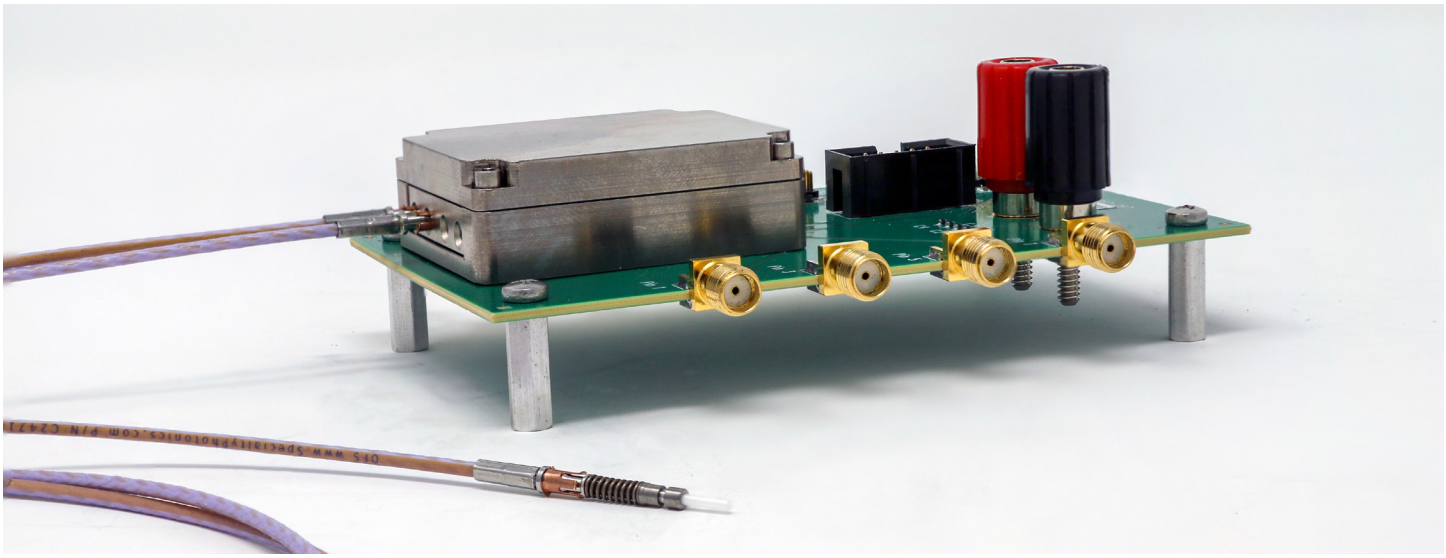
NG-TRx

BOARD MOUNT TRANSCEIVER

Amphenol Aerospace

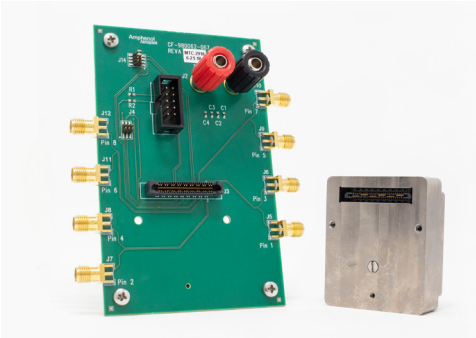
PDS-297

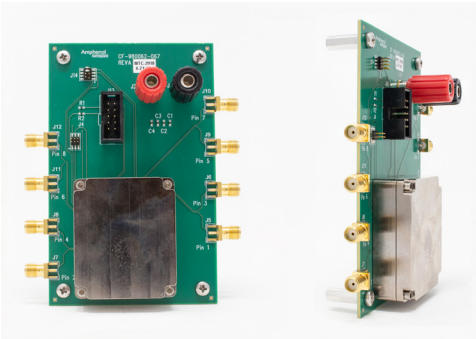


Amphenol provides a high performance ruggedized board mount transceiver, that is specifically developed for NAVAIR/ NAVSEA harsh environment applications capable of supporting up to 10Gbps data rates across four channels. The NG-TRx Board Mount Transceiver combines the interface features of NGCON, ARINC 801, and proven opto-electrical transceiver components. A standard NGCON termini or ARINC 801 can be inserted using common insertion and removal tools for a rugged proven fiber interface and secure connection for fault-free operation in the harshest environments.

