

Features**Patent Number: 86474, 84545(R.O.C.)**

- Operating Voltage: 2.0V~5.5V
- Low standby current
- Low memory retention current: 0.1uA (Typ.)
- Tone/Pulse switchable
- Interface with LCD driver
- 32 (pulse)/31 (tone) digits for redialing
- Pause and P → T key for PBX
- 4×4 keyboard matrix
- 3.58MHz crystal or ceramic resonator
- Hand-free control
- Pause, P → T can be saved for redialing
- Two series for different telephone systems
- One-key redialing
- Lock function
- Keytone output
- Pause time: 2.2s
- Cascadable manual dialing after redialing

General Description

The HT93214/5 are dialer series designed for low cost telephone set applications with expandable features such as Lock function, keytone and LCD display interface. With a 4×4 keyboard, it performs normal tone/pulse switchable dialing, and provides one-key redialing function with a 32-digit memory for speed dialing. An on-chip oscillator is built-in to work with an external 3.58Mhz crystal or ce-

ramic resonator for accurate timing. To meet different telephone systems, the HT93214 provides 300ms (F1 key) and 600ms (F2 key) of flash time; Tone dialing and 10pps, 20pps selection with 1/2 M/B ratio for pulse dialing. The HT93215 provides 98ms (F1 key) and 600ms (F2 key) of flash time; Tone dialing and 10pps with 1/2 or 2/3 M/B ratio selection for pulse dialing.

Selection Table

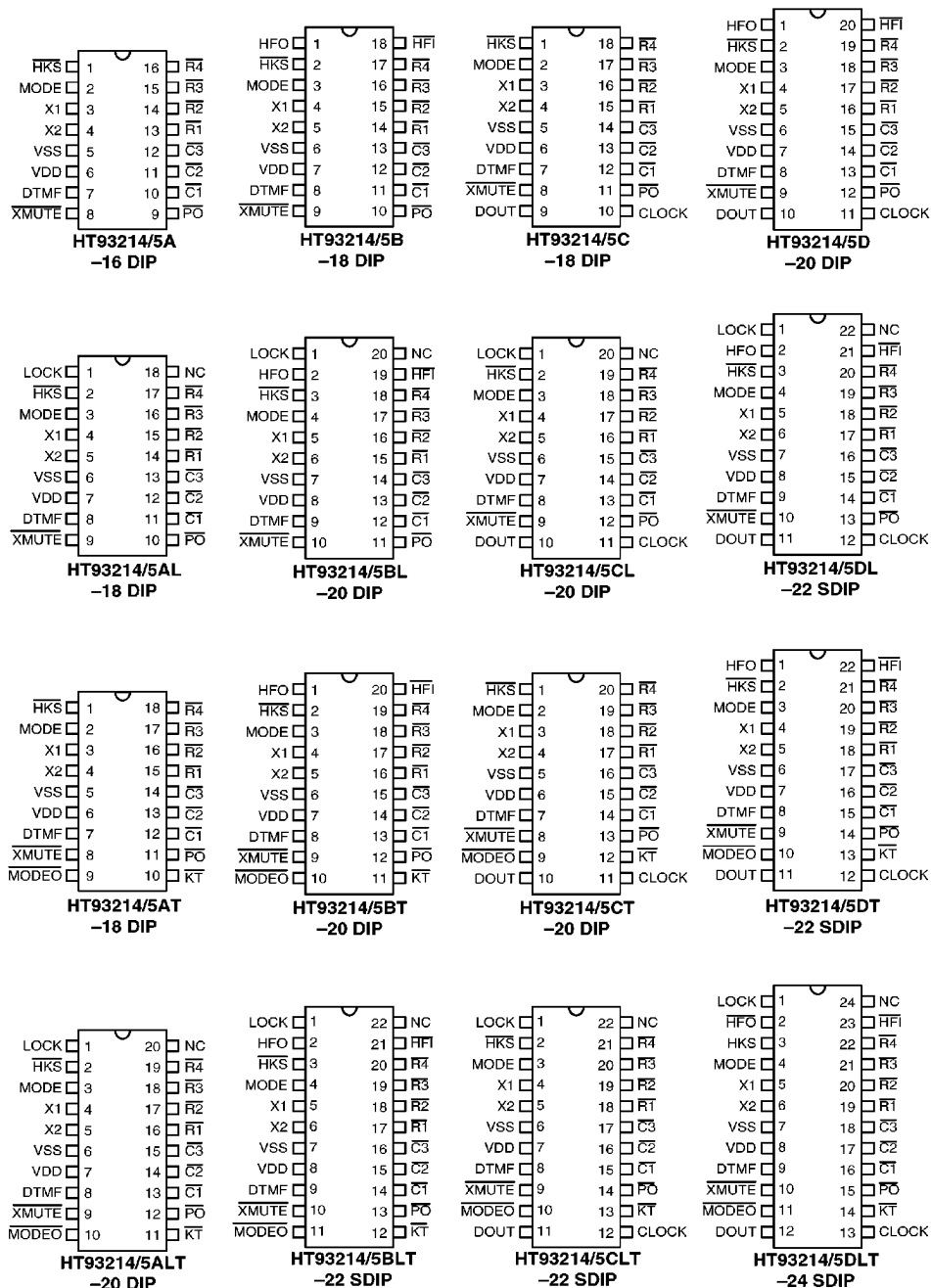
HT93214 series

Function Item	Hand-Free	LCD Interface	LOCK	Key Tone	Flash	Flash Time (ms)	Pulse No.	Tone Duration (ms)	Inter tone pause (ms)	pps	M/B	PKG DIP 300mil
HT93214A					Control	300/600	N	94	96	10/20	1/2	16
HT93214B	✓				Control	300/600	N	94	96	10/20	1/2	18
HT93214C		✓			Control	300/600	N	94	96	10/20	1/2	18
HT93214D	✓	✓			Control	300/600	N	94	96	10/20	1/2	20
HT93214AL			✓		Control	300/600	N	94	96	10/20	1/2	18
HT93214BL	✓		✓		Control	300/600	N	94	96	10/20	1/2	20
HT93214CL		✓	✓		Control	300/600	N	94	96	10/20	1/2	20
HT93214DL	✓	✓	✓		Control	300/600	N	94	96	10/20	1/2	22
HT93214AT				✓	Control	300/600	N	94	96	10/20	1/2	18
HT93214BT	✓			✓	Control	300/600	N	94	96	10/20	1/2	20
HT93214CT		✓		✓	Control	300/600	N	94	96	10/20	1/2	20
HT93214DT	✓	✓		✓	Control	300/600	N	94	96	10/20	1/2	22
HT93214ALT			✓	✓	Control	300/600	N	94	96	10/20	1/2	20
HT93214BLT	✓		✓	✓	Control	300/600	N	94	96	10/20	1/2	22
HT93214CLT		✓	✓	✓	Control	300/600	N	94	96	10/20	1/2	22
HT93214DLT	✓	✓	✓	✓	Control	300/600	N	94	96	10/20	1/2	24

