TOREX SEMICONDUCTOR | 6616

Surpassing FY3/24 MTP targets in year one
Brisk industrial equipment parent sales drove third upward revision

3Q Follow-up

TOREX

Focus Points:

Power management IC specialist with attractive growth profile from new applications driven by 5G, IoT-connected devices and the electrification of cars.

SUMMARY

- TOREX announced Group 9M financial results after the close on February 14 (16:50), and it revised up full-term FY3/22 guidance for the third time. Consolidated net sales were ¥22,920mn (+33.5% YoY) and OP was ¥2,897mn (+317.6% YoY). TOREX the parent in particular posted record 3Q-only sales +62.5% YoY, record OP +132.4% YoY, with OPM of 14.8%, the highest in 5 years, driven by brisk demand from industrial equipment and digital equipment applications, with all regions posting double-digit gains amidst the global chip shortage. The company revised up full-term guidance net sales by ¥1,000mn to ¥30,500mn (+28.6% YoY) and OP by ¥600mn to ¥3,300mn (+172.9% YoY, OPM 10.8%), topping stage one FY3/24 MTP targets in year one.

- The graph below shows the quarterly trend of TOREX Group OP and OPM. Implied 4Q company estimates from revised full-term guidance forecast 4Q OP ¥403mn (-21.9% YoY and OPM dropping to 5.3%). Even factoring in rising costs including raw materials, there appears to be room for an overshoot of revised OP guidance. Also, since the company left full-term DPS guidance at ¥44.0 (hiked 10% on 1H results), the indicated payout ratio drops from 25.5% to 18.5%, below the company's stated target of a minimum 20%, suggesting room to hike the dividend further.

- The current P/E of 10.2x is trading 50% below its historical average. Going forward, even if 14% OPM is not sustainable as capacity utilization rates slowly revert back to normalized levels, the market has entered a new growth period driven by the convergence of demand drivers, including economy-wide DX initiatives (RPA/AI, smart factories, etc.), global rollout of 5G service, rapid growth in IoT connected devices, global EV new model ramp, connected cars, ADAS, and demand for next-generation power devices (climate change). On February 21, TOREX announced it is increasing its stake in Novel Crystal Technology.

Key Indicators	
Share price (3/24)	2,774
YH (21/11/30)	3,960
YL (21/1/14)	1,285
10YH (21/11/30)	3,960
10YL (14/5/20)	725.8
Shrs out. (mn shrs)	11.554
Mkt cap (¥ bn)	32.051
EV (¥ bn)	28.075
Equity ratio (12/31)	65.5%
22,3 P/E (CE)	11.7x
22.3 EV/EBITDA (CE)	6.1x
22.3 ROE (3Q act)	9.9%
22.3 P/B (3Q act)	1.41x
22.3 DY (CE)	1.59%

6M weekly share price
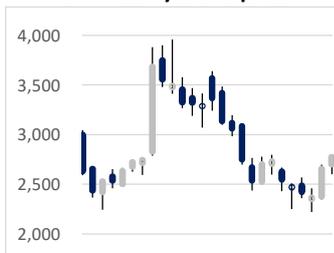
Source: SPEEDA price data

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TOREX Group OP and OPM Quarterly Trend → room for further overshoot in Q4

Source: compiled by Sessa Partners from company TANSHIN financial statements.

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Q3 Key Points

▶ Following on from Q2, Q3 also recorded net sales of ¥7.9bn and OP of ¥1.1bn, although the composition was slightly different. As can be seen from the graph at the bottom of P3, this time profits were led by the parent TOREX, which recorded record sales and OP since listing, along with OPM of 14.8%, the highest in 5 years (see table on the top of P3).

▶ The company revised up full-term guidance for a third time, details shown at the bottom of the right-hand table in grey. In addition, based on implied Q4 company estimates derived from revised full-term FY3/22 guidance, Q4 CE imply OP will decline -21.8% YoY and ordinary profit will decline -48.0% YoY, with OPM dropping from Q3 14.0% → Q4 5.3%. Even with anticipated higher costs including the rise in raw materials costs, there appears to be room for further overshoot. *Q4 CE for profit ATOP includes extraordinary gain on the sale of Kagoshima idle equipment in January.

▶ Also, since the company left full-term DPS guidance at ¥44.0 (hiked 10% on 1H results), the indicated payout ratio drops from 25.5% to 18.5%, below the company's stated target of a minimum 20%, suggesting room to hike the dividend further.
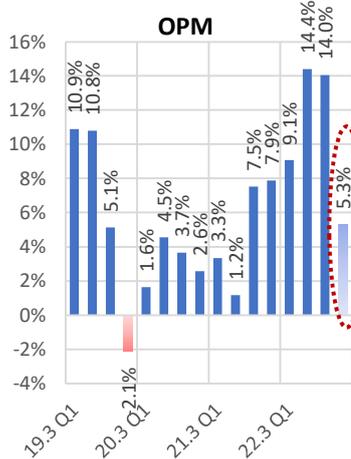
Torex Consolidated 9M FY3/22 Results and Q4 Outlook

JPY mn, %	Net sales	YoY	Operating profit	YoY	Ordinary Profit	YoY	Profit Atop	YoY
17.3 Q1	5,227	—	204	—	(385)	—	2,210	—
Q2	5,087	—	183	—	118	—	123	—
Q3	5,473	—	481	—	911	—	489	—
Q4	5,773	—	383	—	261	—	109	—
18.3 Q1	5,714	9.3	455	123.1	466	TB	234	(89.4)
Q2	6,095	19.8	635	246.6	641	441.8	267	117.1
Q3	6,036	10.3	550	14.3	606	(33.5)	293	(40.1)
Q4	6,152	6.6	572	49.4	285	9.3	108	(0.9)
19.3 Q1	6,203	8.6	675	48.3	924	98.3	496	112.1
Q2	6,266	2.8	676	6.5	819	27.7	469	75.4
Q3	6,074	0.6	311	(43.4)	227	(62.6)	123	(58.2)
Q4	5,353	(13.0)	(112)	TR	(149)	TR	(39)	TR
20.3 Q1	4,797	(22.7)	79	(88.4)	11	(98.8)	12	(97.6)
Q2	5,534	(11.7)	252	(62.8)	267	(67.3)	146	(68.9)
Q3	5,599	(7.8)	205	(34.2)	240	5.8	133	8.7
Q4	5,571	4.1	143	TB	157	TB	127	TB
21.3 Q1	5,858	22.1	195	148.9	180	1,470.3	169	1,301.2
Q2	5,551	0.3	65	(74.1)	(2)	TR	(11)	TR
Q3	5,762	2.9	433	111.6	348	45.2	231	73.1
Q4	6,542	17.4	515	259.9	680	331.8	545	330.8
22.3 Q1	7,014	19.7	636	225.4	677	275.9	477	182.6
Q2	7,970	43.6	1,147	1,657.0	1,152	TB	795	TB
Q3	7,937	37.8	1,114	157.2	1,118	220.9	772	235.0
Q4 CE	7,579	15.8	403	(21.9)	354	(48.0)	555	1.9 *
9M	22,921	33.5	2,897	317.6	2,946	459.9	2,045	426.6
22.3 FY CE	**30,500**	**28.6**	**3,300**	**172.9**	**3,300**	**173.6**	**2,600**	**178.5**
17.3 FY	21,560	—	1,251	—	906	—	2,931	—
18.3 FY	23,997	11.3	2,212	76.8	1,998	120.6	902	(69.2)
19.3 FY	23,897	(0.4)	1,551	(29.9)	1,820	(8.9)	1,049	16.3
20.3 FY	21,501	(10.0)	678	(56.3)	676	(62.9)	418	(60.2)
21.3 FY	23,713	10.3	1,209	78.3	1,206	78.4	934	123.6
22.3 FY init CE	26,000	9.6	2,000	65.4	2,000	65.8	1,400	50.0
Aug. 13 rev CE	28,500	20.2	2,500	106.7	2,500	107.3	1,750	87.4
Nov. 15 rev CE	29,500	24.4	2,700	123.3	2,700	123.8	1,890	102.4
Feb. 14 rev CE	**30,500**	**28.6**	**3,300**	**172.9**	**3,300**	**173.6**	**2,600**	**178.5**
24.3 MTP	30,000		3,000	10.0%				
26.3 MTP	35,000		4,000	11.4%				

Source: compiled by Sessa Partners from TANSHIN financial statements.
Note: TR = turned red, TB = turned black, profit ATOP = profit attributable to owners of parent.

