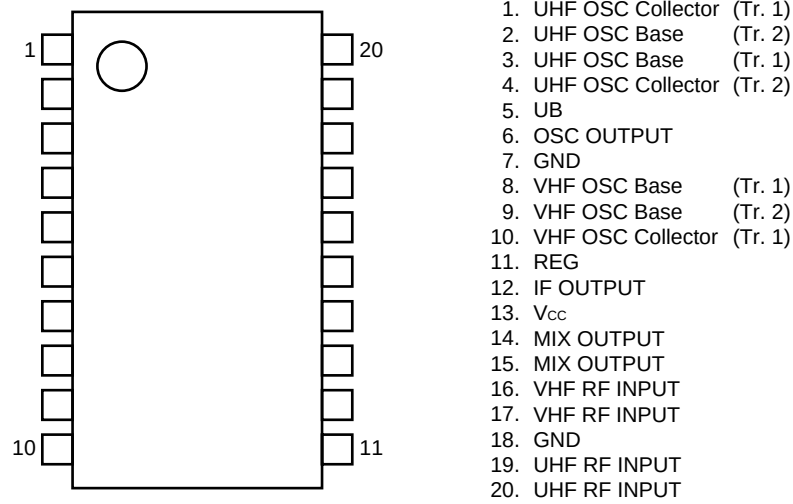
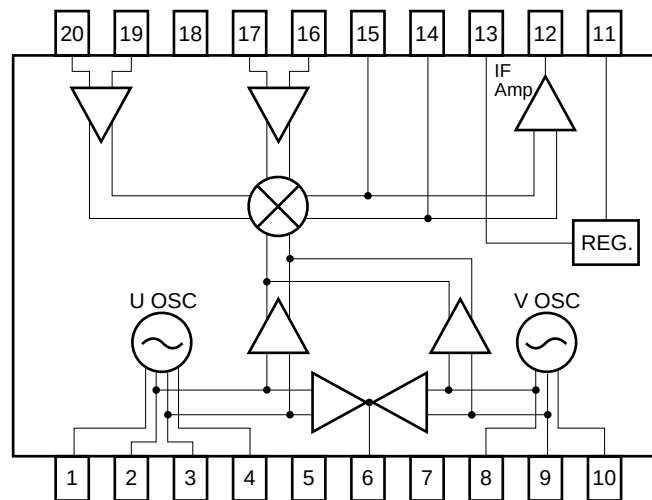


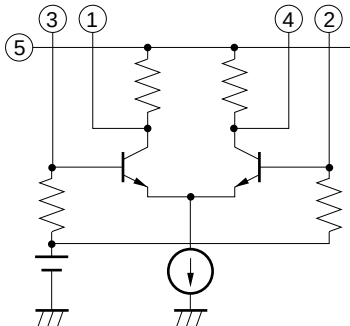
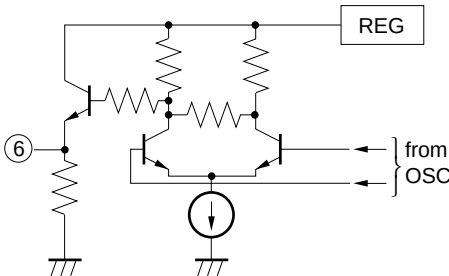
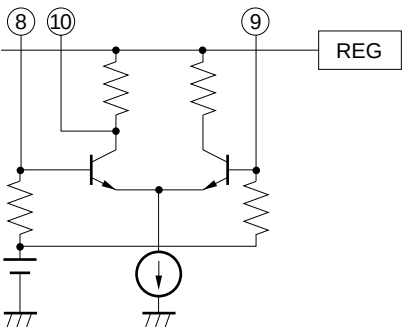
PIN CONFIGURATION (Top View)



INTERNAL BLOCK DIAGRAM



PIN EXPLANATION

Pin No.	Symbol	Pin Voltage TYP. above: VHF mode below: UHF mode	Function and Explanation	Equivalent Circuit				
1	UOSC collector (Tr. 1)	6.90	Collector pin of UHF oscillator. Assemble LC resonator with 2 pin through capacitor ≈ 1 pF to oscillate with active feedback loop.					
		6.25						
2	UOSC base (Tr. 2)	6.00	Base pin of UHF oscillator with balance amplifier. Connected to LC resonator through feedback capacitor ≈ 300 pF.					
		3.90						
3	UOSC base (Tr. 1)	6.00	Base pin of UHF oscillator with balance amplifier. Connected to LC resonator through feedback capacitor ≈ 300 pF.					
		3.90						
4	UOSC collector (Tr. 2)	6.90	Collector pin of UHF oscillator with balance amplifier. Assemble LC resonator with 3 pin through capacitor ≈ 1 pF to oscillate with active feedback loop. Double balanced oscillator with transistor 1 and transistor 2.					
		6.25						
5	UB	—	Switching pin for VHF or UHF operation. VHF operation = open UHF operation = 9.0 V					
		9.0						
6	OSC output	5.40	UHF and VHF oscillator output pin. In case of F/S tuner application, connected PLL synthesizer IC's input pin.					
		5.40						
7	GND	0.0	GND pin of VHF and UHF oscillator.					
		0.0						
8	VOSC base (Tr. 1)	3.50	Base pin of VHF oscillator. Grounded through capacitor ≈ 10 pF.					
		5.90						
9	VOSC base (Tr. 2)	3.50	Base pin of VHF oscillator. Assemble LC resonator with 10 pin to oscillate with active feedback loop.					
		5.90						
10	VOSC collector (Tr. 1)	6.20	Collector pin of VHF oscillator. Connected to LC resonator through feedback capacitor ≈ 3 pF.					
		6.90						

Pin No.	Symbol	Pin Voltage TYP. above: VHF mode below: UHF mode	Function and Explanation	Equivalent Circuit
11	REG	6.90 6.90	Monitor pin of regulator output voltage.	
12	IF output	2.60 2.60	IF output pin of VHF-UHF band functions.	
13	Vcc	9.0 9.0	Power supply pin for VHF-UHF band functions.	
14	MIX output1	7.10 7.00	VHF and UHF MIX output pins. These pins should be equipped with tank circuit to adjust intermediate frequency.	
15	MIX output2	7.10 7.00		
16	VRF input (bypass)	2.75 2.80	Bypass pin for VHF MIX input. Grounded through capacitor.	
17	VRF input	2.75 2.80	VRF signal input pin from antenna.	
18	GND	0.0 0.0	GND pin of MIX, IF amplifier and regulator.	
19	URF input (bypass)	— 2.65	Bypass pin for UHF MIX input. Grounded through capacitor.	
20	URF input	— 2.65	URF signal input pin from antenna.	

ABSOLUTE MAXIMUM RATINGS ($T_A = 25\text{ }^{\circ}\text{C}$ unless otherwise specified)

Parameter	Symbol	Condition	Rating	Unit
Supply Voltage 1	V_{CC}		11.0	V
Supply Voltage 2	UB		11.0	V
Power dissipation	P_D	$T_A = 80\text{ }^{\circ}\text{C}^{*1}$	700	mW
Operating ambient temperature	T_A		-40 to +80	$^{\circ}\text{C}$
Storage temperature	T_{stg}		-60 to +150	$^{\circ}\text{C}$

*1 Mounted on $50 \times 50 \times 1.6$ mm double copper epoxy glass board.

