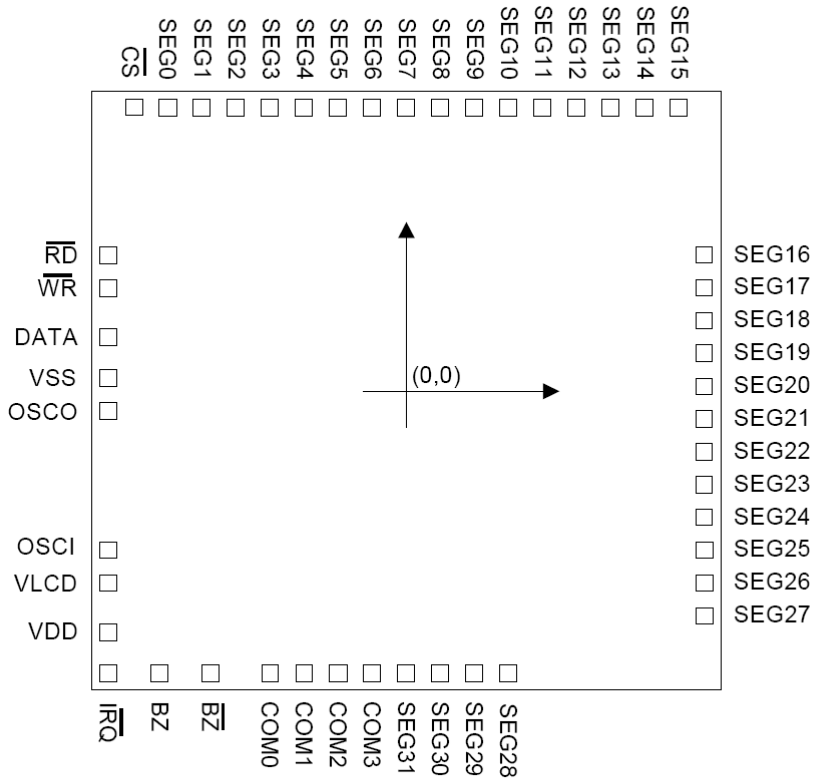
GA1621General Description

The GA1621 is a 128 dots (32x4), memory mapping, and multi-function LCD driver. The S/W con-figuration feature of the GA1621 makes it suitable for multiple LCD applications including LCD modules and display subsystems. Only three or four lines are required for the interface between the host controller and the GA1621. The GA1621 contains a power down command to reduce power consumption.

GA1621Features

- Operating voltage: 2.4V~5.2V
- Built-in 256kHz RC oscillator
- 8 kinds of time base/WDT clock sources
- 32x4 LCD driver
- 3-wire serial interface
- Internal LCD driving frequency source
- Software configuration feature
- Data mode and command mode instructions
- R/W address auto increment
- Three data accessing modes
- Power down command reduces power Consumption

GA1621Pad Assignment



IC SIZE:2.20mm X 2.15mm

The ic cubstrate should be connecte to VDD in PCB layout artwork

GA1621 Pad Coordinates

NO	NAME	X (um)	Y (um)	NO	NAME	X (um)	Y (um)
1	CS-	--926	924	25	SEG23	935	--429
2	RD-	--926	270	26	SEG22	935	--317
3	WR-	--926	112	27	SEG21	935	--205
4	DATA	--926	--31	28	SEG20	935	-93
5	VSS	--926	--179	29	SEG19	935	19
6	OSCO	--926	--358	30	SEG18	935	131
7	OSCI	--926	--522	31	SEG17	935	243
8	VLCD	--926	--640	32	SEG16	935	355
9	VDD	--926	--800	33	SEG15	864	924
10	IRQ-	--916	--929	34	SEG14	752	924
11	BZ	--745	--929	35	SEG13	640	924
12	BZ-	---570	--929	36	SEG12	528	924
13	COM0	--414	--929	37	SEG11	416	924
14	COM1	--302	--929	38	SEG10	304	924
15	COM2	--190	--929	39	SEG9	192	924
16	COM3	--78	--929	40	SEG8	80	924
17	SEG31	34	--929	41	SEG7	--30	924
18	SEG30	146	--929	42	SEG6	--142	924
19	SEG29	258	--929	43	SEG5	--255	924
20	SEG28	370	--929	44	SEG4	--367	924
21	SEG27	935	--877	45	SEG3	--478	924
22	SEG26	935	--765	46	SEG2	--590	924
23	SEG25	935	--653	47	SEG1	--702	924
24	SEG24	935	--541	48	SEG0	--814	924

