
Low Voltage Standard Telephone Circuit with 13 Memories

Description

TEMIC's low voltage telephone circuit, U3761MB 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
- Last number redial up to 32 digits
- Three by 32 digits direct (one touch) memory
- Ten by 16 digits indirect (two touch) memory
- Notice function up to 32 digits
- Standard low-cost crystal 3.57 MHz or ceramic resonator

Dialer

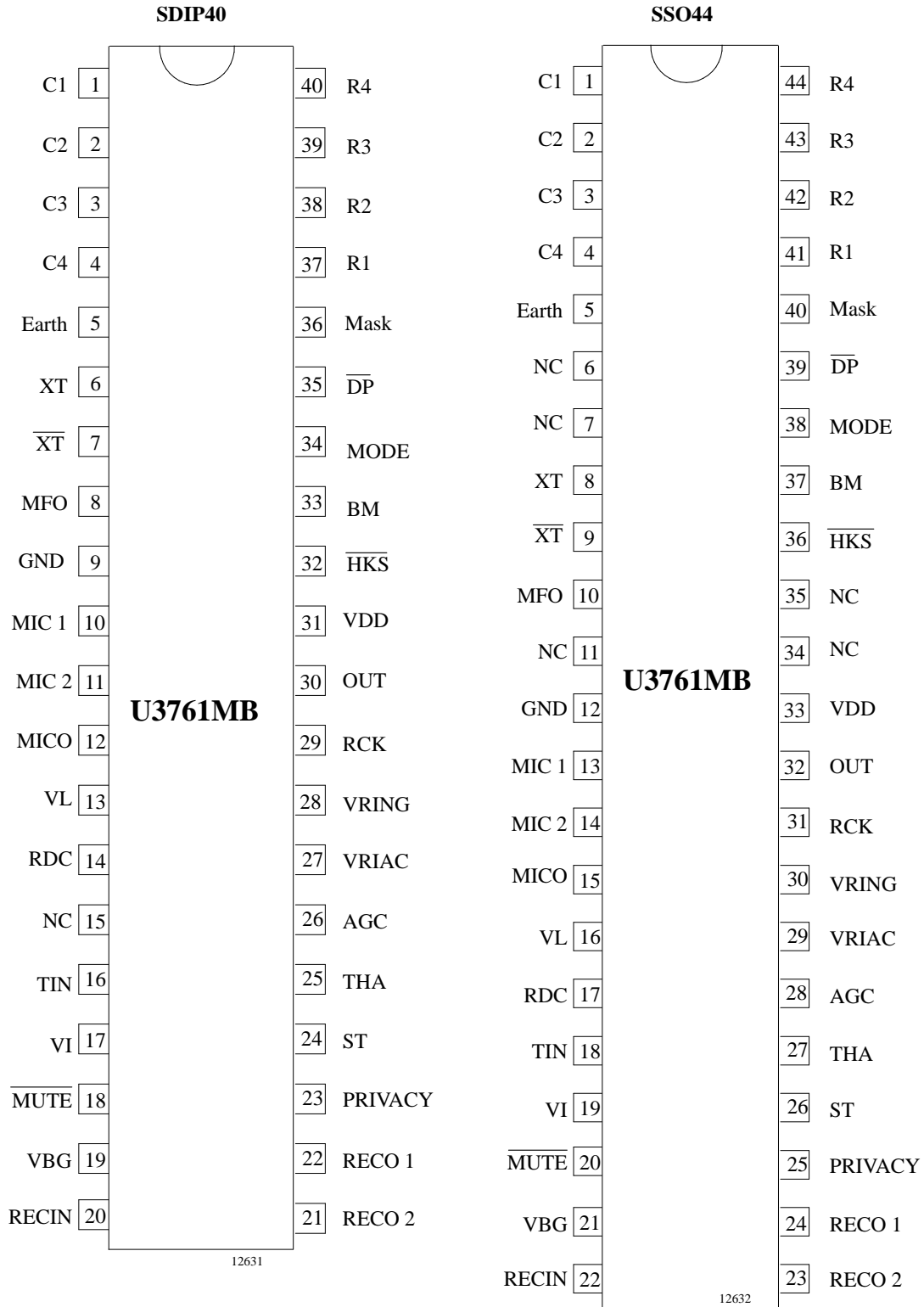
- DTMF / pulse switchable
- Pulse dialling 66/33 or 60/40 or DTMF dialling selectable by pin
- Selectable flashing duration by key pad
- Pause function

Tone Ringer

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

Benefits

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



Pin Description

| SDIP40 | SSO44 | Symbol | Configuration | Function | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--------|-----------------|------------------------|---------------|---|--|----------------|-------------|-----------|----|-----|-----|-------|----|-----|-----|-------|----|-----|-----|-------|----|-----|-----|-------|----|------|------|-------|----|------|------|-------|----|------|------|-------|
| 1 | 1 | C1 | | Keyboard input | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 | 2 | C2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3 | 3 | C3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4 | 4 | C4 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5 | 5 | Earth | | Earth key | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 15 | 7, 6, 34, 35 | NC | | Not connected | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6 | 8 | XT | | A built-in inverter provides oscillation with an inexpensive 3.579545 MHz crystal or ceramic resonator | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7 | 9 | $\overline{\text{XT}}$ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 8 | 10 | MFO | | Output of DTMF DTMF output frequency <table border="1"> <thead> <tr> <th></th> <th>Specified (HZ)</th> <th>Actual (Hz)</th> <th>Error (%)</th> </tr> </thead> <tbody> <tr> <td>R1</td> <td>697</td> <td>699</td> <td>+0.28</td> </tr> <tr> <td>R2</td> <td>770</td> <td>766</td> <td>-0.52</td> </tr> <tr> <td>R3</td> <td>852</td> <td>848</td> <td>-0.47</td> </tr> <tr> <td>R4</td> <td>941</td> <td>948</td> <td>+0.74</td> </tr> <tr> <td>C1</td> <td>1209</td> <td>1216</td> <td>+0.57</td> </tr> <tr> <td>C2</td> <td>1336</td> <td>1332</td> <td>-0.30</td> </tr> <tr> <td>C3</td> <td>1477</td> <td>1472</td> <td>-0.34</td> </tr> </tbody> </table> | | Specified (HZ) | Actual (Hz) | Error (%) | R1 | 697 | 699 | +0.28 | R2 | 770 | 766 | -0.52 | R3 | 852 | 848 | -0.47 | R4 | 941 | 948 | +0.74 | C1 | 1209 | 1216 | +0.57 | C2 | 1336 | 1332 | -0.30 | C3 | 1477 | 1472 | -0.34 |
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| C3 | 1477 | 1472 | -0.34 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 9 | 12 | GND | | Ground | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

| SDIP40 | SSO44 | Symbol | Configuration | Function |
|--------|-------|--------|---------------|--|
| 10 | 13 | MIC 1 | | Inverting input of microphone amplifier |
| 11 | 14 | MIC 2 | | Non-inverting input of microphone amplifier |
| 12 | 15 | MICO | | Transmit pre-amp output which is normally capacitively coupled to Pin TIN |
| 13 | 16 | VL | | Positive supply voltage input to the device. The current through this pin is modulated by the transmit signal. |

