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Miniature, Ruggedized, 20 GHz RF over Fiber Transmitter

PRODUCT FEATURES

- Bandwidth 0.05 to 20 GHz (with LNA); DC to 30 GHz (no LNA)
- Reconfigurable with and without LNA
- Noise Figure < 8 dB (< 22 dB no LNA) at 10 GHz
- Very High Linearity, High intrinsic RF Gain, High RF Saturation
- MIL-STD tested for temperature, shock, vibration, barometric pressure, EMI
- Compact size includes low noise electronics and all optical components



APPLICATIONS

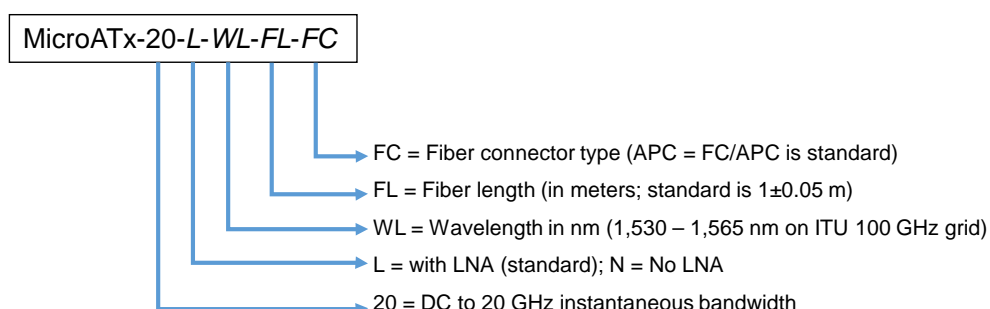
- Broad band RF over fiber – 1 m to 10 km
- Antenna remoting for wireless systems, electronic sensors, and networks
- RF over fiber systems that require robust, ruggedized, compact solutions
- High frequency phase interferometry RF systems

DESCRIPTION

This module is a miniature, ruggedized 20 GHz analog RF over Fiber (RFoF) optical transmitter which is part of a high performance solution for RF remoting. It is a self-contained, compact module that includes ultra-low noise driver electronics, low RIN laser with shot noise performance, high performance modulator, and optional LNA. The transmitter can be operated either by an on/off switch using predefined settings or through a built-in GUI that enables the user to control all internal components (i.e. laser, modulator, and LNA operating parameters). The transmitter offers 50 MHz-20 GHz RF instantaneous bandwidth which, when coupled with APIC's high responsivity and linearity receivers, offers unmatched RFoF link performance.

For applications that require high sensitivity and very low minimum detection signal threshold, use of the optional LNA is recommended. For applications that require higher linearity, the no-LNA option is recommended.

ORDERING INFORMATION



ABSOLUTE MAXIMUM RATINGS

Parameter	Minimum	Maximum	Units	Condition/Comments
Storage Temperature	-55	85	°C	
Operating Temperature	-40	75	°C	
Max RF		10	dBm	With LNA installed
		26	dBm	Without LNA
V _{cc}	14	16	V	
I _{cc}		2	A	
ESD	-500	500	V	

OPTICAL SPECIFICATIONS

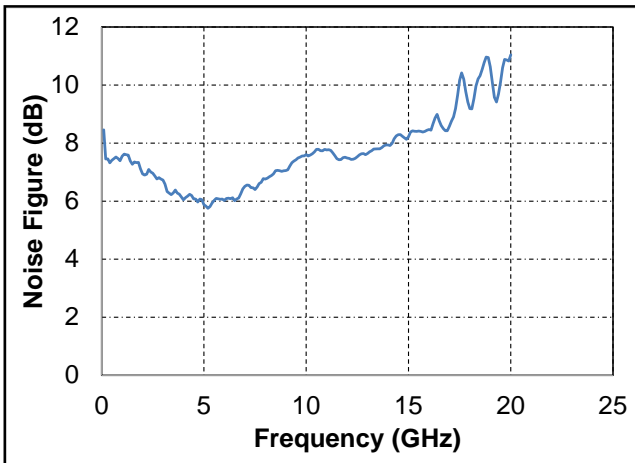
Parameter	Symbol	Min.	Typ.	Max.	Units	Condition/Comments
Operational Wavelength	λ	1,530	1,550	1,565	nm	Factory ordered; ITU channel
Optical Output Power		15	20	25	mW	Factory setting; Modulator at quadrature
Output power flatness	P _{flat}	-0.5		0.5	dB	Over full temperature range; Modulator at quadrature
Power Stability	ΔP			0.5	dB	Over 12 hour period, constant temp
Line Width			250	500	KHz	At Factory Setting, no modulation
RIN			-168	-167	dB/Hz	From 50 MHz to 20 GHz at Factory setting
Side Mode Suppression		50	55		dB	At Factory Setting
Laser Threshold			15	25	mA	
Optical Return Loss		30	45		dB	

