Chipsmall Limited consists of a professional team with an average of over 10 year of expertise in the distribution of electronic components. Based in Hongkong, we have already established firm and mutual-benefit business relationships with customers from,Europe,America and south Asia,supplying obsolete and hard-to-find components to meet their specific needs.

With the principle of “Quality Parts,Customers Priority,Honest Operation,and Considerate Service”,our business mainly focus on the distribution of electronic components. Line cards we deal with include Microchip,ALPS,ROHM,Xilinx,Pulse,ON,Everlight and Freescale. Main products comprise IC,Modules,Potentiometer,IC Socket,Relay,Connector.Our parts cover such applications as commercial,industrial, and automotives areas.

We are looking forward to setting up business relationship with you and hope to provide you with the best service and solution. Let us make a better world for our industry!

Contact us

Tel: +86-755-8981 8866 Fax: +86-755-8427 6832
Email & Skype: info@chipsmall.com Web: www.chipsmall.com
Address: A1208, Overseas Decoration Building, #122 Zhenhua RD., Futian, Shenzhen, China

UPB1509GV

NEC's 1.0 GHz DIVIDE BY 2/4/8 PRESCALER

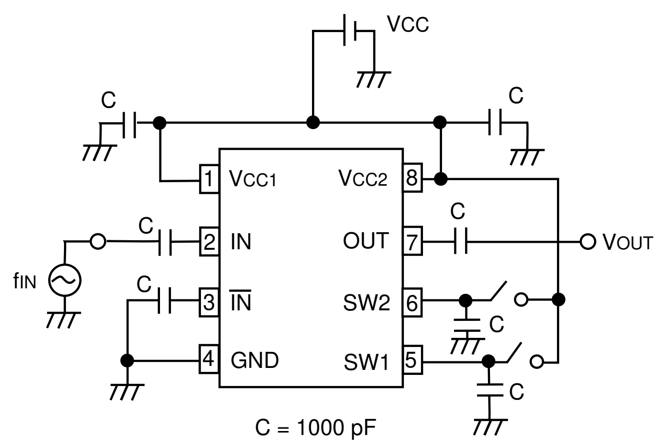
FEATURES

- **HIGH FREQUENCY OPERATION TO 1 GHz**
- **SELECTABLE DIVIDE RATIO:** ÷2, ÷4, ÷8
- **WIDE SUPPLY VOLTAGE RANGE:** 2.2 TO 5 V
- **LOW SUPPLY CURRENT:** 5.3 mA
- **SMALL PACKAGE:** 8 pin SSOP
- **AVAILABLE IN TAPE AND REEL**

DESCRIPTION

NEC's UPB1509GV is a Silicon RFIC digital prescaler manufactured with the NESAT™ IV silicon bipolar process. It features frequency response to 1 GHz, selectable divide-by-two, four, or eight modes, and operates from a 3 to 5 volt supply while drawing only 5.3 milliamps. The device is housed in a small 8 pin SSOP package that contributes to system miniaturization. The low power consumption and wide supply range makes the device well suited for cellular and cordless telephones as well as DBS receiver applications.

TEST CIRCUIT



ELECTRICAL CHARACTERISTICS (TA = -40 to +85°C, VCC = 2.2 to 5.5 V, unless otherwise noted)

PART NUMBER PACKAGE OUTLINE			UPB1509GV S08		
SYMBOLS	**PARAMETERS AND CONDITIONS**	**UNITS**	**MIN**	**TYP**	**MAX**
ICC	Supply Current, No Input Signal, Vcc = 3 V	mA	3.5	5.0	5.9
fIN (u)	Upper Limit Operating Frequency, PIN = -20 to 0 dBm PIN = -20 to -5 dBm at ÷ 2 at ÷ 4 at ÷ 8	MHz MHz MHz MHz	500 700 800 1000		
fIN (L)	Lower Limit Operating Frequency, PIN = -20 to 0 dBm PIN = -20 to -5 dBm	MHz MHz			50 500
PIN	Input Power, fIN = 50 to 1000 MHz fIN = 50 to 500 MHz	dBm dBm	-20 -20		-5 0
VOUT	Output Voltage, RL = 200 Ω	VP-P	0.1	0.2	
VIN(H)	Division Ratio Control Voltage High	V		VCC	
VIN(L)	Division Ratio Control Voltage Low	V		OPEN	

