

2.0 SYSTEM PERFORMANCE

The following figures for the signal requirements at the system outlet are taken from EN 60725-1.

2.1 RF Signal levels at outlets

Modulation and Type of service	Minimum Level dB(μ V)	Maximum Level dB(μ V)	Minimum MER dB
AM-VSB-television	57	80<20 channels, 77>20 channels	n/a
FM-television (satellite IF)	47	77	n/a
FM radio, mono	40	70	n/a
FM radio, stereo	50	70	n/a
QPSK (DVB-S) – television	47	77	11
QPSK, 8PSK, 16APSK, 32APSK (DVB-S2) – television	47	77	u.c.
64QAM - television (DVB-C)	47	67	26
256QAM - television (DVB-C)	54	74	32
COFDM - television (DVB-T)	47	77	26

Note:

n/a = Not applicable

u.c = Under consideration

Table 5: RF signal levels at system outlet

2.1.1 Maximum RF level difference between television channels

Frequency ranges	Modulation	Maximum level difference dB
47MHz to 862MHz	AM-VSB	12
Any 60MHz range	AM-VSB	6
Adjacent channels	AM-VSB	3
Adjacent channel	64QAM	3
Adjacent channel	64QAM adjacent to AM-VSB	-10
Up to 470MHz	FM	15
950MHz to 1750MHz	FM	15

Table 6: RF level difference between channels

2.1.2 RF Amplitude response variation within a channel

Signal Modulation	Occupied or channel bandwidth MHz	Maximum Variation (peak-to-peak) dB	Maximum slope of Variation dB
AM	8	2.5	1.0
QPSK	37.125	8	1.0
64QAM	8	4	1.5
COFDM (2k)	8	8	8.0

Table 7: Amplitude response within a channel

2.2 Minimum RF carrier to noise ratio at system outlet

Modulation and type of service	Minimum RF carrier to noise ratio at system outlet (dB)	Equivalent noise bandwidth
AM-VSB-television	44/43	5.08MHz
FM-television (satellite IF)	15/14	27MHz
FM radio, mono	38/37	200kHz
FM radio, stereo	48/47	200kHz
QPSK – television (DVB-S)	15.6/11.3	See note 1 below
QPSK – television (DVB-S2)	14.7/10.4	See note 1 below
8PSK – television (DVB-S2)	19.3/15.0	See note 1 below
16APSK – television (DVB-S2)	21.5/17.1	See note 1 below
32APSK – television (DVB-S2)	24.4/20.1	See note 1 below
64QAM – television (DVB-C)	31/25	See note 1 below
256QAM – television (DVB-C)	37/31	See note 1 below
COFDM (2k) – television (DVB-T)	33/32	

Note 1 - These figures are recommended in the CENELEC/IEC specifications and are intended at system outlet. The first figure in the second column applies, assuming an unimpaired input signal at the headend input. If in operation (with headend input signal coming from the antenna system), the second figure applies. The "Equivalent Noise Bandwidth" is to be considered for analogue television only. For digital television the RF signal-to-noise ratio is independent of the bandwidth. The values given for digital satellite television (DVB-S and DVB-S2) cover the worst case of code rate: 7/8 for DVB-S or 9/10 for DVB-S2.

Table 8 : RF carrier to noise ratio (C/N) at system outlet

2.3 Occupied bandwidth of a digitally modulated signal

The occupied bandwidth (BW_{OCC}) of a digitally modulated signal is:

$$BW_{OCC} = f_S (1 + \alpha) \text{ (MHz)}$$

where:

f_S is the symbol rate (Msymbol/s),

α is the Nyquist roll off factor (see ETSI ETR 290)

2.4 Analogue Grades of impairment – ITU-R (Recommendation BT.500)

Quality	Grade	Impairment
Excellent	5	Imperceptible
Good	4	Perceptible but not annoying
Fair	3	Slightly annoying
Poor	2	Annoying
Bad	1	Very annoying

Table 9: ITU-R five grade quality scale