INTERNATIONAL STANDARD

IEC 61603-6

First edition
2001-10

Transmission of audio and/or video and related signals using infra-red radiation –

Part 6: Video and audio-visual signals

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TRANSMISSION OF AUDIO AND/OR VIDEO AND RELATED SIGNALS USING INFRA-RED RADIATION –

Part 6: Video and audio-visual signals

FOREWORD

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International Standard IEC 61603-6 has been prepared by Technical area 3: Infrared systems, of IEC technical committee 100: Audio, video and multimedia systems and equipment.

The text of this standard is based on the following documents:

FDIS	Report on voting
100/295/FDIS	100/421/RVD

Full information on the voting for the approval of this standard can be found in the report on voting indicated in the above table.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 3.

The committee has decided that the contents of this publication will remain unchanged until 2003. At this date, the publication will be

- reconfirmed;
- withdrawn;
- replaced by a revised edition, or
- amended.

TRANSMISSION OF AUDIO AND/OR VIDEO AND RELATED SIGNALS USING INFRA-RED RADIATION –

Part 6: Video and audio-visual signals

1 Scope

IEC 61603-1 specifies general requirements and methods of measurement for equipment using infrared radiation as a carrier of information.

This part of IEC 61603 specifies requirements and methods of measurement for analogue video transmission systems which are not covered by IEC 61603-1, nor by other standards. It allows systems which make different economic use of the available bandwidth to be described in order for conclusions regarding interference and compatibility to be drawn.

NOTE For details of audio transmission systems, see IEC 61603-2.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this part of IEC 61603. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this part of IEC 61603 are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of IEC and ISO maintain registers of currently valid International Standards.

IEC 61603-1, *Transmission of audio and/or video and related signals using infra-red radiation – Part 1: General*

IEC 61603-2, *Transmission of audio and/or video and related signals using infra-red radiation – Part 2: Transmission systems for audio wide band and related signals*

IEC 61938, *Audio, video and audiovisual systems – Interconnections and matching values – Preferred matching values of analogue signals*

3 Definitions

For the purposes of this part of IEC 61603, the definitions given in Part 1 apply.

4 Abbreviations

IR	infrared (see IEC 61603-1)
IRED	infrared emitting diode (see IEC 61603-1)
PD	photo diode
O/E	optical/electrical
Tx	transmitter/radiator
Rx	receiver
ND filter	neutral density filter

5 Explanation of terms

5.1 Combined transmitter and radiator

A combined transmitter and radiator (illustrated as element A-B in figure 1) does not have an electrical output.

5.2 Receiver

As well as the general characteristics given in IEC 61603-1, other characteristics may need to be specified if a receiver (illustrated as element B-C in figure 1) is combined with other functions, such as a television set.

5.3 Ancillary equipment

Ancillary equipment, such as power supplies or battery chargers, may be required for the operation of a system. The manufacturer shall specify all the necessary data for correct operation and maintenance.

5.4 Transmission of video signals

The transmission format of composite video signals and Y/C video signals are specified in this part of IEC 61603.

5.5 Safety aspects

Safety aspects are considered in IEC 61603-1.

6 System considerations

6.1 Area of application

This part of IEC 61603 describes a single-channel infrared video transmission system in one direction, mainly used for viewing a video programme from a VCR, video camera, or video disc player.

NOTE 1 In consumer applications, video signals may be available in composite video signals or in Y/C component video signals.

NOTE 2 A channel for video signals is defined in IEC 61603-1.

NOTE 3 Audio signal transmission systems are specified in IEC 61603-2.

NOTE 4 Transmission systems for high-speed data and remote control are under consideration.

6.2 Environmental conditions for operation

The environmental conditions for the equipment are mainly defined in relevant standards for individual units. Unless otherwise specified, the equipment shall at least be capable of operating within the following temperature and relative humidity ranges:

5 °C to 40 °C, and 25 % RH to 75 % RH

Systems and apparatus in accordance with this part of IEC 61603 are primarily used indoors, with the advantage of operating more than one interference-free system in adjacent rooms.

