

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

*For*

**304 MHz WATERPROOF TRANSMITTER**

**MODEL NO: AMAC**

**FCC ID NO: KFR-AMAC**

**REPORT NO: 00E9117**

**ISSUE DATE: JANUARY 08, 2001**

*Prepared for*

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NO. 17, ALLEY 92, LANE 189, SEC. 1,  
AN CHUNG RD., TAINAN,  
TAIWAN, R.O.C.**

*Prepared by*

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

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

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#### 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: 304 MHz WATERPROOF TRANSMITTER

MODEL NAME/NUMBER: AMAC

FCC ID: KFR-AMAC

DATE TESTED: DECEMBER 04, 2000

REPORT NUMBER: 00E9117

|                       |   |
|-----------------------|---|
| TYPE OF EQUIPMENT     | SECURITY EQUIPMENT (INTENTIONAL RADIATOR) |
| EQUIPMENT TYPE        | 304 MHz WATERPROOF 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.

## 2. Product Description

|                       |   |
|-----------------------|---|
| Fundamental Frequency | <b>304 MHz</b>                              |
| Power Source          | <b>6V Battery</b>                           |
| Transmitting Time     | <b>Periodic <math>\leq</math> 5 seconds</b> |
| Associated Receiver   | <b>FCC ID: HNB2Y1500B</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)            | 12/01        |

**7. POWERLINE RFI LIMIT**

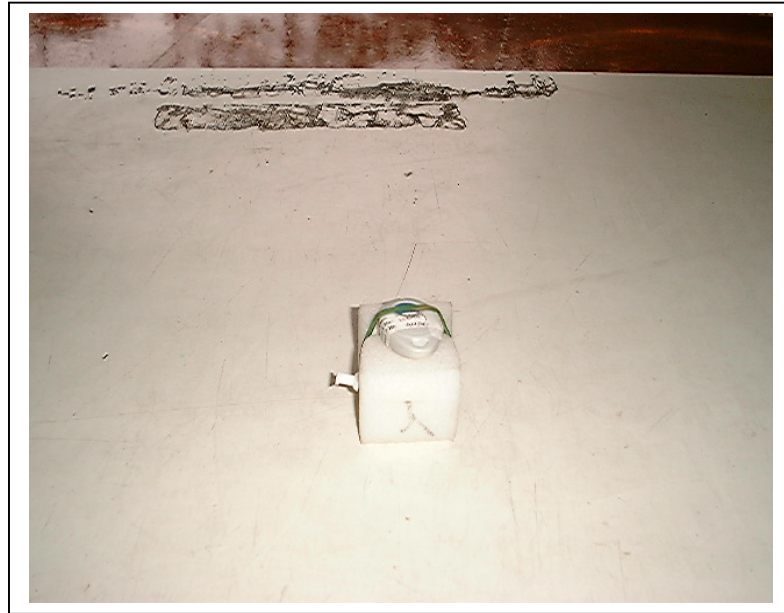
|  |  |
|--|--|
| CONNECTED TO AC POWER LINE   | SECTION 15.207   |
| CARRIER CURRENT SYSTEM IN THE FREQUENCY RANGE OF 450 kHz TO 30 MHz | SECTION 15.205 AND SECTION 15.209, 15.221, 15.223, 15.225 OR 15.227, AS APPROPRIATE. |
| BATTERY POWER  | NO REQUIRED.   |

