

# 3GPP TS 37.144 V0.0.1 (2013-04)

---

*Technical Specification*

## **3rd Generation Partnership Project; Technical Specification Group Radio Access Network; User Equipment (UE) and Mobile Station (MS) over the air performance requirements**

**(Release 12)**



---

**Keywords**

<keyword[, keyword, ...]>

**3GPP**

---

**Postal address**

---

**3GPP support office address**

---

650 Route des Lucioles - Sophia Antipolis  
Valbonne - FRANCE  
Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

---

**Internet**

<http://www.3gpp.org>

---

**Copyright Notification**

---

No part may be reproduced except as authorized by written permission.  
The copyright and the foregoing restriction extend to reproduction in all media.

© 2011, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TTA, TTC).  
All rights reserved.

UMTS™ is a Trade Mark of ETSI registered for the benefit of its members  
3GPP™ is a Trade Mark of ETSI registered for the benefit of its Members and of the 3GPP Organizational Partners  
LTE™ is a Trade Mark of ETSI registered for the benefit of its Members and of the 3GPP Organizational Partners  
GSM® and the GSM logo are registered and owned by the GSM Association

# Contents

Foreword .....	6
1 Scope .....	7
2 References.....	7
3 Definitions, symbols and abbreviations .....	7
3.1 Definitions .....	7
3.2 Symbols.....	8
3.3 Abbreviations.....	8
4 General.....	8
4.1 Minimum requirements for roaming bands.....	8
4.2 Relationship between minimum requirements for roaming bands and test requirements .....	8
4.3 Terminal classes.....	9
4.3.1 Mechanical modes.....	9
4.4 UTRA chip rates .....	9
5 Frequency bands .....	9
5.1 GSM frequency bands .....	9
5.2 UTRA FDD frequency bands.....	9
5.3 UTRA TDD frequency bands.....	10
5.4 E-UTRA FDD frequency bands.....	10
5.5 E-UTRA TDD frequency bands .....	10
6 Transmitter total radiated power.....	10
6.1 Minimum requirement for roaming bands for handheld UE .....	10
6.1.1 Beside the head phantom position.....	10
6.1.1.1 GSM .....	11
6.1.1.2 UTRA FDD.....	11
6.1.1.3 UTRA LCR TDD.....	12
6.1.2 Beside the head and hand phantom position .....	12
6.1.2.1 UTRA FDD.....	12
6.1.2.2 UTRA LCR TDD.....	12
6.1.2.3 E- UTRA FDD .....	12
6.1.2.4 E- UTRA TDD .....	12
6.1.3 Hand phantom browsing mode position.....	12
6.1.3.1 UTRA FDD.....	12
6.1.3.2 UTRA LCR TDD.....	12
6.1.3.3 E- UTRA FDD .....	12
6.1.3.4 E- UTRA TDD .....	12
6.2 Minimum requirement for roaming bands for LME .....	12
6.2.1 GSM .....	13
6.2.2 UTRA FDD .....	13
6.2.3 UTRA LCR TDD .....	13
6.2.4 E-UTRA FDD.....	14
6.2.4 E-UTRA TDD .....	14
6.3 Minimum requirement for roaming bands for LEE.....	14
6.3.1 GSM .....	14
6.3.2 UTRA FDD .....	15
6.3.3 UTRA LCR TDD .....	15
6.3.4 E-UTRA FDD.....	15
6.3.4 E-UTRA TDD .....	15
7 Receiver total radiated sensitivity .....	15
7.1 Minimum requirement for roaming bands for handheld UE .....	15
7.1.1 Beside the head phantom position.....	16
7.1.1.1 GSM .....	16
7.1.1.2 UTRA FDD.....	16
7.1.1.3 UTRA LCR TDD.....	17

7.1.2	Beside the head and hand phantoms position .....	17
7.1.2.1	UTRA FDD.....	18
7.1.2.2	UTRA LCR TDD.....	18
7.1.2.3	E-UTRA FDD .....	18
7.1.2.4	E-UTRA TDD .....	18
7.1.3	Hand phantom browsing mode position.....	18
7.1.3.1	UTRA FDD.....	18
7.1.3.2	UTRA LCR TDD.....	18
7.1.3.3	E-UTRA FDD .....	18
7.1.3.4	E-UTRA TDD .....	18
7.2	Minimum requirement for roaming bands for LME .....	18
7.2.1	GSM .....	18
7.2.2	UTRA FDD .....	19
7.2.3	UTRA LCR TDD .....	19
7.2.4	E-UTRA FDD .....	19
7.2.5	E-UTRA TDD .....	19
7.3	Minimum requirement for roaming bands for LEE.....	19
7.3.1	GSM .....	20
7.3.2	UTRA FDD .....	20
7.3.3	UTRA LCR TDD .....	20
7.3.4	E-UTRA FDD.....	21
7.3.5	E-UTRA TDD .....	21
Annex A (normative): Environmental conditions .....		21
A.1	General.....	21
A.2	Environmental requirements .....	21
A.2.2	Temperature .....	21
A.2.3	Voltage .....	21
Annex B (informative): Recommended performance.....		21
B.1	General.....	21
B.2	Transmitter total radiated power .....	22
B.2.1	Recommended performance for handheld UE .....	22
B.2.1.1	Beside the head phantom position .....	22
B.2.1.1.1	GSM .....	22
B.2.1.1.2	UTRA FDD.....	22
B.2.1.1.3	UTRA LCR TDD.....	23
B.2.1.2	Beside the head and hand phantoms position.....	23
B.2.1.2.1	UTRA FDD.....	23
B.2.1.2.2	UTRA LCR TDD.....	23
B.2.1.2.3	E-UTRA FDD .....	23
B.2.1.2.4	E-UTRA TDD .....	23
B.2.1.3	Hand phantom browsing mode position.....	23
B.2.1.3.1	UTRA FDD.....	23
B.2.1.3.2	UTRA LCR TDD.....	23
B.2.1.3.3	E-UTRA FDD .....	23
B.2.1.3.4	E-UTRA TDD .....	23
B.2.2	Recommended performance for LME .....	23
B.2.2.1	GSM .....	23
B.2.2.2	UTRA FDD .....	24
B.2.2.3	UTRA LCR TDD .....	24
B.2.2.4	E-UTRA FDD.....	24
B.2.2.5	E-UTRA TDD .....	24
B.2.3	Recommended performance for LEE.....	24
B.2.3.1	GSM .....	24
B.2.3.2	UTRA FDD .....	25
B.2.3.3	UTRA LCR TDD .....	25
B.2.3.4	E-UTRA FDD.....	25
B.2.3.5	E-UTRA TDD .....	25

B.3	Receiver total radiated sensitivity .....	25
B.3.1	Recommended performance for handheld UE .....	25
B.3.1.1	Beside the head phantom position.....	25
B.3.1.1.1	GSM .....	26
B.3.1.1.2	UTRA FDD.....	26
B.3.1.1.3	UTRA LCR TDD.....	26
B.3.1.2	Beside the head and hand phantoms position.....	27
B.3.1.2.1	UTRA FDD.....	27
B.3.1.2.2	UTRA LCR TDD.....	27
B.3.1.2.3	E-UTRA FDD .....	27
B.3.1.2.4	E-UTRA TDD .....	27
B.3.1.3	Hand phantom browsing mode position.....	27
B.3.1.3.1	UTRA FDD.....	27
B.3.1.3.2	UTRA LCR TDD.....	27
B.3.1.3.3	E-UTRA FDD .....	27
B.3.1.3.4	E-UTRA TDD .....	27
B.3.2	Recommended performance for LME .....	27
B.3.2.1	GSM .....	27
B.3.2.2	UTRA FDD .....	28
B.3.2.3	UTRA LCR TDD .....	28
B.3.2.4	E-UTRA FDD.....	28
B.3.2.5	E-UTRA TDD .....	28
B.3.3	Recommended performance for LEE.....	28
B.3.3.1	GSM .....	28
B.3.3.2	UTRA FDD .....	29
B.3.3.3	UTRA LCR TDD .....	29
B.3.3.4	E-UTRA FDD.....	29
B.3.3.5	E-UTRA TDD .....	29
Annex C (informative):	Change history .....	30

---

## Foreword

This Technical Specification has been produced by the 3<sup>rd</sup> Generation Partnership Project (3GPP).

