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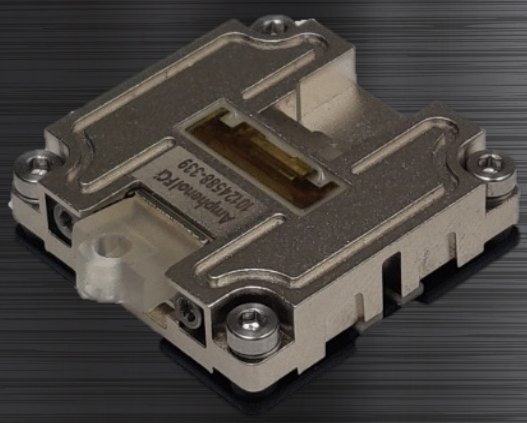
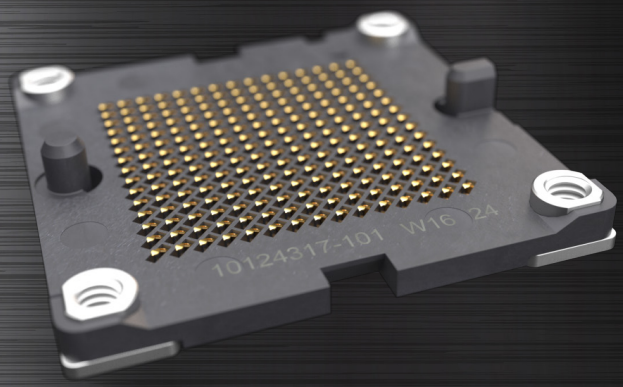
Aerospace

LEAP-AHRD

AMPHENOL HIGH SPEED SOLUTIONS RUGGED DEVICE
12x12 channel, 25Gbps Fiber Optic Transceiver





- Miniature
- High Speed
- High Density
- Power Efficient

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LEAP-AHRD ON BOARD TRANSCEIVER

AMPHENOL HIGH SPEED SOLUTIONS RUGGED DEVICE

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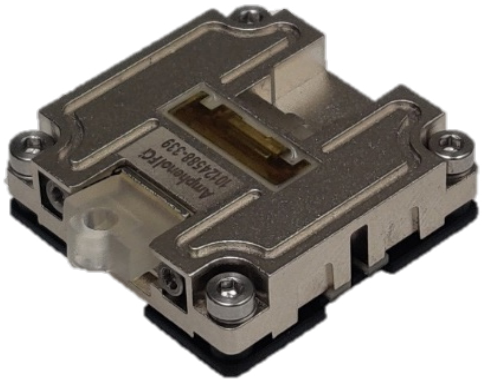

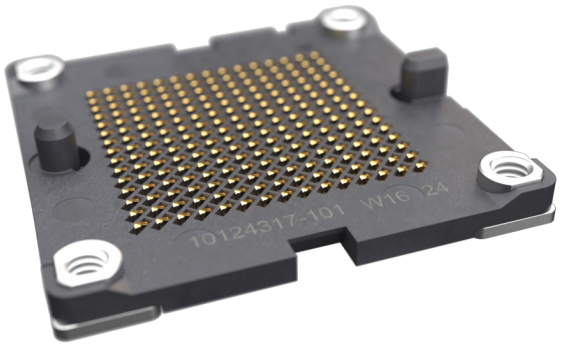

DESCRIPTION

Amphenol 300Gb/s Leap-AHRD® High-Speed Optical Module is faster, smaller, more cost and power efficient than most conventional datacenter interconnects.

