EMC EMISSION - TEST REPORT

Test Report No.	**B850601**	Issue Date	18 November 1998

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:	02 November 1998
Test Result	■ **PASS** ☐ **FAIL**
Test Report Project No.	**B201850601**
Total Pages including Appendices	59

Reviewed By : Felix J. Chavez

Reviewed By : Shawn Singh

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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 7 dB at 11.1 MHz

Failing Margin _____ dB at _____ MHz

Remarks: _____

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

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

Passing Margin 4.7 dB at 67.6 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: _____

GENERAL REMARKS:

Modifications required to pass:

Added a Fair-rite ferrite part #0443164251 to 7.5 ft. antenna cable on tag reader side.

Test Specification Deviations: Additions to or Exclusions from: None

Test Equipment Used

Colorado Test Equipment

05-Nov-98

Report: B8506 **Date: 20 Oct.98-02 Nov.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	3104C	9203-4508	Biconical antenna	19-Jun-98	19-Jun-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

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

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:

			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	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

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

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-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:

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 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	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

SHEET __6__ 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/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:

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 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 Desktop 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

SHEET __9__ 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 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	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

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 Desktop 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

			Condition				
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

PW2 Test Site
10 Meter Antenna Distance
Equipment Under Test:
Micron Communications
Indust. Reader, S/N 24169/016
Notes: w/15"x22" antenna, CCTN58-7.5 B cable, support: Notebook PC, Printer

Report B8506 Run 4
Date 11/02/98 Page 1
Engineer Blake.
Tech: S S Shawn Singh
Requester

Frequency MHz	Level dBuV	Factor dB	Cable dB	Final dBuV/m	Az deg	Polar\ Height		Delta FCC A	Delta
A prescan was done with different antennas. The wrost case emissions were found with 15"x22" antenna.									
38.683	14.15	10.8	1.4	26.3	--	V	--	-12.8	
46.283	19.45	11	1.4	31.8	--	V	--	-7.3	
67.66	23.55	9.3	1.5	34.4	--	V	--	-4.7	
69.796	20.45	8.8	1.6	30.8	--	V	--	-8.3	
84.879	15.75	7.3	1.7	24.7	--	V	--	-14.4	
104.47	12.1	12.4	1.8	26.3	--	V	--	-17.2	
115.99	12.3	15.4	1.8	29.5	--	V	--	-14	
128.75	14.5	13.4	1.9	29.9	--	V	--	-13.6	
144.22	10.65	12.8	2	25.5	--	V	--	-18	
168.28	7.55	15.3	2.2	25	--	V	--	-18.5	
193.30	7.65	16.8	2.3	26.8	--	V	--	-16.7	
90 degrees azimuth \ Above readings were at 0 degrees azimuth, and initial antenna height 1 meter.									
38.683	17.7	10.8	1.4	29.9	--	V	--	-9.2	
115.99	12.8	15.4	1.8	30	--	V	--	-13.5	
180 degrees azimuth									
46.283	20.05	11	1.4	32.4	--	V	--	-6.7	
115.97	17.6	15.4	1.8	34.8	--	V	--	-8.7	
161.14	13.2	15.2	2.1	30.5	--	V	--	-13	
270 degrees azimuth									
46.283	20.9	11	1.4	33.3	--	V	--	-5.8	
Maximized emissions 30 - 200 MHz.									
246 degrees azimuth, antenna height 1 meter.									
46.283	21.05	11	1.4	33.4	--	V	--	-5.7	
0 degrees azimuth, antenna height 1 meter.									

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

RADIATED EMISSIONS

PW2 Test Site
10 Meter Antenna Distance
Equipment Under Test:
Micron Communications
Indust. Reader, S/N 24169/016
Notes: w/15"x22" antenna, CCTN58-7.5 B cable, support: Notebook PC, Printer

Report B8506 Run 4
Date 11/02/98 Page 2
Engineer BLADE.
Tech: S S Sherwin Singh
Requester

Frequency MHz	Level dBuV	Factor dB	Cable dB	Final dBuV/m	Az deg	Polar\ Height		Delta FCC A	Delta
67.66	23	9.3	1.5	33.8	--	V	--	-5.3	

Horizontal polarization.

