TATA

TATA AEROSPACE & DEFENCE


Aerostructures


Aeroengines


Airborne Platforms


Weapons, Sensors & C4I


Land Mobility Solutions


Physical & Cyber Security

TASL Test Capabilities

(emc@tataadvancedsystems.com)

Walkthrough | Agenda

About Tata Group and Tata Aerospace & Defence

EMI/EMC Testing Capabilities

- Telecom & Multimedia Equipment
- Automotive Sector
- Railways
- Household Appliances
- Medical Equipment
- Defense & Aerospace Requirements

RF Testing Capabilities

- IoT & Bluetooth Devices
- Cellular Devices
- Base station

Environmental Testing Capabilities

Power Supply Quality Testing Capabilities

Certification of the facility & Customer

About TATA Group

1868	$150.7 B	9350,000+	10	100+
Founding Year	Revenues in FY 22	Employees	Business Sectors	Operating Companies

150 years of TATA Legacy…

Information Technology
TCS

Global Ranking 2nd (Market Cap)

Satellite Television
TATA SKY

India Ranking 2nd (Volume)

Materials
TATA STEEL

Global Ranking 15th (Volume)

Services
TAJ HOTELS

Asia's largest group of hotels

Engineering
TATA MOTORS

Among top 10 Commercial Vehicle Manufacturer

ICT
TATA COMMUNICATIONS

Global Ranking 1st (Volume)

Consumer
TATA GLOBAL BEVERAGES

Global Ranking 2nd (Volume)

Energy
TATA POWER

India Ranking 1st (Renewable Energy)


Jamsetji Tata
1868

Group Chairman, TATA Group

2019

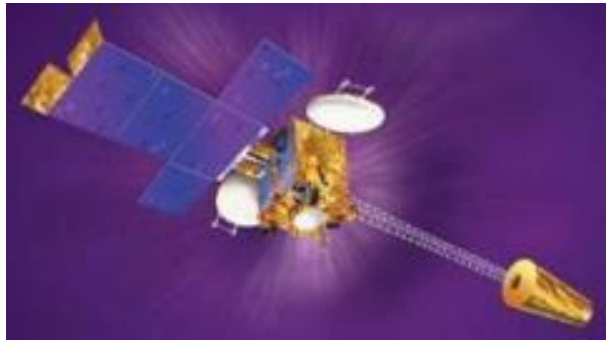
N Chandrasekaran

Vision 2025

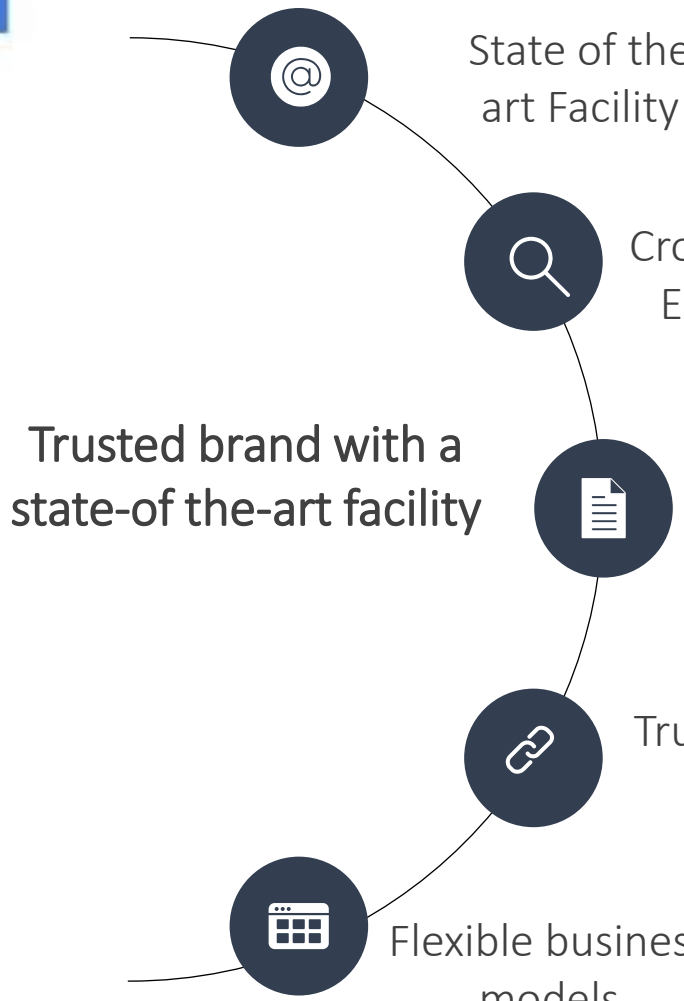
25% of the world's population will experience the Tata commitment to improving the quality of life of customers and communities

Passionate commitment to developing the communities in which we operate

About Tata Aerospace & Defence
(Offering wide range of solutions in Aerospace & Defence)

Weapons, Sensors and C4I Systems	Land Mobility Solutions	Airborne Platforms and Systems	Aerostructures & Aeroengines
			
			
			

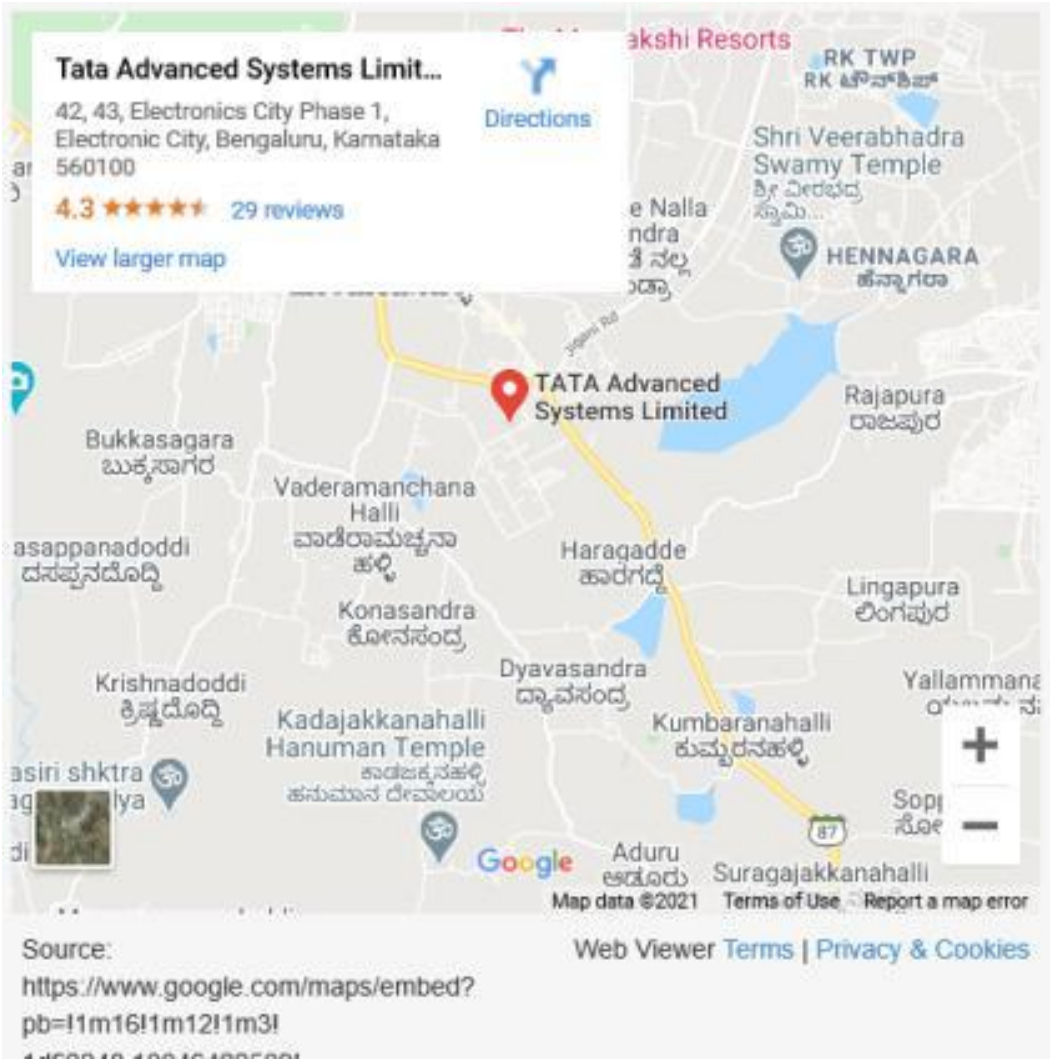
Tata Aerospace & Defence offers an ideal one stop facility for EMI/EMC, RF , Environment and power supply quality testing requirements



