243 Jubug-Ri,Yangji-Myeon, Yongin-Si, Gyeonggi-Do, Korea 449-822
Tel: +82-31-323-6008 Fax: +82-31-323-6010
http://www.ltalab.com

Dates of Tests: June 21 ~ Aug 4, 2009
Test Report S/N: LR500190908B
Test Site : LTA CO., LTD.

CERTIFICATION OF COMPLIANCE

FCC ID. **V6OLMCV100**

APPLICANT **QUFIELD CO.,LTD.**

Device Category	:	**Licensed Non-Broadcast Station Transmitter**
Manufacturing Description	:	**MULTIPURPOSE CORDLESS CALLING SYSTEM**
Manufacturer	:	**QUFIELD CO.,LTD.**
Trade mark	:	**QUFIELD**
Model name	:	**LM-CV100**
Serial number	:	**Identical prototype**
FCC Rule Part(s)	:	**§2, §90**
Frequency Range	:	**447.8625MHz**
RF Output Power	:	**10.48dBm**
Channel Separation	:	**Only one channel**
Emission Designators:	:	**11K56F1D**
Data of issue	:	**Aug 4, 2009**

This test report is issued under the authority of:

Dong –Min JUNG, Technical Manager

The test was supervised by:

Kyung-Taek LEE, Test Engineer

This test result only responds to the tested sample. It is not allowed to copy this report even partly without the allowance of the test laboratory. This report must not be used by the applicant to claim product endorsement by any agency.

NVLAP LAB Code.: 200723-0

TABLE OF CONTENTS

1. General information's

1-1 Test Performed

Company name	:	LTA Co., Ltd.
Address	:	243, Jubug-ri,Yangji-Myeon,Youngin-Si, Kyunggi-Do, Korea. 449-822
Web site	:	http://www.ltalab.com
E-mail	:	chahn@ltalab.com
Telephone	:	+82-31-323-6008
Facsimile	:	+82-31-323-6010

Quality control in the testing laboratory is implemented as per ISO/IEC 17025 which is the "General requirements for the competents of calibration and testing laboratory".

1-2 Accredited agencies

LTA Co., Ltd. is approved to perform EMC testing by the following agencies:

Agency	Country	Accreditation No.	Validity	Reference
NVLAP	U.S.A	200723-0	2009-09-30	ECT accredited Lab.
RRL	KOREA	KR0049	2011-06-20	EMC accredited Lab.
FCC	U.S.A	610755	2011-04-22	FCC filing
VCCI	JAPAN	R2133, C2307	2011-06-21	VCCI registration
IC	CANADA	IC5799	2010-05-03	IC filing

2. Information's about test item

2-1 Client & Manufacturer

Company name	:	QUFIELD CO.,LTD.
Address	:	1485-13,BF1, SONGRYONG BLDG. SEOCHO-DONG, SEOCHO-GU, SEOUL, KOREA.
TEL / FAX	:	82-31-420-4782

2-2 Equipment Under Test (EUT)

Trade name	:	MULTIPURPOSE CORDLESS CALLING SYSTEM
FCC ID	:	V6OLMCV100
Model name	:	LM-CV100
Serial number	:	Identical prototype
Date of receipt	:	July 21, 2009
EUT condition	:	Pre-production, not damaged
Antenna type	:	Helical Antenna
Frequency Range	:	447.8625 MHz
RF output power	:	10.48dBm
Channel Separation	:	-
Power Source	:	Input: 120VAC, Output: 12VDC, 0.78A used adaptor

2-3 Tested frequency

	LOW	MID	HIGH
Frequency (MHz)	-	447.8625	-

2-4 Ancillary Equipment

Equipment	Model No.	Serial No.	Manufacturer
-	-	-	-
-	-	-	-

3. Test Report

3.1 Summary of tests

FCC Part Section(s)	Parameter	Status (note 1)
2.1046 90.205	Carrier Output Power (Conducted)	C
2.1051 90.210	Unwanted Emissions (Transmitter Conducted)	C
2.1053 90.210	Field Strength of Spurious Radiation	C
2.1049 90.209	Emission Masks (Occupied Bandwidth)	C
90.214	Transient Frequency Behavior	C
2.1055 90.213	Frequency Stability	C
2.201	Emssion Designator	Noted
2.1033 (c)	DC Voltages and Current into Final Amplifier	Noted
15.207 /15.107	AC Conducted Emssion (ANSI C-63.4-2003)	C

Note 1: C=Complies NC=Not Complies NT=Not Tested NA=Not Applicable

The following measurement report is submitted on behalf of applicant in support that the certification in accordance with Part 2 Subpart J and Part 90 of the Commission's Rules and Regulations.

3.2 Transmitter requirements

3.2.1 Carrier Output Power (Conducted)

Definition:

- The carrier power output for a transmitter for this service is the power available at the output terminals of the transmitter when the output terminals are connected to the standard transmitter load.

Specification	:	47 CFR 2.1046 (a)
Test method	:	ANSI/TIA/EIA-603-C-2004

Measurement Procedure:

- (1) Antenna was replaced with a short connector
- (2) The spectrum offset was adjusted to compensate the losses caused by the connection.
- (3) Set the spectrum., RBW = 100KHz, VBW = 100KHz, SPAN = 100KHz

Frequency(MHz)	Rated(dBm)	Output power(dBm)	Power(mW)
447.8625	10	10.48	11.17
Measurement uncertainty		± 0,45dB	

Measurement Data:

- Refer to the Appendix II.

