NEC

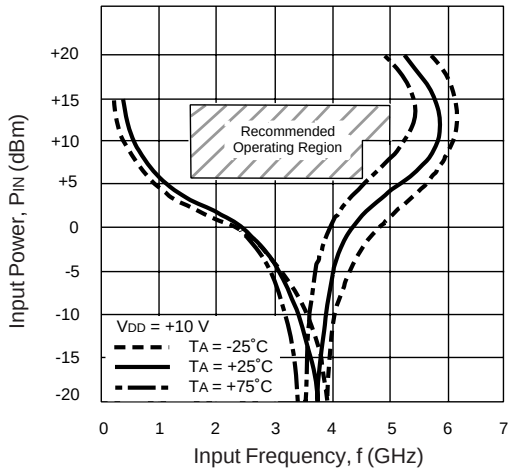
5 GHz DIVIDE-BY-4 STATIC PRESCALER

UPG501B

FEATURES

- **WIDE OPERATING FREQUENCY RANGE:** f_{IN} = 1.5 GHz to 5 GHz (T_A = 25°C)
- **SINGLE SUPPLY VOLTAGE:** V_{DD} = +10 V
- **DIVISION RATIO OF 4**
- **HIGH RELIABILITY HERMETICALLY SEALED PACKAGE**
- **GUARANTEED PERFORMANCE OVER AN AMBIENT TEMPERATURE RANGE:** -25°C to +75°C

INPUT POWER vs. INPUT FREQUENCY



DESCRIPTION

The UPG501B is a GaAs divide-by-4 prescaler that is capable of operating up to 5 GHz. It is intended to be used in frequency synthesizers of microwave communications systems and measurement equipment. The UPG501B is a static divider with two (2) master-slave D-type flip-flops using Source-Coupled-FET-Logic (SCFL). It operates from a single supply voltage. The UPG501B is housed in a hermetically sealed 8-lead ceramic flat package that is easy to use and provides high reliability.

ELECTRICAL CHARACTERISTICS (T_A = -25°C to +75°C, V_{DD} = 10 V, V_{GG} = Open)

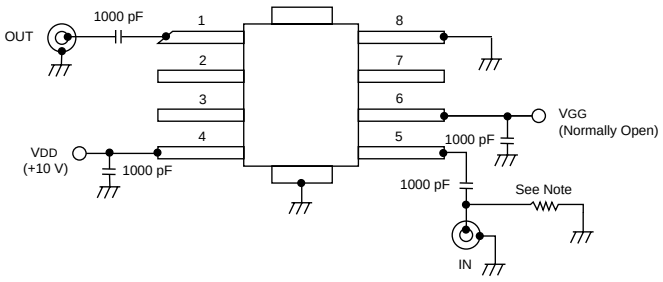
PART NUMBER PACKAGE OUTLINE			UPG501B BF08		
SYMBOLS	**PARAMETERS AND CONDITIONS**	**UNITS**	**MIN**	**TYP**	**MAX**
I_{DD}	Supply Current	mA	50	70	90
$f_{IN(U)}$	Upper Limit of Input Frequency	GHz	5.0	5.3	
$f_{IN(L)}$	Lower Limit of Input Frequency	GHz		0.7	1.5
P_{IN}	Input Power, f_{IN} = 4.5 to 5 GHz f_{IN} = 1.5 to 4.5 GHz	 dBm dBm	 10.0 6.0		 13.0 13.0
P_{OUT}	Output Power at f_{IN} = 5 GHz	dBm	-1.0	2.0	
$R_{TH(CH-C)}$	Thermal Resistance (Channel to Case)	°C/W			16

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

SYMBOLS	PARAMETERS	UNITS	RATINGS
V_{DD}	Supply Voltage	V	+12
I_{DD}	Supply Current	mA	150
P_T	Total Power Dissipation[2]	W	1.5
P_{IN}	Input Power	dBm	+20
T_{OP}	Operating Temperature	°C	-65 to +125
T_{STG}	Storage Temperature	°C	-65 to +175

Notes:
1. Operation in excess of any one of these conditions may result in permanent damage.
2. $T_C \leq 125°C$

TEST CIRCUIT



Note: Because of the high internal gain and gain compression of the UPG501B, the device is subject to self-oscillation in the absence of an RF input signal. This self-oscillation can be suppressed by either of the following means:

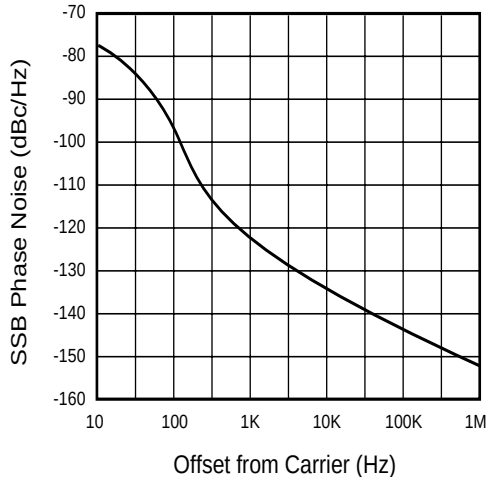
• Add a shunt resistor to the RF input line. Typically a resistor value between 50 and 1000 ohms will suppress the self-oscillation (see the test circuit).

• Apply a negative voltage through a 1000 ohm resistor to the normally open VGG connection. Typically voltages between 0 and -9 volts will suppress the self-oscillation.

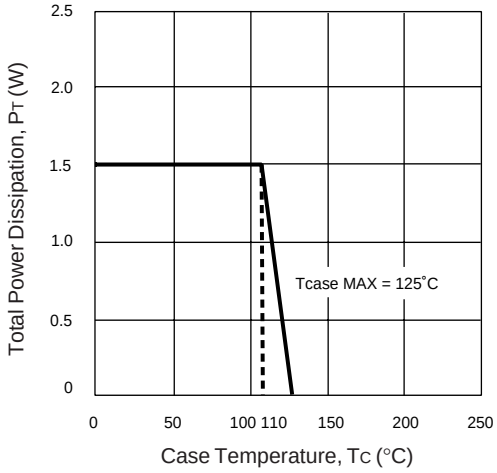
Both of these approaches will reduce the input sensitivity of the device (by as much as 3 dB for a 50 ohm shunt resistor), but otherwise have no effect on the reliability or other electrical characteristics of the device.

TYPICAL PERFORMANCE CURVES (T_A = 25°C)

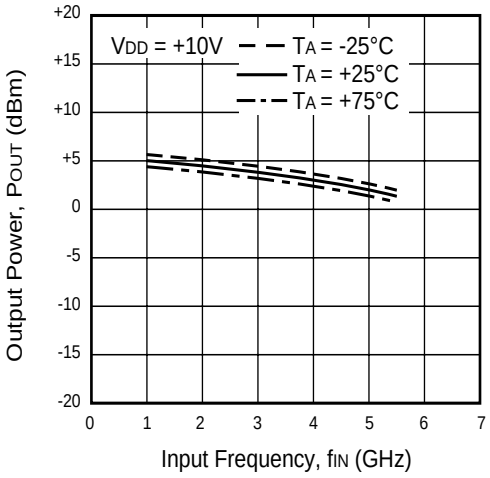
SSB PHASE NOISE vs. OFFSET FROM CARRIER
f_{IN} = 3.41 GHz, T_A = 25°C



POWER DERATING CURVE

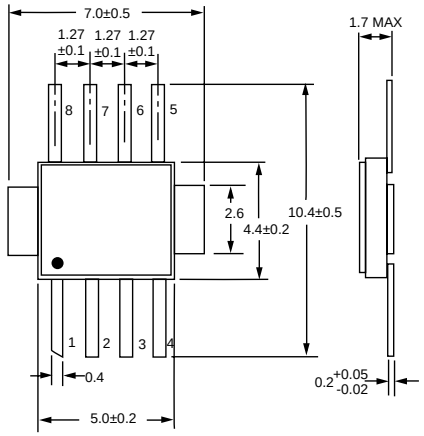


OUTPUT POWER vs. INPUT FREQUENCY



OUTLINE DIMENSIONS (Units in mm)

UPG501B
PACKAGE OUTLINE BF08



LEAD CONNECTIONS:
1. OUTPUT
2. NC*
3. NC*
4. V_{DD}
5. INPUT
6. V_{GG}
7. NC*
8. GND
FLANGE, GND

* No connection