SONY

CXA1695L

All Band TV Tuner IC (VHF-CATV-UHF)

Description

The CXA1695L is a single chip TV tuner IC which performs as an oscillator, mixer for VHF/CATV and UHF bands. An IF amplifier is also provided.

This IC achieves a large reduction of external parts in addition to miniaturizing the tuner and increasing manufacturing productivity, reliability and design efficiency.

This IC is pin-compatible with the CXA1594L with improvement in noise figure and oscillation stability.

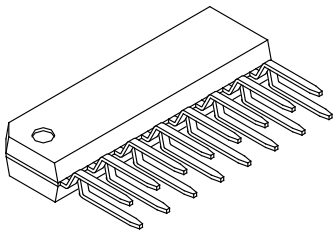
Features

- On-chip oscillator and mixer for UHF band
- Low noise figure
- Reduced spurious interference
- Superior cross modulation
- Stable oscillation characteristics
- Ultra small package ensures tuner miniaturization

Applications

- CTV tuner
- CATV UP-DOWN converter

16 pin SZIP (Plastic)



Structure

Bipolar silicon monolithic IC

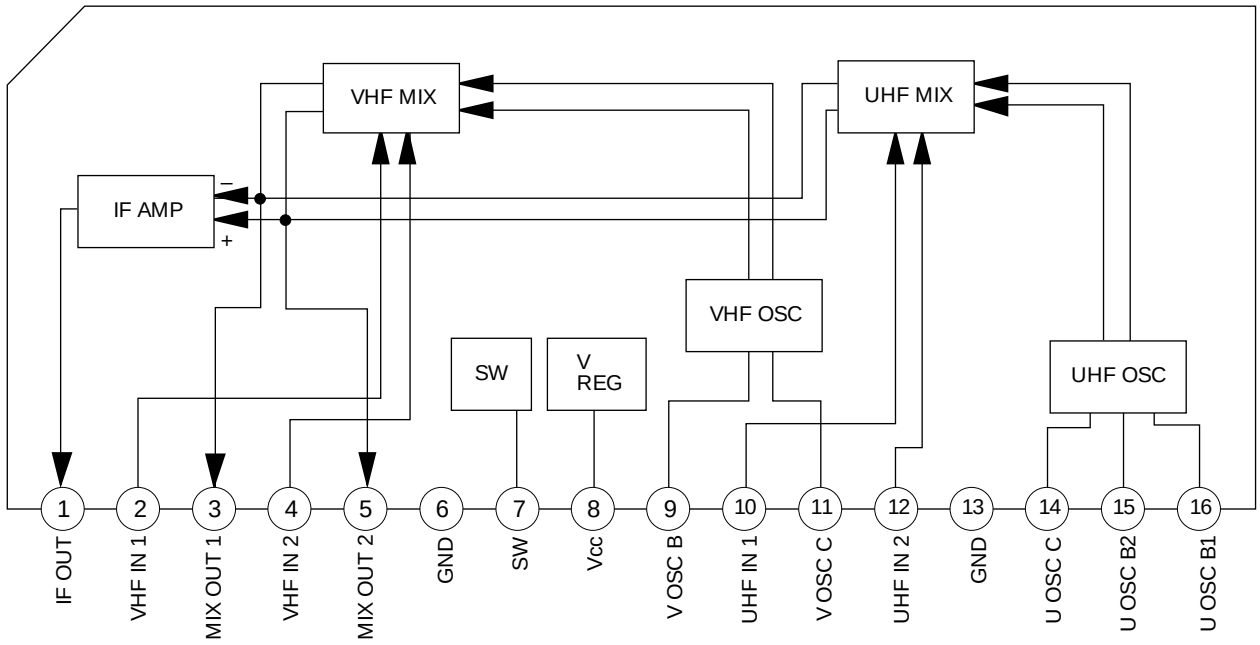
Absolute Maximum Ratings (Ta=25 °C)

• Supply voltage	Vcc	11	V
• Storage temperature	Tstg	–55 to +150	°C
• Allowable power dissipation	P_D	930 (when mounted on board)	mW

