

# NEC

## 2.5 GHz DIVIDE-BY- 512/256 PRESCALER

## UPB586B UPB586G

### FEATURES

- HIGH FREQUENCY OPERATION TO 2.5 GHz
- WIDE BAND OPERATION
- SINGLE SUPPLY VOLTAGE:  $V_{CC} = 5 V \pm 10\%$
- AVAILABLE IN TAPE AND REEL (G08 PACKAGE)

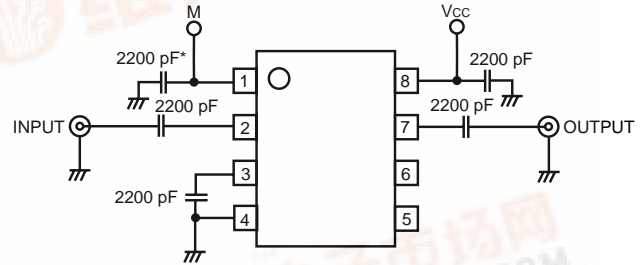
### DESCRIPTION

The UPB586 series of devices are silicon bipolar prescalers which can be operated in divide-by-256 or divide-by-512 mode. They feature high frequency response and operate from a single 5 volt supply. The series is available in two package styles: 8 lead ceramic flat pack (UPB586B) and an 8 pin plastic mini-flat package (UPB586G). Applications include frequency synthesis, division and scaling.

### RECOMMENDED OPERATING CONDITIONS (TA = 25°C)

SYMBOL	PARAMETER	UNITS	RATINGS
Vcc	Supply Voltage	V	4.5 to 5.5
TOP	Operating Temperature	°C	-20 to +75

### TEST CIRCUIT



\*Not required if M is grounded.

Note: Because of the high internal gain and gain compression of the UPB586, this device is prone to self-oscillation in the absence of an RF input signal. If the device will be used in an application where DC power will be applied in the absence of an RF input signal, this self-oscillation can be suppressed by any of the following means:

- \* Add a shunt resistor from the RF input line to ground. The blocking capacitor should be between the resistor and the UPB586, but physical separation should be minimized. Typically a resistor value between 50 and 100 ohms will suppress the self-oscillation.
- \* Apply a DC offset voltage of +3.0 volts to the INPUT pin. The voltage source should be isolated from the INPUT pin by a series 1000 ohm resistor.
- \* Apply a DC offset voltage of +1.5 volts to the BYPASS pin. The voltage source should be isolated from the BYPASS pin by a series 1000 ohm resistor.

All these approaches reduce the input sensitivity of the UPB586 (by as much as 3 dB for the example of a 50 ohm shunt resistor), but otherwise have no affect on the reliability or other electrical characteristics of this device.

### ELECTRICAL CHARACTERISTICS<sup>1</sup> (TA = -20 to +75°C, Vcc = 5 V)

PART NUMBER PACKAGE OUTLINE			UPB586B, UPB586G BF08, G08		
SYMBOLS	PARAMETERS AND CONDITIONS	UNITS	MIN	TYP	MAX
Icc	Supply Current, TA = 25°C	mA	19	28	37
f <sub>IN</sub>	Frequency Response at PIN = -15 to -10 dBm PIN = -10 to -5 dBm PIN = -5 to +5 dBm	GHz GHz GHz	0.5 0.5 1.3		2.3 2.5 2.5
P <sub>IN</sub>	Input Power at f <sub>IN</sub> = 0.5 to 1.3 GHz f <sub>IN</sub> = 1.3 to 2.3 GHz f <sub>IN</sub> = 2.3 to 2.5 GHz	dBm dBm dBm	-15 -15 -10		-5 +5 +5
P <sub>OUT</sub>	Power Output at f <sub>IN</sub> = 2 GHz, P <sub>IN</sub> = 0 dBm, TA = 25°C	dBm	-11	-7	
R <sub>TH</sub> (J-C)	Thermal Resistance, Junction to Case (UPB586B)	°C/W			50
R <sub>TH</sub> (J-A)	Thermal Resistance, Junction to Ambient (UPB586G) <sup>2</sup>	°C/W			270

Notes:  
1. Vcc = 5 V ± 10% (unless otherwise noted); Zs = Zo = 50 Ω.  
2. Mounted on a 5 x 5 x 0.16 mm epoxy glass circuit board.

