查询W91473供应商

Winbond Electronics Corp.

14-MEMORY TONE/PULSE SWITCHABLE DIALER WITH HANDFREE AND LOCK FUNCTIONS

GENERAL DESCRIPTION

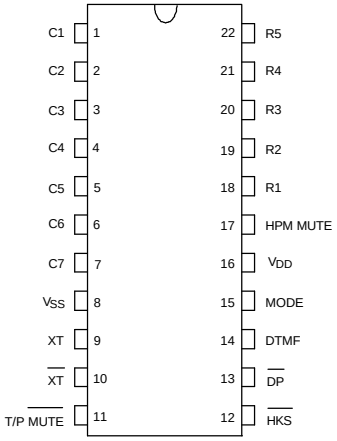
The W91473 series are Si-gate CMOS IC tone/pulse switchable dialers containing a 14-channel automatic dialing memory, including a 16-digit × 3 emergency dialing memory and a 16-digit × 10 channel repertory memory that provides a 32-digit mercury memory. These dialers also provide flash, clear, hold, lock, and one-key redial functions.

FEATURES

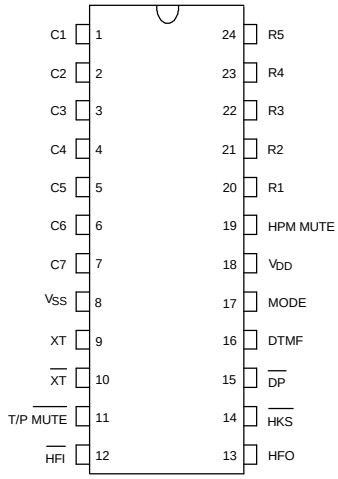
- DTMF/Pulse switchable dialer
- 32-digit LNB (last number buffer) memory
- 32-digit mercury memory
- 16-digit × 3 one-touch direct repertory memory
- 16-digit × 10 direct repertory memory
- Uses 7 × 5 keyboard
- Flash time: 98 mS, 305 mS, or 600 mS (selectable by keypad option)
- Minimum tone output duration: 93 mS
- Minimum intertone pause: 93 mS
- On-chip power-on reset
- Uses 3.579545 MHz crystal or ceramic resonator
- Packaged in 22, 24, or 28-pin plastic DIP
- The different dialers in the W91473 series are shown in the following table:

TYPE NO.	PULSE (ppS)	MEMORY	MERCURY MEMORY	HOLD	HANDFREE	LOCK	PACKAGE
W91473	10	14	Yes	Yes	-	-	22
W91473L	10	14	-	-	-	Yes	22
W91473A	10	14	Yes	Yes	Yes	-	24
W91473AL	10	14	-	-	Yes	Yes	24
W91473B	10/20	14	Yes	Yes	Yes	-	28
W91473BL	10/20	14	Yes	Yes	Yes	Yes	28
W91473C	10/20	14	Save Memory	Yes	Yes	-	28
W91473CL	10/20	14	Save Memory	Yes	Yes	Yes	28
W91473D	10	14	Save Memory	-	-	-	22
W91473DL	10	14	Save Memory	-	-	Yes	22

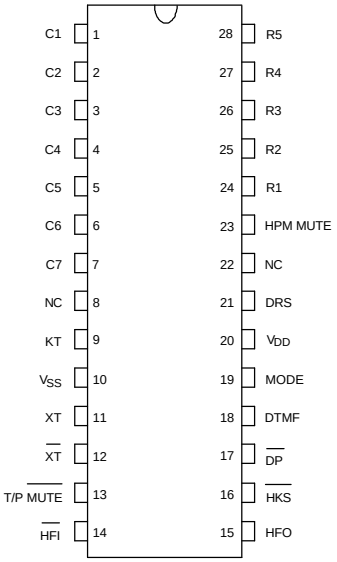
PIN CONFIGURATIONS



W91473/D



W91473A



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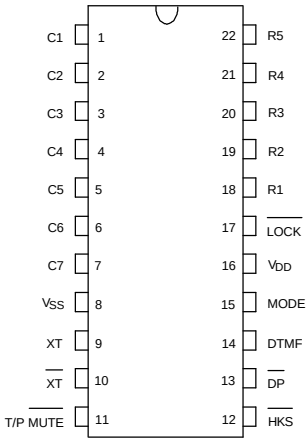
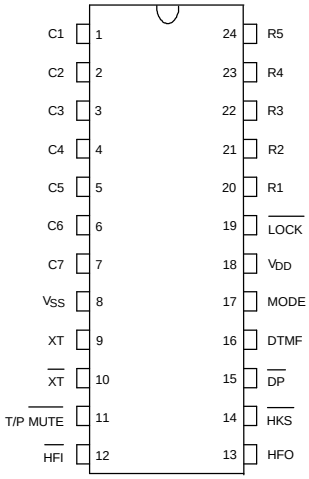
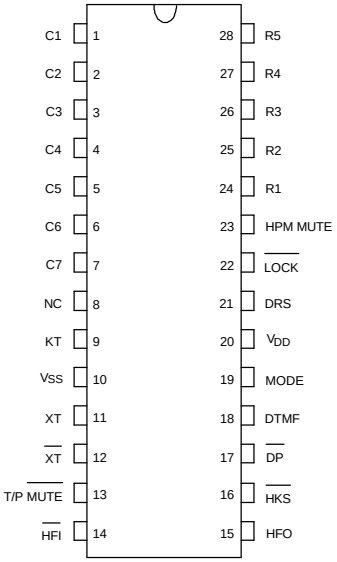


W91473L/DL



W91473AL



W91473BL/CL

PIN DESCRIPTION

SYMBOL	22-PIN	24-PIN	28-PIN	I/O	FUNCTION
Column-Row Inputs	1–7 & 18–22	1–7 & 20–24	1–8 & 24–28	I	The keyboard input may be used with either the standard 7 × 5 keyboard or an inexpensive single contact (form A) keyboard. Electronic input with µC can also be used. A valid key entry is defined by a single row being connected to a single column.
XT, $\overline{XT}$	9, 10	9, 10	11, 12	I, O	A built-in inverter provides oscillation with an inexpensive 3.579545 MHz crystal or ceramic resonator.
T/P $\overline{MUTE}$	11	11	13	O	The T/P $\overline{MUTE}$ is a conventional CMOS N-channel open drain output. The output transistor is switched on during pulse and tone mode dialing sequence and flash break. Otherwise, it is switched off.
$\overline{DP}$	13	15	17	O	N-channel open drain dialing pulse output (Figure 1). Flash key causes $\overline{DP}$ to go active when in pulse mode and tone mode.
MODE	15	17	19	I	Pulling mode pin to V_{SS} places the dialer in tone mode. Pulling mode pin to V_{DD} places the dialer in pulse mode (10 ppS, M/B = 2:3). Leaving mode pin floating places the dialer in pulse mode (10 ppS, M/B = 1:2).
$\overline{HKS}$	12	14	16	I	Hook switch input. $\overline{HKS}$ = 1: On-hook state. Chip in sleep mode, no operation. $\overline{HKS}$ = 0: Off-hook state. Chip enabled for normal operation. $\overline{HKS}$ pin is pulled to V_{DD} by internal resistor.

