



双通道、SiGe、高线性度、700MHz至1000MHz 下变频混频器，带有LO缓冲器/开关

MAX19985A

概述

MAX19985A高线性度、双通道、下变频混频器可为700MHz至1000MHz接收机应用提供8.7dB增益、+25.5dBm IIP3和9.0dB噪声系数。该混频器具有900MHz至1300MHz的优化LO频率范围，适合蜂窝和新700MHz频带中高端LO注入结构。MAX19985支持低端LO注入，与MAX19985A引脚、功能兼容。

除具有优异的线性度和噪声性能外，MAX19985A还具有非常高的元件集成度。该器件包括两个双平衡无源混频器核、两个LO缓冲器、一个双输入LO选择开关以及一对差分IF输出放大器。片内集成的非平衡变压器使器件能够接收单端RF和LO输入。

MAX19985A需要一个标称为0dBm的LO驱动，电源电流在 $V_{CC} = +5.0V$ 时的典型值为330mA、在 $V_{CC} = +3.3V$ 时的典型值为280mA。

MAX19985/MAX19985A与MAX19995/MAX19995A 1700MHz至2200MHz混频器引脚兼容，与MAX19997A/MAX19999 1850MHz至3800MHz混频器引脚相似。这使得该系列下变频混频器非常适合多个频段采用相同PCB布局的应用。

MAX19985A采用带裸焊盘的6mm x 6mm、36引脚、薄型QFN封装。在 $T_C = -40^{\circ}C$ 至 $+85^{\circ}C$ 扩展级温度范围内，可保证电气性能。

应用

850MHz WCDMA和cdma2000®基站
700MHz LTE/WiMAX™基站
GSM850/900 2G和2.5G EDGE基站
iDEN®基站
固定宽带无线接入
无线本地环路
个人移动无线装置
军用系统

cdma2000是电信工业协会的注册商标。
WiMAX是WiMAX论坛的商标。
iDEN是Motorola, Inc.的注册商标。

特性

- ◆ 700MHz至1000MHz RF频率范围
- ◆ 900MHz至1300MHz LO频率范围
- ◆ 50MHz至500MHz IF频率范围
- ◆ 8.7dB (典型值)转换增益
- ◆ 9.0dB (典型值)噪声系数
- ◆ +25.5dBm (典型值)输入IP3
- ◆ +12.6dBm (典型值)输入1dB压缩点
- ◆ $P_{RF} = -10dBm$ 时，具有76dBc (典型值)的2LO-2RF杂散抑制
- ◆ 双通道理想用于分集接收机应用
- ◆ 48dB (典型值)通道间隔离
- ◆ -3dBm至+3dBm的低LO驱动
- ◆ 集成LO缓冲器
- ◆ 内部RF和LO非平衡变压器支持单端输入
- ◆ 内置SPDT LO开关，LO1至LO2的隔离度为46dB，开关时间为50ns
- ◆ 引脚兼容于MAX19995/MAX19995A系列的1700MHz至2200MHz混频器
- ◆ 引脚相似于MAX19997A/MAX19999系列的1850MHz至3800MHz混频器
- ◆ 采用+5.0V或+3.3V单电源供电
- ◆ 外部电流设置电阻允许折中选择混频器的低功耗/低性能工作模式

订购信息

PART	TEMP RANGE	PIN-PACKAGE
MAX19985AETX+	-40°C to +85°C	36 Thin QFN-EP*
MAX19985AETX+T	-40°C to +85°C	36 Thin QFN-EP*

+表示无铅/符合RoHS标准的封装。

*EP = 裸焊盘。

T = 卷带包装。

典型应用电路和引脚配置在数据资料的最后给出。



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ABSOLUTE MAXIMUM RATINGS

V _{CC} to GND	-0.3V to +5.5V	θ _{JA} (Notes 2, 3).....	+38°C/W
LO1, LO2 to GND	±0.3V	θ _{JC} (Note 3).....	7.4°C/W
Any Other Pins to GND.....	-0.3V to (V _{CC} + 0.3V)	Operating Temperature Range (Note 4).....	T _C = -40°C to +85°C
RFMAIN, RFDIV, and LO_ Input Power	+15dBm	Junction Temperature	+150°C
RFMAIN, RFDIV Current (RF is DC shorted to GND through balun).....	50mA	Storage Temperature Range	-65°C to +150°C
Continuous Power Dissipation (Note 1)	8.8W	Lead Temperature (soldering, 10s)	+300°C

Note 1: Based on junction temperature $T_J = T_C + (\theta_{JA} \times V_{CC} \times I_{CC})$. This formula can be used when the temperature of the exposed pad is known while the device is soldered down to a PCB. See the *Applications Information* section for details. The junction temperature must not exceed +150°C.

Note 2: Junction temperature $T_J = T_A + (\theta_{JA} \times V_{CC} \times I_{CC})$. This formula can be used when the ambient temperature of the PCB is known. The junction temperature must not exceed +150°C.

Note 3: Package thermal resistances were obtained using the method described in JEDEC specification JESD51-7, using a four-layer board. For detailed information on package thermal considerations, refer to www.maxim-ic.com.cn/thermal-tutorial.

Note 4: T_C is the temperature on the exposed pad of the package. T_A is the ambient temperature of the device and PCB.

Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

+5.0V SUPPLY DC ELECTRICAL CHARACTERISTICS

(Typical Application Circuit, V_{CC} = 4.75V to 5.25V, T_C = -40°C to +85°C. Typical values are at V_{CC} = 5.0V, T_C = +25°C, all parameters are production tested, unless otherwise noted.)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Supply Voltage	V _{CC}		4.75	5	5.25	V
Supply Current	I _{CC}			330	380	mA
LOSEL Input High Voltage	V _{IH}		2			V
LOSEL Input Low Voltage	V _{IL}				0.8	V
LOSEL Input Current	I _{IH} , I _{IL}		-10		+10	μA

+3.3V SUPPLY DC ELECTRICAL CHARACTERISTICS

(Typical Application Circuit, V_{CC} = 3.0V to 3.6V, T_C = -40°C to +85°C. Typical values are at V_{CC} = 3.3V, T_C = +25°C, all parameters are guaranteed by design and not production tested, unless otherwise noted.)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Supply Voltage	V _{CC}	R2 = R5 = 600Ω	3.0	3.3	3.6	V
Supply Current	I _{CC}	Total supply current, V _{CC} = 3.3V		280		mA
LOSEL Input High Voltage	V _{IH}			2		V
LOSEL Input Low Voltage	V _{IL}			0.8		V

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RECOMMENDED AC OPERATING CONDITIONS

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
RF Frequency	f_{RF}	(Note 5)	700		1000	MHz
LO Frequency	f_{LO}	(Note 5)	900		1300	MHz
IF Frequency	f_{IF}	Using Mini-Circuits TC4-1W-17 4:1 transformer as defined in the <i>Typical Application Circuit</i> , IF matching components affect the IF frequency range (Note 5)	100		500	MHz
		Using alternative Mini-Circuits TC4-1W-7A 4:1 transformer, IF matching components affect the IF frequency range (Note 5)	50		250	
LO Drive Level	P_{LO}	(Note 5)	-3		+3	dBm

+5.0V SUPPLY AC ELECTRICAL CHARACTERISTICS

(*Typical Application Circuit*, $V_{CC} = +4.75V$ to $+5.25V$, RF and LO ports are driven from 50Ω sources, $P_{LO} = -3dBm$ to $+3dBm$, $P_{RF} = -5dBm$, $f_{RF} = 700MHz$ to $1000MHz$, $f_{LO} = 900MHz$ to $1200MHz$, $f_{IF} = 200MHz$, $f_{RF} < f_{LO}$, $T_C = -40^\circ C$ to $+85^\circ C$. Typical values are at $V_{CC} = +5.0V$, $P_{RF} = -5dBm$, $P_{LO} = 0dBm$, $f_{RF} = 900MHz$, $f_{LO} = 1100MHz$, $f_{IF} = 200MHz$, $T_C = +25^\circ C$, all parameters are guaranteed by design and characterization, unless otherwise noted.) (Note 6)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Conversion Power Gain	G_C	$f_{IF} = 200MHz$, $f_{RF} = 824MHz$ to $915MHz$, $T_C = -40^\circ C$ to $+85^\circ C$	7.0	8.7	10.2	dB
		$f_{IF} = 200MHz$, $f_{RF} = 824MHz$ to $915MHz$, $T_C = +25^\circ C$ (Note 9)	7.7	8.7	9.7	
Conversion Power Gain Variation vs. Frequency	ΔG_C	Flatness over any one of three frequency bands: $f_{RF} = 824MHz$ to $849MHz$, $f_{RF} = 869MHz$ to $894MHz$, $f_{RF} = 880MHz$ to $915MHz$ (Note 9)		0.15	0.3	dB
Gain Variation Over Temperature	TC_G	$T_C = -40^\circ C$ to $+85^\circ C$		-0.012		dB/ $^\circ C$
Noise Figure	NF	$T_C = -40^\circ C$ to $+85^\circ C$		9.2	11.5	dB
		$f_{RF} = 850MHz$, $f_{IF} = 200MHz$, $P_{LO} = 0dBm$, $T_C = +25^\circ C$, $V_{CC} = +5.0V$		9.0	10.3	
Noise Figure Temperature Coefficient	TC_{NF}	$T_C = -40^\circ C$ to $+85^\circ C$		0.018		dB/ $^\circ C$
Noise Figure Under Blocking Condition	N_{FB}	+8dBm blocker tone applied to RF port, $f_{RF} = 900MHz$, $f_{LO} = 1090MHz$, $P_{LO} = -3dBm$, $f_{BLOCKER} = 800MHz$, $V_{CC} = +5.0V$ (Note 7)		18.8	22	dB
Input 1dB Compression Point	IP _{1dB}	$T_C = -40^\circ C$ to $+85^\circ C$	10.0	12.6		dBm
		$T_C = +25^\circ C$ (Note 9)	11.0	12.6		
Third-Order Input Intercept Point	IIP3	$f_{RF} = 824MHz$ to $915MHz$, $f_{RF1} - f_{RF2} = 1MHz$, $f_{IF} = 200MHz$, $P_{RF} = -5dBm$ /tone, $T_C = -40^\circ C$ to $+85^\circ C$	22.5	25.5		dBm
		$f_{RF} = 824MHz$ to $915MHz$, $f_{RF1} - f_{RF2} = 1MHz$, $f_{IF} = 200MHz$, $P_{RF} = -5dBm$ /tone, $T_C = +25^\circ C$ (Note 9)	23.5	25.5		

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+5.0V SUPPLY AC ELECTRICAL CHARACTERISTICS (continued)

(Typical Application Circuit, $V_{CC} = +4.75V$ to $+5.25V$, RF and LO ports are driven from 50Ω sources, $P_{LO} = -3dBm$ to $+3dBm$, $P_{RF} = -5dBm$, $f_{RF} = 700MHz$ to $1000MHz$, $f_{LO} = 900MHz$ to $1200MHz$, $f_{IF} = 200MHz$, $f_{RF} < f_{LO}$, $T_C = -40^\circ C$ to $+85^\circ C$. Typical values are at $V_{CC} = +5.0V$, $P_{RF} = -5dBm$, $P_{LO} = 0dBm$, $f_{RF} = 900MHz$, $f_{LO} = 1100MHz$, $f_{IF} = 200MHz$, $T_C = +25^\circ C$, all parameters are guaranteed by design and characterization, unless otherwise noted.) (Note 6)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
2LO-2RF Spur Rejection	2 x 2	$f_{RF} = 800MHz$, $f_{LO} = 1000MHz$, $f_{SPUR} = 900MHz$	$P_{RF} = -10dBm$	-63	-76	dBc
			$P_{RF} = -5dBm$ (Note 9)	-58	-71	
3LO-3RF Spur Rejection	3 x 3	$f_{RF} = 800MHz$, $f_{LO} = 1000MHz$, $f_{SPUR} = 933.3MHz$	$P_{RF} = -10dBm$	-65	-78	dBc
			$P_{RF} = -5dBm$ (Note 9)	-60	-73	
LO Leakage at RF Port		$f_{LO} = 900MHz$ to $1300MHz$, $P_{LO} = +3dBm$ (Note 10)		-40	-20	dBm
2LO Leakage at RF Port		$f_{LO} = 900MHz$ to $1200MHz$, $P_{LO} = +3dBm$ (Note 10)		-38	-25	dBm
		$f_{LO} = 1200MHz$ to $1300MHz$, $P_{LO} = +3dBm$ (Note 10)		-35	-22	
3LO Leakage at RF Port		$f_{LO} = 900MHz$ to $1300MHz$, $P_{LO} = +3dBm$ (Note 10)		-50	-28	dBm
4LO Leakage at RF Port		$f_{LO} = 900MHz$ to $1300MHz$, $P_{LO} = +3dBm$ (Note 9)		-25	-15	dBm
LO Leakage at IF Port		$f_{LO} = 900MHz$ to $1300MHz$, $P_{LO} = +3dBm$ (Note 10)		-35	-23	dBm
RF-to-IF Isolation		$f_{RF} = 824MHz$ to $915MHz$ (Note 10)	30	38		dB
LO-to-LO Isolation		$P_{LO1} = +3dBm$, $P_{LO2} = +3dBm$, $f_{LO1} = 900MHz$, $f_{LO2} = 901MHz$, $P_{RF} = -5dBm$ (Notes 8, 10)	40	46		dB
Channel-to-Channel Isolation		RFMAIN (RFDIV) converted power measured at IFDIV (IFMAIN), relative to IFMAIN (IFDIV), all unused ports terminated to 50Ω (Note 9)	40	48		dB
LO Switching Time		50% of LOSEL to IF settled within 2 degrees		50	1000	ns
RF Input Impedance	Z_{RF}			50		Ω
RF Input Return Loss		LO on and IF terminated into matched impedance		20		dB
LO Input Impedance	Z_{LO}			50		Ω
LO Input Return Loss		RF and IF terminated into matched impedance, LO port selected		20		dB
		RF and IF terminated into matched impedance, LO port unselected		20		
IF Terminal Output Impedance	Z_{IF}	Nominal differential impedance at the IC's IF output		200		Ω
IF Return Loss		RF terminated in 50Ω ; transformed to 50Ω using external components shown in the <i>Typical Application Circuit</i>		18		dB

