Equipment Under Test (EUT) : Lifescan USB Interface Cable
Model No. : 200-102-01
Serial No. : 17
Manufacturer : M/s. HCL Peripherals, Chennai
Tested on : 17th March, 03
Testing location : SAMEER – Centre for Electromagnetics
2nd Corss Road, CIT Campus, Taramani
Chennai – 600 113 INDIA

Test Instrumentation:

Description	Make	Model number	Serial number	Cal. Due date
EMI Receiver	R&S	ESAI-D	825316/004	03/02/04
	R&S	ESAI-RF	863791/009	03/02/04
Biconical Antenna	R&S	HK116	825329/007	24/01/04
Log Periodic Antenna	Electrometrics	LPA 25	1463	10/01/04
EMI Receiver	R&S	ESCS 30	100063	23/08/03
Line Impedance Stabilization Network (LISN)	R&S	ESH2-Z5	893606/023	27/07/04

Applicable Standard:
FCC, class B part 15,1998. The test procedures are followed as given in the standard ANSI C63.4 1992, EIA/TIA 603, and MP-5.

The EMI test receiver (make R&S)(model: ESAI) was used for measuring radiated emission from EUT. The receiver is a sophisticated instrument to specifically carry out EMC measurements. Transducer table settings are available to enter the cable loss & antenna factor in the receiver to get the field strength (dB?V/m) values from the display. So manual calculation is not necessary.

For example:
E (dB?V/m) = V (dB?V)+AF----------Eq.1
Where
E (dB?V/m) = Field strength
V(dB?V) = receiver two terminal voltage
AF = Antenna factor

1. CONDUCTED EMISSION TEST

1.1 EUT Configuration:

The life scan USB interface cable (EUT) was connected to the Laptop and other end with 3 pins stereo Phone Plug (to be connected to a meter) was shorted to communicate with the PC. See in Annexure-1

1.2 Test Frequency and limits:

Frequency (Mhz)	Quasi Peak Limits (dB? V)
0.45-30.0	48

1.3 Test Procedure:

The RF conducted emissions from the EUT sent back to the power lines were measured using LISN and EMI receiver. The measurement was done in Peak detection mode. Since the emission level was within the limit in peak mode, measurement was not done in Quasipeak detection mode. Few Qp values attached for reference along with plots.

1.4 Test Observations:

It was observed that the Conducted Emission from the EUT was within the FCC limits in the test frequency range of 450KHz-30MHz. 9KHz Bandwidth used for measurements.

1.5 Enclosed Documents:

Plot 1A&B shows conducted emissions from the EUT on Line.
Plot 1C&D shows conductd emissions from the EUT on Neutral.
Aattachments shows the photograph of EUT & Conducted Emission test Setup

2. RADIATED EMISSION TEST

2.1 EUT Configuration:

The life scan USB interface cable (EUT) was connected to the Laptop and other end with 3 pins stereo Phone Plug (to be connected to a meter) was shorted to communicate with the PC**.**

2.2 Test Frequency Range and Limits at 10 meter Distance:

Frequency (MHz)	Emission Limits (dB? V)
30-88	29.55
88-216	33.05
216-960	35.55
960-1000	43.55

2.3 Test Procedure:

(I) The Radiated Emission (RE) from the EUT was first measured in anchoic chamber at 3-meter distance for both horizontal and vertical polarization and antenna height was varied to maximize the emission. Logperiodic antenna model LPA 25 and Biconical antenna HK116 were used for Radiated emission measurements. The manipulation cables were done to identify maximum emissions in the frequency range of 30 Mhz – 1000Mhz to identify any emission from the EUT. 120KHz bandwidth used for measurements.

The above measurement was done in two steps.
Step 1: Laptop with subsystems in powered condition.
Step2: Laptop with subsystems plus EUT (Life scan USB interface cable) in powered condition.
The frequencies of appreciable emission were identified and recorded

(II) The above RE measurement procedure was repeated at OATS (Open Area Test Site) at 10 m distance as required by FCC standard for those tests frequencies with appreciable emission. Measurement was carried out for both horizontal and vertical polarization and antenna height was varied to maximize the emission. The manipulation cables were done to idenfity maximum emissions. The photograph shows the maximum emission condition.

2.4 Test Observations:

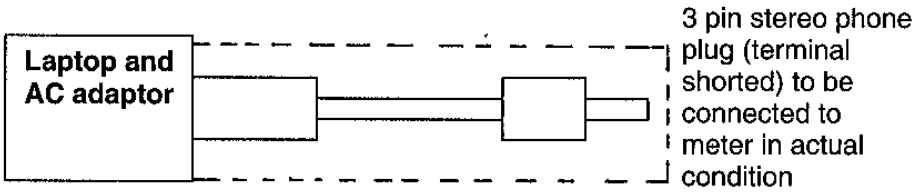
The Radiated Emission (RE) was within the FCC limit. This was observed in Anchoic chamber with peak detection mode as well as in OATS for the test frequency range of 30-1000Mhz. As the emission from the EUT was below the FCC limit, the measurements plots take in the anchoic chamber were enclosed for ready reference. Table RE-1 and RE-2 shows few emission values.

2.7 Enclosed Documents:

Plot 2A&2B shows radiated emission due to ambient (Laptop ON) for the frequency range 30MHz-230Mhz.
Plot 2C & 2D shows radiated emission due to ambient (Laptop ON) for the frequency range 230Mhz – 1000Mhz
Plot 3A&B shows radiated emissions from the entire setup as shown in Annexure-1 for the frequency range 30-230Mhz
Plot 3C &D shows radiated emissions from the entire setup as shown inAnnexure –1 for the frequency range 230-1000Mhz

Annexure 1

EUT (life scan USB interface cable)



Power Supply used for testing:

Voltage: 120V AC
Frequency: 60Hz

Desciption of support equipment:

Item	Make	Model	Serial no.	FCC
Laptop personal computer	Toshiba	TE 2000	42017323V	FCC complied
AC adapter	Polaris Electronics	CH1205	0230	FCC complied

