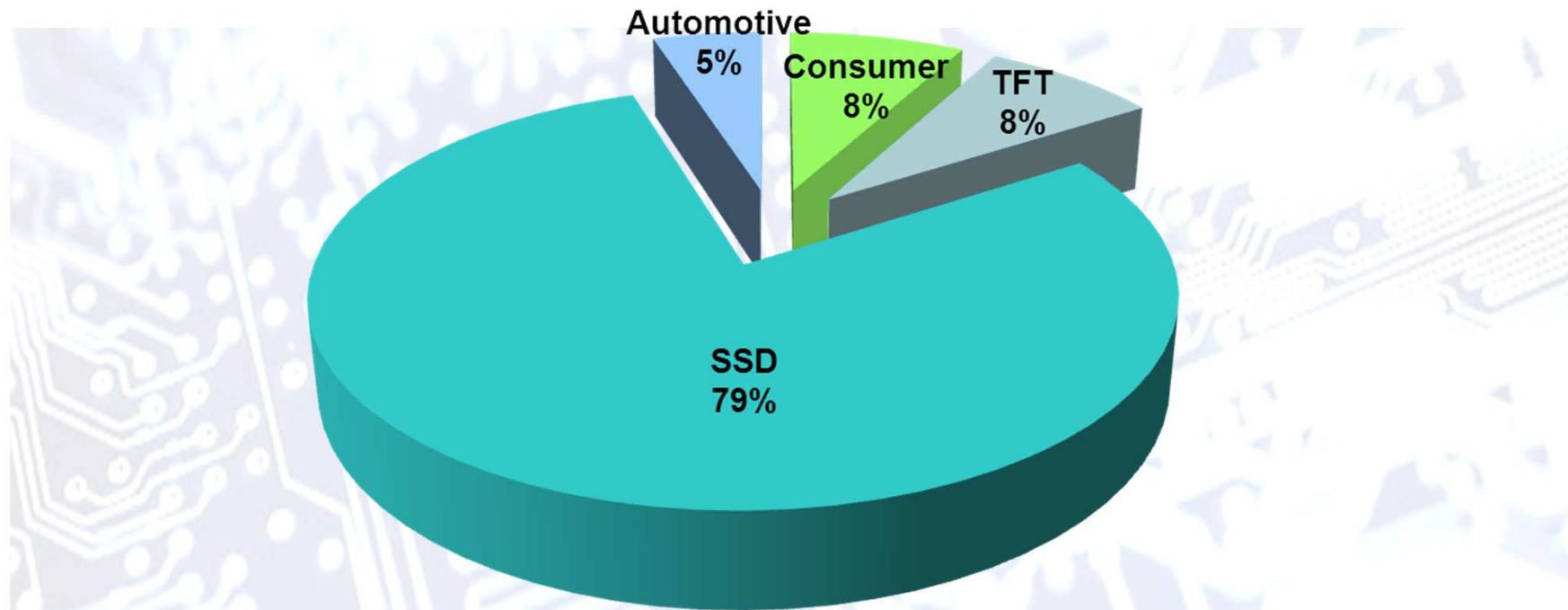


SAFE-DE
赛孚德科技

Technology Development

Product distribution

Sales revenue by application



Main customer by product :

SSD : SanDisk, Micron, SEAGATE, TOSHIBA, LITEON

Consumer : Lenovo, AOI

TFT : AUO, SHARP, REFOND

Automotive : T, Danfoss

- ***Technology roadmap***
- ***Product experience***
- ***Technology capability***

