



# MC34216

## Product Preview

# Programmable Telephone Line Interface Circuit with Loudspeaker Amplifier

The MC34216 is developed for use in telephone applications where besides the standard telephone functions also the group listening-in feature is required. In cooperation with a microcontroller, the circuit performs all basic telephone functions including DTMF generation and pulse dialing. The listening-in part includes a loudspeaker amplifier, an anti-howling circuit and a strong supply. In combination with the TCA3385, the ringing is performed via the loudspeaker.

### FEATURES

#### Line Driver and Supply

- DC and AC Termination of the Line
- Selectable Masks: France, U.K., Low Voltage
- Current Protection
- Adjustable Set Impedance for Resistive and Complex Termination
- Efficient Supply Point for Loudspeaker Amplifier and Peripherals

#### Handset Operation

- Transmit and Receive Amplifiers
- Adjustable Sidetone Network
- Line Length AGC
- Microphone and Earpiece Mute
- Earpiece Gain Increase Switch
- Microphone Squelch Function
- Transmit Amplifier Soft Clipping

#### Dialing and Ringing

- Generates DTMF, Pilot Tones and Ring Signal
- Interrupter Driver for Pulse-Dialing
- Low Current While Pulse-Dialing
- Optimized for Ringing via Loudspeaker
- Programmable Ring Melodies
- Uses Inexpensive 500 kHz Resonator

#### Loudspeaking Facility

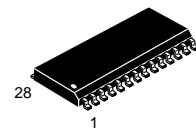
- Integrated Loudspeaker Amplifier
- Peak-to-Peak Limiter Prevents Distortion
- Programmable Volume
- Anti-Howling Circuitry for Group Listening-In
- Interfacing for Handsfree Conversation

#### Application Areas

- Corded Telephony with Group Listening-In
- Cordless Telephony Base Station with Group Listening-In
- Telephones with Answering Machines
- Fax, Intercom, Modem

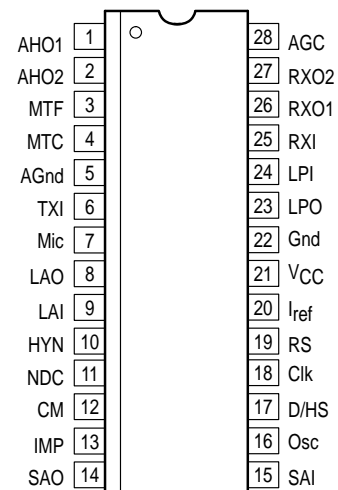
## PROGRAMMABLE TELEPHONE LINE INTERFACE CIRCUIT WITH LOUDSPEAKER AMPLIFIER

### SEMICONDUCTOR TECHNICAL DATA



**DW SUFFIX**  
PLASTIC PACKAGE  
CASE 751F

### PIN CONNECTIONS



(Top View)

### ORDERING INFORMATION

Device	Tested Operating Temperature Range	Package
MC34216DW	T <sub>A</sub> = 0° to +70°C	SO-28L

