

Equities

18 March 2011 | 27 pages

Eastern Japan earthquake/Tech industries

Production disruption and supply chain issues—a sector analysis

■ Industry Overview

- **Eastern Japan earthquake** — The earthquake and ensuing tsunami was one of Japan's worst ever natural disasters. There have been many major aftershocks since the 9.0 magnitude quake on March 11 and damage to the Fukushima nuclear power facility. In this report we summarize the impact on technology sectors based on discussions with the companies and our own analysis.
- **Restoration expectations** — We offer our deepest sympathies to everyone who has been affected and express our hopes for a swift recovery. We want to reassure readers that despite the damage, Japanese electronics makers remain a cornerstone of the economy. We have seen no confusion outside of the areas hit by the disaster and the areas affected by rolling power outages. We expect companies and the population in general to work hard toward a speedy recovery.
- **Consumer electronics, components, semiconductors** — Damage to the plant and equipment in these sectors has been limited. Interest centers on how quickly power supply can be restored. Our main focus is on recoveries at facilities that make customized products and products with high market share because of the potential knock-on effects if shutdowns are protracted. We highlight Casio, Shinko Electric, and Sharp as companies that should be largely unaffected.
- **Industrial electronics** — All companies have suffered damage to key production bases except for Mitsubishi Electric, whose facilities are mainly located in Western Japan. NAND supply could stagnate given that some equipment has been idled at Toshiba.
- **Precision equipment and SPE** — Nikon, Tokyo Electron, Canon, Ricoh, and others have confirmed some direct damage and we expect other makers to be affected indirectly. Stocks we think will attract buying are Fujifilm, as it has been sold down to a PBR of 0.6x and has only suffered minor direct damage, and Canon, which we like as quality name.
- **Electronics materials and glass** — Our favored stocks are Nitto Denko, Sumitomo Bakelite, and NEG. The earthquake has had only a minor impact at all three. We believe the three are heading toward earnings growth phases, driven by ITO film at Nitto Denko, IC package substrate material L&Z at Sumitomo Bakelite, and the ability to respond to demand for thin glass at NEG.
- **Biggest negative impact** — This would appear to be in semiconductor materials with Shin-Etsu and MGC in particular badly affected. In the coming weeks we will look to assess in more depth specific problems in the supply chain and problems in resuming normal production levels.

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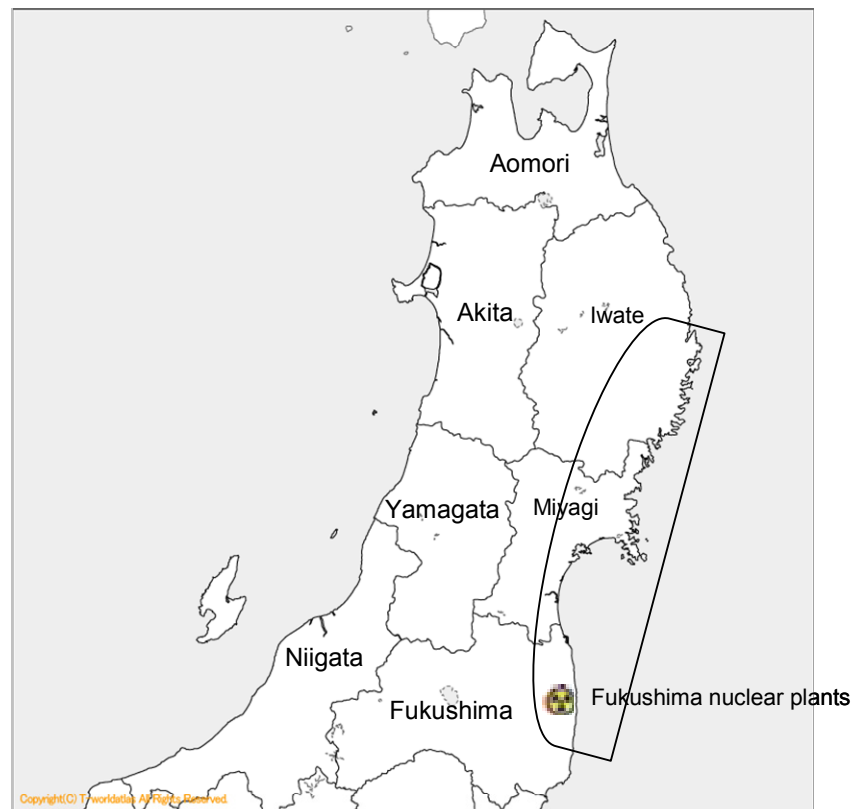
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Figure 1. Prefectures supplied by Tokyo Electric Power (TEPCO)



Source: Citi Investment Research and Analysis.

Figure 2. Prefectures supplied by Tohoku Electric Power



Note: The enclosed area was most severely affected by the earthquake and tsunami.

Source: Citi Investment Research and Analysis.

Impact on major product supply chains

Semiconductors

Earthquake likely to have a widespread impact on semiconductor materials, devices, and electronic components production

The Eastern Japan earthquake appears likely to have a widespread impact on production activity in semiconductor materials, devices, and electronic components. We see the main concerns as 1) production problems for products for which Japanese companies have high market shares (silicon wafers, IC packages, and NAND); and 2) the large number of plants for which there is no clear timeframe for a return to normal operations (even if they make products that do not have a high market share). In addition, 3) even if a company's materials and device production facilities were not directly damaged in the earthquake, a decline in production of electronics goods elsewhere due to shortages of other materials and parts could stall demand for these materials and devices.

Products for which Japanese companies have a high market share

Semiconductor materials: concerns of silicon wafer and package substrate material supply shortages

Silicon wafers: Shin-Etsu Chemical has halted production at its Shirakawa plant in inland Fukushima Prefecture and details about the extent of the damage and the timing of restoration are unclear. MEMC (US) has idled equipment at its 300mm wafer processing plant in Utsunomiya, and SUMCO has halted production at 300mm and 200mm wafer plants in Yonezawa in Yamagata Prefecture. These three plants account for 25%-30% of global 300mm wafer production capacity of 4.2m wafers/month. We believe SUMCO and MEMC can cover some of the lost production by increasing operating rates at other plants. The Shirakawa plant accounts for a large weighting of Shin-Etsu's 300mm wafer output and if production is down for more than one month we think the 300mm wafer supply/demand balance could come under pressure.

IC package materials: Mitsubishi Gas Chemical (MGC) has suspended operations at its Shirakawa plant in inland Fukushima Prefecture. Hitachi Chemical's Shimodate plant in inland Ibaraki Prefecture has started to resume operations. We estimate MGC's BT laminates account for around 60% of the market for high-performance IC package substrate materials and Hitachi Chemical's MCL-E679 for roughly 30%. BT laminates are widely used as substrate materials for ball grid array (BGA) and chip-size package (CSP) ICs used in mobile phones and digital consumer electronics. We estimate Hitachi Chemical's MCL-E679 has a high share of the market for Intel's MPU package materials.

NAND facilities avoid significant damage, but a number of temporary line suspensions raises supply concerns

Toshiba has had to suspend production at its Yokkaichi plant, its NAND production base in Mie Prefecture (global market share of more than 40%), three times so far in March, on the last two occasions as a result of earthquakes. The plant is a long way from the epicenter of the earthquakes and did not suffer any direct damage, but Toshiba still has had to partially suspend production three times. While the series of stoppages in March have been minor compared with the one that followed a temporary power outage last December, we still believe output in April-June is likely to stall. Distribution infrastructure has been disrupted and we believe wafer shortages are a concern for the next few months.

Possible supply shortage for blue-violet laser diodes

Production has been halted at Sony Shiroishi Semiconductor in inland Miyagi Prefecture, which makes around 40% of the world's blue-violet laser diodes, and there are no immediate prospects of a resumption of production.

