Electromagnetic Compatibility (EMC) Test Report

for

Capital Prospect Ltd.
Skylink Universal Remote Control Model 68
and
Skylink Universal Remote Control Model PD68

concerning initial conformance to the U.S. requirement

47 CFR, Part 15, Subpart C

Manufacturer and Applicant for Certification:

Capital Prospect Ltd.
Rm 16, 13/F., Block B, Veristrong Ind. Centre, 34-36 Aupuiwan Street, Fotan, N.T. Hong Kong.

Prepared By: National Technical Systems
1536 E. Valencia Drive
Fullerton, CA 92831

Issued: August 4, 2001

LIST OF RESPONSIBLE PARTIES

Test Laboratory Customer

The customer listed on page one of this report under "Manufacturer and Applicant for Certification" is responsible for the following with respect to the standards contained in the Test Summary:

1. Ensuring that subsequent product will be manufactured to the same specifications as the sample tested.
2. Ensuring that the product retains electromagnetic compatibility after modifications to its design and/or it manufacturing process,
3. Conducting the appropriate EMC auditing of subsequent product unless conformance herein has been demonstrated by statistical means.

If manufacture of the product is by a third party then the customer is strongly encouraged to implement an agreement with his supplier(s) whereby adherence to the above responsibilities is ensured.

Test Laboratory Responsibilities

With our signatures we, the undersigned, attest to the accuracy of this report and to testing having been conducted with adherence to the appropriate international quality standards and test procedures.

Steven C. Halme, 13 Aug 01
Steven C. Halme, Date
Sr. Program Manager/EMC Engineer
National Technical Systems

Betty Matteson, NTS 3 QA 8/13/01
Betty Matteson, Date
Quality Assurance Manager
National Technical Systems

TEST SUMMARY

This test record demonstrates conformance of the Capital Prospect Ltd. Skylink Universal Remote Control Models 68 and PD68 with the below listed standard(s):

Region	Specification	Title/Intent	Notes	Conforms
US	47 CFR, Part 15, Sub C	Radio Frequency Devices	15.231 (b) Operation in the band 40.66-40.70 MHz and above 70 MHz 15.209 Radiated Emissions Limits: General Requirements	Yes

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1.0 GENERAL INFORMATION

1.1 Product Description

The Capital Prospect Ltd. Universal Remote Control Models 68 and PD68 (hereafter and collectively the "Universal Remote") are low power garage door opener control units. They are designed to transmit a coded signal to a receiver which then causes actuation of the door motion mechanism.

There are two models of the Universal Remote, the Model 68 and the Model PD68, both identified by FCC ID KUT68. The frequency generating portion of the two models is identical. The Model PD68 adds a logic gate circuit (sans clock) to allow remote activation of the transmitter.

The **Skylink Universal Remote Control Model 68** (hereafter the "Model 68") is a handheld, battery powered device approximately 6.4cm x 3.6cm x 1.3cm in size and has no external connections. External operator controls are limited to a pushbutton to activate transmission, a red LED to indicate that the transmitter is active and a four position switch to select one of the four transmit frequencies. Internal controls are a series of jumpers whose positions on a three row header are configured to match the code of the particular garage door opener being emulated. Each of these manually repositioned connectors is a two socket jumper which can deliver the value of "+", "-" or "OFF".

Power is supplied by an internal +12VDC battery.

The **Skylink Universal Remote Control Model PD68** (hereafter the "Model PD68") is meant to be mounted onto a vehicle body (i.e., motorcycle or car), is approximately 4.1cm x 3.6cm x 1.3cm in size, and receives power and control inputs from the host vehicle battery through an integral, 11" six-connector cable. Transmission is activated by whatever switch is connected to the vehicle activation inputs. Typically, this will be either the turn signals or the headlight high/low beam switch. Internal controls are the four position transmit frequency switch and the code selection switches. The Model PD68 has a bank of twelve, three-position switches for matching codes with a particular garage door opener receiver.

Power is supplied by the vehicle's +12VDC electrical system.

Model 68 Universal Remote

Model PD68 Universal Remote

1.1.1 Model Variants

There are no model variants, and the Universal Remotes are not marketed under model names other than those listed herein.

1.1.2 Accessories Tested with EUT

There were no accessories identified by the customer.

1.1.3 Internal, fundamental oscillator frequencies

Frequency (MHz)	Frequency generating components such as oscillators, phase-locked-loops, etc. were contained in the following circuit(s) or subassembly(ies):
300	Operator selectable, factory set resonator circuits; identical on both models.
310	
318	
390	

1.2 Administrative Data

1.2.1 References

1. CFR 47, Part 15, Subpart C
2. ANSI C63.4-1992
3. A2LA Certificate No. 0214.02
4. NTS Test Report No. 171-0800-1-1A-N
5. Capital Prospect LTD Purchase Order No. 011522

1.2.2 Test Measurement Instrument Calibration

All test instrumentation requiring calibration had a valid calibration sicker attached and was calibrated in accordance with ANSI Standard NCSL Z540-1.

1.3 Tested System Details

1.3.1 Equipment Under Test (EUT)

EUT	Model No.	Serial No.	Notes
Skylink Universal Remote	68	sch01	1. FCC ID No. KUT68, both models 2. Serial numbers were applied at time of test
Skylink Universal Remote	PD68	sch02	

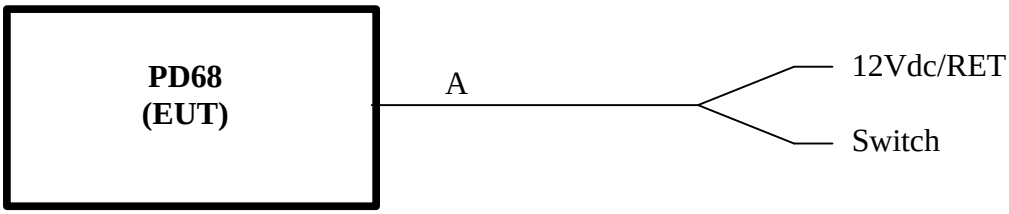
Cable ID	Length (cm)	Shielded		Notes/Function of Cable
		Yes	No	
A	28		X	1. Cable is for 12Vdc/RET and switching signals, model PD68 only. 2. Cable was lengthened for connection to the linear power supply and transmit activation switch.

1.3.2 Support Equipment

None

1.3.3 Interconnection Diagram

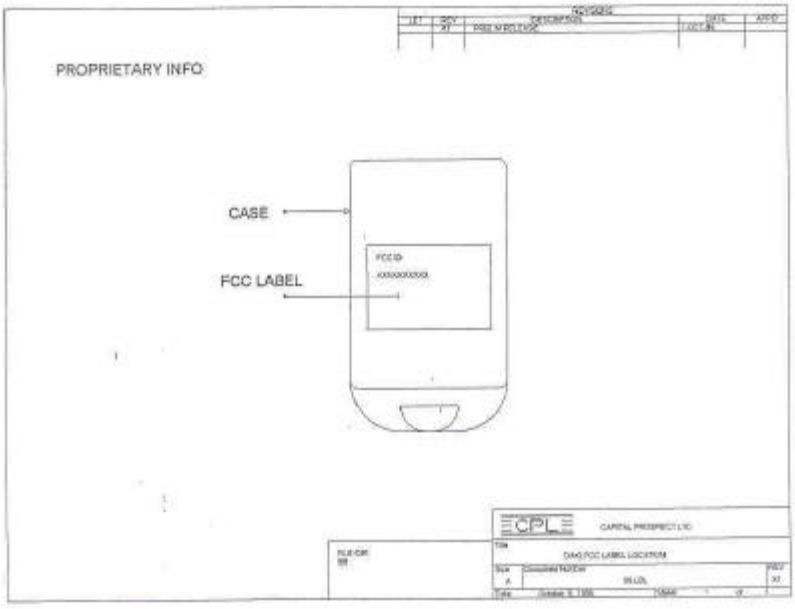
The Model 68 had no interconnections. The Model PD68 is shown below.



1.4 EMC labels/marks

FCC ID : KUT68 FREQ 300 - 320MHZ
RANGE 340 - 390MHZ

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) This device must accept any interference received, including interference that may cause undesired operation.

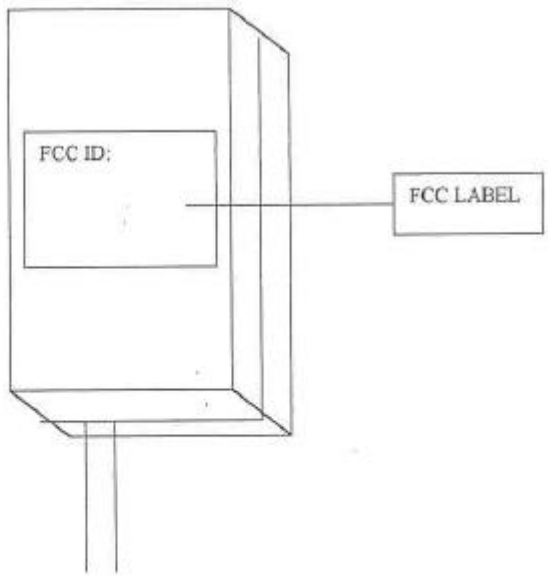


FCC Label, Model 68

FCC LABEL AND LOCATION

FCC ID : KUT68 FREQ 300 - 320MHZ
RANGE 340 - 390MHZ

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions : (1) This device may not cause harmful interference, and (2) This device must accept any interference received, including interference that may cause undesired operation.



FCC Label, Model PD68

1.5 Block Diagram

Refer to NTS Report No. 171-0800-1-1A-N for the Universal Remote block diagrams.

1.6 Electrical schematics

Refer to NTS Report No. 171-0800-1-1A-N for the Universal Remote electrical schematics.

1.7 PCB Layout

Refer to NTS Report No. 171-0800-1-1A-N for the Universal Remote Printed Circuit Board (PCB) layouts.

2.0 GENERAL TEST METHODOLOGY AND FACILITY INFORMATION

2.1 Emissions

Required emissions testing was performed in accordance with ANSI C63.4 :92 and CFR 47 part 15. Specifics such as test locations are listed in the appropriate data sections of this report.

Conducted measurements of powerlines were made with power supplied to the EUT through a 50Ω/50µh Line Impedance Stabilization Network (LISN); support equipment not part of the EUT were powered through a similar but separate LISN. If required, measurements of interface cables were made through either an appropriate Impedance Stabilization Network (ISN) or a suitable substitute.

Radiated measurements were made at either an Open Area Test Site (OATS) or an Alternate OATS with an antenna to EUT distance of 3m or 10m, as appropriate. Where 3m measurements, using an alternate OATS are allowed, final measurements may be made in the listed 3m chamber. The actual test distance is listed in the respective test data sections. The applicable frequency spectrum was searched with a calibrated antenna system for rf emissions approaching the appropriate limits. "Maximization" of each suspect frequency was accomplished by a combination of a 360° azimuth search and varying the antenna to ground plane height from 1m to 4m, in both the vertical and horizontal polarizations. Final data was collected in the worst case configurations of the EUT producing the highest emission levels.

Typically, conducted and radiated emissions measurements were first made with a peak detector. The highest peak amplitudes relative to the appropriate limits were identified and re-measured using quasipeak and/or average detectors as required. Conducted emissions testing was performed using automatic EMI test equipment. This equipment utilizes HP EMI measurement software running on an HP computer. The computer interfaces directly with HPIB (IEEE) compatible instruments having graphical displays presented on the spectrum analyzer's CRT and to a printer which generated hard copies of the data. The program automatically selected the range of test frequencies or band and set the specification line limits to be used during the test. This equipment/software allowed for real-time data reduction and prints tabulated data on peak, quasipeak or average value measurements.

Measurements were made at the National Technical Systems EMC facility located at 1536 E. Valencia Dr., Fullerton, CA 92831-4797. The 3m semi-anechoic chamber meets the NSA requirements of an alternate OATS and is so listed with the Federal Communications Commissions.

2.2 Basic Calculations

2.2.1 Radiated Emissions Field Strength Calculations

[1] FS = RA + AF + CL - AG

where: FS = field strength CL = cable loss AF = antenna factor
RA = receiver amplitude AG = amplifier gain

The receiver used for radiated emissions measurements performed the field strength calculations automatically. The program has resident AF and CL figures for individual antennas and cables.

47CFR part 15 section 231(b) emission limits for signals in the frequency ranges of 130 MHz to 174 MHz and 260 MHz to 470 MHz are calculated as follows:

[2] S = (y2 - y1) / f2 - f1)

[3] IP = y1 – (f1 * S)

[4] Lμv/m = S * f + IP

[5] Ldbμv/m = 20log (Lμv/m)

where:
S = slope of limit line
f = frequency of measured signal
f1 = lowest frequency end-of-slope
f2 = highest frequency end-of-slope
y1 = f1 end of slope limit
y2 = f2 end of slope limit
IP = intersection point
L = limit of f on slope, in μv/m or dbμv/m, as specified

hence:

limit of (f = 300MHz) = 74.67 dbμv/m
limit of (f = 310MHz) = 75.32 dbμv/m
limit of (f = 318MHz) = 75.80 dbμv/m
limit of (f = 390MHz) = 79.24 dbμv/m

2.2.2 Averaged Levels of Pulsed Emissions Calculations

1. Average the sum of the pulse widths over the 100ms width of the transmission with the highest average value.
2. Divide the sum of the pulse widths in the worse case 100ms window by 100ms.
3. Multiply peak detector field strength (μv/m) by the duty cycle to determine the average detector field strength.

2.3 Deviation from Standard Test Methods

The EUT transmission for each model was activated by a Test Engineer during the measurements. The body was positioned to the rear at approximately 135°. Activation of the Model 68 was with a non-conductive rod, 10cm long; activation of the Model PD68 was by momentary switch closure.

2.4 Ambient Conditions During Testing

During this test the average ambient conditions were as follows: Relative humidity between 30-60%, temperature 15-35° C, and barometric pressure between 860-1060 mbar.

2.5 Test facility

Testing was accomplished at the National Technical Systems EMC Test Facility, 1536 East Valencia Drive, Fullerton, California, USA. The EMC facility has the following accreditations, registrations, etc.:

- Compliance with the requirements of ISO/IEC 17025
- Compliance with the requirements of ISO 9000: 1997 (E).
- Accredited by the American Association for Laboratory Accreditation (A2LA)
- Compliance with the radiated and AC line conducted test site criteria in ANSI C63.4-1992 as required by the Federal Communications Commission (FCC).
- NRTL Approved, NTS Acton, MA
- U.S. Conformity Assessment Body as defined in the US/EU Mutual Recognition Agreement
- Accredited by the BSMI of Taiwan as a Conformity Assessment Body under the APEC Agreement, with certification number SL2-IN-E-074R.
- Accredited by the VCCI of Japan.

3.0 TEST CONFIGURATION

3.1 EUT Input Power

The power applied to the EUT was as follows:
1. +12VDC, integral battery for the Model 68; and
2. +12VDC supplied by a linear power supply to simulate the vehicular electrical power for the Model PD68.

