

NTI Quarterly, Second Quarter, 2018

<NTI-100>

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Introduction

It was in 1995 when the author started to collect revenue data from world top PCB makers. Originally, “100” of NTI-100 meant top 100 makers. In early 2000’s, the meaning of “100” changed to “makers with revenue greater than or equal to \$100 million per year”.

In 2000, the PCB output by the US and Japan accounted for slightly more than 60% of the total world PCB output. In 2017, the combined output of Taiwan and China exceeded 55%. It is a matter of time that Taiwan and China will be responsible for more than 60% of the world PCB output putting aside Trump’s duty.

As more privately owned Chinese makers come into NTI-100 table, it is becoming harder every year to grasp accurate data. A fair number of Chinese makes own several “divisions” which are not obvious because these subsidiaries do not bear names which suggest that they are owned by other makers. Some PCB makers are subsidiaries of large international corporations and their data is not readily available publicly. So, the author has to make a calculated guess and there may be at least several good size makers missing.

The makers that have foreign operations convert the overseas output from the local overseas currencies of the locations of the overseas operations to their home country currency, which are then converted to the US dollars. This step creates delicate difference depending on the exchange rates used. Therefore, the readers are reminded, as in the past, that the ranking data presented in this report is not free from errors, which are strictly a responsibility of the author.

Many individuals contributed to this report. TPCA and CPCA data were very useful. The author would like to express his gratitude to those who contributed to the completion of NTI-1200.

In compiling data

1. Any M&A which took place during the course of 2017 is deemed to have taken place on January 1, 2017, so the revenues of acquired makers are fully incorporated into the acquiring makers.
2. Fiscal year of AT&S and majority of Japanese makers is from April 1, 2017 to March 31, 2018.
3. In order to see growth rates, 2016 revenues are recalculated using 2017 exchange rates.

Average Exchange Rates vs US\$1

Currency	2014	2015	2016	2017
China Yuan (RMB)	6.158	6.284	6.634	6.758
Japanese Yen	105.86	121.06	107.84	112.93
Taiwan NTD	31.855	31.777	32.25	30.44
Korean Won	1,053.58	1,132.33	1,160.80	1,130.59
Thai Baht	32.482	34.253	35.290	33.92
Singapore D	1.276	1.375	1.440	1.334
Malaysia Ringgit	3.270	4.120	4.100	4.32
Vietnam Dong	21,137.07	21,920.68	22,763.00	22,721.03
Philippine Peso	44.399	44.520	47.300	50.44
Indonesia Rupiah	12,671.31	13,749.27	13,320.00	13,440.00
Canada D	1.104	1.279	0.997	1.297
Inidan Rupee	61.007	64.235	67.800	64.87
Mexican Pesos	13.306	15.792	19.05	18.95
Russian Rouble	38.512	61.195	57.4	58.31
Swiss Franc	0.915	0.962	0.997	0.98
UK Pound	0.606	0.655	0.74031	0.81
Euro	0.754	0.902	0.904	0.886

(www.x-rates.com)

4. Comments in the table is this author's private view and may not be appropriate.
5. The author is fully responsible for any error which may exist.

Comparison

The following table was made from NTI-100 tabel.

Regional Statistics Unit: \$ Million

Region	# Entry	2016	2017	Growth	2017 Share
Taiwan	25	17,499	19,406	10.9%	33.3%
Japan	21	11,352	12,553	10.6%	21.6%
China	46	10,283	12,384	20.4%	21.3%
S. Korea	12	6,404	7,672	19.8%	13.2%
USA	4	3,493	3,679	5.3%	6.3%
Europe	4	1,331	1,583	18.9%	2.7%
S.E.A.	3	837	906	8.2%	1.6%
Total	115	51,199	58,183	13.6%	100.0%

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Of 115 entries, China has 46, or 40% of the total. The number of Chinese entries continues to increase. Taiwan tops' 33% share is not surprising. Taiwan's 2017 total PCB production (Taiwan, China and Thailand) was about \$20 billion, and therefore 33% is reasonable. Although China has more than two times the number of Japanese entries, its share is nearly the same as that of Japan.

The US is "TTM" and Europe is "AT&S". Nobody will dispute.

Looking Back

See the following table which compares top 20 makers in 1998, 2000 and 2017.

