

**ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT  
CERTIFICATION TO FCC PART 15 REQUIREMENTS**

*for*

**SMART FILTER TRANSMITTER**

**MODEL NO: SMART FILTER**

**FCC ID NO: KFR-HSFT**

**REPORT NO: 00E9116**

**ISSUE DATE: DECEMBER 22, 2000**

*Prepared for*

**VISION AUTOMOBILE ELECTRONICS INDUSTRIAL CO., LTD.  
NO. 17, ALLEY 92, LANE 189, SEC. 1,  
AN CHUNG RD., TAINAN,  
TAIWAN, R.O.C.**

*Prepared by*

**COMPLIANCE ENGINEERING SERVICES, INC.  
No. 199, CHUNG SHENG ROAD  
HSIN TIEN CITY, TAIPEI, TAIWAN R.O.C.  
TEL: (02) 2217-0894  
FAX: (02) 2217-1254**



**FCC, VCCI, CISPR, CE  
UL, CSA, TÜV, VDE**

**U.S.A. : P.O.BOX 612650, SAN JOSE, CA 95161-2650**

**TAIPEI : P.O.BOX 17-82, HSIN TIEN, TAIWAN, R.O.C.**

TABLE OF CONTENTS	PAGE
1. VERIFICATION OF COMPLIANCE.....	1
2. Product Description.....	2
3. Test Facility.....	2
4. Measurement Standards .....	2
5. Test Methodology .....	2
6. Measurement Equipment Used .....	2
7. POWERLINE RFI LIMIT .....	3
8. RADIATED EMISSION LIMITS .....	3
9. SYSTEM TEST CONFIGURATION.....	4
10. Test Procedure.....	5
11. Equipment Modifications.....	6
12. TEST RESULT .....	7
12.1 Maximum Modulation Percentage (M%) .....	7
12.2 The Emissions Bandwidth.....	7

#### TEST DATA

- Maximum Modulation Percentage Plot
- Emission Bandwidth Plot
- Radiated Emission Worksheet for Peak Measurement
- Radiated Emission Worksheet for Average Measurement

**1. VERIFICATION OF COMPLIANCE**

COMPANY NAME: VISION AUTOMOBILE ELECTRONICS  
INDUSTRIAL CO., LTD.  
NO. 17, ALLEY 92, LANE 189, SEC. 1,  
AN CHUNG RD., TAINAN,  
TAIWAN, R.O.C.

CONTACT PERSON: WANG TSUNG CHIN / ENGINEER

TELEPHONE NO.: 06-255-1269

EUT DESCRIPTION: 434 MHz SMART FILTER TRANSMITTER

MODEL NAME/NUMBER: SMART FILTER

FCC ID: KFR-HSFT

DATE TESTED: DECEMBER 20 & 21, 2000

REPORT NUMBER: 00E9116

TYPE OF EQUIPMENT	SECURITY EQUIPMENT (INTENTIONAL RADIATOR)
EQUIPMENT TYPE	434 MHz SMART FILTER TRANSMITTER
MEASUREMENT PROCEDURE	ANSI C63.4 / 1992
LIMIT TYPE	CERTIFICATION
FCC RULE	CFR 47, PART 15

The above equipment was tested by Compliance Certification Services for compliance with the requirements set forth in the FCC CFR 47, PART 15. The results of testing in this report apply to the product/system which was tested only. Other similar equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties. **Warning :** This document reports conditions under which testing was conducted and results of tests performed. This document may not be altered or revised in any way unless done so by Compliance Certification Services and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by Compliance Certification will constitute fraud and shall nullify the document.

*Rick Yeo*

RICK YEO / EMC MANAGER  
COMPLIANCE ENGINEERING SERVICES, INC.

PAGE NO: 1

COMPLIANCE ENGINEERING SERVICES, INC.

NO.199, CHUNG SHENG ROAD, HSIN TIEN, TAIPEI, TAIWAN R.O.C.

DOCUMENT NO:CCSTP4006

TEL:(02)2217-0894/FAX:2217-1254

*This report shall not be reproduced except in full, without the written approval of CES. This document may be altered or revised by Compliance Engineering Services Inc. personnel only, and shall be noted in the revision section of the document..*

## 2. Product Description

Fundamental Frequency	<b>434 MHz</b>
Power Source	<b>3V Battery</b>
Transmitting Time	<b>Periodic <math>\leq 5</math> seconds</b>
Associated Receiver	<b>FCC ID: KFR-HSFR</b>

## 3. Test Facility

The open area test sites and conducted measurement facilities used to collect the radiated data are located at No. 199, Chung Sheng Road, Hsin Tien City, Taipei, Taiwan R.O.C. The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4 and CISPR Publication 22.

## 4. Measurement Standards

The site is constructed and calibrated in conformance with the requirements of ANSI C63.4/1992.

