB 7	9482	28-Oct-16	10/28/2018
Hewlett Packard	Preamplifier, 1-26.5GHz	8449B	WC062438	22-Nov-17	11/22/2018

Appendix B Test Data

TL073348-RA Pages 23 – 60

Client:	Kinsa Inc.	Job Number:	PR073348
Product	Smart Ear Thermometer Model KET-001	T-Log Number:	TL073348-RA
System Configuration:	-	Project Manager:	Christine Krebill
Contact:	David Gal	Project Coordinator:	-
Emissions Standard(s):	FCC Part 15, EN 60601-1-2	Class:	B, Group 1
Immunity Standard(s):	EN 60601-1-2, EN 301 489-1, -17	Environment:	Radio

EMC Test Data

For The

Kinsa Inc.

Product

Smart Ear Thermometer Model KET-001

Date of Last Test: 2/21/2018

Client:	Kinsa Inc.	Job Number:	PR073348
Model:	Smart Ear Thermometer Model KET-001	T-Log Number:	TL073348-RA
		Project Manager:	Christine Krebill
Contact:	David Gal	Project Coordinator:	-
Standard:	FCC Part 15, EN 60601-1-2	Class:	N/A

Duty Cycle

Date of Test: 1/3/2018
Test Engineer: David W. Bare
Test Location: Fremont Lab #4A

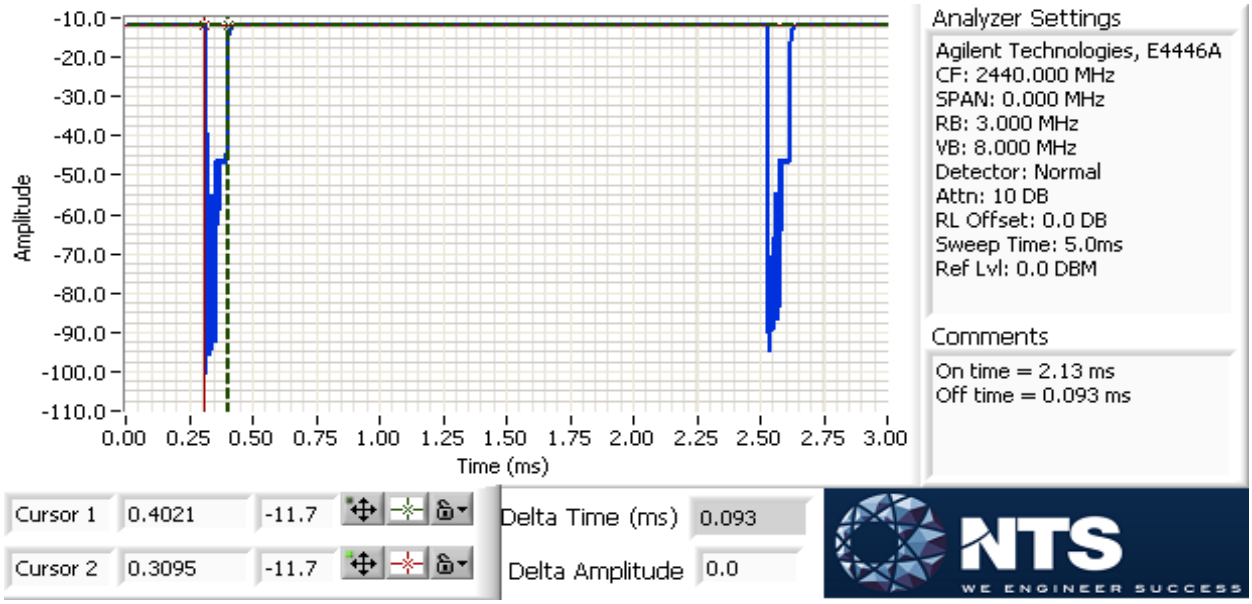
Sample Notes

Sample S/N: EVTFCC40

Notes: Measurements taken with maximum RBW/VBW settings allowed.

Mode		Duty Cycle (x)	Constant DC?	T (ms)	Pwr Cor Factor*	Lin Volt Cor Factor**	Min VBW for FS (Hz)
BLE		0.96	Yes	2.13	0.19	0.37	469

* Correction factor when using RMS/Power averaging - 10*log(1/x)
** Correction factor when using linear voltage average - 20*log(1/x)
T = Minimum transmission duration



Client:	Kinsa Inc.	Job Number:	PR073348
Model:	Smart Ear Thermometer Model KET-001	T-Log Number:	TL073348-RA
		Project Manager:	Christine Krebill
Contact:	David Gal	Project Coordinator:	-
Standard:	FCC Part 15, EN 60601-1-2	Class:	N/A

RSS-247 and FCC 15.247 (DTS) Radiated Spurious Emissions

Test Specific Details

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

General Test Configuration

The EUT and all local support equipment were located on the turntable for radiated spurious emissions testing.
For radiated emissions testing the measurement antenna was located 3 meters from the EUT, unless otherwise noted.

Ambient Conditions:

Temperature: 25 °C
Rel. Humidity: 32 %

Summary of Results - Device Operating in the 2400-2483.5 MHz Band

Run #		Channel		Power Setting	Test Performed	Limit	Result / Margin
1		37 - 2402MHz		4	Restricted Band Edge (2390 MHz)	FCC Part 15.209 / 15.247(c)	28.9 dBµV/m @ 2384.7 MHz (-25.1 dB)
		39 - 2480MHz		4	Restricted Band Edge (2483.5 MHz)	FCC Part 15.209 / 15.247(c)	33.4 dBµV/m @ 2485.8 MHz (-20.6 dB)

Modifications Made During Testing

No modifications were made to the EUT during testing

Deviations From The Standard

No deviations were made from the requirements of the standard.

Sample Notes

Sample M/N: A10240
Antenna: Internal
Power setting: 4

Client:	Kinsa Inc.	Job Number:	PR073348
Model:	Smart Ear Thermometer Model KET-001	T-Log Number:	TL073348-RA
		Project Manager:	Christine Krebill
Contact:	David Gal	Project Coordinator:	-
Standard:	FCC Part 15, EN 60601-1-2	Class:	N/A

Procedure Comments:

Measurements performed in accordance with FCC KDB 558074
Peak measurements performed with: RBW=1MHz, VBW=3MHz, peak detector, max hold, auto sweep time
Unless otherwise stated/noted, emission has a duty cycle ≥ 98% and was measured using RBW=1MHz, VBW=10Hz, peak detector, linear average mode, auto sweep time, max hold.

Mode	Data Rate	Duty Cycle (x)	Constant DC?	T (ms)	Pwr Cor Factor*	Lin Volt Cor Factor**	Min VBW for FS (Hz)	
BLE	1 Mb/s	0.96	Yes	2.134	0.2	0.4	469	1 kHz

Measurement Specific Notes:

Note 1:	Emission in non-restricted band, but limit of 15.209 used.
Note 2:	Emission in non-restricted band, the limit was set 30dB below the level of the fundamental and measured in 100kHz.
Note 3:	Emission has a duty cycle ≥ 98%, average measurement performed: RBW=1MHz, VBW=3MHz, RMS, Power averaging, auto sweep, trace average 100 traces
Note 4:	Emission has constant duty cycle < 98%, average measurement performed: RBW=1MHz, VBW>1/T but not less than 10Hz, peak detector, linear averaging, auto sweep, trace average 100 traces, measurement corrected by Linear voltage correction factor
Note 5:	Emission has constatnt duty cycle < 98%, average measurement performed: RBW=1MHz, VBW=3MHz, RMS, Power averaging, auto sweep, trace average 100 traces, measurement corrected by Pwr correction factor
Note 6:	Emission has non constant duty cycle < 98%, average measurement performed: RBW=1MHz, VBW> 1/T, peak detector, linear average mode, sweep time auto, max hold. Max hold for 50*(1/DC) traces
Note 7:	Emission has non constant duty cycle < 98%, average measurement performed: RBW=1MHz, VBW> 1/T, RMS detector, sweep time auto, max hold. Max hold for 50*(1/DC) traces
Note 8:	Plots of the average and peak bandedge do not account for any duty cycle correction. Refer to the tabular results for final measurements.

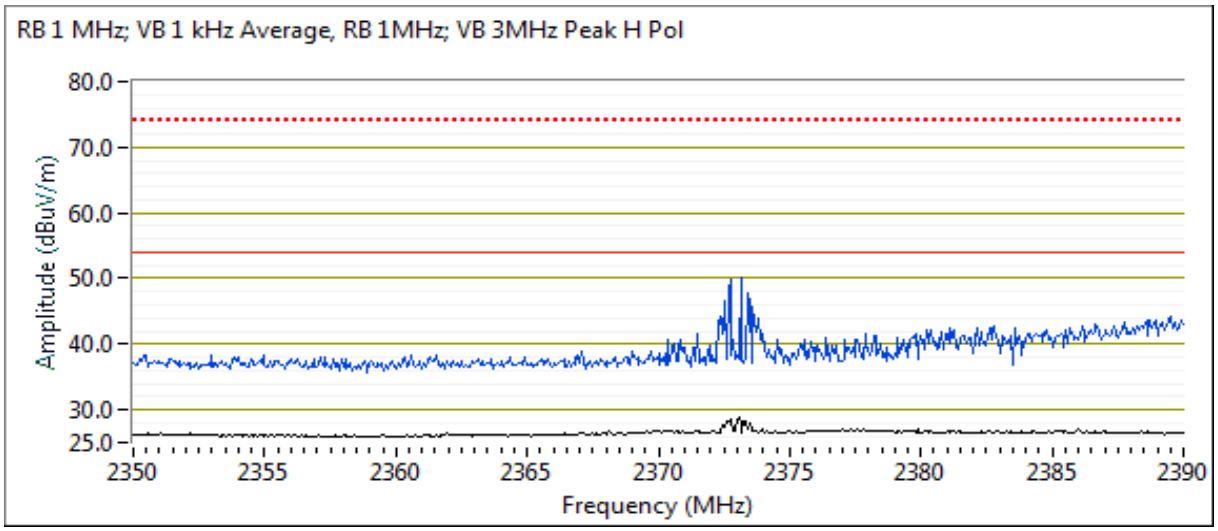
Client:	Kinsa Inc.	Job Number:	PR073348
Model:	Smart Ear Thermometer Model KET-001	T-Log Number:	TL073348-RA
		Project Manager:	Christine Krebill
Contact:	David Gal	Project Coordinator:	-
Standard:	FCC Part 15, EN 60601-1-2	Class:	N/A

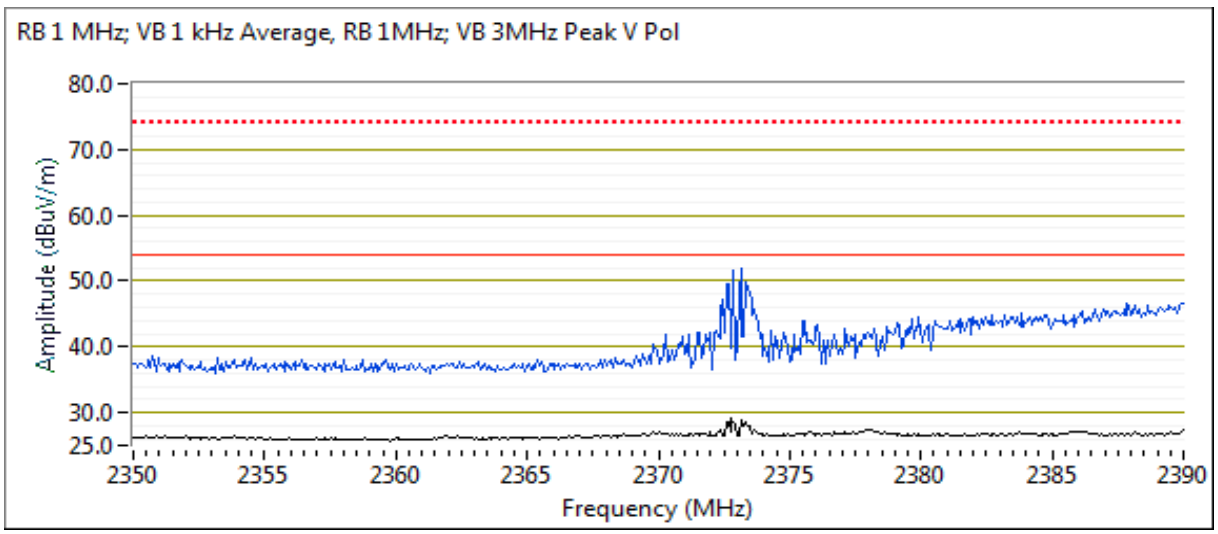
Run #1: Radiated Bandedge Measurements

Date of Test: 2/6/2018 0:00
Test Engineer: Jude Semana
Test Location: Chamber 5

Config. Used: 1
Config Change: None
EUT Voltage: 3V

Channel: 37





Client:	Kinsa Inc.	Job Number:	PR073348
Model:	Smart Ear Thermometer Model KET-001	T-Log Number:	TL073348-RA
		Project Manager:	Christine Krebill
Contact:	David Gal	Project Coordinator:	-
Standard:	FCC Part 15, EN 60601-1-2	Class:	N/A