0 degrees azimuth, initial antenna height 3 meters.

No higher emissions were found.

137.71	-1.8	13	2	13.2	--		--	-30.3	

Please disregard above reading.

90 degrees azimuth

No higher emissions were found.

180 degrees azimuth

No higher emissions were found.

270 degrees azimuth

No higher emissions were found.

Log periodic antenna, vertical polarization.

0 degrees azimuth, initial antenna height 1 meter.

216.35	8.65	11.2	2.5	22.4	--	V	--	-24	
220.16	7.25	11.2	2.5	20.9	--	V	--	-25.5	
231.96	10	11.1	2.6	23.7	--	V	--	-22.7	
254.06	15.05	11.9	2.7	29.7	--	V	--	-16.7	
271.01	10.95	12.6	2.8	26.4	--	V	--	-20	
287.93	8.4	13.6	2.9	25	--	V	--	-21.4	
309.29	6.25	15	3.1	24.3	--	V	--	-22.1	

90 degrees azimuth

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

RADIATED EMISSIONS

PW2 Test Site — Report B8506 Run 4
10 Meter Antenna Distance — Date 11/02/98 Page 3
Equipment Under Test: — Engineer KC Joe
Micron Communications — Tech: S S Shawn Singh
Indust. Reader, S/N 24169/016 — Requester
Notes: w/15"x22" antenna, CCTN58-7.5 B cable, support: Notebook PC, Printer

Frequency MHz	Level dBuV	Factor dB	Cable dB	Final dBuV/m	Az deg	Polar\ Height		Delta FCC A	Delta
254.06	16.45	11.9	2.7	31.1	--	V	--	-15.3	
287.93	10.3	13.6	2.9	26.9	--	V	--	-19.5	
180 degrees azimuth									
271.01	16.15	12.6	2.8	31.6	--	V	--	-14.8	
287.93	15.6	13.6	2.9	32.2	--	V	--	-14.2	
270 degrees azimuth									
231.96	12	11.1	2.6	25.7	--	V	--	-20.7	
Maximized emissions 200 - 1000 MHz.									
200 degrees azimuth, antenna height 1 meter.									
287.93	16.55	13.6	2.9	33.1	--	V	--	-13.3	
Horizontal polarization.									
0 degrees azimuth, initial antenna height 2.5 meters.									
347.94	6.15	14.7	3.3	24.2	--	H	--	-22.2	
90 degrees azimuth									
254.06	18.65	11.9	2.7	33.3	--	H	--	-13.1	
180 degrees azimuth									
347.94	8.3	14.7	3.3	26.3	--	H	--	-20.1	
270 degrees azimuth									
No higher emissions were found.									
Maximized emissions 200 - 1000 MHz.									
100 degrees azimuth, antenna height 3 meters.									

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

RADIATED EMISSIONS

PW2 Test Site
10 Meter Antenna Distance
Equipment Under Test:
Micron Communications
Indust. Reader, S/N 24169/016

Report B8506 Run 4
Date 11/02/98 Page 4
Engineer ______
Tech: S S ______
Requester ______

Notes: w/15"x22" antenna, CCTN58-7.5 B cable, support: Notebook PC, Printer

Frequency MHz	Level dBuV	Factor dB	Cable dB	Final dBuV/m	Az deg	Polar\ Height	Delta FCC A	Delta
254.06	19.4	11.9	2.7	34	--	H --	-12.4	

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

PW2 Test Site | Figure____ | Report B8506 Run 4
10 Meter Antenna Distance | Date 11/02/98 Page 5
Equipment Under Test: | Engineer FJL Joe.
Micron Communications | Tech: S S Shawn Singh
Indust. Reader, S/N 24169/016 | Requester
Notes: w/15"x22" antenna, CCTN58-7.5 B cable, support: Notebook PC, Printer

