

**NEC****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.

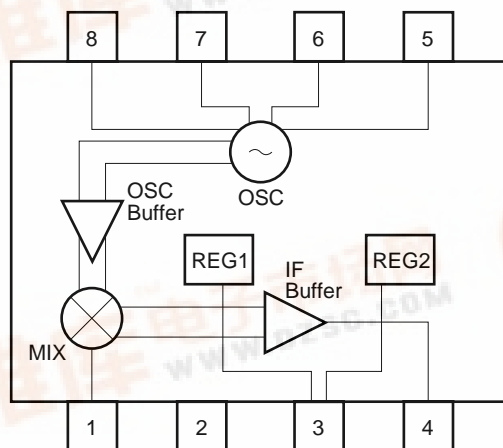
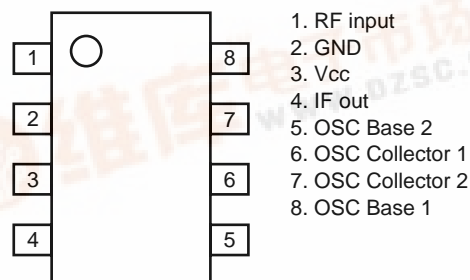
**FEATURES**

- 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

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 ( $T_A = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)**

PARAMETER	SYMBOL	TEST CONDITION	RATINGS	UNIT
Supply Voltage	$V_{CC}$		6.0	V
Power Dissipation	$P_D$	$T_A = 85\text{ }^{\circ}\text{C}^{*1}$	250	mW
Operating Ambient Temperature	$T_A$		-40 to +85	$^{\circ}\text{C}$
Storage Temperature	$T_{stg}$		-55 to +150	$^{\circ}\text{C}$

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

**RECOMMENDED OPERATING RANGE**

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT
Supply Voltage	$V_{CC}$	4.5	5.0	5.5	V
Operating Ambient Temperature	$T_A$	-40	+25	+85	$^{\circ}\text{C}$