The contents of the present document are subject to continuing work within the TSG and may change following formal TSG approval. Should the TSG modify the contents of the present document, it will be re-released by the TSG with an identifying change of release date and an increase in version number as follows:

Version x.y.z

where:

- x the first digit:
  - 1 presented to TSG for information;
  - 2 presented to TSG for approval;
  - 3 or greater indicates TSG approved document under change control.
- y the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.
- z the third digit is incremented when editorial only changes have been incorporated in the document.

---

# 1 Scope

The present document establishes over the air antenna minimum requirements for user equipment (UE) and mobile station (MS).

Handheld UE requirements are defined for roaming bands for the speech position (beside the head and beside the head and hand) and hand phantom browsing mode position. Laptop mounted equipment requirements are defined for roaming bands for the data transfer position (laptop ground plane phantom). Laptop embedded equipment requirements are defined for roaming bands for the data transfer position (free space).

All bands are potential roaming bands, and the requirements for roaming bands shall therefore be fulfilled for all bands supported by a UE/MS.

Requirements for operating bands are dependent on how the network has been built and are thus operator specific and cannot be specified here. Recommended performance values for operating bands (Annex B) are however included in this specification for information. It should be recognised that the ability to meet the recommended performance values depends on the number of frequency bands supported by the UE/MS.

---

# 2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

- [1] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications".
- [2] 3GPP TS 25.101: "User Equipment (UE) radio transmission and reception (FDD)".
- [3] 3GPP TS 45.005: "Radio transmission and reception".
- [4] 3GPP TS 34.114: "User Equipment (UE) / Mobile Station (MS) Over The Air (OTA) antenna performance; Conformance testing".
- [5] ETSI ETR 273: "Electromagnetic compatibility and Radio spectrum Matters (ERM); Improvement of radiated methods of measurement (using test sites) and evaluation of the corresponding measurement uncertainties; Part 1: Uncertainties in the measurement of mobile radio equipment characteristics; Sub-part 2: Examples and annexes".
- [6] 3GPP TR 25.914: "Measurements of radio performances for UMTS terminals in speech mode"

---

# 3 Definitions, symbols and abbreviations

*Delete from the above heading those words which are not applicable.*

*Clause numbering depends on applicability and should be renumbered accordingly.*

## 3.1 Definitions

For the purposes of the present document, the terms and definitions given in TR 21.905 [1] and the following apply. A term defined in the present document takes precedence over the definition of the same term, if any, in TR 21.905 [1].

**primary mechanical mode:** the mode that is most often used during a call beside the head. Other mechanical modes are secondary. Every terminal has at least one primary mechanical mode.

**speech position:** UE used close to head phantom (specific anthropomorphic mannequin).

**data transfer position:** UE used away from the user's head, applicable for LME and LEE devices.

**FS:** UE used in a free space configuration.

**LME:** Laptop mounted equipment (such as plug-in devices like USB dongles).

**LEE:** Laptop embedded equipment (such as embedded module card embedded in notebooks).

## 3.2 Symbols

$TRP_{average}$	the average measured total radiated power of low, mid and high channel
$TRP_{min}$	the lowest measured total radiated power of each channel within an operating band
$TRS_{average}$	the average measured total radiated sensitivity of low, mid and high channel
$TRS_{max}$	the highest measured total radiated sensitivity of each channel within an operating band

## 3.3 Abbreviations

For the purposes of the present document, the abbreviations given in TR 21.905 [1] and the following apply. An abbreviation defined in the present document takes precedence over the definition of the same abbreviation, if any, in TR 21.905 [1].

DUT	Device Under Test
OTA	Over The Air
TRP	Total Radiated Power
TRS	Total Radiated Sensitivity

---

# 4 General

## 4.1 Minimum requirements for roaming bands

The minimum requirements for roaming bands apply only to the primary mechanical mode in the environmental conditions specified in Annex A. All bands are potential roaming bands, and a UE/MS shall fulfil the minimum requirements for roaming bands for all bands supported by the UE/MS.

## 4.2 Relationship between minimum requirements for roaming bands and test requirements

The minimum requirements for roaming bands given in this specification make no allowance for measurement uncertainty. The test specification 34.114 [4] Annex F defines test tolerances. These test tolerances are individually calculated for each test. The test tolerances are used to relax the minimum requirements in this specification to create test requirements.

The measurement results returned by the test system are compared - without any modification - against the test requirements as defined by the shared risk principle.

The shared risk principle is defined in ETR 273 [5] Part 1 sub-part 2 section 6.5.



## 4.3 Terminal classes

### 4.3.1 Mechanical modes

The mechanical modes of a device under test (DUT) are declared by the manufacturer. A DUT shall have at least one mechanical mode. If only one mode is supported, then this is defined as the primary.

## 4.4 UTRA chip rates

The requirements defined in this specification for UTRA are based on a chip rate of 3.84 Mcps (FDD) and 1.28 Mcps (TDD).

NOTE: Other chip rates may be considered in future releases.

# 5 Frequency bands

## 5.1 GSM frequency bands

The requirements defined in this specification for GSM apply to the frequency bands defined in Table 5.1-1.

**Table 5.1-1: GSM frequency bands**

Operating band	UL frequencies MS transmit, BTS receive	DL frequencies MS receive, BTS transmit
GSM 850	824 - 849 MHz	869-894 MHz
P-GSM 900	890 - 915 MHz	935 - 960 MHz
E-GSM 900	880 - 915 MHz	925 - 960 MHz
DCS 1800	1710-1785 MHz	1805-1880 MHz
PCS 1900	1850 -1910 MHz	1930 -1990 MHz

## 5.2 UTRA FDD frequency bands

The requirements defined in this specification for UTRA FDD apply to the frequency bands defined in Table 5.2-1.

**Table 5.2-1: UTRA FDD frequency bands**

Operating Band	UL frequencies UE transmit, Node B receive	DL frequencies UE receive, Node B transmit
I	1920 - 1980 MHz	2110 -2170 MHz
II	1850 -1910 MHz	1930 -1990 MHz
III	1710-1785 MHz	1805-1880 MHz
IV	1710-1755 MHz	2110-2155 MHz
V	824 - 849 MHz	869-894 MHz
VI	830-840 MHz	875-885 MHz
VII	2500-2570 MHz	2620-2690 MHz
VIII	880 - 915 MHz	925 - 960 MHz
IX	1749.9-1784.9 MHz	1844.9-1879.9 MHz
XIX	830 - 845MHz	875 - 890 MHz

Deployment in other frequency bands is not precluded

## 5.3 UTRA TDD frequency bands

The requirements defined in this specification for UTRA TDD apply to the frequency bands defined in Table 5.3-1.

