

# BIPOLAR ANALOG INTEGRATED CIRCUIT

# $\mu$ PC2795GV

### GENERAL PURPOSE L-BAND DOWN CONVERTER

#### DESCRIPTION

The  $\mu$ PC2795GV is Silicon monolithic IC designed for L-band down converter. This IC consists of double balanced mixer, local oscillator, local oscillation buffer amplifier, IF buffer amplifier, and voltage regulator.

The package is 8-pin SSOP suitable for high-density surface mount.

#### FEATURES

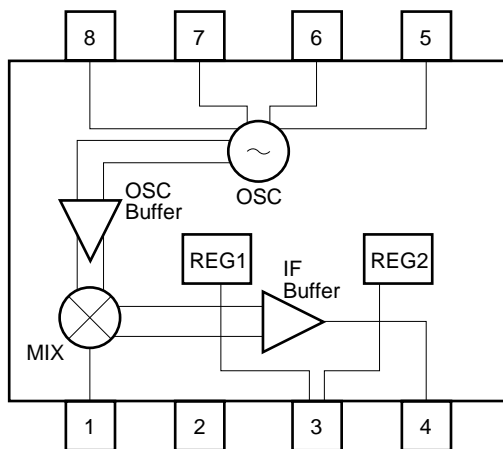
- Wide band operation  $f_{RF} = 0.95$  to  $2.15$  GHz
- Supply voltage  $5$  V
- Low distortion  $IM_3 = 55$  dBc
- Packaged in 8-pin SSOP suitable for high-density mounting

#### ORDERING INFORMATION

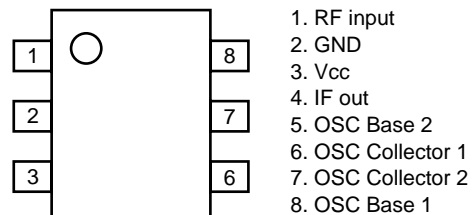
PART NUMBER	PACKAGE	PACKAGE STYLE
$\mu$ PC2795GV-E1	8-pin plastic SSOP (175 mil)	Embossed tape 8 mm wide. 1 k/REEL Pin 1 indicates pull-out direction of tape

For evaluation sample order, please contact your local NEC office. (Part number for sample order:  $\mu$ PC2795GV)

#### INTERNAL BLOCK DIAGRAM



#### PIN CONFIGURATION (Top View)



**Caution: Electro-static sensitive devices**

The information in this document is subject to change without notice.

PIN EXPLANATIONS

Pin NO.	Symbol	Pin Volt (V, TYP.)	Explanation	Equivalent Circuit
1	RF IN	2.1	RF signal input pin. Double balanced mixer with Tr.1 and Tr. 2.	
2	GND	0.0	Ground pin.	
3	Vcc	5.0	Power supply pin.	
4	IF OUT	2.3	IF output pin. This pin is assigned for the emitter follower output with low impedance.	
5	OSC Base 2	2.8	Base pin of oscillator with balanced amplifier. Connected to LC resonator through coupling capacitor.	
6	OSC Collector 1	5.0	Collector pin of oscillator with balanced amplifier. Assemble LC resonator with 5 pin through capacitor to oscillate with active feedback loop. Loads should be connected to this pin.	
7	OSC Collector 2	5.0	Collector pin of oscillator with balanced amplifier. Assemble LC resonator with 8 pin through capacitor to oscillate with active feedback loop. Loads should be connected to this pin.	
8	OSC Base 1	2.8	Base pin of oscillator with balanced amplifier. Connected to LC resonator through coupling capacitor.	

**ABSOLUTE MAXIMUM RATINGS (T<sub>A</sub> = 25 °C, unless otherwise specified)**

PARAMETER	SYMBOL	TEST CONDITION	RATINGS	UNIT
Supply Voltage	V <sub>CC</sub>		6.0	V
Power Dissipation	P <sub>D</sub>	T <sub>A</sub> = 85 °C <sup>*1</sup>	250	mW
Operating Ambient Temperature	T <sub>A</sub>		-40 to +85	°C
Storage Temperature	T <sub>stg</sub>		-55 to +150	°C

\*1 Mounted on 50 × 50 × 1.6 mm double epoxy glass board.

**RECOMMENDED OPERATING RANGE**

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT
Supply Voltage	V <sub>CC</sub>	4.5	5.0	5.5	V
Operating Ambient Temperature	T <sub>A</sub>	-40	+25	+85	°C

**ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = 25 °C, V<sub>CC</sub> = 5 V; <sup>\*1</sup>)**

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITIONS
Circuit Current	I <sub>CC</sub>	25.5	35.0	48.0	mA	no input signal
Lower Input Frequency	f <sub>RF1</sub>	—	—	0.95	GHz	
Upper Input Frequency	f <sub>RF2</sub>	2.15	—	—	GHz	
Conversion Gain 1	CG1	8.0	11.0	14.0	dB	f <sub>RF</sub> = 950 MHz, P <sub>RF</sub> = -30 dBm, f <sub>IF</sub> = 402 MHz, P <sub>OSC</sub> = -10dBm
Conversion Gain 2	CG2	6.5	9.5	12.5	dB	f <sub>RF</sub> = 2.15 GHz, P <sub>RF</sub> = -30 dBm, f <sub>IF</sub> = 402 MHz, P <sub>OSC</sub> = -10 dBm
Noise Figure 1	NF1	—	13.5	16.0	dB	f <sub>RF</sub> = 950 MHz, f <sub>IF</sub> = 402 MHz, P <sub>OSC</sub> = -10 dBm
Noise Figure 2	NF2	—	14.0	16.5	dB	f <sub>RF</sub> = 2.15 GHz, f <sub>IF</sub> = 402 MHz, P <sub>OSC</sub> = -10 dBm
Maximum Output Power 1	P <sub>O(sat) 1</sub>	2.0	5.0	—	dBm	f <sub>RF</sub> = 950 MHz, P <sub>RF</sub> = 0 dBm, f <sub>IF</sub> = 402 MHz, P <sub>OSC</sub> = -10 dBm
Maximum Output Power 2	P <sub>O(sat) 2</sub>	0.0	3.5	—	dBm	f <sub>RF</sub> = 2.15 GHz, P <sub>RF</sub> = 0 dBm, f <sub>IF</sub> = 402 MHz, P <sub>OSC</sub> = -10 dBm

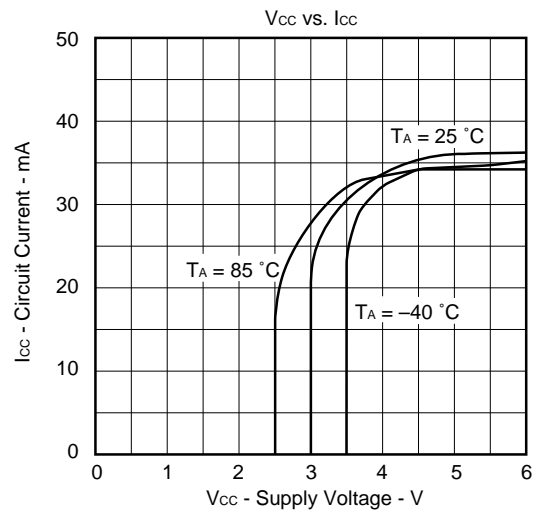
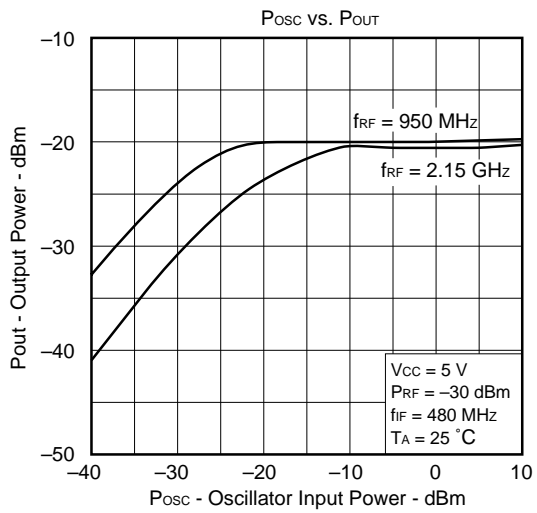
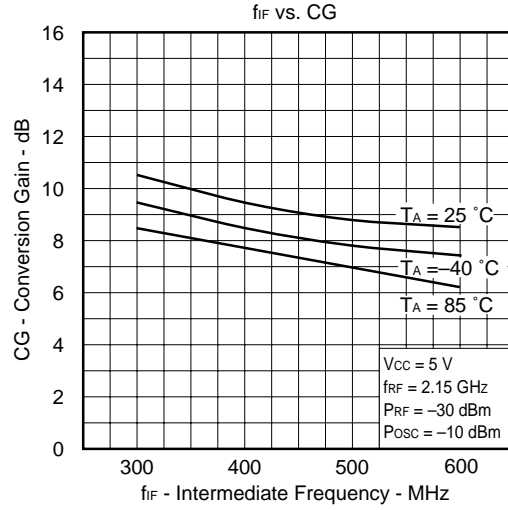
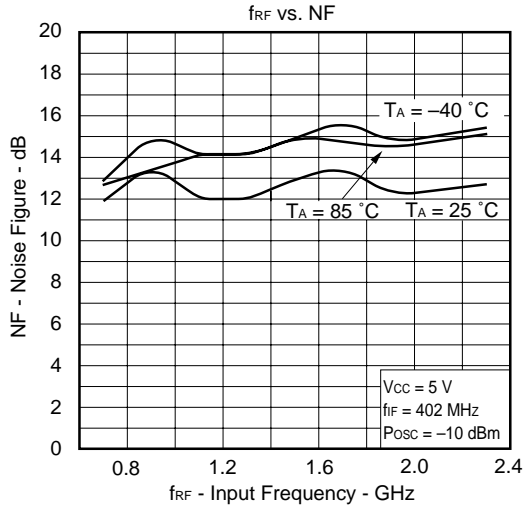
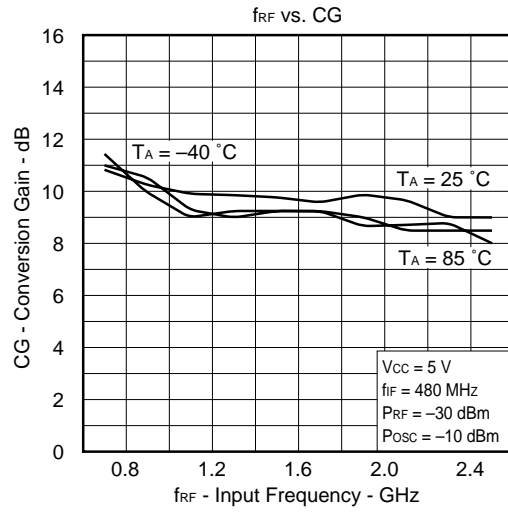
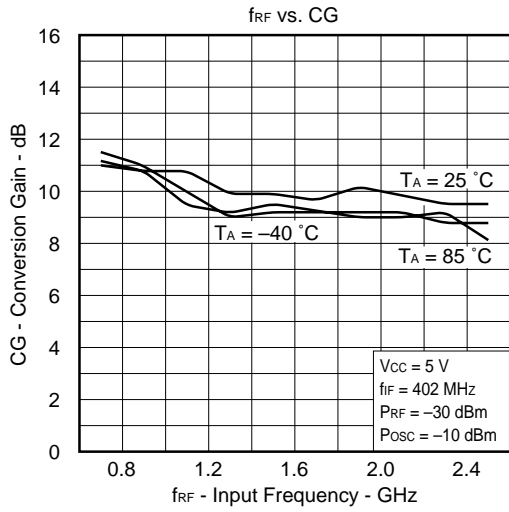
\*1 By measurement circuit.

