TTM Tochnologies	All values in Inches Rev 4 (5-24-15) Chippewa Falls			
TTM Technologies	Standard		Development	
DI : 101 (: 0	Standard	Advanced	Development	
Physical Characteristics	2.000			
Min. Board Thickness	0.030	0.025	0.020	
Max Board Thickness - All Finishes	.150	.200	.320	
Thickness Tolerance	+/- 10%	+/- 8%	+/- 8% > 19:1	
Through Hole Aspect Ratio	15:1 (9.8 Drill)	18:1 (9.8 Drill)		
Bow and Twist (Balanced)	0.007"/inch 16.5 x 18.5	0.005"/inch	.005"/inch	
	18.5 x 24.5			
Panel Sizes	21.5 x 24.5			
Turier Gizes	24.5 x 27.5			
	21.5 x 27.5			
Technology	21.0 X 27.0			
Microvias	Yes	Yes	Yes	
	Sub-assy Drill/Sequential	Sub-assy Drill/Sequential	Sub-assy Drill/Sequential	
Blind Vias	Lam	Lam	Lam	
Buried Vias	≥.005" DS core, ≤15:1 a/r			
Buried vias	Mutlit-layer			
Thin Core Pwr/Gnd	.002	.001	.0005	
Buried Resistor	N/A	N/A	N/A	
Inner Layers				
Minimum Line/Space	.003"/.003"	0025"/ 0025"	002"/ 002"	
H oz 1 oz	.003 /.003	.0025"/.0025" .003"/.003"	.002"/.002"	
	.0055"/.0055"	.005"/.005"		
2 oz 3 oz	.0055 /.0055	.005"/.010"		
4 oz	.0007.012	.003 7.010		
5 oz	.008"/.014"			
	+/0005" for Impedance	+/00025" for Impedance		
Feature Tolerance 1/2 - 1 oz	Lines	Lines		
Feature Tolerance 2 - 5 oz	+/001" (2 oz) +/003" (5 oz)			
Innerlayer Cu to Edge				
PTH (DHS) to Copper (Drill to Copper)	≥.008"	≥.007"	≥.006"	
NPT Hole/Slot to Copper, Second Drill	≥.008"			
Antipad Size	DHS + .018"	DHS + .016"	DHS + .014"	
Annular Ring Requirements for Drilled Hole	s <.026"			
Tangency	DHS + .010"	DHS + .008"		
1 mil Annular Ring	DHS + .010"	DHS + .009"	DHS + .008"	
Outer Layers	2			
Minimum Line/Space				
3/8 oz Base	.003"/.003"	.0025"/.003"		
1/2 oz Base	.0037.003	.00257.005		
1 oz Base	.00537.004	.0007.0000		
2 oz Base	.006"/.008"			
3 oz Base	.008"/.012"			
4 oz Base	.010"/.014"			
5 oz Base	.012"/.016"			
Feature Attributes	12.12.110.10			
PTH to Copper	≥.007"	≥.006"		
NPT Hole/Slot to Copper	≥.010"	≥.007" (Second Drill)		
Rout to O/L Copper	≥.010"	≥.006"		
Score to O/L Copper	.020"	≥ .015"		

	All values in Inches Rev 4 (5-24-15) Chippewa Falls			
` TTM Technologies				
Time-To-market interconnect Solutions-	Standard	Advanced	Development	
Drill				
Min. Drill Size	.0098" (≤.130" thick .0079")	.0079"	.0059"	
Min. Blind Drill Hole Size (Controlled Depth Drilling)	.0098" (Conical)	.0083" (Conical)	.0059" (Conical)	
Min. Slot Width - Std.	.024"	.0138"		
Min. Positional Tolerance	.004" DTP	.003" DTP		
Min. PTH Tolerance (Primary Drill)	+/002" press fit	+/0015 press fit	+/001" press fit	
Min. Tolerance of Plated Cut Out	+/005"	+/003"		
Counter Bore/Sink Tolerance	≥+/010" depth	+/008" depth		
Max. NPT (hole/slot) in Primary Drill	.220" (radius, width or length)	>220", ≤.250" (radius,width, or length)		
Backdrill Size Over Primary Drill	.008"	.006"	.005"	
Backdrill Stub Length	.009 +/007	.008" +/006	.007" +/005	
Microvia				
Laser via diameter	.005"	.005"	.004"	
Capture/Target pads	DHS + .007"	DHS + .006"	DHS + .005"	
Aspect Ratio	.75:1	.85:1	.9:1	
1 Layer Build Up	Yes			
2 Layer Build Up	Yes			
3+ Layer Build Up	Yes			
4+ Layer Build Up	No			
AnyLayer Laser Via Stacked on Buried Via	No Yes			
Skip Via (ex 1-3)	Yes Yes	+		
Via in Pad (through hole)	103			
Non-Conductive Via Fill	Yes			
Line width and Spacing (wrap)	>.005"	>.004" < .004" no wrap process		
Microvia Non-Conductive Via Fill	Yes			
Conductive Via Fill	Outsourced		·	
Laser Direct Imaging	Yes - sublams and all external			
Plating/Surface Finish				
HASL	Outsourced		<u></u>	
Immersion Gold (ENIG)	Yes			
Immersion Ni/Pd/Au	Outsourced			
Electrolytic Ni/Au Tab Plating	Yes			
Electrolytic Ni/Au (Hard Gold)	Yes			
Organic Solderability Preservative	Yes			
mmersion Silver	Yes			
mmersion Tin	Outsourced			
Selective ENIG or ENEPIG	Yes			
Wirebondable Soft Au	Outsourced			
OSP + Electroplate Ni-Au	Yes			

	All values in Inches	Rev 4 (5-24-15)	
TTM Technologies Time-To-Market Interconnect Solutions**	Standard	Chippewa Falls Advanced	Dovolonment
Soldermask	Standard	Advanced	Development
Colderniask			
Туре	LPI	LDI	Dryfilm
Colors	Green/Red/Blue/Black	Purple/White/Clear/Amber	
Thickness	.00035"0007" on top of circuit		
3/8 - 1 oz Base Copper			
Min. Web	.0025"	LDI S/M .002"	
Min. Clearance	.002"	LDI S/M .0015"	
Legend			
Text Width	.004" min.	.003" min.	
Color	White	Yellow, other	
LPI	Yes		
Inkjet	Yes		
Fabrication			
Rout			
Diameter Router Bits Available	.031"125"		
Edge to Edge Tolerance	+/005"	+/003"	
Score			
Score Angles	45°	20°, 30° and 60°	
Positional Tolerance to Datum	+/005"		
Front to Back Tolerance	+/005"	+/003"	
Remaining Web Tolerance	+/005"	+/003"	
Bevel Bevel Angles	20° 20° 45° 60°		T
Depth Tolerance	20°, 30°, 45°, 60° +.010"/015"	+/005" smart bevel	
Electrical Test & Performance	+.010 /015	+/005 Smart bever	
Min. Component Pitch	.016"	<.016"	
Max. Test Voltage	300 Volts	1000 Volts (prober)	
Max. Isolation Resistance	20 M Ohms	100 M Ohms	
Min. Continuity Resistance	20 Ohms	5 Ohms	5 Ohms
Hi Pot Test (Machine Capability)			
	500 VDC for 10 sec.	1200 VDC for 30 sec.	5000 VDC for 30 sec.
		Design dependant	Design dependant
Impedance Tolerance 51-100 ohms	+/- 10%	+/- 8%	+/- 7%
Impedance Tolerance 28-50 Ohms	+/- 10%	+/- 8%	+/- 7%
DC Resistance Testing	Yes	Yes	Yes
Kelvin Test		>2 milli ohms for resistance measurements of through holes. Detecting low plating caused by debris.	
Signal Loss measurement		SPP	SET2DIL
Latent Test	Company Confide		Latent defect detection for traces with resistance under 5 ohms. Still in
	Uhiect to Nondisclosure Agre		development stages.

TTM Tochnologies	Logan		
TTM Technologies Time-To-Market Interconnect Solutions*	Standard	Advanced	Development
Physical Characteristics	- Cianana	7141411004	эстоюрс
Min. Board Thickness	0.020		<0.020
Max Board Thickness - All Finishes	.350	.350450	>.450
Thickness Tolerance	+/-10%	+/-8%	< +/- 8%
Through Hole Aspect Ratio	14:1 (9.8 Drill)	18:1	1 17 070
Bow and Twist (Balanced)	>/=0.007"/inch	>/=0.005"/inch	<.005"/inch
Bow and Twist (Balancea)	18 x 24	77 0.000 ////	1.000 /111011
	18.5 x 24.5	24 x 27	
Panel Sizes	18.5 x 27.5	24 x 31 (backplane only)	
und dizes	21.5 x 24.5	24 x 36 (backplane only)	
	21.5 x 27.5	24 x 66 (backplane only)	
Technology	21.0 X 27.0		
Microvias	Yes	Yes	Yes
	Control Depth / Sequential	Control Depth / Sequential	
Blind Vias	lam	lam	
	≥.005" DS core. ≤.10:1 a/r		
Buried Vias	ML		
Thin Core Pwr/Gnd	.002	.001	
		1001	
Buried Resistor	No		
Inner Layers			
Minimum Line/Space			
H oz	.0035" / .0035"	.003" / .0035"	.003" / .003"
1 oz	.004" / .004"	.0035" / .004"	
2 oz	.005" / .007"	.005"/.005"	
3 oz	.006" / .009"		
4 oz	.007" / .010"		
5 oz	.008" / .011"	6 oz = .010"/.012"	
Feature Tolerance 1/2 - 1 oz	+/- 10%, +/0005 for	+/0003 for Impedance	
reature relevance 1/2 1 62	Impedance Lines	Lines	
Feature Tolerance 2 - 5 oz	+/- 20%	+/-10%	
Innerlayer Cu to Edge			
PTH (DHS) to Copper (Drill to Copper)	>=.008"	<.008	
NPT Hole/Slot to Copper, Second Drill	>=.010"	<.010	
Antipad Size	>=.020" Larger than Drill Tool	>=.016" Larger than Drill Tool	
Annular Ring Requirements for Drilled Holes	S <		
Tangency	DHS + .0009"	DHS + .008"	
1 mil Annular Ring	DHS + .011"	DHS + .010"	
Outer Layers			
Minimum Line/Space			
3/8 oz Base	.0035"/.0035"	.003"/.003"	
1/2 oz Base	.0035" / .004"	.0035" / .0035"	
1 oz Base	.005" / .005"	.004" / .004"	
2 oz Base	.006" / .008"		
3 oz Base	.008" / .010"		
4 oz Base	.010" / .013"		
5 oz Base	.012"/.015"		
Feature Attributes			
PTH to Copper	>/=.008"	.007"0079"	>=.0065"
NPT Hole/Slot to Copper	>/=.008"	>/=.004" (Second Drill)	2777
Rout to O/L Copper	>=0.010"	>=.006"	
Score to O/L Copper	.020"		

TTM Technologies	Logan		
Time-To-Market Interconnect Solutions™	Standard	Advanced	Development
Orill			
Min. Drill Size	.0091"	.0079"	
Min. Blind Drill Hole Size (Controlled Depth Drilling)	>=.012"	.0098"	<.010"
Min. Slot Width - Std.	0.024" (Step Drill)	.020 (Step Drill)	
Min. Positional Tolerance	.003" DTP		
Min. PTH Tolerance (Primary Drill)	Range of .006" Range of .004" for press fit holes	Range of .004" whisper connector +/0015"	
Min. Tolerance of Plated Cut Out	+/005"	+/003"	
Counter Bore/Sink Tolerance	>=+/-0.007" depth	<+/-0.007: depth	
Max. NPT (hole/slot) in Primary Drill	0.220" (radius, width or length)		
Backdrill Size Over Primary Drill	.008"	.006"	
Backdrill Stub Length	.009 +/007	.008" +/006	.007" +/005
Microvia			
Laser via diameter	.006"	.006"	
Capture/Target pads	DHS + .007"	DHS + .006"	
Aspect Ratio	.75:1		
1 Layer Build Up	Yes		
2 Layer Build Up	No		
3+ Layer Build Up	No		
4+ Layer Build Up	No		
AnyLayer	No		
Laser Via Stacked on Buried Via Skip Via (ex 1-3)	No Yes		
ਨਸ਼ਸ ਪੀਬ (ex 1-3) Via in Pad (through hole)	168		
Non-Conductive Via Fill	Yes		
Line width and Spacing (wrap)	.004"/.004"		
Microvia Non-Conductive Via Fill	Yes		
Conductive Via Fill	Outsourced		•
Laser Direct Imaging	I/L, O/L, Soldermask		
Plating/Surface Finish		·	
HASL	Yes		
Immersion Gold (ENIG)	Yes		
Immersion Ni/Pd/Au	Outsourced		
Electrolytic Ni/Au Tab Plating	Yes		
Electrolytic Ni/Au (Hard Gold)	Yes		
Organic Solderability Preservative	Yes		
mmersion Silver	Yes		
Immersion Tin	Outsourced		
Selective ENIG or ENEPIG	Yes		
Wirebondable Soft Au	Outsourced		
OSP + Electroplate Ni-Au	Yes		
Fused Tin/Lead	No		

TTM Technologies Time-To-Market Interconnect Solutions**		Logan	
	Standard	Advanced	Development
Soldermask			
Туре	STD - Taiyo PSR4000 HFX & BN	Dry Film	
Colors	Green/Red/Blue/Clear	White/Black/Orange	
Thickness	.0003 "002"		
3/8 - 1 oz Base Copper			
Min. Web	.003"	.002"	
Min. Clearance	.003"	.002"	
Legend			
Text Width	.004"	.002 (ink jet)	
Color	White	Yellow, other	
LPI	White	Other Colors	
Inkjet	_ Yes		
Fabrication			
Rout			
Diameter Router Bits Available	.031"125"		
Edge to Edge Tolerance	+/-0.005"	+/003	
Score			
Score Angles	30°		
Positional Tolerance to Datum	+/-0.005"		
Front to Back Tolerance	+/-0.005"		
Remaining Web Tolerance	+/004"	+/003"	
Bevel Bevel	45° 00° 05° 00° 45°		
Bevel Angles Depth Tolerance	15°, 20°, 25°, 30°, 45° +/005		
Electrical Test & Performance	17005		
Min. Component Pitch	0.016"	<.016"	
Max. Test Voltage	250 Volts	1000 Volts	
Max. Isolation Resistance	10 M Ohms	100 M Ohms	
Min. Continuity Resistance	10 Ohms	5 Ohms	
Hi Dat Toot (Mashing Oranghillt)	E00 \/DC for 40 //-: \		
Hi Pot Test (Machine Capability)	500 VDC for 10 sec. (layers) 1000 VDC for 30 Seconds	5000 VDC for 30 Seconds	
Impedance Tolerance 51-100 ohms	+/- 10%	+/-8%	
Impedance Tolerance 28-50 Ohms	+/- 10%	+/-8%	
DC Resistance Testing	Yes		
Kelvin Test			
Signal Loss measurement	Outsourced		
Latent Test			
	Company Confident Subject to Nondisclosure Agree	tial	

TTM Technologies		Santa Ana	
Time-To-Market Interconnect Solutions**	Standard	Advanced	Development
Physical Characteristics			•
Min. Board Thickness	0.030"	0.025'	0.020"
Max Board Thickness - All Finishes	0.150"	0.250"	0.275"
Thickness Tolerance	+/-10%	+/-8%	*****
Through Hole Aspect Ratio	12:1	13:1 - 18:1	>18:1
Bow and Twist (Balanced)	0.0075"/inch	0.005"/inch	
Panel Sizes	16x21, 18x24, 21x24	21x28, 24x28	
Technology			
Microvias	Yes	Yes	Yes
Blind Vias	Yes	Yes	Yes
Buried Vias	Yes	Yes	Yes
Thin Core Pwr/Gnd	0.002"	0.001"	
Buried Resistor	Ohmega, Ticer 10, 25, 50, 100 ohm/sq	Ohmega, Ticer 10, 25, 50, 100 ohm/sq	
Inner Layers	100 01111/30	10, 20, 00, 100 01111/39	
Minimum Line/Space			
H oz	.00265"/.00290"	.00215"/.00240"	<.002"/.002"
1 oz	.00300"/.00350"	.00250"/.00300"	
2 oz	.00350"/.00475"	.00300"/.00425"	
3 oz	.00400"/.00600"	.00350"/.00550"	
4 oz	100 100 7100000		
5 oz			
Feature Tolerance 1/2 - 1 oz	±.0005" impedance lines (or IPC)	±.0003" impedance lines (or IPC)	
Feature Tolerance 2 - 5 oz	±.001"0025" (or IPC)		
Innerlayer Cu to Edge			
PTH (DHS) to Copper (Drill to Copper)	.008"	.007"	.005"
NPT Hole/Slot to Copper, Second Drill	.010"	.009"	
Antipad Size	Drill + .018"	Drill + .016"	Drill + .014"
Annular Ring Requirements for Drilled Holes	4		
Tangency	Drill + .010"	Drill + .008"	
1 mil Annular Ring			
Outer Layers			
Minimum Line/Space			
IVIII III LII LII LII LII LII LII LII LI			
	.00330" / .00355"	.00280" / .00305"	
3/8 oz Base 1/2 oz Base		.00280" / .00305" .00290" / .00340"	
3/8 oz Base	.00330" / .00355" .00340" / .00390" .00350" / .00500"	.00280" / .00305" .00290" / .00340" .00300" / .00450"	
3/8 oz Base 1/2 oz Base	.00340" / .00390"	.00290" / .00340"	
3/8 oz Base 1/2 oz Base 1 oz Base	.00340" / .00390" .00350" / .00500"	.00290" / .00340" .00300" / .00450"	
3/8 oz Base 1/2 oz Base 1 oz Base 2 oz Base 3 oz Base	.00340" / .00390" .00350" / .00500" .00450" / .00800"	.00290" / .00340" .00300" / .00450" .00400" / .00750"	
3/8 oz Base 1/2 oz Base 1 oz Base 2 oz Base 3 oz Base	.00340" / .00390" .00350" / .00500" .00450" / .00800"	.00290" / .00340" .00300" / .00450" .00400" / .00750"	
3/8 oz Base 1/2 oz Base 1 oz Base 2 oz Base 3 oz Base 4 oz Base	.00340" / .00390" .00350" / .00500" .00450" / .00800"	.00290" / .00340" .00300" / .00450" .00400" / .00750"	
3/8 oz Base 1/2 oz Base 1 oz Base 2 oz Base 3 oz Base 4 oz Base 5 oz Base Feature Attributes	.00340" / .00390" .00350" / .00500" .00450" / .00800" .00550" / .01100"	.00290" / .00340" .00300" / .00450" .00400" / .00750" .00500" / .01050"	
3/8 oz Base 1/2 oz Base 1 oz Base 2 oz Base 3 oz Base 4 oz Base 5 oz Base Feature Attributes PTH to Copper	.00340" / .00390" .00350" / .00500" .00450" / .00800" .00550" / .01100"	.00290" / .00340" .00300" / .00450" .00400" / .00750" .00500" / .01050"	
3/8 oz Base 1/2 oz Base 1 oz Base 2 oz Base 3 oz Base 4 oz Base 5 oz Base Feature Attributes	.00340" / .00390" .00350" / .00500" .00450" / .00800" .00550" / .01100"	.00290" / .00340" .00300" / .00450" .00400" / .00750" .00500" / .01050"	

TTM Technologies	Santa Ana		
Time-To-Market Interconnect Solutions™	Standard	Advanced	Development
Orill			
Min. Drill Size	.0079"	.0059"	.0050"
Min. Blind Drill Hole Size (Controlled Depth Drilling)	.0118"	.0098"	
Min. Slot Width - Std.	0.0236"	.0138"	
Min. Positional Tolerance	.004"	.003"	
Min. PTH Tolerance (Primary Drill)	+/002" press fit	+/0015 press fit	+/001" press fit
Min. Tolerance of Plated Cut Out	+/005"	+/003"	
Counter Bore/Sink Tolerance	+/005" depth	+/003"	
Max. NPT (hole/slot) in Primary Drill	0.221" (radius, width or length)	0.2559'	
Backdrill Size Over Primary Drill	.008"	.006"	.005
Backdrill Stub Length	.009 +/007	.008" +/006	.007" +/005
Microvia			
aser via diameter	.006"	.005"	.004"
Capture/Target pads	D+.006"	D+.005"	D+.004"
Aspect Ratio	≤.0.75:1	0.85:1	1:1
I Layer Build Up	Yes		
2 Layer Build Up	Yes		
3+ Layer Build Up	Yes		
4+ Layer Build Up		Yes	
AnyLayer _aser Via Stacked on Buried Via		Yes	Yes
Skip Via (ex 1-3)		Yes	
/ia in Pad (through hole)		103	
Non-Conductive Via Fill	Yes		
ine width and Spacing (wrap)	.00310"/.00435" (1/2 oz)	.00300"/.00415" (1/2 oz)	
Microvia Non-Conductive Via Fill			
Conductive Via Fill	Yes (Outsourced)		
aser Direct Imaging	Yes		
Plating/Surface Finish			
HASL	Yes		
mmersion Gold (ENIG)	Yes		
mmersion Ni/Pd/Au	Yes (Outsourced)		
Electrolytic Ni/Au Tab Plating	Yes		
Electrolytic Ni/Au (Hard Gold)	Yes		
Organic Solderability Preservative	Yes		
mmersion Silver	Yes		
mmersion Tin	Yes (Outsourced)		
Selective ENIG or ENEPIG	Yes (ENEPIG Outsourced)		
Virebondable Soft Au	Yes (Outsourced)		
DSP + Electroplate Ni-Au Fused Tin/Lead	Yes Yes (Outsourced)		

		Santa Ana	
TTM Technologies Time-To-Market Interconnect Solutions**	Standard	Santa Ana Advanced	Davolanment
Coldarmonk	Standard	Advanced	Development
Soldermask			
Туре	Taiyo LPI PSR4000	Taiyo LDI JA	
Colors	Green/Red/Blue	All Other Colors	
Thickness	.0005"on top of circuit		
3/8 - 1 oz Base Copper			
Min. Web	.003"	.002"	
Min. Clearance	.002"	LDI S/M .0010"	No clearance (LDI)
Legend			
Text Width	0.005"	.003"	
Color	White	Other Colors	
LPI	Yes Yes		
Inkjet Fabrication	Yes		
Rout			
Diameter Router Bits Available	.024"125"		
Edge to Edge Tolerance	+/-0.005"	+/003	
Score			
Score Angles	20°, 30° & 45°		
Positional Tolerance to Datum	+/-0.005"	± 0.004"	
Front to Back Tolerance	+/-0.005"	± 0.003"	
Remaining Web Tolerance	+/004"	± 0.003"	
Bevel Angles	20°, 30°, 45°		T
Depth Tolerance	± .005		
Electrical Test & Performance			
Min. Component Pitch	0.016"	<0.016"	
Max. Test Voltage	250 Volts	1000 Volts	
Max. Isolation Resistance	10 M Ohms	100 M Ohms	
Min. Continuity Resistance	10 Ohms	5 Ohms	
Hi Pot Test (Machine Capability)	500 VDC	5000 VDC	
Impedance Tolerance 51-100 ohms	+/-10%	+/-8%	+/-5%
Impedance Tolerance 28-50 Ohms	-7 1070	-, 5,0	-7 070
DC Resistance Testing	Yes		
Kelvin Test		Yes	
Signal Loss measurement	No		
Latent Test	No Company Confident	ial	
<u></u>	ibject to Nondisclosure Agree		