3.2 EUT Condition, Configuration and Modes Of Operation

As delivered for testing, the EUT condition can be described as: a pre-production model with the below listed variations from final product:

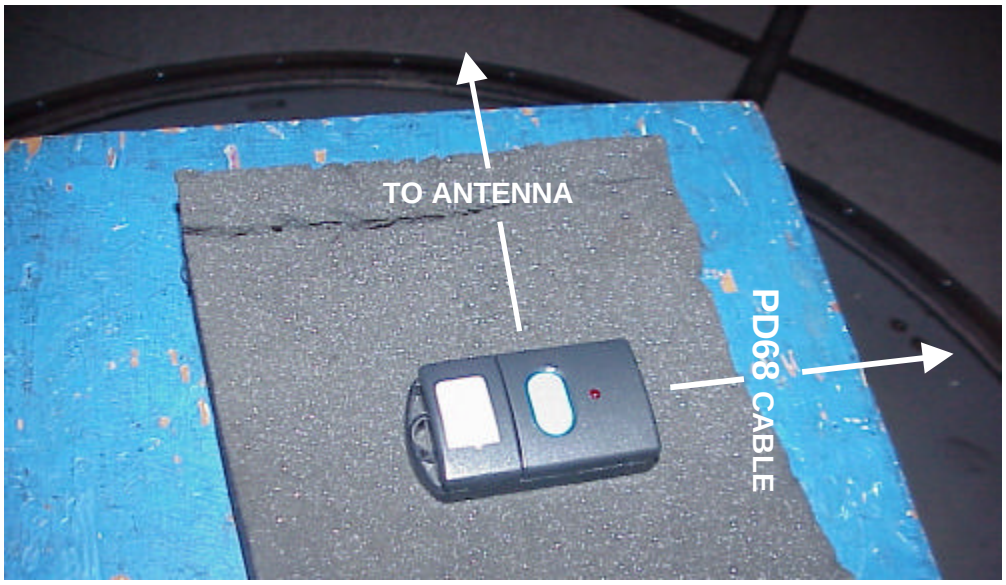
1. Circuit boards were production level
2. The outer cases for each model appeared to be a non-conductive, prototype plastic. This variation is electromagnetically benign, and it is not likely that subsequent repackaging using an equally non-conductive material would alter the performance demonstrated herein.

As per measurement procedures, the worst case test configuration, mode of operation and orientation relative to the antenna was used for all testing. The selection process was based on investigative testing of the EUT.

The mode of operation during testing was “transmit signal”. The only other operational mode to be considered was standby. Measurements were made of the transmitted and spurious signals during transmission.

An integral feature of both EUTs was a time-out circuit, which automatically deactivated the transmission within 5 seconds of switch release. The transmission did not have a regular, periodic interval, nor was it automatically activated.

Each EUT was investigated while articulating through the three axes described by ANSI C63.4. The worst axis was noted and used for testing. The same axis was used for both models, as shown below.



Model 68 and PD68 Test Axis (Model PD68 Shown)

3.3 VDU Mode

There was no video display unit (VDU).

3.4 EUT exercise software

NONE

3.5 Equipment Modifications, Audit Corrective Actions and EMC Specific Components

The information contained in this section as well as that in 4.2 shall be used for visual verification of configuration during EUT audits or other evaluations subsequent to this test.

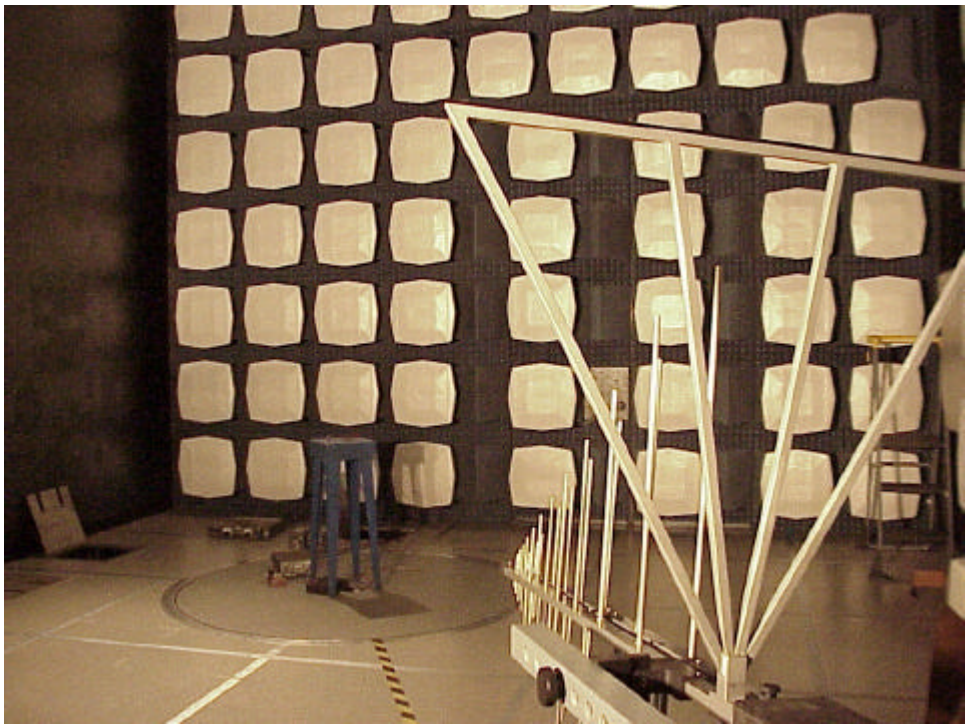
The below listed modifications were found to be necessary for EUT conformance with the requirements listed under Test Summary. These modifications shall become part of the EUT design.

Paragraph	Component and Location; Description of Action Taken or Modification Made	Component Additions	
		Manufacturer	Part number
4.2	On the PD68 a length of 24AWG hook-up wire was used to connect U1 pin 15 to L3.	N/A	N/A

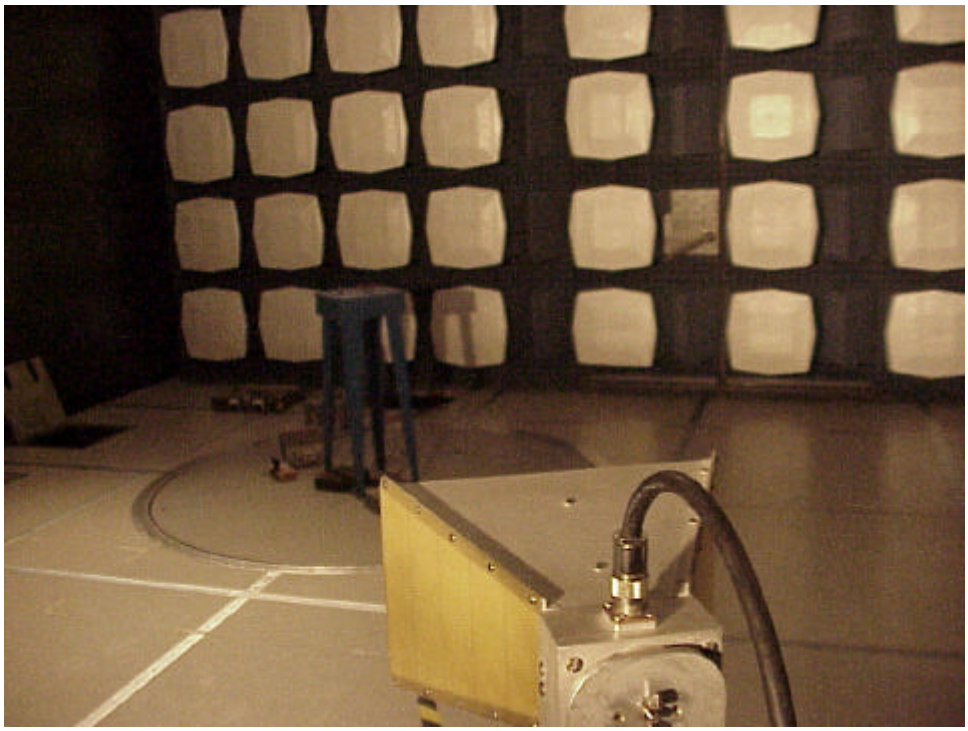
4.0 PHOTOGRAPHS

4.1 Equipment Under Test (EUT)

The EUT layout during testing is shown below. Unless otherwise noted, this layout was used for both the Model 68 and Model PD68. Shown is the Model PD68 with the linear power supply and switch connections. The EUT is situated atop the blue, 80cm high wooden table.



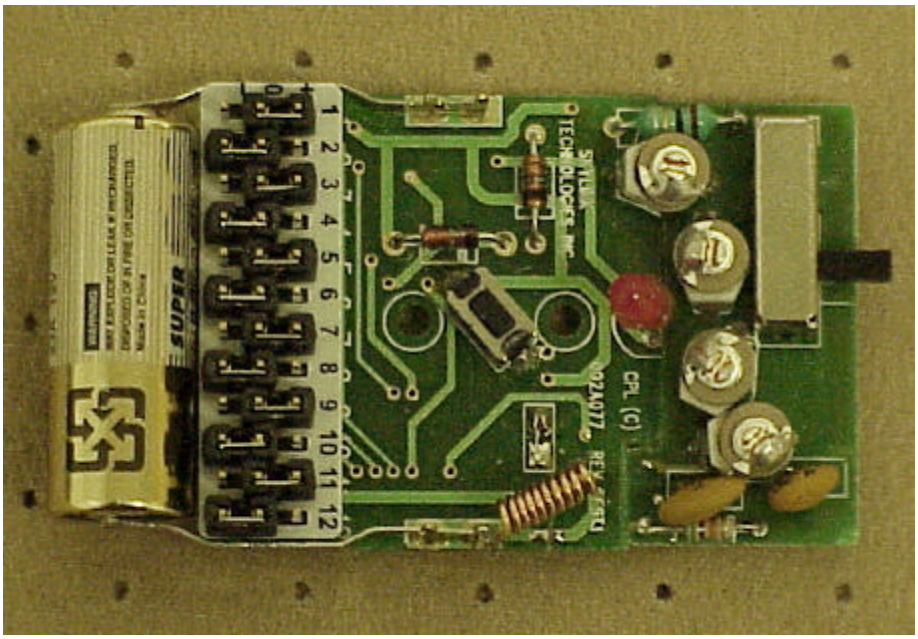
Radiated Emissions Setup, 30 MHz – 1 GHz, Front View



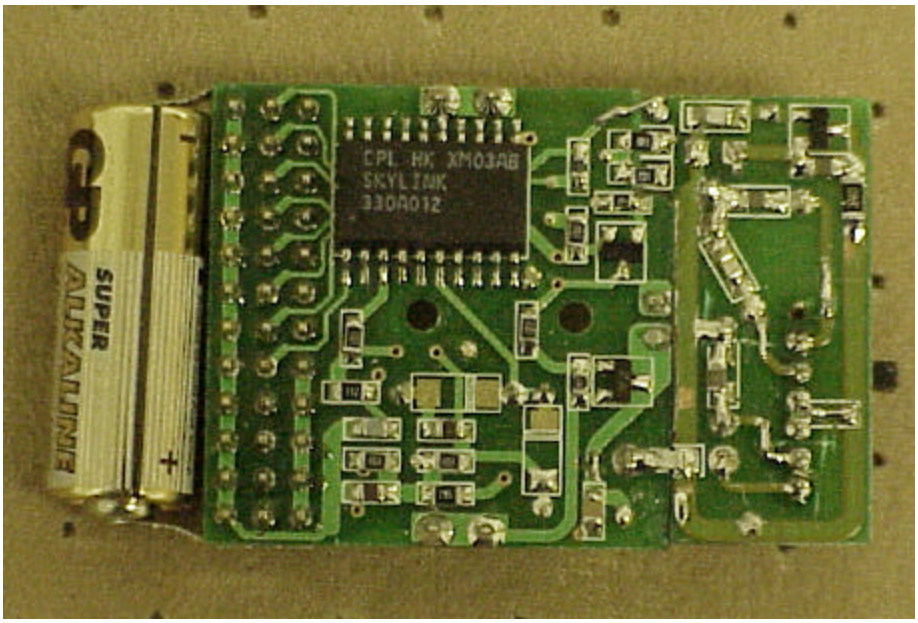
Radiated Emissions Setup, 1 GHz – 10 GHz

4.2 Circuit boards and EMC specific characteristics

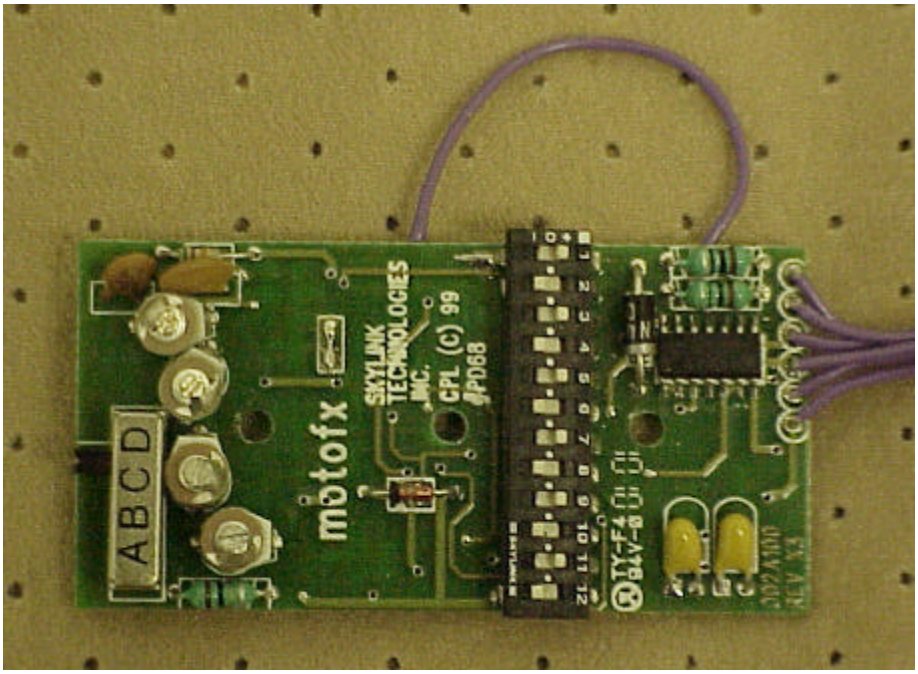
This section contains photographs of circuit boards, EMC specific characteristics/components and of modifications required for conformance (refer to paragraph 3.5).



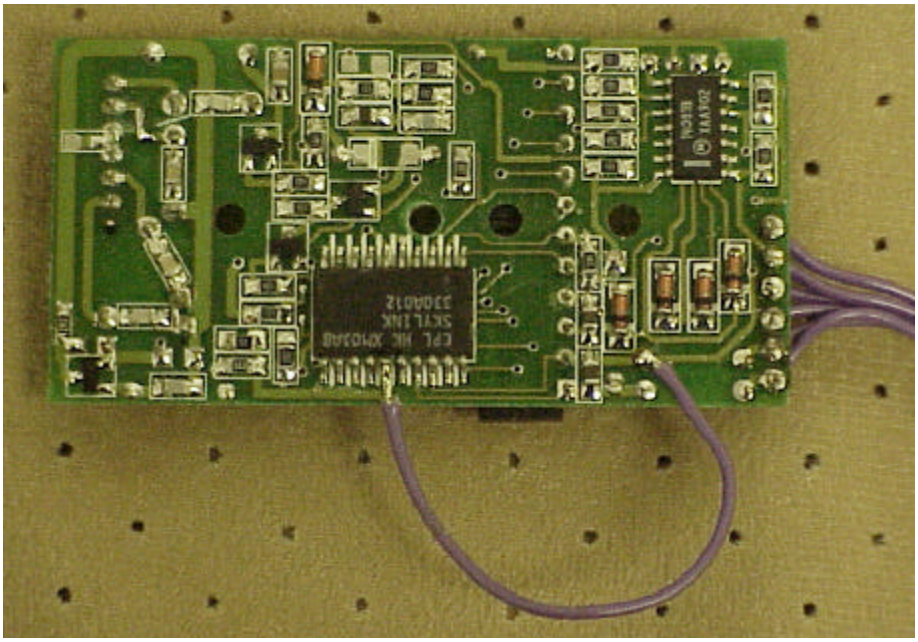
Model 68 Circuit Board, Component Side



Model 68 Circuit Board, Foil Side



Model PD68 Circuit Board, Component Side



Model PD68 Circuit Board, Foil Side with Modification

5.0 TEST INSTRUMENTATION

The instrumentation calibrations contained herein are traceable to NIST.