Measurement Summary

Frequency MHz	Final dBuV/m	Final uV/m	Azimuth deg	Polar\ Height		Delta FCC A	Delta
38.683	29.9	31.260	--	V	--	-9.2	
46.283	33.4	46.773	--	V	--	-5.7	
67.66	34.4	52.480	--	V	--	-4.7	
69.796	30.8	34.673	--	V	--	-8.3	
84.879	24.7	17.179	--	V	--	-14.4	
104.47	26.3	20.653	--	V	--	-17.2	
115.97	34.8	54.954	--	V	--	-8.7	
128.75	29.9	31.260	--	V	--	-13.6	
137.71	13.2	4.5708	--		--	-30.3	
144.22	25.5	18.836	--	V	--	-18	
161.14	30.5	33.496	--	V	--	-13	
168.28	25	17.782	--	V	--	-18.5	
193.30	26.8	21.877	--	V	--	-16.7	
216.35	22.4	13.182	--	V	--	-24	
220.16	20.9	11.091	--	V	--	-25.5	
231.96	25.7	19.275	--	V	--	-20.7	
254.06	34	50.118	--	H	--	-12.4	
271.01	31.6	38.018	--	V	--	-14.8	
287.93	33.1	45.185	--	V	--	-13.3	
309.29	24.3	16.405	--	V	--	-22.1	
347.94	26.3	20.653	--	H	--	-20.1	

Minimum Passing Margin for FCC A is 4.7 dB at 67.66 MHz

File B8506 Run 4

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

RADIATED EMISSIONS

PW2 Test Site
3 Meter Antenna Distance
Equipment Under Test:
Micron Communications
Indust. Reader s/n 24169/016
Notes: Support: Laptop Computer, Printer

Report B8506 Run 2
Date 10/20/98 Page 1
Engineer FJ&JSP
Tech: CKP CKP
Requester

Frequency MHz	Level dBuV	Factor dB	Cable dB	Final dBuV/m	Az deg	Polar\ Height		Delta FCC B		Delta FCC A	
Worse case configuration: 6' antenna cable & 8"x22" antenna											
maximized cables, 282 degrees, 1m											
50.799	37.6	11.1	1.1	49.9	--	V	--	9.9	*	.4	*
50.559	10.95	11.2	1.1	23.2	--	V	--	-16.8		-26.3	
50.559	37.7	11.2	1.1	50	--	V	--	10	*	.5	*
51.052	37.65	11.1	1.1	49.9	--	V	--	9.9	*	.4	*
removed ferrite, maximized cables, 1m height, 235 degrees											
48.797	37.6	11.1	1.1	49.8	--	V	--	9.8	*	.3	*
50.559	30.55	11.2	1.1	42.8	--	V	--	2.8	*	-6.7	
New configuration: 3' cable & 8"x22" antenna											
30.061	21.3	12.8	1	35.1	--	V	--	-4.9		-14.4	
30.949	21.9	12.5	1	35.4	--	V	--	-4.6		-14.1	
31.441	21.85	12.3	1	35.2	--	V	--	-4.8		-14.3	
31.951	20.6	12.2	1	33.8	--	V	--	-6.2		-15.7	
maximized above at 230 degrees, 1m height, maximized cables											
maximized 262 degrees, 1m height											
42.254	23.6	10.8	1.1	35.5	--	V	--	-4.5		-14	
48.29	27.8	11.1	1.1	40	--	V	--	0	*	-9.5	
48.541	26.1	11.1	1.1	38.3	--	V	--	-1.7		-11.2	
49.783	25.9	11.2	1.1	38.2	--	V	--	-1.8		-11.3	
52.315	26.55	11	1.1	38.7	--	V	--	-1.3		-10.8	
bicon vertical, 1m height, 0 degrees											
56.613	20.3	10.8	1.2	32.2	--	V	--	-7.8		-17.3	
61.869	18.9	10.4	1.2	30.5	--	V	--	-9.5		-19	
62.121	18.65	10.4	1.2	30.2	--	V	--	-9.8		-19.3	
64.005	20.9	10.1	1.2	32.2	--	V	--	-7.8		-17.3	
68.409	19.75	9.1	1.2	30.1	--	V	--	-9.9		-19.4	
88.893	20.05	8.2	1.3	29.6	--	V	--	-13.9		-24.4	
89.648	21.65	8.4	1.3	31.4	--	V	--	-12.1		-22.6	
91.91	27.35	8.8	1.4	37.5	--	V	--	-6		-16.5	
92.912	24.3	9	1.4	34.7	--	V	--	-8.8		-19.3	
95.175	23.7	9.5	1.4	34.6	--	V	--	-8.9		-19.4	
104.73	23.35	12.5	1.4	37.2	--	V	--	-6.3		-16.8	
105.49	23.75	12.6	1.4	37.8	--	V	--	-5.7		-16.2	
108.63	24	13.3	1.4	38.7	--	V	--	-4.8		-15.3	
110.64	22.75	13.9	1.5	38.1	--	V	--	-5.4		-15.9	
112.65	26.8	14.7	1.5	43	--	V	--	-.5		-11	
118.69	18.1	14.4	1.5	34	--	V	--	-9.5		-20	