# UPB586B, UPB586G

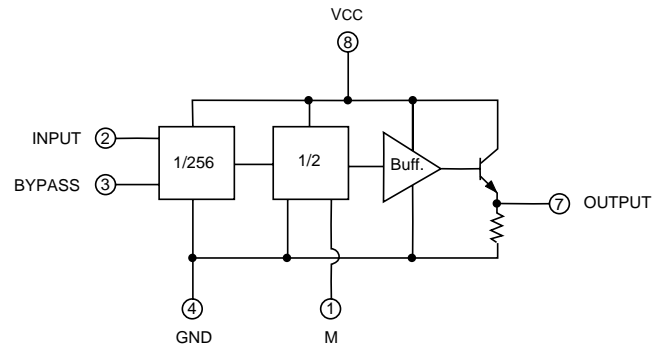
## ABSOLUTE MAXIMUM RATINGS<sup>1</sup> (T<sub>A</sub> = 25°C)

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>IN</sub>	Input Power	dBm	+10
P <sub>D</sub>	Power Dissipation UPB586B UPB586G	W mW	1.5 (T <sub>A</sub> = +125°C) 250 (T <sub>A</sub> = +85°C)
T <sub>OP</sub>	Operating Temperature UPB586B UPB586G	°C °C	-55 to +125 -40 to +85
T <sub>STG</sub>	Storage Temperature UPB586B UPB586G	°C °C	-55 to +200 -65 to +150

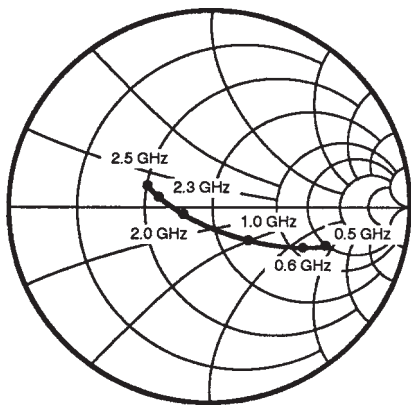
Note:

1. Operaton in excess of any one of these parameters may result in permanent damage.

## INTERNAL BLOCK DIAGRAM



## INPUT IMPEDANCE FOR UPB586G



V<sub>CC</sub> = 5 V, I<sub>C</sub> = 28 mA,  
Z<sub>0</sub> = 50 Ω

Frequency (GHz)	Z <sub>IN</sub> (Ω)
0.5	157.9 -j99.9
0.6	136.6 -j79.9
0.8	111.4 -j61.3
1.0	90.1 -j43.4
1.2	74.2 -j29.7
1.4	62.9 -j20.2
1.6	54.0 -j13.7
1.8	45.7 -j8.6
2.0	39.8 -j4.3
2.2	33.8 -j0.1
2.3	31.1 +j1.6
2.5	28.0 +j4.5