**Table 5.3-1: UTRA LCR TDD frequency bands**

Operating Band	Frequencies
a	1900-1920 MHz 2010-2025 MHz
b*	1850-1910 MHz 1930-1990 MHz
c*	1910-1930 MHz
d**	2570-2620 MHz
e	2300-2400 MHz
f	1880-1920 MHz

NOTE: Deployment in other frequency bands is not precluded.  
 \* Used in ITU Region 2  
 \*\* Used in ITU Region 1

## 5.4 E-UTRA FDD frequency bands

## 5.5 E-UTRA TDD frequency bands

---

# 6 Transmitter total radiated power

## 6.1 Minimum requirement for roaming bands for handheld UE

The average measured total radiated power (TRP) of low, mid and high channel for handheld UE shall be higher than the average TRP requirement specified in subclauses 6.1.1, 6.1.2 and 6.1.3. The averaging shall be done in linear scale for the TRP results of both right and left side of the phantom head in case of beside the head phantom and beside the head and hand phantom positions. For the hand phantom browsing mode position the averaging shall be done in linear scale for the TRP results of both right and left hand phantom measurements. Average TRP requirement is shown in the column "Average" on the requirement tables.

$$TRP_{average} = 10 \log \left[ \frac{10^{P_{left\_low}/10} + 10^{P_{left\_mid}/10} + 10^{P_{left\_high}/10} + 10^{P_{right\_low}/10} + 10^{P_{right\_mid}/10} + 10^{P_{right\_high}/10}}{6} \right]$$

In addition the lowest TRP of each measured channel shall be higher than minimum TRP requirement specified in subclauses 6.1.1, 6.1.2 and 6.1.3. Minimum TRP requirement is shown in the column "Min" on the requirement tables.

$$TRP_{min} = 10 \log \left[ \min \left( 10^{P_{left\_low}/10}, 10^{P_{left\_mid}/10}, 10^{P_{left\_high}/10}, 10^{P_{right\_low}/10}, 10^{P_{right\_mid}/10}, 10^{P_{right\_high}/10} \right) \right]$$

### 6.1.1 Beside the head phantom position

Beside the head phantom test method is defined in TR 25.914 [6] subclauses 5.1.1 and 5.1.2.

### 6.1.1.1 GSM

Handheld MS TRP minimum performance requirements for GMSK in beside the head phantom position and the primary mechanical mode are defined in Table 6.1.1.1-1.

**Table 6.1.1.1-1: Handheld UE TRP minimum performance requirement for GSM roaming bands in beside the head phantom position and the primary mechanical mode**

Operating band	Power class 1		Power class 2		Power class 3		Power class 4		Power class 5	
	Power (dBm)		Power (dBm)		Power (dBm)		Power (dBm)		Power (dBm)	
	Average	Min	Average	Min	Average	Min	Average	Min	Average	Min
GSM 850							19.5	17.5		
GSM 900							20.5	18.5		
DCS 1800	21	19								
PCS 1900	21	19								

NOTE: Applicable for dual-mode GSM/UMTS.

### 6.1.1.2 UTRA FDD

Handheld UETRTP minimum performance requirements for UTRA FDD in beside the head phantom position and the primary mechanical mode are defined in Table 6.1.1.2-1.

**Table 6.1.1.2-1: Handheld UE TRP minimum performance requirement for UTRA FDD roaming bands in beside the head phantom position and the primary mechanical mode**

Operating band	Power class 1	Power class 2	Power class 3		Power class 3bis		Power class 4	
	Power (dBm)	Power (dBm)	Power (dBm)		Power (dBm)		Power (dBm)	
			Average	Min	Average	Min	Average	Min
I	-	-	+15	+13	+15	+13	+13	+11
II	-	-	+15	+13	+15	+13	+13	+11
III	-	-	+15	+13	+15	+13	+13	+11
IV	-	-	+15	+13	+15	+13	+13	+11
V	-	-	+11	+9	+11	+9	+9	+7
VI	-	-	+11	+9	+11	+9	+9	+7
VII	-	-	+15	+13	+15	+13	+13	+11
VIII	-	-	+12	+10	+12	+10	+10	+8
IX	-	-	+15	+13	+15	+13	+13	+11
XIX	-	-	+11.5	+9.5	+11.5	+9.5	+9.5	+7.5

NOTE: Applicable for dual-mode GSM/UMTS.

### 6.1.1.3 UTRA LCR TDD

Handheld UE TRP minimum performance requirements for UTRA LCR TDD in beside the head phantom position and the primary mechanical mode are defined in Table 6.1.1.3-1.

**Table 6.1.1.3-1: Handheld UE TRP minimum performance requirement for UTRA LCR TDD roaming bands in beside the head phantom position and the primary mechanical mode**

Operating band	Power class 1		Power class 2		Power class 3		Power class 4	
	Power (dBm)		Power (dBm)		Power (dBm)		Power (dBm)	
	Average	Min	Average	Min	Average	Min	Average	Min
a	-	-	+15	+13	-	-	-	-
b	-	-	TBD	TBD	-	-	-	-
c	-	-	TBD	TBD	-	-	-	-
d	-	-	TBD	TBD	-	-	-	-
e	-	-	+15	+13	-	-	-	-
f	-	-	+15	+13	-	-	-	-

NOTE: Applicable for dual-mode GSM/UTRA LCR TDD.

### 6.1.2 Beside the head and hand phantom position

Beside the head and hand phantom position is defined in TR 25.914 [6] subclauses 5.1.5 and 5.1.6.

#### 6.1.2.1 UTRA FDD

#### 6.1.2.2 UTRA LCR TDD

#### 6.1.2.3 E-UTRA FDD

#### 6.1.2.4 E-UTRA TDD

### 6.1.3 Hand phantom browsing mode position

Hand phantom browsing mode position is defined in TR 25.914 [6] subclauses 5.1.5 and 5.1.7.

#### 6.1.3.1 UTRA FDD

#### 6.1.3.2 UTRA LCR TDD

#### 6.1.3.3 E-UTRA FDD

#### 6.1.3.4 E-UTRA TDD

## 6.2 Minimum requirement for roaming bands for LME

The average measured TRP of low, mid and high channel for laptop mounted equipment shall be higher than the average TRP requirement specified in subclause 6.2. The averaging shall be done in linear scale for the TRP results. Average TRP requirement is shown in the column "Average" on the requirement tables.

$$TRP_{average} = 10 \log \left[ \frac{10^{P_{low}/10} + 10^{P_{mid}/10} + 10^{P_{high}/10}}{3} \right]$$

In addition the lowest TRP of each measured channel shall be higher than minimum TRP requirement specified in subclause 6.2. Minimum TRP requirement is shown in the column “Min” on the requirement tables.

$$TRP_{min} = 10 \log \left[ \min \left( 10^{P_{low}/10}, 10^{P_{mid}/10}, 10^{P_{high}/10} \right) \right]$$

LME requirements in this clause are defined to be measured with laptop ground plane phantom as defined in TR 25.914 [6] subclauses 5.1.3 and 5.1.4.

## 6.2.1 GSM

LME TRP minimum performance requirements for GSM with laptop ground plane phantom in data transfer position are defined in Table 6.2.1-1.

**Table 6.2.1-1: LME TRP minimum performance requirement for GSM in the data transfer position**

Operating band	Power class 1		Power class 2		Power class 3		Power class 4		Power class 5	
	Power (dBm)		Power (dBm)		Power (dBm)		Power (dBm)		Power (dBm)	
	Average	Min	Average	Min	Average	Min	Average	Min	Average	Min
GSM 850	-	-	-	-	-	-	TBD	TBD	-	-
GSM 900	-	-	-	-	-	-	TBD	TBD	-	-
DCS 1800	TBD	TBD	-	-	-	-	-	-	-	-
PCS 1900	TBD	TBD	-	-	-	-	-	-	-	-

NOTE 1: Applicable for dual-mode GSM/UMTS.

