

### FEATURES

- **WIDE-BAND OPERATION:** DC to 890 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**

### DESCRIPTION AND APPLICATIONS

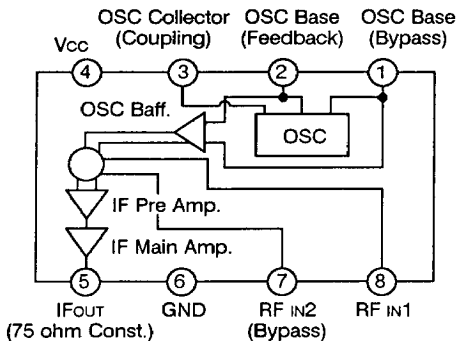
The UPC1687 is a silicon monolithic integrated circuit designed as a wide-band mixer/oscillator/IF amp suitable for UHF TV tuners. Device features include, 25 dB gain from 55 to 890 MHz and an output power of +10 dBm at the saturation point. The device is available in two styles: an 8 lead ceramic flat package (UPC1687B), and an 8 pin mini-flat package (UPC1687G).

### ABSOLUTE MAXIMUM RATINGS (T<sub>A</sub> = 25°C)

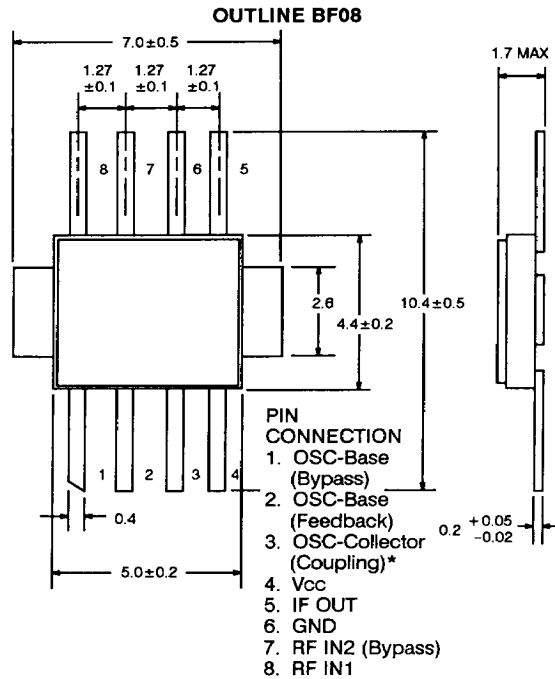
SYMBOLS	PARAMETERS	UNITS	RATINGS
V <sub>CC</sub>	Supply Voltage	V	6
P <sub>T</sub>	Total Power Dissipation UPC1687B UPC1687G	mW mW	1500 280*
T <sub>OP</sub>	Operating Temperature UPC1687B UPC1687G	°C °C	-55 to +125 -20 to +75
T <sub>STG</sub>	Storage Temperature UPC1687B UPC1687G	°C °C	-65 to +200 -65 to +150

\*T<sub>A</sub> = 25°C Mounted on 50 x 50 x 1.6 (mm) (glass epoxy) PWB.

