

TEST REPORT



Certification # 1367-01

Laboratory ID

PRODUCT SAFETY ENGINEERING, INC.
12955 Bellamy Brothers Boulevard
Dade City, Florida 33525 USA
PH (352) 588-2209 FX (352) 588-2544

Submitter ID

The Genie Company
22790 Lake Park Blvd.

Alliance, OH 44601-3498

Report Issue Date: 13 OCT 03
Sample S/N: None
Sample Receipt Date: October 01, 2003
Sample Test Date: see data sheets

Test Report Number: 03F289B
Model Designation: ACSD1G
Product Description: Garage Door Transmitter
Marketing Approval _____

Description of non-standard test method or test practice: *None*

Estimated Measurement Uncertainty: *Not Applicable*

Special limitations of use: *None*

Traceability: *reference standards of measurement have been calibrated by a competent body using standards traceable to the NIST.*

According to testing performed at Product Safety Engineering, Inc., the above-mentioned unit is in compliance with the electromagnetic compatibility requirements defined in regulations indicated on page (3) of the test report. The test results contained herein relate only to the model(s) identified above. It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical characteristics.

As the responsible EMC Project Engineer, I hereby declare that the equipment tested as specified above conforms to the requirements indicated on page (3) of the test report.

Signature David Foerstner Name David Foerstner

Title Engineering Group Leader Date 10 OCT 03

Reviewed by: John E. Hall Date 13 OCT 03
Approved Signatory

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Test Report Number 03F289B

Product Safety Engineering, Inc. 12955 Bellamy Brothers Blvd. Dade City, FL 33525
Tel (352) 588-2209 Fax (352) 588-2544

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EMISSIONS TEST REGULATIONS :

The emissions tests were performed according to following regulations:

- ☐ - EN 50081-1 : 1992
- ☐ - EN 50081-2 : 1995

- ☐ - EN 55011 : 1998 / A1:1999
- ☐ - Group 1
- ☐ - Group 2
- ☐ - Class A
- ☐ - Class B

- ☐ - EN 55013 : 1990 / A12:1994 / A13:1996 / A14:1999

- ☐ - EN 55014 : 1993 / A1:1997
- ☐ - Household appliances and similar
- ☐ - Portable tools
- ☐ - Semiconductor devices

- ☐ - EN 55022 : 1998
- ☐ - Class A
- ☐ - Class B

- ☐ - AS/NZS 3548:1995
- ☐ - Class A
- ☐ - Class B

- ☐ - ICES-003
- ☐ - Class A
- ☐ - Class B

- ☐ - CNS 13438
- ☐ - Class A
- ☐ - Class B

- ☐ - VCCI : 1999
- ☐ - Class A
- ☐ - Class B

- ☒ - FCC Part 15
- ☐ - Class A
- ☒ - Class B

- ☒ - Certification
- ☐ - Verification
- ☐ - Declaration of Conformity

- ☐ - FCC Part 18

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Environmental conditions during testing:

	LAB	OATS
Temperature: *	_____	: _____
Relative Humidity: **	_____	: _____

* The ambient temperature during the testing was within the range of (50° - 104° F) unless indicted above.

** The humidity levels during the testing was within the range of (10% - 90%) relative humidity unless indicated above.

Power supply system : 3 (2x1.5V) Volts DC Hz Battery

Sign Explanations:

- ☐ - not applicable
- ☒ - applicable

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Emissions Test Conditions: CONDUCTED EMISSIONS (Interference Voltage)

The *CONDUCTED EMISSIONS (INTERFERENCE VOLTAGE)* measurements were performed at the following test location:

■ - Test not applicable

- ☐ - Darby Test Site (Open Area Test Site)
- ☐ - Darby Laboratory

Test equipment used :

	Model Number	Manufacturer	Description	Serial Number
<input type="checkbox"/> -	8028-50	Solar	50 Ω LISN	829012, 829022
<input type="checkbox"/> -	3825/2	Solar	50 Ω LISN	924840
<input type="checkbox"/> -	EMC-30	Electro-Metrics	EMI Receiver	191
<input type="checkbox"/> -	8566B	Hewlett-Packard	Spectrum Analyzer	2421A00526
<input type="checkbox"/> -	85650A	Hewlett-Packard	Quasi-Peak Adapter	2043A00209
<input type="checkbox"/> -	85662A	Hewlett Packard	Analyzer Display	2403A07352
<input type="checkbox"/> -	8028-50	Solar	50 Ω LISN	903725, 903726
<input type="checkbox"/> -	FCC-TLISN-T4	Fisher Custom Com.	Telecom ISN	20072

Emissions Test Conditions: RADIATED EMISSIONS (Magnetic Field)

The *RADIATED EMISSIONS (MAGNETIC FIELD)* measurements were performed at the following test location:

- ☐ - Darby Test Site (Open Area Test Site)
- ☐ -
- ☐ -

at a test distance of :

- ☐ - 3 meters
- ☐ - 30 meters

■ - Test not applicable

Test equipment used :

