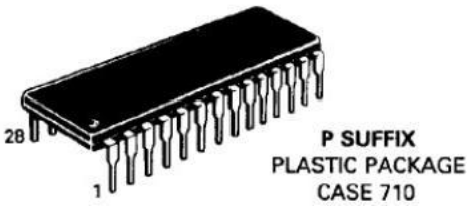
MC34018 voice-activated loudspeaker telephone circuit

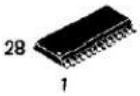
Overview

The MC34018 combines the necessary amplifiers, attenuators, and several control functions to make a high quality hands-free hand-handle speaker phone system. It includes a microphone amplifier, a speaker audio power amplifier, transmit and receive attenuators, a background noise level detection system, and an attenuator control system to respond to transmit and receive levels that are better than background noise levels. The circuit also includes all the adjustment power needed for the internal and external circuits, allowing the use of the voltage on the telephone line to work without the need for additional additional power. There is a selector input on the circuit to control power failure when the circuit is not working. An external potentiometer can complete the volume control function. The MC34018 can be used as a loudspeaker telephone in home and business systems, internal communication systems, car phones, and other applications.

The MC34018 is packaged in the form of 28-pin dual-row plastic encapsulation in line or patch SOP28 form.



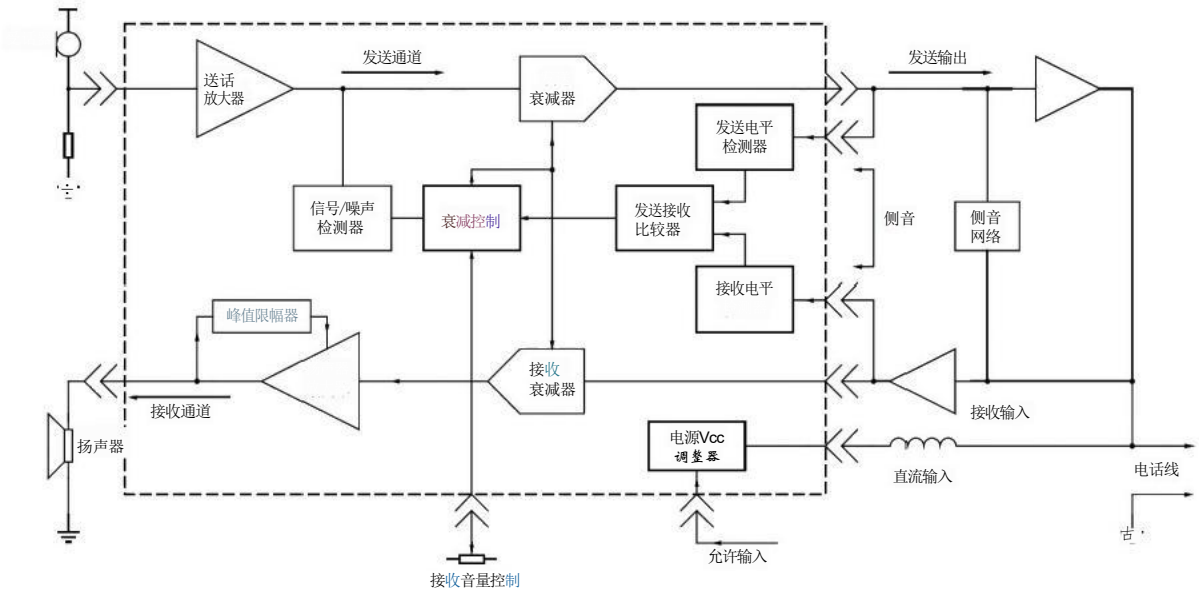
DW SUFFIX
PLASTIC PACKAGE
CASE 761F
SO-28



