

# LR25D80S

## Features

### ● Serial Peripheral Interface(SPI)

- Standard SPI: SCLK, /CS, SI, SO, /WP, /HOLD
- Dual SPI: SCLK, /CS, IO0, IO1, /WP, /HOLD

### ● Read

- Normal Read (Serial): 50MHz clock rate
- Fast Read (Serial): 108MHz clock rate
- Dual Read: 108MHz clock rate

### ● Program

- Serial-input Page Program up to 256bytes

### ● Erase

- Block erase (64/32 KB)
- Sector erase (4 KB)
- Chip erase

### ● Program/Erase Speed

- Page Program time: 0.7ms typical
- Sector Erase time: 100ms typical
- Block Erase time: 0.3/0.5s typical
- Chip Erase time: 8s typical

### ● Flexible Architecture

- Sector of 4K-byte
- Block of 32/64K-byte

### ● Low Power Consumption

- 20mA maximum active current
- 5uA maximum power down current

### ● Software/Hardware Write Protection

- Enable/Disable protection with WP Pin
- Write protect all/portion of memory via software
- Top or Bottom, Sector or Block selection

### ● Single Supply Voltage

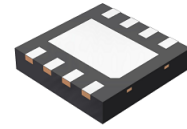
- Full voltage range: 2.7~3.6V

### ● Temperature Range

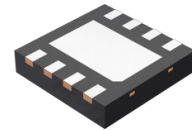
- Commercial (0°C to +70°C)
- Industrial (-40°C to +85°C)

### ● Cycling Endurance/Data Retention

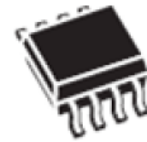
- Typical 100k Program-Erase cycles on any sector
- Typical 20-year data retention at +55°C



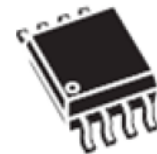
DFN3030-8A



DFN3030-8C



SOP8 150-mil



SOP8 208-mil



DFN2\*3

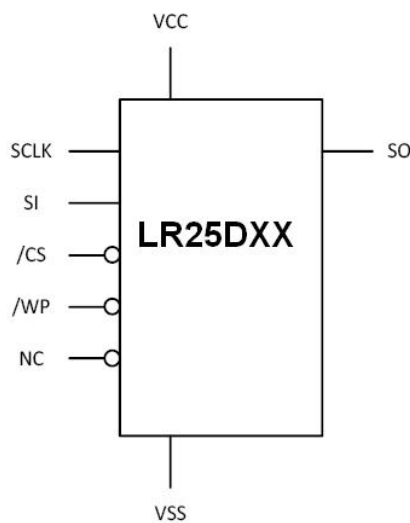
## 1. Description

The LR25D80S is 8M-bit Serial Peripheral Interface(SPI) Flash memory, and supports the Dual SPI: Serial Clock, Chip Select, Serial Data I/O0 (SI),I/O1 (SO). The Dual I/O data is transferred with speed of 108Mbits/s . The device uses a single low voltage power supply, ranging from 2.7 Volt to 3.6 Volt.

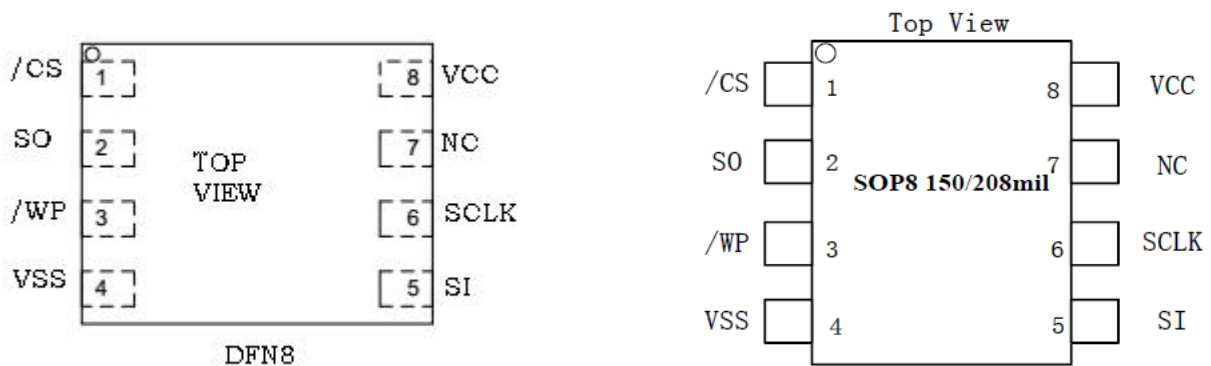
Additionally, the device supports JEDEC standard manufacturer and device ID .