	Model Number	Manufacturer	Description	Serial Number
<input type="checkbox"/> -	96005	Eaton	Log Periodic Antenna	1099
<input type="checkbox"/> -	BIA-25	Electro-Metrics	Biconical Antenna	4283
<input type="checkbox"/> -	8566B	Hewlett-Packard	Spectrum Analyzer	2421A00526
<input type="checkbox"/> -	85662A	Hewlett-Packard	Analyzer Display	2403A07352
<input type="checkbox"/> -	85650A	Hewlett-Packard	Quasi-Peak Adapter	2043A00209
<input type="checkbox"/> -	ALR-30M	Electro-Metrics	Loop Antenna	824
<input type="checkbox"/> -	8447D	Hewlett Packard	Preamplifier	2944A06832
<input type="checkbox"/> -	EMC-30	Electro-Metrics	EMI Receiver	191
<input type="checkbox"/> -	ALA-130/A	Antenna Research	Loop Antenna	106

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Emissions Test Conditions: RADIATED EMISSIONS (Electric Field)

The *RADIATED EMISSIONS (ELECTRIC FIELD)* measurements, in the frequency range of 30 MHz-1000 MHz, were tested in a horizontal and vertical polarization at the following test location :

☐ - Test not applicable

- ☒ - Darby Site (Open Area Test Site)
- ☐ - Darby Lab
- ☐ -

at a test distance of :

- ☒ - 3 meters
- ☐ - 10 meters
- ☐ - 30 meters

Test equipment used :

Model Number	Manufacturer	Description	Serial Number
<input checked="" type="checkbox"/> - 96005	Eaton	Log Periodic Antenna	1099
<input checked="" type="checkbox"/> - BIA-25	Electro-Metrics	Biconical Antenna	4283
<input checked="" type="checkbox"/> - 8566B	Hewlett-Packard	Spectrum Analyzer	2421A00526
<input checked="" type="checkbox"/> - 85662A	Hewlett-Packard	Analyzer Display	2403A07352
<input checked="" type="checkbox"/> - 85650A	Hewlett-Packard	Quasi-Peak Adapter	2043A00209
<input checked="" type="checkbox"/> - 8447D	Hewlett-Packard	Preamplifier (26dB)	2944A06832
<input type="checkbox"/> - EMC-30	Electro-Metrics	EMI Receiver	191
<input type="checkbox"/> - 8568B	Hewlett Packard	Spectrum Analyzer	2407A03213
<input type="checkbox"/> - 85650A	Hewlett Packard	Quasi-Peak Adapter	2043A00358
<input type="checkbox"/> - 85662A	Hewlett Packard	Analyzer Display	2340A05806
<input type="checkbox"/> - LPA30	Electro-Metrics	Log Periodic	2280
<input type="checkbox"/> - BIA 30	Electro-Metrics	Biconical Antenna	3852

Emissions Test Conditions): INTERFERENCE POWER

The *INTERFERENCE POWER* measurements were performed by using the absorbing clamp on the mains and interface cables in the frequency range 30 MHz - 300 MHz at the following test location :

☒ - Test not applicable

- ☐ - Darby Lab
- ☐ -

Test equipment used :

Model Number	Manufacturer	Description	Serial Number
<input type="checkbox"/> - MDS-21	Rhode&Schwarz	Absorbing Clamp	8608447020
<input type="checkbox"/> - 8566B	Hewlett-Packard	Spectrum Analyzer	2421A00526
<input type="checkbox"/> - 85662A	Hewlett-Packard	Analyzer Display	2403A07352
<input type="checkbox"/> - 85650A	Hewlett-Packard	Quasi-Peak Adapter	2043A00209
<input type="checkbox"/> - 8447D	Hewlett-Packard	Amplifier (26 dB)	2944A06832
<input type="checkbox"/> - EMC-30	Electro-Metrics	EMI Receiver	191

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The EQUIVALENT RADIATED EMISSIONS measurements in the frequency range 1 GHz - 4 GHz were performed in a horizontal and vertical polarization at the following test location :

■ - Darby Test Site (Open Area Test Site)

- ☐ -
- ☐ -
- ☐ -

at a test distance of:

- ☐ - 1 meters
- - 3 meters
- ☐ - 10 meters

☐ - **Test not applicable**

Test equipment used :

	Model Number	Manufacturer	Description	Serial Number
■ -	8566B	Hewlett-Packard	Spectrum Analyzer	2421A00526
■ -	85662A	Hewlett-Packard	Analyzer Display	2403A07352
■ -	85650A	Hewlett-Packard	Quasi-Peak Adapter	2043A00209
■ -	8449B	Hewlett-Packard	Preamplifier	3008A00320
■ -	3115	Electro-Mechanics	Double Ridge Guide Horn	3810

The ANTENNA TERMINAL DISTURBANCE VOLTAGE in the frequency range 30 MHz - 1,000 MHz were performed.

☐ - Darby Test Site (Open Area Test Site)

- ☐ - Laboratory
- ☐ -
- ☐ -

■ - **Test not applicable**

	Model Number	Manufacturer	Description	Serial Number
<input type="checkbox"/> -	2F9-3C4-3C5	Wavecom	UHF PAL TV Modulator	185879
<input type="checkbox"/> -	2F1-3C4-3C5	Wavecom	VHF PAL TV Modulator	157728
<input type="checkbox"/> -	A-8000	IFR	Spectrum Analyzer	1306
<input type="checkbox"/> -	8648B	Hewlett-Packard	Signal Generator	3623A01433
<input type="checkbox"/> -	8648B	Hewlett-Packard	Signal Generator	3623A01477
<input type="checkbox"/> -	LMV-182A	Leader	RMS Milli-Voltmeter	8010091
<input type="checkbox"/> -	3202	Krhon-Hite	Active filter	5899
<input type="checkbox"/> -	FMT115	Leaming	FM Modulator	NONE
<input type="checkbox"/> -	371	UDT	Optical power meter	06657
<input type="checkbox"/> -	TSG95	Tektronix	PAL video / Audio generator	B028883
<input type="checkbox"/> -				

