

General Description:

The IC is for LCD controller. It is the most cost performance for MCU+SG1620 application.

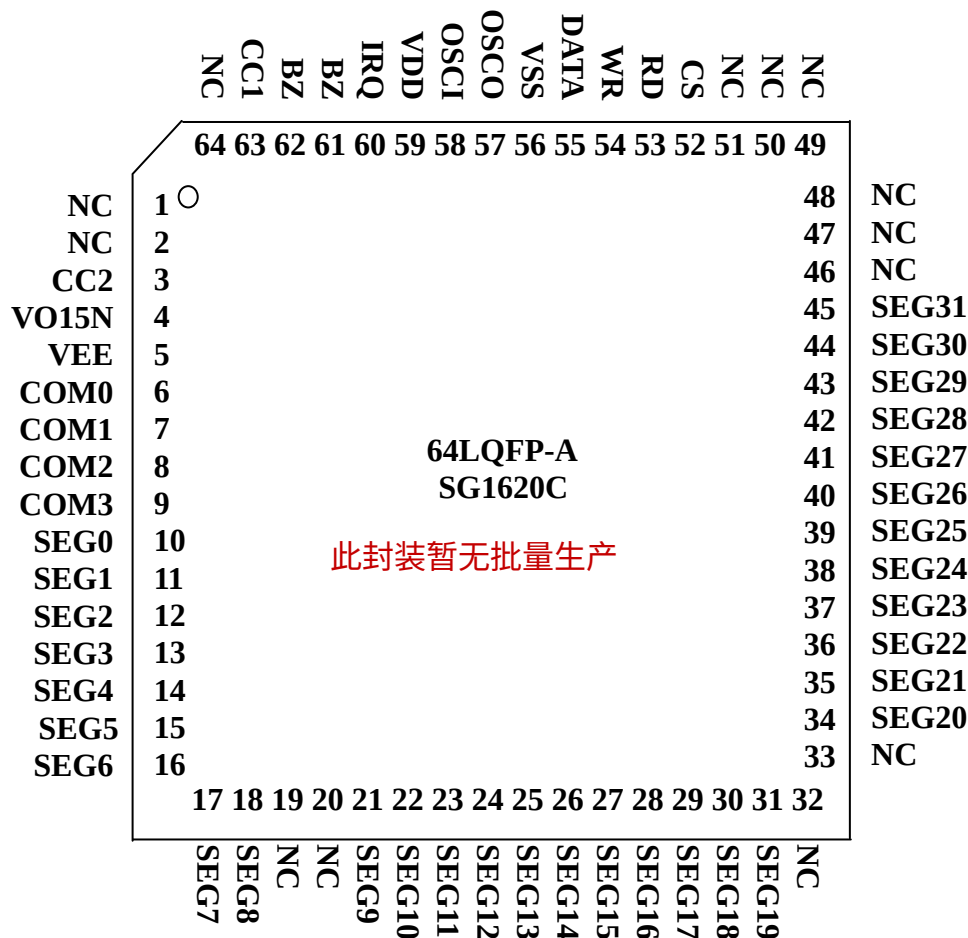
Features:

- ✧ Operating voltage 2.4V-3.3V
- ✧ System clock:- External 32768Hz crystal oscillator
- ✧ Provide 3 pins interface with MCU(RD/ WR/ DATA)
- ✧ Provide Buzzer frequency output
- ✧ Provide Time base timer and watch dog timer function
- ✧ Provide charge pump circuit
- ✧ LCD driver is 32 SEG/4 COM
- ✧ LCD duty is 1/2 duty, 1/3 duty or 1/4 duty
- ✧ LCD bias is 1/2 bias or 1/3 bias
- ✧ Provide internal reset function
- ✧ Provide 64-LQFP package , 48SSOP
- ✧ Low operating current <3uA at 3V

Application:

- LCD controller
- DVD player
- DVR player
- VCD player
- Car Display
- Instrument LCD display
- Home application LCD display
- Telecom LCD display
- MCU + LCD Driver
- LCD modul