In order to meet environmental requirements, LRC offers an 8-pad DFN 3x3-mm ,8-pin SOP8 150/208mil package and other special order packages, please contacts LRC for ordering information.

**Figure 1.** Logic diagram



**Figure 2.**Pin Configuration DFN8 and SOP8



## 2. Signal Description

During all operations, VCC must be held stable and within the specified valid range: VCC(min) to VCC(max).

All of the input and output signals must be held High or Low. These signals are described below.

**Table 1.** Signal Names

Pin Name	I/O	Description
/CS	I	Chip Select
SO (IO1)	I/O	Serial Output for single bit data Instructions. IO1 for Dual Instructions.
/WP (IO2)	I	Write Protect in single bit .
VSS		Ground
SI (IO0)	I/O	Serial Input for single bit data Instructions. IO0 for Dual Instructions.
SCLK	I	Serial Clock
NC		No Connection.
VCC		Core and I/O Power Supply

## 3. Device Identification

Three legacy Instructions are supported to access device identification that can indicate the manufacturer, device type, and capacity (density). The returned data bytes provide the information as shown in the below table.

**Table 2.** LR25D80S ID Definition table

Operation Code	M7-M0	ID15-ID8	ID7-ID0
9FH	68	40	14
90H	68		13
ABH			13

## 4. Block/Sector Addresses

**Table 3.**Block/Sector Addresses of LR25D80S

Memory Density	Block(64k byte)	Block(32k byte)	Sector No.	Sector Size(KB)	Address range
8Mbit	Block 0	Half block 0	Sector 0	4	000000h-000FFFh
			:	:	:
			Sector 7	4	007000h-007FFFh
		Half block 1	Sector 8	4	008000h-008FFFh
			:	4	:
			Sector 15	4	00F000h-00FFFFh
	Block 1	Half block 2	Sector 16	4	010000h-010FFFh
			:	:	:
			Sector 23	4	017000h-017FFFh
		Half block 3	Sector 24	4	018000h-018FFFh
			:	:	:
			Sector 31	4	01F000h-01FFFFh
	:	:	:	:	:
	Block 14	Half block 28	Sector 224	4	0E0000h-0E0FFFh
			:	:	:
			Sector 231	4	0E7000h-0E7FFFh
		Half block 29	Sector 232	4	0E8000h-0E8FFFh
			:	:	:
			Sector 239	4	0EF000h-0EFFFFh
	Block 15	Half block 30	Sector 240	4	0F0000h-0F0FFFh
			:	:	:
			Sector 247	4	0F7000h-0F7FFFh
		Half block 31	Sector 248	4	0F8000h-0F8FFFh
			:	:	:
			Sector 255	4	0FF000h-0FFFFFFh

**Notes:**

1. Block = Uniform Block, and the size is 64K bytes.
2. Half block = Half Uniform Block, and the size is 32k bytes.
3. Sector = Uniform Sector, and the size is 4K bytes.

## 5. Electrical Characteristics

### 5.1 Absolute Maximum Ratings

PARAMETERS	SYMBOL	CONDITIONS	RANGE	UNIT
Supply Voltage	VCC		-0.5 to 4	V
Voltage Applied to Any Pin	VIO	Relative to Ground	-0.5 to 4	V
Transient Voltage on any Pin	VIOT	<20nS Transient Relative to Ground	-2.0V to VCC+2.0V	V
Storage Temperature	TSTG		-65 to +150	°C
Electrostatic Discharge Voltage	VESD	Human Body Model <sup>(1)</sup>	-2000 to +2000	V

Notes:

1. JEDEC Std JESD22-A114A (C1=100pF, R1=1500 ohms, R2=500 ohms)

### 5.2 Operating Ranges

PARAMETER	SYMBOL	CONDITIONS	SPEC		UNIT
			MIN	MAX	
Supply Voltage	VCC	$f_R = 108\text{MHz}$ , $f_R = 50\text{MHz}$	2.7	3.6	V
Temperature Operating	TA	Commercial	0	+70	°C
		Industrial	-40	+85	