**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 |

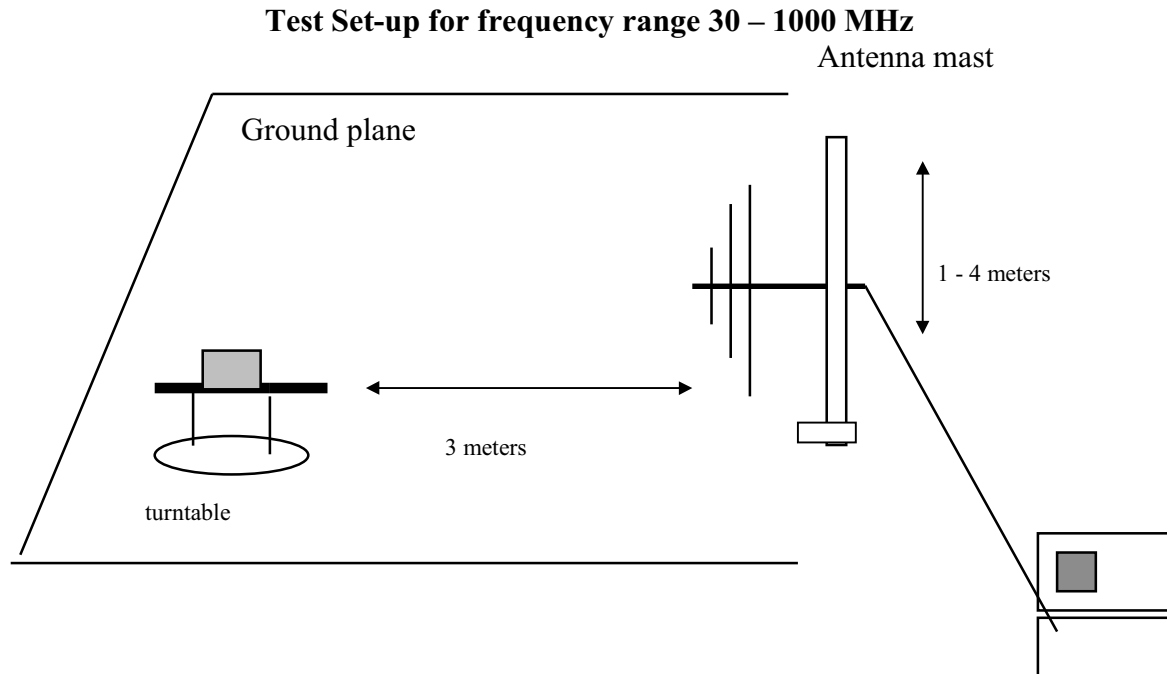
## 9. SYSTEM TEST CONFIGURATION

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)



**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

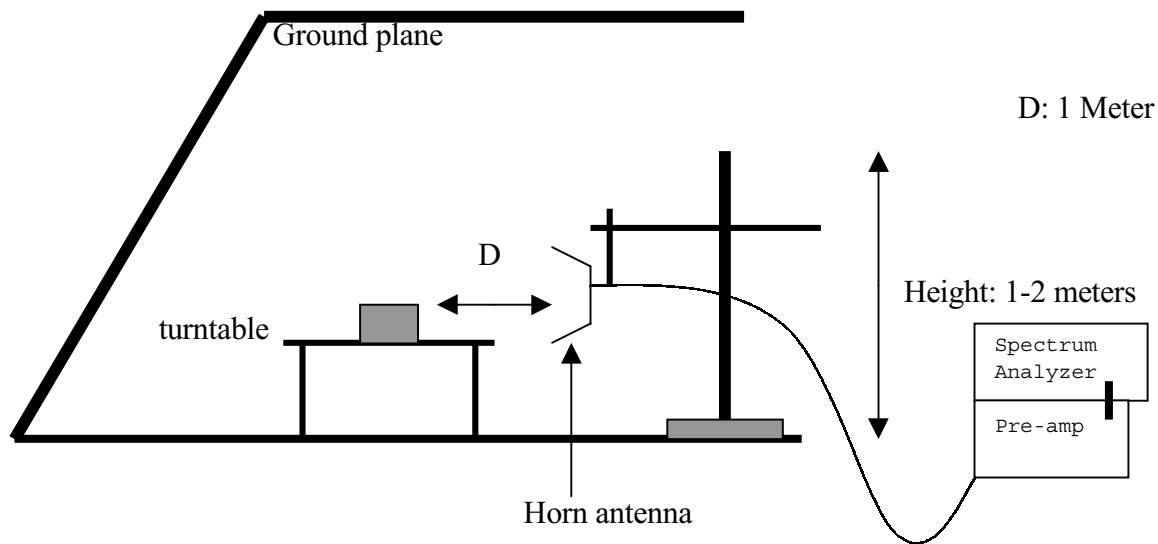


FIG. 2

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:

**NOT APPLICABLE**



**12. TEST RESULT**

| <b>Powerline RFI Class B</b>                               | <b>Eut</b> | <b>Radiated Emission Limits</b> | <b>Eut</b> |
|--|------------|---------------------------------|------------|
| 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                      =21.4 mS.  
                  Long pulse                    =0.4889 mS  
                  Short pulse                        =0.1889 mS  
                  No of Long pulse                =7  
                  No of Short pulse                 =6