Trusted brand with a state-of the-art facility

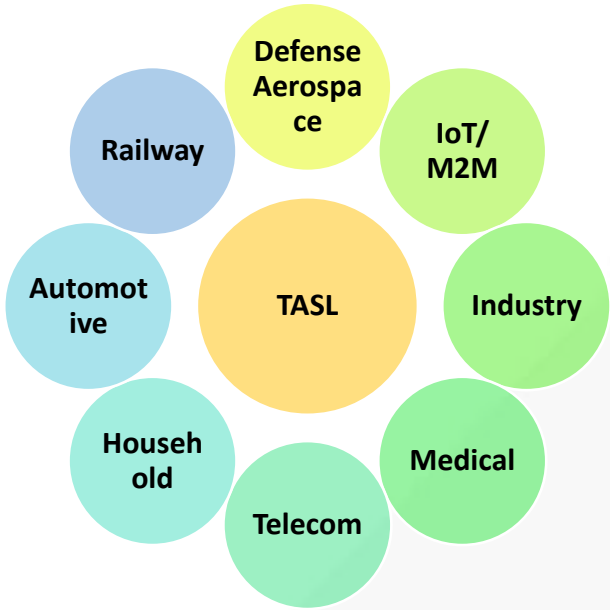
- State of the art Facility → One of the largest anechoic chambers in India with high end equipment and capability to test multiple requirements as per the International standard, located in the heart of Electronics City
- Cross Industry Experience → Have already hosted major OEMs across industries at the facility to their satisfaction
- Hands-on Tech Support → The facility employs technicians & engineers- Including instructor level certified personnel -who are audited regularly,
- Trusted Brand Name → The Tata Group is the biggest Indian private business conglomerate with a strong reputation
- Flexible business models → Tatas offers Pre-compliance based and Test based certifications at both **ONSITE** and **TASL** facility with flexible to your requirements & budget considerations

Location of TASL's Testing Facility



- EMI/EMC
- RF
- Environmental
- Power Supply Quality

Product Addressed



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Environmental Testing Capabilities

Power Supply Quality Testing Capabilities

Certification of the facility & Customer

Tata offers one of the best equipped EMI/EMC testing facilities in India

Facility Overview

(Electronics City Phase 1, Bengaluru- 560100)

- 10m semi-anechoic chamber- **One of the largest** in India with turntable capacity of 3 Tons
- Floor Loading Capacity of **70 Tons**
- Both Emission and Susceptibility testing frequency range starts from 30 Hz to 40 GHz
- Radiated Susceptibility, Capable to generate Field Strength 200 V/m the frequency range.(10k- 40GHz)
- **3 Dedicated rooms** for parallel CE , CS & ESD testing
- Test Frequency from **10 Hz** up to **40 GHz**
- Fully automated test facility for complete system/Vehicles & sub-system levels
- EM Scanner for PCB level EMC Testing, to identify exact emission component.

Dimensions of test area

19m(Length) x 15m (Width)x 10m (Height)

One of the largest EMI/EMC facility in India

Capability of parallel testing across 4 chambers/labs

Semi- Anechoic Chamber

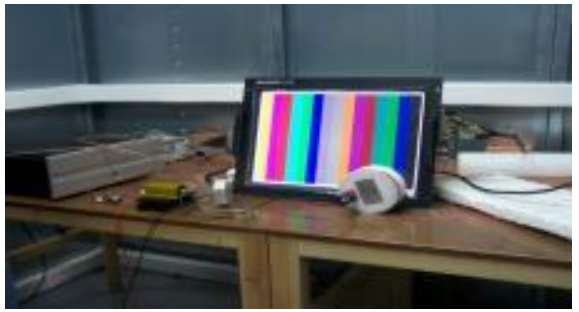
Radiated emission and Immunity to be test in this lab

Conducted Emission Lab

The Conducted Emissions are measured in this Lab

Radiated Susceptibility Lab

RF Energy is radiated by the lab to equipment under test in anechoic chamber



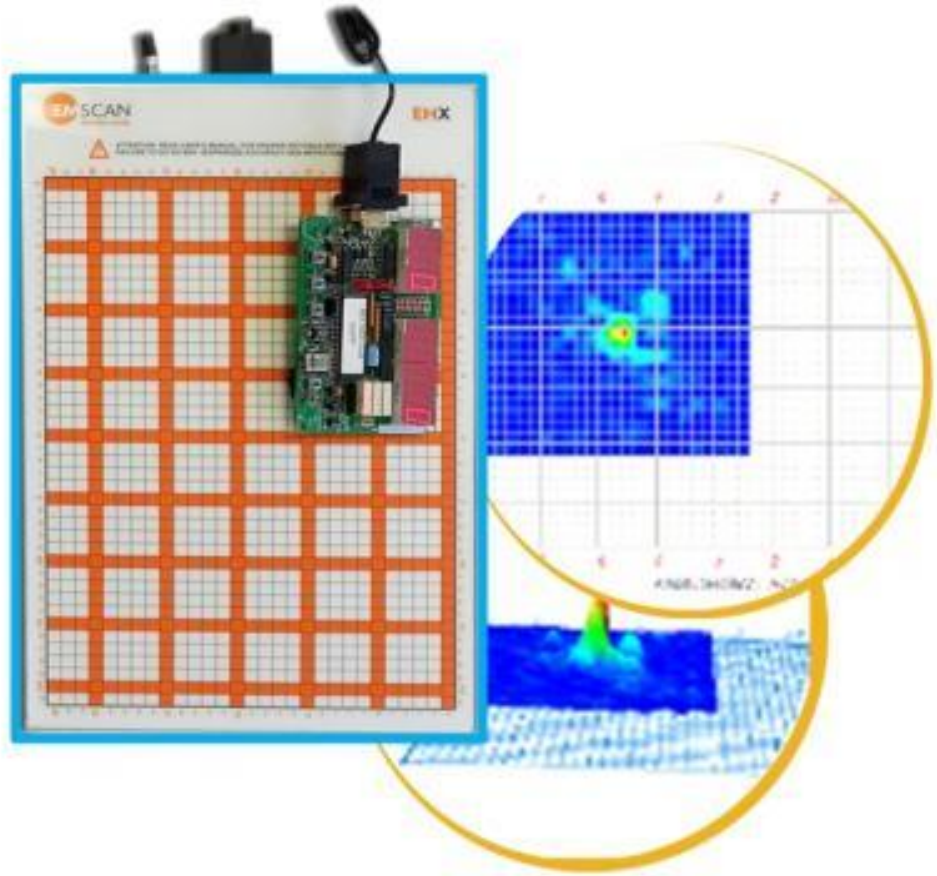
Conducted Susceptibility Lab

RF Energy is applied on the terminals of the unit under test through wires in this Lab

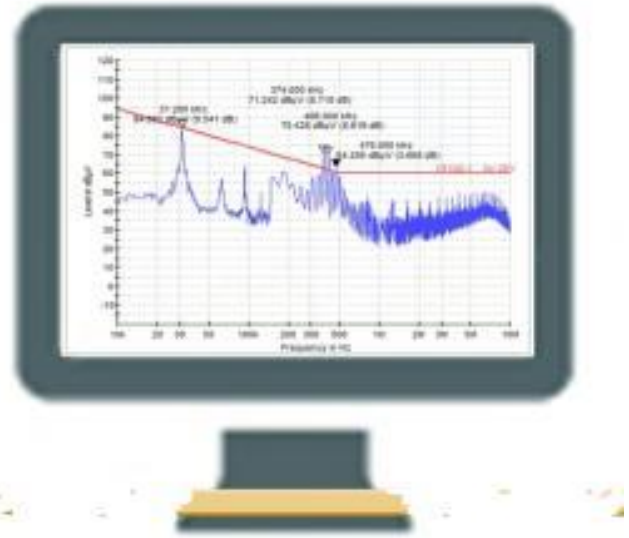
EMC Test Services

- Radiated Emission
- Radiated Susceptibility
- Conducted Emission
- Conducted Susceptibility
- Flicker & Surge
- Electrical Fast Transient
- Electrostatic discharge (ESD)
- Voltage Dips & Interruption
- Harmonic Current Emission
- Power Frequency Magnetic Field

