

SIEMENS

ICs for Communication

Prescaler Circuit 2.1 GHz
PMB 2314T

V1.5

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| PMB 2314T Revision History: 11.95 PMB 2314 V1.3 | |
| Previous Releases: PMB 2314 V1.2 08.95 | |
| Page | Subjects (changes since last revision) |
| 8 | dynamic range |
| | errata sheet removed |
| | supply current values corrected |

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|--|--|
| PMB 2314T Revision History: 07.96 PMB 2314 V1.5 | |
| Previous Releases: PMB 2314 V1.3 11.95 | |
| Page | Subjects (changes since last revision) |
| | internal cross talk eliminated by a metall mask redesign. Plug and play replacement of PMB 2314 V1.3 |
| | |

Data Classification

Maximum Ratings

Maximum ratings are absolute ratings; exceeding only one of these values may cause irreversible damage to the integrated circuit.

Characteristics

The listed characteristics are ensured over the operating range of the integrated circuit. Typical characteristics specify mean values expected over the production spread. If not otherwise specified, typical characteristics apply at TA = 25 °C and the given supply voltage.

Operating Range

In the operating range the functions given in the circuit description are fulfilled.

For detailed technical information about "Processing Guidelines" and "Quality Assurance" for ICs, see our Product Overview "ICs for Communications"

Edition 7.96

This edition was realized using the software system FrameMaker®.

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Preliminary Data

Bipolar IC

Functional Description, Application

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

Due to its low power consumption and low phase noise generation it is suitable for the use in battery powered handheld systems, e.g. PCN, DECT and wireless LANs.

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.

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).

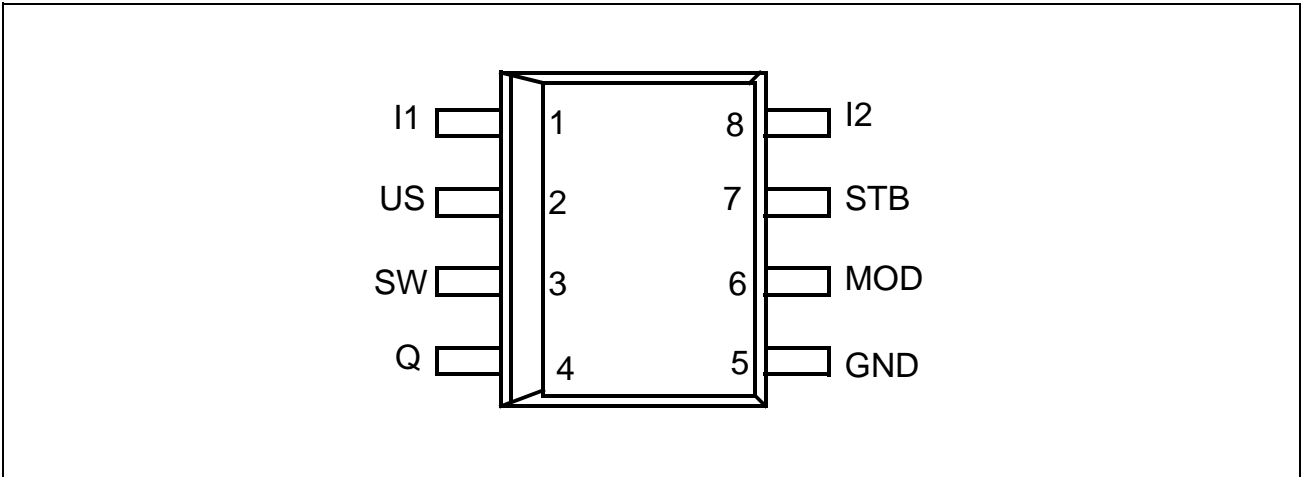
The MOD input is TTL/CMOS compatible.

The emitter follower output is CMOS compatible according to the application circuit on page 11. The minimum logic swing is $0.8 V_{pp}$.

