TEMIC
Semiconductors

U4087B

Low Voltage Voice Switch Interface Circuit for Hands-free Operation in Telephone

Description

The voice switch interface circuit U4087B is a linear integrated circuit for improvement of handsfree performance of U4090B system.

The U4087B provides an optimized interface to U4090B, the necessary level detectors and switching control for a properly operating speakerphone. The detection sensitivity and timing are externally controllable.

Additionally, the U4087B provides a back-ground noise monitor which makes the circuit insensitive to room noise.

The Block diagram shows level detectors, back ground noise monitor.

Due to low voltage operation it can be operated via power supply management of U4090B requiring 1.0 mA typ.

Features

- Low voltage operation: 3.0 to 7.0 V
- Four point signal sensing
- Monitoring system for background noise level
- Case: SO 16
- Chip Disable for active/standby operation

Benefits

- Fast channel switching allows quasi duplex operation
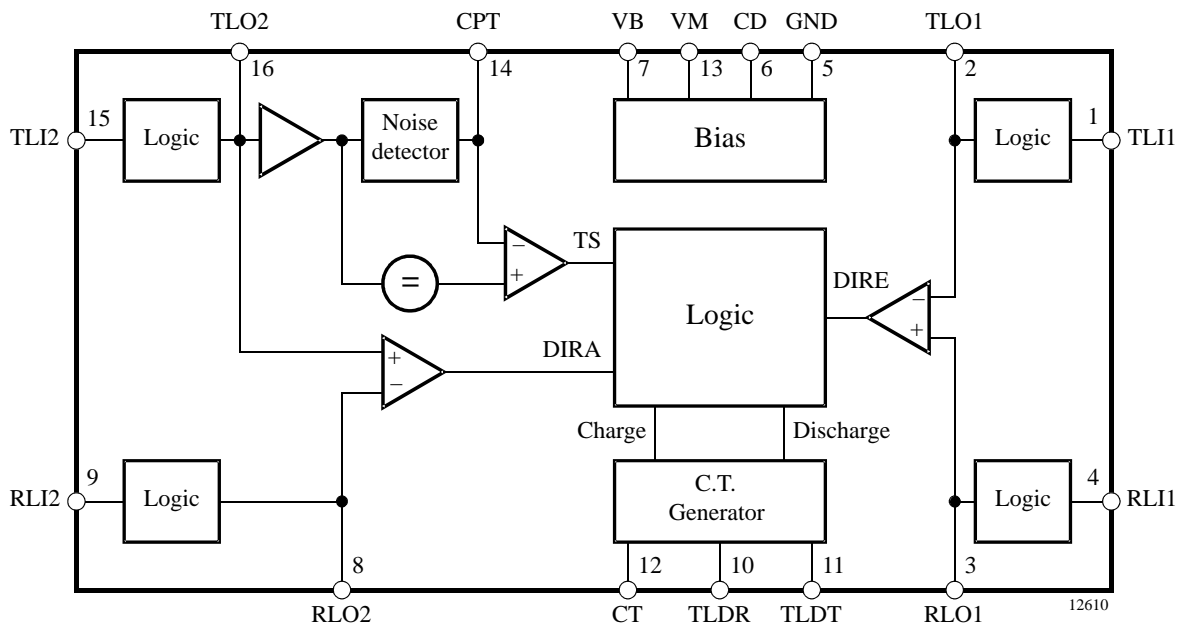- Low current consumption

