

TEST NUMBER - 323-04

TEST REPORT TO

INDUSTRY CANADA RSS 210 SECTION 6.2.2 (e)
FEDERAL COMMUNICATIONS COMMISSION CFR47 PART15.225

Low Power License-Exempt Radio communication Devices
Intentional Radiators

for

TYCO Software House
70 Westview Street
Lexington, MA 02421 USA
781 768 0205

of

RM2L-IC

Prox card reader with LCD and keypad

FCC ID: SZC-RMXIC
IC: 5690A-RMXIC

on

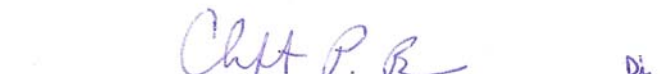
9/29/2004

Tested by



Andrew Mertinooke

Reviewed by


Clifton P. Brick

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TEST DESCRIPTION

1. TEST OBJECTIVE

To test the RM2L-IC to RSS 210 / Part 15 Subpart C Rules and write a report.

2. E.U.T. DESCRIPTION

GENERAL

The RM2L-IC is an access control user interface that includes a keypad, LCD display and rf proximity card reader.

SERIAL NUMBERS:

0451633431 Rev A0

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TEST RESULTS AND CONCLUSIONS

PRODUCT TESTED - Prox Card Reader with keypad and LCD

MODEL NUMBER - RM2L-IC

RADIATED TEST RESULTS

The test results show that the emissions radiated from this equipment are in compliance with IC Rules RSS 210 / FCC Rules Part 15 Subpart C.

OCCUPIED BANDWIDTH & OUTPUT POWER

The test results show that the occupied bandwidth and output power of this equipment are in compliance with IC Rules RSS 210 / FCC Rules Part 15 Subpart C .

CONDUCTED TEST RESULTS

The test results show that the emissions conducted through the power line from this equipment are in compliance with IC Rules RSS 210 / FCC Rules Part 15 Subpart C.

ANALYSIS AND CONCLUSIONS

Based upon the radiated and conducted measurements we find that this equipment is within the limits of the IC Rules RSS 210 / FCC Rules Part 15 Subpart C. All results are based on a test of one sample, and represent other production units, only in as much as a sample represents other production units. If any significant changes are made to the unit, the changes shall be evaluated and a retest may be required.

NOTES (Special conditions unique to this test)

None

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TEST PROCEDURES

1. TEST EQUIPMENT

- A. HP 8546A (9 kHz - 6.5 GHz) EMI Receiver w/ RF Filter Section, S/N 3704A00323 / 3650A00360. Calibration Date 1-16-2004, calibrated annually.
- B. EMC0 6502 Loop Antenna, Model EM6502 S/N 2197.
Calibration Date: 6-23-2003, calibrated bi-annually.
- C. Com-Power Biconilog Antenna, Model AC220, S/N 25509.
Calibration Date 7-16-2004, calibrated annually.
- D. EMC0 LISN, Model EM 3825/2, S/N 9109-1860.
Calibration Date: 3-10-2004, calibrated annually.

2. FREQUENCY RANGE TO BE SCANNED.

- A. Radiated Test from 30 MHz to 40 GHz (or the 10th harmonic of the highest frequency whichever is lower).
- B. Conducted Test from 150 kHz to 30 MHz.

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3. TEST PROCEDURES.

Radiated test procedure:

The EUT, associated cables and peripheral devices are placed on the supporting table and any support equipment is placed off the site. The EUT is turned on and any necessary operating or test software installed and allowed to warm up. The EUT is pre-scanned in our ferrite tile lined chamber where it is rotated 360 degrees and examined in both horizontal and vertical polarization, all emission frequencies are identified and recorded. The EUT is then moved to the OATS and the frequency band from 30 MHz to 40 GHz is scanned, all frequencies identified in the chamber are investigated, as well as harmonic frequencies of the EUT. When an emission is found the emission is maximized by varying the bundle position of the connecting cables, the antenna height, the antenna polarization (vertical and horizontal) and the table orientation (360 degrees). The maximum reading is recorded and the next signal is searched for.

Conducted test procedure:

The power line of the EUT is connected to the LISN (Line Impedance Stabilization Network). A measurement of the emissions are made from the power line for both phase and neutral on the analyzer in the frequency range from 150 kHz to 30 MHz. The maximum readings are recorded for each phase.