Operating Conditions

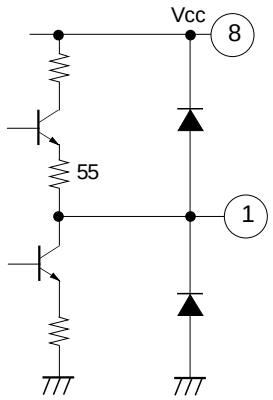
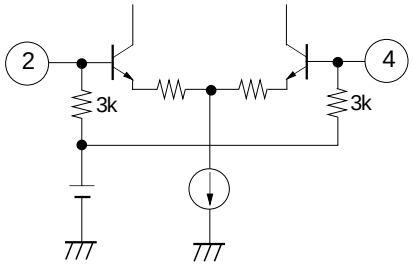
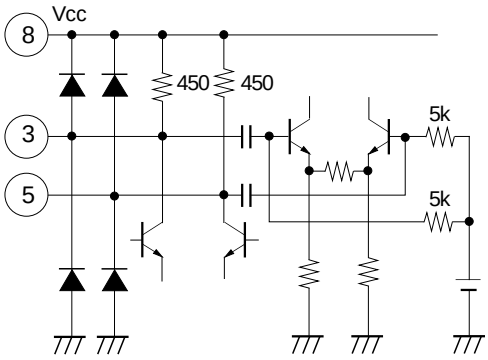
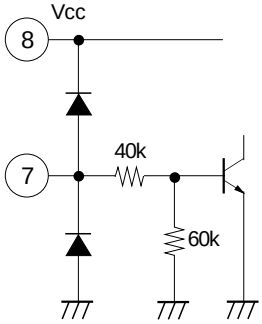
• Supply voltage	Vcc	8.1 to 9.9	V
• Operating temperature	Topr	–20 to +75	°C

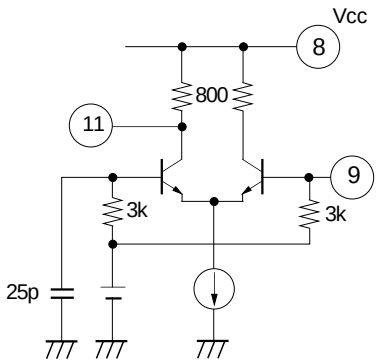
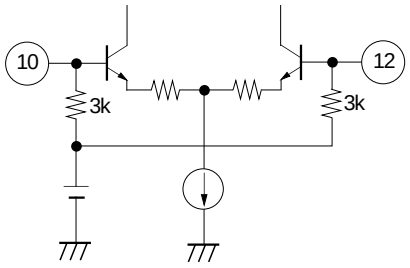
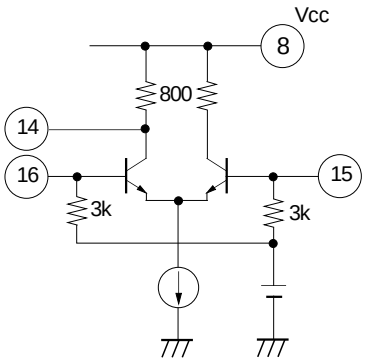
Block Diagram and Pin Configuration



E92Y29A51-TE

Pin Description and Equivalent Circuit

Pin No.	Symbol	Typical pin voltage (V)	Equivalent circuit	Description
1	IF OUT	Under VHF operation 4.4 Under UHF operation 4.4		IF output.
2	VHF IN 1	3.2 3.3		VHF input. Normally a decoupling capacitor is connected at pin 2 to GND and pin 4 is used for input.
4	VHF IN 2	3.2 3.3		
3	MIX OUT 1	7.5 7.2		Mixer output and IF amplifier input.
5	MIX OUT 2	7.5 7.2		
6	GND	0		GND
7	SW	3V or more 0.4V or less		UHF/VHF switch pin. Connect 9V source through about a 10kΩ resister for VHF reception; 0V or leave open for UHF.

