DATA SHEET

NEC

BIPOLAR ANALOG INTEGRATED CIRCUIT

μPC2768GR

GENERAL PURPOSE DOWN CONVERTER IC

The μPC2768GR is a Silicon monolithic IC designed for general purpose down converter. This IC consists of IF amplifier, downconverter, and builts in power save function.

The package is 20 pin SSOP (shrink small outline package) suitable for high-density surface mount.

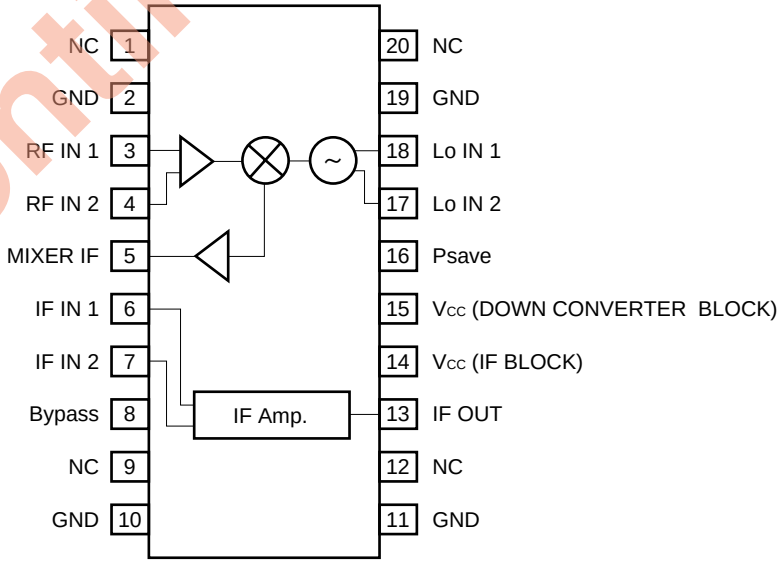
FEATURES

- Supply voltage : 2.7 to 3.3 V
- Power save function : Icc (P/S) = 100 μA (MAX.)
- Packaged in 20 pin SSOP suitable for high-density mount

ORDERING INFORMATION

PART NUMBER	PACKAGE	PACKAGE STYLE
μPC2768GR-E1	20 pin plastic SSOP (225 mil)	Embossed tape 12 mm wide. 2.5k/REEL Pin 1 indicates pull-out direction of tape

INTERNAL BLOCK DIAGRAM



Caution electro-static sensitive device

The information in this document is subject to change without notice. Before using this document, please confirm that this is the latest version.
Not all devices/types available in every country. Please check with local NEC representative for availability and additional information.

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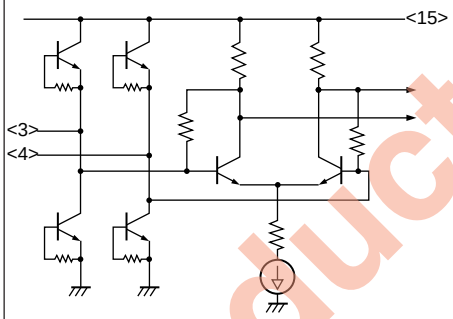
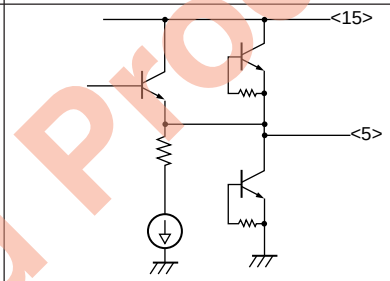
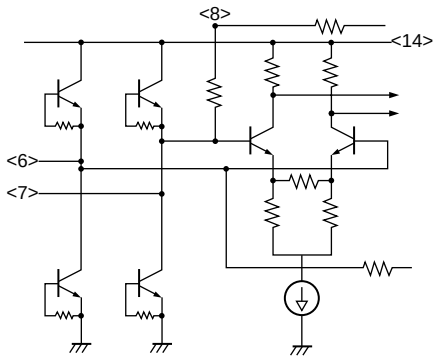
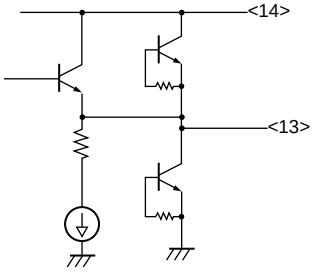
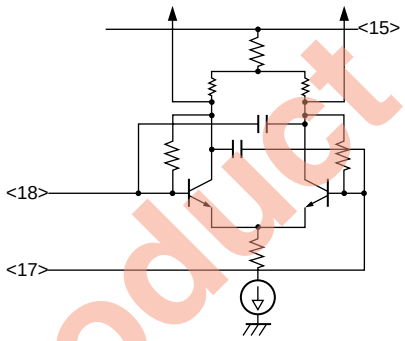
Printed in Japan