P/L forex impact YoY change amount

JPY mn	1Q act	2Q act	3Q act	9M act
FY3/21	(27)	(72)	(99)	(197)
USD	107.7	105.7	104.2	105.9
FY3/22	27	(11)	2	18
USD	110.0	110.3	114.0	111.4
CHG AMT	54	61	101	215

Note: FX gains/losses in parentheses

OPM

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TOREX SEMICONDUCTOR Consolidated Earnings Trend (Qtr)

JPY mn, %	FY3/19				FY3/20				FY3/21				FY3/22		
	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q
Net sales	**6,203**	**6,266**	**6,074**	**5,353**	**4,797**	**5,534**	**5,598**	**5,571**	**5,858**	**5,550**	**5,762**	**6,541**	**7,013**	**7,970**	**7,937**
YoY	8.6	2.8	0.6	(13.0)	(22.7)	(11.7)	(7.8)	4.1	22.1	0.3	2.9	17.4	19.7	43.6	37.7
• Phenitec contrib.	3,727	3,539	3,642	2,884	2,595	2,885	3,035	3,322	3,688	3,330	3,411	3,678	4,011	4,395	4,117
YoY	15.1	0.7	4.4	(19.6)	(30.4)	(18.5)	(16.7)	15.2	42.1	15.4	12.4	10.7	8.8	32.0	20.7
• Torex	2,476	2,727	2,432	2,469	2,202	2,649	2,563	2,249	2,170	2,220	2,351	2,864	3,002	3,575	3,820
YoY	0.1	5.7	(4.6)	(3.7)	(11.1)	(2.9)	5.4	(8.9)	(1.5)	(16.2)	(8.3)	27.3	38.3	61.0	62.5
Gross profit	**1,921**	**1,892**	**1,530**	**1,151**	**1,269**	**1,422**	**1,446**	**1,315**	**1,325**	**1,210**	**1,606**	**1,817**	**1,942**	**2,433**	**2,453**
GPM	*31.0%*	*30.2%*	*25.2%*	*21.5%*	*26.5%*	*25.7%*	*25.8%*	*23.6%*	*22.6%*	*21.8%*	*27.9%*	*27.8%*	*27.7%*	*30.5%*	*30.9%*
SG&A	1,246	1,216	1,218	1,263	1,191	1,170	1,241	1,172	1,129	1,146	1,174	1,301	1,306	1,286	1,339
Ratio to sales	*20.1%*	*19.4%*	*20.1%*	*23.6%*	*24.8%*	*21.1%*	*22.2%*	*21.0%*	*19.3%*	*20.6%*	*20.4%*	*19.9%*	*18.6%*	*16.1%*	*16.9%*
Depreciation	195	239	300	351	305	317	335	355	269	278	325	336	283	302	335
YoY	(11.8)	4.4	29.9	38.7	56.4	32.6	11.7	1.1	(11.8)	(12.3)	(3.0)	(5.4)	5.2	8.6	3.1
EBITDA	**870**	**915**	**612**	**239**	**384**	**568**	**540**	**498**	**464**	**343**	**758**	**851**	**919**	**1,449**	**1,449**
YoY	28.7	5.8	(21.5)	(71.0)	(55.9)	(37.9)	(11.8)	108.4	21.1	(39.6)	40.4	70.9	98.1	322.4	91.2
Ratio to sales	*14.0%*	*14.6%*	*10.1%*	*4.5%*	*8.0%*	*10.3%*	*9.6%*	*8.9%*	*7.9%*	*6.2%*	*13.2%*	*13.0%*	*13.1%*	*18.2%*	*18.3%*
Operating profit	**675**	**676**	**311**	**(112)**	**78**	**252**	**204**	**144**	**195**	**65**	**433**	**515**	**636**	**1,147**	**1,114**
YoY	48.4	6.5	(43.5)	TR	(88.4)	(62.7)	(34.4)	TB	148.9	(74.2)	112.3	257.6	226.2	17.6x	157.3
OPM	*10.9%*	*10.8%*	*5.1%*	*-2.1%*	*1.6%*	*4.6%*	*3.6%*	*2.6%*	*3.3%*	*1.2%*	*7.5%*	*7.9%*	*9.1%*	*14.4%*	*14.0%*
• Phenitec contrib.	487	413	186	(182)	59	4	78	84	122	(33)	189	415	366	655	547
YoY	60.7	(19.6)	(46.1)	TR	(87.9)	(99.0)	(58.1)	TB	106.8	TR	142.3	394.0	200.0	TB	189.4
OPM	*13.1%*	*11.7%*	*5.1%*	*-6.3%*	*2.3%*	*0.1%*	*2.6%*	*2.5%*	*3.3%*	*-1.0%*	*5.5%*	*11.3%*	*9.1%*	*14.9%*	*13.3%*
• Torex	188	263	125	70	19	248	126	60	73	98	244	101	270	492	567
YoY	23.7	117.4	(39.0)	(54.8)	(89.9)	(5.7)	0.8	(14.3)	284.2	(60.5)	93.7	68.3	269.9	402.0	132.4
OPM	*7.6%*	*9.6%*	*5.1%*	*2.8%*	*0.9%*	*9.4%*	*4.9%*	*2.7%*	*3.4%*	*4.4%*	*10.4%*	*3.5%*	*9.0%*	*13.8%*	*14.8%*
Ordinary profit	924	819	227	(150)	11	268	240	157	180	(3)	348	680	676	1,152	1,118
YoY	98.3	27.8	(62.5)	TR	(98.8)	(67.3)	5.7	TB	16.4x	TR	45.0	333.1	275.6	TB	221.3
Profit ATOP	496	469	123	(39)	12	146	133	127	168	(11)	230	545	476	796	772
YoY	112.0	75.7	(58.0)	TR	(97.6)	(68.9)	8.1	TB	13.9x	TR	72.9	329.1	183.3	TB	235.7

Source: compiled by Sessa Partners from TANSHIN financial statements and company IR results briefing materials.

TOREX

Phenitec

▶ Torex posted the highest quarterly sales and OP since listing due to the booming semiconductor market which has continued from 2H last term, with all regions posting strong performance. Revised up FY3/22 guidance for the third time.

▶ Phenitec posted high growth in sales and profits driven by strong orders boosting utilization rates, posting the highest 9M sales and OP since becoming a consolidated subsidiary.

3Q FY3/22 TOREX Group Net Sales and OP Trend by Major Entity

★Torex record sales, OP
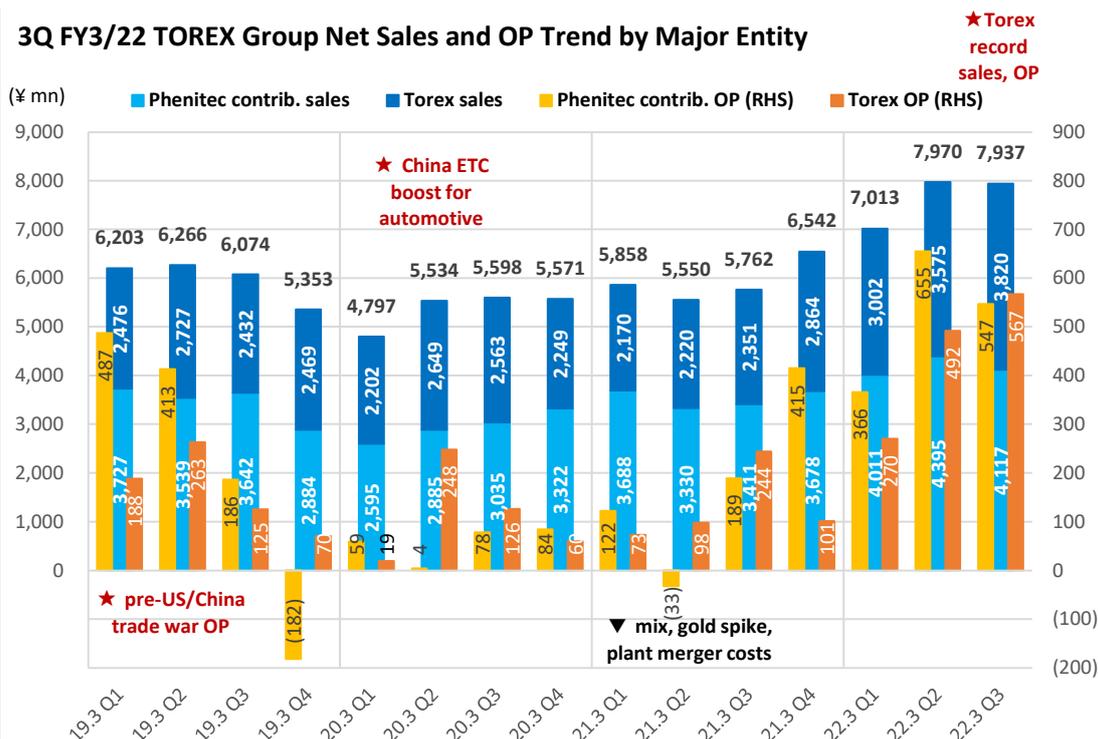
Source: compiled by Sessa Partners from IR results briefing materials.

