

**Prüfbericht - Nr.: 19660356 001**

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Test Report No.:

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**Auftraggeber:** The Kroger Co.  
*Client:* 11450 Grooms Rd.  
Blue Ash, OH 45242  
United States

**Gegenstand der Prüfung:** G3HH2D ZigBee Retail Handheld  
*Test item:*

**Bezeichnung:** HHG32D **Serien-Nr.:** Engineering Sample  
*Identification:* *Serial No.*

**Wareneingangs-Nr.:** 1803282577 **Eingangsdatum:** 21.12.2017  
*Receipt No.:* *Date of receipt:*

**Prüfart:** Refer Page 3 of 17 for test facilities  
*Testing location:*

**Prüfgrundlage:** FCC Part 15 Subpart C 15.247  
*Test specification:* ANSI C63.4-2013

**Prüfergebnis:** Der Prüfgegenstand entspricht oben genannter Prüfgrundlage(n).  
*Test Result:* The test items passed the test specification(s).  
FCC Test Firm Registration No.: 496599

**Prüflaboratorium:** TÜV Rheinland (India) Pvt. Ltd.  
*Testing Laboratory:* 82/A, 3rd Main, West Wing, Electronic City Phase 1  
Hosur Road, Bangalore – 560 100. India

**geprüft / tested by:**

**kontrolliert / reviewed by:**

12.12.2017 Girish Kumar G  
Engineer



28.12.2017 Saibaba Siddapur  
Assistant Manager



**Datum** **Name/Stellung** **Unterschrift**  
*Date* *Name/Position* *Signature*

**Datum** **Name/Stellung** **Unterschrift**  
*Date* *Name/Position* *Signature*

**Sonstiges / Other Aspects:** FCC ID:PBR-SZHHG32D

**Abkürzungen:** P(ass) = entspricht Prüfgrundlage  
F(ail) = entspricht nicht Prüfgrundlage  
N/A = nicht anwendbar  
N/T = nicht getestet

**Abbreviations:** P(ass) = passed  
F(ail) = failed  
N/A = not applicable  
N/T = not tested

**Dieser Prüfbericht bezieht sich nur auf das o.g. Prüfmuster und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens.**

*This test report relates to the a. m. test sample. Without permission of the test center this test report is not permitted to be duplicated in extracts.  
This test report does not entitle to carry any safety mark on this or similar products.*

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# 1 TEST RESULT SUMMARY

Table 1: Test result summary

FCC Test Clause	Test Item	Results	Remarks
15.247 (b) (3)	Maximum Peak Conducted Output Power	N/T	This product contains the certified module with FCC ID : PBR-SZMDLNR1 and the test results of the same are excluded in the report.
15.247 (a) (2)	6 dB / DTS Bandwidth	N/T	
15.247 (e)	Maximum Power Spectral Density	N/T	
15.247 (d)	Emissions in non – restricted band	N/T	
15.247 (a)(1)	Conducted Spurious Emissions	N/T	
15.407	Conducted emission on A.C power lines	Pass	-
FCC 15.209 , FCC 15.205	Radiated Spurious Emissions and Restricted bands of operation	Pass	-

## TEST SITES

### 1.1 Testing Facilities

TUV Rheinland (India) Private Limited  
108 , Beside ISBR Business School,  
Electronic city Phase I  
Bangalore - 560 100.

