SMPTE RP219 HD/SD Compatible Color Bar Signal

SMPTE RP219 High Definition, Standard Definition Compatible Color Bar Signal (SMPTE Color Bars) is the television test signal, originally developed as Multi-Format Color Bars of ARIB STD-B28 (ARIB Color Bars), and was proposed to SMPTE by ARIB. After some modifications applied, it was approved by SMPTE and included in SMPTE specifications as one of Recommendation Practices (RP).

Similar to ARIB Color Bars, there are user-selectable signal characteristics in SMPTE Color Bars. Users are able to select one of 3 types of stripe width. Transient characteristics (Rise / Fall Time), however, are more explicitly defined than ARIB Color Bars.

In the Tektronix TG700 / HDVG7 and TG2000 / HDVG1 signal generators, all 12 types of signals available by combining these possible selections are supported so that users are able to select the type(s) of SMPTE Color Bars most suitable for their testing purposes, in accordance with the description that follows.

1. Signals Selectable as Options

Signals selectable as options are located to the right of 100% Cyan and to the right of 100% Yellow. Although 40% Gray portions at both ends of 75% Color Bar signal at the top of screen as well as 15% Gray portions at both ends of Black / White / PLUGE (Picture Line Up Generating Equipment) signal at the bottom of screen also can be modified by users, normally default 40% Gray and 15% Gray are used.

There are 4 types of user-selectable signals: 75% White (Figure 1), 100% White (Figure 2), +I signal (Figure 3), and a combination of –I signal and +Q signal (Figure 4). Please select the optional signal that you want to use.

Figure 1. When selected 75% White

Figure 2.　When selected 100% White

Figure 3.　When selected +I signal

Figure 4.　When selected Combination of –I signal and +Q signal

2. Stripe Width Selection

There are 3 types of stripe widths: Ideal, Recommended, and Optional Modified (Figure 5, Table 1). "Ideal" is the stripe width determined based on the calculation results.
"Recommended" is the stripe width determined by adjusting the sampling number of Y signal to be an even number to prevent the switching position of Pb / Pr signals from falling upon a location in between two samples. "Optional Modified " is the stripe width determined so that the stripe width of 40% Gray at the both ends to be narrower by 4 samples of Y signal, and the stripe width of 75% White and Blue to be wider to compensate the narrower stripe width of 40% Gray. This adjustment is done to avoid mixed color at both ends when converting HDTV screen (with aspect ratio of 16:9) into a standard definition TV screen (with aspect ratio of 4:3). Out of these 3 types of the stripe width, you can select the one most suitable for your purpose.

