Tekno Kaucuk Sanayii A.S.

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MECHANICAL TESTING AND MEASUREMENT FACILITIES

TEKNO KAUCUK SANAYİİ A.S.

SHOCK AND VIBRATION TEST CENTRE 2013

Test Machines

- Spectral Dynamics Electrodynamic Shaker
- MTS Hydrodynamic Test Machine
- Zwick Torsional Test Machine
- Tekno MWSM Shock Machine
- Angelantoni Climatic Test Cabinet
- Weisstechnik Climatic Test Cabinet
- C&W Salt Sprey Corrosion Test Cabinet

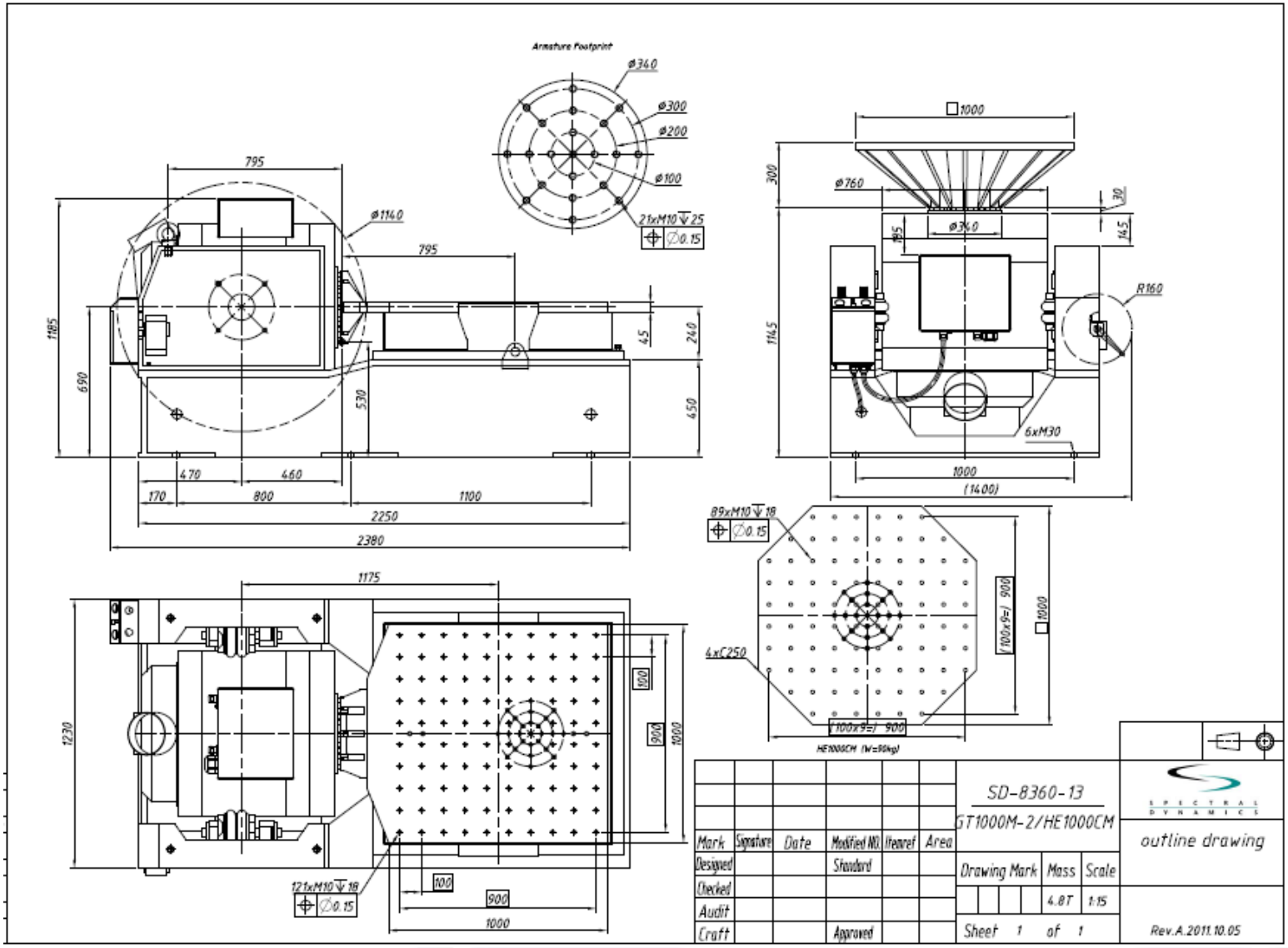
Measurement Systems

- Leader CMM 3D Coordinate Measurement Machine
- 01dB Data Acquisition and Analysis System
- Bruel-Kjaer Noise Measurement and Analysis System

Spectral Dynamics Electrodynamic Shaker

- Vertical Direction:
  - Usable Frequency Range : 5-2800 Hz
  - Maximum Testing Loads :
    - Sine : 3800 kg-f
    - Random : 3800 kg-f
    - Shock : 7600 kg-f
  - Maximum Displacement: ± 25.5 mm
  - MaximumVelocity : 2 m/s
  - Maximum Acceleration : 100 g
  - Armature Mass : 30 kg
  - Vertical Load Support: 500 kg (With Armature and Headexpander)
- Head Expander
  - Mass : 90 Kg
  - Maximum Usable Frequency : 550 Hz
  - Dimensions : 1000mm X1000mmX300mm
- Horizontal Direction _ Slip Table :
  - Effective Mass: 108 kg
  - Maximum Frequency : 2000 Hz
  - Maximum Acceleration : 27.7 g
- Testing Capabilities :
  - Sweep Sine, Step Sine, Random (PSD input)
  - Pulse Type Shock with diffferent profiles
  - Shock test with SRS input

