



TONE/PULSE DIALER WITH REDIAL AND ROM MEMORY

GENERAL DESCRIPTION

The W91081 is Si-gate CMOS IC that provide necessary signal for either Pulse or Tone dialing. It features a built-in 32 digits Redial and a 32 digits ROM memory for fixed number dialing.

FEATURES

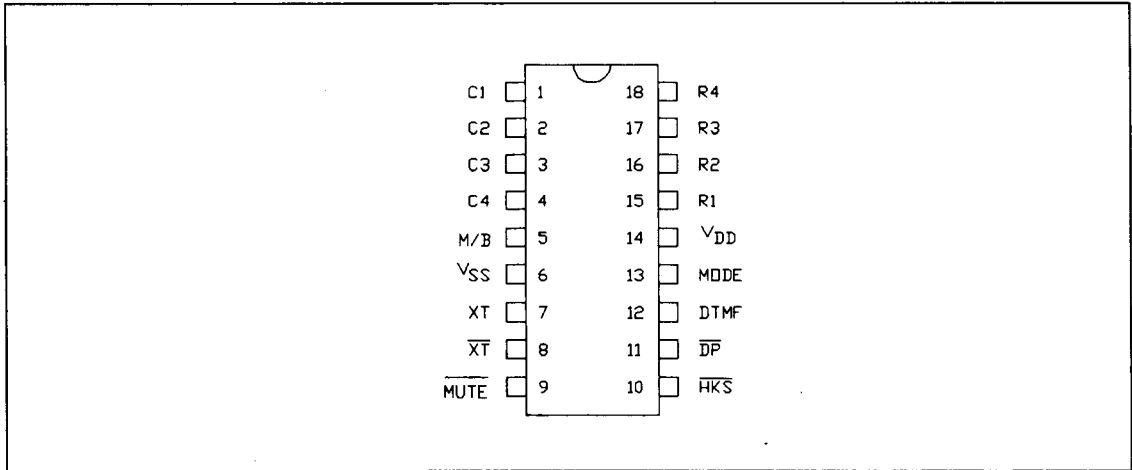
- DTMF/PULSE switchable dialer.
- 32 digits for Redial memory.
- 32 digits ROM memory for fixed number dialing.
- Pulse to Tone keypad for Long Distance Call operation.
- 4 × 4 keyboard can be used.
- Easy operation with Redial, Flash, Pause and P--> keypads.
- Pause, P-->T (Pulse to Tone), Flash can be stored as a digit in memory.
- Minimum tone output duration : 100 msec.
- Minimum inter tone pause : 100 msec.
- Power on reset on chip.
- 3.579545 MHz crystal or ceramic resonator is used.
- Dial rate 10 or 20 pps is selectable.
- DIP 18 pins plastic package.