All measurements are made according to the procedures defined in: "ANSI C63.4-1992 Standard Methods of Measurement of Radio Noise Emissions from Low-Voltage Electrical and Electronics Equipment in the Range of 9 kHz to 40 GHz, American National Standard for (ISBN 1-55937-215-5).

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RSS 210 TEST LIMITS

1. RSS 210 Section 6.2.2, Table 3 Radiation Limits (Quasi-Peak):
FCC Part 15.209, 15.235, 15.249 Radiation Limits (Quasi-Peak):

Frequency MHz	Distance meters	Limit dB μ V/m	Limit μ V/m
1.705 - 30	30	29.5*	30*
13.553-13.567	30	84.0	15,848/15,500
30 - 88	3	40.0	100
88 - 216	3	43.5	150
216 - 960	3	46.0	200
960 - 1000	3	54.0	500
1000 - 40000	3	54.0*	500*

*NOTE: Average Limits

2. RSS 210 Section 6.6a Conduction Limits (Quasi-Peak):
FCC Part 15.207 Conduction Limits (Quasi-Peak)

Frequency MHz	Quasi-Peak Limit dB μ V	Average Limit dB μ V
0.150 - 0.500	66 to 56	56 to 46
0.500 - 5.0	56	46
5.0 - 30.0	60	50

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TEST FACILITY DESCRIPTION

Compliance Worldwide is located on 357 Main Street in Sandown, New Hampshire. The conducted and radiated test sites, located at C.W. are used for Federal Communications Commission (FCC) testing and Industry Canada Testing. A site description is on file with the FCC in Columbia, MD USA. Site information is also on file with Industry Canada, anyone wishing to review this Test Facility Description is referred to file number **IC 3023**. This is currently on file at Industry Canada, 1241 Clyde Avenue, Ottawa, ON K2C 1Y3.

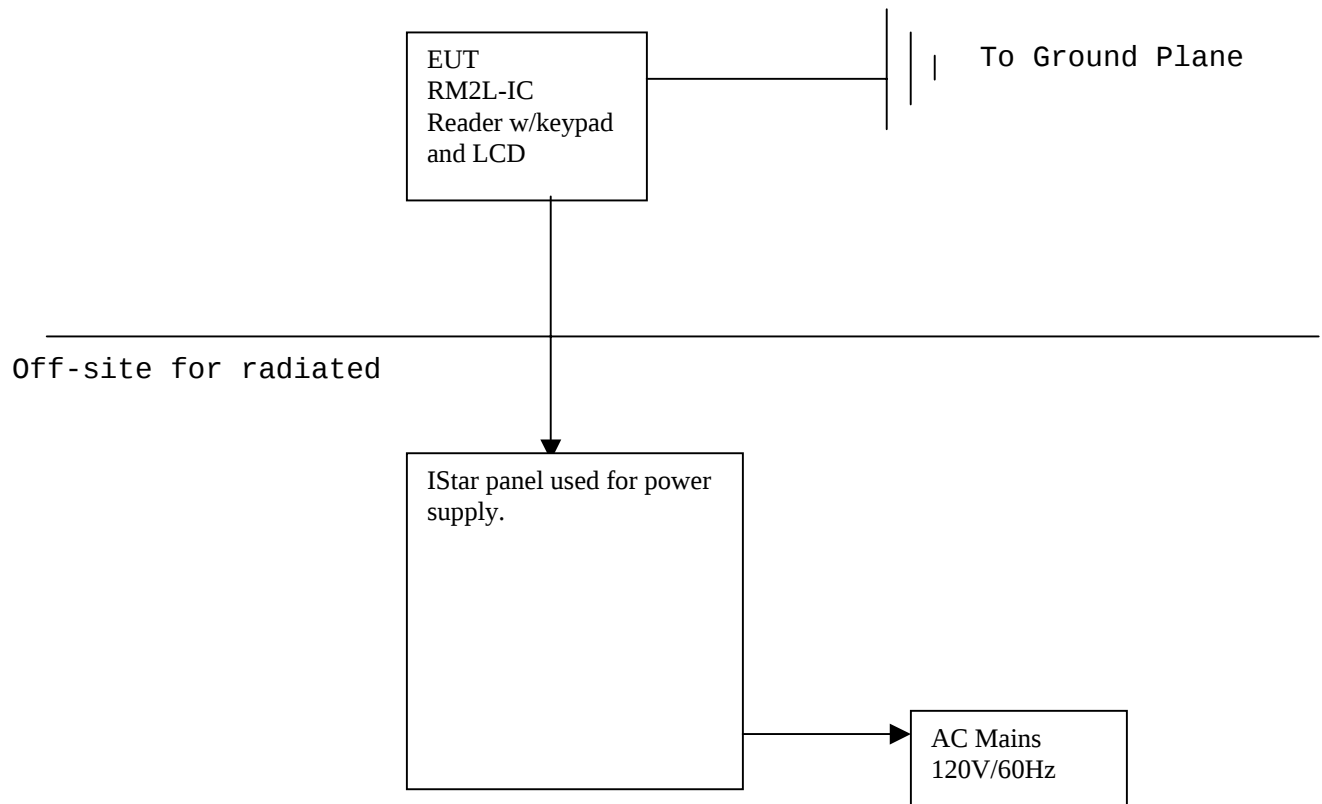
The radiated site is a 3/10 meter indoor site with an enclosure for the product and a basement for the personnel, support equipment and test equipment.