TTM Technologies		Santa Clara	
Time-To-Market Interconnect Solutions**	Standard	Advanced	Development
Physical Characteristics			
Min. Board Thickness	0.005"	0.003"	
Max Board Thickness - All Finishes	.200"	.230"	
Thickness Tolerance	±10%	± 8%	
Through Hole Aspect Ratio	8:1	10:1	12:1
Bow and Twist (Balanced)	IPC standard	< 0.5%	Design dependent
Panel Sizes	18.x24, 12x18, 18.5x24.5 .75" rigid & 1.5" flex and rigid flex border	21x24 & 21.5x24.5 panel .75" rigid & 1.5" flex and rigid flex border	21x26 .75" rigid
Technology			
Microvias	Yes	Yes	Yes
Blind Vias	single & multiple lam-cycles	Sequential lam stacked microvias	
Buried Vias	Yes, laser & mechanical		
Thin Core Pwr/Gnd			
Buried Resistor	Yes outsourced (25-100 ohms)		
Inner Layers			
Minimum Line/Space			
H oz	.004"/.004"	.0035" / .003"	
1 oz	.0045" / .004"	.004"/.004"	
2 oz	.0065" / .0055"	.006" / .0035"	
3 oz	.010" / .010"	.0085" / .0085"	
4 oz			
5 oz			
Feature Tolerance 1/2 - 1 oz	+/- 20% (±.0007")	±10% (±.0005" for CI)	± 5% design dependent
Feature Tolerance 2 - 5 oz	± 20% (±.002")	Design dependent	
Innerlayer Cu to Edge			
PTH (DHS) to Copper (Drill to Copper)	≥ 0.010"	≥ 0.008"	≥ 0.007
NPT Hole/Slot to Copper, Second Drill	≥ 0.015"	≥ 0.010"	
Antipad Size	DHS + .020"	DHS + .016"	design dependent
Annular Ring Requirements for Drilled Holes	<		
Tangency	DHS + .010"	DHS + .008"	D+.006"
1 mil Annular Ring	DHS + .012"	DHS + .010"	D+.008"
Outer Layers			
Minimum Line/Space			
VIII III LII LII LII LII LII LII LII LII		.003" / .003"	
	.004" / .004"	.003 / .003	
3/8 oz Base	.004" / .004" .0045" / .0045"	.0035" / .0035"	
3/8 oz Base 1/2 oz Base	.0045" / .0045"	.0035" / .0035"	
3/8 oz Base 1/2 oz Base 1 oz Base	.0045" / .0045" .0055" / .0055"	.0035" / .0035" .0045" / .0045"	
3/8 oz Base 1/2 oz Base 1 oz Base 2 oz Base	.0045" / .0045" .0055" / .0055" .0075" / .0065"	.0035" / .0035" .0045" / .0045" .0065" / .0065"	
3/8 oz Base 1/2 oz Base 1 oz Base 2 oz Base 3 oz Base	.0045" / .0045" .0055" / .0055"	.0035" / .0035" .0045" / .0045"	
3/8 oz Base 1/2 oz Base 1 oz Base 2 oz Base 3 oz Base 4 oz Base	.0045" / .0045" .0055" / .0055" .0075" / .0065"	.0035" / .0035" .0045" / .0045" .0065" / .0065"	
3/8 oz Base 1/2 oz Base 1 oz Base 2 oz Base 3 oz Base 4 oz Base 5 oz Base	.0045" / .0045" .0055" / .0055" .0075" / .0065"	.0035" / .0035" .0045" / .0045" .0065" / .0065"	
3/8 oz Base 1/2 oz Base 1 oz Base 2 oz Base 3 oz Base 4 oz Base 5 oz Base	.0045" / .0045" .0055" / .0055" .0075" / .0065" .010" / .010"	.0035" / .0035" .0045" / .0045" .0065" / .0065" .0085" / .0085"	
3/8 oz Base 1/2 oz Base 1 oz Base 2 oz Base 3 oz Base 4 oz Base 5 oz Base Feature Attributes PTH to Copper	.0045" / .0045" .0055" / .0055" .0075" / .0065" .010" / .010"	.0035" / .0035" .0045" / .0045" .0065" / .0065" .0085" / .0085"	
3/8 oz Base 1/2 oz Base 1 oz Base 2 oz Base 3 oz Base 4 oz Base 5 oz Base Feature Attributes PTH to Copper NPT Hole/Slot to Copper Rout to O/L Copper	.0045" / .0045" .0055" / .0055" .0075" / .0065" .010" / .010"	.0035" / .0035" .0045" / .0045" .0065" / .0065" .0085" / .0085"	

TTM Technologies	Santa Clara		
Time-To-Market Interconnect Solutions™	Standard	Advanced	Development
Drill			
Min. Drill Size	.0098"	.0079"	< .008" with laser
Min. Blind Drill Hole Size (Controlled Depth Drilling)	.010"	.008"	<.008" with laser
Min. Slot Width - Std.	0.024" (Step Drill)	.020 (Step Drill)	
Min. Positional Tolerance	0.006" DTP MMC per GD&T	0.005" DTP MMC per GD&T	
Min. PTH Tolerance (Primary Drill)	± 0.003"	± 0.002"	
Min. Tolerance of Plated Cut Out	+/005"	+/003"	
Counter Bore/Sink Tolerance	≥ ± 0.010"	+/005"	
Max. NPT (hole/slot) in Primary Drill	0.186"	Design dependent	
Backdrill Size Over Primary Drill	.010"		
Backdrill Stub Length	+/005"		
Microvia			
Laser via diameter	.006"	.005"	
Capture/Target pads	D + 0.006"	D + 0.005"	
Aspect Ratio	< 0.65:1	0.75:1	
1 Layer Build Up	Yes (plated-shut & epoxy- filled)		
2 Layer Build Up	Yes (plated-shut no wrap)		
3+ Layer Build Up	Yes (plated-shut no wrap)		
4+ Layer Build Up			
AnyLayer Laser Via Stacked on Buried Via	Yes		
Skip Via (ex 1-3)	res	YES	
Via in Pad (through hole)		123	
Non-Conductive Via Fill	YES	YES	
Line width and Spacing (wrap)	.005 / .005	.004 /.004	
Microvia Non-Conductive Via Fill		YES	
Conductive Via Fill	YES		
Laser Direct Imaging	YES Internal, External & Soldermask		
Plating/Surface Finish			
HASL	YES		
Immersion Gold (ENIG)	YES		
Immersion Ni/Pd/Au	Yes outside source		
Electrolytic Ni/Au Tab Plating	Yes outside source		
Electrolytic Ni/Au (Hard Gold)	Yes outside source		
Organic Solderability Preservative	Yes outside source		
Immersion Silver	Yes outside source		
Immersion Tin	Yes outside source		
Selective ENIG or ENEPIG		Yes outside source	
Wirebondable Soft Au		Yes outside source	
OSP + Electroplate Ni-Au		Yes outside source	
Fused Tin/Lead	YES		

TTM Technologies Time-To-Market Interconnect Solutions**		Santa Clara	
	Standard	Advanced	Development
Soldermask			•
Туре	Taiyo LPI, PSR4000 BN,PSR4000 LDI, MP	dry film, flexible LPI	
Colors	Red, blue, black, white, green and clear		
Thickness	0.0002" min.	Double coat	
3/8 - 1 oz Base Copper			
Min. Web	.00035"	.00035"	
Min. Clearance	.0003"	.0002"	
Legend			
Text Width	.007"	.003"	
Color	white, yellow, black, red, orange	NASA outgassing compliant	
LPI	3	YES	
Inkjet	YES		
Fabrication			
Rout			
Diameter Router Bits Available	.026"125"		
Edge to Edge Tolerance	± 0.005"	± 0.003	
Score		· · · · · ·	
Score Angles	30°, 45°, 60°		
Positional Tolerance to Datum	± 0.006"	± 0.005"	
Front to Back Tolerance	± 0.005"		
Remaining Web Tolerance	± 0.005"	± 0.003"	
Bevel			
Bevel Angles	20°, 30°, 45°		
Depth Tolerance	± 0.010"		
Electrical Test & Performance			
Min. Component Pitch	.015"	<.015"010	
Max. Test Voltage	250 Volts	500 volts	1000Volts
Max. Isolation Resistance	100 Mohms	200 M Ohms	
Min. Continuity Resistance	10 Ohms	5 Ohms	
Hi Pot Test (Machine Capability)	•		
	1000 VDC for 30 Seconds	6000 VDC, unlimited	
Impedance Tolerance 51-100 ohms	<+/- 10%	<+/- 7.5%	
Impedance Tolerance 28-50 Ohms	<+/- 15%	<+/- 10%	
DC Resistance Testing	, 1070	117 1070	
Kelvin Test			
Signal Loss measurement			
Latent Test	_		
	Company Confider ubject to Nondisclosure Agre		

TTRA To characterists	San Diego		
TIM Technologies Time-To-Market Interconnect Solutions** Physical Characteristics	Standard	Advanced	Development
	Otanidard	Advantoca	Development
Min. Board Thickness		1	
Max Board Thickness - All Finishes	0.020"300"	<.020, >.300	>.400
Thickness Tolerance	+/- 10%	+/- 5%	7.100
Through Hole Aspect Ratio		. 6,0	
Bow and Twist (Balanced)	Per IPC		
Panel Sizes	12x18,12x9,16x18,18x24, 21x24, 24x24	24x54	
Technology			
Microvias	Yes	Yes	Yes
Blind Vias	control depth	drill/sequential lam stacked microvias	
Buried Vias	yes	sequential lamination	
Thin Core Pwr/Gnd			
Buried Resistor	screened carbon and ohmega and chip	Solder chip resistors	
Inner Layers			
Minimum Line/Space			
H oz	.004" / .004" / .004"	.0035" / .004" / .004"	
1 oz	.005" / .005" / .005"	.004" / .004" / .004"	.003" / .003" / .003"
2 oz	.005" / .007" / .008"		
3 oz			
4 oz			
5 oz			
Feature Tolerance 1/2 - 1 oz	+/001	+/0005	
Feature Tolerance 2 - 5 oz	+/002		
Innerlayer Cu to Edge			
PTH (DHS) to Copper (Drill to Copper)	>/=.010"	>/=.008"	
NPT Hole/Slot to Copper, Second Drill	>/=.015"	>/=.010"	<u> </u>
Antipad Size	>/=.015 Larger than Drill Tool	<.015009	
Annular Ring Requirements for Drilled Holes			
Tangency	DHS + .009"	DHS + .008"	
1 mil Annular Ring	DHS + .011"	DHS + .010"	
Outer Layers			
Minimum Line/Space			
3/8 oz Base			
1/2 oz Base	.004" / .004"		
1 oz Base	.005" / .005"		
2 oz Base	.006" / .008"		
3 oz Base		1	
4 oz Base		1	
5 oz Base			
Feature Attributes	> /- 040"	. /- 000"	- 000E"
PTH to Copper	>/=.010" >/=.008"	>/=.008" >/=.004" (Second Drill)	>=.0065"
NPT Hole/Slot to Copper	>/=.008" >=0.010"	>/=.004" (Second Drill) >=.006"	
Rout to O/L Copper	.020"	/U0	
Score to O/L Copper	.020		

TTM Technologies	San Diego		
Time-To-Market Interconnect Solutions™	Standard	Advanced	Development
Drill			
Min. Drill Size	.0091"	.0079"	.0059"
Min. Blind Drill Hole Size (Controlled Depth Drilling)	>=.012"	.010"	<.010"
Min. Slot Width - Std.	0.024" (Step Drill)	.020 (Step Drill)	
Min. Positional Tolerance	.010" DTP	.006" DTP	.003" DTP
Min. PTH Tolerance (Primary Drill)	+/003"	+/002"	
Min. Tolerance of Plated Cut Out	+/005"	+/003"	
Counter Bore/Sink Tolerance	+/004	+/003	
Max. NPT (hole/slot) in Primary Drill	No Limit		
Backdrill Size Over Primary Drill			
Backdrill Stub Length			
Microvia			
Laser via diameter	.006	.005	.004
Capture/Target pads	D+.008	D+.006	D+.005
Aspect Ratio	.75:1	.85:1	1:1
1 Layer Build Up	Yes		
2 Layer Build Up		Yes	
3+ Layer Build Up			Yes
4+ Layer Build Up			
AnyLayer Laser Via Stacked on Buried Via			
Skip Via (ex 1-3)			
Via in Pad (through hole)			
Non-Conductive Via Fill	YES		
Line width and Spacing (wrap)	720		
Microvia Non-Conductive Via Fill			
Conductive Via Fill			
_aser Direct Imaging	YES		
Plating/Surface Finish			
HASL	YES		
mmersion Gold (ENIG)	YES	YES	YES
mmersion Ni/Pd/Au	YES	YES	YES
Electrolytic Ni/Au Tab Plating	YES		
Electrolytic Ni/Au (Hard Gold)			
Organic Solderability Preservative			
mmersion Silver	YES		
mmersion Tin	YES	YES	
Selective ENIG or ENEPIG		YES	
	YES		
OSP + Electroplate Ni-Au			
Fused Tin/Lead	YES		
Selective ENIG or ENEPIG Wirebondable Soft Au OSP + Electroplate Ni-Au Fused Tin/Lead	YES		

TTM Technologies Time-To-Market Interconnect Solutions**	San Diego			
	Standard	Advanced	Development	
Soldermask				
Туре	STD - Taiyo PSR4000 BN	dry film, flexible LPI		
Colors				
Thickness	.0003 "002"	3 - 4 mil, std LPI thickness		
3/8 - 1 oz Base Copper				
Min. Web	.004"	.003"		
Min. Clearance	.003"	.002"		
Legend				
Text Width	0.007" min.	.005" min		
Color	Black, White, Yellow, Orange / White			
LPI				
Inkjet				
Fabrication Rout				
Diameter Router Bits Available	.031"125"	.0156" & .020"		
Edge to Edge Tolerance	+/-0.005"	+/003		
Score	17 0.000	17 .000		
	30° 60°			
Score Angles	30°, 60°			
Positional Tolerance to Datum	+/-0.005	+/002		
Front to Back Tolerance	+/-0.005	+/002 +/003		
Remaining Web Tolerance Bevel	+/005	+/003		
Bevel Angles	15°, 30°, 45°	Any based on Tool		
Depth Tolerance	+/005	7 m.y 20000 0.1 100.		
Electrical Test & Performance				
Min. Component Pitch	0.016"	<.016"		
Max. Test Voltage	200 volts	500 volts	>500 volts	
Max. Isolation Resistance	100 M Ohms	500 M Ohms	> 500 M ohms	
Min. Continuity Resistance	10 Ohms	5 Ohms		
Hi Pot Test (Machine Capability)				
Impedance Telegrapes 54 400 chara				
Impedance Tolerance 51-100 ohms				
Impedance Tolerance 28-50 Ohms DC Resistance Testing				
Kelvin Test				
Signal Loss measurement				
Latent Test				
	Company Confident Subject to Nondisclosure Agree	tial		

TTM Technologies			
Time-To-Market Interconnect Solutions	Standard	Advanced	Development
Physical Characteristics			
Min. Board Thickness	.020	.010	.002
Max Board Thickness - All Finishes	.350	.400	.450
Thickness Tolerance	+/-10%	+/-8%	+/-5%
Through Hole Aspect Ratio	12.5:1	14:1	16:1
Bow and Twist (Balanced)	>/=0.0075"/inch	>/=0.005"/inch	<.005"/inch
Panel Sizes	16x18, 18x21, 20x25, 18x24, 21x24, 21x27, 24x24, 24x36, 24x42	30x42, 24x54, 30x54	
Technology			
Microvias	Yes	Yes	Yes
Blind Vias	Sub-assy Drill/Sequential Lam	Control Depth Drill, Laser Drill	
5	≥.005" DS core,	.004" DS core,	
Buried Vias	≤.10:1 a/r ML	≤.13:1 a/r ML	
Thin Core Pwr/Gnd	.002		.001
Buried Resistor	Yes (Ticer & Ohmega)	Screened Carbon	
Inner Layers			
Minimum Line/Space			
H oz	.004/.004	.003/.003	
1 oz	.004/.005	.004/.004	
2 oz	.005/.007	.005/.006	
3 oz	.008/.011	.008/.010	
4 oz	.008/.012	.008/.011	
5 oz	.008/.013	.008/.012	
Feature Tolerance 1/2 - 1 oz	+/001	+/0005	
Feature Tolerance 2 - 5 oz	+/002	+/0015	
Innerlayer Cu to Edge			
PTH (DHS) to Copper (Drill to Copper)	>/=.010"	>/=.008"	>/=.007
NPT Hole/Slot to Copper, Second Drill	>/=.015"	>/=.010"	>/=.008"
Antipad Size	>/=.020 Larger than Drill Tool	>/=.016 Larger than Drill Tool	>/=.014 Larger than Drill Tool
Annular Ring Requirements for Drilled Holes <	, 33:		
Tangency	DHS + .010	DHS + .009	DHS + .008
1 mil Annular Ring	DHS + .012	DHS + .011	DHS + .010
Outer Layers	B110 + .012	B110 + .011	B110 + 1010
Minimum Line/Space			
	0045" / 005"	004" / 004"	
3/8 oz Base	.0045" / .005"	.004" / .004"	
1/2 oz Base	.005/.0055	.005/.005	
1 oz Base	.005/.008	.005/.007	
2 oz Base	.005/.009	.005/.008	
3 oz Base	.008/.014	.008/.012	
4 oz Base	.008/.016	.008/.014	
5 oz Base	.008/.018	.008/.016	
Feature Attributes	0.1.2.1	I 000"	000="
PTH to Copper	.010"	.008"	.0065"
NPT Hole/Slot to Copper	.015	.012	.010
Rout to O/L Copper	.020	.012	.010
Score to O/L Copper	.020	.012	.010

` TTM Technologies	Stafford		
Time-To-Market Interconnect Solutions™	Standard	Advanced	Development
Drill			
Min. Drill Size	.25mm (.010")	.20mm (.008")	
Min. Blind Drill Hole Size (Controlled Depth Drilling)	.25mm (.010")	.20mm (.008")	
Min. Slot Width - Std.	0.024" (Step Drill)	.020 (Step Drill)	
Min. Positional Tolerance	.006 DTP	.005 DTP	.004 DTP
Min. PTH Tolerance (Primary Drill)	± 0.003"	± 0.002"	
Min. Tolerance of Plated Cut Out	+/005	+/003	
Counter Bore/Sink Tolerance	+/004	+/003	
Max. NPT (hole/slot) in Primary Drill	No Limit	No Limit	
Backdrill Size Over Primary Drill	.012"	.008"	.006"
Backdrill Stub Length	.007 +/005	.006" +/004	.005" +/003
Microvia			
Laser via diameter	.006	.005	.004
Capture/Target pads	D+.008	D+.006	D+.005
Aspect Ratio	.75:1	.85:1	1:1
1 Layer Build Up	Yes		
2 Layer Build Up		Yes	
3+ Layer Build Up			Yes
4+ Layer Build Up			Yes
AnyLayer		V	Yes
Laser Via Stacked on Buried Via Skip Via (ex 1-3)		Yes Yes	
Via in Pad (through hole)		165	
Non-Conductive Via Fill	Yes		
Line width and Spacing (wrap)	.005/ .005 with Class II Wrap	.004/ .004 with Class II Wrap	
Microvia Non-Conductive Via Fill		Yes	
Conductive Via Fill		Yes	-
Laser Direct Imaging	Yes Internal, External, & Soldermask		
Plating/Surface Finish) II =	1	
HASL	YES		
mmersion Gold (ENIG)	YES		
mmersion Ni/Pd/Au	YES		
Electrolytic Ni/Au Tab Plating	YES		
Electrolytic Ni/Au (Hard Gold)	YES		
Organic Solderability Preservative	Outsourced		
mmersion Silver	Outsourced		
Immersion Tin	Outsourced		
Selective ENIG or ENEPIG	YES		
Wirebondable Soft Au OSP + Electroplate Ni-Au	YES YES		
	~		

TTM Technologies Time-To-Market Interconnect Solutions**		Stafford	
	Standard	Advanced	Development
Soldermask	Standard	Advanced	Development
Soldermask			
Туре	Taiyo LDI/LPI, Dry	Taiyo Flexible	
Colors	Green/Red/Blue	White/Clear/Black	
Thickness	.00030015	.0007 min	
3/8 - 1 oz Base Copper			
Min. Web	.005 LPI / .010 Dry	.004 LPI / .008 Dry	
Min. Clearance	.0025 LPI / .003 Dry	.002 LPI	
Legend			
Text Width	.006	.004 (white only)	
Color	Black, White, Yellow, Orange		
LPI		YES	
Inkjet	YES		
Fabrication			
Rout			
Diameter Router Bits Available	.031, .047, .063, .093, .125	Other (special order)	
Edge to Edge Tolerance	+/005"	+/003"	
Score			
Score Angles	30° (20°, 45° & 60°)		
Positional Tolerance to Datum	+/005	+/003	
Front to Back Tolerance	+/005	+/003	
Remaining Web Tolerance Bevel	+/005	+/003	
Bevel Angles	15°, 30°, 45°	Any (Special order Tool)	
Depth Tolerance	+/010	+/005	
Electrical Test & Performance	1	7.000	
Min. Component Pitch	.012	<.012	
Max. Test Voltage	250 Volts	500 Volts	1000Volts
Max. Isolation Resistance	100 M Ohms	200 M Ohms	1 G Ohms
Min. Continuity Resistance	10 Ohms	2 Ohms	1 Ohm
Hi Pot Test (Machine Capability)	500 VDC for 30 Seconds	5000 VDC for infinite	
,	12.22.3333.33		
Impedance Tolerance 51-100 ohms	+/- 10%	+/-8%	+/-5%
Impedance Tolerance 28-50 Ohms	+/- 10%	+/-8%	+/-7%
DC Resistance Testing	Yes	Yes	Yes
_ c . toolotanoo rooting	100	100	100
Kelvin Test	No	No	No
Signal Loss measurement		Yes (to 40 GHz))	
Latent Test	No Company Confider	No	In development
	ubject to Nondisclosure Agre		