TOREX SEMICONDUCTOR

Torex Sales Trend by Application and 'Design-in' based* Region with YoY Heat Map

JPY mn, %	1Q 3/19	2Q 3/19	3Q 3/19	4Q 3/19	1Q 3/20	2Q 3/20	3Q 3/20	4Q 3/20	1Q 3/21	2Q 3/21	3Q 3/21	4Q 3/21	1Q 3/22	2Q 3/22	3Q 3/22
by Application															
Torex sales	2,476	2,727	2,432	2,469	2,202	2,649	2,563	2,249	2,170	2,220	2,351	2,864	3,002	3,575	3,820
• Industrial equipt.	966	1,063	945	953	784	912	933	834	872	763	805	1,064	1,033	1,238	1,262
• Automotive equipt.	381	384	362	408	350	615	457	327	241	249	352	398	400	423	464
• Medical equipt.	36	26	26	37	25	21	29	43	73	44	43	66	49	59	65
• Wearable equipt.	71	74	37	56	53	66	54	47	50	100	100	112	86	107	102
• Other	1,022	1,180	1,062	1,015	990	1,035	1,090	998	934	1,064	1,051	1,224	1,434	1,748	1,927
YoY															
Torex sales	0.1	5.7	(4.6)	(3.7)	(11.1)	(2.9)	5.4	(8.9)	(1.5)	(16.2)	(8.3)	27.3	38.3	61.0	62.5
• Industrial equipt.	9.8	14.3	(0.1)	(2.0)	(18.8)	(14.2)	(1.3)	(12.5)	11.2	(16.3)	(13.7)	27.6	18.5	62.3	56.8
• Automotive equipt.	(3.5)	(3.3)	(18.1)	(13.9)	(8.1)	60.2	26.2	(19.9)	(31.1)	(59.5)	(23.0)	21.7	66.0	69.9	31.8
• Medical equipt.	80.0	(13.3)	(23.5)	54.2	(30.6)	(19.2)	11.5	16.2	192.0	109.5	48.3	53.5	(32.9)	34.1	51.2
• Wearable equipt.	10.9	19.4	(31.5)	5.7	(25.4)	(10.8)	45.9	(16.1)	(5.7)	51.5	85.2	138.3	72.0	7.0	2.0
• Other	788.7	(45.4)	(1.0)	(2.5)	(3.1)	(12.3)	2.6	(1.7)	(5.7)	2.8	(3.6)	22.6	53.5	64.3	83.3
by Region															
Torex D-in* sales	2,476	2,727	2,432	2,469	2,202	2,649	2,563	2,249	2,170	2,220	2,351	2,864	3,002	3,575	3,820
• Japan	1,086	1,159	1,070	1,086	950	1,090	1,104	1,043	896	895	958	1,129	1,160	1,379	1,433
• Asia	791	896	818	807	724	1,001	980	700	781	849	876	1,105	1,197	1,444	1,469
• Europe	345	402	304	379	305	329	268	310	259	242	304	384	383	408	465
• North America	254	270	240	197	223	229	211	196	234	234	213	246	262	344	453
YoY															
Torex D-in* sales	0.1	5.7	(4.6)	(3.7)	(11.1)	(2.9)	5.4	(8.9)	(1.5)	(16.2)	(8.3)	27.3	38.3	61.0	62.5
• Japan	8.8	6.5	0.4	(5.1)	(12.5)	(6.0)	3.2	(4.0)	(5.7)	(17.9)	(13.2)	8.2	29.5	54.1	49.6
• Asia	(0.3)	13.0	(8.7)	(4.7)	(8.5)	11.7	19.8	(13.3)	7.9	(15.2)	(10.6)	57.9	53.3	70.1	67.7
• Europe	(19.0)	0.5	(7.9)	13.1	(11.6)	(18.2)	(11.8)	(18.2)	(15.1)	(26.4)	13.4	23.9	47.9	68.6	53.0
• North America	(1.2)	(10.0)	(6.6)	(17.2)	(12.2)	(15.2)	(12.1)	(0.5)	4.9	2.2	0.9	25.5	12.0	47.0	112.7

*Note: Torex 'Design-in' based sales = regional sales adjusted on orders received basis.

▶ **TOREX:** Similar to TI, high growth was driven by **industrial equipment and the recovery in automotive**, with strength in all regions. Revised up full-term guidance for the 3rd time.

▶ **Phenitec:** posted growth in sales and profits driven by strong orders boosting **utilization rates** driven by **Japan automotive and industrial equipment**.

Phenitec Sales Trend by Application and Region with YoY Heat Map**

JPY mn, %	1Q 3/19	2Q 3/19	3Q 3/19	4Q 3/19	1Q 3/20	2Q 3/20	3Q 3/20	4Q 3/20	1Q 3/21	2Q 3/21	3Q 3/21	4Q 3/21	1Q 3/22	2Q 3/22	3Q 3/22
by Application															
Phenitec sales**	4,136	3,973	4,075	3,268	2,983	3,251	3,435	3,628	3,982	3,703	3,732	4,077	4,536	4,990	4,729
• Industrial equipt.	759	705	1,100	698	408	412	493	696	911	630	588	653	676	793	756
• Automotive equipt.	908	873	923	856	876	921	892	915	838	738	869	942	1,044	1,228	1,090
• Medical equipt.	98	63	145	84	70	48	54	116	60	32	34	39	36	38	43
• Other	2,371	2,332	1,907	1,630	1,629	1,870	1,996	1,901	2,173	2,303	2,241	2,443	2,780	2,931	2,840
YoY															
Phenitec sales**	14.9	1.3	5.1	(17.6)	(27.9)	(18.2)	(15.7)	11.0	33.5	13.9	8.6	12.4	13.9	34.8	26.7
• Industrial equipt.	(15.3)	(8.7)	29.4	(20.3)	(46.2)	(41.6)	(55.2)	(0.3)	123.3	52.9	19.3	(6.2)	(25.8)	25.9	28.6
• Automotive equipt.	49.1	11.6	9.8	0.0	(3.5)	5.5	(3.4)	6.9	(4.3)	(19.9)	(2.6)	3.0	24.6	66.4	25.4
• Medical equipt.	22.5	(52.6)	70.6	42.4	(28.6)	(23.8)	(62.8)	38.1	(14.3)	(33.3)	(37.0)	(66.4)	(40.0)	18.8	26.5
• Other	17.7	4.4	(9.3)	(25.0)	(31.3)	(19.8)	4.7	16.6	33.4	23.2	12.3	28.5	27.9	27.3	26.7
by Region															
Phenitec sales**	4,136	3,973	4,075	3,268	2,983	3,251	3,435	3,628	3,982	3,703	3,732	4,077	4,536	4,990	4,729
• Japan	1,479	1,362	1,356	1,332	1,346	1,410	1,427	1,403	1,280	1,277	1,307	1,654	1,983	2,286	1,983
• Asia	1,019	1,070	750	467	495	661	803	805	914	869	1,088	1,193	1,118	1,084	1,275
• Europe	198	182	204	205	199	224	261	236	268	244	194	183	230	269	222
• North America	1,440	1,359	1,765	1,264	943	956	944	1,184	1,520	1,313	1,143	1,047	1,205	1,351	1,249
YoY															
Phenitec sales**	14.9	1.3	5.1	(17.6)	(27.9)	(18.2)	(15.7)	11.0	33.5	13.9	8.6	12.4	13.9	34.8	26.7
• Japan	27.5	5.6	8.2	1.9	(9.0)	3.5	5.2	5.3	(4.9)	(9.4)	(8.4)	17.9	54.9	79.0	51.7
• Asia	25.0	17.8	(23.9)	(53.3)	(51.4)	(38.2)	7.1	72.4	84.6	31.5	35.5	48.2	22.3	24.7	17.2
• Europe	8.8	(20.9)	7.4	25.8	0.5	23.1	27.9	15.1	34.7	8.9	(25.7)	(22.5)	(14.2)	10.2	14.4
• North America	(0.1)	(9.0)	21.7	(15.5)	(34.5)	(29.7)	(46.5)	(6.3)	61.2	37.3	21.1	(11.6)	(20.7)	2.9	9.3

**Note: Phenitec sales include intra-company transactions with Torex. Classifications subject to change.

Japan exports to China have been a reliable proxy for the general health of the global electronics supply chain, a function of Japan's ongoing leadership in critical electronic components and advanced materials.