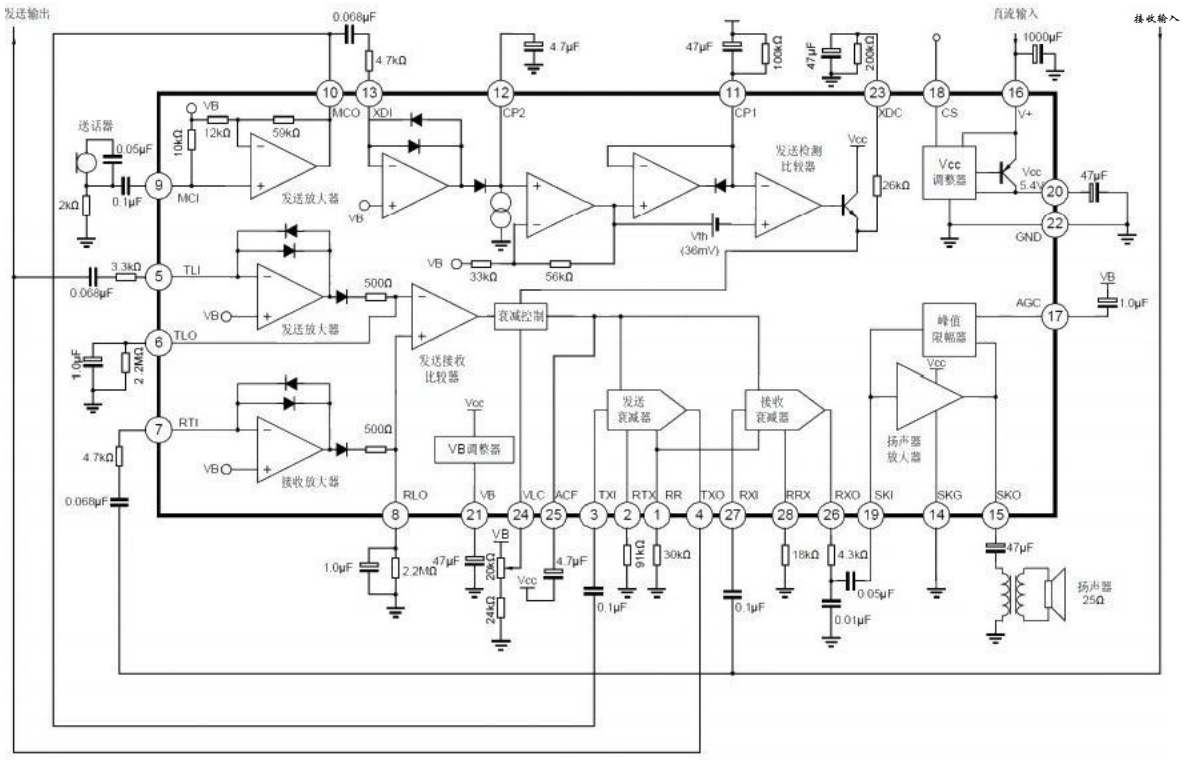
Main feature

- A single integrated circuit includes a necessary level detector and an attenuator control circuit for a hands-free handle telephone.
- Stable monitoring of background noise levels over long periods of time.
- Through the compression of the signal can have a wide dynamic working range.
- The circuit has a power supply and a reference voltage regulating circuit.
- The output power is typically 100mW at 25-Ω loads, limited to a small distortion range.
- The work/wait mode is selected by one of the pins of the circuit.
- Linear volume control.
- Standard 28-pin plastic dual in-line DIP package or patch SOP package.

Internal block diagram (1)



Internal block diagram (2)



Pin comment description

No.	Symbol	Function description
1	RR	Ground resistance. Provides reference currents to transmit and receive attenuators.
2	RTX	Ground resistance. Determine the gain of the normal transmit attenuator, and the transmit channel gain is inversely proportional to the RTX resistance.
3	TXI	Transmit attenuator input. The normal input resistance is 5K
4	TXO	Send attenuator output. The output signal from the TXO drives the input of the sending level detector and drives the external circuit of the telephone line
5	TLI	Transmit level detector input. There is an external resistor AC coupled to the TLI end to establish the detection level, reducing this resistance will increase the sensitivity of the transmit channel signal.
6	TLO	Send level detector output. External resistors and capacitors determine the comparator's timing to keep the system in transmit mode after speech.
7	RLI	Receiving level detector input. The external resistor is ac-coupled to the RLI to establish a detection level, and reducing this resistance increases the sensitivity of the received channel signal.
8	RLO	Receive level detector output. External resistors and capacitors determine the comparator time to keep the system in receiving mode after receiving the signal.

