

MC1 4497

A perspective view of a 18-pin DIP package. The package is black with a white stripe on top. The pins are numbered 1 to 18, with 1 at the bottom left and 18 at the bottom right.

MC14497P Plastic DIP

Pin diagram of the 18-pin package:

Pin Number	Signal Name
1	E3
2	E2
3	E9
4	A4
5	A3
6	A2
7	A1
8	SIGNAL OUT
9	VSS
10	E7
11	E8
12	OSC _{in}
13	OSC _{out}
14	E6
15	E5
16	E4
17	E1
18	VDD

 **MOTOROLA**

MAXIMUM RATINGS (Voltages referenced to V_{SS})

Parameter	Symbol	Value	Unit
DC Supply Voltage	V_{DD}	– 0.5 to + 18	V
Input Voltage, All Inputs	V_{in}	– 0.5 to $V_{DD} + 0.5$	V
DC Current Drain per Pin	I	10	mA
Operating Temperature Range	T_A	– 40 to + 85	°C
Storage Temperature Range	T_{stg}	– 65 to + 150	°C

This device contains circuitry to protect the inputs against damage due to high static voltages or electric fields; however, it is advised that normal precautions be taken to avoid application of any voltage higher than maximum rated voltages to this high-impedance circuit. For proper operation it is recommended that V_{in} and V_{out} be constrained to the range $V_{SS} \leq (V_{in} \text{ or } V_{out}) \leq V_{DD}$.

ELECTRICAL CHARACTERISTICS ($T_A = 0$ to 70°C ; all Voltages Referenced to V_{SS})

Characteristic	Symbol	V_{DD}	Min	Max	Unit
Supply Voltage	V_{DD}	—	4.0	10.0	V
Supply Current Idle	I_{DD}	10	—	50	μA
Operation		10	—	5	mA
Output Current — Signal $V_{OH} = 3.0\text{ V}$ $V_{OL} = 0.5\text{ V}$	Source Sink	I_{OH} I_{OL}	4	– 900 120	μA
Output Current — Scanner $V_{OH} = 3.0\text{ V}$ $V_{OL} = 0.5\text{ V}$	Source Sink	I_{OH} I_{OL}	4	– 30 245	μA
Output Current — Oscillator $V_{OH} = 3.0\text{ V}$ $V_{OL} = 0.5\text{ V}$	Source Sink	I_{OH} I_{OL}	4	– 300 245	μA
Input Current — Oscillator Operation Idle, $V_{IL} = 0.5\text{ V}$	I_{in}	10 4	± 2 30	± 80 —	μA
Input Current — Encoder $V_{IH} = 9.0\text{ V}$ $V_{IL} = 0.5\text{ V}$	I_{in}	10 4	– 15 —	— – 60	μA
Input Voltage — Encoder	V_{IH} V_{IL} V_{IH} V_{IL}	10 10 4 4	9 — 3 —	— 1.2 — 1.0	V

CIRCUIT OPERATION

查询"MC14497"供应商

The transmitter sends a 9-bit, labelled A (LSB) to F (MSB), binary code giving a total of 64 possible combinations or code words. All of these channels are user selectable, except the last two (where channel 63 is not sent while channel 62 is automatically sent by the transmitter at the end of each transmission as an "End of Transmission" code).

In either mode, FSK or AM, the transmitted signal is in the form of a bi-phase pulse code modulation (PCM) signal. The AM coding is shown in Figure 1.

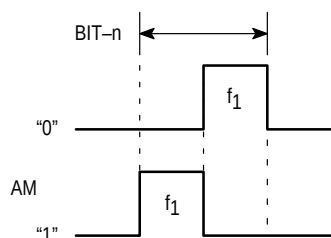


Figure 1. AM Coding

In the AM mode, f_1 is a train of pulses at the modulating frequency of 31.25 kHz for a reference frequency of 500 kHz.

In the FSK mode, two modulating frequencies are used as shown in Figure 2.