## UPB586B

### INPUT AND OUTPUT S-PARAMETERS

V<sub>CC</sub> = 5 V, I<sub>CC</sub> = 28 mA

#### DIVIDE-BY-256 MODE

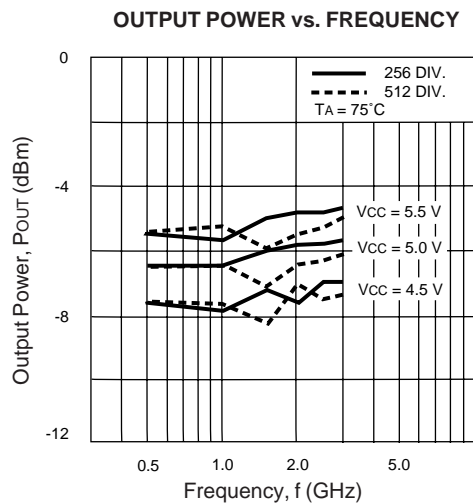
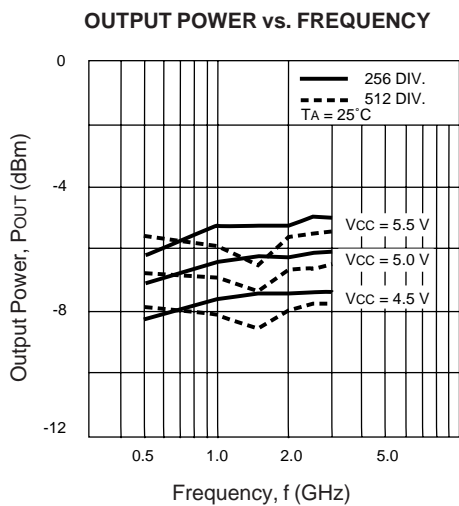
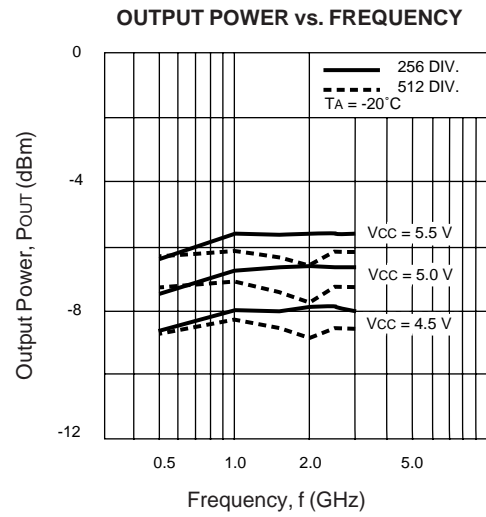
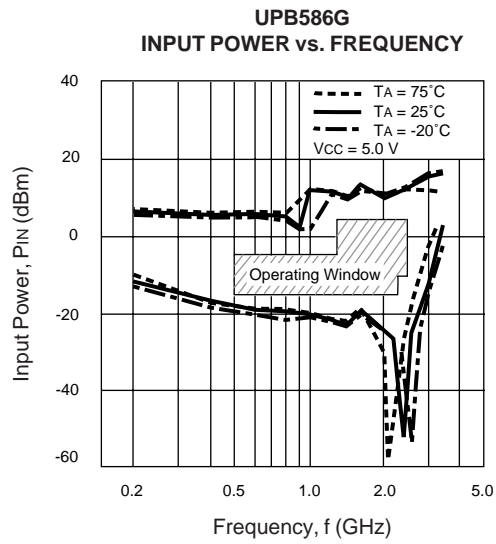
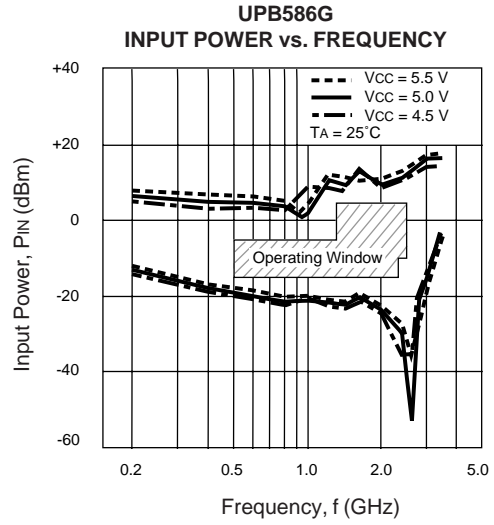
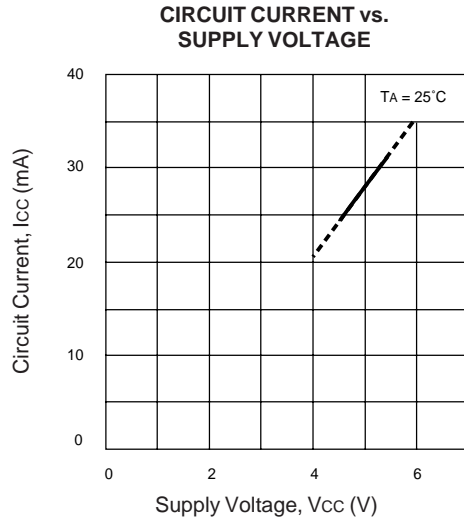
Frequency		S <sub>11</sub>		Frequency		S <sub>22</sub>		
(GHz)	MAG	ANG	(GHz)	MAG	ANG	(GHz)	MAG	ANG
0.20	0.768	-14	0.10	0.516	-9			
0.40	0.752	-29	0.20	0.505	-14			
0.60	0.734	-43	0.30	0.501	-20			
0.80	0.715	-57	0.40	0.500	-27			
1.00	0.698	-70	0.50	0.499	-33			
1.20	0.686	-84	0.60	0.495	-40			
1.40	0.663	-98	0.70	0.492	-46			
1.60	0.629	-112	0.80	0.484	-53			
1.80	0.591	-126	0.90	0.479	-59			
2.00	0.547	-139	1.00	0.474	-66			
2.20	0.502	-151						
2.40	0.456	-162						
2.60	0.413	-172						
2.80	0.378	180						
3.00	0.355	171						