Pin No.	Symbol	Typical pin voltage (V)	Equivalent circuit	Description
8	Vcc	9.0		Power supply
9	V OSC B	3.5 3.7		VHF oscillator.
11	V OSC C	6.7 9.0		
10	UHF IN 1	3.3 3.1		UHF input. The balanced input to Pins 10 and 12, or a decoupling capacitor is connected at Pin 12 to GND and Pin 10 is used for input.
12	UHF IN 2	3.3 3.1		
13	GND	0		GND
14	U OSC C	9.0 6.5		UHF oscillator.
15	U OSC B2	3.6 3.4		
16	U OSC B1	3.6 3.4		

Electrical Characteristics

See Electrical Characteristics Test Circuit (Ta=25°C, V_{CC}=9V)

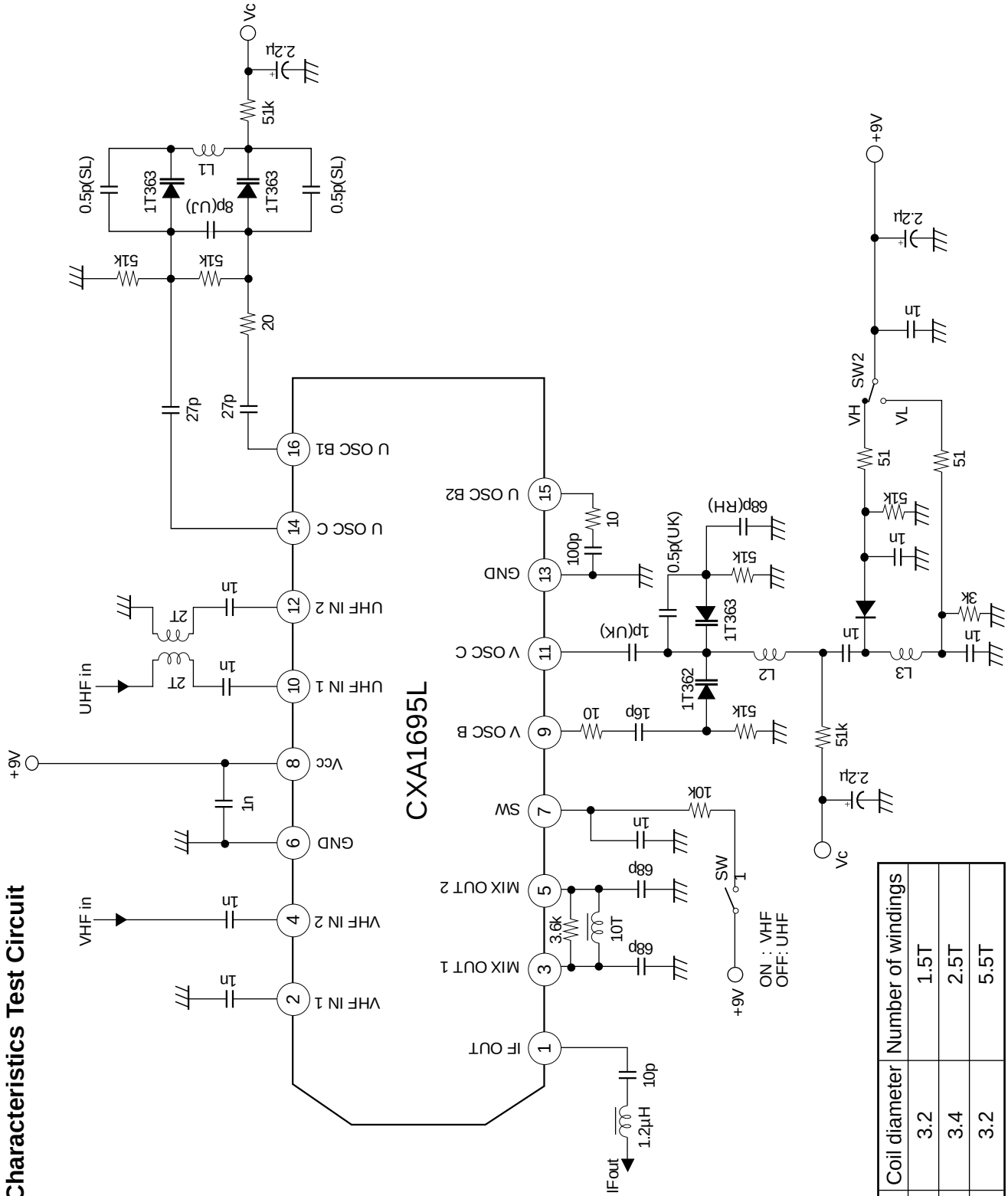
Item	Symbol	Measurement conditions	Min.	Typ.	Max.	Unit
Circuit current	IccV	VHF operation, no signal		45.0	58.0	mA
	IccU	UHF operation, no signal		45.0	58.0	mA
Conversion gain ∗1	CG1	VHF operation, f_{RF}=55 MHz, input level –40 dBm	17.5	20.5	23.5	dB
	CG2	VHF operation, f_{RF}=360 MHz, input level –40 dBm	18.0	21.0	24.0	dB
	CG3	UHF operation, f_{RF}=360 MHz, input level –40 dBm	23.0	26.0	29.0	dB
	CG4	UHF operation, f_{RF}=800 MHz, input level –40 dBm	24.0	27.0	30.0	dB
Noise figure ∗1∗2	NF1	VHF operation, f_{RF}=55 MHz		9.5	12.5	dB
	NF2	VHF operation, f_{RF}=360 MHz		10.0	13.0	dB
	NF3	UHF operation, f_{RF}=360 MHz		6.0	10.0	dB
	NF4	UHF operation, f_{RF}=800 MHz		7.0	11.0	dB
1% cross modulation ∗1∗3	CM1	VHF operation, f_D=55 MHz, f_{UD}=±12 MHz	95.0	99.0		dBµ
	CM2	VHF operation, f_D=360 MHz, f_{UD}=±12 MHz	93.0	97.0		dBµ
	CM3	UHF operation, f_D=360 MHz, f_{UD}=±12 MHz	86.0	90.0		dBµ
	CM4	UHF operation, f_D=800 MHz, f_{UD}=±12 MHz	86.0	90.0		dBµ
Max. output power	Pomax (sat)	50Ωload	+8.0	+12.0		dBm
Switch ON drift	Δfsw1	VHF operation, fosc=100 MHz, Frequency drift from 3 s to 3 min. after switch ON			±300	kHz
	Δfsw2	VHF operation, fosc=405 MHz, Frequency drift from 3 s to 3 min. after switch ON			±400	kHz
	Δfsw2	UHF operation, fosc=405 MHz, Frequency drift from 3 s to 3 min. after switch ON			±600	kHz
	Δfsw4	UHF operation, fosc=845 MHz, Frequency drift from 3 s to 3 min. after switch ON			±700	kHz
+B supply voltage drift	Δfst1	VHF operation, fosc=100 MHz, Frequency shift when V_{CC} +9 V changes ±5 %			±200	kHz
	Δfst2	VHF operation, fosc=405 MHz, Frequency shift when V_{CC} +9 V changes ±5 %			±300	kHz
	Δfst3	UHF operation, fosc=405 MHz, Frequency shift when V_{CC} +9 V changes ±5 %			±400	kHz
	Δfst4	UHF operation, fosc=845 MHz, Frequency shift when Vcc +9 V changes ±5 %			±400	kHz

