TEMIC

TELEFUNKEN Semiconductors

3-GHz Frequency Divider

Description

U 832 BS and U 834 BS use TELEFUNKEN's advanced bipolar process. RF input can be driven differential as well as single ended. Low current consumption makes the device suitable for mobile application.

- U 832 BS divides by 2

- U 834 BS divides by 4

- Very low current consumption (typically 12 mA)

- 3-GHz maximum operating frequency

- Supply voltage, typically 5 V

- ESD protection in accordance with MIL-STD. 883 method 3015 class 2

Benefits

- Extended operation time due to very low current consumption

- Only three external components

- Low RF input level reduces radiation problems
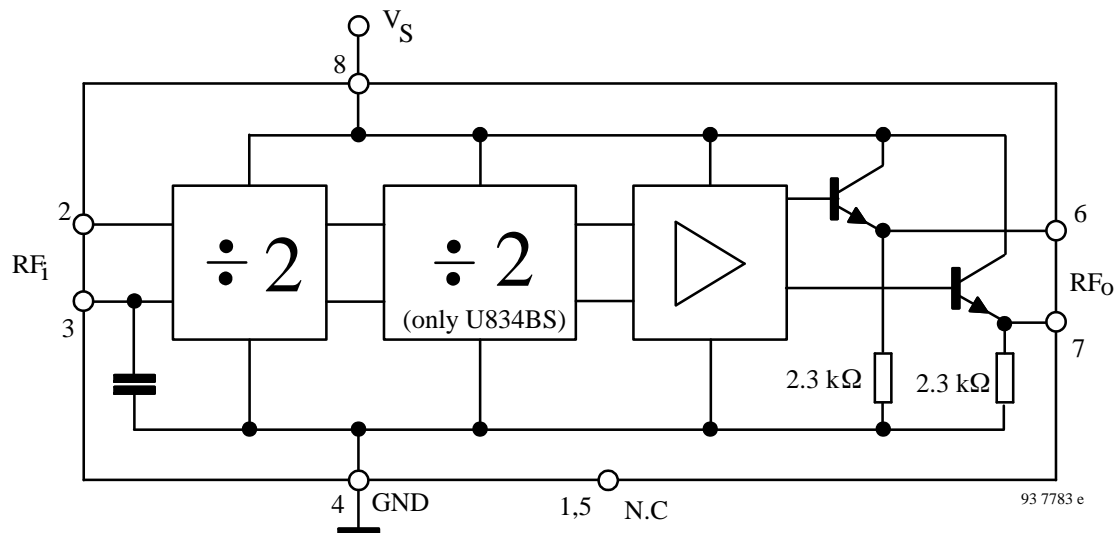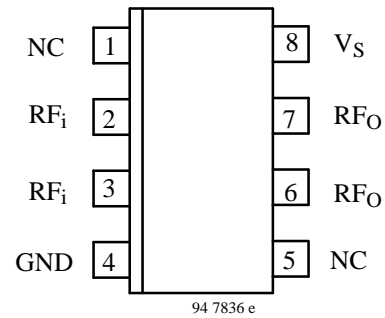
Block Diagram

Figure 1

U 832 BS-FP
U 834 BS-FP

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Pin Description

Pin	Symbol	Function
1	NC	Not connected
2	RF_i	RF input
3	RF_i	RF input with internal decoupling capacitor
4	GND	Ground
5	NC	Not connected
6	RF_O	Output
7	RF_O	Output
8	V_S	Supply voltagee

NC [1]   [8] V_S

RF_i [2]   [7] RF_O

RF_i [3]   [6] RF_O

GND [4]   [5] NC

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Absolute Maximum Ratings

Parameters		Symbol	Value	Unit
Supply voltage	Pin 8	V_S	6	V
Input voltage range	Pins 2 and 3	V_i	0 to V_S	V
Junction temperature		T_j	125	°C
Storage temperature range		T_{stg}	– 40 to + 125	°C

Operating Range

Parameters	Symbol	Value	Unit
Supply voltage range	V_S	4.5 to 5.5	V
Ambient temperature range	T_{amb}	– 25 to + 85	°C

Thermal Resistance

Parameters		Symbol	Value	Unit
Junction ambient	SO 8	R_{thJA}	175	K/W

Electrical Characteristics

V_S = 4.5 to 5.5 V, T_{amb} = 0 to + 70°C, referred to test circuit, unless otherwise specified.