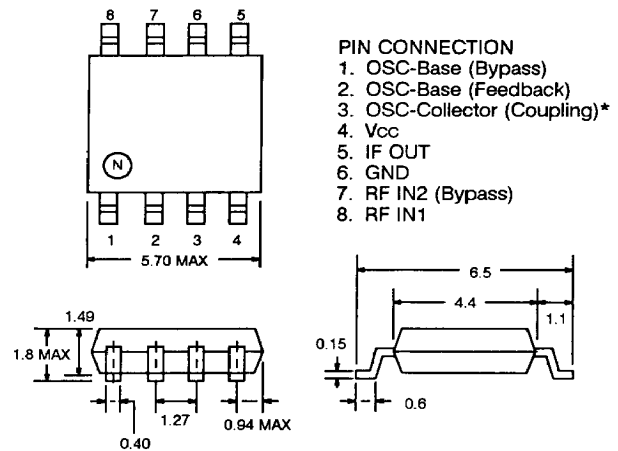
### BLOCK DIAGRAM



### OUTLINE DIMENSIONS (Units in mm)



### OUTLINE G08



OPERATE	#3 Pin
MIXER	4 to 5 V (High Impedance)
IF amp	Floating

**ELECTRICAL CHARACTERISTICS** (TA = 25°C)

**1. Down Converter Application (Vcc = 5 V)**

PART NUMBER PACKAGE OUTLINE			UPC1687B, UPC1687G BF08, G08			
SYMBOLS	PARAMETERS AND CONDITIONS	UNITS	MIN	TYP	MAX	TEST CIRCUIT
Icc	Circuit Current, no input signal	mA		38		Fig. 1
CG1	Conversion Gain (RF Input Terminal is not tuned) at IF = 50 MHz, RF = 55 to 890 MHz	dB		25		Fig. 1
CG2	Conversion Gain (RF Input Terminal is tuned) at IF = 50 MHz, RF = 55 MHz RF = 200 MHz RF = 500 MHz RF = 890 MHz	dB		32		Fig. 4
		dB		32		Fig. 4
		dB		30		Fig. 4
		dB		28		Fig. 5
NF	Noise Figure at IF = 50 MHz, RF = 55 to 470 MHz RF = 470 to 890 MHz	dB		8		Fig. 1 or Fig. 2
		dB		10		Fig. 3
CM	1% Cross Modulation* at IF = 50 MHz, 75 Ω Open Terminal, RF = 55 to 470 MHz RF = 470 to 890 MHz	dBμ		88		Fig. 1
		dBμ		88		Fig. 1
PO(SAT)	Output Power (Saturation Point)	dBm		+ 10		Fig. 1
fSTB	Oscillator Frequency Stability at Vcc = ±10%, OSC f = 100 to 520 MHz OSC f = 520 to 940 MHz	kHz		100		Fig. 2
		kHz		200		Fig. 3
Vosc	Vcc at OSC Stop, OSC f = 100 to 520 MHz OSC f = 520 to 940 MHz	V		2.3		Fig. 2
		V		3.0		Fig. 3
VSWR	IF Output VSWR			1.3		Fig. 1

\*Undesired = Desired ±12 MHz, 30% 100 kHz AM S/I Ratio = 46 dB

**2. IF Amp Application (Vcc = 5 V)**

PART NUMBER PACKAGE OUTLINE			UPC1687B, UPC1687G BF08, G08			
SYMBOLS	PARAMETERS AND CONDITIONS	UNITS	MIN	TYP	MAX	TEST CIRCUIT
Icc	Circuit Current, no input signal	mA		38		Fig. 7
PG	Power Gain at f = 50 MHz	dB		29		Fig. 7
NF	Noise Figure at f = 50 MHz	dB		7		Fig. 7
CM	1% Cross Modulation (30% 100 kHz AM S/I Ratio = 46 dB) Desired = 50 MHz Undesired = 62 MHz	dBμ		87		Fig. 7