HT93215 series

Function Item	Hand-Free	LCD Interface	LOCK	Key Tone	Flash	Flash Time (ms)	Pulse No.	Tone Duration (ms)	Inter tone pause (ms)	pps	M/B	PKG DIP 300mil
HT93215A					Control	98/600	N	94	96	10	1/2,2/3	16
HT93215B	✓				Control	98/600	N	94	96	10	1/2,2/3	18
HT93215C		✓			Control	98/600	N	94	96	10	1/2,2/3	18
HT93215D	✓	✓			Control	98/600	N	94	96	10	1/2,2/3	20
HT93215AL			✓		Control	98/600	N	94	96	10	1/2,2/3	18
HT93215BL	✓		✓		Control	98/600	N	94	96	10	1/2,2/3	20
HT93215CL		✓	✓		Control	98/600	N	94	96	10	1/2,2/3	20
HT93215DL	✓	✓	✓		Control	98/600	N	94	96	10	1/2,2/3	22
HT93215AT				✓	Control	98/600	N	94	96	10	1/2,2/3	18
HT93215BT	✓			✓	Control	98/600	N	94	96	10	1/2,2/3	20
HT93215CT		✓		✓	Control	98/600	N	94	96	10	1/2,2/3	20
HT93215DT	✓	✓		✓	Control	98/600	N	94	96	10	1/2,2/3	22
HT93215ALT			✓	✓	Control	98/600	N	94	96	10	1/2,2/3	20
HT93215BLT	✓		✓	✓	Control	98/600	N	94	96	10	1/2,2/3	22
HT93215CLT		✓	✓	✓	Control	98/600	N	94	96	10	1/2,2/3	22
HT93215DLT	✓	✓	✓	✓	Control	98/600	N	94	96	10	1/2,2/3	24

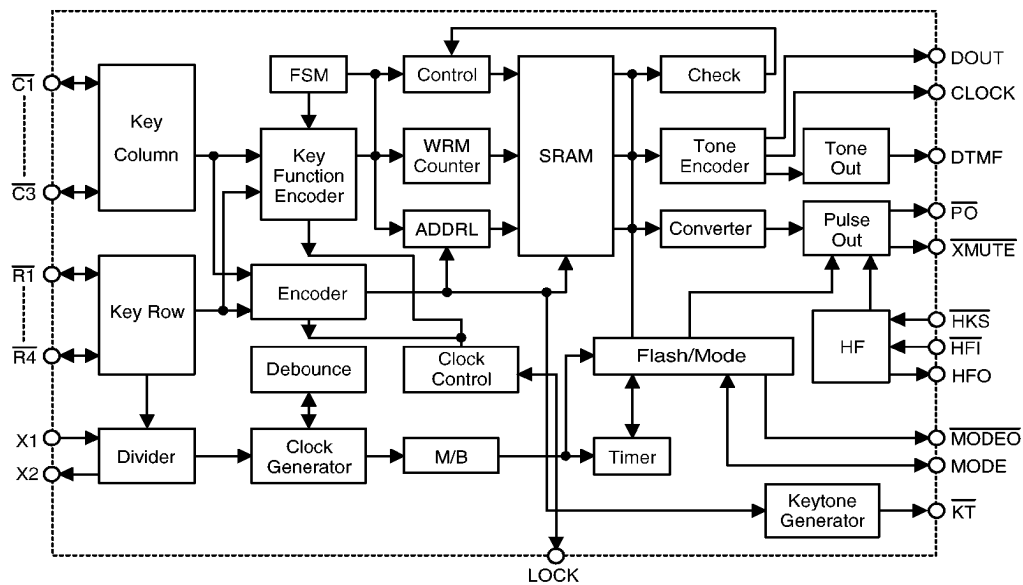
Pin Assignment



Keyboard Information

	$\overline{C1}$	$\overline{C2}$	$\overline{C3}$	HKS
$\overline{R1}$	1	2	3	F1
$\overline{R2}$	4	5	6	F2
$\overline{R3}$	7	8	9	P
$\overline{R4}$	*/T	0	#	R

