

### FEATURES

- **LOW POWER CONSUMPTION:** 20 mW
- **WIDE BAND APPLICATION:** 0.5 to 1.7 GHz
- **SINGLE SUPPLY VOLTAGE:**  $V_{CC} = 3\text{ V} \pm 10\%$
- **SMALL PACKAGE**
- **SUITABLE FOR HAND HELD (BATTERY) APPLICATIONS**

### DESCRIPTION

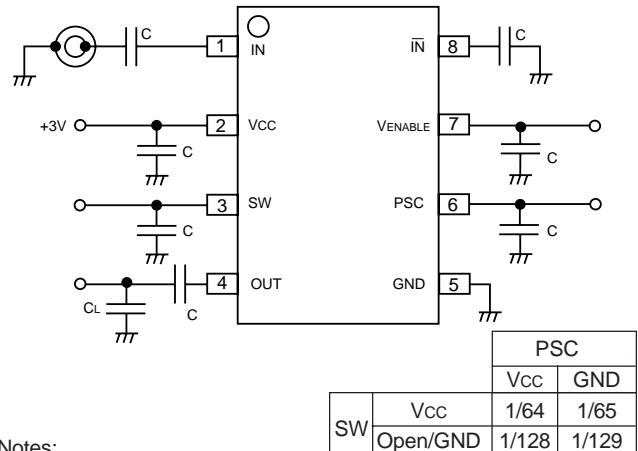
The UPB1502GR prescaler operates from 0.5 to 1.7 GHz at division ratios of 64, 65, 128 or 129. The 3 volt, 7 mA DC power requirements of this device make it highly desirable for hand-held, battery-operated systems. The low cost 8-pin plastic package is suitable for surface mount applications.

### RECOMMENDED

### OPERATING CONDITIONS ( $T_A = 25^\circ\text{C}$ )

SYMBOL	PARAMETER	UNITS	RATINGS
V <sub>CC</sub>	Supply Voltage	V	3.0±0.3
T <sub>OP</sub>	Operating Temperature	°C	-40 to +85

### TEST CIRCUIT



#### Notes:

1. All Capacitors 1000 pF except load capacitor on output should be 8 pF. Capacitors on SW and PSC are not required if these pins are grounded.
2. Connect VENABLE pin to +3 volts for normal operation. Connect to GND to disable device.
3. To minimize self-oscillation, circuit board traces to the input and output pins should be isolated from each other as much as possible.

### ELECTRICAL CHARACTERISTICS ( $T_A = -40$ to $+85^\circ\text{C}$ , $V_{CC} = 2.7$ to $3.3\text{ V}$ )

PART NUMBER PACKAGE OUTLINE			UPB1502GR, UPB1502GR(1) G08		
SYMBOLS	PARAMETERS AND CONDITIONS	UNITS	MIN	TYP	MAX
I <sub>CC</sub>	Supply Current $V_{ENABLE} = V_{CC}$ $V_{ENABLE} \leq 0.8\text{ V}$	mA µA	3.2	6.7 5	11.0 20
f <sub>IN</sub>	Input Frequency at P <sub>IN</sub> = -15 to -11 dBm (UPB1502GR) P <sub>IN</sub> = -11 to -6 dBm (UPB1502GR) P <sub>IN</sub> = -6 to 0 dBm (UPB1502GR) P <sub>IN</sub> = -15 to -14 dBm (UPB1502GR(1)) P <sub>IN</sub> = -14 to -11 dBm (UPB1502GR(1)) P <sub>IN</sub> = -11 to -9 dBm (UPB1502GR(1)) P <sub>IN</sub> = -9 to -1 dBm (UPB1502GR(1)) P <sub>IN</sub> = -1 to 0 dBm (UPB1502GR(1))	GHz	0.8 0.5 0.5 0.8 0.8 0.5 0.5 0.5		1.7 1.7 1.5 1.7 2.0 2.0 1.7 1.5
P <sub>IN</sub>	Input Power at f <sub>IN</sub> = 0.5 to 0.8 GHz f <sub>IN</sub> = 0.8 to 1.5 GHz f <sub>IN</sub> = 1.5 to 1.7 GHz (UPB1502GR) f <sub>IN</sub> = 1.5 to 1.7 GHz (UPB1502GR(1)) f <sub>IN</sub> = 1.7 to 2.0 GHz (UPB1502GR(1))	dBm	-11 -15 -15 -15 -14		0 0 -6 -1 -9
V <sub>OUT</sub>	Output Voltage Swing, C <sub>L</sub> = 8 pF	V <sub>PP</sub>	0.8	1.1	
V <sub>MH</sub>	Modulus Control, Input High (PSC)	V	2.5		
V <sub>ML</sub>	Modulus Control, Input Low (PSC)	V			0.8
V <sub>DH</sub>	Divide Ratio Control, Input High (SW)	V	V <sub>CC</sub>		
V <sub>DL</sub>	Divide Ratio Control, Input Low (SW) <sup>1</sup>	V		OPEN	
T <sub>SET</sub>	Modulus Set-up Time (PSC) f <sub>IN</sub> = 1.7 GHz	ns		11	
R <sub>TH</sub> (CH-A)	Thermal Resistance (Channel to Ambient)	°C/W			260