6.3 Partition of functions between elements of the systems

Due to the different applications for different room sizes, equipment is designed in various combinations of functional blocks. It is desirable to have only a few blocks of small size and low installation cost for home application.

7 General conditions for measurements

7.1 Test conditions

Temperature: 15 °C to 35 °C

Humidity: 45 % RH to 75 % RH

Brightness: 500 lx to 1 000 lx (on the surface of the receiver)

Normal (i.e. not operating at high frequency) fluorescent lamps shall be used.

7.2 Location

A sufficiently large room should be used for the test, so that the reflection of infrared radiation from the walls, floor and ceiling is negligible.

NOTE The location illustrated in figure 2 may be used if a correction due to reflection is made.

An absorbing optical filter (neutral density or ND filter) is applied to the transmitter or the receiver. The following precautions are essential:

a) take into account the correlation between the absorption of the filter and the transmitting distance;
b) when measuring directivity, adjust the filter to the direction of the transmitter;
c) maintain the brightness at the receiver within the 500 lx to 1 000 lx range.

8 Characteristics to be specified and their methods of measurement

8.1 Transmitting distance and directivity

8.1.1 Transmitting distance

Calculate the transmitting distance (as illustrated in figure 3) using the following equation:

$$d_0 = \sqrt{\frac{I}{E}}$$

where

d_0 is the transmitting distance (in m);

I is the specified radiant intensity (in mW/sr), and

E is the irradiance value (in mW/m^2).

The transmitting distance d (in m) at the angle of maximum divergence at half the optical radiant intensity (such as H_1, H_2, V_1, and V_2 illustrated in figure 4) may be calculated as follows:

$$d = \sqrt{\frac{I}{2E}} = d_0 \times \frac{1}{\sqrt{2}}$$

8.1.2 Characteristic of the transmitter to be specified

The radiant intensity I (in mW/sr) in the optical axis (see figure 5).

Measurement methods shall be in accordance with IEC 61603-1.

8.1.3 Characteristics of the receiver to be specified

The minimum required irradiance E (in mW/m^2) for an unweighted signal-to-noise (S/N) ratio of 40 dB under the following conditions (see figure 6):

Directivity:	optical axis (0°)
Signal:	50 % white
Frequency deviation:	2 MHz (sync tip: 11,5 MHz, peak white: 13,5 MHz)
Bandwidth:	NTSC: 100 kHz to 4,2 MHz
	PAL: 100 kHz to 5,0 MHz

8.1.4 Maximum transmitting distance

Calculate the maximum transmitting distance from the specified radiant intensity I (see 8.1.2) and the irradiance value E (see 8.1.3), using the equation specified in 8.1.1.

NOTE In another method, the maximum transmitting distance for an unweighted S/N ratio of 40 dB under the conditions of 8.1.3 can be measured by aligning the optical axes of the transmitter and receiver, without measurement of the radiant intensity of the transmitter and the irradiance at the receiver.

8.1.5 Directivity

8.1.5.1 Directivity characteristics of the transmitter to be specified

Use an optical power meter to measure radiant intensity on the optical axis “AB” (as illustrated in figure 7). Measure the radiant intensity at the vertical and horizontal angles θ_{H1} and θ_{V1} in accordance with 8.1.2. Then find the directivity of the transmitter by measuring the radiant intensity I (in mW/sr) at various angles θ_{H1} and θ_{V1} at the transmitter (see figure 8).

Calculate the directivity characteristics of the transmitting distance from the above directivity characteristics and the irradiance E of receiver (8.1.3) using the equation specified in 8.1.1.

8.1.5.2 Directivity characteristics of the receiver to be specified

Use a transmitter giving a higher S/N ratio and the receiver to be measured on the optical axis (0 degree) as below.