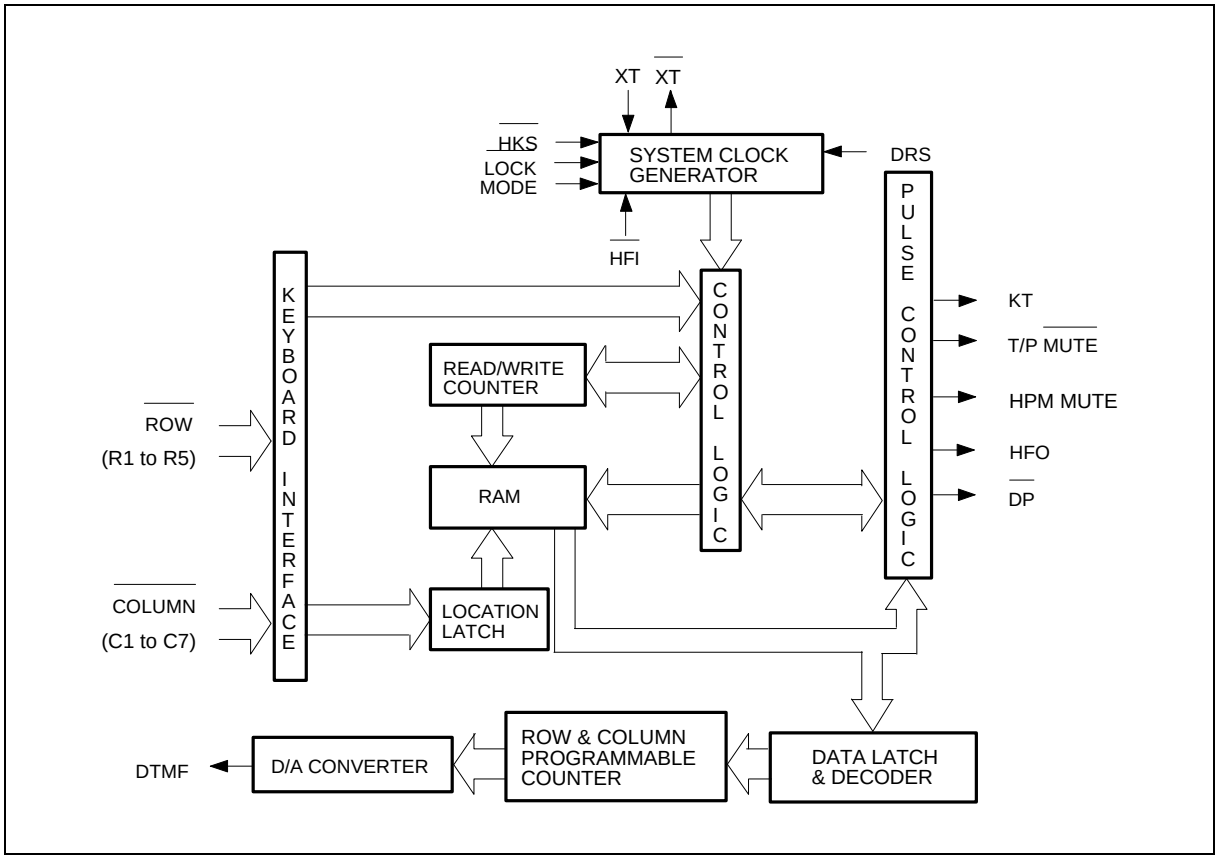
Pin Description, continued

<table>
<tr><th>SYMBOL</th><th>22-PIN</th><th>24-PIN</th><th>28-PIN</th><th>I/O</th><th>FUNCTION</th></tr>
<tr><td>HPM MUTE</td><td>17 (only for W91473/D)</td><td>19 (only for W91473A)</td><td>23</td><td>O</td><td>The HPM MUTE is a conventional inverter output.
During pulse dialing, flash, hold, and mercury mute functions, this pin will output an active high.
It remains in a low state at all other times.</td></tr>
<tr><td>NC</td><td>-</td><td>-</td><td>8, 22 (W91473 B/C)</td><td>-</td><td>No connection.</td></tr>
<tr><td>$\overline{\text{LOCK}}$</td><td>17 (W91473L /DL)</td><td>19 (W91473 AL)</td><td>22 (W91473 BL/CL)</td><td>I</td><td>The function of the $\overline{\text{LOCK}}$ pin is shown below:
<table>
<tr><th>$\overline{\text{LOCK}}$ PIN</th><th>FUNCTION</th></tr>
<tr><td>V_{DD}</td><td>"0," " 9" dialing inhibited</td></tr>
<tr><td>Floating</td><td>Normal dialing</td></tr>
<tr><td>V_{SS}</td><td>"0" dialing inhibited</td></tr>
</table></td></tr>
<tr><td>DTMF</td><td>14</td><td>16</td><td>18</td><td>O</td><td>In pulse mode, remains in low state at all times. In tone mode, outputs a dual or single tone.
Detailed timing diagram for tone mode is shown in Figure 2.
<table>
<tr><th colspan="4">OUTPUT FREQUENCY</th></tr>
<tr><td></td><td>Specified</td><td>Actual</td><td>Error %</td></tr>
<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>
</table></td></tr>
<tr><td>V_{DD}, V_{SS}</td><td>16, 8</td><td>1, 8</td><td>20, 10</td><td>I</td><td>Power input pins.</td></tr>
</table>

Pin Description, continued

<table>
<tr><th>SYMBOL</th><th>22-PIN</th><th>24-PIN</th><th>28-PIN</th><th>I/O</th><th>FUNCTION</th></tr>
<tr><td>$\overline{HFI}$, HFO</td><td>-</td><td>12, 13</td><td>14, 15</td><td>I, O</td><td>Handfree control pins. A low pulse on the $\overline{HFI}$ input pin toggles the handfree control state. Status of the handfree control state is listed in the following table:
<table>
<tr><th colspan="2">CURRENT STATE</th><th colspan="3">NEXT STATE</th></tr>
<tr><td>Hook Sw.</td><td>HFO</td><td>Input</td><td>HFO</td><td>Dialing</td></tr>
<tr><td>-</td><td>Low</td><td>$\overline{HFI}$ ↓</td><td>High</td><td>Yes</td></tr>
<tr><td>On Hook</td><td>High</td><td>$\overline{HFI}$ ↓</td><td>Low</td><td>No</td></tr>
<tr><td>Off Hook</td><td>High</td><td>$\overline{HFI}$ ↓</td><td>Low</td><td>Yes</td></tr>
<tr><td>On Hook</td><td>-</td><td>Off Hook</td><td>Low</td><td>Yes</td></tr>
<tr><td>Off Hook</td><td>Low</td><td>On Hook</td><td>Low</td><td>No</td></tr>
<tr><td>Off Hook</td><td>High</td><td>On Hook</td><td>High</td><td>Yes</td></tr>
</table>
The $\overline{HFI}$ pin is pulled to V_{DD} by an internal resistor.</td></tr>
<tr><td>KT</td><td>-</td><td>-</td><td>9</td><td>O</td><td>Keytone signal output. The keytone will be generated in all valid keys are pressed in tone mode. Frequency is 600 Hz and duration is 35 mS.</td></tr>
<tr><td>DRS</td><td>-</td><td>-</td><td>21</td><td>I</td><td>Dial rate selection. This pin is pulled to V_{DD} by an internal resistor.
<table>
<tr><th>DRS</th><th>MODE PIN</th><th>TONE/PULSE</th><th>DIAL RATE</th><th>M/B</th></tr>
<tr><td rowspan="3">1</td><td>V_{DD}</td><td>Pulse</td><td>10 ppS</td><td>2:3</td></tr>
<tr><td>Floating</td><td>Pulse</td><td>10 ppS</td><td>1:2</td></tr>
<tr><td>V_{SS}</td><td>Tone</td><td>-</td><td>-</td></tr>
<tr><td rowspan="3">0</td><td>V_{DD}</td><td>Pulse</td><td>10 ppS</td><td>1:2</td></tr>
<tr><td>Floating</td><td>Pulse</td><td>20 ppS</td><td>1:2</td></tr>
<tr><td>V_{SS}</td><td>Tone</td><td>-</td><td>-</td></tr>
</table></td></tr>
</table>