Instrument	Manufacturer	NTS Control No.	Calibration Due
Radiated Emissions			
HP Spectrum Analyzer	HP	E5262F	03/13/01
Quasi Peak Detector	HP	E5386F	05/20/01
Biconilog antenna	ETS	E5358F	08/16/01
Horn antenna	EMCO	E4864F	09/29/01
Pre Amplifier	HP	E4722F	04/11/01

6.0 EMISSIONS

The test procedures are from ANSI C63.4 :92 and 47CFR Part 15 Subpart C. Measurements were made in a listed 3m semi-anechoic chamber. The EUT is battery powered, hence conducted measurements were not made. The PD68 input power was supplied by a linear power supply with sufficient lengths of wiring to simulate connection to a vehicular battery.

The Engineering Test Data Sheets, which follow the tabular data, give the calculated average values, individual widths of the eleven pulses comprising each transmission, length of transmission and other pertinent data. Following each Engineering Data Sheet are the particular transmission pulse in time domain and the frequency domain plots from 20 MHz to 10 GHz.

Conformance was demonstrated with either peak values or quasipeak values. If the peak value was below the appropriate limit then it was used to determine conformance. If the peak value exceeded the limit a quasipeak measurement were made and used to determine conformance. Calculated average values were not used to determine conformance.

In all cases both the quasipeak and the calculated Average level were lower than the peak, hence peak was worse case. All spurious emissions were lower than the fundamental.

All measurements were made at 000° azimuth at a 3m distance to the antenna, which was at 100 cm height and horizontal polarity. It was determined that this produced the maximum emissions in all cases.

6.1 Model 68 Test Results and Data: ☑ PASS

6.1.1 Model 68 Tabular Data

Date of measurement: 8 March 2001 Test Engineer: Ba Nguyen

FCC RF Emissions Data, Model 68										
Transmit Channel	Measured Frequency (MHz)	fund.	spurious/ harmonic	other	Level (dbµv/m) (1)				0.25% f_o BW	
					Corrected Level (1)	Limit §15.231(b)	Limit §15.209(a)	Margin (Δ)	Max Allowed BW	Actual BW
A (f_o)	**390.40**	**X**			**46.3**	**79.2**		**-32.9**	**975 kHz**	**158 kHz**
A	89.12			X	17.6		43.5	-25.9		
A	92.50			X	17.7		43.5	-25.8		
A	387.00		X		32.9	59.1		-26.2		
A	568.05			X	30.4		46.02	-15.6		
A	688.40			X	32.5		46.02	-13.5		
A	924.21			X	34.1		46.02	-11.9		
B (f_o)	**318.00**	**X**			**41.5**	**75.8**		**-34.3**	**795 kHz**	**144 kHz**
B	187.4			X	19.8		43.5	-23.7		
B	448.50			X	27.4		46.02	-18.6		
B	464.75			X	27.9		46.02	-18.1		
B	635.90		X		36.2	61.9				
B	688.63			X	31.8		46.02	-14.2		
C (f_o)	**310.00**	**X**			**53.9**	**75.3**		**-21.4**	**775 kHz**	**138 kHz**
C	187.40			X	20.6		43.5	-22.9		
C	464.80			X	28.7		46.02	-17.3		
C	613.60			X	33.5		46.02	-12.5		
C	621.00		X		33.3	61.9		-28.6		
C	688.60			X	33.0		46.02	-13.0		
C	931.63		X		36.9	61.9		-25.0		
C	2348.00			X	43.8		53.98	-10.2		

FCC RF Emissions Data, Model 68										
Transmit Channel	Measured Frequency (MHz)	fund.	spurious/ harmonic	other	Level (dbµv/m) [1]				0.25% f_o BW	
					Corrected Level [1]	limit		Margin (Δ)	Max Allowed BW	Actual BW
						§15.231(b)	§15.209(a)			
D (f_o)	**299.90**	**X**			**58.5**	**74.7**		**-16.2**	**750 kHz**	**178 kHz**
D	187.40			X	38.9		43.5	-4.6		
D	586.05			X	39.5		46.02	-6.5		
D	599.85		X		44.0	61.9		-17.9		
D	688.36			X	41.1		46.02	-4.9		
D	886.00			X	33.8 [1]		46.02	-12.2		

[1] Levels are given as peak if below appropriate the limit, otherwise quasipeak measurements will be made. Quasipeak values will be indicated by the superscript "[1]" following the Corrected Value.

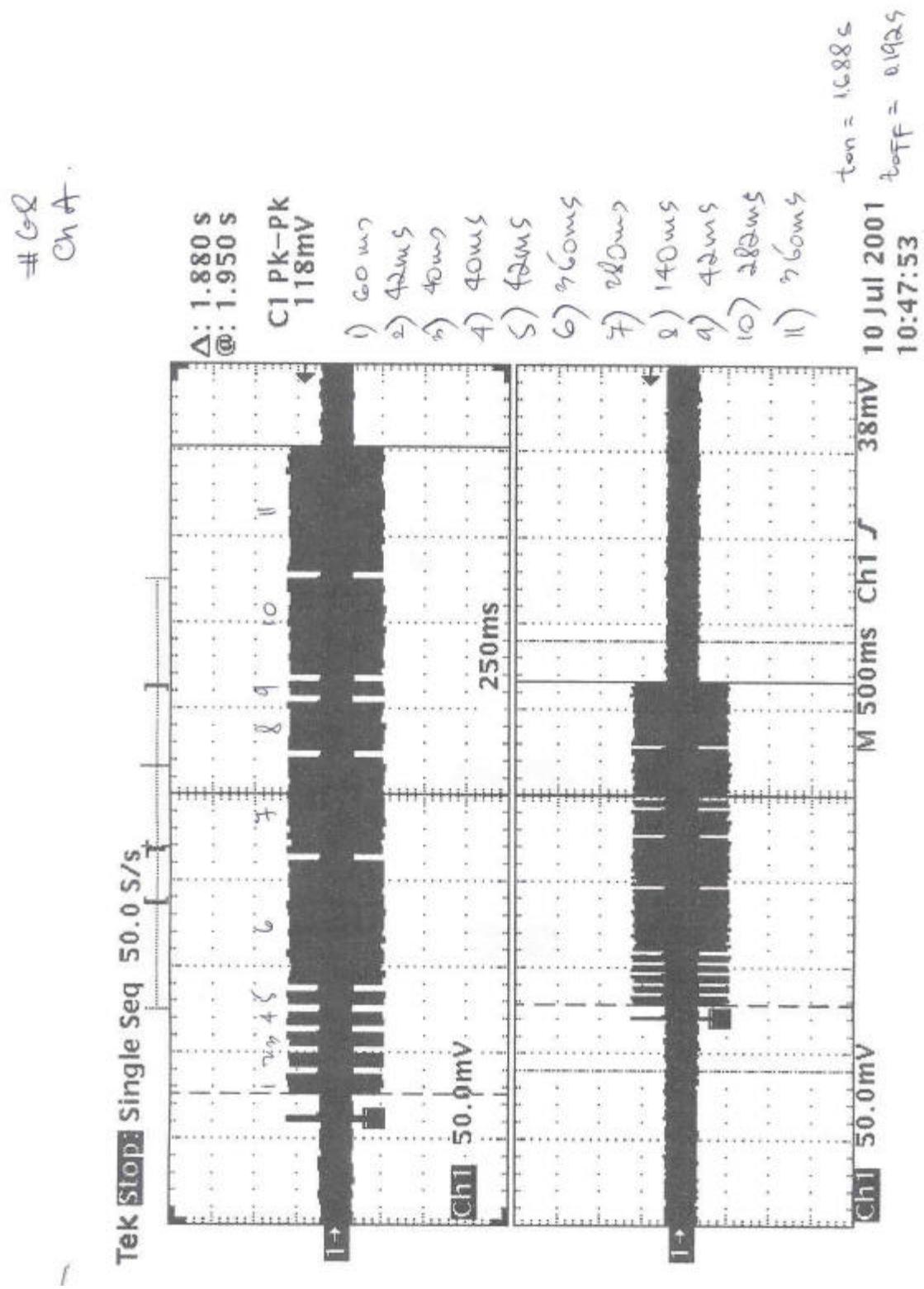
6.1.2 Model 68 Engineering Data Sheets & Waveform Plots

ENGINEERING TEST DATA SHEET

Customer:	SkyLink Technologies	**MJO No:**	171 - 0800	
Test Item:	Garage Door Remote	**P/N:**		
Model:	68	**S/N:**		
Specification: FCC 47CFR Part 15		**Rev.**	**Para:**	
Conducted by:		**Date:**		**Page of**

Fundamental Frequency:	390	MHz	**Channel:**	A
Actual Voltage Measurement:	46.3	dBµV/m	**Limit:**	**79.2** dBµV/m
Bandwidth (BW) Limit:	**975**	kHz		
Measured F1:	305	kHz		
Measured F2:	158	kHz		
Actual Bandwidth (BW):	147.0	kHz		
Duration of Transmitting: (time between transmitting)	N/A *	sec	(*) Manual Operation	
Total Time-on (T_{on}) :	1.688E+00	sec		
Number of Pulses:	11	pulses		
(Average Pulse-width over 100msec or 1 Pulse-train)				
Total Time of 1 Pulse-Train:	1.880	sec		
Calculate of Duty Cycle:	89.787	%		
(Pulse-width sum / 1 pulse-train)				
Calculate Average Value:	41.57	dBµV/m		
(Duty cycle x Peak Emission)				

Pulse #	Pulse Width (s)
1	0.060
2	0.042
3	0.040
4	0.040
5	0.042
6	0.360
7	0.280
8	0.140
9	0.042
10	0.282
11	0.360
Total T_{on}	1.688

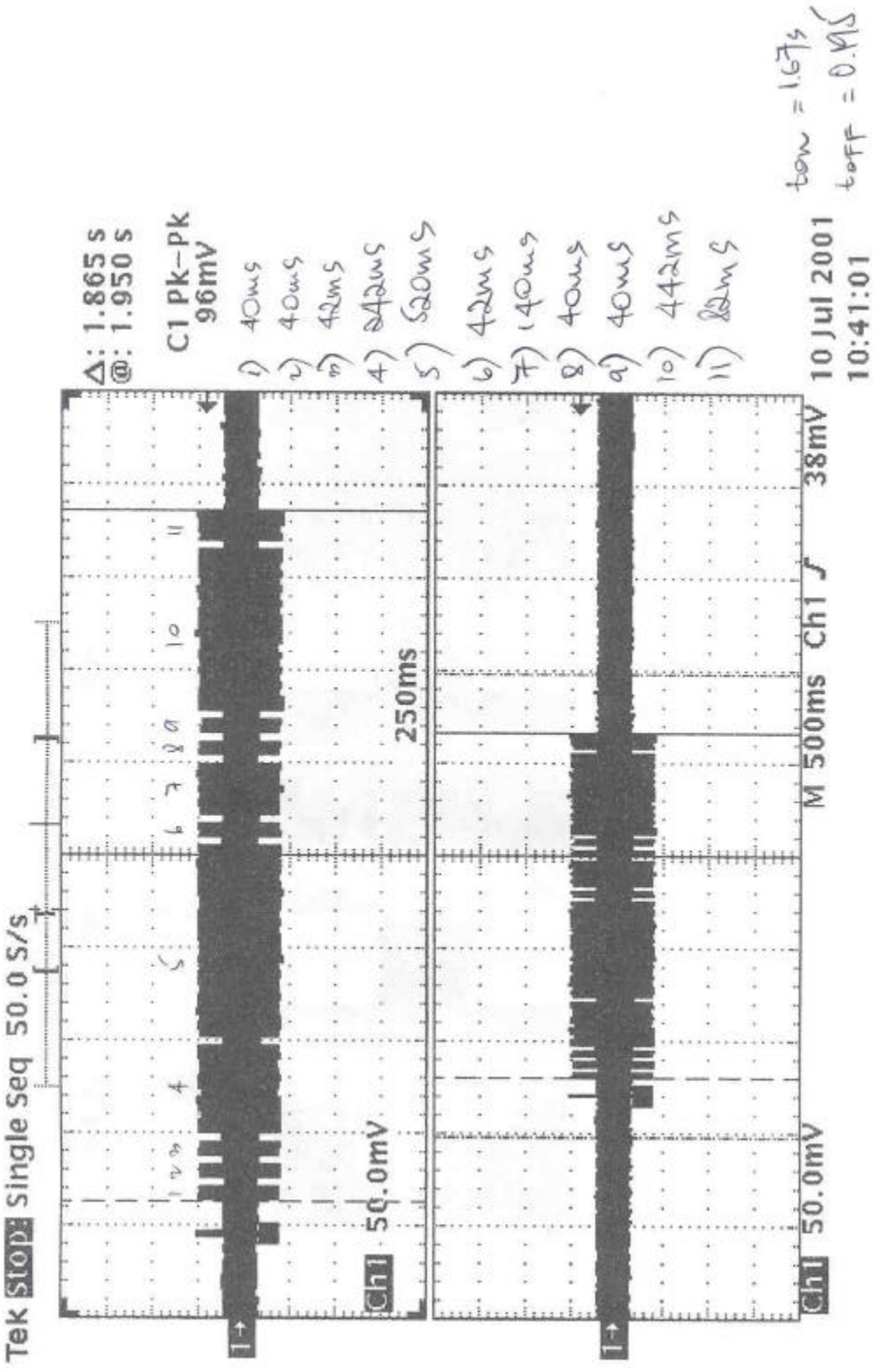

#62
Ch A
Δ: 1.880 s
@: 1.950 s
C1 Pk-Pk
118mV
1) 60 ms
2) 42ms
3) 40ms
4) 40ms
5) 42ms
6) 96ms
7) 280ms
8) 140ms
9) 42ms
10) 280ms
11) 96ms
ton = 1.688 s
toff = 0.192 s
10 Jul 2001
10:47:53
Tek Stop: Single Seq 50.0 S/s
250ms
Ch1 50.0mV
M 500ms Ch1 38mV
Ch1 50.0mV

ENGINEERING TEST DATA SHEET

Customer:	SkyLink Technologies	**MJO No:**	171 - 0800	
Test Item:	Garage Door Remote	**P/N:**		
Model:	68	**S/N:**		
Specification: FCC 47CFR Part 15		**Rev.**	**Para:**	
Conducted by:		**Date:**		**Page of**

Fundamental Frequency:	318	MHz	**Channel:**	B
Actual Voltage Measurement:	41.5	dBµV/m	**Limit:**	**75.8** dBµV/m
Bandwidth (BW) Limit:	**795**	kHz		
Measured F1:	305	kHz		
Measured F2:	144	kHz		
Actual Bandwidth (BW):	161.0	kHz		
Duration of Transmitting: (time between transmitting)	N/A *	sec	(*) Manual Operation	
Total Time-on (T_{on}) :	1.670E+00	sec		
Number of Pulses:	11	pulses		
(Average Pulse-width over 100msec or 1 Pulse-train)				
Total Time of 1 Pulse-Train:	1.865	sec		
Calculate of Duty Cycle: (Pulse-width sum / 1 pulse-train)	89.544	%		
Calculate Average Value: (Duty cycle x Peak Emission)	37.16	dBµV/m		