Design & Solution for EMC Per Compliance



Support Service



Remote test witness

Trouble - Shooting

Specialized Consulting Services

EMI/EMC Facility meets Telecom & Commercial Standards

Telecom Standards

Standards	Applicable Products
• TEC_SD_DD_EMC_ 221_05_OCT16	• Telecommunication
• CISPR 32	• Multimedia
• ETSI EN 3003 28v010701p	• Wireless
• ETSI EN 301 893 V1.7.1	• Wireless
• ETSI EN 300 220-1 V2.4.1	• Wireless
• ETSI EN 301 908-1	• Wireless
• ETSI EN 301 908-2	• Wireless
• IEC61547	• Lighting
• IEC 62040-2	• UPS

Commercial Standards

Emissions	Immunity
• EN55011 • EN55014 • EN55022 • CISPR 11 • CISPR 14 • CISPR 32 • ETSI 301489 series • EN 55032	• IEC 61000-4-2 Electrostatic Discharge • IEC 61000-4-3 Radiated Field Immunity • IEC 61000-4-4 Electrical Fast Transients • IEC 61000-4-5, Surge • IEC 61000-4-6 Conducted Immunity • IEC 61000-4-8 Power Magnetic Field • IEC 61000-4-9 Pulse Magnetic Field • IEC 61000-4-11 Voltage Dips and Interruptions • IEC 61000-4-12, Ring Wave • IEC 61000-4-13 Harmonic and Inter harmonics • IEC 61000-4-14 Voltage Fluctuation Immunity • IEC 61000-4-17 DC Ripple Immunity

EMI/EMC Facility meets Automotive & Medical Standards

Automotive Standards

Emissions	Immunity
• CISPR 12	• ISO 11451-2
• CISPR 25	• ISO 11451-4
• AIS-004 (Part 3)	• ISO 11452-2
• ECE R- 10.05	• ISO 11452-4
	• ISO 11452-9
	• AIS-004 (Part 3, Annex 4 & 7)
	• ISO 10605
	• SAE J1113-4
	• SAE J1113-13
	• SAE J1113 - 21

Medical Standards

IEC 60601-1-2	Test Standard
• Conducted Emission	• CISPR 11
• Radiated Emission	• CISPR 11
• Harmonics Emissions	• IEC 61000-3-2
• Voltage Fluctuations and Flicker	• IEC 61000-3-3
• ESD(air: ±15kV, Contact: ±8kV)	• IEC 61000-4-2
• Radiated Immunity, 10V/m, 80MHz to 2.7GHz as per Table 9	• IEC 61000-4-3
• EFT(± 2kV)	• IEC 61000-4-4
• Surge(± 2kV)	• IEC 61000-4-5
• Conducted immunity, 3V, 150kHz to 80MHz	• IEC 61000-4-6

EMI/EMC Facility meets MIL Standards

MIL Standards (Defence and Aerospace)

Emissions	Immunity
MIL-STD-461 C	**MIL-STD-461 C**
• CE01	• CS01
• CE03	• CS02
• RE01	• CS03 /04 /05
• RE02	• CS06
• RE03	• RS01
	• RS02
	• RS03
	• RS05
MIL-STD-461D/E/F/G	**MIL-STD-461D/E/F/G**
• CE101	• CS101
• CE102	• CS103 /104/ 105
• CE106	• CS114
• RE101	• CS115
• RE102	• CS116
• RE103	• CS106
	• RS101
	• RS103
	• RS105

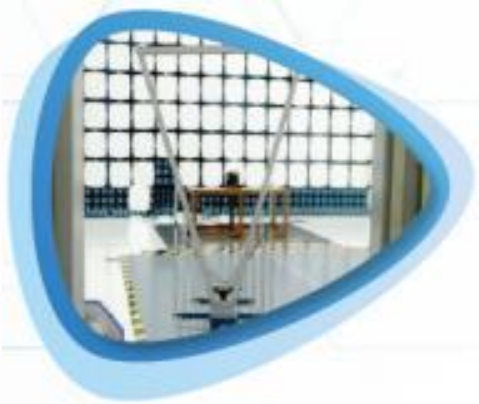
RTCA DO-160 & MIL 704

RTCA DO-160	Power Group
• Section 20 Radiated Susceptibility Conducted Susceptibility • Section 21 Radiated Emission Conducted Emission • Section 25 Electrostatic Discharge	• Single Phase, 400Hz, 115V • Three Phase, 400Hz, 115V • Single Phase, Variable Frequency, 115V • Three Phase, Variable Frequency, 115V • Single Phase, 60Hz, 115V • Low Voltage DC (28VDC) • High Voltage DC (270VDC)

EMI/EMC Facility meets Railway Standards and Shielding Effectiveness

Railway Standards

RDSO Standards	Application
• BS EN 50121-3-2-2015	• Rolling Stock - Apparatus
• BS EN 50121-4	• Signalling and Telecommunications Apparatus
• BS EN 50121-5	• Fixed power supply installations and Apparatus
• BS EN 50155	• Electronic equipment used on rolling stock
• IEC60571	• Electronic equipment used on rolling stock
• IEC62236-3-2	• Rolling Stock – Apparatus
• IEC62236-4	• Signalling and Telecommunications Apparatus
• IEC62236-5	• Fixed power supply installations and Apparatus

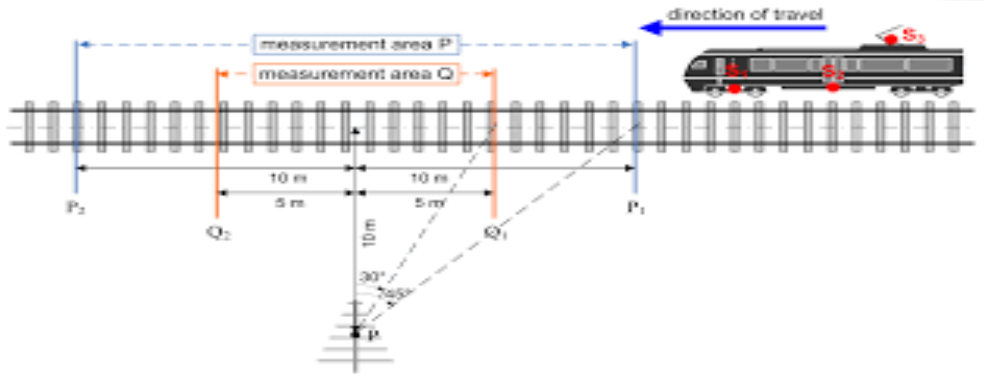


Laboratory Testing - Shielding Effectiveness

- Shielding Effectiveness test as per IEE 299, IEEE 299-1, Mil 188-125-2
- Frequency Range: 10kHz to 40GHz
- Dynamic Range: 120dB

ONSITE EMI/EMC measurements

- TASL gives opportunity to have product EMC tested at your **own location** for very large appliance, or equipment with special demands for external provisions, which are impossible to provide in a laboratory
- Provide the NABL test report for your product
- Either it is Metro Coach Testing in Track, Electric Bus Testing, Military Containers, etc. at your facility

