

Measurement of MPE

1. Foreword

In adopt with the Human Exposure IEEE C95.1, and according to the FCC 1.1310. The *Maximum Permissible Exposure (MPE)* is obligated to measure in order to prove the safety of radiation harmfulness to the human body.

The *Gain* of the antenna used is measured in an *Anechoic chamber*. The *maximum total power to the antenna* is to be recorded. By adopting the ***Friis Transmission Formula*** and the *power gain of the antenna*, we can find the distance right away from the product, where the limit of the MPE is.

2. Description of EUT

EUT	:	USI 802.11B CompactFlash Card
Classification	:	Mobile Device
		(i) Under normal use condition, the antenna is at least 20cm away from the user;
		(ii) Warning statement for keeping 20cm separation distance and the prohibition of operating next to the person has been printed in the user's manual
Model No.	:	CF114100
Granted FCC ID	:	IXMCF114100
Frequency Range	:	2.412 GHz ~ 2.462GHz
Antenna Kit	:	1 chip antenna
Supported Channel:		11 Channel
Modulation Skill	:	DBPSK, DQPSK, CCK
Power Type	:	Powered by the CompactFlash slot of the client's device
Applicant	:	Universal Scientific Industrial Co., Ltd.
		135, Lane 351, Taiping Rd., Sect.1, Tsao Tuen, Nan-Tou 542, Taiwan, R.O.C.

3. Limits for Maximum Permissible Exposure (MPE)

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm ²)	Averaging Time E ² , H ² or S (minutes)
(A) Limits for Occupational/Controlled Exposure				
0.3-3.0	614	1.63	100	6
3.0-30	1842/f	4.89/f	900/f ²	6
30-300	61.4	0.163	1.0	6
300-1500	--	--	f/300	6
1500-100,000	--	--	5	6
(B) Limits for General Population/Uncontrolled Exposure				
0.3-1.34	614	1.63	100	30
1.34-30	824/f	2.19/f	180/f ²	30
30-300	27.5	0.073	0.2	30
300-1500	--	--	f/1500	30
1500-100,000	--	--	1.0	30

[The EUT is tested in transmit and receive modes and in the first, middle and the last channel separately. The following shows only our observation have the greatest emissions.]

According to OET BULLETIN 56 Fourth Edition/August 1999, Equation for Predicting RF Fields:

$$\text{Friis Transmission Formula: } S = \frac{PG}{4pR^2} = \frac{20.61 \times 1.778}{4p(20)^2} = 7.29 \times 10^{-3} \text{ mW/cm}^2$$

Where: S = power density (in appropriate units, e.g. mW/cm²)

P = power input to the antenna (in appropriate units, e.g., mW)

G = power gain of the antenna in the direction of interest relative to an isotropic radiator

R = distance to the center of radiation of the antenna (appropriate units, e.g., cm)

The Numeric gain G of antenna with a gain specified in dB is determined by:

$$G = \text{Log}^{-1} (\text{dB antenna gain}/10)$$

$$G = \text{Log}^{-1} (2.5 / 10) = 1.778$$

QUICK REFERENCE DATA

HF R&D	Print date 02/08/14							
	Long Shape TYPE 230 Multilayer Ceramic Antenna for Bluetooth (ISM Band 2.40GHz)				4311 115 00230 AN2300000708031K			Aug. 7, 02
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DIMENSIONAL DATA

