MAX2042A

SiGe High-Linearity, 1600MHz to 3900MHz Upconversion/Downconversion Mixer with LO Buffer

General Description

The MAX2042A single, high-linearity upconversion/downconversion mixer provides up to +33dBm input IP3, 7.25dB noise figure, and 7.2dB conversion loss for 1600MHz to 3900MHz GSM/EDGE, CDMA, TD-SCDMA, WCDMA, LTE, TD-LTE, WiMAX™, and MMDS wireless infrastructure applications. With an ultra-wide 1300MHz to 4000MHz LO frequency range, the IC can be used in either low-side or high-side LO injection architectures for virtually all 1.7GHz to 3.5GHz applications (for a 2.5GHz variant tuned specifically for low-side LO injection, refer to the MAX2042).

In addition to offering excellent linearity and noise performance, the IC also yields a high level of component integration. This device includes a double-balanced passive mixer core, an LO buffer, and on-chip baluns that allow for single-ended RF and LO inputs. The IC requires a nominal LO drive of 0dBm, and supply current is typically 140mA at V_{CC} = 5.0V or 122mA at V_{CC} = 3.3V.

The MAX2042A is pin compatible with the MAX2042 2000MHz to 3000MHz mixer. The MAX2042A is also pin similar with the MAX2029/MAX2031/MAX2033 650MHz to 1550MHz mixers, the MAX2039/MAX2041 1700MHz to 3000MHz mixers, and the MAX2044 2300MHz to 4000MHz mixer, making the entire family of upconverters/downconverters ideal for applications where a common PCB layout is used for multiple frequency bands.

The MAX2042A is available in a compact, 20-pin TQFN package (5mm x 5mm) with an exposed pad. Electrical performance is guaranteed over the extended T_C = -40°C to +85°C temperature range.

Applications

1.8GHz/1.9GHz GSM/EDGE/CDMA Base Stations

2.1GHz WCDMA/LTE Base Stations

2.3GHz TD-SCDMA/TD-LTE Base Stations

2.5GHz WiMAX and LTE Base Stations

2.7GHz MMDS Base Stations

3.5GHz WiMAX and LTE Base Stations

Fixed Broadband Wireless Access

Wireless Local Loop

Private Mobile Radios

Military Systems

Benefits and Features

- **Wide-Band Coverage**
  - **1600MHz to 3900MHz RF Frequency Range**
  - **1300MHz to 4000MHz LO Frequency Range**
  - **50MHz to 500MHz IF Frequency Range**
- **7.2dB Conversion Loss**
- **7.25dB Noise Figure**
- **High Linearity**
  - **+33dBm Input IP3**
  - **+21.7dBm Input 1dB Compression Point**
  - **72dBc Typical 2LO - 2RF Spurious Rejection at P_{RF} = -10dBm**
- **Simple PCB Layout**
  - **Integrated LO Buffer**
  - **Integrated LO and RF Baluns for Single-Ended Inputs**
- **Low -6dBm to +3dBm LO Drive**
- **Pin Compatible with the MAX2042 2000MHz to 3000MHz Mixer**
- **Pin-Similar with the MAX2029/MAX2031/MAX2033 650MHz to 1550MHz Mixers, MAX2039/MAX2041 1700MHz to 3000MHz Mixers, and MAX2044 2300MHz to 4000MHz Mixer**
- **Single +5.0V or +3.3V Supply**
- **External Current-Setting Resistor Provides Option for Operating Device in Reduced-Power/Reduced-Performance Mode**

***Ordering Information* appears at end of data sheet.**

*For related parts and recommended products to use with this part, refer to **www.maxim-ic.com/MAX2042A.related**.*

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ABSOLUTE MAXIMUM RATINGS

V_{CC} to GND .... -0.3V to +5.5V
IF+, IF-, LOBIAS to GND .... -0.3V to (V_{CC} + 0.3V)
RF, LO Input Power .... +20dBm
IF Input Power (50Ω source) .... +18dBm
RF, LO Current (RF and LO are DC shorted to GND through a balun) 50mA
Operating Case Temperature Range (Note 1) .... -40°C to +85°C
Continuous Power Dissipation (Note 2) 5.0W
Junction Temperature .... +150°C
Storage Temperature Range .... -65°C to +150°C
Lead Temperature (soldering 10s) .... +300°C
Soldering Temperature (reflow) .... +260°C

Note 1: T_C is the temperature on the exposed pad of the package. T_A is the ambient temperature of the device and PCB.
Note 2: Based on junction temperature $T_J = T_C + (\theta_{JC} \times V_{CC} \times I_{CC})$. 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.

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.

PACKAGE THERMAL CHARACTERISTICS

TQFN
Junction-to-Ambient Thermal Resistance θ_{JA} (Notes 3, 4) .... +38°C/W
Junction-to-Case Thermal Resistance θ_{JC} (Notes 2, 4) .... +13°C/W

Note 3: 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 4: 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/thermal-tutorial**.

5.0V SUPPLY DC ELECTRICAL CHARACTERISTICS

(*Typical Application Circuit*, V_{CC} = 4.75V to 5.25V, no input AC signals. T_C = -40°C to +85°C, unless otherwise noted. Typical values are at V_{CC} = 5.0V, T_C = +25°C.)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Supply Voltage	V_{CC}		4.75	5	5.25	V
Supply Current	I_{CC}			140	162	mA

3.3V SUPPLY DC ELECTRICAL CHARACTERISTICS

(*Typical Application Circuit*, V_{CC} = 3.0V to 3.6V, no input AC applied. T_C = -40°C to +85°C, unless otherwise noted. Typical values are at V_{CC} = 3.3V, T_C = +25°C.)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Supply Voltage	V_{CC}		3.0	3.3	3.6	V
Supply Current	I_{CC}			122		mA

RECOMMENDED AC OPERATING CONDITIONS

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
RF Frequency Range Without Tuning	f_{RF1}	*Typical Application Circuit* with C1 = 8.2pF (Table 1) (Notes 5, 6)	2000		2900	MHz
RF Frequency Range With Low-Band Tuning	f_{RF2}	*Typical Application Circuit* with C1 = 1.8pF, L1 = 12nH (Table 1) (Notes 5, 6)	1600		2000	MHz
RF Frequency Range With High-Band Tuning	f_{RF3}	*Typical Application Circuit* with C1 = 1.5pF (Table 1) (Notes 5, 6)	3000		3900	MHz
LO Frequency	f_{LO}	(Note 5, 6)	1300		4000	MHz
IF Frequency	f_{IF}	Using M/A-Com MABACT0069 1:1 transformer as defined in the *Typical Application Circuit*, IF matching components affect the IF frequency range (Notes 5, 6)	50		500	MHz
LO Drive	P_{LO}		-6	0	+3	dBm

5.0V Supply, RF = 2000MHz to 2900MHz, HIGH-SIDE LO INJECTION AC ELECTRICAL CHARACTERISTICS (DOWNCONVERTER OPERATION)

(*Typical Application Circuit* with tuning elements outlined in **Table 1**, V_{CC} = 4.75V to 5.25V, RF and LO ports are driven from 50Ω sources, P_{LO} = -6dBm to +3dBm, P_{RF} = 0dBm, f_{RF} = 2000MHz to 2900MHz, f_{LO} = 2300MHz to 3200MHz, f_{IF} = 300MHz, $f_{RF} < f_{LO}$, T_C = -40°C to +85°C. Typical values are for T_C = +25°C, V_{CC} = 5.0V, P_{LO} = 0dBm, f_{RF} = 2600MHz, f_{LO} = 2900MHz, f_{IF} = 300MHz.) (Note 7)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Small-Signal Conversion Loss	L_C	f_{RF} = 2600MHz, f_{LO} = 2900MHz		7.2		
		f_{RF} = 2900MHz, f_{LO} = 3200MHz (Note 8)		7.8		
Loss Variation vs. Frequency	ΔL_C	f_{RF} = 2010MHz to 2025MHz		±0.05		dB
		f_{RF} = 2305MHz to 2360MHz		±0.05		dB
		f_{RF} = 2500MHz to 2570MHz		±0.05		dB
		f_{RF} = 2570MHz to 2620MHz		±0.05		dB
		f_{RF} = 2500MHz to 2690MHz		±0.13		dB
		f_{RF} = 2700MHz to 2900MHz		±0.02		dB
Conversion Loss Temperature Coefficient	TC_{CL}	T_C = -40°C to +85°C		0.007		dB/°C
Single Sideband Noise Figure	NF_{SSB}	No blockers present		7.25		dB
Noise Figure Temperature Coefficient	TC_{NF}	f_{RF} = 2600MHz, single sideband, no blockers present, T_C = -40°C to +85°C		0.022		dB/°C
Noise Figure Under Blocking	$NF_{Blocking}$	+8dBm blocker tone applied to RF port, f_{RF} = 2600MHz, f_{LO} = 2900MHz, $f_{BLOCKER}$ = 2400MHz (Note 9)		18		dB

5.0V Supply, RF = 2000MHz to 2900MHz, HIGH-SIDE LO INJECTION AC ELECTRICAL CHARACTERISTICS (DOWNCONVERTER OPERATION) (continued)

(*Typical Application Circuit* with tuning elements outlined in **Table 1**, V_{CC} = 4.75V to 5.25V, RF and LO ports are driven from 50Ω sources, P_{LO} = -6dBm to +3dBm, P_{RF} = 0dBm, f_{RF} = 2000MHz to 2900MHz, f_{LO} = 2300MHz to 3200MHz, f_{IF} = 300MHz, $f_{RF} < f_{LO}$, T_C = -40°C to +85°C. Typical values are for T_C = +25°C, V_{CC} = 5.0V, P_{LO} = 0dBm, f_{RF} = 2600MHz, f_{LO} = 2900MHz, f_{IF} = 300MHz.) (Note 7)

PARAMETER	SYMBOL	CONDITIONS		MIN	TYP	MAX	UNITS
Input 1dB Compression Point	IP_{1dB}	(Note 10)			21.7		dBm
Third-Order Input Intercept Point	IIP3	$f_{RF1} - f_{RF2}$ = 1MHz, $P_{RF1} = P_{RF2}$ = 0dBm (Note 8)			33		dBm
IIP3 Variation with T_C		$f_{RF1} - f_{RF2}$ = 1MHz, $P_{RF1} = P_{RF2}$ = 0dBm, T_C = -40°C to +85°C			±0.3		dB
2LO - 2RF Spur Rejection	2 x 2	f_{RF} = 2600MHz, f_{LO} = 2900MHz, f_{SPUR} = 2750MHz	P_{RF} = -10dBm		72		dBc
			P_{RF} = 0dBm		62		
3LO - 3RF Spur Rejection	3 x 3	f_{RF} = 2600MHz, f_{LO} = 2900MHz, f_{SPUR} = 2800MHz	P_{RF} = -10dBm		91		dBc
			P_{RF} = 0dBm		71		
RF Input Return Loss	RL_{RF}	LO on and IF terminated into a matched impedance			20		dB
LO Input Return Loss	RL_{LO}	RF and IF terminated into a matched impedance			19		dB
IF Output Impedance	Z_{IF}	Nominal differential impedance at the IC's IF outputs			50		Ω
IF Return Loss	RL_{IF}	RF terminated into 50Ω, LO driven by 50Ω source, IF transformed to single-ended 50Ω using external components shown in the *Typical Application Circuit*			17.5		dB
RF-to-IF Isolation		P_{LO} = +3dBm (Note 8)			38		dB
LO Leakage at RF Port		P_{LO} = +3dBm (Note 8)			-29		dBm
2LO Leakage at RF Port		P_{LO} = +3dBm			-30.1		dBm
LO Leakage at IF Port		P_{LO} = +3dBm (Note 8)			-31		dBm

3.3V Supply, RF = 2000MHz to 2900MHz, HIGH-SIDE LO INJECTION AC ELECTRICAL CHARACTERISTICS (DOWNCONVERTER OPERATION)

(*Typical Application Circuit* with tuning elements outlined in **Table 1**, RF and LO ports are driven from 50Ω sources, Typical values are for T_C = +25°C, V_{CC} = 3.3V, P_{RF} = 0dBm, P_{LO} = 0dBm, f_{RF} = 2600MHz, f_{LO} = 2900MHz, f_{IF} = 300MHz, unless otherwise noted.)

PARAMETER	SYMBOL	CONDITIONS		MIN	TYP	MAX	UNITS
Small-Signal Conversion Loss	L_C	(Note 8)			7.4		dB
Loss Variation vs. Frequency	ΔL_C	f_{RF} = 2000MHz to 2900MHz, any 100MHz band			±0.25		dB
Conversion Loss Temperature Coefficient	TC_{CL}	T_C = -40°C to +85°C			0.0079		dB/°C
Single Sideband Noise Figure	NF_{SSB}	No blockers present			7.4		dB
Noise Figure Temperature Coefficient	TC_{NF}	Single sideband, no blockers present, T_C = -40°C to +85°C			0.022		dB/°C
Input 1dB Compression Point	IP_{1dB}	(Note 10)			19.7		dBm
Third-Order Input Intercept Point	IIP3	f_{RF1} = 2600MHz, f_{RF2} = 2601MHz, P_{RF1} = P_{RF2} = 0dBm			31		dBm
IIP3 Variation with T_C		f_{RF1} = 2600MHz, f_{RF2} = 2601MHz, P_{RF1} = P_{RF2} = 0dBm, T_C = -40°C to +85°C			±0.1		dB
2LO - 2RF Spur Rejection	2 x 2	f_{RF} = 2600MHz, f_{LO} = 2900MHz, f_{SPUR} = 2750MHz	P_{RF} = -10dBm		72		dBc
			P_{RF} = 0dBm		62		
3LO - 3RF Spur Rejection	3 x 3	f_{RF} = 2600MHz, f_{LO} = 2900MHz, f_{SPUR} = 2800MHz	P_{RF} = -10dBm		85		dBc
			P_{RF} = 0dBm		65		
RF Input Return Loss	RL_{RF}	LO on and IF terminated into a matched impedance			16		dB
LO Input Return Loss	RL_{LO}	RF and IF terminated into a matched impedance			32		dB
IF Output Impedance	Z_{IF}	Nominal differential impedance at the IC's IF outputs			50		Ω
IF Return Loss	RL_{IF}	RF terminated into 50Ω, LO driven by 50Ω source, IF transformed to single-ended 50Ω using external components shown in the *Typical Application Circuit*			18		dB
RF-to-IF Isolation		P_{LO} = +3dBm			38		dB
LO Leakage at RF Port		P_{LO} = +3dBm			-31.5		dBm
2LO Leakage at RF Port		P_{LO} = +3dBm			-30		dBm
LO Leakage at IF Port		P_{LO} = +3dBm			-31.4		dBm

5.0V Supply, RF = 3100MHz to 3900MHz, LOW-SIDE LO INJECTION AC ELECTRICAL CHARACTERISTICS (DOWNCONVERTER OPERATION)

(*Typical Application Circuit* with tuning elements outlined in **Table 1**. Typical values are for T_C = +25°C, V_{CC} = 5.0V, P_{RF} = 0dBm, P_{LO} = 0dBm, f_{RF} = 3500MHz, f_{LO} = 3200MHz, f_{IF} = 300MHz, unless otherwise noted.)

PARAMETER	SYMBOL	CONDITIONS		MIN	TYP	MAX	UNITS
Small-Signal Conversion Loss	L_C				8.2		dB
Loss Variation vs. Frequency	ΔL_C	f_{RF} = 3450MHz to 3750MHz, any 100MHz band			±0.085		dB
		f_{RF} = 3450MHz to 3750MHz, any 200MHz band			±0.17		dB
Conversion Loss Temperature Coefficient	TC_{CL}	T_C = -40°C to +85°C			0.0091		dB/°C
Single Sideband Noise Figure	NF_{SSB}	No blockers present			7.6		dB
Noise Figure Temperature Coefficient	TC_{NF}	Single sideband, no blockers present, T_C = -40°C to +85°C			0.025		dB/°C
Input 1dB Compression Point	IP_{1dB}	(Note 10)			20.6		dBm
Third-Order Input Intercept Point	IIP3	f_{RF1} - f_{RF2} = 1MHz, P_{RF1} = P_{RF2} = 0dBm			31		dBm
IIP3 Variation with T_C		f_{RF1} - f_{RF2} = 1MHz, P_{RF1} = P_{RF2} = 0dBm, T_C = -40°C to +85°C			±0.5		dB
2RF - 2LO Spur Rejection	2 x 2	f_{RF} = 3500MHz, f_{LO} = 3200MHz, f_{SPUR} = 3350MHz	P_{RF} = -10dBm		71		dBc
			P_{RF} = 0dBm		61		
3RF - 3LO Spur Rejection	3 x 3	f_{RF} = 3500MHz, f_{LO} = 3200MHz, f_{SPUR} = 3300MHz	P_{RF} = -10dBm		87		dBc
			P_{RF} = 0dBm		67		
RF Input Return Loss	RL_{RF}	LO on and IF terminated into a matched impedance			15		dB
LO Input Return Loss	RL_{LO}	RF and IF terminated into a matched impedance			20		dB
IF Output Impedance	Z_{IF}	Nominal differential impedance at the IC's IF outputs			50		Ω
IF Return Loss	RL_{IF}	RF terminated into 50Ω, LO driven by 50Ω source, IF transformed to single-ended 50Ω using external components shown in the *Typical Application Circuit*			16.5		dB
RF-to-IF Isolation		P_{LO} = +3dBm			35		dB
LO Leakage at RF Port		P_{LO} = +3dBm			-29.5		dBm
2LO Leakage at RF Port		P_{LO} = +3dBm			-23		dBm
LO Leakage at IF Port		P_{LO} = +3dBm			-31.5		dBm

5.0V Supply, RF = 3100MHz to 3900MHz, HIGH-SIDE LO INJECTION AC ELECTRICAL CHARACTERISTICS (DOWNCONVERTER OPERATION)

(*Typical Application Circuit* with tuning elements outlined in **Table 1**. Typical values are for T_C = +25°C, V_{CC} = 5.0V, P_{RF} = 0dBm, P_{LO} = 0dBm, f_{RF} = 3500MHz, f_{LO} = 3800MHz, f_{IF} = 300MHz, unless otherwise noted.)

PARAMETER	SYMBOL	CONDITIONS		MIN	TYP	MAX	UNITS
Small-Signal Conversion Loss	L_C				8.6		dB
Loss Variation vs. Frequency	ΔL_C	f_{RF} = 3450MHz to 3750MHz, any 100MHz band			±0.1		dB
		f_{RF} = 3450MHz to 3750MHz, any 200MHz band			±0.2		dB
Conversion Loss Temperature Coefficient	TC_{CL}	T_C = -40°C to +85°C			0.01		dB/°C
Single Sideband Noise Figure	NF_{SSB}	No blockers present			9		dB
Noise Figure Temperature Coefficient	TC_{NF}	Single sideband, no blockers present, T_C = -40°C to +85°C			0.025		dB/°C
Input 1dB Compression Point	IP_{1dB}	(Note 10)			18		dBm
Third-Order Input Intercept Point	IIP3	f_{RF1} = 3500MHz, f_{RF2} = 3501MHz, P_{RF1} = P_{RF2} = 0dBm			28.6		dBm
IIP3 Variation with T_C		f_{RF1} = 3500MHz, f_{RF2} = 3501MHz, P_{RF1} = P_{RF2} = 0dBm, T_C = -40°C to +85°C			±0.5		dB
2LO - 2RF Spur Rejection	2 x 2	f_{RF} = 3500MHz, f_{LO} = 3800MHz, f_{SPUR} = 3650MHz	P_{RF} = -10dBm		70		dBc
			P_{RF} = 0dBm		60		
3LO - 3RF Spur Rejection	3 x 3	f_{RF} = 3500MHz, f_{LO} = 3800MHz, f_{SPUR} = 3700MHz	P_{RF} = -10dBm		83		dBc
			P_{RF} = 0dBm		63		
RF Input Return Loss	RL_{RF}	LO on and IF terminated into a matched impedance			15.5		dB
LO Input Return Loss	RL_{LO}	RF and IF terminated into a matched impedance			18.5		dB
IF Output Impedance	Z_{IF}	Nominal differential impedance at the IC's IF outputs			50		Ω
IF Return Loss	RL_{IF}	RF terminated into 50Ω, LO driven by 50Ω source, IF transformed to single-ended 50Ω using external components shown in the *Typical Application Circuit*			16		dB
RF-to-IF Isolation		P_{LO} = +3dBm			35		dB
LO Leakage at RF Port		P_{LO} = +3dBm			-36.4		dBm
2LO Leakage at RF Port		P_{LO} = +3dBm			-12.8		dBm
LO Leakage at IF Port		P_{LO} = +3dBm			-31		dBm

5.0V Supply, RF = 1650MHz to 2250MHz, HIGH-SIDE LO INJECTION AC ELECTRICAL CHARACTERISTICS (DOWNCONVERTER OPERATION)

(*Typical Application Circuit* with tuning elements outlined in **Table 1**. Typical values are for T_C = +25°C, V_{CC} = 5.0V, P_{RF} = 0dBm, P_{LO} = 0dBm, f_{RF} = 1850MHz, f_{LO} = 2150MHz, f_{IF} = 300MHz, unless otherwise noted.)

PARAMETER	SYMBOL	CONDITIONS		MIN	TYP	MAX	UNITS
Small-Signal Conversion Loss	L_C				7.5		dB
Loss Variation vs. Frequency	ΔL_C	f_{RF} = 1650MHz to 1850MHz, any 100MHz band			±0.18		dB
		f_{RF} = 1850MHz to 2250MHz, any 100MHz band			±0.15		
		f_{RF} = 1650MHz to 1850MHz, any 200MHz band			±0.36		
		f_{RF} = 1850MHz to 2250MHz, any 200MHz band			±0.3		
Conversion Loss Temperature Coefficient	TC_{CL}	T_C = -40°C to +85°C			0.0067		dB/°C
Single Sideband Noise Figure	NF_{SSB}	No blockers present			7		dB
Noise Figure Temperature Coefficient	TC_{NF}	Single sideband, no blockers present, T_C = -40°C to +85°C			0.021		dB/°C
Input 1dB Compression Point	IP_{1dB}	(Note 10)			23		dBm
Third-Order Input Intercept Point	IIP3	f_{RF1} = 1850MHz, f_{RF2} = 1851MHz, P_{RF1} = P_{RF2} = 0dBm			34.8		dBm
IIP3 Variation with T_C		f_{RF1} = 1850MHz, f_{RF2} = 1851MHz, P_{RF1} = P_{RF2} = 0dBm, T_C = -40°C to +85°C			±0.5		dB
2LO - 2RF Spur Rejection	2 x 2	f_{RF} = 1850MHz, f_{LO} = 2150MHz, f_{SPUR} = 2000MHz	P_{RF} = -10dBm		83		dBc
			P_{RF} = 0dBm		73		
3LO - 3RF Spur Rejection	3 x 3	f_{RF} = 1850MHz, f_{LO} = 2150MHz, f_{SPUR} = 2050MHz	P_{RF} = -10dBm		94		dBc
			P_{RF} = 0dBm		74		
RF Input Return Loss	RL_{RF}	LO on and IF terminated into a matched impedance			16.4		dB
LO Input Return Loss	RL_{LO}	RF and IF terminated into a matched impedance			25.2		dB
IF Output Impedance	Z_{IF}	Nominal differential impedance at the IC's IF outputs			50		Ω
IF Return Loss	RL_{IF}	RF terminated into 50Ω, LO driven by 50Ω source, IF transformed to single-ended 50Ω using external components shown in the *Typical Application Circuit*			17		dB
RF-to-IF Isolation		P_{LO} = +3dBm			48.7		dB
LO Leakage at RF Port		P_{LO} = +3dBm			-28.8		dBm
2LO Leakage at RF Port		P_{LO} = +3dBm			-35.3		dBm
LO Leakage at IF Port		P_{LO} = +3dBm			-20.8		dBm

5.0V Supply, RF = 1650MHz to 2250MHz, LOW-SIDE LO INJECTION AC ELECTRICAL CHARACTERISTICS (DOWNCONVERTER OPERATION)

(*Typical Application Circuit* with tuning elements outlined in **Table 1**. Typical values are for T_C = +25°C, V_{CC} = 5.0V, P_{RF} = 0dBm, P_{LO} = 0dBm, f_{RF} = 1850MHz, f_{LO} = 1550MHz, f_{IF} = 300MHz, unless otherwise noted.)

PARAMETER	SYMBOL	CONDITIONS		MIN	TYP	MAX	UNITS
Small-Signal Conversion Loss	L_C				8.5		dB
Loss Variation vs. Frequency	ΔL_C	f_{RF} = 1650MHz to 1850MHz, any 100MHz band			±0.35		dB
		f_{RF} = 1850MHz to 2250MHz, any 100MHz band			±0.075		
		f_{RF} = 1650MHz to 1850MHz, any 200MHz band			±0.7		
		f_{RF} = 1850MHz to 2250MHz, any 200MHz band			±0.15		
Conversion Loss Temperature Coefficient	TC_{CL}	T_C = -40°C to +85°C			0.0095		dB/°C
Single Sideband Noise Figure	NF_{SSB}	No blockers present			8.95		dB
Noise Figure Temperature Coefficient	TC_{NF}	Single sideband, no blockers present, T_C = -40°C to +85°C			0.024		dB/°C
Input 1dB Compression Point	IP_{1dB}	(Note 10)			17.2		dBm
Third-Order Input Intercept Point	IIP3	f_{RF1} = 1850MHz, f_{RF2} = 1851MHz, P_{RF1} = P_{RF2} = 0dBm			26.7		dBm
IIP3 Variation with T_C		f_{RF1} = 1850MHz, f_{RF2} = 1851MHz, P_{RF1} = P_{RF2} = 0dBm, T_C = -40°C to +85°C			±0.5		dB
2RF - 2LO Spur Rejection	2 x 2	f_{RF} = 1850MHz, f_{LO} = 1550MHz, f_{SPUR} = 1700MHz	P_{RF} = -10dBm		71		dBc
			P_{RF} = 0dBm		61		
3RF - 3LO Spur Rejection	3 x 3	f_{RF} = 1850MHz, f_{LO} = 1550MHz, f_{SPUR} = 1650MHz	P_{RF} = -10dBm		83		dBc
			P_{RF} = 0dBm		63		
RF Input Return Loss	RL_{RF}	LO on and IF terminated into a matched impedance			12.4		dB
LO Input Return Loss	RL_{LO}	RF and IF terminated into a matched impedance			17.3		dB
IF Output Impedance	Z_{IF}	Nominal differential impedance at the IC's IF outputs			50		Ω
IF Return Loss	RL_{IF}	RF terminated into 50Ω, LO driven by 50Ω source, IF transformed to single-ended 50Ω using external components shown in the *Typical Application Circuit*			19.3		dB
RF-to-IF Isolation		P_{LO} = +3dBm			44.6		dB
LO Leakage at RF Port		P_{LO} = +3dBm			-29.5		dBm
2LO Leakage at RF Port		P_{LO} = +3dBm			-29.5		dBm
LO Leakage at IF Port		P_{LO} = +3dBm			-29.7		dBm

5.0V Supply, RF = 2000MHz to 2900MHz, HIGH-SIDE LO INJECTION AC ELECTRICAL CHARACTERISTICS (UPCONVERTER OPERATION)

(*Typical Application Circuit* with tuning elements outlined in **Table 2**. Typical values are for T_C = +25°C, V_{CC} = 5.0V, P_{IF} = 0dBm, P_{LO} = 0dBm, f_{RF} = 2600MHz, f_{LO} = 2900MHz, f_{IF} = 300MHz, unless otherwise noted.)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Conversion Loss	L_C			7.3		dB
Conversion Loss Variation vs. Frequency	ΔL_C	f_{RF} = 2010MHz to 2025MHz		±0.05		dB
		f_{RF} = 2305MHz to 2360MHz		±0.05		
		f_{RF} = 2500MHz to 2570MHz		±0.05		
		f_{RF} = 2570MHz to 2620MHz		±0.05		
		f_{RF} = 2500MHz to 2690MHz		±0.15		
		f_{RF} = 2700MHz to 2900MHz		±0.2		
Conversion Loss Temperature Coefficient	TC_{CL}	T_C = -40°C to +85°C		0.007		dB/°C
Input 1dB Compression Point	IP_{1dB}	(Note 10)		22		dBm
Input Third-Order Intercept Point	IIP3	f_{IF1} = 300MHz, f_{IF2} = 301MHz, P_{IF} = 0dBm/tone		32.8		dBm
IIP3 Variation with T_C	IIP3	f_{IF1} = 300MHz, f_{IF2} = 301MHz, P_{IF} = 0dBm/tone, T_C = -40°C to +85°C		±0.5		dB
LO ± 2IF Spur		LO - 2IF		61		dBc
		LO + 2IF		62		
LO ± 3IF Spur		LO - 3IF		72		dBc
		LO + 3IF		85		
Output Noise Floor		P_{OUT} = 0dBm (Note 9)		-163		dBm/Hz

3.3V Supply, RF = 2000MHz to 2900MHz, HIGH-SIDE LO INJECTION AC ELECTRICAL CHARACTERISTICS (UPCONVERTER OPERATION)

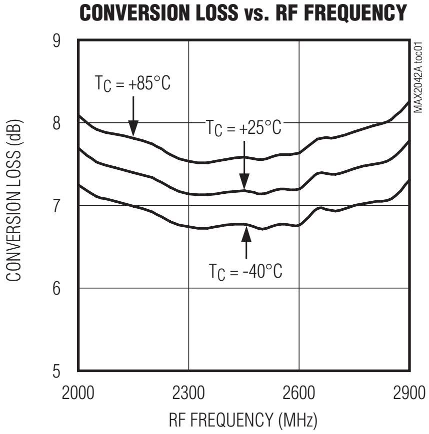
(*Typical Application Circuit* with tuning elements outlined in **Table 2**. Typical values are for T_C = +25°C, V_{CC} = 3.3V, P_{IF} = 0dBm, P_{LO} = 0dBm, f_{RF} = 2600MHz, f_{LO} = 2900MHz, f_{IF} = 300MHz, unless otherwise noted.)