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

RADIATED EMISSIONS

PW2 Test Site
3 Meter Antenna Distance
Equipment Under Test:
Micron Communications
Indust. Reader s/n 24169/016
Notes: Support: Laptop Computer, Printer

Report B8506 Run 2
Date 10/20/98 Page 2
Engineer _____
Tech: CKP _____
Requester _____

Frequency MHz	Level dBuV	Factor dB	Cable dB	Final dBuV/m	Az deg	Polar\ Height		Delta FCC B		Delta FCC A
119.20	18.5	14.3	1.5	34.3	--	V	--	-9.2		-19.7
124.72	22.15	13.5	1.5	37.2	--	V	--	-6.3		-16.8
128.75	22.15	13.4	1.6	37.1	--	V	--	-6.4		-16.9
156.92	13.8	15.3	1.7	30.8	--	V	--	-12.7		-23.2
90 degrees										
48.29	27.75	11.1	1.1	40	--	V	--	0	*	-9.5
49.783	26.1	11.2	1.1	38.4	--	V	--	-1.6		-11.1
56.613	22.25	10.8	1.2	34.2	--	V	--	-5.8		-15.3
61.869	19.2	10.4	1.2	30.8	--	V	--	-9.2		-18.7
64.005	21.1	10.1	1.2	32.4	--	V	--	-7.6		-17.1
88.893	22.75	8.2	1.3	32.3	--	V	--	-11.2		-21.7
89.648	23.9	8.4	1.3	33.7	--	V	--	-9.8		-20.3
92.912	24.65	9	1.4	35	--	V	--	-8.5		-19
104.73	25.65	12.5	1.4	39.5	--	V	--	-4		-14.5
105.49	26.1	12.6	1.4	40.1	--	V	--	-3.4		-13.9
108.63	26.1	13.3	1.4	40.8	--	V	--	-2.7		-13.2
180 degrees										
92.912	24.55	9	1.4	34.9	--	V	--	-8.6		-19.1
95.175	24.5	9.5	1.4	35.4	--	V	--	-8.1		-18.6
104.73	27.35	12.5	1.4	41.2	--	V	--	-2.3		-12.8
110.64	22.9	13.9	1.5	38.2	--	V	--	-5.3		-15.8
128.75	23.1	13.4	1.6	38.1	--	V	--	-5.4		-15.9
156.92	14.85	15.3	1.7	31.9	--	V	--	-11.6		-22.1
270 degrees										
61.869	21	10.4	1.2	32.6	--	V	--	-7.4		-16.9
62.121	20	10.4	1.2	31.6	--	V	--	-8.4		-17.9
124.72	23.05	13.5	1.5	38.1	--	V	--	-5.4		-15.9
128.75	24.2	13.4	1.6	39.2	--	V	--	-4.3		-14.8
maximized cables, 110 degrees, 1m height										
48.29	29	11.1	1.1	41.2	--	V	--	1.2	*	-8.3
Bicon Horizontal, 2.5m, 0 degrees										
30.061	12.3	12.8	1	26.1	--	H	--	-13.9		-23.4
88.893	25.1	8.2	1.3	34.7	--	H	--	-8.8		-19.3
89.648	25.55	8.4	1.3	35.3	--	H	--	-8.2		-18.7
92.912	26.15	9	1.4	36.5	--	H	--	-7		-17.5
95.175	25.3	9.5	1.4	36.2	--	H	--	-7.3		-17.8
112.65	26.3	14.7	1.5	42.5	--	H	--	-1		-11.5
128.75	26.4	13.4	1.6	41.4	--	H	--	-2.1		-12.6
53.574	14.95	10.9	1.1	27	--	H	--	-13		-22.5

