CE
EMC DIRECTIVE (2004/108/EC)
TEST REPORT

EN 61326-1 CLASS A
TEST REPORT
For

NETWORK TESTER AND CABLE TESTER
Model: NET CHASER

Prepared for

T3 INNOVATION
808 CALLE PLANO
CAMARILLO, CA. 93012

Prepared by: _____

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DATE: APRIL 29, 2014

	REPORT BODY	APPENDICES					TOTAL
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GENERAL REPORT SUMMARY

This electromagnetic emission and immunity test report is generated by Compatible Electronics Inc., which is an independent testing and consulting firm. The test report is based on testing performed by Compatible Electronics personnel according to the measurement procedures described in the test specifications given below and in the "Test Procedures" section of this report.

The measurement data and conclusions appearing herein relate only to the sample tested and this report may not be reproduced in any form except in full, without the written permission of Compatible Electronics.

This report must not be used by the client to claim product certification, approval or endorsement by NVLAP, NIST or any agency of the Federal Government.

Device Tested:	Network Tester and Cable Tester Model: Net Chaser S/N: FFFF
Product Description:	The test system consists of a main unit and a remote. Bot units contain gigabit PHYs for testing SNR and bit error rate. The cable wiring and length is also tested.
Modifications:	The EUT was not modified during the testing in order to comply with the specifications.
Manufacturer:	T3 Innovation 808 Calle Plano Camarillo, CA 93012
Test Dates:	August 26 & 27, 2014
Test Specifications:	Emissions and Immunity requirements International Standard EN 61326-1: 2013.

The specification EN 61326-1 is a product family EMC standard; which references the following specifications:

IEC 61000-4-2: 2008
IEC 61000-4-3: 2006 +A1: 2007 + A2: 2010
IEC 61000-4-4: 2004 +A1: 2010
EN 61000-4-5: 2006
IEC 61000-4-6: 2008
IEC 61000-4-8: 2009
IEC 61000-4-11: 2004
EN 61000-3-2: 2006 +A1: 2009 +A2:2009
EN 61000-3-3: 2008
IEC 61000-3-11: 2000
IEC 61000-3-12: 2011
CISPR 11: 2009 +A1: 2010

SUMMARY OF TEST RESULTS

TEST	DESCRIPTION	RESULTS
1	Conducted RF Emissions, 150 kHz – 30 MHz.	Complies with the **Class A** limits of CISPR 11. See section 6.4 for Measurement Uncertainty
2	Radiated RF Emissions, 30 MHz – 1000 MHz.	Complies with the **Class A** limits of CISPR 11 See section 6.4 for Measurement Uncertainty
3	Direct ESD, Air Discharge, ±2 kV, ±4 kV and ±8 kV (insulated surfaces).	The EUT had no air discharges therefore this test was deemed unnecessary and thus was not performed.
4	Direct ESD, Contact Discharge, ±2 kV and ±4 kV (conductive surfaces).	Complies with the relevant requirements of EN 61326-1: 2013. The unit operates within the specifications. *See XX below for uncertainty notes.
5	Indirect ESD, ±2 kV and ±4 kV (HCP & VCP).	Complies with the relevant requirements of EN 61326-1: 2013. The unit operates within the specifications. *See XX below for uncertainty notes.
6	Radio-Frequency Electromagnetic Field, 80 MHz to 1000 MHz, 3 V/m with an amplitude modulated, 1 kHz sine wave at 80%. 1 GHz to 2 GHz @ 3V/m and 2 GHz to 2.7 GHz @ 1 V/m.	Complies with the requirements of EN 61326-1: 2013. The unit operates within its specifications. *See XX below for uncertainty notes. Variations of measured field strength due to reflections from the EUT are not included in the uncertainty calculations.
7	Fast Transients Common Mode, ±0.5 kV and ±1.0 kV on AC lines and ±0.5 kV on data lines.	Complies with the requirements of EN 61326-1: 2013. The unit operates within its specifications. *See XX below for uncertainty notes.
8	Surge Immunity Test Differential Mode, ±0.5 kV on power lines.	Complies with the requirements of EN 61326-1: 2013. The unit operates within its specifications. *See XX below for uncertainty notes.
9	Radio-Frequency Electromagnetic Conducted Field, .150 MHz to 80 MHz, 3Vrms with an amplitude modulated, 1 kHz sine wave at 80%.	Complies with the requirements of EN 61326-1: 2013. The unit operates within its specifications. *See XX below for uncertainty notes.
10	Power Frequency Magnetic Field Susceptibility, 3 A/m @ 50Hz, X, Y, & Z-axis.	Complies with the requirements of EN 61326-1: 2013. The unit operates within its specifications. *See XX below for uncertainty notes.
11	Voltage Dips and Voltage Variations, Short Interrupts, 0% @ 10ms, 20ms and 5 sec, 70% @ 500 ms reduction of rated voltage.	Complies with the requirements of EN 61326-1: 2013. The unit operates within its specifications. *See XX below for uncertainty notes.
12	Quasi-Stationary Current Harmonics Test 230V@50Hz, 39th Odd Harmonics and 40th Even harmonics.	The EUT is rated at less than 75 Watts therefore this test was deemed unnecessary and thus was not performed.
13	Voltage Fluctuation and Flicker Test 230V@50Hz.	The EUT is unlikely to cause voltage fluctuations or flicker therefore this test was deemed unnecessary and thus was not performed.
XX	Note that for all immunity tests above, it has been demonstrated that the generator and or the test configuration meets the specified requirements in the relevant technical standard. Uncertainty is based on a coverage factor of k=2 giving an approximate 95% confidence level. Calibration data is on file at the lab.	

Reported uncertainty is based on a standard uncertainty multiplied by a coverage factor of k=2

1. PURPOSE

This document is a qualification test report based on the emissions and immunity tests performed on the Network Tester and Cable Tester Model: Net Chaser. The emissions measurements were performed according to the measurement procedure described in CISPR 11. The tests were performed in order to determine whether the electromagnetic emissions from the equipment under test, referred to as EUT hereafter, are within the **Class A** specification limits defined in EN 61326-1: 2013 (Electrical Equipment for measurement, control and laboratory use – EMC Requirements).

The immunity tests were performed according to the basic immunity requirements described in EN 61326-1: 2013 (Electrical Equipment for measurement, control and laboratory use – EMC Requirements). These tests were performed in order to determine whether the EUT would accept any interference and still perform within the performance criteria described in section 4.2.1 of this report. The tests were performed by Compatible Electronics personnel; also the unit was operated and monitored for susceptibility by Compatible Electronics personnel.

2. ADMINISTRATIVE DATA

2.1 Location of Testing

The emissions and immunity tests described herein were performed at the test facility of Compatible Electronics, 2337 Troutdale Drive, Agoura, California 91301.

2.2 Traceability Statement

The calibration certificates of all test equipment used during the test are on file at the location of the test. The calibration is traceable to the National Institute of Standards and Technology (NIST). For equipment used for immunity testing, refer to the applicable calibration certificates for tolerance and uncertainty information, which is on file at the location of the test.

2.3 Cognizant Personnel

T3 Innovation

Lee Watkins	Engineering Manager

Compatible Electronics Inc.

Reynald O. Ramirez	Sr. Test Engineer
Alexander F. Baum	Test Technician
Ruby A. Hall	Lab Manager

2.4 Date Test Sample Was Received

The test sample was received on August 25, 2014.

2.5 Disposition of the Test Sample

The test sample remains at Compatible Electronics, Inc.

2.6 Abbreviations and Acronyms

The following abbreviations and acronyms may be used in this document.

EFT	Electrical Fast Transients
RF	Radio Frequency
ESD	Electrostatic Discharge
EMI	Electromagnetic Interference
EMC	Electromagnetic Compatibility
VCP	Vertical Coupling Plane
HCP	Horizontal Coupling Plane
EUT	Equipment Under Test
P/N	Part Number
S/N	Serial Number
HP	Hewlett Packard
ITE	Information Technology Equipment
CML	Corrected Meter Limit
LISN	Line Impedance Stabilization Network

3. APPLICABLE DOCUMENTS

The following documents are referenced or used in the preparation of this Test Report.

SPEC	TITLE
EN 61326-1: 2013	Electrical Equipment for measurement, control and laboratory use – EMC requirements.
CISPR 11 2009 +A1:2010	Industrial, scientific and medical (ISM) radio frequency equipment – Electromagnetic Disturbance characteristics – Limits and methods of measurement.
CISPR 16-1-4 2008	Specification for radio disturbance and immunity measuring apparatus and methods.
EN 61000-3-2 2006 +A1: 2009 & A2: 2009	Electromagnetic compatibility – Part 3: Limits – Section 2: Limits for harmonic current emissions (equipment input current <= 16 A per phase)
EN 61000-3-3 2008	Electromagnetic compatibility – Part 3: Limits – Section 3: Limitation of voltage fluctuations and flicker in low-voltage supply systems for equipment with rated current <= 16 A and not subject to conditional connection
IEC 61000-4-2 2008	Electromagnetic compatibility – Part 4: Testing and measurement techniques – Section 2: Electrostatic discharge immunity test
IEC 61000-4-3 2006 +A1: 2007 +A2: 2010	Electromagnetic compatibility – Part 4: Testing and measurement techniques – Section 3: Radiated, radio-frequency electromagnetic field test
IEC 61000-4-4 2004 +A1: 2010	Electromagnetic compatibility – Part 4: Testing and measurement techniques – Section 4: Electrical fast transient/burst immunity test
EN 61000-4-5 2006	Electromagnetic compatibility – Part 4: Testing and measurement techniques – Section 5: Surge immunity test
IEC 61000-4-6 2008	Electromagnetic compatibility – Part 4: Testing and measurement techniques – Section 6: Immunity to conducted disturbances, Induced by radio-frequency fields
IEC 61000-4-8 2009	Electromagnetic compatibility – Part 4: Testing and measurement techniques – Section 8: Power frequency magnetic field immunity test
IEC 61000-4-11 2004	Electromagnetic Compatibility. Part 4: Testing and measurement techniques. Section 11: Voltage dips, short interruptions and voltage variations immunity tests

4. DESCRIPTION OF TEST CONFIGURATION

4.1 Description of Test Configuration - Emissions

The EUTs were tested in a tabletop configuration. An RJ45 cable was connected between the two devices and a coaxial cable was used to terminate the coaxial port. A looping cable test and length measurement program was used throughout the test.

The radiated and conducted data was taken in the "charging mode" of operation as that was deemed the worst case. All initial investigations were performed with the EMI Receiver in manual mode scanning the frequency range continuously. The cables were bundled and routed as shown in the photographs in Appendix D.

4.1.1 Photograph of Test Configuration – Emissions

4.1.2 Cable Construction and Termination

Cable 1

This is a 4 meter, unshielded, Ethernet cable that connects the EUT test ports to one another. The cable has RJ-45 connectors at either end. The cable was bundled to a length of 1 meter.

Cable 2

This is a 4 meter, foil and braid shielded, round coaxial cable that connects to the EUT test port at one end to a terminator at the opposite end. The cable has coaxial BNC connectors at either end. The shield of the cable was grounded to the chassis via the connectors.

4.2 Description of the Test Configuration - Immunity

The EUT was operating as described in section 4.1 of this report.

4.2.1 Susceptibility Criteria

TEST	PERFORMANCE CRITERIA (Basic Immunity Test Requirements)
Electrostatic Discharge	B
Radio-Frequency Electromagnetic Field	A
Fast Transients Common Mode	B
Surge Immunity Test	B
Conducted Disturbances Test	A
Power Frequency Magnetic Field Susceptibility	A
Voltage Dips	B
Voltage Interruptions	C

Performance criteria A: The equipment shall continue to operate as intended during and after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the equipment is used as intended. The performance level may be replaced by a permissible loss of performance. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, either of these may be derived from the product description and documentation and what the user may reasonably expect from the equipment if used as intended.

Performance criteria B: The equipment shall continue to operate as intended after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the equipment is used as intended. The performance level may be replaced by a permissible loss of performance. During the test, degradation of performance is however allowed. No change of actual operating state or stored data is allowed. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, either of these may be derived from the product description and documentation and what the user may reasonably expect from the equipment if used as intended.

Performance criteria C: Temporary loss of function is allowed, provided the function is self-recoverable or can be restored by the operation of the controls.

5. LISTS OF EUT, ACCESSORIES AND TEST EQUIPMENT

5.1 EUT and Accessory List

#	EQUIPMENT TYPE	MANUFACTURER	MODEL	SERIAL NUMBER
1	NETWORK TESTER (EUT)	T3 INNOVATION	NET CHASER	S/N: FFFF P/N: NC950
2	POWER SUPPLY	KTEC	KSAS025I200250D5	S/N: NONE
3	CABLE TESTER (EUT)	T3 INNOVATION	NET CHASER	S/N: FFFF P/N: NC950
4	POWER SUPPLY	KTEC	KSAS025I200250D5	S/N: NONE

5.2 Emissions Test Equipment

EQUIPMENT TYPE	MANU-FACTURER	MODEL NUMBER	SERIAL NUMBER	CAL. DATE	CAL. DUE DATE
EMI Receiver	Rohde & Schwarz	ESIB-40	100218	Apr. 02, 2014	Apr. 02, 2015
Preamplifier	Com Power	PA-103A	1619	Oct. 02, 2013	Oct. 02, 2014
Biconical Antenna	Com Power	AB-900	43061	May 22, 2014	May 22, 2015
Log Periodic Antenna	Com Power	AL-100	351049	May 20, 2014	May 20, 2015
10dB Attenuator	Weinschel Corp.	2	Asset # 3486	Dec. 09, 2013	Dec. 09, 2014
LISN	Com Power	LI-215	12037	May 02, 2014	May 02, 2015
LISN (Accessory)	Com Power	LI-215	12038	May 02, 2014	May 02, 2015
Antenna Mast	Com Power	AM-400	N/A	N/A	N/A
Turntable	Com Power	TTW-595	N/A	N/A	N/A
Computer	Hewlett Packard	Pavilion 4530	US91912022	N/A	N/A
Printer	Hewlett Packard	C6427B	MY066160TW	N/A	N/A
EMI Application Software	Rohde & Schwarz	ESIB-K1	1.20	N/A	N/A
Hygrometer	Abbeon	HTAB169B	54897	Apr. 22, 2014	Apr. 22, 2015

5.3 Immunity Test Equipment

EQUIPMENT TYPE	MANU-FACTURER	MODEL NUMBER	SERIAL NUMBER	CAL. DATE	CAL. DUE DATE
ESD Generator	Teseq	NSG-437	657	Jun. 27, 2014	Jun. 27, 2015
EMC Test Generator	Thermo Scientific	EMCpro PLUS	1205237	Jan. 27, 2014	Jan. 27, 2015
Capacitive Clamp	KeyTek	CM-CCL	9609501	NCR	N/A
RF Signal Generator	Com-Power	SIG-200	02174	NCR	N/A
Biconical Antenna	Com Power	AB-900	15317	NCR	N/A
Log Periodic Antenna	Com Power	AL-100	16280	NCR	N/A
RF Power Amplifier	Amplifier Research	75A250	24000	NCR	N/A
RF Power Amplifier	Ophir	5066F	1022	NCR	N/A
CDN - Coupling Decoupling Network	Com-Power	CDN M2-25	511024	Jan. 14, 2014	Jan. 14, 2016
CDN - Coupling Decoupling Network	Com-Power	CDN M2-25	511020	Jan. 14, 2014	Jan. 14, 2016
Hydro-Temp Indicator	Abbeon	HTAB 169B	Asset# 3022	Dec. 26, 2013	Dec. 26, 2014
Barometer	Abbeon	BAR130B	Asset# 3043	NCR	N/A
Computer System	Hewlett Packard	6330	US82932677	N/A	N/A
RFI Test Software	Compatible Electronics	E-Field	Version 1.6	N/A	N/A
EMC Test Software	KeyTek	CEWare32	Version 4.1	N/A	N/A
Current Probe	Fischer C. Com.	F-120-9	102	Feb. 27, 2014	Feb. 27, 2016

5.3.1 Immunity Test Equipment (Continued)

EQUIPMENT TYPE	MANU-FACTURER	MODEL NUMBER	SERIAL NUMBER	CAL. DATE	CAL. DUE DATE
Conducted Immunity Test Software	Compatible Electronics	None	3CT31.4	N/A	N/A
Isotropic Field Probe	Amplifier Research	FP2000	15955	May 15, 2013	May 15, 2015
Isotropic Field Monitor	Amplifier Research	FM 2000	18324	NCR	N/A
Radiated Susceptibility Software Program (High Frequency)	Compatible Electronics	SEGI Version 3	N/A	N/A	N/A
RF Power Amplifier	Hughes	117H01F000	083	NCR	N/A
RF Power Amplifier	Hewlett Packard	489A	449-00781	NCR	N/A
Horn Antenna	Com-Power	AH-118	10060	NCR	N/A
Generator, RF Signal	Hewlett Packard	8648C	Asset# 3313	Jan. 04, 2013	Jan 04, 2015
ELF Field Monitor	Walker Scientific	ELF-60D	K71571-37	Apr. 08, 2014	Apr. 08, 2016
Magnetic Field Gen. Loop Antenna	Fischer C. Com.	F-1000-4-8/9/10-1M	9	NCR	N/A
AC Power Source	Hewlett Packard	6842A	3531A00180	NCR	N/A

6. TEST SITE DESCRIPTION

6.1 Test Facility Description

All immunity tests were performed in a shielded enclosure 16 feet wide, 19 feet long and 9 feet high. Please refer to section 2.1 and 7.1.1 of this report for test location.