**STANDARD CHARACTERISTICS (T<sub>A</sub> = 25 °C, V<sub>CC</sub> = 5 V; <sup>\*1</sup>)**

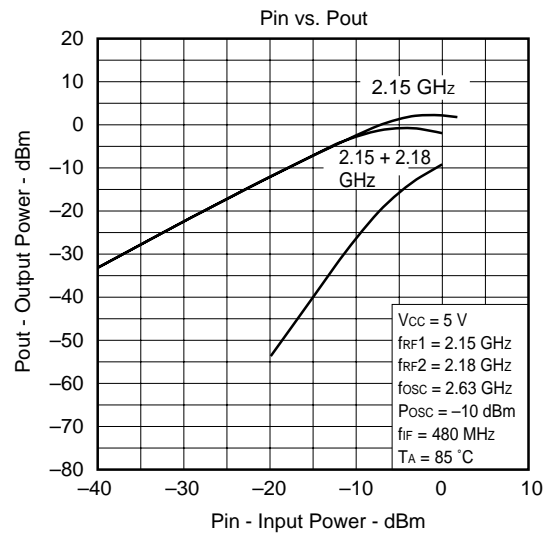
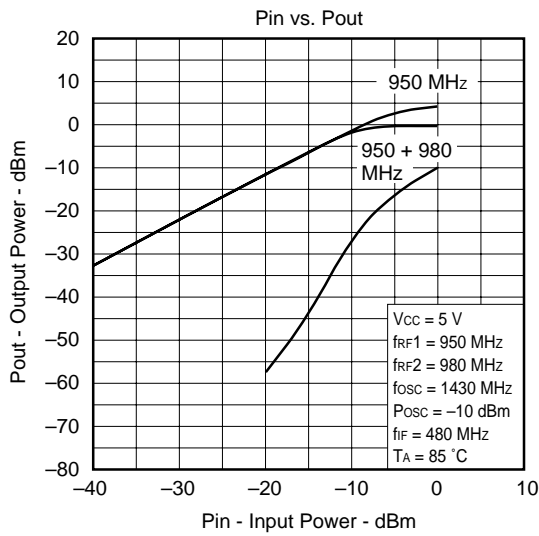
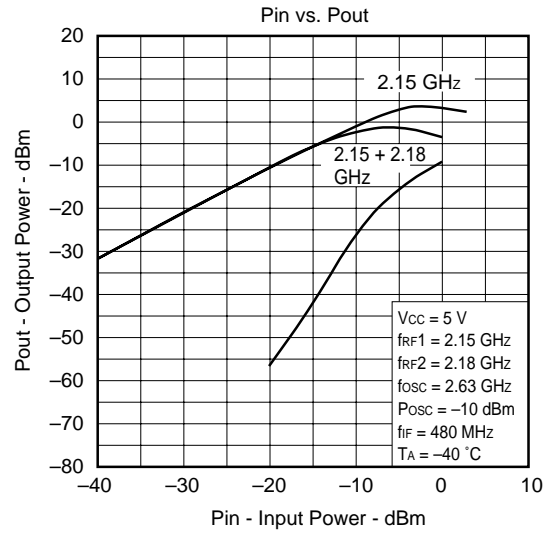
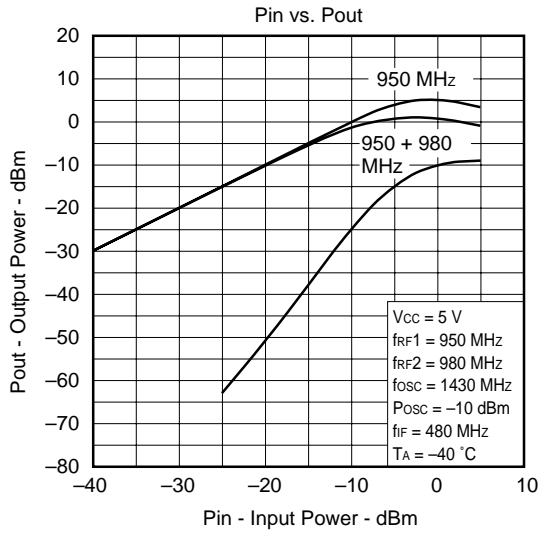
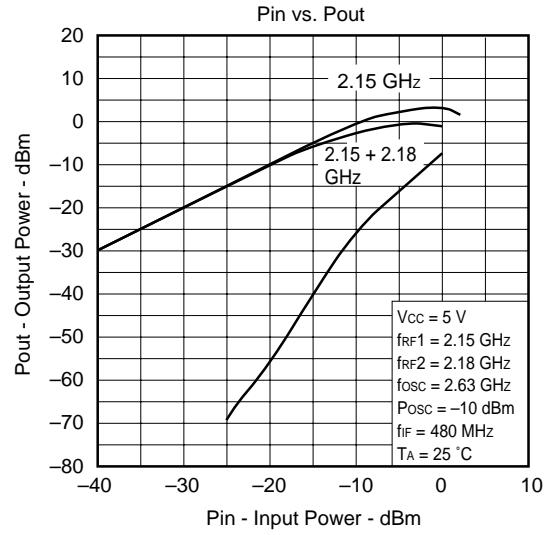
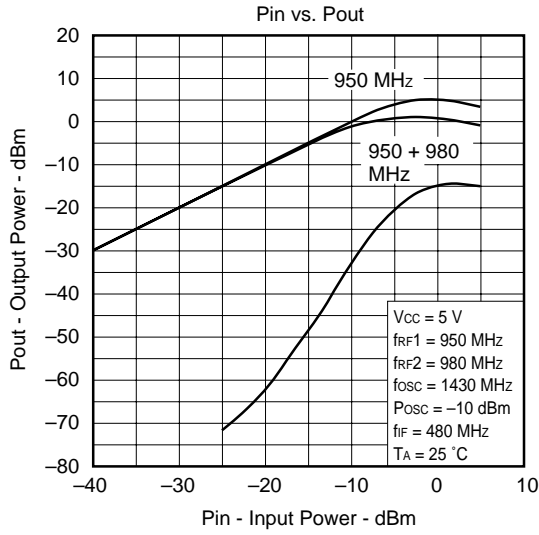
PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITIONS
3rd Order Intermodulation Distortion 1	IM <sub>31</sub>	—	55	—	dBc	f <sub>RF</sub> = 950, 980 MHz, P <sub>RF</sub> = -25 dBm, f <sub>OSC</sub> = 1430 MHz, P <sub>OSC</sub> = -10 dBm