History of Top 20 PCB Makers in the World (\$ million at variable exchange rates)

Rank	Maker	1998	Maker	2000	Maker	2017
1	CMK	1,031	Sanmina	1,550	Zeng DingTech*	3,757
2	Viasystems	980	Viasystems (TTM)	1,250	Nippon Mektron*	3,198
3	Ibiden	980	CMK	1,112	TTM	2,659
4	HADCO (Sanmina)	765	Ibiden	1,083	Unimicron	2,135
5	Nippon Mektron*	660	Hitachi Group	973	Compeq	1,778
6	Hitachi Chemical	582	Nippon Mektron*	905	YP Electronics*	1,715
7	Compeq	547	Compeq	802	Tripod	1,505
8	Shinko Denki	478	Multek (Mflex)	780	HannStar Group	1,302
9	MGC (Taihong)	424	Fujitsu	624	SEMCO	1,279
10	Matsushita EC	409	Tyco PCB (TTM)	600	AT&S	1,119
11	Johnson Matthey	405	Shinko Denki	550	Fujikura*	1,109
12	Photocircuits	380	Daeduck Group	480	Sumitomo Denko*	1,097
13	Fujitsu	364	DDi (TTM)	450	Kingboard Chem	1,057
14	Nanya PCB	359	IBM (Kyocera/JP)	450	Ibiden	1,024
15	Multek	340	Matsushita (gone)	445	Meiko	961
16	IBM (i3/USA)	320	Nanya PCB	440	MFLex*	946
17	Daeduck Group	317	Photocircuits (gone)	400	Daeduck Group	880
18	DDi	290	Unimicron	400	Nanya PCB	875
19	NEC	275	SEMCO	400	WUS	862
20	TYCO PCB	270	WUS	390	Flexium*	849
Total		10,176		14,084		30822

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* Flexible PCB Makers (1 in 1998, 1 in 2000 and 7 in 2017)

In 1998 and 2000, only one FPC maker was in the table, Nippon Mektron. In 2017, there were 7 makers and they are all in top positions. Who is responsible for this leap of FPC makers? Smartphones! For example, iPhone X uses about 20 FPCs. Although 2-017 top maker Zeng Ding Tech has rigid board production including HDI boards for Apple using MSAP process, the large portion of Zeng Ding is said to come from FPC. Number two, Nippon Mektron, derives all of its revenue from FPC.

Only four makers which were in 1998 top ranks remain throughout these years without changing names: Ibiden, Nippon Mektron, Compeq and Daeduck, all Asian makers.

Hadco is now Sanmina. Mitsubishi Gas Chemical PCB Group (MGC) shut down Japan Circuit Industry several years ago and Tai Hong Circuit Industry is now owned majorly by Chang Chung Chemical of Taiwan. Former IBM PCB plants have two survival members, one at Endicott, New York, is now “i3” and IBM Yasu is now a part of Kyocera. IBM Germany is long gone. Viasystems which absorbed Merix and DDi is now core part of TTM Technologies. 16 of top 20 in 2017 were not in 1998. Time has changed. Comes and goes.

Of top makers in 2017, 11 makers grew organically: Zeng Ding, Nippon Mektron, Compeq, Tripod, SEMCO, Fujikura, Sumitomo Denko (Electric), Ibiden, Daeduck, Nanya PCB and Wus. The rest of the top makers grew by mergers and acquisitions. Which is easier or better, organic growth or M&A? Hard to tell.

2017

Please refer to simple comments in the NTI-100 table.

With the exception of Chinese makers, the makers which had good growth in 2017 are those which served smartphone and automotive market. The author cannot pin point the reasons which made Chinese makers to grow so well in 2017.

Select PCB Chinese PCB Makers 2017 Revenue in USD (RMB6.75/USD)

PCB Maker	English Name	2017 Revenue	Growth 17/16	Profit	Profit Growth
深南電路*	Shennan	843	24%	75	66%
滬士電子*	Wus	685	22%	43	54%
景旺電子*	Kinwong	621	28%	120	24%
興森快捷*	SZ Fast Print	488	12%	32	-11%
崇達技術*	Suntak	460	38%	91	20%
方正科技*	Founder	374	-9%	48	na
勝宏科技*	Victory Giant	362	34%	48	20%
超声科技*	CCTC	332	16%	na	na
博敏電子*	Bomin	261	30%	10	27%
奧士康*	ASK PCB	257	32%	30	30%
科翔電子	GD Kingshine	228	57%	na	na
弘信電子*	Xiamen Hongxin	219	41%	5	113%
中京電子*	CEE PCB	160	36%	20	-78%
明陽電腦*	Sunshine	156	29%	20	-9%
華鼎集團	Huading Group	146	4%	na	na
Total		5592	22%	542	23%

(CPCA & NTI)

* Stock-Listed Makers

China is the only country where PCB makers can go public today. In 2017, seven makers went public, gathering \$940 million fund.

