OTyyyyZnn

Ultrabroadband Optical Transmitter

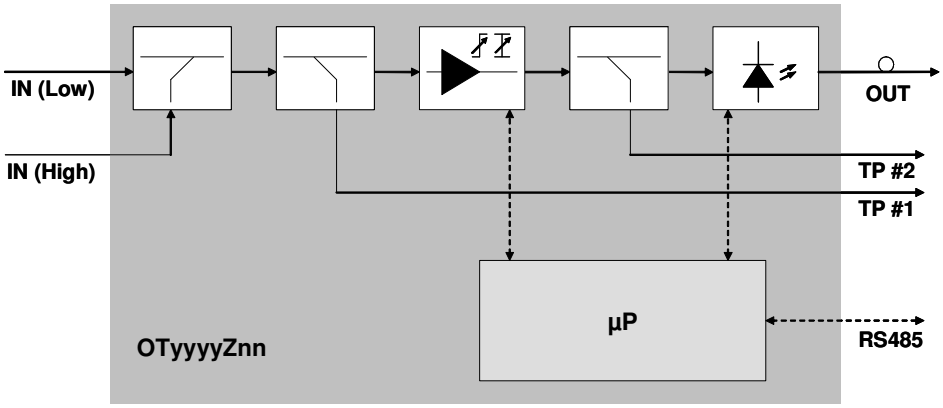
Application

- Electrical to optical conversion of multi-channel CATV signals like AM-VSB, FM and QAM signals
- Downstream or upstream transmission in HFC networks

Features

- Low noise DFB laser with pre-distortion technology, 1310nm, 1550nm, CWDM and DWDM variants with different optical output power
- OTDWnn: ITU-Grid wavelength with adjustable wavelength: +/- 100 GHz
- Output powers between +3 and +14 dBm (+3 and +6 dBm with un-cooled lasers)
- OT1550, OTDWnn: SBS suppression and pre-chirping technology
- Ultra broad bandwidth of up to 5 … 1000 MHz (5 … 450 MHz for transmitters with un-cooled lasers)
- Dual RF inputs: low and high level inputs
- All-electronically adjustments: slope, gain, output power, OMI, pre-chirping etc
- Automatic load control (ALC) for constant OMI_{totrms}
- RS485 remote supervision and control interface
- SC/APC or E2000 connector as standard

Block Diagram



General Technical Data

OTyyyyZnn Mnemonic	
Wavelength yyyy	1310 and 1550 (given in nm) CWmm – CWDM laser (ITU grid channel number mm) DWmm – DWDM laser (ITU grid channel number mm)
Type Z	S – standard uncooled laser for return path applications L – linear cooled laser for forward path (narrowcast) applications N – standard linear cooled laser for forward path (broadcast) applications X – extremely linear cooled laser for forward path (broadcast) applications
Optical output power nn	nn denotes output power in dBm

General Performance Data		S Type	L Type	N Type	X Type
Frequency range		5 ... 450 MHz	5 ... 1000 MHz	45 ... 862 MHz	5 ... 1000 MHz
Input level (OMI = 5%)		73 dBµV minimum (87 dBµV minimum for coupled input)			
Gain adjustment		0 ... 24 dB			
Slope adjustment		-3 (cable equivalent) ... +16 dB (cable equalization)			
Impedance		75 Ω			
RF return loss		> 20 dB (at 47 MHz) - 1.5 dB/oct, min. 15 dB > 18 dB for 5 ... 65 MHz			
Testpoint TP1 attenuation		20 dB			
Testpoint TP2 (AC voltage for RF signal and DC voltage for opt. output power indication)		80 dBµV+2ΔPopt ± 2.0 dB at OMI = 5% (AC) 0.1 V/mW ± 0.02 V/mW (DC)			
Optical output power adjustment		0 ... -3 dB			
Output power tolerance	1310 nm: 1550 nm:	±1.0 dB ±1.0 dB	 ±0.5 dB	±0.7 dB	±0.5 dB -1.5 ... +1.5 dB
Optical wavelength fine tuning		-	-100...+100 GHz	-	-
Optical return loss		> 35 dB	> 45 dB	> 40 dB	> 45 dB
Power consumption (Power consumption in standby mode)		≤ 8 W (≤ 2 W)	≤ 12 W (≤ 4 W)	≤ 12 W (≤ 4 W)	≤ 12 W (≤ 4 W)
Dimensions		Module width 1 slot for 2G6 chassis			
Weight		1.3 kg			

Safety, EMC, Environmental Conditions	
Safety	EN 50 083-1 and EN 60 950 Laser Class 1M acc. IEC 60 825-1 (eyesafe for normal viewing)
EMC	EN 50 083-2
Equipment operation environmental conditions	Class 3.1 acc. ETS 300 019-1-3 (temperature controlled locations)