Robust Statistical Correlation

parameter (between ❶ and ❷)	since 2014	since 2018
correlation coefficient (r)	0.843	0.921
coefficient of determination (r²)	0.711	0.848

Note: r measures the strength and direction of the linear relationship between two variables. r² measures the goodness of fit of a linear regression model (variance of one variable explained by the other). Of course, correlation does not imply causation. Source: compiled and calculated by Sessa Partners.

▶ While statistical data from the Japan Electronics and Information Technology Industries Association (JEITA) provides useful trends on growth products such as drive recorders (DR) which use TOREX power mgt. ICs, our macro checkpoints ❶ and ❷ provide a quick snapshot of the business environment.

Since TI quarterly results are announced roughly 3 weeks ahead of TOREX, they are one useful checkpoint to identify potential positive or negative surprises in TOREX results.

Two Useful Macro Checkpoints:

❶ MOF Monthly Trade Statistics of Japan: Exports to China

Based on MOF Trade Statistics of Japan (monthly press releases), exports to its no.1 trading partner China momentum slowed in Q3 due to lower growth of chipmaking equipment and auto exports turning negative YoY. October exports were +9.5%, and despite a rebound in chipmaking equipment (+30%), autos posted declines for the 3rd consecutive month, finally rebounding in December (-11% → -72% → -47% → -8% → +31%) after automakers ramped up production from November.
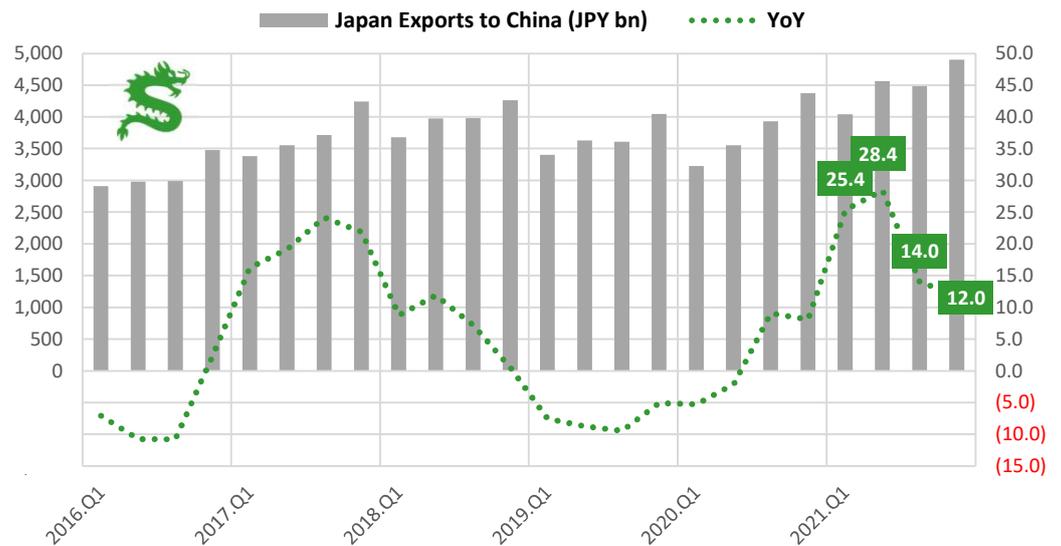
Source: compiled by Sessa Partners from MOF Trade Statistics of Japan (monthly press releases): https://www.customs.go.jp/toukei/shinbun/happyou_e.htm.

❷ Global No.1 Texas Instruments Analog Segment Revenue Quarterly Trend

TI reported strong full-term FY12/21 results attributed to strong demand in industrial and recovery in automotive. In its End Market Revenue Mix annual review by application sectors for 2021, the notable shift was the weight of industrial rose from 37% → 41%, noting 4Q industrial revenue increased +40% YoY (broad-based).
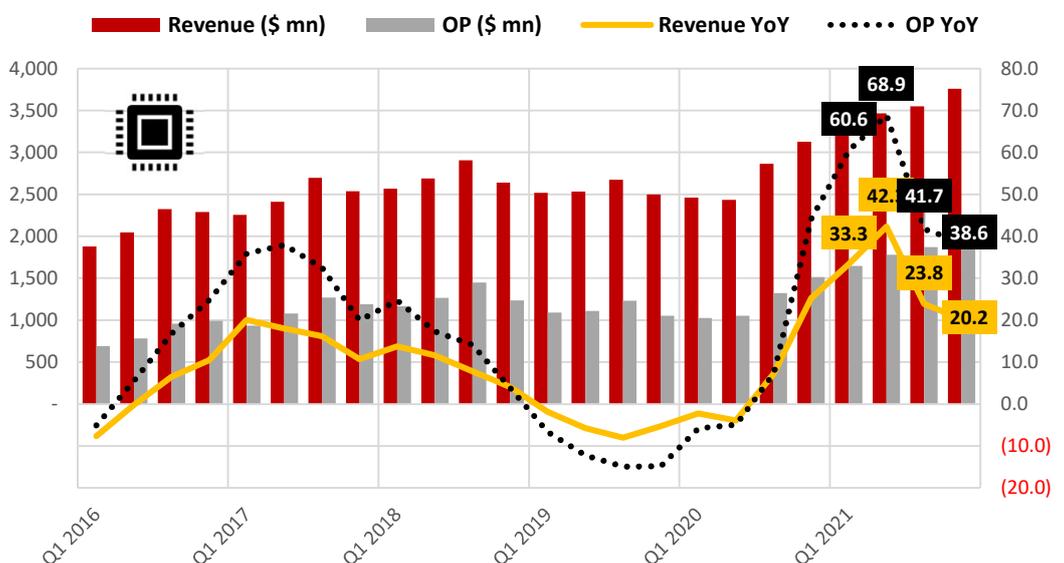
Source: compiled by Sessa Partners from TXN IR summary data, segment revenue and operating profit spreadsheet: https://investor.ti.com/financial-information/financial-data-non-gaap-reconciliations.

Two new products aimed at IoT devices

❶ **Expanded Lineup of Ultra-Low Quiescent Current, Inductor Built-in 150mA Step-down DC/DC Converters "micro DC/DC" XCL232 Series**

Features of this new product are 1) ultra-low consumption current: 200 nA, output voltage from 0.5 V, and 2) high power conversion efficiency from standby current. Efficiency at an output current of several µA to 10 µA has been improved by 70% or more compared to conventional products (left-hand figure). Compatible with low consumption MCUs and SoCs. In addition, a low output voltage from 0.5V can be selected, making it ideal for low voltage SoCs. The XCL232 series are **suitable for IoT/mobile/wearable and all devices that place emphasis on better battery life where small size, small space, and high efficiency performance at a light load current** are important.