FEATURES & BENEFITS

- 300Gb/s High-Speed Optical Module
- Small, fast, high density, and power efficient
- Capable of speeds up to 25Gbps and distances up to 100 meters
- 300Gbps total through-put requires only one square inch of board space and 5.4W of power
- Optical cable can be routed above around other components in the design
- Integrated heat sink design
- Class 1M laser version available
- Enhanced Bit Error Rate (1e-12) requires no or limited FEC
- Compatible with Amphenol socket
- Easy to install
- Transceivers can be placed in 2-dimensional layout grid with 1” pitch between adjacent transceivers
- Uses 2.5x less board space than QSFP28 (12-channels)
- Ethernet transmission distance up to 100m (multi mode fiber)
- Uses off-the-shelf MT optical interface
- No through holes to connect transceiver – one side of board only
- Allows for transceiver optimization and monitoring connection discovery, channel diagnostics, and signal status monitoring

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LEAP-AHRD HOW TO ORDER

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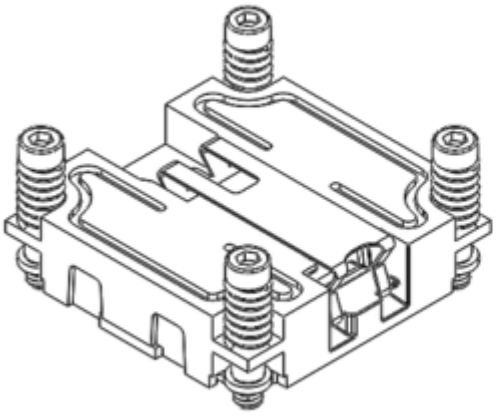
1.	2.	3.	4.
Base Part Number	Package	Laser Class	Heat Sinks
CF-AHRD	2	3	0

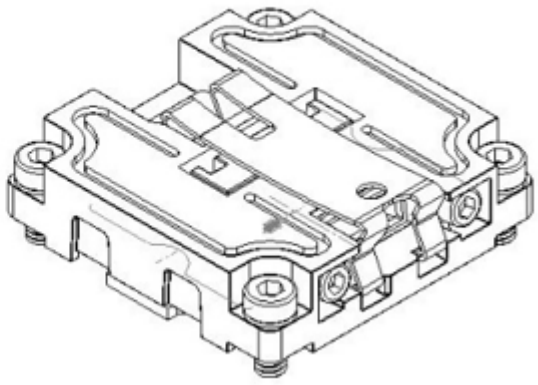
1. Base Part Number	
CF-AHRD	300 Gbps high speed module

2. Package	
2	Spring screw package
3	Flat package

3. Laser Class	
1	Laser Class 1M
3	Laser Class 3B

4. Heat Sinks	
0	No heat sink for customer or water cooled thermal solutions
1	Short height air cooled heat sink- 23.5x23.5x14.6mm (Lxlxh)
2	Medium height air cooled heat sink- 23.5x23.5x17.6mm (Lxlxh)
4	Pillar based tall height air cooled heat sink- 23.5x23.5x23.4mm (Lxlxh)
5	Large flat air cooled heat sink- 53.0x36.5x12.6mm (Lxlxh)
6	Pillar based tall height air cooled heat sink- 2-23.5x23.5x31.7mm (Lxlxh)
7	Fin based tall height air cooled heat sink- 23.5x23.5x31.7
8	Wings form air cooled heat sink- 33.2x55.4x12.6xx (Lxlxh)
9	Block form air cooled heat sink- 33.2x38.0x15.6mm (Lxlxh)
B	Flat adapter for customized or water cooled- 28.4x28.4x12.0mm (Lxlxh)
C	Cubic form air cooled heat sink- 37.4x49.4x24.4mm (Lxlxh)





