



General Description

There are re-drawing features and audio / Pulse dialing convertible circuit.

DL7933 is the audio / Pulse dialing the convertible, has re-drawing the last number (LNB) function. It uses CMOS manufacturing process, both in the way audio or pulse mode, the operating voltage range is very wide. Hang the state to maintain a small current.

DL7933 formalism of the package 18-lead plastic dual in-line.

Features

- Audio / Pulse convertible
- dial-up circuit of a 32-bit memory pulled the last number re-return audio
- pulse (P → T) bond for the use of PBX
- There are flash off key
- Audio for the shortest duration of 100ms
- Audio shortest interval 106ms
- time for the use of 3.579845MHz crystal or ceramic resonator
- Re-drawing the suspension of time (0ms)
- Mixed provide dial-up function
- There are power-on reset circuit
- To provide a variety of ways to choose
 - Dial-up mode (10PPS: 20PPS; sources)
 - Than to continue (40:60; 30:66)
 - Suspension of time (3.6S)
 - Flash off function (RESET)
 - (P → T) waiting time (3.6S)
 - Flash-off time (600/100ms)
 - Suspension of flash off time (0ms)

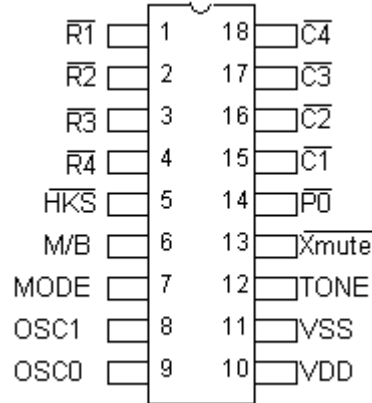
Product Specifications Classification

DL7933C	DIP-18 Package
DL7933D	DIP-18 Package

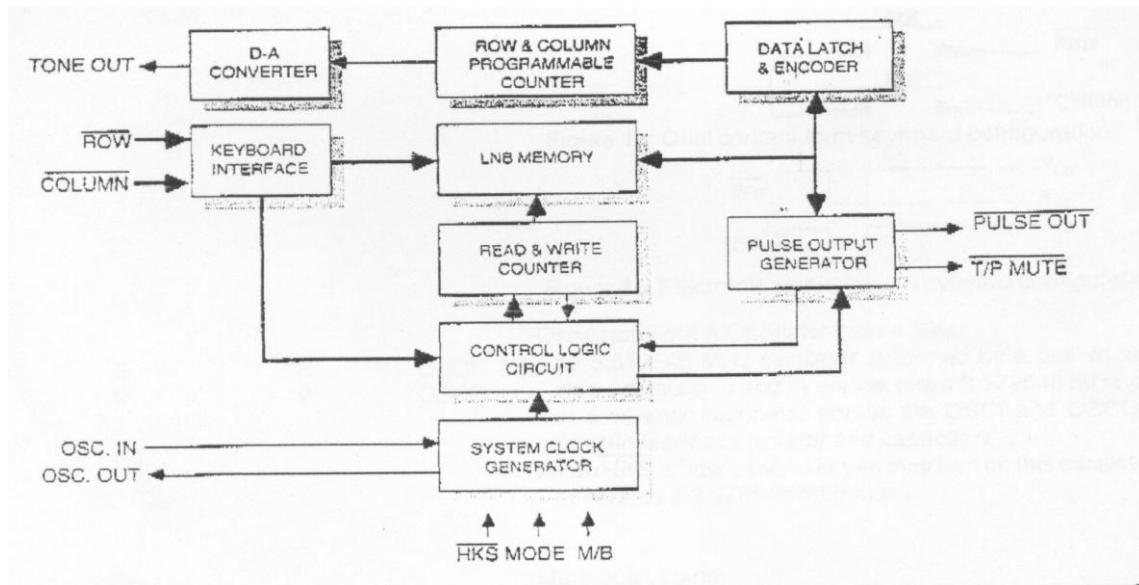
Note: DL7933C and DL7933D please refer to the difference in parameters of the dial-up signal to choose table.