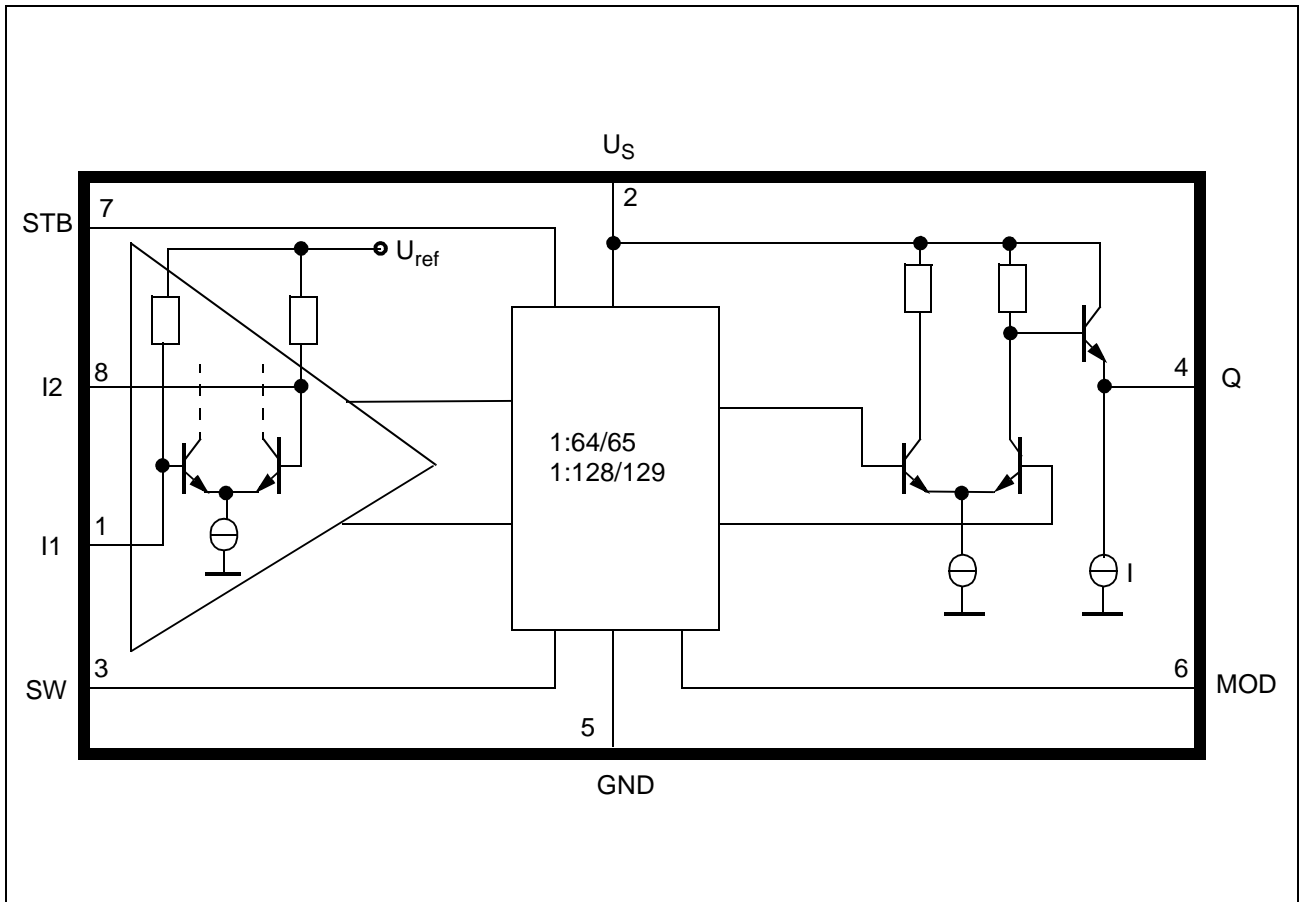
Function table

| 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 |

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



Block Diagram

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

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.

AC/DC Characteristics

Supply voltage $V_S=2.7$ to $5.5V$

Ambient temperature $T_A = -20$ to 85 °C (referred 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 | | V_{PP} | $C_L \leq 12pF$, $R_L=2k\Omega$ |
| | U_Q | 0.8 | 1.1 | | V_{PP} | $C_L \leq 8pF$ |
| Internal current source | I | | 400 | | μA | see block diagram |

Divider Ratio Control Input SW

| | | | | | | |
|--------------------|------------|-----------|--|-------|---------|-----------|
| Voltage 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 |

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

AC/DC Characteristics

Supply voltage $V_S=2.7$ to $5.5V$

Ambient temperature $T_A = -20$ to 85 °C (referred to the test circuit)

| Parameter | Symbol | Limit Values | | | Unit | Test Condition |
|-----------|--------|--------------|------|------|------|----------------|
| | | min. | typ. | max. | | |

