
Serial Flash PCB Layout Guidelines

Introduction

This document provides information on Winbond's SpiFlash® NOR memory packages and suggested PCB land patterns.

Content

The following sections contain detailed Package Outline Drawings with mechanical descriptions of Winbond's SpiFlash® packages and the related suggested PCB land patterns.

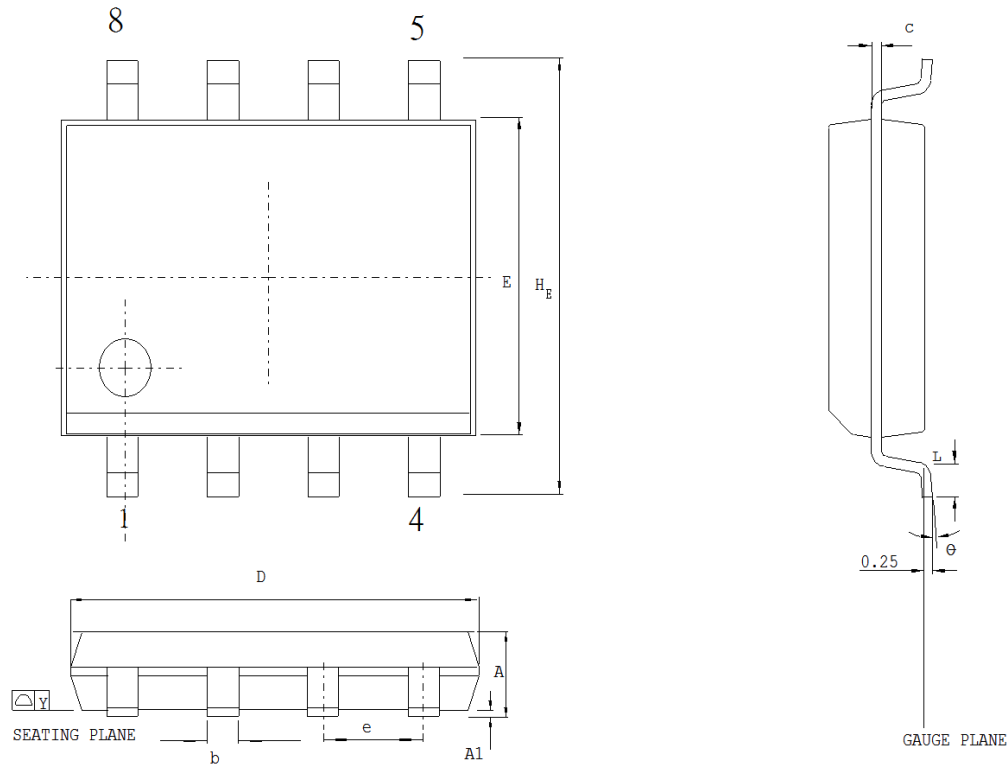
There are three main section SOP, SON and TFBGA.

- SOP Packages; SOP8 150 MIL, VSOP8 150 MIL, SOP8 208 MIL, VSOP8 208 MIL, and SOP16 300 MIL
- SON Packages; USON8 3x2mm, USON8 3x4mm, USON8 4x4mm, WSON8 6x5mm, and WSON8 8x6mm
- BGA Packages; TFBGA24 6x8mm 4x6 matrix and TFBGA24 6x8mm 5x5 matrix

Serial Flash PCB Layout Guidelines

SOP Packages

SOP8 150 MIL

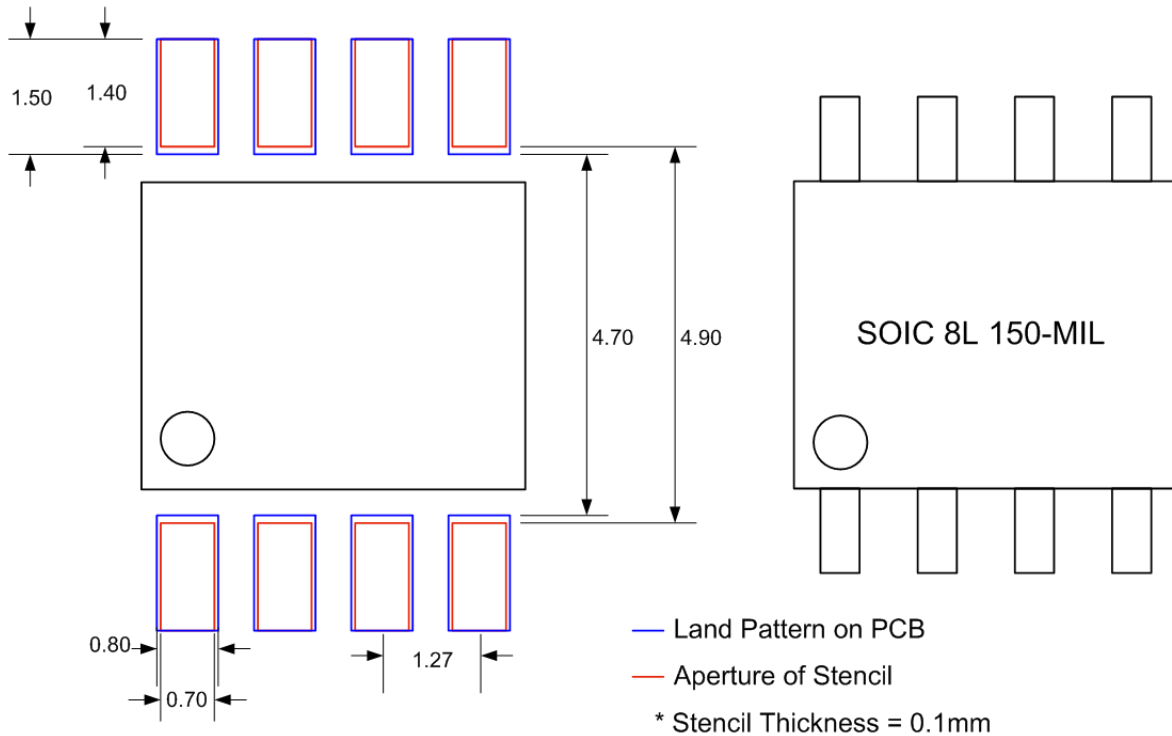


SYMBOL	DIMENSION IN MM		DIMENSION IN INCH	
	MIN.	MAX.	MIN.	MAX.
A	1.35	1.75	0.053	0.069
A1	0.10	0.25	0.004	0.010
b	0.33	0.51	0.013	0.020
c	0.19	0.25	0.008	0.010
E	3.80	4.00	0.150	0.157
D	4.80	5.00	0.188	0.196
e	1.27 BSC		0.050 BSC	
H _E	5.80	6.20	0.228	0.244
Y	—	0.10	—	0.004
L	0.40	1.27	0.016	0.050
θ	0	10	0	10

Serial Flash PCB Layout Guidelines

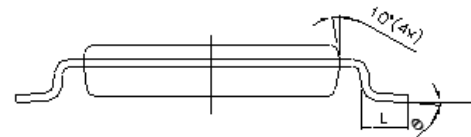
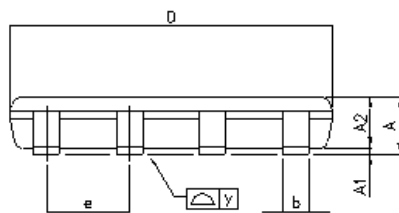
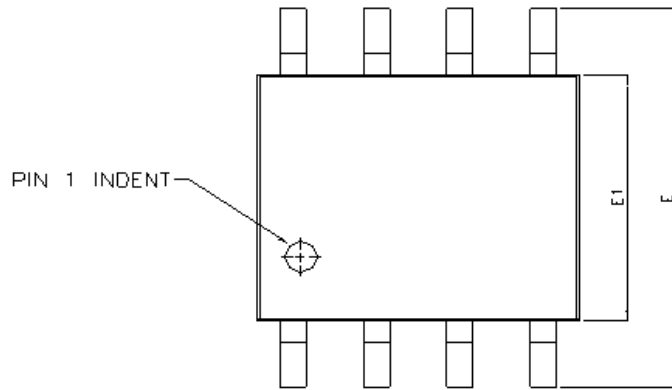
8L SOP 150-MIL Land Pattern