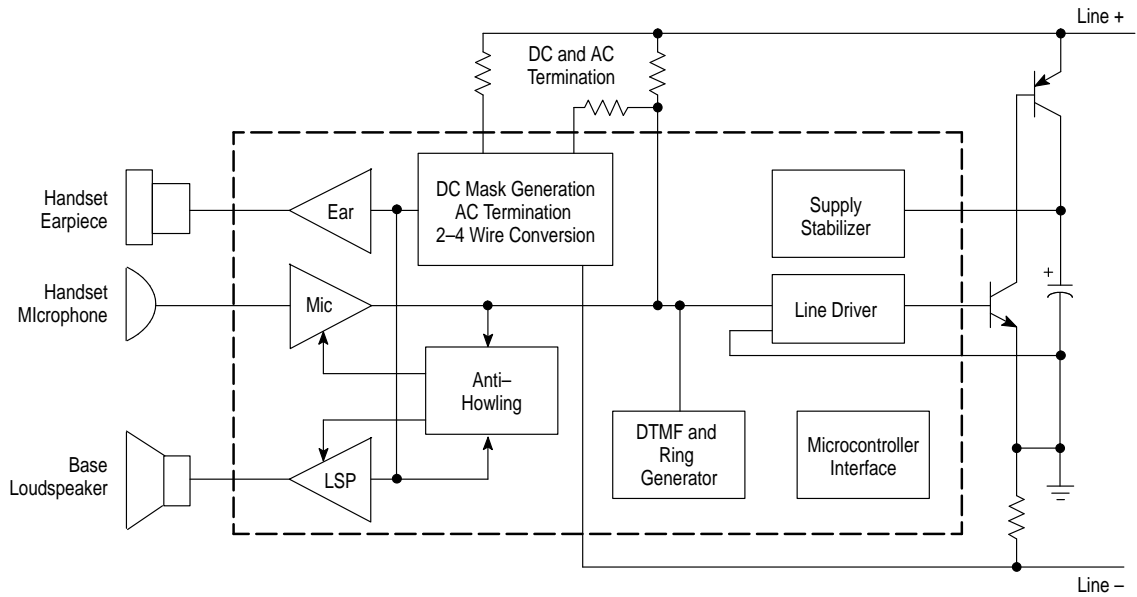
## MC34216

### PIN FUNCTION DESCRIPTION

Pin	Symbol	Description
1	AHO1	Anti-Howling Timing, Speakerphone Input
2	AHO2	Anti-Howling Timing, Low Voltage Line Driver Disable
3	MTF	Microphone Threshold Filtering
4	MTC	Microphone Threshold Timing
5	AGnd	Small Signal Ground
6	TXI	Microphone Amplifier Input
7	Mic	Microphone Bias Current Sink
8	LAO	Line Driver Amplifier Output
9	LAI	Line Driver Amplifier Input
10	HYN	Hybrid Network Input
11	NDC	Noise Decoupling
12	CM	DC Mask Signal Filtering
13	IMP	Reference Voltage
14	SAO	Line Current Sense Amplifier Output
15	SAI	Line Current Sense Amplifier Input
16	Osc	Oscillator Input. Connect to 500 kHz Resonator
17	D/HS	Data Input, Hookstatus Output
18	Clk	Clock Input
19	RS	Reset Output
20	I <sub>ref</sub>	Reference Current
21	V <sub>CC</sub>	Supply Voltage
22	Gnd	Large Signal Ground
23	LPO	Loudspeaker Amplifier Output
24	LPI	Loudspeaker Amplifier Input
25	RXI	Receive Amplifier Input
26	RXO1	Receive Amplifier Output
27	RXO2	Receive Amplifier Output
28	AGC	Loudspeaker AGC Timing

# MC34216

## Simplified Block Diagram



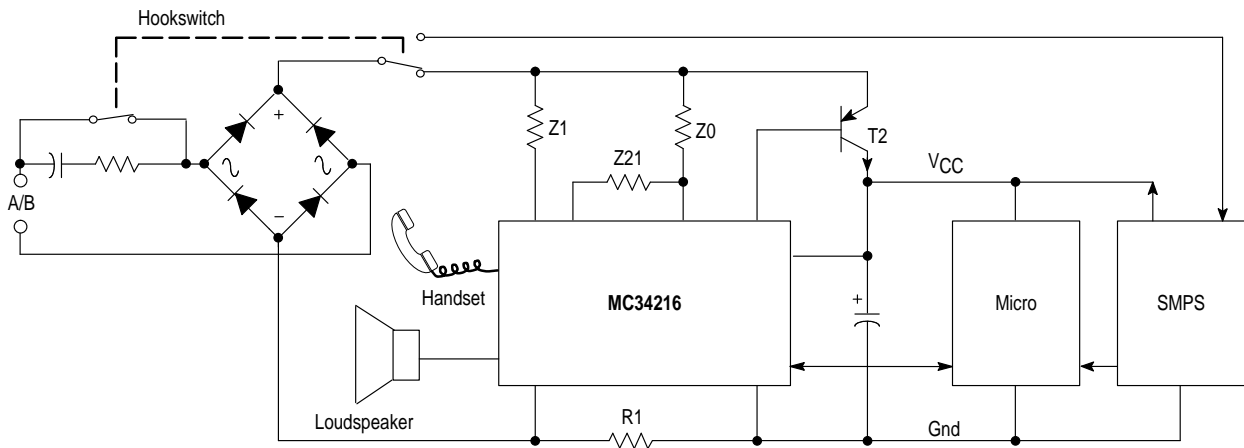
This device contains 6,507 active transistors.

## CIRCUIT DESCRIPTION

With the MC34216, a microcontroller and a switched mode power supply, a telephone set with listening-in function and ringing via loudspeaker can be built as shown in Figure 1.

The block diagram of the MC34216 (see Figure 2), shows the basic blocks of the device plus the essential external components.