Pin Assignments



SEG25	1	48	SEG24
SEG26	2	47	SEG23
SEG27	3	46	SEG22
SEG28	4	45	SEG21
SEG29	5	44	SEG20
SEG30	6	43	SEG19
SEG31	7	42	SEG18
$\overline{CS}$	8	41	SEG17
$\overline{RD}$	9	40	SEG16
$\overline{WR}$	10	39	SEG15
DATA	11	38	SEG14
VSS	12	37	SEG13
OSCO	13	36	SEG12
OSCI	14	35	SEG11
VDD	15	34	SEG10
$\overline{IRQ}$	16	33	SEG9
BZ	17	32	SEG8
$\overline{BZ}$	18	31	SEG7
CC1	19	30	SEG6
CC2	20	29	SEG5
VO15N	21	28	SEG4
VEE	22	27	SEG3
COM0	23	26	COM3
COM1	24	25	COM2

48SSOP-A

SG1620A

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SEG25	1	48	SEG24
SEG26	2	47	SEG23
SEG27	3	46	SEG22
SEG28	4	45	SEG21
SEG29	5	44	SEG20
SEG30	6	43	SEG19
SEG31	7	42	SEG18
$\overline{CS}$	8	41	SEG17
$\overline{RD}$	9	40	SEG16
$\overline{WR}$	10	39	SEG15
DATA	11	38	SEG14
VSS	12	37	SEG13
OSCO	13	36	SEG12
OSCI	14	35	SEG11
VDD	15	34	SEG10
CC1	16	33	SEG9
CC2	17	32	SEG8
VO15N	18	31	SEG7
VEE	19	30	SEG6
COM0	20	29	SEG5
COM1	21	28	SEG4
COM2	22	27	SEG3
COM3	23	26	SEG2
SEG0	24	25	SEG1

48SSOP-B

SG1620D

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. Pin Description

Name	I/O	Description
RD	I	Interface pin,low active,with internal pull high resistor 50Kohm@3V
WR	I	Interface pin,low active,with internal pull high resistor 50Kohm@3V
DATA	I/O	Interface pin,low active,with internal pull high resistor 50Kohm@3V
GND	P	Ground
VEE	-	LCD double voltage output
VDD	P	Positive power
VO15N	-	LCD half voltage output
CC1,CC2	-	External capacitor pin for charge pump circuit
COM0-COM3	O	LCD common pin
SEG31-0	O	LCD segment pin
TEST	I	No use, floating or connect to VDD
BZ/ $\overline{\text{BZ}}$	O	Buzzer frequency output
$\overline{\text{IRQ}}$	O	Timer output,NMOS open drain
OSCI	I	32768Hz crystal oscillator pin or external 256Khz clock input
OSCO	O	32768Hz crystal oscillator pin

. AC / DC Characteristics

1 Absolutely max. ratings

ITEM	SYMBOL	RATING	UNIT
Operating Temperature	Top	-25°C- +75°C	°C
Storage Temperature	Tsto	-50°C- +125°C	°C
Supply Voltage	VDD	5.5	V
Voltage to input terminal	Vin	Vss-0.3 to Vdd+0.3	V