Shaker Holes Pattern Drawing



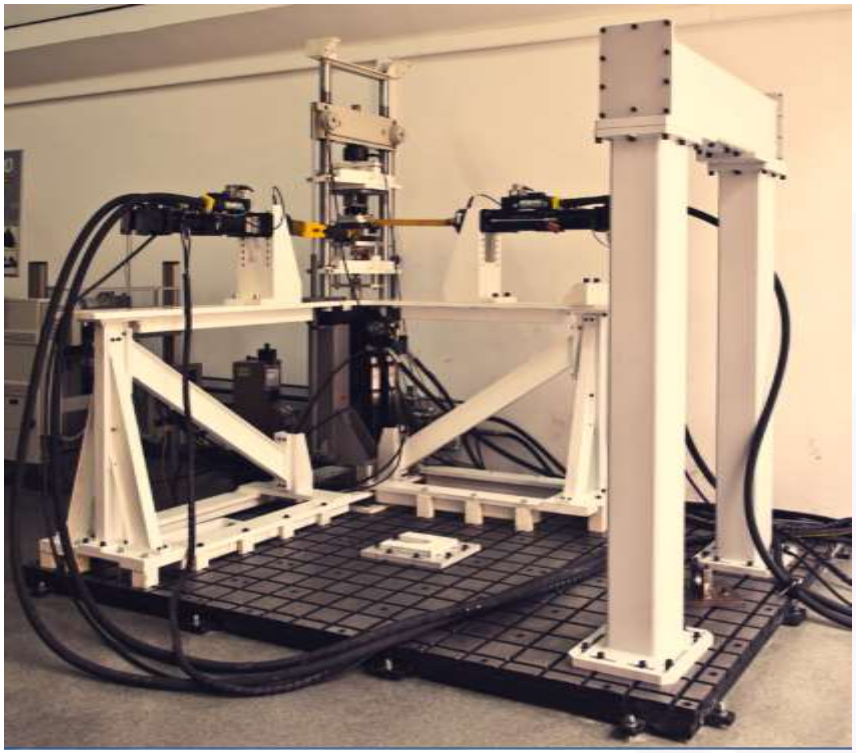
Spectral Dynamics Electrodynamic Shaker

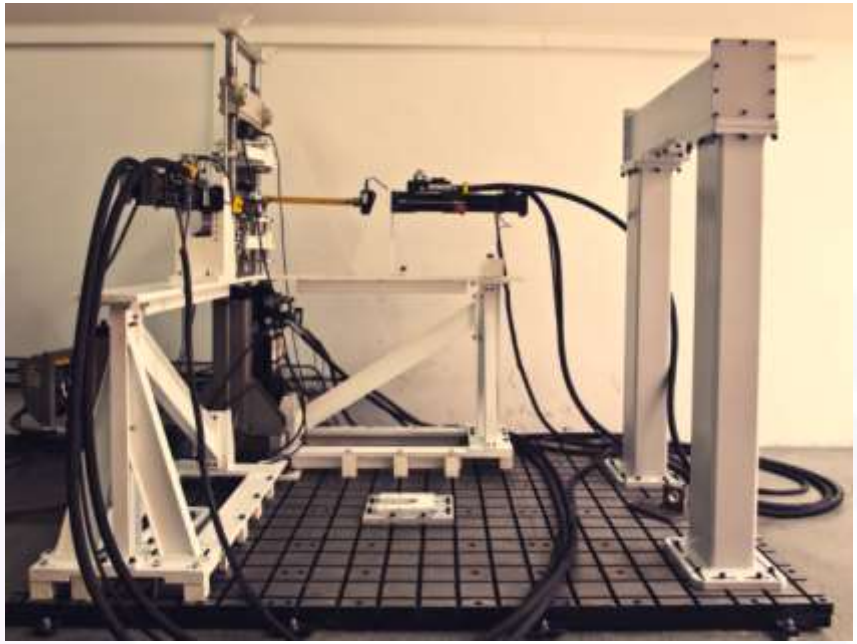
MTS Hydrodynamic Test Machine

- Uni-Axial Test Frame :
  - Frequency Range : 0-200 Hz
  - Force Range : ± 50 kN
  - Displacement Range : ±60 mm
- 2 Servohydraulic Actuators :
  - Frequency Range : 0-100 Hz
  - Force Range : ± 50 kN
  - Displacement Range : ±75 mm

- Test Types
  - Creep
  - Relaxation
  - Static Characterization
  - Dynamic Characterization
