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FCC PART 15.249 TEST REPORT

UNLICENSED INTENTIONAL RADIATOR

Applicant	ZTX Wireless, Inc.
Address	8886 N. Government Way Suite J Hayden, ID 83835
FCC ID	V35ZTX515
Model Number	ZTX515
Product Description	915 MHz LOW POWER TX
Date Sample Received	2/17/2009
Date Tested	2/24/2009
Tested By	Richard Block
Approved By	Mario de Aranzeta
Report Number	323AUT9TestReport.pdf
Test Results	☒ PASS ☐ FAIL

ACCREDITED
Certificate # 0955-01

TABLE OF CONTENT

ATTESTATIONS

This equipment has been tested in accordance with the standards identified in this test report. To the best of my knowledge and belief, these tests were performed using the measurement procedures described in this report.

All instrumentation and accessories used to test products for compliance to the indicated standards are calibrated regularly in accordance with ISO 17025 requirements.

ACCREDITED

Certificate # 0955-01

I attest that the necessary measurements were made, under my supervision, at:

Timco Engineering Inc.
849 NW State Road 45
Newberry, Fl 32669

Authorized Signatory Name: *Mario de Aranzeta*

Mario de Aranzeta C.E.T.
Compliance Engineer/ Lab. Supervisor

Date: March 3, 2009

DUT SPECIFICATION

Applicable Standard	Part 15.249	
DUT Description	915 MHz LOW POWER TX	
FCC ID	V35ZTX515	
Model Number	ZTX515	
Operating Frequency	TX: 903 – 927 MHz	RX: N/A
Modulations	FM	
DUT Power Source	☐ 110–120Vac/50– 60Hz ☐ DC Power ☒ Battery Operated Exclusively	
Test Item	☐ Prototype ☒ Pre-Production ☐ Production	
Type of Equipment	☐ Fixed ☐ Mobile ☒ Portable	
Antenna Connector	FCC Rules require that the antenna connector be unique. The radio has an internal antenna.	

TEST SETUP SUMMARY

Test Facility	Timco Engineering Inc. located at 849 NW State Road 45 Newberry, FL 32669 USA.
Test Conditions	Temperature: 26ºC Relative humidity: 50%
Test Exercise	The DUT was placed in continuous transmit mode of operation.
Deviation from the standard(s)	No deviation
Modifications	No modification

Test Supporting Equipment

Supporting Device	Manufacturer	Model / FCC ID	Serial Number
N/A			

EMC EQUIPMENT LIST

Description	Manufacturer	Model	Serial #	Due date
3/10-Meter OATS	TEI	N/A	N/A	7/10/2009
3-Meter Semi-Anechoic Chamber	Panashield	N/A	N/A	5/10/2010
Analyzer Tan Tower Preamplifier	HP	8449B-H02	3008A00372	11/30/2009
Analyzer Tan Tower QP Adapter	HP	85650A	3303A01690	11/30/2009
Analyzer Tan Tower RF Preselector	HP	85685A	3221A01400	11/30/2009
Tan Tower Spectrum Analyzer	HP	8566B Opt 462	3138A07786 3144A20661	11/30/2009
Antenna: Active Loop	ETS-Lindgren	6502	00062529	3/30/2010
Antenna: BiconiLog	EMCO	3143	9409-1043	12/12/2009
Antenna: Biconnical	Electro-Metrics	BIA-25	1171	7/18/2009
Antenna: ETS Horn 1	ETS-Lindgren	3117	00035923	7/18/2009
Antenna: Log-Periodic	Eaton	96005	1243	12/13/2009
Audio Analyzer	HP	8903A	2336A03066	11/12/2009
Capacitor Clamp	Keytek	CM-CCL	9811359	12/12/2009
CTS - AC Power Source	CA Instrmts	1251RP	L05865	1/30/2010
CTS - PACS-1 Module	CA Instrmts	PACS-1	X71484	1/30/2010
Digital Thermometer	Fluke	2166A	535046	12/14/2009
EFT Attenuator	Thermo	EFT-ATTN-1K	0612360	2/10/2010
Electric Field Sensor	A R	FP6001	302504	1/22/2010
ELF Magnetic Field Meter	F.W. Bell	4070	N/A	3/27/2010
EMI Test Receiver	R & S	ESIB 40	100274	1/24/2010
Field Monitor	A R	FM5004	22288	12/12/2009
Hygro-Thermometer	Extech	445703	0602	11/15/2009
LISN	Electro-Metrics	EM-7820	2682	7/23/2009
Modulation Analyzer	HP	8901A	3435A06868	5/9/2009
Oscilloscope	LeCroy	LT364	00414	1/24/2010
Passive Impedance Adapter	F C C	FCC-801-150-50-CDN	01117 & 01118	4/11/2010
PL CDN	F C C	FCC-801-M3-16A	01060	4/11/2010
Radiating Field Coil	F C C	F-1000-4-8/9/10-L-1M	9859	4/13/2010
RF Power Amplifier	Ophir RF	5126F	1015	6/10/2010
RF Power Amplifier	Ophir RF, Inc.	5150F	1041	6/10/2010