3.2.2 Unwanted Emissions (Transmitter Conducted)

Definition:

- Conducted spurious emissions are emissions at the antenna terminals on a frequency or frequencies which are outside a band sufficient to ensure transmission of information of required quality for the class of communication desired.

Specification	:	47 CFR 2.1051
Test method	:	ANSI/TIA/EIA-603-C-2004

Measurement Procedure:

(1) Set the ref level to the RF power output.

(2) Antenna was replaced with a short connector

(3) The spectrum offset was adjusted to compensate the losses caused by the connection.

(4) Set spectrum Frequency start from 30MHz to 5GHz, RBW = 100KHz, VBW = 100KHz.

To record the spurious emissions.

Frequency(MHz)	Spurious(dBm)	Limit(dBm)	Result
30MHz-5GHz	Underlimit	-20	Pass

LIMIT

-20dBm

Measurement Data:

- Refer to the Appendix II.

3.2.3 Field Strength of Spurious Radiation

Definition:

- Radiated spurious emissions are emissions from the equipment when transmitting into a non-radiating load on a frequency or frequencies which are outside an occupied band sufficient to ensure transmission of information of required quality for the class of communications desire.

Specification	:	47 CFR 2.1053(a)
Test method	:	ANSI/TIA/EIA-603 2.2.12

Measurement Procedure:

(1) Set-up followed by TIA/EIA-603 2.2.12 (Substitution Method)

(2) Pd (dBm) ＝ Pg (dBm) － Cable loss (dB) ＋ antenna gain (dB)

(where, Pd is the equivalent power and Pg is the generator output into the substitution antenna)

LIMIT

All spurious emission are to be attenuated by at least 50 + 10 $\log_{10}$ (P) dBc
The rated power of 10mW gives a limit of -20dBm

Measurement Data: Attached for Worst Case

Freq. (MHz)	Pol. (H/V)	Signal Generator level(dBm)	C.F	Emission Level (dBm)	Limit (dBm)
299.72	V	-36.60	6.3	-30.30	-20
400.41	V	-33.86	6.6	-27.26	-20
896.69	V	-41.36	5.5	-35.86	-20
2241.7	V	-38.82	9.2	-29.62	-20
3133.5	V	-40.22	10.1	-30.12	-20
3579.5	V	-46.35	11.2	-35.15	-20

Remarks

C.F = Antenna gain - Cableloss

No emissions were detected at a level greater than 20dB below limit.

3.2.4 Emission Masks (Occupied Bandwidth)

Definition:

- The term transmitter Sideband Spectrum denotes the sideband energy produced at a discrete frequency separation from the carrier up to the test bandwidth due to all sources of unwanted noise within the transmitter in a modulated condition.

Specification	:	47 CFR 2.1049(c)(1)
Test method	:	ANSI/TIA/EIA-603-C-2004

Measurement Procedure:

(1) Set the ref level to the RF power output.

(2) Antenna was replaced with a short connector

(3) The spectrum offset was adjusted to compensate the losses caused by the connection.

Set spectrum, RBW = 100Hz, VBW = 100Hz, SPAN = 50KHz

(4) Set the EUT at modulation mode.

(5) The Occupied Bandwidth was measured with the Spectrum Analyzer controls set as shown on the test results.

Measurement Data:

- Refer to the Appendix II.

3.2.5 Transient Frequency Behavior

Definition:

- The transient frequency behavior is a measure of the difference, as a function in time. of the actual transmitter frequency to the assigned transmitter frequency when the transmitted RF output power is switched on or off.

Specification	:	47 CFR 90.214
Test method	:	ANSI/TIA/EIA-603-C-2004

Measurement Procedure:

- The EUT was set up as shown on the attached page, following TIA/EIA-603 steps a, b, and c as a guide.
- The transmitter was turned on.
- Sufficient attenuation was provided so that the transmitter carrier level measured at the output of the combiner was 40 dB below the maximum input level of the test receiver. This level was recorded as step f.
- The transmitter was turned off.
- An RF signal generator (1) modulated with a 1 kHz tone at either 25, 12.5, or 6.25 kHz deviation, and set to the same frequency as the assigned transmitter frequency, (2) was adjusted to a level -20 dB below the level recorded for step f, as measured at the output of the combiner. This level was then fixed for the remainder of the test and is recorded at step h.
- The oscilloscope was set up using TIA/EIA-603 steps j and k as a guide, and to either 10 ms/div (UHF) of 5ms/div (VHF).
- The 30 dB attenuator was removed, the transmitter was turned on, and the level of the carrier at the output of the combiner was recorded as step l.
- The carrier on-time as referenced in TIA/EIA-603 steps m, n, and o was captured and plotted. The carrier off-time as referenced in TIA/EIA-603 steps p, q, r, and s was captured and plotted.
- For EUTs supporting audio modulation, the audio signal generator was adjusted to the frequency of maximum response and with output level set for ±2.5 / ±1.25 kHz deviation (or 50% modulation). With level constant, the signal level was increased 16dB.
- For EUTs supporting digital modulation, the digital modulation mode was operated to its maximum extent.
- The Occupied Bandwidth was measured with the Spectrum Analyzer controls set as shown on the test results.