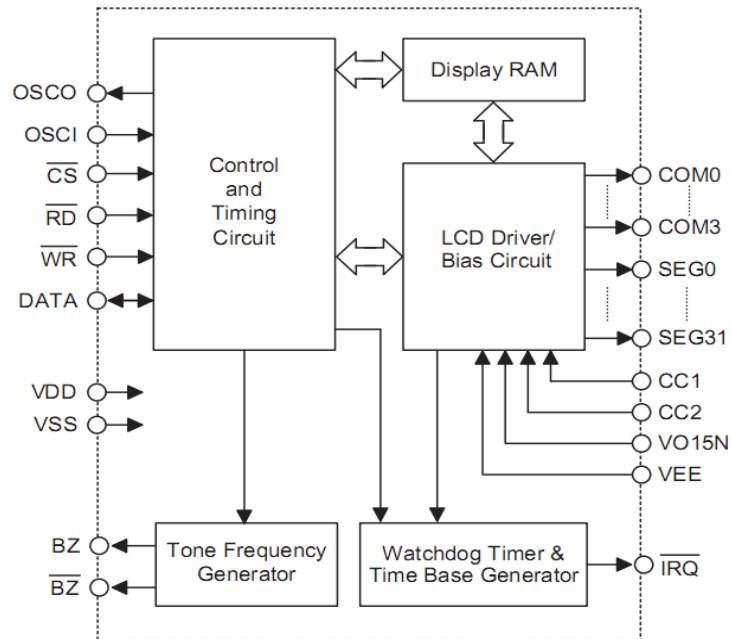
2 D.C. Characteristics

Item	Symbol	Condition	Min.	Typ.	Max.	unit
Operating voltage	VDD		2.4	-	3.3	V
Power consumption current	I _{OPR3}	3V External Crystal oscillator on, LCD on, no load		1	3	uA
stand by current	I _{st}	3V System halt, No load, oscillator off, LCD off			1	uA
Input low voltage for input pin	V _{IL1}	3V $\overline{RD}/\overline{WR}/DATA$	0		0.6	V
Input high voltage for input pin	V _{IH1}	3V $\overline{RD}/\overline{WR}/DATA$	2.4		3	V
BZ, $\overline{BZ}$, $\overline{IRQ}$, DATA Source Current	I _{OH}	3V V _{OH} =2.7V		-1.6	-0.6	mA
BZ, $\overline{BZ}$, $\overline{IRQ}$, DATA Sink Current	I _{OL}	3V V _{OL} =0.3V	0.8	1.8		mA
Segment output 'H'	I _{SOH}	3V		-90	-30	uA
Segment output 'L'	I _{SOL}	3V	70	115		uA
Common output 'H'	I _{COH}	3V		-140	-70	uA
Common output 'L'	I _{COL}	3V	80	145		uA
Pull-High Resistor	R _{PH}	3V DATA, $\overline{WR}$, $\overline{RD}$, $\overline{CS}$	100	200	300	kΩ

3 A.C. Characteristics

Item	Symbol	Condition	Min.	Typ.	Max.	unit
System clock	f _{SYS}	Crystal oscillator @3v (32Khz)		32.768		KHz
LCD frame frequency	F _{LCD1}	1/2 duty		64		HZ
	F _{LCD2}	1/3 duty		85.3		
	F _{LCD3}	1/4 duty		64		
Serial interface CKWB pin	F _{WR}	@3V,Clock duty 50%			150	KHz
Serial interface CKRB pin	F _{RD}	@3V,Clock duty 50%			75	KHz

. Block Diagram



Note: CS: Chip selection
 BZ, $\overline{BZ}$: Tone outputs
 WR, RD, DATA: Serial interface
 COM0~COM3, SEG0~SEG31: LCD outputs
 IRQ: Time base or WDT overflow output
 VO15N: Half voltage circuit output pin
 VEE: Double voltage circuit output pin
 CC1/CC2: External capacitor pin, for double voltage and half voltage circuit use

. Function Description

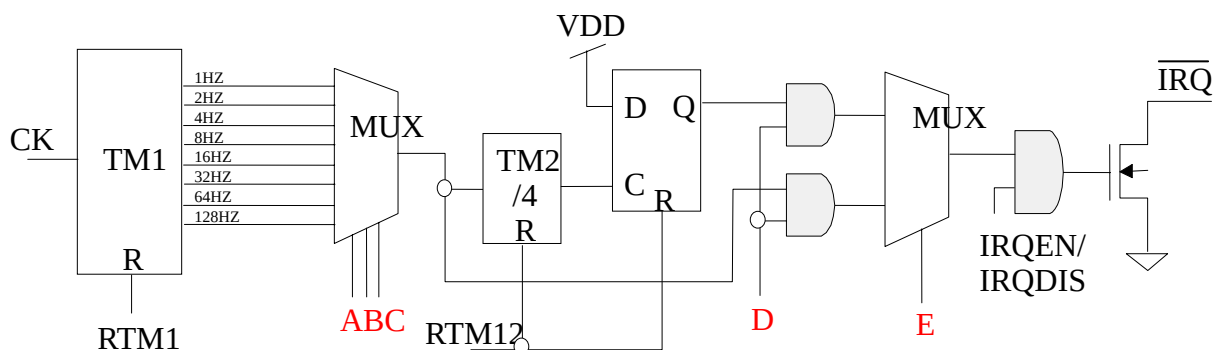
1 Control register format table

Function	Pre-code	Mode Code	Control code	
			Address	Data
Command	1	00	C7C6C5C4--C3C2C1C0--x	
Write	1	01	x-A4A3A2A1A0	B0B1B2B3
Read	1	10	x-A4A3A2A1A0	B0B1B2B3