9	MCI	Microphone amplifier input. The normal input impedance is 10K and the DC bias voltage is equal to VB.
10	MCO	Microphone amplifier output. The gain of the microphone amplifier is set to 34dB in the chip
11	CP1	At this end, the power supply VCC is directly connected to a parallel network of resistors and capacitors to maintain a certain background noise level, sending the detector CP1 voltage to compare with the voice signal from CP2.
12	CP2	This end detects the peak of the voice signal to compare with the background noise level held at CP1.
13	XDI	The input side of the sending detector system. The output of the microphone amplifier is AC coupled to the XDI terminal via an external resistor.
14	SKG	High current ground terminal for loudspeaker amplifier output stage. SKG voltage to pin 22 voltage does not exceed 10mV.
15	SKO	Loudspeaker amplifier output. The SKO end provides 100mA push-pull current when the AC is coupled to the speaker. The speaker amplifier gain is 34dB internally.
16	V+	Dc voltage input. If there is an AC coupling inductor that can block the AC signal on the load, then power can be supplied to V+ from the TIP and Ring(between the two terminals of the telephone line), requiring a voltage of V+ of 6V to 11V, a typical value of 7.5V, and a current of 7mA.
17	AGC	This end and VB are connected with a capacitor, which is used to temperature stabilize the speaker amplifier gain control loop, and also control the conversion time of the circuit. The gain control loop limits the input to the loudspeaker amplifier to prevent limiting at the SKO end. The internal resistance of the AGC terminal is 110K normally.
18	CS	When it is logical "0" (<0.7V), the Vcc regulator is allowed to work, when it is logical "1" (>1.6V), the circuit is in waiting mode, the circuit is 0.5mA, the input impedance typical value is 400K, and the output voltage does not exceed 11V.
19	SKI	At the input end of the loudspeaker amplifier, the typical input impedance is less than 20K.
20	VCC	This end outputs a 5.4V voltage regulator to the circuit, except for the output stage of the speaker amplifier. The VCC plus a filter capacitor can supply power to the external microprocessor (maximum current is 3mA), and the CS end maintains a logic 1 power level, and the M34018 can be powered by a separate adjustment power supply of 4.5V~6.5V connected to the VCC.
21	VB	The voltage output pin, VCC/2, is used as the analog grounding of the loudspeaker telephone system, VB can provide the external load current up to 1.5mA, the output impedance is about 250Ω, and a filter capacitor is required.
22	GND	Ground end, except speaker amplifier.
23	XDC	The transmit detector output, which is connected with a resistor and capacitor, keeps the system in transmit mode during pauses between words or sentences. When the XDC terminal voltage decreases to the ground voltage, the attenuator changes from transmit mode to wait mode. The internal resistance of the XDC is typically 2.6K.
24	VLC	The volume control input end, which is connected to a potentiometer to achieve the volume control of the receiving mode, VLC terminal voltage should be less than or equal to VB.
25	ACF	The attenuator controls the filter, which is terminated by a capacitor to reduce the noise transient value and is used as a control switch for the attenuation level.
26	RXO	Receive attenuator output. Normally, this end is AC coupled to the input end of the speaker amplifier.
27	RXI	The input end of the receiving attenuator. The typical input impedance is 5K.
28	RRX	Ground resistance. Determine the normal gain of the receiving attenuator, and the gain of the receiving channel is inversely proportional to the RRX resistance.

Limiting parameter

Parameter	Symbol	MIN	MAX	Unit
V+ terminal voltage	V+	-1	+12	V
CS(18 Pins)	Vcs	-1	+12	V
Loudspeaker amplification ground	VGs	-1	+3	V
VLC(24 pins)	V24	-1	VCC	V
Operating temperature	Topr	0	70	℃
Storage temperature	Tstg	-60	150	℃

Electrical parameter(TA=25℃)

