MSM6263-01RS

15-MEMORY TONE/PULSE SWITCHABLE REPERTORY DIALER

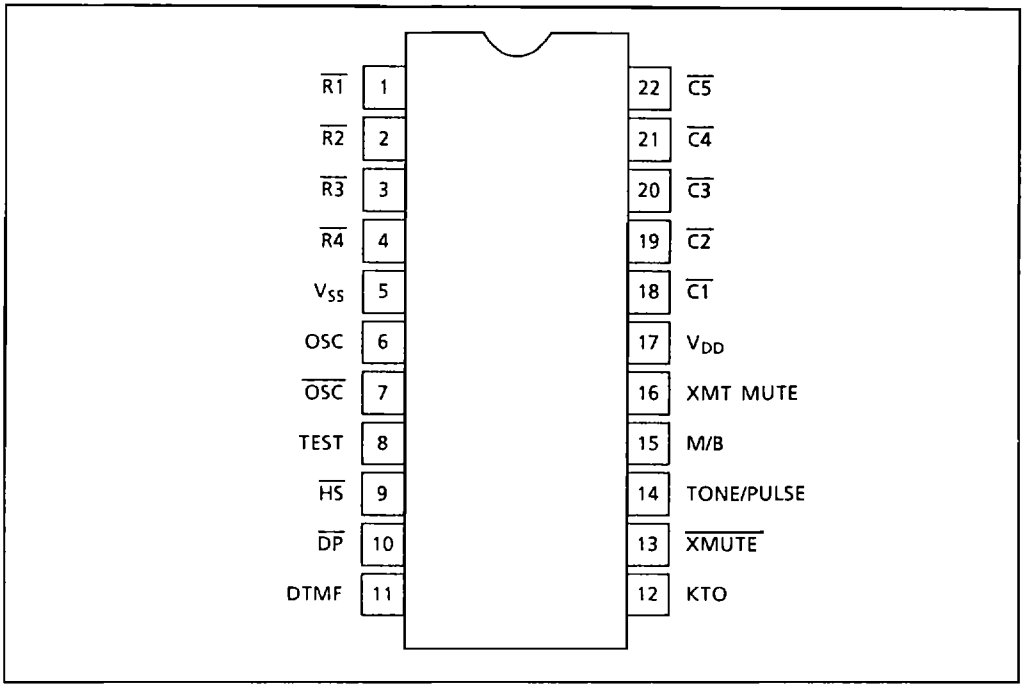
GENERAL DESCRIPTION

The MSM6263-01 is a Tone/Pulse Switchable Repertory Dialer LSI which is fabricated by Oki's low power consumption CMOS silicon gate technology.
The MSM6263-01 has a memory capacity of 13 memories which consists of 3 emergency memories, which can be recalled by single key operation, and 10 memories, which can be recalled by two digits access code. Each repertory has a capacity of 16 digits and save memory has a 32 digit capacity. The MSM6263-01 also has last number redial function and last number save function.
Redial memory has a capacity of 32 digits and it is used as a FIFO memory if more than 33 digits are input.
Operating voltage of the MSM6263-01 is 2.0 - 5.5 V (pulse mode) and 2.3 - 5.5 V (DTMF mode). Memory retension voltage is 1.0 - 5.5 V.

