NEC

BIPOLAR DIGITAL INTEGRATED CIRCUIT

μPB587G

1 GHz DIVIDE-BY-2/4/8 3 V, 5.5 mA PRESCALER

The μPB587G is a divide by 2/4/8 prescaler for portable VHF/UHF TV and radio applications. This IC operates up to 1 GHz with 2.2 to 3.5 V bias supply by utilizing highly efficient ECL process technology. This IC is packaged in 8 pin SOP.

Thus, this IC can contribute to produce a physically small and low voltage PLL synthesizer in conjunction with DTS microcomputer 17K series.

FEATURES

- Low power operation : 2.2 to 3.5 V
- Low supply current : 5.5 mA (TYP.) at 3 V
- Divide by 2/4/8
- Wide band operation :
  - 50 to 1000 MHz @ Divide by 8
  - 50 to 600 MHz @ Divide by 4
  - 50 to 300 MHz @ Divide by 2
- High sensitivity : –18 dBm (MIN.)

ORDERING INFORMATION

PART NUMBER	PACKAGE	SUPPLYING FORM	QUALITY GRADE
μPB587G-E1	8 pin plastic SOP (225 mil)	Embossed tape 12 mm wide. QTY 2.5 k/reel Pin1 is in tape pull-out direction.	Standard
μPB587G-E2	8 pin plastic SOP (225 mil)	Embossed tape 12 mm wide. QTY 2.5 k/reel Pin1 is in tape roll-in direction.	Standard

Please refer to "Quality grade on NEC Semiconductor Devices" (Document number IEI-1209) published by NEC Corporation to know the specification of quality grade on the devices and its recommended applications.

Caution: Electro-static sensitive devices

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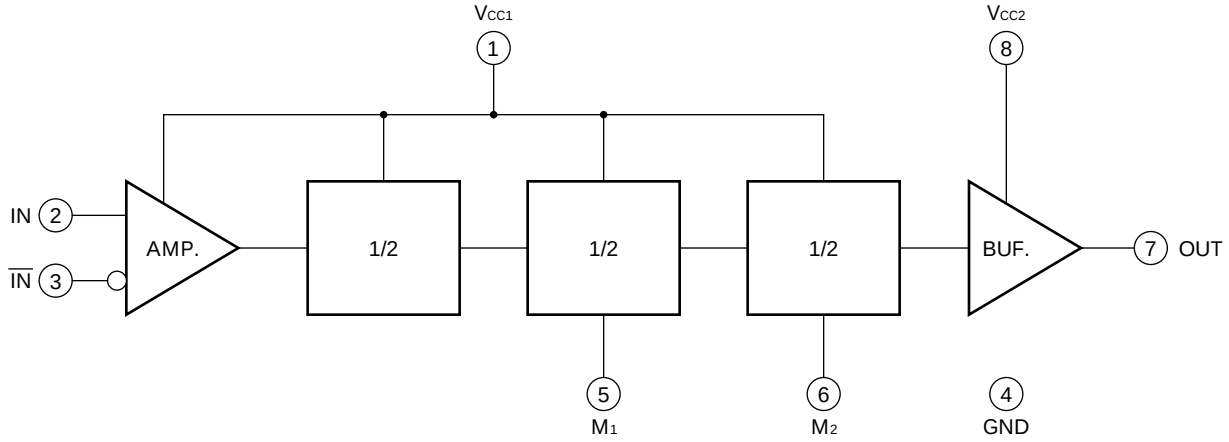
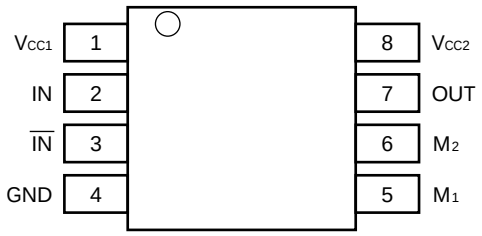
INTERNAL BLOCK DIAGRAM



PIN CONFIGURATION (Top View)



PIN DESCRIPTION

PIN No.	SYMBOL	DESCRIPTION
1	V_{CC1}	Power Supply Pin of Input Amplifier and Divider
2	IN	Signal Input Pin
3	$\overline{IN}$	Input Bypass Pin should be connected to ground through bypass capacitor (e.g. 1000 pF)
4	GND	Ground Pin
5 6	M_1 M_2	Division Ratio Control