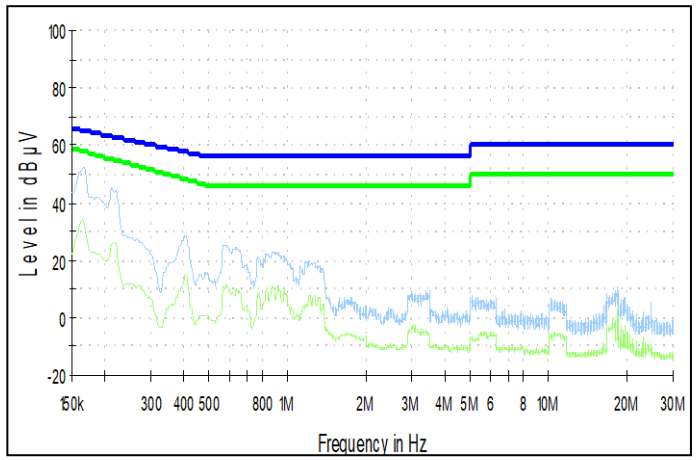


Onsite EMI/EMC measurements for Rolling stocks and Signalling systems

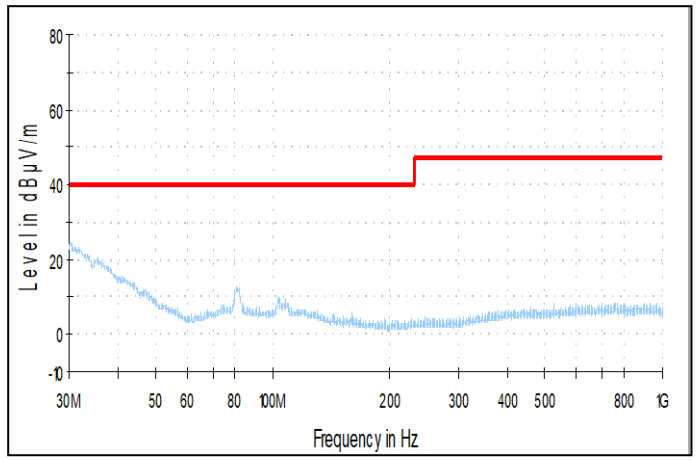
- The Test services division of TATA Advanced Systems is a pioneer in EMC testing specific for the railway industry.
- We are capable of measuring and monitoring electromagnetic emissions (conducted, induced or radiated) according to the major standards, including EN 50121, EN 50238, EN 45502, EN 50155, EN 50500, EN 50592, EN 61000 etc.
- We carryout Major Outstation/Onsite testing for Rolling Stocks, Signalling Systems as per the standards as well as host one the biggest EMI EMC Chamber in India

- The Scope of our major onsite tests for EMI/EMC for Rolling stocks and at Stations are as under
  - Radio Frequency Interference Test (Radiated Emission)
  - Audio Frequency Track Circuit Test / Psophometric Current
  - Conducted Emission
  - Line current harmonics test
  - Human exposure Test
  - Immunity test for electrostatic discharges
  - Intra system compatibility
  - Axle Counter Testing
  - Wayside tests
  - Cartography survey Tests.

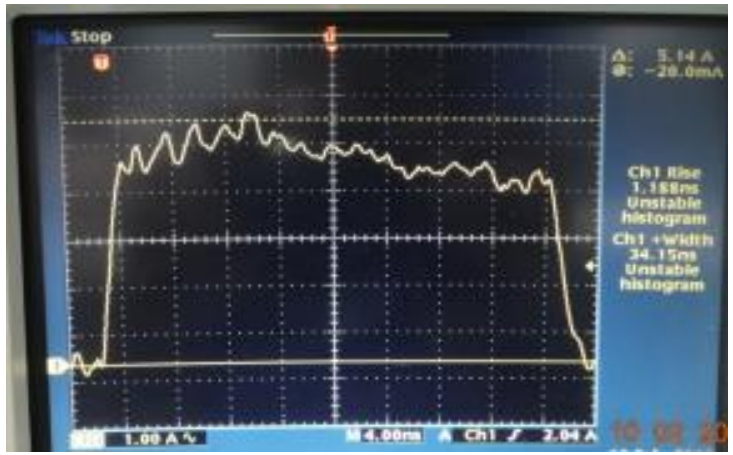
Sample EMC test results



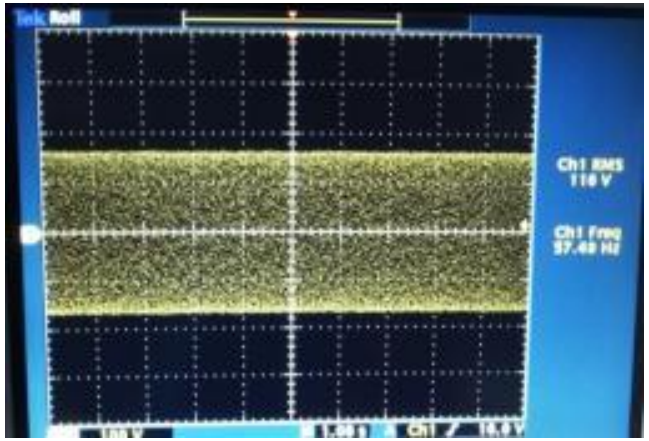
Conducted Emission



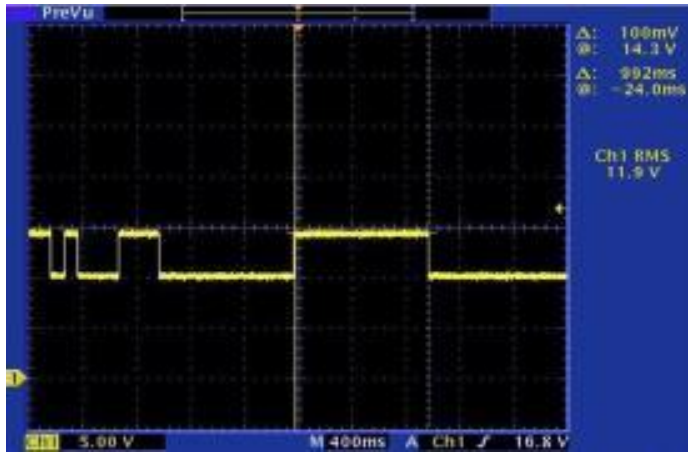
Radiated Emission



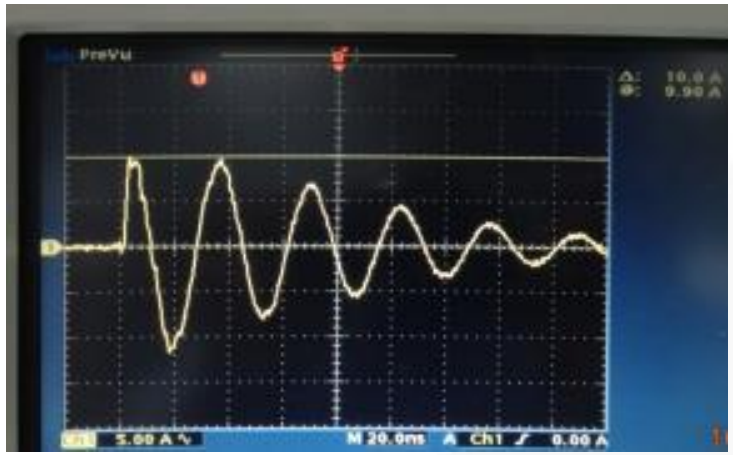
Conducted Susceptibility



Frequency Variation test



Voltage Dips test



Damped Sinusoidal Transients

TATA AEROSPACE & DEFENCE

Walkthrough | Agenda

About Tata Group and Tata Aerospace & Defence

EMI/EMC Testing Capabilities

- Telecom & Multimedia Equipment
- Automotive Sector
- Railways
- Household Appliances
- Medical Equipment
- Defense & Aerospace Requirements

RF Testing Capabilities

- IoT & Bluetooth Devices
- Cellular Devices
- Base station

Environmental Testing Capabilities

Power Supply Quality Testing Capabilities

Certification of the facility & Customer

RF Test Service

- *Operating Frequency ,*
- *Transmitter Max output power,*
- *T x & Rx Out of band Emission,*
- *Tx & Rx Spurious Emission ,*
- *Frequency and Phase Error,*
- *Reference sensitivity level ,*
- *Adjacent channel Rejection ,*
- *Receiver blocking,*
- *Receiver sensitivity*
- *Antenna Patten*
- *Adaptivity*
- *Hopping Frequency*
- *Power Spectral Density*
- *Occupied Channel Bandwidth ,*

