EXHIBIT E: REPORT OF MEASUREMENTS [2.1033(B6)]

Test Report for FCC ID: NZLSTDHL3

FCC Part 2.1031, Part 15 Subpart C(15.231)

Permissive Change Part 2.1043

Report #0300596F
Issued 05/08/03

NVS❶ MIRROR WITH HOMELINK® III TRANSMITTER MODEL NZLSTDHL3

Prepared for: Mr. Brian Perschbacher
Gentex Corporation
600 N. Centennial St.
Zeeland, MI 49464

Test Date(s): February 26, April, 1,2, 2003

data recorded by

Ted Chaffee, NCE
Test Engineer, AHD

witnessed by

Brian Perschbacher
Colin Carpenter

This report prepared by:

Technical Manager/Test Engineer, AHD

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Statements Concerning this Report

NVLAP Accreditation: NVLAP Lab Code 200129-0
The scope of AHD accreditation is the test methods of:

IEC/CISPR 22:	Limits and methods measurement of radio disturbance characteristics of information technology equipment.
FCC Method – 47 CFT Part 15:	Digital Devices.
AS/NZS 3548:	Electromagnetic Interference – Limits and Methods of Measurement of Information Technology Equipment.
IEC61000-4-2 and Amend.1:	ElectroStatic Discharge Immunity

Test Data:
This test report contains data covered by the scope of NVLAP accreditation.

Test Traceability:
The calibration of all measuring and test equipment and the measured data using this equipment are traceable to the National Institute for Standards and Technology (NIST).

Limitations on results:
The test results contained in this report relate only to the Item(s) tested. Any electrical or mechanical modification made to the test item subsequent to the test date shall invalidate the data presented in this report. Any electrical or mechanical modification made to the test item subsequent to this test date shall require an evaluation to verify continued compliance.

Limitations on copying:
This report shall not be reproduced, except in full, without the written approval of AHD.

Limitations of the report:
This report shall not be used to claim product endorsement by NVLAP, FCC, or any agency of the US Government.

Statement of Test Results Uncertainty:
Following the guidelines of NAMAS publication NIS81 and NIST Technical Note 1297, the Measurement Uncertainty at a 95% confidence level is determined to be: ± 1.4 dB

Manufacturer/Applicant [2.1033(b1)]

The manufacturer and applicant:

GENTEX CORPORATION
600 N. Centennial St.
Zeeland, Michigan 49464

Measurement/Test Site Facility & Equipment

Test Site [2.948, 2.1033(b6)]

The AHD test facility is centered on 9 acres of rural property near Sister Lakes, Michigan. The mailing address is 92723 M-152, Dowagiac, Michigan 49047. This test facility is NVLAP accredited (LabCode 200129-0). It has been fully described in a report filed with the FCC and Industry Canada. The report filed with the FCC is, dated November 5, 1996, was accepted by the FCC in a letter dated January 15, 1997, (31040/SIT 1300F2). The report filed with Industry Canada, dated August 11, 1998, was accepted via a letter dated September 1, 1998, (file:IC3161).

Measurement Equipment Used [2.947(d), 15.31(b)]

Equipment	Model	S/N	Last Cal Date	Calibration Interval
HP EMI Receiver system	HP 8546A			
RF Filter Section	HP-85460A	3448A00283	24-Aug-02	12 month
RF Receiver Section	HP-85462A	3625A00342	24-Aug-02	12 month
(3-M) Type 129FF Ultra Flex LowLoss	RG58/U	9910-12	16-Sep-02	6 months
(3-M) LMR-400 Ultra Flex	LMR400	9812-11	16-Sep-02	6 months
(10-M) Amelco 50ohm Coax	RG213/U	9903-10ab	16-Sep-02	6 months
50ohm Coax	RG223/U	9802302	16-Sep-02	12 months
Double Ridged Horn	ONO91202-2	A00329	17-Apr-01	36 months

Measurement Environment

The test was performed with the equipment under test, and measurement equipment inside the all-weather enclosure. Ambient temperature was 22deg.C., the relative humidity 35%.

