Manual for ZQL9712 Chip Product (v 2.2)

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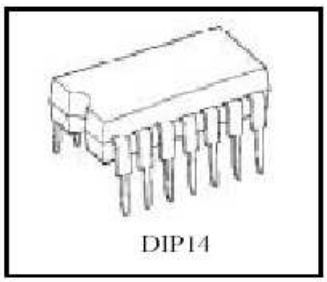
1. Product Description

ZQL9712 chip is specially designed for LED drives applications, and adopt advanced CMOS craft with the advantage of low consumption. The ZQL9712 chip can apply to the LED display system, especially suits the multi-separate dots cascade applies. ZQL9712 supplies 3 pieces of large electric current to drive and output, drive the 30MA most greatly of electric current.



ZQL9712-DIP

ZQL9712 chip including serial-shift register and output latch, Which is through serial-shift register with 3bits parallel output, take this output as the input of the output register at the meantime. The serial-shift register and the output register are controlled by the different clock signal , and all is effective in the clock signal rise。The driven control-signal can be taken as the input signal of the back cascade circuit after it outputted by ZQL9712. ,

2. Features

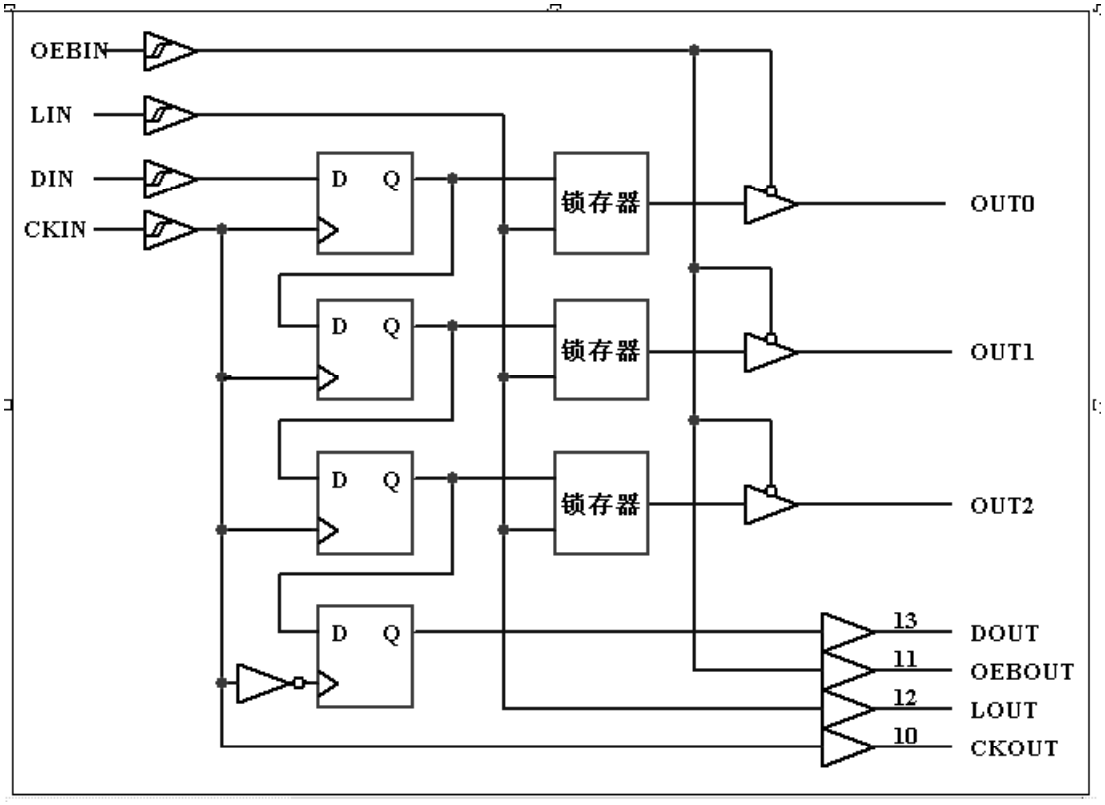
- 3 bits drive output.
- the maximum output current is up to 30 MA.
- Optimized interface with many slice trans-board cascade.
- 5V CMOS level input compatible.
- Max.15M Serial-shift clock frequency.
- Many kinds of package are available.