GA1621 Pad Descriptions

Pad No.	Pad Name	I/O	Description
1	CS-	I	Chip selection input with pull-high resistor. When the CS- is logic high, the data and command read from or written to the GA1621 are disabled. The serial interface circuit is also reset. But if CS- is at logic low level and is input to the CS- pad, the data and command transmission between the host controller and the GA1621 are all enabled.
2	RD-	I	READ clock input with pull-high resistor. Data in the RAM of the GA1621 are clocked out on the falling edge of the RD- signal. The clocked out data will appear on the DATA line. The host controller can use the next rising edge to latch the clocked out data.
3	WR-	I	WRITE clock input with pull-high resistor. Data on the DATA line are latched into the GA1621 on the rising edge of the WR-signal.
4	DATA	I/O	Serial data input/output with pull-high resistor
5	GND	--	Negative power supply, ground
6	OSCO	O	The OSCI and OSCO pads are connected to a 32.768kHz crystal in order to generate a system clock. If the system clock comes from an external clock source, the external clock source should be connected to the OSCI pad. But if and on-chip RC oscillator is selected instead, the OSCI and OSCO pads can be left open.
7	OSCI	I	
8	VLCD	I	VLCD I LCD power input
9	VDD	--	Positive power supply
10	IRQ	O	Time base or WDT overflow flag, NMOS open drain output
11,12	BZ,BZ-	O	2kHz or 4kHz tone frequency output pair
13~116	COM0~COM3	O	LCD common outputs
48~17	SEG0 ~ 31	O	LCD segment outputs

GA1621 Absolute Maximum Ratings

Supply Voltage ---------- -0.3V ~ 5.5V

Input Voltage -------- VSS - 0.3V ~ VDD + 0.3V

Storage Temperature ---------- -50 ℃ ~ 125℃

Operating Temperature ---------- -25 ℃ ~ 75 ℃

GA1621 D.C. Characteristics

Parameter	Sym	Min	Typ	Max	Units	Test Conditions	
						V_{DD}	Conditions
Operating Voltage	V_{DD}	3.0	--	5.0	V	--	
Stand by Current	I_{DD}	--	0.1	5.0	uA	3V	No load
		--	0.3	10.0		5V	Power down mode
Operating Current	I_{OP}	--	150	300	mA	3V	No load/LCD ON
		--	300	600		5V	On-chip RC oscillator
Operating Current	I_{OP}	--	60	120	mA	3V	No load/LCD ON
		--	120	240		5V	Crystal oscillator
Operating Current	I_{OP}	--	100	200	mA	3V	No load/LCD ON
		--	200	400		5V	External clock source
Input Low Voltage	V_{IL}	0	--	0.6	V	3V	DATA, WR-, CS-, RD-
		0	--	1.0		5V	
Input High Voltage	V_{IH}	2.4	--	3.0	V	3V	DATA, WR-, CS-, RD-
		4.0	--	5.0		5V	
DATA, BZ, BZ-, IRQ-	I_{OL1}	0.5	1.2	--	mA	3V	V_{OL}=0.3V
		1.3	2.6	--		5V	V_{OL}=0.5V
DATA, BZ, BZ-	I_{OH1}	-0.4	-0.8	--	mA	3V	V_{OH}=2.7V
		-0.9	-1.8	--		5V	V_{OH}=4.5 V
LCD Common Sink Current	I_{OL2}	80	150	--	uA	3V	V_{OL}=0.3V
		150	250	--		5V	V_{OL}=0.5V
LCD Common Source Current	I_{OH2}	-80	-120	--	uA	3V	V_{OH}=2.7V
		-120	-200	--		5V	V_{OH}=4.5 V
LCD Segment Sink Current	I_{OL3}	60	120	--	uA	3V	V_{OL}=0.3V
		120	200	--		5V	V_{OL}=0.5V
LCD Segment Source Current	I_{OH3}	-40	-70	--	uA	3V	V_{OH}=2.7V
		-70	-100	--		5V	V_{OH}=4.5 V
Pull High Resistor	R_{PH}	40	80	150	KΩ	3V	DATA, WR-, CS-
		30	60	100		5V	

