

FCC Test Report –2.4GHz Bluetooth LE

Report ID: 03360-RF-00096

FCC ID : AZ489FT7078

Tested Model : LEX L10i

Test Date : Nov 19, 2015 ~ Jan 22, 2016

Issued Date : 29 Jan, 2016

Applicant : Motorola Solution Malaysia Sdn Bhd

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1. BT LE 2.4GHz Test

1.0. Summary of Test Result

FCC Clause	Test Item	Result	Remark
15.247 (a)(2)	6dB Channel Bandwidth	Pass	Meet the requirement of limit
15.247 (b)(3)	Conducted RF Output Power (Peak)	Pass	Meet the requirement of limit
15.247 (e)	Maximum Power Spectral Density	Pass	Meet the requirement of limit
15.247 (b)	Conducted Spurious Emissions	Pass	Meet the requirement of limit
15.247 (d)	Band edge Conducted Spurious Emission	Pass	Meet the requirement of limit
15.205, 15.209, 15.247 (d)	Radiated Emission within Restricted Bands	Pass	Meet the requirement of limit
15.207	AC Powerline Conducted Emission	Pass	Meet the requirement of limit
15.203	Antenna requirement	Pass	Internal antenna is not accessible to the end-user

1.1. Measurement Uncertainty

Measurement	Frequency	Expanded Uncertainty (k=1.96) (±)
Radiated Emissions up to 1 GHz	30MHz ~ 200MHz	5.01
	200MHz ~ 1000MHz	5.01
Radiated Emissions above 1 GHz	1GHz ~ 18GHz	5.01
	18GHz ~ 25GHz	5.01

1.2. Equipment List

DESCRIPTION	MODEL	SERIAL NUMBER	CALIBRATION DATE	CALIBRATION DUE DATE
POWER SUPPLY	6652A	3117A00162	6-Mar-15	6-Mar-16
SPECTRUM ANALYZER	FSEK30	838495/014	21-Oct-14	21-Oct-16
SPECTRUM ANALYZER	E4445A	MY45301089	6-Sep-14	6-Sep-16
CHAMBER	SH-641	92002651	15-Mar-15	15-Mar-16
DRG HORN FREQ.	SAS-571	566	2-Aug-15	2-Aug-16
PREAMPLIFIER	PAM-0118P	361	NA	NA
BILOG ANTENNA	CBL6112B	2964	23-Apr-14	23-Apr-16
POWER SUPPLY	6031A	3121A02341	12-Jun-14	12-Jun-16
EMI TEST RECEIVER	ESIB26	100336	17-Jun-15	17-Jun-16
MICROWAVE SIGNAL GENERATOR	SMP04	100131	25-Jun-15	25-Jun-16
SYSTEM CONTROLLER	SC104V	050806-1	NA	NA
TURNTABLE FLUSH MOUNT 2M	FM2011	NA	NA	NA
ANTENNA POSITIONING TOWER	TLT2	NA	NA	NA
TEST RECEIVER	ESIB26	827769/009	16-Jun-15	16-Jun-16
SIGNAL ANALYZER	FSV40	101103	25-Jun-15	25-Jun-16
5m Semi-anechoic Chamber	S800-HX	J2308	29-Apr-15	29-Apr-16
BILOG ANTENNA	CBL6112B	2863	24-Jul-15	24-Jul-16
DATA LOGGER	TM320	12249289	12-Apr-15	12-Apr-16
BILOG ANTENNA	CBL6112D	25516	23-Apr-15	23-Apr-16
BROAD-BAND HORN ANTENNA	BBHA9170	BBHA9170143	24-Nov-15	24-Nov-16
SYSTEM POWER SUPPLY	6033A	2642A02318	14-Apr-14	14-Apr-16
TRANSIENT LIMITER	11947A	3107A04020	NA	NA
V-NETWORK 2-LINE	ENV216V	101268	18-Jun-15	18-Jun-16
LINE IMPEDANCE STAB.NETWORK	NNBM 8125	81251757	23-Jun-14	23-Jun-16
EMI TEST RECEIVER	ESCI	100225	19-Jun-15	19-Jun-16
LINE IMPEDANCE STAB.NETWORK	NNBM 8125	81251366	24-Jun-14	24-Jun-16
V-NETWORK 2-LINE	ENV216V	101039	18-Jun-15	18-Jun-16

1.3. General Information

General Description of EUT

Product	Smart phone
Brand	Motorola Solutions
Test Model	LEX L10i
Power Supply Rating	3.7Vdc (Battery), 5Vdc (Adapter)
Mode of operation	Bluetooth LE
Modulation Type	GFSK
Modulation Technology	FHSS
Transfer Rate	1Mbps
Operating Frequency	2402~2480Mhz
Number of Channel	40
Output Power	1.3149mW
Antenna Type	Inverted-L Monopole with 1.0dBi gain
Antenna Connector	Coaxial connector with switch
SW Version	LEXL10-INT-D17
HW Version	Rev A

Note:

1. The EUT contains following accessory devices and data cable.

Item	Brand	Model or P/N	Specification
Rechargeable Lithium ion battery	MOTOROLA	PMNN4472A	3.7Vdc, 2340mAh, 8.7Wh
Rechargeable Lithium ion battery	MOTOROLA	PMNN4475A	3.7Vdc, 4560mAh, 16.9Wh
ITE Power Supply	MOTOROLA	HKTN4009A	I/P: 100-240Vac, 50-60Hz, 0.2A O/P: 5Vdc, 1.2A
USB cable (CABLE: LEX USB SYNC AND CHARGE)	N/A	CB000262A01	-
Holster	N/A	HKLN4618A	-

General Description of Applied Standards

The EUT is a RF Product. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

FCC Part15, Subpart C (15.247)
558074 D01 DTS Meas Guidance v03r05
ANSI C63.10-2013

All test items have been performed and recorded as per the above standards.

1.4. Channel number and frequency info

40 channels are provided to this EUT:

Channel	Freq. (MHz)	Channel	Freq. (MHz)	Channel	Freq. (MHz)	Channel	Freq. (MHz)
0	2402	10	2422	20	2442	30	2462
1	2404	11	2424	21	2444	31	2464
2	2406	12	2426	22	2446	32	2466
3	2408	13	2428	23	2448	33	2468
4	2410	14	2430	24	2450	34	2470
5	2412	15	2432	25	2452	35	2472
6	2414	16	2434	26	2454	36	2474
7	2416	17	2436	27	2456	37	2476
8	2418	18	2438	28	2458	38	2478
9	2420	19	2440	29	2460	39	2480

1.5. Test Mode Applicability and Test Channel Detail

EUT Configure Mode	Applicable to				Description
	RE $\geq$ 1G	RE<1G	PLC	APCM	-

Where:

RE $\geq$ 1G: Radiated Emission above 1GHz & Bandedge Measurement

RE<1G: Radiated Emission below 1GHz

PLC: Power Line Conducted Emission

APCM: Antenna Port Conducted Measurement

Note: The EUT had been pre-tested on the positioned of each 3 axis. The worst case was found when positioned on **Y-plane**.

Radiated Emission Test (Above 1GHz)

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).

☒ Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type
-	0 to 39	0,19,39	FHSS	GFSK

Radiated Emission Test (Below 1GHz)

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).

☒ Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type
-	0 to 39	0,19,39	FHSS	GFSK

Power Line Conducted Emission Test

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).

☒ Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type
Application Mode	0 to 39	AUTO	FHSS	AUTO

Antenna Port Conducted Measurement:

☒ This item includes all test value of each mode, but only includes spectrum plot of worst value of each mode.

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).

☒ Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type
-	0 to 39	0,19,39	FHSS	GFSK

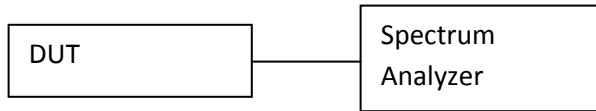
Test Condition:

Applicable To	Environmental Conditions	Input Power	Tested By
RE≥1G	25°C, 50% RH	3.7V DC	Nazrin/Qawiman
RE<1G	25°C, 50% RH	3.7V DC	Nazrin/Qawiman
PLC	22.4°C, 68.6% RH	120V AC, 240V AC	Madi/Rudy
APCM	25°C, 50% RH	3.7V DC	Jino Lim

2.0. Test Types and Results

2.1. 6dB Channel Bandwidth

2.1.1. Test Procedure



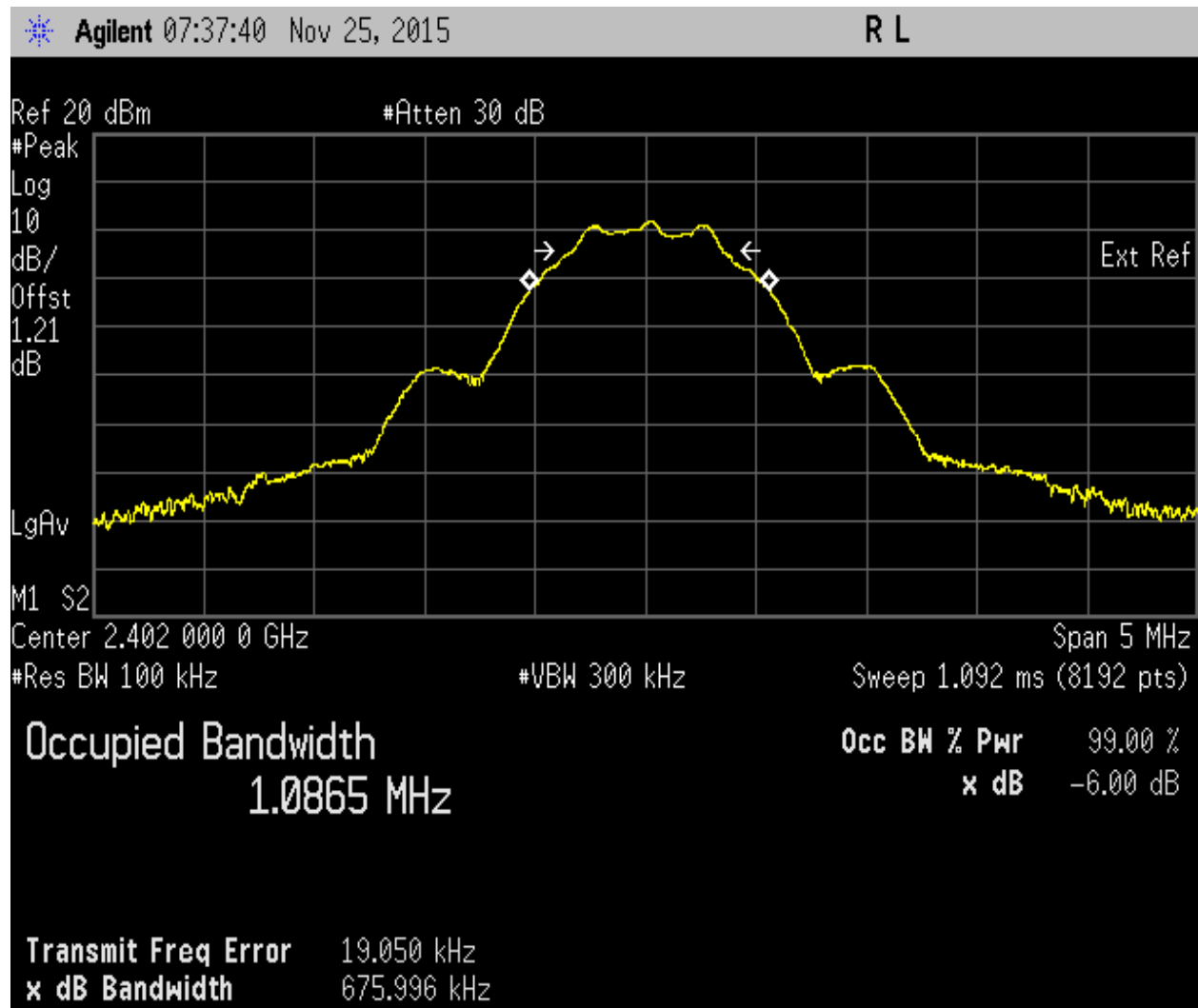
- a) Check and ensure the spectrum analyzer well calibrate.
- b) Turn on the DUT and set DUT to transmit maximum power.
- c) Connect DUT's antenna terminal to spectrum analyzer with a low loss cable.
- d) Setting of Spectrum analyzer :
 - a. RBW = 100 kHz
 - b. VBW = 300 kHz
 - c. Detector mode = Peak
 - d. Trace = Max hold
 - e. Sweep = auto
- e) Measure the freq different of two frequencies that were attenuated 6dB from peak of the emission & record the frequency difference as the emission bandwidth.

