



Transmitter



ETS 300 328 (November 1996)

UPRR020008-01

Amb. temp.: 22 T Rel. humidity: 34 %

Tarried out: 6 / 5 - 2002 by:FTB

7.2.1 Effective radiated power (conducted, by using test fixture)

Rated output power 0 dBm

Antenna assembly gain 1.9 dBi

Duty cycle of the equipment during the test $x = 4.96$

Temp.	Voltage	Transmitter power (dBm)		
		Lowest frequency	Middle frequency	Hightst frequency
Normal	Normal	Pk: -3.5	Pk: -5.1	Pk: -5.8
		Av: -7.6	Av: -8.5	Av: -9.3
Min.	Max.	Pk: -3.5	Pk: -5.1	Pk: -5.8
		Av: -7.4	Av: -8.2	Av: -9.2
	Min.	Pk: -3.5	Pk: -5.1	Pk: -5.8
		Av: -7.4	Av: -8.2	Av: -9.1
Max.	Max.	Pk: -3.4	Pk: -5.1	Pk: -5.8
		Av: -7.4	Av: -8.5	Av: -9.9
	Min.	Pk: -3.4	Pk: -5.1	Pk: -5.8
		Av: -7.4	Av: -8.5	Av: -9.8
5.2.1 Limit:	Under all test conditions	Pk: 23 dBm/ -7 dBW Av: 20 dBm/ -10 dBW		
Measurement uncertainty:		$U_{95} = +1.96 * 8.0\% = +1.3 \text{ dB}$ $U_{95} = -1.96 * 7.34\% = -1.2 \text{ dB}$		

Note: Pk is the peak power as defined in clause 7.2.1 step 4 (C+G)
 Av is the average power as defined in clause 7.2.1 step 2 (D)

Satisfactory: YES NO

For these tests, the following measuring equipment is used (ref. appendix A):

Power meter no.: 423
 Oscilloscope no.: 308
 Signal generator no.: 443
 Thermometer no.: 445
 Test chamber no.: 437
 Test fixture Created and calibrated by telelaboratoriet

Remark(s):



ETS 300 328 (November 1996)

UPRR020008-01

Amb. temp.: 22 T Rel. humidity: 27 %

Carried out: 11 / 1 - 2002 by:SS

7.2.1 Effective radiated power E.I.R.P.

Rated output power 0 dBm

Antenna assembly gain 1.9 dBi

(Applies only to equipment with an integral antenna)

Operating frequency	*)Band width (kHz)	Antenna polarisation	Transmitter power, included antenna gain (dBm)
Lowest	10	Horizontal/ Vertical	Pk: -3.5
Highest	10	Horizontal/ Vertical	Pk: -5.8
5.2.1 Limit:			Pk: 23 dBm/ -7 dBW
Measurement uncertainty:			U ₉₅ = +2.4/ -3.2 dB

Note: Pk is the peak power as defined in clause 7.2.1 step 4 (C + G)

Satisfactory: YES NO

For these tests, the following measuring equipment is used (ref. appendix A):

Spectrum analyzer no.: 017
 Power meter no.: -
 Oscilloscope no.: -
 Signal generator no.: 023

Remark(s):



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7.2.2 Peak power density

FHSS modulation

Rated power density: 0 dBm/ 100 kHz

Is Tx on time > 10 usec.: Yes

Under normal test conditions only	Peak power density		
	Lowest Frequency 2402.000 MHz	Middle Frequency 2441.000 MHz	Highest Frequency 2480.000 MHz
Measured power density (dBm/100 kHz)	-10.9	-12.4	-13.6
Measurement uncertainty:	$U_{95} = +1.96 * 14.0\% = +2.1 \text{ dB}$ $U_{95} = -1.96 * 13.7\% = -2.1 \text{ dB}$		
5.2.2 Limit	20 dBm/ 100 kHz		

Satisfactory: YES NO

For these tests, the following measuring equipment is used (ref. appendix A):

