

PCB sector

AI server spec upgrades to drive upstream PCB material & equipment advancements

Neutral · Maintained

Key message

1. Low-roughness HVLP4 copper foil has emerged as the mainstream choice for AI servers, and Taiwanese supplier Co-Tech (8358 TT) is expected to benefit from this trend.
2. Fulltech Fiber Glass (1815 TT) and Taiwan Glass (1802 TT) will benefit as low dielectric loss glass fiber fabric (Low Dk) has become a standard configuration for AI servers.
3. With the upgrade in drill bits and precision cutting and drilling equipment, manufacturers such as Topoint Technology (8021 TT), Key Ware Electronics (5498 TT) and Ta Liang Technology (3167 TT) are likely to be major beneficiaries.

Event

By 2026F, transmission speeds are projected to reach 1.6 Tbps, placing increasingly stringent demands on insertion loss performance. To address these challenges, the industry is not only shortening trace lengths but also shifting toward the adoption of lower-loss materials. Key strategies include the use of ultra-low loss resins, selection of glass fiber fabrics with low dielectric constants (Dk) and dissipation factors (Df), and the transition to HVLP copper foil with minimized surface roughness. As a result, suppliers of copper foil, glass fiber fabric, drill bits, and drilling equipment are well-positioned to benefit from this technological shift.

Analysis

Low-roughness HVLP4 copper foil emerging as the mainstream for next-generation AI servers. Signal integrity in copper foil is primarily affected by the skin effect, and lower surface roughness (Rz) helps reduce interference. Among standard copper foil (STD), reversed-treated foil (RTF), and ultra-low profile foil (HVLP), their Rz specifications are $>5\mu\text{m}$, $1.3\text{--}5.0\mu\text{m}$, and $0.5\text{--}1.5\mu\text{m}$ respectively. Currently, HVLP 2-3 copper foil are the mainstream specification for AI servers, while HVLP4 is expected to become the next-generation mainstream by 2026F. We expect that by the end of 2025F, monthly HVLP4 capacity of Mitsui (JP) will come in at 250–300 metric tons, while that of Furukawa (JP), Fukuda (JP) and Circuit Foil Luxembourg (CN) will reach 100–150 metric tons, respectively. We estimate Co-Tech (8358 TT, NT\$214, NR) to have a capacity of 150–200 metric tons. We anticipate supply-demand tightness to emerge as GB200/ 300 and Trainium3 servers begin adopting HVLP3–4.

Low dielectric loss (low Dk) fiberglass cloth becomes standard configuration for AI servers. E-glass, low Dk1 & 2, low Dk3, and quartz cloth (Q-glass) have dielectric loss (Df) values at 10GHz of 0.007, 0.003–0.002, and <0.001 respectively. AI servers currently utilise low Dk1 & 2 as mainstream, while low Dk3 and Q-glass paired with M9 are used in the most advanced AI server configurations. Major supplier Nittobo (JP) is expected to ramp up production by 2Q26F. Taiwan Glass (1802 TT, NT\$34.3, NR) and Fulltech Fiber Glass (1815 TT, NT\$70.6, NR) have been certified and adopted by major Taiwanese CCL makers. Taiwan Glass, following Japan and the US, has become the third company to successfully develop Low Dk fiberglass cloth, and is expected to reach over 30% market share by the end of 2025F.

