

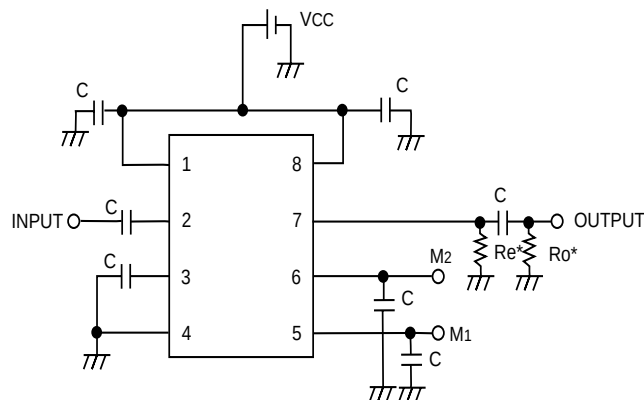
FEATURES

- HIGH FREQUENCY OPERATION TO 1 GHz
- LOW SUPPLY VOLTAGE: 2.2 V to 3.5 V
- LOW SUPPLY CURRENT: 5.5 mA
- AVAILABLE IN TAPE AND REEL (G08 PACKAGE)

DESCRIPTION

The UPB587 series of devices are silicon bipolar digital prescalers which can be operated in divide-by-two, divide-by-four or divide-by-eight mode. They feature frequency response to 1 GHz, and operate from a single 3 volt supply drawing only 5.5 milliamps. The series is available in two package styles: 8 lead ceramic flat pack (UPB587B), and an 8 pin plastic mini-flat package (UPB587G). Applications include: synthesizer for DBS receiver and telecommunication applications. The low DC voltage required and power-saving current draw make them ideal for hand-held, battery-powered applications.

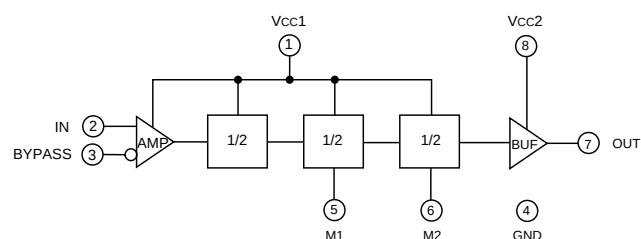
TEST CIRCUIT



C = 2200 pF

*Re and Ro used on test circuit as indicated below.

BLOCK DIAGRAM



ELECTRICAL CHARACTERISTICS¹ (T_A = -20 to +75°C, V_{CC} = 2.2 to 3.5 V)

PART NUMBER PACKAGE OUTLINE			UPB587B, UPB587G BF08, G08		
SYMBOLS	PARAMETERS AND CONDITIONS	UNITS	MIN	TYP	MAX
I _{CC}	Supply Current	mA		5.5	7.5
f _{IN}	Frequency Response at P _{IN} = -20 to 0 dBm, Divide-by-eight Divide-by-four Divide-by-two P _{IN} = -18 to 0 dBm, Divide-by-eight Divide-by-four Divide-by-two	MHz MHz MHz MHz MHz MHz MHz	100 100 100 50 50 50		1000 600 300 1000 600 300
P _{IN}	Input Power at: f _{IN} = 50 to 100 MHz f _{IN} = 100 to 300 MHz, Divide-by-two f _{IN} = 100 to 600 MHz, Divide-by-four f _{IN} = 100 to 1000 MHz, Divide-by-eight	dBm dBm dBm dBm	-18 -20 -20 -20		0 0 0 0
V _O	Output Voltage, at f _{IN} = 0.5 GHz, P _{IN} = -10 dBm, Z _O = 200 Ω	V _{P-P}	0.1	0.3	
R _{TH} (J-C)	Thermal Resistance, Junction to Case (UPB587B)	°C/W			50
R _{TH} (J-A)	Thermal Resistance, Junction to Ambient (UPB587G) ²	°C/W			270

Notes:

1. V_{CC1} = 2.2 V to 3.5 V, V_{CC2} = 2.2 to 3.5 V.
2. Mounted on a 5 x 5 x 0.16 mm epoxy glass circuit board.
3. To improve impedance match to a 50 Ω load, a 1.2 KΩ shunt resistor on the output line is recommended.