Measure the minimum required irradiance E (in mW/m^2) for an unweighted S/N ratio of 40 dB under the conditions specified in 8.1.3, by changing the distance between the reference transmitter and the receiver. Find the minimum required irradiance E (mW/m^2) in the direction “AB” by measuring the irradiance at vertical and horizontal angles θ_{H2} and θ_{V2} at the receiver (see figure 9). Find the following characteristics of the receiver directivity by measuring the minimum required irradiance E at various angles θ_{H2} and θ_{V2} (see figure 10).

Calculate the directivity characteristic of the transmitting distance from the above directivity characteristics and the radiant intensity I (in mW/sr) of the transmitter (8.1.2) using the equation specified in 8.1.1.

If a transmitter and receiver are specified, the directivity characteristic of the transmitting distance can be calculated by an equivalent method.

8.2 Spurious emission

The measuring method is as follows:

a) Sub-carrier without video signals;

b) Measuring band range: 0 MHz to 100 MHz;

c) Measuring system: as specified in figure 11.

8.3 Relative levels of audio and video signals

In the case of a transmission system with audio and video signals using infrared devices, the video level shall be at least 10 dB higher than the audio level.

NOTE It is recommended that the video level be 15 dB to 25 dB higher than the audio level.

9 Interface values, performance requirements and recommendations

Audio signals shall be transmitted by the method specified in IEC 61603-2.

9.1 Electrical input and electrical output

The video signals at the input and output shall be in accordance with IEC 61938.

9.2 Wavelength

The peak wavelength shall be 800 nm to 1 000 nm.

9.3 Bandwidth

The bandwidth shall be 24 MHz.

9.4 Video signal source

The video signal sources are specified in this part as follows:

a) Composite video signal,

b) Y/C video signal.

9.5 Modulation and signal format

9.5.1 Modulation characteristics

9.5.1.1 Composite video signal

The signal has a dual modulation. The infrared transmission is intensity-modulated by the sub-carrier, which is frequency-modulated within the composite video signals.

9.5.1.2 Y/C video signal

The signal has a dual modulation. The infrared transmission is intensity-modulated by the sub-carrier, which is frequency-modulated within the Y and C signals.

The Y (luminance) signal frequency-modulates a sub-carrier.

The C (chrominance) signal frequency-modulates a sub-carrier and the lower side-band of sub-carrier modulated by the C signal are allocated separately by means of frequency multiplex systems.

9.5.2 Transmission format

The analogue video transmission format shall be as specified in figure 12 and figure 13.

9.5.2.1 Composite video signal

The transmission format for composite video signals is specified in figure 12.

New designs of composite video signal transmission systems by frequency-modulation shall use the sub-carrier frequency ranges 6 MHz to 20 MHz.

The following values for composite video signal transmission systems shall be used for new designs.

Sub-carrier modulation:	FM
Sync. tip:	11,5 MHz
Peak white:	13,5 MHz
Deviation:	2,0 MHz

9.5.2.2 Y/C video signal

The transmission format for Y/C video signal is specified in figure 13.

The new design of Y/C video signal transmission system by frequency modulation shall use the sub-carrier frequency ranges 6 MHz to 30 MHz. The following values for the signal transmission system shall be used.

a) Y signal (luminance):

Sub-carrier modulation:	FM
Sync. tip:	11,5 MHz
Peak white:	13,5 MHz
Deviation:	2,0 MHz

b) C signal (chrominance):

Sub-carrier modulation:	FM	
Sub-carrier of C signal:	26,1 MHz	
Frequency deviation of C signal:	2,5 MHz	(at 100 % C signal)

The peak level of C signal sub-carrier shall be 30 dB or higher than the peak level of the upper side-band of the C signal sub-carrier.

c) Y/C sub-carrier relative level ratio

The relative level ratio between the Y and C signal shall be 1/1.

9.5.3 Pre-emphasis of the video signal

The pre-emphasis values of the composite video signal and Y/C video signal shall have T and X values determined from the equations given in figure 14. Any circuit conforming to the specified T and X may be used.