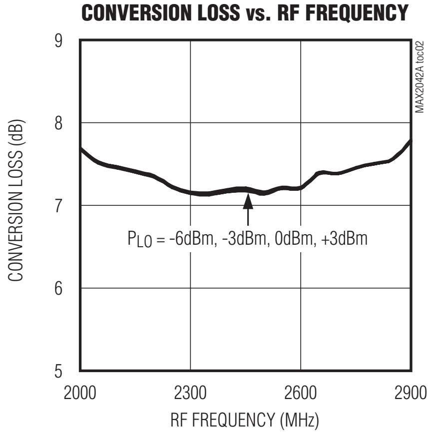
PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Conversion Loss	L_C			7.3		dB
Conversion Loss Variation vs. Frequency	ΔL_C	f_{RF} = 2000MHz to 2900MHz, any 100MHz band		±0.25		dB
Conversion Loss Temperature Coefficient	TC_{CL}	T_C = -40°C to +85°C		0.008		dB/°C
Input 1dB Compression Point	IP_{1dB}	(Note 10)		20.5		dBm
Input Third-Order Intercept Point	IIP3	f_{IF1} = 300MHz, f_{IF2} = 301MHz, P_{IF} = 0dBm/tone		30		dBm
IIP3 Variation with T_C	IIP3	f_{IF1} = 300MHz, f_{IF2} = 301MHz, P_{IF} = 0dBm/tone, T_C = -40°C to +85°C		±0.6		dB
LO ± 2IF Spur		LO - 2IF		60		dBc
		LO + 2IF		64		
LO ± 3IF Spur		LO - 3IF		68		dBc
		LO + 3IF		80		
Output Noise Floor		P_{OUT} = 0dBm (Note 9)		-160		dBm/Hz

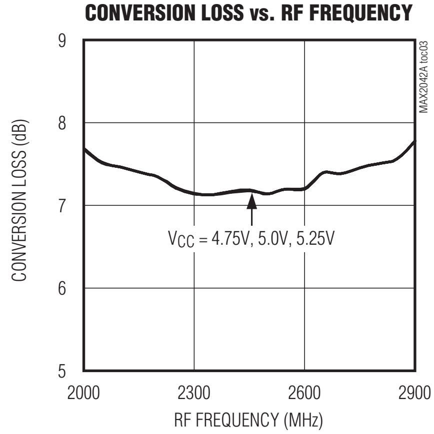
Note 5: Not production tested.
Note 6: Operation outside this range is possible, but with degraded performance of some parameters. See the *Typical Operating Characteristics*.
Note 7: All limits reflect losses of external components, including a 0.5dB loss at f_{IF} = 300MHz due to the 1:1 impedance transformer. Output measurements were taken at IF outputs of the *Typical Application Circuit*.
Note 8: 100% production tested for functional performance.
Note 9: Measured with external LO source noise filtered so that the noise floor is -174dBm/Hz at 100MHz offset. This specification reflects the effects of all SNR degradations in the mixer including the LO noise, as defined in Application Note 2021: *Specifications and Measurement of Local Oscillator Noise in Integrated Circuit Base Station Mixers*.
Note 10: Maximum reliable continuous input power applied to the RF or IF port of this device is +12dBm from a 50Ω source.

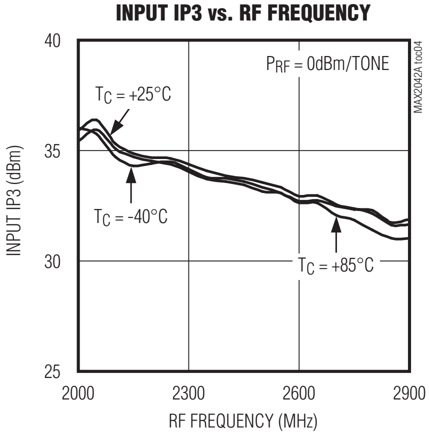
Typical Operating Characteristics

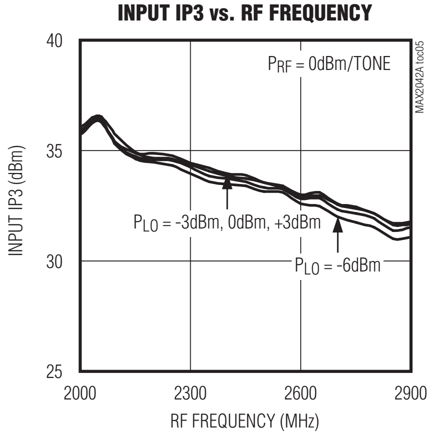
(*Typical Application Circuit* with tuning elements outlined in **Table 1**, **V_{CC} = 5.0V, f_{RF} = 2000MHz to 2900MHz, LO is high-side injected** for a 300MHz IF, P_{RF} = 0dBm, P_{LO} = 0dBm, T_C = +25°C, unless otherwise noted.)

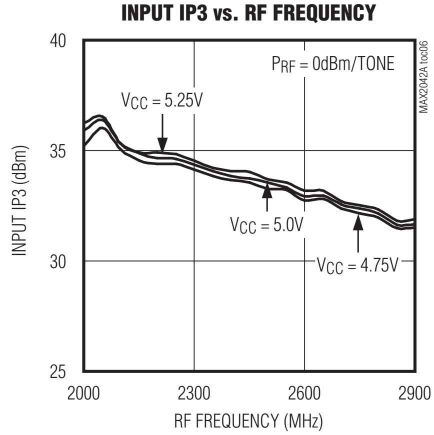


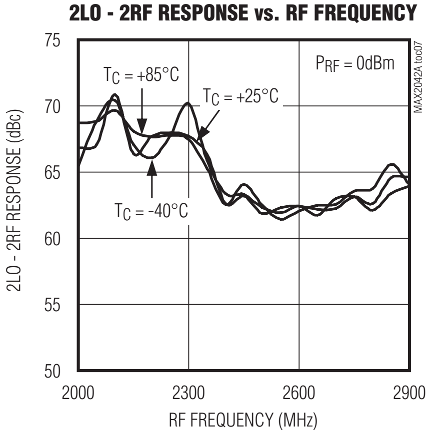


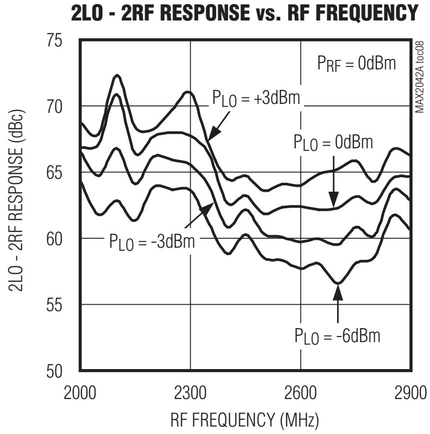


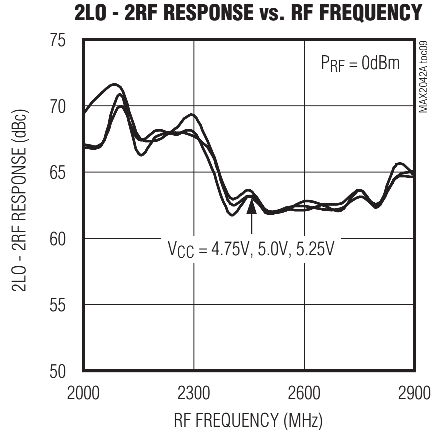








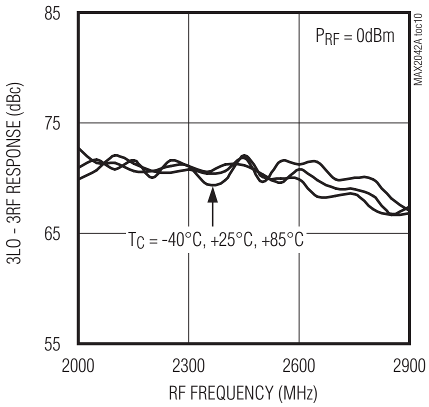




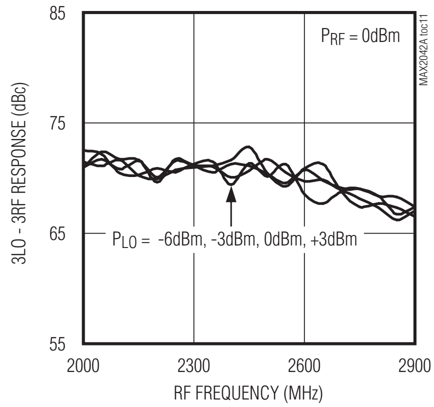
Typical Operating Characteristics (continued)

(*Typical Application Circuit* with tuning elements outlined in **Table 1**, **V_{CC} = 5.0V, f_{RF} = 2000MHz to 2900MHz, LO is high-side injected** for a 300MHz IF, P_{RF} = 0dBm, P_{LO} = 0dBm, T_C = +25°C, unless otherwise noted.)

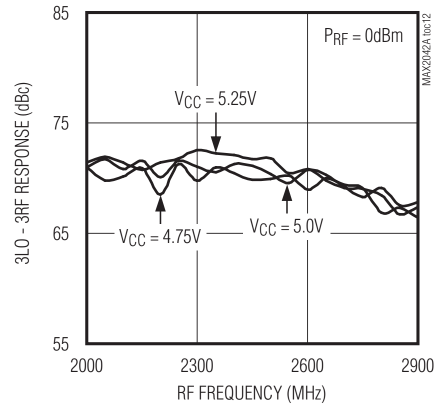
3LO - 3RF RESPONSE vs. RF FREQUENCY



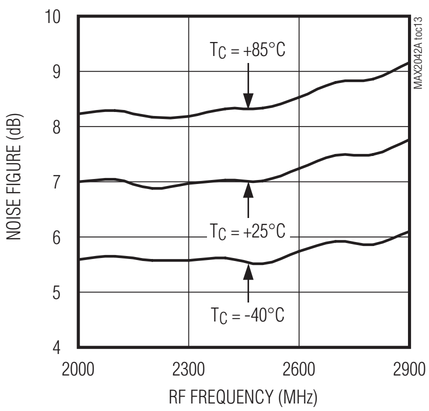
3LO - 3RF RESPONSE vs. RF FREQUENCY



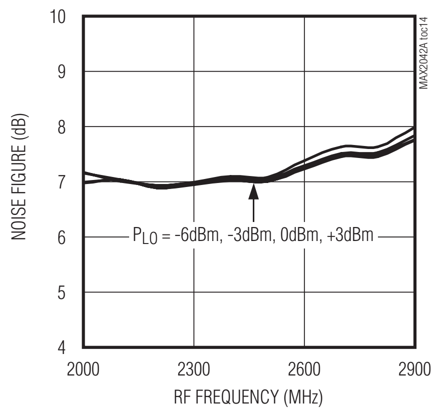
3LO - 3RF RESPONSE vs. RF FREQUENCY



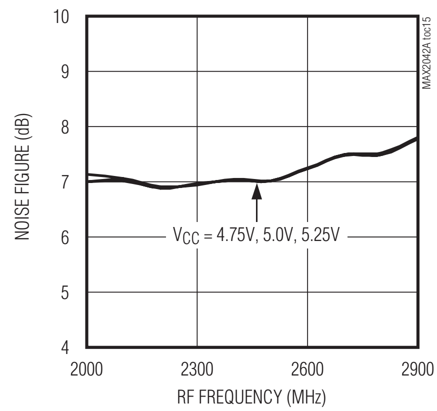
NOISE FIGURE vs. RF FREQUENCY



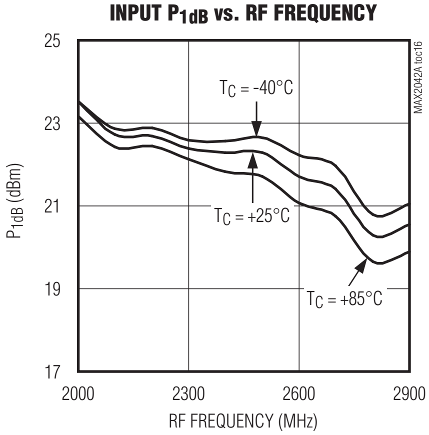
NOISE FIGURE vs. RF FREQUENCY



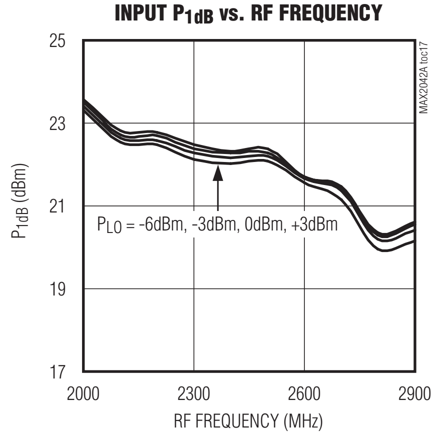
NOISE FIGURE vs. RF FREQUENCY



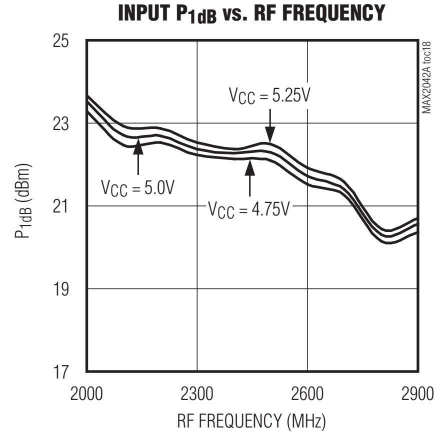
INPUT P_{1dB} vs. RF FREQUENCY



INPUT P_{1dB} vs. RF FREQUENCY



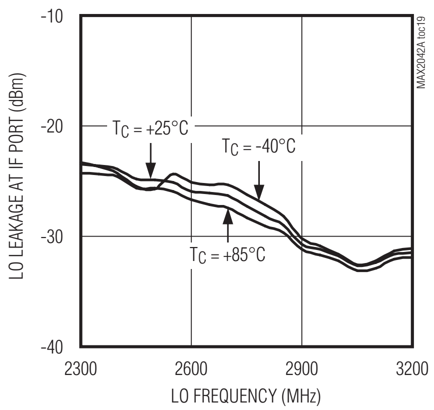
INPUT P_{1dB} vs. RF FREQUENCY



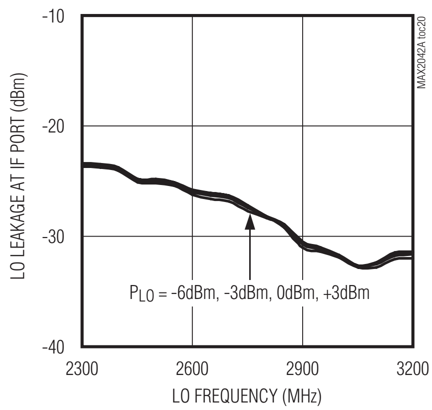
Typical Operating Characteristics (continued)

(*Typical Application Circuit* with tuning elements outlined in **Table 1**, **V_{CC} = 5.0V, f_{RF} = 2000MHz to 2900MHz, LO is high-side injected** for a 300MHz IF, P_{RF} = 0dBm, P_{LO} = 0dBm, T_C = +25°C, unless otherwise noted.)

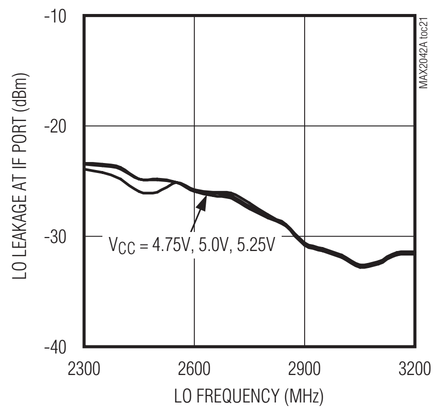
LO LEAKAGE AT IF PORT vs. LO FREQUENCY



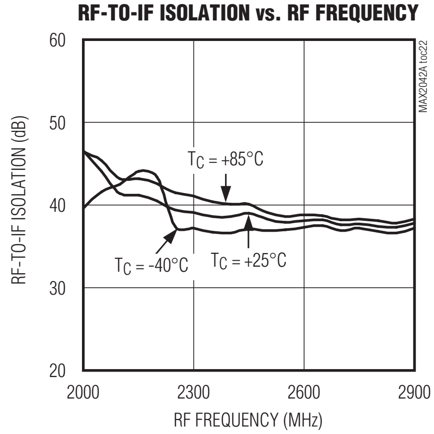
LO LEAKAGE AT IF PORT vs. LO FREQUENCY



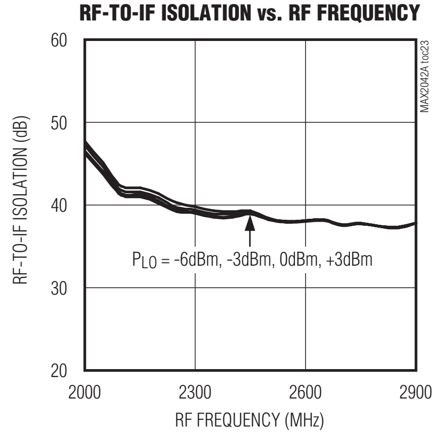
LO LEAKAGE AT IF PORT vs. LO FREQUENCY



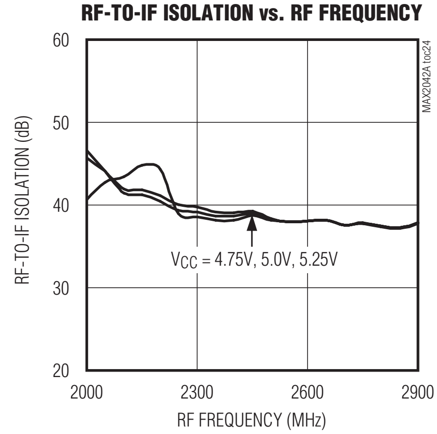
RF-TO-IF ISOLATION vs. RF FREQUENCY



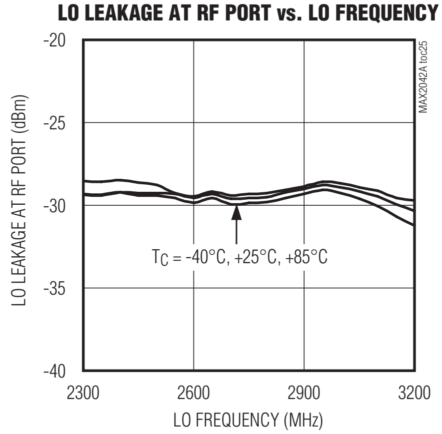
RF-TO-IF ISOLATION vs. RF FREQUENCY



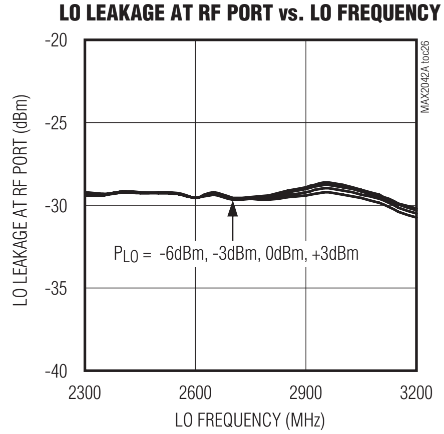
RF-TO-IF ISOLATION vs. RF FREQUENCY



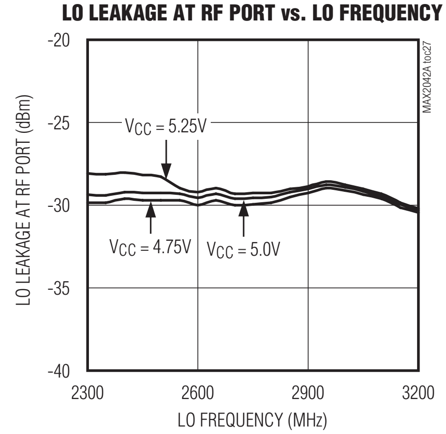
LO LEAKAGE AT RF PORT vs. LO FREQUENCY



LO LEAKAGE AT RF PORT vs. LO FREQUENCY



LO LEAKAGE AT RF PORT vs. LO FREQUENCY

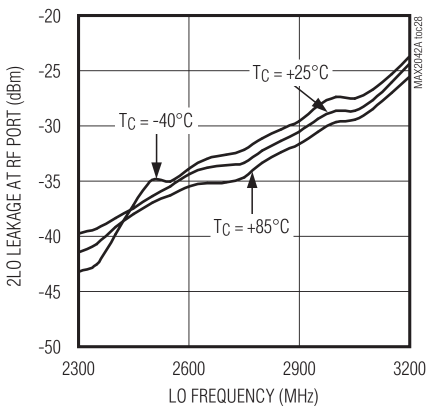


SiGe High-Linearity, 1600MHz to 3900MHz Upconversion/Downconversion Mixer with LO Buffer

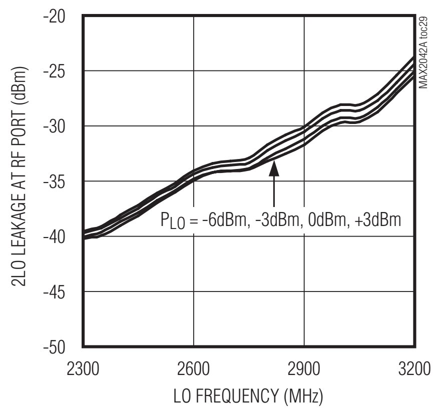
Typical Operating Characteristics (continued)

(*Typical Application Circuit* with tuning elements outlined in **Table 1**, **V_{CC} = 5.0V, f_{RF} = 2000MHz to 2900MHz, LO is high-side injected** for a 300MHz IF, P_{RF} = 0dBm, P_{LO} = 0dBm, T_C = +25°C, unless otherwise noted.)

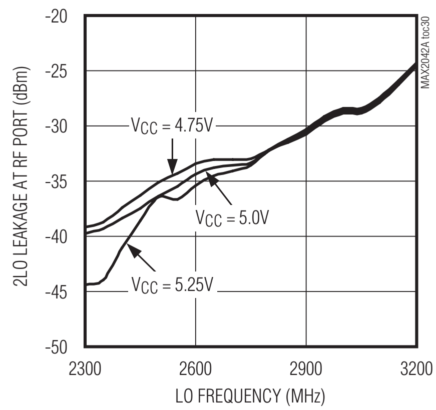
2LO LEAKAGE AT RF PORT vs. LO FREQUENCY



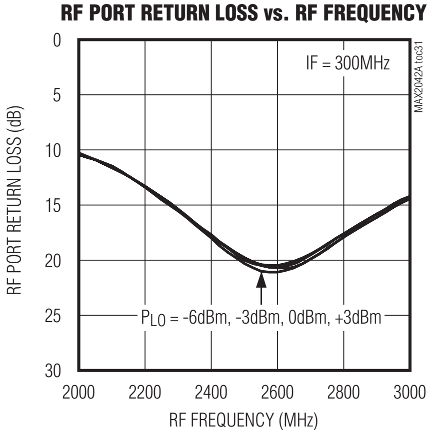
2LO LEAKAGE AT RF PORT vs. LO FREQUENCY



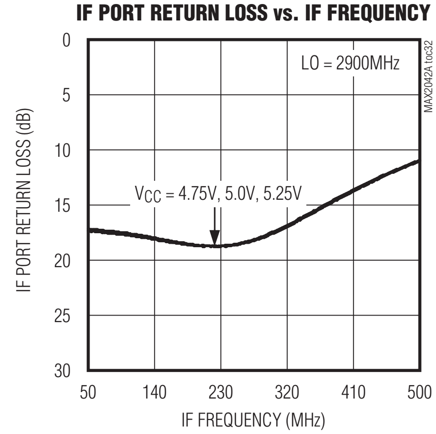
2LO LEAKAGE AT RF PORT vs. LO FREQUENCY



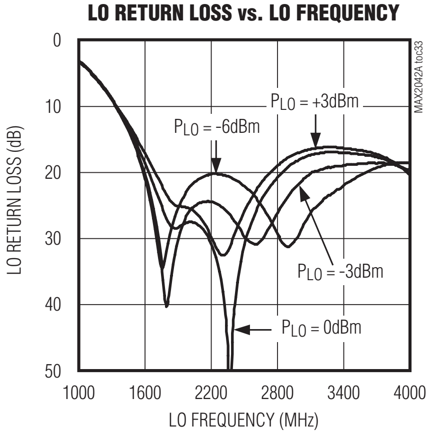
RF PORT RETURN LOSS vs. RF FREQUENCY



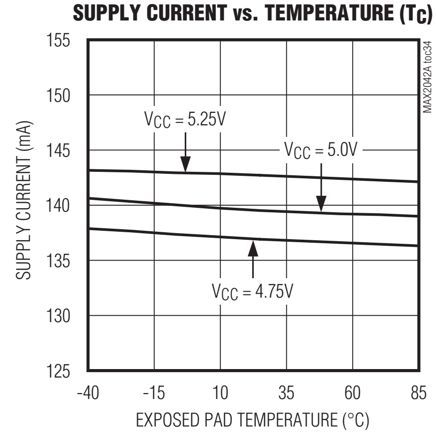
IF PORT RETURN LOSS vs. IF FREQUENCY



LO RETURN LOSS vs. LO FREQUENCY

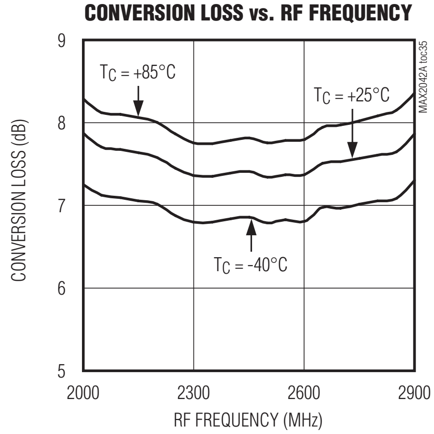


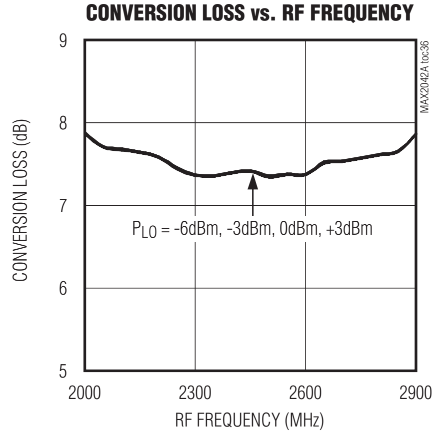
SUPPLY CURRENT vs. TEMPERATURE (T_C)

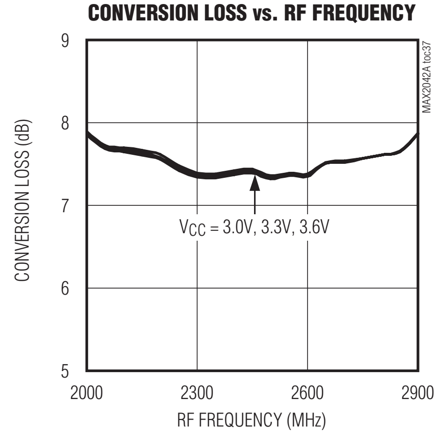


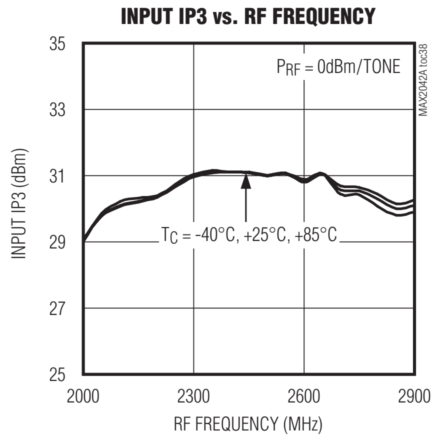
Typical Operating Characteristics (continued)

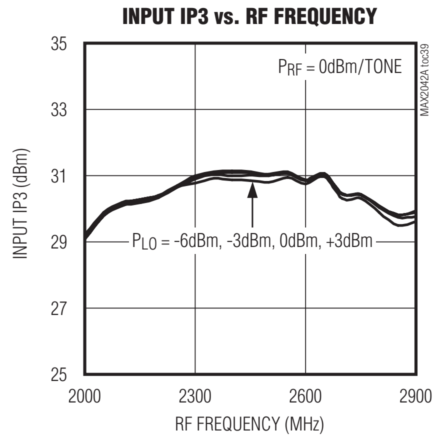
(*Typical Application Circuit* with tuning elements outlined in **Table 1**, **V_{CC} = 3.3V, f_{RF} = 2000MHz to 2900MHz, LO is high-side injected** for a 300MHz IF, P_{RF} = 0dBm, P_{LO} = 0dBm, T_C = +25°C, unless otherwise noted.)

