

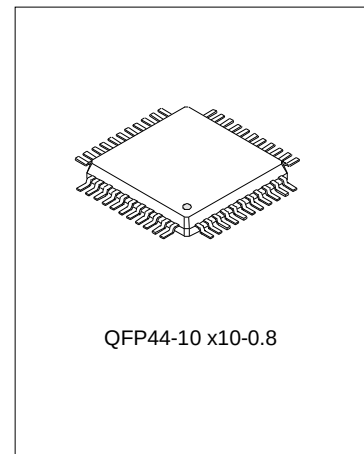
FM/AM TUNER FREQUENCY & CLOCK DISPLAY DRIVER

DESCRIPTION

The SC3610 is a frequency and clock display driver used for displaying FM/AM radio frequency or a 12 hour alarm clock. By using CMOS technology, it consumes very low power in clock display mode.

FEATURES

- * FM input with pre-scalar for radio frequency up to 150 MHz
- * AM input for radio frequency up to 30 MHz
- * 3 common, 13 segment, 1/3 bias LCD display drivers which supports 4 digits LCD display
- * On chip oscillator for external 32.768kHz crystal
- * 10.7 MHz / 70 kHz I.F. frequency offset for FM signal and 455kHz I.F. frequency offset for AM signal
- * Internal real time clock in 12 hour display mode
- * Selectable clock or frequency display
- * 1.8V to 3.3V supply voltage

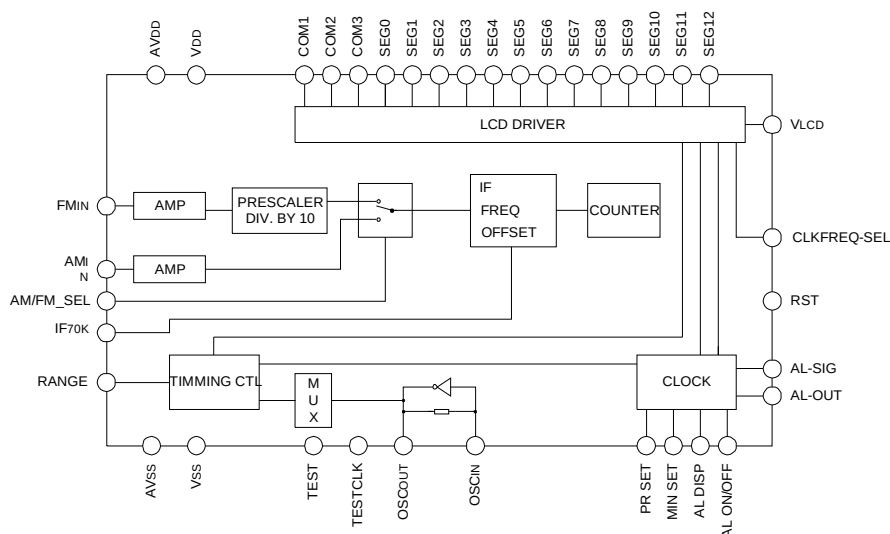


QFP44-10 x10-0.8

ORDERING INFORMATION

SC3610	QFP-44-10x10-0.8 Package
SC3610C	COB Package (QFP Type)
SC3610D	COB Package (SOP Type)