  - Sinusoidal Durability Test in 1,2 and 3 Axis (With Arbitrary Frequency Inputs)
  - Road Test in 1,2 and 3 Axis (with cRPC)

MTS Hydrodynamic Test Machine





Zwick Torsional Test Machine

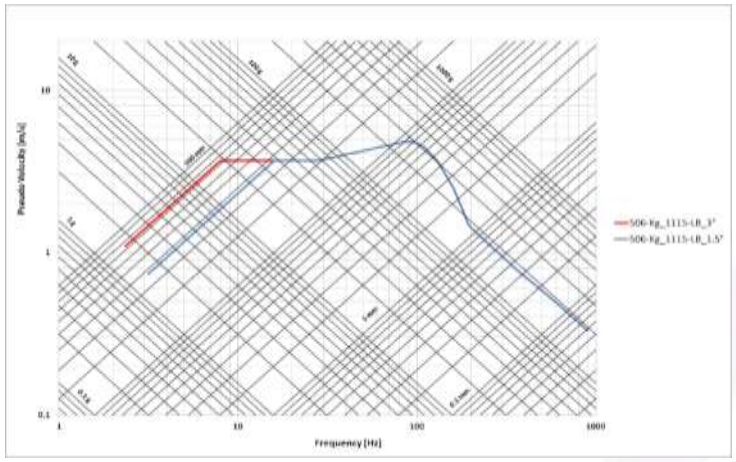
- Test and Measurement Ranges :
  - Torque Measurement Range : ± 20 Nm ve ± 200 Nm (sensitivity is 1%)
  - Angular Displacement Range : ±36000 °
  - Angular Velocity Range : 0.036-32400 °/min
- Test Types :
  - Static Torsional Characterization
  - Static Cardanic Characterization