Block Diagram



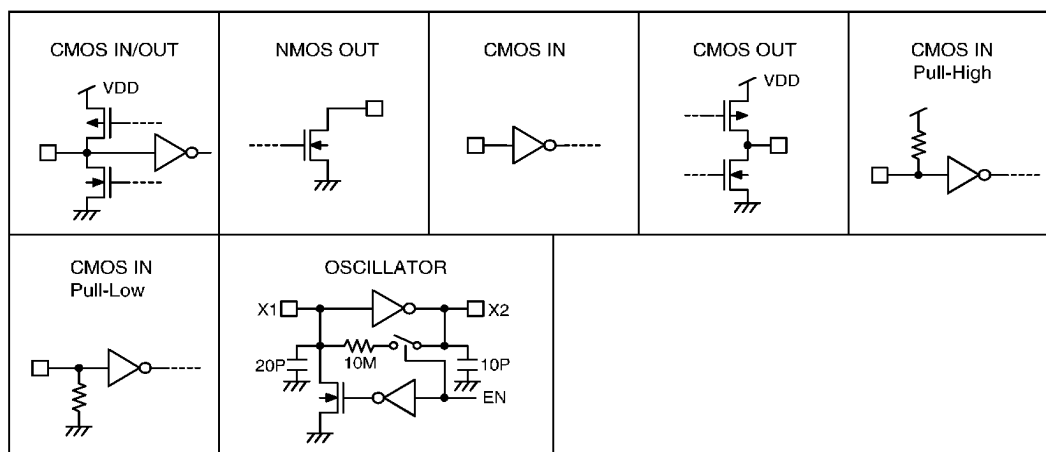
Pin Description

Pin Name	I/O	Internal Connection	Description
$\overline{C1} \sim \overline{C3}$ $\overline{R1} \sim \overline{R4}$	I/O	CMOS I/O	These pins along with the $\overline{HKS}$ form a 4x4 keyboard matrix which can perform keyboard input detection. When on-hook ($\overline{HKS}$ =high) all the pins are set high. While off-hook the column group ($\overline{C1} \sim \overline{C3}$) is set low and the row group ($\overline{R1} \sim \overline{R4}$) remains high for input detection. Pressing a key connects a single row to a single column $\overline{HKS}$ and actuates the system oscillator that results in a dialing signal output. If more than two keys are pressed at the same time, no response occurs. The key-in debounce time is 20ms.
X1	I	OSC	The system oscillator consists of an inverter, a bias resistor and the necessary load capacitor on chip. Connecting a standard 3.579545MHz crystal or ceramic resonator to the X1 and X2 terminals can implement the oscillator function. The oscillator is turned off in the standby mode, and is actuated whenever a keyboard entry is detected.
X2	O		
$\overline{XMUTE}$	O	NMOS Open Drain	NMOS open drain structure pulled to VSS during dialing signal transmission. Otherwise, it is an open circuit. This pin is used to mute the speech circuit when transmitting the dial signal.
$\overline{HKS}$	I	CMOS	This pin is used to monitor the status of the hook-switch and its combination with $\overline{HFI}$ can control the $\overline{PO}$ pin output to make or break the line. $\overline{HKS}$ =VDD: On-hook state ($\overline{PO}$ =low). Except for $\overline{HFI}$ (hand-free control input), other functions are all disabled. $\overline{HKS}$ =VSS: Off-hook state ($\overline{PO}$ =high). The chip is in the standby mode and ready to receive the key input.
$\overline{PO}$	O	NMOS	NMOS open drain output structure, which by receiving the $\overline{HKS}$ and HFO signals, control the dialer so as to connect or disconnect the telephone line. $\overline{PO}$ is pulled to VSS when $\overline{HKS}$ is high (on-hook) and HFO is low. $\overline{PO}$ is an open circuit which make the line connection when $\overline{HKS}$ is low (off-hook) or HFO is high. During the off-hook state, this pin also outputs the dialing pulse train in pulse mode dialing. While in the tone mode, this pin is always an open circuit.

Pin Name	I/O	Internal Connection	Description
MODE	I/O	CMOS	This is a tri-state input/output pin, used for dialing mode selection, either Tone mode or Pulse mode, 10pps/20pps HT93215, for European/American system: MODE=VDD: Pulse, 10pps, M/B=2/3 MODE=Floating: Pulse, 10pps, M/B=1/2 MODE=VSS: Tone. HT93214, for Japanese system: MODE=VDD: Pulse, 10pps, M/B=1/2 MODE=Floating: Pulse, 20pps, M/B=1/2 MODE=VSS: Tone. The MODE selection is checked each time a key input is received.
DTMF	O	CMOS	This pin is active only when the chip transmits tone dialing signals. Otherwise, it always outputs a low. The pin outputs tone signals to drive the external transmitter amplifier circuit. The load resistor (to V_{SS}) should not be less than 5kΩ and any DC load connected to V_{DD} is not allowed.
$\overline{KT}$	O	NMOS	NMOS open drain structure for keytone output. It outputs 34ms of 600Hz tone burst when any key is pressed in the pulse mode or when a function key is pressed in the tone mode.
$\overline{HFI}$	I	CMOS	Pulled-high, this pin is a schmitt trigger input structure. Active low. Applying a negative going pulse to $\overline{HFI}$ can toggle the HFO once and hence control the hand-free function. The pull-high resistance of $\overline{HFI}$ is about 200kΩ typ. An external RC network is recommended for input debouncing.
HFO	O	CMOS	The HFO pin is a CMOS output structure. Its output is toggle-controlled by a negative transition on $\overline{HFI}$ pin. When HFO is high, the hand-free function is enabled and PO outputs a high to connect the line. The hand-free function can be released by an on-off-hook operation or by another $\overline{HFI}$ input. Refer to the functional description for the hand-free functional operation.
LOCK	I/O	CMOS	This is a tri-state input/output pin, used for controlling long distance call function with a lock-switch. LOCK=OPEN: Normal dialing (no lock) LOCK=VDD: 0, 9 is inhibited for use as the first key input LOCK=VSS: 0 is inhibited for use as the first key input
DOUT	O	NMOS	NMOS open drain output pin. It outputs the BCD code of the dialing digits to the LCD driver chip (HT16XX series) or to a microcontroller for dialing number display. Please refer to the functional description for the detailed timing.

Pin Name	I/O	Internal Connection	Description
CLOCK	O	NMOS	NMOS open drain output. When dialing, it outputs a series of pulse trains for DOUT data synchronization. DOUT data is valid at the falling edge of clock.
VDD	I	—	Positive power supply, 2.0V~5.5V for normal operation
VSS	I	—	Negative power supply
$\overline{\text{MODEO}}$	O	NMOS	NMOS open drain output pin pulled to VSS during tone output and is an open circuit during pulse output.

Approximate internal connection circuits



Absolute Maximum Ratings*

Supply Voltage	-0.3V to 6V	Storage Temperature	-50°C to 125°C
Input Voltage	VSS-0.3 to VDD+0.3V	Operating Temperature	-20°C to 75°C

*Note: Stress above those listed under “Absolute Maximum Ratings” may cause permanent damage to the device. These are stress ratings only. Functional operation of this device at these or any other conditions above those indicated in the operational sections of this specification is not implied and exposure to absolute maximum rating conditions for extended periods may affect device reliability.

Electrical Characteristics

(F_{OSC}=3.5795MHz, T_a=25°C)

