

低电荷注入32通道、带泄放电阻高压模拟开关

特性:

- ▶ 高性能的高压CMOS技术
- ▶ 输出集成泄放电阻
- ▶ 32通道高压模拟开关
- ▶ 3.3V输入逻辑电平兼容
- ▶ 20兆赫数据移位时钟频率
- ▶ 非常低的静态功耗（50微安）
- ▶ 低寄生电容
- ▶ 直流至50兆赫小信号频率响应
- ▶ 5.0兆赫时的典型断开隔离-60dB
- ▶ 用于低功耗的CMOS逻辑电路
- ▶ 卓越的抗噪性
- ▶ 带锁存器的级联串行数据寄存器
- ▶ 灵活的工作电源电压

应用:

- ▶ 医疗超声影像
- ▶ 无损探伤
- ▶ 压电传感器驱动
- ▶ 光学MEMS模组

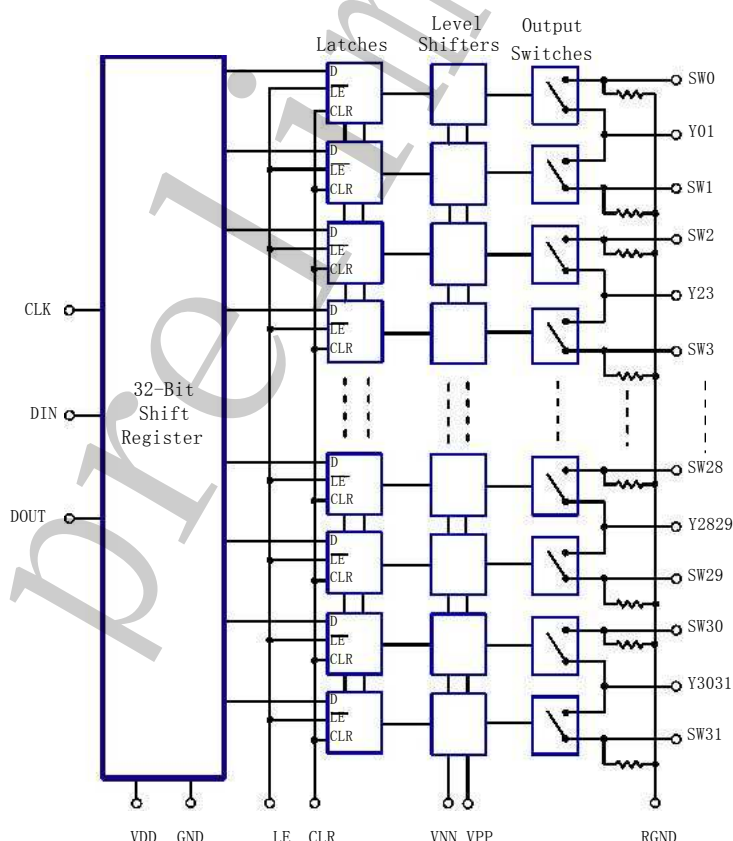
概述:

SY2320为低电荷注入，32通道，高压模拟开关集成电路。这芯片是为以下应用而设计的需要低压信号控制的高压开关，如医学超声图像、工业无损探伤和其他压电传感器驱动器。SY2320集成了泄放电阻，用来消除电容性负载（如压电传感器）两端积累噪声电压

该器件将输入数据移位到32位移位寄存器中，然后可以保留在32位锁存器中。为了减少时钟馈通引入的噪声，在数据载入移位寄存器期间将LE拉至高电平。当移位寄存器装载有效数据后，在LE作用一个低电平脉冲，将移位寄存器内容装载到锁存器。该器件结合了HVCMOS技术、双极性型DMOS开关和低功耗CMOS逻辑对高压模拟信号进行控制。

该芯片适用于多种高电压电源，例如， $V_{pp}/V_{nn}:+60V/-60V$ 。

方框图:



订购信息:

芯片型号	封装
	64-Lead LGA 9.00x9.00mm body 0.7mm height 0.50mm pitch
SY2320	SY2320FN

极限范围:

Parameter	Value
V _{DD} logic supply	-0.5V to +7.0V
V _{PP} -V _{NN} differential supply	140V
V _{PP} positive supply	-0.5V to V _{NN} +140V
V _{NN} negative supply	+0.5V to -70V
Logic input voltage	-0.5V to V _{DD} +0.3V
Analog signal range	V _{NN} to V _{PP}
Peak analog signal current/channel	2.0A
Storage temperature	-65°C to 150°C
Power dissipation: 64-Lead LGA	1.5W

Absolute Maximum Ratings are those values beyond which damage to the device may occur. Functional operation under these conditions is not implied. Continuous operation of the device at the absolute rating level may affect device reliability. All voltages are referenced to device ground.