BLOCK DIAGRAM



ABSOLUTE MAXIMUM RATING

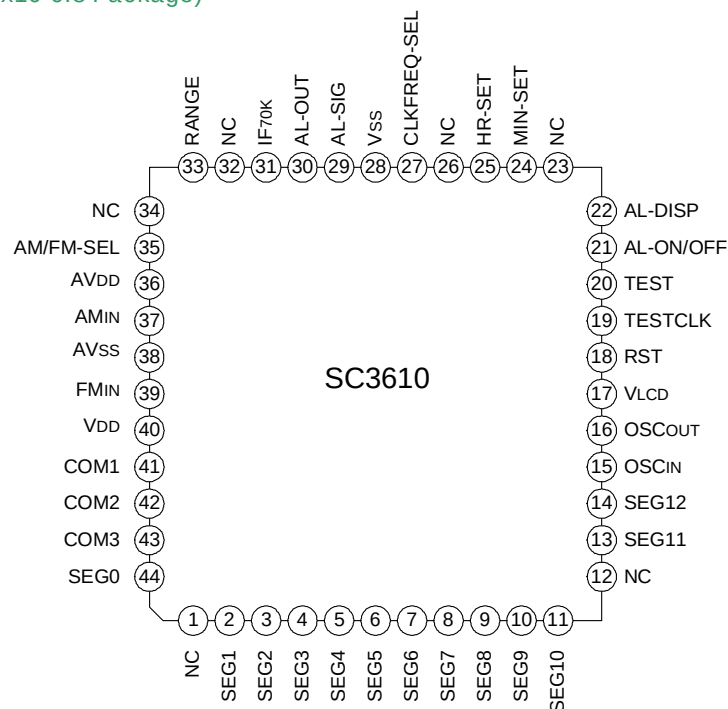
Characteristics	Symbol	Value	Unit
Supply Voltage	V _{DD}	0.5 ~ 7.0	V
Input or Output Voltage	V _{IN} , V _{OUT}	-0.5 ~ V _{DD} +0.5	V
Storage Temperature	T _{STG}	-40 ~ +125	°C
ESD Protection		-2 ~ + 2	kV

ELECTRICAL CHARACTERISTICS (VDD = 3V, Temp = 25°C, unless otherwise specified)

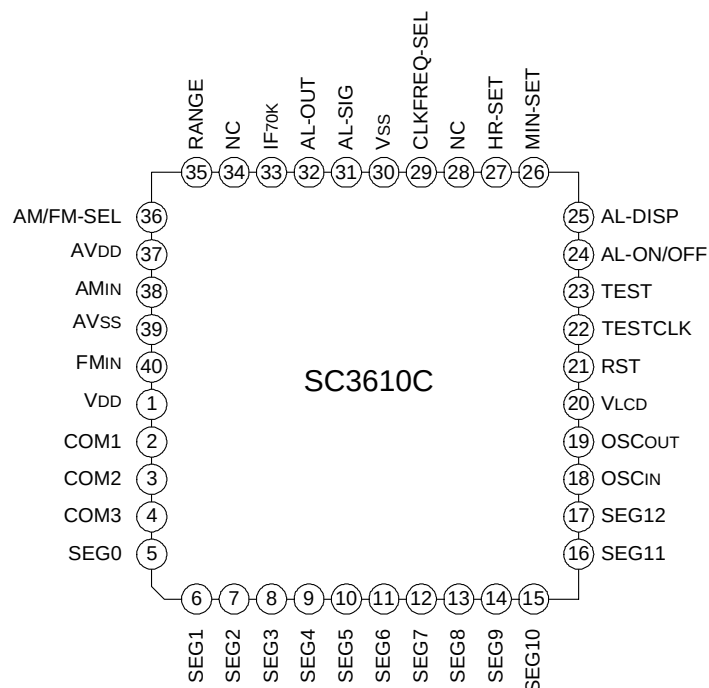
Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Supply Voltage	VDD					
VDD Supply Current Consumption	IDD1	frequency mode	--	1.8	3.6	mA
	IDD2	clock mode	--	55	110	μA
Internal LCD Reference Voltage	VLCD	respect to VDD	2	2.25	2.5	V
LCD Drive Current consumption	ILCD	all segments on	--	--	5	μA
LCD Frame Frequency	FLCD		--	32	--	Hz
Oscillator Frequency	FOSC		--	32.768	--	kHz
FM Input Frequency	FFM	VIN = 0.3 VPP	11.0	--	150	MHz
AM Input Frequency	FAM	VIN = 0.3 VPP	0.5	--	30	MHz
FM Input impedance	RIN(FM)	FFM =120MHz	--	150	--	Ω
AM Input impedance	RIN(AM)	FAM =12MHz	--	2.0	--	kΩ
Open Drain Low Level Voltage	VOLoc	VDD=3V, Isink =10mA	--	--	0.5	V
Low Level Input Voltage	VIL		--	--	0.3VDD	V
High Level Input Voltage	VIH		0.7VDD	--	--	V
Low Level Output Voltage,	VOL	VDD=3V, Isink=4mA	--	--	0.4	V
High Level Output Voltage	VOH	VDD=3V, ISOURCE=-4mA	VDD-0.5	--	--	V
Schmitt Trigger Positive Threshold	Vt+	VDD=3V	--	2.3	2.4	V
Schmitt Trigger Negative Threshold	Vt-	VDD=3V	0.6	0.9	--	V
Schmitt Trigger Input Resistance	RIN+/-	pull-up or pull-down	--	75	--	kΩ
Reset Pin pull-up Resistance	RIN-UP		--	750	--	kΩ