Measurement Data:

- Refer to the Appendix II.

3.2.6 Frequency Stability

Definition:

- Modulation limiting refers to the transmitter circuits ability to limit the transmitter from producing deviations due to modulation in excess of a rated system deviation.

Specification	:	47 CFR 2.1055
Test method	:	ANSI/TIA/EIA-603-C-2004

Measurement Procedure:

The frequency stability of the transmitter is measured by:

a) Temperature: The temperature is varied from -30℃ to +60℃ using an environmental chamber.

b) Primary Supply Voltage: The primary supply voltage is varied from 85% to 115% of the voltage normally at the input to the device or at the power supply terminals if cables are not normally supplied.

Specification- The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block. The frequency stability of the transmitter shall be maintained within ±0.00025(±2.5ppm) of the center frequency.

Time Period and Procedure:

1. The carrier frequency of the transmitter and the individual oscillators is measured at room temperature (25℃ to 27℃ to provide a reference).
2. The equipment is subjected to an overnight “soak” at -30℃ without power applied.
3. After the overnight “soak” at 30℃(usually 14-16 hours), the equipment is turned on in a “standby” condition for one minute before applying power to the transmitter. Measurement of the carrier frequency of the transmitter and the individual oscillators is made within a three minute interval after applying power to the transmitter.
4. Frequency measurements are made at 10℃ interval up to room temperature. At least a period of one and one half-hour is provided to allow stabilization of the equipment at each temperature level.
5. Again the transmitter carrier frequency and the individual oscillators is measured at room temperature to begin measurement of the upper temperature levels.
6. Frequency measurements are at 10 intervals starting at -30℃ up to +60℃ allowing at least two hours at each temperature for stabilization. In all measurements the frequency is measured within three minutes after re-applying power to the transmitter.
7. The artificial load is mounted external to the temperature chamber.

NOTE: The EUT is tested down to the battery endpoint.

Measurement Data:

- Refer to the Appendix II.

3.2.7 Emissions Designator (Part 2.201)

Referencing Part 2.201 and 2.202 of the FCC Rules and Regulation and using the following formula the Emissions Designator(s) and Necessary Bandwidths were calculated.

Necessary Bandwidth:

B = 2M + 2DK

Frequency deviation (D) = 5.3 KHz

Baud rate = 960 baud

M = Baud / 2 = 1200 / 2 = 480

D = 5.3 KHz and using K = 1

For the 5.3 KHz deviation:

B = 2 (480) + (2) (5300) (1) = 11560

Emission Designator: The EUT is an FM device containing digital information for data transmission therefore the emission designator is F1D.

Final emission designator: 11K56F1D

3.2.8 POWER INPUT (Part 2.1033 (c))

DC Voltages and Current into Final Amplifier:

POWER INPUT

FIANL AMPLIFIER ONLY

Vce = 12 Volts

IC = 350 mA

3.2.9 AC Conducted Emissions

Procedure:

The conducted emissions are measured in the shielded room with a spectrum analyzer in peak hold. While the measurement, EUT had its hopping function disabled at the middle channels in line with Section 15.31(m). Emissions closest to the limit are measured in the quasi-peak mode (QP) with the tuned receiver using a bandwidth of 9 kHz. The emissions are maximized further by cable manipulation and Exerciser operation. The highest emissions relative to the limit are listed.

Measurement Data: Complies

- See next pages for actual measured spectrum plots.
- No emissions were detected at a level greater than 10dB below limit.
- The used antenna is "R-AN2400-1901RS" and it gave the worse case emissions.

Minimum Standard: FCC Part 15.207(a)/EN 55022

Frequency Range (MHz)	Conducted Limit (dBuV)	
	Quasi-Peak	Average
0.15 ~ 0.5	66 to 56 *	56 to 46 *
0.5 ~ 5	56	46
5 ~ 30	60	50