## 5. Test Methodology

For an intentional radiator, the spectrum shall be investigated from the lowest radio frequency signal generated in the device, without going below 9 KHz, up to at least the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower. (CFR 47 Section 15.33)

## 6. Measurement Equipment Used

Manufacturer	Model Number	Description	Cal Due Date
HP	8595EM	Spectrum Analyzer	01/01
R & S	ESBI-RF/1005.4300.52	EMI Test Receiver (20Hz-5GHz)	11/01
EMCO	3115	Antenna (1-18GHz)	09/01
EMCO	3142	Antenna (30-2000MHz)	06/01
T.E.C.	PA-102	Amplifier(30-2000MHz)	05/01
MITEQ	NSP2600-44	Amplifier(1-26GHz)	12/00

**7. POWERLINE RFI LIMIT**

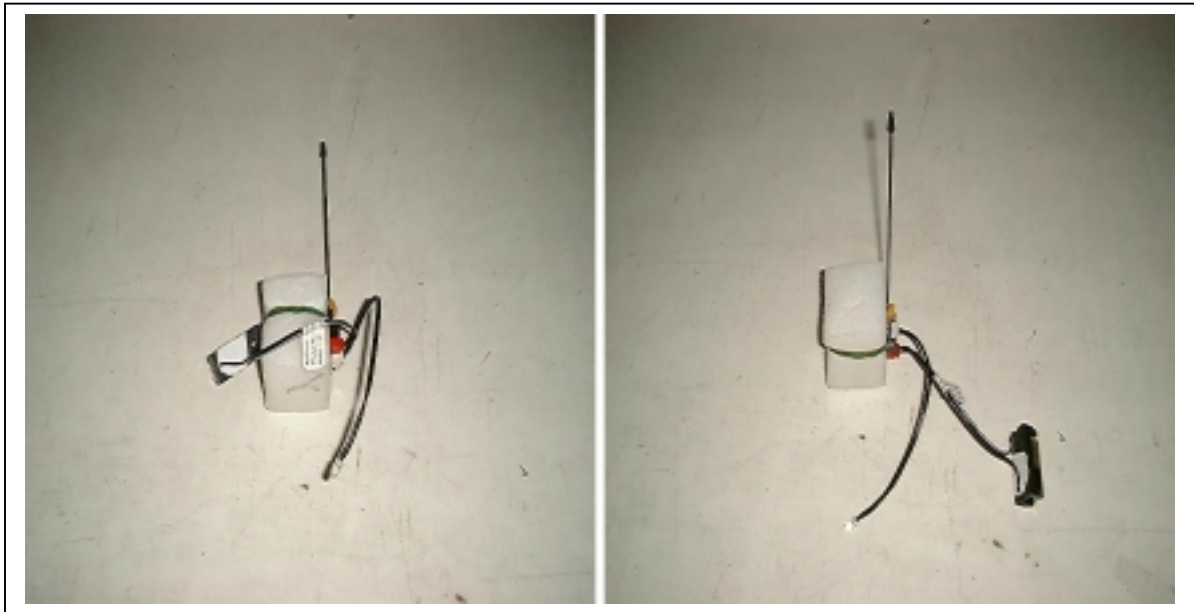
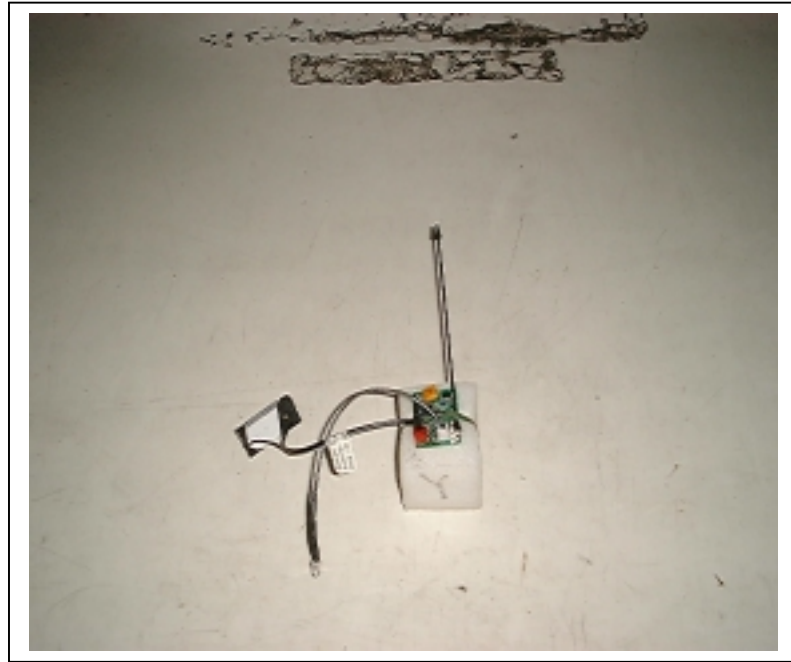
CONNECTED TO AC POWER LINE	SECTION 15.207
CARRIER CURRENT SYSTEM IN THE FREQUENCY RANGE OF 450 kHz TO 30 MHz	SECTION 15.205 AND SECTION 15.209, 15.221, 15.223, 15.225 OR 15.227, AS APPROPRIATE.
BATTERY POWER	NO REQUIRED.

