CỘNG HOÀ XÃ HỘI CHỦ NGHĨA VIỆT NAM

# QCVN 15:2010/BTTTT

# QUY CHUẨN KỸ THUẬT QUỐC GIA VỀ THIẾT BỊ ĐẦU CUỐI THÔNG TIN DI ĐỘNG W-CDMA FDD

***National technical regulation on Mobile Stations for W-CDMA FDD***

***(for information only)***

**HANOI - 2010**

**Table of contents**

## Foreword

QCVN 15:2010/BTTTT is based on the review and convert of TCN 68-245:2006 "Mobile Stations for IMT-2000 CDMA Direct Spread (W-CDMA FDD) - Technical Requirements", issued by decision no 27/2006/QĐ-BBCVT dated July 25, 2006 of Minister of Ministry of Post and Telecommunications (now the Ministry of Information and Communications).

Technical Requirements of QCVN 15:2010/BTTTT accordance with standards ETSI EN 301 908-2 V2.2.1 (2003-10) and EN 301 908-1 V2.2.1 (2003-10) of the European Telecommunications Standards Institute (ETSI).

QCVN 15:2010/BTTTT is drafted by Research Institute of Posts and Telecommunications (RIPT), verified and submitted by Department of Science & Technology, issued by the Minister of Information and Communications as in Circular No 18/2010/TT-BTTTT dated July 30, 2010.

# QUY CHUẨN KỸ THUẬT QUỐC GIA
# VỀ THIẾT BỊ ĐẦU CUỐI THÔNG TIN DI ĐỘNG W-CDMA FDD

***National technical regulation on Mobile Stations for W-CDMA FDD***

## 1. GENERAL

### 1.1. Scope

This technical regulation applies to the User Equipment for IMT-2000 CDMA Direct Spread (UTRA FDD). This radio equipment type is capable of operating in all or any part of the frequency bands given in table 1.

**Table 1 - CDMA Direct Spread service frequency bands (UTRA FDD)**

| Direction of transmission | CDMA Direct Spread service frequency bands (UTRA FDD ) |
|---|---|
| Transmit | 1920 MHz to 1980 MHz |
| Receive | 2110 MHz to 2170 MHz |

The Technical regulation applies to UTRA FDD User Equipments, including **User Terminals** supporting HS-PDSCH transmission using QPSK and 16 QAM Modulation.

Technical requirements of this Technical regulation ensure that the radio equipment shall be so constructed that it effectively uses the spectrum allocated to terrestrial/space radio communications and orbital resources so as to avoid harmful interference.

### 1.2. Subjects of application

This Technical regulation applies to all agencies, organizations, manufacturers, importer and operator User Equipments for use in the IMT-2000 CDMA Direct Spread (UTRA FDD).

### 1.3. Normative references

[1] ETSI EN 301 908-2 V2.2.1 (2003-10): “Electromagnetic compatibility and Radio spectrum Matters (ERM); Base Stations (BS), Repeaters and User Equipment (UE) for IMT-2000 Third-Generation cellular networks; Part 2: Harmonized EN for IMT-2000, CDMA Direct Spread (UTRA FDD) (UE) covering essential requirements of article 3.2 of R&TTE Directive”.

[2] ETSI EN 301 908-1 V2.2.1 (2003-10): “Electromagnetic compatibility and Radio spectrum Matters (ERM); Base Station (BS), Repeaters and User Equipment (UE) for IMT-2000 Third-Generation cellular networks; Part 1: Harmonized EN for IMT-2000, introduction and common requirements, covering essential requirements of article 3.2 of R&TTE Directive”.

### 1.4. Definitions

#### 1.4.1. User Equipment

A Mobile Equipment with one or several UMTS Subscriber Identity Module(s). User Equipment is a device allowing a user access to network services via the Uu interface.

### 1.4.2. Ancillary equipment

Equipment (apparatus) used in connection with a User Equipment (UE) is considered as an ancillary equipment (apparatus) if:

- The equipment is intended for use in conjunction with a User Equipment (UE) to provide additional operational and/or control features to the radio equipment, (e.g. to extend control to another position or location);
- The equipment cannot be used on a stand alone basis to provide user functions independently of a UE; and
- The UE to which it is connected, is capable of providing some intended operation such as transmitting and/or receiving without the ancillary equipment.

### 1.4.3. Environmental profile

Range of environmental conditions under which equipment within the scope of the technical standard is required to comply with the provisions of the technical standard.

### 1.4.4. Maximum output power

Measure of the maximum power the UE can transmit (i.e. the actual power as would be measured assuming no measurement error) in a bandwidth of at least (1 + $\alpha$) times the chip rate of the radio access mode.

NOTE: The period of measurement shall be at least one timeslot.

### 1.4.5. Mean power

Power (transmitted or received) in a bandwidth of at least (1+$\alpha$) times the chip rate of the radio access mode, when applied to a W-CDMA modulated signal.

NOTE: The period of measurement shall be at least one timeslot unless otherwise stated.

### 1.4.6. Nominal maximum output power

Nominal power defined by the UE power class.

### 1.4.7. Power spectral density

Function of power versus frequency and when integrated across a given bandwidth, the function represents the mean power in such a bandwidth.

NOTE 1: When the mean power is normalized to (divided by) the chip-rate it represents the mean energy per chip. Some signals are directly defined in terms of energy per chip, (DPCH_$E_c$, $E_c$, OCNS_$E_c$ and S-CCPCH_$E_c$) and others defined in terms of PSD ($I_o$, $I_{oc}$, $I_{or}$ and $\hat{I}_{or}$). There also exist quantities that are a ratio of energy per chip to PSD (DPCH_$E_c/I_{or}$, $E_c/I_{or}$, etc.). This is the common practice of relating energy magnitudes in communication systems.

NOTE 2: It can be seen that if both energy magnitudes in the ratio are divided by time, the ratio is converted from an energy ratio to a power ratio, which is more useful from a measurement point of view. It follows that an energy

per chip of X dBm/3.84 MHz can be expressed as a mean power per chip of X dBm. Similarly, a signal PSD of Y dBm/3.84 MHz can be expressed as a signal power of Y dBm.

NOTE 3: The units of Power Spectral Density (PSD) are extensively used in the technical standard.

### 1.4.8. RRC filtered mean power

Mean power as measured through a root raised cosine filter with roll-off factor $\alpha$ and a bandwidth equal to the chip rate of the radio access mode.

NOTE: The RRC filtered mean power of a perfectly modulated W-CDMA signal is 0.246 dB lower than the mean power of the same signal.

### 1.4.9. IMT-2000

IMT-2000s are third generation mobile systems which are scheduled to start service around the year 2000 subject to market considerations.

NOTE: ITU-R Recommendation M.8/BL/18 [24] identifies the detailed specifications for the IMT-2000 radio interfaces.

### 1.4.10. Idle mode

State of User Equipment (UE) when switched on but with no Radio Resource Control (RRC) connection.

### 1.4.11. Enclosure port

Physical boundary of the apparatus through which electromagnetic fields may radiate or impinge.

NOTE: In the case of integral antenna equipment, this port is inseparable from the antenna port.

### 1.4.12. Port

Particular interface, of the specified equipment (apparatus), with the electromagnetic environment.NOTE: For example, any connection point on an equipment intended for connection of cables to or from that equipment is considered as a port (see figure 1).

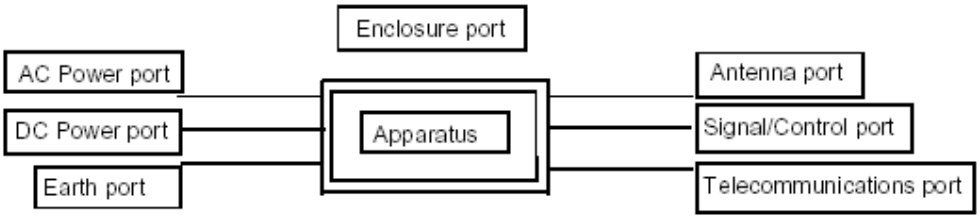


**Figure 1 - Examples of ports**

### 1.4.13. Radio communications equipment

Telecommunications equipment which includes one or more transmitters and/or receivers and/or parts thereof for use in a fixed, mobile or portable application.

NOTE: It can be operated with ancillary equipment but if so, is not dependent on it for basic functionality.

### 1.4.14. Signal and control port

Port which carries information or control signals, excluding antenna ports.

### 1.4.15. Telecommunication port

Port which is intended to be connected to telecommunication networks (e.g. public switched telecommunication networks, integrated services digital networks), local area networks (e.g. ethernet, token ring) and similar networks.

### 1.4.16. Traffic mode

State of user equipment (UE) when switched on and with Radio Resource Control (RRC) connection established.

## 1.5. Symbols

| | |
|---|---|
| $\alpha$ | Roll-off factor of the root raised cosine filter, $\alpha$ = 0.22 |
| DPCH_$E_c$ | Average energy per PN chip for DPCH |
| DPCH_$E_c/I_{or}$ | The ratio of the transmit energy per PN chip of the DPCH to the total transmit power spectral density at the Node B antenna connector (SS). |
| DPCCH_$E_c/I_{or}$ | The ratio of the transmit energy per PN chip of the DPCCH to the total transmit power spectral density at the Node B antenna connector (SS). |
| DPDCH_$E_c/I_{or}$ | The ratio of the transmit energy per PN chip of the DPDCH to the total transmit power spectral density at the Node B antenna connector (SS). |
| $E_c$ | Average energy per PN chip |
| $E_c/I_{or}$ | The ratio of the average transmit energy per PN chip for different fields or physical channels to the total transmit power spectral density. |
| $F_{uw}$ | Frequency of unwanted signal. This is specified in bracket in terms of an absolute frequency(s) or a frequency offset from the assigned channel frequency. |
| $I_{oac}$ | The power spectral density (integrated in a bandwidth of (1+$\alpha$) times the chip rate and normalized to the chip rate) of the adjacent frequency channel as measured at the UE antenna connector. |
| $I_{oc}$ | The power spectral density (integrated in a noise bandwidth equal to the chip rate and normalized to the chip rate) of a band limited white noise source (simulating interference from cells, which are not defined in a test procedure) as measured at the UE antenna connector. |
| $I_{or}$ | The total transmit power spectral density (integrated in a |

bandwidth of (1+$\alpha$) times the chip rate and normalized to the chip rate) of the downlink signal at the Node B antenna connector.