XCL232 vs XCL206 Efficiency Graph

XCL232 Mounting Board
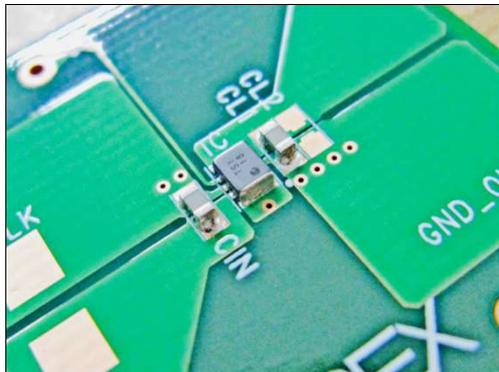
CL-2025-03 Package (2.0 x 2.5 x h1.04mm)
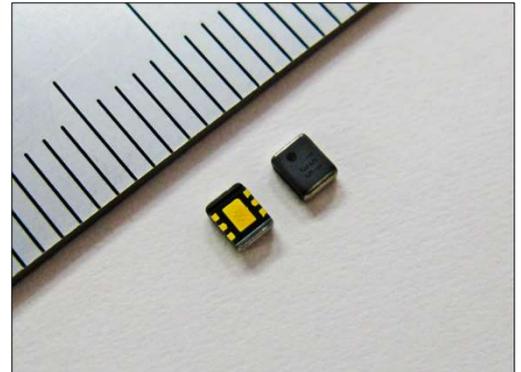
❷ **Expanded Lineup of load switch IC with ideal diode function XC8110/XC8111 series**

TOREX load switch technology develops the 'ideal diode.' Features of this new product with ideal diode function are 1) forward current: low loss with low on-resistance, reverse current: 0µA, and 2) built-in current limit circuit, on/off function. When compared with using Schottky barrier diodes, the 'ideal diode' XC8110/11 series functioned as a replacement low-loss device with 84.6% reduction. Also, it is a compact product compared to general diodes. In an example or power saving for IoT devices, where the forward voltage (V_f) was 0.45 for an SBD and 0.075 for the XC8110/11 series, both with load current (A) of 0.5, unit power consumption (Wh) was 0.225 for the SBD and 0.0375 for XC8110/11 series, i.e. 1/6 that of the SBD due to its low forward current.

XC8110/XC8111 Mounting Board
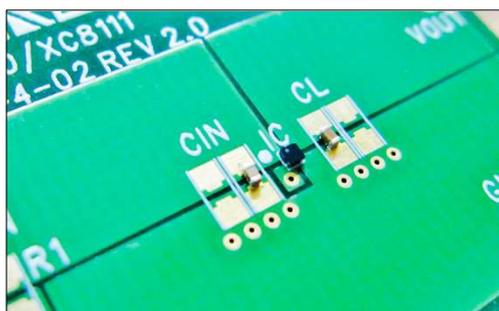
WLP-4-02 Package (0.82 x 0.82 x h0.5mm)
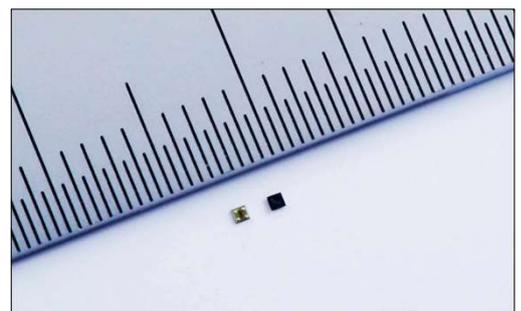
New 5-Year MTP
2021 – 2025
[FY3/22 – FY3/26]

The new MTP promotes 'GX green transformation' through promoting power-saving circuits, reducing mounting board area and promoting low power-loss devices that suppress heat generation.

Parent Torex will continue to focus on developing high value-added power management ICs, including further share expansion of inductor built-in micro DC/DC converters, products specialized for 5G/IoT, solutions for solid-state and semi solid-state batteries, ultra-compact large-capacity packages, etc.

Initiatives for Phenitec include development of silicon-based power devices and compound semiconductors at Kagoshima, and thorough measures for manufacturing cost reduction, following completion of the Daiichi Plant integration project at Okayama.

Since the new MTP was announced last February, FY3/21 full-term guidance was revised up twice, and initial FY3/22 has been revised up three times.
Earnings are on course to surpass FY3/24 targets in year one, two years early.

Torex Group GX Green Transformation:
· Promotes power saving ICs and reduced mounting board size
· Promotes low-loss power devices that dissipate heat generation
⇨ Aiming for a carbon-free society.

DC/DC Converters — Promoting of power saving electronic circuits

Small Packages — Smaller mount boards

Power Devices — Reduced loss with low ON resistance

Decarbonized Society — Becoming a Global Company Supporting GX with Semiconductors
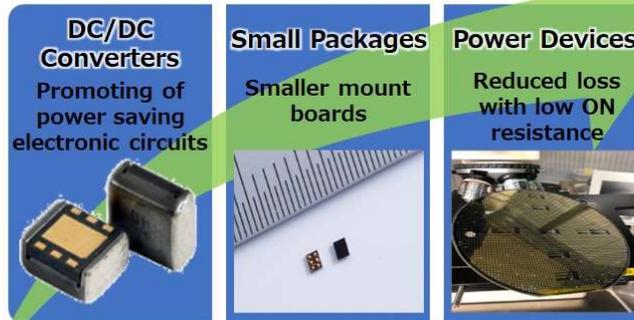
From a company contributing to society with compact, power-saving technologies

Contributing to the realization of a net zero carbon-neutral society through:

❶ Development of highly efficient, energy-saving power mgt. IC products

The step-down DC/DC converter XC9276 Series was awarded the 2020 Energy Conservation Grand Prize in the Product & Business Model category, by the Energy Conservation Center of Japan. By using the newly developed VSET function for switching the 2-value output voltage, the XC9276 series reduces power consumption by 41.3% and increases battery life by 1.7 times compared with traditional products.

Reduced Power Consumption 41.3%

Loss during Active/Sleep

Power Consumption [uW]

	Ultra Low Power DC/DC Conventional Product	Ultra Low Power DC/DC XC9276
Total	95.1	55.8
Upper	32.9	31.8
Lower	62.2	24.0

Battery Life 170%

Battery Life (Comparison the conventional product is 100)
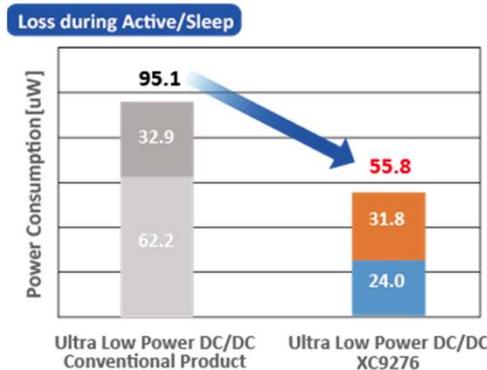
Ultra Low Power DC/DC Conventional Product	Ultra Low Power DC/DC XC9276
100	170
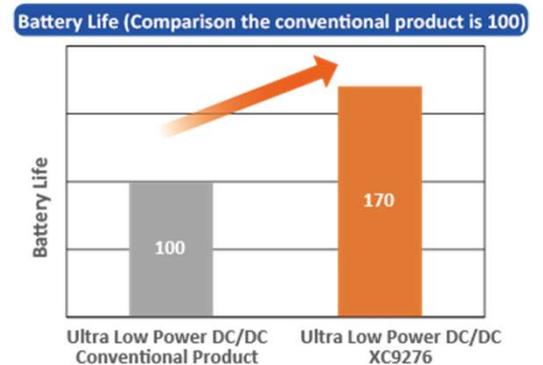
■Technology of ultra-low power
Stop the internal circuit of the IC according to the control status of the IC. Realize ultra-low current consumption.

XC9276 Series Efficiency:76%

22% Increased Efficiency

Conventional Product Efficiency:54%

Efficiency [%] vs Output Current: I_{out} [mA]
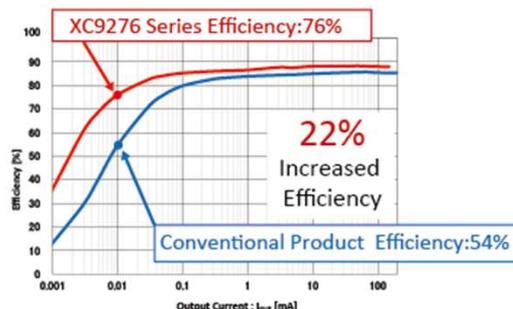
■Technology of switching between two-value output voltage
Only input signal without external parts, Achieves a function that can switch between binary output voltages.