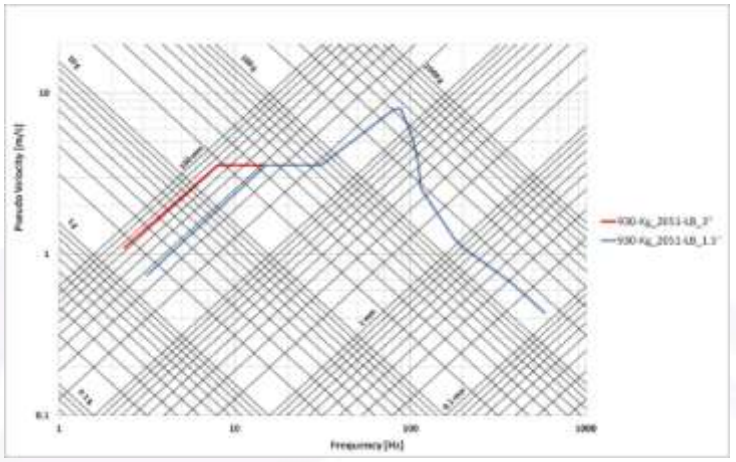
Zwick Torsional Test Machine

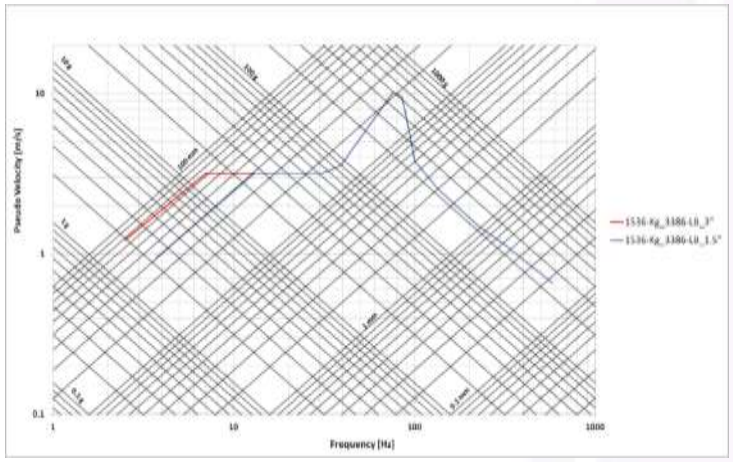
Tekno MWSM Shock Machine

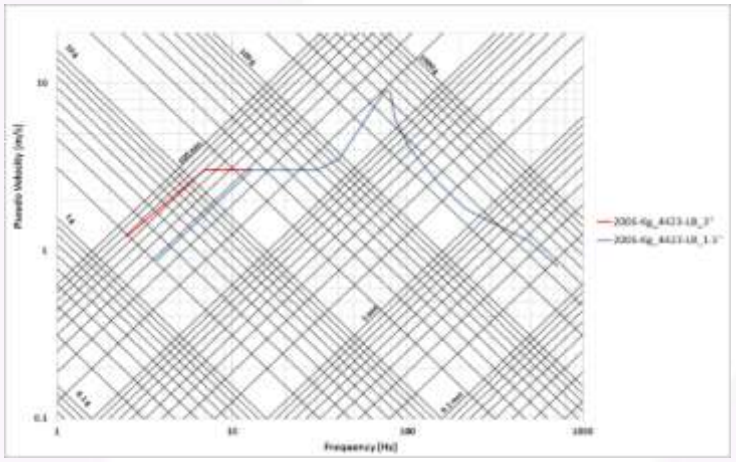
- Our Medium Weight Shock Machine is defined in MIL-S-901D Standard.
- In MIL-S-901D standard, Just the test conditions have been defined without any SRS specification.
- Height of the anvil plate, supporting channel shapes and bolt holes patterns, the masses over the anvil plate, hammer drop height like theese parameters have been given in a table as depending eachothers.
- Provisional PV-SRS curves that is in the next slide can be considered either to predict the shock inputs levels or to compare a different type shock input with the shock can be generated in this machine .

