

Nemko Test Report: 4L0100RUS1REV3

Applicant: AGL Corporation
2202 Redmond Rd.
Jacksonville, AR 72076

**Equipment Under Test:
(E.U.T.)** A710 Laser w/Wireless Remote Control

In Accordance With: **FCC Part 15, Subpart C, 15.249**
For 900 MHz Transmitters

Tested By: Nemko Dallas Inc.
802 N. Kealy
Lewisville, Texas 75057-3136

Authorized By: 
Dustin Oaks, Account Manager

Date: 10/8/2004

Total Number of Pages: 23

EQUIPMENT: A710

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*EQUIPMENT: A710***Section 1. Summary Of Test Results**

Manufacturer: AGL Corporation

Model No.: A710

Serial No.: None

General: **All measurements are traceable to national standards.**

These tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with FCC Part 15.249. All tests were conducted using measurement procedure ANSI C63.4-2001. Radiated Emissions were made on an open area test site.



New Submission



Production Unit



Class II Permissive Change



Pre-Production Unit

THIS TEST REPORT RELATES ONLY TO THE ITEM(S) TESTED.

THE FOLLOWING DEVIATIONS FROM, ADDITIONS TO, OR EXCLUSIONS FROM THE
TEST SPECIFICATIONS HAVE BEEN MADE. NONE

**NVLAP LAB CODE: 100426-0**

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Summary Of Test Data

NAME OF TEST	PARA. NO.	RESULT
Conducted Emissions	15.207	Complies
Radiated Emissions	15.249	Complies

EQUIPMENT: A710
Canadian/FCC Matrix

FCC Section	Canada Section
15.249(a) Fundamental	RSS210 6.2.2(m2)(1) Fundamental
15.249(a) Harmonics	RSS210 6.2.2(m2)(1) Harmonics
15.249(b)	RSS210 6.2.2(m2)(3)
15.207	RSS 210 9.0

Section 2. General Equipment Specification

Frequency Range: Single Channel

Operating Frequency(ies) of Sample: 915.4 MHz

Tunable Bands: N/A

Number of Channels: 1

Channel Spacing: NA

User Frequency Adjustment: None

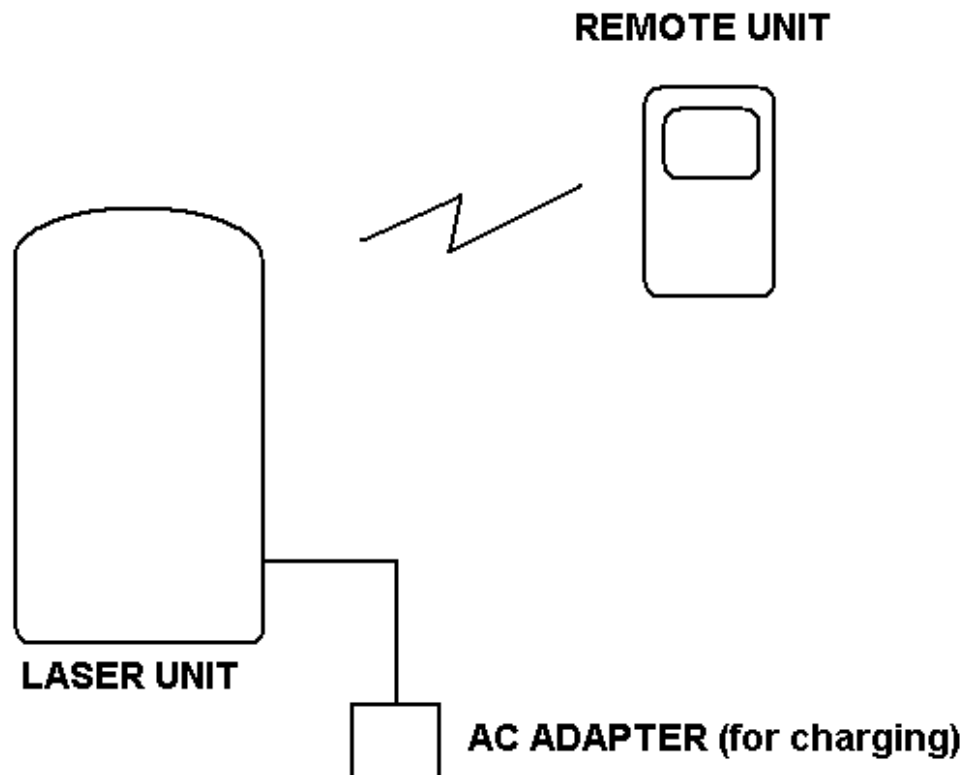
Integral Antenna	Yes	No
	☒	☐

EQUIPMENT: A710

Description of EUT

A visible universal laser that can be used for leveling , vertical alignment, squaring, and single single and dule grade applications.

System Diagram



*EQUIPMENT: A710***Section 3. Powerline Conducted Emissions**

NAME OF TEST: Powerline Conducted Emissions	PARA. NO.: 15.207
TESTED BY: Art Ruvalcaba	DATE: 3/16/04

Minimum Standard:

Limits for conducted disturbance at the mains ports

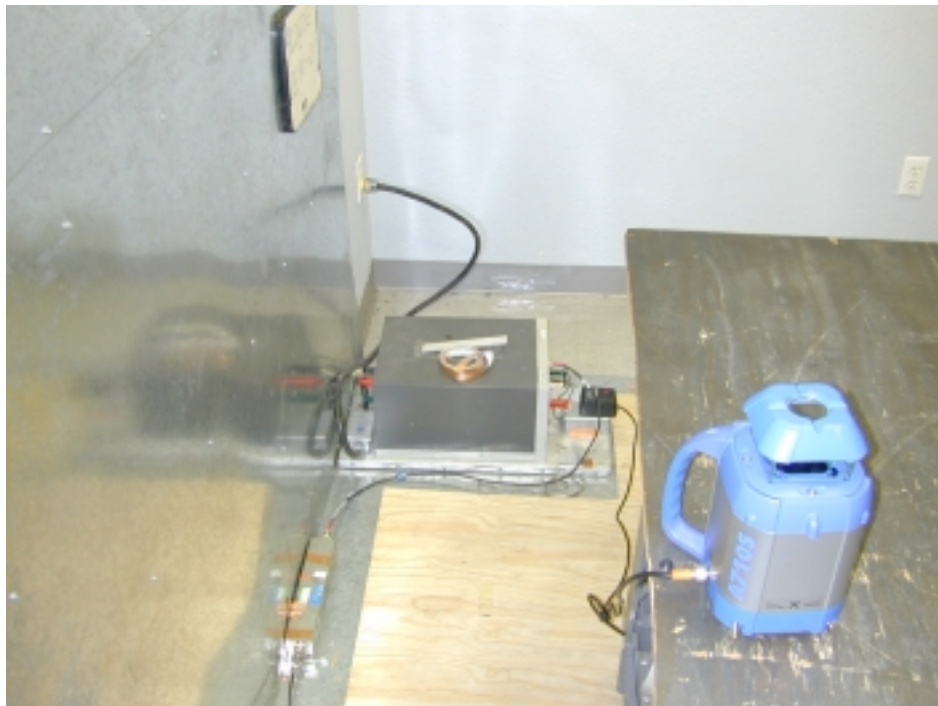
Frequency Range (MHz)	Quasi-peak Limits (dBuV)	Average Limits (dBuV)
0.15 to 0.50	66-56	56-46
0.50 to 5.00	56	46
5.00-30.0	60	50
The limit decreases with the logarithm of the frequency in the range 0.15MHz to 0.5 MHz		

Test Results: Complies.**Measurement Data:** See attached data.**Method of Measurement: (Procedure ANSI C63.4-1992)**

Measurements were made using a spectrum analyzer with 10 kHz RBW, Peak Detector. Any emissions that are close to the limit are measured using a test receiver with 10 kHz bandwidth, CISPR Quasi-Peak Detector.

[illegible]

EQUIPMENT: A710
Conducted Photographs



EQUIPMENT: A710

Section 4. Radiated Emissions

NAME OF TEST: Radiated Emissions	PARA. NO.: 15.249
TESTED BY: David Light	DATE: 3/16/04

Minimum Standard: Para no. 15.249

(a) The field strengths shall not exceed the following:

Fundamental (MHz)	Field Strength (mV/m)	Field Strength (dB μ V)	Harmonic (mV/m)	Harmonic (dB μ V)
902-928	50	94	0.5	54

(b) Field strength limits are specified at a distance of 3 metres.

(c) Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated limits of 15.209 whichever is the less attenuation.

(d) ...for frequencies above 1000 MHz, the above field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation.

Test Results:

Complies

Measurement Data: See attached table.

Test Data - Radiated Emissions (Digital Emissions: both units)

Radiated Emissions Data					
Complete _____X_____	Job # : <u> 4L0100E </u>	Test # : <u>REHE-01</u>			
Preliminary _____	Page <u> 1 </u>	of <u> 2 </u>			
Client Name :	<u>AGL Corporation</u>				
EUT Name :	<u>A 710</u>				
EUT Model #:	<u>A 710</u>				
EUT Part #:	<u>NONE</u>				
EUT Serial #:	<u>NONE</u>				
EUT Config.:	<u>Rotating Power on</u>				
Specification :	<u>CFR47 Part 15, Subpart B, Class B</u>				
Rod. Ant. #: _____NA_____	Temp. (deg. C) : _____24_____ Humidity (%) : _____31_____ EUT Voltage : _____120Vac EUT Frequency : _____60Hz Phase: _____Single Location: _____D OATS Distance: _____3m	Reference : Date : <u>03/17/04</u> Time : <u>8:30</u> Staff : <u>J. Fish</u> Photo ID: <u>4L0100E REHE-01</u> Peak Bandwidth: <u>100 kHz</u> Video Bandwidth: <u>100kHz</u>			
Bicon Ant.#: _____1479_____					
Log Ant.#: _____1508_____					
Bilog Ant.#: _____NA_____					
Dipole Ant.#: _____NA_____					
Cable#: _____1522_____					
Preamp#: _____762_____					
Limiter#: _____NA_____					
Atten #: _____NA_____					
Detector# : _____1284_____					