Chinese PCB Makers which went public in 2017

Maker		Listing Date	Fund (\$M)	Comments
景旺電子	Kinwong	2017.01.06	170.0	Jiangxi #2 & new Zhuhai (RTR FPC)
光		2017.04.06	32.0	LED and R&D
世遠電路	Olympic	2017.04.26	206.0	automotive: 2,000,000m2/yr
偉芝科技		2017.04.26	74.0	
弘信電子	Huaxin	2017.07.23	31.0	720,000m2/yr FPC new plant
廣東駿鼎	GD	2017.09.12	48.0	240,000m2/yr
奧士康	Aoshikan	2017.12.01	168.0	1,200,000m2/yr expansion, 800k for auto
深南電路	SCC	2017.12.13	208.0	Nantong plant for telecomm & automotive
Total			937.0	

Japanese stopped building new plants in China although they do expand existing plants in China. Their main investment is made in Thailand and Vietnam. But, Taiwan makers continue to invest in China not as vigorously as in the past. Chinese makers continue to pour millions of RMB to build new plants. Everyone wonders where are their targeted markets? Equipment sales in China is still strong.

The reader may wonder where Murata (No. 40) comes from? Well-known components maker, Murata was the only maker of LCP (Liquid Crystal Polymer) based antenna boards to Apple. They have three manufacturing plants for this product and manufactures LCP internally for its own use. Murata aims at achieving \$1 billion revenue from this product by 2021. But, it is challenged by Career Technology of Taiwan.

Career Technology entered this market this year with assistance from Apple. Many more FPC makers will join LCP based FPC market in the future, probably dragging down the price.

There are at least a dozen more ready to get into NTI-100 table soon.

World Top PCB Makers (NTI-100/2018)

(unit: USD Million)

Rank	Maker	Nationality	2017	2018	Growth
1	ZD Tech*	Taiwan	3,608	3,929	8.9%
2	TTM Technologies	U.S.A.	2,659	2,847	7.1%
3	Nippon Mektron*	Japan	3,283	2,704	-17.6%
4	Unimicron	Taiwan	2,155	2,513	16.6%
5	Tripod	Taiwan	1,519	1,728	13.8%
6	Mflex (DSBJ)*	China	966	1,725	78.6%
7	Compeq	Taiwan	1,789	1,685	-5.8%
8	HannStar	Taiwan	1,314	1,435	9.2%
9	Samsung E-M	S. Korea	1,279	1,348	5.4%
10	KB Chem PCB Group	China	1,040	1,237	18.9%
11	AT&S	Austria	1,175	1,218	3.6%
12	Young Poong Group*	S. Korea	1,746	1,217	-30.3%
13	Fujikura*	Japan	1,138	1,155	1.5%
14	Shennan Circuit	China	860	1,152	40.0%
15	Meiko	Japan	986	1,081	9.6%
16	Ibiden	Japan	1,051	1,054	0.3%
17	Wus Group	Taiwan	880	1,016	15.4%
18	Nanya PCB	Taiwan	883	956	8.3%
19	Simmtech	S. Korea	738	916	24.1%
20	Flexium*	Taiwan	857	888	3.6%
21	Daeduck Group	S. Korea	858	885	3.1%
22	Sumitomo Denko*	Japan	908	820	-9.7%
23	CMK	Japan	789	820	3.9%
24	LG Innotek	S. Korea	789	807	2.3%
25	Kinsus	Taiwan	740	787	6.3%
26	T.P.T.	Taiwan	746	765	2.5%
27	Kinwong	China	665	755	13.5%
28	BH Flex*	S. Korea	628	698	11.1%
29	Gold Circuit	Taiwan	637	683	6.8%
30	Shinko Denki	Japan	708	683	-3.5%
31	Chin Poon	Taiwan	788	670	-15.0%
32	Unitech	Taiwan	602	648	7.6%
33	Murata*	Japan	450	600	33.3%
34	Shenzhen Suntak	China	467	553	18.4%
35	Kyocera PCB	Japan	540	545	9.0%
36	Shenzhen Fast Print	China	497	525	5.6%
37	Career*	Taiwan	429	515	20.0%
38	Victory Giant	China	369	501	35.8%
39	SI Flex*	S. Korea	528	500	-5.3%
40	Isu-Petasys	S. Korea	483	497	2.9%
41	Ellington	China	496	489	-1.4%
42	Dynamic	Taiwan	385	432	12.2%
43	KCE Electronics	Thailand	426	418	-1.9%