### 5.3 Data Retention and Endurance

Parameter	Test Condition	Min	Units
Minimum Pattern Data Retention Time	150°C	10	Years
	125°C	20	Years
Erase/Program Endurance	-40 to 85°C	100K	Cycles

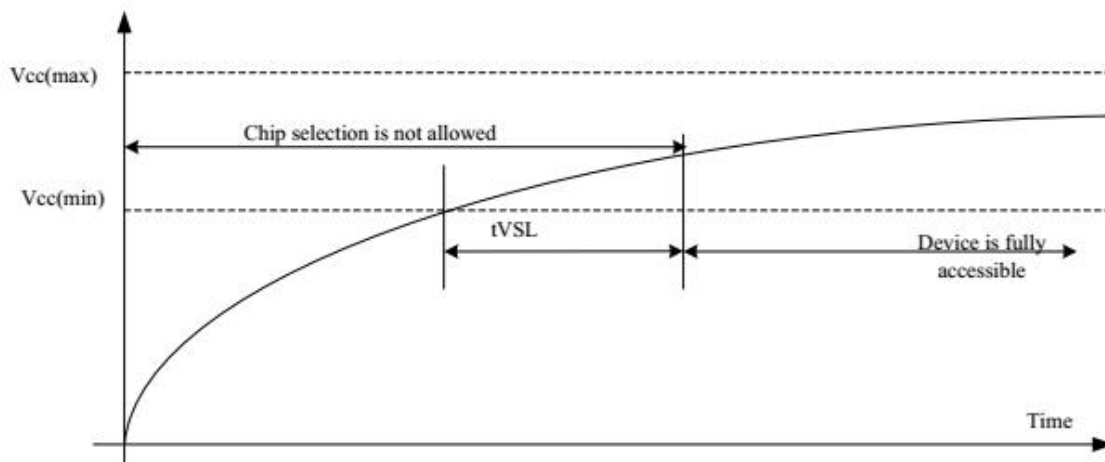
### 5.4 Latch Up Characteristics

Parameter	Min	Max
Input Voltage Respect To VSS On I/O Pins	-1.0V	VCC+1.0V
VCC Current	-100mA	100mA

### 5.5 Power-up Timing

Symbol	Parameter	Min	Max	Unit
tVSL	VCC(min) To /CS Low	300		us

Figure 3. Power-up Timing and Voltage Levels



### 5.6 DC Electrical Characteristics

(T= -40°C~85°C, VCC=2.7~3.6V)

Symbol	Parameter	Test Condition	Min.	Typ	Max.	Unit.
ILI	Input Leakage Current				±2	μA
ILO	Output Leakage Current				±2	μA
ICC1	Standby Current	/CS=VCC, VIN=VCC or VSS		13	25	μA
ICC2	Deep Power-Down Current	/CS=VCC, VIN=VCC or VSS		2	5	μA
ICC3	Operating Current: Read	SCLK=0.1VCC/ 0.9VCC <sup>(1)</sup> at 80 MHz, Q=open(*1, *2, *4 I/O)		13	18	mA
ICC4	Operating Current(Page Program)	/CS=VCC			15	mA
ICC5	Operating Current(WRSR)	/CS=VCC			5	mA
ICC6	Operating Current(Block Erase)	/CS=VCC			20	mA
ICC7	Operating Current(Sector Erase)	/CS=VCC			20	mA
ICC8	Operating Current (Chip Erase)	/CS=VCC			20	mA
VIL	Input Low Voltage		-0.5		0.2VCC	V
VIH	Input High Voltage		0.8VCC		VCC+0.4	V
VOL	Output Low Voltage	IOL =100μA			0.4	V
VOH	Output High Voltage	IOH =-100μA	VCC-0.2			V

