AVANTEK

189 ORIG

005141

5141 AWN

MSF-8885
Silicon Bipolar MMIC
Frequency Converter
July, 1986

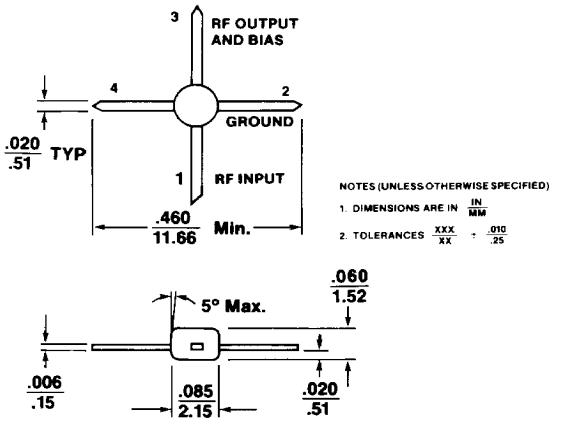
Features

- **Up or Down Frequency Conversion with up to 20 dB Conversion Gain**
- **RF Input From 0.5 to 10 GHz**
- **Low Phase Noise Self-Oscillating LO From 0.5 to 8 GHz Using External Tank Circuit**
- **Downconverted IF Output from dc to 2 GHz**
- **Uniform Performance**
- **Low Power Consumption per Function**
- **Low Cost per Function**
- **Low-Cost 85 mil Plastic Microstrip Package**

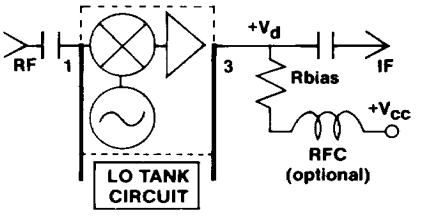
Markets

- **GPS Navigation and INMARSAT Receivers**
- **Satellite MATV and TVRO Block Converters**
- **MDS Multipoint Distribution System TV**
- **2nd IF for Police Radar Detectors**
- **Mobile and Cellular Radio Receivers**
- **CATV Converters**
- **Military Manpack and Mobile Receivers**
- **Communications and Radar Systems**
- **Low-Cost Self-Detecting Doppler Radar**

Avantek 85 Plastic Package



Functional Block Diagram



Description

The MSF-8885 is a member of Avantek's Monolithic Silicon Frequency (MSF) converter MMIC building block family. It is optimized to simultaneously function as a self-oscillating LO and two-port active mixer with up or down conversion gain. It is ideally suited for very low cost or size constrained applications where adequate conversion gain flatness, LO-RF and LO-IF isolation or spurious signal rejection can be achieved using simple external filters.

The MSF series is fabricated using a 10 GHz Ft silicon bipolar MMIC process that features sub-micrometer nitride self-alignment and ion-implantation to achieve excellent unit-unit uniformity. Biasing requires a fixed single polarity supply with an external current stabilizing resistor.

Electrical Specifications: T_a = 25° C, I_d = 35 mA, Z_o = 50 ohms, -20 dBm RF Input at 4.2 GHz and LO at 5.15 GHz

Symbol	Parameter	Freq. (GHz)	Units	Min.	Typ.	Max.
G_C	Conversion Gain to 0.95 GHz IF	4.20	dB	7	9	
P_{1dB}	Output Power at 1dB Compression	0.95	dBm		9	
IP3	3rd-order Output Intercept Point	0.95	dBm		16	
S	IF Band Spurious Signal Level (4RF-3LO)	1.35	dBc		<70	
NF	Single-Side-Band Noise Figure	4.20	dB		12	
VSWR	Input VSWR	.5-6			2.5:1	
VSWR	Output VSWR	.5-2			2.5:1	
V_d	Device Voltage	—	Vd		7.5	
V_{dtc}	Device Voltage Temp. Coefficient	—	mV/C		-11	
I_d	Normal Operating Current Range	—	mA	20	35	40

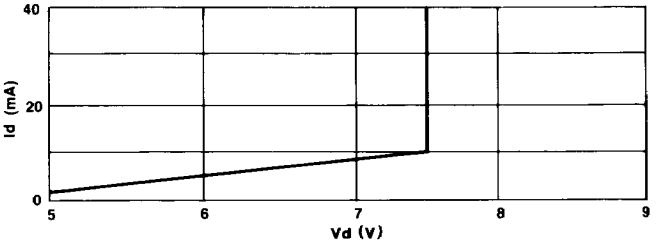
PATENT PENDING

ABSOLUTE MAXIMUM RATINGS

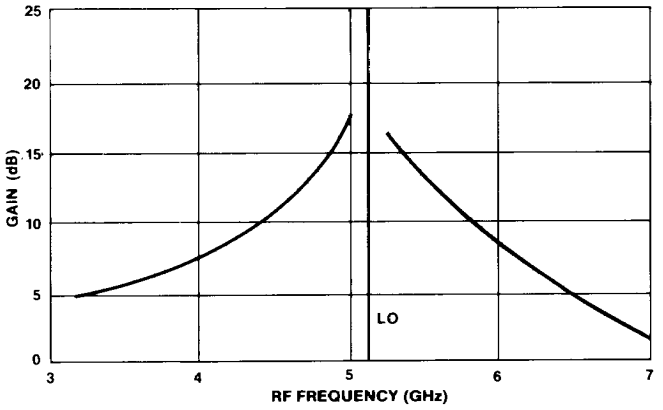
Device Current	65 mA
Power Dissipation	500 mW
RF Input Power	20 dBm
Junction Temperature	200° C
Storage Temperature	150° C
Thermal Resistance Θ_{jc}	<150°C/W

