

F-RFoF-18GHZ-TxR

18GHz Ku-Band Fiber Optic Mini Transmitter / Receiver



18GHz Ku-Band fiber optic mini Transmitter and Receiver set.

The transmitter is able to accept RF signals from 10mhz to 18Ghz analog or digital RF modulated signal and convert it to an optically modulated light; and the receiver converts the optical signal back to an electrical RF.

There are a lot of challenges to sending high-frequency RF over long-distance coaxial copper cable, the K-Band TX/RX allows you to send this signal over fiber from 0 to 40Km if needed.

Electrical to optical conversion is transparent, protocol or modulation independent, they work with analog or digital modulation standards.

Used for C-band, L-band, Ku-band, S-band Sattelite, cell phone 5G/4G/3G Mobile Communication, DAS or radar applications.

Applications:

- 5G/4G/3G Mobile Communication
- Antenna remoting
- Satellite communication
- GPS signal transport
- Pulse signal transport
- Distributed antenna system
- High-speed test and measurement
- Video signal distribution in HFC and FTTx Nodes
- Wideband wireless communication
- OFDM fiber transmission
- Radar over the fiber

Features

Receiver:

- Small size: 22mm x 17mm x 8.9mm
- High responsivity: typical 0.8 mA/mW @ 1310nm
- Operating frequency up to 24GHz
- Wide wavelength range from 800nm to 1650nm
- DC-block and matched to 50 Ohm

Transmitter:

- Low noise, butterfly optical device with TEC
- ITU C Band
- Wide operating frequency from 10MHz to 18GHz
- APC & ATC functions
- Flat frequency response
- High dynamic range
- Excellent EMI/EMC design

Parameter	Symbol	Condition	Min.	Max.	Unit
Operating Temperature	Topr	-40	-40	+70	°C
Storage Temperature	Tstg		-40	+85	°C
Saturation Input Power	Ps		--	10	mW
Forward Current	If		--	10	mA
Reverse Bias	Vr	PD	--	20	V
DC Operating Voltage	Vd	+5V pin	+4.7	+5.5	V
Dark Current	Id		--	10	nA
Relative Humidity	Hr		--	95	%
Pressure	Pr		86	106	kPa
ESD		Human body model	--	Class 1B	

Receiver Electrical and Optical Characteristics

Parameter	Symbol	Test Condition	Min	Typ.	Max	Unit
Wavelength Range	λ		800	--	1650	nm
Responsivity	R	1310nm	0.7	0.8	--	mA/mW
		1550nm	0.7	0.85	--	
Frequency Bandwidth	BW	RCC	0.01	--	6	GHz
		RXC	0.01	--	12	
		RUC	0.01	--	18	
		RKC	0.01	--	24	
Ripple of Passband	Flatness	RCC,0.1GHz~6GHz	--	+1	+1.2	dB
		RXC,0.1GHz~12GHz	--	+1.2	+1.5	
		RUC,0.1GHz~18GHz	--	+1.5	+2	
		RKC,1GHz~24GHz	--	+1.7	+2.5	
RF Return Loss	RL	RCC,0.1GHz~6GHz	--	-12	-9	dB
		RCC,0.1GHz~6GHz	--	-10	-7	
		RCC,0.1GHz~6GHz	--	-10	-5	
		RKC 0.1GHz~18GHz	--	-10	-5	
		RKC 18GHz~24GHz	--	-5	-3	
Back Reflection	ORL	PD	--	-35	--	dB
Dark Current	Id	PD	--	5	10	nA
Operating Voltage	Vd	+5V Pin	+4.8	+5	+5.2	V
Power Consumption	Pdiss	+5V power supply	--	25	50	mW

Receiver Fiber Specification

Parameter	Typ.	Unit
Fiber Type	Single Mode	
Optical Connector Type	FC/APC	
Pigtail Length	1	m
Minimum Bend Radius	30-2	mm

Receiver PIN Function

PIN	Name	Direction	Note
1	GND	I	GND
2	+5V	I	+5V DC Power
3	RF	O	RF Out, SMA Female, 50Ω

