Operator Minimum Acceptance Values for Device Antenna Performance

These values have been agreed & approved by TSG Full Members and Rapporteurs only

V2.0

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Table of Contents

1 Introduction 3
1.1 Overview 3
1.2 Scope 3
1.3 Definition of Terms 4
1.4 Document Cross-References 4
2 Antenna Performance Requirements 4
2.1 The Antenna Performance Calculation Formula 4
2.2 The Minimum Operator Antenna Performance Values: Head and Hand 5
2.3 The Minimum Operator Antenna Performance Values: Browsing 6
2.4 The Minimum Operator Antenna Performance Values: Free Space 7
3 Moving forward 7
Document Management 8
Document History 8
Other Information 8

1 Introduction

1.1 Overview

Mobile handset design has changed significantly over the past few years. Antennas, which were external in many cases, moved inside the terminal and evolved to be light-weight and low-volume.

The increasing focus on design conflicts with radio performance of the antenna systems and can lead to service disruption and increased dropped call rates impacting customer experience. Increasing network density is not an option as it may not be viable in many cases.

Whilst the 3GPP standards define the absolute global minimum OTA performance requirements to be met by devices, numerous operators are already requesting higher values in their own procurement activities to serve customer needs and network rollout plans.

However, the test methods used and antenna performance values requested by the various operators differ widely, leaving vendors with a fragmented requirements landscape.

To facilitate alignment and agreement, antenna experts of operators within the GSMA Terminal Steering Group have reviewed results of antenna performance tests (conducted within their own organisations as well as by the GSMA), have aligned test methods and agreed on performance values to be used as guidelines for operator terminal requirements and procurement activities. The values are supported by participating operators representing the USA, Europe and Asia regions and all these operators have committed to request the GSMA values in the future.

Following the publication of version one, dedicated to the scenarios of devices being held close to Head with left and right Hand scenarios in May 2013 [TS.24], the TSG operators have updated these requirements and aligned performance values for Free Space, and Browsing, which have been added in this version.

1.2 Scope

This document defines the Operator Minimum Acceptance Values for Device Antenna Performance. The values are determined taking into consideration

- devices being held **close to head** with **left and right hand** (section 2.2)
- devices being held with **one hand only** for the purpose of **Browsing** (section 2.3)
- devices being measured with the **Free Space method** (section 2.4)

The requirements (which include measurement uncertainty) are relevant for mobile devices, including feature phones, smart phones, tablets and dongles. More details can be found in the relevant sections.

These GSMA Operator Minimum Acceptance Values for Device Antenna Performance are non-binding, and operators are free to request alternative values as required. It will be up to each individual operator to adopt and enforce the GSMA Operator OTA requirements.

These values serve to align, enhance and promote minimum antenna performance requirements across the industry while seeking to improve device antenna performance and network interoperability.

Note: the alignment of the GSMA Operator Minimum Acceptance Values for Device Antenna Performance does not impact the test process; this will continue as is the case today in Operator-Manufacturer bilateral agreements.

1.3 Definition of Terms

Term	Description
TRS	Total Radiated Sensitivity
TRP	Total Radiated Power

1.4 Document Cross-References

Ref	Document Number	Title
CTIA	3.2.1 or later	Test Plan for Wireless Device Over the Air Performance http://files.ctia.org/pdf/CTIA_OTA_Test_Plan_Rev_3.2.1.pdf
3GPP	TS 25.144	User Equipment (UE) and Mobile Station (MS) over the air performance requirements

2 Antenna Performance Requirements

The following requirements serve as an internal guideline for mobile operators, who are encouraged to apply the required values in their bilateral agreements with the vendors.

2.1 The Antenna Performance Calculation Formula

Req ID	Requirement
TSG24_AP_01	For the scenario "**Head and Hand**" and in line with CTIA, the terminal SHALL support an average value of the low, medium and high frequency channels, on both, the left and right hand-side, a performance equal to or above the GSMA performance requirements for that frequency band listed in table 1 in section 2.2.
TSG24_AP_02	For the scenario "**Browsing**" and in line with CTIA, the terminal SHALL support an average value of the low, medium and high frequency channels, on both the left and right hand-side, a performance equal to or above the GSMA performance requirements for that frequency band listed in table 2 in section 2.3.
TSG24_AP_03	For the scenario "**Free Space**" and in line with CTIA, the terminal SHALL support an average value of the low, medium and high frequency channels a performance equal to or above the GSMA performance requirements for that frequency band listed in table 3 in section 2.4.
TSG24_AP_04	No measured channel SHALL be 1dB worse than the performance values defined for that frequency band.

Note:

a) The values include measurement uncertainty, the settings are ambitious but doable.

b) Operators may accept alternative values for bands outside of their home market.

2.2 The Minimum Operator Antenna Performance Values: Head and Hand

The following table lists the minimum operator antenna performance values per test scenario and frequency band, relevant for devices that support voice and do not exceed the maximum dimensions specified for hand phantom (i.e.72 mm) [CTIA].

These acceptance values include measurement uncertainty.

