



**MOBILE DEVICES BUSINESS**

**PRODUCT SAFETY AND COMPLIANCE  
EMC LABORATORY**

**EMC TEST REPORT**

**Test Report Number** – 24934-1 BT LE

**Report Date** – May 25, 2012

The test results contained herein relate only to the model(s) identified. It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical characteristics.

As the responsible EMC Engineer, I hereby declare that the equipment tested as specified in this report conforms to the requirements indicated.

Signature: 

Name: Albert J. Patapack

Title: EMC Engineer

Date: May 25, 2012

This report must not be reproduced, except in full, without written approval from this laboratory.

THIS REPORT MUST NOT BE USED TO CLAIM PRODUCT ENDORSEMENT BY A2LA OR ANY AGENCY OF THE U.S. GOVERNMENT.



2404

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**Test Report Details**

Tests Performed By: ADR Testing Service  
Location Code: ADR LV  
Motorola Mobility Inc  
Product Safety and Compliance Group  
600 North US Hwy 45  
Libertyville, IL 60048  
PH (847) 523-6167 Fax (847) 523-4538  
FCC Registration Number: 316588  
Industry Canada Number: 1090-1

Tests Requested By: Motorola Mobility, Inc.  
Mobile Devices Business  
600 North US Hwy 45  
Libertyville, IL 60048

Product Type : Cellular Phone

Signaling Capability: GSM 850/1900, WCDMA 850/1700/1900  
HSDPA, HSUPA, EDGE, GPRS, 802.11a/b/g/n,  
LTE Band 4/17, Bluetooth LE + EDR

FCC ID: IHDP56MB4

Serial Numbers: LDNB260042, LDNB270027

Testing Complete Date: April 19, 2012

**Applicable Standards**

All tests and measurements indicated in this document were performed in accordance with the Code of Federal Regulations Title 47 Part 2, Sub-part J as well as the following parts:

  X   Part 15 Subpart C – Intentional Radiators

Applicable Standards: ANSI 63.4 2003, RSS-210 Issue 8

**Summary of Testing**

Test	Test Name	Pass/Fail
1	Spectrum Bandwidth	Pass
2	Peak Power	Pass
3	Power Spectral Density	Pass
4	Spurious RF Conducted Emissions	Pass
5	AC Line Conducted Emissions	Pass

Test	Test Name	Results
1	Spectrum Bandwidth	See plots
2	Peak Power	See plots
3	Power Spectral Density	See tables
4	Spurious RF Conducted Emissions	See plots
5	AC Line Conducted Emissions	See Plots

**General and Special Conditions**

This product utilizes an internal battery that is not removable. When applicable, EMC testing was performed with the internal battery fully charged.

All testing was done in an indoor controlled environment. The temperature and the relative humidity were maintained within the ANSI C63.4 2003 Standard requirements during the entire duration of testing.

**Equipment and Cable Configurations**

The EUT was tested in a stand-alone configuration that is representative of typical use.

**Measuring Equipment and Calibration Information**

Manufacturer	Equipment Type	Model No.	Serial Number	Calibration Due Date
Rohde & Schwarz	Receiver	ESIB40	100001	12/30/2012
Agilent	Signal Analyzer	N9020A	US46470586	01/20/2014
Attenuator	Weinschel	AS-6	6675	NCR
Attenuator	Weinschel	AS-6	6677	NCR
ETS	LISN	3810/2NM	00023630	9/02/2012
ETS	LISN	3810/2NM	2179	9/02/2012

Note that the signal analyzer is on a two-year calibration cycle. All testing was performed using equipment that was within calibration at the time that the test was performed. No equipment listed in the table above was used after the specified calibration due date. If, during the course of product testing, a piece of equipment went out of calibration and that piece of equipment was needed to complete product testing, a similar piece of calibrated equipment was substituted. If a substitution was made, that new piece of equipment would be listed in the above table along with the piece that was removed from service.

**Description of Bluetooth Transmitter**

The Equipment Under Test (EUT) offers Bluetooth LE + EDR as a feature. This report covers Bluetooth LE operation only. The Bluetooth LE + EDR spread-spectrum, is designed to operate between 2402 and 2480 MHz. The Bluetooth antenna is mounted inside of the EUT. The antenna installation is permanent. For a more thorough description of the functionality please refer to Exhibit 12 of this package.

As a Bluetooth LE transmitter, it is designed operate with other Bluetooth LE devices as defined by the industrial standard. In this application, the device is battery operated.

**De Facto EIRP Limit – Pursuant 47 CFR 15.247(b)(4); RSS-210 Section A8.4.**

Criterion: The conducted output power limit of 1-watt is based on the use of antennas with directional gains that do not exceed 6 dB<sub>i</sub>. If transmitting antennas of directional gain greater than 6 dB<sub>i</sub> are used, the conducted output power from the intentional radiator shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dB<sub>i</sub>.

The antenna employed by this transmitter is intended to be omni-directional, and thus will not exhibit directional gain in excess of 6 dB<sub>i</sub>. The conducted power is less than the limits set forth (see elsewhere in this report for details).

## **Measurement Procedures and Data**

### **Spectrum Bandwidth**

CFR 47 Part 15.247

### **Measurement Procedure**

The RF output port of the Equipment-Under-Test is directly coupled to the input of the EMC analyzer through a specialized RF connector and a 10dB passive attenuator. The fully charged internal battery was used for the supply voltage.

The Bluetooth frequency hopping function of the EUT was enabled. The spectrum analyzer used the following settings:

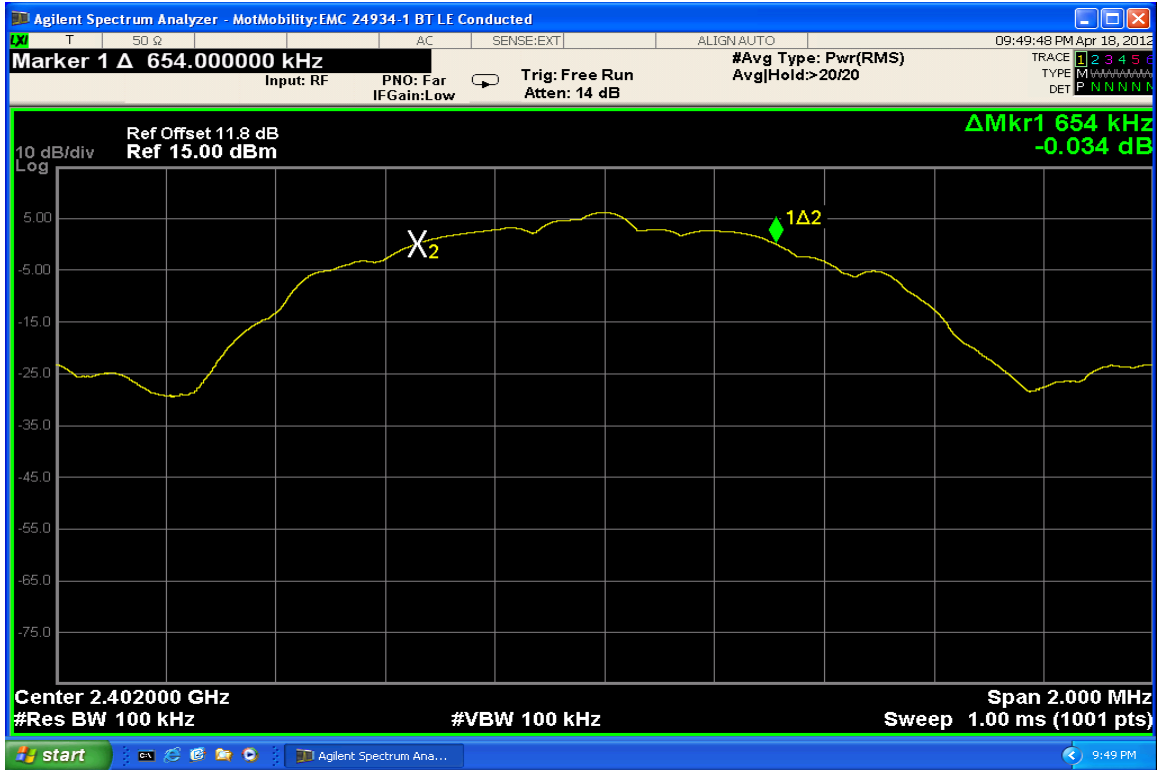
The legacy DTS measurement method allowed per April 2012 TCB Workshop Guidelines.