	Function name	Control code C7C6C5C4--C3C2C1C0--x	Function description	Initial State
System initial	L2B2D	0010—00x0—x	Select 1/2 bias,1/2 duty	
	L2B3D	0010—01x0—x	Select 1/2 bias,1/3 duty	
	L2B4D	0010—10x0—x	Select 1/2 bias,1/4 duty	
	L3B2D	0010—00x1—x	Select 1/3 bias,1/2 duty	
	L3B3D	0010—01x1—x	Select 1/3 bias,1/3 duty	
	L3B4D	0010—10x1—x	Select 1/3 bias,1/4 duty	
	BZ4K	010x—xxxx—x	Select buzzer frequency is 4Khz	
	BZ2K	011x—xxxx—x	Select buzzer frequency is 2Khz	
System control	SysOff	0000—0000—x	Disable system oscillator OFF & LCD circuit OFF	V
	SysOn	0000—0001—x	Enable system oscillator ON	
	LCDoff	0000—0010—x	LCD circuit OFF	V
	LCDon	0000—0011—x	LCD circuit ON	
	BZdis	0000—1000—x	Disable Buzzer output	V
	$\overline{\text{IRQ}}\text{dis}$	100x—0xxx—x	Disable $\overline{\text{IRQ}}$ output	V
	$\overline{\text{IRQ}}\text{en}$	100x—1xxx—x	Enable $\overline{\text{IRQ}}$ output	
Others	No used	1110—0000—x	Don't use	
	Default	1110—0011—x	Don't use	V



* IRQ output pulse width is 8 system clock(TM1) and edge output(TM2).

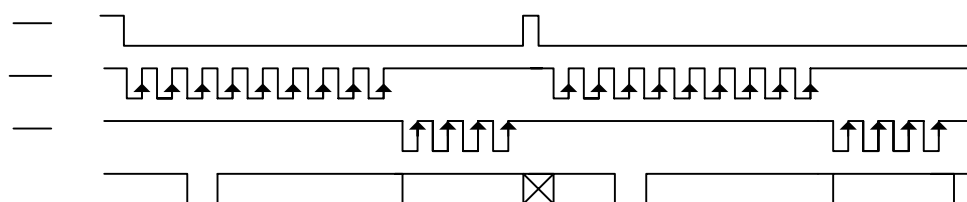


2 LCD RAM Mapping

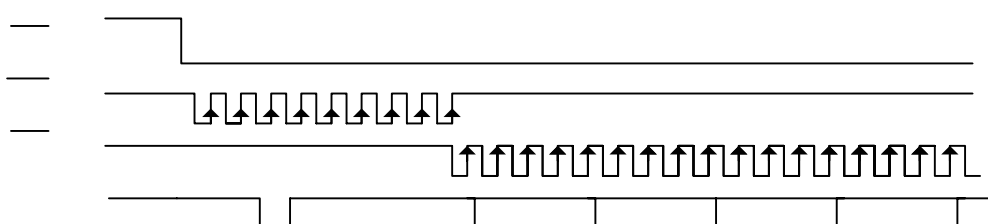
A4A3A2A1A0	COM0	COM1	COM2	COM3
	Bit0	Bit1	Bit2	Bit3
00 _H	SEG0			
01 _H	SEG1			
02 _H	SEG2			
03 _H	SEG3			
04 _H	SEG4			
05 _H	SEG5			
06 _H	SEG6			
07 _H	SEG7			
08 _H	SEG8			
09 _H	SEG9			
0A _H	SEG10			
0B _H	SEG11			
0C _H	SEG12			
0D _H	SEG13			
0E _H	SEG14			
0F _H	SEG15			
10 _H	SEG16			
11 _H	SEG17			
12 _H	SEG18			
13 _H	SEG19			
14 _H	SEG20			
15 _H	SEG21			
16 _H	SEG22			
17 _H	SEG23			
18 _H	SEG24			
19 _H	SEG25			
1A _H	SEG26			
1B _H	SEG27			
1C _H	SEG28			
1D _H	SEG29			
1E _H	SEG30			
1F _H	SEG31			