Date Published: June 28, 2005

ABSOLUTE MAXIMUM RATINGS[1] (T_A = 25°C)

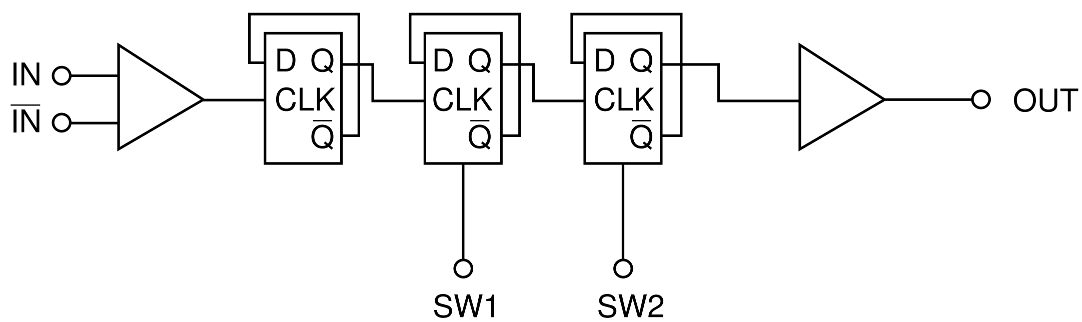
SYMBOLS	PARAMETERS	UNITS	RATINGS
V_{CC1}, V_{CC2}	Supply Voltage	V	6.0
V_{IN}	Input Voltage	V	6.0
P_D	Power Dissipation[2]	mW	250
T_{OP}	Operating Temperature	°C	-45 to +85
T_{STG}	Storage Temperature	°C	-55 to +150

Notes:
1. Operation in excess of any one of these parameters may result in permanent damage.
2. Mounted on a double-sided copper clad 50x50x1.6 mm epoxy glass PWB (T_A = +85˚C).

RECOMMENDED OPERATING CONDITIONS

SYMBOL	PARAMETER	UNITS	MIN	TYP	MAX
V_{CC1}, V_{CC2}	Supply Voltage	V	2.2	3.0	5.5
T_{OP}	Operating Temperature	°C	-40	+25	+85