**ELECTRICAL CHARACTERISTICS ( $T_A = 25\text{ }^{\circ}\text{C}$ ,  $V_{CC} = 5\text{ V}$ ;  $^{*1}$ )**

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

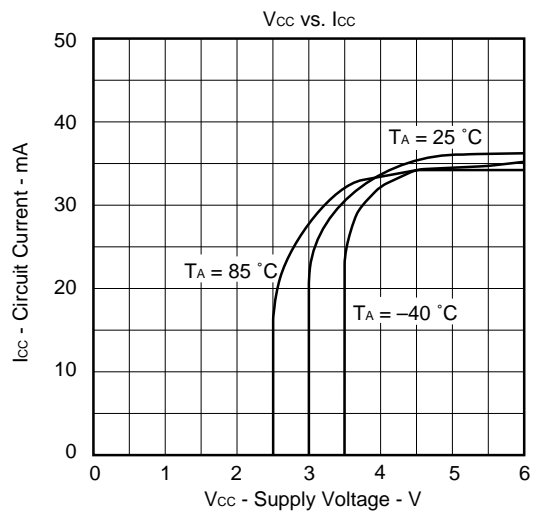
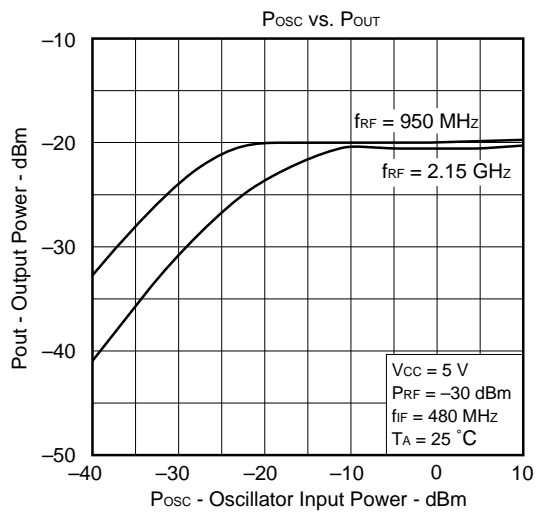
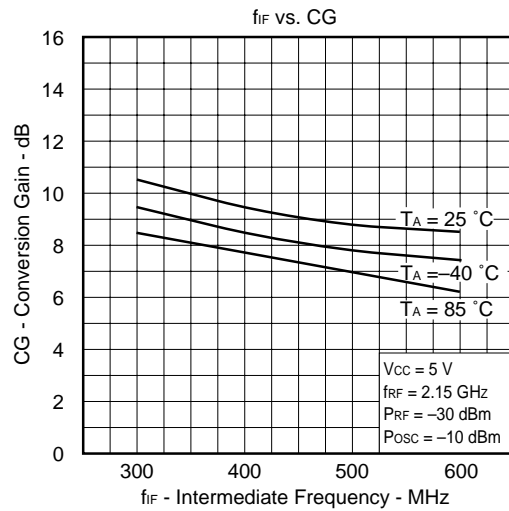
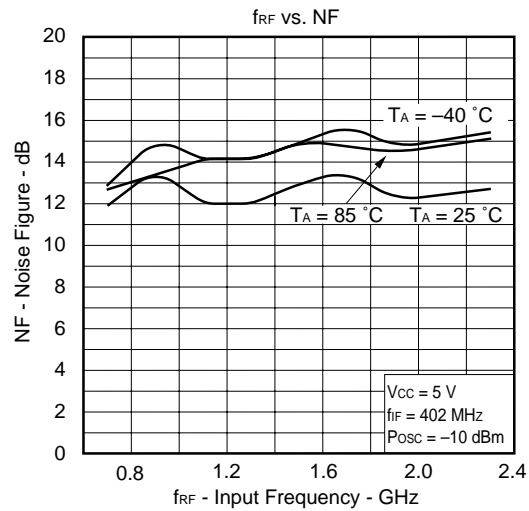
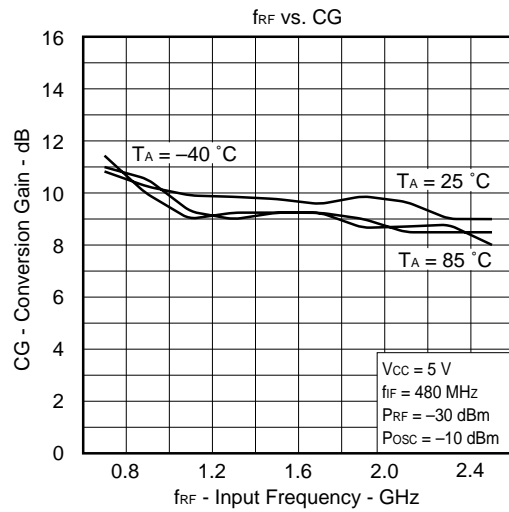
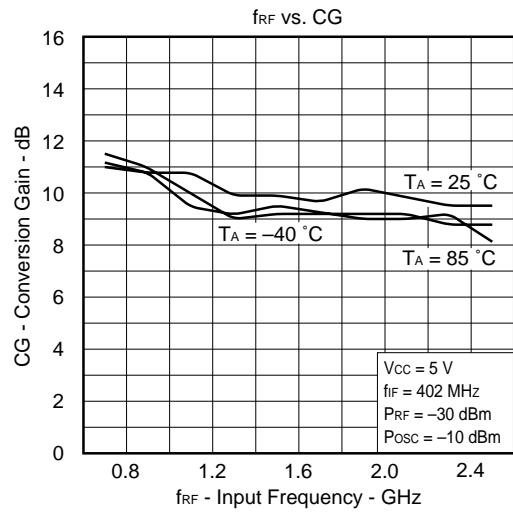
\*1 By measurement circuit.