NOTE 2: Applicable for USB plug-in devices.

## 6.2.2 UTRA FDD

LME TRP minimum performance requirements for UTRA FDD with laptop ground plane phantom in data transfer position are defined in Table 6.2.2-1.

**Table 6.2.2-1: LME TRP minimum performance requirement for UTRA FDD in the data transfer position**

Operating band	Power class 1	Power class 2	Power class 3		Power class 3bis		Power class 4	
	Power (dBm)	Power (dBm)	Power (dBm)		Power (dBm)		Power (dBm)	
			Average	Min	Average	Min	Average	Min
I	-	-	TBD	TBD	TBD	TBD	TBD	TBD
II	-	-	TBD	TBD	TBD	TBD	TBD	TBD
III	-	-	TBD	TBD	TBD	TBD	TBD	TBD
IV	-	-	TBD	TBD	TBD	TBD	TBD	TBD
V	-	-	TBD	TBD	TBD	TBD	TBD	TBD
VI	-	-	TBD	TBD	TBD	TBD	TBD	TBD
VII	-	-	TBD	TBD	TBD	TBD	TBD	TBD
VIII	-	-	TBD	TBD	TBD	TBD	TBD	TBD
IX	-	-	TBD	TBD	TBD	TBD	TBD	TBD
XIX			TBD	TBD	TBD	TBD	TBD	TBD

NOTE 1: Applicable for dual-mode GSM/UMTS.

NOTE 2: Applicable for USB plug-in devices.

## 6.2.3 UTRA LCR TDD

LME TRP minimum performance requirements for UTRA LCR TDD with laptop ground plane phantom in data transfer position are defined in Table 6.2.3-1.

**Table 6.2.3-1: LME TRP minimum performance requirement for UTRA LCR TDD in the data transfer position**

Operating band	Power class 1		Power class 2		Power class 3		Power class 4	
	Power (dBm)		Power (dBm)		Power (dBm)		Power (dBm)	
	Average	Min	Average	Min	Average	Min	Average	Min
a	-	-	TBD	TBD	-	-	-	-
b	-	-	TBD	TBD	-	-	-	-
c	-	-	TBD	TBD	-	-	-	-
d	-	-	TBD	TBD	-	-	-	-
e	-	-	TBD	TBD	-	-	-	-
f	-	-	TBD	TBD	-	-	-	-

NOTE 1: Applicable for dual-mode GSM/UTRA LCR TDD.  
NOTE 2: Applicable for USB plug-in devices.

## 6.2.4 E-UTRA FDD

## 6.2.4 E-UTRA TDD

## 6.3 Minimum requirement for roaming bands for LEE

The average measured TRP of low, mid and high channel for laptop embedded equipment shall be higher than the average TRP requirement specified in subclause 6.3. The averaging shall be done in linear scale for the TRP results. Average TRP requirement is shown in the column “Average” on the requirement tables.

$$TRP_{average} = 10 \log \left[ \frac{10^{P_{low}/10} + 10^{P_{mid}/10} + 10^{P_{high}/10}}{3} \right]$$

In addition the lowest TRP of each measured channel shall be higher than minimum TRP requirement specified in subclause 6.3. Minimum TRP requirement is shown in the column “Min” on the requirement tables.

$$TRP_{min} = 10 \log \left[ \min \left( 10^{P_{low}/10}, 10^{P_{mid}/10}, 10^{P_{high}/10} \right) \right]$$

LEE requirements in this clause are defined to be measured as defined in TR 25.914 [6] subclause 5.3.

### 6.3.1 GSM

LEE TRP minimum performance requirements for GSM are defined in Table 6.3.1-1.

**Table 6.3.1-1: LEE TRP minimum performance requirement for GSM in the data transfer position**

Operating band	Power class 1		Power class 2		Power class 3		Power class 4		Power class 5	
	Power (dBm)		Power (dBm)		Power (dBm)		Power (dBm)		Power (dBm)	
	Average	Min	Average	Min	Average	Min	Average	Min	Average	Min
GSM 850	-	-	-	-	-	-	TBD	TBD	-	-
GSM 900	-	-	-	-	-	-	TBD	TBD	-	-
DCS 1800	TBD	TBD	-	-	-	-	-	-	-	-
PCS 1900	TBD	TBD	-	-	-	-	-	-	-	-

NOTE 1: Applicable for dual-mode GSM/UMTS.  
NOTE 2: Applicable for notebook devices.

## 6.3.2 UTRA FDD

LEE TRP minimum performance requirements for UTRA FDD are defined in Table 6.3.2-1.

**Table 6.3.2-1: LEE TRP minimum performance requirement for UTRA FDD in the data transfers position**

Operating band	Power class 1	Power class 2	Power class 3		Power class 3bis		Power class 4	
	Power (dBm)	Power (dBm)	Power (dBm)		Power (dBm)		Power (dBm)	
			Average	Min	Average	Min	Average	Min
I	-	-	TBD	TBD	TBD	TBD	TBD	TBD
II	-	-	TBD	TBD	TBD	TBD	TBD	TBD
III	-	-	TBD	TBD	TBD	TBD	TBD	TBD
IV	-	-	TBD	TBD	TBD	TBD	TBD	TBD
V	-	-	TBD	TBD	TBD	TBD	TBD	TBD
VI	-	-	TBD	TBD	TBD	TBD	TBD	TBD
VII	-	-	TBD	TBD	TBD	TBD	TBD	TBD
VIII	-	-	TBD	TBD	TBD	TBD	TBD	TBD
IX	-	-	TBD	TBD	TBD	TBD	TBD	TBD
XIX			TBD	TBD	TBD	TBD	TBD	TBD

NOTE 1: Applicable for dual-mode GSM/UMTS.  
NOTE 2: Applicable for notebook devices.

## 6.3.3 UTRA LCR TDD

LEE TRP minimum performance requirements for UTRA LCR TDD are defined in Table 6.3.3-1.

**Table 6.3.3-1: LEE TRP minimum performance requirement for UTRA LCR TDD in the data transfer position**

Operating band	Power class 1		Power class 2		Power class 3		Power class 4	
	Power (dBm)		Power (dBm)		Power (dBm)		Power (dBm)	
	Average	Min	Average	Min	Average	Min	Average	Min
a	-	-	TBD	TBD	-	-	-	-
b	-	-	TBD	TBD	-	-	-	-
c	-	-	TBD	TBD	-	-	-	-
d	-	-	TBD	TBD	-	-	-	-
e	-	-	TBD	TBD	-	-	-	-
f	-	-	TBD	TBD	-	-	-	-

NOTE 1: Applicable for dual-mode GSM/UTRA LCR TDD.  
NOTE 2: Applicable for USB plug-in devices.