Note:

1. GND is acceptable.

# UPB1502GR, UPB1502GR(1)

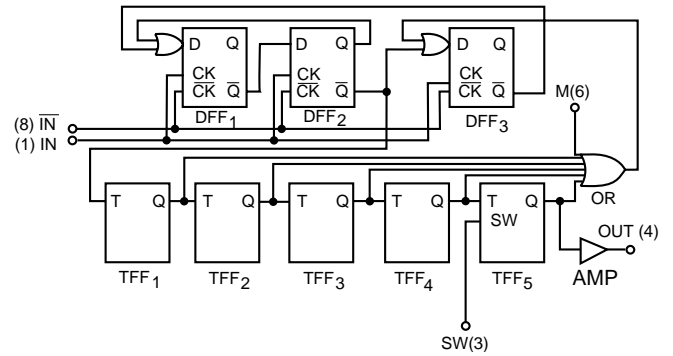
## ABSOLUTE MAXIMUM RATINGS<sup>1</sup> (T<sub>A</sub> = 25°C)

SYMBOLS	PARAMETERS	UNITS	RATINGS
V <sub>CC</sub>	Supply Voltage	V	-0.5 to 6.0
V <sub>IN</sub>	Input Voltage	V	-0.5 to V <sub>CC</sub> + 0.5
P <sub>T</sub>	Total Power Dissipation <sup>2</sup>	mW	250
T <sub>OP</sub>	Operating Temperature	°C	-40 to +85
T <sub>STG</sub>	Storage Temperature	°C	-65 to +150

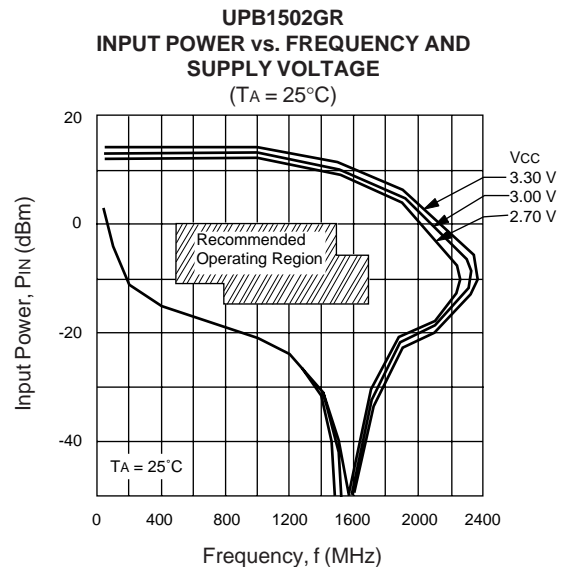
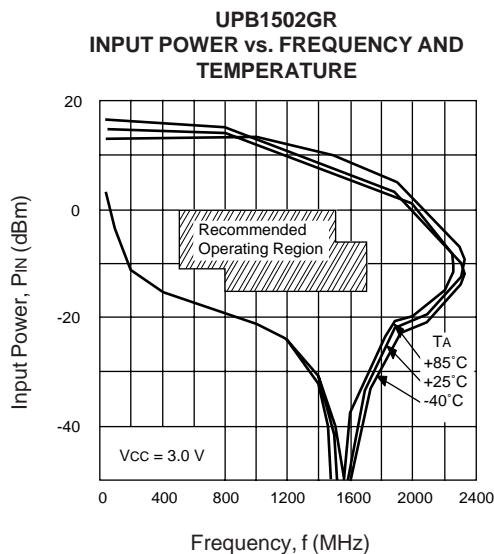
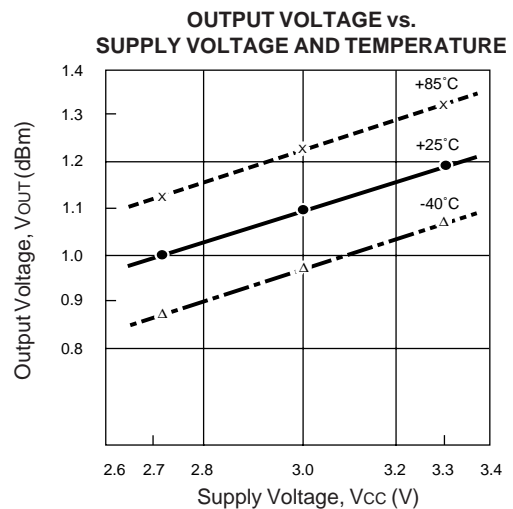
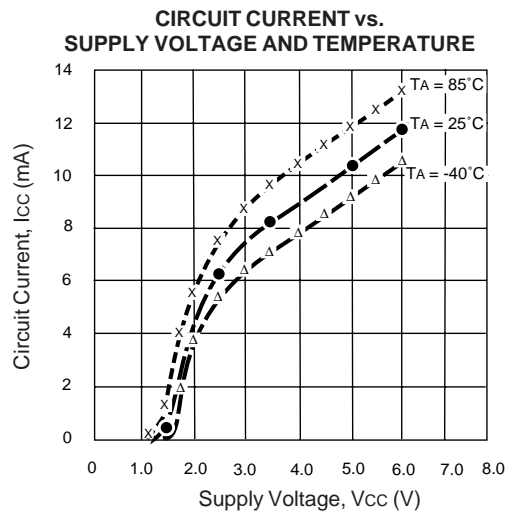
### Notes:

- Operation above any one of these parameters may result in permanent damage.
- Mounted on 50 x 50 x 1.6 mm epoxy glass circuit board, (T<sub>A</sub> = 85°C)

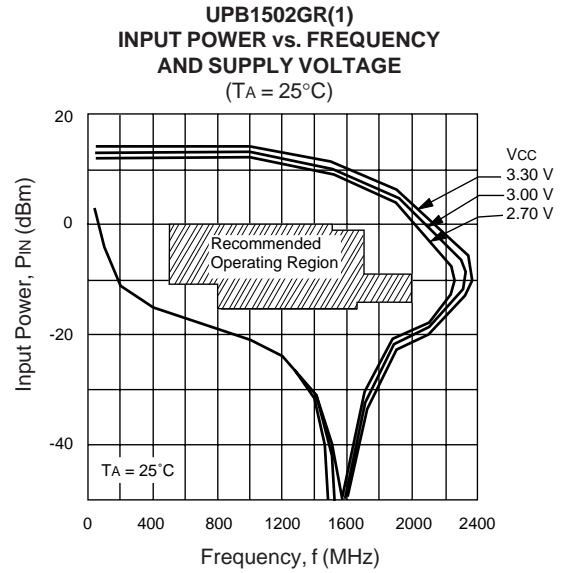
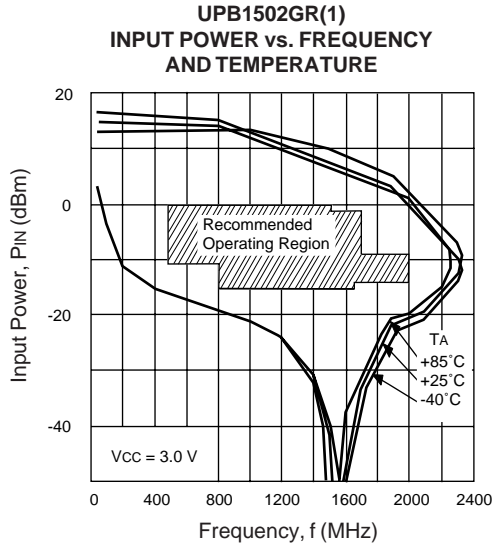
## INTERNAL BLOCK DIAGRAM



## TYPICAL PERFORMANCE CURVES



TYPICAL PERFORMANCE CURVES



TYPICAL SCATTERING PARAMETERS ( $T_A = 25^\circ\text{C}$ )