建议工作条件:

Sym	Parameter	Value
V _{DD}	Logic power supply voltage	3.0V to 5.5V
V _{PP}	Positive high voltage supply	+40V to V _{NN} +120V
V _{NN}	Negative high voltage supply	-40V to -60V
V _{IH}	High level input voltage	0.9V _{DD} to V _{DD}
V _{IL}	Low level input voltage	0V to 0.1V _{DD}
V _{SIG}	Analog signal voltage peak-to-peak	V _{NN} +5V to V _{PP} -5V
T _A	Operating free air temperature	0°C to 70°C

Notes:

1. Power up/down sequence is arbitrary except GND must be powered-up first and powered-down last.
2. V_{SIG} must be within V_{NN} and V_{PP} or floating during power up/down transition.
3. Rise and fall times of power supplies V_{DD}, V_{PP}, and V_{NN} should not be less than 1.0msec.

DC Electrical Characteristics

(over recommended operating conditions unless otherwise noted)

Sym	Parameter	0°C		+25°C			+70°C		Units	Conditions	
		Min	Max	Min	Typ	Max	Min	Max			
R _{ONS}	Small signal switch ON-resistance	-	-	-	-	-	-	-	Ω		V _{PP} = +60V V _{NN} = -60V
		-	-	-	-	-	-	-			
		-	-	-	25	-	-	-		I _{SIG} = 5.0mA	
		-	-	-	17	-	-	-		I _{SIG} = 200mA	
		-	-	-	-	-	-	-			
		-	-	-	-	-	-	-			
ΔR _{ONS}	Small signal switch ON-resistance matching	-	20	-	5.0	20	-	20	%	I _{SIG} = 5.0mA, V _{PP} = +60V, V _{NN} = -60V	
R _{ONL}	Large signal switch ON-resistance	-	-	-	35	-	-	-	Ω	V _{SIG} = V _{PP} -10V, I _{SIG} = 1.0A	
R _{INT}	Value of output bleed resistor	-	-	20	35	50	-	-	kΩ	Output Switch to RGND I _{RINT} = 0.5mA	
I _{SOL}	Switch OFF leakage per switch*	-	5.0	-	1.0	10	-	15	μA	V _{SIG} = V _{PP} -5V and V _{NN} +5V	
V _{OS}	DC offset switch OFF*	-	300	-	100	300	-	300	mV	No Load	
	DC offset switch ON*	-	500	-	100	500	-	500	mV		
I _{PPQ}	Quiescent V _{PP} supply current	-	-	-	2.8	-	-	-	μA	All switches OFF	
I _{NNQ}	Quiescent V _{NN} supply current	-	-	-	-3.1	-	-	-	μA	All switches OFF	
I _{PPQ}	Quiescent V _{PP} supply current	-	-	-	2.6	-	-	-	μA	All switches ON, I _{SW} = 5.0mA	
I _{NNQ}	Quiescent V _{NN} supply current	-	-	-	-3.0	-	-	-	μA	All switches ON, I _{SW} = 5.0mA	
I _{SW}	Switch output peak current	-	2.0	-	-	2.0	-	2.0	A	V _{SIG} duty cycle < 0.1%	
f _{SW}	Output switching frequency	-	-	-	-	50	-	-	kHz	Duty cycle = 50%	
I _{PP}	Average V _{PP} supply current	-	-	-	-	-	-	-	mA		All output switches are turning ON and OFF at 50kHz with no load.
		-	0.5	-	-	0.6	-	-		V _{PP} = +60V V _{NN} = -60V	
		-	-	-	-	-	-	-			
I _{NN}	Average V _{NN} supply current	-	-	-	-	-	-	-	mA		All output switches are turning ON and OFF at 50kHz with no load.
		-	0.9	-	-	1.1	-	-		V _{PP} = +60V V _{NN} = -60V	
		-	-	-	-	-	-	-			
I _{DD}	Average V _{DD} supply current	-	0.5	-	-	0.6	-	-	mA	f _{CLK} = 5.0MHz, V _{DD} = 10.0V	
I _{DDQ}	Quiescent V _{DD} supply current	-	45	-	-	50	-	-	μA	All logic inputs are static	
I _{SOR}	Data out source current	0.45	-	0.45	0.70	-	0.40	-	mA	V _{OUT} = V _{DD} - 0.7V	
I _{SINK}	Data out sink current	0.45	-	0.45	0.70	-	0.40	-	mA	V _{OUT} = 0.7V	
C _{IN}	Logic input capacitance	-	10	-	-	10	-	10	pF	---	