## 6.3.4 E-UTRA FDD

## 6.3.4 E-UTRA TDD

# 7 Receiver total radiated sensitivity

## 7.1 Minimum requirement for roaming bands for handheld UE

The average measured total radiated sensitivity (TRS) of low, mid and high channel for handheld UE shall be lower than the average TRS requirement specified in subclauses 7.1.1, 7.1.2 and 7.1.3. The averaging shall be done in linear

scale for the TRS results of both right and left side of the phantom head in case of beside the head phantom and beside the head and hand phantom positions. For the hand phantom browsing mode position the averaging shall be done in linear scale for the TRS results of both right and left hand phantom measurements. Average TRS requirement is shown in the column “Average” on the requirement tables.

$$TRS_{average} = 10 \log \left[ 6 / \left( \frac{1}{10^{P_{left\_low}/10}} + \frac{1}{10^{P_{left\_mid}/10}} + \frac{1}{10^{P_{left\_high}/10}} + \frac{1}{10^{P_{right\_low}/10}} + \frac{1}{10^{P_{right\_mid}/10}} + \frac{1}{10^{P_{right\_high}/10}} \right) \right]$$

In addition the highest TRS of each measured channel shall be lower than maximum TRS requirement specified in subclauses 7.1.1, 7.1.2 and 7.1.3. Maximum TRS requirement is shown in the column “Max” on the requirement tables.

$$TRS_{max} = 10 \log \left[ \max \left( 10^{P_{left\_low}/10}, 10^{P_{left\_mid}/10}, 10^{P_{left\_high}/10}, 10^{P_{right\_low}/10}, 10^{P_{right\_mid}/10}, 10^{P_{right\_high}/10} \right) \right]$$

## 7.1.1 Beside the head phantom position

Beside the head phantom test method is defined in TR 25.914 [6] subclauses 5.1.1 and 5.1.2.

### 7.1.1.1 GSM

Handheld MS TRS minimum performance requirements for GMSK in beside the head phantom position and the primary mechanical mode for TCH/FS at 2% class II (RBER) [3] are defined in Table 7.1.1.1-1.

**Table 7.1.1.1-1: Handheld UE TRS minimum requirements for GSM roaming bands in beside the head phantom position and the primary mechanical mode**

Operating band	Unit	<REF <sub>or</sub> >	
		Average	Max
GSM 850	dBm	-98	-95
GSM 900	dBm	-97	-94
DCS 1800	dBm	-99.5	-96.5
PCS 1900	dBm	-98.5	-95.5

NOTE 1: For power class 1 and 4 this shall be achieved at the maximum output power.  
NOTE 2: Applicable for dual-mode GSM/UMTS.

### 7.1.1.2 UTRA FDD

Handheld UE TRS minimum performance requirements for UTRA FDD in beside the head phantom position and the primary mechanical mode for 1% BER with 12.2kbps DL reference channel as defined in Annex C.3 of [2] are defined in Table 7.1.1.2-1.



**Table 7.1.1.2-1: Handheld UE TRS minimum requirements for UTRA FDD roaming bands in beside the head phantom position and the primary mechanical mode**

Operating band	Unit	<REF <sub>or</sub> >	
		Average	Max
I	dBm/3.84 MHz	-101	-98
II	dBm/3.84 MHz	-99	-96
III	dBm/3.84 MHz	-98	-95
IV	dBm/3.84 MHz	-101	-98
V	dBm/3.84 MHz	-96	-93
VI	dBm/3.84 MHz	-96	-93
VII	dBm/3.84 MHz	-99	-96
VIII	dBm/3.84 MHz	-96	-93
IX	dBm/3.84 MHz	-100	-97
XIX	dBm/3.84 MHz	-96	-93

NOTE 1: For Power class 3, 3bis and 4 this shall be achieved at the maximum output power.

NOTE 2: For the UE which supports both Band III and Band IX operating frequencies, the reference level of TDB dBm TRS <REF<sub>or</sub>> [average and min] shall apply for Band IX.

NOTE 3: Applicable for dual-mode GSM/UMTS.

NOTE 4: For the UE which supports DB-DC-HSDPA configuration 2, average <REF<sub>or</sub>> level of -98 dBm/3.84 MHz and max <REF<sub>or</sub>> level of -95 dBm/3.84 MHz shall apply for Band II.

NOTE 5: For the UE which supports DB-DC-HSDPA configuration 2, average <REF<sub>or</sub>> level of -100 dBm/3.84 MHz and max <REF<sub>or</sub>> level of -97 dBm/3.84 MHz shall apply for Band IV.

### 7.1.1.3 UTRA LCR TDD

Handheld UE TRS minimum performance requirements for UTRA LCR FDD in beside the head phantom position and the primary mechanical mode for 1% BER with 12.2kbps DL reference channel as defined in Annex C.3 of [2] are defined in Table 7.1.1.3-1.

**Table 7.1.1.3-1: Handheld UE TRS minimum requirement for UTRA LCR TDD roaming bands in beside the head phantom position and the primary mechanical mode**

Operating band	Unit	<REF <sub>or</sub> >	
		Average	Max
a	dBm/1.28 MHz	-101	-100
b	dBm/1.28 MHz	TBD	TBD
c	dBm/1.28 MHz	TBD	TBD
d	dBm/1.28 MHz	TBD	TBD
e	dBm/1.28 MHz	-101	-100
f	dBm/1.28 MHz	-101	-100

Note: Applicable for dual-mode GSM/UTRA LCR TDD.

### 7.1.2 Beside the head and hand phantoms position

Beside the head and hand phantom position is defined in TR 25.914 [6] subclauses 5.1.5 and 5.1.6.

- 7.1.2.1 UTRA FDD
- 7.1.2.2 UTRA LCR TDD
- 7.1.2.3 E-UTRA FDD
- 7.1.2.4 E-UTRA TDD

### 7.1.3 Hand phantom browsing mode position

Hand phantom browsing mode position is defined in TR 25.914 [6] subclauses 5.1.5 and 5.1.7.

- 7.1.3.1 UTRA FDD
- 7.1.3.2 UTRA LCR TDD
- 7.1.3.3 E-UTRA FDD
- 7.1.3.4 E-UTRA TDD

## 7.2 Minimum requirement for roaming bands for LME

The average measured TRS of low, mid and high channel for laptop mounted equipment shall be lower than average TRS requirement specified in subclause 7.2. The averaging shall be done in linear scale for the TRS results. Average TRS requirement is shown in the column “Average” on the requirement tables.

$$TRS_{average} = 10 \log \left[ 3 / \left( \frac{1}{10^{P_{low}/10}} + \frac{1}{10^{P_{mid}/10}} + \frac{1}{10^{P_{high}/10}} \right) \right]$$

In addition the highest TRS of each measured channel shall be lower than maximum TRS requirement specified in subclause 7.2. Maximum TRS requirement is shown in the column “Max” on the requirement tables.

$$TRS_{max} = 10 \log \left[ \max \left( 10^{P_{low}/10}, 10^{P_{mid}/10}, 10^{P_{high}/10} \right) \right]$$

### 7.2.1 GSM

LME TRS minimum performance requirements for GPRS PDTCH/CS1 at 10% BLER [3] with laptop ground plane phantom in data transfer position are defined in Table 7.2.1-1.

**Table 7.2.1-1: LME TRS minimum requirements for GSM in data transfer position**

Operating band	Unit	<REF <sub>or</sub> >	
		Average	Max
GSM 850	dBm	TBD	TBD
GSM 900	dBm	TBD	TBD
DCS 1800	dBm	TBD	TBD
PCS 1900	dBm	TBD	TBD

NOTE 1: For power class 1 and 4 this shall be achieved at the maximum output power.  
NOTE 2: Applicable for dual-mode GSMUMTS.  
NOTE 3: Applicable for USB plug-in devices.

## 7.2.2 UTRA FDD

LME TRS minimum performance requirements for UTRA FDD with laptop ground plane phantom in data transfer position mode for 1% BER with 12.2kbps DL reference channel as defined in Annex C.3 of [2] are defined in Table 7.2.2-1. [The values in the tables are for with no interference.]