3. Product serial number

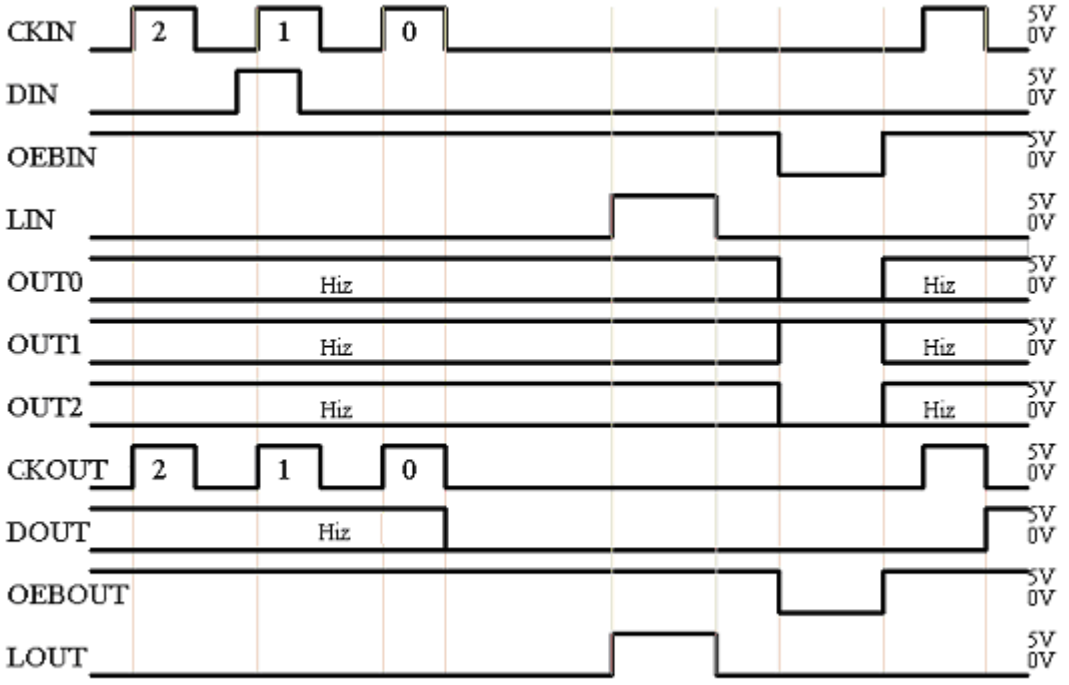
Serial number	Package
ZQ9712-DIP	DIP package
ZQ9712-DIE	DIE package
ZQ9712-COB1	DIPCOB package
ZQ9712-COB2	SMDCOB package
ZQ9712-TSSOP	SMD package
ZQ9712-SOP14L	SMD package

4. Functional Description

4.1 function Diagram



4.2 Basic clock-sequence



5. Capability parameters

5.1Maximum operating condition

PARAMETER	SYM	RANGE	UNIT
Supply voltage	V_{DD}	0～+5.0	V
Input voltage	V_{IN}	-0.4～V_{DD}+0.4	V
Output current	I_{OUT}	30	mA
Output voltage	V_{OUT}	-0.5～V_{DD}+0.5	V
Clock frequency	FCLK	15	MHz
Power consumption	P_D	600	mW
Pin temp.	T_L	260（10S）	°C
Operating temp.	T_{opr}	-40～+85	°C
Storage temp.	T_{stg}	-65～+150	°C

5.2Recommanded operating condition

PARAMETER	SYM	TEST CONDITION	MINI.	TYP	MAX.	UNIT
Supply voltage	V_{DD}		2.0		6.0	V
Output voltage	V_{OUT}	-40~+85° C	-	5		V
Output current	I_{OUT}	Drive output	25	30	-	mA
	I_{OH}	Other output			1.0	mA
	I_{OL}	Other output			-1.0	mA
Input voltage	V_{IH}		4	5	5.5	V
	V_{IL}		-0.3		2.1	V
CLK frequency	FCLK				15	MHz
CLK high level width	CLKH		25			ns
CLK low level width	CLKL		25			ns
Signal set-up time	SETUP		10			ns
Signal hold time	HOLD		10			ns
Power consumption	CLKH				450	mW
CLK low level width	CLKL		25ns			ns
Storage temp.	T_{stg}		-40～+100			°C