- ***Technology roadmap***
- *Product experience*
- *Technology capability*

Technology Roadmap

Mass Production

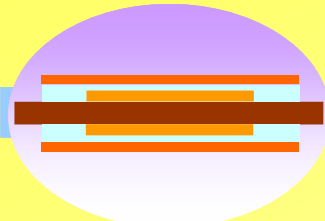
RD Prototype

Evaluation

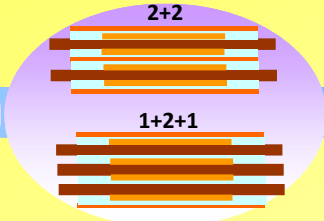
2017 ~ 2018

2019

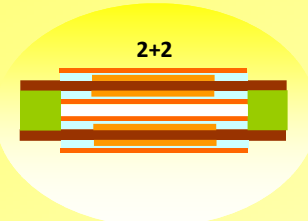
Flex Stack-up trend



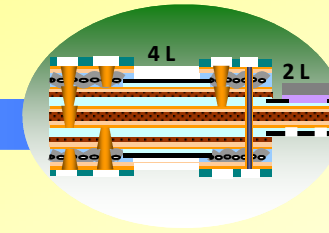
1~2 layer



3~4 layer

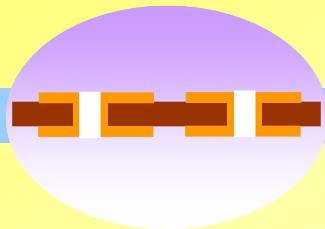


4 layer Air-gap

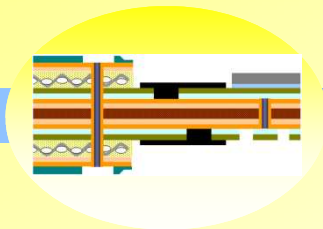


Different flex layer count
(2 & 4 layers FPC)

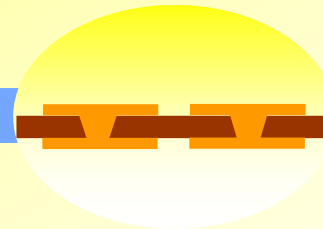
Flex design trend



Through hole plating

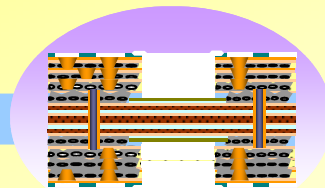


SUS stiffener + Flexible
S/M + Shielding film

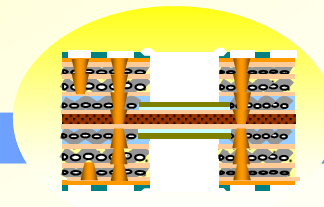


Micro via filled plating

Rigid Stack-up trend



1~3 step micro via



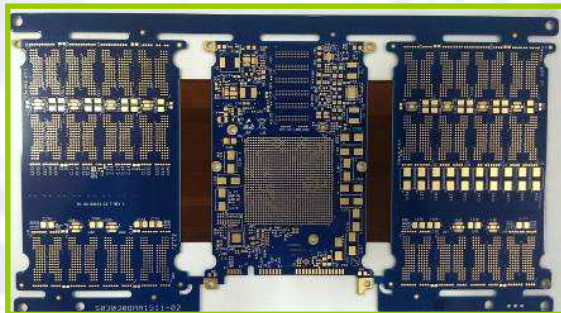
Any layer

- *Technology roadmap*
- **Product experience**
- *Technology capability*

Product experience

Application

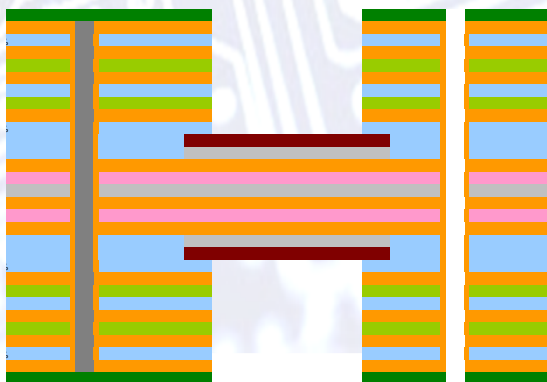
SSD



Specifications

11L Structure : / Items		Specification
External	Min. Conductor Width	96.5 um
	Min. Conductor Spacing	101.6 um
Internal	Min. Conductor Width	81.3 um
	Min. Conductor Spacing	76.2 um
Finish via size		200 um
Material		EM 370(D)/HI-TG
Board thickness		1 mm (39.4mil)
Surface finish		ENIG
BGA design		0.8 mm pitch
S.M		OTC R-500 (BL)