**8. RADIATED EMISSION LIMITS**

GENERAL REQUIREMENTS	SECTION 15.209
RESTRICTED BANDS OF OPERATION	SECTION 15.205
PERIODIC OPERATION IN THE BAND 40.66 -40.70 MHz AND ABOVE 70 MHz.	SECTION 15.231

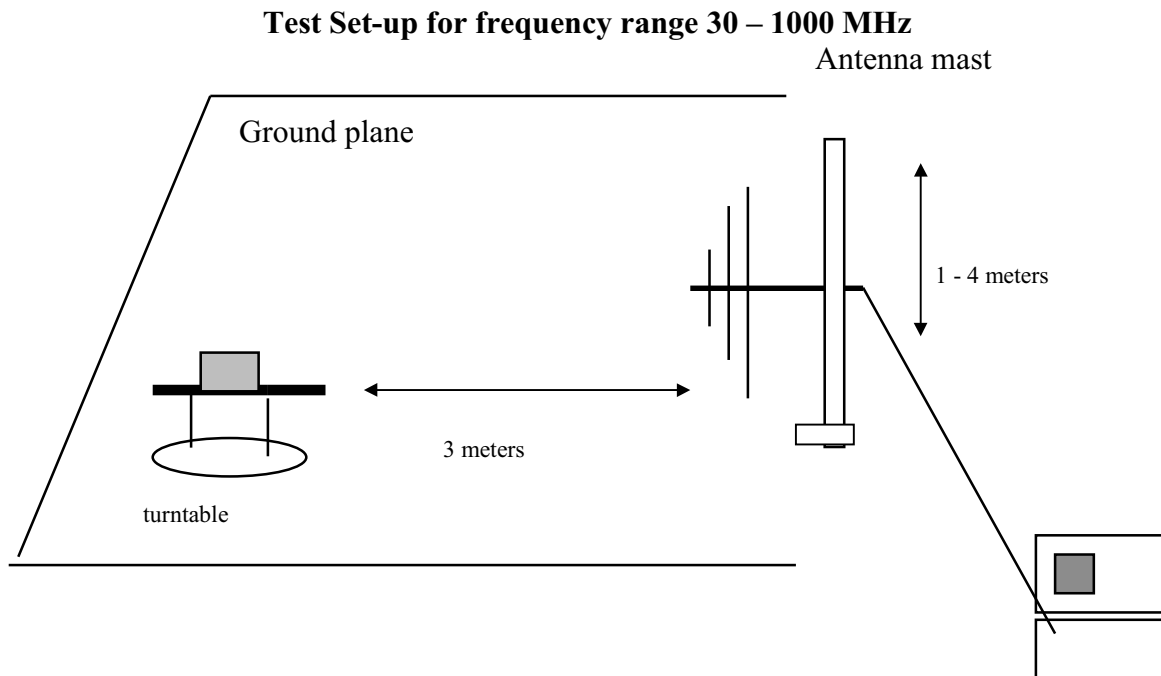
## 9. SYSTEM TEST CONFIGURATION

Use a block of foam and combined it with EUT wrapping rubber band around it. This way it can test X.Y, and Z axis. To activate continuous transmission, place a small plastic block between rubber band and EUT push button.



## 10. Test Procedure

### Radiated Emissions, 15.231(4)(b)



preamplifier/spectrum analyzer

**Fig. 1**

1. The EUT was placed on a wooden table on the outdoor ground plane. The search antenna was placed 3-meters from the EUT.
2. The turntable was slowly rotated to locate the direction of maximum emission at each emission falling in the restricted bands of 15.205. The EUT was moved throughout the XY, XZ, and YZ planes to maximize emissions received by the search antenna.
3. Once maximum direction was determined, the search antenna was raised and lowered in both vertical and horizontal polarizations. The maximum readings so obtained are recorded in the data listed below.