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+3.3V SUPPLY AC ELECTRICAL CHARACTERISTICS

(Typical Application Circuit, RF and LO ports are driven from 50Ω sources. Typical values are at V_{CC} = +3.3V, P_{RF} = -5dBm, P_{LO} = 0dBm, f_{RF} = 900MHz, f_{LO} = 1100MHz, f_{IF} = 200MHz, T_C = +25°C, unless otherwise noted.) (Note 6)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Conversion Power Gain	G _C			8.7		dB
Conversion Power Gain Variation vs. Frequency	ΔG _C	Flatness over any one of three frequency bands: f _{RF} = 824MHz to 849MHz, f _{RF} = 869MHz to 894MHz, f _{RF} = 880MHz to 915MHz		0.15		dB
Gain Variation Over Temperature	TC _G	T _C = -40°C to +85°C		-0.012		dB/°C
Noise Figure	NF			9.0		dB
Noise Figure Temperature Coefficient	TC _{NF}	T _C = -40°C to +85°C		0.018		dB/°C
Input 1dB Compression Point	IP _{1dB}			10.6		dBm
Third-Order Input Intercept Point	IIP ₃	f _{RF1} = 900MHz, f _{RF2} = 901MHz, f _{IF} = 200MHz, P _{RF} = -5dBm/tone		24.7		dBm
2LO-2RF Spur Rejection	2 x 2	f _{RF} = 800MHz, f _{LO} = 1000MHz, f _{SPUR} = 900MHz	P _{RF} = -10dBm	-74.9		dBc
			P _{RF} = -5dBm	-69.9		
3LO-3RF Spur Rejection	3 x 3	f _{RF} = 800MHz, f _{LO} = 1000MHz, f _{SPUR} = 933.333MHz	P _{RF} = -10dBm	-78		dBc
			P _{RF} = -5dBm	-73		
Maximum LO Leakage at RF Port		f _{LO} = 900MHz to 1300MHz, P _{LO} = +3dBm		-40		dBm
Maximum 2LO Leakage at RF Port		f _{LO} = 900MHz to 1300MHz, P _{LO} = +3dBm		-42		dBm
Maximum LO Leakage at IF Port		f _{LO} = 900MHz to 1300MHz, P _{LO} = +3dBm		-34		dBm
Minimum RF-to-IF Isolation		f _{RF} = 824MHz to 915MHz		38		dB
LO-to-LO Isolation		P _{LO1} = +3dBm, P _{LO2} = +3dBm, f _{LO1} = 900MHz, f _{LO2} = 901MHz (Note 8)		45		dB
Channel-to-Channel Isolation		RFMAIN (RFDIV) converted power measured at IFDIV (IFMAIN), relative to IFMAIN (IFDIV), all unused ports terminated to 50Ω		48		dB
LO Switching Time		50% of LOSEL to IF settled within 2 degrees		50		ns
RF Input Impedance	Z _{RF}			50		Ω
RF Input Return Loss		LO on and IF terminated into matched impedance		21		dB
LO Input Impedance	Z _{LO}			50		Ω
LO Input Return Loss		RF and IF terminated into matched impedance, LO port selected		31		dB
		RF and IF terminated into matched impedance, LO port unselected		24		

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+3.3V SUPPLY AC ELECTRICAL CHARACTERISTICS (continued)

(*Typical Application Circuit*, RF and LO ports are driven from 50Ω sources. Typical values are at V_{CC} = +3.3V, P_{RF} = -5dBm, P_{LO} = 0dBm, f_{RF} = 900MHz, f_{LO} = 1100MHz, f_{IF} = 200MHz, T_C = +25°C, unless otherwise noted.) (Note 6)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
IF Terminal Output Impedance	Z _{IF}	Nominal differential impedance at the IC's IF output		200		Ω
IF Output Return Loss		RF terminated in 50Ω; transformed to 50Ω using external components shown in the <i>Typical Application Circuit</i>		17		dB

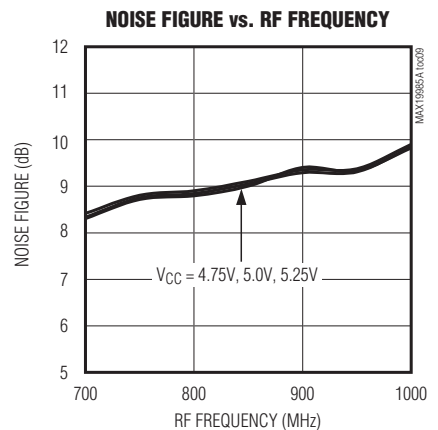
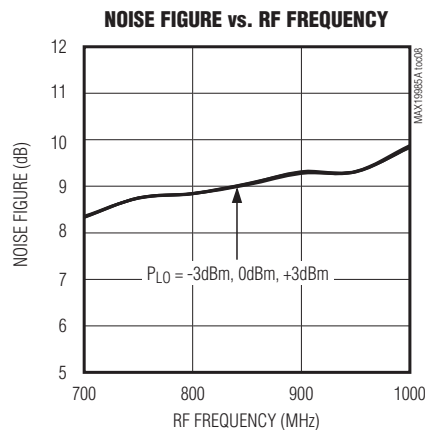
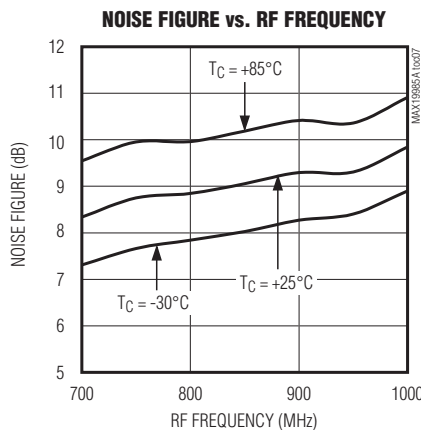
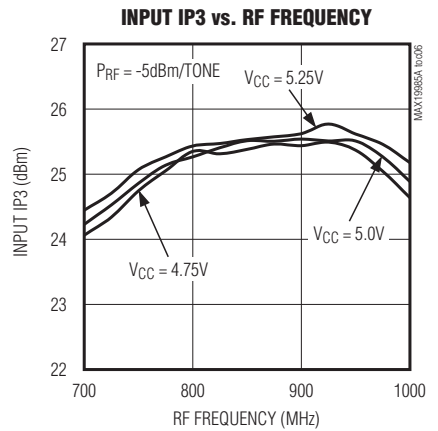
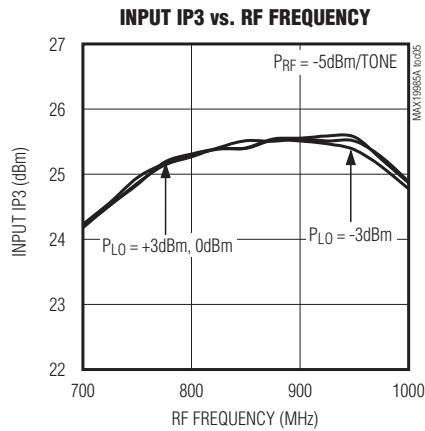
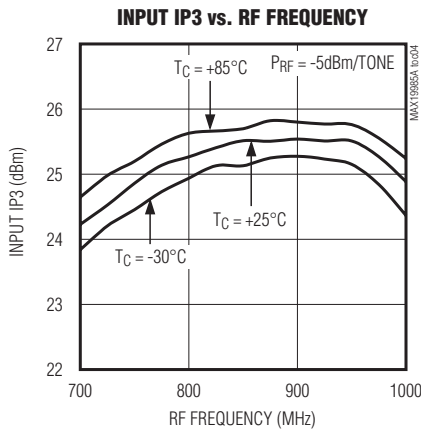
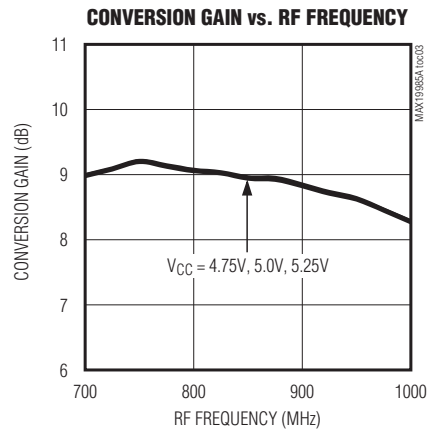
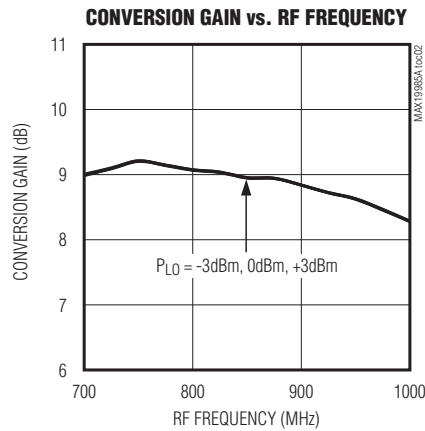
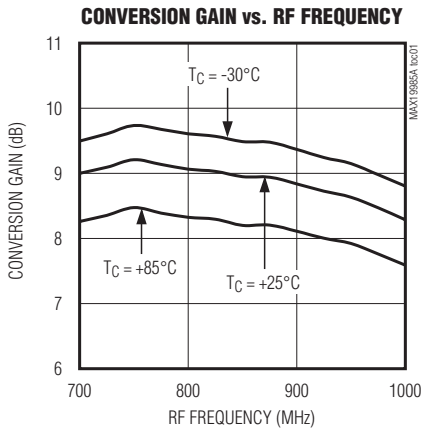
- Note 5:** Not production tested. Operation outside this range is possible, but with degraded performance of some parameters. See the *Typical Operating Characteristics*. Performance is optimized for RF frequencies of 824MHz to 915MHz.
- Note 6:** All limits reflect losses of external components. Output measurements taken at IF outputs of *Typical Application Circuit*.
- Note 7:** Measured with external LO source noise filtered so the noise floor is -174dBm/Hz. This specification reflects the effects of all SNR degradations in the mixer including the LO noise, as defined in the Application Note 2021: *Specifications and Measurement of Local Oscillator Noise in Integrated Circuit Base Station Mixers*.
- Note 8:** Measured at IF port at IF frequency. LOSEL may be in any logic state.
- Note 9:** Limited production testing.
- Note 10:** Guaranteed by production testing.

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典型工作特性

(Typical Application Circuit, $V_{CC} = +5.0V$, $P_{LO} = 0dBm$, $P_{RF} = -5dBm$, LO is high-side injected for a 200MHz IF, $T_C = +25^\circ C$, unless otherwise noted.)

