3.0 GHz DIVIDE BY 4 PRESCALER | UPB1510GV

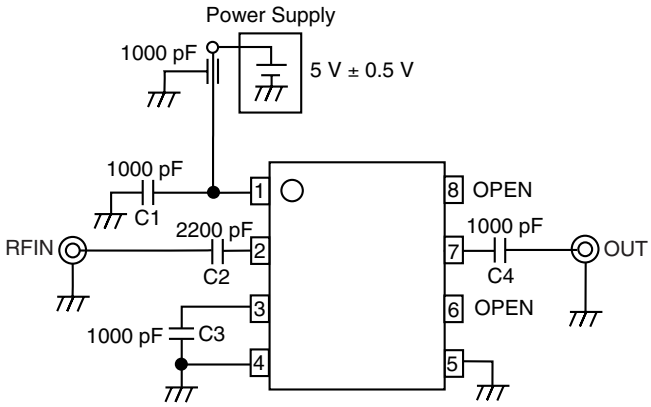
FEATURES

- **HIGH FREQUENCY OPERATION TO 3 GHz**
- **FIXED DIVIDE RATIO: ÷ 4**
- **LOW CURRENT CONSUMPTION:** 15 mA at 5 V
- **SMALL PACKAGE: 8 PIN SSOP**
- **AVAILABLE IN TAPE AND REEL**

DESCRIPTION

NEC's UPB1510GV is a Silicon RFIC digital prescaler manufactured with the NESAT™ IV silicon bipolar process. It features frequency response to 3 GHz, a divide-by-four ratio, and operates on a 5 volt supply while drawing only 15 mA. The device is housed in a small 8 pin SSOP package that contributes to system miniaturization. The low power consumption and wide frequency operation makes the device well suited for use in a PLL synthesizer for UHF/VHF TV and DBS tuner applications.

TEST CIRCUIT



ELECTRICAL CHARACTERISTICS (T_A = -40 to +85°C, V_{CC} = 4.5 to 5.5 V, Z_S = Z_L = 50 Ω)

PART NUMBER PACKAGE OUTLINE			UPB1510GV S08		
SYMBOLS	**PARAMETERS AND CONDITIONS**	**UNITS**	**MIN**	**TYP**	**MAX**
I_{CC}	Circuit Current, No Input Signal	mA	10.5	14	17
f_{IN} (u)1	Upper Limit Operating Frequency 1, P_{IN} = -10 to +6 dBm	GHz	3.0		
f_{IN} (u)2	Upper Limit Operating Frequency 2, P_{IN} = -15 to +6 dBm	GHz	2.7		
$f_{IN\ (L)}$	Lower Limit Operating Frequency, P_{IN} = -15 to +6 dBm	GHz			0.5
$P_{IN}1$	Input Power 1, f_{IN} = 2.7 to 3.0 GHz	dBm	-10		+6
$P_{IN}2$	Input Power 2, f_{IN} = 1.0 to 2.7 GHz	dBm	-15		+6
P_{OUT}	Output Power, P_{IN} = 0 dBm, f_{IN} = 2.0 GHz	dBm	-12	-7	

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

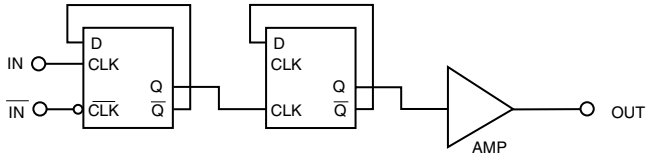
SYMBOLS	PARAMETERS	UNITS	RATINGS
V_{CC}	Supply Voltage	V	6.0
V_{IN}	Input Voltage	V	6.0
P_D	Total Power Dissipation[2]	mW	250
T_A	Operating Ambient Temp.	°C	-40 to +85
T_{STG}	Storage Temperature	°C	-55 to +150