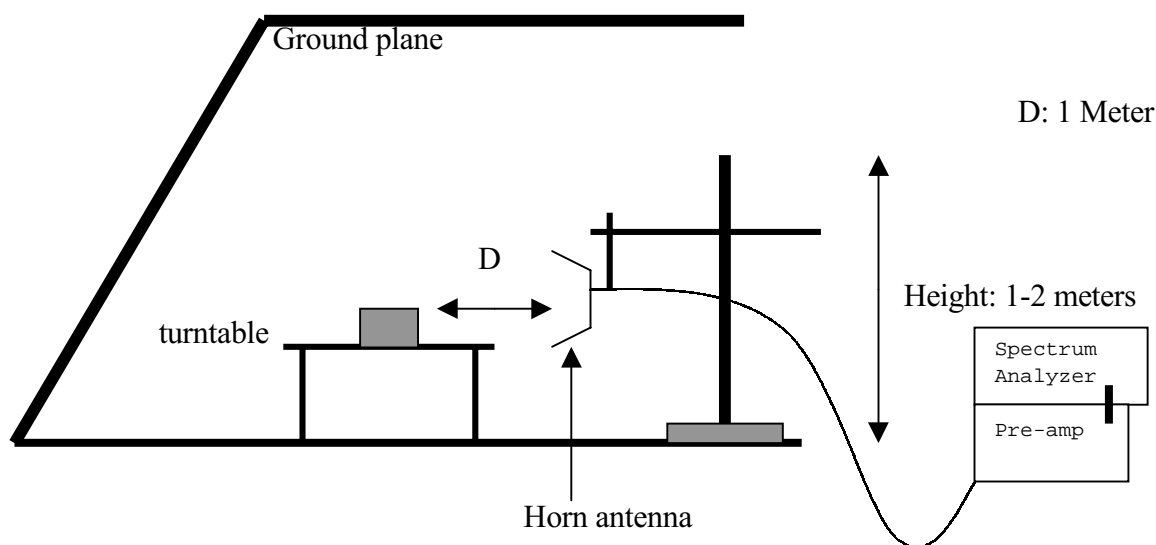
**Test set-up for measurements above 1GHz**

FIG. 2

1. The EUT was placed on a wooden table on the outdoor ground plane. The search antenna was placed 1-meters from the EUT. The EUT antenna was mounted vertically as per normal installation.
2. The turntable was slowly rotated to locate the direction of maximum emission at each emission falling in the restricted bands of 15.205. The EUT was moved throughout the XY, XZ, and YZ planes to maximize emissions received by the search antenna.
3. Once maximum direction was determined, the search antenna was raised and lowered in both vertical and horizontal polarizations. The maximum readings so obtained are recorded in the data listed below.

**11. Equipment Modifications**

To achieve compliance to FCC Section 15.231 technical limits, the following change(s) were made during compliance testing:

Mod. #1 Change Resistance R10 to  $0\Omega$ .

Mod. #2 Change Resistance R6 to  $100k\Omega$ .



**12. TEST RESULT**

Powerline RFI Class B	Eut	Radiated Emission Limits	Eut
SECTION 15.207		SECTION 15.209	X
SECTION 15.205, 15.209, 15.221, 15.223, x 15.225 OR 15.227		SECTION 15.205	
BATTERY POWER	X	SECTION 15.231 (b)	X
		SECTION 15.231 (e)	

**12.1 Maximum Modulation Percentage (M%)**

CALCULATION:

Average Reading = Peak Reading (dBuV/m)+ 20log (Duty Cycle)

In order to determine possible Maximum Modulation percentage, alternations are made to the EUT. We measured:

WHERE      1 Period                      =3.084 S. >100 mS. use 100 mS for calculation  
                  Pulse                        =0.750 mS  
                  No of pulse                    =60