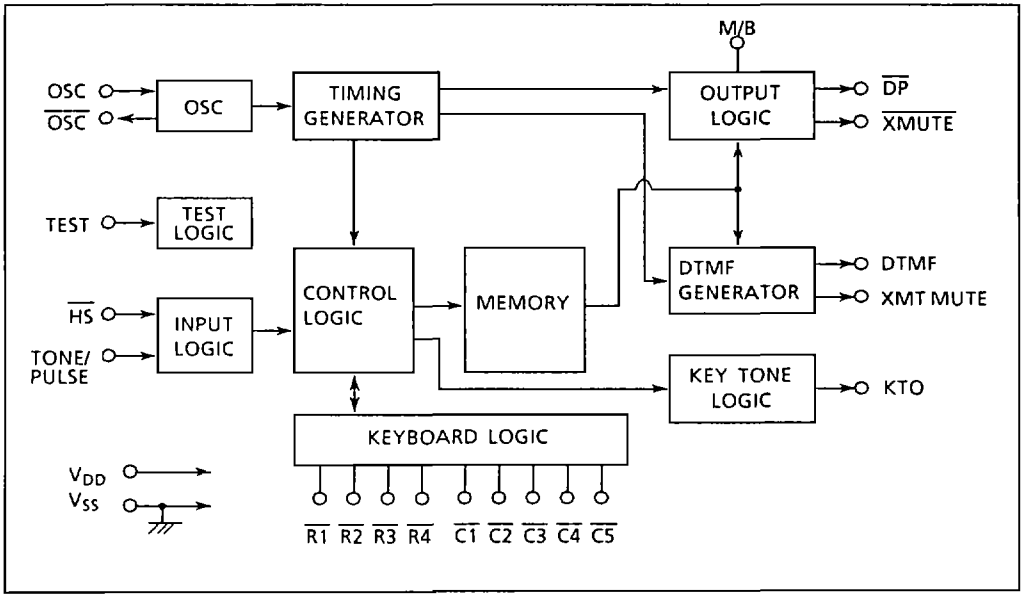
FEATURES

- Tone/Pulse switchable
- 13 repertory memory (3 emergency memories which can be recalled by single key operation and 10 memories which can be reacalled by two digits access)
- Last number redial, 32-digits maximum
- Save function, 32-digits maximum
- Mix dialing
- Mix dialing can be stored in the redial memory
- Flash function, 600 msec
- Auto pause, 3.6 sec
- Make/Break ration selection pin (34/40% switchable)
- Confirmation sound output for the valid key input, 1 kHz, 29 ms
- Single contact keyboard
- On-chip oscillator, 3.58 MHz
- Operating voltage
  2.3 - 5.5 V DTMF mode
  2.0 - 5.5 V Pulse mode
- Stand-by current 2 μA maximum
- 32-digits FIFO memory
- 22 pin plastic DIP (DIP22-P-300-S1)

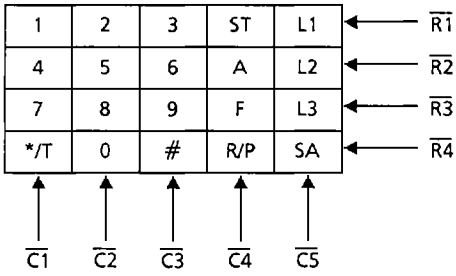
PIN CONFIGURATION (TOP VIEW)



BLOCK DIAGRAM



KEYBOARD CONFIGURATION



A 4 x 5 single contact keyboard shall be used.

[0] — [9] : 10 keys

[*/T] : In the DTMF mode, this key is used as normal [*] key.
In the pulse mode, this key is used to change the mode from pulse mode to DTMF mode.

[#] : In the DTMF mode, this key is used as the normal [#] key.
In the pulse mode, input by this key is disregarded.

[R/P] (REDIAL/PAUSE) : When this key is firstly pressed after the telephone is off-hooked, the last dialed telephone number is automatically dialed out.
When any of other keys is pressed prior to this key, input by this key is used as the pause function. Pressing this key more than twice is also used as the pause function.

[ST] : This key is used in storing the repertory memory.

[A] : Pressing this key followed by two digits recalls the repertory memory (10 repertory memories).

[F] : Hook flash.

[L1] — [L3] : Emergency memories, which can be recalled by pressing one of these keys.

[SA] : Pressing this key first saves the last dialed telephone number.
Second pressing of this key recalls the saved memory contents.

PIN DESCRIPTION

Pin Name	Pin No.	Function
$\overline{R1}$~$\overline{R4}$	1~4	Key input pins.
$\overline{C1}$~$\overline{C5}$	18~22	All of $\overline{R1}$~$\overline{R4}$ and $\overline{C1}$~$\overline{C5}$ are set at high level when telephone is on-hooked. When any key is pressed, these key inputs are scanned at the low level and key input data is read. When key input is finished, key scanning stops and $\overline{R1}$~$\overline{R4}$ are set to low level, while $\overline{C1}$~$\overline{C5}$ are set to high level, then oscillation stops. A4 x 5 single contact keyboard shall be connected.
OSC	6	Crystal connection pin.
$\overline{OSC}$	7	When 3.58 MHz chrystal is being connected to these pins, MSM6263-01's oscillation starts.
V_{DD}	17	V_{DD} : Positive power supply pin.
V_{SS}	5	V_{SS} : Negative power supply pin.
TEST	8	Test pin. This pin should be normally left open or low level.
$\overline{HS}$	9	Hook switch input pin. $\overline{HS}$ = V_{DD} or Open : On-hook $\overline{HS}$ = V_{SS} : Off-hook
$\overline{DP}$	10	$\overline{DP}$ signal is output from this pin. (Pulse rate is fixed to 10 pps) On-hook : Low level output Off-hook : High level output Make : High level output Break : Low level output
DTMF	11	DTMF signal output pin. When any two keys are pressed simultaneously, DTMF signal is not output.
KTO	12	Key tone output pin. A confirmation sound of 1 KHz is output for 29 ms for the valid key inputs. No sound is output for any invalid key inputs.
$\overline{XMUTE}$	13	MUTE output pin for the transmitter. On-hook, DP, or DTMF signal is being output : Low level output All other times : High level output

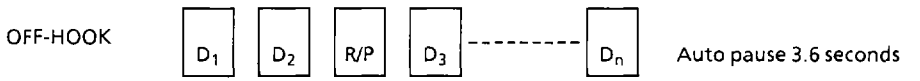
Pin Name	Pin No.	Function
TONE/PULSE	14	TONE/PULSE mode selection pin. TONE/PULSE = V_{DD} : DTMF mode TONE/PULSE = V_{SS} : Pulse mode When [*/T] key is pressed when TONE/PULSE = VSS, the mode changes from pulse mode to DTMF mode.
M/B	15	Make/Break ration selection pin. M/B = V_{DD} : Make ration, 34% M/B = V_{SS} : Make ration, 40%
XMT MUTE	16	Tone mode MUTE output pin. On-hook : Low level DTMF signal output : High level Off-hook other than DTMF : Low level

FUNCTIONS

1. Normal dialing

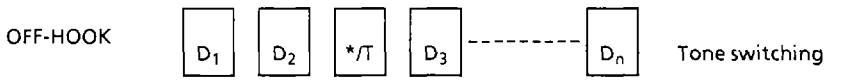
Up to 32 digits can be unconditionally sent out. When receiving 33 digits or more, redialing is automatically inhibited, it operate as 32-digit FIFO buffer memory. That is, if the dial rate is faster than the key input speed, key input will not be limited.

