Non-Linear Transmission Line Comb Generator NLTL-6026

The NLTL-6026 is a GaAs Schottky diode based non-linear transmission line comb generator. It is optimized for at input frequencies of 1 – 16 GHz and minimum input drive powers of +16 dBm. Harmonic content is available up to 50GHz. The NLTL-6026 available as a wire bondable chip or connectorized SMA package. The NLTL-6026 is an excellent alternative to step recovery diodes.

NOTE: Not recommended, see **NLTL-6273** for new designs. For any questions, email our engineering staff at **support@markimicrowave.com**.

Features

- Harmonic content available to 50 GHz
- Compact Chip Dimensions (0.032” x 0.058” x 0.004”)
- Excellent Unit-to-Unit Repeatability
- RoHS Compliant

Electrical Specifications - Specifications guaranteed from -55 to +100°C, measured in a 50Ω system. All bare die are 100% DC tested and 100% visually inspected. RF testing is performed on a sample basis to verify conformance to datasheet guaranteed specifications. Consult factory for more information.

Parameter	Minimum	Maximum
Input Frequency (GHz)	1	16
Input Power (dBm)	+16	+25
Harmonic Output Power (dBm)	See Plots	

Part Number Options

Please specify diode level and package style by adding to model number.

Package Styles		Examples	
Connectorized[1, 3]	S	NLTL-6026CH, NLTL-6026S	
Chip[2, 3] (RoHS)	CH	NLTL-6026 (Model)	S (Package)

[1]Connectorized package consists of chip package wire bonded to a substrate, equivalent to an evaluation board.
[2]Chip package connects to external circuit through wire bondable gold pads.
[3]Note: For port locations and I/O designations, refer to the drawings on page 2 of this document.