1. RBW  $\geq$  100 kHz
2. VBW  $\geq$  RBW
3. Sweep = auto
4. Detector function = peak
5. Trace = max hold

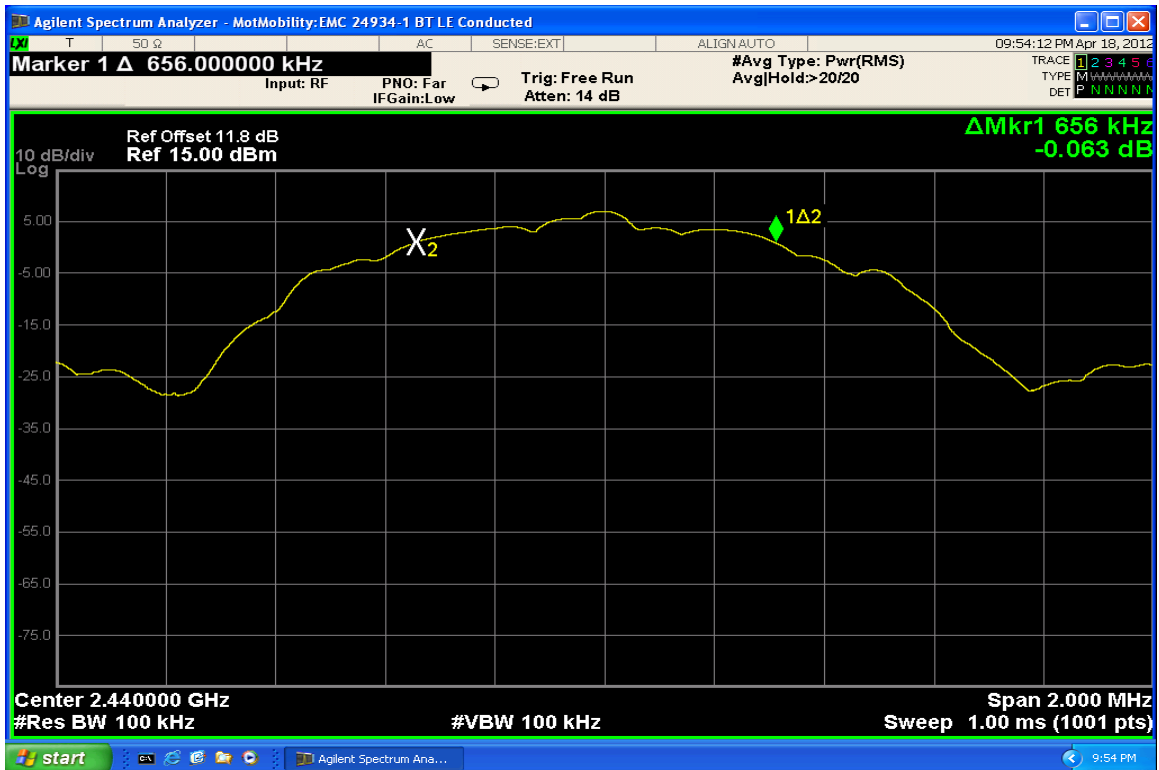
The trace was allowed to stabilize. The EUT was transmitting at its maximum data rate. The marker-to-peak function was used to set the marker to the peak of the emission. The marker-delta function was used to measure 6 dB down one side of the emission. The marker-delta function and marker was moved to the other side of the emission until it was even with the reference marker. The marker-delta reading at this point was the 6 dB bandwidth of the emission. The same procedure was repeated for 20 dB bandwidth.

### **Measurement Results**

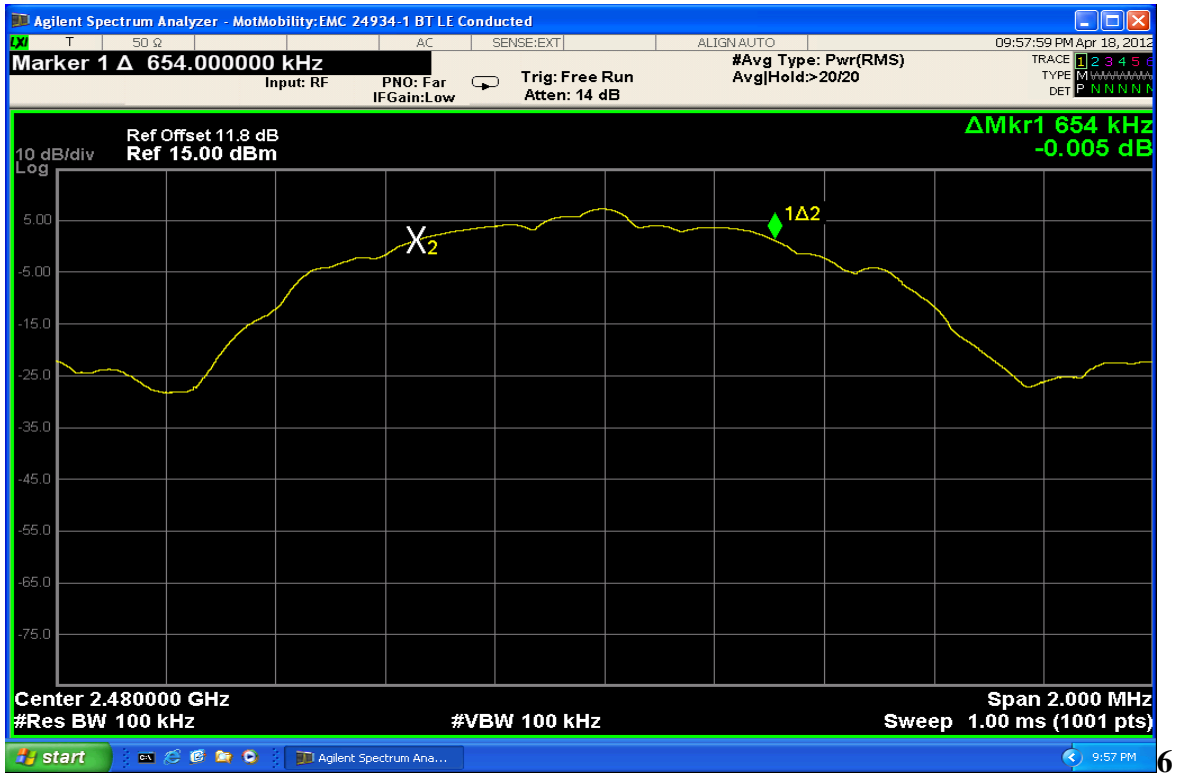
See attached



6 dB Bandwidth Low Channel



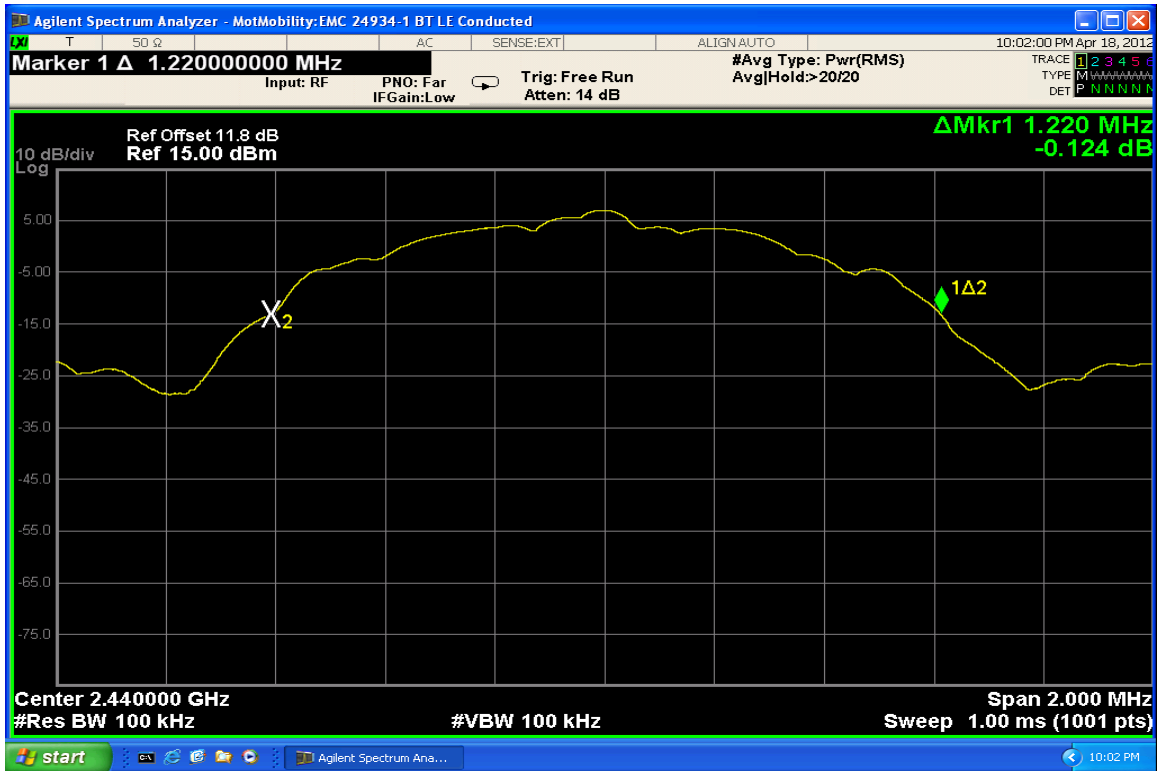
6 dB Bandwidth Mid Channel



dB Bandwidth High Channel



20 dB Bandwidth Low Channel



20 dB Bandwidth Mid Channel



20 dB Bandwidth High Channel

## **PEAK OUTPUT POWER**

CFR 47 Part 15.247

### **Measurement Procedure**

The RF output port of the Equipment-Under-Test is directly coupled to the input of the Spectrum analyzer through a specialized RF connector and a 10dB passive attenuator. The fully charged internal battery was used for the supply voltage. The power is then measured using a peak detector,