Band Edge Signal Field Strength - Direct measurement of field strength

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
2384.670	28.9	V	54.0	-25.1	AVG	126	1.2	RB 1 MHz;VB 1 kHz;Peak, Note 4
2378.070	28.4	H	54.0	-25.6	AVG	178	2.2	RB 1 MHz;VB 1 kHz;Peak, Note 4
2387.630	47.5	H	74.0	-26.5	PK	178	2.2	RB 1 MHz;VB 3 MHz;
2388.700	47.5	V	74.0	-26.5	PK	126	1.2	RB 1 MHz;VB 3 MHz;

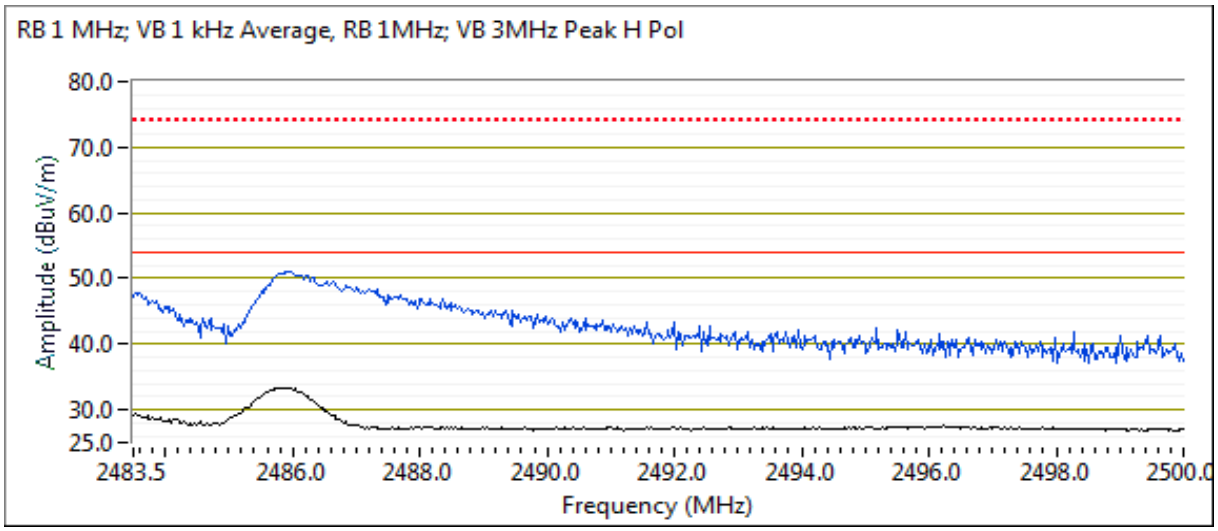
Client:	Kinsa Inc.	Job Number:	PR073348
Model:	Smart Ear Thermometer Model KET-001	T-Log Number:	TL073348-RA
		Project Manager:	Christine Krebill
Contact:	David Gal	Project Coordinator:	-
Standard:	FCC Part 15, EN 60601-1-2	Class:	N/A

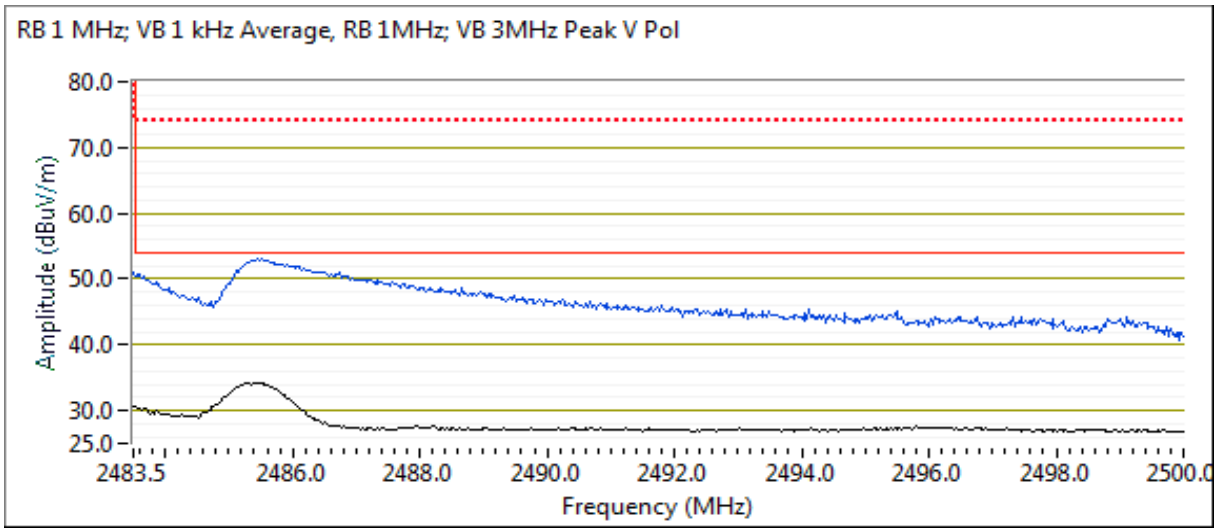
Run #1: Radiated Bandedge Measurements

Date of Test: 2/6/2018 0:00
Test Engineer: Jude Semana
Test Location: Chamber 5

Config. Used: 1
Config Change: None
EUT Voltage: 3V

Channel: 39





Client:	Kinsa Inc.	Job Number:	PR073348
Model:	Smart Ear Thermometer Model KET-001	T-Log Number:	TL073348-RA
		Project Manager:	Christine Krebill
Contact:	David Gal	Project Coordinator:	-
Standard:	FCC Part 15, EN 60601-1-2	Class:	N/A

Band Edge Signal Field Strength - Direct measurement of field strength

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
2485.750	33.4	H	54.0	-20.6	AVG	181	1.0	RB 1 MHz;VB 1 kHz;Peak, Note 4
2485.290	30.6	V	54.0	-23.4	AVG	172	1.0	RB 1 MHz;VB 1 kHz;Peak, Note 4
2485.430	47.8	H	74.0	-26.2	PK	181	1.0	RB 1 MHz;VB 3 MHz;
2483.770	47.8	V	74.0	-26.2	PK	172	1.0	RB 1 MHz;VB 3 MHz;

Client:	Kinsa Inc.	Job Number:	PR073348
Model:	Smart Ear Thermometer Model KET-001	T-Log Number:	TL073348-RA
		Project Manager:	Christine Krebill
Contact:	David Gal	Project Coordinator:	-
Standard:	FCC Part 15, EN 60601-1-2	Class:	N/A

RSS-247 and FCC 15.247 (DTS) Radiated Spurious Emissions

Test Specific Details

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

General Test Configuration

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

For radiated emissions testing the measurement antenna was located 3 meters from the EUT, unless otherwise noted.

Ambient Conditions:

Temperature: 25 °C
Rel. Humidity: 32 %

Summary of Results - Device Operating in the 2400-2483.5 MHz Band

Run #	Channel		Power Setting	Test Performed	Limit	Result / Margin
1	39 - 2480MHz		4	Radiated Emissions, Selected Frequencies	FCC Part 15.209 / 15.247(c)	41.0 dBµV/m @ 9919.3 MHz (-13.0 dB)
2	17 - 2440MHz		4	Radiated Emissions, Selected Frequencies	FCC Part 15.209 / 15.247(c)	42.8 dBµV/m @ 9760.7 MHz (-11.2 dB)
3	37 - 2402MHz		4	Radiated Emissions, Selected Frequencies	FCC Part 15.209 / 15.247(c)	41.3 dBµV/m @ 9609.6 MHz (-12.7 dB)

Modifications Made During Testing

No modifications were made to the EUT during testing

Deviations From The Standard

No deviations were made from the requirements of the standard.

Sample Notes

Sample M/N: A10240
Antenna: Internal
Power setting: 4

Client:	Kinsa Inc.	Job Number:	PR073348
Model:	Smart Ear Thermometer Model KET-001	T-Log Number:	TL073348-RA
		Project Manager:	Christine Krebill
Contact:	David Gal	Project Coordinator:	-
Standard:	FCC Part 15, EN 60601-1-2	Class:	N/A

Procedure Comments:

Measurements performed in accordance with FCC KDB 558074
Peak measurements performed with: RBW=1MHz, VBW=3MHz, peak detector, max hold, auto sweep time
Unless otherwise stated/noted, emission has duty cycle ≥ 98% and was measured using RBW=1MHz, VBW=10Hz, peak detector, linear average mode, auto sweep time, max hold.
2.4GHz band reject filter used

Mode	Data Rate	Duty Cycle (x)	Constant DC?	T (ms)	Pwr Cor Factor*	Lin Volt Cor Factor**	Min VBW for FS (Hz)	
BLE	1 Mb/s	0.96	Yes	2.134	0.2	0.4	469	1 kHz

Measurement Specific Notes:

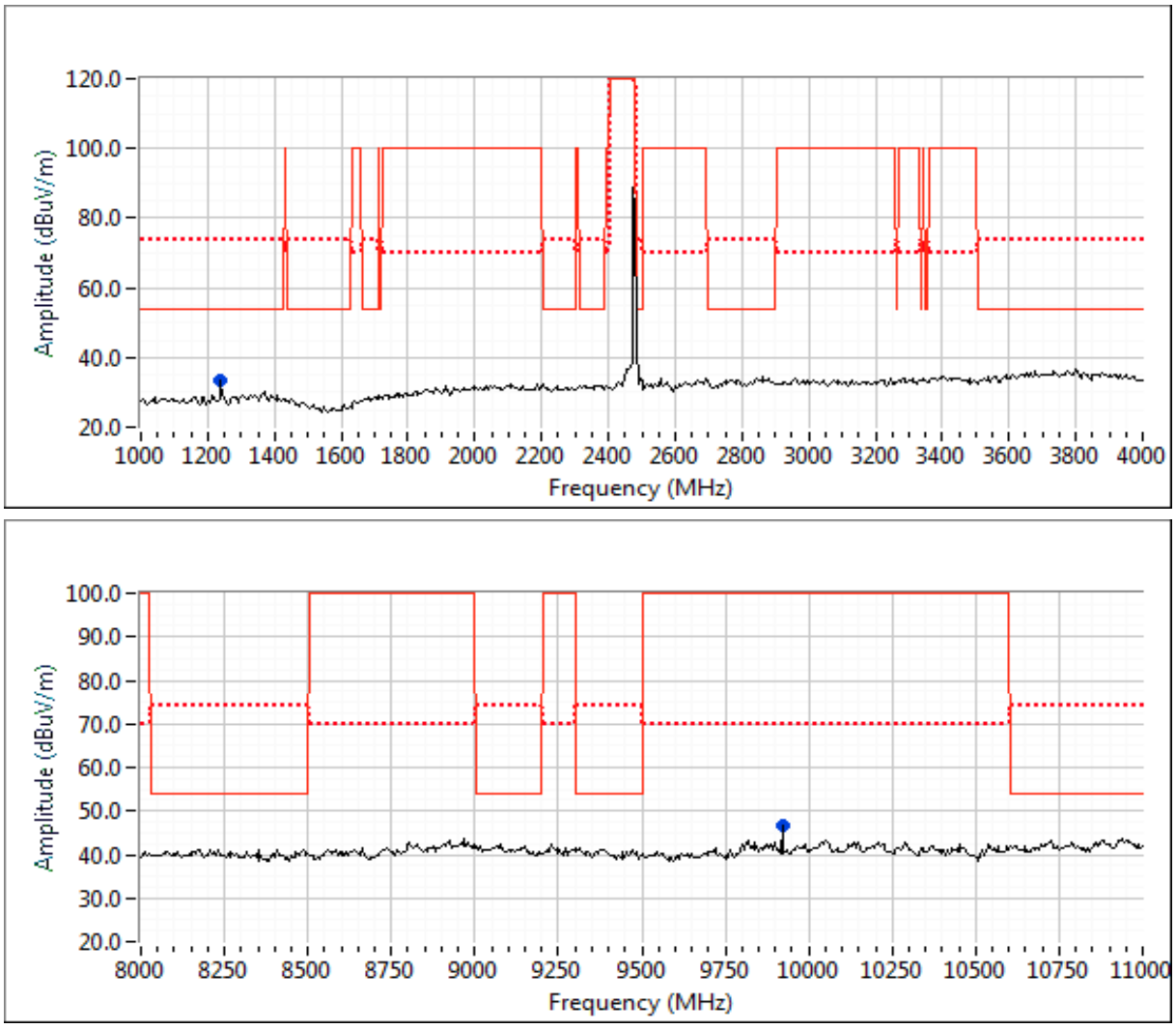
Note 1:	Emission in non-restricted band, but limit of 15.209 used.
Note 2:	Emission in non-restricted band, the limit was set 30dB below the level of the fundamental and measured in 100kHz.
Note 3:	Emission has a duty cycle ≥ 98%, average measurement performed: RBW=1MHz, VBW=3MHz, RMS, Power averaging, auto sweep, trace average 100 traces
Note 4:	Emission has constant duty cycle < 98%, average measurement performed: RBW=1MHz, VBW>1/T but not less than 10Hz, peak detector, linear averaging, auto sweep, trace average 100 traces, measurement corrected by Linear voltage correction factor
Note 5:	Emission has constatnt duty cycle < 98%, average measurement performed: RBW=1MHz, VBW=3MHz, RMS, Power averaging, auto sweep, trace average 100 traces, measurement corrected by Pwr correction factor
Note 6:	Emission has non constant duty cycle < 98%, average measurement performed: RBW=1MHz, VBW> 1/T, peak detector, linear average mode, sweep time auto, max hold. Max hold for 50*(1/DC) traces
Note 7:	Emission has non constant duty cycle < 98%, average measurement performed: RBW=1MHz, VBW> 1/T, RMS detector, sweep time auto, max hold. Max hold for 50*(1/DC) traces