BLOCK DIAGRAM



FUNCTIONAL DESCRIPTION

Keyboard Operation

C1	C2	C3	C4	C5	C6	C7	
1	2	3	S	M00	M05	EM1	R1
4	5	6		M01	M06	EM2	R2
7	8	9	CLR	M02	M07	EM3	R3
*/T	0	#	R/P	M03	M08	H	R4
F1	F2	F3	R	M04	M09	*MER	R5

Note: *MER location in W91473C/CL or W91473D/DL is SAVE memory.

- S: Store function key

- F1, F2, F3: Flash keys
- R: One-key redial
- H: Hold function key
- M0j: Direct repertory memory
- EMi: One-touch memory for emergency call
- */T: * & P→T
- CLR: Clear key
- R/P: Redial and pause function key
- MER: One-touch memory for mercury code dialing

Note: Dn = 0 to 9, *, #, M0j = M00 to M09 (j = 0 to 9).

Normal Dialing

OFF HOOK (or ON HOOK & HFI), 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.

Redialing

1. OFF HOOK , D1 , D2 , ..., Dn BUSY, Come ON HOOK , OFF HOOK

   (or ON HOOK & HFI), R/P

   or ON HOOK & HFI , D1 , D2 , ..., Dn BUSY, HFI Come

   HFI , R/P

   The R/P key can execute redial function only as first key-in after off-hook. Otherwise, it will execute pause function.

2. OFF HOOK (or ON HOOK & HFI), D1 , D2 , ..., Dn , R

   a. The one-key redial function timing diagram is shown in Figure 4.

   b. If dialing D1 to Dn is completed, pressing the R key will cause the pulse output pin of

   to go low for 2.2 seconds. Break time and a 600 mS pause will automatically be added.

   c. If the R key is pressed before the pulses for the number dialed out are completed, it will be ignored.

Number Store

1. [OFF HOOK] (or [ON HOOK] & [HFI]), [S] , [D1] , [D2] , ..., [Dn]

   [S] , [Moj] (or [EMi] or [MER])

   D1, D2, ..., Dn will be stored in memory location but will not be dialed out.

   [R/P] and [*/T] keys can be stored as a digit in memory. In store mode, [R/P] is the pause function key.

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

2. [S] , [D1] , [D2] , ..., [Dn] , [S] , [0] , [j]

   D1, D2, ..., Dn will be stored in memory location M0j and will not be dialed out.

3. [OFFHOOK] (or [ON HOOK] & [HFI]), [D1] , [D2] , ..., [Dn] , [S] ,

   [S] , [Mn]

   a. D1, D2, ..., Dn will be stored in memory location and will be dialed out.

   b. The [S] key must be pressed after completion of the dialing sequence.

4. [D1] , [D2] , ..., [Dn] , [S] , [S] , [0] , [j]

   D1, D2, ..., Dn will be stored in memory location M0j and will be dialed out.

Repertory Dialing

[OFF HOOK] (or [ON HOOK] & [HFI]), [Moj] (or [EMi] or [MER])

Access Pause

[OFF HOOK] (or [ON HOOK] & [HFI]), [D1] , [D2] , [R/P] , [D3] , ..., [Dn]

1. The pause function can be stored in memory.
2. The pause function is executed in normal dialing, redialing, or memory dialing.
3. The pause function timing diagram is shown in Figure 5.

Pulse-to-Tone (*/ T)

OFF HOOK (or ON HOOK & HFI), 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 (3.6s), 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.
4. The P→T function timing diagram is shown in Figure 6.
5. */ T key cannot be stored as a digit in memory.

Save

1. OFF HOOK (or ON HOOK & HFI), S , D1 , D2 , ..., Dn

   S , SAVE

   D1, D2, ..., Dn, will be stored in SAVE memory but will not be dialed out.

2. OFFHOOK (or ON HOOK & HFI), D1 , D2 , ..., Dn , S ,

   S , SAVE

   D1, D2, ..., Dn , will be stored in SAVE memory and will be dialed out.

3. OFF HOOK (or ON HOOK & HFI), SAVE

   The content of SAVE memory will be dialed out.

Flash (F = F1, F2, F3)

OFF HOOK (or ON HOOK & HFI), F

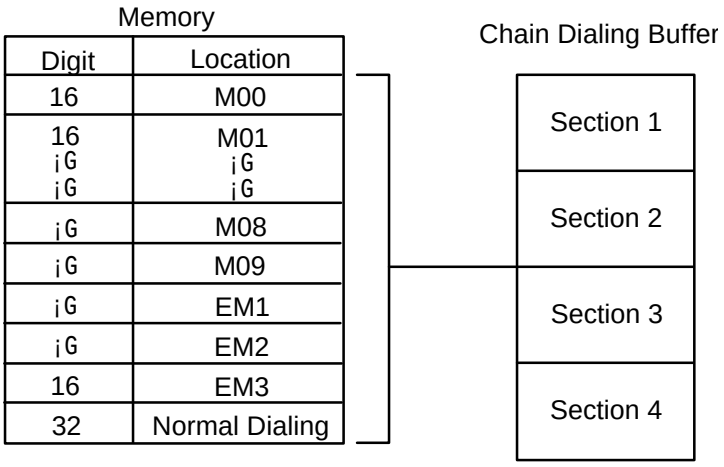
1. Flash key cannot be stored as a digit in memory and it has first priority among keyboard functions.
2. The system will return to the initial state after the break time is finished.
3. The flash function timing diagram is shown in Figure 7.

Clear key

1. CLR , R/P (or R)
   Redial and one-key redial buffer will be cleared.
2. CLR , Moj
   Location M0j buffer content will be cleared.
3. CLR , 0 , j
   Location M0j buffer content will be cleared.

CHAIN DIALING

Relationship between the memory and the chain dialing buffer:



The chain dialing buffer may be divided into four sections, allowing up to four numbers to be dialed out in sequence. For example, if the user enters M01, M03, EM1, and normal dialing (manual dialing), the content of sections 1 to 4 will be M01, M03, EM1, and normal dialing (manual dialing). When numbers are entered into the chain dialing buffer, there is no need to wait until the previous dialing sequence has been completed. Numbers may be entered directly, one after the other, even while previous numbers are being dialed out.