### **Measurement Results**

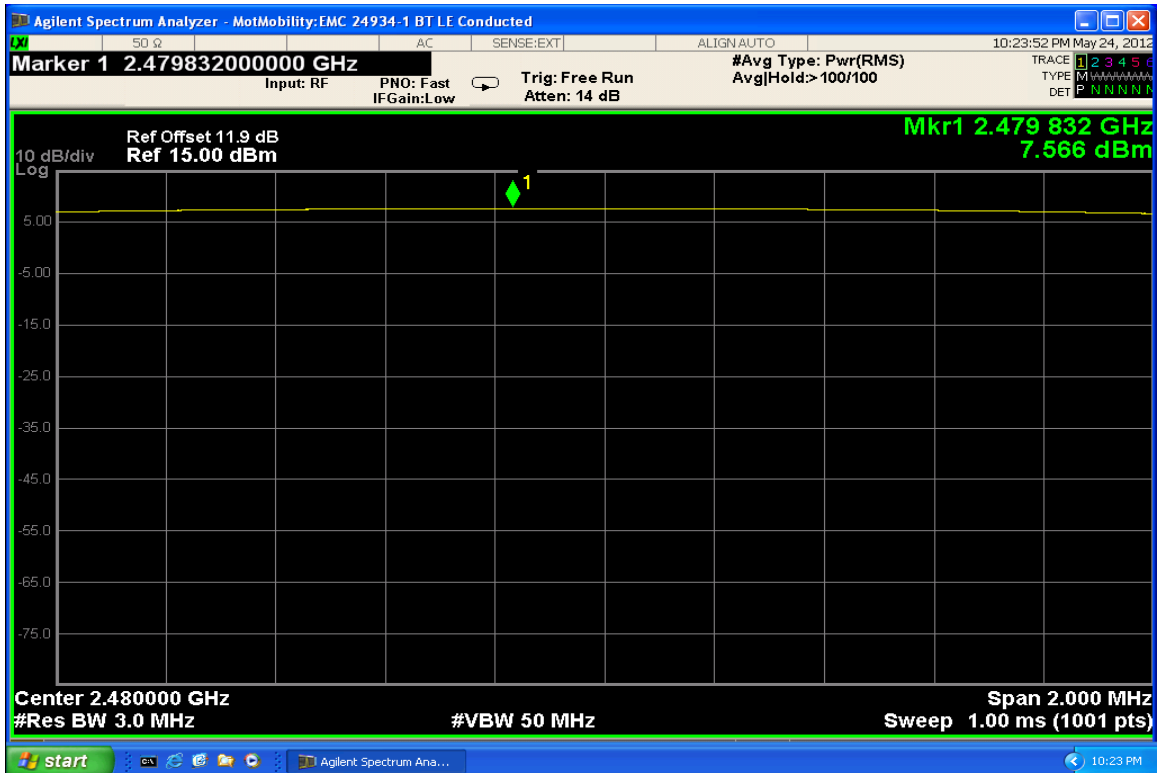
See Attached



Max. Power Low Channel



Max. Power Mid Channel



Max. Power High Channel

**Power Spectral Density**

CFR 47 Part 15.247

**Measurement Procedure**

The RF output port of the Equipment-Under-Test is directly coupled to the input of the EMC analyzer through a specialized RF connector and a 10dB passive attenuator. The fully charged internal battery was used for the supply voltage.

The BT LE function of the EUT was enabled. The spectrum analyzer used the following settings:

The legacy DTS measurement method allowed per April 2012 TCB Workshop Guidelines.

1. Span = 300 kHz
2. VBW =30 kHz
3. RBW=3 kHz
4. Sweep = 50 ms
5. Detector function = peak
6. Trace = max hold

The trace was allowed to stabilize. The EUT was transmitting at its maximum data rate.

**Measurement Results**

<b>2402 MHz</b>	<b>2440 MHz</b>	<b>2480 MHz</b>
4.796	5.658	5.874

## **SPURIOUS RF CONDUCTED EMISSIONS**

CFR 47 Part 15.247

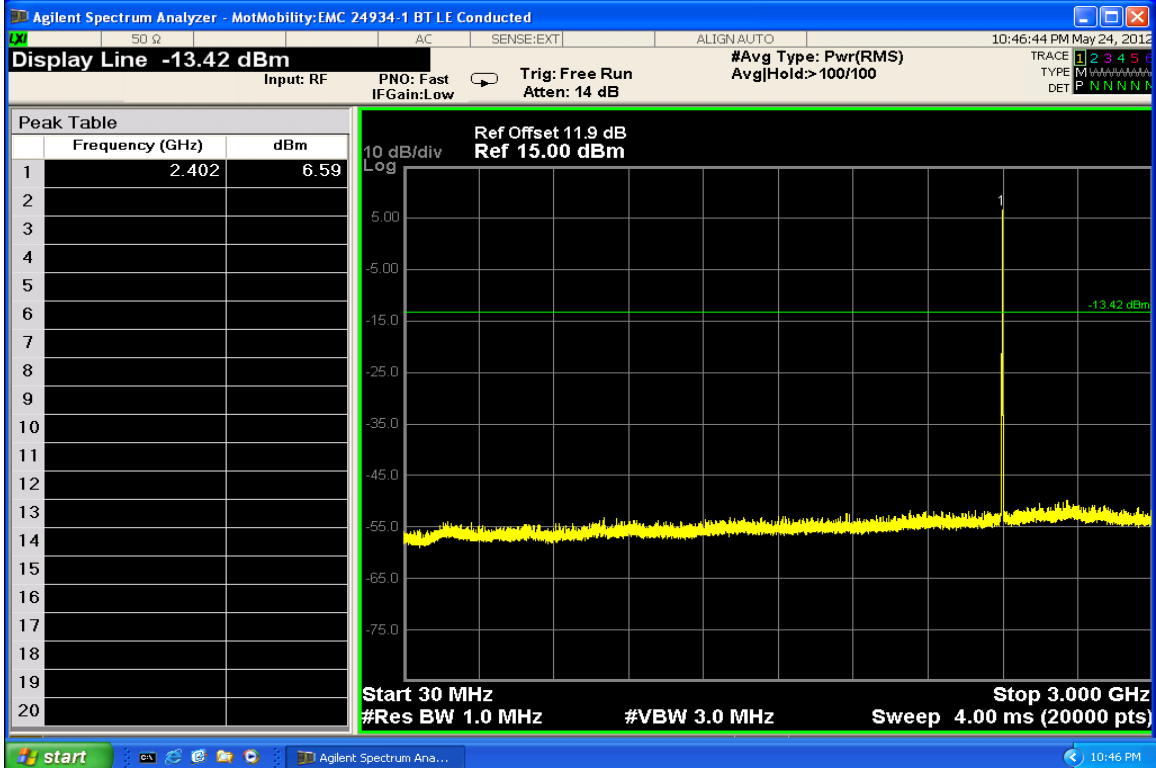
### **Measurement Procedure**

The RF output port of the Equipment-Under-Test is directly coupled to the input of the EMC analyzer through a specialized RF connector and a 10dB passive attenuator. The fully charged internal battery was used for the supply voltage.

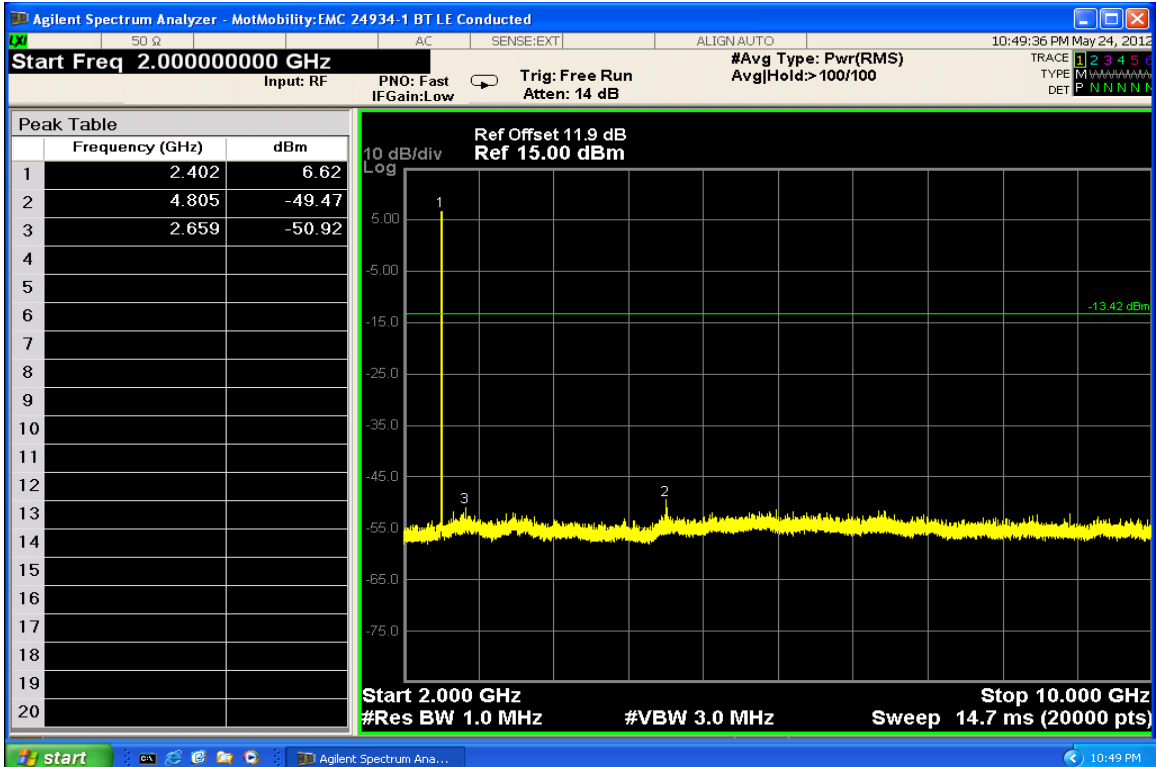
### **Measurement Results**

All measured emissions are greater than 20dB below the fundamental.