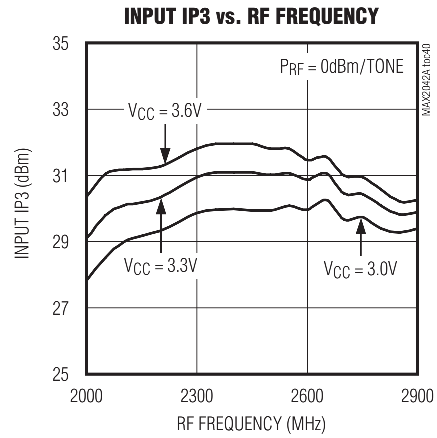


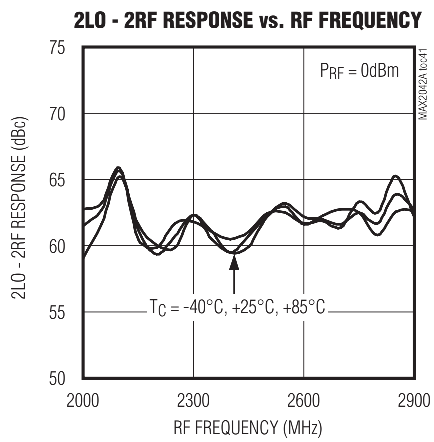


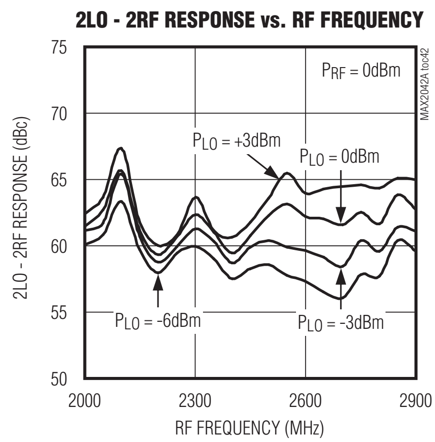


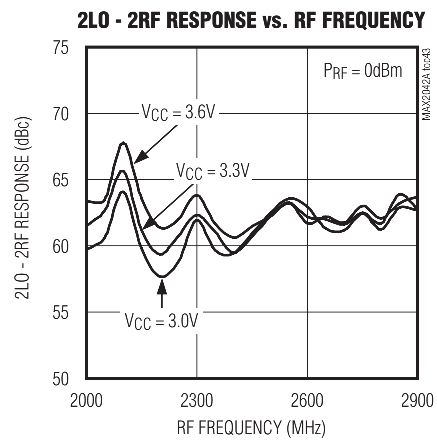






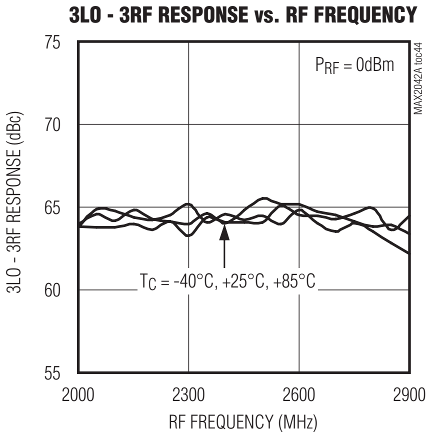


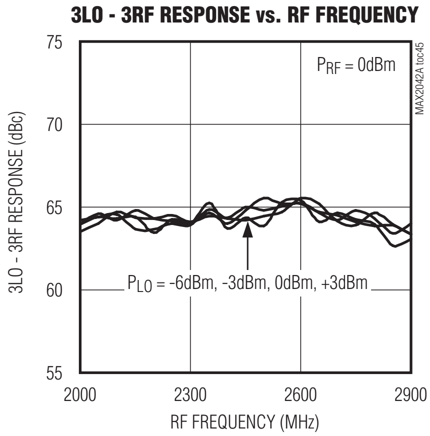


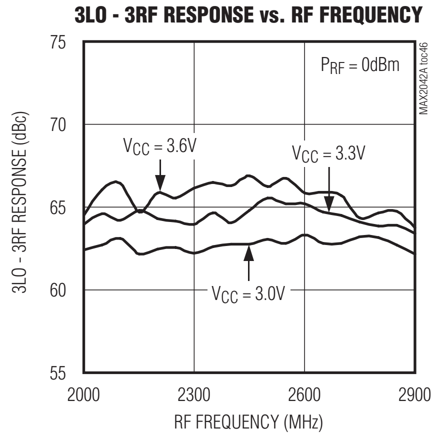


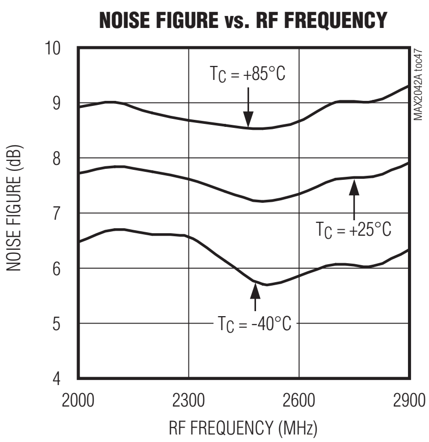
Typical Operating Characteristics (continued)

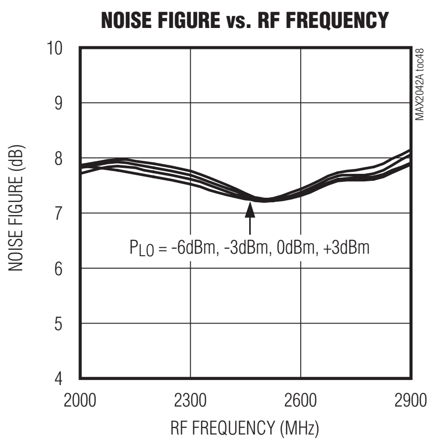
(*Typical Application Circuit* with tuning elements outlined in **Table 1**, **V_{CC} = 3.3V, f_{RF} = 2000MHz to 2900MHz, LO is high-side injected** for a 300MHz IF, P_{RF} = 0dBm, P_{LO} = 0dBm, T_C = +25°C, unless otherwise noted.)

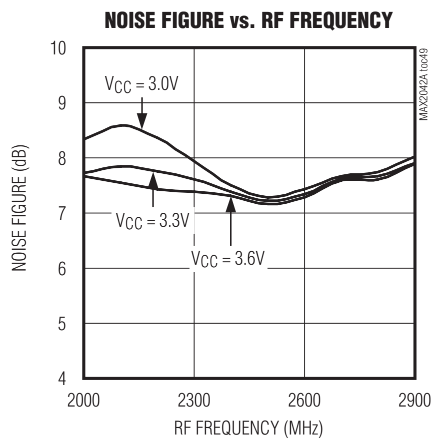


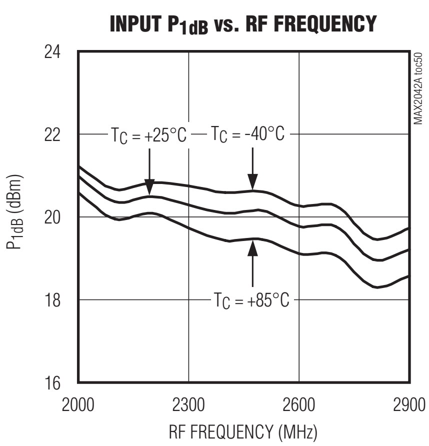


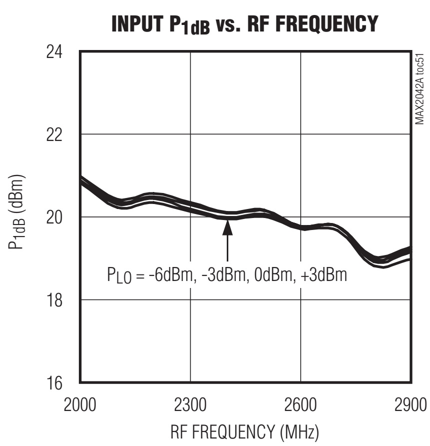


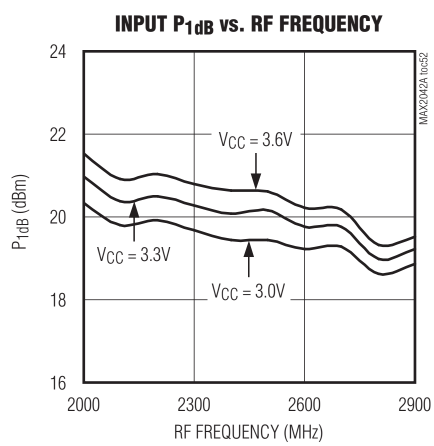








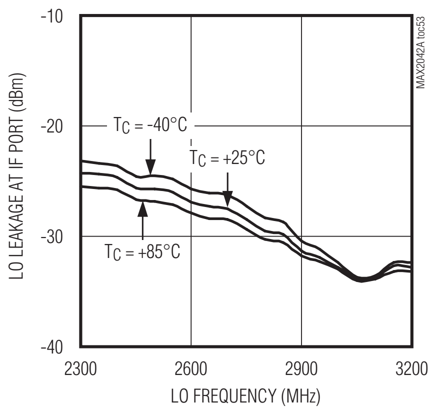




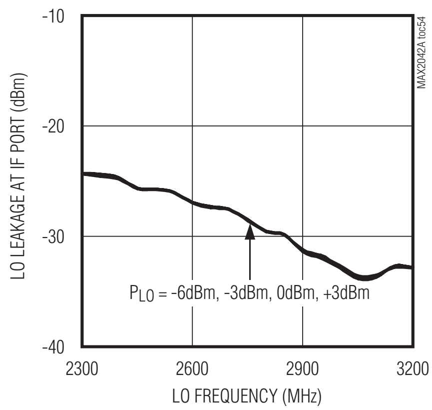
Typical Operating Characteristics (continued)

(*Typical Application Circuit* with tuning elements outlined in **Table 1**, **V_{CC} = 3.3V, f_{RF} = 2000MHz to 2900MHz, LO is high-side injected** for a 300MHz IF, P_{RF} = 0dBm, P_{LO} = 0dBm, T_C = +25°C, unless otherwise noted.)

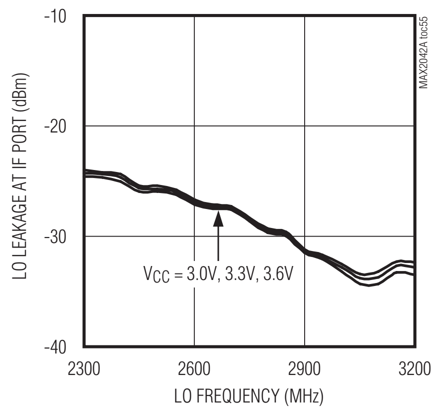
LO LEAKAGE AT IF PORT vs. LO FREQUENCY



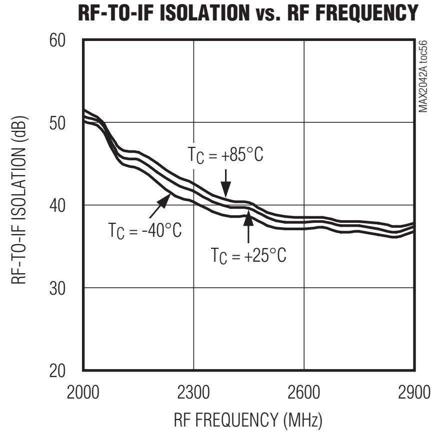
LO LEAKAGE AT IF PORT vs. LO FREQUENCY



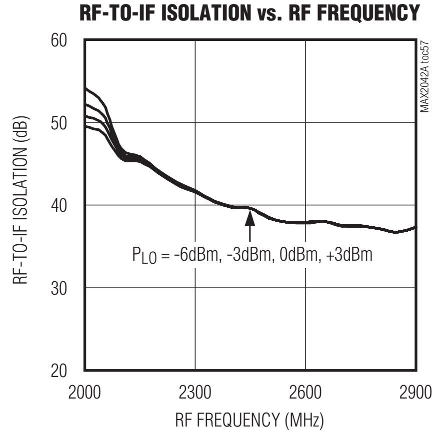
LO LEAKAGE AT IF PORT vs. LO FREQUENCY



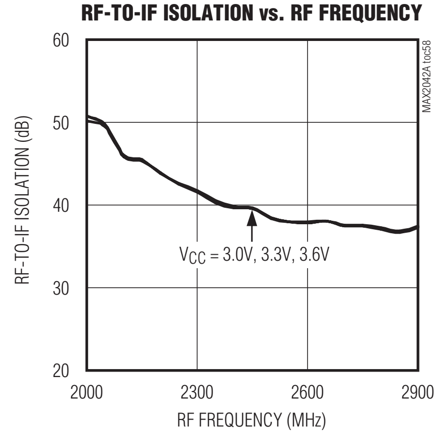
RF-TO-IF ISOLATION vs. RF FREQUENCY



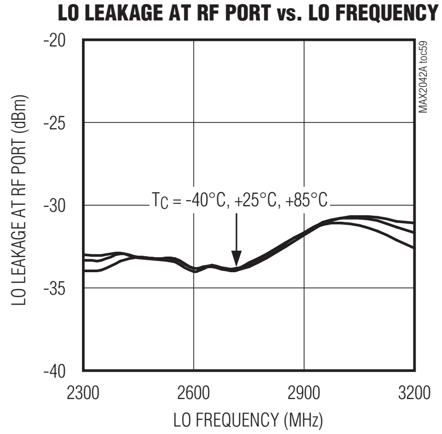
RF-TO-IF ISOLATION vs. RF FREQUENCY



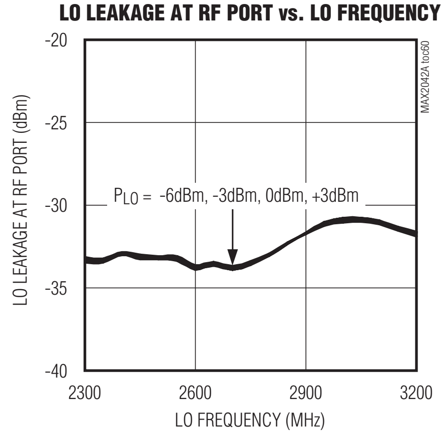
RF-TO-IF ISOLATION vs. RF FREQUENCY



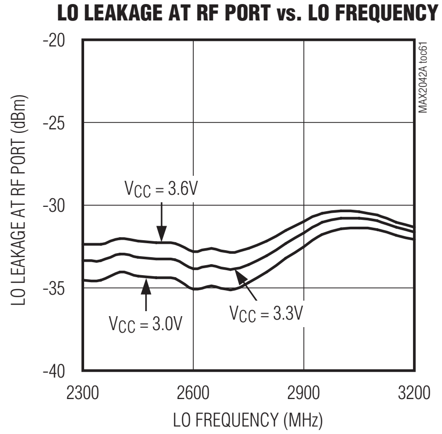
LO LEAKAGE AT RF PORT vs. LO FREQUENCY



LO LEAKAGE AT RF PORT vs. LO FREQUENCY



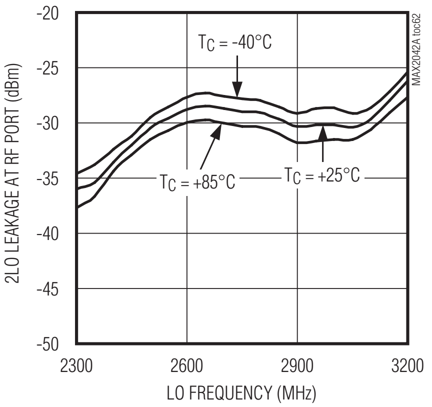
LO LEAKAGE AT RF PORT vs. LO FREQUENCY



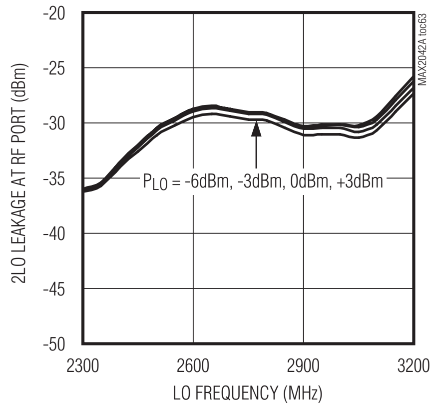
Typical Operating Characteristics (continued)

(*Typical Application Circuit* with tuning elements outlined in **Table 1**, **V_{CC} = 3.3V, f_{RF} = 2000MHz to 2900MHz, LO is high-side injected** for a 300MHz IF, P_{RF} = 0dBm, P_{LO} = 0dBm, T_C = +25°C, unless otherwise noted.)

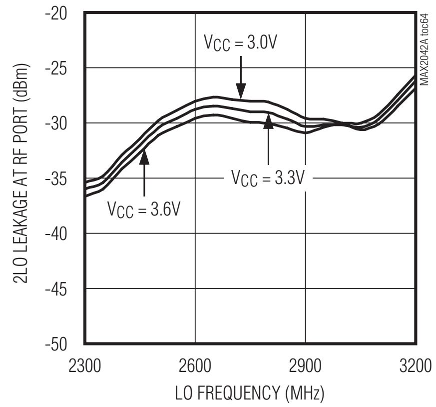
2LO LEAKAGE AT RF PORT vs. LO FREQUENCY



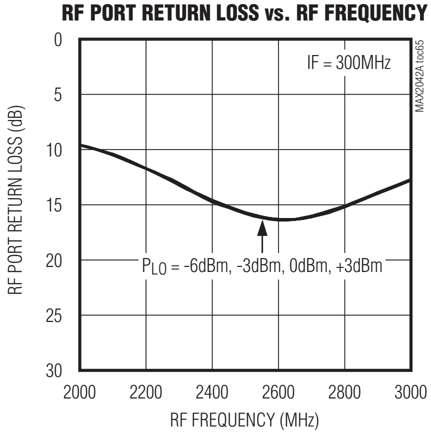
2LO LEAKAGE AT RF PORT vs. LO FREQUENCY



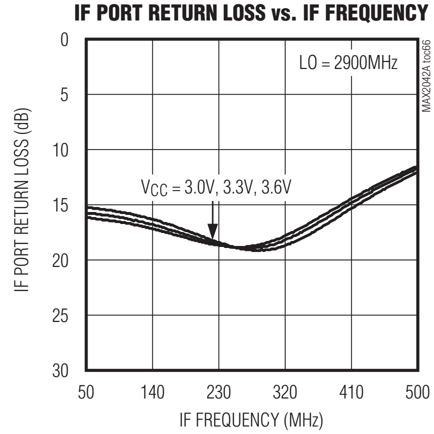
2LO LEAKAGE AT RF PORT vs. LO FREQUENCY



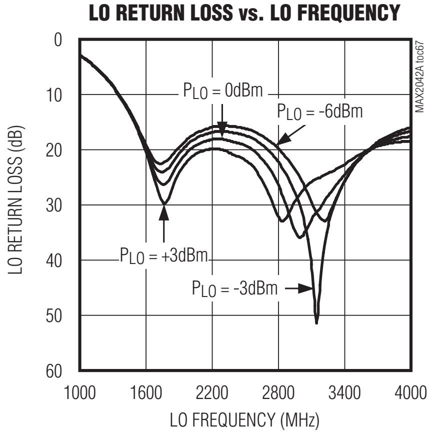
RF PORT RETURN LOSS vs. RF FREQUENCY



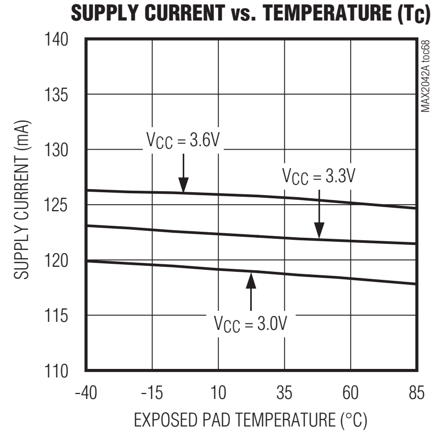
IF PORT RETURN LOSS vs. IF FREQUENCY



LO RETURN LOSS vs. LO FREQUENCY



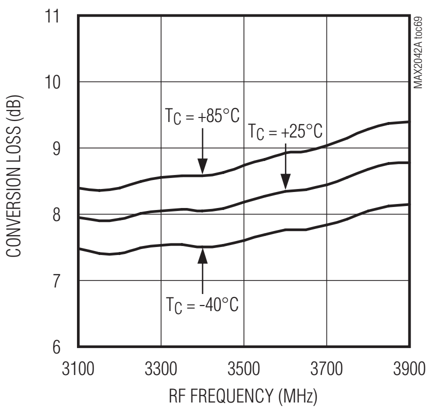
SUPPLY CURRENT vs. TEMPERATURE (T_C)



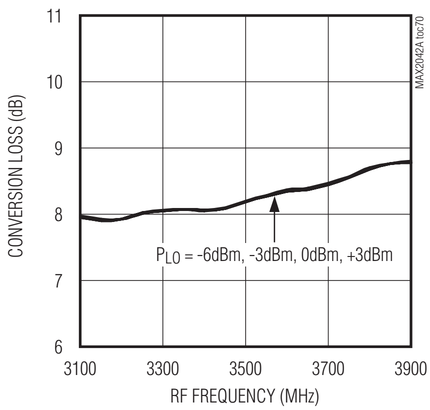
Typical Operating Characteristics (continued)

(*Typical Application Circuit* with tuning elements outlined in **Table 1**, **V_{CC} = 5.0V, f_{RF} = 3100MHz to 3900MHz, LO is low-side injected** for a 300MHz IF, P_{RF} = 0dBm, P_{LO} = 0dBm, T_C = +25°C, unless otherwise noted.)

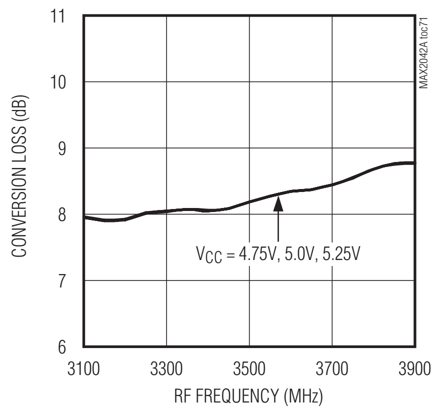
CONVERSION LOSS vs. RF FREQUENCY



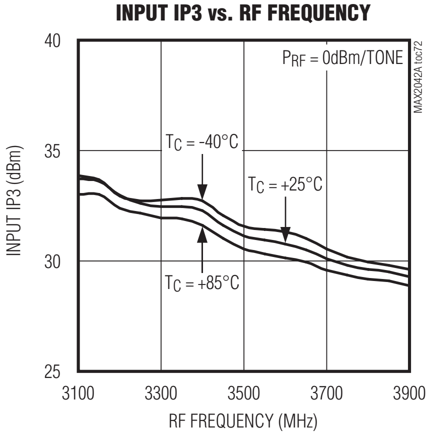
CONVERSION LOSS vs. RF FREQUENCY



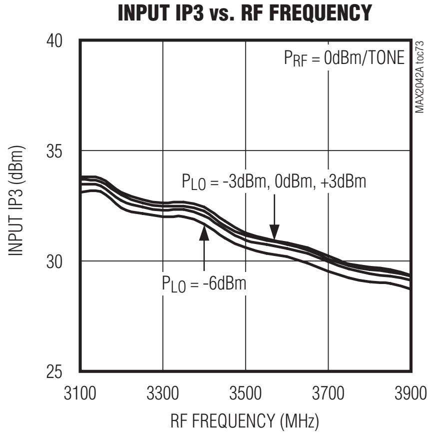
CONVERSION LOSS vs. RF FREQUENCY



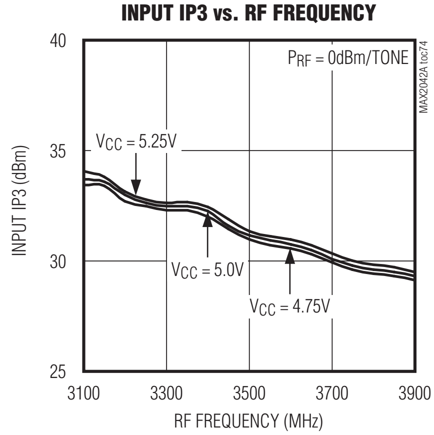
INPUT IP3 vs. RF FREQUENCY



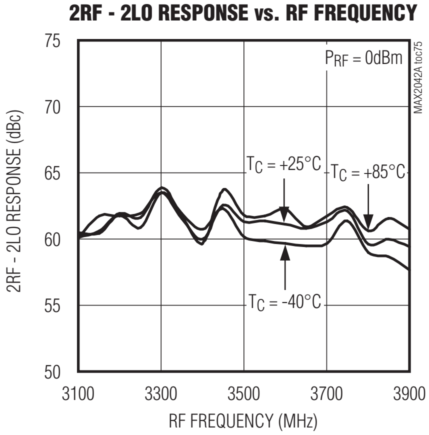
INPUT IP3 vs. RF FREQUENCY



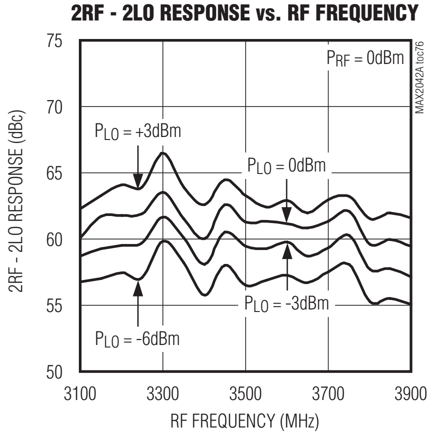
INPUT IP3 vs. RF FREQUENCY



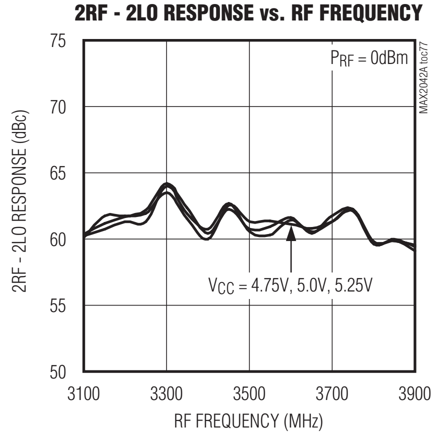
2RF - 2LO RESPONSE vs. RF FREQUENCY



2RF - 2LO RESPONSE vs. RF FREQUENCY



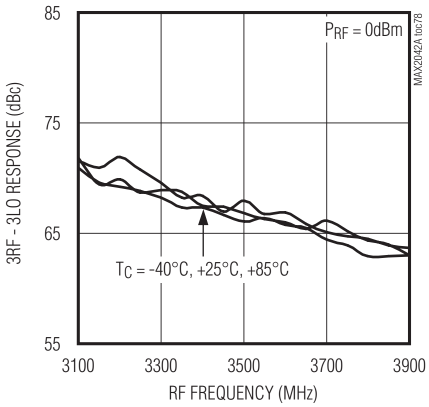
2RF - 2LO RESPONSE vs. RF FREQUENCY



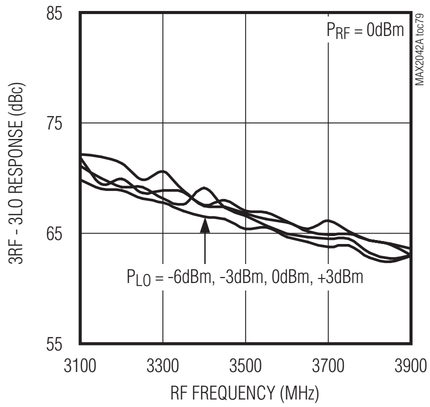
Typical Operating Characteristics (continued)

(*Typical Application Circuit* with tuning elements outlined in **Table 1**, **V_{CC} = 5.0V, f_{RF} = 3100MHz to 3900MHz, LO is low-side injected** for a 300MHz IF, P_{RF} = 0dBm, P_{LO} = 0dBm, T_C = +25°C, unless otherwise noted.)