2.1.2. Limits:

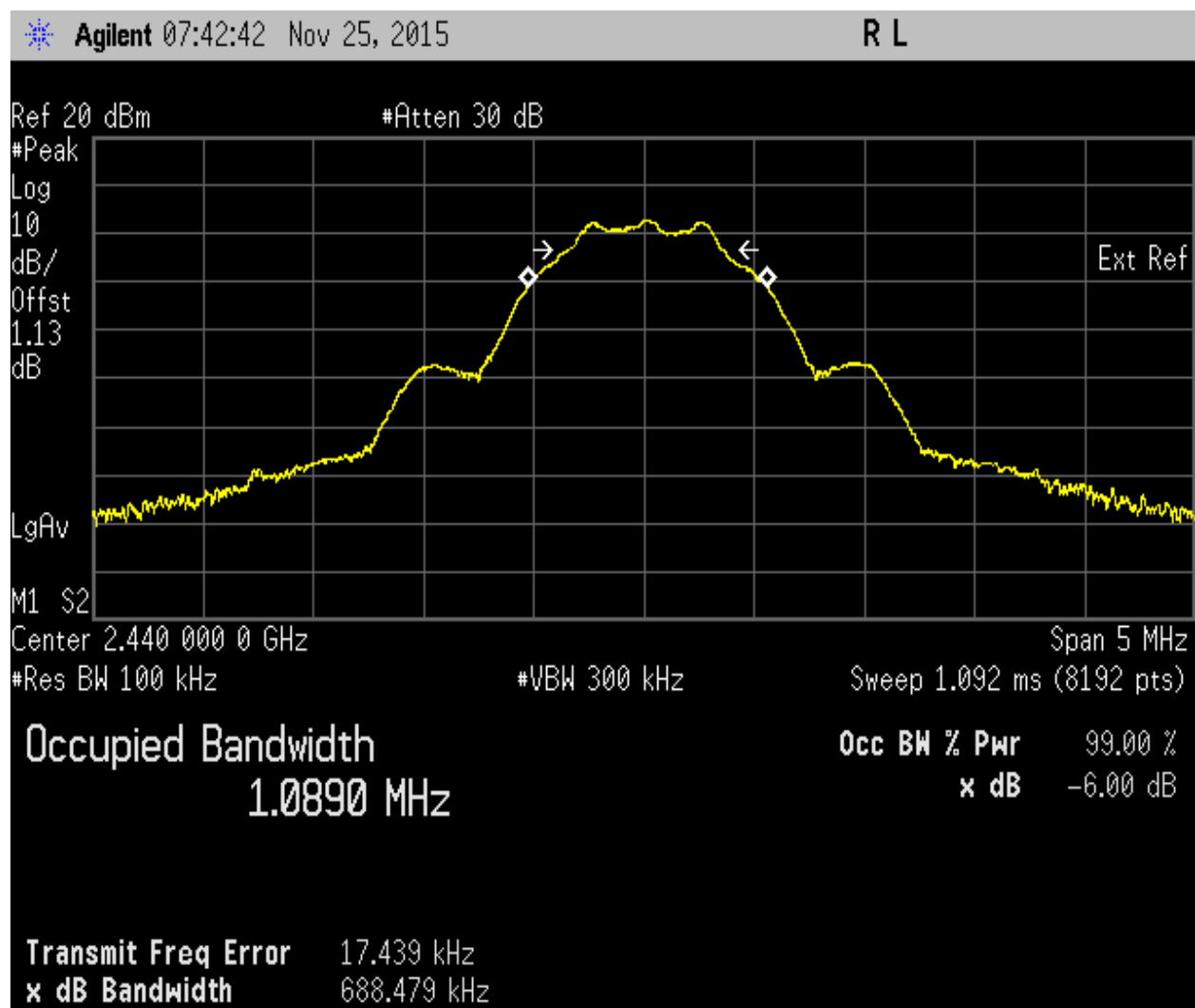
Normal Condition (25 ° C)
≥500 kHz

2.1.3. Test Result

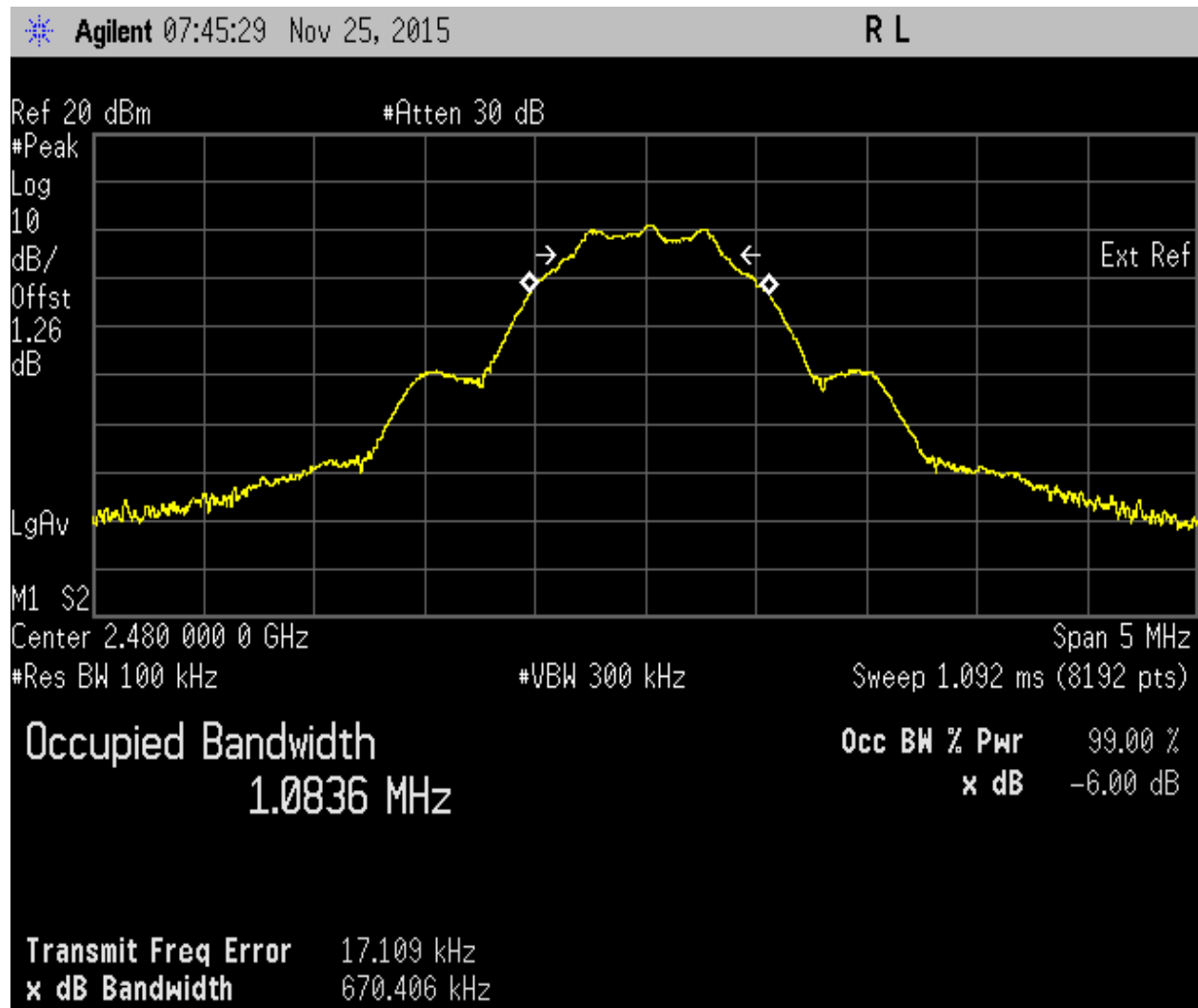
Test Conditions			Test Frequency	Results
Standard	Modulation Type	Tx (MHz)	Bandwidth (kHz)	Status
Bluetooth L.E	GFSK	2402	675.996	Pass
Bluetooth L.E	GFSK	2440	688.479	Pass
Bluetooth L.E	GFSK	2480	670.406	Pass



6dBc Bandwidth. Bluetooth Frequency 2402 MHz



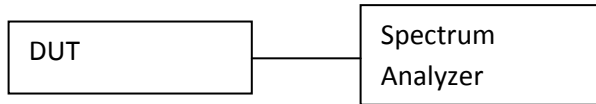
6dBc Bandwidth. Bluetooth Frequency 2440 MHz



6dBc Bandwidth. Bluetooth Frequency 2480 MHz

2.2. Conducted RF Output Power (Peak)

2.2.1. Test Procedure



- a) Check and ensure the spectrum analyzer well calibrate.
- b) Turn on the DUT and set DUT to transmit maximum power.
- c) Connect DUT's antenna terminal to spectrum analyzer with a low loss cable.
- d) Setting of Spectrum analyzer :
 - a. Set the RBW = 1 MHz.
 - b. Set the VBW $\geq [3 \times \text{RBW}]$.
 - c. Set the span $\geq [1.5 \times \text{DTS bandwidth}]$.
 - d. Detector = peak.
 - e. Sweep time = auto couple.
 - f. Trace mode = max hold.
 - g. Allow trace to fully stabilize.
- e) Use the instrument's band/channel power measurement function with the band limits set equal to the DTS bandwidth edges (for some instruments, this may require a manual override to select the peak detector). If the instrument does not have a band power function, then sum the spectrum levels (in linear power units) at intervals equal to the RBW extending across the DTS channel bandwidth.

2.2.2. Limits:

Normal Condition (25 ° C)
≤ 1 Watt(30 dBm)

2.2.3. Test Result

Test Conditions			Test Frequency	Results
Standard	Modulation Type	Tx (MHz)	Output Power (dBm)	Status
Bluetooth L.E	GFSK	2402	-0.091	Pass
Bluetooth L.E	GFSK	2440	1.189	Pass
Bluetooth L.E	GFSK	2480	-0.927	Pass

2.3. Maximum Peak Power Spectral Density

2.3.1. Test Procedure



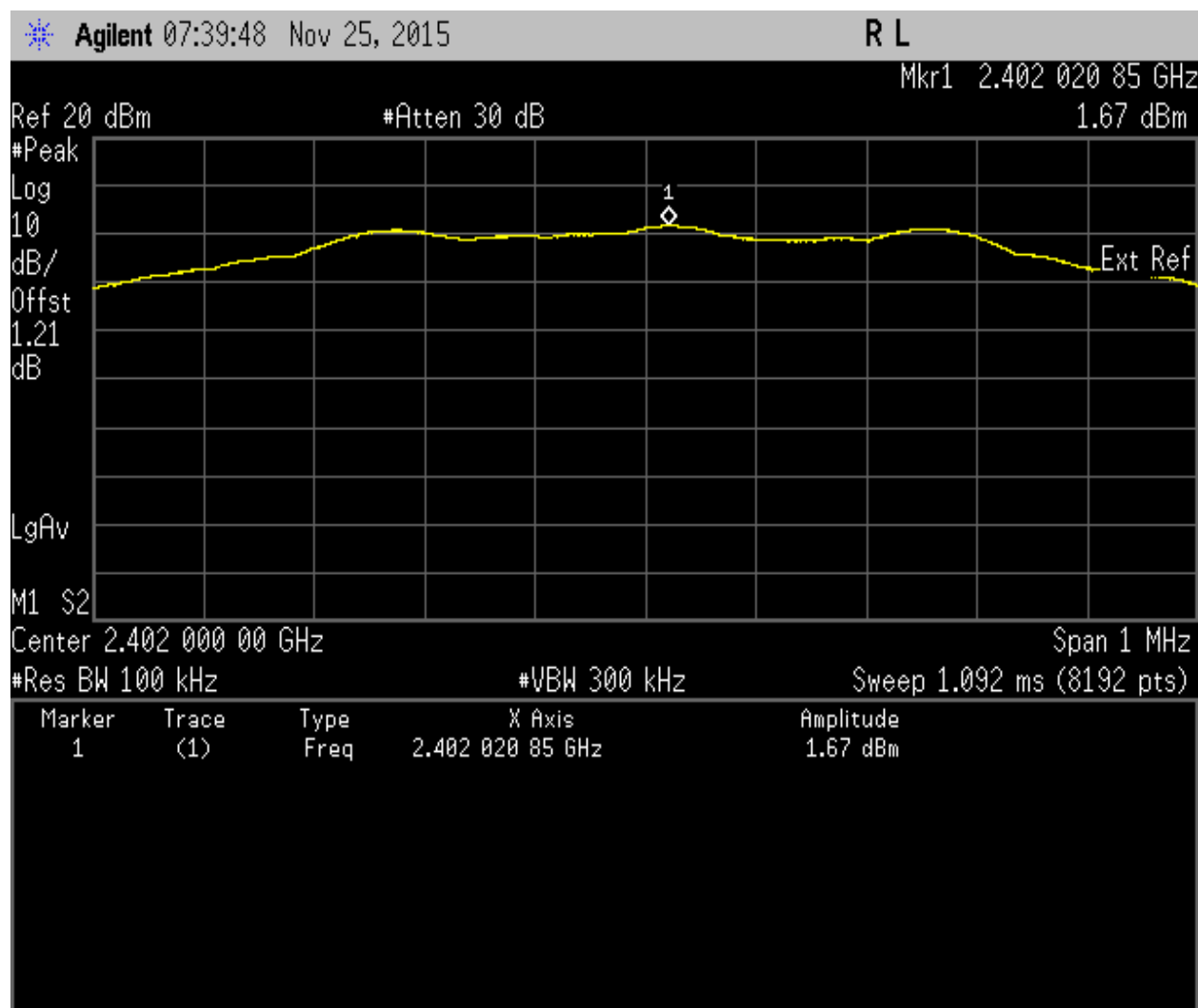
- a) Check and ensure the spectrum analyzer well calibrate.
- b) Turn on the DUT and set DUT to transmit maximum power.
- c) Connect DUT's antenna terminal to spectrum analyzer with a low loss cable.
- d) Setting of Spectrum analyzer :
 - a. Set analyzer center frequency to DTS channel center frequency.
 - b. Set the span to 1.5 times the DTS bandwidth.
 - c. Set the RBW to $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$.
 - d. Set the VBW $\geq [3 \times \text{RBW}]$.
 - e. Detector = peak.
 - f. Sweep time = auto couple.
 - g. Trace mode = max hold.
 - h. Allow trace to fully stabilize.
 - i. Use the peak marker function to determine the maximum amplitude level within the RBW.
 - j. If measured value exceeds requirement, then reduce RBW (but no less than 3 kHz) and repeat.
- e) Convert final result from (dBm/100kHz) $\rightarrow$ (dBm/3kHz).
- f) Example of calculation :
 Assume manual measured result is -6.2 dBm where DUT have duty cycle of 60%
 - = -6.2 dBm - (conversion factor)
 - = -6.2 dBm - $(10 \cdot \log(100/3))$
 - = -6.2 dBm - (15.228 dB)
 - = -21.428dBm

2.3.2. Limits:

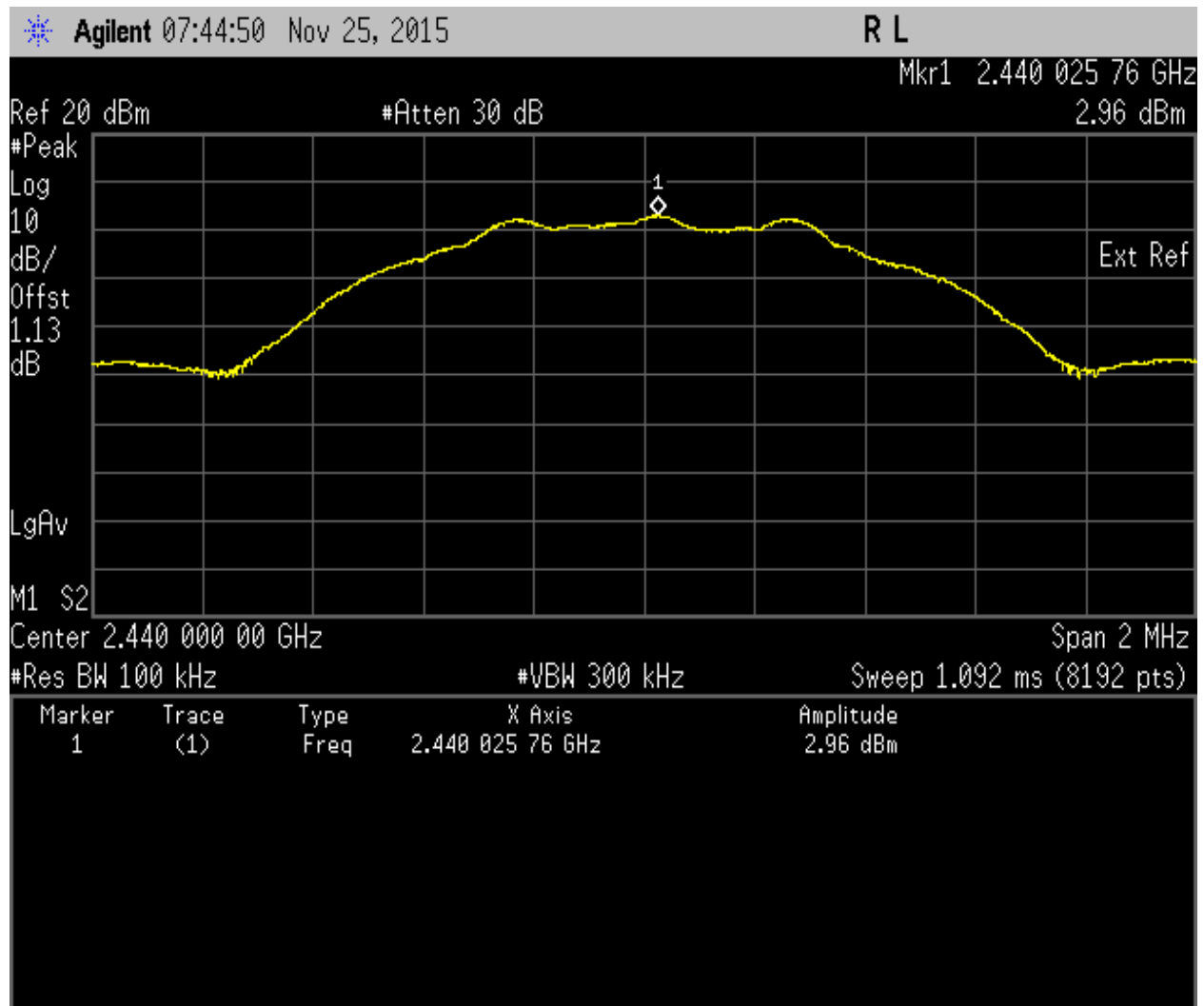
Normal Condition (25 ° C)
$\leq 8 \text{ dBm/3kHz}$