Client:	Kinsa Inc.	Job Number:	PR073348
Model:	Smart Ear Thermometer Model KET-001	T-Log Number:	TL073348-RA
		Project Manager:	Christine Krebill
Contact:	David Gal	Project Coordinator:	-
Standard:	FCC Part 15, EN 60601-1-2	Class:	N/A

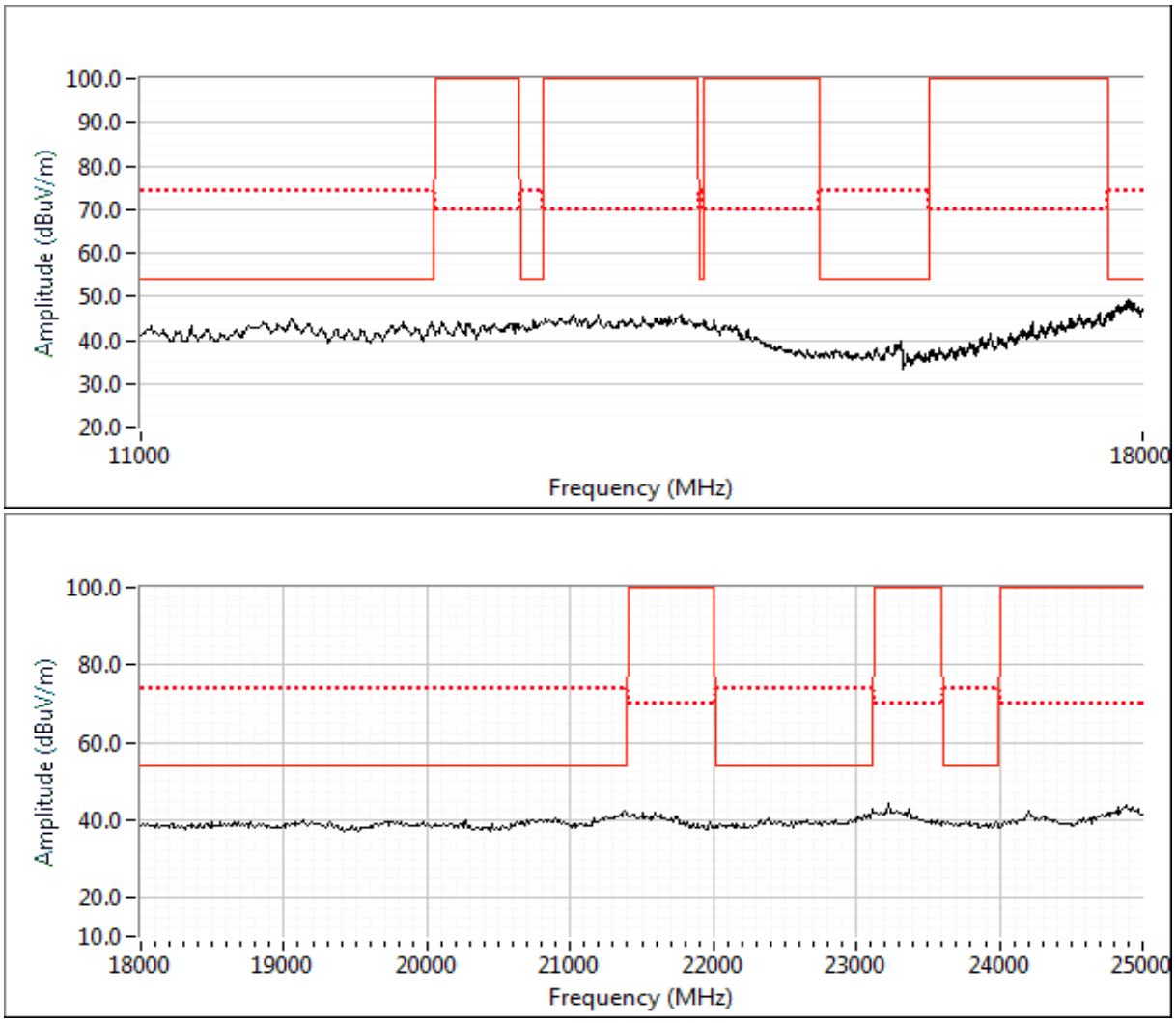
Run #1: Radiated Spurious Emissions, Selected Frequencies

Date of Test: 2/6/2018 0:00 | Config. Used: 1
Test Engineer: Jude Semana | Config Change: None
Test Location: Chamber 5 | EUT Voltage: 3V

BLE mode 2480MHz (Vertical)



Client:	Kinsa Inc.	Job Number:	PR073348
Model:	Smart Ear Thermometer Model KET-001	T-Log Number:	TL073348-RA
		Project Manager:	Christine Krebill
Contact:	David Gal	Project Coordinator:	-
Standard:	FCC Part 15, EN 60601-1-2	Class:	N/A



Client:	Kinsa Inc.	Job Number:	PR073348
Model:	Smart Ear Thermometer Model KET-001	T-Log Number:	TL073348-RA
		Project Manager:	Christine Krebill
Contact:	David Gal	Project Coordinator:	-
Standard:	FCC Part 15, EN 60601-1-2	Class:	N/A

Preliminary peak readings captured during pre-scan (BLE mode 2480MHz Vertical)

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
1240.000	*33.2*	*H*	*54.0*	*-20.8*	*Peak*	*23*	*1.5*	
9920.000	*46.5*	*V*	*70.0*	*-23.5*	*Peak*	*336*	*1.0*	

Maximized Readings

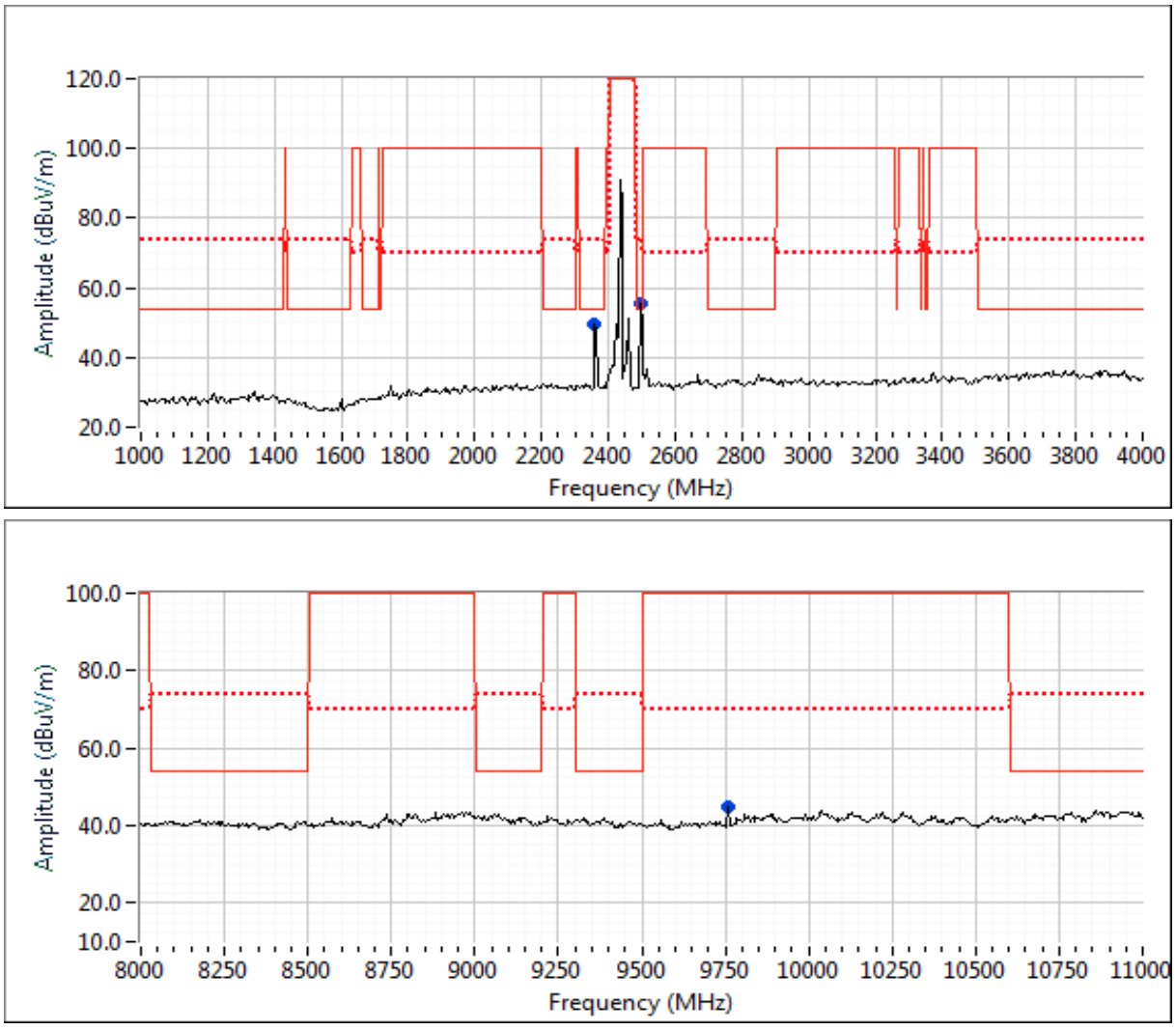
Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
9919.300	41.0	V	54.0	-13.0	AVG	146	2.0	RB 1 MHz;VB 1 kHz;Peak, Note 4
9920.580	50.6	V	74.0	-23.4	PK	146	2.0	RB 1 MHz;VB 3 MHz;Peak

Client:	Kinsa Inc.	Job Number:	PR073348
Model:	Smart Ear Thermometer Model KET-001	T-Log Number:	TL073348-RA
		Project Manager:	Christine Krebill
Contact:	David Gal	Project Coordinator:	-
Standard:	FCC Part 15, EN 60601-1-2	Class:	N/A

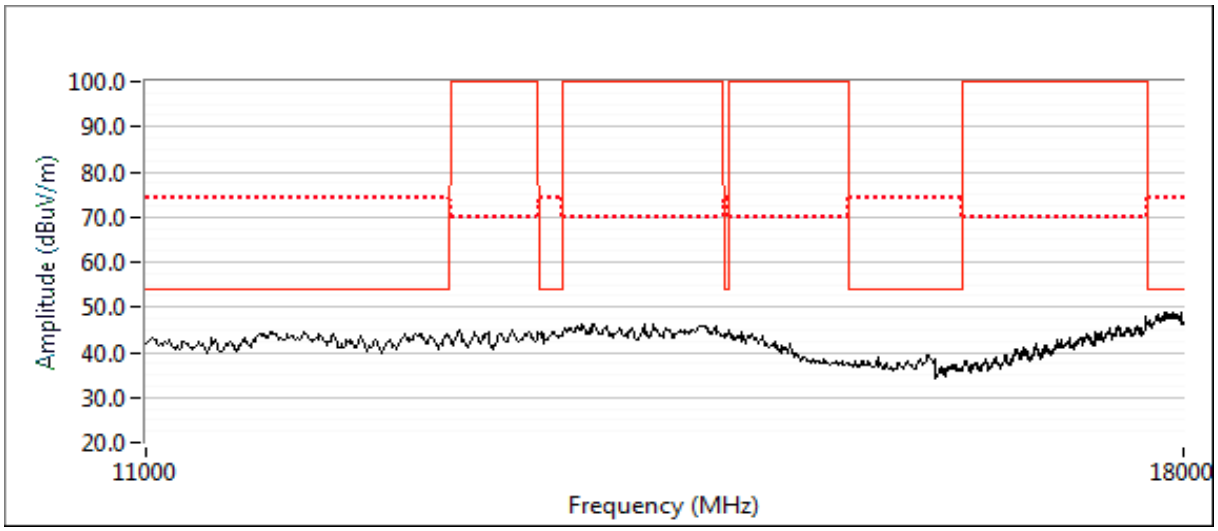
Run #2: Radiated Spurious Emissions, Selected Frequencies

