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TEST / CALIBRATION REPORT

EMC / EMI Test Report
for
MECO Power Line Transducer

Testing as per BS EN 61326 (1998)

ELECTRONICS REGIONAL TEST LABORATORY (WEST)

MINISTRY OF COMMUNICATIONS & INFORMATION TECHNOLOGY, (STQC Dte.)

Government of India

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MEMORANDUM

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2. The report shall not be regarded in any way diminishing the normal contractual responsibilities / obligations between the customer and **ERTL (W).**

3. The result reported in this report are valid only at the time of and under the stated conditions of the measurements.

ELECTRONICS REGIONAL TEST LABORATORY (WEST) MINISTRY OF I.T. AND COMMUNICATIONS (STQC DTE)	REPORT NO. ERTL(W)/ 2002EMI 149		
SUBJECT: EMC TEST ON POWER LINE TRANSDUCER	DATE 14 AUG 2002	PAGE 1	OF 14

1. **SCOPE**

1.1 Service Request No :ERTL(W)/2002 0994

1.1.1 Service Request finalised on : 23 MAY 2002

1.2 Requested by
(Name and address of manufacturer) :MECO INSTRUMENTS PVT. LTD,
301, BHARAT INDUSTRIAL ESTATE,
T.J. ROAD, SEWREE,
MUMBAI 400 015

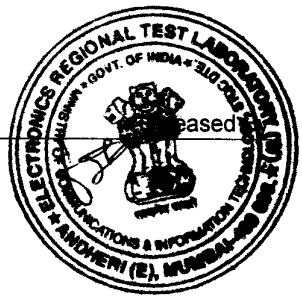
1.3	Item No.	Description	Qty	Manufacturer and Type No.	Serial Nos
	1.	POWER LINE TRANSDUCER	01	MECO/ WT34	-----

1.4 Test specifications BS EN 61326 - 1998

1.5 Lab Ambient Temperature : (25 +_2) deg.C
Humidity : (55 +_5) % RH

1.6 Test Equipment used :

1. EMI/003 : ESD Simulator (Schaffner, NSG 432)
2. EMI/015 : Antenna Kit (EMCO, 1080) for R.E. test
3. EMI/033 : EFT Simulator (EM-Test, EFT-800)
4. EMI/034 : RS Chamber (Keytek, G-Strip)
5. EMI/036 : RF Signal Generator (HP, 8648 A) for C.S and R.S. tests
6. EMI/037 : RF Amplifier (AR, 25A100) for R.S test
7. CPU/064 : EMI System (HP,8648 B) for CE and RE tests
8. EMI/038 : C D N (Keytek) for C.S test
9. EMI/044 : Immunity Test System(EM-Test, UCS 500 M6) for Surge test



2.0 EQUIPMENT UNDER TEST (EUT)

2.1 Description

WT 34 type Active and Reactive power transducers measure power in 1 Phase, 3 Phase three wire and 3 Phase four wire in balanced or unbalanced electrical systems and converts it to an industry standard O/P signal which is directly proportional to the measured I/P. These Transducers provide an O/P which is load independent and isolated from the I/P. These transducers can measure both Import and Export of Power. The O/P can be connected to Controllers, Data loggers, PLCs , Anaog/Digital indicators, Recorders for display , analysis and control. They are ideal for SCADA energy management, Telemetering,for Remote local as well as Central Monitoring stations.

2.2 Operating modes during emissions and immunity testing

Emission testing was carried out on 230VAC Auxiliary supply. During measurement, the three phase I/Ps were energized by 110 VAC supply and carrying a current of 1 A.

Immunity tests were carried out on both 230VAC Auxiliary and 110 VAC 3 phase supply. The 3 Phase supply was loaded with 1 A bulb load. The 20 mA current O/P was monitored.

2.3 Functional check for immunity tests

Variation in reading shall be less than $\pm$ 0.5 % of full span

2.4 Performance Criteria

Criterion A : During testing Normal performance within specification limits.