2.3.3. Test Result

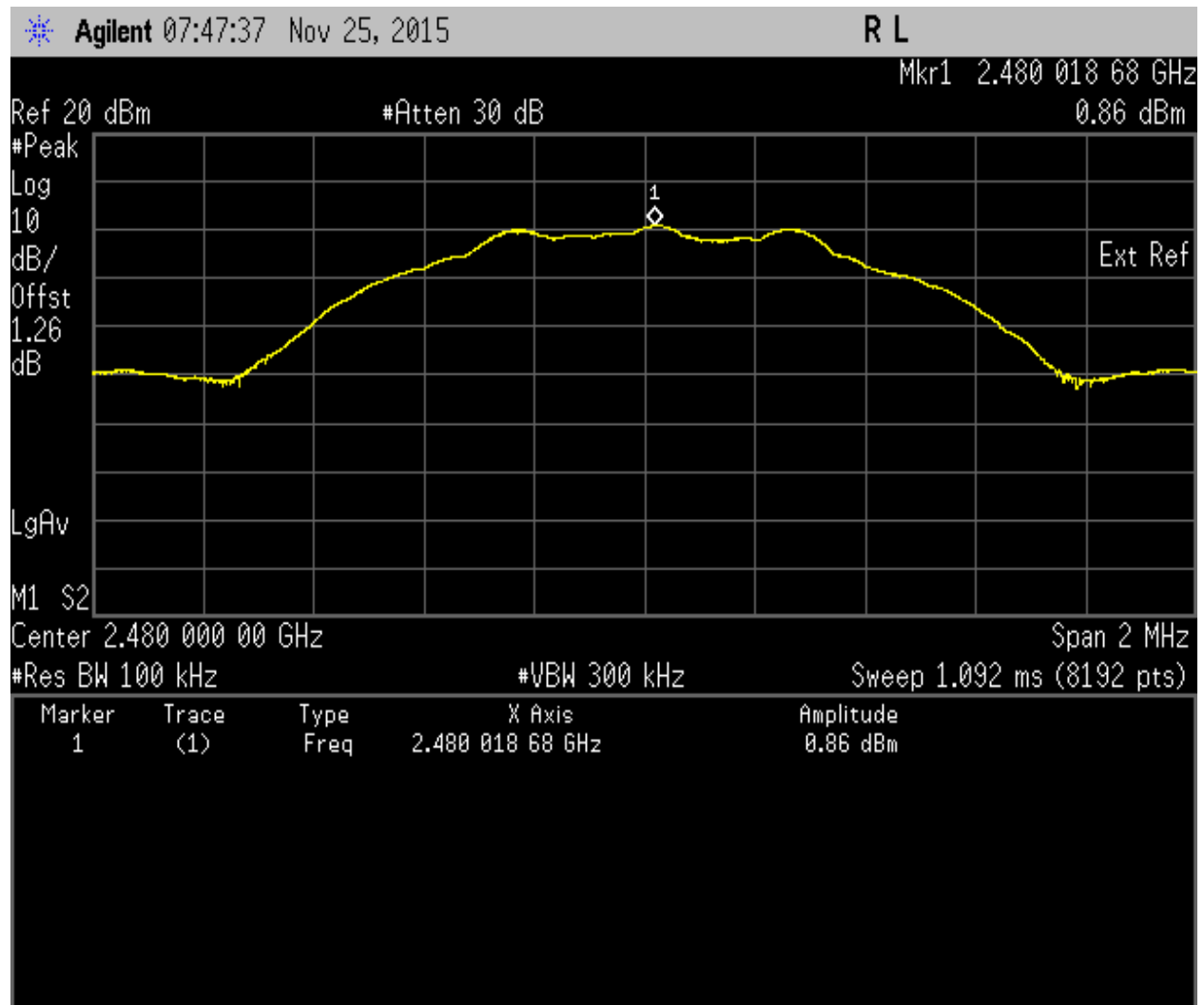
Test Conditions		Test Frequency	Results		
Standard	Modulation Type	Tx (MHz)	Power (dBm/100kHz)	Power (dBm/3kHz)	Status
Bluetooth L.E.	GFSK	2402	1.67	-13.56	Pass
Bluetooth L.E.	GFSK	2440	2.96	-12.27	Pass
Bluetooth L.E.	GFSK	2480	0.86	-14.37	Pass



Maximum Peak Power Spectral Density. Bluetooth Frequency 2402 MHz



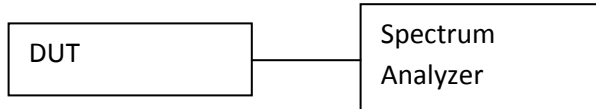
Maximum Peak Power Spectral Density. Bluetooth Frequency 2440 MHz



Maximum Peak Power Spectral Density. Bluetooth Frequency 2480 MHz

2.4. Conducted Spurious Emission

2.4.1. Test Procedure



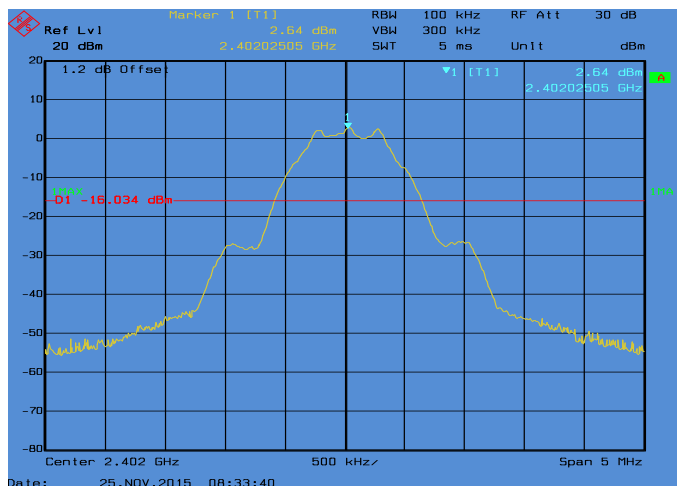
- a) Check and ensure the spectrum analyzer well calibrate.
- b) Turn on the DUT and set DUT to transmit maximum power.
- c) Connect DUT's antenna terminal to spectrum analyzer with a low loss cable.
- d) Setting of Spectrum analyzer :
 - a. RBW = 100 kHz
 - b. VBW = 300 kHz
 - c. Detector mode = Peak
 - d. Trace = Max Hold
 - e. Sweep = auto
- e) Use the peak marker function to measure highest emission and scan up to 10th harmonic.

2.4.2. Limits:

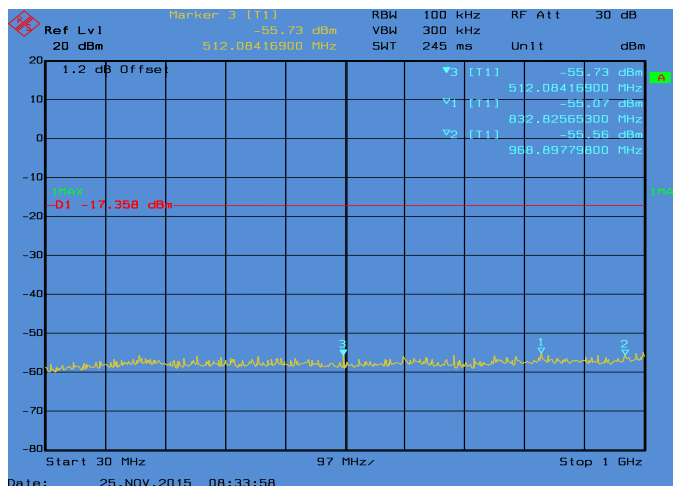
Normal Condition (25 ° C)
Shall be at least 20 dB below peak (max) power.

2.4.3. Test Result

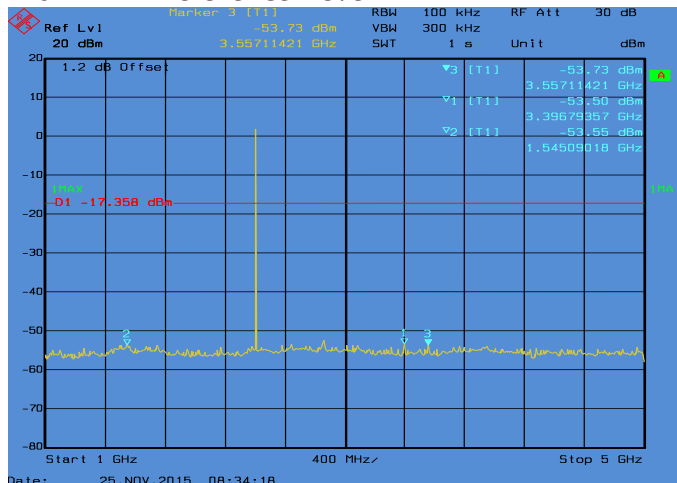
Test Conditions			Test Frequency	Results	
Standard	Modulation Type	Tx (MHz)	Spurs (MHz)	Level (dBm)	Status
Bluetooth L.E.	GFSK	2402	6713.427	-49.18	Pass
			14188.377	-49.32	Pass
			6633.267	-50.17	Pass
Bluetooth L.E.	GFSK	2440	14188.377	-49.11	Pass
			6713.427	-50.56	Pass
			12715.431	-50.66	Pass
Bluetooth L.E.	GFSK	2480	14188.377	-49.41	Pass
			6973.948	-49.76	Pass
			6723.447	-50.74	Pass



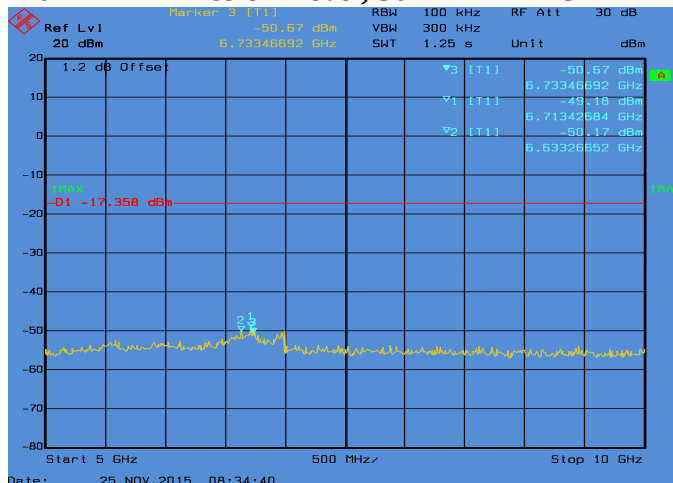
**Conducted Emissions. Bluetooth, Frequency
2402 MHz Reference Level**



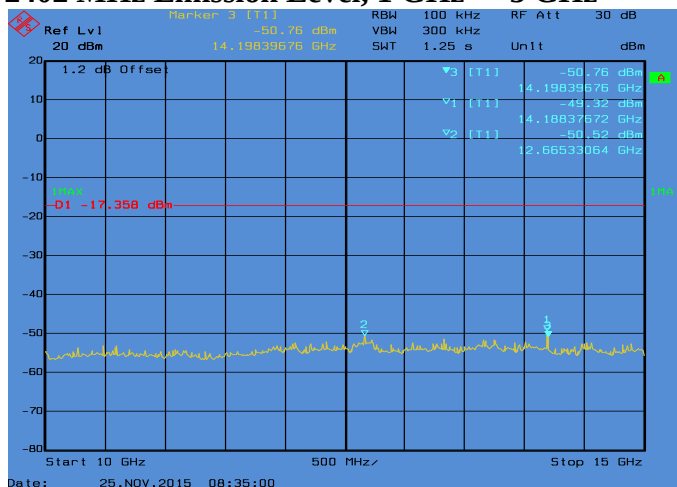
**Conducted Emissions. Bluetooth, Frequency
2402 MHz Emission Level, 30 MHz -> 1 GHz**



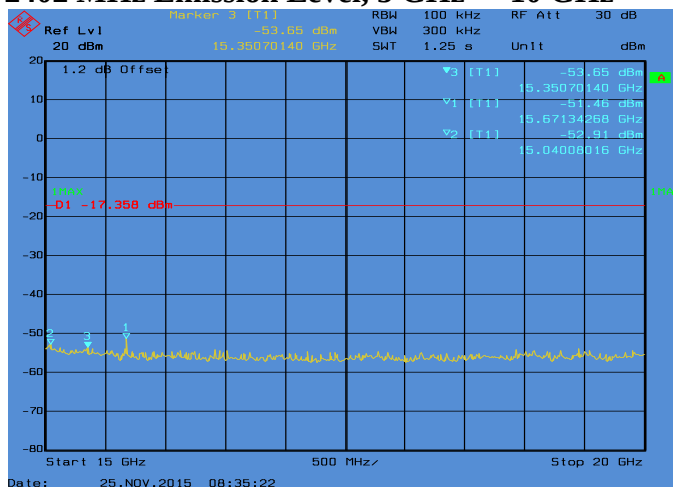
**Conducted Emissions. Bluetooth, Frequency
2402 MHz Emission Level, 1 GHz -> 5 GHz**



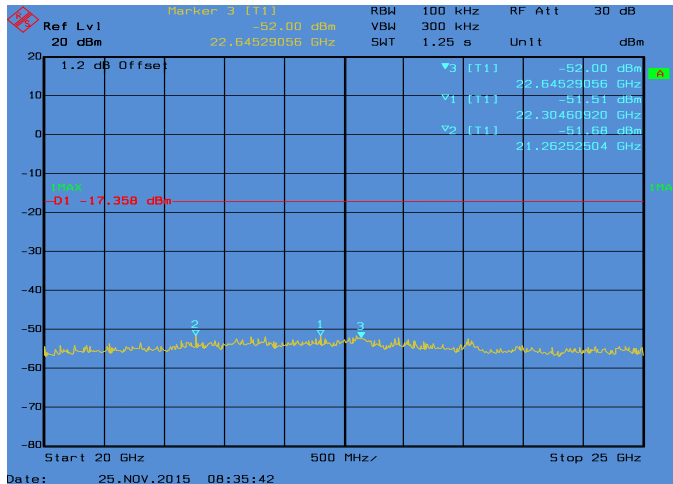
**Conducted Emissions. Bluetooth, Frequency
2402 MHz Emission Level, 5 GHz -> 10 GHz**



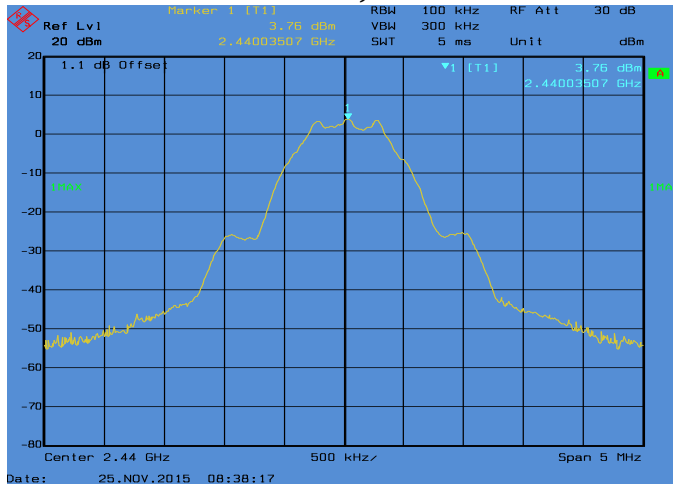
**Conducted Emissions. Bluetooth, Frequency
2402 MHz Emission Level, 10 GHz -> 15 GHz**



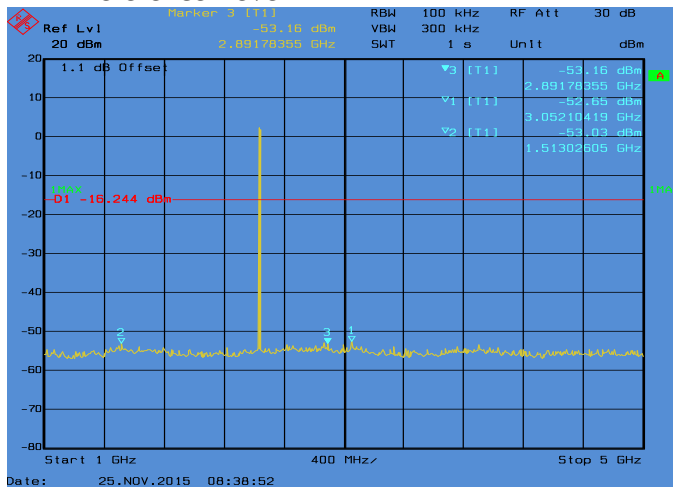
**Conducted Emissions. Bluetooth, Frequency
2402 MHz Emission Level, 15 GHz -> 20 GHz**



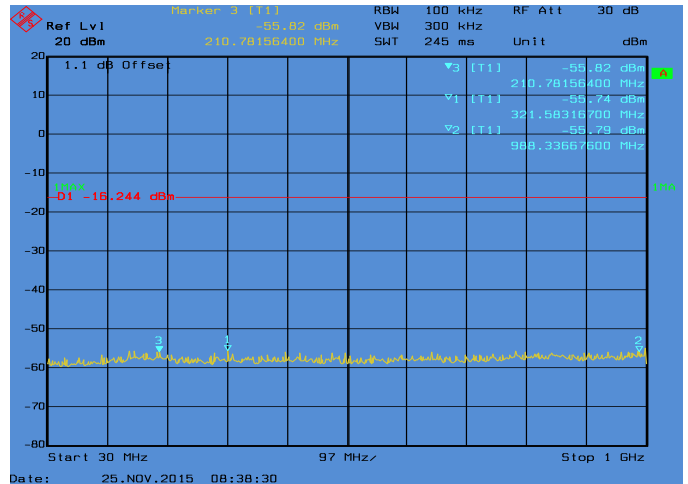
Conducted Emissions. Bluetooth, Frequency 2402 MHz Emission Level, 20 GHz -> 25 GHz