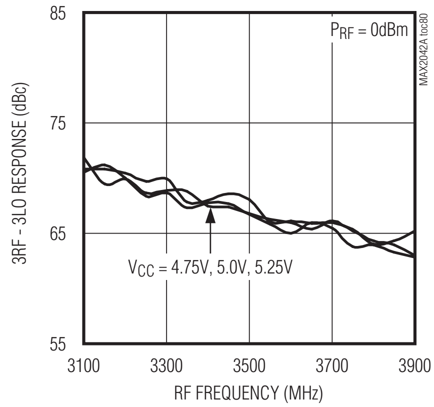
3RF - 3LO RESPONSE vs. RF FREQUENCY



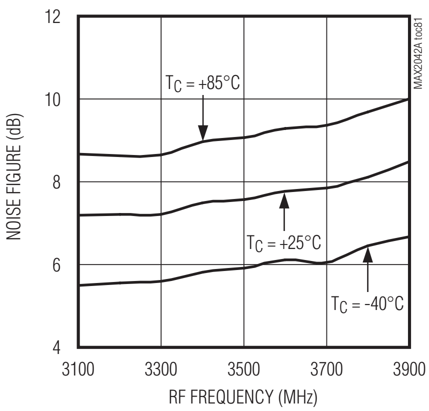
3RF - 3LO RESPONSE vs. RF FREQUENCY



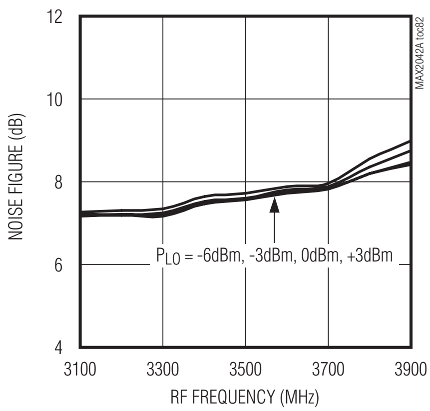
3RF - 3LO RESPONSE vs. RF FREQUENCY



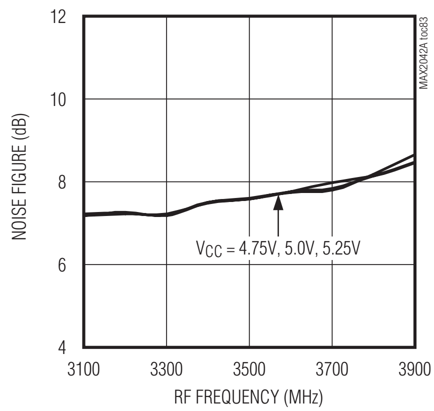
NOISE FIGURE vs. RF FREQUENCY



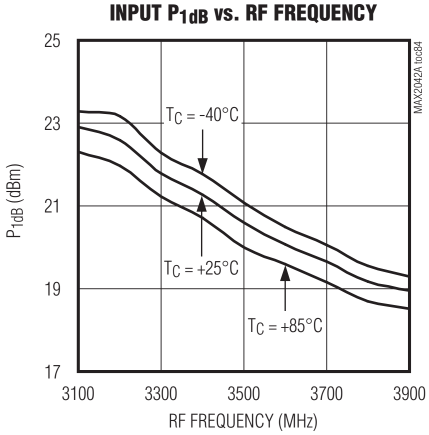
NOISE FIGURE vs. RF FREQUENCY



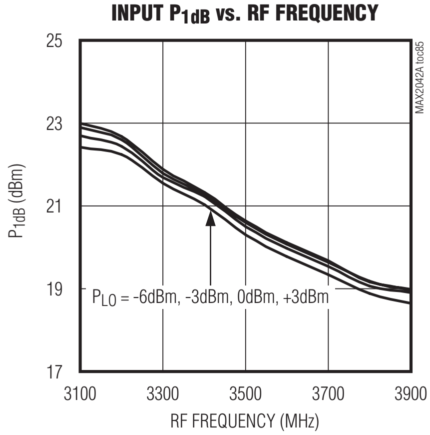
NOISE FIGURE vs. RF FREQUENCY



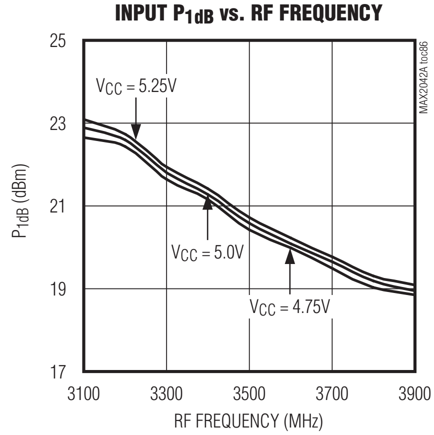
INPUT P_{1dB} vs. RF FREQUENCY



INPUT P_{1dB} vs. RF FREQUENCY



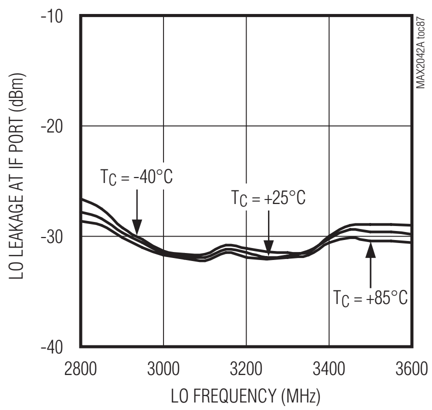
INPUT P_{1dB} vs. RF FREQUENCY



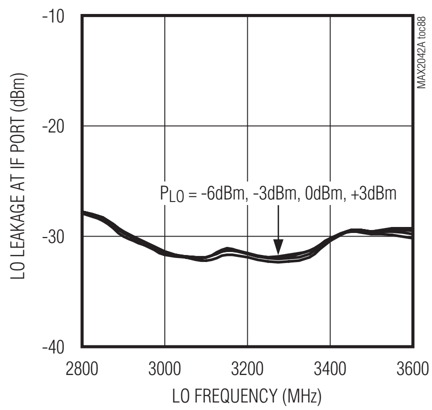
Typical Operating Characteristics (continued)

(*Typical Application Circuit* with tuning elements outlined in **Table 1**, **V_{CC} = 5.0V, f_{RF} = 3100MHz to 3900MHz, LO is low-side injected** for a 300MHz IF, P_{RF} = 0dBm, P_{LO} = 0dBm, T_C = +25°C, unless otherwise noted.)

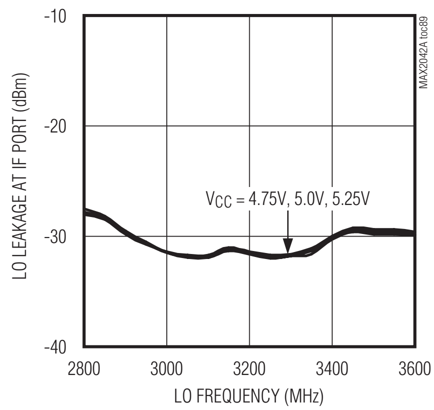
LO LEAKAGE AT IF PORT vs. LO FREQUENCY



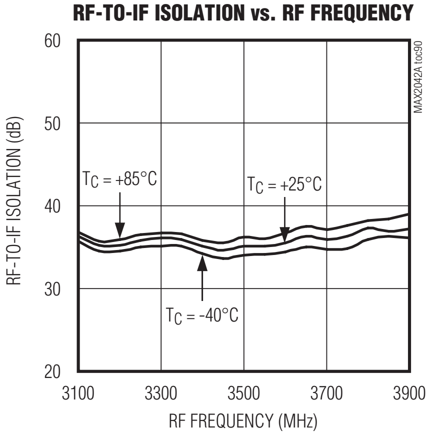
LO LEAKAGE AT IF PORT vs. LO FREQUENCY



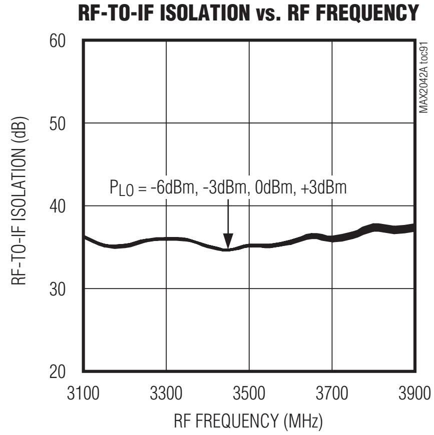
LO LEAKAGE AT IF PORT vs. LO FREQUENCY



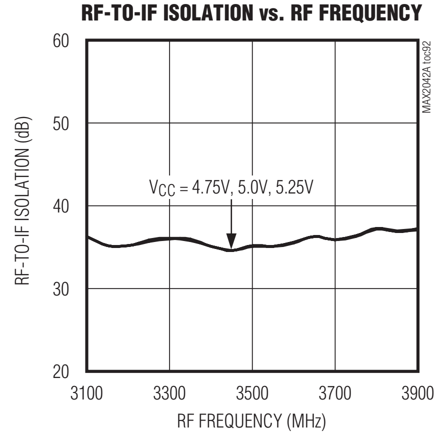
RF-TO-IF ISOLATION vs. RF FREQUENCY



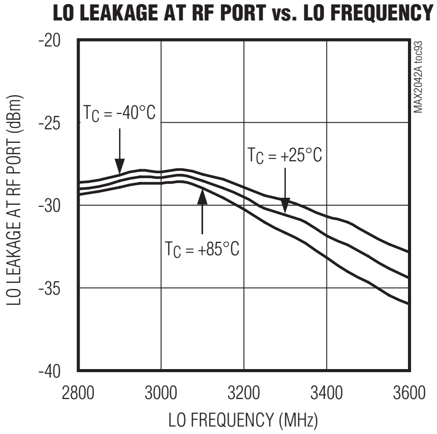
RF-TO-IF ISOLATION vs. RF FREQUENCY



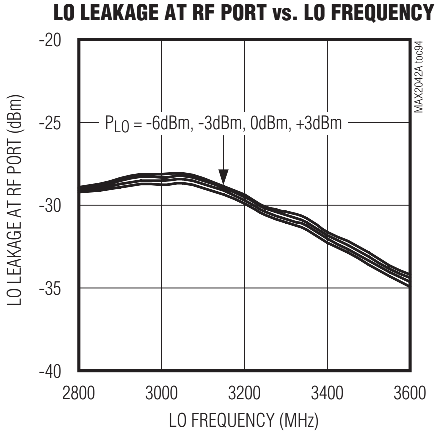
RF-TO-IF ISOLATION vs. RF FREQUENCY



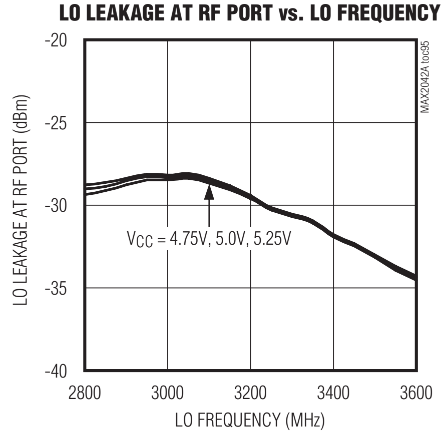
LO LEAKAGE AT RF PORT vs. LO FREQUENCY



LO LEAKAGE AT RF PORT vs. LO FREQUENCY



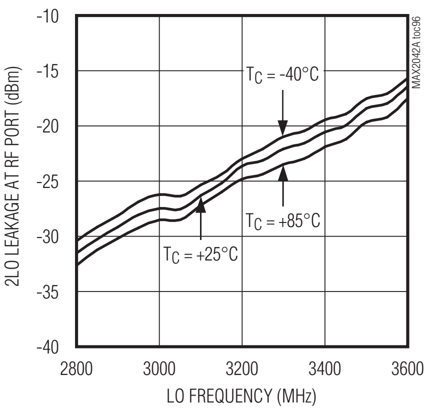
LO LEAKAGE AT RF PORT vs. LO FREQUENCY



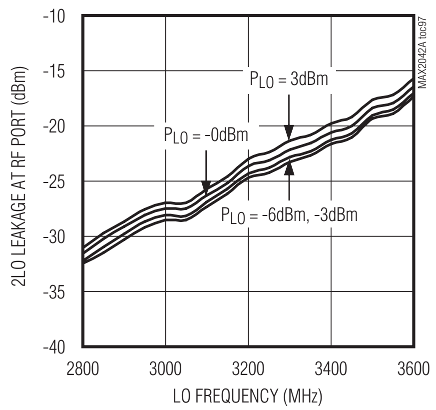
Typical Operating Characteristics (continued)

(*Typical Application Circuit* with tuning elements outlined in **Table 1**, **V_{CC} = 5.0V, f_{RF} = 3100MHz to 3900MHz, LO is low-side injected** for a 300MHz IF, P_{RF} = 0dBm, P_{LO} = 0dBm, T_C = +25°C, unless otherwise noted.)

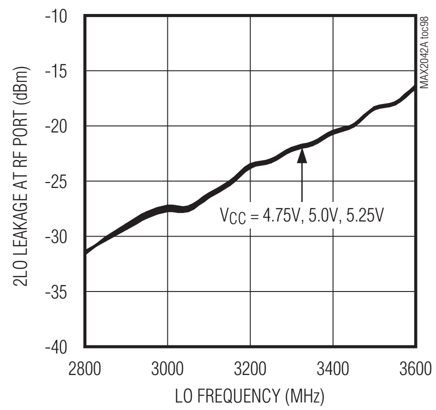
2LO LEAKAGE AT RF PORT vs. LO FREQUENCY



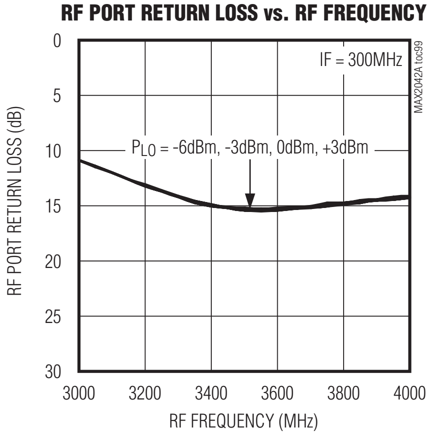
2LO LEAKAGE AT RF PORT vs. LO FREQUENCY



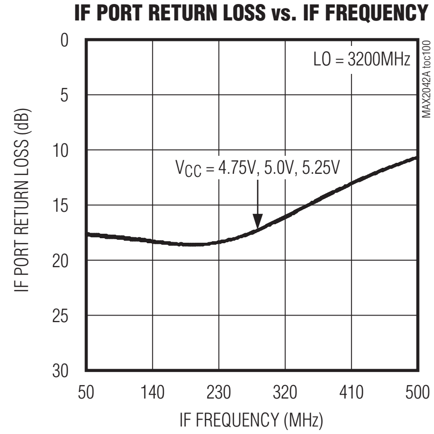
2LO LEAKAGE AT RF PORT vs. LO FREQUENCY



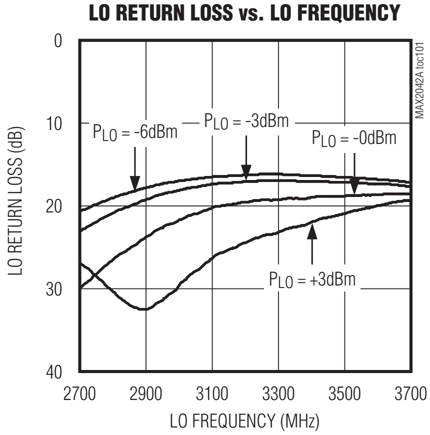
RF PORT RETURN LOSS vs. RF FREQUENCY



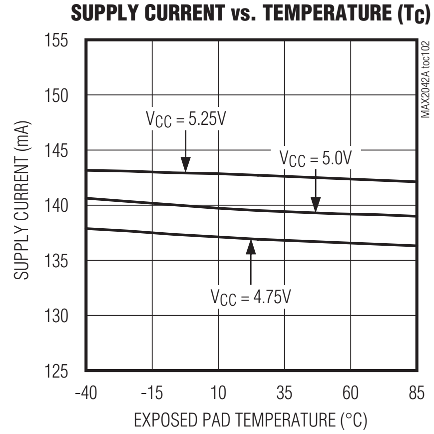
IF PORT RETURN LOSS vs. IF FREQUENCY



LO RETURN LOSS vs. LO FREQUENCY



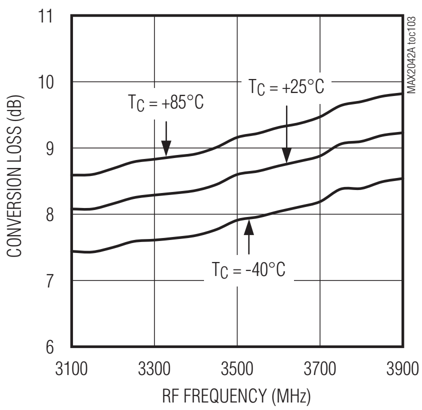
SUPPLY CURRENT vs. TEMPERATURE (T_C)



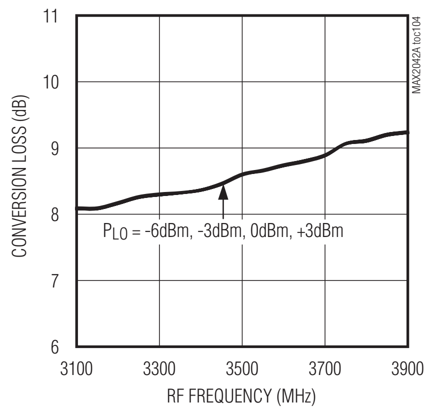
Typical Operating Characteristics (continued)

(*Typical Application Circuit* with tuning elements outlined in Table 1, **V_{CC} = 5.0V, f_{RF} = 3100MHz to 3900MHz, LO is high-side injected** for a 300MHz IF, P_{RF} = 0dBm, P_{LO} = 0dBm, T_C = +25°C, unless otherwise noted.)

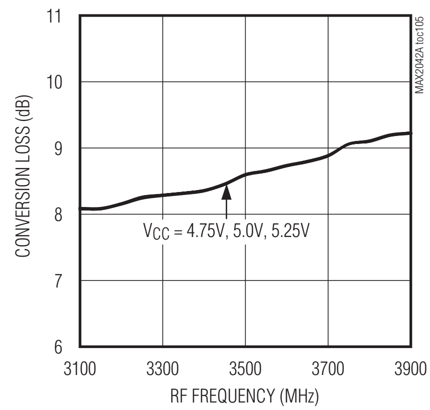
CONVERSION LOSS vs. RF FREQUENCY



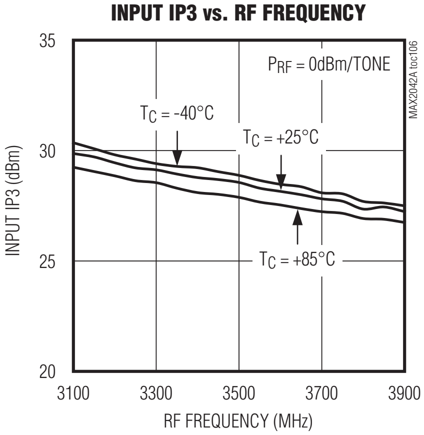
CONVERSION LOSS vs. RF FREQUENCY



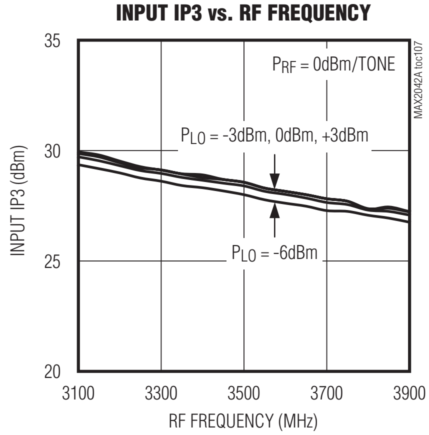
CONVERSION LOSS vs. RF FREQUENCY



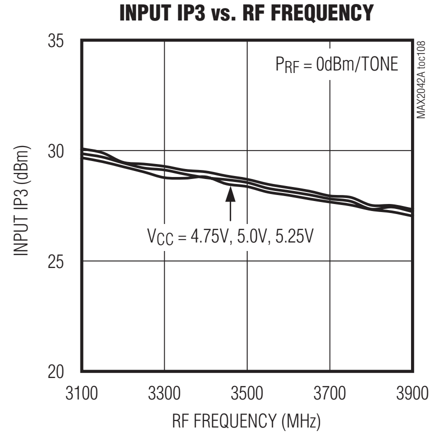
INPUT IP3 vs. RF FREQUENCY



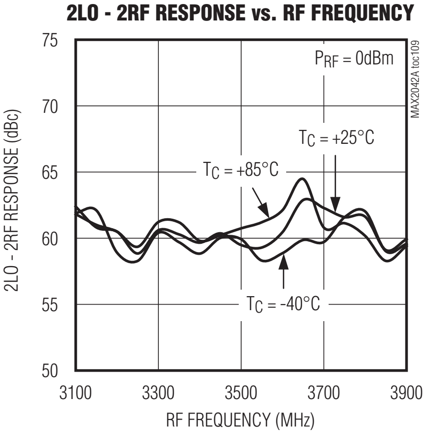
INPUT IP3 vs. RF FREQUENCY



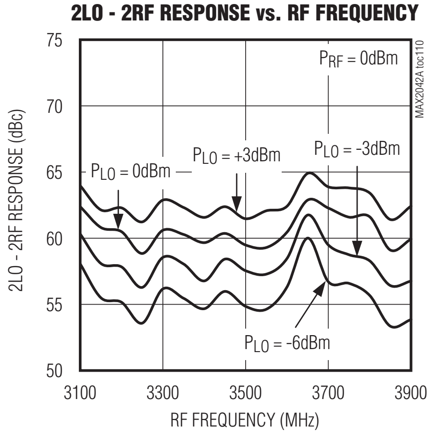
INPUT IP3 vs. RF FREQUENCY



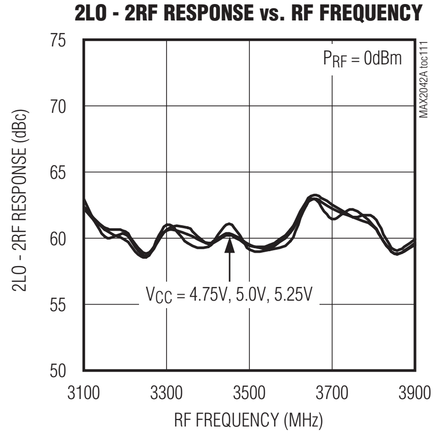
2LO - 2RF RESPONSE vs. RF FREQUENCY



2LO - 2RF RESPONSE vs. RF FREQUENCY



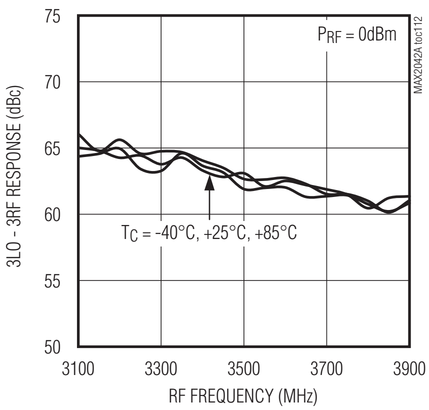
2LO - 2RF RESPONSE vs. RF FREQUENCY



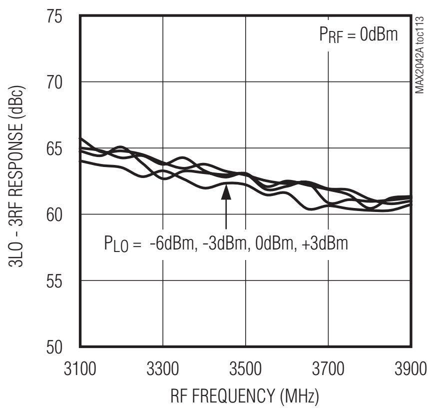
Typical Operating Characteristics (continued)

(*Typical Application Circuit* with tuning elements outlined in Table 1, **V_{CC} = 5.0V, fRF = 3100MHz to 3900MHz, LO is high-side injected** for a 300MHz IF, P_{RF} = 0dBm, P_{LO} = 0dBm, T_C = +25°C, unless otherwise noted.)

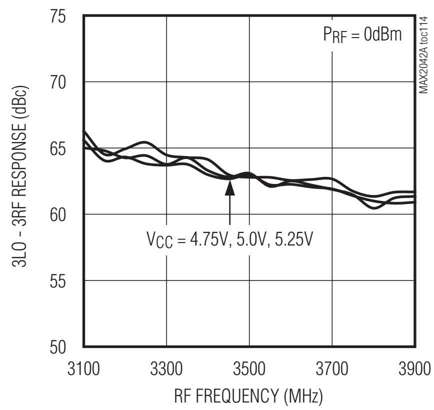
3LO - 3RF RESPONSE vs. RF FREQUENCY



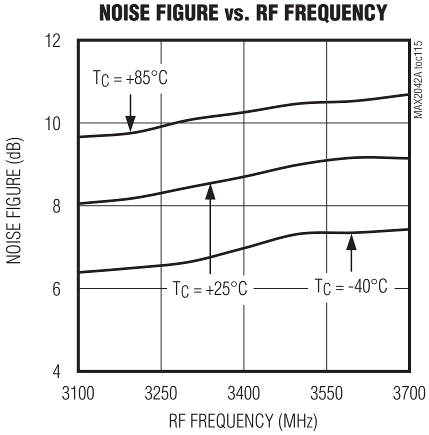
3LO - 3RF RESPONSE vs. RF FREQUENCY



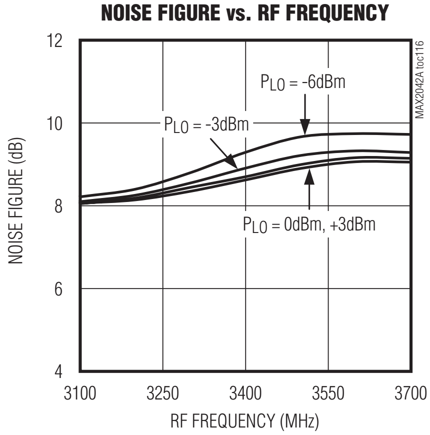
3LO - 3RF RESPONSE vs. RF FREQUENCY



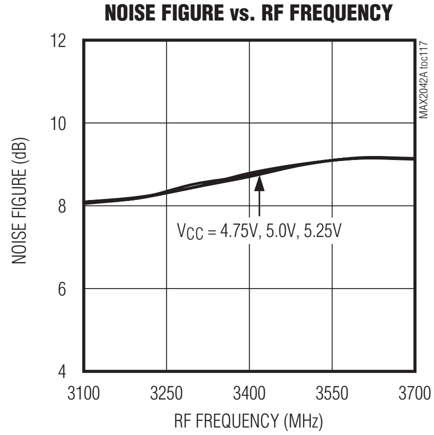
NOISE FIGURE vs. RF FREQUENCY



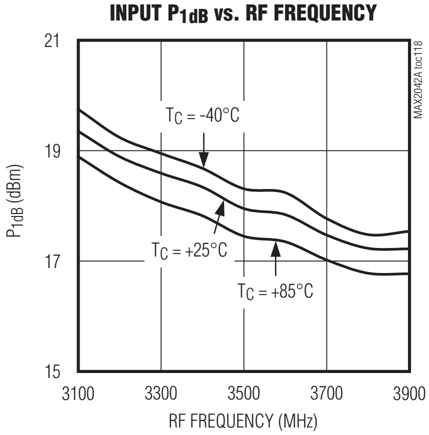
NOISE FIGURE vs. RF FREQUENCY



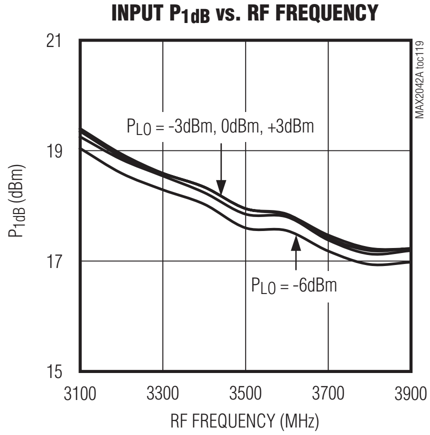
NOISE FIGURE vs. RF FREQUENCY



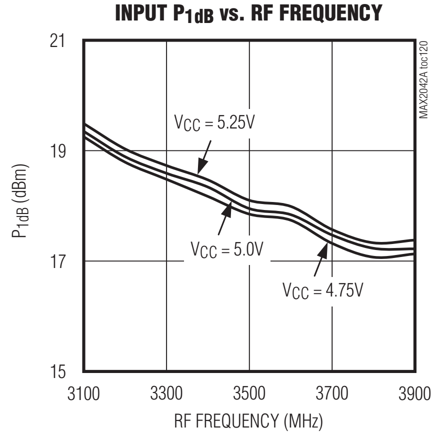
INPUT P_{1dB} vs. RF FREQUENCY



INPUT P_{1dB} vs. RF FREQUENCY

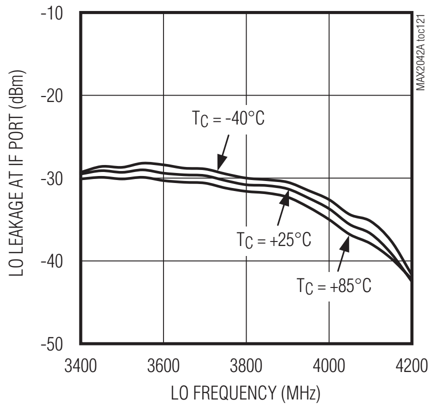


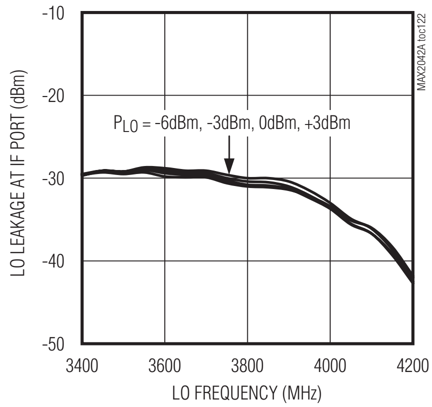
INPUT P_{1dB} vs. RF FREQUENCY

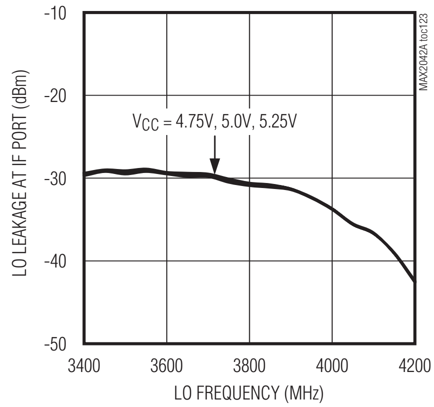


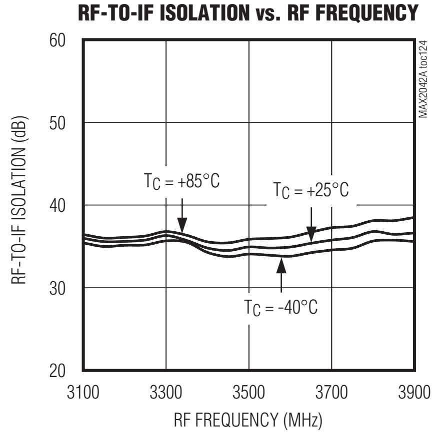
Typical Operating Characteristics (continued)

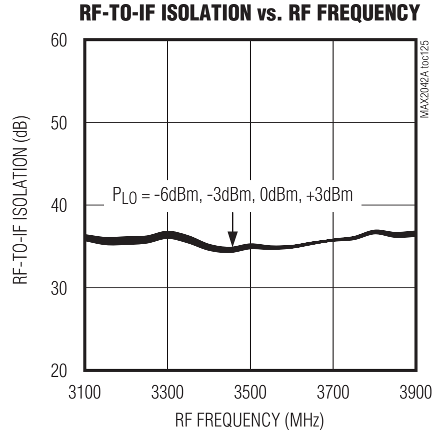
(*Typical Application Circuit* with tuning elements outlined in Table 1, **V_{CC} = 5.0V, fRF = 3100MHz to 3900MHz, LO is high-side injected** for a 300MHz IF, P_{RF} = 0dBm, P_{LO} = 0dBm, T_C = +25°C, unless otherwise noted.)

