

Fx-ES26XL

EXTERNAL MODULATED OPTICAL CATV AND SAT-IF TRANSMITTER 1550 NM

Application

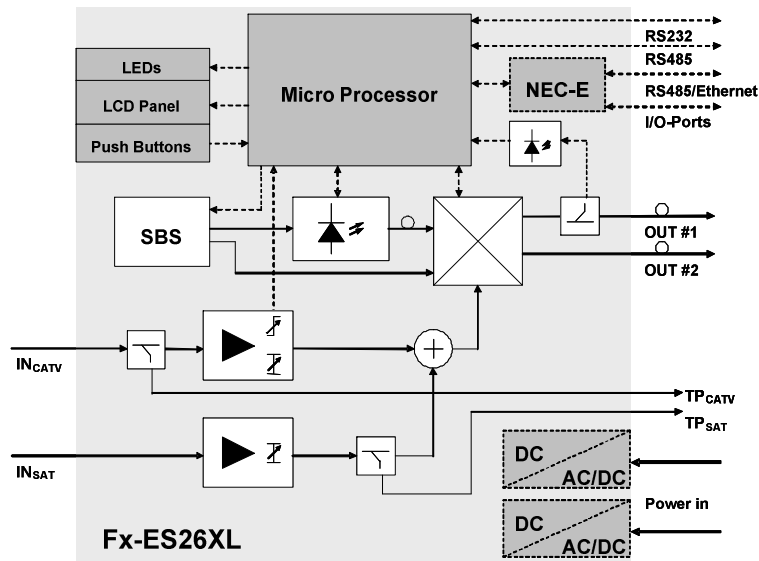


- ▶ Electrical to optical conversion of multi-channel CATV signals like AM-VSB, FM and QAM signals
- ▶ Electrical to optical conversion of SAT-IF video signals by separate input
- ▶ Downstream transmission in HFC and RF Overlay networks with excellent performance
- ▶ Externally modulated 1550 nm DFB laser transmitter
- ▶ Enables the usage of optical amplifiers (EDFAs) as boosters or repeaters in order to realize large scale HFC networks

Features

- ▶ 2 optical outputs with > 10 dBm optical output power each
- ▶ Low noise, narrow linewidth CW DFB laser with DWDM wavelength according to ITU grid and adjustable wavelength
- ▶ Bandwidth of 47...870 MHz for CATV and 950...2605 MHz for SAT-IF input
- ▶ Separate RF input for SAT-IF signals
- ▶ Automatic load control (ALC) for CATV signal input, separate ALC for SAT-IF signal input
- ▶ Adjustable RF slope
- ▶ Front panel CATV- and separate SAT-IF test point
- ▶ Dual, hot-pluggable power supply modules for 100...240 VAC or $\pm 36...72$ VDC
- ▶ Web and SNMP Interface (a-version)
- ▶ LC display and LED status indication
- ▶ General purpose I/O interface for remote functions
- ▶ Very thin, only 1 U design for mounting into 19", ETSI or JIS racks

Block Diagram



General Technical Data

Optical connector	Any type of high return loss connectors front or rear side mounted	
Optical fiber	Standard single mode 9/125 μm	
RF connector	F female, front or rear side mounted	
Control interface	a-version: Ethernet 10/100 interface b-version: RS485/232 interface	
Power supply types (Dual redundant, hot pluggable)	100 ... 240 VAC, 50/60 Hz or ± 36 ... ± 72 VDC	
(Real) Power consumption	[W]	< 60 / 68 (1 / 2 power supply unit(s) equipped)
Enclosure	19" / 1 rack unit [U] (optionally compatible to ETSI or JIS standards)	
Weight	[kg]	≈ 9.0 (depend on power supply)
Safety	EN 60950, Laser class 1M according IEC 60 825-1 (eyesafe for normal viewing)	
EMC	EN50083-2	
Climatic specification		
Operation	ETS 300 019, class 3.1	
Storage	ETS 300 019, class 1.2	

Optical Properties

		Fx-ES26XL-85	Fx-ES26XL-100
Wavelength	[nm]	1548...1560 or ITU grid ch 23...37	
Side mode suppression	[dB]	> 30	
Wavelength adjustment range	[GHz]	-100, -50, 0, 50, 100	
Optical power	[dBm]	2x 8.5 min.	2x 10.0 min.
Relative intensity noise for CATV (for optical fiber return loss > 40 dB)	[dBc/Hz]	< -158 (typ. < -160)	
Maximum SBS suppression threshold			
CATV & SAT-IF application, 25 km	[dBm]	+15 *)	
CATV application, 65 km	[dBm]	+19	
Laser linewidth (typical)	[MHz]	0.3	

*)SBS suppression threshold should be adjusted application individually as low as possible for best signal performance, since using +14...+15 dBm threshold may result in 2 dB penalty of CNR for carrier frequencies 80...110 MHz and 4 dB penalty for band I (47...68 MHz) carrier frequencies.