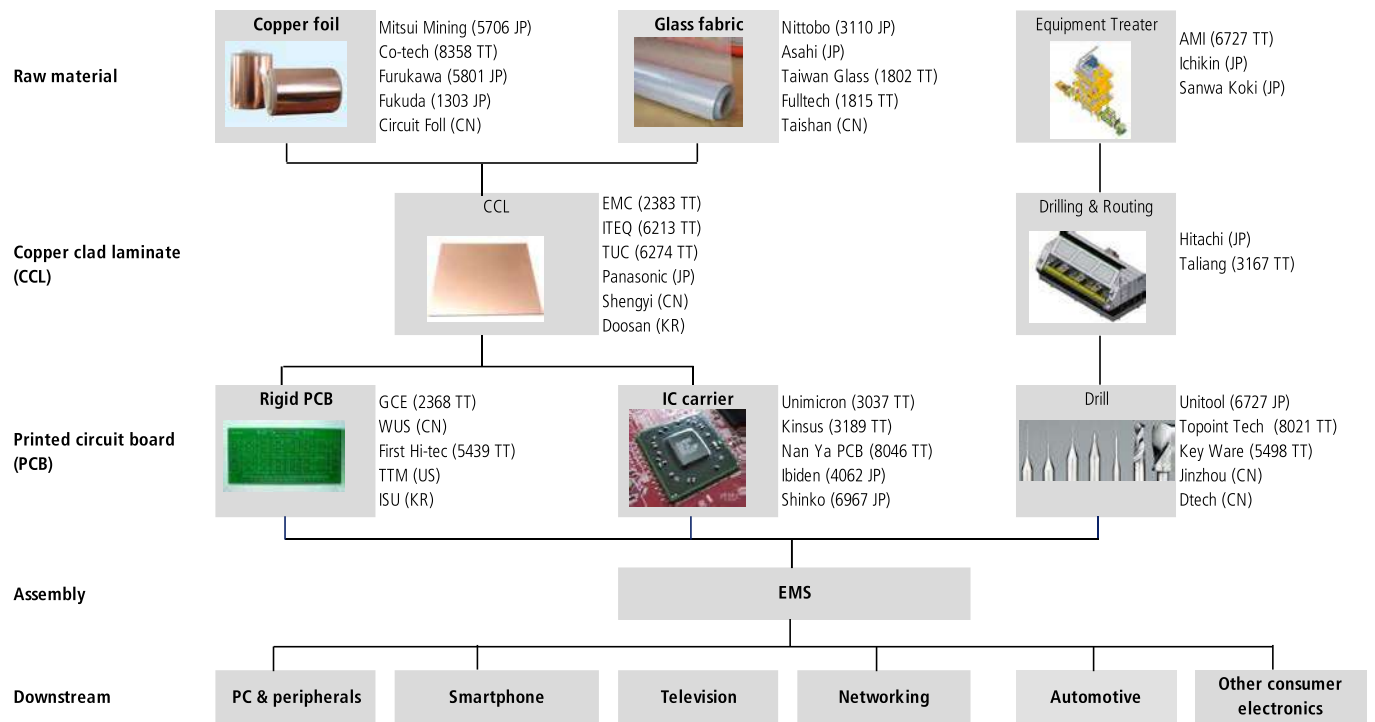
Drill bits and precision cutting & drilling equipment upgrades. The upgrades to high-speed PCB materials has driven increased demand for drill bits. The aspect ratio of drill bits has risen from 20x to 30-40x, significantly pushing up PCB processing difficulty and drill bit wear, thereby elevating the importance of coating technologies. Major global drill bit suppliers expected to benefit include Union Tool (JP), Topoint Technology (8021 TT, NT\$87.6, NR) and Key Ware Electronics (5498 TT, NT\$25.7, NR). Due to a sharp increase in back-drilling holes, to over 6,000 per board, along with the trend of upgrading precision cutting and drilling processes, forming machines and drilling equipment firms are expected to benefit significantly. Equipment supplier Ta Liang Technology (3167 TT, NT\$210.5, NR) is likely to be a major beneficiary.

Stocks for Action

Driven by the adoption of high-speed, multilayer, and advanced materials in AI servers, we believe that Taiwanese copper foil supplier Co-Tech, glass fiber fabric suppliers Fulltech Fiber Glass and Taiwan Glass, drill bits suppliers Topoint Technology and Key Ware Electronics, as well as cutting and drilling equipment manufacturer Ta Liang Technology, are well-positioned to benefit from this trend.

Risks

Disappointing market demand; sharper declines in ASP and margins.