CONDUTED EMISSION PLOT-1A
LINE

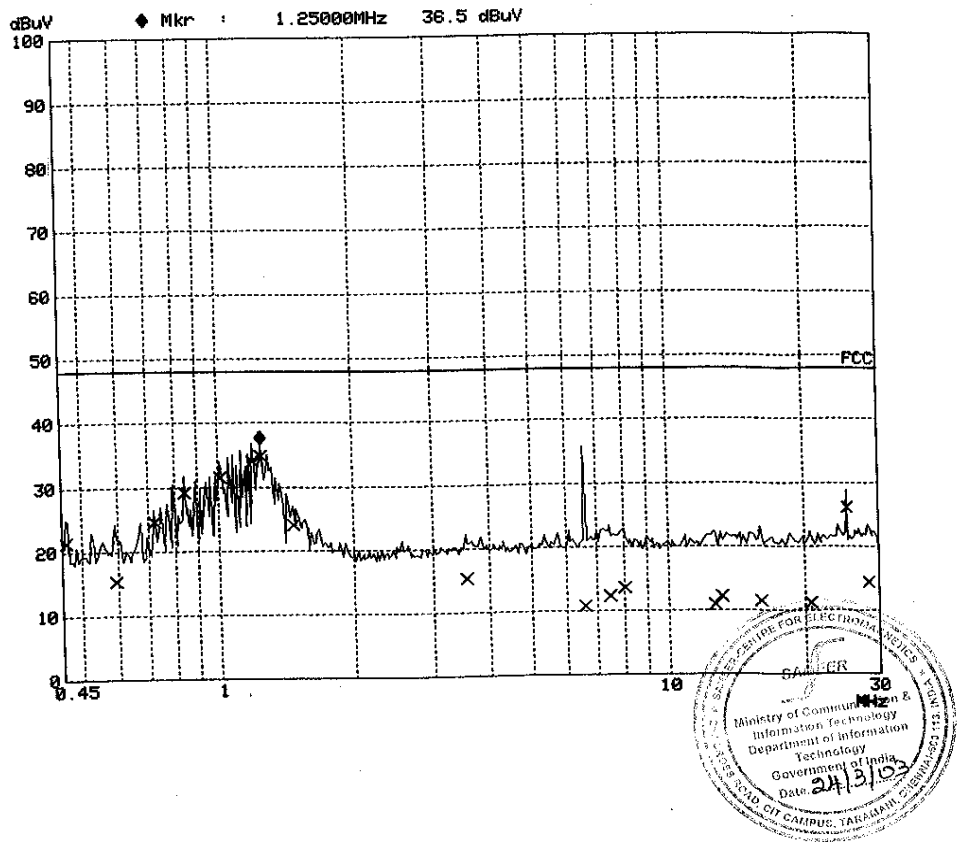
EUT: LIFE SCAN USB Interface Cable
Manuf: M/S HCL PERIPHERALS,CHENNAI
Op Cond: Tx & Rx SHORT:LAPTOPWITH 110VOLTS
Test Spec: FCC CLASS B
Comment: EUT TO LAPTOP MAKE:THOSHIBA M.NO:TE2000 S.N:42017323V
EUT: MODEL NO:200-102-01 SR:NO:17 WITH FERRIATE CORES
Date: 17. Mar 03 10:57

Scan Settings (1 Range)

Frequencies			Receiver Settings				
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp
450k	30M	5k	9k	PK	20ms	10dBLN	OFF

Transducer No.	Start	Stop	Name
1	9k	200M	PFACT1

Final Measurement: x QP
Meas Time: 1 s
Subranges: 25
Acc Margin: 26dB



Conducted Emission Qp Band Width: 9KHz: **Plot 1A**

CONDUTED EMISSION PLOT 1B
LINE

EUT: LIFE SCAN USB Interface Cable
Manuf: M/S HCL PERIPHERALS,CHENNAI
Op Cond: Tx & Rx SHORT:LAPTOPWITH 110VOLTS
Test Spec: FCC CLASS B
Comment: EUT TO LAPTOP MAKE:THOSHIBA M.NO:TE2000 S.N:42017323V
EUT: MODEL NO:200-102-01 SR:NO:17 WITH FERRIATE CORES
Date: 17. Mar 03 10:57

Final Measurement Results:

Frequency MHz	QP Level dBuV	Delta Limit dB
0.46000	21.4	-26.5
0.59000	15.3	-32.6
0.72000	24.7	-23.2
0.84000	29.3	-18.6
1.01000	31.6	-16.3
1.20000	34.0	-13.9
1.25000	34.9	-13.1
1.46500	24.1	-23.8
3.55500	15.3	-32.6
6.56500	10.8	-37.1
7.43000	12.4	-35.5
7.99000	13.6	-34.3
12.57500	11.0	-37.0
13.01500	12.3	-35.7
15.92000	11.5	-36.4
20.63000	11.2	-36.7
25.23000	26.1	-21.8
28.31000	14.4	-33.5

* limit exceeded

Plot 1B

CONDUTED EMISSION PLOT-1C
NEUTRAL

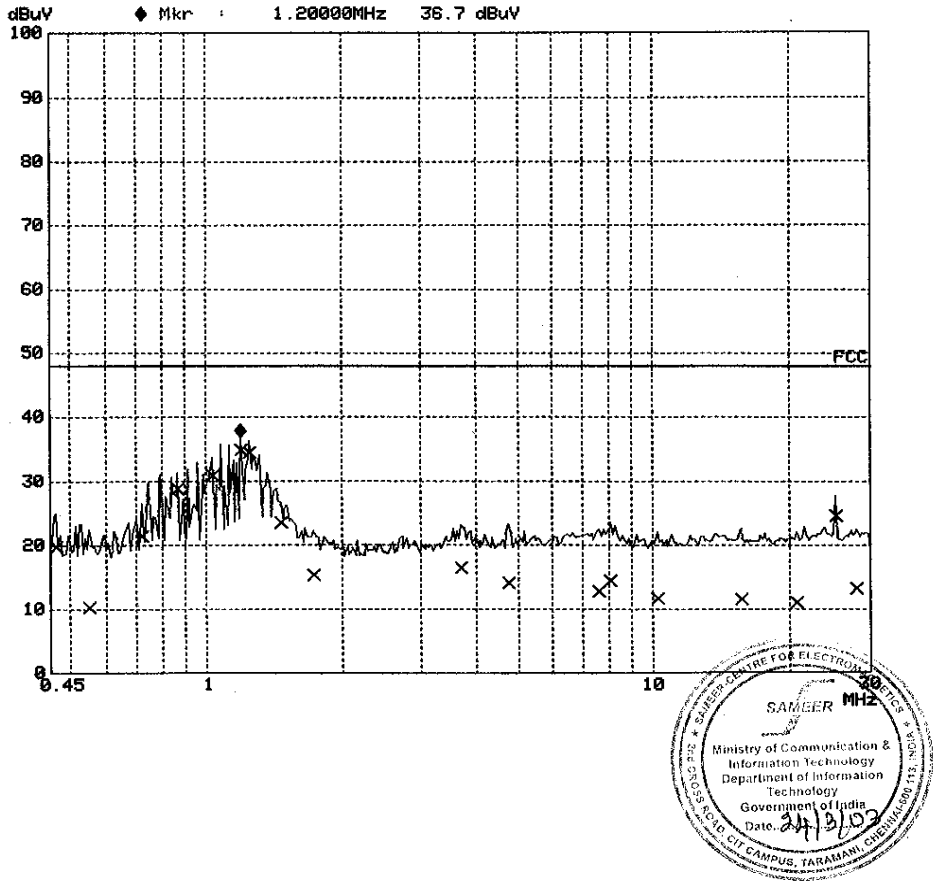
EUT: LIFE SCAN USB Interface Cable
Manuf: M/S HCL PERIPHERALS,CHENNAI
Op Cond: Tx & Rx SHORT:LAPTOPWITH 110VOLTS
Test Spec: FCC CLASS B
Comment: EUT TO LAPTOP MAKE:THOSHIBA M.NO:TE2000 S.N:42017323V
EUT: MODEL NO:200-102-01 SR:NO:17 WITH FERRIATE CORES
Date: 17. Mar 03 11:09

Scan Settings (1 Range)

Frequencies			Receiver Settings				
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp
450k	30M	5k	9k	PK	20ms	10dBLN	OFF

