Alcatel 1916 SDH
SDH / SONET integrated modules
Receiver STM-16 / OC-48 for D-WDM

Preliminary

Description

These integrated modules are intended for use Dense Wavelength Division Multiplex (D-WDM) at SDH and SONET bit rates with a lot of noise on the optical links with several EDFAs. The receiver contains an in-house III-V APD (Avalanche Photodiode) detector with preamplifier in a front-end module, a main amplifier ASIC, a clock and data recovery function with accurate decision circuit. The modules are housed in a space-saving 30-pin package, providing the same electrical access for overall applications. The Alcatel 1916 SDH family is a range of transmitter and receiver modules, providing convenient and flexible optical interfaces for SDH / SONET systems operating at 2.488 Gbit/s & 2.666 Gbit/s and exceeds the applicable ITU-T G.957, ITU-T G.783, ITU-T G.691 and Bellcore GR-253 standards.

Features

- D-WDM receivers for Ultra-Long-Haul :
  6 400 ps/nm (320 km)
  12 800 ps/nm (640 km)
- Bit rate 2.488 Gbit/s & 2.666 Gbit/s (FEC)
- Operate with high noise :
  up to S/N = 14 dB / 0.1 nm at 2.666 Gbit/s (FEC)
  up to S/N = 19 dB / 0.1 nm at 2. 488 Gbit/s
- Operating 1.5 μm wavelength
- Full performance in operating case temperature from 0 to + 70 °C
- Low power consumption
- Small size less than 100 cm^2
- Data Reshaping
- Clock recovery & Data Retiming
- Convenient digital alarms to minimize external circuitry
- Analog information for flexible integration
- Common pin-out for all modules
- Alcatel Reliability and Qualification Program for built in quality

Applications

Used in transmission systems from medium to high-speed for intermediate-reach to long-reach applications, the Alcatel 1900 SDH family operates at SONET OC-3, OC-12 and OC-48 rates as well as at ITU-T SDH rates of STM-1, STM-4 and STM-16. Covering all types of SDH / SONET optical interfaces (tributaries and aggregates) the Alcatel 1900 SDH modules are suitable for line systems, Add Drop Multiplexers and digital cross-connects as well as ATM switches.
As part of the Alcatel 1900 SDH family, the Alcatel 1916 SDH module is suited for all types of STM-16 (Short-Haul, Long-Haul, Very-Long-Haul and Ultra-Long-Haul) and OC-48 (Intermediate-Reach, Long-Reach and Ultra-Long-Reach) optical interfaces. These modules ensure ease of use and offer new flexibility to system designers.

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Optical characteristics

	Condition	Symb	Min	Typ	Max	Min	Typ	Max	Unit
			Y-16.2 WDM			Z-16.2 WDM			
Dispersion	Note 1		6400			12800			ps/nm
Center wavelength		λc	1530		1560	1530		1560	nm
Receiver sensitivity	Note 2	R_{SEN}		- 32	- 28		- 32	- 28	dBm
	Note 3			- 31	- 27		- 31	- 27	
Receiver overload	Note 2	R_{OVE}		- 8			- 8		dBm
	Note 3			- 8			- 8		dBm
BER floor	Note 4	BER_{FR}		10^{-7}	10^{-5}		10^{-7}	10^{-5}	

Note 1: WDM transmitter with ER min > 12 dB with chirp compatible with the dispersion and fiber, with + 7 dBm at all EDFAs output power and optical filter with equivalent noise bandwidth < 1.6nm.
Note 2 : S/N = 19 dB / 0.1 nm; BER = 10^{-12} back to back.
Note 3 : S/N = 19 dB / 0.1 nm; BER = 10^{-12}.
Note 4 : S/N = 14 dB / 0.1 nm; BER = 10^{-5} at 2.666 Gbit/s bit rate with FEC function.