Figure 1. Telephone Concept with MC34216



# MC34216

Figure 2. Block Diagram of the MC34216 with Essential Components

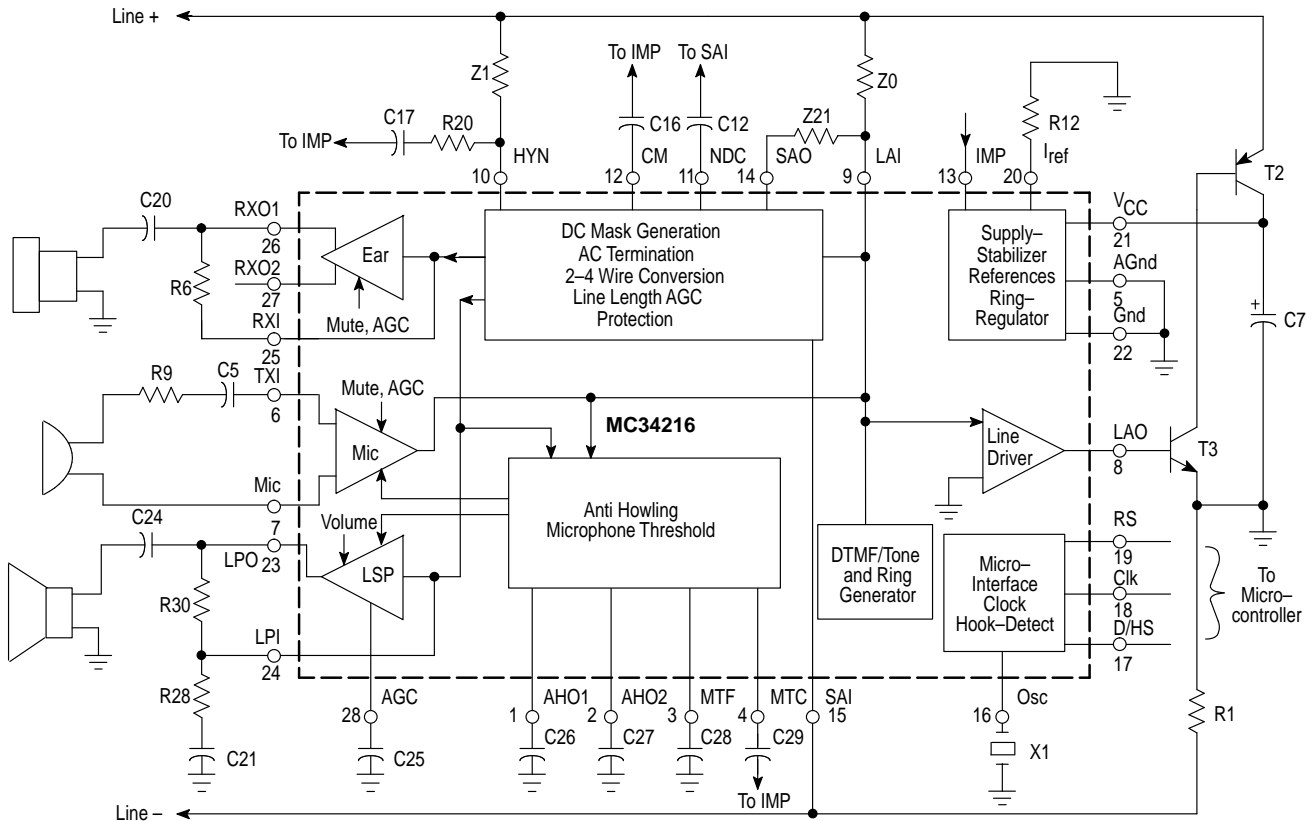


Table 1

A1, A0	Data	Symbol	Function	Comments
00	D0	MicM	Microphone Mute	On/Off
	D1	EM	Earphone Mute	On/Off
	D2	LD	Loop Disconnect	For Pulse-Dialing
	D3	PT	Pilot Tone	On/Off
	D4	IT	Idle Tone	On/Off
	D5	MicP	Microphone Power	On/Off
01	D0	MFC0	Tone Control	Switch On/Off DTMF & Tone Generator
	D1	MFC1	Tone Control	
	D2	MF0	Tone Select	Select DTMF & Tone Frequency
	D3	MF1	Tone Select	
	D4	MF2	Tone Select	
D5	MF3	Tone Select		
10	D0	R/S	Ring/Speech Mode	Select
	D1	EA	Earphone Gain +6.0 dB	On/Off
	D2	G0	Loudspeaker Gain	Reduce Gain up to 27 dB in 4.5 dB Steps & Mute
	D3	G1	Loudspeaker Gain	
	D4	G2	Loudspeaker Gain	
D5	RT	Ring Tone	On/Off	
11	D0	DCM0	DC Mask Control	Select French, U.K., or Low Voltage Mask
	D1	DCM1	DC Mask Control	
	D2	Sp	Speakerphone Mode	On/Off
	D3	GR	Line Length AGC	On/Off
	D4	HPI	Anti-Howling	On/Off
D5	Mth	Microphone Threshold	On/Off	