6.2 EUT Mounting, Bonding and Grounding

For all tests except for ESD and the Conducted Immunity tests, the EUT was set up on a 1.0 by 1.5 by 0.8 meter high non-conductive table, which was placed on the ground plane. For ESD testing, the unit was mounted 0.5 millimeters above the 0.8 meter by 1.6 meter horizontal coupling plane. For the Conducted Immunity, EFT and the Magnetic Field Immunity tests, the EUT was mounted 10 cm above the GRP.

The EUT was not grounded.

6.3 Facility Environmental Characteristics

When applicable refer to the data sheets in Appendix E for the relative humidity, air temperature and barometric pressure.

6.4 Measurement Uncertainty

"Compatible Electronics' U_{lab} value is less than U_{cispr}, thus based on this – compliance is deemed to occur if no measured disturbance exceeds the disturbance limit

$$u_c(y) = \sqrt{\sum_i c_i^2 \; u^2(x_i)}$$

Measurement		U_{cispr}	$U_{lab} = 2\ uc\ (y)$
Conducted disturbance (mains port)	(9 kHz – 150 kHz) (150 kHz – 30 MHz)	4,0 dB 3,6 dB	2.88 dB 9 kHz – 30 MHz
Radiated disturbance (electric field strength on an open area test site or alternative test site)	(30 MHz – 1 000 MHz)	5,2 dB	3.07 dB

7. TEST PROCEDURES

The following sections describe the test methods and the specifications for the tests. Test results are also included in this section.

7.1 RF Emissions

7.1.1 Conducted Emissions Test

The EMI Receiver was used as a measuring meter. The data was collected with the EMI Receiver in the peak detect mode with the "Max Hold" feature activated. The quasi-peak or average was used only where indicated in the data sheets. A 10 dB attenuation pad was used for the protection of the EMI Receiver input stage, and the EMI Receiver offset was adjusted accordingly to read the actual data measured. The EMI Receiver read the LISN output. The output of the second LISN was terminated by a 50-ohm termination. The effective measurement bandwidth used for the conducted emissions test was 9 kHz.

Please see section 6.2 of this report for mounting, bonding and grounding of the EUT. The EUT was powered through the LISN, which was bonded to the ground plane. The LISN power was filtered and the filter was bonded to the ground plane. The EUT was set up with the minimum distances from any conductive surfaces as specified in CISPR 11. The excess power cord was wrapped in a figure eight pattern to form a bundle not exceeding 0.4 meters in length.

The initial test data was taken in manual mode while scanning the frequency ranges of 0.15 MHz to 1.6 MHz, 1.6 MHz to 5 MHz and 5 MHz to 30 MHz. The conducted emissions from the EUT were maximized for operating mode as well as cable placement. Once a predominant frequency (within 12 dB of the limit) was found, it was more closely examined with the EMI Receiver span adjusted to 1 MHz.

The final data was collected under program control by the computer in several overlapping sweeps by running the EMI Receiver at a minimum scan rate of 10 seconds per octave. The six highest emissions are listed in Table 1.1 and Table 1.2.

7.1.2 Radiated Emissions Test

The EMI Receiver was used as a measuring meter. A preamplifier was used to increase the sensitivity of the instrument. The EMI Receiver was used in the peak detect mode with the "Max Hold" feature activated. In this mode, the EMI Receiver records the highest measured reading over all the sweeps. This final reading is then recorded automatically by the computer's automated data recording program, which takes into account the cable loss, amplifier gain and antenna factors, so that a true reading is compared to the true limit. The quasi-peak was used only for those readings, which are marked accordingly on the data sheets. The effective measurement bandwidth used for the radiated emissions test was (according to the frequency measured) 120 kHz for 30 MHz to 1 GHz and 1 MHz for 1 GHz and above.

Broadband biconical and log periodic antennas were used as transducers during the measurement. The biconical antenna was used from 30 MHz to 300 MHz and the log periodic antenna was used from 300 MHz to 1 GHz. The final data was taken with a frequency span of 1 MHz. Furthermore, the frequency span was reduced during the preliminary investigations as deemed necessary.

The open field test site of Compatible Electronics, Inc. was used for radiated emission testing. This test site is set up according to CISPR 16. Please see section 6.2 of this report for mounting, bonding and grounding of the EUT. The turntable supporting the EUT is remote controlled using a motor. The turntable permits EUT rotation of 360 degrees in order to maximize emissions. Also, the antenna mast allows height variation of the antenna from 1 meter to 4 meters. Data was collected in the worst case (highest emission) configuration of the EUT. At each reading, the EUT was rotated 360 degrees and the antenna height was varied from 1 to 4 meters (for E field radiated field strength).

The presence of ambient signals was verified by turning the EUT off. In case an ambient signal was detected, the measurement bandwidth was reduced temporarily and verification was made that an additional adjacent peak did not exist. This ensures that the ambient signal does not hide any emissions from the EUT. The EUT was tested at a 10 meter test distance from 30 MHz to 1 GHz to obtain final test data. The six highest emissions are listed in Table 2.

7.1.3 RF Emissions Test Results

Table 1.1 CONDUCTED EMISSION RESULTS 240V
NETWORK TESTER Model: Net Chaser (Charging Mode)

Frequency MHz	Emission Level* dBuV	Average Specification Limit dBuV	Delta (Spec. Limit-Emissions) dB
0.514	25.20**A**	60	34.8
0.517	25.50**A**	60	34.5
0.520	25.80**A**	60	34.2
0.523	26.40**A**	60	33.6
0.526	25.40**A**	60	34.6
0.529	26.20**A**	60	33.8

Table 1.2 CONDUCTED EMISSION RESULTS 240V
CABLE TESTER Model: Net Chaser (Charging Mode)

Frequency MHz	Emission Level* dBuV	Average Specification Limit dBuV	Delta (Spec. Limit-Emissions) dB
0.535	20.80**A**	60	39.2
0.550	21.10**A**	60	38.9
0.553	21.40**A**	60	38.6
0.556	21.80**A**	60	38.2
0.562	21.90**A**	60	38.1
0.565	21.70**A**	60	38.3

Notes:

* The complete emissions data is given in Appendix E of this report.

** The factors for the antennas and preamplifier gain are attached in Appendix D of this report.

\# Quasi-Peak Reading

A Average Reading

7.1.4 RF Emissions Test Results Continued

Table 2.0 RADIATED EMISSION RESULTS
NETWORK TESTER AND CABLE TESTER Model: Net Chaser (Charging Mode)

Frequency MHz	Corrected Reading* dBuV	Specification Limit dBuV	Delta (Cor. Reading – Spec. Limit) dB
150.00	25.17	40	-14.83
225.00	26.34	40	-13.66
239.99	40.77	47	-6.23
250.00	30.40	47	-16.60
280.1	33.32	47	-13.68
480.00	29.01	47	-17.99

Notes:

* The complete emissions data is given in Appendix E of this report.

** The factors for the antennas and preamplifier gain are attached in Appendix D of this report.

\# Quasi-Peak Reading

A Average Reading

7.2 Electrostatic Discharge Tests

An ESD Generator was used for this test. The characteristics consist of an energy storage capacitor: 150 pF; discharge resistance: 330 Ohms; charging resistor: 100 Megaohms; tolerance of voltage indication: ±5%; polarity of output voltage: positive and negative. The waveshape conforms to IEC 61000-4-2. The test was performed as per IEC 61000-4-2.

7.2.1 Direct ESD - Air Discharge

Test Results:

The EUT had no air discharges therefore this test was deemed unnecessary and thus was not performed. Had this test been applicable it would have been performed as described below.

In the Air ESD test, the EUT was exposed to a direct air discharge at all user accessible surfaces. The ESD arc was drawn directly to any insulated point on the EUT. The test simulated a situation in which any person or object carrying an electrostatic charge discharges it to any point on the equipment. The ground strap of the ESD generator was connected to the earth ground (shield room ground reference plane) and was a minimum of 0.2 m away from the EUT.

Please see section 6.2 of this report for mounting, bonding and grounding of the EUT. The EUT was operated and configured as described in section 4.2 of this report. The EUT was set up as shown in Appendix D of this report. Photographs of the test equipment, and EUT setup during the test are in Appendix D.

Prior to the start of the test, a functional test was performed on the EUT to ensure proper operation. The EUT was also monitored during the test for any degradation of performance. The test point locations were selected based on an exploratory test of inducing 20 discharges per second onto all surfaces of the unit. The test point locations selected for the final test are listed in the data sheets attached in Appendix E.

The test voltages were increased from 2.0 kV to 8.0 kV at 2.0 kV increments, in order to eliminate errors related to the "window" effect associated with ESD testing. Also, testing in increments helps determine the voltage threshold without severely damaging the unit. The final test was performed with 10 single shot discharges on each selected point in each polarity. The rounded discharge probe was used for the test. After completion of the test, a functional test was performed on the EUT to ensure proper operation.

7.2.2 Direct ESD - Contact Discharge

In the contact ESD test, the EUT was exposed to a direct contact discharge at all conductive user accessible surfaces. The ESD arc was drawn directly to any conductive point on the equipment under test. The test provides a repeatable method to determine immunity of the EUT to electrostatic discharges. The ground strap of the ESD generator was connected to the earth ground (shield room ground reference plane) and was a minimum of 0.2 m away from the EUT.

Please see section 6.2 of this report for mounting, bonding and grounding of the EUT. The EUT was operated and configured as described in section 4.2 of this report. The EUT was set up as shown in Appendix D of this report. Photographs of the test equipment and EUT setup during the test are in Appendix D.

Prior to the start of the test, a functional test was performed on the EUT to ensure proper operation. The EUT was also monitored during the test for any degradation of performance. The test point locations were selected based on the exploratory test of inducing 20 discharges per second onto all surfaces of the unit. The test point locations selected for the final test are listed in the data sheets attached in Appendix E.

The test voltages were ±2.0 kV and ±4.0 kV in order to eliminate errors related to the "window" effect associated with ESD testing. Also, testing in increments helps determine the threshold without severely damaging the unit. The final test was performed with single shot discharges on all the selected points.

The pointed discharge probe was touching the conductive surface of the unit before initiating the discharge. For painted surfaces, the sharp tip of the probe was used to penetrate the paint before providing discharge to the EUT. At least 10 discharges (in both polarities) were applied at each test point. After completion of the test, a functional test was performed on the EUT to ensure proper operation.

Test Results:

The EUT complies with the relevant requirements of EN 61326-1: 2013. The unit operates within the specifications for contact discharge at ±2.0 kV and ±4.0 kV (conductive surfaces).

7.2.3 Indirect Electrostatic Discharge Test - Vertical Coupling Plane

For indirect electrostatic discharges, the vertical coupling plane (0.5 m x 0.5 m) was tied to the ground reference plane through braid and a series of two 470 kΩ resistors one at each end of the braid. Please see section 6.2 of this report for mounting, bonding and grounding of the EUT. The EUT was operated and configured as described in section 4.2 of this report. The EUT was set up as shown in Appendix D of this report. Photographs of the test equipment and EUT setup during the test are in Appendix D.

Prior to the start of the test, a functional test was performed on the EUT to ensure proper operation. The EUT was also monitored during the test for any degradation of performance. A distance of one meter was maintained between the EUT and the shield room walls or any other metallic structures. The ground strap of the ESD generator was connected to the earth ground (shield room ground reference plane) and was a minimum of 0.2 m away from the EUT. The coupling plane was placed 0.1 meters from each side of the EUT and at a height close to the center of the EUT. The discharges were applied to the edge of the VCP. Ten discharges were applied to the VCP at each test level in each polarity on each side of the unit. After completion of the test, a functional test was performed on the EUT to ensure proper operation.

Test Results:

The EUT complies with the relevant requirements of EN 61326-1: 2013. The unit operates within the specifications for indirect discharges to the VCP at ±2.0 kV and ±4.0 kV.

7.2.4 Indirect Electrostatic Discharge Test - Horizontal Coupling Plane

For indirect electric discharges the horizontal coupling plane (1.0 m x 1.0 m) was tied to the ground reference plane through braid and a series of two 470 kΩ resistors at each end of the braid.

Please see section 6.2 of this report for mounting, bonding and grounding of the EUT. The EUT was operated and configured as described in section 4.2 of this report. The EUT was set up as shown in Appendix D of this report. Photographs of the test equipment and EUT setup during the test are in Appendix D.

Prior to the start of the test, a functional test was performed on the EUT to ensure proper operation. The EUT was also monitored during the test for any degradation of performance. A distance of one meter was maintained between the EUT and the shield room walls or any other metallic structures. The ground strap of the ESD generator was connected to the earth ground (shield room ground reference plane) and was a minimum of 0.2 m away from the EUT. The discharges were applied to the center of the front edge of the HCP 10 cm in front of the EUT at each test level in each polarity. After completion of the test, a functional test was performed on the EUT to ensure proper operation.

Test Results:

The EUT complies with the relevant requirements of EN 61326-1: 2013. The unit operates within the specifications for indirect discharges to the HCP at ±2.0 kV and ±4.0 kV.