TTM Technologies	Guangzhou		
Time-To-Market Interconnect Solutions**	Standard	Advanced	Development
Physical Characteristics			
Min. Board Thickness	0.020	0.020	
Max Board Thickness - All Finishes	< 0.360"	0.400"	
Thickness Tolerance	+/- 10%	+/-7.5%	
Through Hole Aspect Ratio	10:1/14:1 BP (Backplane)	14:1/16:1 BP	16:1/22:1 BP
Bow and Twist (Balanced)	0.0075 in/inch	0.005 in/inch	
Panel Sizes	12x18,14 x 16, 14 x 24, 16 x 18, 16 x 21, 18 x 21, 18 x 24, 20 x 24, 21.5x24.5, 21X27, 24.5 x 30.5, 24.5x36.5, 24.5x40.5	24 x 42, 24.2 x 48	
Fechnology Microvias	Yes		
VIICIOVIAS	res		
Blind Vias	Yes		
Buried Vias	Yes		
Thin Core Pwr/Gnd	0.002	0.001	
Buried Resistor	No		
nner Layers		<u>'</u>	
Minimum Line/Space			
H oz	.0035/.004	.003/.0035	.003/.003
l oz	.004/.004	.003/.0035	
2 oz	.007/.007	.006/.006	
3 oz	.009/.009	.008/.008	.006/.006
ł oz	.010/.011	.009/.010	
5 oz	.012/.013	.011/.012	
Feature Tolerance 1/2 - 1 oz	+/-15%	+/-10%	+/-8%
Feature Tolerance 2 - 5 oz	+/-20%	+/-15%	
Innerlayer Cu to Edge			
PTH (DHS) to Copper (Drill to Copper)	0.0085	0.008	0.0075
NPT Hole/Slot to Copper, Second Drill	0.0055	0.005	
Antipad Size	DHS+.012	DHS+.010	DHS+.009
Annular Ring Requirements for Drilled Holes <			
Гangency	DHS +0.010	DHS +0.009	
1 mil Annular Ring	DHS +0.011	DHS +0.010	
Outer Layers			
Minimum Line/Space			
3/8 oz Base	.003/.0035	.003/.0035	.003/.003
I/2 oz Base	.003/.004	.003/.0035	.003/.0035
l oz Base	.003/.004	.003/.004	.003/.004
2 oz Base	.005/.0065	.005/.0065	.005/.0060
3 oz Base	.007/.008	.007/.008	.007/.0075
4 oz Base	.008/.011	.008/.011	.008/.0105
oz Base	.01/.013	.01/.013	.01/.0125
eature Attributes			
PTH to Copper	+/-0.005"	+/-0.0034"	
NPT Hole/Slot to Copper	+/-0.005"	+/-0.0034"	
Rout to O/L Copper	+/-0.006"	+/-0.0044"	
Score to O/L Copper	+/-0.006"	+/-0.0044"	

` TTM Technologies		Guangzhou	
Time-To-Market Interconnect Solutions™	Standard	Advanced	Development
Drill			
Min. Drill Size	0.01	0.008	
Min. Blind Drill Hole Size (Controlled Depth Drilling)	0.010	0.008	
Min. Slot Width - Std.	>0.032		
Min. Positional Tolerance	0.006DTP	0.005DTP	0.004DTP
Min. PTH Tolerance (Primary Drill)	+/-0.003	+/002	
Min. Tolerance of Plated Cut Out	+/-0.004		
Counter Bore/Sink Tolerance	+/-0.008"	+/-0.006"	
Max. NPT (hole/slot) in Primary Drill	0.25"		
Backdrill Size Over Primary Drill	0.008	0.006	
Backdrill Stub Length	0.009+/-0.007	0.008+/-0.006	0.007+/-0.005
Microvia			
Laser via diameter	0.005	0.004	
Capture/Target pads	mvia + .010	mvia + 0.006	mvia + 0.004
Aspect Ratio	0.80:1	0.85:1	1:1
1 Layer Build Up	YES		
2 Layer Build Up	NO	NO	YES
3+ Layer Build Up	NO		
4+ Layer Build Up	NO NO		
AnyLayer Laser Via Stacked on Buried Via	NO YES		
Skip Via (ex 1-3)	YES		
Via in Pad (through hole)	TES		
Non-Conductive Via Fill	YES		T
Line width and Spacing (wrap)	.005/ .005	.004/ .004 with Class II Wrap	.0035" /.0035" waive Wrap Spec
Microvia Non-Conductive Via Fill	YES		
Conductive Via Fill	No		
Laser Direct Imaging	Yes (Outer layer)		
Plating/Surface Finish			
HASL	Yes		
Immersion Gold (ENIG)	Yes		
Immersion Ni/Pd/Au	Outsource		
Electrolytic Ni/Au Tab Plating	No		
Electrolytic Ni/Au (Hard Gold)	Yes		
Organic Solderability Preservative	Yes		
Immersion Silver	Yes		
Immersion Tin	Yes		
Selective ENIG or ENEPIG	ENIG+OSP, ENIG+Hard Ni-	AU	
Wirebondable Soft Au	No		
OSP + Electroplate Ni-Au	Yes		
Fused Tin/Lead	No		

TTM Tochnologies	Guangzhou			
TTM Technologies Time-To-Market Interconnect Solutions**	Standard	Advanced	Development	
Soldermask	Standard	Auvanceu	Development	
Soldermask				
Туре	TAIYO – PSR4000 G23K, SP08(spray);Probimer 77MA, 77MA-1, 77EMA (spray)			
Colors	GREEN,RED, BLUE	BLACK		
Thickness		IPC SPEC COVERAGE		
3/8 - 1 oz Base Copper	(SPC RANGES .	0002003 TYPICAL = .000	7 over conductor)	
Min. Web	0.003	0.002		
Min. Clearance	0.004	0.003		
Legend				
Text Width	0.006	0.005	0.0045	
Color	WHITE	BLACK, YELLOW		
LPI Inkjet	NO NO	NO NO		
Fabrication	110	NO		
Rout				
Diameter Router Bits Available	0.8~2.4 mm (0.1 mm interval)	0.5mm		
Edge to Edge Tolerance	+/- 0.004			
Score				
Score Angles		90°/120°/140°		
Positional Tolerance to Datum	0.004			
Front to Back Tolerance Remaining Web Tolerance	+/004 +/002			
Bevel	+/002			
Bevel Angles	15° - 60°			
Depth Tolerance	+/005			
Electrical Test & Performance				
Min. Component Pitch	0.016 fixture/0.008 FP (flying probe)	0.011 fixture	0.008 fixture	
Max. Test Voltage	250V			
Max. Isolation Resistance	10M OHMS	15M OHMS		
Min. Continuity Resistance	50 OHMS	20 OHMS		
Hi Pot Test (Machine Capability)	Yes			
	+/- 10%	+/- 10%	+/ - 8%	
	+/- 10%	+/- 10%	+/- 8%	
Impedance Tolerance 51-100 ohms	No			
Impedance Tolerance 28-50 Ohms	No	Yes		
DC Resistance Testing	Yes			
Kelvin Test	No			
Signal Loss measurement	No			
Latent Test				
	Company Confiden	tial		
S	ubject to Nondisclosure Agree	ement with TTM	I.	

TTM Technologies	Huiyang		
Time-To-Market Interconnect Solutions™	Standard	Advanced	Development
Physical Characteristics			
Min. Board Thickness	0.024	0.016	
Max Board Thickness - All Finishes	0.220"	0.235"	
Thickness Tolerance	+/-10%	+/-8%	
Through Hole Aspect Ratio	10:1	12:1	
Bow and Twist (Balanced)	0.0075 in/inch	0.005 in/inch	
Panel Sizes	Pin lam: 14 x 24, 16 x 18, 18 X 24, 16 x 21, 21 X 24,		
	Mass Lam: 20 X 24, 14 X16	21 x 27 (Double side)	
Technology	V		
Microvias	Yes	Yes	Yes
Blind Vias	Yes	Yes	Yes
Buried Vias	Yes	Yes	Yes
Thin Core Pwr/Gnd	0.001		
Buried Resistor	No	No	
Inner Layers			
Minimum Line/Space			
H oz	.003/.0035	.003/.00325	.003/.003
1 oz	.003/.004	.003/.00375	.003/.0035
2 oz	.005/.006	.005/.0055	.005/.005
3 oz	.008/.008	.0075/.0075	
4 oz			
5 oz			
Feature Tolerance 1/2 - 1 oz	+/-20% or +/001	+/-15% or +/001	
Feature Tolerance 2 - 5 oz	+/-20% or +/001		
Innerlayer Cu to Edge			
PTH (DHS) to Copper (Drill to Copper)	0.008	0.0075	0.007
NPT Hole/Slot to Copper, Second Drill	0.01	0.008	
Antipad Size	DHS+0.020	DHS+0.019	
Annular Ring Requirements for Drilled Holes			
Tangency	DHS +0.010	DHS +0.009	
1 mil Annular Ring	DHS +0.012	DHS +0.011	
Outer Layers			
Minimum Line/Space			
3/8 oz Base	0.0035/0.0035	0.003/0.0035	0.003/0.003
1/2 oz Base	0.004/0.004	0.0035/0.004	0.0035/0.0035
1 oz Base	0.005/0.0055	0.005/0.005	0.0045/0.005
2 oz Base	0.007/0.0075	0.007/0.007	
3 oz Base	0.01/0.011	0.01/0.01	
4 oz Base	0.012/0.013	0.012/0.012	
5 oz Base			
Feature Attributes			
PTH to Copper	0.0075	0.007	
NPT Hole/Slot to Copper	0.0065	0.006	
Rout to O/L Copper	0.01	0.009	0.008 w/single spindle
Score to O/L Copper	0.01	0.009	0.009

TTM Technologies	Huiyang		
Time-To-Market Interconnect Solutions™	Standard	Advanced	Development
Drill			
Min. Drill Size	0.01	0.008	0.006
Min. Blind Drill Hole Size (Controlled Depth Drilling)	0.020	0.016	0.01
Min. Slot Width - Std.	0.062	0.062 - 0.031	
Min. Positional Tolerance	0.006DTP	0.006DTP	
Min. PTH Tolerance (Primary Drill)	+/-0.003	+/-0.002	
Min. Tolerance of Plated Cut Out	+/-0.005	+/-0.004	
Counter Bore/Sink Tolerance	+/-0.008	+/-0.005	+/-0.004
Max. NPT (hole/slot) in Primary Drill	0.200	0.250	
Backdrill Size Over Primary Drill	0.010	0.008	0.006
Backdrill Stub Length	0.009+/-0.007	0.008+/-0.006	0.007+/-0.005
Microvia			
₋aser via diameter	0.005	0.004	
Capture/Target pads	mvia + .011	mvia + .010	
Aspect Ratio	0.8:1	0.85:1	
Layer Build Up	Yes		
2 Layer Build Up	No	Yes	
3+ Layer Build Up	No	No	Yes
l+ Layer Build Up	No	No	Yes
AnyLayer	No	No	No
Laser Via Stacked on Buried Via	No Yes	No	Yes
Skip Via (ex 1-3) /ia in Pad (through hole)	Tes		
Non-Conductive Via Fill	Yes	Yes	
Line width and Spacing (wrap)	0.004/ 0.004	0.004/ 0.004	
Microvia Non-Conductive Via Fill	Yes	Yes	
Conductive Via Fill	No		
aser Direct Imaging			Yes - Q3 2015
Plating/Surface Finish			
HASL	Yes		
mmersion Gold (ENIG)	Yes		
mmersion Ni/Pd/Au	No		
Electrolytic Ni/Au Tab Plating			
Electrolytic Ni/Au (Hard Gold)	Yes		
Organic Solderability Preservative	Yes		
mmersion Silver	Yes		
mmersion Tin	Yes		
Selective ENIG or ENEPIG	ENIG+selective Hard Ni-Au		
Wirebondable Soft Au	No		
OSP + Electroplate Ni-Au	Yes – tie bar		
Fused Tin/Lead	No		

TTM Tochnologica	Huiyang		
TIM Technologies Time-To-Market Interconnect Solutions**	Standard	Advanced	Development
Soldermask	Otandard	Advanced	Development
Ooldermaak	TA	IYO PSR4000-G23K. TAIYO HF	X.
Туре		YO PSR 4000-BL01, PSR4000-	
		Probimer 77-MA 72101	
Colors	GREEN	BLUE, RED,BLACK	
00000	ONEEN	BEOL, KEB, BEXOR	
Thickness		IPC SPEC COVERAGE	
3/8 - 1 oz Base Copper	(SPC RANGES	.0002003 TYPICAL = .0007	over conductor)
Min. Web	0.003	0.0025	ovor contactory
Min. Clearance	0.006	0.005	
Legend		1	
Text Width	0.006	0.005	
Color	WHITE	BLACK, YELLOW	
LPI	No	No	
Inkjet	No	No	
Fabrication Rout			
Diameter Router Bits Available			
	.062, .093,	.031, .047, .039, .125	
Edge to Edge Tolerance Score	+/- 0.005	+/- 0.004	
	200.4	450,000	
Score Angles	30° / 4	45°/60°	
Positional Tolerance to Datum	+/- 0.005	+/- 0.003	
Front to Back Tolerance Remaining Web Tolerance	+/-0.003 +/- 0.005	+/-0.002 +/- 0.003	
Bevel			
Bevel Angles	20°, 30°, 45°, 60° +/010	20°, 30°, 45°, 60° +/008	
Depth Tolerance Electrical Test & Performance	T/U1U	T/000	
	0.020 fixture/0.008 FP	0.016 fixture/0.005 FP	
Min. Component Pitch	(Flying probe)	(Flying probe)	
Max. Test Voltage	250V	250V	
Max. Isolation Resistance	10M OHMS	20M OHMS	
Min. Continuity Resistance	50 OHMS	20 OHMS	10 OHMS
Hi Pot Test (Machine Capability)	No	Yes	
•			
Impodence Televance 54 400 chara	,	/ =2:	. ==:
Impedance Tolerance 51-100 ohms Impedance Tolerance 28-50 Ohms	+/- 10% +/- 15% or +/-5ohm	+/- 7% +/- 10% or +/-4ohm	+/-5%
DC Resistance Testing	+/- 15% 01 +/-5011111 No	Yes	
,			
Kolvin Toet	Voc		
Kelvin Test	Yes		
Signal Loss measurement			
Latent Test	0	4:-1	
	Company Confider	Itial	

TTM Technologies	Zhongshan			
Time-To-Market Interconnect Solutions™	Standard	Advanced	Development	
Physical Characteristics				
Min. Board Thickness	.024	.021	.021	
Max Board Thickness - All Finishes	0.160"	0.160"	0.240"	
Thickness Tolerance	+/-10%	+/-7%	+/-7%	
Through Hole Aspect Ratio	6:1	8:1	10:1	
Bow and Twist (Balanced)	0.0075 in/inch	0.0075 in/inch	0.005 in/inch	
Panel Sizes	20X24	21.5X24.5	26x28	
Technology				
Microvias	No	No	developing	
Blind Vias	No	No	developing	
Buried Vias	No	No	developing	
Thin Core Pwr/Gnd	No	No	developing	
Buried Resistor	No	No	No	
Inner Layers				
Minimum Line/Space				
H oz	.004/.004	.003/.003	.003/.003	
1 oz	.004/.004	.0035/.0035	.0035/.0035	
2 oz	.007/.007	.006/.006	.006/.006	
3 oz	.008/.008	.007/.008	.007/.008	
4 oz	.009/.009	.008/.008	.008/.008	
5 oz	.011/.011	.010/.010	.010/.010	
Facture Talerence 1/2 1 cm	±0.0006 for 1/2OZ	±0.0006 for 1/2OZ	±0.0006 for 1/2OZ	
Feature Tolerance 1/2 - 1 oz	\pm 0.0008 for 1OZ	\pm 0.0008 for 1OZ	\pm 0.0008 for 1OZ	
	±0.0012 for 2OZ	±0.0012 for 2OZ	±0.0012 for 2OZ	
F 1 T1 0 F	±0.0016 for 3OZ	±0.0016 for 3OZ	±0.0016 for 3OZ	
Feature Tolerance 2 - 5 oz	±0.0020 for 4OZ	±0.0020 for 4OZ	±0.0020 for 4OZ	
	\pm 0.0024 for 5OZ	\pm 0.0024 for 5OZ	\pm 0.0024 for 5OZ	
Innerlayer Cu to Edge				
PTH (DHS) to Copper (Drill to Copper)	0.0085	0.008	0.007	
NPT Hole/Slot to Copper, Second Drill	0.01	0.01	0.007	
Antipad Size	DHS+0.017	DHS+0.016	DHS+0.014	
Annular Ring Requirements for Drilled Holes <				
Tangency	DHS+0.016	DHS+0.012	DHS+0.010	
1 mil Annular Ring	DHS+0.018	DHS+0.014	DHS+0.012	
Outer Layers				
Minimum Line/Space				
3/8 oz Base	.004/.004	.004/.004	.004/.004	
1/2 oz Base	.005/.004	.005/.004	.005/.004	
1 oz Base	.006/.006	.006/.006	.006/.006	
2 oz Base	.007/.007	.007/.007	.007/.007	
3 oz Base	.008/.008	.008/.008	.008/.008	
4 oz Base	.009/.009	.009/.009	.009/.009	
5 oz Base	.010/.010	.010/.010	.010/.010	
Feature Attributes	.5.57.510		10.07.010	
PTH to Copper	0.0085	0.008	0.007	
NPT Hole/Slot to Copper	0.000	0.000	0.007	
		I .		
Rout to O/L Copper	0.01	0.01	0.01	

TTM Technologies	Zhongshan		
Time-To-Market Interconnect Solutions**	Standard	Advanced	Development
Drill			
Min. Drill Size	0.010	0.010	0.008
Min. Blind Drill Hole Size (Controlled Depth Drilling)	No	No	No
Min. Slot Width - Std.	>0.032	>0.032	>0.030
Min. Positional Tolerance	+/003	+/002	+/-0.002
Min. PTH Tolerance (Primary Drill)	+/003	+/002	+/002
Min. Tolerance of Plated Cut Out	+/-0.005	+/-0.004	+/-0.003
Counter Bore/Sink Tolerance	Yes	Yes	Yes
Max. NPT (hole/slot) in Primary Drill	0.200	0.250	0.297
Backdrill Size Over Primary Drill	No	No	Yes
Backdrill Stub Length	No	No	Yes
Microvia		·	
_aser via diameter	No	No	developing
Capture/Target pads	No	No	developing
Aspect Ratio	No	No	developing
Layer Build Up	No	No	developing
2 Layer Build Up	No	No	No
3+ Layer Build Up	No	No	No
+ Layer Build Up	No	No	No
AnyLayer	No	No	No
Laser Via Stacked on Buried Via Skip Via (ex 1-3)	No No	No No	No No
/ia in Pad (through hole)	110	140	140
Non-Conductive Via Fill	No	No	No
ine width and Spacing (wrap)	No	No	No
Microvia Non-Conductive Via Fill	No	No	No
Conductive Via Fill	No	No	No
aser Direct Imaging	No	No	No
Plating/Surface Finish			
HASL	Yes	Yes	Yes
mmersion Gold (ENIG)	Yes	Yes	Yes
mmersion Ni/Pd/Au	No	No	No
Electrolytic Ni/Au Tab Plating	No	No	No
Electrolytic Ni/Au (Hard Gold)	No	No	No
Organic Solderability Preservative	Yes	Yes	Yes
mmersion Silver	Yes	Yes	Yes
mmersion Tin	Yes	Yes	Yes
Selective ENIG or ENEPIG	No	No	No
Virebondable Soft Au	No	No	No
OSP + Electroplate Ni-Au	No	No	No
Fused Tin/Lead	No	No	No

TTM Tochnologica		Zhongshan	
TTIM Technologies Time-To-Market Interconnect Solutions**	Standard	Advanced	Development
Soldermask			
Туре	Probimer 77MA: 1070/1050; 7179/7180;PSR4000:Z26;MH;G23K;AM03 Taiyo PSR4000; Z26, MH, SP08		
Colors	GREEN	GREEN/Blue/Red	GREEN/Blue/Red/White
Thickness	Single coating: A≥0.2mil, B=0.4-1.0mil		
3/8 - 1 oz Base Copper	Dou	ble coating: A≥0.4mil, B=0.8-2	Omil
Min. Web	0.0035	0.003	0.002
Min. Clearance	0.0035	0.0025	0.002
Legend			
Text Width	0.005	0.005	0.004
Color	WHITE	WHITE/ BLACK YELLOW	N/A
LPI	No No	No No	No developing
Inkjet Fabrication	140	140	developing
Rout			
Diameter Router Bits Available	0.8-2.4 mm	0.8-2.4 mm	0.8-2.4 mm
Edge to Edge Tolerance	+/- 0.004	+/- 0.004	+/- 0.003
Score			
Score Angles		60°/90°/120°	
Positional Tolerance to Datum	+/005	+/004	+/003
Front to Back Tolerance	0.005 +/005	0.004 +/004	0.003 +/002
Remaining Web Tolerance Bevel	+/005	+/004	+/002
Bevel Angles	20°. 30°. 45°. 60°	20°. 30°. 45°. 60°	20°, 30°, 45°, 60°
Depth Tolerance	20°, 30°, 45°, 60° +/010	20°, 30°, 45°, 60° +/005	+/005
Electrical Test & Performance			
Min. Component Pitch	0.020 fixture/0.004 FP (flying probe)	0.020 fixture/0.004 FP	0.020 fixture/0.004 FP
Max. Test Voltage	150V	250V	250V
Max. Isolation Resistance	20M OHMS	20M OHMS	20M OHMS
Min. Continuity Resistance	20 OHMS	20 OHMS	20 OHMS
Hi Pot Test (Machine Capability)	No	Yes	Yes
Impedance Tolerance 51-100 ohms	+/- 15%	+/- 10%	+/- 10%
Impedance Tolerance 28-50 Ohms	+/- 10%	+/- 10%	+/- 10%
DC Resistance Testing	No	No	No
Kelvin Test	No	Yes	Yes
Signal Loss measurement	No	No	No
Latent Test	No	No	No
	Company Confider ibject to Nondisclosure Agre		