FEATURES

- Four optical channels:
  - Each can be configured as either a fiber optic transmitter or receiver
  - Each can support 850nm multi-mode, 1310nm single-mode, or 1300 multi-mode
- Protocol agnostic - can support encoded or pathological data
- Supports data rates from 25 Mbps to 10.3125 Gbps
- MIL-PRF-62466 or ARINC 801 for MIL-PRF-29504/18 industry standard fiber termini interface
- Onboard monitor for status and diagnostics (I2C)
- Operating temperature range: -40°C to +85°C
- Transmit enable pin for any and all transmitters
- LOS pin for any and all receivers
- Fault pin – for various errors





Supports network protocols:

- XFI/XGMII – 10G copper
- 10GBASE-KX4 (XAUI) – 10G copper
- 10GBASE-R – 10G copper
- 10GBASE-SR – 10G MMF
- 10GBASE-LR – 10G SMF
- SGMII – 1G copper
- 1GBASE-X – 1G copper
- 1GBASE-SX – 1G MMF
- 1GBASE-LX – 1G SMF
- PCI express
- Infiniband
- Fibre Channel
- SDI/HD/36-SDI

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PRODUCT LINE:

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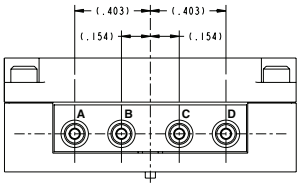

Part Number	I	A	B	C	D
CF-020012-014	850nm (multi-mode)	TX	RX	TX	RX
CF-020012-016		TX	TX	TX	TX
CF-020012-017		RX	RX	RX	RX
Contact AAO for more information		TX	X	X	X
		TX	TX	X	X
		TX	TX	TX	X
		RX	X	X	X
		RX	RX	X	X
		RX	RX	RX	X
		TX	RX	X	X
		TX	RX	RX	RX
		RX	TX	TX	TX
CF-020012-015	1310nm (Single-mode)	TX	RX	TX	RX
CF-020012-018		TX	TX	TX	TX
CF-020012-019		RX	RX	RX	RX
Contact AAO for more information		TX	X	X	X
		TX	TX	X	X
		TX	TX	TX	X
		RX	X	X	X
		RX	RX	X	X
		RX	RX	RX	X
		TX	RX	X	X
		TX	RX	RX	RX
		RX	TX	TX	TX
Contact Amphenol Aerospace	1300 nm	TBD			

GENERAL SPECIFICATIONS

Parameter	Min	Nom	Max	Units	Notes
Supply Voltage	2.9	3.3	3.6	V	-40°C to +85°C, [1]
Supply Current (all channels active)	298	345	402	mA	-40°C to +85°C, [1]
Data Rate	0.025		10.75	Gbps	-40°C to +85°C, [2]
Operating Temperature	-40		+85	°C	[1]

Note: the following specs/measurements are applicable for CF-020012-014

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SPECIFICATIONS:

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ELECTRICAL SPECIFICATIONS

Parameter	Min	Nom	Max	Units	Notes
Transmitter					
Supply current (per channel)	18	22	37	mA	-40°C to +85°C, [3]
Input Differential Impedance	80	100	120	Ω	Differential (7)
Differential Input Voltage Swing	150 (8)	1000	1200 (8)	mVpp	-40°C to +85°C, [5]
Receiver					
Supply current (per channel)			1	mA	-40°C to +85°C, [3]
Output termination impedance		50		Ω	Single-ended (7)
Differential Output Voltage Swing	298	427	610	mVpp	-40°C to +85°C, [4]

Note: the following specs/measurements are applicable for CF-020012-014

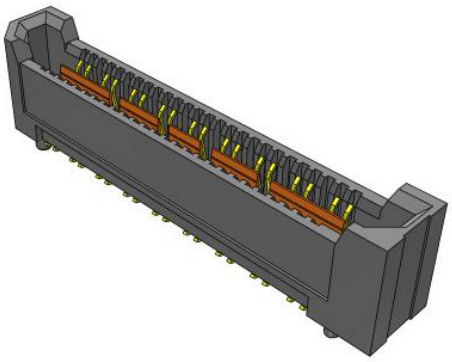
OPTICAL SPECIFICATIONS

Parameter	Min	Nom	Max	Units	Notes
Transmitter					
Output Optical Power	-10		-1	dBm	-40°C to +85°C, [5]
Optical Wavelength		850		nm	
Extinction Ratio	1.82		3.36	dB	-40°C to +85°C, [5]
Optical Rise Time		30(8)	50(8)	ps	-40°C to +85°C, [5]
Optical Fall Time		30(8)	50(8)	ps	-40°C to +85°C, [5]
Receiver					
Sensitivity			-10	dBm	-40°C to +85°C, [6]