Criterion B : During testing, temporary degradation, or loss of function or performance which is self recoverable.

Criterion C : During testing, temporary degradation, or loss of function or performance which is recoverable by operator intervention or system reset.

3.1 CONDUCTED EMISSION

Test Rationale : To measure emissions of the EUT* (referenced to Earth) on Power Mains and to compare them with specified limits to ascertain that the EUT will not disturb other equipment by generating such emissions above a certain limit

a) Test Condition

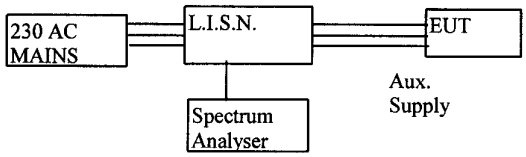
Set-up	As per CISPR 22
Measurement Range	150 kHz – 30 MHz
Measurement On	Auxiliary Supply
Line Voltage	230 V
Line Frequency	50 Hz
Length of mains	1 m

EUT in normal operating condition as per Sr. No. 2.2

b) Reciever

Bandwidth	9 KHz
Detectors	Quasi – peak and Average
Configuration	Conforming to CISPR 16

c) Test procedure



EUT supplied with required Auxiliary voltage through an LISN. Emission of the EUT were measured with a Spectrum Analyser.

d Requirements

EUT emissions shall be below following Class 'B' limits

Freq. (MHz)	Limits (dBuV)	
	Quasi-Peak	Average
0.15-0.5	66-56	56-46
0.5-5	56	46
5-30	60	50

e Observations

Pl. see Graph at page 14 of 14

f Results

Complies with Class 'B' Limits

Tested By

* EUT : Equipment Under Test

3.2 RADIATED EMISSION

Test Rationale :

To measure emissions of the EUT radiated into space and to compare them with specified limits to ascertain that the EUT will not disturb other equipment by generating such emissions above a certain limit.

a) Test Condition :

Set-up	As per CISPR 22
Frequency Range	30 MHz – 1000MHz

EUT in normal operating condition as per Sr. No. 2.2

b) Reciever :

Bandwidth	120 KHz
Detectors	QP
Antenna	Bi-Conical (For 30 – 200 MHz) Log-Periodic (For 200 – 1000 MHz)
Configuration	Conforming to CISPR 16

c) Test procedure

- Emission measurements were carried out in an Open Area Test Site (OATS)
- Ambient measurements carried out first with EUT "off" and peaks noted
- EUT was switched "ON" and Emission peaks noted.
- Antenna height and position were changed to maximize Emissions.
- A table of Emission and corresponding Ambients was then drawn up.
- "Ambient" and "Emission" peaks were compared. Peaks with a difference of less than 5 dB were discarded.

d) Requirements

EUT emissions shall be below following limits

Freq. (MHz)	Limits (dBuV/m) QP
30-230	40.45
230-1000	47.45

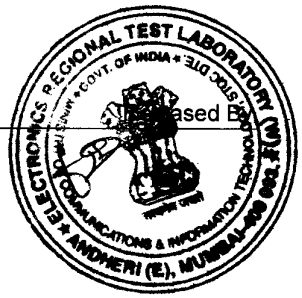
e) Observations

Maximum Emissions were obtained from front portion of EUT in Horizontal Polarisation and Antenna ht of 1 m

Pl. see Table at page of for details

f) Results

Complies with Class 'B' limits



3.3 RADIATED SUSCEPTIBILITY (RS) (Amplitude Modulated)

Test Rationale

To check immunity characteristics of the EUT in the presence of radiated fields generated by intentional emitters like Radio /TV transmitters, wireless equipment and the like by illuminating the EUT by such frequency

a Test Condition :

Set-up	As per IEC 61000-4-3
Frequency Range	80 MHz – 1000MHz
Modulation	80 % AM @ 1 kHz
Amplitude	10V/m
Simulation	Using G-Strip RF immunity chamber