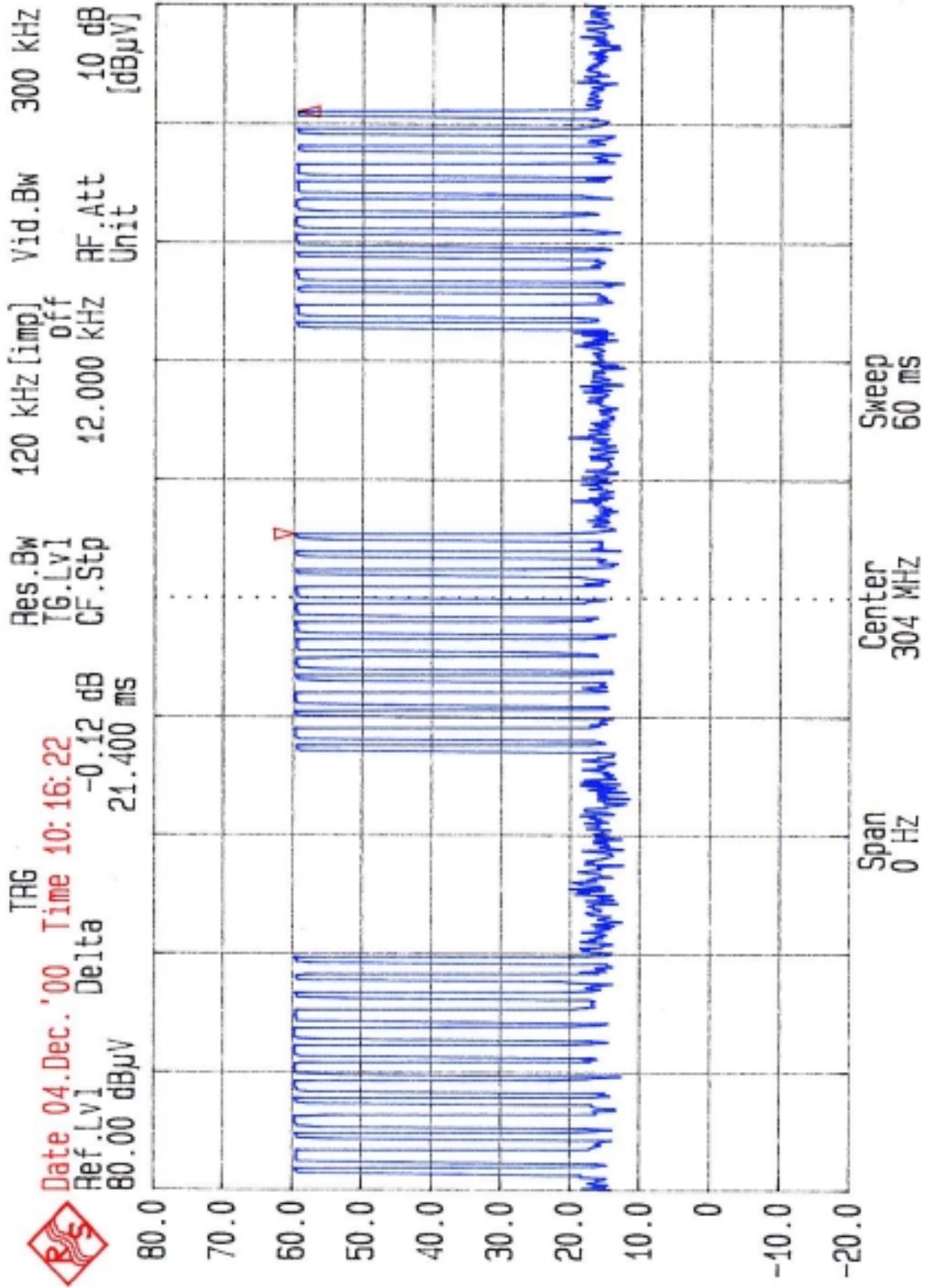
Duty Cycle = ( N1L1+N2L2+...+Nn-1Ln-1+NnLn)/100 or T