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 |

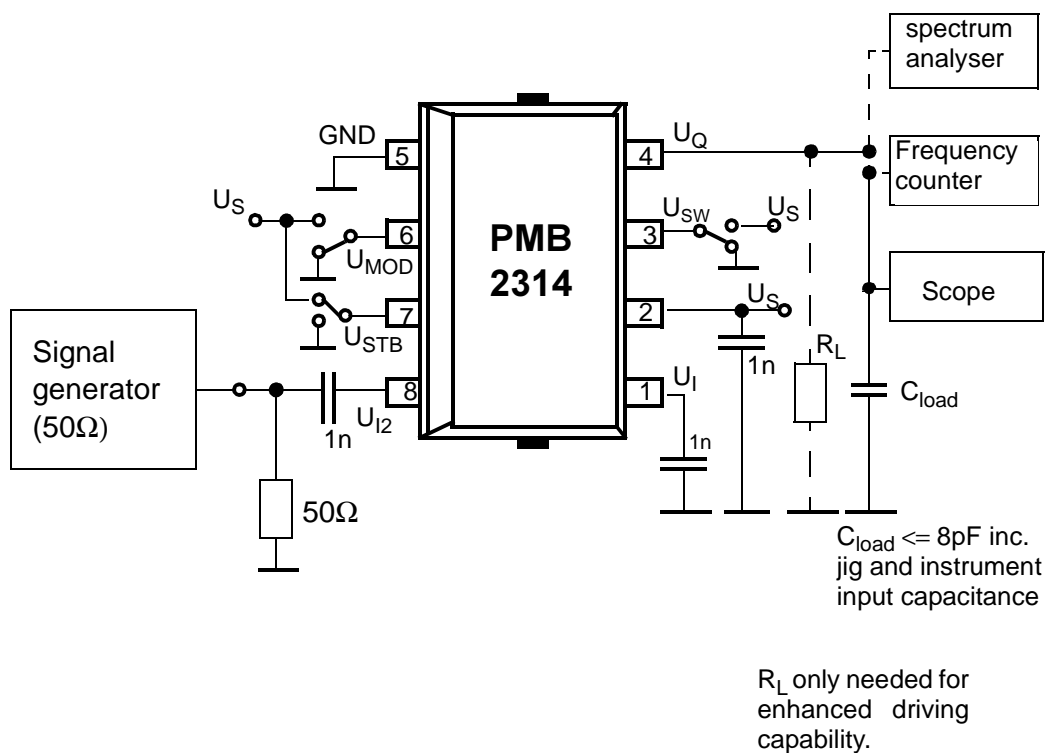
Delay times

| | | | | | | |
|----------------------------|-----------|--|---|----|----|--|
| MOD setup time (diagram 1) | t_{set} | | 8 | 14 | ns | |
|----------------------------|-----------|--|---|----|----|--|