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Equipment Under Test (EUT) Test Operation Mode - Emission tests :

The device under test was operated under the following conditions during emissions testing:

- ☐ - Standby
- ☐ - Test program (H - Pattern)
- ☐ - Test program (color bar)
- ☐ - Test program (customer specific)
- ☒ - Practice operation
- ☐ - Normal Operating Mode
- ☐ -

Configuration of the device under test:

- ☒ - See System Under Test Information in Appendix B

Rationale for EUT setup / configuration:

ANSI C63.4

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Product Safety Engineering, Inc 12955 Bellamy Brothers Blvd. Dade City, FL 33525
Tel (352) 588-2209 Fax (352) 588-2544

Emission Test Results:

Conducted emissions 10/150/450 kHz - 30 MHz
--

The requirements are	<input type="checkbox"/> - MET	<input type="checkbox"/> - NOT MET
Minimum limit margin	dB	at MHz
Remarks:		

Radiated emissions (magnetic field) 10 kHz - 30 MHz
--

The requirements are	<input type="checkbox"/> - MET	<input type="checkbox"/> - NOT MET
Minimum limit margin	dB	at MHz
Remarks:		

Radiated emissions (electric field) 30 MHz - 1000 MHz
--

The requirements are	<input checked="" type="checkbox"/> - MET	<input type="checkbox"/> - NOT MET
Minimum limit margin	10.9 dB	at 390.0 MHz
Remarks:		

Interference Power at the mains and interface cables 30 MHz - 300 MHz
--

The requirements are	<input type="checkbox"/> - MET	<input type="checkbox"/> - NOT MET
Minimum limit margin	dB	at MHz
Remarks:		

Radiated emissions 1 GHz - 4 GHz

The requirements are	<input checked="" type="checkbox"/> - MET	<input type="checkbox"/> - NOT MET
Minimum limit margin	16.6 dB	at 1.170 GHz
Remarks:		

Antenna Terminal Disturbance Voltage 30 MHz - 1,000 MHz
--

The requirements are	<input type="checkbox"/> - MET	<input type="checkbox"/> - NOT MET
Minimum limit margin	dB	at MHz
Remarks:		

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GENERAL REMARKS:

SUMMARY:

The requirements according to the technical regulations are

■ - met

□ - **not** met.

The device under test does

■ - fulfill the general approval requirements mentioned on page 3.

□ - **not** fulfill the general approval requirements mentioned on page 3.

Testing Start Date October 02, 2003

Testing End Date: October 02, 2003

- PRODUCT SAFETY ENGINEERING INC -

Test Report Number 03F289B

Product Safety Engineering, Inc 12955 Bellamy Brothers Blvd. Dade City, FL 33525
Tel (352) 588-2209 Fax (352) 588-2544

Test-setup photo(s):
Conducted emission 450/150 kHz - 30 MHz

N/A

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Test-setup photo(s):
Radiated emission 30 MHz - 4000 MHz



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APPENDIX

A

Test Equipment Calibration Information & Test Data Sheets

TEST EQUIPMENT CALIBRATION INFORMATION

Manufacturer	Model	Description	Serial Number	Cal Due
Hewlett Packard	8566B	Spectrum Analyzer	2421A00526	08/14/04
Hewlett Packard	85662A	Display	2403A07352	08/14/04
Hewlett Packard	85650A	Quasi-Peak Adapter	2043A00209	08/14/04
Hewlett Packard	8447D	Preamplifier 0.1 - 1,000 MHz	2944A06832	11/13/03
Hewlett Packard	8568B	Spectrum Analyzer	2407A03213	08/14/04
Hewlett Packard	85662A	Display	2340A05806	08/14/04
Hewlett Packard	85650A	Quasi-Peak Adapter	2043A00358	08/14/04
Hewlett Packard	8447D	Preamplifier 0.1 - 1,000 MHz	2944A06901	08/02/03
Hewlett Packard	8447D	Preamplifier 0.1 - 1,000 MHz	1937A03247	07/17/04
Hewlett Packard	8449B	Preamplifier 1 - 26.5 GHz	3008A00320	11/08/03
Hewlett Packard	8648B	Signal Generator	3443U00312	04/24/04
Hewlett Packard	8672A	Signal Generator	2211A02426	11/14/03
Eaton	96005	Log Periodic Antenna	1099	01/24/04
Electro-Metrics	LPA 30	Log Periodic Antenna	2280	12/06/03
Electro-Metrics	BIA 30	Biconical Antenna	3852	12/05/03
Electro-Metrics	BIA 25	Biconical Antenna	4283	01/22/04
Electro-Mechanics	3115	Double Ridge Guide Ant.	3810	11/07/03
Electro-Metrics	ALR30M	Magnetic Loop Antenna	824	12/12/03
Solar	8012	LISN	924840	12/29/03
Solar	8028	LISN	829012/809022	12/19/03
Solar	8028	LISN	903725/903726	11/18/03
Schwartzbeck	MDS-21	Absorbing Clamp	02581	09/13/03
Leader	LFG1310	Function Generator	8060233	04/24/04
IFR Systems	A-8000	Spectrum Analyzer	1306	11/13/03
Electro-Metrics	EMC-30	EMI Receiver	191	04/24/04
Antenna Research	ALA-130/A	Loop Antenna	106	03/14/04
Radio Shack	63-867	Temp/Hygrometer	N/A	04/18/04
Radio Shack	63-867A	Temp/Hygrometer	N/A	04/28/04