① IC built-in output voltage setting resistor

IC

V_{OUT}

Output Voltage Logic

Input Signal

② Output two-value output voltage through input signal

Source: company website.
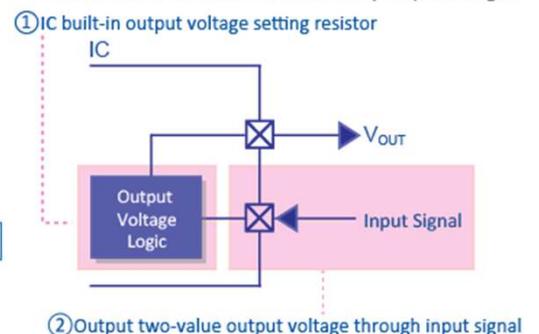
SOT package
(small-outline transistor)
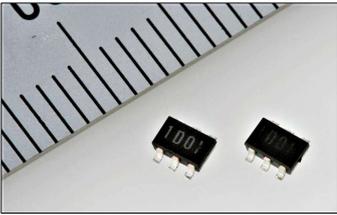
USP package
(ultra-small package)
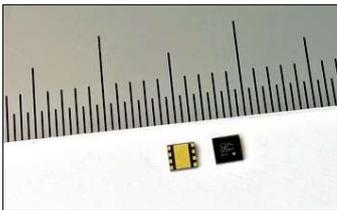
WLP package
(wafer-level package)
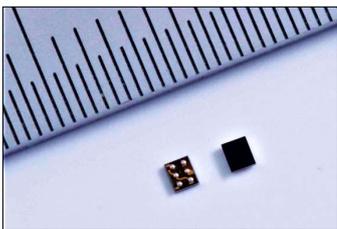
Powerfully small.
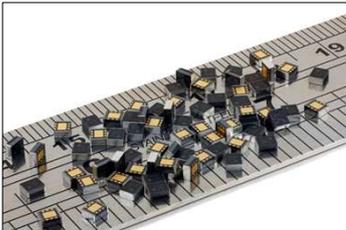
"Micro DC/DC" XCL Series
Ultra small DC/DC converters that integrate a coil and a control IC. Simultaneously achieve **space-saving, high efficiency, low noise, high heat dissipation, and low cost**.

❷ **Resource conservation with PKG miniaturization and space-saving design**

The XC9276 series is expected to be deployed in products such as **small IoT devices and wearable devices** that are small and need to be driven for a long time.

■ **Technology of reduce mounting area**

The installation area is reduced by reducing the coil inductance value and the IC package area.

High-growth focus product: Inductor Built-in Micro DC/DC converters

The Micro DC/DC XCL Series is ultra small DC/DC converters that integrate a coil and a control IC using Torex's unique technology, which realize devices that **simultaneously achieve space-saving, high efficiency, low noise, high heat dissipation, and low cost**.

Wireless and GPS functions are being added to a wide variety of devices, and radio-frequency interference and noise have become key concerns in electrical circuit design. Torex's Micro DC/DC XCL Series is optimized to achieve a lower noise than with a discrete DC/DC converter configuration. Improving power conversion efficiency is a key point in miniaturizing a power circuit. When semiconductor and electronic components are made smaller, the resistance component increases, and the loss appears as heat generation. The Micro DC/DC XCL Series reduces the loss of efficiency that accompanies miniaturization.

Different package types emphasize the required properties of 1) low EMI noise, 2) small, low-cost, 3) high efficiency/heat dissipation for large current, and 4) high heat dissipation and low noise for high withstand voltages.
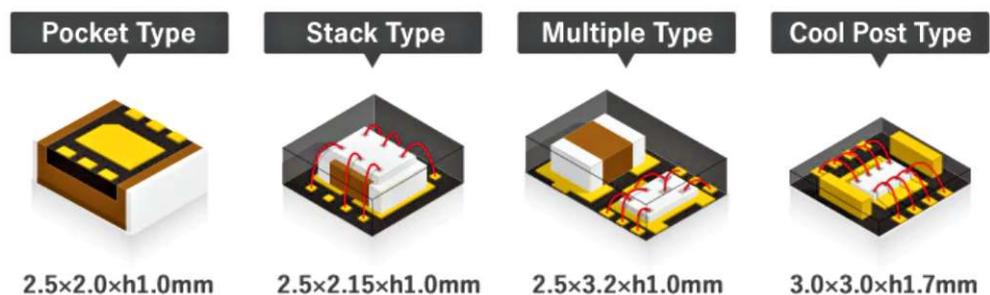
The XCL303/XCL304 series below targets high-speed optical transceivers for 5G applications, and it is the first inductor built-in Micro DC/DC converter product on the market to handle negative output voltage.

XCL303/XCL304 Series

Source: company website.

❸ **Reduced power loss with low ON resistance* through development and sales promotion of next-generation silicon carbide (SiC) and gallium oxide (β-Ga₂O₃) power devices**

Phenitec schedule for advancing development of next-generation SiC power devices

Development of SiC devices at 6-inch Kagoshima Plant, start-up of process line, and mass production Development of price-competitive SiC SBDs (Schottky barrier diodes) in progress
➡ SiC SBD Gen1 650V/10A Sample shipping now

Participating as an Associate Member of Tsukuba Power Electronics Constellations (TPEC) promoted by the National Institute of Advanced Industrial Science and Technology (AIST) toward further cost reduction and R&D of SiC MOSFETs

Gen 2 sample shipments by end of FY3/22

Uses high-concentration substrate
⇓
Process simplification
Chip size shrink
⇓
✓ Low cost
✓ High quality

SiC devices produced in-house
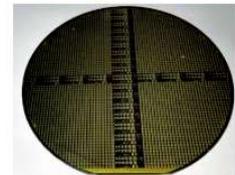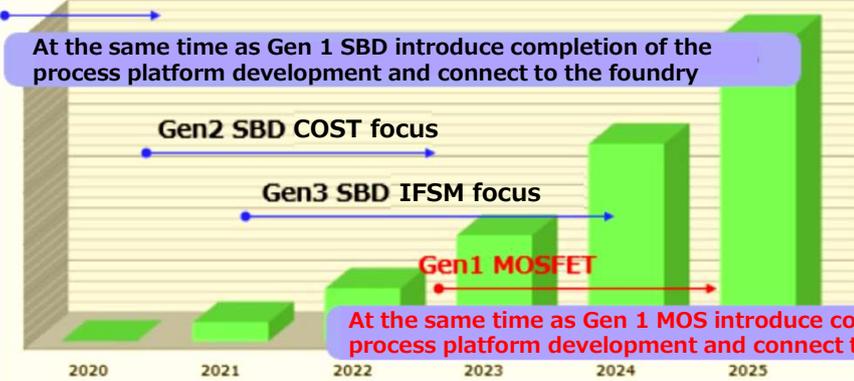
In the future, we will make capital investment according to the progress of development and mass production of SiC-SBD and SiC-FET.

Source: excerpt from 4Q FY3/21 IR results briefing materials, May 24, 2021, updated with 3Q FY3/22 IR results briefing materials, February 14, 2022.

NCT 4-inch beta-gallium oxide β-Ga₂O₃ epitaxial wafer
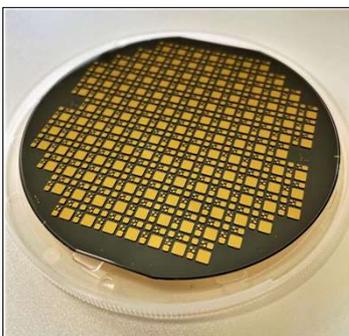
Source: Novel Crystal Technology
June 16, 2021 press release.

*ON Resistance
The resistance value between the Drain and Source of a MOSFET during operation (ON) is called the ON Resistance $R_{DS(on)}$. The smaller the value, the lower the power loss.

Torex capital tie-up partner Novel Crystal Technology achieves world's first mass production of 100mm (4-inch) beta-gallium oxide (β-Ga₂O₃) epitaxial wafers, making it possible to mass produce next-generation power devices (June 16, 2021)
Previously Novel Crystal Technology had announced in April 2019 that it succeeded in developing high-quality 50mm (2-inch) beta-gallium oxide (β-Ga₂O₃) epitaxial wafers, and it has been manufacturing them and selling them since then, but they are limited to use for R&D since mass production is not economically viable with 2-inch wafers. Compared with silicon carbide (SiC) and gallium nitride (GaN), beta-gallium oxide (β-Ga₂O₃) has large band gap energy of 4.5eV (electron volts) which translates to lower loss of power, making it ideal for applications such as electric vehicles (EV) and other industrial equipment. In addition, beta-gallium oxide bulk single crystals are grown using the melt growth method, which is 100 times faster than the vapor growth method used for SiC and GaN. Finally, since beta-gallium oxide has a hardness similar to silicon, it can be processed (cutting and polishing) using existing equipment for silicon wafers (reducing the capex burden for customers).

NCT succeeded in demonstrating beta-gallium oxide low-loss Schottky barrier diodes (SBD) with a trench structure in September 2017, and it will continue to build mass production technology for trench-type SBDs on the 100mm line. The company plans to supply 150mm (6-inch) beta-gallium oxide (β-Ga₂O₃) epitaxial wafers in 2023.

TOREX SEMICONDUCTOR

Source: NCT website.

