EMC EMISSION - TEST REPORT

Test Report No.	**B850601a**	Issue Date	06 January 1999

Model / Serial No.	4053 / EMC-1
Product Type	Industrial Reader
Client	Micron Communications, Inc.
Manufacturer	Micron Communications, Inc.
License holder	Micron Communications, Inc.
Address	3176 South Denver Way Boise, Idaho 83707-0006
Test Criteria Applied	FCC Part 15 15.209C
Test Start Date:	20 October 1998
Test End Date:	30 December 1998
Test Result	■ **PASS** ☐ **FAIL**
Test Report Project No.	**B201850601**
Total Pages including Appendices	67

Reviewed By : Felix J. Chavez

Reviewed By : Shawn Singh

DIRECTORY - EMISSIONS

STATEMENT OF MEASUREMENT UNCERTAINTY

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities that can account for a nominal measurement error of ±4 dB. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

EMISSIONS TEST REGULATIONS :

The tests were performed according to following regulations :

■ - Federal Communication Commission part 15 ☐ - Class A ■ - Class B
■ - Federal Communication Commission part 15, Subpart C ■ - 15.207 ■ - 15.209

All tests performed according to ANSI C63.4.

Emission Test Results:

Conducted emissions 150 kHz - 30 MHz

Test Result ■ **- PASS** ☐ **- FAIL** ☐ **- Not Applicable**

Passing Margin 2 dB at 1.6 MHz

Failing Margin _____ dB at _____ MHz

Remarks: Worst case emissions were found with 7.5' cable.

Radiated emissions (electric field) 30 MHz - 1000 MHz (Unintentional Radiator)

Test Result ■ **- PASS** ☐ **- FAIL** ☐ **- Not Applicable**

Passing Margin 3.5 dB at 266.1 MHz

Failing Margin _____ dB at _____ MHz

Remarks: _____

Radiated emissions (Magnetic field) 0.125 MHz - 1.250 MHz (Intentional Radiator)

Test Result ■ **- PASS** ☐ **- FAIL** ☐ **- Not Applicable**

Passing Margin 23.2 dB at 0.125 MHz

Failing Margin _____ dB at _____ MHz

Remarks: No higher emissions were found with Phihong PSA-30U-150 AC Adapter. No significant difference was found between 3' and 7.5' antenna cables.

GENERAL REMARKS:

Modifications required to pass: None

Test Specification Deviations: Additions to or Exclusions from: None

Test Equipment Used

Colorado Test Equipment

05-Nov-98

Report: B8506 **Date: 20 Oct.98-21 Dec.98** **Signature: Shawn Singh**

Temp: 21° C **Rel. Humd.: 37%** **Atmo. Pressure: 80kPa**

Location	Tests	Manufacturer	Model Number	Serial Number	Description	Cal Date	Cal Due
PW	R	EMCO	SAS-200/512	104	Log Periodic Antenna	13-Jul-98	13-Jul-99
PW	R	EMCO	3108	7059203-2457	Biconical Dipole Antenna	06-Jul-98	06-Jul-99
PW	-3, R	EMCO	3146	9203-3376	Log Periodic Antenna	18-Jun-98	18-Jun-99
PW	C	EMCO	3825/2	9202-1945	LISN	15-Jul-98	15-Jul-99
PW	R	EMCO	4610	9205-1199	Royce field site source		
PW	R	EMCO	6502	9205-2738	Magnetic loop	30-Oct-97	29-Oct-00
PW		Gishard	600-1040 mb	002	Altimeter		
PW	C	Hewlett Packard	11947A	3107A01975	Transient Limiter	17-Jun-98	17-Jun-99
PW	R	Hewlett Packard	85650A	2043A00256	Quasi Peak Adapter (set 1)	17-Jun-98	17-Jun-99
PW	R	Hewlett Packard	85650A	2811A01300	Quasi Peak Adapter	18-Nov-97	18-Nov-98
PW	R, C	Hewlett Packard	85662A	2112A02220	Display Section	11-Mar-98	11-Mar-99
PW	R, C,	Hewlett Packard	85662A	2403A08749	Display Section	01-Apr-98	01-Apr-99
PW	R, C	Hewlett Packard	8566B	2115A00853	Spectrum Analyzer (dc-22 GHz)	11-Mar-98	11-Mar-99
PW	R, C	Hewlett Packard	8566B	2410A00154	Spectrum Analyzer (dc-22 GHz)	01-Apr-98	01-Apr-99
PW	R	Mini-Circuits	ZHL-1042J	D020698-14	RF Pre-Amplifier (10-4200 MHZ)	13-Feb-98	13-Feb-99
PW	C	Polarad Electroni	ESH3-Z2	357.881J.32	Transient Limiter		
PW		Radio Shack	63-867	005	Temperature / Humidity Indicator		
PW	C	Rhode & Schwarz	ESH2-Z5	830364/002	LISN 50 ohm/50uH 3 line	23-Feb-98	23-Feb-99
PW	C	Rhode & Schwarz	ESH3	872318/036	Low Frequency Receiver	03-Sep-98	03-Sep-99

TÜV PRODUCT SERVICE INC 40 Meadow Road Pinewood Springs, Lyons, CO 80540 Tel: 303 786 7999 Fax: 303 449 3004 Rev.No 1.0

Appendix A

Transmitter Data Sheets

TUV PRODUCT SERVICE

RADIATED EMISSIONS SUMMARY

Report #	B8506	Operator: Shawn Singh
Date of test:	20 Oct 98	Engineer: Shawn Singh
Model No.:	4053	
Equipment tested:	Desktop Reader w/Internal Antenna	
Requester:	Micron Communications, Inc.	
Representative:	Jack Henry	

TEST EQUIPMENT

EMCO 6502 Loop Antenna
Hewlett Packard 8566B Spectrum Analyzer

TEST DETAILS:

FCC Rules Section:	15.209
Fundamental Frequency:	0.125 MHz
Antenna description:	Internal Loop Antenna
Modulation Method:	None, continuous carrier
FCC Limit Distance:	300 meters
FCC Limit	19.2 uV/m 25.7 dBuV/m
FCC Default Falloff	40 dB/decade
Alternate Calculated Falloff	67.7 dB/decade
Falloff Used	67.7 dB/decade

MEASURED DATA:

Harmonic #	Freq. MHz	Readings dBuV/m					
		10 meters	Extrapolated Limit	Delta dB	30 meters	Extrapolated Limit	Delta dB
1	0.125	80.1	125.9	45.8	47.5	93.3	45.8
2	0.250	49.9	119.9	70	No emissions were found above the		
3	0.375	48.9	116.4	67.5	receiver's noise floor to 1.25 MHz.		
4	0.500	No emissions were found above the					
5	0.625	receiver's noise floor to 1.25 MHz.					
6	0.750						
7	0.875						
8	1.000						
9	1.125						
10	1.250						

CONCLUSION: The device under test passed emissions requirements under Section 15.209 with a passing margin of 45.8 dB at test distance of 3 meters using alternate calculated falloff distance extrapolation of 67.7 dB per decade.

TUV PRODUCT SERVICE

RADIATED EMISSIONS SUMMARY

Report #	B8506	Operator: Shawn Singh
Date of test:	20 Oct 98	Engineer: Shawn Singh
Model No.:	4053	
Equipment tested:	Industrial Reader w/Internal Antenna	
Requester:	Micron Communications, Inc.	
Representative:	Jack Henry	

TEST EQUIPMENT

EMCO 6502 Loop Antenna
Hewlett Packard 8566B Spectrum Analyzer

TEST DETAILS:

FCC Rules Section:	15.209
Fundamental Frequency:	0.125 MHz
Antenna description:	Internal Small Diameter Loop
Modulation Method:	None, continuous carrier
FCC Limit Distance:	300 meters
FCC Limit	19.2 uV/m 25.7 dBuV/m
FCC Default Falloff	40 dB/decade
Alternate Calculated Falloff	63.5 dB/decade
Falloff Used	63.5 dB/decade

MEASURED DATA:

Harmonic #	Freq. MHz	Readings dBuV/m					
		10 meters	Extrapolated Limit	Delta dB	30 meters	Extrapolated Limit	Delta dB
1	0.125	85.4	119.7	34.3	54.8	89.1	34.3
2	0.250	50.9	113.7	62.8	No emissions were found above the		
3	0.375	50.9	110.2	59.3	receiver's noise floor to 1.25 MHz.		
4	0.500	No emissions were found above the					
5	0.625	receiver's noise floor to 1.25 MHz.					
6	0.750						
7	0.875						
8	1.000						
9	1.125						
10	1.250						

CONCLUSION: The device under test passed emissions requirements under Section 15.209 with a passing margin of 34.3 dB at test distance of 3 meters using alternate calculated falloff distance extrapolation of 63.5 dB per decade.

TUV PRODUCT SERVICE

RADIATED EMISSIONS SUMMARY

Report #	B8506	Operator: Shawn Singh
Date of test:	20 Oct 98	Engineer: Shawn Singh
Model No.:	4053	
Equipment tested:	Industrial Reader w/External 4" x14 " Antenna	
Requester:	Micron Communications, Inc.	
Representative:	Jack Henry	

TEST EQUIPMENT

EMCO 6502 Loop Antenna
Hewlett Packard 8566B Spectrum Analyzer

TEST DETAILS:

FCC Rules Section:	15.209
Fundamental Frequency:	0.125 MHz
Antenna description:	External Loop
Modulation Method:	None, continuous carrier
FCC Limit Distance:	300 meters
FCC Limit	19.2 uV/m 25.7 dBuV/m
FCC Default Falloff	40 dB/decade
Alternate Calculated Falloff	60.2 dB/decade
Falloff Used	60.2 dB/decade

MEASURED DATA:

Harmonic #	**Freq. MHz**	**Readings dBuV/m**					
		10 meters	**Extrapolated Limit**	**Delta dB**	**30 meters**	**Extrapolated Limit**	**Delta dB**
1	0.125	87.9	114.8	26.9	58.9	85.8	26.9
2	0.250	50.9	108.8	57.9	No emissions were found above the		
3	0.375	48.9	105.3	56.4	receiver's noise floor to 1.25 MHz.		
4	0.500	No emissions were found above the					
5	0.625	receiver's noise floor to 1.25 MHz.					
6	0.750						
7	0.875						
8	1.000						
9	1.125						
10	1.250						

CONCLUSION: The device under test passed emissions requirements under Section 15.209 with a passing margin of 26.9 dB at test distance of 3 meters using alternate calculated falloff distance extrapolation of 60.2 dB per decade.