INTERNAL BLOCK DIAGRAM



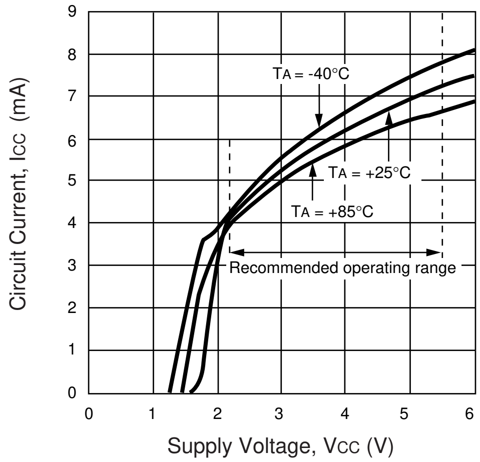
PIN DESCRIPTIONS

<table>
<tr><th>Pin No.</th><th>Symbol</th><th>Applied Voltage</th><th>Pin Voltage</th><th>Description</th></tr>
<tr><td>1</td><td>VCC1</td><td>2.2 to 5.5</td><td>–</td><td>Power supply pin of input amplifier and dividers. This pin must be equipped with bypass capacitor (eg 1000 pF) to ground.</td></tr>
<tr><td>2</td><td>IN</td><td>–</td><td>1.7 to 4.95</td><td>Signal input pin. This pin should be coupled with a capacitor (eg 1000 pF).</td></tr>
<tr><td>3</td><td>$\overline{IN}$</td><td>–</td><td>1.7 to 4.95</td><td>Signal input bypass pin. This pin must be equipped with a bypass capacitor (eg 1000 pF) to ground.</td></tr>
<tr><td>4</td><td>GND</td><td>0</td><td>–</td><td>Ground pin. Ground pattern on the board should be formed as wide as possible to minimize ground impedance.</td></tr>
<tr><td>5</td><td>SW1</td><td>H/L (VCC/OPEN)</td><td rowspan="2">–</td><td rowspan="2">Divided ratio control pin. Divide ratio can be controlled by the following input voltages to these pins.
<table>
<tr><td colspan="2"></td><td colspan="2">SW2</td></tr>
<tr><td colspan="2"></td><td>H (VCC)</td><td>L (OPEN)</td></tr>
<tr><td rowspan="2">SW1</td><td>H (VCC)</td><td>1/2</td><td>1/4</td></tr>
<tr><td>L (OPEN)</td><td>1/4</td><td>1/8</td></tr>
</table>
These pins must each be equipped with a bypass capacitor to ground.</td></tr>
<tr><td>6</td><td>SW2</td><td>H/L (VCC/OPEN)</td></tr>
<tr><td>7</td><td>OUT</td><td>–</td><td>1.0 to 4.7</td><td>Divided frequency output pin. This pin is designed as an emitter follower output. This pin can output 0.1 Vp-p min with a 200 Ω load.
This pin should be coupled to load device with a capacitor (eg 1000 pF).</td></tr>
<tr><td>8</td><td>VCC2</td><td>2.2 to 5.5</td><td>–</td><td>Power supply pin of output buffer amplifier. This pin must be equipped with bypass capacitor (eg 1000 pF) to ground.</td></tr>
</table>

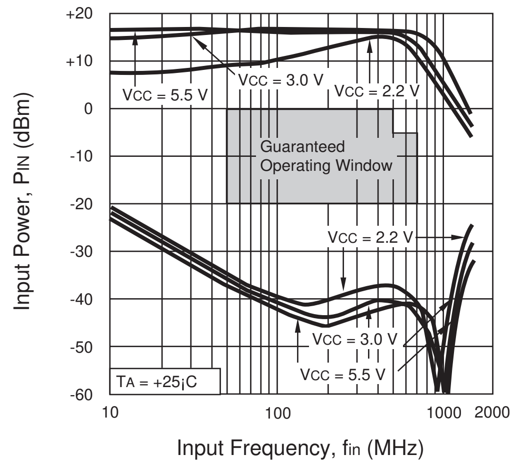
TYPICAL PERFORMANCE CURVES

(T_A = +25°C unless otherwise noted)

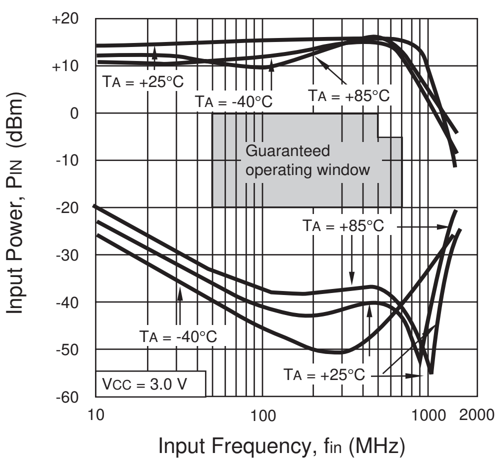
CIRCUIT CURRENT vs.
SUPPLY VOLTAGE and TEMPERATURE



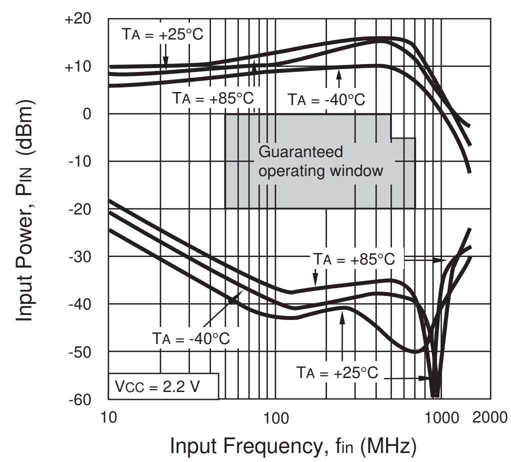
INPUT POWER vs.
INPUT FREQUENCY and VOLTAGE