M_1	M_2	Division Ratio
L	L	1/8
L	H	1/4
H	H	1/2

7	OUT	Output Pin
8	V_{CC2}	Power Supply Pin of Output Buffer

ABSOLUTE MAXIMUM RATINGS

Supply Voltage	V_{CC}	–0.5 to +4.0	V
Input Voltage to M pin	V_I		–0.5 to V_{CC} + 0.5 V
Input Level to IN pin	P_{in}		10 dBm
Power Dissipation	P_D	250	mW
Storage Temperature	T_{stg}	–65 to +150	°C

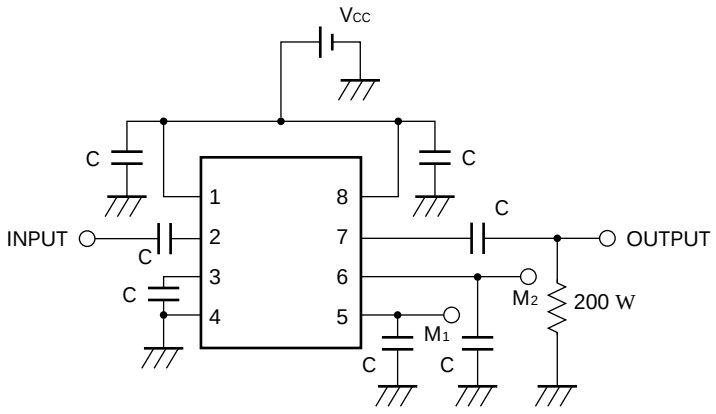
RECOMMENDED OPERATING CONDITIONS

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT
Supply Voltage	V_{CC}	2.2	3.0	3.5	V
Operating Temperature	T_{opt}	–20		+75	°C

ELECTRICAL CHARACTERISTICS (V_{CC} = 2.2 to 3.5 V, T_a = –20 to +75 °C, Z_S = 50 Ω, Z_L = 200 Ω)

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITIONS
Supply Current	I_{CC}		5.5	7.5	mA	V_{CC} = 3.0 V, T_a = +25 °C
Output Voltage	V_O	0.1	0.3		V_{P-P}	OUT pin, f_{in} = 500 MHz, P_{in} = –10 dBm
Input Power	$P_{in}1$	–20		0	dBm	IN pin, f_{in} = 100 to 1000 MHz
Input Power	$P_{in}2$	–18		0	dBm	IN pin, $f_{in} \geq$ 50 MHz
Operating Frequency	f_{in1}	100		1000	MHz	IN pin, P_{in} = –20 to 0 dBm Divide by 8
Operating Frequency	f_{in2}	50		1000	MHz	IN pin, P_{in} = –18 to 0 dBm Divide by 8
Operating Frequency	f_{in3}	100		600	MHz	IN pin, P_{in} = –20 to 0 dBm Divide by 4
Operating Frequency	f_{in4}	50		600	MHz	IN pin, P_{in} = –18 to 0 dBm Divide by 4
Operating Frequency	f_{in5}	100		300	MHz	IN pin, P_{in} = –20 to 0 dBm Divide by 2
Operating Frequency	f_{in6}	50		300	MHz	IN pin, P_{in} = –18 to 0 dBm Divide by 2
Division ratio control input high	V_{IH}	V_{CC}		$V_{CC} \times 1.1$	V	M_1, M_2 pin
Division ratio control input low	V_{IL}	0		$V_{CC} - 0.5$	V	M_1, M_2 pin

TEST CIRCUIT

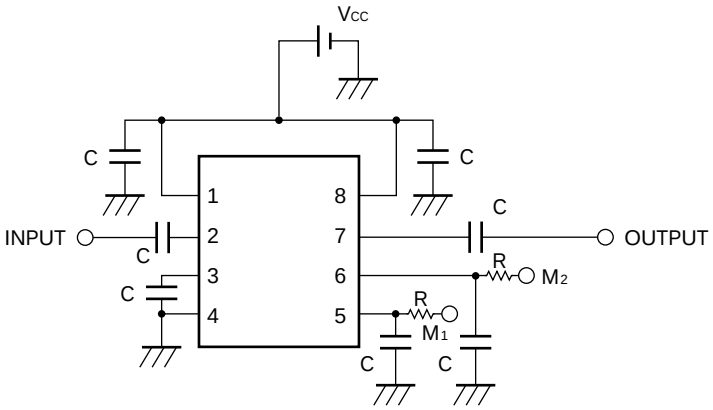


C: 1 000 pF

CHARACTERISTICS ON THE APPLICATION CIRCUIT (V_{CC} = 2.2 to 3.5 V, T_a = –20 to +75 °C)