TTM Technologies		Forest Grove		
Time-To-Market Interconnect Solutions™	Standard	Advanced	Development	
Physical Characteristics				
Min. Board Thickness	0.017	0.015	0.010	
Max Board Thickness - All Finishes	0.126	0.24	0.275	
Thickness Tolerance	+/- 10%	+/- 8%		
Through Hole Aspect Ratio	12.5:1	14:1	20:1	
Bow and Twist (Balanced)	0.010 in/inch	0.0075 in/inch	0.005 in/inch	
Panel Sizes	18 x 24 , 14 X 24, 21x24	16 x 18, 24 x 28		
Technology				
Microvias	Yes	Yes	Yes	
Blind Vias	Yes	Yes	Yes	
Buried Vias	Yes	Yes	Yes	
Thin Core Pwr/Gnd	0.001			
Buried Resistor		YES	YES	
Inner Layers				
Minimum Line/Space				
H oz	.00325/.0035	.003/.00325		
1 oz	.004/.004	.0035/.004		
2 oz	.006/.006	.0055/.0055		
3 oz	NO	.008/.008		
4 oz	NO	.010/.010		
5 oz				
Feature Tolerance 1/2 - 1 oz	20%			
Feature Tolerance 2 - 5 oz	20%			
Innerlayer Cu to Edge				
PTH (DHS) to Copper (Drill to Copper)	0.0085	0.008	0.007	
NPT Hole/Slot to Copper, Second Drill	+/005	+/003		
Antipad Size				
Annular Ring Requirements for Drilled Holes	4			
Tangency	DHS+0.010	DHS+0.009		
1 mil Annular Ring	DHS+0.012			
Outer Layers				
Minimum Line/Space				
3/8 oz Base	.003/.003	.003/.0275	.0025/.00275	
1/2 oz Base	.00325/.0035	.003/.00325	.003/.003	
1 oz Base	.004/.004	.0035/.004	.00325/.0035	
2 oz Base	.006/.006	.0055/.0055	.005/.0055	
3 oz Base	NO	.008/.008	.0075/.0075	
4 oz Base	NO	.010/.010	NO	
5 oz Base	NO	NO	NO	
Feature Attributes				
PTH to Copper	0.008	0.0075	0.007	
NPT Hole/Slot to Copper	0.01	0.008	0.002	
Rout to O/L Copper	0.012	0.008	0.002	
Score to O/L Copper	0.012	0.008	0.005	

	Forest Crove		
` TTM Technologies		Forest Grove	
rame" 10-market interconnect Solutions =	Standard	Advanced	Development
Drill			
Min. Drill Size	0.010	0.008	
Min. Blind Drill Hole Size (Controlled Depth Drilling)	0.010	0.008	
Min. Slot Width - Std.	0.062	0.062 - 0.031	
Min. Positional Tolerance	0.007	0.006	0.005" Vision
Min. PTH Tolerance (Primary Drill)	+/003	+/002	
Min. Tolerance of Plated Cut Out	+/-0.005	+/-0.004	+/-0.003
Counter Bore/Sink Tolerance	+/- 0.008	+/- 0.006	+/- 0.005
Max. NPT (hole/slot) in Primary Drill	0.200	0.250	
Backdrill Size Over Primary Drill	0.010	0.008	0.006
Backdrill Stub Length	0.009+/-0.007	0.008+/-0.006	0.007+/-0.005
Microvia			
₋aser via diameter	0.004	0.004	
Capture/Target pads	mvia + .010	mvia + .006	mvia + .005
Aspect Ratio	.75:1	.85:1	
I Layer Build Up	YES	YES	
2 Layer Build Up	YES	YES	
3+ Layer Build Up	No	YES	
1+ Layer Build Up	No	Yes	
AnyLayer	No	No No	No
Laser Via Stacked on Buried Via Skip Via (ex 1-3)	Yes; nowever not preferred Yes	d due to long term reliability is un	nknown
/ia in Pad (through hole)	res		
Non-Conductive Via Fill	YES	YES	
Line width and Spacing (wrap)	.004 / .0045	.004/ .004 with Class II Wrap	.0035/.0035 with flat wrap
Microvia Non-Conductive Via Fill	YES	YES	
Conductive Via Fill	Outsource	120	
aser Direct Imaging	Yes		
Plating/Surface Finish			
HASL	Yes		
mmersion Gold (ENIG)	Yes		
mmersion Ni/Pd/Au	Outsource		
Electrolytic Ni/Au Tab Plating	YES		
Electrolytic Ni/Au (Hard Gold)	YES		
Organic Solderability Preservative	Yes		
mmersion Silver	Yes		
mmersion Tin	Yes		
Selective ENIG or ENEPIG	YES		
Virebondable Soft Au	YES		
OSP + Electroplate Ni-Au	YES		
Fused Tin/Lead	Outsource		
	-	- ·	

	Forest Grove			
TTM Technologies Time-To-Market Interconnect Solutions**	Ctandard		Dovolonment	
	Standard	Advanced	Development	
Soldermask				
Туре	TAIYO PSR4000HFX, PSR4000MP, PSR4000BN Dry Film			
Colors	GREEN	RED, BLUE, BLACK, CLEAR		
Thickness	IPC SPEC COVERAGE			
3/8 - 1 oz Base Copper	(SPC RANGES	.0002003 TYPICAL = .0007	over conductor)	
Min. Web	0.003	0.002	over conductory	
Min. Clearance	0.005	0.004	0.003 (LDI)	
Legend				
Text Width	0.004			
Color	White, Black, Yellow			
LPI	White, Black			
Inkjet	White			
Fabrication Rout				
Diameter Router Bits Available				
	0.063, 0.093, 0.125	0.031, 0.039		
Edge to Edge Tolerance Score	+/- 0.005	+/- 0.004		
Score Angles	30°	30°/15° (half blade)		
Positional Tolerance to Datum	+/- 0.005	+/-0.002		
Front to Back Tolerance	0.008	0.005	0.004	
Remaining Web Tolerance Bevel	+/- 0.003	+/- 0.002		
Bevel Angles	49° 45° 40°	30°, 20°		
Depth Tolerance	49°, 45°, 40° +/- 0.008	+/- 0.005		
Electrical Test & Performance				
Min. Component Pitch	0.020 fixture/0.010 FP (flying probe)	0.016 fixture/0.005 FP		
Max. Test Voltage	250V/1000V	250V/1000V		
Max. Isolation Resistance	10M OHMS	100M OHMS		
Min. Continuity Resistance	20 OHMS	5 OHMS		
Hi Pot Test (Machine Capability)	YES	YES		
Impedance Tolerance 51-100 ohms	+/- 10%	+/- 10%	+/- 7.5%	
Impedance Tolerance 28-50 Ohms	+/- 10%	+/- 7.5%	+/- 5%	
DC Resistance Testing	No	YES		
Kelvin Test		Yes		
Signal Loss measurement	Yes			
Latent Test	0	4:-1		
	Company Confidential Company Confidential	ntial		

TTM Technologies	Toronto		
Time-To-Market Interconnect Solutions*	Standard	Advanced	Development
Physical Characteristics			
Min. Board Thickness	0.010	0.008	0.005
Max Board Thickness - All Finishes	< 0.200"	<u><</u> 0.250"	
Thickness Tolerance	+/-10%	+/- 8%	+/-5%
Through Hole Aspect Ratio	13:1	16:1	20:1
Bow and Twist (Balanced)	0.008 in/inch	0.007 in/inch	0.005 in/inch
Panel Sizes	12X18/18 x 24/21x24		Flex & Rigid Flex PCB 12 X 18/18 X 24
Technology			
Microvias	Yes		
Blind Vias	Yes		
Buried Vias	Yes		
Thin Core Pwr/Gnd	Yes		
Buried Resistor	Yes (Ticer)		
Inner Layers	, ,		<u>, </u>
Minimum Line/Space			
H oz	.003/.003	.0025/.0025	
1 oz	.004/.004	.0035/.0035	.003/.003
2 oz	.006/.006	.0055/.0055	
3 oz	.008/.008	.0075/.0075	
4 oz	.009/.009		
5 oz	.010/.010		
Feature Tolerance 1/2 - 1 oz	+/- 0.0003		
Feature Tolerance 2 - 5 oz	+/- 0.0005		
Innerlayer Cu to Edge			
PTH (DHS) to Copper (Drill to Copper)	0.010	0.008	0.006
NPT Hole/Slot to Copper, Second Drill	0.010	0.008	
Antipad Size	DHS +0.02	DHS +0.016	DHS +0.012
Annular Ring Requirements for Drilled Holes <			
Tangency	DHS+0.010	DHS+0.009	DHS+0.008
1 mil Annular Ring	DHS+0.012	DHS+0.011	DHS+0.010
Outer Layers			
Minimum Line/Space			
3/8 oz Base	0.003/0.003		
1/2 oz Base	0.0035/0.0035		
1 oz Base	0.00475/0.00475		
2 oz Base	0.007/0.007		
3 oz Base	0.009/0.009		
4 oz Base	0.0105/0.0105		
5 oz Base	0.012/0.012		
Feature Attributes			
PTH to Copper	0.010		
NPT Hole/Slot to Copper	0.010	0.008	
Rout to O/L Copper	0.010	0.008	<u> </u>
ROULIO U/L CODDEL			

TTM Technologies	Toronto		
Time-To-Market Intercannect Solutions**	Standard	Advanced	Development
Drill			
Min. Drill Size	0.008	0.006	0.005
Min. Blind Drill Hole Size (Controlled Depth Drilling)	0.008	0.006	
Min. Slot Width - Std.	0.062	0.062 -0.031	0.02
Min. Positional Tolerance	0.007	0.006	0.004
Min. PTH Tolerance (Primary Drill)	+/003	+/002	0.015
Min. Tolerance of Plated Cut Out	+/-0.005	+/-0.004	+/-0.003
Counter Bore/Sink Tolerance	+/-0.005	+/-0.003	
Max. NPT (hole/slot) in Primary Drill	0.180	0.200	
Backdrill Size Over Primary Drill	0.010	0.008	0.006
Backdrill Stub Length	0.009+/-0.007	0.008+/-0.006	0.007+/-0.005
Microvia			•
Laser via diameter	0.012 - 0.004		
Capture/Target pads	mvia + .006	mvia + .004	
Aspect Ratio	0.9:1	1:1	
1 Layer Build Up	YES		
2 Layer Build Up	YES		
3+ Layer Build Up	YES		
4+ Layer Build Up	YES		
AnyLayer	NO VEO		
Laser Via Stacked on Buried Via	YES YES		
Skip Via (ex 1-3) Via in Pad (through hole)	TES		
Non-Conductive Via Fill	Sanei PHP	Taiyo DX1	Taiyo PIHP
Line width and Spacing (wrap)	0.004 / 0.004	0.003 / 0.003	Tayoriii
Microvia Non-Conductive Via Fill	YES		
Conductive Via Fill	Sub (CB100/AE3030)		
Laser Direct Imaging	Yes		
Plating/Surface Finish			
HASL	Yes		
Immersion Gold (ENIG)	Yes		
Immersion Ni/Pd/Au	Yes		
Electrolytic Ni/Au Tab Plating	see next line		
Electrolytic Ni/Au (Hard Gold)	Yes		
Organic Solderability Preservative	Yes		
Immersion Silver	Yes		
Immersion Tin	Yes		
Selective ENIG or ENEPIG	ENIG only		
Wirebondable Soft Au	No	<u> </u>	
OSP + Electroplate Ni-Au	Yes		
Fused Tin/Lead	Sub (other division)		

TTM Technologies	Toronto			
Time-To-Market Interconnect Solutions™	Standard	Advanced	Development	
Soldermask				
Туре	Taiyo PSR4000-BN, MP, HFX, LEW1, LDI, G23K - Probimer 77 - Dryfilm			
Colors	LDI -GREEN BLUE, RED, PURPLE, CLEAR and BLACK			
Thickness	IPC SPEC COVERAGE (other on request)			
3/8 - 1 oz Base Copper	(Single	e Coat .00020015 over cond	uctor)	
Min. Web	0.004	0.003	0.002	
Min. Clearance	0.002	0.001		
Legend				
Text Width	0.005	0.004		
Color	WHITE	Black, Y	'ellow	
LPI		YES - WHITE		
Inkjet		YES - WHITE		
Fabrication				
Rout		1		
Diameter Router Bits Available	.058, .070, .093	0.031	0.020	
Edge to Edge Tolerance	+/- 0.005	+/- 0.004	+/- 0.002	
Score	17 0.000	77 0.001	-17 0.002	
Score Angles	20° /30°	² /45° /60°		
Positional Tolerance to Datum	+/005	+/003	+/002	
Front to Back Tolerance	+/- 0.005	+/- 0.003		
Remaining Web Tolerance	+/003	+/002		
Bevel Bevel Arrate	000 000 450 000			
Bevel Angles Depth Tolerance	20°, 30°, 45°, 60° +/005	+/003	+/002	
Electrical Test & Performance	17003	17003	17002	
Min. Component Pitch	0.020 fixture/0.008 FP (flying probe)	0.016 fixture/0.004 FP (flying probe)		
Max. Test Voltage	250V	500V		
Max. Isolation Resistance	10M OHMS	100M OHMS	2G OHMS	
Min. Continuity Resistance	10 OHMS			
Hi Pot Test (Machine Capability)	YES			
or root (maonino Capability)	TES			
Impedance Tolerance 51-100 ohms	+/- 10%	+/- 5%		
Impedance Tolerance 28-50 Ohms	+/- 10%	+/- 5%		
DC Resistance Testing	No	., 5,0		
Kelvin Test	Yes			
Signal Loss measurement	No			
Latent Test	No O			
	Company Confider abject to Nondisclosure Agre			

	7	<u> </u>			
TTM Technologies Time-To-Market Interconnect Solutions**	Sterling				
	Standard	Advanced	Development		
Physical Characteristics					
Min. Board Thickness	0.015	0.01	0.008		
Max Board Thickness - All Finishes	0.250"	0.250"	0.250"		
Thickness Tolerance	+/- 10%	+/- 7%	+/- 5%		
Through Hole Aspect Ratio	10:1	12:1	14:1		
Bow and Twist (Balanced)	0.0075 in/inch	0.005 in/inch	0.005 in/inch		
Panel Sizes					
Tachwalam	12 x 18, 18 x 24, 21x24				
Technology Microvias	Yes	Yes	Yes		
iviiciovias	res	165	res		
Blind Vias	Yes	Yes	Yes		
Buried Vias	Yes	Yes	Yes		
Thin Core Pwr/Gnd	0.001	0.0005			
Buried Resistor	Yes (Ohmega & Ticer)				
Inner Layers					
Minimum Line/Space					
H oz	.003/.0035	.003/.003	.0023/.0025		
1 oz	.004/.004	.0035/.0035	.003/.003		
2 oz	.0050/.0050	.0045/.0045	.004/.005		
3 oz	.008 / .008	.006/.007	.006 / .006		
4 oz	.010/.010	.008 / .008	.0075/.008		
5 oz	NA	NA	NA		
Feature Tolerance 1/2 - 1 oz	+/-0.0005	+/-0.0003	+/-0.00025		
Feature Tolerance 2 - 5 oz	+/-0.0015	+/-0.001	+/-0.00075		
Innerlayer Cu to Edge					
PTH (DHS) to Copper (Drill to Copper)	0.009	0.008	0.0065		
NPT Hole/Slot to Copper, Second Drill	0.009	0.008	0.0065		
Antipad Size	DHS +0.018	DHS +0.016	DHS +0.013		
Annular Ring Requirements for Drilled Holes	<				
Tangency	DHS+0.010	DHS+0.009	DHS+0.008		
1 mil Annular Ring	DHS+0.012	DHS+0.010	DHS+0.009		
Outer Layers					
Minimum Line/Space					
3/8 oz Base	.003/.0035	.003/.003	.0023/.0025		
1/2 oz Base	.003/.0035	.003/.003	.0023/.0025		
1 oz Base	.004/.004	.0035/.0035	.003/.003		
2 oz Base	.0050/.0050	.0045/.0045	.004/.005		
3 oz Base	NA	NA	NA		
4 oz Base	NA	NA	NA		
5 oz Base	NA	NA	NA		
Feature Attributes					
PTH to Copper	0.007	0.005	0.004		
NPT Hole/Slot to Copper	0.009	0.008	0.007		
Rout to O/L Copper	0.015	0.01	.002 (LENZ)		
Score to O/L Copper	0.018	0.015	NA		

TTM Technologies	Sterling		
Time-To-Market Interconnect Solutions**	Standard	Advanced	Development
Drill			
Min. Drill Size	0.01	0.008	0.006
Min. Blind Drill Hole Size (Controlled Depth Drilling)	0.010	0.008	0.006
Min. Slot Width - Std.	0.062	0.062 - 0.024	0.024 - 0.016
Min. Positional Tolerance	0.008	0.006	0.004
Min. PTH Tolerance (Primary Drill)	+/- 0.003	+/- 0.002	+/- 0.002
Min. Tolerance of Plated Cut Out	+/-0.005	+/-0.004	+/-0.002 (LENZ)
Counter Bore/Sink Tolerance	+/-0.005	+/-0.004	+/-0.002 (LENZ)
Max. NPT (hole/slot) in Primary Drill	0.170	0.185	0.200
Backdrill Size Over Primary Drill	0.008	0.006	0.005
Backdrill Stub Length	0.009+/-0.007	0.008+/-0.006	0.007+/-0.005
Microvia			
Laser via diameter	0.005	0.004	0.004
Capture/Target pads	mvia + .006	mvia + .005	mvia + .004
Aspect Ratio	.75:1	.85:1	.85:1
1 Layer Build Up	YES	YES	YES
2 Layer Build Up	YES	YES	YES
3+ Layer Build Up	YES	YES	YES
4+ Layer Build Up	YES	YES	YES
AnyLayer	NA	No d due to long term reliability is u	No
Laser Via Stacked on Buried Via Skip Via (ex 1-3)	Yes		IKHOWH
Via in Pad (through hole)	163		
Non-Conductive Via Fill	YES	YES	YES
Line width and Spacing (wrap)	.0045/ .005	.004/ .004 with Class II Wrap or flat wrap	.0035/.0035 with flat wrap
Microvia Non-Conductive Via Fill	YES	YES	YES
Conductive Via Fill	YES	YES	YES
Laser Direct Imaging	YES	YES	YES
Plating/Surface Finish			
HASL	YES		
Immersion Gold (ENIG)	YES		
Immersion Ni/Pd/Au	YES		
Electrolytic Ni/Au Tab Plating	YES		
Electrolytic Ni/Au (Hard Gold)	YES		
Organic Solderability Preservative	YES		
Immersion Silver	YES		
Immersion Tin	Outsource		
Selective ENIG or ENEPIG	YES		
Wirebondable Soft Au	YES		
OSP + Electroplate Ni-Au	YES		
Fused Tin/Lead	YES		

	Starling			
TTM Technologies	Standard	Sterling	Davidanment	
Polidarmonic	Standard	Advanced	Development	
Soldermask				
Туре	Taiyo PSR4000BN, Taiyo LDI, Dry Film			
Colors	GREEN	Red, Blue, Black, Clear	Teal, Purple Orange	
Thickness		IPC SPEC COVERAGE		
3/8 - 1 oz Base Copper	(SPC RANGES	.0002003 TYPICAL = .0007	7 over conductor)	
Min. Web	0.003	0.0025	0.002	
Min. Clearance	0.006	0.005	0.004	
Legend				
Text Width	0.005	0.0045	0.004	
Color	White	Black, Yellow		
LPI	0.004 0.004	0.003 0.0035	0.0025 0.003	
Inkjet Fabrication	0.004	0.0033	0.003	
Rout				
Diameter Router Bits Available	0.063, 0.093, 0.125	0.031, 0.039	.016, .0240	
Edge to Edge Tolerance	+/- 0.005	+/- 0.004	+/-0.002 (lenz)	
Score			,	
Score Angles	30°	30°	30°	
Positional Tolerance to Datum	+/- 0.005	+/-0.002	+/-0.002	
Front to Back Tolerance	0.008	0.005	0.005	
Remaining Web Tolerance Bevel	+/- 0.003	+/- 0.002	+/- 0.002	
Bevel Angles	45°, 30°, 20° +/- 0.008	45°, 30°, 20° +/- 0.005	45°, 30°, 20° +/- 0.005	
Depth Tolerance	+/- 0.008	+/- 0.005	+/- 0.005	
Electrical Test & Performance				
Min. Component Pitch	0.020 fixture/0.010 FP (flying probe)	0.016 fixture/0.005 FP		
Max. Test Voltage	100V	250V	500V(flying probe only)	
Max. Isolation Resistance	20M Ohm	50M Ohm	100M Ohm	
Min. Continuity Resistance	10 ohm	7 ohm (gold pins- fixture)	5 ohm (flying probe only)	
Hi Pot Test (Machine Capability)	Yes	Yes	Yes	
Impedance Tolerance 51-100 ohms	+/- 10%	+/- 10 %	+/- 5%	
Impedance Tolerance 28-50 Ohms	+/- 10%	+/-7.5%	+/- 5%	
DC Resistance Testing	YES	YES		
Kelvin Test	YES			
Signal Loss measurement	No			
Latent Test	IST			
	Company Confidential Company Compa			