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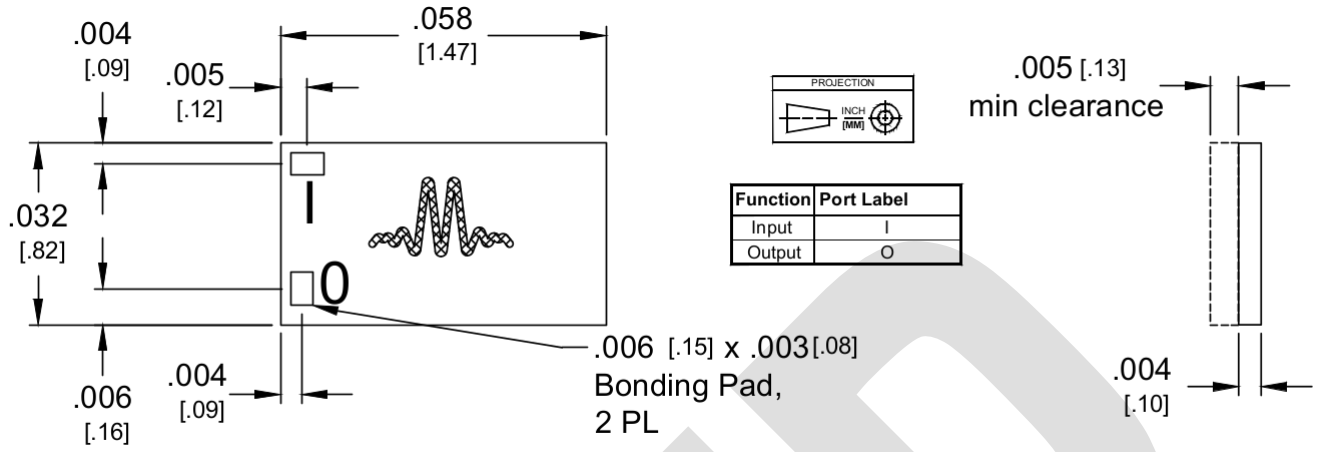
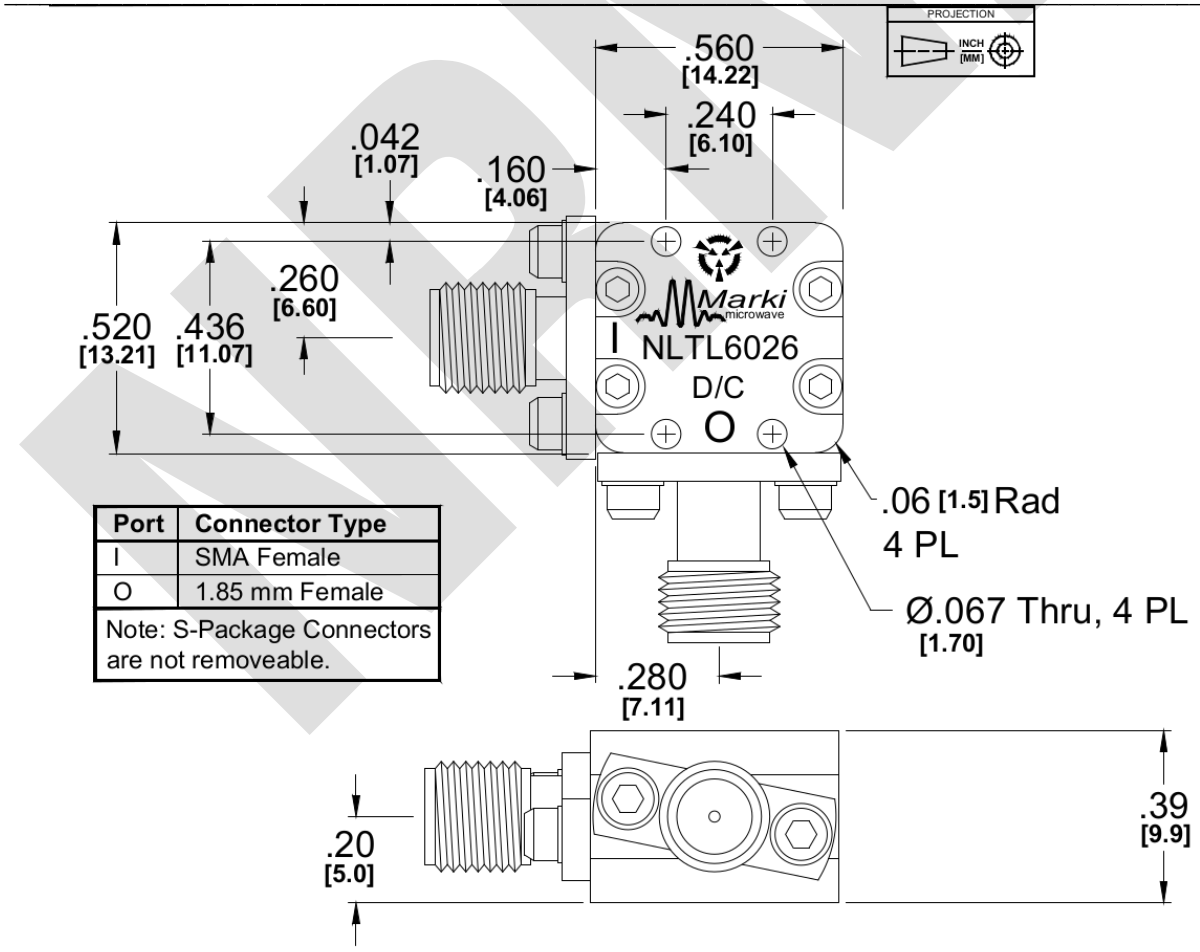


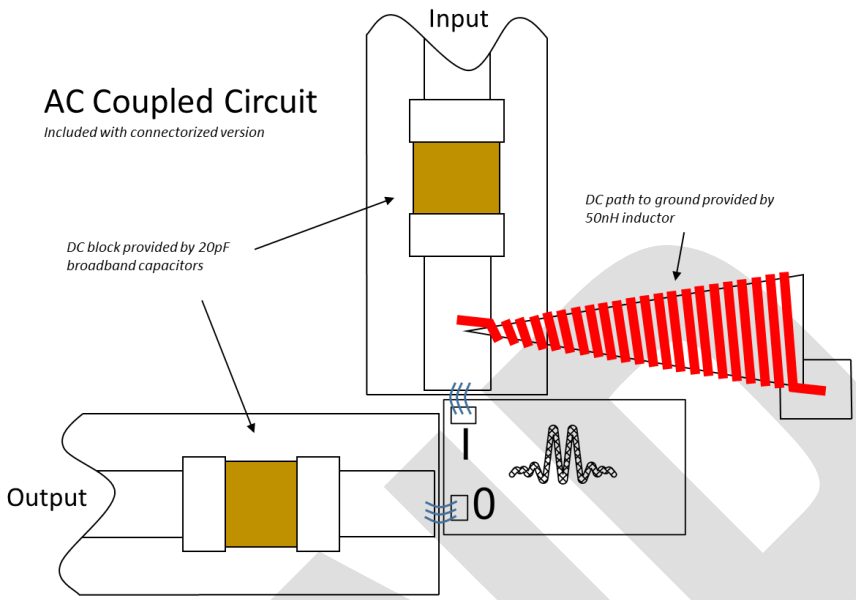
1. CH Substrate material is .004 thick GaAs.
2. I/O traces and ground plane finish is 2 microns Au.
3. Wire Bonding - Ball or wedge bond with 0.025 mm (1 mil) diameter pure gold wire. Thermosonic wirebonding with a nominal stage temperature of 150 °C and a ball bonding force of 40 to 50 grams or wedge bonding force of 18 to 22 grams is recommended. Use the minimum level of ultrasonic energy to achieve reliable wirebonds. Wirebonds should be started on the chip and terminated on the package or substrate. All bonds should be as short as possible <0.31 mm (12 mils).



