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Prescaler Circuit 2.1 GHz

PMB 2314T

Version 1.5

Wireless Infrastructure

Never stop thinking.

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Prescaler Circuit 2.1 GHz

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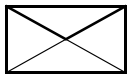

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1 Overview – Prescalar Circuit 2.1 GHz

1.1 Functional Description/ Application

The IC is designed for use in mobile radio communication devices up to 2100 MHz and upconversion systems up 2500 MHz.

Due to low power consumption and low phase noise generation, the PMB2314T is suitable for use in battery powered handheld systems, e.g. GSM, cordless telephones and cordless consumer products, as well as in basestations.

Low supply voltage down to 2.7V. It can be switched to a low-power standby mode.

Internal current source at the emitter follower output. No external resistor needed in typical applications.

The divide ratio is 1:64/65 or 1:128/129 depending on the external circuit configuration.

1.2 Circuit Description

The differential inputs of the IC may be connected either balanced or single ended. In the latter case the unused input must be RF-grounded with a capacitor (about 10 pF) with a low serial inductance.

Depending on the logic level at SW input the basic divide ratio of the ECL-stages is fixed to 1:64/65 or 1:128/129. The MOD input determines whether modulus 1:n or 1:n+1 (n=64 or 128 according to SW-level) is active.

The IC can be switched to a low-power standby mode (input STB).

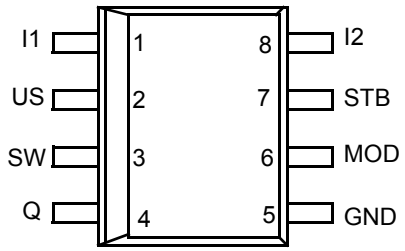
The MOD input is TTL/CMOS compatible.

The emitter follower output is CMOS compatible according to the application circuit on page 12. The minimum logic swing is 0.8 V_{pp}.

Table 1 Function Table

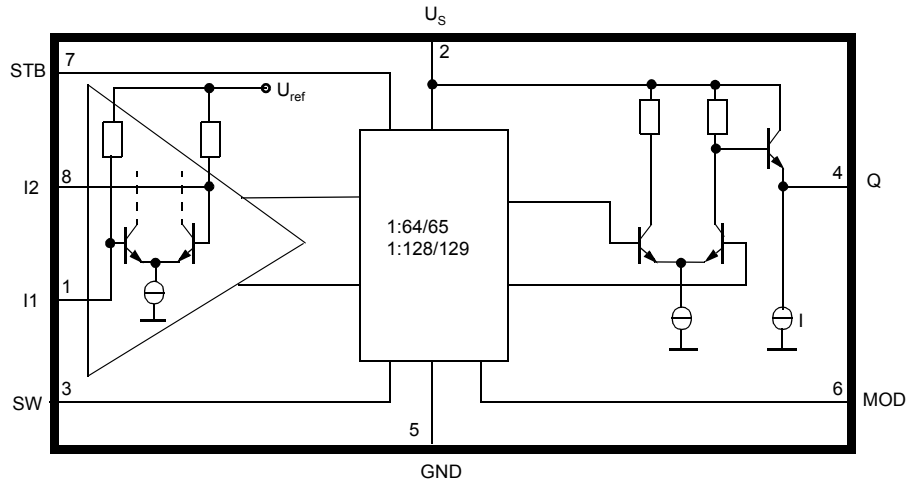
Input pin	Logic level	Prescaler function
SW	HIGH = U_S-0.1 V to U_S LOW = GND to 0.8 V or open	1:64/65 1:128/129
MOD	HIGH = 2.0 V to U_S or open LOW = GND to 0.8 V	1:64/1:128 1:65/1:129
STB	HIGH = U_S-0.1 V to U_S LOW = GND to 0.8 V	Divider Q=HIGH, STANDBY-mode

2 Pin Assignment



Pin 1	RF-input I1
Pin 2	supply voltage U_S
Pin 3	divide ratio 1:64/65 - 1:128/129 control input (SW)
Pin 4	output Q
Pin 5	GND
Pin 6	modulus 1:n/n+1 (n=64 or 128) control input (MOD)
Pin 7	standby mode control input (STB)
Pin 8	RF-input I2