Transducer No.	Start	Stop	Name
1	9k	200M	PFACT1

Final Measurement: x QP
Meas Time: 1 s
Subranges: 25
Acc Margin: 26dB



Plot 1C

CONDUTED EMISSION
NEUTRAL

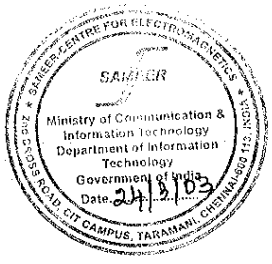
PLOT-- 1D

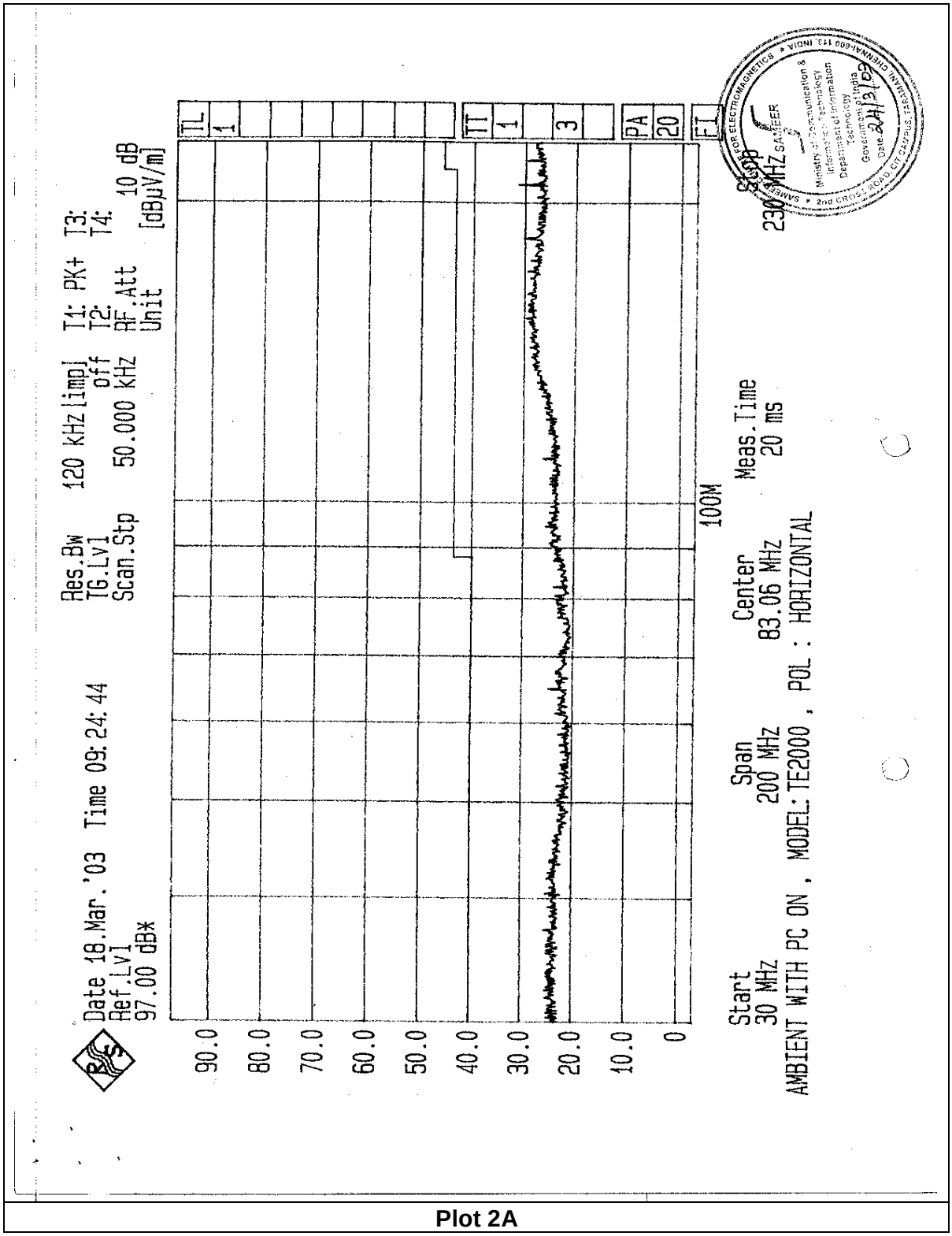
EUT: LIFE SCAN USB Interface Cable
Manuf: M/S HCL PERIPHERALS,CHENNAI
Op Cond: Tx & Rx SHORT:LAPTOPWITH 110VOLTS
Test Spec: FCC CLASS B
Comment: EUT TO LAPTOP MAKE:THOSHIBA M.NO:TE2000 S.N:42017323V
EUT: MODEL NO:200-102-01 SR:NO:17 WITH FERRIATE CORES
Date: 17. Mar 03 11:09

Final Measurement Results:

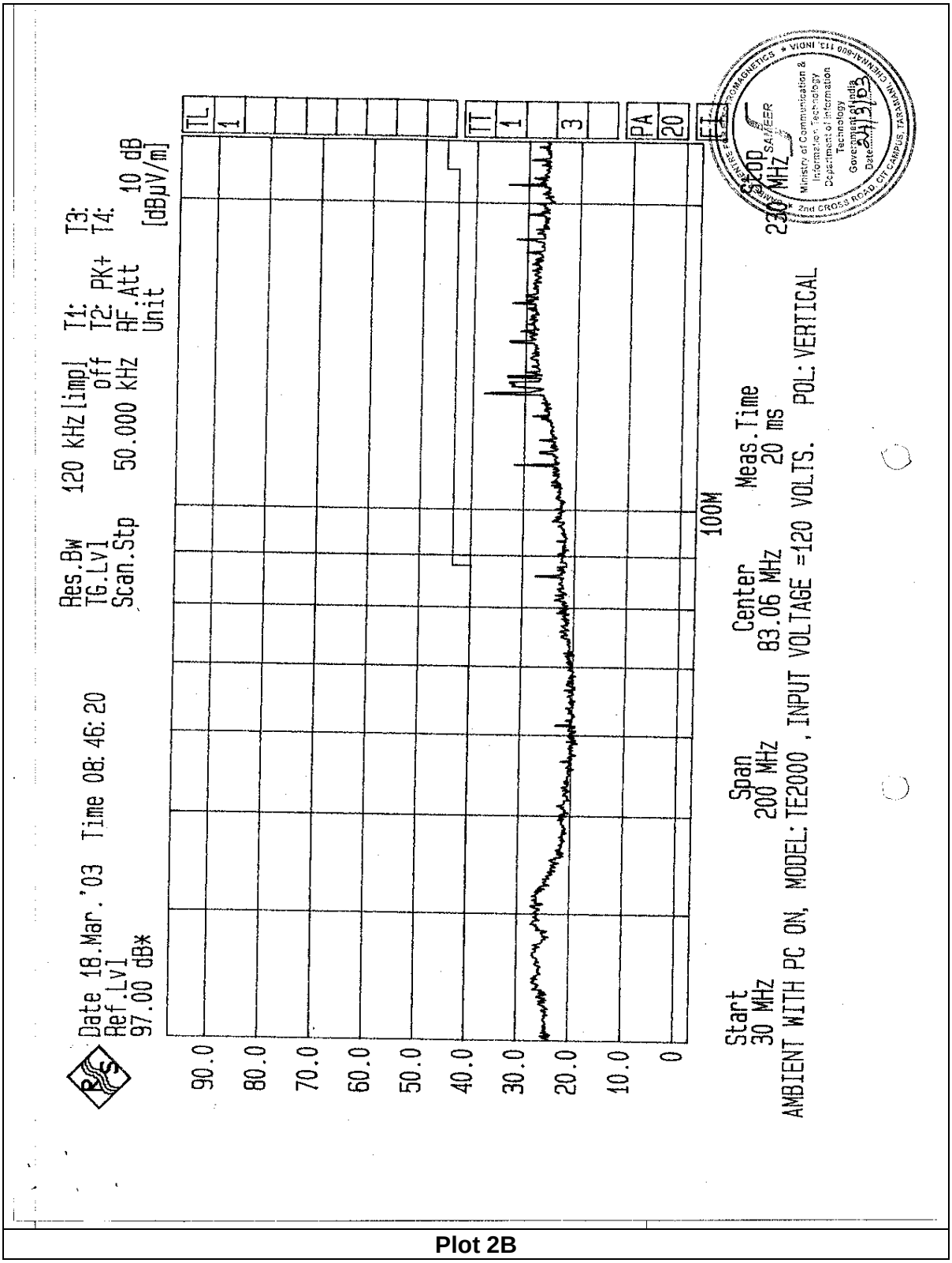
Frequency MHz	QP Level dBuV	Delta Limit dB
0.46500	19.7	-28.2
0.55000	10.4	-37.6
0.72000	21.4	-26.5
0.86500	28.8	-19.1
1.03500	30.8	-17.1
1.20000	34.9	-13.0
1.25000	34.5	-13.4
1.46500	23.6	-24.3
1.73000	15.4	-32.6
3.70000	16.5	-31.4
4.75000	14.1	-33.8
7.57500	12.9	-35.0
8.05000	14.6	-33.3
10.23000	11.8	-36.1
15.63000	11.6	-36.3
20.68000	11.1	-36.8
25.23000	24.7	-23.2
27.91000	13.2	-34.7