1. Manual Dialing ¡Ï Repertory Dialing
   Redial buffer content = Manual dialing + Repertory dialing.
2. Repertory Dialing ¡Ï Manual Dialing
   Redial buffer content = Repertory dialing + Manual dialing.
3. Repertory Dialing ¡Ï Repertory Dialing
   Redial buffer content = Repertory dialing + Repertory dialing.
4. Redialing ¡Ï Manual Dialing
   Redial buffer content = Redialing + Manual dialing.

The primary redial content may not be manual dialing. Otherwise, the last redial content will be overwritten.

5. [Redialing] ¡Ï [Repertory Dialing]

Redial buffer content = Redialing + Repertory dialing.

Redialing is valid only as the first key-in after off-hook or after the handfree dialing function is toggled on.

The second sequence should not be performed until the first sequence is completely dialed out.

6. [Manual Dialing] ¡Ï [One key Redialing]

Redial buffer content = Manual dialing.

The one-key redial may only be used after dialing out of a manual dialing sequence is completed.

7. [Repertory Dialing 1(M1)] ¡Ï [One key Redialing] ¡Ï

[Repertory Dialing 2(M2)] ¡Ï [One key Redialing]

or

[Repertory Dialing 1(M1)] ¡Ï [One key Redialing] ¡Ï

[Repertory Dialing 2(M2)] , [ON HOOK] , [OFF HOOK] , [Redialing]

M1 and M2 represent any of the repertory dialing memories.

The first redialing will dial out M1; the second will dial out M1, M2.

If dialing out of the repertory dialing memories has not been completed, the one-key redial key will be ignored.

Dialing of the second repertory dialing memory (M2) should not be performed until the one-key redialing operation is completed.

Notes:

Chain dialing (cascaded dialing) allows for memory or manual dialing while a previous dialing sequence is still being dialed out.More than one sequence of manual dialing is not permitted. Entering more than one manual dialing sequence will inhibit redialing. Chain dialing of more than four sections is not permitted.

[Manual Dialing] ¡Ï [M1] ¡Ï [Manual Dialing] (two sections of manual dialing)

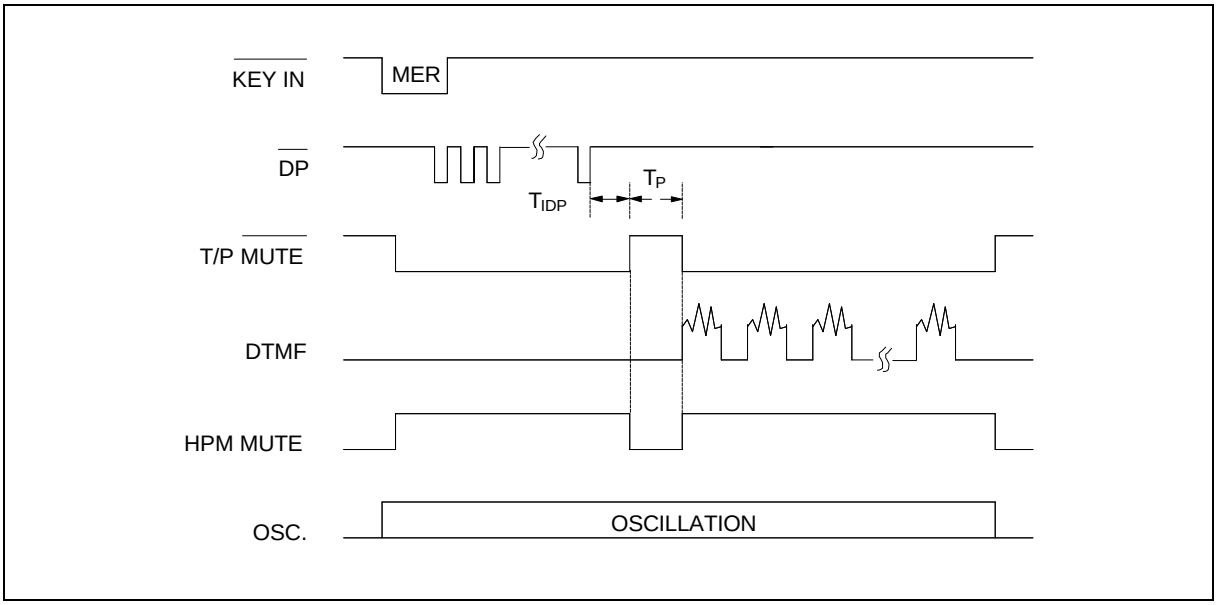
If more than four sections are entered, all sections after the fourth section will be ignored and redialing will be inhibited.

[Manual Dialing] ¡Ï [M1] ¡Ï [M2] ¡Ï [M3] ¡Ï [M4] (over 4 sections, ignore [M4] and inhibit redial)

There is a 2.0 sec. inter-chain dialing pause for cascaded dialing.

MERCURY DIALING

1. Up to 32 digits may be stored.
2. Mercury dialing is activated only as the first key-in after off-hook or handfree dialing is activated.
3. The timing diagram for the mercury memory function is given below.



Mercury Function Timing Diagram

ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	RATING	UNIT
DC Supply Voltage	V_{DD}–V_{SS}	-0.3 to +7.0	V
Input/Output Voltage	V_{IL}	V_{SS} -0.3	V
	V_{IH}	V_{DD} +0.3	V
	V_{OL}	V_{SS} -0.3	V
	V_{OH}	V_{DD} +0.3	V
Power Dissipation	P_D	120	mW
Operating Temperature	T_{OPR}	-20 to +70	°C
Storage Temprature	T_{STG}	-55 to +125	°C

Note: Exposure to conditions beyond those listed under Absolute Maximum Ratings may adversely affect the life and reliability of the device.

DC CHARACTERISTICS

(V_{DD}–V_{SS} = 2.5V, Fosc. = 3.58 MHz, Ta = 25° C, all outputs unloaded)

PARAMETER	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNIT
Operating Voltage	V_{DD}		2.0	-	5.5	V
Operating Current	I_{OP}	Tone	-	0.3	0.5	mA
		Pulse	-	0.15	0.3	
Standby Current	I_{SR}	$\overline{HKS}$ = 0, No load & No key entry	-	-	15	µA
Memory Retention Current	I_{MR}	$\overline{HKS}$ = 1, V_{DD} = 1.0V	-	-	0.2	µA
DTMF Output Voltage	V_{TO}	Row group, R_L = 5 KΩ	130	150	170	VrmS
Pre-emphasis	-	Col/Row, V_{DD} = 2.0 to 5.5V	1	2	3	dB
DTMF Distortion	THD	R_L= 5 KΩ, V_{DD} = 2.0 to 5.5V	-	-30	-23	dB
DTMF Output DC Level	V_{TDC}	R_L = 5 KΩ, V_{DD} = 2.0 to 5.5V	1.0	-	3.0	V
DTMF Output Sink Current	I_{TL}	V_{TO} = 0.5V	0.2	-	-	mA
$\overline{DP}$ Output Sink Current	I_{PL}	V_{PO} = 0.5V	0.5	-	-	mA
T/P $\overline{MTUE}$ Output Sink Current	I_{MI}	V_{MO} = 0.5V	0.5	-	-	mA
HPM MUTE Output Sink Current	I_{HPMI}	V_{TO} = 0.5V	0.5	-	-	mA
HPM MUTE Output drive Current	I_{HPMH}	V_{TH} = 2.0V	0.5	-	-	mA
$\overline{HKS}$ I/P Pull-high Resistor	R_{KH}		-	300	-	KΩ
Key Tone Output Current	I_{KTH}	V_{KTH} = 2.0V	0.5	-	-	mA
	I_{KTL}	V_{KTH} = 0.5V	0.5	-	-	
HFO Drive/Sink Current	I_{HFH}	V_{HFH} = 2.0V	0.5	-	-	mA
	I_{HFL}	V_{HFL} = 0.5	0.5	-	-	
Keypad Input Drive Current	I_{KD}	V_I = 0V	30	-	-	µA
Keypad Input Sink Current	I_{KS}	V_I = 2.5V	200	400	-	µA
Keypad Resistance			-	-	5.0	KΩ