3 Serial interface format

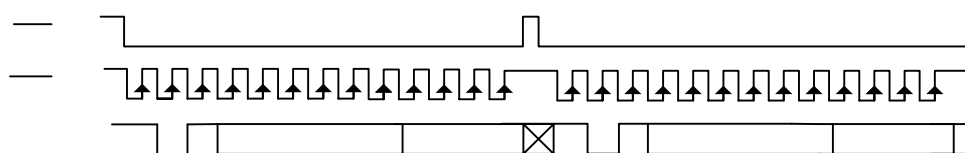
A. Read mode(Command Code:110)



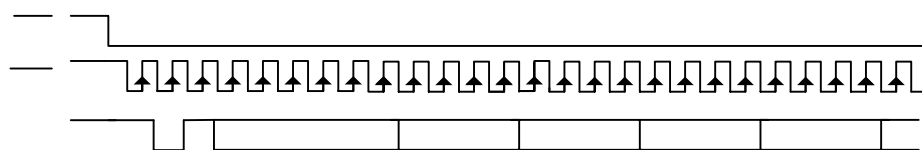
B. Read mode(Successive Address Reading)



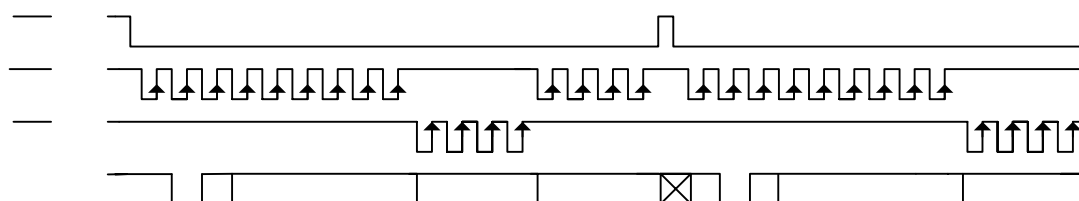
C. Write mode (Command Code:101)

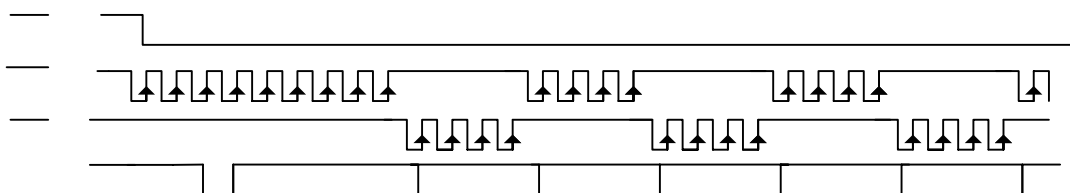
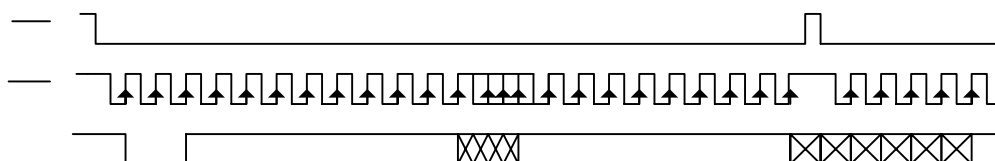
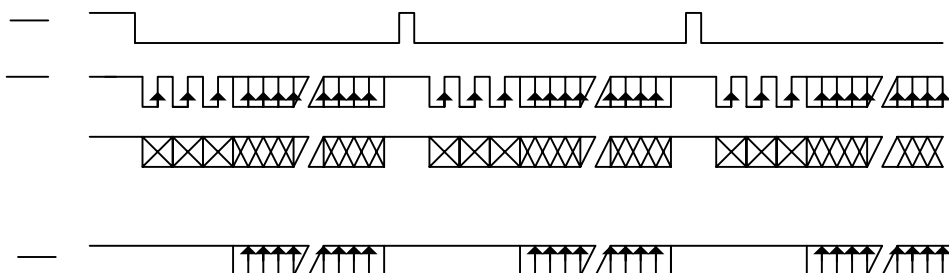


