

**NEC****BIPOLAR ANALOG INTEGRATED CIRCUIT**  
 **$\mu$ PC2766GR/GS****WIDE BAND IQ DEMODULATOR FOR DIGITAL VIDEO/DATA RECEIVER****DESCRIPTION**

The  $\mu$ PC2766GR/GS is a Silicon monolithic IC designed for use as IQ demodulator in wide dynamic range compressed video or spread spectrum receivers. This IC consists of a wide band RF amplifier, gain control amplifier, dual balanced mixers (DBM), Lo buffers, and I & Q output buffer amplifiers.

The package is 20 pin SSOP (shrink small outline package:  $\mu$ PC2766GR) or 20 pin SOP ( $\mu$ PC2766GS) suitable for high-density surface mount.

**FEATURES**

- Broadband operation      RF & LO up to 1 000 MHz  
   IF (IQ) up to 200 MHz
- Wideband IQ phase and amplitude balance      Amplitude balance       $\pm 0.3$  dB (TYP.)  
   Phase balance       $\pm 0.3$  degree (TYP.)
- AGC dynamic range      45 dB
- Low distortion; IM<sub>3</sub>      30 dBc
- Supply Voltage      5 V
- Packaged in 20 pin SSOP or 20 pin SOP suitable for high-density surface mount

**ORDERING INFORMATION**

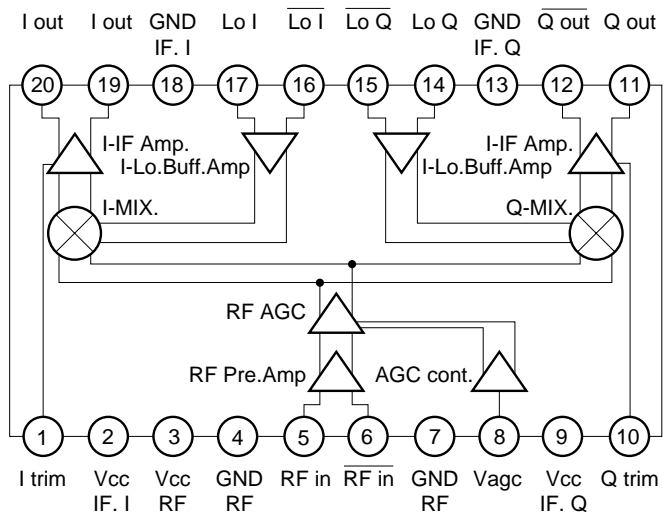
PART NUMBER	PACKAGE	PACKAGE STYLE
$\mu$ PC2766GR-E1	20 pin plastic SSOP (225 mil)	Embossed tape 12 mm wide. 2.5 k/REEL Pin 1 indicates pull-out direction of tape
$\mu$ PC2766GS-E1	20 pin plastic SOP (300 mil)	Embossed tape 24 mm wide. 2.5 k/REEL Pin 1 indicates pull-out direction of tape

**Caution electro-static sensitive device**

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Not all devices/types available in every country. Please check with local NEC representative for availability and additional information.



INTERNAL BLOCK DIAGRAM



**PIN FUNCTIONS**

PIN No.	PIN NAME	PIN VOLTAGE TYP. (V)	FUNCTION AND EXPLANATION	EQUIVALENT CIRCUIT
1	I Trim	4.2	Trimming pin for I-IF output.	
2	VccIF I	5.0	Power supply pin for I-MIXER.	
3	VccRF	5.0	Power supply pin for RF and AGC block.	
4	GND RF	0.0	Ground pin of RF and AGC block.	
5	RFin	2.6	RF input pin. In case of single input, 6 pin should be grounded through capacitor.	
6	RFin	2.6		
7	GND RF	0.0	Ground pin of RF and AGC block.	
8	V <sub>AGC</sub>	0 to 5	Gain control pin. <ul style="list-style-type: none"> <li>V<sub>AGC</sub> = 0 V: Full gain</li> <li>V<sub>AGC</sub> = 5 V: Maximum reduction</li> </ul>	
9	VccIF Q	5.0	Power supply pin for Q-MIXER.	
10	Q Trim	4.2	Trimming pin for Q-IF output.	