9.5.4 Spurious emission

Due to the modulation procedure used, the outgoing signal may contain energy components outside of the used channel, and other systems may be disturbed.

It is recommended that the ratio of the carrier-frequency level of composite signal to the spurious signal (high harmonics and crossmodulation signal) level in other signal bands, for frequencies from 10 kHz to 100 MHz, should be 30 dB or more, when measured in accordance with 8.2.

In Y/C video signal transmission, the spurious signals of Y signals emitted from the transmitter are measured in accordance with 8.2.

It is recommended that a ratio of the Y signal level to the spurious signal (high harmonics and crossmodulation signal) level in other signal bands, for frequencies from 10 kHz to 100 kHz, should be 40 dB or more, when measured in accordance with 8.2.

10 Marking and contents of specifications

10.1 Marking

The marking of data marked R in table 1 is optional, but recommended.

10.2 Contents of specifications

The specifications of the product shall include all the data marked X in table 1, and all the data marked X in Table 3 of IEC 61603-1. The provision of data marked R in either table is optional, but recommended.

Table 1 – Marking and contents of specifications

Clause	Characteristics	
8.1	Transmitting distance and directivity	R
8.2	Spurious emission	R
8.3	Relative levels of audio and video signals	R
9.1	Electrical input and output	X
9.2	Wavelength	X
9.3	Bandwidth	X
9.4	Video signal source	X
9.5	Modulation and signal format	R