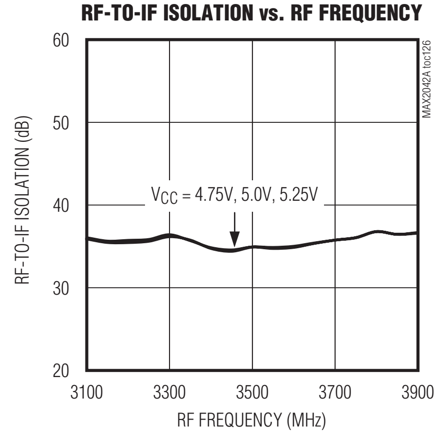


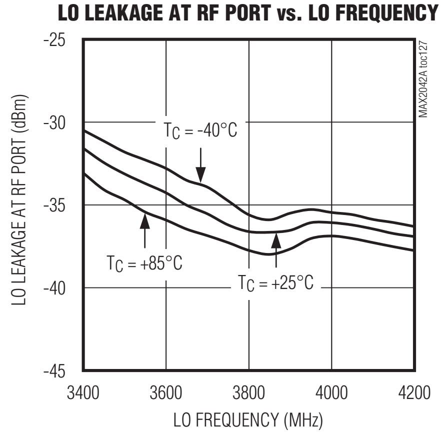


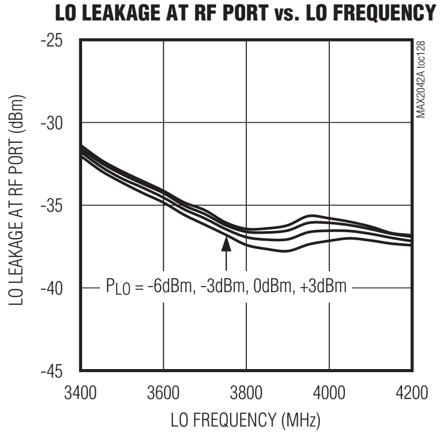


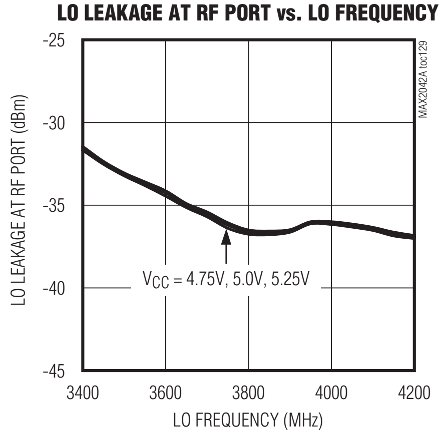








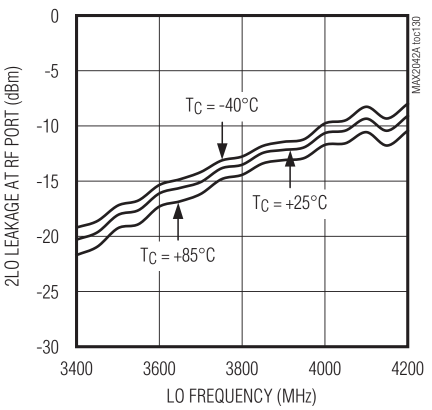




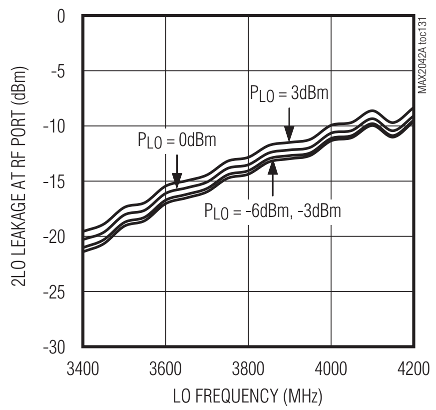
Typical Operating Characteristics (continued)

(*Typical Application Circuit* with tuning elements outlined in Table 1, **V_{CC} = 5.0V, fRF = 3100MHz to 3900MHz, LO is high-side injected** for a 300MHz IF, P_{RF} = 0dBm, P_{LO} = 0dBm, T_C = +25°C, unless otherwise noted.)

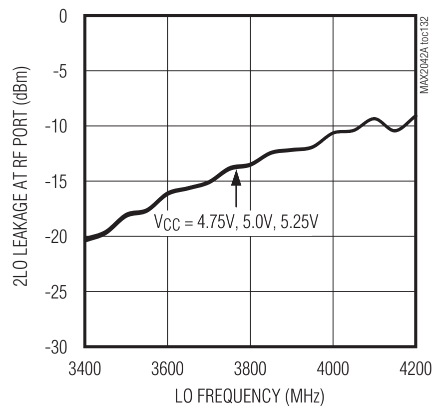
2LO LEAKAGE AT RF PORT vs. LO FREQUENCY



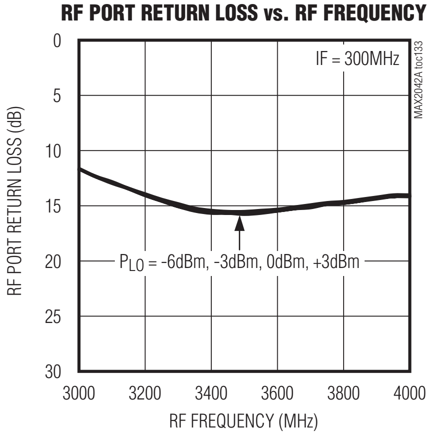
2LO LEAKAGE AT RF PORT vs. LO FREQUENCY



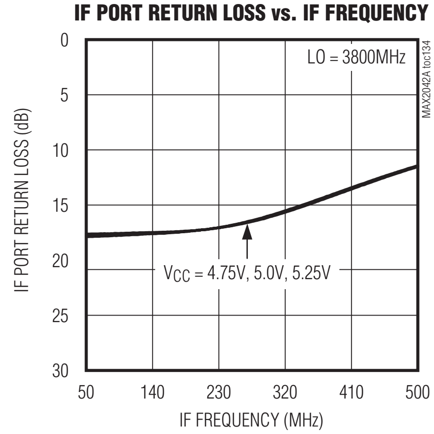
2LO LEAKAGE AT RF PORT vs. LO FREQUENCY



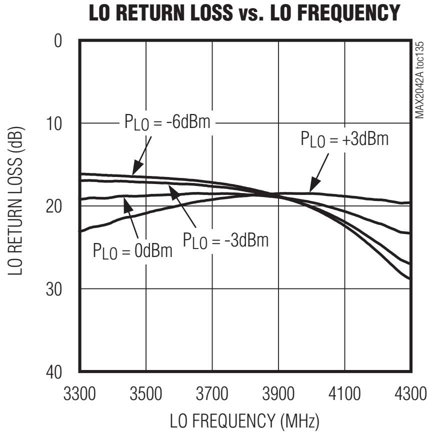
RF PORT RETURN LOSS vs. RF FREQUENCY



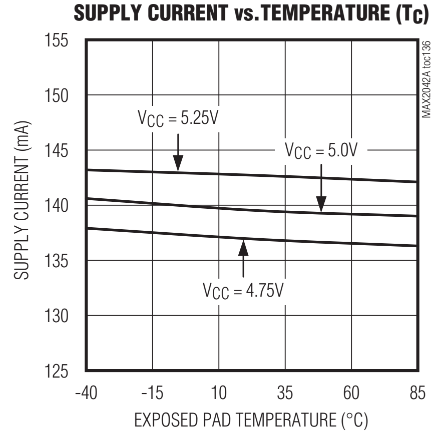
IF PORT RETURN LOSS vs. IF FREQUENCY



LO RETURN LOSS vs. LO FREQUENCY

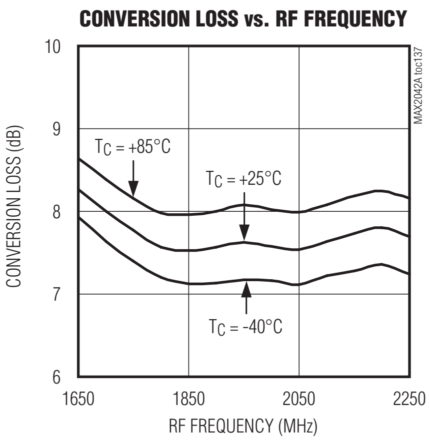


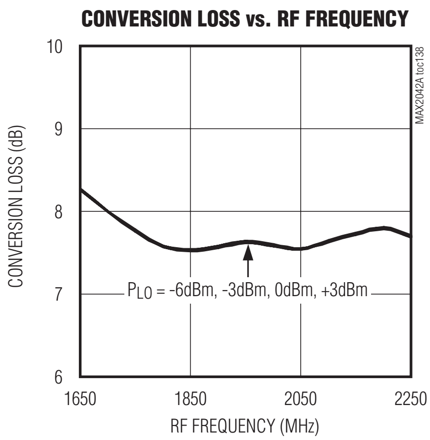
SUPPLY CURRENT vs. TEMPERATURE (T_C)

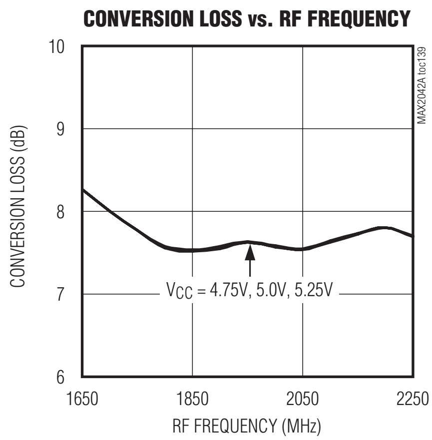


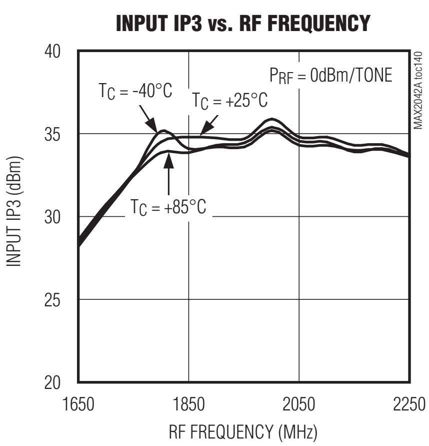
Typical Operating Characteristics (continued)

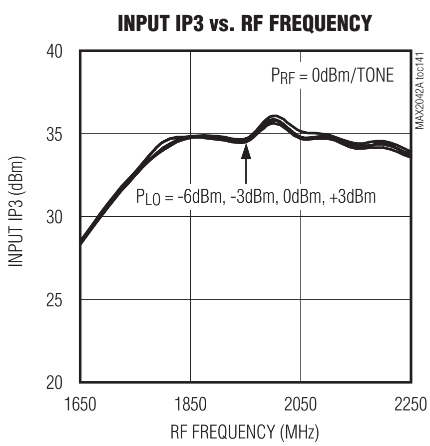
(*Typical Application Circuit* with tuning elements outlined in Table 1, **V_{CC} = 5.0V, f_{RF} = 1650MHz to 2250MHz, LO is high-side injected** for a 300MHz IF, P_{RF} = 0dBm, P_{LO} = 0dBm, T_C = +25°C, unless otherwise noted.)

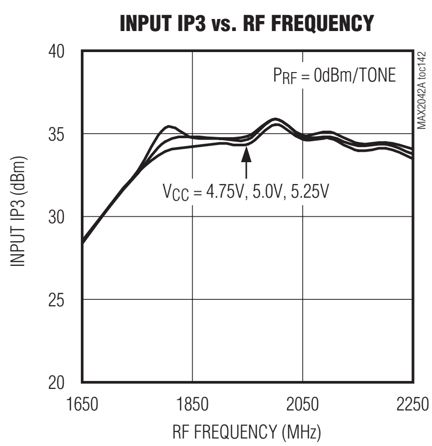


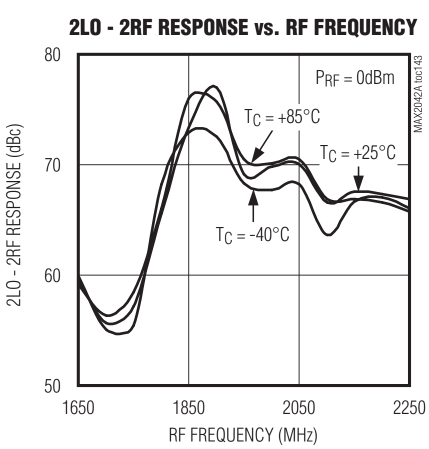


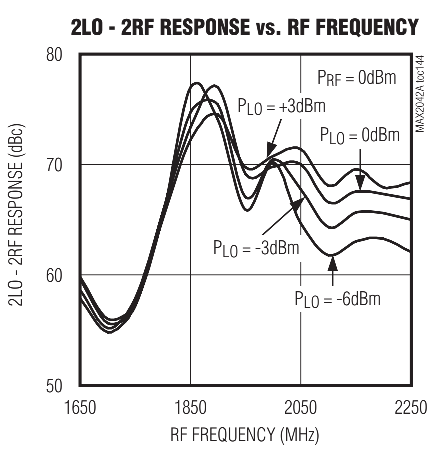


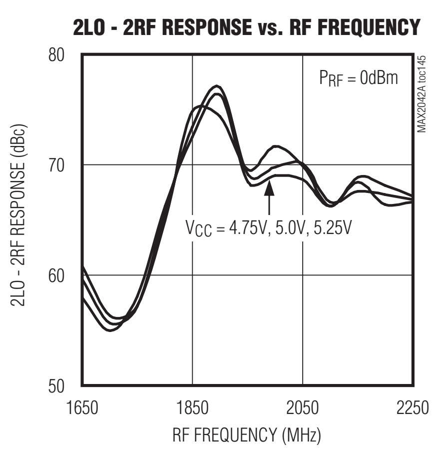








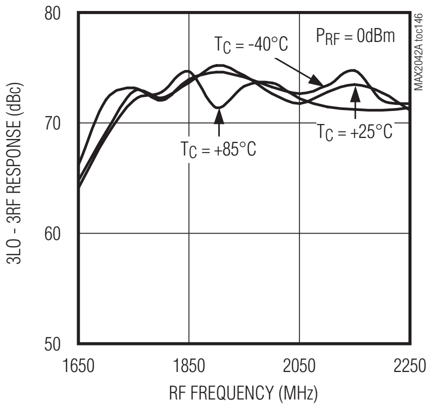




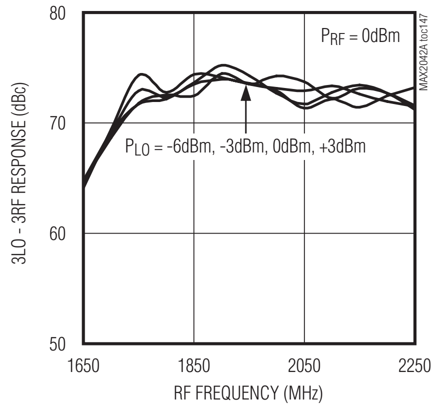
Typical Operating Characteristics (continued)

(*Typical Application Circuit* with tuning elements outlined in Table 1, **V_{CC} = 5.0V, f_{RF} = 1650MHz to 2250MHz, LO is high-side injected** for a 300MHz IF, P_{RF} = 0dBm, P_{LO} = 0dBm, T_C = +25°C, unless otherwise noted.)

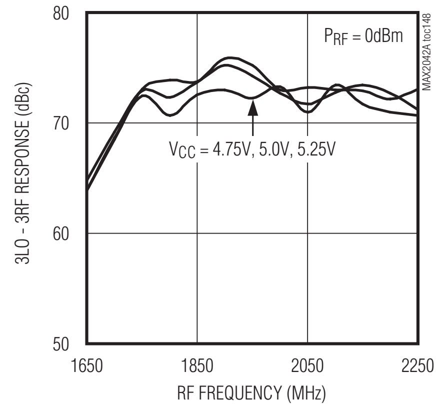
3LO - 3RF RESPONSE vs. RF FREQUENCY



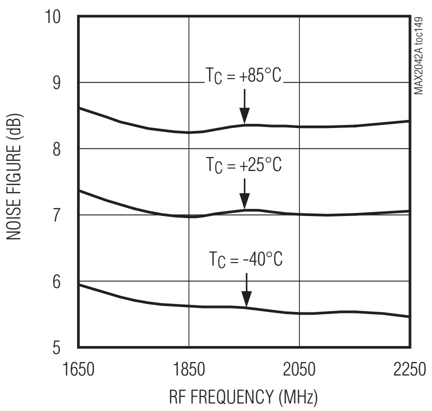
3LO - 3RF RESPONSE vs. RF FREQUENCY



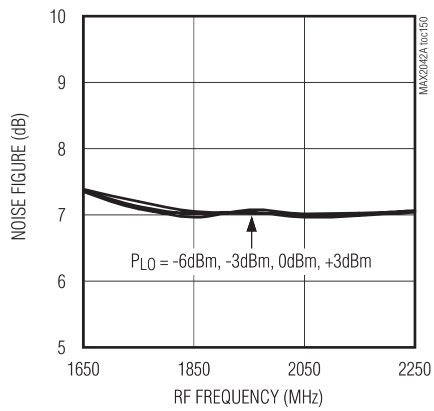
3LO - 3RF RESPONSE vs. RF FREQUENCY



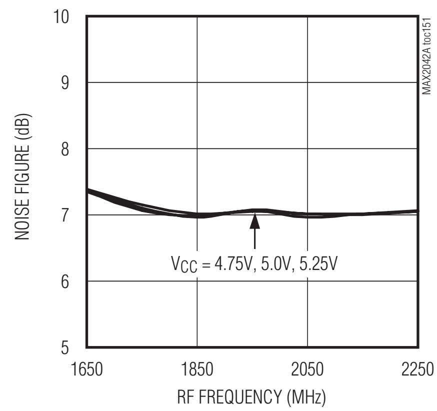
NOISE FIGURE vs. RF FREQUENCY



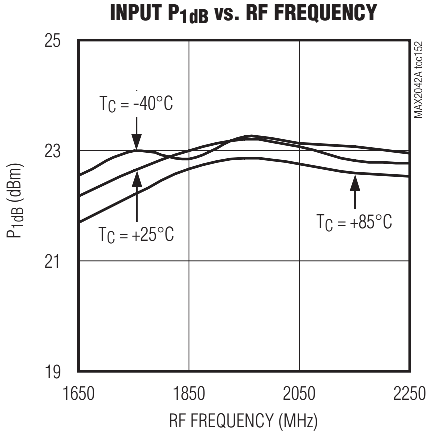
NOISE FIGURE vs. RF FREQUENCY



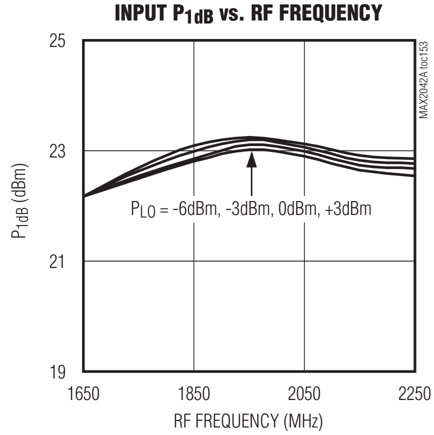
NOISE FIGURE vs. RF FREQUENCY



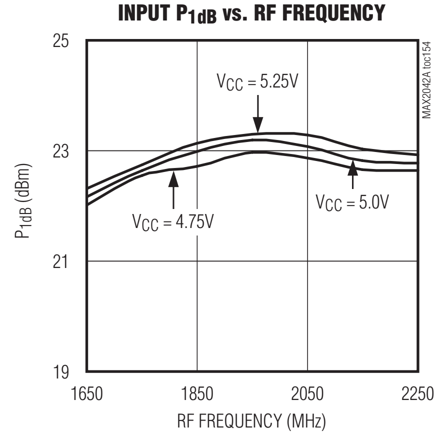
INPUT P_{1dB} vs. RF FREQUENCY



INPUT P_{1dB} vs. RF FREQUENCY



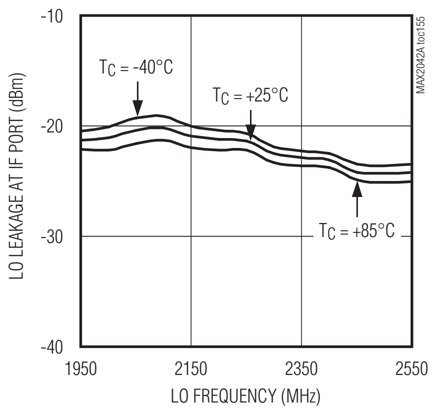
INPUT P_{1dB} vs. RF FREQUENCY



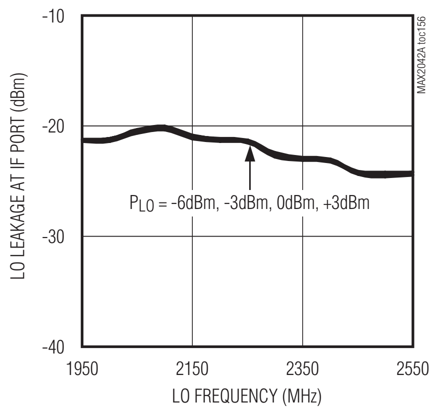
Typical Operating Characteristics (continued)

(*Typical Application Circuit* with tuning elements outlined in Table 1, **V_{CC} = 5.0V, f_{RF} = 1650MHz to 2250MHz, LO is high-side injected** for a 300MHz IF, P_{RF} = 0dBm, P_{LO} = 0dBm, T_C = +25°C, unless otherwise noted.)