PIN No.	PIN NAME	PIN VOLTAGE TYP. (V)	FUNCTION AND EXPLANATION	EQUIVALENT CIRCUIT
11	Qout	3.3	Q-IF output pin. 11 pin and 12 pin are balance outputs.	
12	$\overline{\text{Qout}}$	3.3		
13	GNDIF Q	0.0	Ground pin of Q-IF block.	
14	Lo Q	2.2	Oscillator signal input pin of Q-MIXER. In case of single input, 15 pin should be grounded through capacitor.	
15	$\overline{\text{Lo Q}}$	2.2		
16	$\overline{\text{Lo I}}$	2.2	Oscillator signal input pin of I-MIXER. In case of single input, 16 pin should be grounded through capacitor.	
17	Lo I	2.2		
18	GNDIF I	0.0	Ground pin of I-IF block.	
19	$\overline{\text{lout}}$	3.3	I-IF output pin. 19 pin and 20 pin are balance outputs.	
20	lout	3.3		

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

**μPC2766GR**

PARAMETER	SYMBOL	RATING	UNIT	TEST CONDITIONS
Supply voltage	V <sub>CC</sub>	6.0	V	
Power dissipation	P <sub>D</sub>	430	mW	T <sub>A</sub> = 85 °C <b>Note 1</b>
Operating temperature range	T <sub>A</sub>	-40 to +85	°C	
Storage temperature range	T <sub>stg</sub>	-55 to +150	°C	

**μPC2766GS**

PARAMETER	SYMBOL	RATING	UNIT	TEST CONDITIONS
Supply voltage	V <sub>CC</sub>	6.0	V	
Power dissipation	P <sub>D</sub>	650	mW	T <sub>A</sub> = 85 °C <b>Note 1</b>
Operating temperature range	T <sub>A</sub>	-40 to +85	°C	
Storage temperature range	T <sub>stg</sub>	-55 to +150	°C	