Meas. Freq.	Ant. Pol.	Atten.	Meter Reading	Antenna Factor	Path Loss	RF Gain	Corrected Reading	Spec. limit	CR/SL Diff.	Pass Fail Unc.	peak readings Comment
(MHz)	(H/V)	(dB)	(dBuV)	(dB)	(dB)	(dB)	(dBUV/m)	(dBUV/m)	(dB)		
35.4	V	0	41.2	12.2	1.9	27.4	27.9	40.0	-12.1	Pass	
45.8	V	0	45.9	10.3	1.9	27.0	31.1	40.0	-8.9	Pass	
60.4	V	0	45.4	9.8	2.4	26.8	30.8	40.0	-9.2	Pass	
78.5	V	0	53.8	8.8	2.8	26.8	38.6	40.0	-1.4	Unc.	REFER TO QP
78.5	V	0	52.5	8.8	2.8	26.8	37.3	40.0	-2.7	Pass	QP
82.5	V	0	52	8.4	2.8	26.5	36.7	40.0	-3.3	Pass	REFER TO QP
82.5	V	0	51.5	8.4	2.8	26.5	36.2	40.0	-3.8	Pass	QP
111.3	V	0	40.5	12.6	3.4	26.9	29.6	43.5	-14.0	Pass	
136.2	V	0	37.7	11.3	3.8	26.6	26.2	43.5	-17.3	Pass	
46.4	H	0	39.7	10.3	1.9	27.0	24.9	40.0	-15.1	Pass	
77.9	H	0	44.4	8.8	2.8	26.8	29.2	40.0	-10.8	Pass	
82.4	H	0	41.6	8.4	2.8	26.5	26.3	40.0	-13.7	Pass	
117.3	H	0	40.2	12.2	3.4	26.9	28.9	43.5	-14.7	Pass	
142.8	H	0	37.5	11.2	3.8	26.6	25.9	43.5	-17.6	Pass	
305	V	0	27	13.8	6.3	26.8	20.3	46.0	-25.7	Pass	
320	V	0	27	14.9	6.3	26.8	21.4	46.0	-24.6	Pass	
380	V	0	27	14.8	6.3	26.8	21.3	46.0	-24.7	Pass	
420	V	0	27	15.8	7.4	27.4	22.8	46.0	-23.2	Pass	

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Digital Emissions Continued

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EQUIPMENT: A710

Carrier Field Strength



NEMKO Dallas, Inc.

Dallas Headquarters:

802 N. Kealy
Lewisville, TX 75057
Tel: (972) 436-9600
Fax: (972) 436-2667

Radiated Emissions Data

Complete X
Preliminary _____

Job # : 4L0100R Test # : REHE-02
Page 1 of 1

Client Name : AGL Corporation
EUT Name : A710
EUT Model # : A710
EUT Part # : None
EUT Serial # : None
EUT Config. : Laser Unit on side (Worst case)
Remote unit on edge (Worst case)
Specification : 15.249(a) Reference : _____
Rod. Ant. # : NA Temp. (deg. C) : 22 Date : 09/30/04
Bicon Ant.#: NA Humidity (%) : 45 Time : 9:00
Log Ant.#: 1034 EUT Voltage : _____ Staff : D. Light
Bilog Ant.#: NA EUT Frequency : _____ Photo ID: NA
Dipole Ant.#: NA Phase: _____ Peak Bandwidth: 100 kHz
Cable#: 1983 Location: AOATS Video Bandwidth 100kHz
Preamp#: 791 Distance: 3M
Limiter#: NA
Atten # : NA
Detector#: 1464

Meas. Freq. (MHz)	Ant. Pol. (H/V)	External Attenuation (dB)	Meter Reading (dBuV)	Antenna Factor (dB)	Path Loss (dB)	RF Gain (dB)	Corrected Reading (dBuV/m)	Spec. limit (dBuV/m)	CR/SL Diff. (dB)	Pass Fail Unc.	Comment
											Laser Unit
915.5	V	0	59.5	23.9	8.2	0.0	91.6	94.0	-2.4	Pass	
915.5	H	0	51	23.9	8.2	0.0	83.1	94.0	-10.9	Pass	
											Remote Unit
915.5	V	0	39	23.9	8.2	0.0	71.1	94.0	-22.9	Pass	
915.5	H	0	38.6	23.9	8.2	0.0	70.7	94.0	-23.3	Pass	

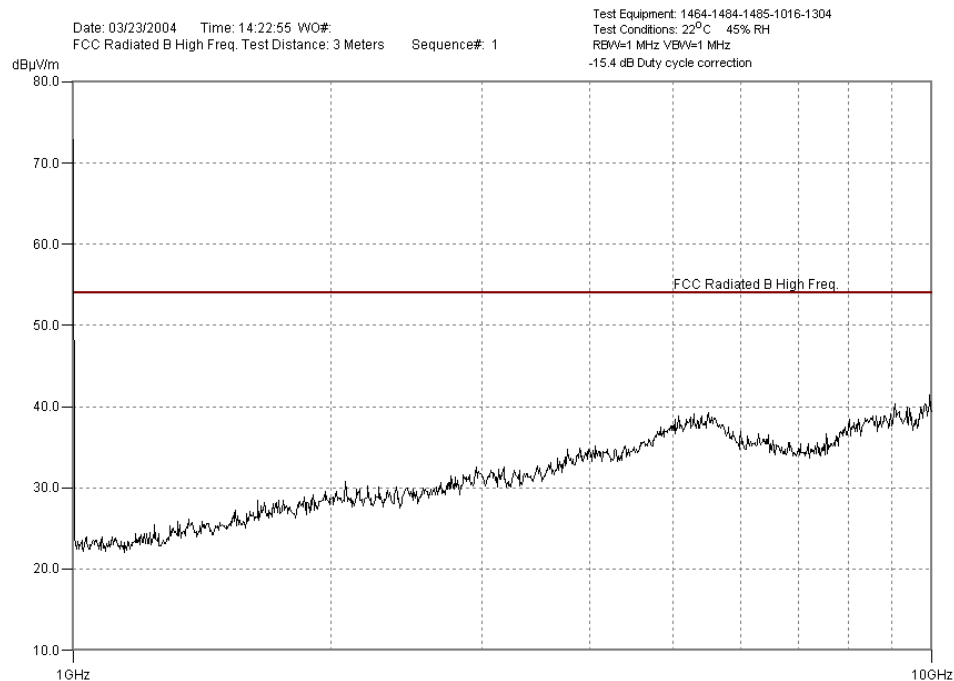
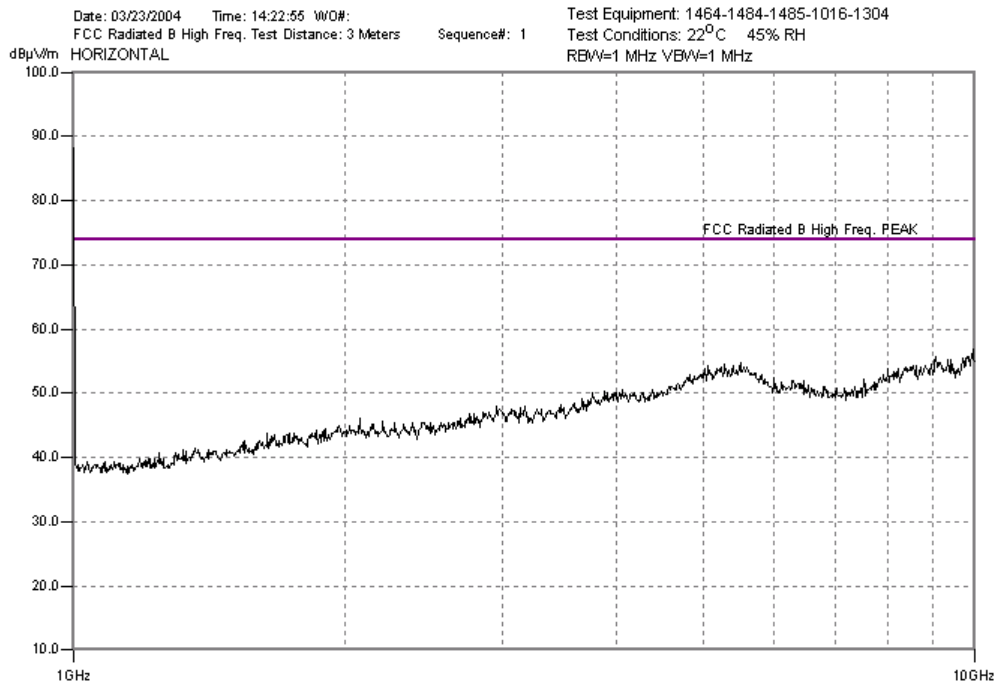
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EQUIPMENT: A710