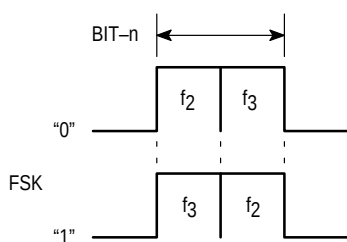


Figure 2. FSK Coding

In this mode, f_3 is 50 kHz and f_2 is 41.66 kHz for a reference frequency of 500 kHz.

The keyboard can be a simple switch matrix using no external diodes, connected to the four scanner inputs (A1 – A4) and the eight row input (E1 – E8). Under these conditions, only the first 32 code words are available since bit-F is always at logical 0. However, a simple 2-pole changeover switch, in the manner of a typewriter "shift" key (switch FK3 in the Block Diagram) can be used to change the polarity of bit-F to give access to the next full set of 32 instructions.

An alternative method of accessing more than 32 instructions is by the use of external diodes between the address inputs (see Figure 3). These have the effect of producing "phantom" address inputs by pulling two inputs low at the same time, which causes bit-F to go high (i.e., to logical 1). By interconnecting only certain address inputs it is possible

to make an intermediate keyboard with between 32 and 64 keys.

The other two switches in the Block Diagram (FK1 and FK2) change the modulation mode. Closing FK1 changes the modulation from FSK to AM and the start-bit polarity. Closing FK2 changes the start-bit to a logical 0.

The full range of options available is illustrated in Table 1.

Table 1.

	Start Bit	Modulation	Bit-F	Channels
E9 = Open	1	FSK	0	0 – 31
E9 = A1 (FK1)	1	AM	0	0 – 31
E9 = A2 (FK2)	0	FSK	0	0 – 31*
E9 = A3 (FK3)	1	FSK	1	32 – 61
E9 = A1 • A2	0	AM	0	0 – 31
E9 = A1 • A3	1	AM	1	32 – 61
E9 = A2 • A3	0	FSK	1	32 – 61*
E9 = A1 • A2 • A3	0	AM	1	32 – 61

* Not allowed.

One of the transmitter's major features is its low power consumption (in the order of 10 μ A in the idle state). For this reason, the battery is perpetually in circuit. It has in fact been found that a light discharge current is beneficial to battery life.

In its active state, the transmitter efficiency is increased by the use of a low duty cycle which is less than 2.5% for the modulating pulse trains.

While no key is pressed, the circuit is in its idle state and the reference oscillator is stopped. Also, the eight address input lines are held high through internal pull-up resistors.

As soon as a key is pressed, this takes the appropriate address line low, signaling to the circuit that a key has been selected. The oscillator is now enabled. If the key is released before the code word has been sent, the circuit returns to its idle state. To account for accidental activation of the transmitter, the circuit has a built-in reactive time of approximately 20 ms, which also overcomes contact bounce. After this delay, the code word will be sent and repeated at 90 ms intervals for as long as the key is pressed. As soon as the key is released, the circuit automatically sends channel 62, the "End of Transmission" (EOT) code. The transmitter then returns to its idle state.

The differences between the two modulation modes are illustrated in Figure 4. However, it should be noted that in the AM mode, each transmitted word is preceded by a burst of pulses lasting 512 μ s. This is used to set up the AGC loop in the receiver's preamp. In the FSK mode, the first frequency of the first bit is extended by 1.5 ms and the AGC burst is suppressed. In either mode, it is assumed that the normal start-bit is present.

PIN DESCRIPTIONS

查询"MC14497"供应商

Row Inputs (Pins 1, 2, 10, 11, 14, 15, 16, 17)

Under idle conditions, these inputs are held high by internal pull-up resistors. As soon as a key is pressed, a logical 0 on that particular line signals to the circuit that a key has been selected. After a delay of 20 ms, the internal register is loaded with the code word for the key selected.

E9

Row Input (Pin 3)

This is a special programming input and when connected to the appropriate scanner output via a diode, it will modify the transmitted output according to Table NO TAG.

In Table NO TAG, the figures in brackets (FK1, etc.) refer to the switches shown in the Block Diagram and Figure 3. If only one option is required, the diode may be omitted. The connections shown in Table NO TAG may be made in any combination.