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

**RECOMMENDED OPERATING RANGE**

**μPC2766GR/GS**

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

**ELECTRICAL CHARACTERISTICS (V<sub>CC</sub> = 5 V, T<sub>A</sub> = 25 °C, Z<sub>L</sub> = 250 Ω)**

**μPC2766GR/GS**

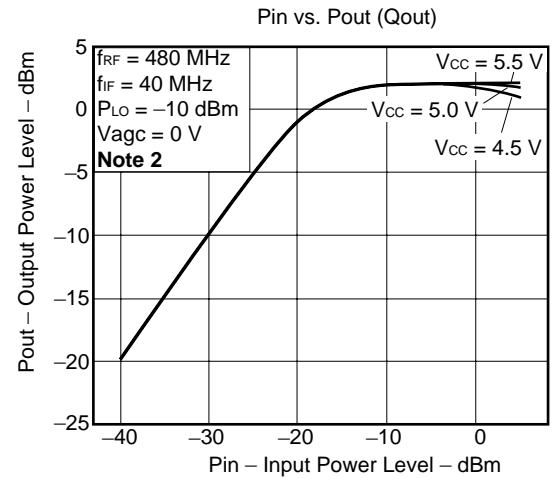
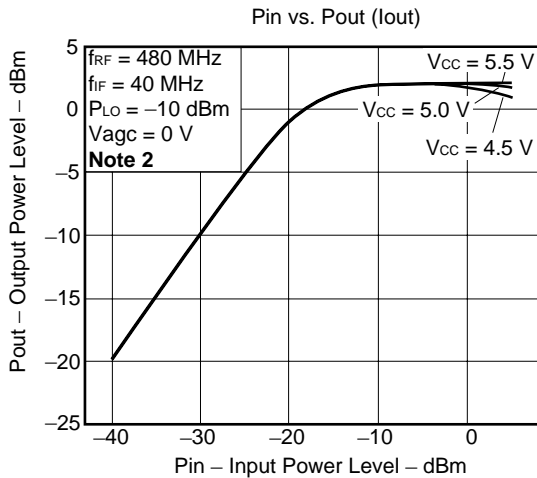
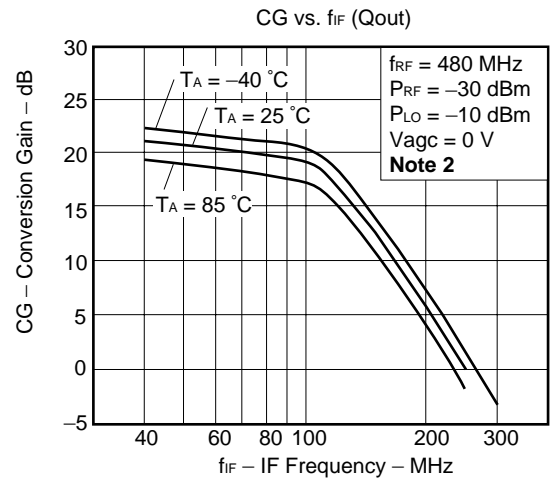
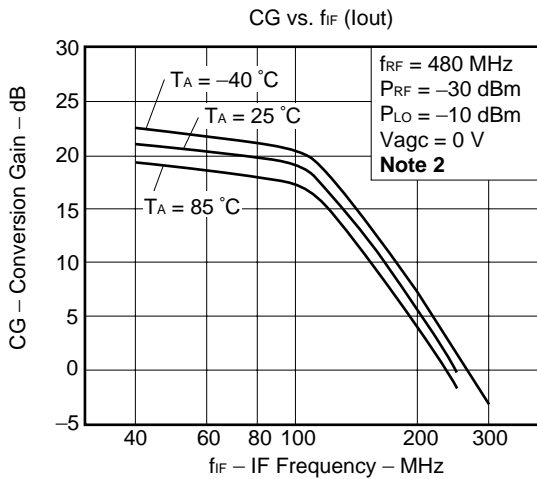
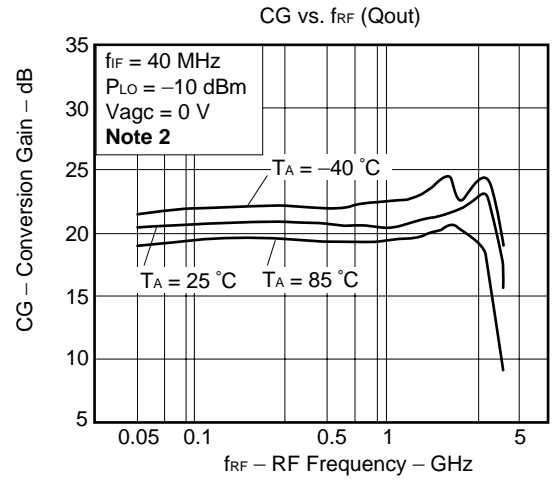
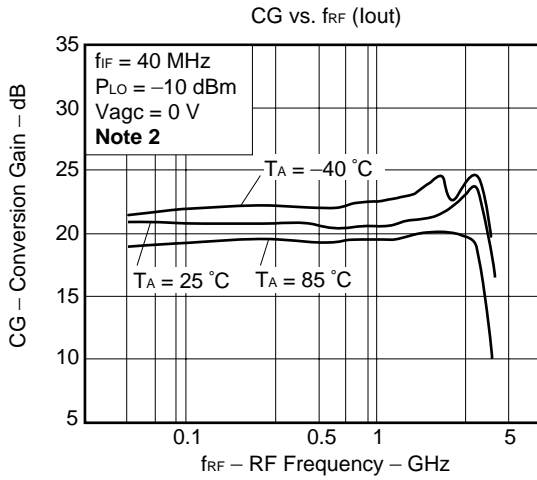
PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITIONS
Supply current	I <sub>CC</sub>	–	60	78	mA	no input signal
RF input bandwidth	RF BW	DC - 750	DC - 1000	–	MHz	f <sub>IF</sub> = 40 MHz, f <sub>RF</sub> > f <sub>LO</sub> IQ phase balance ≤ ±1.5°
IF output bandwidth	IF BW	DC	200	–	MHz	f <sub>RF</sub> = 480 MHz, P <sub>LO</sub> = –10 dBm f <sub>RF</sub> > f <sub>LO</sub> , –3 dB down, V <sub>agc</sub> = 0 V
Gain control range	G <sub>GC</sub>	40	45	–	dB	f <sub>RF</sub> = 480 MHz, f <sub>IF</sub> = 40 MHz P <sub>RF</sub> = –30 dBm, P <sub>LO</sub> = –10 dBm V <sub>agc</sub> = 0 – 5 V
IQ phase balance	Δφ	–	±0.3	±1.5	deg	f <sub>RF</sub> = 480 MHz, f <sub>IF</sub> = 40 MHz P <sub>RF</sub> = –30 dBm, P <sub>LO</sub> = –10 dBm
IQ amplitude balance	ΔG	–	±0.3	±0.5	dB	f <sub>RF</sub> = 480 MHz, f <sub>IF</sub> = 40 MHz P <sub>RF</sub> = –30 dBm, P <sub>LO</sub> = –10 dBm V <sub>agc</sub> = 0 V
Output voltage	V <sub>O</sub>	1.2	1.5	–	V <sub>P-P</sub>	f <sub>RF</sub> = 480 MHz, f <sub>IF</sub> = 40 MHz P <sub>LO</sub> = –10 dBm, Z <sub>L</sub> = 250 Ω
Conversion gain	CG	15	20	25	dB	f <sub>RF</sub> = 480 MHz, f <sub>IF</sub> = 40 MHz V <sub>agc</sub> = 0 V

