

Antenna Engineering Specification

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Revision History

Revision	Revision History	Date	Author(s)
0.1	First Release	12/20/2006	Chuan-Ku Liu

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Embedded Quad-Band Antenna

1. Overview

The following is the specification of the embedded Quad-band antenna for PHONE applications. Quad-band includes GSM850, GSM900, DCS1800 and PCS1900.

1.1.1 Denotations

dBi: Decibel relative isotropic antenna

VSWR: **V**oltage **S**tanding **W**ave **R**atio

Tx: Transmit frequency

Rx: Receive frequency

GSM: **G**lobal **S**ervice for **M**obile communication

DCS: **D**igital **C**ommunication **S**ystem

PCS: **P**ersonal **C**ommunication **S**ystem

SAR: **S**pecific **A**bsorption **R**ate

Peak Gain: The peak value of the antenna gain

Average Gain: The average value of the antenna gain

EIRP: **E**ffective **I**sotropic **R**adiation **P**ower

TRP: **T**otal **R**adiation **P**ower

EIS: **E**ffective **I**sotropic **S**ensitivity

TIS: **T**otal **I**sotropic **S**ensitivity

dBm: Decibel of m-Watt

1.1.2 Frequency Allocation

GSM850: 824MHz~894MHz

GSM900: 880MHz~960MHz

DCS1800: 1710MHz~1880MHz

PCS1900: 1850MHz~1990MHz

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2. Measurement Parameters

2.1 Passive Parameters

2.1.1 VSWR

VSWR indicates the matching characteristics of the antenna. VSWR can be measured by a network analyzer.

2.1.2 Antenna Gain and Pattern

Antenna gain and far-field pattern can be determined by two measurement skills, depending on the own equipments. One is the far-field measurement; the other is the 3-D measurement system. Sometimes, the gain value is also needed to be measured under specified user conditions.

2.2 Active Parameters

2.2.1 Radiation Power

Antenna radiation power means the real radiated ability of an active system. Two most popular index values to specify the ability of radiation power is EIRP and TRP. EIRP means the peak radiation power, and TRP is the total radiation power. In some user conditions, the TRP value is also specified.

2.2.2 Receiving Sensitivity

Antenna radiation power means the real receiving ability of an active system. Two most popular index values to specify the ability of receiving ability is EIS and TIS. EIS means the peak receiving sensitivity, and TIS is the total receiving sensitivity. In some user conditions, the TIS value is also specified.

2.2.3 SAR (Specified Absorption Rate)

In order to protect the health of human, WHO has specified the SAR value (Specified Absorption Rate of human) to ensure the RF device has less damage to human health. The SAR value limitation is 1.6mW/g.

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3. Specification Requirements

3.1 Passive Specifications

3.1.1 VSWR (For Europe 900/1800 System)

	GSM850	GSM900	DCS1800	PCS1900
Free space	4:1	4:1	3:1	3:1

VSWR (For US 850/1900 System only)

	GSM850	GSM900	DCS1800	PCS1900
Free space	4:1	4:1	3:1	3:1

Notably: The VSWR value will be degraded due to mechanical and space constrains.

3.1.2 Gain and Patterns (Total Field)

(1) Free Space (For Europe 900/1800 System)

	GSM850	GSM900	DCS1800	PCS1900
Peak gain	>0dBi	>0dBi	>1dBi	>1dBi
Average gain	>-4dBi	>-4dBi	>-3dBi	>-3dBi

Free Space (For US 850/1900 System only)

	GSM850	GSM900	DCS1800	PCS1900
Peak gain	>0dBi	>0dBi	>1dBi	>1dBi
Average gain	>-4dBi	>-4dBi	>-3dBi	>-3dBi

(2) Phantom Mode (For Europe 900/1800 System)

	GSM850	GSM900	DCS1800	PCS1900
Average gain	>-11.0dBi	>-9.0dBi	>-5.0dBi	>-7.5dBi

Phantom Mode (For US 850/1900 System only)

	GSM850	GSM900	DCS1800	PCS1900
Average gain	>-8.0dBi	>-10.5dBi	> -7.5dBi	> -5.0dBi

Notably: The target values (peak and average gains) will be degraded due to mechanical and space constrains.

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3.2 Active Specifications

3.2.1 Radiation Power

(1) Free Space (For Europe 900/1800 System)

	GSM850	GSM900	DCS1800	PCS1900
EIRP	>26.0dBm	>30.5dBm	>28.0dBm	>26.0dBm
TRP	>25.5dBm	>28.0dBm	>27.0dBm	>25.0dBm

Free Space (For US 850/1900 System only)

	GSM850	GSM900	DCS1800	PCS1900
EIRP	>30.0dBm	>28.0dBm	>25.0dBm	>29.0dBm
TRP	>28.0dBm	>26.0dBm	>24.5dBm	>27.0dBm

(2) Phantom Mode (For Europe 900/1800 System)

	GSM850	GSM900	DCS1800	PCS1900
TRP	>20.0dBm	>21.0dBm	>24.0dBm	>22.0dBm

Phantom Mode (For US 850/1900 System only)

	GSM850	GSM900	DCS1800	PCS1900
TRP	>22.0dBm	>20.0dBm	>22.0dBm	>24.5dBm

Notably: The radiation power values will be degraded due to mechanical and space constrains.