Parameter	Symbol	Test conditions	Pin	MC34018			Unit
				MIN	TYP.	MAX.	
Supply voltage							
V+ power supply current	Iv+	V+=11V,18-terminal=0.7V	16	—	—	9	mA
		V+=11V,18-terminal=1.6V		·	—	0.8	mA
VCC voltage	VCC	V+=7.5V	20	4.9	5.4	5.9	V
linearity	VCCLN	6.5V<V+<11V		—	65	150	mV
Output resistance	Rovcc	Icc=3mA		—	6	20	Ω
Exit voltage	VCCsat	V+=5V		—	80	300	mV
VB voltage Output voltage	VB	V+=7.5V	21	2.5	2.9	3.3	V
	Rovb	Ib=1.7mA		—	250	—	Ω
Attenuator							
Receive attenuator gain		1KHz	26 27				
RX mode	GRX	24 ends =VB,27 ends =250mVrms		2	6	**10**	**dB**
RX to TX mode Range	△GRX			**40**	**44**	48	**dB**
Wait mode	GRXI	27ends=250mVrms		**-20**	-16	-12	dB
RXO voltage	VRXO	RX mode		1.8	2.3	3.2	V
RXO Voltage increment	△VRXO	Transform from RX to TX		—	—	100	mV
RXO Trapping current	IRXOL	RX mode		75			uA

RXO Source current	IRXOH	RX mode		1		3	mA
RXI Input resistance	RRXI			3.5	5	8	KΩ
Volume control range	VCR	RX Mode 0.6VB<24 terminal <VB,RX attenuator gain		24.5		32.5	dB
Transmit attenuator gain		1KHz					
TX Mode	GTX	3ends==250mVrms		4	6	8	dB
TX to RX Mode range	△GTX			40	44	48	dB
Wait Mode	GTXI	3ends==250mVrms	3 4	-16.5	-13	-8.5	dB
TXO voltage	VTXO	TX Mode		1.8	2.3	3.2	V
TXO voltage increment	△VTXO	Transform from TX to RX		—	—	100	mV
TXOTXO Source current	ITXOH	TX Mode		1		3	mA
TXI Input resistance	RTXI			3.5	5	8	KΩ
ACF voltage	△VACF	VCC—25endsvoltage					
RX Mode			20		150		mV
TX Mode			25		6		mV
Wait Mode					75		mV
Loudspeaker amplifier							
Amplifier gain of loudspeaker	GSPK	19ends=20mVrms		33	34	35	dB
SKI Input impedance	RSKJ		15	15	22	37	KΩ
SKO voltage	VSKO	19ends Capacitive grounding	19	2.4	3	3.6	V
SKO High level	VSKOH	19ends=0.1V,15ends plus - 0.1 - A		5.5			V
SKO Lowlevel	VSKOL	19ends=0.1V,15endsplus 0.1A				0.6	V
Microphone amplifier							
Gain	GMCI	9ends=10mVrms,1K Hz	9	32.5	34	35	dB
Input resistance	RMCI		10	6.5	10	16	KΩ
Transmitting detector							
XDC voltage							
Wait Mode	VXDC		23		0		V
Send Mode	VXDC				4		V

CP2 Current	Icp2		12	5	10	13	uA
Logarithmic amplifier							
RLO Leakage current	ILKRLO	8ends=VB+1V	8			2	uA
TLO Leakage current	ILKTLO	6ends=VB+1V	6			2	uA
Send and receive conversion threshold	Ith	Ratio of ITLI to IRLI, TX-RX comparison transition point at 20uA	5,7,25	0.8		1.2	uA
Distortion degree							
RX Mode- RXI for SKO	RXD	27ends=10mVrms,1KHz	27,15		1.5		%
TX Mode-MCI for TXO	TXD	9ends=5mVrms,1KHz	4,9		2		%

Note: 1. Unless otherwise specified, V+=7.5V,CS=0.7V

2.RX Mode, unless otherwise specified, 7ends=-100uA,5ends=+100uA; TXMode, 5,13ends=-100uA,7ends=+100uA,11

ends=0V

Wait Mode, 5ends=-100uA,7,13 ends=+100Ua

3. The current direction is positive for the input to the pin and negative for the output from the pin.

4. The voltage uses 22ends as the reference point. TA=25 ° C.

Recommended working conditions

V+ends voltage	+6V—+11V
CS(18ends)	0V—+11V
Vcc(20ends)	0—3mA
VLC(24ends)	0.55V*VB—VB
Received signal (27ends)	0—250 mVrms
Microphone signal (9ends)	0—5 mVrms
Loudspeaker amplification ground (14ends)	-10—10mV

Typical application circuit