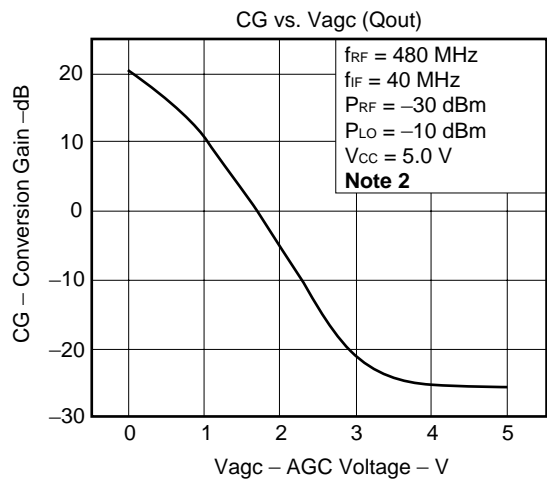
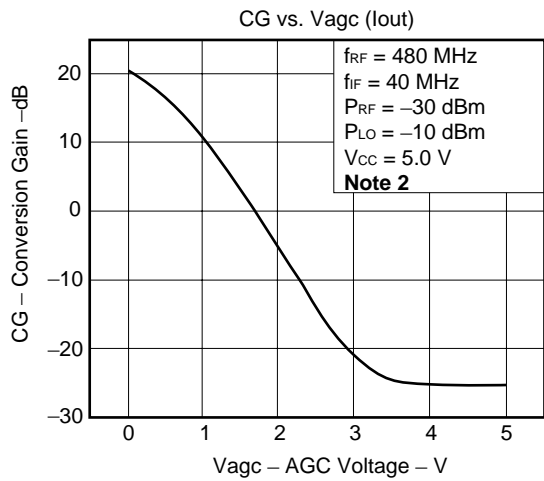
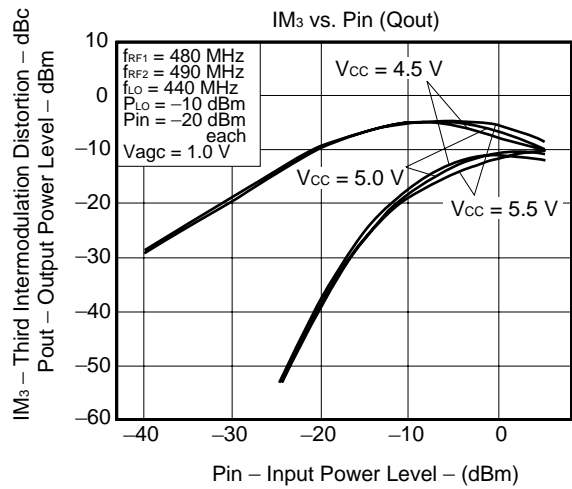
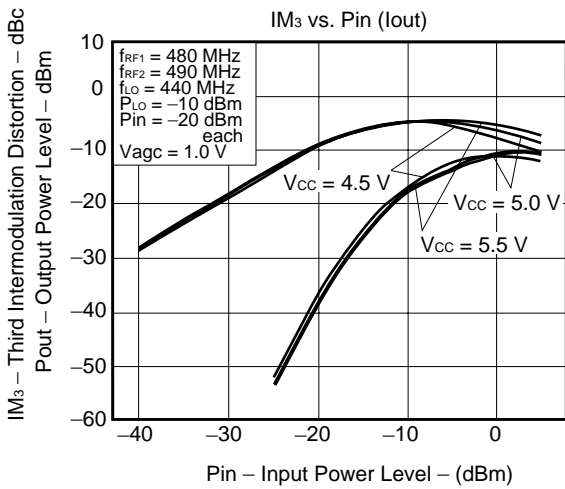
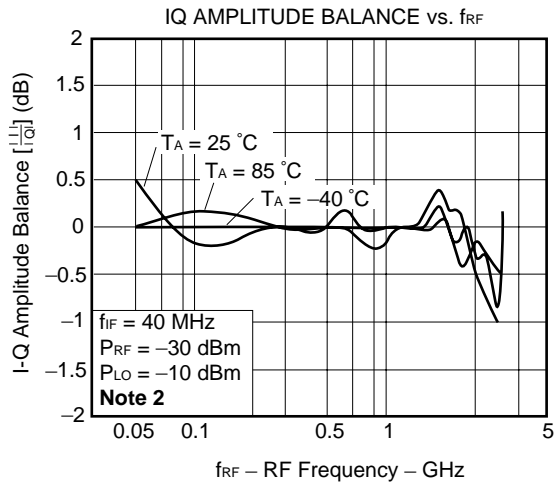
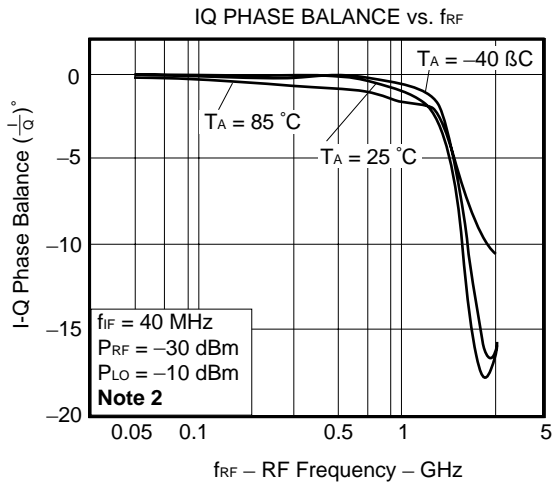
**STANDARD CHARACTERISTICS (REFERENCE VALUES) (V<sub>CC</sub> = 5 V, T<sub>A</sub> = 25 °C, Z<sub>L</sub> = 250 Ω)**