∗1) Measured value for untuned inputs. Unbalanced input for VHF; balanced input for UHF.

∗2) Noise figure is uncorrected for image.

∗3) Desired signal (f_D) input level is –34 dBm. Undesired signal (f_{UD}) is 100 kHz at 40 %AM. The measurement value is undesired signal level, it measured with spectrum analyzer at S/I=46 dB.

Electrical Characteristics Test Circuit



	Wire diameter	Coil diameter	Number of windings
L1	0.5	3.2	1.5T
L2	0.5	3.4	2.5T
L3	0.5	3.2	5.5T

Description of Operation (See Electrical Characteristics Test Circuit)

(1) VHF oscillator circuit

The differential oscillator circuit with Pin 11 output and Pin 9 input.

Connect an LC resonance circuit comprising a varicap diode to Pin 11 through a coupling capacitor. The positive feedback from the resonance circuit is applied to Pin 9 through a feedback capacitor to execute oscillation. Note that if a parasitic capacitance across Pins 9 and 11 is too large, it may cause undesired oscillation.

(2) VHF mixer circuit

This is a double-balanced mixer having small leakage of local oscillation signal. The RF signal input terminal are Pins 2 and 4. In normal use, the signal is input to one pin while the other pin is connected to GND by decoupling capacitor. The RF signal is converted to IF with the signal supplied from oscillator. The converted RF is sent to the IF amplifier and output to Pins 3 and 5 simultaneously.

