

SFD DOCSIS[®] Signal Generator

The Calian SFD produces OFDM and SC-QAM signals for DOCSIS 4.0, legacy DOCSIS, and digital cable TV in line with J.83 A/B/C and analog cable TV standards. Its downstream frequency range covers from 47 MHz to 1794 MHz. The upstream frequency range covers from 5 MHz to 204 MHz. Downstream and upstream DOCSIS OFDM and SC-QAM carriers are modulated using Ethernet data traffic or an internally generated internal PN23 data sequence.

The Calian SFD downstream DOCSIS 4.0 OFDM modulated carriers are specification compliant with carrier bandwidths up to 192 MHz and support all constellation rates. Alternatively, either a single DOCSIS SC-QAM channel at any downstream frequency or 96 simultaneous SC-QAM channels above 1002 MHz are available and all compliant with ITU J.83 modulation standards. The Calian SFD can also produce an analog TV signal or other preconfigured common cable waveforms.

The Calian SFD upstream DOCSIS OFDMA signal can be generated in real-time at the desired burst transmission rate. DOCSIS ATDMA or S-CDMA signals can also be produced using real-time data.

The digital signal generation capabilities of the Calian SFD make it ideal for testing tuners, cable modems and upstream CMTS receivers in R&D and production environments. The available RF cable impairment simulate real world transmission environments for a variety of testing scenarios, plus it can add phase noise, AWGN noise, RF tilt, AM hum, and a defined bit error rate in the transmit signal.

The desktop size of a half rack unit width and two-unit height make it convenient for use by developers at their desk or manufacturing facilities with limited available space.

The complex signal generation process can be conveniently configured from a PC or a web interface. Remote control SCPI commands enable the generator to be used in automatic test systems.



Key facts

- Frequency range in downstream: 47 MHz to 1218 MHz (extendable to 1794 MHz)
- Frequency range in upstream: 5 MHz to 204 MHz
- DOCSIS OFDM, SC-QAM, digital and analog TV
- Simultaneous generation of 96 SC-QAM channels above 1GHz with SFD-K202 option for DOCSIS 4.0
- ARB generator bandwidth up to 200 MHz
- Signal interference and distortion simulation

Benefits and key features

Downstream signal generation

- Realtime modulation of DOCSIS OFDM and SC-QAM (J.83 A/B/C)

Upstream cable modem data traffic simulation

- Realtime modulation of DOCSIS OFDMA, A-TDMA, and S-CDMA
- Trigger function for burst timing control

Powerful ARB generator

- Playout ARB files up to 200 MHz bandwidth

Specifications in brief

RF parameters

Frequency range

Downstream	47 MHz to 1212 MHz
With SFD-K3018 option	47 MHz to 1794 MHz
Upstream	5 MHz to 204 MHz

Level

192 MHz DOCSIS 3.1	59 dBmV
J.83/A/B/C (DOCSIS 3.0)	62 dBmV

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192 MHz DOCSIS 3.1	57 dB (typ.)
J.83/A/B/C	48 dB (typ.)

ARB waveform generator

Bandwidth	200 MHz
Memory	256 Mbyte
Sample rate	240 Msample/s
Waveform	DOCSIS 3.1, DOCSIS 3.0, J.83, PAL, NTSC, A-TDMA, S-CDMA, FM spectrum, additional PAL and SECAM signals

Downstream modulation (SFD-K200 option)

DOCSIS 3.1

Modulation mode	OFDM
Bandwidth	24 MHz to 192 MHz
Number of profiles	1 to 4

DOCSIS 3.0

Modulation mode	SC-QAM
Standards	J.83 A/B/C, PAL, NTSC
Bandwidth	6 MHz, 7 MHz, 8 MHz

Enhanced Functions (SFD-K201 option)

Enhanced functions	Insertion of timestamps in the downstream PLC, display of transmission data rate, Calian FSW compatibility
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Upstream modulation (SFD-K300 option)

DOCSIS 3.1

Modulation mode	OFDMA
Bandwidth	6.4 MHz to 96 MHz

DOCSIS 3.0

Modulation mode	A-TDMA, S-CDMA
Bandwidth	800 kHz, 1.6 MHz, 3.2 MHz, 6.4 MHz

Signal interference (SFD-K1050 option)

Bit error rate	10 ⁻² to 10 ⁻⁶
Noise	AWGN, phase noise
AC hum (Amplitude modulation)	47 Hz to 200 Hz, 0 % to 6 %
Tilt (DOCSIS 3.1)	± 15dB/GHz

Multi-channel SC-QAM (SFD-K202 option)

J.83 A (DVB-C) / B / C

Frequency range	1002 MHz to 1794 MHz
Constellation	64QAM, 256QAM
Rolloff	0.15, 0.18, 0.12
Symbol rate	6.952 Msps, 5.057 Msps, 5.361 Msps
Number of carriers	80 (J.83 A / DVB-C), 96 (J.83 B / C)

Network IQ (SFD-K2010 option)

Network IQ output

Modes	Downstream and upstream DOCSIS 3.0, DOCSIS 3.1, ARB
Sample rate	204.8 Msps
Format	16-bit IQ, UDP with Real Time Protocol

Network IQ input

Sample rate	204.8 Msps
Bandwidth	192 MHz
Format	16-bit IQ, UDP with Real Time Protocol

Ordering Information

Type	Description
SFD	DOCSIS Signal Generator base unit
SFD-K200	Downstream Modulation (incl. CLGD-K2)
SFD-K201	Enhanced Functions
SFD-K202	SC-QAM Multichannel Generation
SFD-K300	Upstream Modulation
SFD-K1050	Impairments simulation
SFD-K2010	Network IQ functions
SFD-K3018	Ext Freq. Range 1794 MHz