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

RADIATED EMISSIONS

PW2 Test Site
3 Meter Antenna Distance
Equipment Under Test:
Micron Communications
Indust. Reader s/n 24169/016
Notes: Support: Laptop Computer, Printer

Report B8506 Run 2
Date 10/20/98 Page 3
Engineer EMC3RD
Tech: CKP CKP
Requester

Frequency MHz	Level dBuV	Factor dB	Cable dB	Final dBuV/m	Az deg	Polar\ Height	Delta FCC B	Delta FCC A
76.064	26.05	7.4	1.3	34.7	--	H --	-5.3	-14.8
72.539	24	8.1	1.2	33.4	--	H --	-6.6	-16.1
87.893	25	8	1.3	34.3	--	H --	-5.7	-15.2
89.399	25.6	8.4	1.3	35.3	--	H --	-8.2	-18.7
89.908	25.7	8.5	1.3	35.5	--	H --	-8	-18.5
91.654	25.35	8.8	1.3	35.5	--	H --	-8	-18.5
98.218	22	11.1	1.4	34.5	--	H --	-9	-19.5
100.71	23.4	12.1	1.4	36.9	--	H --	-6.6	-17.1
102.21	24.55	12.2	1.4	38.2	--	H --	-5.3	-15.8
90 degrees								
53.574	21.95	10.9	1.1	34	--	H --	-6	-15.5
118.69	18.6	14.4	1.5	34.5	--	H --	-9	-19.5
119.20	19.4	14.3	1.5	35.2	--	H --	-8.3	-18.8
128.75	28.05	13.4	1.6	43	--	H --	-.5	-11
180 degrees								
72.539	26.25	8.1	1.2	35.6	--	H --	-4.4	-13.9
76.064	27.65	7.4	1.3	36.3	--	H --	-3.7	-13.2
87.893	25.4	8	1.3	34.7	--	H --	-5.3	-14.8
89.648	25.85	8.4	1.3	35.6	--	H --	-7.9	-18.4
98.218	23.15	11.1	1.4	35.6	--	H --	-7.9	-18.4
270 degrees								
53.574	23.4	10.9	1.1	35.4	--	H --	-4.6	-14.1
maximized cables, 253 degrees, 3.64m								
53.822	28.05	10.9	1.1	40.1	--	H --	.1 *	-9.4
Log vertical, 1m, 0 degrees								
200.02	14.45	11.5	2	27.9	--	V --	-15.6	-26.1
209.08	13.1	11.3	2	26.5	--	V --	-17	-27.5
220.19	13.05	11.2	2.1	26.3	--	V --	-19.7	-30.6
237.11	14.9	11.3	2.2	28.3	--	V --	-17.7	-28.6
90 degrees								
220.17	17.45	11.2	2.1	30.7	--	V --	-15.3	-26.2
237.11	16.8	11.3	2.2	30.2	--	V --	-15.8	-26.7
237.11	16.95	11.3	2.2	30.4	--	V --	-15.6	-26.5

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

RADIATED EMISSIONS

PW2 Test Site
3 Meter Antenna Distance
Equipment Under Test:
Micron Communications
Indust. Reader s/n 24169/016
Notes: Support: Laptop Computer, Printer

Report B8506 Run 2
Date 10/20/98 Page 4
Engineer
Tech: CKP
Requester

Frequency MHz	Level dBuV	Factor dB	Cable dB	Final dBuV/m	Az deg	Polar\ Height		Delta FCC B	Delta FCC A
180 degrees									
209.08	13.6	11.3	2	27	--	V	--	-16.5	-27
270 degrees									
209.08	13.85	11.3	2	27.2	--	V	--	-16.3	-26.8
Log horizontal, 2.5m, 0 degrees									
231.96	9.55	11.1	2.1	22.8	--	H	--	-23.2	-34.1
312.57	9.1	14.9	2.6	26.6	--	H	--	-19.4	-30.3
313.82	9.25	14.9	2.6	26.8	--	H	--	-19.2	-30.1
316.83	7.9	14.8	2.6	25.4	--	H	--	-20.6	-31.5
90 degrees									
220.17	18.65	11.2	2.1	31.9	--	H	--	-14.1	-25
231.95	19.65	11.1	2.1	32.9	--	H	--	-13.1	-24
180 degrees									
312.57	10.1	14.9	2.6	27.6	--	H	--	-18.4	-29.3
313.82	10.65	14.9	2.6	28.2	--	H	--	-17.8	-28.7
316.83	9.7	14.8	2.6	27.2	--	H	--	-18.8	-29.7
270 degrees									
209.08	16.85	11.3	2	30.2	--	H	--	-13.3	-23.8