Construction



Type

**11 Layer structure
(4+3F+4)**

2015

2016

2017

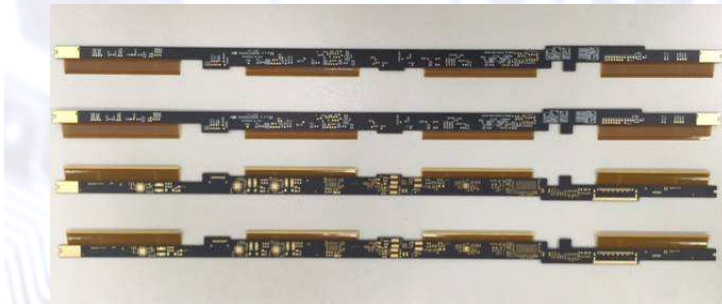
2018~

Mass production

Product experience

Application

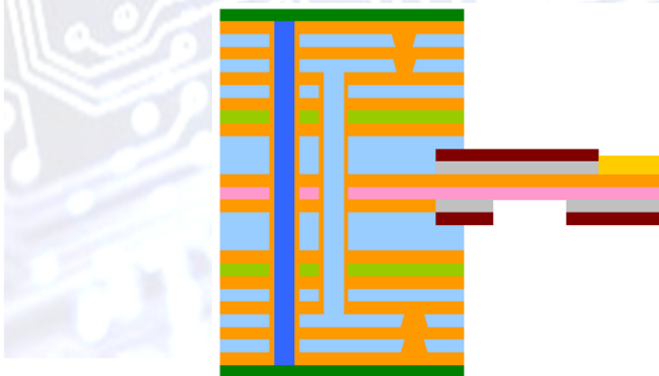
Note book / Tablet Displayer



Specifications

12L Structure : / Items		Specification
External	Min. Conductor Width	100 um
	Min. Conductor Spacing	100 um
Internal	Min. Conductor Width	50 um
	Min. Conductor Spacing	50 um
Finish via size		100 um
Material		EM 285
Board thickness		0.9 mm (35.46mil)
Surface finish		ENIG
BGA design		0.4 mm pitch
S.M		OTC R-500

Construction



Type

2015

2016

2017

2018~

12 Layer structure
(1+(1+(3+2F+3)+1)+1)

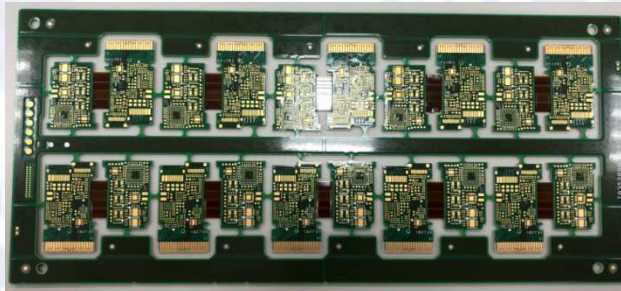
Sample

Mass production

Product experience

Application

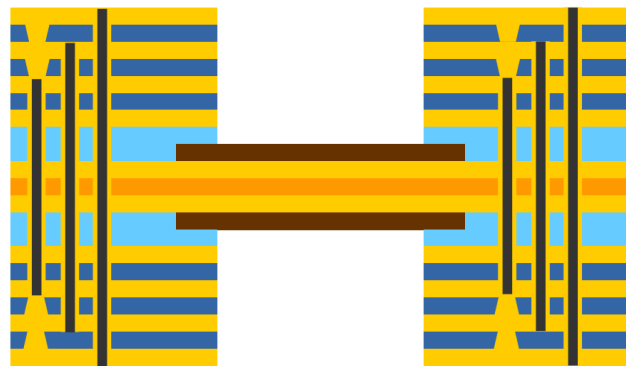
Photoelectric converter



Specifications

10L Structure : / Items		Specification
External	Min. Conductor Width	101.6 um
	Min. Conductor Spacing	88.9 um
Internal	Min. Conductor Width	81.3 um
	Min. Conductor Spacing	101.6 um
Finish via size		203 um
Material		M6 R5670/ Hi-Tg
Board thickness		1 mm (39.4mil)
Surface finish		ENIG+Gold Finger
BGA design		0.8mm pitch
S.M		R-500 ZN23(G)