* limit exceeded

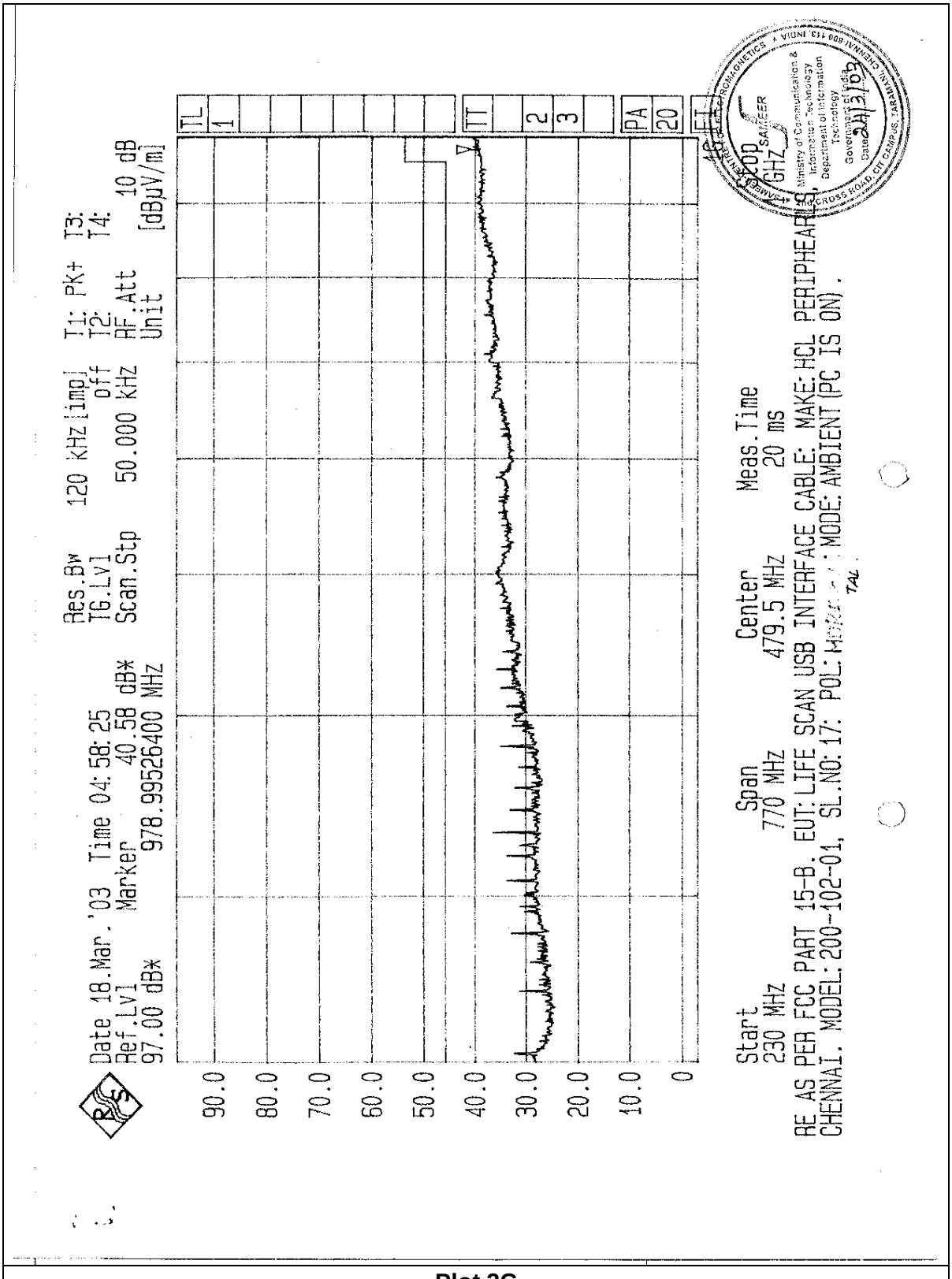



Date 18.Mar.'03 Time 09:24:44
Ref.Lvl
97.00 dBµ
Res.Bw 120 kHz[imp]
T6.Lvl off
Scan.Stp 50.000 kHz
T1: PK+
T2:
RF.Att
Unit
T3:
T4:
10 dB
[dBµV/m]
TL 1
TT 1 3
PA 20
FT
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0
Start 30 MHz
Span 200 MHz
Center 83.06 MHz
100M
Meas.Time 20 ms
AMBIENT WITH PC ON , MODEL: TE2000 , POL : HORIZONTAL
Stop 230 MHz
SAMEER
Ministry of Communication & Information Technology
Department of Information Technology
Government of India
Date 24/3/03