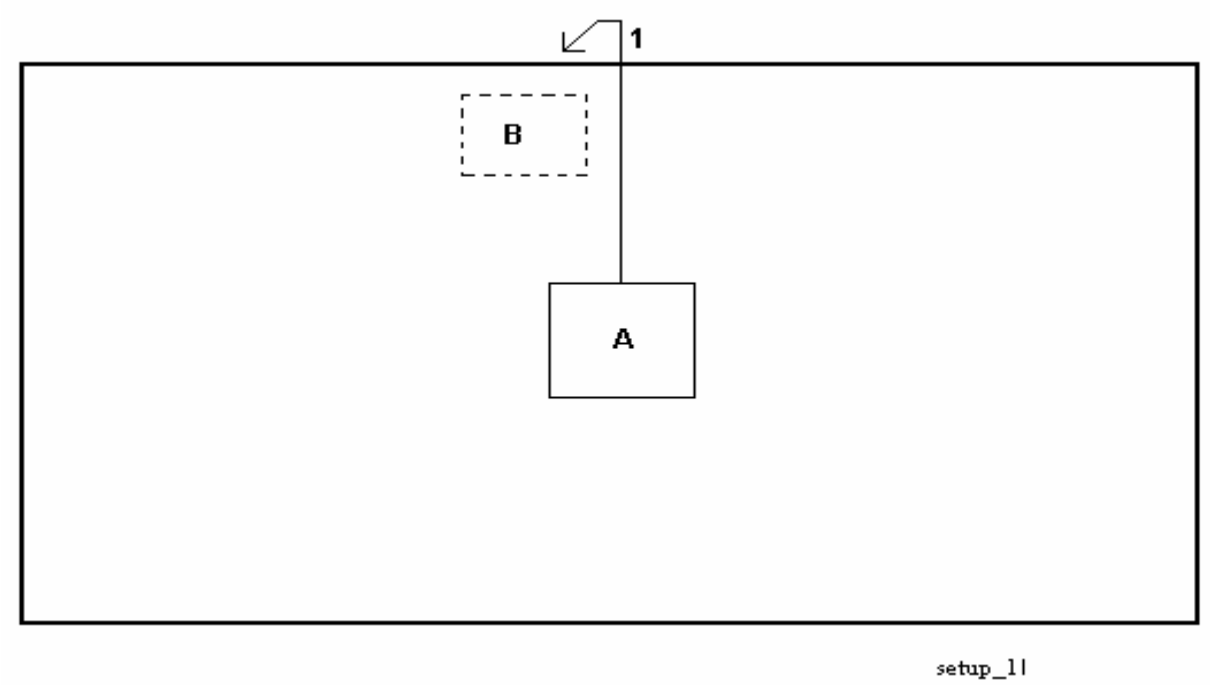
Tested Configuration /Setup: [2.1033(b8)]

Support Equipment & Cabling

Setup Diagram Legend	Description	Model	Serial No. / Part No.	EMC Consideration
A	[EUT] NVS❶ Mirror with Homelink® Garage Door Opener	[GENTEX] NZLSTDHL3	AHL0596	FCC ID: NZLSTDHL3
B	12V DC Power Supply	[Trygon] DL40-1	7968152	Located on the turntable base below the EUT table.
1	Power Supply Cable Harness	--	--	1.5 meters, Unshielded, 2-lead lightly twisted cable harness.

Setup Diagram

Note: Setup photographs are located in Attached Electronic File, Exhibit E.



