

## E-Band Externally Biased Balanced Up-Converter

**SFU-12-E2** is an E-Band, externally biased, balanced up-converter. The up-converter supports the full waveguide band operation for both LO and RF frequencies from 60 to 90 GHz with an extremely broad IF input from DC to 30 GHz. The up-converter offers a typical conversion loss of 9 dB and a high RF to LO port isolation. The main advantage of using an externally biased up-converter is that it only requires a local oscillator (LO) power of 0 to +5 dBm when a bias of +5 VDC is applied. This eliminates the need for an expensive local oscillator, making system integrations more affordable.



### Electrical Specifications:

Parameter	Minimum	Typical	Maximum
RF Frequency	60 GHz		90 GHz
LO Frequency	60 GHz		90 GHz
IF Frequency	DC		30 GHz
LO Pumping Power	+0 dBm	+3 dBm	+10 dBm
IF Input P <sub>1dB</sub>		-8 dBm	
Conversion Loss		9 dB	13 dB
RF to LO Isolation		30 dB	
Combined IF and LO Power			+13 dBm
External Bias Voltage/Current		+5 V <sub>DC</sub> / 1 mA	+5 V <sub>DC</sub> / 5 mA
Specification Temperature		+25°C	
Operating Temperature	-40°C		+85°C

### Mechanical Specifications:

Item	Specification
RF Ports	WR-12 Waveguide with UG-387/U Anti-Cocking Flange
LO Ports	WR-12 Waveguide with UG-387/U Anti-Cocking Flange
IF Port	K (F)
External Bias	SMA (F)
Case Material	Aluminum
Finish	Gold Plated
Weight	0.8 Oz
Outline	FB-EE-2-A

### ECCN

EAR99

### FEATURES

- Full Waveguide Band Coverage
- Low LO Power Requirement
- Low Conversion Loss
- High IF Frequency up to 30 GHz