RECOMMENDED OPERATING RANGE

Parameter	Symbol	MIN.	TYP.	MAX.	Unit
Supply voltage 1	V_{CC}	8.0	9.0	10.0	V
Supply voltage 2	UB	8.0	9.0	10.0	V
Operating ambient temperature	T_A	-20	+25	+80	$^{\circ}\text{C}$

ELECTRICAL CHARACTERISTICS ($T_A = 25\text{ }^{\circ}\text{C}$, $V_{CC} = 9\text{ V}$, $f_{IF} = 45\text{ MHz}$, $P_{osc} = -10\text{ dBm}$)

Parameter	Symbol	Test Conditions	MIN.	TYP.	MAX.	Unit
Circuit Current 1	I_{CC1}	@VHF, no input signal *1	36.0	48.0	56.0	mA
Circuit Current 2	I_{CC2}	@UHF, no input signal *1	37.0	50.0	60.0	mA
Conversion Gain 1	CG1	$f_{RF} = 55\text{ MHz}$, $P_{RF} = -30\text{ dBm}$ *2	19.5	23.0	26.5	dB
Conversion Gain 2	CG2	$f_{RF} = 200\text{ MHz}$, $P_{RF} = -30\text{ dBm}$ *2	19.5	23.0	26.5	dB
Conversion Gain 3	CG3	$f_{RF} = 470\text{ MHz}$, $P_{RF} = -30\text{ dBm}$ *2	20.5	24.0	27.5	dB
Conversion Gain 4	CG4	$f_{RF} = 470\text{ MHz}$, $P_{RF} = -30\text{ dBm}$ *2	28.5	32.0	35.5	dB
Conversion Gain 5	CG5	$f_{RF} = 890\text{ MHz}$, $P_{RF} = -30\text{ dBm}$ *2	28.5	32.0	35.5	dB
Noise Figure 1	NF1	$f_{RF} = 55\text{ MHz}$ *3	—	11.0	14.0	dB
Noise Figure 2	NF2	$f_{RF} = 200\text{ MHz}$ *3	—	11.0	14.0	dB
Noise Figure 3	NF3	$f_{RF} = 470\text{ MHz}$ *3	—	11.0	14.0	dB
Noise Figure 4	NF4	$f_{RF} = 470\text{ MHz}$ *3	—	9.0	12.0	dB
Noise Figure 5	NF5	$f_{RF} = 890\text{ MHz}$ *3	—	10.0	13.0	dB
Maximum Output Power 1	$P_{O(sat)1}$	$f_{RF} = 55\text{ MHz}$, $P_{RF} = 0\text{ dBm}$ *2	10.0	13.0	—	dBm
Maximum Output Power 2	$P_{O(sat)2}$	$f_{RF} = 200\text{ MHz}$, $P_{RF} = 0\text{ dBm}$ *2	10.0	13.0	—	dBm
Maximum Output Power 3	$P_{O(sat)3}$	$f_{RF} = 470\text{ MHz}$, $P_{RF} = 0\text{ dBm}$ *2	10.0	13.0	—	dBm
Maximum Output Power 4	$P_{O(sat)4}$	$f_{RF} = 470\text{ MHz}$, $P_{RF} = 0\text{ dBm}$ *2	10.0	13.0	—	dBm
Maximum Output Power 5	$P_{O(sat)5}$	$f_{RF} = 890\text{ MHz}$, $P_{RF} = 0\text{ dBm}$ *2	10.0	13.0	—	dBm

*1 By measurement circuit 1

*2 By measurement circuit 2

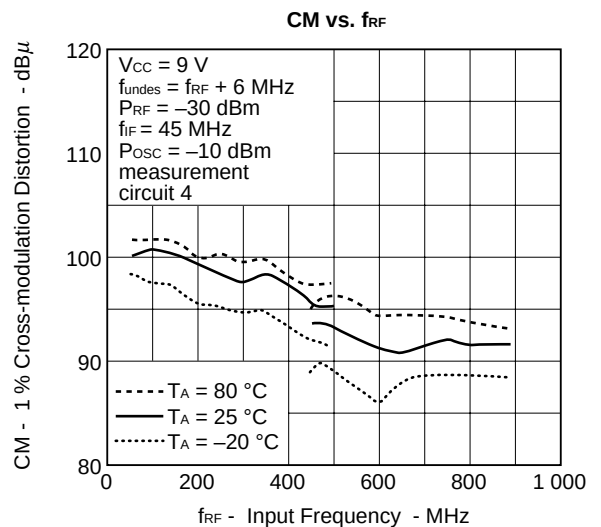
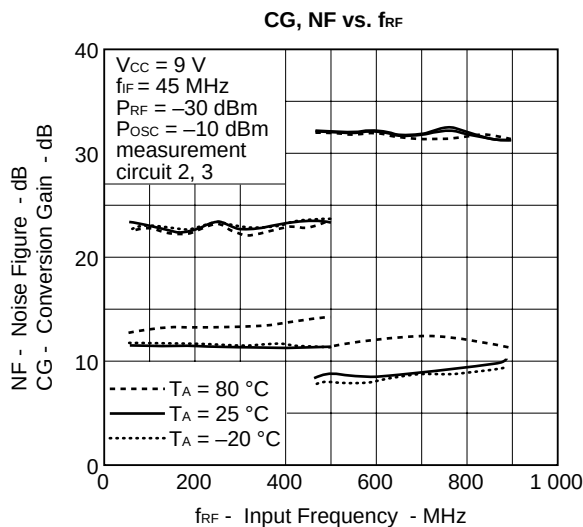
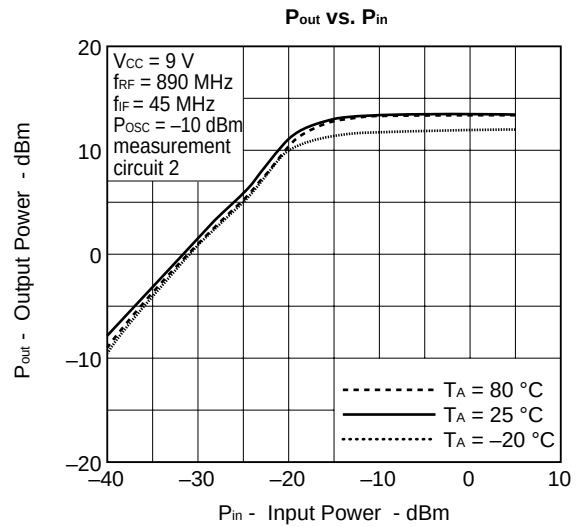
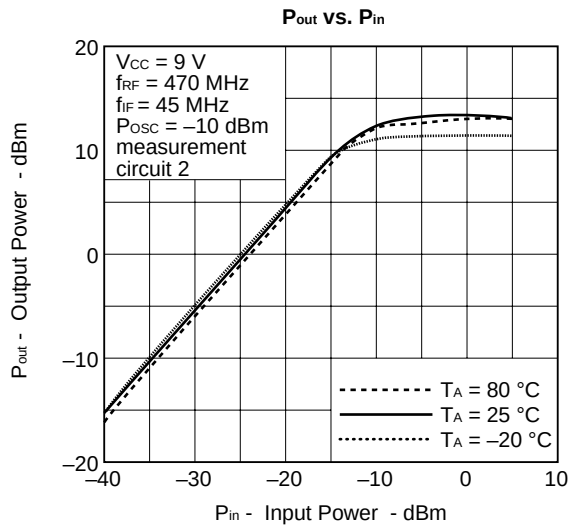
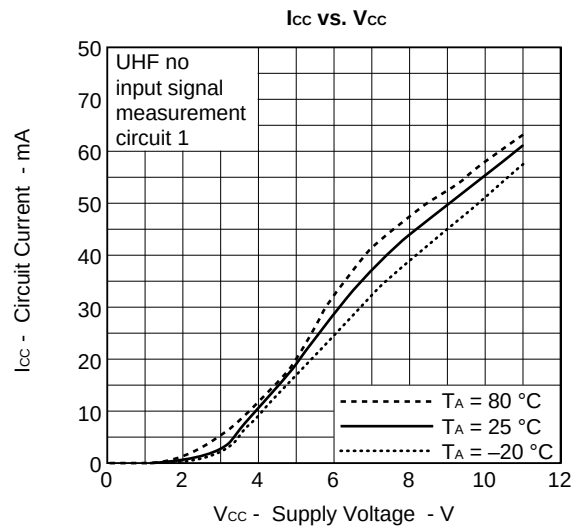
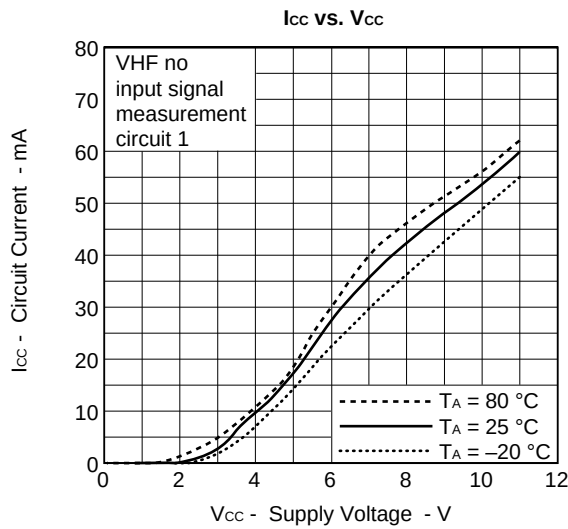
*3 By measurement circuit 3