TUV PRODUCT SERVICE

RADIATED EMISSIONS SUMMARY

Report #	B8506	Operator: Shawn Singh
Date of test:	20 Oct 98	Engineer: Shawn Singh
Model No.:	4053	
Equipment tested:	Industrial Reader w/External 8" x22 " Antenna	
Requester:	Micron Communications, Inc.	
Representative:	Jack Henry	

TEST EQUIPMENT

EMCO 6502 Loop Antenna
Hewlett Packard 8566B Spectrum Analyzer

TEST DETAILS:

FCC Rules Section:	15.209
Fundamental Frequency:	0.125 MHz
Antenna description:	External Loop
Modulation Method:	None, continuous carrier
FCC Limit Distance:	300 meters
FCC Limit	19.2 uV/m 25.7 dBuV/m
FCC Default Falloff	40 dB/decade
Alternate Calculated Falloff	63.5 dB/decade
Falloff Used	63.5 dB/decade

MEASURED DATA:

Harmonic #	Freq. MHz	Readings dBuV/m					
		10 meters	Extrapolated Limit	Delta dB	30 meters	Extrapolated Limit	Delta dB
1	0.125	96.5	119.7	23.2	65.9	89.1	23.2
2	0.250	51.6	113.7	62.1	No emissions were found above the		
3	0.375	51.9	110.2	59	receiver's noise floor to 1.25 MHz.		
4	0.500	No emissions were found above the					
5	0.625	receiver's noise floor to 1.25 MHz.					
6	0.750						
7	0.875						
8	1.000						
9	1.125						
10	1.250						

CONCLUSION: The device under test passed emissions requirements under Section 15.209 with a passing margin of 23.2 dB at test distance of 3 meters using alternate calculated falloff distance extrapolation of 63.5 dB per decade.

TUV PRODUCT SERVICE

RADIATED EMISSIONS SUMMARY

Report #	B8506	Operator: Shawn Singh
Date of test:	20 Oct 98	Engineer: Shawn Singh
Model No.:	4053	
Equipment tested:	Industrial Reader w/External 15" x22 " Antenna	
Requester:	Micron Communications, Inc.	
Representative:	Jack Henry	

TEST EQUIPMENT

EMCO 6502 Loop Antenna
Hewlett Packard 8566B Spectrum Analyzer

TEST DETAILS:

FCC Rules Section:	15.209
Fundamental Frequency:	0.125 MHz
Antenna description:	External Loop
Modulation Method:	None, continuous carrier
FCC Limit Distance:	300 meters
FCC Limit	19.2 uV/m 25.7 dBuV/m
FCC Default Falloff	40 dB/decade
Alternate Calculated Falloff	71.2 dB/decade
Falloff Used	71.2 dB/decade

MEASURED DATA:

Harmonic #	**Freq. MHz**	**Readings dBuV/m**					
		10 meters	**Extrapolated Limit**	**Delta dB**	**30 meters**	**Extrapolated Limit**	**Delta dB**
1	0.125	102.5	130.9	28.4	68.5	96.9	28.4
2	0.250	52.7	124.9	72.2	No emissions were found above the		
3	0.375	56.6	121.3	64.7	receiver's noise floor to 1.25 MHz.		
4	0.500	No emissions were found above the					
5	0.625	receiver's noise floor to 1.25 MHz.					
6	0.750						
7	0.875						
8	1.000						
9	1.125						
10	1.250						

CONCLUSION: The device under test passed emissions requirements under Section 15.209 with a passing margin of 28.4 dB at test distance of 3 meters using alternate calculated falloff distance extrapolation of 71.2 dB per decade.

Appendix B

Detailed Test Data Sheets

TÜV Product Service

RADIATED EMISSIONS DATA SHEET

SHEET __1__ OF _10___

TEST REPORT # B8506

TEST DISTANCE 10 Meters | DATE: 20-Oct-98

Test Area TT1-1 | TESTED BY: Shawn Singh

Test Standards FCC Pt 15 15.209C | REVIEWED BY: _____

Manufacturer Micron Communications, Inc. Representative Jack Henry

EUT Description Desktop Reader w/Internal Antenna

EUT Model # 4053 EUT Serial # EMC-1

Test Specification Deviations: Additions to or Exclusions from:

S\emc\datashee\BLDRform.xlscv/jVD Mar 96

FREQ. (MHz)	Reading (dBuV)	Factor (dB)	Condition [1] (dBuV/m)	Condition [2] (dBuV/m)	Azimuth (deg)	Polarization	Remarks: Rotated loop antenna for maximum emissions
0.125	70.2	9.9	80.1				
0.25	40	9.9	49.9				
0.375	39	9.9	48.9				
0.5							No emissions were found above
"							the receiver's noise floor to
1.25							1.25 MHz.

Condition 1: Peak readings

Condition 2: _____

Modifications to EUT at time of test:

TÜV PRODUCT SERVICE INC 40 Meadow Road Pinewood Springs, Lyons, CO 80540 Tel: 303 786 7999 Fax: 303 449 3004 Rev.No 1.0

TÜV Product Service

RADIATED EMISSIONS DATA SHEET

TEST REPORT # B8506

TEST DISTANCE 30 Meters | DATE: 20-Oct-98

Test Area TT1-1 | TESTED BY: Shawn Singh

Test Standards FCC Pt 15 15.209C | REVIEWED BY:

Manufacturer Micron Communications, Inc. Representative Jack Henry

EUT Description Desktop Reader w/Internal Antenna

EUT Model # 4053 EUT Serial # EMC-1

Test Specification Deviations: Additions to or Exclusions from:

			Condition		S\emc\datashee\BLDRform.xlscv/jVD Mar 96		
FREQ. (MHz)	Reading (dBuV)	Factor (dB)	[1] (dBuV/m)	[2] (dBuV/m)	Azimuth (deg)	Polarization	Remarks: Rotated loop antenna for maximum emissions
0.125	37.6	9.9	47.5				
0.25							No emissions were found above
"							the receiver's noise floor to
1.25							1.25 MHz.

Condition 1: Peak readings

Condition 2:

Modifications to EUT at time of test:

TÜV PRODUCT SERVICE INC 40 Meadow Road Pinewood Springs, Lyons, CO 80540 Tel: 303 786 7999 Fax: 303 449 3004 Rev.No 1.0

TÜV Product Service

RADIATED EMISSIONS DATA SHEET

TEST REPORT # B8506

TEST DISTANCE 10 Meters | DATE: 20-Oct-98

Test Area TT1-1 | TESTED BY: Shawn Singh

Test Standards FCC Pt 15 15.209C | REVIEWED BY: _____

Manufacturer Micron Communications, Inc. Representative Jack Henry

EUT Description Industrial Reader w/Internal Antenna

EUT Model # 4053 EUT Serial # EMC-2

Test Specification Deviations: Additions to or Exclusions from:

			Condition		S\emc\datashee\BLDRform.xlscv/jVD Mar 96		
FREQ. (MHz)	Reading (dBuV)	Factor (dB)	[1] (dBuV/m)	[2] (dBuV/m)	Azimuth (deg)	Polarization	Remarks: Rotated loop antenna for maximum emissions
0.125	75.5	9.9	85.4				
0.25	41	9.9	50.9				
0.375	41	9.9	50.9				
0.5							No emissions were found above
"							the receiver's noise floor to
1.25							1.25 MHz.

Condition 1: Peak readings

Condition 2: _____

Modifications to EUT at time of test:

TÜV PRODUCT SERVICE INC 40 Meadow Road Pinewood Springs, Lyons, CO 80540 Tel: 303 786 7999 Fax: 303 449 3004 Rev.No 1.0

TÜV Product Service

RADIATED EMISSIONS DATA SHEET

SHEET __4__ OF _10___

TEST REPORT # B8506

TEST DISTANCE 30 Meters | DATE: 20-Oct-98

Test Area TT1-1 | TESTED BY: Shawn Singh

Test Standards FCC Pt 15 15.209C | REVIEWED BY: _____

Manufacturer Micron Communications, Inc. | Representative Jack Henry

EUT Description Desktop Reader w/Internal Antenna

EUT Model # 4053 | EUT Serial # EMC-2

Test Specification Deviations: Additions to or Exclusions from:

			Condition		S\emc\datashee\BLDRform.xlscv/jVD Mar 96		
FREQ. (MHz)	Reading (dBuV)	Factor (dB)	[1] (dBuV/m)	[2] (dBuV/m)	Azimuth (deg)	Polarization	Remarks: Rotated loop antenna for maximum emissions
0.125	44.9	9.9	54.8				
0.25							No emissions were found above
"							the receiver's noise floor to
1.25							1.25 MHz.

Condition 1: Peak readings

Condition 2: _____

Modifications to EUT at time of test:

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TÜV Product Service

RADIATED EMISSIONS DATA SHEET

TEST REPORT # B8506

TEST DISTANCE 10 Meters | DATE: 20-Oct-98

Test Area TT1-1 | TESTED BY: Shawn Singh

Test Standards FCC Pt 15 15.209C | REVIEWED BY: _____

Manufacturer Micron Communications, Inc. Representative Jack Henry

EUT Description Industrial Reader w/External 4" x 14" Antenna, S/N: 001(Ant.)

EUT Model # 4053 EUT Serial # EMC-3

Test Specification Deviations: Additions to or Exclusions from:

			Condition		S\emc\datashee\BLDRform.xlscv/jVD Mar 96		
FREQ. (MHz)	Reading (dBuV)	Factor (dB)	[1] (dBuV/m)	[2] (dBuV/m)	Azimuth (deg)	Polarization	Remarks: Rotated loop antenna for maximum emissions
0.125	78	9.9	87.9				
0.25	41	9.9	50.9				
0.375	39	9.9	48.9				
0.5							No emissions were found above
"							the receiver's noise floor to
1.25							1.25 MHz.

Condition 1: Peak readings

Condition 2: _____

Modifications to EUT at time of test:

TÜV Product Service

RADIATED EMISSIONS DATA SHEET

TEST REPORT # B8506

TEST DISTANCE 30 Meters | DATE: 20-Oct-98

Test Area TT1-1 | TESTED BY: Shawn Singh

Test Standards FCC Pt 15 15.209C | REVIEWED BY: _____

Manufacturer Micron Communications, Inc. Representative Jack Henry

EUT Description Industrial Reader w/External 4" x 14" Antenna, S/N: 001(Ant.)

EUT Model # 4053 EUT Serial # EMC-3

Test Specification Deviations: Additions to or Exclusions from:

S\emc\datashee\BLDRform.xlscv/jVD Mar 96

FREQ. (MHz)	Reading (dBuV)	Factor (dB)	Condition [1] (dBuV/m)	Condition [2] (dBuV/m)	Azimuth (deg)	Polarization	Remarks: Rotated loop antenna for maximum emissions
0.125	49	9.9	58.9				
0.25							No emissions were found above
"							the receiver's noise floor to
1.25							1.25 MHz.

Condition 1: Peak readings

Condition 2: _____

Modifications to EUT at time of test:

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TÜV Product Service

RADIATED EMISSIONS DATA SHEET

SHEET __7__ OF _10___

TEST REPORT # B8506

TEST DISTANCE 10 Meters | DATE: 20-Oct-98

Test Area TT1-1 | TESTED BY: Shawn Singh

Test Standards FCC Pt 15 15.209C | REVIEWED BY: _____

Manufacturer Micron Communications, Inc. Representative Jack Henry

EUT Description Industrial Reader w/External 8" x 22" Antenna, S/N: 001(Ant.)

EUT Model # 4053 EUT Serial # EMC-3

Test Specification Deviations: Additions to or Exclusions from:

S\emc\datashee\BLDRform.xlscv/jVD Mar 96

FREQ. (MHz)	Reading (dBuV)	Factor (dB)	Condition [1] (dBuV/m)	Condition [2] (dBuV/m)	Azimuth (deg)	Polarization	Remarks: Rotated loop antenna for maximum emissions
0.125	86.6	9.9	96.5				
0.25	41.7	9.9	51.6				
0.375	42	9.9	51.9				
0.5							No emissions were found above
"							the receiver's noise floor to
1.25							1.25 MHz.