Production facilities that do not have a commanding market share but for which there is no timeframe for the restoration of operations

Impact could extend across a wide range of applications

There is no time frame for the resumption of production at the following facilities: 1) five of Renesas Electronics' 22 front-end processing facilities; 2) the majority of Fujitsu's plants for 200mm and smaller-diameter wafers; and 3) Iwate Toshiba Electronics. While we do not believe any of the products made by these facilities have a commanding market share, they are used in a wide range of applications (auto electronics, digital consumer electronics, PCs, game consoles, etc.) Production can be switched to other facilities for some, but we think it will take time to assess the damage and the delays could potentially have a large impact on the production plans of end-product makers

SPE makers have suffered little direct damage but face latent risks

Latent risk for Nikon

SPE makers that have production bases in the disaster-struck area are Nikon (LCD and semiconductor lithography equipment), Tokyo Electron (etchers, heat treatment coating equipment).

At this time there appears to be little direct damage to production facilities at Nikon, but products (i.e., SPE) must be inspected to ensure their operation has not been affected by the shaking and must be adjusted where necessary, and this could result in shipment delays. Also, Nikon had planned to increase capacity at its LCD lithography equipment production base in Miyagi Prefecture in July, but if this is delayed we think the supply of equipment for smaller LCD lines, demand for which has been strong of late, could fall short of expectations. The two Tokyo Electron production bases in Miyagi Prefecture are surprisingly important and if the shutdowns are protracted they could affect orders from April-June onward.

Figure 3. Situation at major semiconductor-related production bases

Products	Company	Domestic plants	Situation
Semiconductors	Elpida Memory	Akita (Akita)	Operations suspended but resumption scheduled from 3/16
	Renesas	Tsugaru (Aomori), Hitachinaka (Ibaraki), Takasaki (Gunma), Tsuruoka (Yamagata)	We understand all operations are suspended, and there is no schedule for restart
	Sony	Tagajo/Shiroishi/Tome (Miyagi), Atsugi (Kanagawa)	Operations suspended at Tagajo, Tome, and Shiroishi; voluntary power cuts at Atsugi
	Toshiba	Kitakami (Iwate), Yokkaichi (Mie)	Operations suspended at Kitakami; partially suspended at Yokkaichi but currently in operation
	Fujitsu	Isawa (Iwate), Aizuwakamatsu (Fukushima), Shibata (Miyagi)	Operations suspended at Isawa and Shibata; earthquake damage at Aizuwakamatsu, but commencement of operations is starting
SPE	Nikon	Otawara (Tochigi)	Operations suspended
	Tokyo Electron	Matsushima (Miyagi), Oshu (Iwate)	Operations suspended, no schedule for restoration of infrastructure
	Shin-Etsu Chemical	Shirakawa (Fukushima)	Operations suspended, we understand there is no schedule for resumption of operations
Electronic materials	SUMCO	Yonezawa (Yamagata)	Operations suspended
	MEMC	Utsunomiya (Tochigi)	Operations suspended
	Mitsubishi Gas Chemical	Shirakawa (Fukushima)	Operations suspended, we understand there is no schedule for resumption of operations
	Hitachi Chemical	Shimodate (Ibaraki)	Operations suspended, but restarting in stages

Source: Company discussions, Citi Investment Research and Analysis.

LCDs

Little impact on overall supply chain

We gather there has not been much impact from the earthquake on production of LCD materials and panels. As shown in Figure 2, most production bases are located in Kanto (the Tokyo area) and further west, and were not directly damaged by the quake. While it is possible that Kanto facilities may be affected by TEPCO blackouts and by logistical disruptions, no major impact on production of particular materials or components is expected, even in terms of sourcing inputs.

Modest damage to companies where power was cut

Hitachi Chemical's anisotropic conductive film accounts for about 65% of the global market, and there was a temporary power outage at the plant in Shimodate, Ibaraki, that produces it, but the facilities are currently up and running again. Furthermore, Asahi Glass processes smaller glass panels at a plant in Yonezawa in Yamagata Prefecture that was affected, but it is being phased back into operation.

Figure 4. Situation at major LCD-related production bases

Products	Company	Domestic plants	Situation
Glass	Asahi Glass	Takasago, Kansai (Hyogo), Keihin (Kanagawa), Yonezawa (Yamagata)	Some damage at Yonezawa, but production restarting in stages
	Nippon Electric Glass	Takatsuki, Notogawa (Shiga)	No earthquake damage
	Corning	Kakegawa (Shizuoka)	No earthquake damage
LCD materials	Chisso	Ichihara (Chiba)	Operations suspended but have already restarted
	DIC	Ina (Saitama)	No earthquake damage
Orientation film	JSR	Yokkaichi (Mie)	No earthquake damage
	Nissan Chemical	Sodegaura (Chiba)	No earthquake damage
Color resist	JSR	Yokkaichi (Mie), Saga (Saga)	No earthquake damage
	Mitsubishi Chemical	Kurosaki (Fukuoka)	No earthquake damage
Polarization film	Nitto Denko	Onomichi (Hiroshima), Kameyama (Mie)	No earthquake damage
	Sumitomo Chemical	Ehime (Ehime)	No earthquake damage
PVA film	Kuraray	Tamashima (Okayama), Saijo (Ehime)	No earthquake damage
	Nippon Synthetic Chemical Industry	Uto (Kumamoto), Ogaki (Shiga)	No earthquake damage
TAC/retardation film	Fujifilm	Ashigara (Kanagawa), Kikuyo (Kumamoto)	No earthquake damage
	Konica Minolta	Kobe (Hyogo)	No earthquake damage
	Zeon	Himi (Toyama)	No earthquake damage
	Nippon Shokubai	Himeji (Hyogo)	No earthquake damage
Anisotropic conductive film	Hitachi Chemical	Shimodate (Ibaraki)	Operations suspended but have already restarted
	Sony	Kanuma (Tochigi)	Operations suspended but have already restarted
LCD panels	Sharp	Kameyama (Mie), Sakai (Osaka)	No earthquake damage
	Panasonic	Mobara (Chiba), Himeji (Hyogo)	No earthquake damage

Source: Company discussions, Citi Investment Research and Analysis.

Lithium-ion batteries

Normal production of batteries except at Sony

As for lithium-ion batteries, Sony's production facilities in Koriyama and Motomiya (both in inland Fukushima Prefecture) were damaged and production has been suspended. The production facilities of other companies, including Sanyo Electric, Panasonic, and GS Yuasa, are located in Western Japan and were not damaged.

Key materials largely produced in western Japan

Many parts and material makers are not listed companies and information is limited, but Asahi Kasei, a major maker of separators, has production facilities in Moriyama (Shiga Prefecture) and Hyuga (Miyazaki Prefecture)—both in western Japan and undamaged. The biggest maker of electrolytic fluids, Ube Industries, produces them in Ube (Yamaguchi Prefecture), and the second

Hitachi Chemical's negative electrode materials facility is closed

biggest maker Mitsubishi Chemical has its facilities in Yokkaichi (Mie Prefecture); we understand there are no problems in this area. The positive electrode material production facilities of Nichia and Tanaka Chemical are in Western Japan, so these are unlikely to be affected either.

The only material where we can see potential for some minor bottlenecks is negative electrode materials. The Ibaraki production facilities of Hitachi Chemical, which has a roughly 40% global market share, were slightly damaged in the earthquake, and power and water supplies remain insufficient. However, we understand the damage is not severe and we gather production could be up and running again within a week or two. We therefore do not anticipate major problems.