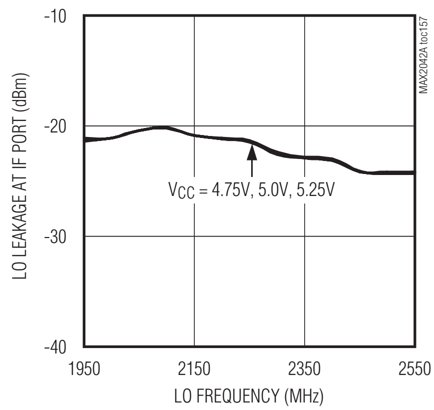
LO LEAKAGE AT IF PORT vs. LO FREQUENCY



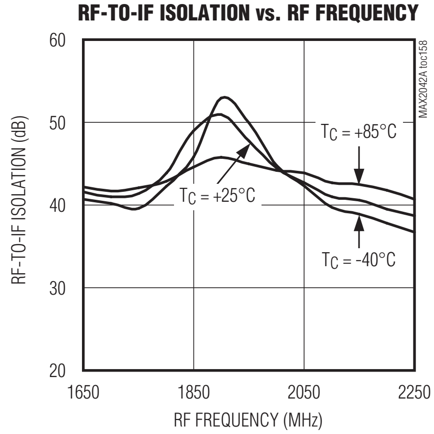
LO LEAKAGE AT IF PORT vs. LO FREQUENCY



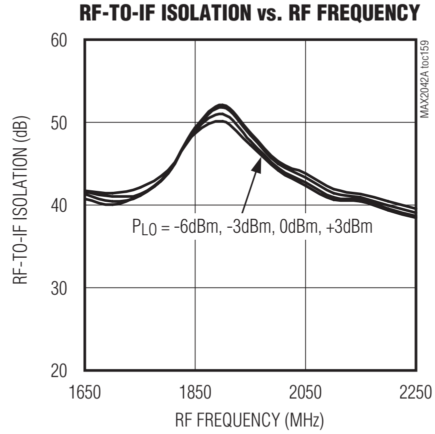
LO LEAKAGE AT IF PORT vs. LO FREQUENCY



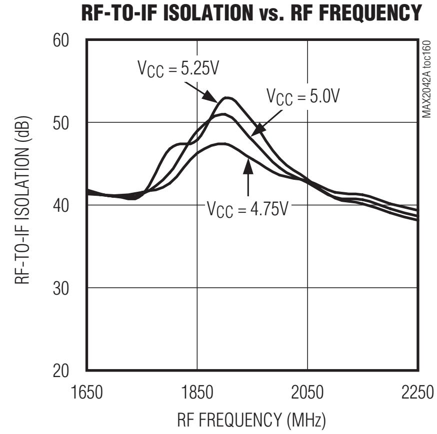
RF-TO-IF ISOLATION vs. RF FREQUENCY



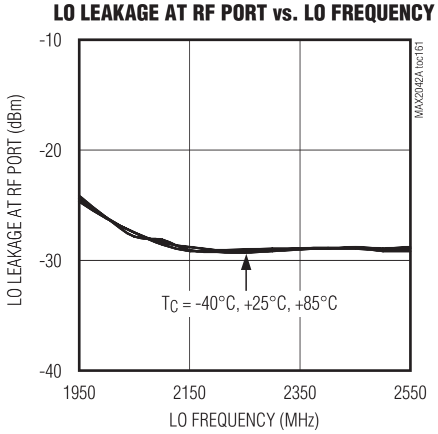
RF-TO-IF ISOLATION vs. RF FREQUENCY



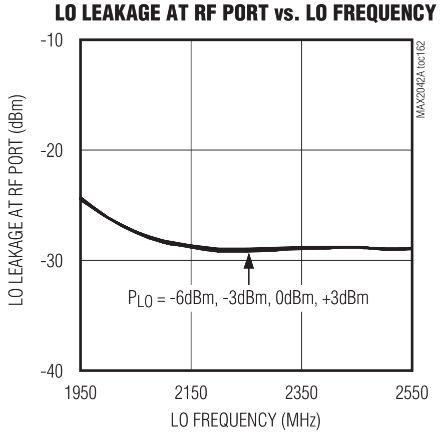
RF-TO-IF ISOLATION vs. RF FREQUENCY



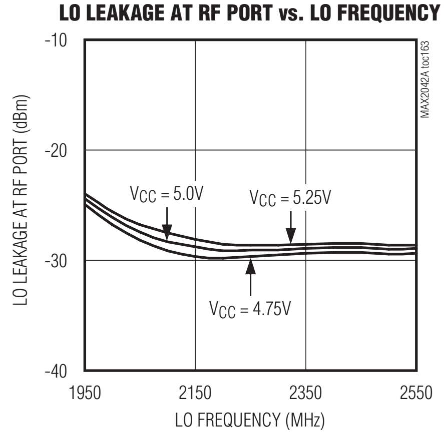
LO LEAKAGE AT RF PORT vs. LO FREQUENCY



LO LEAKAGE AT RF PORT vs. LO FREQUENCY

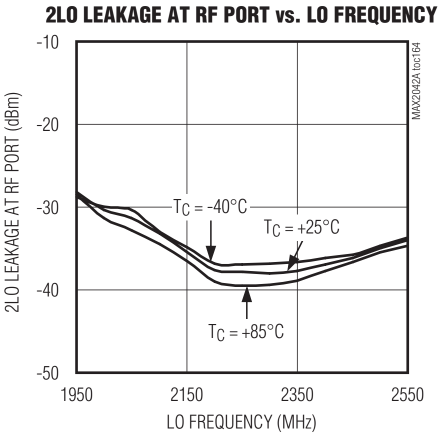


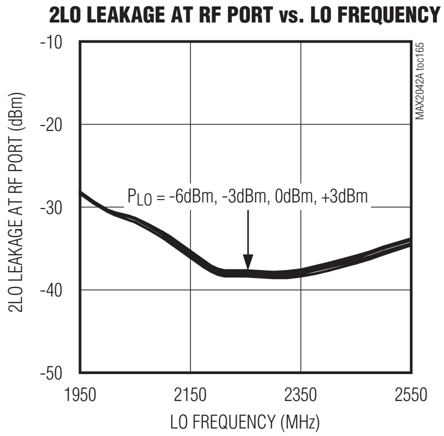
LO LEAKAGE AT RF PORT vs. LO FREQUENCY

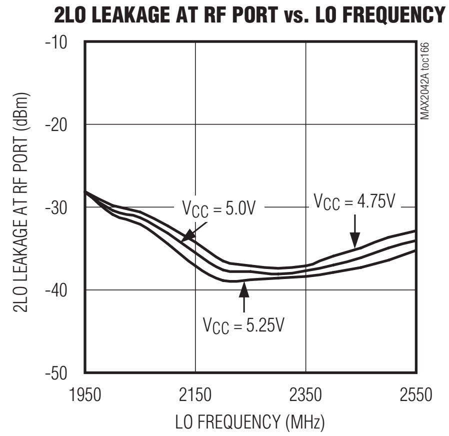


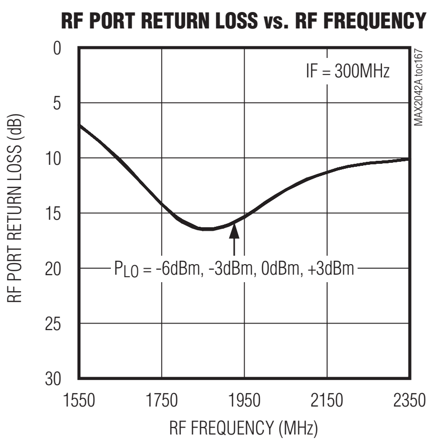
Typical Operating Characteristics (continued)

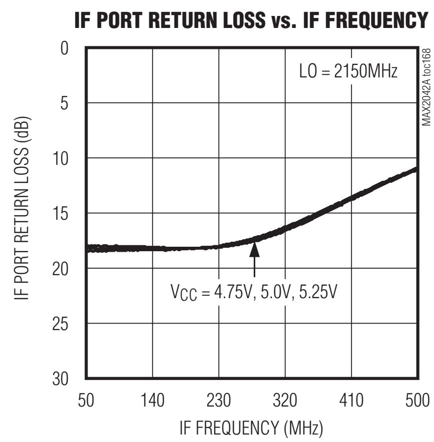
(*Typical Application Circuit* with tuning elements outlined in Table 1, **V_{CC} = 5.0V, f_{RF} = 1650MHz to 2250MHz, LO is high-side injected** for a 300MHz IF, P_{RF} = 0dBm, P_{LO} = 0dBm, T_C = +25°C, unless otherwise noted.)

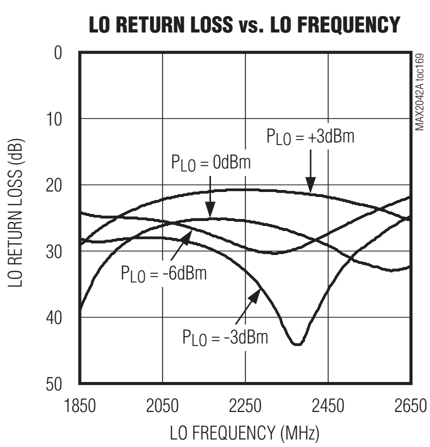


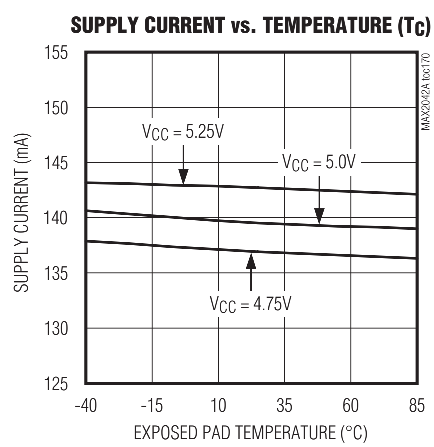








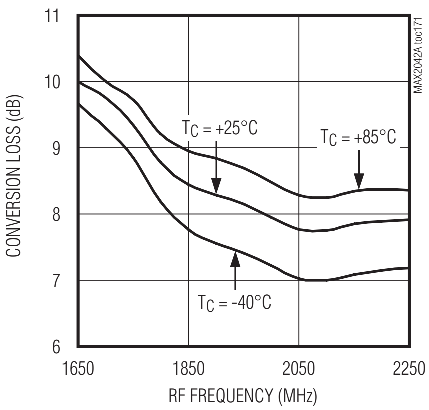




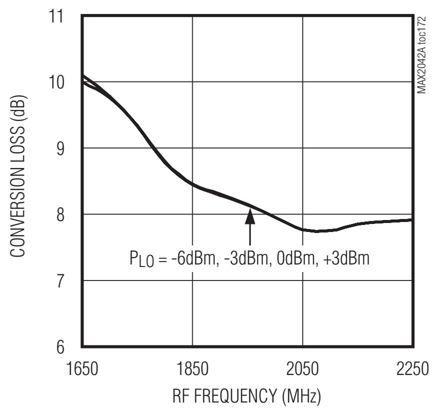
Typical Operating Characteristics (continued)

(*Typical Application Circuit* with tuning elements outlined in Table 1, **V_{CC} = 5.0V, f_{RF} = 1650MHz to 2250MHz, LO is low-side injected** for a 300MHz IF, P_{RF} = 0dBm, P_{LO} = 0dBm, T_C = +25°C, unless otherwise noted.)

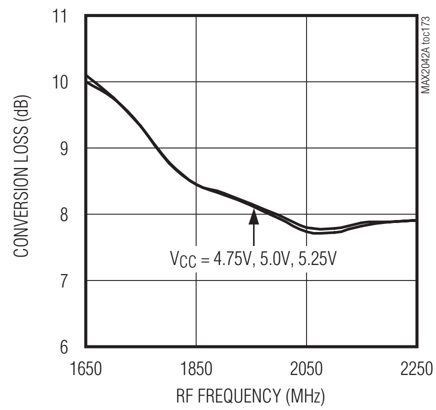
CONVERSION LOSS vs. RF FREQUENCY



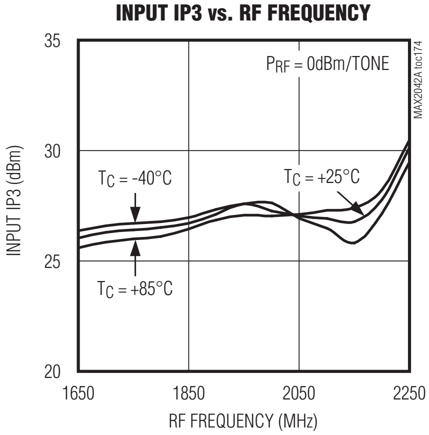
CONVERSION LOSS vs. RF FREQUENCY



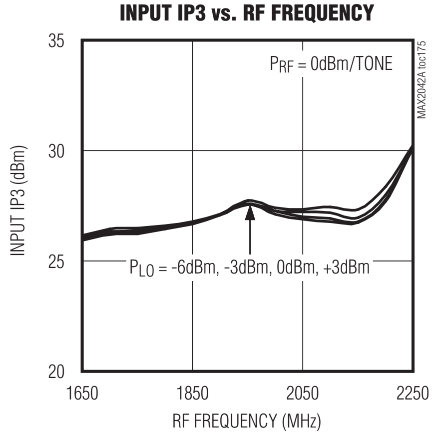
CONVERSION LOSS vs. RF FREQUENCY



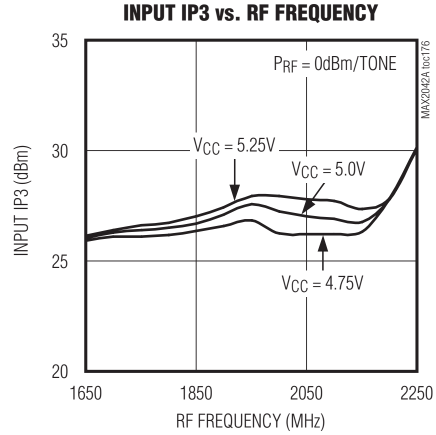
INPUT IP3 vs. RF FREQUENCY



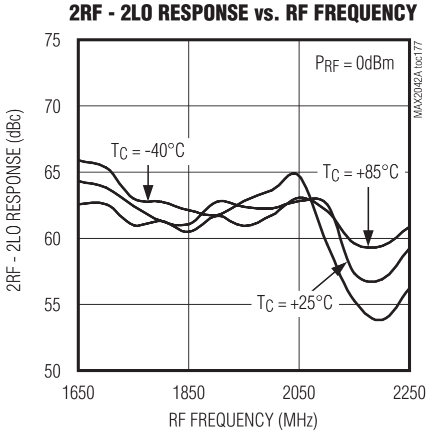
INPUT IP3 vs. RF FREQUENCY



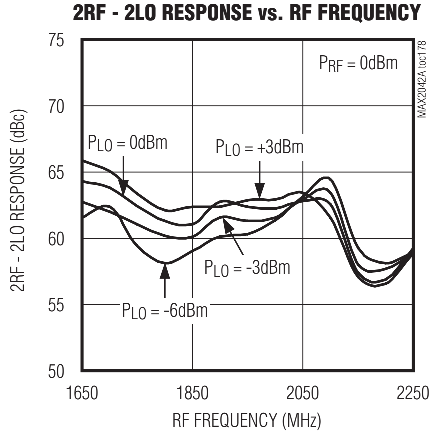
INPUT IP3 vs. RF FREQUENCY



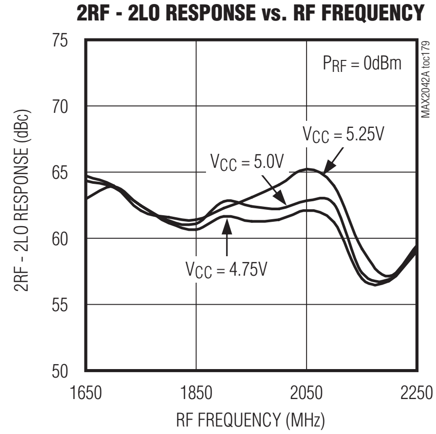
2RF - 2LO RESPONSE vs. RF FREQUENCY



2RF - 2LO RESPONSE vs. RF FREQUENCY



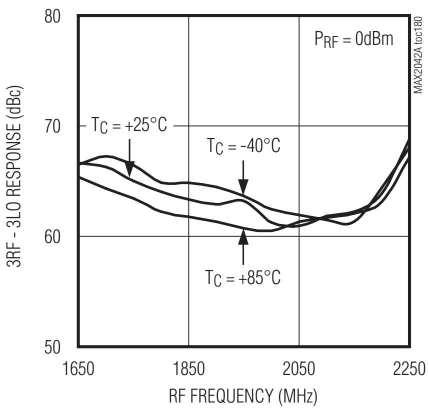
2RF - 2LO RESPONSE vs. RF FREQUENCY



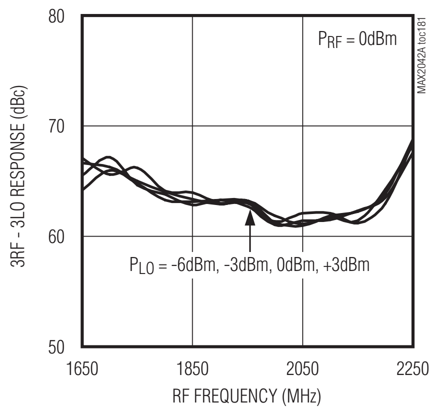
Typical Operating Characteristics (continued)

(*Typical Application Circuit* with tuning elements outlined in Table 1, **V_{CC} = 5.0V, f_{RF} = 1650MHz to 2250MHz, LO is low-side injected** for a 300MHz IF, P_{RF} = 0dBm, P_{LO} = 0dBm, T_C = +25°C, unless otherwise noted.)

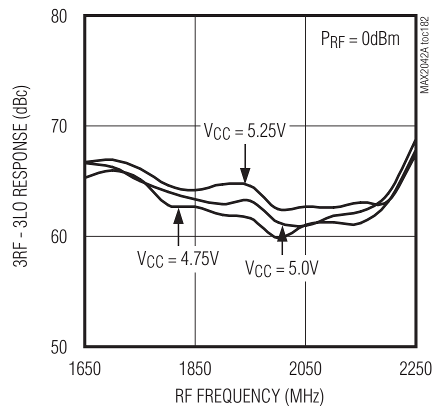
3RF - 3LO RESPONSE vs. RF FREQUENCY



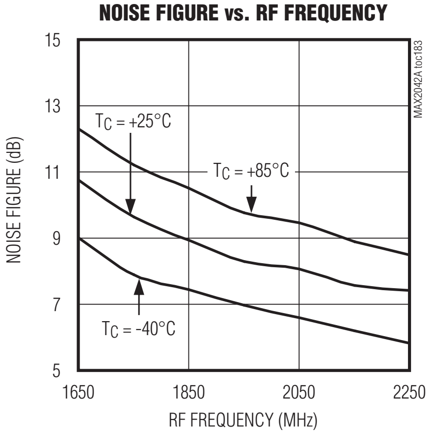
3RF - 3LO RESPONSE vs. RF FREQUENCY



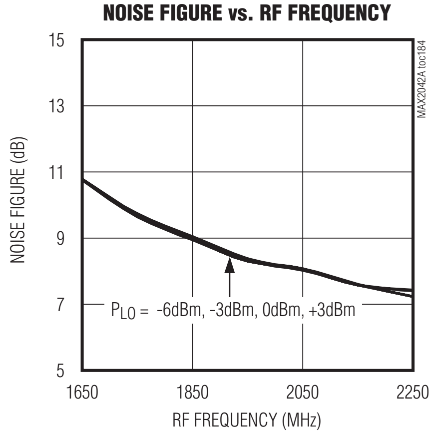
3RF - 3LO RESPONSE vs. RF FREQUENCY



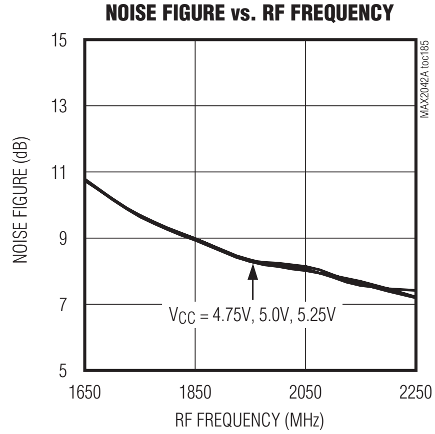
NOISE FIGURE vs. RF FREQUENCY



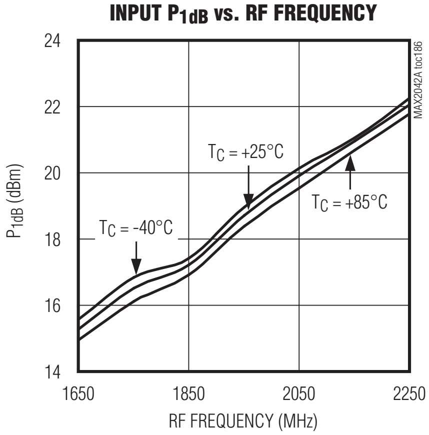
NOISE FIGURE vs. RF FREQUENCY



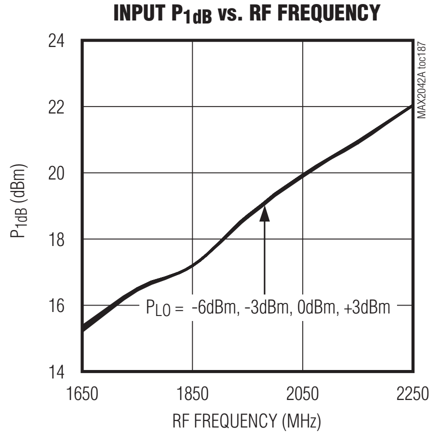
NOISE FIGURE vs. RF FREQUENCY



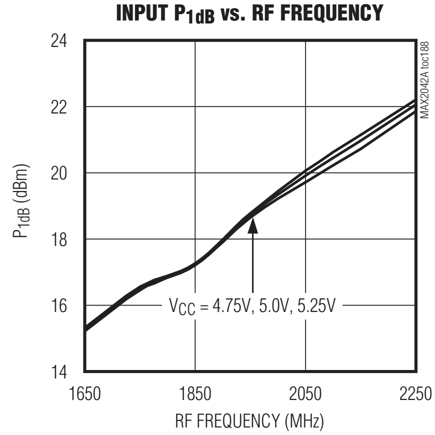
INPUT P_{1dB} vs. RF FREQUENCY



INPUT P_{1dB} vs. RF FREQUENCY

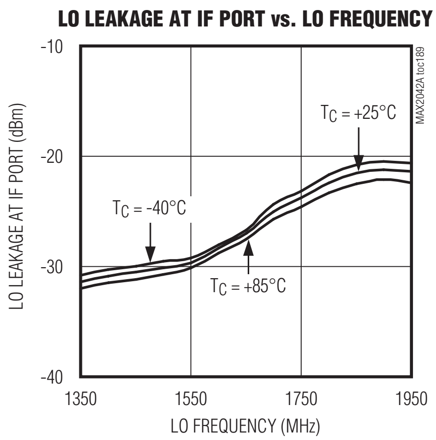


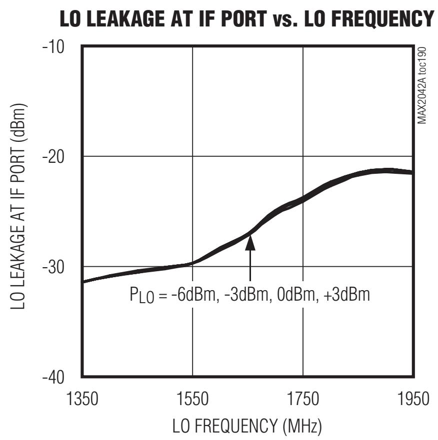
INPUT P_{1dB} vs. RF FREQUENCY

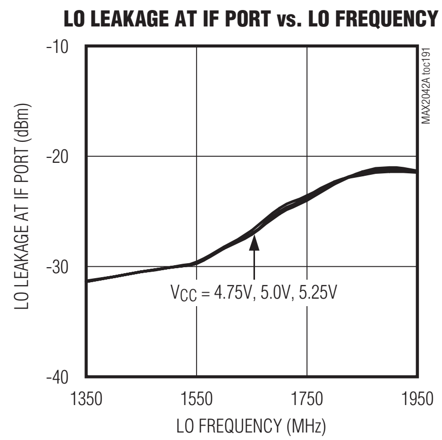


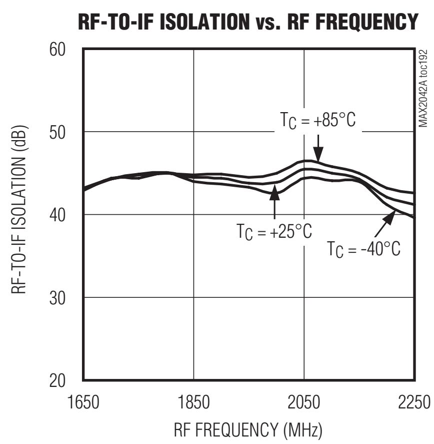
Typical Operating Characteristics (continued)

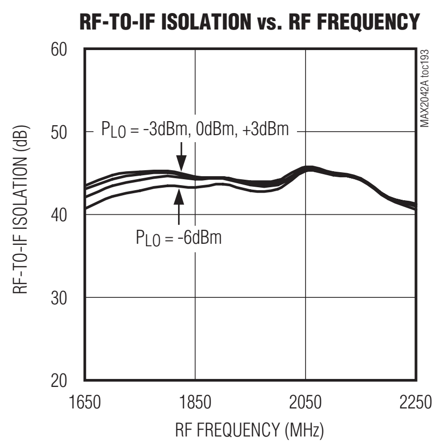
(*Typical Application Circuit* with tuning elements outlined in Table 1, **V_{CC} = 5.0V, f_{RF} = 1650MHz to 2250MHz, LO is low-side injected** for a 300MHz IF, P_{RF} = 0dBm, P_{LO} = 0dBm, T_C = +25°C, unless otherwise noted.)

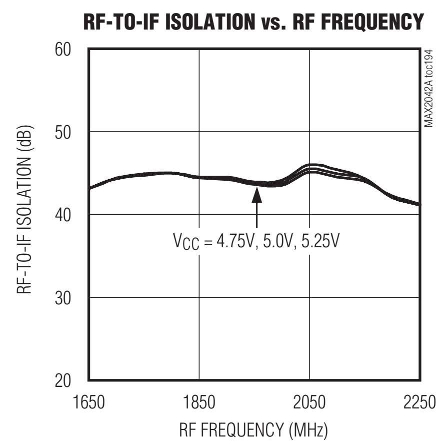


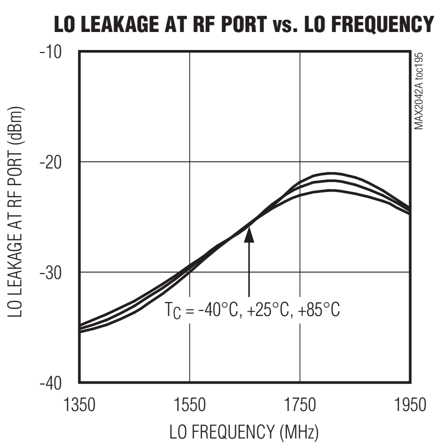


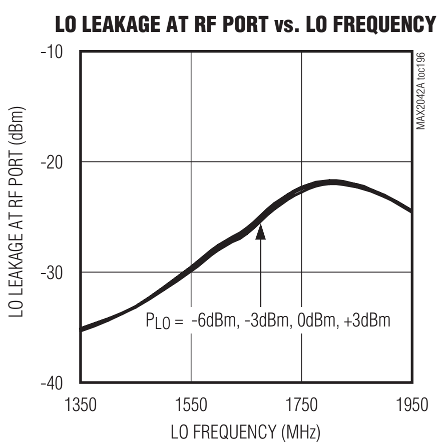


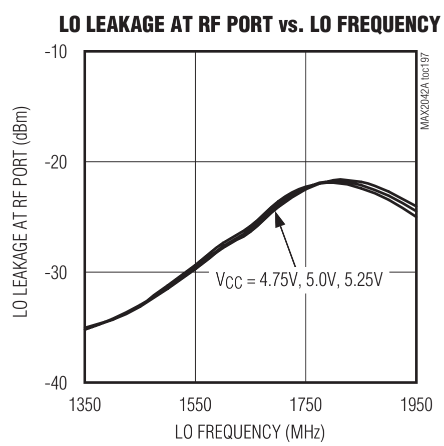








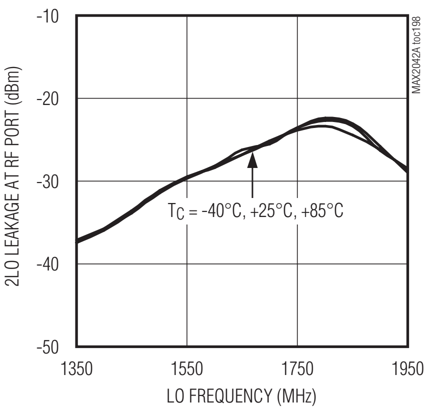




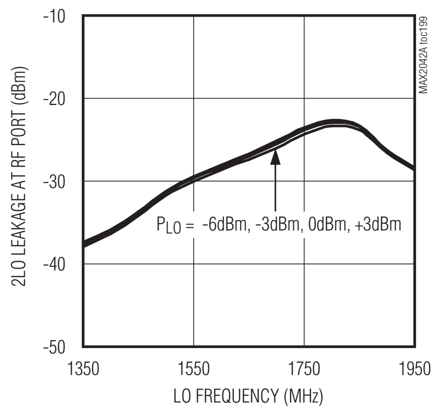
Typical Operating Characteristics (continued)

(*Typical Application Circuit* with tuning elements outlined in Table 1, **V_{CC} = 5.0V, f_{RF} = 1650MHz to 2250MHz, LO is low-side injected** for a 300MHz IF, P_{RF} = 0dBm, P_{LO} = 0dBm, T_C = +25°C, unless otherwise noted.)