PRODUCT EMISSIONS

PRODUCT SAFETY ENGINEERING

Data File: KEYPAD FCC-B 10-2-2003

No	EMISSION	SPEC LIMIT	MEASUREMENTS			POL	SITE		CORR FACTOR	COMMENTS
	FREQUENCY MHz		ABS	dLIM	MODE		HGT	AZM		
							cm	deg	dB	
1	60.07	40.0	14.9	-25.1	PK	V	100	1		
2	61.74	40.0	19.4	-20.6	PK	V	100	90		
3	68.89	40.0	16.1	-23.9	PK	V	100	180		
4	118.85	43.5	20.7	-22.8	PK	H	200	225		
5	390.021	46.0	81.3	35.3	PK	V	200	45		
6	512.34	46.0	23.0	-23.0	PK	H	200	90		
7	681.14	46.0	24.3	-21.7	PK	H	200	270		
8	728.39	46.0	24.9	-21.1	PK	V	100	135		
9	779.986	46.0	56.2	10.2	PK	V	200	45		

A3

Genie WKEP Transmitter

Measured @ 3 Meters

Frequency (GHz)	Spec Limit (dB μ V/M)	Measurement (dB μ V/M)	Δ Limit	Polarity	Height (cm)
1.170	72.2	55.6	-16.6	Vertical	100
1.560	72.2	46.6	-25.6	Vertical	100
1.950	72.2	37.5	-34.7	Vertical	100
2.340	72.2	36.3	-35.9	Vertical	100
2.730	72.2	32.0	-40.2	Vertical	100
3.120	72.2	32.1	-40.1	Vertical	100
3.510	72.2	32.2	-40.0	Vertical	100
3.900	72.2	32.0	-40.2	Vertical	100