HDDs

While there are some concerns, we think the impact will be limited

HDD components and materials potentially impacted by the effects of the Japan earthquake include motor driver ICs and preamps produced by Texas Instruments (TI) and the aluminum blanks produced by Kobe Steel and Furukawa Electric. Production bases for glass substrates (made by Hoya, Konica Minolta, and Asahi Glass), which are the main material used in 2.5" HDDs for notebook PCs, and for glass blanks (made by Hoya and Ohara) have not been damaged. Showa Denko is likely to resume media production in stages from March 17. We see no problems with production of Nidec's motors, NHK Spring's springs, Alps Electric's pressure sensors, or TDK's heads.

TI's production facilities for motor ICs and preamps in Miho in inland Ibaraki Prefecture are currently shut down. The company has said it expects to resume operations within a month. Looking forward, this could be a concern in terms of bottlenecks in parts supplies, but we understand driver makers have two weeks' to one month's worth of parts inventories, and we think possibly some alternative supplies from other plants or companies can be found to limit the impact.

Consumer electronics/electronic components/semiconductors

Eastern Japan earthquake

The earthquake and ensuing tsunami have damaged electronics plants and there have been reports of production being suspended. Electronic component, semiconductor, and consumer electronics production bases are spread across Japan and there are relatively few important ones in the worst affected prefectures of Iwate, Miyagi, and Fukushima. Most companies report that damage to buildings and equipment is not serious and that normal earthquake response measures have been effective. However, it appears that a return to normality at major production facilities in northern Japan will depend on the restoration of power and other utilities, and it is too early to be optimistic on this front.

Primary damage not severe but power down

Many companies have plants in Tohoku and Koshinetsu (Yamanashi, Nagano, and Niigata prefectures), regions that were closest to the epicentre of the earthquakes (Nidec, TDK, Alps Electric, Hirose Electric, Rohm, Kyocera, Taiyo Yuden, Murata, Elpida Memory, Renesas Technologies, Sony, etc.) In most cases the damage has not been serious, although many companies report that the resumption of normal operations hinges on the restoration of electricity and other utilities. We estimate this will take around a month in Iwate, Miyagi, and some parts of Fukushima, prefectures closest to the epicentre of the biggest earthquake, and from several days to a month in the next closest prefectures of Akita, Yamagata, Ibaraki, Chiba and some parts of Fukushima. Plants in Niigata, Gunma, Tochigi, and Nagano are operating at close to normal.

Products that are difficult to substitute could have a large impact on the industry

The extent to which plant shutdowns affect the broader industry will depend on the type of products made at the plants. If they are products for which it is difficult to transfer production to another plant or for competitors to make substitute products, restarting production before supply chain inventory is exhausted becomes crucial. Customized components fall into this category and include Hirose's smartphone connectors, Murata's high-frequency modules, and Alps Electric's structural components.

Concern about multiple impacts

Components that command high market shares are also difficult to substitute, as competitors cannot cover the loss of production. The loss of supply capacity not only hurts the companies that make the components but also potentially other companies. Disruption to the production of package substrate materials at Mitsubishi Gas Chemical (BT materials) and Hitachi Chemicals is a risk for package substrate makers, especially in Taiwan. Other components with high market shares whose production has been disrupted include TI's motor controller ICs for HDDs and Sony's blue-violet laser diodes for Blu-Ray DVDs.

Companies affected

We believe the risks are high for plants near the epicenter that may not have power restored for a while and identify Hirose, Murata, Rohm, Renesas, and Sony as companies where production problems could be protracted.

Companies that have suffered indirect damage include Funai (shortage of laser diodes for Blu-Ray player/recorders), and Pioneer (car electronics hurt by suspension of domestic auto production). We highlight the following companies outside the sector that could be affected: Nokia (smartphones); Kinsus Interconnect Technology and SEMCO (package substrates), Apple (smartphones, tablet PCs), Nidec, Showa Denko, TDK, Western Digital, Seagate (HDDs).

Figure 5. Situation at electronic component makers

Code	Name	Date	Source	Comments
4062	Ibiden	3/15	Company	No major physical damage likely to impair production or sales at the plants or offices of Ibiden and group companies.
5334	NGK Spark Plug	3/14	Company	No production bases in Tohoku; no impact at present on production structure from factors such as damage to facilities.
6592	Mabuchi Motor	3/14	Company	All production is overseas, and continues uninterrupted. Headquarters facilities functioning normally except for the effects of planned power outages. Minor damage at peripheral facilities; details under investigation.
6594	Nidec	3/17	Company	Nidec Copal: Ichinoseki plant (precision small motors, etc.) operating 3/17, Koriyama R&D center (optical devices, industrial printers) open 3/17 Nidec Copal Precision Parts: Fukushima plant (dies, etc.), Koriyama plant (dies, etc.) open 3/17 Copal Electronics: Tajiri office (circuit components) closed 3/17 Nidec Nissin Tohoku (plastic forming, etc.) operating 3/17
16	TDK	3/15	Company	Narita plant (metal magnets), Akita plant (various electronic materials), Chokai plant (ferrite cores), Inakura plant (ferrite cores), Akita, Kitakami, Honjo plants (capacitors), Ouchi plant (coils, high-frequency components): Preparations being made for production, but possible impact from planned power outages Kofu plant (thin film devices, silicon devices), Media Technology (Yamanashi; data storage tapes, commercial broadcasting tape), Kisakata plant (capacitors); Konoura plant, Yuzawa plant, Iwaki plant (coils, high-frequency components); Honjo plant (power supplies); Yashima plant (sensors); TDK Ujo (capacitors); Sakata plant, Yuza plant (coils, transformers, power supplies, sensors), Nagaoka Technical Center (power supply components): Production resuming, but subject to planned power outages Technical Center (Ichikawa, Chiba; development of various products), Kisakata plant (development of various products), Hirasawa plant (R&D), Tsuruoka plant (coils, transformers, power supplies, sensors): Operating, but subject to power outages TDK Micro Device (Ibaraki; organic EL): Damage inspections underway; production suspended. Subject to planned power outages
6767	Mitsumi Electric	3/16 15:30	Company	Minor damage to buildings and facilities, but no impact on business activities Headquarters (Tama, Tokyo): Continuing to operate on reduced schedule due to planned power outages Atsugi: Scheduling chip production line operations to fit planned power outages. Continuing with scaled-back activities due to rolling blackouts Kyushu, Chiba: Operating as usual Yamagata, Akita: Continuing to operate as usual, but potential scaling back of activity if planned power outages are implemented Some disrupted logistics in the six Tohoku prefectures, Tochigi Prefecture, Ibaraki Prefecture, and Hokkaido likely to result in delayed shipments of certain products
6770	Alps Electric	3/15 17:00	Company	Bases in affected areas closed, working toward resuming activities. Damage assessment underway, but no serious damage from building collapses, fires, or tsunami waves
6804	Hosiden	3/14	Company	Very minor direct damage to domestic group bases; production not seriously affected. As for indirect damage, the company has few suppliers in the Tohoku region on the whole, and at present it sees no major impact. Certain suppliers and partners are based in Tohoku, and their situations are being checked
6806	Hirose Electric	3/17 8:00	Company	Miyauchi plant: No major damage to buildings or facilities. Expects to resume production as infrastructure is restored. Koriyama plant: Damage to buildings and facilities, but mostly repaired. Resuming production gradually as electricity and communications are restored Ichinoseki plant: Minor damage to buildings and facilities is being repaired. Expects to gradually resume production as electricity and communications are restored Group partners: Production facilities at only two of 70 Tohoku-based partners were destroyed, and one has suspended operations due to the effects of the nuclear power plant situation. Company looking into alternative production options overseas
6963	Rohm	3/17 11:00	Company	Okai Semiconductor Miyagi (LSI): Water and power have yet to be restored, and the company is making preparations to ensure a swift resumption of operations once infrastructure is back in place. The company is building an alternative production system at its Kyoto plant and the Rohm Hamamatsu plant, and is striving to ensure its ability to meet orders Rohm Tsukuba (transistors, diodes): Industrial-use water supplies are cut off, but the company aims to resume partial operations as early as the end of this week. The company is building an alternative production structure at Rohm Wako Device and Rohm Apollo Device, and is striving to ensure its ability to meet orders
6967	Shinko Electric	3/15	Company	No earthquake-related damage to buildings and facilities
6971	Kyocera	3/16 12:00	Company	Fukushima Tanagura plant (communications equipment): Some damage to buildings and facilities. Partial resumption of production from 3/15 Kyocera Chemical Koriyama plant (organic materials): Some damage to buildings and facilities. Due to impact on utility infrastructure, production currently suspended Kyocera Kinseki Yamagata Corporation (quartz crystal components): Some damage to buildings and facilities. Due to impact on utility infrastructure, production currently suspended Kyocera Chemical Kawaguchi plant (organic materials): Some damage to buildings and facilities. Production resumed from 3/15 Kyocera Chemical Kawasaki plant (organic materials): Some damage to buildings and facilities. Production resumed from 3/15 Kyocera Chemical Moka plant (organic materials): Some damage to buildings and facilities. Resumed production from 3/17
6976	Taiyo Yuden	3/14 8:00	Company	That's Fukushima Co.: Some damage to buildings and facilities. Production suspended due to interruption of power and gas supplies. There is some concern there will be delays in shipments of manufactured products At other production bases, planned power outages are likely, and we expect scheduling and planning of resumed operations to be set accordingly
6981	Murata	3/16 17:00	Company	Tome plant (EMI filters, coils): Damage assessment underway. We understand there was some damage to building interiors and facilities. The company expects power to return on the afternoon of 3/17 and is preparing to repair buildings and equipment. Outlook for restoration, including other infrastructure lifelines, TBA Sendai plant (piezoelectric products and high-frequency devices): No major damage to buildings or facilities. Electricity (for industrial use), water, and gas lifelines are currently cut off. Outlook for restoration TBA. If the restoration is delayed, the company plans alternative supplies with products from Kanazawa Murata Manufacturing (Shirayama, Ishikawa Prefecture) Oyama plant (polymer capacitors): Preparing to resume operations. If there is no power due to planned outages, restoration may take time; plans TBA