$\hat{I}_{or}$ The received power spectral density (integrated in a bandwidth of (1+$\alpha$) times the chip rate and normalized to the chip rate) of the downlink signal as measured at the UE antenna connector.

$I_{ouw}$ Unwanted signal power level.

### 1.6. Abbreviations

For the purposes of the present document, the following abbreviations apply:

| | |
|---|---|
| 16QAM | 16-Quadrature Amplitude Modulation |
| ACLR | Adjacent Channel Leakage power Ratio |
| ACS | Adjacent Channel Selectivity |
| BER | Bit Error Ratio |
| BLER | Block Error Ratio |
| BS | Base Station |
| CW | Continuous Wave (unmodulated signal) |
| DCH | Dedicated Channel |
| DL | Down Link (forward link) |
| DPCH | Dedicated Physical Channel |
| DPCCH | Dedicated Physical Control Channel |
| DPDCH | Dedicated Physical Data Channel |
| DTX | Discontinuous Transmission |
| e.i.r.p | equivalent isotropically radiated power |
| EMC | ElectroMagnetic Compatibility |
| e.r.p | effective radiated power |
| EUT | Equipment Under Test |
| FACH | Forward Access Channel |
| FDD | Frequency Division Duplex |
| HS- | High Speed Physical Downlink Shared Channel |

PDSCH

| | |
|---|---|
| Data rate | Rate of the user information, which must be transmitted over the Air Interface. For example, output rate of the voice codec. |
| LV | Low Voltage |
| Node B | A logical node responsible for radio transmission/reception in one or more cells to/from the User Equipment |
| OCNS | Orthogonal Channel Noise Simulator |
| QPSK | Quadrature Phase Shift Keying |
| P-CCPCH | Primary Common Control Physical Channel |
| PCH | Paging Channel |
| P-CPICH | Primary Common Pilot Channel |
| PICH | Paging Indicator Channel |
| PN | PseudoNoise |
| PSD | Power Spectral Density |
| RF | Radio Frequency |
| RRC | Radio Resource Control |
| RRC | Root Raised Cosine |
| R&TTE | Radio equipment and Telecommunications Terminal Equipment |
| S-CCPCH | Secondary Common Control Physical Channel |
| SCH | Synchronization Channel |
| SS | System Simulator |
| TDD | Time Division Duplex |
| TFC | Transport Format Combination |
| TFCI | Transport Format Combination Indicator |
| TPC | Transmit Power Control |
| UARFCN | UTRA Absolute Radio Frequency Channel Number |
| UE | User Equipment |

UTRA Universal Terrestrial Radio Access

## 2. TECHNICAL REQUIREMENTS

### 2.1. Environmental profile

The technical requirements of the present document apply under the environmental profile for operation of the equipment, which shall be declared by the supplier. The equipment shall comply with all the technical requirements of the present document at all times when operating within the boundary limits of the declared operational environmental profile.

For guidance on how a supplier can declare the environmental profile see annex A.

### 2.2. Conformance requirements

#### 2.2.1. Essential parameters and corresponding technical requirements

This technical standard identifies 9 essential parameters for IMT-2000 user equipment (UE). Table 2 provides a cross reference between these 9 essential parameters and the corresponding 13 technical requirements for equipment within the scope of the present document.

**Table 2 - Cross references**

| Essential parameter | Corresponding technical requirements |
|---|---|
| Spectrum emissions mask | 2.2.3 Transmitter Spectrum emissions mask |
| | 2.2.12 Transmitter adjacent channel leakage power ratio |
| Conducted spurious emissions in active mode | 2.2.4 Transmitter spurious emissions |
| Accuracy of maximum output power | 2.2.2 Transmitter maximum output power |
| Prevention of harmful interference through control of power | 2.2.5 Transmitter minimum output power |
| Conducted spurious emission in idle mode | 2.2.10 Receiver spurious emissions |
| Impact of interference on receiver performance | 2.2.7 Receiver Blocking characteristics |
| | 2.2.8 Receiver spurious response |
| | 2.2.9 Receiver Intermodulation characteristics |

| | |
|---|---|
| Receiver adjacent channel selectivity | 2.2.6 Receiver Adjacent Channel Selectivity (ACS) |
| Control and Monitoring functions | 2.2.11 Out of synchronization handling of output power |
| | 2.2.14 Control and Monitoring functions |
| Radiated emissions | 2.2.13 Radiated emissions |

### 2.2.2. Transmitter maximum output power

#### 2.2.2.1. Definition

The nominal maximum output power and its tolerance are defined according to the power class of the UE.

The nominal power defined is the transmit power of the UE, i.e. the power in a bandwidth of at least (1 + $\alpha$) times the chip rate of the radio access mode. The period of measurement shall be at least one timeslot.

#### 2.2.2.2. Limits

The UE maximum output power shall be within the shown value in table 3 even for the multi-code transmission mode.

**Table 3 - UE power classes**

| Power Class 3 | | Power Class 4 | |
|---|---|---|---|
| **Power (dBm)** | **Tol (dB)** | **Power (dBm)** | **Tol (dB)** |
| +24 | +1.7/-3.7 | +21 | +2.7/-2.7 |

#### 2.2.2.3. Conformance

Conformance tests described in clause 3.3.1 shall be carried out.

### 2.2.3. Transmitter spectrum emission mask

#### 2.2.3.1. Definition

The spectrum emission mask of the UE applies to frequencies, which are between 2.5 MHz and 12.5 MHz away from the UE centre carrier frequency. The out of channel emission is specified relative to the RRC filtered mean power of the UE carrier.

#### 2.2.3.2. Limits

The power of any UE emission shall not exceed the levels specified in table 4.

**Table 4 - Spectrum emission mask requirement**

| $\Delta$f in MHz | Minimum requirement | Measurement bandwidth |
|---|---|---|
| 2.5 to 3.5 | $\left\{-33.5-15\times\left(\frac{\Delta f}{MHz}-2.5\right)\right\}dBc$ | 30 kHz (see note 2) |

| | | |
|---|---|---|
| 3.5 to 7.5 | $\left\{-33.5-1\times\left(\frac{\Delta f}{MHz}-3.5\right)\right\}dBc$ | 1 MHz (see note 3) |
| 7.5 to 8.5 | $\left\{-37.5-10\times\left(\frac{\Delta f}{MHz}-7.5\right)\right\}dBc$ | 1 MHz (see note 3) |
| 8.5 to 12.5 | -47.5 dBc | 1 MHz (see note 3) |
| NOTE 1: $\Delta f$ is the separation between the carrier frequency and the centre of the measuring filter.<br>NOTE 2: The first and last measurement position with a 30 kHz filter is at $\Delta f$ equals to 2.515 MHz and 3.485 MHz.<br>NOTE 3: The first and last measurement position with a 1 MHz filter is at $\Delta f$ equals to 4 MHz and 12 MHz.<br>NOTE 4: As a general rule, the resolution bandwidth of the measuring equipment should be equal to the measurement bandwidth. To improve measurement accuracy, sensitivity and efficiency, the resolution bandwidth can be different from the measurement bandwidth. When the resolution bandwidth is smaller than the measurement bandwidth, the result should be integrated over the measurement bandwidth in order to obtain the equivalent noise bandwidth of the measurement bandwidth<br>NOTE 5: The lower limit shall be -48.5 dBm/3.84 MHz. | | |

#### 2.2.3.3. Conformance

Conformance tests described in clause 3.3.2 shall be carried out.

### 2.2.4. Transmitter spurious emissions

#### 2.2.4.1. Definition

Spurious emissions are emissions, which are caused by unwanted transmitter effects such as harmonics emission, parasitic emission, intermodulation products and frequency conversion products, but exclude out-of-band emissions.

#### 2.2.4.2. Limits

The limits shown in tables 5 and 6 are only applicable for frequencies, which are greater than 12.5 MHz away from the UE centre carrier frequency.

**Table 5 - General spurious emissions requirements**

| Frequency bandwidth | Measurement bandwidth | Minimum requirement |
|---|---|---|
| 9 kHz ≤ f < 150 kHz | 1 kHz | -36 dBm |
| 150 kHz ≤ f < 30 MHz | 10 kHz | -36 dBm |
| 30 MHz ≤ f < 1000 MHz | 100 kHz | -36 dBm |
| 1 GHz ≤ f < 12.75 GHz | 1 MHz | -30 dBm |

**Table 6 - Additional spurious emissions requirements**

| Frequency bandwidth | Measurement bandwidth | Minimum requirement |
|---|---|---|
| 925 MHz ≤ f ≤ 935 MHz | 100 kHz | -67 dBm (see note) |
| 935 MHz < f ≤ 960 MHz | 100 kHz | -79 dBm (see note) |
| 1805 MHz ≤ f ≤ 1880 MHz | 100 kHz | -71 dBm (see note) |
| 1893.5 MHz < f < 1919.6 MHz | 300 kHz | -41 dBm |
| NOTE: The measurements are made on frequencies which are integer multiples of 200 kHz. As exceptions, up to five measurements with a level up to the applicable requirements defined in table 5 are permitted for each UARFCN used in the measurement. | | |

#### 2.2.4.3. Conformance

Conformance tests described in clause 3.3.3 shall be carried out.

### 2.2.5. Transmitter minimum output power

#### 2.2.5.1. Definition

The minimum controlled output power of the UE is when the power is set to a minimum value. The minimum transmit power is defined as a mean power in one time slot.

#### 2.2.5.2. Limits

The minimum output power shall be less than -49 dBm.

#### 2.2.5.3. Conformance

Conformance tests described in clause 3.3.4 shall be carried out.

### 2.2.6. Receiver adjacent channel selectivity

#### 2.2.6.1. Definition

Adjacent Channel Selectivity (ACS) is a measure of a receiver's ability to receive a W-CDMA signal at its assigned channel frequency in the presence of an adjacent channel signal at a given frequency offset from the centre frequency of the assigned channel. ACS is the ratio of the receive filter attenuation on the assigned channel frequency to the receive filter attenuation on the adjacent channel(s).

#### 2.2.6.2. Limits

For the UE of power class 3 and 4, the BER shall not exceed 0.001 for the parameters specified in table 7. This test condition is equivalent to the ACS value 33 dB.