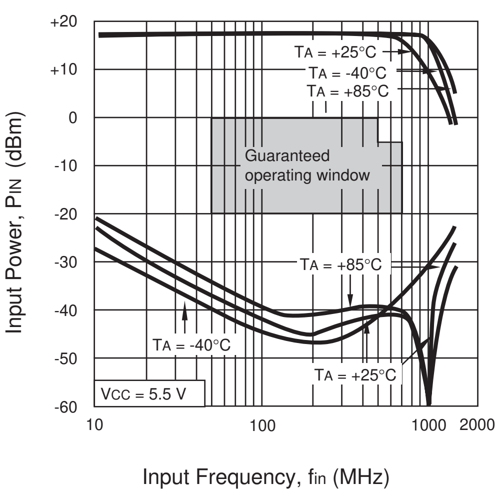
INPUT POWER vs.
INPUT FREQUENCY and TEMPERATURE



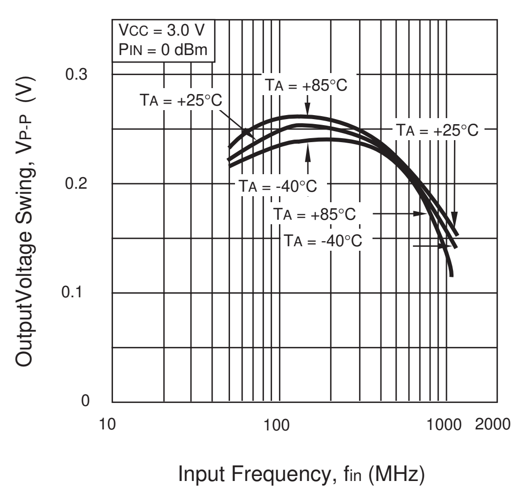
INPUT POWER vs.
INPUT FREQUENCY and TEMPERATURE



INPUT POWER vs.
INPUT FREQUENCY and TEMPERATURE



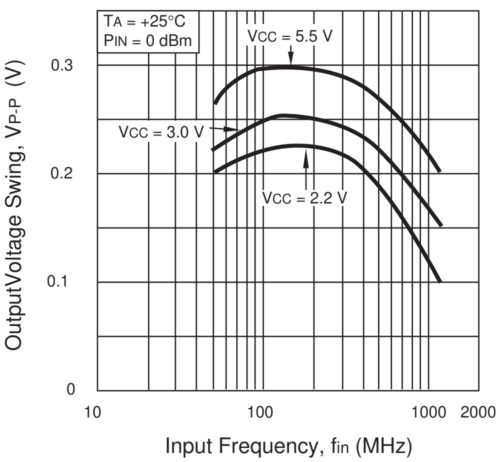
OUTPUT VOLTAGE SWING vs.
INPUT FREQUENCY and VOLTAGE



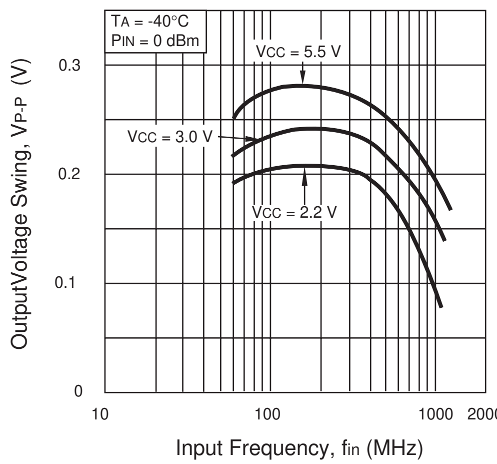
TYPICAL PERFORMANCE CURVES

(T_A = +25°C unless otherwise noted)

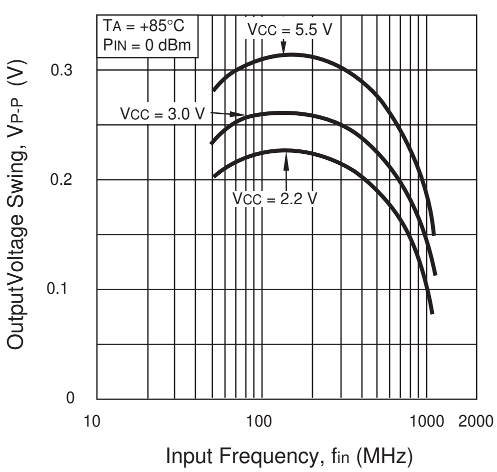
OUTPUT VOLTAGE SWING vs.
INPUT FREQUENCY and VOLTAGE