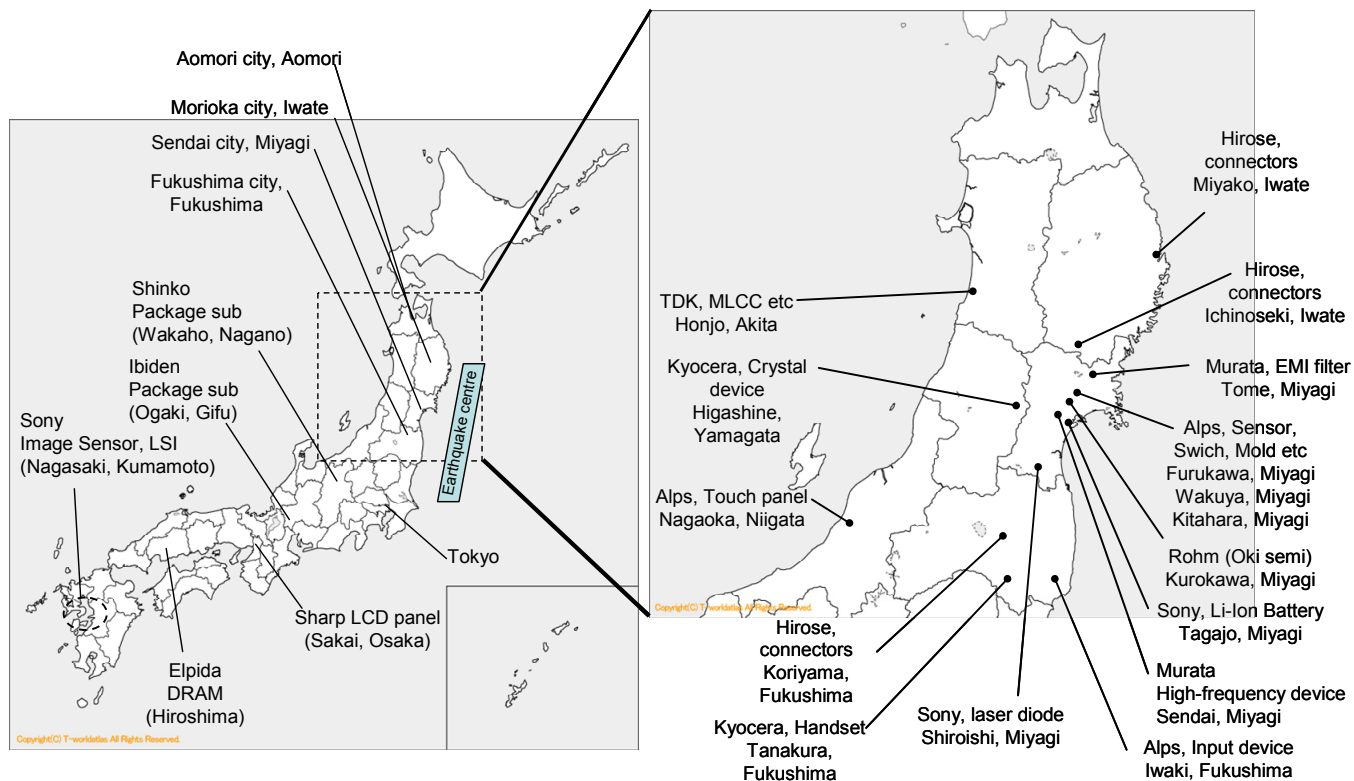
Source: Citi Investment Research and Analysis, based on information from companies.