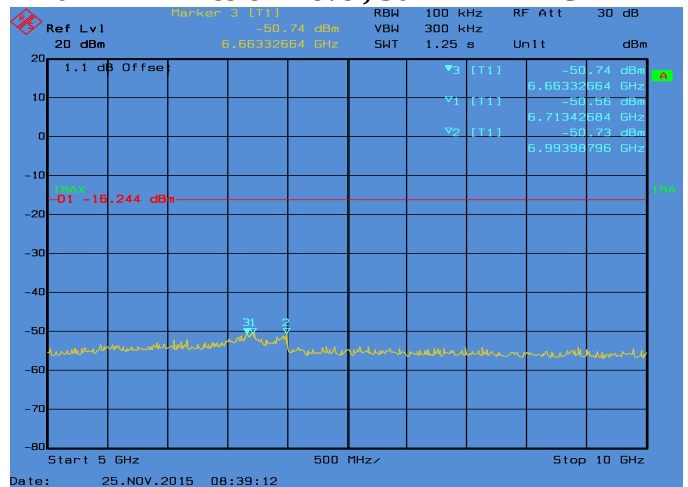
Conducted Emissions. Bluetooth, Frequency 2440 MHz Reference Level



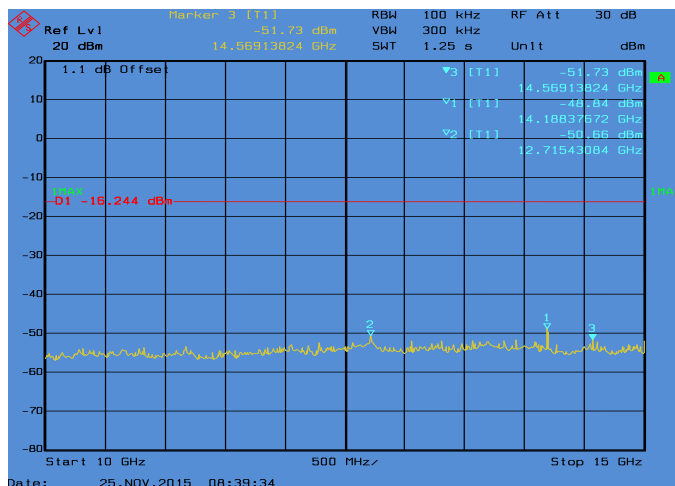
Conducted Emissions. Bluetooth, Frequency 2440 MHz Emission Level, 1 GHz -> 5 GHz



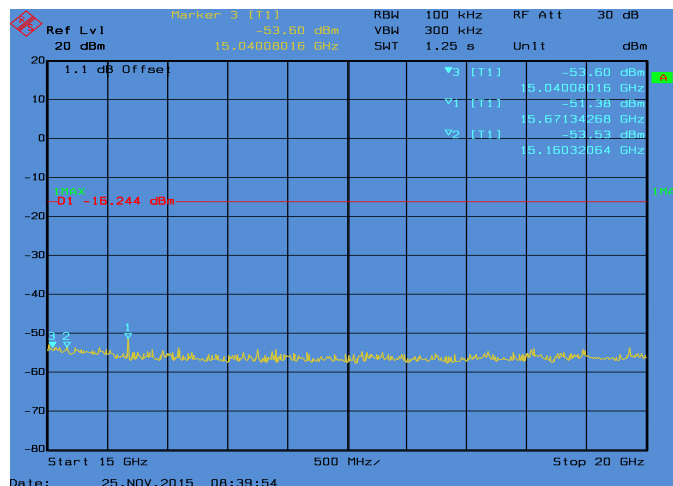
Conducted Emissions. Bluetooth, Frequency 2440 MHz Emission Level, 30 MHz -> 1 GHz



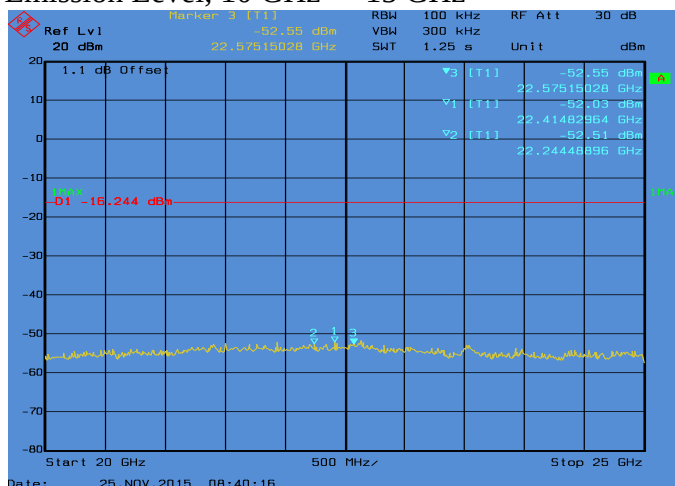
Conducted Emissions. Bluetooth, Frequency 2440 MHz Emission Level, 5 GHz -> 10 GHz



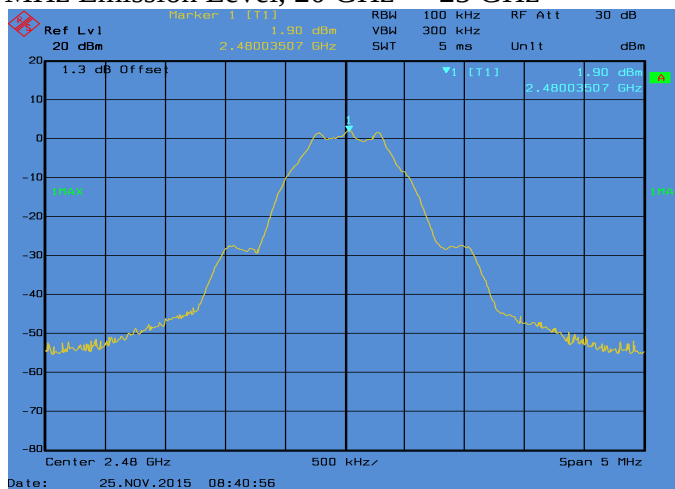
Conducted Emissions. Bluetooth, Frequency 2440 MHz Emission Level, 10 GHz -> 15 GHz



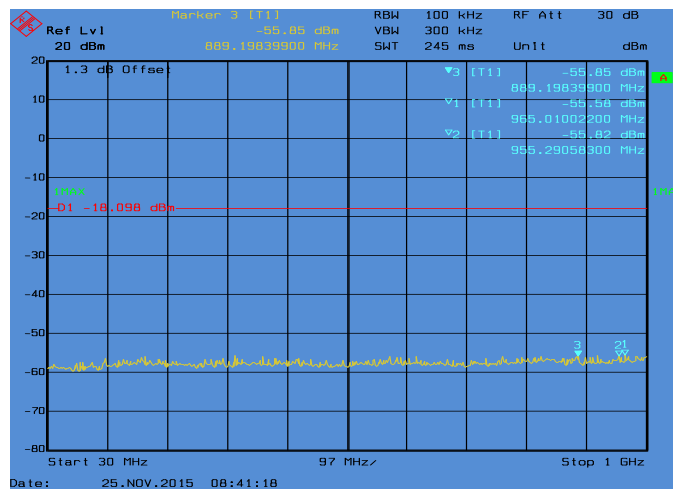
Conducted Emissions. Bluetooth, Frequency 2440 MHz Emission Level, 15 GHz -> 20 GHz



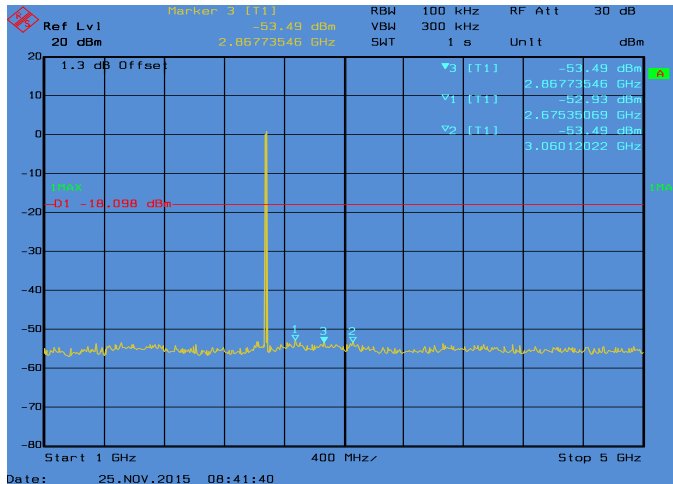
Conducted Emissions. Bluetooth, Frequency 2440 MHz Emission Level, 20 GHz -> 25 GHz



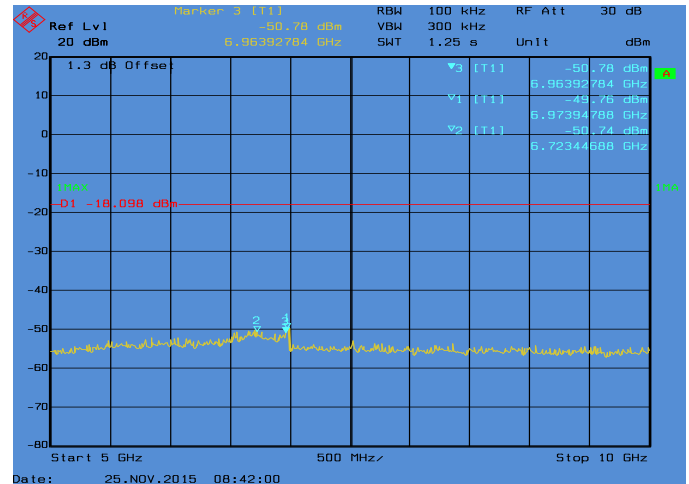
Conducted Emissions. Bluetooth, Frequency 2480 MHz Reference Level



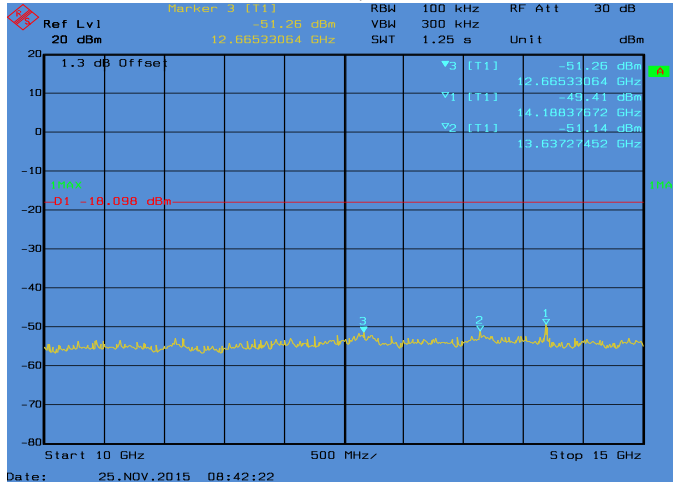
Conducted Emissions. Bluetooth, Frequency 2480 MHz Emission Level, 30 MHz -> 1 GHz



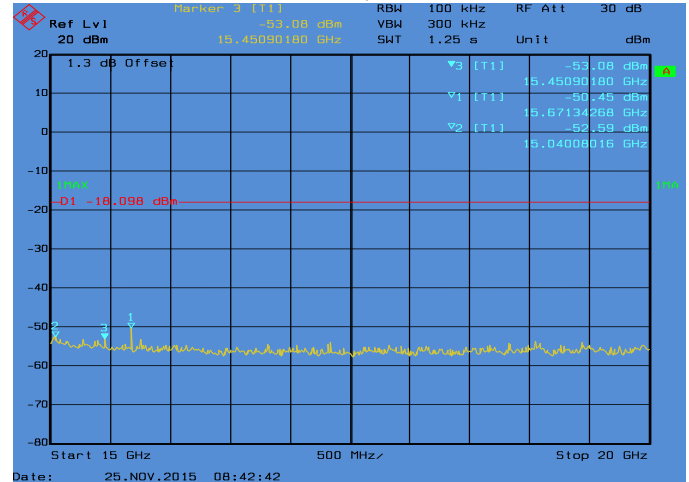
Conducted Emissions. Bluetooth, Frequency 2480 MHz Emission Level, 1 GHz -> 5 GHz



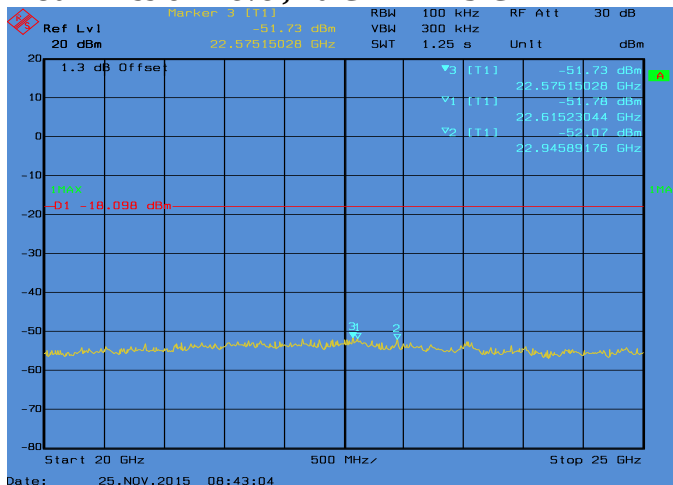
Conducted Emissions. Bluetooth, Frequency 2480 MHz Emission Level, 5 GHz -> 10 GHz



Conducted Emissions. Bluetooth, Frequency 2480 MHz Emission Level, 10 GHz -> 15 GHz



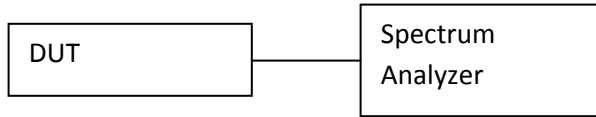
Conducted Emissions. Bluetooth, Frequency 2480 MHz Emission Level, 15 GHz -> 20 GHz



Conducted Emissions. Bluetooth, Frequency 2480 MHz Emission Level, 20 GHz -> 25 GHz