Pin Configurations



Functional Block Diagram



Keyboard Assignment

	C1	C2	C3	C4
R1	1	2	3	(P→T)
R2	4	5	6	F
R3	7	8	9	P
R4	*/P	0	#/RD	RD

Note: 1. P → T: functions P → T implementation of the

2. P: PAUSE

3. F: flash off button

4. RD: re-drawing key

5. */P: In the audio the way, the implementation of *; pulse in the way, To suspend the implementation of 6. # /

RD: In the audio mode, the implementation of the #; pulse in the way, re-drawing



Dial-up Signal to Choose

M/B	Pulse rate	Continued on/off ration	Flash-off time	
			DL7933D	DL7933C
VSS	10PPS	40: 60	600ms	100ms
VDD	10PPS	33: 66	100ms	600ms
Open	20PPS	33: 66	600ms	600ms

Limit Parameter (unless a special note: Tamb=25°C, VDD=3.6V, fosc=3.579545MHz)

Parameters	Symbols	Area	Unit
Supply voltage	VDD	6.0	V
Input voltage	V _{IN}	-0.3~VDD+0.3	V
Power	PD	500	mW
Temperature	Topr	-25~70	°C
Storage temperature	Tstg	-55~150	°C

Electrical Parameters (unless a special note, Tamb=25°C, VDD=3.6V, fosc=3.579545MHz)

Parameters	Symbols	conditions	Max	Typ	Max	Unit	
Operating voltage	VDD	Audio or pulse mode	2.6	3.6	5.5	V	
	-	To maintain storage	1.0	-	5.5		
Operating current	Iop	Audio	-	-	-	mA	
	-	Pulse/Pick/Type/No-load	-	0.6	2		
Standby current	Is	Hanging up keyless entry and no-load, VDD=1.0V	-	0.1	5	uA	
Memory detention current	Imr	-	-	0.1	0.1	uA	
Control input pin low voltage	Vil	-	VSS	-	0.3V _{DD}	V	
High voltage control input pin	Vih	-	0.7V _{DD}	-	VDD		
XUTE High-state leakage current I	Imth	V _{XMUTE} =12.0V	-	-	1	uA	
XUTE O low-current depression	Imth	V _{XMUTE} =0.5V	1	-	-	mA	
HKS Pin input current	Ihks	Vhks=2.5V	-	-	0.1	uA	
Scan pin keyboard	Driving current	Ikbd	Vn=0V(Note 1)	4	10	30	uA
	Current depression	Ikbs	Vn=0V(Note 1)	200	400	-	
Key-in denounce time	t _{DB}	-	-	20	-	ms	
Pulse output pin							
Leakage current	I _{poh}	V _{po} =12V	-	-	1.0	uA	
Sink current	I _{pol}	V _{po} =0.5V	1.0	3.0	-	mA	
Pulse rate	f _{pr}	-	-	10	-	pps	
			-	20	-		



接上表

Make/Break ration	tm:ta	-	-	40:60	-	%	
			-	33:66	-		
Pre-digit pause (Pulse rate=10pps)	t _{PDP}	M/B ration=40:60	-	40	-	ms	
		M/B ration=33:66	-	33	-		
Pre-digit pause (Pulse rate=20pps)	t _{PDP}	M/B ration=40:60	-	20	-	ms	
		M/B ration=33:66	-	16.5	-		
Inter-digit pause	t _{IDP}	Pulse rate=10pps	-	800	-	ms	
		Pulse rate=20pps	-	600	-		
Audio part of the dial-up							
TONE output Pin	DC level	V _{dc}	VDD=2.0V~5.5V	0.45V _{DD}	0.55V _{DD}	0.7V _{DD}	V
	Sink current	I _{tl}	V _{dtmf} =0.5V	0.15	-	-	mA
	AC level	V _{dtmf}	Row group, RL=10KΩ	120	150	180	mV _{rms}
	Load resistor	R _l	Dist <=-23dB	10	-	-	KΩ
DTMF signal	Pre-emphasis	twist	VDD=2.0~5.5V	1	2	3	Db
	Distortion (Note 2)	Dist.	RL=10 KΩ	-	-30	-23	dB
Minimum tone duration	t _{TD}	Auto redial	-	100	-	ms	
Minimum intestine pause	t _{TTP}	Auto redial	-	106	-	ms	