Port	Connector Type
I	SMA Female
O	1.85 mm Female

Note: S-Package Connectors are not removeable.

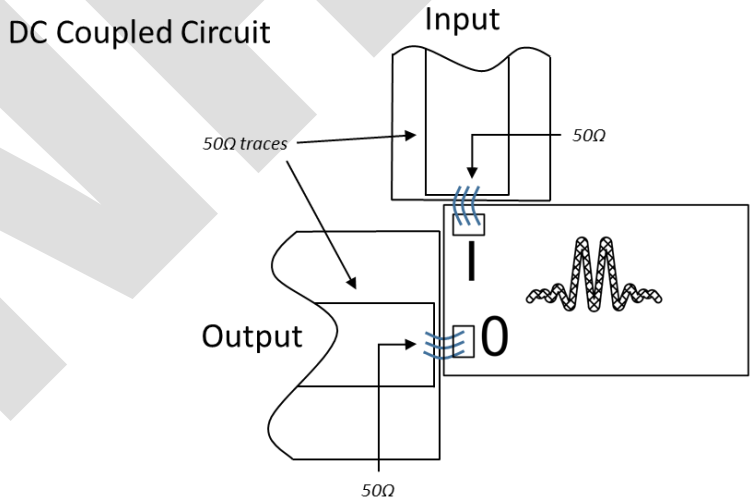
Application Information



Blocking Capacitor — DC blocking capacitors on the input and output of the NLTL-6026's integrated circuit are required for optimal performance. Degradation of higher order harmonic content will occur without blocking capacitors on the input or output. 20pF broadband capacitors are recommended. Blocking capacitors are included on the NLTL-6026S connectorized module.

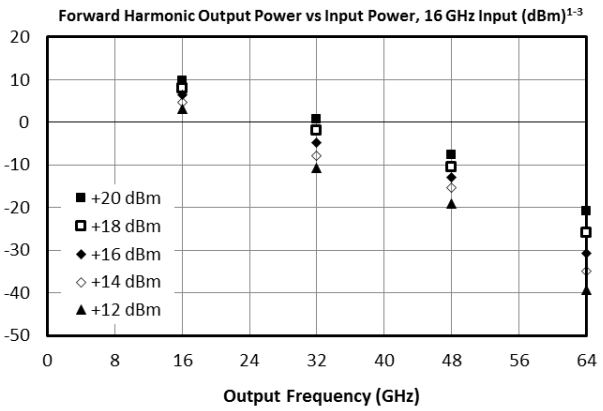
DC Path to Ground — An RF choke should be used to provide a DC path to ground on the input of the transmission line. The DC return to ground removes DC rectified current created by high power RF signal injection. A conical coil inductor is included as the RF choke on the NLTL-6026S connectorized module. The recommended inductance value is 50nH or higher.