TEST PROCEDURES

Radiation Interference: ANSI C63.4-2003 using a spectrum analyzer, a preselector, a quasi-peak adapter, and an appropriate antenna. The analyzer was calibrated in dB above a microvolt at the output of the antenna. The resolution bandwidth was 100 kHz with an appropriate sweep speed and the video bandwidth was 300 kHz up to 1 GHz and 1 MHz with a video BW of 3 MHz above 1 GHz. When an emission was found, the table was rotated to produce the maximum signal strength. The antenna was placed in both the horizontal and vertical planes and the worse case emissions were reported. The spectrum was searched to at least the tenth (10) harmonic of the fundamental.

Formula Of Conversion Factors: The field strength at 3m was established by adding the meter reading of the spectrum analyzer (which is set to read in units of dBµV) to the antenna correction factor supplied by the antenna manufacturer. The antenna correction factors are stated in terms of dB. The gain of the preselector was accounted for in the spectrum analyzer meter reading.

Example:			
Freq (MHz)	Meter Reading	+ ACF	+ CL = FS
33	20 dBµV	+ 10.36 dB	+ 0.5 = 30.86 dBµV/m @ 3m

Power Line Conducted Interference: The procedure used was ANSI C63.4-2003 using a 50uH LISN. Both lines were observed. The bandwidth of the spectrum analyzer was 10kHz with an appropriate sweep speed. The spectrum was scanned from 0.15 to 30 MHz.

Occupied Bandwidth: A small sample of the transmitter output was fed into the spectrum analyzer and the attached plot was printed. The vertical scale is set to -10 dBm per division.

ANSI C63.4-2003 10.1 Measurement Procedures: The DUT was placed on a table 80 cm high and with dimensions of 1m by 1.5m. The DUT was placed in the center of the table (1.5m side). The table used for radiated measurements is capable of continuous rotation.

When an emission was found, the table was rotated to produce the maximum signal strength. At this point, the antenna was raised and lowered from 1m to 4m. The antenna was placed in both the horizontal and vertical planes. Emissions attenuated more than 20 dB below the permissible value are not reported.

RADIATION INTERFERENCE

Rules Part No.: 15.249, 15.209

Requirements:

Frequency	Limits
Part 15.209	
9 to 490 kHz	2400/F (kHz) µV/m @ 300 meters
490 to 1705 kHz	24000/F (kHz) µV/m @ 30 meters
1705 kHz to 30 MHz	29.54 dBµV/m @ 30 meters
30 – 88	40.0 dBµV/m @ 3 meters
80 – 216	43.5 dBµV/m @ 3 meters
216 – 960	46.0 dBµV/m @ 3 meters
Above 960	54.0 dBµV/m @ 3 meters
Part 15.249	
Fundamental 902 – 928 MHz	94.0 dBµV/m @ 3 meters
Fundamental 2.4 – 2.4835 MHz	94.0 dBµV/m @ 3 meters
Harmonics	54.0 dBµV/m @ 3 meters