PARAMETER	SYMBOL	REFERENCE VALUE (UNIT: V)			
		CONDITIONS	MIN.	TYP.	MAX.
Division ratio control input high	V_{IH}	External registor 300 kΩ on application circuit example	V_{CC} – 0.2		5.5
Division ratio control input low	V_{IL}		0		$V_{CC} \times 0.3$

Application circuit example

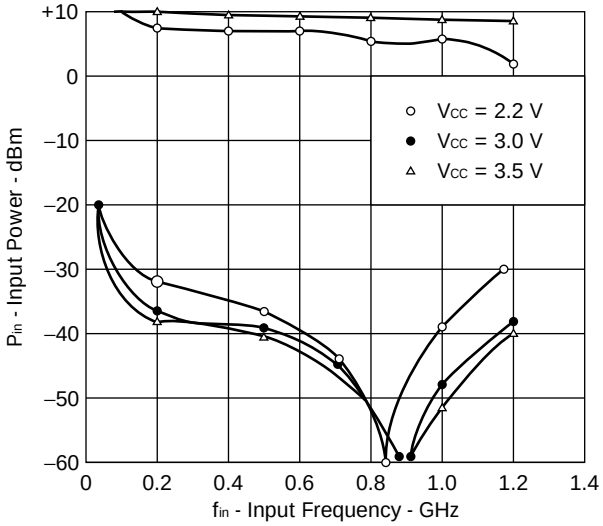


R = 300 kΩ
C: 2 200 pF

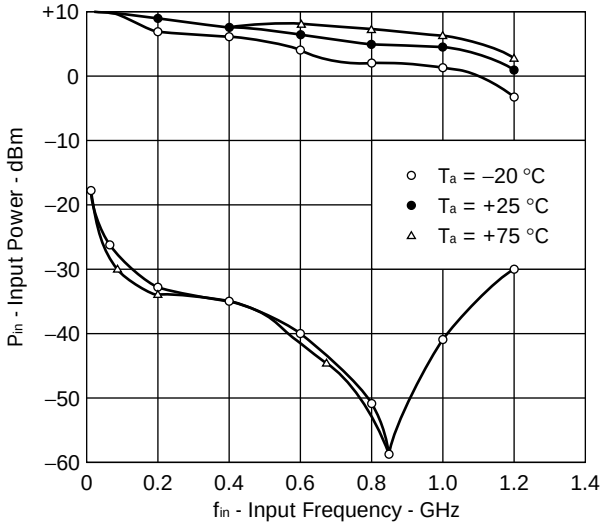
The application circuits and their parameters are for references only and are not intended for use in actual design-in's.

TYPICAL CHARACTERISTICS – ON THE TEST CIRCUIT –

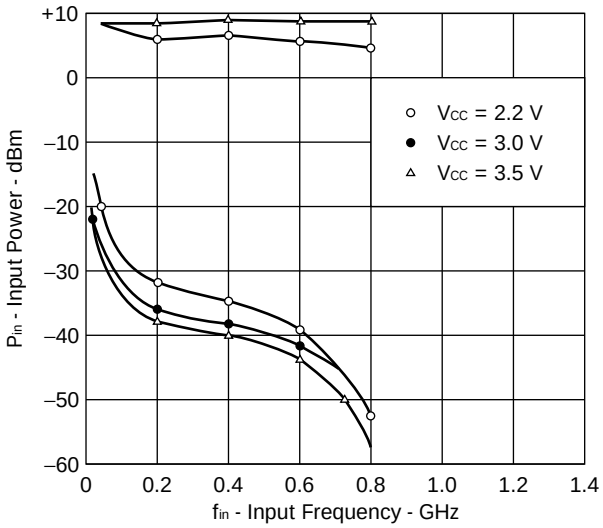
INPUT POWER vs. INPUT FREQUENCY (Divide by 8, T_a = +25 °C)



