



Proven Flight Heritage

The TTRM2021 is a RF subsystem consisting of a fully integrated PA, LNA, and dual filter assembly. It is currently in service with a 5G IoT CubeSat operating in LEO. This unit has been designed for the high power, high efficiency, and out of band rejection performance figures of the radio payload, to comply with 5G NB IoT requirements.

TTRM2021

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TTRM2021 FEATURES

- Integrated Dual PA / LNA Cavity Passband Filter
- I2C Temperature Monitoring
- Independent PA / LNA Enable Control
- Temperature cycle tested from -30 to + 65 °C
- Shock tested to ECSS-E-ST-10-03C Standard



CHARACTERISTICS/SPECIFICATIONS

TX RF Performance Specifications

Parameter	Min.	Typ.	Max	Unit	Notes
Operating Frequency	2155	—	2200	MHz	
Total Power Output (Post Filter)	6.3	—	10	W	At least 6W of OFDM Modulated, QPSK @ 15 dB EVM at Antenna Port - Post Filter. Amplifier will need appr. 42 dBm to achieve this.
Input Power P_{in}	-6	-5	-4	dBm	This is the power level seen at the input of the amplifier connector from the transceiver. The design will compensate for any losses seen through the amplifier connector.
Gain Flatness (Peak to Peak)	—	.5	1.0	dB	This is measured across any 5 MHz channel within the transmit band.
Input Return Loss	—	—	-13	dB	
Harmonics at Min	20	30	—	dBc	
Spurious at Min	—	—	-60	dBc	
Maximum Output VSWR	—	—	5:1	VSWR	

RX RF Performance Specifications

Parameter	Min.	Typ.	Max	Unit	Notes
Operating Frequency	1970	—	2035	MHz	
Linear Gain - RX	—	30	—	dB	
Gain Flatness (Peak to Peak)	—	—	1	dB	
Input Return Loss	—	—	-6.0	dB	
Maximun Input Powser	—	—	-20	dBm	
Noise Figure - RX	—	1.5	2	dB	
Output P1dB	5	—	6.5	dBm	

TX Filtering Specifications

Parameter	Min.	Typ.	Max	Unit	Notes
Passband	2155	—	2220	MHz	
Stop Band Rejection @ 2035 MHz	40	—	—	dB	
Stop Band Rejection @ 2300 MHz	20	—	—	dB	



RX Filtering Specifications

Parameter	Min.	Typ.	Max	Unit	Notes
Passband	1970	—	2035	MHz	
Stop Band Rejection @ 1890 MHz	20	—	—	dB	
Stop Band Rejection @ 2155 MHz	85	—	—	dB	

Electrical Specifications

Parameter	Min.	Typ.	Max	Unit	Notes
Supply Voltage Range	+12	+28	+36	VDC	
Operating Current Draw - TX	—	1.25	1.75	A	Typical supply voltage
Operating Current Draw - No TX	—	.25	—	A	Typical supply voltage
Power Consumption	—	50	—	W	Typical supply voltage