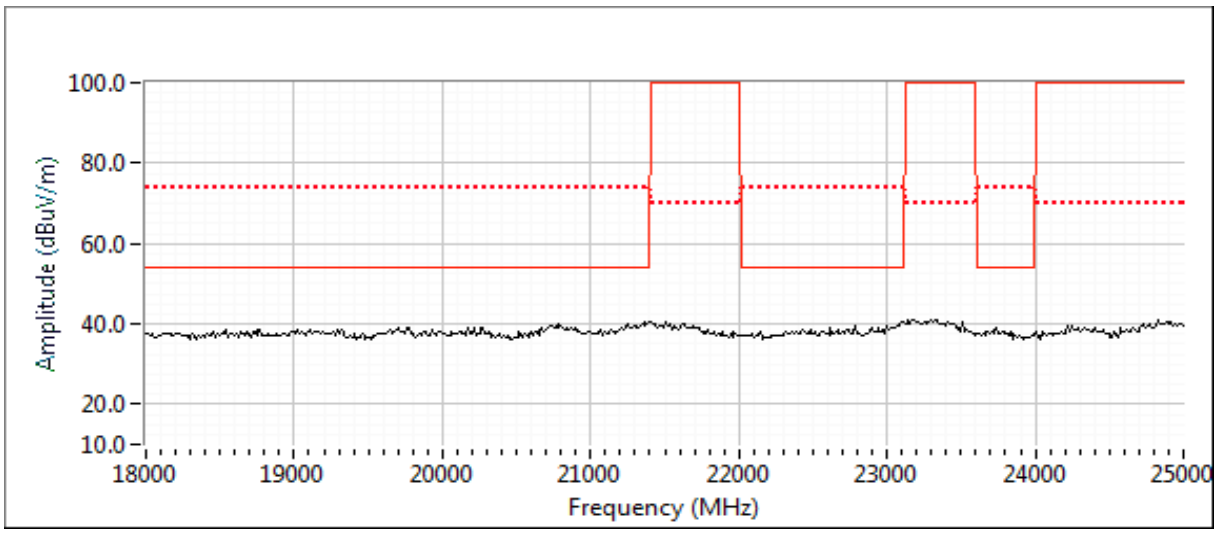
Date of Test: 2/6/2018 0:00 | Config. Used: 1
Test Engineer: Jude Semana | Config Change: None
Test Location: Chamber 5 | EUT Voltage: 3V

BLE mode 2440MHz (Vertical)



Client:	Kinsa Inc.	Job Number:	PR073348
Model:	Smart Ear Thermometer Model KET-001	T-Log Number:	TL073348-RA
		Project Manager:	Christine Krebill
Contact:	David Gal	Project Coordinator:	-
Standard:	FCC Part 15, EN 60601-1-2	Class:	N/A





Client:	Kinsa Inc.	Job Number:	PR073348
Model:	Smart Ear Thermometer Model KET-001	T-Log Number:	TL073348-RA
		Project Manager:	Christine Krebill
Contact:	David Gal	Project Coordinator:	-
Standard:	FCC Part 15, EN 60601-1-2	Class:	N/A

Preliminary peak readings captured during pre-scan (BLE mode 2440MHz Vertical)

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
2495.000	*55.6*	*V*	*54.0*	*1.6*	*Peak*	*39*	*1.0*	
2360.000	*49.4*	*V*	*54.0*	*-4.6*	*Peak*	*291*	*1.0*	
9760.000	*44.8*	*V*	*70.0*	*-25.2*	*Peak*	*7*	*2.0*	

Maximized Readings

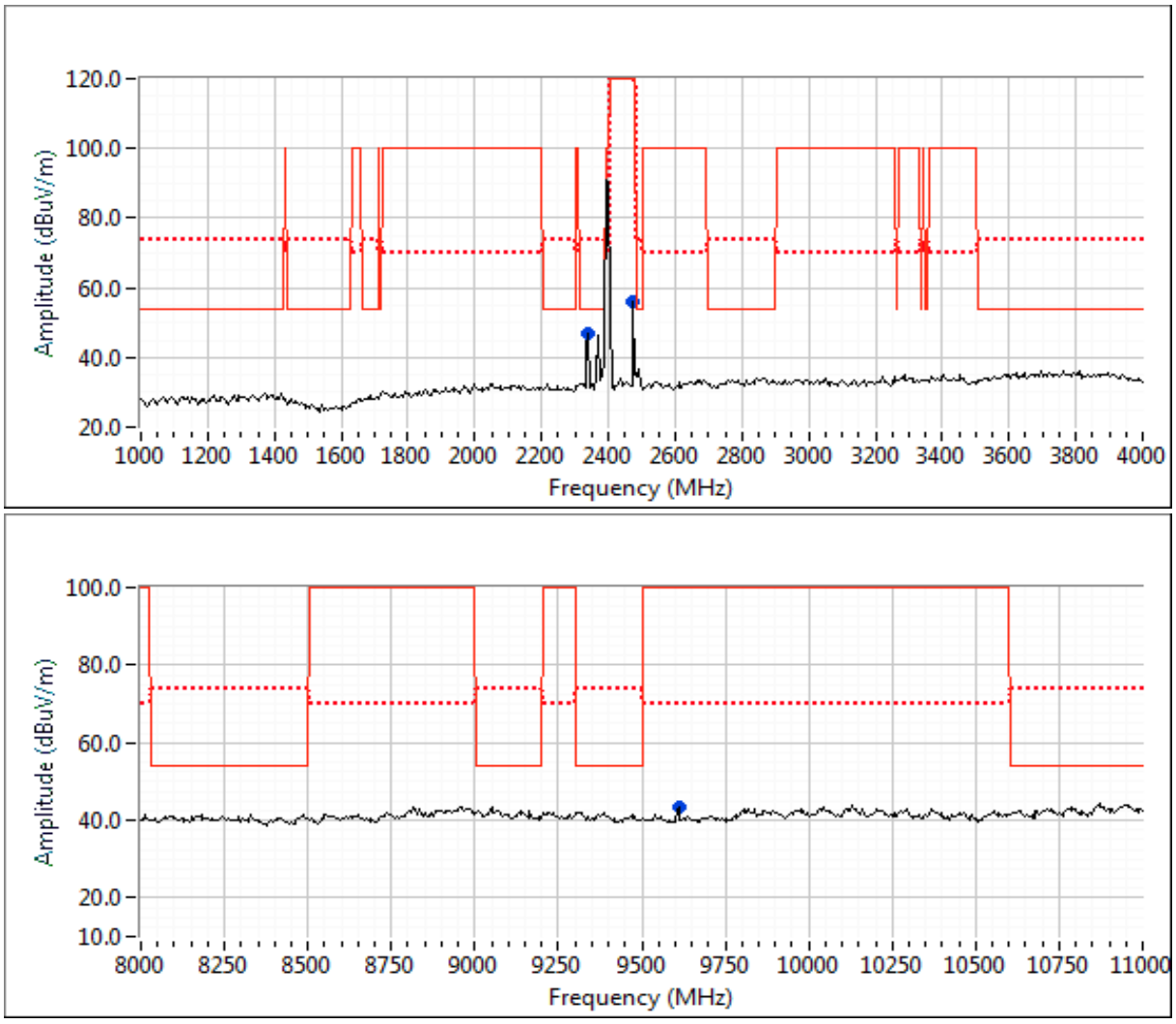
Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
9760.650	42.8	V	54.0	-11.2	AVG	5	2.0	RB 1 MHz;VB 1 kHz;Peak, Note 4
9760.590	53.3	V	74.0	-20.7	PK	5	2.0	RB 1 MHz;VB 3 MHz;Peak
2495.730	28.2	V	54.0	-25.8	AVG	40	1.0	RB 1 MHz;VB 1 kHz;Peak, Note 4
2494.350	40.5	V	74.0	-33.5	PK	40	1.0	RB 1 MHz;VB 3 MHz;Peak

Client:	Kinsa Inc.	Job Number:	PR073348
Model:	Smart Ear Thermometer Model KET-001	T-Log Number:	TL073348-RA
		Project Manager:	Christine Krebill
Contact:	David Gal	Project Coordinator:	-
Standard:	FCC Part 15, EN 60601-1-2	Class:	N/A

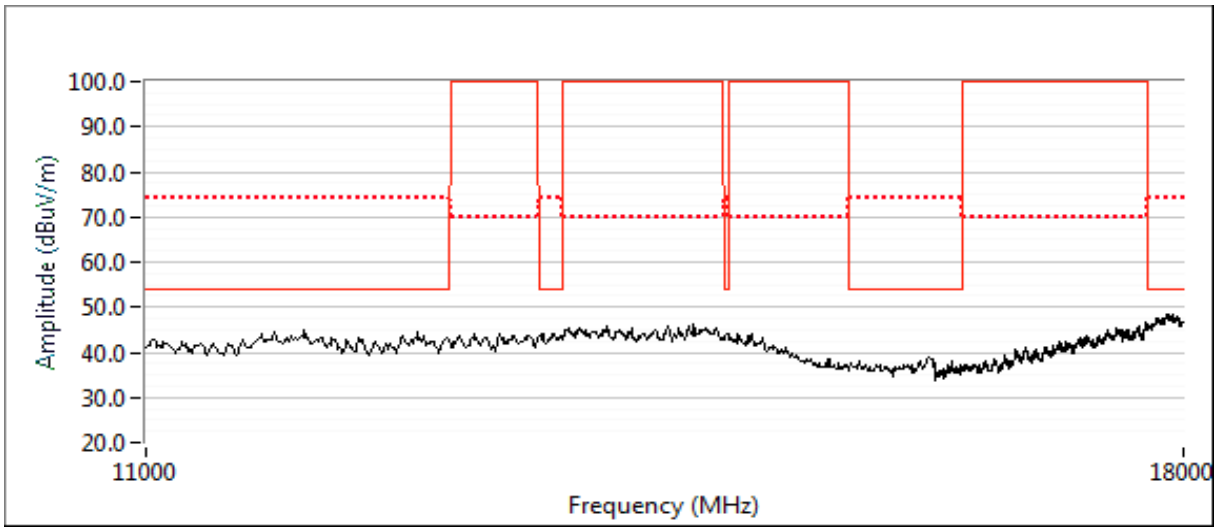
Run #3: Radiated Spurious Emissions, Selected Frequencies

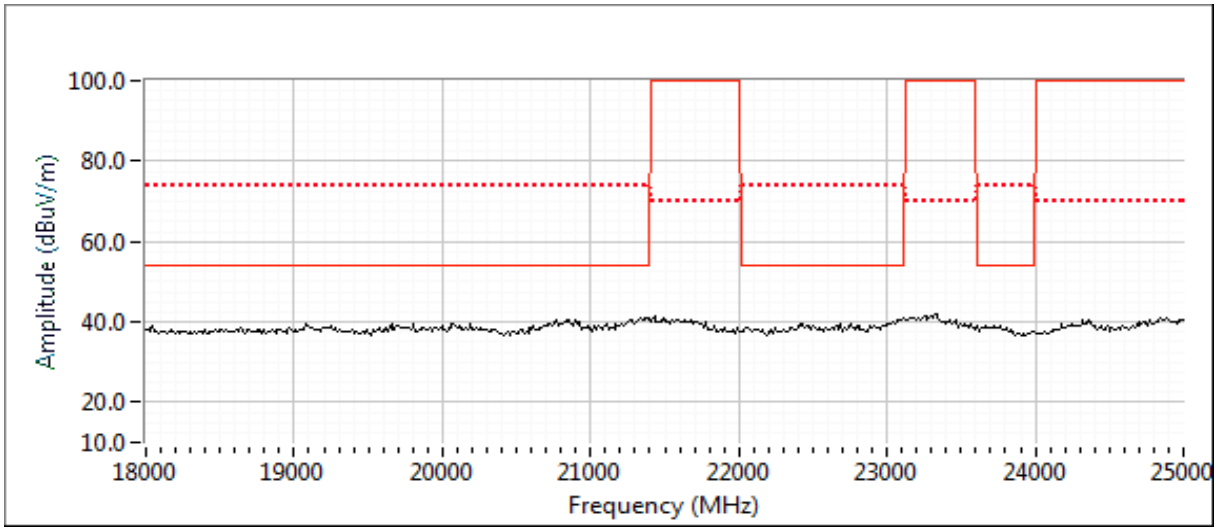
Date of Test: 2/6/2018 0:00 | Config. Used: 1
Test Engineer: Jude Semana | Config Change: None
Test Location: Chamber 5 | EUT Voltage: 3V

