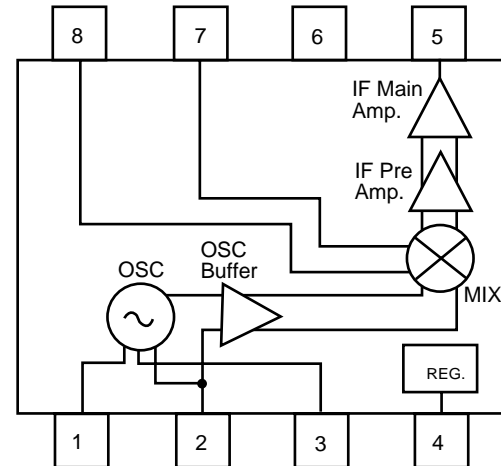


FEATURES

- **WIDE-BAND OPERATION:** DC to 900 MHz
- **SMALL PACKAGE**
- **DOUBLE BALANCED MIXER:**
Low Distortion
Low Oscillator Radiation
- **BALANCED AMPLIFIER FOR VOLTAGE CONTROLLED OSCILLATORS:**
Up to UHF Frequency
- **SINGLE ENDED PUSH-PULL IF AMPLIFIER:**
Constant Resistive Impedance
- **SWITCHABLE AS MIXER OR IF AMP**

BLOCK DIAGRAM



DESCRIPTION

The UPC1687GV is a silicon RFIC designed as a wide-band mixer/oscillator/IF amp suitable for UHF TV tuners. Device features include: 25 dB gain from 55 to 900 MHz and an output power of +10 dBm at the saturation point. The IC is housed in an 8 pin SSOP package.

ELECTRICAL CHARACTERISTICS (T_A = 25°C, V_{CC} = 5 V)

PART NUMBER PACKAGE OUTLINE			UPC1687GV S08			TEST CIRCUIT
SYMBOLS	PARAMETERS AND CONDITIONS	UNITS	MIN	TYP	MAX	
I _{CC}	Circuit Current, no input signal	mA	25	38	48	Fig. 1
CG	Conversion Gain (RF Input Terminal is not tuned) at IF = 50 MHz, P _{RF} = -40 dBm, P _{OSC} = -5 dBm RF = 500 MHz RF = 900 MHz	dB	22	26	29	Fig. 1
		dB	20	24	27	Fig. 1
NF	Noise Figure at IF = 50 MHz, P _{osc} = -5 dBm RF = 500 MHz RF = 900 MHz	dB	—	9	12	Fig. 1
		dB	—	10	13	Fig. 1
CM	1% Cross Modulation Distortion ¹ RF = 500 MHz RF = 900 MHz	dBμ	—	88	—	Fig. 1
		dBμ	—	89	—	Fig. 1
PSAT	Output Power (Saturation Point)	dBm	—	+10	—	Fig. 1
f _{STB}	Oscillator Frequency Stability at V _{CC} ± 10% OSC f = 550 to 950 MHz	kHz	—	±200	—	Fig. 2
V _{OSC}	V _{CC} at OSC Start OSC f = 550 to 950 MHz	V	—	3.0	—	Fig. 2
VSWR	IF Output		—	—	1.5	Fig. 1

Note:

1. Undesired = Desired ± 12 MHz, 100 kHz, 30% AM Mod, S/I Ratio = 46 dBc.

ABSOLUTE MAXIMUM RATINGS¹ (TA = 25°C)

SYMBOLS	PARAMETERS	UNITS	RATINGS
VCC	Supply Voltage	V	6
PT	Total Power Dissipation ²	mW	250
TOP	Operating Temperature	°C	-40 to +85
TSTG	Storage Temperature	°C	-65 to +150