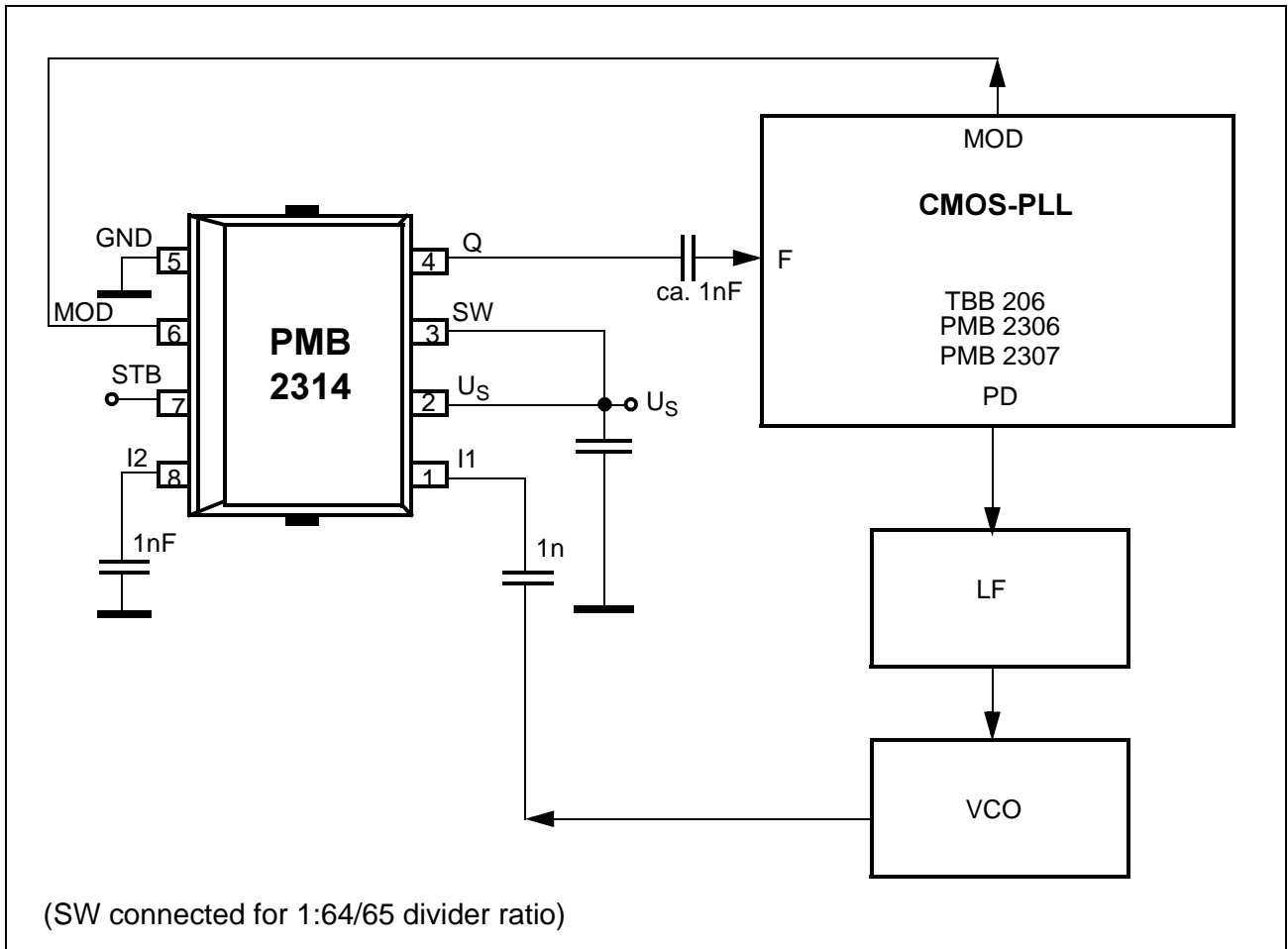
AC /DC characteristics involve the spread of values guaranteed within the specified supply voltage and ambient temperature range. Typical characteristics are the median of the production.