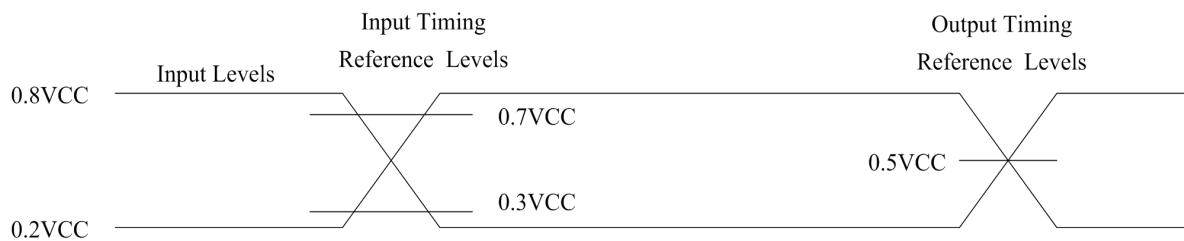
Note:

(1) ICC3 is measured with ATE loading

### 5.7 AC Measurement Conditions

Symbol	Parameter	Min	Typ	Max	Unit	Conditions
CL	Load Capacitance			30	pF	
TR, TF	Input Rise And Fall time			5	ns	
VIN	Input Pause Voltage	0.2VCC to 0.8VCC			V	
IN	Input Timing Reference Voltage	0.3VCC to 0.7VCC			V	
OUT	Output Timing Reference Voltage	0.5VCC			V	

Figure 4 .AC Measurement I/O Waveform



### 5.8 AC Electrical Characteristics

Symbol	Parameter	Min.	Typ.	Max.	Unit.
fc	Clock frequency for all read instructions except Read Data(03H)	DC.		108	MHz
fR	Clock freq.for Read Data instruction(03H)	DC.		55	MHz
tCLH	Serial Clock High Time	4			ns
tCLL	Serial Clock Low Time	4			ns
tCLCH	Serial Clock Rise Time (Slew Rate)	0.1 <sup>(1)</sup>			V/ns
tCHCL	Serial Clock Fall Time (Slew Rate)	0.1 <sup>(1)</sup>			V/ns
tSLCH	/CS Active Setup Time	5			ns
tCHSH	/CS Active Hold Time	5			ns
tSHCH	/CS Not Active Setup Time	5			ns
tCHSL	/CS Not Active Hold Time	5			ns

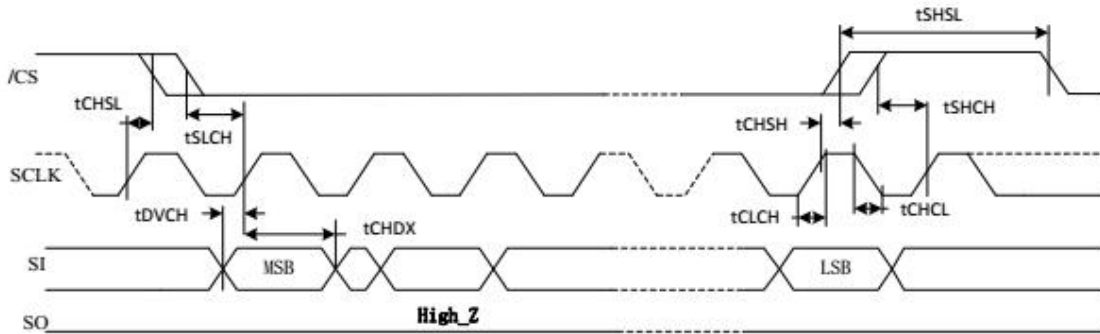


Symbol	Parameter	Min.	Typ.	Max.	Unit.
tSHSL	/CS High Time (read/write)	20			ns
tSHQZ	Output Disable Time			6	ns
tCLQX	Output Hold Time	0			ns
tDVCH	Data In Setup Time	2			ns
tCHDX	Data In Hold Time	2			ns
tCLQV	Clock Low To Output Valid			7	ns
tWHSL	Write Protect Setup Time Before /CS Low	20			ns
tSHWL	Write Protect Hold Time After /CS High	100			ns
tDP	/CS High To Deep Power-Down Mode			0.1	μs
tRES1	/CS High To Standby Mode Without Electronic Signature Read			3	μs
tRES2	/CS High To Standby Mode With Electronic Signature Read			1.5	μs
tW	Write Status Register Cycle Time		2	15	ms
tPP	Page Programming Time		0.7	2.4	ms
tSE	Sector Erase Time		100	300	ms
tBE	Block Erase Time(32K Bytes/64K Bytes)		0.3/0.5	2.5/3.0	s
tCE	Chip Erase Time		8	30	s