Note: 1、V_n: Input voltage of any keyboard scanning pin (Row group, Column group)。

$$2、\text{Distortion (dB)} = 20 \log \left\{ \frac{[V_1^2 + V_2^2 + V_3^2 + \dots + V_n^2]^{1/2}}{[(V_L^2 + V_H^2)^{1/2}]} \right\}$$

V_L, V_H: Row group and Column group signal。

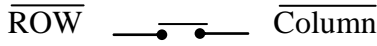
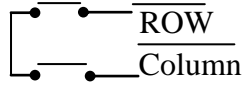
V₁, V₂..., V_n: Harmonic signal (BW=300Hz~3500Hz)

Actual Frequency Output (f_{osc}=3.579545MHz)

Keyboard scanning pin	standard(Hz)	output	devoatopm(%)
R1 f1	697	699	+0.28
R2 f2	770	766	-0.52
R3 f3	852	848	-0.47
R4 f4	941	948	+0.74
R5 f5	1209	1216	+0.57
R6 f6	1336	1332	-0.30
R7 f7	1477	1472	-0.34



Pin Description

Pin	symbol	Function
15	$\overline{C1}$	*Provides keyboard scanning and dialing signal options; *While \overline{HKS} pin is Low, the column group stays in "HIGH" state and row group stays in "LOW" state.
16	$\overline{C2}$	*The key pad is compatible with the standard dual contact matrix keyboard (as Figure 1b), the inexpensive single contact keyboard (as Figure 1a), and electronic input (as Figure 1c). *When \overline{KHS} is "low", a valid key entry is defined by related Row & Column connection or by electronic input; (as show in Figure 1c). *Activation of two or more keys will result in no response, except for single key.
17	$\overline{C3}$	
18	$\overline{C4}$	
1	$\overline{R1}$	*To avoid keyboard bouncing error, this chip provides built-in denounce circuit. (The denounce time=20ms)
2	$\overline{R2}$	  <p>(1a) (1b)</p> <p>Figure 1a: Single contact form keyboard configuration Figure 1b: Dual contact form keyboard configuration</p>
3	$\overline{R3}$	
4	$\overline{R4}$	
8	OSCI	*Oscillator input & output pins. *The 3.579545 MHz oscillator is formed by a built-in inverter inside of this chip and by connection a 3.579545MHz crystal or a ceramic resonator across the OSCI and OSCO pins.(built-in feedback resistor and capacitor)
9	OSCO	*When \overline{HKS} is "low", a valid key-in may turn on this oscillator and generates a 3.579545MHz clock.
13	\overline{XMUTE}	*Mute output pins. *NMOS open drain output structure. *The output is in "low" state ruing dialing sequence (both Pulse and Tone mode) otherwise this pin is "high-impedance". *Long (continue)mute
11	VSS	*Negative power supply pin
10	VDD	*Positive power supply pin



5	$\overline{\text{HKS}}$	*Pulse switch input pin * When the phone hanging up, the pin must be "1" to prohibit the operation of dial-up and lower power consumption. * When picking machine in the state, the pin must be "0" to enable the implementation of all functions.		
14	$\overline{\text{PO}}$	*Pulse output signal pin. *NMOS open drain output structure. * Pulse dial and flash off operation, the lower the output of electronic forms, otherwise the output was high resistance state.		
12	TONE	*Dual Tone Multi-frequency output pin. * In the audio dial-up state, type the number keys (including the *, # key), this pin will send the corresponding DTMF signals. * TONE pin to provide the shortest duration of audio and audio shortest interval to ensure the rapid type. If you type in a short time 100ms, while dual tone multi-frequency signal will continue to 100ms; press the button or how long the audio will last long.		
7	MODE	*Mode select pin.	MODE	Dialing mode
		*Tri-state input structure.	VDD	Pulse mode
		*This pin can select following three modes.	Open	Pulse mode
			VSS	TONE mode
6	M/B	*Make/Break ratio selection pin		

Keyboard Operation

Symbol definitions:

- a) \uparrow : OFF-HOOK or enable Hand Free function.
- b) \downarrow : OFF-HOOK or disable Hand Free function.
- c) $\downarrow \uparrow$: Input level form low to high.
- d) $\uparrow \downarrow$: Input level form high to low.
- e) D1~Dn : Digit key: 1,2,3,4,5,6,7,8,9,0,*,#,(C1~Cn is same as D1~Dn)。
- f) Dp1~Dpn : Pulse digit: 1,2,3,4,5,6,7,8,9,0,*,#,(Cp1~Cpn is same as Dp1~Dpn)。
- g) Dt1~Dtn : Tone digit: 1,2,3,4,5,6,7,8,9,0,*,#,(Ct1~ Ctn is same as Dt1~Dtn)。
- h) t_F : Flash time.
- i) t_P : Pause time.
- j) t_{PT} : Pulse to Tone wait time.
- k) t_{FP} : Pause time for flash.
- l) t_{RP} : Pause time for redial.
- m) LNB : Last number redial buffer

A) Normal Dialing

1、Digit Dialing

Procedure: $\uparrow D1, D2, \dots, DN \downarrow$

Dial out: Dt1, Dt2, ..., Dtn (tone mode)

Dial out: Dp1, DP2, ..., Dpn (pulse mode)

LNB : D1, D2, ..., Dn



2、Dialing with flash key

Procedure: ↑F,D1,D2...,DN↓

Dial out: tF,tFP,Dt1,Dt2...,Dtn(tone mode)

Dial out: tF,tFP,Dp1,DP2..., Dpn (pulse mode)

LNB : D1, D2..., Dn

3、Dialing with P→T Key

Procedure: ↑D1,D2..., P→T, ..., DN↓

Dial out: Dp1, Dp2, ...tPT, Dpn (pulse mode)

LNB : D1, D2..., P→T, ..., Dn

Note: If key in digit over maximum digit stored in LNB, the RD is inhibit even after on/off hook.

B) Mixed dialing

Procedure: ↑D1,D2..., P→T, D9, D10..., Dn↓

Dial out: Dp1, Dp2, ...tPT, Dt9, Dt10..., Dtn

LNB : D1, D2..., P→T, D9, D10..., Dn

C) Redial

LNB : D1, D2..., DN

Procedure: ↑RD↓

Dial out: tRP, Dt1,Dt2...,Dtn(tone mode)

Dial out: Trp,DP1,DP2..., Dpn (pulse mode)

Note: If key in digit over maximum digit stored in LNB, then RD is inhibit.

D) Pause Function

Procedure: ↑D1,D2...,Dn, P, C1..., Cn↓

Dial out:Dt1, Dt2, ...Dtn, tP, Ct1...Ctn(tone mode)

Dial out:Dp1, Dp2, ...Dpn, tP, Cp1..., Cpn (pulse mode)