Pause operation



Pressing the "R/P" key temporarily inhibits pulses from being sent at the digit. The pause is automatically released in 3.6 seconds, and the pulses restart to be sent.

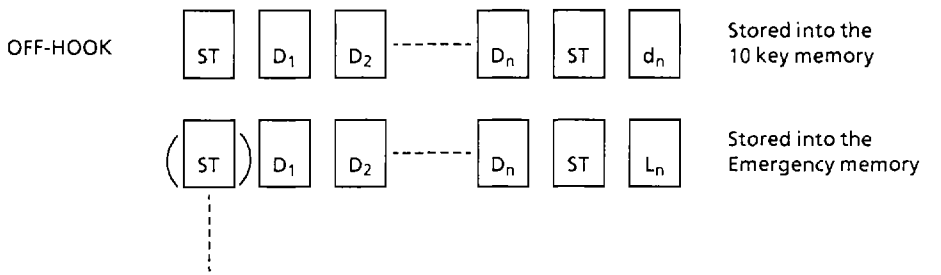
Tone switching



Pressing "*/T" key in the DP mode switches the mode to DTMF at the digit. If the key is pressed while pulses are being sent, the equipment are placed in the pause operation state after the pulses are sent. The pause is automatically released in 3.6 seconds, then the equipment are placed in the DTMF mode.
The "*/T" key is operated as "T" key when it is pressed once. When the key is pressed twice or more times, it is operated as "*" key.

Note: When the pause key or tone key is pressed, one digit is written into memory respectively. In addition, the pause is not manually released (in 3.6 seconds).

2. Repertory write



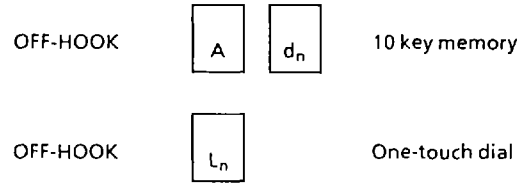
Data can be continuously written into the repertory. When data is written into the repertory twice or more, the first "ST" key can be omitted. When data is stored into the 10 memory, Dn stands for keys 0 to 9. When data is stored into one-touch dial, Ln stands for L1 to L3. When specifying the repertory into which data is written, the contents of the repertory is updated.

The number of memory digits for 10 memory and for one-touch dial is specified to be 16, and the number of digits D1 to Dn is up to 16. When the number of digits entered by the 10 key exceeds 16, the digits exceeding 16 digits are ignored.

In the store state, data cannot be written into the redial memory or the save memory. In this state, redial is automatically inhibited.

Note: Each of the pause key and the tone switching key requires the storage capacity of 1 digit.

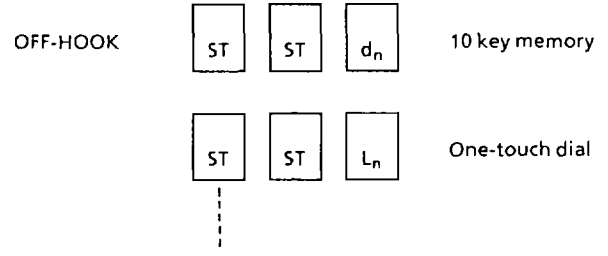
3. Repertory dial



Dn stands for keys 0 to 9, and Ln stands for keys L1 to L3.

When pause is stored in the repertory memory, a signal stops for 3.6 seconds. When tone switching "T" is stored in the repertory memory, the mode is switched from DP to DTMF, and a signal is stopped for 3.6 seconds.

4. Erase of repertory



Dn stands for keys 0 to 9, and L_n stands for keys L1 to L3.

The operation for repertory erase can be continuously carried out. When the "ST" key is continuously pressed twice, the contents of the memory specified next are erased. In addition, data can be continuously written into the repertory memory.

5. Redial

OFF-HOOK [R/P] Redial

The last dialing number is sent again. The pause and tone switching operations are the same as those of the repertory.

When the redial is inhibited, the key confirmation tone is sent, but the redial is not operated. In this state, the second "R/P" key input is regarded as the redial input, and the input is not processed as the pause key input.

6. Save memory write

OFF-HOOK [D_1] [D_2] -------- [D_n] [SA] Save memory

Since the number of digits in the save memory is 32, the number of digits D1 to Dn must be 32 or less. When the number of digits D1 to Dn is 33 or more, the data cannot be written into the save memory.

Note: The pause key or tone switching key needs the storage capacity of 1 digit respectively.

Since the save memory has the storage capacity for one office, the last contents are updated when data is written into the memory.

7. Save memory read

OFF-HOOK [SA] Save memory

The dial number written into the save memory is read. The pause and tone switching operations are the same as those of the redial.

When the "SA" key is pressed twice or more, data is written into the save memory.