## 1.2 List of Test and Measurement Instruments

Table 2: List of Test and Measurement Instruments

Equipment	Manufacturer	Model Name	Serial Number	Calibration Due Date	Periodicity	Used for Test Items
EMI Test Receiver	Rohde & Schwarz	ESU 40	100288	24-10-2018	Yearly	Spurious Radiated Emissions
Active loop antenna	Frankonia	LAX-10	LAX-10-800	13.04.2018	Yearly	
Biconical Antenna	Schwarzbeck mess - elektronik	VHBB-9124 / BBA-9106	9124-656	09.01.2018	Yearly	
Log - Periodic Antenna	Schwarzbeck mess - elektronik	VUSLP-9111B	9111B-111	10.01.2018	Yearly	
Broadband Horn Antenna	Frankonia	HAX-18	HAX18-802	16-03-2018	Yearly	
Emission Horn Antenna	ETS Lindgren	116706	00107323	22.06.2018	Yearly	
Semi Anechoic Chamber	Frankonia	-	-	-	-	
EMI Test Receiver	Rohde & Schwarz	ESR7	101133	16.01.2018	Yearly	Conducted Emission on AC Power Lines
Two Line V-Network (LISN)	Rohde & Schwarz	ENV216	100022	05.09.2018	Yearly	

## 2 GENERAL PRODUCT INFORMATION

### 2.1 Product Function and Intended Use

SRHHG32D has two ZigBee modules mounted on it. These ZigBee Modules are used for wireless data communication with other ZigBee device. It also has RGB graphic LCD , Keypad , Mic , Speaker , vibrating motor, 2D Barcode scanner and a VGA CMOS Imager for user interface . User can scan barcode and QR Code using 2D scanner and receive all information about product over wireless ZigBee network. And can able to see on RGB graphic LCD. Using Keypad we can able to add/remove item in cart list. Device can be use as walkie-talkie by using mic and speaker.

## 2.2 Ratings and System Details

**Table 3: Ratings and System Details**

Operating Frequency Range	2400MHz – 2483.5MHz
Radio Protocol	ZigBee
No. of channels	15
Channel Spacing	5 MHz
Modulation	DSSS
Data Rate	250 kbps
Number of antennas	Two (One on each module)
Antenna Gain & Type	3.27dBi Max & PCB Inverted F antenna
Supply Voltage to Product	3.7V DC
Environmental conditions	Temp: 5-45 °C (41-113 °F) Humidity: 20-80% RHG

### Test Conditions:

**Voltage:** 3.7 V DC Battery Supply

### Environmental conditions:

Temperature: +23 °C      RH: 62 %

## 2.3 Measurement Uncertainty:

**Table 4: Measurement Uncertainty**

Parameter	Uncertainty
Occupied Channel Bandwidth	±5 %
RF output power, conducted	±1.5 dB
Power Spectral Density, conducted	±3 dB
Unwanted Emissions, conducted	±3 dB
All emissions, radiated	±6 dB
Temperature	±3 °C
Supply Voltages	±3 %
Time	±5 %

### **3 OPERATIONAL DESCRIPTIONS**

#### **SRHHG32D (CC2530 based ZigBee Scanning Handheld)**

SRHHG32D is Battery operated hand held device. It can perform data transfer over air using on - Board ZigBee Modules. User can scan barcode of product and will get all information about that Product to device this information transfer over Wireless ZigBee network .Device can also use as walkie-talkie audio data also transfer over ZigBee network. Device can be used to take the images of the product which customer wants to report about.

### **4 TEST SET-UP AND OPERATION MODE**

#### **4.1 Principle of Configuration Selection**

Transmission was enabled on highest possible duty cycled transmission on low, mid and high channel on supporting datarates to obtain maximum emissions

#### **4.2 Test Operation and Test Software**

Testing software was used to enable the continuous transmission on low/mid/high channels on the EUT for the tests in this report.

#### **4.3 Special Accessories and Auxiliary Equipment**

- None

#### **4.4 Countermeasures to achieve EMC Compliance**

- None

**Table 5: List of Centre Frequencies**

Frequency Band	Channel No.	Frequency (MHz)
2400-2483.5 MHz	11	2405
	12	2410
	13	2415
	14	2420
	15	2425
	16	2430
	17	2435
	18	2440
	19	2445
	20	2450
	21	2455
	22	2460
	23	2465
	24	2470
25	2475	

## 5 TEST METHODOLOGY

### 5.1 Radiated Emission Test

The radiated emission measurement was performed according to the procedures in ANSI C63.10-2013. The equipment under test (EUT) was placed at the middle of the 80 cm high turntable for below 1 GHz & 1.5 m height for above 1 GHz measurement, and the EUT is 3 meters far from the measuring antenna.

