Low voltage standard telephone circuit with 13 memories

Description

TELEFUNKEN microelectronic's low voltage telephone circuit, U 3761 MB performs all the speech and line interface functions required in an electronic telephone set, the tone ringer, the pulse and DTMF dialing with redial, notice function, and 13 memories.

Features

Speech circuit

- Adjustable dc characteristic
- Symmetrical input of microphone amplifier
- Receiving amplifier for dynamic or piezo-electric earpieces
- Automatic line loss compensation

Dialer

- DTMF / pulse switchable
- Pulse dialling 66/33 or 60/40 or DTMF dialling selectable by pin
- Selectable flashing duration by key pad
- Pause function
- Last number redial up to 32 digits
- Three direct (one touch) memory
- Ten indirect (two touch) memory
- Notice function
- Standard low-cost crystal 3.57 MHz or ceramic resonator

Tone ringer

- 2 Tone ringer
- Adjustable volume
- RC oscillator
- Adjustable threshold

Benefits

- Low number of external components
- High quality through one IC solution

Block Diagram / Applications

Pin Description

Pin	Symbol	Function
	OUT	Buzzer output
	V_{RING}	Ringing supply
	V_B	Output for charging capacitor
	RCK	RC clock oscillator for ringer
	V_T	Ringer threshold adjustment
	RECO	Output of the receive amplifier. Dynamic transducers with a minimum impedance of 100 Ω can be directly driven by these outputs.
	GND	Ground.
	ST	The output of the sidetone cancellation signal, which requires a balanced impedance of 8 to 10 times the subscribers line impedance to be connected to Pin V_L.
	TIN	Input to the line output driver amplifier. Transmit a.g.c. applied to this stage.
	MICO	Transmit pre-amp output which is normally capacitively coupled to Pin TIN.
	MIC 1, MIC 2	Inputs of symmetrical microphone amplifier with high common mode rejection ratio.
	V_{DD}	Requlated output voltage of 2.7 V for biasing the dialing part activated by MUTE.
	RECIN	Receive amplifier input. The receiving amplification is regulated by an a.g.c.
	V_L	Positive supply voltage input to the device. The current through this pin is modulated by the transmit signal.
	R_{DC}	An external resistor (1 W) is required from this pin to GND to control the dc input impedance of the circuit. It has a nominal value of 56 Ω for low voltage operation. Values up to 100 Ω may be used to increase the available transmit output voltage swing at the expense of low-voltage operation.

Pin	Symbol	Function
	V_I	This internal voltage bias line must be connected to V_L via an external resistor, R_B, which dominates the ac input impedance of the circuit and should be 620 Ω for an 600 Ω input impedance or 910 Ω for a 900 Ω input impedance.
	R_{AGC}	The range of transmit and receive gain variations between short and long loops may be adjusted by connecting a resistor R_{AGC} from this pin to (GND). This pin can be left open to set a.g.c. out of action.
	C1 to C5, R1 to R4	The keyboard input
	XT, $\overline{XT}$	A built-in inverter provides oscillation with an inexpensive 3.579545 MHz crystal or ceramic resonator
	MODE	Pulling mode pin to GND places the dialer in tone mode. Pulling mode pin to V_{DD} places the dialer in pulse mode (10 ppS, M/B = 2:3). If the mode pin is left floating, the dialer is in pulse mode (10 ppS, M/B = 1:2)
	HKS	Hook switch input. $\overline{HKS}$ = 1: On-hook state. Chip in sleep mode, no operation. $\overline{HKS}$ = 0: Off-hook state. Chip enable for normel operation. $\overline{HKS}$ pin is pulled to V_{DD} by internal resistor.
	$\overline{DP}$	N-channel open drain pulse dialing output. Flash key will cause $\overline{DP}$ to be active in either DTMF mode or pulse mode.
	MFO	Output of DTMF

Electrical Characteristics speech circuit

Reference point Pin GND, f = 1000 Hz, 0 dBm = 775 mV_{rms}, R_{DC} = 56 Ω / 1 W, T_{amb} = 25°C, unless otherwise specified