ORDERING INFORMATION

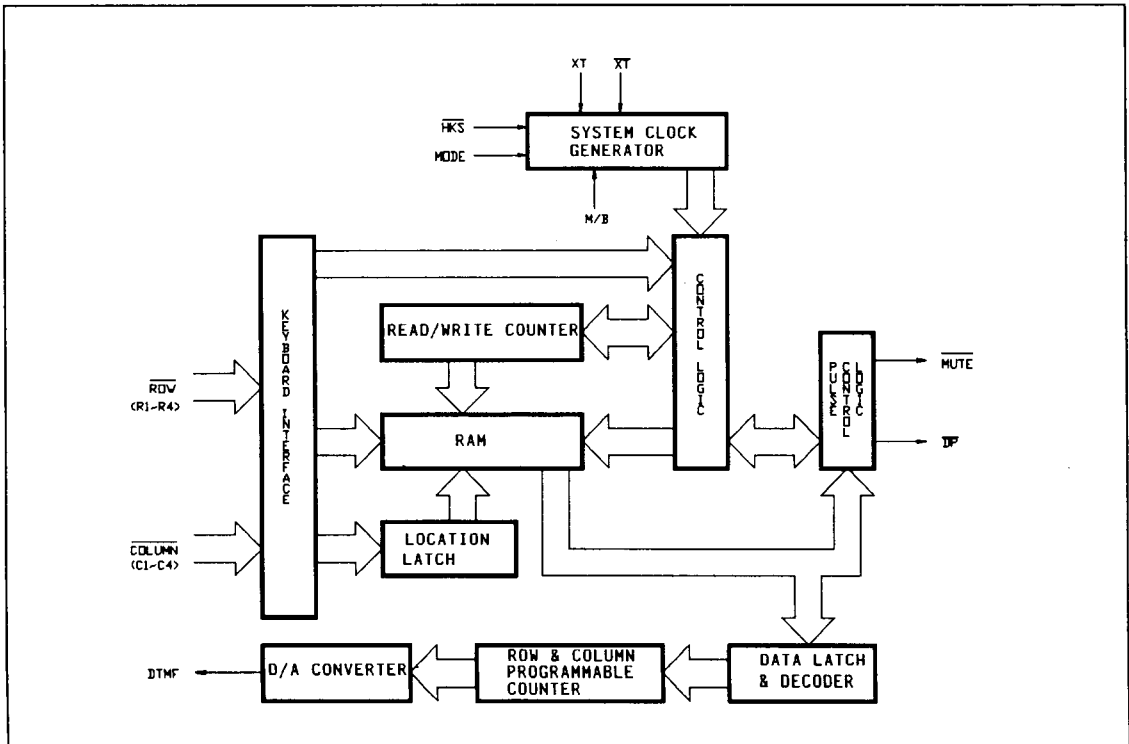
TYPE NO.	CUSTOMER CODE
W91081-	XX

TONE/PULSE
DIALER

PIN CONFIGURATION



BLOCK DIAGRAM



PIN DESCRIPTION

SYMBOL	18 PIN	I/O	FUNCTION																																				
Column-Row Inputs	1~4 & 15~18	I	The Keyboard input may be used with either the standard 4x5 keyboard or the inexpensive single contact (Form A) keyboard, the electronic input with μC , that also can be connected to be used. A valid key entry is defined by a single row being connected to a single column.																																				
XT	7	I	A built in inverter provides oscillation with an inexpensive 3.579545MHz crystal.																																				
\overline{XT}	8	O	The oscillator output pin.																																				
\overline{MUTE}	9	O	The \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.																																				
MODE	13	I	Pull mode pin to V_{SS} ; the dialer is in Tone mode. Pull mode pin to V_{DD} ; the dialer is in Pulse mode-10pps. Pull mode pin to floating; the dialer is in Pulse mode-20pps.																																				
\overline{HKS}	10	I	This pin is the hook switch input. $\overline{HKS}=1$, ON HOOK state, chip in sleeping mode, no operation. $\overline{HKS}=0$, OFF HOOK state, enable chip on normal operation. \overline{HKS} pin is pulled to V_{DD} by internal resistor.																																				
\overline{DP}	11	O	Open drain dialing pulse output (Fig. 1). Flash key will cause \overline{DP} active either in Tone mode or Pulse mode.																																				
DTMF	12	O	In pulse mode, it always keeps at low state. In tone mode, it will output a dual or single tone. The detailed timing diagram of tone mode is shown in Fig.2(a,b). <table border="1"> <thead> <tr> <th colspan="4">OUTPUT FREQUENCY (Hz)</th> </tr> <tr> <th></th> <th>Specified</th> <th>Actual</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>	OUTPUT FREQUENCY (Hz)					Specified	Actual	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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V_{DD}, V_{SS}	14, 6	I	Power input pins.																																				
M/B	5	I	When M/B=1 then Make/Break ratio is 40:60, if M/B=0 the 66.6:33.3.																																				

FUNCTIONAL DESCRIPTION

A. KEYBOARD OPERATION

	C1	C2	C3	C4
R1	1	2	3	ROM
R2	4	5	6	F
R3	7	8	9	P->T
R4	*	0	#	R/P

- F--Flash keys.
Flash keys can be stored in memory.
- P->T--In the pulse mode this key works as pulse->Tone key, and it works as pause key can be stored as a digit in pulse or tone mode.
- R/P--Redial and pause function key.
The Redial function can be executed only in first key-in after OFF HOOK, otherwise it will be operated as pause function.
- ROM--Fixed number dialing keypad.

B. NORMAL DIALING

OFF HOOK, [D1], [D2], - - - , [Dn]

1. D1, D2, - - - , Dn will be dialed out.
2. Dialing length is unlimited, but the Redial is inhibited if it oversteps 32 digits.

C. REDIALING

OFF HOOK, [D1], [D2], - - - , [Dn], BUSY, Come ON HOOK, OFF HOOK, [R/P]

.The [R/P] key can execute Redial function only in first key-in after OFF HOOK, otherwise it will be Pause function.