**STANDARD CHARACTERISTICS ( $T_A = 25\text{ }^{\circ}\text{C}$ ,  $V_{CC} = 5\text{ V}$ ;  $^{*1}$ )**

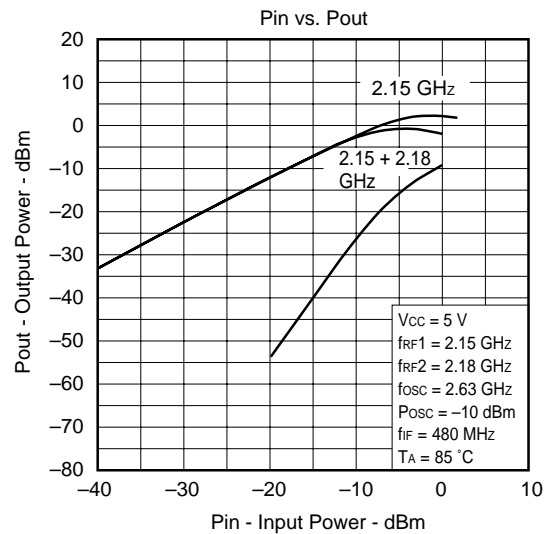
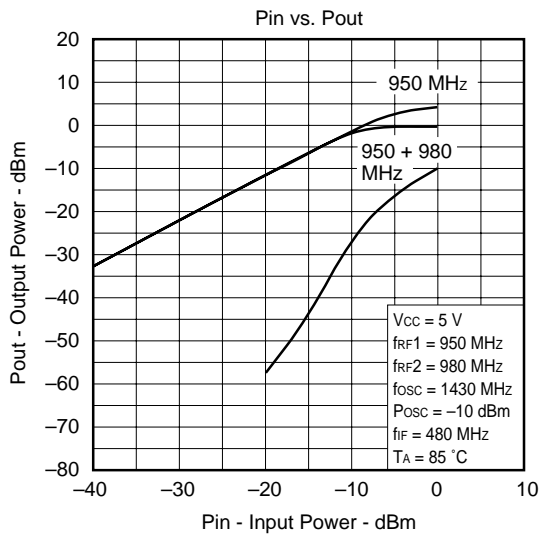
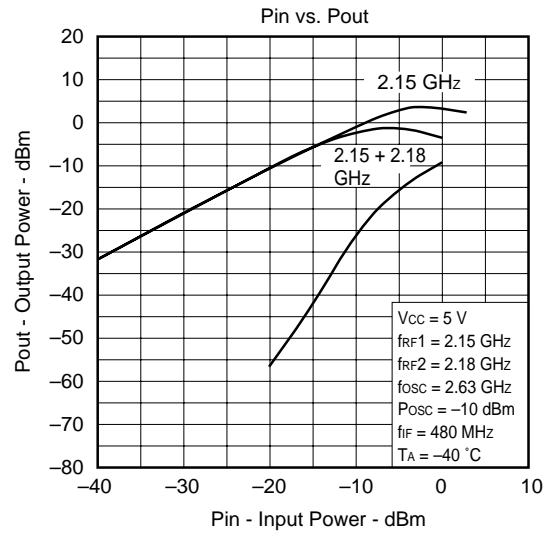
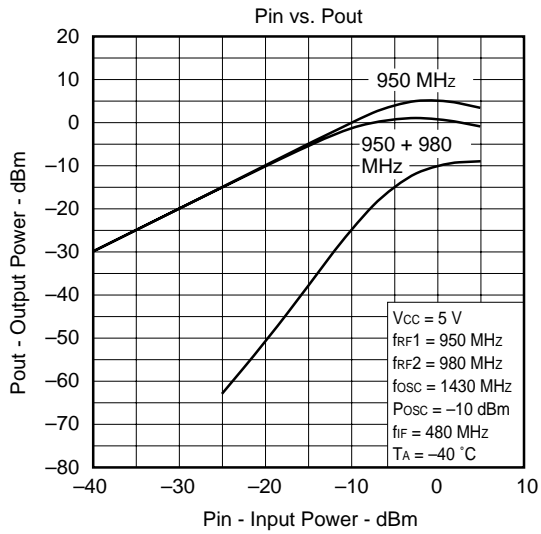
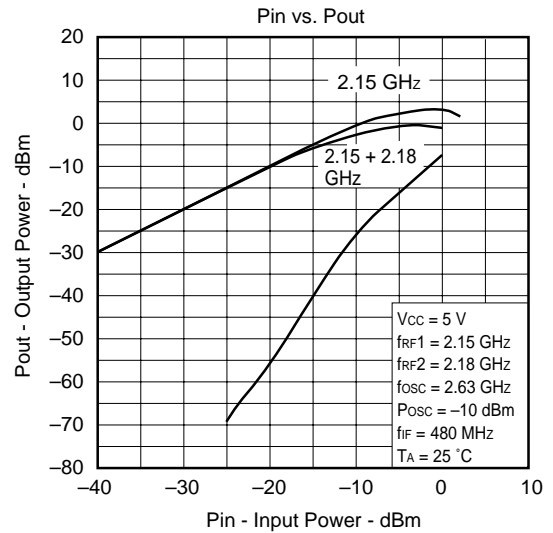
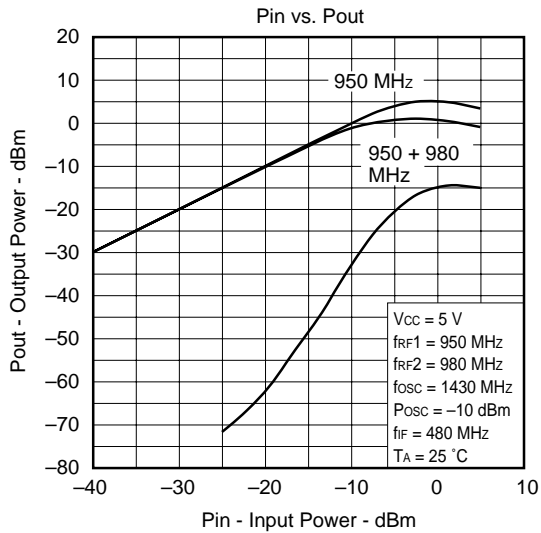
PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITIONS
3rd Order Intermodulation Distortion 1	IM <sub>31</sub>	—	55	—	dBc	$f_{RF} = 950, 980\text{ MHz}$ , $P_{RF} = -25\text{ dBm}$ , $f_{OSC} = 1430\text{ MHz}$ , $P_{OSC} = -10\text{ dBm}$
3rd Order Intermodulation Distortion 2	IM <sub>32</sub>	—	55	—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