Figure 6. Situation at semiconductor and consumer electronics companies

Code	Name	Date	Source	Comments
6665	Elpida Memory	3/16 19:00	Company	Operations at Akita Elpida, a domestic base for package assembly and testing, were suspended due to a loss of power accompanying the earthquake on 3/11, but with the incremental return of power from 3/16, production is resuming in stages. There was no damage from the quake or the power outage. Furthermore, more than 90% of the package assembly and testing in Elpida's DRAM production is handled overseas, so we think the potential business risk of further stoppages is limited
6723	Renesas Electronics	3/16 12:00	Company	Renesas Northern Japan Semiconductor, Tsugaru plant: No damage to building. Production equipment being checked. Currently assessing operational status (power still down). Facilities inspections start when power is back up Renesas Yamagata Semiconductor, Tsuruoka plant: Some damage to building. No damage to production equipment. Preparing to resume operations. Start-up interrupted in response to planned power outage Renesas Electronics, Naka plant: Damage to building. Damage to production equipment. Operations suspended (power down). Cleanroom inspection to proceed after power is restored Renesas Electronics, Takasaki plant: Some damage to building. No damage to production equipment. Preparing to resume operations (subject to planned power outages). Plans to restart after blackout Renesas Electronics, Kofu plant: Some damage to building. Some damage to production equipment. Preparing to resume operations (subject to planned power outages). Plans to restart after blackout Renesas High Components (semiconductor back-end processes; Tsuruta, Aomori): No damage to buildings. No damage to production equipment. Preparing to resume operations (subject to planned power outages). Plans to restart after blackout Renesas Northern Japan Semiconductor, Yonezawa plant (semiconductor back-end processes): Some damage to buildings. Some damage to production equipment. Resumption of operations underway (subject to planned power outages). Preparing to resume production during hours that power is on Renesas Eastern Japan Semiconductor, Tokyo Device Division (semiconductor back-end processes): No damage to buildings. No damage to production equipment. Partial resumption of production activities. Operating during hours that power is on; however, only for products that had been in progress, as supply of pure water is interrupted
6752	Panasonic	3/14 15:40	Company	Production has been halted at the Sendai plant (electronic components), Fukushima plant (digital camera), Koriyama plant (Panasonic Electric Works, electronic materials), and Tokyo Seisakusho (Gunma prefecture, Sanyo, washers and dryers, etc.) The Sendai plant and Fukushima plant are off-limits because of the risk of aftershocks. Panasonic is collecting information about the impact the earthquake has had on electricity, gas, water supply and distribution and procurement for other facilities in these regions and will study appropriate response measures
6753	Sharp	3/15 17:00	Company	No major damage to buildings. Only production base in eastern Japan is Tochigi Plant, but this will be operating on a curtailed schedule from 3/15, depending on power supplies
6758	Sony	3/14 11:00	Company	Operations at the following sites are suspended: Sony Chemical & Information Devices Tagajo plant (magnetic tape, BD, etc.), Tome office (optical components, IC cards, etc.), Sony Shiraishi Semiconductor (semiconductor lasers), Sony Energy Devices Koriyama office, Motomiya office (lithium-ion batteries, etc.), Sony Manufacturing Systems (Kuki, Saitama; mounting equipment, etc.), Sony DADC Japan Ibaraki plant (CDs, DVDs, etc.), Sony Sendai Technology Center The following sites have voluntarily powered down: Sony Chemical & Information Devices Kanuma office, Sony Energy Devices Tochigi office, Sony Atsugi Technology Center There are no reports of damage to other production facilities or buildings. Sites other than those noted above are operating. Conditions at other domestic affiliates are currently being checked
6773	Pioneer	3/15 11:00	Company	Minor damage resulting from the earthquake was confirmed at facilities at the Pioneer head office (Kawasaki, Kanagawa Prefecture), Kawagoe plant (Kawagoe, Saitama Prefecture), Tohoku Pioneer (Tendo, Yamagata Prefecture), and Towada Pioneer (Towada, Aomori Prefecture), but after safety was confirmed, the facilities continue to operate normally
6839	Funai	3/15	Company	No damage to facilities
6954	Casio Computer	3/14	Company	Casio said it is working to ascertain the condition of its facilities while confirming safety as well as the status of materials and infrastructure in efforts to resume operations. While prioritizing safety, the company plans to resume operations when inspections and checks are complete. While it does not expect major damage to buildings, it expect activities to be affected by interruptions in essential utilities

Source: Company data, Citi Investment Research and Analysis.

Figure 7. Consumer electronics, electronic components, semiconductors: Location of key production bases



Source: Company data, Citi Investment Research and Analysis.

Industrial electronics

We believe the main blow to the industrial electronics sector is doubts about the future of nuclear energy raised by events at the Fukushima nuclear plant. However, in this report we focus on the supply chain impact.

NAND: Supply stagnation possible

NAND supply could stagnate, partly because of three line suspensions at Toshiba in March

Toshiba's Yokkaichi plant, which is the NAND production base, did not suffer serious damage in the earthquake. However, we have confirmed that production has been suspended three times in March (only a partial suspension on each occasion) as described below.

Considering production lead times, temporary line suspensions should have only a very limited impact on near-term output. But given the disruption to distribution and other delays, there is potential for the supply shortages in the very near term. Moreover, we believe the three line suspensions in March will probably have an impact on output over the next few months. And considering supply pressures on the input side, we think there is a good chance that NAND supply will stagnate.

- Some equipment was idled on March 8 because of problems during maintenance (resumed on the morning of March 10)
- Some equipment was idled on March 11 following the earthquake (operations had almost returned to normal by 19:00 on March 12)
- Some equipment was idled following the Shizuoka aftershock on the night of March 15 (operations had almost returned to normal by 7:00 on March 16)

Impact on the overall supply chain

Impact on auto electronics and digital consumer electronics supply chain

The key semiconductor and electronic component production bases that suffered the most damage in the earthquake were Iwate Toshiba Electronics (MCU, ASIC), Fujitsu Semiconductor's Aizuwakamatsu plant (MCU, NOR, logic ICs, mainly for digital consumer electronics), and Fujitsu Semiconductor's Iwate plant (MCUs for auto electronics and digital consumer electronics). We understand that these facilities do not make any products that have dominant market shares, and there is still no time frame for the restoration of operations at some facilities. Developments should be monitored to assess the impact on auto electronics and digital consumer electronics supply chains.

Mitsubishi Electric the least affected by the earthquake

Mitsubishi Electric least affected

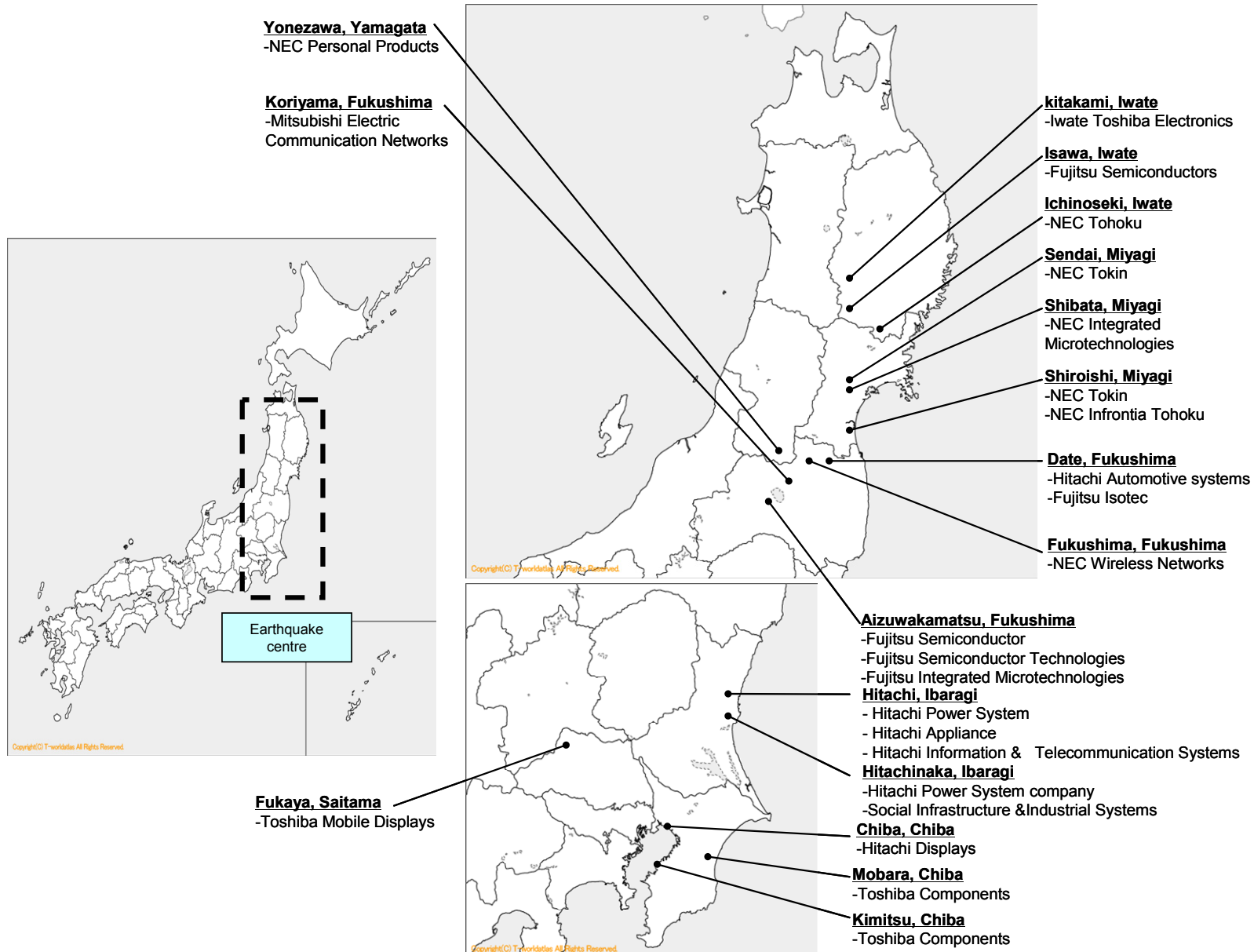
The integrated electronics maker that has probably been least affected is Mitsubishi Electric. This is because its production bases are mainly located in western Japan. Mitsubishi could feel the impact of secondary effects, such as the suspension of production by automakers, although we think this would be of little consequence for earnings. The main production bases of other sector companies that have suffered some damage are shown in Figure 6.