EUT in normal operating condition as per Sr. No. 2.2

c Test procedure

EUT was illuminated with the required field strength inside the test chamber, and operation was monitored.

d Requirements

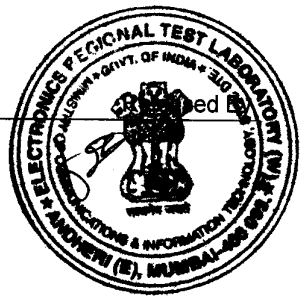
Operation of the EUT shall be normal as per Sr. No. 2.3 during and after the test.
Performance Criterion : 'A'

e Observations

Operation of the EUT was normal as per Sr. No. 2.3 during and after the test. No variation in O/P current could be observed

f Results

Complies with Criterion 'A'



3.4 ELECTROSTATIC DISCHARGE (ESD)

Test Rationale :

To check immunity characteristics of the EUT against Discharge of Static Electricity that may occur when a charged operator touches the EUT.

a Test Condition :

Set-up	As per IEC 61000-4-2
Mode of simulation:	Contact Discharge on conductive surfaces Air Discharge on non- conductive surfaces
Test Voltage:	Contact Discharge: 4kV Air Discharge: 8kV
No. of Discharges	10
Polarity	Positive and Negative
Points of Discharge	**Contact Discharge** Maintenance screws **Air Discharge :** EUT body
Simulation	Using ESD Gun

EUT in normal operating condition as per Sr. No. 2.2

c Test procedure :

- EUT initially subjected to indirect discharge on VCP and HCP.
- EUT was then screened in continuous discharge mode.
- At susceptible points, ten single discharges were applied.

d Requirement :

Operation of the EUT shall be normal as per Sr. No. 2.3 after the test.
Performance Criterion : 'B'

e Observations :

Operation of the EUT was normal as per Sr. No. 2.3 during and after the test. No variation in O/P current could be observed

f Results :

Air Discharge : Complies with Criterion 'A'
Contact Discharge : Complies with Criterion 'A'

3.5 ELECTRICAL FAST TRANSIENTS (EFT)

Test Rationale :

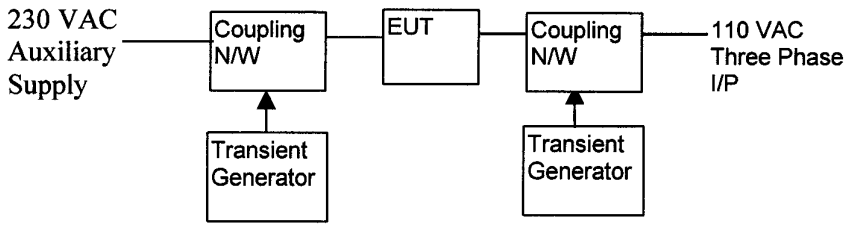
To check immunity characteristics of the EUT against transients generated by inductive load switching, Relay contact bouncing, switching of high voltage switchgear and the like

a Test Condition :

Set-up	As per IEC 61000-4-4
Pulse	5/50 nSec
Modes	Common and Differential
Pulse Amplitude	2 kV
Pulse Rep. Rate	5 kHz
Polarity	Positive and Negative
Duration of test in each mode	60 s
Simulation	On 230 VAC Auxiliary and 110V Three Phase I/P by Direct Injection

EUT in normal operating condition as per Sr. No. 2.2.

c Test procedure :



- Transients generated by the generator were coupled to the 230 VAC Auxiliary Supply through a coupling N/W
- The level was stepped up from minimum to the specified severity in steps of 0.5 kV to determine threshold of failure.
- The test was repeated on 110 VAC Three Phase I/P lines

d Requirements :

Operation of the EUT shall be normal as per Sr. No. 2.3 after the test.
Performance Criterion : 'B'

e Observations :