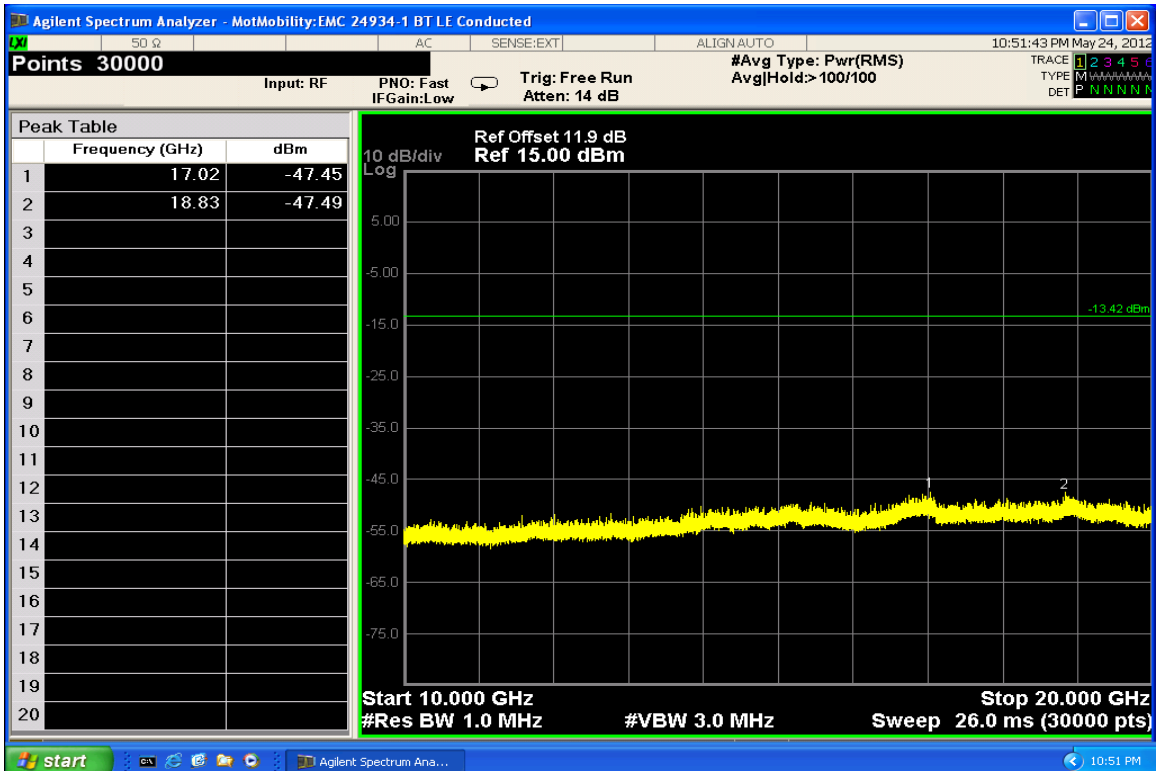
See attached:



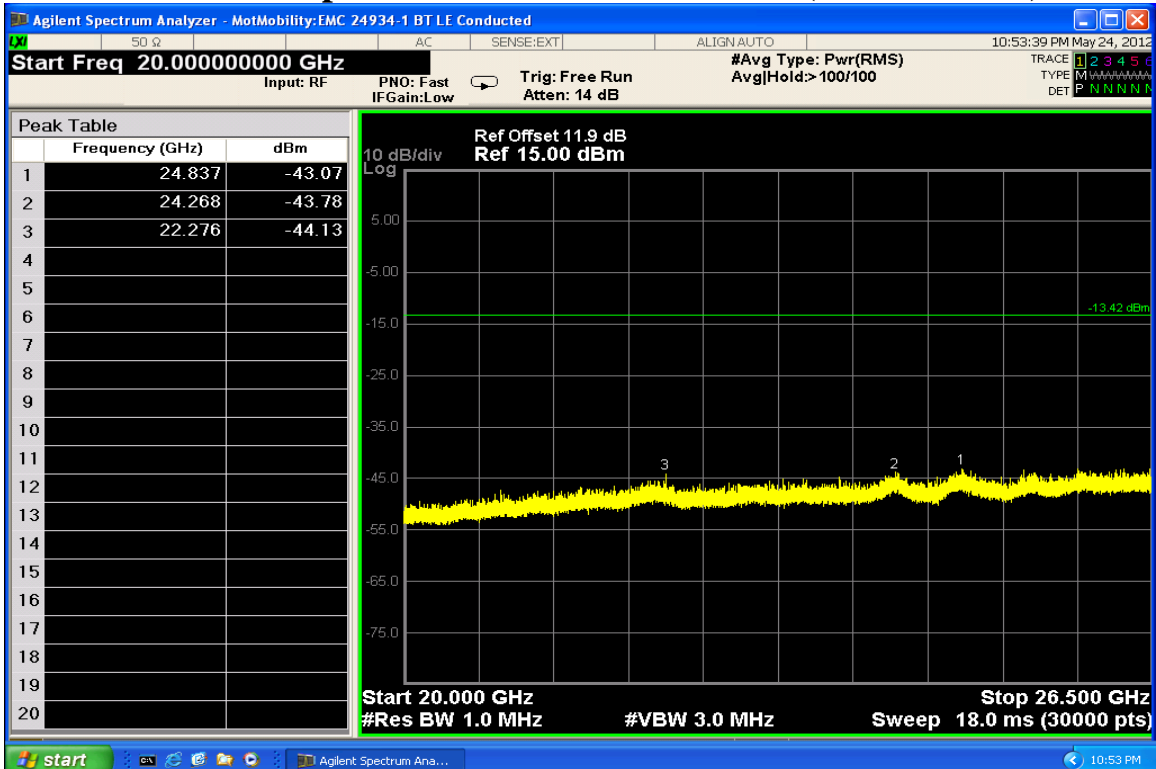
Conducted Spurious Emissions 30-3000 MHz (Low Channel)



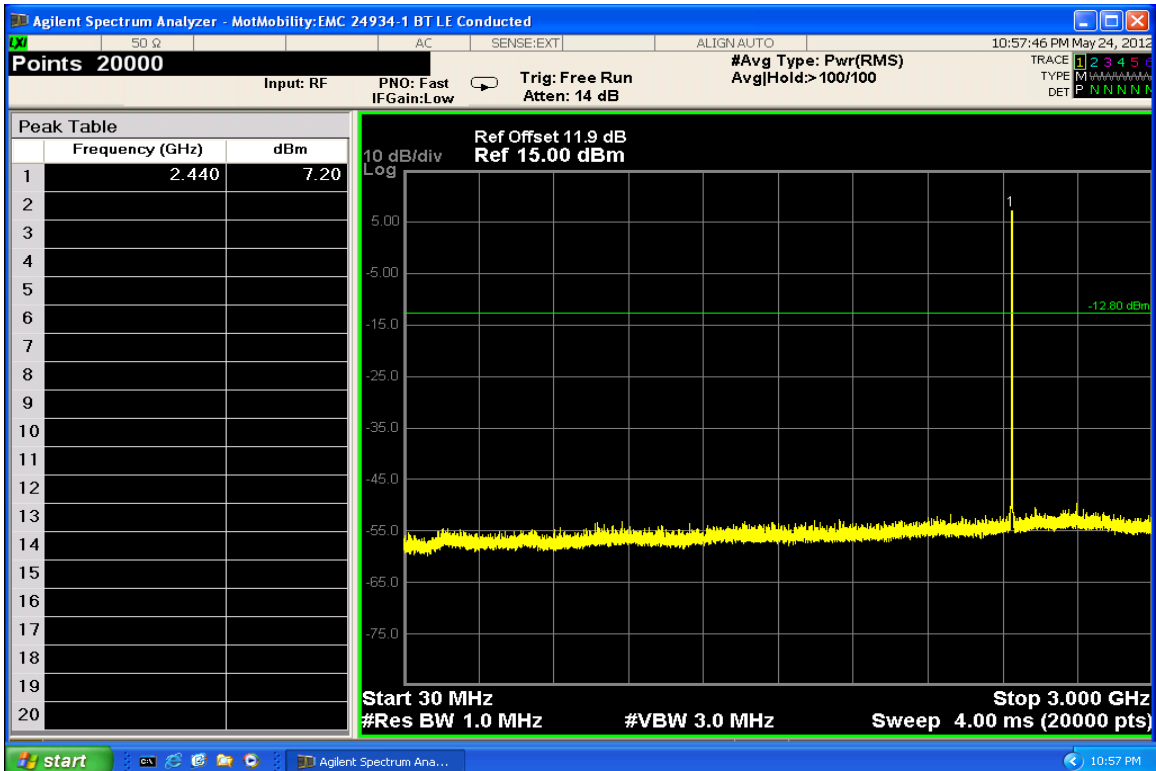
Conducted Spurious Emissions 2-10 GHz (Low Channel)