TTM Technologies	Anaheim			
Time-To-Market Interconnect Solutions™	Standard	Advanced	Development	
Physical Characteristics				
Min. Board Thickness	0.014	0.012	0.005	
Max Board Thickness - All Finishes	0.250"	0.280"	0.300"	
Thickness Tolerance	+-10%	+/-8%	+/-8%	
Through Hole Aspect Ratio	10:1	16:1	25:1 (DFM reqd.)	
Bow and Twist (Balanced)	0.007 in/inch	0.007 in/inch	0.005 in/inch	
Panel Sizes				
	18 x 24	18 x 24,21 x 24,24 x 30		
Technology				
Microvias	Yes	Yes	Yes	
Blind Vias	Yes	Yes	Yes	
Buried Vias	Yes	Yes	Yes	
Thin Core Pwr/Gnd	0.001			
Buried Resistor	Yes (Ohmega & Ticer)			
Inner Layers				
Minimum Line/Space				
H oz	0.0035/0.0035	0.003/0.003	0.275/0.003	
1 oz	0.005/0.005	0.004/0.004	0.003/0.003	
2 oz	0.007/0.007	0.006/0.006	0.005/0.005	
3 oz	0.009/0.009	0.008/0.008	No	
4 oz	No	No	No	
5 oz	No	No	No	
Feature Tolerance 1/2 - 1 oz	+/-0.0005 to +/-0.001			
Feature Tolerance 2 - 5 oz	+/-0.002 to +/-0.005			
Innerlayer Cu to Edge		'		
PTH (DHS) to Copper (Drill to Copper)	0.008	0.007	.005	
NPT Hole/Slot to Copper, Second Drill	0.008	0.007	.005	
Antipad Size	DHS +0.014	DHS +0.010	DHS +0.006	
Annular Ring Requirements for Drilled Holes <				
Tangency	DHS+0.010	DHS+0.009	DHS+0.008	
1 mil Annular Ring	DHS+0.012	DHS+0.011	DHS+0.010	
Outer Layers				
Minimum Line/Space				
	0.00350/0.0035	0.003/0.003	0.0025/0.0025	
3/8 oz Base		0.003/0.003 0.0035/0.0035	0.0025/0.0025 0.003/0.003	
3/8 oz Base 1/2 oz Base	0.00350/0.0035 0.004/0.004 0.006/0.006	0.0035/0.0035		
3/8 oz Base 1/2 oz Base 1 oz Base	0.004/0.004 0.006/0.006	0.0035/0.0035 0.0055/0.0055	0.003/0.003	
3/8 oz Base 1/2 oz Base 1 oz Base 2 oz Base	0.004/0.004	0.0035/0.0035	0.003/0.003 0.005/0.005	
3/8 oz Base 1/2 oz Base 1 oz Base 2 oz Base 3 oz Base	0.004/0.004 0.006/0.006	0.0035/0.0035 0.0055/0.0055	0.003/0.003 0.005/0.005	
3/8 oz Base 1/2 oz Base 1 oz Base 2 oz Base 3 oz Base 4 oz Base	0.004/0.004 0.006/0.006	0.0035/0.0035 0.0055/0.0055	0.003/0.003 0.005/0.005	
3/8 oz Base 1/2 oz Base 1 oz Base 2 oz Base 3 oz Base 4 oz Base 5 oz Base	0.004/0.004 0.006/0.006	0.0035/0.0035 0.0055/0.0055	0.003/0.003 0.005/0.005	
3/8 oz Base 1/2 oz Base 1 oz Base 2 oz Base 3 oz Base 4 oz Base 5 oz Base Feature Attributes	0.004/0.004 0.006/0.006 0.0075/0.0075	0.0035/0.0035 0.0055/0.0055 0.007/0.007	0.003/0.003 0.005/0.005 0.0065/0.0065	
3/8 oz Base 1/2 oz Base 1 oz Base 2 oz Base 3 oz Base 4 oz Base 5 oz Base Feature Attributes PTH to Copper	0.004/0.004 0.006/0.006 0.0075/0.0075	0.0035/0.0035 0.0055/0.0055 0.007/0.007	0.003/0.003 0.005/0.005 0.0065/0.0065	
2 oz Base 3 oz Base 4 oz Base 5 oz Base	0.004/0.004 0.006/0.006 0.0075/0.0075	0.0035/0.0035 0.0055/0.0055 0.007/0.007	0.003/0.003 0.005/0.005 0.0065/0.0065	

TTM Technologies		Anaheim	
Time-To-Market Interconnect Solutions**	Standard	Advanced	Development
Drill			
Min. Drill Size	0.010	0.008	0.006
Min. Blind Drill Hole Size (Controlled Depth Drilling)	0.016	0.012	0.010
Min. Slot Width - Std.	0.062	0.031	0.016
Min. Positional Tolerance	.007	.006	.004
Min. PTH Tolerance (Primary Drill)	+/003	+/002	+/002
Min. Tolerance of Plated Cut Out	+/-0.005	+/-0.004	+/-0.004
Counter Bore/Sink Tolerance	+/-0.005	+/-0.004	+/-0.004
Max. NPT (hole/slot) in Primary Drill	0.125	0.150	0.175
Backdrill Size Over Primary Drill	0.010	0.008	0.008
Backdrill Stub Length	0.009+/-0.007	0.008+/-0.006	0.007+/-0.005
Microvia			
Laser via diameter	0.005	0.004	0.003
Capture/Target pads	uvia +.006	uvia +.005	uvia+0.004
Aspect Ratio	0.5:1	0.75:1	1.2:1
1 Layer Build Up	YES	YES	YES
2 Layer Build Up	YES	YES	YES
3+ Layer Build Up	YES	YES	YES
4+ Layer Build Up	YES	YES	YES
AnyLayer	YES	YES	YES
Laser Via Stacked on Buried Via	YES YES	YES YES	YES YES
Skip Via (ex 1-3) Via in Pad (through hole)	120	120	120
Non-Conductive Via Fill	YES	YES	YES
Line width and Spacing (wrap)	0.004/0.004	0.0035/0.0035	0.0035/0.0035
Microvia Non-Conductive Via Fill	YES	1	
Conductive Via Fill	Outsource		
Laser Direct Imaging	Yes		
Plating/Surface Finish		<u> </u>	
HASL	Outsource		
Immersion Gold (ENIG)	Yes		
Immersion Ni/Pd/Au	Yes		
Electrolytic Ni/Au Tab Plating	Yes		
Electrolytic Ni/Au (Hard Gold)	YES		
Organic Solderability Preservative	Yes		
Immersion Silver	Yes		
Immersion Tin	Oustource		
Selective ENIG or ENEPIG	Yes		
Wirebondable Soft Au	Yes		
OSP + Electroplate Ni-Au	Design specific - contact ANA engineering		
Fused Tin/Lead	No	No	Yes

TTM Tochmologica		Anaheim	
TTM Technologies Time-To-Market Interconnect Solutions**	Standard	Advanced	Development
Soldermask			
Туре	Taiyo PSR4000 LDI	Taiyo PSR4000BN, HFX, MP, AUS5	Dry Film - design specific application
Colors	GREEN, BLUE RED	GREEN, BLUE RED	BLACK, CLEAR,
Thickness	0.007-0.0012	0.007-0.0012	0.005-0.001
3/8 - 1 oz Base Copper	T	PICAL = 0.0007 (over conduc	etor)
Min. Web	0.004	0.003	0.003
Min. Clearance	0.005	0.004	0.002
Legend			
Text Width	0.005	0.004	0.003
Color	WHITE	WHITE, BLACK	YELLOW
LPI	Yes	Yes	Yes
Inkjet		WHITE ONLY	
Fabrication			
Rout			T
Diameter Router Bits Available	0.093 & 0.062	0.031	0.016
Edge to Edge Tolerance	+/-0.005	+/-0.005	+/-0.003
Score	17-0.003	17-0.003	17-0.003
			T .
Score Angles	45	20,30,60	Custom tools
Positional Tolerance to Datum	0.008	0.008	0.008
Front to Back Tolerance	+/-0.005	+/-0.005	+/-0.005
Remaining Web Tolerance	+/-0.007	+;/-0.005	+/-0.004
Bevel			
Bevel Angles	45 +/-0.008	30 +/-0.007	20 +/-0.007
Depth Tolerance Electrical Test & Performance	17-0.008	17-0.007	17-0.007
Min. Component Pitch	0.006 FP (flying probe)	0.003 FP	
Max. Test Voltage	100V	250V	1000V
Max. Isolation Resistance	100 MOHMS	>100 MOHMS	>100 MOHMS
Min. Continuity Resistance	20 OHMS	10 OHMS	5 OHMS
Hi Pot Test (Machine Capability)	2000 DC	3000 DC	3000 DC
Impedance Tolerance 51-100 ohms	+/-10%	+/-7%	+/-5%
Impedance Tolerance 28-50 Ohms	+/-10%	+/-7%	+/-5%
DC Resistance Testing	NO	NO	YES
Kelvin Test	NO		
Signal Loss measurement			YES
Latent Test	Company Confide	ntial	-
	Company Confider		

TIM Technologies Time-To-Market Interconnect Solutions**		San Jose (SV)	
	Standard	Advanced	Development
Physical Characteristics			
Min. Board Thickness	0.017	0.015	<0.015
Max Board Thickness - All Finishes	0.126	0.240"	
Thickness Tolerance	+/- 10% 10:1	+/- 8% 12:1	
Through Hole Aspect Ratio	0.010 in/inch	0.0075 in/inch	0.00E in/inah
Bow and Twist (Balanced)	0.010 In/Inch	0.0075 In/Inch	0.005 in/inch
Panel Sizes			
	18 X 24, 12 X 18	16x18	
Technology			
Microvias	Yes	Yes	Yes
Blind Vias	Yes	Yes	Yes
Buried Vias	Yes	Yes	Yes
Thin Core Pwr/Gnd	0.002	0.002	0.001
Buried Resistor	No		
Inner Layers			
Minimum Line/Space			
H oz	.00325/.0035	.0025/.003	
1 oz	.004/.004	.0035/.0035	
2 oz	.006/.006	.0055/.0055	
3 oz	.008/.008	.007/.007	
4 oz	NO	NO	
5 oz	NO	NO	
Feature Tolerance 1/2 - 1 oz	+/0015	+/001	+/0005
Feature Tolerance 2 - 5 oz	+/004	+/0035	+/003
Innerlayer Cu to Edge			
PTH (DHS) to Copper (Drill to Copper)	0.0085	0.008	0.006
NPT Hole/Slot to Copper, Second Drill	0.008	0.008	0.005
Antipad Size	DHS+0.017	DHS+0.016	DHS+0.012
Annular Ring Requirements for Drilled Holes <			
Tangency	DHS+0.010	DHS+0.009	DHS+0.008
1 mil Annular Ring	DHS+0.012	DHS+0.011	
Outer Layers			
Minimum Line/Space			
3/8 oz Base	.00325/.0035	.0025/.003	
1/2 oz Base	0.0035/0.0035	0.003/0.003	
1 oz Base	0.0035/0.004	0.003/0.0035	
2 oz Base	0.0055/0.006	0.004/0.005	
3 oz Base	NO	NO	
4 oz Base	NO	NO	
5 oz Base	NO	NO	
Feature Attributes			
PTH to Copper	0.0085	0.008/ 0.007 with CAF matl	0.006
NPT Hole/Slot to Copper	0.012	0.011	
Rout to O/L Copper	0.008	0.007	
Score to O/L Copper	Design dependent		

TTUT observed and an	San Jose (SV)		
TTM Technologies	Standard	Advanced	Development
Dwill	Standard	Advanced	Development
Drill			
Min. Drill Size	0.010	0.009	
Min. Blind Drill Hole Size (Controlled Depth Drilling)	0.008	0.006	
Min. Slot Width - Std.	0.062	0.062 - 0.031	
Min. Positional Tolerance	0.005	0.004	
Min. PTH Tolerance (Primary Drill)	+/003	+/002	
Min. Tolerance of Plated Cut Out	+/-0.005	+/-0.004	
Counter Bore/Sink Tolerance	+/- 0.010	+/009	
Max. NPT (hole/slot) in Primary Drill	0.200	0.250	
Backdrill Size Over Primary Drill	0.010	0.006	0.004
Backdrill Stub Length	0.010+/-0.008	0.009+/-0.007	0.007+/-0.005
Microvia			
Laser via diameter	0.004	0.004	
Capture/Target pads	mvia + .010	mvia + .006	mvia + .005
Aspect Ratio	.75:1	0.85:1	1:01
1 Layer Build Up	YES	YES	
2 Layer Build Up	YES	YES	
3+ Layer Build Up	No	YES	
4+ Layer Build Up		YES	
AnyLayer	No NEO	VEO	
Laser Via Stacked on Buried Via	YES No	YES	
Skip Via (ex 1-3) Via in Pad (through hole)	INU		
Non-Conductive Via Fill	YES	YES	
Line width and Spacing (wrap)	.004 / .004	.003 / .003	
Microvia Non-Conductive Via Fill	YES	YES	
Conductive Via Fill	Outsource	0	
Laser Direct Imaging	Yes		
Plating/Surface Finish			
HASL	YES		
Immersion Gold (ENIG)	Yes		
Immersion Ni/Pd/Au	Outsource		
Electrolytic Ni/Au Tab Plating	NO		
Electrolytic Ni/Au (Hard Gold)	Outsource		
Organic Solderability Preservative	Yes		
mmersion Silver	Yes		
Immersion Tin	Yes		
Selective ENIG or ENEPIG	NO		
Wirebondable Soft Au	Outsource		
OSP + Electroplate Ni-Au	YES		
Fused Tin/Lead	NO		

TTM Technologies		San Jose (SV)	
Time-To-Market Interconnect Solutions ==	Standard	Advanced	Development
Soldermask		Ī	
Туре	Taiyo PSR4000 LDI	Taiyo PSR4000 HFX	
Colors	GREEN	BLUE, RED, BLACK	MATTE GREEN, YELLOW, CLEAR, PURPLE
Thickness		IPC SPEC COVERAGE	
3/8 - 1 oz Base Copper	(SPC RANGES	.0002003 TYPICAL = .000	7 over conductor)
Min. Web	0.002	0.002	,
Min. Clearance	0.004	0.003	
Legend			
Text Width	0.006	0.005	0.005
Color	WHITE	BLACK, YELLOW	WHITE
LPI Inkjet	0.005	BLUE 0.005	0.004
Fabrication	0.000	0.000	0.004
Rout			
Diameter Router Bits Available	0.093 & 0.125	0.062,0.039,0.031	0.020
Edge to Edge Tolerance	+/- 0.005	+/- 0.004	
Score			
Score Angles	30° / 45°	30° / 45°	
Positional Tolerance to Datum	+/005	+/003	
Front to Back Tolerance	+/-0.010 +/-0.005	+/- 0.005 +/;-0.003	
Remaining Web Tolerance Bevel	+7-0.005	+/,-0.003	
Bevel Angles	45°	30° / 20°	
Depth Tolerance	+/010	+/005	
Electrical Test & Performance			
Min. Component Pitch	0.008 FP (flying probe)	0.008 FP	
Max. Test Voltage	100V	200V	
Max. Isolation Resistance	10M OHMS	50M OHMS	
Min. Continuity Resistance	20 OHMS	10 OHMS	
Hi Pot Test (Machine Capability)	NO	YES	
Impedance Tolerance 51-100 ohms	+/- 15%	+/- 10%	
Impedance Tolerance 28-50 Ohms	+/- 10%	+/- 7.5%	+/- 5%
DC Resistance Testing	No	YES	
Kelvin Test	Outsource		
Signal Loss measurement	No		
Latent Test			
Latent 165t	Company Confide	tial	
<u>e</u> ,	Company Confider	ement with TTM	

TTM Technologies		Milpitas (SV)	
Time-To-Market Interconnect Solutions™	Standard	Advanced	Development
Physical Characteristics			
Min. Board Thickness	0.015	0.008	0.008
Max Board Thickness - All Finishes	0.005 to .250	0.005 to .250	0.250 Max
Thickness Tolerance	+/- 10%	+/- 8%	+/- 5%
Through Hole Aspect Ratio	10:1	18:1	30:1
Bow and Twist (Balanced)	0.01	0.008	0.005
Panel Sizes	18.5 x 24.5, 21.5x 24.5, 24.5 x 27.5, 21.5 x 27.5		
Taahnalagu	21:5 X 21:5		
Technology	Yes	Yes	Yes
Microvias	res	168	res
Blind Vias	Yes	Yes	Yes
Buried Vias	Yes	Yes	Yes
Thin Core Pwr/Gnd	0.001	-	
Buried Resistor	No	No	No
Inner Layers			
Minimum Line/Space			
H oz	.004/.004	.003/.003	.0025/.0025
1 oz	.0045/.0045	.0035/.004	.003 / .004
2 oz	.005/.006	.0045/.006	.004/.006
3 oz	.008/.008	.007/.008	.006/.008
4 oz	.010/.010	.008/.010	.006/.010
5 oz	N/A	N/A	N/A
Feature Tolerance 1/2 - 1 oz	+/0015	+/001	+/0005
Feature Tolerance 2 - 5 oz	+/004	+/0035	+/003
Innerlayer Cu to Edge			
PTH (DHS) to Copper (Drill to Copper)	0.008	0.006	0.0038
NPT Hole/Slot to Copper, Second Drill	0.008	0.008	0.005
Antipad Size	DHS +0.02	DHS +0.014	DHS +0.008
Annular Ring Requirements for Drilled Hole	s <		
Tangency	DHS+0.010	DHS+0.008	DHS+0.006
1 mil Annular Ring	DHS+0.012	DHS+0.010	DHS+0.0089
Outer Layers			
Minimum Line/Space			
3/8 oz Base	.004/.004	.003/.003	.0025/.0025
1/2 oz Base	.004/.004	.003/.003	.0025/.0025
1 oz Base	.0045/.0045	.0035/.004	.003 / .004
2 oz Base	.005/.006	.0045/.006	.004/.006
3 oz Base	.008/.008	.007/.008	.006/.008
4 oz Base	.010/.010	.008/.010	.006/.010
5 oz Base	N/A	N/A	N/A
Feature Attributes	1971	10/1	14//
PTH to Copper	0.008	0.006	0.0038
NPT Hole/Slot to Copper	0.008	0.008	0.005
Rout to O/L Copper	0.005	0.005	0.003
TOUL TO OIL OUPPOI	0.003	0.003	0.002

TTM Technologies		Milpitas (SV)	
Time-To-Market Interconnect Solutions™	Standard	Advanced	Development
Drill			
Min. Drill Size	0.008	0.006	0.005*
Min. Blind Drill Hole Size (Controlled Depth Drilling)	0.008	0.006	0.005
Min. Slot Width - Std.	>0.062	0.062 - 0.031	0.031 - 0.010
Min. Positional Tolerance	0.006	0.005	0.002
Min. PTH Tolerance (Primary Drill)	+/003	+/002	
Min. Tolerance of Plated Cut Out	+/-0.005	+/-0.004	+/-0.003
Counter Bore/Sink Tolerance	+/-0.005	+/-0.004	+/-0.003
Max. NPT (hole/slot) in Primary Drill	0.186	0.186	0.186
Backdrill Size Over Primary Drill	0.008	0.006	0.004
Backdrill Stub Length	0.010+/-0.008	0.009+/-0.007	0.007+/-0.005
Microvia			
Laser via diameter	0.004	0.004	0.003
Capture/Target pads	mvia + .005	mvia + .004	mvia + .003
Aspect Ratio	0.8	0.9	1:1
1 Layer Build Up	YES	YES	YES
2 Layer Build Up	YES	YES	YES
3+ Layer Build Up	YES	YES	YES
4+ Layer Build Up	Yes	Yes	Yes
AnyLayer	Yes	Yes	Yes
Laser Via Stacked on Buried Via	Yes No	Yes No	Yes No
Skip Via (ex 1-3) Via in Pad (through hole)	INO	INO INO	INU
Non-Conductive Via Fill	Yes	Yes	Yes
Line width and Spacing (wrap)	.003/.0035	.003/.0035	.003/.003
Microvia Non-Conductive Via Fill	Yes	Yes	Yes
Conductive Via Fill	Yes	Yes	Yes
Laser Direct Imaging	Yes		
Plating/Surface Finish			
HASL	Yes		
mmersion Gold (ENIG)	Yes		
mmersion Ni/Pd/Au	Outsource		
Electrolytic Ni/Au Tab Plating			
Electrolytic Ni/Au (Hard Gold)	Yes		
Organic Solderability Preservative	Yes		
mmersion Silver	Yes		
mmersion Tin	Outscource		
Selective ENIG or ENEPIG	Yes on ENIG		
Wirebondable Soft Au	Outscource		
OSP + Electroplate Ni-Au	Yes		
Fused Tin/Lead	No		
		•	

TTIM Technologies Time-To-Market Interconnect Solutions**	Milpitas (SV)		
	Standard	Advanced	Development
Soldermask			
Туре	Taiyo PSR	Taiyo PSR4000 LDI	
Colors	Green, Blue	Black, Red, Purple	Custom colors
Thickness		IPC SPEC COVERAGE	
3/8 - 1 oz Base Copper	(SPC RANGES (0002003 TYPICAL = .0007	7 over conductor)
Min. Web	0.004	0.003	0.003
Min. Clearance	0.004	0.003	0.002
Legend			
Text Width	0.005	0.004	0.003
Color	White	Black, Yellow	Custom colors
LPI	Yes	Yes	Yes
Inkjet	White	White	White
Fabrication			
Rout			
Diameter Router Bits Available	0.062	0.062	0.031
Edge to Edge Tolerance	+/- 0.005	+/- 0.004	+/003
Score			
Score Angles	30° / 45°	30° / 45°	30° / 45°
Positional Tolerance to Datum	+/005	+/003	+/002
Front to Back Tolerance	0.010	0.005	0.003
Remaining Web Tolerance Bevel	+/-0.005	+/- 0.003	+/- 0.002
Bevel Angles	20°, 30°, 45°	20°, 30°, 45°	n/a
Depth Tolerance	+/- 0.010	+/- 0.005	+/- 0.005
Electrical Test & Performance			
Min. Component Pitch	0.020 FP (flying probe)	0.015 FP	0.010 FP
Max. Test Voltage	100V	500V	
Max. Isolation Resistance	10M OHMS	100M OHMS	
Min. Continuity Resistance	20 OHMS	10 OHMS	5 OHMS
Hi Pot Test (Machine Capability)	Yes	Yes	Yes
•			
Impedance Tolerance 51-100 ohms	+/- 10%	+-7%	+-5%
Impedance Tolerance 28-50 Ohms	+/- 10%	+/- 5%	- 070
DC Resistance Testing	No	No	No
Kelvin Test	No		
Signal Loss measurement	Yes		
Latent Test			
	Company Confident Subject to Nondisclosure Agree		

TTM Technologies	North Jackson			
Time-To-Market Interconnect Solutions	Standard	Advanced	Development	
Physical Characteristics				
Min. Board Thickness	0.010	0.007	0.004	
Max Board Thickness - All Finishes	≤ 0.125	≤ 0.220	≤ 0.250	
Thickness Tolerance	+/- 10%	+/- 8%		
Through Hole Aspect Ratio	10:1	12.5:1	16:1	
Bow and Twist (Balanced)	0.010	0.008	0.005	
Panel Sizes	12 x 18		14 x 18	
	18 x 24		6 x 38	
Technology				
Microvias	Yes	Yes	Yes	
Blind Vias	Yes	Yes	Yes	
Buried Vias	Yes	Yes	Yes	
Thin Core Pwr/Gnd	0.001			
Buried Resistor		Yes (Outside Service)		
Inner Layers				
Minimum Line/Space				
H oz	0.0035/0.0035	0.003/0.003	0.003/0.0025	
1 oz	.004/.004	.0035/.0035		
2 oz	.006/.006	.0055/.0055		
3 oz	0.009/0.009	0.0085/0.0085		
4 oz	0.014/0.014	0.012/0.0105		
5 oz				
Feature Tolerance 1/2 - 1 oz	+/-0.001	+/-0.001	+/-0.0005	
Feature Tolerance 2 - 5 oz	+/-0.003	+/-0.0025	+/-0.002	
Innerlayer Cu to Edge				
PTH (DHS) to Copper (Drill to Copper)	0.010	0.008		
NPT Hole/Slot to Copper, Second Drill	0.010	0.008	0.007	
Antipad Size	DHS+0.020	DHS+0.016	DHS+0.014	
Annular Ring Requirements for Drilled Holes <				
Tangency	DHS+0.010	DHS+0.009		
1 mil Annular Ring	DHS+0.012	DHS+0.010	-	
Outer Layers				
Minimum Line/Space				
3/8 oz Base	0.00375/0.00375	0.00325/0.00325		
1/2 oz Base	0.004/0.004	0.0035/0.0035		
1 oz Base	0.005/0.005	0.0045/0.0045		
2 oz Base	0.006/0.006	0.0055/0.0055		
3 oz Base	-	0.010/0.010	-	
4 oz Base	-	-	-	
5 oz Base	-	-	-	
Feature Attributes				
PTH to Copper	0.01	0.008		
NPT Hole/Slot to Copper	0.01	0.008	0.007	
Rout to O/L Copper	0.01	0.008	0.007	
Score to O/L Copper	0.015	0.012	0.01	

