

Declaration of conformity Test Report

EN 50155: 2007

(EMC, Characteristic, Environmental...Test)

Product : **Monitor**

Trade Name : i-Tech

Model Number : ECHW1700X-EN50155-TR

Prepared for

i-Tech Company

42978 Osgood Road Fremont, CA 94539 USA

TEL. : 888-483-2418

1 General Information

1.1 Description of Equipment Under Test

Product : Monitor

Model Number : ECHW1700X-EN50155-TR

Applicant : **i-Tech**
42978 Osgood Road Fremont, CA 94539 USA

Manufacturer : **i-Tech**
42978 Osgood Road Fremont, CA 94539 USA

Power Supply : Input: 12V/24V/48V

Date of Receipt of Sample : Mar. 21, 2016

Date of Test : Mar. 21 ~ 24, 2016

Product Information : **Interface/ Port:**
1. VGA

1.2 Summary of Test Results

Report Clause	Phenomenon	EN 50155 Reference Clause(s)	Reference standard	Result
2	Characteristic Test			
2.1	Visual Inspection	12.2.1	-	Applicable
2.2	Performance (Supply variations)	12.2.2 5.1.1.1	-	Applicable
2.3	Performance (Supply interruption)	12.2.2 5.1.1.2 5.1.3	-	Applicable
2.4	Performance (Supply over change)	12.2.2 5.1.3	-	Applicable
2.5	Insulation Test	12.2.9	-	Applicable
3	Electromagnetic Compatibility (EMC)			
3.1	Supply Overvoltages	12.2.6	-	Applicable
3.2	Surges Test	12.2.7.1	EN 50121-3-2 EN 61000-4-5	Applicable
3.3	Electrostatic Discharge Test	12.2.7.2	EN 50121-3-2 EN 61000-4-2	Applicable
3.4	Transient Burst Susceptibility Test	12.2.7.3	EN 50121-3-2 EN 61000-4-4	Applicable
3.5	Radio- Frequency, Electromagnetic Field Immunity Test	12.2.8.1	EN 50121-3-2 EN 61000-4-3	Applicable
3.6	Radio- Frequency, Conducted Disturbances Immunity Test	12.2.8.1	EN 50121-3-2 EN 61000-4-6	Applicable
3.7	Power Line Conducted Emission Measurement	12.2.8.2	EN 50121-3-2 EN 55011	Applicable
3.8	Radiated Emission Measurement	12.2.8.2	EN 50121-3-2 EN 55011	Applicable
4	Environmental Tests			
4.1	Cooling Test	12.2.3	EN 60068-2-1	Applicable
4.2	Dry heat Test	12.2.4	EN 60068-2-2	Applicable
4.3	Vibration Test	12.2.11	EN 61373	Applicable
4.4	Shock Test	12.2.11	EN 61373	Applicable

1.4 Measurement Uncertainty

No.	Item	Value
1	Power Line Conducted Emission (Conduction 1)	2.40 dB
2	Power Line Conducted Emission (Conduction 2)	2.40 dB
3	Disturbance Power Emission (Conduction 2)	3.10 dB
4	Click disturbances Emission (Conduction 2)	2.40 dB
5	Radiated Electromagnetic disturbance (Loop Antenna)	4.80 dB
6	Radiated Emission Test (OATS 1)	3.14 dB
7	Radiated Emission Test (OATS 2)	3.14 dB
8	Radiated Emission Test (OATS 3)	3.14 dB
9	Radiated Emission Test (OATS 4)	3.14 dB
10	Radiated Emission Test (1GHz~18GHz)	3.20 dB
11	Radiated Emission Test (18GHz~40GHz)	3.40 dB

2 Characteristic Test

2.1 Visual Inspection

2.1.1 Inspection Requirement

The visual inspection shall be carried out to ensure that the equipment construction meets its specified requirements.

2.1.2 Test Procedures

Reference to EN 50155 clause 12.2.1

2.1.3 Inspection Result

Pass.

2.2 Performance (Supply variations)

2.2.1 Instrument

Instrument	Manufacturer	Model	Serial No.	Next Cal. Date
Function Generator	SCHAFFNER	FG5620-750-0051-00	52	2010/12/01
Transient Generator	SCHAFFNER	MT5510-750-0034	79	2010/12/01
Nissan Transient Generator	SCHAFFNER	NT5510-750-0063	10	2010/12/01
Load Dump Generator	SCHAFFNER	LD5505-750-0045r01	48	2010/12/01
JASO Transient Generator	SCHAFFNER	JT5510-750-0050	10	2010/12/01
Burst Generator	SCHAFFNER	FT5530-750-0033r01	79	2010/12/01
JASO Load Dump Generator	SCHAFFNER	JT5550-750-0058	20	2010/12/01
Power Amplifier	SCHAFFNER	PA5840-75	581-0010	2010/12/01

Note: The above equipments are within the valid calibration period.

2.2.2 Test Requirement

- Supply voltage: (1) rated input voltage *0.7 (2) rated input voltage *1.25
- Operation function shall be worked normally at the supply variations.

2.2.3 Test Procedures

Reference to EN 50155 clause 12.2.2

2.2.4 Test Result

Temperature: 21.0 °C ; Humidity: 58 % ; Atm pres: 101 Kpa ; Test Engineer: Victor

Test Mode 1: EUT power (12VDC) (Nominal)

Test voltage		Result / Observation
Nominal *1.25	15VDC	No deviation
Nominal *1.15	13.8VDC	No deviation
Nominal *0.7	8.4VDC	No deviation

Test Mode 2: EUT power (24VDC) (Nominal)

Test voltage		Result / Observation
Nominal *1.25	30VDC	No deviation
Nominal *1.15	27.6VDC	No deviation
Nominal *0.7	16.8VDC	No deviation

Test Mode 3: EUT power (48VDC) (Nominal)

Test voltage		Result / Observation
Nominal *1.25	60VDC	No deviation
Nominal *1.15	55.2VDC	No deviation
Nominal *0.7	33.6VDC	No deviation

2.3 Performance (Supply interruption)

3 Electromagnetic compatibility (EMC)

3.1 Supply Overvoltages

3.1.1 Instrument

Instrument	Manufacturer	Model	Serial No.	Next Cal. Date
Function Generator	SCHAFFNER	FG5620-750-0051-00	52	2010/12/01
Transient Generator	SCHAFFNER	MT5510-750-0034	79	2010/12/01
Nissan Transient Generator	SCHAFFNER	NT5510-750-0063	10	2010/12/01
Load Dump Generator	SCHAFFNER	LD5505-750-0045r01	48	2010/12/01
JASO Transient Generator	SCHAFFNER	JT5510-750-0050	10	2010/12/01
Burst Generator	SCHAFFNER	FT5530-750-0033r01	79	2010/12/01
JASO Load Dump Generator	SCHAFFNER	JT5550-750-0058	20	2010/12/01
Power Amplifier	SCHAFFNER	PA5840-75	581-0010	2010/12/01

Note: The above equipments are within the valid calibration period.

3.1.2 Test Requirement

Reference to EN 50155 clause 12.2.6

- Voltage level (minimum): $1.4 U_n$
- Duration d (maximum): 0.1s
- Duration D (maximum): 1.0s
- Series resistor R_s (Tol. $\pm 10\%$): 1Ω

Performance criterion: PASS

3.1.3 Test Procedures

Reference to EN 50155 clause 12.2.6

3.1.4 Test Result

Temperature: 21.0 °C ; Humidity: 58 % ; Atm pres: 101 Kpa ; Test Engineer: Victor

Test Mode 1: EUT power (12VDC) (Nominal)

Voltage level (minimum)	Duration d (maximum)	Duration D (maximum)	Series resistor R_s (Tol. $\pm 10\%$)	Result / Observation
16.8VDC	0.1s	1.0s	1Ω	No deviation

Test Mode 2: EUT power (24VDC) (Nominal)

Voltage level (minimum)	Duration d (maximum)	Duration D (maximum)	Series resistor R_s (Tol. $\pm 10\%$)	Result / Observation
33.6VDC	0.1s	1.0s	1Ω	No deviation

Test Mode 3: EUT power (48VDC) (Nominal)

Voltage level (minimum)	Duration d (maximum)	Duration D (maximum)	Series resistor R_s (Tol. $\pm 10\%$)	Result / Observation
67.2VDC	0.1s	1.0s	1Ω	No deviation

3.2 Surges Test

3.2.1 Instrument

Instrument	Manufacturer	Model	Serial No.	Next Cal. Date
EMC Pro Systems	KeyTek	EMC Pro	0003234	2010/03/15
Surge Telecom Box	KeyTek	CM-TELCD	0202316	N. C. R.

Note: The above equipments are within the valid calibration period.

3.2.2 Test Requirement

Reference to EN 50155 clause 12.2.7.1 and EN 50121-3-2 table 7

- Input AC power ports: Line to Neutral: $\pm 1\text{kV}$ (peak), 1.2/50 us, 42 Ω , 0.5 μF
 Line (Neutral) to earth: $\pm 2\text{kV}$ (peak), 1.2/50 us, 42 Ω , 0.5 μF
- Input DC power ports: Line to Neutral: $\pm 1\text{kV}$ (peak), 1.2/50 us, 42 Ω , 0.5 μF
 Line (Neutral) to earth: $\pm 2\text{kV}$ (peak), 1.2/50 us, 42 Ω , 0.5 μF
- Signal and telecommunication ports: $\pm 2\text{kV}$ (peak): 1.2/50 us, 42 Ω , 0.5 μF

Performance criterion: B

3.2.3 Test Procedures

Reference to IEC 61000-4-5 clause 8

3.2.4 Test Result

Temperature: 24.0 °C ; Humidity: 59 % ; Atm pres: 101 Kpa ; Test Engineer: Victor

PASS.

Test Mode 1: EUT power (12VDC)

- $\pm 0.5\text{kV}$ (peak) Input DC power port: Line to line
Performance criterion: A B C
- $\pm 1.0\text{kV}$ (peak) Input DC power port: Line to line
Performance criterion: A B C
- $\pm 0.5\text{kV}$ (peak) Input DC power port: Line to earth (ground)
Performance criterion: A B C
- $\pm 1.0\text{kV}$ (peak) Input DC power port: Line to earth (ground)
Performance criterion: A B C
- $\pm 2.0\text{kV}$ (peak) Input DC power port: Line to earth (ground)
Performance criterion: A B C
- $\pm 2.0\text{ kV}$ (peak) Signal and telecommunication ports: RJ45
Performance criterion: A B C

* "A": The apparatus shall continue to operate as intended during and after the test, no degradation of performance or loss of function.

* "B": During the test at the EUT stay at stand by mode, and restored connection automatically after the test.

3.5 Radio- Frequency, Electromagnetic Field Immunity Test

3.5.1 Instrument

Instrument	Manufacturer	Model	Serial No.	Next Cal. Date
RF Power Amplifier (80MHz~1GHz)	Frankonia	FLG-200B	1038	N. C. R
RF Power Amplifier (1GHz~3GHz)	Frankonia	FLG-50C	1013	N. C. R
Directional Coupler (80MHz~1GHz)	Werlatone	C5982	37354	N. C. R
Directional Coupler (1GHz~3GHz)	Werlatone	C6187	37355	N. C. R
Bilog Antenna (20MHz~3GHz)	Frankonia	BTA-M	06012M	N. C. R
Signal Generator	R&S	SM300	101768	2009/10/14
RF Power Meter	Anritsu	ML2945A	736010	2009/10/16
Electric Field Probe	Narda	2244/90.21	BF-0045	2010/11/06
Field-strength-meter	Narda	EMR-20	BC-0028	2010/11/06

Note: The above equipments are within the valid calibration period.