| SDIP40 | SSO44 | Symbol | Configuration | Function |
|--------|-------|-------------------|---------------|---|
| 14 | 17 | RDC | | 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 39 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. |
| 16 | 18 | TIN | | Input to the line output driver amplifier. Transmit AGC applied to this stage. |
| 17 | 19 | V _I | | This internal voltage bias line must be connected to VL via an external resistor, R _B , which dominates the AC input impedance of the circuit and should be 680 Ω for an 600 Ω input impedance or 1.2 kΩ for a 900 Ω input impedance. |
| 18 | 20 | MUTE | | Pin for testing |
| 19 | 21 | VBG | | Pin for test mode |
| 20 | 22 | REC _{IN} | | Receive amplifier input. The receiving amplification is regulated by an AGC. |
| 22 | 24 | RECO1 | | Output of the receive amplifier. Dynamic transducers with a minimum impedance of 100 Ω can be directly driven by these outputs. |
| 21 | 23 | RECO2 | | |

| SDIP40 | SSO44 | Symbol | Configuration | Function |
|--------|-------|---------|---------------|--|
| 23 | 25 | PRIVACY | | Input for handset mute |
| 24 | 26 | 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 VL. |
| 25 | 27 | THA | | Ringer threshold adjustment |
| 26 | 28 | 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 AGC out of action. |
| 27 | 29 | VRIAC | | Ringling supply |
| 28 | 30 | VRING | | DC supply voltage for the tone ringer is limited to 30 V with integrated Z-diode. |
| 29 | 31 | RCK | | RC clock oscillator for ringer |

| SDIP40 | SSO44 | Symbol | Configuration | Function |
|--------|-------|-------------------------|---------------|--|
| 30 | 32 | OUT | | Buzzer output |
| 31 | 33 | VDD | | Supply output for dialer part |
| 32 | 36 | $\overline{\text{HKS}}$ | | Hook switch input. $\overline{\text{HKS}} = 1$: On-hook state. Chip in sleep mode, no operation. $\overline{\text{HKS}} = 0$: Off-hook state. Chip enable for normal operation with a pull-high resistor of about 4 M Ω . |
| 33 | 37 | BM | | If BM = floating pulse dialing with 3:2 B/M ratio If BM is connected to ground pulse dialing with a B/M ratio of 2:1 |
| 34 | 38 | MODE | | Pulling mode pin to V _{DD} places the dialer in tone mode. Pulling mode pin to GND places the dialer in DTMF with 140 ms inter-tone pause. If the mode pin is left floating, the dialer is in pulse mode (10 ppS) |
| 35 | 39 | $\overline{\text{DP}}$ | | N-channel open drain pulse dialing output. Flash key will cause $\overline{\text{DP}}$ to be active in either DTMF mode or pulse mode. |
| 36 | 40 | Mask | | Short mute during pulse dialing |

| SDIP40 | SSO44 | Symbol | Configuration | Function |
|--------|-------|--------|---------------|----------------|
| 37 | 41 | R1 | | Keyboard input |
| 38 | 42 | R2 | | |
| 39 | 43 | R3 | | |
| 40 | 44 | R4 | | |

Keyboard Operation

| | C1 | C2 | C3 | C4 | |
|-------|-------|----|----|-----|----|
| | 1 | 2 | 3 | S | M1 |
| | 4 | 5 | 6 | | M2 |
| | 7 | 8 | 9 | A | M3 |
| | * / T | 0 | # | R/P | N |
| VDD ← | F1 | F2 | F3 | E | ⏚ |

- S: Store function key
- A: Indirect repertory dialing function key (LN 0 to 9)
- R/P: Redial and pause function key
- N: Notice function
- * / T: * and pulse-to-tone key
- M1 to M3: One-touch memory
- F1, F2, F3: Flash keys

Normal Dialing

OFF HOOK , D1 , D2 , ..., Dn

1. D1, D2, ..., Dn will be dialed out.
2. Dialing length is unlimited, but redial is inhibited if length oversteps 32 digits.
3. If redialing length oversteps 32 digits, the redialing function will be inhibited.

Redialing

OFF HOOK , D1 , D2 , ..., Dn BUSY, Come ON HOOK , OFF HOOK , R/P

The R/P key can execute the redial function only as the first key-in after off-hook; otherwise, it executes the pause function.

Number Store

[OFF HOOK] , [D1] , [D2] , ..., [Dn] , [S] , [S] , [Mn] (or [Ln])

1. If the sequence of the dialed digits D1, D2, ..., Dn has not finished [S] will be ignored.
2. D1, D2, ..., Dn will be stored in memory location and dialed out.

[OFF HOOK] , [S] , [D1] , [D2] , ..., [Dn] , [S] , [Mn] (or [Ln])

3. D1, D2, ..., Dn will be stored in memory location but will not be dialed out.
4. [R/P] and [*T] keys can be stored as a digit in memory.

In store mode, [R/P] is the pause function key; [*T] is the pulse-to-tone function key.

5. The store mode is released after the store function is executed or when the state of the hook switch is changed.

Reportery Dialing

1. [OFF HOOK] , [Mn]

2. [OFF HOOK] , [A] , [Ln]

Notice (N)

[OFF HOOK] , [D1] , [D2] , ..., [Dn] , [N]

1. If the dialing of [D1] to [Dn] is finished, pressing the [N] key will cause D1 to Dn to be copied to the N memory.

[OFF HOOK] , [N]

2. D1 to Dn will be dialed out after the N key is pressed.

Cascaded Dialing

1. [Normal dialing] + [Reportery dialing] + [Normal dialing]

2. [Reportery dialing] + [Normal dialing] + [Normal dialing]

3. [Redialing] + [Normal dialing] + [Reportery dialing]