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
		V _{DD}	Conditions				
V _{DD}	Operating Voltage	—	—	2	—	5.5	V
I _{DD}	Operating Current	2.5V	Pulse	—	0.2	1	mA
			Tone	—	0.6	2	mA
I _{STB}	Standby Current	1V	On-hook, no load No entry	—	—	1	μA
V _R	Memory Retention Voltage	—	—	1	—	5	V
I _R	Memory Retention Current	1V	On-hook	—	0.1	0.2	μA
V _{IL}	Input Low Voltage	—	—	V _{SS}	—	0.2V _{DD}	V
V _{IH}	Input High Voltage	—	—	0.8V _{DD}	—	V _{DD}	V
I _{XMO}	$\overline{\text{XMUTE}}$ Leakage Voltage	—	V $\overline{\text{XMUTE}}$ =12V No entry	—	—	1	μA
I _{OLXM}	$\overline{\text{XMUTE}}$ Sink Current	2.5V	V $\overline{\text{XMUTE}}$ =0.5V	1	—	—	mA
I _{HKS}	$\overline{\text{HKS}}$ Pin Input Current	2.5V	V $\overline{\text{HKS}}$ =2.5V	—	—	0.1	μA
R _{HFI}	$\overline{\text{HFI}}$ Pull- High Resistance	2.5V	V $\overline{\text{HFI}}$ =0V	—	200	—	kΩ
I _{OH1}	Keypad Pin Source Current	2.5V	V _{OH} =0V	−4	—	−40	μA
I _{OL1}	Keypad Pin Sink Current	2.5V	V _{OL} =2.5V	200	400	—	μA
I _{OH2}	HFO Pin Source Current	2.5V	V _{OH} =2V	−1	—	—	mA
I _{OL2}	HFO Pin Sink Current	2.5V	V _{OL} =0.5V	1	—	—	mA
I _{OL3}	$\overline{\text{MODEO}}$ Sink Current	2.5V	V _{OL} =0.5V	0.6	3.5	—	mA
T _{FP}	Pause Time After Flash	2.5V	—	—	800	—	ms
T _{RP}	One-key Redialing Pause Time	2.5V	—	—	800	—	ms
F _{OSC}	System Frequency	—	—	—	3.58	—	MHz
T _{DB}	Key-in Debounce Time	2.5V	—	—	20	—	ms
T _{BRK}	Break Time For One-key Redialing	2.5V	—	—	2.2	—	s
T _{HKDL}	Off-hook Delay Time	2.5V	10pps	—	800	—	ms
			20pps	—	500	—	

Pulse Mode Electrical Characteristics

(F_{OSC}=3.5795MHz, T_a=25°C)

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
		V _{DD}	Conditions				
I _{POH}	P _O Output Source Current	2.5V	V _{OH} =2V	-0.2	—	—	mA
I _{POL}	P _O Output Sink Current	2.5V	V _{OL} =0.5V	0.2	0.6	—	mA
P _R	Pulse Rate	—	MODE pin is connected to V _{DD}	—	10	—	pps
			HT93214 MODE pin is opened	—	20	—	
M/B	Make/Break Ratio	—	HT93214/HT93215 with MODE=open	—	33:66	—	%
			HT93215 MODE=V _{DD}	—	40:60	—	
T _{PDP}	Pre-digit-pause Time	—	M/B=40:60 (10 pps)	—	40	—	ms
			M/B=40:60 (20 pps)	—	20	—	
			M/B=33:66 (10 pps)	—	33	—	
			M/B=33:66 (20 pps)	—	17	—	
T _{IDP}	Inter-digit-pause Time	—	10 pps	—	800	—	ms
			20 pps	—	500	—	
T _M	Pulse Make Duration	—	10 pps, M/B=1/2	—	33.3	—	ms
			10 pps, M/B=2/3	—	40	—	
			20 pps, M/B=1/2	—	16.7	—	
			20 pps, M/B=2/3	—	20	—	
T _B	Pulse Break Duration	—	10 pps, M/B=1/2	—	66.6	—	ms
			10 pps, M/B=2/3	—	60.0	—	
			20 pps, M/B=1/2	—	33.3	—	
			20 pps, M/B=2/3	—	30.0	—	
T _P	Pause Time	—	—	—	2.2	—	s

Tone Mode Electrical Characteristics

(F_{OSC}=3.5795MHz, Ta=25°C)

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
		V _{DD}	Conditions				
V _{TDC}	DTMF Output DC Level	—	No load	0.45V _{DD}	—	0.7V _{DD}	V
I _{TOL}	DTMF Sink Current	2.5V	V _{DTMF} =0.5V	0.1	—	—	mA
V _{TAC}	DTMF Output AC Level	—	Row group, R _L =5kΩ	0.12	0.155	0.18	V _{rms}
R _L	DTMF Output Load	2.5V	THD≤-23dB	5	—	—	kΩ
ACR	Column Pre-emphasis	2.5V	Row group=0dB	1	2	3	dB
THD	Tone Signal Distortion	2.5V	R _L =5kΩ	—	-30	-23	dB
T _{TMIN}	Minimum Tone Duration	—	Auto-redial	—	94	—	ms
T _{ITPM}	Minimum Inter-Tone Pause	—	Auto-redial	—	96	—	ms

$$\text{THD (Distortion) (dB)} = 20 \log \left(\frac{\sqrt{V_1^2 + V_2^2 + \dots + V_n^2}}{\sqrt{V_i^2 + V_h^2}} \right)$$

V_i, V_h: Row group and column group signals

V₁, V₂, ... V_n: Harmonic signals (BW=300Hz~3500Hz)

Functional Description
Keyboard matrix

$\overline{C1} \sim \overline{C3}$, $\overline{HKS}$ and $\overline{R1} \sim \overline{R4}$ form a keyboard matrix. Together with a standard 4×4 keyboard, the keyboard matrix is used for dialing entries. The keyboard arrangement of the HT93214/5 series is shown in the **Keyboard Information**.

Tone frequency

Tone Name	Output Frequency (Hz)		% Error
	Specified	Actual	
$\overline{R1}$	697	699	+0.29%
$\overline{R2}$	770	766	-0.52%
$\overline{R3}$	852	847	-0.59%
$\overline{R4}$	941	948	+0.74%
$\overline{C1}$	1209	1215	+0.50%
$\overline{C2}$	1336	1332	-0.30%
$\overline{C3}$	1477	1472	-0.34%

Note: % Error does not contain the crystal frequency drift

Dialing specification selection

Two versions are offered for different telephone system applications

- HT93215 is for European and American systems. The specifications are selected by the MODE pin.

MODE	Tone/Pulse	Dial Rate	M/B Ratio
VDD	Pulse	10pps	2/3
VSS	Tone	—	—
Floating	Pulse	10pps	1/2

- HT93214 is for Japanese system. The specifications are selected by the MODE pin.

MODE	Tone/Pulse	Dial Rate	M/B Ratio
VDD	Pulse	10pps	1/2
VSS	Tone	—	—
Floating	Pulse	20pps	1/2

- The MODE pin status is checked whenever a digit key is pressed, however the M/B and pulse rate are determined at the first key entry.

Hand-free function operation

- When HFO is low, a falling edge triggers the $\overline{\text{HFI}}$, enabling the Hand-free function (HFO becomes high).
- Reset Hand-free function
When HFO is high, the Hand-free function is enabled and can be reset by:
 - Off-hook
 - Applying a falling edge to $\overline{\text{HFI}}$

- Hand-free function table

Current State		Next State		
Hook SW	HFO	Input	HFO	Dialing?
—	Low	$\overline{\text{HFI}} \downarrow$	High	Yes
On hook	High	$\overline{\text{HFI}} \downarrow$	Low	No
Off hook	High	$\overline{\text{HFI}} \downarrow$	Low	Yes
On hook	—	of off-hook	Low	Yes
Off hook	Low	on hook	Low	No
Off hook	High	on hook	High	Yes

DOUT BCD code

When dialing, the corresponding 4-bit BCD codes are serially presented on DOUT from MSB to LSB to interface with external LCD driver chip or microcontroller for expanded features. The data of DOUT is valid at the falling edge of the CLOCK pin. The following table lists the BCD codes corresponding to the keyboard input.