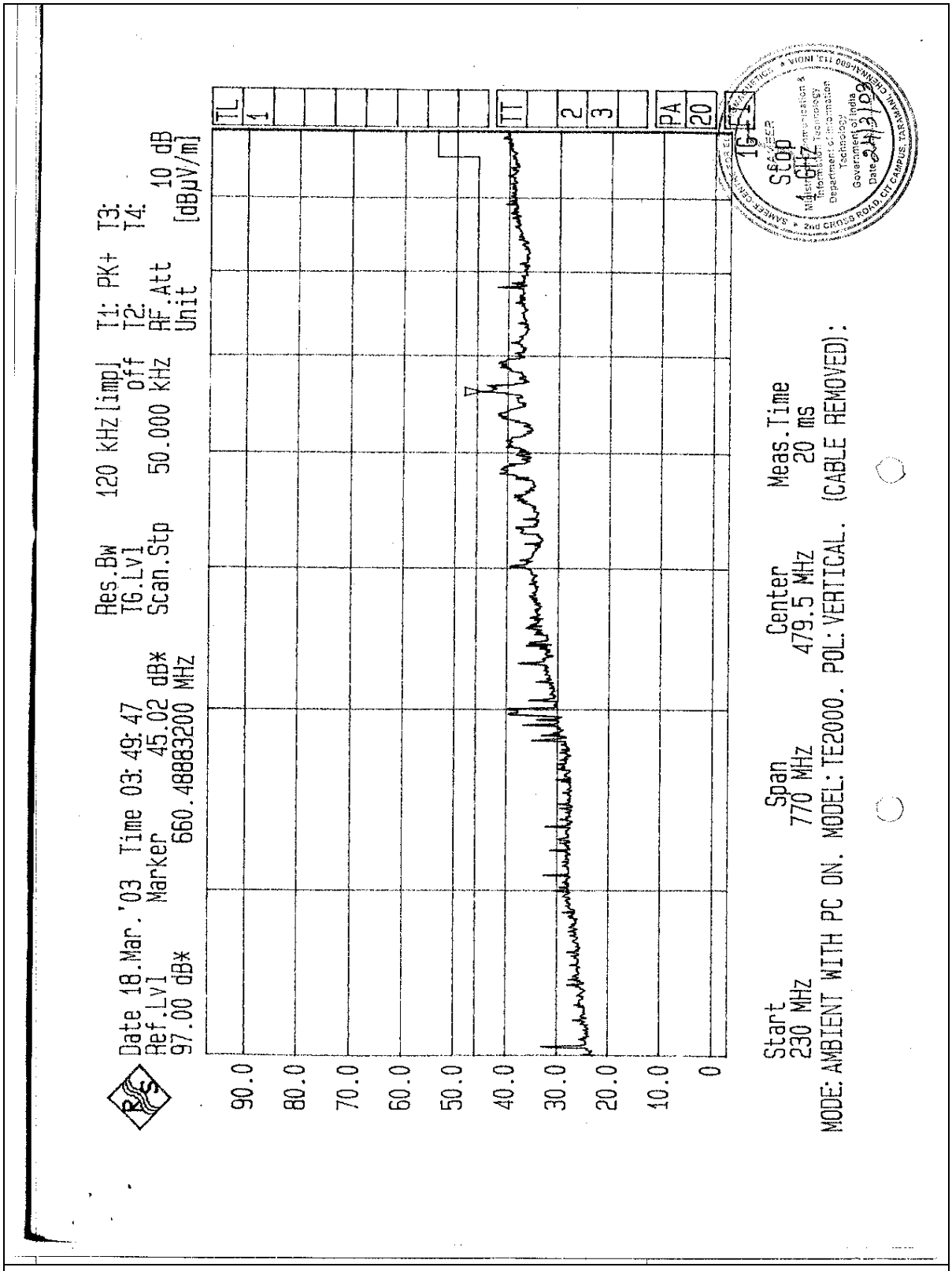
Plot 2A


Date 18.Mar.'03 Time 08:46:20
Ref.Lvl
97.00 dB*
Res.Bw 120 kHz [imp]
TG.Lvl off
Scan.Stp 50.000 kHz
T1:
T2: PK+
RF.Att
Unit
T3:
T4:
10 dB
[dBµV/m]
TL 1
TT 1 3
PA 20
FT
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0
Start 30 MHz
Span 200 MHz
Center 83.06 MHz
100M
Meas.Time 20 ms
AMBIENT WITH PC ON, MODEL: TE2000 , INPUT VOLTAGE =120 VOLTS. POL: VERTICAL
S200 SAMEER
230 MHz
Ministry of Communication & Information Technology
Department of Information Technology
Government of India
Date 24/3/03