Test circuit

Input sensitivity and output logic swing measurement



Application Circuit



Definition of Modulus Setup Time

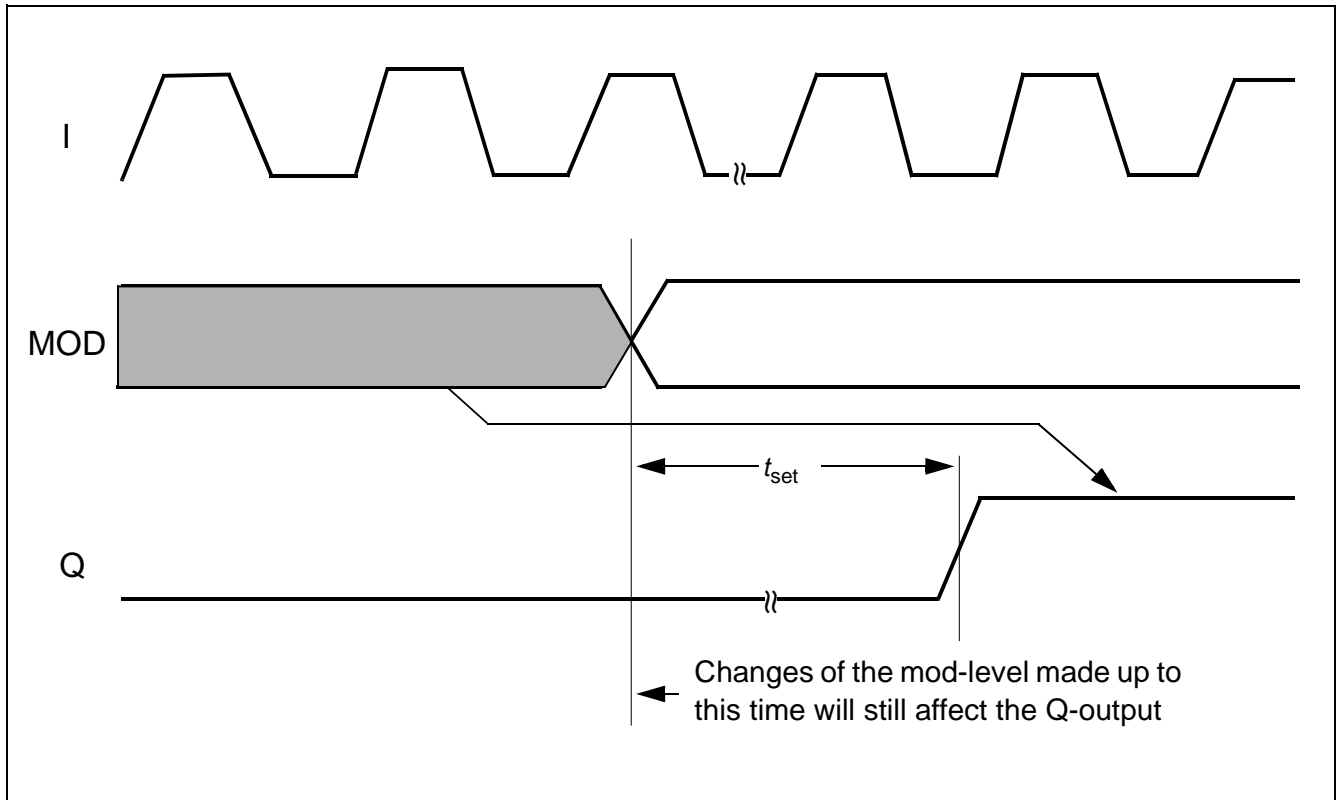


Diagram 1

Input Dynamic Range