2.5. Band edge Conducted Spurious Emission

2.5.1. Test Procedure



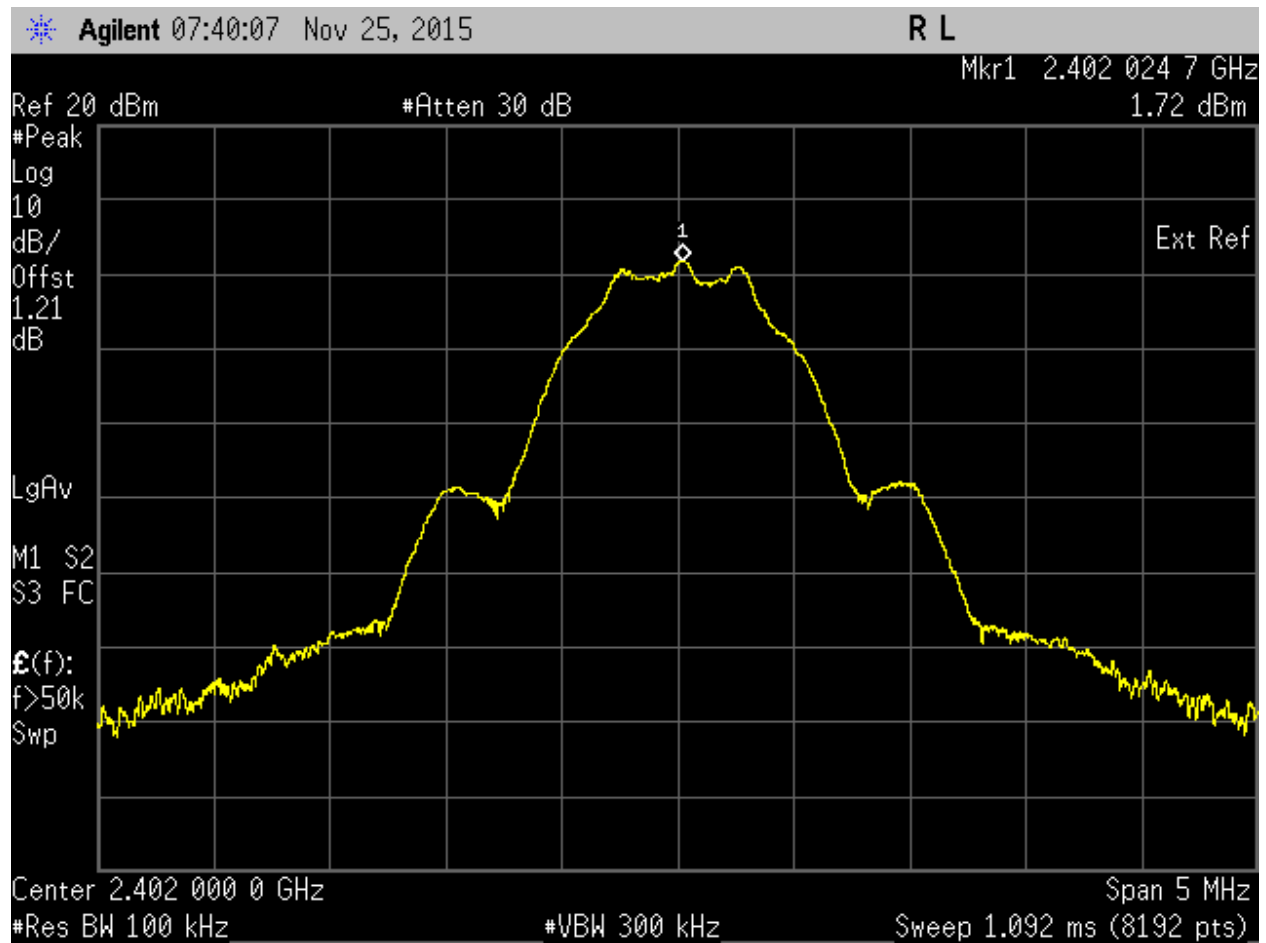
- a) Check and ensure the spectrum analyzer well calibrate.
- b) Turn on the DUT and set DUT to transmit maximum power.
- c) Connect DUT's antenna terminal to spectrum analyzer with a low loss cable.
- d) Setting of Spectrum analyzer :
 - a. RBW = 100 kHz
 - b. VBW = 300 kHz
 - c. Detector mode = Peak
 - d. Trace = Max Hold
 - e. Sweep = auto
- e) Use the peak marker function to measure highest emission.

2.5.2. Limits:

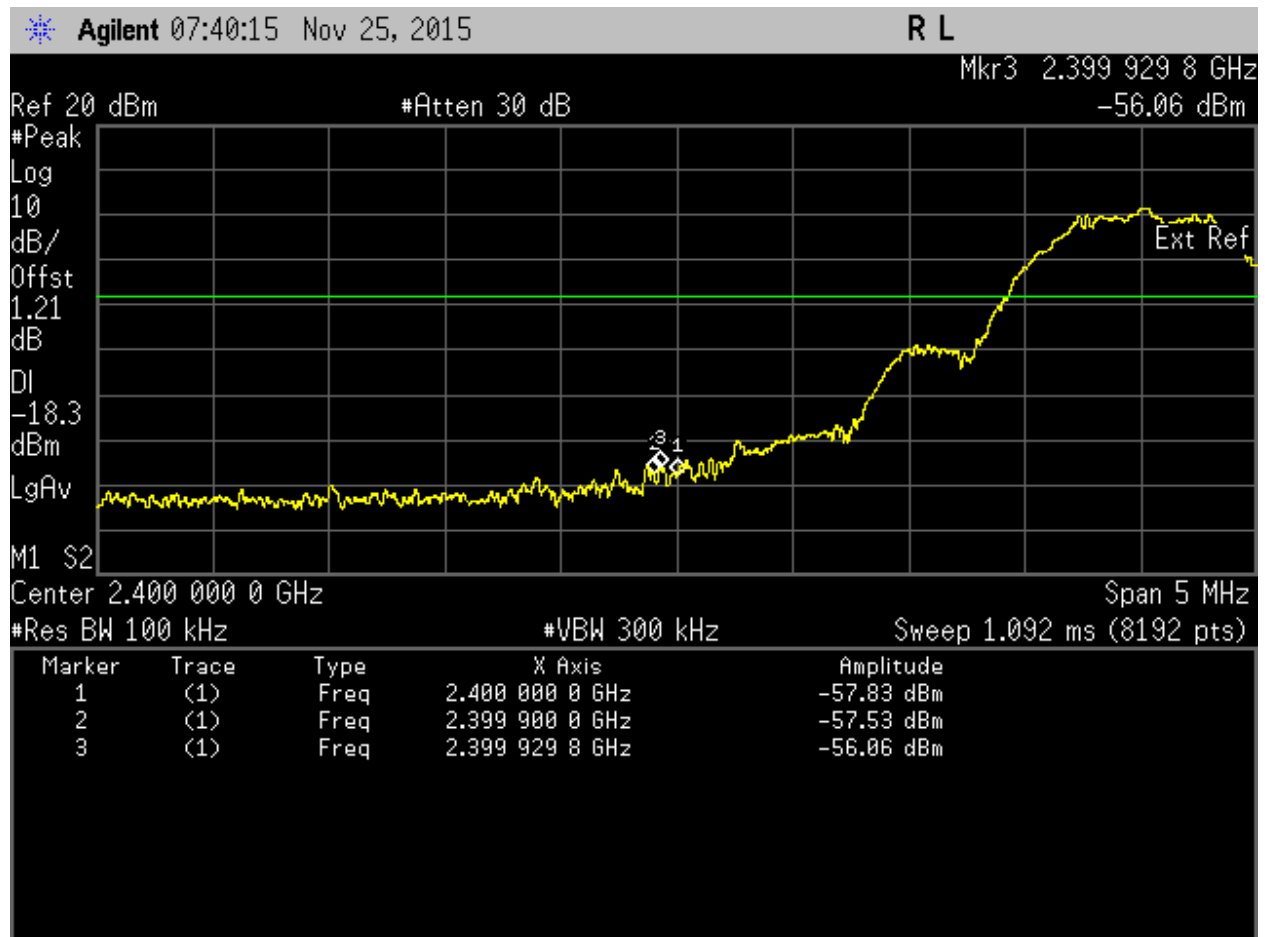
Normal Condition (25 ° C)
Shall be at least 20 dB below peak (max) power.

2.5.3. Test Results

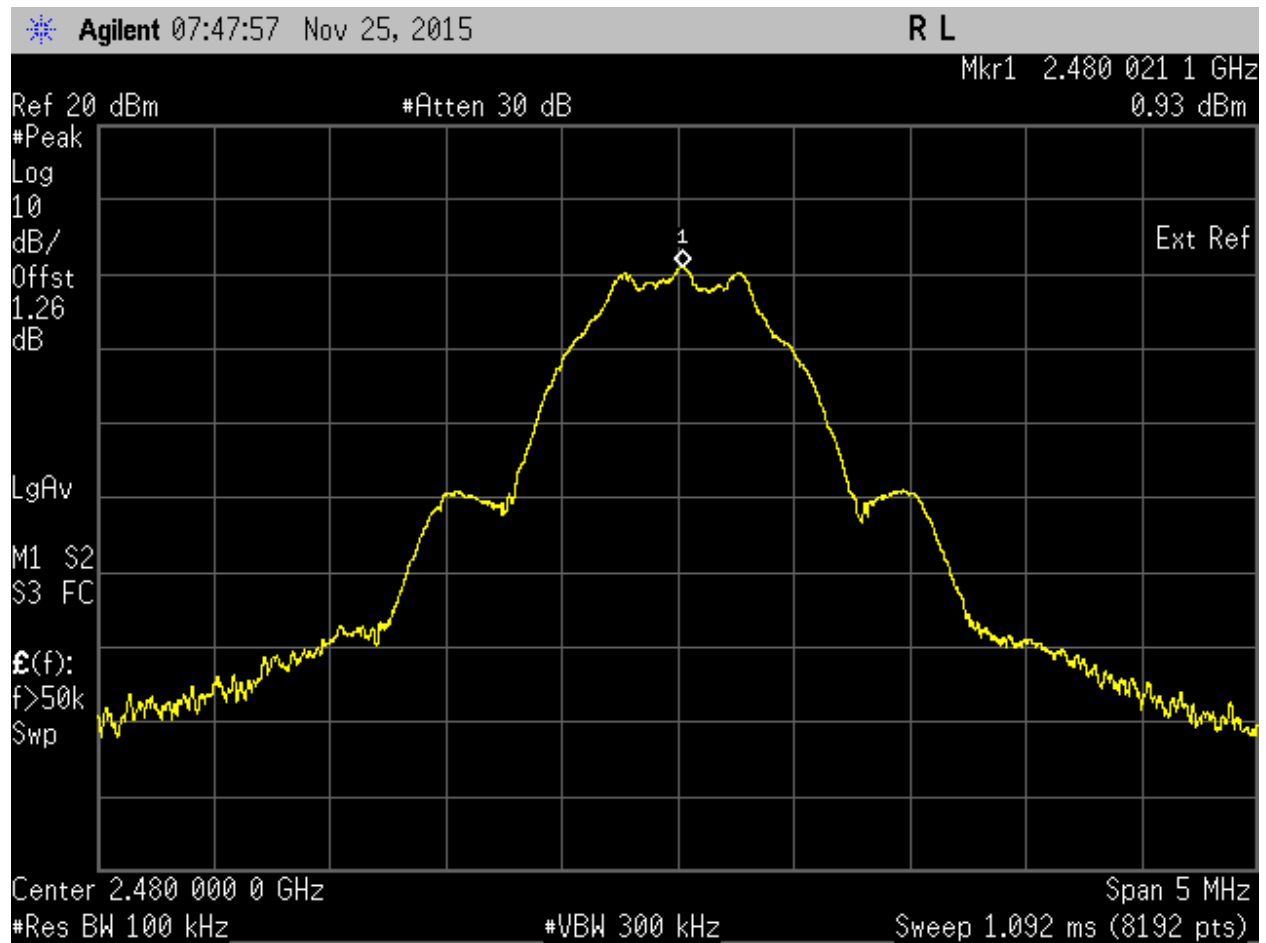
Test Conditions		Test Frequency	Results		
Standard	Modulation Type	Tx (MHz)	Frequencies (MHz)	Power (dBm)	Status
Bluetooth L.E	GFSK	2402	2399.930	-56.06	Pass
Bluetooth L.E	GFSK	2480	2481.000	-29.57	Pass



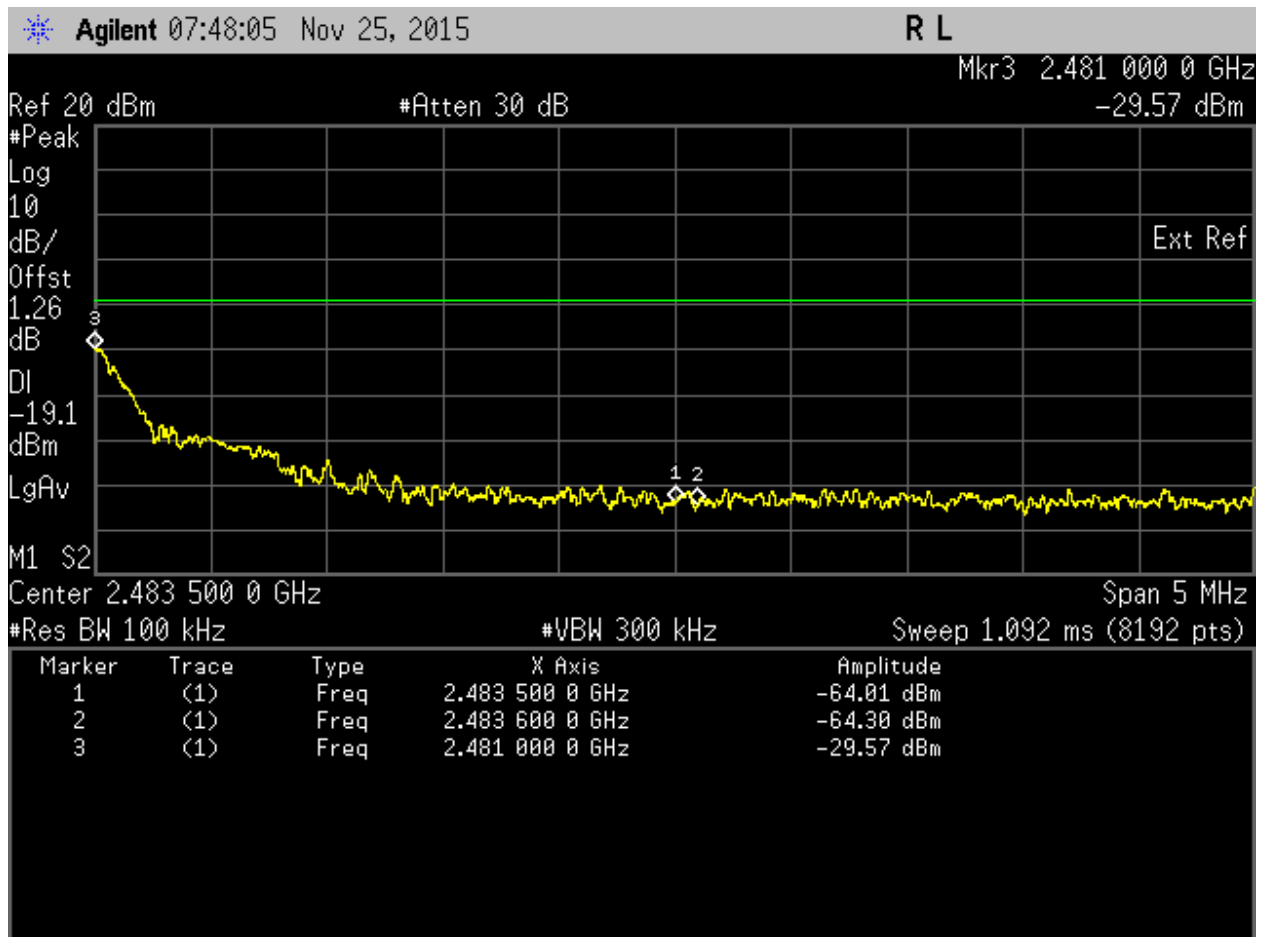
Band Edge (100 kHz). Bluetooth Frequency 2402 MHz Reference Level



Band Edge (100 kHz). Bluetooth Frequency 2402 MHz Band Edge



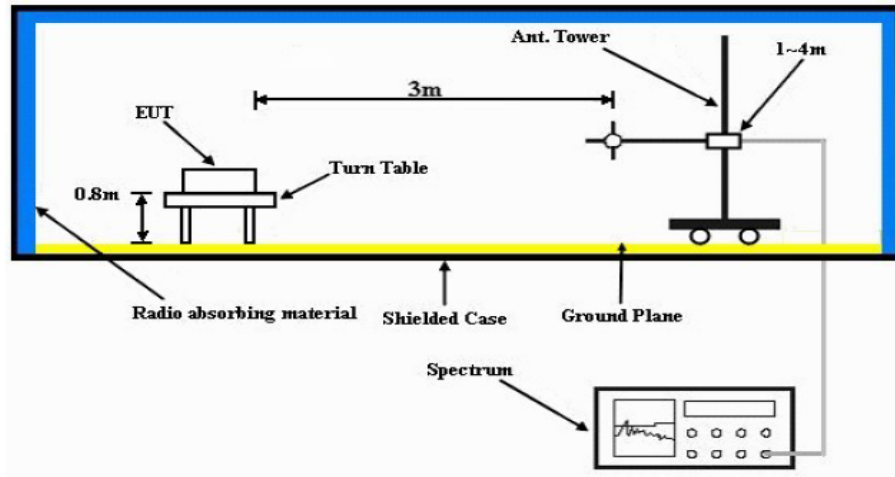
Band Edge (100 kHz). Bluetooth Frequency 2480 MHz Reference Level



Band Edge (100 kHz). Bluetooth Frequency 2480 MHz Band Edge

2.6. Radiated Emission within Restricted Bands

2.6.1. Test Procedure



- The EUT is placed on the top of a rotating table 0.8m above the ground at a 3m semi-anechoic chamber. The table is rotated 360 degrees to determine the position of the highest radiation.
- The EUT is set 3m away from the interference-receiving antenna, which is mounted on the top of a variable-height antenna tower.
- The antenna is Bilog/Horn antenna depend on which frequency range uses, and its height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- For each suspected emission, the EUT is arranged to its worst case and then the antenna is tuned to heights from 1m to 4m and the rotatable table is turned from 0 degrees to 360 degrees to find the maximum reading.
- The test-receiver system is set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- If the emission level of the EUT in peak mode is fall within the range of 10dB from the limit specified, the emissions would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet. Otherwise, the testing could be stopped and the peak values of the EUT would be reported.