**μPC2766GR/GS**

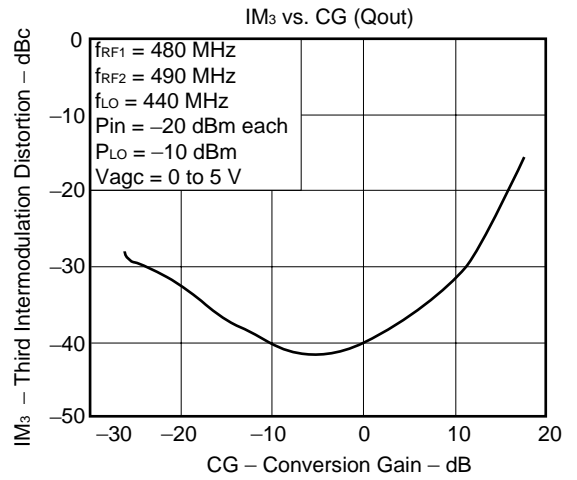
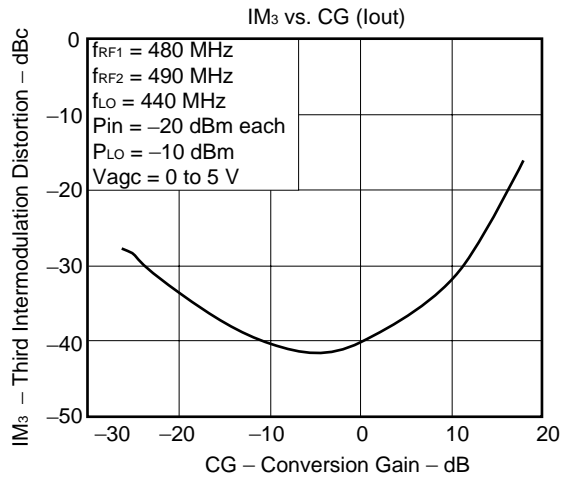
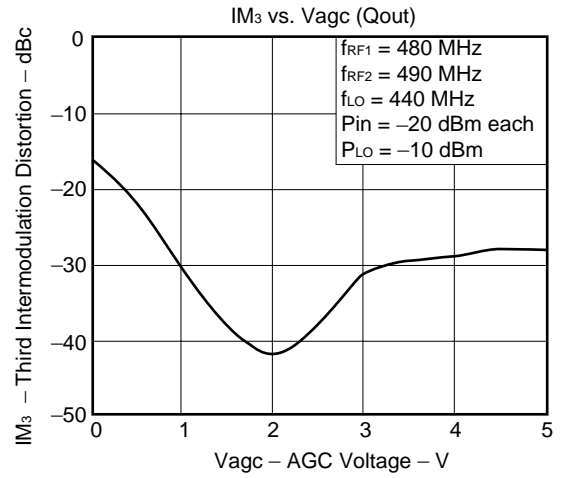
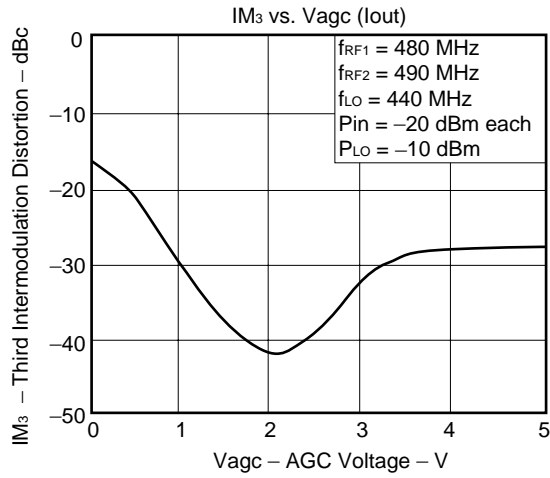
PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITIONS
Noise figure	NF	–	21	–	dB	f <sub>RF</sub> = 480 MHz, f <sub>IF</sub> = 40 MHz P <sub>LO</sub> = –10 dBm, V <sub>agc</sub> = 0 V
LO to RF isolation	LO-RF <sub>isol</sub>	–	55	–	dB	f <sub>LO</sub> = 440 MHz, P <sub>LO</sub> = –10 dBm V <sub>agc</sub> = 0 V
LO to IF isolation	LO-IF <sub>isol</sub>	–	10	–	dB	f <sub>LO</sub> = 440 MHz, P <sub>LO</sub> = –10 dBm V <sub>agc</sub> = 0 V
3rd order intermodulation distortion	IM <sub>3</sub>	–	30	–	dBc	f <sub>RF1</sub> = 480 MHz, f <sub>RF2</sub> = 490 MHz f <sub>LO</sub> = 440 MHz, P <sub>in</sub> = –20 dBm P <sub>LO</sub> = –10 dBm, V <sub>agc</sub> = 1 V
Saturated output level	P <sub>O(SAT)</sub>	–	+2	–	dBm	f <sub>RF</sub> = 480 MHz, f <sub>IF</sub> = 40 MHz P <sub>RF</sub> = –10 dBm