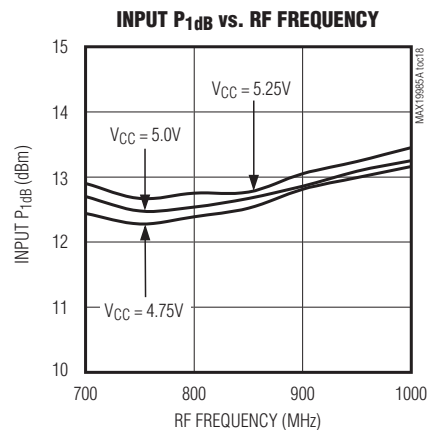
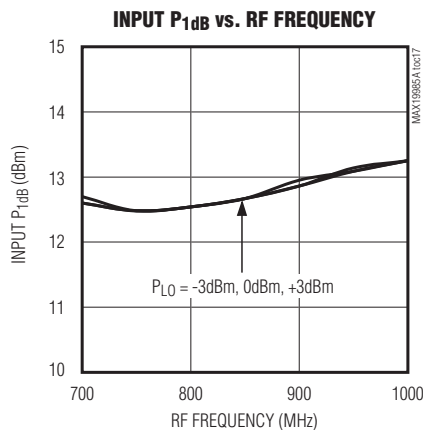
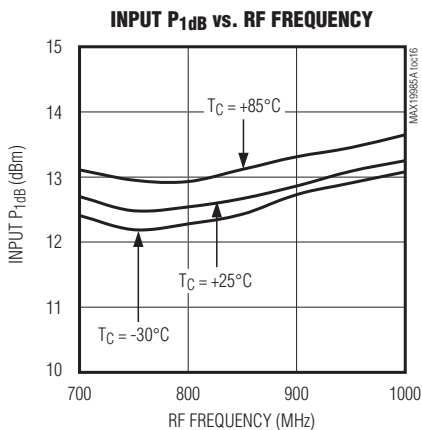
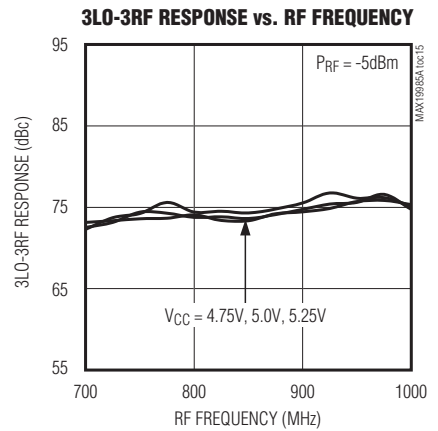
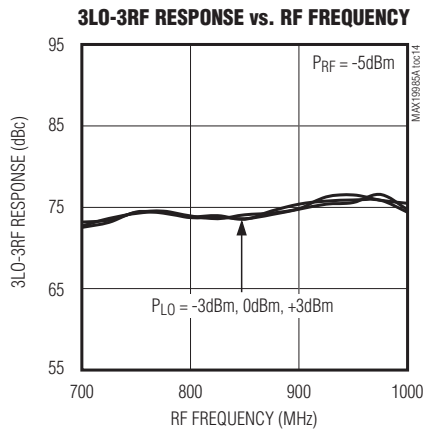
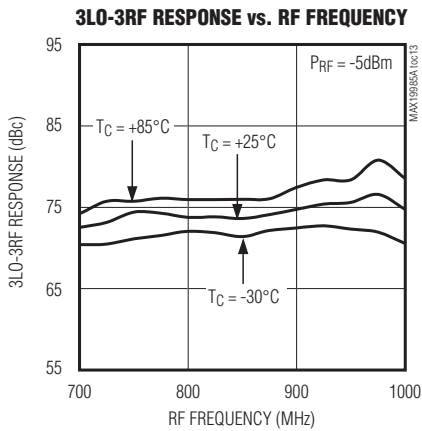
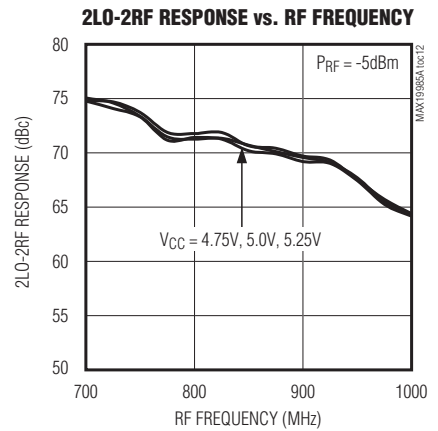
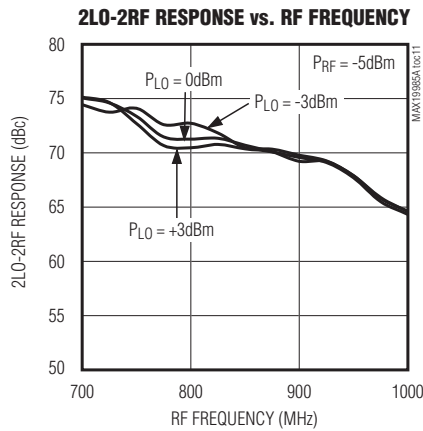
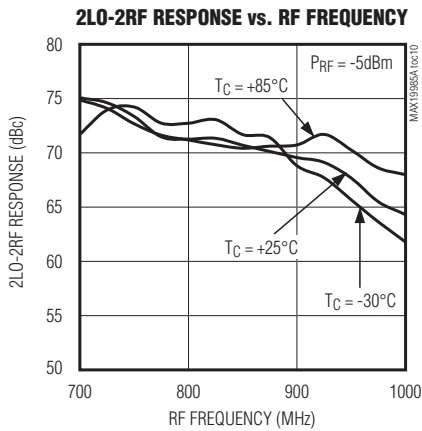
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双通道、SiGe、高线性度、700MHz至1000MHz 下变频混频器，带有LO缓冲器/开关

典型工作特性(续)

(Typical Application Circuit, $V_{CC} = +5.0V$, $P_{LO} = 0dBm$, $P_{RF} = -5dBm$, LO is high-side injected for a 200MHz IF, $T_C = +25^\circ C$, unless otherwise noted.)

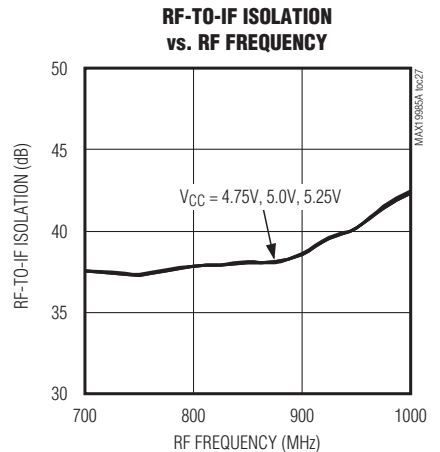
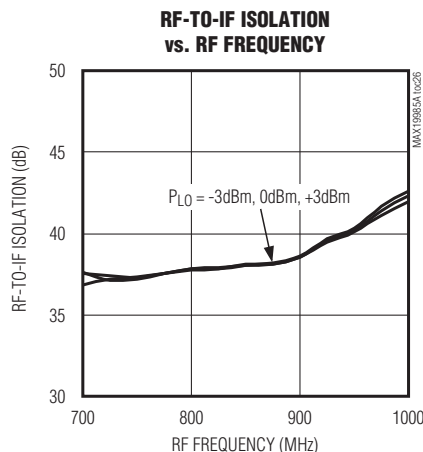
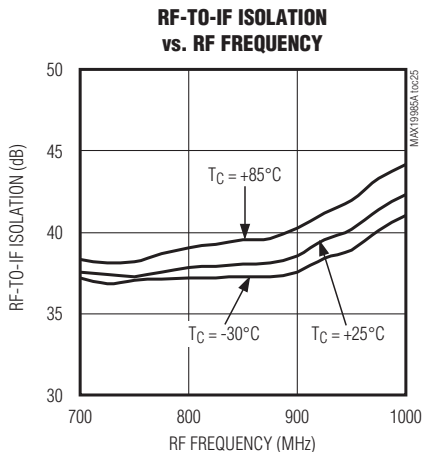
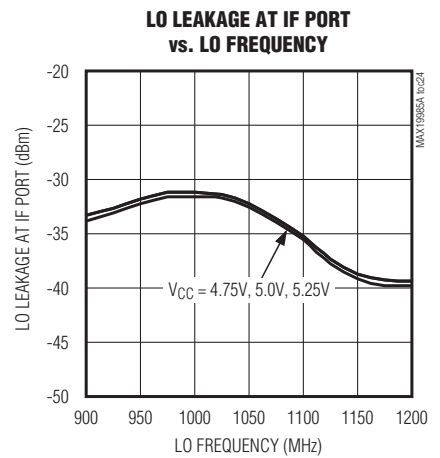
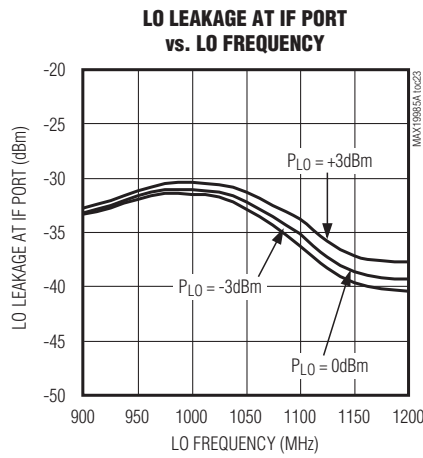
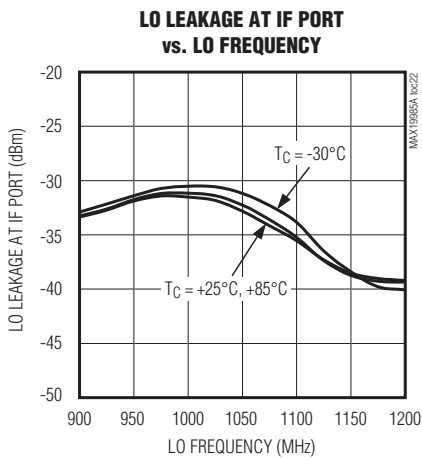
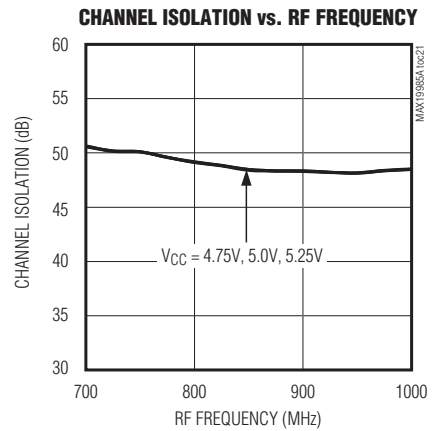
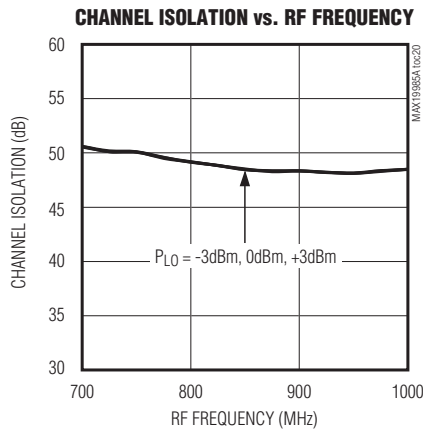
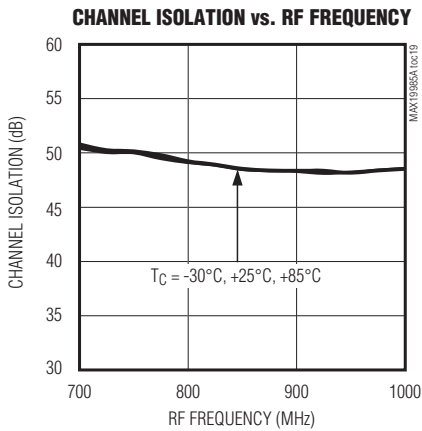


双通道、SiGe、高线性度、700MHz至1000MHz 下变频混频器，带有LO缓冲器/开关

典型工作特性(续)

(Typical Application Circuit, $V_{CC} = +5.0V$, $P_{LO} = 0dBm$, $P_{RF} = -5dBm$, LO is high-side injected for a 200MHz IF, $T_C = +25^\circ C$, unless otherwise noted.)