All parameters are specified End-of-Life within the overall relevant operating temperature range.
The typical values are referenced to + 25 °C, nominal power supply, beginning of life.

Electrical characteristics

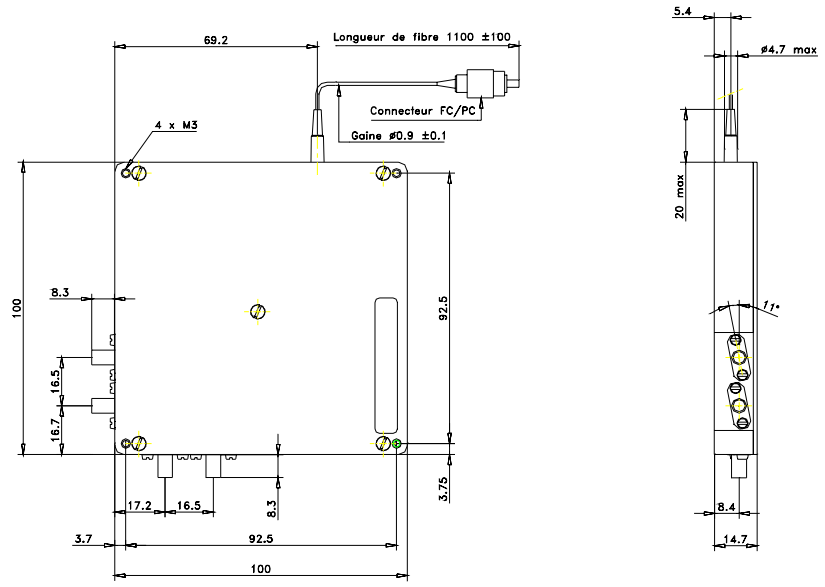
Parameter	Condition	Symbol	Min	Typical	Max	Unit
Positive supply voltage		V_{CC}	+ 4.75	5	+ 5.25	V
Positive supply current		I_{CC}		+ 380	+ 510	mA
Negative supply voltage		V_{EE}	- 5.45	- 5.2	- 4.94	V
Negative supply current		I_{EE}	- 400	- 340		mA
Power consumption		Pc			4.9	W
ECL output data & clock voltage	Note 5	DV	0.5	0.7	0.9	Vpp
Logic high level output	Isrc=-150 µA	V_{OH}	3.5	4.7		V
Logic low level output	Isink < 4 mA	V_{OL}		0.2	0.44	V
Alarm activation level	Note 6	A_{AC}			10^{-3}	
Alarm desactivation level	Note 6	A_{DE}			10^{-4}	
Alarm activation time		T_{AC}			95	µs
Alarm deactivation time		T_{DE}			50	ms

Note 5 : internally AC coupled and externally loaded by 50 Ω.
Note 6 : input power sensitivity is considered at connector interface and related to BER with S/N > 19 dB / 0.1 nm.
All parameters are specified End-of-Life within the overall relevant operating temperature range. The typical values are referenced to + 25 °C, nominal power supply, beginning of life.

Absolute maximum ratings

Parameter	Symbol	Min	Max	Unit
Maximum optical input power		- 5		dBm
Positive supply voltage	V_{CC}	0	+ 6	V
Negative supply voltage	V_{EE}	- 6	0	V
Output current		- 50	0	mApp
Alarm output voltage		0	V_{CC}	V
Alarm output current		- 0.5	+ 20	mA
Storage temperature	TSTG	- 25	+ 70	°C
Storage 72h max		- 40	+ 70	
Operating temperature	TOP	0	+ 70	°C