PAD ASSIGNMENT

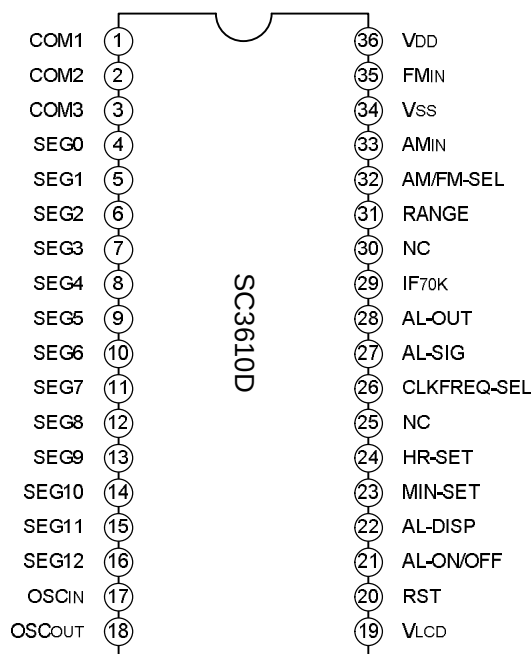
SC3610 (QFP-44-10x10-0.8 Package)



SC3610C (COB Package, QFP Type)



SC3610D (COB Package, SOP Type)



PAD DESCRIPTION (The pad no. is according to SC3610C)

Pad No.	Symbol	Description
1	VDD	Supply voltage
2 ~ 4	COM1 ~ COM3	LCD common drive signal for driving LCD display
5 ~ 17	SEG0 ~ SEG12	LCD segment drive signal for driving LCD display
18	OSCI	32.768 kHz crystal oscillator input pin
19	OSCO	32.768 kHz crystal oscillator output pin
20	VLCD	LCD Supply voltage. Connects a 0.1 μ F capacitor between this pin and VSS
21	RST	Active low power-on reset with pull-up resistor of approx.750k Ω
22	TESTCLK	For testing use only with internal pull-down
23	TEST	When high, the chip will enter test mode
24	AL-ON/OFF	Alarm function on or off in toggle mode. Internal pull up input
25	AL-DISP	When pressed, will display the alarm time. Internal pull up input
26	MIN-SET	Minute setting for time and alarm(together with AL-DISP). Internal pull up.
27	HR-SET	Hour setting for time and alarm(together with AL-DISP). Internal pull up.
28	NC	No connection
29	CLKFREQ-SEL	Clock or frequency display mode. Internal pull-down input. When low, clock will be displayed. When high, radio frequency will be displayed.
30	VSS	Ground pin
31	AL-SIG	Open drain alarm signal output, active low.
32	AL-OUT	Alarm output at 1kHz with 0.2 sec on and 0.2 sec off, push-pull output.
33	IF70k	Select IF offset in FM mode. H:70kHz, L:10.7kHz
34	NC	No connection
35	RANGE	For frequency counting mode only, Range = H or L, gate time = 0.1S
36	AM/FM-SEL	AM/FM mode selection. High for AM and low for FM, internal pull-up.
37	AVDD	Analog Supply voltage
38	AMIN	AM signal input, 0.3V peak to peak, 500kHz to 30MHz.
39	AVSS	Analog Ground pin.
40	FMIN	FM signal input, 0.3V peak to peak, 11-150MHz.