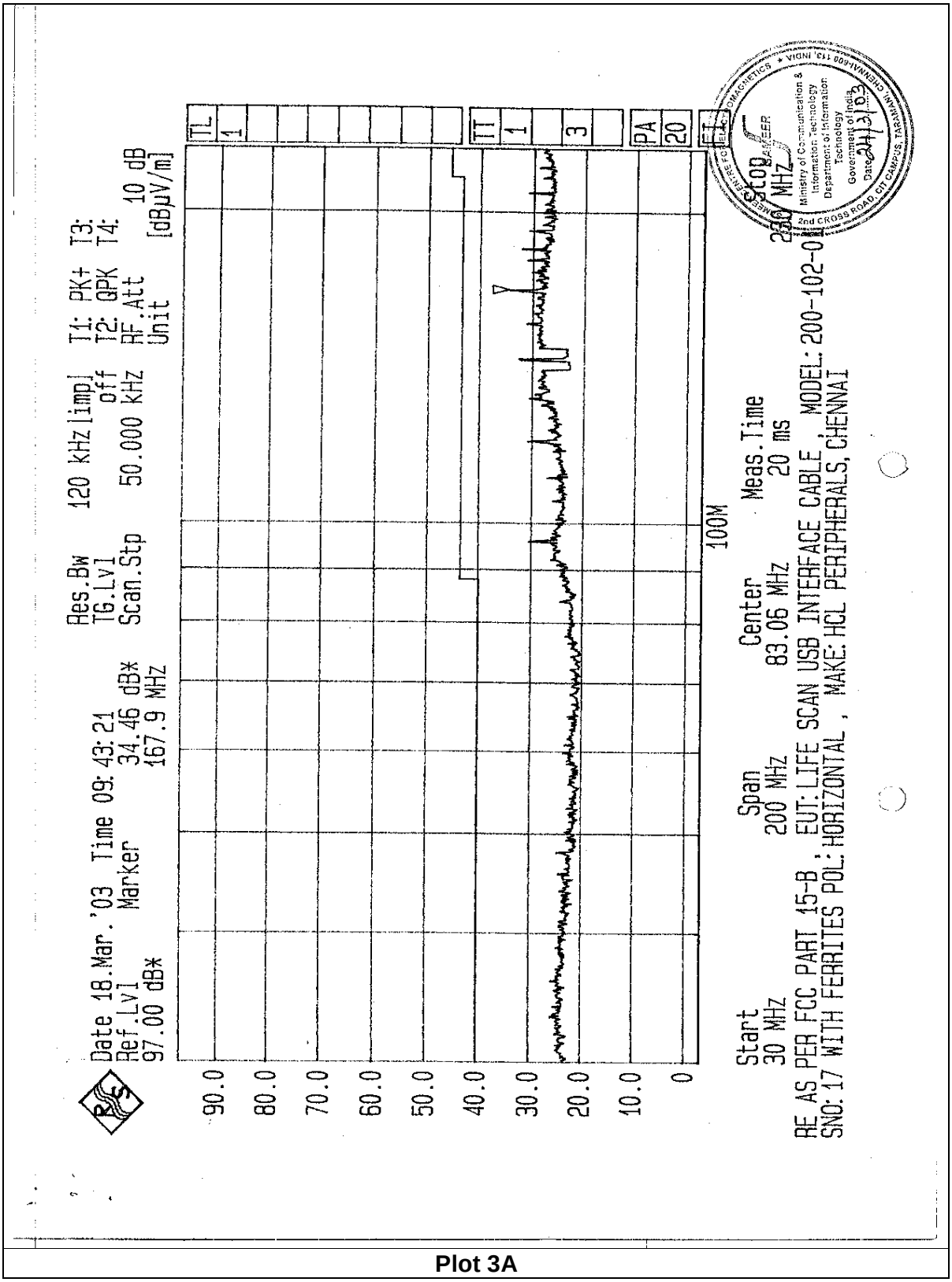
Plot 2B


Date 18.Mar.'03 Time 04:58:25
Ref.Lvl 40.58 dBµ
97.00 dBµ Marker 978.9952640 MHz
Res.Bw 120 kHz [imp]
TG.Lvl off
Scan.Stp 50.000 kHz
T1: PK+
T2:
RF.Att 10 dB
Unit [dBµV/m]
T3:
T4:
TL 1
TT 2 3
PA 20
ET
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0
Start 230 MHz
Span 770 MHz
Center 479.5 MHz
Meas.Time 20 ms
RE AS PER FCC PART 15-B. EUT: LIFE SCAN USB INTERFACE CABLE: MAKE: HCL PERIPHEARALS,
CHENNAI. MODEL: 200-102-01, SL.NO: 17. POL: H/V. MODE: AMBIENT (PC IS ON).

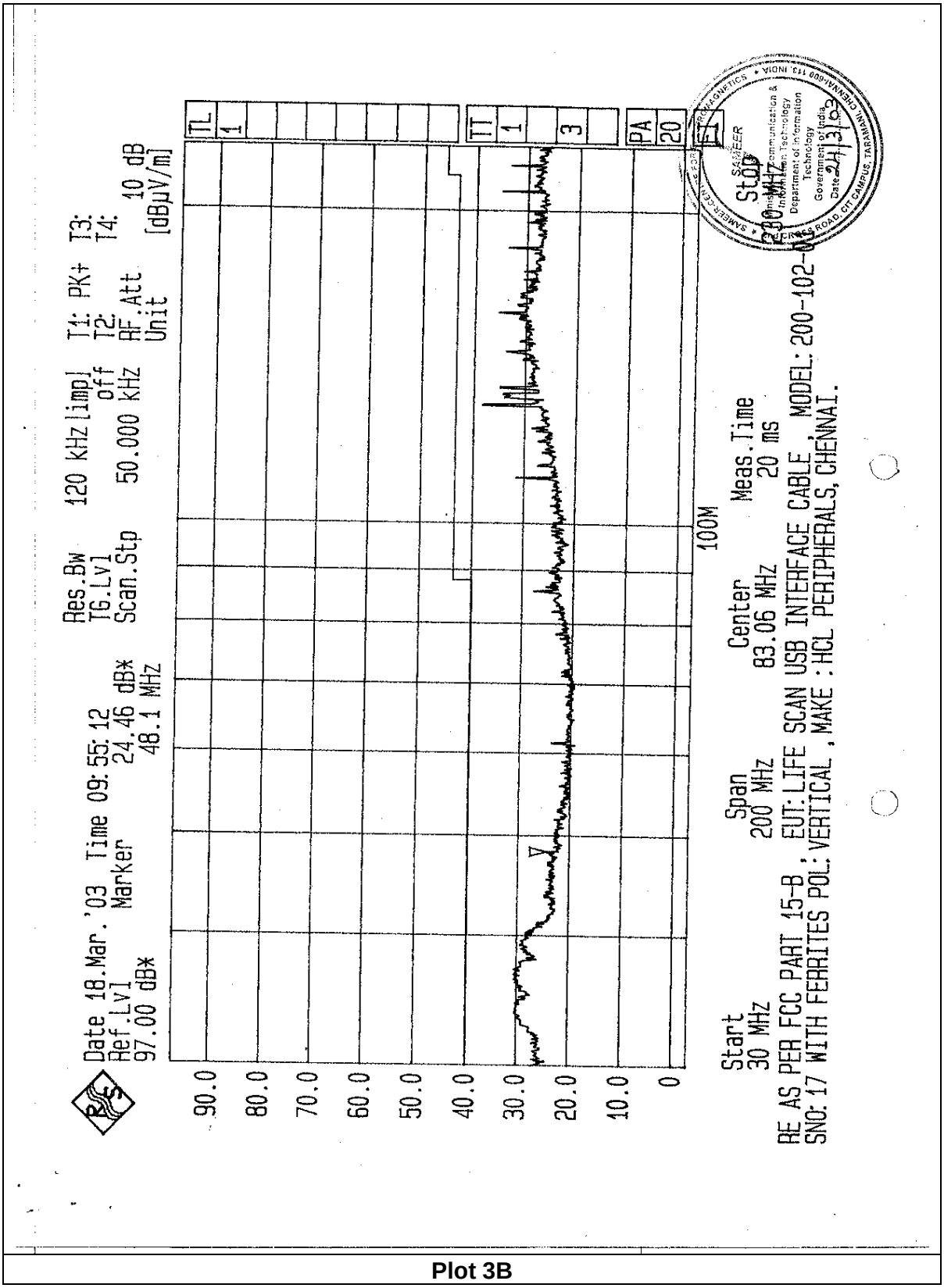
Plot 2C


Date 18.Mar.'03 Time 03:49:47
Ref.Lvl
97.00 dB*
Marker
45.02 dB*
660.48883200 MHz
Res.Bw
120 kHz [impl
T6.Lvl
off
Scan.Stp
50.000 kHz
T1: PK+
T2:
RF.Att
Unit
T3:
T4:
10 dB
[dBµV/m]
TL
1
TT
2
3
PA
20
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0
Start
230 MHz
Span
770 MHz
Center
479.5 MHz
Meas.Time
20 ms
MODE: AMBIENT WITH PC ON. MODEL: TE2000. POL: VERTICAL. (CABLE REMOVED):
Stop
1 GHz