8. Mix dial

OFF-HOOK [R/P] [D_1] [D_2] ---- [D_n] [A] [d_n] [L_n]

R/P ; Redial
D_1 to D_n ; Manual dial

OFF-HOOK [SA] [D_1] [D_2] ---- [D_n] [A] [d_n] [L_n]

A ; Auto
d_n ; 10 key memory
L_n ; Repertory memory

Mix dial including normal, repertory, redial, save memory, etc., can be carried out. However, the redial or the save memory can be executed only once before an operation. In addition, if the number of the digits for the mix dial is 32 or less, the redial in the mix dial can be carried out. However, 32 digits means the total digits of the data in redial, save, 10 memory, and repertory, and the digits does not mean the total digit of memory specified key.

9. Flash

OFF-HOOK  Flash

The flash function of 600 ms can be carried out. However, pulse, tone dialing, or key input data during flash operation is ignored. Beside, the flash data is not stored in any case.

10. Others

When no data is stored in the repertory, redial, or save memory, the key tone signal is output. However, the key input data is ignored.

ELECTRICAL CHARACTERISTICS

Absolute Maximum Ratings

Item	Symbol	Condition	Limits	Unit
Power supply voltage	V_{DD}	Ta = 25°C	− 0.3~6.0	V
Input voltage	V_{IN}	Ta = 25°C	− 0.3~V_{DD} + 0.3	V
Output voltage	V_O	Ta = 25°C	− 0.3~V_{DD} + 0.3	V
Power dissipation	P_D	Ta = 25°C	200 max	mW
Storage temperature	T_{stg}	−	− 55~ + 125	°C

Operating Ranges

Item	Symbol	Condition		Limits	Unit
Power supply voltage	V_{DD}	fosc = 3.579545 MHz	DP mode	2.0~5.5	V
			DTMF mode	2.3~5.5	V
Memory retension voltage	V_{DDM}	−		1.0~5.5	V
Operation temperature	T_{op}	−		− 20~ + 75	°C

DC Characteristics

(fosc = 3.579545 MHz Ta = − 20~ + 75°C)

Item	Symbol	Condition		V_{DD}	Min.	Typ.	Max.	Unit
"H" Output voltage	V_{OH1}	$\overline{XMUTE}$ XMT MUTE $\overline{DP}$, KT$\overline{O}$	Io = − 0.2 mA	3.0 V	2.6	−	−	V
"L" Output voltage	V_{OL1}		Io = 0.5 mA	3.0 V	−	−	0.4	V
"H" Output current	I_{OH1}	$\overline{C1}$~$\overline{C5}$	V_{IN} = 0V	3.0 V	− 3	− 12	− 30	μA
"L" Output voltage	V_{OL2}	$\overline{R1}$~$\overline{R4}$	I_O = 30μA	3.0 V	−	−	0.4	V
"H" Input current 1	I_{IH1}	$\overline{HS}$	V_{IN} = V_{DD}	5.5 V	−	−	2	μA
"L" Input current 1	I_{IL1}		V_{IN} = 0V	5.5 V	− 10	− 36	− 100	μA
				3.0 V	− 3	− 12	− 30	μA
"H" Input current 2	I_{IH2}	TONE/PULSE	V_{IN} = V_{DD}	5.5 V	−	−	2	μA
"L" Input current 2	I_{IL2}	M/B	V_{IN} = 0V	5.5 V	−	−	− 2	μA
"H" Input voltage	V_{IH}	$\overline{C1}$~$\overline{C5}$, $\overline{R1}$~$\overline{R4}$		−	V_{DD} − 0.2	−	V_{DD}	V
"L" Input voltage	V_{IL}	$\overline{HS}$, TONE/PULSE, M/B		−	V_{SS}	−	V_{SS} + 0.2	V
Power consumption 1	$I_{DD\,P}$	Pulse mode, No load		5.5 V	−	−	3.0	mA
				3.0 V	−	−	0.8	mA
Power consumption 2	$I_{DD\,T}$	DTMF mode, No load		5.5 V	−	−	8.0	mA
				3.0 V	−	−	3.0	mA
Power consumption 3	$I_{DD\,M}$	On-hook, No load Ta = 25°C		3.0 V	−	−	2	μA
External resistor for DTMF	R_{DTMF}	—		−	5.1	−	−	kΩ

AC Characteristics

(Ta = −20~ +75°C)

Item	Symbol	Condition	V_{DD}	Min.	Typ.	Max.	Unit
DTMF output	V_{OUT}	ROW side only R_L = 5.1KΩ	5.5 V	–	300	–	mV rms
			2.5 V	–	175	–	
HIGH/LOW level ratio	dBCR		5.5 V	1	2	3	dB
			2.5 V	1	2	3	
Distortion	%DIS	R_L = 5.1KΩ	5.5 V	–	–	5	%
			2.5 V	–	–	5	
Switch input	t_{KIN}		–	33	–	–	ms

DTMF Tone Output Frequency

(fosc = 3.579545 MHz)