7.3 Radio-Frequency Electromagnetic Field

The test was performed as per IEC 61000-4-3. For this test, broadband antennas were used to radiate the energy onto the EUT. The signal was 80% AM modulated with a 1 kHz sine wave, with a field strength of 3V/m peak, over the frequency range 80 MHz to 1 GHz, and 1.4 GHz to 2 GHz and 1V/m from 2 GHz to 2.7 GHz. The frequency range was covered with a step size of 1% and the dwell time was 3 seconds. The fields were established prior to injecting modulation per the requirements of IEC 61000-4-3.

Please see section 6.2 of this report for mounting, bonding and grounding of the EUT. The EUT was operated and configured as described in section 4.2 of this report. The EUT was set up as shown in Appendix D of this report. Photographs of the test equipment and EUT setup during the test are included in Appendix D.

Prior to the start of the test, a functional test was performed on the EUT to ensure proper operation. The EUT was also monitored during the test for any degradation of performance. The RF energy was radiated using the Biconical Antenna from 80 MHz to 275 MHz and Log Periodic Antenna from 275 MHz to 1000 MHz and the horn antenna above 1 GHz. The field strength was set to the test level contained in IEC 1000-4-3 using the RFI test software, which was installed on the desktop computer. The field strength was monitored using a field strength probe placed near the EUT. After completion of the test, a functional test was performed on the EUT to ensure proper operation.

Test Results:

The EUT complies with the relevant requirements of EN 61326-1: 2013. The unit operates within the specifications.

7.4 Fast Transient Common Mode Tests

The test was performed as per IEC 61000-4-4. The burst duration was 15 ms, with 300 ms burst period. The individual impulse had a 5ns rise time and a 50ns decay time and a 5 kHz frequency up to 2 kV, and a 2.5 kHz frequency above 2 kV. The EMC immunity test system was used for the test. Please see section 6.2 of this report for mounting, bonding, and grounding of the EUT. The EUT was operated and configured as described in section 4.2 of this report. The coupling device was placed 1 meter away from the EUT. The EUT was set up as shown in Appendix D of this report. Photographs of the test equipment and EUT setup during the test are included in Appendix D.

7.4.1 Power Lines

Prior to the start of the test, a functional test was performed on the EUT to ensure proper operation. The EUT was also monitored during the test for any degradation of performance. The transient energy was injected onto the power line through the use of a coupling/decoupling network. Bursts of pulse trains were injected onto the power line, in both positive and negative polarities. The test level was 0.5 kV and 1.0 kV. The test was run for one minute on each lead and each lead combination. After completion of the test, a functional test was performed on the EUT to ensure proper operation.

Test Results:

The EUT complies with the relevant requirements of EN 61326-1: 2013. The unit operates within the specifications.

7.4.2 Data Lines

Prior to the start of the test, a functional test was performed on the EUT to ensure proper operation. The EUT was also monitored during the test for any degradation of performance. The transient energy was coupled from the EMC immunity test system to the signal lines through the use of the capacitive coupling clamp. The clamp meets the requirements of IEC 61000-4-4. The clamp was placed on the ground plane, and the data lines were placed inside the clamp. Bursts of pulse trains were injected onto the signal lines, in both positive and negative polarities. The test level was ±0.5 kV. The test was run for two minutes on each cable. After completion of the test, a functional test was performed on the EUT to ensure proper operation.

Test Results:

The EUT complies with the relevant requirements of EN 61326-1: 2013. The unit operates within the specifications.

7.5 Surge Immunity Test

Power Lines

The EMC Test Immunity System was used to provide the "Combination Wave" as specified in EN 61000-4-5 Voltage waveform for high impedance - Rise time to crest voltage: 1.2 uS approx. and Decay: 50 uS to 50% of peak voltage value. Current waveform for low impedance - Rise time to crest voltage: 8.0 uS approx. and Decay: 20 uS to 50% of peak current value. The amplitude was increased incrementally at the stated test levels contained in IEC 1000-4-5 using the EMC Test Immunity System software, which was installed on the desktop computer. As per EN 61000-4-5, the selection of the voltage or current waveform depends on impedance offered by the EUT.

Test Results:

The EUT complies with the relevant requirements of EN 61326-1: 2013. The unit operates within the specifications.

7.6 Conducted disturbances induced by RF Electromagnetic Field Test

Prior to the start of the test, a functional test was performed on the EUT to ensure proper operation. The EUT was also monitored during the test for any degradation of performance. This test was performed as per IEC 61000-4-6. For this test, a Coupling Decoupling Network was used to induce an RF-field current directly onto the AC lines and a current probe was used for data lines. The signal was 80% AM modulated with a 1 kHz sine wave, with a field strength of 3Vrms, over the frequency range of 150 kHz to 80 MHz. The frequency range was covered with a 1% step size and the dwell time was 1 second. The EUT was placed 10 cm above the GRP with the Coupling Decoupling Network mounted and bonded to the GRP.

The EUT was operated as described in section 4.2 of this report. The EUT was set up as shown in Appendix D of this report. Photographs of the test equipment and EUT setup during the test are included in Appendix D.

Test Results:

The EUT complies with the relevant requirements of EN 61326-1: 2013. The unit operates within the specifications.

7.7 Power Frequency Magnetic Field Test

Prior to the start of the test, a functional test was performed on the EUT to ensure proper operation. The EUT was also monitored during the test for any degradation of performance. This test was performed to determine if the test sample was susceptible to Power Frequency Magnetic Fields which are generated by power frequency current in conductors and leaking transformers. The test was performed as per EN 61000-4-8. The magnetic field is applied by the immersion method to the EUT; in this method the EUT is placed in the center of an induction coil. The waveform is that of the typical power frequency either 50Hz or 60Hz. The Magnetic Field Strength is expressed in A/m; 1 A/m corresponds to free space induction of 1.26µTesla. A Square Induction coil in conjunction with a variable AC power source was used to induce the magnetic field. Prior to placing the EUT in the induction coil, the level of the field was verified through the use of an ELF meter. The test duration was 1 minute for each of the three Orthogonal Axes.

Test Results:

The EUT complies with the relevant requirements of EN 61326-1: 2013. The unit operates within the specifications.

7.8 Voltage Dips, Short Interruptions, and Voltage Variations

Prior to the start of the test, a functional test was performed on the EUT to ensure proper operation. The EUT was also monitored during the test for any degradation of performance. This test was performed as per IEC 61000-4-11. The purpose of this test was to determine the immunity of the EUT when subjected to voltage dips, short interruptions, and voltage variations. The voltages of the EUT were varied and disrupted at various levels of the supplied voltages for a given period of time. The voltage reduction level was 0% for 10 ms, 20ms and 5 seconds and 70% for 500 ms. The test was performed 3 times. The voltage change-overs took place at zero degree crossings.

Test Results:

The EUT complies with the relevant requirements of EN 61326-1: 2013. The unit operates within the specifications.

7.9 Quasi-Stationary Harmonics and Flicker Test

Test Results:

The EUT was rated at less than 75 Watts and was unlikely to cause voltage fluctuations or flicker therefore these tests were deemed unnecessary and thus were not performed. Had these tests been applicable they would have been performed as described below.

The Harmonic/Flicker Test System was used as a measuring meter along with a laptop computer. The data was collected using the Harmonic/Flicker Test System with software control activated. The voltage settings were 230V at 50Hz.

Please see section 6.2 of this report for mounting, bonding and grounding of the EUT. The EUT was set up with the minimum distances from any conductive surfaces as specified in IEC 61000-3-2 (EN 61000-3-2) and IEC 61000-3-3 (EN 61000-3-3).

The final data was collected under program control by the software running the Harmonic Flicker Test System. The data and test report were collected under program control by the test system software.

8. DEVIATIONS FROM THE TEST PROCEDURES

There were no deviations from the test procedures.

9. CONCLUSIONS

The Network Tester and Cable Tester, model: Net Chaser, as tested, meets all of the emissions (Class A) and Basic immunity requirements of the International Standard EN 61326-1: 2013 (Electrical Equipment for measurement, control and laboratory use – EMC Requirements).

APPENDIX A

LABORATORY ACCREDITATIONS

LABORATORY ACCREDITATIONS AND RECOGNITIONS

NVLAP LAB CODES 200063-0, 200528-0, 200527-0

For US, Canada, Australia/New Zealand, Taiwan and the European Union, Compatible Electronics is currently accredited by NVLAP to ISO/IEC 17025 an ISO 9002 equivalent. Please follow the link to the NIST site for each of our facilities NVLAP certificate and scope of accreditation.

NVLAP listing links
Agoura Division - http://ts.nist.gov/Standards/scopes/2000630.htm
Brea Division - http://ts.nist.gov/Standards/scopes/2005280.htm
Silverado/Lake Forest Division - http://ts.nist.gov/Standards/scopes/2005270.htm

"This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer joint ISO-ILAC-IAF Communiqué)"

See: https://www.ilac.org/documents/17025_joint_communique.pdf

ANSI listing
CETCB
https://www.ansica.org/wwwversion2/outside/ALLdirectoryDetails.asp?menuID=1&prgID=3&orgID=123&status=4

Compatible Electronics has been nominated as a Conformity Assessment Body (CAB) for EMC under the US/EU Mutual Recognition Agreement (MRA).

Compatible Electronics has been nominated as a Conformity Assessment Body (CAB) for Taiwan/BSMI under the US/APEC (Asia-Pacific Economic Cooperation) Mutual Recognition Agreement (MRA).

We are also certified/listed for IT products by the following country/agency:

VCCI Listing, from VCCI site
Enter "Compatible" in search form http://www.vcci.or.jp/vcci_e/activity/registration/setsubi.html

FCC Listing, from FCC OET site
FCC test lab search https://fjallfoss.fcc.gov/oetcf/eas/reports/TestFirmSearch.cfm

Industry Canada Industrie Canada Compatible Electronics IC listing can be found at:
http://www.ic.gc.ca/eic/site/ic1.nsf/eng/home

APPENDIX B

MODIFICATIONS TO THE EUT

MODIFICATIONS TO THE EUT

There were no modifications made to the EUT during the test.

APPENDIX C

ADDITIONAL MODELS COVERED UNDER THIS REPORT

ADDITIONAL MODELS COVERED UNDER THIS REPORT

USED FOR THE PRIMARY TEST: Network Tester and Cable Tester
Model: Net Chaser
S/N: FFFF

There were no additional models covered under this report.