Block Diagram

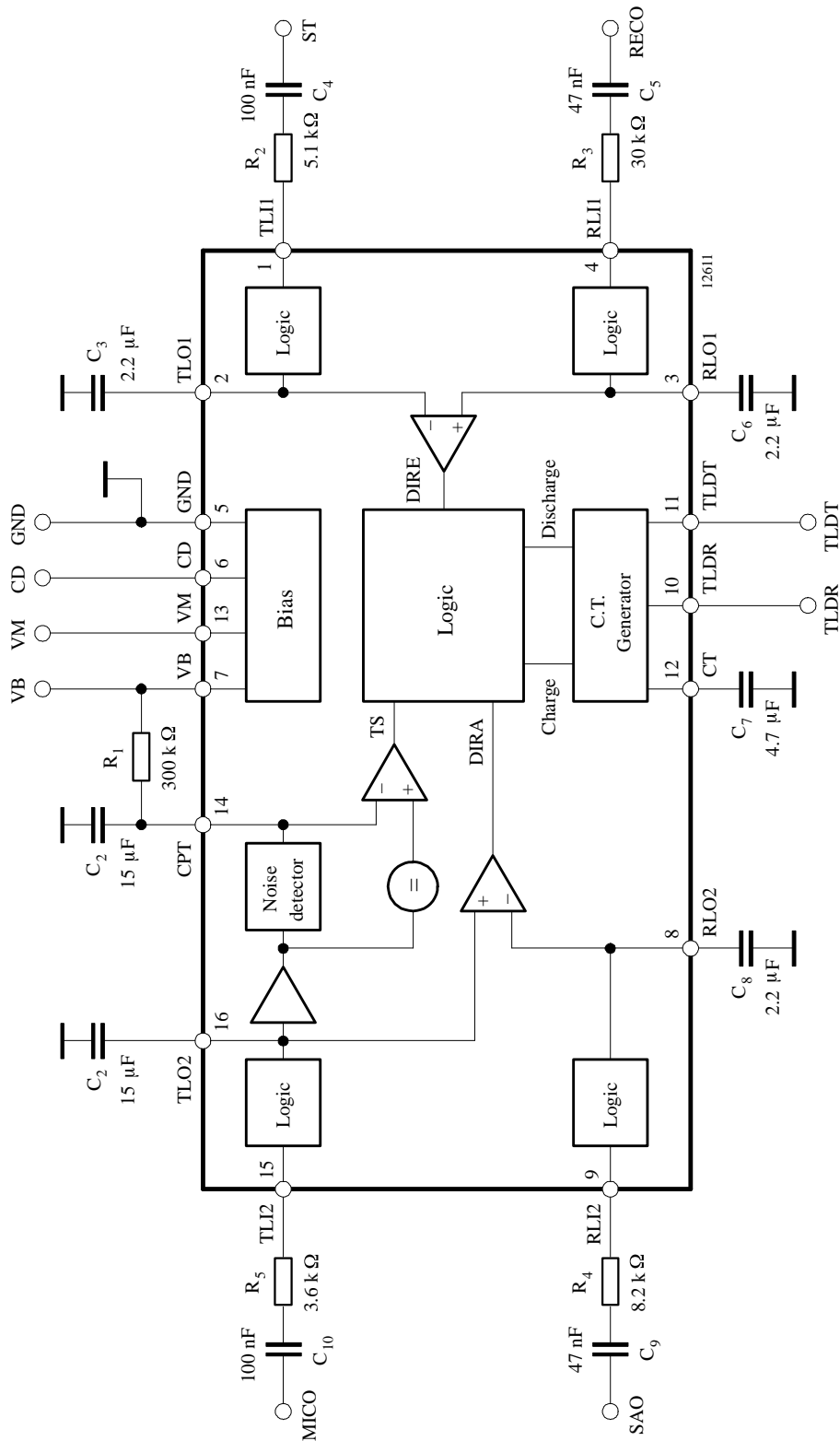Figure 1. Block diagram with external circuit