Unit of Measurement: mm



Serial Flash PCB Layout Guidelines

VSOP8 150 MIL

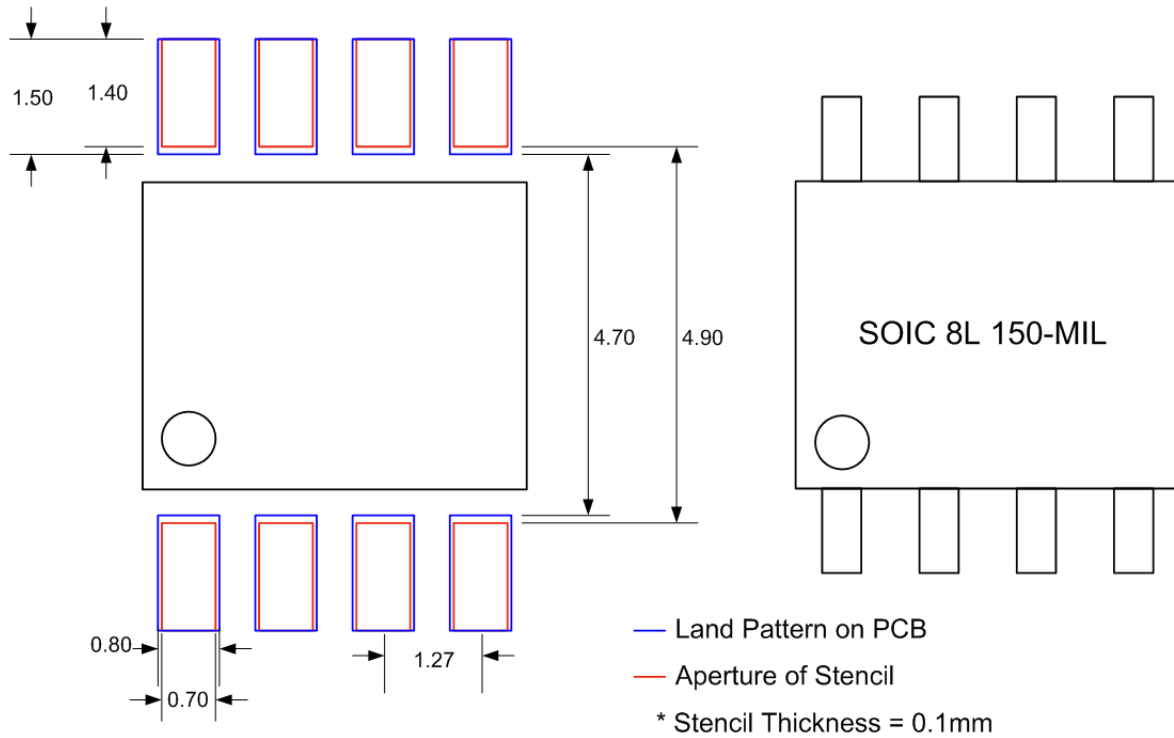


SYMBOLS	DIMENSIONS IN MILLIMETERS		
	MIN	NOM	MAX
A	0.75	0.85	0.90
A1	0.01	0.05	—
A2	—	0.80	—
b	0.33	—	0.51
c	0.125 BSC		
D	4.80	4.90	5.00
E	5.80	6.00	6.20
E1	3.80	3.90	4.00
e	1.27 BSC		
L	0.40	0.71	1.27
y	—	—	0.10
θ	0°	—	10°

Serial Flash PCB Layout Guidelines

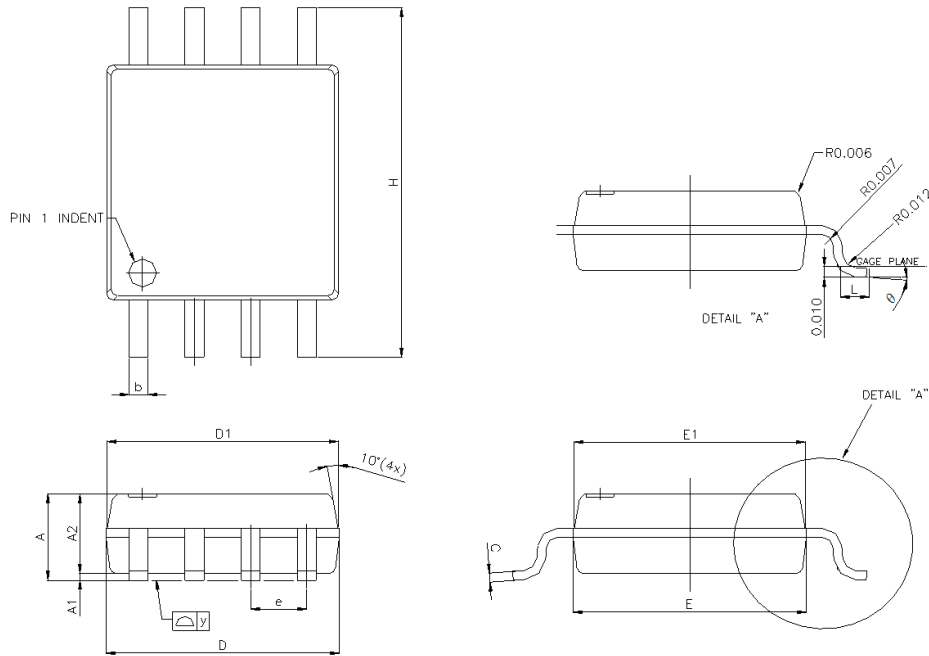
8L SOP 150-MIL Land Pattern

Unit of Measurement: mm



Serial Flash PCB Layout Guidelines

SOP8 208 MIL

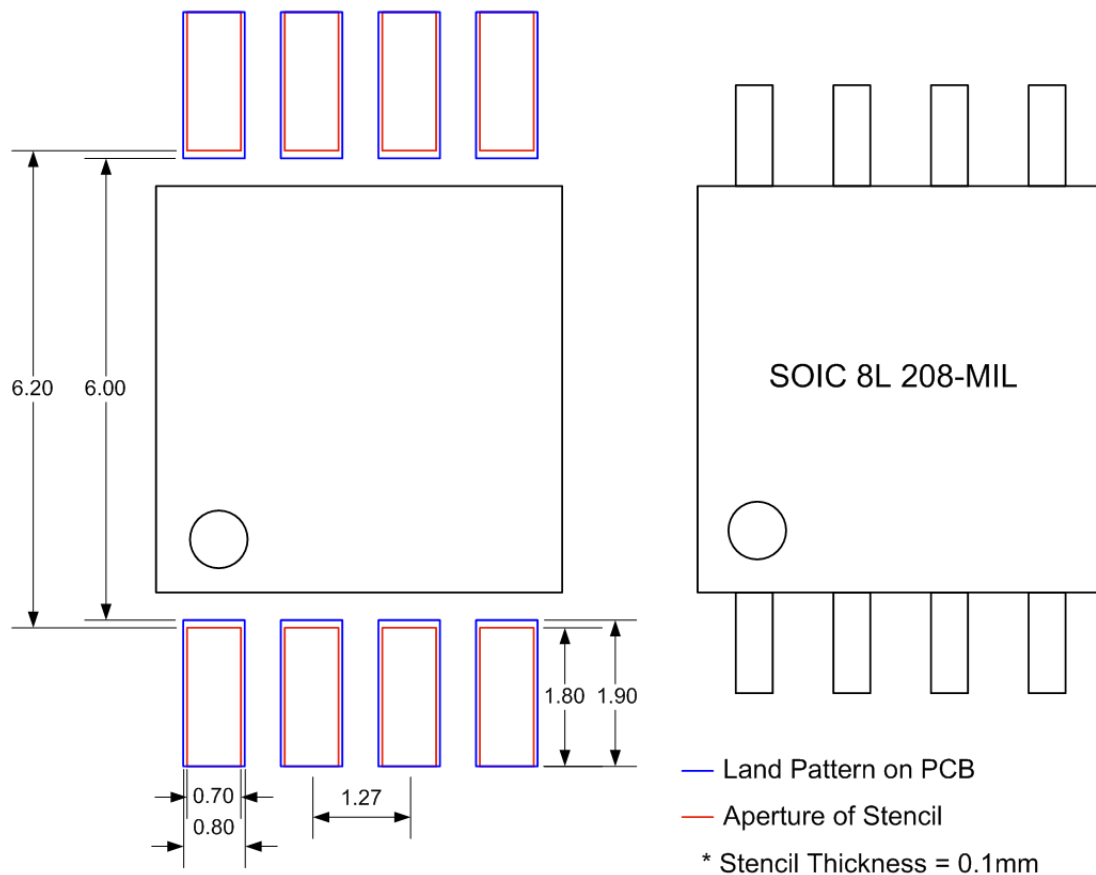


SYMBOLS	DIMENSIONS IN MILLIMETERS			DIMENSIONS IN INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	1.75	1.95	2.16	0.069	0.077	0.085
A1	0.05	0.15	0.25	0.002	0.006	0.010
A2	1.70	1.80	1.91	0.067	0.071	0.075
b	0.35	0.42	0.48	0.014	0.017	0.019
C	0.19	0.20	0.25	0.007	0.008	0.010
D	5.18	5.28	5.38	0.204	0.208	0.212
D1	5.13	5.23	5.33	0.202	0.206	0.210
E	5.18	5.28	5.38	0.204	0.208	0.212
E1	5.13	5.23	5.33	0.202	0.206	0.210
e	—	1.27	—	—	0.050	—
H	7.70	7.90	8.10	0.303	0.311	0.319
L	0.50	0.65	0.80	0.020	0.026	0.031
y	—	—	0.10	—	—	0.004
θ	0°	—	8°	0°	—	8°