Although E9 is a row input, forcing this line low will not activate the circuit.

A1 – A4

Scanner Outputs (Pins 4 – 7)

Under idle conditions, these outputs are held low, logical 0. When a key is pressed, the circuit is activated and the oscillator will start and release the outputs (see Figure 5).

OSC_{in}, OSC_{out}

Oscillator Input and Oscillator Output (Pins 12, 13)

These pins are designed to operate with a 500 kHz ceramic resonator or a tune LC circuit. It is important that a ceramic resonator and **not a filter** be used here, as the oscillator frequency cannot be guaranteed if a ceramic filter is used.

SIGNAL OUT

Signal Output (Pin 8)

This output provides the modulating signal ready to drive the modulation amplifier. If required, the transmitter can be used as a keyboard encoder for direct use with a receiver. In this case, the AM option is selected, the output inverted, and fed directly to the receiver's signal input pin.

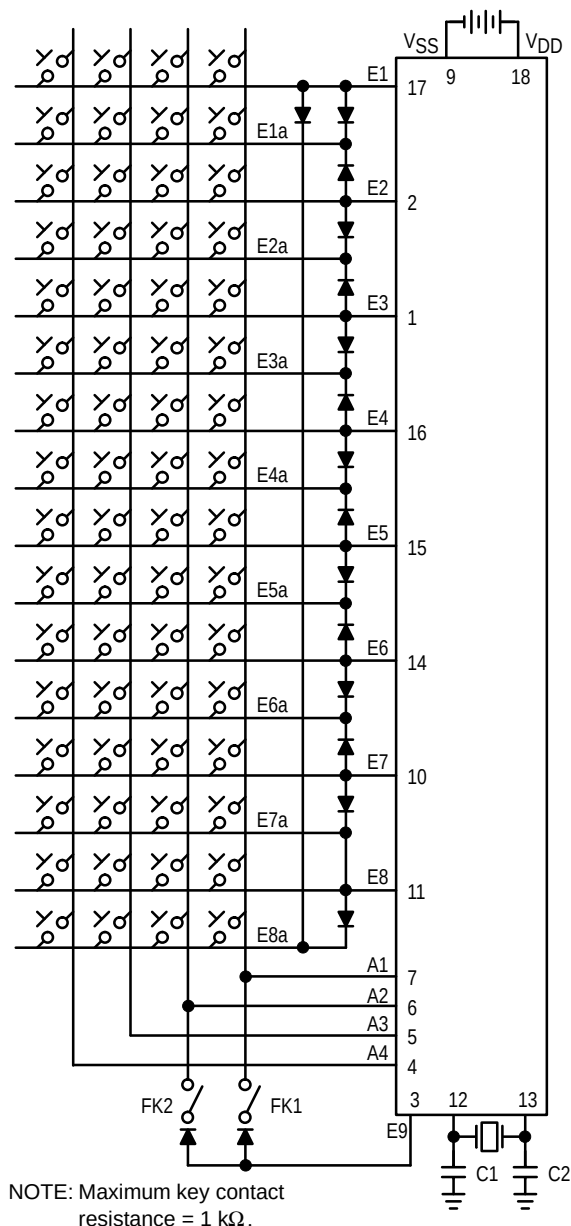


Figure 3. 64-Key Keyboard

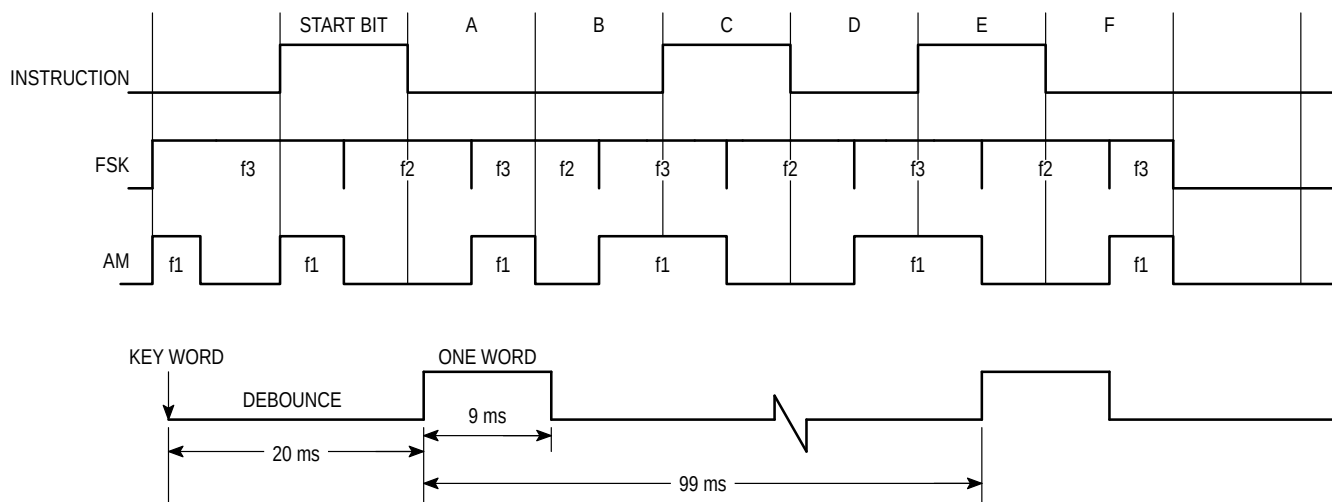
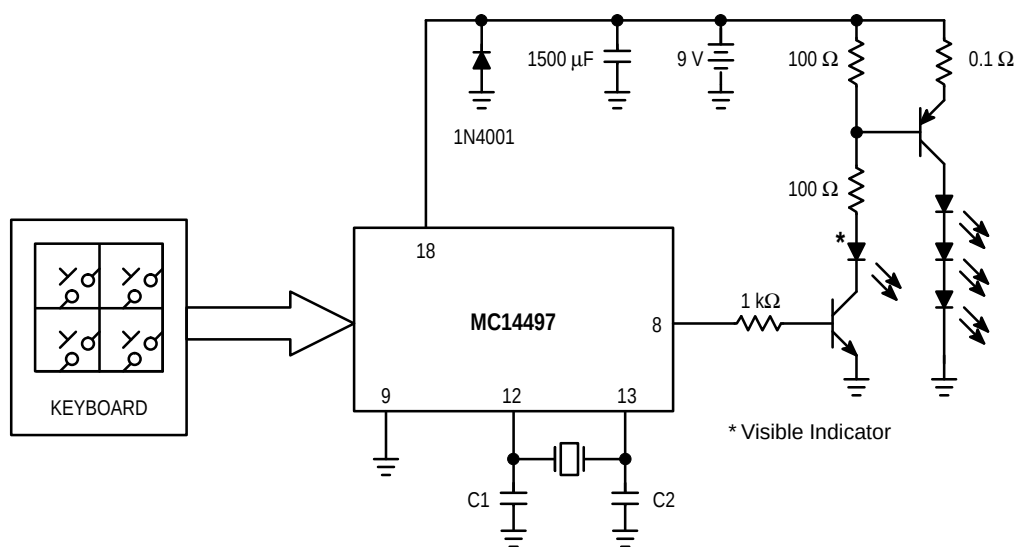


Figure 4. Transmitted Waveforms and Timing (Not Drawn to Scale)

查询"MC14497"供应商

The diagram shows four digital signals, A1, A2, A3, and A4, over time. A1 has a 'DEBOUNCE' label. Arrows indicate 'KEY DOWN' and 'KEY RELEASED' events.

The diagram shows four digital signals, A1, A2, A3, and A4, over time. Signal A1 has a 'KEY DOWN' event followed by a 'DEBOUNCE' period. Signal A2 has a long high pulse followed by a low pulse. Signal A3 has a high pulse followed by a low pulse. Signal A4 has a high pulse followed by a low pulse. All signals end with a 'KEY RELEASED' event.