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

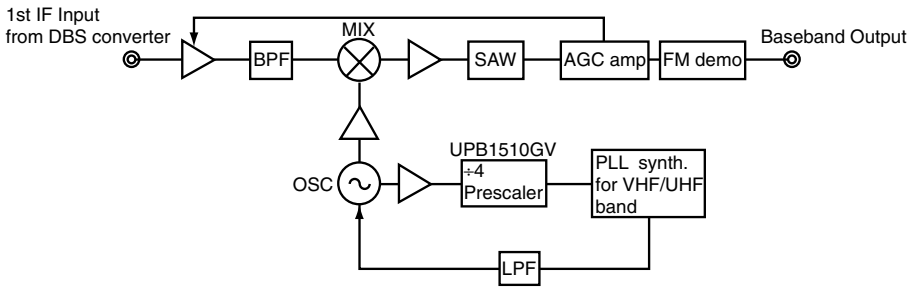
SYMBOL	PARAMETER	UNITS	MIN	TYP	MAX
V_{CC}	Supply Voltage	V	4.5	5.0	5.5
T_A	Operating Ambient Temp.	°C	-40	+25	+85

INTERNAL BLOCK DIAGRAM



SYSTEM APPLICATION EXAMPLE

RF UNIT BLOCK OF DBS TUNER

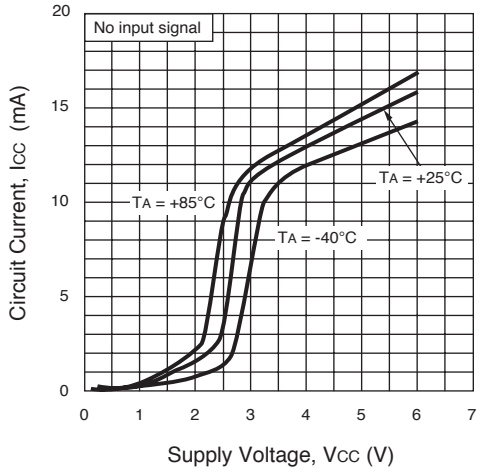


PIN DESCRIPTIONS

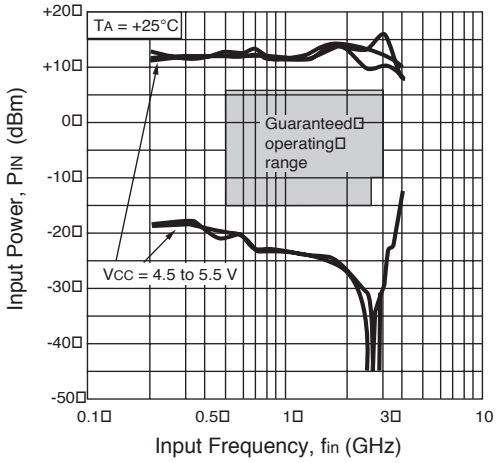
Pin No.	Symbol	Applied Voltage	Description
1	VCC	4.5 to 5.5 1000 pF).	Power supply pin. This pin must be decoupled with a bypass capacitor (e.g.
2	IN	–	Signal input pin. This pin should be coupled to source with a capacitor (e.g. 1000 pF).
3	$\overline{IN}$	–	Signal input bypass pin. This pin must be equipped with a bypass capacitor (e.g. 1000 pF) to ground.
4	GND	0	Ground pin. Ground pattern on the board should be formed as wide as possible to minimize ground impedance.
5	GND	0	
6	NC	–	No connection, this pin should be left open.
7	OUT	–	Divided frequency output pin. This pin is designed as an emitter follower output, and should be coupled to the load with a capacitor (e.g. 1000 pF).
8	NC	–	No connection, this pin should be left open.