RF Test product addressed

WIRELESS TEST FACILITY

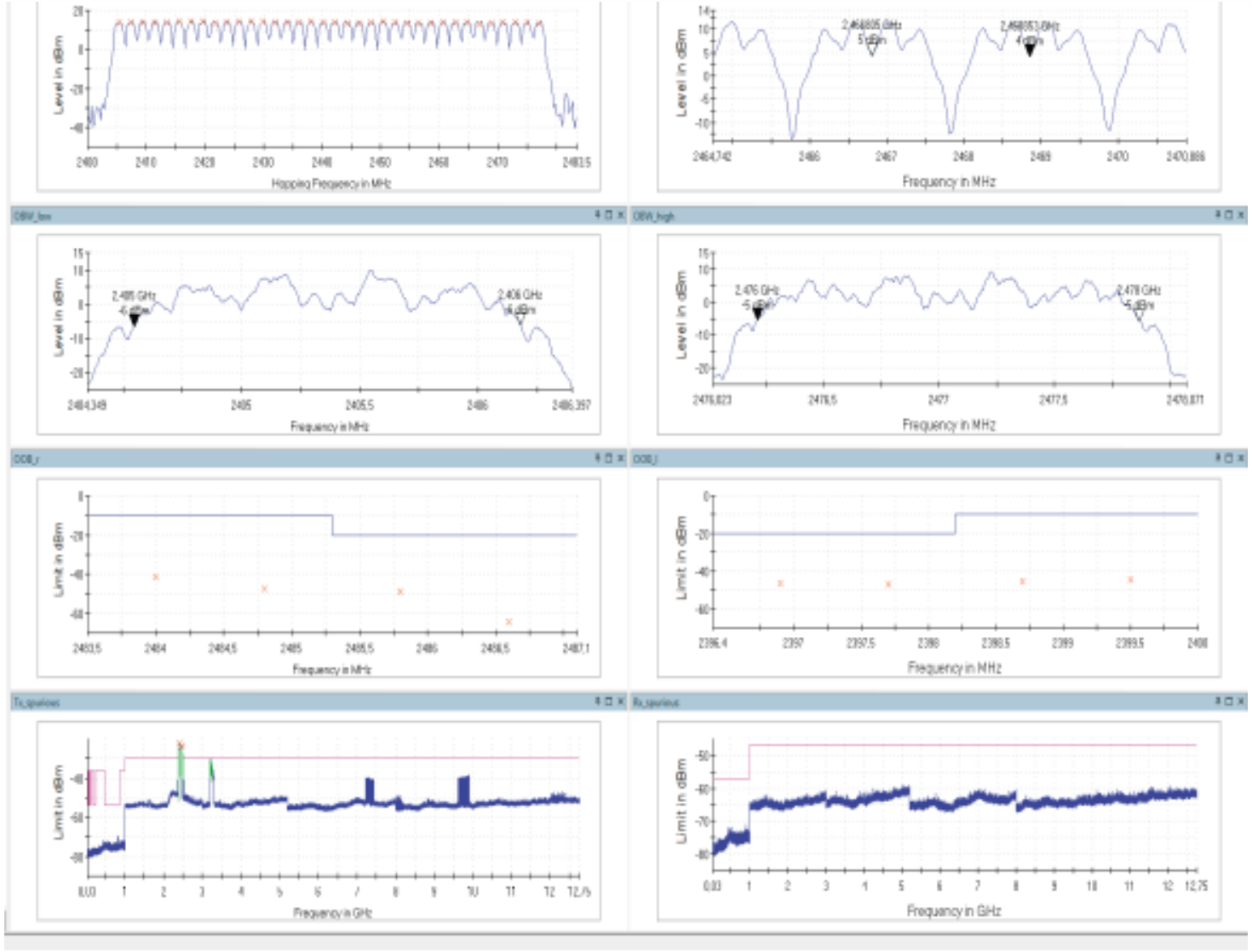
ETSI EN 300 328
ETSI EN 301 893
ETSI EN 302 502
ETSI EN 300 440
ETSI EN 300 220
ETSI EN 300 330
ETSI EN 301 893
ETSI EN 302 502

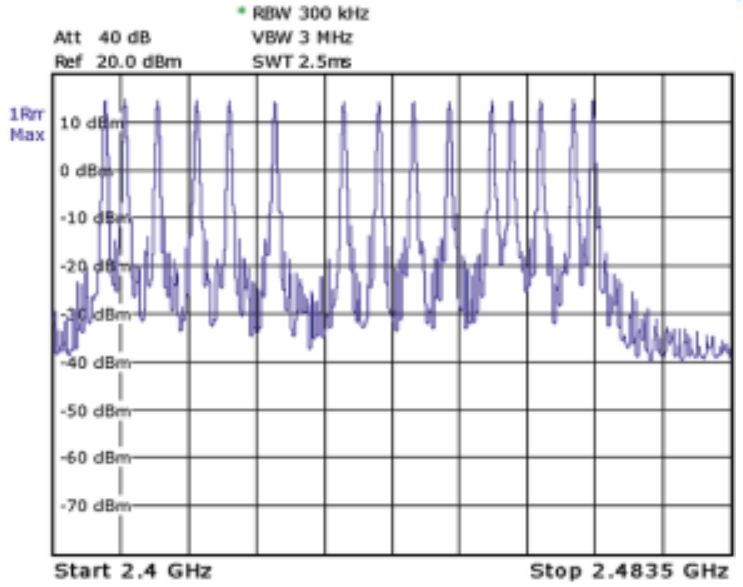
Bluetooth
Wi Fi
ZigBee
LoRa
sigfox

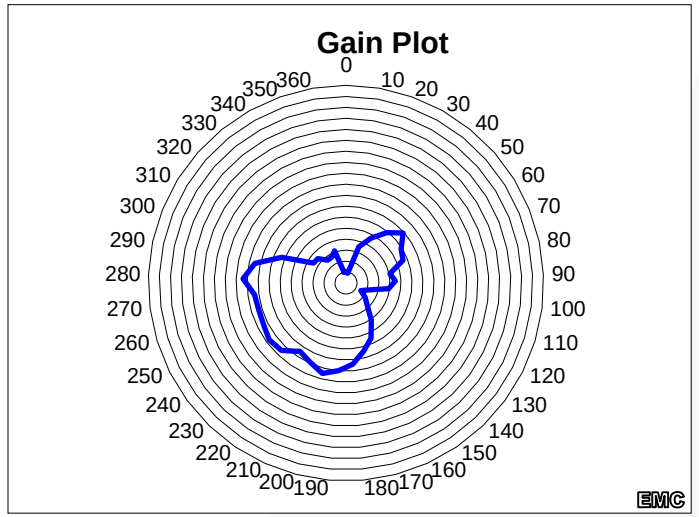
NABL
WPC
WIRELESS PLANNING & COORDINATION CERTIFICATION
ilac-MRA