D. Write mode (Successive Address Writing)

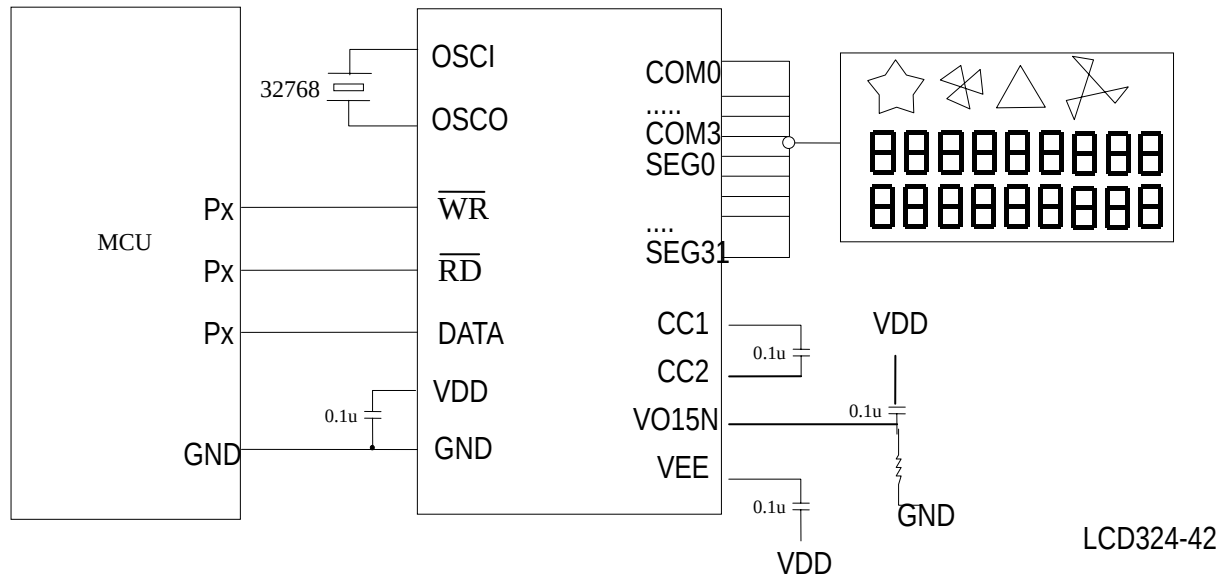


E. Read-modfy-write mode(Command Code:101)



F.Read-modfy-write mode (Successive Address Accessing)

G.Command mode (Command Code:100)

H.Mode (Data and command mode)


Application circuit



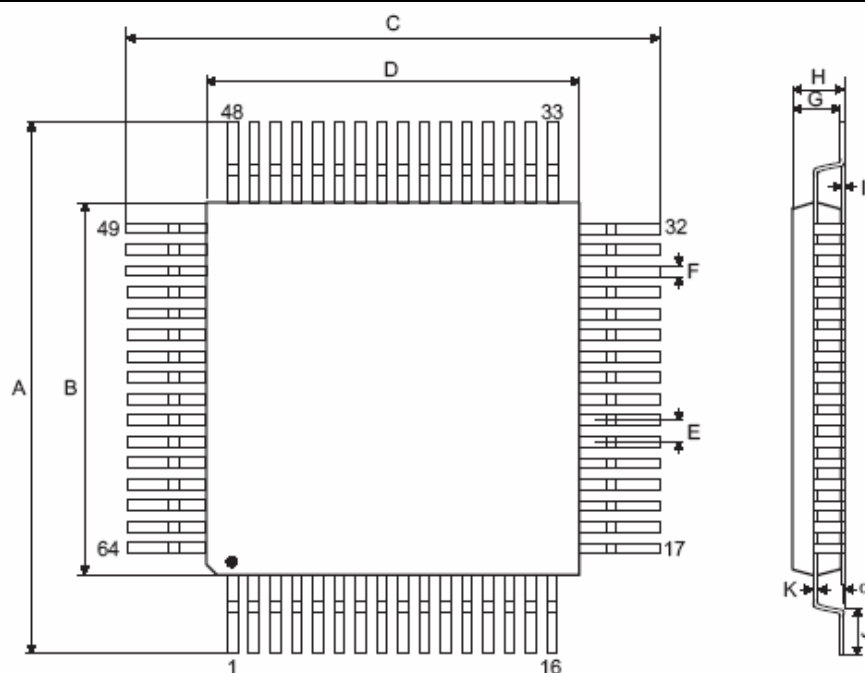
Application note: The 0.1uF capacitor is between VDD and GND. Its PCB layout must be very closed to SG1620 pin to be sure the anti-noise capability.