**Table 7 - Test parameters for adjacent channel selectivity**

| Parameter | Unit | Level/Status |
|---|---|---|
| DPCH_$E_c$ | dBm/3.84 MHz | -103 |
| $\hat{I}_{or}$ | dBm/3.84 MHz | -92.7 |
| $I_{oac}$ (modulated) | dBm/3.84 MHz | -52 |
| $F_{uw}$ (offset) | MHz | -5 or +5 |
| UE transmitted mean power | dBm | 20 (for Power class 3)<br>18 (for Power class 4) |
| NOTE: The $I_{oac}$ (modulated signal) consists of the common channels and the 16 dedicated data channels as specified in TS 125 101. | | |

#### 2.2.6.3. Conformance

Conformance tests described in clause 3.3.5 shall be carried out.

### 2.2.7. Receiver blocking characteristics

#### 2.2.7.1. Definition

The blocking characteristic is a measure of the receiver's ability to receive a wanted signal at its assigned channel frequency in the presence of an unwanted interferer on frequencies other than those of the spurious response or the adjacent channels, without this unwanted input signal causing a degradation of the performance of the receiver beyond a specified limit. The blocking performance shall apply at all frequencies except those at which a spurious response occur.

#### 2.2.7.2. Limits

The BER shall not exceed 0.001 for the parameters specified in tables 8 and 9. For tables 9 up to 24 exceptions are allowed for spurious response frequencies in each assigned frequency channel when measured using a 1 MHz step size.

**Table 8 - Test parameters for in-band blocking characteristics**

| Parameter | Unit | Level | |
|---|---|---|---|
| DPCH_Ec | dBm/3.84 MHz | -114 | |
| $\hat{I}_{or}$ | dBm/3.84 MHz | -103.7 | |
| $I_{blocking}$ mean power (modulated) | dBm | -56 (for $F_{uw}$ offset ± 10 MHz) | -44 (for $F_{uw}$ offset ± 15 MHz) |
| UE transmitted mean power | dBm | 20 (for Power class 3)<br>18 (for Power class 4) | |
| NOTE: The $I_{blocking}$ (modulated signal) consists of the common channels and the 16 dedicated data channels as specified in TS 125 101. | | | |

**Table 9 - Test parameters for out-of-band blocking characteristics**

| Parameter | Unit | Frequency range 1 | Frequency range 2 | Frequency range 3 |
|---|---|---|---|---|
| DPCH_$E_c$ | dBm/3.84 MHz | -114 | -114 | -114 |
| $\hat{I}_{or}$ | dBm/3.84 MHz | < -103.7 | < -103.7 | < -103.7 |
| $I_{blocking}$ (CW) | dBm | -44 | -30 | -15 |
| $F_{uw}$ | MHz | 2050 < f < 2095<br>2185 < f < 2230 | 2025 < f < 2050<br>2230 < f < 2255 | 1 < f < 2025<br>2255 < f < 12750 |
| UE transmitted mean power | dBm | 20 (for Power class 3)<br>18 (for Power class 4) | | |
| NOTE: For 2095 MHz < f < 2110 MHz and 2170 MHz < f < 2185 MHz, the appropriate adjacent channel selectivity or in-band blocking in clause 2.2.6 and table 8 shall be applied. | | | | |

#### 2.2.7.3. Conformance

Conformance tests described in clause 3.3.6 shall be carried out.

### 2.2.8. Receiver spurious response

#### 2.2.8.1. Definition

Spurious response is a measure of the receiver's ability to receive a wanted signal on its assigned channel frequency without exceeding a given degradation due to the presence of an unwanted CW interfering signal at any other frequency at which a response is obtained i.e. for which the out-of-band blocking limit as specified in table 9 is not met.

#### 2.2.8.2. Limits

The BER shall not exceed 0.001 for the parameters specified in table 10.

**Table 10 - Test parameters for spurious response**

| Parameter | Unit | Level/Status |
|---|---|---|
| DPCH_$E_c$ | dBm/3.84 MHz | -114 |
| $\hat{I}_{or}$ | dBm/3.84 MHz | -103.7 |
| $I_{blocking}$ (CW) | dBm | -44 |
| $F_{uw}$ | MHz | Spurious response frequencies |
| UE transmitted mean power | dBm | 20 (for Power class 3)<br>18 (for Power class 4) |

#### 2.2.8.3. Conformance

Conformance tests described in clause 3.3.7 shall be carried out.

### 2.2.9. Receiver intermodulation characteristics

#### 2.2.9.1. Definition

Third and higher order mixing of the two interfering RF signals can produce an interfering signal in the band of the desired channel. Intermodulation response rejection is a measure of the capability of the receiver to receiver a wanted signal on its assigned channel frequency in the presence of two or more interfering signals which have a specific frequency relationship to the wanted signal.

#### 4.2.9.2. Limits

The BER shall not exceed 0.001 for the parameters specified in table 11.

**Table 11 - Receive intermodulation characteristics**

| Parameter | Unit | Level/Status | |
|---|---|---|---|
| DPCH_$E_c$ | dBm/3.84 MHz | -114 | |
| $\hat{I}_{or}$ | dBm/3.84 MHz | -103.7 | |
| $I_{ouw1}$ (CW) | dBm | -46 | |
| $I_{ouw2}$ mean power (modulated) | dBm | -46 | |
| $F_{uw1}$ (offset) | MHz | 10 | -10 |

| | | | |
|---|---|---|---|
| $F_{uw2}$ (offset) | MHz | 20 | -20 |
| UE transmitted mean power | dBm | 20 (for Power class 3)<br>18 (for Power class 4) | |
| NOTE: $I_{ouw2}$ (modulated) consists of the common channels and the 16 dedicated data channels as specified in TS 125 101. | | | |

#### 2.2.9.3. Conformance

Conformance tests described in clause 3.3.8 shall be carried out.

### 2.2.10. Receiver spurious emissions

#### 2.2.10.1. Definition

The spurious emissions power is the power of emissions generated or amplified in a receiver that appear at the UE antenna connector.

#### 2.2.10.2. Limits

The power of any narrow band CW spurious emission shall not exceed the maximum level specified in tables 12 and 13.

**Table 12 - General receiver spurious emission requirements**

| Frequency band | Measurement bandwidth | Maximum level |
|---|---|---|
| 30 MHz ≤ f < 1 GHz | 100 kHz | -57 dBm |
| 1 GHz ≤ f ≤ 12.75 GHz | 1 MHz | -47 dBm |

**Table 13 - Additional receiver spurious emission requirements**

| Frequency band | Measurement bandwidth | Maximum level | Note |
|---|---|---|---|
| 1920 MHz ≤ f ≤ 1980 MHz | 3.84 MHz | -60 dBm | UE transmit band in URA_PCH, Cell_PCH and idle state |
| 2110 MHz ≤ f ≤ 2170 MHz | 3.84 MHz | -60 dBm | UE receive band |

#### 2.2.10.3 Conformance

Conformance tests described in clause 3.3.9 shall be carried out.

### 2.2.11. Out-of-synchronization handling of output power

#### 2.2.11.1 Definition

The UE shall monitor the DPCCH quality in order to detect a loss of the signal on Layer 1. The threshold $Q_{out}$ specifies at what DPCCH quality levels the UE shall shut its power off. The threshold is not defined explicitly, but is defined by the conditions under which the UE shall shut its transmitter off, as stated in this clause.

The DPCCH quality shall be monitored in the UE and compared to the threshold Qout for the purpose of monitoring synchronization. The threshold Qout should correspond to a level of DPCCH quality where no reliable detection of the TPC

commands transmitted on the downlink DPCCH can be made. This can be at a TPC command error ratio level of e.g. 20%.

### 2.2.11.2. Limits

When the UE estimates the DPCCH quality over the last 160 ms period to be worse than a threshold $Q_{out}$ the UE shall shut its transmitter off within 40 ms.

The quality level at the thresholds $Q_{out}$ correspond to different signal levels depending on the downlink conditions DCH parameters. For the conditions in table 14, a signal with the quality at the level $Q_{out}$ can be generated by a DPCCH_$E_c/I_{or}$ ratio of -25 dB. The DL reference measurement channel (12.2 kbit/s) is specified in annex D and with static propagation condition. The downlink physical channels, other than those specified in table 14, are as specified in TS 134 121.

**Table 14 - DCH parameters for test of out-of-synchronization handling**

| Parameter | Value | Unit |
|---|---|---|
| $\hat{I}_{or}/I_{oc}$ | -1 | dB |
| $I_{oc}$ | -60 | dBm/3.84 MHz |
| (DPDCH_$E_c$)/ $I_{or}$ | See figure 2:<br>Before point -16.6<br>After point A not defined | dB |
| (DPCCH_$E_c$)/ $I_{or}$ | See figure 2 | dB |
| Information Data Rate | 12.2 | kbit/s |

Figure 2 shows an example scenario where the DPCCH_$E_c/I_{or}$ ratio varies from a level where the DPCH is demodulated under normal conditions, down to a level below $Q_{out}$ where the UE shall shut its power off.

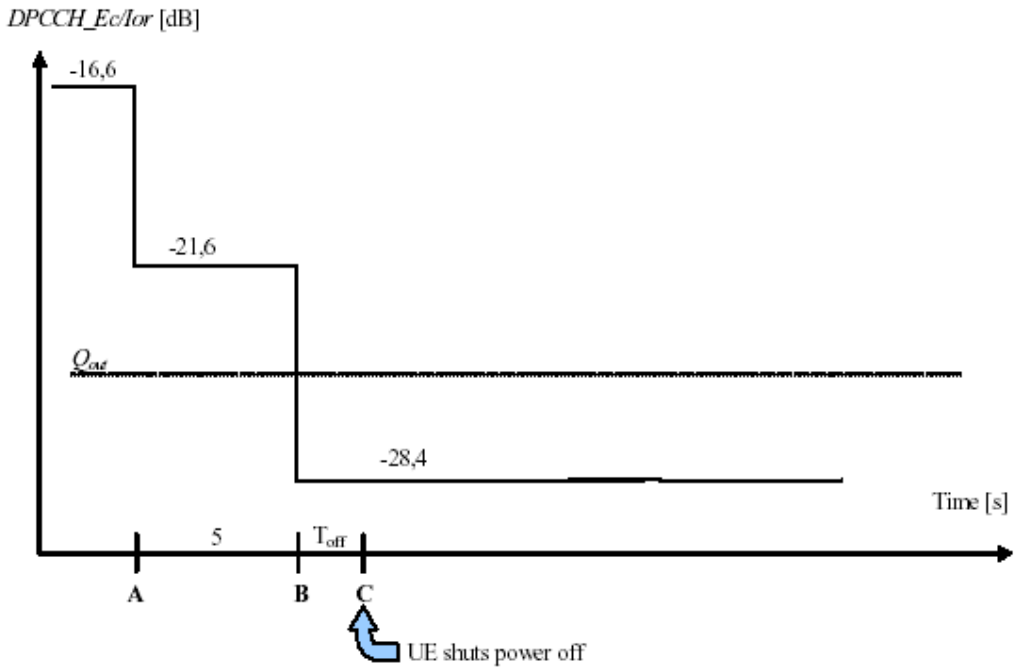


**Figure 2 - Conditions for out-of-synch handling in the User Equipment**

The requirements for the UE are that it shall shut its transmitter off before point C.