Figure 8. Industrial electronics: Overview of earthquake impact on major production bases

Code	Name	Date	Facility	Products	Location	Status	Infrastructure			Outlook for resumed operations
							Electricity	Water	Production equipment	
6501	Hitachi	3/17	Hitachi Power Systems, Hitachi Works	Thermal, hydroelectric, nuclear power systems; electrical systems; environment systems	Hitachi, Ibaraki	Idle	Some	None	Damaged	Damage assessment
		3/17	Hitachi Urban Planning and Development Systems, Mito Works	Elevators and escalators, building systems, railway traffic systems	Hitachinaka, Ibaraki	Idle	None	None	Damaged	Damage assessment
		3/17	Hitachi Appliances, Taga Office	Home appliances, high-performance plastic materials, printed circuit boards	Hitachi, Ibaraki	Idle	None	None	Damaged	Damage assessment
		3/17	Hitachi Displays, Mobara Office	Small TFT LCDs for mobile phones, small low-temperature polysilicon TFTs	Chiba, Chiba	Idle	Unknown	Unknown	Unknown	Damage assessment underway, may take until early April to resume ops
		3/17	Hitachi Automotive Systems, Sawa Works	Engine control systems, HEV systems, outside recognition drive systems	Hitachinaka, Ibaraki	Idle	None	None	Damaged	Damage assessment
		3/17	Hitachi Automotive Systems, Fukushima Works	Suspension systems	Date, Fukushima	Idle	None	None	Damaged	Damage assessment
		3/17	Hitachi Information & Control Systems, Omika Works	Power control, plant measurement control, and general industrial control systems	Hitachi, Ibaraki	Idle	None	None	Damaged	Damage assessment
6502	Toshiba	3/15	Iwate Toshiba Electronics	Image sensors, microcontrollers, power MOSFETs	Kitakami, Iwate	Idle	Some	Unknown	Damaged	Damage assessment, expecting resumption c3/22
		3/17	Toshiba Motile Display	Small LCD panels for mobile handsets/smartphones	Fukaya, Saitama	Idle	Normal	Normal	Normal	Damage assessment, could take a month to restore ops
		3/15	Toshiba Components	Semiconductor elements, electronic components	Kimitsu/Mobara, Chiba	Idle	Normal	Normal	Normal	Some ops started, damage assessment
		3/15	Toshiba Yokkaichi plant	NAND flash memory	Yokkaichi, Mie	Running	Normal	Normal	Normal	Some equipment stopped, but operating normally
6503	Mitsubishi Electric	3/14	Communication Networks Center	Image monitoring systems, network equipment	Koriyama, Fukushima	Idle	Unknown	Unknown	Damaged	Confirming safety of building
6701	NEC	3/15	NEC Wireless Networks	Communications equipment	Fukushima, Fukushima	Idle	Normal	None	Damaged	Damage assessment
		3/15	NEC Tohoku	Communications equipment for carriers and corporate use	Ichinoseki, Iwate	Idle	None	None	Damaged	Damage assessment
		3/15	NEC Tokin	Electronic components, li-ion batteries, capacitors, sensors	Sendai, Miyagi	Idle	Normal	Some	Damaged	Damage assessment
		3/15	NEC Tokin		Shiroishi, Miyagi	Idle	Normal	Some	Damaged	Damage assessment
		3/15	NEC Infrontia Tohoku	Commercial-use terminals	Shiroishi, Miyagi	Idle	Unknown	Unknown	Damaged	Damage assessment
		3/15	NEC Personal Products	PC, corporate-use printers	Yonezawa, Yamagata	Running	Normal	Normal	Normal	Employees: trouble getting in
6702	Fujitsu	3/14	Fujitsu Semiconductor	Electronic devices/semiconductors	Isawa, Iwate	Idle	Some	None	Damaged	Damage assessment
		3/14	Fujitsu Semiconductor	Electronic devices/semiconductors	Aizuwakamatsu, Fukushima	Idle	Normal	Normal	Damaged	Resuming operations
		3/14	Fujitsu Semiconductor Technology	Semiconductor FE processing	Aizuwakamatsu, Fukushima	Idle	Normal	Normal	Damaged	Resuming operations
		3/14	Fujitsu Isotec	Desktop PCs, PC servers, printers	Date, Fukushima	Idle	None	None	Damaged	Damage assessment
		3/14	Fujitsu Integrated Microtechnology	Semiconductor BE processing	Shibata, Miyagi	Idle	Some	None	Damaged	Damage assessment
		3/14	Fujitsu Integrated Microtechnology	Semiconductor back-end processing	Aizuwakamatsu, Fukushima	Idle	Normal	Normal	Damaged	Resuming operations

Source: Company data, Citi Investment Research and Analysis.

Figure 9. Industrial electronics: Overview of major production bases in earthquake affected areas



Source: Company data, Citi Investment Research and Analysis.

Precision and SPE sectors

Production bases that sustained direct damage

Nikon, Tokyo Electron, Canon, and Ricoh sustain relatively large direct damage

Companies that have production bases in the disaster-hit region are Nikon (LCD and semiconductor lithography equipment), Tokyo Electron (etchers, heat treatment coating equipment), and Canon (LBP and IJP consumables, interchangeable lenses). However, damage to their plant buildings and production equipment was limited. Hoya, Konica Minolta, Fuji Film, and Seiko Epson have few major production facilities in the area that make large contributions to earnings, so we believe the direct impact will be minor.

Tokyo Electron, which has two plants in Miyagi Prefecture, aims to resume operations in two to three weeks, assuming utility supply is restored. However, the general view is that it will take longer given the plant locations of primary and secondary suppliers, the utility supply status, and the need for stable logistics and electricity supply.

Our take on indirect effects

On the sales front, concerns about the impact on Japanese office equipment businesses

We think it is necessary to assume that sales will be hit, mainly in the disaster-hit Tohoku region and the Kanto region around Tokyo, where economic activity is likely to be affected by rolling blackouts. While we foresee various consequences, we note the potential for relatively large impacts at Fujifilm and Ricoh. This is because their Japanese office equipment businesses (mainly copiers) account for a high proportion of consolidated sales (Fujifilm c36%, Ricoh c35%) and are likely to be affected by damage to customers, cooling replacement demand, and reduced business activity (lower consumables consumption volume).

Impact from disruption of parts procurement gradually emerging

Indirect impact on production caused by damage to suppliers and the disruption of logistics systems are already becoming evident. Canon shut down its Oita plant on Kyushu, which is far from the Tohoku region, for March 16 through 18, due to a shortage of parts. While it is impossible to fully assess the status of suppliers to our coverage companies from our vantage point, we expect to see similar situations at other firms moving forward. As Japan only accounted for 9% of global digital camera demand in 2010, we think the impact on the demand side will be limited.

Stock selection

We spotlight Fujifilm from among firms suffering little direct impact

Companies that have suffered little direct damage include Hoya, Konica Minolta, Fujifilm, and Seiko Epson. Fujifilm has been sold down to a PBR of 0.6x and we think downside is limited.