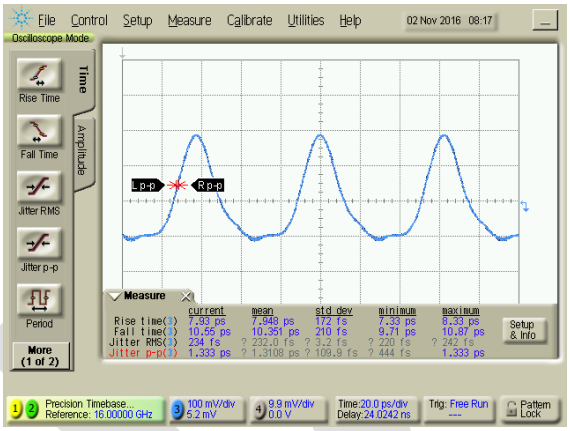
Harmonic Output — The NLTL-6026 is designed to respond up with to a 16GHz input. Higher frequency inputs will display the same conversion loss for the output fundamental, 2nd, 3rd, etc. harmonic.



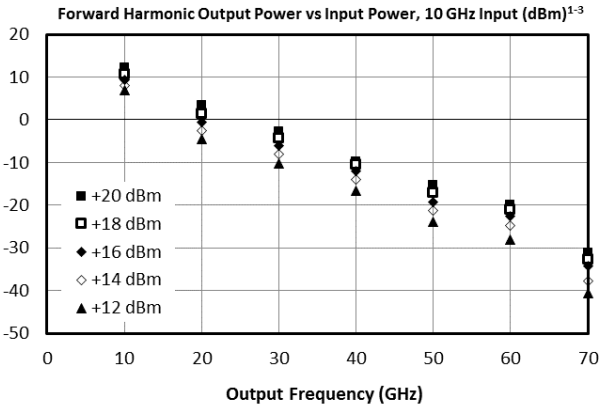
Characteristic Impedance — The NLTL-6026 is 50Ω matched on both the input and output ports. Transition from a 50Ω trace to the NLTL to provide the best performance.

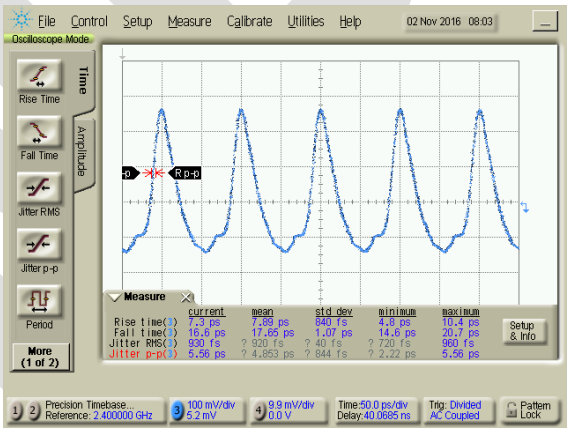
Typical Performance



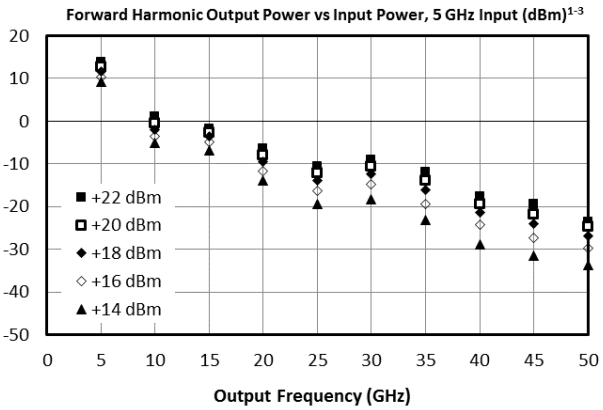


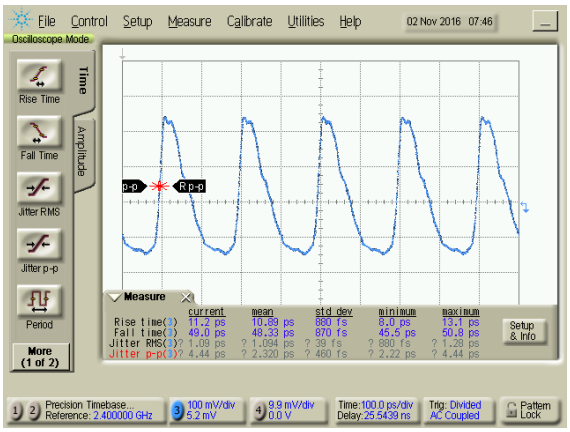
16GHz, +18dBm Input[1-3]