Key-In	BCD Code	Key-In	BCD Code
1	0001	8	1000
2	0010	9	1001
3	0011	0	1010
4	0100	*/T	1101
5	0101	#	1100
6	0110	F	1011
7	0111	P	1110

LOCK function

This function aims to detect the locked dialing number to prevent a long distance call from being dialed. The dialing output of the chip is disabled if the first key input after on-off-hook is the locked number when a lock number is selected. The lock function selection is listed below.

LOCK pin Connection	Locked Number
Open	None
V _{DD}	0, 9
V _{SS}	0

Flash

Two flash keys are provided, namely F1, F2 for both series. All the flash key function as control key with different break duration. Whenever a flash key is pressed the $\overline{PO}$ pin will be forced low for a T_F duration and the transmission of the new digit key inputs will be further delayed for a T_{FP} after T_F . See the following table for flash duration selection.

Item	F1	F2
HT93214	300ms	98ms
HT93215	600ms	600ms

Key definition

- 0,1,2,3,4,5,6,7,8,9 keys

These are dialing number input keys for both the pulse mode and the tone mode operation.

- */T

This key executes the P→T function and waits a $T_{P→T}$ duration in the pulse mode. On the other hand, the */T key executes the * function in the tone mode. The */T key will occupy one memory digit in either tone or pulse mode.

- #

This is a dialing signal key for the tone mode only, no response in the pulse mode.

- F1, F2

Pressing one of the flash keys will force the $\overline{PO}$ pin to become low for the T_F duration. To transmit the dial signals of the key input that are entered after the F key, a wait period T_{FP} (sec) after $\overline{PO}$ pin returns from low is provided.

- P

Pause key. The execution of this key pauses the output for the T_P duration (2.2s).

- R

Redial key. It executes redialing as well as one-key redial function.

Keyboard Operation

The following operations are described under an on-off-hook or on-hook condition with the hand-free active condition.

- Normal dialing

- Pulse mode

- (a) without */T

Keyboard input: D1 D2 ... Dn

Dialing output: D1 D2 ... Dn

RM: D1 D2 ... Dn

- (b) with */T

Keyboard input: D1 D2 ... Dn */T Dn+1 ...
Dm

Dialing output: D1 D2 ... Dn TP→T Dn+1 ... Dm
PulseTone

RM: D1 D2 ... Dn */T Dn+1 ... Dm

- Tone mode

- (a) without */T

Keyboard input: D1 D2 ... Dn

Dialing output: D1 D2 ... Dn

RM: D1 D2 ... Dn

- (b) with */T

Keyboard input: D1 D2 ... Dn */T Dn+1 ...
Dm

Dialing output: D1 D2 ... Dn * Dn+1 ... Dm

RM: D1 D2 ... Dn * Dn+1 ... Dm

Note: The maximum capacity of the RM memory is 32 digits. When more than 32 digits are entered, the signal is transmitted but the redial function is inhibited.

- Redial

- Pulse mode

- (a) without */T

RM content: D1 D2 ... Dn

Keyboard input: R

Dialing output: D1 D2 ... Dn

RM: Unchanged

- (b) with */T

RM content: D1 D2 ... Dn */T Dn+1 ... Dm

Keyboard input: R

Dialing output: D1 D2 ... Dn TP→T Dn+1 ... Dm
PulseTone

RM: Unchanged

- Tone mode

- (a) without */T

RM content: D1 D2 ... Dn

Keyboard input: R

Dialing output: D1 D2 ... Dn

RM: Unchanged

- (b) with */T

RM content: D1 D2 ... Dn */T Dn+1 ... Dm

Keyboard input: R

Dialing output: D1 D2 ... Dn * Dn+1 ... Dm

RM: Unchanged

- One-key redial

- Pulse mode

- (a) without */T

Keyboard input: D1 D2 ... Dn R
Dialing output: D1 D2 ... Dn TBRK TRP
D1 D2 ... Dn
RM: D1 D2 ... Dn

- (b) with */T

Keyboard input: D1 D2 ... Dn */T Dn+1 ...
Dm R
Dialing output: D1 D2 ... Dn TP→T Dn+1 ... Dm
Pulse Tone
TBRK TRP D1 D2 ... Dn TP→T
Pulse
Dn+1 ... Dm
Tone
RM: D1 D2 ... Dn */T Dn+1 ... Dm

- Tone mode

- (a) without */T

Keyboard input: D1 D2 ... Dn R
Dialing output: D1 D2 ... Dn TBRK TRP D1 D2
... Dn
RM: D1 D2 ... Dn

- (b) with */T

Keyboard input: D1 D2 ... Dn */T Dn+1 ...
Dm R
Dialing output: D1 D2 ... Dn * Dn+1 ... Dm
TBRK TRP D1 D2 ... Dn * Dn+1
... Dm
RM: D1 D2 ... Dn * Dn+1 ... Dm

Note: If the dialing number exceeds 32 digits, redialing is inhibited and $\overline{PO}$ =open

- Flash

- Flash as a control key

Keyboard input: D1 D2 ... Dn F Dn+1 ...
Dm
Dialing output: D1 D2 ... Dn TF TFP Dn+1 ...
Dm
RM: Dn+1 ... Dm

Note: TF: break a flash time

- Pause

Keyboard input: D1 D2 ... Dn P Dn+1 ... Dm
Dialing output: D1 D2 ... Dn TP Dn+1 ... Dm
RM: D1 D2 ... Dn P Dn+1 ... Dm