Condition 1: Peak readings

Condition 2: _____

Modifications to EUT at time of test:

TÜV Product Service

RADIATED EMISSIONS DATA SHEET

TEST REPORT # B8506

TEST DISTANCE 30 Meters | DATE: 20-Oct-98

Test Area TT1-1 | TESTED BY: Shawn Singh

Test Standards FCC Pt 15 15.209C | REVIEWED BY: _____

Manufacturer Micron Communications, Inc. Representative Jack Henry

EUT Description Industrial Reader w/External 8" x 22" Antenna, S/N: 001(Ant.)

EUT Model # 4053 EUT Serial # EMC-3

Test Specification Deviations: Additions to or Exclusions from:

S\emc\datashee\BLDRform.xlscv/jVD Mar 96

FREQ. (MHz)	Reading (dBuV)	Factor (dB)	Condition [1] (dBuV/m)	Condition [2] (dBuV/m)	Azimuth (deg)	Polarization	Remarks: Rotated loop antenna for maximum emissions
0.125	56	9.9	65.9				
0.25							No emissions were found above
"							the receiver's noise floor to
1.25							1.25 MHz.

Condition 1: Peak readings

Condition 2: _____

Modifications to EUT at time of test:

TÜV PRODUCT SERVICE INC 40 Meadow Road Pinewood Springs, Lyons, CO 80540 Tel: 303 786 7999 Fax: 303 449 3004 Rev.No 1.0

TÜV Product Service

RADIATED EMISSIONS DATA SHEET

TEST REPORT # B8506

TEST DISTANCE 10 Meters | DATE: 20-Oct-98

Test Area TT1-1 | TESTED BY: Shawn Singh

Test Standards FCC Pt 15 15.209C | REVIEWED BY: _____

Manufacturer Micron Communications, Inc. Representative Jack Henry

EUT Description Industrial Reader w/External 15" x 22" Antenna, S/N: 24169/016(Ant.)

EUT Model # 4053 EUT Serial # EMC-3

Test Specification Deviations: Additions to or Exclusions from:

S\emc\datashee\BLDRform.xlscv/jVD Mar 96

FREQ. (MHz)	Reading (dBuV)	Factor (dB)	Condition [1] (dBuV/m)	Condition [2] (dBuV/m)	Azimuth (deg)	Polarization	Remarks: Rotated loop antenna for maximum emissions
0.125	92.6	9.9	102.5				
0.25	42.8	9.9	52.7				
0.375	46.7	9.9	56.6				
0.5							No emissions were found above
"							the receiver's noise floor to
1.25							1.25 MHz.

Condition 1: Peak readings

Condition 2: _____

Modifications to EUT at time of test:

TÜV PRODUCT SERVICE INC 40 Meadow Road Pinewood Springs, Lyons, CO 80540 Tel: 303 786 7999 Fax: 303 449 3004 Rev.No 1.0

TÜV Product Service

RADIATED EMISSIONS DATA SHEET

SHEET __10__ OF _10___

TEST REPORT # B8506

TEST DISTANCE 30 Meters

DATE: 20-Oct-98

Test Area TT1-1

TESTED BY: Shawn Singh

Test Standards FCC Pt 15 15.209C

REVIEWED BY: _____

Manufacturer Micron Communication, Inc. Representative Jack Henry

EUT Description Industrial Reader w/External 15" x 22" Antenna, S/N: 24169/016(Ant.)

EUT Model # 4053 EUT Serial # EMC-3

Test Specification Deviations: Additions to or Exclusions from:

			Condition		S\emc\datashee\BLDRform.xlscv/jVD Mar 96		
FREQ. (MHz)	Reading (dBuV)	Factor (dB)	[1] (dBuV/m)	[2] (dBuV/m)	Azimuth (deg)	Polarization	Remarks: Rotated loop antenna for maximum emissions
0.125	58.6	9.9	68.5				
0.25							No emissions were found above
"							the receiver's noise floor to
1.25							1.25 MHz.

Condition 1: Peak readings

Condition 2: _____

Modifications to EUT at time of test:

TÜV PRODUCT SERVICE INC 40 Meadow Road Pinewood Springs, Lyons, CO 80540 Tel: 303 786 7999 Fax: 303 449 3004 Rev.No 1.0

T U V P R O D U C T S E R V I C E

RADIATED EMISSIONS

PW1 Test Site — Report B8506 Run 5
3 Meter Antenna Distance — Date 12/30/98 Page 1
Equipment Under Test: — Engineer _____
Micron Communications 4053 — Tech: S S_____
Industrial Reader, S/N: EMC-3 — Requester_____
Notes: W/Ext. 15"x22" ant., S/N: 24169/016, Phihong PSA-30U-150 AC Adapter

Frequency MHz	Level dBuV	Factor dB	Cable dB	Final dBuV/m	Az deg	Polar\ Height		Delta FCC B	Delta
Shielded power cord. w/3', and 7.5' antenna cables.									
Below readings are with 7.5 ft cable.									
B/V antenna, 0 deg, init. ant. ht 1 m									
30.054	15.05	14.5	.4	29.9	--	V	--	-10.1	
38.676	14.45	13.4	.4	28.3	--	V	--	-11.7	
42.012	11.75	12.9	.4	25.1	--	V	--	-14.9	
47.996	11.85	12.5	.5	24.8	--	V	--	-15.2	
61.496	12.65	10.8	.5	23.9	--	V	--	-16.1	
73.541	16.15	9.1	.5	25.8	--	V	--	-14.2	
76.45	18.5	8.9	.5	27.9	--	V	--	-12.1	
112.64	12.65	11.3	.6	24.5	--	V	--	-19	
115.99	22.7	11.5	.6	34.9	--	V	--	-8.6	
128.75	12.4	12.2	.7	25.2	--	V	--	-18.3	
133.15	11.25	12.4	.7	24.3	--	V	--	-19.2	
144.25	9.05	13	.7	22.7	--	V	--	-20.8	
154.63	12.85	13	.7	26.6	--	V	--	-16.9	
156.90	9.25	13	.7	23	--	V	--	-20.5	
160.92	13.9	13	.7	27.6	--	V	--	-15.9	
164.95	10.75	13	.7	24.5	--	V	--	-19	
168.27	11.75	13	.7	25.5	--	V	--	-18	
171.82	12.95	13	.7	26.7	--	V	--	-16.8	
172.99	13.55	13	.7	27.3	--	V	--	-16.2	
177.02	17.8	13.1	.8	31.7	--	V	--	-11.8	
181.03	12.2	13.4	.8	26.3	--	V	--	-17.2	
185.07	14.45	13.6	.8	28.8	--	V	--	-14.7	
186.31	10.5	13.7	.8	25	--	V	--	-18.5	
189.09	12.35	13.8	.8	27	--	V	--	-16.5	
193.11	11.7	14.1	.8	26.6	--	V	--	-16.9	
90 deg									
30.054	15.8	14.5	.4	30.7	--	V	--	-9.3	
38.676	19.2	13.4	.4	33.1	--	V	--	-6.9	
73.541	17.95	9.1	.5	27.6	--	V	--	-12.4	
76.45	22.35	8.9	.5	31.7	--	V	--	-8.3	
115.99	22.4	11.5	.6	34.6	--	V	--	-8.9	

T U V P R O D U C T S E R V I C E

RADIATED EMISSIONS

PW1 Test Site — Report B8506 Run 5
3 Meter Antenna Distance — Date 12/30/98 Page 2
Equipment Under Test: — Engineer _____
Micron Communications 4053 — Tech: S S_____
Industrial Reader, S/N: EMC-3 — Requester_____
Notes: W/Ext. 15"x22" ant., S/N: 24169/016, Phihong PSA-30U-150 AC Adapter

Frequency MHz	Level dBuV	Factor dB	Cable dB	Final dBuV/m	Az deg	Polar\ Height		Delta FCC B	Delta
133.15	11.45	12.4	.7	24.5	--	V	--	-19	
168.27	12.8	13	.7	26.5	--	V	--	-17	
171.82	13.7	13	.7	27.4	--	V	--	-16.1	
193.11	11.75	14.1	.8	26.6	--	V	--	-16.9	
180 deg									
30.054	15.55	14.5	.4	30.4	--	V	--	-9.6	
61.496	14.3	10.8	.5	25.6	--	V	--	-14.4	
112.64	15.1	11.3	.6	27	--	V	--	-16.5	
128.75	15.7	12.2	.7	28.5	--	V	--	-15	
156.90	11.65	13	.7	25.4	--	V	--	-18.1	
168.27	13.95	13	.7	27.7	--	V	--	-15.8	
189.09	13.15	13.8	.8	27.8	--	V	--	-15.7	
193.11	14.45	14.1	.8	29.3	--	V	--	-14.2	
270 deg									
61.496	15.35	10.8	.5	26.6	--	V	--	-13.4	
112.64	15.4	11.3	.6	27.3	--	V	--	-16.2	
154.63	16.05	13	.7	29.8	--	V	--	-13.7	
160.92	14.65	13	.7	28.4	--	V	--	-15.1	
164.95	11.35	13	.7	25.1	--	V	--	-18.4	
193.11	15.45	14.1	.8	30.3	--	V	--	-13.2	
Maximized emissions 30 - 200 MHz.									
66 deg/1 m									
38.682	20.35	13.4	.4	34.2	--	V	--	-5.8	
166 deg/1 m									
76.45	22.9	8.9	.5	32.3	--	V	--	-7.7	
44 deg/1 m									
115.99	23.65	11.5	.6	35.8	--	V	--	-7.7	
Horizontal polarization.									
0 deg, init. ant ht 2.7 m									
112.64	15.95	11.3	.6	27.8	--	H	--	-15.7	

T U V P R O D U C T S E R V I C E

RADIATED EMISSIONS

PW1 Test Site — Report B8506 Run 5
3 Meter Antenna Distance — Date 12/30/98 Page 3
Equipment Under Test: — Engineer _____
Micron Communications 4053 — Tech: S S_____
Industrial Reader, S/N: EMC-3 — Requester_____
Notes: W/Ext. 15"x22" ant., S/N: 24169/016, Phihong PSA-30U-150 AC Adapter

Frequency MHz	Level dBuV	Factor dB	Cable dB	Final dBuV/m	Az deg	Polar\ Height		Delta FCC B	Delta
156.90	14.55	13	.7	28.3	--	H	--	-15.2	
160.92	15.75	13	.7	29.5	--	H	--	-14	
164.95	13.25	13	.7	27	--	H	--	-16.5	
172.99	14.1	13	.7	27.8	--	H	--	-15.7	
90 deg									
133.15	16.75	12.4	.7	29.8	--	H	--	-13.7	
144.25	12.1	13	.7	25.8	--	H	--	-17.7	
180 deg									
76.45	24.6	8.9	.5	34	--	H	--	-6	
112.64	16.4	11.3	.6	28.3	--	H	--	-15.2	
156.90	15.65	13	.7	29.4	--	H	--	-14.1	
160.92	16.65	13	.7	30.4	--	H	--	-13.1	
270 deg									
No higher emissions were found.									
128.75	17.5	12.2	.7	30.3	--	H	--	-13.2	
Please disregard above note.									
Maximized emissions									
186 deg/2.5 m									
76.45	25.05	8.9	.5	34.4	--	H	--	-5.6	
L/V ant, 0 deg, init. ant ht 1 m									
200	18.21	14.5	.8	33.5	--	V	--	-10	
201.14	11.95	11.5	.8	24.2	--	V	--	-19.3	
209.19	9.25	11.3	.8	21.4	--	V	--	-22.1	
232.97	9.88	11.1	.9	21.9	--	V	--	-24.1	
241.38	9.1	11.4	.9	21.4	--	V	--	-24.6	