5.3 Electric parameters

PARAMETER	SYM	TEST CONDITION	V_{DD}	T=25° C		T=-40～85° C	T=-55～125° C	UNIT
				TYP	limiting value			
Minimum high level output	V_{OH}	$V_{IN}=V_{IH}$ orV_{IL} I_{OUT}<30	2.0	2.0	1.9	1.9	1.9	ns
			4.5	4.5	4.4	4.4	4.4	ns
			6	6.0	5.9	5.9	5.9	ns
Maximum low level output	V_{OL}	$V_{IN}=V_{IH}$ orV_{IL} I_{OUT}<30	2.0	0	0.1	0.1	0.1	ns
			4.5	0	0.1	0.1	0.1	ns
			6.0	0	0.1	0.1	0.1	ns
Maximum input current	I_{IN}	$V_{IN}=V_{DD}$orGND	6.0		±0.1	±0.1	±0.1	uA

5.4 Clock-sequence Parameters

PARAMETER	SYM	TEST CONDITION	MINI.	TYP.	MAX.	UNIT
CLK high level width	CLKH		25			ns
CLK low level width	CLKL		25			ns
Signal set-up time	SETUP		10			ns
Signal hold time	HOLD		10			ns

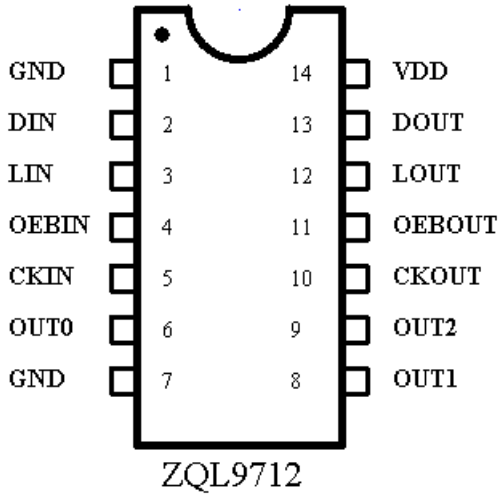
PARMETER	SYM.	V_{DD}	T=25° C	T=-40~85° C	T=-55~125° C		UNIT
			TYP	limiting value			
MAX. Input Rise and Fall time	t_r t_f	2		1000	1000	1000	ns
		4.5		500	500	500	ns
		6		400	400	400	ns
MAX. Output and Fall time	t_{THL} t_{TLH}	2	25	60	75	90	ns
		4.5	7	12	15	18	ns
		6	6	10	13	15	ns