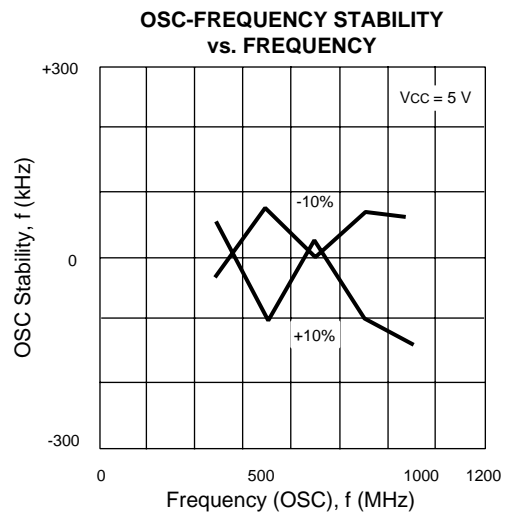
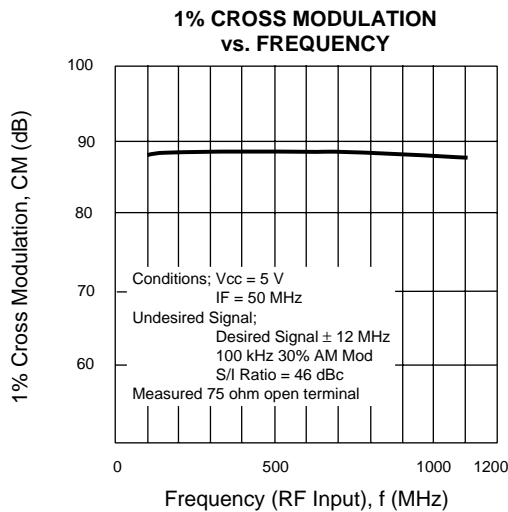
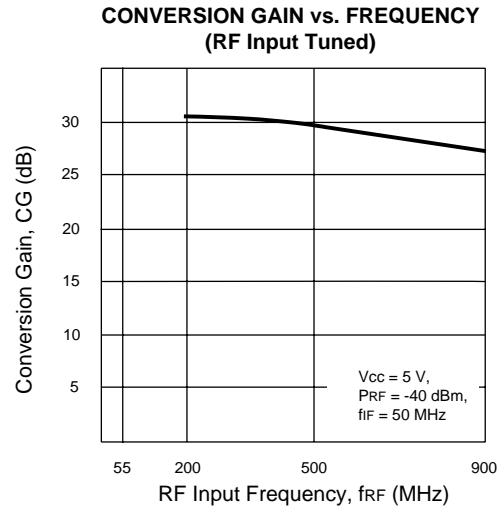
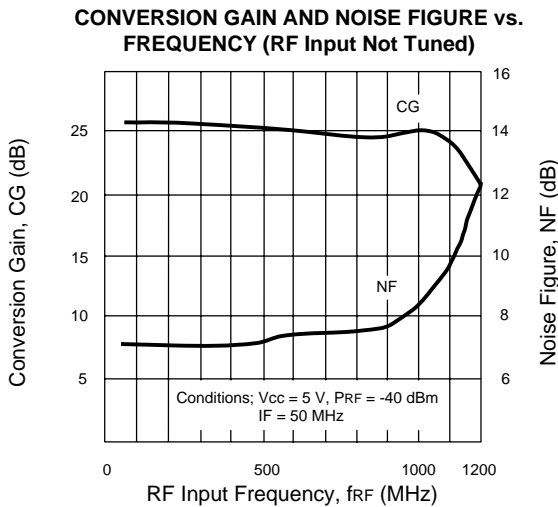
Notes:

1. Operation in excess of any one of these parameters may result in permanent damage.
2. TA = 85°C mounted on 50 x 50 x 1.6 (mm) PWB (glass-epoxy).

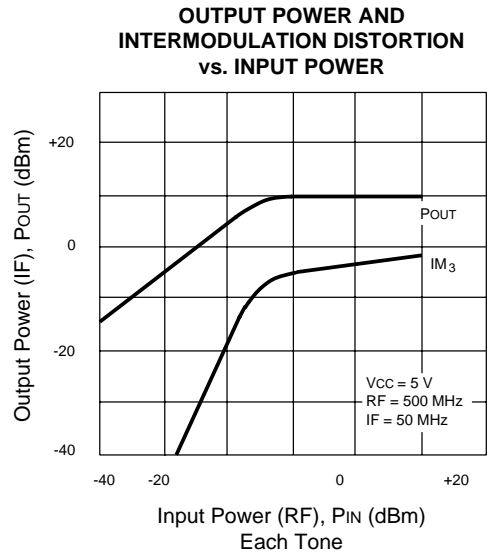
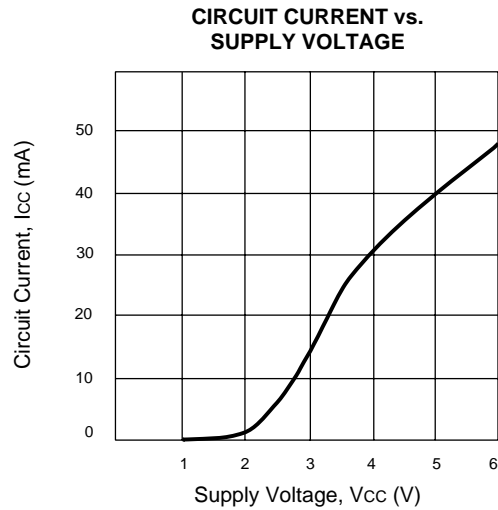
ELECTRICAL CHARACTERISTICS (TA = 25°C)