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

RADIATED EMISSIONS

PW2 Test Site | Figure____ | Report B8506 Run 2
3 Meter Antenna Distance | Date 10/20/98 Page 5
Equipment Under Test: | Engineer FLO CKP
Micron Communications | Tech: CKP
Indust. Reader s/n 24169/016 | Requester
Notes: Support: Laptop Computer, Printer

Measurement Summary

Frequency MHz	Final dBuV/m	Final uV/m	Azimuth deg	Polar\ Height	Delta FCC B		Delta FCC A	
30.061	35.1	56.885	--	V --	-4.9		-14.4	
30.949	35.4	58.884	--	V --	-4.6		-14.1	
31.441	35.2	57.544	--	V --	-4.8		-14.3	
31.951	33.8	48.977	--	V --	-6.2		-15.7	
42.254	35.5	59.566	--	V --	-4.5		-14	
48.29	41.2	114.81	--	V --	1.2	*	-8.3	
48.541	38.3	82.224	--	V --	-1.7		-11.2	
~~48.797~~	~~49.8~~	~~309.02~~	--	V --	~~9.8~~	*	~~.3~~	* CKP
49.783	38.4	83.176	--	V --	-1.6		-11.1	
~~50.559~~	~~50~~	~~316.22~~	--	V --	~~10~~	*	~~.5~~	* CKP
~~50.799~~	~~49.9~~	~~312.60~~	--	V --	~~9.9~~	*	~~.4~~	* CKP
~~51.052~~	~~49.9~~	~~312.60~~	--	V --	~~9.9~~	*	~~.4~~	* CKP
52.315	38.7	86.099	--	V --	-1.3		-10.8	
53.574	35.4	58.884	--	H --	-4.6		-14.1	
53.822	40.1	101.15	--	H --	.1	*	-9.4	
56.613	34.2	51.286	--	V --	-5.8		-15.3	
61.869	32.6	42.657	--	V --	-7.4		-16.9	
62.121	31.6	38.018	--	V --	-8.4		-17.9	
64.005	32.4	41.686	--	V --	-7.6		-17.1	
68.409	30.1	31.988	--	V --	-9.9		-19.4	
72.539	35.6	60.255	--	H --	-4.4		-13.9	
76.064	36.3	65.313	--	H --	-3.7		-13.2	
87.893	34.7	54.325	--	H --	-5.3		-14.8	
88.893	34.7	54.325	--	H --	-8.8		-19.3	
89.399	35.3	58.210	--	H --	-8.2		-18.7	
89.648	35.6	60.255	--	H --	-7.9		-18.4	
89.908	35.5	59.566	--	H --	-8		-18.5	
91.654	35.5	59.566	--	H --	-8		-18.5	
91.91	37.5	74.989	--	V --	-6		-16.5	
92.912	36.5	66.834	--	H --	-7		-17.5	
95.175	36.2	64.565	--	H --	-7.3		-17.8	
98.218	35.6	60.255	--	H --	-7.9		-18.4	
100.71	36.9	69.984	--	H --	-6.6		-17.1	
102.21	38.2	81.283	--	H --	-5.3		-15.8	
104.73	41.2	114.81	--	V --	-2.3		-12.8	
105.49	40.1	101.15	--	V --	-3.4		-13.9	
108.63	40.8	109.64	--	V --	-2.7		-13.2	
110.64	38.2	81.283	--	V --	-5.3		-15.8	

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

RADIATED EMISSIONS

PW2 Test Site
3 Meter Antenna Distance
Equipment Under Test:
Micron Communications
Indust. Reader s/n 24169/016
Notes: Support: Laptop Computer, Printer