FUNCTIONAL DESCRIPTION
1. RADIO FREQUENCY DISPLAY OPERATION (DTS MODE):

The FM and AM local oscillator output generated from the external RF receiver enters a high gain input comparator through the FMIN and the AMIN pins respectively. The FM signal then routes through a divide-by-10 dynamic pre-scalar. Depending on the state of the AM/FM-SEL pin, the FM and AM signal will be selected and enters the IF frequency offset block. Depending on the FM/AM selection, 10.7MHz/70kHz or 455kHz I.F. frequency will be subtracted or added from the input signal.

LCD Display Range:

Mode	Range	Display range (on LCD)	Step	Resolution
FM	H	11.00 MHz to 99.99 MHz	10kHz	1kHz
	L	11.00 MHz to 149.9 kHz	100kHz	10kHz
AM	H	500 kHz to 9999 kHz	1kHz	100kHz
	L	0.5 MHz to 29.99 MHz	10kHz	1kHz

Note: 1 When counter frequency overflow, MSB will not be displayed.

IF Offset for different application:

IF70K	AMFM-SEL	IF OFFSET	OPERATION
0	0	+10.7MHz	Display FM input frequency 10.7MHz
0	1	+455kHz	Display AM input frequency 455kHz
1	0	-70 kHz*	Display FM input frequency +70kHz
1	1	+455 kHz	Display AM input frequency 455kHz

* Suitable to use with Silan SC1088.

2. CLOCK FUNCTION:

1) The clock will be advanced in the following flow:

PM 12:00 → PM 11:59 → AM 12:00 → 11:59

2) The [.] sign is the second indicator and will blink at a rate of 2Hz

3) TIME SETTING:

- Pressing the keys combination of [TIME SET] [HR SET] or [TIME SET] [MIN SET] will enter the time setting mode.
- One digit will be incremented after entering the alarm setting mode. Keep pressing the keys combination for more than 0.5 seconds will make the digit to be advanced at a rate of 2Hz.

4) ALARM TIME SETTING:

- Pressing the keys combination of [AL DISP] [HR SET] or [AL DISP] [MIN SET] will enter the alarm time setting mode. The [AL] indicator will turn on and the [.] sign will stop blinking.
- One digit will be incremented after entering the alarm setting mode. Keep pressing the keys combination for more than 0.5 seconds will make the digit to be advanced at a rate of 2Hz.

5) ALARM FUNTION:

- AL OUT output pin will output an alarm frequency of 1024Hz at 0.2 sec on and 0.2 sec off.
- AL OUT pin can be used to direct drive a piezo buzzer.
- When alarm is active, AL OUT output can be disabled by pressing the [AL-ON/OFF] key or it will turn off automatically after 3 minutes lapse.
- AL-SIG pin is an open drain output (active low). Once alarm is activated, AL-SIG can be disabled by pressing [AL-ON/OFF] key or it will turn off automatically after one hour time lapse.
- When [AL DISP] is pressed, alarm setting time will be displayed on the LCD and the [AL] indicator will be on.
- The [AL-ON/OFF] pin will toggle the [🔔] indicator to turn on of off the alarm function. When the indicator is on, alarm function is on.

6) 32.768kHz crystal is used for the reference frequency.

7) After Power-on-reset (RST):

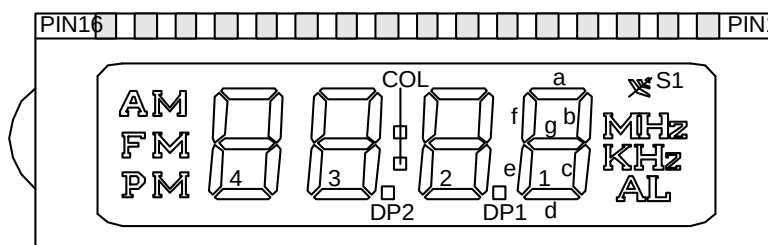
- [HR SET] and [MIN SET] keys will be disabled.
- [AL-DISP] KEY,[AL-ON/OFF] KEY AND AL-SIG output will be enabled.