T U V P R O D U C T S E R V I C E

RADIATED EMISSIONS

PW1 Test Site — Report B8506 Run 5
3 Meter Antenna Distance — Date 12/30/98 Page 4
Equipment Under Test: — Engineer _____
Micron Communications 4053 — Tech: S S_____
Industrial Reader, S/N: EMC-3 — Requester_____
Notes: W/Ext. 15"x22" ant., S/N: 24169/016, Phihong PSA-30U-150 AC Adapter

Frequency MHz	Level dBuV	Factor dB	Cable dB	Final dBuV/m	Az deg	Polar\ Height		Delta FCC B	Delta
254.06	12.1	11.9	.9	24.9	--	V	--	-21.1	
257.46	7.8	12	.9	20.7	--	V	--	-25.3	
266.10	19.62	12.4	.9	32.9	--	V	--	-13.1	
271.01	10.85	12.6	.9	24.4	--	V	--	-21.6	
288.05	11.95	13.6	1	26.6	--	V	--	-19.4	
332.87	11.56	14.5	1.1	27.1	--	V	--	-18.9	
366.23	6.26	14.9	1.1	22.2	--	V	--	-23.8	
386.60	3.9	15.1	1.1	20.2	--	V	--	-25.8	
399.09	5.6	15.3	1.2	22.1	--	V	--	-23.9	
463.91	12.26	16.9	1.3	30.4	--	V	--	-15.6	
466.49	10.72	17	1.3	29	--	V	--	-17	
502.57	5.9	17.7	1.3	24.9	--	V	--	-21.1	
525.05	2.75	18.1	1.4	22.2	--	V	--	-23.8	
632.04	1.75	19.5	1.5	22.8	--	V	--	-23.2	
90 deg									
254.06	12.55	11.9	.9	25.4	--	V	--	-20.6	
266.10	19.86	12.4	.9	33.1	--	V	--	-12.9	
332.87	19.26	14.5	1.1	34.8	--	V	--	-11.2	
399.09	9.13	15.3	1.2	25.6	--	V	--	-20.4	
463.91	8.57	16.9	1.3	26.7	--	V	--	-19.3	
180 deg									
209.19	10.95	11.3	.8	23.1	--	V	--	-20.4	
271.01	11.7	12.6	.9	25.2	--	V	--	-20.8	
366.23	8.92	14.9	1.1	24.9	--	V	--	-21.1	
386.60	6.75	15.1	1.1	23	--	V	--	-23	
463.91	16.98	16.9	1.3	35.1	--	V	--	-10.9	
466.49	16.53	17	1.3	34.8	--	V	--	-11.2	
502.57	8.9	17.7	1.3	27.9	--	V	--	-18.1	
525.05	4.65	18.1	1.4	24.1	--	V	--	-21.9	
270 deg									
632.04	2.68	19.5	1.5	23.7	--	V	--	-22.3	

Maximized emissions 200 - 1000 MHz.

T U V P R O D U C T S E R V I C E

RADIATED EMISSIONS

PW1 Test Site — Report B8506 Run 5
3 Meter Antenna Distance — Date 12/30/98 Page 5
Equipment Under Test: — Engineer _____
Micron Communications 4053 — Tech: S S_____
Industrial Reader, S/N: EMC-3 — Requester_____
Notes: W/Ext. 15"x22" ant., S/N: 24169/016, Phihong PSA-30U-150 AC Adapter

Frequency MHz	Level dBuV	Factor dB	Cable dB	Final dBuV/m	Az deg	Polar\ Height		Delta FCC B	Delta
168 deg/ 1 m									
200.01	18.12	11.5	.8	30.4	--	V	--	-13.1	
68 deg/1 m									
332.87	20.85	14.5	1.1	36.4	--	V	--	-9.6	
180 deg/ 1m									
466.49	17.74	17	1.3	36	--	V	--	-10	
Horizontal polarization.									
254.06	12.85	11.9	.9	25.7	--		--	-20.3	
Please disregard above reading.									
0 deg, init. ant. ht 1.9 m									
No higher emissions were found.									
90 deg									
232.97	14.89	11.1	.9	26.9	--	H	--	-19.1	
254.06	18.8	11.9	.9	31.6	--	H	--	-14.4	
266.10	25.36	12.4	.9	38.6	--	H	--	-7.4	
288.05	13.7	13.6	1	28.3	--	H	--	-17.7	
180 deg									
399.09	12	15.3	1.2	28.5	--	H	--	-17.5	
270 deg									
266.10	26.03	12.4	.9	39.3	--	H	--	-6.7	
288.05	15.55	13.6	1	30.2	--	H	--	-15.8	
Maximized emissions									
250 deg/1.4 m									

T U V P R O D U C T S E R V I C E

RADIATED EMISSIONS

PW1 Test Site — Report B8506 Run 5
3 Meter Antenna Distance — Date 12/30/98 Page 6
Equipment Under Test: — Engineer _____
Micron Communications 4053 — Tech: S S_____
Industrial Reader, S/N: EMC-3 — Requester_____
Notes: W/Ext. 15"x22" ant., S/N: 24169/016, Phihong PSA-30U-150 AC Adapter

Frequency MHz	Level dBuV	Factor dB	Cable dB	Final dBuV/m	Az deg	Polar\ Height		Delta FCC B	Delta
266.10	28.86	12.4	.9	42.1	--	H	--	-3.9	

****

Below readings are with 3 ft cable.

****

L/H ant.

No higher emissions were found.

Vertical polarization.

No higher emissions were found.

B/H antenna

0 deg, init. ant. ht 2.6 m

61.346	15.9	10.8	.5	27.2	--	H	--	-12.8	
128.75	22.6	12.2	.7	35.4	--	H	--	-8.1	
156.90	16.5	13	.7	30.2	--	H	--	-13.3	
160.92	18.45	13	.7	32.2	--	H	--	-11.3	
172.99	15.65	13	.7	29.4	--	H	--	-14.1	
177.02	19.95	13.1	.8	33.8	--	H	--	-9.7	

90 deg

133.15	18.27	12.4	.7	31.3	--	H	--	-12.2	

180 deg

61.346	17.35	10.8	.5	28.6	--	H	--	-11.4	
61.61	17.15	10.8	.5	28.4	--	H	--	-11.6	
128.75	22.9	12.2	.7	35.7	--	H	--	-7.8	

T U V P R O D U C T S E R V I C E

RADIATED EMISSIONS

PW1 Test Site — Report B8506 Run 5
3 Meter Antenna Distance — Date 12/30/98 Page 7
Equipment Under Test: — Engineer _____
Micron Communications 4053 — Tech: S S_____
Industrial Reader, S/N: EMC-3 — Requester_____
Notes: W/Ext. 15"x22" ant., S/N: 24169/016, Phihong PSA-30U-150 AC Adapter

Frequency MHz	Level dBuV	Factor dB	Cable dB	Final dBuV/m	Az deg	Polar\ Height		Delta FCC B	Delta
64.381	24.9	10.3	.5	35.7	--	H	--	-4.3	
124.70	19.75	12	.6	32.4	--	H	--	-11.1	
132.76	18.35	12.4	.7	31.4	--	H	--	-12.1	
136.79	16.2	12.6	.7	29.5	--	H	--	-14	
140.81	17.9	12.8	.7	31.4	--	H	--	-12.1	
144.83	20.25	13	.7	33.9	--	H	--	-9.6	

270 deg

No higher emissions were found.

Maximized emissions 30 - 200 MHz.

160 deg/ 2.3 m

64.381	24.4	10.3	.5	35.2	--	H	--	-4.8	

212 deg/2.5 m

128.75	23.75	12.2	.7	36.6	--	H	--	-6.9	

L/V antenna

No higher emissions were found.

T U V P R O D U C T S E R V I C E

RADIATED EMISSIONS

PW1 Test Site Figure____ Report B8506 Run 5
3 Meter Antenna Distance Date 12/30/98 Page 8
Equipment Under Test: Engineer _____
Micron Communications 4053 Tech: S S_____
Industrial Reader, S/N: EMC-3 Requester_____
Notes: W/Ext. 15"x22" ant., S/N: 24169/016, Phihong PSA-30U-150 AC Adapter

Measurement Summary

Frequency	----- Final -----		Azimuth	Polar\		Delta	Delta
MHz	dBuV/m	uV/m	deg	Height		FCC B	
30.054	30.7	34.276	--	V	--	-9.3	
38.682	34.2	51.286	--	V	--	-5.8	
42.012	25.1	17.988	--	V	--	-14.9	
47.996	24.8	17.378	--	V	--	-15.2	
61.346	28.6	26.915	--	H	--	-11.4	
61.61	28.4	26.302	--	H	--	-11.6	
64.381	35.7	60.953	--	H	--	-4.3	
73.541	27.6	23.988	--	V	--	-12.4	
76.45	34.4	52.480	--	H	--	-5.6	
112.64	28.3	26.001	--	H	--	-15.2	
115.99	35.8	61.659	--	V	--	-7.7	
124.70	32.4	41.686	--	H	--	-11.1	
128.75	36.6	67.608	--	H	--	-6.9	
132.76	31.4	37.153	--	H	--	-12.1	
133.15	31.3	36.728	--	H	--	-12.2	
136.79	29.5	29.853	--	H	--	-14	
140.81	31.4	37.153	--	H	--	-12.1	
144.25	25.8	19.498	--	H	--	-17.7	
144.83	33.9	49.545	--	H	--	-9.6	
154.63	29.8	30.902	--	V	--	-13.7	
156.90	30.2	32.359	--	H	--	-13.3	
160.92	32.2	40.738	--	H	--	-11.3	
164.95	27	22.387	--	H	--	-16.5	
168.27	27.7	24.266	--	V	--	-15.8	
171.82	27.4	23.442	--	V	--	-16.1	
172.99	29.4	29.512	--	H	--	-14.1	
177.02	33.8	48.977	--	H	--	-9.7	
181.03	26.3	20.653	--	V	--	-17.2	
185.07	28.8	27.542	--	V	--	-14.7	
186.31	25	17.782	--	V	--	-18.5	
189.09	27.8	24.547	--	V	--	-15.7	
193.11	30.3	32.734	--	V	--	-13.2	
200	33.5	47.315	--	V	--	-10	
201.14	24.2	16.218	--	V	--	-19.3	
209.19	23.1	14.288	--	V	--	-20.4	
232.97	26.9	22.130	--	H	--	-19.1	
241.38	21.4	11.748	--	V	--	-24.6	
254.06	31.6	38.018	--	H	--	-14.4	

T U V P R O D U C T S E R V I C E

RADIATED EMISSIONS

PW1 Test Site | Figure____ | Report B8506 Run 5
3 Meter Antenna Distance | Date 12/30/98 Page 9
Equipment Under Test: | Engineer _____
Micron Communications 4053 | Tech: S S_____
Industrial Reader, S/N: EMC-3 | Requester_____
Notes: W/Ext. 15"x22" ant., S/N: 24169/016, Phihong PSA-30U-150 AC Adapter

Measurement Summary (Cont'd)