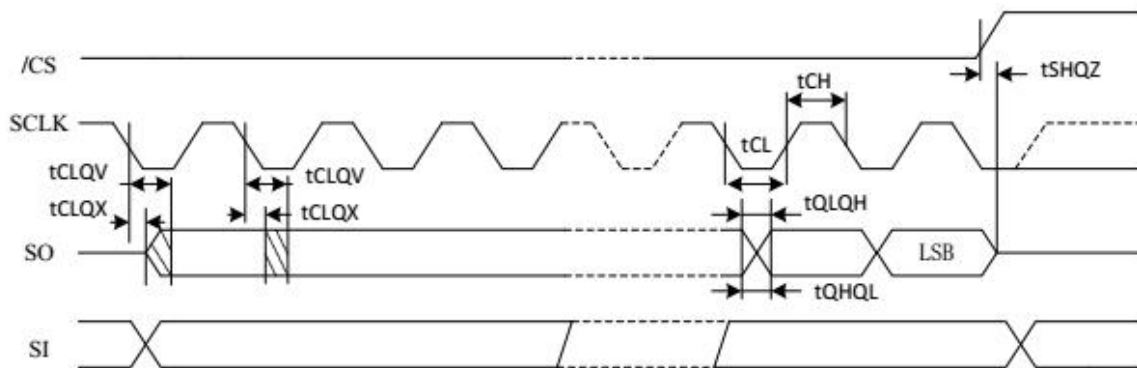
Note:

Tested with clock frequency lower than 50MHz.