\*1 By measurement circuit.

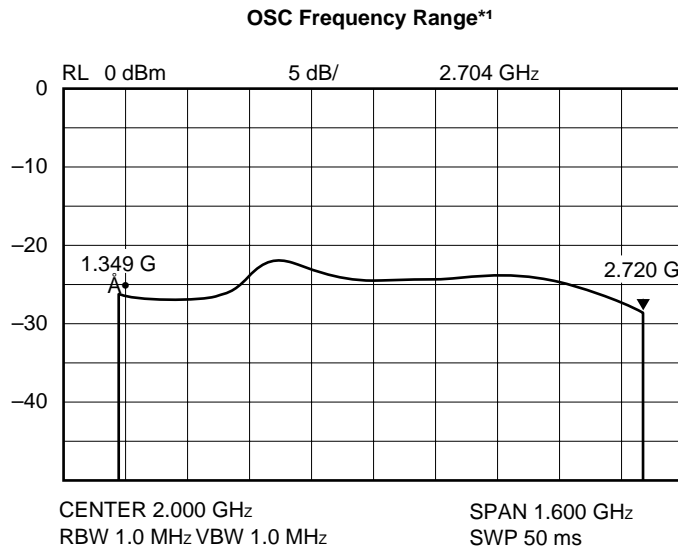
TYPICAL CHARACTERISTICS



STANDARD CHARACTERISTICS

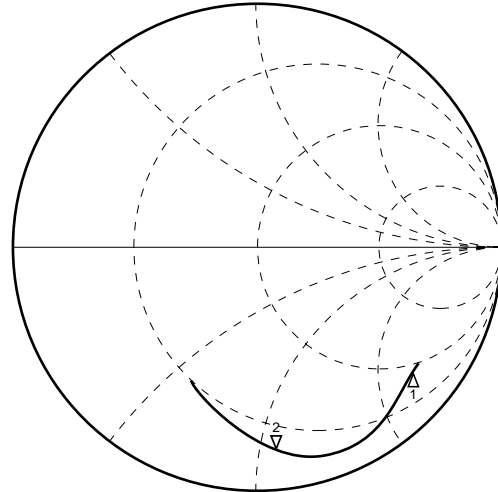


STANDARD CHARACTERISTICS ( $V_{CC} = 5\text{ V}$ ,  $T_A = 25\text{ }^{\circ}\text{C}$ )



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

RF Input Impedance (@1 pin)