BASIC EUT SETUP
(Legend designation is above)

Summary of Results:

1. This test series evaluated the Equipment Under Test to FCC Part 15, SubPart C. This report is for a Permissive Change of the EUT pursuant to FCC Part 2.1043.
2. Changes to the PCB layout of the original unit prompted this test series. There are no changes in any frequency determining components or circuitry.
3. The judgment was made to restrict evaluation to the radiated emissions of the product. It was felt the remaining parameters reported in the original submittal would not be impacted by the nature of the layout change of the circuit board. Because of a degradation in the harmonic emission levels reported to the Commission for the original Grant, this Class II Permissive Change report was prepared.
4. The system tested is compliant to the requirement of CFR 47, FCC Part 15, SubPart C for periodic operation in the allowed frequency bands above 70MHz, (Part 15.231).
5. The equipment under test was received on February 26, 2003 and this test series commenced on February 26, 2003.
6. The measurements were compared to the measurements made on the original submitted unit. The original unit was issued a grant of equipment authorization on 09/10/2001.
7. The frequencies selected for final evaluation include 288MHz, 310MHz, and 418MHz. These frequencies were used for measurement in the original submittal.
8. The suspect spurious emissions were all at or below the area ambient signals. The test results presented in the original submittal are valid.
9. The field strength level of the fundamental emission nearest the limit occurred while operating at 310MHz with 500Hz pulsed modulation at a 30% duty cycle. The EUT was positioned on the 'side' and the receive antenna oriented in the horizontal polarization. This signal was measured to be 1.4dB below the limit of 75.3dBuV/m (5833uV/m).
10. The evaluation of the field strength levels of the harmonics showed the emission nearest the limit occurred while operating at 288MHz with 500Hz pulsed modulation at 30% duty cycle. The EUT was positioned on the 'end'; and the receive antenna oriented in the horizontal polarization. This signal, at 576MHz, was measured to be 6.9dB below the limit of 53.8dBuV/m (490uV/m).

Changes made to achieve compliance

1. NONE

Changes made to product

The changes made to the transmitter PCB include:

1. Increase the foil pad size at center leg of transmit antenna.
2. Plate the thru-holes at the J1 header.
3. Change pad width from .095" to .120" at the J1 header.

The changes made to the main PCB include:

1. Delete the jumper wire and trace at JU2.
2. Relocate the following parts for glue stencil.
   D23, R32, R18, Q13.
3. Relocate the following parts for design improvements.
   C23, C24, C61, R17, R18, R32, Q13.
4. Delete C8.

Standards Applied to Test: [2.1033(b6)]

ANSI C63.4 - 1992, Appendix I
CFR47 FCC Part 2, Part 15, SubPart C, 15.231 Intentional Radiator; SubPart B, Digital Device
RSS-210 Issue 2.Rev.1, ICES-00 Issue 3
AHD test procedures TP0101-01, TP0102-01

Test Methodology: [2.1033(b6)]

The pictures in this report, showing test setups, indicate the agreed upon configuration of testing for this product-type.

For the testing, the Universal Garage Door Opener Transmitter was installed in the automotive rearview mirror for which it has been designed. The system was placed at the center of the table 80cm above the ground plane pursuant to ANSI C63.4 for stand-alone equipment. The 12volt supply harness was routed to the edge of the long side of the table then down to the power supply located on the turntable base.

The line conducted emission testing was not performed on this product. In its final configuration the product is powered from an automobile 12 volt system only.

Radiated

The system was placed upon a 1 x 1.5 meter non-metallic table 80cm above the open field site ground plane in the prescribed setup per ANSI C63.4, Figure 9(c).

The table sits upon a remote controlled turntable. The receiving antenna, located at the appropriate standards distance of 3 or 10 meters from the table center, is also remote controlled.

The principle settings of the EMI Receiver for radiated testing include:

IF Bandwidth:	120KHz for frequencies less than 1GHz.
	1 MHz for frequencies greater than 1GHz.
Detector Function:	Peak Mode
	The Average levels were determined mathematically based upon the duty cycle of the pulsed modulation of the transmitted signal.

At frequencies up to 1000MHz a BiconiLog broadband antenna was used for measurements.

At frequencies above 1000MHz a double-ridge Horn broadband antenna was used for measurements.

