

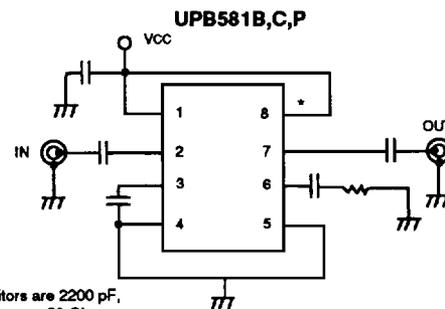
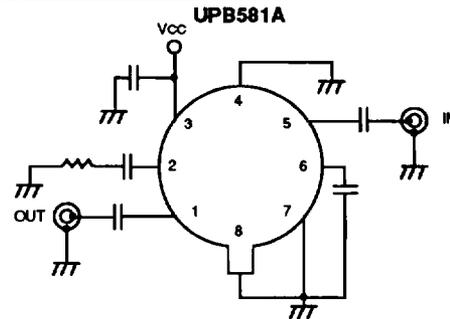
FEATURES

- HIGH FREQUENCY OPERATION TO 2.8 GHz
- WIDE BAND OPERATION
- SINGLE SUPPLY VOLTAGE: $V_{CC} = 5\text{ V} \pm 10\%$
- COMPLEMENTARY OUTPUTS

DESCRIPTION

The UPB581 series of devices are divide-by-2 silicon bipolar digital prescalers. They feature high frequency response and operate from a single 5 volt supply. The series is available in chip form (UPB581P) and three package styles: 8 pin can (UPB581A); 8 lead ceramic flat package (UPB581B) and an 8 pin DIP (UPB581C). Applications include: frequency synthesis, division and scaling.

TEST CIRCUITS



Note:
All capacitors are 2200 pF,
All resistors are 50 Ohms.
*Pin 8 is not connected for UPB581C.

ELECTRICAL CHARACTERISTICS ($V_{CC} = 5.0 \pm 0.5\text{ V}$, $Z_s = Z_L = 50\ \Omega$)

PART NUMBER PACKAGE OUTLINE			UPB581A A08			UPB581B, UPB581P BF08, CHIP			UPB581C C08		
SYMBOLS	PARAMETERS AND CONDITIONS	UNITS	MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX
I_{CC}	Power Supply Current	mA	15	30	40	15	30	40	15	30	40
f_{IN}	Frequency Response at PIN = -10 to -5 dBm ¹ PIN = -5 to 0 dBm ¹ PIN = 0 to +5 dBm ¹ PIN = -2 to +10 dBm ² PIN = +3 to +10 dBm ² PIN = -5 to +10 dBm ³ PIN = -5 to +10 dBm ⁴ PIN = -3 to +10 dBm ⁵	GHz GHz GHz GHz GHz GHz GHz GHz									
PIN	Input Power at $f_{IN} = 0.5$ to 2.4 GHz ¹ $f_{IN} = 0.5$ to 2.6 GHz ¹ $f_{IN} = 0.5$ to 2.8 GHz ¹ $f_{IN} = 0.5$ to 2.6 GHz ² $f_{IN} = 0.5$ to 2.8 GHz ² $f_{IN} = 0.5$ to 2.2 GHz ³ $f_{IN} = 0.5$ to 2.4 GHz ⁴ $f_{IN} = 0.5$ to 2.4 GHz ⁵	dBm dBm dBm dBm dBm dBm dBm dBm									
P_{OUT}	Output Power ⁶	dBm	-12	-8		-12	-8		-12	-8	
$R_{TH}(J-C)$	Thermal Resistance, Junction to Case (UPB581B)	°C/W						50			

Notes:

1. $T_A = -40$ to $+85^\circ\text{C}$.
2. $T_A = -20$ to $+75^\circ\text{C}$.
3. $T_A = -35$ to $+85^\circ\text{C}$.
4. $T_A = -20$ to $+65^\circ\text{C}$, $V_{CC} = 5.0 \pm 0.25$ Volts.
5. $T_A = -20$ to $+70^\circ\text{C}$, $V_{CC} = 5.0 \pm 0.25$ Volts.
6. $T_A = +25^\circ\text{C}$, $f_{IN} = 2.0$ GHz, $P_{IN} = 0$ dBm.