RF SPECIFICATIONS – with LNA

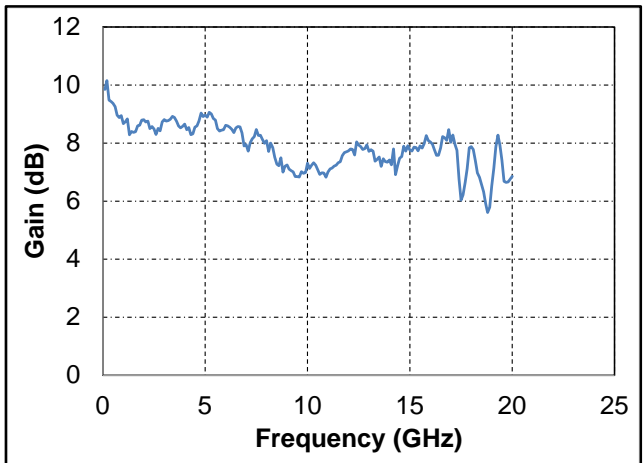
Parameter	Symbol	Min.	Typ.	Max.	Units	Condition/Comments
RF Bandwidth		0.05		20	GHz	3 dB RF roll off
RF Gain at 10GHz	G_{rf}	6	7		dB	
NF			8	8.5	dB	At 10 GHz, with APIC ARX
SFDR		112	114		dB/Hz ^{2/3}	At 10 GHz, with APIC ARX
IIP3		2.5	3		dBm	At 10 GHz, with APIC ARX
IIP2		25	30		dBm	At 2 GHz, with APIC ARX
P1dB		-4	-3		dB	At 10GHz
Phase Stability			1	2	deg	Measured over 1 Hour at 10 GHz
Return Loss	S_{11}		10		dB	From 50 MHz to 20 GHz

RF SPECIFICATIONS – No LNA

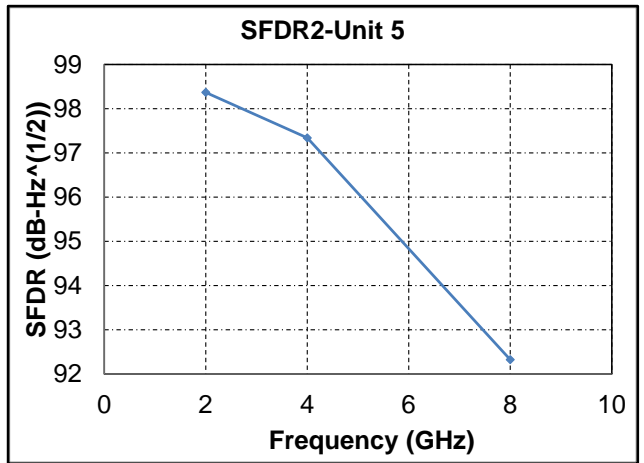
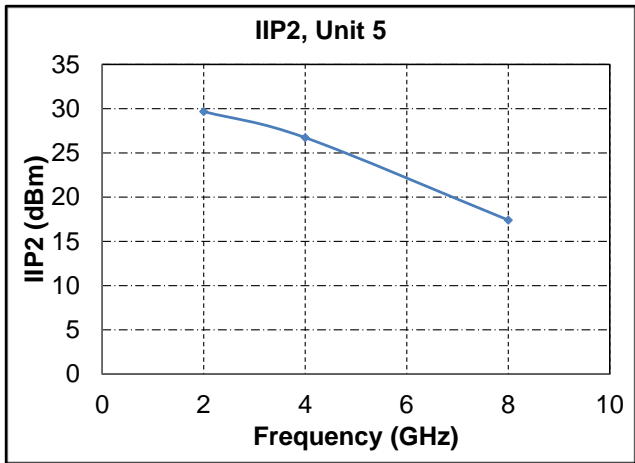
Parameter	Symbol	Min.	Typ.	Max.	Units	Condition/Comments
RF Bandwidth		DC		30	GHz	3 dB RF roll off
RF Gain at 10GHz	G_{rf}	-10	-8		dB	
NF			22	23	dB	At 10 GHz, with APIC ARX
SFDR		113	114		dB/Hz ^{2/3}	At 10 GHz, with APIC ARX
IIP3		19	20		dBm	At 10 GHz, with APIC ARX
IIP2		46	53		dBm	At 2 GHz with APIC receiver
P1dB		11	12		dB	No LNA, 10 GHz
Phase Stability			1	2	deg	Measured over 1 Hour at 10GHz
Return Loss	S_{11}		10		dB	From DC to 20GHz