STANDARD CHARACTERISTICS (Reference Values) ($T_A = 25^\circ\text{C}$, $V_{CC} = 9\text{ V}$)

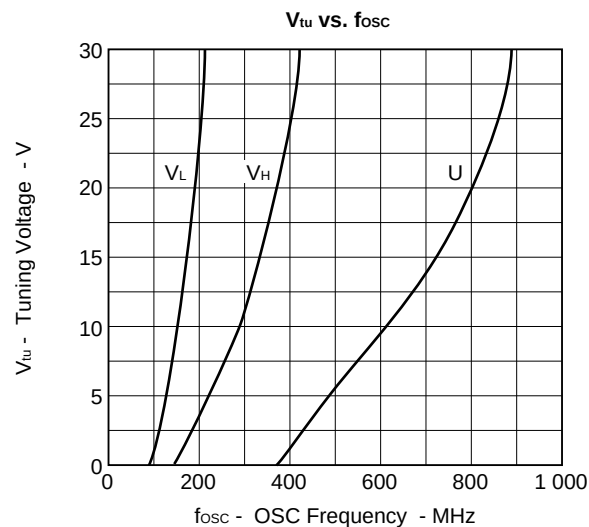
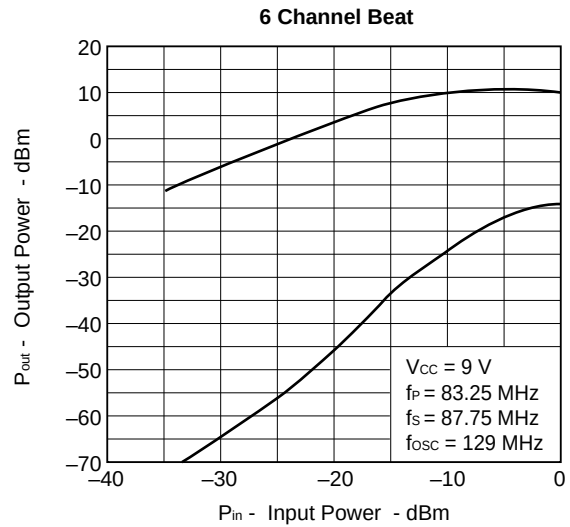
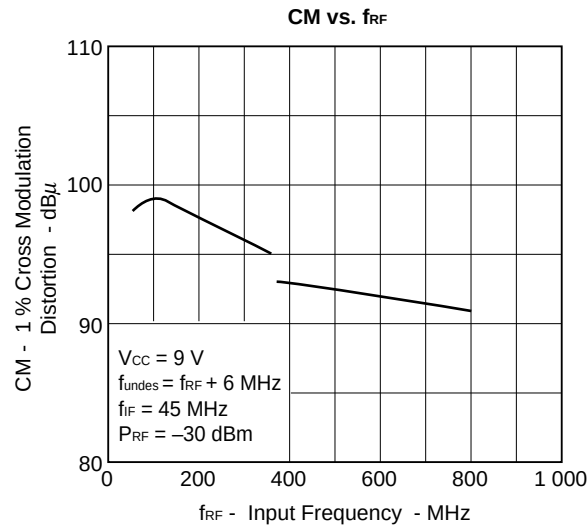
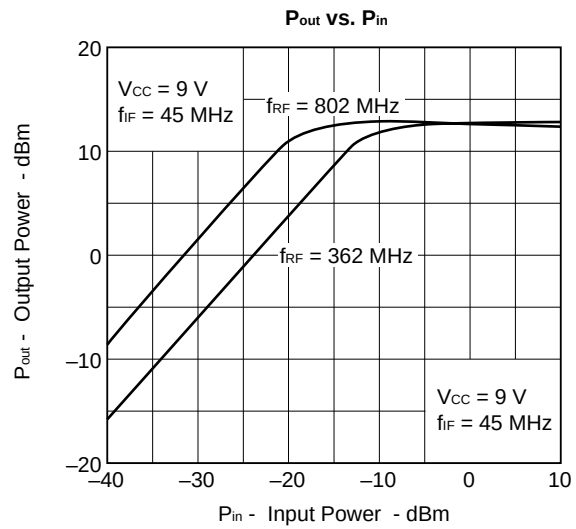
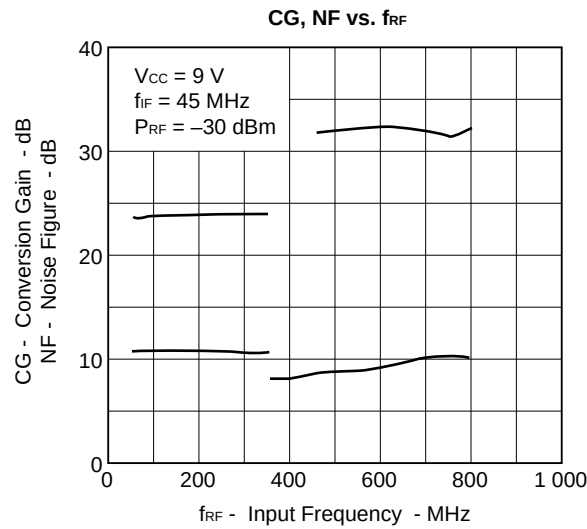
Parameter	Symbol	Test Conditions	Value for Reference	Unit
1 % cross-modulation distortion 1	CM1	$f_{des} = 55\text{ MHz}$, $f_{undes} = f_{des} + 6\text{ MHz}$, $P_{des} = -30\text{ dBm}$, $f_{IF} = 45\text{ MHz}$, $P_{osc} = -10\text{ dBm}$, AM 100 kHz, 30 % modulation, DES/CM = 46 dBc *1	100	$\text{dB}\mu$
1 % cross-modulation distortion 2	CM2	$f_{des} = 200\text{ MHz}$, $f_{undes} = f_{des} + 6\text{ MHz}$, $P_{des} = -30\text{ dBm}$, $f_{IF} = 45\text{ MHz}$, $P_{osc} = -10\text{ dBm}$, AM 100 kHz, 30 % modulation, DES/CM = 46 dBc *1	100	$\text{dB}\mu$
1 % cross-modulation distortion 3	CM3	$f_{des} = 470\text{ MHz}$, $f_{undes} = f_{des} + 6\text{ MHz}$, $P_{des} = -30\text{ dBm}$, $f_{IF} = 45\text{ MHz}$, $P_{osc} = -10\text{ dBm}$, AM 100 kHz, 30 % modulation, DES/CM = 46 dBc *1	96	$\text{dB}\mu$
1 % cross-modulation distortion 4	CM4	$f_{des} = 470\text{ MHz}$, $f_{undes} = f_{des} + 6\text{ MHz}$, $P_{des} = -30\text{ dBm}$, $f_{IF} = 45\text{ MHz}$, $P_{osc} = -10\text{ dBm}$, AM 100 kHz, 30 % modulation, DES/CM = 46 dBc *1	94	$\text{dB}\mu$
1 % cross-modulation distortion 5	CM5	$f_{des} = 890\text{ MHz}$, $f_{undes} = f_{des} + 6\text{ MHz}$, $P_{des} = -30\text{ dBm}$, $f_{IF} = 45\text{ MHz}$, $P_{osc} = -10\text{ dBm}$, AM 100 kHz, 30 % modulation, DES/CM = 46 dBc *1	92	$\text{dB}\mu$