3 Block Diagram



4 Absolute Maximum Ratings

T_A = -40 to 85 °C

Parameter	Symbol	Limit Values		Unit	Remarks
		min.	max.		
Supply voltage	U_S	-0.3	6	V	
Input level (Pin 1; Pin 8)	U_I		2	V	U_S=0V
Voltage swing (Pin 1 to 8)	U_{I18}	-2	2	V	
Input level (Pin 3; Pin 6; Pin 7)	U_{SW}, U_{MOD}, U_{STB},	-0.3	U_S+0.7V or 5.5V if U_S+0.7V > 5.5V	V	U_S=2.7...5.5V
Output level (Pin 4)	U_Q		U_S	V	
Output current (Pin 4)	$-I_Q$		5	mA	
Junction temperature	T_j		125	°C	
Storage temperature	T_S	-65	125	°C	
Thermal resistance system-ambient	R_{thsa}		185	K/W	

The maximum ratings may not be exceeded under any circumstances, not even momentarily and individually, as permanent damage to the IC will result.

ESD-integrity (according MIL-STD 883D, Meth. 3015.7): 500V

5 Operating Range

Parameter	Symbol	Limit Values		Unit	Remarks
		min.	max.		
Supply Voltage	U_S	2.7	5.5	V	
Input frequency	f	100	2300	MHz	
Ambient temperature	T_A	-40	85	°C	

Within the operational range the IC operates as described in the circuit description. The AC / DC characteristic limits are not guaranteed.

6 AC/DC Characteristics

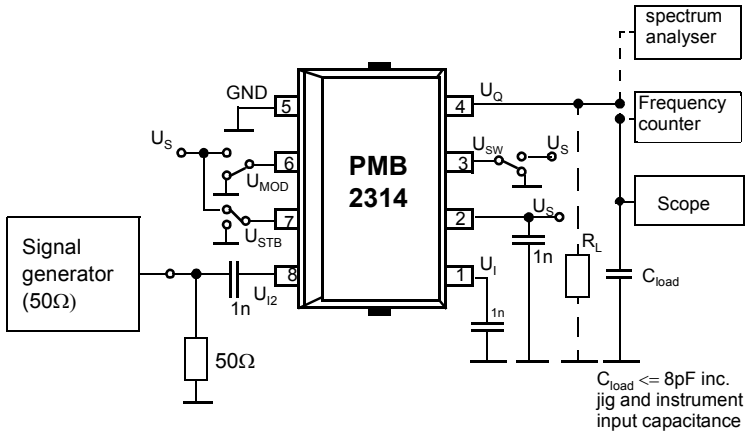
Supply voltage V_S=2.7 to 5.5V
Ambient temperature T_A = -20 to 85 °C (refered to the test circuit)

Parameter	Symbol	Limit Values			Unit	Test Condition
		min.	typ.	max.		
Supply Current						
Supply current normal operation	I_S		2.7	3.3	mA	inputs RF-grounded, U_S=2.7, T_A = 25 °C, STB= V_S output open
	I_S		2.8	3.4	mA	inputs RF-grounded, U_S=4.0, T_A = 25 °C, STB= V_S output open
	I_S		2.9	3.5	mA	inputs RF-grounded, V_S=5.5, T_A = 25 °C, STB= V_S output open
Supply current standby-mode	I_{STB}			0.1	mA	inputs RF-grounded, output open, STB = GND
RF Input I1,I2						
Input level dynamic range	P_{in}	-20		4	dBm	100-1500MHz (sine wave)
	P_{in}	-20		-3	dBm	2100 MHz (diagram 2)
Output Q						
Output logic swing	U_Q	1	1.1		VPP	C_L <= 12pF, R_L=2kΩ
	U_Q	0.8	1.1		VPP	C_L <= 8pF
Internal current source	I		400		µA	see block diagram
Divider Ratio Control Input SW						
age high	V_{SWH}	V_S-0.1		V_S	V	
Voltage low	V_{SWL}	GND		0.8	V	
Input current high	I_{SWH}			60	µA	SW=V_S
Input current low	-I_{SWL}			30	µA	SW=GND
Modulus Control Input MOD						
Voltage high	V_{MODH}	2.3		V_S	V	
Voltage low	V_{MODL}	GND		0.8	V	
Input current high	I_{MODH}			50	µA	MOD=V_S
Input current low	-I_{MODL}			120	µA	MOD=GND
Standby Mode Control Input STB						
Voltage high	V_{STBH}	U_S-0.1		V_S	V	
Voltage low	V_{STBL}	GND		0.8	V	
Input current high	I_{STBH}			30	µA	STB=V_S
Input current low	-I_{STBL}			60	µA	STB=GND
Delay times						
MOD setup time (diagram 1)	t_{set}		8	14	ns	