The mark ★ shows major revised points.

PIN EXPLANATION

Pin No.	Symbol	Pin Voltage TYP.(V)	Function and Explanation	Equivalent Circuit
1	NC	-	Non Connection pin.	
2	GND	0.00	Ground pin of down converter block.	
3	RF IN1	2.53	RF signal input pin. In case of single input, alternative pin should be grounded through capacitor.	
4	RF IN2	2.53		
5	MIXER IF	2.2	Output pin of IF signal from mixer. This pin is assigned for emitter follower output with constant resistive inpedance.	
6	IF IN1	2.05	Input pin of IF amplifier. 6 and 8 pin should be grounded through capacitor. IF filter is made up of L, C should be connected between 5 pin and 7 pin in order to prevent undesired harmonics.	
7	IF IN2	2.05		
8	Bypass	2.05		
9	NC	–	Non Connection pin.	
10 11	GND	0.00	Ground pin of IF block.	
12	NC	–	Non Connection on pin.	
13	IF OUT	1.4	Output pin of IF signal. This pin is assigned for emitter follower output with constant resistive impedance. Ceramic filter should be connected in order to eliminate higher order harmonics and to minimize noise bandwidth.	

Pin No.	Symbol	Pin Voltage TYP.(V)	Function and Explanation	Equivalent Circuit
14	V_{CC}	3.00	Supply voltage pin of IF block.	
15	V_{CC}	3.00	Supply voltage pin of down convertor block.	
16	Psave		Switch pin of power save function. By grounding the power save pin, the chip can be put in an OFF state where it draws less than 100 μA of current.	
17	Lo IN1	2.55	Input pin of oscillator signal. Assemble SAW resonator and 33 to 60 Ω resistance between 17 pin and 18 pin to oscillate with active feedback loop.	
18	Lo IN2	2.55		
19	GND	0.00	Ground pin of down convertor block.	
20	NC	–	Non connection pin.	

ABSOLUTE MAXIMUM RATINGS (T_A = 25 °C, unless otherwise specified)

PARAMETER	SYMBOL	RATING	UNIT	TEST CONDITION
Supply Voltage	V_{CC}	4.0	V	
Total Circuit Current	I_{total}	20	mA	
Package Permissible Dissipation	P_D	433	mW	T_A = +85 °C Note 1
Operating Temperature Range	T_A	–40 to +85	°C	
Storage Temperature Range	T_{stg}	–65 to +150	°C	

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

RECOMMENDED OPERATING RANGE

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT
Supply Voltage	V_{CC}	2.7	3.0	3.3	V
Operating Temperature Range	T_A	–40	25	85	°C
RF Frequency	f_{RF}	DC	–	450	MHz
IF Frequency	f_{IF}	DC	–	25	MHz

ELECTRICAL CHARACTERISTICS (V_{CC} = 3.0 V, T_A = 25 °C, Zs = Zo = 50 Ω)