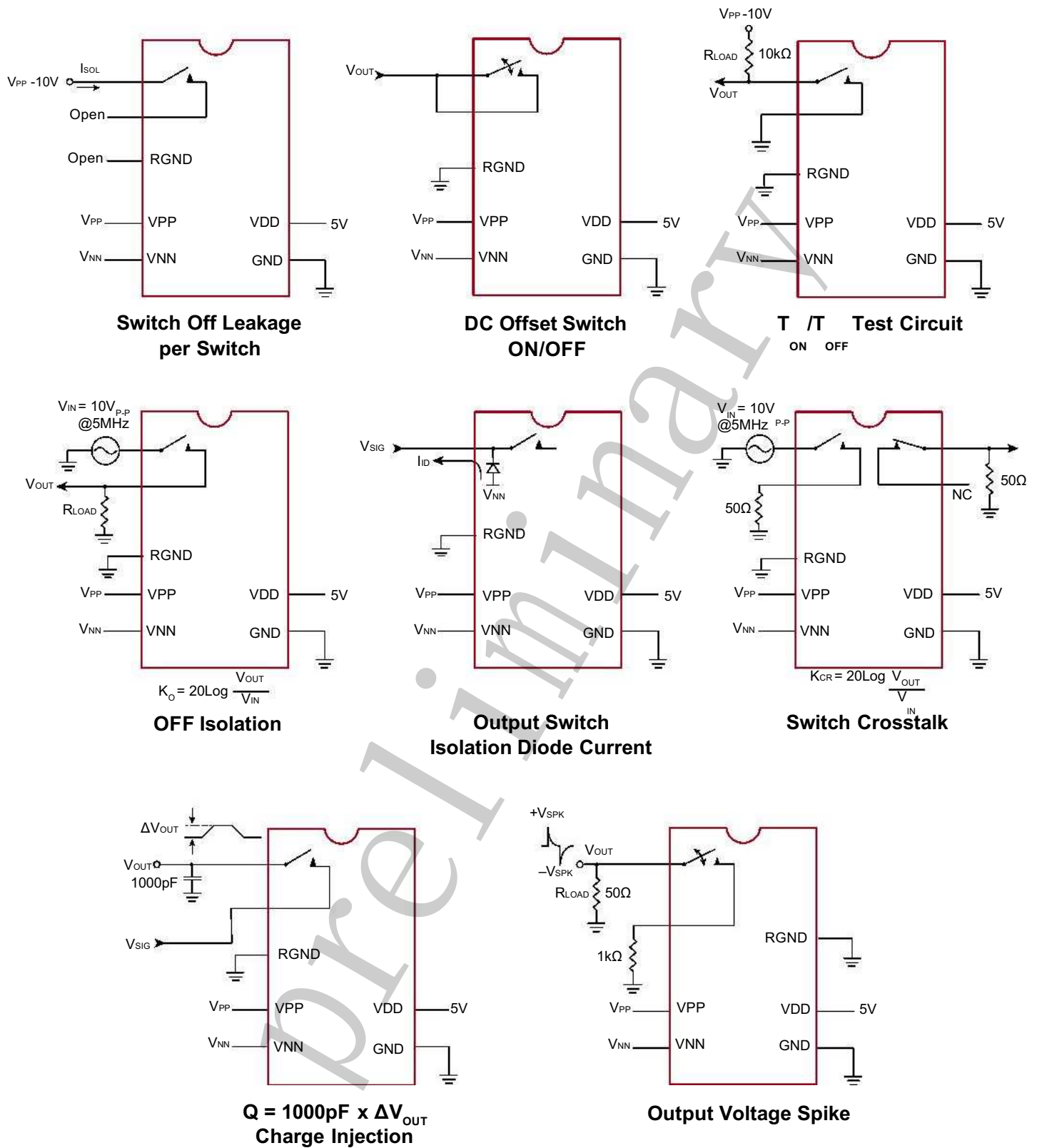
AC Electrical Characteristics

(over recommended operating conditions, $V_{DD} = 5.0V$, $t_R = t_F \leq 5.0ns$, 50% duty cycle, $C_L = 20pF$ unless otherwise noted)

Sym	Parameter	0°C		+25°C			+70°C		Units	Conditions
		Min	Max	Min	Typ	Max	Min	Max		
t_{SD}	Set up time before $\overline{LE}$ rises	25	-	25	-	-	25	-	ns	---
t_{WLE}	Time width of $\overline{LE}$	56	-	-	56	-	56	-	ns	$V_{DD} = 3.0V$
		12	-	-	12	-	12	-		$V_{DD} = 5.0V$
t_{DO}	Clock delay time to data out	50	100	50	78	100	50	100	ns	$V_{DD} = 3.0V$
		15	40	15	30	40	15	40		$V_{DD} = 5.0V$
t_{WCLR}	Time width of CLR	55	-	55	-	-	55	-	ns	---
t_{SU}	Set up time data to clock	21	-	-	21	-	21	-	ns	$V_{DD} = 3.0V$
		7.0	-	-	7.0	-	7.0	-		$V_{DD} = 5.0V$
t_H	Hold time data from clock	2.0	-	2.0	-	-	2.0	-	ns	$V_{DD} = 3.0$ or $5.0V$
f_{CLK}	Clock frequency	-	8.0	-	-	8.0	-	8.0	MHz	$V_{DD} = 3.0V$
		-	20	-	-	20	-	20		$V_{DD} = 5.0V$
t_R, t_F	Clock rise and fall times	-	50	-	-	50	-	50	ns	----
T_{ON}	Turn ON time*	-	0.2	-	-	0.2	-	0.2	μs	$V_{SIG} = V_{PP} - 5V$, $R_{LOAD} = 10k\Omega$