D. 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 or Redialing or memory dialing.

3. The pause function timing diagram is shown in Fig.3.

E. PULSE TO TONE (P->T)

OFF HOOK, [D1], [D2], - - - , [Dn],
P->T, [D1'], [D2'], - - - , [Dn']

1. If the mode switch is set in Pulse mode, then the output signal will be:
D1, D2, - - - , Dn, Pause (3.6s)
(Pulse)
D1', D2', - - - , Dn'
(Tone)
2. If the mode switch is set in Tone mode, then the output signal will be:
D1, D2, - - - , Dn
(Tone)
, Pause, D1', D2', - - - , Dn'
(Tone) (Tone)
3. It can be reset to Pulse mode only in operation of ON HOOK, because it's still in Tone mode when the digits have been dialed out.
4. The P --> T function timing diagram is shown in Fig.4.

F. FLASH (F)

OFF HOOK, [F]

1. Flash key can be stored as a digit in memory.
2. The Flash function timing diagram is shown in Fig.5.

G. FIXED NUMBER DIALING (ROM)

OFF-HOOK, [ROM]

The, number which is fixed in ROM memory will be dialed out after ROM key is pressed.

The ROM memory is fixed in ICs fabrication, it can not be changed or erased by power off.

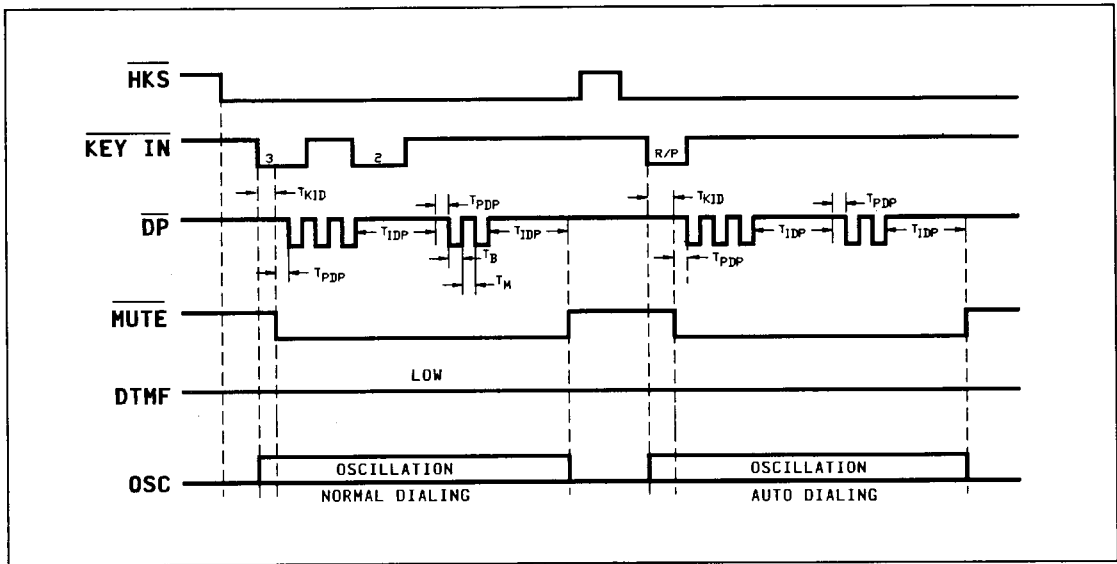


Figure 1. Pulse Mode Timing Diagram

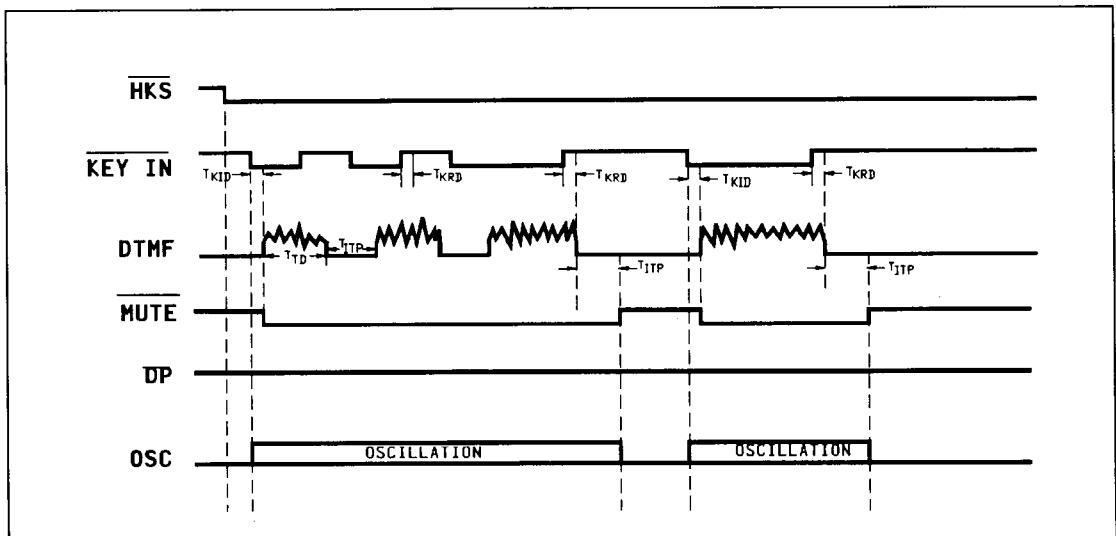


Figure 2(a). Tone Mode Normal Dialing Timing Diagram

TONE/PULSE
DIALER

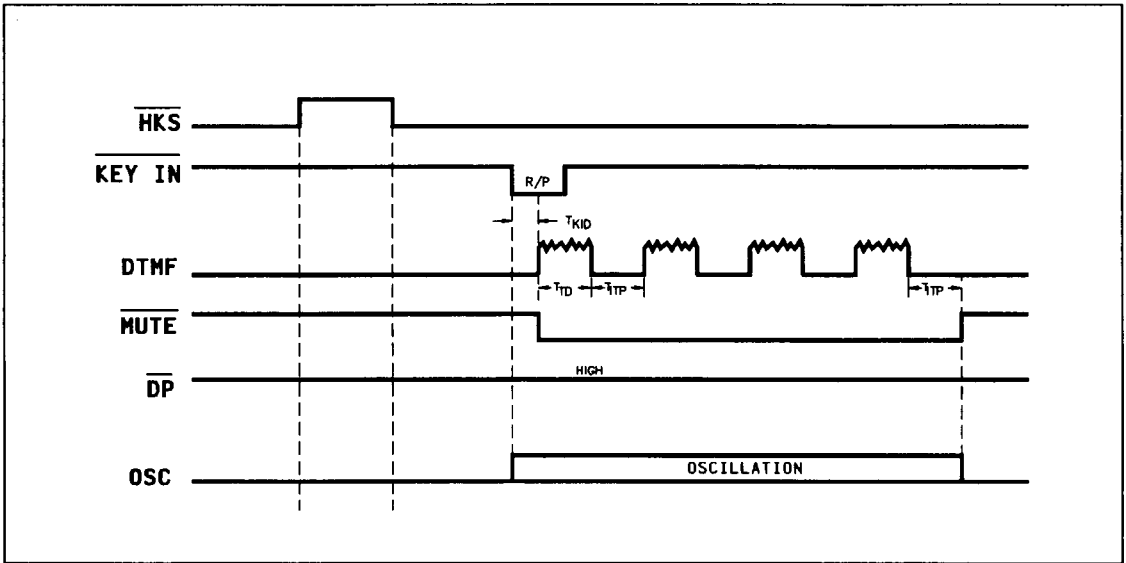


Figure 2(b). Tone Mode Auto Dialing Timing Diagram

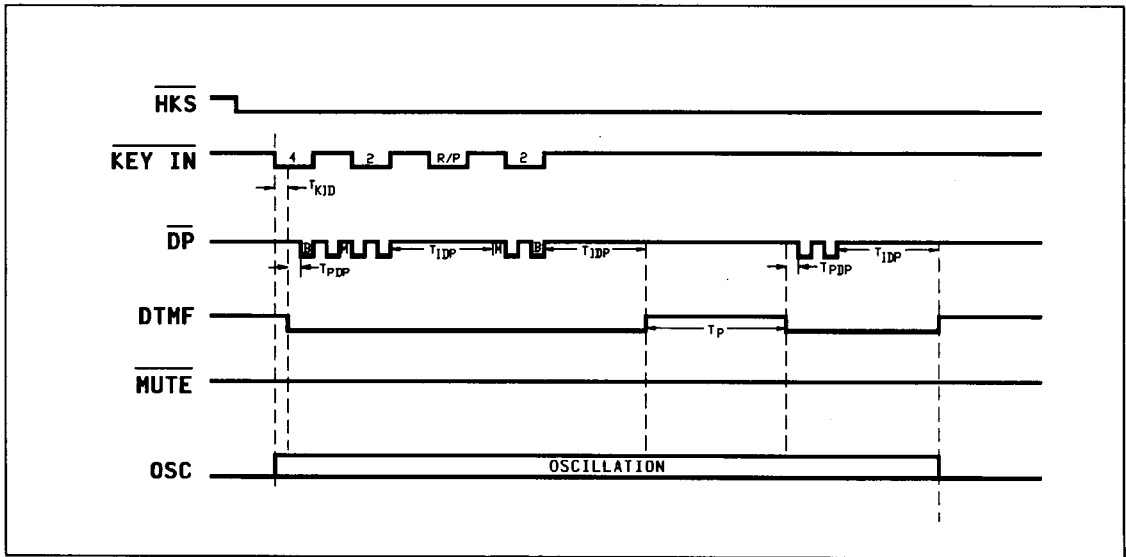


Figure 3. Pause Function Timing Diagram

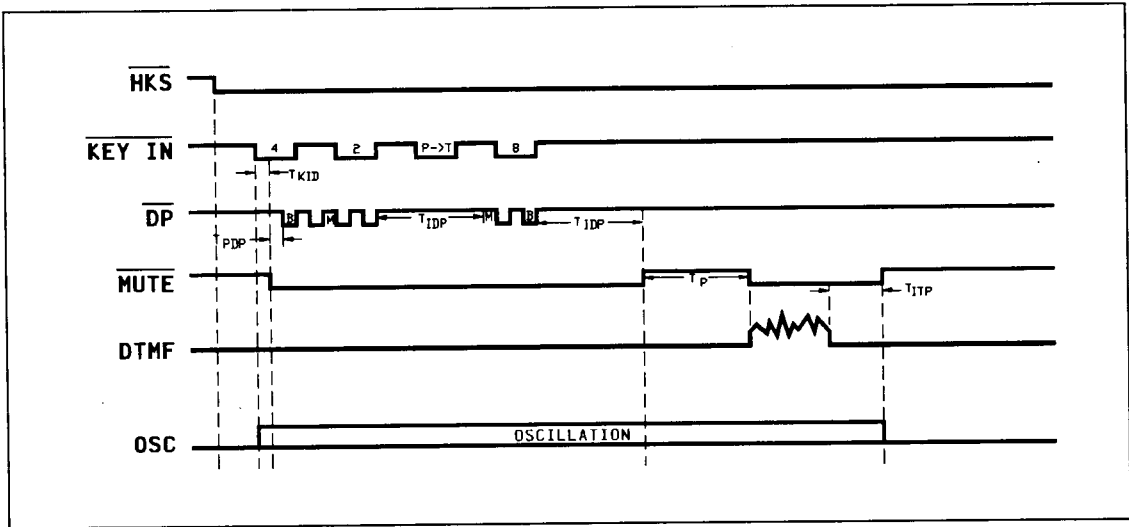


Figure 4. P->T Operation Timing Diagram in Normal Dialing

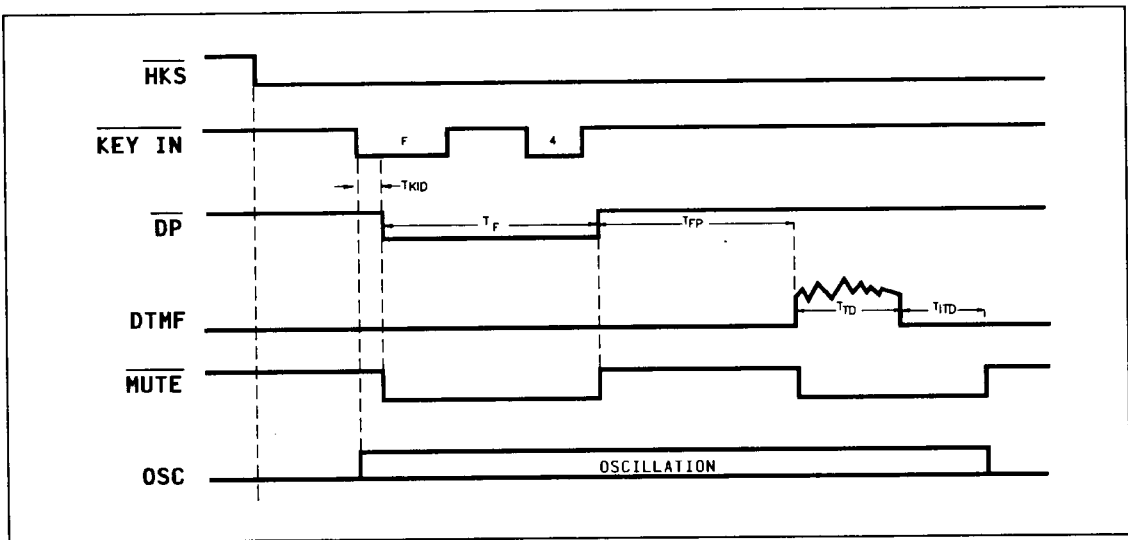


Figure-5 Flash Function Timing Diagram

TONE/PULSE
DIALER

ABSOLUTE MAXIMUM RATING

PARAMETER	SYMBOL	RATING	UNIT
DC Supply Voltage	$V_{DD} - V_{SS}$	-0.3 ~ +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}	0 ~ 70	°C
Storage Temperature	T_{STG}	-55 ~ +150	°C

DC CHARACTERISTICS