UPB581A, UPB581B, UPB581C, UPB581P

ABSOLUTE MAXIMUM RATINGS¹ (TA = 25°C)

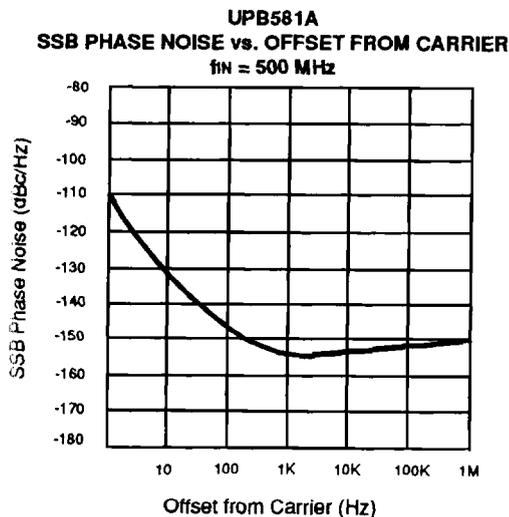
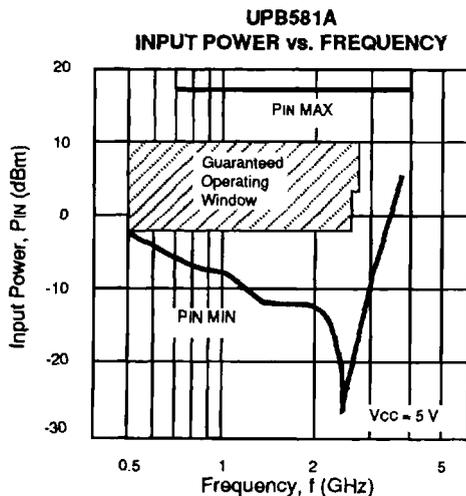
SYMBOLS	PARAMETERS	UNITS	RATINGS
VCC	Supply Voltage	V	-0.5 to 6.0
VIN	Input Voltage	V	-0.5 to VCC + 0.5
Pin	Input Power	dBm	+10
Pd	Power Dissipation		
	UPB581B, P ²	mW	1500
	UPB581A ³ UPB581C ³	mW	750 600
TOP	Operating Temperature		
	UPB581B, P UPB581A, C	°C	-55 to +125 -55 to +85
TSTG	Storage Temperature		
	UPB581B, P	°C	-65 to +200
	UPB581A	°C	-55 to +200
	UPB581C	°C	-55 to +125

Notes:

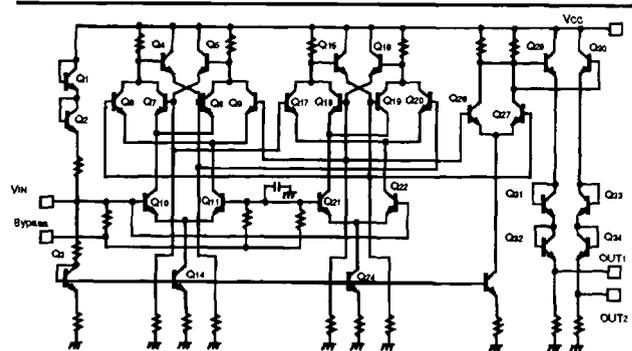
1. Operation in excess of any one of these parameters may result in permanent damage.
2. TA = Absolute Maximum Operating Temperature.
3. TA = +125°C.
4. TA = +85°C.

TYPICAL PERFORMANCE CURVES

(TA = 25°C unless otherwise noted.)