Torex announced a capital tie-up with Novel Crystal Technology on June 30, 2020, as Group subsidiary Phenitec is also working on developing next-generation power devices, and the market for ultra low-loss and low-cost power devices is expected to grow rapidly over the next decade. NCT's β-Ga_2O_3 is summarized below. On February 21, 2022, TOREX announced it is increasing its stake in Novel Crystal Technology.
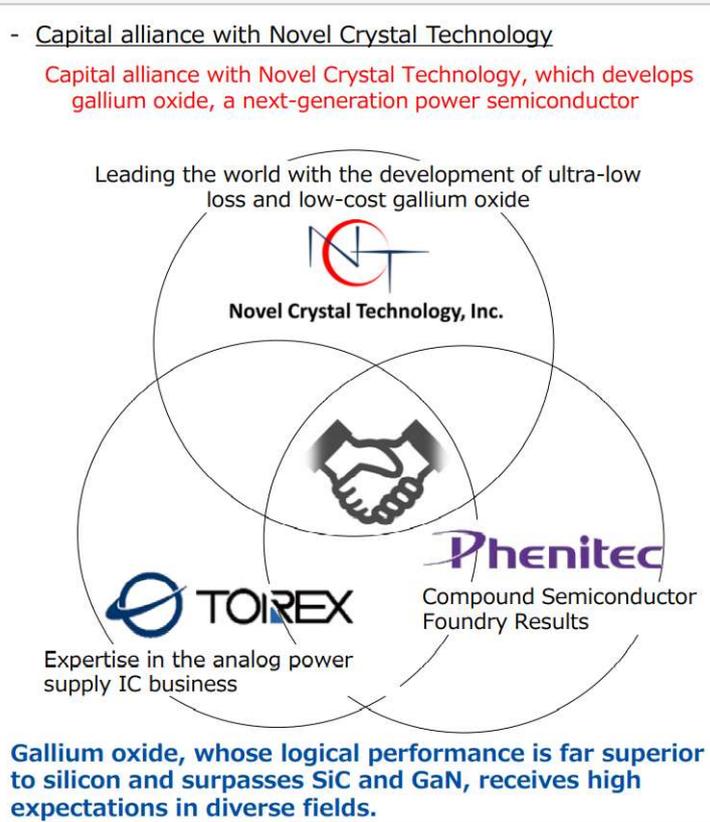
Source: excerpt from IR material "FY2021 – 2025 Mid-Term Management Plan," February 15, 2021.

Summary of Novel Crystal Technology's next-generation power device material beta-gallium oxide (β-Ga_2O_3) epitaxial wafers and bulk single crystal growth technology

Established in June 2015, Novel Crystal Technology Inc. is a carve-out venture of Tamura Corporation (6768 TSE1) and a technology transfer venture of NICT (National Institute of Information and Communications Technology), and along with the Tokyo University of Agriculture and Technology, it is advancing research on beta-gallium oxide, a promising next generation power device material, aiming to IPO in 2023.

Novel Crystal Technology Inc. is developing and manufacturing β-Ga_2O_3 substrates and epitaxial wafers. It also leads the world in bulk single crystal growth technology, epitaxial film-forming techniques and power device fabrication technology. With the growing call for a carbon-free society, renewable energy development and efficient power usage are expected to build momentum. β-Ga_2O_3 power devices have promising applications in electric vehicles, robots and a host of other industrial equipment, contributing to sustainable society.

NCT Business Description
• Manufacture and sale of substrates with gallium oxide epitaxial film
• Manufacture and sale of single crystals and their applied products
• Manufacture and sale of semiconductors and their applied products

Head Office
2-3-1 Hirosedai, Sayama City, Saitama

President and CEO
Akito Kuramata

TOREX SEMICONDUCTOR

Large band gap energy of 4.5eV (electron volts) means lower loss of power. Silicon is reaching its theoretical limit to lower ON resistance.

Bulk single crystals
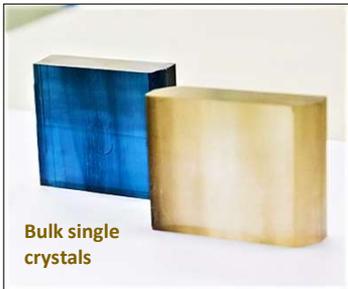
NCT Shareholders:
- Tamura Corp. (6768): 38%
- Individual investors: 36%
- Corporate investors: 26%

Corporate investors:
- AGC (5201)
- TDK (6762)
- Iwatani Venture Capital
- Satori Electric (7420)
- Shindengen Electric (6844)
- JX Nippon Mining & Metals
- Sojitz Machinery Corp.
- **Torex Semiconductor (6616)**
- Yaskawa Electric (6506)

Source: NEDO Project Review: Practical Development of Ampere-grade Gallium Oxide Power Device <July 2018 – May 2020>

Source: NCT company website

Features of β-Ga₂O₃: Promising Next-Generation Power Device Material
– Comparison with other wide band-gap semiconductor materials
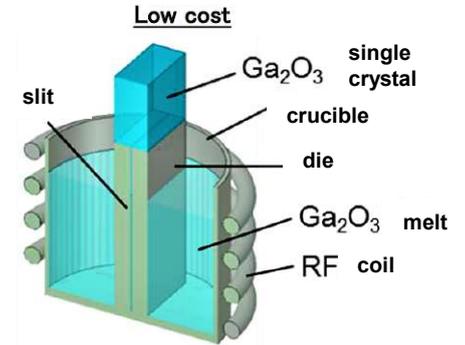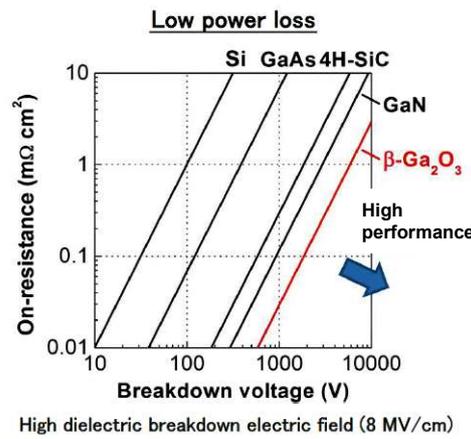
Single crystal growth method diagram

High dielectric breakdown electric field (8 MV/cm)   High growth rate due to melt growth (30 mm/h)

The closer to the bottom-right corner, the greater the material's ability to realize a device that both saves energy and has a high breakdown voltage. Silicon is the material currently used for power devices, yet it is reaching its performance limits. Silicon carbide (SiC) and gallium nitride (GaN) have wider band gaps and greater theoretical values than Si, yet beta gallium oxide (β-Ga₂O₃) surpasses them both.

★ Cost / performance advantages of beta-gallium oxide (β-Ga₂O₃)

❶ Difference in bulk crystal growth speed
With SiC and GaN, bulk single crystals are generally grown using the vapor growth method. However, the issues with this method are that only several hundred micrometers can be grown per hour, and high-quality crystals are difficult to produce. Meanwhile, beta gallium oxide (β-Ga₂O₃) is grown using the melt growth method. With a growth rate of several dozen millimeters per hour, this method is approximately 100 times faster than the vapor growth method, enabling the production of high-quality bulk single crystals. The speed at which the bulk single crystals can be grown translates to noticeably lower crystal growth costs.

❷ Easy to process (cutting, polishing)
Because both SiC and GaN are extremely hard materials, the process of cutting out substrates from bulk single crystals and polishing them is time-consuming and labor intensive. Meanwhile, β-Ga₂O₃ has a hardness similar to silicon. This means it can be processed easily in the same facilities as silicon.

❸ Development of large-diameter substrates has progressed rapidly
With SiC, it took roughly 15 years to develop a 6-inch substrate (1997 – 2012). With β-Ga₂O₃, the same was achieved in just 5 years (2012 – 2017).