The UE transmitter is considered to be OFF if the measured RRC filtered mean power is less than -55 dBm

#### 2.2.11.3 Conformance

Conformance tests described in clause 3.3.10 shall be carried out.

### 2.2.12. Transmitter Adjacent Channel Leakage power Ratio

#### 2.2.12.1 Definition

Adjacent Channel Leakage power Ratio (ACLR) is the ratio of the RRC filtered mean power centred on the assigned channel frequency to the RRC filtered mean power centred on an adjacent channel frequency.

#### 2.2.12.2 Limits

**Table 14a - UE ACLR**

| Power Class | Adjacent channel frequency relative to assigned channel frequency | ACLR limit |
|---|---|---|
| 3 | +5 MHz or -5 MHz | 32.2 dB |
| 3 | +10 MHz or -10 MHz | 42.2 dB |
| 4 | +5 MHz or -5 MHz | 32.2 dB |
| 4 | +10 MHz or -10 MHz | 42.2 dB |
| Note: The requirement shall still be met in the presence of swithching transients. | | |

#### 2.2.12.3. Conformance

Conformance tests described in clause 3.3.11 shall be carried out.

### 2.2.13. Radiated emissions

#### 2.2.13.1. Definition

This test assesses the ability of radio communications equipment and ancillary equipment to limit unwanted emissions from the enclosure port.

This test is applicable to radio communications equipment and ancillary equipment.

This test shall be performed on the radio communications equipment and/or a representative configuration of the ancillary equipment.

#### 2.2.13.2. Limits

The frequency boundary and reference bandwidths for the detailed transitions of the limits between the requirements for out of band emissions and spurious emissions are based on ITU-R Recommendations SM.329-10 and SM.1539-1.

The requirements shown in table 15 are only applicable for frequencies in the spurious domain.

**Table 15 - Radiated spurious emissions requirements**

| Frequency | Minimum requirement (e.r.p)/reference bandwidth idle mode | Minimum requirement (e.r.p)/reference bandwidth traffic mode | Applicability |
|---|---|---|---|
| 30 MHz ≤ f < 1000 MHz | -57 dBm/ 100 kHz | -36 dBm/ 100 kHz | All |
| 1 GHz ≤ f < 12.75 GHz | -47 dBm/ 1 MHz | -30 dBm/ 1 MHz | All |
| NOTE: $f_c$ is the UE transmit centre frequency | | | |

#### 2.2.13.3. Conformance

Conformance tests described in clause 3.3.12 shall be carried out.

### 2.2.14. Control and monitoring functions

#### 2.2.14.1. Definition

This requirement, together with other control and monitoring technical requirements identified in the table of cross references, verifies that the control and monitoring functions of the UE prevent it from transmitting in the absence of a valid network.

This test is applicable to radio communications equipment and ancillary equipment.

This test shall be performed on the radio communications equipment and/or a representative configuration of the ancillary equipment.

#### 2.2.14.2. Limits

The maximum measured power during the duration of the test shall not exceed -30 dBm.

#### 2.2.14.3 Conformance

Conformance tests described in clause 3.3.13 shall be carried out.

## 3. METHOD OF MEASUREMENT

### 3.1 Environmental conditions for testing

Tests defined in the present document shall be carried out at representative points within the boundary limits of the declared operational environmental profile.

Where technical performance varies subject to environmental conditions, tests shall be carried out under a sufficient variety of environmental conditions (within the boundary limits of the declared operational environmental profile) to give confidence of compliance for the affected technical requirements.

Normally it should be sufficient for all tests to be conducted using normal test conditions except where otherwise stated. For guidance on the use of other conditions to be used in order to show compliance reference can be made to TS 134 121.

Many tests in the present document are performed with appropriate frequencies in the low, middle and high range of the operating frequency band of the UE. These frequencies are defined in table E.1 of annex E.

### 3.2. Interpretation of the measurement results

The interpretation of the results recorded in a test report for the measurements described in the present document shall be as follows:

- The measured value related to the corresponding limit will be used to decide whether an equipment meets the requirements of the present document;

- The value of the measurement uncertainty for the measurement of each parameter shall be included in the test report;

- The recorded value of the measurement uncertainty shall be, for each measurement, equal to or lower than the figures in tables 16 and 16a.

For the test methods, according to the present document, the measurement uncertainty figures shall be calculated in accordance with TR 100 028-1 and shall correspond to an expansion factor (coverage factor) k = 1.96 (which provides a confidence level of 95% in the case where the distributions characterizing the actual measurement uncertainties are normal (Gaussian)). For guidance on other measurement conditions reference can be made to annex (s) of TS 134 121.

Tables 16 and 16a are based on this expansion factor.

**Table 16: Maximum measurement uncertainty of the test system**

| Parameter | Conditions | Test System uncertainty |
|---|---|---|
| Transmitter maximum power | | ±0.7 dB |
| Transmitter spectrum emissions mask | | ±1.5 dB |
| Transmitter spurious emissions | f ≤ 2.2 GHz<br>2.2 GHz <f ≤ 4 GHz<br>f > 4 GHz<br>Co-existence band (> - 60 dBm):<br>Co-existence band (< - 60 dBm): | ±1.5 dB<br>±2.0 dB<br>±4.0 dB<br>±2.0 dB<br>±3.0 dB |
| Transmitter Minimum output power | | ±1.0 dB |
| Receiver Adjacent Channel Selectivity (ACS) | | ±1.1 dB |
| Receiver Blocking characteristics | f < 15 MHz offset:<br>15 MHz offset ≤ f ≤ 2.2 GHz<br>2.2 GHz < f ≤ 4 GHz<br>f > 4 GHz | ±1.4 dB<br>±1.0 dB<br>±1.7 dB<br>±3.1 dB |
| Receiver spurious response | f ≤ 2.2 GHz<br>2.2 GHz < f ≤ 4 GHz<br>f > 4 GHz | ±1.0 dB<br>±1.7 dB<br>±3.1 dB |
| Receiver intermodulation characteristics | | ±1.3 dB |
| Receiver spurious emissions | For UE receive band (-60 dBm)<br>For UE transmit band (-60 dBm)<br>Outside the UE receive band:<br>f ≤ 2.2 GHz<br>2.2 GHz < f ≤ 4 GHz<br>f > 4 GHz | ±3.0 dB<br>±3.0 dB<br>±2.0 dB<br>±2.0 dB<br>±4.0 dB |
| Out of synchronization of handling power | DPCCH_$E_c/I_{or}$<br>Transmit OFF power | ±0.4 dB<br>±1.0 dB |
| Transmitter adjacent channel leakage power ratio | | ±0.8 dB |

**Table 16a - Maximum measurement uncertainty of radiated emissions, control and monitoring functions**

| Parameter | Uncertainty |
|---|---|
| Effective radiated RF power between 30 MHz and 180 MHz | ±6 dB |
| Effective radiated RF power between 180 MHz and 12.75 GHz | ±3 dB |
| Conducted RF power | ±1 dB |

NOTE 1: For RF tests it should be noted that the uncertainties in tables 16 and 16a apply to the test system operating into a nominal 50Ω load and do not include system effects due to mismatch between the EUT and the test system.

NOTE 2: Annex G of TR 100 028-2 [10] provides guidance for the calculation of the uncertainty components relating to mismatch.

NOTE 3: If the test system for the test is known to have a measurement uncertainty greater than that specified in tables 16 and 16a, this equipment can still be used provided that an adjustment is made follows: Any additional uncertainty in the test system over and above that specified in tables 16 and 16a should be used to tighten the test requirements-making the test harder to pass (for some tests, e.g. receiver tests, this may require modification of stimulus signals).

### 3.3. Essential radio test suites

#### 3.3.1. Transmitter maximum output power

#### 3.3.1.1. Method of test

a) Initial conditions

Test environment: normal, TL/VL, TL/VH, TH/VL, TH/VH (for guidance see annex A).

The frequencies to be tested are low range, mid range and high range as defined in table E1, annex E.

- Connect the SS to the UE antenna connector (as shown in figure C.1, annex C).
- A call is set up according to the Generic call setup procedure.
- Enter the UE into loopback test mode and start the loopback test.

NOTE: When reference is made to test set up, call set up and loopback test mode, guidance on the applicability of these can be found in annex C, annex F and TS 134 109 respectively.

b) Procedure

- Set and send continuously Up power control commands to the UE.
- Measure the mean power of the UE in a bandwidth of at least (1+$\alpha$) times the chip rate of the radio access mode. The mean power shall be averaged over at least one timeslot.

#### 3.3.1.2. Test requirements

The results obtained shall be compared to the limits in clause 2.2.2.2 in order to show compliance.

### 3.3.2 Transmitter spectrum emission mask

#### 3.3.2.1. Method of test

a) Initial conditions

Test environment: normal (for guidance see annex A).

The frequencies to be tested are low range, mid range and high range as defined in table E1, annex E.

- Connect the SS to the UE antenna connector (as shown in figure C.1, annex C).
- A call is set up according to the Generic call setup procedure.
- Enter the UE into loopback test mode and start the loopback test.

NOTE: When reference is made to test set up, call set up and loopback test mode, guidance on the applicability of these can be found in annex C, annex F and TS 134 109 respectively.

b) Procedure

- Set and send continuously Up power control commands to the UE until the UE output power shall be at the maximum level.
- Measure the power of the transmitted signal with a measurement filter of bandwidths according to table 4. Measurements with an offset from the carrier centre frequency between 2.515 MHz and 3.485 MHz shall use a 30 kHz measurement filter. Measurements with an offset from the carrier centre frequency between 4 MHz and 12 MHz shall use 1 MHz measurement bandwidth and the result may be calculated by integrating multiple 50 kHz or narrower filter measurements. The characteristic of the filter shall be approximately Gaussian (typical spectrum analyzer filter). The centre frequency of the filter shall be stepped in contiguous steps according to table 4. The measured power shall be recorded for each step.
- Measure the RRC filtered mean power centred on the assigned channel frequency.
- Calculate the ratio of the power 2) with respect to 3) in dBc.