PART NUMBER PACKAGE OUTLINE			UPC1687GV S08	TEST CIRCUIT
SYMBOLS	PARAMETERS AND CONDITIONS	UNITS	TYP	
Gs	Small Signal Gain of IF amplifier at f = 50 MHz	dB	29	Fig. 3
NF	Noise Figure of IF amplifier at f = 50 MHz	dB	7	Fig. 3
CM	1% Cross Modulation of IF amplifier (100 kHz, 30% AM Mod, S/I Ratio = 46 dBc) Desired = 50 MHz Undesired = 62 MHz	dBμ	87	Fig. 3

TYPICAL PERFORMANCE CURVES (TA = 25°C)



TYPICAL PERFORMANCE CURVES ($T_A = 25^\circ\text{C}$)



PIN DESCRIPTION

Pin No.	Pin Name	Description	Internal Equivalent Circuit
1	OSC Base (bypass)	Input pins for the internal oscillator which consists of a balanced amplifier. Pin 1 should be bypassed to ground through a capacitor. Pins 2 and 3 should be externally equipped with a tank resonator. Note that pin 3 is an open collector and must be supplied voltage through an external resistor or choke coil.	
2	OSC Base (feedback)		
3	OSC Collector (Coupling)		
4	V _{CC}	Supply voltage pin. This pin should be externally equipped with a bypass capacitor to minimize ground impedance.	
5	IF Output	IF output pin from the single-ended push-pull amplifier. This pin is an emitter follower output with a constant resistive impedance of 50 Ω.	
6	GND	Ground pin. This pin must be connected to system ground. Form ground pattern as wide as possible to minimize ground impedance.	
7	RF Input 1 (bypass)	RF input pins. Pins 7 and 8 are each base inputs to a double balanced mixer. Either pin can be assigned as the input. The unused pin should be bypassed to ground through a capacitor.	
8	RF Input 2		