Harmonic Emissions

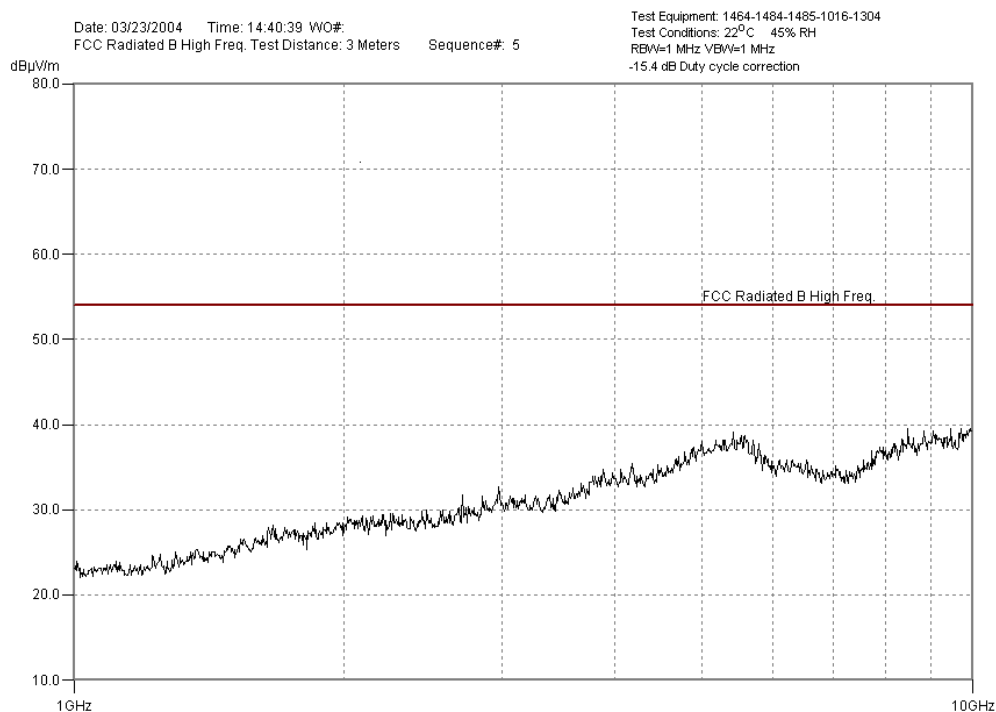
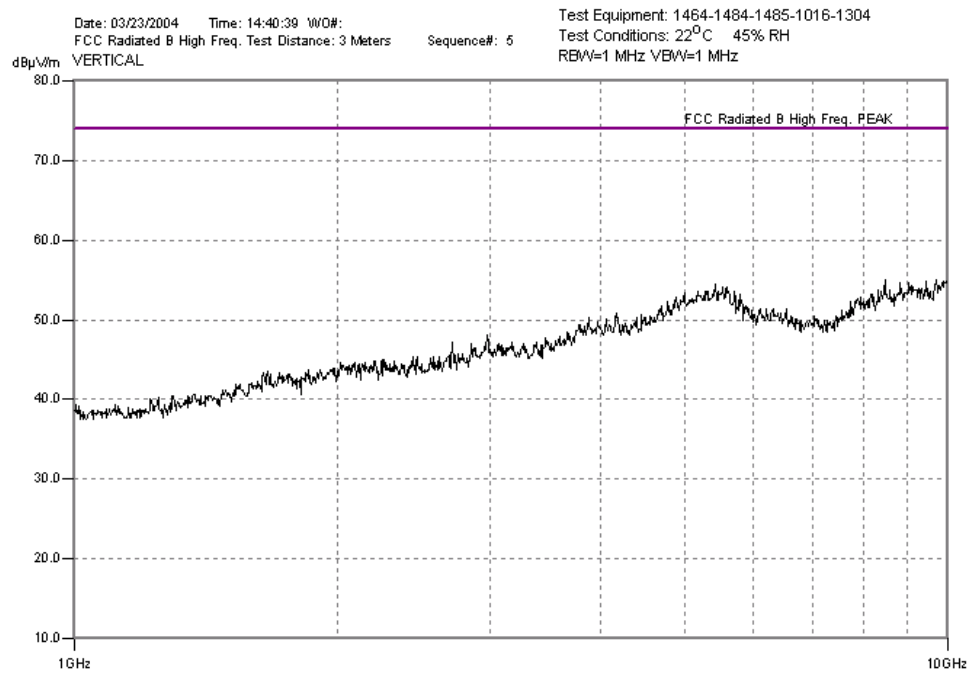
Note: There were no emissions detected above. 1 GHz. Plots shown are representative of all devices and configurations.