Provisional PV-SRS Curves in MWSM









MWSM Shock Machine Fixtures

Standard Base Mounting Platform

30 Degree Base Mounting Fixture

MWSM Shock Machine Fixtures

Standard Bulkhead Mounting Fixture

30 Degree Bulkhead Mounting Fixture

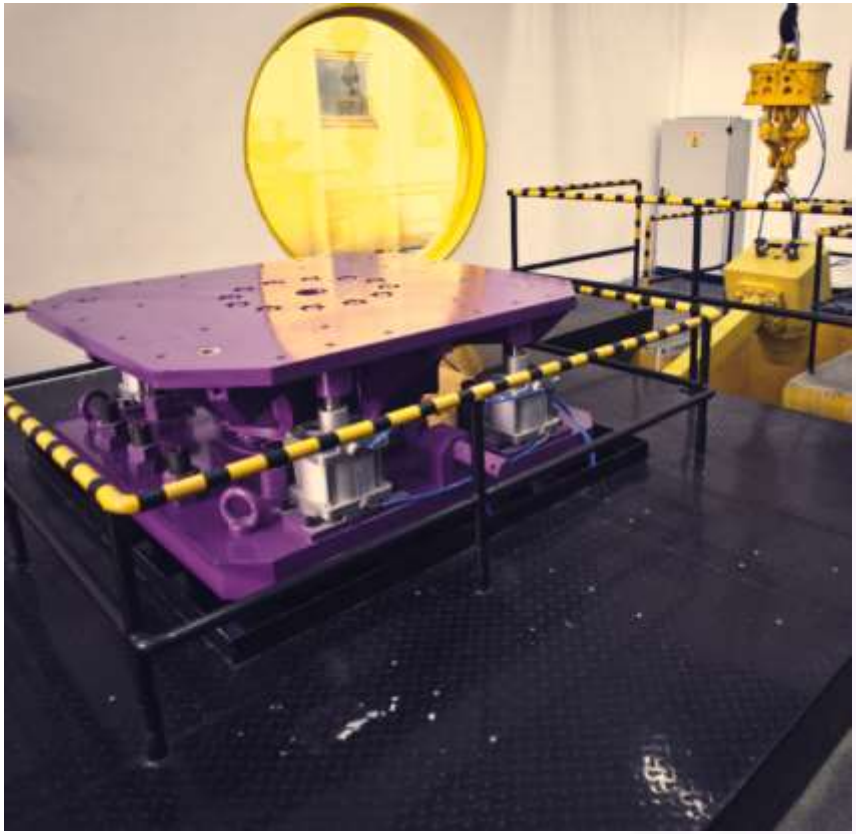
Shock Test Schedule For MWSM

TABLE I. Test schedule for medium weight shock machine.

Group number Number of blows Anvil table travel, inches	I 2 3	II 2 3	III 2 1.5
Total weight on anvil table (pounds)[1]	Height of hammer drop[2] feet)		
Under 1,000	0.75	1.75	1.75
1,000 - 2,000	1.0	2.0	2.0
2,000 - 3,000	1.25	2.25	2.25
3,000 - 3,500	1.5	2.5	2.5
3,500 - 4,000	1.75	2.75	2.75
4,000 - 4,200	2.0	3.0	3.0
4,200 - 4,400	2.0	3.25	3.25
4,400 - 4,600	2.0	3.5	3.5
4,600 - 4,800	2.25	3.75	3.75
4,800 - 5,000	2.25	4.0	4.0
5,000 - 5,200	2.5	4.5	4.5
5,200 - 5,400	2.5	5.0	5.0
5,400 - 5,600	2.5	5.5	5.5
5,600 - 6,200	2.75	5.5	5.5
6,200 - 6,800	3.0	5.5	5.5
6,800 - 7,400	3.25	5.5	5.5

- Total Three blows applied in the normal equipment orientation ; one from each group Shown in Table I
- Total Three blows applied with the equipment inclined ; one from each group Shown in Table I
- The number of total blows are at least 6. It may be increased according to more detailed operation mode investigation.