Typical Performance, T_a = 25° C, I_d = 35 mA

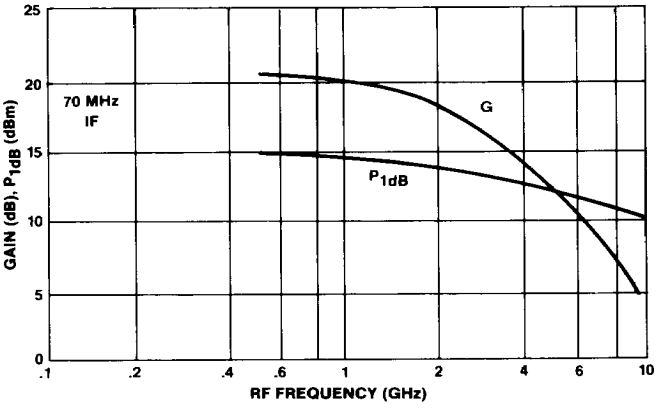
DEVICE CURRENT versus DEVICE VOLTAGE



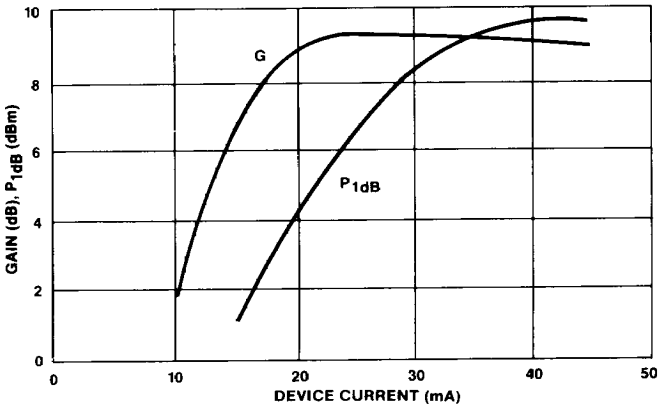
CONVERSION GAIN versus RF FREQUENCY WITH LO AT 5.15 GHz



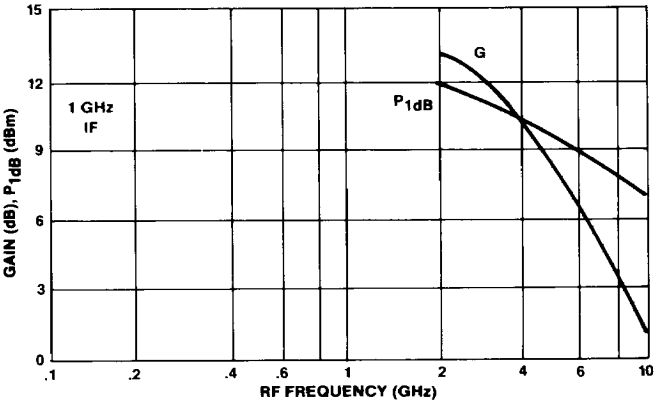
CONVERSION GAIN AND IF OUTPUT P_{1dB} versus FREQUENCY FOR IF = 70 MHz AND HIGH-SIDE LO



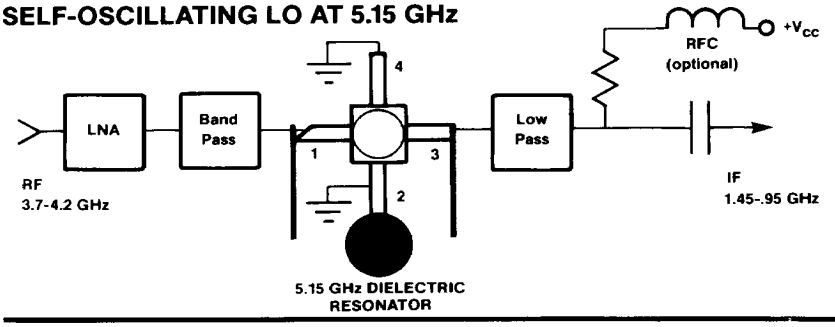
CONVERSION GAIN AND IF OUTPUT P_{1dB} versus Id FOR RF = 4.2 GHz AND IF = .95 GHz WITH LO AT 5.15 GHz

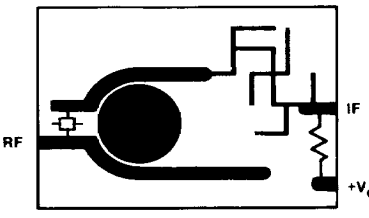


CONVERSION GAIN AND IF OUTPUT P_{1dB} versus FREQUENCY FOR IF = 1 GHz AND HIGH-SIDE LO



EXAMPLE OF TVRO BLOCK DOWN CONVERTER—CONVERSION GAIN = 7.5 ± .5 dB from 3.7-4.2 GHz WITH SELF-OSCILLATING LO AT 5.15 GHz





Actual Size PC Board
Including Output Low-Pass Filter

COMPONENT COUNT:
1-Si MMIC
2-PC Filters
1-Resistor
1-Capacitor
1-Dielectric Puck

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