3.5.2 Test Requirement

Reference to EN 50155 clause 12.2.8.1 and EN 50121-3-2 table 9

The frequency steps: 1%, Log sweep, Dwell time: 3.0 sec.

- Frequency range: 80 to 1000 MHz, Field strength: 20 V/m, 80% AM (1kHz),
(Note: For equipment mounted in network communication center a severity level of 10V/m may be used.)
- Frequency range: 1400 to 2100 MHz, Field strength: 10 V/m, 80% AM (1kHz),
- Frequency range: 2100 to 2500 MHz, Field strength: 5 V/m, 80% AM (1kHz),
Performance criterion: A

3.5.3 Test Procedures

Reference to IEC 61000-4-3 clause 8

3.5.4 Test Result

Temperature: 23.0 °C ; Humidity: 57 % ; Atm pres: 101 Kpa ; Test Engineer: Victor

PASS.

Test Mode 1: EUT power (12VDC)

- Frequency range: **80** to **1000** MHz, Field strength: **20** V/m, 80% AM (1kHz),
Performance criterion: **A** **B** **C**
- Frequency range: **1400** to **2100** MHz, Field strength: **10** V/m, 80% AM (1kHz),
Performance criterion: **A** **B** **C**
- Frequency range: **2100** to **2500** MHz, Field strength: **5** V/m, 80% AM (1kHz),
Performance criterion: **A** **B** **C**

* "A": The apparatus shall continue to operate as intended during and after the test, no degradation of performance or loss of function.

3.6 Radio- Frequency, Conducted Disturbances Immunity Test

3.6.1 Instrument

Instrument	Manufacturer	Model	Serial No.	Next Cal. Date
Signal Generator	R&S	SMY02	829846/013	2009/07/20
Power Amplifier	Frankonia	CIT-10	162D1278	N. C. R.
Coupler	WERLATONE	C2630	8067	N. C. R.
Attenuator	SCHAFFNER	ATN6075	22300	N. C. R.
M3 C.D.N	FCC	FCC-801-M3-25A	2045	N. C. R.
M2 C.D.N	SCHAFFNER	M216	16394	N. C. R.
EM-CLAMP	SCHAFFNER	KEMZ 801	17037	N. C. R.

Note: The above equipments are within the valid calibration period.

3.6.2 Test Requirement

Reference to EN 50155 clause 12.2.8.1 and EN 50121-3-2 table 7 & 8
Frequency range: **0.15** to **80** MHz, Field strength: **10** V, 80% AM (1kHz)

- Input AC power ports.
- Input DC power ports.
- Signal and telecommunication ports.

Performance criterion: A

3.6.3 Test Procedures

Reference to EN 61000-4-6 clause 8

3.6.4 Test Result

Temperature: 21.0 °C ; Humidity: 55 % ; Atm pres: 101 Kpa ; Test Engineer: Victor

PASS.

Test Mode 1: EUT power (12VDC)

Frequency range: **0.15** to **80** MHz, Field strength: **10** V, 80% AM (1kHz),

- Input DC power port.

Performance criterion: **A** **B** **C**

- Signal and telecommunication port.

Performance criterion: **A** **B** **C**

* "A": The apparatus shall continue to operate as intended during and after the test, no degradation of performance or loss of function.

3.7 Power Line Conducted Emission

3.7.1 Instrument

Instrument	Manufacturer	Model	Serial No.	Next Cal. Date
EMI Test Receiver	Rohde & Schwarz	ESCS 30	830245/027	2009/08/19
Pulse Limiter	Rohde & Schwarz	ESH3-Z2	843602/02	2009/09/08
RF Cable	HARBOUR	RG400	CBL32	2010/03/16
L.I.S.N.	Schwarzbeck	NNLK8121	8121417	2009/07/21
L.I.S.N.	Rohde & Schwarz	ESH3-Z5	100176	2010/02/18

Note: The above equipments are within the valid calibration period.

3.7.2 Test Requirement

Reference to EN 50155 clause 12.2.8.2 and EN 50121-3-2 table 5

Frequency (MHz)	Q.P. (Quasi-Peak)
0.15 ~ 0.50	99
0.50 ~ 30	93

3.7.3 Test Procedures

Reference to EN 55011 clause 7

3.7.4 Test Result

PASS.

The final test data is shown on as following pages.

Mode 1: Working Mode (DC Power Port)

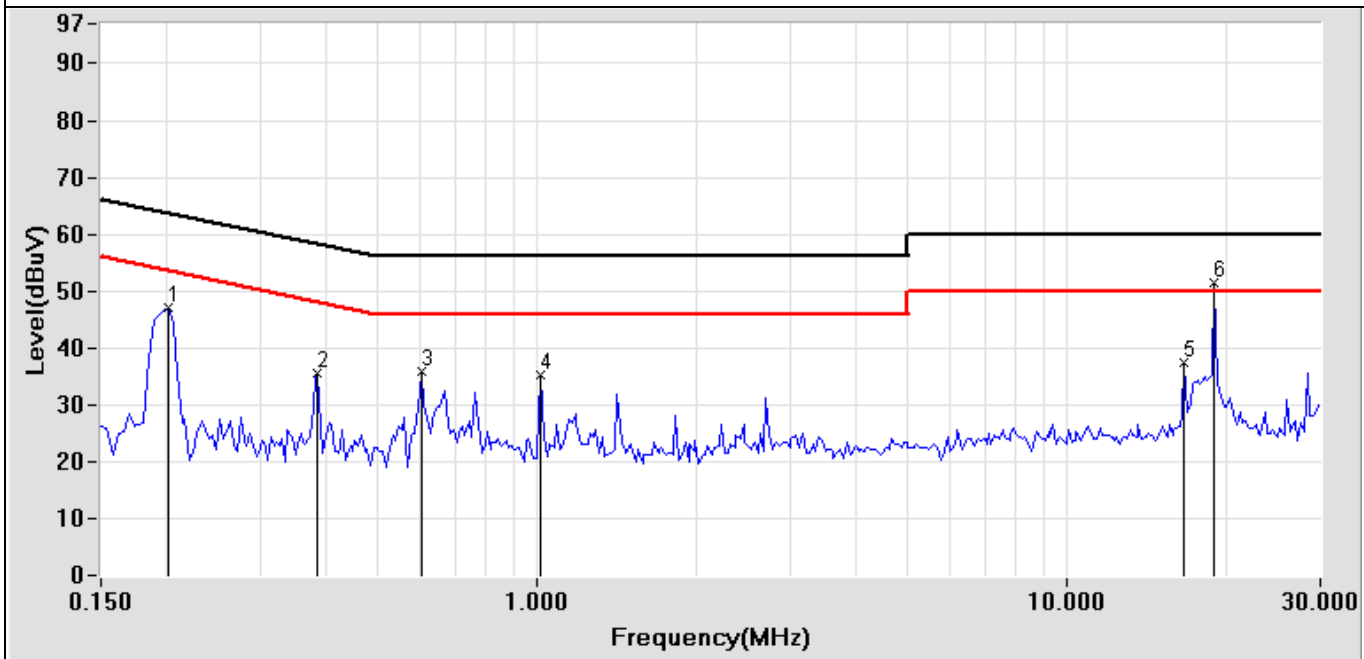
Power Line Conducted Test Data

EUT: Industrial IEEE 802.11a/b/g Dual-RF AP/Bridge/Client CLIENT: i-Tech MODEL: ECHW1700X-EN50155-TR RATING: DC 12V Temperature: 25.0 °C Humidity: 68 %	POLARITY: Line DISTANCE: Serial No.: FILE/DATA#: TEST SITE: Conduction1
---------------------------------------------------------------------------------------------------------------------------------------------------------------------------	-------------------------------------------------------------------------------------

Frequency (MHz)	Factor (dB)	Meter Reading (dBμV)		Emission Level (dBμV)		Limits (dBμV)		Margin (dB)	
		Quasi-Peak	Average	Quasi-Peak	Average	Quasi-Peak	Average	Quasi-Peak	Average
0.201	0.15	45.70	46.22	45.85	46.37	63.57	53.57	-17.72	-7.20
0.384	0.17	34.23	34.15	34.40	34.32	58.19	48.19	-23.79	-13.87
0.603	0.11	34.80	34.27	34.91	34.38	56.00	46.00	-21.09	-11.62
1.009	0.12	34.61	34.68	34.73	34.80	56.00	46.00	-21.27	-11.20
16.541	0.74	36.68	34.20	37.42	34.94	60.00	50.00	-22.58	-15.06
18.912	0.81	49.90	49.00	50.71	49.81	60.00	50.00	-9.29	-0.19

Remark:

1. All readings are Quasi-Peak and Average values.
2. Factor = Insertion Loss + Cable Loss.



Test Mode: Mode 1: Working Mode (DC Power Port)

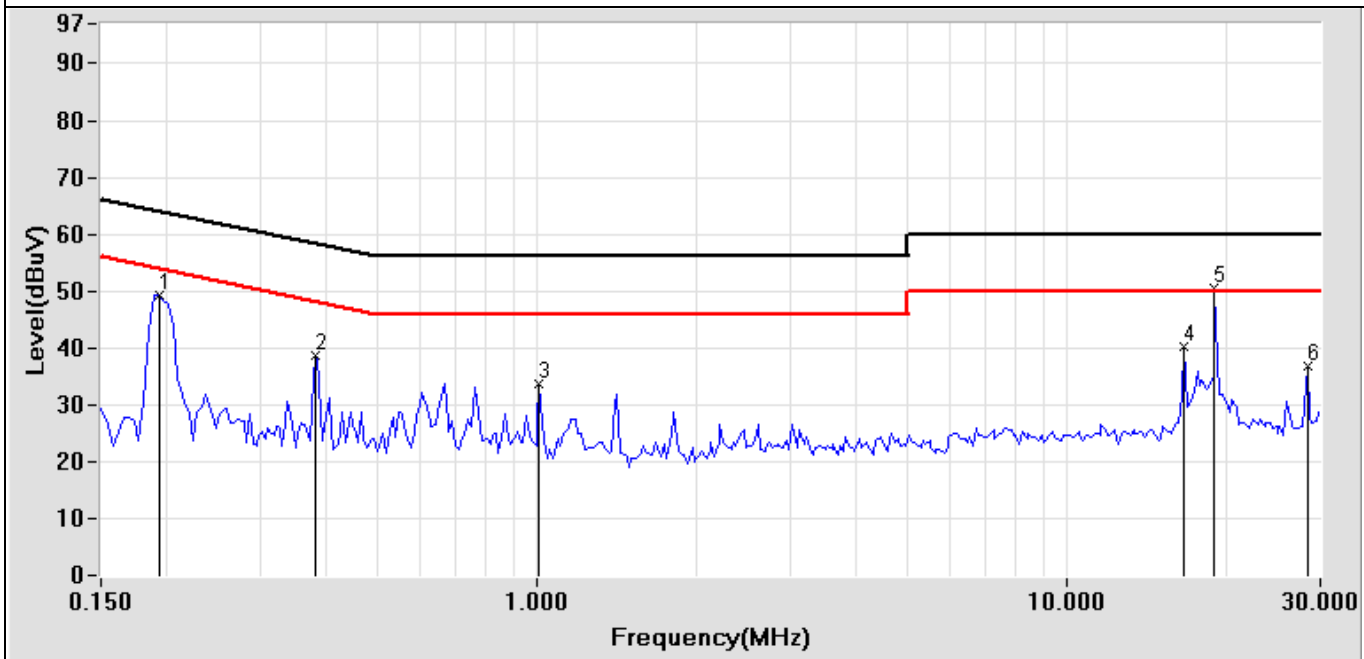
Power Line Conducted Test Data

EUT: Industrial IEEE 802.11a/b/g Dual-RF AP/Bridge/Client CLIENT: i-Tech MODEL: ECHW1700X-EN50155-TR RATING: DC 12V Temperature: 25.0 °C Humidity: 68 %	POLARITY: Neutral DISTANCE: Serial No.: FILE/DATA#: TEST SITE: Conduction1
---------------------------------------------------------------------------------------------------------------------------------------------------------------------------	----------------------------------------------------------------------------------------