4. Redialing is valid as first key-in only.

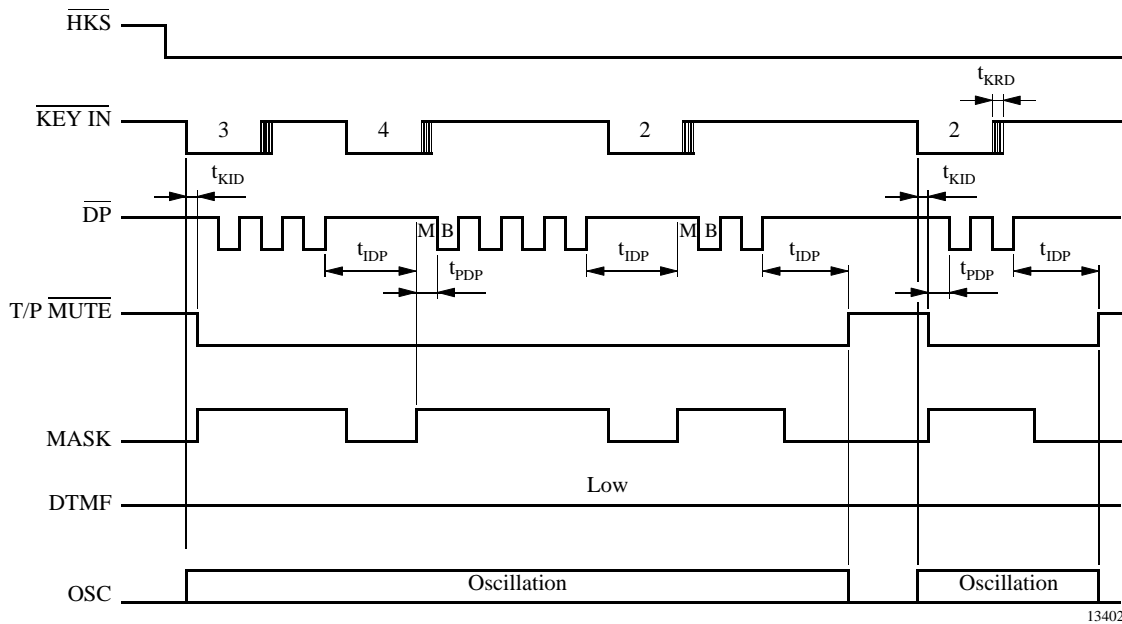


Figure 2. Pulse mode normal dialing

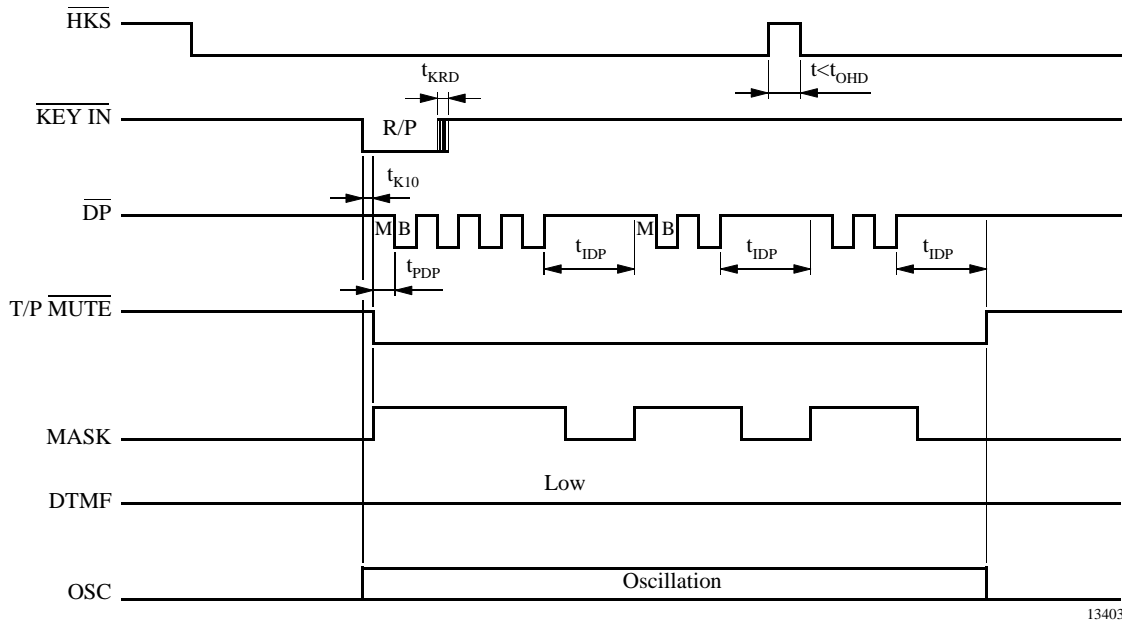
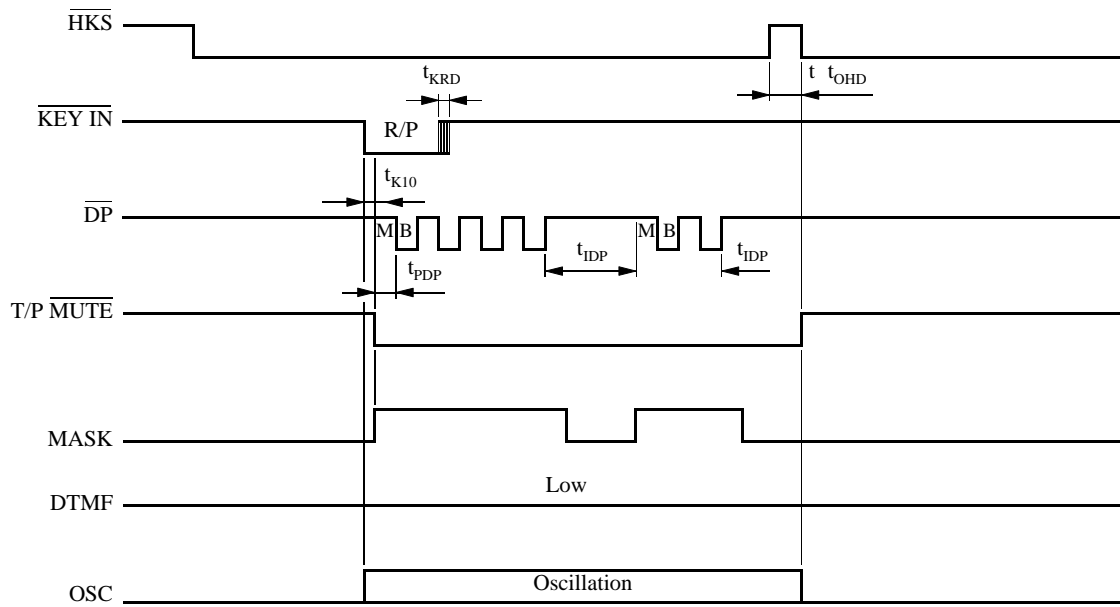
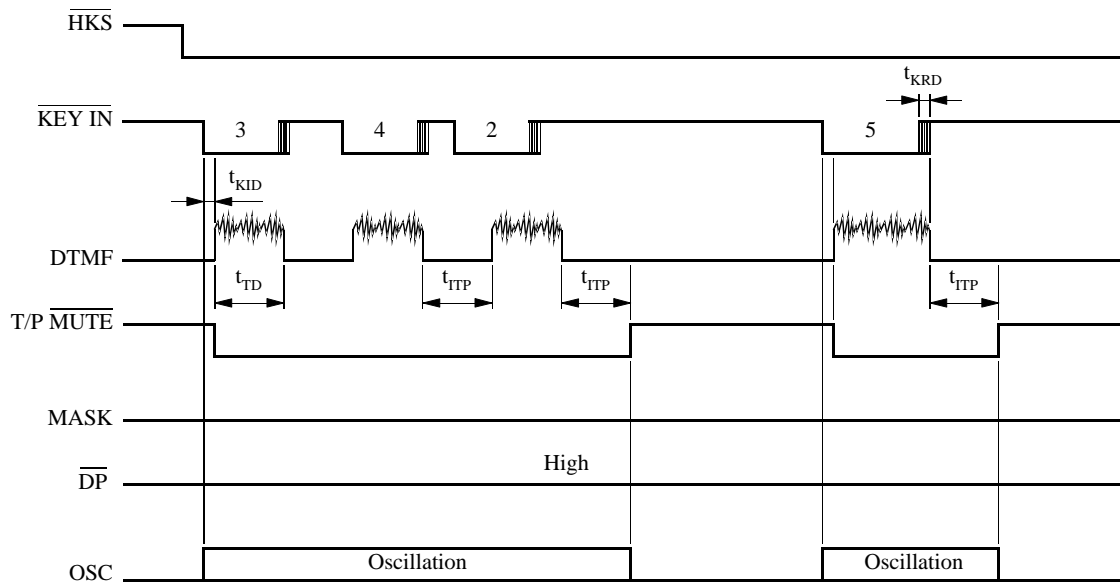