3rd Order Intermodulation Distortion 2	IM <sub>32</sub>	—	55	—	dBc	f <sub>RF</sub> = 2.15, 2.18 GHz, P <sub>RF</sub> = -25 dBm, f <sub>OSC</sub> = 2.63 GHz, P <sub>OSC</sub> = -10 dBm
Oscillator Frequency	f <sub>OSC</sub>	1.35	—	2.65	GHz	

\*1 By measurement circuit.

TYPICAL CHARACTERISTICS

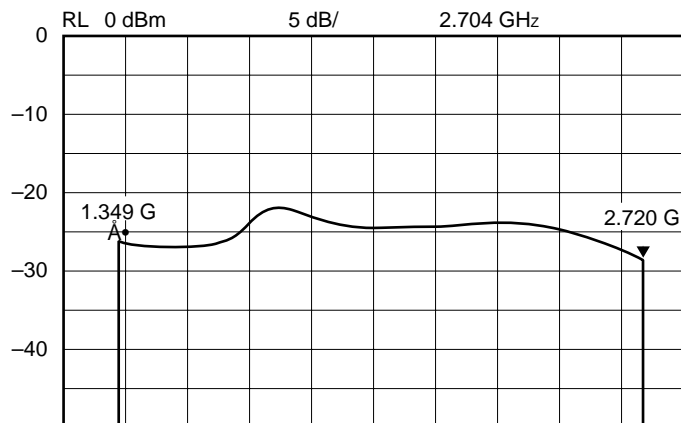


STANDARD CHARACTERISTICS



STANDARD CHARACTERISTICS ( $V_{CC} = 5\text{ V}$ ,  $T_A = 25\text{ }^\circ\text{C}$ )