***1** By measurement circuit 4

TYPICAL CHARACTERISTICS

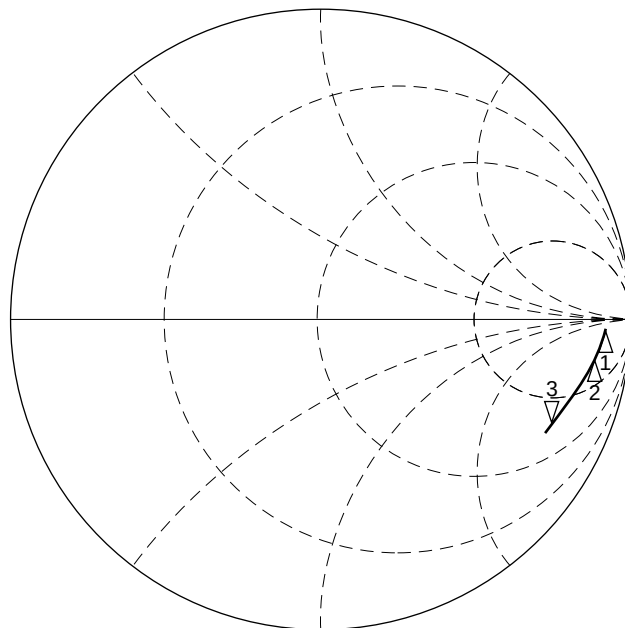


STANDARD CHARACTERISTICS (by application circuit example)



INPUT IMPEDANCE (by measurement circuit 5)

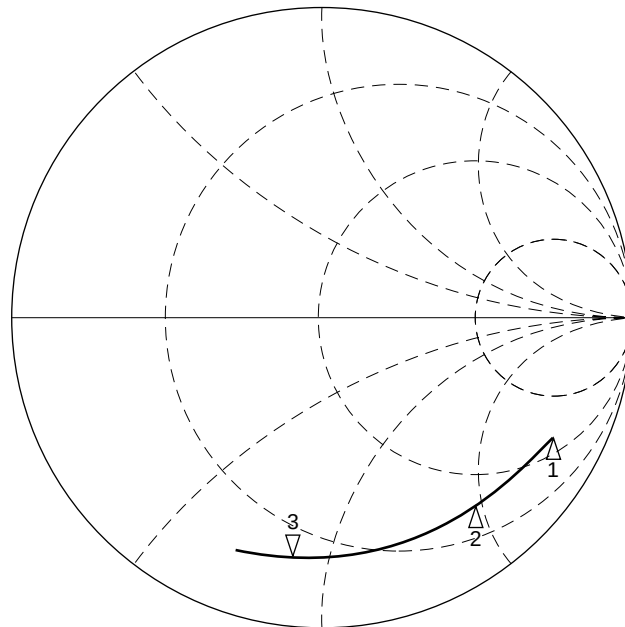
<VRF INPUT: 17 PIN>



- ▽ 1 45 MHz
931.31Ω -247.16Ω
- ▽ 2 200 MHz
358.08Ω -395.55Ω
- ▽ 3 470 MHz
95.062Ω -184.34Ω

START 0.045000000 GHz
STOP 0.500000000 GHz

<URF INPUT: 20 PIN>

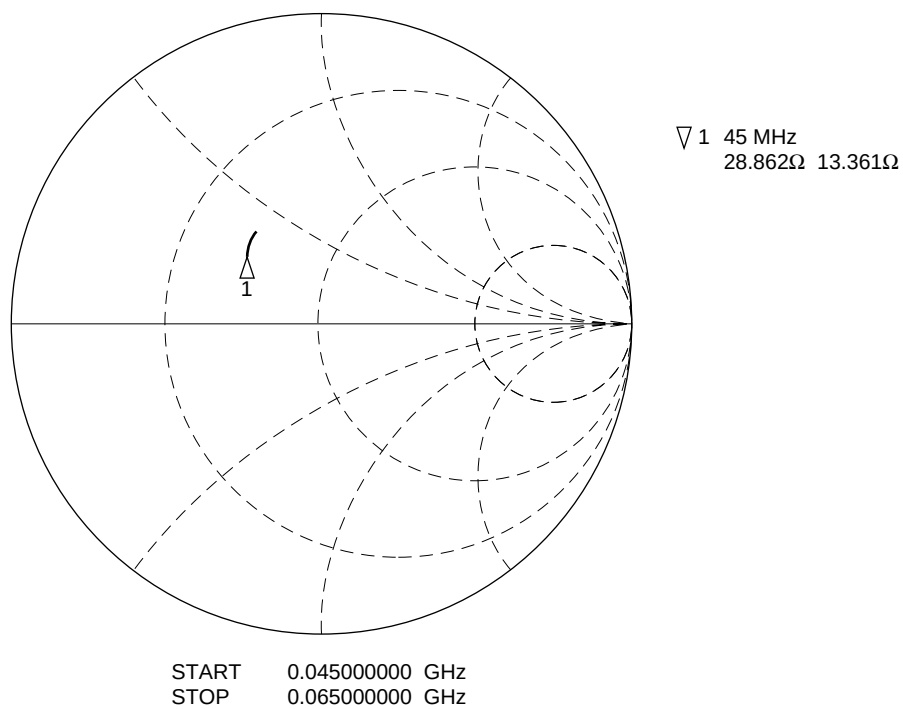


- ▽ 1 400 MHz
71.531Ω -178.98Ω
- ▽ 2 600 MHz
31.352Ω -96.094Ω
- ▽ 3 890 MHz
10.85Ω -42.965Ω