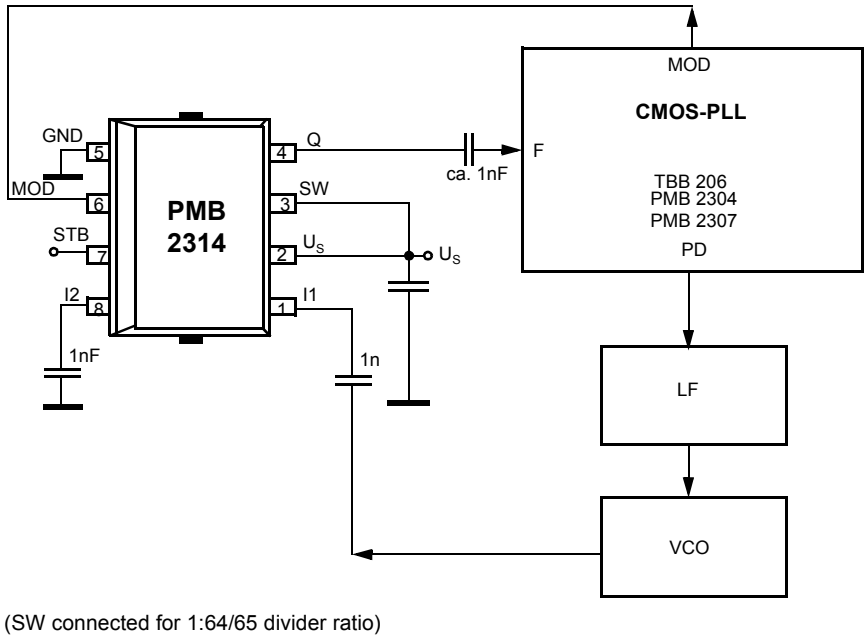
AC /DC characteristics involve the spread of values guaranteed within the specified suply voltage and ambient temperature range. Typical characteristics are the median of the production.

7 Test Circuit

Input sensitivity and output logic swing measurement



8 Application Circuit



(SW connected for 1:64/65 divider ratio)