Figure 1: AI server PCB raw materials & equipment supply chain


Source: KGI Research

Figure 2: Comparison of high-speed copper foil substrate product lines

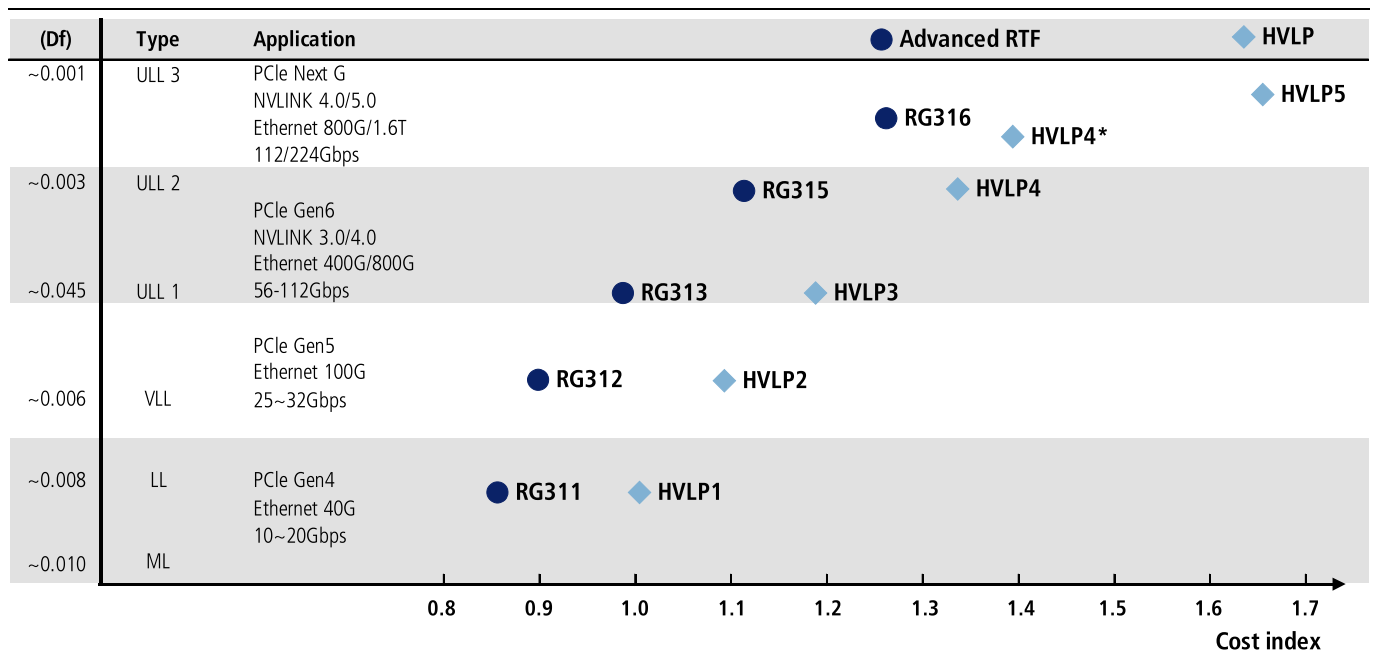
CCL Category	Dk @10Ghz	Df(10 ⁻³) @10Ghz	Elite	Dk @10Ghz	Df(10 ⁻³) @10Ghz	TUC	Dk @10Ghz	Df(10 ⁻³) @10Ghz	ITEQ
Extreme Low Loss PCIe 7.0 800G & 1.6T	2.8	0.7	896K3	3.0	0.7	953Q	2.93	0.7	999GSE3
	2.8	0.8	896K2	3.15	1.3/1.2	943 HN/HR	3.05	1.1	998GSE2
	2.8	1.7/1.3	892K/K2	3.15/3.16	1.4/1.3	943 SN/SR	3.14	1.3	998GSE
Ultra Low Loss PCIe 6.0 AI server & 400G	3.0/2.8	3.6/2.4	890/K	3.15	1.7	885 Sp	3.3	2.6	988GLSE
	3.1/2.9	3.8/2.5	626/K	3.16	2.1	933	3.3	2.6	988GSE
	3.2/3.0	4.5/3.3	891/K	3.17	1.8	883A Sp	3.63	3.5	988GL
Very Low Loss PCIe 5.0 100G & Server	3.5/3.2	5.8/4.2	528/K						
	3.2	4.5	891	3.43	3.1	885	3.59	5.0	968G
	3.1	7.4	888K	3.45	3.2	883A			
				3.39	4.5	883C			
				3.59	3.6	901			