Horizontal



EQUIPMENT: A710

Vertical



EQUIPMENT: A710

Duty Cycle - Laser



Nemko Dallas, Inc.

Dallas Headquarters:

802 N. Kealy
Lewisville, TX 75057
Tel: (972) 436-9600
Fax: (972) 436-2667

Data Plot

Page 1 of 4

Job No.: 410100

Specification: 15.249 (15.207)

Tested By: Lance Walker

E.U.T.:	<u>LASER</u>
---------	--------------

Configuration:	TX
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Sample Number: 1

Location:	A-OATS
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Detector Type:	Peak
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1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300	301	302	303	304	305	306	307	308	309	310	311	312	313	314	315	316	317	318	319	320	321	322	323	324	325	326	327	328	329	330	331	332	333	334	335	336	337	338	339	340	341	342	343	344	345	346	347	348	349	350	351	352	353	354	355	356	357	358	359	360	361	362	363	364	365	366	367	368	369	370	371	372	373	374	375	376	377	378	379	380	381	382	383	384	385	386	387	388	389	390	391	392	393	394	395	396	397	398	399	400	401	402	403	404	405	406	407	408	409	410	411	412	413	414	415	416	417	418	419	420	421	422	423	424	425	426	427	428	429	430	431	432	433	434	435	436	437	438	439	440	441	442	443	444	445	446	447	448	449	450	451	452	453	454	455	456	457	458	459	460	461	462	463	464	465	466
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Spurious Emissions

Date: 3/23/2004

Temperature(°C): 22

Relative Humidity(%)	40
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Complete X

Preliminary: _____

Test Equipment Used

Antenna: 1034

Pre-Amp:	791
----------	-----

Filter: _____

Receiver:	1464
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Attenuator #1

Attenuator #2: _____

Additional equipment used:

Measurement Uncertainty:

Directional Coupler: _____

Cable #1:

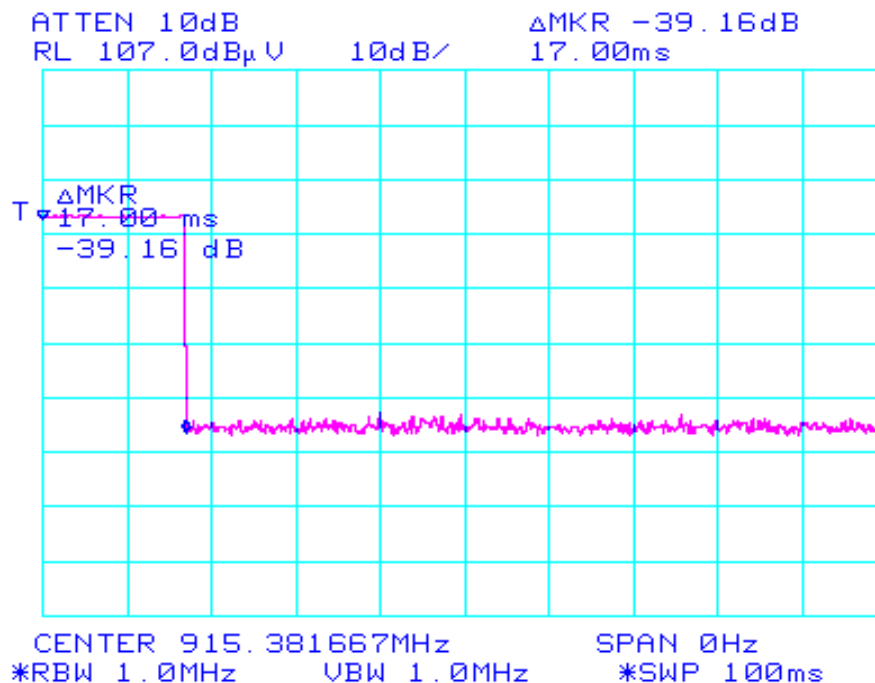
Cable #2:

Cable #3: _____

Cable #4:

Mixer: _____

Measurement Uncertainty:	+/-1.7 dB
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Notes:	Duty cycle = 17%
	$20\log(0.17) = -15.4 \text{ dB}$
	Laser Unit