APPENDIX D

DIAGRAMS, CHARTS AND PHOTOS

FIGURE 1: CONDUCTED EMISSIONS TEST SETUP

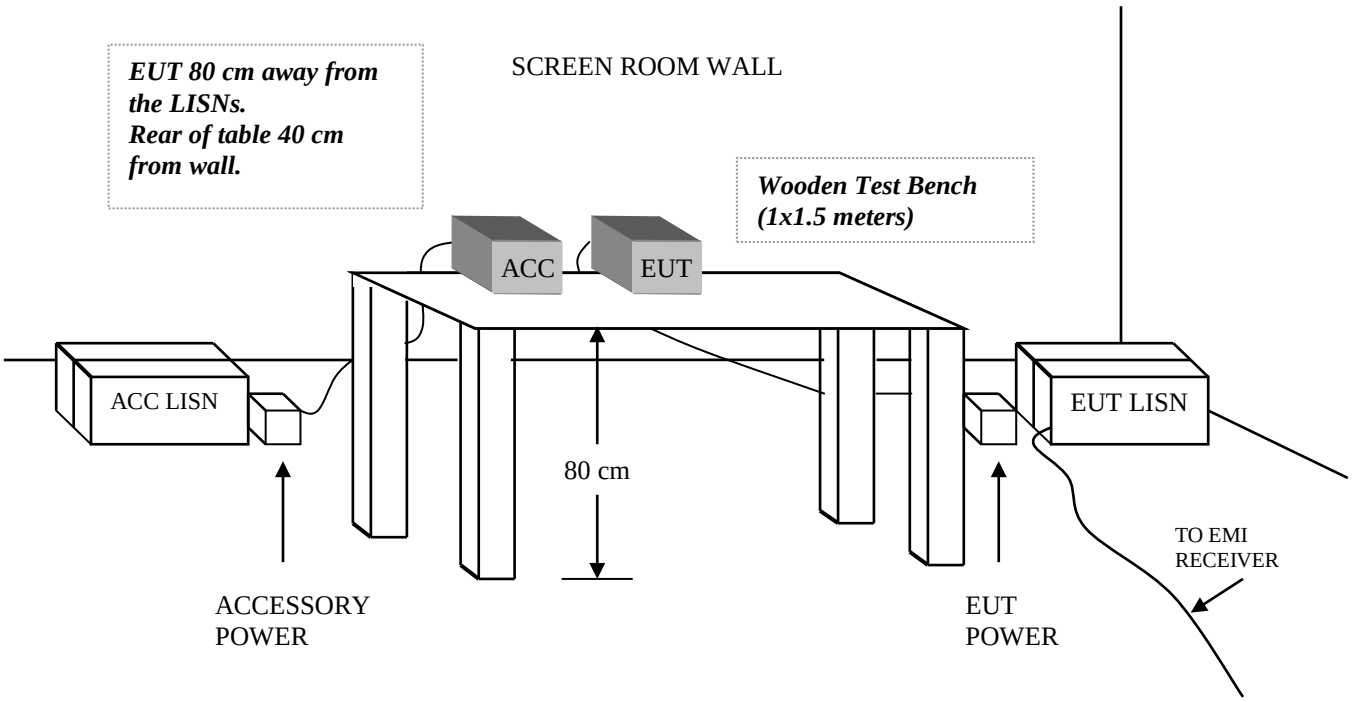


FIGURE 2: PLOT MAP AND LAYOUT OF RADIATED SITE

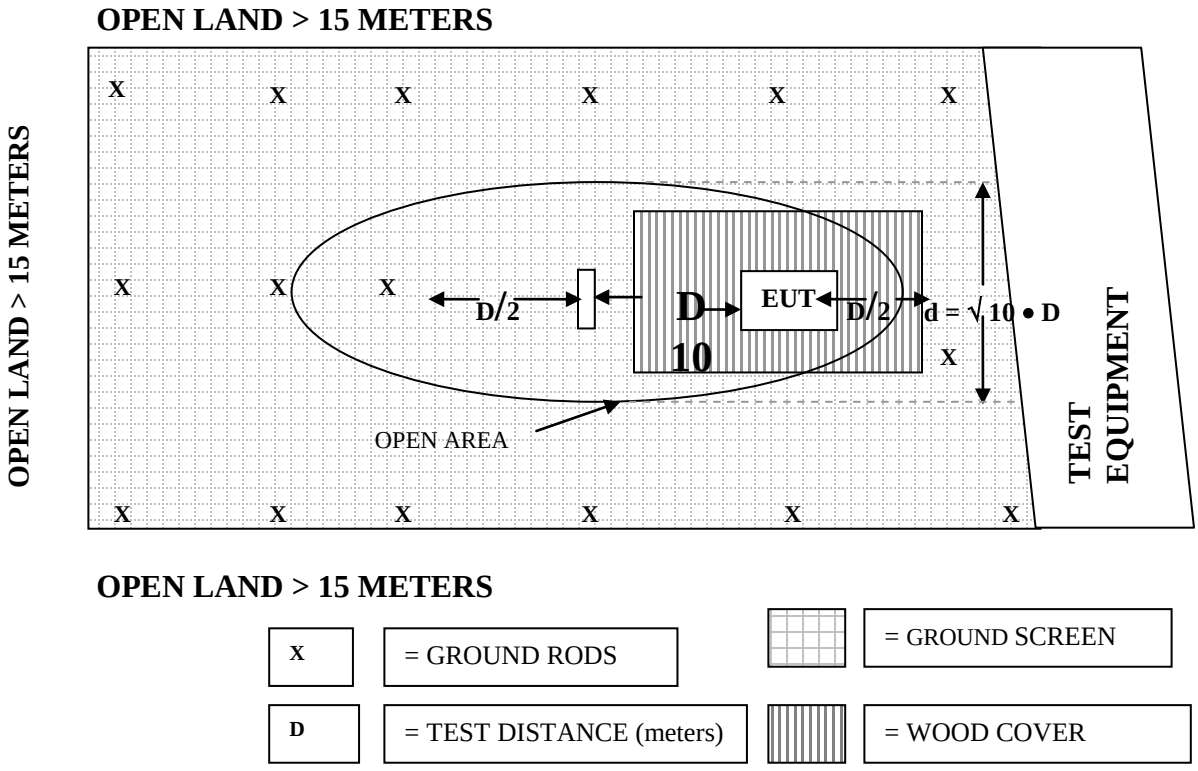


FIGURE 3: ELECTROSTATIC DISCHARGE

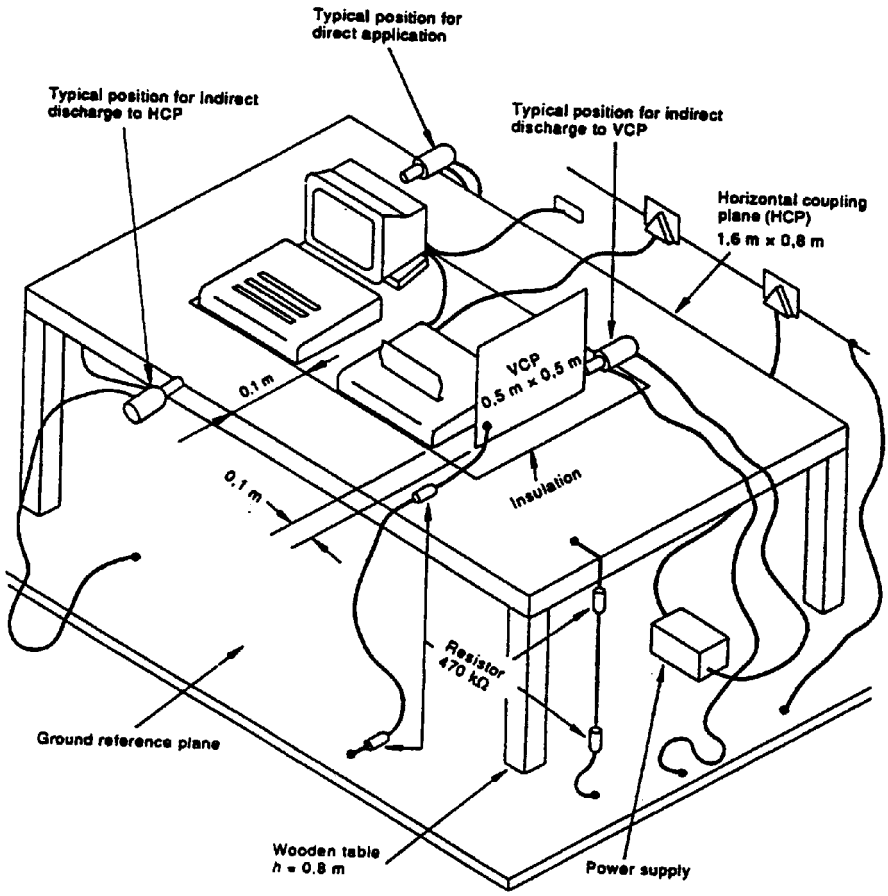


FIGURE 4: RADIATED SUSCEPTIBILITY SETUP

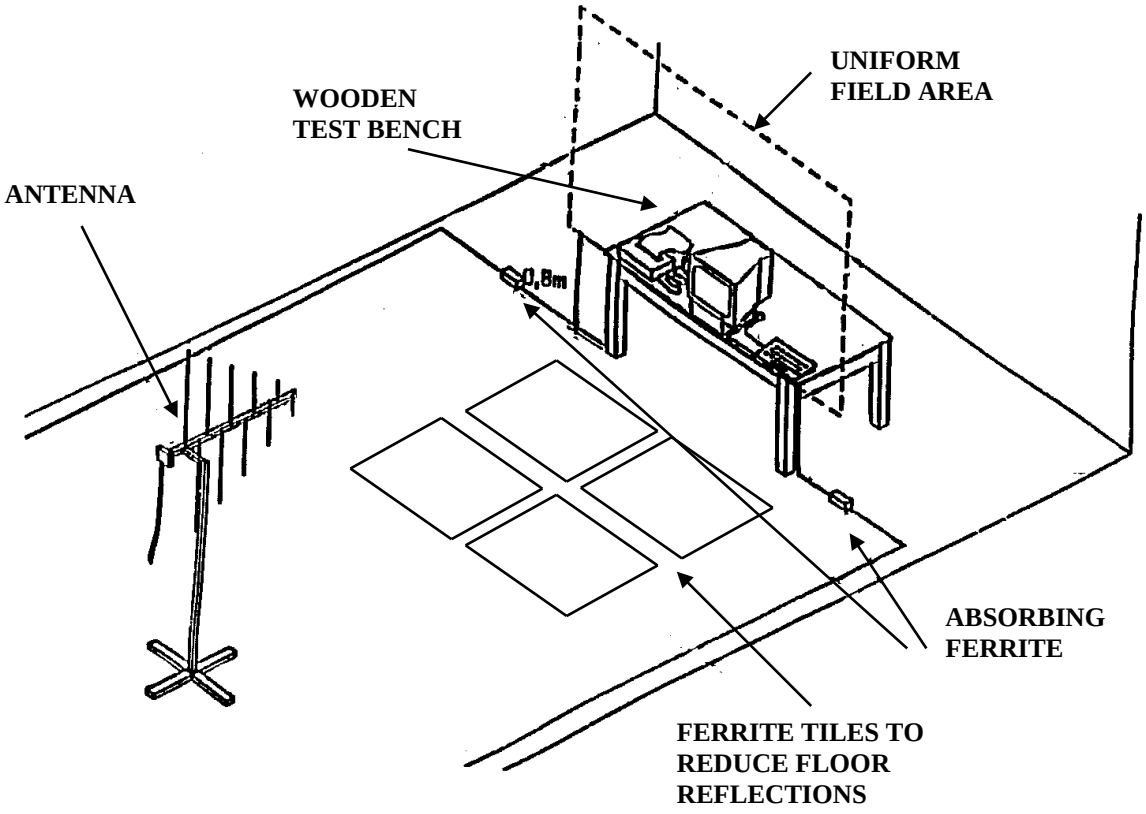


FIGURE 5: FAST TRANSIENTS COMMON MODE TEST SETUP

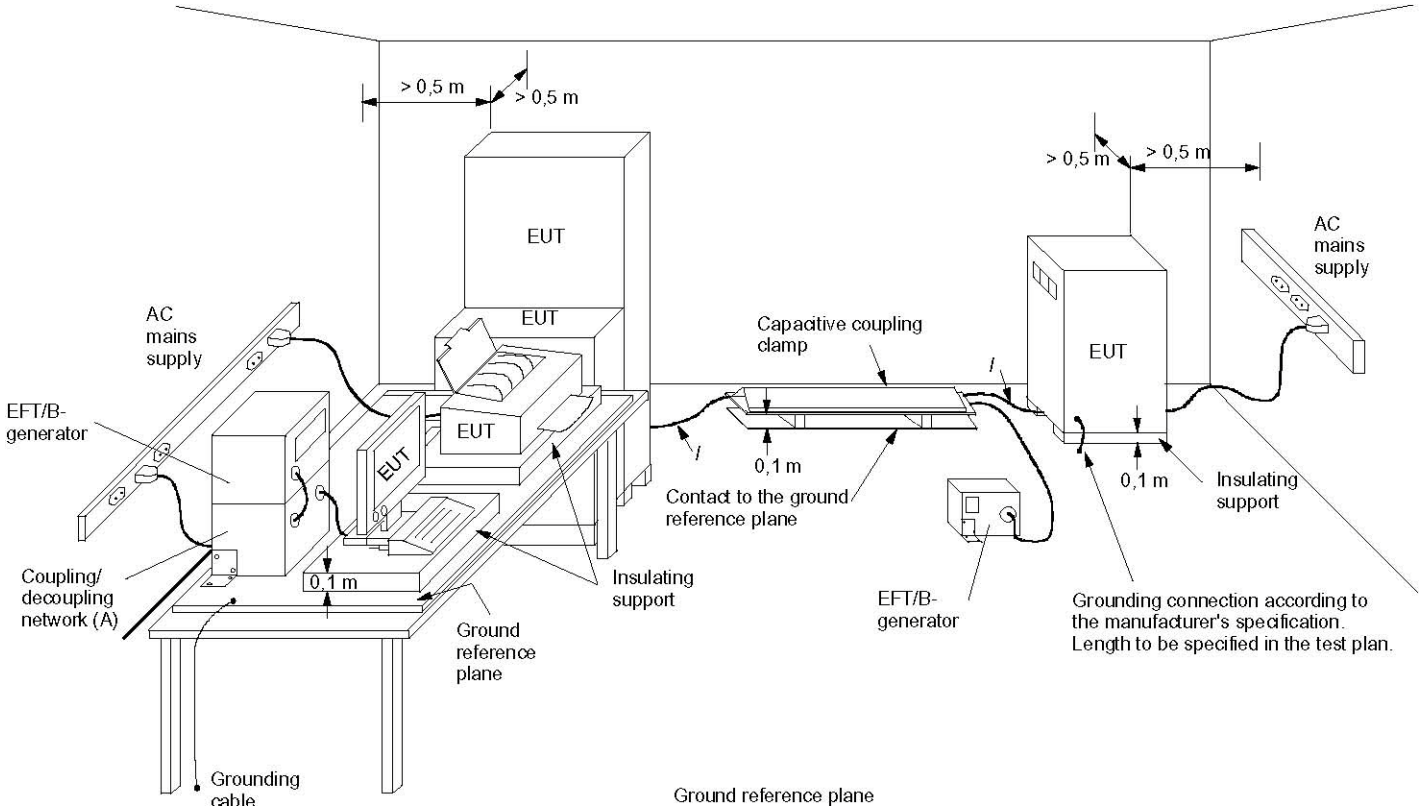


FIGURE 6: SURGE IMMUNITY TEST SETUP

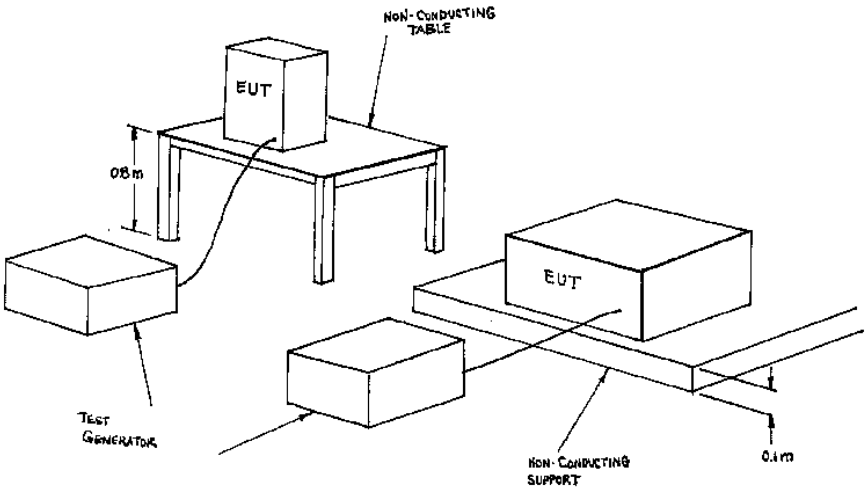


FIGURE 7: CONDUCTED DISTURBANCES INDUCED BY RF FIELDS TEST SETUP

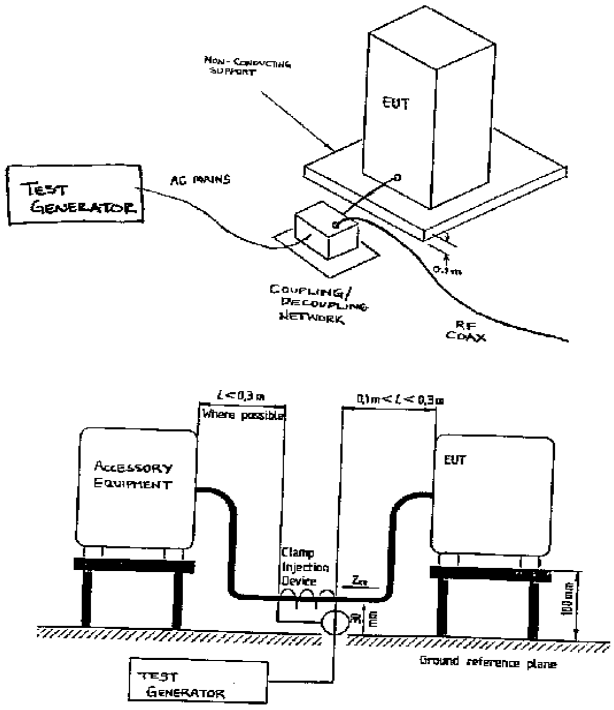


FIGURE 8: POWER FREQUENCY MAGNETIC FIELD TEST SETUP

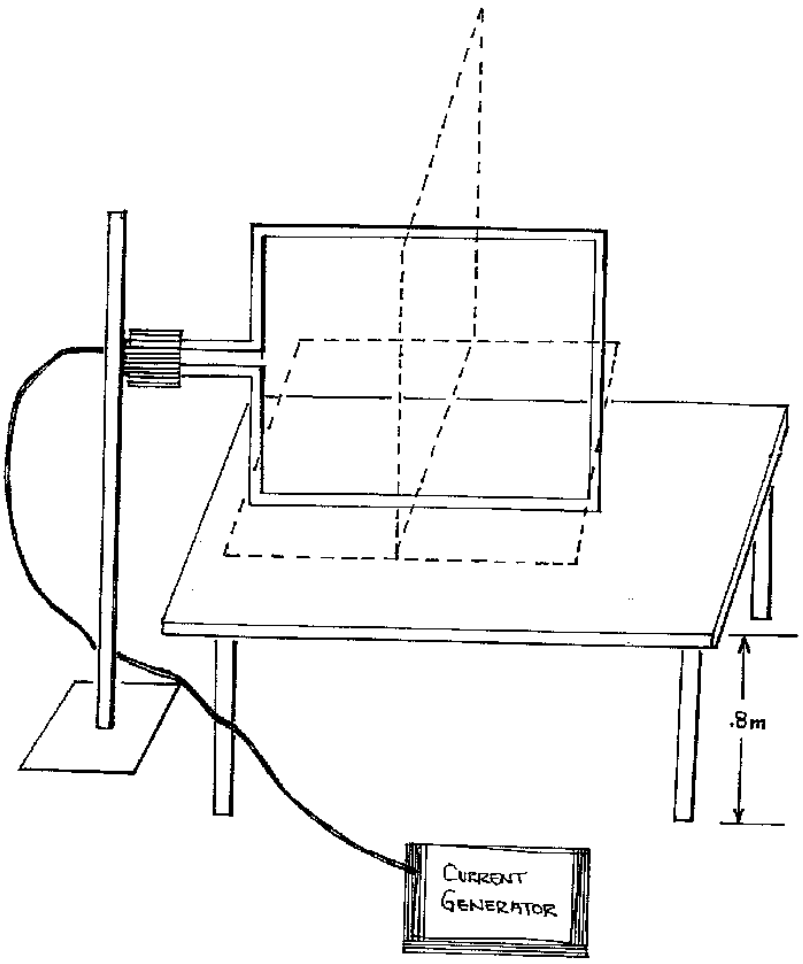
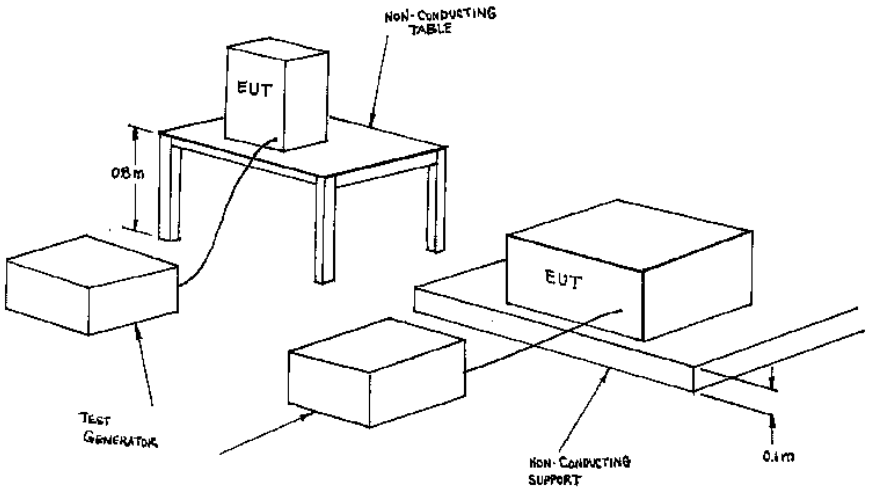