Serial Flash PCB Layout Guidelines

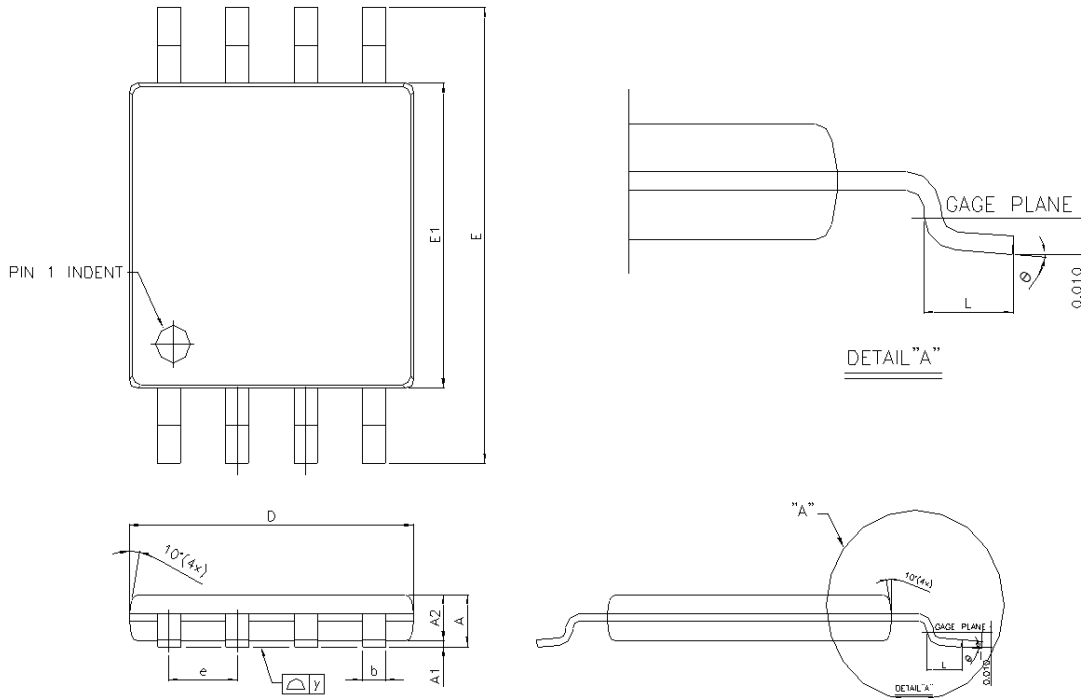
8L SOP 208-MIL Land Pattern

Unit of Measurement: mm



Serial Flash PCB Layout Guidelines

VSOP8 208 MIL

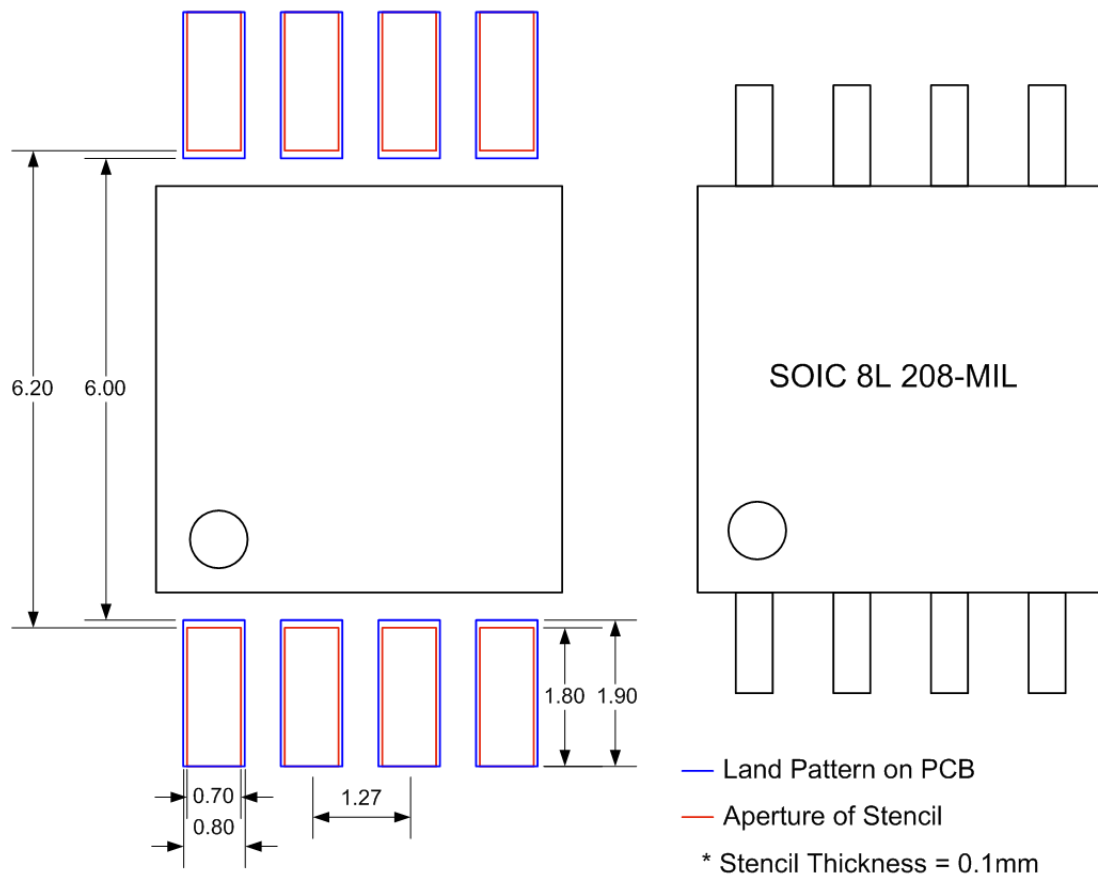


SYMBOLS	DIMENSIONS IN MILLIMETERS			DIMENSIONS IN INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	—	—	1.00	—	—	0.039
A1	0.05	0.10	0.15	0.002	0.004	0.006
A2	0.75	0.80	0.85	0.030	0.031	0.033
b	0.35	0.42	0.48	0.014	0.017	0.019
c	0.127 REF.			0.005 REF.		
D	5.18	5.28	5.38	0.204	0.208	0.212
E	7.70	7.90	8.10	0.303	0.311	0.319
E1	5.18	5.28	5.38	0.204	0.208	0.212
e	—	1.27	—	—	0.050	—
L	0.50	0.65	0.80	0.020	0.026	0.031
y	—	—	0.10	—	—	0.004
∅	0°	—	8°	0°	—	8°

Serial Flash PCB Layout Guidelines

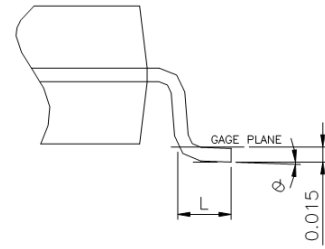
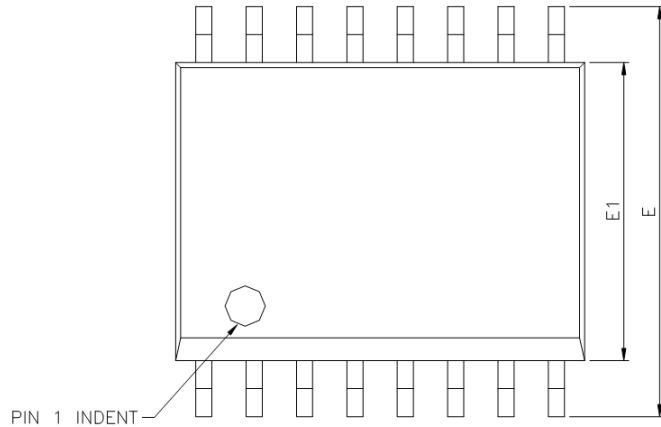
8L SOP 208-MIL Land Pattern

Unit of Measurement: mm

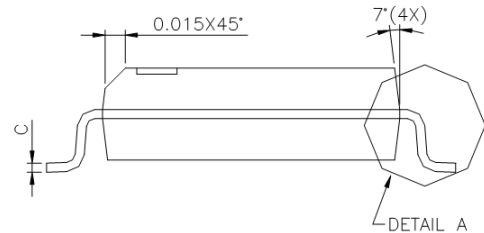
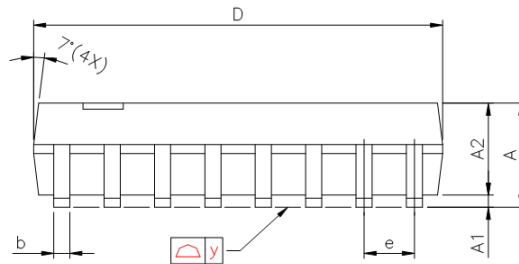