T_{OFF}	Turn OFF time*	-	0.5	-	-	0.5	-	0.5	μs	$V_{SIG} = V_{PP} - 5V$, $R_{LOAD} = 10k\Omega$
dv/dt	Maximum V_{SIG} slew rate	-	-	-	-	-	-	-	v/ns	
		-	20	-	-	20	-	20		$V_{PP} = +60V$, $V_{NN} = -60V$
		-	-	-	-	-	-	-		
K_O	OFF isolation*	-35	-	-	-35	-	-35	-	dB	$f = 5.0MHz$, $1.0k\Omega/15pF$ load
		-56	-	-	-56	-	-56	-		$f = 5.0MHz$, 50Ω load
K_{CR}	Switch crosstalk*	-60	-	-	-60	-	-60	-	dB	$f = 5.0MHz$, 50Ω load
I_{ID}	Output switch isolation diode current	-	300	-	-	300	-	300	mA	300ns pulse width, 2.0% duty cycle
$C_{SG(OFF)}$	OFF capacitance SW to GND	5.0	17	5.0	12	17	5.0	17	pF	0V, $f = 1.0MHz$
$C_{SG(ON)}$	ON capacitance SW to GND	25	50	25	38	50	25	50	pF	0V, $f = 1.0MHz$
$+V_{SPK}$	Output voltage spike*	-	-	-	-	-	-	-	mV	
$-V_{SPK}$		-	-	-	-	-	-	-		
$+V_{SPK}$		-	-	-	-	150	-	-		$V_{PP} = +60V$, $V_{NN} = -60V$, $R_{LOAD} = 50\Omega$
$-V_{SPK}$		-	-	-	-	-	-	-		
$+V_{SPK}$		-	-	-	-	-	-	-		
$-V_{SPK}$		-	-	-	-	-	-	-		
QC	Charge injection*	-	-	-	-	-	-	-	pC	
		-	-	-	600	-	-	-		$V_{PP} = +60V$, $V_{NN} = -60V$, $V_{SIG} = 0V$
		-	-	-	-	-	-	-		