GA1621 A.C. Characteristics

Parameter	Sym	Min	Typ	Max	Units	Test Conditions	
						V_{DD}	Conditions
System Clock	f_{SYS1}	--	256	--	KHz	3V	On Chip RC Oscillator
		--	256	--		5V	
System Clock	f_{SYS2}		32.768		KHz	3V	Crystal Oscillator
			32.768			5V	
System Clock	f_{SYS3}		256		KHz	3V	External clock source
			256			5V	
LCD Clock	f_{LCD}	--	F_{SYS1}/1024	--	Hz	--	On-chip RC oscillator
		--	F_{SYS2}/128	--			Crystal Oscillator
		--	F_{SYS3}/1024	--			External clock source
LCD Common Period	t_{COM}	--	n/f_{LCD}	--	S		n: Number of COM
Serial Date Clock (WR- Pin)	f_{CLK1}	--	--	150	KHz	3V	Duty cycle 50%
		--	--	300		5V	
Serial Date Clock (RD- Pin)	f_{CLK2}	--	--	75	KHz	3V	Duty cycle 50%
		--	--	150		5V	
Tone Frequency	f_{TONE}	--	2.0 or 4.0	--	KHz	--	On-chip RC oscillator
Serial Interface Reset Pulse Width (Figure 3)	t_{CS}	--	250	--	ns	3V	CS-
						5V	
WR-, RD- Input Pulse Width (Figure 1)	t_{CLK}	3.34	--	--	us	3V	Write mode
		6.67	--	--		5V	Read mode
		1.67	--	--		3V	Write mode
		3.34	--	--		5V	Read mode
Rise/Full Time Serial Data Clock Width (Figure 1)	t_r,t_f	--	120	--	ns	3V	
						5V	
Setup Time for Data to WR-, RD- Clock Width (Figure 1)	t_{su}	--	120	--	ns	3V	
						5V	
Hold Time for Data to WR-, RD- Clock Width (Figure 1)	t_h	--	120	--	ns	3V	
						5V	
Setup Time for Data to CS- Clock Width (Figure 1)	t_{su1}	--	100	--	ns	3V	
						5V	
Hold Time for Data to CS- Clock Width (Figure 1)	t_{h1}	--	100	--	ns	3V	
						5V	

GA1621 Commanded Formant

The GA1621 can be configured by the S/W setting. There are two mode commands to configure the GA1621 resources and to transfer the LCD display data. The configuration mode of the GA1621 is called command mode, and its command mode ID is **1 0 0**. The command mode consists of a system configuration command, a system frequency selection command, a LCD configuration command, a tone frequency selection command, a timer/WDT setting command, and an operating command. The data mode, on the other hand, includes READ, WRITE, and READ-MODIFY-WRITE operations. The following are the data mode IDs and the comm and mode ID:

Operation	Mode	ID
READ	Data	110
WRITE	Data	101
READ-MODIFY-WRITE	Data	101
COMMAND	Command	100

The mode command should be issued before the data or command is transferred. If successive commands have been issued, the command mode ID, namely **1 0 0**, can be omitted. While the system is operating in the non-successive command or the non-successive address data mode, the CS- pin should be set to “1” and the previous operation mode will be reset also. Once the CS- pin returns to “0” a new operation mode ID should be issued first.