Page **A4**

PRODUCT SAFETY ENGINEERING
ATTN: O DB

PRODUCT SAFETY ENGINEERING

OPEN AREA TEST SITE

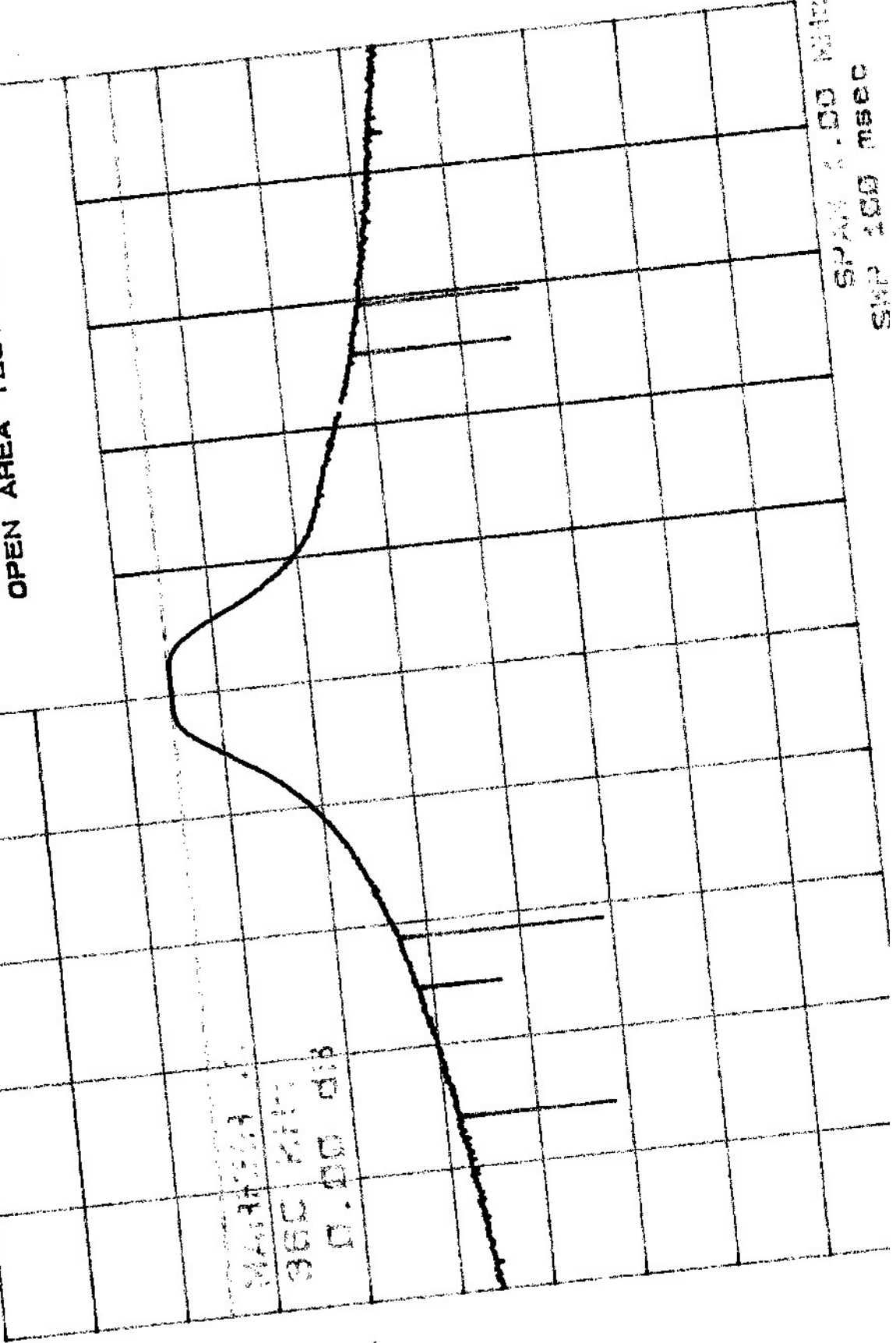
REF: 97.0 dBm

20 dB

POS PK

MAX: 97.0 dB
36C kHz
0.00 dB

01.
-2.0
dBm



SPAN: 1.00 MHz
SWP: 100 mHz

FIELD STRENGTH LIMIT CALCULATION

Per FCC Part 15.231

For Transmitter operating at 390 MHz, Peak Limit for Fundamental Frequency:

$$\text{Limit } \mu\text{V/M} = 3750 + ((\text{Fundamental MHz} - 260) \times 41.6667)$$

$$\begin{aligned} \text{Limit } \mu\text{V/M} &= 3750 + ((390 - 260) \times 41.6667) = (3750 + (130 \times 41.6667)) = \\ &= (3750 + 5,416.6) = 9166.6 \mu\text{V/M} \end{aligned}$$

$$\text{Fundamental Limit in dBuV/M} = 20 \log (9166.6) = 79.2 \text{ dBuV/M}$$

For Transmitter operating at 390 MHz, Limit for Spurious Emissions is 20 dB down
Therefore Spurious Limit is $79.2 - 20 = 59.2 \text{ dBuV/M}$

CALCULATION FOR DUTY CYCLE ADJUSTMENT

Sample of 100 ms pulse train (see plot#1)

52.0 ms "completely off time"

43.0 ms "mixed on/off time"

5.0 ms mostly on time which we will count as completely on

Examining the 43.0 ms of "mixed on/off time", we see that each 5.0 ms frame of mixed has six "short on pulses" of 200 μ S and two "long on pulses" of 420 μ S (per plots #2 & #3)

Calculating the "on time" for mixed: $6 \times 200 \mu\text{S} = 1.2 \text{ ms}$ and $2 \times 420 \mu\text{S} = 0.84 \text{ ms}$
Combining $1.2 \text{ ms} + 0.84 \text{ ms} = 2.04 \text{ ms}$ "on time" per each 5 ms frame, so there is 4 ms "on time" per each 10 ms frame.

Therefore in 43 ms of mixed there is **$4.3 \times 4.0 = 17.2 \text{ ms}$ of "on time"** and $43 - 17.2 = 25.8 \text{ ms}$ of "off time".

Combining completely off time of 52 ms with mixed off time of 25.8ms we get:
 $52 + 25.8 \text{ ms} = 77.8 \text{ ms}$ "total off time" which means total on time at most is $100 \text{ ms (total train)} - 77.8 = 22.2 \text{ ms}$ of "on time" maximum

To determine the correction factor for comparing to the Average limit
 $20 \log (\text{on time} / \text{total time}) = 20 \log (22.2/100) = 20 \log (0.222) = (-13.0) \text{ dB}$