The table illustrates the suggestion value of capacities (C1, C2)

Crystal Error	Capacity Value
$\pm 10\text{ppm}$	0~10p
10~20ppm	10~20p

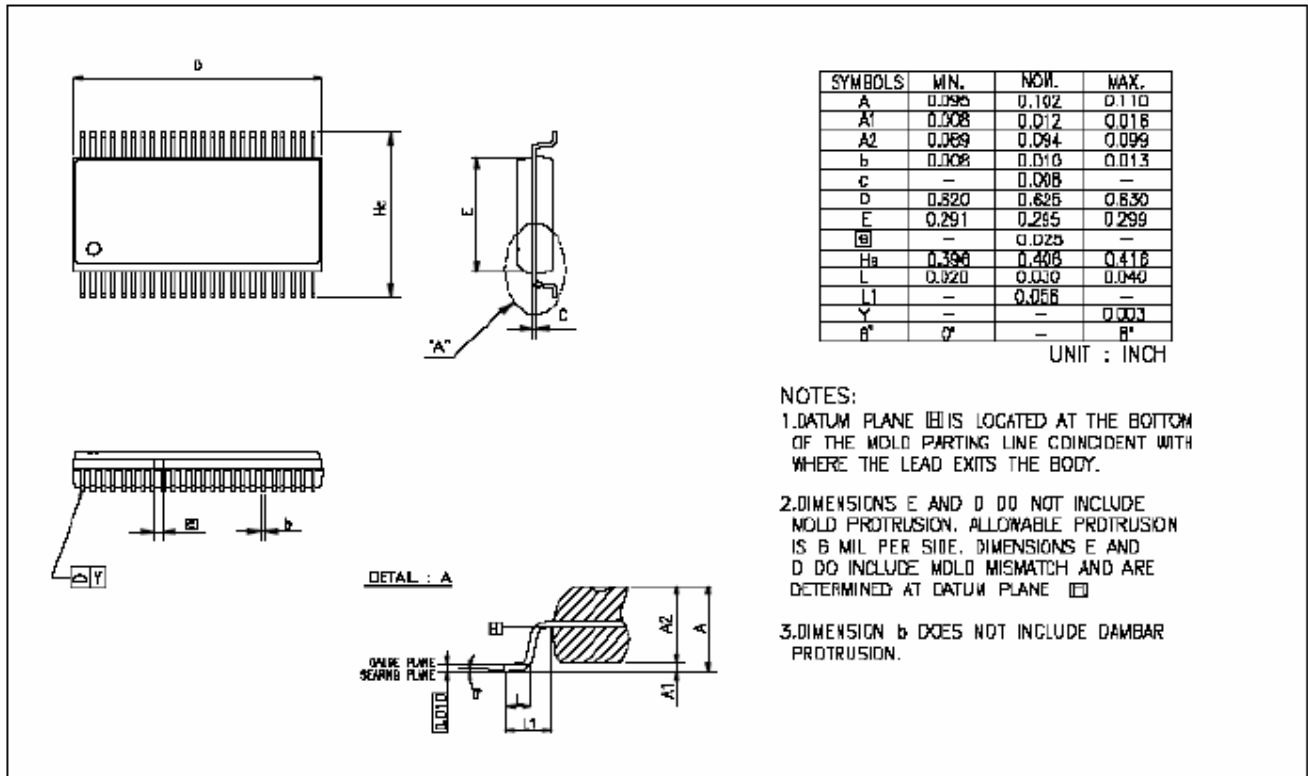
. Package Information

(64-LQFP) 此封装暂无批量生产

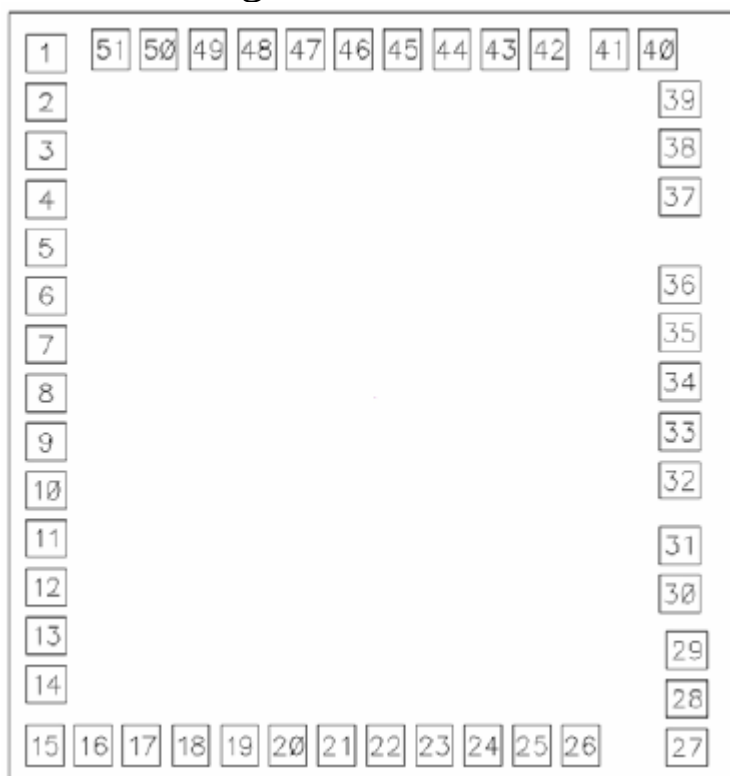


Symbol	Dimensions in mm		
	Min.	Nom.	Max.
A	8.9	—	9.1
B	6.9	—	7.1
C	8.9	—	9.1
D	6.9	—	7.1
E	—	0.4	—
F	0.13	—	0.23
G	1.35	—	1.45
H	—	—	1.6
I	0.05	—	0.15
J	0.45	—	0.75
K	0.09	—	0.20
α	0°	—	7°

(48-SSOP) 此封装暂无批量生产



SG1620 Pad Coordinate Diagram



OUTLINE SIZE: $1650 \times 1750 \mu\text{m}^2$

SUBSTRATE floating (recommend) or VDD

NO	NAME	X	Y
1	SEG6	-740.300	780.050
2	SEG7	-740.300	670.050
3	SEG8	-740.300	560.050
4	SEG9	-740.300	450.050
5	SEG10	-740.300	340.050
6	SEG11	-740.300	230.050
7	SEG12	-740.300	120.050
8	SEG13	-740.300	10.050
9	SEG14	-740.300	-99.950
10	SEG15	-740.300	-209.950
11	SEG16	-740.300	-319.950
12	SEG17	-740.300	-429.950
13	SEG18	-740.300	-539.950