6. Described for package

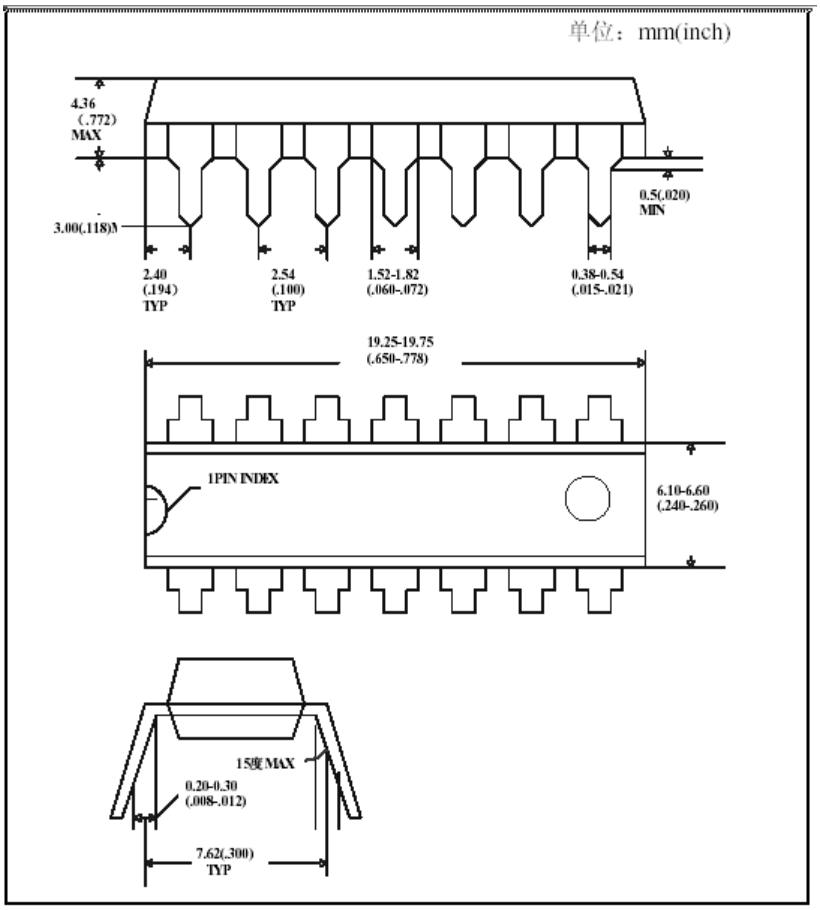
6.1 Duel in-line package: DIP 14

6.1.1 Pin definition

Pin NO.	Pin name	Description
1	GND	ground
2	DIN	Serial dada input
3	LIN	Load signal input
4	OEBIN	Output enable input
5	CKIN	Serial clock input
6	OUT0	Drive output
7	GND	ground
8	OUT1	Drive output
9	OUT2	Drive output
10	CKOUT	Serial clock output
11	OEBOUT	Output enable input
12	LOUT	Load signal output
13	DOUT	Serial data output
14	VDD	power



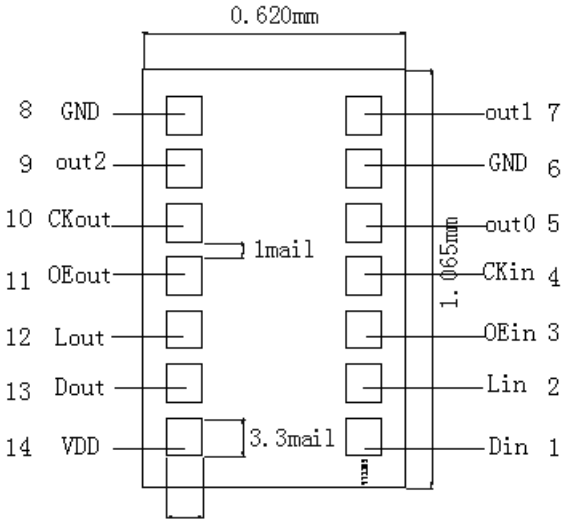
6.1.2 Physical dimensions



6.2 ZQ9712-DIE (Naked slice)

6.2.1 Pin definition and dimension

PAD		COORDINATES	
PAD NO.	PAD name	X(um)	Y(um)
1	Din	216.28	47
2	Lin	321.28	47
3	$\overline{Oein}$	426.28	47
4	Ckin	531.28	47
5	Out0	636.28	47
6	Gnd	741.28	47
7	Out1	846.28	47
8	Gnd	846.28	573
9	Out2	741.28	573
10	Ckout	636.28	573
11	$\overline{Oeout}$	531.28	573
12	Lout	426.28	573
13	Dout	321.28	573
14	vdd	216.28	573