Duty Cycle = ( N1L1+N2L2+...+Nn-1Ln-1+NnLn)/100 or T

Duty Cycle = (60X0.750)/100=0.45=45.00% or -6.94dB

**12.2 The Emissions Bandwidth**

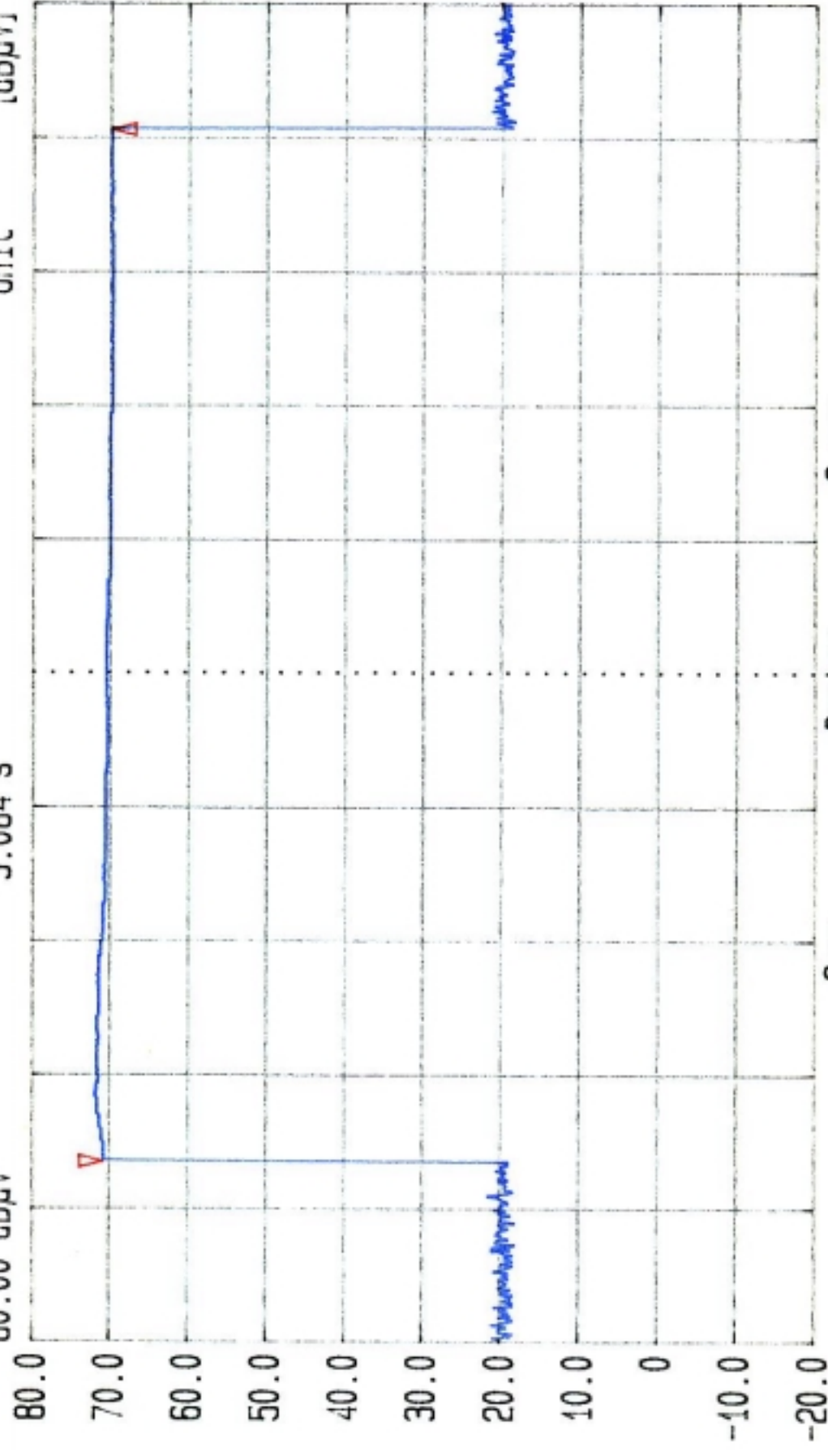
The bandwidth of the emissions were investigated per 15.231(c)

Center Frequency	Measured	Limits
<b>434 MHz</b>	<b>515.5 kHz &lt; (refer to plot)</b>	<b>434X0.25%=1085 kHz</b>



Date 21.Dec.'00 Time 09:13:15  
Ref.Lvl Delta  
80.00 dBuV -0.76 dB  
3.084 s

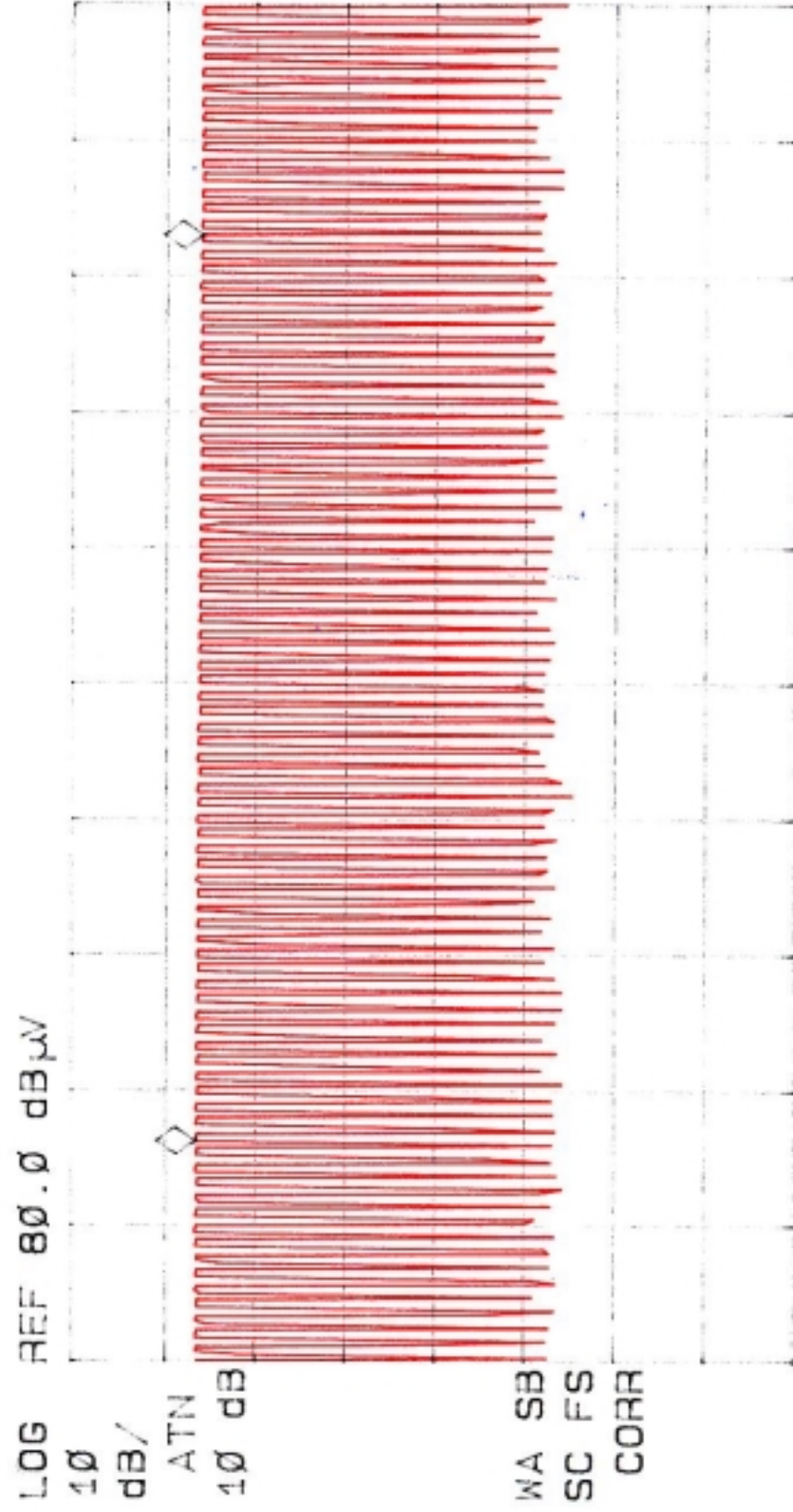
TRG  
Res.Bw 120 kHz [imp] 300 kHz  
TG.Lvl off  
CF.Stp 2.000 MHz  
Vid.Bw  
RF.Att 10 dB  
Unit [dBuV]