Parameters	Test Conditions / Pin	Symbol	Min	Typ	Max	Unit
Supply current	V_S = 5 V Pin 8 U 832 BS (: 2) U 834 BS (: 4)	I_S		12 13	16 17.5	mA mA
RF Input	Pin 2	RF_i				
Input sensitivity [1]	R_S = 50 Ω	V_{iRF}	80		300	mV
Input frequency range	R_S = 50 Ω Pin 2	f_{imin} f_{imax}	 3000		300	MHz

Parameters	Test Conditions / Pin	Symbol	Min	Typ	Max	Unit
RF output	Pins 6 and 7	RF_O				
Output level	$V_S = 5$ V,　$R_6, R_7 = \infty$ $R_L = 50\ \Omega$,　$R_6, R_7 = 1$ K	V_{RFo}		-8 -5		dBm
DC output level	$R_L \geq 10$ kΩ $V_S = 5$ V High Low	 RF_{DCH} RF_{DCL}		 3.6 3.1		 V V

Note:　1.　RMS-voltage calculated from the measured available power.
　　　　R_S = System resistance, R_L = Load resistance

Output stage
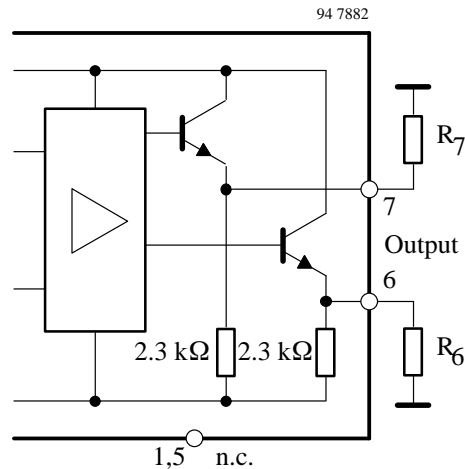
Figure 2

Input sensitivity vs. frequency
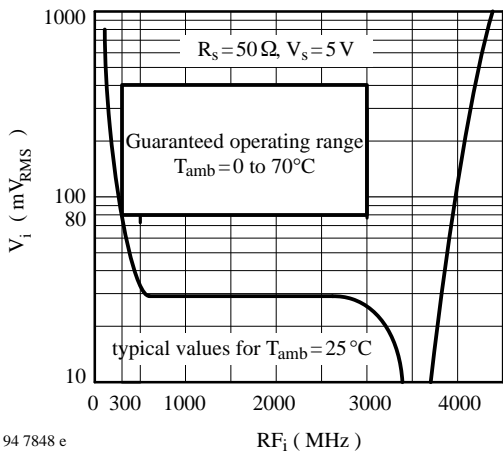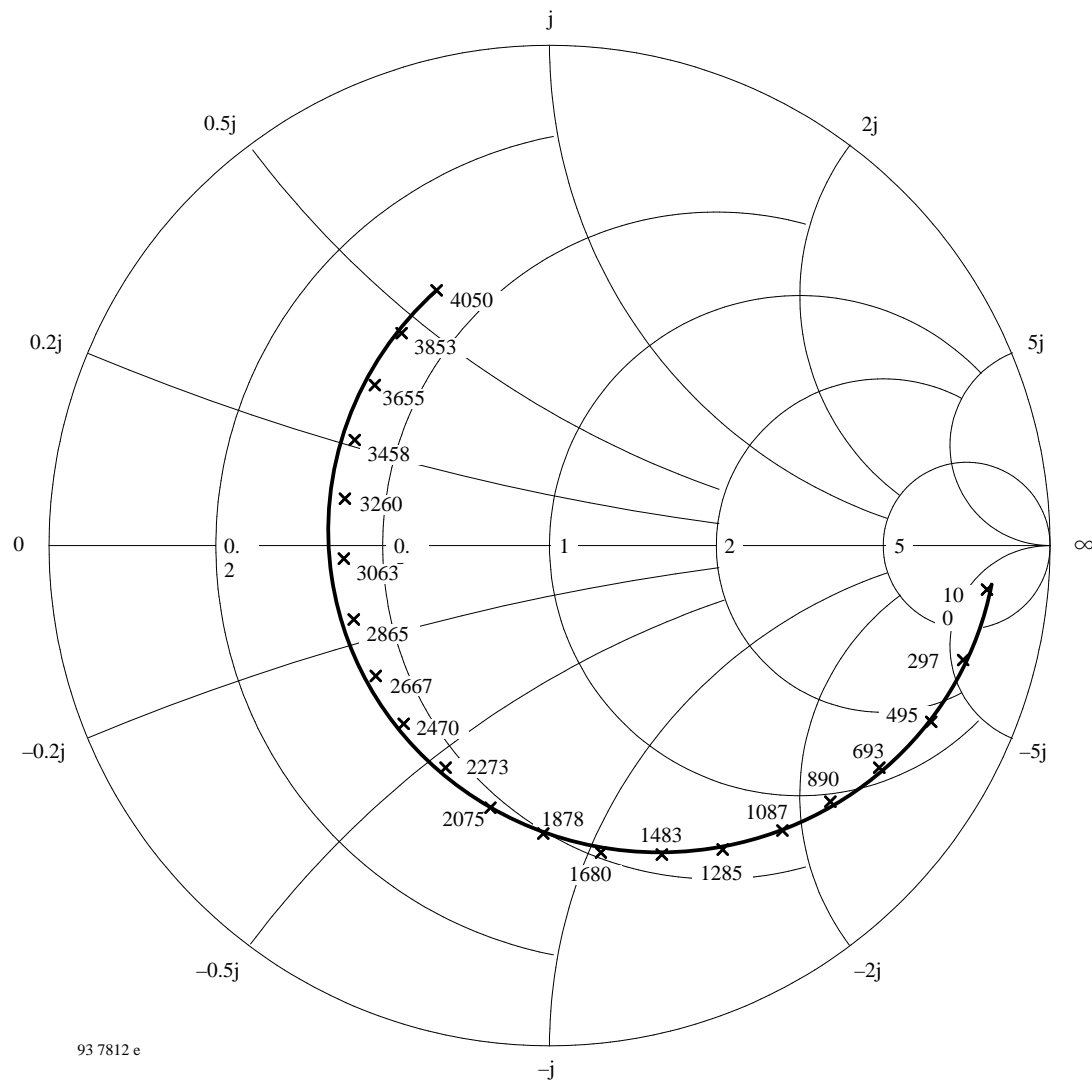

Figure 3

Input impedance S11

Figure 4

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Application

Master-Slave-D-Flip-Flops (MS-D-FF's) can be used for frequency division by feeding back the inverted output to the data input. Typical for this kind of dividers is a free running oscillation of the first divider stage. Here the input sensitivity of the circuit has a minimum (see data sheet page 5: input sensitivity vs. frequency). An oscillation frequency of e.g. 3.5 GHz (related to the input) will result in an output frequency of 3.5 GHz: 4 = 875 MHz. To indicate this TEMIC's self oscillating frequency dividers are ending with "S" (U 834 BS-AFP). This oscillation often is used for quality control of IC's: the higher the frequency, the better the performance. It only occurs if the offset voltage of the input transistor pair is below a certain limit.

