Summary Specifications for 3M™ Flexible Circuits 2-Metal Layer

Note: These Summary Specifications indicate individual capabilities; combinations may or may not be available for your design. Contact a 3M representative to discuss your specific requirements.

Dielectric

Material	Kapton® E Film
Nominal thickness	25 or 50µm
Chemical etch patterning:	
Min dielectric opening (not metal masked)	125µm (25µm PI); 200µm (50µm PI)
Min dielectric opening (metal masked)	100µm (25µm or 50µm PI)
Min dielectric feature (not metal masked)	125µm (25µm PI); 250µm (50µm PI)
Min dielectric feature (metal masked)	100µm (25µm or 50µm PI)
Min metal mask width	300µm
Feature tolerance	+/- 2 mils
Mechanical patterning:	
Scope	Part excise or debuss
Capabilities	Laser (low volume); Punch and die (high volume)
Registration	Design/equip-dependent. Check with Appl. Eng.
Min feature (punched opening)	250µm
Min spacing between features	500µm

Copper conductors

Minimum Lead Width:	30µm (both M1 & M2)
Minimum Space:	30µm (both M1 & M2)
Cu Thickness nominal range:	
Designs with vias:	12 – 35µm*
Designs without vias:	5 – 35µm*

* 12 - 18µm recommended

Conductor finishes

Ni Thickness*:	0 – 3.0µm (1.5µm recommended for wirebonding)
Au Thickness*:	0.4 – 2.5µm (0.75µm recommended for wirebonding)
Alternate finishes:	Organic Solderability Preservative (OSP)
Material:	Entek® CU-56HF

*All metal features need to be bussed for electrolytic Ni/Au plating

Vias

Fabrication method:	Laser-drilled
Typical via sizes*:	
Closed via, 1mil substrate:	
Entrance:	55µm
Exit:	25µm
Open via, 2 mil substrate (assumes 12 – 15µm Cu thickness)	
Entrance:	66µm
Exit:	50µm

*Larger via diameters available with both 1 and 2 mil substrate (including open vias on 1 mil substrate)

Minimum capture pad diameters:	
M1:	via exit diameter + (2 x via drill-to-M1 layer reg.*)
M2:	via entrance diameter + (2 x via drill-to-M2 layer reg.*)

*via drill-to-Mx layer registration in table below

Minimum via spacing (center-to-center):

Capture pad diameter + minimum space (redundant vias may be spaced closer)

Layer registration:

Layers:	Flow 1	Flow 2
M1-to-M2	25µm	50 - 100µm*
M1-to-PI (non metal-masked)	50 - 100µm*	25µm
M1-to-PI (metal masked on M1)	0µm	0µm
PICC1-to-M1	50 - 75µm*	50 - 75µm*
PICC2-to-M2	50 - 75µm*	50 - 75µm*
PI-to-M2 (non metal-masked)	55 - 105µm*	55 - 105µm*
PI-to-M2 (metal masked on M2)	0µm	0µm
PICC1-to-PI	70 - 125µm*	55 - 80µm*
PICC2-to-PI	75 - 130µm*	75 - 130µm*
via drill-to-M1	50µm	75µm*
via drill-to-M2	50µm	65µm*

* specified as a typical range because capability is design-dependent

** registration tolerance estimates in blue are derived from the others listed

Covercoat/soldermask

Materials	
Photoimageable:	R/Flex® 8080* (Si-free epoxy acrylate)
Screen-printed:	Asahi CCR232 (thermally-cured epoxy)
* may be used as a Au-plating mask	
Target thicknesses:	12 – 30µm typically
Registration:	
Photoimageable:	+/- 50-75µm (see registration table above)
Screen-printed:	+/- 300µm

Feature size capability:

	Minimum opening	Minimum feature (between openings)
Photoimageable	100µm	100µm
Screen-printed	200µm	200µm

AOI/E-test:

Test capabilities:	Various available for both low and high volume

Adhesive

Material:	R/Flex® 1500
Thickness:	25 or 50µm
Capability:	Unpatterned adhesive laminated continuously in reel-to-reel format (may be patterned after lamination by mechanical punching).

Stiffener/heatspreader lamination

Materials:	Cu, various on-conducting stiffener materials
Finishes:	Ni, black oxide, black epoxy
Registration:	Down to 70µm radius true position

Deliverable format(s):

Types:	Tape-on-reel, strips, singulated, laminated
Standard tape formats:	19mm, 24mm, 35mm, S35mm, 48mm, S48mm, 70mm, S70mm

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