TEST CIRCUITS

Fig. 1

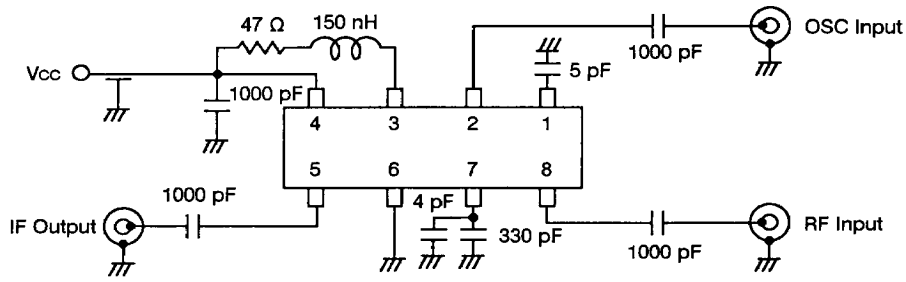


Fig. 2

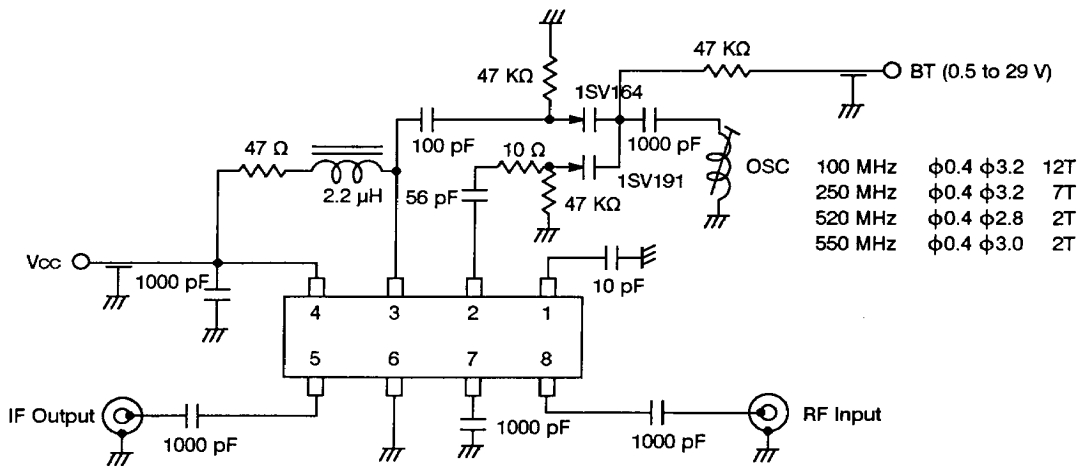
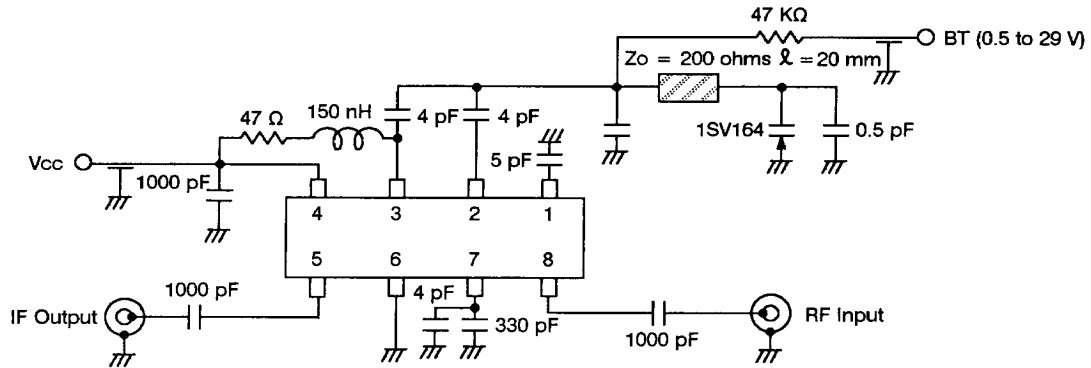