($V_{DD} - V_{SS} = 2.5$ V , Fosc. = 3.58 MHz , $T_a = 25$ °C , All output unloaded)

PARAMETER	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNIT
Operating Voltage	V_{DD}	-	2.0	-	5.5	V
Operating Current	I_{OP}	Tone	-	-	1.0	mA
		Pulse	-	-	0.50	
Standby Current	I_{SB}	$\overline{HKS} = 0$, No load & No key entry	-	-	15	μA
Memory Retention Current	I_{MR}	$\overline{HKS} = 1$, $V_{DD} = 1.0$ V	-	-	0.2	μA
DTMF Output Voltage	V_{TO}	Row group, $R_L = 10K\Omega$	130	150	170	mVrms
Pre-emphasis		Col/Row, $V_{DD} = 2.0 \sim 5.5$ V	1	2	3	dB
DTMF Distortion	T_{HD}	$R_L = 10K\Omega$, $V_{DD} = 2.0 \sim 5.5$ V	-	-30	-23	dB
DTMF Output DC Level	V_{TDC}	$R_L = 10K\Omega$, $V_{DD} = 2.0 \sim 5.5$ V	1.1	-	2.8	V
DTMF Output Sink Current	I_{TL}	$V_{TO} = 0.5$ V	0.2	-	-	mA
DP Output Sink Current	I_{PL}	$V_{PO} = 0.5$ V	0.5	-	-	mA
T/P MUTE Output Sink Current	I_{ML}	$V_{MO} = 0.5$ V	0.5	-	-	mA
\overline{HKS} I/P Pull High Resister	R_{KH}		300	-	-	KΩ
Keypad Input Drive current	I_{Kd}	$V_I = 0$ V	4	-	-	μA