**Figure 5.** Serial Input Timing

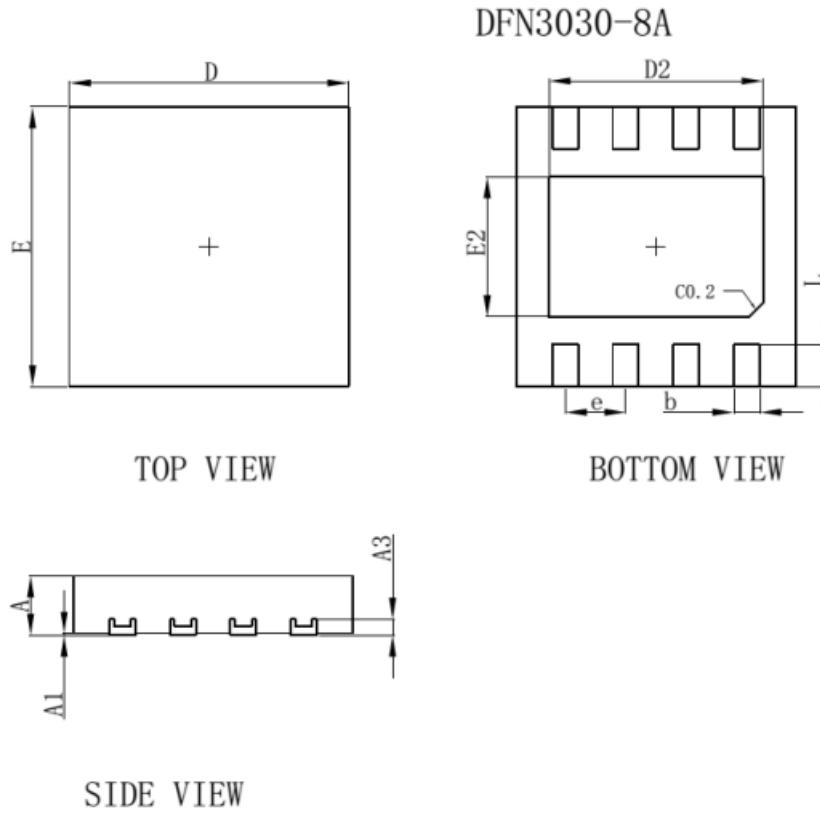


**Figure 6.** Output Timing



## 6. Package Information

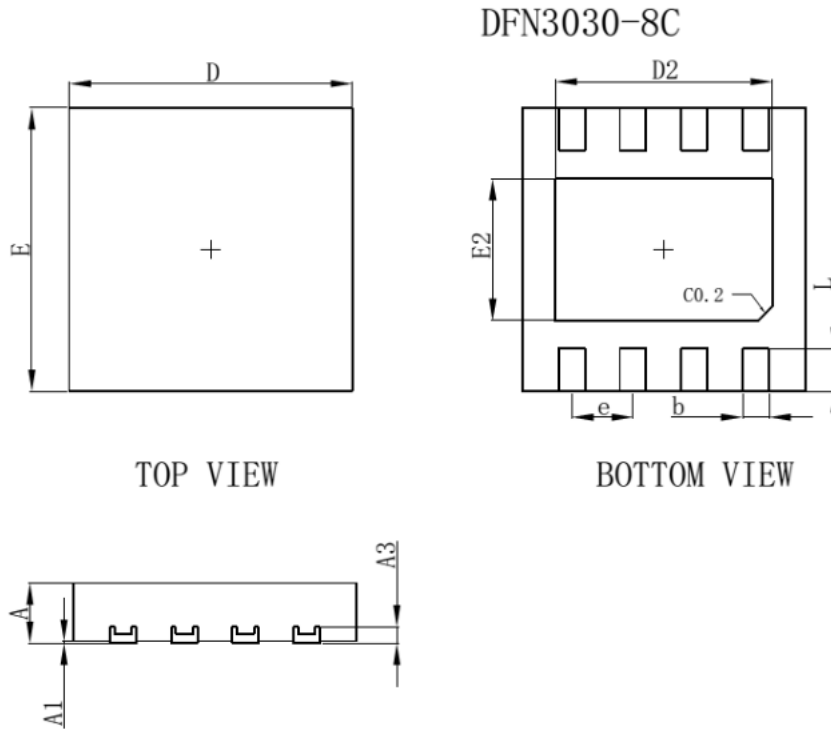
### 6.1 Package DFN 3030-8A



DFN3030-8A			
Dim	Min	Typ	Max
D	2.95	3.00	3.05
E	2.95	3.00	3.05
e	-	0.65	-
L	0.40	0.45	0.50
b	0.23	0.28	0.33
A	0.60	0.65	0.70
A1	0	0.02	0.05
A3	-	0.152	-
E2	1.45	1.50	1.55
D2	2.25	2.30	2.35
All Dimensions in mm			