Fig. 3



TEST CIRCUITS

Fig. 4

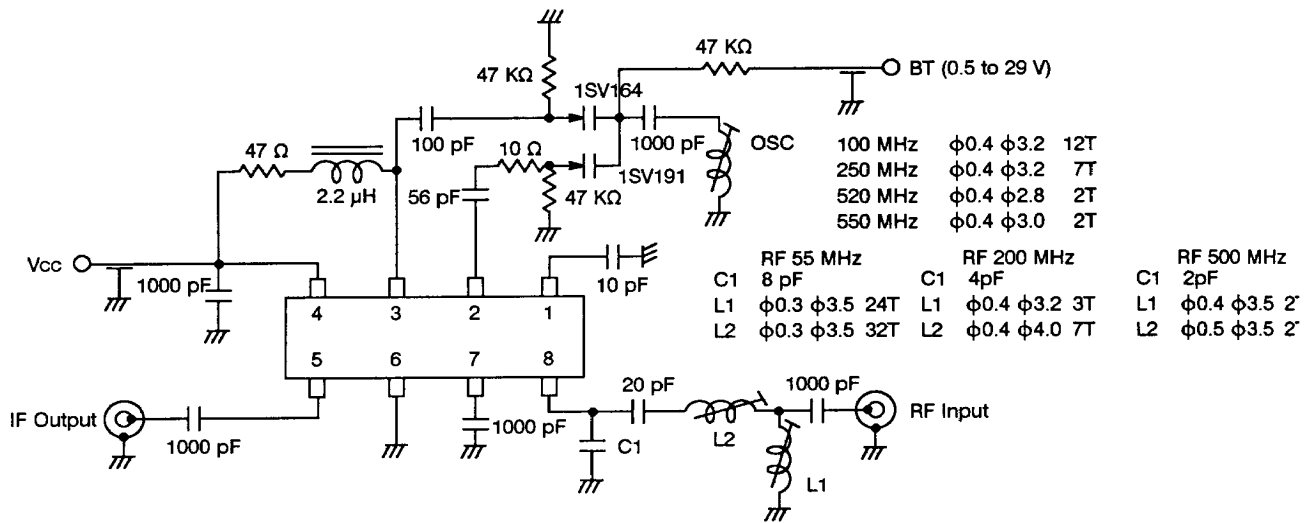


Fig. 5

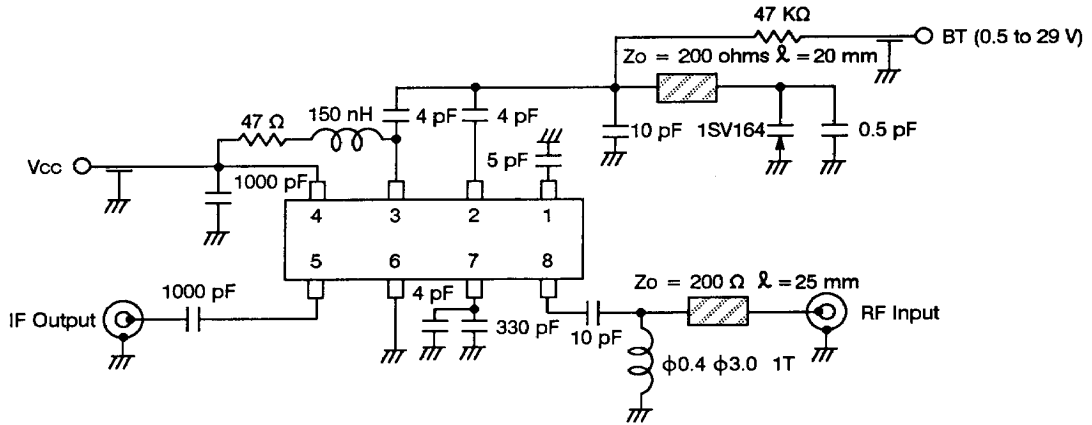
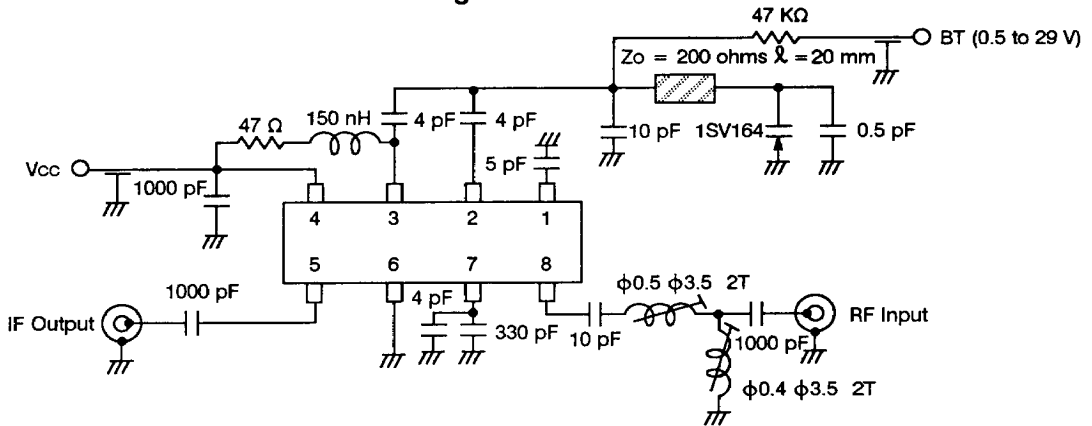