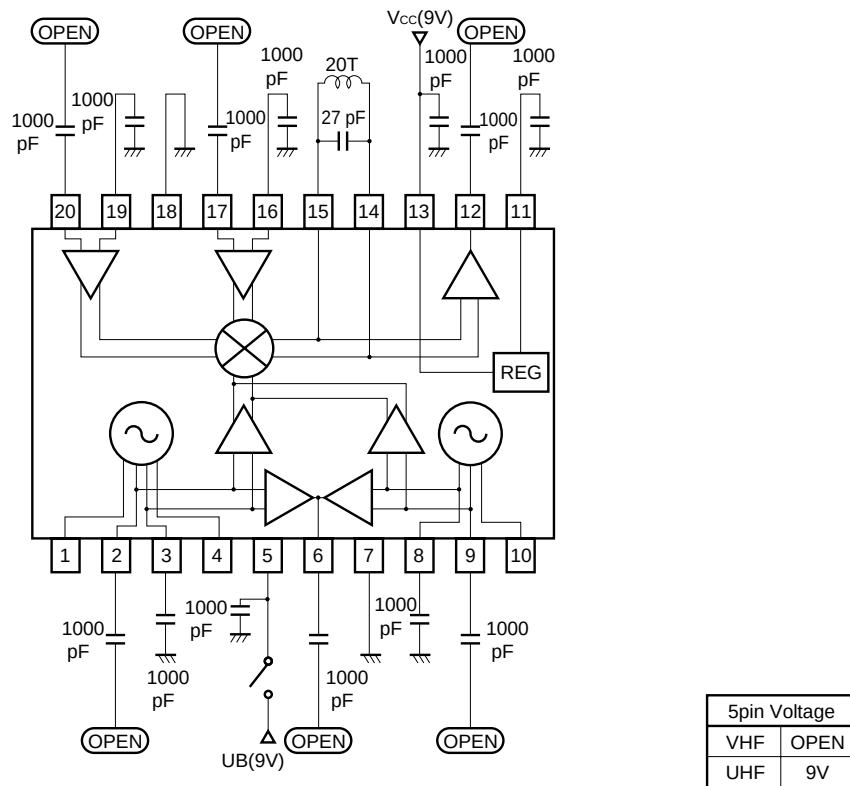
START 0.400000000 GHz
STOP 1.000000000 GHz

OUTPUT IMPEDANCE (by measurement circuit 5)