Parameters	Test Conditions / Pin	Symbol	Min	Typ	Max	Unit
Line voltage	I_L = 8 mA I_L = 20 mA I_L = 30 mA I_L = 73 mA	V_L	1.8 3.0 3.6 7.7	2.1 3.3	2.6 3.6 4.5 9.7	V V V V
Transmit and sidetone						
Input resistance	R_i	R_i	30	50	75	kΩ
Gain	I_L = 30 mA	G_s	47	48	49	dB
Line loss compensation	R_{AGC} = 0 Ω, I_L = 73 mA	ΔG_s	–5	–6	–7	dB
Noise at line weighted psophometrically	I_L > 30 mA, G_S = 48dB	n_o			– 72	dBmp
Sidetone reduction	$I_L \geqq$ 20 mA	G_{STA}	10	15	20	dB
DTMF-Amplifier						
Volume range d ≧ 5%		V_0	1			V_{RMS}
Receiving amplifier						
Gain	$I_L \geq$ 20 mA	G_R	–9	–8	–7	dB
Line loss compensation	I_L = 73 mA	ΔG_R	–5	–6	–7	dB
Receiving noise at earphone weighted psophometrially	I_L = 73 mA	n_i		–80	–71	dBm
Gain change when muted	$I_L \geqq$ 20 mA	G_{RM}	15	20	24	dB
Output voltage	$I_L \geqq$ 20 mA	V_0	0.8	1	1.5	V_{pp}
Supply voltage						
Output voltage	$I_L \geqq$ 20 mA dialing mode speech mode dialing mode	V_{DD}	 3 2.5	 2.9	 6.1 3.1	 V V

DC Characteristics of dialer

V_{DD} = 2.5 V, f_{OSC} = 3.58 MHz, all outputs unloaded

Parameters	Test Conditions / Pin	Symbol	Min	Typ	Max	Unit
Memory rentention current	$\overline{HKS}$ = 1, V_{DD} = 1.0 V	I_{MR}			0.2	µA
Pre-emphases	Col/Row		1	2	3	dB
DTMF distortion	R_L = 5 kΩ	d		–30	–23	dB
DTMF output DC level	R_L = 5 kΩ	V_{TDC}	1.1		2.8	V
DP output sink current	V_{PO} = 0.5 V	I_{PL}	0.5			mA
$\overline{HKS}$ I/P pull-high resistor		R_{KH}		300	500	kΩ
Keyboard input drive current	V_I = 0 V	I_{KD}	30			µA
Keyboard input sink current		I_{KS}	200	400		µA
Keyboard resistance					5	kΩ

AC Characteristics of dialer

Parameters	Test Conditions / Pin	Symbol	Min	Typ	Max	Unit
Keypad active in debounce		t_{KID}		20		mS
Key release debounce		t_{KRD}		20		mS
Pre-digit pause	Mode pin = 1 Mode pin = floating	t_{PDP1}=10 ppS t_{PDP2}=20 ppS		40 33.3		mS mS
Interdigit Pause (auto dialing)	10 ppS 20 ppS	t_{IDP}		800 500		mS mS
Make/break ratio	Mode pin = 1 Mode pin = floating	M/B		40:60 33:67		% %
DTMF output duration	Auto dialing	t_{TD}		93		mS
Intertone pause	Auto dialing	t_{ITP}		93		mS
Flash break time		t_{FB}		73		mS
Flash pause time		t_{FP}		140		mS
Pause time		t_P		3.6		S
Last no. redial/P						

Electrical Characteristics Tone ringer

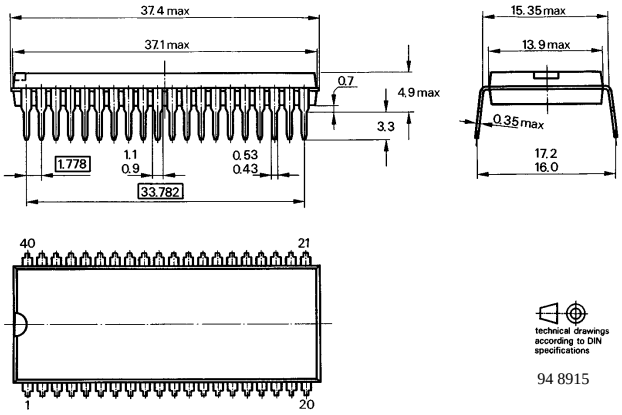
V_{ring} = 10 V, f = 4 kHz, T_{amb} = 25°C, Reference point GND, unless otherwise specified