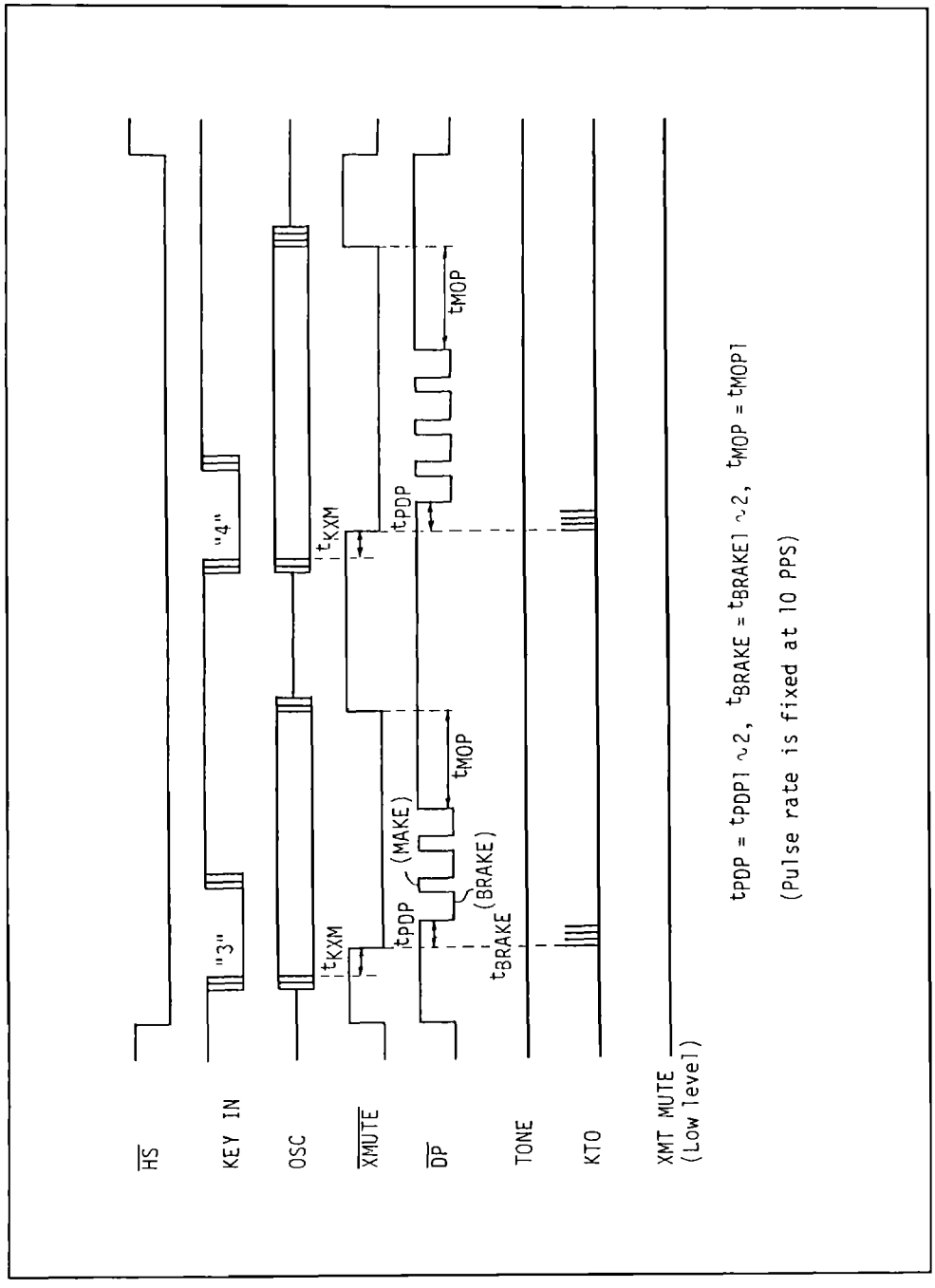
Key input	Nominal Frequeny (Hz)	Output Frequeny (Hz)	Distortion (%)
R1	697	699.1	+ 0.30
R2	770	766.2	– 0.49
R3	852	847.4	– 0.54
R4	941	948.0	+ 0.74
C1	1209	1215.9	+ 0.57
C2	1336	1331.7	– 0.32
C3	1477	1471.9	– 0.35

Sending Signal Timing (Pulse rate is fixed to 10 pps.)