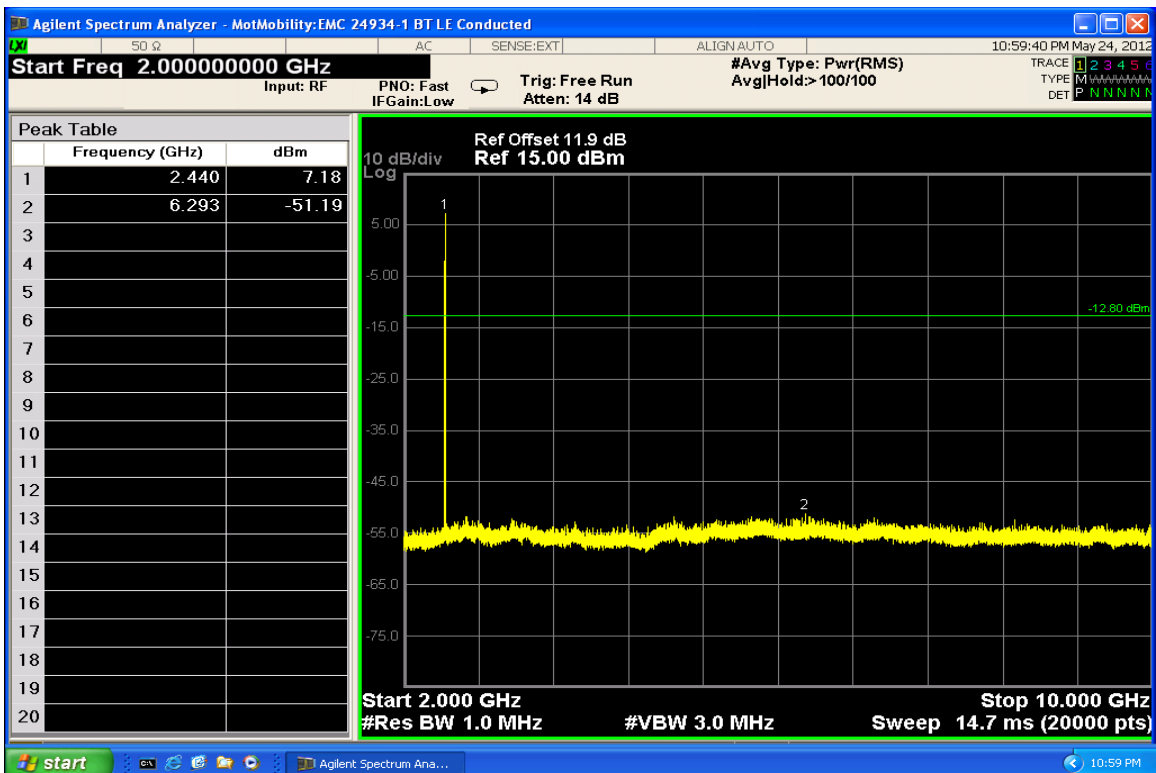
**Conducted Spurious Emissions 10-20 GHz (Low Channel)**



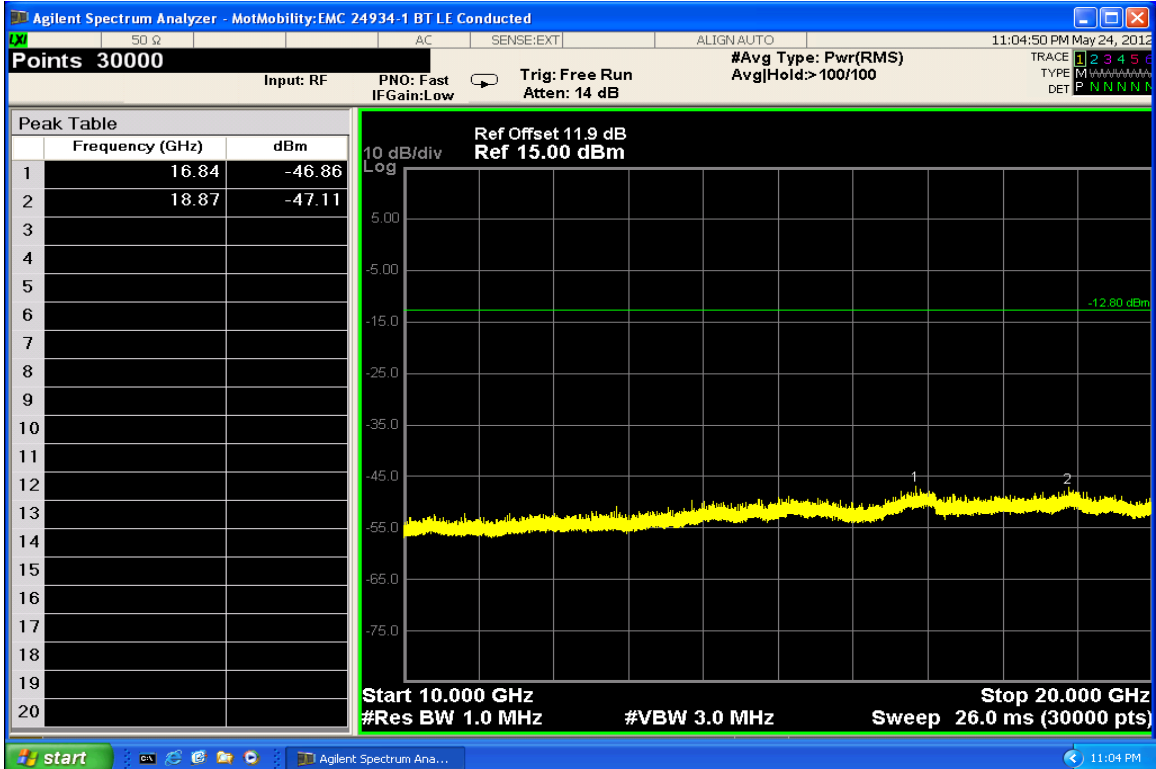
**Conducted Spurious Emissions 20-26.5 GHz (Low Channel)**



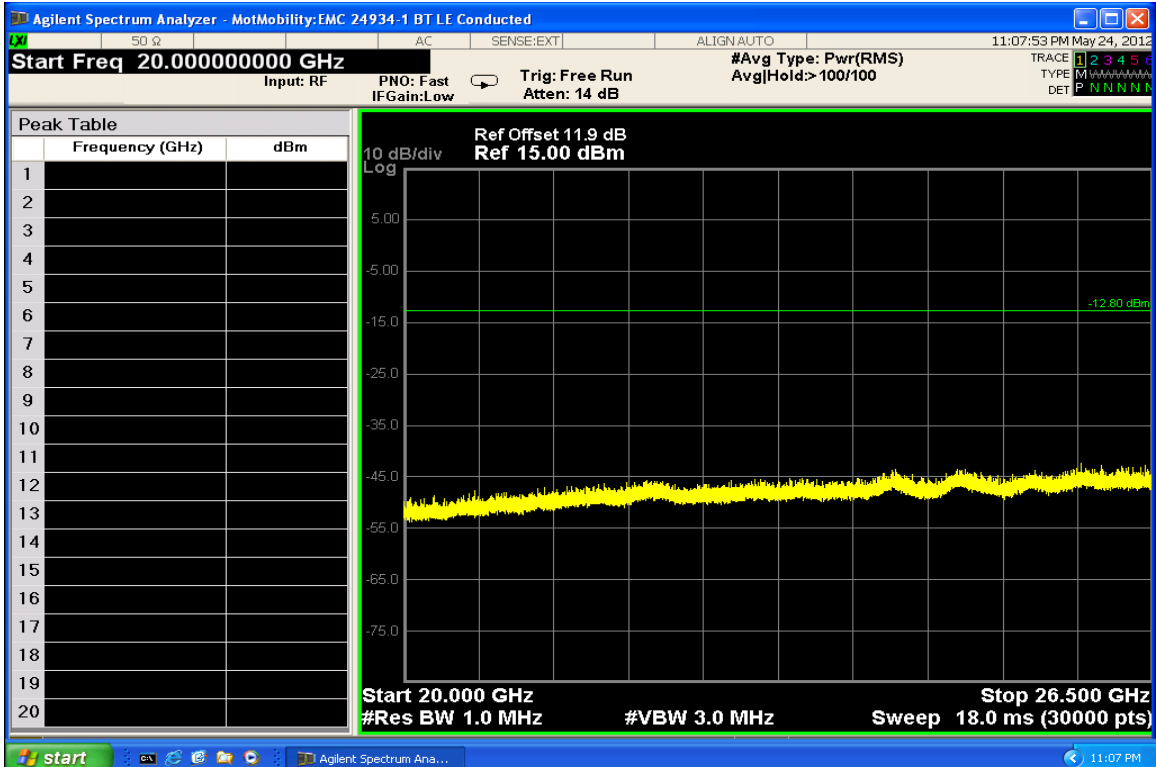
**Conducted Spurious Emissions 30-3000 MHz (Mid Channel)**



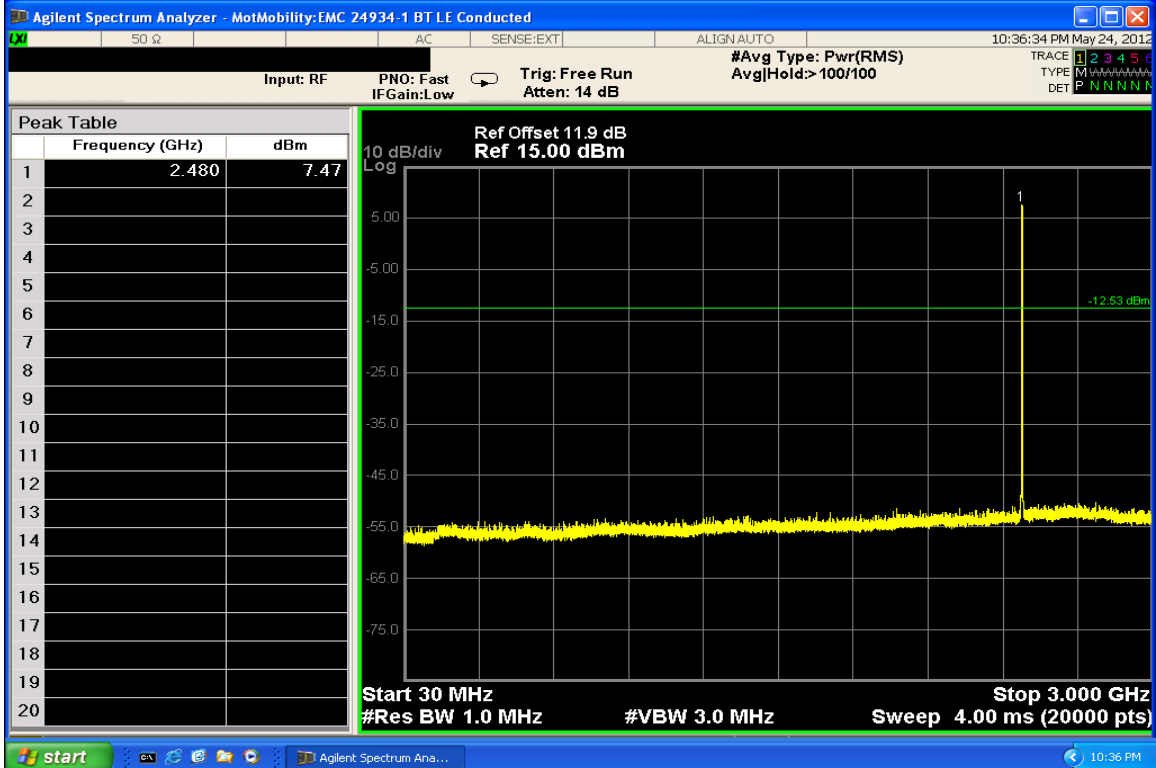
**Conducted Spurious Emissions 2-10 GHz (Mid Channel)**



