

Notification of the National Telecommunications Commission

On Technical Standards for Telecommunication Equipment

Re: Radiocommunication Equipment Used in the Land Mobile Service in the VHF/UHF Frequency Bands

Whereas it is deemed appropriate to prescribe technical standards and requirements in telecommunications, and due to the provisions requiring telecommunication equipment used in telecommunication business which have effects on the provision of telecommunication services to meet specified technical standards; pursuant to Section 51 (6) of the Act on the Organization to Assign Radio Frequency and to Regulate the Broadcasting and Telecommunication Services B.E. 2543 (2000), Section 32 paragraph 1 of the Telecommunications Business Act B.E. 2544 (2001), and Section 29 (4) of the Radiocommunications Act B.E. 2498 (1955), and its amendments, together with Section 78 paragraph 1 of the Act on the Organization to Assign Radio Frequency and to Regulate the Broadcasting and Telecommunication Services B.E. 2543 (2000), the National Telecommunications Commission hereby issues the Notification on Technical Standards for Telecommunication Equipment regarding Radiocommunication Equipment Used in the Land Mobile Service in the VHF/UHF Frequency Bands, as detailed in the Standard No. NTC TS 001 – 2548 appended hereto.

Announced on the 29th date of August B.E. 2548 (2005)

General Choochart Promphrasid

Chairman of the National Telecommunications Commission



Technical Standards for Telecommunication Equipment

NTC TS 001 – 2548

Radiocommunication Equipment Used in the Land Mobile Service in the VHF/UHF Frequency Bands

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**Technical Standards for Telecommunication Equipment:
Radiocommunication Equipment Used in the Land Mobile Service in the VHF/UHF Frequency Bands**

1. Scope

This technical standard specifies the minimum technical characteristics for radiocommunication equipment with frequency modulation (FM) or phase modulation (PM) and channel spacing of 12.5 kHz or 25.0 kHz, which is used as base station, mobile station and hand portable station in the land mobile service within the frequency range of 30-960 MHz; as follows:

- 1) **base station** is a radiocommunication transmitter, receiver, or transceiver fitted with an antenna socket for use with an external antenna, and intended for use at certain, fixed locations.
- 2) **mobile station** is a radiocommunication transmitter, receiver, or transceiver fitted with an antenna socket for use with an external antenna, normally used in a vehicle or as a transportable station.
- 3) **hand portable stations** is a transmitter, receiver, or transceiver either fitted with an antenna socket or an integral antenna, or both, and intended for use as being carried on a person or held in the hand.

2. Requirements for Transmitter

2.1 Rated carrier power

Definition **Rated carrier power** is the carrier power of the equipment declared by the manufacturer in its technical documents. The carrier power is the average power delivered to the artificial antenna during a radio frequency cycle, in the absence of modulation. The carrier power measured shall be within ± 1.5 dB of the rated carrier power.

Limit The rated carrier power shall not exceed the maximum value given in the table below:

Type of transmitter	Rated carrier power (watt)
Base station	60
Mobile station	30
Hand portable station	5

Note: The National Telecommunications Commission (NTC) may authorize the rated carrier power beyond the limits shown in the table above on a case-by-case basis.

2.2 Conducted spurious emissions

Definition **Conducted spurious emissions** are emissions at the antenna connector on a frequency or frequencies which are outside the necessary bandwidth and the level of which may be reduced without affecting the corresponding transmission of information. Spurious emissions include harmonic emissions, parasitic emissions, intermodulation products and frequency conversion products, but exclude out-of-band emissions.

Limit The power levels of conducted spurious emissions within the radio frequency range of 9 kHz - 3 GHz shall be attenuated below the carrier power in the absence of modulation at least $43 + 10 \log P$ (dB) or 70 dBc, whichever is less stringent, where P is mean power in watt (W).

2.3 Frequency error

Definition **Frequency error** is the difference between the measured carrier frequency in the absence of modulation and the nominal frequency of the transmitter.

Limit The frequency error shall not exceed the values given in the table below:

Channel spacing (kHz)	Frequency error (kHz)			
	Frequency range 30 – 47 MHz	Frequency range 68 – 87 MHz	Frequency range 137 – 174, 230 – 510 MHz	Frequency range 790 – 960 MHz
12.5	± 0.60	± 1.00	± 1.00 (base station) ± 1.50 (mobile station, hand portable)	± 2.50
25	± 0.60	± 1.35	± 2.00	± 2.50

2.4 Frequency deviation

Definition **Frequency deviation** is the maximum difference between the instantaneous frequency of the modulated radio frequency signal and the carrier frequency in the absence of modulation.