(3) UHF oscillator circuit

This is the differential oscillator same circuit as the VHF oscillator. In Electrical Characteristics Test Circuit, oscillation is executed as a Colpitts oscillator using one side transistor of the differential amplifier.

(4) UHF mixer circuit

This is the double-balanced mixer same circuit as the VHF mixer. The RF signal input terminal are to Pins 10 and 12.These are used balanced differential input from pre-stage double tune circuit, or an unbalanced input to Pin 10 with the capacitor connected at Pin 12 to GND. Balanced input achieves better NF rather than unbalanced input.

Otherwise, the conditions and usage are the same as for the VHF mixer.

(5) IF amplifier circuit

The mixer output signal is amplified by the IF amplifier and output to Pin 1. The output impedance is approximately 75Ω.

(6) UHF/VHF switching circuit

UHF / VHF modes are switched by the DC voltage at Pin 7. UHF operation is for open or 0V; VHF operation, for 3V or more.

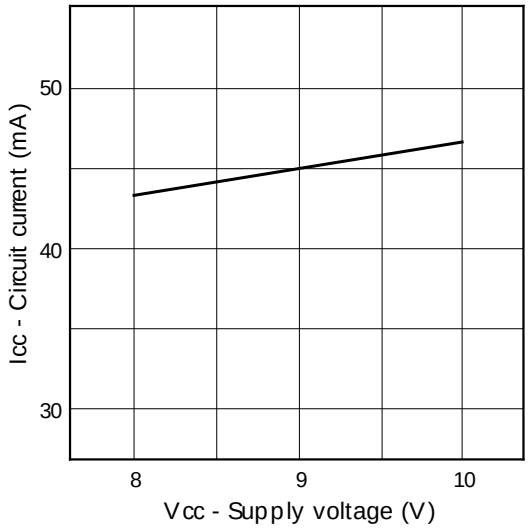
Normally, for internal protection UHF/VHF switch is performed by 9V or open through about 10kΩ resistor.

Notes on Usage

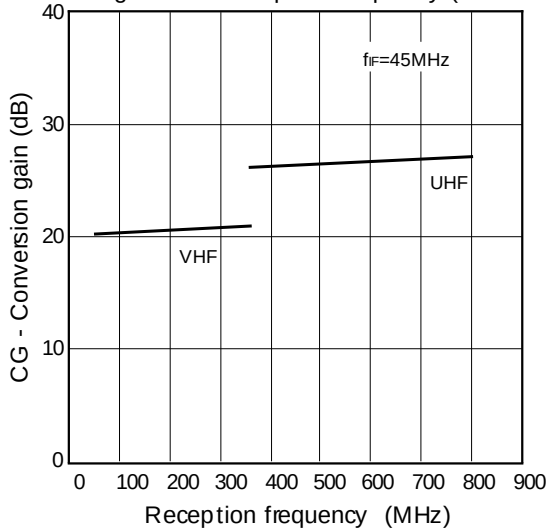
Care should be taken in placing external parts because high frequencies are present. Adjust accordingly to prevent heat problems with special care for Pins 6 and 13 (GND) whose heat dissipation accumulate.