Figure 3. Pulse mode auto dialing



13404

Figure 4. Pulse mode auto dialing



13405

Figure 5. DTMF mode normal dialing

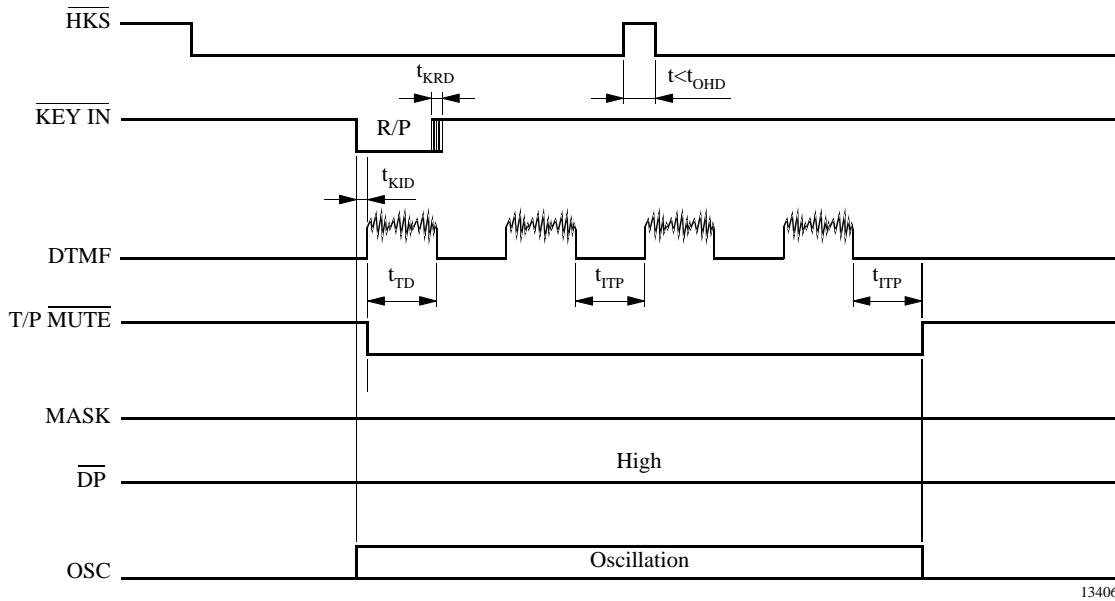


Figure 6. DTMF mode auto dialing

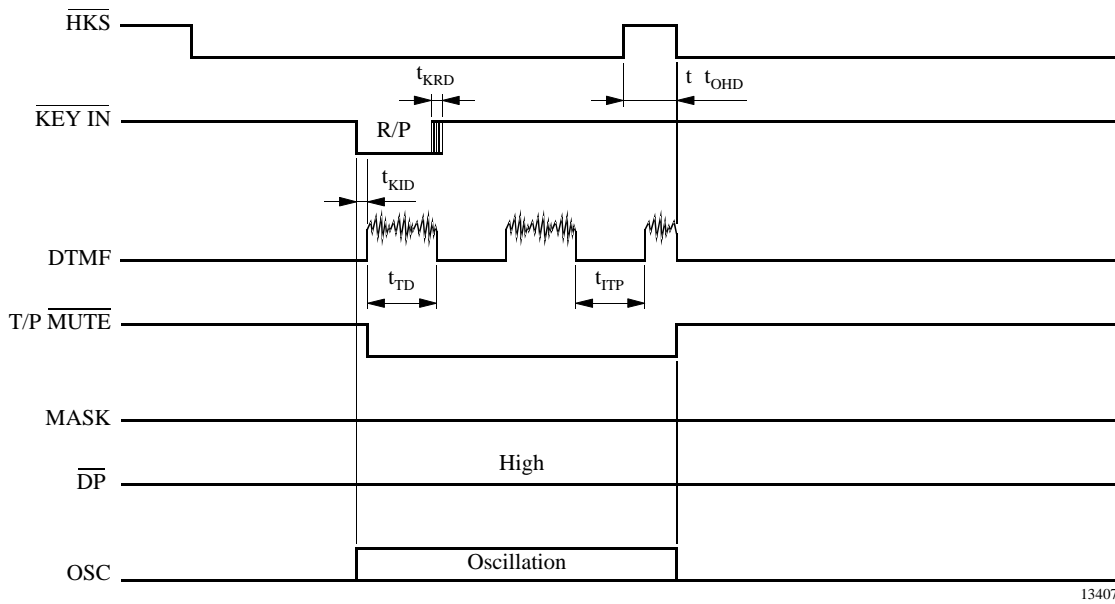


Figure 7. DTMF mode auto dialing

Access Pause

OFF HOOK , D1 , D2 , R/P , D3 , ..., Dn'

1. The pause function can be stored in memory.
2. The pause function is executed in normal dialing and redialing.

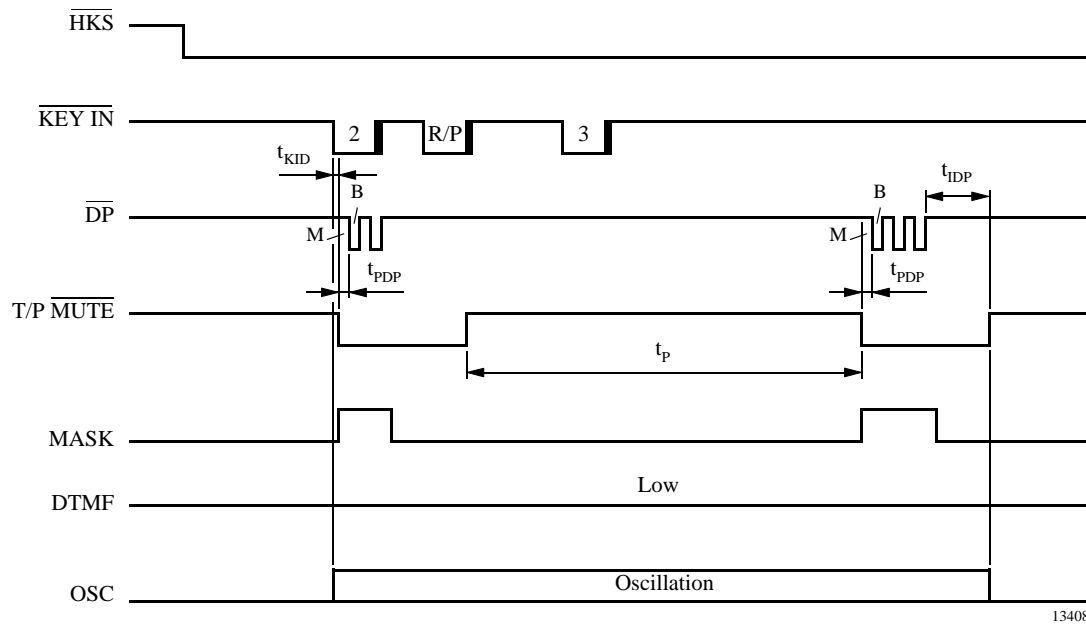


Figure 8. Pause function

Pulse-to-Tone (* / T)

OFF HOOK , D1 , D2 , ..., Dn , * / T , D1' , D2' , ..., Dn'

1. If the mode switch is set to pulse mode, then the output signal will be:
 D1, D2, ..., Dn, Pause (3.6 s), D1', D2', ..., Dn'
 (Pulse) (Tone)
2. If the mode switch is set to tone mode, then the output signal will be:
 D1, D2, ..., Dn, * , D1', D2', ..., Dn'
 (Tone) (Tone) (Tone)
3. The dialer remains in tone mode when the digits have been dialed out and can be reset to pulse mode only by going on-hook.