* Decreases with the logarithm of the frequency

AC Conducted Emissions at normal operation mode – Line

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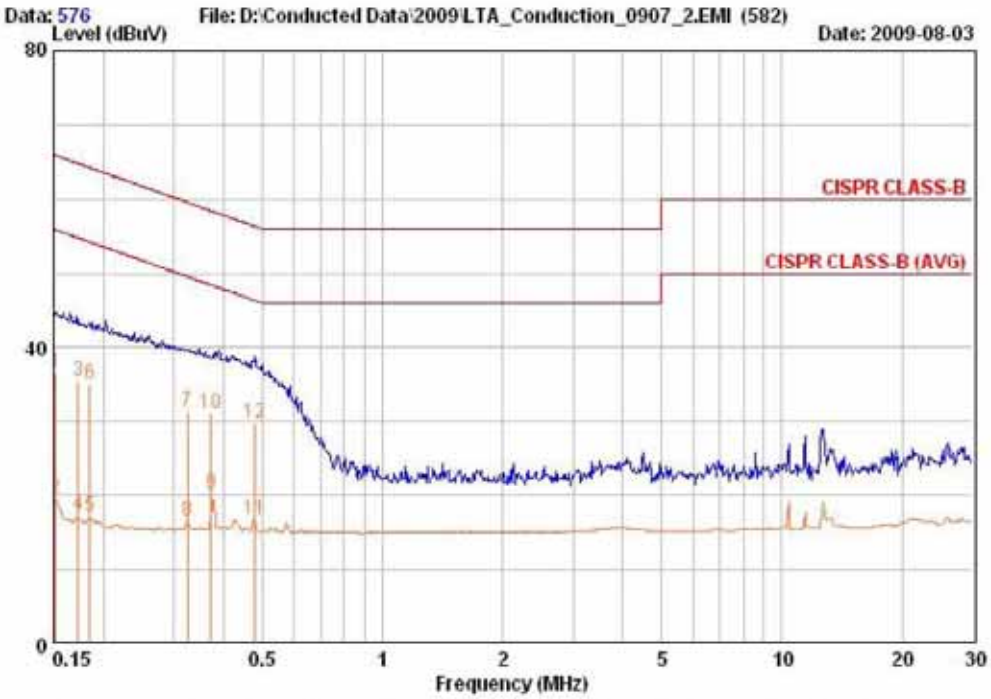
EUT / Model No.	: LM-CV100	Phase	: LINE
Test Mode	: TX mode	Test Power	: 120 / 60
Temp./Humi.	: 25 / 61	Test Engineer	: B.S.KIM



Freq	RD QP	RD AV	C.F	Result QP	Result AV	Limit QP	Limit AV	Margin QP	Margin AV
MHz	dBuV	dBuV	dB	dBuV	dBuV	dBuV	dBuV	dB	dB
0.152	26.80	9.80	9.75	36.55	19.55	65.89	55.89	29.34	36.34
0.173	25.79	7.79	9.63	35.43	17.43	64.82	54.82	29.39	37.39
0.185	25.49	7.69	9.60	35.10	17.30	64.26	54.26	29.16	36.96
0.325	21.67	6.77	9.71	31.37	16.47	59.58	49.58	28.21	33.11
0.373	21.36	10.46	9.71	31.07	20.17	58.43	48.43	27.37	28.27
0.476	20.25	7.05	9.67	29.92	16.72	56.41	46.41	26.49	29.69

Remarks: C.F (Correction Factor) = Insertion loss + Cable loss

AC Conducted Emissions at normal operation mode – Neutral

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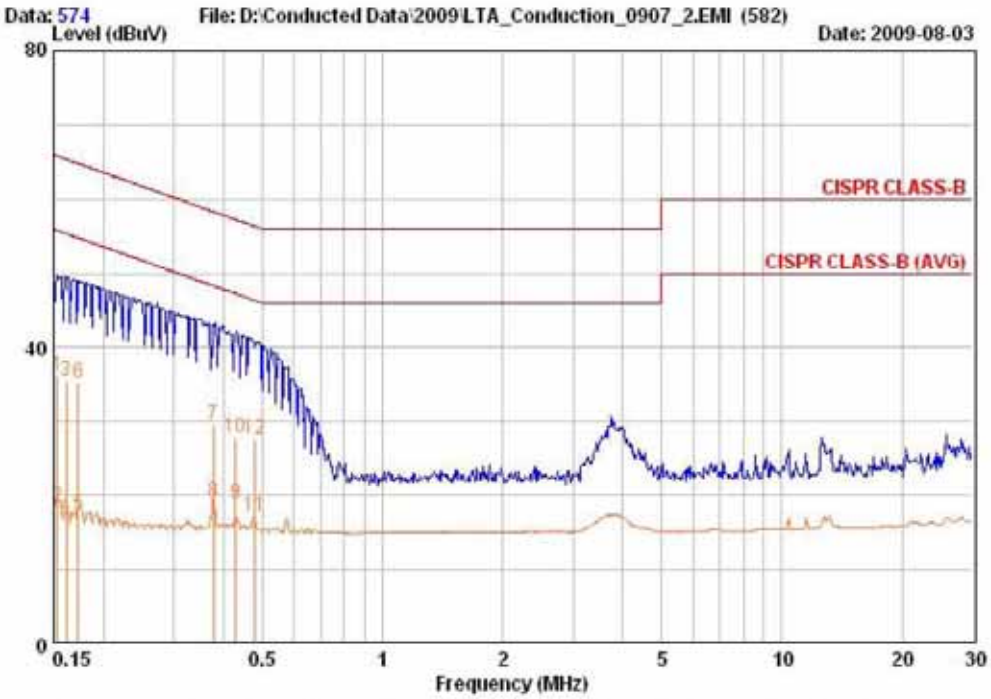
Fax:+82-31-323-6010

EUT / Model No.	: LM-CV100	Phase	: NEUTRAL
Test Mode	: TX mode	Test Power	: 120 / 60
Temp./Humi.	: 25 / 61	Test Engineer	: B.S.KIM