(7) Per manufacturer's datasheet.
(8) Untested, these values were provided by the manufacturer's datasheet.
Note: the following specs/measurements are applicable for CF-020012-014

MATING ELECTRICAL CONNECTOR PIN-OUT

Signal Name	Description
CH#_TX/RX_P/N	High speed differential signal. The direction of this signal is from the perspective of transceiver
CH#_TX_DISABLE	Optical transmit disable pin. To enable the optical transmitter, apply 0VDC. To disable the optical transmitter, apply 3.3VDC or leave floating.
CH#_RX_LOS	Optical receive loss of signal indicator. High level indicates the amplitude is below the programmed threshold level.
FAULT	The on board processor was unable to successfully write to the laser driver or limiting amplified over I2C.
I2C_SCL	I2C two wire serial clock input. Pulled to 3.3VDC internally via 4.7k ohm resistor. Able to operate up to 400kHz
I2C_SDA	I2C two wire serial data input. Pulled to 3.3VDC internally via 4.7k ohm resistor. Able to operate up to 400kHz
VCC_3V3	Apply 3.3VDC to power the CF-020012-0XX device
GND	Ground Return



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PIN-OUT

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CF-020012-014 (MMF) /015(SMF):

Pin Description	Pin #	Pin #	Pin Description
CH1_TX_P	1	2	CH1_RX_P
CH1_TX_N	3	4	CH1_RX_N
CH2_TX_P	5	6	CH2_RX_P
CH2_TX_N	7	8	CH2_RX_N
CH1_TX_DISABLE	9	10	CH1_RX_ LOS
CH2_ TX_DISABLE	11	12	CH2_RX_ LOS
DNC	13	14	FAULT
DNC	15	16	DNC
DNC	17	18	DNC
DNC	19	20	DNC
I2C_SCL	21	22	DNC
I2C_SDA	23	24	DNC
DNC	25	26	DNC
DNC	27	28	DNC
VCC_3V3	29	30	VCC_3V3
VCC_3V3	31	32	VCC_3V3
GND	33	34	GND
GND	35	36	GND
GND	G1	G2	GND
GND	G3	G4	GND

CF-020012-016(MMF)/018(SMF):

Pin Description	Pin #	Pin #	Pin Description
CH1_RX_P	1	2	CH3_RX_P
CH1_RX_N	3	4	CH3_RX_N
CH2_RX_P	5	6	CH4_RX_P
CH2_RX_N	7	8	CH4_RX_N
CH1_TX_DISABLE	9	10	CH3_TX_DISABLE
CH2_ TX_DISABLE	11	12	CH4_TX_DISABLE
DNC	13	14	FAULT
DNC	15	16	DNC
DNC	17	18	DNC
DNC	19	20	DNC
I2C_SCL	21	22	DNC
I2C_SDA	23	24	DNC
DNC	25	26	DNC
DNC	27	28	DNC
VCC_3V3	29	30	VCC_3V3
VCC_3V3	31	32	VCC_3V3
GND	33	34	GND
GND	35	36	GND
GND	G1	G2	GND
GND	G3	G4	GND

CF-020012-017(MMF)/019(SMF):

Pin Description	Pin #	Pin #	Pin Desciption
CH1_TX_P	1	2	CH3_TX_P
CH1_TX_N	3	4	CH3_TX_N
CH2_TX_P	5	6	CH4_TX_P
CH2_TX_N	7	8	CH4_TX_N
CH1_RX_LOS	9	10	CH3_RX_LOS
CH2_RX_LOS	11	12	CH4_RX_LOS
DNC	13	14	FAULT
DNC	15	16	DNC
DNC	17	18	DNC
DNC	19	20	DNC
I2C_SCL	21	22	DNC
I2C_SDA	23	24	DNC
DNC	25	26	DNC
DNC	27	28	DNC
VCC_3V3	29	30	VCC_3V3
VCC_3V3	31	32	VCC_3V3
GND	33	34	GND
GND	35	36	GND
GND	G1	G2	GND
GND	G3	G4	GND