Tekno MWSM Shock Machine



Angelantoni Climatic Test Cabinet

- Technical Specifications :
  - Usable Volume : 1535 l
  - Dimensions (WxDxH mm) :
    - Inner : 1000 x 1505 x 1020
    - Outer : 1320 x 2628 x 2160
  - Temperature Range : -40 °C ... +150 °C
  - Temperature Fluctuation : ±0.1 °C ... ±0.3 °C
  - Heating Rate : 3 °C/dk
  - Cooling Rate : 3 °C/dk
  - Relative Humidity Range (-20 °C/+94 °C) : %10 ... %98
  - Relative Humidity Sensitivity : ±%1 ...±%3
  - Test Step Programming

Angelantoni Climatic Test Cabinet

MAIN STANDARDS

TEMPERATURE TESTS

COLD ONLY
DIN 40046 Page 3, Test A
IEC 68-2-1, Test A
BS 2011, Part 2, Test A
MIL-STD 810 D, Met. 502.2
MIL-E 5272, Test 4.2

HOT ONLY
DIN 40046, Page 4, Test 3
IEC 68-2-2, Test B
BS 2011, Part 2, Test B
MIL-STD 810 D, Met. 501.2
MIL-STD 883 C, Met. 1008.2
MIL-E 5272, Met. 4.1
MIL-STD 202 E, Met. 108 A

HOT/COLD
DIN 40046, Page 14, Test Nb
IEC 68-2-14 Nb
MIL-STD 311 A, Part 112.1

CLIMATIC TESTS

CONSTANT CLIMATE
DIN 40046
DIN 50014
IEC 68-2-3, Test Ca
MIL-STD 202 E, Met. 103 B
DIN/IEC 68-2-56

VARIABLE CLIMATE
DIN/IEC 68-2-30 DB
IEC 68-2-38
MIL-STD 202 E, Met. 106 D
MIL-STD 883 C, Met. 1004.4
DIN 40046 Page 6 and 31
IEC 68-2-4, Test D
BS 2011, Part 2.1, Test Da
MIL-STD 750 B, Met. 1021.1
DIN 40046 Page 101
DIN 50016
MIL-STD 311 A, Part. 105.1
MIL-STD 810, Met. 507 Proc. 1-2-3

Weisstechnik Climatic Test Cabinet

- Technical Specifications :
  - Usable Volume : 1628 l
  - Dimensions (WxDxH mm) :
    - Inner : 1100 x 1480 x 1000
    - Outer : 1350 x 2440 x 2140
  - Temperature Range : -40 °C ... +90 °C
  - Temperature Fluctuation : ±0.3 °C ... ±0.5 °C
  - Heating Rate : 0.4 °C/dk
  - Cooling Rate : 0.4 °C/dk

Weisstechnik Climatic Test Cabinet

C&W Salt Sprey Corrosion Test Cabinet

Salt Sprey Corrosion Test by ASTM B117 and Other Standards

Leader CMM Coordinate Measurement Machine

- Technical Specifications:
  - Measurement Range (X,Y,Z mm) : 700 mm , 1000 mm , 700 mm
  - Touch Probe Sensitivity : 0.1 μm
  - Laser Scanner Sensitvity : 0.03 mm
  - Laser Scaner Resolution : 10000 points/s
  - Laser Head Scanning Distance Range: 80 ±30 mm

Leader CMM Coordinate Measurement Machine

Vibration and Noise Measurement Systems

- 01dB Data Acquisition and Analysis System :
  - Orchestra Module Capacity : 6
  - Module Quantity : 3
  - Channel Capacity Per Module: 4
  - Total Sensor Capacity : 12
  - Total Acceleration Sensor Quantity : 30
  - Sampling Frequency Changing Capability (For Each Modules Seperately)
  - Sampling Frequency Range : 8-65536 Hz
  - Data Acquisition Rate : 26.2144 Mbps
  - Post Processing Capability
  - Realtime Frequency Analysis Capability
  - Device Vibration Resistance : MIL-STD-810C/E
- Bruel-Kjaer Noise Measurement and Analysis System :
  - Measurement Scales : A, Z, C Weighted
  - Realtime Frequency Analysis in 1/1 or 1/3 Octave Band Capability
  - Broadband Frequency Range : 3 Hz-20 kHz
  - Broadband and Spectral Data Acquisition for post processing Capability
  - Dynamic Range : >120 dB

01dB Data Acquisition and Analysis System

Bruel-Kjaer Noise Measurement and Analysis System

Vibration and Noise Measurement Systems