Freq	RD QP	RD AV	C.F	Result QP	Result AV	Limit QP	Limit AV	Margin QP	Margin AV
MHz	dBuV	dBuV	dB	dBuV	dBuV	dBuV	dBuV	dB	dB
0.153	26.40	8.90	9.73	36.13	18.63	65.84	55.84	29.71	37.21
0.161	25.90	7.40	9.72	35.62	17.12	65.41	55.41	29.79	38.29
0.173	25.49	7.79	9.71	35.21	17.51	64.82	54.82	29.61	37.31
0.377	19.96	9.56	9.72	29.68	19.28	58.35	48.35	28.66	29.06
0.428	18.25	9.35	9.72	27.97	19.07	57.29	47.29	29.32	28.22
0.476	17.95	7.55	9.68	27.63	17.23	56.41	46.41	28.78	29.18

Remarks: C.F (Correction Factor) = Insertion loss + Cable loss

APPENDIX I

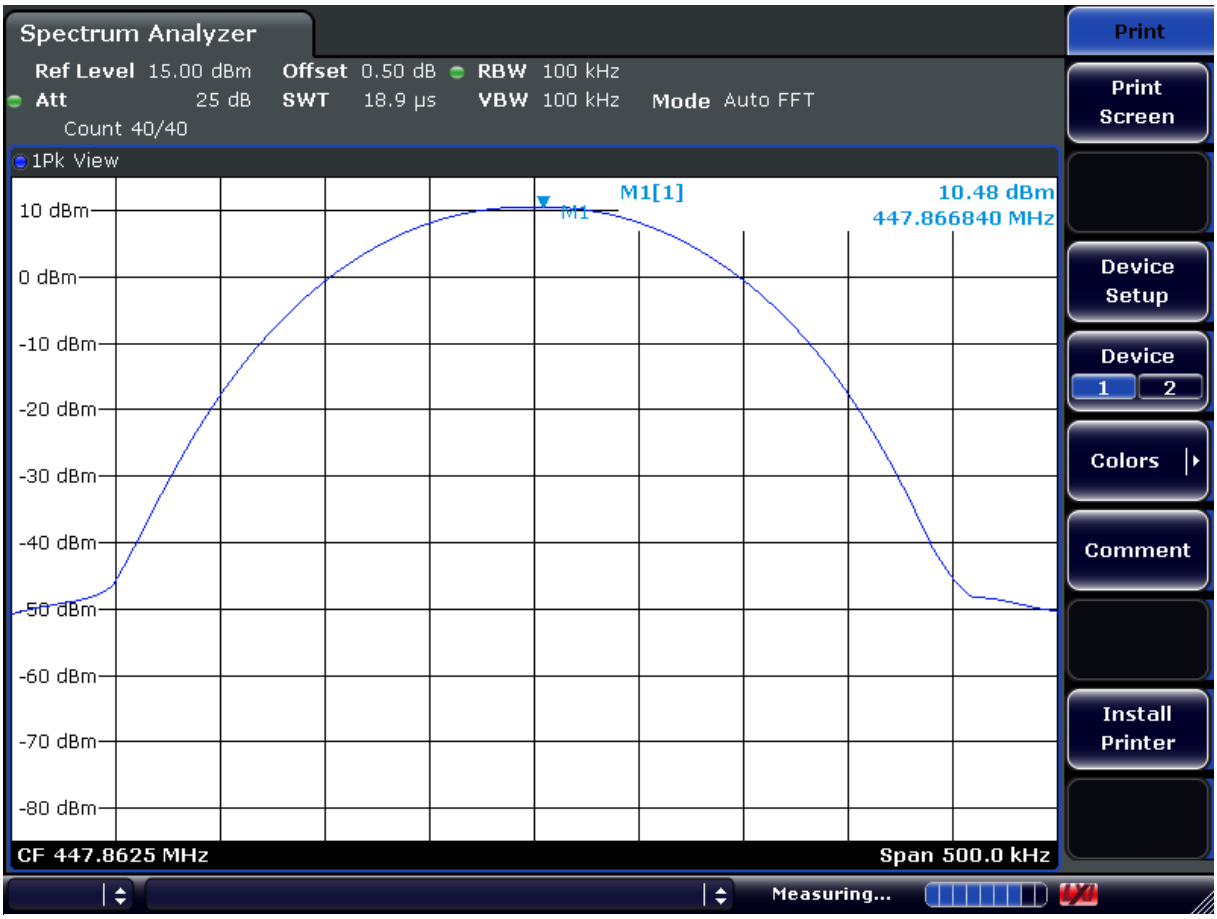
TEST EQUIPMENT USED FOR TESTS

	Description	Model No.	Serial No.	Manufacturer	Next Cal. Date
1	Spectrum Analyzer	FSV-30	100757	R&S	Feb-10
2	Spectrum Analyzer	8563E	3425A02505	HP	Apr-10
3	Spectrum Analyzer	8594E	3710A04074	HP	Oct-09
4	Signal Generator	8648C	3623A02597	HP	Apr-10
5	Signal Generator	83711B	US34490456	HP	Apr-10
6	Attenuator (3dB)	8491A	37822	HP	Oct-09
7	Attenuator (10dB)	8491A	63196	HP	Oct-09
8	Attenuator (30dB)	8498A	1801A06689	HP	Oct-09
9	EMI Test Receiver	ESVD	843748/001	R&S	Apr-10
10	Horn Antenna(18 ~ 40GHz)	SAS-574	154	Schwarzbeck	Nov-10
11	Horn Antenna(18 ~ 40GHz)	SAS-574	155	Schwarzbeck	Nov-10
12	RF Amplifier	8447D	2949A02670	HP	Oct-10
13	RF Amplifier	8449B	3008A02126	HP	Apr-10
14	Test Receiver	ESHS10	828404/009	R&S	Apr-10
15	TRILOG Antenna	VULB 9160	9160-3212	SCHWARZBECK	Apr-11
16	Log.-Per. Antenna	VULP 9118	9118 A 401	SCHWARZBECK	Apr-11
17	Biconical Antenna	BBA 9106	VHA 9103-2315	SCHWARZBECK	Apr-11
18	Horn Antenna	3115	00055005	ETS LINDGREN	Mar-11
19	Horn Antenna	BBHA 9120D	9120D122	SCHWARZBECK	Dec-11
20	Dipole Antenna	VHA9103	2116	SCHWARZBECK	Nov-09
21	Dipole Antenna	VHA9103	2117	SCHWARZBECK	Nov-09
22	Dipole Antenna	VHA9105	2261	SCHWARZBECK	Nov-09
23	Dipole Antenna	VHA9105	2262	SCHWARZBECK	Nov-09
24	Hygro-Thermograph	THB-36	0041557-01	ISUZU	Apr-10
25	Splitter (SMA)	ZFSC-2-2500	SF617800326	Mini-Circuits	-
26	RF Switch	MP59B	6200414971	ANRITSU	-
27	Power Divider	11636A	6243	HP	Oct-09
28	DC Power Supply	6622A	3448A03079	HP	Oct-09
29	Frequency Counter	5342A	2826A12411	HP	Apr-10
30	Power Meter	EPM-441A	GB32481702	HP	Apr-10
31	Power Sensor	8481A	2702A64048	HP	Apr-10
32	Audio Analyzer	8903B	3729A18901	HP	Oct-09
33	Modulation Analyzer	8901B	3749A05878	HP	Oct-09
34	TEMP & HUMIDITY Chamber	YJ-500	LTAS06041	JinYoung Tech	Oct-09
35	LOOP-ANTENNA	FMZB 1516	151602/94	SCHWARZBECK	Mar-11
36	Stop Watch	HS-3	601Q09R	CASIO	Apr-10
37	LISN	ENV216	100408	R&S	Oct-09
38	Oscillo Scope	TDS340A	B013937	Tektronics	Apr-10