Figure____

Report B8506 Run 2
Date 10/20/98 Page 6
Engineer ~~EMC~~ CKP
Tech: CKP
Requester

Measurement Summary (Cont'd)

Frequency MHz	Final dBuV/m	Final uV/m	Azimuth deg	Polar\ Height		Delta FCC B	Delta FCC A
112.65	43	141.25	--	V	--	-.5	-11
118.69	34.5	53.088	--	H	--	-9	-19.5
119.20	35.2	57.544	--	H	--	-8.3	-18.8
124.72	38.1	80.352	--	V	--	-5.4	-15.9
128.75	43	141.25	--	H	--	-.5	-11
156.92	31.9	39.355	--	V	--	-11.6	-22.1
200.02	27.9	24.831	--	V	--	-15.6	-26.1
209.08	30.2	32.359	--	H	--	-13.3	-23.8
220.17	31.9	39.355	--	H	--	-14.1	-25
231.95	32.9	44.157	--	H	--	-13.1	-24
237.11	30.4	33.113	--	V	--	-15.6	-26.5
312.57	27.6	23.988	--	H	--	-18.4	-29.3
313.82	28.2	25.703	--	H	--	-17.8	-28.7
316.83	27.2	22.908	--	H	--	-18.8	-29.7

Maximum Failure Margin for FCC B is ~~10 dB at 50.559 MHz~~ 1.2dB @ 48.29mHz CKP
~~Maximum Failure Margin for FCC A is .5 dB at 50.559 MHz~~ CKP
Minimum passing Margin for FCC A is 8.3dB @ 48.29mHz CKP
File B8506 Run 2

Chris K Poore
20 Oct 98

A

TUV PRODUCT SERVICE

Figure ____

NARROWBAND CONDUCTED EMISSIONS
MICRON COMM.,DESKTOP.W/INTERNAL ANT., CARD READER
CONDOR TRANSFORMER MDL. D7-10-01, 120V 60HZ.

Report: B8506 Run 5
Date: 20-OCT-98 Page 1
Engineer
Tech

Measurement Summary

Frequency (MHz)	Amplitude (dBuV)	DELTA FCC CLASS A
0.450	43.8	-16.2
5.00	46.7	-22.8
11.19	56.7	-12.8
11.25	56.9	-12.6
11.32	57.7	-11.8
11.38	57.0	-12.5
29.79	18.0	-51.5

Minimum Passing Margin for FCC CLASS A is 11 dB at 11.3 MHz

File B8506 Run 5

A

TUV PRODUCT SERVICE

Figure ____

NARROWBAND CONDUCTED EMISSIONS
MICRON COMM.,INDUST.W/INTERNAL ANT., CARD READER
CONDOR TRANSFORMER MDL. D7-10-01, 120V 60HZ.

Report: B8506 Run 4
Date: 20-OCT-98 Page 1
Engineer
Tech

Measurement Summary

Frequency (MHz)	Amplitude (dBuV)	DELTA FCC CLASS A
0.450	43.8	-16.2
5.00	45.2	-24.3
11.19	57.3	-12.2
11.25	57.9	-11.6
11.32	60.4	-9.1
11.38	57.0	-12.5
29.79	25.0	-44.5

Minimum Passing Margin for FCC CLASS A is 9 dB at 11.3 MHz

File B8506 Run 4

A

TUV PRODUCT SERVICE

Figure ____

NARROWBAND CONDUCTED EMISSIONS
MICRON COMM., 4 X 14 ANTENNA, CARD READER
CONDOR TRANSFORMER MDL. D7-10-01, 120V 60HZ.

Report: B8506 Run 3
Date: 20-OCT-98 Page 1
Engineer
Tech

Measurement Summary

Frequency (MHz)	Amplitude (dBuV)	DELTA FCC CLASS A
0.450	44.0	-16.0
5.00	46.4	-23.1
11.19	59.9	-9.6
11.25	59.9	-9.6
11.32	60.4	-9.1
11.38	59.1	-10.4
29.79	46.5	-23.0

Minimum Passing Margin for FCC CLASS A is 9 dB at 11.3 MHz

File B8506 Run 3

A

TUV PRODUCT SERVICE

Figure ____

NARROWBAND CONDUCTED EMISSIONS
MICRON COMM., 8 X 22 ANTENNA, CARD READER
CONDOR TRANSFORMER MDL. D7-10-01, 120V 60HZ.