Frequency (MHz)	Factor (dB)	Meter Reading (dB μ V)		Emission Level (dB μ V)		Limits (dB μ V)		Margin (dB)	
		Quasi-Peak	Average	Quasi-Peak	Average	Quasi-Peak	Average	Quasi-Peak	Average
0.193	0.16	48.20	48.10	48.36	48.26	63.91	53.91	-15.55	-5.65
0.380	0.18	37.43	37.40	37.61	37.58	58.28	48.28	-20.67	-10.70
1.005	0.13	32.17	31.99	32.30	32.12	56.00	46.00	-23.70	-13.88
16.552	0.84	38.40	34.94	39.24	35.78	60.00	50.00	-20.76	-14.22
18.892	0.92	49.10	48.30	50.02	49.22	60.00	50.00	-9.98	-0.78
28.373	1.16	34.41	31.09	35.57	32.25	60.00	50.00	-24.43	-17.75

Remark:

1. All readings are Quasi-Peak and Average values.
2. Factor = Insertion Loss + Cable Loss.



Test Mode: Mode 1: Working Mode (DC Power Port)

3.8 Radiated emission

3.8.1 Instrument

Instrument	Manufacturer	Model	Serial No.	Next Cal. Date
EMI Test Receiver	Rohde & Schwarz	ESCS30	100135	2009/09/10
Bilog Antenna	Schaffner	CBL6111c	2804	2010/02/22
Pre-Amplifier	Agilent	8447D	1937A01903	2009/12/08
RF Cable	IETC	CBL15	CBL15	2009/11/18

Note: The above equipments are within the valid calibration period.

3.8.2 Test Requirement

Reference to EN 50155 clause 12.2.8.2 and EN 50121-3-2 table 6

Frequency (MHz)	Quasi-Peak dB(μ V/m)
30 ~ 230	40.0
230 ~ 1000	47.0

3.8.3 Test Procedures

Reference to EN 55011 clause 7

3.8.4 Test Result

PASS.

The final test data is shown on as following pages.

Mode 1: Working Mode (DC Power Port)

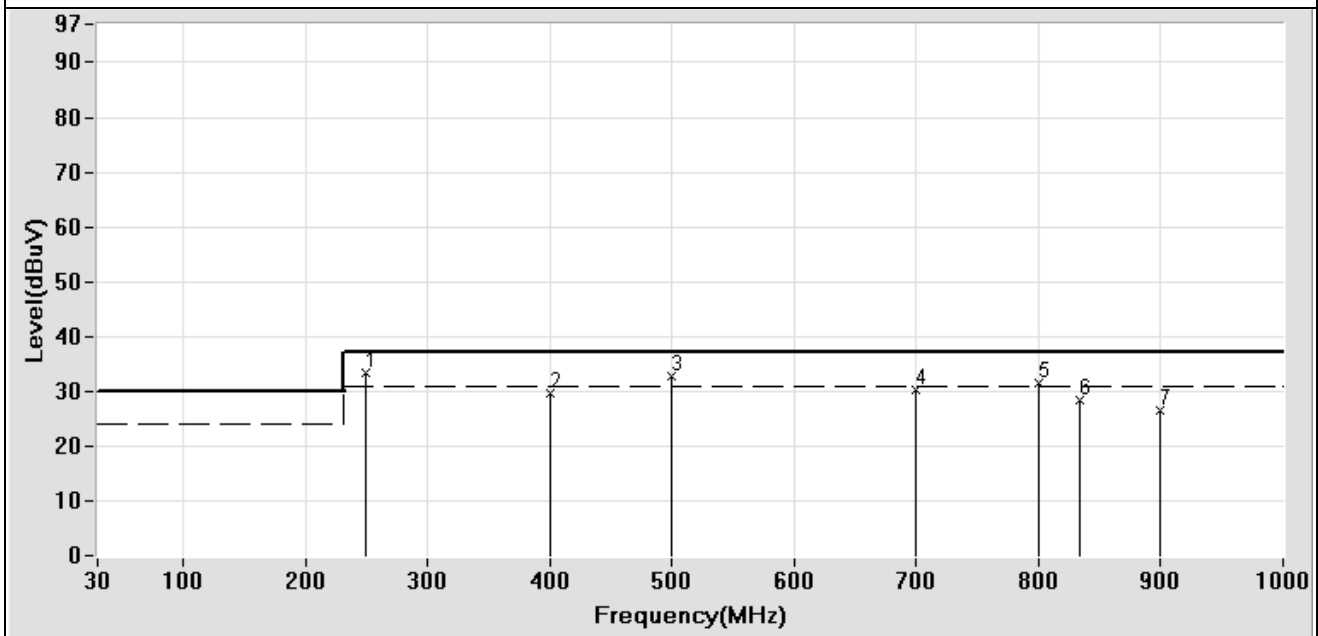
Radiated Emission Measurement Data

EUT: Industrial IEEE 802.11a/b/g Dual-RF AP/Bridge/Client CLIENT: i-Tech MODEL: ECHW1700X-EN50155-TR RATING: DC 12V Temperature: 23.0 °C Humidity: 68 %	POLARITY: Horizontal DISTANCE: 10 m Serial No.: FILE/DATA#: TEST SITE: OATS1
---------------------------------------------------------------------------------------------------------------------------------------------------------------------------	------------------------------------------------------------------------------------------

Frequency (MHz)	Factor (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)
250.000 **	-14.93	48.16	33.23	37.00	-3.77
400.000 **	-10.21	39.90	29.69	37.00	-7.31
500.000 **	-8.20	40.95	32.75	37.00	-4.25
700.000 **	-3.00	33.26	30.26	37.00	-6.74
800.000 **	-1.60	33.06	31.46	37.00	-5.54
833.000 **	0.21	28.26	28.47	37.00	-8.53
900.000 **	0.48	25.95	26.43	37.00	-10.57

Remark:

1. " * " Mark means readings are Peak Values.
2. " ** " Mark means readings are Quasi-Peak values.
3. Factor = Antenna Factor + Cable Loss – Pre-amplifier.



Test Mode: Mode 1: Working Mode (DC Power Port)

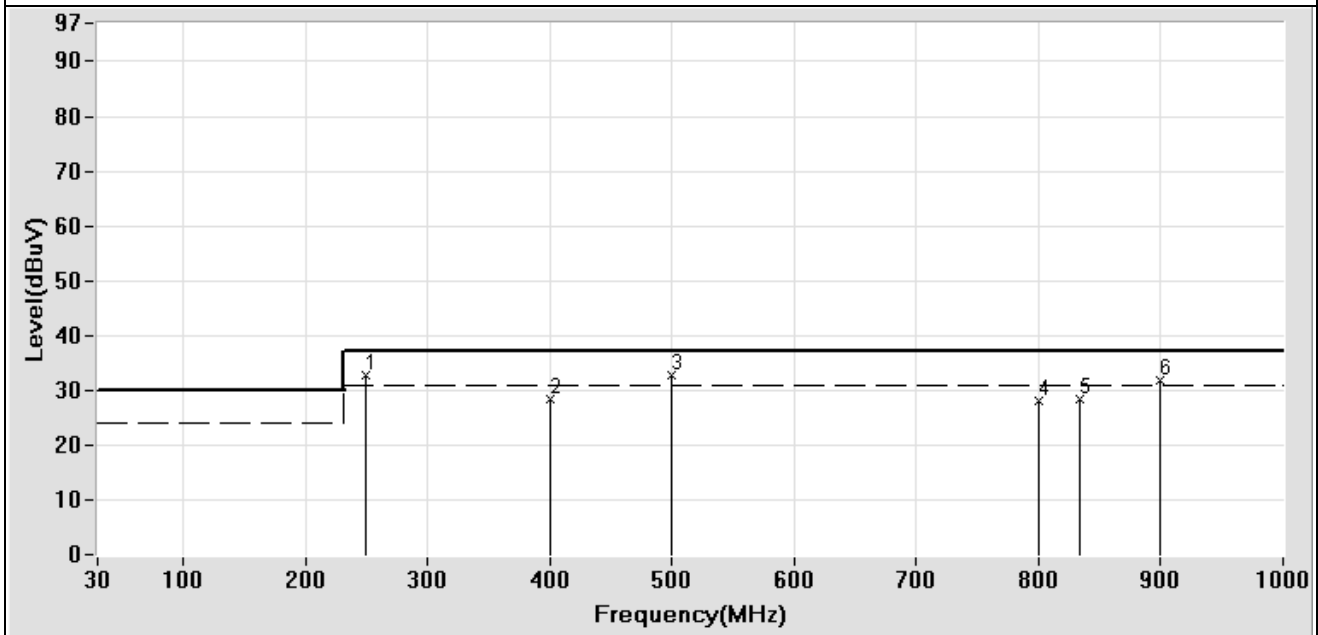
Radiated Emission Measurement Data

EUT: Industrial IEEE 802.11a/b/g Dual-RF AP/Bridge/Client CLIENT: i-Tech MODEL: ECHW1700X-EN50155-TR RATING: DC 12V Temperature: 23.0 °C Humidity: 68 %	POLARITY: Vertical DISTANCE: 10 m Serial No.: FILE/DATA#: TEST SITE: OATS1
---------------------------------------------------------------------------------------------------------------------------------------------------------------------------	----------------------------------------------------------------------------------------

Frequency (MHz)	Factor (dB)	Meter Reading (dB μ V)	Emission Level (dB μ V/m)	Limits (dB μ V/m)	Margin (dB)
250.001 **	-14.81	47.62	32.81	37.00	-4.19
400.120 **	-9.92	38.26	28.34	37.00	-8.66
500.000 **	-7.75	40.52	32.77	37.00	-4.23
800.000 **	-1.75	29.85	28.10	37.00	-8.90
833.240 **	0.23	28.12	28.35	37.00	-8.65
900.000 **	0.44	31.25	31.69	37.00	-5.31

Remark:

1. " * " Mark means readings are Peak Values.
2. " ** " Mark means readings are Quasi-Peak values.
3. Factor = Antenna Factor + Cable Loss – Pre-amplifier.