Serial Flash PCB Layout Guidelines

SOP16 300 MIL



DETAIL A

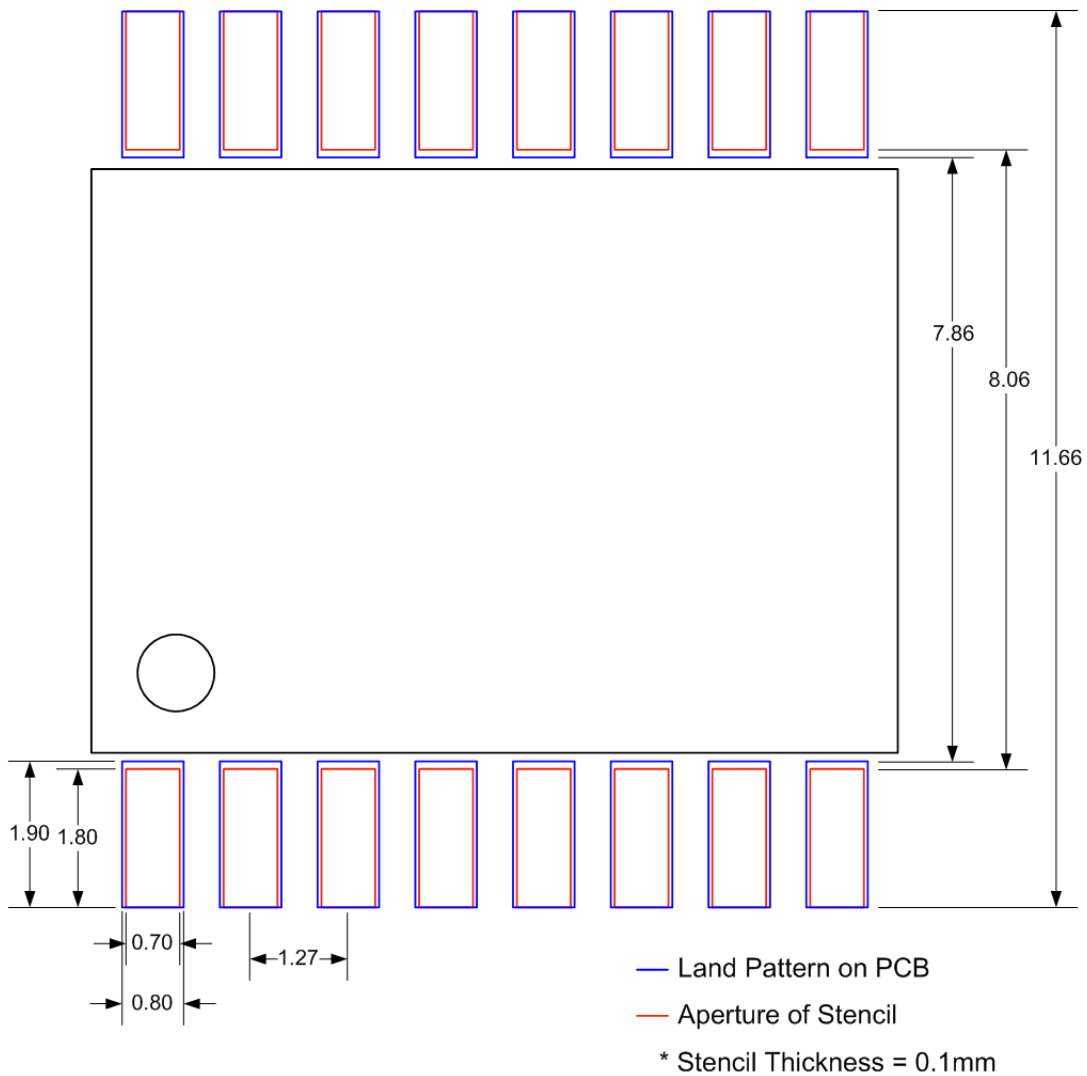


SYMBOLS	DIMENSIONS IN MILLIMETERS			DIMENSIONS IN INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	2.36	2.49	2.64	0.093	0.098	0.104
A1	0.10	—	0.30	0.004	—	0.012
A2	—	2.31	—	—	0.091	—
b	0.33	0.41	0.51	0.013	0.016	0.020
C	0.18	0.23	0.28	0.007	0.009	0.011
D	10.08	10.31	10.49	0.397	0.406	0.413
E	10.01	10.31	10.64	0.394	0.406	0.419
E1	7.39	7.49	7.59	0.291	0.295	0.299
e	—	1.27	—	—	0.050	—
L	0.38	0.81	1.27	0.015	0.032	0.050
y	—	—	0.076	—	—	0.003
Ø	0°	—	8°	0°	—	8°

Serial Flash PCB Layout Guidelines

16L SOP 300-MIL Land Pattern

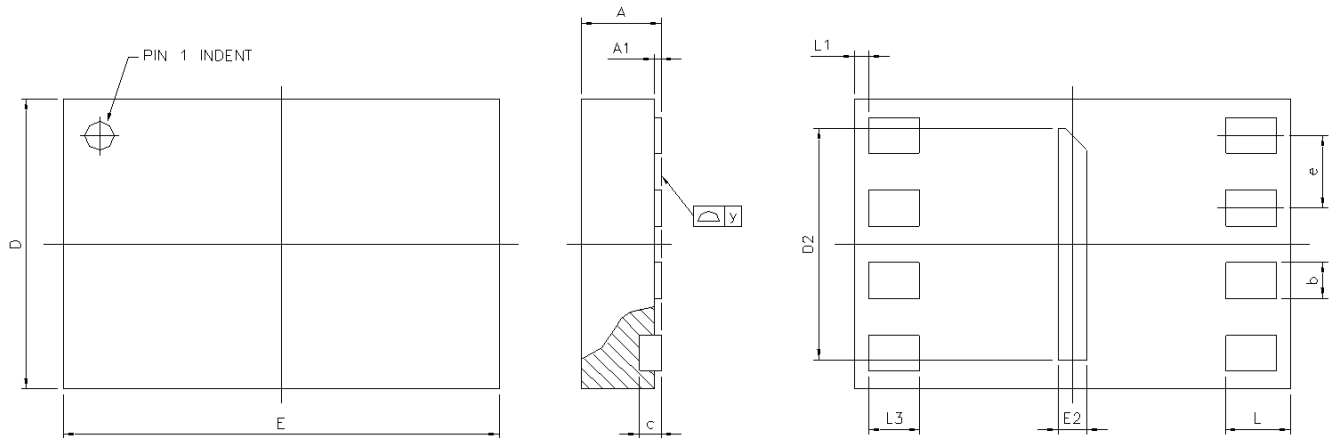
Unit of Measurement: mm



Serial Flash PCB Layout Guidelines

SON Packages

USON8 3x2mm



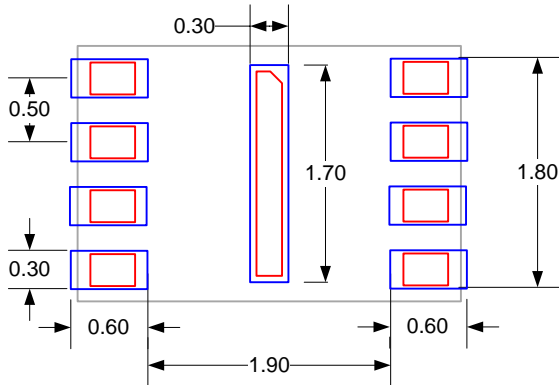
SYMBOLS	DIMENSIONS IN MILLIMETERS		
	MIN	NOM	MAX
A	0.50	0.55	0.60
A1	0.00	0.02	0.05
b	0.20	0.25	0.30
C	—	0.15 REF.	—
D	1.90	2.00	2.10
D2	1.55	1.60	1.65
E	2.90	3.00	3.10
E2	0.15	0.20	0.25
e	—	0.50	—
L	0.40	0.45	0.50
L1	—	0.10	—
L3	0.30	0.35	0.40
y	0.00	—	0.075

Serial Flash PCB Layout Guidelines

USON8 3x2MM Land Pattern

Unit of Measurement: mm

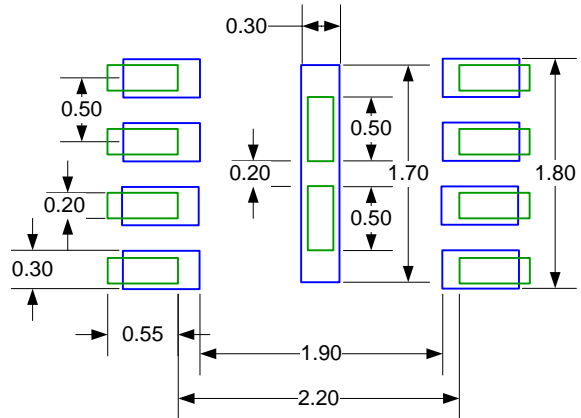
Resist opening in motherboard



Red color is the IC lead and exposed pads
Blue color is the mother's pad

Tolerance: $\pm 0.05\text{mm}$

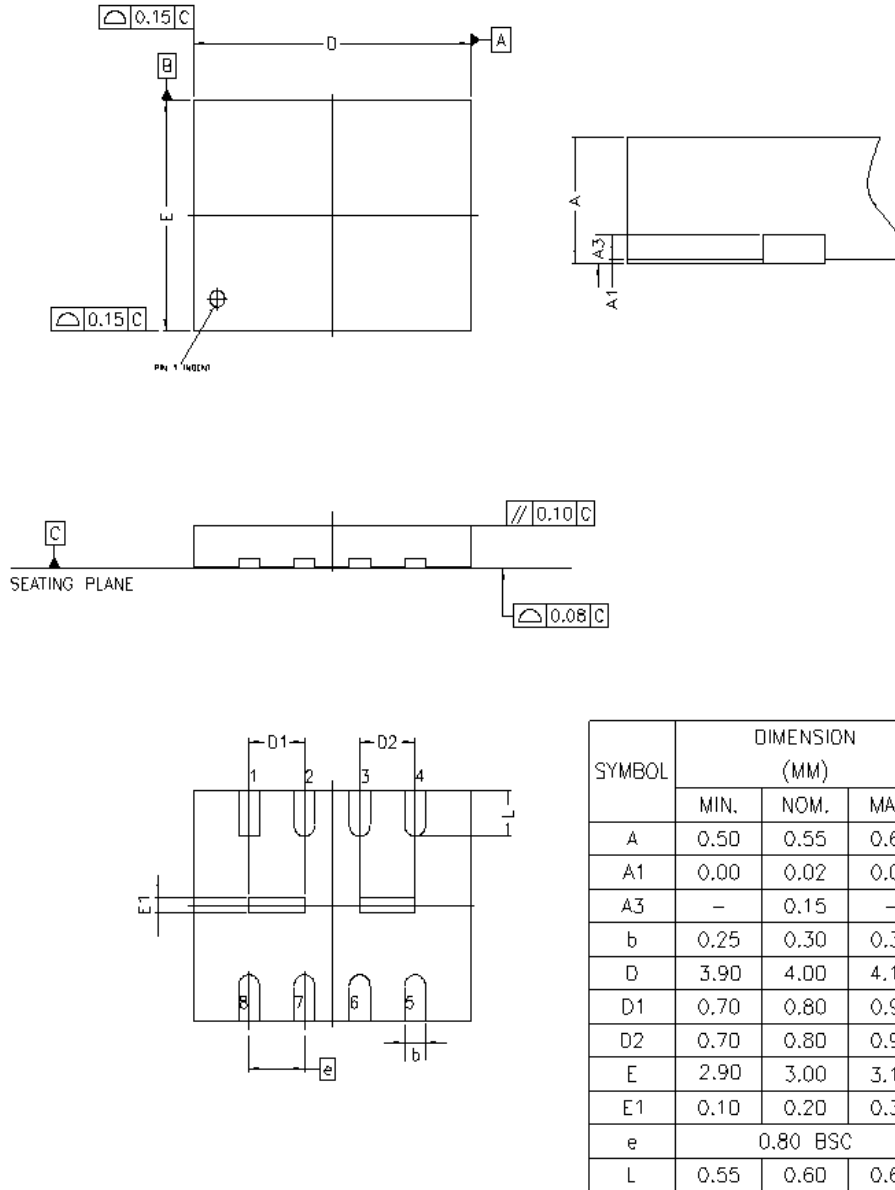
Pad dimension (XxY) and position in the metal mask