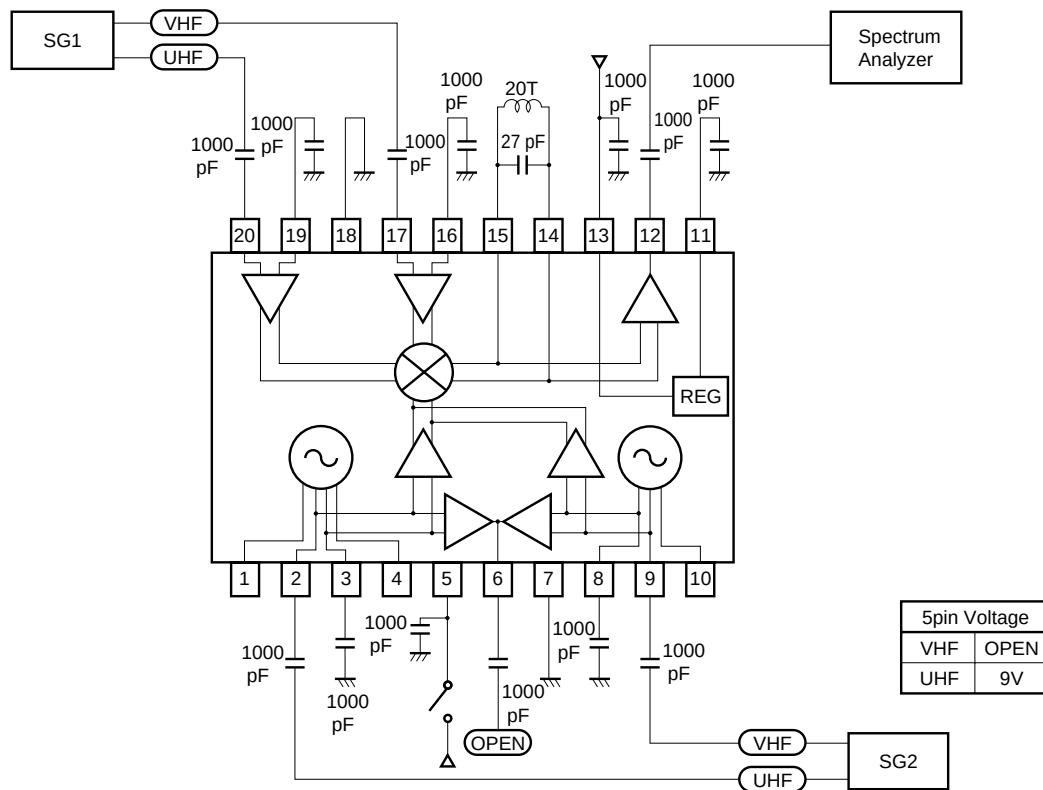
<IF OUTPUT: 12 PIN>



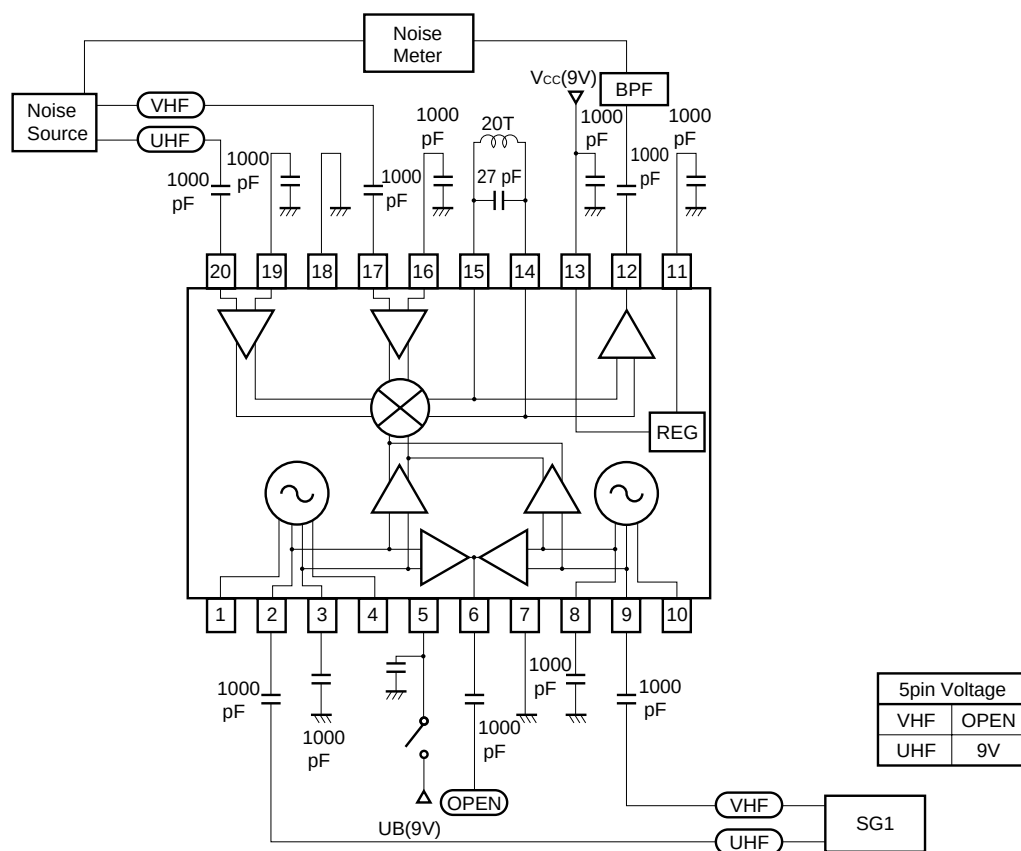
MEASUREMENT CIRCUIT 1



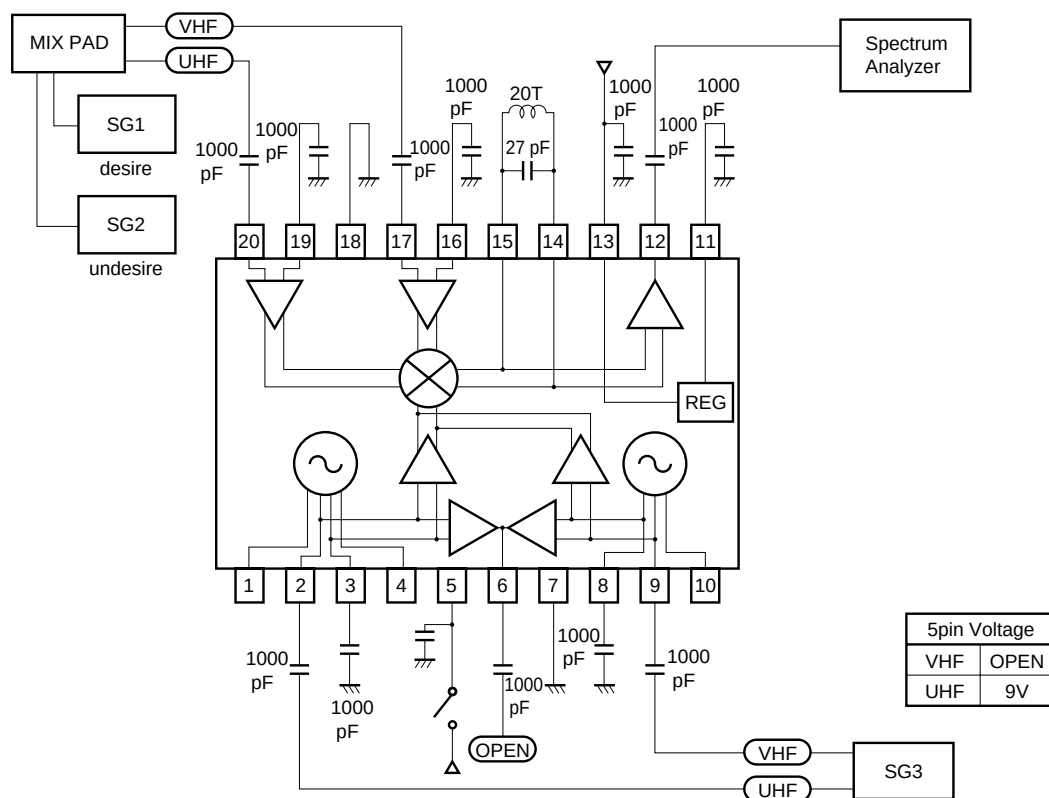
MEASUREMENT CIRCUIT 2



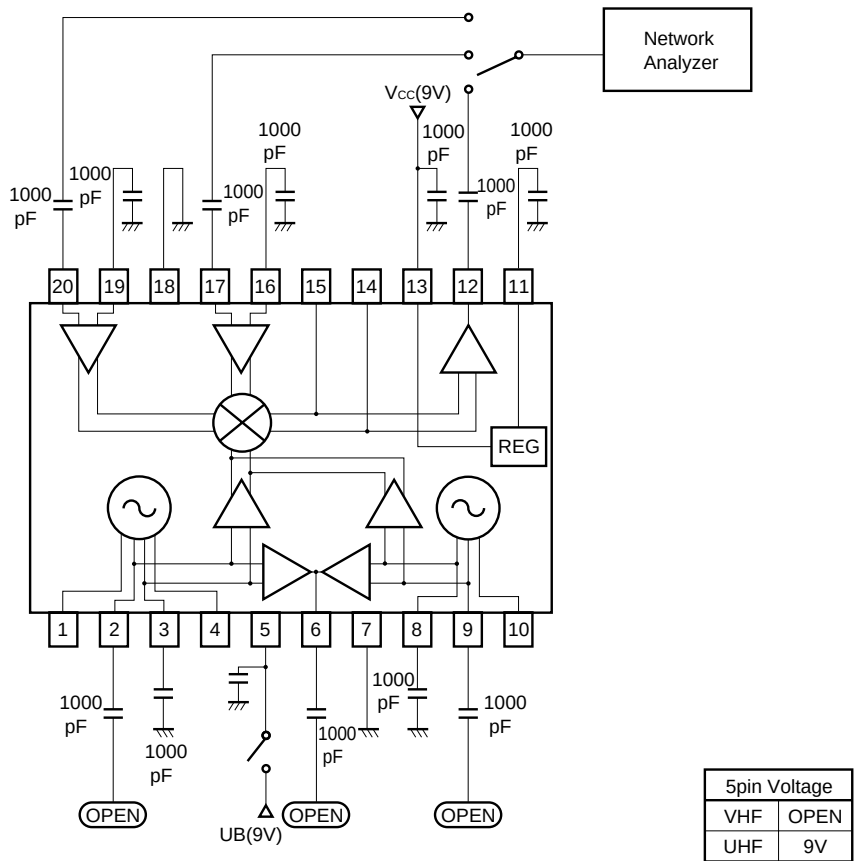
MEASUREMENT CIRCUIT 3



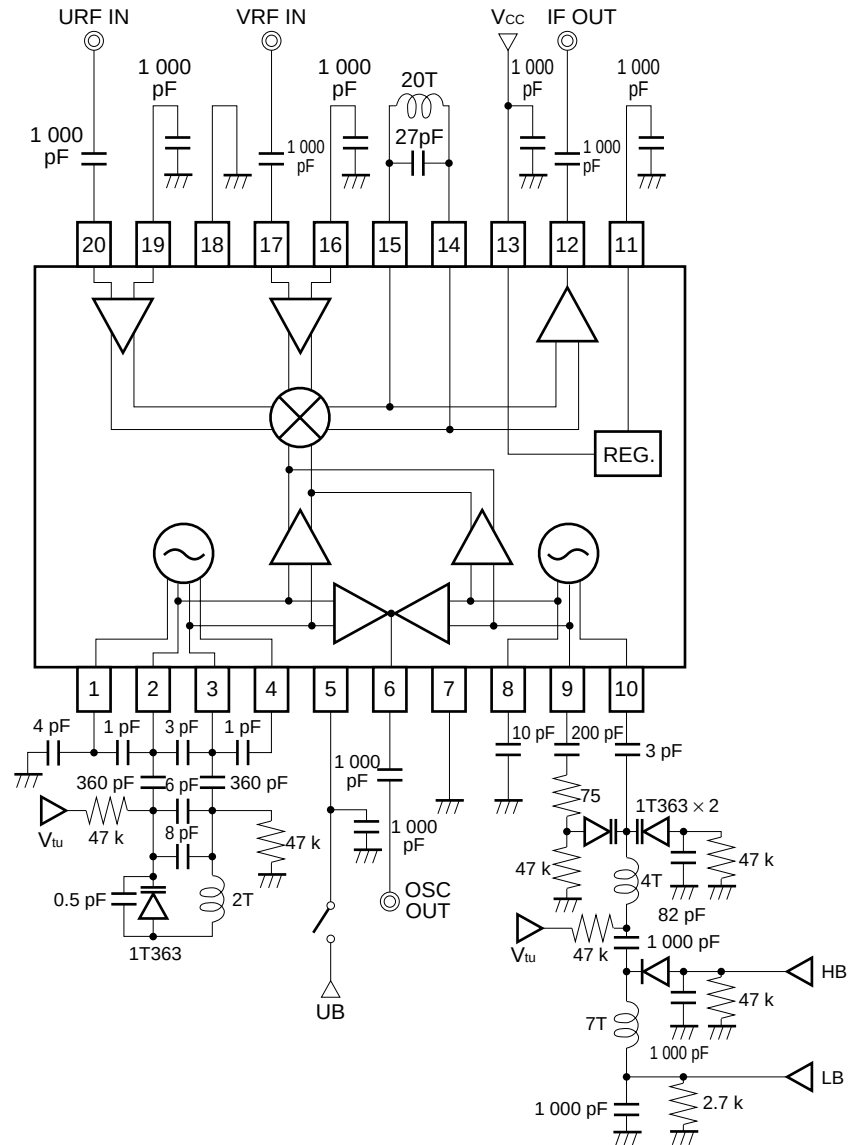
MEASUREMENT CIRCUIT 4



MEASUREMENT CIRCUIT 5