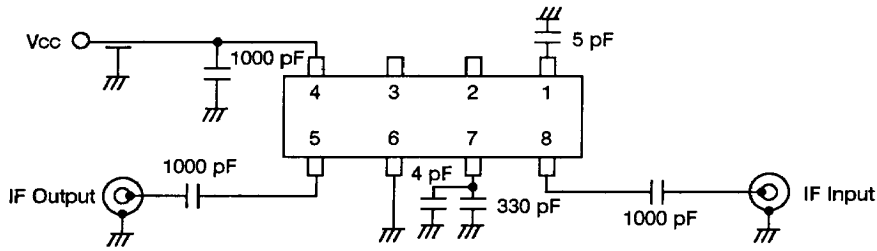
Fig. 6\*



\*This test circuit is used to match the device from 500 to 890 MHz. 500 MHz matching is shown.

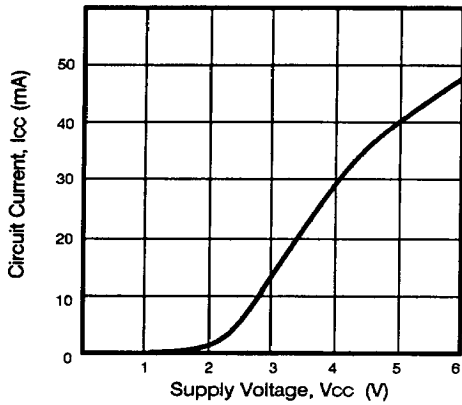
TEST CIRCUITS

Fig. 7

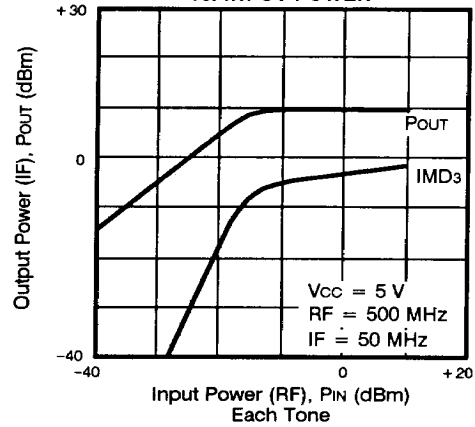


TYPICAL PERFORMANCE CHARACTERISTICS (TA = 25°C)

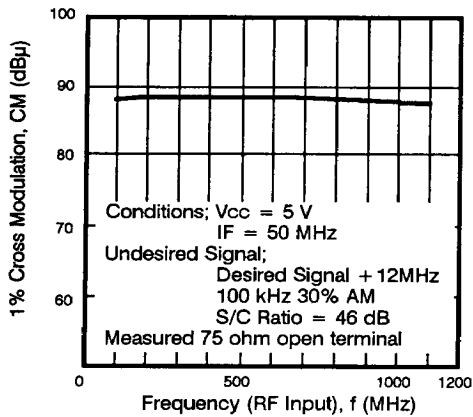
CIRCUIT CURRENT vs. SUPPLY VOLTAGE



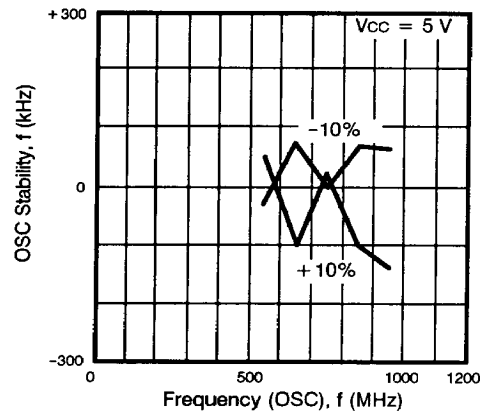
OUTPUT POWER & INTERMODULATION DISTORTION vs. INPUT POWER