TYPICAL PERFORMANCE CURVES (TA = +25°C unless otherwise noted)

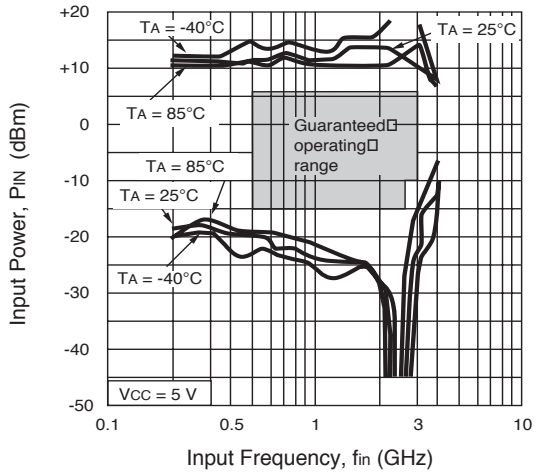
CURRENT vs. VOLTAGE and TEMPERATURE



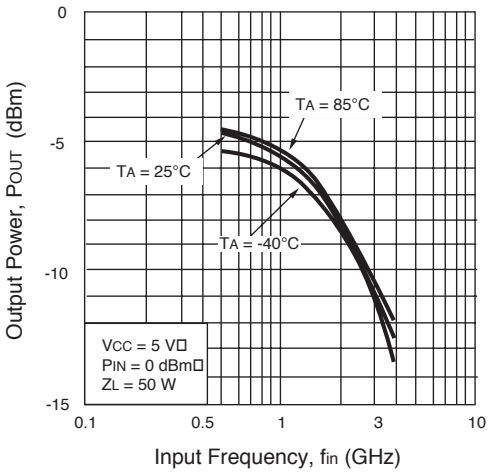
INPUT POWER vs. INPUT FREQUENCY and VOLTAGE



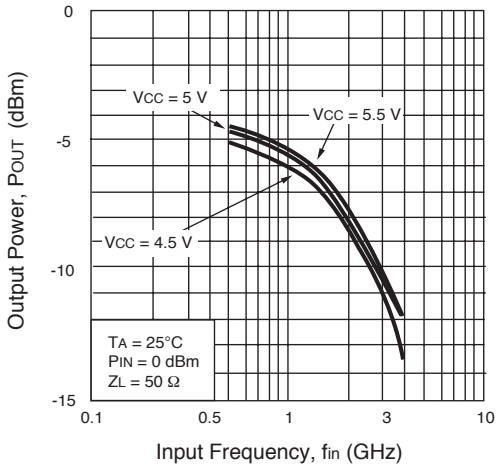
INPUT POWER vs. INPUT FREQUENCY and TEMPERATURE



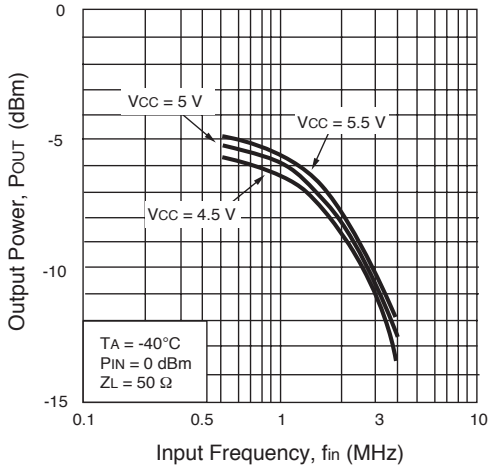
OUTPUT POWER vs. INPUT FREQUENCY and VOLTAGE