BLE mode 2402MHz (Vertical)



Client:	Kinsa Inc.	Job Number:	PR073348
Model:	Smart Ear Thermometer Model KET-001	T-Log Number:	TL073348-RA
		Project Manager:	Christine Krebill
Contact:	David Gal	Project Coordinator:	-
Standard:	FCC Part 15, EN 60601-1-2	Class:	N/A





Client:	Kinsa Inc.	Job Number:	PR073348
Model:	Smart Ear Thermometer Model KET-001	T-Log Number:	TL073348-RA
		Project Manager:	Christine Krebill
Contact:	David Gal	Project Coordinator:	-
Standard:	FCC Part 15, EN 60601-1-2	Class:	N/A

Preliminary peak readings captured during pre-scan (BLE mode 2402MHz Vertical)

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
2340.000	*46.7*	*V*	*54.0*	*-7.3*	*Peak*	*231*	*2.5*	
2475.000	*56.1*	*V*	*N/A*	*N/A*	*Peak*	*106*	*1.0*	
9610.000	*43.4*	*V*	*54.0*	-10.6	*Peak*	*241*	*2.0*	

Maximized Readings

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
9608.570	41.3	V	54.0	-12.7	AVG	275	2.1	RB 1 MHz;VB 1 kHz;Peak, Note 4
9609.840	51.5	V	74.0	-22.5	PK	275	2.1	RB 1 MHz;VB 3 MHz;Peak

Client:	Kinsa Inc.	Job Number:	PR073348
Model:	Smart Ear Thermometer Model KET-001	T-Log Number:	TL073348-RA
		Project Manager:	Christine Krebill
Contact:	David Gal	Project Coordinator:	-
Standard:	FCC Part 15, EN 60601-1-2	Class:	B, Group 1

Radiated Emissions

(NTS Silicon Valley, Fremont Facility, Semi-Anechoic Chamber)

Test Specific Details

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

Date of Test: 2/6/2018 0:00
Test Engineer: Jude Semana
Test Location: Chamber 5

Config. Used: 1
Config Change: None
EUT Voltage: 3V

General Test Configuration

The EUT and any local support equipment were located on the turntable for radiated emissions testing.
The test distance and extrapolation factor (if applicable) are detailed under each run description.
Note, preliminary testing indicates that the emissions were maximized by orientation of the EUT and elevation of the measurement antenna. Maximized testing indicated that the emissions were maximized by orientation of the EUT, elevation of the measurement antenna, and manipulation of the EUT's interface cables.

Ambient Conditions:

Temperature: 25 °C
Rel. Humidity: 32 %

Summary of Results

Run #	Test Performed	Limit	Result	Margin
1	Radiated Emissions 30 - 1000 MHz, Preliminary	FCC and CISPR 11 Class B	Pass	Refer to individual runs
3	Radiated Emissions Fundamental	-	-	Radiated power = -0.1 dBm

Modifications Made During Testing

No modifications were made to the EUT during testing

Deviations From The Standard

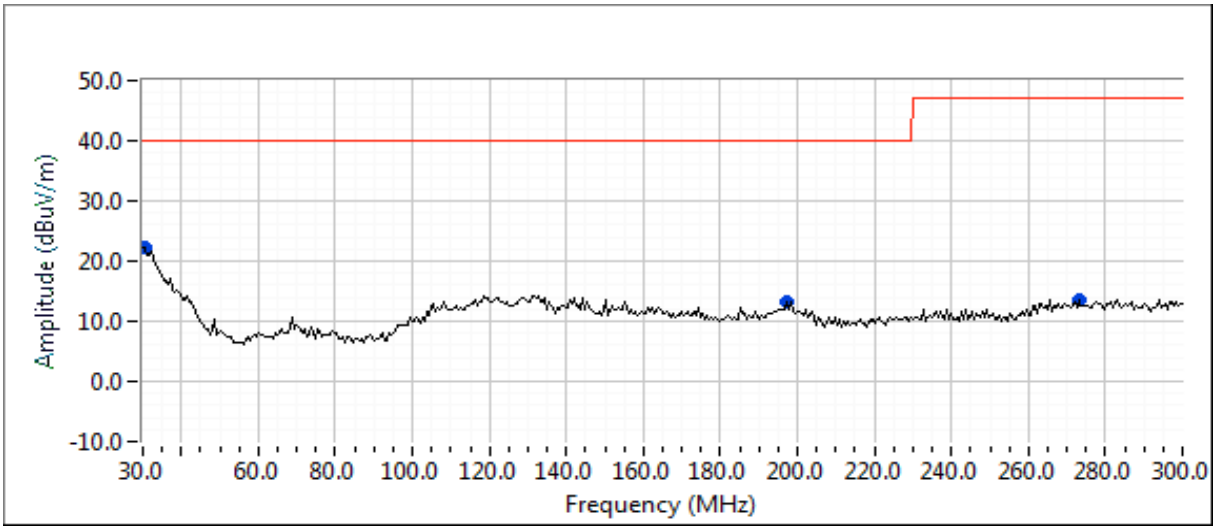
No deviations were made from the requirements of the standard.

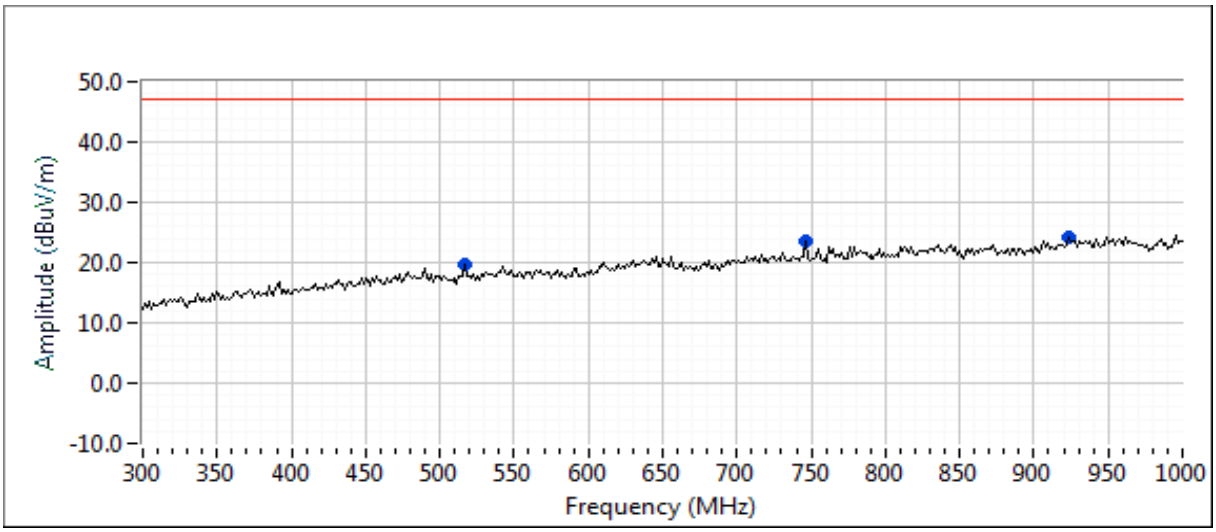
EUT power setting: 4

Client:	Kinsa Inc.	Job Number:	PR073348
Model:	Smart Ear Thermometer Model KET-001	T-Log Number:	TL073348-RA
		Project Manager:	Christine Krebill
Contact:	David Gal	Project Coordinator:	-
Standard:	FCC Part 15, EN 60601-1-2	Class:	B, Group 1

Run #1a: Preliminary Radiated Emissions, 30 - 1000 MHz
Channel 17 (2440MHz)

Test Parameters for Preliminary Scan(s)			
Frequency Range (MHz)	Prescan Distance (meters)	Limit Distance (meters)	Extrapolation Factor (dB, applied to data)
30 - 1000	3	3	0.0





Client:	Kinsa Inc.	Job Number:	PR073348
Model:	Smart Ear Thermometer Model KET-001	T-Log Number:	TL073348-RA
		Project Manager:	Christine Krebill
Contact:	David Gal	Project Coordinator:	-
Standard:	FCC Part 15, EN 60601-1-2	Class:	B, Group 1

Preliminary peak readings captured during pre-scan

Frequency	Level	Pol	Class B		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
30.541	*22.1*	*V*	*40.0*	*-17.9*	*Peak*	*183*	*2.0*	*Noise Floor*
197.194	*13.1*	*V*	*40.0*	*-26.9*	*Peak*	*329*	*2.0*	*Noise Floor*
272.946	*13.4*	*H*	*47.0*	*-33.6*	*Peak*	*80*	*2.0*	*Noise Floor*
517.435	*19.6*	*V*	*47.0*	*-27.4*	*Peak*	*29*	*1.0*	*Noise Floor*
746.092	*23.7*	*V*	*47.0*	*-23.3*	*Peak*	*41*	*1.0*	*Noise Floor*
922.846	*24.2*	*V*	*47.0*	*-22.8*	*Peak*	*299*	*2.0*	*Noise Floor*

Note 1:	No emission below 1GHz above the noise floor. Therefore, there is no need to test other channels.

Client:	Kinsa Inc.	Job Number:	PR073348
Model:	Smart Ear Thermometer Model KET-001	T-Log Number:	TL073348-RA
		Project Manager:	Christine Krebill
Contact:	David Gal	Project Coordinator:	-
Standard:	FCC Part 15, EN 60601-1-2	Class:	B, Group 1

Run #3: Maximized Fundamental Emission for antenna gain calculation
Check three orthogonal positions of the EUT, use 2 MHz wide BW, Max Hold
Final peak
All final readings collected at 3 meters test distance, unless otherwise noted

Frequency	Level	Pol	-		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
2440.000	95.1	V	-	-	PK	199	1.9	Radiated Power = -0.1 dBm

Note 1:	Radiated power in dBm calculated form Field Strength by subtracting 95.2 dB.

Client:	Kinsa Inc.	Job Number:	PR073348
Model:	Smart Ear Thermometer Model KET-001	T-Log Number:	TL073348-RA
		Project Manager:	Christine Krebill
Contact:	David Gal	Project Coordinator:	-
Standard:	FCC Part 15, EN 60601-1-2	Class:	N/A

RSS-247 and FCC 15.247 (DTS) Radiated Spurious Emissions

Test Specific Details

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

General Test Configuration

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

For radiated emissions testing the measurement antenna was located 3 meters from the EUT, unless otherwise noted.

Ambient Conditions:

Temperature: 22 °C
Rel. Humidity: 33 %

Summary of Results - Device Operating in the 2400-2483.5 MHz Band

Run #	Channel		Power Setting	Test Performed	Limit	Result / Margin
1	39 - 2480MHz		4	Radiated Emissions, Selected Frequencies	FCC Part 15.209 / 15.247(c)	52.2 dBµV/m @ 4959.9 MHz (-1.8 dB)
2	17 - 2440MHz		4	Radiated Emissions, Selected Frequencies	FCC Part 15.209 / 15.247(c)	53.4 dBµV/m @ 4880.0 MHz (-0.6 dB)
3	37 - 2402MHz		4	Radiated Emissions, Selected Frequencies	FCC Part 15.209 / 15.247(c)	47.8 dBµV/m @ 4804.0 MHz (-6.2 dB)

Modifications Made During Testing

No modifications were made to the EUT during testing

Deviations From The Standard

No deviations were made from the requirements of the standard.