Test Case	Frequency Band	TSG Full Members Acceptance Values
TRP [dBm]	GSM 850	20.0
TRP [dBm]	EGSM 900	20.0
TRP [dBm]	GSM 1800	21.0
TRP [dBm]	GSM 1900	21.0
TRP [dBm]	WCDMA Band 1	15.0
TRP [dBm]	WCDMA Band 2	16.5
TRP [dBm]	WCDMA Band 3	13.5
TRP [dBm]	WCDMA Band 5	11.0
TRP [dBm]	WCDMA Band 8	11.0
TRP [dBm]	WCDMA Band 19	11.0
TRS [dBm]	GSM 850	-97.0
TRS [dBm]	EGSM 900	-95.0
TRS [dBm]	GSM 1800	-99.0
TRS [dBm]	GSM 1900	-99.5
TRS [dBm]	WCDMA Band 1	-101.0
TRS [dBm]	WCDMA Band 2	-98.5
TRS [dBm]	WCDMA Band 3	-98.5
TRS [dBm]	WCDMA Band 5	-94.5
TRS [dBm]	WCDMA Band 8	-96.0
TRS [dBm]	WCDMA Band 19	-96.0

Table 1: GSMA Operator Minimum Acceptance Values for Antenna Performance for the Scenario: Head and Hand

2.3 The Minimum Operator Antenna Performance Values: Browsing

The following table lists the minimum operator antenna performance values per test scenario and frequency band, relevant for devices where the display is visible to the end user for data usage and where width ranges between 56mm and 72 mm [CTIA].

The values are defined considering one-hand only and are relevant for left or right hand.

The 3G Frequencies are measured, using a 12.2Kbps reference measurement channel (RMC).

These acceptance values include measurement uncertainty.

Test Case	Frequency Band	TSG Full Members Acceptance Values
TRP [dBm]	GSM 850	24,0
TRP [dBm]	EGSM 900	25,0
TRP [dBm]	GSM 1800	23,0
TRP [dBm]	GSM 1900	23,0
TRP [dBm]	WCDMA Band 1	17,0
TRP [dBm]	WCDMA Band 2	17,0
TRP [dBm]	WCDMA Band 3	14,7
TRP [dBm]	WCDMA Band 5	14,7
TRP [dBm]	WCDMA Band 8	15,0
TRP [dBm]	WCDMA Band 19	15,5
TRS [dBm]	GSM 850	-99,0
TRS [dBm]	EGSM 900	-99,0
TRS [dBm]	GSM 1800	-100,0
TRS [dBm]	GSM 1900	-100,0
TRS [dBm]	WCDMA Band 1	-103,0
TRS [dBm]	WCDMA Band 2	-101,0
TRS [dBm]	WCDMA Band 3	-99,0
TRS [dBm]	WCDMA Band 5	-100,0
TRS [dBm]	WCDMA Band 8	-101,0
TRS [dBm]	WCDMA Band 19	-102,0

Table 2: GSMA Operator Minimum Acceptance Values for Antenna Performance for the Scenario: Browsing

2.4 The Minimum Operator Antenna Performance Values: Free Space

The following table lists the minimum operator antenna performance values per test scenario and frequency band, relevant for any device that embeds an antenna, including devices wider than 72mm that support voice

The applicable measurement method is: Voice (CS) mode.

The 3G frequencies are measured, using a 12.2Kbps reference measurement channel (RMC).

These acceptance values include measurement uncertainty.

Test Case	Frequency Band	TSG Full Members Acceptance Values
TRP [dBm]	GSM 850	27,0
TRP [dBm]	EGSM 900	28,0
TRP [dBm]	GSM 1800	26,0
TRP [dBm]	GSM 1900	26,0
TRP [dBm]	WCDMA Band 1	20,0
TRP [dBm]	WCDMA Band 2	20,0
TRP [dBm]	WCDMA Band 3	17,7
TRP [dBm]	WCDMA Band 5	17,7
TRP [dBm]	WCDMA Band 8	18,0
TRP [dBm]	WCDMA Band 19	18,0
TRS [dBm]	GSM 850	-103,0
TRS [dBm]	EGSM 900	-103,0
TRS [dBm]	GSM 1800	-104,0
TRS [dBm]	GSM 1900	-103,0
TRS [dBm]	WCDMA Band 1	-106,0
TRS [dBm]	WCDMA Band 2	-104,0
TRS [dBm]	WCDMA Band 3	-102,0
TRS [dBm]	WCDMA Band 5	-103,0
TRS [dBm]	WCDMA Band 8	-104,0
TRS [dBm]	WCDMA Band 19	-104,5

Table 3: GSMA Operator Minimum Acceptance Values for Antenna Performance for the Scenario: Free Space

3 Moving forward

As part of Phase 3, the GSMA operators will progress:

- Alignment of antenna performance values for LTE frequency bands
- Antenna performance values for devices supporting voice which are wider than 72mm.
- Support for data only device types.

In addition, operators will continue to test antenna performance of market devices and actively monitor and/or engage in work driven in relevant industry bodies.

Document Management

Document History

Version	Date	Brief Description of Change	Approval Authority	Editor / Company
V1.0	14 May 2013	Published on GSM world	TSG	Katrin Jordan, DT
V2.0	Feb 2014	Updated scope, references, requirements and added performance values for Free Space and Browsing.	TSG	Katrin Jordan, DT

Other Information

Type	Description
Document Owner	This document is owned and approved by TSG Full Members

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