OUTPUT VOLTAGE SWING vs.
INPUT FREQUENCY and VOLTAGE



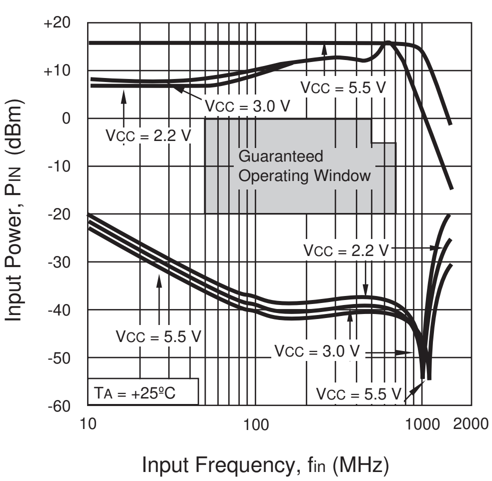
OUTPUT VOLTAGE SWING vs.
INPUT FREQUENCY and VOLTAGE



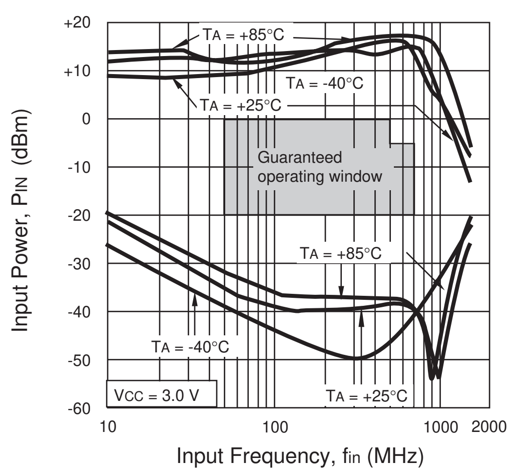
Divide by 4 mode

(Guaranteed operating window: V_{CC} = 2.2 to 5.5 V, T_A = -40 to +85°C)

INPUT POWER vs.
INPUT FREQUENCY and VOLTAGE



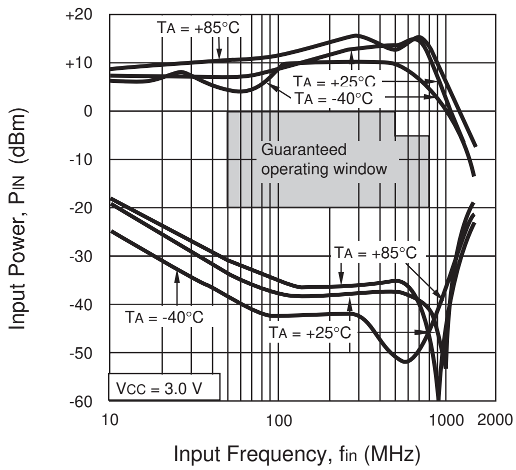
INPUT POWER vs.
INPUT FREQUENCY and TEMPERATURE



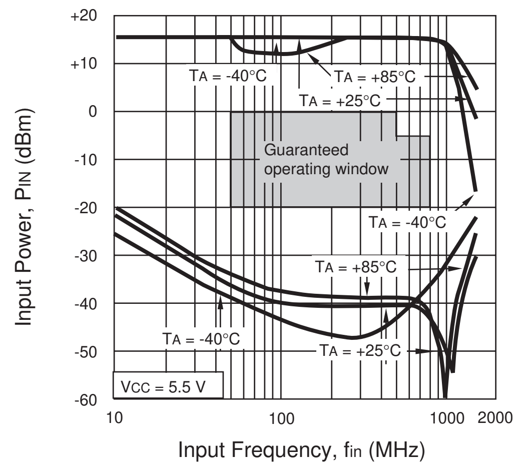
TYPICAL PERFORMANCE CURVES

(T_A = +25°C unless otherwise noted)