Environmental Specifications

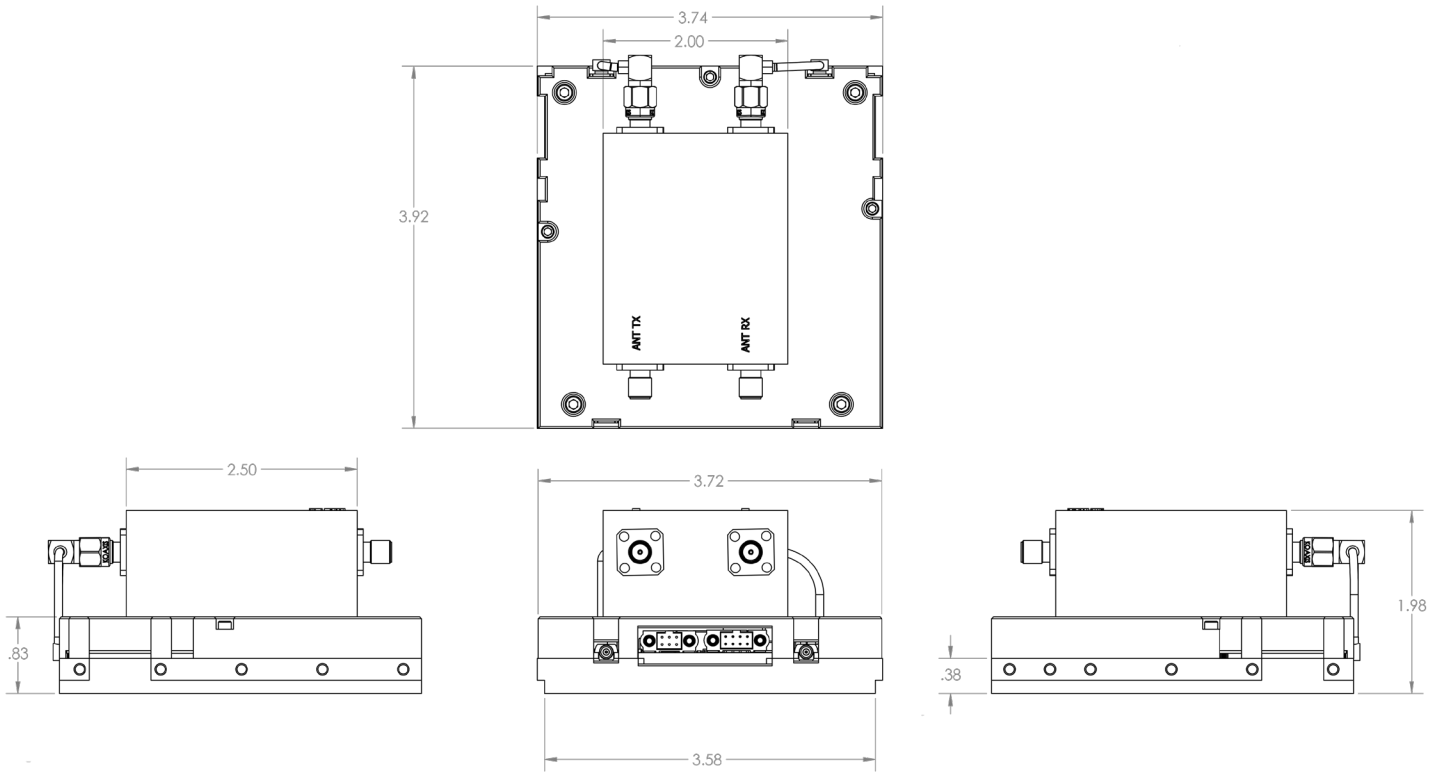
Parameter	Min.	Typ.	Max	Unit	Notes
Operating Temperature	-40	—	+85	°C	Ambient Temperature at TX
PA Shut-off Temperature	—	+85	+90	—	
Cooling	Baseplate Conduction			—	

Mechanical Specifications

Parameter	Value	Unit	Notes
Dimensions	3.92 x 3.74 x 1.98 (99.57 x 95 x 50.29)	in (mm)	L x W x H
RF Connectors - Antenna	SMA-F	Connector Type	Mating Connector Type: SMA-M
RF Connectors - Radio	SMP-M	Connector Type	Mating Connector Type: SMP-F
DC Power Connector	M80-5400642	Part Number	Mating Connector PN: M80-4610605
Control Connector	M80-5400842	Part Number	Mating Connector PN: M80-4610805
Mounting	#M2.5 Threaded Holes	—	See Mechanical Drawing Below
Weight	22.92 (650)	oz (g)	
Filter	2DFA-2002.5/2187.5-X65S11	Part Number	Reactel Dual Filter
Finish	MIL-DTL-5541	—	Material: Alloy 6061



MECHANICAL DRAWING



DC/CONTROL CONNECTORS

DC Connector

(Harwin PN: M80-5400642)

Pin	Description	Type	I/O	Notes
1	Power	Power	Output	+12 to +36 VDC
2	Power	Power	Output	+12 to +36 VDC
3	Power	Power	Output	+12 to +36 VDC
4	GND	GND	—	Power Ground
5	GND	GND	—	Power Ground
6	GND	GND	—	Power Ground

Control Connector

(Harwin PN: M80-5400842)

Pin	Description	Type	I/O	Notes
1	TEMP-I2C-CLK	Serial CLK	Output	Temperature Output I2C Interface CLK
2	TEMP-I2C-DATA	Serial DATA	Output	Temperature Output I2C Interface DATA
3	RX Enable	TTL Input	Input	0V = No Tx, 3.3V = LNA Enabled
4	Status	TTL Output	Output	0V = Fault, 3.3V = No Fault
5	SGND	Signal	—	Signal Ground
6	SGND	Signal	—	Signal Ground (Optional)
7	TX Enable	TTL Input	Input	0V = No Tx, 3.3V = TX PA Enabled
8	N/A	N/A	—	Not Used

CABLE OPTIONS

For available cable options, please [contact us](#) for inquiries and pricing.