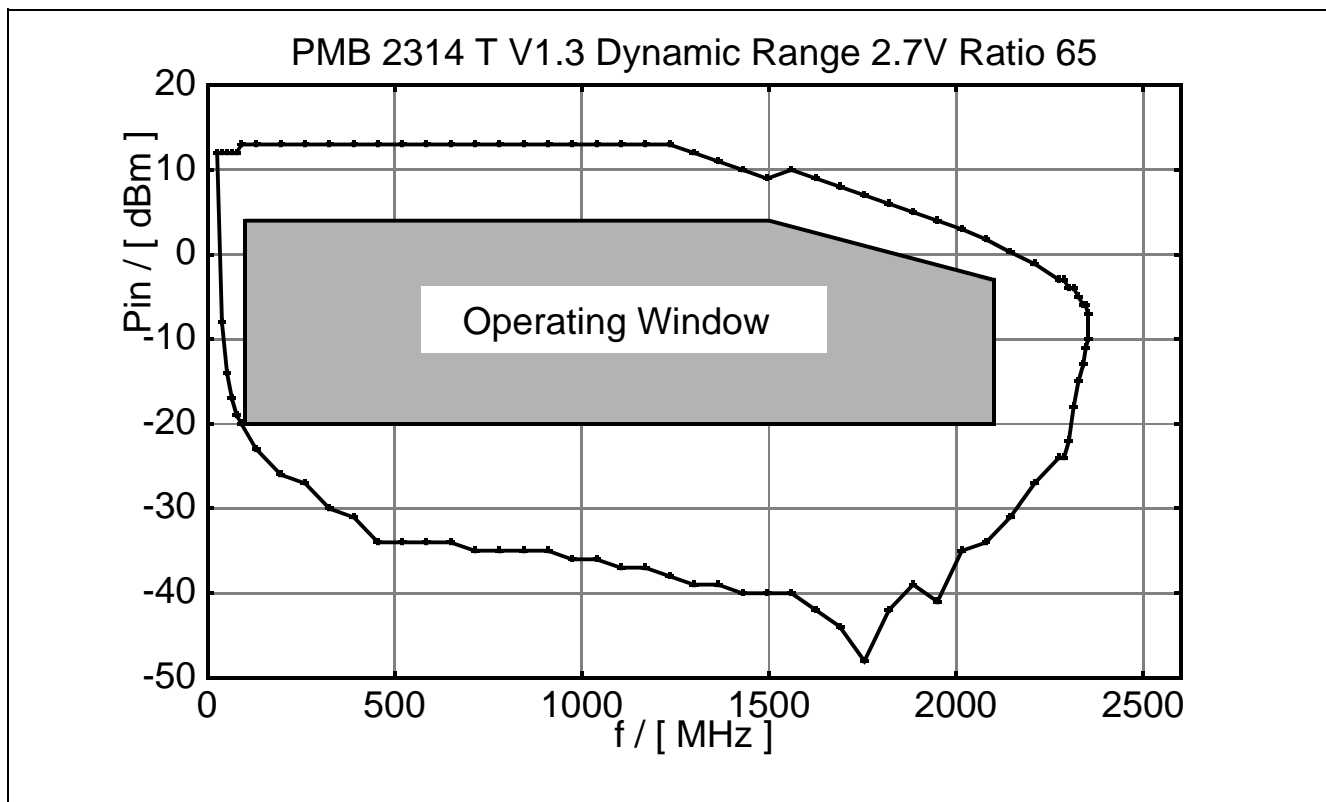
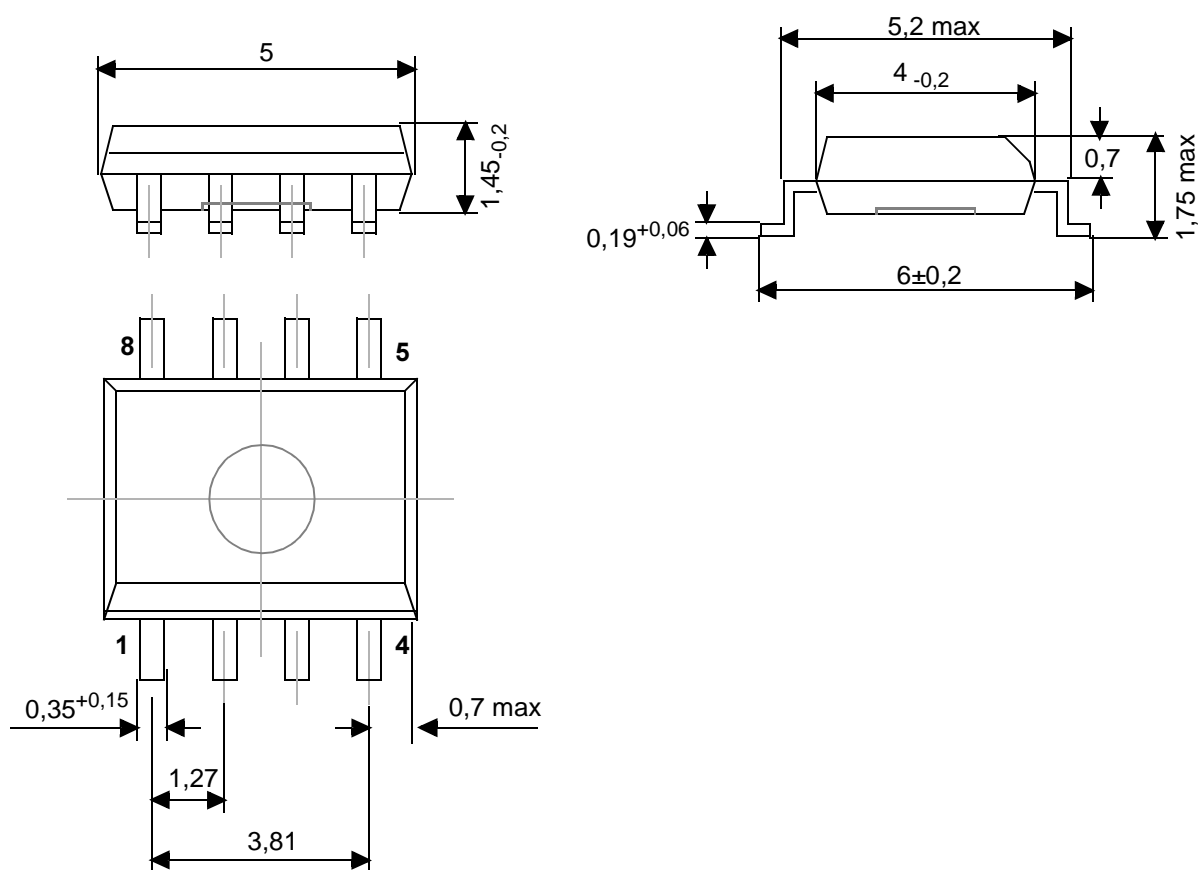


Diagram 2

Package Outlines

Plastic-Package, P-DSO-8



(Dual-in-Line-Package, Small-Outline)
20 A 8 DIN 41870 T16 (SMD)