INPUT POWER vs.
INPUT FREQUENCY and TEMPERATURE



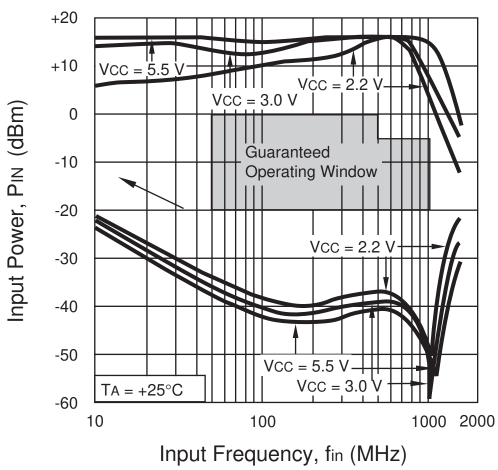
INPUT POWER vs.
INPUT FREQUENCY and TEMPERATURE



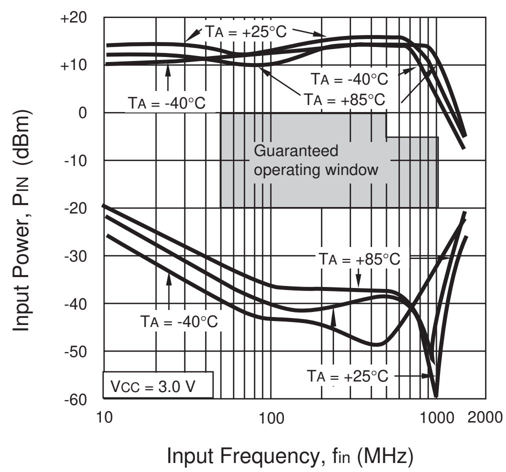
Divide by 8 mode

(Guaranteed operating window: V_{CC} = 2.2 to 5.5 V, T_A = -40 to +85 °C)

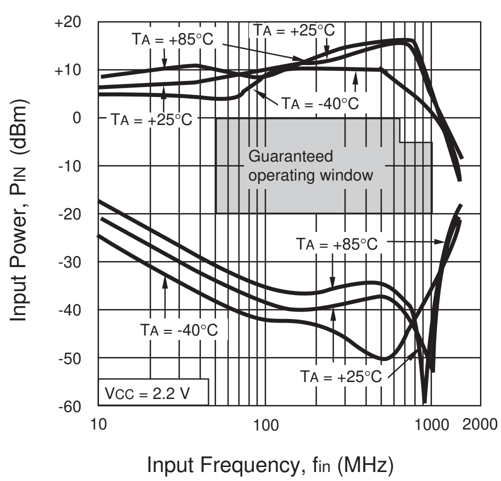
INPUT POWER vs.
INPUT FREQUENCY and VOLTAGE



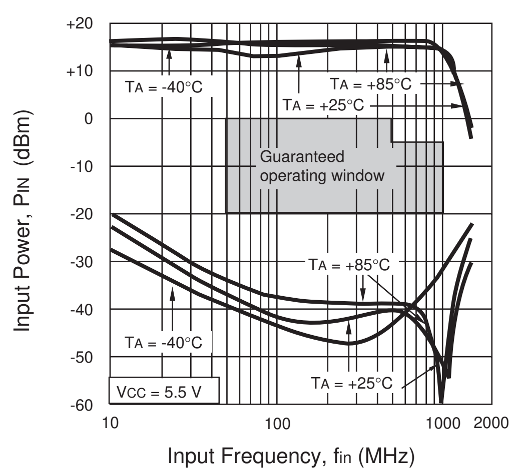
INPUT POWER vs.
INPUT FREQUENCY and TEMPERATURE