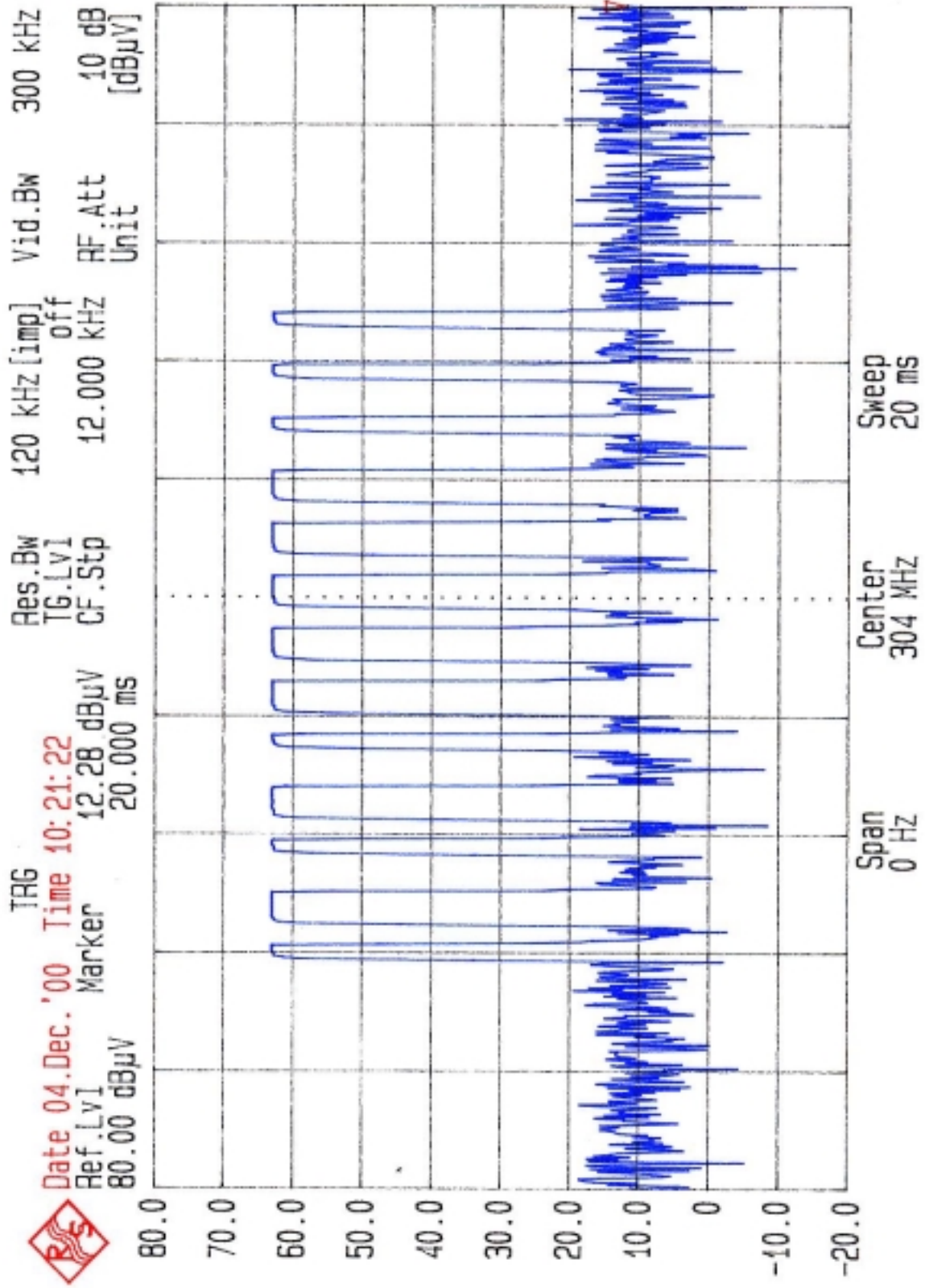
Duty Cycle = ((7X0.4889)+(6X0.1889)/21.4=0.2129=21.29% or -13.437dB