TATA AEROSPACE & DEFENCE

Sample RF test results

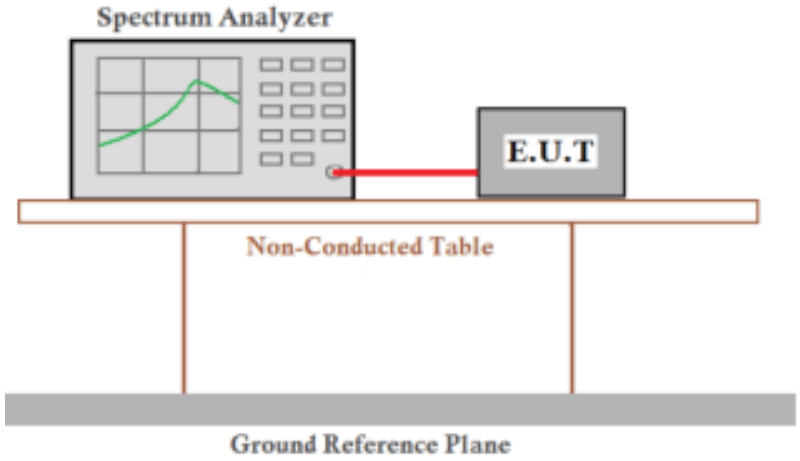




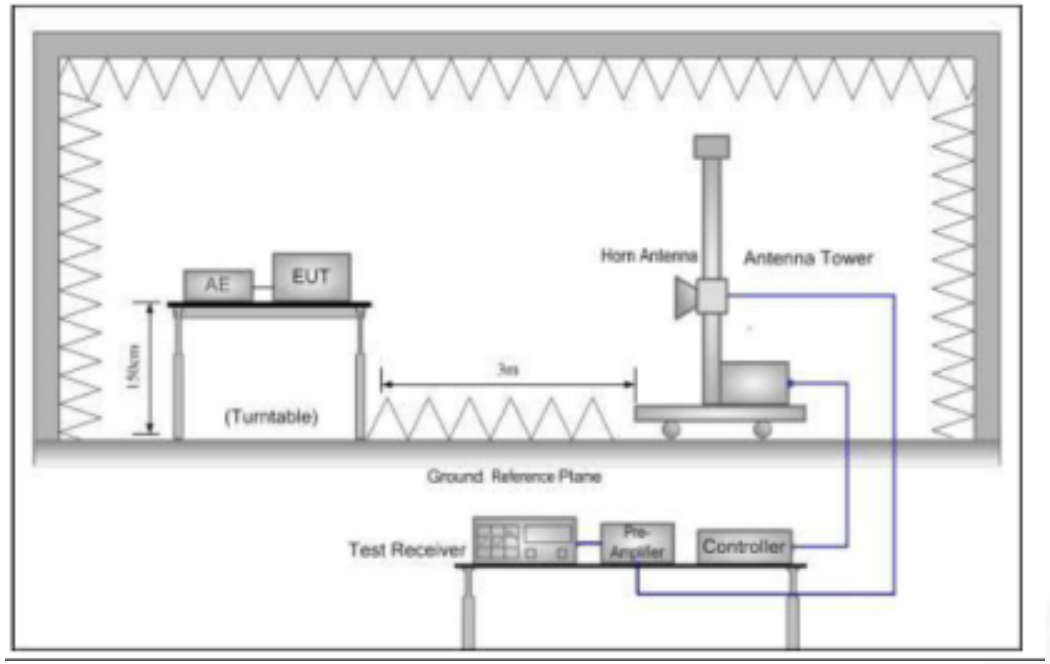


RF Test Set up

RF Conducted Test Setup



RF Radiated Test Setup



*EUT- Equipment Under Test (Base station, Microwave nodes, Mobiles, routers etc.)

Supported Devices

Automotive

Industrial

IoT M2M

Telehealth

Security & Surveillances

Smart Meters

Communication Modules

Smart Lighting Controller

Home appliances

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  - Base station
- **Environmental Testing Capabilities**
- Power Supply Quality Testing Capabilities
- Certification of the facility & Customer

Environmental Test Service

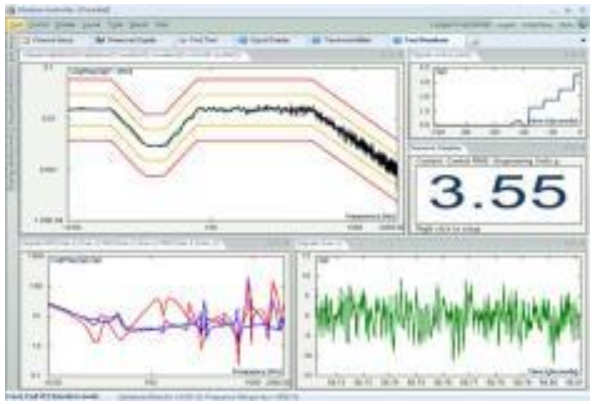
➢ Dynamic Tests

- Vibration
- Bump
- Drop
- Shock
- Acceleration

➢ Climatic Tests

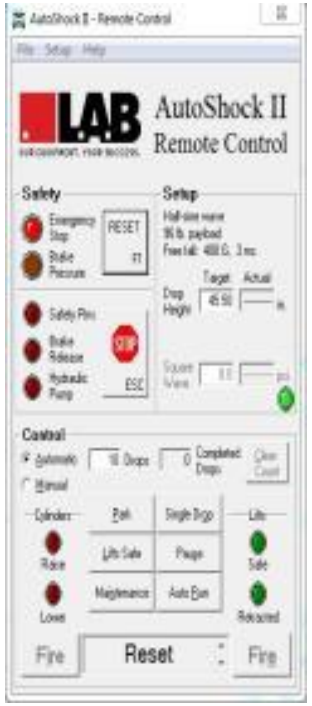
- Low temperature Test
- High temperature test
- Damp heat test, humidity test
- Altitude Test
- Temperature Cycling Test
- Thermal shock
- Dust Test
- Rain Test
- Salt Corrosion
- Tropical exposure

Dynamic Tests - Vibration

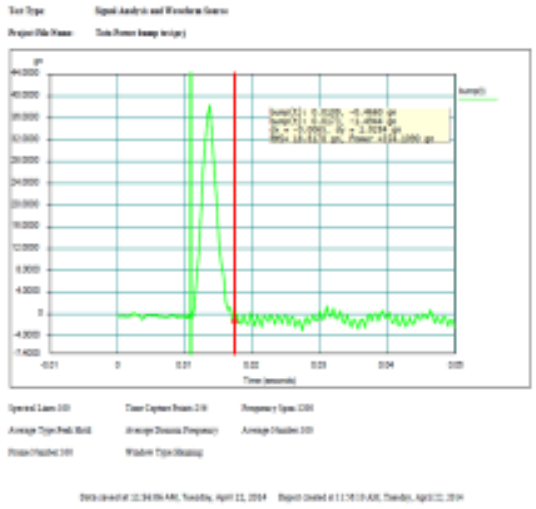


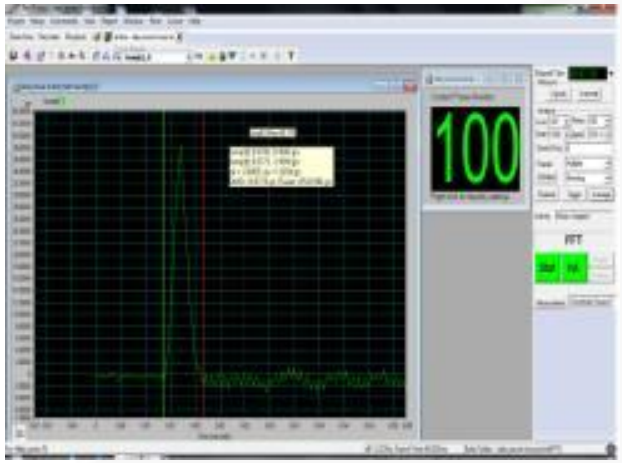
- Capacity : 3500 KGF with 50mm Displacement, 1.8m/s Velocity and 110g Acceleration
- Range: DC to 2500 Hz
- Test profiles: Sine, RSTD, Random, Shock

Dynamic Tests - Bump



- **Maximum Velocity**: 6.5 m/s
- **Pulse duration** : 3 to 40 ms
- **Acceleration** : 10 to 500g
- **Table Size**: 1000 x 1000 mm
- **Load bearing capacity**: 600Kg
- **Test profiles** : Half Sine, Saw tooth, trapezoidal, square wave forms MIL 810G, JSSS 55555, IEC 60068, IS 9000, IS 10236