Pulse #	Pulse Width (s)
1	0.040
2	0.040
3	0.042
4	0.242
5	0.520
6	0.042
7	0.140
8	0.040
9	0.040
10	0.442
11	0.082
Total T_{on}	1.670

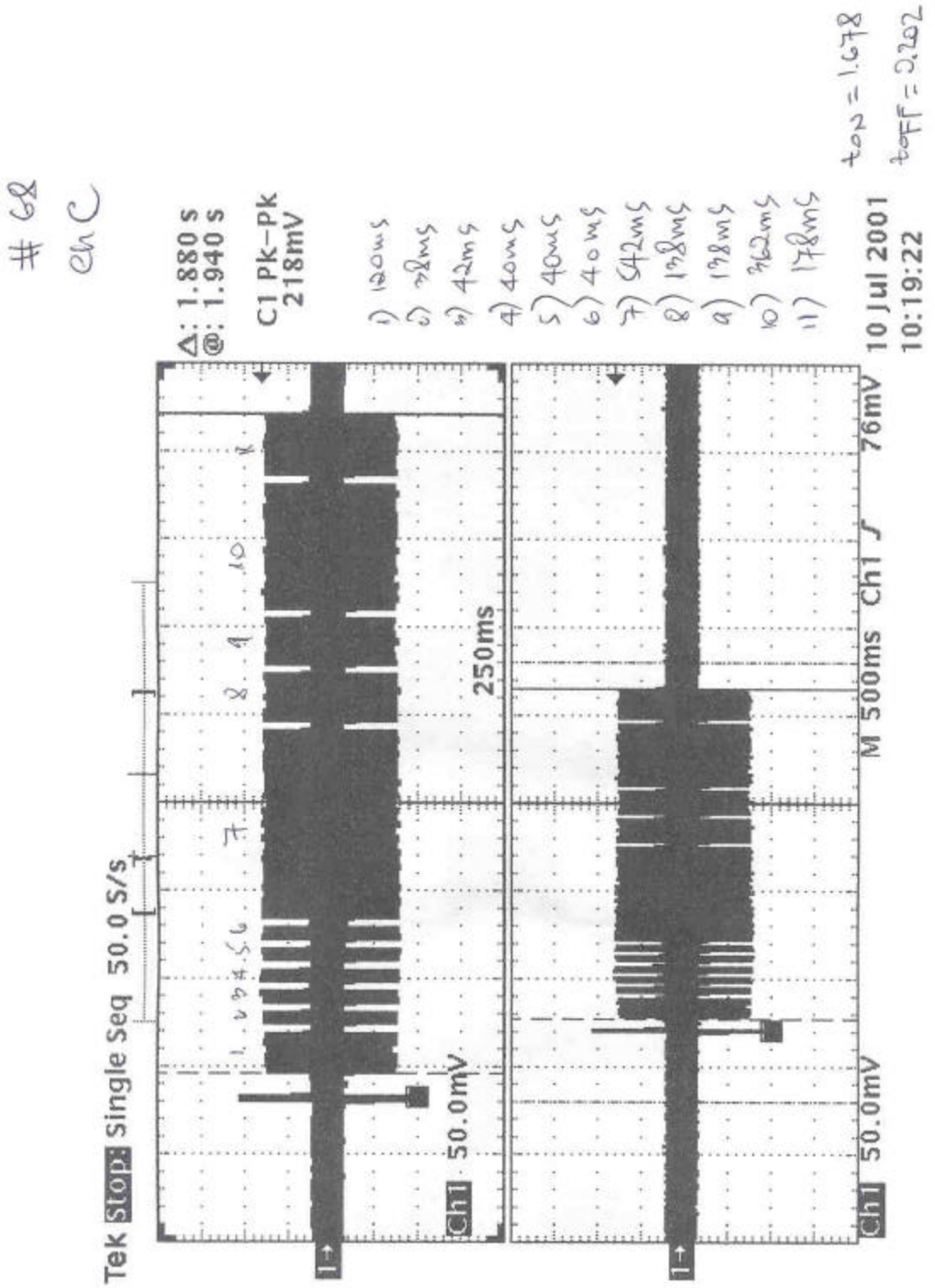

#62
Ch3
Δ: 1.865 s
@: 1.950 s
C1 Pk-Pk
96mV
1) 40ms
2) 40ms
3) 42ms
4) 242ms
5) 520ms
6) 42ms
7) 140ms
8) 40ms
9) 40ms
10) 442ms
11) 82ms
10 Jul 2001
10:41:01
ton = 1.67s
toff = 0.49s
Tek Stop: Single Seq 50.0 S/s
Ch1 50.0mV
250ms
M 500ms Ch1 38mV
Ch1 50.0mV

ENGINEERING TEST DATA SHEET

Customer:	SkyLink Technologies	**MJO No:**	171 - 0800	
Test Item:	Garage Door Remote	**P/N:**		
Model:	68	**S/N:**		
Specification: FCC 47CFR Part 15		**Rev.**	**Para:**	
Conducted by:		**Date:**		**Page of**

Fundamental Frequency:	310	MHz	**Channel:**	C
Actual Voltage Measurement:	53.9	dBµV/m	**Limit:**	**75.3** dBµV/m
Bandwidth (BW) Limit:	**775**	kHz		
Measured F1:	**305**	kHz		
Measured F2:	**138**	kHz		
Actual Bandwidth (BW):	167.0	kHz		
Duration of Transmitting: (time between transmitting)	N/A *	sec	(*) Manual Operation	
Total Time-on (T_{on}) :	1.678E+00	sec		
Number of Pulses: (Average Pulse-width over 100msec or 1 Pulse-train)	11	pulses		
Total Time of 1 Pulse-Train:	1.880	sec		
Calculate of Duty Cycle: (Pulse-width sum / 1 pulse-train)	89.255	%		
Calculate Average Value: (Duty cycle x Peak Emission)	48.11	dBµV/m		

Pulse #	Pulse Width (s)
1	0.120
2	0.038
3	0.042
4	0.040
5	0.040
6	0.040
7	0.542
8	0.138
9	0.138
10	0.362
11	0.178
Total T_{on}	1.678

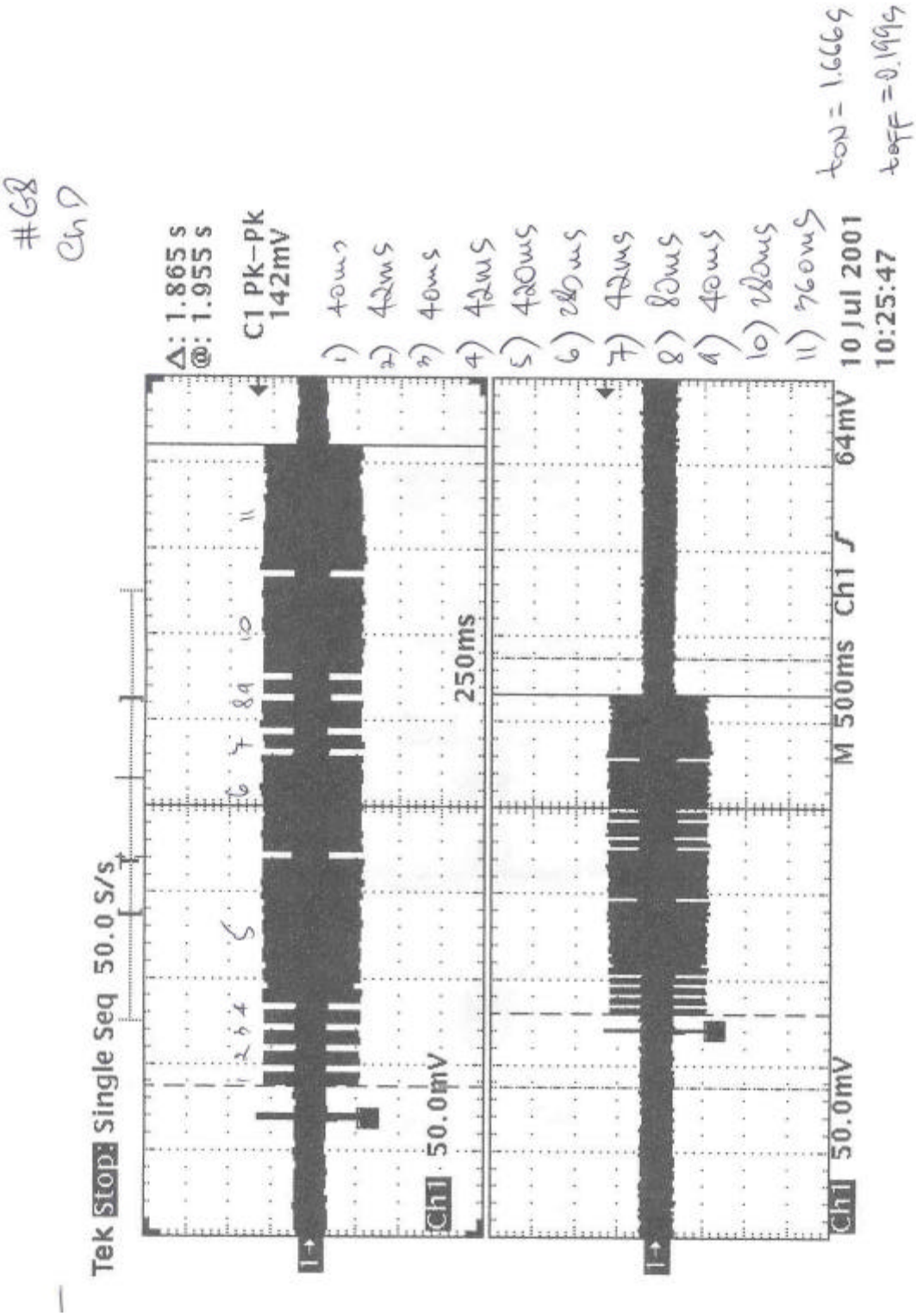

#68
ch C
Tek Stop: Single Seq 50.0 S/s
Δ: 1.880 s
@: 1.940 s
C1 Pk-Pk
218mV
1) 120ms
2) 78ms
3) 42ms
4) 40ms
5) 40ms
6) 40ms
7) 542ms
8) 198ms
9) 198ms
10) 962ms
11) 178ms
ton = 1.678
toff = 0.262
10 Jul 2001
10:19:22
Ch1 50.0mV
250ms
M 500ms Ch1 ƒ 76mV
Ch1 50.0mV

ENGINEERING TEST DATA SHEET

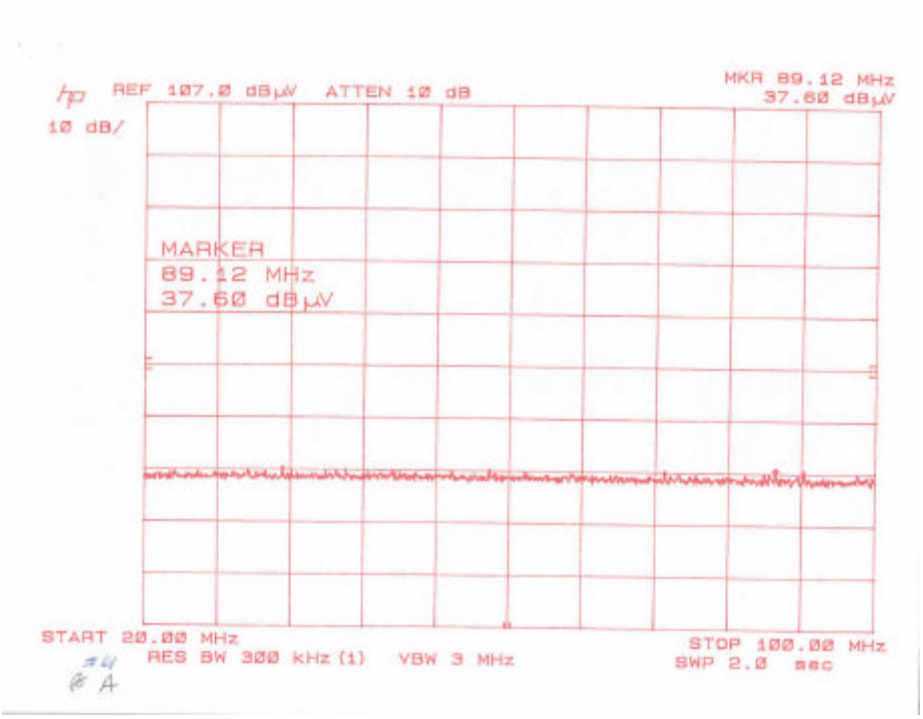
Customer:	SkyLink Technologies	**MJO No:**	171 - 0800	
Test Item:	Garage Door Remote	**P/N:**		
Model:	68	**S/N:**		
Specification: FCC 47CFR Part 15		**Rev.**	**Para:**	
Conducted by:		**Date:**		**Page of**

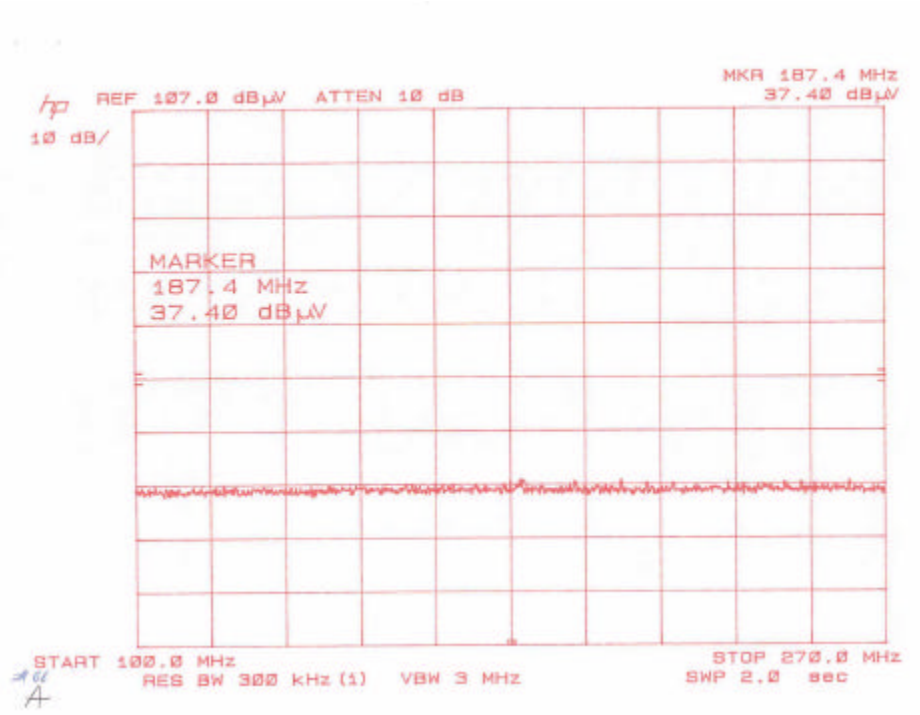
Fundamental Frequency:	300	MHz	**Channel:**	D
Actual Voltage Measurement:	58.5	dBµV/m	**Limit:**	**74.7**dBµV/m
Bandwidth (BW) Limit:	**750**	kHz		
Measured F1:	**340**	kHz		
Measured F2:	**178**	kHz		
Actual Bandwidth (BW):	162.0	kHz		
Duration of Transmitting: (time between transmitting)	N/A *	sec	(*) Manual Operation	
Total Time-on (T_{on}) :	1.666E+00	sec		
Number of Pulses:	11	pulses		
(Average Pulse-width over 100msec or 1 Pulse-train)				
Total Time of 1 Pulse-Train:	1.865	sec		
Calculate of Duty Cycle:	89.330	%		
(Pulse-width sum / 1 pulse-train)				
Calculate Average Value:	52.26	dBµV/m		
(Duty cycle x Peak Emission)				