**Table 7.2.2-1: LME TRS minimum requirements for UTRA FDD in data transfer position**

Operating band	Unit	<REF <sub>or</sub> >	
		Average	Max
I	dBm/3.84 MHz	TBD	TBD
II	dBm/3.84 MHz	TBD	TBD
III	dBm/3.84 MHz	TBD	TBD
IV	dBm/3.84 MHz	TBD	TBD
V	dBm/3.84 MHz	TBD	TBD
VI	dBm/3.84 MHz	TBD	TBD
VII	dBm/3.84 MHz	TBD	TBD
VIII	dBm/3.84 MHz	TBD	TBD
IX	dBm/3.84 MHz	TBD	TBD
XIX	dBm/3.84 MHz	TBD	TBD

NOTE 1: For power class 3, 3bis and 4 this shall be achieved at the maximum output power.  
NOTE 2: Applicable for dual-mode GSMUMTS.  
NOTE 3: Applicable for USB plug-in devices.

## 7.2.3 UTRA LCR TDD

LME TRS minimum performance requirements for UTRA LCR TDD with laptop ground plane phantom in data transfer position mode for 1% BER with 12.2kbps DL reference channel as defined in Annex C.3 of [2] are defined in Table 7.2.3-1. [The values in the tables are for with no interference.]

**Table 7.2.3-1: LME TRS minimum requirements for UTRA LCR TDD in data transfer position**

Operating band	Unit	<REF <sub>or</sub> >	
		Average	Max
a	dBm/1.28 MHz	TBD	TBD
b	dBm/1.28 MHz	TBD	TBD
c	dBm/1.28 MHz	TBD	TBD
d	dBm/1.28 MHz	TBD	TBD
e	dBm/1.28 MHz	TBD	TBD
f	dBm/1.28 MHz	TBD	TBD

NOTE 1: Applicable for dual-mode GSMUTRA LCR TDD.  
NOTE 2: Applicable for USB plug-in devices.

## 7.2.4 E-UTRA FDD

## 7.2.5 E-UTRA TDD

## 7.3 Minimum requirement for roaming bands for LEE

The average measured TRS of low, mid and high channel for laptop embedded equipment shall be lower than average TRS requirements specified in subclause 7.3. The averaging shall be done in linear scale for the TRS results. Average TRS requirement is shown in the column "Average" on the requirement tables.

$$TRS_{average} = 10 \log \left[ 3 / \left( \frac{1}{10^{P_{low}/10}} + \frac{1}{10^{P_{mid}/10}} + \frac{1}{10^{P_{high}/10}} \right) \right]$$

In addition the highest TRS of each measured channel shall be lower than maximum TRS requirement specified in subclause 7.3. Maximum TRS requirement is shown in the column “Max” on the requirement tables.

$$TRS_{\max} = 10 \log \left[ \max \left( 10^{P_{\text{low}}/10}, 10^{P_{\text{mid}}/10}, 10^{P_{\text{high}}/10} \right) \right]$$

### 7.3.1 GSM

LEE TRS minimum performance requirements for GPRS PDTCH/CS1 at 10% BLER [3] are defined in Table 7.2.1-1.

**Table 7.3.1-1: LME TRS minimum requirements for GSM in data transfer position**

Operating band	Unit	<REF <sub>or</sub> >	
		Average	Max
GSM 850	dBm	TBD	TBD
GSM 900	dBm	TBD	TBD
DCS 1800	dBm	TBD	TBD
PCS 1900	dBm	TBD	TBD

NOTE 1: For power class 1 and 4 this shall be achieved at the maximum output power.  
NOTE 2: Applicable for dual-mode GSM/UMTS.  
NOTE 3: Applicable for notebook devices.

### 7.3.2 UTRA FDD

LEE TRS minimum performance requirements for UTRA FDD in data transfer position mode for 1% BER with 12.2kbps DL reference channel as defined in Annex C.3 of [2] are defined in Table 7.3.2-1. [The values in the tables are for with no interference.]

**Table 7.3.2-1: LEE TRS minimum requirements for UTRA FDD in data transfer position**

Operating band	Unit	<REF <sub>or</sub> >	
		Average	Max
I	dBm/3.84 MHz	TBD	TBD
II	dBm/3.84 MHz	TBD	TBD
III	dBm/3.84 MHz	TBD	TBD
IV	dBm/3.84 MHz	TBD	TBD
V	dBm/3.84 MHz	TBD	TBD
VI	dBm/3.84 MHz	TBD	TBD
VII	dBm/3.84 MHz	TBD	TBD
VIII	dBm/3.84 MHz	TBD	TBD
IX	dBm/3.84 MHz	TBD	TBD
XIX	dBm/3.84 MHz	TBD	TBD

NOTE 1: For power class 3, 3bis and 4 this shall be achieved at the maximum output power.  
NOTE 2: Applicable for dual-mode GSM/UMTS.  
NOTE 3: Applicable for notebook devices.

### 7.3.3 UTRA LCR TDD

LEE TRS minimum performance requirements for UTRA LCR TDD in data transfer position mode for 1% BER with 12.2kbps DL reference channel as defined in Annex C.3 of [2] are defined in Table 7.3.3-1. [The values in the tables are for with no interference.]

Table 7.3.3-1: LEE TRS minimum requirements for UTRA LCR TDD in data transfer position

Operating band	Unit	<REF for>	
		Average	Max
a	dBm/1.28 MHz	TBD	TBD
b	dBm/1.28 MHz	TBD	TBD
c	dBm/1.28 MHz	TBD	TBD
d	dBm/1.28 MHz	TBD	TBD
e	dBm/1.28 MHz	TBD	TBD
f	dBm/1.28 MHz	TBD	TBD

NOTE 1: Applicable for dual-mode GSM/UTRA LCR TDD.  
NOTE 2: Applicable for notebook devices.

### 7.3.4 E-UTRA FDD

### 7.3.5 E-UTRA TDD

---

## Annex A (normative): Environmental conditions

### A.1 General

This normative annex specifies the environmental requirements of the UE. Within these limits the requirements of the present documents shall be fulfilled.

---

### A.2 Environmental requirements

The requirements in this clause apply to all types of UE(s) and MS(s).

#### A.2.2 Temperature

All the OTA requirements are applicable in room temperature e.g. 25°C.

#### A.2.3 Voltage

The UE or MS shall be equipped with a real battery that is fully charged (in the beginning of the Test).

---

## Annex B (informative): Recommended performance

### B.1 General

This annex introduces the concept of recommended OTA performance for operating bands. This requirement is not mandatory but is recommended.

The concept of recommended performance is to ensure that UE/MS OTA performance is maximised in order to improve user experience and network performance. It is recognised that the ability to meet the recommended performance depends on the number of frequency bands supported by the UE/MS.

## B.2 Transmitter total radiated power

The OTA TRP performance for GSM, UTRA and E-UTRA should be greater or equal than the recommended values in subclause B.2.

### B.2.1 Recommended performance for handheld UE

#### B.2.1.1 Beside the head phantom position

Beside the head phantom test method is defined in TR 25.914 [6] subclauses 5.1.1 and 5.1.2.