Test Mode: Mode 1: Working Mode (DC Power Port)

4 Environmental Tests

4.1 Cooling Test

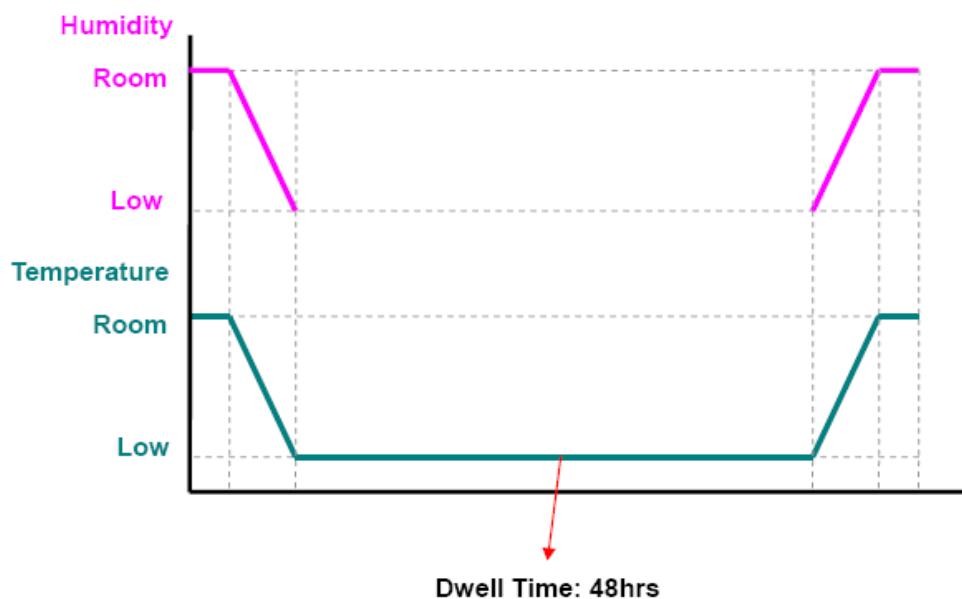
4.1.1 Instrument

Instrument	Manufacturer	Model	Serial No.
Programmable Temperature & Humidity Chamber	KSON	THS-E4T-150	N/A

4.1.2 Sample Configuration & Quantity Under Test:

Product Model	ECHW1700X-EN50155-TR
Sample Source	Engineering Sample
Test Standard	IEC-68-2-1
Test Parameters	Temperature Humidity Time
Total Quantity	6 Units

4.1.3 Test Environmental Curve:



Test Condition	Low Temperature : -5 °C
	Low Humidity : 0 % RH
	Power ON Time : 5 Min
	Power OFF Time : 2 hrs
Times : 10 times	
Room Temperature : 25±5°C	
Room Humidity : 60±20% RH	

4.1.4 Criterion:

After completion of test then conduct functional test and check for the electrical and mechanical irregularity can not over specification.

4.1.5 Test Result

PASS.

4.2 Dry Heat Test

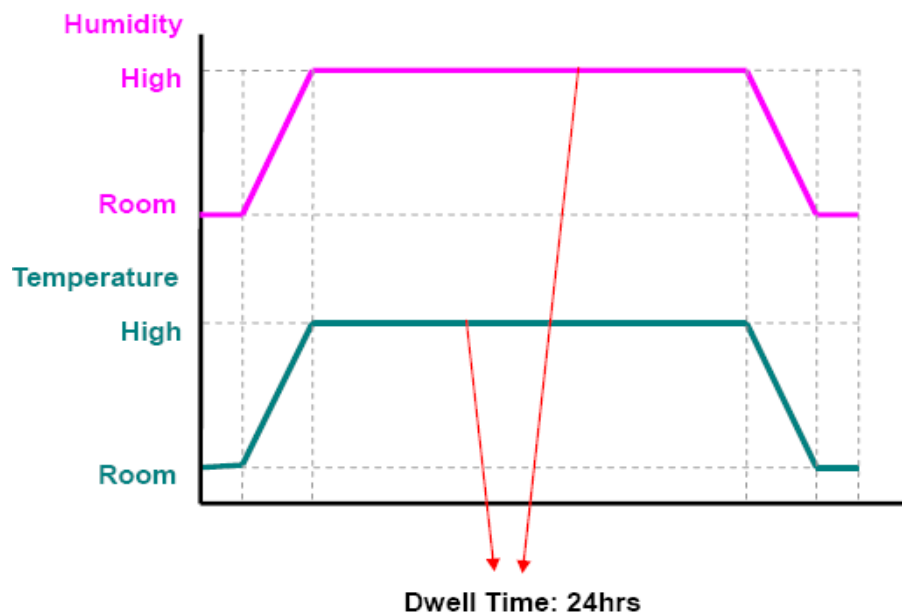
4.2.1 Instrument

Instrument	Manufacturer	Model	Serial No.
Programmable Temperature & Humidity Chamber	KSON	THS-E4T-150	N/A

4.2.2 Sample Configuration & Quantity Under Test:

Product Model	ECHW1700X-EN50155-TR
Sample Source	Engineering Sample
Test Standard	IEC-68-2-3
Test Parameters	Temperature Humidity Time
Total Quantity	6 Units

4.2.3 Test Environmental Curve:



Test Condition	High Temperature : 65 °C High Humidity : 95 % RH
	Room Temperature : 25±5°C Room Humidity : 60±20% RH

4.2.4 Criterion:

After completion of test then conduct functional test and check for the electrical and mechanical irregularity can not over specification.

4.2.5 Test Result

PASS.

4.3 Vibration Test

4.3.1 Instrument

Instrument	Manufacturer	Model	Serial No.
Vibration Tester	KING DESIGN	KD-9363EM-1000F2K-50N120	GUG02102091
Controller	DACTRON	FRONT-End Box	6329253
Control Accelerometer	B&K	4399	2158444

4.3.2 Test ambience

Temperature: 26.2°C (25±10°C)

Humidity: 64%RH (60±20% RH)

4.3.3 Test Requirement

Reference to EN 50155 section 12.2.11

1. Random vibration test (Operation)

Frequency: 5Hz to 150Hz

Acceleration: 0.7 m/s²rms (Longitudinal)

0.7 m/s²rms (Transverse)

1.0 m/s²rms (Vertical)

P.S.D: 0.0144 m/s²/Hz (5Hz to 20Hz) (Longitudinal)

0.0144 m/s²/Hz (5Hz to 20Hz) (Transverse)

0.0298 m/s²/Hz (5Hz to 20Hz) (Vertical)

-6dB/oct (20 Hz to 150Hz)

Test Axis: Longitudinal, Transverse, Vertical Axis

Test Time: 10 mins (Each Axis)

Total Test Time: 30 mins

2. Random vibration test (Non-Operation)

Frequency: 5Hz to 150Hz

Acceleration: 5.5 m/s²rms (Longitudinal)

5.5 m/s²rms (Transverse)

7.9 m/s²rms (Vertical)

P.S.D: 0.901 m/s²/Hz (5Hz to 20Hz) (Longitudinal)

0.901 m/s²/Hz (5Hz to 20Hz) (Transverse)

1.857 m/s²/Hz (5Hz to 20Hz) (Vertical)

-6dB/oct (20 Hz to 150Hz)

Test Axis: Longitudinal, Transverse, Vertical Axis

Test Time: 5 hrs (Each Axis)

Total Test Time: 15 hrs

4.3.4 Test Procedures

Reference to EN 61373

4.3.5 Test Result

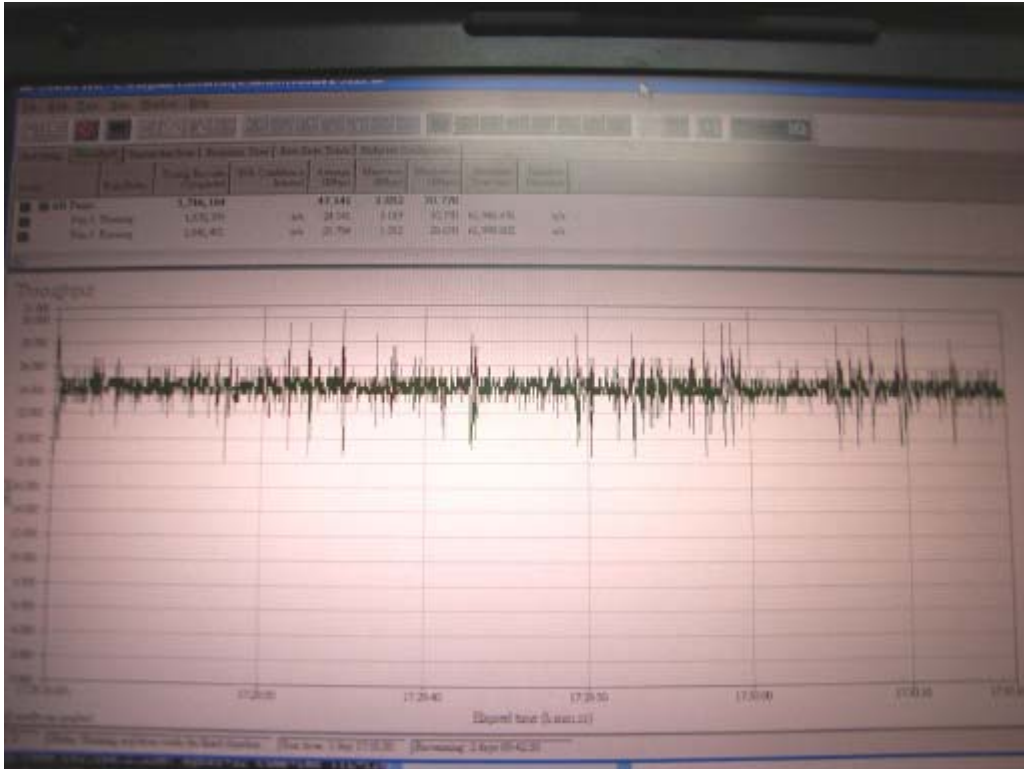
Describe	PASS	FAIL	Non-Judgment
Function judgment	√	--	--
Appearance check	√	--	--

Testing Photos (Operation)



Testing Photos

After Test



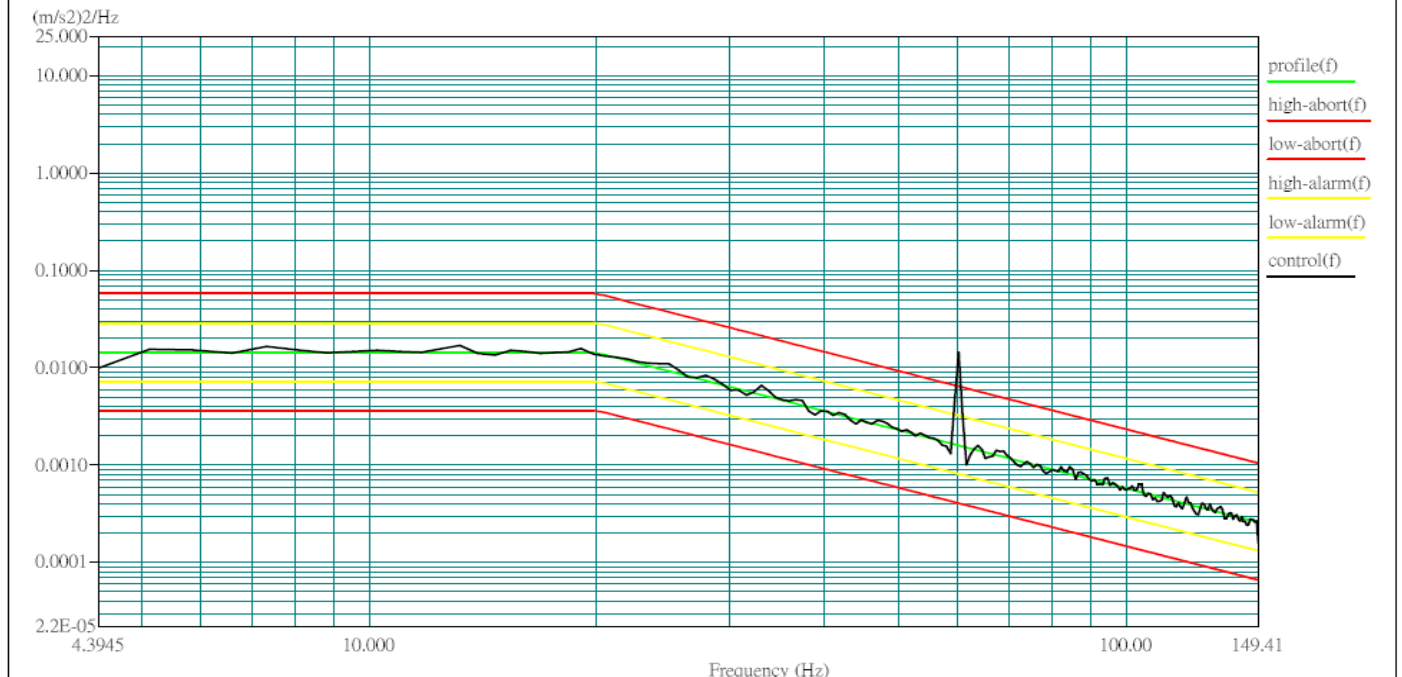
Longitudinal

Project File Name: 5~150 0.7m/s².prj

Profile Name: 5~150 0.7m/s²

Test Type: Random

Run Folder: .\RunDefault Jun 01,2009 17-17-26



Level: 100 %

Control RMS: 0.706185 m/s² Full Level Elapsed Time: 00:09:58 Lines: 225 Frame Time: 1.365333 Seconds