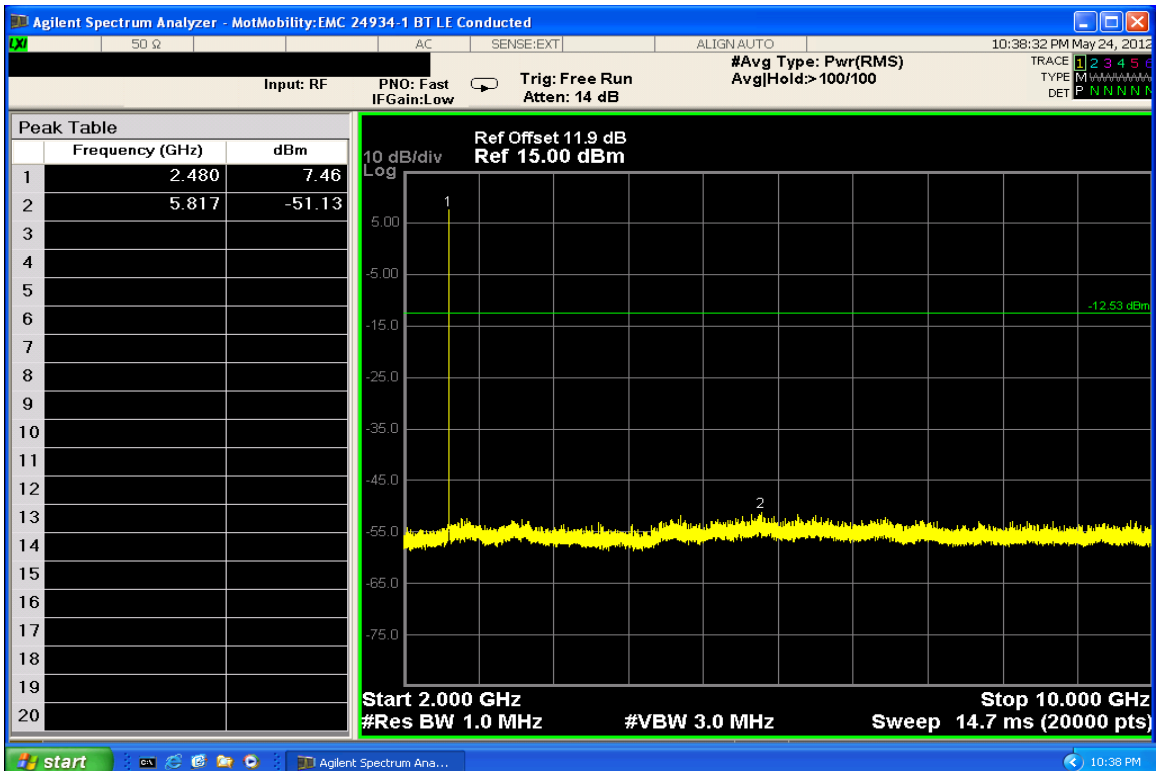
Conducted Spurious Emissions 10-20 GHz (Mid Channel)



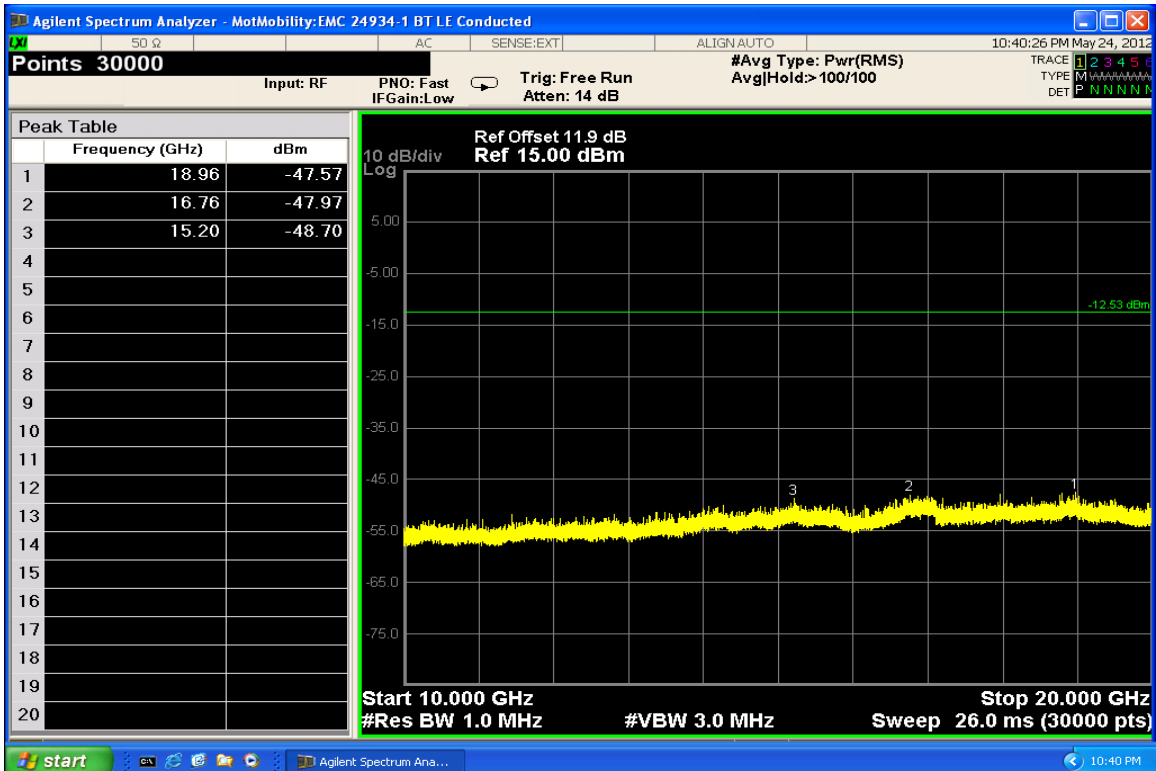
Conducted Spurious Emissions 20-26.5 GHz (Mid Channel)



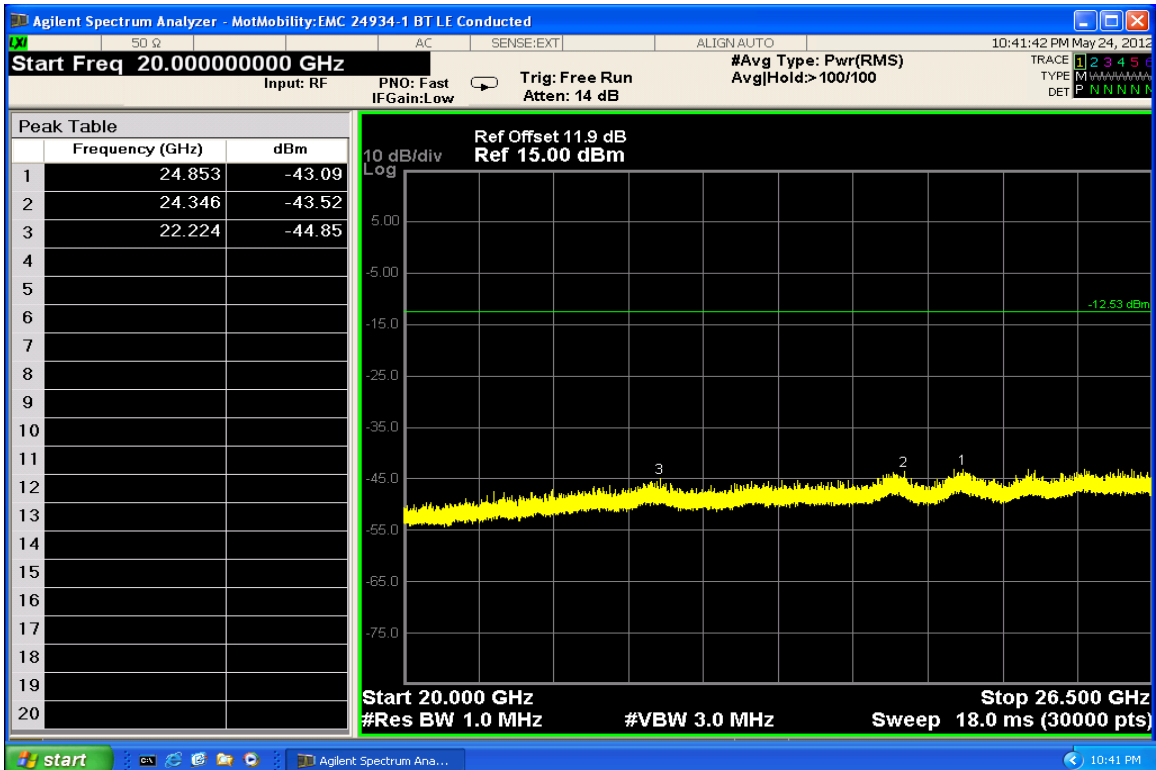
**Conducted Spurious Emissions 30-3000 MHz (High Channel)**