The turntable was rotated 360° for obtaining the maximum emission. The height of the measuring antennas was scanned between 1 m and 4 m, and the antenna rotated to repeat the measurements for both the horizontal and vertical antenna polarizations. Repeat the measurement steps until the maximum emissions were obtained. The measurement above 1000 MHz was performed by horn antenna, The measurement below 30 MHz was performed by loop antenna.

The EUT was rotated around the X-, Y-, and Z-Axis and the results from worst case axis are recorded.

5.1.1 Test Setup Configuration

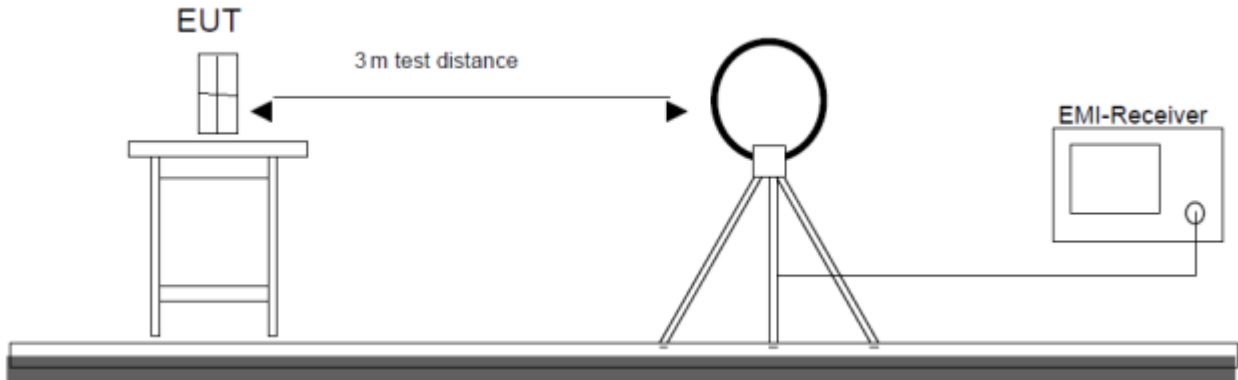


Figure 1: Frequency Range 9 KHz -30 MHz

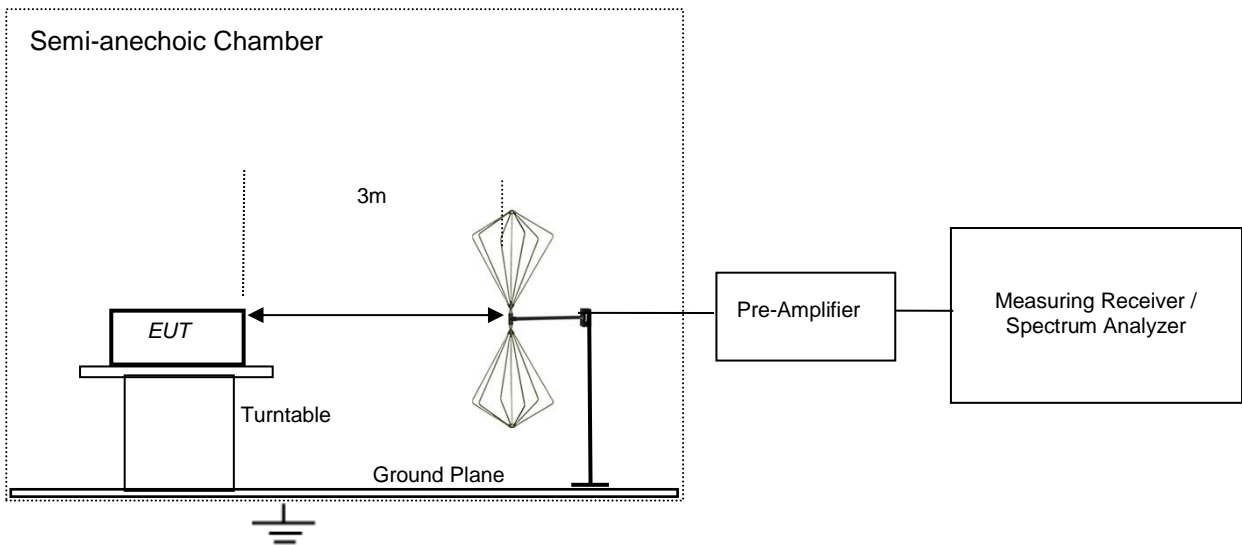


Figure 2: Frequency Range 30 MHz - 200 MHz



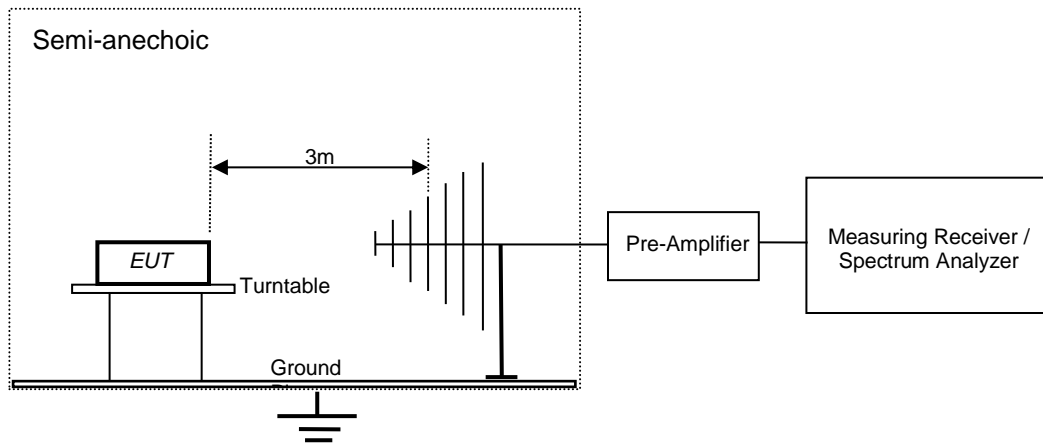


Figure 3: Frequency Range 200 MHz - 1 GHz

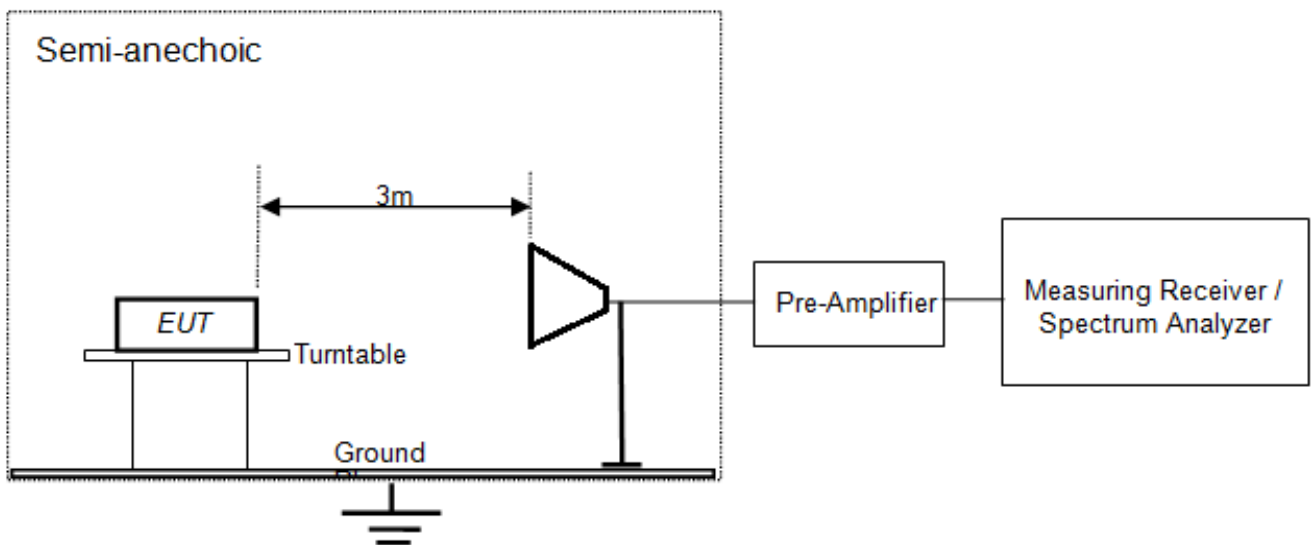


Figure 4: Frequency above 1 GHz