Demand RMS: 0.687722 m/s² Remaining Time: 00:00:00 DOF: 154 dF: 0.732422 Hz

Data saved at 05:28:07 PM, Monday, June 01, 2009

Report created at 05:28:08 PM, Monday, June 1, 2009

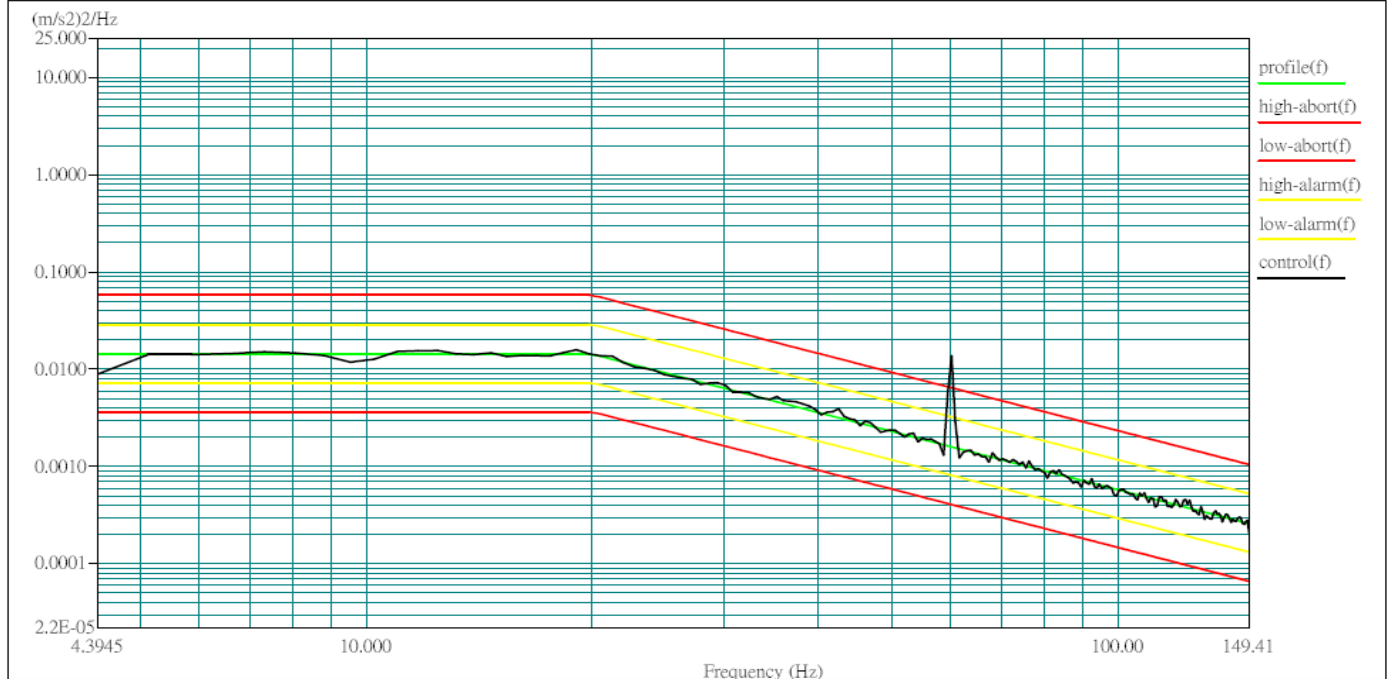
Transverse

Project File Name: 5~150 0.7m/s².prj

Profile Name: 5~150 0.7m/s²

Test Type: Random

Run Folder: .\RunDefault Jun 01,2009 17-00-07



Level: 100 %

Control RMS: 0.697312 m/s² Full Level Elapsed Time: 00:09:58 Lines: 225 Frame Time: 1.365333 Seconds

Demand RMS: 0.687722 m/s² Remaining Time: 00:00:00 DOF: 154 dF: 0.732422 Hz

Data saved at 05:10:56 PM, Monday, June 01, 2009

Report created at 05:10:56 PM, Monday, June 1, 2009

Vertical

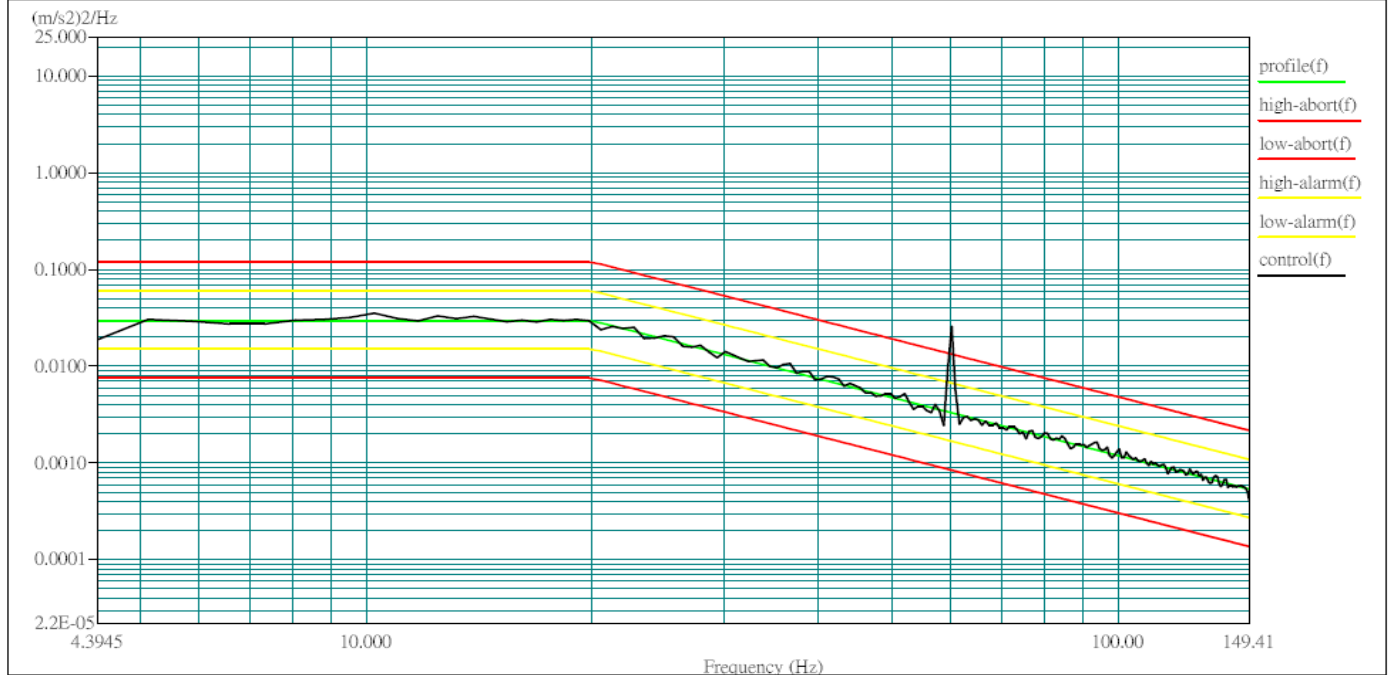
Project File Name: 5~150Hz 1.0m/s².prj

Profile Name: 5~150Hz 1.0m/s²

Test Type: Random

Run Folder: .\RunDefault

Jun 01,2009 16-36-51



Level: 100 %

Control RMS: 1.006876 m/s² Full Level Elapsed Time: 00:09:58 Lines: 225 Frame Time: 1.365333 Seconds

Demand RMS: 0.989326 m/s² Remaining Time: 00:00:00 DOF: 154 dF: 0.732422 Hz

Data saved at 04:47:31 PM, Monday, June 01, 2009

Report created at 04:47:33 PM, Monday, June 1, 2009

Longitudinal

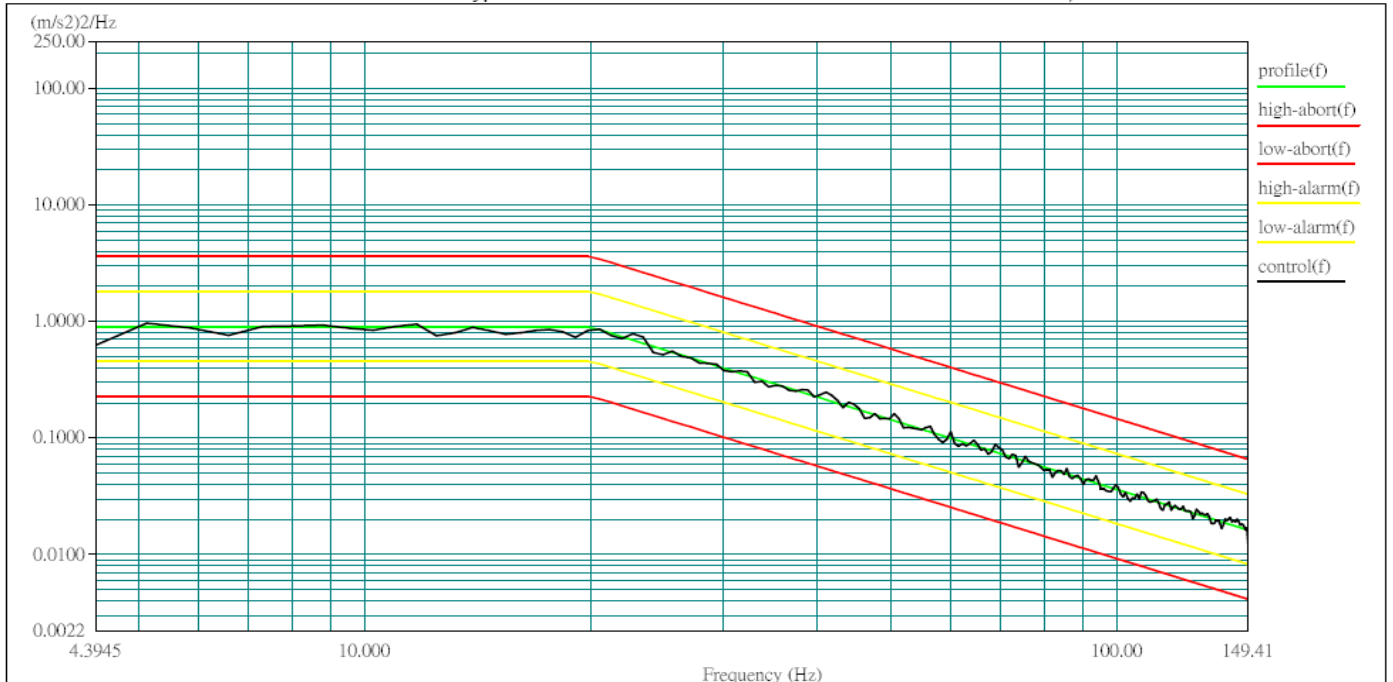
Project File Name: 5~150Hz 5.5 m/s².prj

Profile Name: 5~150Hz 5.5 m/s²

Test Type: Random

Run Folder: .\RunDefault

Jun 01,2009 17-29-36



Level: 100 %

Control RMS: 5.375860 m/s² Full Level Elapsed Time: 04:59:59 Lines: 225 Frame Time: 1.365333 Seconds