During the evaluation the EUT was transmitting continuously.

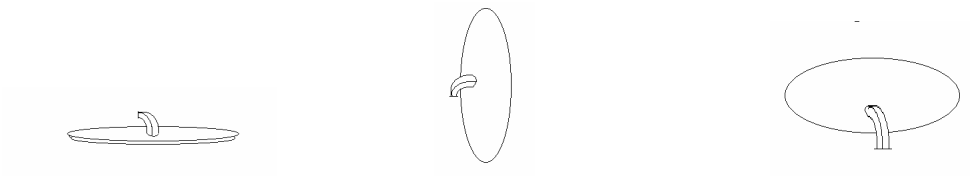
The turntable was rotated 360 degrees and the receiving antenna height varied from 1 to 4 meters to search out the highest emissions.

Preliminary tests were done at 288MHz, 310MHz, 340MHz, 365MHz, 390MHz, and 418MHz. The final measurements were made at a low band frequency (288MHz), a mid band frequency (310MHz), and a high band frequency (418MHz) pursuant to the requirements of 47CFR 15.31(m). At each frequency the EUT was placed in three orthogonal positions. At each position the 500Hz pulse modulation was adjusted to a 30%, 50%, and 80% duty cycle. At each duty cycle, measurements were taken with the receive antenna in vertical and horizontal positions.

The unit was evaluated up to the tenth harmonic of the fundamental as an intentional radiator, and up to 1000MHz as a digital device.

The orthogonal positions of EUT are:

Flat Side End



FORMULAS AND SAMPLE CALCULATIONS:

THE HP8546A EMI Receiver has stored in memory the antenna and coax correction factors used in this test. The resultant Field Strength (FS) in dBuV/m presented by the HP8546A is the summation in decibels (dB) of the Received Level (RF), the Antenna Correction Factor (AF), and the Cable Loss Factor (CF).

Formula 1: FS(dBuV/m) = RF(dBuV) + AF(dB/m) +CF(dB)

The resultant Field Strength measurement is recorded using the peak hold detector of the HP8546A.

This recorded peak level is further corrected, by calculation, to an average level by a factor determined by the duty cycle of the pulsed modulation. The duty cycle factor is determined as outlined in Appendix I4 of the standard ANSI C63.4:1992.

Formula 2: Average Level(uV/m) = [Peak Level(uV/m)] x [duty cycle factor].

Formula 2a: Average Level(dBuV/m) = Peak Level)dBuV/m) + duty cycle factor(dB).

The duty cycle factor to apply is determined for the duty cycles of 30%, 50% and 80% as follows.

For 30% (0.30): duty cycle factor(dB) = 20*Log(0.3) = -10.46
For 50% (0.50): duty cycle factor(dB) = 20*Log(0.5) = -6.02
For 80% (0.80): duty cycle factor(dB) = 20*Log(0.8) = -1.94

As an example:

A measured peak level of 50% duty cycle pulse modulated signal is 500uV/m.
Calculated to dBuV/m is 20*Log(500) = 53.98dBuV/m Peak level.
Applying the duty cycle factor: Avg. Level(dBuV/m) = 53.98 - 6.02dB = 47.96dBuV/m.

Calculation of FCC limits Part 15.231

For the frequency range 260MHz - 470MHz, the limit is a linear interpolation between 3750uV/m and 12500uV/m where the limit at 260MHz is 3750uV/m and the limit at 470MHz is 12500uV/m.

A formula to calculate the limit is established with a ratio linearly equating the frequency range to the limit range.

$$(F_0 - F_L) / (F_H - F_L) = (L_0 - L_L) / (L_H - L_L)$$

where F_0 and L_0 represent the frequency in question and its limit
where F_L and L_L represent the lower frequency (260MHz) and its limit (3750uV/m).
Where F_H and L_H represent the higher frequency (470MHz) and its limit (12500uV/m).