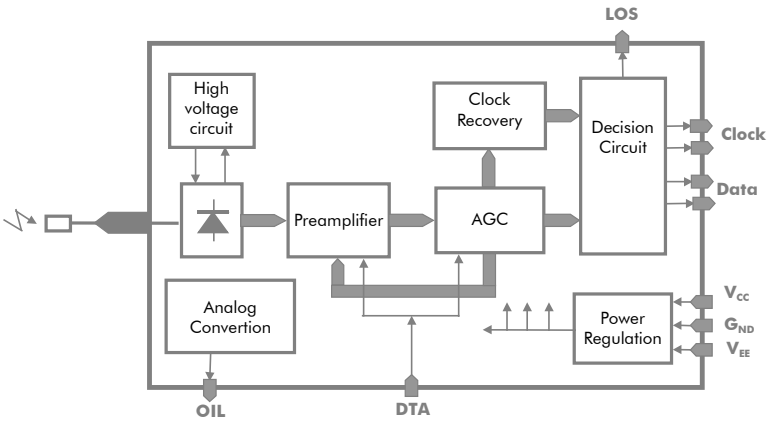
Outline drawing



Pin out

N°	Symb	Description	N°	Symb	Description
1	GND	Ground (0 V)	2	GND	Ground (0 V)
3	VCC	Positive Power Supply	4	VCC	Positive Power Supply
5	VCC	Positive Power Supply	6	VCC	Positive Power Supply
7	GND	Ground (0 V)	8	GND	Ground (0 V)
9	VEE	Negative Power Supply	10	VEE	Negative Power Supply
11	VEE	Negative Power Supply	12	VEE	Negative Power Supply
13	GND	Ground (0 V)	14	GND	Ground (0 V)
15	NUC	No User Connection	16	NUC	No User Connection
17	NUC	No User Connection	18	LOS	Loss of Optical Signal
19	NUC	No User Connection	20	NUC	No User Connection
21	DTA	Decision Threshold Adjustment	22	OIL	Optical Input Level
23	NUC	No User Connection	24	NUC	No User Connection
25	GND	Ground (0 V)	26	GND	Ground (0 V)
27	GND	Ground (0 V)	28	GND	Ground (0 V)
29	GND	Ground (0 V)	30	GND	Ground (0 V)

System block diagram



Pin description

DATA — Serial retimed data output true. AC coupled with 50 Ω external load capability. A high electrical level corresponds to a high optical level.

$\overline{\text{DATA}}$ — Serial retimed data output false. AC coupled with 50 Ω external load capability. A high electrical level corresponds to a low optical level.

CLOCK — Serial recovered clock output true. AC coupled with 50 Ω external load capability. The falling edge is in the middle of the data pattern.

$\overline{\text{CLOCK}}$ — Serial recovered clock output false. AC coupled with 50 □□external load capability. The rising edge is in the middle of the data pattern.

DTA — Decision Threshold Adjustment : input analog voltage that allows optimization of the sensitivity around the factory setting. When DTA is opened the factory setting is the default value.

LOS — Loss of Optical Signal : set when the incoming optical power level cross the alarm threshold. An hysteresis is provided. Open collector with internal pull-up. The active level corresponds to a 0 V voltage output level.

OIL — Optical Input Level : analog information, proportional to the optical input signal.

NUC — No User Connection : this lead must be left open.

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Ordering information

Alcatel 1916 SDH

	Dispersion (ps/nm)	Bit Rate Mbit/s	Part Number
Y-16.2 WDM	6 400	2.448	3CN 00217 GA
		2.666	3CN 00217 KA
Z-16.2 WDM	12 800	2.448	3CN 00217 HA
		2.666	3CN 00217 JA

Options
3CN xxxxx xA → FC/PC
xB → SC/PC

Standards

Compliant with ITU-T G.957 & G.783 & G.691
Optical fiber according to ITU-T G.652
Environment according to IEC 68-2 and MIL STD 883
Bellcore TR-EOP-000063
Bellcore GR-253-CORE

Customized versions are available for large quantities.

Performance figures contained in this document must be specifically confirmed in writing by Alcatel Optronics before they become applicable to any particular order or contract. Alcatel Optronics reserves the right to make changes to the products or information contained herein without notice.

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