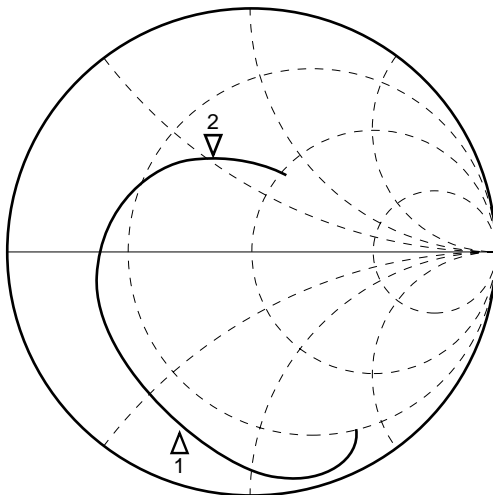


START 900 MHz

STOP 3 GHz

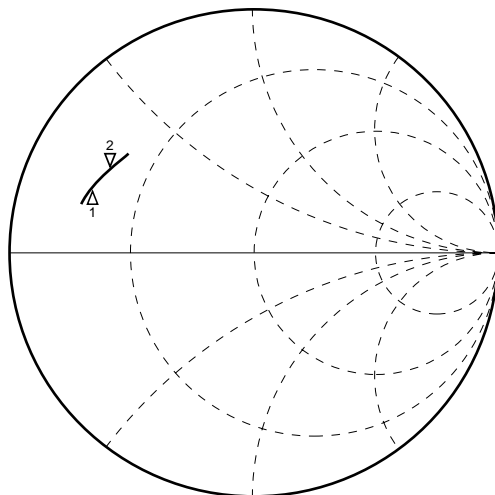
MARKER	Re [ $\Omega$ ]	Im [ $\Omega$ ]
1 : 950 MHz	41.5	-152 (1.10 pF)
2 : 2150 MHz	11.2	-54.9 (1.35 pF)

OSC Input Impedance (@8 pin)



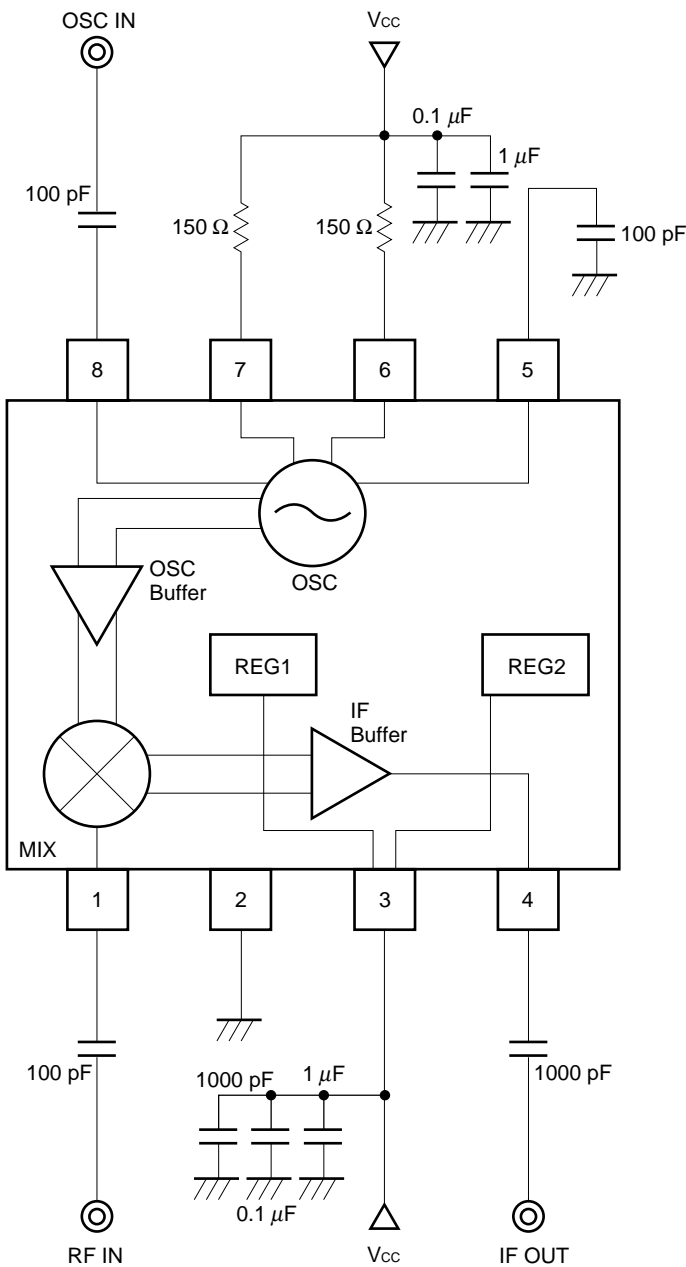
START	900 MHz		
STOP	3 GHz		
MARKER	Re [ $\Omega$ ]	Im [ $\Omega$ ]	
1 : 1350 MHz	9.22	-36.1 (3.27 pF)	
2 : 2630 MHz	31.5	26.9 (1.63 nH)	