TTM Technologies	North Jackson		
Time-To-Market Intercannect Solutions™	Standard	Advanced	Development
Orill			
Min. Drill Size	0.0098	0.008	
Min. Blind Drill Hole Size (Controlled Depth Drilling)	0.010	0.008	0.006
Min. Slot Width - Std.	>0.050	0.050 - 0.031	0.031 - 0.016
Min. Positional Tolerance	0.008	0.006	0.003
Min. PTH Tolerance (Primary Drill)	+/-0.003	+/-0.002	
Min. Tolerance of Plated Cut Out	+/-0.005	+/-0.004	+/-0.003
Counter Bore/Sink Tolerance	+/-0.005	+/-0.004	+/-0.003
Max. NPT (hole/slot) in Primary Drill	0.200	0.250	0.250 x 1.0 slots
Backdrill Size Over Primary Drill	0.010	0.008	
Backdrill Stub Length	0.009+/-0.007	0.008+/-0.006	0.007+/-0.005
Microvia			
_aser via diameter	0.004	0.004	0.002
Capture/Target pads	mvia + .010	mvia + .006	mvia + .005
Aspect Ratio	0.75:1	0.85:1	1:1
Layer Build Up	Yes		
2 Layer Build Up	Yes		
3+ Layer Build Up	Yes		
4+ Layer Build Up	-	-	-
AnyLayer Laser Via Stacked on Buried Via	<u>-</u>	-	<u> </u>
Skip Via (ex 1-3)	Yes		
/ia in Pad (through hole)			
Non-Conductive Via Fill	YES		
ine width and Spacing (wrap)	.005/ .005 Class 3 Wrap	.004/ .004 with Class 3 Wrap	.005/ .005 double or triple Class 3 wrap
Microvia Non-Conductive Via Fill	Yes		•
Conductive Via Fill	Yes		
aser Direct Imaging	Yes		
Plating/Surface Finish			
HASL	Yes		
mmersion Gold (ENIG)	Yes		
mmersion Ni/Pd/Au	Outsource		
Electrolytic Ni/Au Tab Plating			
Electrolytic Ni/Au (Hard Gold)	Yes		
Organic Solderability Preservative	Outsource		
mmersion Silver mmersion Tin	Yes	+	
	Yes	V	
Selective ENIG or ENEPIG	Outer	Yes	
Virebondable Soft Au DSP + Electroplate Ni-Au	Outsource		
Fused Tin/Lead	Yes YES		

		North Joseph		
TTM Technologies Time-To-Market Interconnect Solutions	Standard	North Jackson Advanced	Davolanment	
Poldownools	Standard	Advanced	Development	
Soldermask				
Туре	PSR 4000-BN	PSR 4000-BN & PSR4000-MP		
Colors	GREEN, RED	BLUE, BLACK, YELLOW, CLEAR	LPI Coverlay Amber Clear	
Thickness		IPC SPEC COVERAGE		
3/8 - 1 oz Base Copper	(SPC RANGES	.0002003 TYPICAL = .000	7 over conductor)	
Min. Web	Image + 0.003	Image + 0.0025		
Min. Clearance	0.005	0.004		
Legend		1		
Text Width	0.005	0.004	0.0035	
Color	White, Black, & Yellow	White & Yellow	White & Yellow	
LPI Inkjet	PSR 4001W	PSR 4001W IJR-4000 MW300	PSR 4001W	
Fabrication		1314-4000 19199 300		
Rout				
Diameter Router Bits Available	0.031 0.050 0.0	63 0.0945 0.125	0.016 0.020	
Edge to Edge Tolerance	+/- 0.005	+/- 0.004	+/-0.002	
Score				
Score Angles	30° 60°	90° 120°		
Positional Tolerance to Datum	0.008	0.006	0.005	
Front to Back Tolerance Remaining Web Tolerance	0.010 +/-0.005	0.005 +/-0.003	0.003 +/-0.003	
Bevel	17-0.000	17-0.003	17-0.000	
Bevel Angles	15° 30°	45° 60°		
Depth Tolerance	+/005	+/003		
Electrical Test & Performance	0.016 fixture/0.004 FP	l	Ī	
Min. Component Pitch	(flying probe)			
Max. Test Voltage	250V	500V		
Max. Isolation Resistance	10 Mohms			
Min. Continuity Resistance	10 Ohms			
Hi Pot Test (Machine Capability)	YES (6000 VAC, VDC)			
Impedance Tolerance 51-100 ohms	+/- 10%	+/- 7.5%	+/-5%	
Impedance Tolerance 28-50 Ohms	+/- 10%	+/- 7.5%	+/-5%	
DC Resistance Testing	YES			
Kelvin Test		Yes		
Signal Loss measurement	No	No	No	
Latent Test	Outsourced Company Confider	Outsourced	Outsourced	
9	ibject to Nondisclosure Agre			

No.	TTM Technologies	Cleveland			
Min. Board Thickness	Time-To-Market Intercannect Solutions™	Standard	Advanced	Development	
Max Board Thickness - All Finishes ≤ 0.130 ≤ 0.175 ≤ 0.175 Thickness Tolerance +/- 10% +/- 8% Through Hole Aspect Ratio 10.1 12.5:1 16 Bow and Twist (Balanced) 0.010 in/inch 0.0075 in/inch 0.005 in/inch Panel Sizes 18x24 18x24 18x24 18x Technology Microvias Outsource	Physical Characteristics				
Thickness Tolerance	Min. Board Thickness	0.006	0.005	0.004	
Through Hole Aspect Ratio 10.1 12.5:1 16	Max Board Thickness - All Finishes	≤ 0.130	≤ 0.175	≤ 0.200	
Bow and Twist (Balanced)	Thickness Tolerance	+/- 10%	+/- 8%		
Panel Sizes		10:1	12.5:1	16:1	
18x24	Bow and Twist (Balanced)	0.010 in/inch	0.0075 in/inch	0.005 in/inch	
Dutsource Outsource Outs	Panel Sizes				
Microvias Outsource Outsource Outsource Outsource		18x24	18x24	18x24	
Second S					
Buried Vias Yes Yes Yes Yes Yes Thin Core Pwr/Gnd 0.001 0.00	Microvias	Outsource	Outsource	Outsource	
Thin Core Pwr/Gnd	Blind Vias	Yes	Yes	Yes	
No	Buried Vias			Yes	
No	Thin Core Pwr/Gnd	0.001	0.001	0.001	
Minimum Line/Space	Buried Resistor	No	No	No	
H oz	Inner Layers				
1 0Z	Minimum Line/Space				
2 oz .006/.006 .0055/.0055 .0055/.0055 .0098/0.009 .0088/0.0085 .4 oz .0.014/0.014 .0.012/0.0105 .5 oz .0.016/0.015			I .	0.003/0.0025	
3 oz	1 oz				
4 oz					
Feature Tolerance 1/2 - 1 oz					
Feature Tolerance 1/2 - 1 oz			0.012/0.0105		
Feature Tolerance 2 - 5 oz	5 0Z	0.016/0.015			
Innerlayer Cu to Edge	Feature Tolerance 1/2 - 1 oz	+/-0.001	+/-0.001	+/-0.001	
PTH (DHS) to Copper (Drill to Copper) 0.010 0.008 NPT Hole/Slot to Copper, Second Drill 0.006 0.004 0.0 Antipad Size DHS +0.024 DHS +0.016 DHS + Annular Ring Requirements for Drilled Holes Tangency DHS+0.012 DHS+0.010 DHS+1 1 mil Annular Ring DHS+0.014 DHS+0.013 DHS+1 Outer Layers Minimum Line/Space 3/8 oz Base 0.004/0.004 0.0035/0.0035 0.003/ 1/2 oz Base 0.004/0.004 0.0035/0.0035 0.003/ 1 oz Base 0.005/0.005 0.004/0.004 0.005/0.005 2 oz Base 0.006/0.006 0.005/0.005 0.005/0.005 3 oz Base 0.008/0.008 0.005/0.005 0.005/0.005 4 oz Base 0.010/0.010 0.012/0.012 0.012/0.012 Feature Attributes PTH to Copper 0.008 0.007	Feature Tolerance 2 - 5 oz	+/-0.002	+/-0.002	+/-0.002	
NPT Hole/Slot to Copper, Second Drill 0.006 0.004 0.0 Antipad Size DHS +0.024 DHS +0.016 DHS + Annular Ring Requirements for Drilled Holes Tangency DHS+0.012 DHS+0.010 DHS+1 1 mil Annular Ring DHS+0.014 DHS+0.013 DHS+1 Outer Layers Minimum Line/Space 3/8 oz Base 0.004/0.004 0.0035/0.0035 0.003/ 1/2 oz Base 0.004/0.004 0.0035/0.0035 0.003/ 1 oz Base 0.005/0.005 0.004/0.004 0.005/0.005 2 oz Base 0.006/0.006 0.005/0.005 0.005/0.005 3 oz Base 0.008/0.008 0.005/0.005 0.005/0.005 4 oz Base 0.010/0.010 0.012/0.012 0.012/0.012 Feature Attributes PTH to Copper 0.008 0.007					
Antipad Size DHS +0.024 DHS +0.016 DHS + Annular Ring Requirements for Drilled Holes < Tangency DHS+0.012 DHS+0.010 DHS+1 1 mil Annular Ring DHS+0.014 DHS+0.013 DHS+1 Outer Layers Minimum Line/Space 3/8 oz Base 0.004/0.004 0.0035/0.0035 0.003/ 1/2 oz Base 0.004/0.004 0.0035/0.0035 0.003/ 1 oz Base 0.005/0.005 0.004/0.004 2 oz Base 0.006/0.006 0.005/0.005 3 3 oz Base 0.008/0.008 0.005/0.005 4 oz Base 0.010/0.010 5 5 oz Base 0.012/0.012 Feature Attributes PTH to Copper 0.008 0.007					
Annular Ring Requirements for Drilled Holes < Tangency	NPT Hole/Slot to Copper, Second Drill	0.006	0.004	0.002	
Tangency DHS+0.012 DHS+0.010 DHS+1 1 mil Annular Ring DHS+0.014 DHS+0.013 DHS+1 Outer Layers Minimum Line/Space 3/8 oz Base 0.004/0.004 0.0035/0.0035 0.003/ 1/2 oz Base 0.004/0.004 0.0035/0.0035 0.003/ 1 oz Base 0.005/0.005 0.004/0.004 0.003/ 2 oz Base 0.006/0.006 0.005/0.005 0.005/0.005 3 oz Base 0.008/0.008 0.005/0.005 0.005/0.005 4 oz Base 0.010/0.010 0.012/0.012 0.005/0.005 Feature Attributes 0.008 0.007 0.007		DHS +0.024	DHS +0.016	DHS + 0.012	
1 mil Annular Ring DHS+0.014 DHS+0.013 DHS+1 Outer Layers Minimum Line/Space 3/8 oz Base 0.004/0.004 0.0035/0.0035 0.003/ 1/2 oz Base 0.004/0.004 0.0035/0.0035 0.003/ 1 oz Base 0.005/0.005 0.004/0.004 0.003/ 2 oz Base 0.006/0.006 0.005/0.005 0.005/0.005 3 oz Base 0.008/0.008 0.005/0.005 0.005/0.005 4 oz Base 0.010/0.010 0.012/0.012 0.012/0.012 Feature Attributes 0.008 0.007	Annular Ring Requirements for Drilled Holes <				
Outer Layers Minimum Line/Space 0.004/0.004 0.0035/0.0035 0.003/ 3/8 oz Base 0.004/0.004 0.0035/0.0035 0.003/ 1/2 oz Base 0.005/0.005 0.004/0.004 0.003/ 2 oz Base 0.006/0.006 0.005/0.005 0.005/0.005 3 oz Base 0.008/0.008 0.005/0.005 0.005/0.005 4 oz Base 0.010/0.010 0.012/0.012 0.012/0.012 Feature Attributes Feature Attributes 0.008 0.007				DHS+0.009	
Minimum Line/Space 3/8 oz Base 0.004/0.004 0.0035/0.0035 0.003/ 1/2 oz Base 0.004/0.004 0.0035/0.0035 0.003/ 1 oz Base 0.005/0.005 0.004/0.004 0.005/0.005 2 oz Base 0.006/0.006 0.005/0.005 0.005/0.005 3 oz Base 0.008/0.008 0.005/0.005 4 oz Base 0.010/0.010 0.012/0.012 5 oz Base 0.012/0.012 0.005/0.005 Feature Attributes PTH to Copper 0.008 0.007		DHS+0.014	DHS+0.013	DHS+0.012	
3/8 oz Base 0.004/0.004 0.0035/0.0035 0.003/ 1/2 oz Base 0.004/0.004 0.0035/0.0035 0.003/ 1 oz Base 0.005/0.005 0.004/0.004 0.005/0.005 2 oz Base 0.006/0.006 0.005/0.005 0.005/0.005 3 oz Base 0.008/0.008 0.005/0.005 0.005/0.005 4 oz Base 0.010/0.010 0.012/0.012 0.012/0.012 Feature Attributes PTH to Copper 0.008 0.007					
1/2 oz Base 0.004/0.004 0.0035/0.0035 0.003/ 1 oz Base 0.005/0.005 0.004/0.004 0.005/0.005 2 oz Base 0.006/0.006 0.005/0.005 3 oz Base 0.008/0.008 0.005/0.005 4 oz Base 0.010/0.010 0.012/0.012 5 oz Base 0.012/0.012 0.007 Feature Attributes PTH to Copper 0.008 0.007					
1 oz Base 0.005/0.005 0.004/0.004 2 oz Base 0.006/0.006 0.005/0.005 3 oz Base 0.008/0.008 4 oz Base 0.010/0.010 5 oz Base 0.012/0.012 Feature Attributes PTH to Copper 0.008 0.007				0.003/0.003	
2 oz Base 0.006/0.006 0.005/0.005 3 oz Base 0.008/0.008 4 oz Base 0.010/0.010 5 oz Base 0.012/0.012 Feature Attributes PTH to Copper 0.008 0.007			I .	0.003/0.003	
3 oz Base 0.008/0.008 4 oz Base 0.010/0.010 5 oz Base 0.012/0.012 Feature Attributes PTH to Copper 0.008 0.007					
4 oz Base 0.010/0.010 5 oz Base 0.012/0.012 Feature Attributes PTH to Copper 0.008 0.007			0.005/0.005		
5 oz Base 0.012/0.012 Feature Attributes PTH to Copper 0.008 0.007					
Feature Attributes 0.008 0.007					
PTH to Copper 0.008 0.007		0.012/0.012			
		0.000	0.00=		
NDT II I 101 II 0				0.004	
				0.001	
				0	

TTM Technologies	Cleveland		
Time-To-Market Interconnect Solutions™	Standard	Advanced	Development
Drill			
Min. Drill Size	0.012	0.010	
Min. Blind Drill Hole Size (Controlled Depth Drilling)	0.010	0.008	0.006
Min. Slot Width - Std.	.0.050	0.050 - 0.031	
Min. Positional Tolerance	0.008	0.006	0.003
Min. PTH Tolerance (Primary Drill)	+/- 0.003	+/- 0.002	
Min. Tolerance of Plated Cut Out	+/- 0.005	+/-0.004	+/-0.003
Counter Bore/Sink Tolerance	+/- 0.010	+/- 0.008	+/- 0.005
Max. NPT (hole/slot) in Primary Drill	0.250	0.250	0.250 x 1.0 slots
Backdrill Size Over Primary Drill	0.010	0.008	
Backdrill Stub Length	0.010+/-0.008	0.009+/-0.007	0.007+/-0.005
Microvia			
Laser via diameter	0.004	0.004	0.002
Capture/Target pads	mvia + .010	mvia + .006	mvia + .005
Aspect Ratio	0.75:1	0.85:1	1:1
1 Layer Build Up	0.75:1	0.85:1	1:1
2 Layer Build Up	0.75:1	0.85:1	1:1
3+ Layer Build Up	No	No	No
4+ Layer Build Up	No	No	No
AnyLayer	No	No	No
Laser Via Stacked on Buried Via	No 0.75:1	No 0.85:1	No 1:1
Skip Via (ex 1-3)	0.73.1	0.85.1	1.1
Via in Pad (through hole) Non-Conductive Via Fill	Outsource	Outsource	Outsource
Line width and Spacing (wrap)	.005/ .005 Class 3 Wrap	.004/ .004 with Class 3 Wrap	.005/ .005 double or triple
Missassia New Construction V. E.	·	·	Class 3 wrap
Microvia Non-Conductive Via Fill Conductive Via Fill	Outsource Outsource	Outsource Outsource	Outsource Outsource
Laser Direct Imaging	Outsource	Outsource	Outsource
Plating/Surface Finish	V	T v	
HASL	Yes	Yes	Yes
Immersion Gold (ENIG)	Outsource	Outsource	Outsource
Immersion Ni/Pd/Au	Outsource	Outsource	Outsource
Electrolytic Ni/Au Tab Plating	Outsource	Outsource	Outsource
Electrolytic Ni/Au (Hard Gold)	Outsource	Outsource	Outsource
Organic Solderability Preservative	Outsource	Outsource	Outsource
mmersion Silver	Outsource	Outsource	Outsource
Immersion Tin	Outsource	Outsource	Outsource
Selective ENIG or ENEPIG	Outsource	Outsource	Outsource
Wirebondable Soft Au OSP + Electroplate Ni-Au	Outsource	Outsource	Outsource
•	YES	Yes	YES
Fused Tin/Lead	YES	YES	YES

TTANTO observator of a	Cleveland			
TTM Technologies	Standard		Dovalonment	
Online of the connect southers	Standard	Advanced	Development	
Soldermask				
Туре	PSR 4000-BN, PSR 4000-MP & PSR 9000-FXT			
Colors	GREEN BLUE RED	BLACK, YELLOW, CLEAR	LPI Coverlay Amber Clear	
Thickness	IPC SPEC COVERAGE			
3/8 - 1 oz Base Copper	(SPC RANGES	.0002003 TYPICAL = .0007	7 over conductor)	
Min. Web	0.003	0.0025	over conductor)	
Min. Clearance	0.005	0.004		
Legend				
Text Width	0.005	0.004	0.0035	
Color	White, Black, & Yellow	White & Yellow	White & Yellow	
LPI		PSR 4001W - Outsource IJR-4000 MW300 - Inhouse		
Inkjet Fabrication		IJR-4000 MW300 - Innouse		
Rout				
Diameter Router Bits Available	0.031.0.050.0.0	63 0.0945 0.125	0.016 0.020	
Edge to Edge Tolerance	+/- 0.005	+/- 0.004	+/-0.002	
Score				
Score Angles	30° 60°	90° 120°		
Positional Tolerance to Datum	0.008	0.007	0.006	
Front to Back Tolerance	+/-0.005	+/-0.003	+/-0.003	
Remaining Web Tolerance	+/-0.005	+/-0.003	+/-0.003	
Bevel Bevel Angles	15° 30°	45° 60°		
Depth Tolerance	+/-0.005	+/-0.003	+/-0.003	
Electrical Test & Performance				
Min. Component Pitch	0.016 fixture/0.004 FP (flying probe)	0.016 fixture/0.004 FP (flying probe)	0.016 fixture/0.004 FP (flying probe)	
Max. Test Voltage	500V	500V	500V	
Max. Isolation Resistance	10 Mohms	10 Mohms	10 Mohms	
Min. Continuity Resistance	10 Ohms	1 Ohm	1 Ohm	
Hi Pot Test (Machine Capability)	YES	YES	YES	
Impedance Tolerance 51-100 ohms	+/- 10%	+/- 7.5%	+/-5%	
Impedance Tolerance 28-50 Ohms	+/- 10%	+/- 7.5%	+/-5%	
DC Resistance Testing	YES	YES	YES	
Kelvin Test	Outsourced	Outsourced	Outsourced	
Signal Loss measurement				
Latent Test	Company Confider			
Si	ibject to Nondisclosure Agre		I .	