Construction



Type

2015

2016

2017

2018~

10 Layer structure
(1+1+(1+1F+2F+1F+1)+1+1)

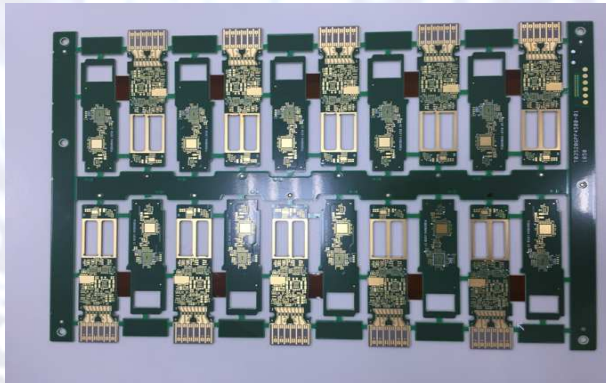
Sample

Mass production

Product experience

Application

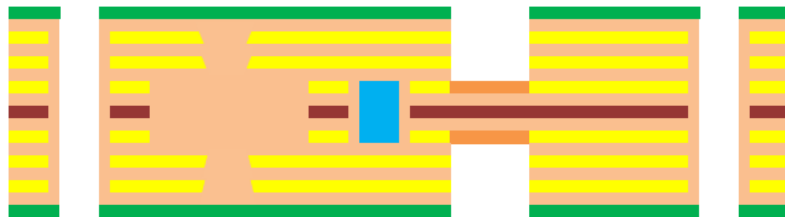
Photoelectric converter (Copper coin buried)



Specifications

8L Structure : / Items		Specification
External	Min. Conductor Width	79.75 um
	Min. Conductor Spacing	57.9 um
Internal	Min. Conductor Width	83.82 um
	Min. Conductor Spacing	82.29 um
Finish via size		200 um
Material		M6 R5670/ Hi-Tg
Board thickness		1 mm (39.4mil)
Surface finish		ENIG+Gold Finger
BGA design		0.5mm pitch
S.M		R-500 ZN23(G)

Construction



Type

2015

2016

2017

2018~

8 Layer structure
(1+1+(1+2F+1)+1+1)

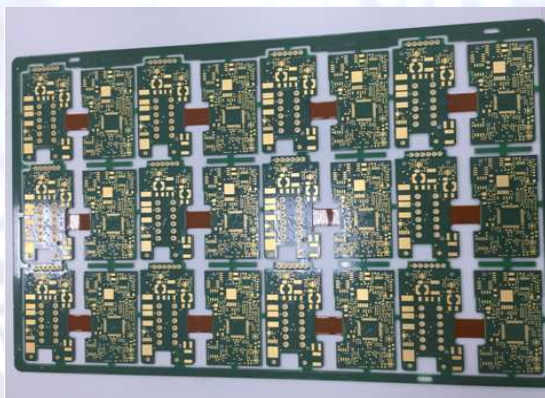
Sample

Mass production

Product experience

Application

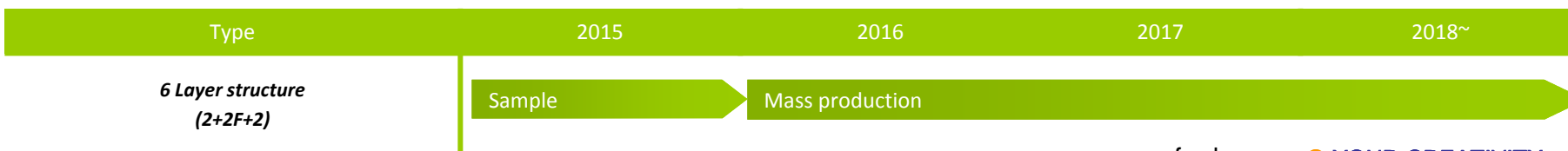
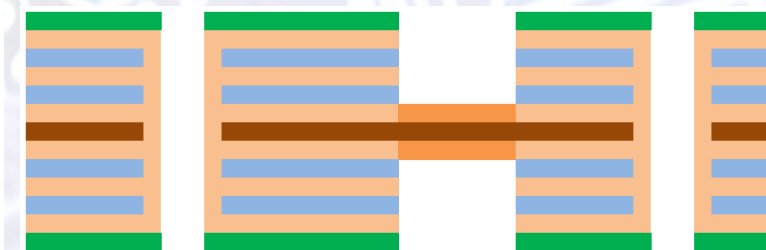
Automotive (Control system)