Simulation on Auxiliary Supply :Operation of the EUT was normal as per Sr. No. 2.3 during and after the test.. No variation in O/P current could be observed
Simulation on Three phase I/P: Operation of the EUT was normal as per Sr. No. 2.3 during and after the test. No variation in O/P current could be observed

f Results :

Auxiliary Supply : Complies with Criterion 'A'
Three phase I/P: Complies with Criterion 'A'

Reviewed By

3.6 CONDUCTED RF SUSCEPTIBILITY

Test Rationale :

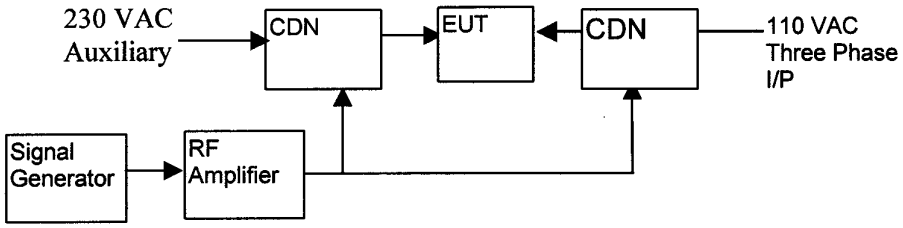
To study immunity characteristics of the EUT when subjected to continuous conducted Noise.

a Test Condition :

Set-up	As per IEC 61000-4-6
Frequency	150 kHz – 100MHz
Modulation	80 % AM @ 1 kHz
Amplitude	3V
Simulation	On 230 VAC Auxiliary and 110V Three Phase I/P Using CDN

EUT in normal operating condition as per Sr. No. 2.2

c Test procedure :



- The required simulation signal was generated by the Signal Generator and the Amplifier
- It was then coupled onto 230 VAC Auxiliary supply using CDN and operation of EUT was monitored
- The test was repeated on 110VAC Three Phase I/P lines.

d Requirements :

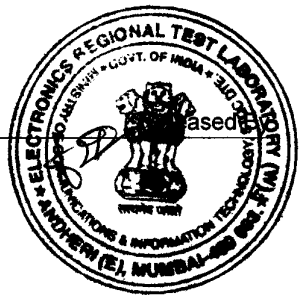
Operation of the EUT shall be normal as per Sr. No. 2.3 after the test.
Performance Criterion : 'A'

e Observations :

Simulation on Auxiliary Supply :Operation of the EUT was normal as per Sr. No. 2.3 during and after the test.. No variation in O/P current could be observed
Simulation on Three phase I/P: Operation of the EUT was normal as per Sr. No. 2.3 during and after the test. No variation in O/P current could be observed

f Results :

Auxiliary Supply : Complies with Criterion 'A'
Three phase I/P: Complies with Criterion 'A'



3.7 SURGE

Test Rationale :

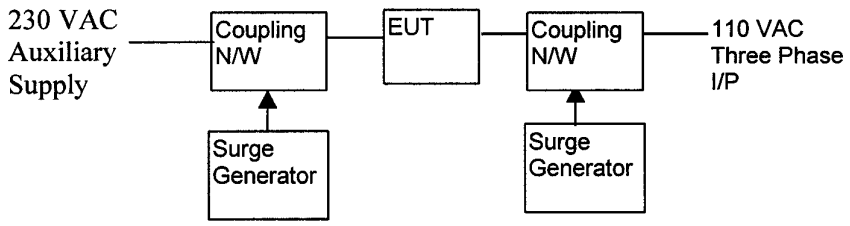
To check immunity characteristics of the EUT against Surges generated because of Capacitive Bank Switching, Faults, Lightning and the like.

a Test Condition :

Set-up	As per IEC 61000-4-5
Pulse	1.2 / 50 uS
Modes	Common (Line to Ground) and Differential (Line to Line)
Pulse Amplitude	Common Mode : 2 kV Differential Mode : 1kV
Polarity	Positive and Negative
No. of transients	Five in each mode
Simulation	On 230 VAC Auxiliary and 110V Three Phase I/P by Direct Injection