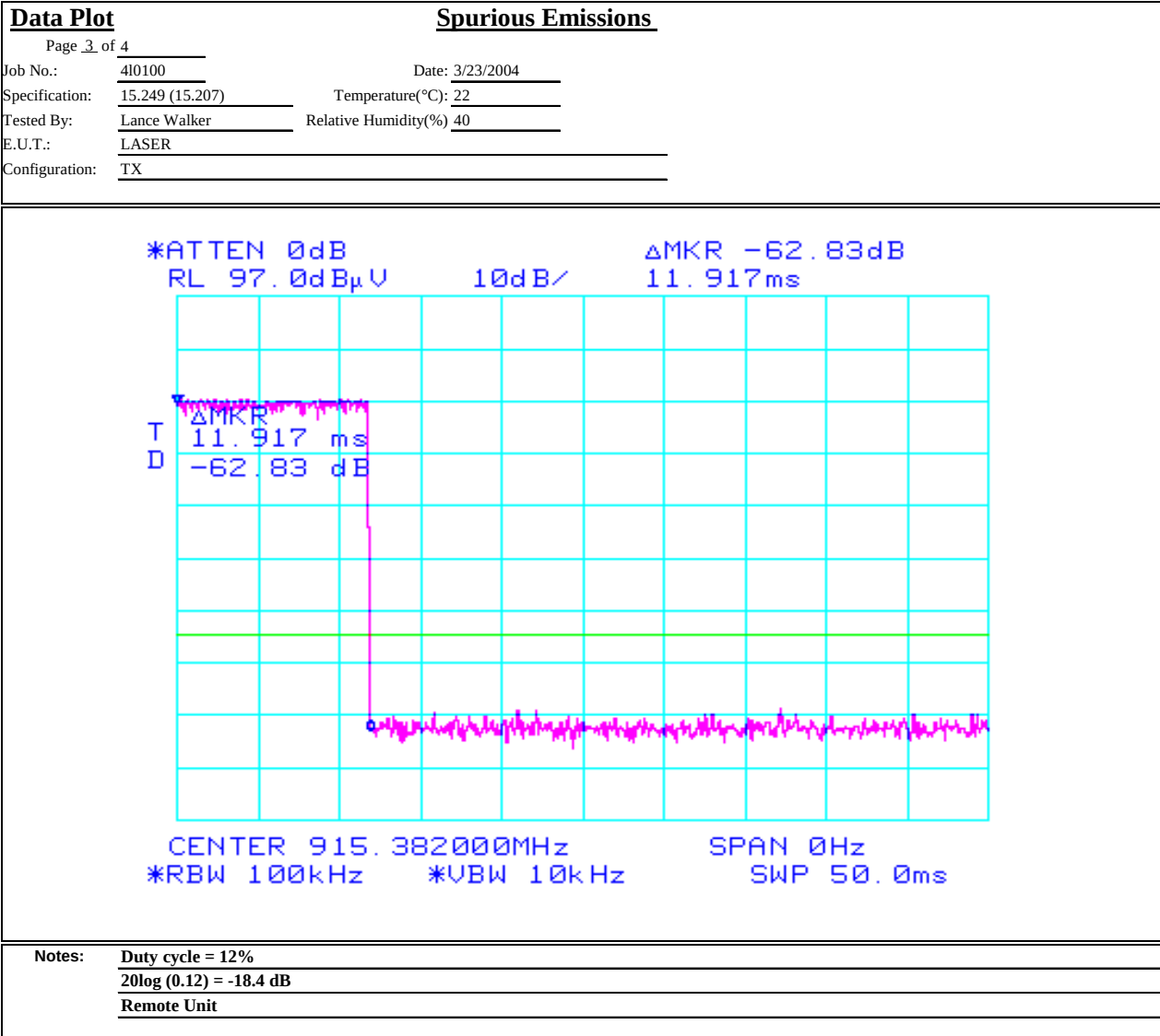
EQUIPMENT: A710

Duty Cycle – Remote Unit



Dallas Headquarters:
802 N. Kealy
Lewisville, TX 75057
Tel: (972) 436-9600
Fax: (972) 436-2667