AC CHARACTERISTICS

PARAMETER	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNIT
Keypad Active in Debounce	T_{KID}	-	-	20	-	mS
Key Release Debounce	T_{KRD}	-	-	20	-	mS
Pre-digit Pause[1]	T_{PDP1}	M/B = 2/3	-	40	-	mS
	10 ppS	M/B = 1/2	-	33.3	-	
Pre-digit Pause[2]	T_{PDP2}	M/B = 2/3	-	20	-	mS
	20 ppS	M/B = 1/2	-	16.7	-	
Interdigit Pause (Auto dialing)	T_{IDP}	10 ppS	-	800	-	mS
		20 ppS	-	500	-	
Make/Break Ratio	M/B	M/B = 2/3	-	40:60	-	%
		M/B = 1/2	-	33:67	-	
Tone Output Duration	T_{TD}	Auto Dialing	-	93	-	mS
Intertone Pause	T_{ITP}	Auto Dialing	-	93	-	mS
Flash Break Time	T_{FB}	-	-	98	-	mS
			-	305	-	
			-	600	-	
Pause Time	T_P	-	-	3.6	-	S
Key Tone Frequency	F_{KT}	-	-	600	-	Hz
Key Tone Duration	T_{KTD}	-	-	35	-	mS
One-key Redialing Pause Time	T_{PR}	-	-	600	-	mS
One-key Redialing Break Time	T_{RB}	-	-	2.2	-	S
First key-in Pause Time	T_{FKP}	-	-	600	-	mS

Notes:

1. Crystal parameters suggested for proper operation are Rs < 100Ω, Lm = 96 mH, Cm = 0.02 pF, Cn = 5 pF, Cl = 18 pF, $F_{OSC.}$ = 3.579545 MHz ±0.02%.
2. Crystal oscillator accuracy directly affects these times.

TIMING WAVEFORMS

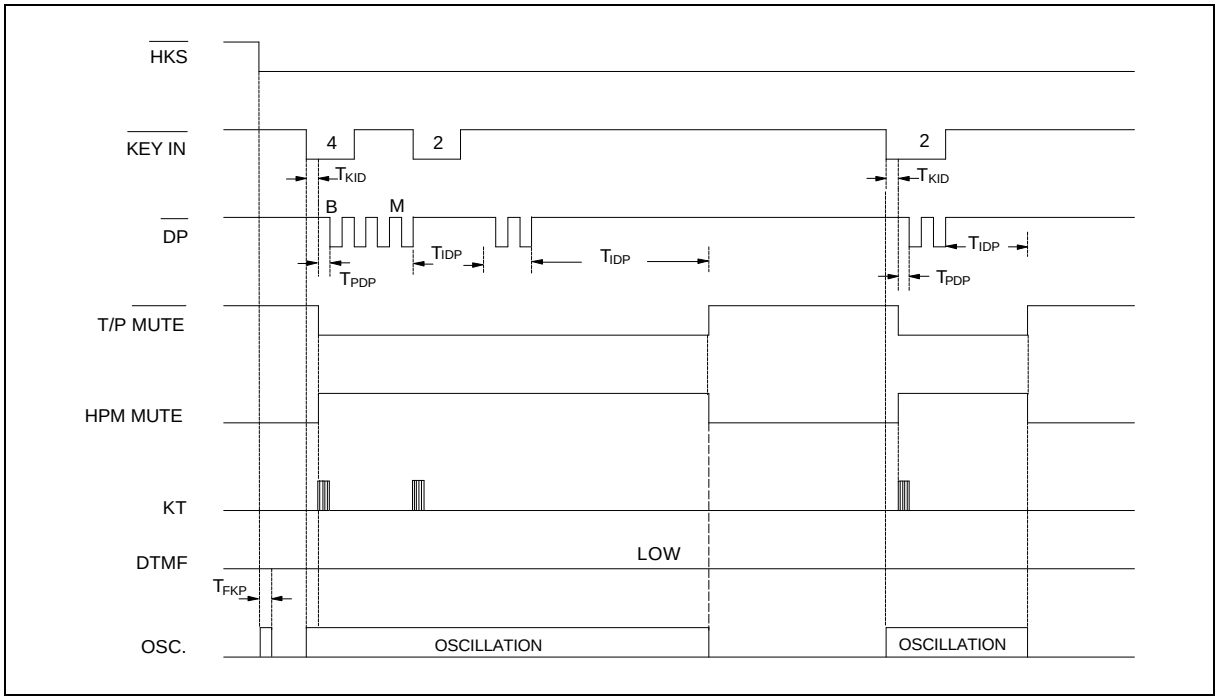


Figure 1. Pulse Mode Diagram (Normal Dialing)