EUT in normal operating condition as per Sr. No. 2.2

c Test procedure :



- Surges generated by the generator were coupled to the mains and I/O through respective coupling N/Ws.
- The level was stepped up from minimum to the specified severity in steps of 0.5 kV to determine threshold of failure.
- The test was repeated on 110 VAC Three Phase I/P lines

d Requirements :

Operation of the EUT shall be normal as per Sr. No. 2.3 after the test.
Performance Criterion : 'B'

e Observations :

Simulation on Auxiliary Supply :Operation of the EUT was normal as per Sr. No. 2.3 during and after the test.. No variation in O/P current could be observed
Simulation on Three phase I/P: Operation of the EUT was normal as per Sr. No. 2.3 during and after the test. No variation in O/P current could be observed

f Results :

Auxiliary Supply : Complies with Criterion 'A'.
Three phase I/P : Complies with Criterion 'A'.

3.8 VOLTAGE DIPS AND INTERRUPTIONS

Test Rationale :

To study performance of the EUT when subjected to voltage dips and interruptions

a Test Condition :

Set-up	As per IEC 61000-4-11
Line Voltage	230 VAC
Line Frequency	50 Hz
Reduction	100%
Duration	10 mSec (0.5 cycle)
Simulation	On 230 VAC Auxiliary supply.

EUT in normal operating condition as per Sr. No. 2.2

c Test procedure :

The above conditions were simulated using dedicated test system and operation of the EUT was monitored

d Requirements :

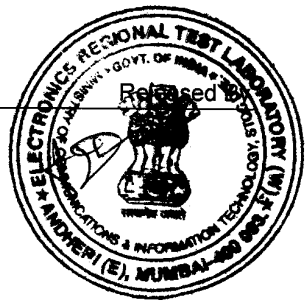
Operation of the EUT shall be normal as per Sr. No. 2.3 after the test.
Performance Criterion : 'C'

e Observations :

Operation of the EUT was normal as per Sr. No. 2.3 during and after the test. No variation in O/P current could be observed.

f Results :

Complies with Criterion 'A'



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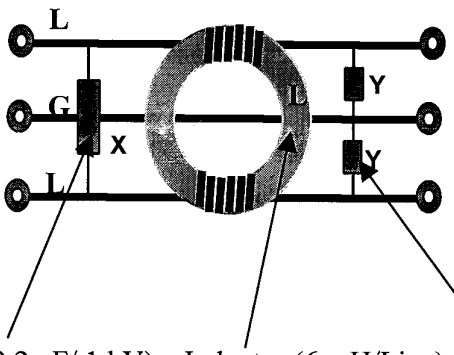
4.2 EMC modifications incorporated

Conducted RF Susceptibility

- A Power Line Filter was introduced in the power mains. It was mounted close to the mains entry point to reduce long length of unfiltered mains.



X Capacitor (2.2 nF/ 1 kV) Inductor (6 mH/Line) Y Cap(2.2 nF/ 1 kV)

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This is an amended version of page 11 0f 14 of report No ERTL(W)/2002EMI149

Amendment Issued By

Amendment Released By

ELECTRONICS REGIONAL TEST LABORATORY (W) GOVT. OF MINISTRY OF INFORMATION TECHNOLOGY STQC DTE ANDHERI, MUMBAI-400 093.