IF Output Impedance

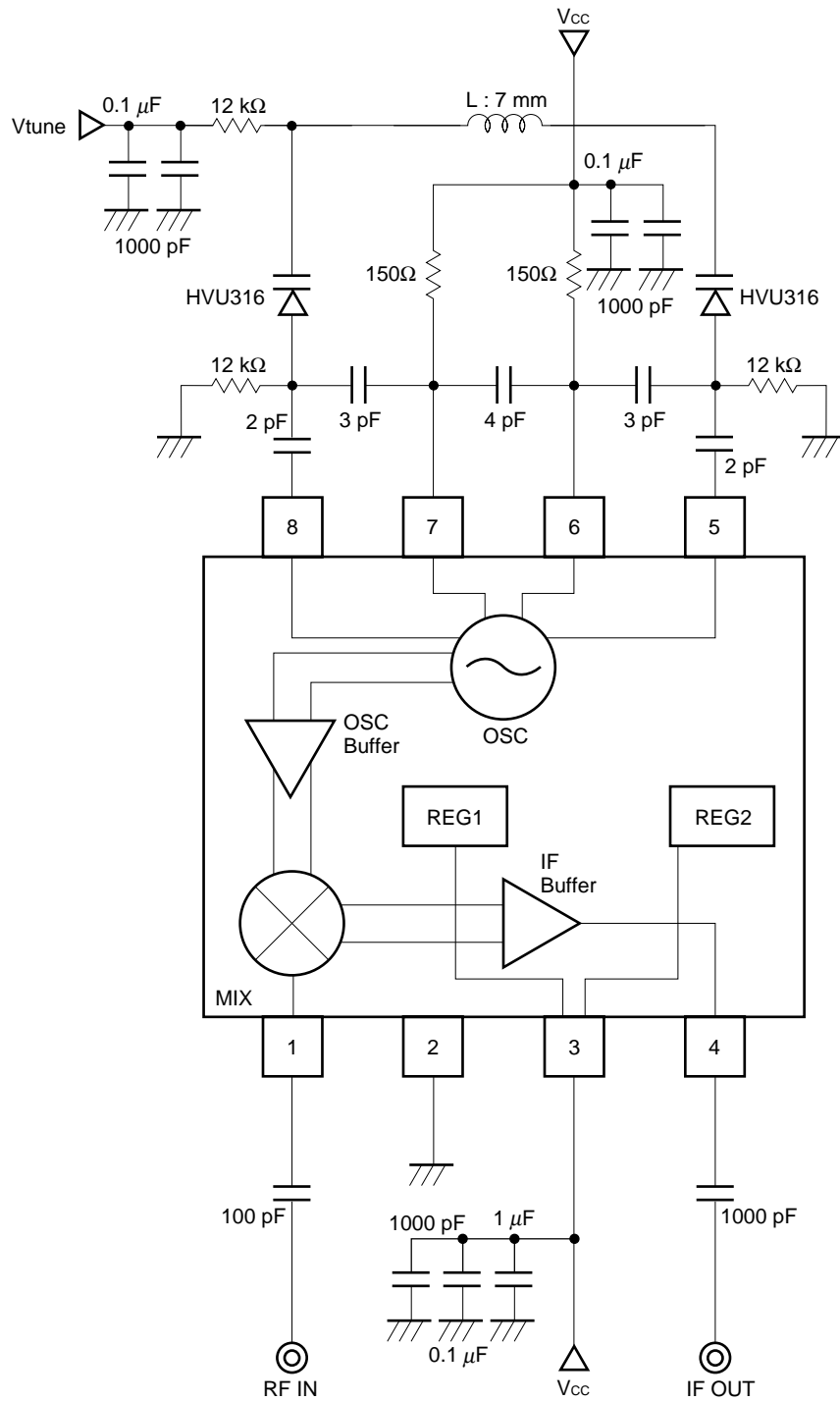


START	300 MHz		
STOP	600 MHz		
MARKER	Re [ $\Omega$ ]	Im [ $\Omega$ ]	
1 : 402.8 MHz	9.48	11.2 (9.40 nH)	
2 : 479.5 MHz	10.4	13.4 (4.46 nH)	