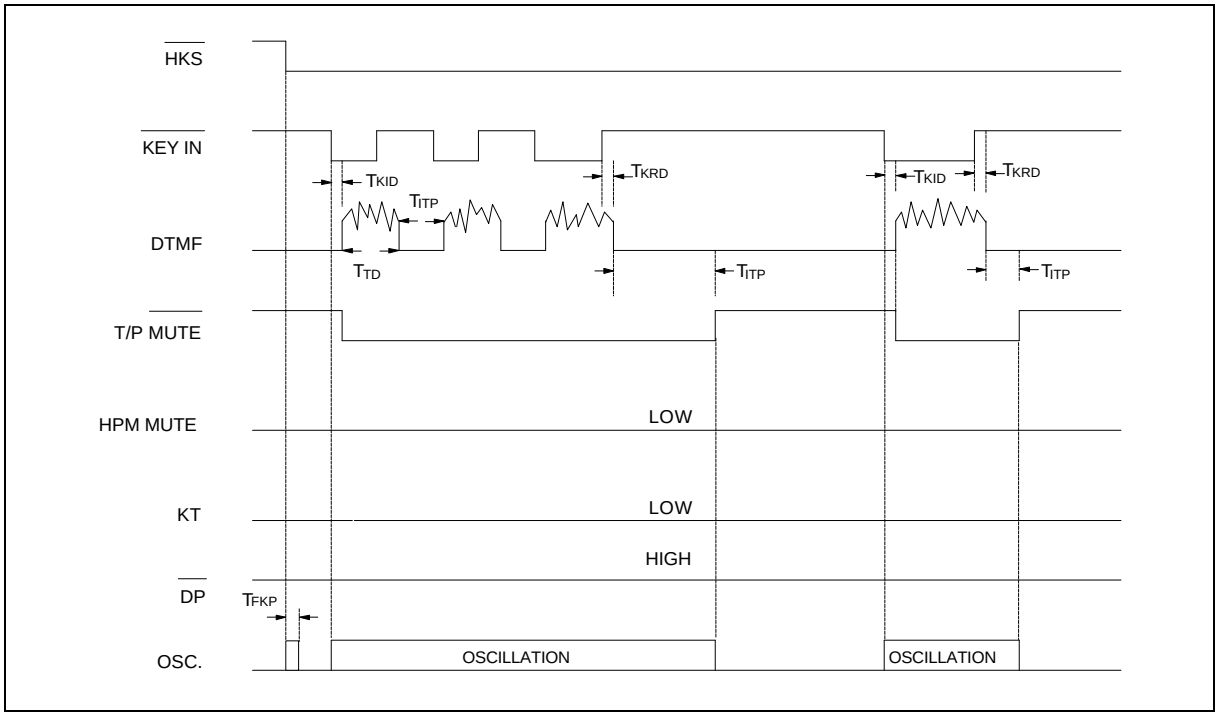


Figure 2. Tone Mode Diagram (Normal Dialing)

Timing waveforms, continued

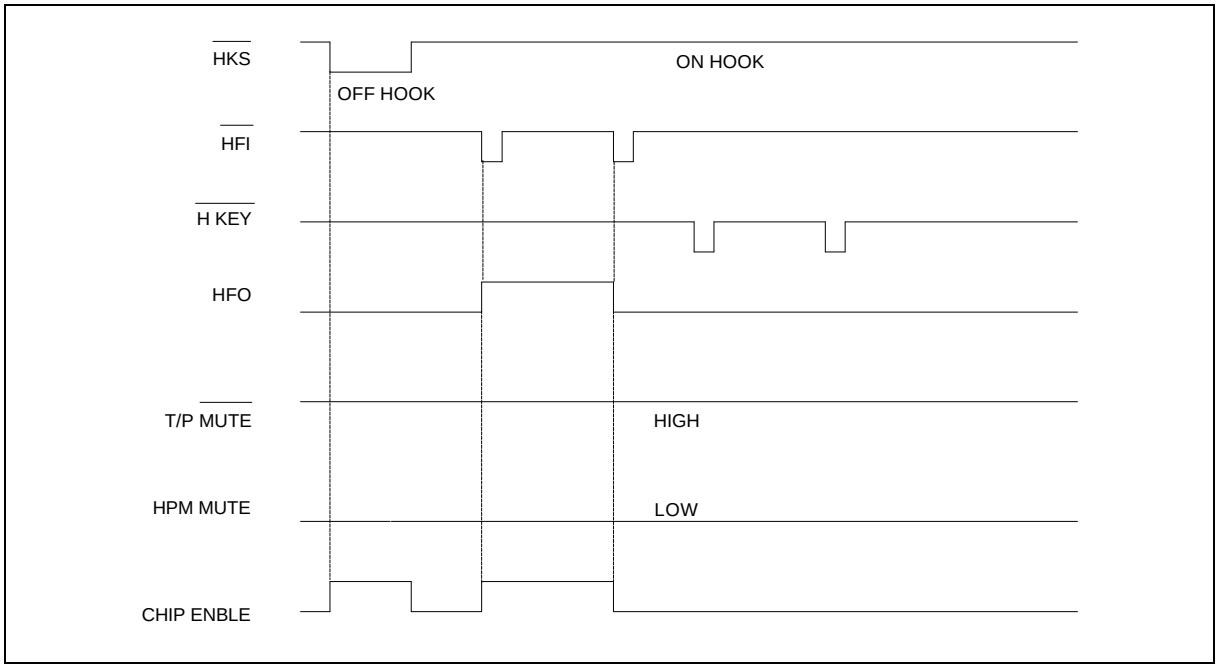


Figure 3(a).

Note: The $\overline{\text{H KEY}}$ cannot be enabled when chip is disabled.

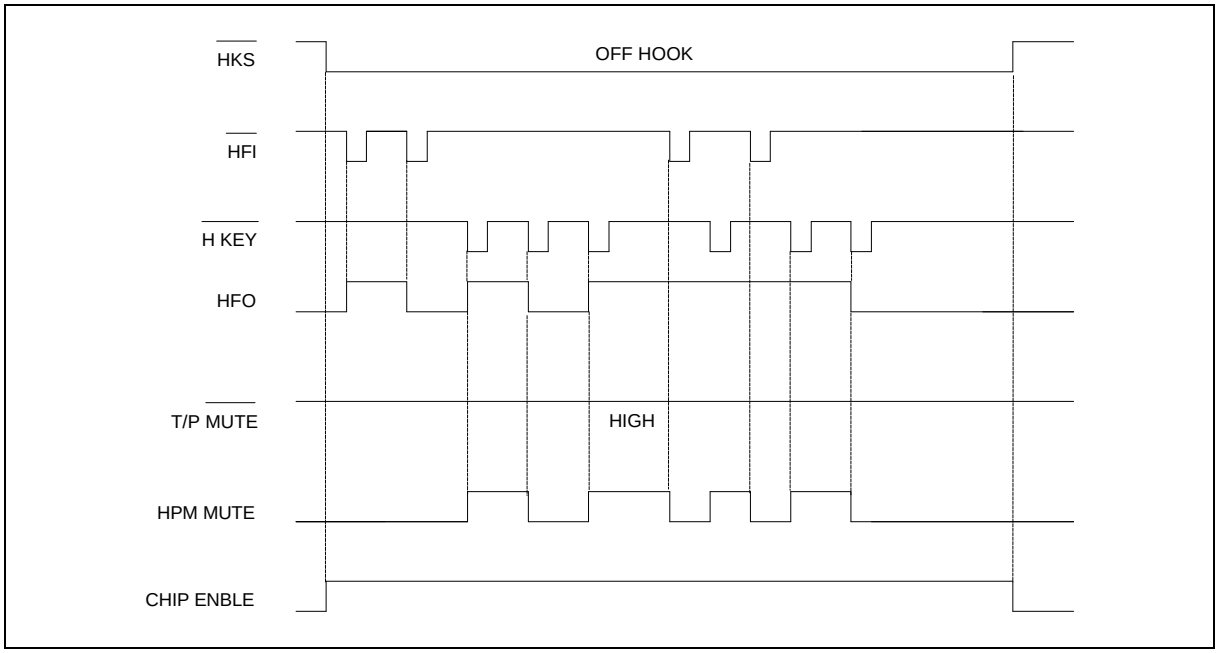


Figure 3(b).

Note: The $\overline{\text{HFI}}$ and $\overline{\text{H KEY}}$ inputs will toggle the HFO signal; as soon as either $\overline{\text{HFI}}$ or $\overline{\text{H KEY}}$ is activated, the HFO signal will go high and previous inputs will be ignored.