Green color is the stencil opening
Blue color is the motherboard's pads

Serial Flash PCB Layout Guidelines

USON8 3x4mm



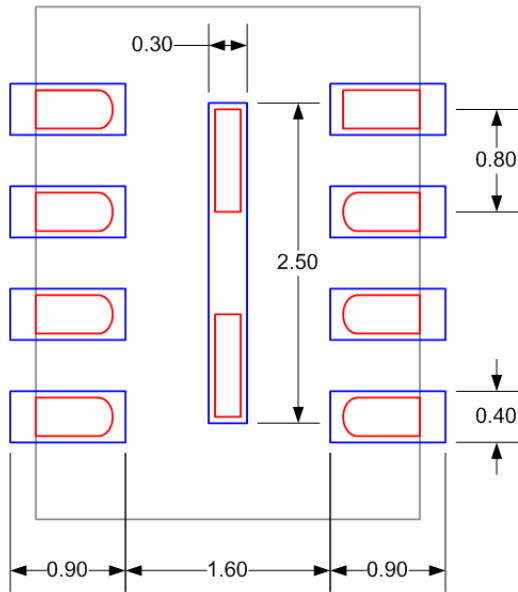
SYMBOL	DIMENSION (MM)			DIMENSION (MIL)		
	MIN.	NOM.	MAX.	MIN.	NOM.	MAX.
A	0.50	0.55	0.60	20	22	24
A1	0.00	0.02	0.05	0	1	2
A3	-	0.15	-	-	6	-
b	0.25	0.30	0.35	10	12	14
D	3.90	4.00	4.10	153	157	161
D1	0.70	0.80	0.90	27	31	35
D2	0.70	0.80	0.90	27	31	35
E	2.90	3.00	3.10	114	118	122
E1	0.10	0.20	0.30	4	8	12
e	0.80 BSC			31 BSC		
L	0.55	0.60	0.65	22	24	26

Serial Flash PCB Layout Guidelines

USON8 4X3MM Land Pattern

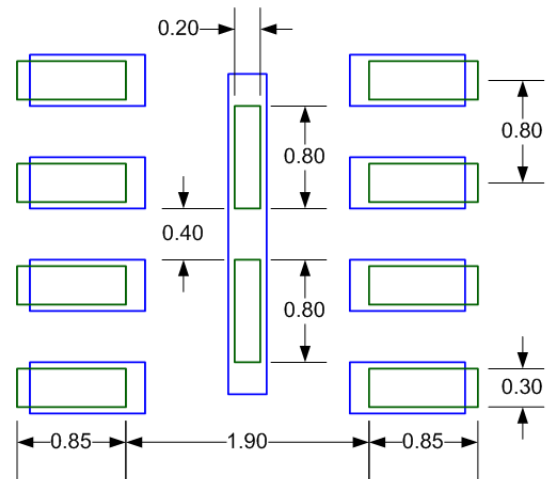
Unit of Measurement: mm

Resist opening in motherboard



Red color is the IC lead and exposed pads
Blue color is the mother's pad

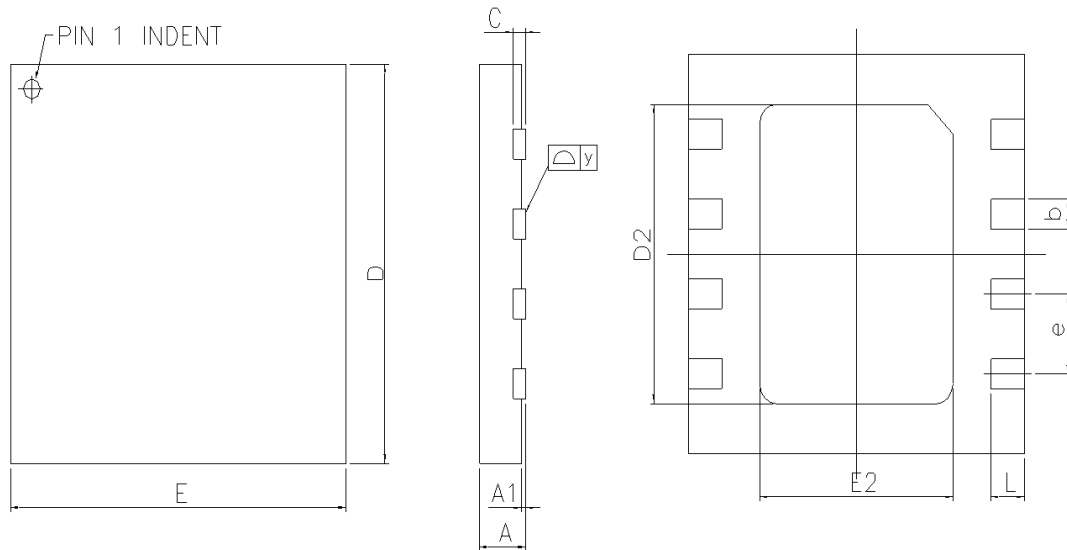
Pad dimension (XxY) and position in the metal mask



Green color is the stencil opening
Blue color is the motherboard's pads

Serial Flash PCB Layout Guidelines

USON8 4x4mm

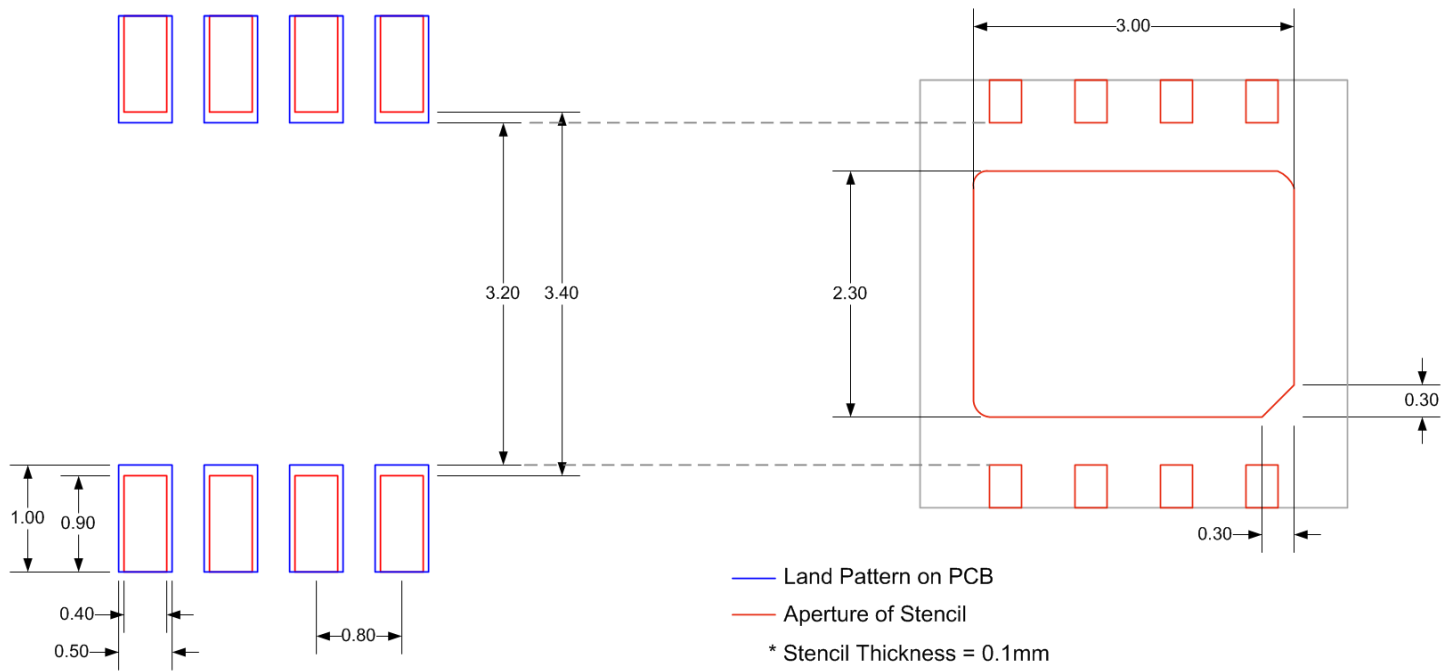


SYMBOLS	DIMENSIONS IN MILLIMETERS		
	MIN	NOM	MAX
A	0.50	0.55	0.60
A1	0.00	0.02	0.05
b	0.25	0.30	0.35
C	—	0.15 REF.	—
D	3.90	4.00	4.10
D2	2.95	3.00	3.05
E	3.90	4.00	4.10
E2	2.25	2.30	2.35
e	—	0.80	—
L	0.35	0.40	0.45
y	0.00	—	0.075