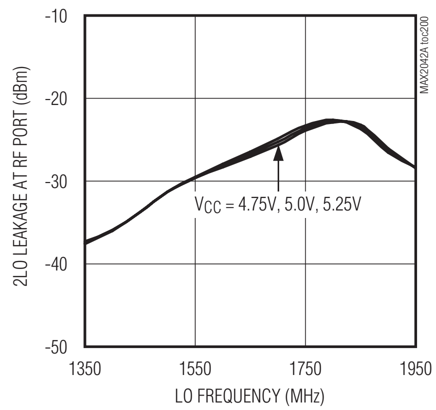
2LO LEAKAGE AT RF PORT vs. LO FREQUENCY



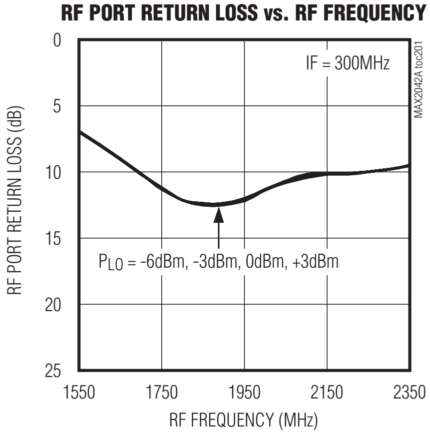
2LO LEAKAGE AT RF PORT vs. LO FREQUENCY



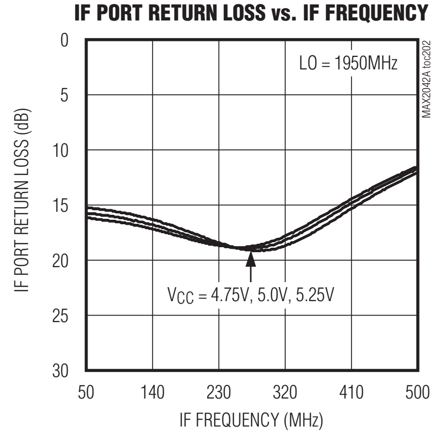
2LO LEAKAGE AT RF PORT vs. LO FREQUENCY



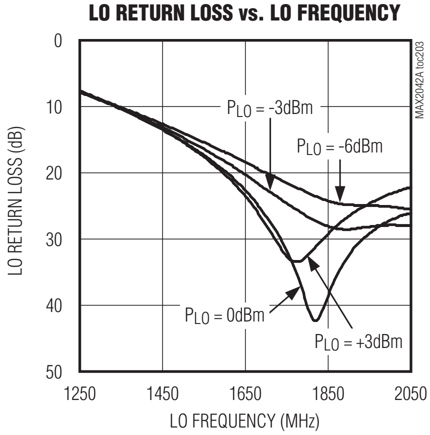
RF PORT RETURN LOSS vs. RF FREQUENCY



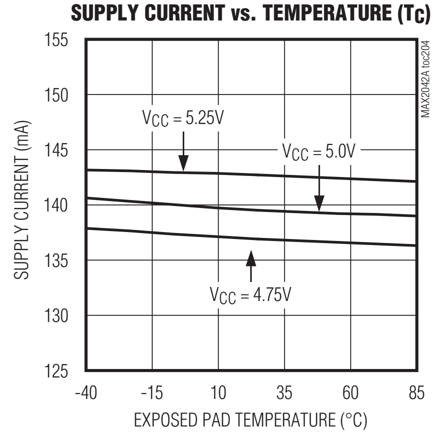
IF PORT RETURN LOSS vs. IF FREQUENCY



LO RETURN LOSS vs. LO FREQUENCY



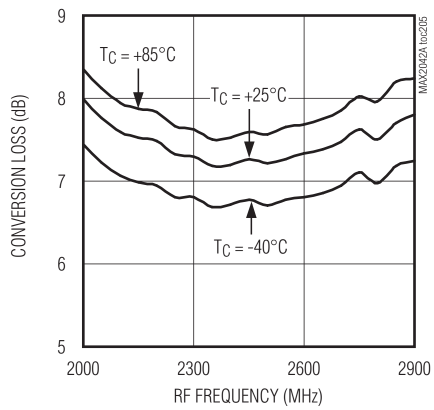
SUPPLY CURRENT vs. TEMPERATURE (T_C)



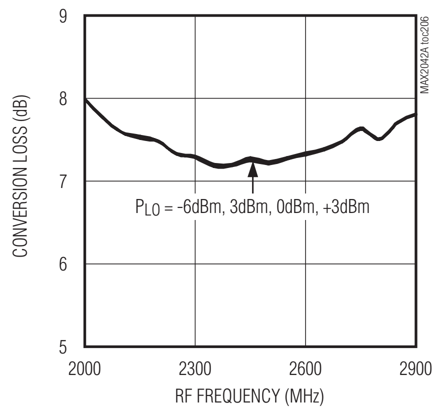
Typical Operating Characteristics (continued)

(*Typical Application Circuit* with tuning elements outlined in Table 2, **V_{CC} = +5.0V, f_{RF} = f_{LO} - f_{IF},** f_{IF} = 300MHz, P_{IF} = 0dBm, P_{LO} = 0dBm, T_C = +25°C, unless otherwise noted.)

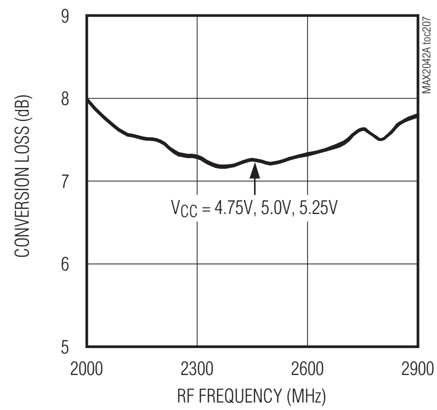
CONVERSION LOSS vs. RF FREQUENCY



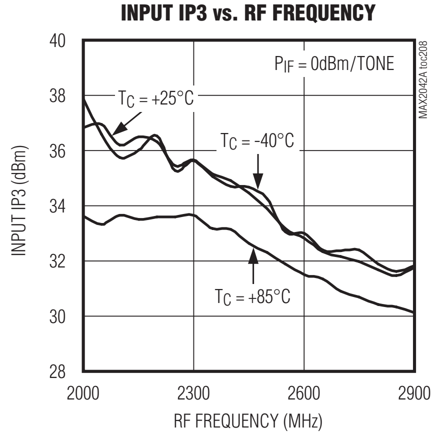
CONVERSION LOSS vs. RF FREQUENCY



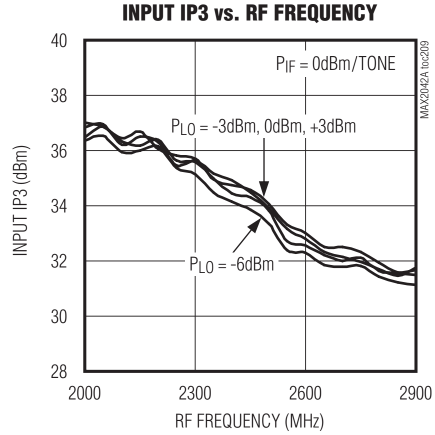
CONVERSION LOSS vs. RF FREQUENCY



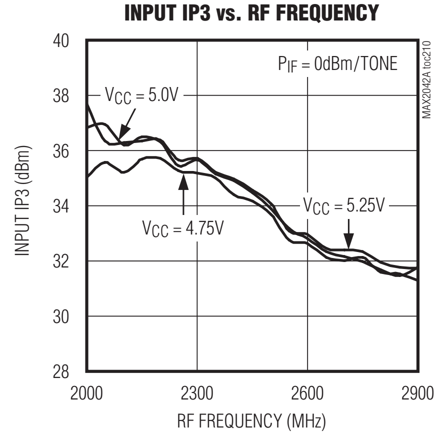
INPUT IP3 vs. RF FREQUENCY



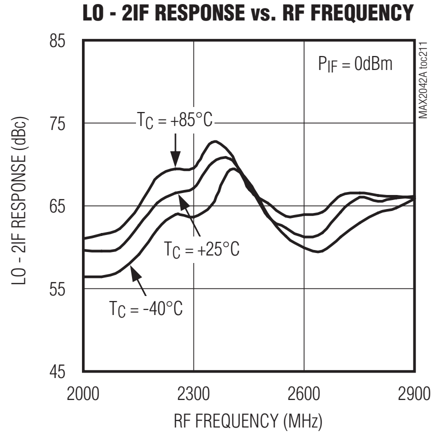
INPUT IP3 vs. RF FREQUENCY



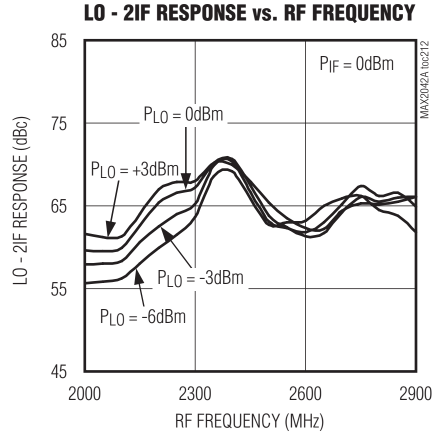
INPUT IP3 vs. RF FREQUENCY



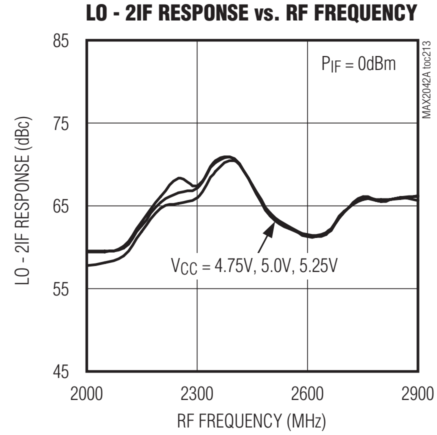
LO - 2IF RESPONSE vs. RF FREQUENCY



LO - 2IF RESPONSE vs. RF FREQUENCY



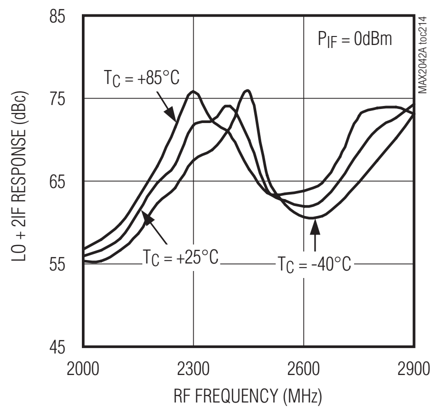
LO - 2IF RESPONSE vs. RF FREQUENCY



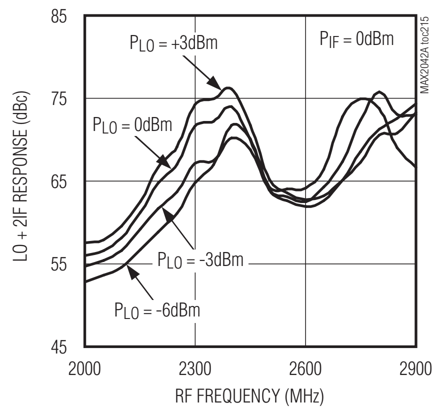
Typical Operating Characteristics (continued)

(*Typical Application Circuit* with tuning elements outlined in Table 2, **V_{CC} = +5.0V, f_{RF} = f_{LO} - f_{IF},** f_{IF} = 300MHz, P_{IF} = 0dBm, P_{LO} = 0dBm, T_C = +25°C, unless otherwise noted.)

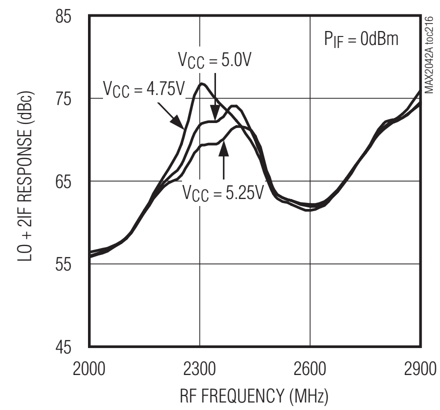
LO + 2IF RESPONSE vs. RF FREQUENCY



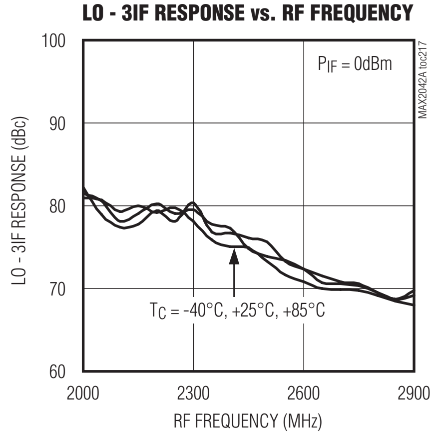
LO + 2IF RESPONSE vs. RF FREQUENCY



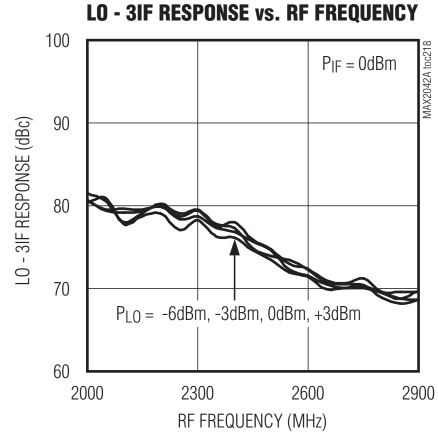
LO + 2IF RESPONSE vs. RF FREQUENCY



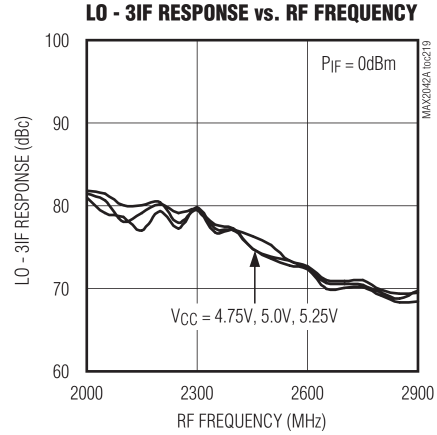
LO - 3IF RESPONSE vs. RF FREQUENCY



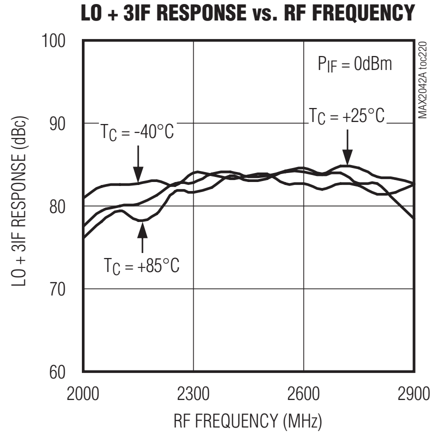
LO - 3IF RESPONSE vs. RF FREQUENCY



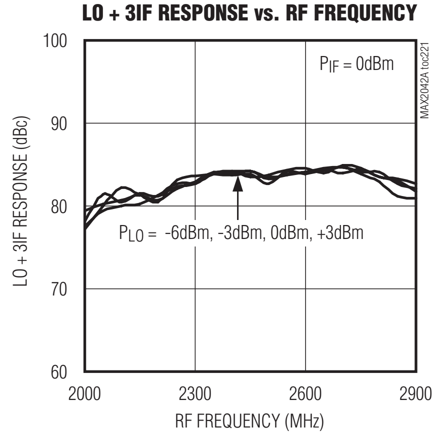
LO - 3IF RESPONSE vs. RF FREQUENCY



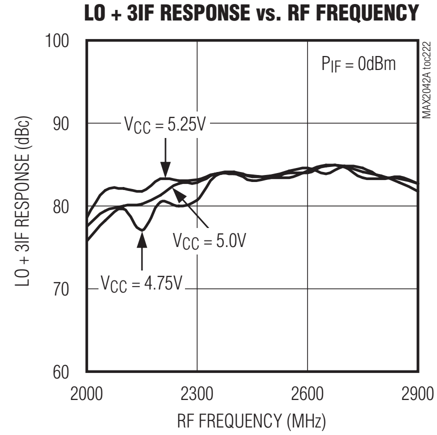
LO + 3IF RESPONSE vs. RF FREQUENCY



LO + 3IF RESPONSE vs. RF FREQUENCY



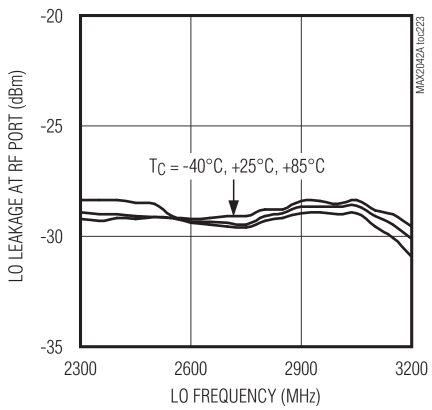
LO + 3IF RESPONSE vs. RF FREQUENCY



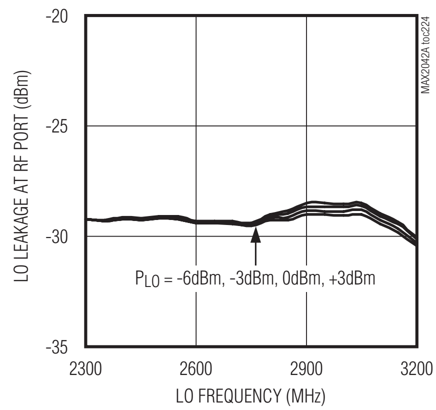
Typical Operating Characteristics (continued)

(*Typical Application Circuit* with tuning elements outlined in Table 2, **V_{CC} = +5.0V, f_{RF} = f_{LO} - f_{IF},** f_{IF} = 300MHz, P_{IF} = 0dBm, P_{LO} = 0dBm, T_C = +25°C, unless otherwise noted.)

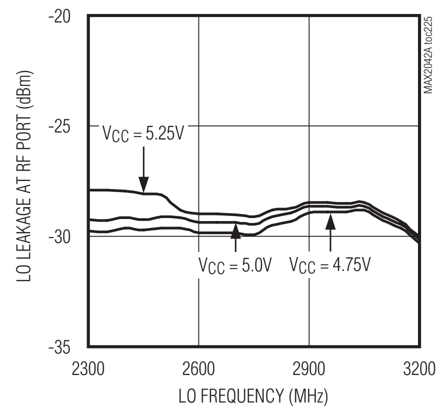
LO LEAKAGE AT RF PORT vs. LO FREQUENCY



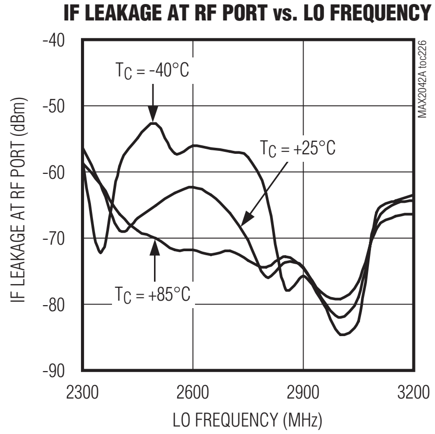
LO LEAKAGE AT RF PORT vs. LO FREQUENCY



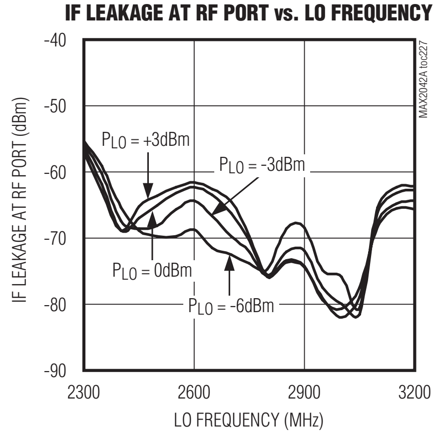
LO LEAKAGE AT RF PORT vs. LO FREQUENCY



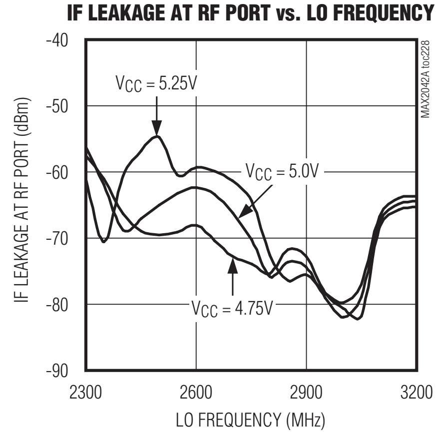
IF LEAKAGE AT RF PORT vs. LO FREQUENCY



IF LEAKAGE AT RF PORT vs. LO FREQUENCY

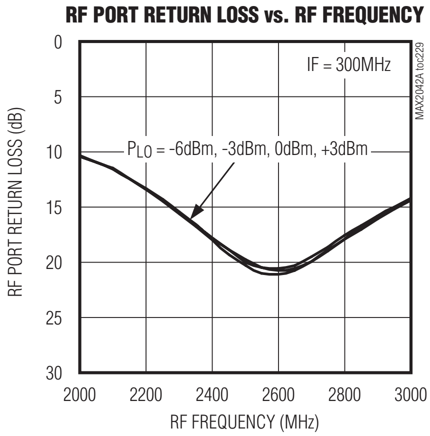


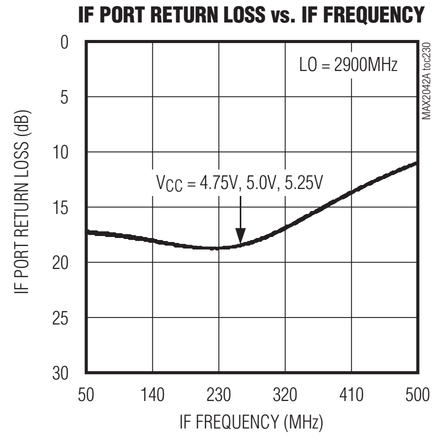
IF LEAKAGE AT RF PORT vs. LO FREQUENCY

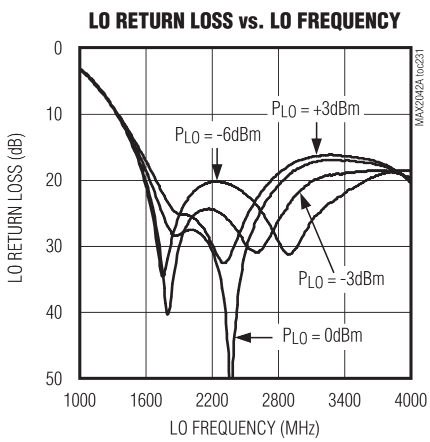


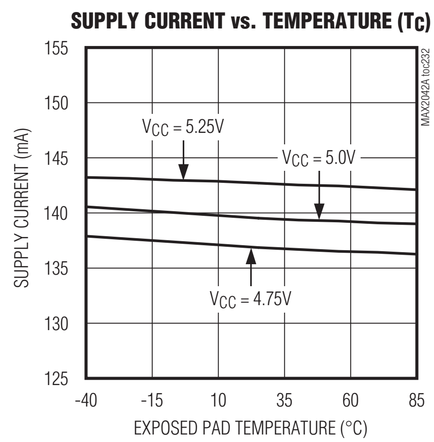
Typical Operating Characteristics (continued)

(Typical Application Circuit with tuning elements outlined in Table 2, **V_{CC} = +5.0V, f_{RF} = f_{LO} - f_{IF},** f_{IF} = 300MHz, P_{IF} = 0dBm, P_{LO} = 0dBm, T_C = +25°C, unless otherwise noted.)





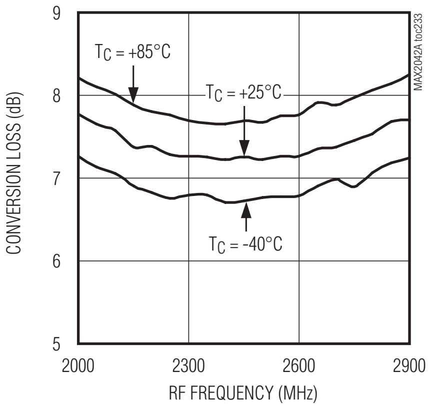




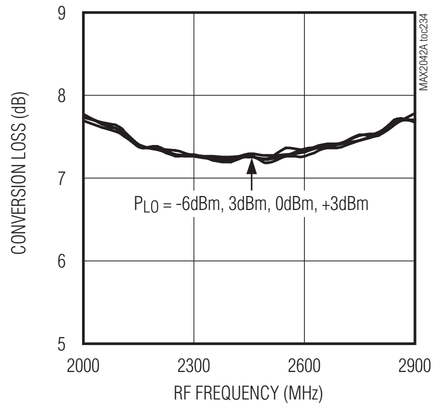
Typical Operating Characteristics (continued)

(*Typical Application Circuit* with tuning elements outlined in **Table 2**, **V_{CC} = +3.3V, $f_{RF} = f_{LO} - f_{IF}$,** f_{IF} = 300MHz, P_{IF} = 0dBm, P_{LO} = 0dBm, T_C = +25°C, unless otherwise noted.)

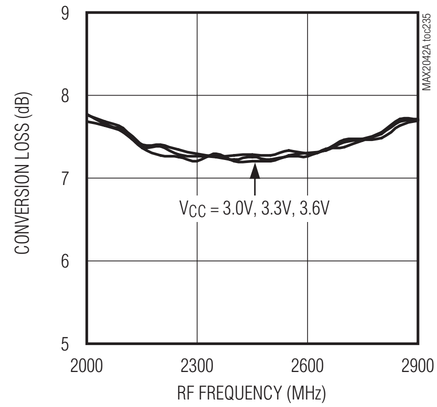
CONVERSION LOSS vs. RF FREQUENCY



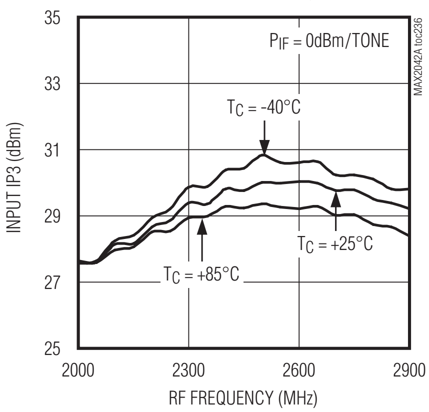
CONVERSION LOSS vs. RF FREQUENCY



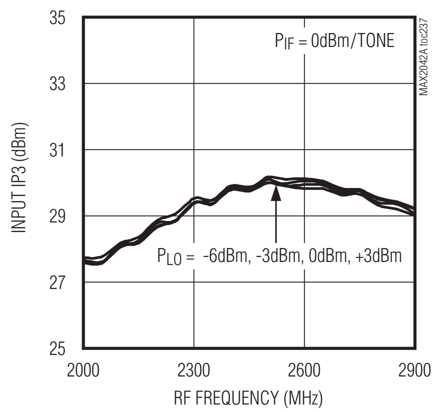
CONVERSION LOSS vs. RF FREQUENCY



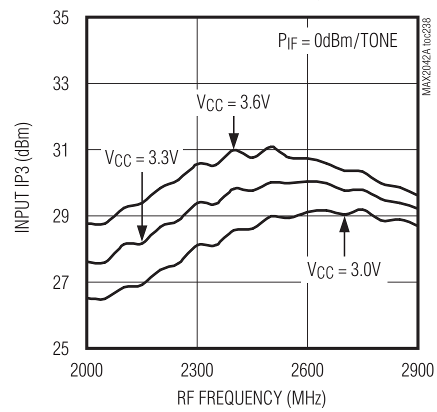
INPUT IP3 vs. RF FREQUENCY



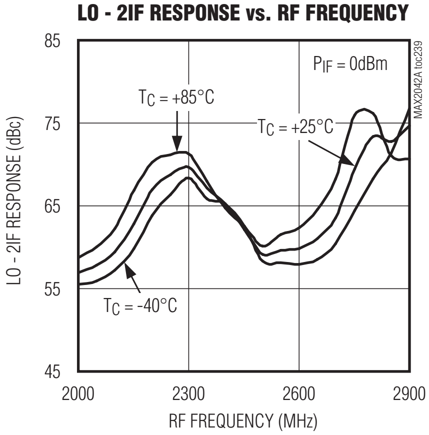
INPUT IP3 vs. RF FREQUENCY



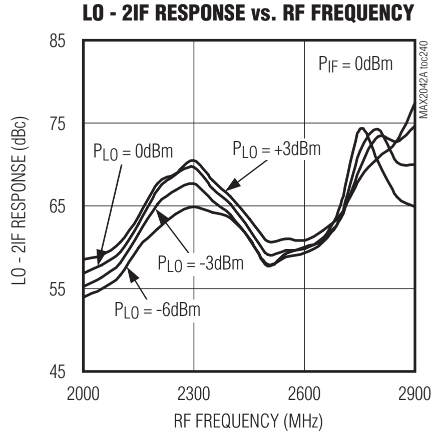
INPUT IP3 vs. RF FREQUENCY



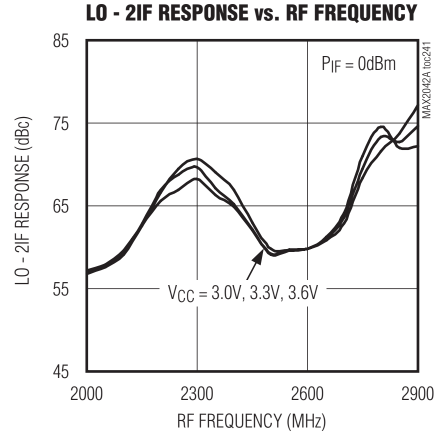
LO - 2IF RESPONSE vs. RF FREQUENCY



LO - 2IF RESPONSE vs. RF FREQUENCY



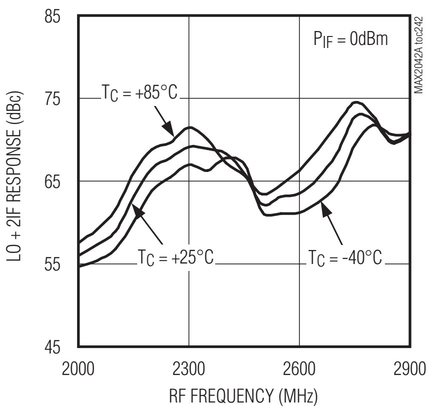
LO - 2IF RESPONSE vs. RF FREQUENCY



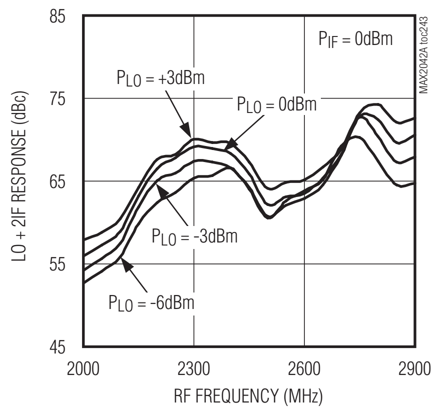
Typical Operating Characteristics (continued)

(*Typical Application Circuit* with tuning elements outlined in **Table 2**, **V_{CC} = +3.3V, f_{RF} = f_{LO} - f_{IF},** f_{IF} = 300MHz, P_{IF} = 0dBm, P_{LO} = 0dBm, T_C = +25°C, unless otherwise noted.)