Power meter no.: 423
 Spectrum analyzer no.: 300
 Signal generator no.: 443

Remark(s):



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Carried out: 6.5 / - 2002 by:FTB

7.2.3 Frequency range af equipment using FHSS modulation

Temp.	Voltage	Frequency (MHz) at which -30 dBm/ 100 kHz occurs	
		lowest	highest
Normal	Normal	2401.350	2480.550
Min	Min	2401.325	2480.613
	Max	2401.325	2480.600
Max	Min	2401.350	2480.550
	Max	2401.350	2480.550
Measured frequencies (lowest and highest)		$f_L = 2401.325$	$f_H = 2480.613$
Measurement uncertainty		$U_{95} = +1.96 * (0.69 \text{ dB} * 5 \text{ kHz/ dB}) = +6.55 \text{ kHz}$ $U_{95} = -1.96 * (0.61 \text{ dB} * 5 \text{ kHz/ dB}) = -6.0 \text{ kHz}$	
5.2.3 Limits		$f_L > 2400 \text{ MHz}$ $f_H < 2483.5 \text{ MHz}$	

Satisfactory: YES NO

For these tests, the following measuring equipment is used (ref. appendix A):

Spectrum analyzer no.: 300
 Signal generator no.: 443

Remark(s):

Wide band transmission systems

for data transmission equipment operating in the 2.4 GHz ISM band and using spread spectrum modulation techniques

Telelaboratoriet



ETS 300 328 (November 1996)

UPRR020008-01

Amb. temp.: T Rel. humidity: %

Carried out: / - 2001 by:

7.2.5 Spurious emissions - conducted (TX-on)

(Applies only to equipment with an external RF-connector)

Rated power level: ____ Watt / ____ dBm			Modulation: FHSS		
Operating frequency	Spurious frequency MHz	*Band-width kHz	Narrow band dBm	Wide band dBm/Hz	Excess dB
Lowest					
	Others				
Highest					
	Others				
Measurement uncertainty:			$U_{95} = 1.96 * 0.63 = \pm 1.2 \text{ dB}$		

5.2.4 Limits

Frequency range	Narrow band	Wide band
	Operating	Operating
30 MHz - 1 GHz	-36 dBm	-86 dBm/ Hz
> 1 GHz - 12.75 GHz	-30 dBm	-80 dBm/ Hz
1.8 - 1.9 GHz	-47 dBm	-97 dBm/ Hz
5.15 - 5.3 GHz		

Satisfactory: YES NO

For these tests, the following measuring equipment is used (ref. appendix A):

Spectrum analyzer no.:
Signal generator no.:

Remark(s):N/A

Wide band transmission systems
 for data transmission equipment operating in the 2.4 GHz ISM band
 and using spread spectrum modulation techniques

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ETS 300 328 (November 1996)

UPRR020008-01

Amb. temp.: T Rel. humidity: %

Carried out: / - 2001 by:

7.2.5 Spurious emissions conducted (TX-standby)

(Applies only to equipment with an external RF-connector)

Operating frequency	Spurious frequency MHz	Bandwidth kHz	Narrow band	Wide band	Excess dB
			dBm	dBm/Hz	
Lowest					
	Others				
Highest					
	Others				
Measurement uncertainty:		$U_{95} = 1.96 * 0.63 = \pm 1.2 \text{ dB}$			

5.2.4 Limits

Frequency range	Narrow band	Wide band
	Standby	Standby
30 MHz - 1 GHz	-57 dBm	-107 dBm/ Hz
> 1 GHz - 12.75 GHz	-47 dBm	-97 dBm/ Hz
1.8 - 1.9 GHz	-47 dBm	-97 dBm/ Hz
5.15 - 5.3 GHz		

Satisfactory: YES NO

For these tests, the following measuring equipment is used (ref. appendix A):

Spectrum analyzer no.:
 Signal generator no.:

Remark(s): N/A

Wide band transmission systems

for data transmission equipment operating in the 2.4 GHz ISM band and using spread spectrum modulation techniques