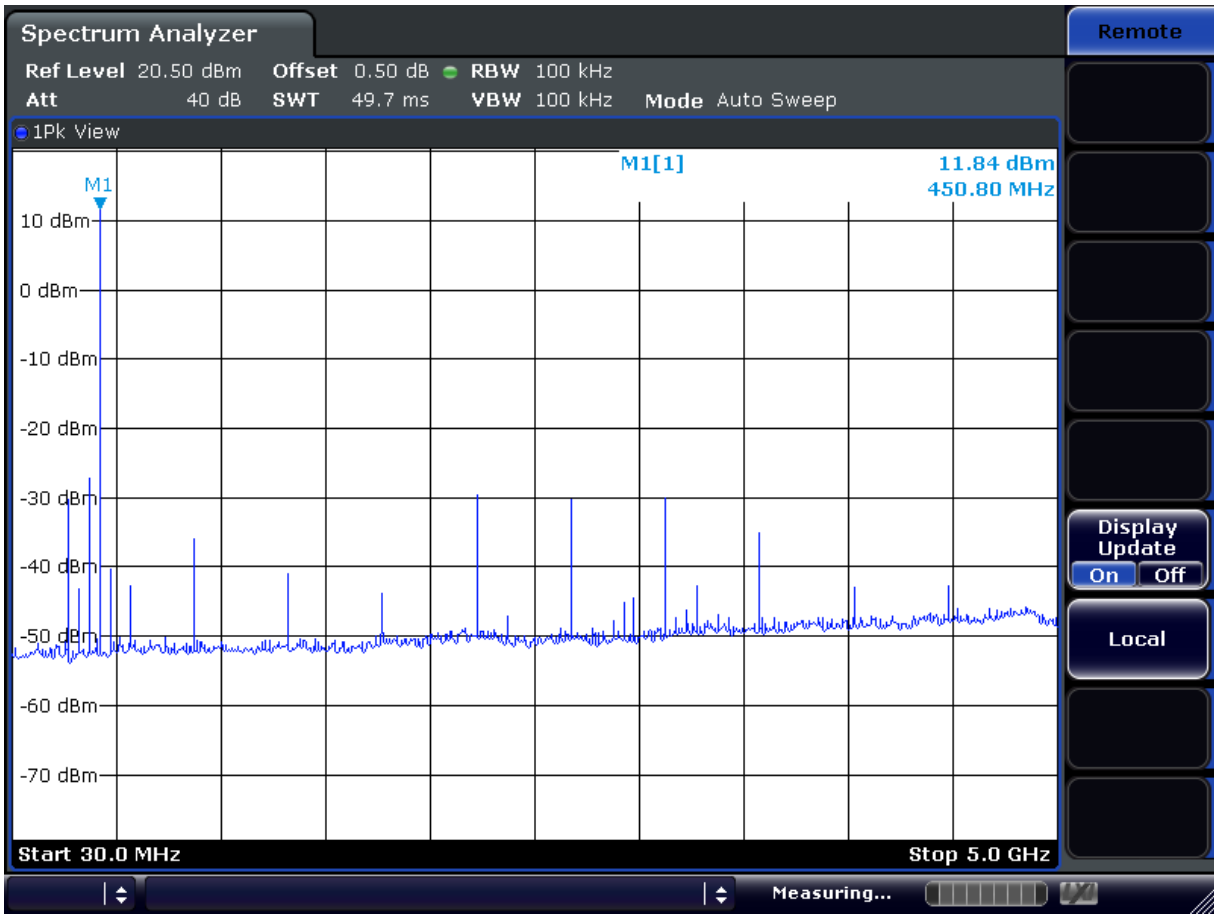
APPENDIX II

TEST PLOTS

Output power Data:



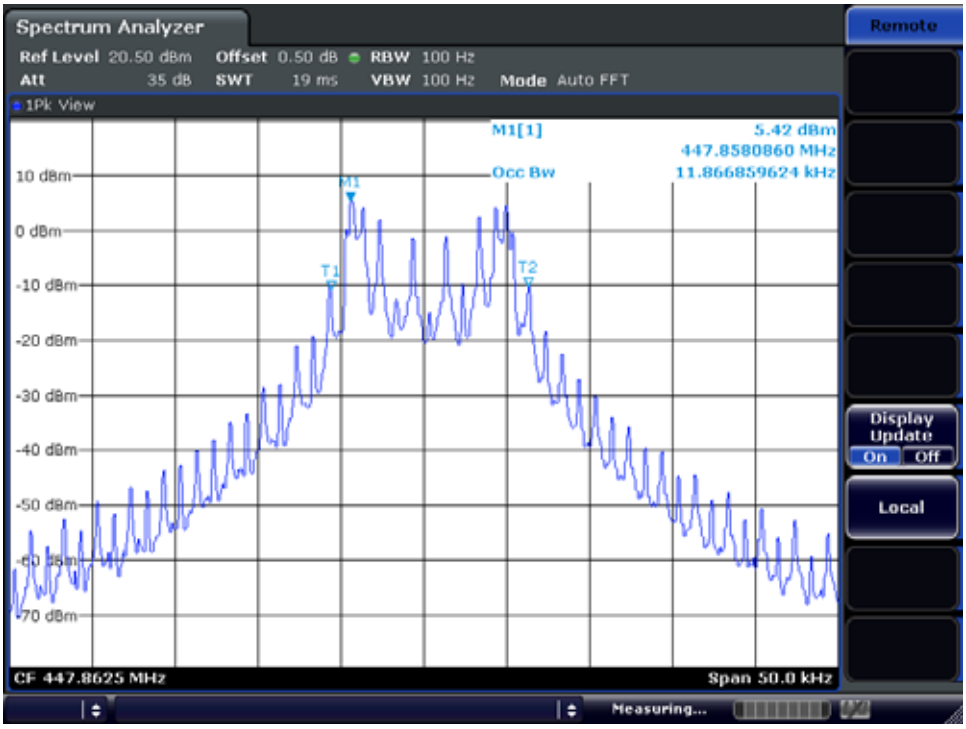
