LEMIC

Speech Circuit with Line-powered Loudspeaker Amplifier

Description

The electronic speech circuit U 4050 B is a linear integrated circuit for use in telephone sets. It replaces the hybrid transformer, side tone equivalent and ear protection rectifiers.

The circuit is line powered and contains all components necessary for amplification of signals and adaptation to the line. An integrated loudspeaker amplifier allows loudhearing operation.

Features

- Integrated amplifier for loudhearing operation
- Anticlipping for loudspeaker amplifier
- Supply voltages for all functional blocks of a subscriber set
- Adjustable dc characteristics
- Adjustable sending and receiving amplification
- Automatic line loss compensation
- · Symmetrical output of earpiece amplifier
- · Built in ear protection
- · Symmetrical input of microphone amplifier
- Adjustable side tone suppression independent of sending and receiving amplification
- DTMF and MUTE inputs
- Anticlipping in transmit direction

- Squelch
- Integrated transistor for short circuiting the line voltage
- Power down
- · Operation possible at line currents above 10 mA

Benefits

- Independent adjustment of transmit gain, receive gain and side tone suppression
- . Low number of external components

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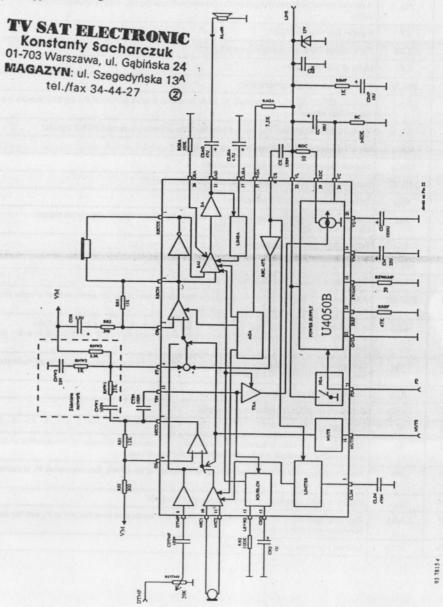
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Block Diagram / Application Circuit

With a squelch function, acoustical feedback during loudhearing can be reduced significantly. The generated supply voltage is suitable for a wide range of peripheral circuits.

Typical Application Diagram

U 4050 B



Pin	Symbol	Function			
1, 3	R _{ECO} 2, R _{ECO} 1	Symmetrical outputs of receiving amplifier			
2	G _R	A resistor connected from this pin to V _M (ac coupled) sets the receiving amplification at the circuit			
4	ST	Input of side tone amplifier			
5	CLIM	Time constant of anticlipping in transmit patch			
6	CK	Input of receiving path			
7	MICO	Output of microphone preamplifier			
8	DTMF	Input for DTMF signals (ac coupled). In Mute condition a small portion of the signal at this pin is monitored to the receiver output.			
9	GS	A resistor from this pin to V _M sets the amplification of microphone and DTMF signals.			
10	MIC ₁	Inverting input of microphone amplifier			
11	MIC ₂	Non-inverting input of microphone amplifier			
12	LEVSQ	Input for setting the switching level of the squelch circuit			
13	C _{SQ}	Time constant of the squelch function			
14	. V _M	Reference node for microphone, earphone and loudspeaker amplifier. Supply for electret microphone set to V _D /2.			
15	TIN	Input of intermediate transmit stage			
16	MUTE	Active high input to switch the circuit into DTMF condition.			
17	CLISA	Time constant of anticlipping of speaker amplifier.			
18	SWAMP	A resistor connected from this pin to ground converts the excess line current into heat in order to prevent t IC from thermal destruction at high line currents			
19	R _{DC}	A small resistor connected from this pin to V _L sets the slope of the characteristic and also affects the line length equalization characteristics and the line current at which the loudspeaker amplifier is switched on.			
20	V _D	Unregulated supply voltage for peripheral circuits (dialers, microprocessors, etc.). Output current capability and output voltage increase with line current.			
21	SAO	Output of loudspeaker amplifier.			
22	GND	Reference point for dc and ac output signals			
23	V _L	Line voltage			
24	v _c	The internal equivalent inductance of the circuit is proportional to the value of the capacitor at this pin. A resistor connected to ground may be used to reduce the line voltage.			
25	PD	Active high input for reducing the current consumption of the circuit. Simultaneously V _L is shorted by an internal switch.			
26	GSA	Current input for setting the gain of the speaker amplifier			
27	AGA	Automatic gain adjustment with line current. A resistor connected from this pin to V _L sets the starting point. Maximum gain change is 6 dB.			
28	IREF	Internal reference current generation			

Absolute Maximum Ratings

U 4050 B

Parameters	Symbol	Value	Unit	
Line current	IL	140	mΛ	
Line voltage	V _L	15	V	
Junction temperature	Tj	150	°C	
Ambient temperature	T _{amb}	-25 to +75	°C	
Storage temperature	T _{stg}	-55 to +150	°C	
Total power dissipation T _{amb} = 60°C SO 28	P _{tot}	750	mW	

Thermal Resistance

Parameters	Symbol	tom la faça Value al	¿ Unit
Junction ambient SO 28	R _{thIA}	120	K/W

Electrical Characteristics

Test conditions unless otherwise specified: f = 1 kHz, 0 dBm = 775 Vrms, $I_M = 0.3$ mA, $I_D = 2$ mA, RC = 130 k Ω , $T_{amb} = 25$ °C, $R_{GSA} = 560$ k Ω , $Z_H = Z_M = 68$ nF, Pin AGA open

Parameters Parameters	Test Conditions / Pin	Symbol	Min	Тур	-Max	Unit	Fig.	
DC characteristics	Asia, read place of							
	$I_L = 2 \text{ mA}$	V _L		1.9	27.076.50	V	1	
DC voltage drop	I _L = 15 mA	V _L	4.8	5.2	5.6	V		
over circuit	$I_L = 19 \text{ mA}$	VL		5.4		V		
	$I_L = 30 \text{ mA}$	V _L		6.0		V		
	I _L = 100 mA	V _L		9.5	12.27	v		
Transmission amplifier								
Adjustment range of transmit gain	I _L = 15 mA	GS	40	48	56	dB		
Transmitting amplification	I _L = 15 mA	GS	47.75	48.25	48.75	dB		
Frequency response	I _L ≥ 15 A, C _L = 4.7 nF f = 300 to 3400 Hz	ΔGs			± 0.5	dB	2	
Gain change with current	Pin AGA open I _L = 15 to 100 mA	ΔGs			± 0.5	dB		
Gain deviation	$T_{amb} = -10 \text{ to } +60^{\circ}\text{C}$ $I_L = 15 \text{ mA}$	ΔG _S			± 0.5	dB		
CMRR of microphone amplifier		CMRR	60	80		dB	8	