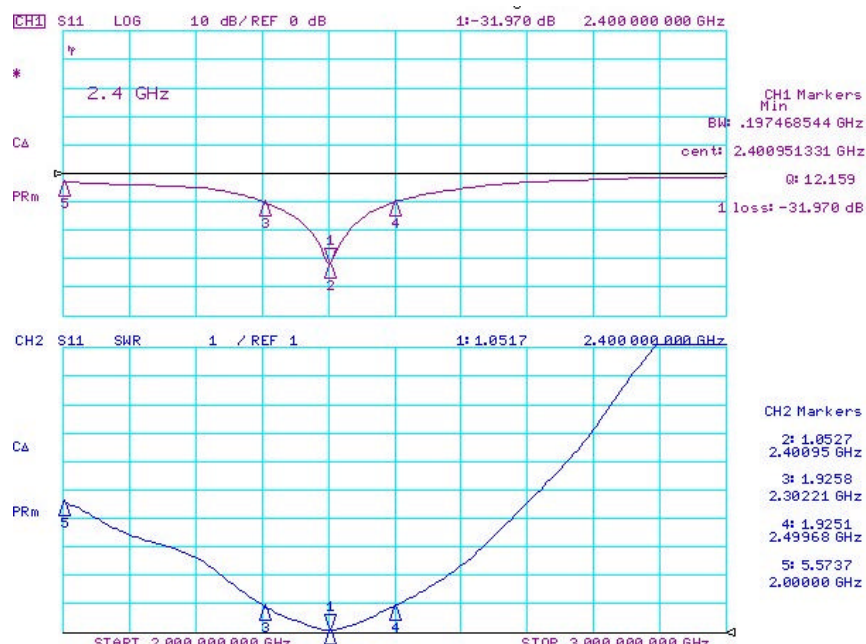
Figure	Dimension	Port
The figure shows three views of a rectangular PCB component. The top view is a blue rectangle with a central white circle. Dimensions include length L, width W, and a central feature S1. The side view shows a blue rectangle with a central white circle, with dimensions T (thickness), F (feature width), and C (clearance). The bottom view shows a blue rectangle with a central white circle, with dimensions S2 (feature width) and F (feature width). The top view also shows dimensions S1 (feature width) and C (clearance).	L : 7.8 +/-0.25 mm W: 3.6 +/- 0.2 mm T: 0.9 +/- 0.2 mm F: 1.25 +/- 0.25 mm C: 0.4 +/-0.2 mm S1: 1.25 +/- 0.25 mm S2: 1.40 +/- 0.25 mm	- - - Feed Termination - NC Solder Termination Only Optional NC Solder Termination Only

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Figure	Dimensions		Remark
	L	$9 \pm 0.10 \text{ mm}$	Feed Pad NC Mount Pad Only Optional NC Mount Pad Only
	W	$4.4 \pm 0.20 \text{ mm}$	
	F	$1.40 \pm 0.25 \text{ mm}$	
	C	$0.80 \pm 0.20 \text{ mm}$	
	S1	$1.40 \pm 0.25 \text{ mm}$	
	S2	$1.60 \pm 0.25 \text{ mm}$	

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Typical Return Loss and SWR



RELIABILITY DATA (Reference to IEC Specification)

IEC 384-10/ CECC 32 100 CLAUSE	IEC 60068-2 TEST METHOD	TEST	PROCEDURE	REQUIREMENTS
4.4		Mounting	The antenna can be mounted on printed-circuit boards or ceramic substrates by applying wave soldering, reflow soldering (including vapour phase soldering) or conductive adhesive	No visible damage
4.5		Visual inspection and dimension check	Any applicable method using $\times 10$ magnification	In accordance with specification (chip off 4mm)
4.6.1		Antenna	Central Frequency 2.37GHz at 20 °C	Per customer request board

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ORDERING INFORMATION: Method I- by 12NC Ordering Code

The antennas may be ordered by using the 12 NC ordering code. These code numbers can be determined by the following rules:

4311 1 15 00 230

F C M S T A

F. Family Code

43 = Antenna

C. Packing Type Code

11 = 180 mm/ 7" blister (1000pcs)

M. Materials Code

1 = High Frequency Material

S. Size Code

15 = 7.8 * 3.6 * 0.9 mm

T. Tolerance

00 = larger than 100 M Hz Band Width

A. Working Frequency (three types of antenna are available)

230 = 2.3 GHz ~2.40GHz

Type 230

Example: 12NC 4311 115 00230

Product description: Antenna (43) by 180 mm blister (11) of High Frequency Material (1), Size 7.8*3.6*0.9 mm (1);

Tolerance (00) of 100 MHz (VSWR<2)

Working Frequency (230) = 2.30~2.40G Hz

ORDERING INFORMATION: Method II- by Clear Text Code

The antennas may be ordered by using the 16-digit clear text ordering code. These code numbers can be determined by the following rules:

AN2300000708031K (Clear Text Code Example)						
AN	2300	00	07	0803	1	K
Product	Central Freq.	Bandwidth	Material	Size	Quantities	Packing
AN= Antenna	2300= 2.30~2.40GHz	00= >100MHz	07=K7	0803=7.8*3.6 * 0.9 mm	1 = 1K	K=7" plastic

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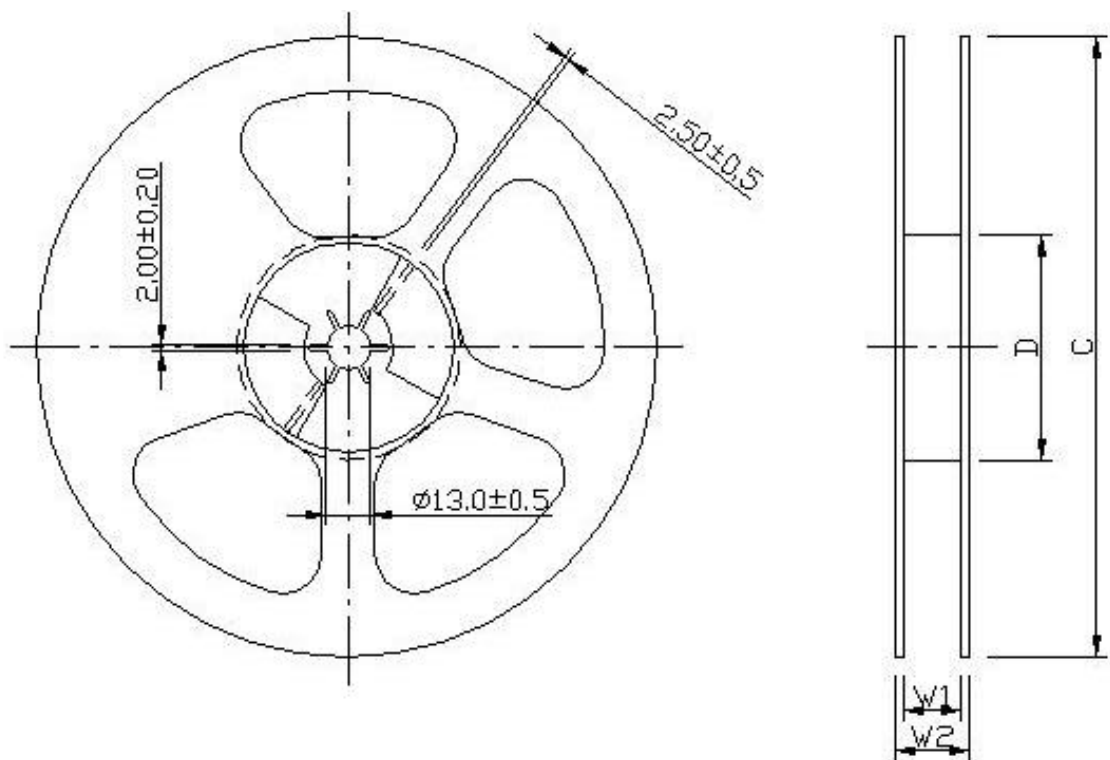


DIMENSION:

Serial no	Checking note	Index	Spec(mm)
1	Sprocket hole	Do	1.55±0.10
2	Pocket hole	D1	1.50±0.10
3	Distance sprocket hole/sprocket hole	Po	4.0±0.10
4	Distance pocket/pocket	P1	8.0±0.10
5	Distance sprocket hole/pocket	P2	2.0±0.10
6	Tape width	W	16.0±0.30
7	Distance sprocket hole/outside	E	1.75±0.10
8	Distance sprocket hole/pocket	F	7.50±0.10
9	Pocket length	Ao	3.86±0.10
10	Pocket length	Bo	8.15±0.10
11	Pocket depth	Ko	1.20±0.10
12	Thickness of tape	T	0.25±0.10
13	10x sprocket hole pitch	10Po	40.0±0.20

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7”(180mm) Reel Specifications



Product size code	Units per Reel	Tape Width (mm)	C (mm)	D (mm)	W ₁ (mm)	W ₂ (mm)
Antenna	1000	16	180.0±1.0	62±0.5	16.0 ⁺¹ ₋₀	20.5±0.2

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