Quality name Canon likely to be preferred

Canon, which we like as a quality name, is relatively high up our order of preference. While Canon has three facilities in the Tohoku region that were damaged, we believe it will be able to secure alternative production bases, and we see little possibility of immediate supply disruption. We see a clear growth scenario for Canon once business operations normalize and barring the emergence of new company-specific risks we believe it will be relatively high up investors' preferred lists.

Stocks with latent risks

We view Nikon as latent risk stock. While there appears to be little direct damage to production facilities, equipment must be inspected to ensure their operation has not been affected by the shaking and must be adjusted where necessary, and this could result in shipment delays. Also, Nikon had planned to increase LCD lithography equipment unit production capacity at its facility in Miyagi Prefecture in July, but if this is delayed we think the supply of equipment

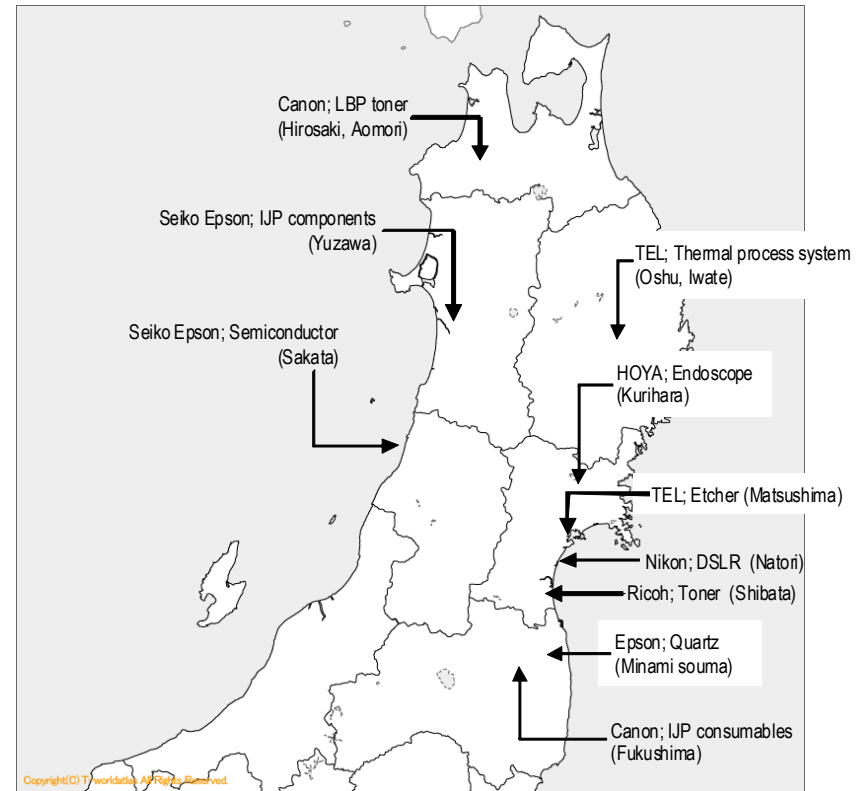
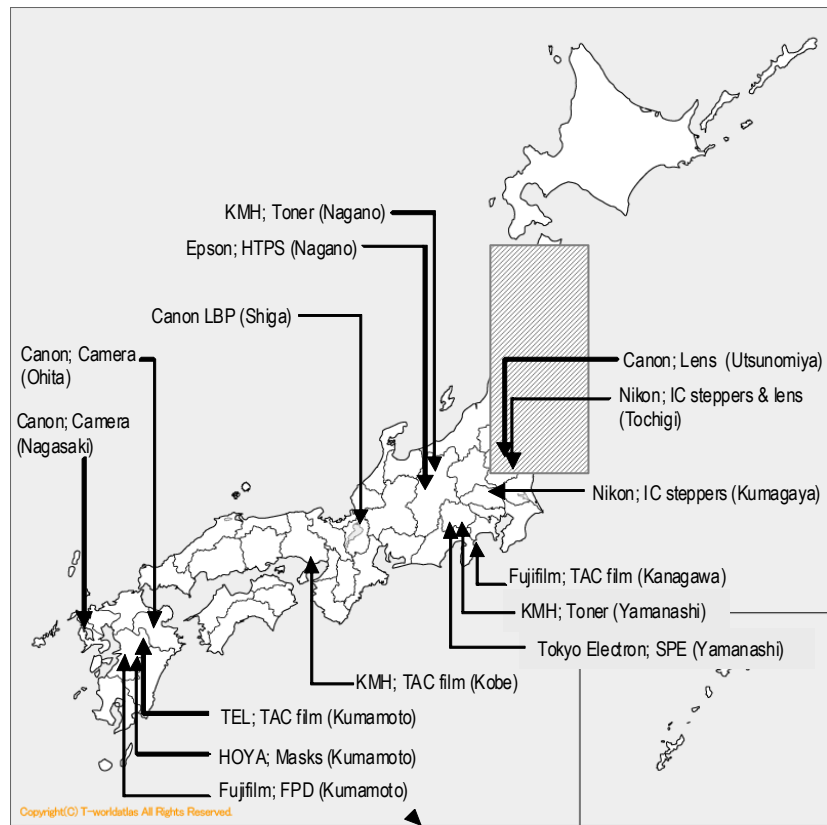
for smaller-sized LCD lines, demand for which has been strong of late, could fall short of expectations.

Figure 10. Summary of the earthquake damage at the eight precision equipment and SPE companies in our coverage

Ticker	Company	Opinion
4901	Fujifilm	Impact No major bases in Tohoku; one of the companies least exposed to direct impact. However, indirect effects bear watching.
		Production bases Production bases concentrated in Kanto (Shizuoka, Kanagawa) and Kumamoto, but no impact from the 3/15 quake (measuring up to 6 on the intensity scale) in the Shizuoka region.
		Concerns Possible indirect effects on office equipment business in Tohoku and Kanto regions (delivery delays, reduced printing volume, etc.) (consolidated sales weighting 25%).
4902	Konica Minolta	Impact No major bases in Tohoku; minor direct impact. Risk factors limited to general impact of power outages and disrupted logistics.
		Production bases Chemical toner production bases in Yamanashi and Nagano, but no damage at present. Copiers themselves are produced in China. TAC film produced in Kobe (western Japan); the company has facilities for HDD glass substrates in Asia.
		Concerns Based on the locations of production bases, our assumption is that direct damage is a relatively minor concern.
6724	Seiko Epson	Impact Four production bases in Tohoku, but they are not in mainstay businesses, so we expect the impact to be limited.
		Production bases Mainstay IJPs are produced in Indonesia and the Philippines, consumable supplies at multiple bases in Japan, China, the UK and the US. POS printers and SIDM printers are produced in China and Indonesia.
		Concerns It will probably take some time before the Epson Toyocom (high-frequency oscillators) production facility in Fukushima is running as normal.
7731	Nikon	Impact We understand there is little direct damage, but latent risk factors bear watching in the days ahead.
		Production bases Company has Tohoku bases in Miyagi (liquid crystal lithography equipment, professional-use DSLRs) and Tochigi (interchangeable lenses, semiconductor lithography equipment) and a Kanto base in Saitama (semiconductor lithography equipment, S620 systems, etc.). Principal DSLR production facilities are in Thailand.
		Concerns Possible need to re-inspect and adjust lithography equipment prior to shipping, which could delay deliveries. The company had planned to expand its Miyagi plant for liquid crystal lithography equipment production from July 2011, but if the start of operations is delayed it could have an impact on growth assumptions.
7741	Hoya	Impact Minor direct impact, but potential for indirect effects going forward.
		Production bases Outside of endoscopes produced at the Miyagi plant, the company has no major bases in Tohoku. The company has an optical glass furnace in Akishima in the western part of Tokyo; it produces glass HDD substrates overseas and masks in Hachioji and Kumamoto.
		Concerns We understand planned power outages will make stable production at the optical glass furnace in western Tokyo difficult. Furthermore, we gather there was some damage at suppliers for the Miyagi endoscope operation, and think it could take some time before a return to normal production.
7751	Canon	Impact The Utsunomiya plant and the operations of Oita Canon and Nagasaki Canon (mainly producing DSLR cameras) in Kyushu are suspended until March 18 at present. The knock-on effects on parts supplies are an issue that many companies are likely to share.
		Production bases Office equipment produced in China, Vietnam, and Thailand, etc., and consumable supplies produced in various regions. The company has production and development operations in the quake-hit Tohoku and Northern Kanto region, including Utsunomiya (interchangeable lenses), Fukushima (IJP parts), and Aomori (LBP supplies).
		Concerns If the parts procurement problems that have caused the suspension of operations at DSLR facilities in Kyushu drag out, it could have an earnings impact. However, the company is already looking at production at alternative sites, and we think protracted low production levels can probably be avoided.
7752	Ricoh	Impact Tohoku Ricoh was damaged, but the direct impact is minor. However, indirect effects could emerge going forward.
		Production bases Consumable supplies are produced in Miyagi and in Numazu, Shizuoka. Most equipment is produced in China, although some is produced in Thailand and Japan.
		Concerns Main concern is potential indirect effects on office equipment business in Tohoku and Kanto regions (sales weighting of more than 30%).
8035	Tokyo Electron	Impact Resumption of operations will probably take at least three weeks at Tokyo Electron AT's Miyagi facilities (Matushima city; etchers) and about two weeks at Tokyo Electron Tohoku (Oshu, Iwate Prefecture; thermal processing systems). The closures could be protracted depending on when lifelines can be restored.
		Production bases The company has important production bases in Tohoku (Miyagi and Iwate prefectures), Kumamoto Prefecture, and Yamanashi Prefecture. Mainstay coater/developers are mainly produced in Kumamoto, while etchers are produced at the Matsushima plant in Miyagi and thermal processing equipment at Oshu in Iwate.
		Concerns The two bases in Tohoku have turned out to be unexpectedly important to SPE business. Therefore, if it takes a long time to resume operations, it could lead to concerns regarding the outlook for orders and shipments in April-June and beyond.