On the other hand, if this oscillation results in troubles e.g. in frequency counters an external offset may be added. This can simply be done by connecting an ohmic resistor from Pin 3 (RF INPUT) to ground. Using a value of $R_3 = 47$ kΩ will stop self oscillation without degrading the input sensitivity markly. Smaller values will decrease the sensitivity especially at higher frequencies.
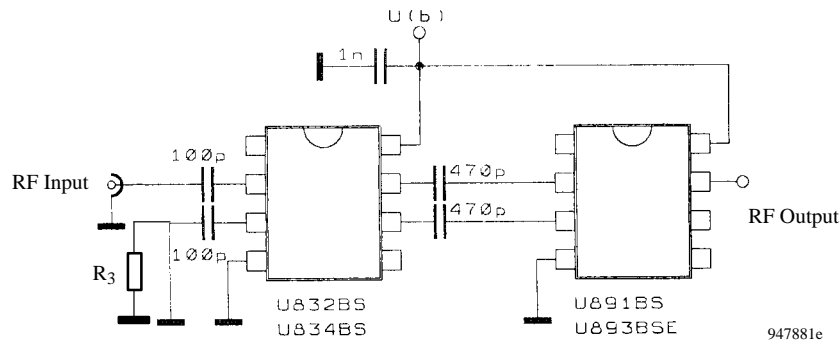
Dimensions in mm

Package: SO 8

technical drawings according to DIN specifications

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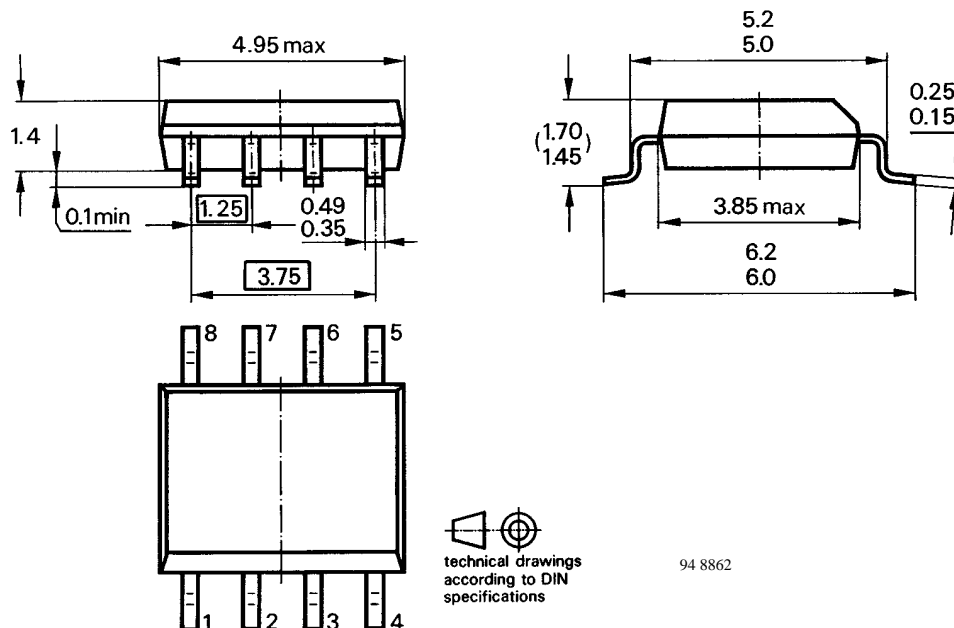
OZONE DEPLETING SUBSTANCES POLICY STATEMENT

It is the policy of **TEMIC TELEFUNKEN microelectronic GmbH** to

1. Meet all present and future national and international statutory requirements and

2. Regularly and continuously improve the performance of our products, processes, distribution and operating systems with respect to their impact on the health and safety of our employees and the public, as well as their impact on the environment.

Of particular concern is the control or elimination of releases into the atmosphere of those substances which are known as ozone depleting substances (ODSs).

The Montreal Protocol (1987) and its London Amendments (1990) will soon severely restrict the use of ODSs and forbid their use within the next ten years. Various national and international initiatives are pressing for an earlier ban on these substances.

TEMIC TELEFUNKEN microelectronic GmbH semiconductor division has been able to use its policy of continuous improvements to eliminate the use of any ODSs listed in the following documents.

1. Annex A, B and list of transitional substances of the Montreal Protocol and the London Amendments respectively

2. Class I and II ozone depleting substances in the Clean Air Act Amendments of 1990 by the Environmental Protection Agency (EPA) in the USA and

3. Council Decision 88/540/EEC and 91/690/EEC Annex A, B and C (transitional substances) respectively.

TEMIC can certify that our semiconductors are not manufactured with and do not contain ozone depleting substances.