Test Data:

Tuned Frequency MHz	Emission Frequency MHz	Meter Reading dBµV	Ant. Polarity V/H	Coax Loss dB	Correction Factor dB/m	Duty Cycle dB	Field Strength dBµV/m	Margin dB
903	903.00	56.5	H	1.95	23.33	10.45	71.33	22.67
903	903.00	66.1	V	1.95	22.67	10.45	80.27	13.73
903	1806.00	16.5	H	2.74	29.96	10.45	38.75	15.25
903	1806.00	17.9	V	2.74	29.96	10.45	40.15	13.85
903	2709.00	9.1	V	3.4	32.54	10.45	34.59	19.41
903	2709.00	9.9	H	3.4	32.54	10.45	35.39	18.61
903	3612.00	9.4	H	4.15	32.98	10.45	36.08	17.92
903	3612.00	11.1	V	4.15	32.98	10.45	37.78	16.22
903	4515.00	12.3	H	4.76	34.1	10.45	40.71	13.29
903	4515.00	13	V	4.76	34.1	10.45	41.41	12.59
903	5418.00	18.9	V	5.13	34.6	10.45	48.18	5.82
903	5418.00	22.9	H	5.13	34.6	10.45	52.18	1.82

[Continued]

Tuned Frequency MHz	Emission Frequency MHz	Meter Reading dBµV	Ant. Polarity V/H	Coax Loss dB	Correction Factor dB/m	Duty Cycle dB	Field Strength dBµV/m	Margin dB
903	6321.00	15.5	H	5.4	35.66	10.45	46.11	7.89
903	6321.00	16.4	V	5.4	35.66	10.45	47.01	6.99
903	7224.00	13.9	H	5.73	36.04	10.45	45.22	8.78
903	7224.00	18.6	V	5.73	36.04	10.45	49.92	4.08
903	8127.00	7.2	V	6.25	36	10.45	39.00	15.00
903	8127.00	7.6	H	6.25	36	10.45	39.40	14.60
903	9030.00	8.7	V	6.61	36.32	10.45	41.18	12.82
903	9030.00	8.8	H	6.61	36.32	10.45	41.28	12.72
915	915.00	56.4	H	1.97	23.35	10.45	71.27	22.73
915	915.00	63.4	V	1.97	22.6	10.45	77.52	16.48
915	1830.00	16.3	V	2.76	30.11	10.45	38.72	15.28
915	1830.00	16.3	H	2.76	30.11	10.45	38.72	15.28
915	2745.00	9.2	H	3.42	32.55	10.45	34.72	19.28
915	2745.00	11.3	V	3.42	32.55	10.45	36.82	17.18
915	3660.00	10.1	H	4.19	33.06	10.45	36.90	17.10
915	3660.00	11	V	4.19	33.06	10.45	37.80	16.20
915	4575.00	11.7	H	4.79	34.1	10.45	40.14	13.86
915	4575.00	15.1	V	4.79	34.1	10.45	43.54	10.46
915	5490.00	16.7	V	5.15	34.69	10.45	46.09	7.91
915	5490.00	23.5	H	5.15	34.69	10.45	52.89	1.11
915	6405.00	14.9	H	5.42	35.72	10.45	45.59	8.41
915	6405.00	15.8	V	5.42	35.72	10.45	46.49	7.51
915	7320.00	16.1	H	5.79	36.06	10.45	47.50	6.50
915	7320.00	18.8	V	5.79	36.06	10.45	50.20	3.80
915	8235.00	6.4	V	6.29	36	10.45	38.24	15.76
915	8235.00	6.7	H	6.29	36	10.45	38.54	15.46
915	9150.00	8.8	V	6.65	36.39	10.45	41.39	12.61
915	9150.00	9.7	H	6.65	36.39	10.45	42.29	11.71