FIGURE 9: VOLTAGE DIPS & VOLTAGE VARIATIONS & SHORT INTERRUPTIONS



COM-POWER AB-900

BICONICAL ANTENNA

S/N: 43061

CALIBRATION DATE: MAY 22, 2014

FREQUENCY (MHz)	FACTOR (dB)	FREQUENCY (MHz)	FACTOR (dB)
30	17.00	140	17.90
40	16.90	150	17.40
50	17.20	160	17.60
60	15.70	175	19.80
70	13.70	180	20.60
80	12.10	200	21.60
90	13.00	250	20.50
100	15.80	300	24.80
120	18.80		
125	19.40		

COM-POWER AL-100

LOG PERIODIC ANTENNA

S/N: 351049

CALIBRATION DATE: MAY 20, 2014

FREQUENCY (MHz)	FACTOR (dB)
300	12.3
350	13.5
400	15.9
450	14.8
500	15.7
550	16.7
600	17.8
650	17.3
700	18.2
750	20.4
800	20.4
850	21.3
900	20.7
950	21.7
1000	20.6

COM-POWER PA-103

PREAMPLIFIER

S/N: 1619

CALIBRATION DATE: OCT. 2, 2013

FREQUENCY (MHz)	FACTOR (dB)	FREQUENCY (MHz)	FACTOR (dB)
30	32.6	300	31.9
40	32.5	350	32.0
50	32.7	400	31.8
60	32.7	450	31.7
70	32.5	500	31.8
80	32.7	550	31.5
90	32.6	600	31.2
100	32.5	650	31.8
125	32.5	700	31.4
150	32.5	750	30.5
175	32.4	800	31.7
200	32.4	850	30.5
225	32.4	900	30.5
250	32.1	950	30.1
275	32.1	1000	30.3

FRONT VIEW

T3 INNOVATION
NETWORK TESTER AND CABLE TESTER
MODEL: Net Chaser
EN 61326-1 CLASS A - RADIATED EMISSIONS – 8-26-14

PHOTOGRAPH SHOWING THE EUT CONFIGURATION FOR MAXIMUM EMISSIONS

REAR VIEW

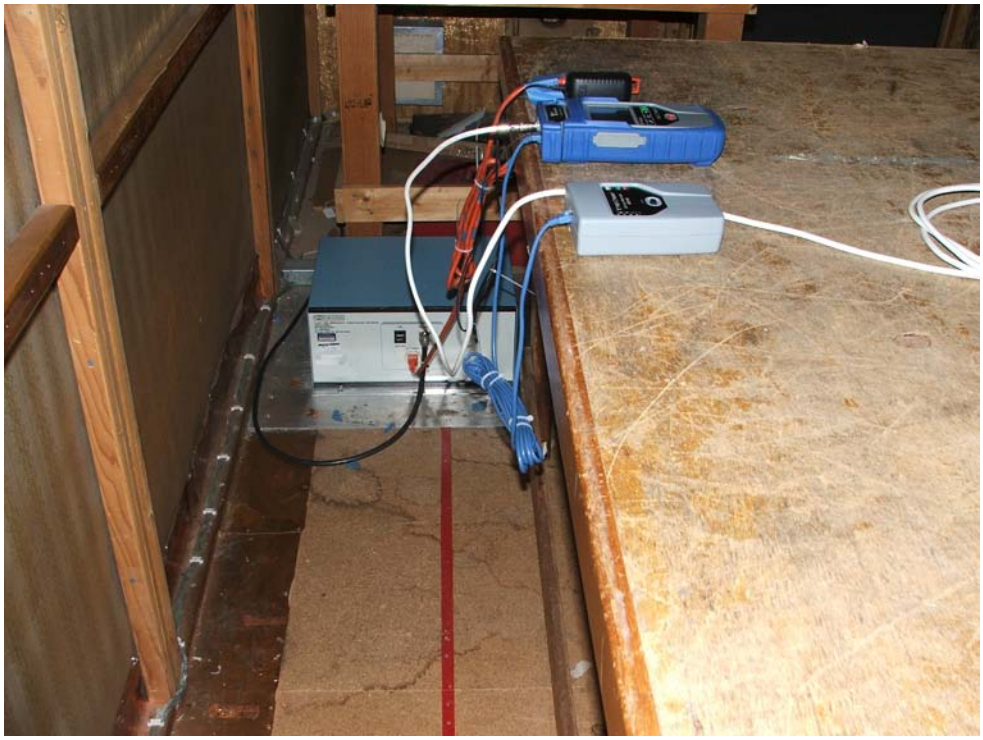
T3 INNOVATION
NETWORK TESTER AND CABLE TESTER
MODEL: Net Chaser
EN 61326-1 CLASS A - RADIATED EMISSIONS – 8-26-14

PHOTOGRAPH SHOWING THE EUT CONFIGURATION FOR MAXIMUM EMISSIONS

FRONT VIEW

T3 INNOVATION
NETWORK TESTER AND CABLE TESTER
MODEL: Net Chaser
EN 61326-1 CLASS A - CONDUCTED EMISSIONS – 8-26-14

PHOTOGRAPH SHOWING THE EUT CONFIGURATION FOR MAXIMUM EMISSIONS



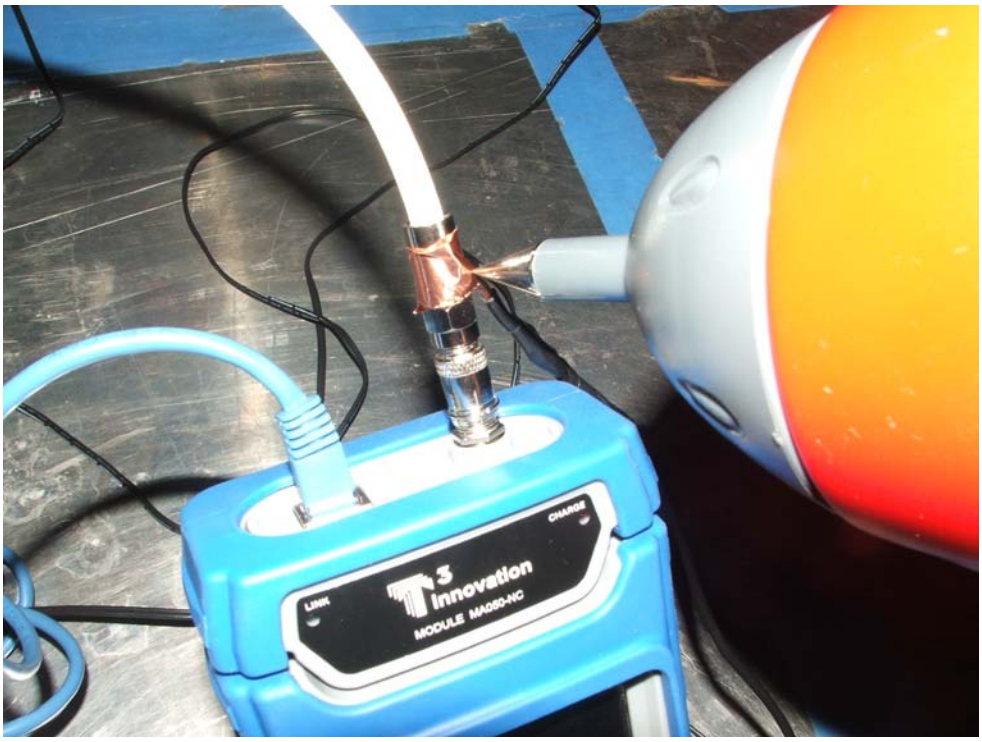
REAR VIEW

T3 INNOVATION
NETWORK TESTER AND CABLE TESTER
MODEL: Net Chaser
EN 61326-1 CLASS A - CONDUCTED EMISSIONS – 8-26-14

PHOTOGRAPH SHOWING THE EUT CONFIGURATION FOR MAXIMUM EMISSIONS

ELECTROSTATIC DISCHARGE

COMPANY:	T3 INNOVATION	**DATE:**	8-27-14
EUT:	NETWORK TESTER AND CABLE TESTER	**ENGINEER:**	A. Baum
MODEL:	Net Chaser	**S/N:**	FFFF



PHOTOGRAPH OF THE TEST SETUP FOR
DIRECT ELECTROSTATIC DISCHARGE TEST
(CONTACT DISCHARGE)

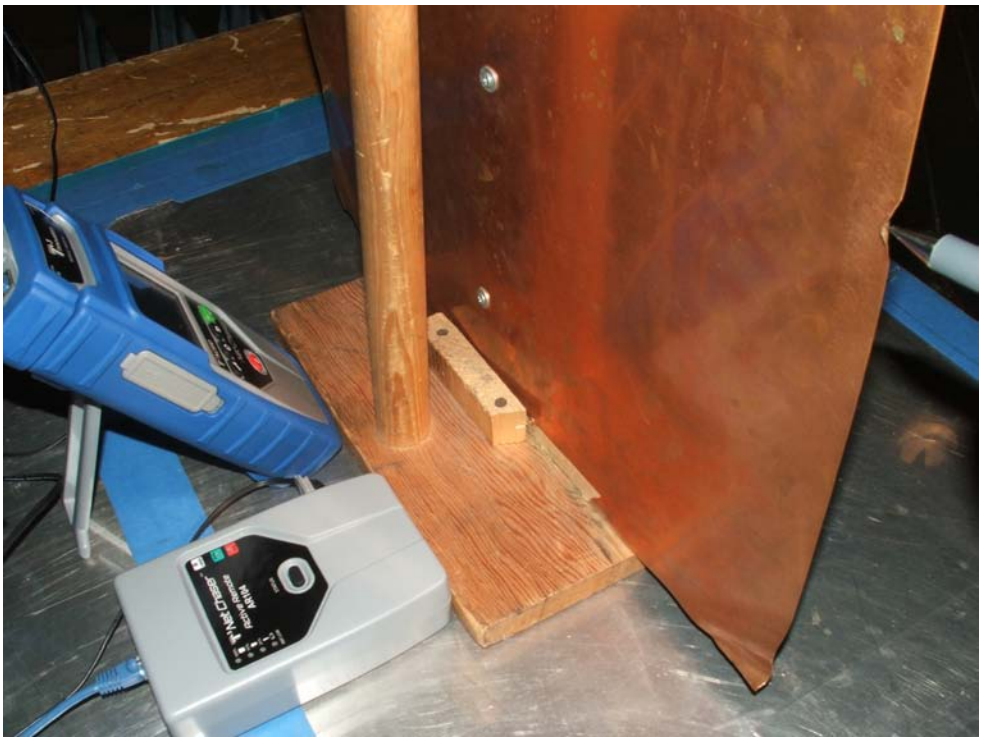
ELECTROSTATIC DISCHARGE

COMPANY:	T3 INNOVATION	**DATE:**	8-27-14
EUT:	NETWORK TESTER AND CABLE TESTER	**ENGINEER:**	A. Baum
MODEL:	Net Chaser	**S/N:**	FFFF

PHOTOGRAPH OF THE TEST SETUP FOR
INDIRECT ELECTROSTATIC DISCHARGE TEST
(HORIZONTAL COUPLING PLANE)

ELECTROSTATIC DISCHARGE

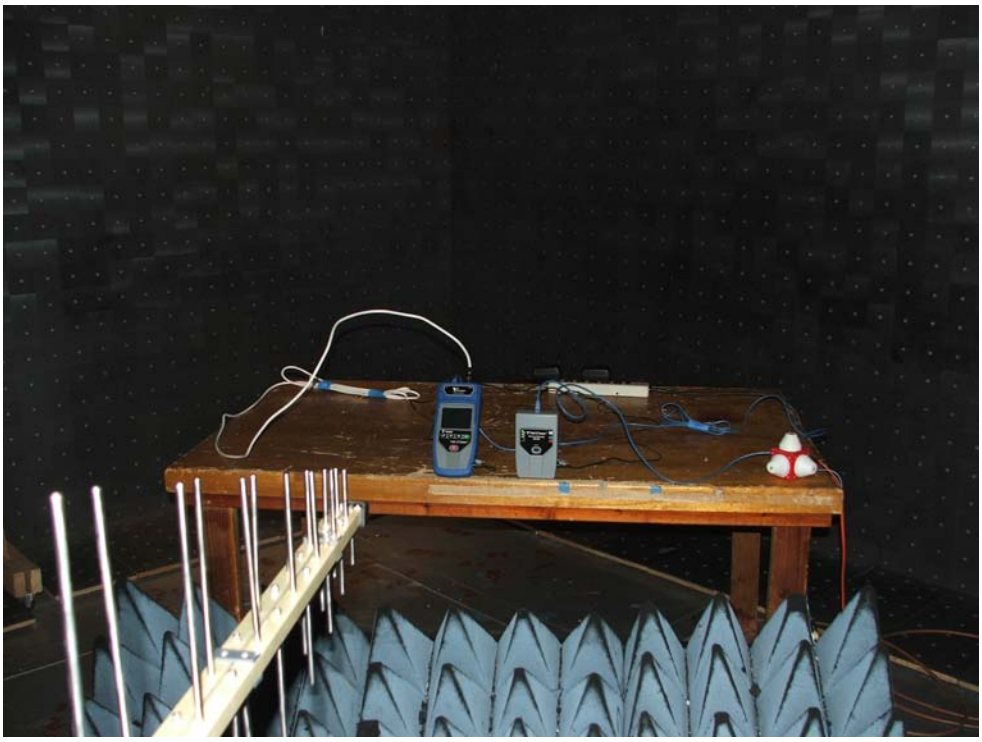
COMPANY:	T3 INNOVATION	**DATE:**	8-27-14
EUT:	NETWORK TESTER AND CABLE TESTER	**ENGINEER:**	A. Baum
MODEL:	Net Chaser	**S/N:**	FFFF