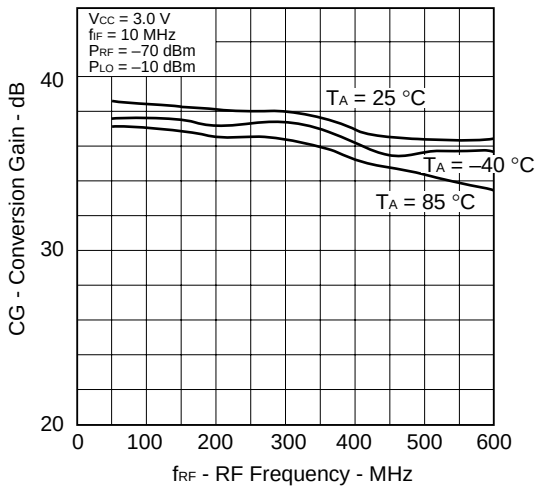
PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITION
Circuit Current	I_{CC}	4.7	6.8	8.5	mA	no input signal
Power Save Dark Current	I_{CC} (P/S)	–	–	100	μA	$V_{p/s}$ = 0.5 V
DOWN CONVERTER BLOCK						
Conversion Gain 1	CG1	33	36	40	dB	f_{RF} = 450 MHz, f_{IF} = 10 MHz
Conversion Gain 2	CG2	32	35	39	dB	f_{RF} = 450 MHz, f_{IF} = 25 MHz
Noise Figure	NF	–	12	15	dB	f_{RF} = 450 MHz, f_{IF} = 10 MHz
IF AMPLIFIER BLOCK						
Gain 1	Gp1	41	45	48	dB	f_{in} = 10 MHz
Gain 2	Gp2	39	43	46	dB	f_{in} = 25 MHz
IF Output Voltage	V_{out}	350	450	550	mVp-p	f_{in} = 10 MHz, Zo = 2 kΩ

STANDARD CHARACTERISTICS (V_{CC} = 3.0 V, T_A = 25 °C, Zs = Zo = 50 Ω)

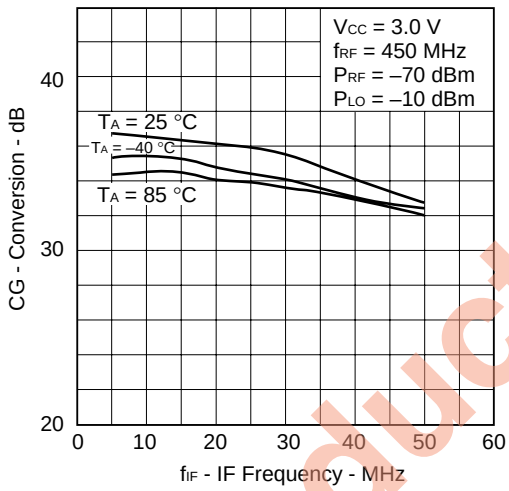
PARAMETER	SYMBOL	TYP.	UNIT	TEST CONDITION
LO-RF Isolation	LO-RF_{isol}	62	dB	f_{LO} = 1 to 450 MHz
LO-IF Isolation	LO-IF_{isol}	25	dB	f_{LO} = 1 to 450 MHz

