GENERAL DESCRIPTION

The NWSTR20213031-40A is an integrated K/Ka-Band Transmit and Receive Assembly designed for CW operation in a space environment.

The low mass K/Ka-band payload assembly includes:

- Qty. 2 Solid State Power Amplifier (SSPA) Modules
- Qty. 2 Low Noise Amplifier (LNA) Modules
- One set of SSPA / LNA can be operated at a time.
- Customer Selectable Band-definition filters
- Monitoring and Control via customizable interface to command/configure the LNAs and SSPAs and provide status through telemetry.
- Integrated Electronic Power Conditioner (EPC)

FEATURES

- Transmit Bandwidth: 20.2 to 21.2GHz
- Receive Bandwidth: 30.0 to 31.0GHz
- Customer Selectable Control Interface (CAN bus, UART via RS-422/RS-485, SPI via LVDS, Spacewire, MODBUS, or other proprietary protocol)

APPLICATIONS

- LEO Communications payload

NANOWAVE Technologies Inc.
425 Horner Avenue
Etobicoke, ON M8W 4W3
Canada
Phone: +1 416 252-5602
Fax: +1 416 252-7077
Email: sales@nanowavetech.com

ELECTRICAL PARAMETERS

Parameter	Unit	Min	Typ	Max	Remarks
Receive Band					
Operating Frequency	GHz	30.0		31.0	
Instantaneous Bandwidth (BW)	MHz			800	
Nominal Input Power	dBm		-50		
Maximum Input Power	dBm			-38	
Gain			39		Including input and output filter
Gain Flatness vs Frequency	dB			± 0.75	
Noise Figure	dB			4.5 3.6	Including input filter Without input filter
Output P1dB	dBm	+11			
IM3 (2x tones at -55dBm each)	dBc			-65	Including bandpass input filter
Input Return Loss	dB			-12	Including bandpass input filter
Output Return Loss	dB			-14	Including bandpass output filter
Out of Band Rejection					Including bandpass filtering
22.21 – 23.6GHz	dBc		49		
23.6 – 30.0GHz	dBc		79		
30.0 – 31.0GHz	dBc		80		
> 31GHz	dBc		77		
Stability		Unconditional			

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Parameter	Unit	Min	Typ	Max	Remarks
Transmit Band					
Operating Frequency	GHz	20.2		21.2	
Instantaneous Bandwidth	MHz			800	
Psat	dBm		40		
Linear Input Power	dBm		-22.5		
Linear Gain	dB		55.5		
Gain Control	dB		+/- 5.0		
Gain Control Steps	dB		0.5		
Gain Flatness over Frequency	dB		± 0.5		Over any 500MHz within 20.2 to 21.2GHz operating band
Group Delay Variation	ns			1.0	
Linearity: EVM using QPSK Waveform (Single Carrier: 400MHz)					
@ Psat-2dB (38dBm)	%		5		
@ Psat-3dB (37dBm)	%		4		
@ Psat -4dB (36dBm)	%		3		
@ Psat -7dB (33dBm)	%		2		
Input Return Loss	dB			-12	
Output Return Loss	dB			-12	
Stability		Unconditional			

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Mechanical and Environmental Parameters

Parameter	Unit	Min	Typ	Max	Remarks
Operating Temperature Range	ºC	-30		+65	
Input / Output (SSPA &LNA) RF Connectors			K-connector Female		WR28, WR42, WR51 optional
DC/DC & Control Interface			Micro-D 15 Pins		Other customer defined interfaces are optional
Size (L, W, H)	mm		170.0 (L) 150.0 (W) 40.0 (H)		
Weight	kg		1.3		
Spacecraft Power Bus	V	22		38	
DC Power	W		37		Qty. 1 SSPA + 1 LNA ON with SSPA operated at +35.5dBm output power

Note: Unit is designed to operation one set of SSPA and LNA simultaneously.

Mechanical Qualification Levels

Assembly	Frequency	Level
Shock	10 Hz 10 Hz – 2,000 Hz 2,000 Hz – 10000 Hz	20g 20g to 2,000g (rising log linear) 2,000g
Sinusoidal Vibration	20 Hz – 100 Hz	20g
Random Vibration – In plane	20 Hz – 80 Hz 80 Hz – 500 Hz 500 Hz – 2,000 Hz overall	+ 4 dB/oct 0.1 g^2/Hz - 5 dB/oct 9.5 g_{RMS}
Random Vibration – Out of plane	20 Hz – 80 Hz 80 Hz – 500 Hz 500 Hz – 2,000 Hz overall	+ 9 dB/oct 1.0 g^2/Hz - 8 dB/oct 18.3 g_{RMS}

Manufacturing Standards

Assembly	Standard	Notes
RF Hybrid Assemblies	MIL-STD-883 Class K*	Excluding: 1) PIND: not possible due to assembly construction 2) Fine leak testing: not applicable (hybrids are vented) 3) Radiograph: test can be conducted based if required/requested
Printed Circuit Card Assemblies	IPC-A-610 CLASS 3	

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Digital Control Interface Options

The monitor and control activity of all subassemblies in the unit is done internally. The interface with the Payload Controller for the communication of telemetry (TM) and telecommands (TC) can be done via a customer defined interface.

Options include:

- CAN Bus
- RS-422 / RS-485
- SPI over LVDS
- Spacewire
- Customer defined or other proprietary interfaces

Telemetry parameters include:

- Temperatures
- Voltages
- SSPA input and output RF Power
- DC Current Consumption
- Unit Status

Telecommands include:

- Unit Operational Mode (Service / Operational)
- SSPA1/LNA1 Power ON / OFF
- SSPA2/LNA2 Power ON / OFF
- SSPA1 Gain Control
- SSPA2 Gain Control
- (further options on request)

Additional features:

- Marking: The unit is marked with manufacturer part no., date code, and Serial Number.
- All plating and painting is RoHS compliant

For further information please contact NANOWAVE Technologies Inc. at sales@nanowavetech.com, or call at (+1) 416-252-5602.

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