Span 0 Hz  
Center 433.913055 MHz  
Sweep 4.0 s

14:54:38 DEC 20, 2000

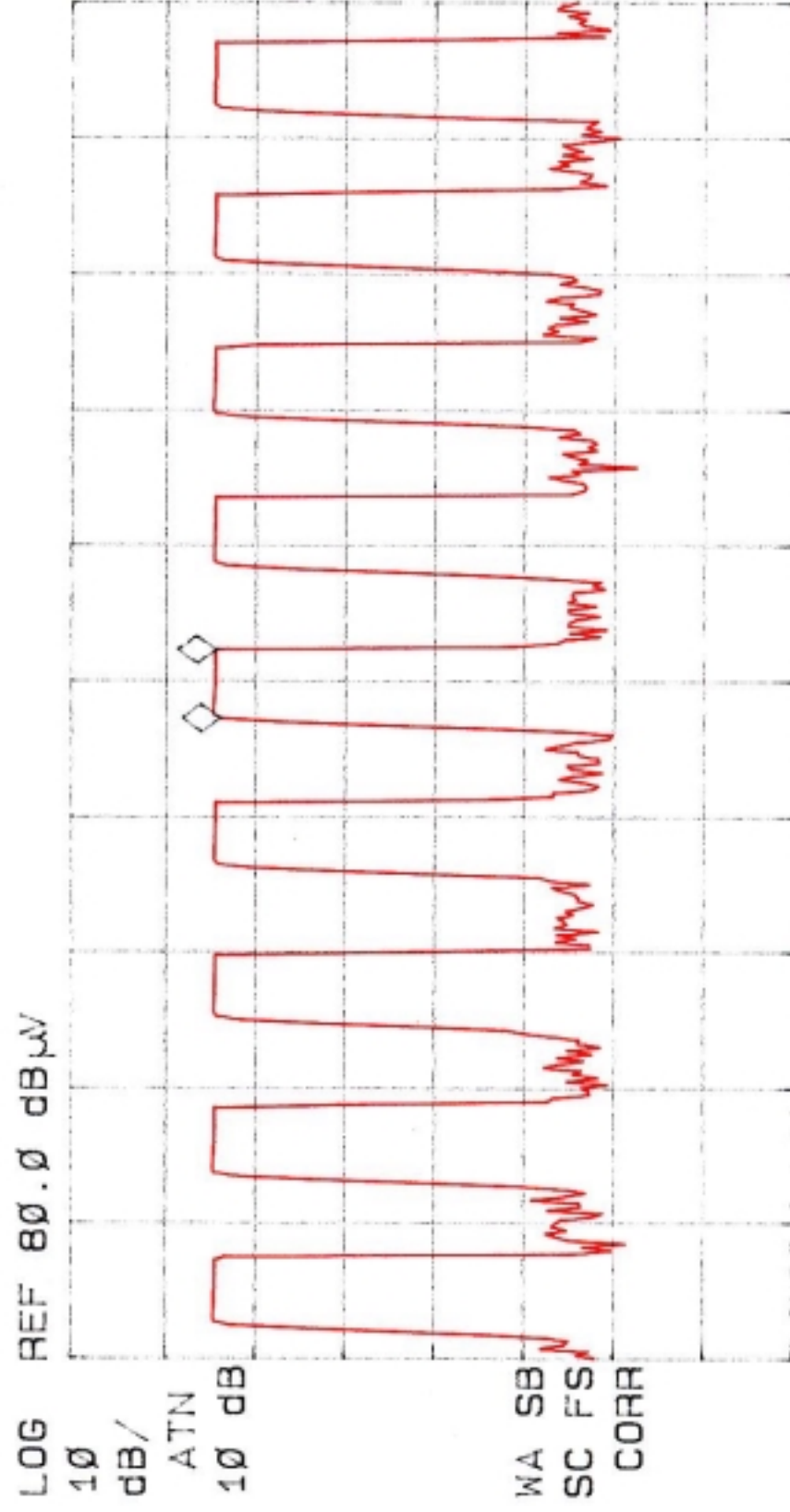
ACTV DET: PEAK  
MEAS DET: PEAK QP AVG  
MKR 100.13 msec  
--.68 dB