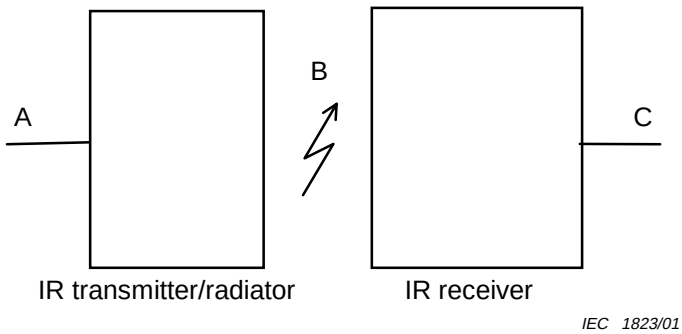


Figure 1 – Transmission chain

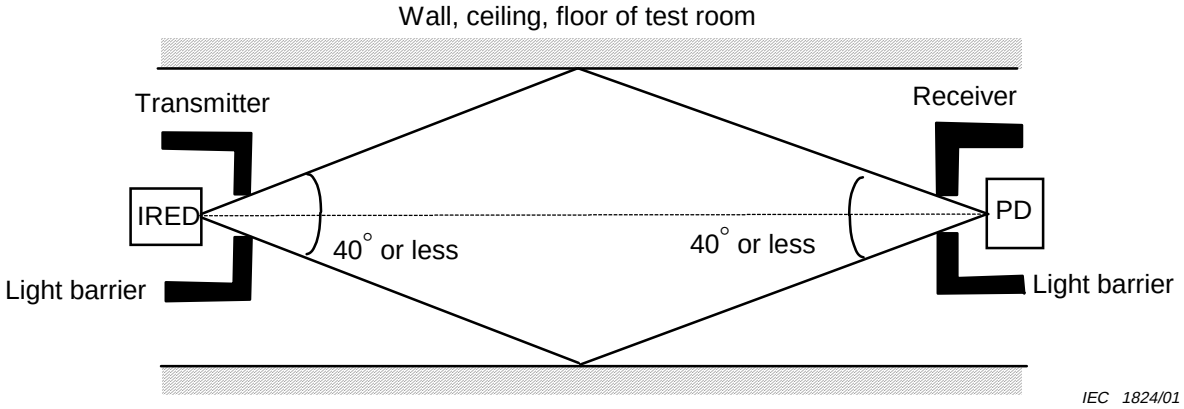


Figure 2 – Location for measuring

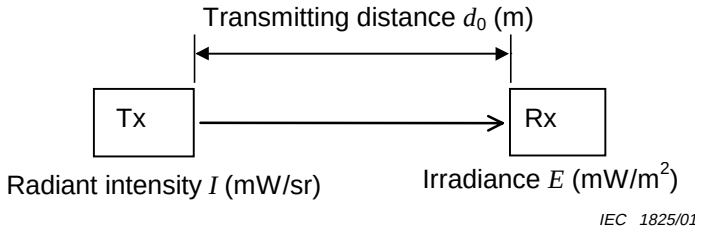


Figure 3 – Transmitting distance

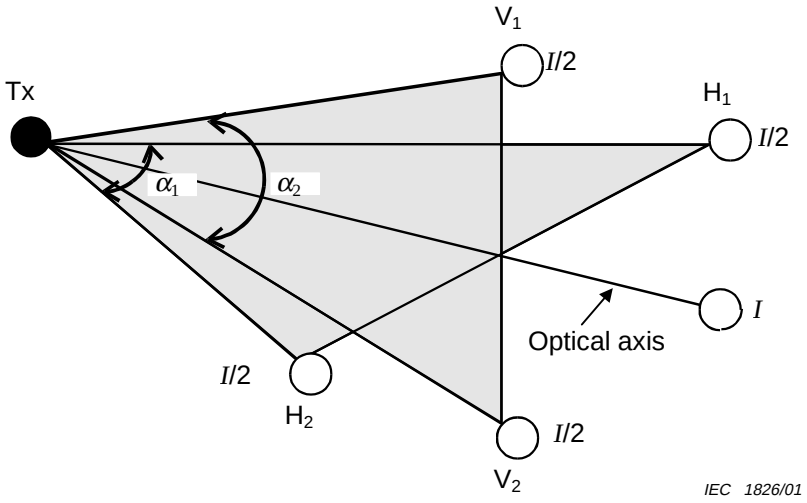
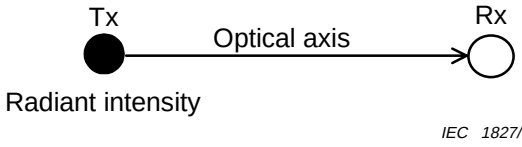
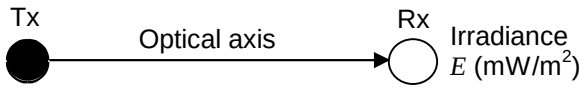


Figure 4 – Angle of maximum divergence at half optical radiant intensity



NOTE This figure illustrates the optical axis. The method of measurement is specified in IEC 61603-1.

Figure 5 – Radiant intensity of transmitter or radiator



NOTE This figure illustrates the optical axis. The method of measurement is specified in IEC 61603-1.

