

# NWSTR107127-40

Ku-band User Integrated LNA and SSPA  
Dual Package Assembly

SPACE Products



**NANOWAVE**  
Technologies Inc.

Revision 2.2

## GENERAL DESCRIPTION

The NWSTR107127-40 is a highly linear solid-state power amplifier (SSPA) and a low noise LNA for continuous wave (CW) operation. The small signal gain for the SSPA is 60dB in the frequency band of 10-13GHz. Pout is +40dBm CW and modulated carrier. The noise figure at ambient is 1.6dB.

There are two (2) Low Noise Amplifiers. Each LNA receives uplink RF signal in Ku-band of 13-16GHz and amplifies this RF signal with a low noise contribution. A hybrid combines the two LNA output signals into one signal RF.



There are two (2) Solid-State Power Amplifiers. The two SSPAs combine RF signal through a hybrid and amplify before transmission. Each SSPA has individual Automatic Level Control (ALC) capability.

One (1) monitoring and control function (MCS) receives telecommands from ground via a serial CAN bus to command/configure the LNAs and SSPAs and provide status through telemetry. The unit efficiently mutes the DC power to each SSPA individually based on a synchronized ECO-MUTE duty cycle command.

One (1) D/DC converter is used to convert the power bus primary voltage into secondary voltages required to power SSPAs, LNAs and MCS.

## FEATURES

- Linear CW SSPA and low noise LNA
- Frequency: 10.0~13.0 GHz for SSPA, 13~16GHz for LNA
- Automatic Level Control
- Commandable ECO-MUTE Capability
- SOCAN bus interface
- Radiation qualified

## APPLICATIONS

- Payloads for LEO
- SATCOM
- Aerospace



## ELECTRICAL PARAMETERS

Parameter	Unit	Min	Typ	Max	Remarks
Low Noise Amplifier (LNA) Module					
Operating frequency	GHz	13.0		16.0	Can be customized
Small Signal Gain			40.5		
Gain Flatness	dB		0.5		Over any 500MHz within the frequency range
Noise figure	dB		1.6		
OIP3	dBm	-5			
Input return loss	dB		-16		
Output return loss	dB		-18		
Solid-State Power Amplifier (SSPA) Module					
Operating frequency	GHz	10		13	
Nominal Output Power	dBm		40		
Input power range	dBm	-20.5		+8	With ALC operational
Gain versus frequency	dB			± 0.75	
EVM	%		8	10	Using QPSK waveform with 250MHz bandwidth
Maximum tolerable input power	dBm			+13	5dB above the maximum input power
Input return loss	dB			-15	
Output return loss	dB			-14	

## Mechanical and Environmental Parameters

Parameter	Unit	Min	Typ	Max	Remarks
Operating Temperature Range	°C	-25		+65	

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<b>Input SSPA/ Output LNA Connectors</b>			K-connector		Female
<b>SSPA Output/ LNA Input Connectors</b>			SMA		Female
<b>DC Power and TM/TC connector</b>			Micro-D 21-pin		
<b>Size (L, W, H)</b>	mm		208.9 x 103.7 x 35.4		
<b>Weight</b>	kg		1.2		
<b>Input Bus Voltage</b>	V	22		34	
<b>DC Power</b>	W			90	At P1dB (2xSSPA+2xLNA+MCS+EPC)
<b>Total Ionizing Dose (TID)</b>	krad			44	Including RDM = 2
<b>LET</b>	MeVcm2/mg	20			

## Digital Control Interface

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 and tele-commands is done via a customized CAN-Bus communication link (SOCAN). The internal Monitor and Control Subassembly (MCS) communicates through the same CAN-Bus link and carries out the control as requested, reports failures and monitored status, and has the ability to shut down various sections of the unit (SSPA, LNA, EPC) in the event of a catastrophic failure. Optionally, other higher-level communication protocols (e.g. SpaceWire, UART via RS485) can be implemented.