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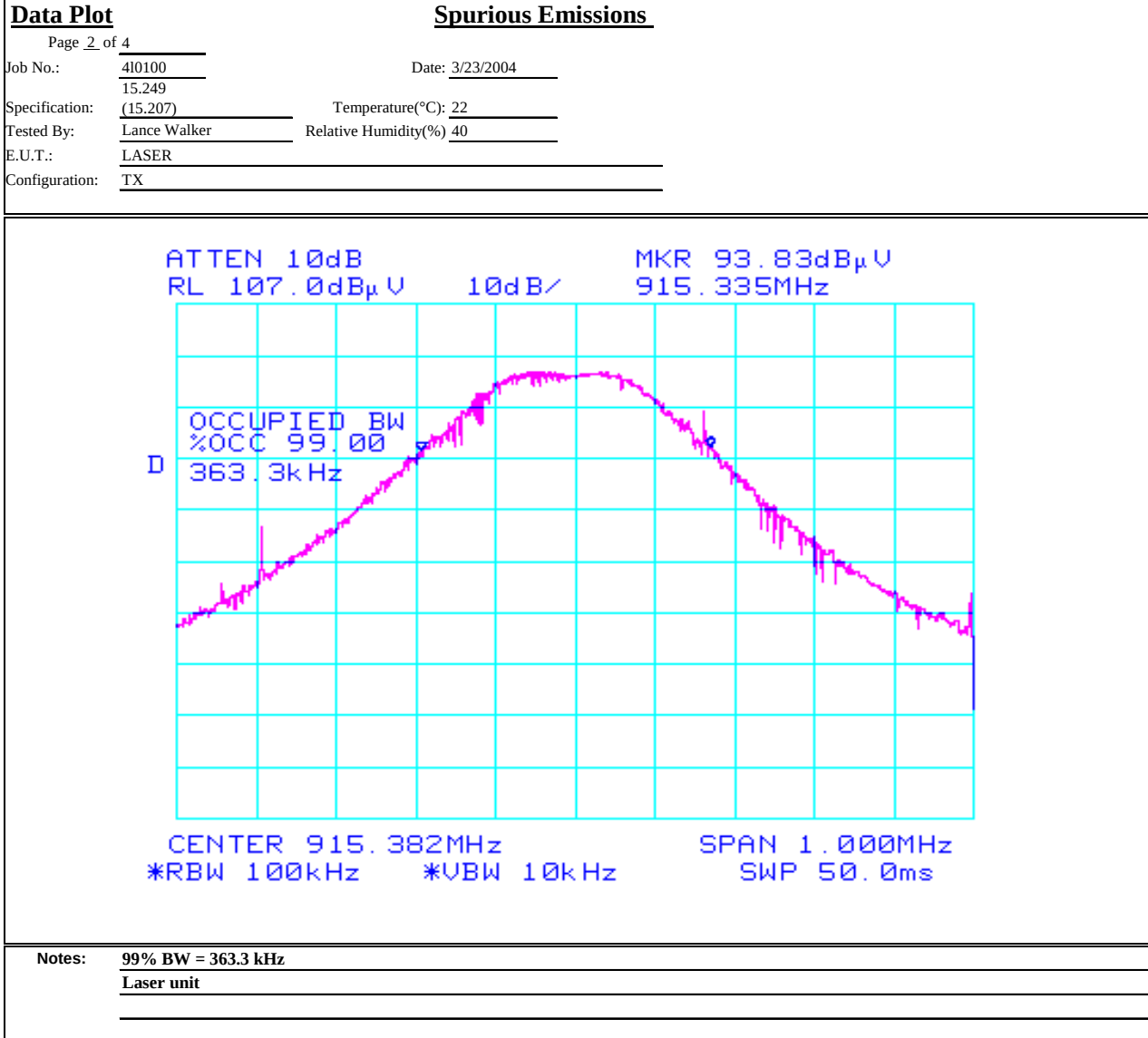
EQUIPMENT: A710

Occupied Bandwidth – Laser



Dallas Headquarters:
802 N. Kealy
Lewisville, TX 75057
Tel: (972) 436-9600
Fax: (972) 436-2667

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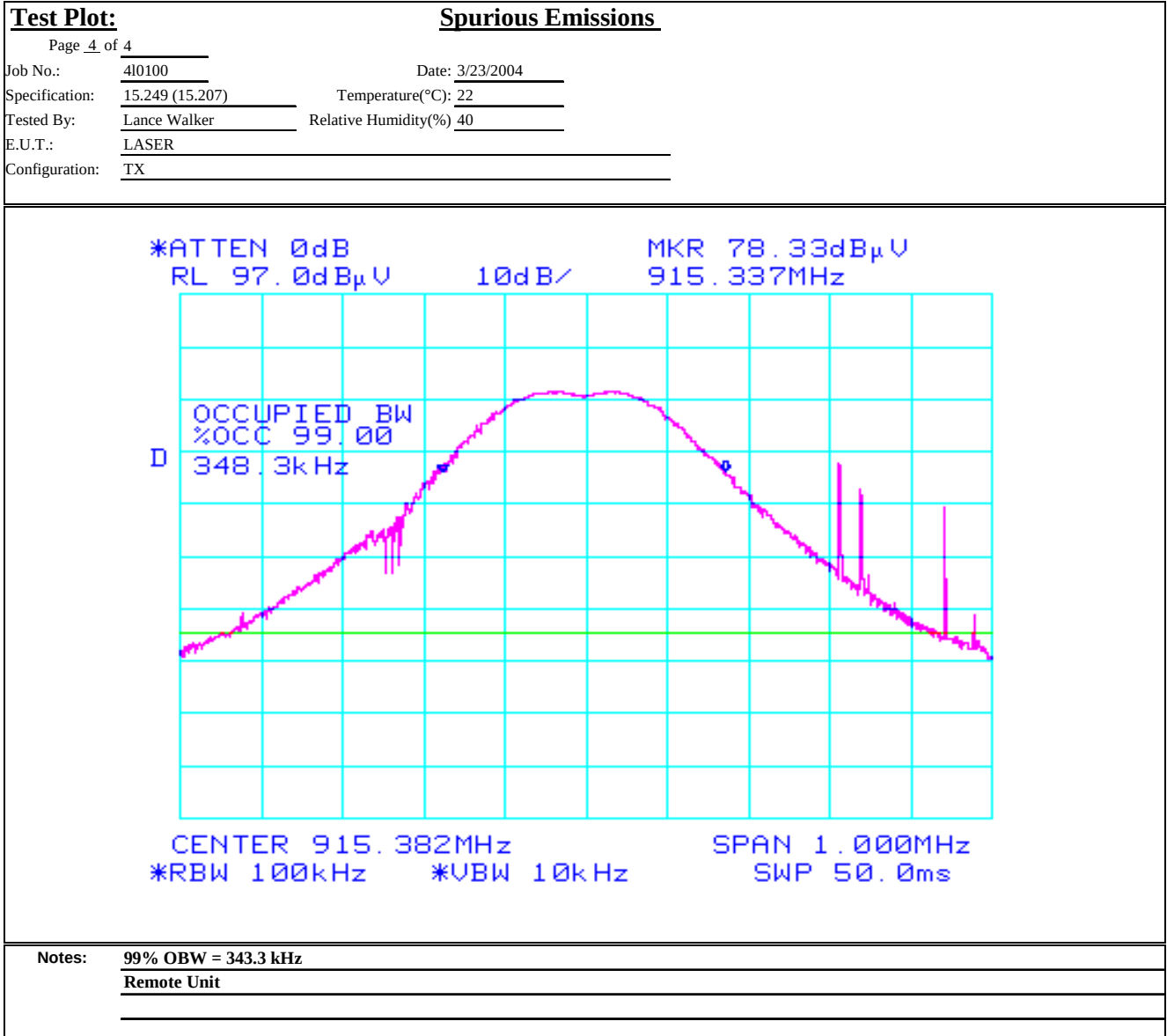
EQUIPMENT: A710