Frequency	----- Final -----		Azimuth	Polar\		Delta	Delta
MHz	dBuV/m	uV/m	deg	Height		FCC B	
257.46	20.7	10.839	--	V	--	-25.3	
266.10	42.1	127.35	--	H	--	-3.9	
271.01	25.2	18.197	--	V	--	-20.8	
288.05	30.2	32.359	--	H	--	-15.8	
332.87	36.4	66.069	--	V	--	-9.6	
366.23	24.9	17.579	--	V	--	-21.1	
386.60	23	14.125	--	V	--	-23	
399.09	28.5	26.607	--	H	--	-17.5	
463.91	35.1	56.885	--	V	--	-10.9	
466.49	36	63.095	--	V	--	-10	
502.57	27.9	24.831	--	V	--	-18.1	
525.05	24.1	16.032	--	V	--	-21.9	
632.04	23.7	15.310	--	V	--	-22.3	

Minimum Passing Margin for FCC B is 3.9 dB at 266.10 MHz

File B8506 Run 5

T U V P R O D U C T S E R V I C E

RADIATED EMISSIONS

PW1 Test Site
3 Meter Antenna Distance
Equipment Under Test:
Micron Communications 4053
Industrial Reader, S/N: EMC-3
Notes: W/Ext. 8"x22" ant., S/N:001, Phihong PSA-30U-150 AC Adapter

Report B8506 Run 6
Date 12/30/98 Page 1
Engineer _____
Tech: S S_____
Requester_____

Frequency MHz	Level dBuV	Factor dB	Cable dB	Final dBuV/m	Az deg	Polar\ Height		Delta FCC B	Delta
Shielded power cord. With 3', and 7.5' antenna cables.									
Below readins are with 3 ft cable.									
B/V ant., 0 deg, init. ant ht 1 m									
30.054	18.1	14.5	.4	33	--	V	--	-7	
64.381	16.8	10.3	.5	27.6	--	V	--	-12.4	
128.75	14.85	12.2	.7	27.7	--	V	--	-15.8	
270 deg									
No higher emissions were found.									
180 deg									
30.054	18.35	14.5	.4	33.2	--	V	--	-6.8	
No higher emissions were found.									
90 deg									
30.054	19	14.5	.4	33.9	--	V	--	-6.1	
38.682	16.6	13.4	.4	30.5	--	V	--	-9.5	
Maximized emissions									
180 deg/ 1m									
30.054	19.35	14.5	.4	34.2	--	V	--	-5.8	
Horizontal polarization.									
0 deg, init. ant ht 2.3 m									
64.381	18.1	10.3	.5	28.9	--	H	--	-11.1	
128.75	20.85	12.2	.7	33.7	--	H	--	-9.8	
144.83	20.95	13	.7	34.6	--	H	--	-8.9	
193.11	20.4	14.1	.8	35.3	--	H	--	-8.2	

T U V P R O D U C T S E R V I C E

RADIATED EMISSIONS

PW1 Test Site
3 Meter Antenna Distance
Equipment Under Test:
Micron Communications 4053
Industrial Reader, S/N: EMC-3
Notes: W/Ext. 8"x22" ant., S/N:001, Phihong PSA-30U-150 AC Adapter

Report B8506 Run 6
Date 12/30/98 Page 2
Engineer _____
Tech: S S_____
Requester_____

Frequency MHz	Level dBuV	Factor dB	Cable dB	Final dBuV/m	Az deg	Polar\ Height	Delta FCC B	Delta
50	6.4	12.5	.5	19.4	--	--	-20.6	

Please disregard above reading.

270 deg

No higher emissions were found.

180 deg

64.381	21.85	10.3	.5	32.7	--	H --	-7.3	
177.02	19.3	13.1	.8	33.2	--	H --	-10.3	

90 deg

No higher emissions were found.

Maximized emissions

194 deg/2.4 m

64.381	22.15	10.3	.5	33	--	H --	-7	

L/V antenna

No higher emissions were found than previously recorded in RUN 5.

Horizontal polarization.

Below frequencies were maximized.

263 deg/1.4 m

266.10	29.23	12.4	.9	42.5	--	H --	-3.5	

115 deg/1.5 m

200.01	21.28	11.5	.8	33.6	--	H --	-9.9	

T U V P R O D U C T S E R V I C E

RADIATED EMISSIONS

PW1 Test Site — Report B8506 Run 6
3 Meter Antenna Distance — Date 12/30/98 Page 3
Equipment Under Test: — Engineer _____
Micron Communications 4053 — Tech: S S_____
Industrial Reader, S/N: EMC-3 — Requester_____
Notes: W/Ext. 8"x22" ant., S/N:001, Phihong PSA-30U-150 AC Adapter

Frequency MHz	Level dBuV	Factor dB	Cable dB	Final dBuV/m	Az deg	Polar\ Height		Delta FCC B	Delta

Below readings are with 7.5 ft cable.

L/H antenna.

No higher emissions were found.

Vertical polarization.

No higher emissions were found.

B/V antenna

0 deg, init. ant ht 1 m

64.381	22.15	10.3	.5	33	--	V	--	-7	

90 deg

38.682	18.35	13.4	.4	32.2	--	V	--	-7.8	
64.381	24.15	10.3	.5	35	--	V	--	-5	

180 deg

64.381	24.4	10.3	.5	35.2	--	V	--	-4.8	

270 deg

No higher emisisons were found.

Maximzied emissions

99 deg/1 m

64.381	24.75	10.3	.5	35.6	--	V	--	-4.4	

Horizontal polarization.

T U V P R O D U C T S E R V I C E

RADIATED EMISSIONS

PW1 Test Site — Report B8506 Run 6
3 Meter Antenna Distance — Date 12/30/98 Page 4
Equipment Under Test: — Engineer _____
Micron Communications 4053 — Tech: S S_____
Industrial Reader, S/N: EMC-3 — Requester_____
Notes: W/Ext. 8"x22" ant., S/N:001, Phihong PSA-30U-150 AC Adapter

Frequency MHz	Level dBuV	Factor dB	Cable dB	Final dBuV/m	Az deg	Polar\ Height	Delta FCC B	Delta

No higher emissions were found.

T U V P R O D U C T S E R V I C E

RADIATED EMISSIONS

PW1 Test Site Figure____ Report B8506 Run 6
3 Meter Antenna Distance Date 12/30/98 Page 5
Equipment Under Test: Engineer _____
Micron Communications 4053 Tech: S S_____
Industrial Reader, S/N: EMC-3 Requester_____
Notes: W/Ext. 8"x22" ant., S/N:001, Phihong PSA-30U-150 AC Adapter

Measurement Summary

Frequency	----- Final -----		Azimuth	Polar\		Delta	Delta
MHz	dBuV/m	uV/m	deg	Height		FCC B	
30.054	34.2	51.286	--	V	--	-5.8	
38.682	32.2	40.738	--	V	--	-7.8	
50	19.4	9.3325	--		--	-20.6	
64.381	35.6	60.255	--	V	--	-4.4	
128.75	33.7	48.417	--	H	--	-9.8	
144.83	34.6	53.703	--	H	--	-8.9	
177.02	33.2	45.708	--	H	--	-10.3	
193.11	35.3	58.210	--	H	--	-8.2	
200.01	33.6	47.863	--	H	--	-9.9	
266.10	42.5	133.35	--	H	--	-3.5	

Minimum Passing Margin for FCC B is 3.5 dB at 266.10 MHz

File B8506 Run 6

T U V P R O D U C T S E R V I C E

RADIATED EMISSIONS

PW1 Test Site
3 Meter Antenna Distance
Equipment Under Test:
Micron Communications 4053
Industrial Reader, S/N: EMC-3
Notes: W/Ext. 4"x14" ant., S/N:001, Phihong PSA-30U-150 AC Adapter

Report B8506 Run 7
Date 12/30/98 Page 1
Engineer _____
Tech: S S_____
Requester_____

Frequency MHz	Level dBuV	Factor dB	Cable dB	Final dBuV/m	Az deg	Polar\ Height	Delta FCC B	Delta

Shielded power cord. With 3', and 7.5' antenna cables.

Below readings are with 7.5 ft cable.

No higher emissions were found than previously recorded.

B/H antenna for above.

Vertical polarization.

Below frequency was maximized.

0 deg/1 m

80.471	24.75	8.5	.5	33.8	--	V	--	-6.2

L/V antenna

No higher emissions were found.

Horizontal polarization.

No higher emissions were found.

Below readings are with 3 ft cable.

B/V antenna

No higher emissions were found.

Horizontal polarization.

No higher emissions were found.

L/V antenna

T U V P R O D U C T S E R V I C E

RADIATED EMISSIONS

PW1 Test Site — Report B8506 Run 7
3 Meter Antenna Distance — Date 12/30/98 Page 2
Equipment Under Test: — Engineer _____
Micron Communications 4053 — Tech: S S_____
Industrial Reader, S/N: EMC-3 — Requester_____
Notes: W/Ext. 4"x14" ant., S/N:001, Phihong PSA-30U-150 AC Adapter

Frequency MHz	Level dBuV	Factor dB	Cable dB	Final dBuV/m	Az deg	Polar\ Height	Delta FCC B	Delta

No higher emissions were found.

Horizontal polarization.

No higher emissions were found.

T U V P R O D U C T S E R V I C E

RADIATED EMISSIONS

PW1 Test Site | Figure____ | Report B8506 Run 7
3 Meter Antenna Distance | Date 12/30/98 Page 3
Equipment Under Test: | Engineer _____
Micron Communications 4053 | Tech: S S_____
Industrial Reader, S/N: EMC-3 | Requester_____
Notes: W/Ext. 4"x14" ant., S/N:001, Phihong PSA-30U-150 AC Adapter

Measurement Summary

Frequency	----- Final -----		Azimuth	Polar\	Delta	Delta
MHz	dBuV/m	uV/m	deg	Height	FCC B	
80.471	33.8	48.977	--	V --	-6.2	

Minimum Passing Margin for FCC B is 6.2 dB at 80.471 MHz

File B8506 Run 7

T U V P R O D U C T S E R V I C E

RADIATED EMISSIONS

PW1 Test Site — Report B8506 Run 8
3 Meter Antenna Distance — Date 12/30/98 Page 1
Equipment Under Test: — Engineer _____
Micron Communications 4053 — Tech: S S_____
Industrial Reader, S/N: EMC-1 — Requester_____
Notes: W/int. antenna, Phihong PSA-30U-150 AC Adapter, shielded power cord

Frequency MHz	Level dBuV	Factor dB	Cable dB	Final dBuV/m	Az deg	Polar\ Height		Delta FCC B	Delta
B/H antenna.									
0 deg, init. ant ht 1 m									
69.911	10.75	9.5	.5	20.8	--	V	--	-19.2	
86.741	12.95	8.5	.6	22	--	V	--	-18	
90 deg									
132.76	18.96	12.4	.7	32	--	V	--	-11.5	
180 deg									
No higher emissions were found.									
270 deg									
No higher emissions were found.									
Maximized emissions									
270 deg/2.3 m									
132.76	18.7	12.4	.7	31.8	--	H	--	-11.7	
Vertical polarization.									
No higher emissions were found than RUN 5-7.									
L/V antenna									
No higher emissions were found.									
Horizontal polarization.									