Specifications

6L Structure : / Items		Specification
External	Min. Conductor Width	168 um
	Min. Conductor Spacing	75 um
Internal	Min. Conductor Width	170 um
	Min. Conductor Spacing	183 um
Finish via size		299 um
Material		EM 827
Board thickness		1.6 mm (63mil)
Surface finish		ENIG
BGA design		N/A
S.M		R-500 ZN23(G)

Construction



Product experience

Application

Automotive (Sensor)



Specifications

4L Structure : / Items		Specification
External	Min. Conductor Width	269 um
	Min. Conductor Spacing	155 um
Internal	Min. Conductor Width	135 um
	Min. Conductor Spacing	78.74 um
Finish via size		200 um
Material		EM 827
Board thickness		0.85 mm (33.5mil)
Surface finish		ENIG
BGA design		N/A
S.M		R-500 ZN23(G)

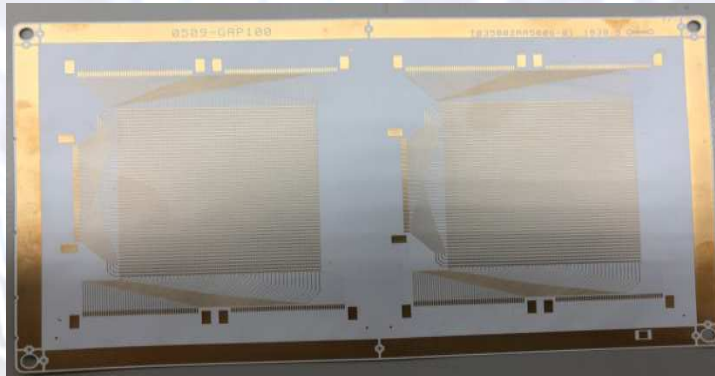
Construction



Product experience

Application

LED Monitor



Construction



Specifications

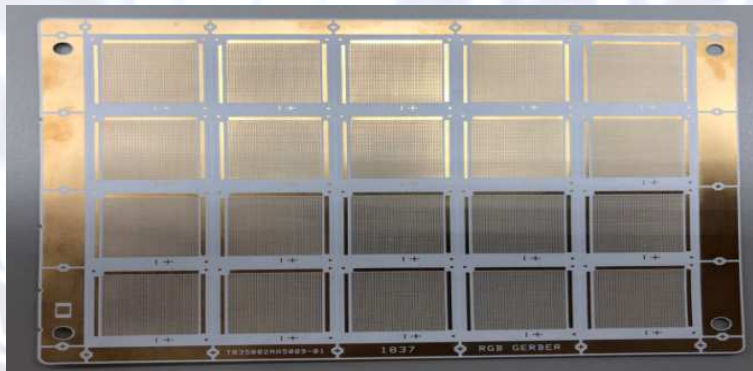
2L Structure : / Items		Specification
External	Min. Conductor Width	50 um
	Min. Conductor Spacing	40 um
Internal	Min. Conductor Width	None
	Min. Conductor Spacing	None
Finish via size		50 um
Material		Y-206BS / Halogen-free
Board thickness		0.114 mm (4.49mil)
Surface finish		ENIG
BGA design		None
S.M		None



Product experience

Application

LED Monitor



Construction



Specifications

2L Structure : / Items		Specification
External	Min. Conductor Width	75 um
	Min. Conductor Spacing	75 um
Internal	Min. Conductor Width	None
	Min. Conductor Spacing	None
Finish via size		50 um
Material		Y-206BS / Halogen-free
Board thickness		0.114 mm (4.49mil)
Surface finish		ENIG
BGA design		None
S.M		None

Type

2016

2017

2018

2019

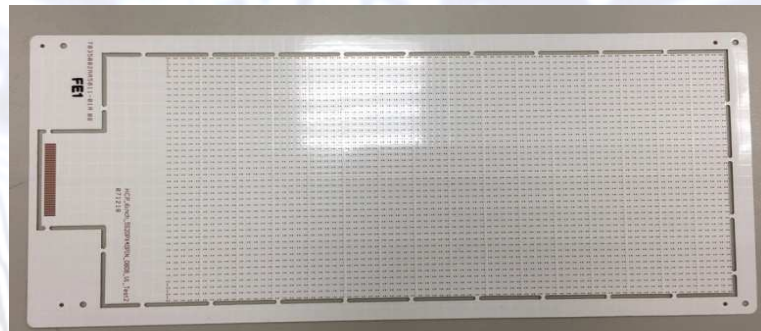
**2 Layer structure
(2F)**

Sample

Product experience

Application

Photoelectric converter



Construction



Specifications

2L Structure : / Items		Specification
External	Min. Conductor Width	150 um
	Min. Conductor Spacing	43.18 um
Finish via size		100 um
Material		Y-201TS(White)
Board thickness		0.2 mm (8mil)
Surface finish		ENIG
BGA design		N/A
S.M		OTC-R-500 2W(9)