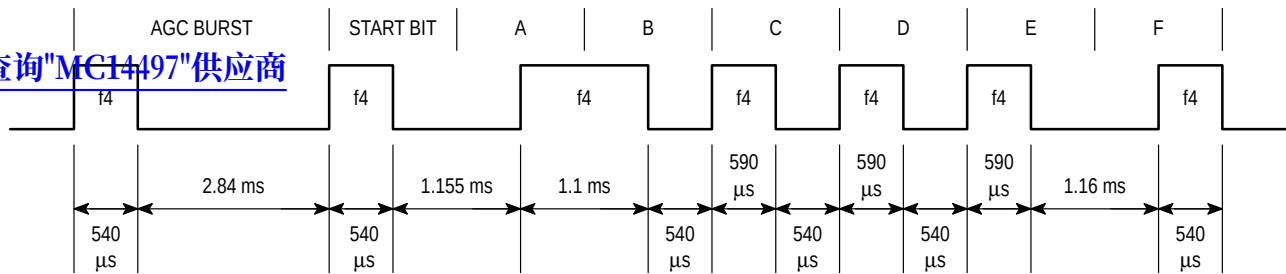
C1 and C2 are sized per the ceramic resonator supplier's recommendation.

Ceramic Resonator Suppliers:

1. Morgan Matrox, Inc., Bedford, OH, 216/232-8600
2. Radio Materials Co., Attica, IN, 317/762-2491

Motorola cannot recommend one supplier over another and in no way suggests that this is a complete listing of ceramic resonator suppliers.

Figure 6. Typical Application Circuit



NOTES:

1. $f_4 = 28.4$ kHz.
2. Indicated time durations are approximated.

Figure 7. AM Mode Transmitted Wavetrain with 455 kHz Oscillator

Table 2. Transmitted Codes

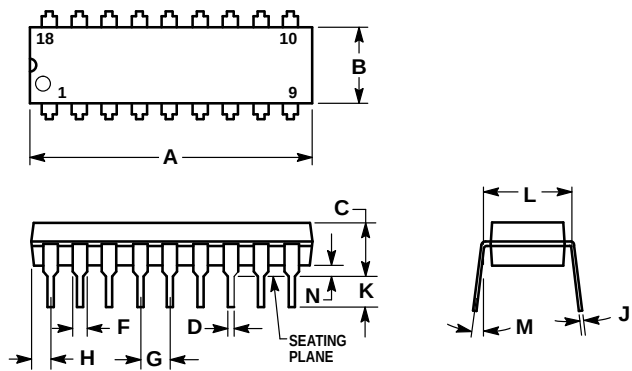
Code Word									Keyboard								
Channel	F	E	D	C	B	A	In	Out	Channel	F	E	D	C	B	A	In	Out
0	0	0	0	0	0	0	E8	A4	32	1	0	0	0	0	0	E8a	A4
1				0	0	1	E1	A4	33				0	0	1	E1a	A4
2				0	1	0	E2	A4	34				0	1	0	E2a	A4
3				0	1	1	E3	A4	35				0	1	1	E3a	A4
4				1	0	0	E4	A4	36				1	0	0	E4a	A4
5				1	0	1	E5	A4	37				1	0	1	E5a	A4
6				1	1	0	E6	A4	38				1	1	0	E6a	A4
7				1	1	1	E7	A4	39				1	1	1	E7a	A4
8	0	0	1	0	0	0	E8	A1	40	1	0	1	0	0	0	E8a	A1
9				0	0	1	E1	A1	41				0	0	1	E1a	A1
10				0	1	0	E2	A1	42				0	1	0	E2a	A1
11				0	1	1	E3	A1	43				0	1	1	E3a	A1
12				1	0	0	E4	A1	44				1	0	0	E4a	A1
13				1	0	1	E5	A1	45				1	0	1	E5a	A1
14				1	1	0	E6	A1	46				1	1	0	E6a	A1
15				1	1	1	E7	A1	47				1	1	1	E7a	A1
16	0	1	0	0	0	0	E8	A3	48	1	1	0	0	0	0	E8a	A3
17				0	0	1	E1	A3	49				0	0	1	E1a	A3
18				0	1	0	E2	A3	50				0	1	0	E2a	A3
19				0	1	1	E3	A3	51				0	1	1	E3a	A3
20				1	0	0	E4	A3	52				1	0	0	E4a	A3
21				1	0	1	E5	A3	53				1	0	1	E5a	A3
22				1	1	0	E6	A3	54				1	1	0	E6a	A3
23				1	1	1	E7	A3	55				1	1	1	E7a	A3
24	0	1	1	0	0	0	E8	A2	56	1	1	1	0	0	0	E8a	A2
25				0	0	1	E1	A2	57				0	0	1	E1a	A2
26				0	1	0	E2	A2	58				0	1	0	E2a	A2
27				0	1	1	E3	A2	59				0	1	1	E3a	A2
28				1	0	0	E4	A2	60				1	0	0	E4a	A2
29				1	0	1	E5	A2	61				1	0	1	E5a	A2
30				1	1	0	E6	A2	62				1	1	0	E6a	A2
31	0	1	1	1	1	1	E7	A2	Not Transmitted	1	1	1	1	1	1	E7a	A2