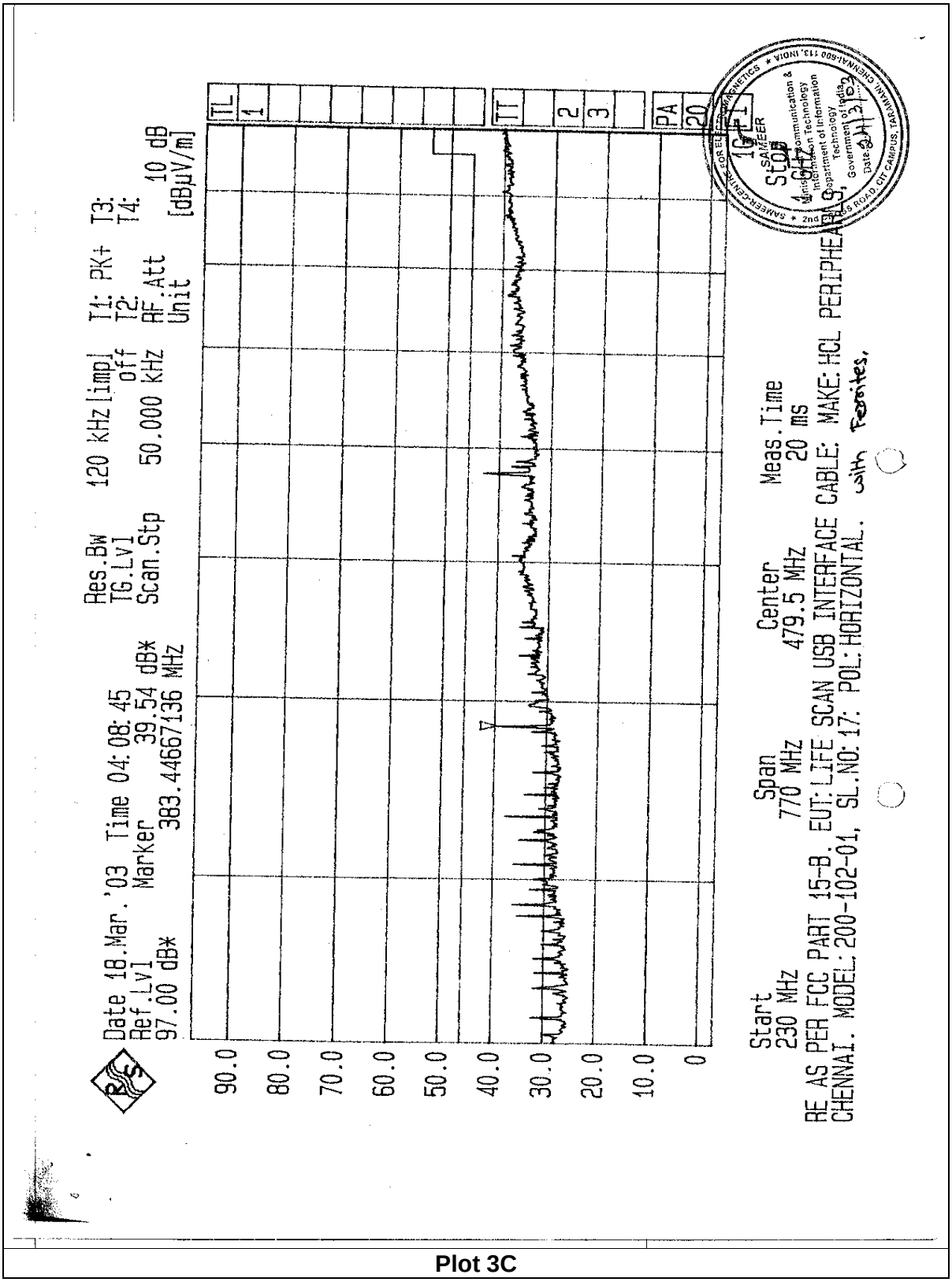
Plot 2D


Date 18.Mar.'03 Time 09:43:21
Ref.Lvl 34.46 dBµ
97.00 dBµ Marker 167.9 MHz
Res.Bw 120 kHz [impj T1: PK+ T3:
TG.Lvl off T2: QPK T4:
Scan.Stp 50.000 kHz RF.Att 10 dB
Unit [dBµV/m]
TL 1
TT 1 3
PA 20
EI
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0
Start 30 MHz
Span 200 MHz
Center 83.06 MHz
100M
Meas.Time 20 ms
RE AS PER FCC PART 15-B ; EUT:LIFE SCAN USB INTERFACE CABLE , MODEL: 200-102-01
SNO: 17 WITH FERRITES POL: HORIZONTAL , MAKE: HCL PERIPHERALS, CHENNAI
Stop 2500 MHz
Ministry of Communication & Information Technology
Department of Information Technology
Government of India
Date 24.3.03
2nd CROSS ROAD, CIT CAMPUS, TARAMANI, CHENNAI-600 113