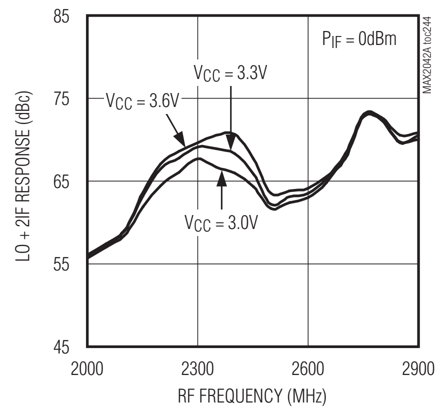
LO + 2IF RESPONSE vs. RF FREQUENCY



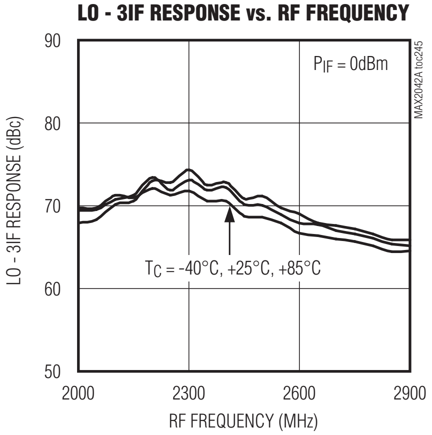
LO + 2IF RESPONSE vs. RF FREQUENCY



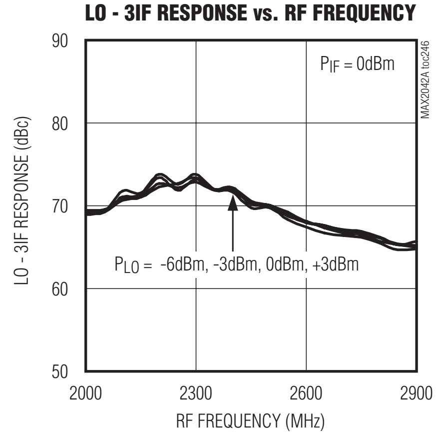
LO + 2IF RESPONSE vs. RF FREQUENCY



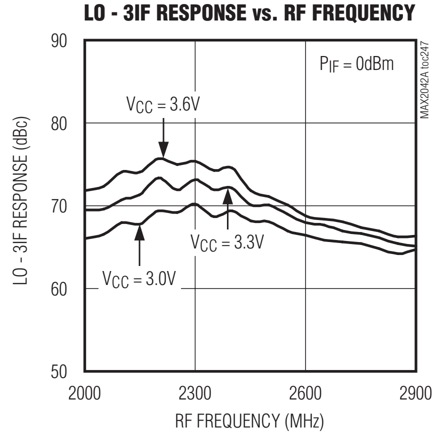
LO - 3IF RESPONSE vs. RF FREQUENCY



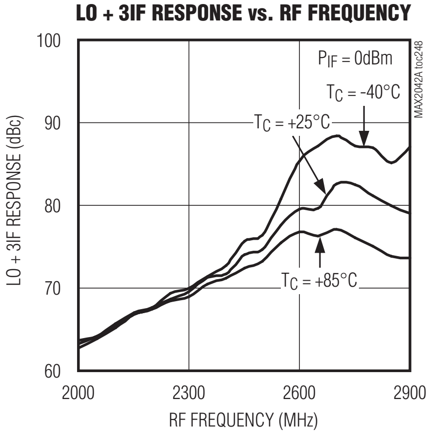
LO - 3IF RESPONSE vs. RF FREQUENCY



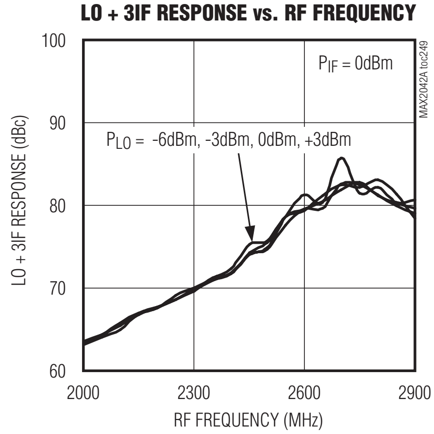
LO - 3IF RESPONSE vs. RF FREQUENCY



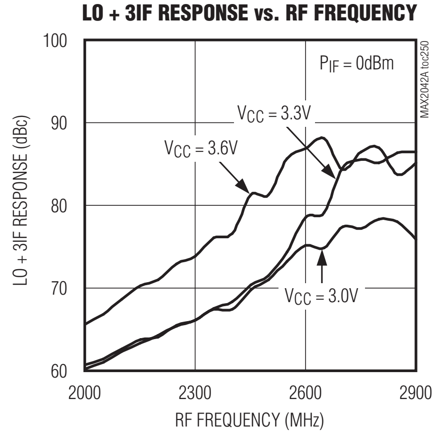
LO + 3IF RESPONSE vs. RF FREQUENCY



LO + 3IF RESPONSE vs. RF FREQUENCY



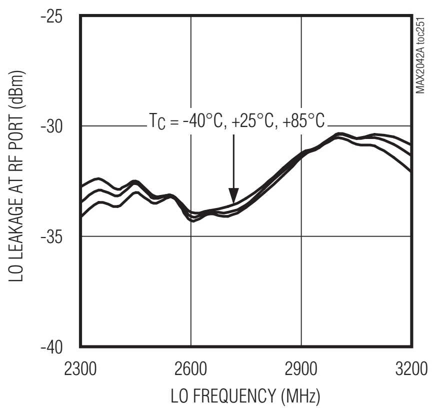
LO + 3IF RESPONSE vs. RF FREQUENCY



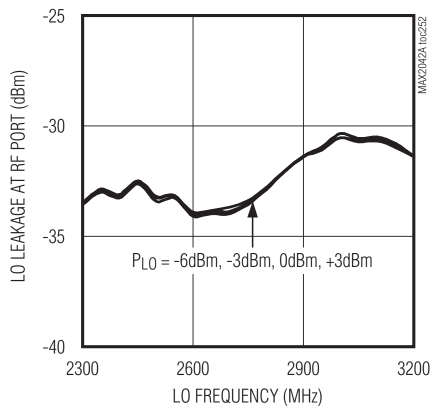
Typical Operating Characteristics (continued)

(*Typical Application Circuit* with tuning elements outlined in **Table 2**, **V_{CC} = +3.3V, $f_{RF} = f_{LO} - f_{IF}$,** f_{IF} = 300MHz, P_{IF} = 0dBm, P_{LO} = 0dBm, T_C = +25°C, unless otherwise noted.)

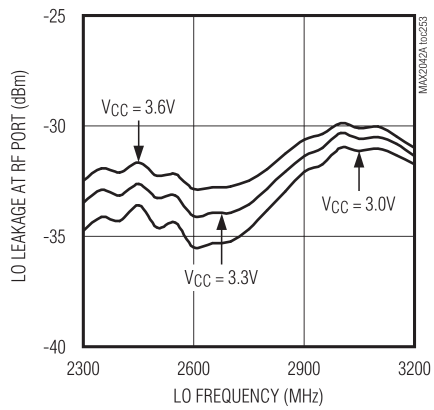
LO LEAKAGE AT RF PORT vs. LO FREQUENCY



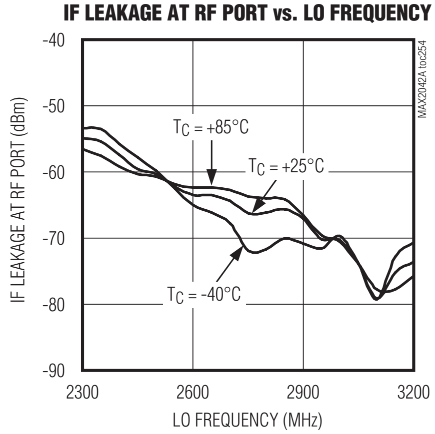
LO LEAKAGE AT RF PORT vs. LO FREQUENCY



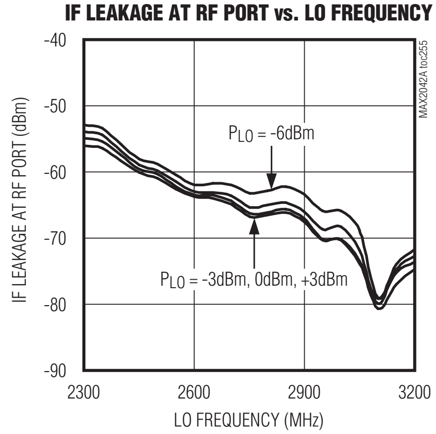
LO LEAKAGE AT RF PORT vs. LO FREQUENCY



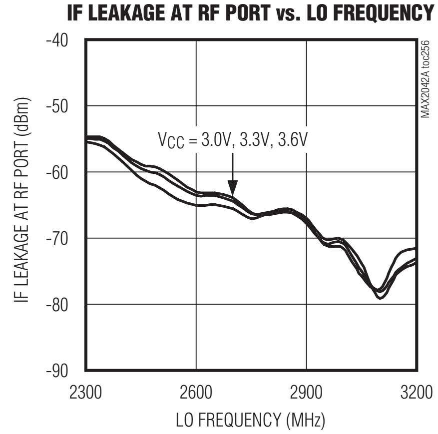
IF LEAKAGE AT RF PORT vs. LO FREQUENCY



IF LEAKAGE AT RF PORT vs. LO FREQUENCY

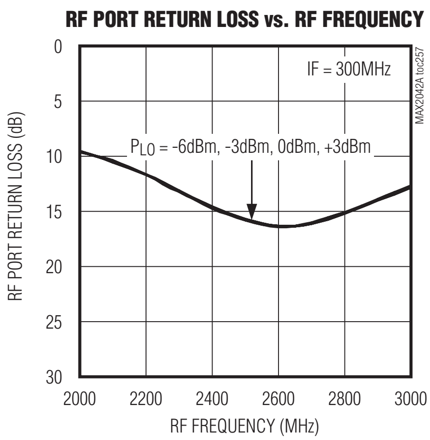


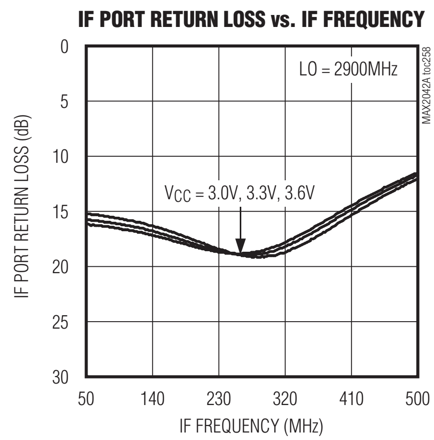
IF LEAKAGE AT RF PORT vs. LO FREQUENCY

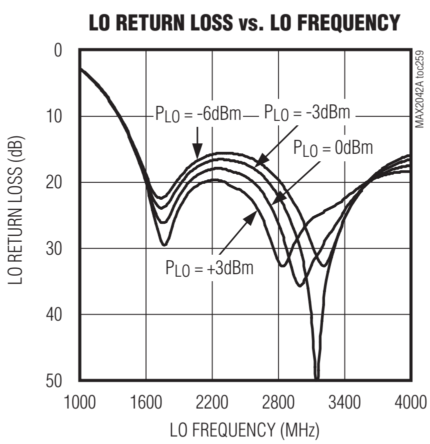


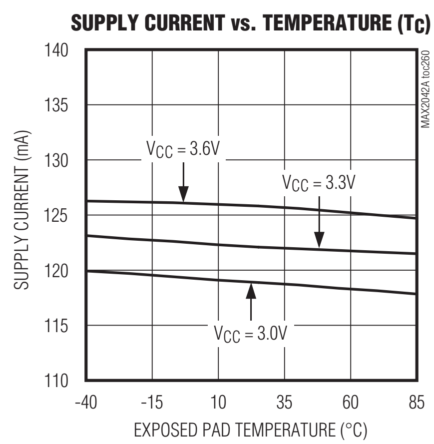
Typical Operating Characteristics (continued)

(*Typical Application Circuit* with tuning elements outlined in **Table 2**, **V_{CC} = +3.3V, f_{RF} = f_{LO} - f_{IF},** f_{IF} = 300MHz, P_{IF} = 0dBm, P_{LO} = 0dBm, T_C = +25°C, unless otherwise noted.)

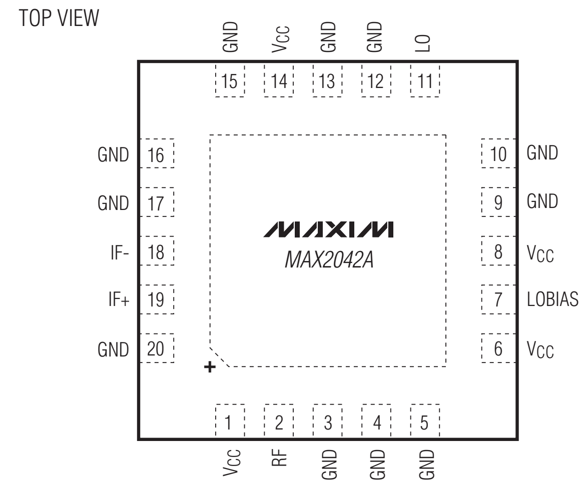








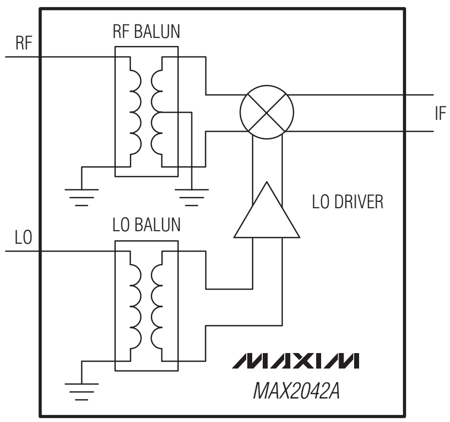
Pin Configuration



Pin Description

PIN	NAME	FUNCTION
1, 6, 8,14	V_{CC}	Power Supply. Bypass to GND with 0.01µF capacitors as close as possible to the pin.
2	RF	Single-Ended 50Ω RF Input. Internally matched and DC shorted to GND through a balun. Provide a DC-blocking capacitor if required. Capacitor also provides some RF match tuning.
3, 4, 5, 10, 12, 13, 17	GND	Ground. Internally connected to the exposed pad. Connect all ground pins and the exposed pad (EP) together.
7	LOBIAS	LO Amplifier Bias Control. Output bias resistor for the LO buffer. Connect a 698Ω ±1% resistor (nominal bias condition) from LOBIAS to ground. The maximum current seen by this resistor is 3mA.
9, 15	GND	Ground. Not internally connected. Ground these pins or leave unconnected.
11	LO	Local Oscillator Input. This input is internally matched to 50Ω. Requires an input DC-blocking capacitor. Capacitor also provides some LO match tuning.
16, 20	GND	Ground. Connect all ground pins and the exposed pad (EP) together.
18, 19	IF-, IF+	Mixer Differential IF Output/Input
—	EP	Exposed Pad. Internally connected to GND. Solder this exposed pad to a PCB pad that uses multiple ground vias to provide heat transfer out of the device into the PCB ground planes. These multiple via grounds are also required to achieve the noted RF performance (see the *Layout Considerations* section).

Functional Diagram



Detailed Description

When used as a high-side LO injection mixer in the 2300MHz to 2900MHz band, the MAX2042A provides +33dBm of IIP3, with typical conversion loss and noise figure values of only 7.2dB and 7.25dB, respectively. The integrated baluns and matching circuitry allow for 50Ω single-ended interfaces to the RF and the LO port. The integrated LO buffer provides a high drive level to the mixer core, reducing the LO drive required at the IC's input to a -6dBm to +3dBm range. The IF port incorporates a differential output, which is ideal for providing enhanced 2LO - 2RF performance.

Specifications are over broad frequency ranges to allow for use in GSM/EDGE, CDMA, TD-SCDMA, WCDMA, LTE, TD-LTE, WiMAX, and MMDS base stations. The device is specified to operate over a 1600MHz to 3900MHz RF input range, a 1300MHz to 4000MHz LO range, and a 50MHz to 500MHz IF range. The external IF components set the lower frequency range (see the *Typical Operating Characteristics* for details). Operation beyond these ranges is possible (see the *Typical Operating Characteristics* for additional information).

RF Input and Balun

The IC's RF input provides a 50Ω match when combined with a series DC-blocking capacitor. This DC-blocking capacitor is required as the input is internally DC shorted to ground through the on-chip balun. When using an 8.2pF DC-blocking capacitor, the RF port input return loss is typically 17dB over the 2300MHz to 2900MHz RF frequency range. A return loss of 14dB over the 3000MHz to 3900MHz range is achieved by changing the DC-blocking capacitor to 1.5pF.

For applications spanning the 1700MHz to 2200MHz frequency range, a 12nH shunt inductor can be used in conjunction with a 1.8pF DC-blocking capacitor to provide a typical return loss of 12dB. See the *Typical Application Circuit* and Table 1 for details.

LO Inputs, Buffer, and Balun

With a broadband LO drive circuit spanning 1300MHz to 4000MHz, the device can be used in either low- or high-side LO injection architectures for virtually all 1.7GHz to 3.5GHz receiver and transmitter applications. The LO input is internally matched to 50Ω, requiring only a 2pF DC-blocking capacitor. A two-stage internal LO buffer allows for a -6dBm to +3dBm LO input power range. The on-chip low-loss balun, along with an LO buffer, drives the double-balanced mixer. All interfacing and matching components from the LO inputs to the IF outputs are integrated on-chip.

High-Linearity Mixer

The core of the device is a double-balanced, high-performance passive mixer. Exceptional linearity is provided by the large LO swing from the on-chip LO buffer. IIP3, 2LO - 2RF rejection, and noise-figure performance are typically 33dBm, 72dBc, and 7.25dB, respectively.

Differential IF Ports

The device has a 50MHz to 500MHz IF frequency range, where the low-end frequency depends on the frequency response of the external IF components.

The device's differential IF ports are ideal for providing enhanced 2LO - 2RF performance. The user can connect a differential IF amplifier or SAW filter to the mixer IF port, but a DC block is required on both IF+/IF- ports to keep external DC from entering the IF ports of the mixer. To characterize the part, an external MABACT0069 1:1 transformer is used to transform the 50Ω differential IF interface to 50Ω single-ended. Its loss is included in the data presented in this data sheet. This transformer also supplies a needed IF pin ground return for the on-chip circuitry. If a ground return is not available on the IF pins, the return is achievable through some off-chip resistance to ground or large-value inductors. A 1kΩ to ground on each IF pin can be used for such an application. In addition, the IF interface directly supports single-ended, AC-coupled signals into or out of IF+ by shorting IF- to ground and using a 1kΩ resistor from IF+ to ground.

Applications Information

Input and Output Matching

The RF input provides a 50Ω match when combined with a series DC-blocking capacitor. Use an 8.2pF capacitor value for RF frequencies ranging from 2000MHz to 2900MHz. Use a 1.5pF capacitor value to match the RF port for the 3000MHz to 3900MHz band. For RF frequencies in the 1650MHz to 2250MHz range, use C1 = 1.8pF and L1 = 12nH. The LO input is internally matched to 50Ω, so use a 2pF DC-blocking capacitor to cover operations spanning the 1300MHz to 4000MHz range. The IF output impedance is 50Ω (differential). For evaluation, an external low-loss 1:1 (impedance ratio) balun transforms this impedance down to a 50Ω single-ended output (see the *Typical Application Circuit*).

Reduced-Power Mode

The device includes a pin (LOBIAS) that allows an external resistor to set the internal bias current. A nominal value for this resistor is given in Tables 1 and 2. Larger-value resistors can be used to reduce power dissipation at the expense of some performance loss. If ±1% resistors are not readily available, substitute with ±5% resistors.

Significant reductions in power consumption can also be realized by operating the mixer with an optional supply voltage of 3.3V. Doing so reduces the overall power consumption by up to 42%. See the *3.3V Supply AC Electrical Characteristics* tables and the relevant 3.3V curves in the *Typical Operating Characteristics* section to evaluate the power vs. performance tradeoffs.

Layout Considerations

A properly designed PCB is an essential part of any RF/microwave circuit. Keep RF signal lines as short as possible to reduce losses, radiation, and inductance. For the best performance, route the ground pin traces directly to the exposed pad under the package. The PCB exposed pad **MUST** be connected to the ground plane of the PCB. It is suggested that multiple vias be used to connect this pad to the lower-level ground planes. This method provides a good RF/thermal conduction path for the device. Solder the exposed pad on the bottom of the device package to the PCB.

Power-Supply Bypassing

Proper voltage-supply bypassing is essential for high-frequency circuit stability. Bypass each V_{CC} pin with the capacitors shown in the *Typical Application Circuit* and see Table 1.

Exposed Pad RF/Thermal Considerations

The exposed pad (EP) of the device's 20-pin TQFN package provides a low thermal-resistance path to the die. It is important that the PCB on which the device is mounted be designed to conduct heat from the EP. In addition, provide the EP with a low-inductance path to electrical ground. The EP **MUST** be soldered to a ground plane on the PCB, either directly or through an array of plated via holes.

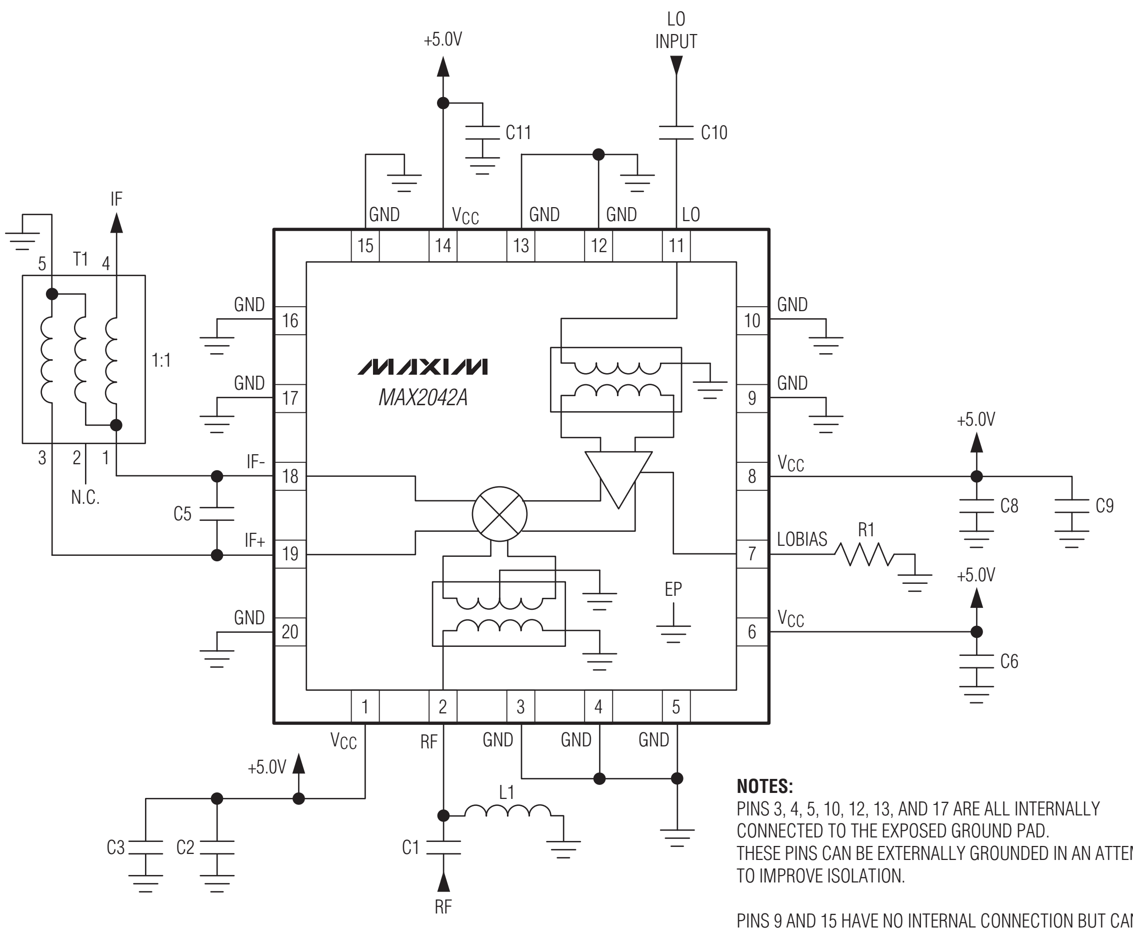
Table 1. Component Values—Downconverter Mode

DESIGNATION	QTY	DESCRIPTION	COMPONENT SUPPLIER
C1	1	8.2pF microwave capacitor (0402); use for **2000MHz to 2900MHz** RF frequencies	Murata Electronics North America, Inc.
		1.5pF microwave capacitor (0402); use for **3000MHz to 3900MHz** RF frequencies	Murata Electronics North America, Inc.
		1.8pF microwave capacitor (0402); use for **1600MHz to 2000MHz** RF frequencies	Murata Electronics North America, Inc.
C2, C6, C8, C11	4	0.01µF microwave capacitors (0402)	Murata Electronics North America, Inc.
C3, C9	0	Not installed, capacitors	—
C5	0	Not installed, capacitor	—
C10	1	2pF microwave capacitor (0402)	Murata Electronics North America, Inc.
L1	1	12nH microwave inductor (0402); use for **1600MHz to 2000MHz** RF frequencies (this inductor is not used for other RF bands noted above)	TOKO America, Inc.
R1	1	698Ω ±1% resistor (0402)	—
T1	1	1:1 IF balun MABACT0069	M/A-Com, Inc.
U1	1	MAX2042A IC (20 TQFN)	Maxim Integrated Products, Inc.

Table 2. Component Values—Upconverter Mode

DESIGNATION	QTY	DESCRIPTION	COMPONENT SUPPLIER
C1	1	8.2pF microwave capacitor (0402); use for **2000MHz to 2900MHz** RF frequencies	Murata Electronics North America, Inc.
		1.5pF microwave capacitor (0402); use for **3000MHz to 3900MHz** RF frequencies	Murata Electronics North America, Inc.
		1.8pF microwave capacitor (0402); use for **1600MHz to 2000MHz** RF frequencies	Murata Electronics North America, Inc.
C2, C6, C8, C11	4	0.01µF microwave capacitors (0402)	Murata Electronics North America, Inc.
C3, C9	0	Not installed, capacitors	—
C5	0	Not installed, capacitor	—
C10	1	2pF microwave capacitor (0402)	Murata Electronics North America, Inc.
L1	1	12nH microwave inductor (0402); use for **1600MHz to 2000MHz** RF frequencies (this inductor is not used for other RF bands noted above)	TOKO America, Inc.
R1	1	698Ω ±1% resistor (0402)	—
T1	1	1:1 IF balun MABACT0069	M/A-Com, Inc.
U1	1	MAX2042A IC (20 TQFN)	Maxim Integrated Products, Inc.

Typical Application Circuit



NOTES:

PINS 3, 4, 5, 10, 12, 13, AND 17 ARE ALL INTERNALLY CONNECTED TO THE EXPOSED GROUND PAD. THESE PINS CAN BE EXTERNALLY GROUNDED IN AN ATTEMPT TO IMPROVE ISOLATION.

PINS 9 AND 15 HAVE NO INTERNAL CONNECTION BUT CAN BE EXTERNALLY GROUNDED IN AN ATTEMPT TO IMPROVE ISOLATION.

SiGe High-Linearity, 1600MHz to 3900MHz Upconversion/Downconversion Mixer with LO Buffer

Ordering Information

PART	TEMP RANGE	PIN-PACKAGE
MAX2042AETP+	-40°C to +85°C	20 TQFN-EP*
MAX2042AETP+T	-40°C to +85°C	20 TQFN-EP*

+Denotes a lead(Pb)-free/RoHS-compliant package.
**EP = Exposed pad.*
T = Tape and reel.

Chip Information

PROCESS: SiGe BiCMOS

Package Information

For the latest package outline information and land patterns (footprints), go to **www.maxim-ic.com/packages**. Note that a "+", "#", or "-" in the package code indicates RoHS status only. Package drawings may show a different suffix character, but the drawing pertains to the package regardless of RoHS status.

PACKAGE TYPE	PACKAGE CODE	OUTLINE NO.	LAND PATTERN NO.
20 TQFN-EP	T2055+3	**21-0140**	**90-0008**

Revision History

REVISION NUMBER	REVISION DATE	DESCRIPTION	PAGES CHANGED
0	6/11	Initial release	—