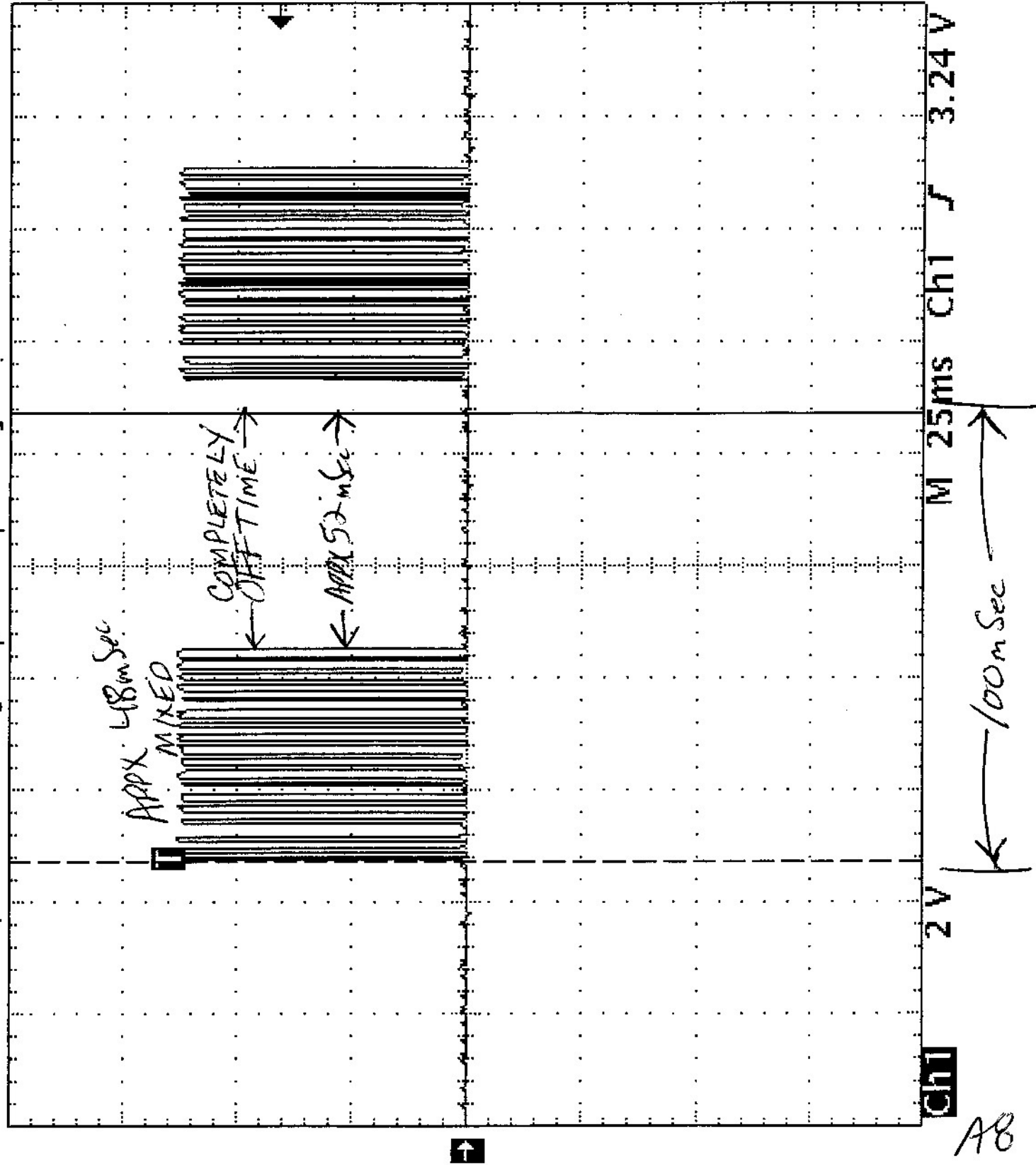
The Peak Limit for fundamental as determined previously is 79.2 dBuV/M
Thus Average Limit is $79.2 \text{ dBuV/M} + 13.0 \text{ dB} = 92.2 \text{ dBuV/M}$ (Fundamental)
And Average Limit for the Spurious Emissions is $92.2 - 20 \text{ dB} = 72.2 \text{ dBuV/M}$