PHOTOGRAPH OF THE TEST SETUP FOR
INDIRECT ELECTROSTATIC DISCHARGE TEST
(VERTICAL COUPLING PLANE)

RADIO-FREQUENCY ELECTROMAGNETIC FIELD

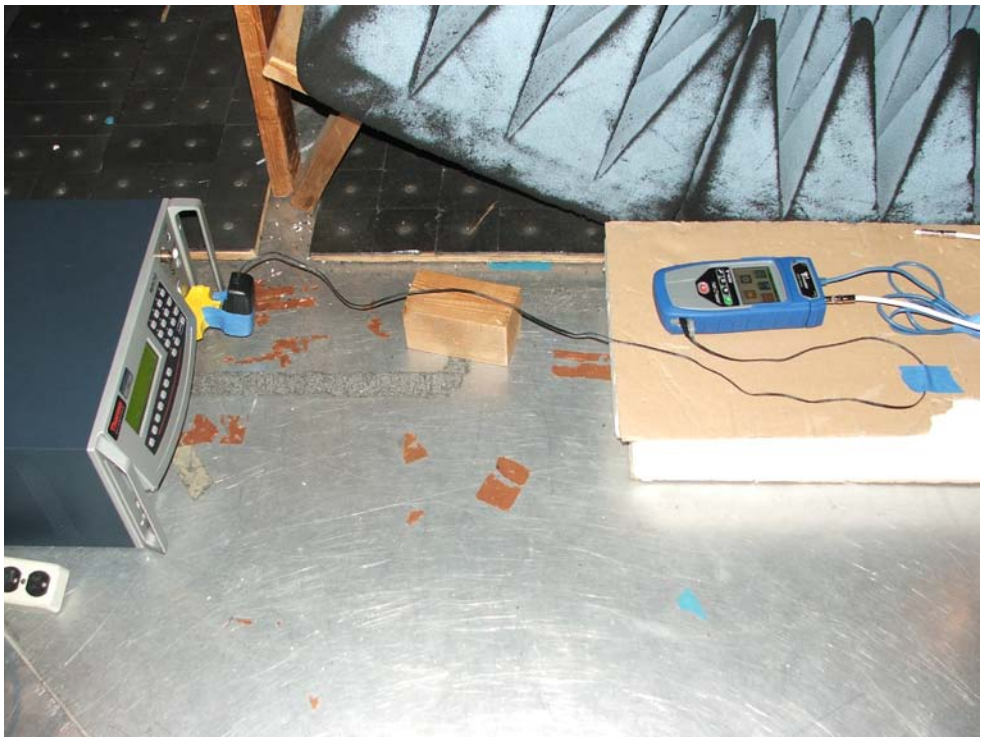
COMPANY:	T3 INNOVATION	**DATE:**	8-27-14
EUT:	NETWORK TESTER AND CABLE TESTER	**ENGINEER:**	A. Baum
MODEL:	Net Chaser	**S/N:**	FFFF



PHOTOGRAPH OF THE TEST SETUP FOR
RADIO-FREQUENCY ELECTROMAGNETIC FIELDS TEST

FAST TRANSIENTS COMMON MODE

COMPANY:	T3 INNOVATION	**DATE:**	8-27-14
EUT:	NETWORK TESTER AND CABLE TESTER	**ENGINEER:**	A. Baum
MODEL:	Net Chaser	**S/N:**	FFFF



PHOTOGRAPH OF THE TEST SETUP FOR
FAST TRANSIENT COMMON MODE TEST
(AC LINES)

FAST TRANSIENTS COMMON MODE

COMPANY:	T3 INNOVATION	**DATE:**	8-27-14
EUT:	NETWORK TESTER AND CABLE TESTER	**ENGINEER:**	A. Baum
MODEL:	Net Chaser	**S/N:**	FFFF

PHOTOGRAPH OF THE TEST SETUP FOR
FAST TRANSIENT COMMON MODE TEST
(DATA LINES)

SURGE IMMUNITY TEST

COMPANY:	T3 INNOVATION	**DATE:**	8-26-14
EUT:	NETWORK TESTER AND CABLE TESTER	**ENGINEER:**	A. Baum
MODEL:	Net Chaser	**S/N:**	FFFF

PHOTOGRAPH OF THE TEST SETUP FOR
SURGE IMMUNITY TEST
(AC INPUT)

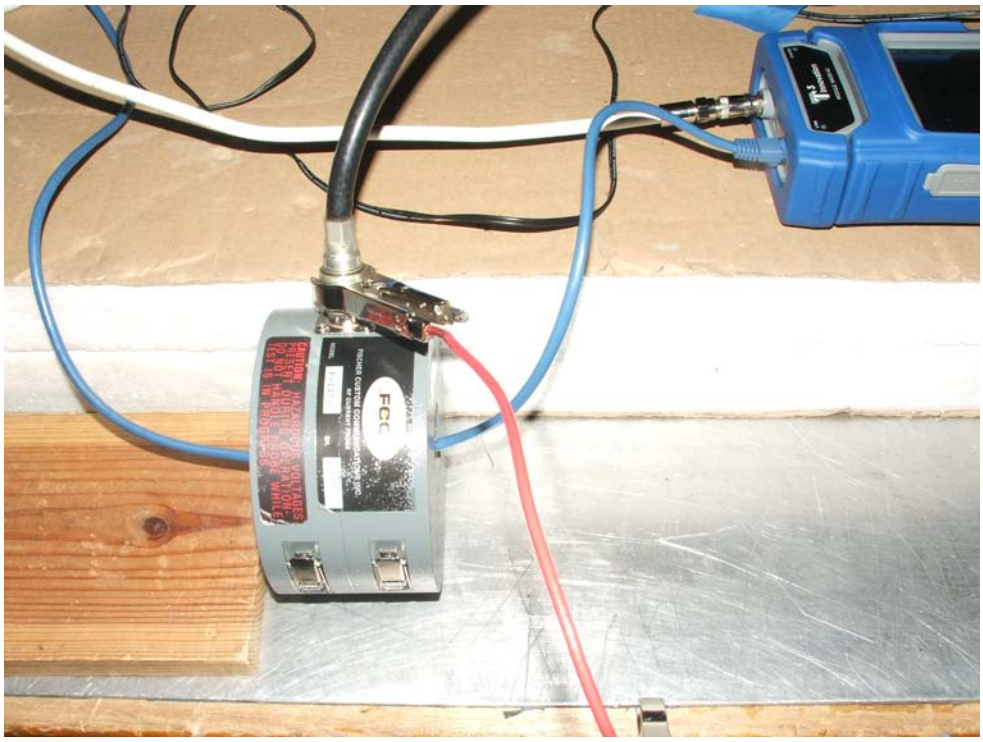
CONDUCTED DISTURBANCES INDUCED BY RF FIELDS TEST

COMPANY:	T3 INNOVATION	**DATE:**	8-27-14
EUT:	NETWORK TESTER AND CABLE TESTER	**ENGINEER:**	A. Baum
MODEL:	Net Chaser	**S/N:**	FFFF

PHOTOGRAPH OF THE TEST SETUP FOR
CONDUCTED DISTURBANCES INDUCED BY RF FIELDS
(AC INPUT)

CONDUCTED DISTURBANCES INDUCED BY RF FIELDS TEST

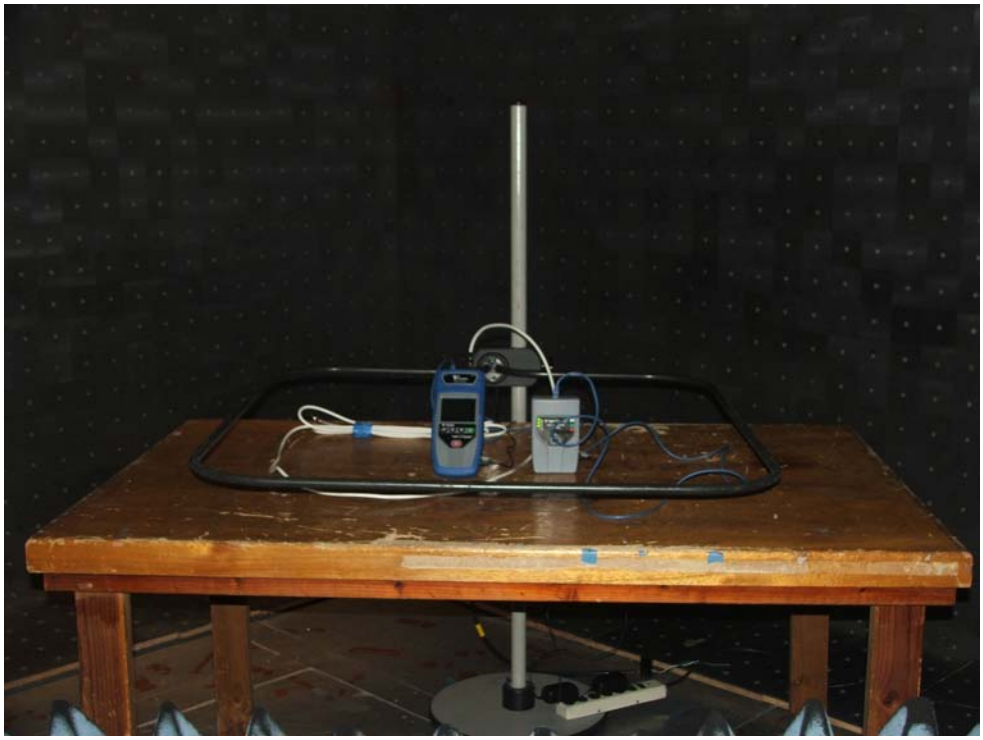
COMPANY:	T3 INNOVATION	**DATE:**	8-27-14
EUT:	NETWORK TESTER AND CABLE TESTER	**ENGINEER:**	A. Baum
MODEL:	Net Chaser	**S/N:**	FFFF



PHOTOGRAPH OF THE TEST SETUP FOR
CONDUCTED DISTURBANCES INDUCED BY RF FIELDS
(DATA INPUT)

POWER FREQUENCY MAGNETIC FIELD SUSCEPTIBILITY

COMPANY:	T3 INNOVATION	**DATE:**	8-27-14
EUT:	NETWORK TESTER AND CABLE TESTER	**ENGINEER:**	A. Baum
MODEL:	Net Chaser	**S/N:**	FFFF



PHOTOGRAPH OF THE TEST SETUP FOR
POWER FREQUENCY MAGNETIC FIELD SUSCEPTIBILITY

VOLTAGE DIPS & VOLTAGE VARIATIONS AND SHORT INTERRUPTIONS

COMPANY:	T3 INNOVATION	**DATE:**	8-26-14
EUT:	NETWORK TESTER AND CABLE TESTER	**ENGINEER:**	A. Baum
MODEL:	Net Chaser	**S/N:**	FFFF

PHOTOGRAPH OF THE TEST SETUP FOR
VOLTAGE DIPS & VOLTAGE VARIATIONS AND SHORT INTERRUPTIONS

APPENDIX E

DATA SHEETS

ELECTROSTATIC DISCHARGE

COMPANY:	T3 INNOVATION	**DATE:**	8-27-14
EUT:	NETWORK TESTER AND CABLE TESTER	**ENGINEER:**	A. Baum
MODEL:	Net Chaser	**S/N:**	FFFF
SPEC.: **TEST PROC.:**	EN 61326-1: 2013 IEC 61000-4-2: 2008	**AIR TEMPERATURE:**	26° C
LEVEL:	±4.0 kV Direct and Indirect Contact Discharges	**BAROMETRIC PRESSURE:**	102.6 kPa
PERFORMANCE CRITERIA:	B	**RELATIVE HUMIDITY:**	42 %

TEST POINT	TEST POINT DESCRIPTION	TEST POINT	TEST POINT DESCRIPTION
1	RG-6 Coaxial Cable Shield		

TEST POINTS	LEVEL (kV)	DISCHARGES PER POLARITY	NO. OF FAILURES	COMMENTS
1	±2.0	10	0	No susceptibility observed
1	±4.0	10	0	No susceptibility observed
Horizontal	±2.0	10	0	No susceptibility observed
Coupling Plane	±4.0	10	0	No Susceptibility observed
Vertical	±2.0	10	0	No susceptibility observed
Coupling Plane	±4.0	10	0	No Susceptibility observed

RADIO-FREQUENCY ELECTROMAGNETIC FIELD

COMPANY:	T3 INNOVATION	**DATE:**	8-27-14
EUT:	NETWORK TESTER AND CABLE TESTER	**ENGINEER:**	A. Baum
MODEL:	Net Chaser	**S/N:**	FFFF
SPEC.: **TEST PROC.:**	EN 61326-1: 2013 IEC 61000-4-3: 2006 +A1: 2007 +A2: 2010	**AIR TEMPERATURE:**	27° C
LEVEL:	3V/m & 1V/m, 1 kHz AM sine wave at 80%	**BAROMETRIC PRESSURE:**	102.9 kPa
PERFORMANCE CRITERIA:	A	**RELATIVE HUMIDITY:**	41 %

ALL SIX SIDES OF THE EUT WERE EXPOSED TO THE FIELDS.