NOTE: Although the "a" suffix applies to a phantom input when using a keyboard with up to 64 keys, the coding is identical with a 32-key keyboard when switch FK3 is closed.

PACKAGE DIMENSIONS

[查询"MC14497"供应商](#)

P SUFFIX
PLASTIC DIP
CASE 707-02



- NOTES:
1. POSITIONAL TOLERANCE OF LEADS (D), SHALL BE WITHIN 0.25 (0.010) AT MAXIMUM MATERIAL CONDITION, IN RELATION TO SEATING PLANE AND EACH OTHER.
 2. DIMENSION L TO CENTER OF LEADS WHEN FORMED PARALLEL.
 3. DIMENSION B DOES NOT INCLUDE MOLD FLASH.

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	22.22	23.24	0.875	0.915
B	6.10	6.60	0.240	0.260
C	3.56	4.57	0.140	0.180
D	0.36	0.56	0.014	0.022
F	1.27	1.78	0.050	0.070
G	2.54 BSC		0.100 BSC	
H	1.02	1.52	0.040	0.060
J	0.20	0.30	0.008	0.012
K	2.92	3.43	0.115	0.135
L	7.62 BSC		0.300 BSC	
M	0°	15°	0°	15°
N	0.51	1.02	0.020	0.040

查询"MC14497"供应商

Motorola reserves the right to make changes without further notice to any products herein. Motorola makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does Motorola assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation consequential or incidental damages. "Typical" parameters can and do vary in different applications. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. Motorola does not convey any license under its patent rights nor the rights of others. Motorola products are not designed, intended, or authorized for use as components in systems intended for surgical implant into the body, or other applications intended to support or sustain life, or for any other application in which the failure of the Motorola product could create a situation where personal injury or death may occur. Should Buyer purchase or use Motorola products for any such unintended or unauthorized application, Buyer shall indemnify and hold Motorola and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that Motorola was negligent regarding the design or manufacture of the part. Motorola and  are registered trademarks of Motorola, Inc. Motorola, Inc. is an Equal Opportunity/Affirmative Action Employer.

How to reach us:

USA/EUROPE: Motorola Literature Distribution;
P.O. Box 20912; Phoenix, Arizona 85036. 1-800-441-2447

JAPAN: Nippon Motorola Ltd.; Tatsumi-SPD-JLDC, Toshikatsu Otsuki,
6F Seibu-Butsuryu-Center, 3-14-2 Tatsumi Koto-Ku, Tokyo 135, Japan. 03-3521-8315

MFAX: RMFAX0@email.sps.mot.com – TOUCHTONE (602) 244-6609
INTERNET: <http://Design-NET.com>

HONG KONG: Motorola Semiconductors H.K. Ltd.; 8B Tai Ping Industrial Park,
51 Ting Kok Road, Tai Po, N.T., Hong Kong. 852-26629298



MC14497/D