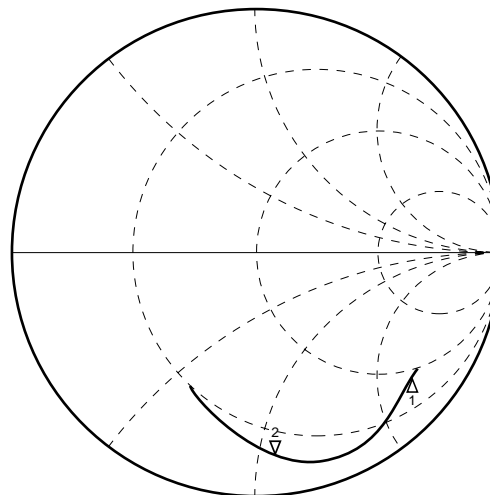
OSC Frequency Range\*1



CENTER 2.000 GHz      SPAN 1.600 GHz  
RBW 1.0 MHz VBW 1.0 MHz      SWP 50 ms

\*1 Measured at IF output pin (4 pin)

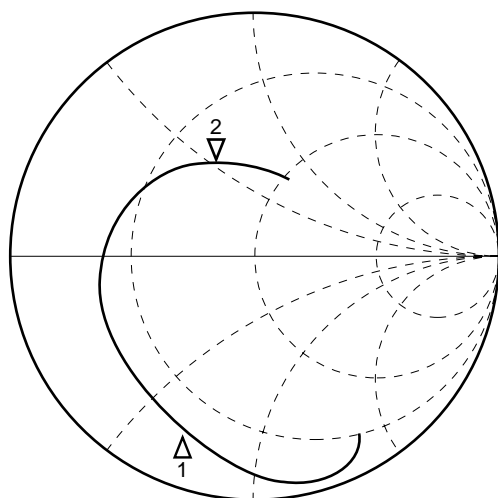
RF Input Impedance (@1 pin)



START 900 MHz  
STOP 3 GHz

MARKER	Re [ $\Omega$ ]	Im [ $\Omega$ ]
1 : 950 MHz	41.5	-152 (1.10 pF)
2 : 2150 MHz	11.2	-54.9 (1.35 pF)

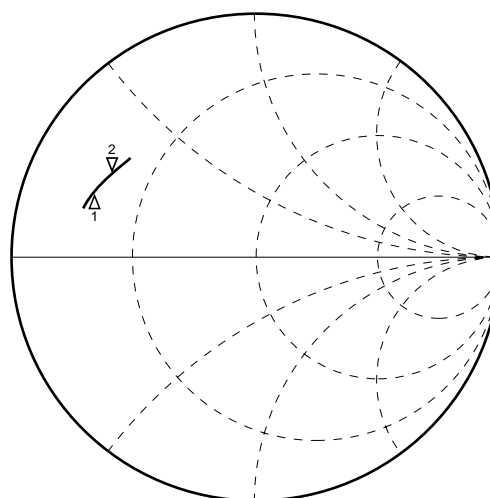
OSC Input Impedance (@8 pin)



START 900 MHz  
STOP 3 GHz

MARKER	Re [ $\Omega$ ]	Im [ $\Omega$ ]
1 : 1350 MHz	9.22	-36.1 (3.27 pF)
2 : 2630 MHz	31.5	26.9 (1.63 nH)