3.2.2 Receiving Sensitivity

(1) Free Space (For Europe 900/1800 System)e

	GSM850	GSM900	DCS1800	PCS1900
EIS	<-104.0dBm	<-104.0dBm	<-104.0dBm	<-102.0dBm
TIS	<-100.0dBm	<-102.0dBm	<-101.5dBm	<-99.0dBm

Free Space (For US 850/1900 System only)

	GSM850	GSM900	DCS1800	PCS1900
EIS	<-104.0dBm	<-100.0dBm	<-104.0dBm	<-104.0dBm
TIS	<-103.0dBm	<-100.0dBm	<-101.5dBm	<-103.0dBm

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(2) Phantom Mode (For Europe 900/1800 System)

	GSM850	GSM900	DCS1800	PCS1900
TIS	<-96.0dBm	<-98.0dBm	<-100.0dBm	<-97.5dBm

Phantom Mode (For US 850/1900 System only)

	GSM850	GSM900	DCS1800	PCS1900
TIS	<-99.0dBm	<-96.0dBm	<-100.0dBm	<-101.5dBm

Notably: The receiving sensitivity values will be degraded due to mechanical and space constrains.

4. Antenna Materials

The antenna can not have the materials of plumbum (Pb), halogen and mercury (Hg).

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Embedded BT Antenna

1. Overview

The following is the specification of the embedded BT antenna for PHONE applications.

1.1.1 Denotations

dBi: Decibel relative isotropic antenna

VSWR: **V**oltage **S**tanding **W**ave **R**atio

Peak Gain: The peak value of the antenna gain

Average Gain: The average value of the antenna gain

EIRP: **E**ffective **I**sotropic **R**adiation **P**ower

EIS: **E**ffective **I**sotropic **S**ensitivity

dBm: Decibel of m-Watt

1.1.2 Frequency Allocation

BT: 2400MHz~2500MHz

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2. Specification Requirements

2.1 Passive Specifications

2.1.1 VSWR

	BT2400
Free space	2:1

Notably: The VSWR value will be degraded due to mechanical and space constrains.

2.1.2 Gain and Patterns (Total Field)

Free Space

	BT2400
Peak gain	>1.0dBi
Average gain	> -4.0dBi

Notably: The target values (peak and average gains) will be degraded due to mechanical and space constrains.

2.2 Active Specifications

2.2.1 Radiation Power

Free Space

	BT2400
EIRP	>1.0dBm

Notably: The radiation power values will be degraded due to mechanical and space constrains.

2.2.2 Receiving Sensitivity

Free Space

	BT
EIS	< -79.0dBm

Notably: The receiving sensitivity values will be degraded due to mechanical and space constrains.

3. Antenna Materials

The antenna can not have the materials of plumbum (Pb), halogen and mercury (Hg).

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Embedded WiFi Antenna

4. Overview

The following is the specification of the embedded WiFi antenna for PHONE applications.

1.1.3 Denotations

dBi: Decibel relative isotropic antenna

VSWR: **V**oltage **S**tanding **W**ave **R**atio

Peak Gain: The peak value of the antenna gain

Average Gain: The average value of the antenna gain

EIRP: **E**ffective **I**sotropic **R**adiation **P**ower

EIS: **E**ffective **I**sotropic **S**ensitivity

dBm: Decibel of m-Watt

1.1.4 Frequency Allocation

WiFi: 2400MHz~2500MHz

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5. Specification Requirements

2.1 Passive Specifications

2.1.3 VSWR

	WiFi2400
Free space	2:1

Notably: The VSWR value will be degraded due to mechanical and space constrains.

2.1.4 Gain and Patterns (Total Field)

Free Space

	WiFi2400
Peak gain	>1.0dBi
Average gain	> -4.0dBi

Notably: The target values (peak and average gains) will be degraded due to mechanical and space constrains.

2.2 Active Specifications

2.2.3 Radiation Power

Free Space

	WiFi2400
EIRP	>14.0dBm

Notably: The radiation power values will be degraded due to mechanical and space constrains.

2.2.4 Receiving Sensitivity

Free Space

	WiFi
EIS	< -80.0dBm

Notably: The receiving sensitivity values will be degraded due to mechanical and space constrains.

6. Antenna Materials

The antenna can not have the materials of plumbum (Pb), halogen and mercury (Hg).

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