9325812 UNITED MICROELECTRONICS   92D 00359   D T-75-07-07

UMC

UM91610A

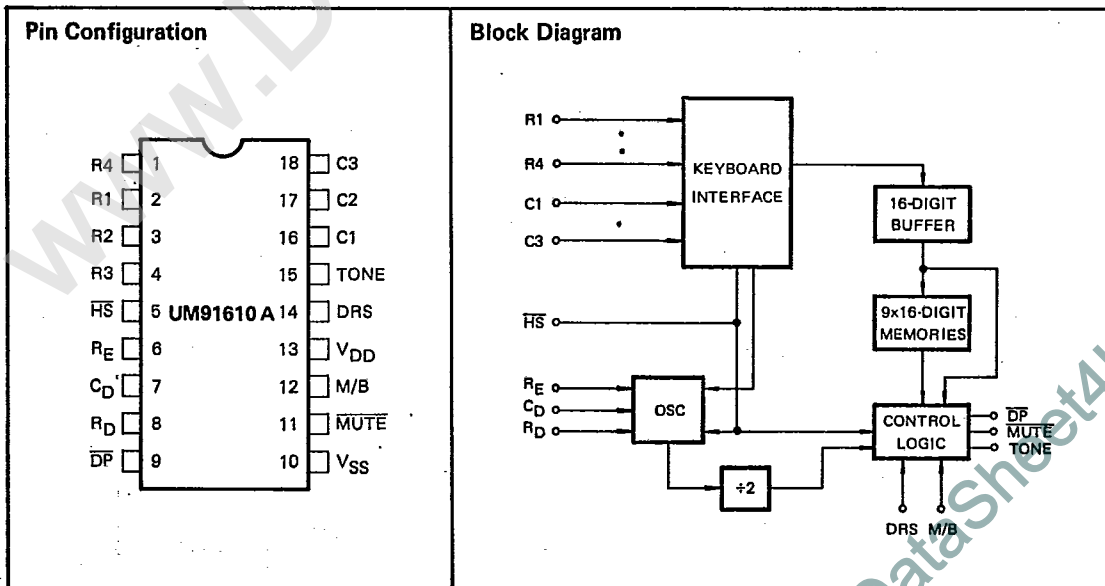## 10 Memory Pulse Dialer

Features

- Ten 16-digit number memories (location 0-9) with location 0 as last-number-redial memory)
- Low voltage CMOS process for direct operation from telephone line
- Inexpensive R-C oscillator design with accuracy better than ±5% over temperature and unit-unit variations
- Independent select inputs for variation of dialing rates (10pps/20pps), Make/Break ratio ($33\frac{1}{3}$/$66\frac{2}{3}$ or 40-60)

- Can interface with inexpensive XY matrix keyboard
- Mute and pulse drivers on chip
- Interdigit pause 800 ms
- Last-number/redial can be transfered to any of the other 9 locations easily
- Tone output for valid key input

General Description

The UM91610/A pulse dialers are monolithic CMOS integrated circuits which convert pushbutton inputs to a series of pulses suitable for telephon dialing. The 91610 series are upgraded versions of the popular UM9151/UM 9152. In addition to dialer functions performed by the UM9151/UM9152, 91610 series devices have ten-16-digit number memory capability with valid key-in-tone output.

CMOS technology is used to produce these devices, resulting in very low power requirements, high noise immunity, and easy interface to a variety of telephones requiring few external components.

Pin Configuration

	UM91610A	
R4	1	18 C3
R1	2	17 C2
R2	3	16 C1
R3	4	15 TONE
$\overline{HS}$	5	14 DRS
R_E	6	13 V_{DD}
C_D	7	12 M/B
R_D	8	11 $\overline{MUTE}$
$\overline{DP}$	9	10 V_{SS}

Block Diagram

9325812 UNITED MICROELECTRONICS   92D 00360   D T-75-07-07

UMC

UM91610A

Absolute Maximum Ratings*

Supply voltage . . . . —0.3V to +4.0V

Ambient temperature under bias (T_A) . . —10°C to +60°C

Storage temperature (T_{STG}) . . . . —55°C to +125°C

*Comments

Stresses above those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. This is a stress rating only and functional operation of the device at these or any other conditions above those indicated in the operational sections of this specification is not implied.

Electrical Characteristics

(Specifications apply over the operating temperature and $1.0V \leqslant V_{DD}$ to $V_{SS} \leqslant 3.5V$ unless otherwise specified.)