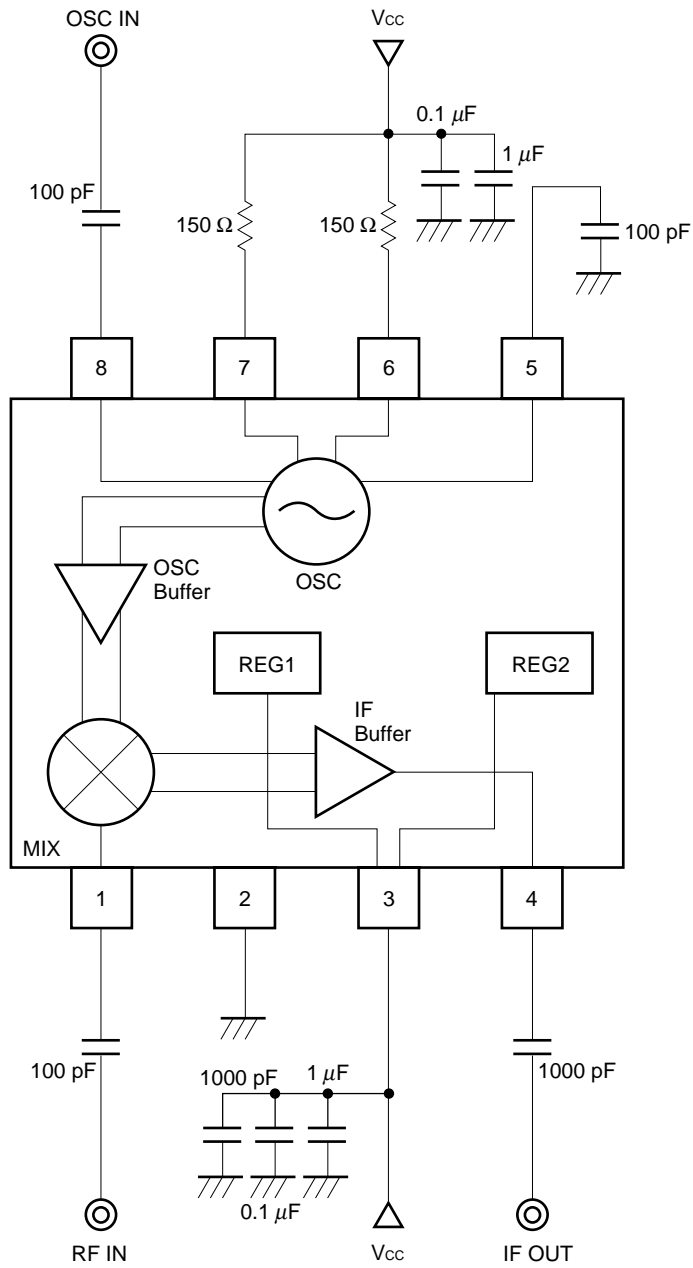
IF Output Impedance



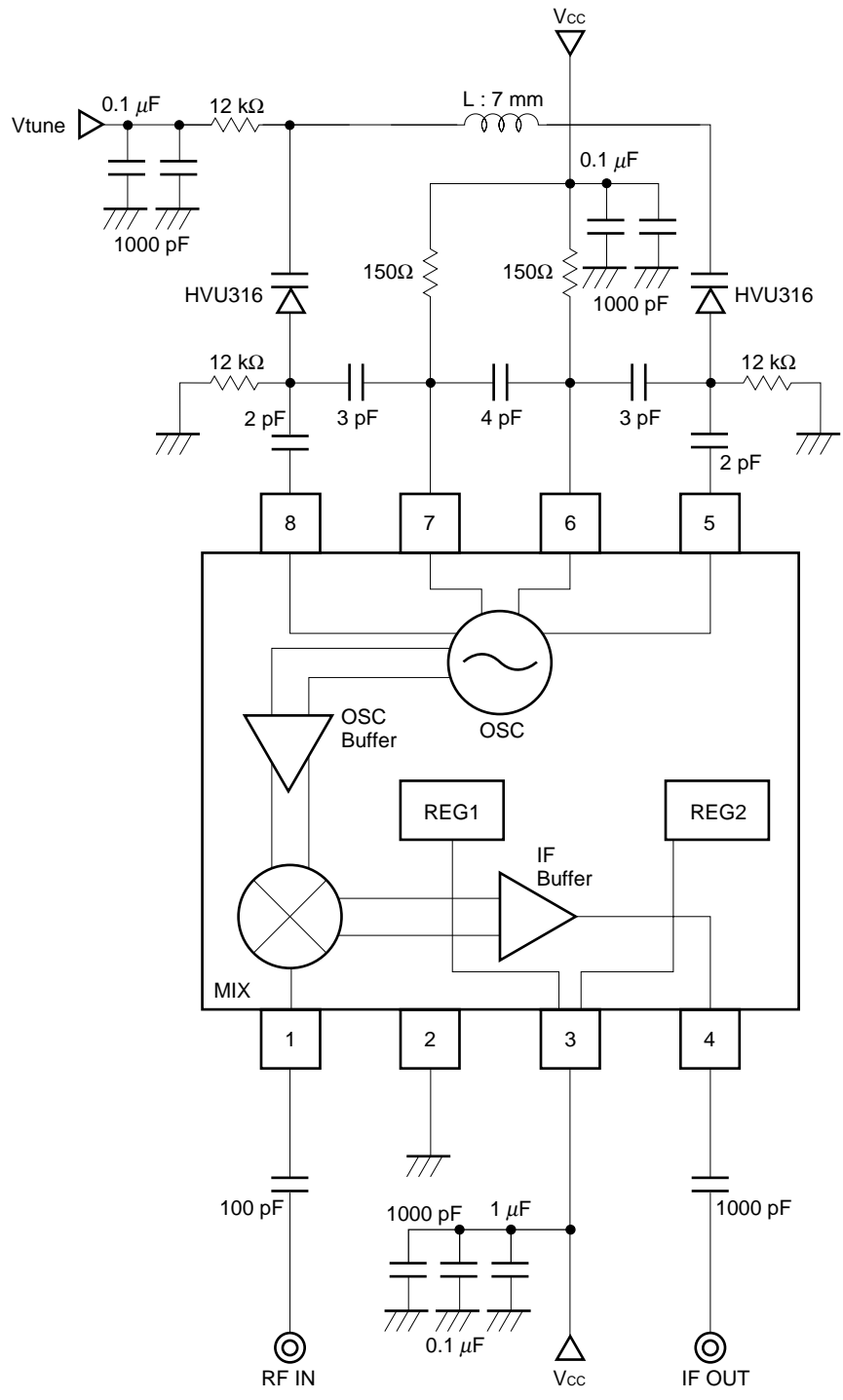
START 300 MHz  
STOP 600 MHz

MARKER	Re [ $\Omega$ ]	Im [ $\Omega$ ]