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LEAP-AHRD BLOCK DIAGRAM

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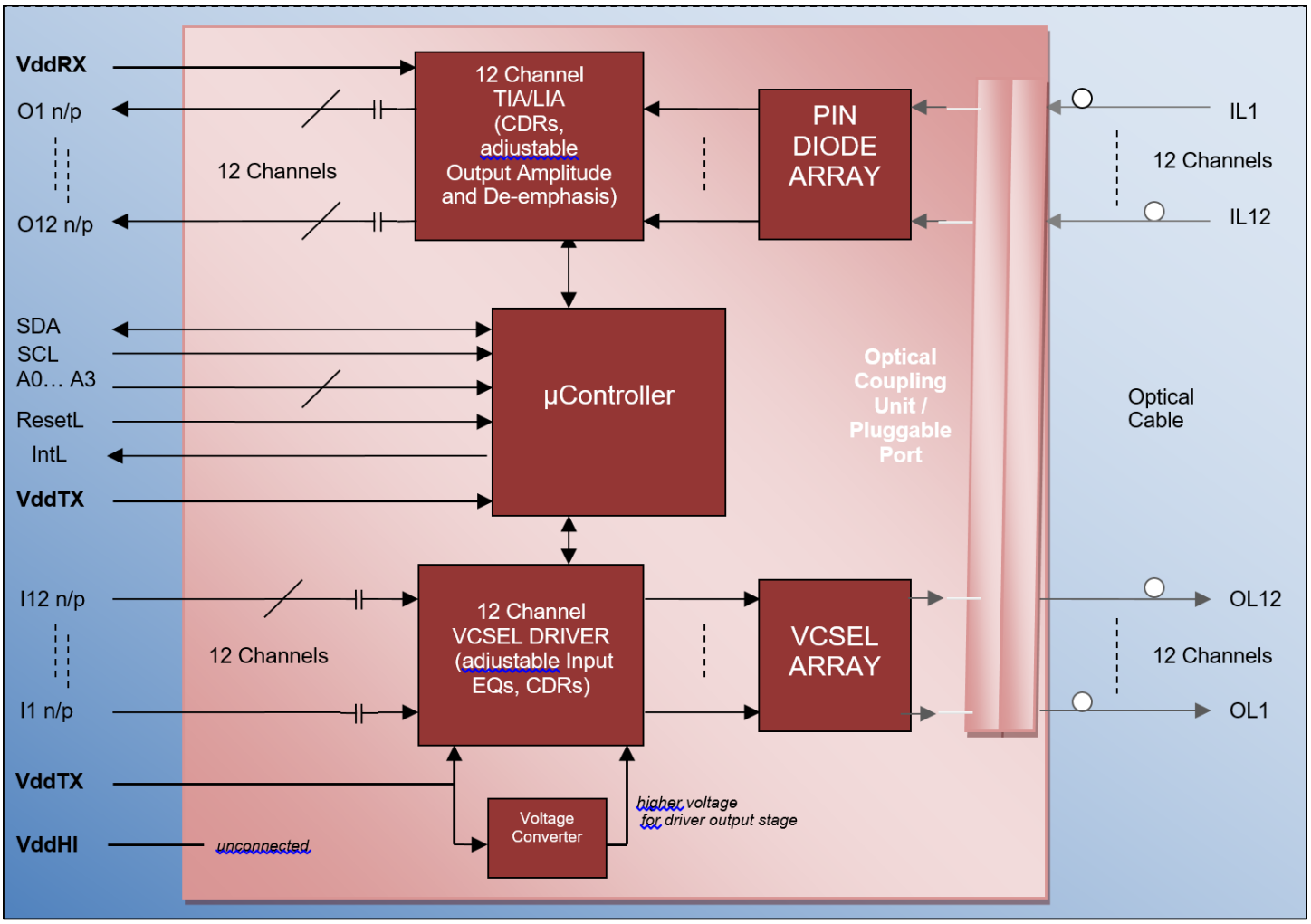

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LEAP-AHRD LANDING PAD/FOOTPRINT