Occupied Bandwidth – Remote Unit



Dallas Headquarters:
802 N. Kealy
Lewisville, TX 75057
Tel: (972) 436-9600
Fax: (972) 436-2667

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EQUIPMENT: A710
Radiated Photographs

Laser Unit



Remote Unit



EQUIPMENT: A710

Section 5. Test Equipment List

Nemko ID	Description	Manufacturer Model Number	Serial Number	Calibration Date	Calibration Due
1258	LISN .15mhz-30mhz	EMCO 0	1305	09/15/03	09/14/04
1433	High pass filter	Solar 7930-5.0	933142	02/04/04	02/03/05
1998	CABLE, 1m	KTL RG223	N/A	06/27/03	06/26/04
1194	CABLE, 7m	KTL RG214	N/A	11/13/03	11/12/04
785	ANALYZER, SPECTRUM	HP 8591E	3412A02996	04/09/03	04/08/04
1479	Bi Conical Antenna 20-330 Mhz	A. H. Systems SAS-200/540	496	07/02/03	07/01/04
1508	ANTENNA, LP	KTL 3146	1349	06/05/03	06/04/04
1522	Cable Assy, LAB 5 - D OATS	KTL Site D OATS	N/A	03/11/04	03/11/05
762	27dB GAIN PREAMP	ICC 27dB LNA	946	08/28/03	08/27/04
1284	QuasiPeak ADAPTER	HEWLETT PACKARD 85650A	2521A00769	12/19/03	12/18/04
1034	ANTENNA,LP	A.H. SYSTEMS SAS-200/510	121	06/09/03	06/08/04
1983	CABLE	KTL Site A OATS	N/A	03/11/04	03/11/05
791	PREAMP, 25dB	ICC LNA25	398	10/27/03	10/26/04
1464	Spectrum analyzer	Hewlett Packard 8563E	3551A04428	02/11/03	02/11/05
1484	Cable 2.0-18.0 Ghz	Storm PR90-010-072	N/A	07/24/03	07/23/04
1485	Cable 2.0-18.0 Ghz	Storm PR90-010-216	N/A	07/24/03	07/23/04
1016	Pre-Amp	HEWLETT PACKARD 8449A	2749A00159	10/27/03	10/26/04
1304	HORN ANTENNA	ELECTRO METRICS RGA-60	6151	09/22/03	09/22/05

Nemko Dallas

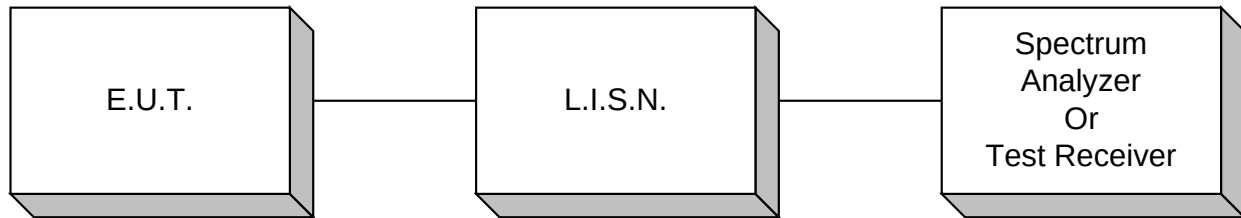
FCC PART 15, SUBPART C
FOR 900 MHz Transmitters
Test Report No.: 4L0100RUS1

EQUIPMENT: A710

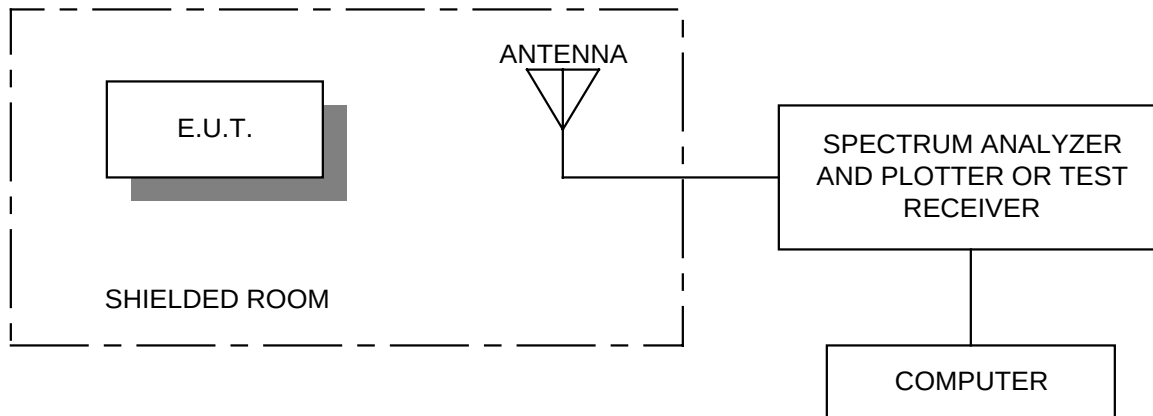
ANNEX A

TEST DIAGRAMS

EQUIPMENT: A710
Conducted Emissions



Radiated Prescan



EQUIPMENT: A710

Test Site For Radiated Emissions