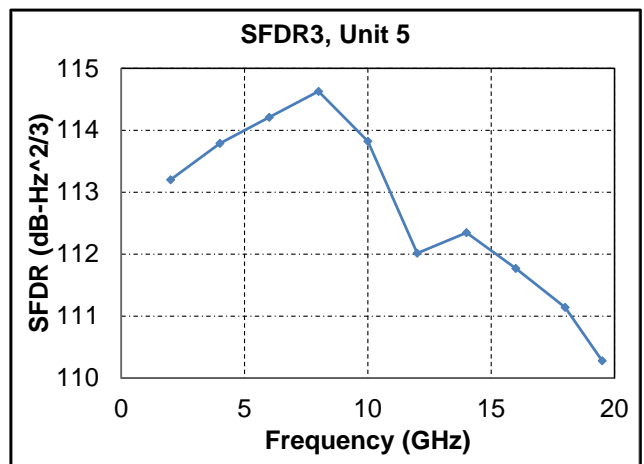
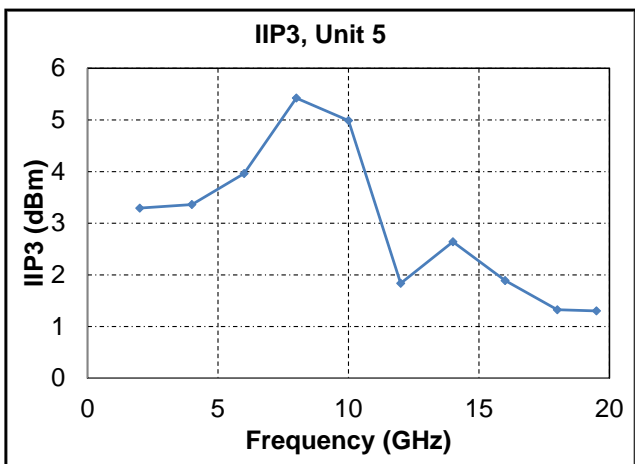
Noise Figure, Micro ATX with LNA



Gain, Micro ATX with LNA



IIP2 and SFDR2 for Micro ATX, with LNA



IIP3 and SFDR3 for Micro ATX, with LNA

MECHANICAL SPECIFICATIONS

Parameter	Symbol	Minimum	Maximum	Units	Condition/Comments
Height	H		21.5	mm	
Length	L		137	mm	Not Including Snout
Width	W		46	mm	
Electrical Connector (Power)					2.1mm ID /5.5mm OD; 15V 1 A DC Source
Package Heat Flow					Package base
Fiber Pigtail Length		0.93	1.03	m	Polarization-maintaining fiber
Pigtail Termination					FC/APC SMF Fiber

ENVIRONMENTAL SPECIFICATIONS (preliminary, qualification in progress)

Parameter	Minimum	Maximum	Units	Condition/Comments
Operating Temperature	-40	+70	°C	
Storage Temperature	-40	+85	°C	
Operating Humidity	0	80	% RH	
Shock	20 G amplitude, 11 ms duration, 3 shocks each axis and each direction		G	MIL-STD-810G, Method 516.6, Procedure I, Operational
Operational Vibration	3.56 Grms one hour each axis		Grms	MIL-STD-810 Method 514.6, Category 12
Endurance Vibration	8.25 Grms one hour each axis		Grms	MIL-STD-810 Method 514.6, Category 12
Barometric Pressure	0.11	2.0	atm	Up to 50,000 ft. equivalent
Radiated Emission (EMI), Electrical	24	70	dBµV/m	MIL-STD-461G, RE102, 10 KHz to 26.5 GHz
Radiated Emission (EMI), Magnetic	30	110	dBpT	MIL-STD-461G, RE101, 30 Hz to 100 KHz
Radiated Susceptibility (Electrical)	200		V/m	MIL-STD-461G, RS103, from 10 KHz to 40 GHz
Radiated Susceptibility (Magnetic)	130	180	dBpT	MIL-STD-461G, RS101, from 30 Hz to 100 KHz