The calculations for the frequencies included in the application are:

288MHz (288 - 260) / (470 - 260) = (L_0 - 3750) / (12500 - 3750)
(28 / 210) * (8750) = L_0 - 3750
L_0 = 1166.7 + 3750
L_0 = 4916.7 uV/m is LIMIT at 288MHz

310MHz (310 - 260) / (470 - 260) = (L_0 - 3750) / (12500 - 3750)
(50 / 210) * (8750) = L_0 - 3750
L_0 = 2083.3 + 3750
L_0 = 5833.3 uV/m is LIMIT at 310MHz

418MHz (418 - 260) / (470 - 260) = (L_0 - 3750) / (12500 - 3750)
(158 / 210) * (8750) = L_0 - 3750
L_0 = 6583.3 + 3750
L_0 = 10333.3 uV/m is LIMIT at 418MHz

The limit in dB terms is calculated as the result of 20 times the log of the uV/m limit.

288MHz dB limit is 20 * LOG(4916.7 uV/m) = 73.8 dBuV/m

310MHz dB limit is 20 * LOG(5833.3 uV/m) = 75.3 dBuV/m

418MHz dB limit is 20 * LOG(10333.3 uV/m) = 80.3 dBuV/m

Test Data [2.1033(b6)]

Radiated Field Strength Measurements: [15.231(b), 15.205]

Field Strength Measurements of Fundamental : [15.231(b)]

MEASUREMENT PROCEDURE:

1. The EUT was trained to one of the three test frequencies.
2. The EUT was trained to one of the three test duty cycles.
3. The EUT was setup to one of the three orthogonal positions.
4. Steps 1-3 were repeated to cover all positions, duty cycles, and frequencies.

DUT Tuned to transmit at 288MHz

Freq. MHz	DUT position	Ant. Pol.	Corrected Data Peak Detector dBuV/m	Duty Cycle %	Duty Cycle Factor dB	Calculated Average Level dBuV/m	FCC Limit dBuV/m	Margin dB	Cable +Ant. Factor dB+dB/m
288	side	H	82.2	30%	-10.46	71.7	73.8	**2.1**	14.7
"	"	"	77.8	50%	-6.02	71.8	73.8	**2.0**	"
"	"	"	73.7	80%	-1.94	71.8	73.8	**2.0**	"

DUT Tuned to transmit at 310MHz

Freq. MHz	DUT position	Ant. Pol.	Corrected Data Peak Detector dBuV/m	Duty Cycle %	Duty Cycle Factor dB	Calculated Average Level dBuV/m	FCC Limit dBuV/m	Margin dB	Cable +Ant. Factor dB+dB/m
310	side	H	84.4	30%	-10.46	73.9	75.3	**1.4**	15.1
"	"	"	79.8	50%	-6.02	73.8	75.3	**1.5**	"
"	"	"	74.7	80%	-1.94	72.8	75.3	**2.5**	"

DUT Tuned to transmit at 418MHz

Freq. MHz	DUT position	Ant. Pol.	Corrected Data Peak Detector dBuV/m	Duty Cycle %	Duty Cycle Factor dB	Calculated Average Level dBuV/m	FCC Limit dBuV/m	Margin dB	Cable +Ant. Factor dB+dB/m
418	end	V	89.1	30%	-10.46	78.6	80.3	**1.7**	18.3
"	-	"	84.4	50%	-6.02	78.4	80.3	**1.9**	"
"	-	"	79.7	80%	-1.94	77.8	80.3	**2.5**	"

Field Strength Measurements of Harmonics: [15.231(b), 15.205]