Report: B8506 Run 2
Date: 20-OCT-98 Page 1
Engineer
Tech

Measurement Summary

Frequency (MHz)	Amplitude (dBuV)	DELTA FCC CLASS A
0.450	44.0	-16.0
5.00	46.4	-23.1
11.19	60.0	-9.5
11.25	59.9	-9.6
11.32	60.2	-9.3
11.38	60.2	-9.3
26.78	45.3	-24.2

Minimum Passing Margin for FCC CLASS A is 9 dB at 11.3 MHz

File B8506 Run 2

A

TUV PRODUCT SERVICE

Figure ____

NARROWBAND CONDUCTED EMISSIONS
MICRON COMM., 15 X 22 ANTENNA, CARD READER
CONDOR TRANSFORMER MDL. D7-10-01, 120V 60HZ.

Report: B8506 Run 1
Date: 20-OCT-98 Page 1
Engineer
Tech

Measurement Summary

Frequency (MHz)	Amplitude (dBuV)	DELTA FCC CLASS A
0.450	44.0	-16.0
5.00	46.5	-23.0
11.19	62.4	-7.1
11.25	60.3	-9.2
11.32	60.2	-9.3
11.38	59.9	-9.6
26.78	47.7	-21.8

Minimum Passing Margin for FCC CLASS A is 7 dB at 11.1 MHz

File B8506 Run 1

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 A** (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	**11 Nov. 1998**
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: **Passice 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.**

Four external and one 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: **7.5'** Maximum: **7.5'** Tested:**7.5'**

I/O Ports and Cables

Description: **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)	**Double -Shielded**			
Termination: (describe)	**360 degrees**			
Transmission Type:	☐	Analog	☐	Digital

Length of cable: **3',7.5'** Maximum: **7.5'** Tested:**3', 7.5'**

I/O Ports and Cables

Description:

Type of Port: # of ports/cables of type

Exercised during testing?	☐	Yes	☐	No
Assembly ↔ Assembly Interconnect	☐	Yes	☐	No
Cable shielded:	☐	Yes	☐	No
Shield Type (describe)				
Termination: (describe)				
Transmission Type:	☐	Analog	☐	Digital

Length of cable: Maximum: Tested:

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 #*

☐ **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)*
	Condor	**D7-10-01**	**0498C**	**12 VDC 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*
Ferrite	**Fair-rite**	**0443164251**	**1**	**Tag Reader Side**

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

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

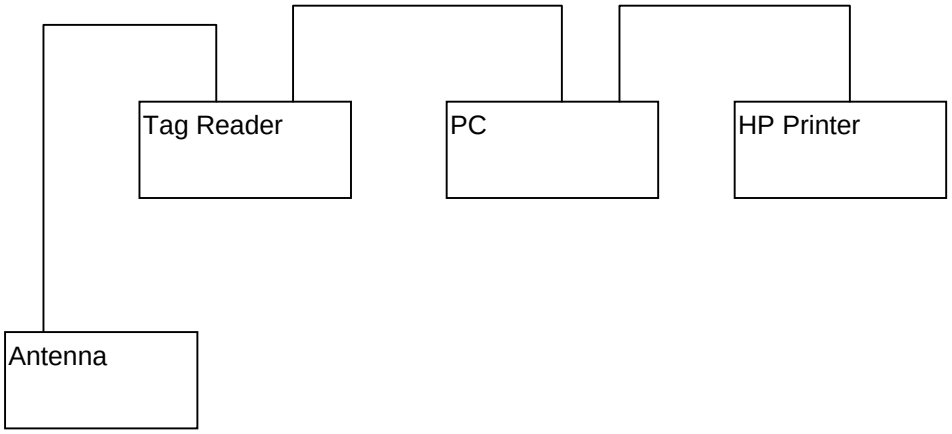
Press TAB to go to the next field. Date and sign each page of the CDF. Original signatures must be present on each page.

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