Demand RMS: 5.439937 m/s² Remaining Time: 00:00:00 DOF: 154 dF: 0.732422 Hz

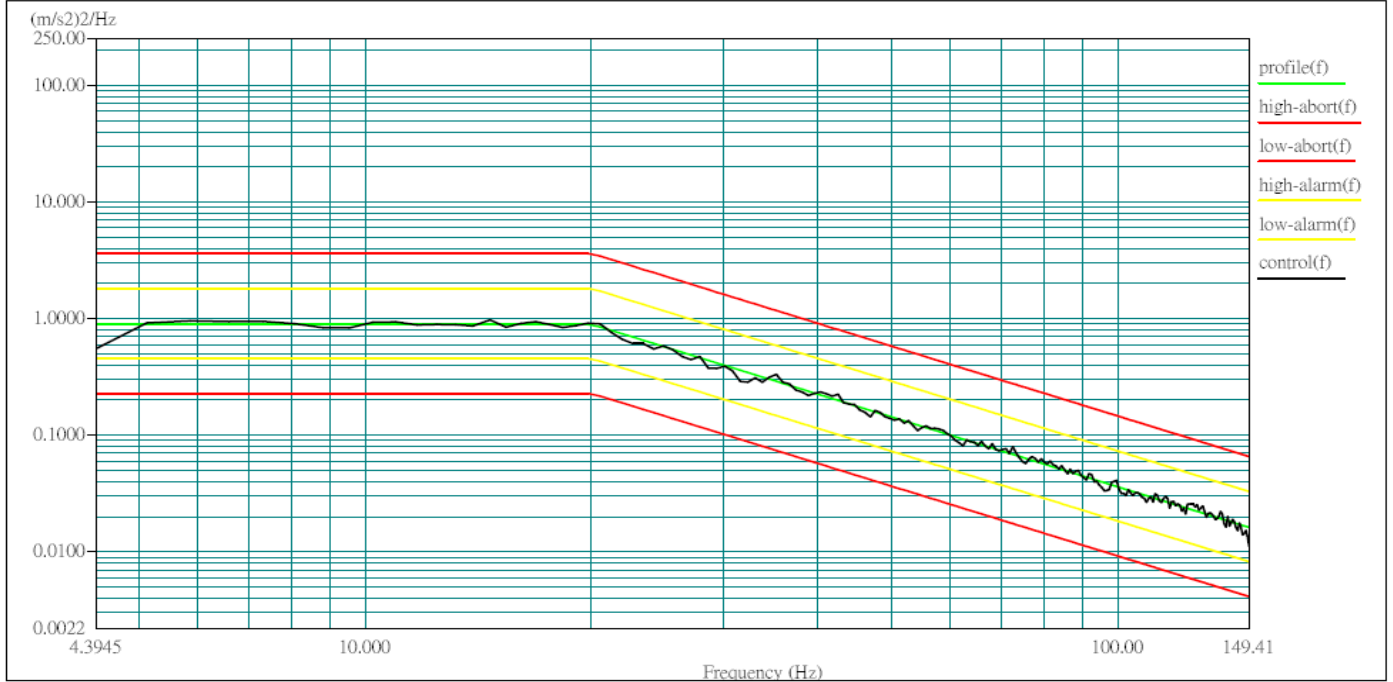
Data saved at 10:30:24 PM, Monday, June 01, 2009

Report created at 10:30:39 PM, Monday, June 1, 2009

Transverse

Project File Name: 5~150Hz 5.5 m/s².prj

Profile Name: 5~150Hz 5.5 m/s² Test Type: Random Run Folder: \RunDefault Jun 02,2009 08-06-26



Level: 100 %

Control RMS: 5.396463 m/s² Full Level Elapsed Time: 04:59:59 Lines: 225 Frame Time: 1.365333 Seconds

Demand RMS: 5.439937 m/s² Remaining Time: 00:00:00 DOF: 154 dF: 0.732422 Hz

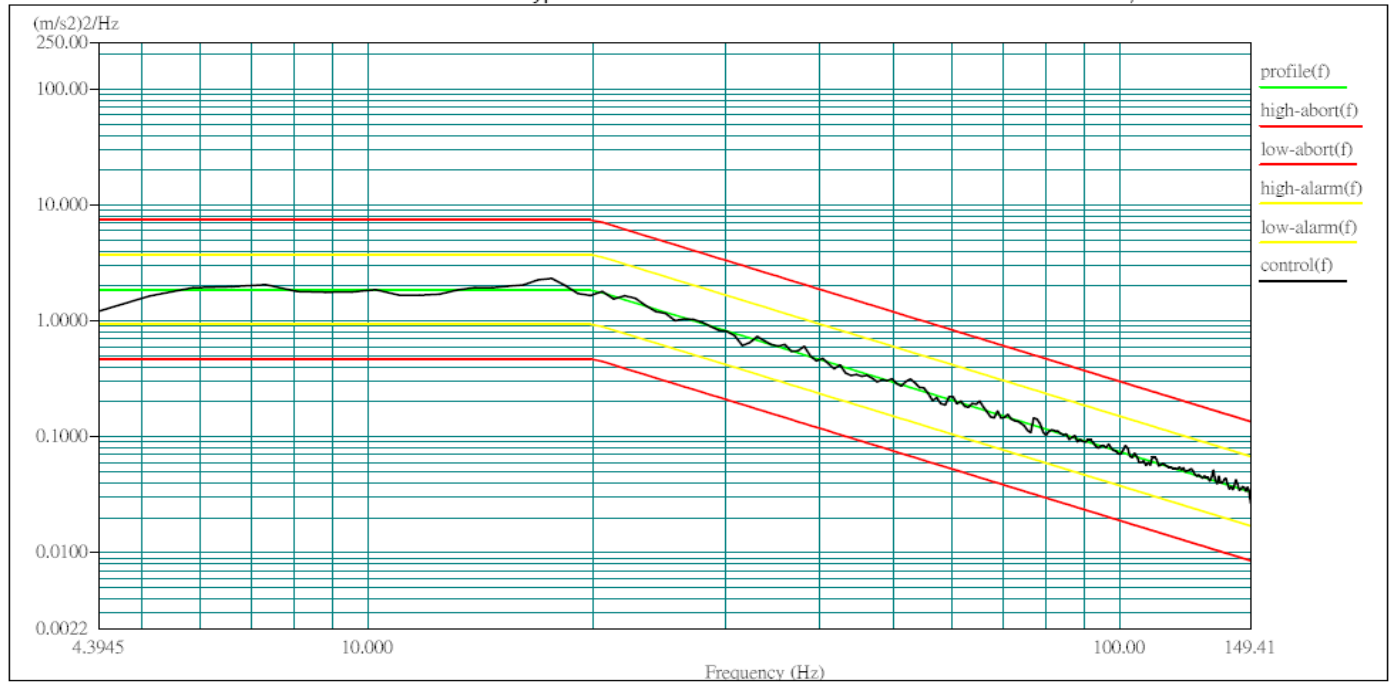
Data saved at 01:07:19 PM, Tuesday, June 02, 2009

Report created at 01:07:20 PM, Tuesday, June 2, 2009

Vertical

Project File Name: 5~150Hz 7.9 m/s².prj

Profile Name: 5~150Hz 7.9 m/s² Test Type: Random Run Folder: \RunDefault Jun 02,2009 13-19-20



Level: 100 %

Control RMS: 7.869572 m/s² Full Level Elapsed Time: 04:59:59 Lines: 225 Frame Time: 1.365333 Seconds

Demand RMS: 7.809752 m/s² Remaining Time: 00:00:00 DOF: 154 dF: 0.732422 Hz

Data saved at 06:20:09 PM, Tuesday, June 02, 2009

Report created at 06:20:11 PM, Tuesday, June 2, 2009

4.4 Shock Test

4.4.1 Instrument

Instrument	Manufacturer	Model	Serial No.
Vibration Tester	KING DESIGN	KD-9363EM-1000F2K-50N120	GUG02102091
Controller	DACTRON	FRONT-End Box	6329253
Control Accelerometer	B&K	4399	2158444

4.4.2 Test ambience

Temperature: 26.2°C (25±10°C)

Humidity: 64%RH (60±20% RH)

4.4.3 Test Requirement

Reference to EN 50155 section 12.2.11

Wave Form: Half Sine Wave

Acceleration: 50 m/s²

Duration Time: 30 ms

Shock Direction: ±Longitudinal, ±Transverse, ±Vertical axis

No. of Shock: Each axis 3 times

Total Test Time: 18 times

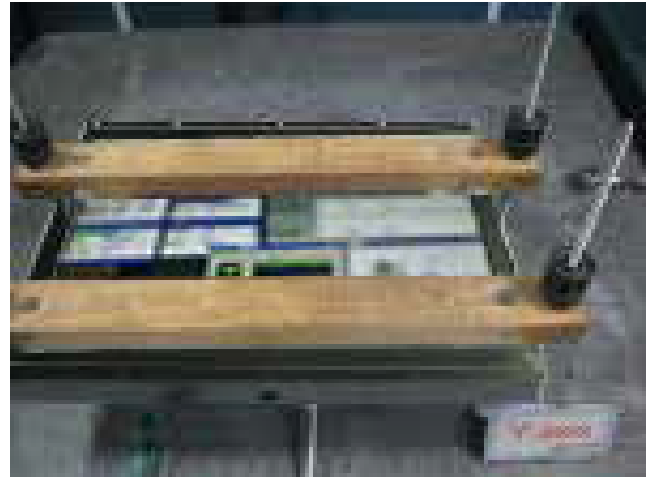
4.4.4 Test Procedures

Reference to EN 61373

4.4.5 Test Result

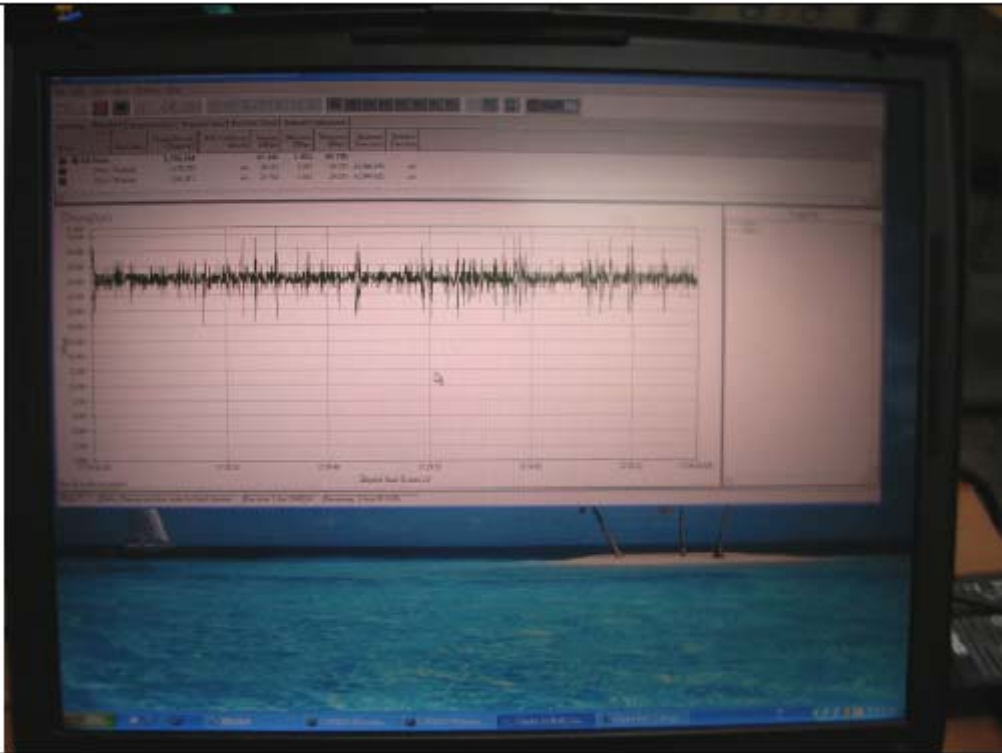
Describe	PASS	FAIL	Non-Judgment
Function judgment	√	--	--
Appearance check	√	--	--