3. AFTER POWER-ON-SET (RST):

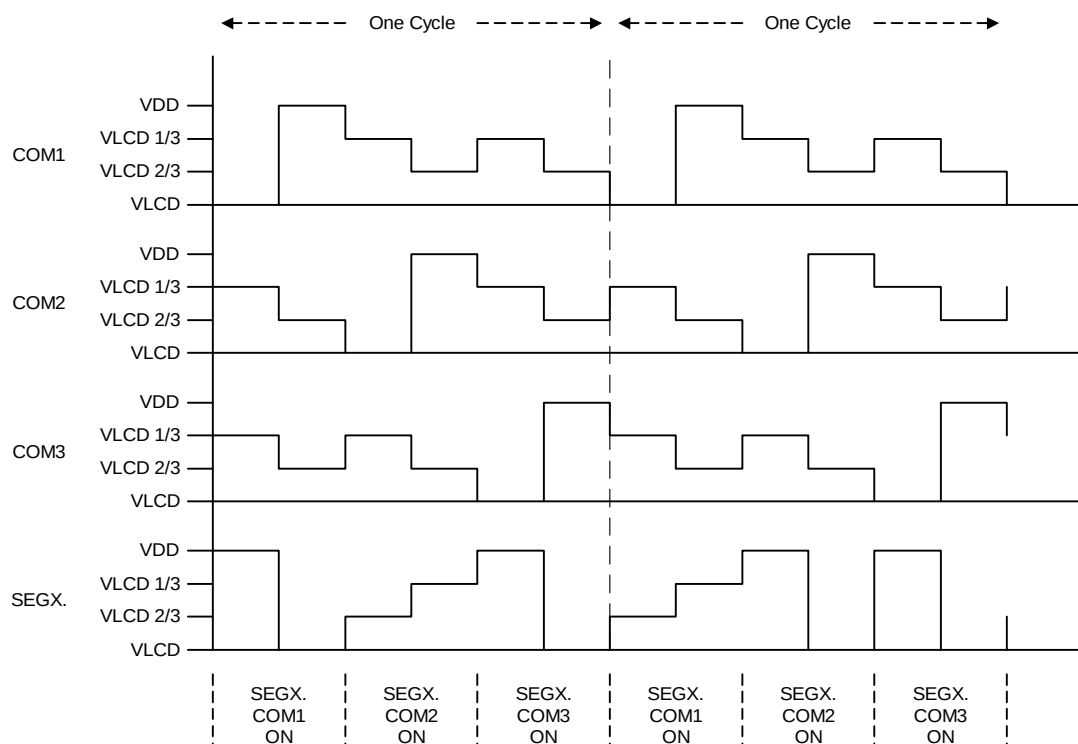
- When in clock mode, it will display and start at AM 7:00.
- When in DTS frequency mode, if CLKFREQ-SEL = High, and FMIN & AMIN pins are grounded, all LCD segments will be turned on(LCD test mode).