OUTPUT POWER vs. INPUT FREQUENCY and VOLTAGE

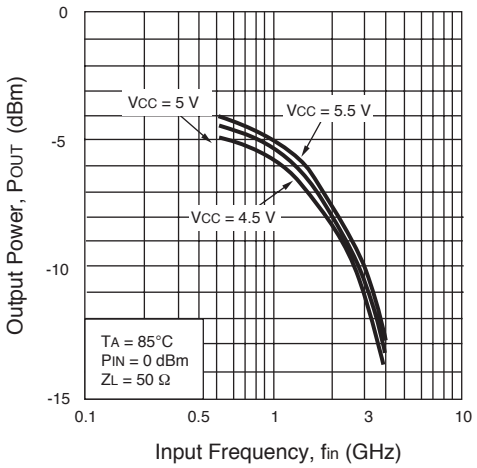


OUTPUT POWER vs. INPUT FREQUENCY and VOLTAGE



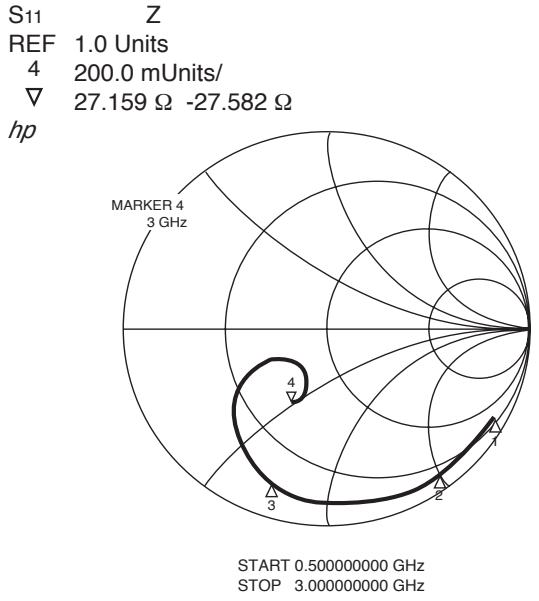
TYPICAL PERFORMANCE CURVES (TA = +25°C unless otherwise noted)

OUTPUT POWER vs.
INPUT FREQUENCY and VOLTAGE



TYPICAL SCATTERING PARAMETERS (TA = 25°C)

S11 vs. INPUT FREQUENCY
VCC = 5.0 V, TA = 25°C, ZO = 50 Ω



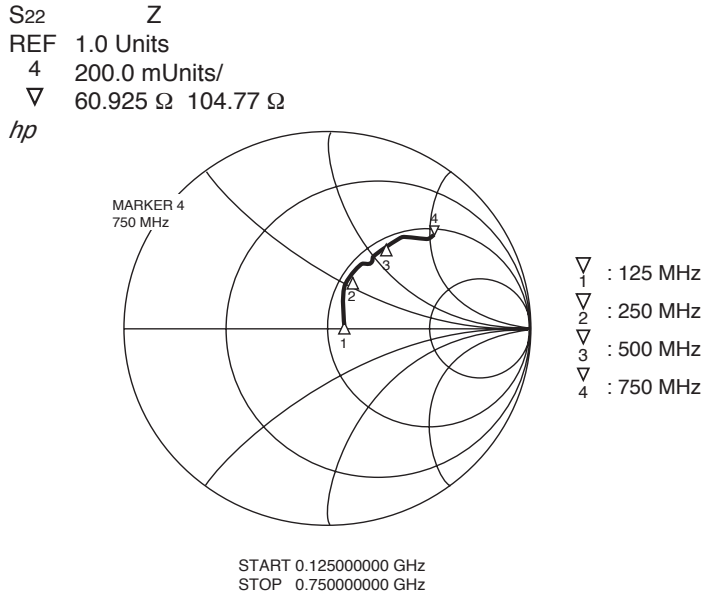
∇1 : 500 MHz
∇2 : 1000 MHz
∇3 : 2000 MHz
∇4 : 3000 MHz

FREQUENCY MHz	S11 (Ω)
500	37.1 - j207.8
1000	14.2 - j105.1
2000	7.9 - j35.8
3000	27.1 - j27.5

TYPICAL SCATTERING PARAMETERS (T_A = 25°C)