## 6 TEST RESULTS

### 6.1 Restricted Spurious Emissions & Restricted Bands of Operation

**Result**

**Pass**

Test Specification	FCC 15.205, FCC 15.209
Test Method	ANSI C63.10-2013
Measurement Location	Semi Anechoic Chamber
Measuring Frequency Range	9 KHz to 40 GHz (Up to 10 <sup>th</sup> harmonic of the highest fundamental frequency)
Measuring Distance	3 m
Detection	QP for frequency below 1 GHz, Peak, Average for frequency above 1 GHz
Requirement	As per the limits mentioned in the below table

**Table 6: Limit for radiated emission measurement 15.209**

Frequency (MHz)	Field strength (µV/m)	Field strength (dBµV/m)	Distance of Measurement (m)
0.009 – 0.490	2400/F (KHz)	48.50 – 13.80	300*
0.490 – 1.705	24000/F (KHz)	33.80 – 23.00	30*
1.705 - 30	30	29.54	30*
30 - 88	100	40.0	3
88 - 216	150	43.5	3
216 - 960	200	46.0	3
Above 960	500	54.0	3

Remark: \* The limit shows in the table above of frequency range 0.009 – 0.490, 0.490 – 1.705 MHz and 1.705-30MHz is at 300 meter, 30 meter and 30 meter range respectively, which corresponds to 128.51 – 93.80, 73.80 – 62.96 and 69.54 dBµV/m at 3m range by extrapolation calculation and the measurement of loop antenna.

The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9–90 kHz, 110–490 kHz and above 1000 MHz Radiated emission limits in these three bands are based on measurements employing an average detector.

**Test Conditions:**

**Voltage:** 3.7 V DC Battery Supply

**Environmental conditions:**

Temperature: +23 °C      RH: 62 %

**Test results:**

No emission found for the frequency range 9 KHz to 30 MHz

Test results for the frequency range 30 MHz to 1GHz are reported below.

**Table 7: Test results for frequency range 30 MHz to 1 GHz**

Polarization	Measured Frequency (MHz)	Radiated Spurious Emission (dBµV/m)	Limit (dBµV/m)	Margin (dB)
Vertical	39.11	36.3	40	3.7
	53.59	33.89	40	6.11
	72.1	33.17	40	6.83
	216	39.15	43.5	4.35
Horizontal	32.32	32.12	40	7.88
	216.04	32.78	43.5	10.72
	359.99	33.54	46	12.46
	768.07	42.92	46	3.08