The conducted site is part of a 16' x 20' x 12' ferrite tile chamber and uses one of the walls for the vertical metal wall required by EN 55022.

Both sites are designed to test products or systems 1.5 meter x 1.0 meter, floor standing or table top.

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**TEST SET UP
AND
PERIPHERAL CONNECTION INFORMATION**



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PLEASE NOTE - EUT (equipment under test) is RM2L-IC.

The cables directly connected to this equipment are listed below.

Connection Descriptions

1. 14AWG Ground wire (description)
EUT (from device)
Ground Plane (to device)
 CABLE LENGTH 2m (S) SHIELDED or (U) UNSHIELDED U
2. Shieleded signal and power cable (description)
EUT (from device)
I Star Pro Panel (support Equipment) (to device)
 CABLE LENGTH 5m (S) SHIELDED or (U) UNSHIELDED S
3. Power Cable (description)
Istar Pro panel (support Equipment) (from device)
AC Mains 120V 60Hz (to device)
 CABLE LENGTH 2m (S) SHIELDED or (U) UNSHIELDED U

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RADIATED TEST RESULTS

Frequency Range: 30 - 1000 MHz.
Measurement Distance: 3.0 Meters.
Bandwidth: 120 kHz, Per ANSI C63.4-1992.*
Detector Functions: Peak, Quasi Peak, Average
Video Filter: 300 kHz
Table Height: 0.8 meters
Antenna Height Variation: 1 - 4 Meters.
Horizontal and Vertical Polarization Measurements Taken.

*Measurement Bandwidth is 1 MHz above 1 GHz

PLEASE SEE NEXT PAGE FOR RADIATED TEST DATA

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Radiated Worst Case Tabular Data

Freq (MHz)	Pol. (H/V)	Peak Amp (dBuV)	QP Amp (dBuV)	QP Limit (dBuV)	QP Margin (dB)
27.120	N/A	34.2	N/M	69.5	-35.3
40.680	V	37.5	N/M	40.0	-2.5
54.240	V	30.3	N/M	40.0	-9.7
67.800	V	27.2	N/M	40.0	-12.8
81.360	H	19.7	N/M	40.0	-20.3
94.920	H	21.7	N/M	43.5	-21.8
108.480	V	27.5	N/M	43.5	-16.0
122.040	V	42.1	N/M	43.5	-1.4
135.600	V	23.6	N/M	43.5	-19.9

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RADIATED OUTPUT POWER & OCCUPIED BANDWIDTH TEST RESULTS

Frequency Range: 13.553-13.567 MHz.
Measurement Distance: 3.0 Meters.
Bandwidth: As Noted, Per ANSI C63.4-1992.
Detector Functions: Peak, Quasi Peak, Average.
Video Filter: 300 kHz
Table Height: 0.8 meters
Antenna Height Variation: 1 - 4 Meters.
Horizontal and Vertical Polarization Measurements Taken, Worst Case Reported.