ABSOLUTE MAXIMUM RATINGS¹ (T_A = 25°C)

SYMBOLS	PARAMETERS	UNITS	RATINGS
V _{CC1} , V _{CC2}	Supply Voltage	V	-0.5 to 4.0
V _{IN} , V _M	Input Voltage, Ratio Control Voltage	V	-0.5 to V _{CC} + 0.5
P _{IN}	Input Power	dBm	+10
P _T	Power Dissipation UPB587B UPB587G	W mW	1.5 (T _A = +125°C) 250 (T _A = +85°C)
T _{OP}	Operating Temperature UPB587B UPB587G	°C °C	-55 to +125 -40 to +85
T _{STG}	Storage Temperature UPB587B UPB587G	°C °C	-65 to +200 -65 to +150

Note:

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

RECOMMENDED
OPERATING CONDITIONS

SYMBOL	PARAMETER	UNITS	RATINGS
V _{CC1} , V _{CC2}	Supply Voltage	V	2.2 to 3.5
T _{OP}	Operating Temperature	°C	-20 to +75

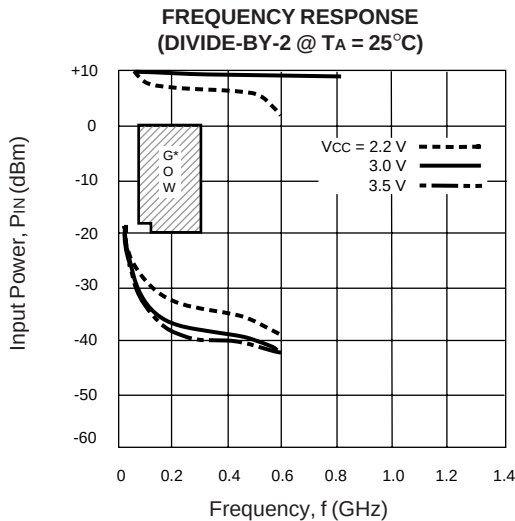
Note: Because of the high internal gain and gain compression of the UPB587, this device is prone to self-oscillation in the absence of an RF input signal. If the device will be used in an application where DC power will be applied in the absence of an RF input signal, this self-oscillation can be suppressed 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 UPB587, 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 +2.0 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 +1.0 volts to the BYPASS pin. The voltage source should be isolated from the BYPASS pin by a series 1000 ohm resistor.