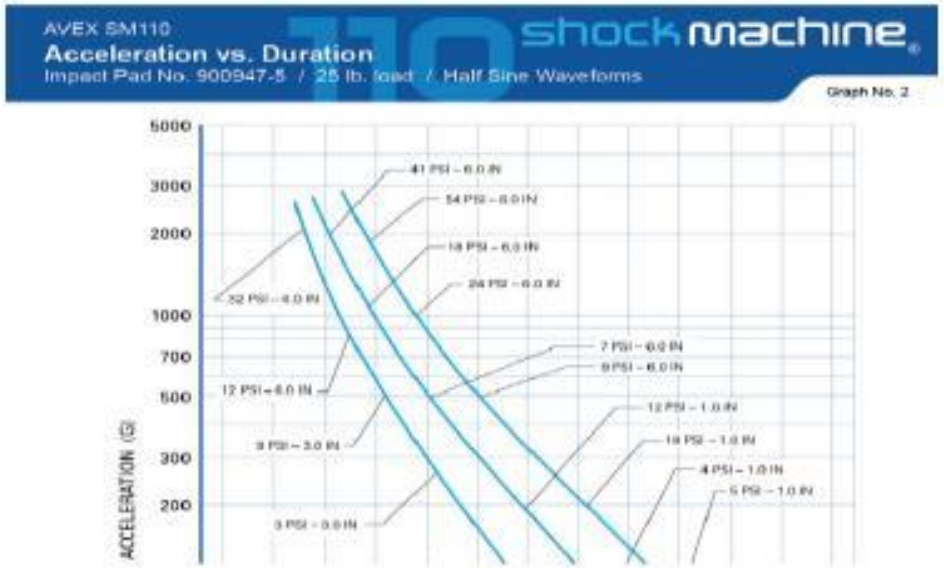


Dynamic Tests - Drop

SPECIFICATION

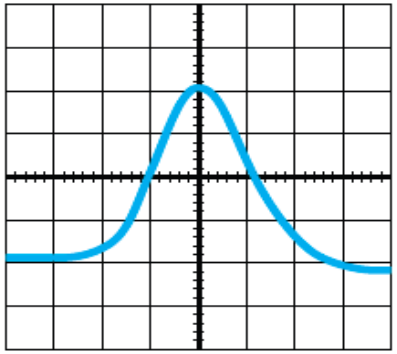
- Up to 1.5-meter Height
- Platform MS plate wet floated
- Wooden
- Sand
- Standard MIL 810G , JSS 55555,IS, &QM 333

Dynamic Tests - Shock

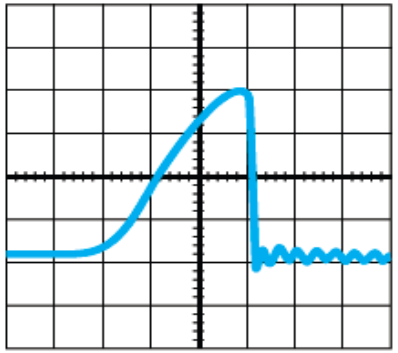


Specific shock generator data available

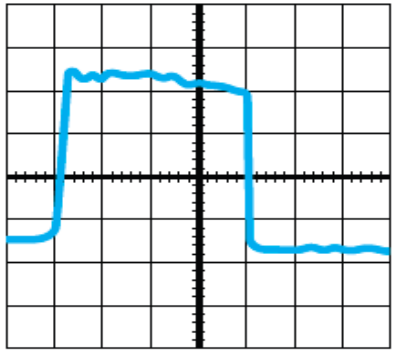
Half Sine Wave Pulse



Sawtooth Wave Pulse



Square Wave Pulse



SPECIFICATIONS

- **Stroke** - 17 in. max
- **Specimen Weight** :200 lb
- **Carriage Size** – 16 in by 16 in

Dynamic Tests - Acceleration

SPECIFICATIONS

- Acceleration range : 5 to 35 g
- Payloads up to 20Kg
- Test Methods: JSS 55555 & MIL 810 G

Climatic Tests

- **Ramp Rate**: Up to 10ºC/min & comply with ESS test methods
- **Test Volume**: 600 Litres to 1500 Litres and walkin chamber of $2m^3$
- **Type of tests** : Low Temperature, High Temperature, Damp heat, Temperature cycling Thermal Shock , Altitude tests

Cyclic Salt Corrosion test

- **Make:** Ascott
- **COO :** UK
- **Capacity:** 2000 liters
- **Temperature range :** Ambient to +60°C
- **Humidity Range:** 95% - 100% RH
- **Test profiles:** Wet, Dry, Salt spray, CH Mode
- **Compliance with:** ASTM, MIL 810G, JSSS 55555, IEC 60068, IS 9000, IS 10236

Rain test

chamber 5mx5mx15m
JSS 55555
Rain fall rate: 250mm/hour
Static Pressure: 200 Kpa

15mx5mx15m(LXWXH)
JSS55555
250mm/hr
Static Pressure:200 Kpa

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Power Supply Quality Testing Capabilities

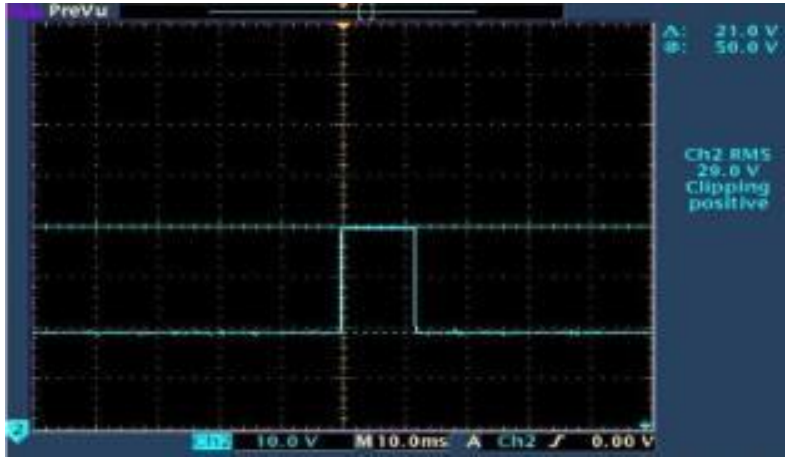
Certification of the facility& Customer

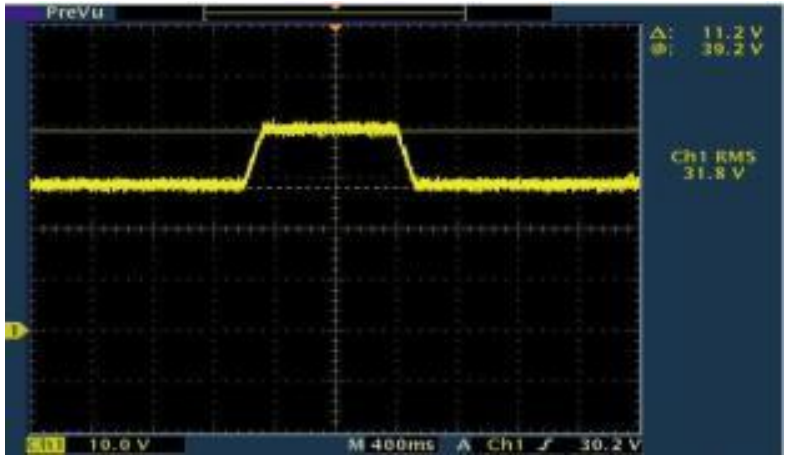
Power Supply Quality Test Service

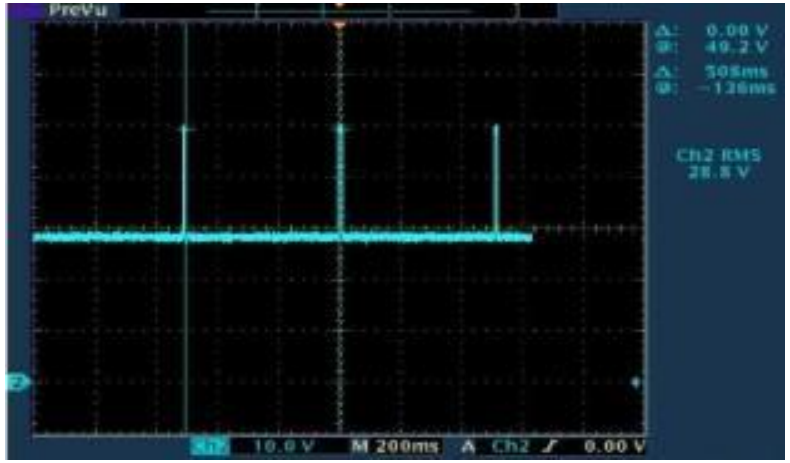
- **Make:** California Instruments
- **Capacity**: 3000 watts
- Max : 500V