[Continued]

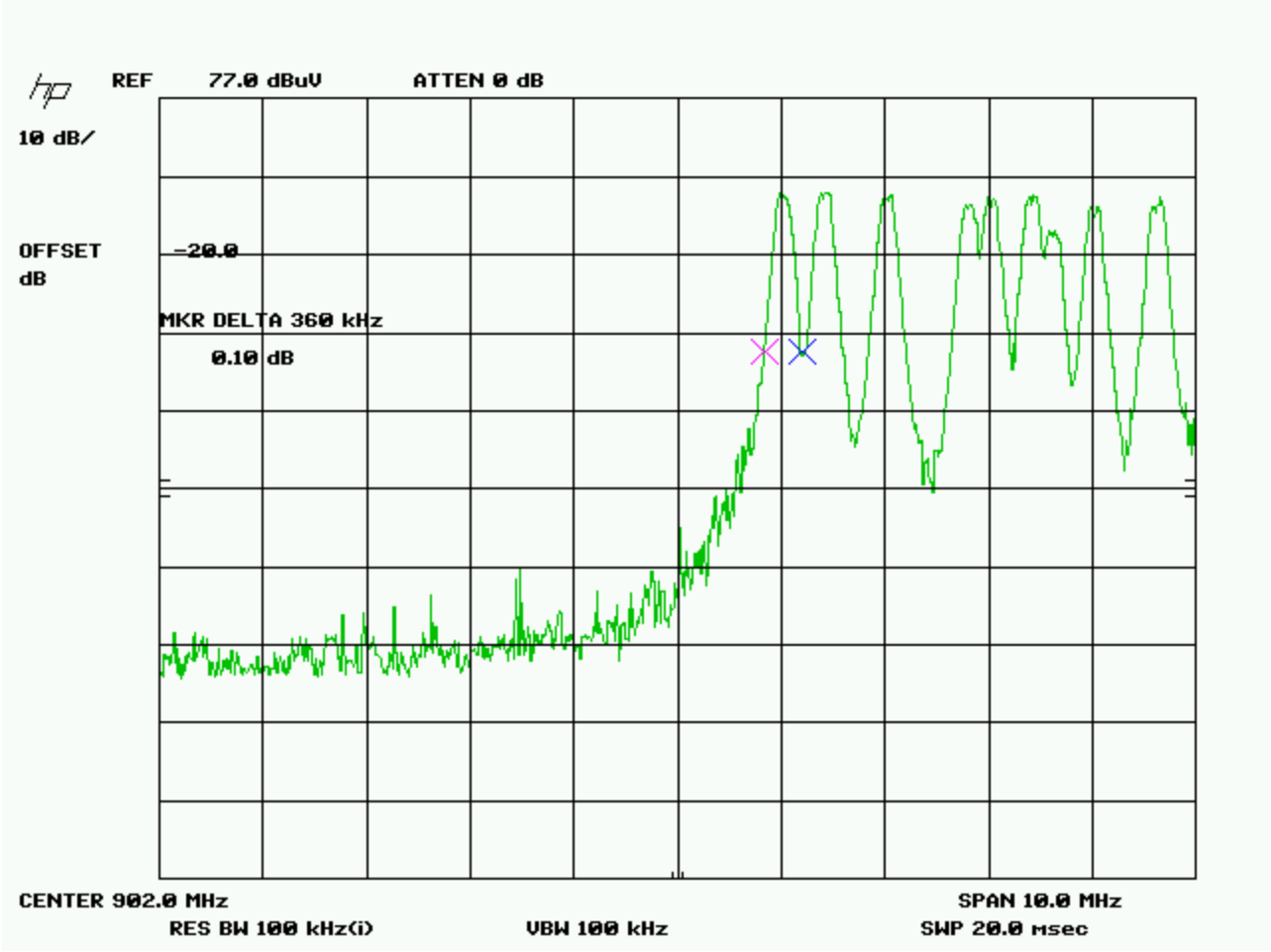
Tuned Frequency MHz	Emission Frequency MHz	Meter Reading dBµV	Ant. Polarity V/H	Coax Loss dB	Correction Factor dB/m	Duty Cycle dB	Field Strength dBµV/m	Margin dB
927	927.00	52.1	H	1.99	23.44	10.45	67.08	26.92
927	927.00	63.6	V	1.99	22.67	10.45	77.81	16.19
927	1854.00	16.2	H	2.78	30.27	10.45	38.80	15.20
927	1854.00	17.7	V	2.78	30.27	10.45	40.30	13.70
927	2781.00	8.2	H	3.45	32.56	10.45	33.76	20.24
927	2781.00	11.4	V	3.45	32.56	10.45	36.96	17.04
927	3708.00	11.6	H	4.24	33.13	10.45	38.52	15.48
927	3708.00	14.4	V	4.24	33.13	10.45	41.32	12.68
927	4635.00	12.7	H	4.82	34.1	10.45	41.17	12.83
927	4635.00	17.1	V	4.82	34.1	10.45	45.57	8.43
927	4635.00	17.8	V	4.82	34.1	10.45	46.27	7.73
927	5562.00	19.7	V	5.17	34.79	10.45	49.21	4.79
927	5562.00	23.1	H	5.17	34.79	10.45	52.61	1.39
927	6489.00	15.1	V	5.45	35.79	10.45	45.89	8.11
927	6489.00	15.4	H	5.45	35.79	10.45	46.19	7.81
927	7416.00	18	H	5.85	36.08	10.45	49.48	4.52
927	7416.00	19.8	V	5.85	36.08	10.45	51.28	2.72
927	8343.00	6.4	V	6.34	36.00	10.45	38.29	15.71
927	8343.00	6.6	H	6.34	36.00	10.45	38.49	15.51
927	9270.00	9.8	H	6.68	36.46	10.45	42.49	11.51
927	9270.00	10.8	V	6.68	36.46	10.45	43.49	10.51

