

Description

The TLCO01981, or the "O-Chip," is a two-stage, three-port multi-type MMIC oscillator, sub-harmonic mixer, and multiplier. A 0.15mm MMHEMT was chosen to provide low conversion loss and high power. The mixer can be used as an up converter, as well as a down converter. The oscillator will function as a VCO, DRO, ILO, or PLL. The multiplier will multiply the carrier signal 2 to 8 times. All of the functions of the TLCO01981 are tunable by mechanically plucking airbridges (course) and bias voltage (fine) to customer specifications. The multiple uses provided by the O-Chip makes it an excellent candidate for use in radar and communication systems.

Features

- **0.15mm MMHEMT Process**
- 2x to 8x Multiplier
- VCO, DRO, ILO, PLL
- Up and Down Converter
- Low Conversion loss
- **Chip Dimensions 2.21 x 1.3 x 0.1 mm**

Absolute

Maximum

Ratings Symbol	Parameter	Rating
V _D	Positive Supply Voltage	6 V
V _G	Negative Supply Voltage	-2 V
I _D	Positive Supply Current	200 mA
Т _с	Operating Temperature	-50 to 130 °C
Τ _{stg}	Storage Temperature	-65 to 150 °C



TLCO01981

MMIC Oscillator/Mixer/Multiplier

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Performance Summary

Oscillator

<u>Min</u>	Тур	Max	
28		50	GHz
	500		MHz
10	15	18	dBm
	-85		dBc/Hz
28		45	GHz
	100		MHz
10	15	18	dBm
	-95		dBc/Hz
1		100	GHz
	TBD		MHz
			dBm
	-135		dBc/Hz
25		50	GHz
	500		MHz
8	12	16	dBm
	-120		dBc/Hz
<u>Min</u>	Тур	<u>Max</u>	
2		50	GHz
4		100	GHz
-15	0	20	dB
Min	Тур	Max	
1	2	3	GHz
4		100	GHz
-15	0	2	dB
-20	-12	-8	dB
0.75	2	3	V
-0.5	0	0.5	V
75	100	150	mA
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MMIC Oscillator/Mixer/Multiplier



Bond Pad 1 (RF/IF Input)	0.1x0.1
Bond Pad 2 (LO Input)	0.1x0.1
Bond Pad 3 (RF/IF Output)	0.1x0.1
Bond Pad 4 (VG)	0.1x0.1
Bond Pad 5 (VD)	0.1x0.1





Note: Use one (1) 0.002" by 0.0005" gold ribbon or two (2) 0.0007" wire for bonding the RF input and output. Mount chip using silver epoxy (e.g. Epo-Tek H32C) or Gold-Tin (AuSn:80/20) solder. For best heat sinking, use either gold plated copper or composite matrix material, e.g. Thermocon.



Recommended Assembly Diagram





TLCO01981 MMIC Oscillator/Mixer/Multiplier

Performance Capabilities



Figure 1. Spectral output of the TLCO01981 configured as a frequency multiplier from a 9.0 GHz fundamental signal injected into the terminal, multiplied 4X to 36 GHz.



Figure 3. Phase noise measurement of the TLCO01981 in a DRO configuration at 36 GHz. –93 dBc/Hz @ 100 kHz.



Figure 2. Spectral output of TLCO01991 as a doubler from a 38.5 GHz source from a frequency synthesizer to 77 GHz signal. Output after 10 dB coupler.



Figure 4. Spectral output of the TLCO01981 as a free running VCO at 38 GHz.



Performance Capabilities



Figure 5. The TLCO01981 as an Injection Lock Oscillator with a 0 dBm 35 GHz synthesize source input. Span @100Hz.



Figure 6. The TLCO01981 as a self locking (PLL) 35GHz Oscillator. Po=7.5 + 3.5 cable loss = 10.5 dBm output power.



Note: 1. The additional amplifier (TLCA03981), 10 dB coupler (TLC10DBKA), and alumina bends from the PLL design are available from TLC.

TLC issues test data on all parts sold. For volume orders, customer tuning is designed into the layout prior to fabrication (no plucking required). If additional testing is required, please send inquiry to the sales department. TLC reserves the right to change the performance data and specifications without notice.