Timing waveforms, continued

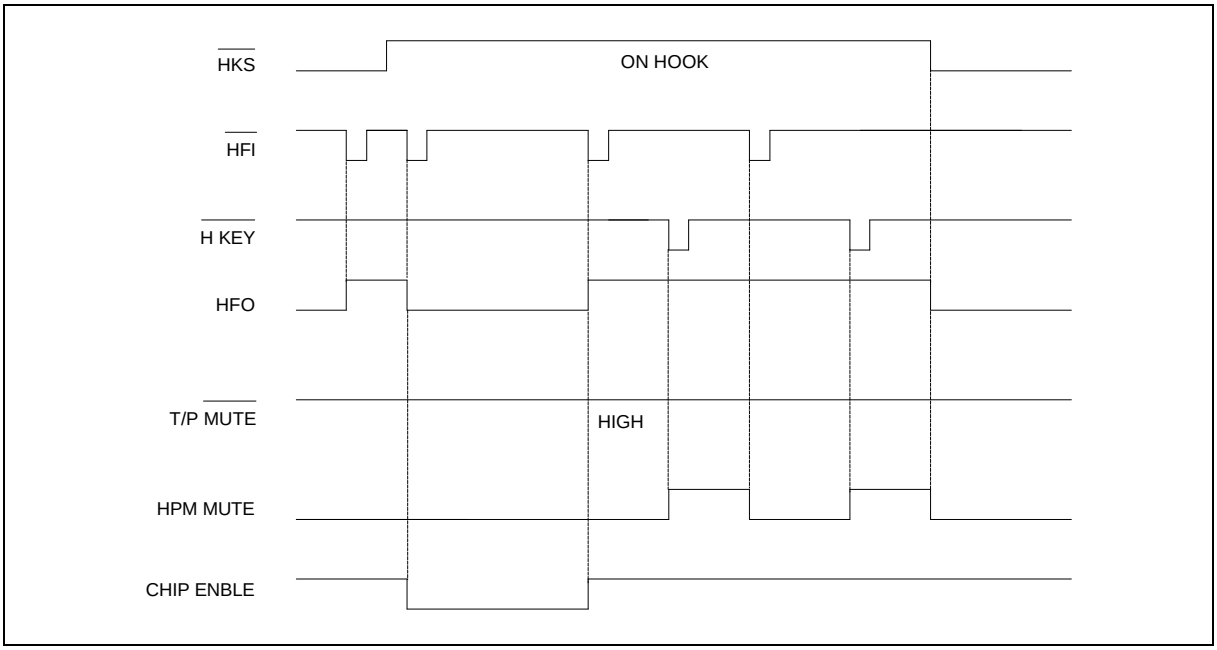


Figure 3(c).

Note: Changing the state of the $\overline{HKS}$ signal from high to low will initialize the HFO and HPM MUTE signals.

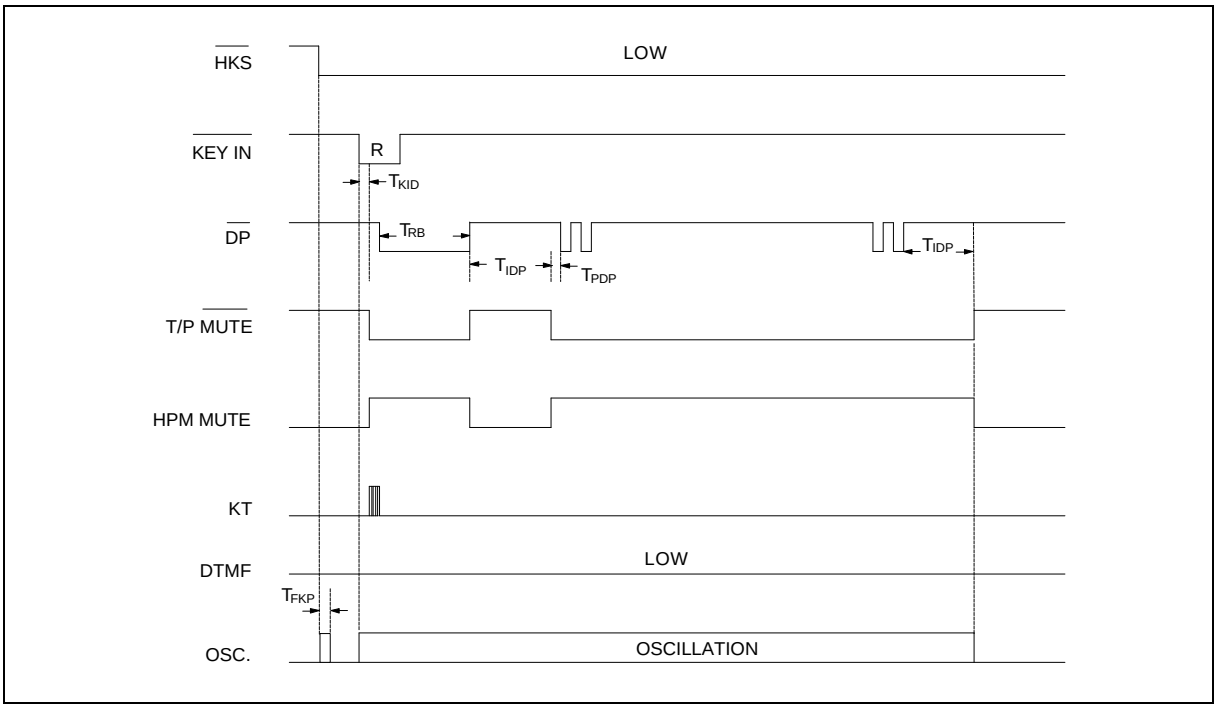


Figure 4. Pulse Mode One-key Redialing Timing Diagram (when not first key)