OCCUPIED BANDWIDTH

Rules Part No.: 15.249 (d)

Requirements: The field strength of any emissions appearing outside the bandedges and up to 10 kHz above and below the band edges shall be attenuated at least 50 dB below the level of the carrier or to the general limits of 15.249.

Test Data:



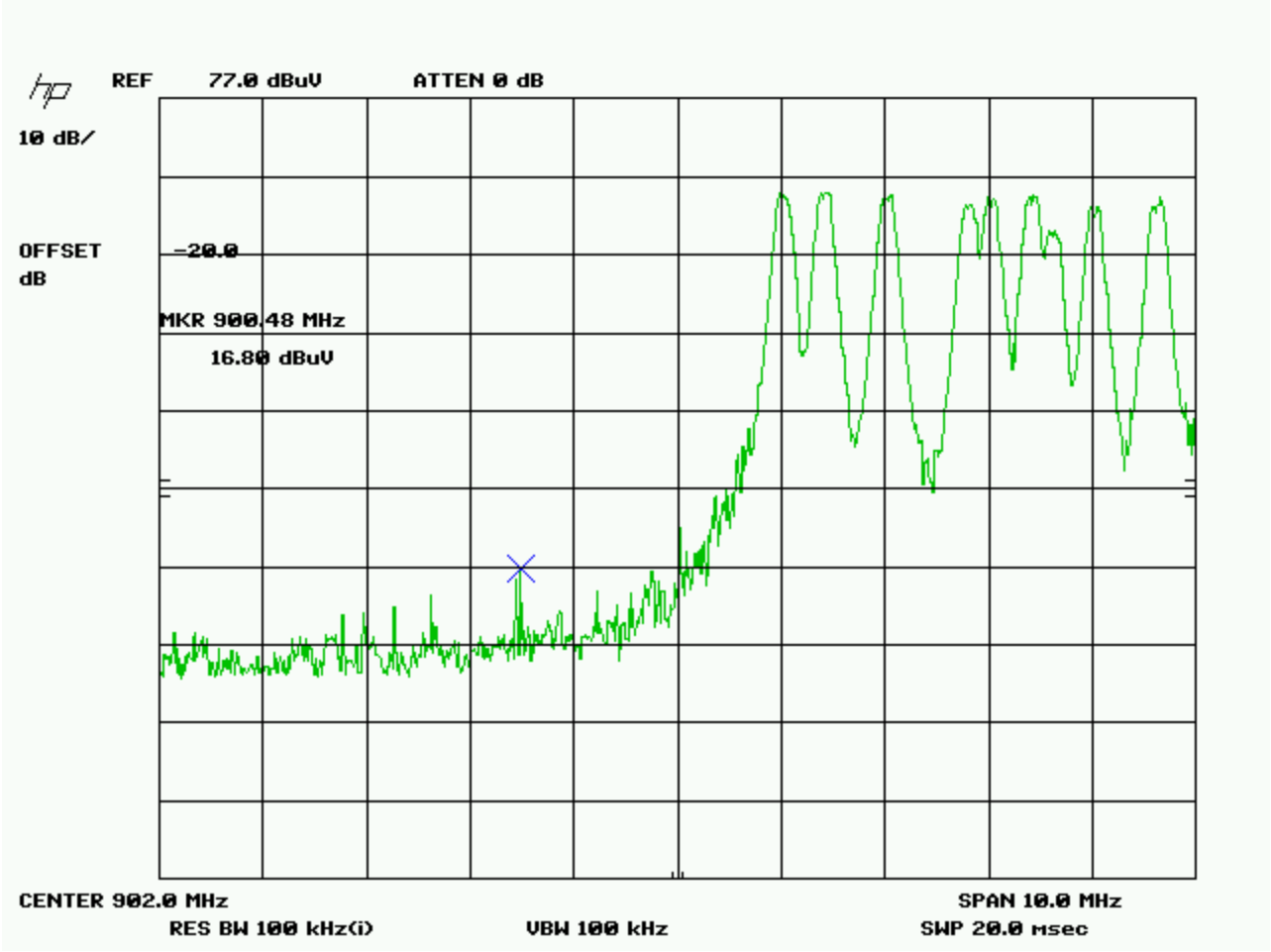
BAND EDGE COMPLIANCE

Rules Part No.: 15.249 (d)

Requirements: 40 dBc or in the case of restricted bands 54 dBµV/m.