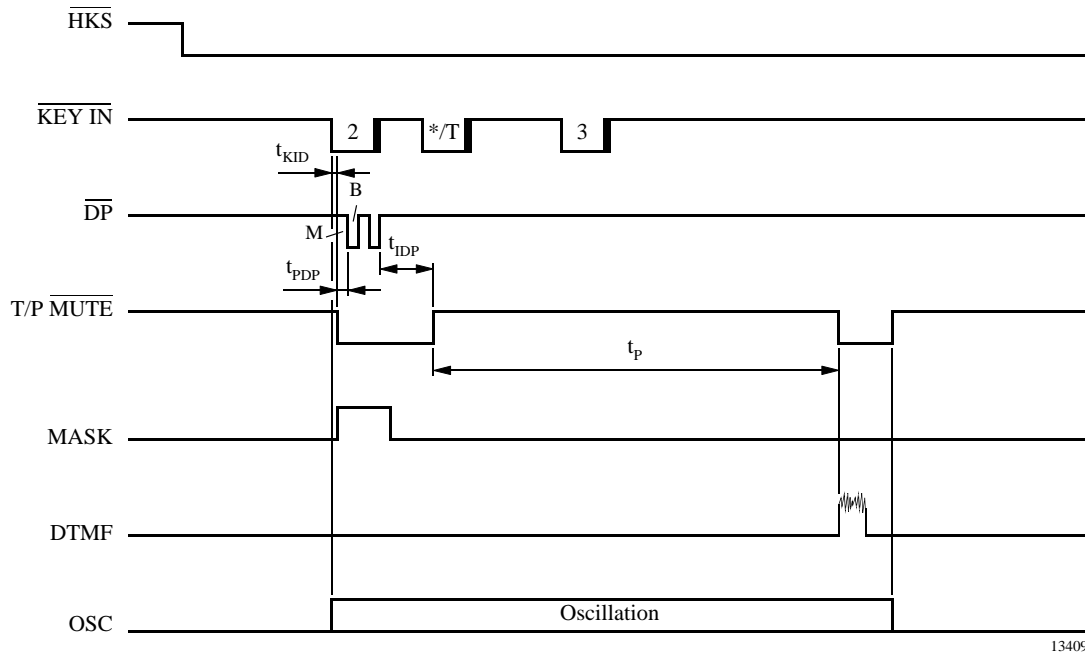


Figure 9. Pulse-to-tone operation

13409

Earth

The Earth pin will go high 400 ms and the pause time of 1 s will be added when the Earth key is pressed. It can be stored as a digit in Memory and has not the first priority.

Flash (F1 or F2 or F3)

OFF HOOK , F_n

1. The dialer will execute flash break and all the flash pause time before the next digits is dialed out.
2. The flash key can be stored as a digit in memory, however, only one flash will be releases to users.
3. The system will return to the initial state after the flash pause time is finished.

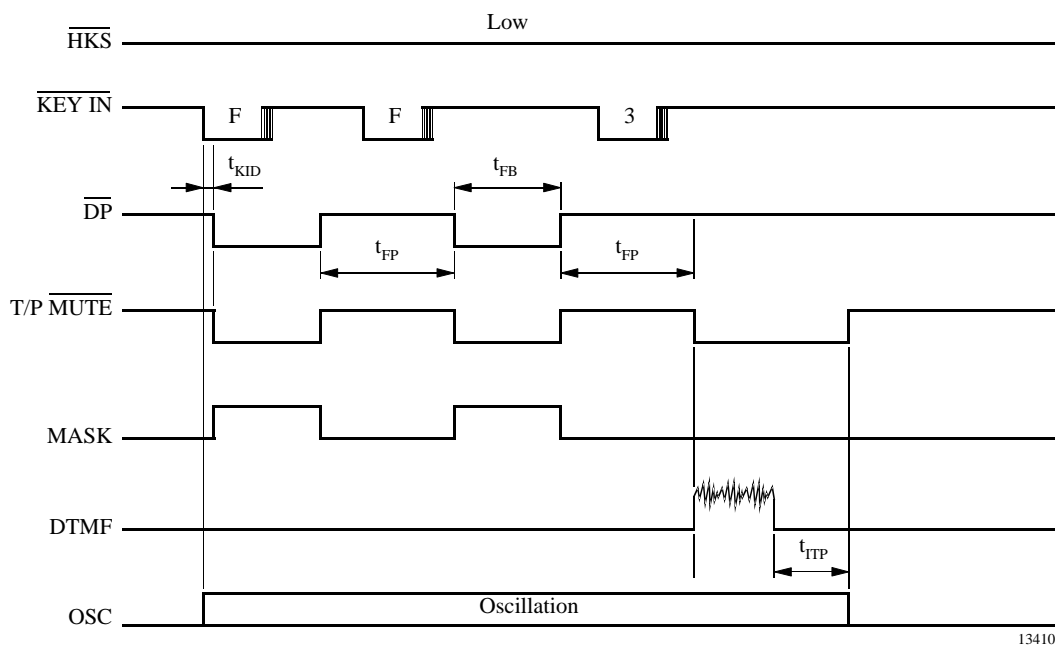


Figure 10. Flash operation

t_{KID} = key active in debounce
 t_{KRD} = key release debounce
 t_{PDP} = pre-digit pause
 t_{IDP} = inter-digit pause
 t_{TD} = DTMF output duration

t_{ITP} = intertone pause
 t_{FB} = flash break time
 t_{FP} = flash pause time
 t_p = pause time

Absolute Maximum Ratings

| Parameters | Symbol | Value | Unit | |
|---|-----------|-------------|------|-----|
| Line current | I_L | 140 | mA | |
| DC line voltage | V_L | 14 | V | |
| Junction temperature | T_j | 125 | °C | |
| Ambient temperature | T_{amb} | -25 to +75 | °C | |
| Storage temperature | T_{stg} | -55 to +150 | °C | |
| Total power dissipation, $T_{amb} = 60^\circ\text{C}$ | SSO44 | P_{tot} | 0.9 | W |
| | SDIP40 | P_{tot} | 1.3 | W |
| Junction ambient | SSO44 | R_{thJA} | 70 | K/W |
| | SDIP40 | R_{thJA} | 50 | K/W |