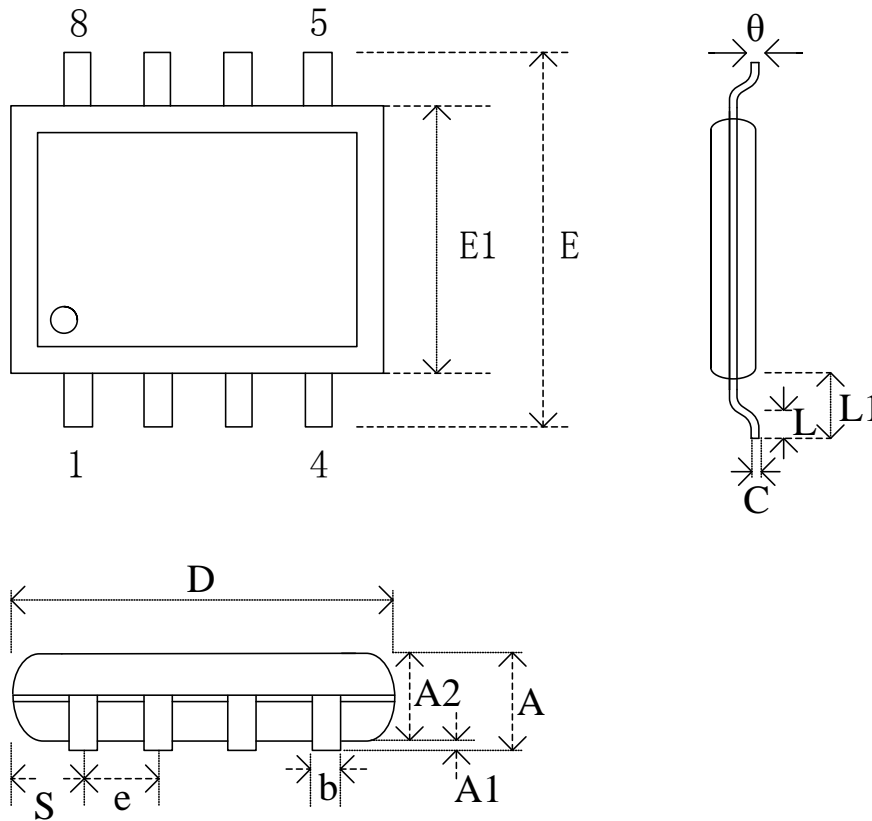
## 6. Package Information

### 6.2 Package DFN 3030-8C



DFN3030-8C			
Dim	Min	Typ	Max
D	2.95	3.00	3.05
E	2.95	3.00	3.05
e	-	0.65	-
L	0.40	0.45	0.50
b	0.23	0.28	0.33
A	0.48	0.53	0.58
A1	0	0.02	0.05
A3	-	0.152	-
E2	1.45	1.50	1.55
D2	2.25	2.30	2.35
All Dimensions in mm			

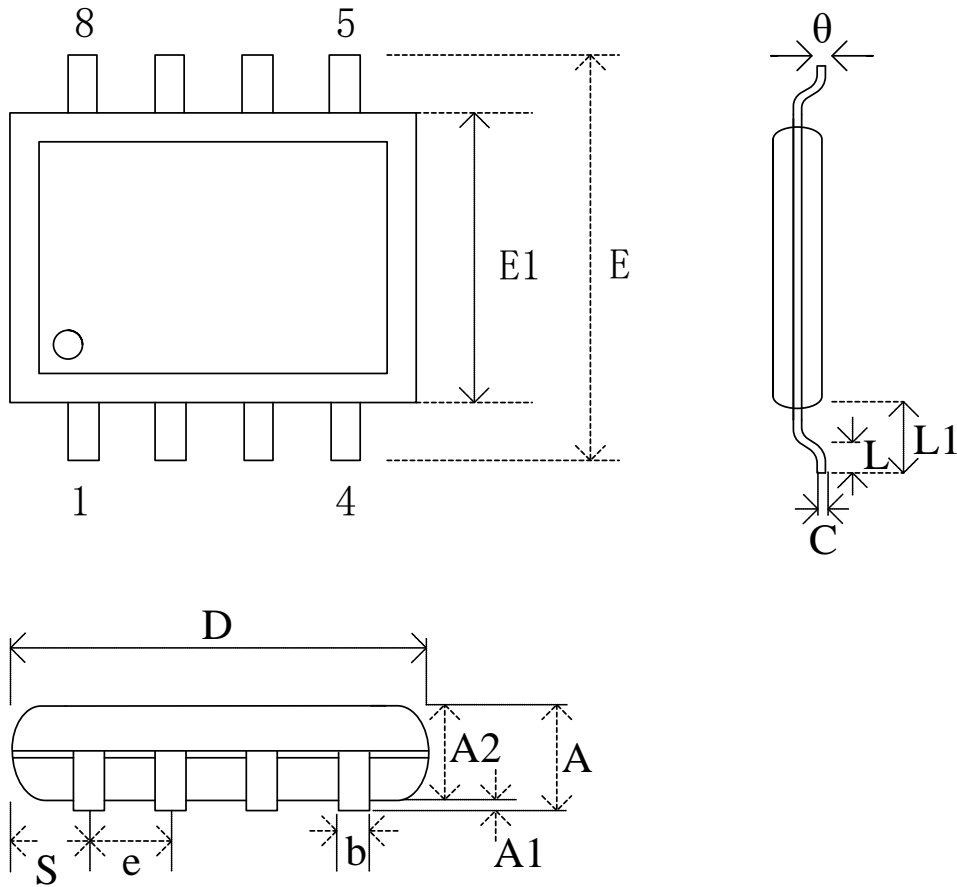
### 6.3 Package 8-Pin SOP 150 mil



#### Dimensions

Symbol		A	A1	A2	b	C	D	E	E1	e	L	L1	S	$\theta$
Unit														
mm	Min		0.10	1.35	0.36	0.15	4.77	5.80	3.80		0.46	0.85	0.41	0
	Nom		0.15	1.45	0.41	0.20	4.90	5.99	3.90	1.27	0.66	1.05	0.54	5
	Max	1.75	0.20	1.55	0.51	0.25	5.03	6.20	4.00		0.86	1.25	0.67	8
Inch	Min		0.004	0.053	0.014	0.006	0.188	0.228	0.150		0.018	0.033	0.016	0
	Nom		0.006	0.057	0.016	0.008	0.193	0.236	0.154	0.05	0.026	0.041	0.021	5
	Max	0.069	0.008	0.061	0.020	0.010	0.198	0.244	0.158		0.034	0.049	0.026	8