INPUT POWER vs.
INPUT FREQUENCY and TEMPERATURE



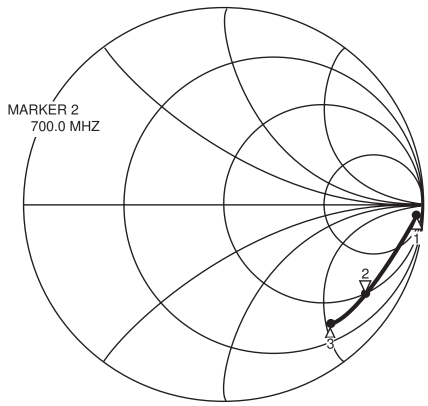
INPUT POWER vs.
INPUT FREQUENCY and TEMPERATURE



TYPICAL SCATTERING PARAMETERS (T_A = 25°C)

S_{11} vs. INPUT FREQUENCY

S11
REF 1.0 Units/
2 200.0 mUnits/
∇ 55.375 Ω -142.79 Ω



START 0.050000000 GHz
STOP 1.000000000 GHz

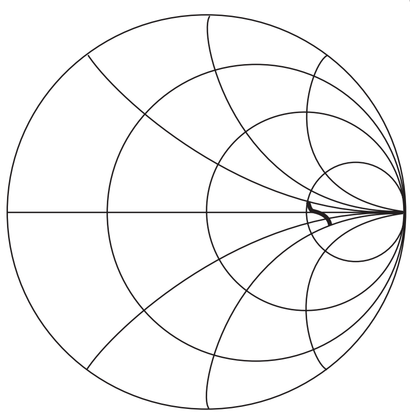
V_{CC1} = V_{CC2} = 3.0 V, SW1 = SW2 = 3.0 V

FREQUENCY	S_{11}	
GHz	MAG	ANG
0.1	0.929	-6.7
0.2	0.898	-10.5
0.3	0.866	-13.6
0.4	0.840	-15.9
0.5	0.834	-19.1
0.6	0.819	-21.9
0.7	0.803	-24.7
0.8	0.792	-27.0
0.9	0.787	-30.0
1.0	0.771	-32.7