LNB : D1, D2..., Dn, P, C1, C2, ..., Cn

E) Flash Function

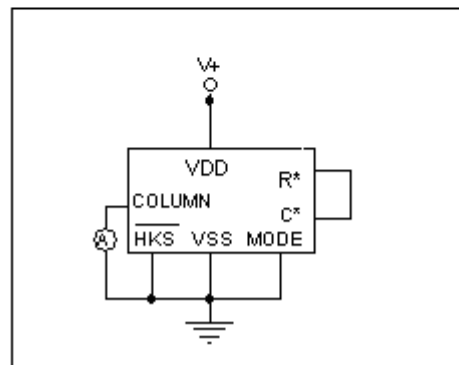
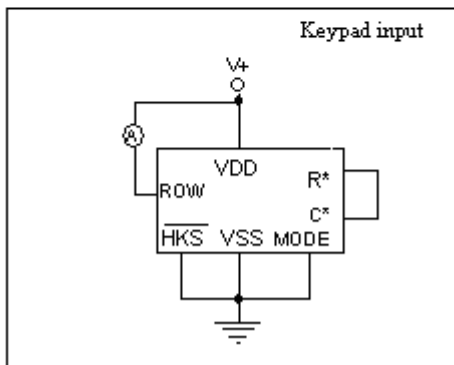
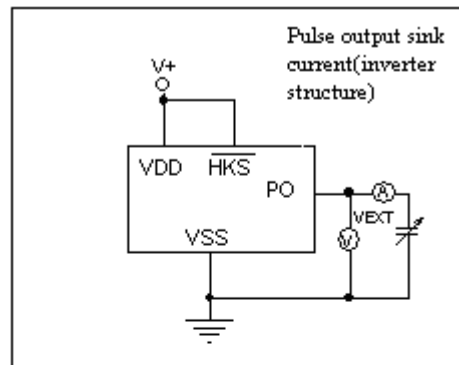
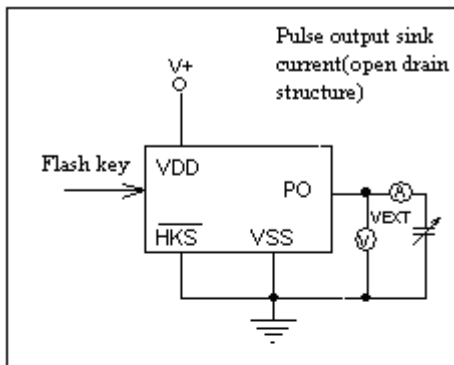
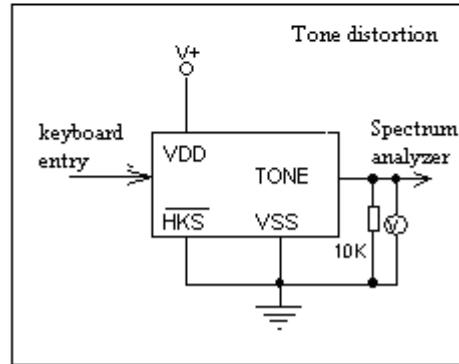
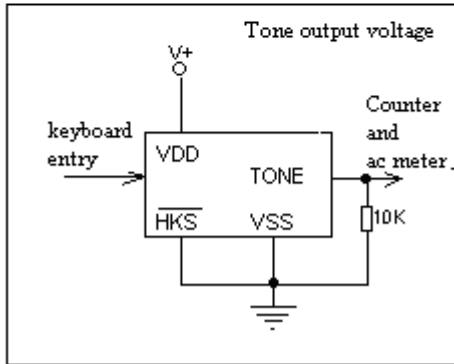
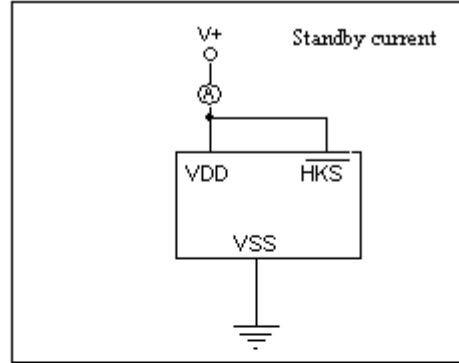
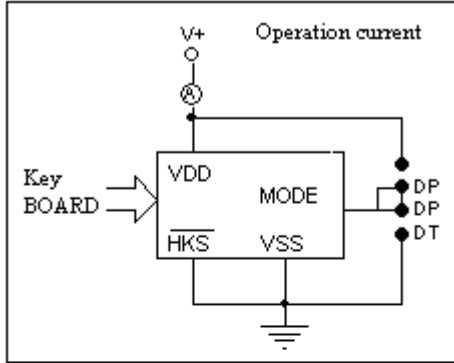
Procedure: ↑D1,D2...,Dn, F, C1..., Cn↓

Dial out:Dt1, Dt2, ...Dtn, tFP, Ct1...Ctn(tone mode)

Dial out:Dp1, Dp2, ...Dpn, tF, Tfp, Cp1..., Cpn (pulse mode)