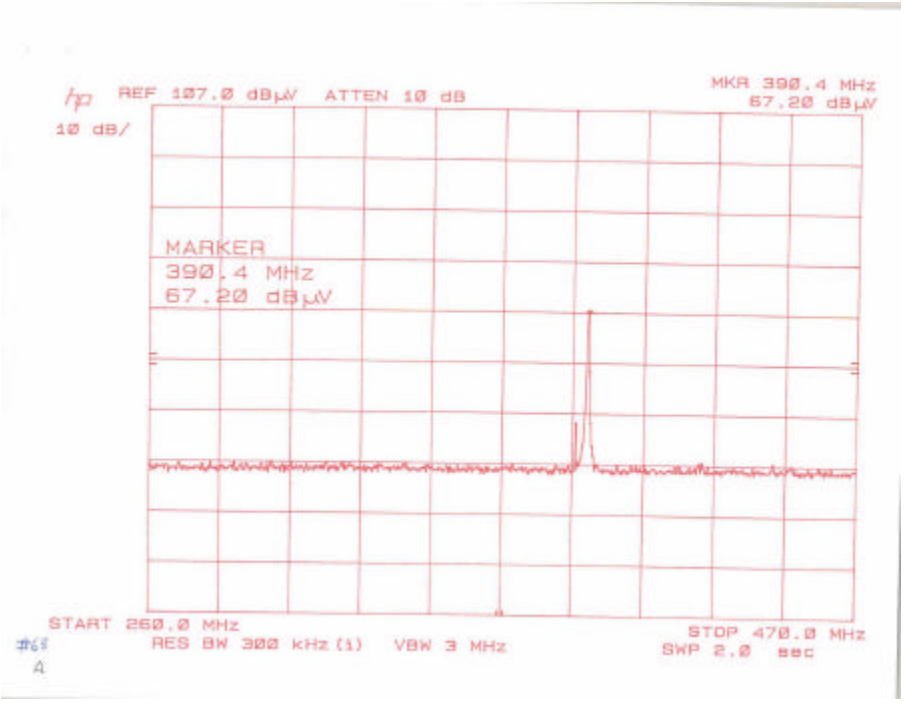
Pulse #	Pulse Width (s)
1	0.040
2	0.042
3	0.040
4	0.042
5	0.420
6	0.280
7	0.042
8	0.080
9	0.040
10	0.280
11	0.360
Total T_{on}	1.666

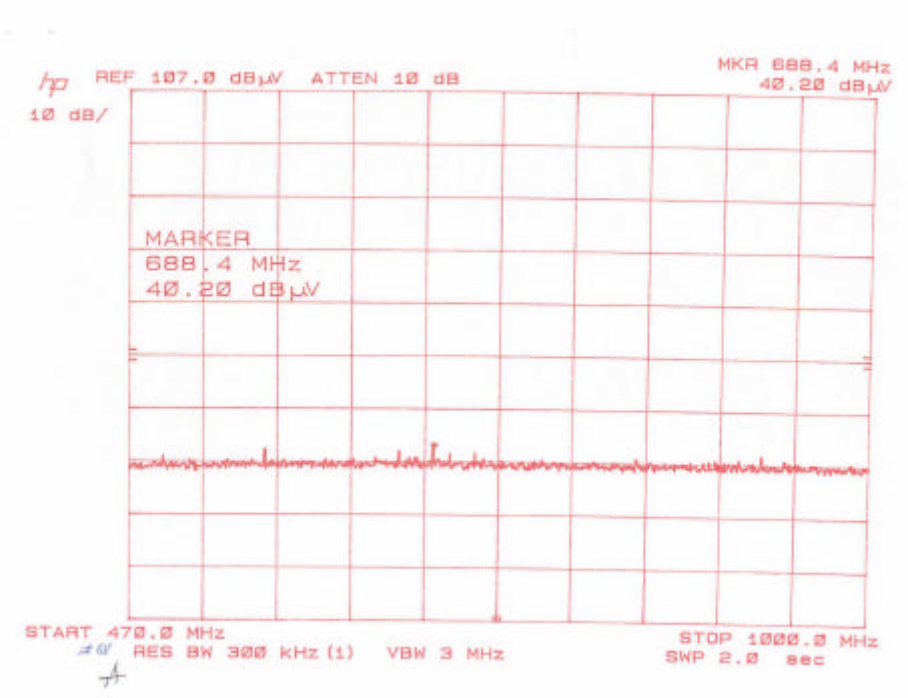

#62
Ch D
Tek Stop: Single Seq 50.0 S/s
Δ: 1.865 s
@: 1.955 s
C1 Pk-Pk
142mV
1) 40ms
2) 42ms
3) 40ms
4) 42ms
5) 420ms
6) 280ms
7) 42ms
8) 80ms
9) 40ms
10) 280ms
11) 960ms
Ton = 1.666s
toff = 0.199s
10 Jul 2001
10:25:47
Ch1 50.0mV
250ms
M 500ms Ch1 64mV
Ch1 50.0mV

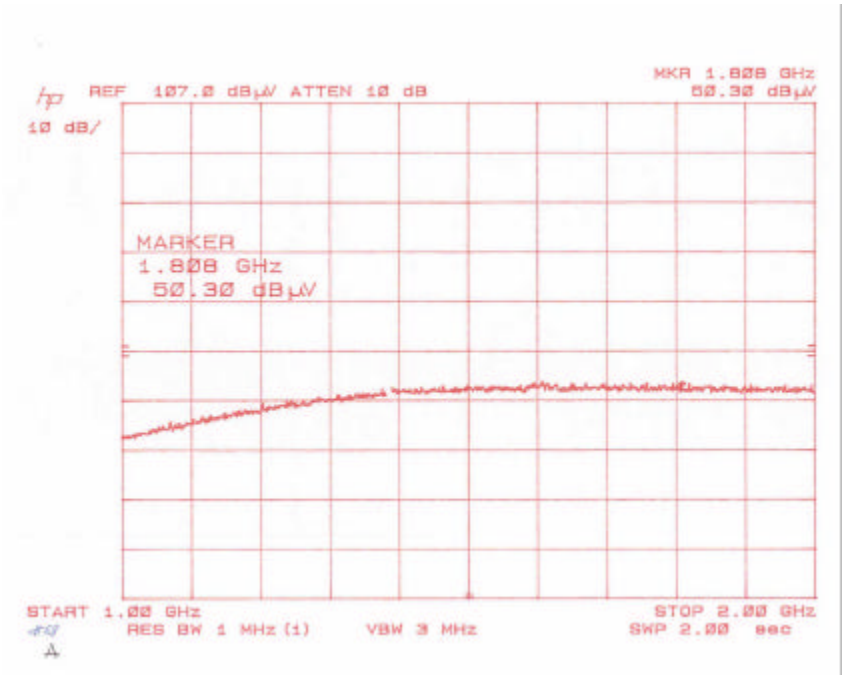
6.1.3 Model 68 Emissions Plots, Channel A

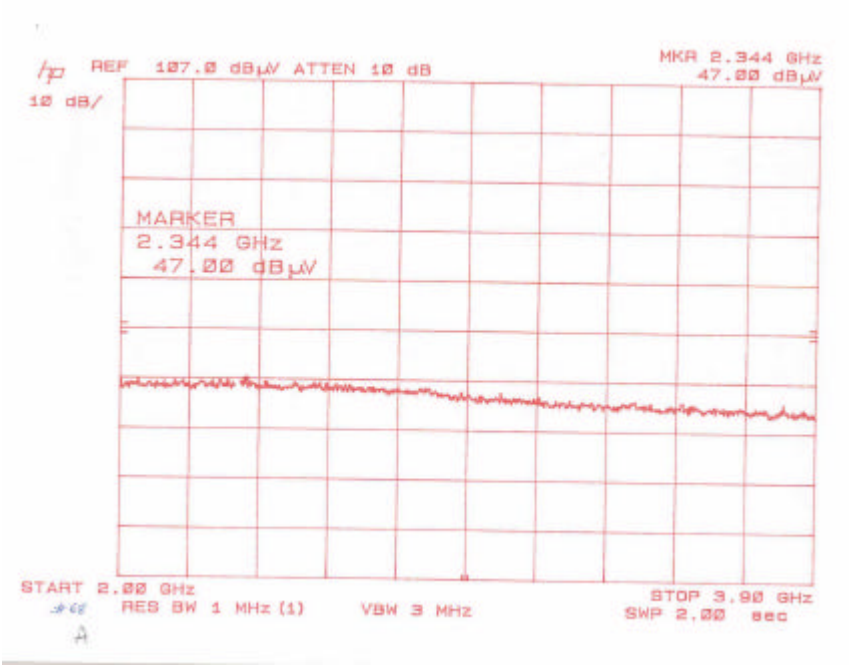


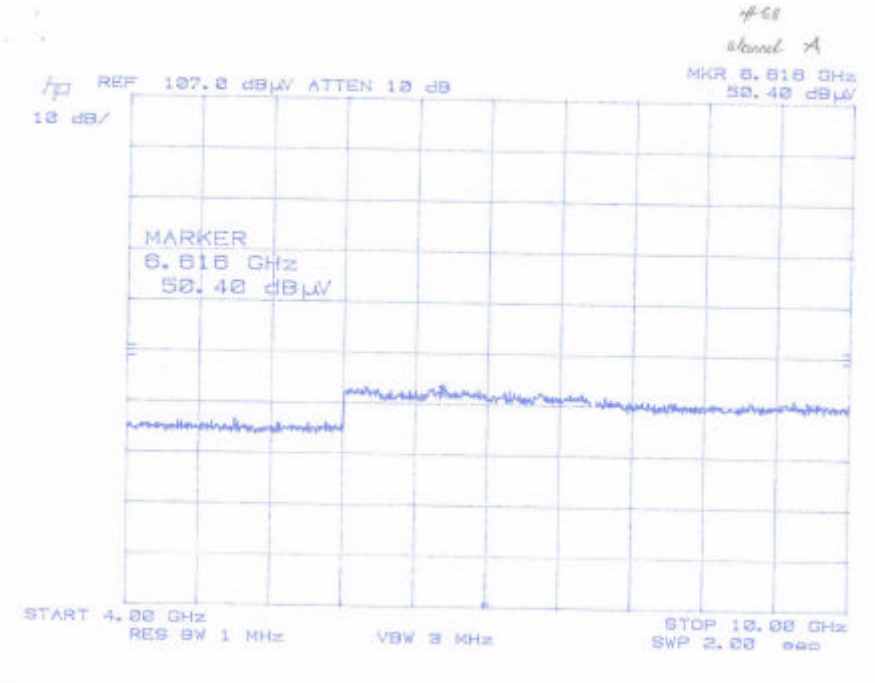



REF 107.0 dBµV
ATTEN 10 dB
10 dB/
MKR 390.4 MHz
67.20 dBµV
MARKER
390.4 MHz
67.20 dBµV
START 260.0 MHz
RES BW 300 kHz (1)
VBW 3 MHz
STOP 470.0 MHz
SWP 2.0 sec

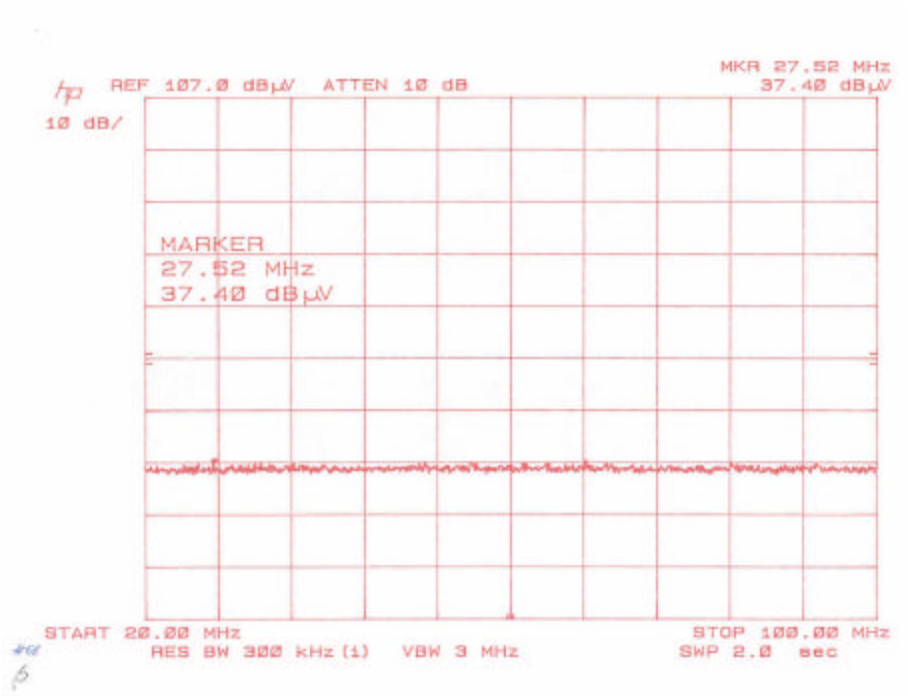

REF 107.0 dBµV
ATTEN 10 dB
10 dB/
MKR 688.4 MHz
40.20 dBµV
MARKER
688.4 MHz
40.20 dBµV
START 470.0 MHz
RES BW 300 kHz (1)
VBW 3 MHz
STOP 1000.0 MHz
SWP 2.0 sec

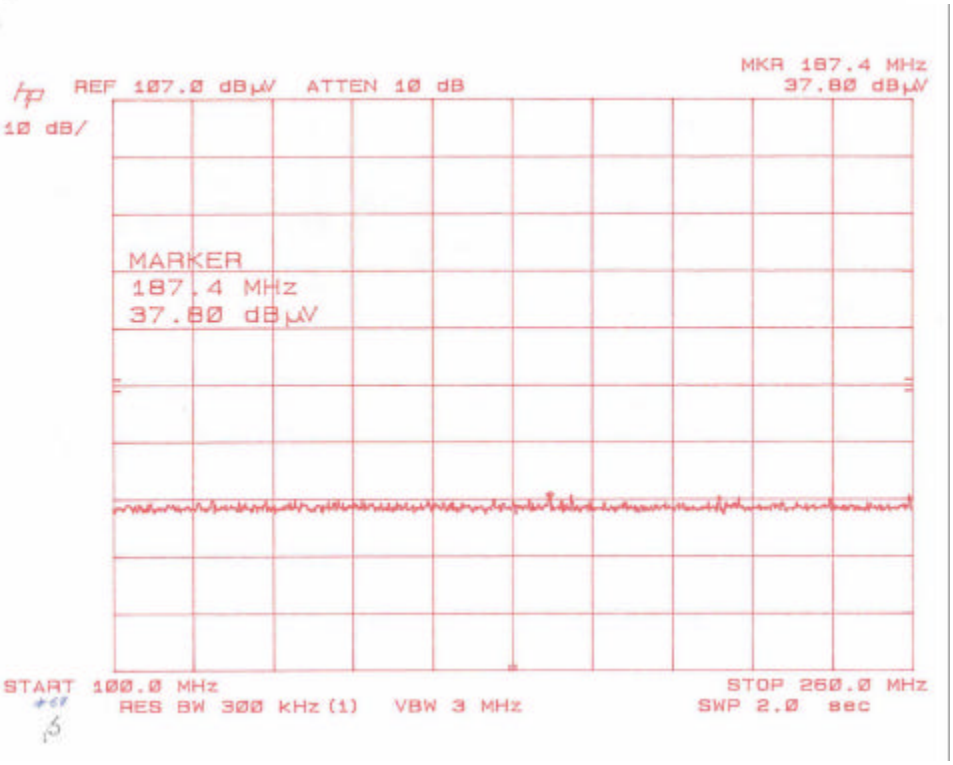

REF 107.0 dBµV ATTEN 10 dB
MKR 1.808 GHz
50.30 dBµV
10 dB/
MARKER
1.808 GHz
50.30 dBµV
START 1.00 GHz
RES BW 1 MHz (1)
VBW 3 MHz
STOP 2.00 GHz
SWP 2.00 sec