##### B.2.1.1.1 GSM

**Table B.2.1.1.1-1: Handheld UE TRP recommended performance for GSM in beside the head phantom position and the primary mechanical mode**

Operating band	Power class 1	Power class 2	Power class 3	Power class 4	Power class 5
	Power (dBm)	Power (dBm)	Power (dBm)	Power (dBm)	Power (dBm)
	Average	Average	Average	Average	Average
GSM 850	-	-	-	24	-
GSM 900	-	-	-	24	-
DCS 1800	24	-	-	-	-
PCS 1900	24	-	-	-	-

NOTE: Applicable for dual-mode GSM/UMTS.

##### B.2.1.1.2 UTRA FDD

**Table B.2.1.1.2-1: Handheld UE TRP recommended performance for UTRA FDD in beside the head phantom position and the primary mechanical mode**

Operating band	Power class 1	Power class 2	Power class 3	Power class 3bis	Power class 4
	Power (dBm)	Power (dBm)	Power (dBm)	Power (dBm)	Power (dBm)
	Average	Average	Average	Average	Average
I	-	-	+18	+18	+16
II	-	-	+18	+18	+16
III	-	-	+18	+18	+16
IV	-	-	+18	+18	+16
V	-	-	+14	+14	+12
VI	-	-	+14.5	+14.5	+12.5
VII	-	-	+18	+18	+16
VIII	-	-	+15	+15	+13
IX	-	-	+18	+18	+16
XIX	-	-	+14.5	+14.5	+12.5

NOTE: Applicable for dual-mode GSM/UMTS.

## B.2.1.1.3 UTRA LCR TDD

Table B.2.1.1.3-1: Handheld UE TRP recommended performance for UTRA LCR TDD in beside the head phantom position and the primary mechanical mode

Operating band	Power class 1	Power class 2	Power class 3	Power class 3bis	Power class 4
	Power (dBm)	Power (dBm)	Power (dBm)	Power (dBm)	Power (dBm)
	Average	Average	Average	Average	Average
a	-	+18	-	-	-
b	-	TBD	-	-	-
c	-	TBD	-	-	-
d	-	TBD	-	-	-
e	-	+18	-	-	-
f	-	+18	-	-	-

Note: Applicable for dual-mode GSM/UTRA LCR TDD.

## B.2.1.2 Beside the head and hand phantoms position

## B.2.1.2.1 UTRA FDD

## B.2.1.2.2 UTRA LCR TDD

## B.2.1.2.3 E-UTRA FDD

## B.2.1.2.4 E-UTRA TDD

## B.2.1.3 Hand phantom browsing mode position

## B.2.1.3.1 UTRA FDD

## B.2.1.3.2 UTRA LCR TDD

## B.2.1.3.3 E-UTRA FDD

## B.2.1.3.4 E-UTRA TDD

## B.2.2 Recommended performance for LME

## B.2.2.1 GSM

Table B.2.2.1-1: LME TRP recommended performance for GSM in data transfer position

Operating band	Power class 1	Power class 2	Power class 3	Power class 4	Power class 5
	Power (dBm)	Power (dBm)	Power (dBm)	Power (dBm)	Power (dBm)
	Average	Average	Average	Average	Average
GSM 850	-	-	-	TBD	-
GSM 900	-	-	-	TBD	-
DCS 1800	TBD	-	-	-	-
PCS 1900	TBD	-	-	-	-

NOTE 1: Applicable for dual-mode GSM/UMTS.  
NOTE 2: Applicable for USB plug-in devices.

## B.2.2.2 UTRA FDD

Table B.2.2.2-1: LME TRP recommended performance for UTRA FDD in data transfer position

Operating band	Power class 1	Power class 2	Power class 3	Power class 3bis	Power class 4
	Power (dBm)	Power (dBm)	Power (dBm)	Power (dBm)	Power (dBm)
	Average	Average	Average	Average	Average
I	-	-	TBD	TBD	TBD
II	-	-	TBD	TBD	TBD
III	-	-	TBD	TBD	TBD
IV	-	-	TBD	TBD	TBD
V	-	-	TBD	TBD	TBD
VI	-	-	TBD	TBD	TBD
VII	-	-	TBD	TBD	TBD
VIII	-	-	TBD	TBD	TBD
IX	-	-	TBD	TBD	TBD
XIX	-	-	TBD	TBD	TBD

NOTE 1: Applicable for dual-mode GSM/UMTS.  
NOTE 2: Applicable for USB plug-in devices.

## B.2.2.3 UTRA LCR TDD

Table B.2.2.3-1: LME TRP recommended performance for UTRA LCR TDD in data transfer position

Operating band	Power class 1	Power class 2	Power class 3	Power class 3bis	Power class 4
	Power (dBm)	Power (dBm)	Power (dBm)	Power (dBm)	Power (dBm)
	Average	Average	Average	Average	Average
a	-	TBD	-	-	-
b	-	TBD	-	-	-
c	-	TBD	-	-	-
d	-	TBD	-	-	-
e	-	TBD	-	-	-
f	-	TBD	-	-	-

NOTE 1: Applicable for dual-mode GSM/UTRA LCR TDD.  
NOTE 2: Applicable for USB plug-in devices.

## B.2.2.4 E-UTRA FDD

## B.2.2.5 E-UTRA TDD

## B.2.3 Recommended performance for LEE

### B.2.3.1 GSM

Table B.2.3.1-1: LEE TRP recommended performance for GSM in data transfer position

Operating band	Power class 1	Power class 2	Power class 3	Power class 4	Power class 5
	Power (dBm)	Power (dBm)	Power (dBm)	Power (dBm)	Power (dBm)
	Average	Average	Average	Average	Average
GSM 850	-	-	-	TBD	-
GSM 900	-	-	-	TBD	-
DCS 1800	TBD	-	-	-	-
PCS 1900	TBD	-	-	-	-

NOTE 1: Applicable for dual-mode GSM/UMTS.  
NOTE 2: Applicable for notebook devices.



### B.2.3.2 UTRA FDD

**Table B.2.3.2-1: LEE TRP recommended performance for UTRA FDD in data transfer position**

Operating band	Power class 1	Power class 2	Power class 3	Power class 3bis	Power class 4
	Power (dBm)	Power (dBm)	Power (dBm)	Power (dBm)	Power (dBm)
	Average	Average	Average	Average	Average
I	-	-	TBD	TBD	TBD
II	-	-	TBD	TBD	TBD
III	-	-	TBD	TBD	TBD
IV	-	-	TBD	TBD	TBD
V	-	-	TBD	TBD	TBD
VI	-	-	TBD	TBD	TBD
VII	-	-	TBD	TBD	TBD
VIII	-	-	TBD	TBD	TBD
IX	-	-	TBD	TBD	TBD
XIX	-	-	TBD	TBD	TBD

NOTE 1: Applicable for dual-mode GSM/UMTS.  
NOTE 2: Applicable for notebook devices.

### B.2.3.3 UTRA LCR TDD

**Table B.2.3.3-1: LEE TRP recommended performance for UTRA LCR TDD in data transfer position**

Operating band	Power class 1	Power class 2	Power class 3	Power class 3bis	Power class 4
	Power (dBm)	Power (dBm)	Power (dBm)	Power (dBm)	Power (dBm)
	Average	Average	Average	Average	Average
a	-	TBD	-	-	-
b	-	TBD	-	-	-
c	-	TBD	-	-	-
d	-	TBD	-	-	-
e	-	TBD	-	-	-
f	-	TBD	-	-	-

NOTE 1: Applicable for dual-mode GSM/UTRA LCR TDD.  
NOTE 2: Applicable for notebook devices.

### B.2.3.4 E-UTRA FDD

### B.2.3.5 E-UTRA TDD

---

## B.3 Receiver total radiated sensitivity

The OTA TRS performance for GSM, UTRA and E-UTRA should be lower or equal than the recommended values shown in subclause B.3.