1% CROSS MODULATION vs. FREQUENCY

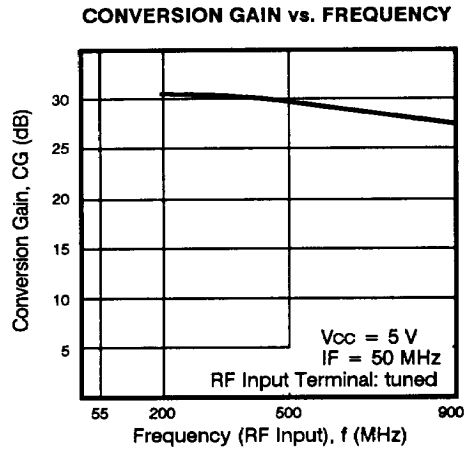
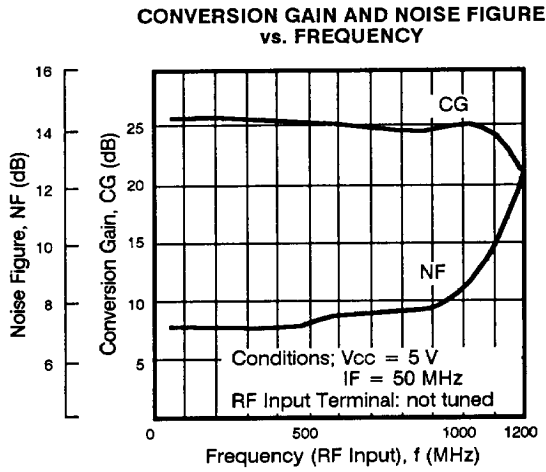