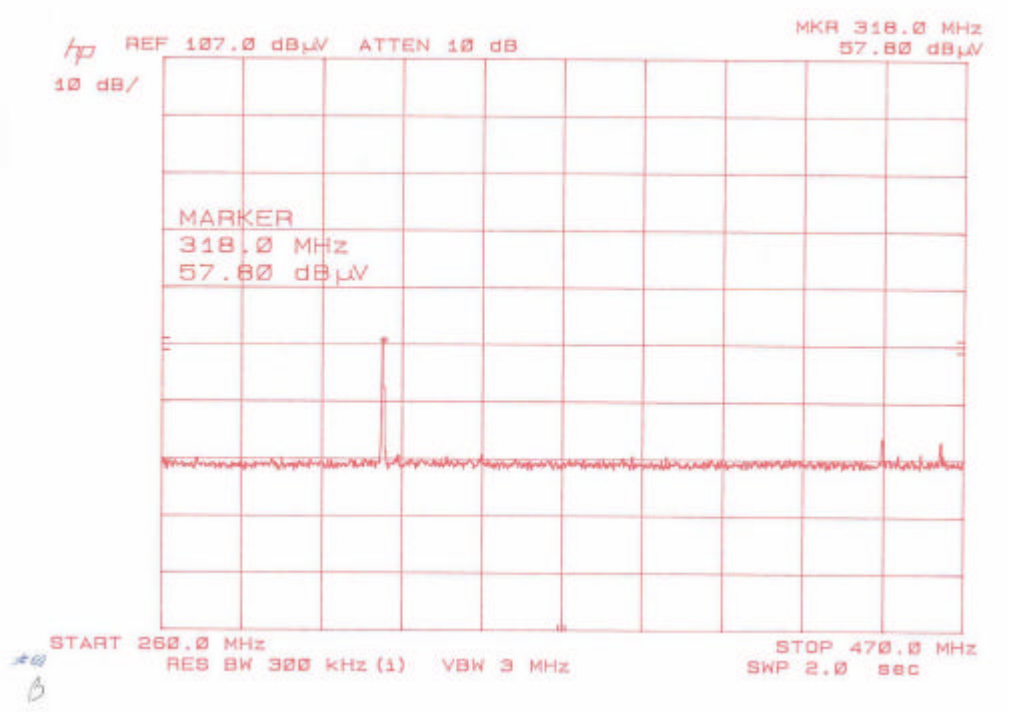

REF 107.0 dBµV ATTEN 10 dB
MKR 2.344 GHz
47.00 dBµV
10 dB/
MARKER
2.344 GHz
47.00 dBµV
START 2.00 GHz
RES BW 1 MHz (1)
VBW 3 MHz
STOP 3.90 GHz
SWP 2.00 sec

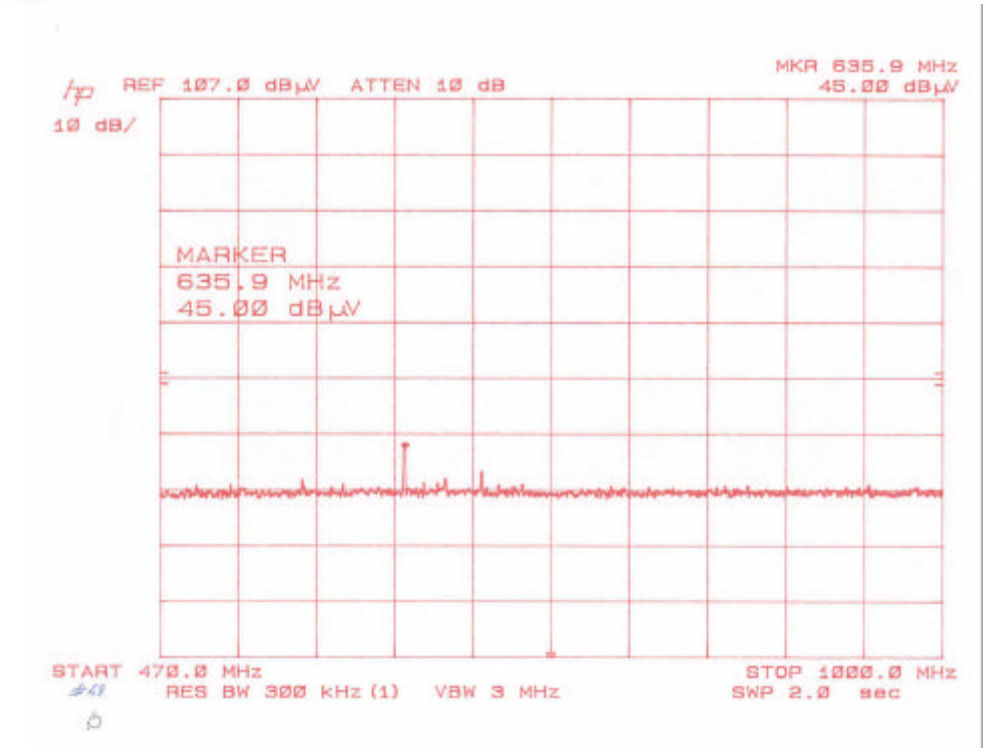

#Ch
channel A
REF 107.8 dBµV ATTEN 10 dB
MKR 6.618 GHz
50.40 dBµV
10 dB/
MARKER
6.618 GHz
50.40 dBµV
START 4.00 GHz
RES BW 1 MHz
VBW 3 MHz
STOP 10.00 GHz
SWP 2.00 sec

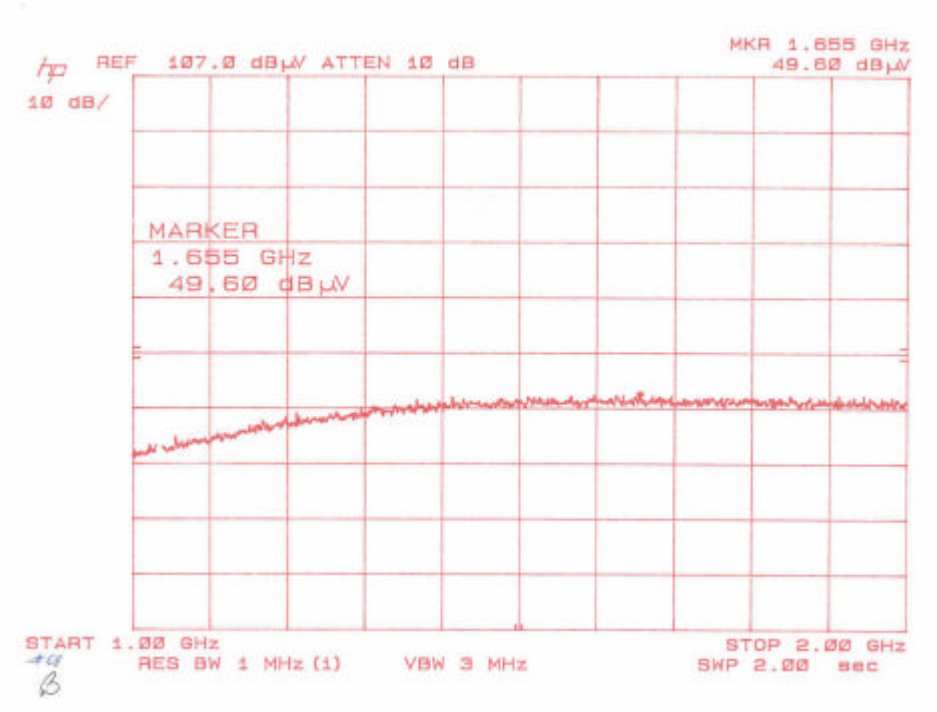
6.1.4 Model 68 Emissions Plots, Channel B

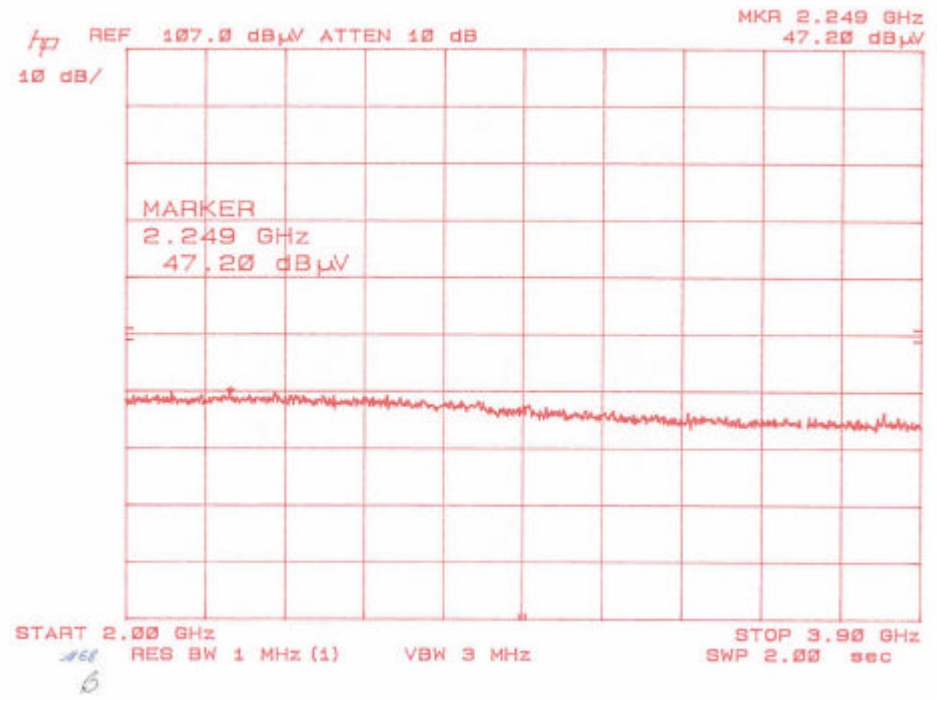


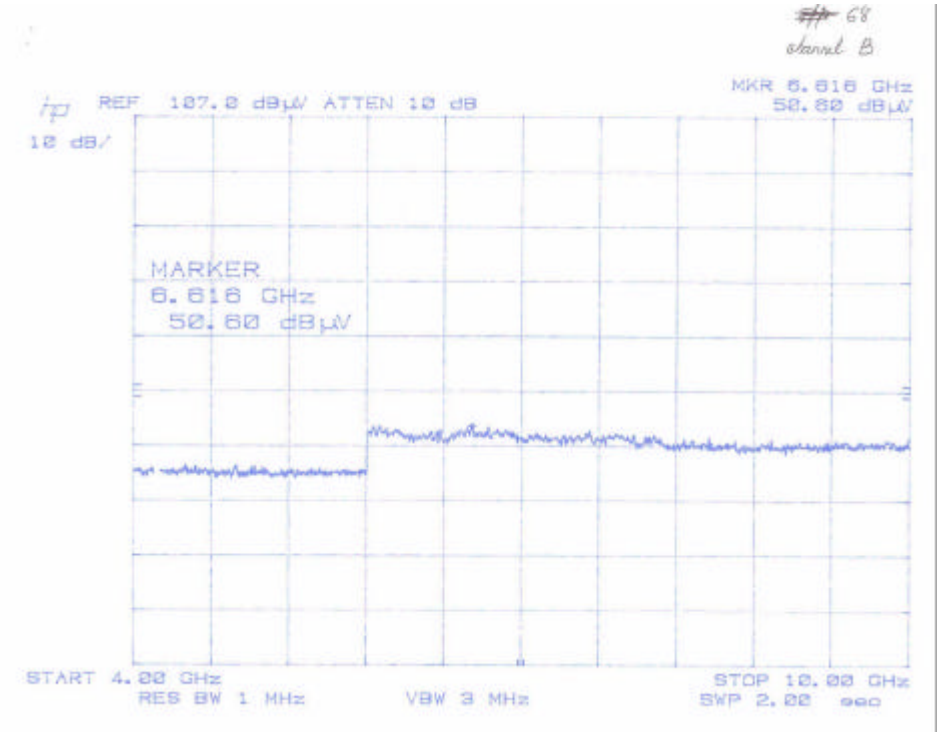



REF 107.0 dBµV
ATTEN 10 dB
MKR 318.0 MHz
57.80 dBµV
10 dB/
MARKER
318.0 MHz
57.80 dBµV
START 260.0 MHz
RES BW 300 kHz (1)
VBW 3 MHz
STOP 470.0 MHz
SWP 2.0 sec

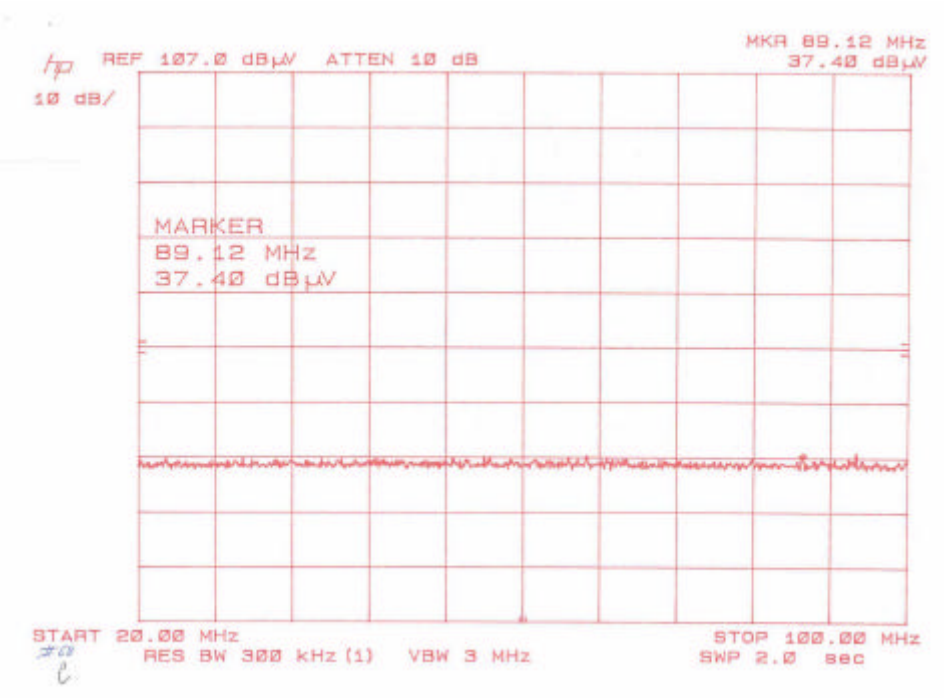

REF 107.0 dBµV
ATTEN 10 dB
MKR 635.9 MHz
45.00 dBµV
10 dB/
MARKER
635.9 MHz
45.00 dBµV
START 470.0 MHz
RES BW 300 kHz (1)
VBW 3 MHz
STOP 1000.0 MHz
SWP 2.0 sec