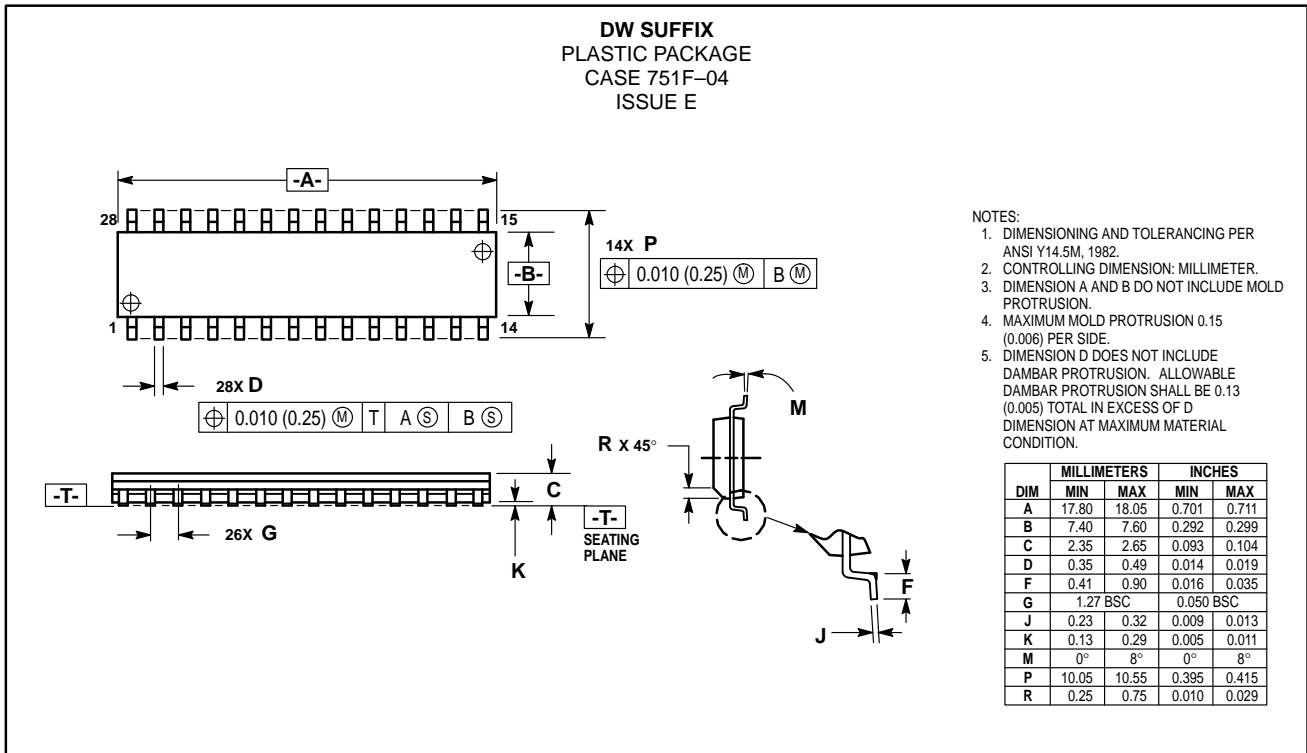
# MC34216

When off-hook, the loop current flows through transistor T2 and supplies the externals (microcontroller, etc.) at  $V_{CC}$  which is stabilized by the MC34216. The V-I line characteristic is programmed by the microcontroller and adjusted by the external components Z0, Z1, Z21 and R1 which are in a regulator loop, acting on transistor T2. The ac impedance is generated in a similar way. The handset and loudspeaker can be connected directly to the MC34216 to perform handset and listening-in operation. Via the bus, the

microcontroller programs the MC34216 to perform the DTMF/pulse-dialing and provide supervisory tones, as well as control other functions. The user keypad has to be connected to the microcontroller. When on-hook, the SMPS (TCA3385) supplies the circuit in the presence of a ringing signal. The microcontroller programs the MC34216 and a ringing melody can be generated via the loudspeaker.

A summary of the control bits which can be programmed from the microcontroller are in Table 1.

## OUTLINE DIMENSIONS



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