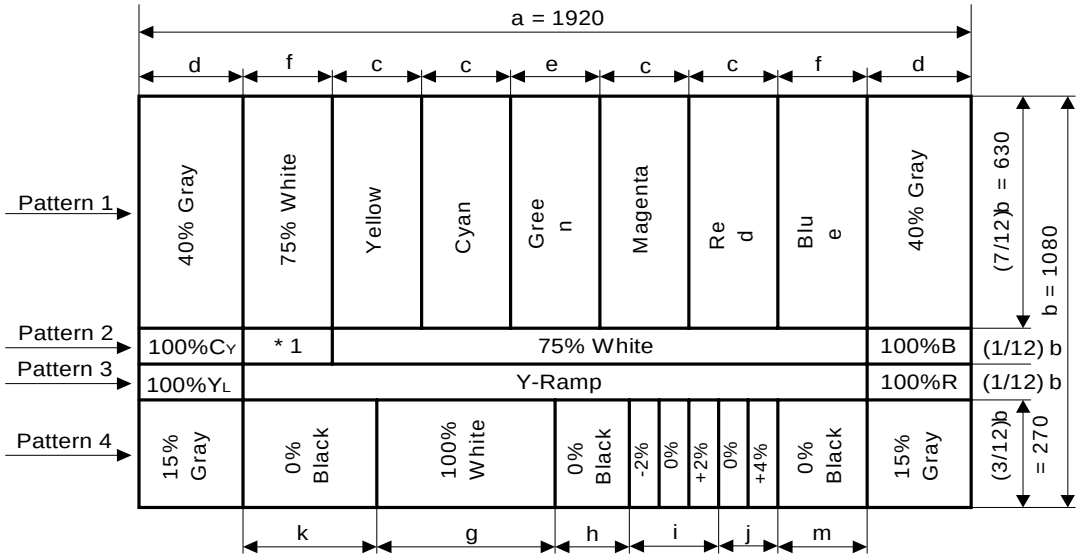


Figure 5. Stripe Width Specifications

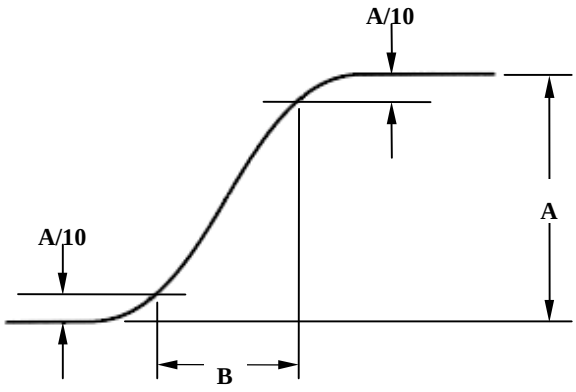
Basic Pattern 1 in Fig C1	d GY	f 75%W	C YL	c CY	e G	C MG	c R	f B	d GY
(a) Ideal width (1920)	240	205	206	206	206	206	206	205	240
(b) Recommended width (1920)	240	206	206	206	204	206	206	206	240
(c) Optional modified width (1920)	236	210	206	206	204	206	206	210	236

Pattern 4 in Fig C1	k 0%BLK	g 100%W	h 0%BLKh	i -2 / 0 /+2	j 0 / +4	m 0%BLK
I(a) Ideal width (1440)	309	411	171	69/68/69	68/69	206
(b) Recommended width (1440)	308	412	170	68/70/68	70/68	206
(c) Optional modified width (1448)	312	412	170	68/70/68	70/68	210

Table 1. Reference Values of Stripe Width

3. Transient Portion (Rise / Fall Time)

SMPTE RP219 specifies the transient portion (Rise / Fall Time) of the Color Bar signal to be 55 ns +/- 10% for both the luminance signal and for Pb / Pr signals. Because of this, the test signals of the TG700 / HDVG7 and TG2000 / HDVG1 adopt 55 ns for the transient portion of Y / Pb / Pr signals (the time period of "B" in Figure 6). For the characteristics of the transient portion, in addition, Sine Square Integration waveform is adopted.



A: 100% Amplitude

B: 10-90% Rise time

Figure 6. Transient Characteristics

4. Verification of Downloaded Files

The TG700 / HDVG7 and TG2000 / HDVG1 support 12 types of SMPTE Color Bars, which result from the combination of 3 types of stripe width with each of 4 types of user-selectable test signals. To be able to individually install and use the necessary signals out of these 12 types of SMPTE Color Bars, Tektronix prepared 12 types of Downloadable Files (referred to as "DNL file"). For DNL files, file names for identification are assigned with the method shown in Figure 7, based on their Format, Optional Signal, and Stripe Width. Please confirm the DNL file name(s) that you want to use.