INTERNAL SCHEMATIC



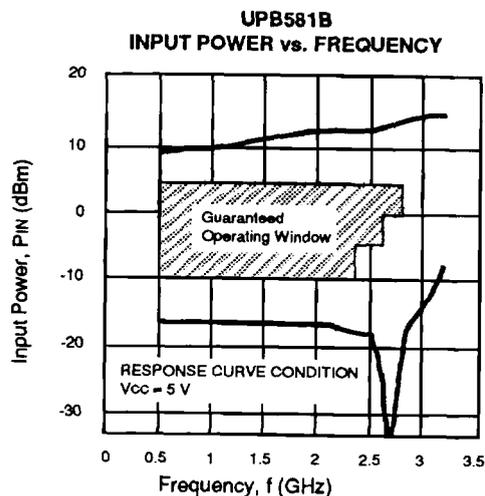
RECOMMENDED OPERATING CONDITIONS

SYMBOL	PARAMETER	UNITS	RATINGS
VCC	Supply Voltage	V	4.5 to 5.5
TOP	Operating Temperature		
	UPB581B, P	°C	-40 to +85
	UPB581A UPB581C	°C	-20 to +75 -35 to +85

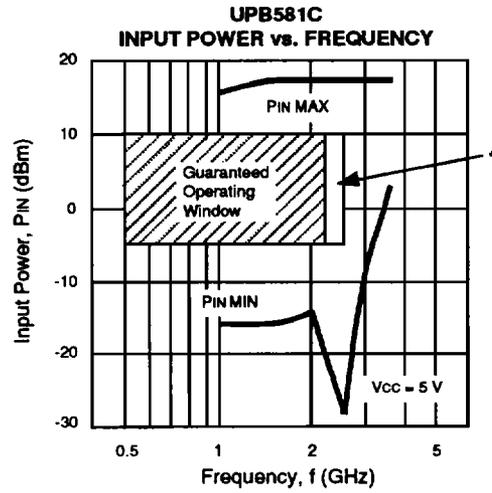
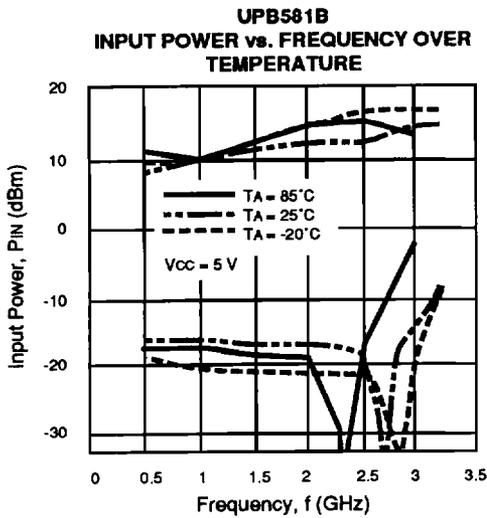
Note: Because of the high internal gain and gain compression of the UPB581, this device is prone to self-oscillation in the absence of an RF input signal. If the device will be used in an application where DC power will be applied in the absence of an RF input signal, this self-oscillation can be suppressed 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 UPB581, 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. Less than 50 microamps current draw is expected.
- * 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. Less than 50 microamps current draw is expected.