Divide-by-sixty-four mode  
V<sub>CC</sub> = 3.0 V, I<sub>CC</sub> = 6.7 mA

SW = High, PSC = High

FREQUENCY			FREQUENCY		
(MHz)	S <sub>11</sub> MAG	ANG	(MHz)	S <sub>22</sub> MAG	ANG
250	0.811	-13	50	0.976	-6
500	0.778	-26	100	0.924	-12
750	0.733	-41	150	0.817	-17
1000	0.654	-54	200	0.733	-16
1250	0.585	-68	250	0.693	-15
1500	0.511	-82			
1750	0.484	-95			
2000	0.462	-116			
2250	0.447	-144			
2500	0.430	-173			

Divide-by-one-twenty-eight mode  
V<sub>CC</sub> = 3.0 V, I<sub>CC</sub> = 6.7 mA

SW = Low, PSC = High

FREQUENCY			FREQUENCY		
(MHz)	S <sub>11</sub> MAG	ANG	(MHz)	S <sub>22</sub> MAG	ANG
250	0.801	-13	50	0.980	-6
500	0.767	-26	100	0.921	-13
750	0.724	-41	150	0.801	-18
1000	0.637	-54	200	0.712	-18
1250	0.573	-68	250	0.666	-16
1500	0.505	-82			
1750	0.474	-96			
2000	0.459	-116			
2250	0.442	-145			
2500	0.425	-172			

Divide-by-sixty-five mode  
V<sub>CC</sub> = 3.0 V, I<sub>CC</sub> = 6.7 mA

SW = High, PSC = Low

FREQUENCY			FREQUENCY		
(MHz)	S <sub>11</sub> MAG	ANG	(MHz)	S <sub>22</sub> MAG	ANG
250	0.810	-13	50	0.972	-6
500	0.775	-26	100	0.924	-12
750	0.731	-41	150	0.817	-17
1000	0.652	-55	200	0.733	-16
1250	0.579	-68	250	0.693	-15
1500	0.501	-82			
1750	0.465	-96			
2000	0.454	-116			
2250	0.436	-144			
2500	0.420	-174			

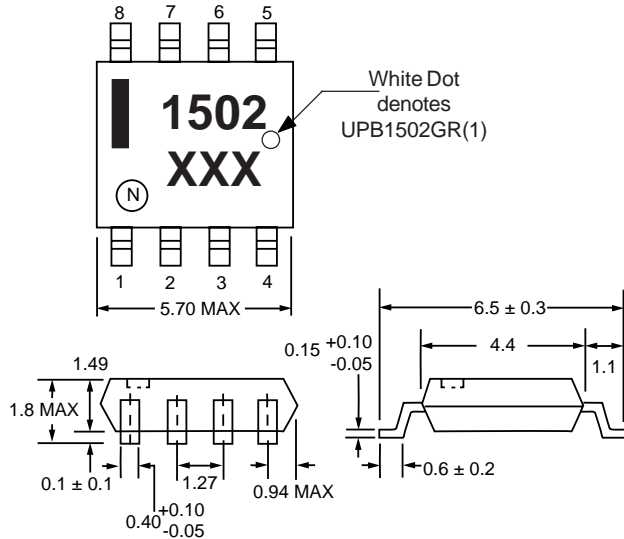
Divide-by-one-twenty-nine mode  
V<sub>CC</sub> = 3.0 V, I<sub>CC</sub> = 6.7 mA

SW = Low, PSC = Low

FREQUENCY			FREQUENCY		
(MHz)	S <sub>11</sub> MAG	ANG	(MHz)	S <sub>22</sub> MAG	ANG
250	0.804	-13	50	0.981	-6
500	0.769	-26	100	0.921	-13
750	0.727	-41	150	0.801	-18
1000	0.650	-54	200	0.712	-17
1250	0.581	-68	250	0.667	-16
1500	0.508	-82			
1750	0.467	-96			
2000	0.452	-115			
2250	0.435	-144			
2500	0.413	-171			

**OUTLINE DIMENSIONS** (Units in mm)

**UPB1502GR  
PACKAGE OUTLINE G08**



Lead Material: Alloy 42  
Lead Plating: Lead-Tin Alloy

PIN CONNECTION	DESCRIPTION
1. IN	Signal Input
2. Vcc	DC Supply Voltage
3. SW	Divide Ratio Control*
4. OUT	Signal Output
5. GND	Ground
6. PSC	Modulus Control*
7. STBY	Stand By Operation*
8. $\overline{\text{IN}}$	Signal Input Reference

\* See Application Circuit

**ORDERING INFORMATION**

PART NUMBER	QUANTITY
UPB1502GR-E1	2500/REEL
UPB1502GR(1)-E1	2500/REEL

Note:  
Embossed tape, 12 mm wide.

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