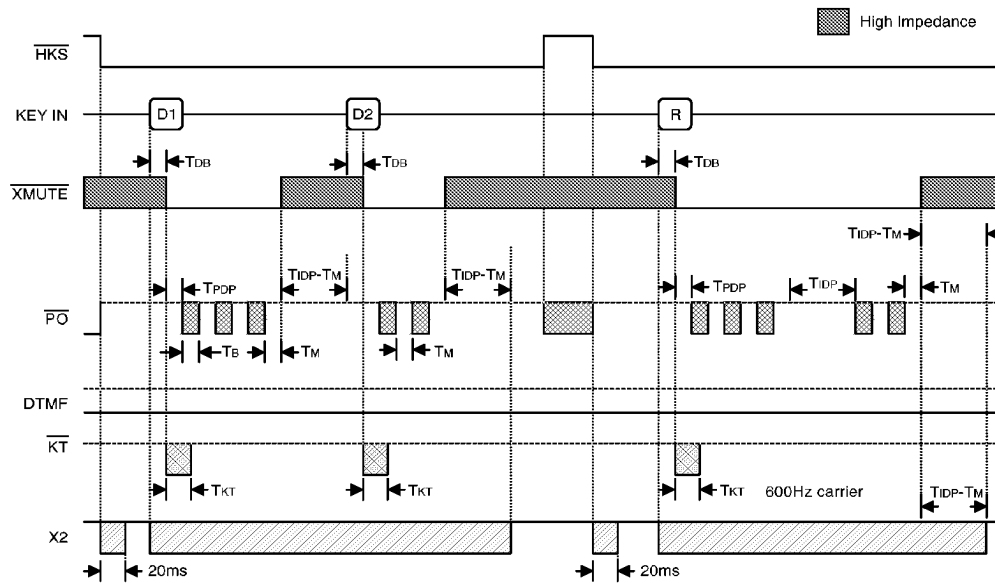
- Note

RM: Redial memory
D1 D2 ... Dn: 0~9
Dn+1 ... Dm: 0~9, *, #

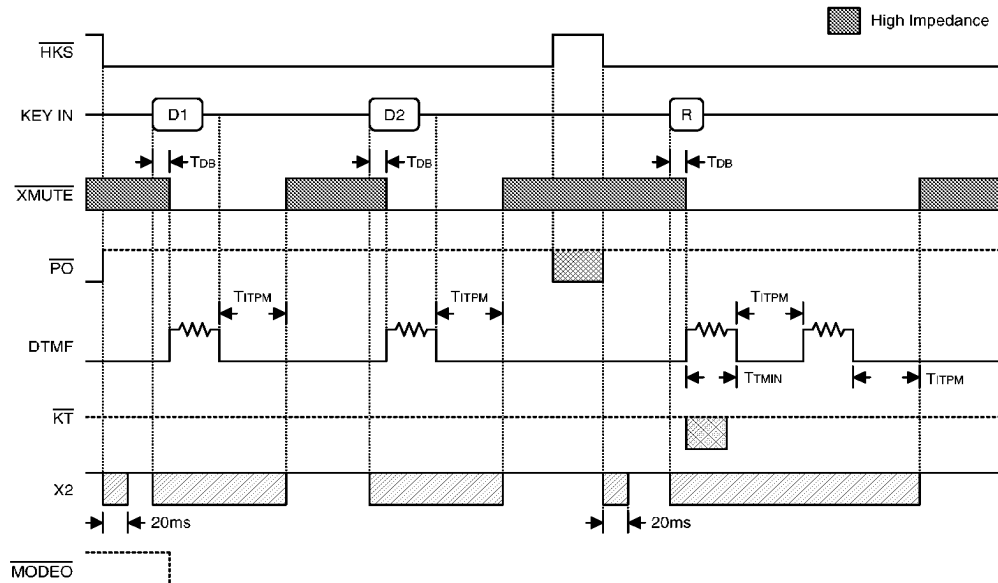
Timing Diagrams

Normal dialing

• Pulse mode

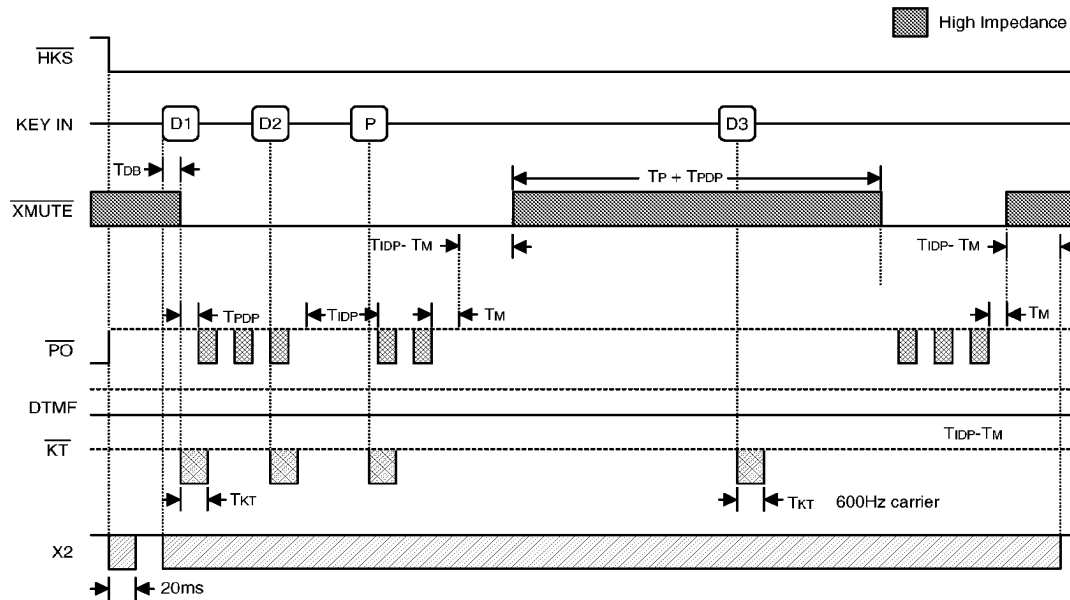


• Tone mode

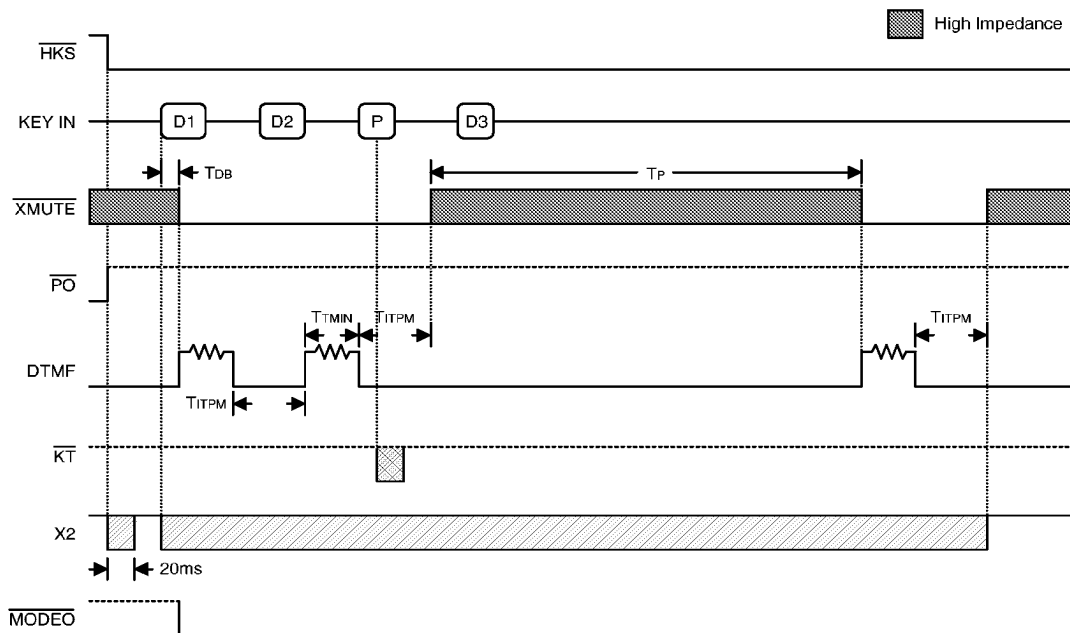