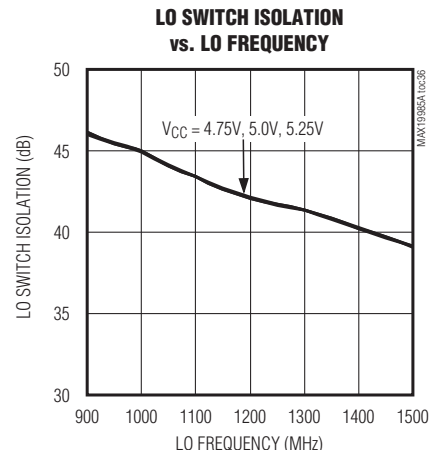
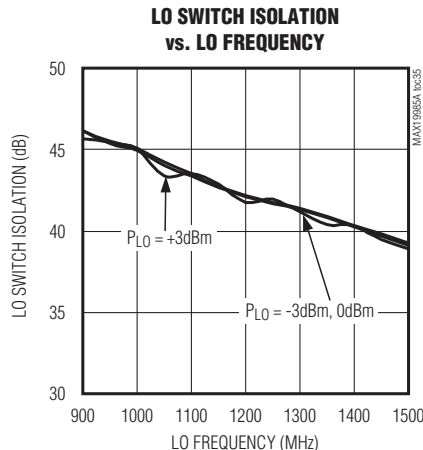
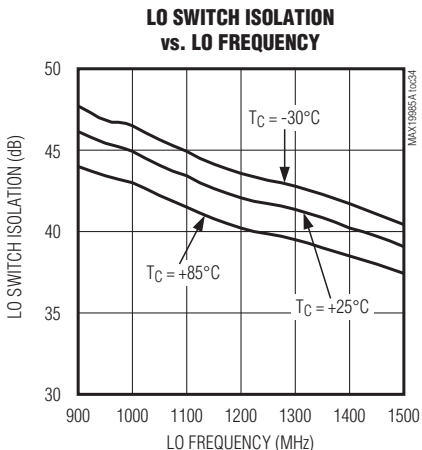
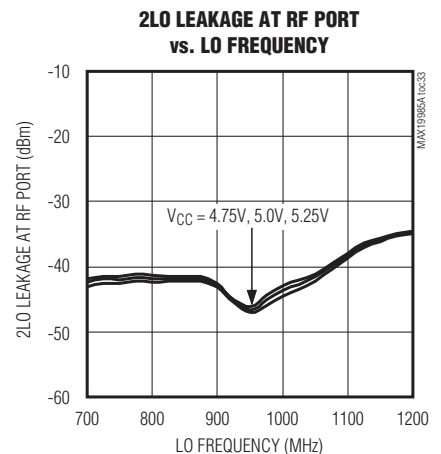
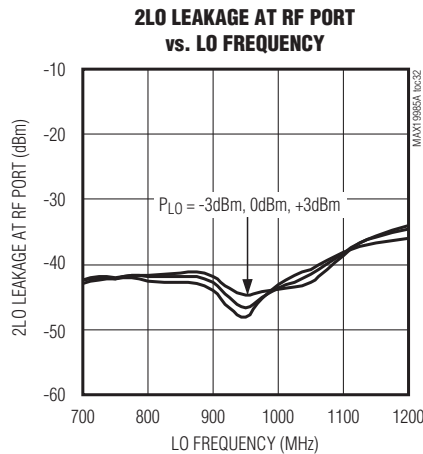
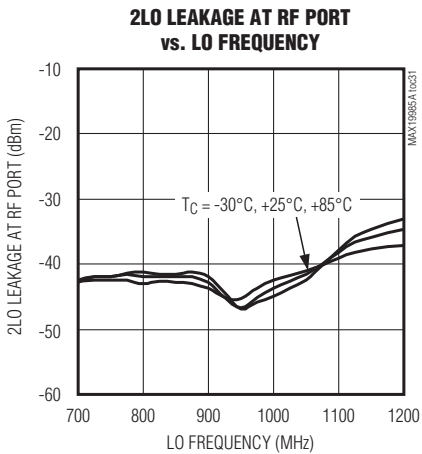
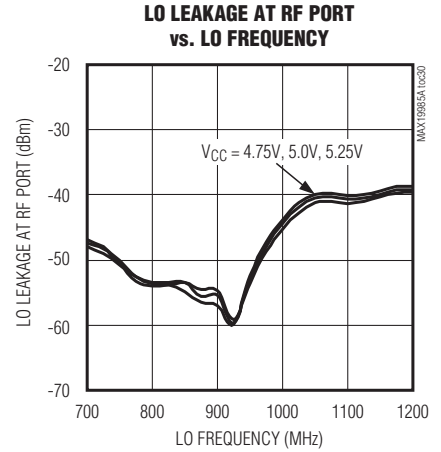
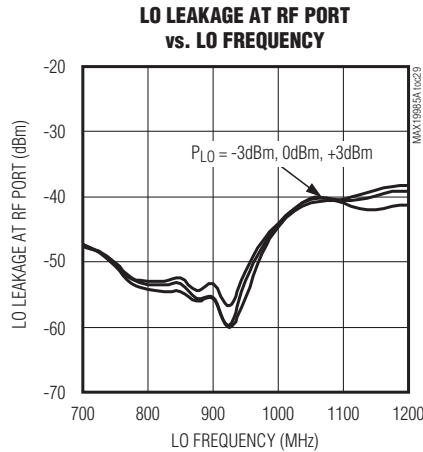
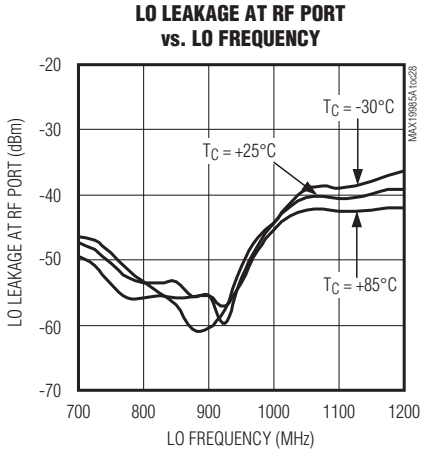
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双通道、SiGe、高线性度、700MHz至1000MHz 下变频混频器，带有LO缓冲器/开关

典型工作特性(续)

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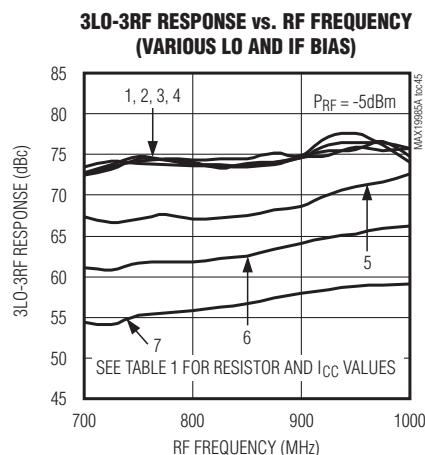
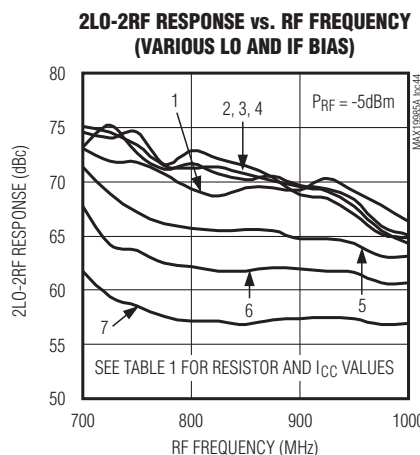
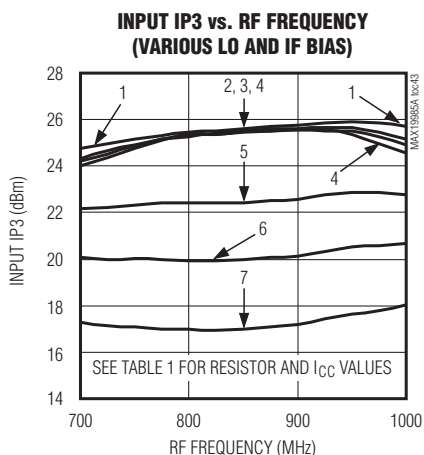
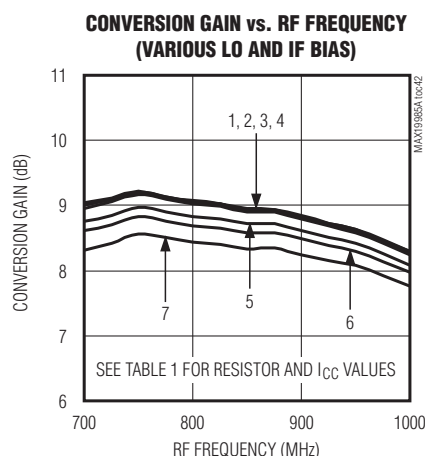
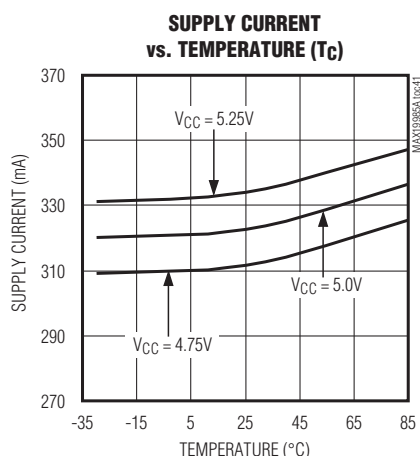
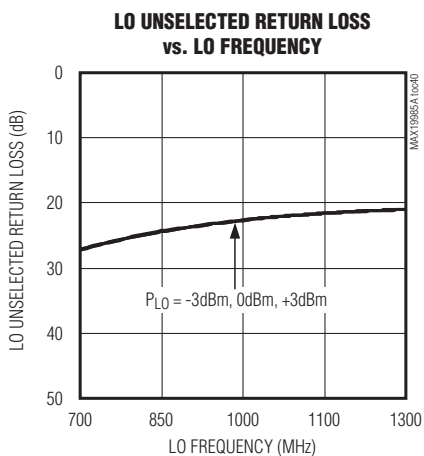
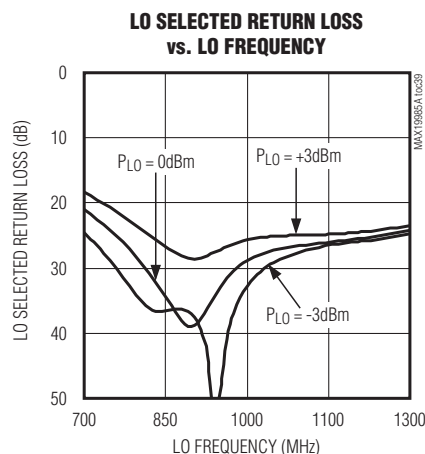
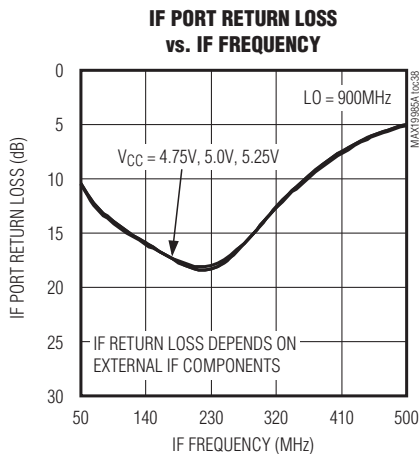
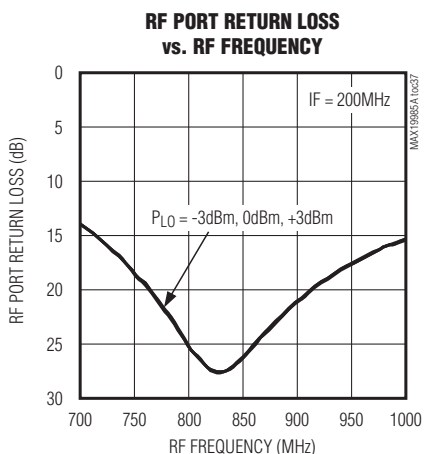


双通道、SiGe、高线性度、700MHz至1000MHz 下变频混频器，带有LO缓冲器/开关

典型工作特性(续)

(Typical Application Circuit, $V_{CC} = +5.0V$, $P_{LO} = 0dBm$, $P_{RF} = -5dBm$, LO is high-side injected for a 200MHz IF, $T_C = +25^\circ C$, unless otherwise noted.)