PLEASE SEE NEXT PAGE(S) FOR OCCUPIED BANDWIDTH RADIATED TEST DATA

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Output Power Plot

10:43:40 29 SEP 2004 RADIATED FS
TEST#344-04 TYCO RM2L-1C

FREQ 13.56 MHz
PEAK 67.2 dB μ V
QP 64.9 dB μ V
AVC 45.0 dB μ V

LOC REF 120.0 dB μ V

20
dB/
ATN
40 dB

VA SB
SC FC
ACORR

CENTER 13.56002 MHz
RL #1F BW 9.0 kHz

AVC BW 30 kHz

SPAN 21.57 kHz
SWP 50.0 msec

Freq (MHz)	Peak (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
13.5600	67.2	124.0	-56.8

Note: Limit is extrapolated from 30m to 3m by adding 40dB.

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Occupied Bandwidth Plot

10:49:36 29 SEP 2004 RADIATED 99% PWR BW
TEST#344-04 TYCO RM2L-1C

ACTV DET: PEAK
MEAS DET: PEAK OP AVG
MKRΔ 6.98 kHz
.40 dB

LOO REF 98.0 dBμV

10
dB/
ATN
20 dB

VA SB
SC FC
ACORR



CENTER 13.56000 MHz

L #1F BW 1.0 kHz

AVG BW 1 kHz

SPAN 15.00 kHz

SWP 300 msec

limit line shown is the 15.209 limit at the edges of the 13.553-13.567 MHz band.

99% Power BW (kHz)
6.98

FREQUENCY STABILITY TEST RESULTS

Frequency Range: 13.553-13.567 MHz.

Measurement Distance: Conducted

The device was examined at 85 and 115% of nominal operating voltage and from -20°C to +50°C at nominal voltage.

Frequency stability was found to be better than +/- 500 Hz.

The limit for stability is +/- 1.356 kHz or +/- 0.01% of 13.560 MHz.

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CONDUCTED TEST RESULTS

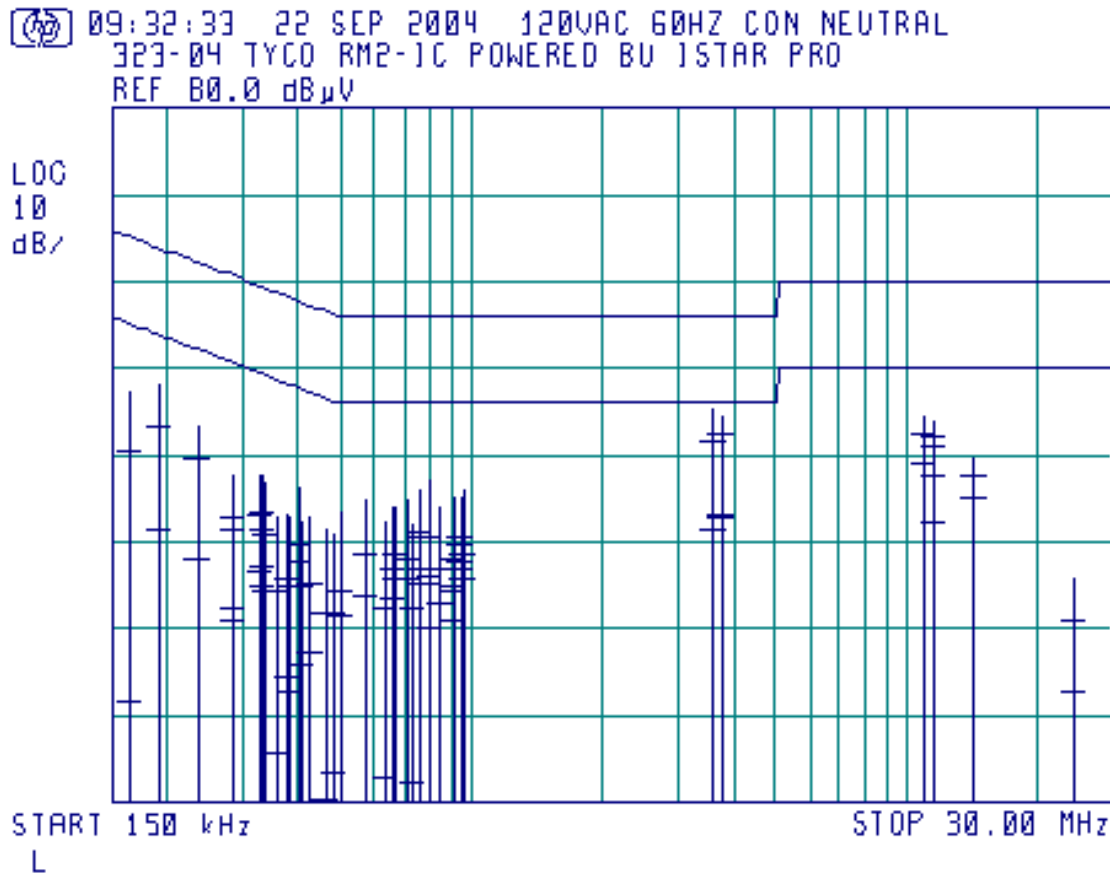
Frequency Range:	150 kHz to 30.0 MHz.
Bandwidth:	9 kHz per ANSI C63.4-1992.
Detector Functions:	Peak, Quasi-Peak, Average
Table Height:	0.8 meters
Video Bandwidth:	30 kHz.