Serial Flash PCB Layout Guidelines

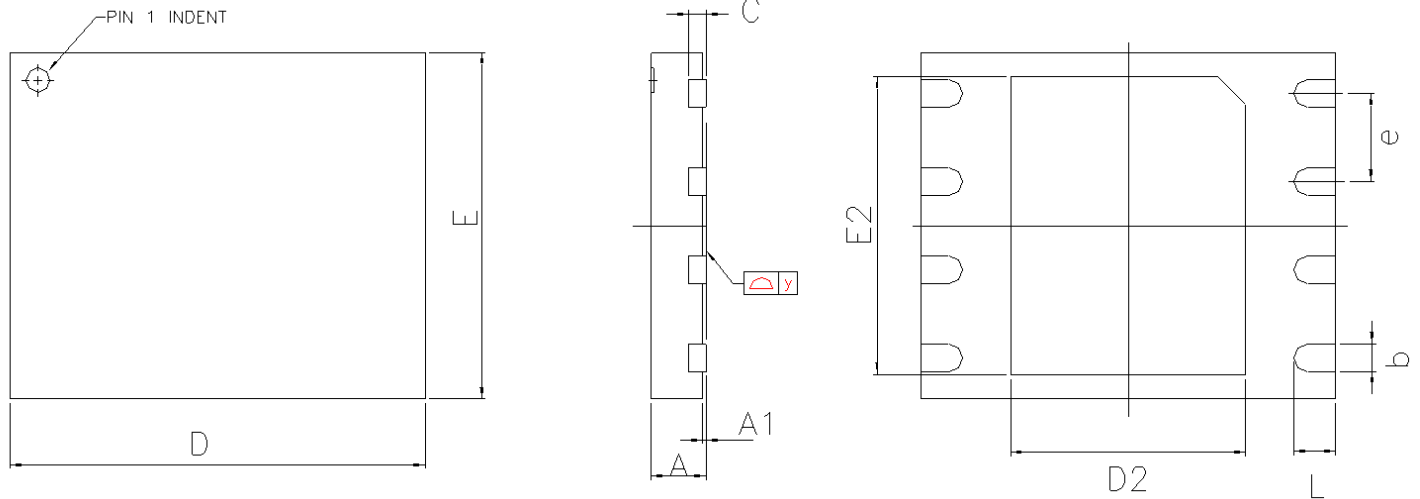
USON8 4x4mm Land Pattern

Unit of Measurement: mm



Serial Flash PCB Layout Guidelines

WSO8 6x5mm

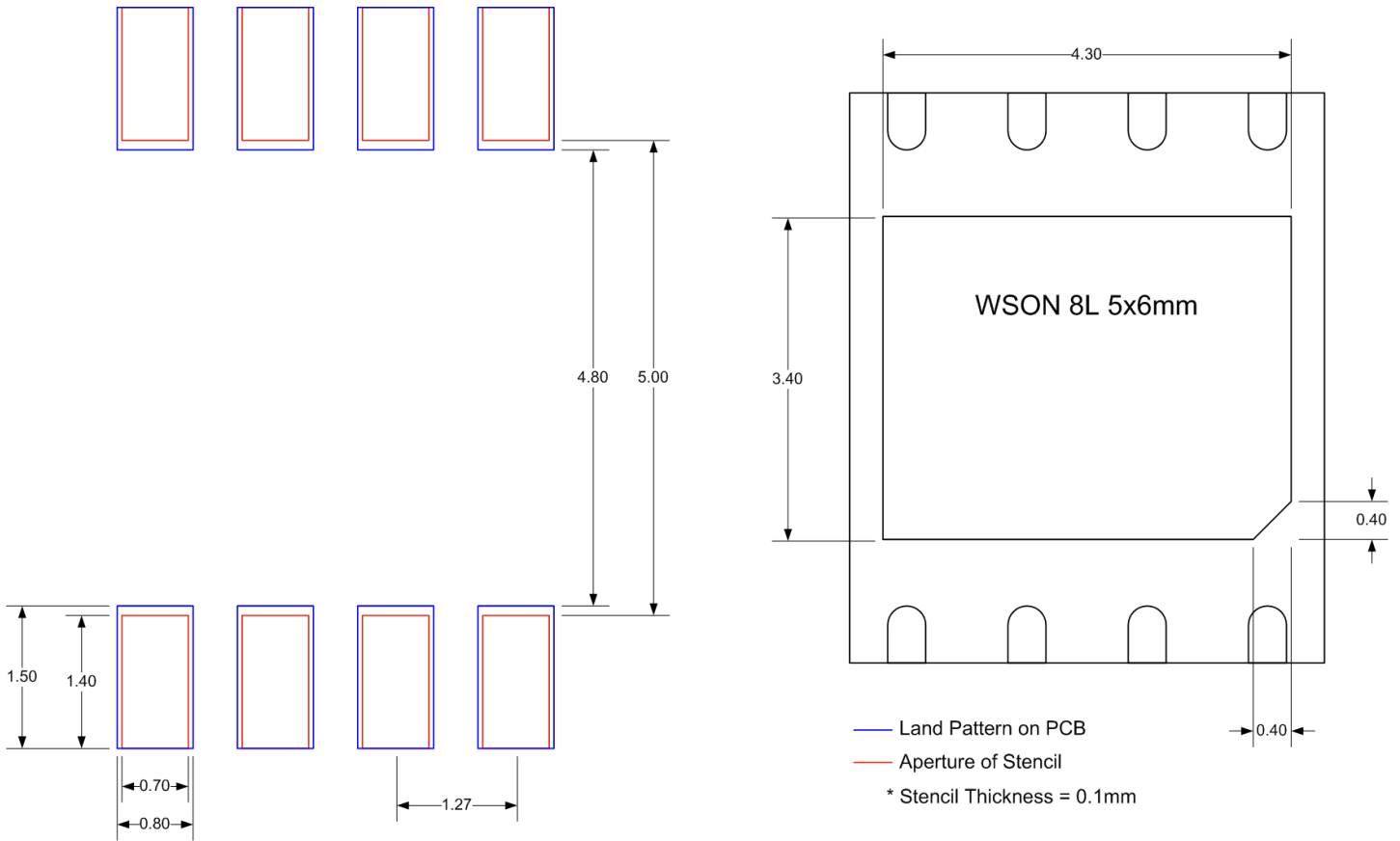


SYMBOLS	DIMENSIONS IN MILLIMETERS			DIMENSIONS IN Inch		
	MIN	NOM	MAX	MIN	NOM	MAX
A	0.70	0.75	0.80	0.0275	0.0295	0.0314
A1	0.00	0.02	0.05	0.0000	0.0007	0.0019
b	0.35	0.40	0.48	0.0137	0.0157	0.0188
C	—	0.20 REF.	—	—	0.0078REF.	—
D	5.90	6.00	6.10	0.2322	0.2362	0.2401
D2	3.35	3.40	3.45	0.1318	0.1338	0.1358
E	4.90	5.00	5.10	0.1929	0.1968	0.2007
E2	4.25	4.30	4.35	0.1673	0.1692	0.1712
e	—	1.27	—	—	0.05	—
L	0.55	0.60	0.65	0.0216	0.0236	0.0255
y	0.00	—	0.075	0.0000	—	0.0029