Transmitter Absolute Maximum Ratings

Parameter	Symbol	Condition	Min.	Max.	Unit
Operating Temperature	Topr	Case temperature	-40	+70	°C
Storage Temperature	Tstg		-40	+85	°C
DC Operating Voltage	Vd	-5V	-5.5	-4.7	V
		+5V	+4.7	+5.5	
RF Input Power	Prf	Continuous	--	20	dBm
Relative Humidity	Hr		10	95	%
Atmospheric Pressure	Pr		86	106	kPa
ESD		Human body model	--	Class1A	

Transmitter Typical Specification (CWDM)

Parameter	Test Condition	Min.	Typ.	Max.	Unit
Frequency Range	TSC	0.01 ~ 3			GHz
	TCC	0.01 ~ 6			
	TXC	0.01 ~ 12			
	TYC	0.01 ~ 16			
	TUC	0.01 ~ 18			
Optical Wavelength	λ0 is the standard CWDM wavelength	Optional			nm
Optical Wavelength Range	Operating Temperature Range	λ0-3	λ0	λ0+3	nm
Output Optical Power	+25	--	9	--	dBm
Gain (1)	Operating Temperature Range	-30	-26	--	dB
Gain Flatness	TSC 100MHz ~ 3GHz	--	+1.5	+2	dB
	TCC 100MHz ~ 6GHz	--	+1.5	+2.5	
	TXC 100MHz ~ 12GHz	--	+2	+3	
	TYC 100MHz ~ 16GHz	--	+2	+2.5	
	TUC 100MHz ~ 18GHz	--	+2	+3	
RF Return Loss	TSC 100MHz ~ 3GHz	--	-15	-10	dB
	TCC 100MHz ~ 6GHz	--	-10	-5	
	TXC 100MHz ~ 12GHz	--	-10	-5	
	TYC 100MHz ~ 16GHz	--	-12	-10	
	TUC 100MHz ~ 18GHz	--	-10	-5	
Input P-1dB	1GHz	--	18	--	dBm

Transmitter Data Sheet

Parameter	Test Condition			Min.	Typ.	Max.	Unit
SFDR (1)	TSC	1GHz		114	119	--	dB·Hz ^{2/3}
		2GHz		112	116	--	
		3GHz		107	111	--	
	TCC	1GHz		110	118	--	
		3GHz		105	112	--	
		6GHz		101	106	--	
	TXC	1GHz	1270nm/1370nm	110	118	--	
			1530nm/1550nm	108	114	--	
		6GHz	1270nm/1370nm	102	110	--	
			1530nm/1550nm	102	108	--	
		12GHz	1270nm/1370nm	98	106	--	
			1530nm/1550nm	94	100		
	TYC	1GHz		110	116	--	
		10GHz		105	112	--	
		16GHz		100	106	--	
	TUC	1GHz		108	114	--	
		10GHz		102	108	--	
		18GHz		97	103	--	
IIP3 (1)	TSC	1GHz		32	36	--	dBm
		2GHz		30	33	--	
		3GHz		27	30	--	
	TCC	1GHz		27	34	--	
		2GHz		25	31	--	
		6GHz		22	26	--	
	TXC	1GHz		27	33	--	
		2GHz		24	30	--	
		12GHz		21	26	--	
	TYC	1GHz		28	32	--	
		10GHz		25	30	--	
		16GHz		22	26	--	
	TUC	1GHz		28	32	--	
		10GHz		25	30	--	
		18GHz		22	27	--	

Noise Figure (1)	TSC	1GHz		--	31	34	dB
		2GHz		--	33	36	
		3GHz		--	37	40	
	TCC	1GHz		--	31	36	
		3GHz		--	36	41	
		6GHz		--	40	44	
	TXC	1GHz	1270nm/1370nm	--	31	36	
			1530nm/1550nm	--	35	39	
		6GHz	1270nm/1370nm	--	39	44	
			1530nm/1550nm	--	41	45	
		12GHz	1270nm/1370nm	--	41	47	
			1530nm/1550nm	--	49	53	
	TYC	1GHz		--	32	37	
		10GHz		--	36	41	
		16GHz		--	40	45	
	TUC	1GHz		--	34	39	
		10GHz		--	41	46	
		18GHz		--	46	50	
Operating Current	+5V			--	65	800	mA
	-5V			--	70	100	
Operating Voltage	+5V			+4.8	+5	+5.2	VDC
	-5V			-5.2	-5	-4.8	