Summary of beta-gallium oxide (β-Ga₂O₃) characteristics:
1) Energy saving / high breakdown voltage (ultra low-loss)
2) Bulk single crystals can be grown rapidly (100x faster than the vapor method)
3) The material is easy to process on existing equipment for silicon wafers
4) Large diameter substrates were achieved in a short time period

TOREX SEMICONDUCTOR

**Share Price,
Valuations and
Shareholder Rebates**

**Performance and
Valuations:
SESSA Smart Charts**

- ✓ **The P/E of 11.7x is 42% below the historical avg. Torex has revised up full-term guidance for 5 consecutive quarters.**

- ✓ **Ultimately this is the nature of powerful cyclical recoveries, and current-term forecasts cannot capture the true upside potential.**

- ✓ **The P/B of 1.41x is roughly 50% above the historical average, and DY of 1.59% is roughly 38% below the historical average. Given potential for further overshoot on 4Q results and the current indicated payout has dropped to 18.5%, there appears to be room to hike DPS further.**

Analyst's view

## Sessa Smart Charts: 3-Year Weekly Share Price and Valuations Trend
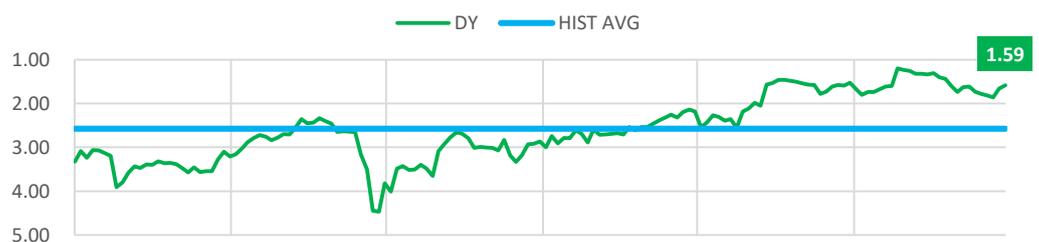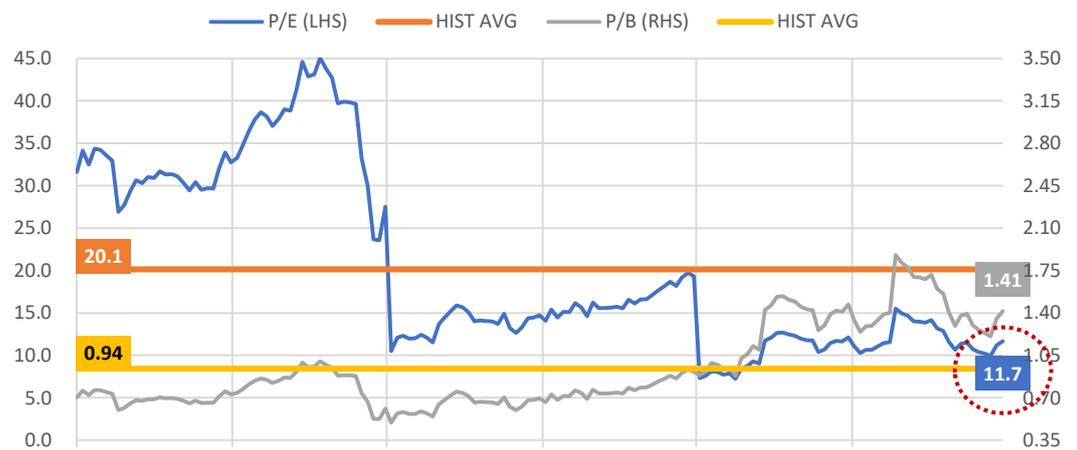
Source: compiled by Sessa Partners from SPEEDA historical earnings and price data. Valuations calculated based on CE.

Sessa Investment Research
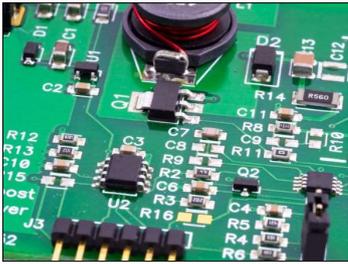
Boost converter circuit
(image licensed from Adobe Stock)

3-Year Weekly Relative Performance Trend

Legend: — 6616 Torex — 6768 Tamura — 6963 Rohm — 6723 Renesas ···· TOPIX

Jun-2021 news that NCT succeeded in world's first mass production of 100mm (4-inch) beta-gallium oxide (β-Ga₂O₃) epitaxial wafers
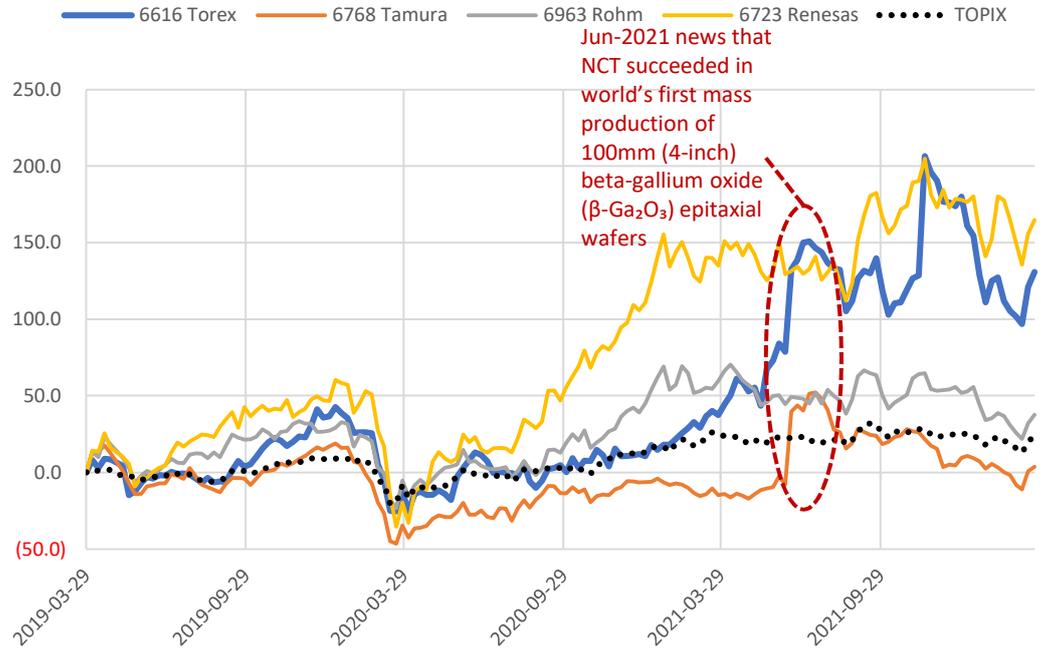

Koji Shibamiya (President)

The lower left table shows that **both Phenitec Chairman Fujisaka and Torex President Shibamiya are in the top 10 shareholders, whose interests are aligned with all shareholders, an attractive point that cannot be understated in our view.**

The company's stated dividend policy is highlighted in the graph below: consolidated dividend payout ratio of at least 20%, aiming for DOE of 3.0%. Like many Japanese companies, a common point of frustration among foreign shareholders is policy which emphasizes 'stable' dividends. It is also true that Torex has a large net cash position, and given that its business is highly cash generative, the unrelenting increase in shareholders' equity will make the DOE target of 3.0% increasingly difficult to achieve. HOWEVER, it is also true that management did not hesitate to approve a 5.2% share buyback in 2019, which is not the same as many Japanese companies, nor is two top managers among the top 10 shareholders. "Actions speak louder than words."

TOREX SEMICONDUCTOR Major Shareholders (2021/09/30)

Rank	Shareholder	03/31	09/30
1	The Master Trust Bank of Japan, Ltd. (Trust Acct)	9.01%	13.10%
2	THE BANK OF NEW YORK 133652	6.93%	7.42%
3	Custody Bank of Japan, Ltd. (Trust Acct)	7.02%	7.19%
4	**Tomoyuki Fujisaka (Phenitec Chairman)**	**4.60%**	**4.60%**
5	The Chugoku Bank, Limited	4.28%	4.28%
6	ARS Co., Ltd.	4.10%	4.10%
7	Kibi Kogyo Co., Ltd.	3.61%	3.61%
8	Takanori Ozaki	2.91%	2.91%
9	**Koji Shibamiya (Torex President)**	**2.67%**	**2.67%**
10	Kimiko Ozaki	1.86%	1.86%
Top 10 —		**46.99%**	**51.74%**

Source: FY3/21 Q4 and FY3/22 Q2 YUHO financial statements.

Legend: ■ Annual dividend (¥) ● Payout ratio (%) ● DOE (%, RHS)

	FY3/19 (act)	FY3/20 (act)	FY3/21 (act)	FY3/22 (init CE)	FY3/22 (rev CE)
DOE	2.5	2.3	2.0	2.2	2.3
Payout ratio	39.6	105.2	42.1	31.3	18.5
Annual dividend	38	40	36	40	44

10% hike

Sessa Partners Inc.

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info@sessapartners.co.jp