Keypad Input Sink Current	I_{KS}	$V_I = 2.5$ V	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} 10 pps	M/B = 2:3	-	40	-	ms
		M/B = 1:2	-	33.3	-	
Pre-digit-pause (2)	T_{PDP2} 20 pps	M/B = 2:3	-	20	-	ms
		M/B = 1:2	-	16.7	-	
Inter Digit 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	-	
DTMF Output Duration	T_{TD}	Auto Dialing	-	100	-	ms
Inter Tone Pause	T_{ITP}		-	100	-	ms
Flash Break Time	T_{FB}		-	600	-	ms
Flash Pause	T_{FP}		-	600	-	ms
Pause Time	T_P		-	3.6	-	S

COMPONENT SELECTION TABLE

R1	20M Ω	R13	10 Ω	D4	1N4002
R2	33K Ω	R14	1.5 Ω	D5	1N4148
R3	220K Ω	R15	1.2K Ω	TNR	TNR680K
R4	3.9K Ω	R16	4.7K Ω	Z1	1N4731
R5	1M Ω	R17	220K Ω	Q1	MPSA92
R6	100K Ω	C1	0.01 μ F	Q2	2N5551
R7	10K Ω	C2	0.1 μ F	Q3	2N5551
R8	68 Ω	C3	100 μ F/10V	Q4	2N9014
R9	470K Ω	C4	2.2 μ F/10V	Q5	2N4034
R10	100K Ω	C5	0.01 μ F	Q6	2N4403
R11	100 Ω	D1	1N4002	Q7	MPSA13
R12	100 Ω	D2	1N4002	XTL	3.579545MHZ
R12b	180 Ω	D3	1N4002	-	-

APPLICATION CIRCUIT