TYPICAL CHARACTERISTICS – on Measurement Circuit – (Note 2 Lower local)

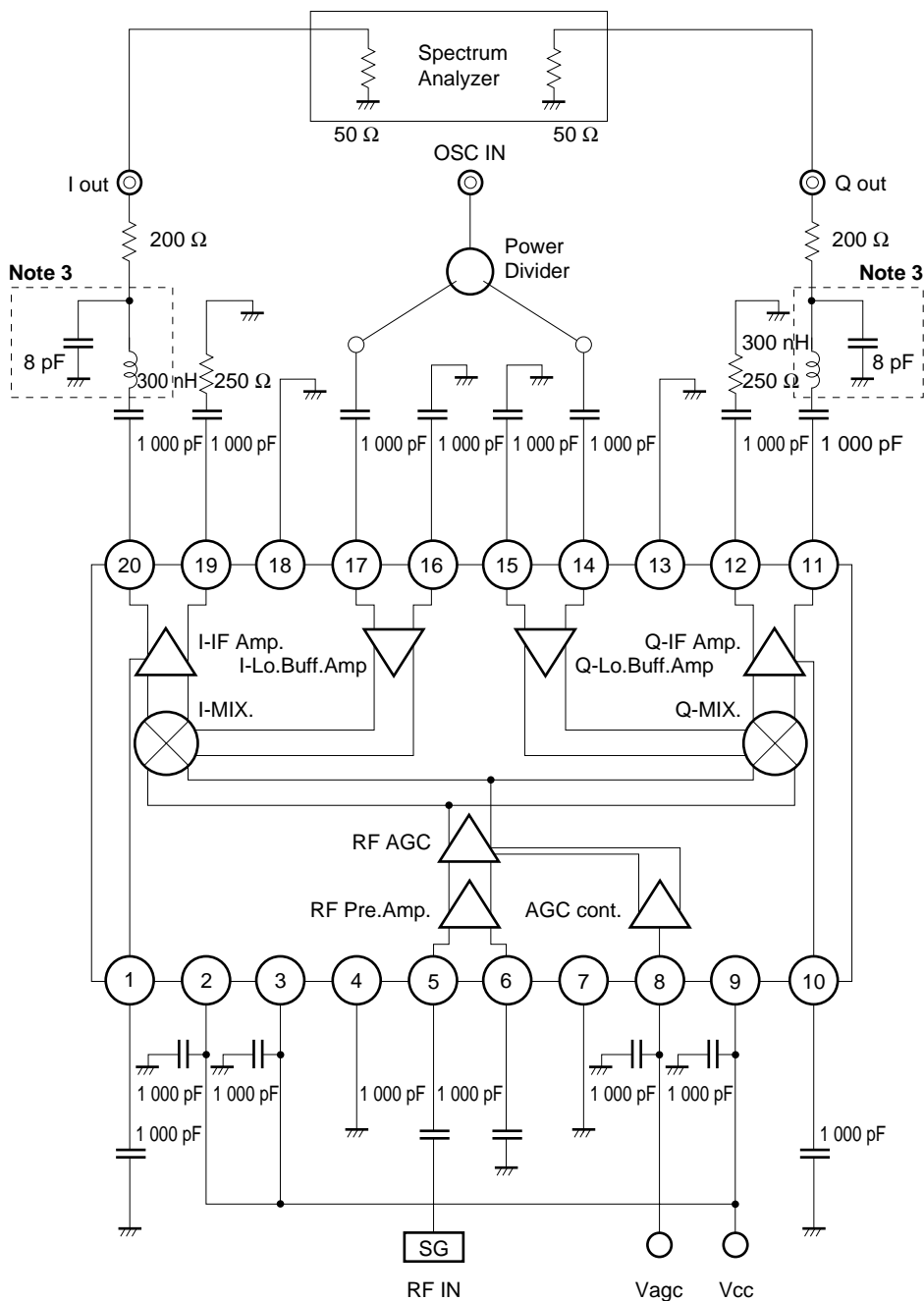






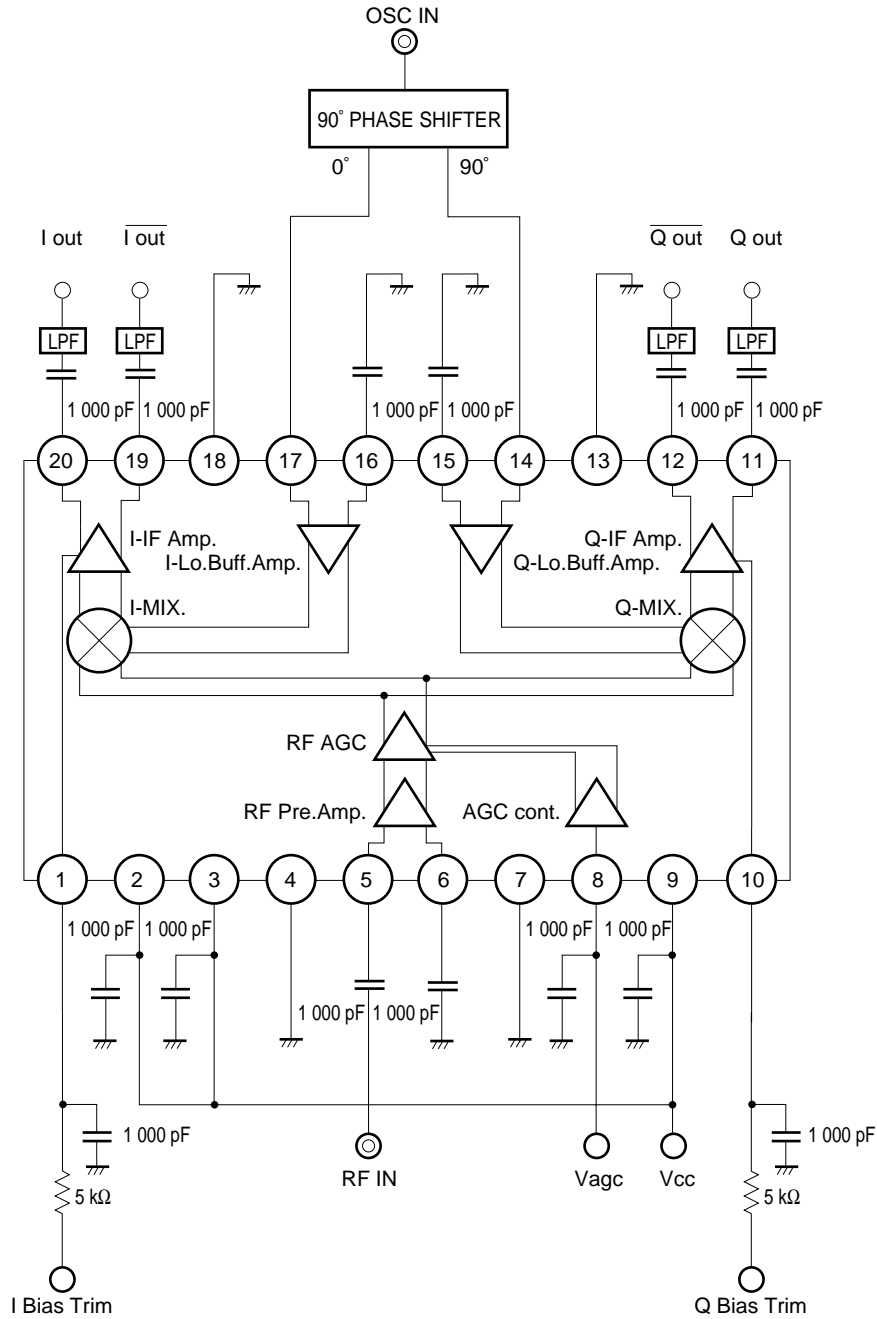


**MEASUREMENT CIRCUIT**  
 (@  $Z_L = 250 \Omega$ )



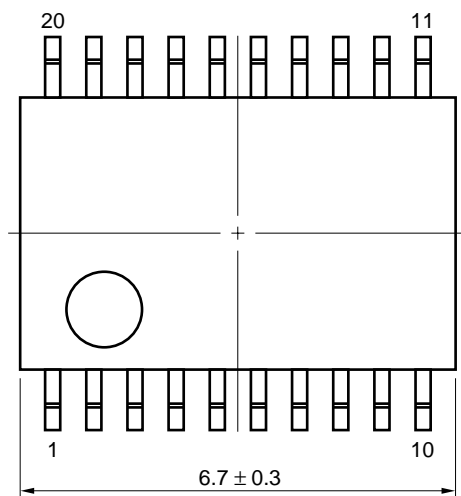
**Note 3** [ ] is Low pass filter in order to eliminate local leak.