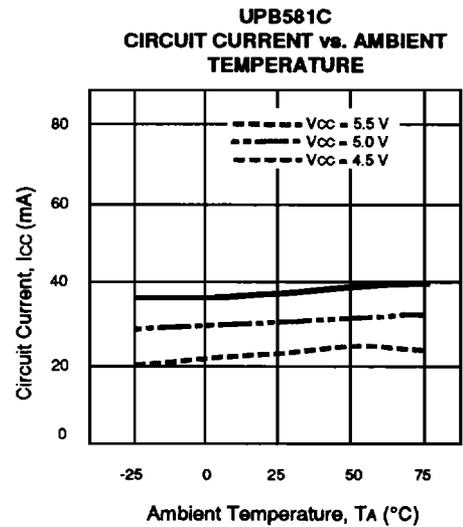
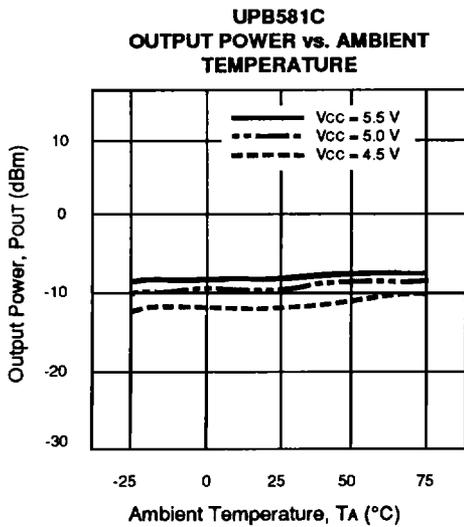
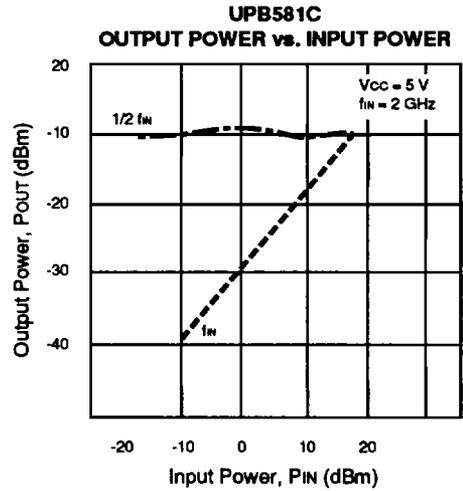
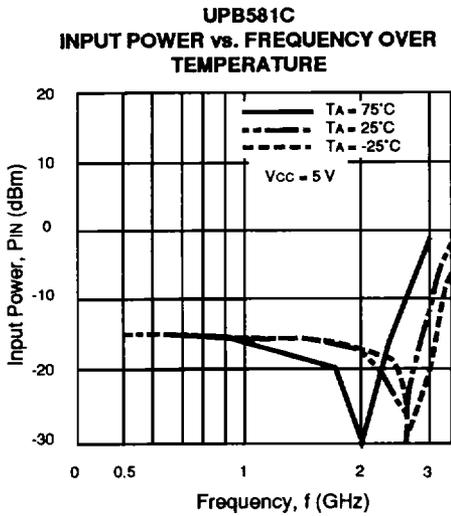
All these approaches reduce the input sensitivity of the UPB581 (by as much as 3 dB for the example of a 50 ohm shunt resistor), but otherwise have no effect on the reliability or other electrical characteristics of this device.



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



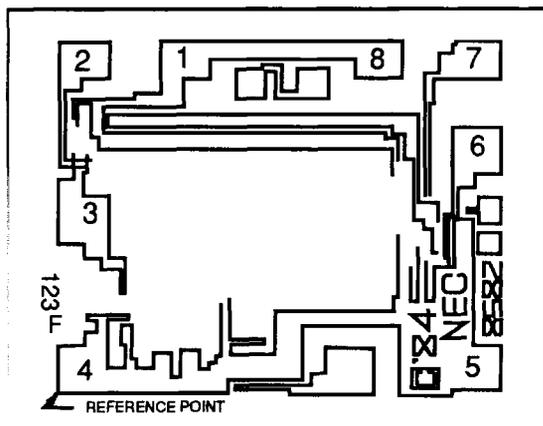
* See special conditions in Electrical Characteristics Table.



UPB581A, UPB581B, UPB581C, UPB581P

OUTLINE DIMENSIONS (Units in mm)

UPB581P (CHIP)



CHIP FEATURES

- Die Size: 1.01 X 0.88 mm
- Thickness: 170 ± 30 μm
- Pad Size: 100 X 100 μm
- Ti/Pt/Au Metallization

BONDING INFORMATION

BONDING PAD NO.	BONDING PAD POSITION ¹ (μm)		PAD CONNECTION
	X AXIS	Y AXIS	
1	250	700	VCC
2	50	700	Input
3	50	360	Bypass
4	50	50	GND
5	830	50	GND
6	830	500	Output 1
7	830	700	Output 2
8	630	700	VCC

Note:

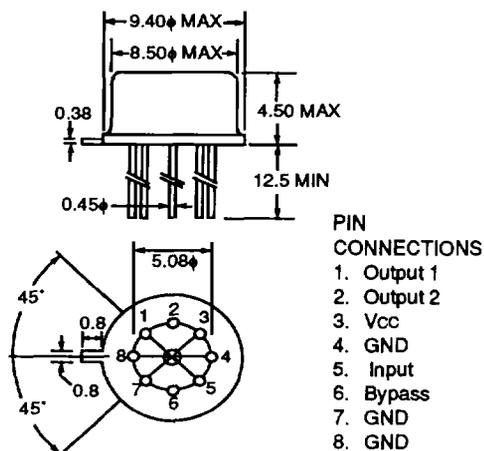
1. From reference point to center of bonding pad. See chip drawing.

UPB581B INPUT AND OUTPUT S-PARAMETERS

Vcc = 5.0 V, Icc = 30 mA

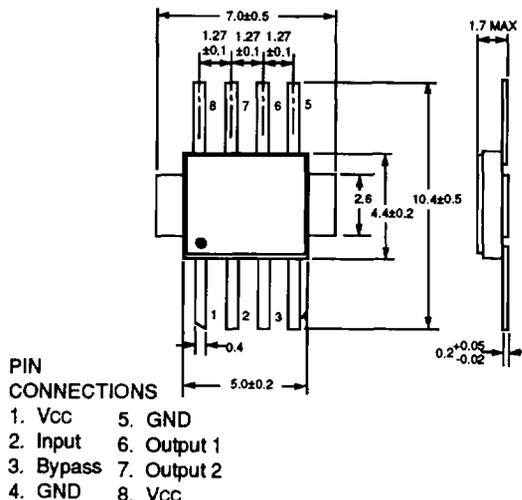
Freq (GHz)	S ₁₁		Freq (GHz)	S ₂₂	
	MAG	ANG		MAG	ANG
0.20	0.732	-16	0.10	0.174	168
0.40	0.713	-32	0.20	0.207	138
0.60	0.691	-47	0.30	0.227	114
0.80	0.674	-62	0.40	0.257	96
1.00	0.659	-77	0.50	0.284	81
1.20	0.655	-92	0.60	0.310	67
1.40	0.642	-108	0.70	0.332	55
1.60	0.617	-125	0.80	0.347	41
1.80	0.583	-142	0.90	0.377	33
2.00	0.537	-159	1.00	0.367	17
2.20	0.488	-176	1.10	0.386	11
2.40	0.435	167	1.20	0.389	-10
2.60	0.377	149	1.30	0.406	-10
2.80	0.305	132	1.40	0.363	-28
3.00	0.245	115	1.50	0.428	-30

UPB581A
PACKAGE OUTLINE A08



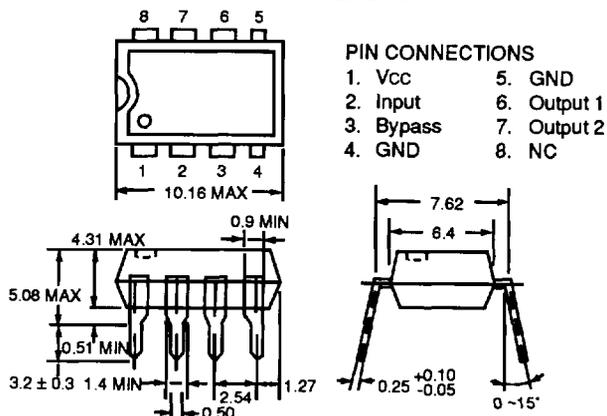
- PIN CONNECTIONS
1. Output 1
 2. Output 2
 3. Vcc
 4. GND
 5. Input
 6. Bypass
 7. GND
 8. GND

UPB581B
PACKAGE OUTLINE BFO8



- PIN CONNECTIONS
1. Vcc
 2. Input
 3. Bypass
 4. GND
 5. GND
 6. Output 1
 7. Output 2
 8. Vcc

UPB581C
PACKAGE OUTLINE C08



- PIN CONNECTIONS
1. Vcc
 2. Input
 3. Bypass
 4. GND
 5. GND
 6. Output 1
 7. Output 2
 8. NC