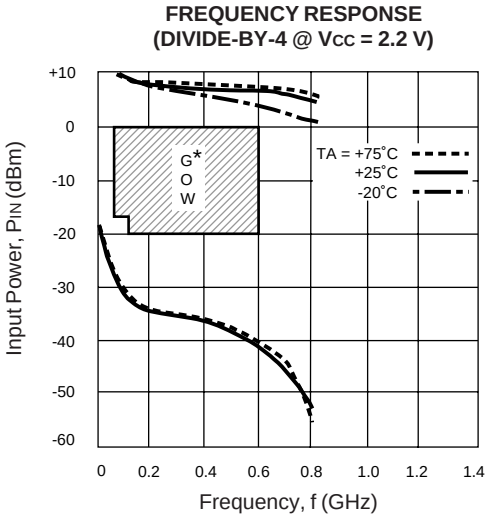
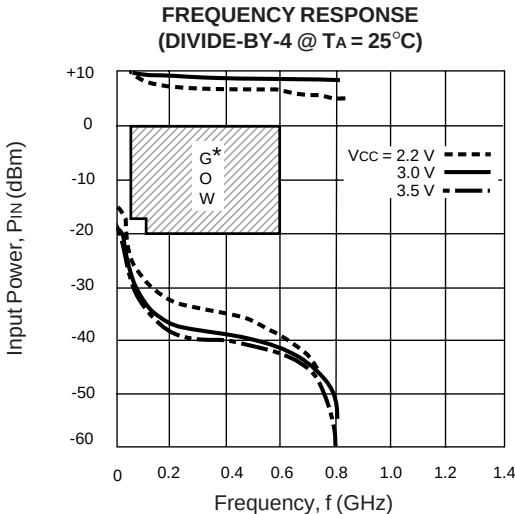
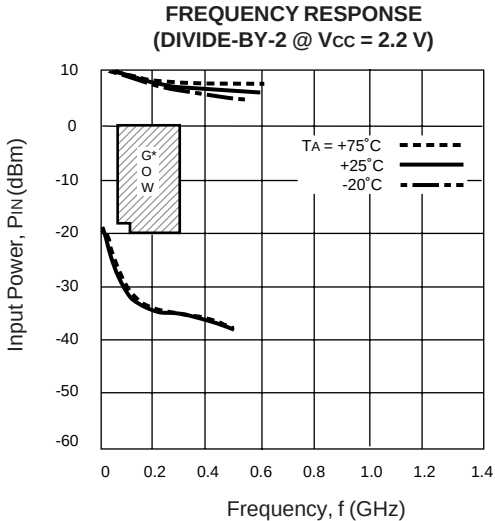
All these approaches reduce the input sensitivity of the UPB587 (by as much as 3 dB for the example of a 50 ohm shunt resistor), but otherwise have no affect on the reliability or other electrical characteristics of this device.