CENTER 433.950 MHz SPAN 0 Hz  
IF BW 120 KHz AVG BW 300 KHz #SWP 150 msec

15:03:45 DEC 20, 2000  
77

ACTV DET: PEAK  
MEAS DET: PEAK QP AVG  
MKR 750.00  $\mu$ sec  
.53 dB



CENTER 433.950 MHz  
IF BW 120 KHZ  
AVG BW 300 KHZ  
SPAN 0 HZ  
#SWP 15.0 msec





Date 21.Dec.'00 Time 09:32:11

Ref.Lvl Delta

80.00 dBuV

-0.33 dB

515.5 kHz

300 kHz

Vid.Bw

120 kHz [imp]

Res.Bw

off

2.000 MHz

TG.Lvl

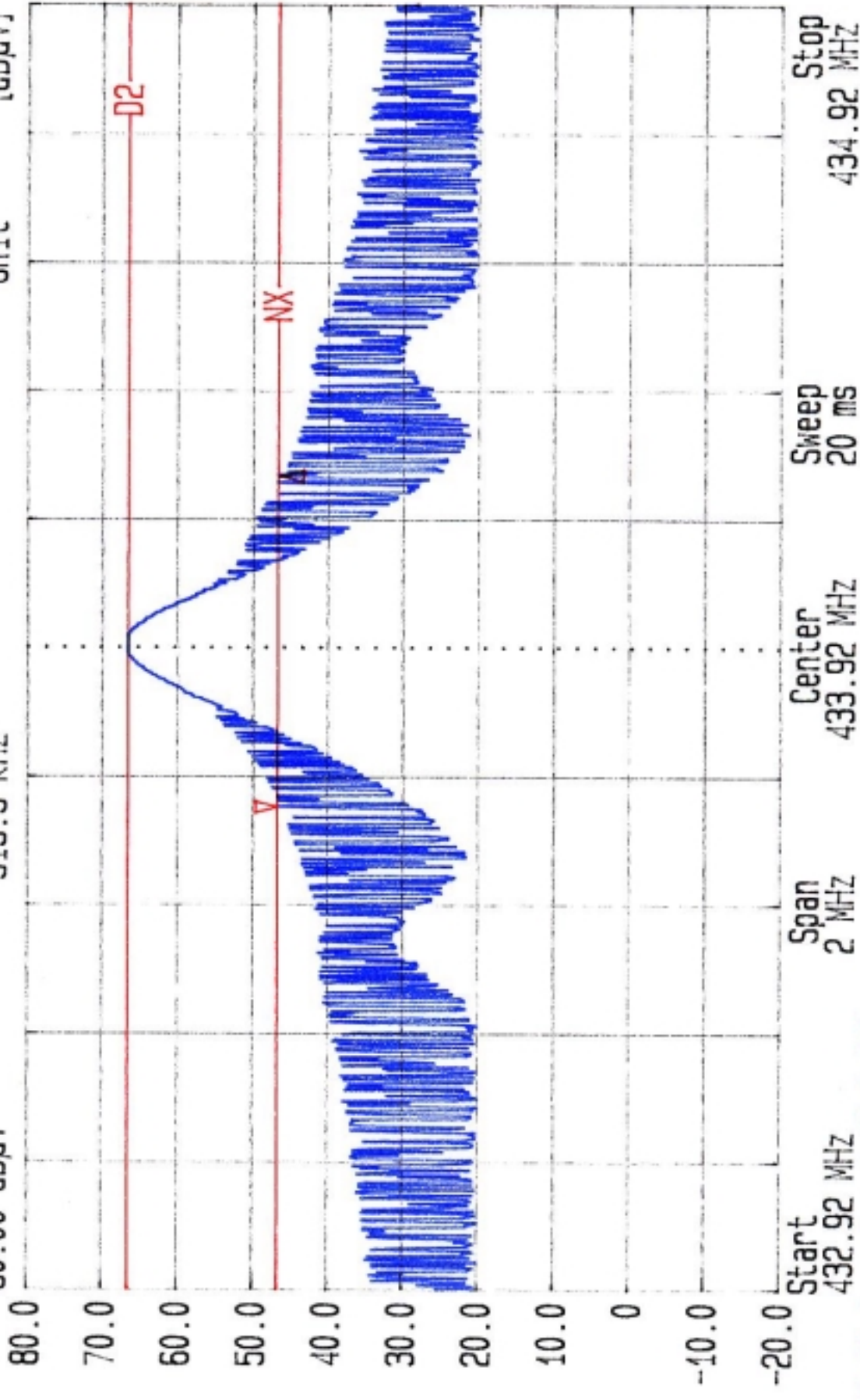
CF.Stp

10 dB

AF.Att

Unit

[dBuV]



Start 432.92 MHz

Span 2 MHz

Center 433.92 MHz

Sweep 20 ms

Stop 434.92 MHz

N dB down Level 20.0 dB  
DELTA MARK 515.5 KHz

	Freq.	Pk Rdg	Av Rdg	AF	Closs	Pre-amp	Level	Limit	Margin	Pol	Az	Height
	(MHz)	(dBuV)	(dBuV)	(dB)	(dB)	(dB)	(dBuV/m)	FCC_B	(dB)	(H/V)	(Deg)	(Meter)
X	433.94	73.55	66.61	17.50	3.19	21.28	66.02	80.83	-14.80	3mV	0	1.00
	867.87	37.66	30.72	23.37	4.26	20.69	37.66	60.83	-23.17	3mV	180	1.00
Y	433.93	79.36	72.42	17.50	3.19	21.28	71.83	80.83	-8.99	3mV	0	1.50
	867.89	38.47	31.53	23.37	4.26	20.69	38.47	60.83	-22.36	3mV	180	1.00
Z	433.94	72.89	65.95	17.50	3.19	21.28	65.36	80.83	-15.47	3mV	0	1.50
	867.86	39.78	32.84	23.37	4.26	20.69	39.78	60.83	-21.05	3mV	0	2.20
X	433.92	73.30	66.36	17.50	3.19	21.28	65.77	80.83	-15.05	3mH	0	1.00
	867.85	37.75	30.81	23.37	4.26	20.69	37.75	60.83	-23.08	3mH	180	1.00
Y	433.93	65.94	59.00	17.50	3.19	21.28	58.41	80.83	-22.41	3mH	0	1.50