ek stop: 2ks/s

19 Acqs

Δ : 100ms
@: 99ms

PLOT #1



AB

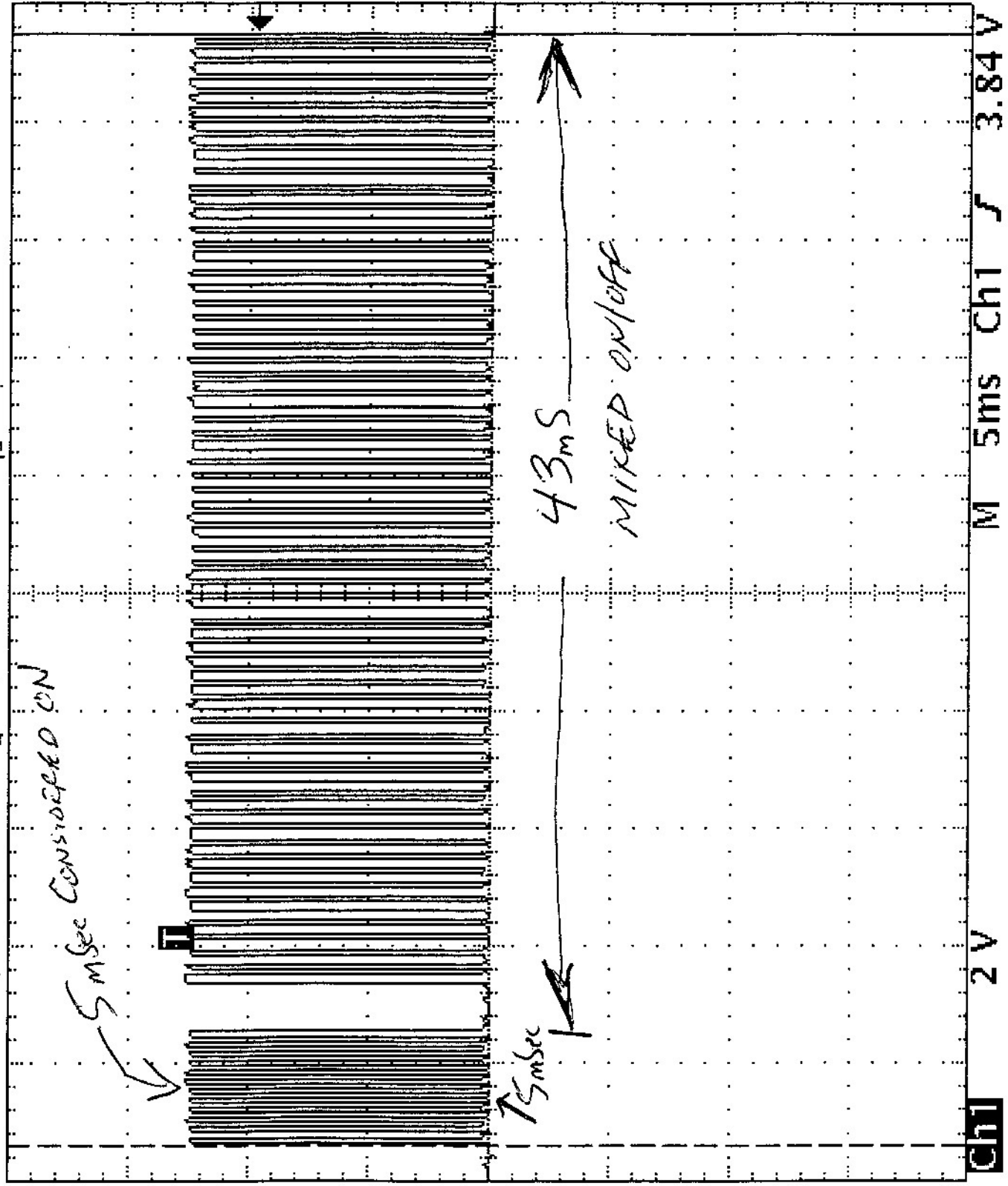
ek Stop 10KS/s

8 Acqs

[T]

Δ : 47.2ms
@: 38.3ms

PLOT #2



A9

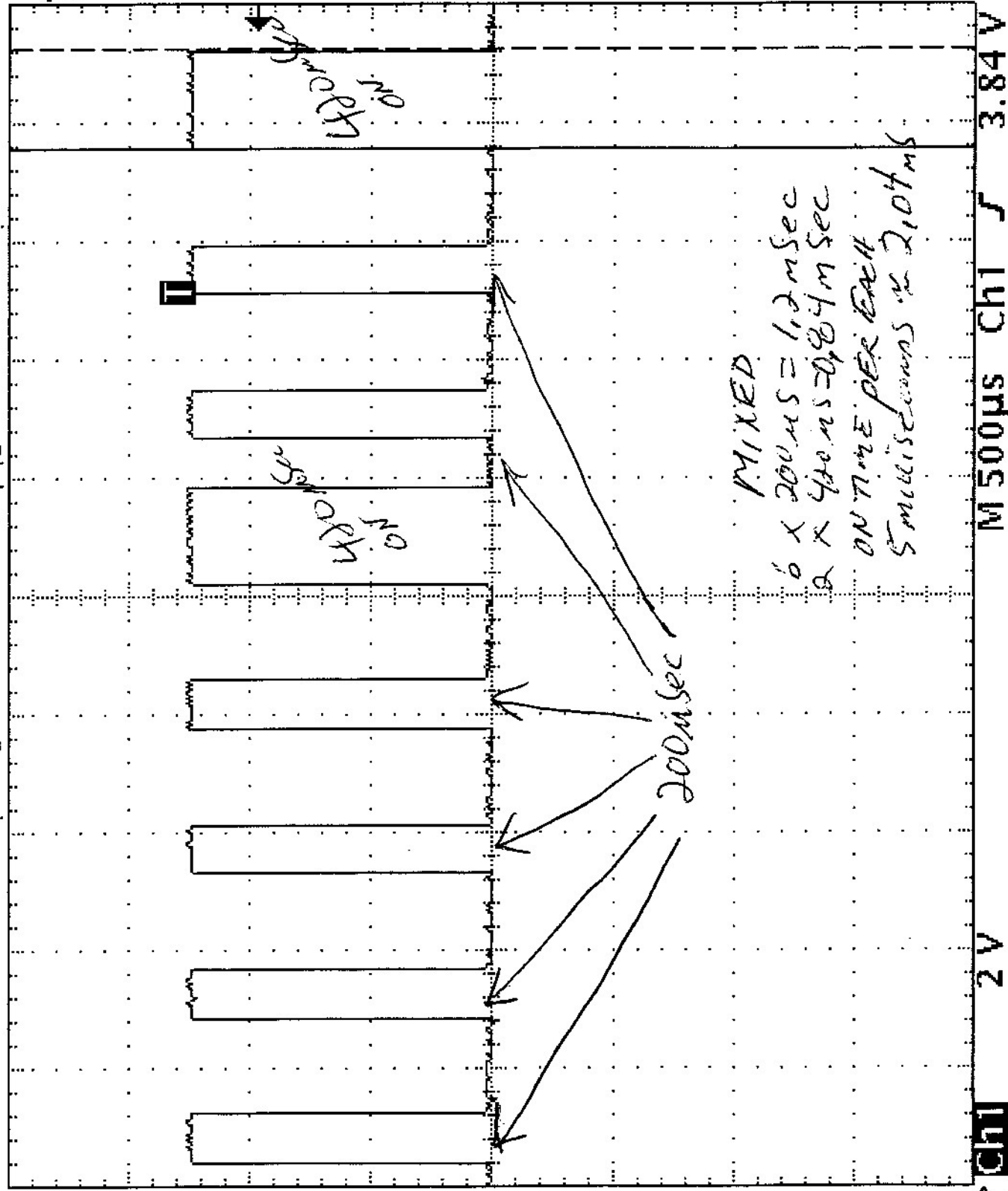
ek Stop 100KS/s

76 Acqs

[T]