FREQ. RANGE (MHz)	POLAR-. IZATION	RESULT	THRESHOLD (V/m)	COMMENTS
80 - 1000	Horizontal	Passed	> 3.0 V/m	No susceptibility observed
80 - 1000	Vertical	Passed	> 3.0 V/m	No susceptibility observed
1400 - 2000	Horizontal	Passed	> 3.0 V/m	No susceptibility observed
1400 - 2000	Vertical	Passed	> 3.0 V/m	No susceptibility observed
2000 – 2700	Horizontal	Passed	> 1.0 V/m	No susceptibility observed
2000 – 2700	Vertical	Passed	> 1.0 V/m	No susceptibility observed

FAST TRANSIENTS COMMON MODE

COMPANY:	T3 INNOVATION	**DATE:**	8-27-14
EUT:	NETWORK TESTER AND CABLE TESTER	**ENGINEER:**	A. Baum
MODEL:	Net Chaser	**S/N:**	FFFF
SPEC.: **TEST PROC.:**	EN 61326-1: 2013 IEC 61000-4-4: 2004+A1: 2010	**AIR TEMPERATURE:**	25° C
LEVEL:	±1.0 kV on Power Lines	**BAROMETRIC PRESSURE:**	102.9 kPa
PERFORMANCE CRITERIA:	B	**RELATIVE HUMIDITY:**	44 %

TEST LEVEL (kV)	START VOLTAGE (kV)	STEP VOLTAGE (kV)	TEST DURATION (minutes)	TIME BETWEEN TESTS (seconds)
1.0	0.5	0.5	1.0	10.0

AC ENTRY DESIGNATION	LEVEL (kV)	RESULT	COMMENTS
L1 (Network Tester)	±0.5	Passed	No susceptibility observed
"	±1.0	"	"
L2 (Network Tester)	±0.5	Passed	"
"	±1.0	"	"
L1-L2 (Network Tester)	±0.5	Passed	"
"	±1.0	"	"
L1 (Cable Tester)	±0.5	Passed	No susceptibility observed
"	±1.0	"	"
L2 (Cable Tester)	±0.5	Passed	"
"	±1.0	"	"
L1-L2 (Cable Tester)	±0.5	Passed	"
"	±1.0	"	"

FAST TRANSIENTS COMMON MODE

COMPANY:	T3 INNOVATION	**DATE:**	8-27-14
EUT:	NETWORK TESTER AND CABLE TESTER	**ENGINEER:**	A. Baum
MODEL:	Net Chaser	**S/N:**	FFFF
SPEC.: **TEST PROC.:**	EN 61326-1: 2013 IEC 61000-4-4: 2004+A1: 2010	**AIR TEMPERATURE:**	25° C
LEVEL:	± 0.5kV Signal Lines	**BAROMETRIC PRESSURE:**	102.9 kPa
PERFORMANCE CRITERIA:	B	**RELATIVE HUMIDITY:**	44 %

TEST LEVEL (kV)	TEST DURATION (minutes)	TIME BETWEEN TESTS (seconds)
0.5	1.0	10.0

PORT ENTRY DESIGNATION	LEVEL (kV)	RESULT	COMMENTS
RG-6 Coaxial Cable	±0.5	Passed	No Susceptibility observed
Ethernet	±0.5	Passed	No Susceptibility observed

SURGE IMMUNITY TEST

COMPANY:	T3 INNOVATION	**DATE:**	8-26-14
EUT:	NETWORK TESTER AND CABLE TESTER	**ENGINEER:**	A. Baum
MODEL:	Net Chaser	**S/N:**	FFFF
SPEC.: **TEST PROC.:**	EN 61326-1: 2013 EN 61000-4-5: 2006	**AIR TEMPERATURE:**	27 C
LEVEL:	±0.5 kV Differential mode on Power Lines	**BAROMETRIC PRESSURE:**	102.6 kPa
PERFORMANCE CRITERIA:	B	**RELATIVE HUMIDITY:**	41 %

ENTRY DESIGNATION	PHASE ANGLE				LEVEL (V)	RESULT	COMMENTS
L1 & L2 (Network Tester)	0	90	180	270	±500	Passed	No Susceptibility observed
L1 & L2 (Cable Tester)	0	90	180	270	±500	Passed	No Susceptibility observed

CONDUCTIVE DISTURBANCES INDUCED BY RF ELECTROMAGNETIC FIELDS TEST

COMPANY:	T3 INNOVATION	**DATE:**	8-27-14
EUT:	NETWORK TESTER AND CABLE TESTER	**ENGINEER:**	A. Baum
MODEL:	Net Chaser	**S/N:**	FFFF
SPEC.: **TEST PROC.:**	EN 61326-1: 2013 IEC 61000-4-6: 2008	**AIR TEMPERATURE:**	25° C
LEVEL:	3Vrms, 1 kHz sine wave, AM Modulation at 80%	**BAROMETRIC PRESSURE:**	102.9 kPa
PERFORMANCE CRITERIA:	A	**RELATIVE HUMIDITY:**	44%

PORT ENTRY	FREQ. RANGE (MHz)	RESULT	THRESHOLD (V)	COMMENTS
AC Mains (Network Tester)	.150 - 80	Passed	3.0	No susceptibility observed
AC Mains (Cable Tester)	.150 - 80	Passed	3.0	No susceptibility observed
RG-6 Coaxial Cable	.150 - 80	Passed	3.0	No susceptibility observed
Ethernet	.150 - 80	Passed	3.0	No susceptibility observed

POWER-FREQUENCY MAGNETIC FIELD SUSCEPTIBILITY

COMPANY:	T3 INNOVATION	**DATE:**	8-27-14
EUT:	NETWORK TESTER AND CABLE TESTER	**ENGINEER:**	A. Baum
MODEL:	Net Chaser	**S/N:**	FFFF
SPEC.: **TEST PROC.:**	EN 61326-1: 2013 IEC 61000-4-8: 2009	**AIR TEMPERATURE:**	27° C
LEVEL:	3 A/m, 50 Hz	**BAROMETRIC PRESSURE:**	102.9 kPa
PERFORMANCE CRITERIA:	A	**RELATIVE HUMIDITY:**	41 %

ALL THREE ORTHOGONAL AXES WERE TESTED

ORTHOGONAL AXIS	LEVEL A/m	RESULT	COMMENTS
X	3	Passed	No susceptibility observed
Y	3	Passed	No susceptibility observed
Z	3	Passed	No susceptibility observed

VOLTAGE DIPS, SHORT INTERRUPTIONS, and VOLTAGE VARIATIONS

COMPANY:	T3 INNOVATION	**DATE:**	8-26-14
EUT:	NETWORK TESTER AND CABLE TESTER	**ENGINEER:**	A. Baum
MODEL:	Net Chaser (Power Supply and AFM AC Adapter)	**S/N:**	FFFF
SPEC.: **TEST PROC.:**	EN 61326-1: 2013 IEC 61000-4-11: 2004	**AIR TEMPERATURE:**	27° C
LEVEL:	0% @10ms, 20ms and 5 Sec. reduction, 70% at 500ms	**BAROMETRIC PRESSURE:**	102.6 kPa
PERFORMANCE CRITERIA:	B	**RELATIVE HUMIDITY:**	41 %

TEST LEVEL (%)	NUMBER OF TEST REPETITIONS	TIME BETWEEN TESTS (seconds)
100%	3	10.0

DURATION	LEVEL (%)	RESULT	COMMENTS
10ms	100	Passed	No susceptibility observed
20ms	100	Passed	No susceptibility observed
5 seconds	100	Passed	Charging lights of Cable Tester turn off; unit returns to normal after test
500 ms	30	Passed	No susceptibility observed

COMPATIBLE ELECTRONICS

EN 55022 A

T3 Innovation LLC
Network Tester and Cable Tester
Net Chaser

Date: 8/26/2014
Lab: F
Tested By: R. Ramirez
Test Distance 10 meters

Configuration: Clock oscillators: 25 & 50 MHz
Temp: 70F Humidity: 60%

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit (dBuV/m)	Margin (dB)	Peak / QP / Avg	Comments
30.22	19.26	V	40.00	-20.74	Peak	
65.24	19.76	V	40.00	-20.24	Peak	
114.49	19.08	V	40.00	-20.92	Peak	
150.00	25.17	V	40.00	-14.83	Peak	
225.00	21.79	V	40.00	-18.21	Peak	
239.99	40.77	V	47.00	-6.23	Peak	
250.00	30.24	V	47.00	-16.76	Peak	
280.00	28.56	V	47.00	-18.44	Peak	
30.22	20.88	H	40.00	-19.12	Peak	
65.24	16.81	H	40.00	-23.19	Peak	
114.49	21.88	H	40.00	-18.12	Peak	
150.01	22.34	H	40.00	-17.66	Peak	
225.00	26.34	H	40.00	-13.66	Peak	
240.00	32.57	H	47.00	-14.43	Peak	
250.00	30.40	H	47.00	-16.60	Peak	
280.01	33.32	H	47.00	-13.68	Peak	
349.98	24.31	V	47.00	-22.69	Peak	
359.99	26.84	V	47.00	-20.16	Peak	
399.99	29.00	V	47.00	-18.00	Peak	
480.00	29.01	V	47.00	-17.99	Peak	
350.00	21.95	H	47.00	-25.05	Peak	
359.99	23.89	H	47.00	-23.11	Peak	
399.99	27.93	H	47.00	-19.07	Peak	
480.01	28.61	H	47.00	-18.39	Peak	

AC Conducted

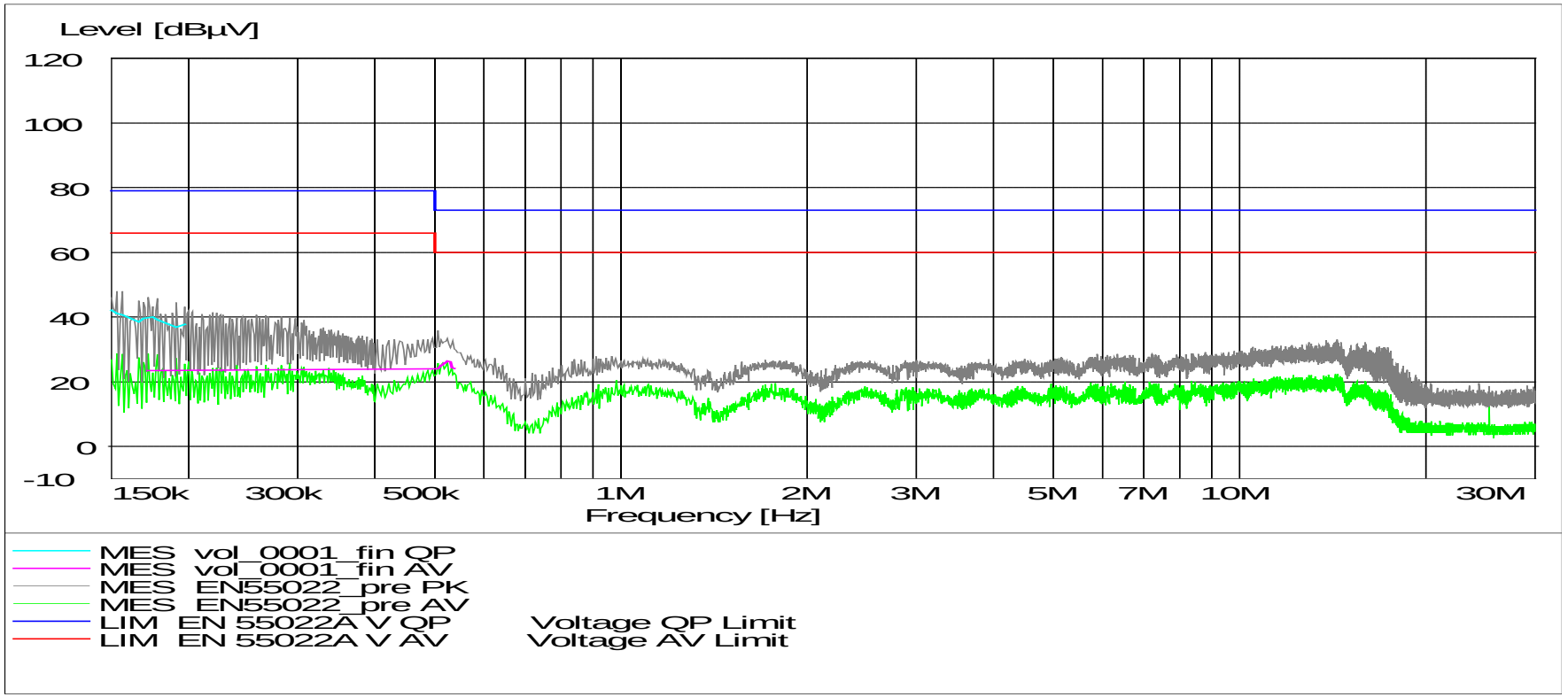
Line

EUT: Network Tester
Company: T3 Innovation LLC
Operating Condition: 240V
Test Site: Lab F
Operator: R. Ramirez
Test Specification: EN55022 A
Comment: Net Chaser
Start of Test: 8/26/14 / 10:51:31AM

SCAN TABLE: "EN 55022 VoltageFin"

Short Description: EN 55022 Voltage

Start Frequency	Stop Frequency	Step Width	Detector	Meas. Time	IF Bandw.	Transducer
150.0 kHz	30.0 MHz	4.0 kHz	QuasiPeak CISPR AV	1.0 s	9 kHz	LI-215 Line



8/26/14 10:55AM vol_0001

AC Conducted

Line

EUT: Network Tester
Company: T3 Innovation LLC
Operating Condition: 240V
Test Site: Lab F
Operator: R. Ramirez
Test Specification: EN55022 A
Comment: Net Chaser
Start of Test: 8/26/14 / 10:51:31AM

MEASUREMENT RESULT: "vol_0001_fin QP"

8/26/14 10:54AM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Line	PE
0.150000	42.10	10.5	79	36.9	1	---
0.153000	41.10	10.5	79	37.9	1	---
0.156000	40.70	10.5	79	38.3	1	---
0.166000	38.50	10.5	79	40.5	1	---
0.169000	39.60	10.4	79	39.4	1	---
0.172000	39.80	10.4	79	39.2	1	---
0.175000	40.00	10.4	79	39.0	1	---
0.178000	39.10	10.4	79	39.9	1	---
0.191000	36.90	10.3	79	42.1	1	---
0.197000	37.70	10.3	79	41.3	1	---

MEASUREMENT RESULT: "vol_0001_fin AV"

8/26/14 10:54AM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Line	PE
0.172000	23.50	10.4	66	42.5	1	---
0.505000	24.00	9.5	60	36.0	1	---
0.511000	25.10	9.5	60	34.9	1	---
0.514000	25.20	9.5	60	34.8	1	---
0.517000	25.80	9.5	60	34.2	1	---
0.520000	25.80	9.5	60	34.2	1	---
0.523000	26.40	9.5	60	33.6	1	---
0.529000	26.20	9.5	60	33.8	1	---
0.532000	24.30	9.5	60	35.7	1	---
0.538000	24.10	9.5	60	35.9	1	---

AC Conducted

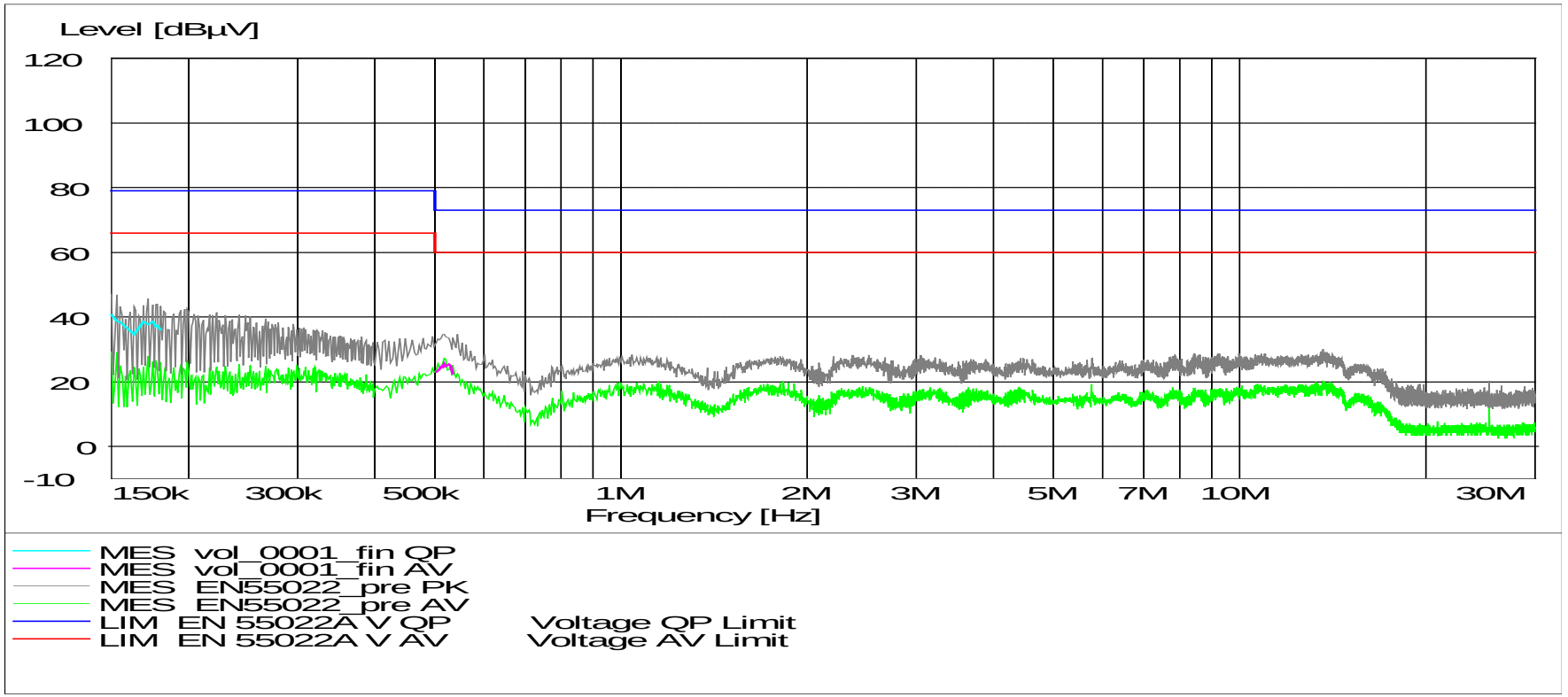
Neutral

EUT: Network Tester
Company: T3 Innovation LLC
Operating Condition: 240V
Test Site: Lab F
Operator: R. Ramirez
Test Specification: EN55022 A
Comment: Net Chaser
Start of Test: 8/26/14 / 10:56:55AM