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MECHANICAL SPECIFICATIONS

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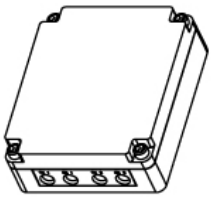
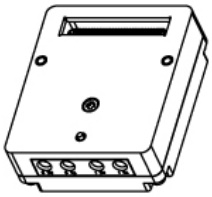
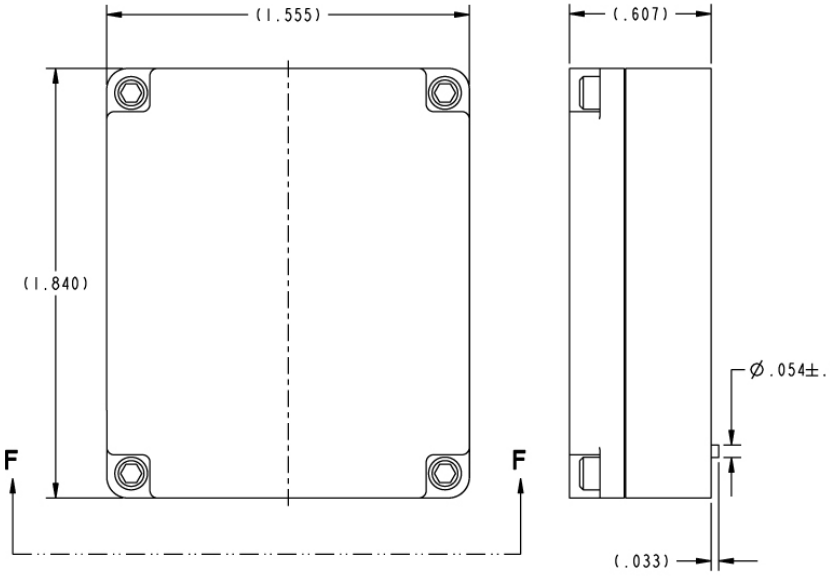
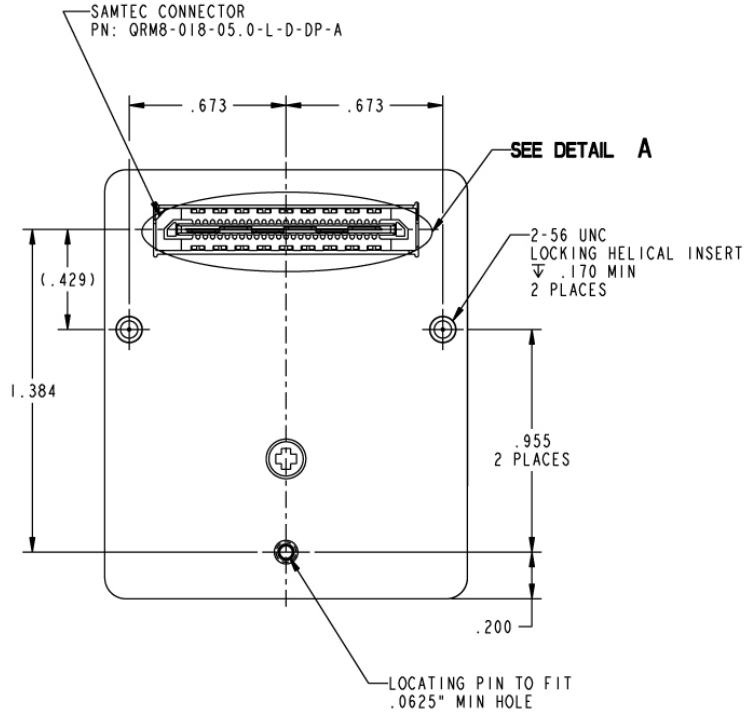