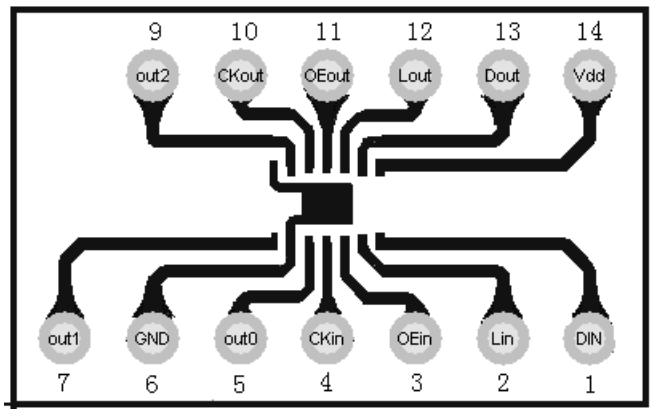


6.3 COB Package

6.3.1 ZQ9712-COB1

Pin definition and dimension

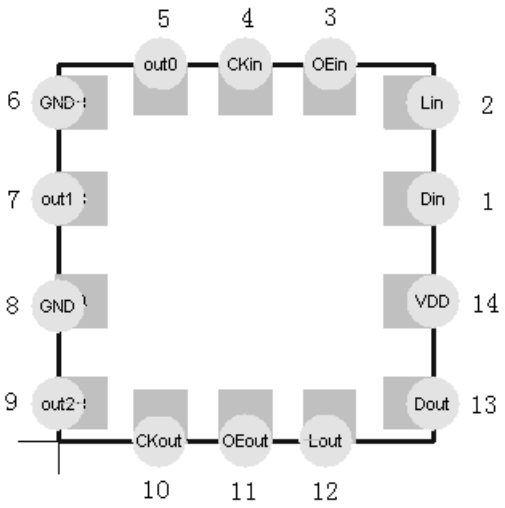
Pin		Coordinates	
Pin NO.	**Pin name**	**X(mil)**	**Y(mil)**
1	DIN	522.4	49.8
2	LIN	433.7	49.8
3	$\overline{\text{OEIN}}$	365.0	49.8
4	CKIN	286.2	49.8
5	OUT0	207.5	49.8
6	GND	128.7	49.8
7	OUT1	50	49.8
8	NC		
9	OUT2	128.7	286.0
10	CKOUT	207.5	286.0
11	$\overline{\text{OEOUT}}$	286.2	286.0
12	LOUT	365.0	286.0
13	DOUT	433.7	286.0
14	VDD	522.4	286.0



6.3.2 ZQ9712-COB2

Pin definition and dimension

Pin		Coordinates	
Pin NO.	**Pin name**	**X(mil)**	**Y(mil)**
1	DIN	275.6	177.2
2	LIN	275.6	248.0
3	$\overline{\text{OEIN}}$	199.8	275.6
4	CKIN	137.8	275.6
5	OUT0	75.8	275.6
6	GND	0	98.4
7	OUT1	0	177.2
8	GND	0	248.0
9	OUT2	0	27.6
10	CKOUT	74.8	0
11	$\overline{\text{OEOUT}}$	137.8	0
12	LOUT	199.8	0
13	DOUT	275.6	27.6
14	VDD	275.6	102.4