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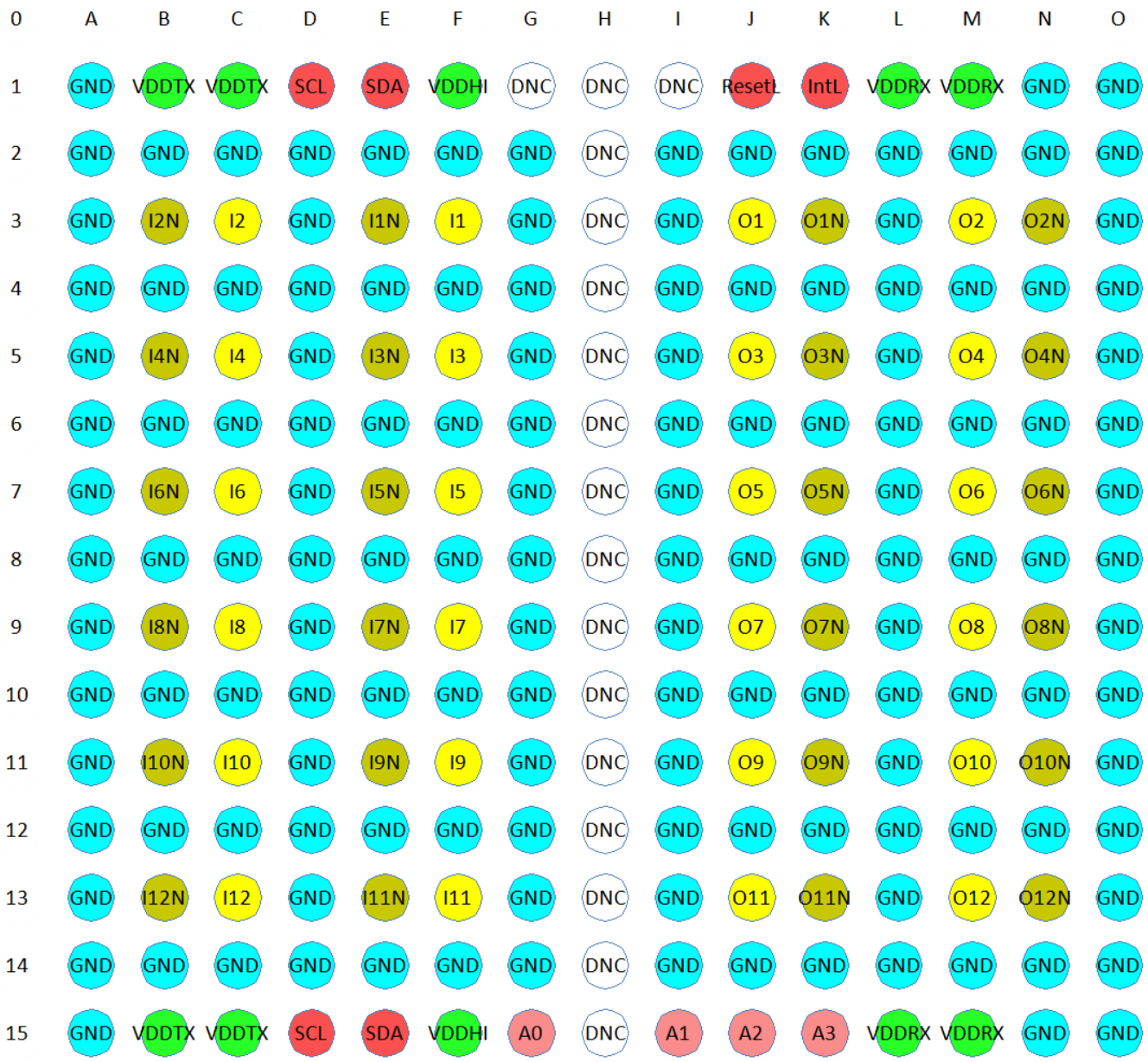

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LEAP-AHRD PINOUT DESCRIPTIONS