Transmitter Data Sheet

Parameter	Test Condition		Min.	Typ.	Max.	Unit
Gain Flatness	TSC	100MHz ~ 3GHz	--	±1.5	±2	dB
	TCC	100MHz ~ 6GHz	--	±1.5	±2.5	
	TXC	100MHz ~ 12GHz	--	±2	±3	
RF Return Loss	TSC	100MHz ~ 3GHz	--	-13	-10	
	TCC	100MHz ~ 6GHz	--	-12	-10	
	TXC	100MHz ~ 12GHz	--	-10	-8	
Input P-1dB	1GHz		--	18	--	dBm
SFDR (2)	TSC	1GHz	112	118	--	dB·Hz ^{2/3}
		2GHz	110	115	--	
		3GHz	108	113	--	
	TCC	1GHz	112	118	--	
		3GHz	108	113	--	
		6GHz	102	107	--	
	TXC	1GHz	108	114	--	
		6GHz	101	106	--	
		12GHz	95	99	--	
IIP3 (2)	TSC	1GHz	33	38	--	dBm
		2GHz	31	35	--	
		3GHz	29	33	--	
	TCC	1GHz	33	38	--	
		3GHz	29	33	--	
		6GHz	22	27	--	
	TXC	1GHz	28	33	--	
		6GHz	24	28	--	
		12GHz	20	23	--	
Noise Figure (2)	TSC	1GHz	--	35	38	dB
		2GHz	--	36	39	
		3GHz	--	37	40	
	TCC	1GHz	--	35	38	
		3GHz	--	37	40	
		6GHz	--	40	43	
	TXC	1GHz	--	36	39	
		6GHz	--	43	46	
		12GHz	--	48	51	

Parameter	Test Condition	Min.	Typ.	Max.	Unit
Operating Current	+5V	--	65	800	mA
	-5V	--	70	100	
Operating Voltage	+5V	+4.8	+5	+5.2	VDC
	-5V	-5.2	-5	-4.8	

Transmitter Connector

Type	Connector	
RF	TSC	SMA, 50Ω, Female
	TCC	SMA, 50Ω, Female
	TXC	SMA, 50Ω, Female
	TYC	K Type (2.92mm, 50Ω), Female
	TUC	K Type (2.92mm, 50Ω), Female
Optical	FC/APC (3)	
Optical Fiber Type	SMF-28 (Standard) (3)	
Power	EMI Low Pass Filter, Feed Through Capacitor, Soldering Temperature Should not Exceed 300°C and 3s	

PIN Function

PIN	Name	Direction	Note
1	+5V	I	+5V DC Power
2	-5V	I	-5V DC Power
3	GND	I	GND
4	OP	O	Optical Power Monitor, TTL Level, Low Level(<0.4V)is Optical Power. Low, High Level(+5V)is Optical Power Normal.

ITU C band Wavelength Code Number Table

xx	Frequency (THz)	Center Wavelength (nm)	xx	Frequency	Center Wavelength (nm)
17	191.7	1563.86	37	193.7	1547.72
18	191.8	1563.05	38	193.8	1546.92
19	191.9	1562.23	39	193.9	1546.12
20	192.0	1561.42	40	194.0	1545.32
21	192.1	1560.61	41	194.1	1544.53
22	192.2	1559.79	42	194.2	1543.73
23	192.3	1558.98	43	194.3	1542.94
24	192.4	1558.17	44	194.4	1542.14
25	192.5	1557.36	45	194.5	1541.35
26	192.6	1556.55	46	194.6	1540.56
27	192.7	1555.75	47	194.7	1539.77
28	192.8	1554.94	48	194.8	1538.98
29	192.9	1554.13	49	194.9	1538.19
30	193.0	1553.33	50	195.0	1537.40
31	193.1	1552.52	51	195.1	1536.61
32	193.2	1551.72	52	195.2	1535.82
33	193.3	1550.92	53	195.3	1535.04
34	193.4	1550.12	54	195.4	1534.25
35	193.5	1549.32	55	195.5	1533.47
36	193.6	1548.51	56	195.6	1532.68