Figure 6 – Irradiance of receiver

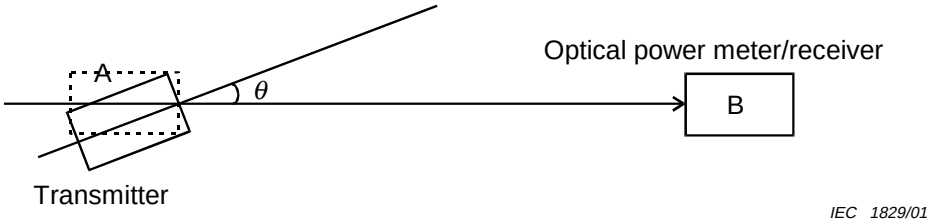


Figure 7 – Characteristics of the transmitter

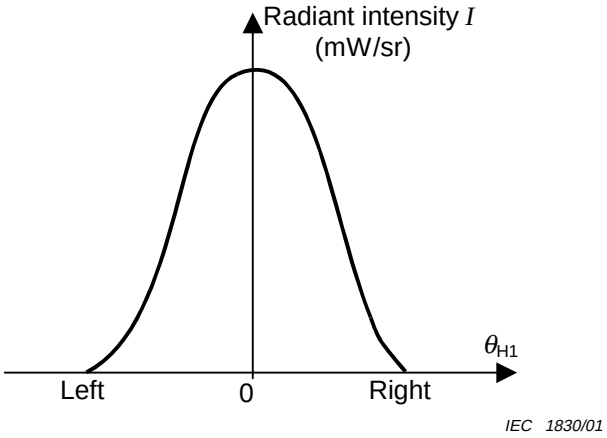


Figure 8a – Horizontal directivity

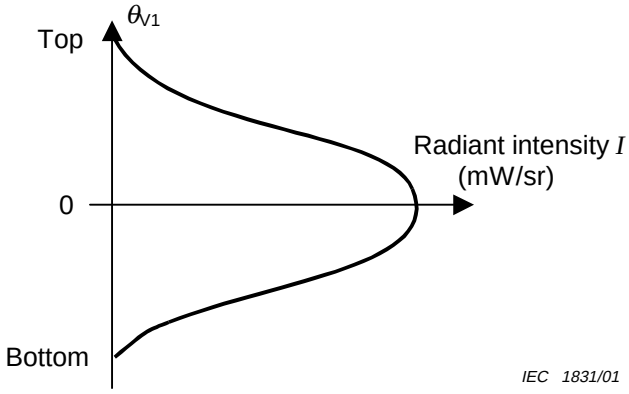


Figure 8b – Vertical directivity

NOTE Figures 8a and 8b are illustrative

Figure 8 – Directivity characteristics of the transmitter

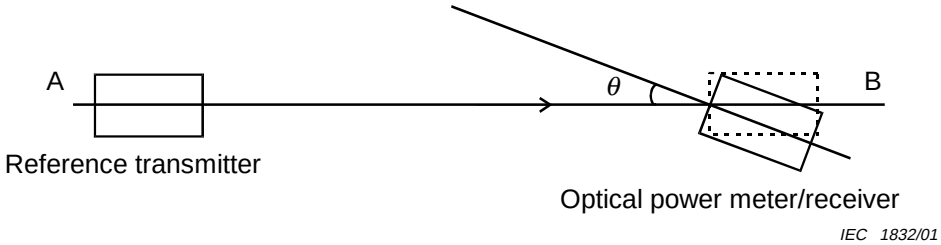


Figure 9 – Characteristics of the receiver

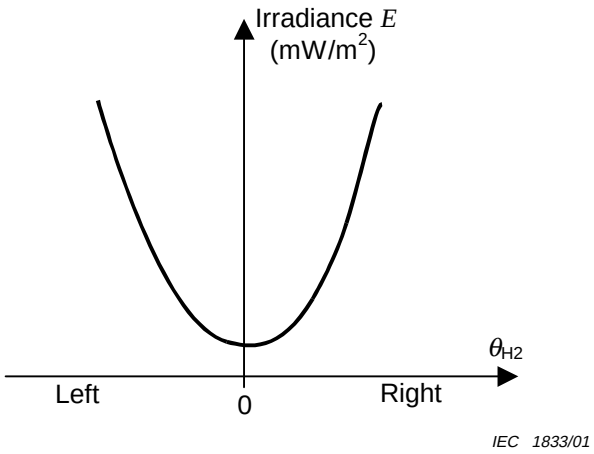


Figure 10a – Horizontal directivity