### B.3.1 Recommended performance for handheld UE

#### B.3.1.1 Beside the head phantom position

Beside the head phantom test method is defined in TR 25.914 [6] subclauses 5.1.1 and 5.1.2.

## B.3.1.1.1 GSM

**Table B.3.1.1.1-1: Handheld UE TRS recommended performance for GSM in beside the head phantom position and the primary mechanical mode.**

Operating band	Unit	<REF <sub>or</sub> > Average
GSM 850	dBm	-100.5
GSM 900	dBm	-100.5
DCS 1800	dBm	-103.5
PCS 1900	dBm	-103.5

NOTE: Applicable for dual-mode GSM/UMTS.

## B.3.1.1.2 UTRA FDD

**Table B.3.1.1.2-1: Handheld UE TRS recommended performance for FDD in beside the head phantom position for the primary mechanical mode**

Operating band	Unit	<REF <sub>or</sub> >
I	dBm/3.84 MHz	-104
II	dBm/3.84 MHz	-102
III	dBm/3.84 MHz	-101
IV	dBm/3.84 MHz	-104
V	dBm/3.84 MHz	-99.5
VI	dBm/3.84 MHz	-101
VII	dBm/3.84 MHz	-102
VIII	dBm/3.84 MHz	-100
IX	dBm/3.84 MHz	-103
XIX	dBm/3.84 MHz	-101

NOTE 1: For the UE which supports DB-DC-HSDPA configuration 2, average <REF<sub>or</sub>> level of -101 dBm/3.84 shall apply for Band II.

NOTE 2: For the UE which supports DB-DC-HSDPA configuration 2, average <REF<sub>or</sub>> level of -103 dBm/3.84 MHz shall apply for Band IV.

## B.3.1.1.3 UTRA LCR TDD

**Table B.3.1.1.3-1: Handheld UE TRS recommended performance for UTRA LCR TDD in beside the head phantom position and the primary mechanical mode.**

Operating band	Unit	<REF <sub>or</sub> > Average
a	dBm/1.28 MHz	-105
b	dBm/1.28 MHz	TBD
c	dBm/1.28 MHz	TBD
d	dBm/1.28 MHz	TBD
e	dBm/1.28 MHz	-105
f	dBm/1.28 MHz	-105

NOTE: Applicable for dual-mode GSM/UTRA LCR TDD.

### B.3.1.2 Beside the head and hand phantoms position

#### B.3.1.2.1 UTRA FDD

#### B.3.1.2.2 UTRA LCR TDD

**Table B.3.1.2.2-1: TRS recommended performance for UTRA LCR TDD in the beside the head and hand phantoms position and the primary mechanical mode**

Operating band	Unit	<REF <sub>or</sub> > Average
a	dBm/1.28 MHz	TBD
b	dBm/1.28 MHz	TBD
c	dBm/1.28 MHz	TBD
d	dBm/1.28 MHz	TBD
e	dBm/1.28 MHz	TBD
f	dBm/1.28 MHz	TBD
NOTE: Applicable for dual-mode GSM/UTRA LCR TDD.		

#### B.3.1.2.3 E-UTRA FDD

#### B.3.1.2.4 E-UTRA TDD

### B.3.1.3 Hand phantom browsing mode position

#### B.3.1.3.1 UTRA FDD

#### B.3.1.3.2 UTRA LCR TDD

#### B.3.1.3.3 E-UTRA FDD

#### B.3.1.3.4 E-UTRA TDD

## B.3.2 Recommended performance for LME

### B.3.2.1 GSM

**Table B.3.2.1-1: LME TRS recommended performance for GSM in the data transfer position**

Operating band	Unit	<REF <sub>or</sub> > Average
GSM 850	dBm	TBD
GSM 900	dBm	TBD
DCS 1800	dBm	TBD
PCS 1900	dBm	TBD
NOTE 1: Applicable for dual-mode GSM/UMTS.		
NOTE 2: Applicable for USB plug-in devices.		

### B.3.2.2 UTRA FDD

**Table B.3.2.2-1: LME TRS recommended performance for UTRA FDD in the data transfer position**

Operating band	Unit	<REF <sub>or</sub> > Average
I	dBm/3.84 MHz	TBD
II	dBm/3.84 MHz	TBD
III	dBm/3.84 MHz	TBD
IV	dBm/3.84 MHz	TBD
V	dBm/3.84 MHz	TBD
VI	dBm/3.84 MHz	TBD
VII	dBm/3.84 MHz	TBD
VIII	dBm/3.84 MHz	TBD
IX	dBm/3.84 MHz	TBD
XIX	dBm/3.84 MHz	TBD

NOTE: Applicable for USB plug-in devices.

### B.3.2.3 UTRA LCR TDD

**Table B.3.2.3-1: LME TRS recommended performance for UTRA LCR TDD in the data transfer position**

Operating band	Unit	<REF <sub>or</sub> > Average
a	dBm/1.28 MHz	TBD
b	dBm/1.28 MHz	TBD
c	dBm/1.28 MHz	TBD
d	dBm/1.28 MHz	TBD
e	dBm/1.28 MHz	TBD
f	dBm/1.28 MHz	TBD

NOTE 1: Applicable for dual-mode GSM/UTRA LCR TDD.  
NOTE 2: Applicable for USB plug-in devices.

### B.3.2.4 E-UTRA FDD

### B.3.2.5 E-UTRA TDD

## B.3.3 Recommended performance for LEE

### B.3.3.1 GSM

**Table B.3.3.1-1: LEE TRS recommended performance for GSM in the data transfer position**

Operating band	Unit	<REF <sub>or</sub> > Average
GSM 850	dBm	TBD
GSM 900	dBm	TBD
DCS 1800	dBm	TBD
PCS 1900	dBm	TBD

NOTE 1: Applicable for dual-mode GSM/UMTS.  
NOTE 2: Applicable for notebook devices.

### B.3.3.2 UTRA FDD

Table B.3.3.2-1: LEE TRS recommended performance for UTRA FDD in the data transfer position

Operating band	Unit	<REF <sub>or</sub> > Average
I	dBm/3.84 MHz	TBD
II	dBm/3.84 MHz	TBD
III	dBm/3.84 MHz	TBD
IV	dBm/3.84 MHz	TBD
V	dBm/3.84 MHz	TBD
VI	dBm/3.84 MHz	TBD
VII	dBm/3.84 MHz	TBD
VIII	dBm/3.84 MHz	TBD
IX	dBm/3.84 MHz	TBD
XIX	dBm/3.84 MHz	TBD

NOTE: Applicable for notebook devices.

### B.3.3.3 UTRA LCR TDD

Table B.3.3.3-1: LEE TRS recommended performance for UTRA LCR TDD in the data transfer position

Operating band	Unit	<REF <sub>or</sub> > Average
a	dBm/1.28 MHz	TBD
b	dBm/1.28 MHz	TBD
c	dBm/1.28 MHz	TBD
d	dBm/1.28 MHz	TBD
e	dBm/1.28 MHz	TBD
f	dBm/1.28 MHz	TBD

NOTE 1: Applicable for dual-mode GSM/UTRA LCR TDD.  
NOTE 2: Applicable for notebook devices.

### B.3.3.4 E-UTRA FDD

### B.3.3.5 E-UTRA TDD

---

## Annex C (informative): Change history

Change history							
Date	TSG #	TSG Doc.	CR	Rev	Subject/Comment	Old	New