**Conducted Spurious Emissions 2-10 GHz (High Channel)**



**Conducted Spurious Emissions 10-20 GHz (High Channel)**



**Conducted Spurious Emissions 20-26.5 GHz (High Channel)**

**AC LINE CONDUCTED EMISSIONS**

CFR 47 Part 15.207

**Measurement Procedure**

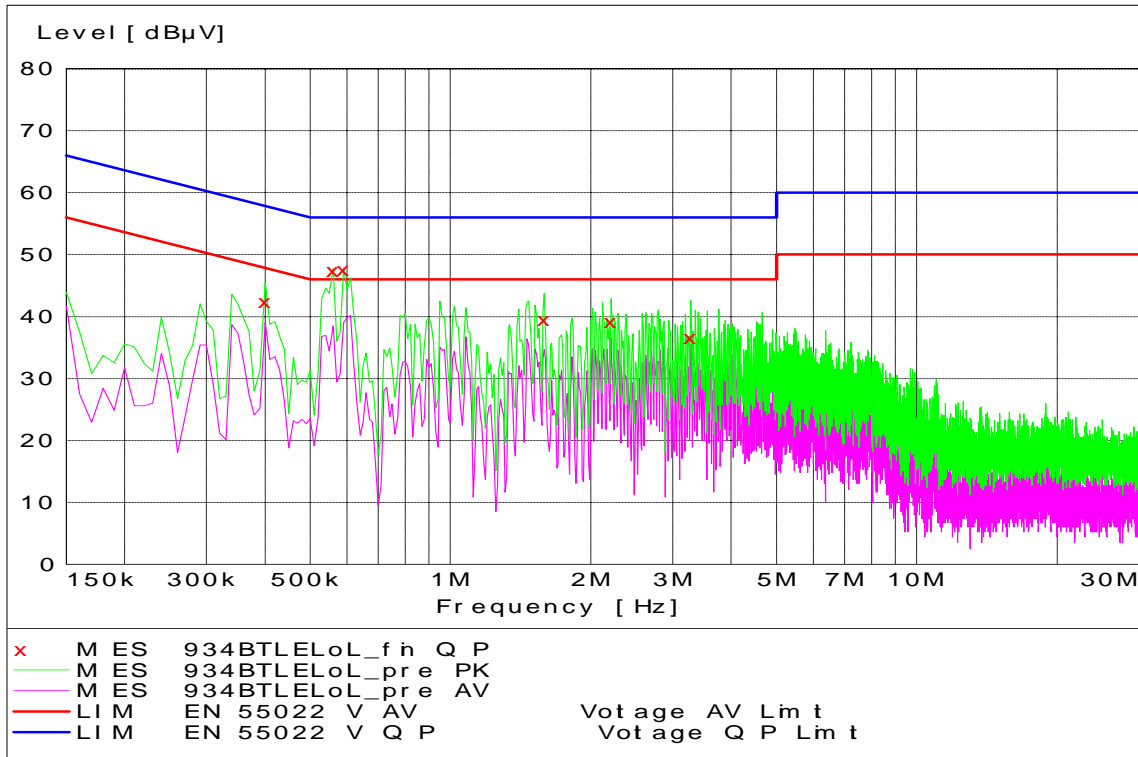
Measured levels of ac power line conducted emission shall be the radio-noise voltage from the line probe or across the 50  $\Omega$  LISN port, where permitted, terminated into a 50  $\Omega$  noise meter, or where permitted or required, the radio-noise current on the power line sensed by a current probe.

All radio-noise voltage and current measurements shall be made on each current-carrying conductor at the plug end of the EUT power cord or calibrated extension cord by the use of mating plugs and receptacles on the EUT and LISN. Equipment shall be tested with power cords that are normally supplied using an LISN, the 50  $\Omega$  measuring port is terminated by a 50  $\Omega$  radio-noise meter or a 50  $\Omega$  resistive load. All other ports are terminated in 50  $\Omega$ .

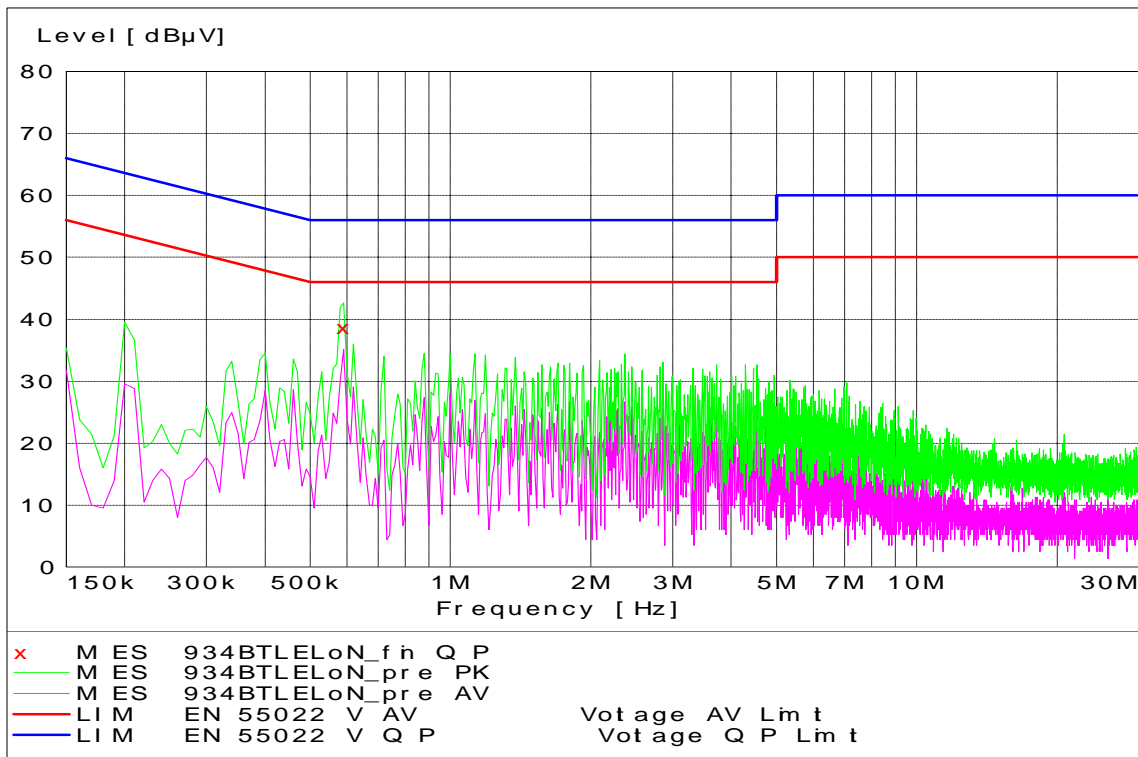
Detectors – Quasi Peak and Average Detector.

**Measurement Results**

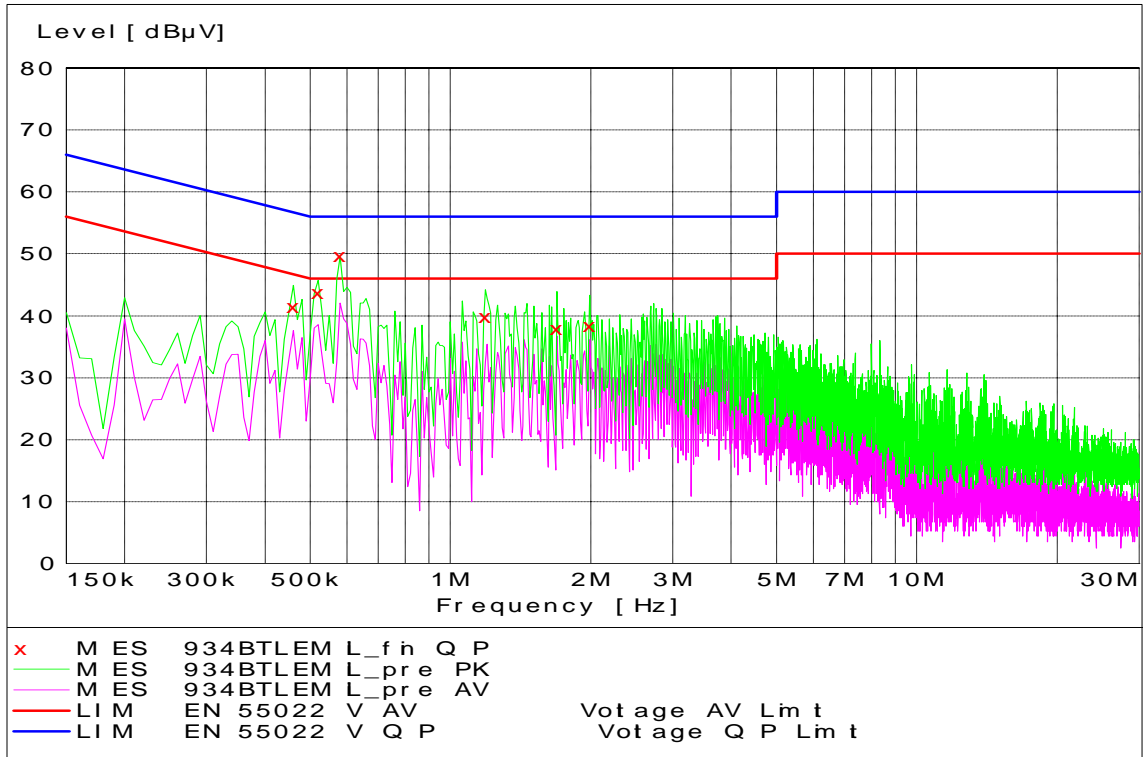
See attached:



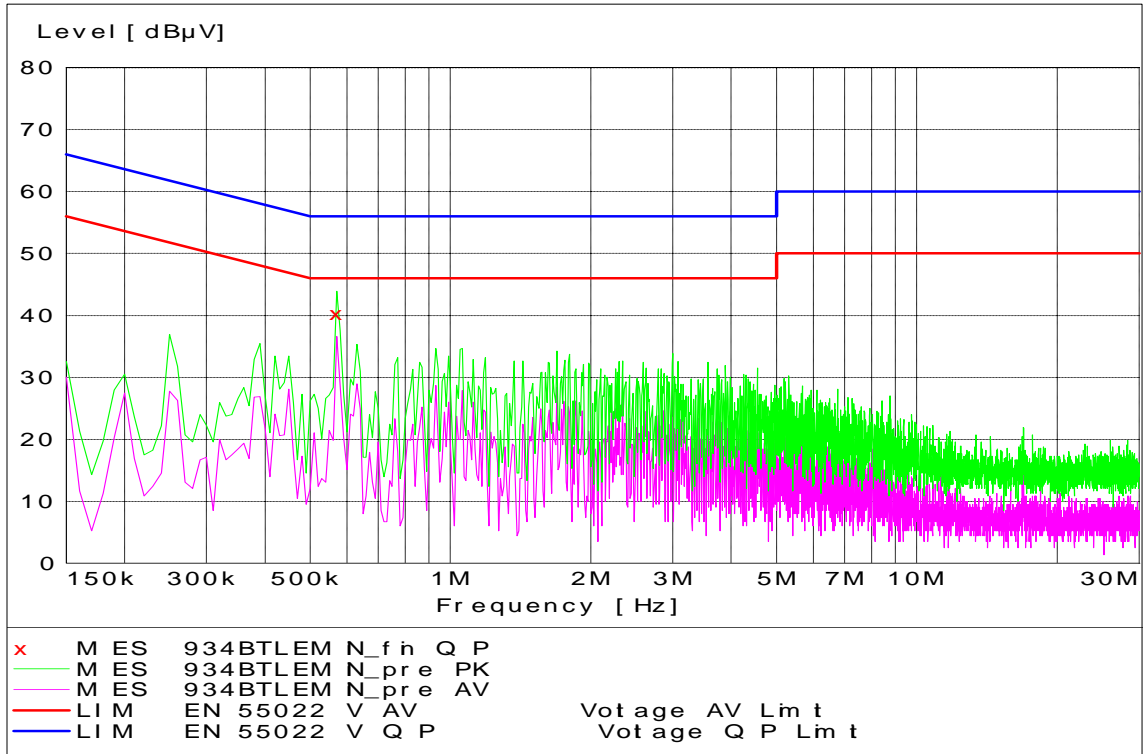
**Low Channel - Tx Mode - Line Coupling**



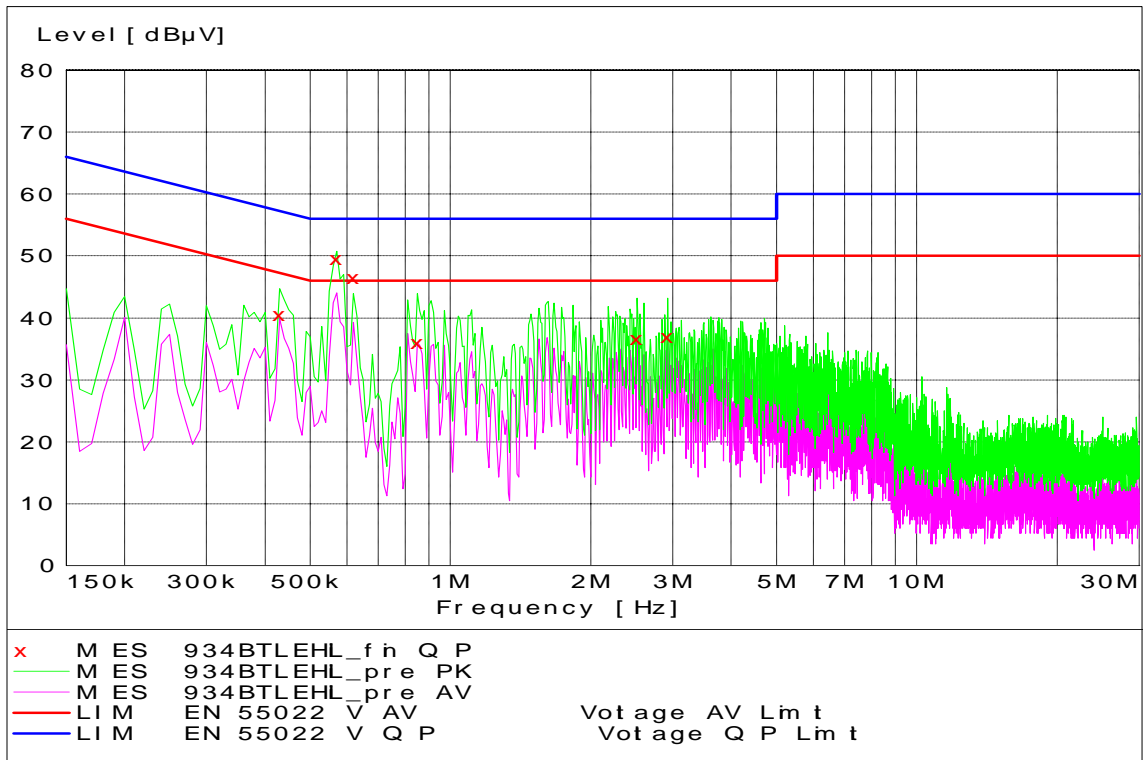
**Low Channel - Tx Mode - Neutral Coupling**



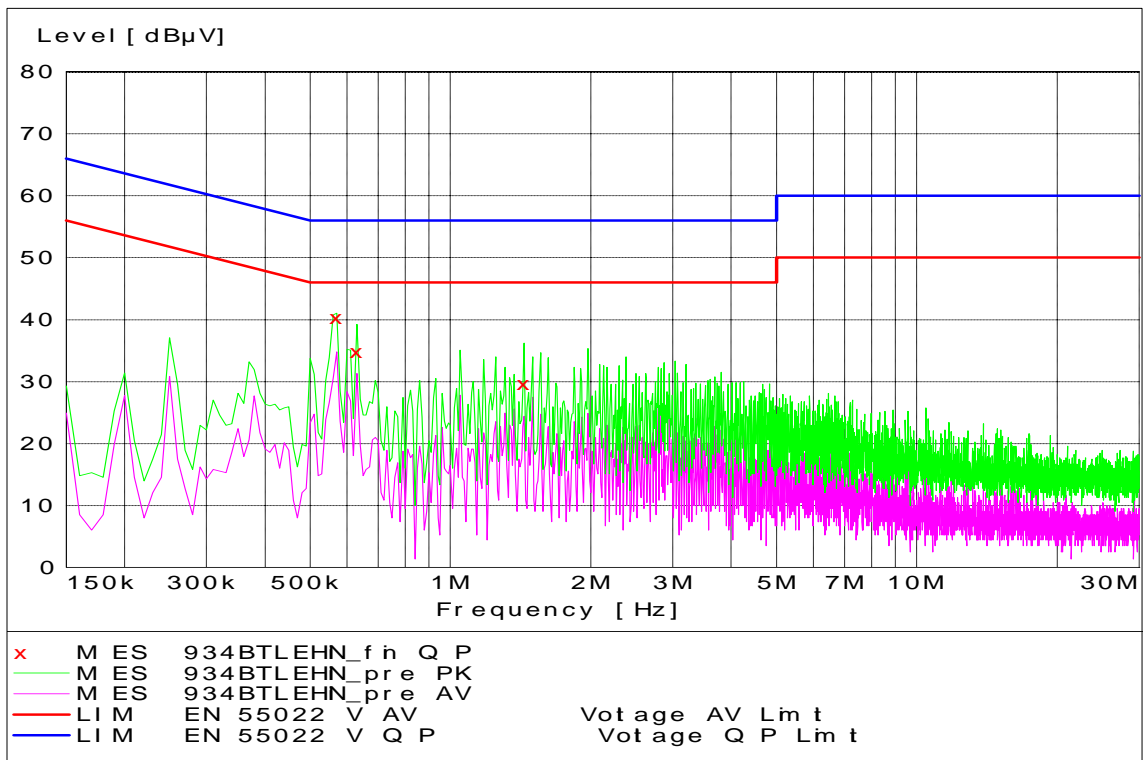
**Mid Channel - Tx Mode - Line Coupling**



**Mid Channel - Tx Mode - Neutral Coupling**



**High Channel - Tx Mode - Line Coupling**



**High Channel - Tx Mode - Neutral Coupling**

**End of Test Report**