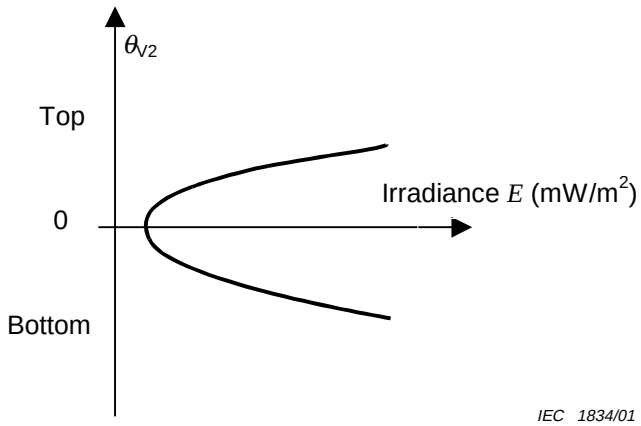
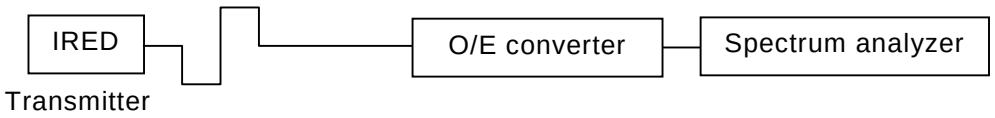


Figure 10b – Vertical directivity

Figure 10 – Directivity characteristics of the receiver

a) Optical fibre method



b) Air free transmission method

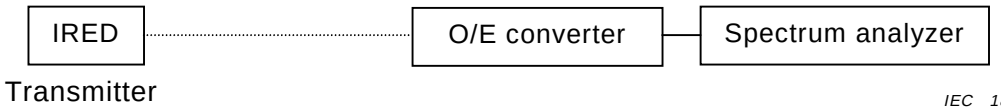


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Figure 11 – Measuring system for spurious emission

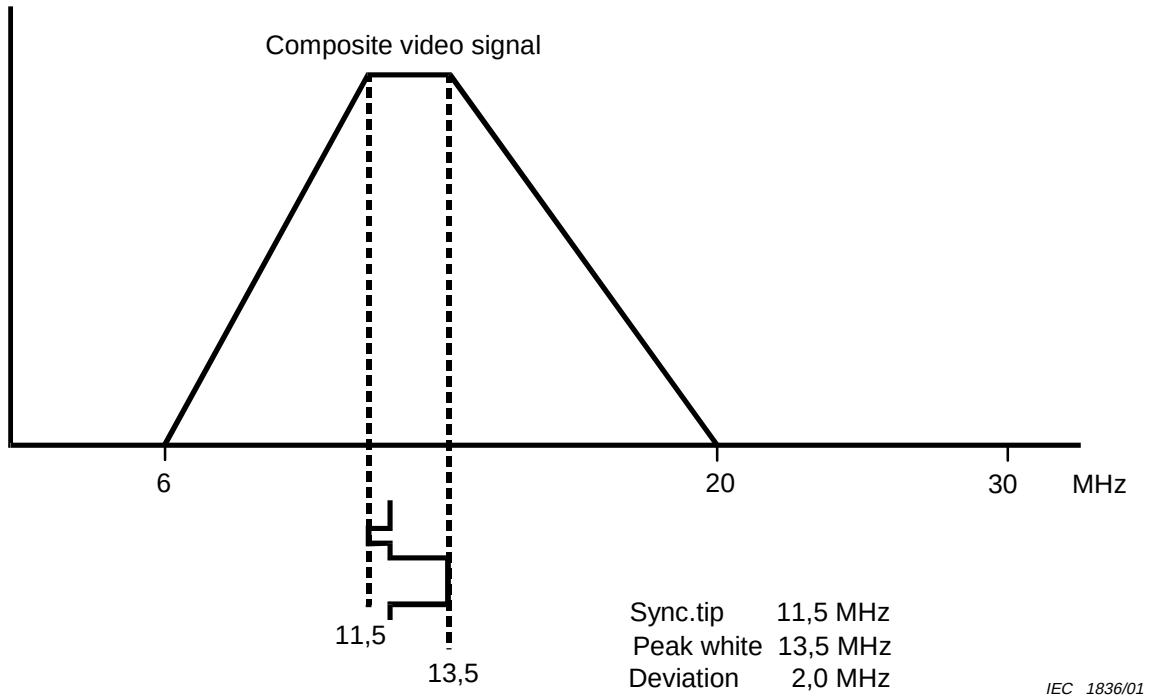

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Figure 12 – Transmission format (composite video signal)