TYPICAL CHARACTERISTICS

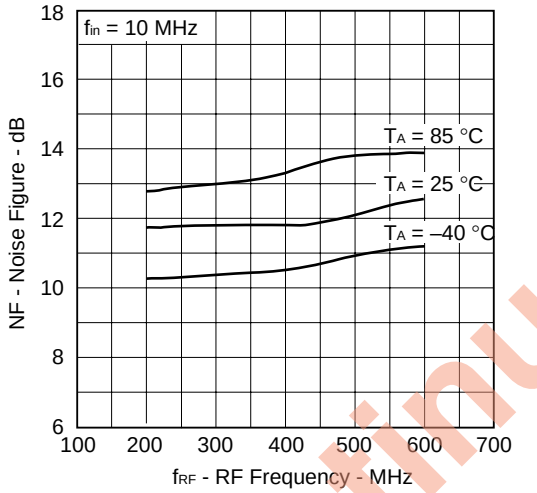
CG vs. f_{RF}



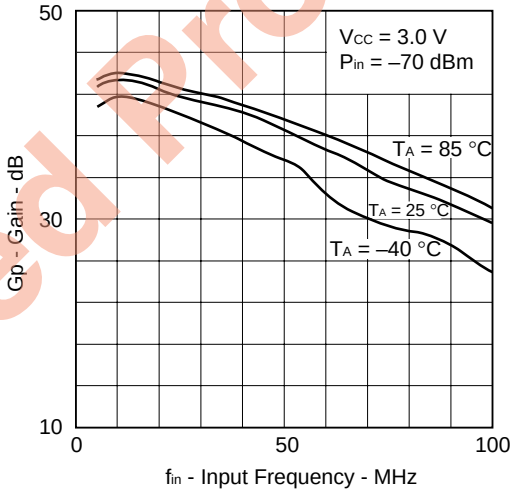
CG vs. f_{IF}



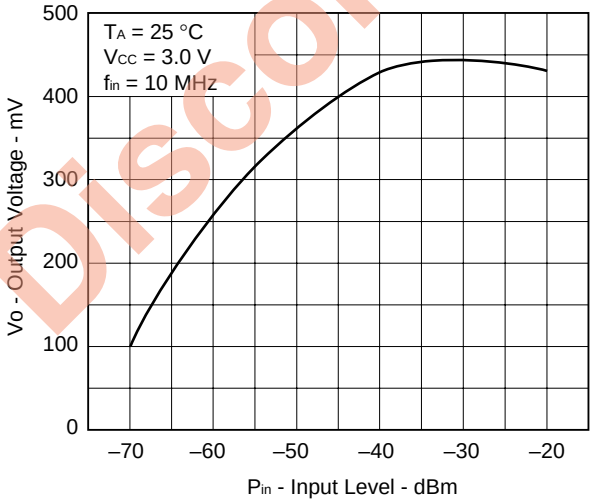
NF vs. f_{RF}



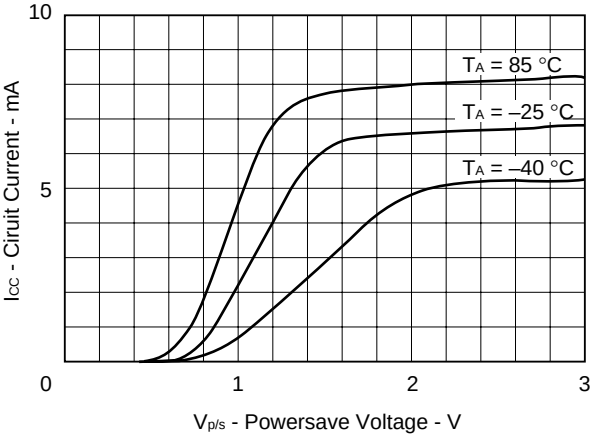
Gain vs. f_{in}



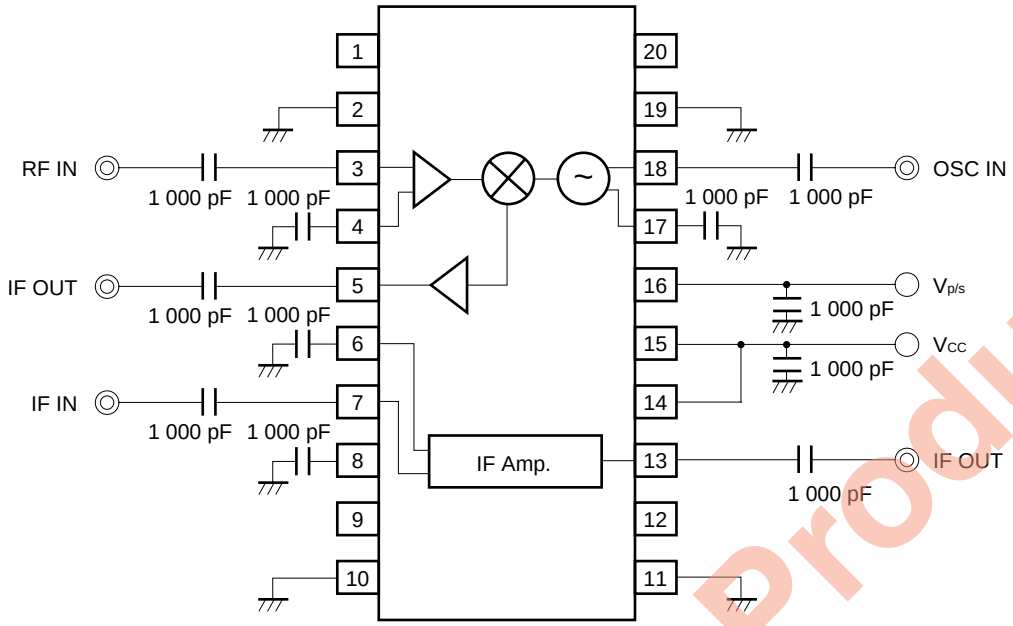
P_{in} vs. Vo



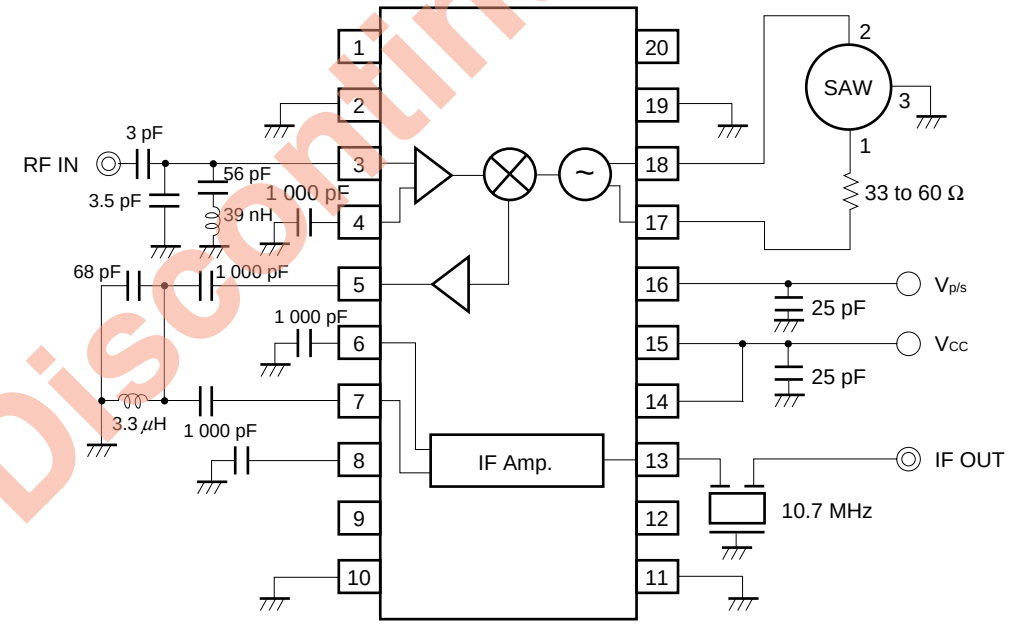
Powersave Voltage vs. I_{CC}



MEASUREMENT CIRCUIT