Sample Notes

Sample S/N: EVTFCC1
Antenna: Internal
Power setting: 4

Client:	Kinsa Inc.	Job Number:	PR073348
Model:	Smart Ear Thermometer Model KET-001	T-Log Number:	TL073348-RA
		Project Manager:	Christine Krebill
Contact:	David Gal	Project Coordinator:	-
Standard:	FCC Part 15, EN 60601-1-2	Class:	N/A

Procedure Comments:

Measurements performed in accordance with FCC KDB 558074
Peak measurements performed with: RBW=1MHz, VBW=3MHz, peak detector, max hold, auto sweep time
Unless otherwise stated/noted, emission has duty cycle ≥ 98% and was measured using RBW=1MHz, VBW=10Hz, peak detector, linear average mode, auto sweep time, max hold.
2.4GHz band reject filter used

Mode	Data Rate	Duty Cycle (x)	Constant DC?	T (ms)	Pwr Cor Factor*	Lin Volt Cor Factor**	Min VBW for FS (Hz)	
BLE	1 Mb/s	0.96	Yes	2.134	0.2	0.4	469	1 kHz

Measurement Specific Notes:

Note 1:	Emission in non-restricted band, but limit of 15.209 used.
Note 2:	Emission in non-restricted band, the limit was set 30dB below the level of the fundamental and measured in 100kHz.
Note 3:	Emission has a duty cycle ≥ 98%, average measurement performed: RBW=1MHz, VBW=3MHz, RMS, Power averaging, auto sweep, trace average 100 traces
Note 4:	Emission has constant duty cycle < 98%, average measurement performed: RBW=1MHz, VBW>1/T but not less than 10Hz, peak detector, linear averaging, auto sweep, trace average 100 traces, measurement corrected by Linear voltage correction factor
Note 5:	Emission has constatnt duty cycle < 98%, average measurement performed: RBW=1MHz, VBW=3MHz, RMS, Power averaging, auto sweep, trace average 100 traces, measurement corrected by Pwr correction factor
Note 6:	Emission has non constant duty cycle < 98%, average measurement performed: RBW=1MHz, VBW> 1/T, peak detector, linear average mode, sweep time auto, max hold. Max hold for 50*(1/DC) traces
Note 7:	Emission has non constant duty cycle < 98%, average measurement performed: RBW=1MHz, VBW> 1/T, RMS detector, sweep time auto, max hold. Max hold for 50*(1/DC) traces

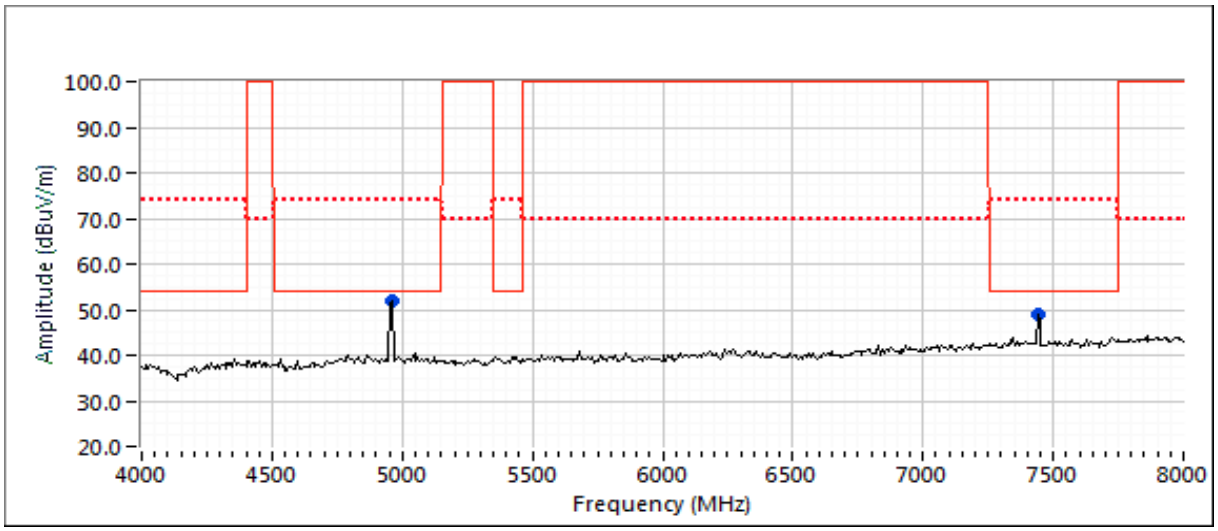
Client:	Kinsa Inc.	Job Number:	PR073348
Model:	Smart Ear Thermometer Model KET-001	T-Log Number:	TL073348-RA
		Project Manager:	Christine Krebill
Contact:	David Gal	Project Coordinator:	-
Standard:	FCC Part 15, EN 60601-1-2	Class:	N/A

Run #1: Radiated Spurious Emissions, Selected Frequencies

Date of Test: 12/14/2017 0:00
Test Engineer: Jude Semana
Test Location: Chamber 7

Config. Used: 1
Config Change: None
EUT Voltage: 3V

BLE mode 2480MHz (Vertical)



Client:	Kinsa Inc.	Job Number:	PR073348
Model:	Smart Ear Thermometer Model KET-001	T-Log Number:	TL073348-RA
		Project Manager:	Christine Krebill
Contact:	David Gal	Project Coordinator:	-
Standard:	FCC Part 15, EN 60601-1-2	Class:	N/A

Preliminary peak readings captured during pre-scan (BLE mode 2480MHz Vertical)

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
4960.000	*51.2*	*H*	*54.0*	*-2.8*	*Peak*	*208*	*1.9*	
7440.000	*49.0*	*V*	*54.0*	*-5.0*	*Peak*	*34*	*1.0*	

Maximized Readings

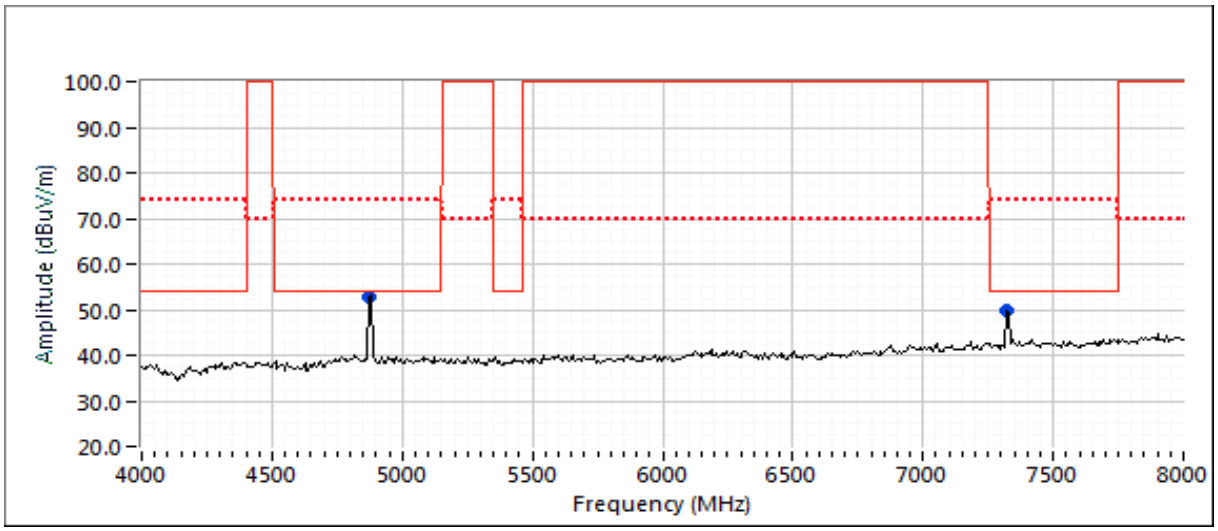
Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
FLAT								
4960.070	47.5	H	54.0	-6.5	AVG	138	1.0	RB 1 MHz;VB 1 kHz;Peak:Note 4
4959.970	53.5	H	74.0	-20.5	PK	138	1.0	RB 1 MHz;VB 3 MHz;Peak
4959.950	51.3	V	54.0	-2.7	AVG	194	1.7	RB 1 MHz;VB 1 kHz;Peak:Note 4
4960.250	55.3	V	74.0	-18.7	PK	194	1.7	RB 1 MHz;VB 3 MHz;Peak
7439.930	47.6	H	54.0	-6.4	AVG	6	2.5	RB 1 MHz;VB 1 kHz;Peak:Note 4
7439.520	56.7	H	74.0	-17.3	PK	6	2.5	RB 1 MHz;VB 3 MHz;Peak
7439.970	49.2	V	54.0	-4.8	AVG	145	1.0	RB 1 MHz;VB 1 kHz;Peak:Note 4
7439.560	57.0	V	74.0	-17.0	PK	145	1.0	RB 1 MHz;VB 3 MHz;Peak
VERTICAL								
4959.920	52.2	H	54.0	-1.8	AVG	210	1.9	RB 1 MHz;VB 1 kHz;Peak:Note 4
4959.630	55.5	H	74.0	-18.5	PK	210	1.9	RB 1 MHz;VB 3 MHz;Peak
4959.910	44.9	V	54.0	-9.1	AVG	291	1.3	RB 1 MHz;VB 1 kHz;Peak:Note 4
4959.340	51.9	V	74.0	-22.1	PK	291	1.3	RB 1 MHz;VB 3 MHz;Peak
7439.880	48.0	H	54.0	-6.0	AVG	294	1.6	RB 1 MHz;VB 1 kHz;Peak:Note 4
7439.440	56.3	H	74.0	-17.7	PK	294	1.6	RB 1 MHz;VB 3 MHz;Peak
7439.920	48.4	V	54.0	-5.6	AVG	42	1.0	RB 1 MHz;VB 1 kHz;Peak:Note 4
7440.310	56.6	V	74.0	-17.4	PK	42	1.0	RB 1 MHz;VB 3 MHz;Peak
SIDE								
4960.000	52.2	H	54.0	-1.8	AVG	26	2.1	RB 1 MHz;VB 1 kHz;Peak:Note 4
4960.480	56.3	H	74.0	-17.7	PK	26	2.1	RB 1 MHz;VB 3 MHz;Peak
4959.980	50.5	V	54.0	-3.5	AVG	60	1.2	RB 1 MHz;VB 1 kHz;Peak:Note 4
4960.130	56.3	V	74.0	-17.7	PK	60	1.2	RB 1 MHz;VB 3 MHz;Peak
7439.880	49.7	H	54.0	-4.3	AVG	44	1.1	RB 1 MHz;VB 1 kHz;Peak:Note 4
7439.650	57.3	H	74.0	-16.7	PK	44	1.1	RB 1 MHz;VB 3 MHz;Peak
7439.980	51.8	V	54.0	-2.2	AVG	235	1.0	RB 1 MHz;VB 1 kHz;Peak:Note 4
7440.540	58.3	V	74.0	-15.7	PK	235	1.0	RB 1 MHz;VB 3 MHz;Peak

Client:	Kinsa Inc.	Job Number:	PR073348
Model:	Smart Ear Thermometer Model KET-001	T-Log Number:	TL073348-RA
		Project Manager:	Christine Krebill
Contact:	David Gal	Project Coordinator:	-
Standard:	FCC Part 15, EN 60601-1-2	Class:	N/A

Run #2: Radiated Spurious Emissions, Selected Frequencies

Date of Test: 12/14/2017 0:00 | Config. Used: 1
Test Engineer: Jude Semana | Config Change: None
Test Location: Chamber 7 | EUT Voltage: 3V

BLE mode 2440MHz (Vertical)



Client:	Kinsa Inc.	Job Number:	PR073348
Model:	Smart Ear Thermometer Model KET-001	T-Log Number:	TL073348-RA
		Project Manager:	Christine Krebill
Contact:	David Gal	Project Coordinator:	-
Standard:	FCC Part 15, EN 60601-1-2	Class:	N/A

Preliminary peak readings captured during pre-scan BLE mode 2440MHz Vertical)

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
4873.330	*52.7*	*V*	*54.0*	*-1.3*	*Peak*	*154*	*2.5*	
7320.000	*49.8*	*H*	*54.0*	*-4.2*	*Peak*	*217*	*2.2*	

Maximized Readings

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
VERTICAL								
4880.060	49.9	H	54.0	-4.1	AVG	60	1.4	RB 1 MHz;VB 1 kHz;Peak:Note 4
4880.230	54.9	H	74.0	-19.1	PK	60	1.4	RB 1 MHz;VB 3 MHz;Peak
4880.010	53.4	V	54.0	-0.6	AVG	152	2.5	RB 1 MHz;VB 1 kHz;Peak:Note 4
4879.650	57.1	V	74.0	-16.9	PK	152	2.5	RB 1 MHz;VB 3 MHz;Peak
SIDE								
7319.900	47.8	H	54.0	-6.2	AVG	47	1.4	RB 1 MHz;VB 1 kHz;Peak:Note 4
7320.630	56.4	H	74.0	-17.6	PK	47	1.4	RB 1 MHz;VB 3 MHz;Peak
7319.890	49.5	V	54.0	-4.5	AVG	231	1.2	RB 1 MHz;VB 1 kHz;Peak:Note 4
7320.040	57.5	V	74.0	-16.5	PK	231	1.2	RB 1 MHz;VB 3 MHz;Peak

Test reduction used based on results for all three orientations on channel 39.