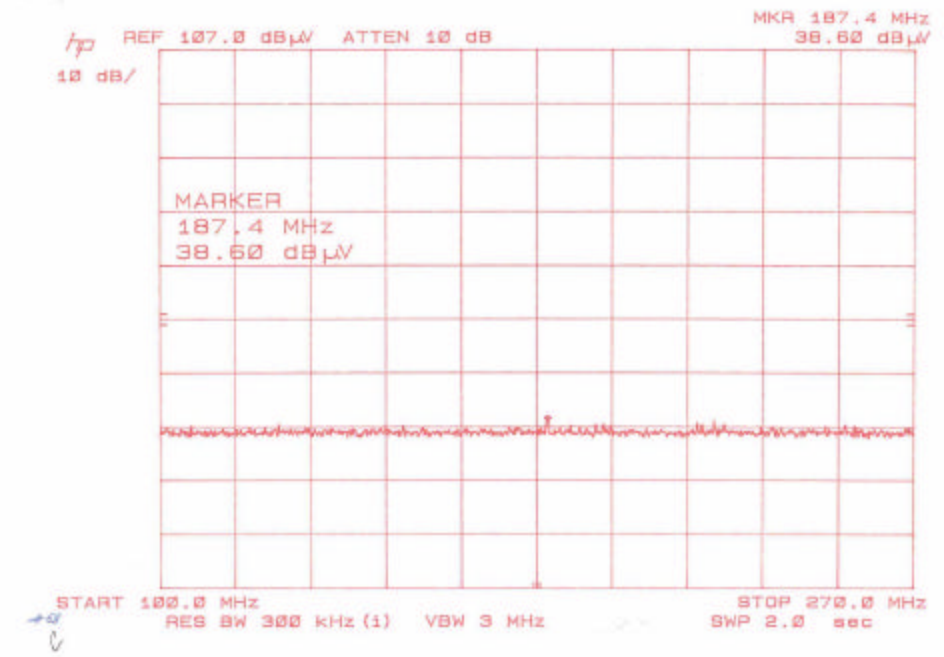

REF 107.0 dBµV ATTEN 10 dB
MKR 1.655 GHz
49.60 dBµV
10 dB/
MARKER
1.655 GHz
49.60 dBµV
START 1.00 GHz
RES BW 1 MHz (1)
VBW 3 MHz
STOP 2.00 GHz
SWP 2.00 sec

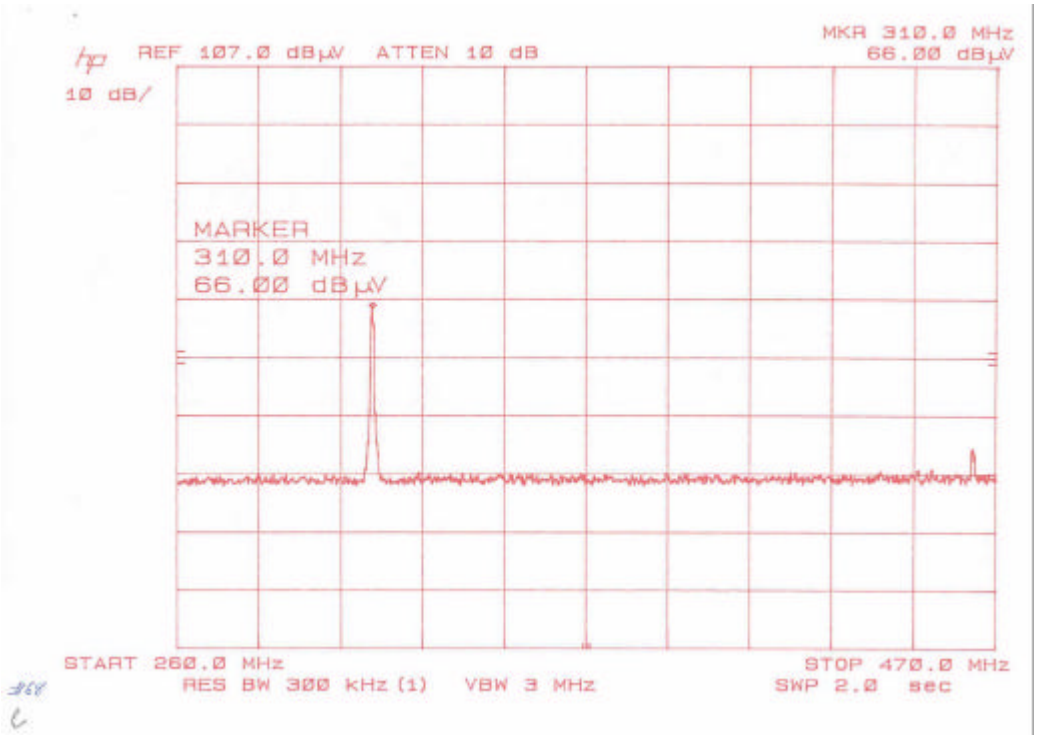

REF 107.0 dBµV ATTEN 10 dB
MKR 2.249 GHz
47.20 dBµV
10 dB/
MARKER
2.249 GHz
47.20 dBµV
START 2.00 GHz
RES BW 1 MHz (1)
VBW 3 MHz
STOP 3.90 GHz
SWP 2.00 sec

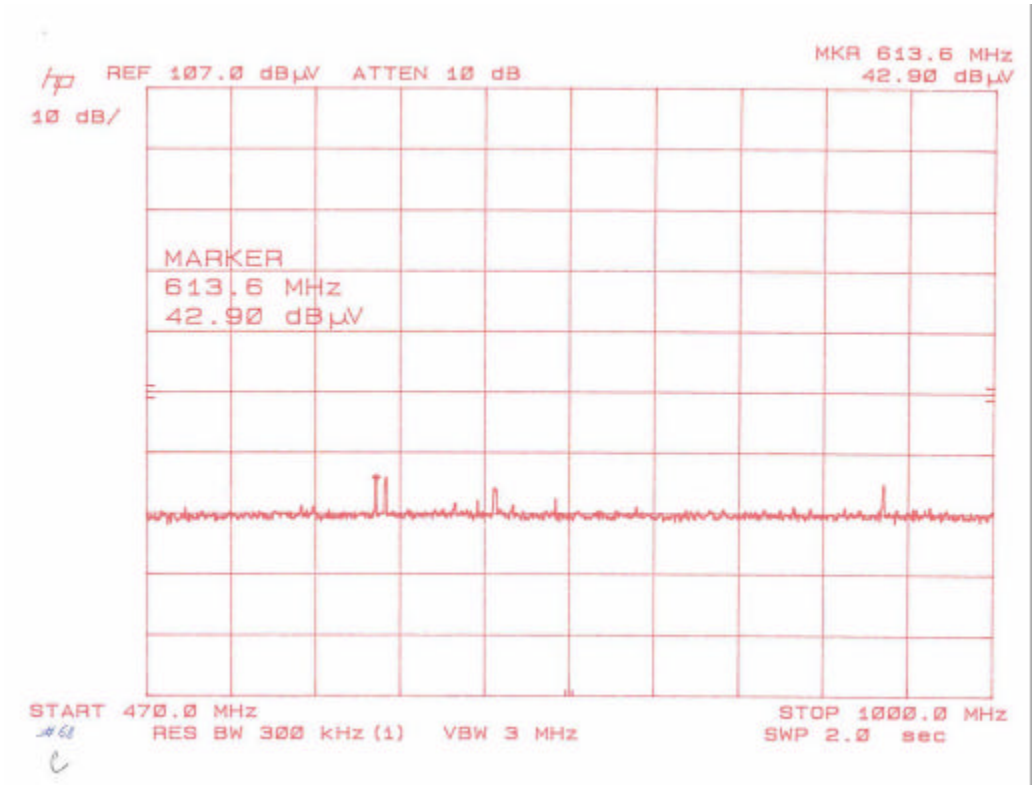

68
channel B
REF 107.0 dBµV ATTEN 10 dB
MKR 6.816 GHz
50.60 dBµV
10 dB/
MARKER
6.816 GHz
50.60 dBµV
START 4.00 GHz
RES BW 1 MHz
VBW 3 MHz
STOP 10.00 GHz
SWP 2.00

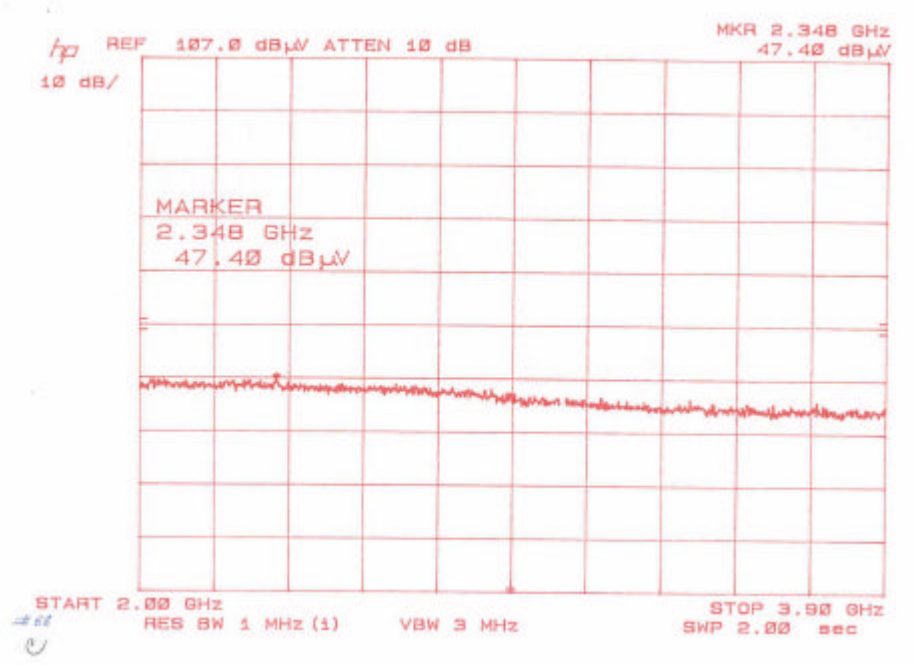
6.1.5 Model 68 Emissions Plots, Channel C

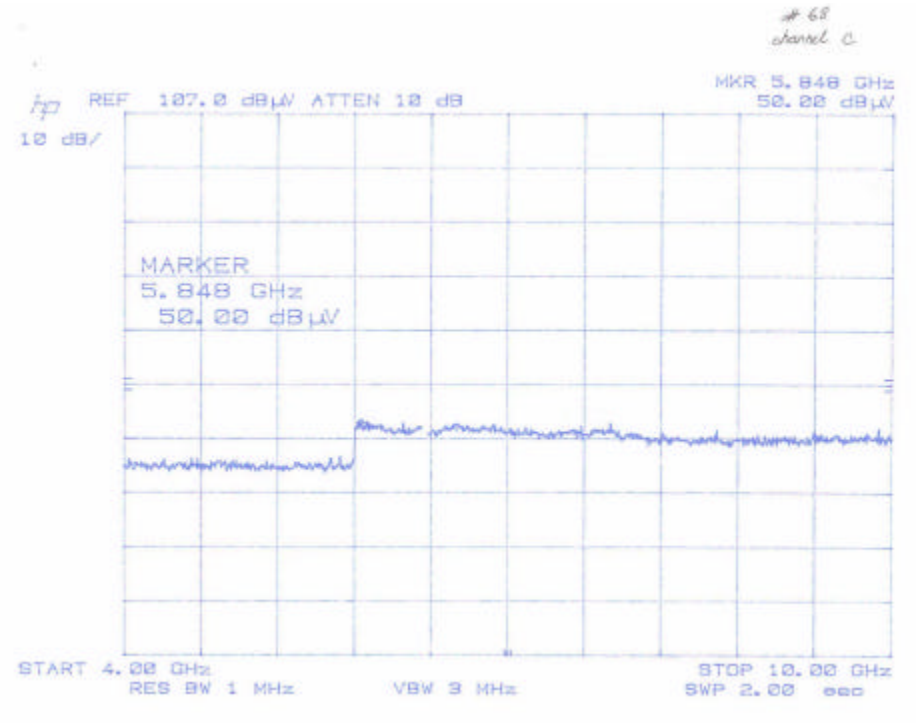




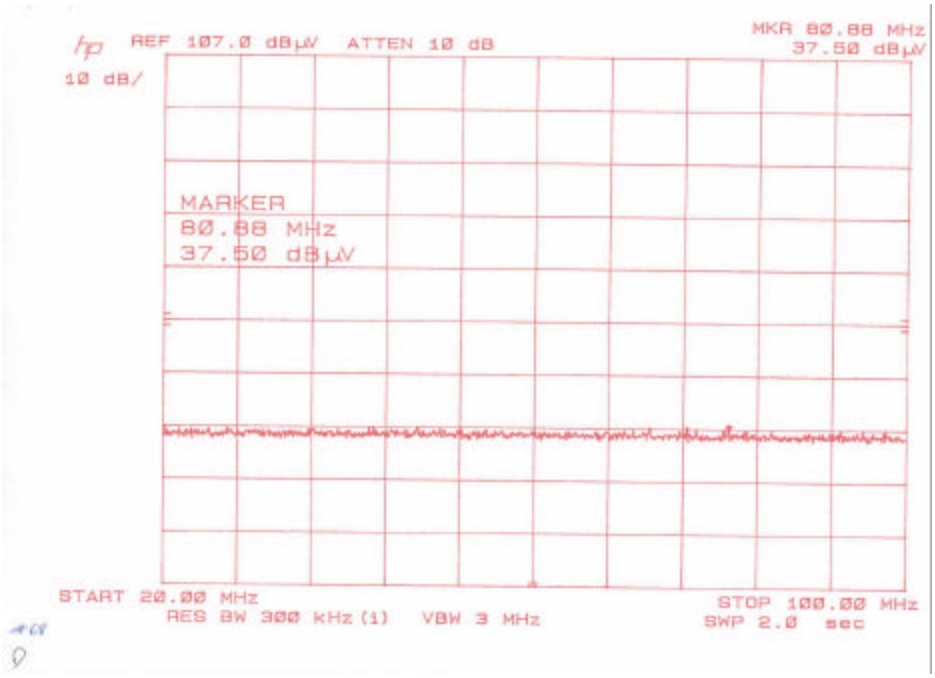

REF 107.0 dBµV
ATTEN 10 dB
MKR 310.0 MHz
66.00 dBµV
10 dB/
MARKER
310.0 MHz
66.00 dBµV
START 260.0 MHz
RES BW 300 kHz (1)
VBW 3 MHz
STOP 470.0 MHz
SWP 2.0 sec

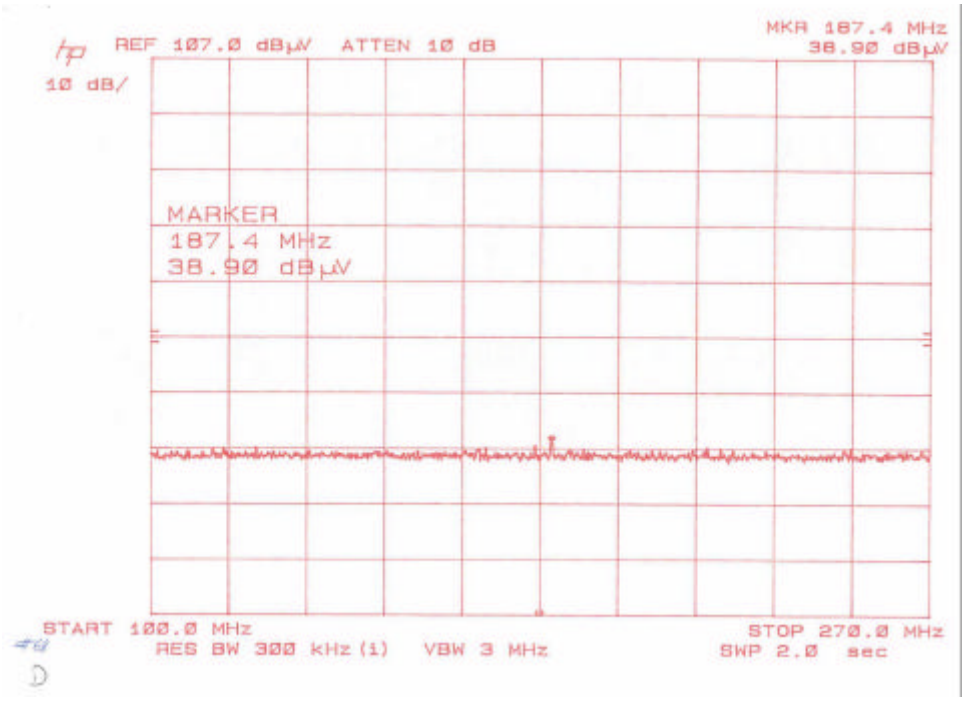

REF 107.0 dBµV
ATTEN 10 dB
MKR 613.6 MHz
42.90 dBµV
10 dB/
MARKER
613.6 MHz
42.90 dBµV
START 470.0 MHz
RES BW 300 kHz (1)
VBW 3 MHz
STOP 1000.0 MHz
SWP 2.0 sec