**Table 8: Test results for frequency range 1 GHz to 26.5 GHz**

Channel Frequency (MHz)	Polarization	Measured Frequency (MHz)	Radiated Spurious Emission (dBµV/m)	Limit (dBµV/m)	Margin (dB)
<b>Test Configuration 1: Both modules operating at low channel</b>					
2405	Vertical	2390 (Pk)	46.4	74	27.6
		2390 (Av)	30.02	54	23.98
		2405 (Pk)	72.24	*	-
		2405 (Av)	64.41	*	-
		4810 (Pk)	49.61	74	24.39
		4810 (Av)	37.22	54	16.78
	Horizontal	2390 (Pk)	41.17	74	32.83
		2390 (Av)	26.74	54	27.26
		2405 (Pk)	78.27	*	-
		2405 (Av)	73.38	*	-
		4810 (Pk)	49.14	74	24.86
		4810 (Av)	37.11	54	16.89
<b>Test Configuration 2: Both modules operating at high channel</b>					
2480	Vertical	2483.5 (Pk)	42.01	74	31.99
		2483.5 (Av)	29.38	54	24.62
		2480 (Pk)	74.25	*	-
		2480 (Av)	68.95	*	-
		4960 (Pk)	49.58	74	24.42
		4960 (Av)	36.55	54	17.45
	Horizontal	2483.5 (Pk)	42.22	74	31.78
		2483.5 (Av)	32.75	54	21.25
		2480 (Pk)	81.55	*	-
		2480 (Av)	76.74	*	-
		4960 (Pk)	49.48	74	24.52
		4960 (Av)	36.67	54	17.33

Channel Frequency (MHz)	Polarization	Measured Frequency (MHz)	Radiated Spurious Emission (dBµV/m)	Limit (dBµV/m)	Margin (dB)
<b>Test Configuration 3: Both modules operating in different channels</b>					
Module1: 2405MHz  Module2: 2480MHz	V	2390(Pk)	50.74	74	23.26
		2390(Av)	33.26	54	20.74
		2405(Pk)	71.4	*	-
		2405(Av)	64.24	*	-
		2480(Pk)	75.66	*	-
		2480(Av)	70.54	*	-
		2483.5(Pk)	42.09	74	31.91
		2483.5(Av)	28.83	54	25.17
		4810(Pk)	49.61	74	24.39
		4810(Av)	37.24	54	16.76
		4960(Pk)	49.59	74	24.41
		4960(Av)	37.47	54	16.53
	H	2390(Pk)	43.26	74	30.74
		2390(Av)	28.35	54	25.65
		2405(Pk)	80.56	*	-
		2405(Av)	75.59	*	-
		2480(Pk)	81.58	*	-
		2480(Av)	75.78	*	-
		2483.5(Pk)	42.6	74	31.4
		2483.5(Av)	31.96	54	22.04
		4810(Pk)	49.14	74	24.86
		4810(Av)	37.11	54	16.89
		4960(Pk)	49.98	74	24.02
		4960(Av)	37.27	54	16.73

## 6.2 Conducted Emission Test on A.C. Power Line

**Result**

**Pass**

Test Specification : FCC Part 15 Section 15.207  
 Test Method : ANSI C63.10-2013  
 Testing Location : Screened room  
 Measurement Bandwidth : 9kHz  
 Frequency Range : 150kHz – 30MHz  
 Supply Voltage : 120VAC,60Hz

### Limit of section 15.207

Frequency of emission (MHz)	QP Limit (dB $\mu$ V)	AV Limit (dB $\mu$ V/m)
0.15 – 0.5	66 – 56*	56 – 46*
0.5 – 5	56	46
5 – 30	60	50