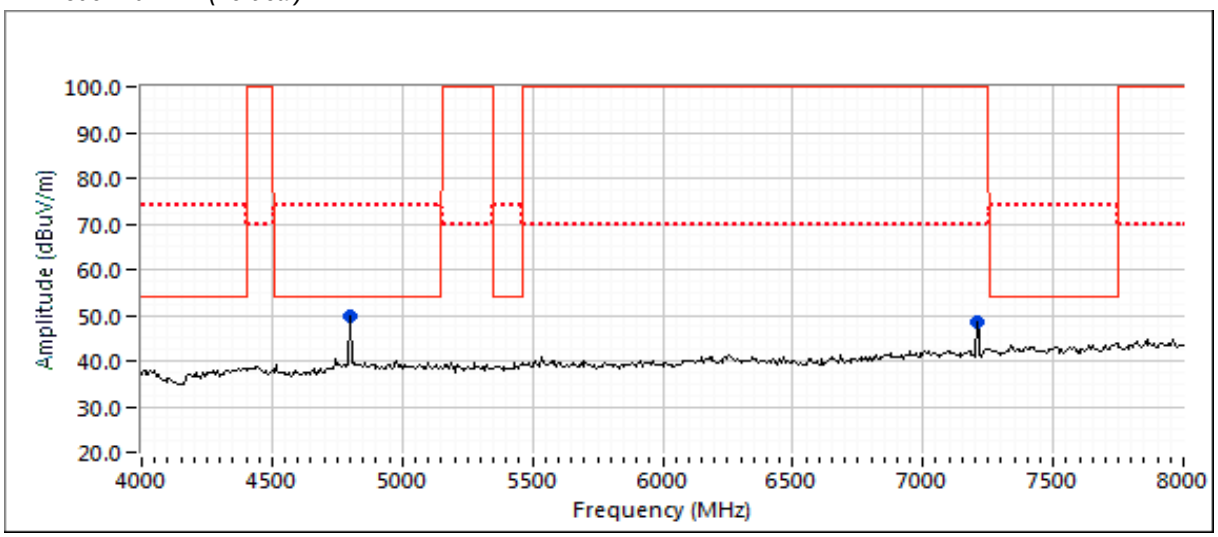
Client:	Kinsa Inc.	Job Number:	PR073348
Model:	Smart Ear Thermometer Model KET-001	T-Log Number:	TL073348-RA
		Project Manager:	Christine Krebill
Contact:	David Gal	Project Coordinator:	-
Standard:	FCC Part 15, EN 60601-1-2	Class:	N/A

Run #3: Radiated Spurious Emissions, Selected Frequencies

Date of Test: 12/14/2017 0:00
Test Engineer: Jude Semana
Test Location: Chamber 7

Config. Used: 1
Config Change: None
EUT Voltage: 3V

BLE mode 2402MHz (Vertical)



Client:	Kinsa Inc.	Job Number:	PR073348
Model:	Smart Ear Thermometer Model KET-001	T-Log Number:	TL073348-RA
		Project Manager:	Christine Krebill
Contact:	David Gal	Project Coordinator:	-
Standard:	FCC Part 15, EN 60601-1-2	Class:	N/A

Preliminary peak readings captured during pre-scan (BLE mode 2402MHz Vertical)

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
4800.000	*49.8*	*V*	*54.0*	*-4.2*	*Peak*	*125*	*1.6*	
7206.670	*48.7*	*V*	*70.0*	*-21.3*	*Peak*	*25*	*1.0*	

Maximized Readings

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
VERTICAL								
4803.970	46.9	H	54.0	-7.1	AVG	130	1.0	RB 1 MHz;VB 1 kHz;Peak:Note 4
4804.080	52.8	H	74.0	-21.2	PK	130	1.0	RB 1 MHz;VB 3 MHz;Peak
4804.000	47.8	V	54.0	-6.2	AVG	88	1.8	RB 1 MHz;VB 1 kHz;Peak:Note 4
4803.610	53.6	V	74.0	-20.4	PK	88	1.8	RB 1 MHz;VB 3 MHz;Peak
SIDE								
7206.010	48.4	H	100.0	-51.6	AVG	46	1.3	RB 1 MHz;VB 1 kHz;Peak:Note 4
7205.430	56.4	H	70.0	-13.6	PK	46	1.3	RB 1 MHz;VB 3 MHz;Peak
7206.000	51.9	V	100.0	-48.1	AVG	231	1.0	RB 1 MHz;VB 1 kHz;Peak:Note 4
7205.520	58.6	V	70.0	-11.4	PK	231	1.0	RB 1 MHz;VB 3 MHz;Peak

Test reduction used based on results for all three orientations on channel 39.

Client:	Kinsa Inc.	Job Number:	PR073348
Model:	Smart Ear Thermometer Model KET-001	T-Log Number:	TL073348-RA
		Project Manager:	Christine Krebill
Contact:	David Gal	Project Coordinator:	-
Standard:	FCC Part 15, EN 60601-1-2	Class:	N/A

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

Power, PSD, Bandwidth and Spurious Emissions

Test Specific Details

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

Date of Test: 1/4/2018
Test Engineer: David W. Bare
Test Location: Fremont Lab #4A
Config. Used: 1
Config Change: None
EUT Voltage: Battery

General Test Configuration

The EUT was connected to the spectrum analyzer or power meter via a suitable attenuator. All measurements were made on a single chain.
All measurements have been corrected to allow for the external attenuators used.

Ambient Conditions:

Temperature: 20 °C
Rel. Humidity: 55 %

Summary of Results

Run #	Pwr setting		Test Performed	Limit	Pass / Fail	Result / Margin
1	4		Output Power	15.247(b)	Pass	-0.4 dBm
2	4		Power spectral Density (PSD)	15.247(d)	Pass	-0.4 dBm
3	4		Minimum 6dB Bandwidth	15.247(a)	Pass	0.52 MHz
3	4		99% Bandwidth	RSS GEN	-	1.093 MHz
4	4		Spurious emissions	15.247(b)	Pass	All > 20 dBc

Modifications Made During Testing

The following modifications were made to the EUT during testing in order to comply with the requirements of the standard:
A short cable with SMA connector was added to the EUT to enable conducted measurements.

Deviations From The Standard

No deviations were made from the requirements of the standard.

Client:	Kinsa Inc.	Job Number:	PR073348
Model:	Smart Ear Thermometer Model KET-001	T-Log Number:	TL073348-RA
		Project Manager:	Christine Krebill
Contact:	David Gal	Project Coordinator:	-
Standard:	FCC Part 15, EN 60601-1-2	Class:	N/A

Procedure Comments:

Measurements performed in accordance with ANSI C63.10

Mode	Data Rate	Duty Cycle (x)	Constant DC?	T (ms)	Pwr Cor Factor*	Lin Volt Cor Factor**	Min VBW for FS (Hz)
BLE	1 Mb/s	0.96	Yes	2.13	0.19	0.37	469

Sample Notes

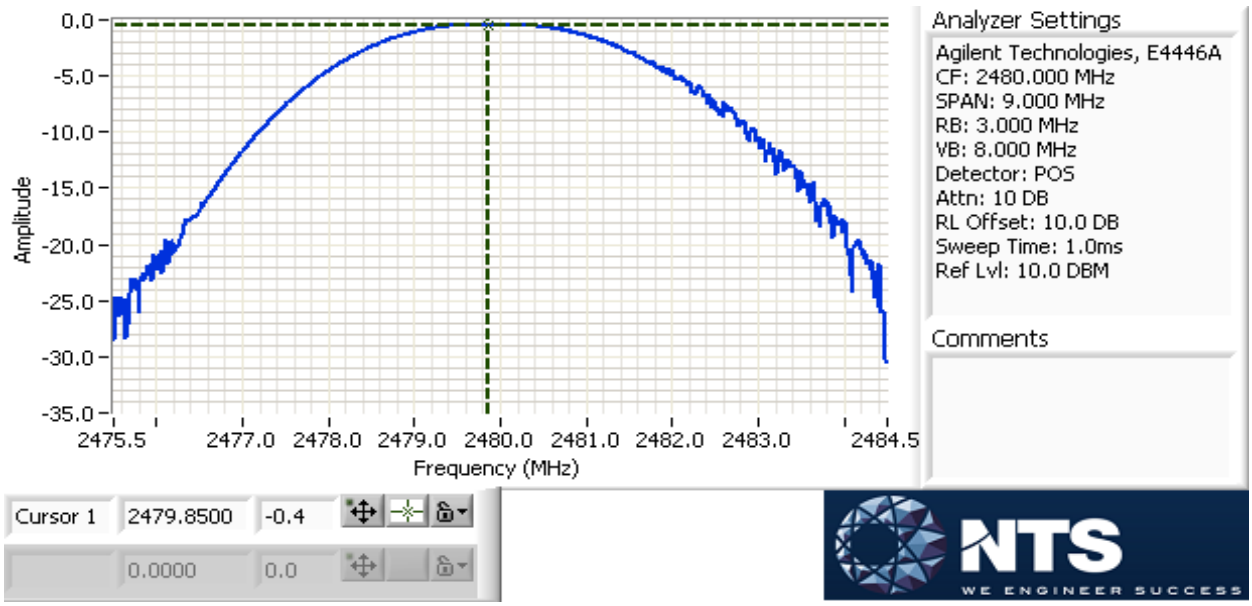
Sample S/N: EVTFCC02, EVTFCC40 and EVTFCC80

Client:	Kinsa Inc.	Job Number:	PR073348
Model:	Smart Ear Thermometer Model KET-001	T-Log Number:	TL073348-RA
		Project Manager:	Christine Krebill
Contact:	David Gal	Project Coordinator:	-
Standard:	FCC Part 15, EN 60601-1-2	Class:	N/A

Run #1: Output Power

Power Setting[2]	Frequency (MHz)	Output Power (dBm) [1]	Output Power mW	Antenna Gain (dBi)	Result	EIRP dBm	EIRP W	Output Power (dBm) [3]	Output Power mW
4	2402	-1.8	0.66	1.5	Pass	-0.3	0.0009		
4	2440	-1.6	0.69	1.5	Pass	-0.1	0.0010		
4	2480	-0.4	0.91	1.5	Pass	1.1	0.0013		

Note 1:	Output power measured using a spectrum analyzer (see plot below) with RBW = 3 MHz and VBW = 8MHz, Span = 9 MHz, auto sweep time, peak detector, max hold.
Note 2:	Power setting - the software power setting used during testing, included for reference only.
Note 3:	Power measured using average power meter (non-gated) and is included for reference only.
Note 4:	Antenna gain calucluated from radiated power and output power. See separate test for fundamental field strength.



Client:	Kinsa Inc.	Job Number:	PR073348
Model:	Smart Ear Thermometer Model KET-001	T-Log Number:	TL073348-RA
		Project Manager:	Christine Krebill
Contact:	David Gal	Project Coordinator:	-
Standard:	FCC Part 15, EN 60601-1-2	Class:	N/A

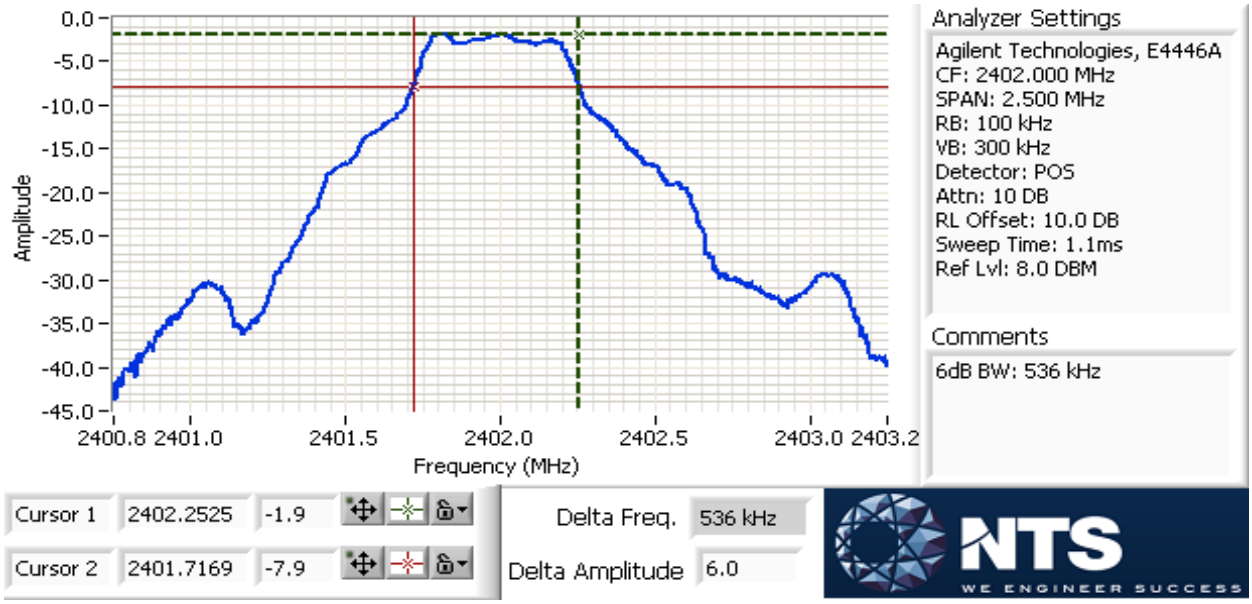
Run #2: Power spectral Density

Note 1:	Since maximum output power is less than the PSD limit, no separate measurement was taken for PSD.