APPLICATION CIRCUIT EXAMPLE



The application circuits and their parameters are for reference only and are not intended for use in actual design-ins.

ILLUSTRATION OF THE EVALUATION BOARD FOR APPLICATION CIRCUIT EXAMPLE (Surface)

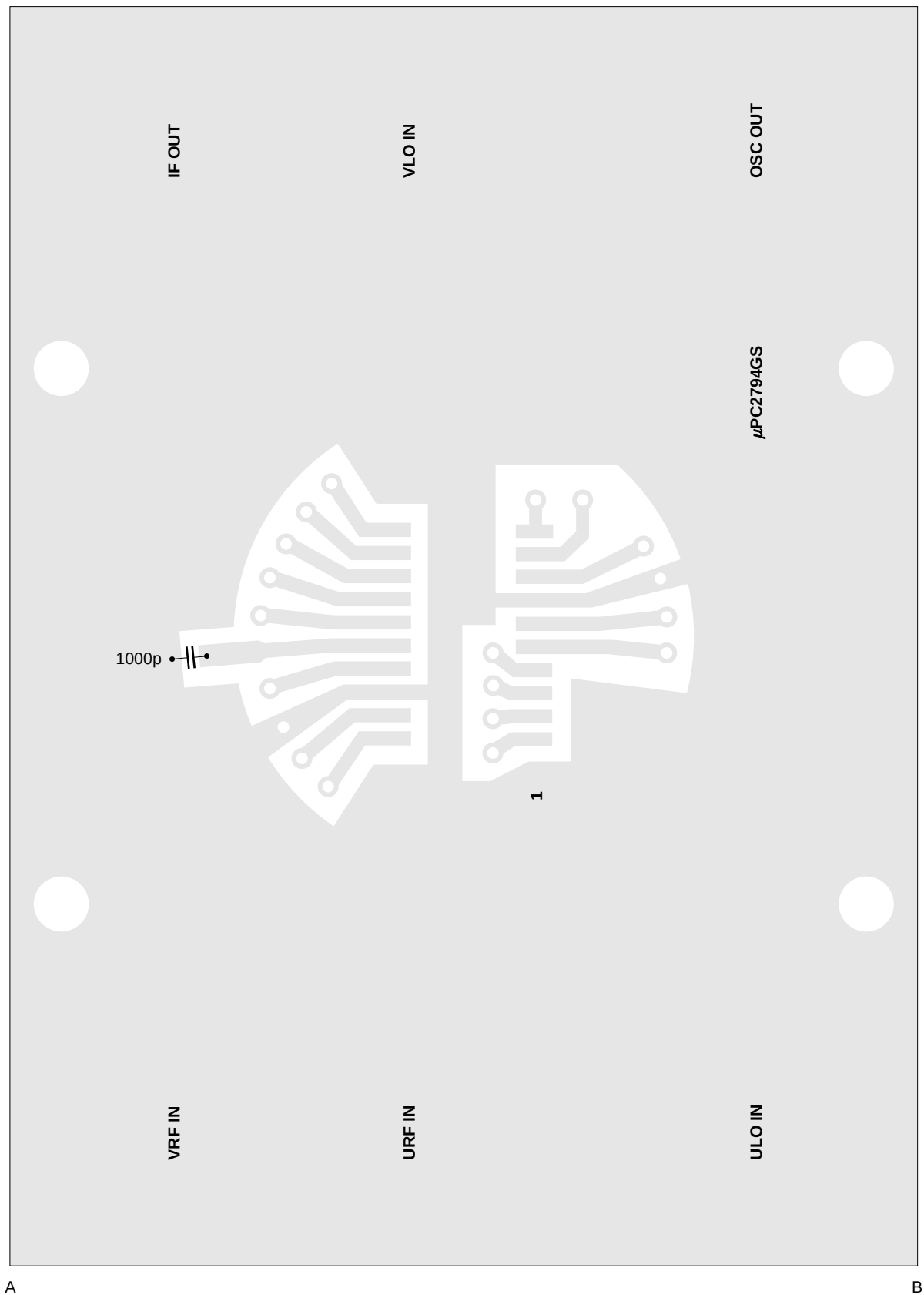
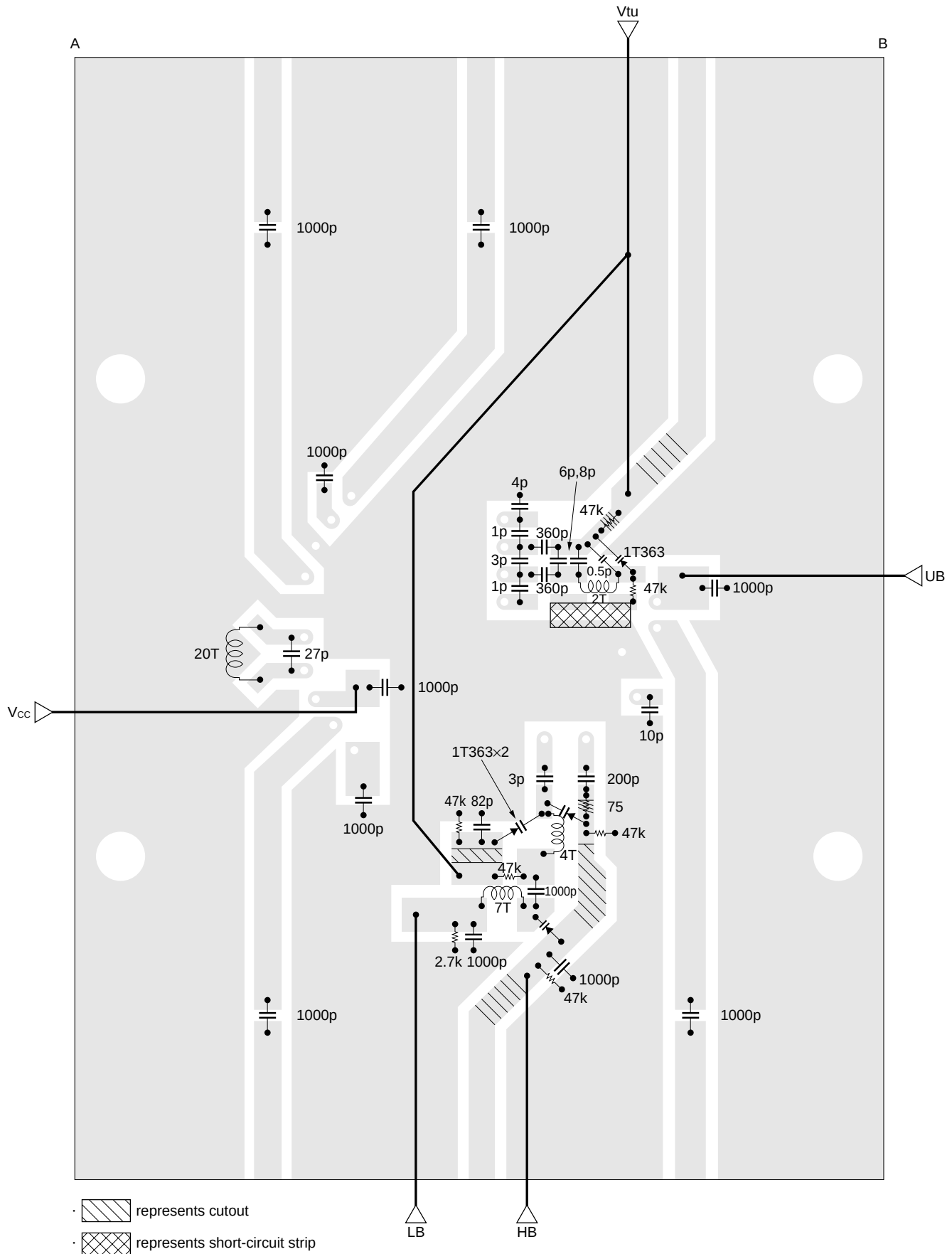
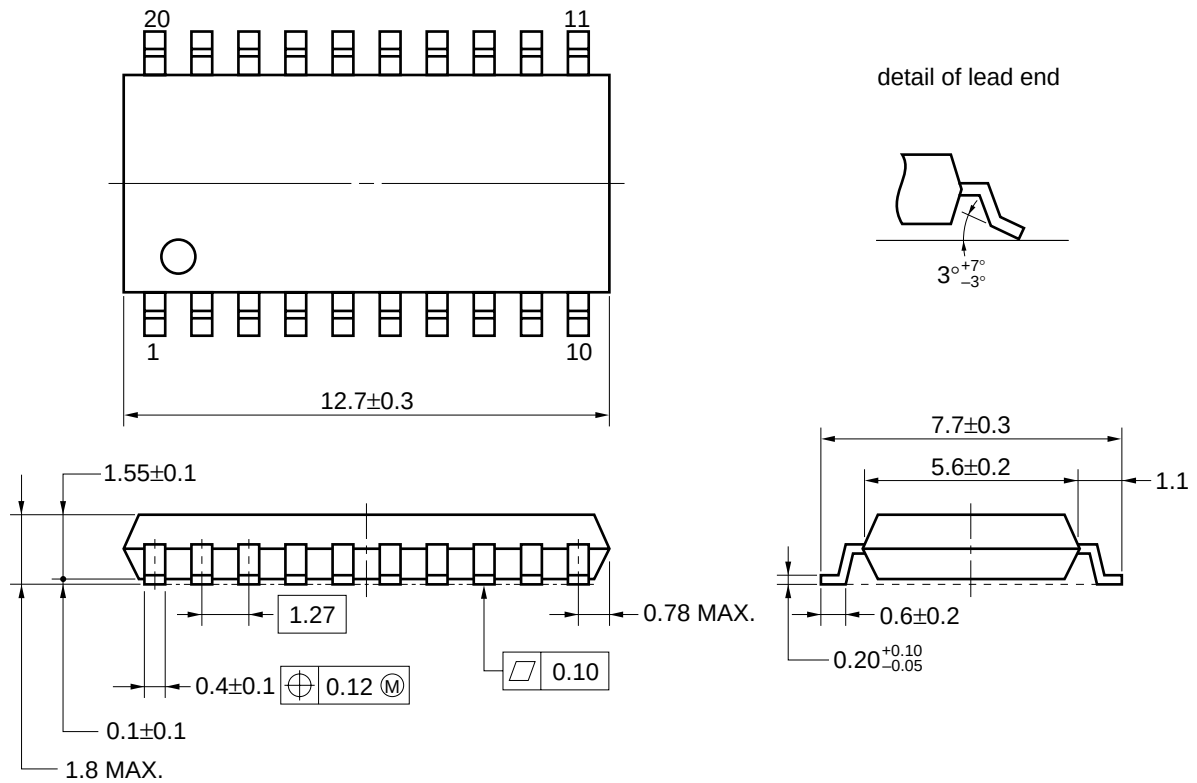