TTM Technologies	Denver		
Time-To-Market Interconnect Solutions™	Standard	Advanced	Development
Physical Characteristics			
Min. Board Thickness	0.015	0.010	0.005
Max Board Thickness - All Finishes	.126	0.240"	0.250"
Thickness Tolerance	+/- 10%	+/- 8%	+/- 8%
Through Hole Aspect Ratio	10:1	12:1	14:1
Bow and Twist (Balanced)	0.0075 in/inch	0.005 in/inch	0.0025 in/inch
Panel Sizes			
	18 X 24, 12 X 18		
Technology			
Microvias	Yes	Yes	Yes
Blind Vias	Yes	Yes	Yes
Buried Vias	Yes	Yes	Yes
Thin Core Pwr/Gnd	0.002	0.002	0.002
Buried Resistor	No	No	Yes
Inner Layers			
Minimum Line/Space			
H oz	.00325/.0035	.003/.00325	.003/.00325
1 oz	.004/.0045	.0035/.004	.0035/.004
2 oz	.006/.0065	.006/.006	.006/.006
3 oz	.008/.0085	.007/.0085	.007/.0085
4 oz	.010/.012	.008/.011	.008/.011
5 oz	.012/.014	.010/.013	.010/.013
Feature Tolerance 1/2 - 1 oz	+/001	+/0005	+/0005
Feature Tolerance 2 - 5 oz	+/003	+/002	+/001
Innerlayer Cu to Edge			
PTH (DHS) to Copper (Drill to Copper)	0.0085	0.008	0.007
NPT Hole/Slot to Copper, Second Drill	0.01	0.009	0.008
Antipad Size	DHS+0.017	DHS+0.016	DHS+0.014
Annular Ring Requirements for Drilled Holes <			
Tangency	DHS+0.010	DHS+0.009	DHS+0.008
1 mil Annular Ring	DHS+0.012	DHS+0.011	DHS+0.010
Outer Layers			
Minimum Line/Space			
3/8 oz Base	.00325/.0035	.003/.00325	.003/.003
1/2 oz Base	.0035/.0035	.003/.00325	.003/.00325
1 oz Base	.004/.0045	.0035/.004	.0035/.004
2 oz Base	.006/.0065	.006/.006	.006/.006
3 oz Base	.008/.0085	.007/.0085	.007/.0085
4 oz Base	.010/.012	.008/.011	.008/.011
5 oz Base	.012/.014	.010/.013	.010/.013
Feature Attributes			
PTH to Copper	0.015	0.01	0.008
NPT Hole/Slot to Copper	0.01	0.008	0.005
Rout to O/L Copper	0.01	0.008	0.005
Score to O/L Copper	0.01	0.0075	0.0075

TTM Technologies	Denver		
Time-To-Market Intercannect Solutions	Standard	Advanced	Development
Drill			·
Min. Drill Size	0.0098	0.0079	0.0059
Min. Blind Drill Hole Size (Controlled Depth Drilling)	0.008	0.006	0.006
Min. Slot Width - Std.	>0.062	0.062 - 0.031	0.02
Min. Positional Tolerance	0.007	0.006	0.004
Min. PTH Tolerance (Primary Drill)	+/003	+/002	+/0015
Min. Tolerance of Plated Cut Out	+/-0.005	+/-0.003	+/-0.002
Counter Bore/Sink Tolerance	+/-0.005	+/-0.005	+/-0.003
Max. NPT (hole/slot) in Primary Drill	0.257	0.257	0.257
Backdrill Size Over Primary Drill	0.012	0.010	0.010
Backdrill Stub Length	0.010+/-0.008	0.009+/-0.007	0.007+/-0.005
Microvia			
Laser via diameter	0.004	0.004	0.004
Capture/Target pads	mvia + .010	mvia + .006	mvia + .005
Aspect Ratio	.75:1	.85:1	.85:1
1 Layer Build Up	YES	YES	YES
2 Layer Build Up	NO	YES	YES
3+ Layer Build Up	NO	YES	YES
4+ Layer Build Up	NO	YES	YES
AnyLayer	NO NO	YES	YES
Laser Via Stacked on Buried Via	NO NO	YES NO	YES YES
Skip Via (ex 1-3) Via in Pad (through hole)	INO	NO	120
Non-Conductive Via Fill	YES	YES	YES
Line width and Spacing (wrap)	.004 / .0045	.004/ .004 with Class II Wrap	.003" /.003" waive Wrap Spec
Microvia Non-Conductive Via Fill	YES	YES	YES
Conductive Via Fill	YES	YES	YES
Laser Direct Imaging	Yes	YES	YES
Plating/Surface Finish			
HASL	YES	YES	YES
Immersion Gold (ENIG)	YES	YES	YES
Immersion Ni/Pd/Au	Outsource	Outsource	Outsource
Electrolytic Ni/Au Tab Plating	YES	YES	YES
Electrolytic Ni/Au (Hard Gold)	YES	YES	YES
Organic Solderability Preservative	Outsource	Outsource	Outsource
Immersion Silver	Outsource	Outsource	Outsource
Immersion Tin	YES	YES	YES
Selective ENIG or ENEPIG	NO	YES	YES
Wirebondable Soft Au	YES	YES	YES
OSP + Electroplate Ni-Au	Outsource	Outsource	Outsource
Fused Tin/Lead	YES	YES	YES

Standard Taiyo PSR4000BN	Denver Advanced	Development
Taiyo PSR4000BN		Development
Taiyo PSR4000BN		
PSR4000-LDI PSR4000MP	Taiyo PSR4000BN PSR4000-LDI PSR4000MP	Taiyo PSR4000BN PSR4000-LDI PSR4000MP
GREEN	BLUE, RED, BLACK	YELLOW, CLEAR
IPC SPEC COVERAGE		
(SPC RANGES	0002003 TYPICAL = .0007	7 over conductor)
0.004	0.0035	0.003
0.005	0.004	0.002 LDI
0.006	0.005	0.004
WHITE	BLACK, YELLOW	RED, BLUE
Yes	Yes	Yes
Yes	Yes	Yes
0.062.0.002.0.125	0.047.0.020.0.021	0226 020
		.0236 .020 +/-0.003
+/- 0.005	+ 7-0.004	+/-0.003
30°	30° / 45°	30° / 45°
.008	.006	.004
		0.003
+/-0.005	+/-0.003	+/-0.003
45° / 30° / 20°	45° / 30° / 20°	45° / 30° / 20°
		+/005
0.020 fixture/0.008 FP (flying probe)	0.016 fixture/0.004 FP (flying probe)	0.016 fixture/0.004 FP (flying probe)
30V min. 100V	250V	500V max.
10M OHMS	100M OHMS	150M ohms
20 OHMS	< 20 OHMS	< 20 OHMS
YES	YES	YES
+/ ₋ 10%	+/ ₋ 10%	+/- 10%
		+/- 10 %
		YES
Outsource		
No		
Company Confider	tial	
	0.007 +/-0.005 45° / 30° / 20° +/010 0.020 fixture/0.008 FP (flying probe) 30V min. 100V 10M OHMS 20 OHMS YES +/- 10% +/- 10% No	+/- 0.005

TTM Technologies	OPC		
Time-To-Market Interconnect Solutions™	Standard	Advanced	Development
Physical Characteristics			
Min. Board Thickness	0.020"	0.007"	0.007"
Max Board Thickness - All Finishes	0.325"	0.325"	0.325"
Thickness Tolerance	+/-10% for >0.8mm board	+/-10% for >0.8mm board	+/-10% for >0.8mm board
Through Hole Aspect Ratio	16:1 for > 0.3mm,	16:1 for > 0.3mm,	18:1 for > 0.3mm,
Bow and Twist (Balanced)	0.7%	0.5%	NA NA
Panel Sizes	24" x 20"	24" x 20"	24" x 20"
Technology			
Microvias	Yes	Yes	Yes
Blind Vias	Yes	Yes	Yes
Buried Vias	Yes	Yes	Yes
Thin Core Pwr/Gnd			
Buried Resistor	No	No	No
Inner Layers			
Minimum Line/Space			
H oz	0.003"/0.003"	0.0024"/0.0024"	0.002"/0.002"
1 oz	0.004"/0.004"	0.004"/0.004"	NA
2 oz	0.005"/0.005"	0.005"/0.005"	NA
3 oz	0.007"/0.007"	0.007"/0.007"	NA
4 oz	NA	0.009"/0.009"	NA
5 oz	NA	0.011"/0.011"	NA NA
Feature Tolerance 1/2 - 1 oz			
Feature Tolerance 2 - 5 oz			
Innerlayer Cu to Edge			
PTH (DHS) to Copper (Drill to Copper)	0.008"	0.007"	NA
NPT Hole/Slot to Copper, Second Drill	0.005"	0.004"	NA
Antipad Size	DHS+0.016"	DHS+0.014"	NA
Annular Ring Requirements for Drilled Holes <			
Tangency	DHS+0.016"	DHS+0.016"	NA
1 mil Annular Ring	DHS+0.018"	DHS+0.018"	NA
i mii Annular Ring			
Outer Layers			
Outer Layers			
Outer Layers Minimum Line/Space	0.003"/0.003"	0.003"/0.003"	0.0024"/0.0024"
Outer Layers Minimum Line/Space 3/8 oz Base	0.003"/0.003" 0.003"/0.003"	0.003"/0.003" 0.003"/0.003"	0.0024"/0.0024" NA
Outer Layers Minimum Line/Space 8/8 oz Base 1/2 oz Base	0.003"/0.003"	0.003"/0.003"	NA
Outer Layers Minimum Line/Space 3/8 oz Base 1/2 oz Base 1 oz Base	0.003"/0.003" 0.004"/0.004"	0.003"/0.003" 0.0035"/0.0035"	NA NA
Outer Layers Winimum Line/Space 3/8 oz Base 1/2 oz Base 1 oz Base 2 oz Base	0.003"/0.003" 0.004"/0.004" 0.005"/0.005"	0.003"/0.003" 0.0035"/0.0035" 0.005"/0.005"	NA NA NA
Outer Layers Minimum Line/Space 3/8 oz Base 1/2 oz Base 1 oz Base 2 oz Base 3 oz Base	0.003"/0.003" 0.004"/0.004" 0.005"/0.005" 0.007"/0.007"	0.003"/0.003" 0.0035"/0.0035" 0.005"/0.005" 0.007"/0.007"	NA NA NA NA
Outer Layers Winimum Line/Space 3/8 oz Base 1/2 oz Base 1 oz Base 2 oz Base 3 oz Base 4 oz Base	0.003"/0.003" 0.004"/0.004" 0.005"/0.005"	0.003"/0.003" 0.0035"/0.0035" 0.005"/0.005"	NA NA NA
Outer Layers Winimum Line/Space 3/8 oz Base 1/2 oz Base 2 oz Base 3 oz Base 4 oz Base 5 oz Base	0.003"/0.003" 0.004"/0.004" 0.005"/0.005" 0.007"/0.007"	0.003"/0.003" 0.0035"/0.0035" 0.005"/0.005" 0.007"/0.007"	NA NA NA NA
Outer Layers Minimum Line/Space 3/8 oz Base 1/2 oz Base 1 oz Base 2 oz Base 3 oz Base 4 oz Base 5 oz Base Feature Attributes	0.003"/0.003" 0.004"/0.004" 0.005"/0.005" 0.007"/0.007" 0.009"/0.009"	0.003"/0.003" 0.0035"/0.0035" 0.005"/0.005" 0.007"/0.007" 0.009"/0.009"	NA NA NA NA NA
Outer Layers Minimum Line/Space 3/8 oz Base 1/2 oz Base 2 oz Base 3 oz Base 4 oz Base 5 oz Base Feature Attributes PTH to Copper	0.003"/0.003" 0.004"/0.004" 0.005"/0.005" 0.007"/0.007" 0.009"/0.009"	0.003"/0.003" 0.0035"/0.0035" 0.005"/0.005" 0.007"/0.007" 0.009"/0.009"	NA NA NA NA NA
Outer Layers Minimum Line/Space 3/8 oz Base 1/2 oz Base 2 oz Base 3 oz Base 4 oz Base 5 oz Base Feature Attributes	0.003"/0.003" 0.004"/0.004" 0.005"/0.005" 0.007"/0.007" 0.009"/0.009"	0.003"/0.003" 0.0035"/0.0035" 0.005"/0.005" 0.007"/0.007" 0.009"/0.009"	NA NA NA NA NA

TTM Technologies	OPC		
Time-To-Market Interconnect Solutions	Standard	Advanced	Development
Drill			
Min. Drill Size	0.006	0.006	0.006
Min. Blind Drill Hole Size (Controlled Depth Drilling)	0.018	0.016	NA
Min. Slot Width - Std.	0.016	0.016	NA
Min. Positional Tolerance	0.003	0.002	NA
Min. PTH Tolerance (Primary Drill)	0.003	0.002	NA
Min. Tolerance of Plated Cut Out Counter Bore/Sink Tolerance	0.010	0.010	NA
Max. NPT (hole/slot) in Primary Drill	Slot length: (0.7 ~ 10+W) mm	Slot length: (0.7 ~ 10+W) mm	NA
Backdrill Size Over Primary Drill			
Backdrill Stub Length	0.002+0.012/-0	0.002+0.010/-0	NA
Microvia			
Laser via diameter	0.003	0.003	0.003
Capture/Target pads			
Aspect Ratio	0.85:1, and 0.80:1 for keip via	0.85:1, and 0.80:1 for keip via	0.9:1, and 0.85:1 for keip via
1 Layer Build Up	Yes	Yes	Yes
2 Layer Build Up	Yes	Yes	Yes
3+ Layer Build Up	Yes	Yes	Yes
4+ Layer Build Up	Yes	Yes	Yes
AnyLayer	Yes	Yes	Yes
Laser Via Stacked on Buried Via	Yes	Yes	Yes
Skip Via (ex 1-3)	Yes	Yes	Yes
Via in Pad (through hole)			
Non-Conductive Via Fill	Yes	Yes	Yes
Line width and Spacing (wrap)			
Microvia Non-Conductive Via Fill	Yes	Yes	Yes
Conductive Via Fill	Yes	Yes	Yes
Laser Direct Imaging	Yes	Yes	Yes
Plating/Surface Finish			
HASL	Yes (none lead free)	Yes (none lead free)	Yes (none lead free)
Immersion Gold (ENIG)	Yes	Yes	Yes
Immersion Ni/Pd/Au	Yes	Yes	Yes
Electrolytic Ni/Au Tab Plating	Yes	Yes	Yes
Electrolytic Ni/Au (Hard Gold)	Yes	Yes	Yes
Organic Solderability Preservative	Yes	Yes	Yes
Immersion Silver	Yes	Yes	Yes
Immersion Tin	Yes	Yes	Yes
Selective ENIG or ENEPIG	Yes	Yes	Yes
Wirebondable Soft Au	Yes	Yes	Yes
OSP + Electroplate Ni-Au	Gold Finger, Selective hard gold, Soft Gold, Flash Gold	Gold Finger, Selective hard gold, Soft Gold, Flash Gold	Gold Finger, Selective hard gold, Soft Gold, Flash Gold
Fused Tin/Lead	gola, Golt Gola, Flash Gola	gora, con cola, i lasti dola	gola, Colt Cola, i lasti Gola

TTM To changle also		OPC	
TTM Technologies Time-To-Market Interconnect Solutions**	Standard	Advanced	Development
Soldermask	Ottania u	7147411004	Zorolopinioni
Туре	LPI	LPI	NA
Colors	Glossy green, matte green,red, blue, black, green	Glossy green, matte green,red, blue, black, green	NA
Thickness	10um min on conductor surface; 5um min on isolated conductor surface; 4um min for conductor corner; 10um min for copper GND	15um min on conductor surface; 5um min on isolated conductor surface; 4um min for conductor corner; 15um min for copper GND	NA
3/8 - 1 oz Base Copper			
Min. Web	0.005	0.005	NA.
Min. Clearance Legend	0.005	0.005	NA
Text Width	0.006	0.005	NA
Color	White, yellow, black, red, blue	White, yellow, black, red, blue	NA
LPI	Yes	Yes	Yes
Inkjet	Yes		
Fabrication			
Rout		T	
Diameter Router Bits Available	0.8~2.0 mm		
Edge to Edge Tolerance	+/-0.004	+/-0.004	+/-0.004
Score			
Score Angles	+/-5	+/-5	NA
Positional Tolerance to Datum	+/-0.005	+/-0.004	NA
Front to Back Tolerance Remaining Web Tolerance	+/-0.004	+/-0.004	NA
Bevel			
Bevel Angles	20, 30,45	20, 30,45	NA
Depth Tolerance	+/-0.004	+/-0.004	NA
Electrical Test & Performance			
Min. Component Pitch	0.015	0.015	NA
Max. Test Voltage	300V for Manson machine,250V for Emmaflying probe	300V for Manson machine,250V for Emmaflying probe	NA
Max. Isolation Resistance	100ΜΩ	100ΜΩ	NA
Min. Continuity Resistance	20Ω max.	20Ω max.	NA
Hi Pot Test (Machine Capability)	Yes		
Impedance Tolerance 51-100 ohms	+/-8% for >75um line width.+/-	 +/-8% for >75um line width,+/-	+/-8% for >75um line width.+/-
Impedance Tolerance 28-50 Ohms	+/-4ohm for >75um line width,	+/-4ohm for >75um line width,	+/-4ohm for >75um line width,
DC Resistance Testing	Micro resistance meter		
Kelvin Test	4 wire tester		
Signal Loss measurement			
Latent Test	0	-4:-1	
	Company Confide		

TTM Technologies	SME			
Time-To-Market Interconnect Solutions	Standard	Advanced	Development	
Physical Characteristics				
Min. Board Thickness	0.018" (10L anylayer)	0.018" (10L anylayer)	0.016" (10L anylayer)	
Max Board Thickness - All Finishes	0.157"	0.157"	0.157"	
Thickness Tolerance	+/-10% for >0.8mm board	+/-10% for >0.8mm board	+/-10% for >0.8mm board	
Through Hole Aspect Ratio	4.67:1 for 0.15 mm	4.67:1 for 0.15 mm	4.67:1 for 0.15 mm	
Bow and Twist (Balanced)	0.7%	0.5%	NA	
Panel Sizes	22"x19"	22"x19"	22"x19"	
Technology				
Microvias	Yes	Yes	Yes	
Blind Vias	Yes	Yes	Yes	
Buried Vias	Yes	Yes	Yes	
Thin Core Pwr/Gnd				
Buried Resistor	Distributed	Distributed	Distributed	
Inner Layers				
Minimum Line/Space				
H oz	0.002"/0.002"	0.0016"/0.0018"	0.0016"/0.0016	
1 oz	0.0035"/0.0035"	0.003"/0.003"	NA	
2 oz	0.006"/0.006"	0.0055"/0.0055"	NA	
3 oz				
4 oz				
5 oz				
Feature Tolerance 1/2 - 1 oz				
Feature Tolerance 2 - 5 oz				
Innerlayer Cu to Edge				
PTH (DHS) to Copper (Drill to Copper)	0.008"	0.007"	NA	
NPT Hole/Slot to Copper, Second Drill	0.005"	0.004"	NA	
Antipad Size	DHS+0.016"	DHS+0.014"	NA	
Annular Ring Requirements for Drilled Holes				
Tangency	DHS+0.016"	DHS+0.016"	NA	
1 mil Annular Ring	DHS+0.018"	DHS+0.018"	NA	
Outer Layers				
Minimum Line/Space				
3/8 oz Base	0.0016"/0.002"	0.0016"/0.002"	0.0016"/0.0016"	
1/2 oz Base	0.003"/0.003"	0.003"/0.003"	NA	
1 oz Base	0.005"/0.005"	0.005"/0.005"	NA	
2 oz Base	1			
3 oz Base				
oz Base				
5 oz Base				
Feature Attributes	0.000"	0.007"		
PTH to Copper	0.008"	0.007"	NA NA	
NPT Hole/Slot to Copper	0.005"	0.004"	NA	
Rout to O/L Copper				
Score to O/L Copper				

TTM Technologies	SME			
Time-To-Market Interconnect Solutions™	Standard	Advanced	Development	
Drill				
Min. Drill Size	0.004	0.004	0.004	
Min. Blind Drill Hole Size (Controlled Depth Drilling)	NA	NA	NA	
Min. Slot Width - Std.	0.016	0.016	NA	
Min. Positional Tolerance	0.003	0.002	NA	
Min. PTH Tolerance (Primary Drill)	0.003	0.002	NA	
Min. Tolerance of Plated Cut Out Counter Bore/Sink Tolerance	0.008	0.004	NA	
Max. NPT (hole/slot) in Primary Drill Backdrill Size Over Primary Drill	Slot length: (0.7 ~ 10+W) mm	Slot length: (0.7 ~ 10+W) mm	NA	
Backdrill Stub Length	NA	NA	NA	
<u> </u>	IVA	IVA	INA	
Microvia	0.000	0.000	0.000	
Laser via diameter Capture/Target pads	0.0024	0.0024	0.002	
capture/ rarget pads				
Aspect Ratio	0.8:1	0.8:1	0.8:1	
Layer Build Up	Yes	Yes	Yes	
Layer Build Up	Yes	Yes	Yes	
+ Layer Build Up	Yes	Yes	Yes	
+ Layer Build Up	Yes	Yes	Yes	
AnyLayer B : 17	Yes	Yes	Yes	
aser Via Stacked on Buried Via	Yes Yes	Yes Yes	Yes Yes	
Skip Via (ex 1-3) /ia in Pad (through hole)	fes	res	res	
Non-Conductive Via Fill	Yes	Yes	Yes	
ine width and Spacing (wrap)		100		
Microvia Non-Conductive Via Fill	Yes	Yes	Yes	
Conductive Via Fill	Yes	Yes	Yes	
aser Direct Imaging	Yes	Yes	Yes	
Plating/Surface Finish				
lasl .	Outsource	Outsource	Outsource	
mmersion Gold (ENIG)	Yes	Yes	Yes	
mmersion Ni/Pd/Au	Outsource	Outsource	Outsource	
lectrolytic Ni/Au Tab Plating	Yes	Yes	Yes	
lectrolytic Ni/Au (Hard Gold)	Yes	Yes	Yes	
Organic Solderability Preservative	Yes	Yes	Yes	
mmersion Silver	Yes	Yes	Yes	
mmersion Tin	Yes	Yes	Yes	
elective ENIG or ENEPIG	Outsource	Outsource	Outsource	
Virebondable Soft Au	NA	NA	NA	
OSP + Electroplate Ni-Au	Yes	Yes	Yes	
used Tin/Lead	NA	NA	NA	

	SME			
TTM Technologies	O	- 	5 1 .	
Time-To-Market Interconnect Solutions	Standard	Advanced	Development	
Soldermask				
Туре	LPI	LPI	NA	
Colors	Green, matte green, black, red, blue, matte black, purple, white	Green, matte green, black, red, blue, matte black, purple, white	NA	
Thickness	10um min on conductor surface; 5um min on isolated conductor surface; 4um min for conductor corner; 15um min for copper GND	10um min on conductor surface; 10um min on isolated conductor surface	NA	
3/8 - 1 oz Base Copper				
Min. Web Min. Clearance	0.005	0.005	NA	
Legend	0.005	0.005	INA	
Text Width	0.005 (negative) or 0.004 (positve)	0.005 (negative) or 0.004 (positve)	NA	
Color	White, yellow, black	White, yellow, black	NA	
LPI Inkjet	NA	NA	NA	
Fabrication		L		
Rout				
Diameter Router Bits Available	0.8~2.0 mm			
Edge to Edge Tolerance	+/-0.004	+/-0.004	+/-0.004	
Score		1		
Score Angles	+/-3	+/-2	NA	
Positional Tolerance to Datum	+/-0.005	+/-0.004	NA	
Front to Back Tolerance Remaining Web Tolerance	+/-0.004	+/-0.004	NA	
Bevel				
Bevel Angles	20~45	20~45	NA	
Depth Tolerance	+/-0.004	+/-0.004	NA	
Electrical Test & Performance				
Min. Component Pitch	0.012	0.012	NA	
Max. Test Voltage	200V	200V	NA	
Max. Isolation Resistance	50MΩ for 2-wire machine,100MΩ for 4-wire machine	50MΩ for 2-wire machine,100MΩ for 4-wire machine	NA	
Min. Continuity Resistance	$500M\Omega$ max. for 2-wire machine1- $100K\Omega$ for 4-wire machine	500MΩ max. for 2-wire machine1-100KΩ for 4-wire machine	NA	
Hi Pot Test (Machine Capability)	Yes			
Impedance Tolerance 51-100 ohms	+/-8% for >75um line width,+/-	+/-8% for >75um line width,+/-	+/-8% for >75um line width,+/-	
Impedance Tolerance 28-50 Ohms	+/-4ohm for >75um line width,	+/-4ohm for >75um line width,	+/-4ohm for >75um line width,	
DC Resistance Testing	Micro resistance meter			
Kelvin Test	4 wire tester			
Signal Loss measurement				
Latent Test	Company Confide	ntial		
	Company Confide Subject to Nondisclosure Agre			