Example of Representative Characteristics

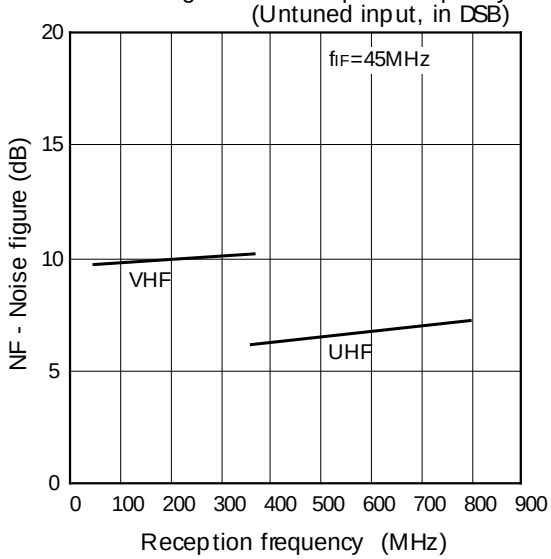
Circuit current vs. Supply voltage



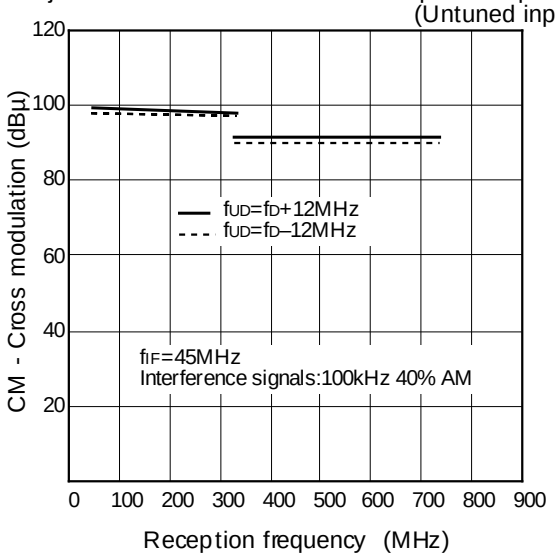
Conversion gain vs. Reception frequency (Untuned input)



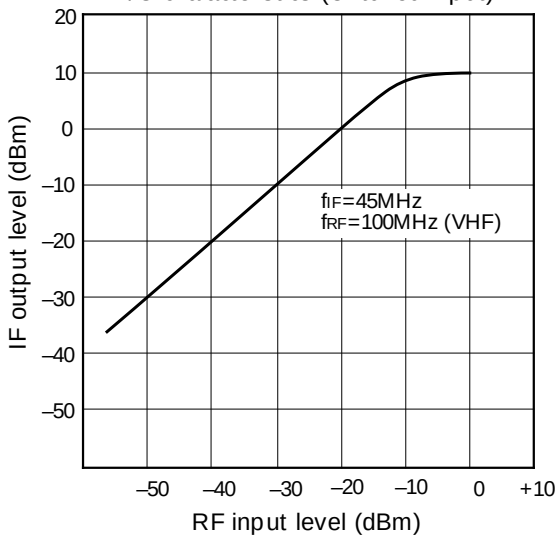
Noise figure vs. Reception frequency (Untuned input, in DSB)



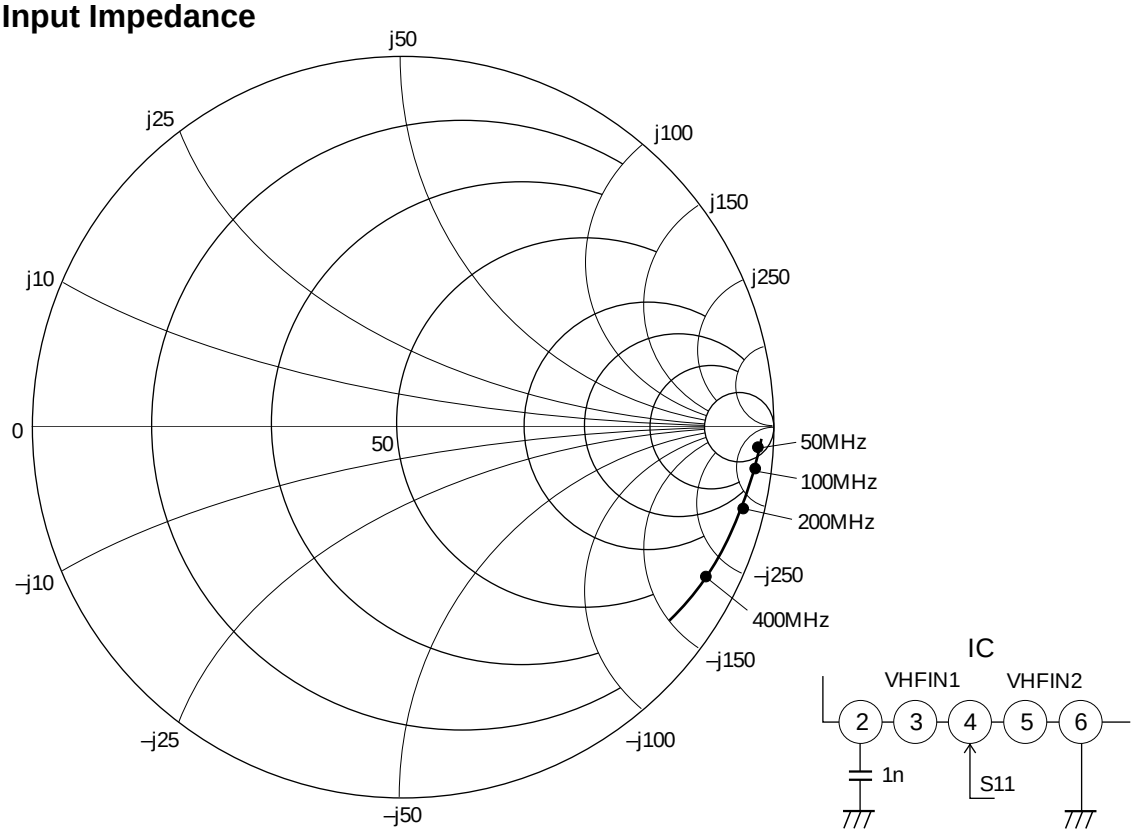
Next adjacent cross modulation vs. Reception frequency (Untuned input)