Electrical Properties CATV

RF frequency range	[MHz]	47 ... 862
Frequency response flatness	[dB]	< ±0.75
Nom. Input level per TV channel	[dBμV]	80
Input level range (per carrier)	[dBμV]	78 ... 96 (for OMI= 5% per CATV carrier)
True RMS input level range	[dBm]	-16 ... +2 (for ALC correctly working)
Slope range	[dB]	-2 (cable equivalent) ... +8 (cable equalization)
RF impedance	[Ω]	75
Return loss	[dB]	> 20 (@ 47 MHz) – 1.5 dB/octave, minimum 15
RF monitor (test point) level	[dB]	-20 (-0.8 ... +0.2)

Electrical Properties SAT-IF

RF frequency range	[MHz]	950 ... 2605
Frequency response flatness	[dB]	< ±2
Input level range (per SAT-IF carrier)	[dBμV]	82 ... 98 (OMI _{SAT} = 1.0%)
True RMS input level range	[dBm]	-11 ... +5 (for ALC correctly working)
RF impedance	[Ω]	75
Return loss	[dB]	> 10
RF monitor (test point) level	[dBμV]	66 ±2.5 (for OMI= 1.0%)

Performance Characteristics CATV

Transmitter version		C42	D84	N77
Channel allocation plan for test		CENELEC 42	PAL-D 84	NTSC 77
Number of TV carriers		42	84	77
Noise bandwidth	[MHz]	5	5	4
CNR Tx/Rx ¹⁾	[dB]	54.5 (52.5)	51.5 (49.5)	53 (51)
CNR Link 1 ¹⁾	[dB]	53.5 (51.5)	50.5 (48.5)	52 (50)
CSO Tx/Rx and Link 1 ²⁾	[dBc]		64	
CTB Tx/Rx and Link 1	[dBc]		63	

¹⁾ Values are valid for pure CATV application, value in brackets (...) are valid for CATV & SAT-IF application with 36 QPSK modulated SAT-IF signals with carrier frequencies in the range of 1000 ... 2600 MHz

²⁾ Optical output #1

Performance Characteristics SAT-IF

CNR ¹⁾	[dB]	> 27
Intermodulation products ¹⁾	[dBc]	< -35 (including intermodulation due to CATV signal!)
Spurious signals ¹⁾	[dBc]	< -38

¹⁾ Measurement conditions as described in table "Test Condition" under row "Tx/Rx"; moreover 36 QPSK modulated SAT-IF signals with carrier frequencies in the range of 1000 ... 2600 MHz and 27 MHz IF bandwidth are used.

Test Conditions

	Booster EDFA ²⁾	1 st Fiber Length ³⁾	In-Line EDFA ²⁾	2 nd Fiber Length ³⁾	Receiver P _{opt,Rx} ⁴⁾
Tx/Rx ¹⁾	no	no	no	no	0 dBm
Link 1 ¹⁾	15 dBm	25 km	no	no	0 dBm
Transmitter mode for all tests	ALC of both, CATV and SAT-IF input switched ON !				

¹⁾ RF input level at 80 dBμV per TV carrier ²⁾ EDFA with noise figure N= 5 dB

³⁾ Non-dispersion shifted fiber

⁴⁾ Receiver Rx with equivalent input noise current density of I_{eq}= 7 pA/√Hz and efficiency η= 0.95 A/W

Ordering Information

For more information on this product please contact BKtel communications. Properties for ordering optical transmitter Fx-ES26XL:

Optical output power	85	+8.5 dBm
	100	+10.0 dBm
Frequency plan *)	C42	Cenelec 42
	N77	NTSC 77
	PAL84	PAL 84
NMS-Interface	A	HTTP/SNMP Ethernet
	B	RS485
Wavelength	X	1548...1560 nm
	15xx.xx	15xx.xx ITU wavelength
Optical connector	1	E2000
	2	SC/APC
	3	FC/APC-NTT
	4	FC/APC-JDS
	5	SC/APC with shutter
RF input / optical output	F	on front side
	R	on rear side
Version	0	BKtel
	OEM	OEM
Power supply	230/230	2 x (100...240 VAC)
	48/48	2 x (36...72 VDC)
	230	1 x (100...240 VAC)
	48	1 x (36...72 VDC)
	230/48	mixed 230 VAC / 48 VDC
Power plug	0	No power cable included
	Eu	Europe (Germany, Spain,...)
	US	USA
	Sw	Switzerland
	UK	UK, Ireland
	Jp	Japan
	Ch	China

*) Other frequency plan on request!

Available ITU grid wavelengths

ITU Grid Ch. No.	DWDM Wavelength
23	1558.98 nm
24	1558.17 nm
25	1557.36 nm
26	1556.55 nm
27	1555.75 nm
28	1554.94 nm
29	1554.13 nm
30	1553.33 nm

ITU Grid Ch. No.	DWDM Wavelength
31	1552.52 nm
32	1551.72 nm
33	1550.92 nm
34	1550.12 nm
35	1549.32 nm
36	1548.51 nm
37	1547.72 nm

Other wavelengths on request!