TYPICAL PERFORMANCE CURVES

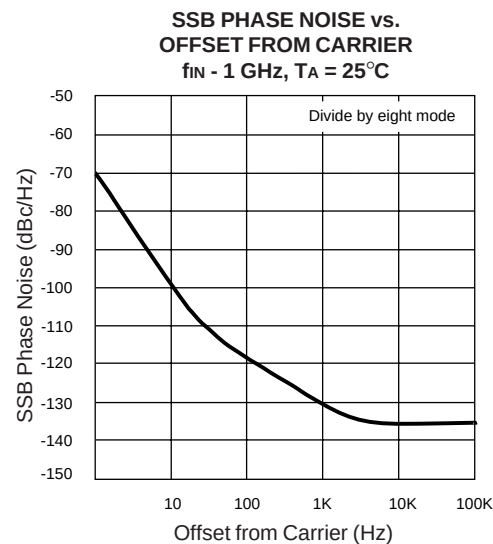
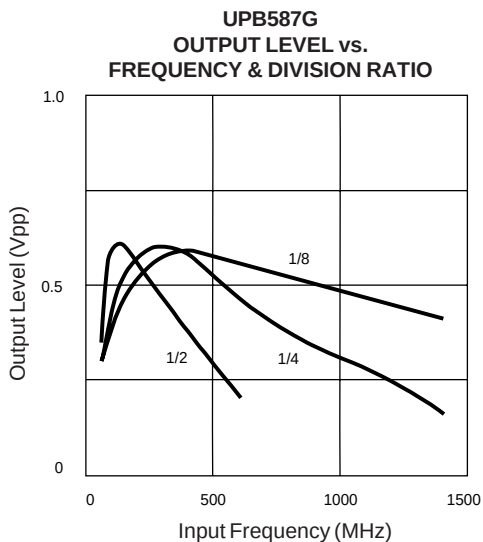
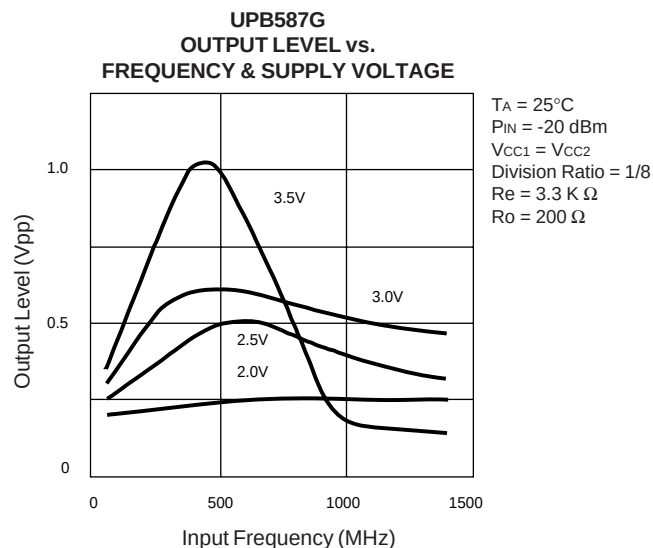
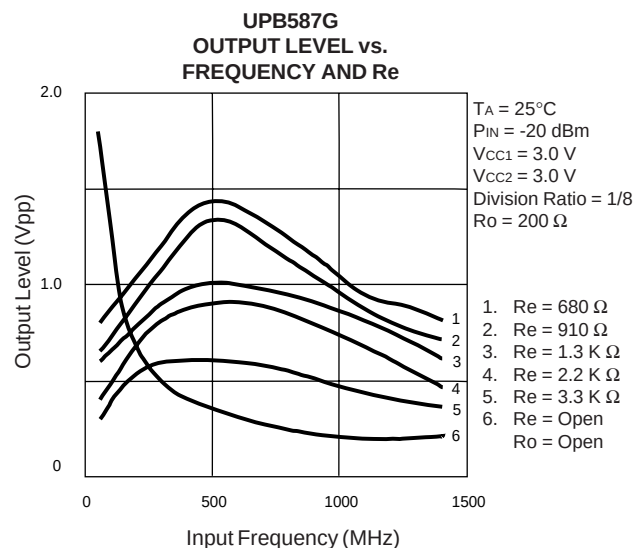
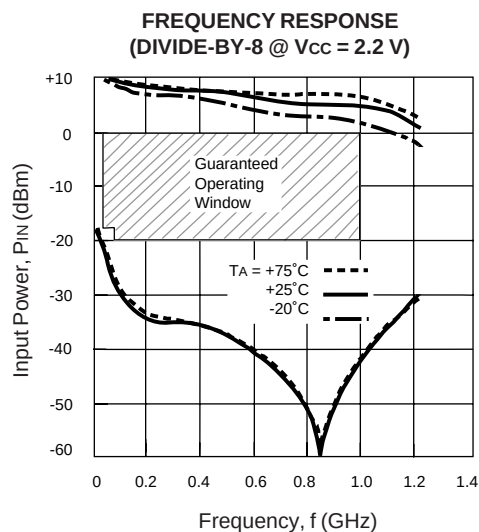
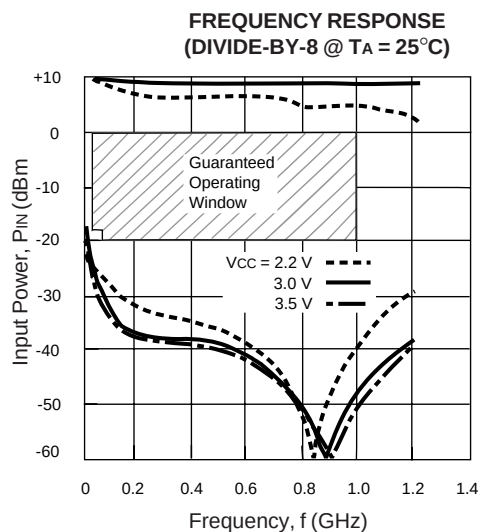
(T_A = 25°C unless otherwise noted)