#### DIVIDE-BY-512 MODE

Frequency		S <sub>11</sub>		Frequency		S <sub>22</sub>		
(GHz)	MAG	ANG	(GHz)	MAG	ANG	(GHz)	MAG	ANG
0.20	0.990	-11	0.10	0.495	-9			
0.40	0.978	-21	0.20	0.487	-14			
0.60	0.968	-32	0.30	0.482	-20			
0.80	0.957	-42	0.40	0.482	-26			
1.00	0.947	-52	0.50	0.482	-33			
1.20	0.939	-62	0.60	0.477	-39			
1.40	0.930	-72	0.70	0.476	-46			
1.60	0.916	-82	0.80	0.468	-53			
1.80	0.905	-92	0.90	0.471	-59			
2.00	0.889	-102	1.00	0.458	-65			
2.20	0.871	-112						
2.40	0.854	-121						
2.60	0.832	-130						
2.80	0.812	-139						
3.00	0.795	-144						

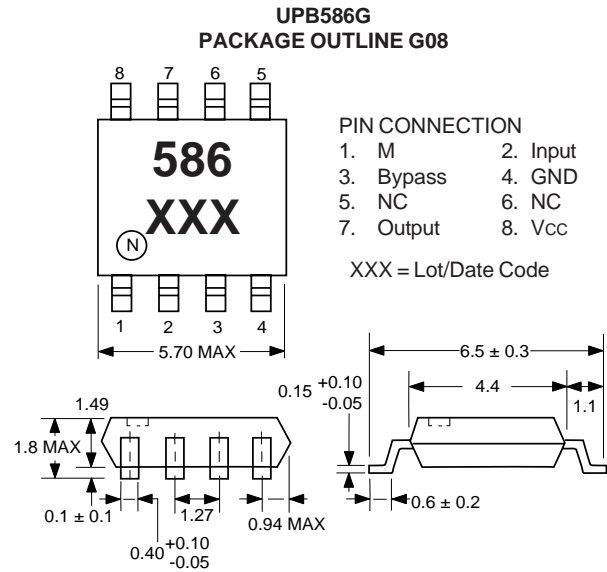
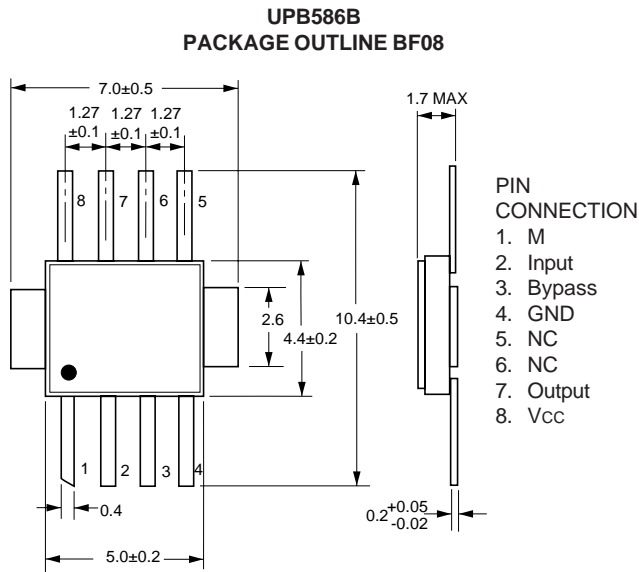
# UPB586B, UPB586G

## TYPICAL PERFORMANCE CURVES (TA = 25°C)



# UPB586B, UPB586G

## OUTLINE DIMENSIONS (Units in mm)



## PIN DESCRIPTION

PIN NO.	SYMBOL	DESCRIPTION	
1	M	Division Ratio Control	
		M	Division Ratio
		L (GND)	1/512
		H (Vcc)	1/256
2	INPUT	Signal Input Pin	
3	BYPASS	Input Bypass Pin, shall be connected to ground through bypass connector	
4	GND	Ground Pin	
5	NC	Non Connection	
6	NC	Non Connection	
7	OUTPUT	Output Pin	
8	Vcc	Power Supply	

## ORDERING INFORMATION

PART NUMBER	QTY
UPB586G-E1	2500/Reel