Transmission Performance Data

X, N, L Type Transmitter Performance

Version ccc, channel allocation plan	C42	B36	N77
Channel allocation plan (number of carriers)	Cenelec (42)	PAL B/G (36)	NTSC (77)
Optical modulation index OMI for X- / L-type Optical modulation index OMI for N-type	4.1% 3.4%	4.4% 3.7%	3.0% 2.5%
Noise bandwidth	5 MHz	5 MHz	4 MHz
CNR X-Type (1310 nm) [1,2] CNR X-Type (1550 nm) [1]	≥ 51.5 dB ≥ 51.0 dB	≥ 52.2 dB ≥ 51.7 dB	≥ 51.2 dB ≥ 50.7 dB
CNR N-Type (1310 nm) [3]	≥ 51.5 dB	≥ 52.2 dB	≥ 51.2 dB
CNR L-Type (1550 nm) [1]	≥ 51.0 dB	≥ 51.7 dB	≥ 50.7 dB
CSO X-Type (1310 nm) [1,2] CSO X-Type (1550 nm) [1,4]	≥ 65 dBc ≥ 50 dBc [5]	≥ 68.5 dBc ≥ 56 dBc	≥ 67 dBc ≥ 56 dBc
CSO N-Type (1310 nm) [3]	≥ 62 dBc	≥ 65 dBc	≥ 65 dBc
CSO L-Type (1550 nm) [1,4]	≥ 46 dBc [5]	–	–
CTB X-Type (1310 nm) [1,2] CTB X-Type (1550 nm) [1,4]	≥ 66 dBc ≥ 62 dBc	≥ 70 dBc ≥ 64 dBc	≥ 68 dB ≥ 63 dB
CTB N-Type (1310 nm) [3]	≥ 66 dBc	≥ 70 dBc	≥ 68 dBc
CTB L-Type (1550 nm) [1,4]	≥ 58 dBc	–	–
CXM X-Type (1310 nm) [1,2] CXM X-Type (1550 nm) [1,4]	≥ 63 dBc ≥ 55 dBc [5]	≥ 63 dBc ≥ 57 dBc	≥ 63 dBc ≥ 57 dBc
CXM N-Type (1310 nm) [3]	≥ 62 dBc	≥ 62 dBc	≥ 62 dBc

S Type Transmitter Performance

Laser RIN	≤ -145 dB/Hz (typical better -150 dB/Hz)
IM2 S-Type [7] IM3 S-Type [7]	≥ 46 dBc (two tone with OMI= 20% per carrier) ≥ 54 dBc (two tone with OMI= 20% per carrier)

Test Conditions

[1] Transmitters with 8 to 15 dBm optical output power: 20 km non-dispersion shifted fiber, optical attenuator and optical receiver with $P_{opt,in}$= 0 dBm, I_{eq}= 7.0 pA/√Hz and η= 0.80 / 0.95 A/W (at 1310 / 1550 nm) used

[2] Transmitters with 3 to 5 dBm optical output power: 6 km non-dispersion shifted fiber, optical attenuator and optical receiver with $P_{opt,in}$= 0 dBm, I_{eq}= 7.0 pA/√Hz and η= 0.80 / 0.95 A/W (at 1310 / 1550 nm) used

[3] No fiber, but optical attenuator and optical receiver with $P_{opt,in}$= 0 dBm, I_{eq}= 7.0 pA/√Hz and η= 0.80 / 0.95 A/W (at 1310 / 1550 nm) used

[4] Fiber length (chirp) compensation adjustment set to 10 km

[5] When only frequencies up to 600 MHz are measured, CSO value is 6 dB better and CXM value is 2 dB better!

[6] CXM measured according "C" method: CXM is the ratio between measurement carrier (lowest frequency carrier) and the side lobes arising when all other carriers (besides the meas. carrier) are 100% modulated with 15.625 kHz modulation frequency

[7] No fiber, optical receiver with $P_{opt,in}$= 0 dBm, I_{eq}= 7.0 pA/√Hz and η= 0.95 A/W (at 1550 nm) used

Available Types

S -Type

OT1310S03 and S06

OT1550S03 and S06

OTCW11S03 … CW18S03,
OTCW11S06 … CW18S06

N -Type

OT1310N03,
OT1310N04,
OT1310N05,
…
OT1310N15

L -Type

OTDW21L08 and L11,
OTDW22L08 and L11,
…
OTDW58L08 and L11

X –Type

OT1310X03, OT1310X05,
OT1310X08, OT1310X11
OT1310X13, OT1310X14

OT1550X08,
OTDW21X08, OTDW23X08,
… OTDW37X08