*Guaranteed
Operating
Window



TYPICAL PERFORMANCE CURVES



UPB587B
INPUT AND OUTPUT S-PARAMETERS

V_{CC} = 3.5 V, I_{CC} = 5.5 mA, Z_S = Z_L = 50 Ω

DIVIDE-BY-2 MODE

Frequency			S ₁₁			Frequency			S ₂₂		
(MHz)	MAG	ANG	(GHz)	MAG	ANG	(MHz)	MAG	ANG	(GHz)	MAG	ANG
100	0.039	-106	0.10	0.597	-1	100	0.049	-107	0.10	0.331	9
200	0.052	-109	0.20	0.619	-5	200	0.054	-114	0.20	0.451	22
300	0.069	-112	0.30	0.623	-8	300	0.066	-113	0.30	0.480	16
400	0.087	-115	0.40	0.634	-14	400	0.079	-112	0.40	0.517	15
500	0.103	-118	0.50	0.636	-19	500	0.092	-111	0.50	0.548	13

DIVIDE-BY-4 MODE

100	0.039	-106	0.10	0.606	-1	100	0.049	-107	0.10	0.377	7
200	0.052	-109	0.20	0.626	-2	200	0.055	-111	0.20	0.410	23
300	0.069	-112	0.30	0.644	-6	300	0.066	-112	0.30	0.508	22
400	0.086	-115	0.40	0.660	-12	400	0.080	-111	0.40	0.565	17
500	0.102	-118	0.50	0.665	-19	500	0.092	-110	0.50	0.599	13
600	0.119	-120				600	0.106	-109			
700	0.135	-123				700	0.117	-108			
800	0.150	-126				800	0.130	-106			

DIVIDE-BY-8 MODE

100	0.039	-106	0.10	0.606	0	100	0.049	-107	0.10	0.392	9
200	0.052	-109	0.20	0.628	-2	200	0.054	-113	0.20	0.433	21
300	0.069	-112	0.30	0.644	-6	300	0.066	-112	0.30	0.518	19
400	0.086	-115	0.40	0.659	-13	400	0.078	-111	0.40	0.569	15
500	0.102	-118	0.50	0.662	-19	500	0.091	-110	0.50	0.597	11
600	0.119	-120				600	0.105	-109			
700	0.135	-123				700	0.117	-108			
800	0.150	-126				800	0.128	-106			
900	0.164	-128				900	0.143	-105			
1000	0.181	-130				1000	0.155	-103			

UPB587G
INPUT AND OUTPUT S-PARAMETERS

V_{CC} = 3.5 V, I_{CC} = 5.5 mA, Z_S = Z_L = 50 Ω

DIVIDE-BY-TWO MODE *

Frequency			S ₁₁			Frequency			S ₂₂		
(MHz)	MAG	ANG	(GHz)	MAG	ANG	(MHz)	MAG	ANG	(GHz)	MAG	ANG
100	0.049	-107	0.10	0.331	9	100	0.049	-107	0.10	0.331	9
200	0.054	-114	0.20	0.451	22	200	0.054	-114	0.20	0.451	22
300	0.066	-113	0.30	0.480	16	300	0.066	-113	0.30	0.480	16
400	0.079	-112	0.40	0.517	15	400	0.079	-112	0.40	0.517	15
500	0.092	-111	0.50	0.548	13	500	0.092	-111	0.50	0.548	13