T U V P R O D U C T S E R V I C E

RADIATED EMISSIONS

PW1 Test Site — Report B8506 Run 8
3 Meter Antenna Distance — Date 12/30/98 Page 2
Equipment Under Test: — Engineer _____
Micron Communications 4053 — Tech: S S_____
Industrial Reader, S/N: EMC-1 — Requester_____
Notes: W/int. antenna, Phihong PSA-30U-150 AC Adapter, shielded power cord

Frequency MHz	Level dBuV	Factor dB	Cable dB	Final dBuV/m	Az deg	Polar\ Height	Delta FCC B	Delta

No higher emissions were found.

T U V P R O D U C T S E R V I C E

RADIATED EMISSIONS

PW1 Test Site Figure____ Report B8506 Run 8
3 Meter Antenna Distance Date 12/30/98 Page 3
Equipment Under Test: Engineer _____
Micron Communications 4053 Tech: S S_____
Industrial Reader, S/N: EMC-1 Requester_____
Notes: W/int. antenna, Phihong PSA-30U-150 AC Adapter, shielded power cord

Measurement Summary

Frequency MHz	Final dBuV/m	Final uV/m	Azimuth deg	Polar\ Height		Delta FCC B	Delta
69.911	20.8	10.964	--	V	--	-19.2	
86.741	22	12.589	--	V	--	-18	
132.76	32	39.810	--	V	--	-11.5	

Minimum Passing Margin for FCC B is 11.5 dB at 132.76 MHz

File B8506 Run 8

T U V P R O D U C T S E R V I C E

RADIATED EMISSIONS

PW1 Test Site — Report B8506 Run 9
3 Meter Antenna Distance — Date 12/30/98 Page 1
Equipment Under Test: — Engineer _____
Micron Communications 4053 — Tech: S S_____
Desktop Reader, S/N: EMC-2 — Requester_____
Notes: W/int. antenna, Phihong PSA-30U-150 AC Adapter, shielded power cord

Frequency MHz	Level dBuV	Factor dB	Cable dB	Final dBuV/m	Az deg	Polar\ Height		Delta FCC B	Delta

L/V antenna.

Below frequency was maximized.

0 deg/1 m

287.36	18.55	13.6	1	33.1	--	V	--	-12.9	

Horizontal polarization.

No higher emissions were found.

B/V antenna.

Below frequencies were maximized.

244 deg/1 m

70.38	17.05	9.5	.5	27	--	V	--	-13	
126.44	16.7	12.1	.7	29.4	--	V	--	-14.1	

Horizontal polarization.

No higher emissions were found than previously recorded in RUN 5-8.

T U V P R O D U C T S E R V I C E

RADIATED EMISSIONS

PW1 Test Site | Figure____ | Report B8506 Run 9
3 Meter Antenna Distance | Date 12/30/98 Page 2
Equipment Under Test: | Engineer _____
Micron Communications 4053 | Tech: S S_____
Desktop Reader, S/N: EMC-2 | Requester_____
Notes: W/int. antenna, Phihong PSA-30U-150 AC Adapter, shielded power cord

Measurement Summary

Frequency MHz	Final dBuV/m	Final uV/m	Azimuth deg	Polar\ Height		Delta FCC B	Delta
70.38	27	22.387	--	V	--	-13	
126.44	29.4	29.512	--	V	--	-14.1	
287.36	33.1	45.185	--	V	--	-12.9	

Minimum Passing Margin for FCC B is 12.9 dB at 287.36 MHz

File B8506 Run 9

TUV PRODUCT SERVICE

Figure ____

NARROWBAND CONDUCTED EMISSIONS
MICRON, INDUST. READER W/15'X22' ANT., 120 V 60 HZ
PHIHONG PSA-30U-150 AC ADAPTER, SHIELDED AC CORD

Report: B8506 Run 1
Date: 21-DEC-98 Page 1
Engineer_____
Tech_____

Measurement Summary

Frequency (MHz)	Amplitude (dBuV)	DELTA FCC CLASS B
0.540	29.0	-19.0
1.635	44.8	-3.2
5.00	31.3	-16.7
14.71	35.7	-12.3
25.65	27.0	-21.0
29.29	29.2	-18.8

Minimum Passing Margin for FCC CLASS B is 3 dB at 1.6 MHz

File B8506 Run 1

TUV PRODUCT SERVICE

Figure ____

NARROWBAND CONDUCTED EMISSIONS
MICRON, INDUST. READER W/8'X22' ANT., 120 V 60 HZ
PHIHONG PSA-30U-150 AC ADAPTER, SHIELDED AC CORD

Report: B8506 Run 2
Date: 21-DEC-98 Page 1
Engineer_____
Tech_____

Measurement Summary

Frequency (MHz)	Amplitude (dBuV)	DELTA FCC CLASS B
0.540	29.2	-18.8
1.635	45.6	-2.4
5.00	30.0	-18.0
14.71	35.4	-12.6
25.65	27.6	-20.4
29.29	29.2	-18.8

Minimum Passing Margin for FCC CLASS B is 2 dB at 1.6 MHz

File B8506 Run 2

TUV PRODUCT SERVICE

Figure ____

NARROWBAND CONDUCTED EMISSIONS
MICRON, INDUST. READER W/4'X14' ANT., 120 V 60 HZ
PHIHONG PSA-30U-150 AC ADAPTER, SHIELDED AC CORD

Report: B8506 Run 3
Date: 21-DEC-98 Page 1
Engineer_____
Tech_____

Measurement Summary

Frequency (MHz)	Amplitude (dBuV)	DELTA FCC CLASS B
0.542	29.0	-19.0
1.635	39.1	-8.9
5.00	29.3	-18.7
14.71	27.1	-20.9
25.65	21.0	-27.0
29.29	27.5	-20.5

Minimum Passing Margin for FCC CLASS B is 8 dB at 1.6 MHz

File B8506 Run 3

TUV PRODUCT SERVICE

Figure ____

NARROWBAND CONDUCTED EMISSIONS
MICRON, INDUST. READER W/INT. ANT., 120 V 60 HZ
PHIHONG PSA-30U-150 AC ADAPTER, SHIELDED AC CORD

Report: B8506 Run 4
Date: 21-DEC-98 Page 1
Engineer_____
Tech_____

Measurement Summary

Frequency (MHz)	Amplitude (dBuV)	DELTA FCC CLASS B
0.499	29.0	-19.0
2.388	32.2	-15.8
4.86	32.8	-15.2
4.99	35.1	-12.9
7.74	24.3	-23.7
20.57	15.5	-32.5

Minimum Passing Margin for FCC CLASS B is 12 dB at 4.9 MHz

File B8506 Run 4

TUV PRODUCT SERVICE

Figure ____

NARROWBAND CONDUCTED EMISSIONS
MICRON, DESKTOP READER W/INT. ANT., 120 V 60 HZ
PHIHONG PSA-30U-150 AC ADAPTER, SHIELDED AC CORD

Report: B8506 Run 5
Date: 21-DEC-98 Page 1
Engineer_____
Tech_____

Measurement Summary

Frequency (MHz)	Amplitude (dBuV)	DELTA FCC CLASS B
0.499	30.5	-17.5
2.129	18.5	-29.5
4.74	34.2	-13.8
4.99	33.7	-14.3
7.74	25.5	-22.5
20.57	17.4	-30.6

Minimum Passing Margin for FCC CLASS B is 13 dB at 4.7 MHz

File B8506 Run 5

Appendix C

Test Plan

and

Constructional Data Form

Test Plan
for Electromagnetic Compatibility Testing

General Information (if you need assistance completing this form contact your TÜV Product Service representative.)

Company:	**Micron Communication**	Quote Number:	
Contact:	**Jack Henry**	Phone: (business hrs)	**208-333-7464**
E-mail Address:	**jhenry@micron.com**	Phone: (after hrs)	**208-345-8901**

Product Description

Description: **Passive Tag Reader**

Model Number: **4053** Serial Number: **001**

Test Objective

- ☐ EMC Directive 89/336/EEC (EMC)
- ☐ Machinery Directive 89/392/EEC (EMC
- ☐ Medical Device Directive 93/42/EEC (EMC)
- ☒ FCC **15** Part **209C** (list)
- ☐ Vehicle Directive 72/245/EEC (EMC)
- ☐ FDA Reviewers Guidance for Premarket Notification Submissions (EMC)
- ☒ Other **FCC Class B** (list)

Attendance

Test will be: ☒ Attended by the customer ☐ Unattended by the customer

Failure

If a failure occurs, TUV Product Service should:

- ☐ Call contact listed above, if not available then stop testing.
- ☐ Continue testing to complete test series.
- ☒ Continue testing to define corrective action.
- ☐ Stop testing.

Authorization

Mark Tuttle	**13 Oct. 1998**
Customer authorization to perform tests according to this test plan.	Date
Test Plan Prepared By (please print)	Date
Shawn Singh	**05 Jan. 1999**
Reviewed by TÜV Product Service Associate	Date

Test Plan
for Electromagnetic Compatibility Testing

Equipment Under Test Transportation

☒ Transportation between sites by customer.
☐ Other (consult your TÜV Product Service representative)

Dimensions and Weight

Length **6.3"** Width **3.75"**

Height **1.3"** Weight **10 Oz.**

Facilities

Power Requirements

☐	230 VAC 50 Hz	Single Phase	_____	Amps
☐	400 VAC 50 Hz	Three Phase	_____	Amps per phase
☒	120 VAC 60 Hz	Single Phase	**0.200**	Amps
☐	208 VAC 60 Hz	Three Phase	_____	Amps per phase
☐	_____	VDC	_____	Amps
☐	Battery _____	VDC	Expected life _____	hours
☐	Other _____			

Regulations require testing to be performed at typical power ratings in the countries of intended use. (i.e., European power is typically 230 VAC 50 Hz or 400 VAC 50 Hz, single and three phase, respectively)

Other

☐ Air _____ cfm _____ psi ☐ Water _____ gpm _____ psi
☐ Other _____ (describe)

Test Plan Attachments

Constructional *Data Form (CDF)* * The CDF is required for all test plans.
☒ Applicable (attached)

Immunity Test Plan Details
☐ Applicable (attached) ☐ N/A

Emissions Test Plan Details
☐ Applicable (attached) ☐ N/A

On Site Test Plan Details
☐ Applicable (attached) ☐ N/A

Constructional Data Form
for Electromagnetic Compatibility Testing

A completed form helps ensure that product testing will go smoothly. Add attachments as necessary for additional documentation. For additional help, please contact your TÜV Product Service Representative.

Press TAB to go to the next field.

Applicant -- Enter company information pertaining to the location where the product is manufactured and for the manufacturer's contact soliciting the testing.

Company: **Micron Communications, Inc.**

Address: **3176 S. Denver Way**

Boise, Idaho 83707-0006

Phone: **208-333-7464** Fax: **208-333-7445**

Contact: **Jack C. Henry** Position: **Regulatory Complicance Manager**

General Equipment Description -- Indicate which attachments you are providing with this document. It is recommended that you provide those listed.

Type of Equipment: **Passive Tag Reader** Model No.: **4053**

Serial No.: **001** FCC ID No.: **LC6-4053**

General description: **The MicroBadge 4053 RFID reader is a self-contained low frequency reader for powering and interrogating passive RFID transponders. The reader is configured to interface with other electronic devices via an RS-232 or RS-485 connection.**

Product Variant/Options: **Two different product casing: desktop and industrial versions.**

Three external and two internal antennas.