Preliminary Information

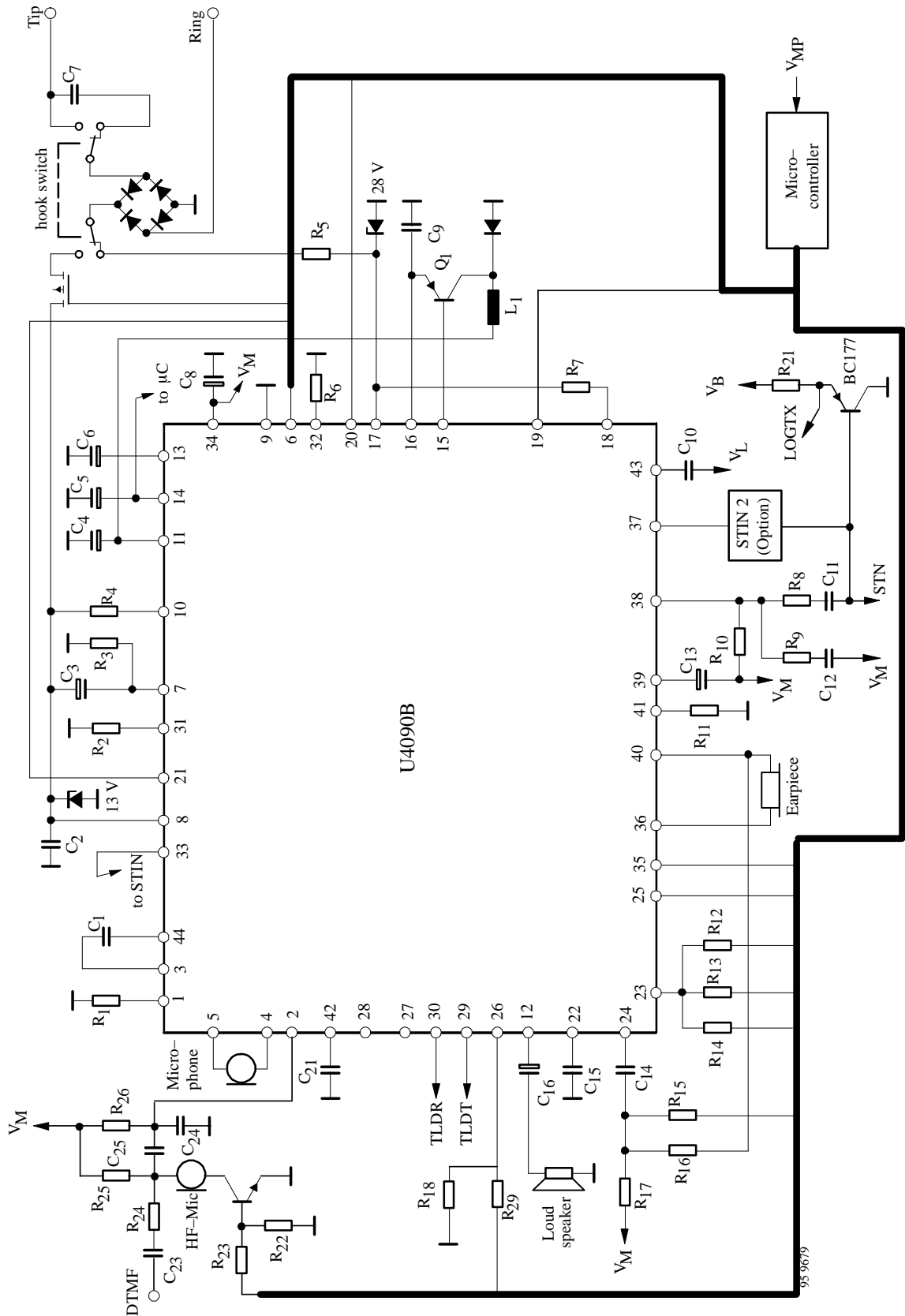Figure 2. Application for hands-free operation