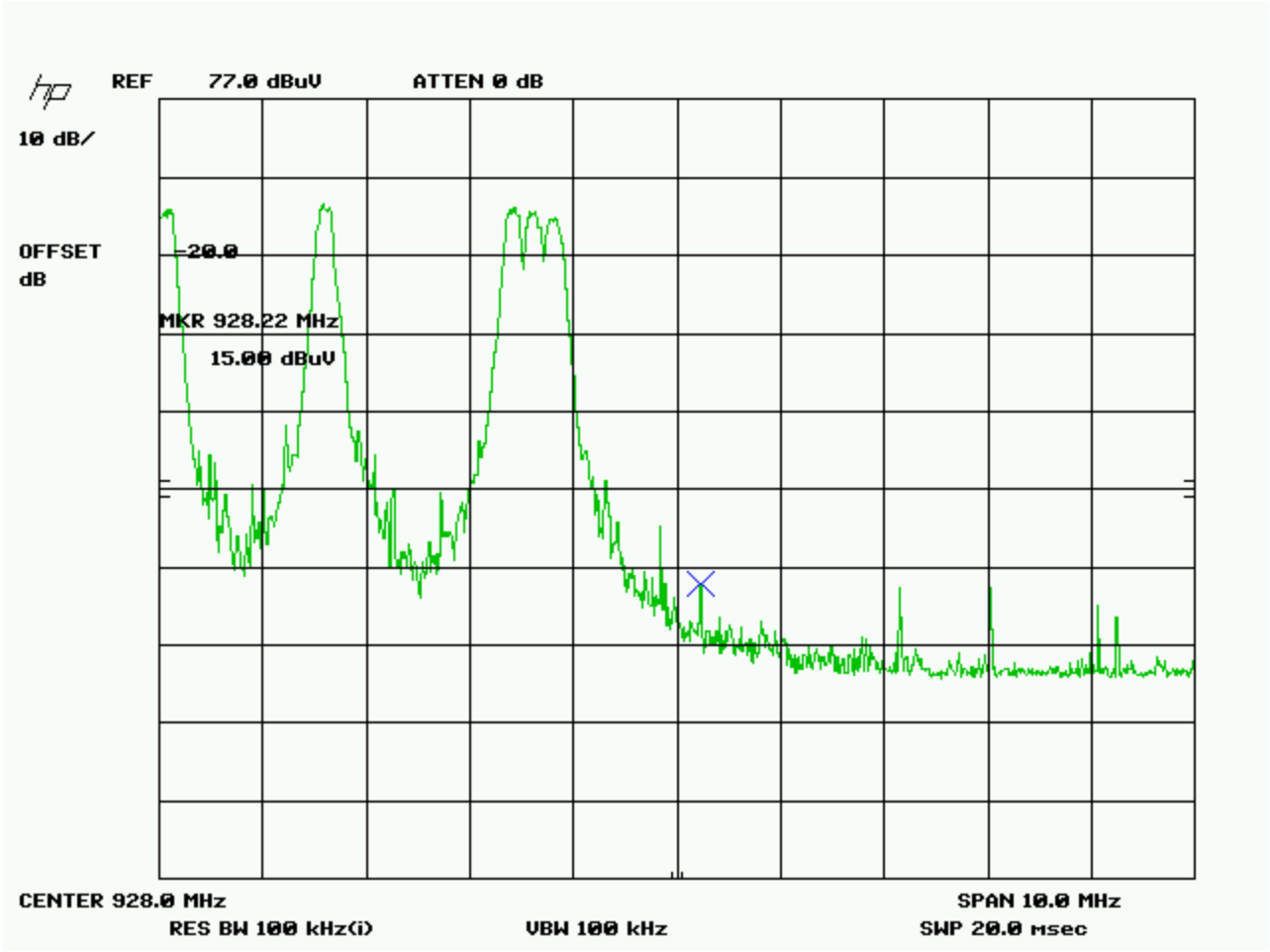
Test Data:

Lower bandedge



Emission Frequency MHz	Meter Reading dBµV	Ant. Polarity V/H	Coax Loss dB	Correction Factor dB/m	Duty Cycle dB	Field Strength dBµV/m	Margin dB
900.48	16.8	V	1.95	22.70	10.45	31.00	15.00

Upper bandedge



Emission Frequency MHz	Meter Reading dBµV	Ant. Polarity V/H	Coax Loss dB	Correction Factor dB/m	Duty Cycle dB	Field Strength dBµV/m	Margin dB
928.22	15.0	V	1.99	22.68	10.45	29.22	16.78

DUTY CYCLE

30 ms maximum on time during a 100 ms period according to manufacturer.

20*log (30/100)=20*log (0.3)=10.45 dB

POWER LINE CONDUCTED INTERFERENCE

Rules Part No.: 15.207

Requirements:

Frequency (MHz)	Quasi Peak Limits (dBµV)	Average Limits (dBµV)
0.15 – 0.5	66 – 56	56 – 46
0.5 – 5.0	56	46
5.0 – 30	60	50

Test Data: The attached graphs represent the emissions read for power line conducted for this device. Both lines were observed.

N/A
Battery powered DUT.