Cu/Polyimide hybrid 12µm Copper, version5

Normalise to 74.6 x 21 mm^2 = **1566.6**

Item	No. off	Basic x (mm)	Basic y (mm)	Basic area	Less area	Actual area	Scaled area	Thickness (mm)	Thickness mea (mm)	Scaled thickness	X0 (mm)	Rad len (%)	Density (g/cm^3)	Weight (gm)	Summed weight (gm)	Measured weight (gm)
Main hybrids (2-in-1)	2	74.6	21			1566.6		0.267	0.233	0.2203	86.13	0.621		1.681	2.03	2.04
Gold flash(0.4µm)	2	74.6	21	1566.6	881	686	0.438	0.000		0.0002	3.35	0.010	19.3	0.011		
Nickel plating(2µm)	2	74.6	21	1566.6	881	686	0.438	0.002		0.0009	14.7	0.012	8.845	0.024		
Photoresist (20µ) layer	2	74.6	21	1566.6	567	1000	0.638	0.020		0.0128	357.5	0.007	1.136	0.045		
L1:Copper(12µm)+TH-plating(13µm) (60% hash)	2	74.6	21	1566.6	881	686	0.438	0.025		0.0109	14.3	0.153	8.93	0.306		
Polyimide+adhesive (25µ+25µ) layer	2	74.6	21	1566.6	0	1567	1.000	0.050		0.0500	357.5	0.028	1.136	0.178		
L2:Copper tracking(12µm)	2	74.6	21	1566.6	1268	298	0.190	0.012		0.0023	14.3	0.032	8.93	0.064		
Polyimide layer (25µ)	2	74.6	21	1566.6	0	1567	1.000	0.025		0.0250	357.5	0.014	1.136	0.089		
L3:Copper gnd plane(12µm)	2	74.6	21	1566.6	112	1455	0.929	0.012		0.0111	14.3	0.156	8.93	0.312		
Polyimide+adhesive (25µ+25µ) layer	2	74.6	21	1566.6	0	1567	1.000	0.050		0.0500	357.5	0.028	1.136	0.178		
L4:Copper(12µm)+TH-plating(13µm) (60% hash)	2	74.6	21	1566.6	873	694	0.443	0.025		0.0111	14.3	0.155	8.93	0.310		
Polyimide cover+adhesive (13µ+33µ) layer	2	74.6	21	1566.6	0	1567	1.000	0.046		0.0460	357.5	0.026	1.136	0.164		
Interconnect	1	9	21			189		0.149	0.141	0.0173	90.43	0.020		0.058		
Polyimide+adhesive (25µ+25µ) layer	1	9	21	189.0	0	189	0.121	0.050		0.0060	357.5	0.002	1.136	0.011		
Copper tracking	1	9	21	189.0	72	117	0.075	0.012		0.0009	14.3	0.006	8.93	0.013		
Polyimide layer	1	9	21	187.1	0	187	0.119	0.025		0.0030	357.5	0.001	1.136	0.005		
Copper gnd plane	1	9	21	189.0	14	176	0.112	0.012		0.0013	14.3	0.009	8.93	0.019		
Polyimide+adhesive (25µ+25µ) layer	1	9	21	189.0	0	189	0.121	0.050		0.0060	357.5	0.002	1.136	0.011		
Pig tail	1	30	24.5			735		0.149	0.141	0.0658	87.78	0.080		0.228		
Polyimide+adhesive (25µ+25µ) layer	1	30	24.5	735.0	42	693	0.442	0.050		0.0221	357.5	0.006	1.136	0.039		
L2:Copper tracking(12µm)	1	30	24.5	735.0	192	543	0.347	0.012		0.0042	14.3	0.029	8.93	0.058		
Polyimide plane	1	30	24.5	735.0	42	693	0.442	0.025		0.0111	357.5	0.003	1.136	0.020		
L3:Copper gnd plane(12µm)	1	30	24.5	735.0	87	648	0.414	0.012		0.0050	14.3	0.035	8.93	0.069		