14	SEG19	-740.300	-649.950

15	SEG20	-744.300	-789.950
16	SEG21	-634.300	-789.950
17	SEG22	-524.300	-789.950
18	SEG23	-414.300	-789.950
19	SEG24	-304.300	-789.950
20	SEG25	-194.300	-789.950
21	SEG26	-84.300	-789.950
22	SEG27	25.700	-789.950
23	SEG28	135.700	-789.950
24	SEG29	245.700	-789.950
25	SEG30	355.700	-789.950
26	SEG31	465.700	-789.950
27	CSB	706.550	-793.550
28	RDB	706.550	-683.550
29	WRB	706.550	-573.550
30	DATA	689.700	-445.450
31	VSS	689.700	-334.300
32	OSCO	689.700	-187.150
33	OSCI	689.700	-77.150
34	VDD	689.700	34.850
35	IRQB	689.700	146.850
36	BZ	689.700	256.850
37	BZB	689.700	455.750
38	CC1	689.700	565.750
39	CC2	689.700	675.750
40	VO15N	640.700	789.950
41	VEE	530.700	789.950
42	COM0	394.700	789.950
43	COM1	284.700	789.950
44	COM2	174.700	789.950
45	COM3	64.700	789.950
46	SEG0	-45.300	789.950
47	SEG1	-155.300	789.950
48	SEG2	-265.300	789.950
49	SEG3	-375.300	789.950
50	SEG4	-485.300	789.950
51	SEG5	-595.300	789.950