OSC-FREQUENCY STABILITY vs. FREQUENCY

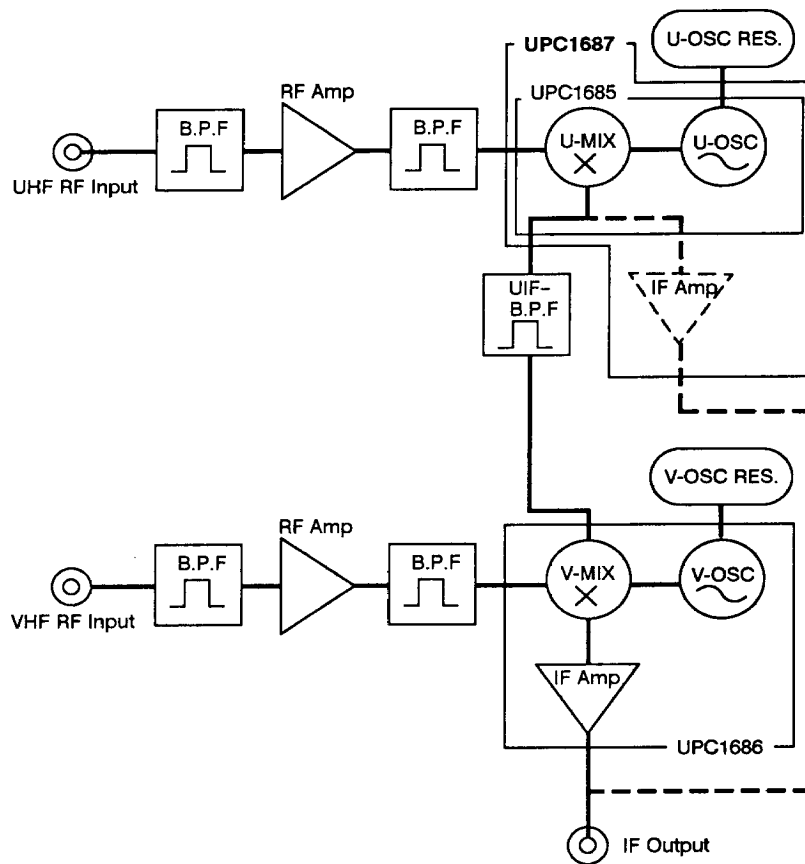


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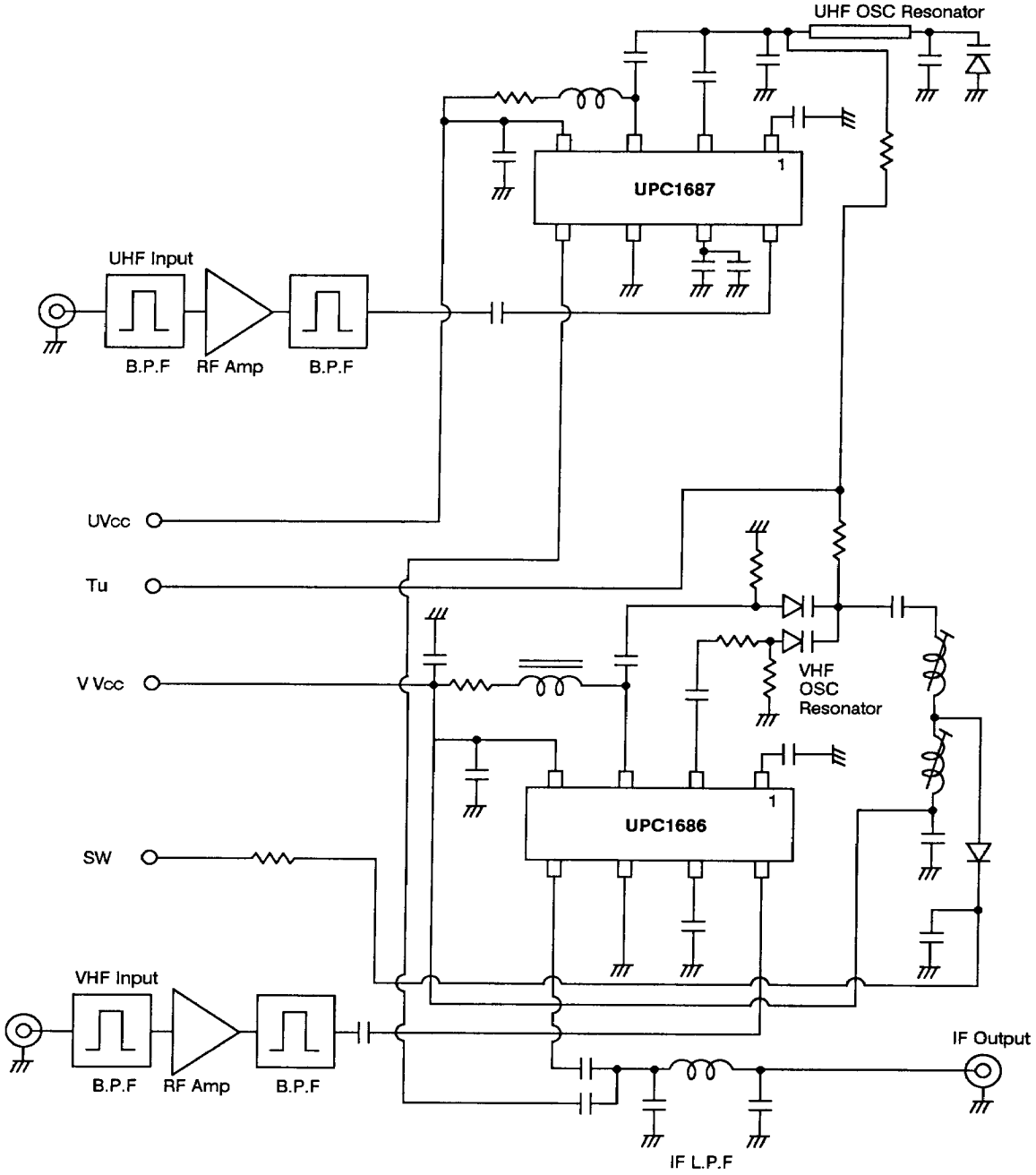
TYPICAL PERFORMANCE CHARACTERISTICS (T<sub>A</sub> = 25°C)



APPLICATION BLOCK DIAGRAM FOR T.V. TUNER



APPLICATION CIRCUIT FOR T.V. TUNER



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