DIVIDE-BY-FOUR MODE *

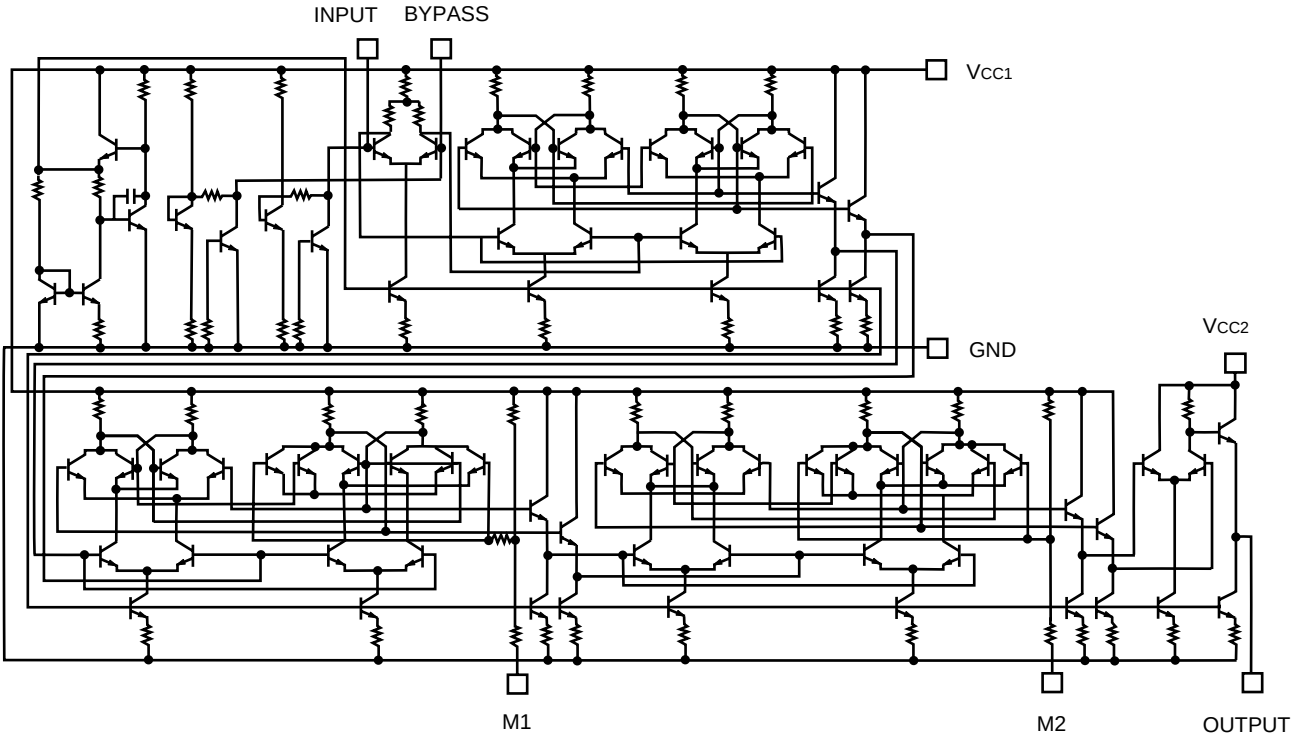
100	0.049	-107	0.10	0.377	7	100	0.049	-107	0.10	0.377	7
200	0.055	-111	0.20	0.410	23	200	0.055	-111	0.20	0.410	23
300	0.066	-112	0.30	0.508	22	300	0.066	-112	0.30	0.508	22
400	0.080	-111	0.40	0.565	17	400	0.080	-111	0.40	0.565	17
500	0.092	-110	0.50	0.599	13	500	0.092	-110	0.50	0.599	13
600	0.106	-109				600	0.106	-109			
700	0.117	-108				700	0.117	-108			
800	0.130	-106				800	0.130	-106			