4. LCD PIN CONFIGURATION AND 0 TO 9 DIGITS SEGMENTS DISPLAY CONFIGURATION.

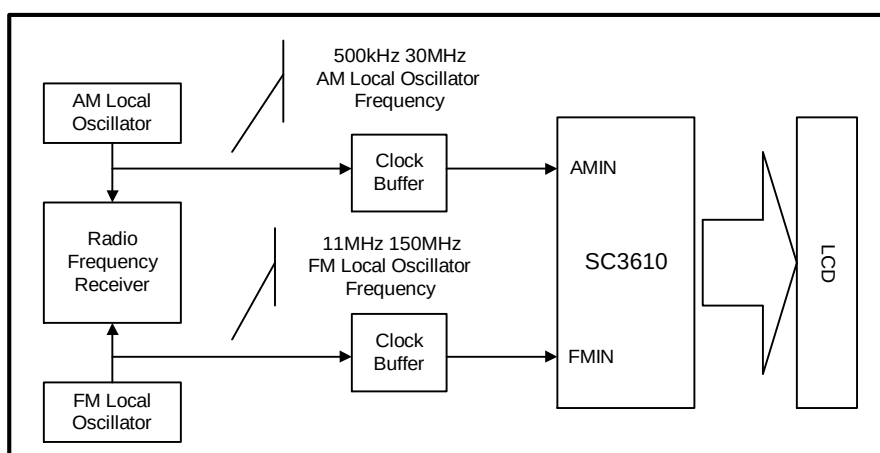
Pin	Function	LCD Mapping		
1	COM1	COM1	--	--
2	COM2	--	COM2	--
3	COM3	--	--	COM3
4	SEG0	kHz	MHz	
5	SEG1	AL	DIG1-c	DIG1-b
6	SEG2	DIG1-d	DIG1-g	DIG1-a
7	SEG3	DP1	DIG1-e	DIG1-f
8	SEG4	DP2	DIG2-c	DIG2-b
9	SEG5	DIG2-d	DIG2-g	DIG2-a
10	SEG6	:	DIG2-e	DIG2-f
11	SEG7	AM	DIG3-c	DIG3-b
12	SEG8	DIG3-d	DIG3-g	DIG3-a
13	SEG9	--	DIG3-e	DIG3-f
14	SEG10	FM	DIG4-c	DIG4-b
15	SEG11	DIG4-d	DIG4-g	DIG4-a
16	SEG12	PM	DIG34-e	DIG4-f



LCD TIMING WAVEFORMS



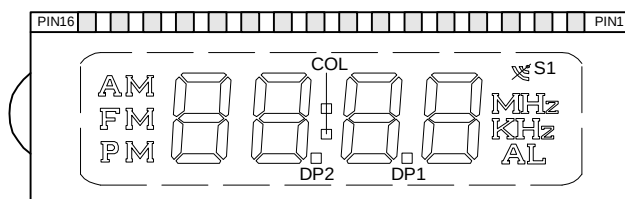
SUGGESTED APPLICATION



TYPEICAL LCD LAYOUT

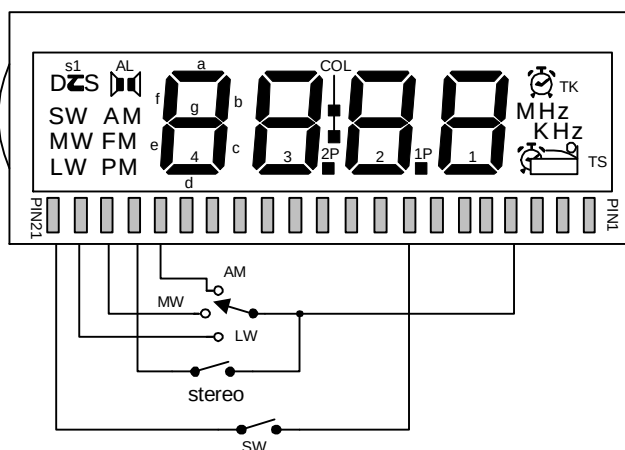
Counter Only Mode

PIN	COM1	COM2	COM3
1	COM1	--	--
2	--	COM2	--
3	--	--	COM3
4	kHz	MHz	S1
5	AL	1C	1B
6	1D	1G	1A
7	DP1	1E	1F
8	DP2	2C	2B
9	2D	2G	2A
10	COL	2E	2F
11	AM	3C	3B
12	3D	3G	3A
13	--	3E	3F
14	FM	4C	4B
15	4D	4G	4A
16	PM	4E	4F