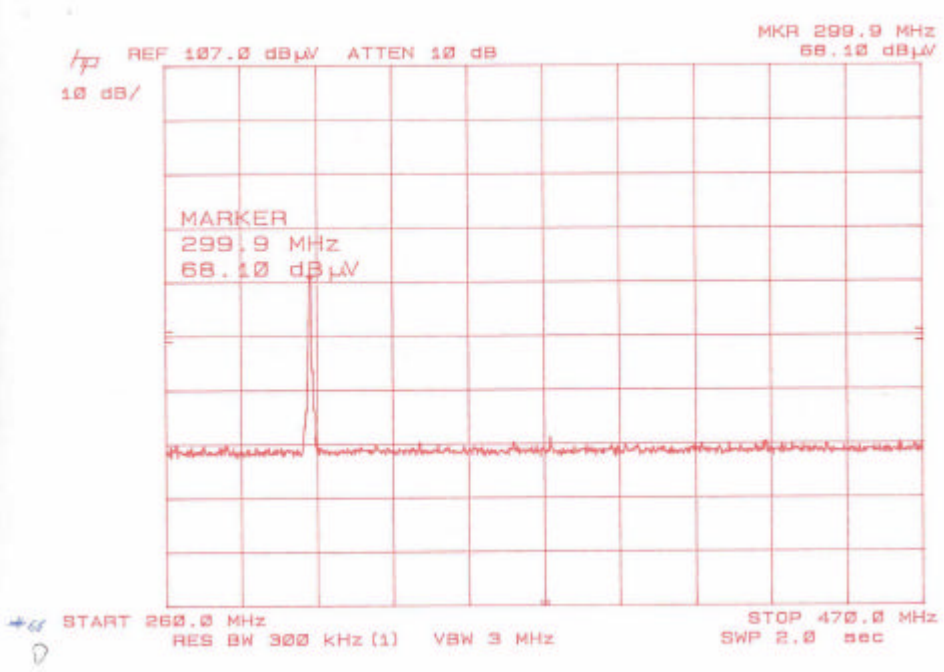

REF 107.0 dBµV ATTEN 10 dB
MKR 2.348 GHz
47.40 dBµV
10 dB/
MARKER
2.348 GHz
47.40 dBµV
START 2.00 GHz
RES BW 1 MHz (i)
VBW 3 MHz
STOP 3.90 GHz
SWP 2.00 sec

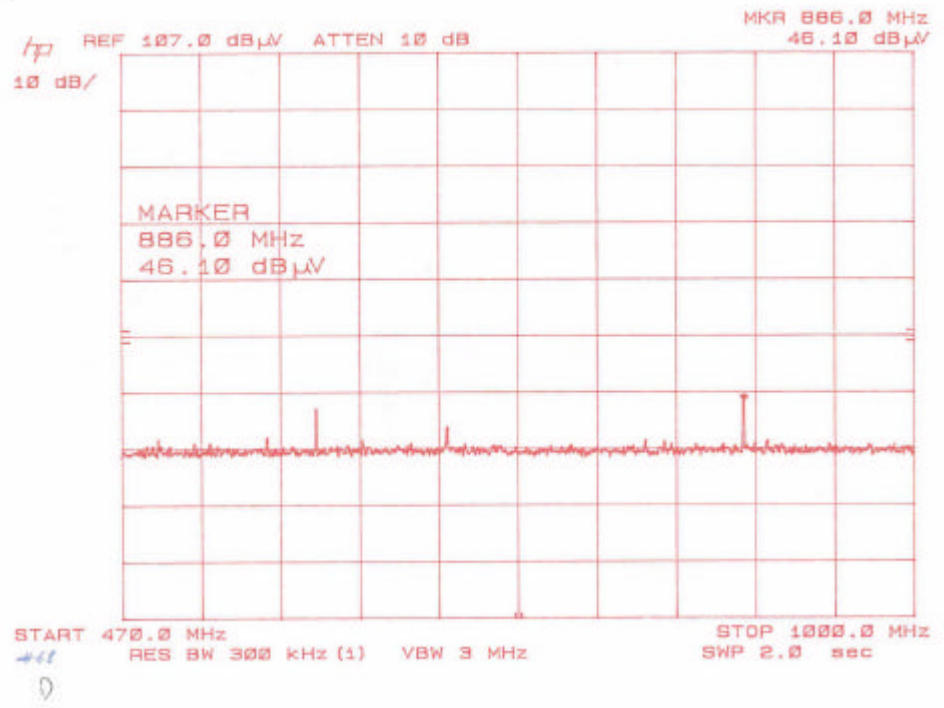

#68
channel C
REF 107.0 dBµV ATTEN 10 dB
MKR 5.848 GHz
50.00 dBµV
10 dB/
MARKER
5.848 GHz
50.00 dBµV
START 4.00 GHz
RES BW 1 MHz
VBW 3 MHz
STOP 10.00 GHz
SWP 2.00 sec

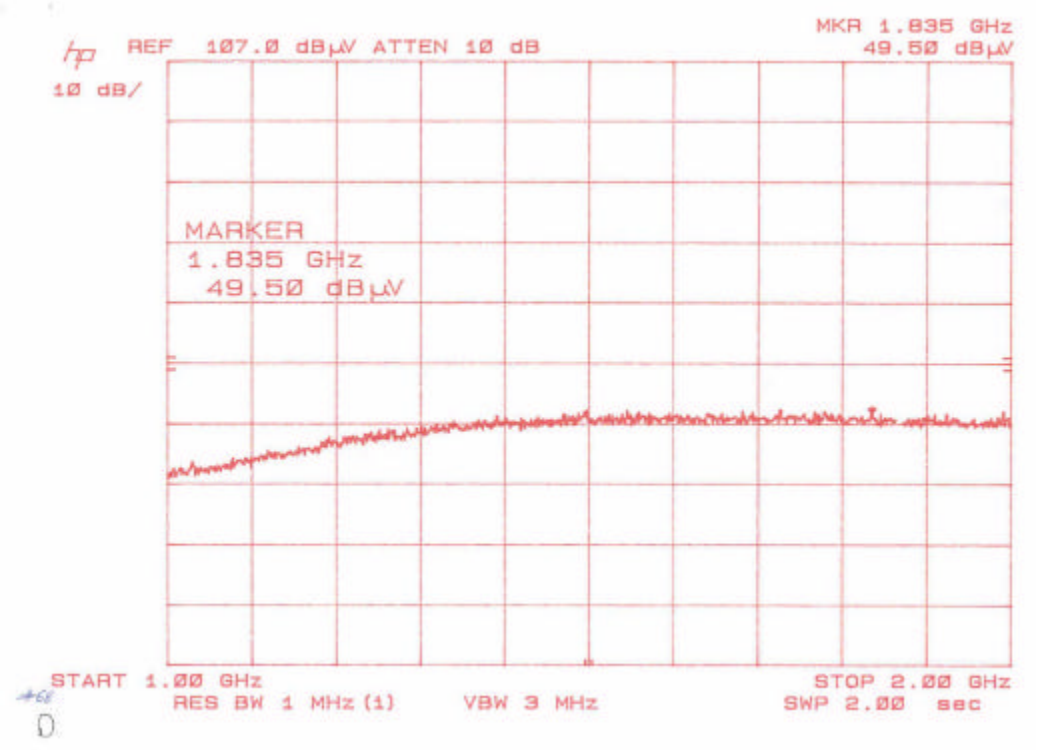
6.1.6 Model 68 Emissions Plots, Channel D

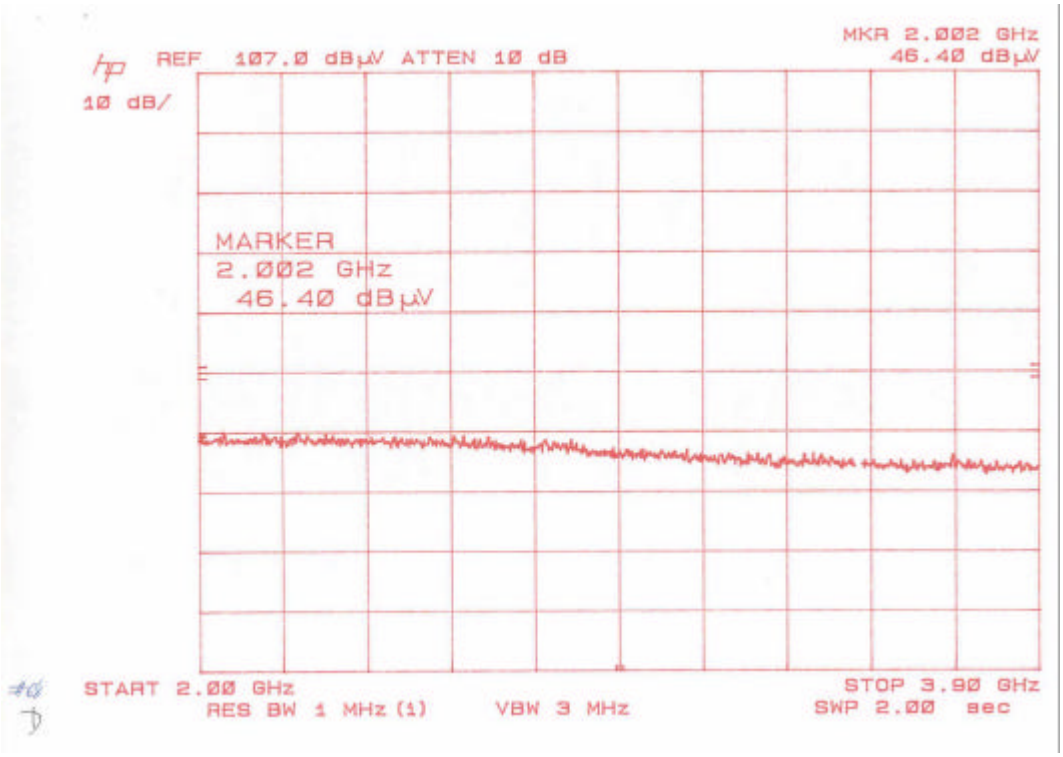


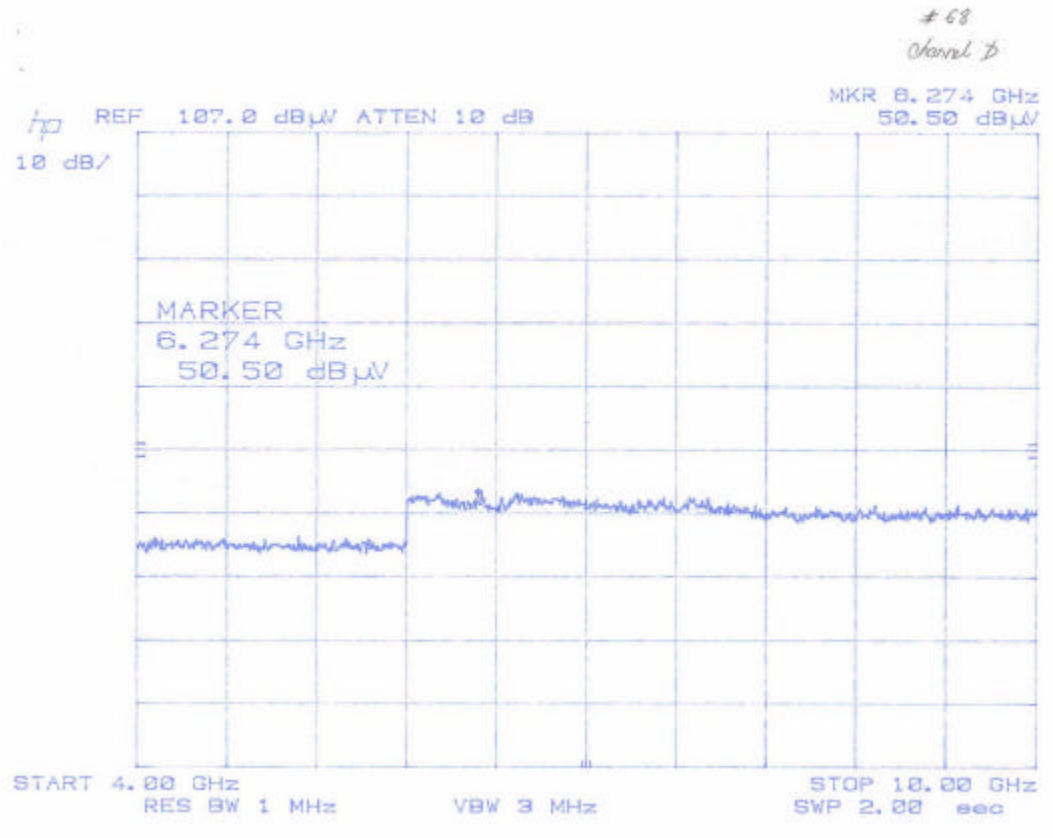



MKR 299.9 MHz
68.10 dBµV
REF 107.0 dBµV ATTEN 10 dB
10 dB/
MARKER
299.9 MHz
68.10 dBµV
START 260.0 MHz
RES BW 300 kHz (1) VBW 3 MHz
STOP 470.0 MHz
SWP 2.0 sec


MKR 886.0 MHz
46.10 dBµV
REF 107.0 dBµV ATTEN 10 dB
10 dB/
MARKER
886.0 MHz
46.10 dBµV
START 470.0 MHz
RES BW 300 kHz (1) VBW 3 MHz
STOP 1000.0 MHz
SWP 2.0 sec


REF 107.0 dBµV ATTEN 10 dB
MKR 1.835 GHz
49.50 dBµV
10 dB/
MARKER
1.835 GHz
49.50 dBµV
START 1.00 GHz
RES BW 1 MHz (1)
VBW 3 MHz
STOP 2.00 GHz
SWP 2.00 sec


REF 107.0 dBµV ATTEN 10 dB
MKR 2.002 GHz
46.40 dBµV
10 dB/
MARKER
2.002 GHz
46.40 dBµV
START 2.00 GHz
RES BW 1 MHz (1)
VBW 3 MHz
STOP 3.90 GHz
SWP 2.00 sec


#68
Channel D
REF 107.0 dBµV ATTEN 10 dB
MKR 6.274 GHz
50.50 dBµV
10 dB/
MARKER
6.274 GHz
50.50 dBµV
START 4.00 GHz
RES BW 1 MHz
VBW 3 MHz
STOP 10.00 GHz
SWP 2.00 sec