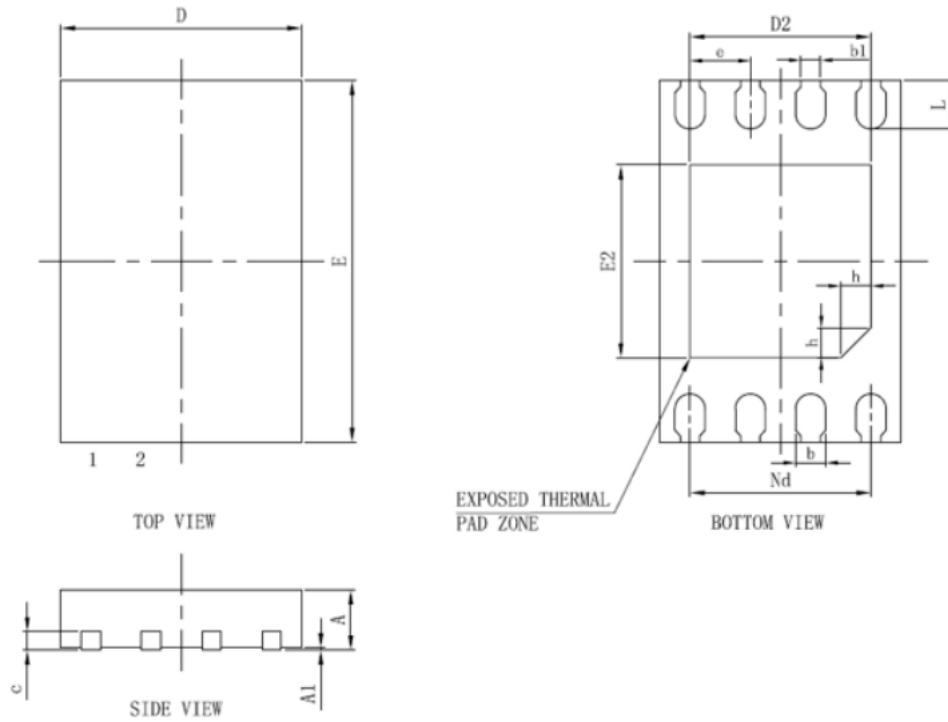
### 6.4 Package 8-Pin SOP 208 mil



### Dimensions

Symbol		A	A1	A2	b	C	D	E	E1	e	L	L1	S	è
Unit														
mm	Min		0.05	1.70	0.36	0.19	5.13	7.70	5.18		0.50	1.21	0.62	0
	Nom		0.15	1.80	0.41	0.20	5.23	7.90	5.28	1.27	0.65	1.31	0.74	5
	Max	2.16	0.25	1.91	0.51	0.25	5.33	8.10	5.38		0.80	1.41	0.88	8
Inch	Min		0.002	0.067	0.014	0.007	0.202	0.303	0.204		0.020	0.048	0.024	0
	Nom		0.006	0.071	0.016	0.008	0.206	0.311	0.208	0.050	0.026	0.052	0.029	5
	Max	0.085	0.010	0.075	0.020	0.010	0.210	0.319	0.212		0.031	0.056	0.035	8

### 6.5 Package DFN2\*3



Symbol		A	A1	b	b 1	c	D	D2	e	Nd	E	E2	L	h	载体尺寸
Unit															
mm	Min	0.45	0	0.18	0.16REF	0.10	1.90	1.40	0.50BSC	1.50BSC	2.90	1.50	0.30	0.20	67*75
	Nom	0.50	0.02	0.25		0.15	2.00	1.50			3.00	1.60	0.40	0.25	
	Max	0.55	0.05	0.30		0.20	2.10	1.60			3.10	1.70	0.50	0.30	

## 7. Order Information