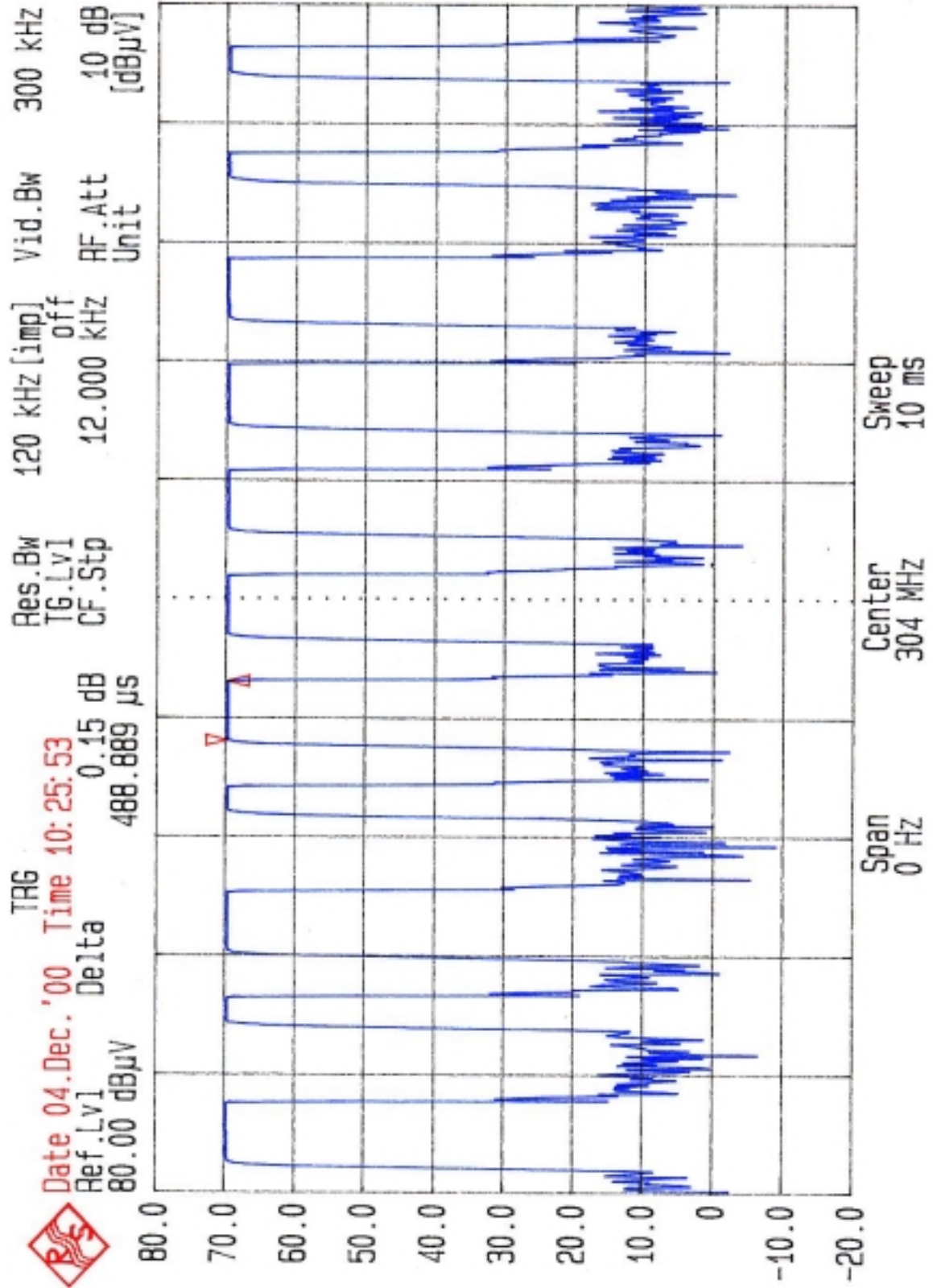
**12.2 The Emissions Bandwidth**

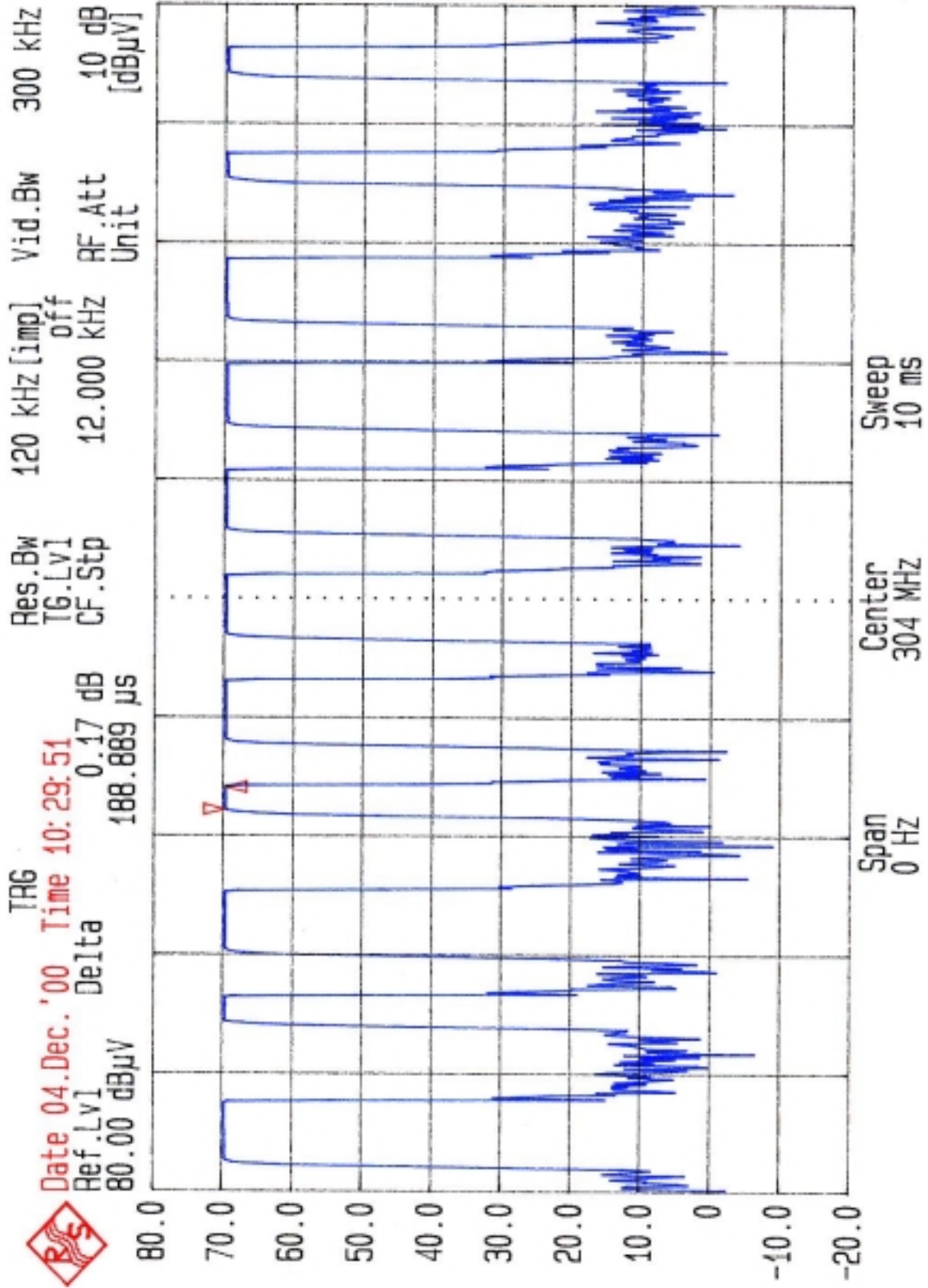
The bandwidth of the emissions were investigated per 15.231(c)