Phase and Neutral Measurements Taken.

PLEASE SEE NEXT PAGE FOR CONDUCTED TEST DATA

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Conducted 120V 60Hz Neutral Data Log Plot



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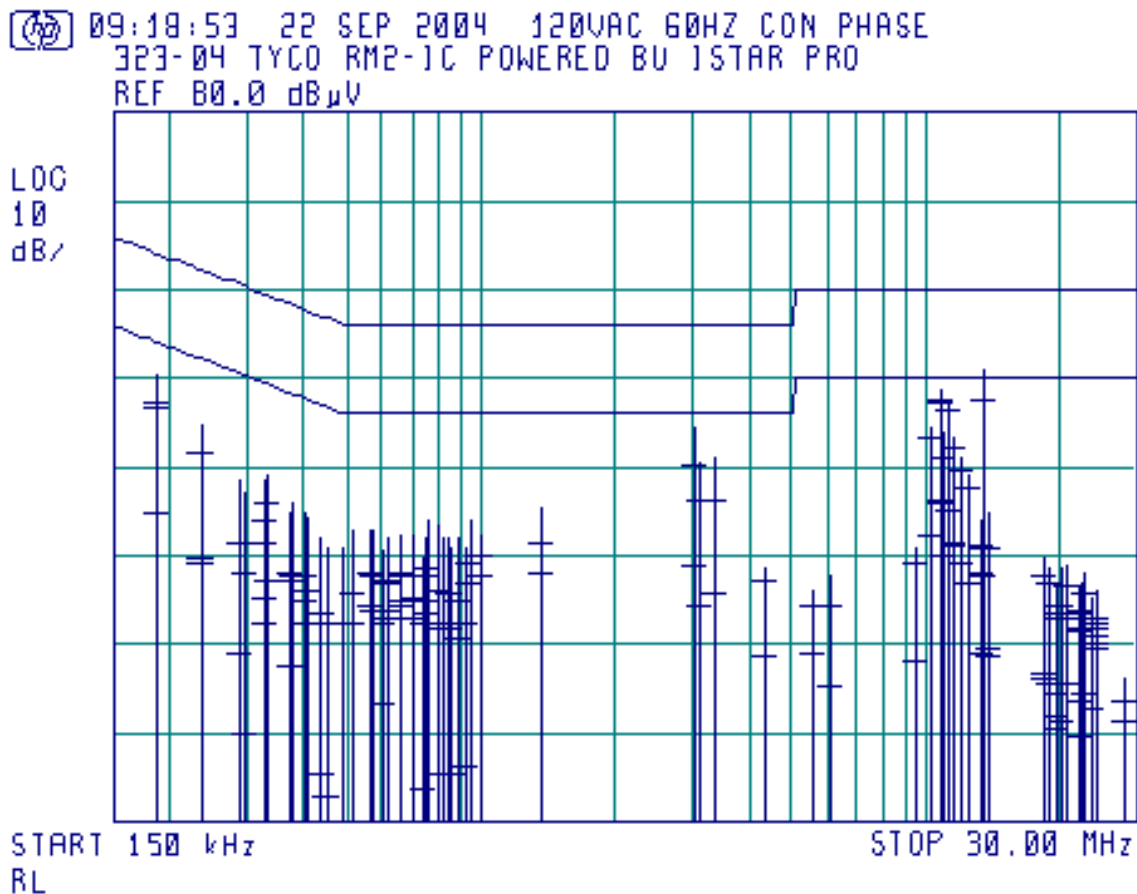
Conducted 120V 60Hz Neutral Tabular Data