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7.2.5 Spurious emissions, radiated (TX-on)

Rated power level: High Low

Lowest frequency			FHSS modulation		
Spurious frequency (MHz)	Bandwidth (kHz)	Symbol	Radiated emissions		Excess dB
			Narrow band (dBm)	Wide band (dBm/Hz)	
All	-	H	< -50		-
		V	< -50		-
		H			
		V			
		H			
		V			
		H			
		V			
		H			
		V			

Measurement uncertainty: $U_{95} = +2.4/-3.2$ dB

5.2.4 Limits

Frequency range	Narrow band	Wide band
	Operating	Operating
30 MHz - 1 GHz	-36 dBm	-86 dBm/ Hz
> 1 GHz - 12.75 GHz	-30 dBm	-80 dBm/ Hz
1.8 - 1.9 GHz	-47 dBm	-97 dBm/ Hz
5.15 - 5.3 GHz		

A preliminary scan in 1 m test distance in the whole frequency range 25 – 12750 MHz has been performed, to register the frequencies where spurious emissions is observed. The reported values in the table are the measured spurious emission at the significant frequencies determined in 3 m test distance.

Satisfactory: YES NO

¹⁾ = Bandwidth of measuring receiver

For this test, the measuring equipment listed in appendix B is used.

Remark(s):



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7.2.5 Spurious emissions, radiated (TX-on)

Rated power level: High Low

Highest frequency			FHSS modulation		
Spurious frequency (MHz)	Bandwidth (kHz)	Symbol	Spurious emissions		Excess dB
			Narrow band (dBm)	Wide band (dBm/Hz)	
All	-	H	<-50		-
		V	<-50		-
		H			
		V			
		H			
		V			
		H			
		V			
		H			
		V			

Measurement uncertainty: $U_{95} = +2.4/-3.2$ dB

5.2.4 Limits

Frequency range	Narrow band	Wide band
	Operating	Operating
30 MHz - 1 GHz	-36 dBm	-86 dBm/ Hz
> 1 GHz - 12.75 GHz	-30 dBm	-80 dBm/ Hz
1.8 - 1.9 GHz	-47 dBm	-97 dBm/ Hz
5.15 - 5.3 GHz		

A preliminary scan in 1 m test distance in the whole frequency range 25 - 12750 MHz has been performed, to register the frequencies where spurious emissions is observed. The reported values in the table are the measured spurious emission at the significant frequencies determined in 3 m test distance.

Satisfactory: YES NO

^{*)} = Bandwidth of measuring receiver

For this test, the measuring equipment listed in appendix B is used.

Remark(s):



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Carried out: 11 / 1 - 2002 by:SS

7.2.5 Spurious emissions, radiated (TX-standby)

Spurious frequency (MHz)	Bandwidth (kHz)	Symbol	Spurious emissions		Excess dB
			Narrow band (dBm)	Wide band (dBm/Hz)	
All	-	H	< -60	-	-
		V	< -60	-	-
		H			
		V			
		H			
		V			
		H			
		V			
		H			
		V			
Measurement uncertainty:		U ₉₅ = +2.4/-3.2 dB			

5.2.4 Limits

Frequency range	Narrow band	Wide band
	Standby	Standby
30 MHz - 1 GHz	-57 dBm	-107 dBm/ Hz
> 1 GHz - 12.75 GHz	-47 dBm	-97 dBm/ Hz
1.8 - 1.9 GHz	-47 dBm	-97 dBm/ Hz
5.15 - 5.3 GHz		

A preliminary scan in 1 m test distance in the whole frequency range 25 – 12750 MHz has been performed, to register the frequencies where spurious emissions is observed. The reported values in the table are the measured spurious emission at the significant frequencies determined in 3 m test distance.

Satisfactory: YES NO

¹⁾ = Bandwidth of measuring receiver

For this test, the measuring equipment listed in appendix B is used.

Remark(s):