#### 3.3.2.2. Test requirements

The results obtained shall be compared to the limits in clause 2.2.3.2 in order to show compliance.

### 3.3.3. Transmitter spurious emissions

#### 3.3.3.1. Method of test

**a) Initial conditions**

Test environment: normal (for guidance see annex A).

The frequencies to be tested are low range, mid range and high range as defined in table E1, annex E.

- Connect the SS to the UE antenna connector (as shown in figure C.6, annex C).
- A call is set up according to the Generic call setup procedure.
- Enter the UE into loopback test mode and start the loopback test.

NOTE: When reference is made to test set up, call set up and loopback test mode, guidance on the applicability of these can be found in annex C, annex F and TS 134 109 respectively.

b) Procedure

- Set and send continuously Up power control commands to the UE until the UE output power shall be maximum level.
- Sweep the spectrum analyser (or equivalent equipment) over a frequency range and measure the average power of spurious emission.

#### 3.3.3.2 Test requirements

The results obtained shall be compared to the limits in clause 2.2.4.2 in order to show compliance.

### 3.3.4. Transmitter minimum output power

#### 3.3.4.1. Method of test

a) Initial conditions

Test environment: normal, TL/VL, TL/VH, TH/VL, TH/VH (for guidance see annex A).

The frequencies to be tested are mid range as defined in table E1, annex E.

- Connect the SS to the UE antenna connector (as shown in figure C.1, annex C).
- A call is set up according to the Generic call setup procedure.
- Enter the UE into loopback test mode and start the loopback test.

NOTE: When reference is made to test set up, call set up and loopback test mode, guidance on the applicability of these can be found in annex C, annex F and TS 134 109 respectively.

b) Procedure

- Set and send continuously Down power control commands to the UE.
- Measure the mean power of the UE.

#### 3.3.4.2. Test requirements

The results obtained shall be compared to the limits in clause 4.2.5.2 in order to show compliance.

### 3.3.5. Receiver adjacent channel selectivity (ACS)

#### 3.3.5.1 Method of test

a) Initial conditions

Test environment: normal (for guidance see annex A).

The frequencies to be tested are mid range as defined in table E1, annex E.

- Connect the SS to the UE antenna connector (as shown in figure C.2, annex C).
- A call is set up according to the Generic call setup procedure, and RF parameters are set up according to table 7.
- Enter the UE into loopback test mode and start the loopback test.

NOTE: When reference is made to test set up, call set up and loopback test mode, guidance on the applicability of these can be found in annex C, annex F and TS 134 109 respectively.

b) Procedure

- Set the parameters of the interference signal generator as shown in table 7.
- Set the power level of the UE according to table 7 with a ±1 dB tolerance.
- Measure the BER of DCH received from the UE at the SS.

#### 3.3.5.2 Test requirements

The results obtained shall be compared to the limits in clause 2.2.6.2 in order to show compliance.

### 3.3.6. Receiver blocking characteristics

#### 3.3.6.1 Method of test

a) Initial requirements

Test environment: normal (for guidance see annex A).

For in band case, the frequencies to be tested are mid range as defined in table E1, annex E.

For out-of-band case, frequencies to be, mid range as defined in table E1, annex E.

- Connect the SS to the UE antenna connector (as shown in figure C.3, annex C).
- A call is set up according to the Generic call setup procedure, and RF parameters are set up according to tables 8 and 9.
- Enter the UE into loopback test mode and start the loopback test.

NOTE: When reference is made to test set up, call set up and loopback test mode, guidance on the applicability of these can be found in annex C, annex F and TS 134 109 respectively.

b) Procedure

- Set the parameters of the CW generator or the interference signal generator as shown in tables 8 and 9. For table 9 the frequency step size is 1 MHz.
- Set the power level of the UE according to tables 8 and 9 with a ±1 dB tolerance.
- Measure the BER of DCH received from the UE at the SS.
- For table 9, record the frequencies for which the BER exceeds the test requirements.

**3.3.6.2 Test requirements**

The results obtained shall be compared to the limits in clause 2.2.7.2 in order to show compliance.

**3.3.7. Receiver spurious response**

**3.3.7.1. Method of test**

a) Initial conditions

Test environment: normal (for guidance see annex A).

The frequencies to be tested are mid range as defined in table E1, annex E.

- Connect the SS to the UE antenna connector (as shown in figure C.4, annex C).
- A call is set up according to the Generic call setup procedure, and RF parameters are set up according to table 10.
- Enter the UE into loopback test mode and start the loopback test.

NOTE: When reference is made to test set up, call set up and loopback test mode, guidance on the applicability of these can be found in annex C, annex F and TS 134 109 respectively.

b) Procedure

- Set the parameter of the CW generator as shown in table 10. The spurious response frequencies are determined in step 4) of clause 5.3.6.1.2.
- Set the power level of the UE according to table 10 with a ±1 dB tolerance.
- Measure the BER of DCH received from the UE at the SS.

**3.3.7.2 Test requirements**

The results obtained shall be compared to the limits in clause 2.2.8.2. in order to show compliance.

**3.3.8 Receiver Intermodulation characteristics**

**3.3.8.1. Method of test**

a) Initial conditions

Test environment: normal (for guidance see annex A).

The frequencies to be tested are mid range as defined in table E1, annex E.

- Connect the SS to the UE antenna connector (as shown in figure C.5, annex C).
- A call is set up according to the Generic call setup procedure as per annex F, and RF parameters are set up according to table 11.
- Enter the UE into loopback test mode and start the loopback test using the procedure defined in TS 134 109 [8].

NOTE: When reference is made to test set up, call set up and loopback test mode, guidance on the applicability of these can be found in annex C, annex F and TS 134 109 respectively.

b) Procedure

- Set the parameters of the CW generator and interference generator as shown in table 11.
- Set the power level of the UE according to table 11 with a ±1 dB tolerance.
- Measure the BER of DCH received from the UE at the SS.

#### 3.3.8.2. Test requirements

The results obtained shall be compared to the limits in clause 4.2.9.2 in order to show compliance.

### 3.3.9. Receiver spurious emissions

#### 3.3.9.1. Method of test

a) Initial conditions

Test environment: normal (for guidance see annex A).

The frequencies to be tested are mid range as defined in table E1, annex E.

- Connect a spectrum analyser (or other suitable test equipment) to the UE antenna connector (as shown in figure C.6, annex C).
- UE shall be in CELL_FACH state.
- The UE shall be setup such that UE will not transmit during the measurement. (For guidance see TS 134 121.)

b) Procedure

Sweep the spectrum analyser (or other suitable test equipment) over a frequency range from 30 MHz to 12.75 GHz and measure the average power of the spurious emissions.

#### 3.3.9.2. Test requirements

The results obtained shall be compared to the limits in clause 2.2.10.2 in order to show compliance.

### 3.3.10. Out-of-synchronization handling of output power

### 3.3.10.1. Method of test

a) Initial conditions

Test environment: normal (for guidance see annex A).

The frequencies to be tested are mid range as defined in table E1, annex E.

- Connect the SS to the UE antenna connector (as shown in figure C.1, annex C).
- A call is set up according to the Generic call setup procedure, with the following exception according to table 17 for information elements in System Information Block type 1 found in TS 134.108.

**Table 17 - System Information Block type 1 message**

| Information Element | Value/Remark |
|---|---|
| UE Timers and constants in connected mode | |
| -T313 | 15 s |
| -N313 | 200 |

- RF parameters are set up according to table 14 with DPCCH_Ec/Ior ratio level at -16.6 dB.
- Enter the UE into loopback test mode and start the loopback test.

NOTE: When reference is made to test set up, call set up and loopback test mode, guidance on the applicability of these can be found in annex C, annex F and TS 134 109 respectively.

b) Procedure

- The SS sends continuously up power control commands to the UE until the UE transmitter power reach maximum level.
- The SS controls the DPCCH_$E_c/I_{or}$ ratio level to -21.6 dB.
- The SS controls the DPCCH_$E_c/I_{or}$ ratio level to -28.4 dB. The SS waits 200 ms and then verifies that the UE transmitter has been switched off.
- The SS monitors the UE transmitted power for 5 s and verifies that the UE transmitter is not switched on during this time.

### 3.3.10.2. Test requirements

The results obtained shall be compared to the limits in clause 2.2.11.2 in order to compliance.

### 3.3.11. Transmitter adjacent channel leakage power ratio

### 3.3.11.1. Method of test

a) Initial conditions

Test environment: normal, TL/VL, TL/VH, TH/VL, TH/VH (for guidance see annex A).

The frequencies to be tested are mid range as defined in table E1, annex E.

- Connect the SS to the UE antenna connector (as shown in figure C.1, annex C).
- A call is set up according to the Generic call setup procedure.
- Enter the UE into loopback test mode and start the loopback test.

NOTE: When reference is made to test set up, call set up and loopback test mode, guidance on the applicability of these can be found in annex C, annex F and TS 134 109 respectively.

b) Procedure

- The SS sends continuously Up power control commands to the UE until the UE transmitter power reach maximum level.
- Measure the RRC filtered mean power.
- Measure the RRC filtered mean power of the first adjacent channels and the second adjacent channels.
- Calculate the ratio of the power between the values measured in 2) and 3) above.

### 3.3.11.2 Test requirements

The results obtained shall be compared to the limits in clause 2.2.12.2 in order to compliance.

### 3.3.12. Radiated emissions

### 3.3.12.1. Method of test

Whenever possible the test site should be a fully anechoic chamber simulating the free-space conditions. EUT shall be placed on a non-conducting support. Average power of any spurious components shall be detected by the test antenna and measuring receiver (e.g. a spectrum analyser).

At each frequency at which a component is detected, the EUT shall be rotated to obtain maximum response, and the effective radiated power (e.r.p) of that component determined by a substitution measurement, which shall be the reference method. The measurement shall be repeated with the test antenna in the orthogonal polarization plane.

NOTE: Effective radiated power (e.r.p) refers to the radiation of a half wave tuned dipole instead of an isotropic antenna. There is a constant difference of 2.15 dB between e.i.r.p. and e.r.p.

e.r.p. (dBm) = e.i.r.p. (dBm) - 2.15

(ITU-R Recommendation SM.329-10, annex 1).

Measurements are made with a tuned dipole antenna or a reference antenna with a known gain referenced to an isotropic antenna.