Dialing with PAUSE key

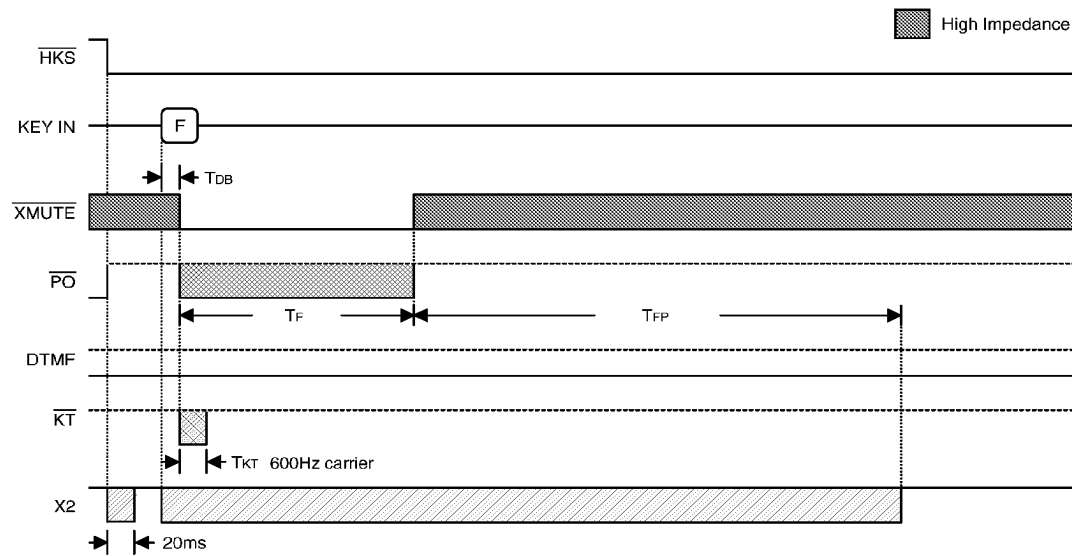
• Pulse mode



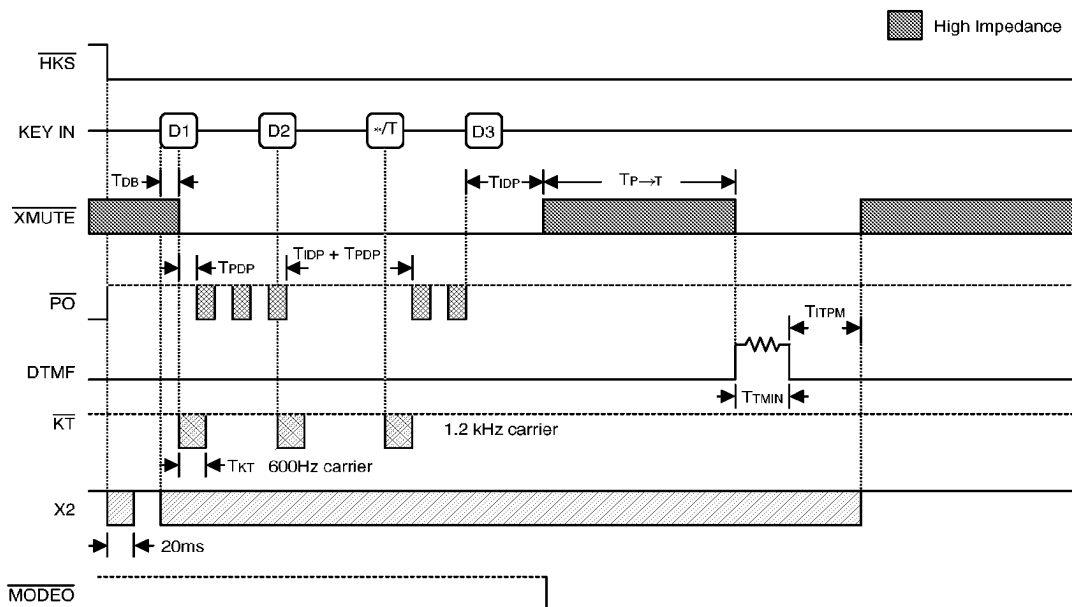
• Tone mode



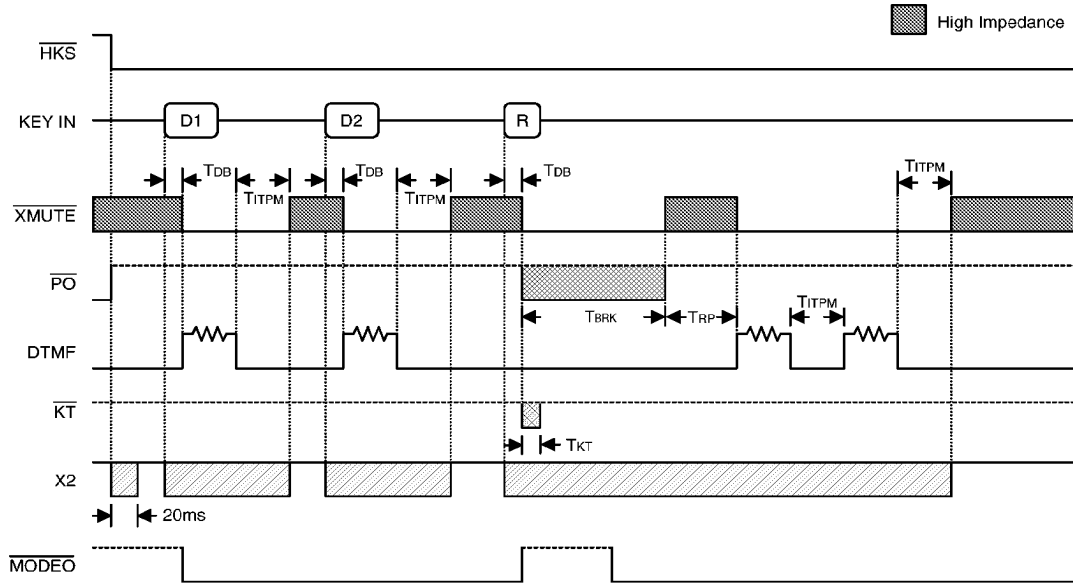
• Flash key operation



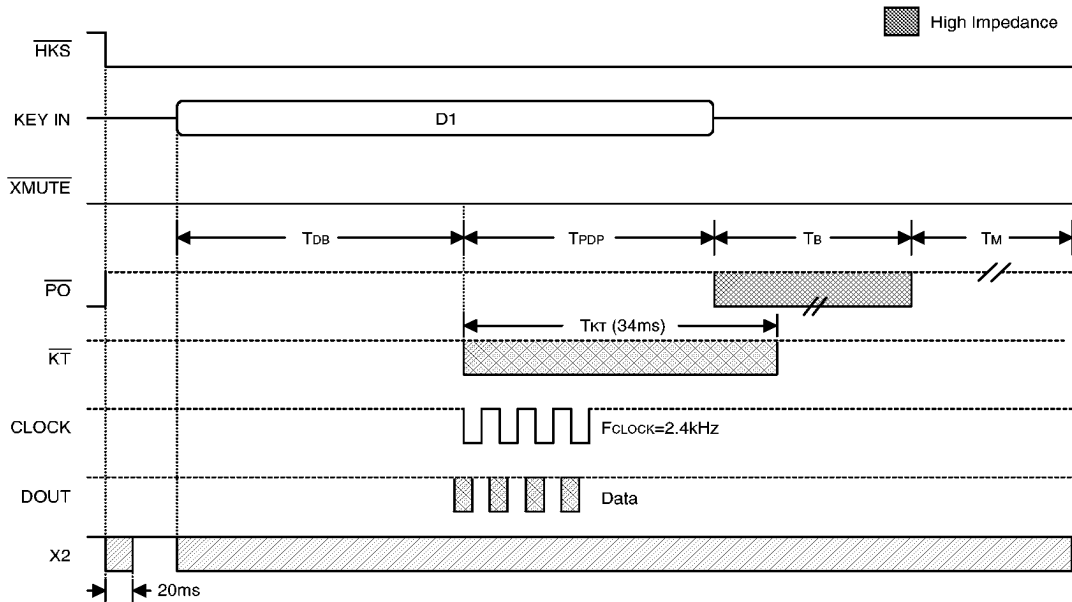
• Pulse to Tone operation



• One key redial operation