DUT Tuned to transmit at 288MHz

576	end	H	57.4	30%	-10.46	46.9	53.8	**6.9**	21.4
"	"	"	50.8	50%	-6.02	44.8	53.8	**9.0**	"
"	"	"	43.3	80%	-1.94	41.4	53.8	**12.4**	"
864	side	H	35.1	30%	-10.46	24.6	53.8	**29.2**	25.3
"	"	"	29.4	50%	-6.02	23.4	53.8	**30.4**	"
"	"	"	25.0	80%	-1.94	23.1	53.8	**30.7**	"
1152	flat	V	38.3	30%	-10.46	27.8	54.0	**26.2**	28.7
"	-	"	37.5	50%	-6.02	31.5	54.0	**22.5**	"
"	-	"	36 noise floor	80%	-1.94	<34.1	54.0	**>19.9**	"
1440	end	V	41.3	30%	-10.46	30.8	54.0	**23.2**	29.4
"	side	H	40.8	50%	-6.02	34.8	54.0	**19.2**	"
"	"	"	40.0	80%	-1.94	38.1	54.0	**15.9**	"
1728	side	V	39.0	30%	-10.46	28.5	54.0	**25.5**	30.3
"	"	"	39 noise floor	50%	-6.02	<33.0	54.0	**>21.0**	"
"	"	"	39 noise floor	80%	-1.94	<37.1	54.0	**>16.9**	"
2016	side	H	42.1	30%	-10.46	31.6	54.0	**22.4**	31.2
"	"	"	42.1	50%	-6.02	36.1	54.0	**17.9**	"
"	"	"	41.0	80%	-1.94	39.1	54.0	**14.9**	"
2304	-	V	41 noise floor	30%	-10.46	<30.5	54.0	**>23.5**	32.3
	-	"	41 noise floor	50%	-6.02	<35.0	54.0	**>19.0**	
"	-	"	41 noise floor	80%	-1.94	<39.1	54.0	**>14.9**	"
2592	-	V	41 noise floor	30%	-10.46	<30.5	54.0	**>23.5**	33.1
"	-	"	41 noise floor	50%	-6.02	<35.0	54.0	**>19.0**	"
"	-	"	41 noise floor	80%	-1.94	<39.1	54.0	**>14.9**	"
2880	-	V	41 noise floor	30%	-10.46	<30.5	54.0	**>23.5**	33.3
"	-	"	41 noise floor	50%	-6.02	<35.0	54.0	**>19.0**	"
"	-	"	41 noise floor	80%	-1.94	<39.1	54.0	**>14.9**	"

DUT Tuned to transmit at 310MHz

Freq. MHz	DUT position	Ant. Pol.	Corrected Data Peak Detector dBuV/m	Duty Cycle %	Duty Cycle Factor dB	Calculated Average Level dBuV/m	FCC Limit dBuV/m	Margin dB	Cable +Ant. Factor dB+dB/m
620	side	H	52.0	30%	-10.46	41.5	55.3	**13.8**	22.1
"	"	"	44.5	50%	-6.02	38.5	55.3	**16.8**	"
"	"	"	37.0	80%	-1.94	35.1	55.3	**20.2**	"
930	side	V	32.9	30%	-10.46	<25.8	55.3	**>29.5**	25.8
"	"	"	29.1	50%	-6.02	23.1	55.3	**32.2**	"
"	"	"	27.2	80%	-1.94	25.3	55.3	**30.0**	"
1240	flat	H	41.4	30%	-10.46	30.9	54.0	**23.1**	29.0
"	"	"	41.2	50%	-6.02	35.2	54.0	**18.8**	"
"	"	"	40.8	80%	-1.94	38.9	54.0	**15.1**	"
1550	end	V	45.7	30%	-10.46	35.2	54.0	**18.8**	29.7
"	"	"	42.2	50%	-6.02	36.2	54.0	**17.8**	"
"	"	"	41.1	80%	-1.94	39.2	54.0	**14.8**	"
1860	side	V	42.0	30%	-10.46	31.5	55.3	**23.8**	30.7
"	"	"	40.4	50%	-6.02	34.4	55.3	**20.9**	"
"	"	"	40.0	80%	-1.94	38.1	55.3	**17.2**	"
2170	end	V	44.2	30%	-10.46	33.7	55.3	**21.6**	31.8
"	-	"	43.0	50%	-6.02	37.0	55.3	**18.3**	"
"	-	"	41.0	80%	-1.94	39.1	55.3	**16.2**	"
2480	-	V	41 noise floor	30%	-10.46	<30.5	55.3	**>24.8**	32.9
	-		41 noise floor	50%	-6.02	<35.0	55.3	**>20.3**	
"	-	"	41 noise floor	80%	-1.94	<39.0	55.3	**>16.3**	"
2790	-	V	41 noise floor	30%	-10.46	<31.5	54.0	**>22.5**	33.2
"	-	"	41 noise floor	50%	-6.02	<36.0	54.0	**>18.0**	"
"	-	"	41 noise floor	80%	-1.94	<40.0	54.0	**>14.0**	"
3100	-	V	41 noise floor	30%	-10.46	<31.5	54.0	**>22.5**	33.7
"	-	"	41 noise floor	50%	-6.02	<36.0	54.0	**>18.0**	"
"	-	"	41 noise floor	80%	-1.94	<40.0	54.0	**>14.0**	"