Unwanted Emission Measurement Data:

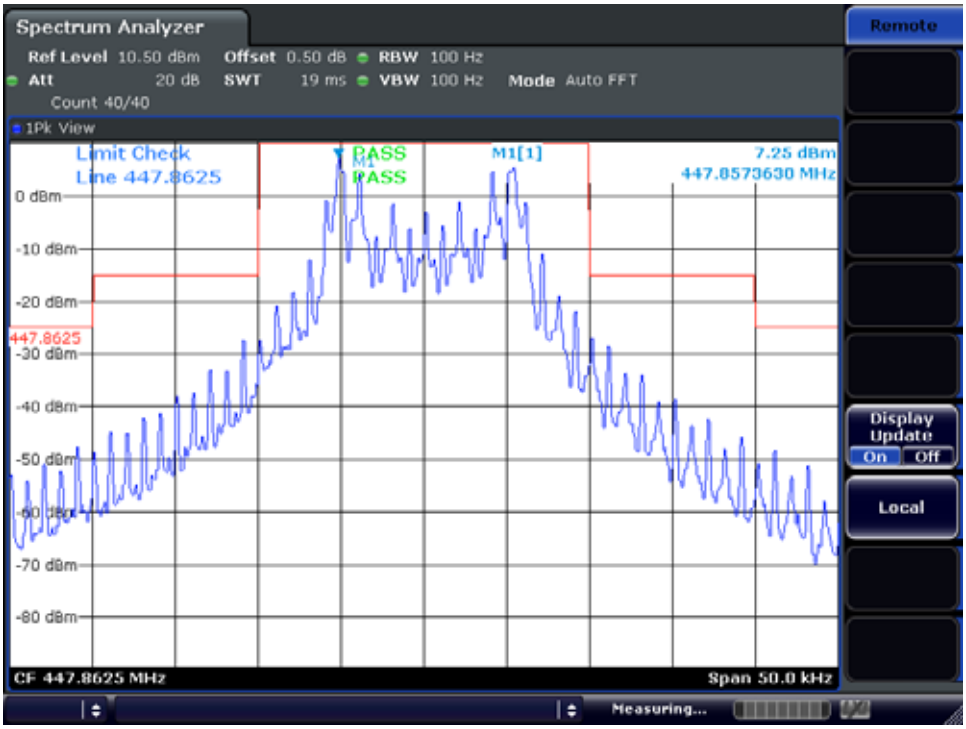


Emission Masks Measurement Data:

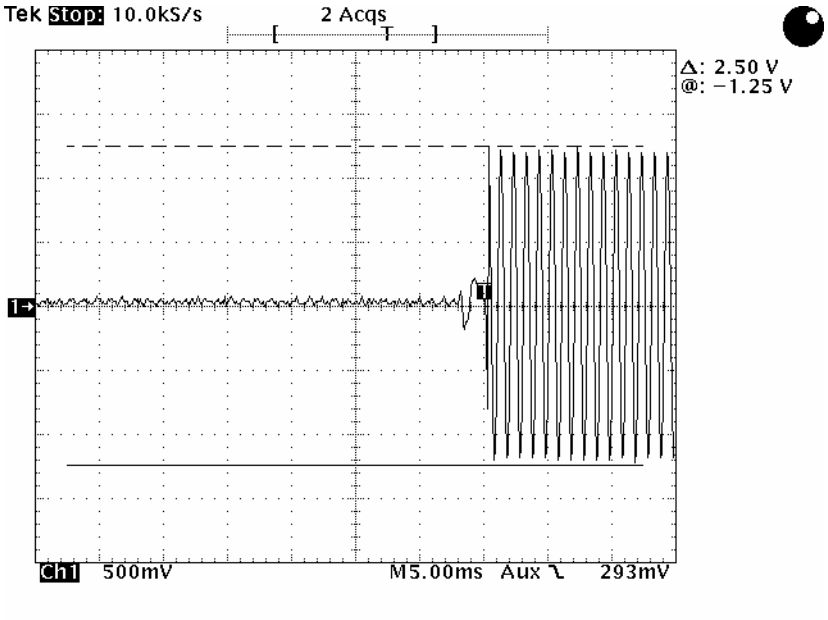
OPERATING FREQUENCY : 447.8625 MHz

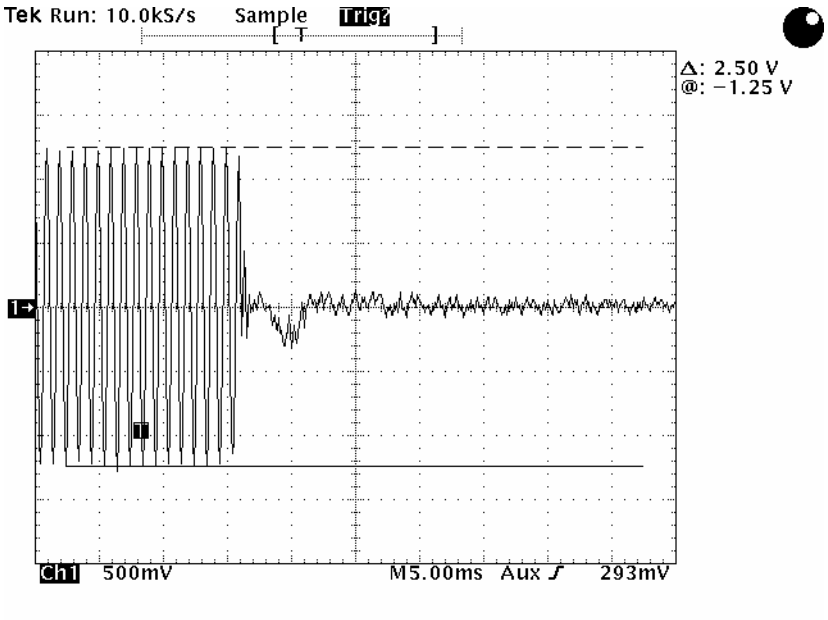
MODULATION : on





447.8625MHz TRASIENT TEST DATA





Frequency Stability Measurement Data:

OPERATING FREQUENCY : 447.8625 MHz

REFERENCE VOLTAGE: 120 Vac

DEVIATION LIMIT: ± 0.00025 % or 2.5ppm

VOLTAGE (%)	**POWER** (VAC)	TEMP (dB)	**FREQ** (Hz)	**Deviation** (%)
100%	120	+20(Ref)	447,862,503	0.000000
100%		-30	447,862,501	0.000069
100%		-20	447,862,504	0.000053
100%		-10	447,862,505	0.000044
100%		0	447,862,508	0.000029
100%		+10	447,862,511	0.000019
100%		+20	447,862,513	0.000000
100%		+25	447,862,512	0.000006
100%		+30	447,862,510	0.000022
100%		+40	447,862,512	-0.000013
100%		+50	447,862,502	-0.000039
100%		+60	447,862,502	-0.000047
85%	102	+20	447,862,501	0.000000
115%	138	+20	447,862,501	0.000000