1 : 402.8 MHz	9.48	11.2 (9.40 nH)
2 : 479.5 MHz	10.4	13.4 (4.46 nH)

MEASUREMENT CIRCUIT



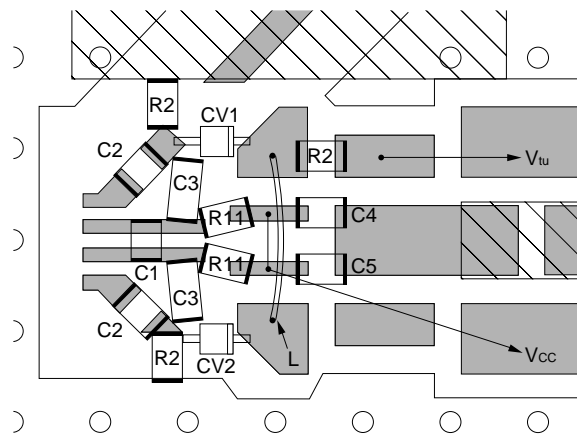
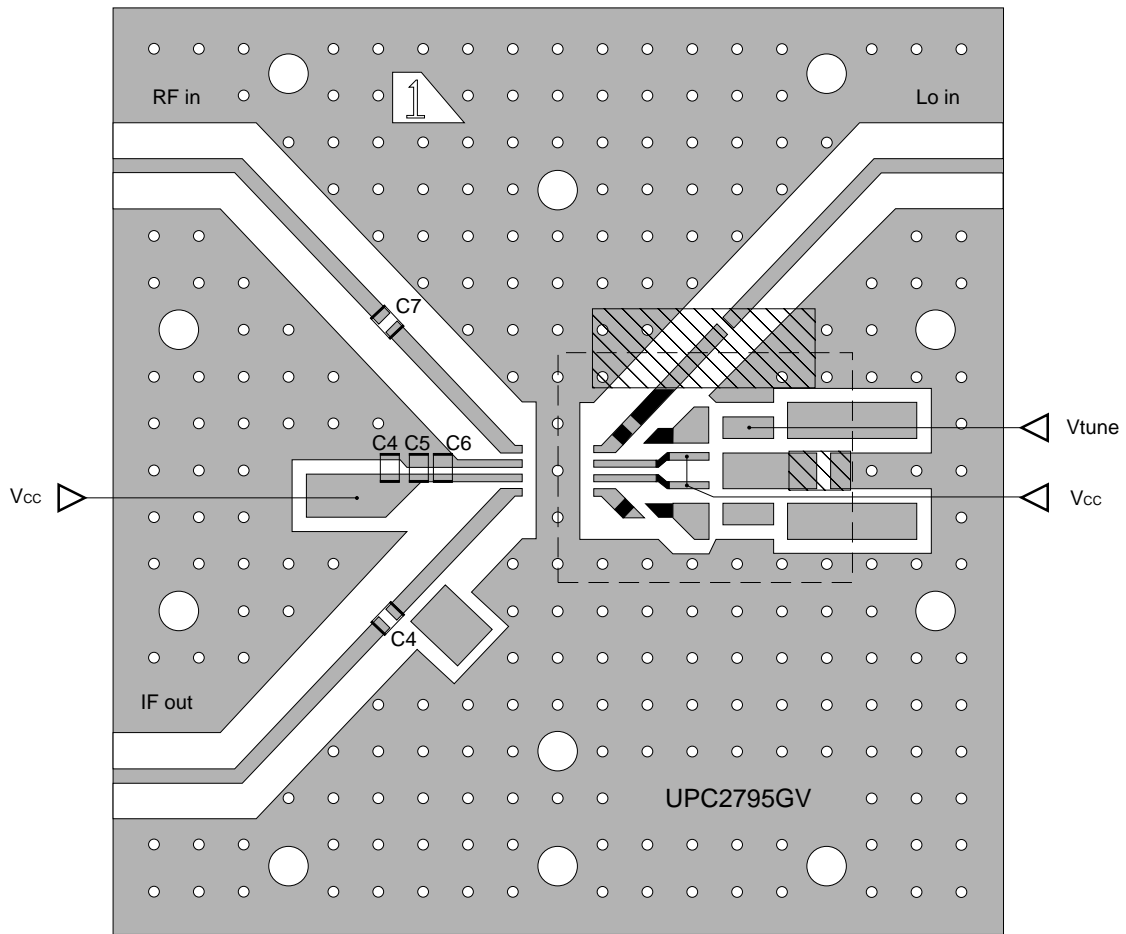
APPLICATION CIRCUIT EXAMPLE