If a different test site or method is used, this shall be stated in the test report. The results shall be converted to the reference method values and the validity of the conversion shall be demonstrated.

### 3.3.12.2 Test configurations

This clause defines the configurations for emission tests as follows:

- The equipment shall be tested under normal test conditions;
- The test configuration shall be as close to normal intended use as possible;
- If the equipment is part of a system, or can be connected to ancillary equipment, then it shall be acceptable to test the equipment while connected to the minimum configuration of ancillary equipment necessary to exercise the ports;
- If the equipment has a large number of ports, then a sufficient number shall be selected to simulate actual operation conditions and to ensure that all the different types of termination are tested;
- The test conditions, test configuration and mode of operation shall be recorded in the test report;
- Ports which in normal operation are connected shall be connected to an ancillary equipment or to a representative piece of cable correctly terminated to simulate the input/output characteristics of the ancillary equipment, RF input/output ports shall be correctly terminated;
- Ports that are not connected to cables during normal operation, e.g. service connectors, programming connectors; temporary connectors etc. shall not be connected to any cables for the purpose of this test. Where cables have to be connected to these ports, or interconnecting cables have to be extended in length in order to exercise the EUT, precautions shall be taken to ensure that the evaluation of the EUT is not affected by the addition or extension of these cables;

Emission tests shall be performed in two modes of operation:

- With a communication link established (traffic mode); and
- In the idle mode.

The results obtained shall be compared to the limits in clause 2.2.13.2 in order to prove compliance.

### 3.3.13 Control and monitoring functions

#### 3.3.13.1 Method of test

1) At the start of the test, the UE shall be switched off. The UE antenna connector shall be connected to a power measuring equipment, with the following characteristics:

- The RF bandwidth shall exceed the total operating transmit frequency range of the UE;
- The response time of the power measuring equipment shall be such that the measured power has reached within 1 dB of its steady state value within 100 μs of a CW signal being applied;

- It shall record the maximum power measured.

NOTE: The equipment may include a video low pass filter to minimize its response to transients or Gaussian noise peaks.

2) The UE shall be switched on for a period of approximately fifteen minutes, and then switched off.

3) The EUT shall remain switched off for a period of at least thirty seconds, and shall then be switched on for a period of approximately one minute.

4) Step 2) shall be repeated four times.

5) The maximum power emitted from the UE throughout the duration of the test shall be recorded.

The results obtained shall be compared to the limits in clause 2.2.14.2 in order to prove compliance.

## 4. MANAGEMENT REGULATIONS

User Equipments for use in the IMT-2000 CDMA Direct Spread (UTRA FDD) must comply with requirements in this technical regulation.

## 5. RESPONSIBILITY OF ORGANISATIONS/INDIVIDUALS

Organisations/individuals in Vietnam are responsible to comply with this technical regulation and to accept supervision of regulatory authority as existing regulations.

## 6. IMPLEMENTATION

5.1. Vietnam Telecommunication Authority and local departments of Information and Communications are responsible for guidance and implementation of this technical regulation.

5.2. This Technical Regulation replace standard TCN 68-245:2006 “Mobile Stations for IMT-2000 CDMA Direct Spread (W-CDMA FDD) - Technical Requirements”.

5.3. In cases of having referencing regulations specified in this technical regulation changed, modified or superseded, the new reference versions are applied.

# Annex A

## (Informative)

## Environmental profile

### A.1. Temperature

The UE should fulfil all the requirements in the full temperature range as given in table A.1.

**Table A.1 - Temperatures**

| Range | Conditions |
|---|---|
| +15°C to +35°C | For normal conditions (with relative humidity of 25% to 75%) |
| -10°C to +55°C | For extreme conditions (see IEC publications 60068-2-1 [12] and 60068-2-2 [13]) |

Outside this temperature range the UE, if powered on, shall not make ineffective use of the radio frequency spectrum. In no case shall the UE exceed the transmitted levels as defined in TS 125.101 [5] for extreme operation.

These test conditions are denoted as TL (temperature low, $-10^0$C) and TH (temperature high, $+55^0$C).

### A.2. Voltage

The UE shall fulfil all the requirements in the full voltage range, i.e. the voltage range between the extreme voltages.

The manufacturer shall declare the lower and higher extreme voltages and the approximate shutdown voltage. For the equipment that can be operated from one or more of the power sources listed in table A.2, the lower extreme voltage shall not be higher, and the higher extreme voltage shall not be lower than that specified in table A.2.

**Table A.2 - Power sources**

| Power source | Lower extreme voltage | Higher extreme voltage | Normal conditions voltage |
|---|---|---|---|
| AC mains | 0.9 * nominal | 1.1 * nominal | nominal |
| Regulated lead acid battery | 0.9 * nominal | 1.3 * nominal | 1.1 * nominal |
| Non regulated batteries:<br>- Leclanché / lithium<br>- Mercury/nickel & cadmium | <br>0.85 * nominal<br>0.90 * nominal | <br>Nominal<br>Nominal | <br>Nominal<br>Nominal |

Outside this voltage range the UE if powered on, shall not make ineffective use of the radio frequency spectrum. In no case shall the UE exceed the transmitted levels as defined in TS 125.101 [5] for extreme operation. In particular, the UE shall inhibit all

RF transmissions when the power supply voltage is below the manufacturer declared shutdown voltage.

These test conditions are denoted as VL (lower extreme voltage) and VH (higher extreme voltage).

### A.3. Test environment

Where a normal environment is required then the normal conditions shown in clauses A.1 and A.2 should be applied.

Where an extreme environment is required then the various combinations of extreme temperatures together with the extreme voltages shown in clauses A.1 and A.2 should be applied. The combinations are:

- Low extreme temperature/low extreme voltage (TL/VL);
- Low extreme temperature/high extreme voltage (TL/VH);
- High extreme temperature/low extreme voltage (TH/VL);
- High extreme temperature/high extreme voltage (TH/VH).

### A.4. Vibration

The UE shall fulfil all the requirements when vibrated at the following frequency/amplitudes:

**Table A.3 - Vibration**

| Frequency | ASD (Acceleration Spectral Density) random vibration |
|---|---|
| 5 Hz to 20 Hz | 0.96 $m^2/s^3$ |
| 20 Hz to 500 Hz | 0.96 $m^2/s^3$ at 20 Hz, thereafter - 3 dB/Octave |

Outside the specified frequency range the UE, if powered on, shall not make ineffective use of the radio frequency spectrum. In no case shall the UE exceed the transmitted levels as defined in TS 125.101 [5] for extreme operation.

### A.5. Specified frequency range

The manufacturer shall declare, which of the frequency bands defined in clause 4.2, TS 134 121 is supported by the UE.

Some tests in the present document are performed also in low, mid and high range of the operating frequency band of the UE. The UARFCN's to be used for low, mid and high range are defined in table E1, annex E.

### A.6. Acceptable uncertainty of Test System

The maximum acceptable uncertainty of the Test System is specified in tables 16 and 16a for each test, where appropriate. The Test System shall enable the stimulus signals in the test case to be adjusted to within the specified range, and the

equipment under test to be measured with an uncertainty not exceeding the specified values. All ranges and uncertainties are absolute values, and are valid for a confidence level of 95 %, unless otherwise stated.

A confidence level of 95% is the measurement uncertainty tolerance interval for a specific measurement that contains 95% of the performance of a population of test equipment.

For RF tests it should be noted that the uncertainties in clause A.6 apply to the Test System operating into a nominal 50 ohm load and do not include system effects due to mismatch between the EUT and the Test System.

**A.6.1. Measurement of test environments**

The measurement accuracy of the UE test environments defined in clauses A.1, A.2, A.4 and A.5 shall be:

- Pressure : ±5 kPa.
- Temperature : ±2 degrees.
- Relative Humidity : ±5 %.
- DC Voltage : ±1.0 %.
- AC Voltage : ±1.5 %.
- Vibration : 10 %.
- Vibration frequency : 0.1 Hz.

The above values shall apply unless the test environment is otherwise controlled and the specification for the control of the test environment specifies the uncertainty for the parameter.

# Annex B

## (Informative)

## Receiver sensitivity and correct operation of the equipment

### B.1 Receiver sensitivity

In the cellular radio communications systems using IMT-2000 standards within the scope of the present document, the power of transmissions is usually controlled so that the power of the transmitted signal intended to be received by a particular receiver is reduced to the minimum level consistent with proper reception. This is accomplished by a closed-loop employing messages reporting received power and/or signal quality between the BS and UE.

If a receiver has inadequate receiver sensitivity, the power of the transmitted signal intended for that receiver will need to be much higher than would otherwise be needed. If the transmitted power is increased excessively, this will cause harmful interference to other receivers using the same frequency in the neighbouring geographic area. Therefore, receiver sensitivity is justified as an essential requirement [1].

The product specifications for IMT-2000 UE and BS (falling within the scope of applicable parts) include requirements relating to receiver sensitivity. The level of these requirements has been based on consideration of the performance of that receiver, and not harmful interference indirectly caused to other receivers. As a consequence, these requirements are too stringent to be justified as essential requirements [1]. However, the applicable parts [1] for IMT-2000 UE and BS include an essential requirement for strong interfering signal handling of the receiver. This requirement implicitly requires a certain level of receiver performance, which is less stringent than that required by the product requirements relating directly to receiver sensitivity.

It is considered that the level of receiver performance needed by an IMT-2000 UE and BS to meet the essential requirement for receiver strong interfering signal handling is an appropriate level for an essential requirement [1].

Therefore, no separate conformance requirement is defined in the present document or in the applicable parts relating to receiver sensitivity.

### B.2 Correct functioning of the equipment

In a radio communications system, it is essential that certain functions of equipment operate correctly, in order to prevent harmful interference to other users of the radio spectrum. These functions can include transmission on the correct frequency, at the correct time and/or using the correct code (for equipment using CDMA). For the BS, the parameters of these functions are commanded by the network, and for the UE they are commanded by the BS.

Several of the tests in the applicable parts implicitly require a connection to be established between the Equipment Under Test (EUT) and the test apparatus. This implicitly requires the EUT to respond correctly to the commands it receives.

It is considered that the establishment of a connection demonstrates that the equipment meets most aspects of correct functioning to meet the essential requirements [1]. Tests for certain specific functions are defined in applicable parts, where these functions are critical to the prevention of harmful interference.