LNB : C1, C2..., Cn

Test Circuit

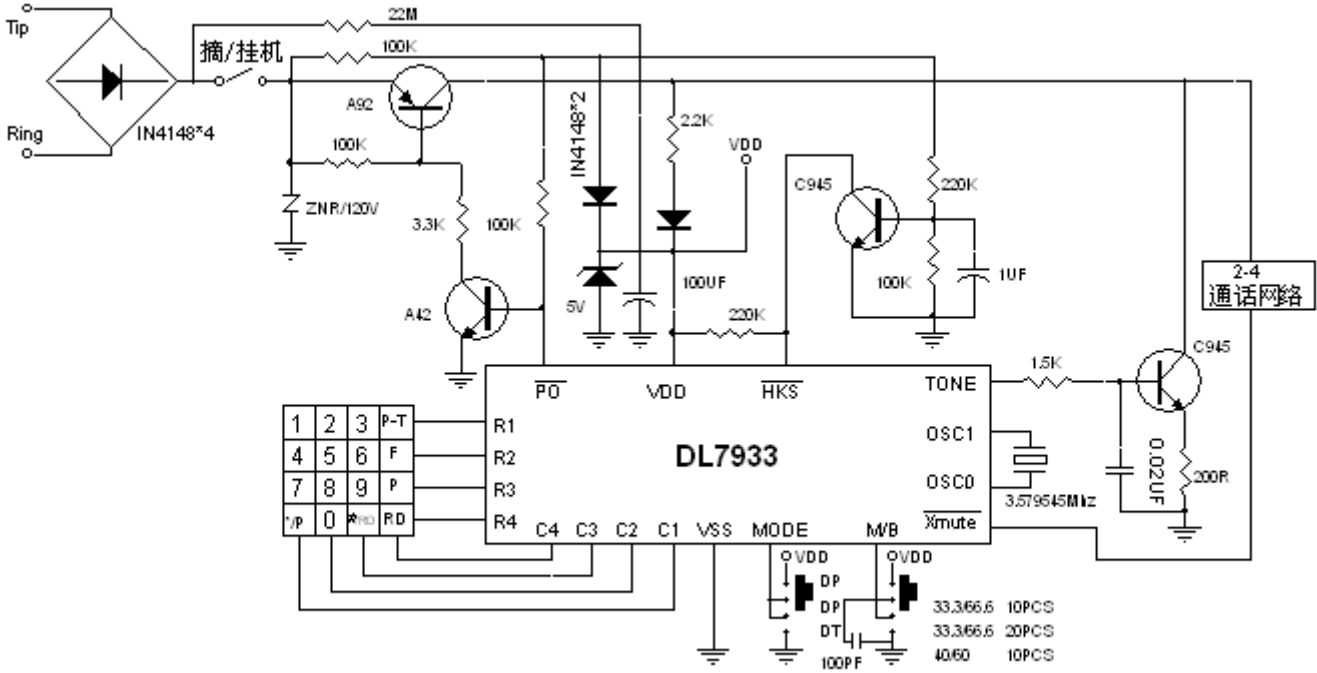


Note: 1、 $DIST (dB) = 20 \log \{ [V_1^2 + V_2^2 + V_3^2 + \dots + V_n^2]^{1/2} / [(V_L^2 + V_H^2)^{1/2}] \}$

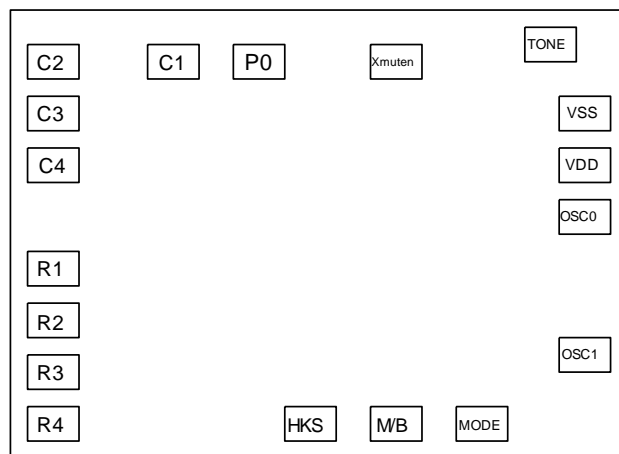
a、 $V_1 \dots V_n$ are extraneous frequencies (ie, inter modulation and harmonic), components in the 500Hz to 3400Hz band.

- b、VL, VH are the individual frequency components of the DTMF signal.
- c、Whether keyboard is pushed refer to the TONE mode time diagram.
- 2、Isnik=1/ (1-Duty Cycle), I is the net DC current measured from ampere meter.
- 3、R*, C* mean others column and row.

Application Example



PAD ASSIGNMENT



Substrate to VSS