Polyimide/adhesive (25µ+25µ) layer	1	30	24.5	735.0	0	735	0.469	0.050		0.0235	357.5	0.007	1.136	0.042		
Connector pad	1	5	25			125		0.267		0.0173	110.15	0.019		0.060		
Gold flash(0.4µm)	1	5	25	125.0	80	45	0.029	0.000		0.0000	3.35	0.000	19.3	0.000		
Nickel plating(2µm)	1	5	25	125.0	80	45	0.029	0.002		0.0001	14.7	0.000	8.845	0.001		
Photoresist (20µ) layer	0	5	25	125.0	0	125	0.080	0.020		0.0016	357.5	0.000	1.136	0.000		
L1:Copper(12µm)+TH plating(13µm)	1	5	25	125.0	80	45	0.029	0.025		0.0007	14.3	0.005	8.93	0.010		
Polyimide/adhesive (25µ+25µ) layer	1	5	25	125.0	0	125	0.080	0.050		0.0040	357.5	0.001	1.136	0.007		
L2:Copper tracking (12µm)	1	5	25	125.0	105	20	0.013	0.012		0.0002	14.3	0.001	8.93	0.002		
Polyimide layer(25µm)	1	5	25	125.0	0	125	0.080	0.025		0.0020	357.5	0.001	1.136	0.004		
L3:Copper gnd plane (12µm)	1	5	25	125.0	75	50	0.032	0.012		0.0004	14.3	0.003	8.93	0.005		
Polyimide/adhesive (25µ+25µ) layer	1	5	25	125.0	0	125	0.080	0.050		0.0040	357.5	0.001	1.136	0.007		
L4:Copper(12µm)+TH plating (13µm)	1	5	25	125.0	80	45	0.029	0.025		0.0007	14.3	0.005	8.93	0.010		
Polyimide cover+adhesive (13µ+33µ) layer	2	5	25	125.0	0	125	0.080	0.046		0.0037	357.5	0.002	1.136	0.013		
Substrate	2	74.6	21			1566.6		0.337		0.3108	199.42	0.338		2.345		2.368
CC	2	74.6	21	1566.6	0	1567	1.000	0.300		0.3000	218.10	0.275	2.0385	1.916		
CC "step"	4	4	21	84.0	0	84	0.054	0.500		0.0268	218.10	0.049	2.0385	0.342		
Parylene top layer (10 µm)	2	74.6	21	1566.6	105	1462	0.933	0.010		0.0093	286	0.007	1.42	0.042		
Parylene bottom layer (10 µm)	2	74.6	21	1566.6	0	1567	1.000	0.010		0.0100	286	0.007	1.42	0.044		
Substrate-hybird adhesive	2	74.6	21			1566.6		0.100		0.0500	277.80	0.072		0.312		
Conductive adhesive (7% area)	2	74.6	21	1566.6	1462	105	0.067	0.050		0.0034	42.77	0.016	3.68	0.039		
Thermal adhesive (93% area)	2	74.6	21	1566.6	105	1462	0.933	0.050		0.0466	165.65	0.056	1.87	0.273		
Total	**1**					**1566.6**				**0.681**	**59.27**	**1.150**		**4.683**		

TPGBB/Cu/Polyimide/CC module

Item	No. off	Basic x (mm)	Basic y (mm)	Basic area	Less area	Actual area	Scaled area	Thickness (mm)	Thickness mea (mm)	Scaled thickness	X0 (mm)	Rad len (%)	Density [g/cm^3]	Mass (gm)	Measured weight (gm)	Measured weight (gm)
Normalise to 128 x 63.6 mm^2 =	**8140.8**															
Module																
Silicon sensors w/thermal adhesive	4									0.1425	93.10	0.612	2.35	10.891		**24.69**
Silicon sensors	4	64	63.6	4070	0	4070	0.500	0.285		0.1425	93.6	0.609	2.33	10.812		