APPLICATION CIRCUIT EXAMPLE

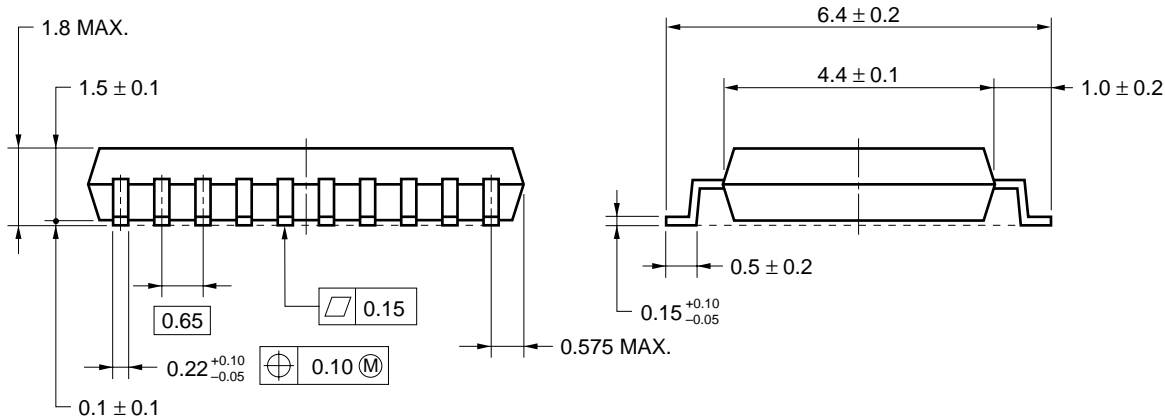
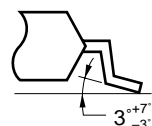


PACKAGE DIMENSIONS

★ 20 PIN PLASTIC SSOP (225 mil) (UNIT: mm)

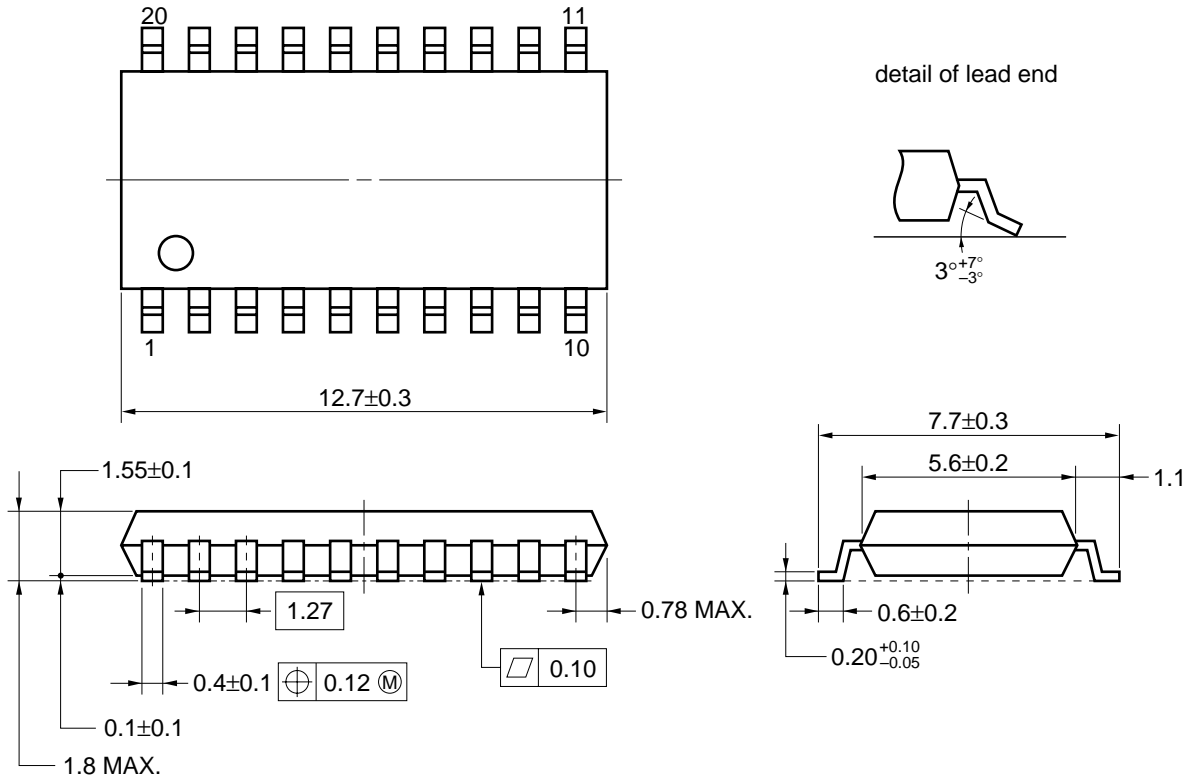


detail of lead end



**NOTE** Each lead centerline is located within 0.10 mm of its true position (T.P.) at maximum material condition.

★ 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.

**RECOMMENDED SOLDERING CONDITIONS**

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

Please consult with our sales offices 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)**.

μPC2766GR

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, Flow time: 10 seconds or below, Number of flow 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".

[MEMO]

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