Freq (MHz)	Peak Amp (dBuV)	QP Amp (dBuV)	Avg Amp (dBuV)	QP Limit (dBuV)	Avg Limit (dBuV)	QP Margin (dB)	Avg Margin (dB)
0.165104	47.54	40.76	11.99	65.26	55.26	-24.50	-43.27
0.192879	48.05	43.49	31.63	63.93	53.93	-20.44	-22.30
0.237889	43.11	39.47	28.25	62.20	52.20	-22.73	-23.95
0.237955	43.32	39.44	28.25	62.19	52.19	-22.75	-23.94
0.283118	38.13	31.66	21.41	60.78	50.78	-29.12	-29.37
0.286183	37.69	32.90	22.44	60.69	50.69	-27.79	-28.25
0.331205	38.17	33.19	26.67	59.47	49.47	-26.28	-22.80
0.333720	38.14	33.87	27.39	59.41	49.41	-25.54	-22.02
0.335811	36.92	31.83	25.03	59.36	49.36	-27.53	-24.33
0.336256	36.71	31.07	24.23	59.35	49.35	-28.28	-25.12
0.359699	33.00	24.81	6.17	58.79	48.79	-33.98	-42.62
0.378429	33.41	26.05	14.55	58.35	48.35	-32.30	-33.80
0.385668	32.91	25.16	12.93	58.17	48.17	-33.01	-35.24
0.405664	36.45	30.03	28.06	57.76	47.76	-27.73	-19.70
0.413391	32.67	25.16	16.01	57.62	47.62	-32.46	-31.61
0.426620	32.84	25.46	17.38	57.37	47.37	-31.91	-29.99
0.462915	31.61	22.12	0.73	56.69	46.69	-34.57	-45.96
0.485129	30.90	21.95	3.70	56.28	46.28	-34.33	-42.58
0.505544	33.57	24.20	21.69	56.00	46.00	-31.80	-24.31
0.572843	34.85	28.61	23.95	56.00	46.00	-27.39	-22.05
0.639705	32.64	22.43	3.10	56.00	46.00	-33.57	-42.90
0.662944	34.07	27.00	23.73	56.00	46.00	-29.00	-22.27
0.667749	34.00	28.58	26.10	56.00	46.00	-27.42	-19.90
0.713486	35.09	28.30	26.11	56.00	46.00	-27.70	-19.89
0.735076	32.38	22.78	2.43	56.00	46.00	-33.22	-43.57
0.765149	36.21	31.47	27.07	56.00	46.00	-24.53	-18.93
0.766320	35.96	30.67	25.71	56.00	46.00	-25.33	-20.29
0.809355	37.18	30.57	25.43	56.00	46.00	-25.43	-20.57
0.813310	36.21	26.22	20.31	56.00	46.00	-29.78	-25.69
0.856419	34.18	26.98	23.18	56.00	46.00	-29.02	-22.82
0.906163	35.23	28.10	24.20	56.00	46.00	-27.90	-21.80
0.907874	33.30	25.00	21.28	56.00	46.00	-31.00	-24.72
0.949811	34.75	29.98	27.03	56.00	46.00	-26.02	-18.97
0.951118	35.26	30.72	28.06	56.00	46.00	-25.28	-17.94
0.954660	35.92	28.72	25.81	56.00	46.00	-27.28	-20.19
3.615755	45.46	42.07	31.98	56.00	46.00	-13.93	-14.02
3.758639	44.74	42.76	33.28	56.00	46.00	-13.24	-12.72
3.760331	44.22	42.84	33.15	56.00	46.00	-13.16	-12.85
10.942288	44.21	42.73	39.19	60.00	50.00	-17.27	-10.81
10.942921	44.24	42.76	39.36	60.00	50.00	-17.24	-10.64
10.943376	44.32	42.89	39.37	60.00	50.00	-17.11	-10.63