NOTE:

- The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz for Quasi-peak detection at frequency below 1GHz.
- The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and video bandwidth is 3 MHz for Peak detection at frequency above 1 GHz.
- All modes of operation were investigated and the worst-case emissions are reported.

2.6.2. Test Limits:

Radiated emissions which fall in the restricted bands must comply with the radiated emission limits specified as below table. Other emissions shall be at least 20dB below the highest level of the desired power.

Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100**	3
88-216	150**	3
216-960	200**	3
Above 960	500	3

NOTE:

- The lower limit shall apply at the transition frequencies.
- Emission level (dBuV/m) = 20 log Emission level (uV/m).
- For frequencies above 1000 MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition of modulation.

2.6.3. Test Data:

2.7. AC Powerline Conducted Emission

2.7.1. Test Procedure

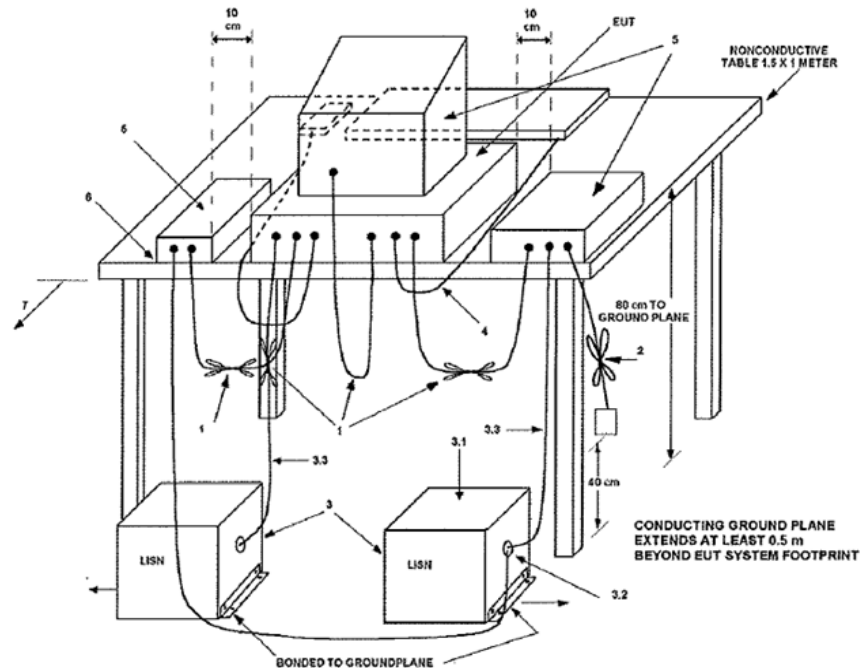


Figure 1: AC Power Line Conducted Emission Test Setup Diagram (Table Top Equipment)

a. The EUT set up is shown as Figure 1 above and the details legend for the figure 1 as below:

1. Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.
2. I/O cables that are not connected to a peripheral shall be bundled in the center and not more than 40cm. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.
3. EUT connected to one LISN. Unused LISN measuring port connectors shall be terminated in 50 Ω . LISN can be placed on top of, or immediately beneath, reference ground plane.
 - 3.1) all other equipment powered from additional LISN(s).
 - 3.2) multiple outlet strip can be used for multiple power cords of non-EUT equipment.
 - 3.3) LISN is setup at least 80 cm from nearest part of EUT chassis.
4. Cables of hand-operated devices, such as keyboards, mice, etc., shall be placed as for normal use.
5. Non-EUT components of EUT system being tested.
6. Rear of EUT, including peripherals, shall all be aligned and flush with rear of tabletop. (for table top equipments only).
7. Rear of tabletop shall be 40 cm removed from a vertical conducting plane that is bonded to the ground plane. (For table top equipments only).
8. EUT and cables shall be insulated from the horizontal ground reference plane by up to 15cm. (for floor standing equipments only).

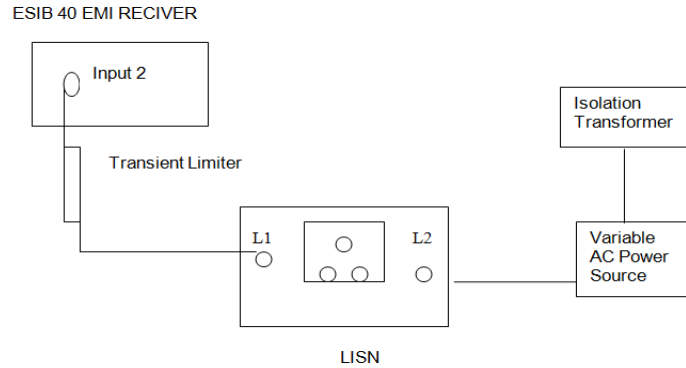


Figure 2: AC Power Line Conducted Emission Test System General Equipment Block Diagram.

The measurements were performed at power terminals with the LISN port L1/L or LISN port L2/N, connected to a spectrum analyzer or EMI receiver in the frequency range referred to Table 1 or Table 2. Unused coaxial connector of the LISN is terminated with 50 Ohm. Quasi-peak and average detectors were used throughout the testing.

2.7.2. Test Limits:

For AC Power Line Conducted Test Limit can be Class A or B depends on product classification.

Limits for conducted disturbance at the mains ports of class A ITE

Frequency range MHz	Limits dB(μV)	
	Quasi-peak	Average
0,15 to 0,50	79	66
0,50 to 30	73	60
NOTE The lower limit shall apply at the transition frequency.		

Table 1: Limits for Conducted Disturbance at the Mains Ports of Class A ITE.

Limits for conducted disturbance at the mains ports of class B ITE

Frequency range MHz	Limits dB(μV)	
	Quasi-peak	Average
0,15 to 0,50	66 to 56	56 to 46
0,50 to 5	56	46
5 to 30	60	50
NOTE 1 The lower limit shall apply at the transition frequencies.		
NOTE 2 The limit decreases linearly with the logarithm of the frequency in the range 0,15 MHz to 0,50 MHz.		

Table 2: Limits for Conducted Disturbance at the Mains Ports of Class B ITE

2.7.3. Test Data:

Conducted Emission

Radio Model	: LEX L10i
Serial No.	: 171PRQ1027
Battery No.	: PMNN4472A
Accy Serial No.	: HKTN4009A, HKTN4007A, CB000262A01, 1054-89409N
Ambient Temperature:	: 22.4 °C
Humidity:	: 68.6 %
Tester:	: Madi/Rudy
Date of test:	: 17 January 2016

EMI Auto Test Template: Voltage with 2-Line-LISN

Hardware Setup: Voltage with 2-Line-LISN
Measurement Type: 2 Line LISN
Frequency Range: 150 kHz - 30 MHz
Graphics Level Range: 0 dBµV - 80 dBµV

Preview Measurements:
Scan Test Template: Voltage with 2-Line-LISN pre

Data Reduction:
Limit Line #1: EN 55022 Voltage on Mains QP Class B
Limit Line #2: EN 55022 Voltage on Mains AV Class B
Peak Search: 6 dB , Maximum Results: 20
Subrange Maxima: 10 Subranges , Maxima per Subrange: 1
Acceptance Offset: -20 dB
Maximum Number of Results: 20

Maximization Measurements:
Template for Single Meas.: Voltage with 2-Line-LISN max

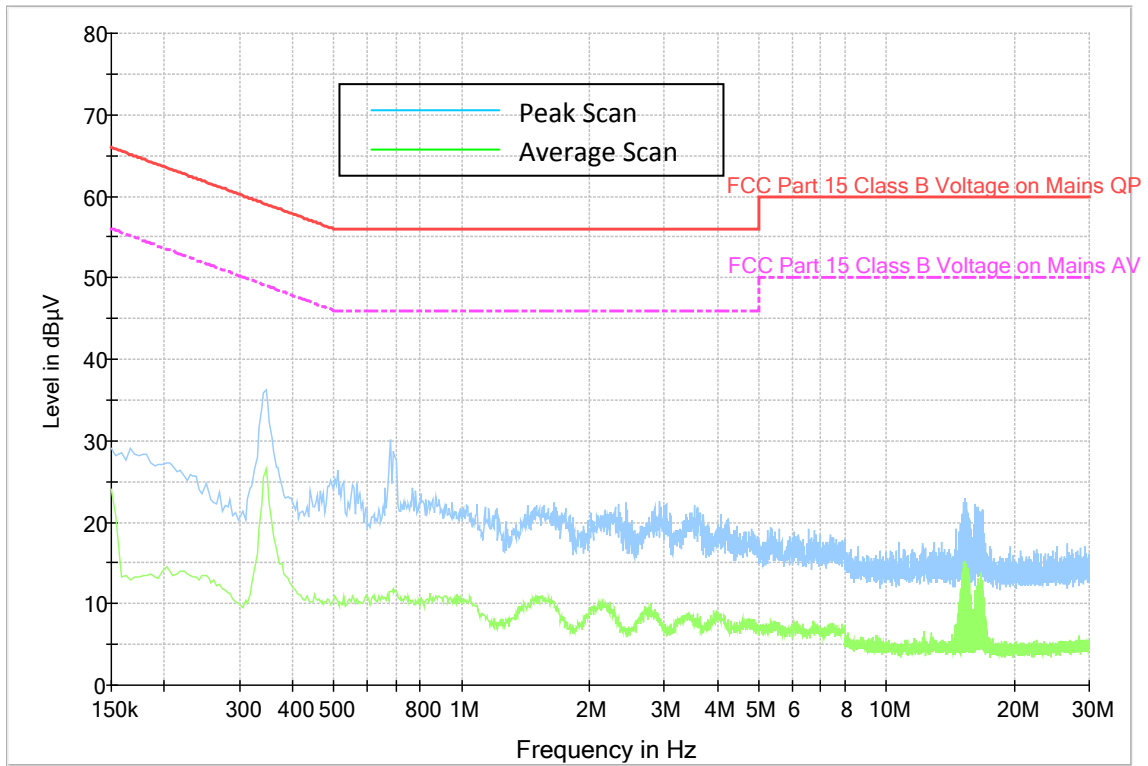
Final Measurements:
Template for Single Meas.: Voltage with 2-Line-LISN fin

Subrange	Step Size	Detectors	IF BW	Meas. Time	Preamp
150 kHz - 30 MHz	4.5 kHz	QPK; AVG	9 kHz	1 s	0 dB
Receiver:	[ESCI 3]				

Test Data

1) Ambient Noise

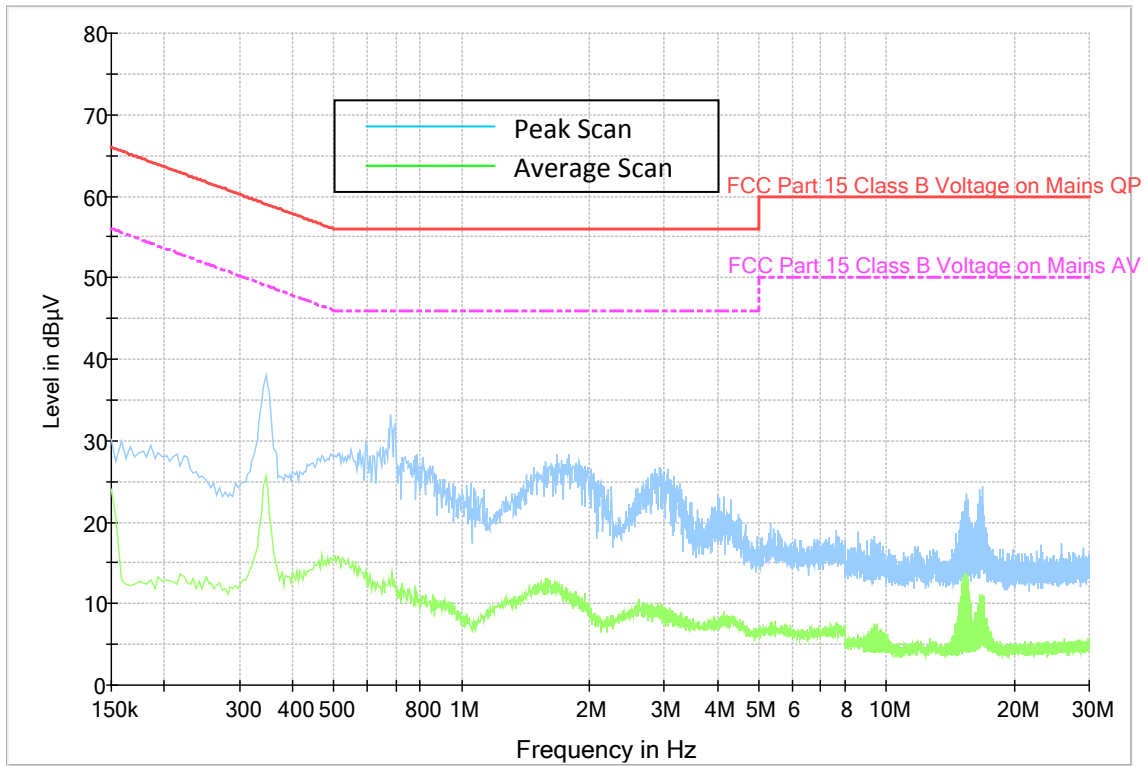
Voltage with 2-Line-LISN



Voltage Supply: 240VAC

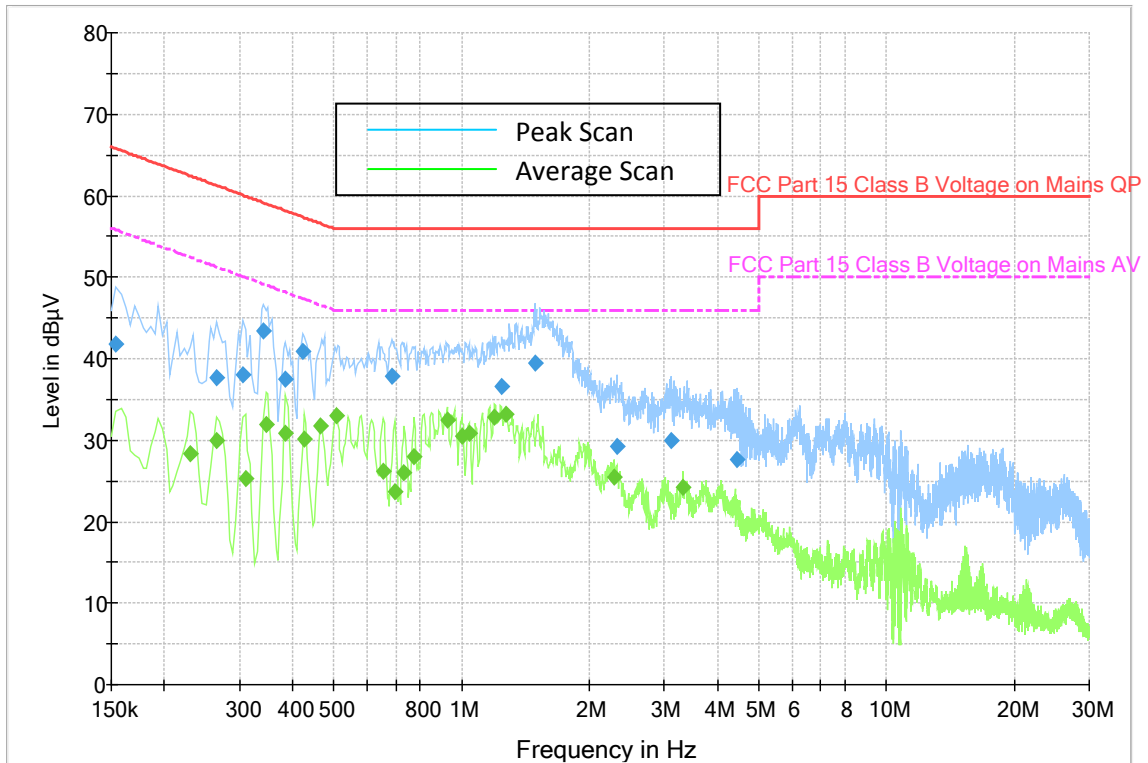
1) Charger Alone

Voltage with 2-Line-LISN



2) EUT Off

Voltage with 2-Line-LISN



QuasiPeak Measurement

Frequency (MHz)	QuasiPeak (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.154000	41.9	1000.0	9.000	On	N	10.0	23.9	65.8	
0.266000	37.6	1000.0	9.000	On	L1	10.0	23.7	61.2	
0.306000	38.1	1000.0	9.000	On	L1	10.0	22.0	60.1	
0.342000	43.3	1000.0	9.000	On	L1	10.1	15.8	59.2	
0.386000	37.5	1000.0	9.000	On	L1	10.1	20.6	58.1	
0.422000	40.9	1000.0	9.000	On	L1	10.1	16.5	57.4	
0.686000	37.9	1000.0	9.000	On	L1	10.0	18.1	56.0	
1.242000	36.6	1000.0	9.000	On	L1	9.8	19.4	56.0	
1.486000	39.4	1000.0	9.000	On	L1	9.8	16.6	56.0	
2.322000	29.2	1000.0	9.000	On	N	9.7	26.8	56.0	
3.126000	30.0	1000.0	9.000	On	L1	9.6	26.0	56.0	
4.466000	27.7	1000.0	9.000	On	L1	9.5	28.3	56.0	