TTM Technologies	DMC		
Time-To-Market Interconnect Solutions*	Standard	Advanced	Development
Physical Characteristics			
Min. Board Thickness	0.020"	0.016"	0.016"
Max Board Thickness - All Finishes	0.315"	0.315"	0.315"
Thickness Tolerance	+/-10% for >0.8mm board	+/-10% for >0.8mm board	+/-8% for >0.8mm board
Through Hole Aspect Ratio	13:1 (line card)	13:1 (line card)	15:1 (line card)
Bow and Twist (Balanced)	0.7%	0.5%	NA
Panel Sizes	40" x22"	40" x22"	40" x22"
Technology			
Microvias	Yes	Yes	Yes
Blind Vias	Yes	Yes	Yes
Buried Vias	Yes	Yes	Yes
Thin Core Pwr/Gnd			
Buried Resistor	No	No	No
Inner Layers			
Minimum Line/Space			
H oz	0.003"/0.0035"	0.003"/0.003"	0.003"/0.003"
1 oz	0.004"/0.004"	0.0035"/0.003"	NA
2 oz	0.006"/0.006"	0.006"/0.006"	NA NA
3 oz	0.008"/0.008"	0.008"/0.008"	NA NA
4 oz	0.000 70.000	0.000 70.000	101
5 oz			
Feature Tolerance 1/2 - 1 oz			
Feature Tolerance 2 - 5 oz			
· · · · · · · · · · · · · · · · · · ·			
Innerlayer Cu to Edge			
	0.008"	0.007"	NA
Innerlayer Cu to Edge	0.008" 0.008"	0.007" 0.006"	NA NA
Innerlayer Cu to Edge PTH (DHS) to Copper (Drill to Copper) NPT Hole/Slot to Copper, Second Drill Antipad Size			
Innerlayer Cu to Edge PTH (DHS) to Copper (Drill to Copper) NPT Hole/Slot to Copper, Second Drill	0.008"	0.006"	NA
Innerlayer Cu to Edge PTH (DHS) to Copper (Drill to Copper) NPT Hole/Slot to Copper, Second Drill Antipad Size Annular Ring Requirements for Drilled Holes < Tangency	0.008" DHS+0.016" DHS+0.020"	0.006" DHS+0.014" DHS+0.016"	NA
Innerlayer Cu to Edge PTH (DHS) to Copper (Drill to Copper) NPT Hole/Slot to Copper, Second Drill Antipad Size Annular Ring Requirements for Drilled Holes < Tangency 1 mil Annular Ring	0.008" DHS+0.016"	0.006" DHS+0.014"	NA NA
Innerlayer Cu to Edge PTH (DHS) to Copper (Drill to Copper) NPT Hole/Slot to Copper, Second Drill Antipad Size Annular Ring Requirements for Drilled Holes < Tangency 1 mil Annular Ring Outer Layers	0.008" DHS+0.016" DHS+0.020"	0.006" DHS+0.014" DHS+0.016"	NA NA NA
Innerlayer Cu to Edge PTH (DHS) to Copper (Drill to Copper) NPT Hole/Slot to Copper, Second Drill Antipad Size Annular Ring Requirements for Drilled Holes < Tangency 1 mil Annular Ring Outer Layers	0.008" DHS+0.016" DHS+0.020"	0.006" DHS+0.014" DHS+0.016"	NA NA NA
Innerlayer Cu to Edge PTH (DHS) to Copper (Drill to Copper) NPT Hole/Slot to Copper, Second Drill Antipad Size Annular Ring Requirements for Drilled Holes < Tangency 1 mil Annular Ring Outer Layers Minimum Line/Space	0.008" DHS+0.016" DHS+0.020"	0.006" DHS+0.014" DHS+0.016"	NA NA NA
Innerlayer Cu to Edge PTH (DHS) to Copper (Drill to Copper) NPT Hole/Slot to Copper, Second Drill Antipad Size Annular Ring Requirements for Drilled Holes < Tangency 1 mil Annular Ring Outer Layers Minimum Line/Space 3/8 oz Base	0.008" DHS+0.016" DHS+0.020" DHS+0.022"	0.006" DHS+0.014" DHS+0.016" DHS+0.018" 0.003"/0.0035"	NA NA NA NA
Innerlayer Cu to Edge PTH (DHS) to Copper (Drill to Copper) NPT Hole/Slot to Copper, Second Drill Antipad Size Annular Ring Requirements for Drilled Holes < Tangency 1 mil Annular Ring Outer Layers Minimum Line/Space 3/8 oz Base 1/2 oz Base	0.008" DHS+0.016" DHS+0.020" DHS+0.022" 0.0035"/0.0035"	0.006" DHS+0.014" DHS+0.016" DHS+0.018" 0.003"/0.0035" 0.004"/0.004"	NA NA NA NA 0.003"/0.003"
Innerlayer Cu to Edge PTH (DHS) to Copper (Drill to Copper) NPT Hole/Slot to Copper, Second Drill Antipad Size Annular Ring Requirements for Drilled Holes < Tangency 1 mil Annular Ring Outer Layers Minimum Line/Space 3/8 oz Base 1/2 oz Base 1 oz Base	0.008" DHS+0.016" DHS+0.020" DHS+0.022" 0.0035"/0.0035" 0.004"/0.004"	0.006" DHS+0.014" DHS+0.016" DHS+0.018" 0.003"/0.0035"	NA NA NA NA 0.003"/0.003"
Innerlayer Cu to Edge PTH (DHS) to Copper (Drill to Copper) NPT Hole/Slot to Copper, Second Drill Antipad Size Annular Ring Requirements for Drilled Holes < Tangency 1 mil Annular Ring Outer Layers Minimum Line/Space 3/8 oz Base 1/2 oz Base 1 oz Base 2 oz Base	0.008" DHS+0.016" DHS+0.020" DHS+0.022" 0.0035"/0.0035" 0.004"/0.004" 0.005"/0.005"	0.006" DHS+0.014" DHS+0.016" DHS+0.018" 0.003"/0.0035" 0.004"/0.004" 0.005"/0.005"	NA NA NA NA 0.003"/0.003" NA NA
Innerlayer Cu to Edge PTH (DHS) to Copper (Drill to Copper) NPT Hole/Slot to Copper, Second Drill Antipad Size Annular Ring Requirements for Drilled Holes < Tangency 1 mil Annular Ring Outer Layers Minimum Line/Space 3/8 oz Base 1/2 oz Base 1 oz Base 2 oz Base 3 oz Base	0.008" DHS+0.016" DHS+0.020" DHS+0.022" 0.0035"/0.0035" 0.004"/0.004" 0.005"/0.005"	0.006" DHS+0.014" DHS+0.016" DHS+0.018" 0.003"/0.0035" 0.004"/0.004" 0.005"/0.005"	NA NA NA NA 0.003"/0.003" NA NA
Innerlayer Cu to Edge PTH (DHS) to Copper (Drill to Copper) NPT Hole/Slot to Copper, Second Drill Antipad Size Annular Ring Requirements for Drilled Holes < Tangency 1 mil Annular Ring Outer Layers Minimum Line/Space 3/8 oz Base 1/2 oz Base 1 oz Base 2 oz Base 3 oz Base 4 oz Base	0.008" DHS+0.016" DHS+0.020" DHS+0.022" 0.0035"/0.0035" 0.004"/0.004" 0.005"/0.005"	0.006" DHS+0.014" DHS+0.016" DHS+0.018" 0.003"/0.0035" 0.004"/0.004" 0.005"/0.005"	NA NA NA NA 0.003"/0.003" NA NA
Innerlayer Cu to Edge PTH (DHS) to Copper (Drill to Copper) NPT Hole/Slot to Copper, Second Drill Antipad Size Annular Ring Requirements for Drilled Holes < Tangency 1 mil Annular Ring Outer Layers Minimum Line/Space 3/8 oz Base 1/2 oz Base 1 oz Base 2 oz Base 3 oz Base 4 oz Base 5 oz Base	0.008" DHS+0.016" DHS+0.020" DHS+0.022" 0.0035"/0.0035" 0.004"/0.004" 0.005"/0.005"	0.006" DHS+0.014" DHS+0.016" DHS+0.018" 0.003"/0.0035" 0.004"/0.004" 0.005"/0.005"	NA NA NA NA 0.003"/0.003" NA NA
Innerlayer Cu to Edge PTH (DHS) to Copper (Drill to Copper) NPT Hole/Slot to Copper, Second Drill Antipad Size Annular Ring Requirements for Drilled Holes < Tangency 1 mil Annular Ring Outer Layers Minimum Line/Space 3/8 oz Base 1/2 oz Base 1 oz Base 2 oz Base 3 oz Base 4 oz Base 5 oz Base Feature Attributes	0.008" DHS+0.016" DHS+0.020" DHS+0.022" 0.0035"/0.0035" 0.004"/0.004" 0.005"/0.005" 0.008"/0.008"	0.006" DHS+0.014" DHS+0.016" DHS+0.018" 0.003"/0.0035" 0.004"/0.004" 0.005"/0.005" 0.008"/0.008"	NA NA NA NA 0.003"/0.003" NA NA NA
Innerlayer Cu to Edge PTH (DHS) to Copper (Drill to Copper) NPT Hole/Slot to Copper, Second Drill Antipad Size Annular Ring Requirements for Drilled Holes < Tangency 1 mil Annular Ring Outer Layers Minimum Line/Space 3/8 oz Base 1/2 oz Base 1 oz Base 2 oz Base 3 oz Base 4 oz Base 5 oz Base Feature Attributes PTH to Copper	0.008" DHS+0.016" DHS+0.020" DHS+0.022" 0.0035"/0.0035" 0.004"/0.004" 0.005"/0.005" 0.008"/0.008"	0.006" DHS+0.014" DHS+0.016" DHS+0.018" 0.003"/0.0035" 0.004"/0.004" 0.005"/0.005" 0.008"/0.008"	NA NA NA NA 0.003"/0.003" NA NA NA
Innerlayer Cu to Edge PTH (DHS) to Copper (Drill to Copper) NPT Hole/Slot to Copper, Second Drill Antipad Size Annular Ring Requirements for Drilled Holes < Tangency 1 mil Annular Ring Outer Layers Minimum Line/Space 3/8 oz Base 1/2 oz Base 1 oz Base 2 oz Base 3 oz Base 4 oz Base 5 oz Base	0.008" DHS+0.016" DHS+0.020" DHS+0.022" 0.0035"/0.0035" 0.004"/0.004" 0.005"/0.005" 0.008"/0.008"	0.006" DHS+0.014" DHS+0.016" DHS+0.018" 0.003"/0.0035" 0.004"/0.004" 0.005"/0.005" 0.008"/0.008"	NA NA NA NA 0.003"/0.003" NA NA NA

TTM Technologies	DMC		
Time-To-Market Interconnect Solutions™	Standard	Advanced	Development
Drill			
Min. Drill Size	0.008	0.008	0.008
Min. Blind Drill Hole Size (Controlled Depth Drilling)	0.018	0.016	NA
Min. Slot Width - Std.	0.020	0.016	NA
Min. Positional Tolerance	0.003	0.002	NA
Min. PTH Tolerance (Primary Drill)	0.003	0.002	NA
Min. Tolerance of Plated Cut Out Counter Bore/Sink Tolerance	0.008	0.006	NA
Max. NPT (hole/slot) in Primary Drill	Slot length: (0.7 ~ 10+W) mm	Slot length: (0.7 ~ 10+W) mm	NA
Backdrill Size Over Primary Drill			
Backdrill Stub Length	0.009+/-0.007	0.007+/-0.005	NA
Microvia			
Laser via diameter	0.005	0.005	0.005
Capture/Target pads			
Aspect Ratio	0.6:1 for 1+ laser,0.66:1 for skip via	0.6:1 for 1+ laser,0.66:1 for skip via	0.6:1 for 1+ laser,0.66:1 for skip via
1 Layer Build Up	Yes	Yes	Yes
2 Layer Build Up	only for Skip via	only for Skip via	only for Skip via
3+ Layer Build Up	No	No	No
4+ Layer Build Up	No	No	No
AnyLayer	No	No	No
Laser Via Stacked on Buried Via	No	No	No
Skip Via (ex 1-3)	Yes	Yes	Yes
Via in Pad (through hole) Non-Conductive Via Fill	Yes	Yes	Yes
Line width and Spacing (wrap)	165	165	103
Microvia Non-Conductive Via Fill	Yes	Yes	Yes
Conductive Via Fill	Yes	Yes	Yes
Laser Direct Imaging	NA	NA	NA
Plating/Surface Finish			
HASL	Yes (none lead free)	Yes (none lead free)	Yes (none lead free)
Immersion Gold (ENIG)	Yes	Yes	Yes
Immersion Ni/Pd/Au	NA	NA	NA
Electrolytic Ni/Au Tab Plating	Yes	Yes	Yes
Electrolytic Ni/Au (Hard Gold)	Yes	Yes	Yes
Organic Solderability Preservative	Yes	Yes	Yes
Immersion Silver	Yes	Yes	Yes
Immersion Tin	Yes	Yes	Yes
Selective ENIG or ENEPIG	NA	NA	NA
Wirebondable Soft Au	Yes	Yes	Yes
OSP + Electroplate Ni-Au	, Selective hard gold, Soft Gold	Gold Finger Selective hard	Gold Finger, Selective hard gold, Soft Gold, Flash Gold
Fused Tin/Lead	NA	NA	NA

TTRA Tochmologica	DMC		
TTM Technologies Time-To-Market Interconnect Solutions**	Standard	Advanced	Development
Soldermask			
Туре	LPI	LPI	NA
Colors	Glossy green, matte geeen,black, red, blue, matte black	Glossy green, matte geeen,black, red, blue, matte black	NA
Thickness	10um min on conductor surface; 5um min on isolated conductor surface; 4um min for conductor corner; 15um min for copper GND	13um min on conductor surface; 5um min on isolated conductor surface; 4um min for conductor corner; 15um min for copper GND	NA
3/8 - 1 oz Base Copper			
Min. Web	0.005	0.005	NIA
Min. Clearance	0.005	0.005	NA
Legend Text Width	0.005	0.004	NA
Color LPI	White, yellow, black	White, yellow, black	NA NA
Inkjet	NA NA	INA	INA
Fabrication			
Rout			
Diameter Router Bits Available	0.8~2.0 mm		
Edge to Edge Tolerance	+/-0.004	+/-0.004	+/-0.004
Score			
Score Angles	+/-5	+/-5	NA
Positional Tolerance to Datum	+/-0.005	+/-0.004	NA
Front to Back Tolerance	+/-0.004	+/-0.002	NA
Remaining Web Tolerance			
Bevel Bevel Angles	19~45	19~45	NA
Depth Tolerance	+/-0.005	+/-0.004	NA NA
Electrical Test & Performance			
Min. Component Pitch	0.010 for fly probe, 0.015 for fixture	0.010 for fly probe, 0.015 for fixture	NA
Max. Test Voltage	300V for Manson and ATG fly probe machine,250V for Emmaflying probe		NA
Max. Isolation Resistance	100ΜΩ	100ΜΩ	NA
Min. Continuity Resistance	20Ω max	20Ω max	NA
Hi Pot Test (Machine Capability)	Yes		
Impedance Tolerance 51-100 ohms	+/-8% for >75um line width	+/-8% for >75um line width	+/-8% for >75um line width
Impedance Tolerance 28-50 Ohms	+/-4ohm for >75um line width	+/-4ohm for >75um line width	+/-4ohm for >75um line width
DC Resistance Testing	Micro resistance meter		
Kelvin Test	4 wire tester		
Signal Loss measurement	SPP		
Latent Test	Co	ndial	
	Company Confidential Subject to Nondisclosure Agreement with TTM		

TTM Technologies			
Time-To-Market Interconnect Solutions**	Standard	Advanced	Development
Physical Characteristics			
Min. Board Thickness	0.021" (10L anylayer)	0.021" (10L anylayer)	0.018" (10L anylayer)
Max Board Thickness - All Finishes	0.126"	0.157"	0.157"
Thickness Tolerance	+/-10% for >0.8mm board	+/-10% for >0.8mm board	+/-10% for >0.8mm board
Through Hole Aspect Ratio	5:1 for 0.15 mm	5:1 for 0.15 mm	5:1 for 0.15 mm
Bow and Twist (Balanced)	0.7%	0.5%	NA
Panel Sizes	22"x19"	22"x19"	22"x19"
Technology			
Microvias	Yes	Yes	Yes
Blind Vias	Yes	Yes	Yes
Buried Vias	Yes	Yes	Yes
Thin Core Pwr/Gnd			
Buried Resistor	No	No	No
Inner Layers			
Minimum Line/Space			
H oz	0.002"/0.002"	0.0016"/0.0016"	0.0016"/0.0016"
1 oz	0.003"/0.003"	0.003"/0.003"	NA
2 oz	0.003"/0.005"	0.003"/0.005	NA
3 oz	0.004"/0.007"	0.004"/0.007"	NA
4 oz			
5 oz			
Feature Tolerance 1/2 - 1 oz			
Feature Tolerance 2 - 5 oz			
Innerlayer Cu to Edge			
PTH (DHS) to Copper (Drill to Copper)	0.008"	0.007"	NA
NPT Hole/Slot to Copper, Second Drill	0.006"	0.006"	NA
Antipad Size	DHS+0.016"	DHS+0.014"	NA
Annular Ring Requirements for Drilled Holes <			
Tangency	DHS+0.016"	DHS+0.016"	NA
1 mil Annular Ring	DHS+0.018"	DHS+0.018"	NA
Outer Layers			
Minimum Line/Space			
3/8 oz Base	0.0016"/0.002"	0.0016"/0.002"	0.0016"/0.0016"
1/2 oz Base	0.003"/0.003"	0.003"/0.003"	NA NA
1 oz Base	0.005"/0.005"	0.005"/0.005"	NA NA
2 oz Base			
3 oz Base			
4 oz Base			
5 oz Base	 		
Feature Attributes			
PTH to Copper	0.008"	0.007"	NA
NPT Hole/Slot to Copper	0.006"	0.007	NA NA
Rout to O/L Copper	0.000	0.000	INA
Score to O/L Copper			
ocore to O/L Copper			

TTM Technologies	GME		
Time-To-Market Interconnect Solutions	Standard	Advanced	Development
Drill			
Min. Drill Size	0.006	0.006	0.004
Min. Blind Drill Hole Size (Controlled Depth Drilling)	0.018	0.016	NA
Min. Slot Width - Std.	0.020	0.016	NA
Min. Positional Tolerance	0.003	0.002	NA
Min. PTH Tolerance (Primary Drill)	0.003	0.002	NA
Min. Tolerance of Plated Cut Out			
Counter Bore/Sink Tolerance	0.010	0.008	NA
Max. NPT (hole/slot) in Primary Drill	Slot length: (0.7 ~ 10+W) mm	Slot length: (0.7 ~ 10+W) mm	NA
Backdrill Size Over Primary Drill			
Backdrill Stub Length	nomial +/- 0.005, or 0.002 min.	0.002 min.	NA
Microvia			
Laser via diameter	0.003	0.003	0.0024
Capture/Target pads			
Aspect Ratio	0.8:1	0.8:1	0.8:1
1 Layer Build Up	Yes	Yes	Yes
2 Layer Build Up	Yes	Yes	Yes
3+ Layer Build Up	Yes	Yes	Yes
4+ Layer Build Up	Yes	Yes	Yes
AnyLayer	Yes	Yes	Yes
Laser Via Stacked on Buried Via	Yes	Yes	Yes
Skip Via (ex 1-3)	Yes	Yes	Yes
Via in Pad (through hole)			.,
Non-Conductive Via Fill Line width and Spacing (wrap)	Yes	Yes	Yes
Microvia Non-Conductive Via Fill	Yes	Yes	Yes
Conductive Via Fill	Yes	Yes	Yes
Laser Direct Imaging	Yes	Yes	Yes
Plating/Surface Finish			
HASL	Outsource	Outsource	Outsource
Immersion Gold (ENIG)	Yes	Yes	Yes
Immersion Ni/Pd/Au	NA	NA	NA
Electrolytic Ni/Au Tab Plating	Yes	Yes	Yes
Electrolytic Ni/Au (Hard Gold)	Yes	Yes	Yes
Organic Solderability Preservative	Yes	Yes	Yes
mmersion Silver	Yes	Yes	Yes
mmersion Tin	NA	NA	NA
Selective ENIG or ENEPIG	NA	NA	NA
Wirebondable Soft Au	NA	NA	NA
OSP + Electroplate Ni-Au	Yes	Yes	Yes
Fused Tin/Lead	NA	NA	NA
		·	

TTM Technologies	GME		
Time-To-Market Interconnect Solutions	Standard	Advanced	Development
Soldermask			
Туре	LPI	LPI	NA
Colors	Green, matte green, black, blue, red, matte black	Green, matte green, black, blue, red, matte black	NA
Thickness	10um min on conductor surface; 5um min on isolated conductor surface; 15um min for copper GND	10um min on conductor surface; 5um min on isolated conductor surface; 15um min for copper GND	NA
3/8 - 1 oz Base Copper			
Min. Web	0.005	0.005	NIA
Min. Clearance Legend	0.005	0.005	NA
Text Width	0.005	0.004	NA
Color	White, yellow, black	White, yellow, black	NA
LPI	Yes	Yes	Yes
Inkjet	100	100	100
Fabrication			
Rout			
Diameter Router Bits Available	0.8~2.0 mm		
Edge to Edge Tolerance	+/-0.004	+/-0.004	+/-0.004
Score			
Score Angles	+/-5	+/-5	NA
Positional Tolerance to Datum	+/-0.005	+/-0.004	NA NA
Front to Back Tolerance Remaining Web Tolerance	+/-0.004	+/-0.004	NA NA
Bevel			
Bevel Angles	15~45	15~45	NA
Depth Tolerance	+/-0.005	+/-0.004	NA
Electrical Test & Performance			
Min. Component Pitch	0.012	0.012	NA
Max. Test Voltage	250V for LM/ATG/EMMA fly probe machine,300V for Mason machine.	250V for LM/ATG/EMMA fly probe machine,300V for Mason machine.	NA
Max. Isolation Resistance	100ΜΩ	100ΜΩ	NA
Min. Continuity Resistance	1Ω-10kΩ	1Ω-10kΩ	NA
Hi Pot Test (Machine Capability)	Yes		
Impedance Tolerance 51-100 ohms	+/-8% for >75um line width,+/-	+/-8% for >75um line width,+/-	
Impedance Tolerance 28-50 Ohms	+/-4ohm for >75um line width,	+/-4ohm for >75um line width,	+/-4ohm for >75um line width,
DC Resistance Testing	Micro resistance meter		
Kelvin Test	4 wire tester		
Signal Loss measurement	VNA		
Latent Test	Company	nfidential	
	Company Co Subject to Nondisclosure		