Therefore, the explicit tests for correct functioning of the equipment, together with the implicit testing through the ability to establish a connection, are sufficient to meet the essential requirement for correct functioning of the equipment so as to prevent harmful interference.

## Annex C

## (Informative)

## Test Models

***System Simulator or SS*** – A device or system, that is capable of generating simulated Node B signalling and analysing UE signalling responses on one or more RF channels, in order to create the required test environment for the UE under test. It will also include the following capabilities:

1. Measurement and control of the UE Tx output power through TPC commands
2. Measurement of RX BLER and BER
3. Measurement of signalling timing and delays
4. Ability to simulate UTRAN and/or GERAN signalling

***Test System*** – A combination of devices brought together into a system for the purpose of making one or more measurements on a UE in accordance with the test case requirements. A test system may include one or more System Simulators if additional signalling is required for the test case. The following diagrams are all examples of Test Systems.

NOTE: The above terms are logical definitions to be used to describe the test methods used in this document, in practice, real devices called 'System Simulators' may also include additional measurement capabilities or may only support those features required for the test cases they are designed to perform.

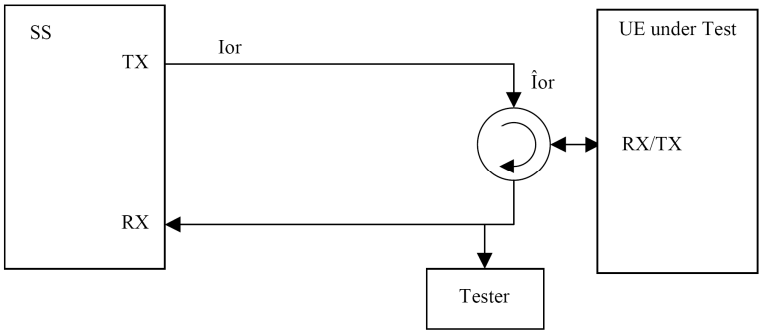


**Figure C.1 - Connection for Basic TX Test**

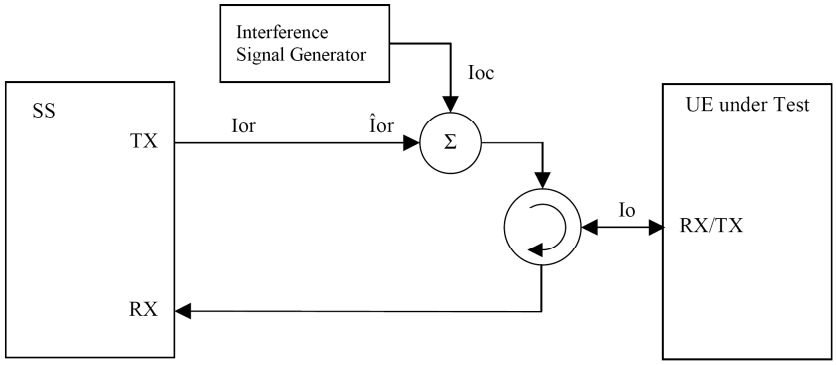


**Figure C.2 - Connection for RX Test with Interference**

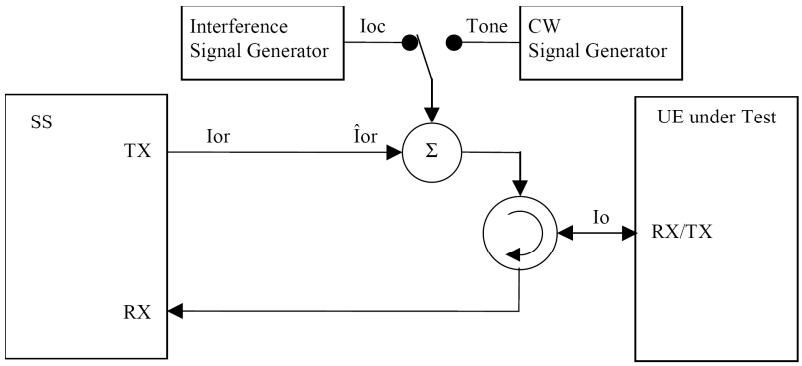


**Figure C.3 - Connection for RX Test with Interference or additional CW**

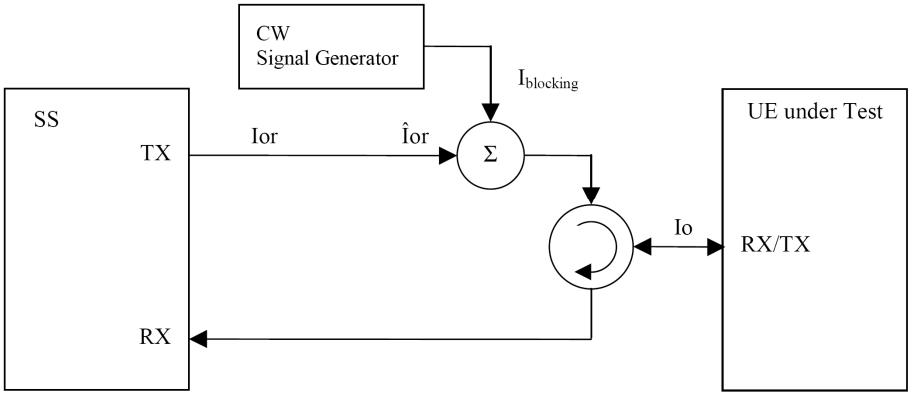


**Figure C.4 - Connection for RX Test with additional CW**

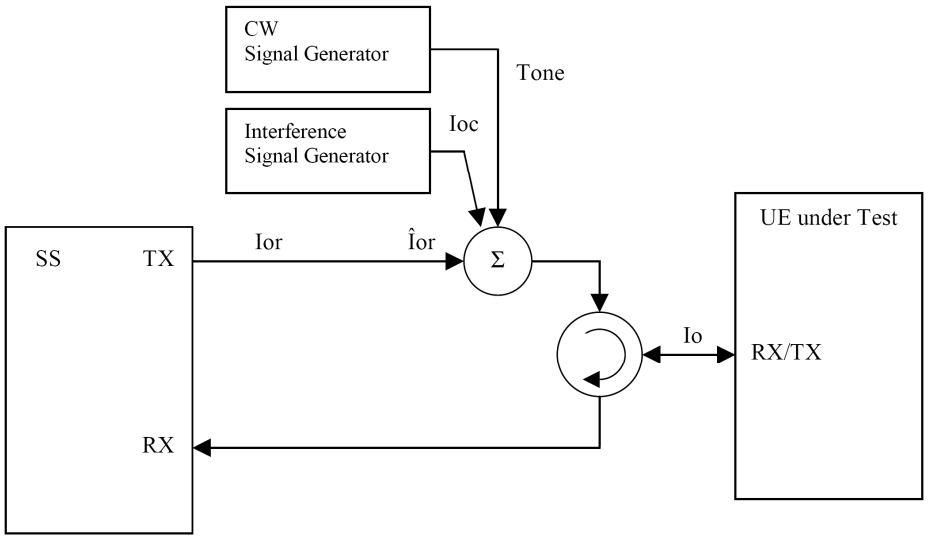


**Figure C.5 - Connection for RX Test with both Interference and additional CW**

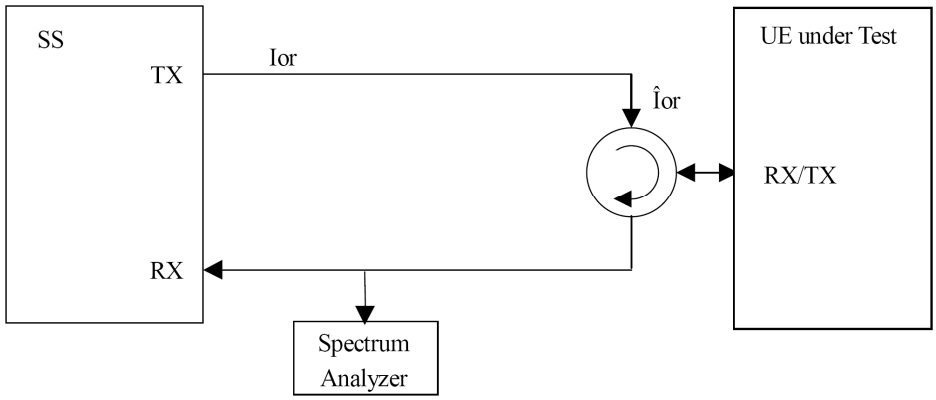


**Figure C.6 - Connection for Spurious Emission Test**

# Annex D

## (Normative)

## DL reference measurement channel (12.2 kbps) and static propagation condition

### D.1. DL reference measurement channel (12.2 kbps)

The parameters for the 12.2 kbps DL reference measurement channel are specified in table D.1.1, table D.1.2, table D.1.3. The channel coding is detailed in figure D.1.1. For the RLC configuration of AM DCCHs Timer_STATUS_Periodic shall not be set in RRC CONNECTION SETUP message used in test procedure for RF test as defined in TS 34.108 clause 7.3. This is to prevent unexpected DCHs from being transmitted through such RLC entities when the timer has expired in order to sure that the required TFC from the minimum set of TFCs can continuously convey a DCH for DTCH during the test.