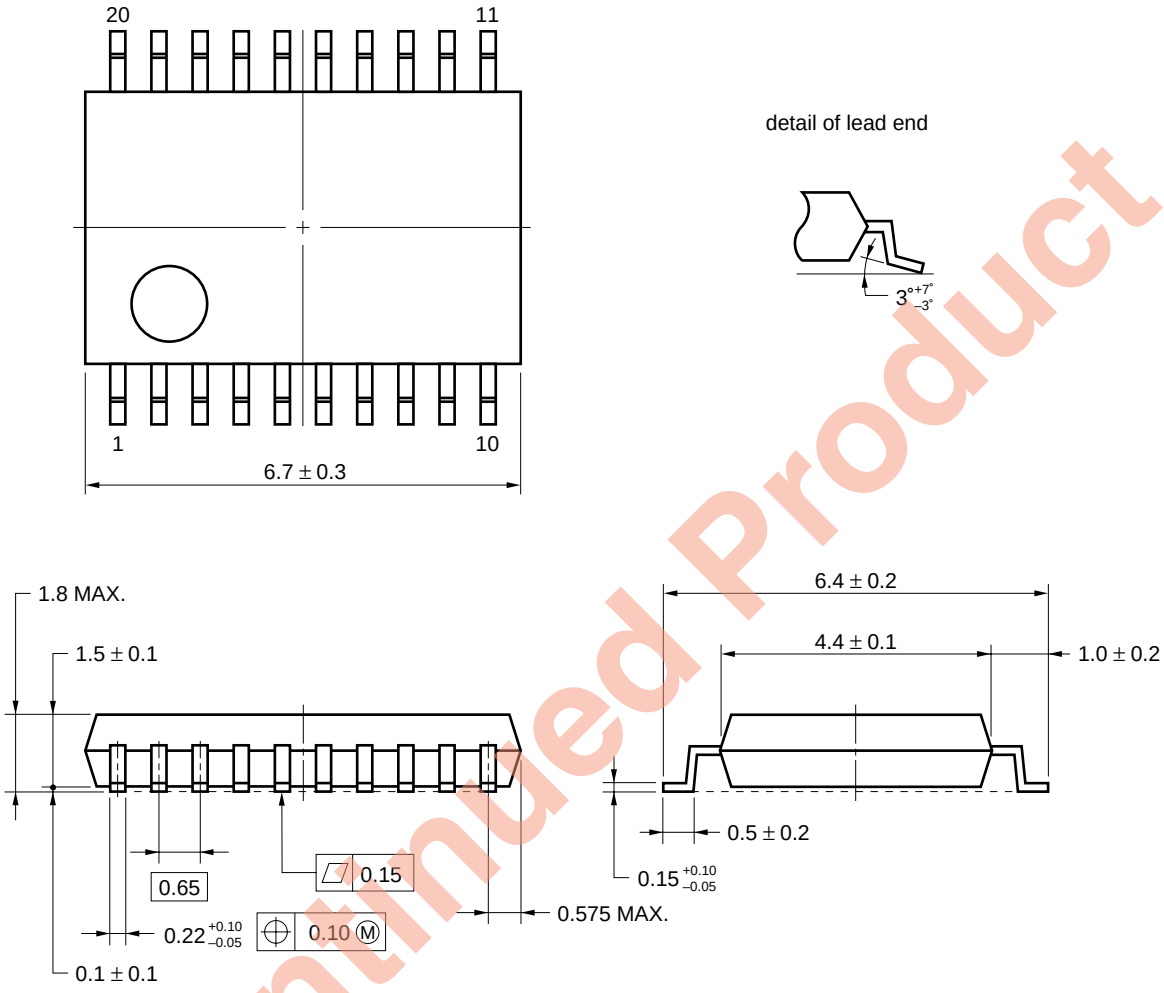
APPLICATION CIRCUIT



The application circuits and their parameters are for references only and are not intended for use in actual design-in's.

PACKAGE DIMENSIONS

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



NOTE Each lead centerline is located within 0.10 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).

μPC2768GR

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[Note 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[Note 1]: 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[Note 1]: None	WS60-00-1
Partial heating method	Terminal temperature: 300 °C or below, Flow time: 3 seconds or below, Exposure limit[Note 1]: None	

Note 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".

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