

GUIDELINES FOR IMPLEMENTATION

CABLE NETWORKS FOR TELEVISION SIGNALS - SYSTEM PERFORMANCE OF FORWARD PATHS

Publisher FICORA		DESCRIPTION	
		Date of publication 22.12.2009	
Authors Representatives of the CATV industry, SESKO ry and FICORA		Type of publication GFI	
		Assigned by FICORA	
Name of publication GFI 0901 GUIDELINES FOR IMPLEMENTATION; Cable networks for television signals - System performance of forward paths			
Abstract GFI 0901 contains national additions to the IEC standard 60728-1 specifying the performance requirements at system outlet when modulation 128 QAM is used. Also, substitutive national symbols for the symbols 'Subscriber tap' and 'Splitter' used in IEC standard 60728-1, are presented.			
Keywords CATV, 128 QAM, performance requirement, symbol			
Serial name FICORA's publications			
Pages, total 6	Language English	Price 3,50 €	Confidence status Public
Distributed by FICORA		Published by FICORA	

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1 INTRODUCTION

This document, Guidelines for implementation, Cable networks for television signals – System performance of forward paths, contains national additions to the IEC standard 60728-1 specifying the performance requirements at system outlet when modulation 128 QAM is used. Also, substitutive national symbols for the symbols 'Subscriber tap' and 'Splitter' used in the IEC standard 60728-1, are presented.

This GFI refers explicitly to standard IEC 60728-1 (2007-09) Ed.4.0, transposed as European standard EN 60728-1:2008 through an enforcement notification. This European standard is then, through so-called information procedure, transposed as Finnish standard SFS-EN 60728-1:2009-06-22.

This document applies to digital signals only. Analogue signals have not been taken into consideration because analogue television system is no longer used in Finland.

This guideline document has been prepared in collaboration with representatives of the CATV industry, SESKO ry and FICORA, and it is recommended that it be complied in Finland.

2 REFERENCES

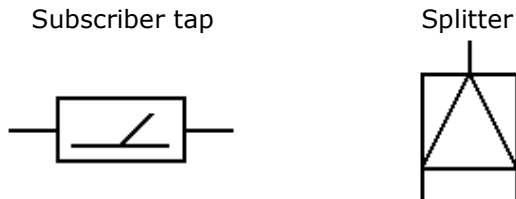
IEC 60728-1 (2007-09) Ed. 4.0; Cable networks for television signals, sound signals and interactive services – Part 1: System performance of forward paths.

3 NATIONAL AMENDMENTS

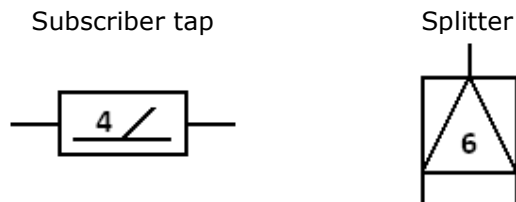
3.1 Symbols

Sub-clause 3.2:

For the symbols 'Subscriber tap' and 'Splitter', substitutive national graphical symbols are presented below.



The number of outputs may be presented inside these symbols. Examples of these are shown below.



3.2 Performance requirements at system outlet

The performance requirements at system outlet are specified in clause 5 of the standard. When modulation 128 QAM is used in the digital CATV system, the national additions for system performance limits, presented in this chapter, apply.

3.2.1 Carrier levels at system outlets

Sub-clause 5.4.1, Table 4:

The minimum carrier signal level at any system outlet is 50 dB(μ V) and the maximum level is 70 dB(μ V).

Sub-clause 5.4.2, Table 5:

The maximum level difference at any system outlet between distributed television channels is 12 dB in frequency range 47 MHz to 862 MHz, and 3 dB in adjacent channel.

3.2.2 Frequency response within a television channel at any system outlet

Sub-clause 5.6.1, Table 8:

The amplitude response variation must not exceed the following values:

- Occupied or channel bandwidth: 8 MHz
- Maximum variation (peak-to-peak): 3 dB
- Maximum slope of variation: u.c.¹ dB/MHz

3.2.3 Long-term frequency stability of distributed carrier signals at any system outlet

Sub-clause 5.7, Table 10:

The maximum deviation of conversion frequency from its nominal value is ± 100 kHz.

¹ under consideration

3.2.4 Random noise

Sub-clause 5.8, Table 11:

Carrier-to-noise ratios at system outlet must not be less than the following values:

- Minimum RF signal-to-noise ratio ($S_{D,RF}/N$): 29 dB
- Equivalent noise bandwidth (BW): Independent of bandwidth (MHz)

3.2.5 Interference to television channels

Sub-clause 5.9:

In case of single-frequency interference, at any system outlet, the level of any unwanted signal within the system is still under consideration (u.c.) when modulation 128 QAM is used.

3.2.6 Additional performance requirements

Sub-clause 5.13.1.3, Table 14:

Modulation error ratio MER of a DVB signal should not be lower than 29 dB.

Sub-clause 5.13.1.5, Table 16:

The phase jitter degree is still under consideration and the phase noise must be lower than the values given in Table 1.

Table 1. Phase noise of a DVB signal (128 QAM)

Signal modulation	Frequency distance	Phase noise dB(Hz ⁻¹)				
	f_a, f_b, f_c, f_d, f_e	100 Hz	1 kHz	10 kHz	100 kHz	1 000 kHz
	Symbol rate (MSymbols/s)	L_a	L_b	L_c	L_d	L_e
DVB-C: 128 QAM	>3.5	-	-41	-83	-103	-113
	1.7/3.5	-	-50	-89	-109	-113

3.3 Performance requirements at home network interfaces of cable networks

The performance requirements at home network interfaces are specified in clause 7 of the standard. When modulation 128 QAM is used in the digital CATV system, the national additions for performance limits at home network interfaces, presented in this chapter, apply.

3.3.1 Requirements at HNI1 for passive coaxial home networks

Sub-clause 7.2.2.1, Table 28:

In the frequency range VHF/UHF, the minimum signal level at the HNI1 must not be less than $50 + \alpha_p$ dB(μ V) and the maximum level must not exceed $70 + \alpha_p$ dB(μ V).

Sub-clause 7.2.2.2, Table 29:

In adjacent channel, the maximum carrier level difference at HNI1 must not exceed the value (3-SSLP) dB.

3.3.2 Requirements at HNI2 for active coaxial home networks

Sub-clause 7.3.1.1, Table 33:

In the frequency range VHF/UHF, the minimum signal level at the HNI2 must not be less than $50 + \beta_{\min}$ dB(μ V) and the maximum level must not exceed $70 + \beta_{\max}$ dB(μ V).

Sub-clause 7.3.1.2, Table 34:

In adjacent channel, the maximum carrier level difference at HNI2 must not exceed the value (3-SSLA) dB.

Sub-clause 7.3.3.1, Table 36:

Within any television channel present at the HNI2, the amplitude response variations must not exceed the following values:

- Occupied or channel bandwidth: 8 MHz
- Maximum variation (peak-to-peak): 2.25 dB
- Maximum slope variation: u.c. dB/MHz

Sub-clause 7.3.6, Table 37:

At HNI2, the minimum RF signal-to-noise ratio ($S_{D,RF}/N$) must not be less than 32 dB.

3.3.3 Requirements at HNI3 and system outlet or terminal input when home networks are mainly of balanced type

Sub-clause 7.4.3, Table 39:

The minimum signal level at coaxial terminal input (case A) should be 50 dB(μ V) and at coaxial system outlet (case B) 51 dB(μ V).