Freq (MHz)	Peak Amp (dBuV)	QP Amp (dBuV)	Avg Amp (dBuV)	QP Limit (dBuV)	Avg Limit (dBuV)	QP Margin (dB)	Avg Margin (dB)
10.944326	44.57	42.74	39.12	60.00	50.00	-17.26	-10.88
11.453185	42.03	41.04	38.04	60.00	50.00	-18.96	-11.96
11.473673	44.37	42.52	32.55	60.00	50.00	-17.48	-17.45
14.135660	39.76	37.87	35.37	60.00	50.00	-22.13	-14.63
24.080434	26.05	21.23	13.03	60.00	50.00	-38.77	-36.97

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Conducted 120V 60Hz Phase Data Log Plot



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Conducted 120V 60Hz Phase Tabular Data

Freq (MHz)	Peak Amp (dBuV)	QP Amp (dBuV)	Avg Amp (dBuV)	QP Limit (dBuV)	Avg Limit (dBuV)	QP Margin (dB)	Avg Margin (dB)
0.189281	50.11	47.40	34.99	64.08	54.08	-16.68	-19.09
0.190109	50.59	47.21	34.90	64.04	54.04	-16.83	-19.14
0.236215	44.89	42.02	29.68	62.26	52.26	-20.24	-22.58
0.237263	44.20	41.92	29.42	62.22	52.22	-20.30	-22.80
0.287658	38.71	31.86	19.43	60.65	50.65	-28.79	-31.22
0.297806	37.13	28.33	10.41	60.34	50.34	-32.01	-39.93
0.327519	38.95	31.74	22.73	59.56	49.56	-27.82	-26.83
0.328933	38.64	34.07	25.72	59.53	49.53	-25.46	-23.81
0.331685	39.10	36.10	27.66	59.46	49.46	-23.36	-21.80
0.377753	34.98	28.21	17.63	58.36	48.36	-30.15	-30.73
0.379009	36.03	27.80	17.91	58.33	48.33	-30.53	-30.42
0.380219	34.09	27.53	17.84	58.30	48.30	-30.77	-30.46
0.408470	34.84	27.81	25.21	57.71	47.71	-29.90	-22.50
0.409875	34.64	26.53	22.89	57.68	47.68	-31.15	-24.79
0.437478	32.16	23.71	5.78	57.17	47.17	-33.46	-41.39
0.452883	31.08	23.01	3.16	56.88	46.88	-33.87	-43.72
0.487019	30.99	22.49	0.30	56.24	46.24	-33.75	-45.94
0.512610	33.09	25.92	22.77	56.00	46.00	-30.08	-23.23
0.569539	33.05	28.20	24.23	56.00	46.00	-27.80	-21.77
0.570166	33.10	28.00	23.84	56.00	46.00	-28.00	-22.16
0.602283	30.63	22.26	13.32	56.00	46.00	-33.74	-32.68
0.618459	31.25	27.49	23.96	56.00	46.00	-28.51	-22.04
0.618863	32.28	27.04	23.23	56.00	46.00	-28.96	-22.77
0.664591	32.51	28.24	25.03	56.00	46.00	-27.76	-20.97
0.664840	32.36	27.96	24.86	56.00	46.00	-28.04	-21.14
0.712519	32.47	25.62	23.20	56.00	46.00	-30.38	-22.80
0.744943	29.77	22.41	4.14	56.00	46.00	-33.59	-41.86
0.760375	32.10	27.73	23.57	56.00	46.00	-28.27	-22.43
0.762536	34.13	28.53	25.30	56.00	46.00	-27.47	-20.70
0.811154	33.88	26.24	21.88	56.00	46.00	-29.76	-24.12
0.832276	32.07	22.62	5.75	56.00	46.00	-33.38	-40.25
0.853215	32.20	26.00	22.16	56.00	46.00	-30.00	-23.84
0.868453	31.17	22.82	5.69	56.00	46.00	-33.18	-40.31
0.904241	32.36	25.32	20.95	56.00	46.00	-30.68	-25.05
0.925355	30.89	22.72	6.25	56.00	46.00	-33.28	-39.75
0.947565	32.96	29.56	27.05	56.00	46.00	-26.44	-18.95
0.948945	34.11	29.56	26.96	56.00	46.00	-26.44	-19.04
0.995391	32.72	30.21	27.94	56.00	46.00	-25.79	-18.06
1.375159	35.71	31.80	28.28	56.00	46.00	-24.20	-17.72
3.035031	44.68	40.37	29.02	56.00	46.00	-15.63	-16.98
3.129276	40.80	36.49	24.41	56.00	46.00	-19.51	-21.59