$\Delta: 420\mu s$
 $@: 600\mu s$

PLOT #3



MIXED

6 x 200µs = 1.2mSec

2 x 400µs = 0.8mSec

ON TIME PER EACH

5mSec

2.104mSec

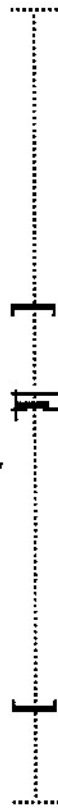
5mSec

Ch1

A10

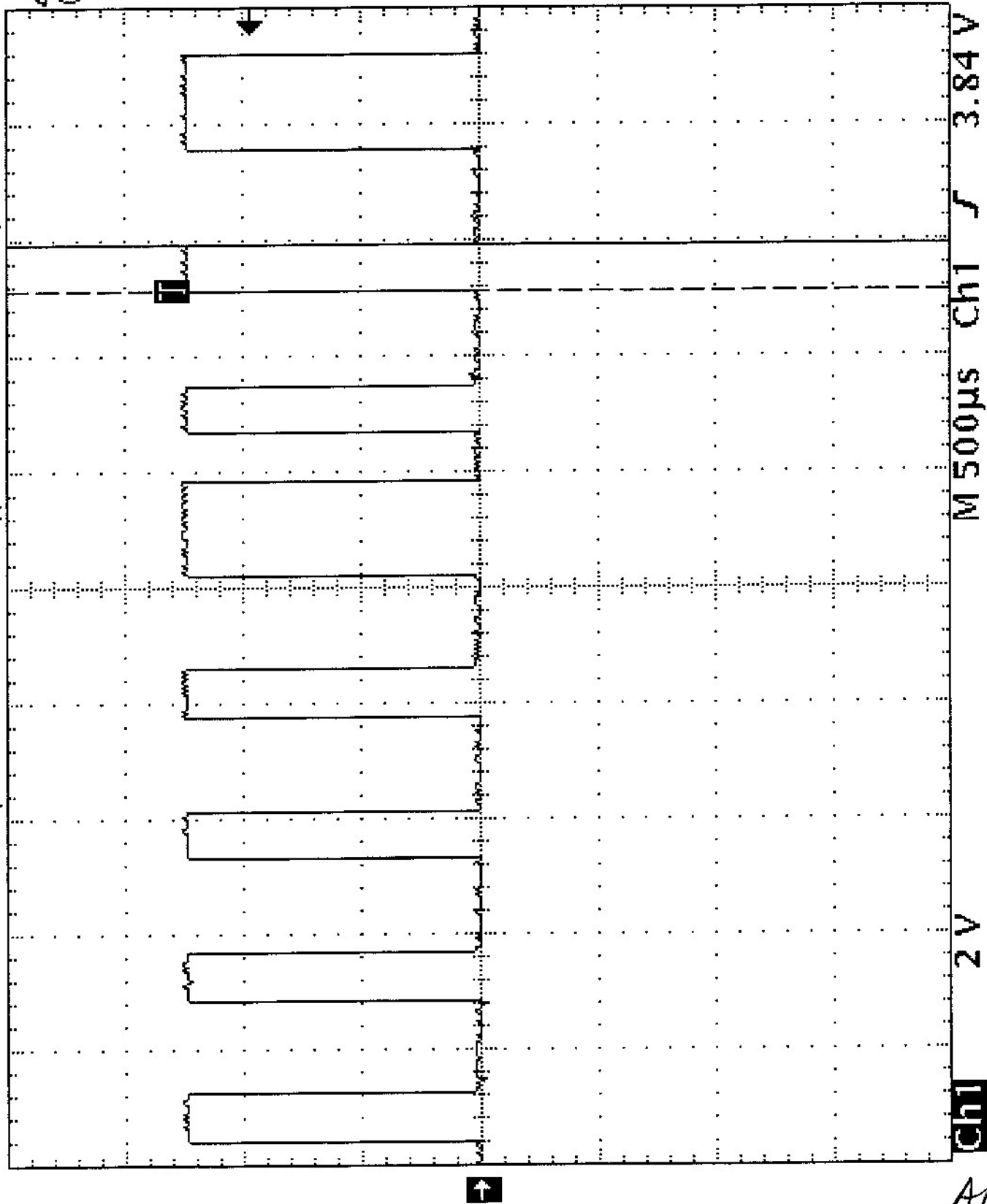
ek stop: 100KS/s

76 Acqs



Δ : 200µs
@: 190µs

PLOT # 4



A11

APPENDIX

B

System Under Test Description

SYSTEM COMPONENTS

DEVICE TYPE: EUT, GENIE WKEP GARAGE DOOR TRANSMITTER

INTERFACE CABLES

DEVICE TYPE: EUT NONE

SHIELD:

LENGTH:

CONNECTOR TYPE:

PORT:

AC LINE CORDS

DEVICE TYPE: EUT NONE

SHIELD:

LENGTH:

CONNECTOR TYPE:

APPENDIX

C

Measurement Protocol

The test methodology followed during the collection of the data included within this technical report was ANSI C63.4:1992.

The EUT was powered with 3 Volts DC during the collection of data included within.

The data is compared to the FCC Part 15 Class B limits.

The "EMI" instrumentation is capable of calculating the final emission level based on the following formula:

Level at the receiver (dB μ V) + Antenna Correction Factor (dB/M) + Cable Loss (dB) - Preamp Gain (dB) = Actual Level in dB μ V/M.

The sample calculation below is based on the actual test data collected:

Observed Level		88.1	dB μ V	
ACF	+	16.7	dB/M	
Cable Loss	+	2.6	dB	
Preamp Gain	-	26.0	dB	
Actual Level		81.3	dB μ V/M	@ 390.0 MHz

Please have a company official review this report and sign.