Preliminary Information

Figure 3. Application for handsfree operation

Preliminary Information

Typical Value of External Components

C_1	100 nF	R_3	> 68 kΩ
C_2	4.7 nF	R_4	10 Ω
C_3	10 μF	R_5	1.5 kΩ
C_4	220 μF	R_6	62 kΩ
C_5	47 μF	R_7	680 kΩ
C_6	470 μF	R_8	22 kΩ
C_7	820 nF	R_9	330 Ω
C_8	100 μF	R_{10}	3 kΩ
C_9	100 nF	R_{11}	62 kΩ
C_{10}	150 nF	R_{12}	30 kΩ
C_{11}	68 nF	R_{13}	62 kΩ
C_{12}	33 nF	R_{14}	120 kΩ
C_{13}	10 μF	R_{15}	47 kΩ
C_{14}	100 nF	R_{16}	1 kΩ
C_{15}	1 μF	R_{17}	1.2 Ω
C_{16}	47 μF	R_{18}	30 kΩ
C_{17}	10 μF	R_{19}	6.8 kΩ
C_{18}	10 μF	R_{20}	6.8 kΩ
C_{19}	68 nF	R_{21}	15 kΩ
C_{20}	68 nF	R_{22}	330 kΩ
C_{21}	1 μF	R_{23}	220 kΩ
C_{22}	100 nF	R_{24}	68 kΩ
C_{23}	6.8 nF	R_{25}	2 kΩ
C_{24}	10 nF	R_{26}	3.3 kΩ
C_{25}	100 nF	R_{27}	18 kΩ
L_1	2.2 mH	R_{28}	2 kΩ
R_1	27 kΩ	R_{29}	
R_2	20 kΩ	R_{31}	56 kΩ

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Pin Description

Pin	Symbol	Function
1	TLI1	Transmit level detector input on the line side
2	TLO1	Transmit level detector output on the line side
3	RLO1	Receive level detector output on the line side
4	RLI1	Receive level detector input on the line side
5	GND	Ground
6	CD	Chip Disable A logic low (< 0.8 V) sets normal operation. A logic high (> 2.0 V) disables the IC to conserve power. Input impedance is nominally 90 kΩ.
7	V_B	Supply voltage 2.8 to 7.0 V, approx. @ 1 mA
8	RLO2	Receive level detector output on the microphone/speaker side
9	RLI2	Receive level detector input on the microphone/speaker side
10	TLDR	Positive control output for U4090B
11	TLDT	Negative control output for U4090B
12	C_T	Response time An RC at this pin sets the response time for the circuit to switch modes
13	V_M	It is a system ac ground, supplied by U4090B, $V_M \sim VB/2$
14	CPT	An RC at this pin sets the time constant for the transmit background monitor
15	TLI2	Transmit level detector input on the microphone/speaker side
16	TLO2	Transmit level detector output on the microphone/speaker side, and input to the transmit background monitor

Absolute Maximum Ratings

Reference point Pin 1, $T_{amb} = 25°C$, unless otherwise specified

Parameters		Symbol	Value	Unit
Supply voltage	Pin 7	V_B	$- 0.3$ to $+ 12$	V
Voltages:	Pin 6 Pin 13		$- 0.3$ to 6 $- 0.3$ to $(V_B + 0.3)$	V
Storage temperature range		T_{stg}	$- 55$ to $+ 150$	°C
Junction temperature		T_j	125	°C
Ambient temperature range		T_{amb}	$- 20$ to $+ 60$	°C
Power dissipation $T_{amb} = 60$ °C	SO 16	P_{tot}	750	mW
Maximum thermal resistance Junction ambient	SO 16	R_{thJA}	110	K/W

Operation Recommendation

Parameters	Test conditions / Pin	Symbol	Min.	Typ.	Max.	Unit
Supply voltage	Pin 7	V_B	3.0	–	7.0	V
CD input Pin 6			0	–	V_B	V
Ambient temperature range		T_{amb}	$- 20$	–	$+ 60$	°C