Electrical Characteristics Speech Circuit

Reference point Pin GND, $f = 1000 \text{ Hz}$, $0 \text{ dBm} = 775 \text{ mV}_{\text{rms}}$, $R_{\text{DC}} = 39 \Omega / 1 \text{ W}$, $T_{\text{amb}} = 25^\circ\text{C}$, unless otherwise specified

| Parameters | Test Conditions / Pin | Symbol | Min. | Typ. | Max. | Unit |
|--|--|---------------------|------|-------|------|------------------|
| Line voltage | $I_L = 5 \text{ mA}$ | V_L | 1.2 | | 1.5 | V |
| | $I_L = 20 \text{ mA}$ | | | 4.0 | | |
| | $I_L = 30 \text{ mA}$ | | | 4.5 | | |
| | $I_L = 73 \text{ mA}$ | | | 6.4 | | |
| Transmit and sidetone | | | | | | |
| Input resistance | R_i | R_i | 45 | 80 | 120 | $\text{k}\Omega$ |
| Gain | $I_L = 20 \text{ mA}$, $S5 = \text{open}$ | G_S | 46.8 | 47.8 | 48.8 | dB |
| Gain change with current | $I_L = 20 \text{ to } 60 \text{ mA}$ $R_{\text{AGC}} = \text{infinite}$ | ΔG_S | -0.5 | | 0.5 | dB |
| Gain deviation | $T_{\text{amb}} = -10 \text{ to } +60^\circ\text{C}$ $I_L = 20 \text{ mA}$ | ΔG_S | -0.5 | | 0.5 | dB |
| Line-loss compensation | $R_{\text{AGC}} = 12 \text{ k}\Omega$, $I_L = 73 \text{ mA}$ | ΔG_S | -4.8 | -6 | -7 | dB |
| Noise at line weighted psophometrically | $I_L > 20 \text{ mA}$, $G_S = 48\text{dB}$ | n_o | | | -72 | dBmp |
| Sidetone reduction | $I_L \geq 20 \text{ mA}$ | G_{STA} | 10 | 15 | 20 | dB |
| DTMF amplifier | | | | | | |
| Volume range $d < 5\%$ | Single tone, $I_L \geq 20 \text{ mA}$ | V_L | 1.3 | | | dBm |
| DTMF output level low frequency group | $I_L = 20 \text{ mA}$, $S5 = \text{closed}$ | V_L | -8 | | -4 | dBm |
| Pre-emphasis between high and low level frequency group | $P_{\text{PRE}} = P_{\text{HLG}} - P_{\text{LLG}}$, $S5 = \text{closed}$ | P_{PRE} | 1 | | 3 | dB |
| Receiving amplifier | | | | | | |
| Gain | $I_L \geq 20 \text{ mA}$ | G_R | 3 | | 5 | dB |
| Gain change with current | $I_L = 20 \text{ to } 60 \text{ mA}$ $R_{\text{AGC}} = \text{infinite}$ | ΔG_R | -0.5 | | 0.5 | dB |
| Gain deviation | $T_{\text{amb}} = -10 \text{ to } +60^\circ\text{C}$ $I_L = 20 \text{ mA}$ | ΔG_R | -0.3 | | 0.7 | dB |
| Line-loss compensation | $I_L = 73 \text{ mA}$ | ΔG_R | -4.7 | -6 | -7 | dB |
| Receiving noise at earphone weighted psophometrically | $I_L = 73 \text{ mA}$ | n_i | | -77.5 | -71 | dBm |
| Gain change when muted | $I_L \geq 20 \text{ mA}$ | G_{RM} | 24 | 29 | 34 | dB |
| Output voltage push-pull | $I_L \geq 20 \text{ mA}$, $Z_{\text{ear}} = 68 \text{ nF}$, 100Ω in series | V_{RECO} | 0.8 | 0.9 | | V_{RMS} |
| Ear protection differential | $I_L = 40 \text{ mA}$, $V_{\text{gen}} = 4 \text{ V}_{\text{rms}}$, $Z_{\text{ear}} = 68 \text{ nF} + 100 \Omega$ | V_{ear} | 1.3 | 1.6 | 2.5 | V_{rms} |
| Supply voltage (for internal use only) | | | | | | |
| Output voltage | $I_L \geq 20 \text{ mA}$ dialing mode | V_{DD} | 2.3 | | 6.3 | V |
| Distortion at line $V_L = 0.775 \text{ V}_{\text{rms}}$ | $I_L = 20 \text{ mA}$, $S5 = \text{open}$ | d_t | | | 2 | % |
| Maximum output voltage swing at line | $I_L = 20 \text{ mA}$, $V_{\text{mic}} = 50 \text{ mV}_{\text{off}}$ | $V_{L \text{ max}}$ | | 3.4 | 4 | V_{pp} |
| Mute suppression transmit with privacy function | $I_L = 20 \text{ mA}$ | G_{SPRIV} | 60 | | | dB |

DC Characteristics Dialer

$V_{DD2} = 2.7\text{ V}$, $f_{OSC} = 3.58\text{ MHz}$, all outputs unloaded, S9b

| Parameters | Test Conditions / Pins | Symbol | Min. | Typ. | Max. | Unit |
|--------------------------------|---|------------------|------|------|------|------------------|
| Memory retention current | $\overline{HKS} = 1$, $V_{DD2} = 1.0\text{ V}$ | I_{MR} | | | 0.2 | μA |
| Pre-emphases | Column/Row | | 1 | 2 | 3 | dB |
| DTMF distortion | $R_L = 5\text{ k}\Omega$ | d | | -30 | -23 | dB |
| DP output sink current | $V_{PO} = 0.5\text{ V}$ | I_{PL} | 0.5 | | | mA |
| Keyboard input drive current | $V_I = 0\text{ V}$ | I_{KD} | 30 | | | μA |
| Keyboard input sink current | $V_I = 2.7\text{ V}$ | I_{KS} | 200 | 400 | | μA |
| Keyboard resistance | | | | | 5 | $\text{k}\Omega$ |
| F1, F2, F3, E board resistance | | | | | 300 | Ω |
| Mask sink / drive current | | $I_M\text{ H/L}$ | 0.5 | | | mA |
| Earth sink / drive current | | $I_e\text{ H/L}$ | 0.5 | | | mA |

AC Characteristics Dialer

| Parameters | Test Conditions / Pins | Symbol | Min. | Typ. | Max. | Unit |
|------------------------------------|--|-----------|------|-----------|------|------|
| Keypad active in de-bounce | | t_{KID} | | 20 | | ms |
| Key release debounce | | t_{KRD} | | 20 | | ms |
| Pre-digit pause | B/M pin = floating B/M pin = low | t_{pDP} | | 40 | | ms |
| | | t_{pDP} | | 33.3 | | ms |
| Inter-digit pause (auto dialing) | 10 ppS | t_{iDP} | | 800 | | ms |
| Make/break ratio | B/M pin = floating | M/B | | 40:60 | | % |
| | B/M pin = low | | | 33:67 | | % |
| DTMF output duration | Auto dialing, MODE = V_{DD} MODE = GND | t_{TD} | | 87 70 | | ms |
| Inter-tone pause | Auto dialing, MODE = V_{DD} MODE = GND | t_{iTP} | | 87 140 | | ms |
| Flash break time F1 F2 F3 | C ₁ connected to V_{DD} C ₂ connected to V_{DD} C ₃ connected to V_{DD} | t_{FB} | | 98 | | ms |
| | | | | 250 | | ms |
| | | | | 600 | | ms |
| Flash pause time F1 F2 F3 | | t_{FP} | | 1 | | s |
| Pause time | | t_p | | 3.6 | | s |
| On Hook debounce time | | t_{ohd} | | 150 | | ms |
| Earth time | C ₄ connected to V_{DD} | t_{et} | | 400 | | ms |
| Earth pause time | | t_{pt} | | 1 | | s |