DIVIDE-BY-EIGHT MODE *

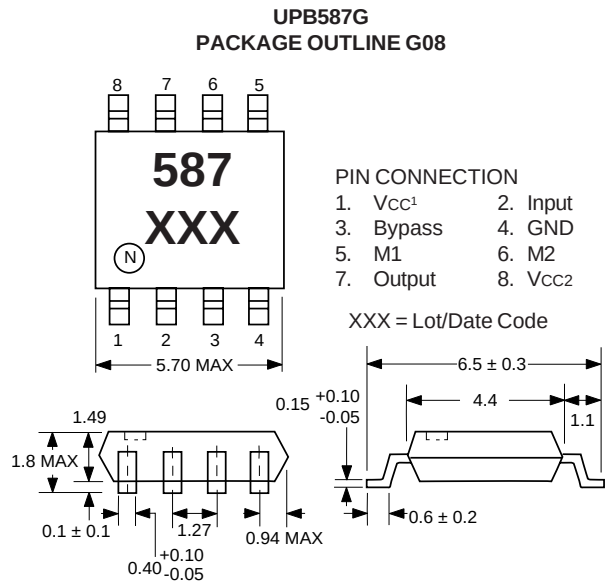
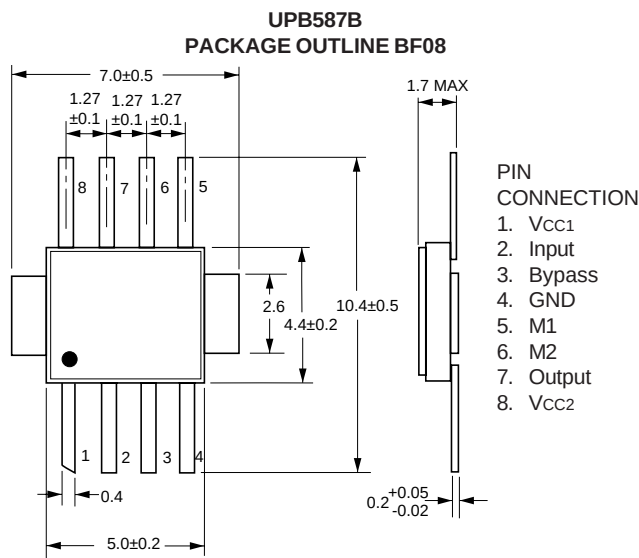
100	0.049	-107	0.10	0.392	9	100	0.049	-107	0.10	0.392	9
200	0.054	-113	0.20	0.433	21	200	0.054	-113	0.20	0.433	21
300	0.066	-112	0.30	0.518	19	300	0.066	-112	0.30	0.518	19
400	0.078	-111	0.40	0.569	15	400	0.078	-111	0.40	0.569	15
500	0.091	-110	0.50	0.597	11	500	0.091	-110	0.50	0.597	11
600	0.105	-109				600	0.105	-109			
700	0.117	-108				700	0.117	-108			
800	0.128	-106				800	0.128	-106			
900	0.143	-105				900	0.143	-105			
1000	0.155	-103				1000	0.155	-103			

* These parameters were taken with the oscillation suppression 50 Ω resistor on the input line.

EQUIVALENT CIRCUIT

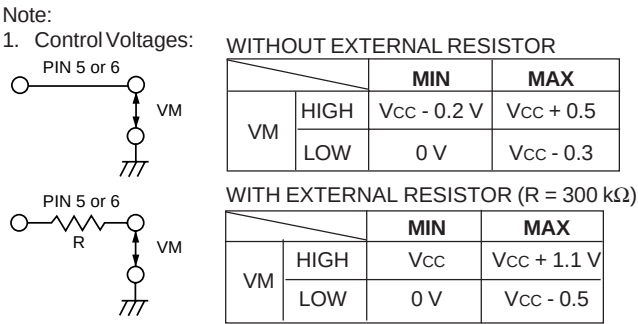


OUTLINE DIMENSIONS (Units in mm)



PIN DESCRIPTION

PIN NO.	SYMBOL	DESCRIPTION												
1	Vcc1	Power Supply Pin of Input Amplifier and Divider												
2	INPUT	Signal Input Pin												
3	BYPASS	Input Bypass Pin, shall be connected to ground through bypass capacitor												
4	GND	Ground Pin												
5	M1	Division Ratio Control¹ <table><tr><th>M1</th><th>M2</th><th>Division Ratio</th></tr><tr><td>L</td><td>L</td><td>1/8</td></tr><tr><td>L</td><td>H</td><td>1/4</td></tr><tr><td>H</td><td>H</td><td>1/2</td></tr></table>	M1	M2	Division Ratio	L	L	1/8	L	H	1/4	H	H	1/2
M1	M2		Division Ratio											
L	L		1/8											
L	H		1/4											
H	H	1/2												
6	M2													
7	OUTPUT	Output Pin												
8	Vcc2	Power Supply of Output Buffer												



ORDERING INFORMATION

PART NUMBER	QTY
UPB587G-E1	2500/Reel