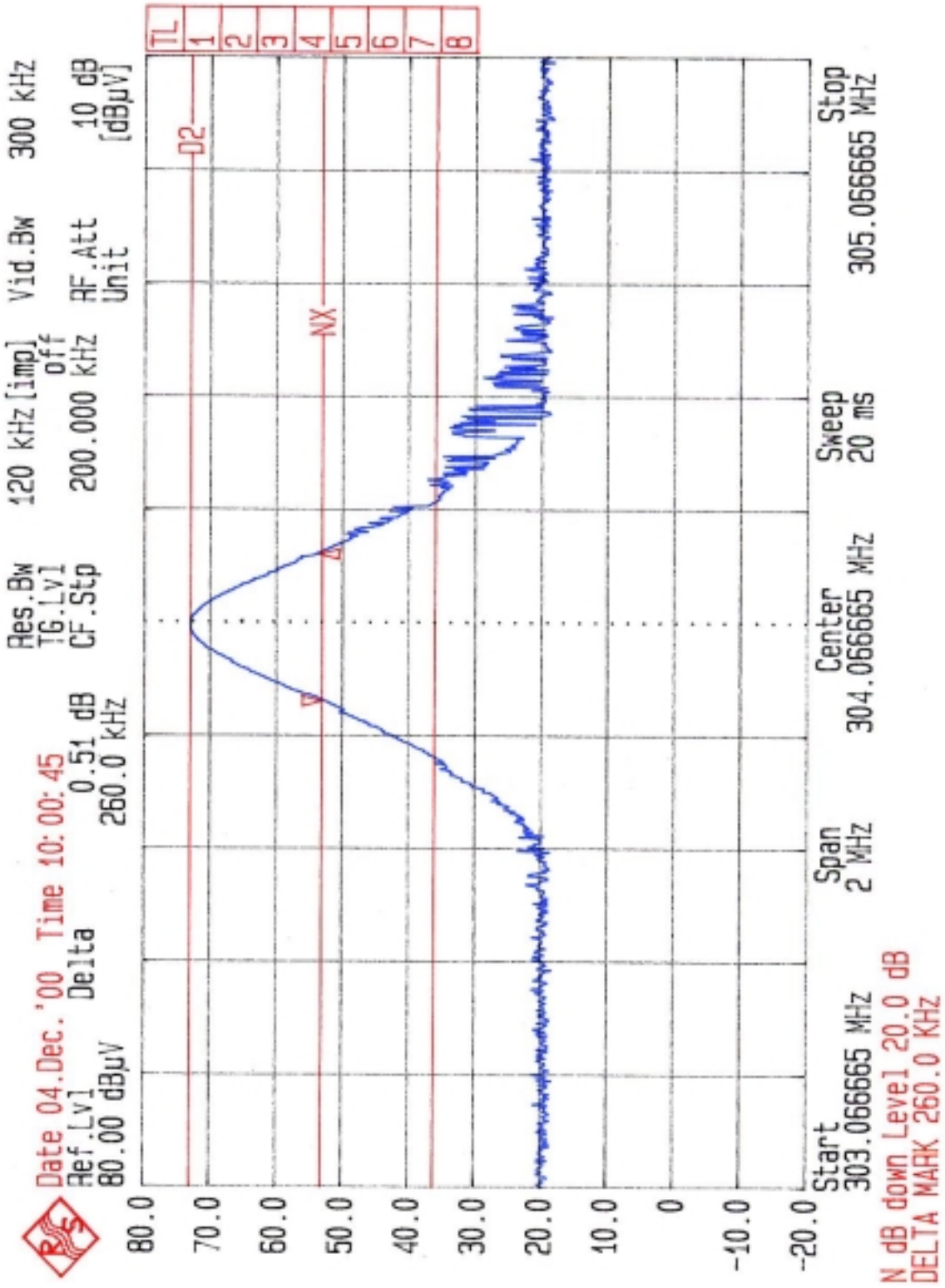
| <b>Center Frequency</b> | <b>Measured</b>                         | <b>Limits</b>               |
|-------------------------|---|-----------------------------|
| <b>304 MHz</b>          | <b>260 kHz &lt;<br/>(refer to plot)</b> | <b>304MHzX0.25%=760 kHz</b> |