Source: Co-Tech; KGI Research

Figure 3: Comparison of copper foil product lines

Full Type	Bonding side roughness (Rz)	CCP 長春	Nanya 南亞	Co-Tech 金居	Mitsui (TCF) 三井 (台銅)	Circuit Foll 盧森堡	Furukawa 古河	Fukuda 福田
RTF	≤5	RTF-3	TLC-HP	RT311	MLS-G			
RTF 2	≤2.3	RTF-25	H1	RG311	MLS-G3			
RTF 3	≤2.1	RTF-35*	H2A	RG312	MLS-G4			
RTF 4	≤1.7	RTF-45*		RG313	MLS-G5*			
RTF 5	≤1.5	RTF-55*		RG315*				
RTF 6	≤1.3			RG316*				
HVLP	≤1.5		V1		HS1-VSP			T9FB-SV
HVLP 1	≤1.0			VL411	HS2-VSP	BF-NM (HT)	F1X-WS	T9T-SV
UHVLP	≤0.8	VFP-100*	SV1		S1-VSP	BFL-NN-2		OSV-A
HVLP4	≤0.5	VFP-101*		PF51N*	S12-VSP	BFL-NX-Y*	FOX-WS	T90A-SV*
HVLP5	N.P.	VFP-200*		PF511*	SF-VSP*	BFL-NX-Z*	FOTW-WS*	T9DA-DSV*

Source: Co-Tech; KGI Research

Figure 4: Co-Tech specialty copper foil roadmap


Source: Co-Tech; KGI Research

Figure 5: Comparison table of Nittobo's glass fiber cloth specifications and end-use applications

			2022	2024	2026	2028	2030	2032	2034	
5G~6G Timeline			<div>6G ◆ Study</div> <div>6G ◆ Specifications</div> <div>6G (10 X 5G capacity) ◆ Production</div>							
			<div>5G mature, industrial application expansion</div>							
			<div>5G Sub6 mobile</div> <div>5G millimeter wave, local expansion</div>							
More advanced functions in 5G/6G devices	Wireless telecoms market	Smartphones	<div>5G - Sub6</div> <div>AIP</div> <div>5G millimeter wave ◆ 10Gbps(28GHz)</div> <div>6G ◆ 100Gbps</div>							
		Base startions	<div>5G - Sub6 ◆ BBU ● RRH</div> <div>5G millimeter wave ◆ BBU ● RRH</div> <div>High speed, low latency, multiple connections</div>							
		Automobile Rader	<div>Quasi - millimeter Wave rader</div> <div>Millimeter Wave rader</div>							
	Wired telecoms market	Routers Switches (FEN+BEN (AI))	<div>3.2Tbe 200Gbps</div> <div>1.6Tbe ◆ 100Gbps X 16L(LPO) ◆ 200Gbps X 8L(TRO)</div> <div>800Gbe ◆ 100Gbps X 8L(NER) * FEN/BEN(AI)</div> <div>400Gbe ◆ 50Gbps X 8L(NE) * FEN/BEN(AI)</div> <div>100Gbe ◆ 25Gbps X 4L(NE)</div> <div>High speed, large capacity, low latency</div>							
			Servers	<div>★ PCIe 8 ◆ 200Gbps</div> <div>★ PCIe 7 ◆ 128Gbps X 16L</div> <div>PCIe 6 ◆ 64Gbps X 16L</div> <div>PCIe 5 ◆ 32Gbps X 16L</div> <div>AI Server 100Gbps</div> <div>200Gbps</div> <div>AI Server 56Gbps</div> <div>High speed, large capacity,</div>						
		CPO (Photoeletric fusion PKG)		<div>Front End 6.4TbE</div> <div>Back End 3.2TbE</div> <div>Back End 1.6TbE</div>						
					Low transmission loss	Ultra - low transmission loss	Next generations super - low loss I	Next generations super - low loss II	Low CTE, high tensile elasticity	Low CTE, low loss
NTB Low - dielectric, low - loss GF development			NE	NER	NEZ	DX II	T	V		

Source: Co-Tech; KGI Research

Figure 6: Valuation table – Upstream supply chain for PCB materials & equipment in AI servers