S_{22} vs. OUTPUT FREQUENCY

V_{CC} = 5.0 V, f_{in} = 500 MHz, T_A = 25°C, Z_O = 50 Ω

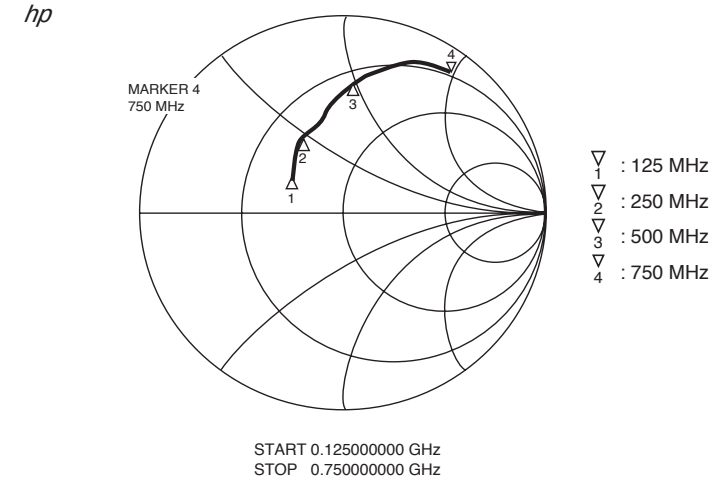


∇1 : 125 MHz
∇2 : 250 MHz
∇3 : 500 MHz
∇4 : 750 MHz

FREQUENCY MHz	S_{22} (Ω)
125	55.5 + j6.7
250	53.7 + j30.4
500	55.0 + j60.3
750	60.9 + j104.8

S_{22} vs. OUTPUT FREQUENCY

V_{CC} = 5.0 V, f_{in} = 3 GHz, T_A = 25°C, Z_O = 50 Ω

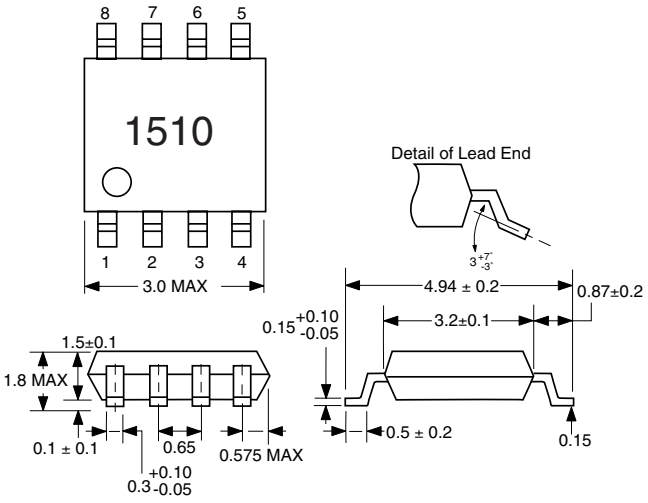


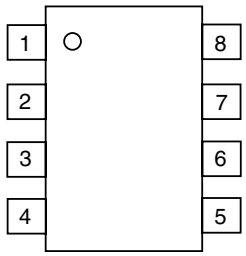
∇1 : 125 MHz
∇2 : 250 MHz
∇3 : 500 MHz
∇4 : 750 MHz

FREQUENCY MHz	S_{22} (Ω)
125	28.5 + j11.5
250	27.6 + j23.6
500	20.5 + j50.7
750	15.6 + j98.2

OUTLINE DIMENSIONS (Units in mm)

PACKAGE OUTLINE S08





PIN CONNECTIONS

1. V_{CC}	5. GND
2. IN	6. NC
3. $\overline{IN}$	7. OUT
4. GND	8. NC

ORDERING INFORMATION

PART NUMBER	QUANTITY
UPB1510GV-E1-A	1000/Reel

Note:
1. Embossed tape 8 mm wide.
   Pin 1 is in the tape pull-out direction.

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	
Lead (Pb)	< 1000 PPM	-A	-AZ
		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.