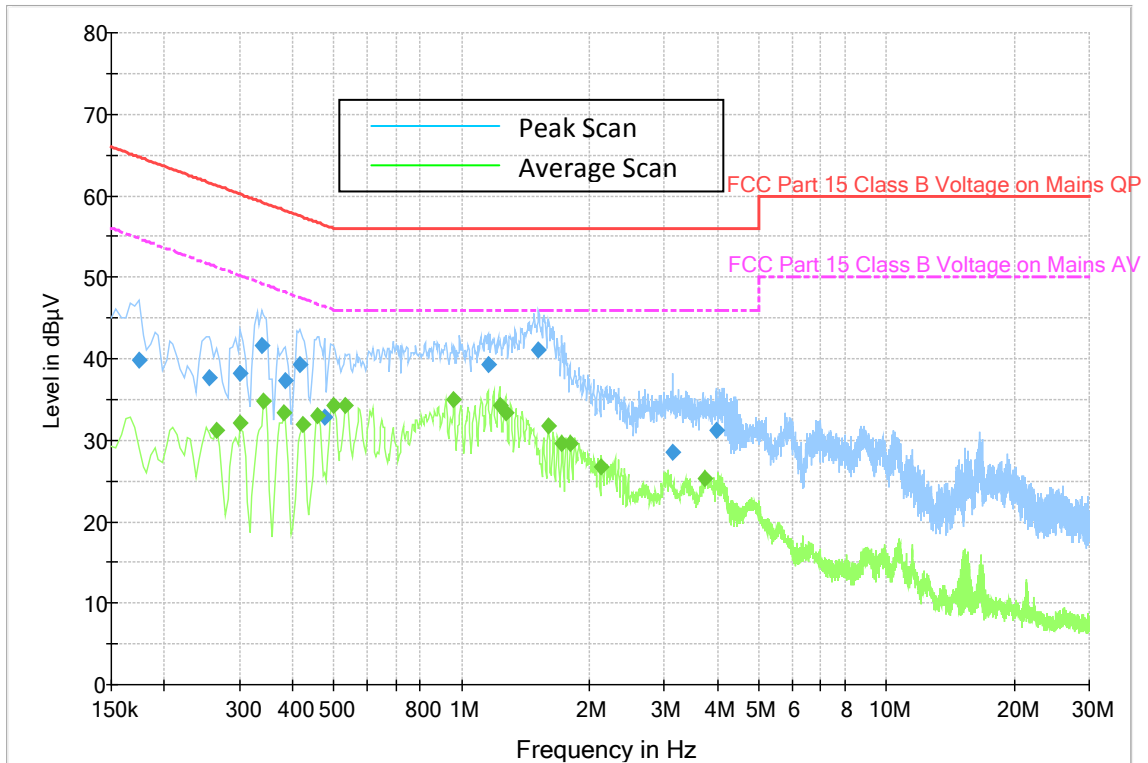
Average Measurement

Frequency (MHz)	Average (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.230000	28.4	1000.0	9.000	On	L1	10.0	24.1	52.4	
0.266000	29.9	1000.0	9.000	On	L1	10.0	21.4	51.2	
0.310000	25.2	1000.0	9.000	On	N	10.0	24.7	50.0	
0.346000	32.0	1000.0	9.000	On	L1	10.1	17.0	49.1	
0.386000	30.8	1000.0	9.000	On	L1	10.1	17.4	48.1	
0.426000	30.2	1000.0	9.000	On	L1	10.1	17.2	47.3	
0.466000	31.8	1000.0	9.000	On	L1	10.2	14.8	46.6	
0.506000	33.0	1000.0	9.000	On	L1	10.2	13.0	46.0	
0.654000	26.1	1000.0	9.000	On	N	10.1	19.9	46.0	
0.698000	23.8	1000.0	9.000	On	N	10.0	22.2	46.0	
0.734000	26.0	1000.0	9.000	On	L1	10.0	20.0	46.0	
0.774000	28.0	1000.0	9.000	On	L1	10.0	18.0	46.0	
0.926000	32.5	1000.0	9.000	On	L1	9.9	13.5	46.0	
1.002000	30.5	1000.0	9.000	On	L1	9.9	15.5	46.0	
1.042000	30.8	1000.0	9.000	On	L1	9.9	15.2	46.0	
1.198000	32.9	1000.0	9.000	On	L1	9.8	13.1	46.0	
1.274000	33.2	1000.0	9.000	On	L1	9.8	12.8	46.0	
2.286000	25.5	1000.0	9.000	On	L1	9.7	20.5	46.0	
3.326000	24.3	1000.0	9.000	On	L1	9.6	21.7	46.0	

* Expanded Uncertainty (U) = +/- 3.43 dB

3) EUT Standby

Voltage with 2-Line-LISN



QuasiPeak Measurement

Frequency (MHz)	QuasiPeak (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.174000	39.8	1000.0	9.000	On	L1	10.1	25.0	64.8	
0.254000	37.6	1000.0	9.000	On	L1	10.0	24.0	61.6	
0.302000	38.3	1000.0	9.000	On	N	10.0	21.9	60.2	
0.338000	41.5	1000.0	9.000	On	N	10.1	17.7	59.3	
0.386000	37.3	1000.0	9.000	On	L1	10.1	20.8	58.1	
0.418000	39.3	1000.0	9.000	On	L1	10.1	18.1	57.5	
0.478000	32.8	1000.0	9.000	On	N	10.2	23.5	56.4	
1.154000	39.3	1000.0	9.000	On	L1	9.8	16.7	56.0	
1.518000	41.0	1000.0	9.000	On	L1	9.8	15.0	56.0	
3.138000	28.5	1000.0	9.000	On	N	9.6	27.5	56.0	
3.966000	31.1	1000.0	9.000	On	L1	9.6	24.9	56.0	

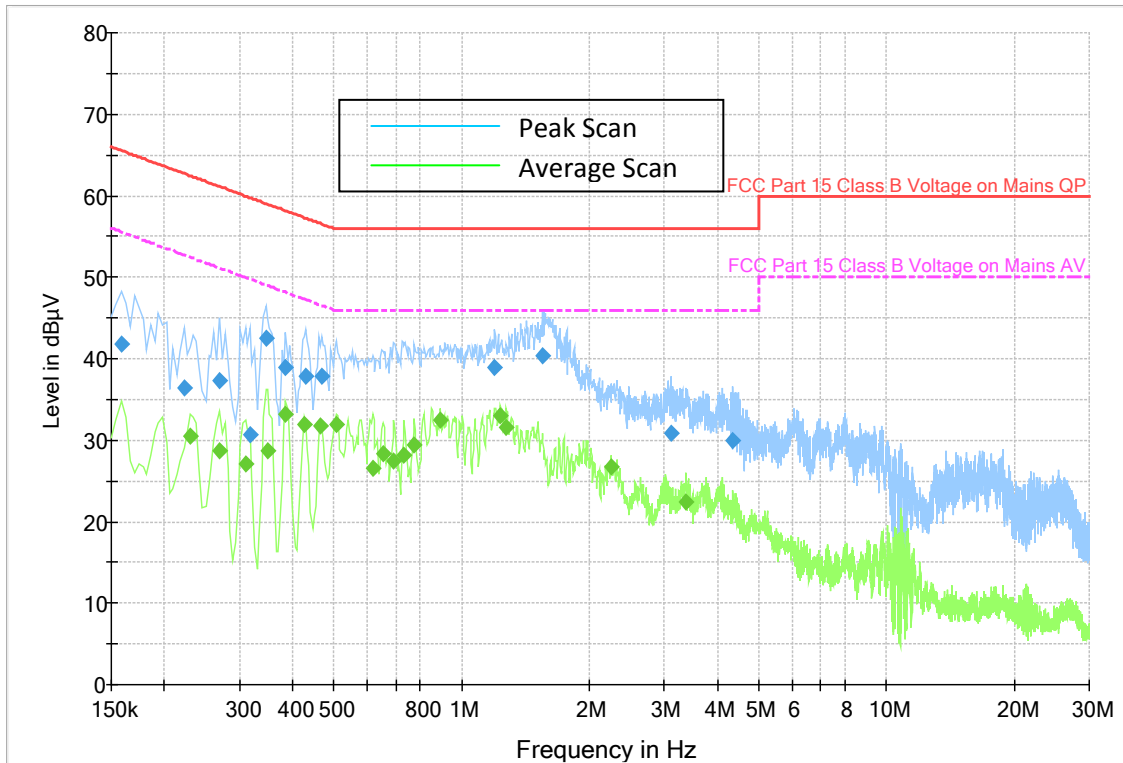
Average Measurement

Frequency (MHz)	Average (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.266000	31.2	1000.0	9.000	On	L1	10.0	20.0	51.2	
0.302000	32.2	1000.0	9.000	On	L1	10.0	18.0	50.2	
0.342000	34.9	1000.0	9.000	On	L1	10.1	14.3	49.2	
0.382000	33.4	1000.0	9.000	On	L1	10.1	14.9	48.2	
0.422000	31.9	1000.0	9.000	On	L1	10.1	15.5	47.4	
0.458000	33.0	1000.0	9.000	On	L1	10.2	13.8	46.7	
0.498000	34.3	1000.0	9.000	On	L1	10.2	11.8	46.0	
0.534000	34.2	1000.0	9.000	On	L1	10.2	11.8	46.0	
0.958000	34.9	1000.0	9.000	On	L1	9.9	11.1	46.0	
1.230000	34.3	1000.0	9.000	On	L1	9.8	11.7	46.0	
1.270000	33.3	1000.0	9.000	On	L1	9.8	12.7	46.0	
1.598000	31.8	1000.0	9.000	On	N	9.8	14.2	46.0	
1.726000	29.6	1000.0	9.000	On	L1	9.8	16.4	46.0	
1.806000	29.6	1000.0	9.000	On	L1	9.7	16.4	46.0	
2.138000	26.8	1000.0	9.000	On	L1	9.7	19.2	46.0	
3.726000	25.3	1000.0	9.000	On	L1	9.6	20.7	46.0	

* Expanded Uncertainty (U) = +/- 3.43 dB

4) Link Idle

Voltage with 2-Line-LISN



QuasiPeak Measurement

Frequency (MHz)	QuasiPeak (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.158000	41.8	1000.0	9.000	On	L1	10.0	23.8	65.6	
0.222000	36.4	1000.0	9.000	On	L1	10.0	26.3	62.7	
0.270000	37.3	1000.0	9.000	On	L1	10.0	23.8	61.1	
0.318000	30.6	1000.0	9.000	On	L1	10.1	29.2	59.8	
0.346000	42.5	1000.0	9.000	On	N	10.1	16.5	59.1	
0.386000	38.9	1000.0	9.000	On	L1	10.1	19.2	58.1	
0.430000	37.9	1000.0	9.000	On	L1	10.1	19.4	57.3	
0.470000	37.9	1000.0	9.000	On	L1	10.2	18.6	56.5	
1.198000	38.9	1000.0	9.000	On	L1	9.8	17.1	56.0	
1.550000	40.4	1000.0	9.000	On	N	9.8	15.6	56.0	
3.114000	30.9	1000.0	9.000	On	L1	9.6	25.1	56.0	
4.358000	29.9	1000.0	9.000	On	L1	9.5	26.1	56.0	

Average Measurement

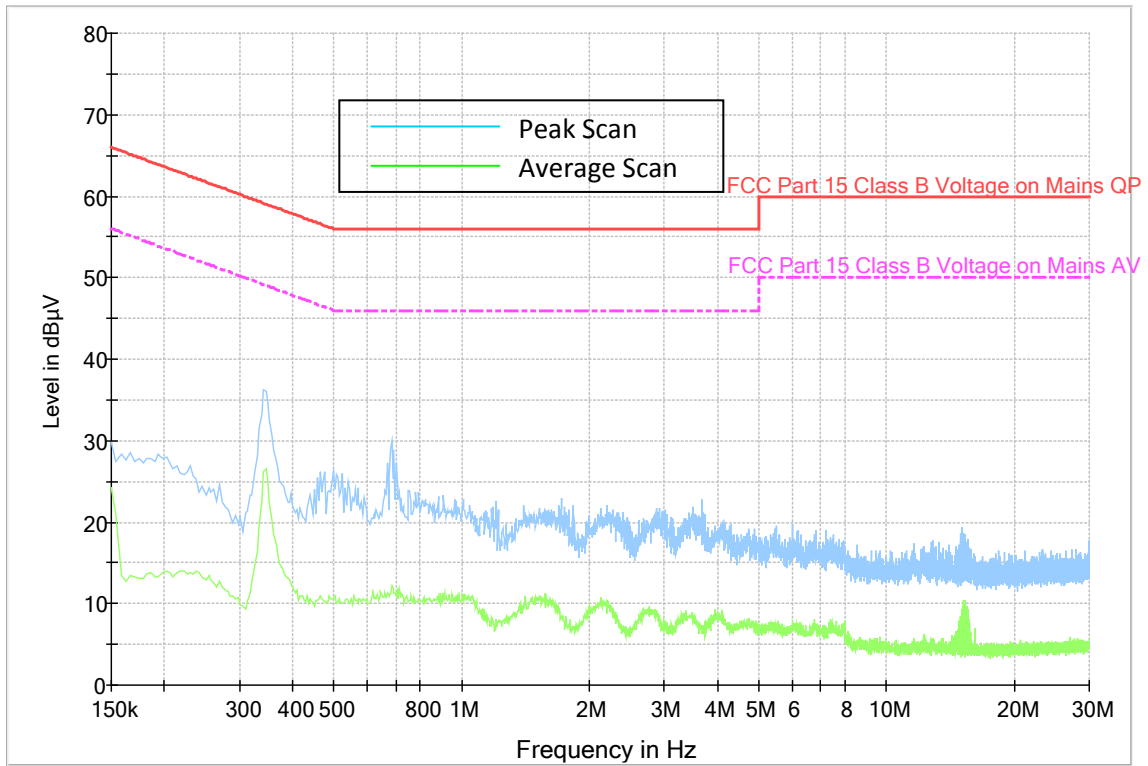
Frequency (MHz)	Average (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.230000	30.6	1000.0	9.000	On	L1	10.0	21.9	52.4	
0.270000	28.6	1000.0	9.000	On	L1	10.0	22.5	51.1	
0.310000	27.1	1000.0	9.000	On	L1	10.0	22.9	50.0	
0.350000	28.7	1000.0	9.000	On	L1	10.1	20.2	49.0	
0.386000	33.2	1000.0	9.000	On	L1	10.1	15.0	48.1	
0.426000	31.9	1000.0	9.000	On	L1	10.1	15.4	47.3	
0.466000	31.7	1000.0	9.000	On	L1	10.2	14.9	46.6	
0.506000	32.0	1000.0	9.000	On	L1	10.2	14.0	46.0	
0.618000	26.6	1000.0	9.000	On	L1	10.1	19.4	46.0	
0.654000	28.3	1000.0	9.000	On	L1	10.1	17.7	46.0	
0.694000	27.5	1000.0	9.000	On	L1	10.0	18.5	46.0	
0.734000	28.1	1000.0	9.000	On	L1	10.0	17.9	46.0	
0.774000	29.4	1000.0	9.000	On	L1	10.0	16.6	46.0	
0.894000	32.4	1000.0	9.000	On	L1	9.9	13.6	46.0	
1.234000	33.0	1000.0	9.000	On	L1	9.8	13.0	46.0	
1.274000	31.6	1000.0	9.000	On	L1	9.8	14.4	46.0	
2.250000	26.8	1000.0	9.000	On	L1	9.7	19.2	46.0	
3.374000	22.4	1000.0	9.000	On	L1	9.6	23.6	46.0	