Electrical Characteristics Tone Ringer

$f_{RCK} = 4 \text{ kHz}$, $V_{RING} = 20 \text{ V}$, $T_{amb} = 25^\circ \text{C}$, reference point GND, unless otherwise specified

| Parameters | Test Conditions / Pins | Symbol | Min. | Typ. | Max. | Unit |
|------------------------------|--|----------------------|------------|-------------|-------------|----------|
| Supply current, outputs open | $V_{RIAC} = 20 \text{ V}$ | I_{RING} | 2.1 | | 3.8 | mA |
| Switch-on threshold | V_{RIAC} | V_{RON} | | 23.5 | | V |
| Switch-off threshold | V_{RIAC} | V_{ROFF} | | 5.6 | | V |
| Ringing frequency | $R = 150 \text{ k}\Omega$, $C = 1 \text{ nF}$ $V_{RIAC} > V_{RON}$ | f_{1H} f_{1L} | 937 752 | 1010 808 | 1083 868 | Hz |
| Audio sequence frequency | | f_2 | 11.5 | 12.5 | 14.0 | Hz |
| Output voltage swing | $V_{Ring} = 25 \text{ V}$, $C_{out} = 68 \text{ nF}$ | V_{out} | 21 | 23 | | V_{pp} |
| Turn-off delay | See figure 11 | t_{off} | | 65 | | ms |

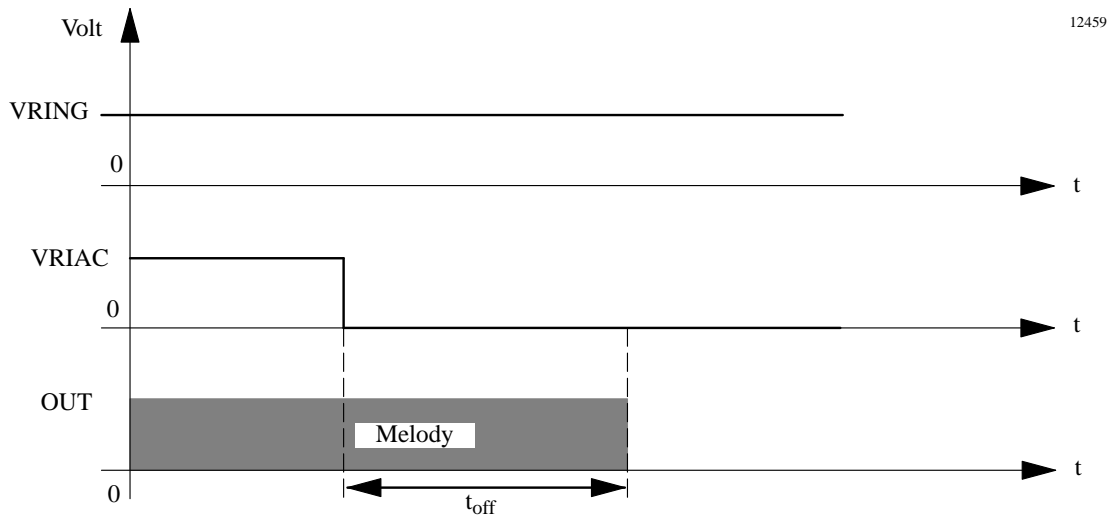
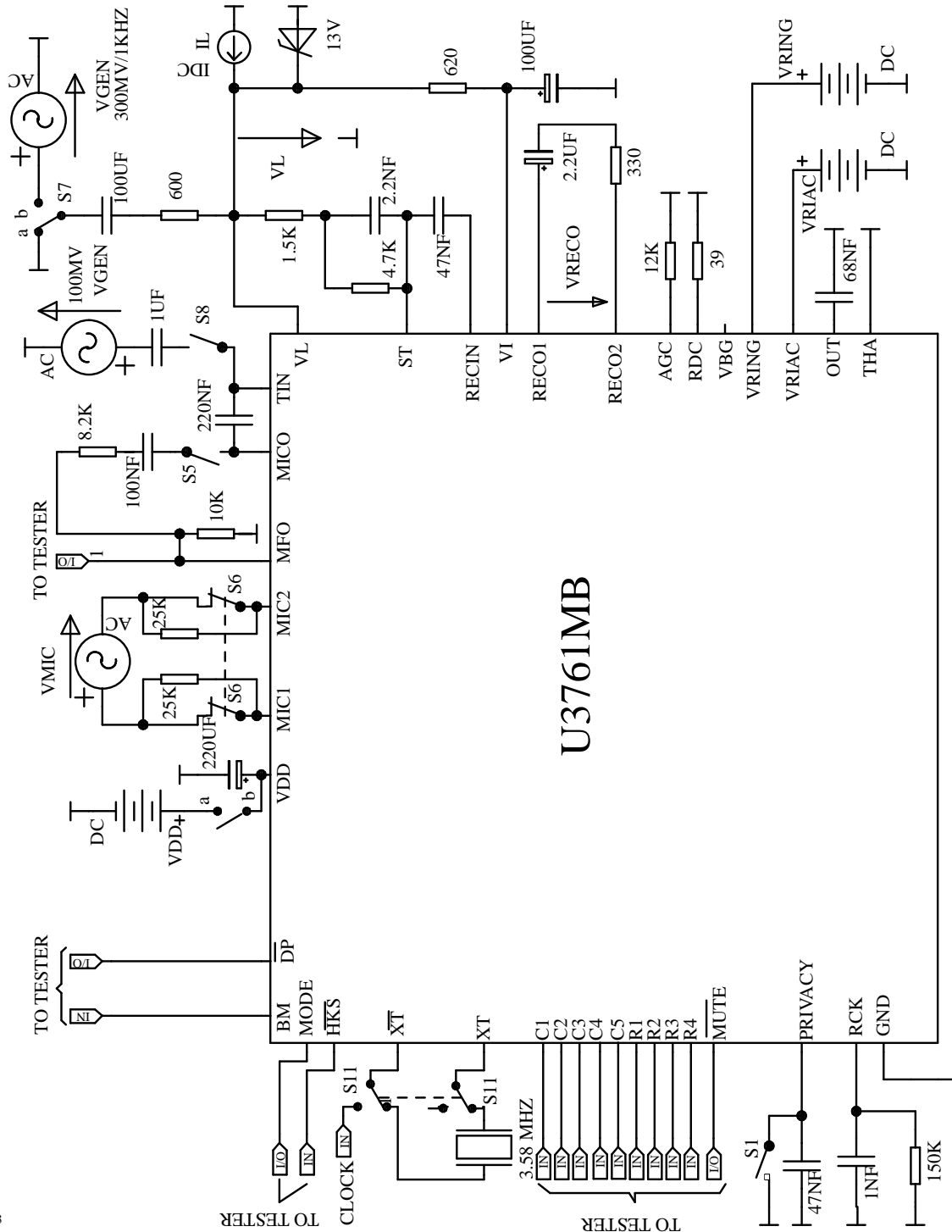


Figure 11. Turn off delay time

Ordering Information

| Type | Package |
|---------------|---------------------|
| U3761MB-ASD | SDIP40 |
| U3761MB-AFN | SSO44 |
| U3761MB-AFNG3 | SSO44 tape and reel |

Basic Test Circuit



12633

Formulas for Parameters of Electrical Characteristics of Speech Circuit

Formulas referred to the basic test circuit. If not otherwise specified switches in basic test circuit are inactive.