Type

2016

2017

2018

2019

**2 Layer structure
(2F)**

Sample

Product experience

Application

Photoelectric converter



Construction



Specifications

3L Structure : / Items		Specification
External	Min. Conductor Width	49.7 um
	Min. Conductor Spacing	49.7 um
Internal	Min. Conductor Width	N/A um
	Min. Conductor Spacing	38 um
Finish via size		50 um
Material		EM-285/ Mid-Tg / Halogen-free
Board thickness		0.177 mm (7mil)
Surface finish		ENIG
BGA design		N/A
S.M		OTC R-500 (MKH)

Type

2016

2017

2018

2019

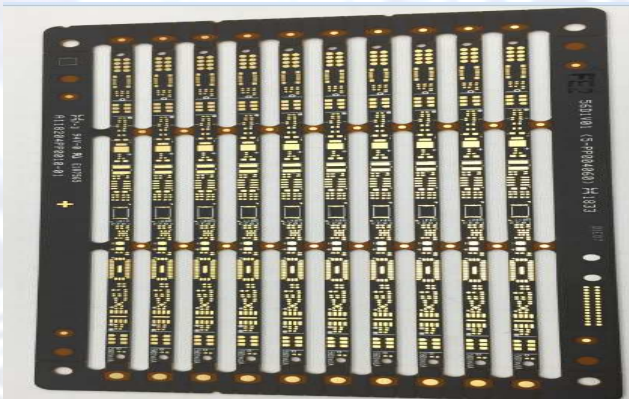
**3 Layer structure
(1+2)**

Sample

Product experience

Application

Consumer (NB camera)



Construction



Specifications

6L Structure : / Items		Specification
External	Min. Conductor Width	45.72 um
	Min. Conductor Spacing	55.88 um
Internal	Min. Conductor Width	63.5 um
	Min. Conductor Spacing	63.5 um
Finish via size		100 um
Material		EM-285/ Mid-Tg / Halogen-free
Board thickness		0.381 mm (15mil)
Surface finish		NiPaAu
BGA design		None
S.M		PSR2000 ME8H