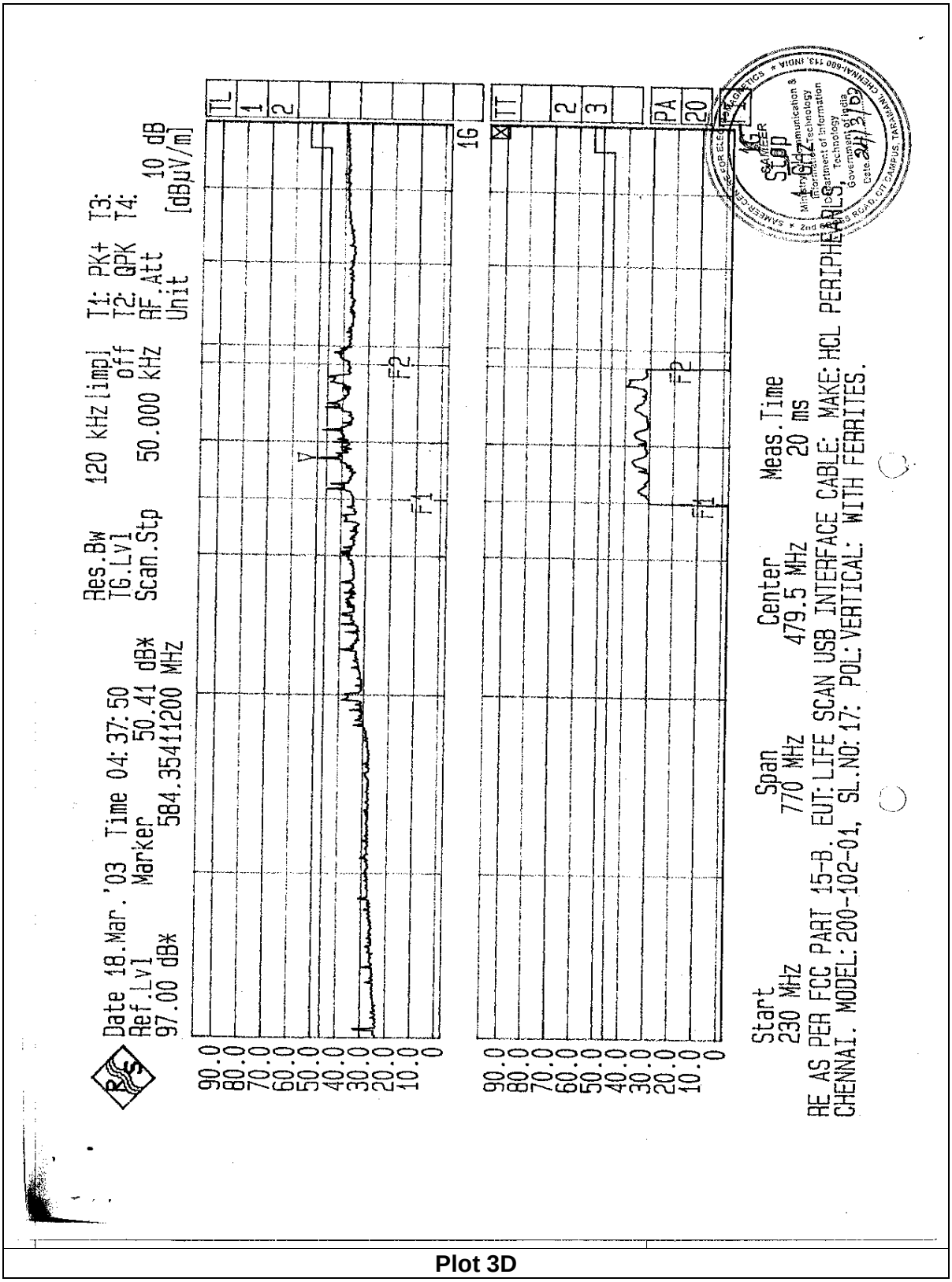
Plot 3A


Date 18.Mar.'03 Time 09:55:12
Ref.Lvl
97.00 dBµ
Marker
24.46 dBµ
48.1 MHz
Res.Bw 120 kHz limpl
TG.Lvl off
Scan.Stp 50.000 kHz
T1: PK+
T2:
RF.Att 10 dB
Unit [dBµV/m]
T3:
T4:
TL 1
TT 1 3
PA 20
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0
Start 30 MHz
Span 200 MHz
Center 83.06 MHz
100M
Meas.Time 20 ms
Stop 230 MHz
RE AS PER FCC PART 15-B ; EUT: LIFE SCAN USB INTERFACE CABLE , MODEL: 200-102-01
SNO: 17 WITH FERRITES POL: VERTICAL , MAKE : HCL PERIPHERALS, CHENNAI.

Plot 3B


Date 18.Mar.'03 Time 04:08:45
Ref.Lvl
97.00 dB*
Marker
383.4667136 MHz
39.54 dB*
Res.Bw 120 kHz [impl]
TG.Lvl off
Scan.Stp 50.000 kHz
T1: PK+
T2:
RF.Att 10 dB
Unit [dBµV/m]
T3:
T4:
TL
1
TT
2
3
PA
20
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0
Start 230 MHz
Span 770 MHz
Center 479.5 MHz
Meas.Time 20 ms
RE AS PER FCC PART 15-B, EUT: LIFE SCAN USB INTERFACE CABLE: MAKE: HCL PERIPHERALS,
CHENNAI. MODEL: 200-102-01, SL.NO: 17. POL: HORIZONTAL. with Ferrites,
SAMEER
Stop
Date 24/3/03

Plot 3C


Date 18.Mar.'03 Time 04:37:50
Ref.Lvl 50.41 dBµ
97.00 dBµ Marker 584.35411200 MHz
Res.Bw 120 kHz [imp]
TG.Lvl off
Scan.Stp 50.000 kHz
T1: PK+
T2: QPK
RF.Att 10 dB
Unit [dBµV/m]
T3:
T4:
TL
TT
PA
Start 230 MHz
Span 770 MHz
Center 479.5 MHz
Meas.Time 20 ms
RE AS PER FCC PART 15-B. EUT: LIFE SCAN USB INTERFACE CABLE: MAKE: HCL PERIPHERALS,
CHENNAI. MODEL: 200-102-01, SL.NO: 17: POL: VERTICAL: WITH FERRITES.

Plot 3D

Radiated emission Qp max values:

Table RE-1

Horizontal Polarisation at 3 meters

Frequency (MHz)	Qp Value (dB? V/m)
143.6	32.73
167.9	32.22
184.2	30.41
119.8	28.03
95.7	27.02
993.48	36.2
383.44	36.0

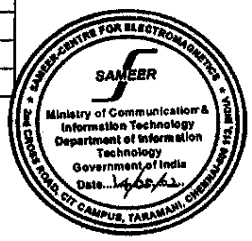
Table RE-2

Vertical polarization at 3 meters

Frequency (MHz)	Qp Value (dB? V/m)
34.0	28.56
36.65	28.66
39.1	27.29
48.1	21.0
584.35	37.18
660.48	40.05
666.99	38.73

Cable Loss

Frequency(MHz)	Cable Loss
30	0.4
40	0.52
50	0.58
60	0.61
70	0.67
80	0.75
90	0.75
100	0.84
200	1.25
300	1.66
400	2.03
500	2.10
600	2.14
700	2.19
800	2.54
900	2.74
1000	2.86



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Calibration Report

Calibration Report No: SCEM/EMCD/CAL/RER808 Date:09.03.2003

Frequency in MHz	Antenna Factor		
	1m	3m	10m
20	12.81	16.07	20.60
30	13.26	17.01	19.59
40	12.93	14.18	18.06
50	10.32	11.19	15.67
60	11.39	8.34	8.01
70	11.32	9.45	11.27
80	9.65	9.13	11.87
90	10.01	8.65	10.59
100	12.32	11.14	14.23
110	12.87	11.99	14.55
120	15.19	13.16	15.62
130	14.13	14.67	16.53
140	15.36	15.56	17.46
150	16.09	14.04	16.97
160	14.33	16.01	16.44
170	15.77	15.65	17.03
180	15.04	15.85	16.32
190	15.15	15.95	17.91
200	16.22	14.30	16.93
210	17.41	15.72	19.74
220	17.01	17.01	19.16
230	17.00	13.99	17.40
240	16.37	15.30	16.94
250	19.66	15.55	17.85
260	15.56	16.90	18.81
270	18.62	16.62	19.95
280	20.65	18.30	21.12
290	20.16	19.09	21.42
300	21.27	20.31	22.10
310	24.76	20.03	21.64
320	26.19	22.26	24.39
330	24.75	23.58	26.04

SAMEER	SAMEER - Centre for Electromagnetics EMC Division	FM7.6/05 Rev.00

Calibration Report

Calibration Report No: SCEM/EMCD/CAL/RERS11 Date:06.03.2003

Frequency In MHz	Antenna Factor		
	1m	3m	10m
200	12.00	15.82	17.06
225	12.23	16.35	16.69
250	13.06	13.64	14.93
275	14.45	16.89	18.92
300	16.12	16.34	19.64
325	16.28	17.87	19.06
350	16.16	16.66	19.74
375	16.56	17.04	20.12
400	17.46	16.25	17.65
425	19.64	18.40	20.69
450	19.00	19.04	20.44
475	20.60	20.84	23.04
500	22.28	20.15	21.89
525	19.68	18.06	21.29
550	19.51	20.09	21.71
575	22.05	22.28	23.61
600	19.98	21.84	23.30
625	20.30	20.82	22.69
650	21.42	21.26	22.80
675	22.08	22.42	24.57
700	22.02	23.22	25.34
725	22.37	23.08	24.80
750	22.21	22.98	24.84
775	22.10	21.72	24.02
800	21.53	22.96	25.50
825	22.80	23.44	25.69
850	22.97	24.94	27.26
875	23.75	25.06	26.62
900	23.68	22.22	24.33
925	23.29	25.97	27.15
950	24.38	25.19	26.78
975	25.25	25.75	27.10
1000	25.95	26.75	28.47

SAMEER CENTRE FOR ELECTROMAGNETICS
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Department of Information Technology
Government of India
Date. 2.6.03
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