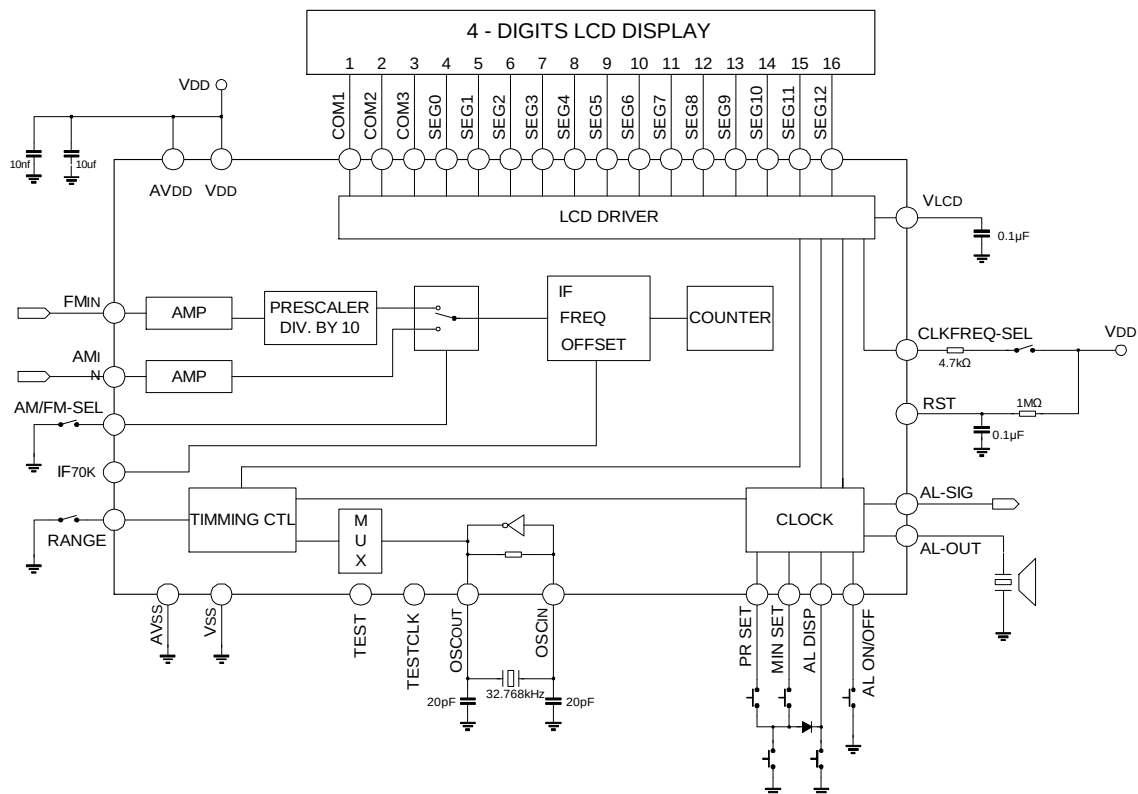


Clock and Counter Mode

PIN	COM1	COM2	COM3
1	COM1	--	--
2	--	COM2	--
3	--	--	COM3
4	kHz	MHz	TK
5	TS	1C	1B
6	1D	1G	1A
7	1P	1E	1F
8	2P	2C	2B
9	2D	2G	2A
10	COL	2E	2F
11	--	3C	3B
12	3D	3G	3A
13	S1	3E	3F
14	FM	4C	4B
15	4D	4G	4A
16	PM	4E	4F
17	AM		
18		AL	
19	MW		
20	LW		
21	SW		



TYPICAL APPLICATION CIRCUITS (1)