* See Test Circuits on page 5

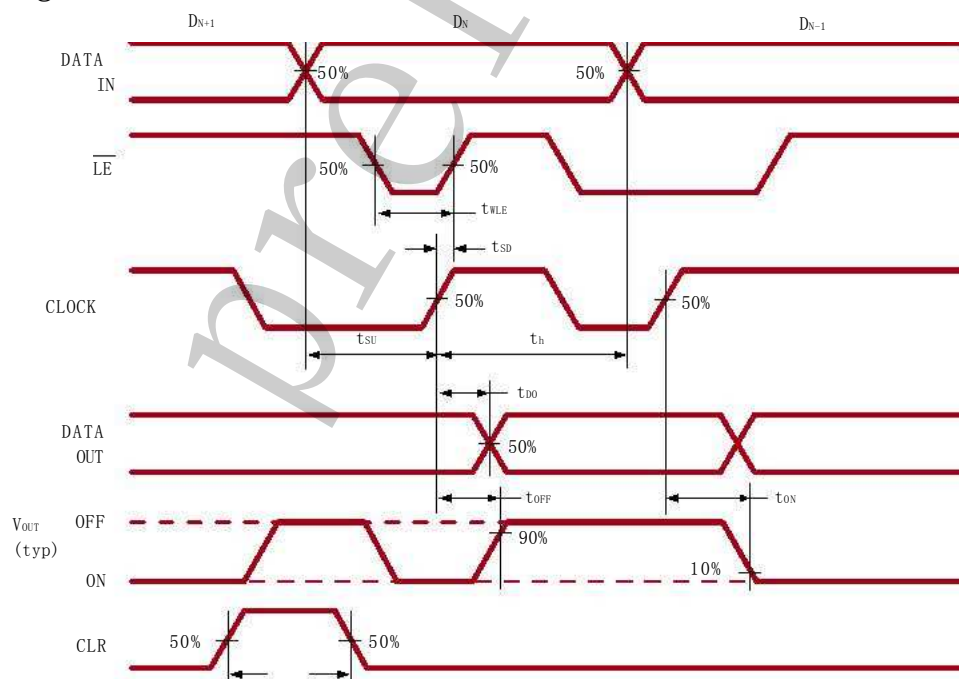
SY2320 Test Circuits



Notes:

1. The 32 switches operate independently.
2. Serial data is clocked in on the L to H transition of the CLK.
3. All 32 switches go to a state retaining their latched condition at the rising edge of LE. When LE is low the shift registers data flow through the latch.
4. Dout is high when data in the register 31 is high.
5. Shift registers clocking has no effect on the switch states if LE is high.
6. The CLR clear input overrides all other inputs.

Logic Timing Waveforms

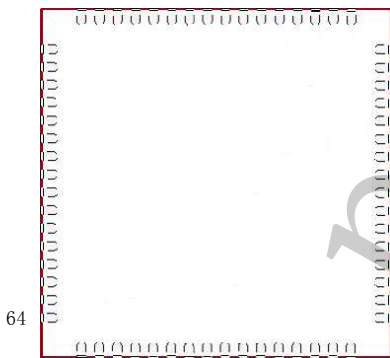


Pin Function

Pin	Function	Pin	Function	Pin	Function	Pin	Function
1	SW30	17	SW2	33	Y1213	49	SW19
2	Y3031	18	Y23	34	SW13	50	SW20
3	SW31	19	SW3	35	VPP	51	Y2021
4	NC	20	SW4	36	RGND	52	SW21
5	CLR	21	Y45	37	VNN	53	SW22
6	NC	22	SW5	38	SW14	54	Y2223
7	LE	23	SW6	39	Y1415	55	SW23
8	CLK	24	Y67	40	SW15	56	SW24
9	VDD	25	SW7	41	SW16	57	Y2425
10	DIN	26	SW8	42	Y1617	58	SW25
11	GND	27	Y89	43	SW17	59	SW26
12	DOUT	28	SW9	44	VNN	60	Y2627
13	NC	29	SW10	45	RGND	61	SW27
14	SW0	30	Y1011	46	VPP	62	SW28
15	Y01	31	SW11	47	SW18	63	Y2829
16	SW1	32	SW12	48	Y1819	64	SW29