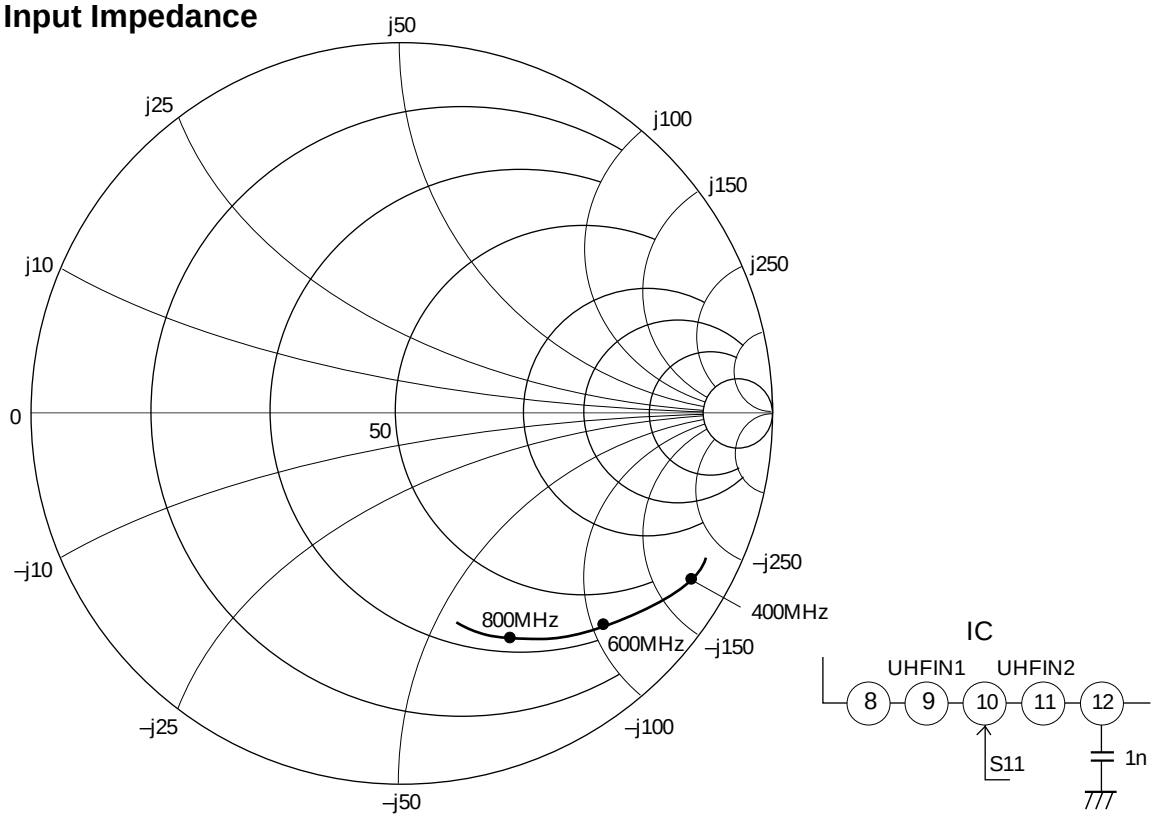
I/O characteristics (Untuned input)