44	Kyoden	Japan	398	401	0.7%
45	Wuzhou	China	336	386	14.9%
46	Founder Tech	China	389	383	-1.5%
47	Hitachi Chemical	Japan	381	375	-1.6%
48	CCTC	China	349	372	6.6%
49	APEX	Taiwan	345	370	7.2%
50	Nitto Denko*	Japan	382	362	-5.2%
51	Xiamen Hongxin	China	224	341	40.0%
52	Aoshikan	China	263	338	28.5%
53	Gul Technologies	Singapore	260	338	30.0%
54	Olympic	China	285	330	15.8%
55	DG Shengyi Electronics	China	285	320	12.3%
56	Guangdong Xinda	China	306	300	-2.0%
57	Sanmina	U.S.A.	330	300	-9.1%
58	APCB	Taiwan	290	296	2.1%
59	Bomin	China	266	295	10.9%
60	Redboard	China	283	293	3.5%
61	DAP	S. Korea	269	290	7.8%
62	CEE PCB	China	163	263	61.3%
63	ASE	Taiwan	280	260	-7.1%
64	Shirai Denshi	Japan	259	260	0.0%
65	Sun & Lynn	China	244	260	6.6%
66	Boardtek	Taiwan	227	252	11.0%
67	AbonMax (Palwonn)	Taiwan	230	250	8.7%
68	BYD	China	167	250	49.7%
69	Ichia*	Taiwan	238	240	0.8%
70	MFS*	Singapore	186	238	28.0%
71	Fujitsu	Japan	226	230	1.3%
72	Guangdong Chao Hua	China	218	210	-3.7%
73	Kunshan Huaxing	China	202	204	1.0%
74	SDG Precision Tech	China	117	201	71.8%
75	STEMCO	S. Korea	199	200	0.0%
76	Kyosha	Japan	193	191	-1.0%
77	Somacis	Italy	181	187	3.3%
78	Delton	China	155	185	19.3%
79	AKM*	China	170	185	8.8%
80	Onpress	China	177	182	2.8%
81	KSG	Germany	154	182	5.2%
82	Lead-Tech	China	146	181	27.0%
83	Liang Dar	Taiwan	175	180	2.8%
84	Circuitronix	China	175	180	2.8%
85	Ji'An Mankun	China	154	180	3.9%
86	Zhuhai Kingsun PCB	China	124	173	39.4%
87	Shenzhen Sunshine	China	160	171	6.9%
88	Guangzhou Kingshine	China	171	171	0.0%
89	GZ Junya (Champion Asia)	China	149	169	13.4%
90	Guangzhou GCI	China	148	168	13.5%

91	Daisho Denshi	Japan	164	166	1.2%
92	Würth Elektronik	Germany	158	166	5.1%
93	OKI PCB Group	Japan	150	164	9.3%
94	New Flex*	S. Korea	137	164	19.7%
95	3Win Group	China	150	160	6.7%
96	Huading Group	China	149	154	3.3%
97	Schweizer	Germany	138	148	7.2%
98	Changzhou Haihong	China	144	145	0.0%
99	SZ Jove Enterprise	China	138	144	4.3%
100	Hyunwoo	S. Korea	125	141	12.8%
101	Jiangsu Suhan	China	131	141	7.6%
102	Amphenol PCB Div	U.S.A.	130	140	7.7%
103	Mutual Tceh	Taiwan	104	139	33.6%
104	Kunshan Wanzhen PCB	China	135	137	1.5%
105	Plotech	Taiwan	128	133	3.9%
106	Yamamoto Mfg	Japan	143	125	-12.8%
107	Netron Soft Tech*	China	123	122	0.0%
108	Kunshan Hua Zhu	China	119	119	0.0%
109	Zhuhai Topsun Elec	China	116	116	0.0%
110	Suzhou Forein FPC*	China	94	111	18.1%
111	HT Circuits	China	112	110	-1.8%
112	CHPT (中華精測)	China	103	109	5.8%
113	Benlinda PCB	China	94	104	8.5%
114	Dongguang Honyuen	China	91	103	13.2%
115	HT (HeTon) Electronics	China	105	103	-1.9%
116	QDOS*	Malaysia	90	103	14.4%
117	Brain Power	Taiwan	112	101	-9.8%
	Top 117 Total		58,266	62,061	6.5%

(N.T. Information Ltd)

* Major products are FPC.