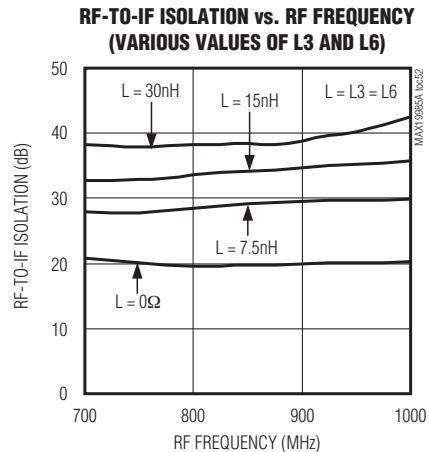
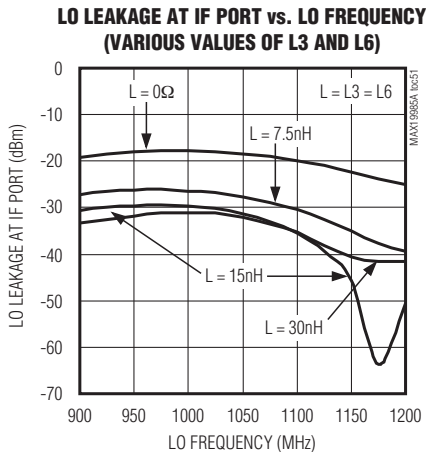
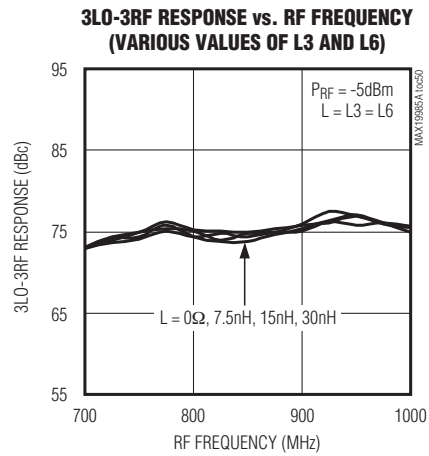
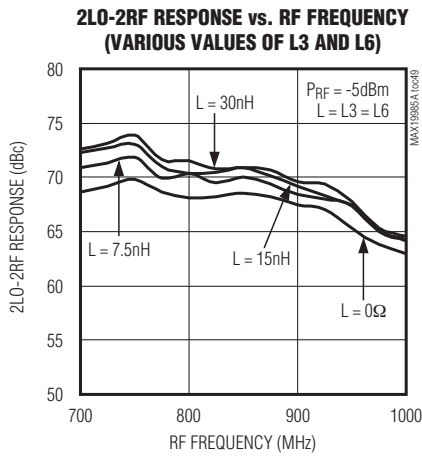
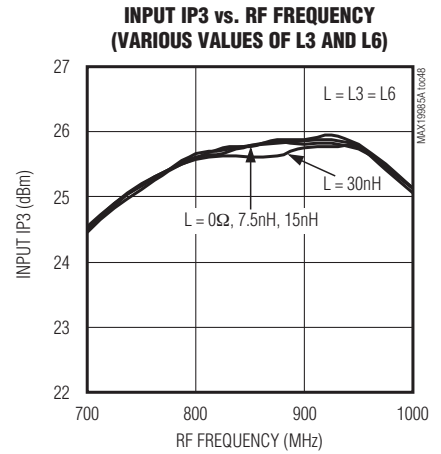
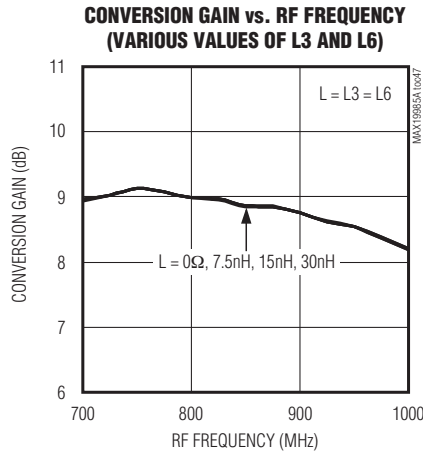
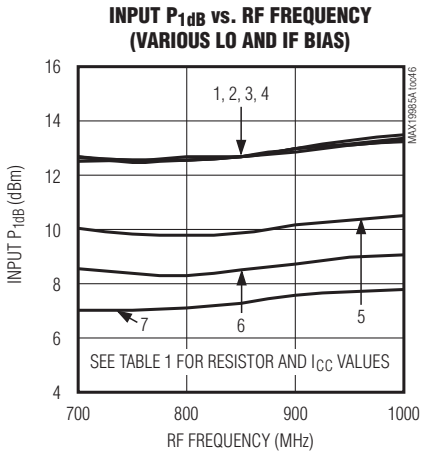
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双通道、SiGe、高线性度、700MHz至1000MHz 下变频混频器，带有LO缓冲器/开关

典型工作特性(续)

(Typical Application Circuit, $V_{CC} = +5.0V$, $P_{LO} = 0dBm$, $P_{RF} = -5dBm$, LO is high-side injected for a 200MHz IF, $T_C = +25^\circ C$, unless otherwise noted.)

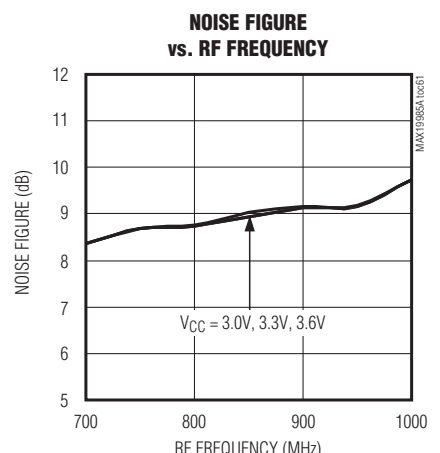
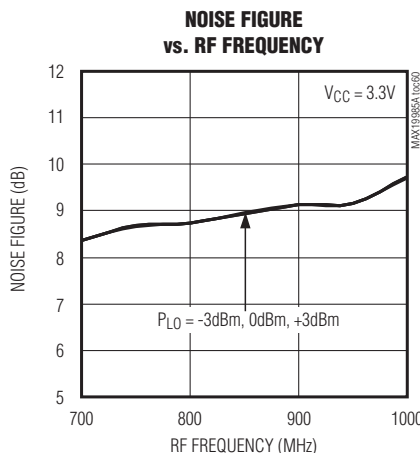
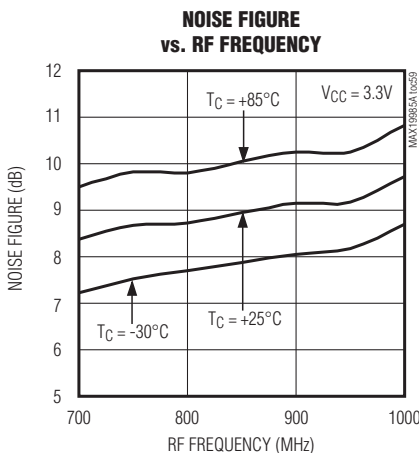
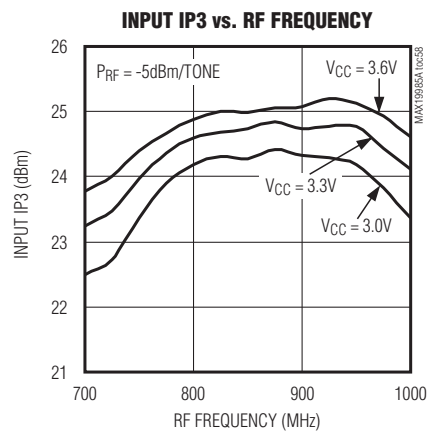
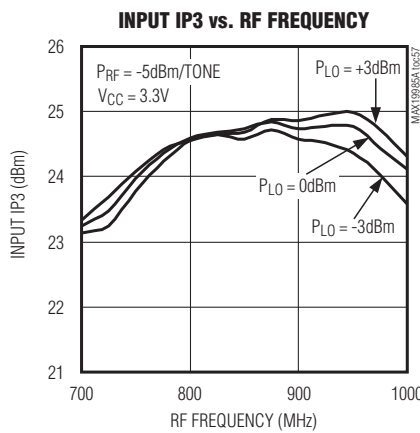
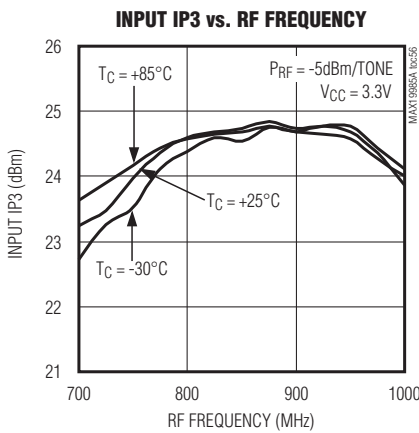
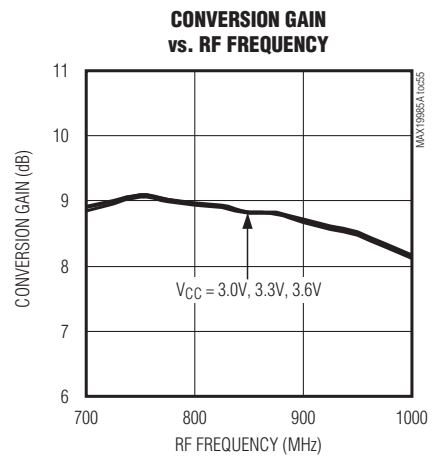
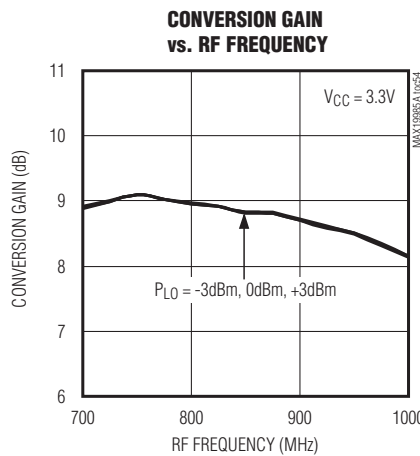
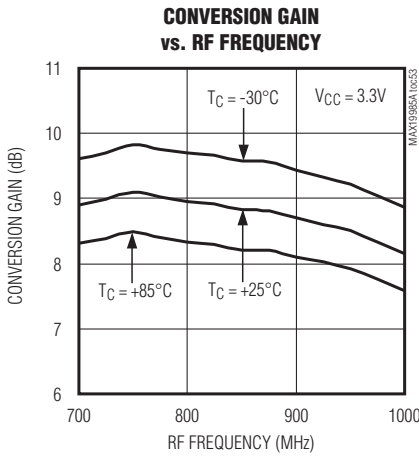


双通道、SiGe、高线性度、700MHz至1000MHz 下变频混频器，带有LO缓冲器/开关

典型工作特性(续)

(Typical Application Circuit, $V_{CC} = +3.3V$, $P_{LO} = 0dBm$, $P_{RF} = -5dBm$, LO is high-side injected for a 200MHz IF, $T_C = +25^\circ C$, unless otherwise noted.)

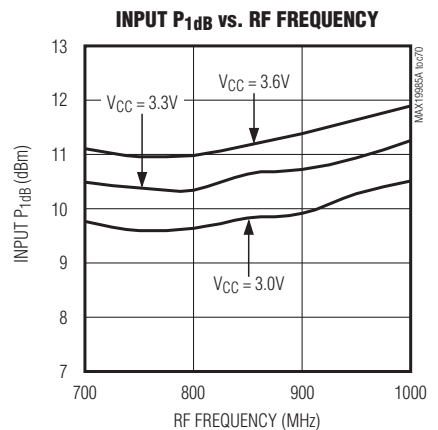
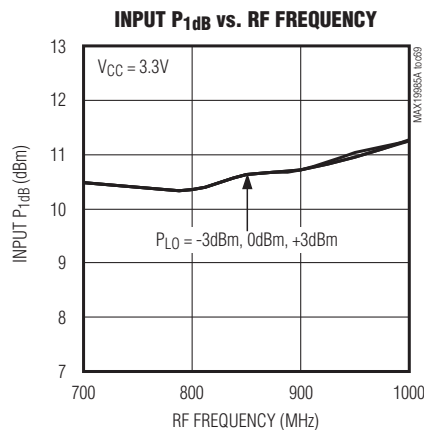
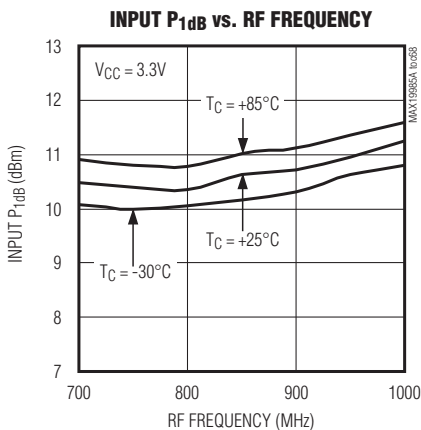
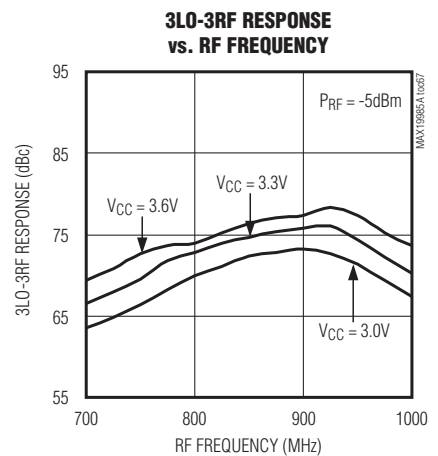
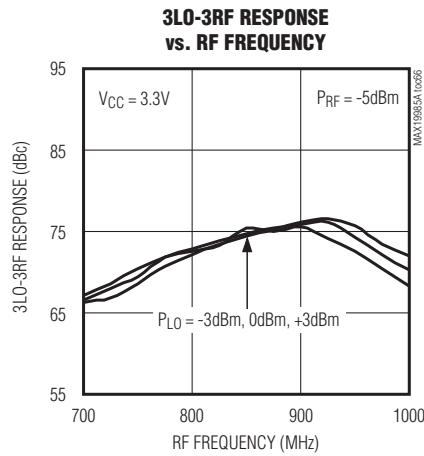
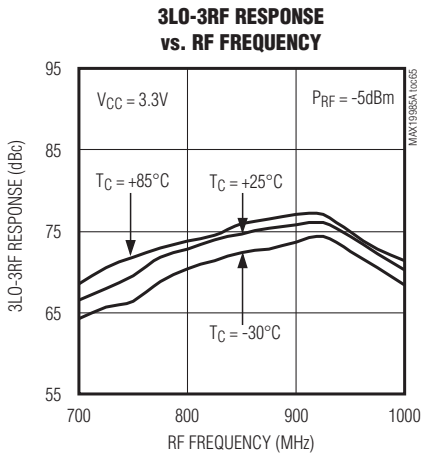
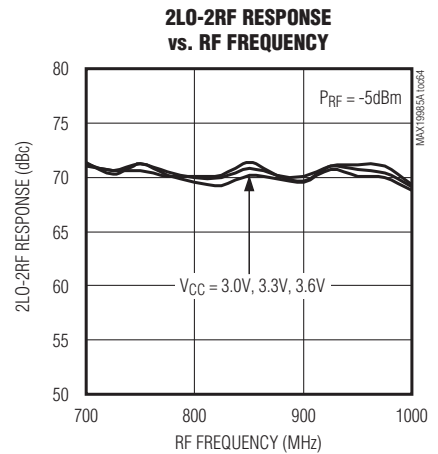
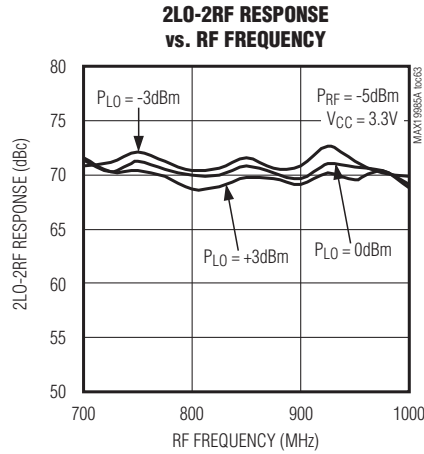
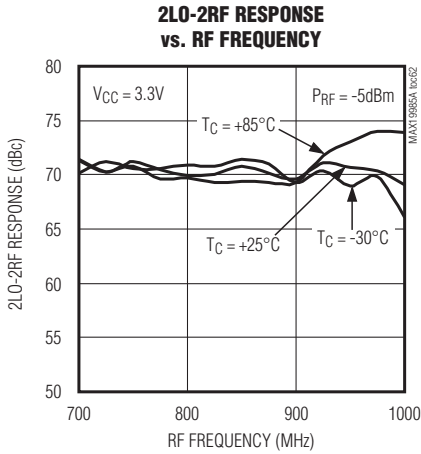
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双通道、SiGe、高线性度、700MHz至1000MHz 下变频混频器，带有LO缓冲器/开关