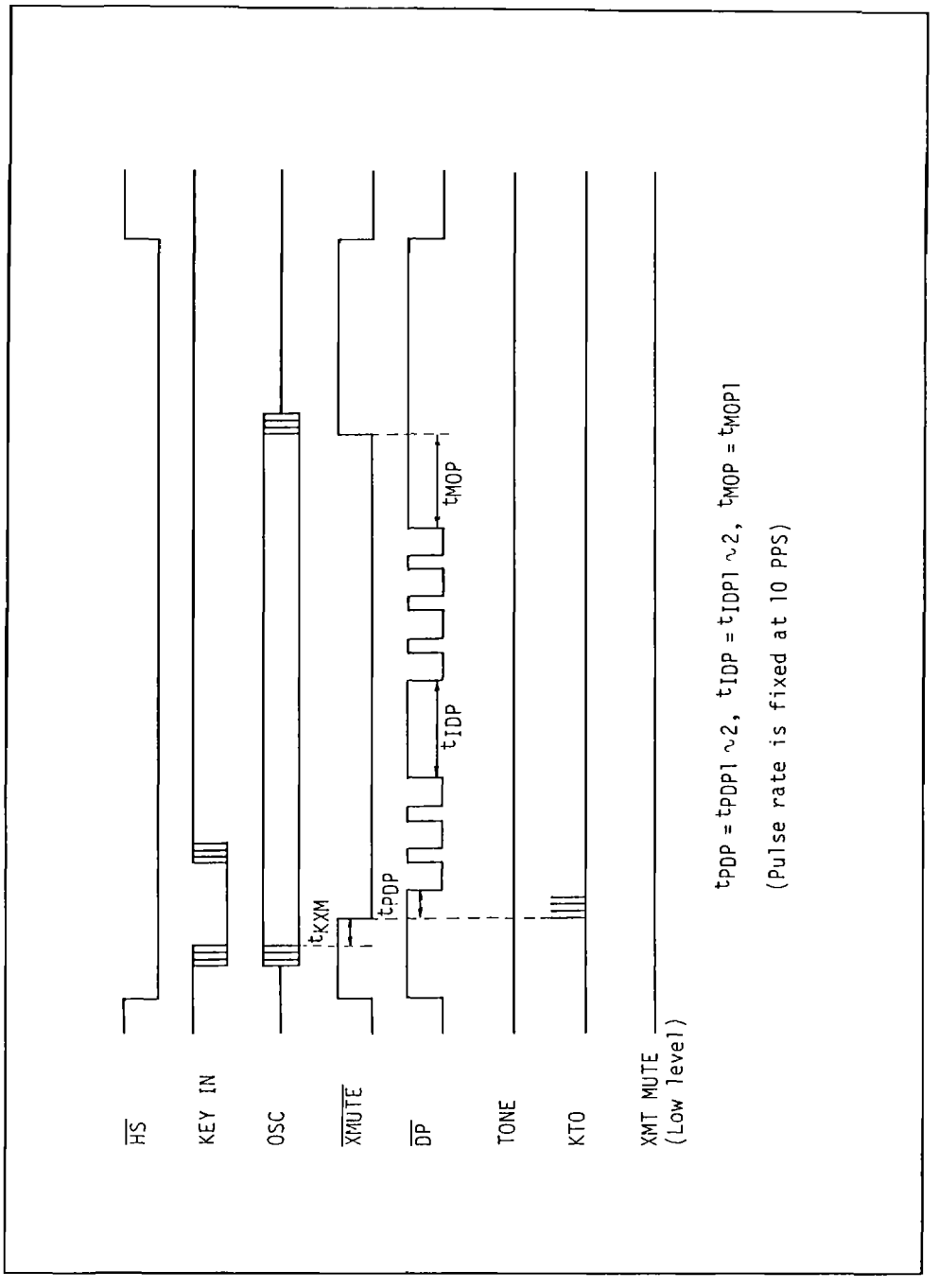
Item	Symbol	Condition	Typ.	Unit
Time from key input to $\overline{\text{XMUTE}}$ output	t_{KXM}		34	ms
Pre-digit pause time	t_{PDP1}	M/B = V_{DD}	134	ms
	t_{PDP2}	M/B = V_{SS}	140	
	t_{PDP3}	TONE	100	
	t_{PDP4}	Flash	100	
Break time	t_{BRAKE1}	M/B = V_{DD}	66	ms
	t_{BRAKE2}	M/B = V_{SS}	60	
Tone sending time	t_{TONE}	Tone auto dial	100	ms
Pause between digits	t_{IDP1}	M/B = V_{DD}	834	ms
	t_{IDP2}	M/B = V_{SS}	840	
	t_{IDP3}	Tone auto dial	100	
Time from the last signal to $\overline{\text{XMUTE}}$ stop	t_{MOP1}	Pulse	800	ms
	t_{MOP2}	Flash	100	
	t_{MOT}	TONE	100	
Flash time	t_F		600	ms
Time to tone end from after key input release	t_D	TONE	0~134	ms
Pause time at the time of tone key input or pause key input	t_{PAUSE}		3.6	s

