



Proven Flight Heritage | NB-IoT and NTN-NR

TTRM2020-D03 is an S-Band (n256) RF Subsystem, with proven flight heritage, created in support of NB-IoT and NTN-NR networks.

Currently in service on CubeSats operating in LEO, each TTRM2020-D03 unit contains a fully integrated PA, LNA and dual filter assembly. The unit is designed to deliver exceptional performance in terms of high power, efficiency, and out-of-band rejection, aligning with 5G 3GPP specifications to support NTN MNOs in achieving compliance.

TTRM2020-D03

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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

APPLICATIONS

- 5G / Narrowband IoT Networks
- Cubesat / Smallsat Systems

CHARACTERISTICS/SPECIFICATIONS

Specifications subject to change without notice. Typical performance at VDC at 25°C in a 50Ω system.

Tx Specifications (Per Stream)

Parameter	Min.	Typ.	Max	Unit
Operating Frequency	2155	—	2200	MHz
64QAM Power Output 20 MHz BW, -27 dB EVM Limit	36	—	—	dBm
BPSK Power Output 20 MHz BW, -9 dB EVM Limit	40	—	—	dBm
Maximum Power Output CW Sweep at Design Limit, 5-6 dB gain compression	36	40	—	dBm
Transmit Gain Over Temperature (-40 to +85 baseplate)	—	—	0.7	dB
Small Signal Gain	50	54	—	dB
Small Signal Gain Flatness	—	—	1	dB (peak to peak)
Input Return Loss	—	—	-11	dB
Tx / Rx Switching Time	—	1	2	μs

Rx Specifications (Per Stream)

Parameter	Min.	Typ.	Max	Unit
Operating Frequency	1970	—	2035	MHz
Small Signal Gain	28	30	—	dB
Small Signal Gain Flatness	—	—	1	dB (peak to peak)
Noise Figure	—	1.5	2	dB
Input Return Loss	—	—	-7	dB

Tx Filtering Specifications

Parameter	Min.	Typ.	Max	Unit
Passband	2155	—	2200	MHz
Stop Band Rejection @ 2035 MHz	50	—	—	dB
Stop Band Rejection @ 2300 MHz	40	—	—	dB

Rx Filtering Specifications

Parameter	Min.	Typ.	Max	Unit
Passband	1970	—	2035	MHz
Stop Band Rejection @ 1890 MHz	55	—	—	dB
Stop Band Rejection @ 2155 MHz	85	—	—	dB

Power Supply Specifications

Parameter	Min.	Typ.	Max	Unit	Notes
Supply Voltage Range	27	28	29	VDC	
Average Operating Current Draw (Idle)	—	—	0.35	A	28A supply voltage, idle in receive mode
Average Operating Current Draw (64QAM Power Output)	—	—	0.9	A	28A supply voltage, 100% Tx Duty Cycle
Average Operating Current Draw (BPSK Power Output)	—	—	1.45	A	28A supply voltage, 100% Tx Duty Cycle

Mechanical Specifications

Parameter	Value	Unit	Notes
Dimensions (L x W x H)	3.92 x 3.74 x 1.98 (99.6 x 95 x 50.3)	in (mm)	
Cooling	Baseplate Conduction	—	
Cooling Fan Kit	—	—	
Weight	20.71 (587)	oz (g)	
Filter	Reactel Dual Filter	—	
Finish	MIL-DTL-5541	—	Material: Alloy 6061

Interface Specifications

Parameter	Value	Notes
RF Connectors (Input / Output)	SMA-F / SMA-F	
DC Power Connector	M80-5400642	Mating Connector PN: M80-4610605
Control Connector	M80-5400842	Mating Connector PN: M80-4610805
Test Integration Cable	—	Not included, available for purchase separately.

Environmental Specifications

Parameter	Min.	Max	Unit
Operating Temperature (Housing Temp.)	-40	85	°C
Storage Temperature	-40	100	°C
Altitude	0	(0)	ft. (m.)
Ingress Protection Rating	—		—
Shock / Vibration	Designed to comply with MIL-STD-810 Shock/Vibration Test Methods		—

Protections / Maximum Ratings

Parameter	Value	Unit	Notes
Maximum RF Input (Per Stream)	-17	dBm	CW Power
Over Temp Protection Trip Level	88	°C	Internally Monitored System Temperature
RF Output Open Load Survivability	38	dBm	CW with an open circuit at the antenna port

Configuration / Ordering Options

Model Number	Description
TTRM2020-D03	TTRM2020-D03 10W S-Band FDD Cubesat PA/LNA Assembly

Please confirm with Triad that the desired configuration is available prior to ordering.

DC/CONTROL CONNECTORS

DC Connector (Harwin PN: M80-5400642)

Pin	Description	Type	I/O	Notes
1	Power	Power	Output	+27 to +29 VDC
2	Power	Power	Output	+27 to +29 VDC
3	Power	Power	Output	+27 to +29 VDC
4	GND	GND	—	Power Ground
5	GND	GND	—	Power Ground
6	GND	GND	—	Power Ground

DC Connector (Harwin PN: M80-5400642)

Pin	Description	Type	I/O	Notes
1	TEMP-I2CCLK	Serial CLK	Output	Temperature Output I2C Interface CLK
2	TEMP-I2CDATA	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 inquires and pricing.

MECHANICAL DRAWING