Transmit gain

$$GS = 20 \times \log \left(\frac{VL}{VMIC} \right)$$

VMIC = 3 mV/1 kHz, S5 = open

Receiving gain

$$GR = 20 \times \log \left(\frac{VRECO}{VL} \right)$$

RX-mode: VGEN = 300 mV/1 kHz, S7b

Line loss compensation transmit

$$\Delta GS = GS(\text{at } IL = 73 \text{ mA}) - GS(\text{at } IL = 20 \text{ mA})$$

TX-mode: VMIC = 3 mV/1 kHz, S5 = open

Sidetone reduction

$$GSTA = 20 \times \log \left(\frac{VL}{VRECO} \right) (\text{in TX-mode}) + GR$$

TX-mode: VMIC = 3 mV/1 kHz, S5 = open

Line loss compensation receive

$$\Delta GR = GR(\text{at } IL = 73 \text{ mA}) - GR(\text{at } IL = 20 \text{ mA})$$

RX-mode: VGEN = 300 mV/1 kHz, S7b

Gain change when muted

$$GRM = 20 \times \log \frac{VRECO}{VL} (\text{Mute} = \text{inactive}) - 20 \times \log \frac{VRECO}{VL} (\text{Mute} = \text{active})$$

VGEN = 100 mV/1 kHz, S5 = open, S8 = open

Input impedance of microphone amplifier

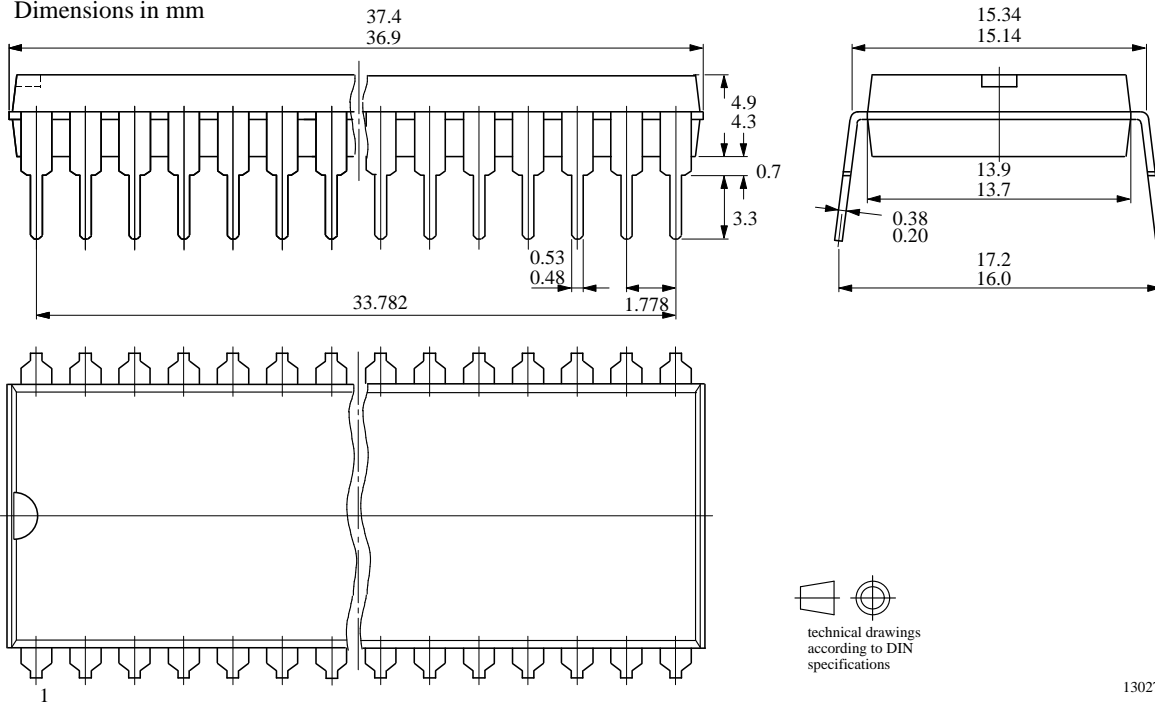
$$Ri = \frac{50 \text{ k}}{\left(\frac{VL_{(S6 = \text{closed})}}{VL_{(S6 = \text{open})}} - 1 \right)}$$

TX-mode: VMIC = 3 mV/1 kHz, S5 = open

Packaging Information

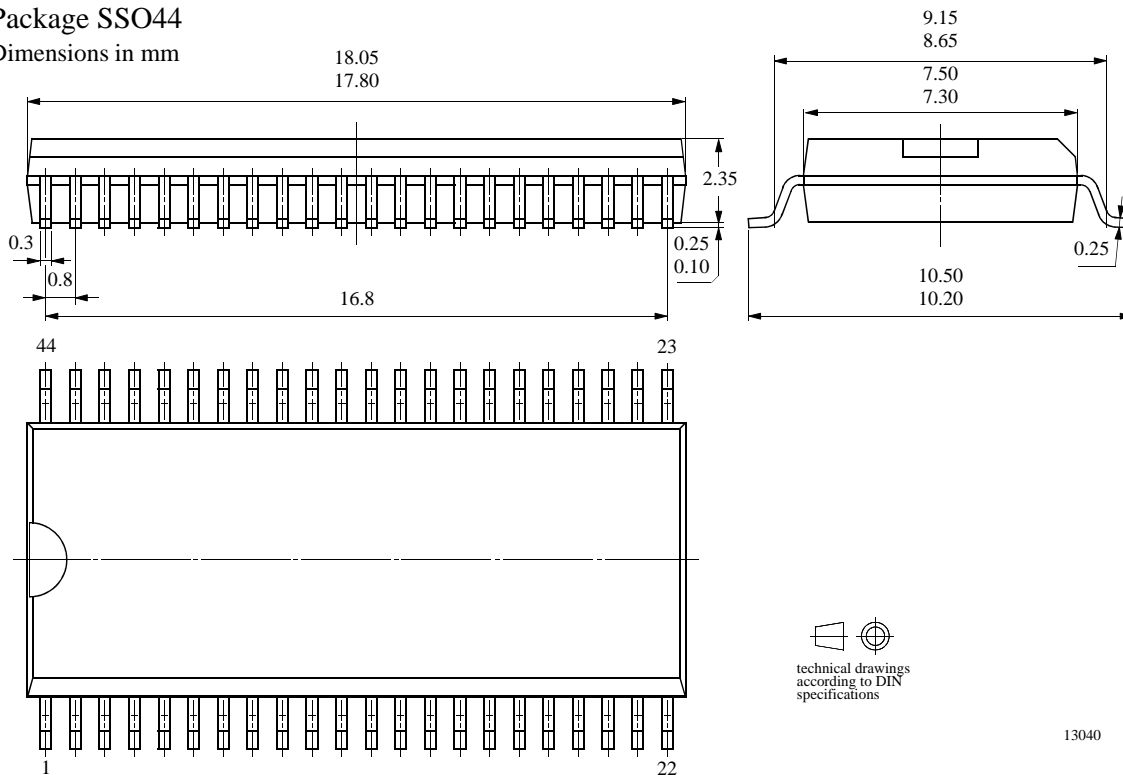
Package SDIP40

Dimensions in mm



Package SSO44

Dimensions in mm



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.

We reserve the right to make changes to improve technical design and may do so without further notice.

Parameters can vary in different applications. All operating parameters must be validated for each customer application by the customer. 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, any claim of 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