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



Illustration of the application circuit assembled on evaluation board

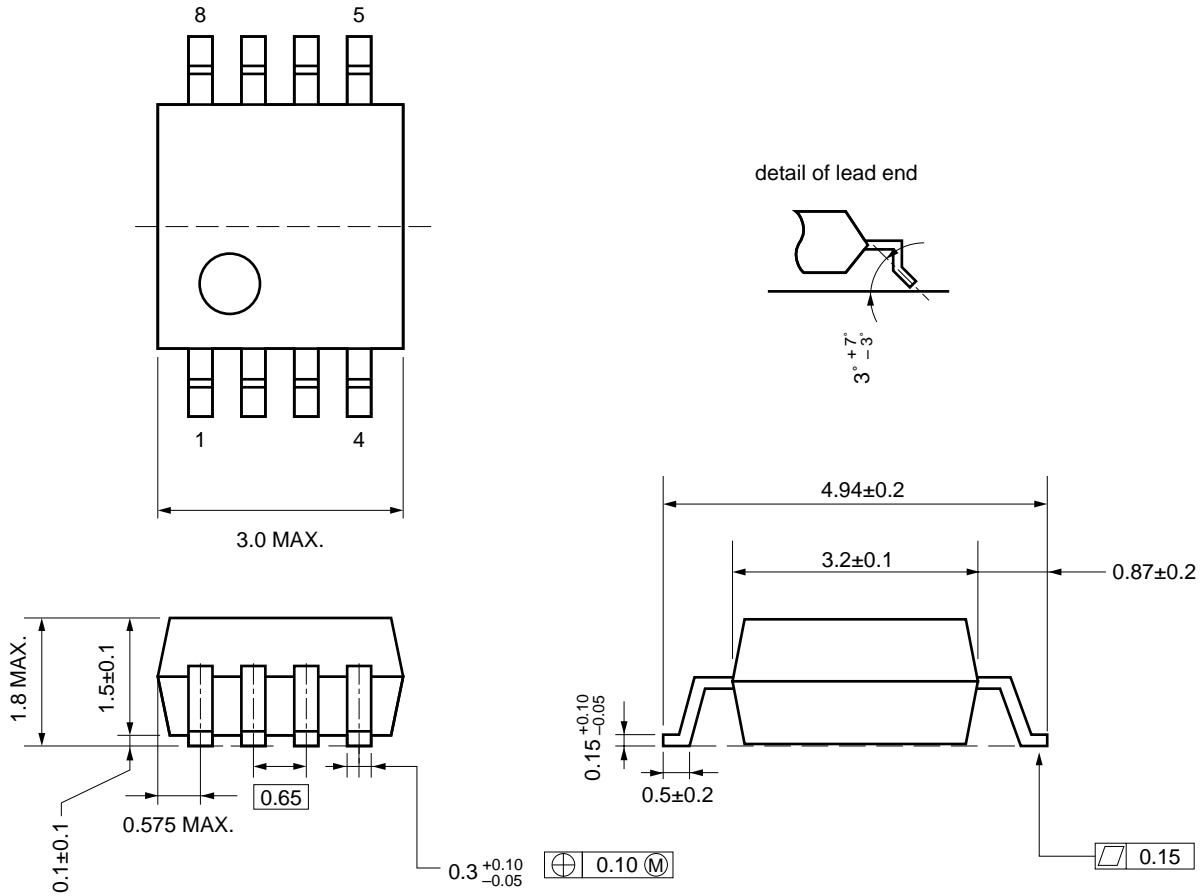


- |                    |             |
|--------------------|-------------|
| CV1 = CV2 : HVU316 | C5 : 0.1 μF |
| C1 : 4 pF          | C6 : 1 μF   |
| C2 : 2 pF          | C7 : 100 pF |
| C3 : 3 pF          | R1 : 150 Ω  |
| C4 : 1000 pF       | R2 : 12 kΩ  |

 shows short circuited strip for ground  
 shows cutout

PACKAGE DIMENSIONS

8 PIN PLASTIC SSOP (unit : mm)



**NOTES ON CORRECT USE**

- (1) Observe precautions for handling because of electro-static sensitive devices.
- (2) Form a ground pattern as wide 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 Vcc 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).

**μPC2795GV**

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 <sup>Note</sup> : 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 <sup>Note</sup> : None	VP15-00-3
Wave soldering	Solder temperature: 260°C or below, Reflow time: 10 seconds or below, Number of reflow process: 1, Exposure limit <sup>Note</sup> : None	WS60-00-1
Partial heating method	Terminal temperature: 300 °C or below, Flow time: 3 seconds or below, Exposure limit <sup>Note</sup> : None	

**Note** 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”.

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

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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)

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Anti-radioactive design is not implemented in this product.