Parameter	Symbol	Min.	Typ.	Max.	Units	Conditions
OPERATING VOLTAGE						
Data rentention 91610	V_{DD}	1.5		3.5	V	ON HOOK (HS = V_{DD})
91610A	V_{DD}	1.0		3.5	V	
Nondialing	V_{DD}	1.5		3.5	V	OFF HOOK, Oscillator not running
Dialing	V_{DD}	2.0		3.5	V	OFF HOOK, Oscillator running
OPERATING CURRENT						
Data rentention 91610	I_{DD}			1	μA	ON HOOK V_{DD} = 1.5V @ 25°C
	I_{DD}			3	μA	ON HOOK V_{DD} = 1.5V @ 40°C
91610A	I_{DD}			200	nA	ON HOOK V_{DD} = 1.0V @ 25°C
	I_{DD}			750	nA	ON HOOK V_{DD} = 1.0V @ 40°C
Nondialing	I_{DD}			10	μA	OFF HOOK V_{DD} = 1.5V Oscillator not running, outputs not loaded
Dialing	I_{DD}			500	μA	OFF HOOK V_{DD} = 3.5 Oscillator running outputs not loaded
OUTPUT CURRENT						
$\overline{DP}$ Sink current	I_{OLDP}	125			μA	V_{DD} = 3.5V V_{OUT} = 0.5V
$\overline{DP}$ Source current	I_{OHDP}	20			μA	V_{DD} = 1.5V V_{OUT} = 1.0V
	I_{OHDP}	125			μA	V_{DD} = 3.5V V_{OUT} = 2.5V
$\overline{MUTE}$ Sink current	I_{OLM}	125			μA	V_{DD} = 3.5V V_{OUT} = 0.5V
$\overline{MUTE}$ Source current	I_{OHM}	20			μA	V_{DD} = 1.5V V_{OUT} = 1.0V
	I_{OHM}	125			μA	V_{DD} = 3.5V V_{OUT} = 2.5V
TONE Drive current	T_{OHT}	250			μA	V_{DD} = 2.0V V_{OUT} = 1.5V
Input high voltage	V_{IH}	80% V_{DD}		V_{DD} +0.3	V	
Input low voltage	V_{IL}	—0.3		20% V_{DD}	V	
Oscillator frequency F_0 stability V.S. supply voltage	$\Delta f_0/f_0$	—4		+4	%	V_{DD} = 2.0V to V_{DD} = 2.75V
	$\Delta f_0/f_0$	—4		+4	%	V_{DD} = 2.75V to V_{DD} = 3.5V

UMC

UM91610A

Pin Descriptions

Keyboard (R_1, R_2, R_3, R_4, C_1, C_2, C_3)

These are 4 row and 3 column inputs from the keyboard contacts. An XY matrix keyboard can contact to these pins directly. Active pull up and pull down networks are present on these inputs when the device begins keyboard scan. The keyboard scan begins when a key is pressed and starts the oscillator. Debouncing is provided to avoid false entry (typ. 15 ms).

Dial Rate Select (DRS)

A programmable line allows selection of two different output rates (10pps/20pps when DRS connect to V_{SS}/V_{DD})

Make/Break (M/B)

This input allows selection of the Make/Break ratio $33\frac{1}{3}$:$66\frac{2}{3}$/40:60 when M/B connect to V_{SS}/V_{DD})

Mute Out ($\overline{MUTE}$)

A negative going low pulse in available to turn off an external transistor to mute the handset network during the dial pulsing. (See typical application circuit)

Dial Pulse Out ($\overline{DP}$)

A sequence of negative going low pulse (during "Space") is available to turn off an external transistor to disconnect the loop current. (also see typical application circuit)

Dial Rate Oscillator (R_E, C_D, R_D)

These pins are provided to connect external resistors R_E, R_D and capacitor C_D to form an RC oscillator that generate the time base for this chip. (the recommended value of RC components are R_E = 1.5 MΩ, R_D = 470 KΩ, C_D = 330 pF, f_0 = 2.4 KHz)

Key Tone Output (TONE)

This pin provide a direct piezo drive capability to produce a $\frac{1}{2}f_0$ frequency tone output when a valid key depressed.

Hook Switch ($\overline{HS}$)

This input detects the state of the hook switch contact. "off hook" corresponds to V_{SS} condition.

Power (V_{DD}, V_{SS})

These are the power supply inputs. This device is designed to operate from 1.5V to 3.5V.

Operating Characteristics

Normal Dialing

OFF HOOK, $\boxed{D_1}$ ...., $\boxed{D_n}$

Dial pulsing to start as soon as first key is entered (debounced and dectected on chip). Pause may be entered in the dialing sequence by pressing the " $\boxed{\#}$ " key. Those digits that entered after " $\boxed{\#}$ " key will not be sent out until press the " $\boxed{\#}$ " again. Please notice that the pause key can be used only in this mode.

Redialing

OFF HOOK, $\boxed{\#}$, $\boxed{0}$

Last number dialed can be redialed by pressing $\boxed{\#}$, $\boxed{0}$ key. Access pause "S" terminated by pushing the " $\boxed{\#}$ " key as usual.

Storing of a Telephone Number

OFF HOOK, $\boxed{*}$, $\boxed{D_1}$ ...., $\boxed{D_n}$, $\boxed{*}$, $\boxed{LOCN}$

One can easily store the telephone numbers into the memory locations he choosed as he follows the storing sequence properly.

9325812 UNITED MICROELECTRONICS   92D 00362   D T·75 -07-07

UMG

UM91610A

Repertory Dialing

OFF HOOK, [#] , [LOCN] ,......., [#] , [LOCN]

At repertory dialing, wait for the first location number dialing to complete before pressing the next " [#] " key.

Normal Dialing + Repertory Dialing

OFF HOOK, [D₁] ,......., [Dₙ] , [*] , [#] , [LOCN]

Same as repertory dialing, wait for the normal dialing to complete before pressing " [*] " key.

Normal Dialing After Repertory Dialing or Redialing

OFF HOOK, [#] , [LOCN] ,......., [D₁] ,......., [Dₙ]

Same as above, wait for dialing to complete before pressing [D₁] key.

Last Number Dialed Transfer

OFF HOOK, [*] , [*] , [LOCN]

One can easily store the last dialed number into the memory location he choosed as the above sequence by pressing three times.

Pulse Dialer