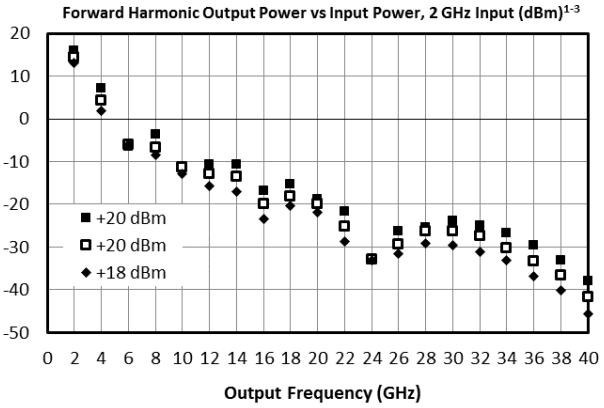
10GHz, +18dBm Input[1-3]

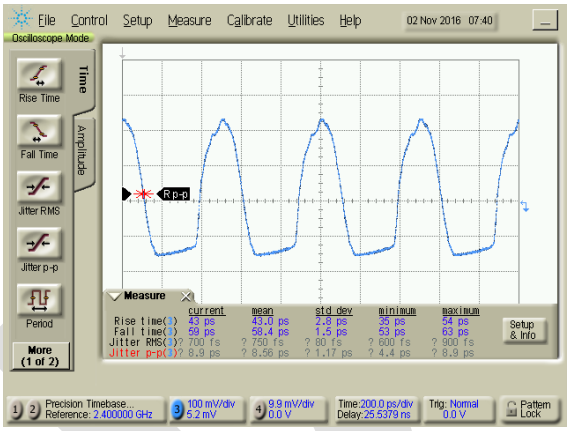




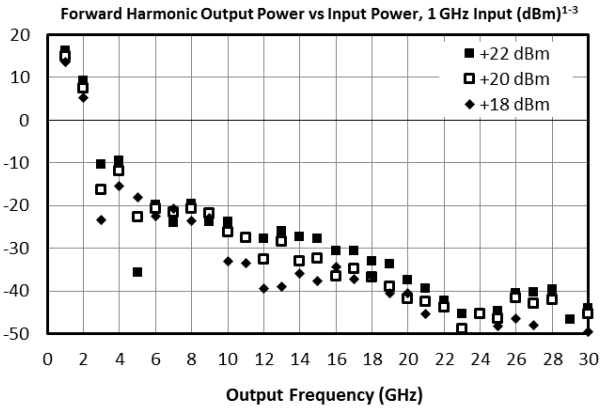
5GHz, +18dBm Input[1-3]

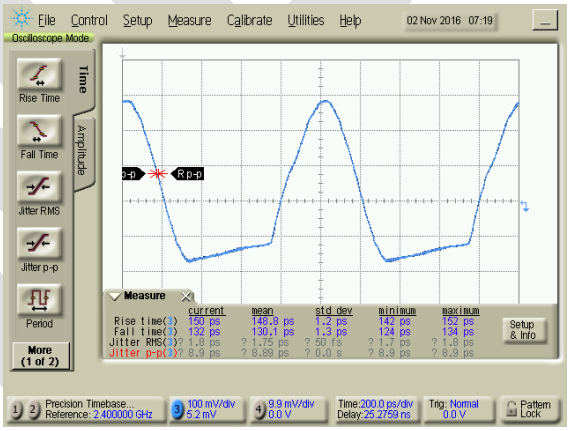
Typical Performance





2GHz, +18dBm Input[1-3]





1GHz, +18dBm Input[1-3]

Mounting and Bonding Recommendations

Marki MMICs should be attached directly to a ground plane with conductive epoxy. The ground plane electrical impedance should be as low as practically possible. This will prevent resonances and permit the best possible electrical performance. Datasheet performance is only guaranteed in an environment with a low electrical impedance ground.

Mounting - To epoxy the chip, apply a minimum amount of conductive epoxy to the mounting surface so that a thin epoxy fillet is observed around the perimeter of the chip. Cure epoxy according to manufacturer instructions.

Wire Bonding - Ball or wedge bond with 0.025 mm (1 mil) diameter pure gold wire. Thermosonic wirebonding with a nominal stage temperature of 150 °C and a ball bonding force of 40 to 50 grams or wedge bonding force of 18 to 22 grams is recommended. Use the minimum level of ultrasonic energy to achieve reliable wirebonds. Wirebonds should be started on the chip and terminated on the package or substrate. All bonds should be as short as possible <0.31 mm (12 mils).