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PIN	Symbol	I/O	Description
F3,E3	I1, I1N	Input	TxChannel 1, Differential Transmitter Data Input, AC coupled
C3,B3	I2, I2N	Input	TxChannel 2, Differential Transmitter Data Input, AC coupled
F5,E5	I3, I3N	Input	TxChannel 3, Differential Transmitter Data Input, AC coupled
C5,B5	I4, I4N	Input	TxChannel 4, Differential Transmitter Data Input, AC coupled
F7,E7	I5, I5N	Input	TxChannel 5, Differential Transmitter Data Input, AC coupled
C7,B7	I6, I6N	Input	TxChannel 6, Differential Transmitter Data Input, AC coupled
F9,E9	I7, I7N	Input	TxChannel 7, Differential Transmitter Data Input, AC coupled
C9,B9	I8, I8N	Input	TxChannel 8, Differential Transmitter Data Input, AC coupled
F11,E11	I9, I9N	Input	TxChannel 9, Differential Transmitter Data Input, AC coupled
C11,B11	I10, I10N	Input	TxChannel 10, Differential Transmitter Data Input, AC coupled
F13,E13	I11, I11N	Input	TxChannel 11, Differential Transmitter Data Input, AC coupled
C13,B13	I12, I12N	Input	TxChannel 12, Differential Transmitter Data Input, AC coupled
A1 to A15	GND	Power	Common Ground
B2,B4,B6,B8,B10,B12,B14	GND	Power	Common Ground
C2,C4,C6,C8,C10,C12,C14	GND	Power	Common Ground
D2 to D14	GND	Power	Common Ground
E2,E4,E6,E8,E10,E12,E14	GND	Power	Common Ground
F2,F4,F6,F8,F10,F12,F14	GND	Power	Common Ground
G2 to G14	GND	Power	Common Ground
G1, H1 to H14,I1			
H15	DNC	(reserved)	Do not connect these pins on host board, reserved for OBT module H15 is used by FCI for firmware programming. This pin has a Microcontroller internal pull up resistance of about 20kOhm to 50kOhm, applied to VddTx)
I2 to I14	GND	Power	Common Ground
J2,J4,J6,J8,J10,J12,J14	GND	Power	Common Ground
K2,K4,K6,K8,K10,K12,K14	GND	Power	Common Ground
L2 to L14	GND	Power	Common Ground
M2,M4,M6,M8,M10,M12,M14	GND	Power	Common Ground
N1,N2,N4,N6,N8,N10,N12,N14, N15	GND	Power	Common Ground
O1 to O15	GND	Power	Common Ground
B1,C1,B15,C15	VDDTX	Power	Power Supply Transmit Side
F1,F15	VDDHI	Power	not used, not connected inside OBT
L1,M1,L15,M15	VDDRX	Power	Power Supply Receiver Side
D1,D15	SCL	Input	I2C, Serial Clock, need Pull-up resistor on host board, SCL pins D1 and D15 are connected together inside OBT
E1,E15	SDA	Input/Output	I2C, Serial Data, need Pull-up resistor on host board, SDA pins E1 and E15 are connected together inside OBT
G15	A0	Input	I2C Address Line, internal 10k Pull-up resistor to VDDTX
I15	A1	Input	I2C Address Line, internal 10k Pull-up resistor to VDDTX
J15	A2	Input	I2C Address Line, internal 10k Pull-up resistor to VDDTX
K15	A3	Input	I2C Address Line, internal 10k Pull-up resistor to VDDTX
J1	Reset L	Input	Module Reset, internal 10k Pull-up resistor to VDDTX

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LEAP-AHRD PINOUT DESCRIPTIONS AND OPERATING PARAMETERS

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PINOUT DESCRIPTIONS

K1	IntL	Output	Interrupt Low, need Pull up resistor on host board
J3,K3	O1, O1N	Output	RxChannel 1, Differential Receiver Data Output, AC coupled
M3,N3	O2, O2N	Output	RxChannel 2, Differential Receiver Data Output, AC coupled
J5,K5	O3, O3N	Output	RxChannel 3, Differential Receiver Data Output, AC coupled
M5,N5	O4, O4N	Output	RxChannel 4, Differential Receiver Data Output, AC coupled
J7,K7	O5, O5N	Output	RxChannel 5, Differential Receiver Data Output, AC coupled
M7,N7	O6, O6N	Output	RxChannel 6, Differential Receiver Data Output, AC coupled
J9,K9	O7, O7N	Output	RxChannel 7, Differential Receiver Data Output, AC coupled
M9,N9	O8, O8N	Output	RxChannel 8, Differential Receiver Data Output, AC coupled
J11,K11	O9, O9N	Output	RxChannel 9, Differential Receiver Data Output, AC coupled
M11,N11	O10, O10N	Output	RxChannel 10, Differential Receiver Data Output, AC coupled
J13,K13	O11, O11N	Output	RxChannel 11, Differential Receiver Data Output, AC coupled
M13,N13	O12, O12N	Output	RxChannel 12, Differential Receiver Data Output, AC coupled