|   |                |  |                  |            |               |                 |  |                |                |              |             |                   |
|--|----------------|--|------------------|------------|---------------|-----------------|--|----------------|----------------|--------------|-------------|-------------------|
| FCC, VCCI, CISPR, CE, AUSTEL, NZ<br>UL, CSA, TUV, BSMI, DHHS, NVLAP<br>No. 199 Chung Sheng Road<br>Hsin Tien City, Taipei, Taiwan, R.O.C.<br>PHONE: 02-2217-0894 FAX: 02-2217-1254 |                |  |                  |            |               |                 | <i>Project #:</i> 00E9117<br><i>Report #:</i> 9117D1<br><i>Date &amp; Time:</i> 12/04/00<br><i>Test Engr:</i> MICHAEL HUNG |                |                |              |             |                   |
| <i>Company:</i>  |                | VISION AUTOMOBILE ELECTRONICS INDUSTRIAL |                  |            |               |                 |  |                |                |              |             |                   |
| <i>EUT Description:</i>  |                | AMAC (Alarm TX / 304MHz)                 |                  |            |               |                 |  |                |                |              |             |                   |
| <i>Test Configuration :</i>  |                | EUT ONLY                                 |                  |            |               |                 |  |                |                |              |             |                   |
| <i>Type of Test:</i>   |                | FCC 15.231(b)/FCC 15.209                 |                  |            |               |                 |  |                |                |              |             |                   |
| <i>Mode of Operation:</i>  |                | NORMAL MODE                              |                  |            |               |                 |  |                |                |              |             |                   |
| <input checked="" type="checkbox"/> D-Site   |                |  |                  |            |               |                 | <input type="checkbox"/> E-Site  |                |                |              |             |                   |
| $M\% = ((I1+I2+I3+...)/T) * 100\% = 21.29 \%$  |                |  |                  |            |               |                 | Av Reading = Pk Reading + 20*log(M%)<br>20*log(M%) = -13.437   |                |                |              |             |                   |
|  | Freq.<br>(MHz) | Pk Rdg<br>(dBuV)                         | Av Rdg<br>(dBuV) | AF<br>(dB) | Closs<br>(dB) | Pre-amp<br>(dB) | Level<br>(dBuV/m)  | Limit<br>FCC_B | Margin<br>(dB) | Pol<br>(H/V) | Az<br>(Deg) | Height<br>(Meter) |
| X  | 304.10         | 54.98                                    | 41.54            | 14.51      | 1.98          | 21.31           | 36.72  | 74.94          | -38.22         | 3mV          | 90          | 1.30              |
|  | 608.13         | 35.86                                    | 22.42            | 20.42      | 3.42          | 21.13           | 25.13  | 54.00          | -28.87         | 3mV          | 90          | 1.30              |
|  | 912.23         | 29.41                                    | 15.97            | 23.88      | 4.20          | 20.60           | 23.45  | 54.94          | -31.49         | 3mV          | 90          | 1.30              |
| Y  | 304.08         | 68.03                                    | 54.59            | 14.51      | 1.98          | 21.31           | 49.77  | 74.94          | -25.17         | 3mV          | 0           | 1.40              |
|  | 608.15         | 41.44                                    | 28.00            | 20.42      | 3.42          | 21.13           | 30.71  | 54.00          | -23.29         | 3mV          | 0           | 1.40              |
|  | 912.25         | 36.26                                    | 22.82            | 23.88      | 4.20          | 20.60           | 30.30  | 54.94          | -24.64         | 3mV          | 0           | 1.50              |
| Z  | 304.08         | 74.84                                    | 61.40            | 14.51      | 1.98          | 21.31           | 56.58  | 74.94          | -18.36         | 3mV          | 0           | 1.25              |
|  | 608.16         | 41.70                                    | 28.26            | 20.42      | 3.42          | 21.13           | 30.97  | 54.00          | -23.03         | 3mV          | 0           | 1.50              |
|  | 912.20         | 34.44                                    | 21.00            | 23.88      | 4.20          | 20.60           | 28.48  | 54.94          | -26.46         | 3mV          | 0           | 1.50              |
| X  | 304.10         | 78.28                                    | 64.84            | 14.51      | 1.98          | 21.31           | 60.02  | 74.94          | -14.92         | 3mH          | 180         | 1.25              |
|  | 608.13         | 39.12                                    | 25.68            | 20.42      | 3.42          | 21.13           | 28.39  | 54.00          | -25.61         | 3mH          | 180         | 1.30              |
|  | 912.24         | 28.18                                    | 14.74            | 23.88      | 4.20          | 20.60           | 22.22  | 54.94          | -32.72         | 3mH          | 0           | 1.50              |
| Y  | 304.06         | 74.01                                    | 60.57            | 14.51      | 1.98          | 21.31           | 55.75  | 74.94          | -19.19         | 3mH          | 180         | 1.25              |
|  | 608.13         | 40.06                                    | 26.62            | 20.42      | 3.42          | 21.13           | 29.33  | 54.00          | -24.67         | 3mH          | 180         | 1.30              |
|  | 912.22         | 28.20                                    | 14.76            | 23.88      | 4.20          | 20.60           | 22.24  | 54.94          | -32.70         | 3mH          | 180         | 1.50              |
| Z  | 304.06         | 73.96                                    | 60.52            | 14.51      | 1.98          | 21.31           | 55.70  | 74.94          | -19.24         | 3mH          | 0           | 1.20              |
|  | 608.13         | 40.54                                    | 27.10            | 20.42      | 3.42          | 21.13           | 29.81  | 54.00          | -24.19         | 3mH          | 0           | 1.20              |
|  | 912.21         | 29.93                                    | 16.49            | 23.88      | 4.20          | 20.60           | 23.97  | 54.94          | -30.97         | 3mH          | 180         | 1.50              |
| Total data #: 18   |                |  |                  |            |               |                 |  |                |                |              |             |                   |