ILLUSTRATION OF THE EVALUATION BOARD FOR APPLICATION CIRCUIT EXAMPLE (Back side)



PACKAGE DIMENSIONS

★ 20 PIN PLASTIC SOP (300 mil) (UNIT: mm)



NOTE Each lead centerline is located within 0.12 mm of its true position (T.P.) at maximum material condition.

NOTE ON CORRECT USE

- (1) Observe precautions for handling because of electro-static sensitive devices.
- (2) Form a ground pattern as widely as possible to minimize ground impedance (to prevent undesired oscillation).
- (3) Keep the track length of the ground pins as short as possible.
- (4) A low pass filter must be attached to V_{CC} line.
- (5) A matching circuit must be externally attached to output port.

RECOMMENDED SOLDERING CONDITIONS

The following conditions (see table below) must be met when soldering this product.

Please consult with our sales officers in case other soldering process is used or in case soldering is done under different conditions.

For details of recommended soldering conditions for surface mounting, refer to information document SEMICONDUCTOR DEVICE MOUNTING TECHNOLOGY MANUAL (C10535E).

μPC2794GS

Soldering Process	Soldering Conditions	Symbol
Infrared ray reflow	Peak package's surface temperature: 235 °C or below, Reflow time: 30 seconds or below (210 °C or higher), Number of reflow process: 3, Exposure limit*1: None	IR35-00-3
VPS	Peak package's surface temperature: 215 °C or below, Reflow time: 40 seconds or below (200 °C or higher), Number of reflow process: 3, Exposure limit*1: None	VP15-00-3
Partial heating method	Terminal temperature: 300 °C or below, Flow time: 3 seconds or below, Exposure limit*1: None	

*1 Exposure limit before soldering after dry-pack package is opened.

Storage conditions: 25 °C and relative humidity at 65 % or less.

Caution Do not apply more than single process at once, except for "Partial heating method".

[MEMO]

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 - Standard: Computers, office equipment, communications equipment, test and measurement equipment, audio and visual equipment, home electronic appliances, machine tools, personal electronic equipment and industrial robots
 - Special: Transportation equipment (automobiles, trains, ships, etc.), traffic control systems, anti-disaster systems, anti-crime systems, safety equipment and medical equipment (not specifically designed for life support)
 - Specific: Aircraft, aerospace equipment, submersible repeaters, nuclear reactor control systems, life support systems or medical equipment for life support, etc.
- The quality grade of NEC devices is "Standard" unless otherwise specified in NEC's Data Sheets or Data Books. If customers intend to use NEC devices for applications other than those specified for Standard quality grade, they should contact an NEC sales representative in advance.