Type

2016

2017

2018

2019

6 Layer structure
(1+(1+(2)+1)+1)

Sample

Mass production

- *Technology roadmap*
- *Product experience*
- ***Technology capability***

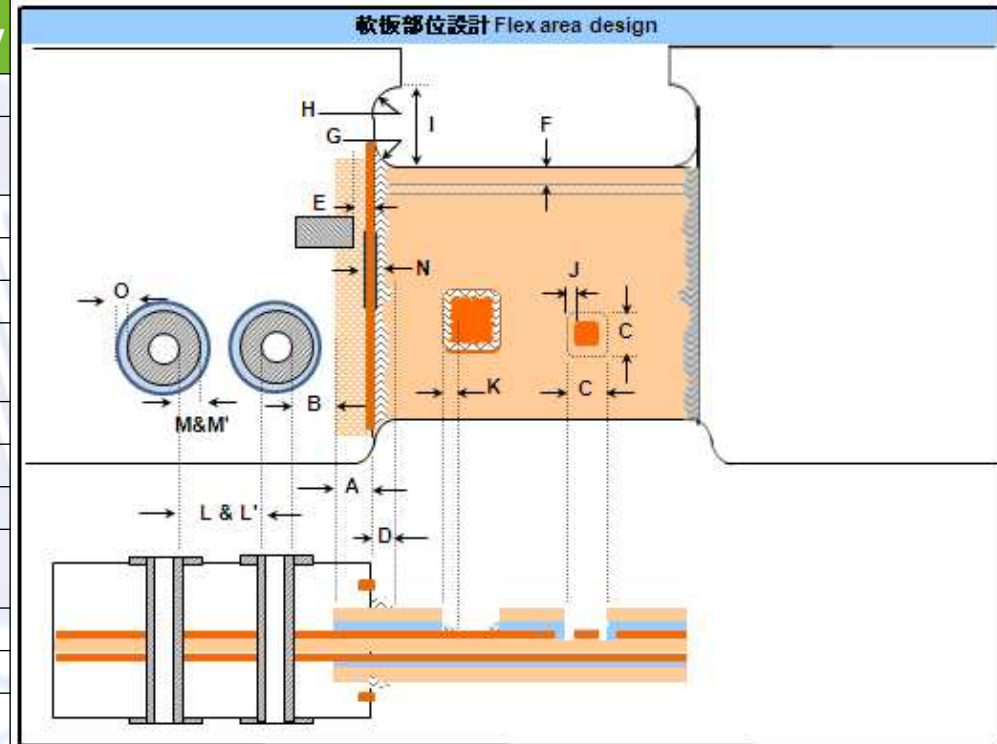
Technology capability

Feature Description		2018 (Unit : um)	2019 (Unit : um)
Stack up		2+N+2	3+N+3, Anylayer
Maximum R/F layer count		≤ 14	≤ 16
Maximum FPC layer count		≤ 4	≤ 4
FPC	Single side board thickness	≥ (25+T oz)	≥ (12+T oz)
	Double side board thickness	≥ (T oz+25+T oz)	≥ (T oz+12+T oz)
Rigid	Core thickness	≥ (T oz+50+T oz)	≥ (T oz+40+T oz)
	Prepreg thickness	≥ 40	≥ 40
HDI	Line/Space	≥ (50/50)	≥ (40/50)
	Laser via hole size	≥ 100	≥ 75
	Laser Capture/Target pad	≥ 250/250	≥ 200/200
	SM registration	≥ +/-38	≥ +/-25
	SM dam on Rigid	≥ 75	≥ 65
PTH Drill diameter		≥ 200	≥ 150
PTH land diameter		≥ 400	≥ 350
MTL. type & supplier	FCCL (1 & 2 Layers)	DuPont / Thinflex /Doosan	Low Dk material (DK 2.6 , 1GHZ)
	Coverlay (PI+AD)	Taiflex (PI: 8/12.5/25 AD:15/25)	Bond Ply (AD+PI+AD)
	Adhesive	Taiflex / Arisawa	Acrylic type (DuPont)
	Low flow prepreg	EMC / Panasonic	-
	Supporting MTL.	Type: FR4/Steel/PI	-
	EMI Shielding film	Tatsuta	-