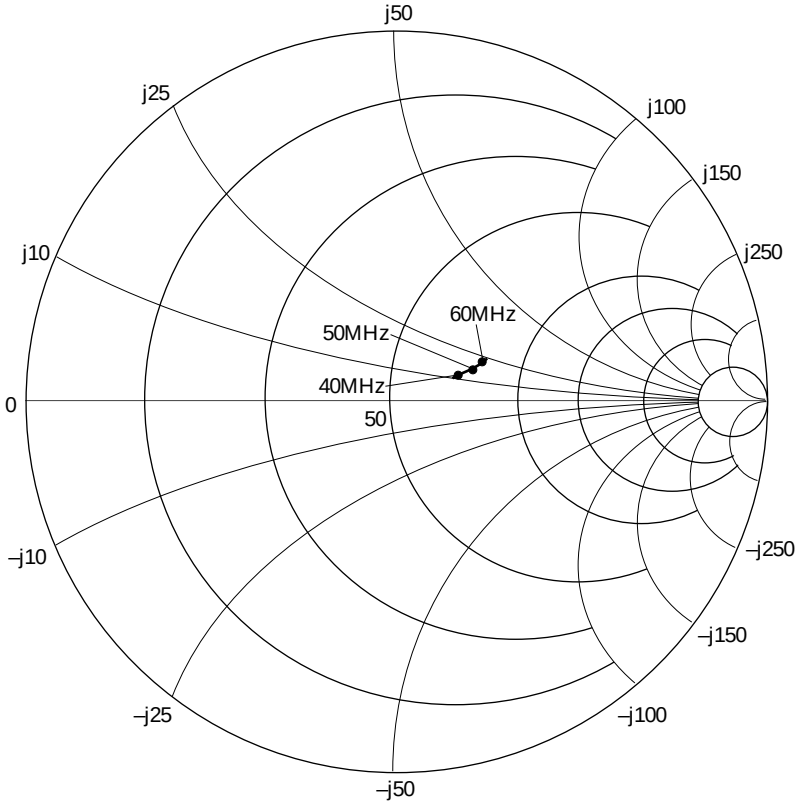
VHF Input Impedance



UHF Input Impedance

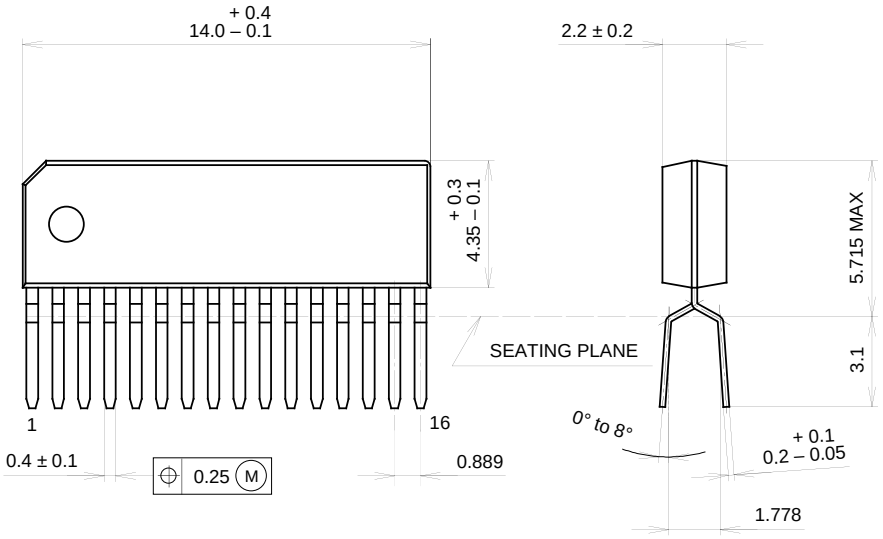


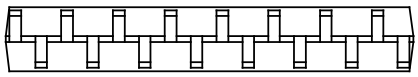
IF Output Impedance



Package Outline Unit : mm

16PIN SZIP (PLASTIC) 225mil





SONY CODE	SZIP-16P-01
EIAJ CODE	SZIP016-P-0225-A
JEDEC CODE	————————

PACKAGE STRUCTURE

PACKAGE MATERIAL	EPOXY RESIN
LEAD TREATMENT	SOLDER PLATING
LEAD MATERIAL	COPPER ALLOY
PACKAGE WEIGHT	0.3g