Pin Configuration

Product Marking

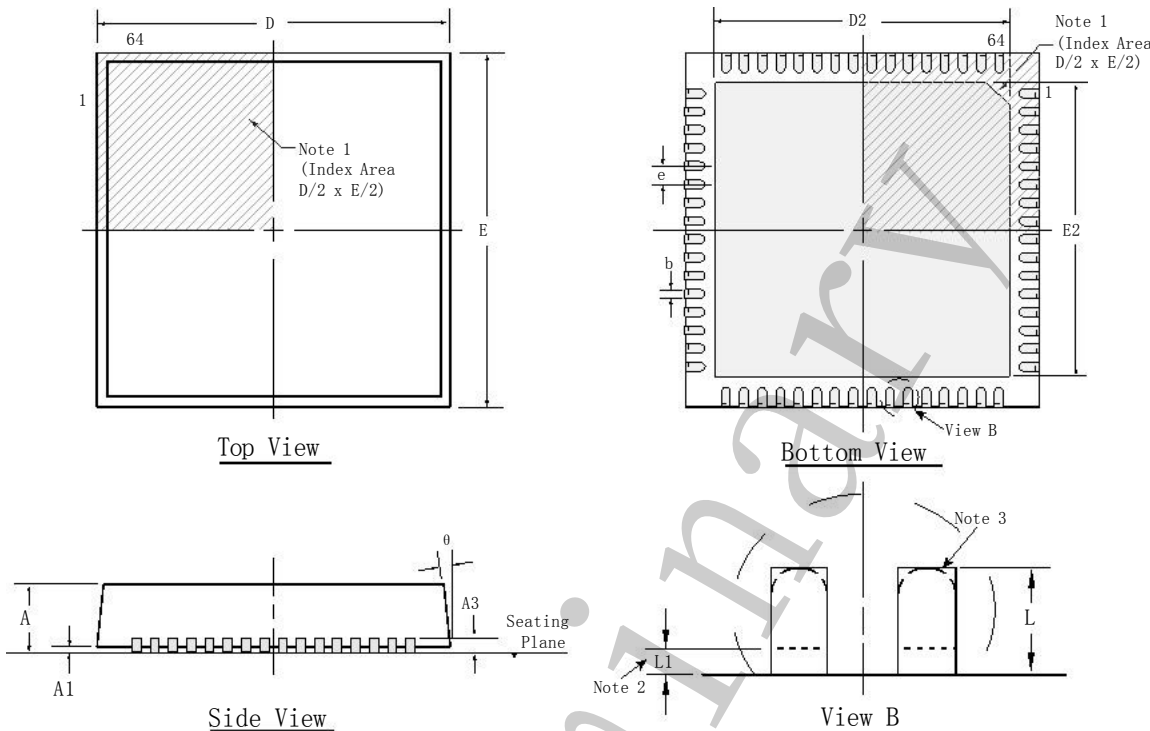


L = Lot Number
YY = Year Sealed
WW = Week Sealed

64-Lead LGA

64-Lead LGA

64-Lead LGA Package Outline 9.00x9.00mm body, 0.75mm height (max), 0.50mm pitch



Notes:

1. A Pin 1 identifier must be located in the index area indicated. The Pin 1 identifier can be: a molded mark/identifier; an embedded metal marker; or a printed indicator.
2. Depending on the method of manufacturing, a maximum of 0.15mm pullback (L1) may be present.
3. The inner tip of the lead may be either rounded or square.

Symbol		A	A1	A3	b	D	D2	E	E2	e	L	L1	θ
Dimension (mm)	MIN	0.65	0.00	0.20 REF	0.20	8.90	7.60	8.90	7.60	0.50 BSC	0.30	0.00	0 °
	NOM	0.70	0.02		0.25	9.00	7.70	9.00	7.70		0.40	—	—
	MAX	0.75	0.05		0.30	9.10	7.80	9.10	7.80		0.50	0.15	14 °