Freq (MHz)	Peak Amp (dBuV)	QP Amp (dBuV)	Avg Amp (dBuV)	QP Limit (dBuV)	Avg Limit (dBuV)	QP Margin (dB)	Avg Margin (dB)
3.367288	41.15	36.62	25.82	56.00	46.00	-19.38	-20.18
4.333491	28.77	27.62	18.82	56.00	46.00	-28.38	-27.18
5.596629	26.18	24.20	19.15	60.00	50.00	-35.80	-30.85
6.116433	27.07	24.44	15.37	60.00	50.00	-35.56	-34.63
6.116834	27.71	24.59	15.56	60.00	50.00	-35.41	-34.44
9.432596	31.10	29.45	18.47	60.00	50.00	-30.55	-31.53
10.196394	44.80	43.61	32.60	60.00	50.00	-16.39	-17.40
10.197434	44.64	43.54	32.50	60.00	50.00	-16.46	-17.50
10.707705	49.14	47.71	36.43	60.00	50.00	-12.29	-13.57
10.707996	48.78	47.51	36.27	60.00	50.00	-12.49	-13.73
10.958960	44.32	41.33	30.09	60.00	50.00	-18.67	-19.91
11.215929	47.65	46.60	35.35	60.00	50.00	-13.40	-14.65
11.216174	47.61	46.64	35.45	60.00	50.00	-13.36	-14.55
11.217371	47.69	46.57	35.27	60.00	50.00	-13.43	-14.73
11.472060	43.47	42.32	31.72	60.00	50.00	-17.68	-18.28
11.472389	43.49	42.27	31.59	60.00	50.00	-17.73	-18.41
11.980543	41.18	40.16	29.33	60.00	50.00	-19.84	-20.67
12.491936	39.25	38.04	26.98	60.00	50.00	-21.96	-23.02
13.231930	32.91	31.36	28.23	60.00	50.00	-28.64	-21.77
13.253228	34.06	30.91	19.50	60.00	50.00	-29.09	-30.50
13.562196	51.26	47.73	27.94	60.00	50.00	-12.27	-22.06
13.761743	35.10	30.88	19.11	60.00	50.00	-29.12	-30.89
13.762254	34.39	30.96	19.77	60.00	50.00	-29.04	-30.23
18.354356	29.70	27.90	16.92	60.00	50.00	-32.10	-33.08
18.354479	29.82	27.86	16.76	60.00	50.00	-32.14	-33.24
18.864211	28.58	26.93	15.93	60.00	50.00	-33.07	-34.07
19.624425	27.13	23.33	10.84	60.00	50.00	-36.67	-39.16
19.625489	27.20	23.43	12.23	60.00	50.00	-36.57	-37.77
19.627723	27.04	24.88	14.61	60.00	50.00	-35.12	-35.39
20.132660	28.79	24.68	11.41	60.00	50.00	-35.32	-38.59
20.647123	28.93	26.55	15.94	60.00	50.00	-33.45	-34.06
21.921444	26.83	24.15	13.77	60.00	50.00	-35.85	-36.23
22.128414	26.26	23.39	21.87	60.00	50.00	-36.61	-28.13
22.129808	25.72	23.17	21.71	60.00	50.00	-36.83	-28.29
22.427464	27.18	23.47	10.01	60.00	50.00	-36.53	-39.99
22.433218	28.11	25.85	14.78	60.00	50.00	-34.15	-35.22
23.453683	25.72	23.34	13.08	60.00	50.00	-36.66	-36.92
23.970304	25.35	22.21	19.79	60.00	50.00	-37.79	-30.21
23.970815	26.38	22.77	20.54	60.00	50.00	-37.23	-29.46
23.973208	26.00	23.33	21.36	60.00	50.00	-36.67	-28.64
27.999813	16.43	13.88	11.69	60.00	50.00	-46.12	-38.31

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NOTES AND COMMENTS

(Special conditions unique to this test)

None