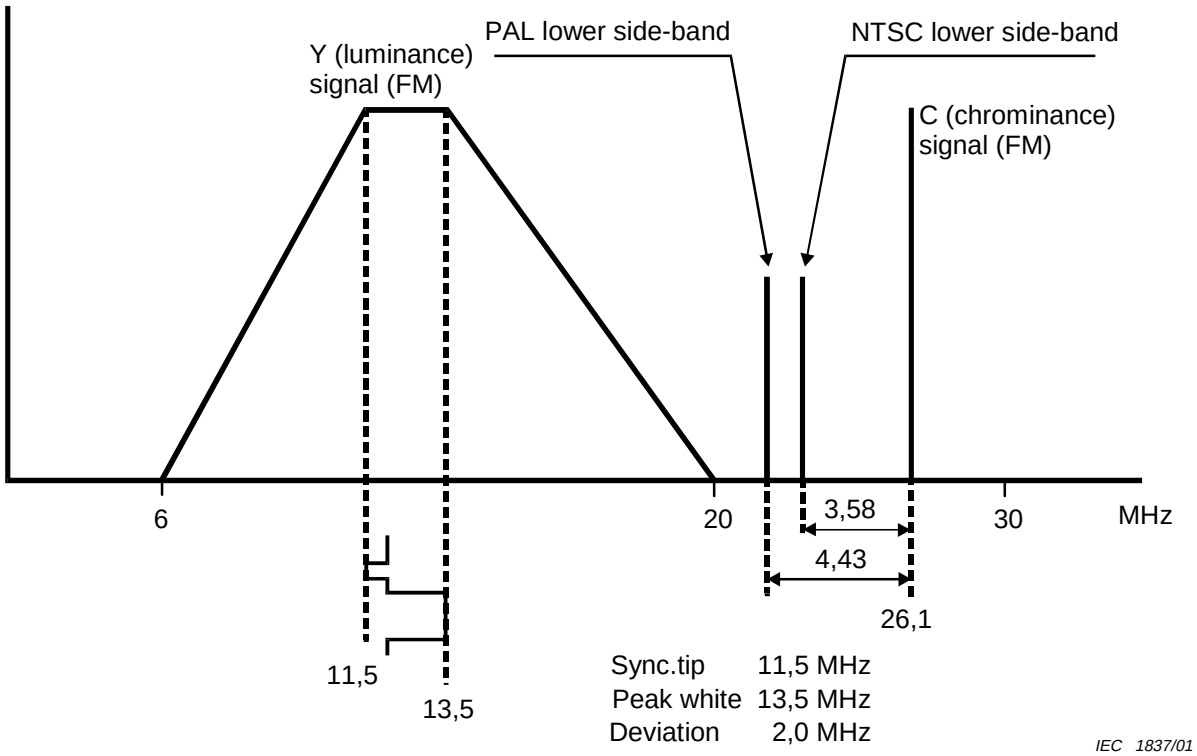

Figure 13 – Transmission format (Y/C separation video signal)

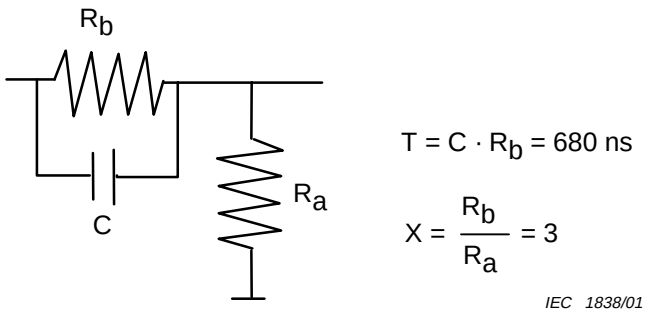

Figure 14 – Pre-emphasis circuit (example)

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