TIMING CHART OF DP MODE

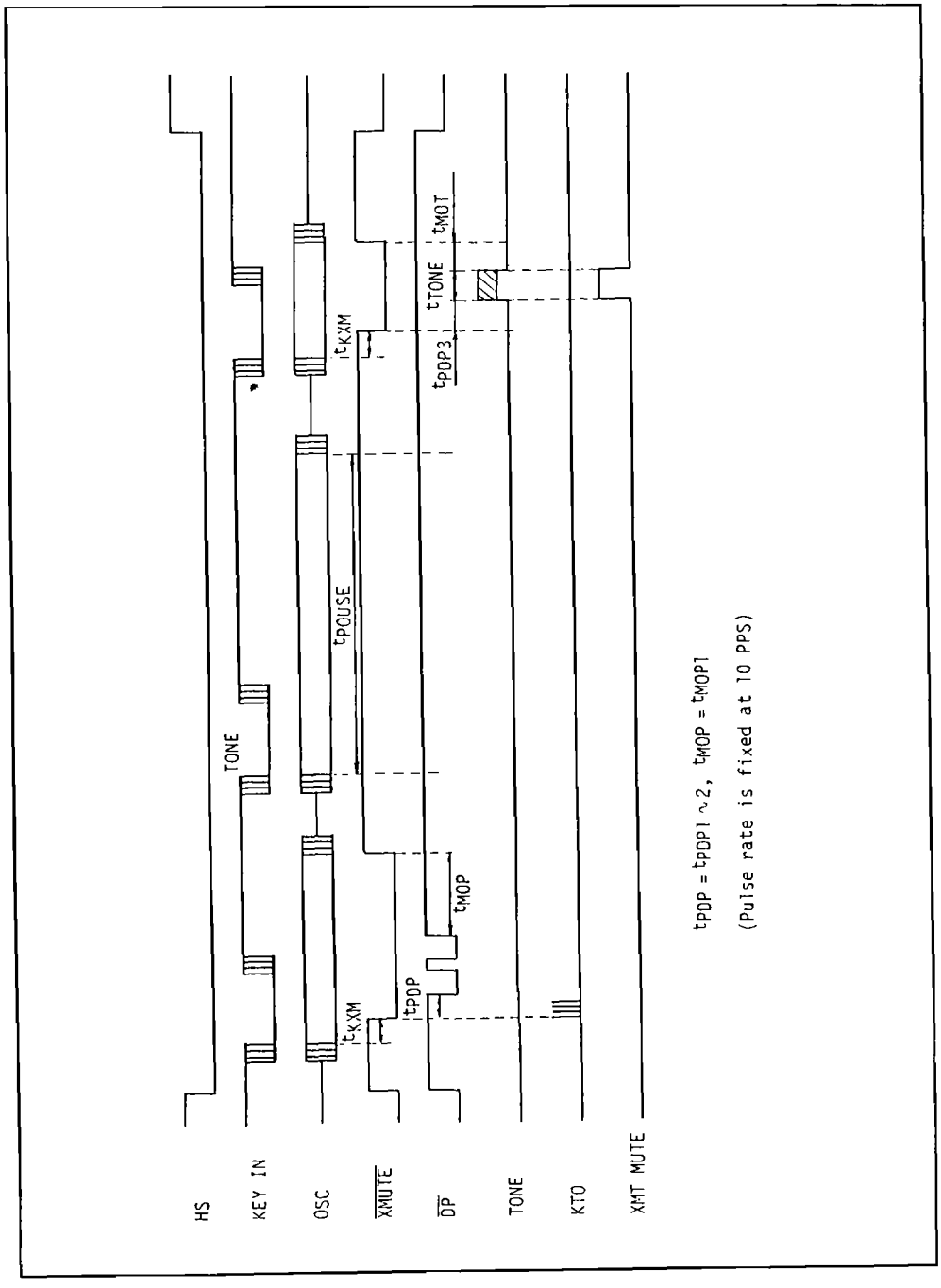
1) Normal dialing



2) Repertory dial, redial and save

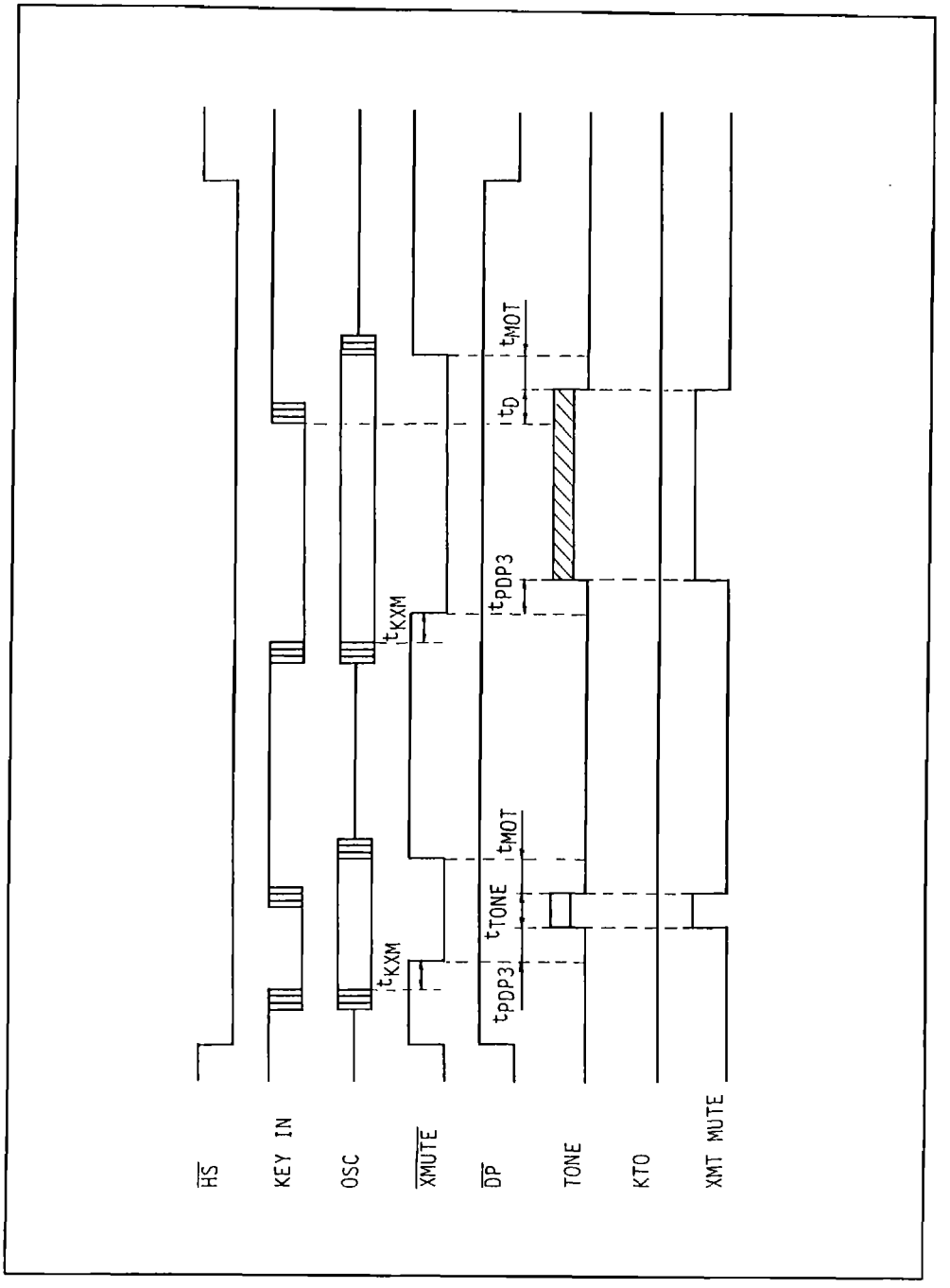