Serial Flash PCB Layout Guidelines

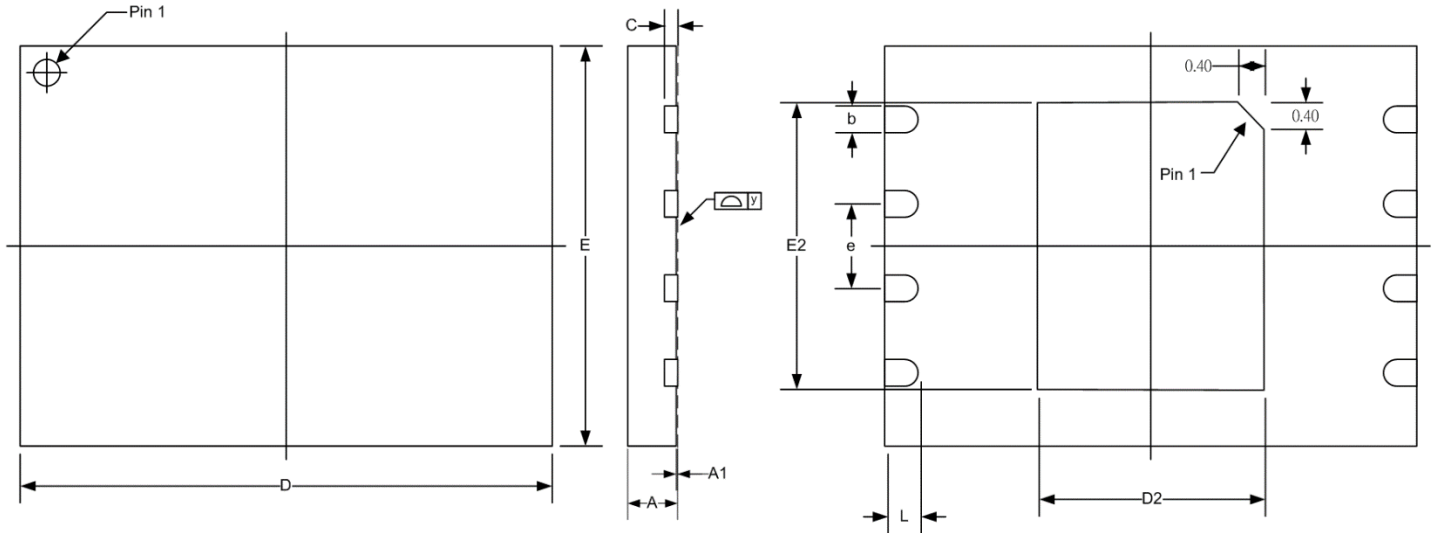
WSO8 8L 5x6mm Land Pattern

Unit of Measurement: mm



Serial Flash PCB Layout Guidelines

WSO8 8x6mm

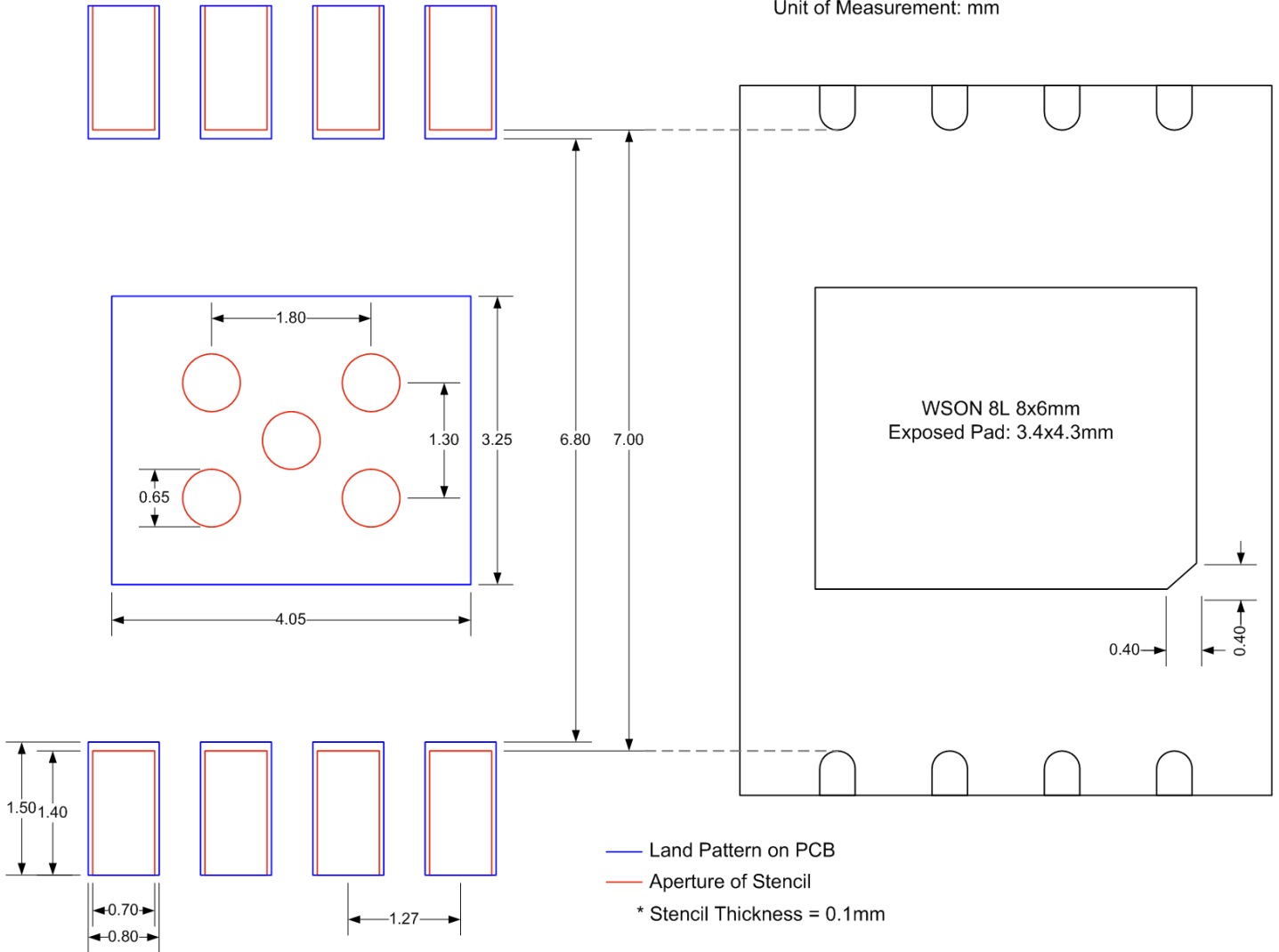


SYMBOL	MILLIMETERS			INCHES		
	Min	Nom	Max	Min	Nom	Max
A	0.70	0.75	0.80	0.028	0.030	0.031
A1	0.00	0.02	0.05	0.000	0.001	0.002
b	0.35	0.40	0.48	0.014	0.016	0.019
C	---	0.20 Ref.	---	---	0.008 Ref.	---
D	7.90	8.00	8.10	0.311	0.315	0.319
D2	3.35	3.40	3.45	0.132	0.134	0.136
E	5.90	6.00	6.10	0.232	0.236	0.240
E2	4.25	4.30	4.35	0.167	0.169	0.171
e	1.27 BSC			0.050 BSC		
L	0.45	0.50	0.55	0.018	0.020	0.022
y	0.00	---	0.05	0.000	---	0.002

Serial Flash PCB Layout Guidelines

WSO8 8L 8x6mm Land Pattern

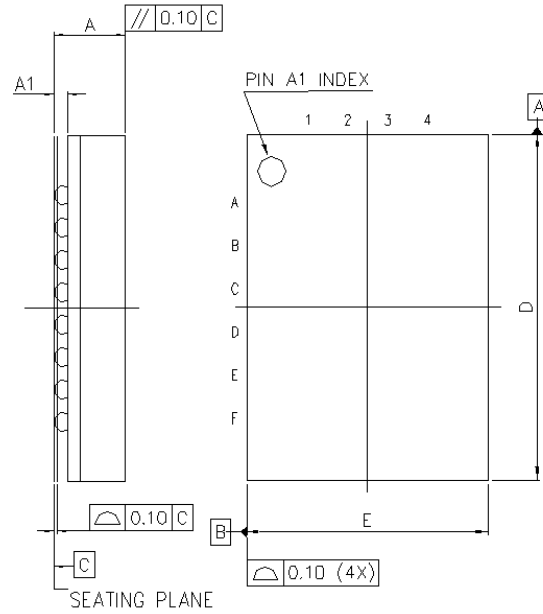
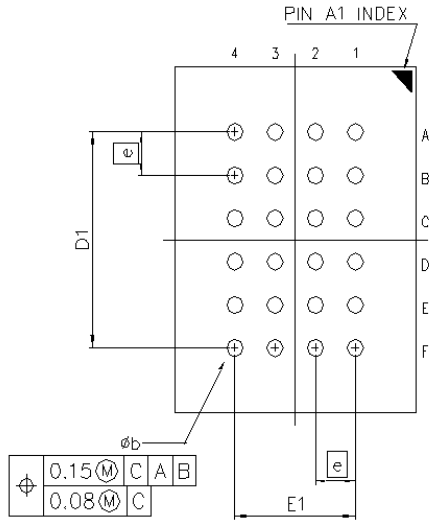
Unit of Measurement: mm



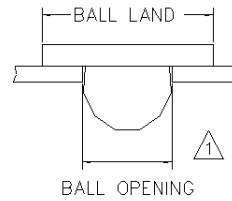
Serial Flash PCB Layout Guidelines

BGA Packages

TFBGA24 6x8mm 4x6 matrix



SYM.	DIMENSION (mm)			DIMENSION (inch)		
	MIN.	NOM.	MAX.	MIN.	NOM.	MAX.
A	—	—	1.20	—	—	0.047
A1	0.25	0.30	0.35	0.010	0.012	0.014
b	0.35	0.40	0.45	0.014	0.016	0.018
D	7.95	8.00	8.05	0.313	0.315	0.317
D1	5.00 BSC			0.197 BSC		
E	5.95	6.00	6.05	0.234	0.236	0.238
E1	3.00 BSC			0.118 BSC		
\bar{E}	1.00 BSC			0.039 BSC		