TEST CIRCUITS

Figure 1

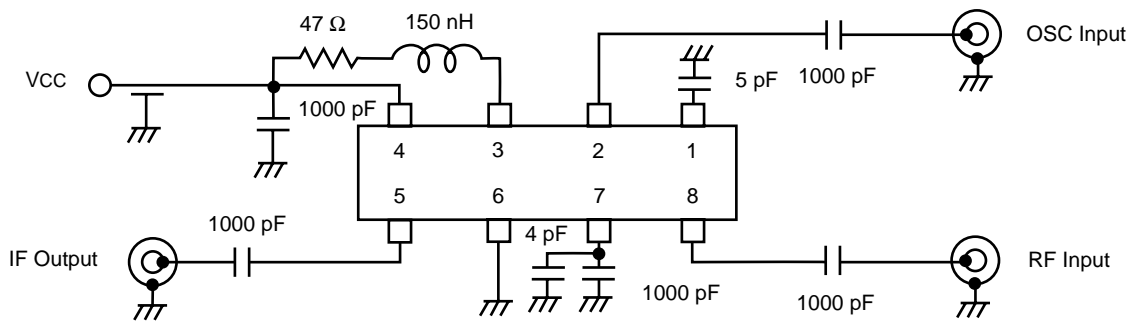


Figure 2

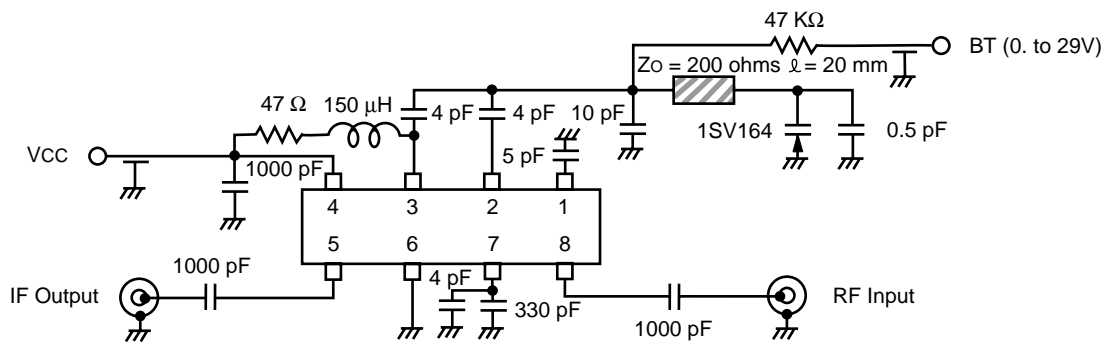
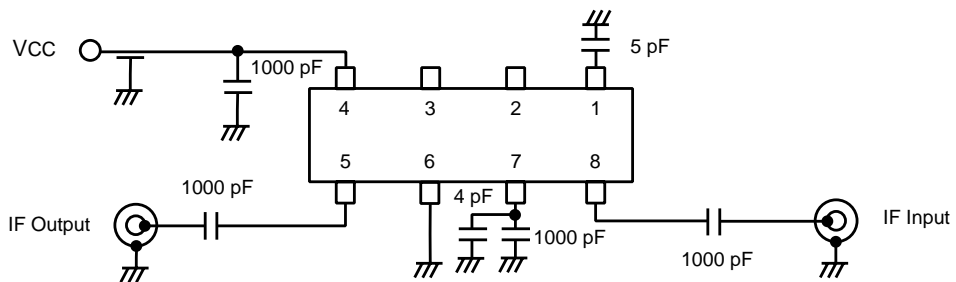
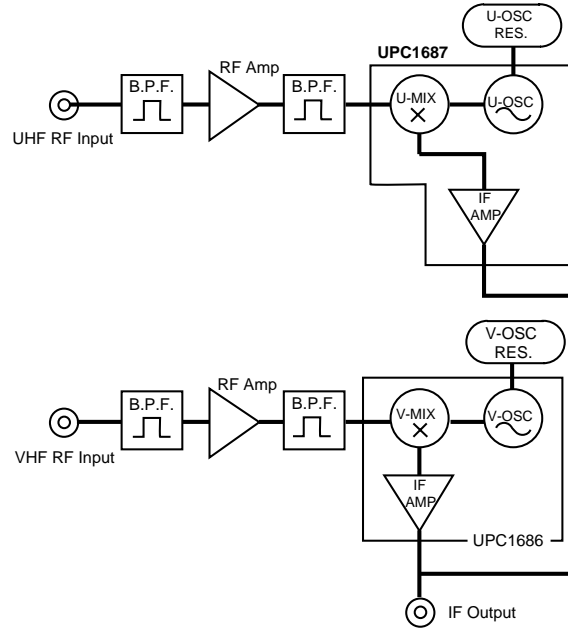


Figure 3

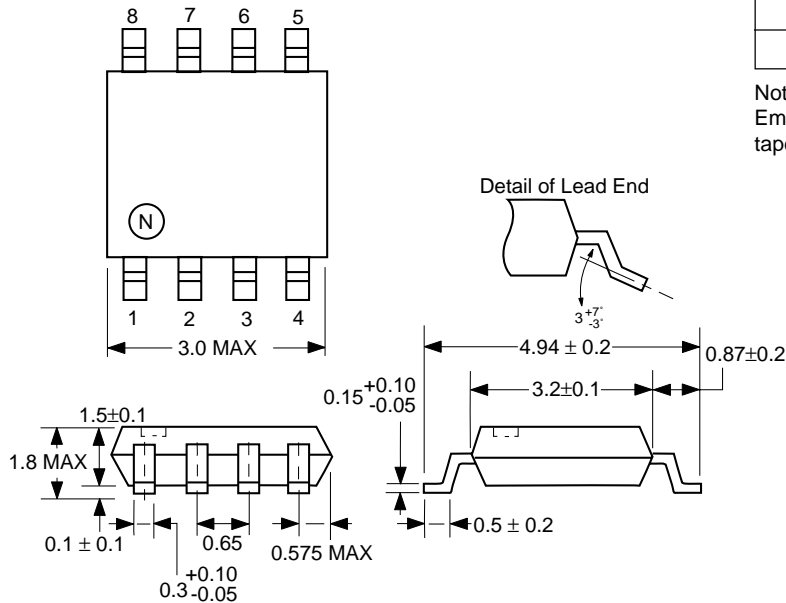


APPLICATION BLOCK DIAGRAM FOR T.V. TUNER



OUTLINE DIMENSIONS (Units in mm)

UPC1687GV PACKAGE OUTLINE S08



Note: All dimensions are typical unless otherwise specified.

PIN CONNECTION

- 1. OSC-Base (Bypass)
- 2. OSC-Base (Feedback)
- 3. OSC-Collector (Coupling)
- 4. Vcc
- 5. IF OUT
- 6. GND
- 7. RF IN1 (Bypass)
- 8. RF IN2

ORDERING INFORMATION

PART NUMBER	QUANTITY
UPC1687GV-E1	1000/REEL

Note: Embossed Tape, 8 mm wide. Pin 1 indicates pull-out direction of tape.

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