MEASUREMENT CIRCUIT



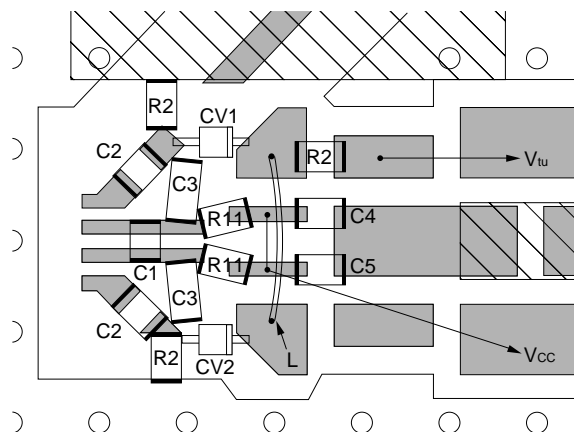
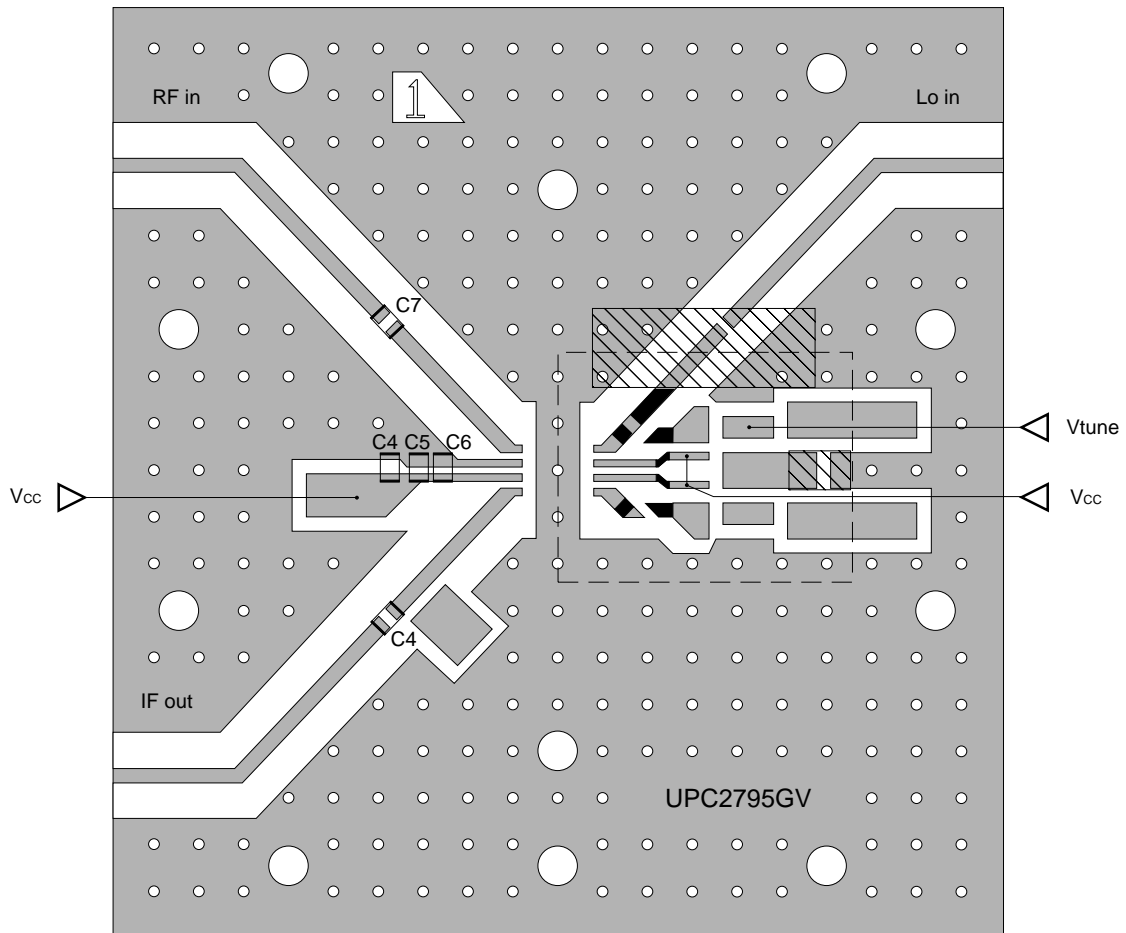
APPLICATION CIRCUIT EXAMPLE