S_{22} vs. OUTPUT FREQUENCY

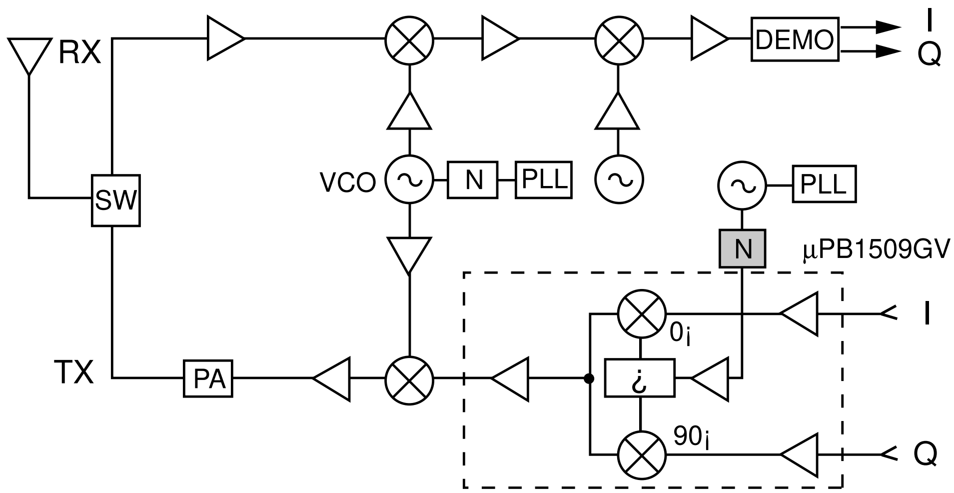
S22
REF 1.0 Units
200.0 mUnits/

Z
50 MHz
149.09 Ω + j 14.86 Ω
350 MHz
194.21 Ω – j 36.64 Ω



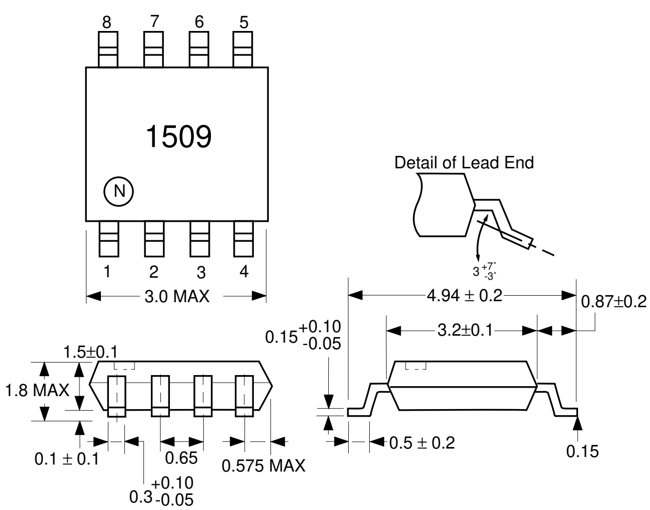
START 0.050000000 GHz
STOP 0.350000000 GHz

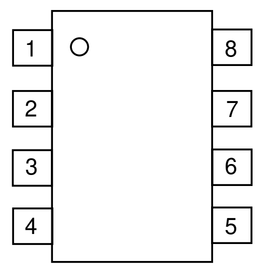
SYSTEM APPLICATION EXAMPLE



OUTLINE DIMENSIONS (Units in mm)

PACKAGE OUTLINE S08





PIN CONNECTIONS

1. V_{CC1}
2. IN
3. $\overline{IN}$
4. GND
5. SW1
6. SW2
7. OUT
8. V_{CC2}

ORDERING INFORMATION (Solder Contains Lead)

PART NUMBER	QUANTITY
UPB1509GV-E1	1000/Reel

ORDERING INFORMATION (Pb-Free)

PART NUMBER	QUANTITY
UPB1509GV-E1-A	1000/Reel

CEL **California Eastern Laboratories,** Your source for NEC RF, Microwave, Optoelectronic, and Fiber Optic Semiconductor Devices.
4590 Patrick Henry Drive • Santa Clara, CA 95054-1817 • (408) 919-2500 • FAX (408) 988-0279 • **www.cel.com**

CEL California Eastern Laboratories

4590 Patrick Henry Drive
Santa Clara, CA 95054-1817
Telephone: (408) 919-2500
Facsimile: (408) 988-0279

Subject: Compliance with EU Directives

CEL certifies, to its knowledge, that semiconductor and laser products detailed below are compliant with the requirements of European Union (EU) Directive 2002/95/EC Restriction on Use of Hazardous Substances in electrical and electronic equipment (RoHS) and the requirements of EU Directive 2003/11/EC Restriction on Penta and Octa BDE.

CEL Pb-free products have the same base part number with a suffix added. The suffix –A indicates that the device is Pb-free. The –AZ suffix is used to designate devices containing Pb which are exempted from the requirement of RoHS directive (*). In all cases the devices have Pb-free terminals. All devices with these suffixes meet the requirements of the RoHS directive.

This status is based on CEL's understanding of the EU Directives and knowledge of the materials that go into its products as of the date of disclosure of this information.

Restricted Substance per RoHS	Concentration Limit per RoHS (values are not yet fixed)	Concentration contained in CEL devices	
		-A	-AZ
Lead (Pb)	< 1000 PPM	Not Detected	(*)
Mercury	< 1000 PPM	Not Detected	
Cadmium	< 100 PPM	Not Detected	
Hexavalent Chromium	< 1000 PPM	Not Detected	
PBB	< 1000 PPM	Not Detected	
PBDE	< 1000 PPM	Not Detected	

If you should have any additional questions regarding our devices and compliance to environmental standards, please do not hesitate to contact your local representative.

Important Information and Disclaimer: Information provided by CEL on its website or in other communications concerning the substance content of its products represents knowledge and belief as of the date that it is provided. CEL bases its knowledge and belief on information provided by third parties and makes no representation or warranty as to the accuracy of such information. Efforts are underway to better integrate information from third parties. CEL has taken and continues to take reasonable steps to provide representative and accurate information but may not have conducted destructive testing or chemical analysis on incoming materials and chemicals. CEL and CEL suppliers consider certain information to be proprietary, and thus CAS numbers and other limited information may not be available for release.
In no event shall CEL's liability arising out of such information exceed the total purchase price of the CEL part(s) at issue sold by CEL to customer on an annual basis.
See CEL Terms and Conditions for additional clarification of warranties and liability.