### APPLICATIONS

- 5G Systems
- Radar Systems
- Communication Systems
- Test Equipment

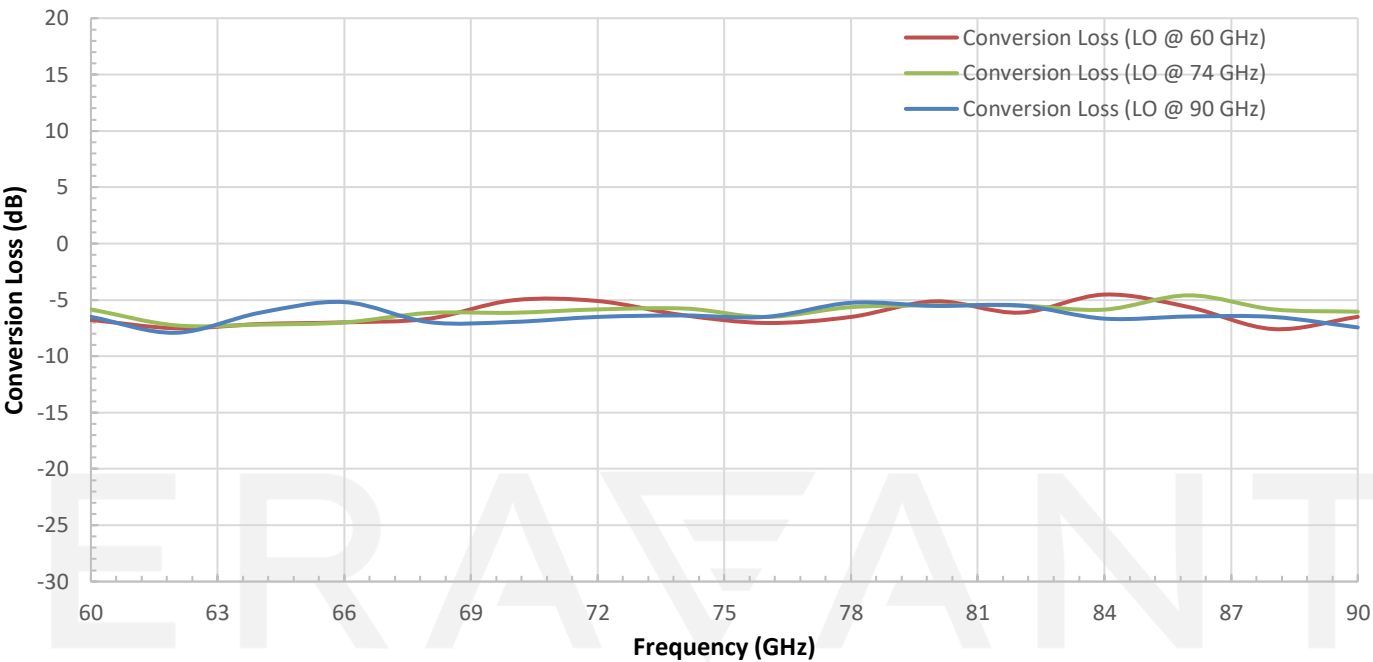
### SUPPLEMENTAL DETAILS



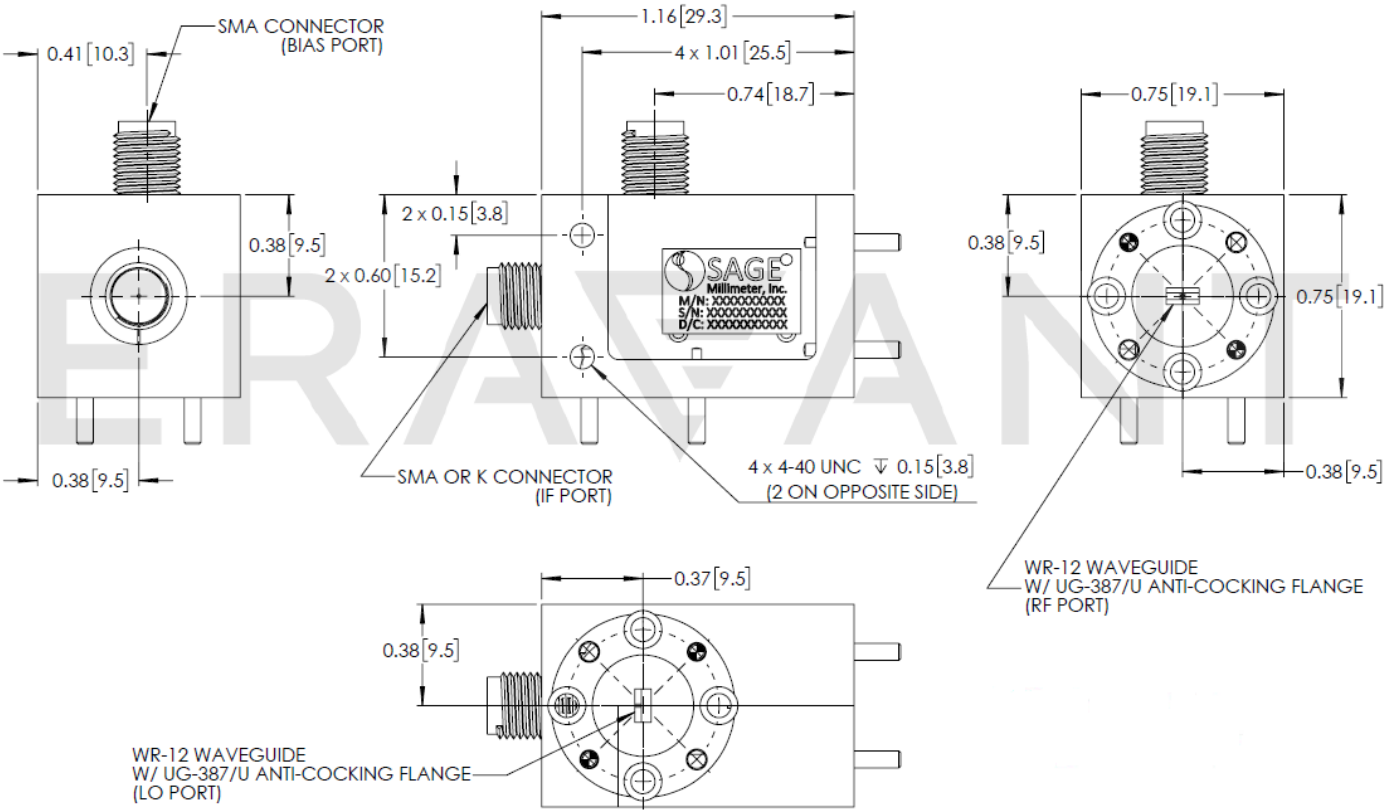
SFU-12-E2

Typical Conversion Loss vs. Frequency

RF: -20 dBm; LO: +3 dBm, Bias: +5 V<sub>DC</sub>/1 mA



Mechanical Outline: (Unless otherwise specified, all dimensions are in inches [millimeters])



## SFU-12-E2

### NOTE:

- The test data provided is collected from a sample lot. Actual data may vary slightly from unit to unit. All testing is performed under +25 °C room temperature.
- A DC block at IF port may be required when connecting to a device, such as an IF low noise amplifier or a base band mixer which input port is DC coupled.
- To protect mixer from accidental static discharge, overbias and/or reverse bias, it is highly recommended to use voltage regulator (**M/N: SOR-05-SM-R1**) with this mixer.
- When sufficient LO power is available, always use non-biased mixers to get optimum conversion loss and LO to RF isolation. Externally biased mixers should be used only if 13 dBm LO power is not available.

### CAUTION:

- Exceeding absolute maximum ratings shown will damage the device.
- The device is static sensitive. Always follow ESD rules when working with the device.
- The IF port of the externally biased mixer is DC coupled. Due to the external bias, it has a small DC offset voltage (+0.7 VDC), which could upset the connecting device performance or even damage the device. Use a **DC block when connecting to other devices**.
- **Never apply an external bias voltage to the IF port because the mixer will be damaged.**
- Any foreign objects in the waveguide will cause performance degradation and may damage or destroy the unit.
- For 1.35 mm, 1.85 mm, 2.4 mm, 2.92 mm, and SMA connectors proper torque should be applied:  $8.0 \pm 0.15$  inch-pounds ( $0.90 \pm 0.02$  Nm). Torque wrench model SCH-08008-S1 is highly recommended.

### Appendix: The Outline of Externally Biased Mixer Voltage Regulator (SOR-05-SM-R1).

*Unless otherwise specified, all dimensions are in inches [millimeters]*