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

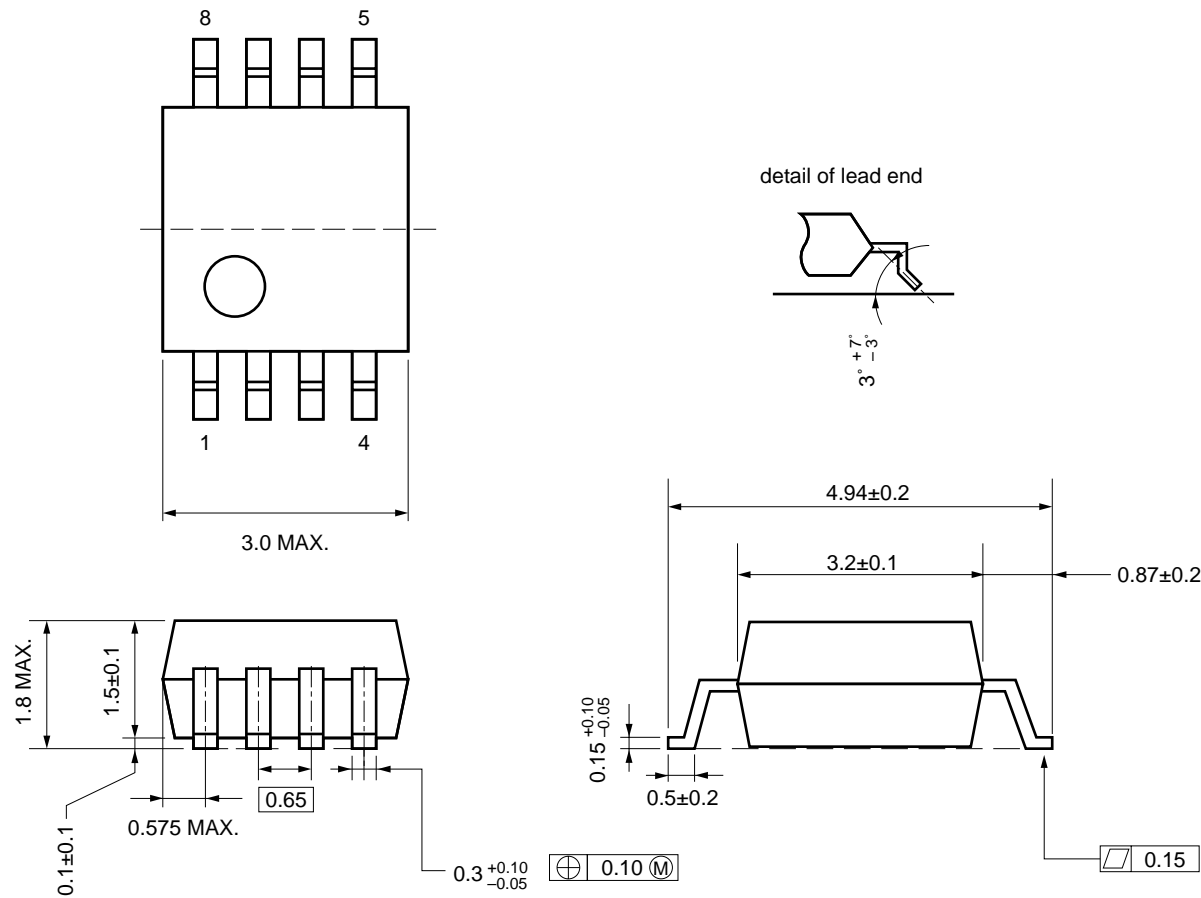


$Cv1 = Cv2$  : HVU316     $C5$  :  $0.1 \mu F$   
 $C1$  :  $4 pF$      $C6$  :  $1 \mu F$   
 $C2$  :  $2 pF$      $C7$  :  $100 pF$   
 $C3$  :  $3 pF$      $R1$  :  $150 \Omega$   
 $C4$  :  $1000 pF$      $R2$  :  $12 k\Omega$

 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”.

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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)

Specific: Aircrafts, aerospace equipment, submersible repeaters, nuclear reactor control systems, life support systems or medical equipment for life support, etc.

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Anti-radioactive design is not implemented in this product.