Timing waveforms, continued

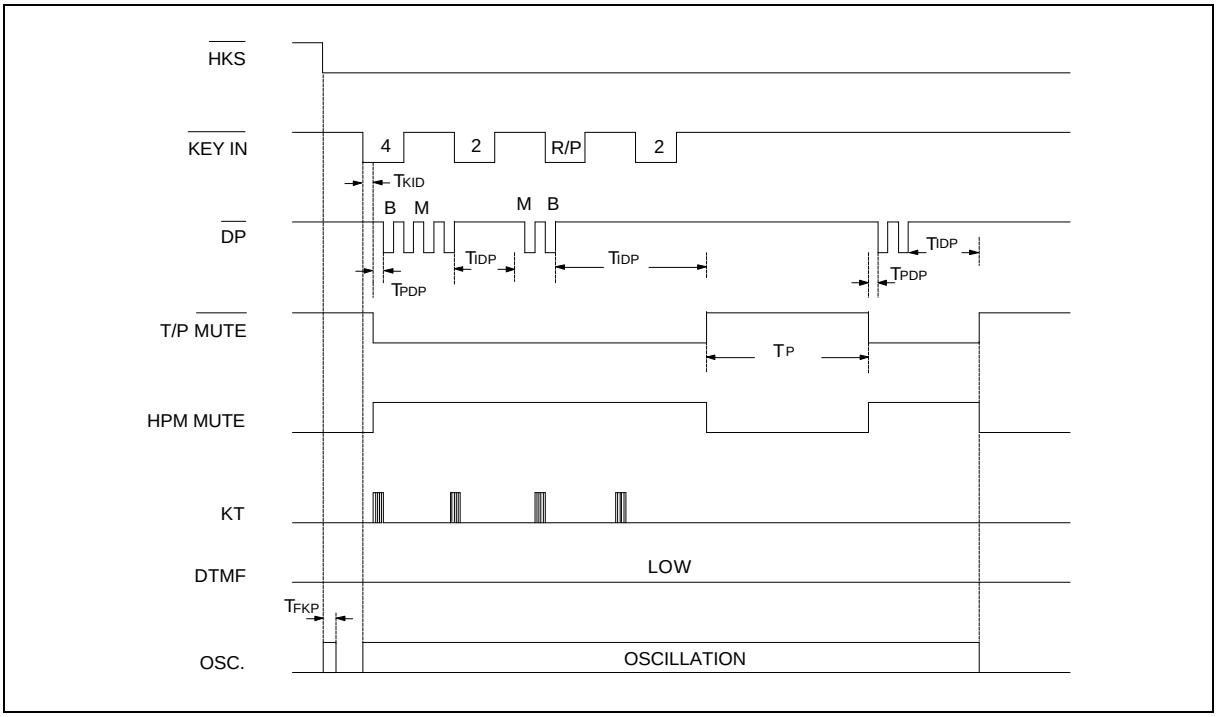


Figure 5. Pause Function Timing Diagram

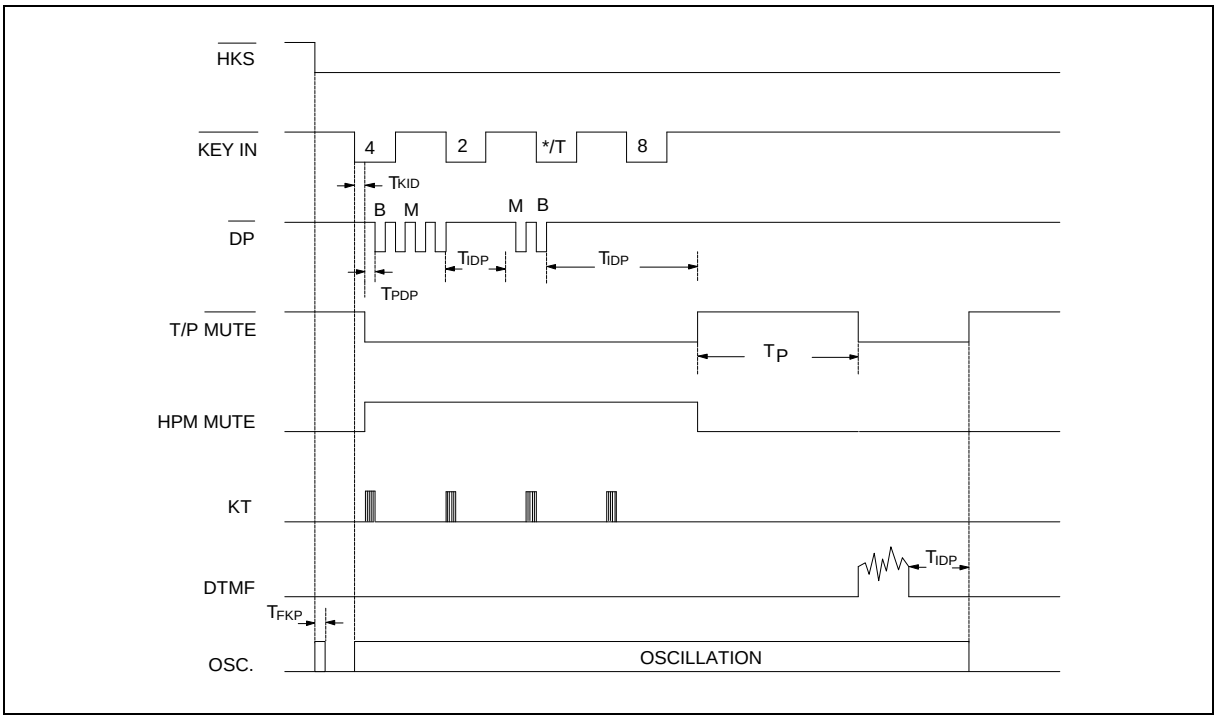


Figure 6. Pulse-to-Tone Function Timing Diagram

Timing waveforms, continued

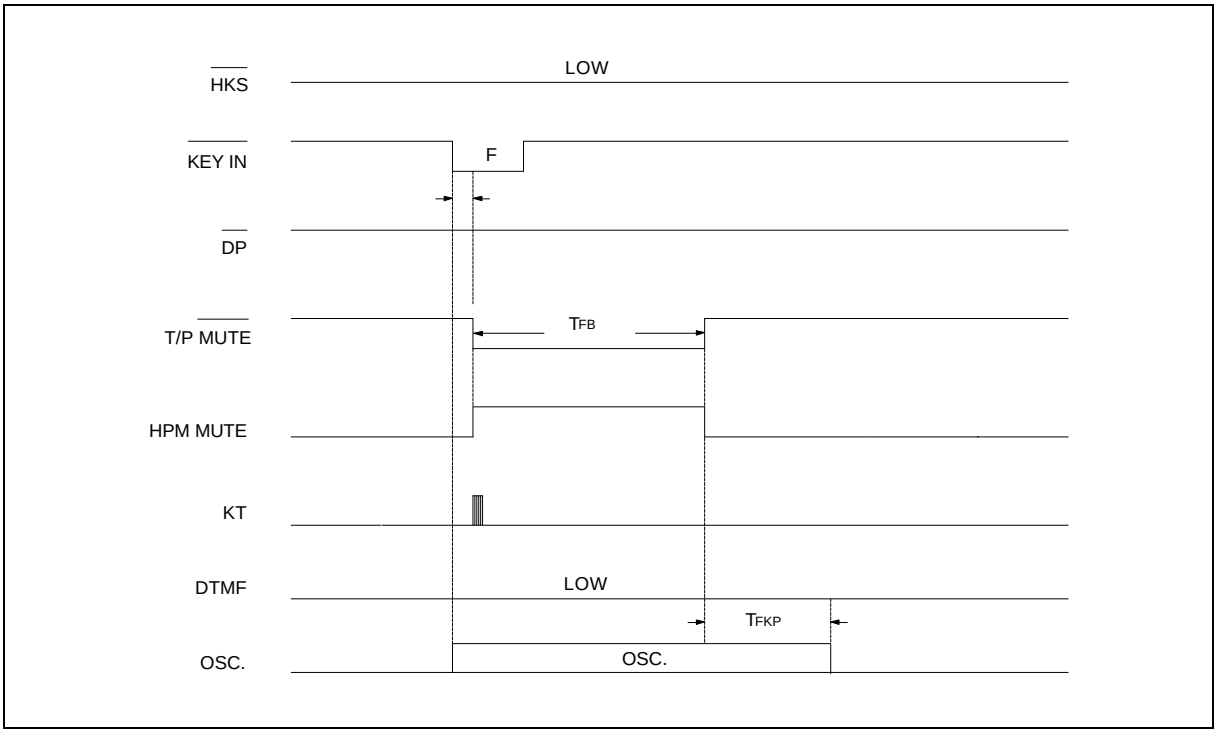


Figure 7. Flash Operation Timing Diagram

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Note: All data and specifications are subject to change without notice.