Parameters	Test Conditions / Pin	Symbol	Min	Typ	Max	Unit
Supply current, outputs open	V_B	I_S	1.5	2.0	2.5	mA
Switch-on threshold		V_{RING}		28		V
Switch-off threshold		V_{RING}		6		V
Ringing frequency	R = 160 kΩ, C = 1 nF	 f_{1H} f_{1L}	 937 752	 1010 808	 1083 868	Hz
Audio sequence frequency		f_2	11.5	12.5	14.0	HZ

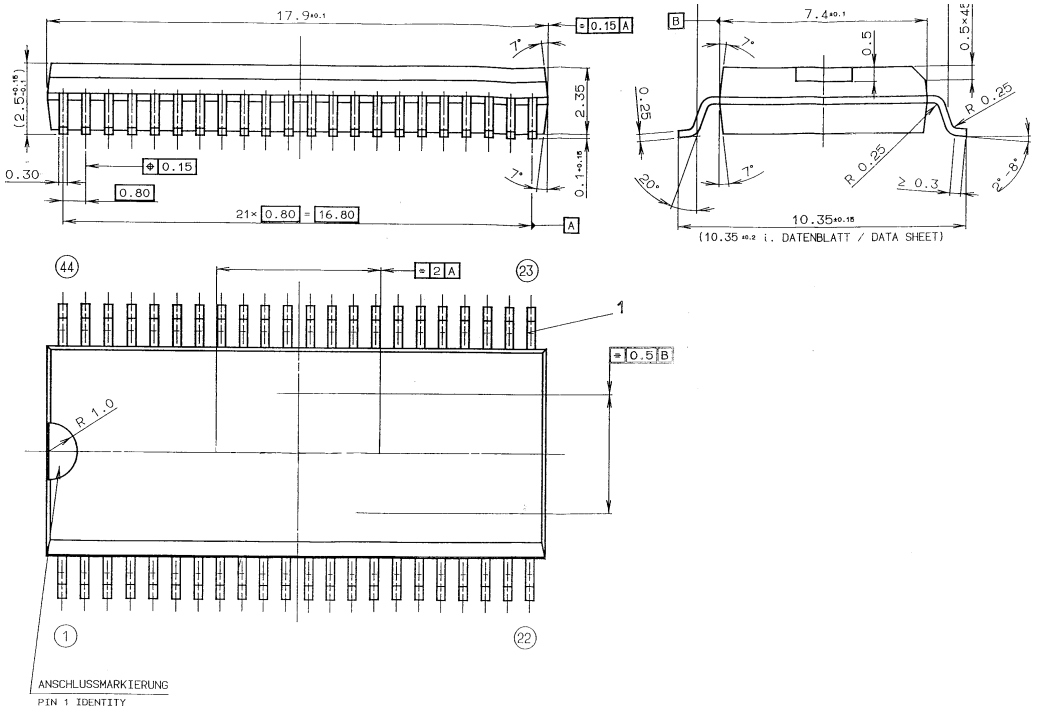
Type	Package
U 3761 MB	SDIP 40
U 3761 MB-FN	SSO 44

Dimensions in mm

Package: SDIP 40



Package: SSO 44



We reserve the right to make changes without further notice to improve technical design.
Parameters can vary in different applications. All operating parameters must be validated by the customer for each customer application. Should the buyer use TEMIC products for any unintended or unauthorized application the buyer shall indemnify TEMIC against all claims, costs, damages, and expenses arising out of, directly or indirectly, personal damage, injury or death associated with such unintended or unauthorized use.

TEMIC TELEFUNKEN microelectronic GmbH, P.O.B. 3535, D-74025 Heilbronn, Germany
Telephone: 49 (0)7131 67 2831, Fax Number: 49 (0)7131 67 2423

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 these substances which are known as ozone depleting substances (ODSs).

The Montreal Protocol (1987) and its London Amendments (1990) will 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 that all refer to the same substances:

(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.