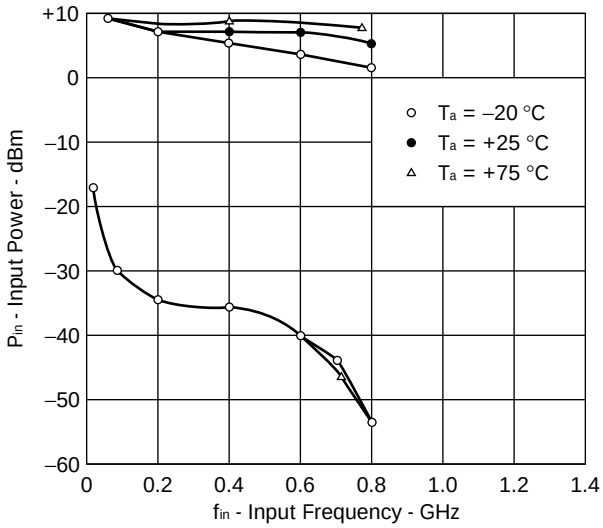
INPUT POWER vs. INPUT FREQUENCY (Divide by 8, V_{CC} = 2.2 V)



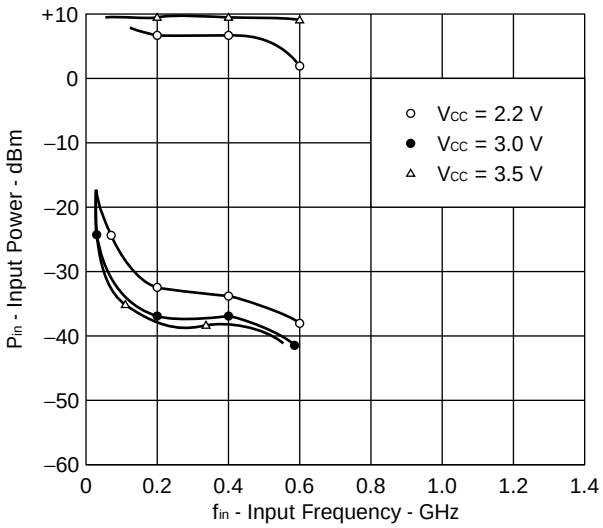
INPUT POWER vs. INPUT FREQUENCY (Divide by 4, T_a = +25 °C)



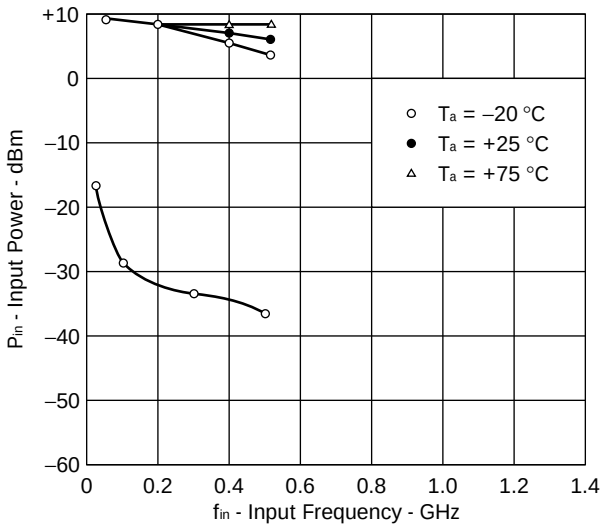
INPUT POWER vs. INPUT FREQUENCY (Divide by 4, V_{CC} = 2.2 V)