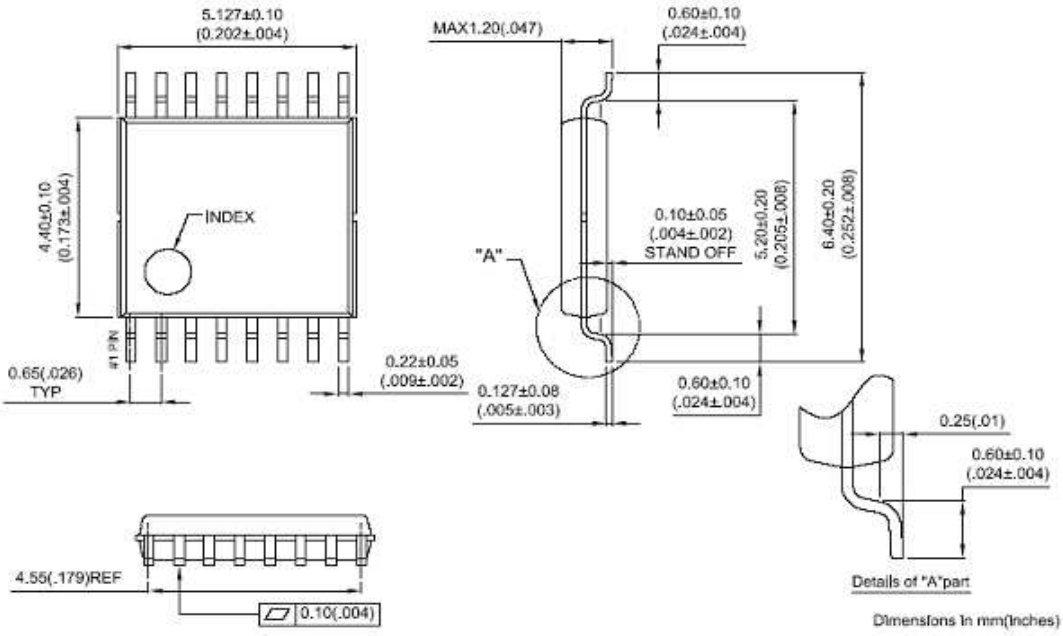
6.4 Package with table

6.4.1 TSSOP16 package 9712

6.4.1.1 Pin definition and dimension

Pin No.	Pin Name	Description
1	Din	Serial data input
2	Lin	Load signal input
3	$\overline{\text{OEin}}$	Output enable input
4	CKin	Serial clock input
5	Out0	Drive output
6	GND	Ground
7	Out1	Drive output
8	GND	Ground
9	GND	Ground
10	GND	Ground
11	Out2	Drive output
12	CKout	Serial clock output
13	$\overline{\text{OEout}}$	Output enable input
14	Lout	Load signal output
15	Dout	Serial data output
16	VDD	power

6.4.1.2 TSSOP16 Physical dimension



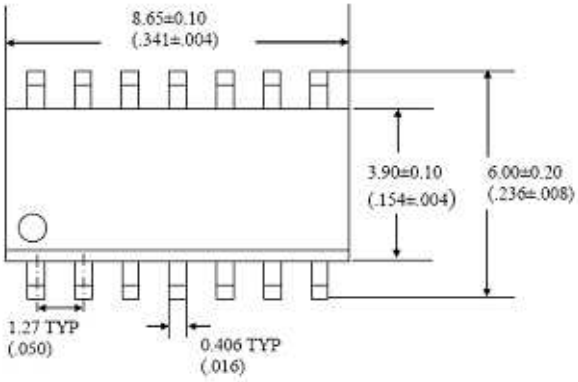
6.4.2 SOP14L

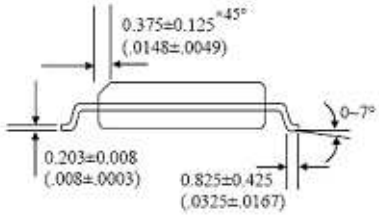
6.4.2.1 Pin definition and dimension

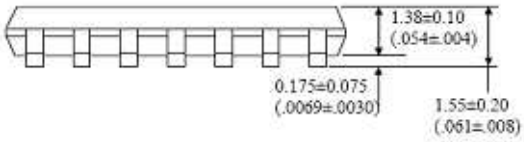
PAD No.	PAD Name
1	Din
2	Lin
3	Oein
4	Ckin
5	Out0
6	Gnd
7	Out1
8	Gnd
9	Out2
10	Ckout
11	Oeout
12	Lout
13	Dout
14	vdd

6.4.2.2 ZQL9712-SOP14L Physical dimension

引线间距 Lead Pitch	1.27mm(50mil)
切筋凸缘 Trim Flange	0~0.1mm(0~3.9mil)
载体尺寸 Pad Size	90mil×110mil
载体打凹深度 Depressed Die Pad	0.229±0.025mm (0.009±0.001mil)
单位 Unit	mm(inches)

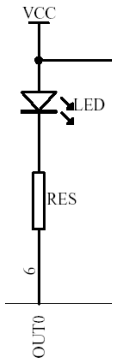






7. Application circuit

7.1 Sketch map



7.2 Method for current adjustment

After selected the LED, adjust the current in LED by adjusting the finite resistence in series with LED：Method for resistance computing R=(Vcc-V_{9712}-V_{LED})/I

thereinto R：finite current resistance

Vcc：supply voltage 5v +/- 0.5v

V_{9712}：saturated chip and voltage drop 0.8v-1v

V_{LED}：LED on-state voltage drop

I：LED Operating current (recommended not bigger than 20 MA when static)

8. Applications for notice

8.1 Solder for notice

6.1.1 Solder temperature: iron constant temperature is 245℃.

6.1.2 Solder time: less than 10s.

8.2 Binding for notice

6.2.1When chip on the PCB board., there is no tin spraying in binding

6.2.2 Select IC glue of small coefficient of expansion for use

6.2.3When designing the binding domain, the copper leather under the chip to cover the ground should be as lager as possible.

8.3 Test for notice

6.3.1 Adds the power first while test beginning, and then add the signal of testing.

6.3.2 Take away the signal first when test finished, and then drop back the power.

6.3.3 First test the IC pin soldering that if it has broken circuit visually, and then test it with electricity.