典型工作特性(续)

(Typical Application Circuit, $V_{CC} = +3.3V$, $P_{LO} = 0dBm$, $P_{RF} = -5dBm$, LO is high-side injected for a 200MHz IF, $T_C = +25^\circ C$, unless otherwise noted.)

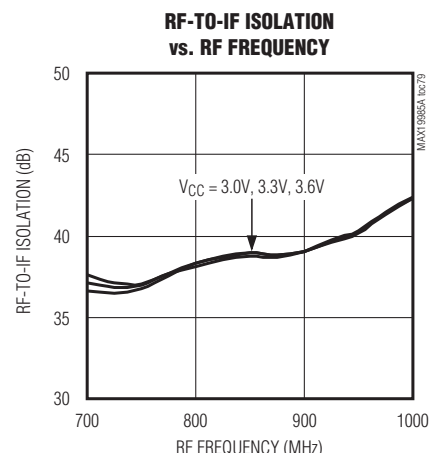
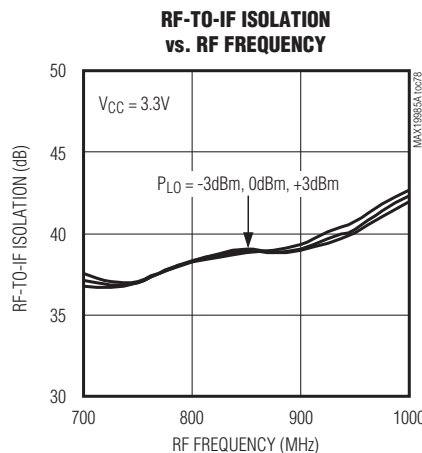
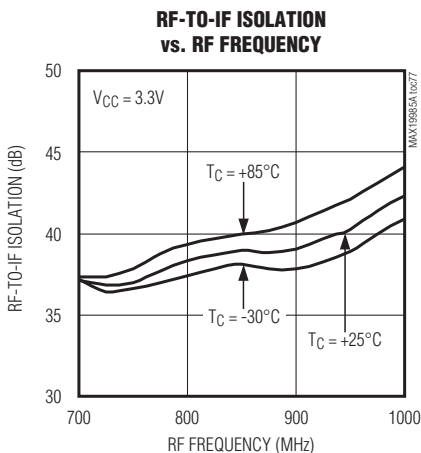
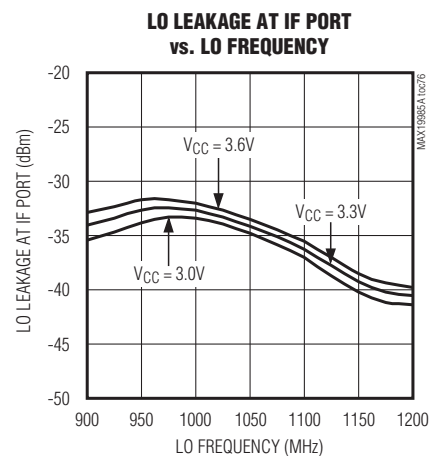
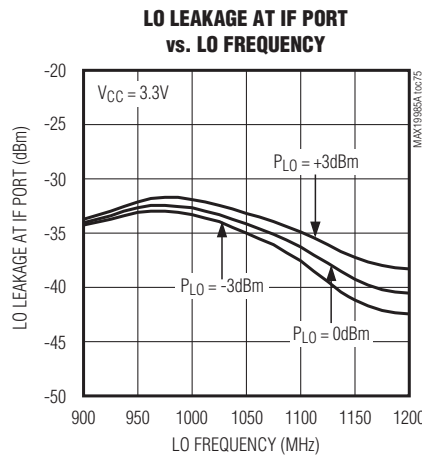
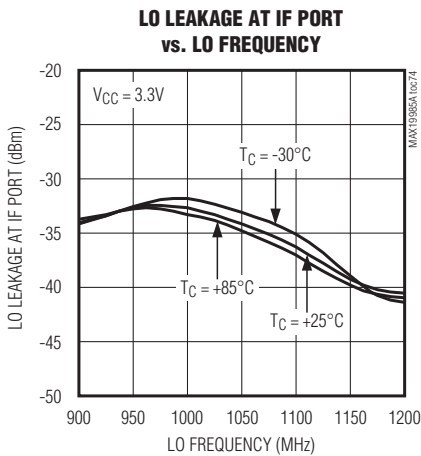
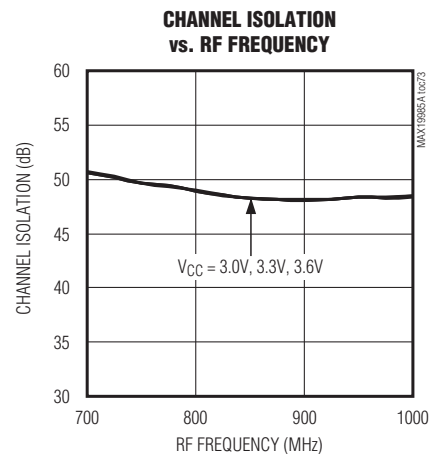
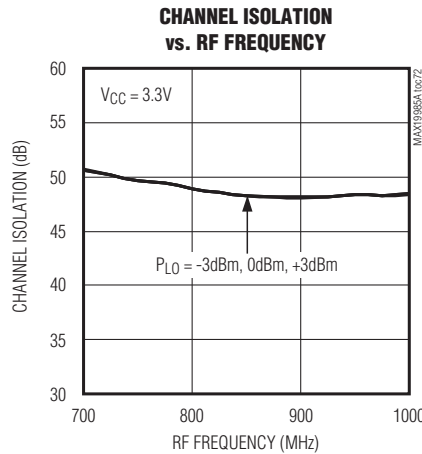
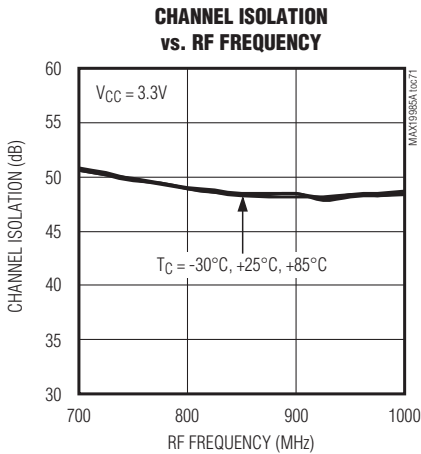


双通道、SiGe、高线性度、700MHz至1000MHz 下变频混频器，带有LO缓冲器/开关

典型工作特性(续)

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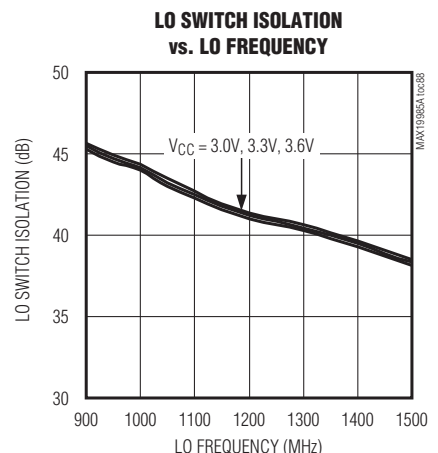
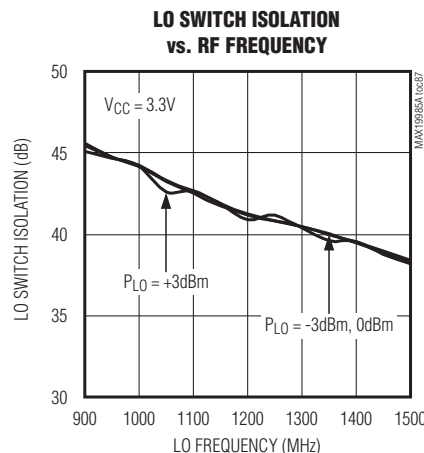
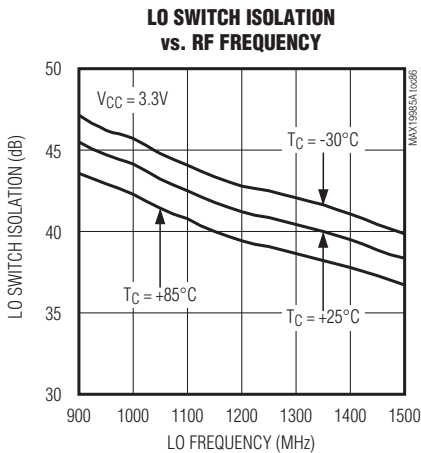
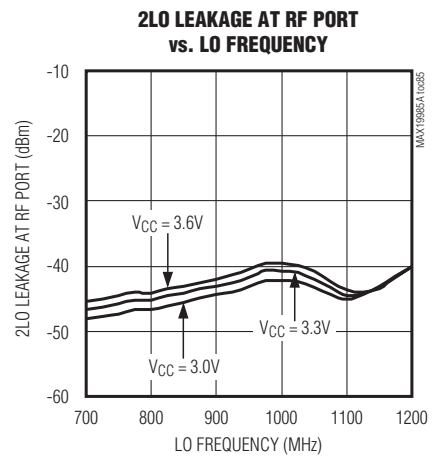
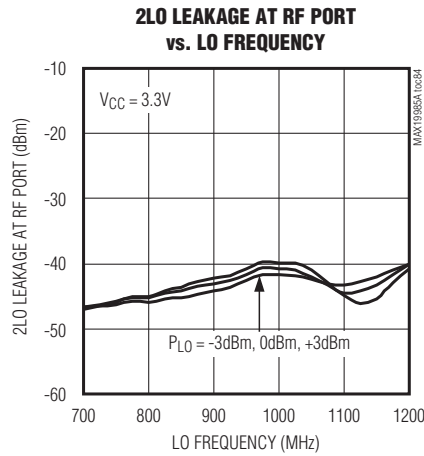
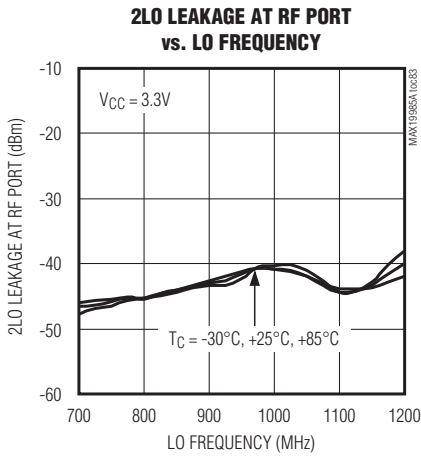
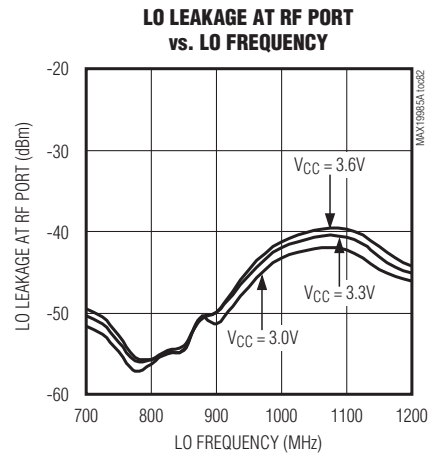
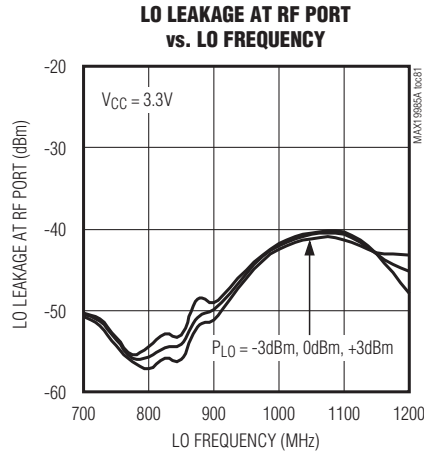
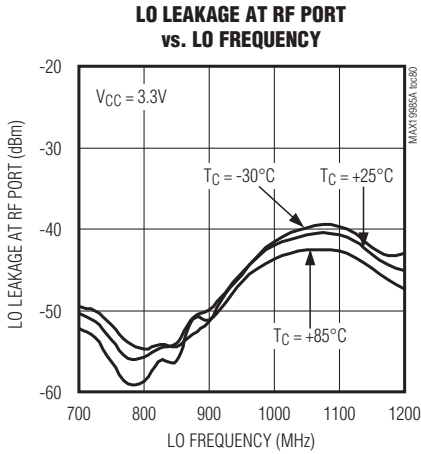
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双通道、SiGe、高线性度、700MHz至1000MHz 下变频混频器，带有LO缓冲器/开关