3.0 **General Remarks :**

REPORT APPROVED BY

HEAD (EMI/PCT)

REPORT RELEASED BY

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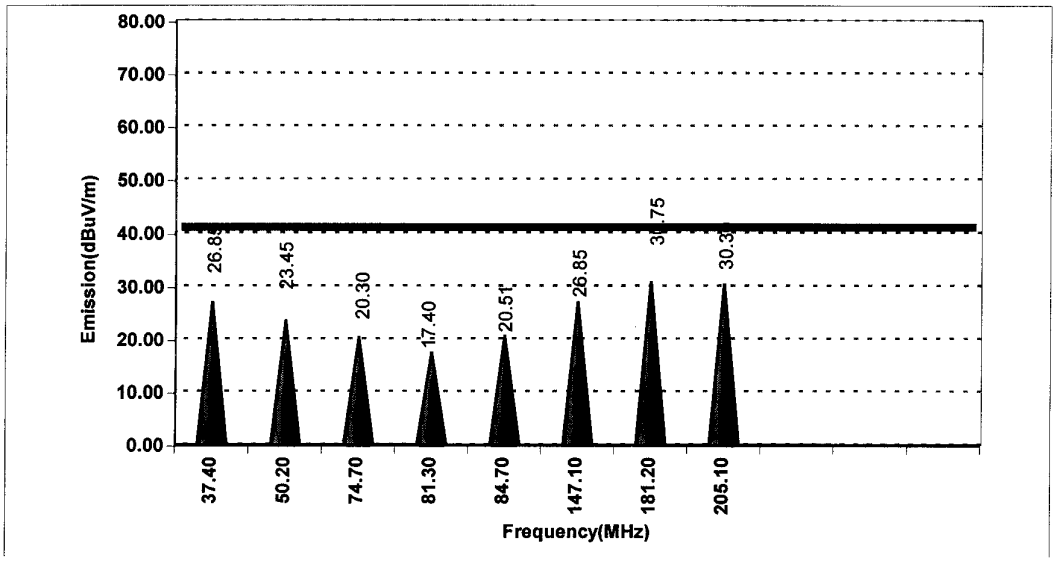
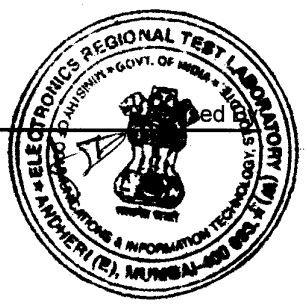
Radiated Emission Test Results

Sr.	Frequency(MHz)	Emissions (dBμV/m)	Limit (dBμV/m)	Results
1.	37.4	26.85	40.45	Pass
2.	50.2	23.45	40.45	Pass
3.	74.7	20.3	40.45	Pass
4.	81.3	17.4	40.45	Pass
5.	84.7	20.51	40.45	Pass
6.	147.1	26.85	40.45	Pass
7.	181.2	30.75	40.45	Pass
8.	205.1	30.3	40.45	Pass