Silicon sensor conductive adhesive	16	1.5	1.5	2.25	0	2.25	0.000	0.080		0.0000	43	0.001	3.10	0.009		24.77 +/- 0.15
Silicon sensor thermal adhesive	296	1.5	1.5	2.25	0	2.25	0.000	0.080		0.0000	250.00	0.003	1.31	0.070		(2004/9/24)
Baseboard w/BeO facings	1									0.3082	162.32	0.190	2.59	6.503	6.654	(out of 10 modules)
TPG baseboard	1	82.1	87.2	7159	1814.0	5345	0.657	0.380		0.2495	198.5371	0.126	2.20	4.471		
Epoxy film	2	82.1	87.2	7159	1814.0	5345	0.657	0.020		0.0131	300	0.009	1.20	0.257		
BeO facing (cooling-end)	2	59.975	16.6738	1000	32	968	0.119	0.250		0.0297	144	0.041	2.86	1.384		
BeO facing (far-end)	2	35.975	5.325	192	0	192	0.024	0.250		0.0059	144	0.008	2.86	0.274		
Dowell washers (Al)	2	5	5	25	3	22	0.003	1.000		0.0027	89	0.006	2.70	0.118		
Handling bushes (PEEK)	0	6	6	28	4	24	0.003	2.450		0.0073	319	0.000	1.30	0.000		
ASIC's w/conductive adhesive and w-bonds	12									0.0041	78.26	0.063	2.46	0.981		
FE amplifiers (ABCD3T)	12	8.4	6.6	55.44	0	55	0.007	0.500		0.0034	93.6	0.044	2.33	0.775	0.75	
FE amplifiers conductive adhesive	12	8.4	6.6	55.44	0	55	0.007	0.100		0.0007	43	0.019	3.10	0.206		
Al wire-bonds	5454	0.025	3	0.075	0	0.075	0.000	0.025		0.0000	89	0.001	2.70	0.028		
Hybrid w/passive compo's	1									0.1831	61.58	0.297	4.18	6.233	6.15	
Cu/Polyimide hybrid with substrate	1					1567	0.1924	0.681		0.1311	59.27	0.221		4.683		
Passive components	1									0.0520	68.31	0.076		1.550		
Pitch-adaptor glass	2	2.7	63	170	0	170	0.0209	0.250		0.0052	123	0.008	2.2	0.187	0.1808	
Pitch-adaptor tracks	2	2.7	63	170	119	51	0.0063	0.001		0.0000	89	0.000	2.7	0.000		
Pitch-adaptor-hybrid adhesive	2	2.7	63	170.1	0	170	0.0209	0.050		0.0010	250	0.001	1.2	0.020		
SMD 220nF (1608)	28	1.6	0.8	1.28	0.00	1.28	0.0002	0.800		0.0001	54.3	0.006	5.46	0.157	0.154	
SMD 330nF (3216)	8	3.2	1.6	5.12	0.00	5.12	0.0006	1.250		0.0008	54.3	0.012	5.46	0.280	0.264	
SMD 10nF (3216)	5	3.2	1.6	5.12	0.00	5.12	0.0006	1.250		0.0008	54.3	0.007	5.46	0.175	0.1615	
SMD resistors (1608)	8	1.6	0.8	1.28	0.00	1.28	0.0002	0.400		0.0001	63.3	0.001	4.68	0.019	0.0184	
SMD thermistors	2	1.6	0.8	1.28	0.00	1.28	0.0002	0.800		0.0001	58.5	0.000	5.07	0.010	0.0096	
Pigtail connector	1	25.4	3.05	77.47	0	77	0.0095	4.600		0.0438	291.0	0.015	1.625	0.579	0.578	
SMD soldering solders	80	1.6	0.8	1.28	0	1	0.0002	0.200		0.0000	10	0.025	6	0.123		
Hybrid-facing thermal adhesive	4	4	21	84	0	84	0.010	0.080		0.0008	250.00	0.001	1.31	0.035		
											Total =	**1.162**		**24.64**		
										Scaled by mass	**1.164**					