**Table D.1.1 - DL reference measurement channel (12.2 kbps)**

| Parameter | Level | Unit |
|---|---|---|
| Information bit rate | 12.2 | kbps |
| DPCH | 30 | ksps |
| Slot format #1 | 11 | - |
| TFCI | On | |
| Power offsets PO1, PO2 and PO3 | 0 | dB |
| DTX position | Fixed | - |

**Table D.1.2 - DL reference measurement channel using RLC-TM for DTCH, transport channel parameters (12.2 kbps)**

| Higher Layer | RAB/Signalling RB | | RAB | SRB |
|---|---|---|---|---|
| RLC | Logical channel type | | DTCH | DCCH |
| | RLC mode | | TM | UM/AM |
| | Payload sizes, bit | | 244 | 88/80 |
| | Max data rate, bps | | 12200 | 2200/2000 |
| | PDU header, bit | | N/A | 8/16 |
| | TrD PDU header, bit | | 0 | N/A |
| MAC | MAC header, bit | | 0 | 4 |
| | MAC multiplexing | | N/A | Yes |
| Layer 1 | TrCH type | | DCH | DCH |
| | Transport Channel Identity | | 6 | 10 |
| | TB sizes, bit | | 244 | 100 |
| | TFS | TF0, bits | 0x244 | 0x100 |
| | | TF1, bits | 1x244 | 1x100 |
| | TTI, ms | | 20 | 40 |
| | Coding type | | Convolution coding | Convolution coding |
| | Coding rate | | 1/3 | 1/3 |
| | CRC, bit | | 16 | 12 |
| | Max number of bits/TTI after channel coding | | 804 | 360 |
| | RM attribute | | 256 | 256 |

***Table D.1.3 - DL reference measurement channel, TFCS (12.2 kbps)***

| TFCS size | 4 |
|---|---|
| TFCS | (DTCH, DCCH) = (TF0, TF0), (TF1, TF0), (TF0, TF1), (TF1, TF1) |

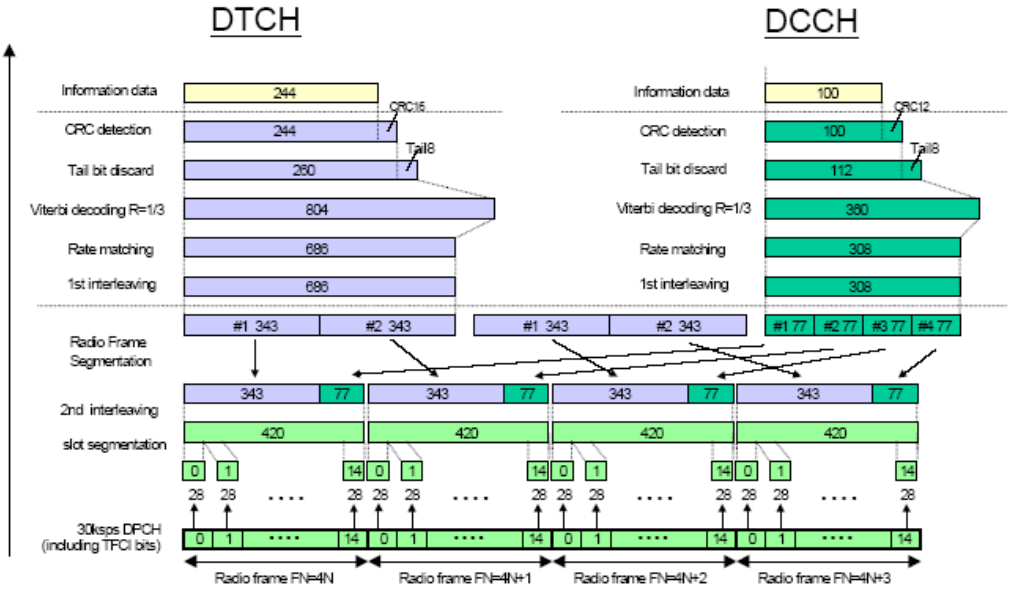


*Figure D.1.1- Channel coding of DL reference measurement channel (12.2 kbps)*

## D.2. Static propagation condition

The propagation for the static performance measurement is an Additive White Gaussian Noise (AWGN) environment. No fading and multi-paths exist for this propagation model.

# Annex E

## (Normative)

## UE Conformance Test Frequencies

The test frequencies are based the UMTS frequency bands defined in the core specifications.

To avoid interference with adjacent frequency bands the lowest test frequency (downlink and uplink) needs to be offset upwardly by at least 2.6 MHz since the channel's width is 5 MHz for FDD option. The raster spacing is 200 kHz. Similarly the highest test frequency (downlink and uplink) needs to be offset downwardly by at least 2.6 MHz for FDD option.

NOTE: Additional regulations concerning interferences to frequency bands used by different systems may also exist. Those regulations are specific to the country where the test equipment is used and need to be taken into account if they require a higher offset than 2.6 MHz from the edge frequencies for FDD option.

### UE Conformance Test Frequencies (UTRA/FDD)

UTRA/FDD is designed to operate in one of three paired bands [5]. The reference test frequencies for the common test environment for CDMA Direct Spread service (UTRA FDD) are defined in the following table:

**Table E.1- FDD reference test frequencies for CDMA Direct Spread service (UTRA FDD)**

| Test Frequency ID | UARFCN | Frequency of Uplink | UARFCN | Frequency of Downlink |
|---|---|---|---|---|
| Low range | 9613 | 1922.6 MHz | 10563 | 2112.6 MHz |
| Mid range | 9750 | 1950.0 MHz | 10700 | 2140.0 MHz |
| High range | 9887 | 1977.4 MHz | 10837 | 2167.4 MHz |

# Annex F

## (Informative)

## Generic Call Setup Procedure

### F.1. Generic call set-up procedure for mobile terminating circuit switched calls

#### F.1.1. Initial conditions

*System Simulator:*

- 1 cell, default parameters.

*User Equipment:*

- The UE shall be operated under normal test conditions.
- The Test-USIM shall be inserted.

#### F.1.2. Definition of system information messages

The default system information messages are used.

#### F.1.3. Procedure

The Call Set-up procedure shall be performed under Ideal radio conditions as defined in TS 134 108, clause 5.

| Step | Direction | | Message | Comments |
|---|---|---|---|---|
| | UE | SS | | |
| 1 | ← | | SYSTEM INFORMATION (BCCH) | Broadcast |
| 2 | ← | | PAGING (PCCH) | Paging |
| 3 | → | | RRC CONNECTION REQUEST (CCCH) | RRC |
| 4 | ← | | RRC CONNECTION SETUP (CCCH) | RRC |
| 5 | → | | RRC CONNECTION SETUP COMPLETE (DCCH) | RRC |
| 6 | → | | PAGING RESPONSE | RR |
| 7 | ← | | AUTHENTICATION REQUEST | MM |
| 8 | → | | AUTHENTICATION RESPONSE | MM |
| 9 | ← | | SECURITY MODE COMMAND | RRC |
| 10 | → | | SECURITY MODE COMPLETE | RRC |
| 11 | ← | | SETUP | CC |
| 12 | → | | CALL CONFIRMED | CC |
| 13 | ← | | RADIO BEARER SETUP | RRC RAB SETUP |
| 14 | → | | RADIO BEARER SETUP COMPLETE | RRC |
| 15 | → | | ALERTING | CC (this msg is optional) |
| 16 | → | | CONNECT | CC |
| 17 | ← | | CONNECT ACKNOWLEDGE | CC |

#### F.1.4. Specific message contents

All Specific message contents shall be referred to TS 134 108 [7],clause 9.

## F.2. Generic call set-up procedure for mobile originating circuit switched calls

### F.2.1. Initial conditions

*System Simulator:*

- 1 cell, default parameters.

*User Equipment:*

- The UE shall be operated under normal test conditions.
- The Test-USIM shall be inserted.

### F.2.2. Definition of system information messages

The default system information messages are used.

### F.2.3. Procedure

The Call Set-up procedure shall be performed under Ideal radio conditions as defined in TS 134 108, clause 5.

| Step | Direction | | Message | Comments |
|---|---|---|---|---|
| | UE | SS | | |
| 1 | ← | | SYSTEM INFORMATION (BCCH) | Broadcast |
| 2 | → | | RRC CONNECTION REQUEST (CCCH) | RRC |
| 3 | ← | | RRC CONNECTION SETUP (CCCH) | RRC |
| 4 | → | | RRC CONNECTION SETUP COMPLETE (DCCH) | RRC |
| 5 | → | | CM SERVICE REQUEST | MM |
| 6 | ← | | AUTHENTICATION REQUEST | MM |
| 7 | → | | AUTHENTICATION RESPONSE | MM |
| 8 | ← | | SECURITY MODE COMMAND | RRC |
| 9 | → | | SECURITY MODE COMPLETE | RRC |
| 10 | → | | SETUP | CC |
| 11 | ← | | CALL PROCEEDING | CC |
| 12 | ← | | RADIO BEARER SETUP | RRC RAB SETUP |
| 13 | → | | RADIO BEARER SETUP COMPLETE | RRC |
| 14 | ← | | ALERTING | CC |
| 15 | ← | | CONNECT | CC |
| 16 | → | | CONNECT ACKNOWLEDGE | CC |

### F.2.4. Specific message contents

All Specific message contents shall be referred to TS 134 108, clause 9.

## Annex G

## (Normative)

## W-CDMA Modulated Interferer

The W-CDMA modulated interferer consists of the downlink channels defined in table G.1 plus the OCNS channels defined in Table G.2. The relative power of the OCNS channels shall be such that the power of the total signal adds up to one. In this subclause $I_{or}$ refers to the power of the interferer.

**Table G.1 - Spreading Code, Timing offsets and relative level settings for W-CDMA Modulated Interferer signal channels**

| Channel Type | Spreading Factor | Channelization Code | Timing Offset (x 256 Tchip) | Power | Note |
|---|---|---|---|---|---|
| P-CCPCH | 256 | 1 | 0 | P-CCPCH_Ec/$I_{or}$ = - 10 dB | |
| SCH | 256 | - | 0 | SCH_Ec/$I_{or}$ = - 10 dB | The SCH power shall be divided equally between Primary and Secondary Synchronous channels |
| P-CPICH | 256 | 0 | 0 | P-CPICH_Ec/$I_{or}$ = - 10 dB | |
| PICH | 256 | 16 | 16 | PICH_Ec/$I_{or}$ = - 15 dB | |
| OCNS | See table G.2 | | | Necessary power so that total transmit power spectral density of Node B (Ior) adds to one | OCNS interference consists of the dedicated data channels. as specified in Table G.2 |

**Table G.2- DPCH Channelization Code and relative level settings for OCNS signal**

| Channelization Code SF=128 | Relative Level Settings (dB) (Note 2) | DPCH Data |
|---|---|---|
| 2 | -1 | The DPCH data for each channelization code shall be uncorrelated with each other and with any wanted signal over the period of any measurement. |
| 11 | -3 | |
| 17 | -3 | |
| 23 | -5 | |
| 31 | -2 | |
| 38 | -4 | |
| 47 | -8 | |
| 55 | -7 | |
| 62 | -4 | |
| 69 | -6 | |
| 78 | -5 | |
| 85 | -9 | |
| 94 | -10 | |
| 125 | -8 | |
| 113 | -6 | |
| 119 | 0 | |

NOTE 1: The DPCH Channelization Codes and relative level settings are chosen to simulate a signal with realistic Peak to Average Ratio.

NOTE 2: The relative level setting specified in dB refers only to the relationship between the OCNS channels. The level of the OCNS channels relative to the $I_{or}$ of the complete signal is a function of the power of the other channels in the signal with the intention that the power of the group of OCNS channels is used to make the total signal add up to 1.