	867.86	33.08	26.14	23.37	4.26	20.69	33.08	60.83	-27.75	3mH	180	1.00
Z	433.92	72.31	65.37	17.50	3.19	21.28	64.78	80.83	-16.05	3mH	0	1.50
	867.87	34.30	27.36	23.37	4.26	20.69	34.30	60.83	-26.53	3mH	0	2.20
Total data #: 12												



FCC, VCCI, CISPR, CE, AUSTEL, NZ  
UL, CSA, TUV, BSMI, DHHS, NVLAP

1366 BORDEAUX DRIVE, SUNNYVALE, CA 94089  
PHONE: (408) 752-8166 FAX: (408) 752-8168

*Project #:* 00E9116  
*Report #:* 9116D2  
*Date & Time:* 12/21/20 22:10  
*Test Engr:* Michael Hung

*Company:* VISION AUTOMOBILE ELECTRONICS INDUSTRIAL  
*EUT Description:* SMART FILTER (Alarm TX / 434MHz)  
*Test Configuration :* EUT ONLY  
*Type of Test:* FCC 15.231(b)/FCC 15.209  
*Mode of Operation:* NORMAL MODE

☒ D-Site

☐ E-Site

6 W oistData

Des

Freq.	Pk Rdg	Av Rdg	AF	Closs	Pre-amp	Dist	Level	Limit	Margin	Pol	Az	Height	Mark
(MHz)	(dBuV)	(dBuV)	(dB)	(dB)	(dB)	dB	(dBuV/m)	FCC_B	(dB)	(H/V)	(Deg)	(Meter)	(P/Q/A)
1302	57.93	50.99	24.8	2.8	43.27	-9.5	25.87	54.0	-28.13	1mV	0	1.2	A
1736	34.57	27.63	25.8	3.3	43.04	-9.5	4.16	60.8	-56.67	1mV	0	1.2	A
1303	59.25	52.31	24.8	2.8	43.27	-9.5	27.19	54.0	-26.81	1mH	0	1.2	A
1736	32.63	25.69	25.8	3.3	43.04	-9.5	2.22	60.8	-58.61	1mH	0	1.2	A

\* No other emission were found within 20dB under the limits upto 4.5 GHz.

Total data #: 4  
V.2d

Peak: RBW=VBW=1MHz  
Average: Pk Reading - 6.9357dB

Distance =  $20\log(1/3) = -9.5\text{dB}$