DUT Tuned to transmit at 418MHz

Freq. MHz	DUT position	Ant. Pol.	Corrected Data Peak Detector dBuV/m	Duty Cycle %	Duty Cycle Factor dB	Calculated Average Level dBuV/m	FCC Limit dBuV/m	Margin dB	Cable +Ant. Factor dB+dB/m
836	end	V	53.7	30%	-10.46	43.2	60.3	**17.1**	25.0
"	"	"	44.0	50%	-6.02	38.0	60.3	**22.3**	"
"	"	"	38.3	80%	-1.94	36.4	60.3	**23.9**	"
1254	side	V	42.1	30%	-10.46	31.6	54.0	**22.4**	29.0
"	"	"	41.7	50%	-6.02	35.7	54.0	**18.3**	"
"	"	"	43.0	80%	-1.94	41.1	54.0	**12.9**	"
1672	side	V	47.8	30%	-10.46	37.3	54.0	**16.7**	30.1
"	"	"	44.2	50%	-6.02	38.2	54.0	**15.8**	"
"	"	"	42.9	80%	-1.94	41.0	54.0	**13.0**	"
2090	end	H	44.0	30%	-10.46	33.5	60.3	**26.8**	31.5
"	"	"	42.1	50%	-6.02	36.1	60.3	**24.2**	"
"	"	"	42.3	80%	-1.94	40.4	60.3	**19.9**	"
2508	end	V	43.2	30%	-10.46	32.7	60.3	**27.6**	33.0
"	-	"	42 noise floor	50%	-6.02	<36.0	60.3	**>24.3**	"
"	-	"	42 noise floor	80%	-1.94	<40.1	60.3	**>20.2**	"
2926	-	V	41 noise floor	30%	-10.46	<30.5	60.3	**>29.8**	33.3
"	-	"	41 noise floor	50%	-6.02	<35.0	60.3	**>25.3**	"
"	-	"	41 noise floor	80%	-1.94	<39.1	60.3	**>21.2**	"
3344	-	V	41 noise floor	30%	-10.46	<30.5	60.3	**>29.8**	34.4
	-		41 noise floor	50%	-6.02	<35.0	60.3	**>25.3**	
"	-	"	41 noise floor	80%	-1.94	<39.1	60.3	**>21.2**	"
3762	-	V	42 noise floor	30%	-10.46	<31.5	54.0	**>22.5**	34.8
"	-	"	42 noise floor	50%	-6.02	<36.0	54.0	**>18.0**	"
"	-	"	42 noise floor	80%	-1.94	<40.1	54.0	**>13.9**	"
4180	-	V	42 noise floor	30%	-10.46	<31.5	54.0	**>22.5**	35.0
"	-	"	42 noise floor	50%	-6.02	<36.0	54.0	**>18.0**	"
"	-	"	42 noise floor	80%	-1.94	<40.1	54.0	**>13.9**	"