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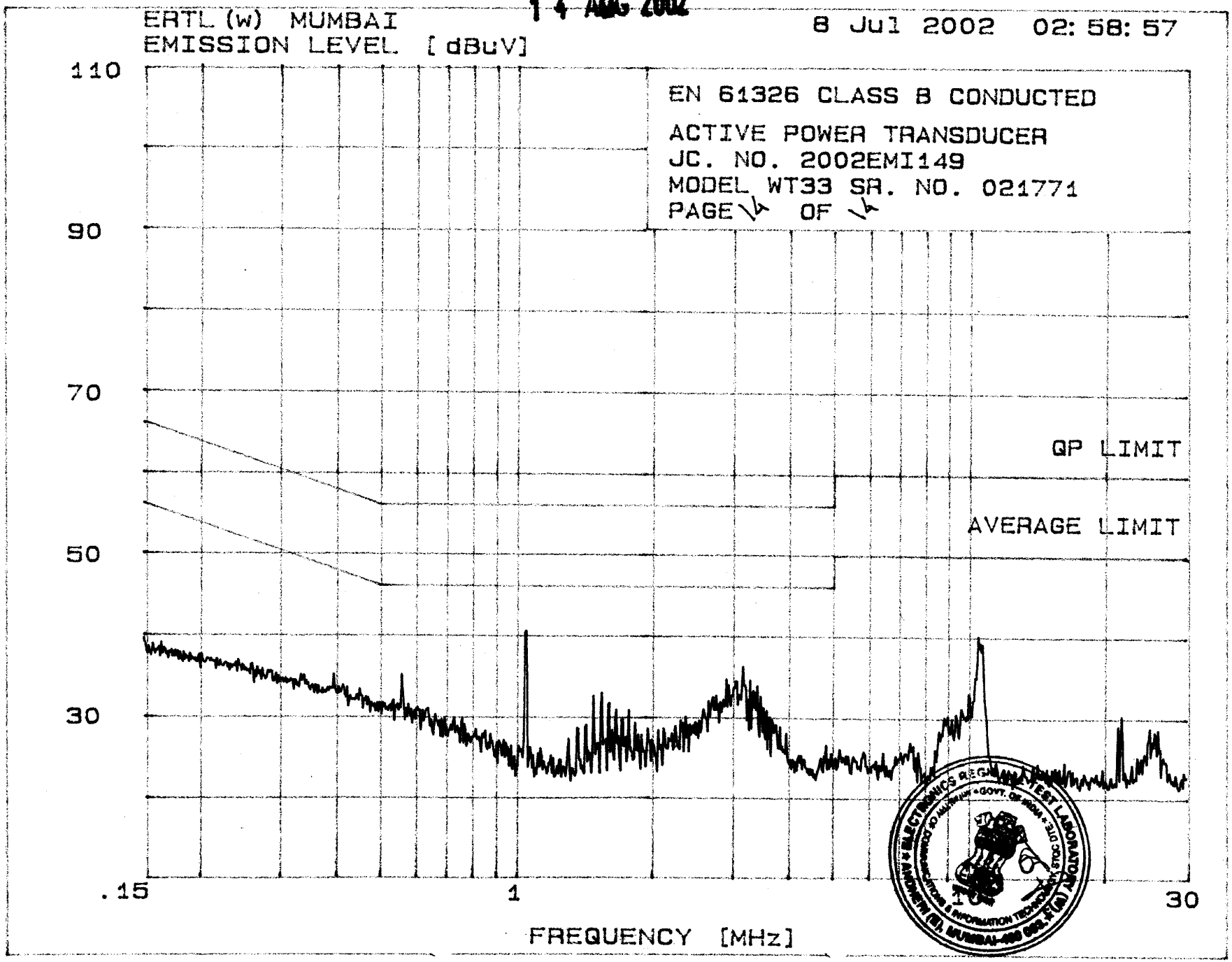
ERTL (w) MUMBAI
EMISSION LEVEL [dBuV]
8 Jul 2002 02: 58: 57
EN 61326 CLASS B CONDUCTED
ACTIVE POWER TRANSDUCER
JC. NO. 2002EMI149
MODEL WT33 SR. NO. 021771
PAGE 14 OF 14
110
90
70
50
30
QP LIMIT
AVERAGE LIMIT
.15
1
30
FREQUENCY [MHz]

OUR ACCREDITATION STATUS

ERTL (W) set up under the STQC Directorate, Ministry of Communications & Information Technology, Govt. of India has been accreditated under number of national / international systems as follows :

SYSTEM	AREA	STATUS
IECQ (International Electro-technical Commission on Quality Assessment System for Electronic Components)	**Component Testing** • Resistors (Fixed) • Capacitors (Fixed)	Accreditated as ITL (Independent Test Laboratory)
NABL (C), India National Accreditational Board for Test & Calibration laboratories (Calibration System)	**Calibration** • Electro-technical discipline • Thermal discipline • Mechanical discipline	Accreditated Calibration Laboratory
NABL(T), India National Accreditational Board for Test & Calibration laboratories (Testing System)	Electronic & Electrical Testing	Accreditated Test Laboratory
IECEE-CE-Scheme	• Mains Operated Electronic Consumer Products	Approved as a CB test Laboratory
Other recognisation		Recognised by CSPO of State Govt., DOT, Naval Docyard, LCSO etc.