Monitored parameters are:

- Temperatures
- Voltages
- RF Power
- SSPA1 ALC Level
- SSPA2 ALC Level
- General Status

The following functions can be remote controlled:

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

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## Outline Drawing

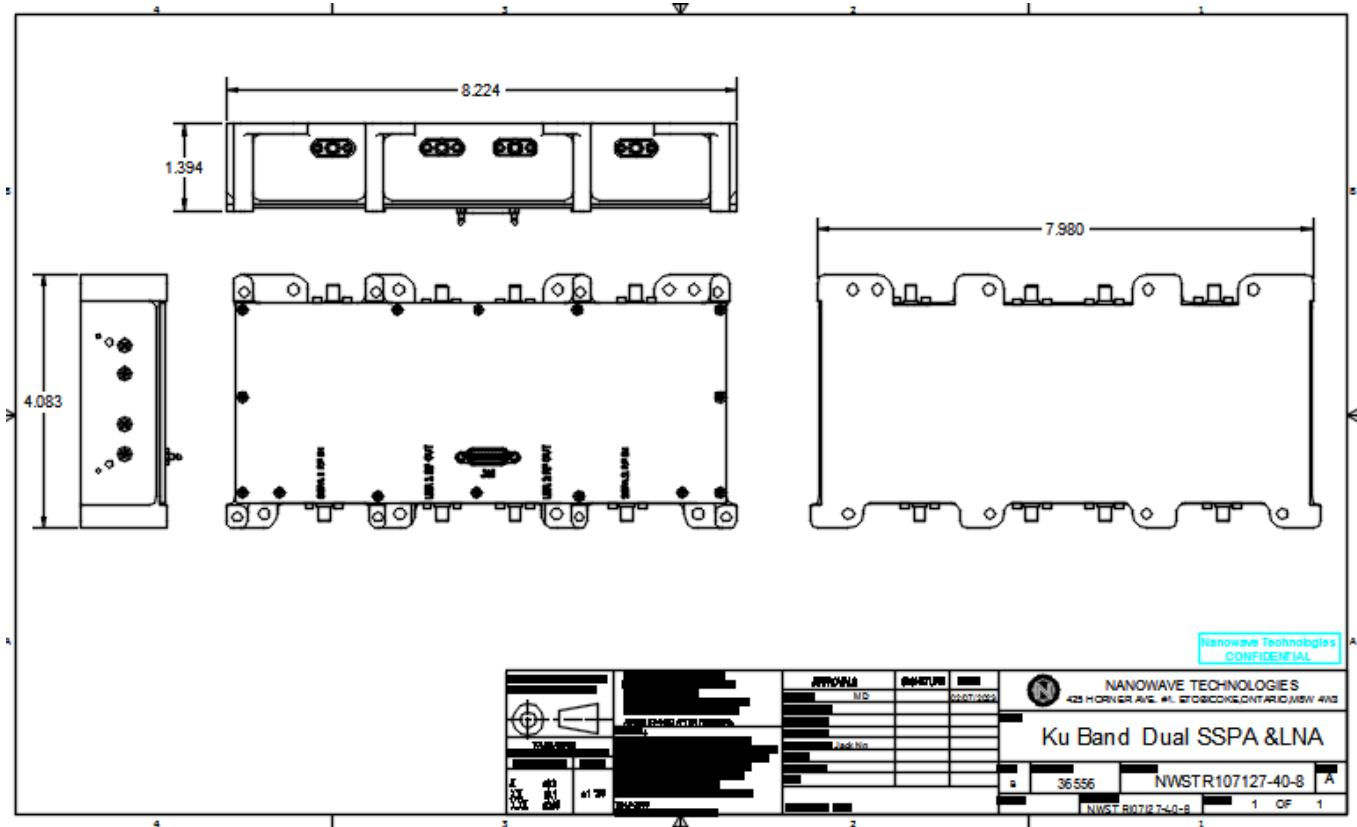


Fig 1: Outline Drawing of Ku-band User Integrated LNA and SSPA

### Notes:

The outline of this unit is fully customizable. Arbitrary shapes are possible to accommodate form-fit functionality.

### 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](mailto:sales@nanowavetech.com), or call at (+1) 416-252-5602