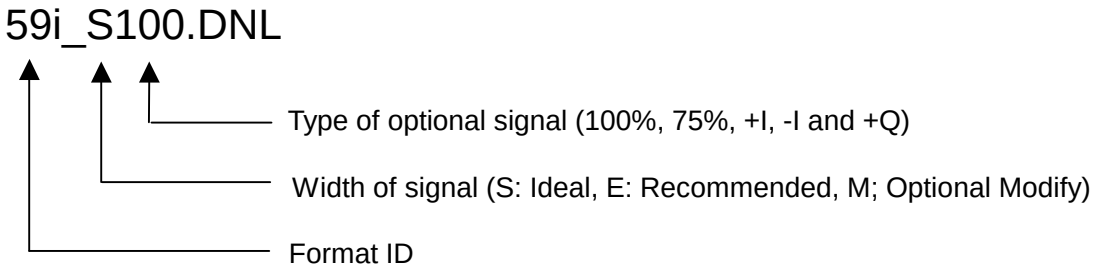


Figure 7. Relationship between "Name" and "Signal" of DNL File

The case shown in Figure 7 indicates a DNL file with 1080/59i Format, 100% White signal option and Ideal stripe width (a DNL file whose Optional signal portion indicates "ALL" contains all 4 types of stripe width of Optional signals).

* It is recommended that you install only the type(s) of SMPTE Color Bars that you want to use. This will prevent you from using unwanted SMPTE Color Bars by mistake.

5. Installation Procedure of SMPTE Color Bars

Select and install SMPTE Color Bars to the TG700 / HDVG7 or TG2000 / HDVG1.

5-1. In the case of the TG700 / HDVG7

You can use the TG7Comm software contained in the CD-ROM (one of the standard accessories) to download DNL files from your PC or via a network. After downloading is completed, restart the TG700. On restart, the SMPTE Color Bars is assigned to the COLOR BAR button of the HDVG7, and you can select and use the SMPTE Color Bars just installed the same way as other pre-installed test signals.

5-2. In the case of the TG2000 / HDVG1

You can copy the DNL file to a floppy disk, and download it from the floppy disk drive on the TG2000. For the TG2000, you can select and use the SMPTE Color Bar just downloaded from the front panel.

* For a detailed description of DNL file downloading, such as "TG7Comm Software Usage", refer to the user manual for the TG700 or TG2000.

6. Verification of SMPTE Color Bars

When the SMPTE Color Bars become available on the TG700 or TG2000, check the signal name to verify that the signal you are intending to use is correctly installed. To each type of SMPTE Color Bars, one of signal names listed below is assigned:

(Name of Signal)	(Type of Signal)
SMPTE Color Bars (100%):	Ideal width, 100% White signal
SMPTE Color Bars (75%):	Ideal width, 75% White signal
SMPTE Color Bars (+I):	Ideal width, +I signal
SMPTE Color Bars (IQ):	Ideal width, -I and +Q signal
SMPTE Color Bars (100% Even):	Recommended width, 100% White signal
SMPTE Color Bars (75% Even):	Recommended width, 75% White signal
SMPTE Color Bars (+I Even):	Recommended width, +I signal
SMPTE Color Bars (IQ Even):	Recommended width, -I and +Q signal
SMPTE Color Bars (100% Mod):	Optional modified width, 100% White signal
SMPTE Color Bars (75% Mod):	Optional modified width, 75% White signal
SMPTE Color Bars (+I Mod):	Optional modified width, +I signal
SMPTE Color Bars (IQ Mod):	Optional modified width, -I and +Q signal

SMPTE Color Bars of 1080/59.94i format are available free of charge. They are included in the TG700 Signal Library Files that can be downloaded from *Software & Drivers* in the Tektronix web site (http//:www.Tektronix.com/).

ARIB Color Bars of 1080/59.94i format are also available free of charge. They are included in the TG700 Signal Library Files that can be downloaded from *Software & Drivers* in the Tektronix web site (http//:www.Tektronix.com/).

ARIB Color Bars test signals of 1080 system format other than 1080/59.94i format are available from ARIB Multi-Format Color Bar Signal Library CD-ROM (Tektronix part number: 062-A265-XX). This CD-ROM contains the DNL files of ARIB Color Bar signals as well as the test signal library compatible with SDP2000 Signal Generation Software.

For details of SMPTE RP219: High Definition, Standard Definition Compatible Color Bar signal, refer to SMPTE RP219. For details of ARIB STD-B28 Multi-Format Color Bars, refer to ARIB Standard STD-B28.