TOP ISO VIEW
SCALE 1.000



BOTTOM ISO VIEW
SCALE 1.000





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EYE DIAGRAMS

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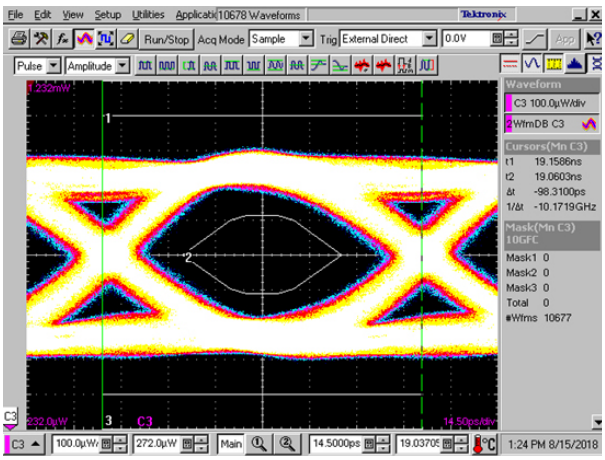
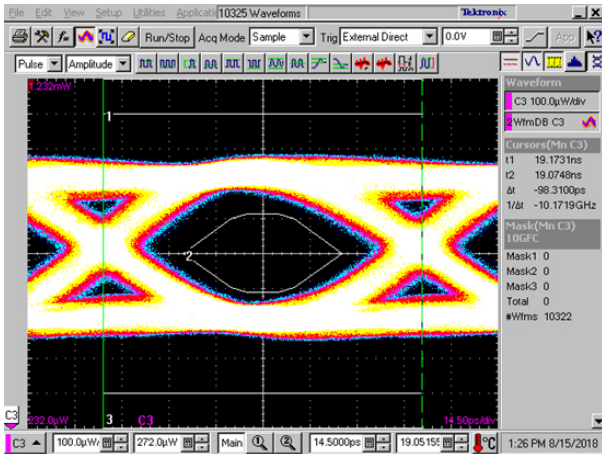
OPTIC EYE DIAGRAMS, 25°C