SCAN TABLE: "EN 55022 VoltageFin"

Short Description: EN 55022 Voltage

Start Frequency	Stop Frequency	Step Width	Detector	Meas. Time	IF Bandw.	Transducer
150.0 kHz	30.0 MHz	4.0 kHz	QuasiPeak CISPR AV	1.0 s	9 kHz	LI-215 Neutral



8/26/14 11:01AM vol_0001

AC Conducted

Neutral

EUT: Network Tester
Company: T3 Innovation LLC
Operating Condition: 240V
Test Site: Lab F
Operator: R. Ramirez
Test Specification: EN55022 A
Comment: Net Chaser
Start of Test: 8/26/14 / 10:56:55AM

MEASUREMENT RESULT: "vol_0001_fin QP"

8/26/14 11:01AM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Line	PE
0.150000	40.70	10.5	79	38.3	1	---
0.153000	38.70	10.5	79	40.3	1	---
0.155000	38.50	10.5	79	40.5	1	---
0.163000	34.70	10.5	79	44.3	1	---
0.169000	38.60	10.4	79	40.4	1	---
0.172000	37.70	10.4	79	41.3	1	---
0.175000	38.60	10.4	79	40.4	1	---
0.177000	37.10	10.4	79	41.9	1	---
0.178000	37.30	10.4	79	41.7	1	---
0.180000	36.10	10.4	79	42.9	1	---

MEASUREMENT RESULT: "vol_0001_fin AV"

8/26/14 11:01AM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Line	PE
0.502000	23.00	9.5	60	37.0	1	---
0.505000	23.40	9.5	60	36.6	1	---
0.508000	23.90	9.5	60	36.1	1	---
0.511000	24.70	9.5	60	35.3	1	---
0.514000	24.40	9.5	60	35.6	1	---
0.517000	25.50	9.5	60	34.5	1	---
0.520000	24.80	9.5	60	35.2	1	---
0.526000	25.40	9.5	60	34.6	1	---
0.529000	25.00	9.5	60	35.0	1	---
0.535000	22.50	9.5	60	37.5	1	---

AC Conducted

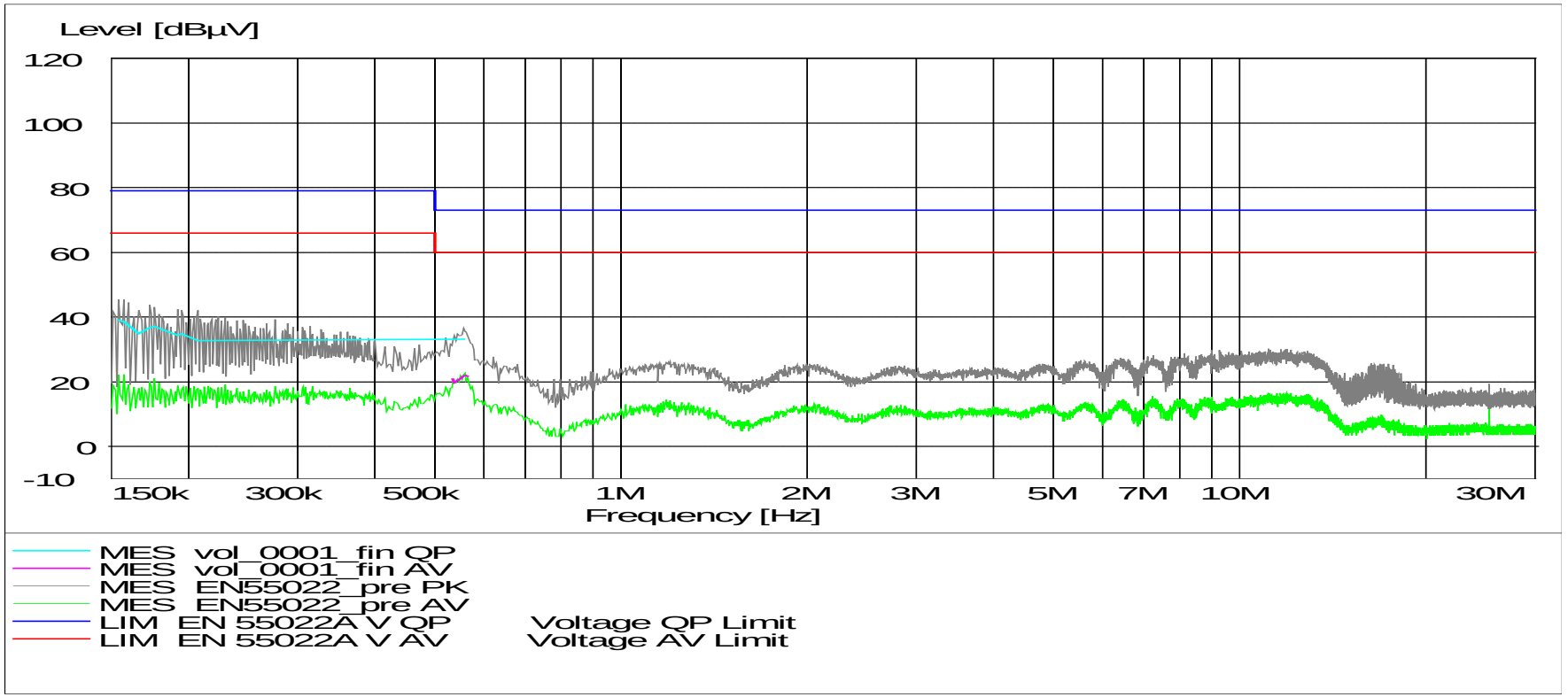
Line

EUT: Cable Tester
Company: T3 Innovation LLC
Operating Condition: 240V
Test Site: Lab F
Operator: R. Ramirez
Test Specification: EN55022 A
Comment: Net Chaser
Start of Test: 8/26/14 / 11:09:55AM

SCAN TABLE: "EN 55022 VoltageFin"

Short Description: EN 55022 Voltage

Start Frequency	Stop Frequency	Step Width	Detector	Meas. Time	IF Bandw.	Transducer
150.0 kHz	30.0 MHz	4.0 kHz	QuasiPeak CISPR AV	1.0 s	9 kHz	LI-215 Line



8/26/14 11:12AM vol_0001

AC Conducted

Line

EUT: Cable Tester
Company: T3 Innovation LLC
Operating Condition: 240V
Test Site: Lab F
Operator: R. Ramirez
Test Specification: EN55022 A
Comment: Net Chaser
Start of Test: 8/26/14 / 11:09:55AM

MEASUREMENT RESULT: "vol_0001_fin QP"

8/26/14 11:12AM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Line	PE
0.154000	39.00	10.5	79	40.0	1	---
0.157000	38.60	10.5	79	40.4	1	---
0.160000	37.40	10.5	79	41.6	1	---
0.166000	34.90	10.5	79	44.1	1	---
0.173000	36.80	10.4	79	42.2	1	---
0.176000	37.10	10.4	79	41.9	1	---
0.192000	34.40	10.3	79	44.6	1	---
0.195000	34.80	10.3	79	44.2	1	---
0.207000	32.70	10.3	79	46.3	1	---
0.556000	33.10	9.6	73	39.9	1	---

MEASUREMENT RESULT: "vol_0001_fin AV"

8/26/14 11:12AM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Line	PE
0.535000	20.80	9.5	60	39.2	1	---
0.538000	19.70	9.5	60	40.3	1	---
0.544000	20.40	9.5	60	39.6	1	---
0.547000	20.60	9.5	60	39.4	1	---
0.550000	21.10	9.5	60	38.9	1	---
0.553000	21.40	9.6	60	38.6	1	---
0.556000	21.80	9.6	60	38.2	1	---
0.559000	21.90	9.6	60	38.1	1	---
0.562000	21.90	9.6	60	38.1	1	---
0.565000	21.70	9.6	60	38.3	1	---

AC Conducted

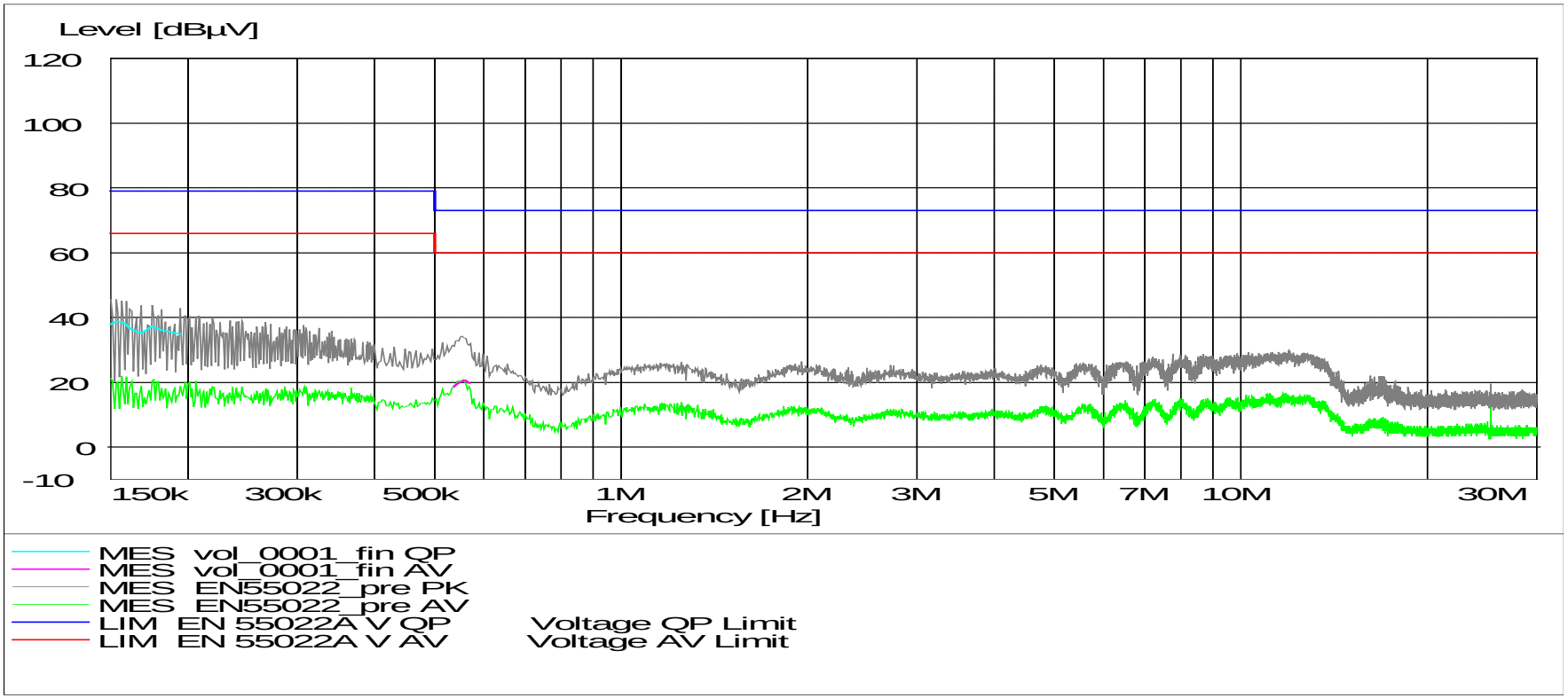
Neutral

EUT: Cable Tester
Company: T3 Innovation LLC
Operating Condition: 240V
Test Site: Lab F
Operator: R. Ramirez
Test Specification: EN55022 A
Comment: Net Chaser
Start of Test: 8/26/14 / 11:05:26AM

SCAN TABLE: "EN 55022 VoltageFin"

Short Description: EN 55022 Voltage

Start Frequency	Stop Frequency	Step Width	Detector	Meas. Time	IF Bandw.	Transducer
150.0 kHz	30.0 MHz	4.0 kHz	QuasiPeak CISPR AV	1.0 s	9 kHz	LI-215 Neutral



8/26/14 11:08AM vol_0001

AC Conducted

Neutral

EUT: Cable Tester
Company: T3 Innovation LLC
Operating Condition: 240V
Test Site: Lab F
Operator: R. Ramirez
Test Specification: EN55022 A
Comment: Net Chaser
Start of Test: 8/26/14 / 11:05:26AM

MEASUREMENT RESULT: "vol_0001_fin QP"

8/26/14 11:08AM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Line	PE
0.150000	37.90	10.5	79	41.1	1	---
0.153000	38.80	10.5	79	40.2	1	---
0.156000	38.60	10.5	79	40.4	1	---
0.159000	37.80	10.5	79	41.2	1	---
0.161000	36.80	10.5	79	42.2	1	---
0.162000	36.30	10.5	79	42.7	1	---
0.168000	35.10	10.5	79	43.9	1	---
0.175000	37.30	10.4	79	41.7	1	---
0.181000	36.10	10.4	79	42.9	1	---
0.194000	34.90	10.3	79	44.1	1	---

MEASUREMENT RESULT: "vol_0001_fin AV"

8/26/14 11:08AM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Line	PE
0.538000	18.80	9.5	60	41.2	1	---
0.541000	19.20	9.5	60	40.8	1	---
0.544000	19.50	9.5	60	40.5	1	---
0.547000	19.80	9.5	60	40.2	1	---
0.550000	20.10	9.5	60	39.9	1	---
0.553000	20.20	9.5	60	39.8	1	---
0.556000	20.50	9.5	60	39.5	1	---
0.559000	20.60	9.5	60	39.4	1	---
0.562000	20.50	9.5	60	39.5	1	---
0.568000	19.80	9.5	60	40.2	1	---