Sector	Company	Ticker	Mkt Cap (US\$mn)	Price (LCY)	EPS (LCY)			PE (x)			PB (x)			ROE (%)			YIELD (%)		
					2024	2025F	2026F	2024	2025F	2026F	2024	2025F	2026F	2024	2025F	2026F	2024	2025F	2026F
Copper foil	Co-Tech	8358 TT	7,549	214.00	3.65	3.87	8.03	58.6	55.3	26.7	8.3	7.4	5.9	14.7	13.4	22.2	0.7	N.A.	N.A.
	LCYT	4989 TT	145	32.20	(2.22)	N.A.	N.A.	N.M.	N.A.	N.A.	2.3	N.A.	N.A.	(14.7)	N.A.	N.A.	N.A.	N.A.	N.A.
	Mitsui Mining & Smelting	5706 JP	416	10,120.00	1,130.95	315.71	633.22	8.9	32.1	16.0	1.7	1.7	1.6	21.2	5.5	10.3	1.9	1.6	2.0
	Furukawa Electric	5801 JP	87,684	8,885.00	473.49	549.31	633.01	18.8	16.2	14.0	1.8	1.7	1.5	10.0	10.8	11.3	1.4	1.3	1.6
	Defu Technology	301511 CH	768	37.23	(0.39)	0.17	0.53	N.M.	219.0	70.2	5.9	5.7	5.3	(5.9)	2.6	7.5	N.A.	N.A.	N.A.
Fiberglass cloth	Nitto Boseki	3110 JP	154	5,710.00	352.61	375.66	442.85	16.2	15.2	12.9	1.6	1.5	1.4	10.4	10.5	11.8	1.9	1.6	1.9
	TGI	1802 TT	3,262	34.30	(0.54)	N.A.	N.A.	N.M.	N.A.	N.A.	2.1	N.A.	N.A.	(3.3)	N.A.	N.A.	N.A.	N.A.	N.A.
	FFG	1815 TT	26	70.60	0.13	N.A.	N.A.	543.1	N.A.	N.A.	4.7	N.A.	N.A.	0.9	N.A.	N.A.	N.A.	N.A.	N.A.
Equipment	AMI	6727 TT	163	185.00	5.69	N.A.	N.A.	32.5	N.A.	N.A.	3.8	N.A.	N.A.	12.6	N.A.	N.A.	1.6	N.A.	N.A.
	Machvision	3563 TT	4,620	569.00	5.52	20.50	30.22	103.1	27.8	18.8	6.6	5.7	4.6	6.4	N.A.	N.A.	0.5	N.A.	N.A.
	Utechzone	3455 TT	200	102.00	5.29	N.A.	N.A.	19.3	N.A.	N.A.	2.3	N.A.	N.A.	11.9	N.A.	N.A.	4.4	N.A.	N.A.
	CBT	1595 TT	66	37.10	(0.06)	N.A.	N.A.	N.M.	N.A.	N.A.	0.7	N.A.	N.A.	(0.1)	N.A.	N.A.	1.4	N.A.	N.A.
	SAA	6438 TT	2,189	191.00	7.58	8.29	10.74	25.2	23.1	17.8	3.1	2.6	2.4	13.1	12.3	14.6	3.1	2.7	3.7
	Group Up	6664 TT	458	235.00	16.97	16.13	19.39	13.8	14.6	12.1	3.6	N.A.	N.A.	29.1	24.7	28.1	4.2	5.5	6.6
	TA LIANG	3167 TT	608	210.50	1.48	N.A.	N.A.	142.2	N.A.	N.A.	6.5	N.A.	N.A.	5.2	N.A.	N.A.	0.5	N.A.	N.A.
Micro drill bit	UNION TOOL CO	6278 JP	1,153	8,620.00	305.86	351.18	425.49	28.2	24.5	20.3	2.0	2.0	1.9	7.5	8.2	N.A.	1.5	1.5	1.6
	Topoint	8021 TT	407	87.60	1.45	2.46	4.42	60.4	35.6	19.8	2.7	2.3	2.4	4.6	6.4	13.2	1.4	1.4	1.4
	Key Ware	5498 TT	162	25.70	(0.01)	N.A.	N.A.	N.M.	N.A.	N.A.	2.4	N.A.	N.A.	(0.1)	N.A.	N.A.	0.6	N.A.	N.A.

Source: Bloomberg; KGI Research

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