OPERATING PARAMETERS

Parameter	Conditions	Symbol	Min	Max	Units
Storage Temperature		ϑSt	-50	100	°C
Powered Case Temperature Range		ϑC	-40	85	°C
Relative Humidity	Non condensing	RH	0	100	%
Power Supply Voltage		VDDRX, VDDTX	-0.3	3.6	V
Voltage on Low Speed Inputs		VIN	-0.3	Vcc+0.3	V
DC Voltage at High Speed Pins		VD	-0.5	Vcc+0.5	V
Differential Input Swing max	Differential peak-to-peak amplitude max, before damage, defines not recommended operating condition and AC characteristics	vINmax		2.8	Vpp

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LEAP-AHRD POWER CONSUMPTIONS

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POWER CONSUMPTIONS

Parameter	Symbol	Typ.	Max	Units
Power Consumption, 12 Channel device	$P_{Plug_}$12CH	5.8	7.9	W
		4.7	6.4	
		2.9	4.2	
Supply Current VDDRX, 12 Channel device	I_{DD}RX_12CH	0.89	1.10	A
		0.56	0.67	
		0.36	0.48	
Supply Current VDDTX, 12 Channel device	I_{DD}TX_12CH	0.86	1.18	A

Parameter	Symbol	Typ.	Max	Units
Power Consumption, 8 Channel device	$P_{Plug_}$8CH	3.9	5.3	W
		3.1	4.3	
		1.9	2.8	
Supply Current VDDRX, 8 Channel device	I_{DD}RX_8CH	0.59	0.73	A
		0.38	0.45	
		0.24	0.32	
Supply Current VDDTX, 8 Channel device	I_{DD}TX_8CH	0.57	0.79	A
		0.57	0.79	
		0.34	0.50	

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LEAP-AHRD ELECTRICAL AND OPTICAL SPECIFICATIONS

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ELECTRICAL SPECIFICATIONS

Parameter	Conditions		Symbol	Min	Typ.	Max	Units
Bit Rate with CDR			$T\text{-}1_{Baud\_CDR}$	25.3		26.3	Gbit/s
Bit Rate without CDR			$T\text{-}1_{Baud}$	1.25		26.3	Gbit/s
Differential input voltage peak-peak swing with no equalization			$V_{DI,diff}$	2x100		2x450	mVpp
Differential Input Termination Resistance			RDI	80	100	120	Ω
Data Input Coupling Capacitance	per lane		CC		100		nF
Differential Input Return Loss	referred to RG = 100 Ω	f = 0.05…4 GHz	SDD11			-11	dB
		f = 4…28 GHz				-6 + 9.2log(2f/28GHz)	dB
Common to Differential Conversion	referred to RG = 100 Ω	f = 0.05…14 GHz	SDC11			-22 + 14*(f/28GHz)	dB
		f = 14…28 GHz				-18+6*(f/28GHz)	
CDR Loop bandwidth	-3dB Corner		PLL_{bw}	10			MHz

OPTICAL SPECIFICATIONS

Parameter	Conditions	Symbol	Min	Typ.	Max	Units
Center wavelength			840		861	nm
RMS spectral width	Standard deviation of spectrum			0.5		nm
Average launch power	EOL	TxP_{AVG}	-5		3	dBm
Transmit OMA per lane	EOL	TxOMA	-3		3	dBm
Transmitter and dispersion eye closure (TDEC)					4.3	dB
Difference in launch power between lanes (OMA)					4	dB
Optical Extinction ratio		ER	3			dB
Optical return loss						
Tolerance		ORL			12	dB
Eye Mask coordinates X1, X2, X3, Y1, Y2, Y3	Hit Ratio = 1.5x10-3 hits per sample	0.3, 0.38, 0.45, 0.35, 0.41, 0.5				UI
Average launch power of OFF transmitter					-30	dB

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