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Electrical Characteristics

$T_{amb} = +25°C$, $V_S = 5.0$ V, CD ≤ 0.8 V, unless otherwise specified

Parameters	Test conditions / Pin	Symbol	Min.	Typ.	Max.	Unit
Power supply						
Supply current	$V_B = 6.5$ V, CD = 0.8 V	I_B		1.0	2.0	mA
	$V_B = 6.5$ V, CD = 2.0 V			60.0	150.0	μA
CD input resistance	$V_B = V_{CD} = 6.5$ V	R_{CD}	50.0	90.0		kΩ
CD input voltage	– High	V_{CDH}	2.0		V_B	V
	– Low	V_{CDL}	0.0		0.8	
Attenuator control						
C_T voltage	Pin 12 – V_M R mode Idle mode T mode	V_{CT}		+ 240.0 0.0 – 240.0		mV
C_T source current	R mode	I_{CTR}	– 85.0	– 60.0	– 40.0	μA
C_T sink current	T mode	I_{CTT}	+ 40.0	+ 60.0	+ 85.0	μA
C_T idle current		I_{CTS}		0.0		μA
Level detectors and background noise monitor						
Source current	at RLO1, RLO2, TLO1, TLO2	I_{LSO}		– 2.0		mA
Sink current	at RLO1, RLO2, TLO1, TLO2	I_{LSK}		4.0		μA
CPT output resistance	$I_O = 1.0$ mA	R_{CP}		100		Ω
CPT leakage current		I_{CPLK}		– 0.2		μA

Ordering Information

Type	Package
U4087B-FP	SO16

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Dimensions in mm

Package: SO16

9.85 max

1.4

0.1 min

1.27

8.89

0.49
0.35

5.2
5.0

$\left(\begin{array}{c}1.70\\1.45\end{array}\right)$

0.25
0.15

3.85 max

6.2
6.0

16 15 14 13 12 11 10 9

1   2   3   4   5   6   7   8
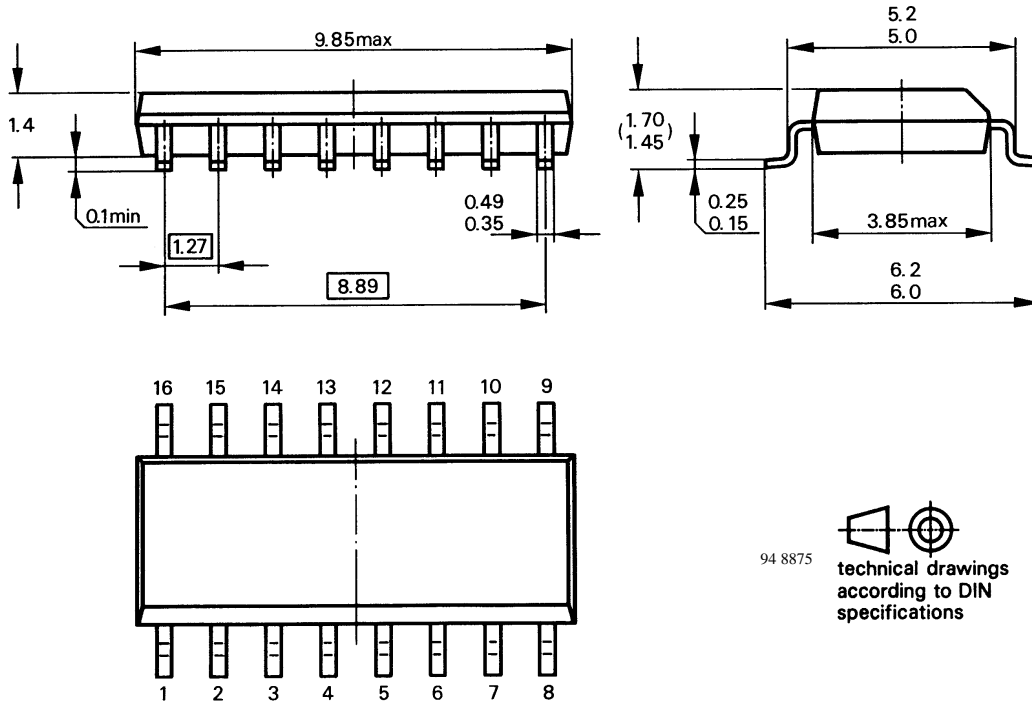
94 8875

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.

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.

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

The Montreal Protocol (1987) and its London Amendments (1990) intend to 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 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

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 ozone depleting substances and do not contain such substances.