Testing Photos (Shock Test)



Testing Photos

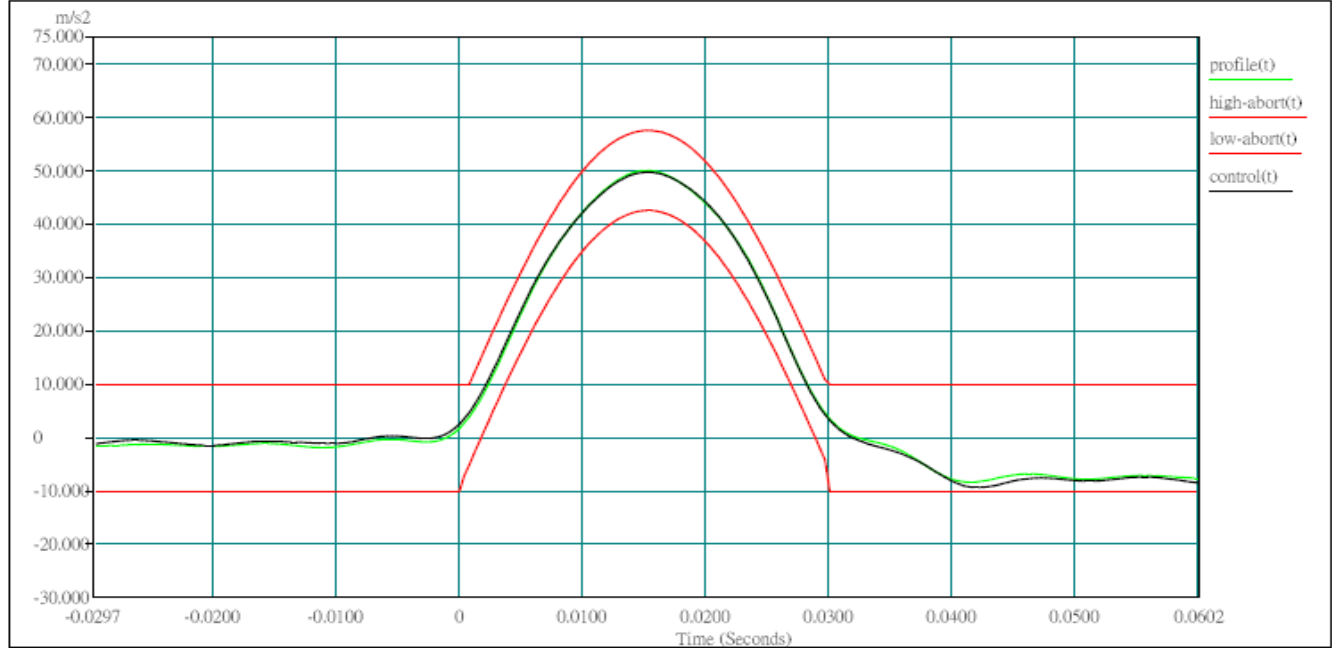
After Test



+Longitudinal

Project File Name: 50m/s2 30mSec.prj

Profile Name: 50m/s2 30mSec Test Type: Classical Shock Run Folder: .\RunDefault Jun 03,2009 11-32-28

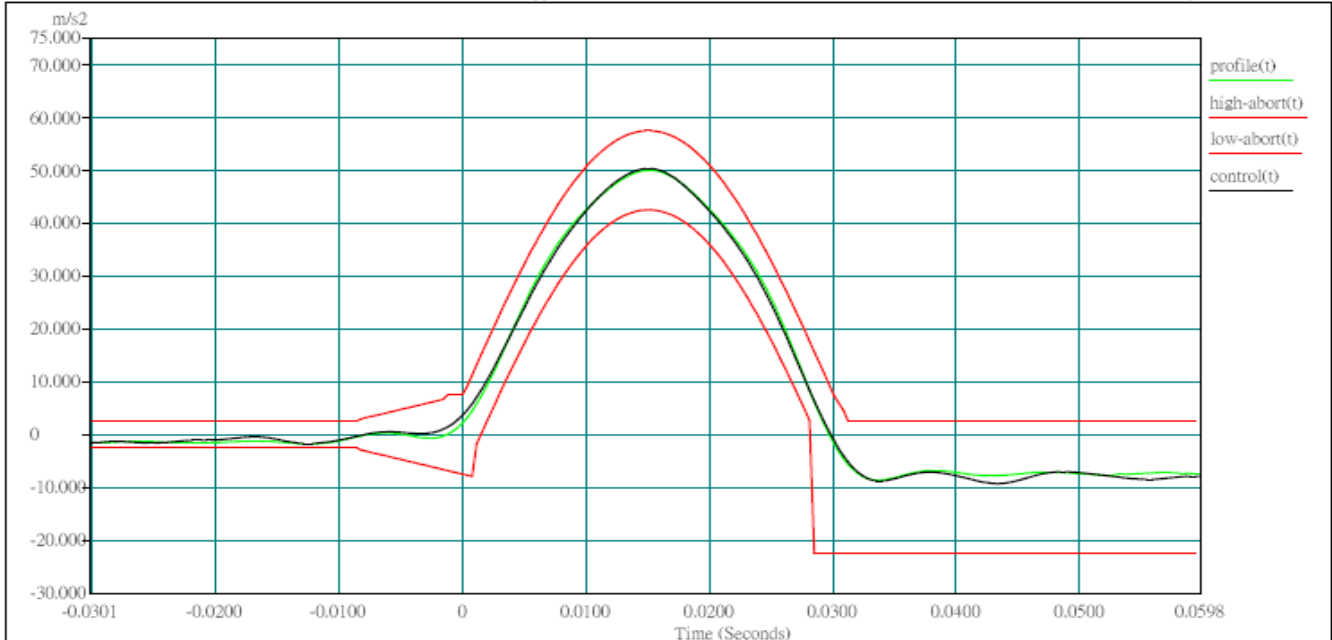


Level: 100 % Block Size: 4096 Elapsed Pulses: 12
Frame Time: 1.600000 Seconds Control Peak: 49.690178 m/s2Control RMS: 5.558774 m/s2 Full Level Elapsed Pulses: 3
dT: 0.000391 Seconds Demand Peak: 50.000000 m/s2Demand RMS: 5.502609 m/s2 Remaining Pulses: 0
Pulse Type: Half Sine Amplitude: 50.000000 m/s2Pulse Width: 30.000001 ms
Data saved at 11:32:53 AM, Wednesday, June 03, 2009 Report created at 11:32:54 AM, Wednesday, June 3, 2009

-Longitudinal

Project File Name: 50m/s2 30mSec.prj

Profile Name: 50m/s2 30mSec Test Type: Classical Shock Run Folder: .\RunDefault Jun 03,2009 11-44-54

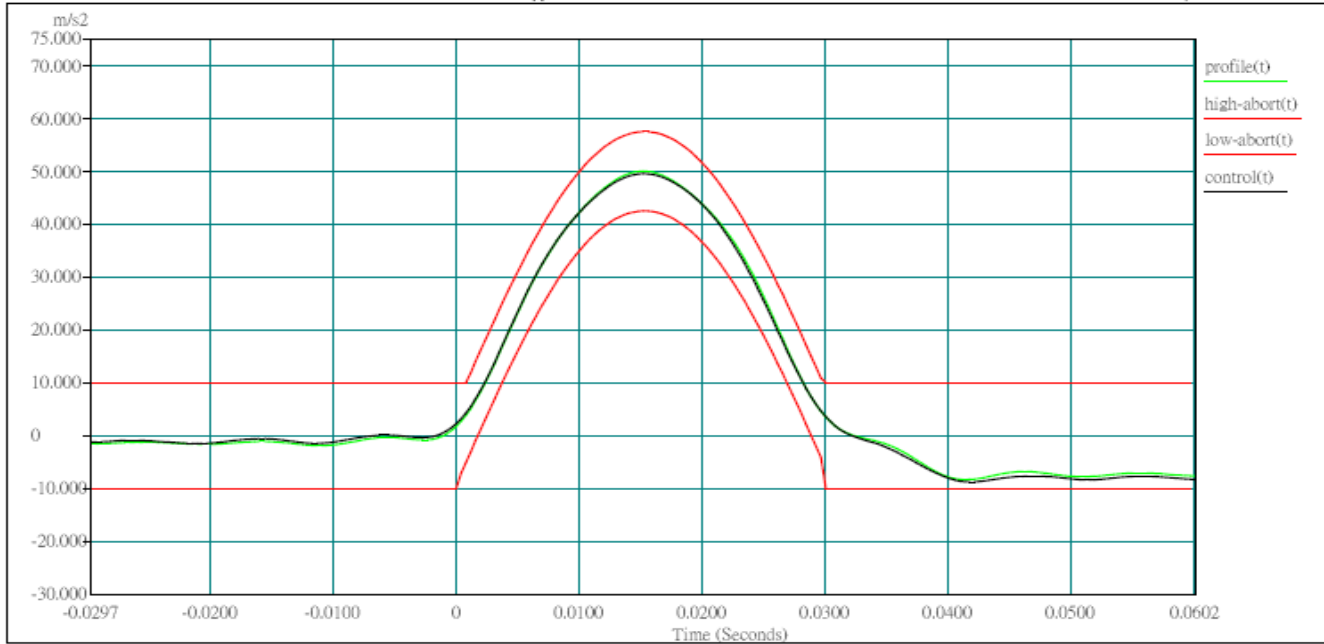


Level: 100 % Block Size: 4096 Elapsed Pulses: 12
Frame Time: 1.600000 Seconds Control Peak: 50.320992 m/s2Control RMS: 5.518628 m/s2 Full Level Elapsed Pulses: 3
dT: 0.000391 Seconds Demand Peak: 50.000000 m/s2Demand RMS: 5.486731 m/s2 Remaining Pulses: 0
Pulse Type: Half Sine Amplitude: 50.000000 m/s2Pulse Width: 30.000001 ms
Data saved at 11:45:20 AM, Wednesday, June 03, 2009 Report created at 11:45:21 AM, Wednesday, June 3, 2009