典型工作特性(续)

(Typical Application Circuit, $V_{CC} = +3.3V$, $P_{LO} = 0dBm$, $P_{RF} = -5dBm$, LO is high-side injected for a 200MHz IF, $T_C = +25^\circ C$, unless otherwise noted.)



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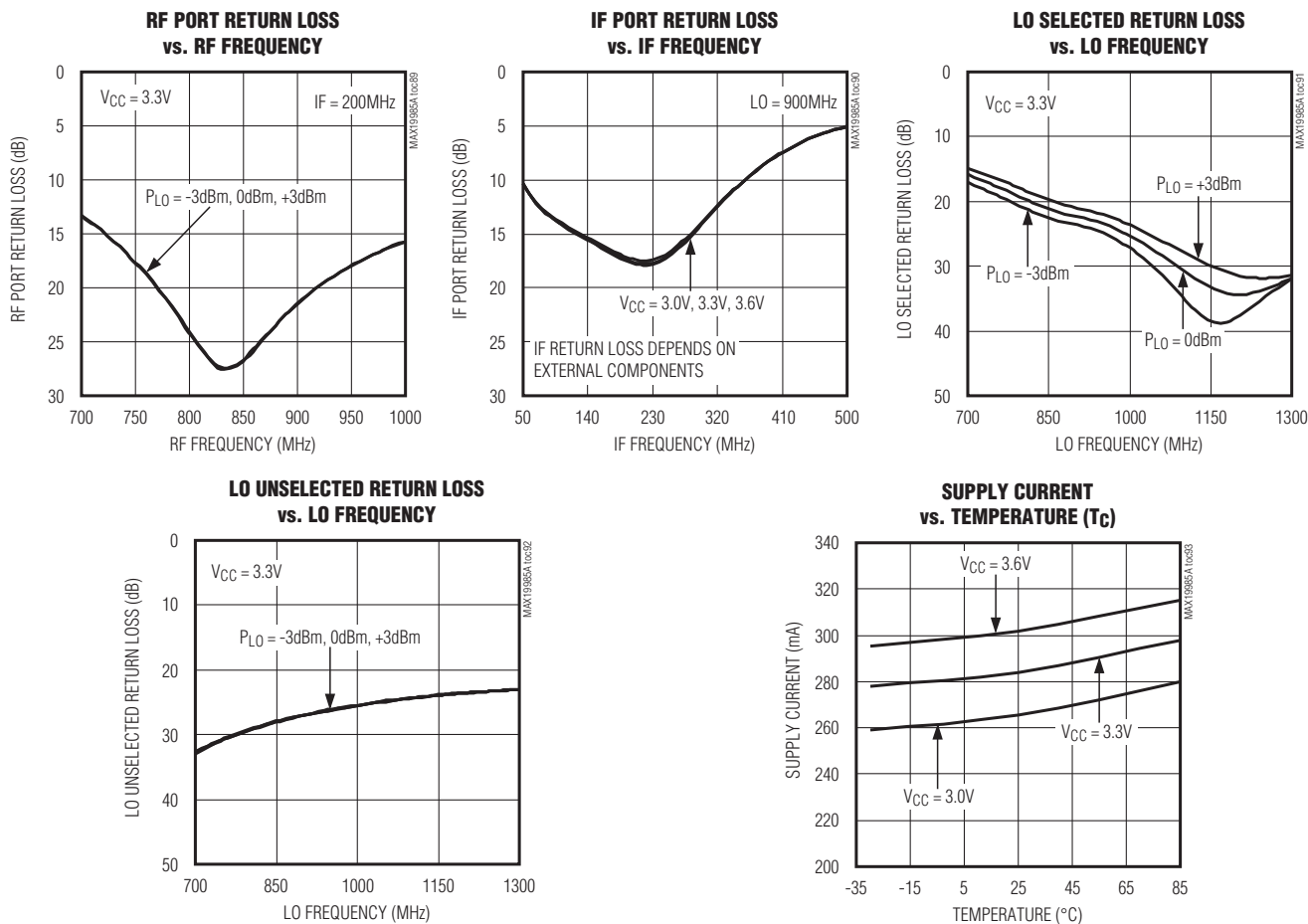


表1. 直流电流与偏压电阻设置关系

BIAS CONDITION	DC CURRENT (mA)	R1 AND R4 VALUES (Ω)	R2 AND R5 VALUES (Ω)
1	359.4	698	800
2	331.8	698	1100
3	322.8	698	1200
4	311.7	698	1400
5	268.2	1100	1200
6	244.4	1400	1200
7	223.7	1820	1200

注：参见典型工作特性中图42-46所示性能与直流偏置之间的关系。

双通道、SiGe、高线性度、700MHz至1000MHz 下变频混频器，带有LO缓冲器/开关

引脚说明

引脚	名称	功能
1	RFMAIN	主通道RF输入。内部匹配为50Ω，需要一个输入隔直电容。
2	TAPMAIN	主通道非平衡变压器的中间抽头。使用尽可能靠近该引脚放置的39pF和0.033μF电容旁路至GND，容值较小的电容离器件较近。
3, 5, 7, 12, 20, 22, 24, 25, 26, 34	GND	地。
4, 6, 10, 16, 21, 30, 36	VCC	电源，使用0.01μF电容旁路至GND，电容应尽可能靠近引脚放置，引脚4和6不需要旁路电容。
8	TAPDIV	分集通道非平衡变压器的中间抽头。使用尽可能靠近该引脚放置的39pF和0.033μF电容旁路至GND，容值较小的电容离器件较近。
9	RFDIV	分集通道RF输入。内部匹配为50Ω，需要一个输入隔直电容。
11	IFDBIAS	IF分集放大器的偏置控制。在该引脚与地之间连接一个电阻来设置分集IF放大器的偏置电流(典型性能与电阻值的对应关系请参考典型工作特性)。
13, 14	IFD+, IFD-	分集混频器差分IF输出。各引脚均需通过上拉电感连接至VCC(参见典型应用电路)。
15	LEXTD	外部分集电感连接端。在该引脚和地之间并联一个电感和一个500Ω电阻，以提高RF与IF之间和LO与IF之间的隔离度(典型性能与电感值的对应关系请参考典型工作特性)。
17	LODBIAS	LO分集放大器的偏置控制。在该引脚与地之间连接一个电阻来设置分集LO放大器的偏置电流(典型性能与电阻值的对应关系请参考典型工作特性)。
18, 28	N.C.	无连接。无内部连接。
19	LO1	本振1输入。该输入端在内部匹配为50Ω，需要一个输入隔直电容。
23	LOSEL	本振选择。该引脚为高电平时选择LO1，为低电平时选择LO2。
27	LO2	本振2输入。该输入端在内部匹配为50Ω，需要一个输入隔直电容。
29	LOMBIAS	LO主放大器的偏置控制。在该引脚与地之间连接一个电阻来设置LO主放大器的偏置电流(典型性能与电阻值的对应关系请参考典型工作特性)。
31	LEXTM	外部主电感连接端。在该引脚和地之间并联一个电感和一个500Ω电阻，以提高RF与IF之间和LO与IF之间的隔离度(典型性能与电感值的对应关系请参考典型工作特性)。
32, 33	IFM-, IFM+	主混频器差分IF输出。各引脚均需通过上拉电感连接至VCC(参见典型应用电路)。
35	IFMBIAS	IF主放大器的偏置控制。在该引脚与地之间连接一个电阻来设置IF主放大器的偏置电流(典型性能与电阻值的对应关系请参考典型工作特性)。
—	EP	裸焊盘。内部连接至GND，使用多个过孔将其连接至大面积地层，以改善散热和RF性能。

双通道、SiGe、高线性度、700MHz至1000MHz 下变频混频器，带有LO缓冲器/开关

详细说明

MAX19985A是一款双通道下变频器，设计用于提供8.7dB的转换增益、+25.5dBm的IIP3、+12.6dBm (典型值)输入1dB压缩点以及9.0dB的噪声系数。

除具有高线性度性能外，MAX19985A还具有非常高的器件集成度。该器件集成有两个双平衡混频器用于双通道下变频。主通道和分集通道都包含非平衡变压器和匹配电路，允许50Ω单端连接至RF端口和两个LO端口。集成的单刀双掷(SPDT)开关在两个LO输入之间的切换时间为50ns，具有46dB的LO至LO隔离度，在RF端具有-40dBm的LO泄漏。此外，集成LO缓冲器可以为各混频器核提供较强的驱动能力，将MAX19985A输入端的LO驱动减小到-3dBm至+3dBm。两个通道的IF端口配合差分输出进行下变频转换，可有效改善2LO-2RF性能。

该器件可在较宽的频率范围内保证性能，适用于WCDMA、GSM/EDGE、iDEN、cdma2000以及LTE/WiMAX蜂窝和700MHz带宽基站。MAX19985A能够工作在700MHz至1000MHz RF输入范围、900MHz至1300MHz LO范围以及50MHz至500MHz IF范围。外部IF器件可设置更低的频率范围(详细信息请参见典型工作特性)。器件也可以工作在上述范围以外(更多信息请参见典型工作特性)。尽管该器件针对高端LO注入架构进行优化，但其同样可用于低端LO注入模式。然而，随着 f_{LO} 频率的降低，性能有所下降。如需获得改善低端LO性能的相关信息，请参考MAX19985数据资料。

RF端口和非平衡变压器

主通道和分集通道的RF输入端均在内部匹配为50Ω，无需外部匹配元件。输入端通过片上非平衡变压器内部直流短接到地，因此需要隔直电容。在整个770MHz至915MHz的RF频率范围内，RF端口的输入回波损耗典型值为20dB。

LO输入、缓冲器和非平衡变压器

MAX19985A针对900MHz至1300MHz的LO频率范围进行了优化。作为一个附加功能，MAX19985A包括一个内部LO SPDT开关，可以用于跳频设计。该开关选择两个单端LO端口中的一个，允许外部振荡器在接入之前稳定在一个特定频率上。典型LO切换时间为50ns，远远超过典型GSM应用的要求。如果不使用跳频功能，可以简单地将开关置于任意一个LO输入端。该开关由数字输入(LOSEL)控制：逻辑高电平时选择LO1；逻辑低电平时选择LO2。LO1和LO2输入端在内部匹配为50Ω，只需一个82pF的隔直电容。为了避免损坏器件， V_{CC} 必须在LOSEL加载数字逻辑电平之前上电。在LOSEL在 V_{CC} 之前上电的应用中，可在LOSEL端串联一个1kΩ的电阻来限制输入电流。

主通道和分集通道采用两级LO缓冲器，允许使用宽输入功率范围的LO驱动。片上低损耗非平衡变压器和LO缓冲器配合使用，驱动双平衡混频器。LO输入端与IF输出端之间的所有接口和匹配元件均已集成在芯片上。

高线性度混频器

MAX19985A双通道下变频器的核心由两个双平衡、高性能无源混频器组成。片上LO缓冲器具有较大的LO摆幅，可提供优异的线性度指标。与集成IF放大器配合使用时，级联后的IIP3、2LO-2RF抑制和噪声系数的典型值分别为+25.5dBm、76dBc和9.0dB。