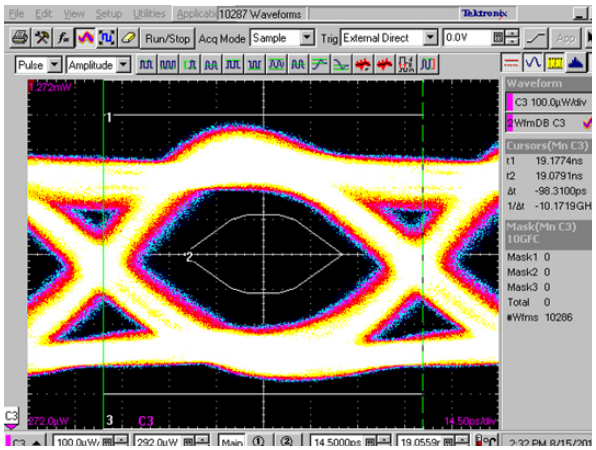


CH1

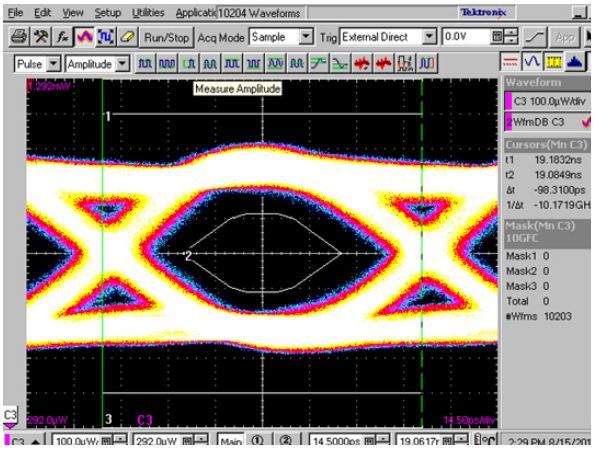


CH2

OPTIC EYE DIAGRAMS, -40°C

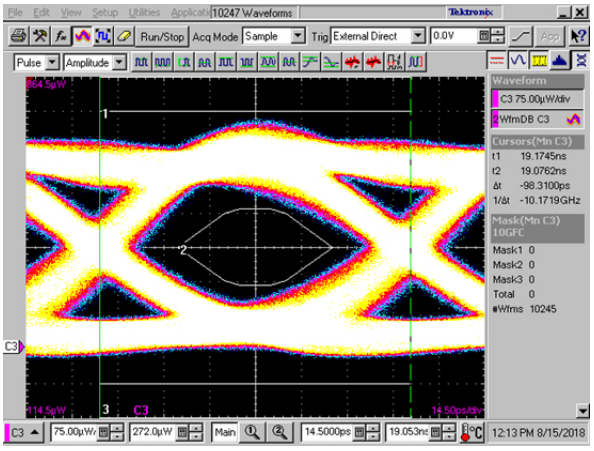


CH1

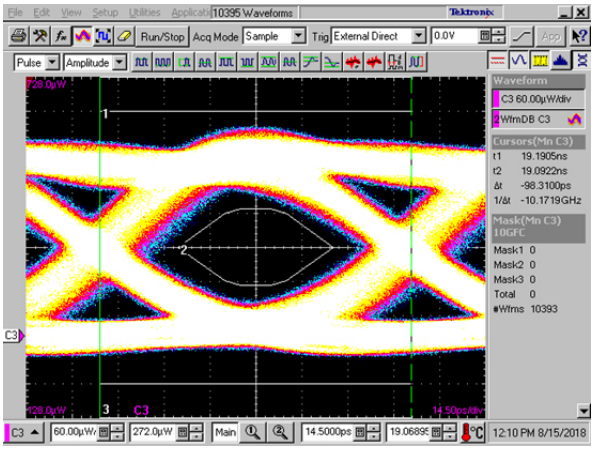


CH2

OPTIC EYE DIAGRAMS, 85°C



CH1



CH2

Note: The above images were captured from XPCF-020012-014

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TEST DATA

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[1] SUPPLY VOLTAGE AND CURRENT TESTING

Temperature	Supply Voltage	Unit Operates	Supply Current (mA)
-40°C	2.9 V	Yes	298
	3.3 V	Yes	313
	3.6 V	Yes	316
25°C	2.9 V	Yes	337
	3.3 V	Yes	345
	3.6 V	Yes	348
85°C	2.9 V	Yes	346
	3.3 V	Yes	396
	3.6 V	Yes	402

Note: Testing performed with all channels active on XPCP-020012-014

[2] DATA RATE TESTING

Temperature	Channel	Min Data Rate (Gbps)	Max Data Rate (Gbps)
-40°C	1	0.01	10.75
	2	0.01	10.75
25°C	1	0.01	10.75
	2	0.01	10.75
85°C	1	0.025	10.75
	2	0.025	10.75

Note: Testing performed with a supply voltage of 3.3V, and a AWG amplitude of 1.0V on XPCF-020012-014

[3] CURRENT PER CHANNEL TESTING

Temperature	Tx1 Active	Tx2 Active	Rx1 Active	Rx2 Active	Supply Current (mA)
-40°C					275
	*	*	*	*	313
25°C					301
	*	*	*	*	344
85°C					330
	*	*	*	*	404

Note: Testing performed with a supply voltage of 3.3V on XPCF-020012-014

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VOLTAGE TESTING

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[4] RECEIVER OUTPUT VOLTAGE TESTING

Temperature	Channel	Output Voltage Register Value	Output Voltage (Vpp)
-40°C	1	0x00 (350 mVpp)	298
		0x02 (550 mVpp)	386
		0x07 (850 mVpp)	508
	2	0x00 (350 mVpp)	341
		0x02 (550 mVpp)	445
		0x07 (850 mVpp)	595
25°C	1	0x00 (350 mVpp)	311
		0x02 (550 mVpp)	406
		0x07 (850 mVpp)	515
	2	0x00 (350 mVpp)	325
		0x02 (550 mVpp)	427
		0x07 (850 mVpp)	555
85°C	1	0x00 (350 mVpp)	364
		0x02 (550 mVpp)	465
		0x07 (850 mVpp)	633
	2	0x00 (350 mVpp)	353
		0x02 (550 mVpp)	453
		0x07 (850 mVpp)	610

Testing performed with a supply voltage of 3.3V on XPCF-020012-014

[5] TRANSMITTER OPTICAL PARAMETER TESTING

Temperature	Channel	Input Voltage Swing (mVpp)	Extinction Ratio (dB)	Optical Power (uW) [dBm]
-40°C	1	500	2.12	704 (-3.05)
		1000	2.12	704 (-3.05)
	2	500	1.82	756 (-2.43)
		1000	1.82	756 (-2.43)
25°C	1	500	3.02	691 (-3.21)
		1000	3.02	691 (-3.21)
	2	500	2.53	717 (-2.89)
		1000	2.53	717 (-2.89)
85°C	1	500	3.36	468 (-6.60)
		1000	3.35	468 (-6.60)
	2	500	3.04	402 (-7.92)
		1000	3.00	402 (-7.92)

Testing performed with a supply voltage of 3.3V on XPCF-020012-014, with a data rate of 10.3125 Gbps.

[6] BER TESTING

Temperature	A-B Errors @ 1 hr	C-D Errors @ 1 hr
-40°C	0	0
25°C	0	0
85°C	0	0

Temperature	A-B-C-D Errors @ 1 hr	C-D-A-B Errors @ 1 hr
-40°C	0	0
25°C	0	0
85°C	0	0

All BER testing was performed at 10.3125Gbps with a PRBS pattern of 2^31 -1

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