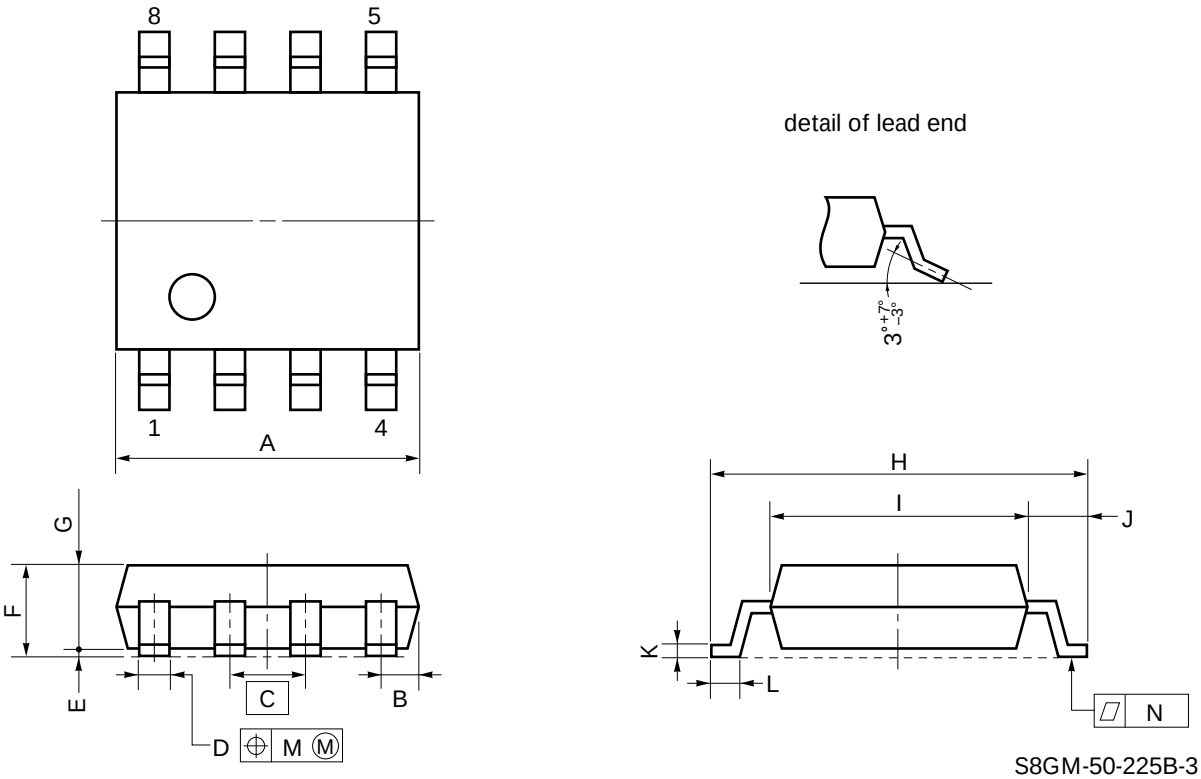
INPUT POWER vs. INPUT FREQUENCY (Divide by 2, T_a = +25 °C)



INPUT POWER vs. INPUT FREQUENCY (Divide by 2, V_{CC} = 2.2 V)



8 PIN PLASTIC SOP (225 mil)



S8GM-50-225B-3

NOTE

Each lead centerline is located within 0.12 mm (0.005 inch) of its true position (T.P.) at maximum material condition.

ITEM	MILLIMETERS	INCHES
A	5.37 MAX.	0.212 MAX.
B	0.78 MAX.	0.031 MAX.
C	1.27 (T.P.)	0.050 (T.P.)
D	$0.40^{+0.10}_{-0.05}$	$0.016^{+0.004}_{-0.003}$
E	0.1±0.1	0.004±0.004
F	1.8 MAX.	0.071MAX.
G	1.49	0.059
H	6.5±0.3	0.256±0.012
I	4.4	0.173
J	1.1	0.043
K	$0.15^{+0.10}_{-0.05}$	$0.006^{+0.004}_{-0.002}$
L	0.6±0.2	$0.024^{+0.008}_{-0.009}$
M	0.12	0.005
N	0.10	0.004

NOTE ON CORRECT USE

(1) Observe precautions for handling because of electro-static sensitive devices.
(2) Form a ground pattern as wide as possible to keep the minimum ground impedance (to prevent undesired operation).
(3) Keep the wiring length of the ground pins as short as possible.
(4) Connect a bypass capacitor (e.g. 1 000 pF) to the V_{CC} pin.

RECOMMENDED SOLDERING CONDITIONS

This product should be soldered in the following recommended conditions. Other soldering methods and conditions than the recommended conditions are to be consulted with our sales representatives.

μPB587G

Soldering method	Soldering conditions	Recommended condition symbol
Infrared ray reflow	Package peak temperature: 235 °C, Hour: within 30 s. (more than 210 °C), Time: 2 times, Limited days: no.*	IR35-00-2
VPS	Package peak temperature: 215 °C, Hour: within 40 s. (more than 200 °C), Time: 2 times, Limited days: no.*	VP15-00-2
Wave soldering	Soldering tub temperature: less than 260 °C, Hour: within 10 s. Time: 1 time, Limited days: no.	WS60-00
Pin part heating	Pin area temperature: less than 300 °C, Hour: within 10 s. Limited days: no.*	

***:** It is the storage days after opening a dry pack, the storage conditions are 25 °C, less than 65 % RH.

Note 1. The combined use of soldering method is to be avoided (However, except the pin area heating method).

For details of recommended soldering conditions for surface mounting, refer to information document SEMICONDUCTOR DEVICE MOUNTING TECHNOLOGY MANUAL (IEI-1207).

[MEMO]

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