3) Mode change by TONE key

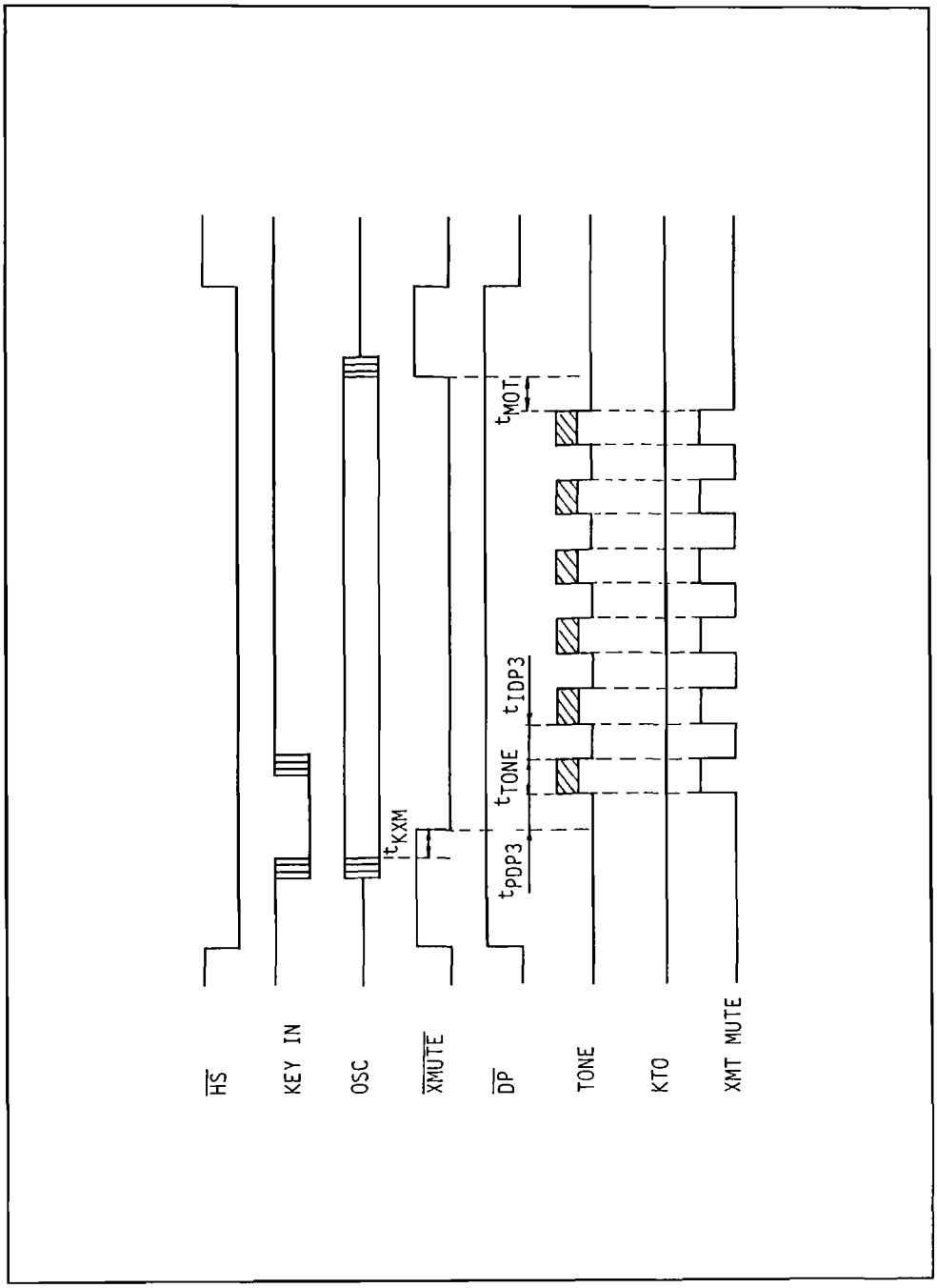


TIMING CHART OF DTMF MODE

1) Normal dialing



2) Repertory dial, redial and save



TIMING CHART OF FLASH FUNCTION