9 Diagrams

Diagram 1 - Definition of Modulus Set-Up Time

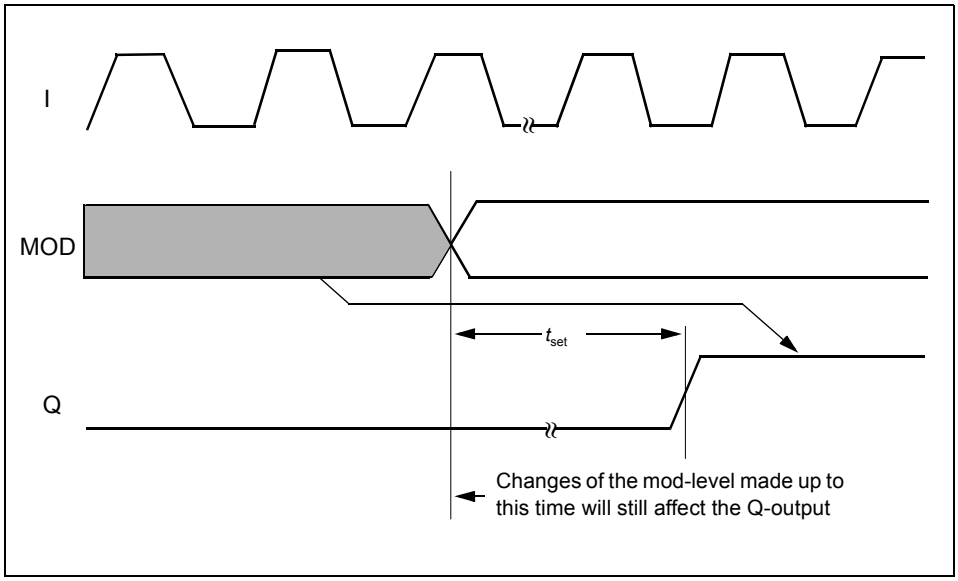
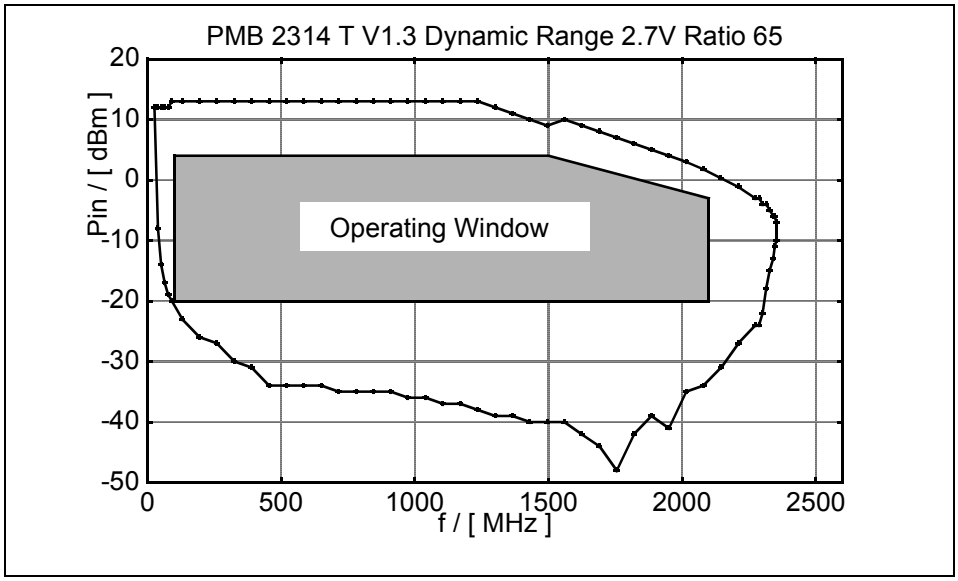
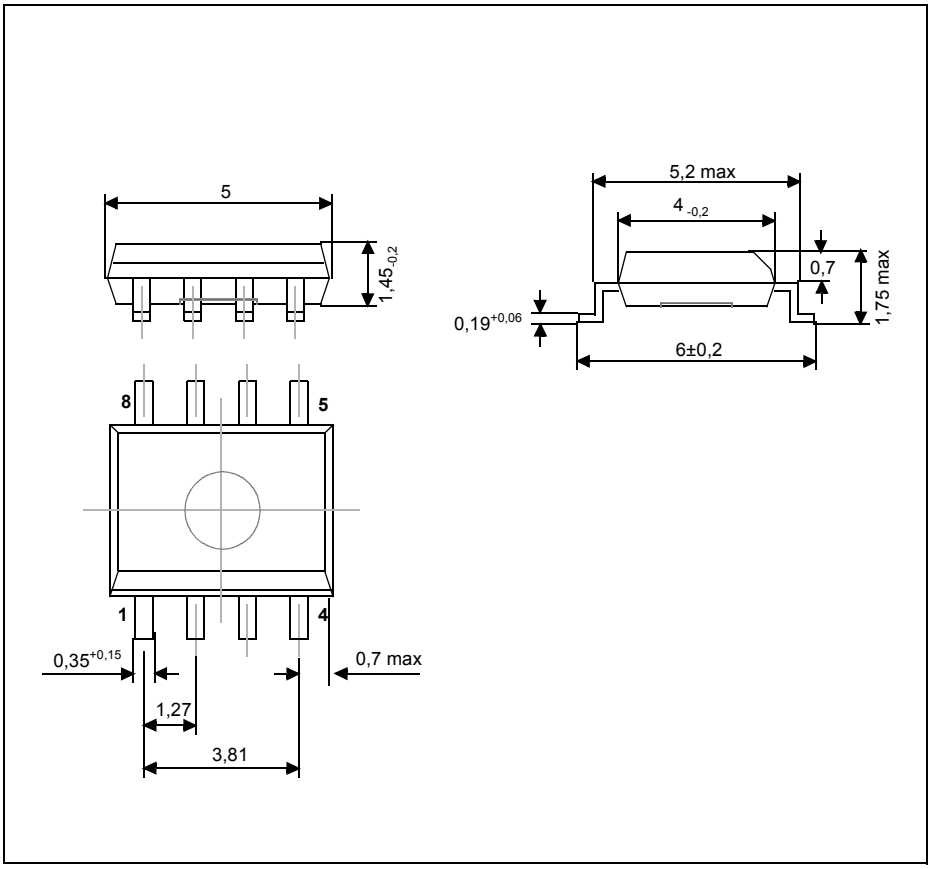


Diagram 2 - Input Dynamic Range



10 Package Outlines



Plastic Package, P-DSO-8, Dual-in-Line-Package, 20 A 8 DIN 41870 T16 (SMD)

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