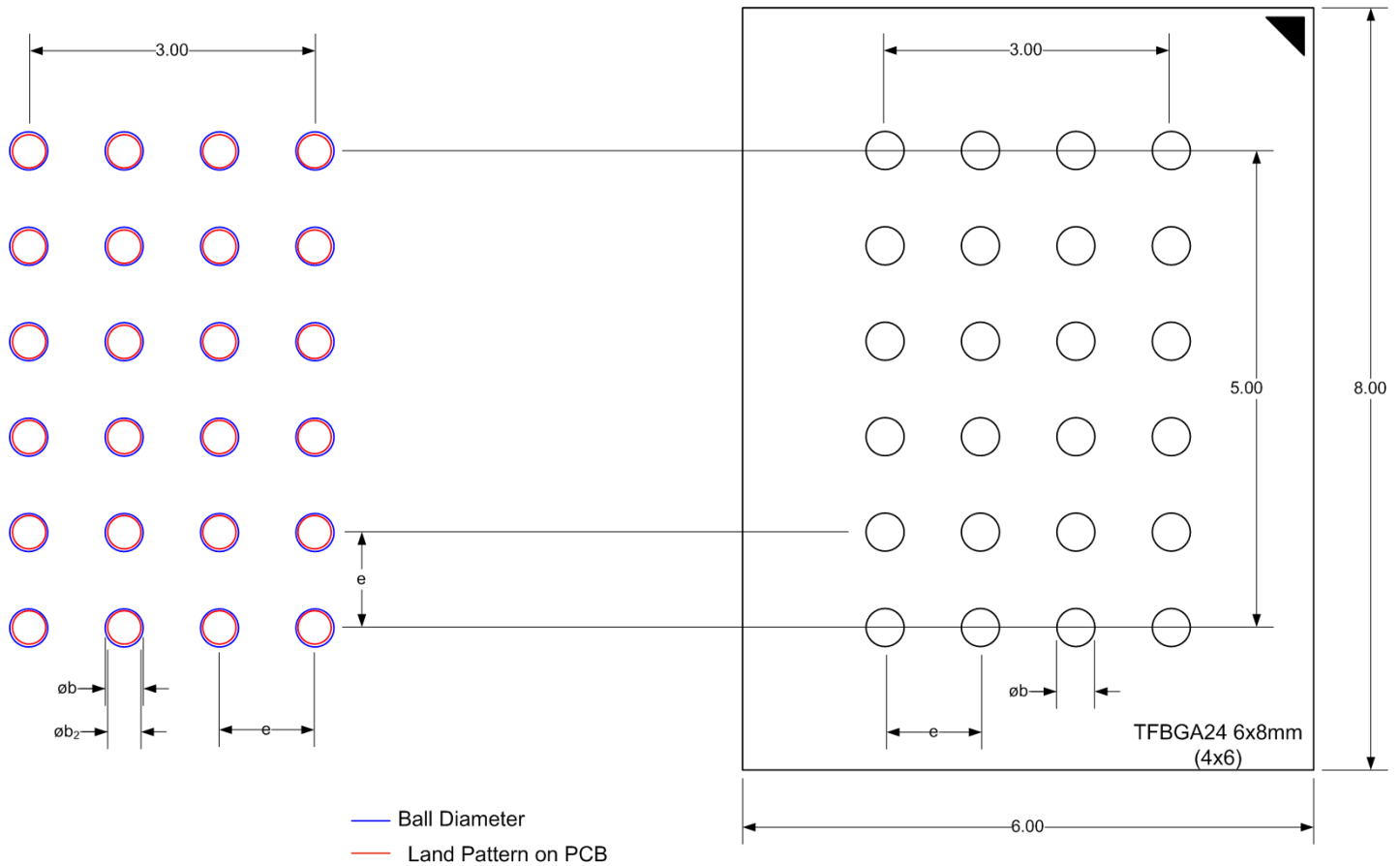


Note:
1. Ball land:0.45mm. Ball opening:0.35mm.
PCB ball land suggested ≤ 0.35 mm

Serial Flash PCB Layout Guidelines

TFBGA24 6x8mm 4x6 matrix Land Pattern

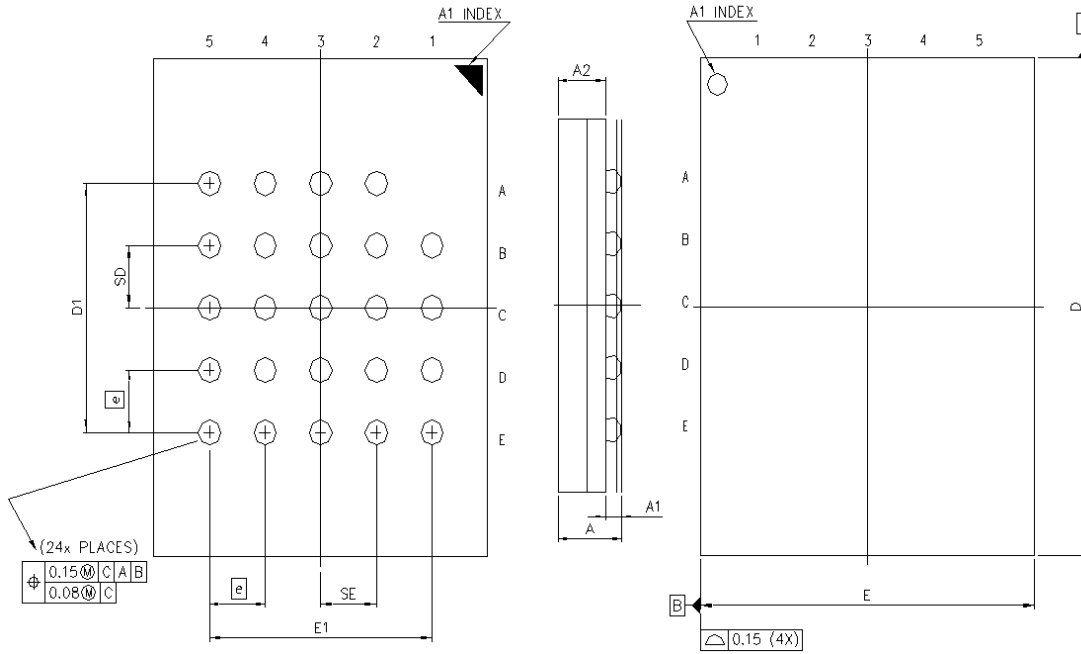
Unit of Measurement: mm



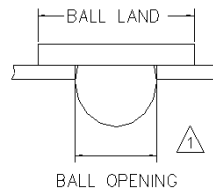
Symbol	Millimeters	Remarks
e	1.0	Pitch
$\varnothing b$	0.4	Ball Size
$\varnothing b_2$	0.35	Land Diameter

Serial Flash PCB Layout Guidelines

TFBGA24 6x8mm 5x5 matrix



SYM.	DIMENSION (mm)			DIMENSION (inch)		
	MIN.	NOM.	MAX.	MIN.	NOM.	MAX.
A	—	—	1.20	—	—	0.047
A1	0.26	0.31	0.36	0.010	0.012	0.014
A2	—	0.85	—	—	0.033	—
b	0.35	0.40	0.45	0.014	0.016	0.018
D	7.90	8.00	8.10	0.311	0.315	0.319
D1	4.00 BSC			0.157 BSC		
E	5.90	6.00	6.10	0.232	0.236	0.240
E1	4.00 BSC			0.157 BSC		
SE	1.00 TYP			0.039 TYP		
SD	1.00 TYP			0.039 TYP		
a	1.00 BSC			0.039 BSC		

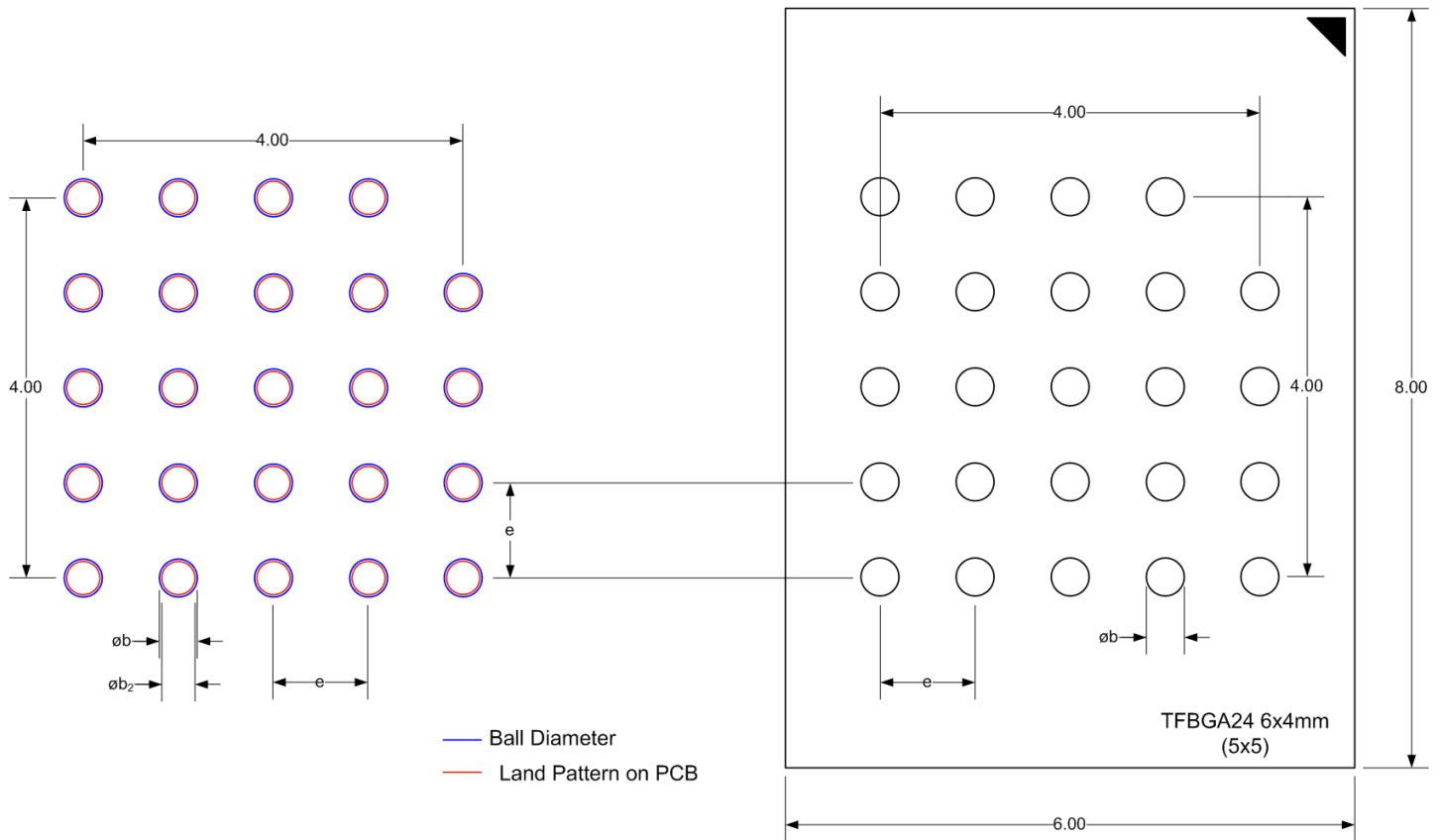


Note:
1. Ball land:0.45mm. Ball opening:0.35mm.
PCB ball land suggested <=0.35 mm

Serial Flash PCB Layout Guidelines

TFBGA24 6x8mm 5x5 matrix Land Pattern

Unit of Measurement: mm



Symbol	Millimeters	Remarks
e	1.0	Pitch
øb	0.4	Ball Size
øb ₂	0.35	Land Diameter

Serial Flash PCB Layout Guidelines

Revision History

Version	Date	Page	Description
1.0	11/15/2015	NA	Original AN-SF1006
2.0	09/25/2017	NA	Convert t 2017 App Note Template
2.1	06/13/2018	13	3x2mm USON missing pad width dimension

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