+Transverse

Project File Name: 50m/s2 30mSec.prj

Profile Name: 50m/s2 30mSec Test Type: Classical Shock Run Folder: .\RunDefault Jun 03,2009 13-37-10

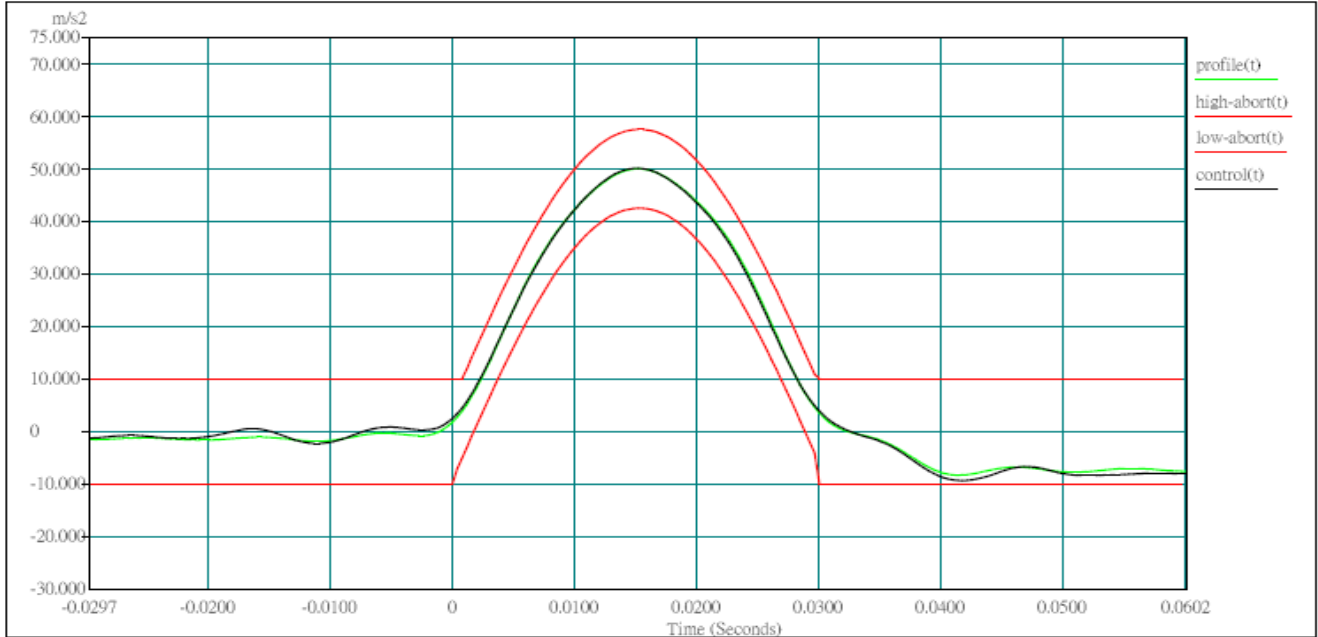


Level: 100 % Block Size: 4096 Elapsed Pulses: 12
Frame Time: 1.600000 Seconds Control Peak: 49.541065 m/s² Control RMS: 5.543383 m/s² Full Level Elapsed Pulses: 3
dT: 0.000391 Seconds Demand Peak: 50.000000 m/s² Demand RMS: 5.502609 m/s² Remaining Pulses: 0
Pulse Type: Half Sine Amplitude: 50.000000 m/s² Pulse Width: 30.000001 ms
Data saved at 01:37:36 PM, Wednesday, June 03, 2009 Report created at 01:37:37 PM, Wednesday, June 3, 2009

-Transverse

Project File Name: 50m/s2 30mSec.prj

Profile Name: 50m/s2 30mSec Test Type: Classical Shock Run Folder: .\RunDefault Jun 03,2009 13-35-34

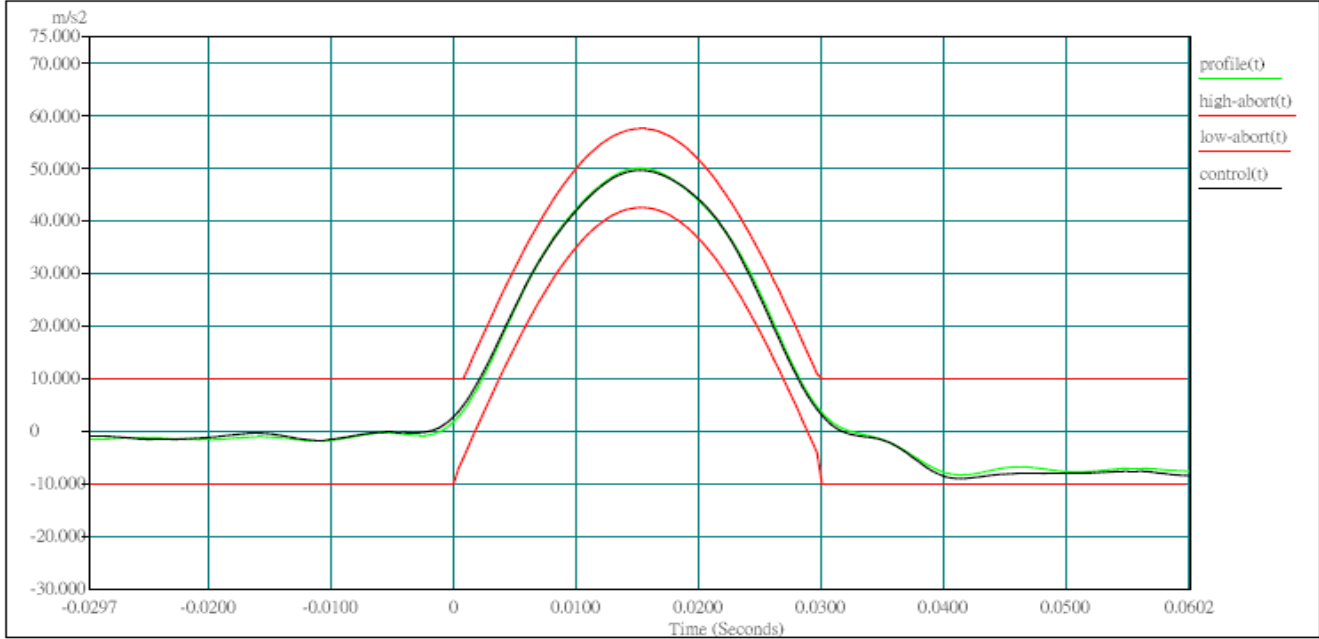


Level: 100 % Block Size: 4096 Elapsed Pulses: 12
Frame Time: 1.600000 Seconds Control Peak: 50.103569 m/s² Control RMS: 5.545721 m/s² Full Level Elapsed Pulses: 3
dT: 0.000391 Seconds Demand Peak: 50.000000 m/s² Demand RMS: 5.502609 m/s² Remaining Pulses: 0
Pulse Type: Half Sine Amplitude: 50.000000 m/s² Pulse Width: 30.000001 ms
Data saved at 01:35:59 PM, Wednesday, June 03, 2009 Report created at 01:36:00 PM, Wednesday, June 3, 2009

+Vertical

Project File Name: 50m/s2 30mSec.prj

Profile Name: 50m/s2 30mSec Test Type: Classical Shock Run Folder: \RunDefault Jun 03,2009 13-26-36

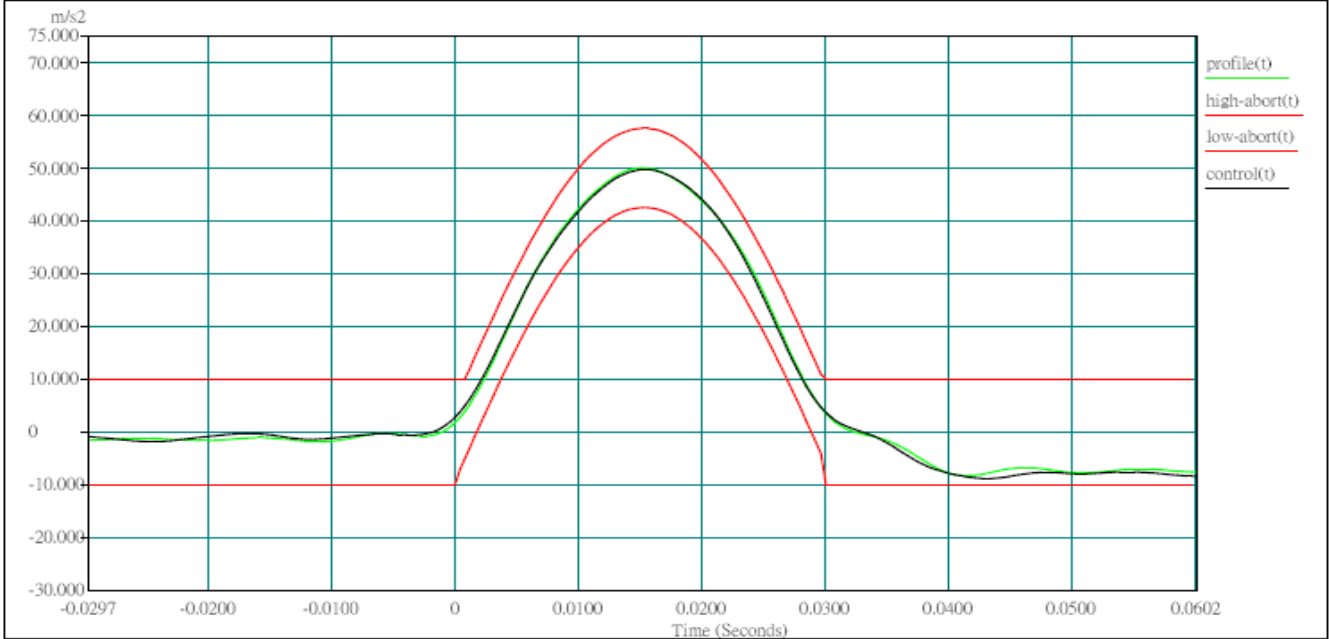


Level: 100 % Block Size: 4096 Elapsed Pulses: 12
Frame Time: 1.600000 Seconds Control Peak: 49.563953 m/s2 Control RMS: 5.541413 m/s2 Full Level Elapsed Pulses: 3
dT: 0.000391 Seconds Demand Peak: 50.000000 m/s2 Demand RMS: 5.502609 m/s2 Remaining Pulses: 0
Pulse Type: Half Sine Amplitude: 50.000000 m/s2 Pulse Width: 30.000001 ms
Data saved at 01:27:02 PM, Wednesday, June 03, 2009 Report created at 01:27:03 PM, Wednesday, June 3, 2009

-Vertical

Project File Name: 50m/s2 30mSec.prj

Profile Name: 50m/s2 30mSec Test Type: Classical Shock Run Folder: \RunDefault Jun 03,2009 13-31-53



Level: 100 % Block Size: 4096 Elapsed Pulses: 12
Frame Time: 1.600000 Seconds Control Peak: 49.695477 m/s2 Control RMS: 5.544336 m/s2 Full Level Elapsed Pulses: 3
dT: 0.000391 Seconds Demand Peak: 50.000000 m/s2 Demand RMS: 5.502609 m/s2 Remaining Pulses: 0
Pulse Type: Half Sine Amplitude: 50.000000 m/s2 Pulse Width: 30.000001 ms
Data saved at 01:32:25 PM, Wednesday, June 03, 2009 Report created at 01:32:26 PM, Wednesday, June 3, 2009