Attachments: (only required for certification)

☒ External Photographs ☒ Product Literature ☐ High Level Bill of Materials

Press TAB to go to the next field. Date and sign each page of the CDF. Original signatures must be present on each page.

Date: 10/13/98 **Signature of Applicant:**

Constructional Data Form
for Electromagnetic Compatibility Testing

Installation and Environmental Conditions (describe) -- Describe the intended installation. Include details such as power connection and system grounding approaches. Describe the intended operating environment, include details such as humidity, cooling, heating and hazardous environments. Attaching a copy of an Installation manual is recommended for proper documentation of your system. Please indicate.

Installation: Power connector is a standard class 2 transformer (plug in). There is a DB9 connection to a computer.

Intended operation environment: Industrial, dry, non hazardous, any humidity, and temperature
-40 degree C to 70 degree C.

☒ Installation manual/instructions (attached, only required for certification)

Power Requirements -- Indicate your system power requirements for the equipment to be tested.

Rated Voltage **12 VDC** Rated Input Power _____

Protection Class -- Indicate your product's protection class. Contact your TÜV Product Service representative and is only required for certification.

Type: _____ Class: _____

Press TAB to go to the next field. Date and sign each page of the CDF. Original signatures must be present on each page.

Date: 10/13/98 **Signature of Applicant:**

Constructional Data Form
for Electromagnetic Compatibility Testing

I/O Ports and Cables

Indicate all interface cables which can be attached to the equipment even if they are not sold as part of your system. Describe the port (e.g., Parallel, Serial, SCSI), list its type (e.g., AC, DC, Signal, Control) and number of ports/cables of type. Indicate if the I/O port is to be exercised during testing. List the type of transmission and if the cable is an EUT assembly-to-assembly interconnection cable (PC to printer, to modem). Indicate whether the cable is shielded or not, type of shield (e.g. Braid, Foil) and how terminated (e.g. 360 degree to conductive shell, pigtail) at both ends of the cable. If a cable can have a typical length of ≥ 3.0 meters, then it is required to test with a cable of at least 3.0 meters.

I/O Ports and Cables

Description: **RS232 (Standard Type) and RS485**

Type of Port: **RS232 or RS485** # of ports/cables of type **1**

Exercised during testing?	☒	Yes	☐	No
Assembly ↔ Assembly Interconnect	☐	Yes	☒	No
Cable shielded:	☒	Yes	☐	No

Shield Type (describe) **Standard**

Termination: (describe) **DB9**

Transmission Type:	☐	Analog	☒	Digital

Length of cable: **6'** Maximum: **6'** Tested:**6'**

I/O Ports and Cables

Description: **RG-174 Coaxial Cable (Antenna Cable)**

Type of Port: **Antenna Port** # of ports/cables of type **1**

Exercised during testing?	☒	Yes	☐	No
Assembly ↔ Assembly Interconnect	☐	Yes	☐	No
Cable shielded:	☒	Yes	☐	No

Shield Type (describe) **Braid (Single-Shield)**

Termination: (describe) **360 degrees**

Transmission Type:	☐	Analog	☒	Digital

Length of cable: **7.5'** Maximum: **7.5'** Tested:**7.5'**

I/O Ports and Cables

Description: **Thin Net Coaxial Cable (Antenna Cable)**

Type of Port: **Antenna Port** # of ports/cables of type **1**

Exercised during testing?	☒	Yes	☐	No
Assembly ↔ Assembly Interconnect	☐	Yes	☐	No
Cable shielded:	☒	Yes	☐	No

Shield Type (describe) **Braid (Single-Shield)**

Termination: (describe) **360 degrees**

Transmission Type:	☐	Analog	☒	Digital

Length of cable: **3'** Maximum: **3'** Tested:**3'**

Press TAB to go to the next field. Date and sign each page of the CDF. Original signatures must be present on each page.

Date: 10/13/98 **Signature of Applicant:**

Constructional Data Form
for Electromagnetic Compatibility Testing

EUT configurations -- Provide a technical description of all possible EUT configurations. Specify if more than one configuration is to be tested.

RS232 output to PC with hyperterminal software.
RS485 output to PC with hyperterminal software

EUT Software and Operation Modes to be Tested -- list the operating modes to be used during test. It is recommended the equipment be tested while operating in a typical operation mode. Consult with your TÜV Product Service Representative when typical operating modes are not practical. FCC testing of personal computers and/or peripherals requires that a simple program generate a complete line of upper case H's. This pattern must be sent to the parallel port device, serial port device, and must be write/read/verified to each storage device. Monitors must display the H pattern, typically in white letters on a black background. Provide a general description of all software, firmware, and PLD algorithms used in the equipment. List all code modules as described above, with the revision level used during testing.

General Description: (describe)	**Hyperterminal/Win95**
Software Revision Level: (list and describe)	**N/A**
Operating modes to be tested: (list and describe)	**On**

☒ Operation manual/instructions (attached)

Press TAB to go to the next field. Date and sign each page of the CDF. Original signatures must be present on each page.

Date: 10/13/98 **Signature of Applicant:**

Constructional Data Form
for Electromagnetic Compatibility Testing

System, Subsystem, Major Subassemblies or Internal Peripherals -- List and describe all system, subsystem, major subassemblies and all internal peripherals. This should include such things as an external monitor, parallel interface peripheral, serial interface peripheral, internal disk drives or internal circuit boards. It is recommended that circuit diagrams, assembly and subassembly drawings be attached. Please indicate.

Description	*Model #*	*Serial #*	*FCC ID #*
15''x22" Panel Antena	**MP0068**	**24169/016**	
8"x22" Panel Antenna	**MP0063**	**001**	
4"x14" Panel Antenna	**MP0093**	**001**	

☐ **Technical Drawings attached**

Interfacing Equipment and/or Simulators (which are not part of the EUT) -- List and Describe all equipment or peripherals that will be connected to the EUT. For FCC testing a minimum configuration is required. If you have questions about this minimum configuration contact your TÜV Product Service representative.

Description	*Model #*	*Serial #*	*FCC ID #*
Micron PC	**M1000-13-TFT**	**56402599**	**JBQM1000PC**
Micron AC Adapter	**310-0073-00**	**3102540770469**	**N/A**
HP Printer	**C2168A**	**US4B4150X0**	**B94C2121X**

Press TAB to go to the next field. Date and sign each page of the CDF. Original signatures must be present on each page.

Date: 10/13/98 **Signature of Applicant:**

Constructional Data Form
for Electromagnetic Compatibility Testing

EMC System Details -- List all frequencies and sub-harmonics which are 10kHz or above for such things as oscillators, horizontal line rate of monitors, and clock rates of incorporated OEM assemblies. List all power supplies. Indicate switching frequencies. List power line filters and indicate the manufacturer, model and location on EUT. Indicate all components used for high frequency noise reduction. (e.g., ceramic capacitor, 0.01µF, 1 ea. at C12 - C20).

Oscillator Frequencies

Frequency	*Sub-harmonics*	*EUT Location*	*Description of Use*
16 MHz		**Motherboada, Y1**	**uP Clock**
125 kHz		**Motherboard**	**Int.to Transponder omm.**

Power Supply

Frequency	*Manufacturer*	*Model #*	*Serial #*	*Type (list frequency)*
	Phihong	**PSA-30U-150**	**C7391191 0D3**	**AC Adapter**

Power Line Filters

Manufacturer	*Model #*	*Qty*	*Location on EUT*

Critical EMI Components (Capacitors, ferrites, etc.)

Description	*Manufacturer*	*Part # or Value*	*Qty*	*Location on EUT*

Press TAB to go to the next field. Date and sign each page of the CDF. Original signatures must be present on each page.

Date: 10/13/98 **Signature of Applicant:**

TÜV PRODUCT SERVICE INC 40 Meadow Road Pinewood Springs, Lyons, CO 80540 Tel: 303 786 7999 Fax: 303 449 3004 Rev.No 1.0

Constructional Data Form
for Electromagnetic Compatibility Testing

Other EMI Critical Construction Detail -- Indicate any other measures taken to reduce high frequency noise, (e.g., grounding the circuit board on the right rear corner with 0.25" braid, 3 inches long to the chassis).

Description of Enclosure -- Describe the principle materials of the enclosure (e.g., plastic, plastic with shielding material, metal, metal with specific shielding contact points, metal with paint on all surfaces).

Plastic

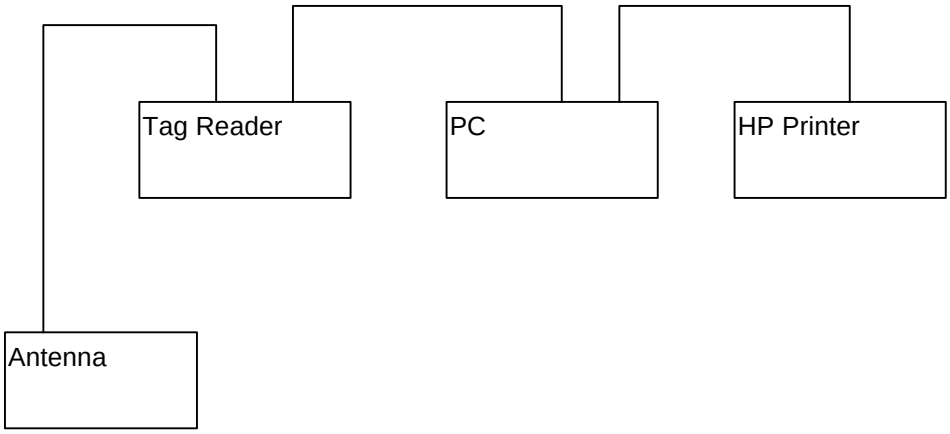
Press TAB to go to the next field. Date and sign each page of the CDF. Original signatures must be present on each page.

Date: 10/13/98 **Signature of Applicant:**

Constructional Data Form
for Electromagnetic Compatibility Testing

System Configuration Block Diagram -- Provide a line drawing identifying the EUT, simulators, support equipment, I/O cables, power cables, and any other pertinent components to be used during testing. Use a dashed line to separate the equipment in the testing field versus equipment outside testing field.

Date and sign each page of the CDF. Original signatures must be present on each page.



Date: **Signature of Applicant:**

Appendix D

Measurement of Protocol

MEASUREMENT PROTOCOL FOR FCC

GENERAL INFORMATION

Measurement Uncertainty

The test system for conducted emissions is defined as the LISN, tuned receiver or spectrum analyzer, and coaxial cable. The test system for radiated emissions is defined as the antenna, the pre-amplifier, the spectrum analyzer and the coaxial cable. These test systems have a measurement uncertainty of ±4.5 dB. The equipment comprising the test systems are calibrated on an annual basis.

Justification

The Equipment Under Test (EUT) is configured in a typical user arrangement in accordance with the manufacturer's instructions. A cable is connected to each available port and either terminated with a peripheral into it's characteristic impedance or left unterminated. When appropriate, the cables are manually manipulated with respect to each other to obtain maximum emissions from the unit.

CONDUCTED EMISSIONS

The final level, expressed in dBµV, is arrived at by taking the reading directly from the EMI receiver. This level is compared directly to the FCC limit.

To convert between dBµV and µV, the following conversions apply:

dBµV = 20(log µV)

µV = Inverse log(dBµV/20)

RADIATED EMISSIONS

The final level, expressed in dBµV/m, is arrived at by taking the reading from the spectrum analyzer (Level dBµV) and adding the antenna correction factor and cable loss factor (Factor dB) to it. This result then has the FCC limit subtracted from it to provide the Delta which gives the tabular data as shown in the data sheets in Attachment B. The amplifier gain is automatically accounted for by using an analyzer offset.