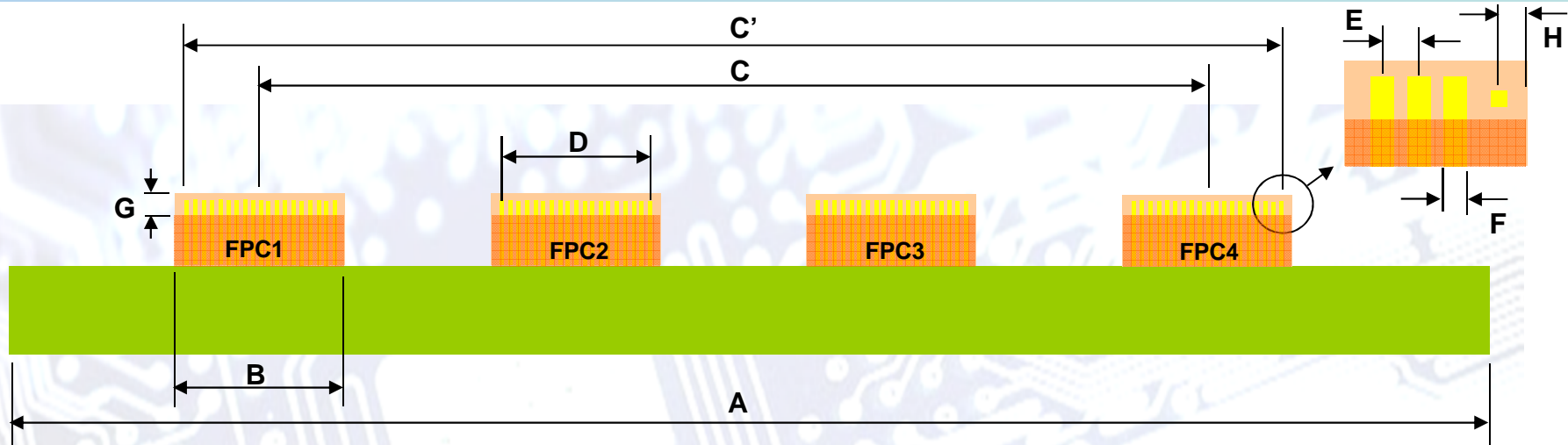
Technology capability for Flex portion

Item	Description	Capability
A	Minimum partial coverlay into rigid distance	≥ 0.40
B	Minimum hole edge to partial coverlay edge distance	≥ 0.30
A+B	Minimum hole edge to boundary of R&F	≥ 0.80
C	Minimum coverlay opening	≥ 1.60
D	Maximum squeeze out	≤ 0.70
E	Minimum conductor (Rigid) to boundary of R&F	≥ 0.35
F	Minimum conductor (Flexible) to FPC outline	≥ 0.30
G	Minimum Flex outline R value	≥ 0.20
H	Minimum Rigid outline R value (Routing)	≥ 0.50
I	Minimum slot width (Flex outline to Rigid outline)	> 1.50
J	Coverlay registration (Manual)	≥ 0.60
K	Coverlay adhesive squeeze out	≤ 0.20
L	Minimum hole edge to another hole edge (the same net)	≥ 0.15
L'	Minimum hole edge to another hole edge (different net)	≥ 0.225
M	Minimum hole edge to ring edge (machine hole)	≥ 0.125
M'	Minimum hole edge to ring edge (Laser hole)	≥ 0.10
N	Laser stop pad edge to boundary of R&F	≥ 0.15
O	Minimum clearance	≥ 0.0625

unit : MM

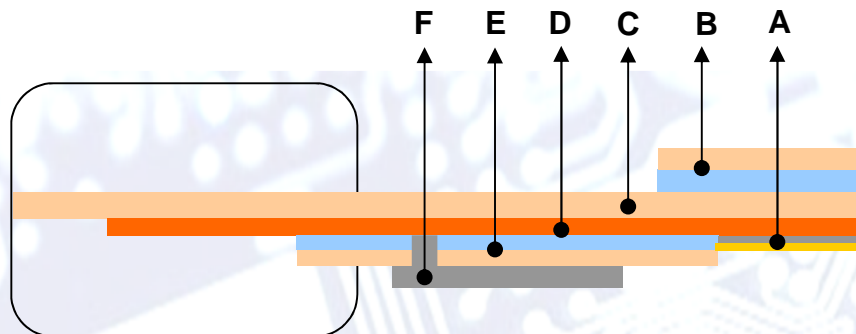


Dimension capability for TFT product



Item	Description	Production
A	Outline tolerance	+/-0.15mm
B	FPC outline tolerance	+/-0.075mm
C or C'	C' (The distance between data line center on both end of flex side)	C & C' >200mm : +/-0.05% C & C' ≤ 200mm : +/-0.07 mm
	C (FPC1 center to FPC4 center distance tolerance)	
D	1st Pin to last Pin distance tolerance	+/- D*0.15%
E	Pin pitch tolerance	+/-0.02mm
F	Pin width tolerance	+/-0.03mm
G	CVL opening tolerance	+/-0.2mm
H	Fiducial mark center to FPC outline tolerance	+/-0.15mm

Flex material capability for TFT product



Item	Description	Production	
		Minimum thickness	Tolerance
A	ENIG thickness	Au: Min. 0.03um ; Ni: Min. 1~3um	--
B	Top CVL thickness	PI: 8 / 12.5 / 25um ; AD:15 / 25um(Supporting G/F)	PI: +/-2um AD: +/-3um
C	FCCL PI thickness	20um / 25um / 50um	+/- 10%
D	FCCL Cu Type & thickness	ED or RA ; 1/3 oz or 1/2 oz	+1/-2um
E	Bottom CVL thickness	PI: 8 / 12.5/ 25um ; AD:10 / 20um	PI: +/-2um AD: +/-3um
F	EMI shielding thickness	16um (SF-PC600-U1)	--



Thank you!