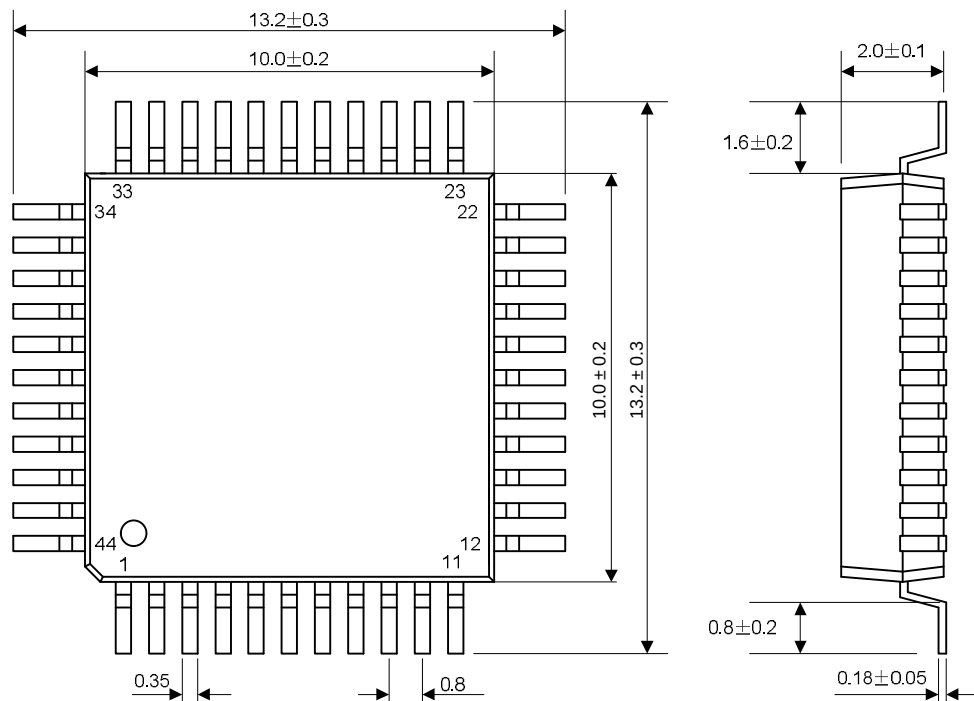


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PACKAGE OUTLINE

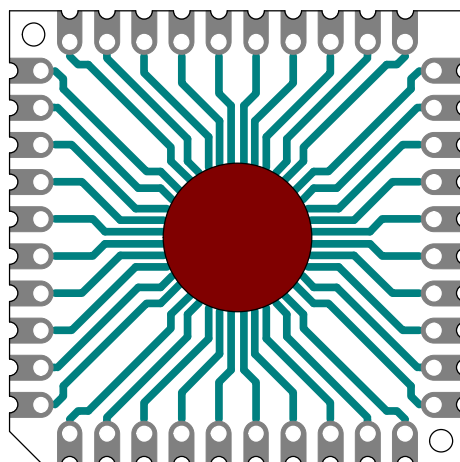
QFP-44-10x10-0.8

UNIT: mm



COB PACKAGE (QFP TYPE)

UNIT: mm

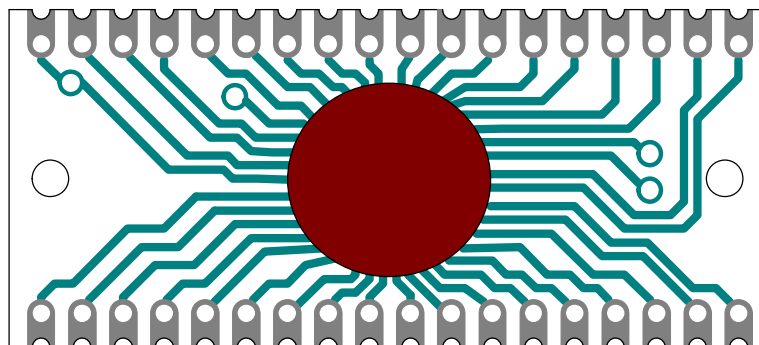


Note: PCB size refers to the label of detail products.

PACKAGE OUTLINE

COB PACKAGE (SOP TYPE)

UNIT: mm



Note: PCB size refers to the label of detail products.



HANDLING MOS DEVICES:

Electrostatic charges can exist in many things. All of our MOS devices are internally protected against electrostatic discharge but they can be damaged if the following precautions are not taken:

- Persons at a work bench should be earthed via a wrist strap.
- Equipment cases should be earthed.
- All tools used during assembly, including soldering tools and solder baths, must be earthed.
- MOS devices should be packed for dispatch in antistatic/conductive containers.

ATTACHMENT

Revision History

Data	REV	Description	Page
2000.12.31	1.0	Original	
2003.07.03	1.1	Modify the "PAD ASSIGNMENT"	3
2004.08.27	1.2	Add "CHIP TOPOGRAPHY" and "PAD COORDINATES" (1.39 x 1.26mm ²)	
2006.02.27	1.3	Modify the package of "QFP-44-10X10-0.8"	
2007.04.29	1.4	Delete"QFP-48-12X12-0.8" package and related content Delete"CHIP OUTLINE"and "BONDING COORDINATES" Delete detail size of COB in "PACKAGE OUTLINE"	