Run #3: Signal Bandwidth

Power Setting	Frequency (MHz)	Bandwidth (MHz)		RBW Setting (MHz)	
		6dB	99%	6dB	99%
4	2402	0.536	0.963	0.1	0.03
4	2440	0.556	1.093	0.1	0.03
4	2480	0.520	1.068	0.1	0.03

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



Client:	Kinsa Inc.	Job Number:	PR073348
Model:	Smart Ear Thermometer Model KET-001	T-Log Number:	TL073348-RA
		Project Manager:	Christine Krebill
Contact:	David Gal	Project Coordinator:	-
Standard:	FCC Part 15, EN 60601-1-2	Class:	N/A

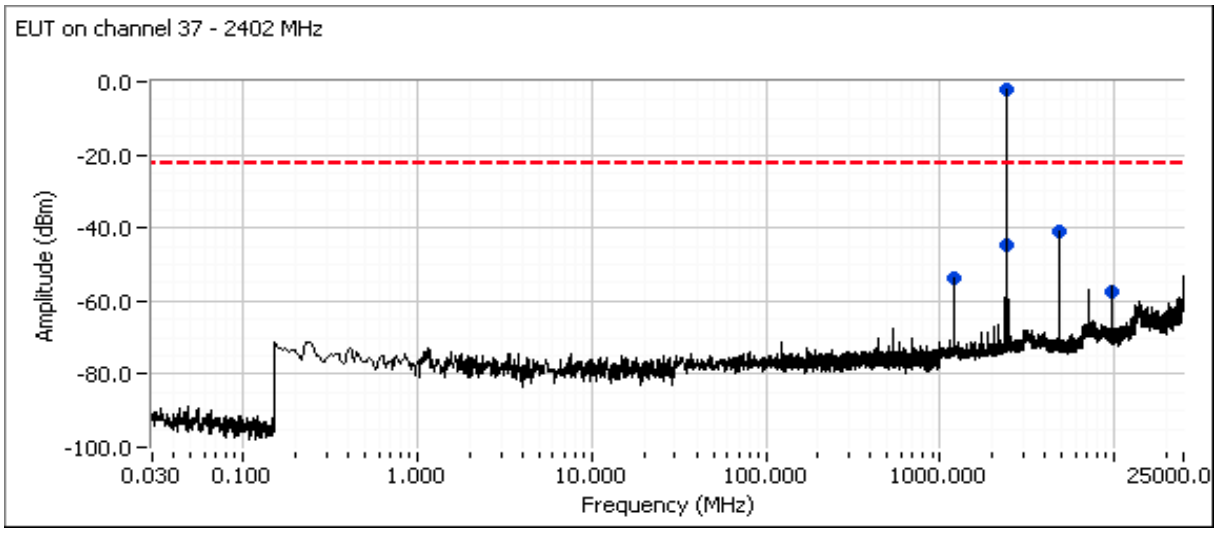
Run #4a: Out of Band Spurious Emissions

Frequency MHz	Level dBµV	Antenna	Limit	Margin	Detector QP/Ave	Comments	Channel
1201.000	-53.8	RF Port	-21.8	-32.0	Peak		37
2383.210	-44.6	RF Port	-21.8	-22.8	Peak		37
2402.000	-1.8	RF Port	N/A	-	Peak	Fundamental	37
4804.000	-41.2	RF Port	-21.8	-19.4	Peak		37
9608.000	-57.6	RF Port	-21.8	-35.8	Peak		37
1220.000	-53.2	RF Port	-21.6	-31.6	Peak		17
2440.000	-1.6	RF Port	N/A	-	Peak	Fundamental	17
4880.000	-34.4	RF Port	-21.6	-12.8	Peak		17
7320.000	-52.4	RF Port	-21.6	-30.8	Peak		17
9760.000	-50.2	RF Port	-21.6	-28.6	Peak		17
2338.460	-44.5	RF Port	-20.6	-23.9	Peak		17
2472.810	-42.6	RF Port	-19.6	-23.0	Peak		17
1240.000	-54.0	RF Port	-20.4	-33.6	Peak		39
2479.980	-54.3	RF Port	-20.4	-33.9	Peak		39
2480.000	-0.4	RF Port	N/A	-	Peak	Fundamental	39
2500.250	-47.6	RF Port	-20.4	-27.2	Peak		39
4960.000	-39.9	RF Port	-20.4	-19.5	Peak		39
7440.000	-57.3	RF Port	-20.4	-36.9	Peak		39

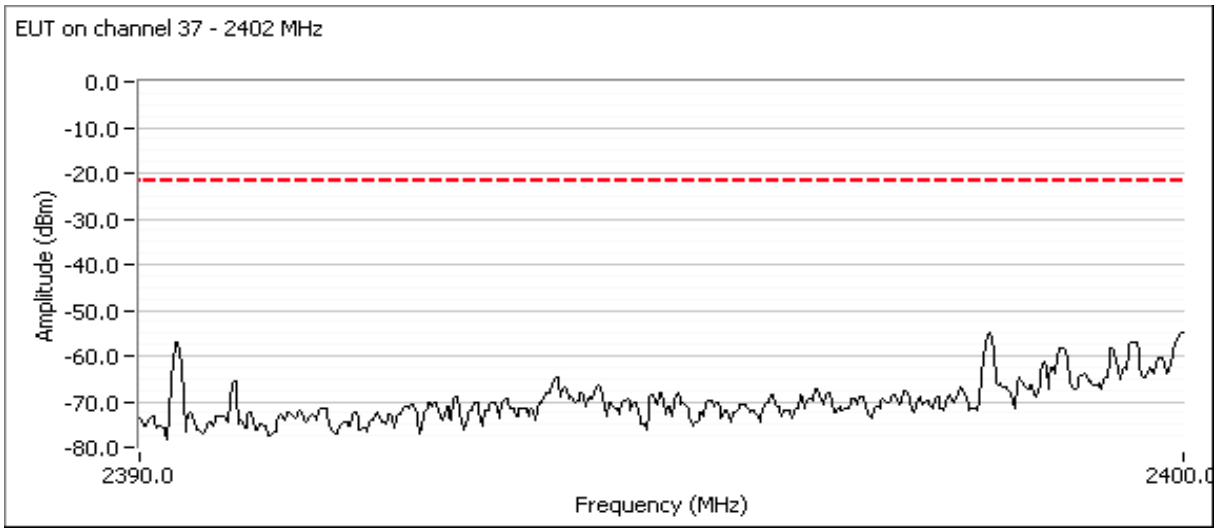
RBW = 100 kHz and VBW = 300 kHz for all plots except below 150 kHz due to SA DC component.

Client:	Kinsa Inc.	Job Number:	PR073348
Model:	Smart Ear Thermometer Model KET-001	T-Log Number:	TL073348-RA
		Project Manager:	Christine Krebill
Contact:	David Gal	Project Coordinator:	-
Standard:	FCC Part 15, EN 60601-1-2	Class:	N/A

Plots for low channel

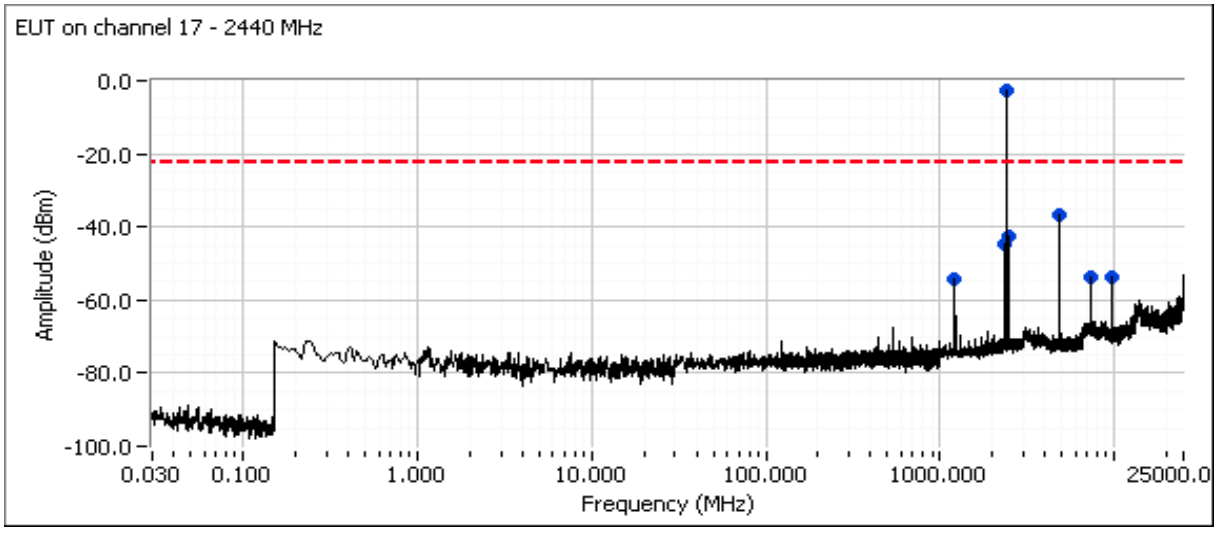


Additional plot showing compliance with -20dBc limit from 2390 MHz to 2400 MHz. Radiated measurements used to show compliance with the limits in the restricted band below 2390 MHz.

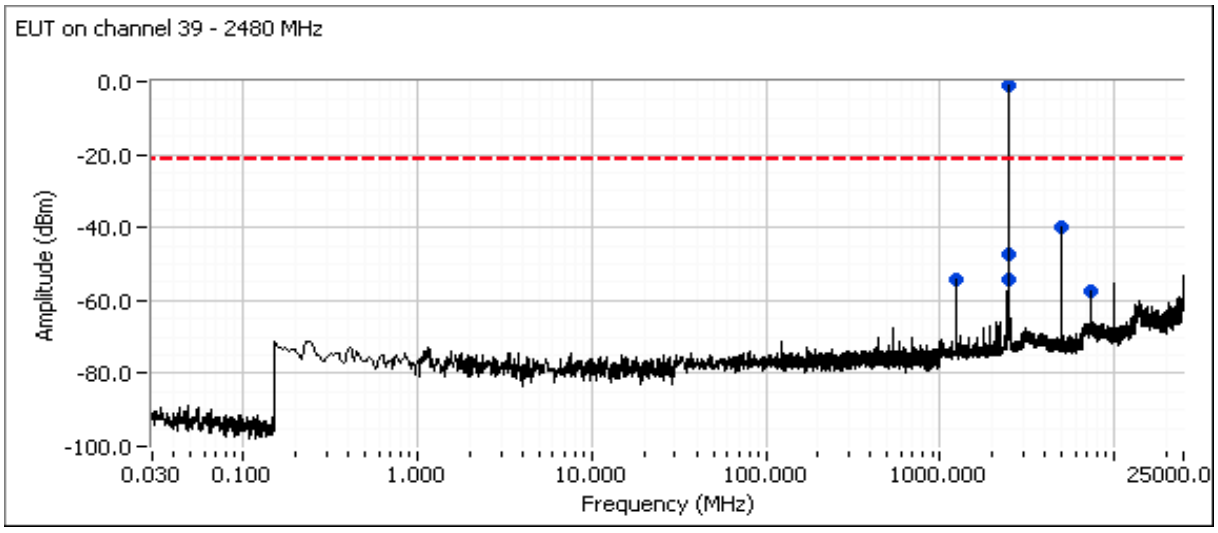


Client:	Kinsa Inc.	Job Number:	PR073348
Model:	Smart Ear Thermometer Model KET-001	T-Log Number:	TL073348-RA
		Project Manager:	Christine Krebill
Contact:	David Gal	Project Coordinator:	-
Standard:	FCC Part 15, EN 60601-1-2	Class:	N/A

Plot for center channel



Plot for high channel



End of Report

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