差分IF

MAX19985A具有50MHz至500MHz的IF频率范围，其低端频率取决于外部IF元件的频率响应。注意：这些差分端口可以改善IIP2性能。单端IF应用需要一个4:1(阻抗比)的非平衡变压器将200Ω的差分IF阻抗转换为50Ω单端输出。经过非平衡变压器之后，回波损耗的典型值为18dB。用户可以在混频器的IF端口使用差分IF放大器，但是IFD+/IFD-和IFM+/IFM-端口均需要隔直，以防止外部直流进入混频器的IF端口。

双通道、SiGe、高线性度、700MHz至1000MHz 下变频混频器，带有LO缓冲器/开关

应用信息

LEXT_电感

输入和输出匹配

RF和LO输入端在内部匹配为 50Ω ，无需匹配元件。在整个770MHz至915MHz的RF频率范围内，RF端口的输入回波损耗典型值为20dB；而在整个LO范围内，LO端口的回波损耗典型值为20dB。RF和LO输入端只需通过隔直电容连接。

IF输出阻抗为 200Ω （差分）。为方便评估，通过外部低损耗4:1（阻抗比）非平衡变压器将该阻抗转化成 50Ω 单端输出（参见典型应用电路）。

外部可调偏置

MAX19985A的每个通道均具有两个引脚(LO_BIAS、IF_BIAS)，允许通过外部电阻设置内部偏置电流。电阻的标称值如表2所示。增大电阻值可降低功耗，但性能会有所下降。请参见典型工作特性，评估功率与性能的对应关系。如果没有 $\pm 1\%$ 精度的电阻，可以采用 $\pm 5\%$ 的电阻替代。

在需要改善RF与IF之间和LO与IF之间隔离度的应用中，可以在LEXT_（引脚15和31）与地之间并联一个低ESR电感和一个 500Ω 电阻。如无需较高的隔离度指标时，用一个 0Ω 电阻将LEXT_连接至地。隔离度与电感值的对应关系请参考典型工作特性。

布局考虑

合理的PCB设计是任何RF/微波电路的一个重要部分。RF信号线应尽可能短，以减小损耗、辐射和自感。连接至混频器的负载阻抗必须保证IF-和IF+与地之间的电容不会超过几个皮法(pF)。为获得最佳性能，接地引脚须直接与封装底部的裸焊盘连接。PCB上的裸焊盘必须连接至PCB的地层。建议采用多个过孔将该焊盘连接至地层。这种方法能为器件提供一个良好的RF/散热路径。将器件封装底部的裸焊盘焊接至PCB。电路板布局请参考MAX19985A评估板，Gerber文件可从www.maxim-ic.com.cn申请。

表2. 元件值

COMPONENT	VALUE	DESCRIPTION
C1, C2, C7, C8	39pF	Microwave capacitors (0402)
C3, C6	0.033 μ F	Microwave capacitors (0603)
C4, C5	—	Not used
C9, C13, C15, C17, C18	0.01 μ F	Microwave capacitors (0402)
C10, C11, C12, C19, C20, C21	150pF	Microwave capacitors (0603)
C14, C16	82pF	Microwave capacitors (0402)
L1, L2, L4, L5	330nH	Wire-wound high-Q inductors (0805)
L3, L6	30nH	Wire-wound high-Q inductors (0603). Smaller values can be used at the expense of some performance loss (see the <i>Typical Operating Characteristics</i>).
R1, R4	698 Ω	$\pm 1\%$ resistors (0402). Larger values can be used to reduce power at the expense of some performance loss (see the <i>Typical Operating Characteristics</i>).
R2, R5	1.2k Ω	$\pm 1\%$ resistors (0402). Use for V_{CC} = +5.0V applications. Larger values can be used to reduce power at the expense of some performance loss (see the <i>Typical Operating Characteristics</i>).
	600 Ω	$\pm 1\%$ resistors (0402). Use for V_{CC} = +3.3V applications.
R3, R6	0 Ω	$\pm 1\%$ resistors (1206)
R7, R8	500 Ω	$\pm 1\%$ resistors (0402)
T1, T2	4:1	Transformers (200:50) Mini-Circuits TC4-1W-7A
U1	—	MAX19985A IC

双通道、SiGe、高线性度、700MHz至1000MHz 下变频混频器，带有LO缓冲器/开关

电源旁路

合理的电源旁路对高频电路的稳定性至关重要。如典型应用电路所示，对各V_{CC}引脚和TAPMAIN/TAPDIV引脚使用电容旁路(元件值如表2所示)。将TAPMAIN/TAPDIV的对地旁路电容放置在距相应引脚100mil以内的位置。

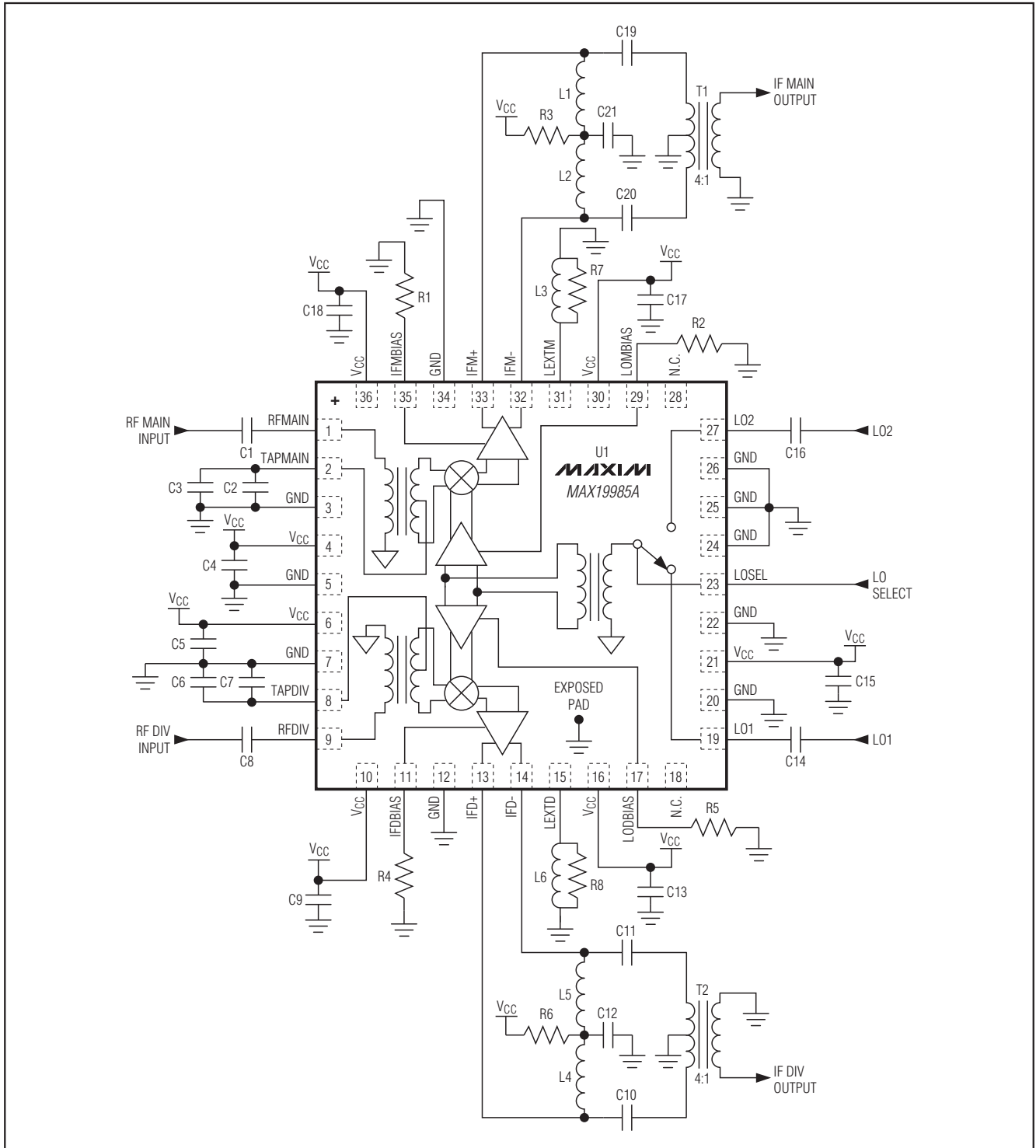
裸焊盘的RF/散热考虑

MAX19985A采用36引脚、薄型QFN-EP封装，其裸焊盘(EP)提供了一个与管芯之间的低热阻通路。在安装MAX19985A的PCB与EP之间保持良好的热传递通道非常重要。此外，EP应通过一个低电感路径接地。EP必须直接或通过一系列电镀过孔焊接至PCB的地层。

MAX19985A

双通道、SiGe、高线性度、700MHz至1000MHz 下变频混频器，带有LO缓冲器/开关

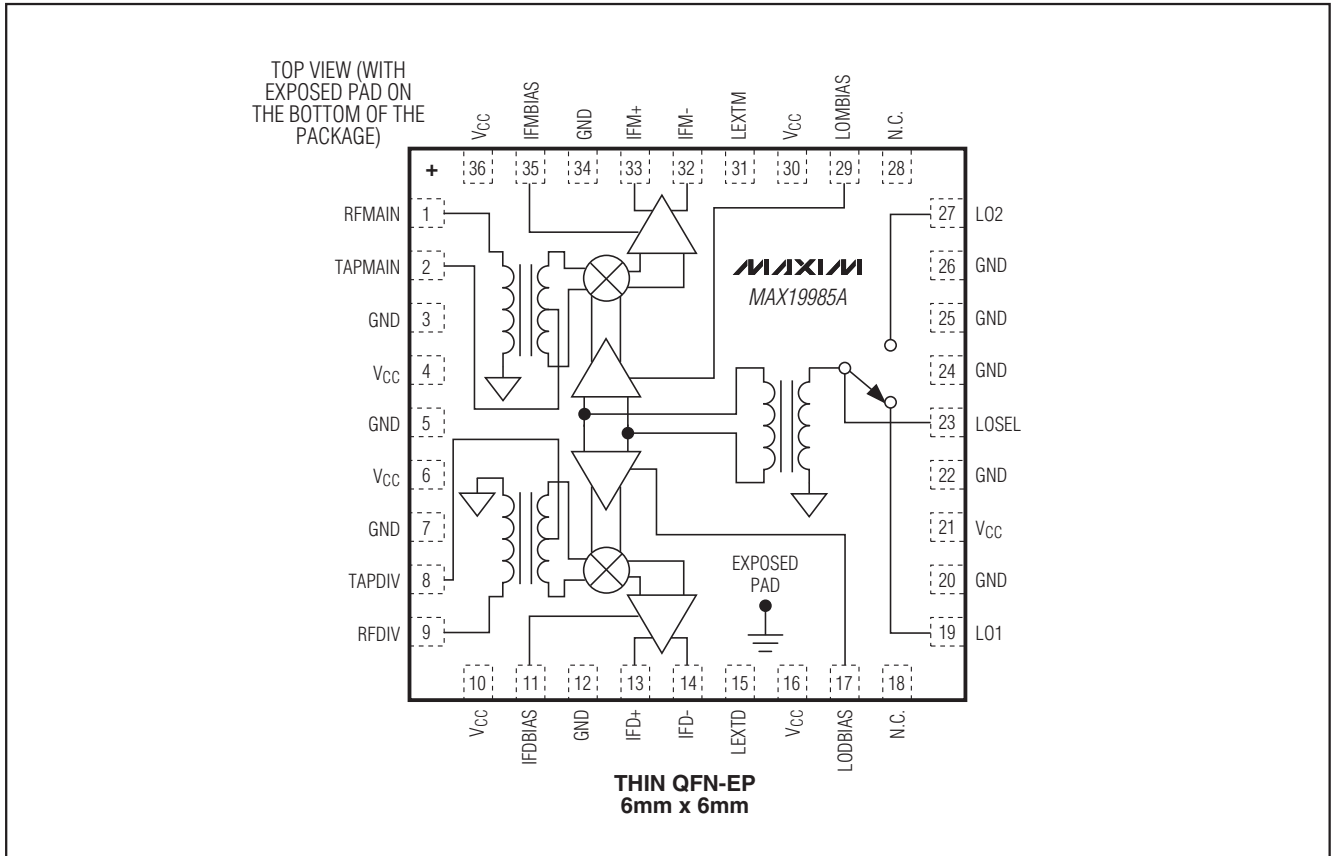
典型应用电路



双通道、SiGe、高线性度、700MHz至1000MHz 下变频混频器，带有LO缓冲器/开关

引脚配置/功能框图

MAX19985A



芯片信息

PROCESS: SiGe BiCMOS

封装信息

如需最近的封装外形信息和焊盘布局，请查询
www.maxim-ic.com.cn/packages.

封装类型	封装编码	文档编号
36引脚薄型QFN-EP	T3666+2	21-0141

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