* Expanded Uncertainty (U) = +/- 3.43 dB

Voltage Supply: 120VAC

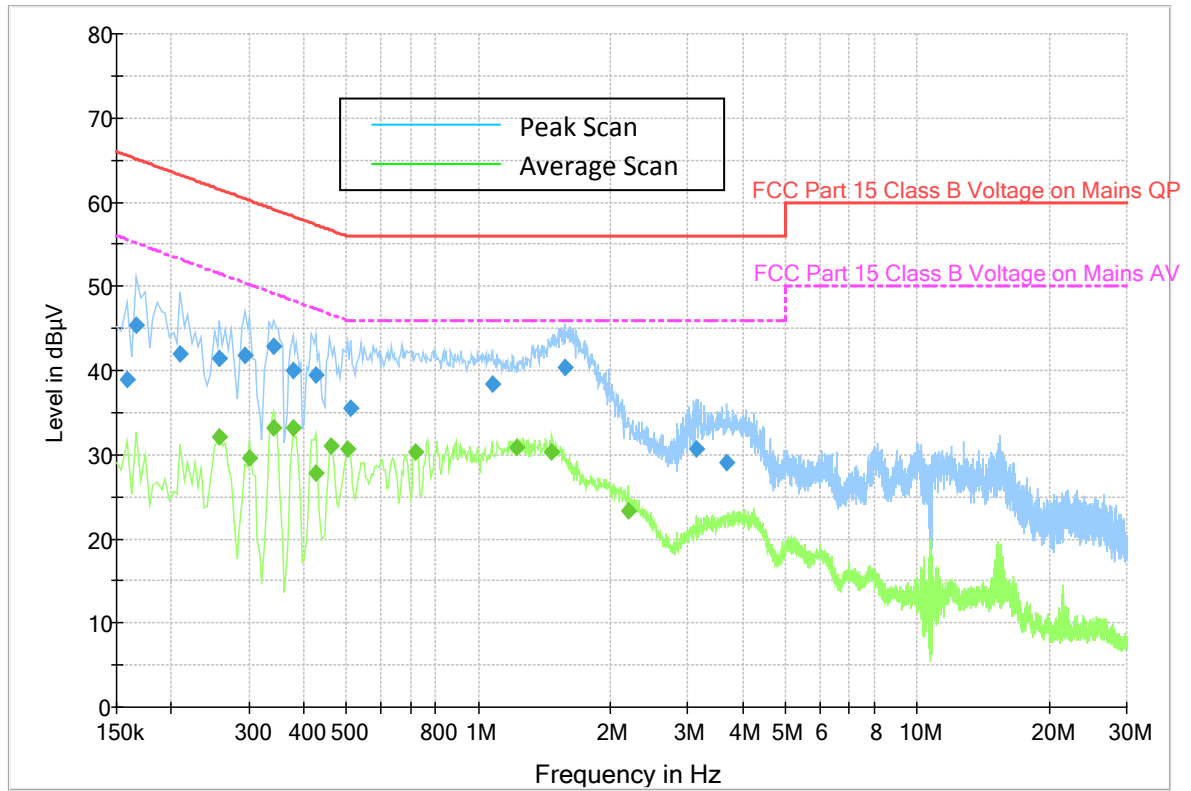
1) Charger Alone

Voltage with 2-Line-LISN



2) EUT Off

Voltage with 2-Line-LISN



QuasiPeak Measurement

Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.158000	38.9	1000.0	9.000	On	L1	10.0	26.7	65.6	
0.166000	45.4	1000.0	9.000	On	L1	10.0	19.7	65.2	
0.210000	41.9	1000.0	9.000	On	N	9.9	21.3	63.2	
0.258000	41.5	1000.0	9.000	On	L1	10.0	20.0	61.5	
0.294000	41.8	1000.0	9.000	On	L1	10.0	18.6	60.4	
0.342000	42.8	1000.0	9.000	On	N	10.1	16.3	59.2	
0.378000	39.9	1000.0	9.000	On	L1	10.1	18.4	58.3	
0.426000	39.4	1000.0	9.000	On	L1	10.1	17.9	57.3	
0.510000	35.5	1000.0	9.000	On	N	10.2	20.5	56.0	
1.074000	38.4	1000.0	9.000	On	L1	9.9	17.6	56.0	
1.574000	40.4	1000.0	9.000	On	L1	9.8	15.6	56.0	
3.138000	30.7	1000.0	9.000	On	L1	9.6	25.3	56.0	
3.678000	29.1	1000.0	9.000	On	L1	9.6	26.9	56.0	

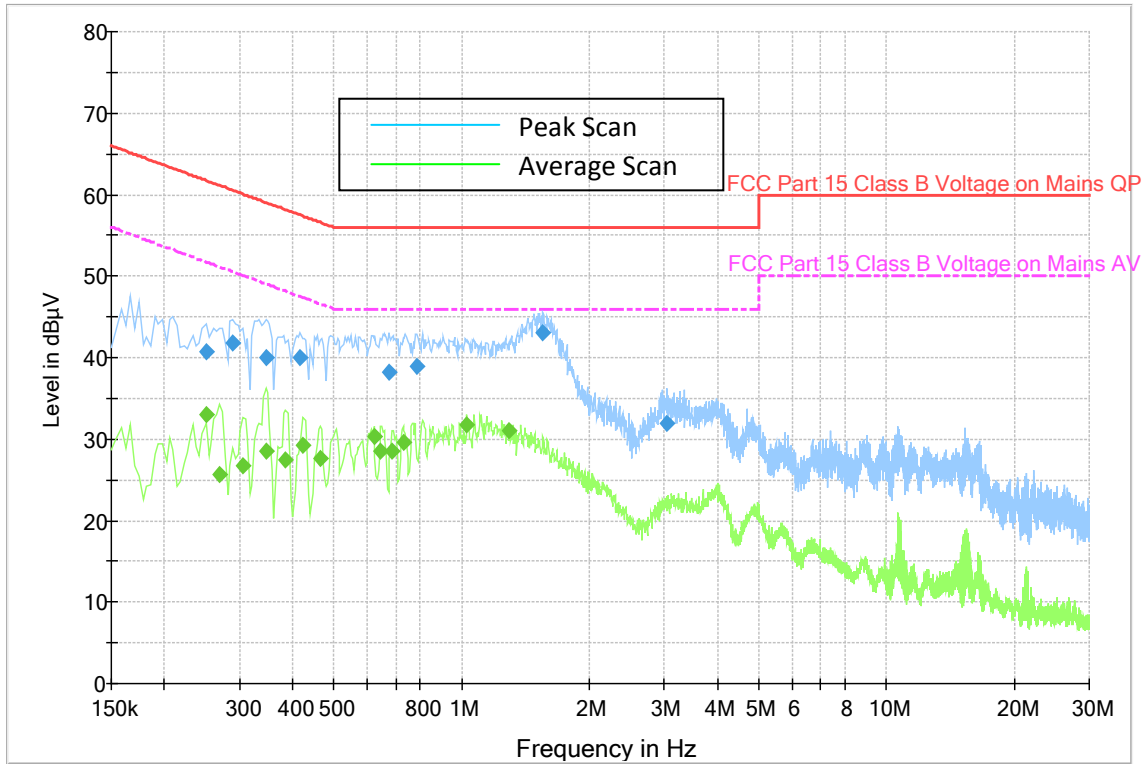
Average Measurement

Frequency (MHz)	Average (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.258000	32.0	1000.0	9.000	On	L1	10.0	19.5	51.5	
0.302000	29.6	1000.0	9.000	On	L1	10.0	20.6	50.2	
0.342000	33.3	1000.0	9.000	On	L1	10.1	15.9	49.2	
0.378000	33.2	1000.0	9.000	On	L1	10.1	15.2	48.3	
0.426000	27.9	1000.0	9.000	On	L1	10.1	19.4	47.3	
0.462000	30.9	1000.0	9.000	On	L1	10.2	15.7	46.7	
0.502000	30.7	1000.0	9.000	On	L1	10.2	15.3	46.0	
0.722000	30.2	1000.0	9.000	On	L1	10.0	15.8	46.0	
1.222000	30.9	1000.0	9.000	On	L1	9.8	15.1	46.0	
1.470000	30.3	1000.0	9.000	On	L1	9.8	15.7	46.0	
2.190000	23.4	1000.0	9.000	On	L1	9.7	22.6	46.0	

* Expanded Uncertainty (U) = +/- 3.43 dB

3) EUT Standby

Voltage with 2-Line-LISN



QuasiPeak Measurement

Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.250000	40.6	1000.0	9.000	On	L1	10.0	21.1	61.8	
0.290000	41.8	1000.0	9.000	On	L1	10.0	18.8	60.5	
0.346000	40.0	1000.0	9.000	On	L1	10.1	19.0	59.1	
0.418000	40.0	1000.0	9.000	On	L1	10.1	17.5	57.5	
0.674000	38.2	1000.0	9.000	On	L1	10.0	17.8	56.0	
0.786000	39.0	1000.0	9.000	On	L1	10.0	17.0	56.0	
1.554000	43.0	1000.0	9.000	On	L1	9.8	13.0	56.0	
3.034000	31.9	1000.0	9.000	On	L1	9.6	24.1	56.0	

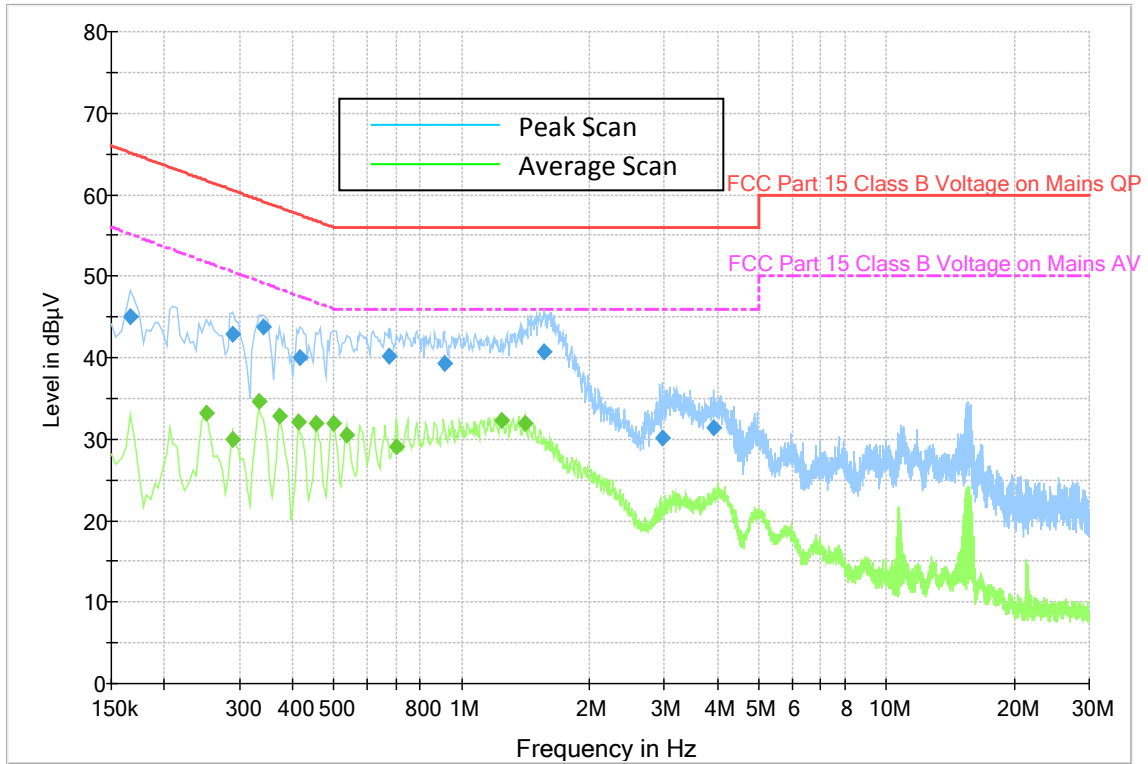
Average Measurement

Frequency (MHz)	Average (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.250000	33.1	1000.0	9.000	On	L1	10.0	18.7	51.8	
0.270000	25.7	1000.0	9.000	On	L1	10.0	25.4	51.1	
0.306000	26.7	1000.0	9.000	On	L1	10.0	23.4	50.1	
0.346000	28.5	1000.0	9.000	On	L1	10.1	20.5	49.1	
0.386000	27.4	1000.0	9.000	On	L1	10.1	20.8	48.1	
0.422000	29.2	1000.0	9.000	On	L1	10.1	18.2	47.4	
0.466000	27.6	1000.0	9.000	On	L1	10.2	19.0	46.6	
0.622000	30.3	1000.0	9.000	On	L1	10.1	15.7	46.0	
0.646000	28.5	1000.0	9.000	On	L1	10.1	17.5	46.0	
0.686000	28.5	1000.0	9.000	On	L1	10.0	17.5	46.0	
0.730000	29.7	1000.0	9.000	On	L1	10.0	16.3	46.0	
1.030000	31.7	1000.0	9.000	On	L1	9.9	14.3	46.0	
1.298000	31.1	1000.0	9.000	On	L1	9.8	14.9	46.0	

* Expanded Uncertainty (U) = +/- 3.43 dB

4) Link Idle

Voltage with 2-Line-LISN



QuasiPeak Measurement

Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.166000	45.0	1000.0	9.000	On	L1	10.0	20.1	65.2	
0.290000	42.9	1000.0	9.000	On	L1	10.0	17.7	60.5	
0.342000	43.7	1000.0	9.000	On	N	10.1	15.4	59.2	
0.418000	39.9	1000.0	9.000	On	L1	10.1	17.6	57.5	
0.674000	40.2	1000.0	9.000	On	L1	10.0	15.8	56.0	
0.910000	39.3	1000.0	9.000	On	L1	9.9	16.7	56.0	
1.566000	40.6	1000.0	9.000	On	L1	9.8	15.4	56.0	
2.970000	30.1	1000.0	9.000	On	N	9.6	25.9	56.0	
3.918000	31.4	1000.0	9.000	On	L1	9.6	24.6	56.0	

Average Measurement

Frequency (MHz)	Average (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.250000	33.2	1000.0	9.000	On	L1	10.0	18.5	51.8	
0.290000	30.0	1000.0	9.000	On	L1	10.0	20.5	50.5	
0.334000	34.5	1000.0	9.000	On	L1	10.1	14.8	49.4	
0.374000	32.8	1000.0	9.000	On	L1	10.1	15.6	48.4	
0.414000	32.0	1000.0	9.000	On	L1	10.1	15.5	47.6	
0.454000	31.9	1000.0	9.000	On	L1	10.2	14.9	46.8	
0.498000	31.9	1000.0	9.000	On	L1	10.2	14.2	46.0	
0.538000	30.5	1000.0	9.000	On	L1	10.1	15.5	46.0	
0.702000	29.1	1000.0	9.000	On	L1	10.0	16.9	46.0	
1.238000	32.3	1000.0	9.000	On	L1	9.8	13.7	46.0	
1.406000	32.0	1000.0	9.000	On	L1	9.8	14.0	46.0	

* Expanded Uncertainty (U) = +/- 3.43 dB