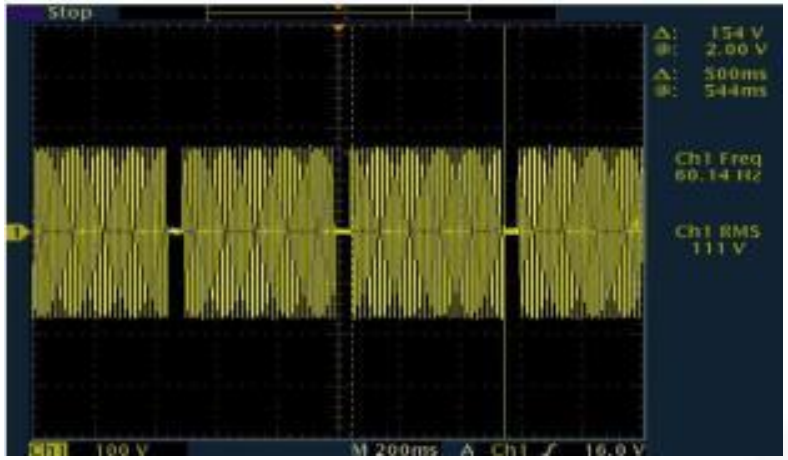
- Total Ripple
- Transient voltage
- Phase reversal
- Steady state Voltage
- Power failure
- Voltage distortion

Sample Power supply quality test results









Walkthrough | Agenda

About Tata Group and Tata Aerospace & Defence

EMI/EMC Testing Capabilities

- Telecom & Multimedia Equipment
- Automotive Sector
- Railways
- Household Appliances
- Medical Equipment
- Defense & Aerospace Requirements

RF Testing Capabilities

- IoT & Bluetooth Devices
- Cellular Devices
- Base station

Environmental Testing Capabilities

Power Supply Quality Testing Capabilities

Certification of the facility & Customers

Major Accreditations

Certificate of Accreditation by NABL

National Accreditation Board for Testing and Calibration Laboratories

NABL

CERTIFICATE OF ACCREDITATION

TATA ADVANCED SYSTEMS LIMITED

has been assessed and accredited in accordance with the standard

ISO/IEC 17025:2017

"General Requirements for the Competence of Testing & Calibration Laboratories"

for its facilities at

42-43 HOSUR ROAD, ELECTRONIC CITY, BENGALURU, BENGALURU URBAN, KARNATAKA, INDIA

in the field of

TESTING

Certificate Number: TC-5228

Issue Date: 05/02/2021 Valid Until: 12/12/2022

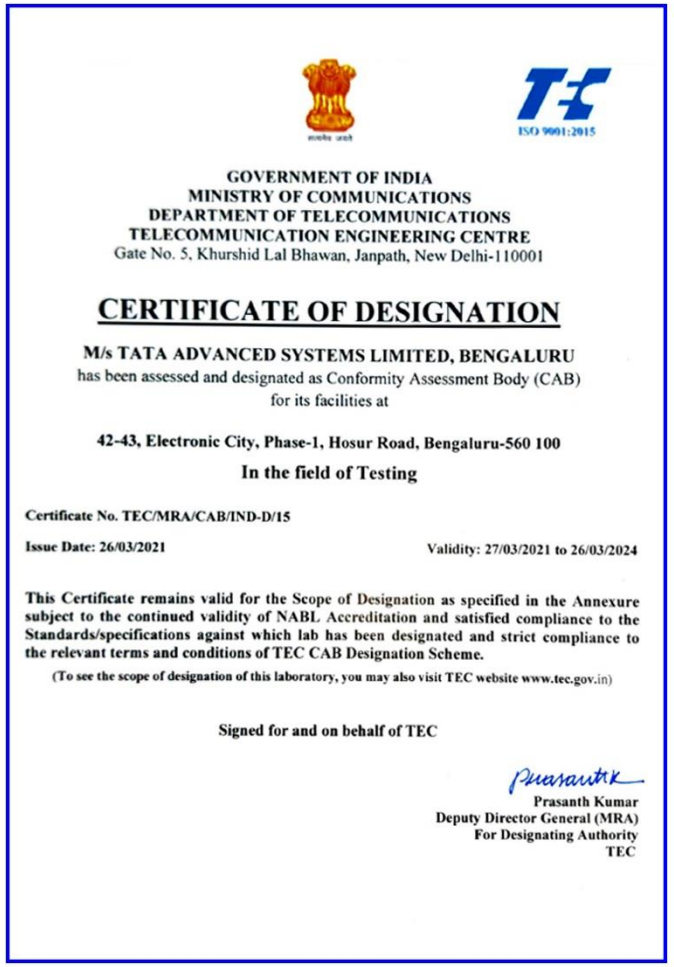
This certificate remains valid for the Scope of Accreditation as specified in the annexure subject to continued satisfactory compliance to the above standard & the relevant requirements of NABL.
(To see the scope of accreditation of this laboratory, you may also visit NABL website www.nabl-india.org)

Name of Legal Identity : TATA Advanced Systems Limited

Signed for and on behalf of NABL

N. Venkateswaran
Chief Executive Officer

Certificate of Designation by TEC, Dept of Telecommunications



ISO 9001:2015

GOVERNMENT OF INDIA
MINISTRY OF COMMUNICATIONS
DEPARTMENT OF TELECOMMUNICATIONS
TELECOMMUNICATION ENGINEERING CENTRE
Gate No. 5, Khurshid Lal Bhawan, Janpath, New Delhi-110001

CERTIFICATE OF DESIGNATION

M/s TATA ADVANCED SYSTEMS LIMITED, BENGALURU
has been assessed and designated as Conformity Assessment Body (CAB)
for its facilities at

42-43, Electronic City, Phase-1, Hosur Road, Bengaluru-560 100

In the field of Testing

Certificate No. TEC/MRA/CAB/IND-D/15

Issue Date: 26/03/2021 Validity: 27/03/2021 to 26/03/2024

This Certificate remains valid for the Scope of Designation as specified in the Annexure subject to the continued validity of NABL Accreditation and satisfied compliance to the Standards/specifications against which lab has been designated and strict compliance to the relevant terms and conditions of TEC CAB Designation Scheme.

(To see the scope of designation of this laboratory, you may also visit TEC website www.tec.gov.in)

Signed for and on behalf of TEC

Prasanth Kumar
Deputy Director General (MRA)
For Designating Authority
TEC

Certificate by TEC as CAB, Dept of Telecommunications

ISO 9001:2015

GOVERNMENT OF INDIA
MINISTRY OF COMMUNICATIONS
DEPARTMENT OF TELECOMMUNICATIONS
TELECOMMUNICATION ENGINEERING CENTRE
Gate No. 5, Khurshid Lal Bhawan, Janpath, New Delhi - 110 001

CERTIFICATE OF DESIGNATION

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for its facilities at

42-43, Electronic City, Phase-1, Hosur Road, Bengaluru-560 100

In the field of Testing

Certificate No. TEC/MRA/CAB/IND-D/15-I

Issue Date: 21/07/2022 Valid Until: 20/07/2025

This Certificate remains valid for the Scope of Designation as specified in the Annexure subject to the continued validity of NABL Accreditation and satisfied compliance to the Standards/specifications against which lab has been designated and strict compliance to the relevant terms and conditions of TEC CAB Designation Scheme.

(To see the scope of designation of this laboratory, you may also visit TEC website www.tec.gov.in)

Signed for and on behalf of TEC

Prasanth Kumar
Deputy Director General (MTCTE)
For Designating Authority
TEC

Test Catering to wide range of Customers across Industries
(As per Military, IEEE, Automotive, DO160, Railways, & Telecom Standards accredited by M/s NABL)

Defense & Aerospace Requirements	Communication Electronic (CE) & Non-CE equipment
Telecom Equipment (Incl TEC) (MTCTE)	All telecom equipment as per Indian Telegraph Rules- 2017
Automotive Sector	New tech/regulations for Automotive sub-systems, Power systems etc governed by ARAI
Household Appliances	Household Appliances, Electric tools and similar apparatus
Railways	Equipments for railways as per RDSO guidelines
Medical Equipment	Medical devices per requirements within EMC Directives, including particular IEC standards.

Standards

CISPR, FCC, IEC, RDSO, CE, ARAI, ISO, Mil Std 461

250+ customers served globally in different Sectors

Leadership with Trust

Since 1868

Thank You