Limit The frequency deviation shall not exceed the values given in the table below:

Channel spacing (kHz)	Frequency deviation
12.5	± 2.5 kHz
25	± 5 kHz

2.5 Adjacent channel power

Definition **Adjacent channel power** is that part of the total output power of a transmitter under defined conditions of modulation, which falls within a specified passband centered on the nominal frequency of either of the adjacent channels. This power is the sum of the mean power produced by the modulation, hum and noise of the transmitter.

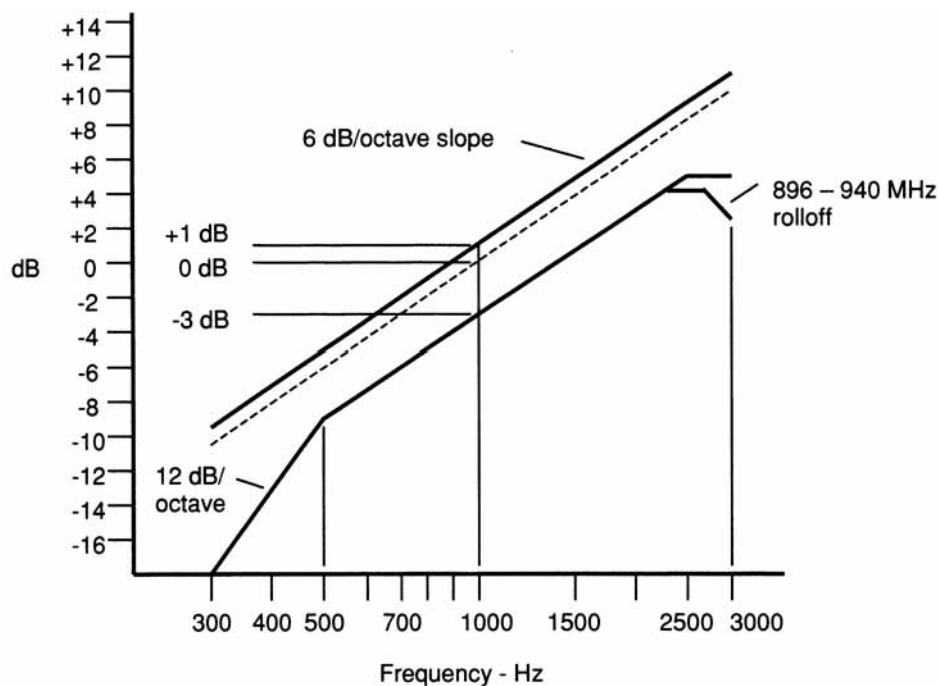
Limit The adjacent channel power levels shall have the values given in the table below:

Channel spacing (kHz)	Adjacent channel power
12.5	at least 60 dB below the carrier power
25	at least 70 dB below the carrier power

2.6 Audio frequency response

Definition **Audio frequency response** is the degree of closeness to which the frequency deviation of the transmitter follows the prescribed characteristics.

Limit The audio frequency response from 300 Hz to 3000 Hz shall not vary from the true 6 dB per octave pre-emphasis characteristic as referenced to the 1000 Hz level, as shown in figure below:



3. Requirements for Receiver

3.1 Reference sensitivity

Definition **Reference sensitivity** is the level of receiver input signal at a specified frequency with specified modulation that will result in the standard SINAD at the output of the receiver.

Limit The maximum input signal level shall not exceed 0.50 microvolts (μV) at 12 dB SINAD.

3.2 Adjacent channel selectivity

Definition **Adjacent channel selectivity** is the capability of a receiver to receive a wanted modulated signal at the nominal frequency without exceeding a given degradation due to the presence of an unwanted modulated signal in the adjacent channel.

Limit The adjacent channel selectivity shall not be less than the values given in the table below

Channel spacing (kHz)	Adjacent channel selectivity
12.5	60 dB
25	70 dB

3.3 Intermodulation response rejection

Definition **Intermodulation response rejection** is the capability of a receiver to receive a wanted modulated signal at the nominal frequency without exceeding a given degradation due to the presence of two or more unwanted signals with a specific frequency relationship to the unwanted signal frequency.