\* Decreases with the logarithm of the frequency

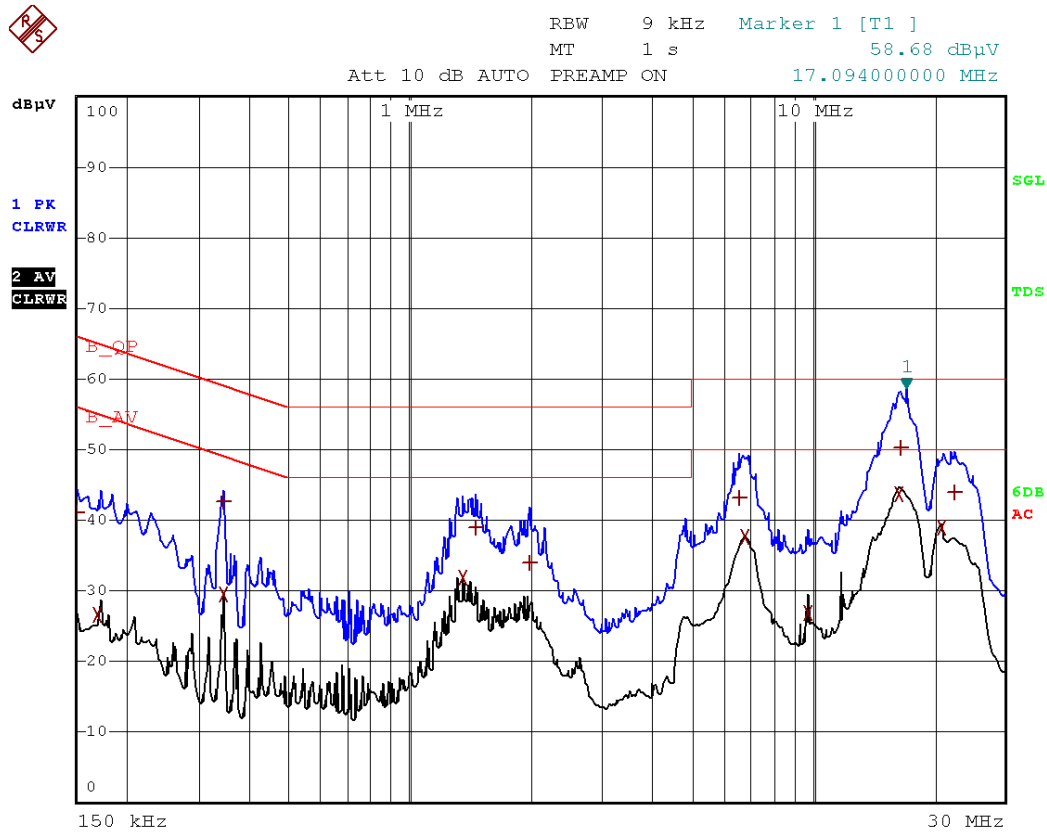
Table 9: Test Result: LINE - Graphs and Tables



```
Trace1:      B_QP
Trace2:      B_AV
Trace3:      ---
```

TRACE	FREQUENCY	LEVEL dBµV	DELTA LIMIT dB
2 Average	16.338 MHz	42.24	-7.75
2 Average	20.702 MHz	39.02	-10.97
2 Average	6.826 MHz	38.59	-11.40
1 Quasi Peak	16.614 MHz	48.42	-11.57
2 Average	342 kHz	36.52	-12.63
2 Average	1.358 MHz	32.66	-13.33
1 Quasi Peak	20.566 MHz	45.37	-14.63
1 Quasi Peak	6.794 MHz	45.16	-14.83
1 Quasi Peak	1.358 MHz	40.21	-15.78
1 Quasi Peak	342 kHz	42.18	-16.97
1 Quasi Peak	154 kHz	40.02	-25.76
2 Average	178 kHz	27.70	-26.87

Table 10: Test Result for Neutral - Graphs and Tables



Trace1:	B_QP		
Trace2:	B_AV		
Trace3:	---		
TRACE	FREQUENCY	LEVEL dBµV	DELTA LIMIT dB
2 Average	16.326 MHz	43.60	-6.39
1 Quasi Peak	16.522 MHz	50.29	-9.70
2 Average	20.826 MHz	38.93	-11.06
2 Average	6.814 MHz	37.69	-12.31
2 Average	1.358 MHz	31.85	-14.14
1 Quasi Peak	22.434 MHz	43.88	-16.12
1 Quasi Peak	342 kHz	42.61	-16.53
1 Quasi Peak	6.598 MHz	43.11	-16.88
1 Quasi Peak	1.462 MHz	38.90	-17.09
2 Average	342 kHz	29.64	-19.51
1 Quasi Peak	1.978 MHz	33.96	-22.03
2 Average	9.718 MHz	26.95	-23.04
1 Quasi Peak	150 kHz	40.95	-25.04
2 Average	170 kHz	26.61	-28.34



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\*\*\*END OF TEST REPORT\*\*\*