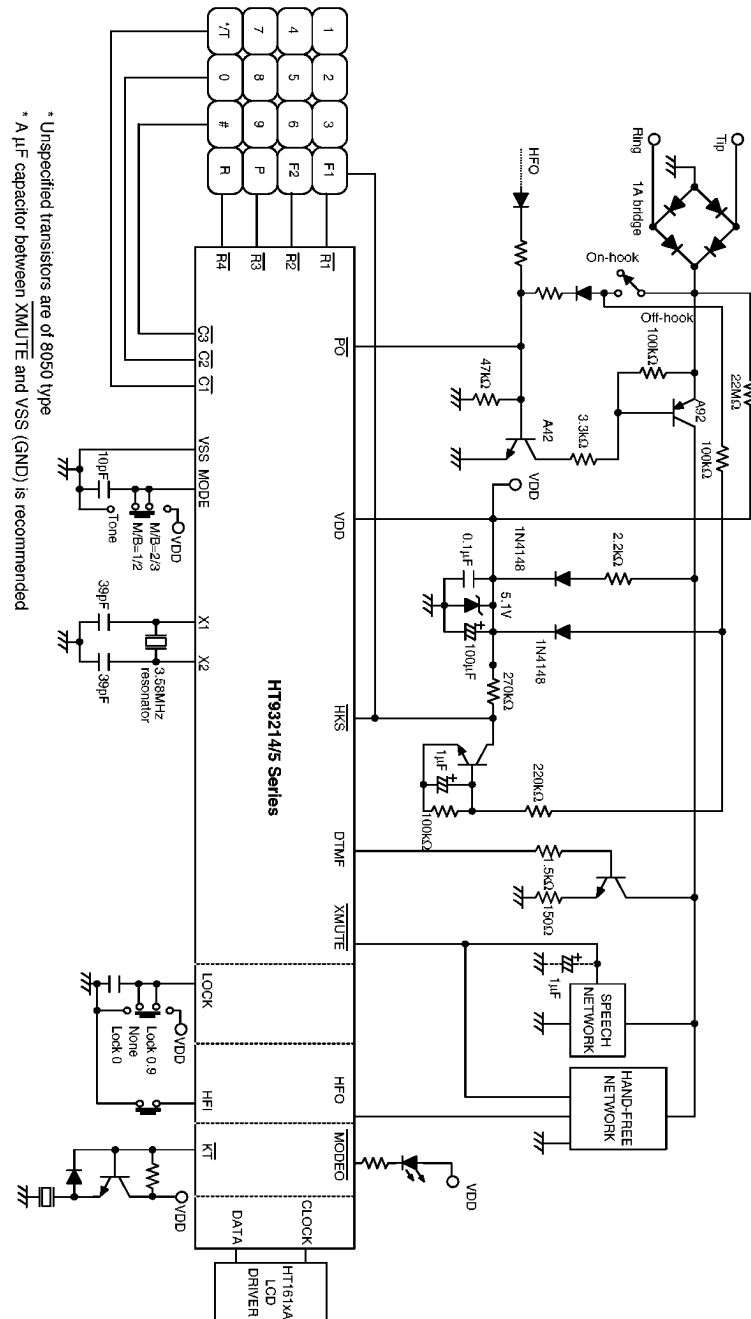


• CLOCK & DOUT operation



Note: D1=D3=3
D2=2

Application Circuit



* Unspecified transistors are of 8050 type

* A μF capacitor between XMUTE and VSS (GND) is recommended

* A μF capacitor between XMUTE and VSS (GND) is recommended