|    |                  | <b>Project #:</b> 00E9117<br><b>Report #:</b> 9117D2<br><b>Date &amp; Time:</b> 12/04/00<br><b>Test Engr:</b> Michael Hung  |            |  |                 |            |                   |                                |                |              |             |                   |                 |
|---|------------------|---|------------|--|-----------------|------------|-------------------|--------------------------------|----------------|--------------|-------------|-------------------|-----------------|
| FCC, VCCI, CISPR, CE, AUSTEL, NZ<br>UL, CSA, TUV, BSMI, DHS, NVLAP<br>1366 BORDEAUX DRIVE, SUNNYVALE, CA 94089<br>PHONE: (408) 752-8166 FAX: (408) 752-8168 |                  |   |            |  |                 |            |                   |                                |                |              |             |                   |                 |
| <b>Company:</b><br><b>EUT Description:</b><br><b>Test Configuration:</b><br><b>Type of Test:</b><br><b>Mode of Operation:</b>                               |                  | VISION AUTOMOBILE ELECTRONICS INDUSTRIAL<br>AMAC (Alarm TX / 304MHz)<br>EUT ONLY<br>FCC 15.231(b)/FCC 15.209<br>NORMAL MODE |            |  |                 |            |                   |                                |                |              |             |                   |                 |
| <input checked="" type="checkbox"/> D-Stk   |                  | <input type="checkbox"/> E-Stk  |            |  |                 |            |                   |                                |                |              |             |                   |                 |
| <input type="checkbox"/> 6 Worst Data   |                  | <input type="checkbox"/> Descending   |            |  |                 |            |                   |                                |                |              |             |                   |                 |
| Freq.<br>(MHz)  | Pk Rdg<br>(dBuV) | Av Rdg<br>(dBuV)  | AF<br>(dB) | Class<br>(dB)  | Pre-amp<br>(dB) | Dist<br>dB | Level<br>(dBuV/m) | Limit<br>FCC_B                 | Margin<br>(dB) | Pol<br>(H/V) | Az<br>(Deg) | Height<br>(Meter) | Mark<br>(P/Q/A) |
| 1216  | 60.31            | 46.87   | 25.2       | 2.7  | 43.31           | -9.5       | 21.93             | 54.0                           | -32.07         | 1mV          | 90          | 1.0               | A               |
| 1216  | 63.04            | 49.60   | 25.2       | 2.7  | 43.31           | -9.5       | 24.66             | 54.0                           | -29.34         | 1mH          | 270         | 1.0               | A               |
| * No other emission were found within 20dB under the limits upto 3.1 GHz.   |                  |   |            |  |                 |            |                   |                                |                |              |             |                   |                 |
| Total data #: 2<br>V.2d   |                  |   |            | P(Peak): RBW=VBW=1MHz<br>A(Average): Pk Reading-13.437dB |                 |            |                   | Distance = 20log(1/3) = -9.5dB |                |              |             |                   |                 |