Circuit Considerations – 50 Ω transmission lines should be used for all high frequency connections in and out of the chip. Wirebonds should be kept as short as possible, with multiple wirebonds recommended for higher frequency connections to reduce parasitic inductance. In circumstances where the chip more than .001" thinner than the substrate, a heat spreading spacer tab is optional to further reduce bondwire length and parasitic inductance.

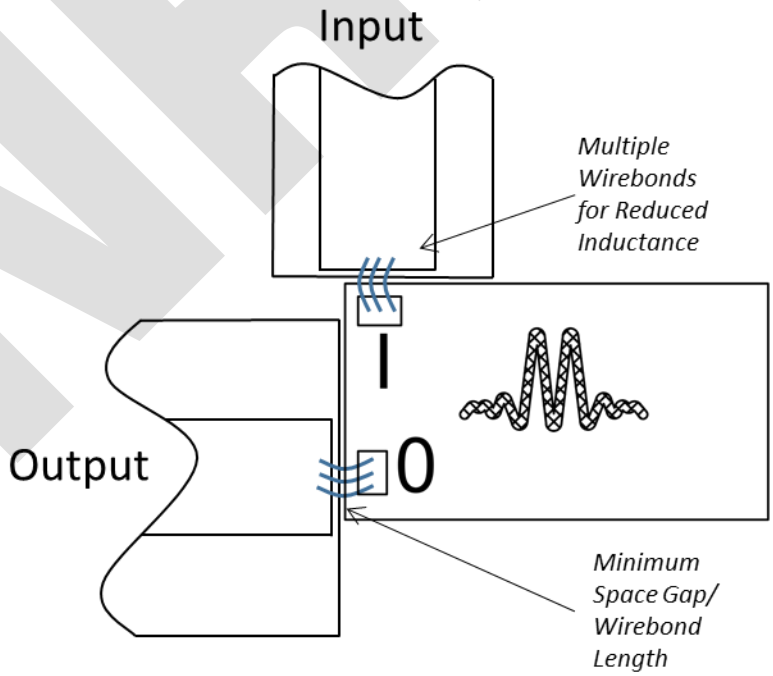
Handling Precautions

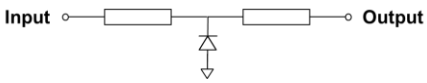
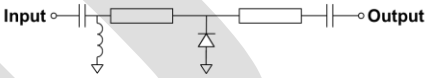
General Handling: Chips should be handled with a vacuum collet when possible, or with sharp tweezers using well trained personnel. The surface of the chip is fragile and should not be contacted if possible.

Static Sensitivity: GaAs MMIC devices are subject to static discharge, and should be handled, assembled, tested, and transported only in static protected environments.

Cleaning and Storage: Do not attempt to clean the chip with a liquid cleaning system or expose the bare chips to liquid. Once the ESD sensitive bags the chips are stored in are opened, chips should be stored in a dry nitrogen atmosphere.

Bonding Diagram



Port	Description	DC Interface Schematic
Chip Input Port	Input port of the chip is DC coupled to the diodes. Blocking capacitors must be used for optimal performance. A DC path to ground using an RF choke is recommended.	
Chip Output Port	Output port of the chip is DC coupled to the diodes. Blocking capacitors must be used for optimal performance.	
Module Input Port	Input Port of the module is DC open. Blocking capacitors and a DC path to ground is provided.	
Module Output Port	Output Port of the module is DC open. Blocking capacitors are provided.	

Absolute Maximum Ratings	
Parameter	**Maximum Rating**
Port 1 DC Current	1 A
Port 2 DC Current	1 A
Input Power	+ 27 dBm
Operating Temperature	-55ºC to +100ºC
Storage Temperature	-65ºC to +125ºC

DATA SHEET NOTES:
1. Device is internally DC blocked and DC grounded on the connectorized module. Ground return path is required when input and output is DC blocked.
2. Input signal amplified by an ADM1-0026PA and filtered using a low-pass filter.
3. Harmonic content varies based on input frequency, input power, and input waveform.
4. Specifications are subject to change without notice. Contact Marki Microwave for the most recent specifications and data sheets.
5. Design continuously improved. Contact factory for custom specification designs.

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