Example:

Frequency (MHz)	Level (dBµV)	+	Factor & Cable (dB)	=	Final (dBµV/m)	-	FCC B Limit (dBµV/m)	=	Delta FCC B (dB)
32.21	13.9	+	16.3	=	30.2	-	40.0	=	-9.8

DETAILS OF TEST PROCEDURES

General Standard Information

The test methods used comply with ANSI C63.4-1992 - "Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz."

Conducted Emissions

Conducted emissions on the 60 Hz power interface of the EUT are measured in the frequency range of 450 kHz to 30 MHz. The measurements are performed using a receiver, which has CISPR characteristic bandwidth and quasi-peak detection, and a Line Impedance Stabilization Network (LISN), with 50 Ω/50 μH (CISPR 16) characteristics. Table top equipment is placed on a non-conducting table 80 centimeters above the floor and is positioned 40 centimeters from the vertical ground plane (wall) of the screen room. In some cases, a pre-scan using a spectrum analyzer is initially performed on the units comprising the system under test to locate the highest emissions. If the minimum passing margin appears to be less than 20 dB with a peak mode measurement, the emissions are re-measured using a tuned receiver or spectrum analyzer with quasi-peak and average detection and recorded on the data sheets.

Magnetic Field Radiated Emissions

Magnetic field radiated emissions from the EUT are measured in the frequency range of 9 kHz to 30 MHz using a spectrum analyzer and loop antenna. Measurements between 9 kHz and 30 MHz are made with 10 kHz/6 dB bandwidth and peak or quasi-peak detection. Table top equipment is placed on a 1.0 X 1.5 meter non-conducting table 80 centimeters above the ground plane. Floor standing equipment is placed directly on the turntable/ground plane. Interface cables that are closer than 40 centimeters to the ground plane are bundled in the center in a serpentine fashion so they are at least 40 centimeters from the ground plane. Cables to simulators/testers (if used in this test) are routed through the center of the table and to a screen room located outside the test area. The antenna is positioned with its plane vertical at the specified distance from the EUT and rotated about its vertical axis for maximum response at each azimuth about the EUT. To locate maximum emissions from the test sample the antenna is varied in height from 1 to 4 meters, and the EUT are rotated 360 degrees.

Electric Field Radiated Emissions

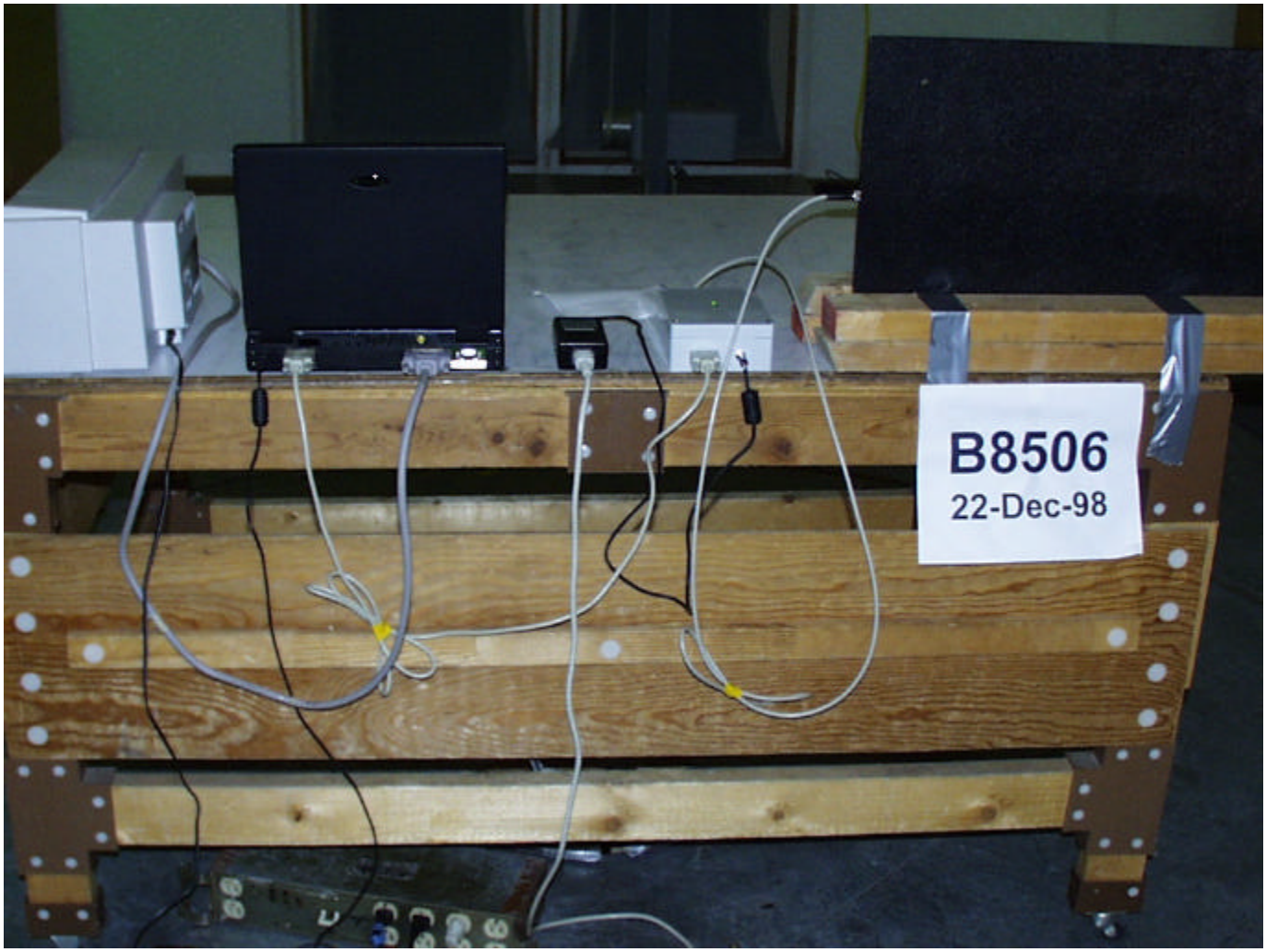
Radiated emissions from the EUT are measured in the frequency range of 30 to 1000 MHz using a spectrum analyzer and appropriate broadband linearly polarized antennas. Measurements between 30 MHz and 1000 MHz are made with 120 kHz/6 dB bandwidth and quasi-peak detection and measurements above 1000 MHz are made with a 1 MHz/6 dB bandwidth and peak detection. Table top equipment is placed on a 1.0 X 1.5 meter non-conducting table 80 centimeters above the ground plane. Floor standing equipment is placed directly on the turntable/ground plane. Interface cables that are closer than 40 centimeters to the ground plane are bundled in the center in a serpentine fashion so they are at least 40 centimeters from the ground plane. Cables to simulators/testers (if used in this test) are routed through the center of the table and to a screen room located outside the test area. The antenna is positioned 3 meters horizontally from the EUT . To locate maximum emissions from the test sample the antenna is varied in height from 1 to 4 meters, measurement scans are made with both horizontal and vertical antenna polarizations and the EUT are rotated 360 degrees. Intentional radiators are rotated through three orthogonal axes to determine the attitude that maximizes the emissions.

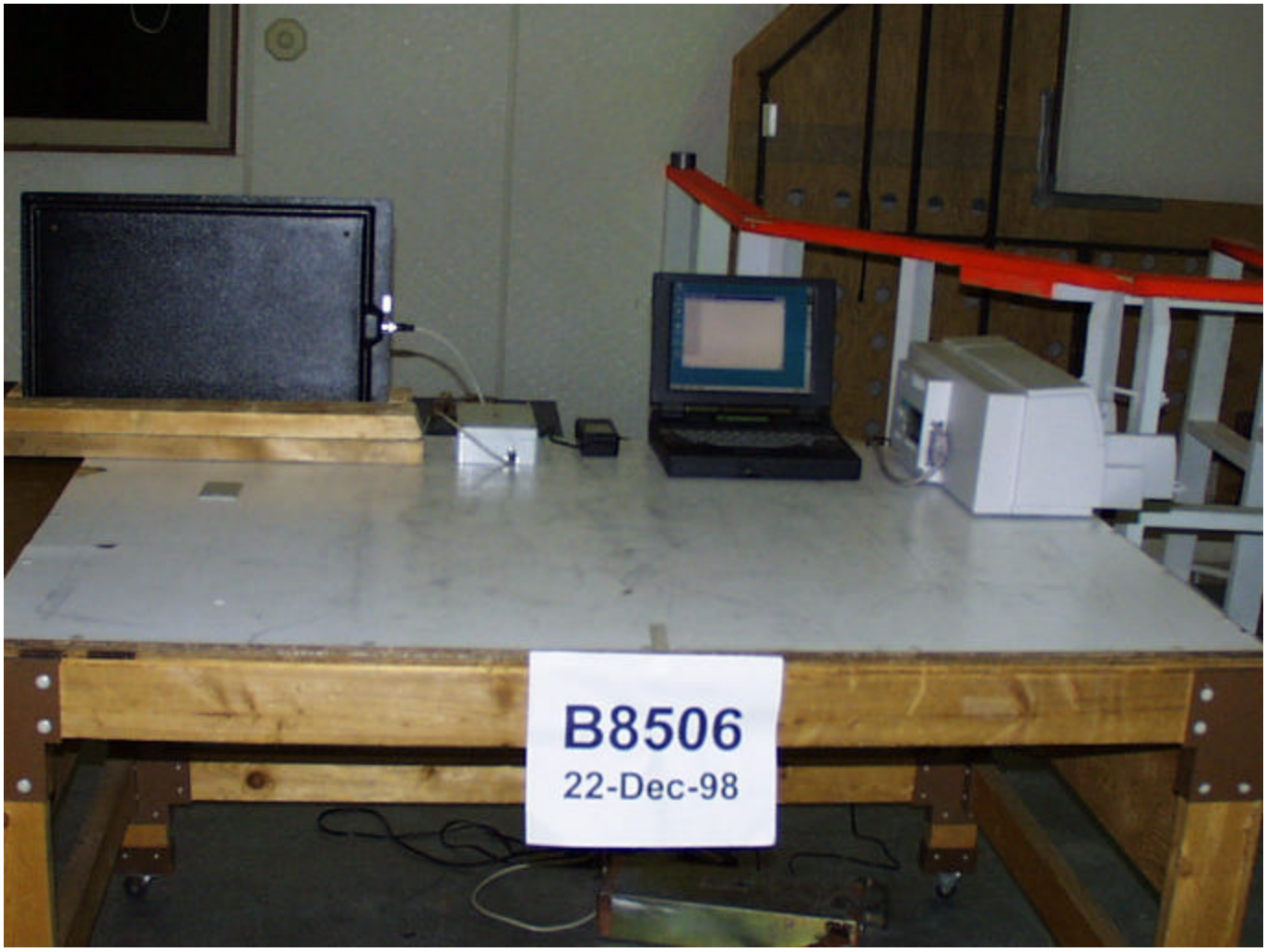
Appendix E

Test Setup Photographs
(see attached photos)

Test Setup Photo(s)
Conducted Emissions

Test Setup Photo(s)
Radiated Emissions

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