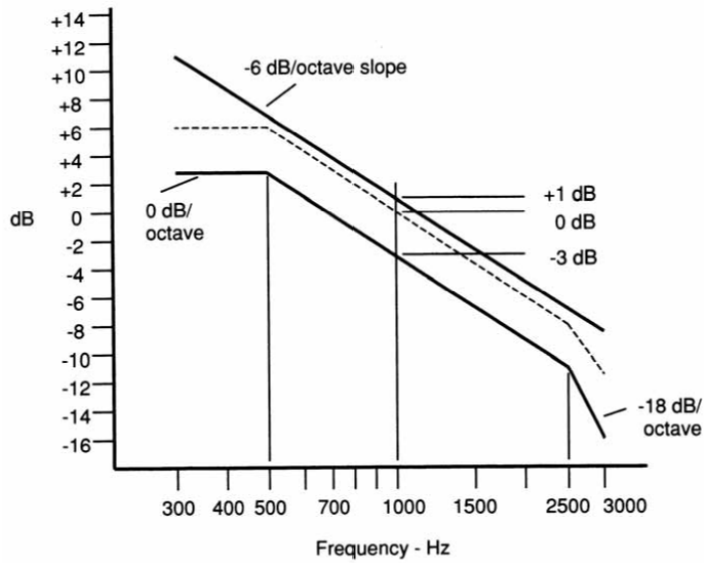
Limit The intermodulation response rejection ratio shall not be less than the values given in the table below

Type of transmitter	intermodulation response rejection ratio (dB)
Base station	70
Mobile station	65
Hand portable station	65

3.4 Audio frequency response

Definition **Audio frequency response** is the degree of closeness to which the audio output of a receiver follows a 6 dB per octave de-emphasis curve with constant frequency deviation over a given continuous frequency range.

Limit The audio frequency response from 300 Hz to 3000 Hz shall not vary from the a standard 6 dB per octave de-emphasis curve as referenced to the 1000 Hz level, as shown in figure below:



4. Methods of Measurement

4.1 Transmitter

4.1.1 Rated carrier power

The measurement method shall follow IEC 60489-2 [1], ETSI EN 300 086-1 [2], ANSI/TIA/EIA-603-B [3], or any other equivalent method.

4.1.2 Conducted spurious emissions

The measurement method shall follow ANSI/TIA/EIA-603-B, ITU-R Rec. SM. 329-10 [4], or any other equivalent method.

4.1.3 Frequency error

The measurement method shall follow IEC 60489-2, ETSI EN 300 086-1, ANSI/TIA/EIA-603-B (applicable clause: carrier frequency stability), or any other equivalent method.

4.1.4 Frequency deviation

The measurement method shall follow IEC 60489-2, ETSI EN 300 086-1, ANSI/TIA/EIA-603-B (applicable clause: modulation limiting), or any other equivalent method.

4.1.5 Adjacent channel power

The measurement method shall follow IEC 60489-2, ETSI EN 300 086-1, ANSI/TIA/EIA-603-B, or any other equivalent method.

4.1.6 Audio frequency response

The measurement method shall follow ANSI/TIA/EIA-603-B, or any other equivalent method.

4.2 Receiver

4.2.1 Reference sensitivity

The measurement method shall follow IEC 60489-3 [5], ANSI/TIA/EIA-603-B, or any other equivalent method.

4.2.2 Adjacent channel selectivity

The measurement method shall follow IEC 60489-3, ETSI EN 300 086-1, ANSI/TIA/EIA-603-B, or any other equivalent method.

4.2.3 Intermodulation response rejection

The measurement method shall follow IEC 60489-3 (applicable clause: Intermodulation Immunity), ETSI EN 300 086-1, ANSI/TIA/EIA-603-B, or any other equivalent method.

4.2.4 Audio frequency response

The measurement method shall follow IEC 60489-3, ANSI/TIA/EIA-603-B, or any other equivalent method.

Remarks:

- [1] IEC 60489-2: Methods of measurement for radio equipment used in the mobile services – Part 2: Transmitters employing A3E, F3E or G3E emissions
 - [2] ETSI EN 300 086-1 V1.2.1: Electromagnetic compatibility and radio spectrum matters (ERM); Land mobile service; Radio equipment with an internal or external RF connector intended primarily for analogue speech; Part 1: Technical characteristics and methods of measurement
 - [3] ANSI/TIA/EIA-603-B: Land mobile FM or PM communications equipment; Measurement and performance standards
 - [4] ITU-R Rec. SM. 329-10: Unwanted emissions in the spurious domain
 - [5] IEC 60489-3: Methods of measurement for radio equipment used in the mobile services. Part 3: Receivers for A3E or F3E emissions
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