Source: Company discussions, company data, Citi Investment Research and Analysis.

Figure 11. Precision equipment and SPE sectors: Major production bases



Source: Company data, Citi Investment Research and Analysis.

Electronic materials

Semiconductors: Earthquake impact on major materials

Wafers and package substrate materials pose bottlenecks

In semiconductor materials, silicon wafer and package substrate material production has been affected. There appear to be almost no problems for photoresists, sealants, and other major materials.

Shin-Etsu Chemical has idled its main 300mm plant

In silicon wafers, Shin-Etsu Chemical has shut down production at its Shirakawa plant in inland Fukushima Prefecture. This integrated 300mm wafer facility accounts for 60% (our estimate) of the company's c1.2mn wafer/month production capacity. Damage is being assessed and our understanding is that there is still no timeframe for the restart of operations. It appears that it will take some time to restore power supply and logistics infrastructure.

MEMC and SUMCO also impacted

US-based MEMC has also shut down its 300mm processing facility in Utsunomiya. Production is estimated at around 200,000 wafers/month. SUMCO has suspended operations at its 300mm wafer plant in Yonezawa in Yamagata Prefecture and at its 200mm crystal plant there. We estimate these facilities account for around 20% of SUMCO's production capacity of c1.4m wafers/month.

25%-30% of global capacity down

The shutdown of these three plants reduces global 300mm wafer production capacity of 4.2m wafers/month by around 25%-30%. We believe SUMCO can draw on surplus capacity at its Imari, Saga, and Taiwan facilities to fill the hole. MEMC should be able to cope to some degree by boosting operating rates at its other processing facilities. We expect Shin-Etsu to take whatever action it can at other plants to cover the loss. But given the large weighting of the Shirakawa plant and Shin-Etsu's high market share, if the shut down lasts more than one month we think it would be difficult for other makers to completely bridge the gap, resulting in 300mm wafer supply/demand tightening.

Figure 12. 300mm wafer production capacity and demand

('000 units/month)	End CY06	End CY07	End CY08	End CY09	End CY10	End CY11 estimate
Capacity	1,950	2,680	3,650	3,950	4,200	4,450
Shin-Etsu Chemical	750	1,100	1,200	1,200	1,200	1,300
SUMCO	595	815	1,250	1,350	1,400	1,400
Siltronic	225	285	400	500	500	500
MEMC	280	330	400	400	450	500
Covalent Materials	40	50	150	150	150	150
LG Siltron	60	100	250	350	500	600
Demand	2,038	2,711	1,560	3,250	3,500	4,100
Operating rate	105%	101%	43%	82%	83%	92%

Source: Citi Investment Research and Analysis.

Mitsubishi Gas Chemical, which has high market share, suspends substrate material production

In IC package substrate materials, Mitsubishi Gas Chemical has suspended operations at its Shirakawa plant in Fukushima Prefecture, and Hitachi Chemical has suspended operations at its Shimodate plant in Ibaraki Prefecture. MGC's BT laminates account for around 60% of the market for high-performance IC package substrate materials and Hitachi Chemical's MCL-E679 for roughly 30%. BT laminates are widely used as substrate materials for CSP and BGA ICs used in mobile phones and digital consumer electronics. We estimate Hitachi Chemical's MCL-E679 has a high share of the market for Intel's MPU package materials.

Disruption of mobile phone IC production a risk

Hitachi Chemical's Shimodate plant sustained relatively light damage and production is expected to restart soon. On the other hand, we understand it is unclear how long it will take for MGC's Shirakawa plant, including electric power and other infrastructure, to return to normal operations. Package substrate materials differ depending on the type of IC in which they are used. Substrate materials for logic ICs, in particular, are difficult to replace effectively. Consequently, if the restoration of MGC's Shirakawa plant is delayed, this could impede the production of ICs that use BT laminates. For more details, please see our March 16 memo, [Eastern Japan earthquake/Chemical and semiconductor sectors - Mitsubishi Gas Chemical: Impact of suspended BT materials supply on the semiconductor industry](#).

Most major LCD materials production bases are in western Japan and have suffered little quake damage

Glass substrates

We do not expect the LCD material supply chain to be much affected by the earthquake. The domestic glass substrate melting furnaces of Asahi Glass, Nippon Electric Glass, and Corning have not been affected. We understand that Asahi Glass' Yonezawa plant, which is the main polishing facility for smaller glass substrates, stopped production temporarily, and that there was damage to facilities at partner companies.

Cell process materials

We see no impact on materials used in the LCD cell processing, such as liquid crystal materials supplied by DIC and Chisso and alignment film supplied by Nissan Chemical and JSR. Also, there has been no impact on JSR's spacers and other chemical-related materials, as they are produced at the Yokkaichi plant.

Polarizing film materials

The polarizing film production bases of Nitto Denko and Sumitomo Chemical are located in western Japan. PVA film is a polarizing film input, and the PVA facilities of Kuraray and Nippon Synthetic Chemical Industry have not been affected, while in TAC film, neither Daicel's TAC facilities nor the TAC film facilities of Fuji Film and Konica Minolta have been affected. In retardation film, there has been no impact at Konica Minolta and Fujifilm, nor on Zeon's Zeonor film and Nippon Shokubai's Acryviewa.

PET films

LCD-use PET film has not been significantly affected, aside from the temporary suspension of production at Teijin DuPont Film's Utsunomiya and Ibaraki plants. Toray's Mishima, Gifu, and Nakatsugawa plants, Teijin's Gifu plant, and Mitsubishi Chemical's Saga plant all appear to be operating normally.

Anisotropic conductive film

Production of anisotropic conductive film has restarted at Hitachi Chemical's Shimodate plant in Ibaraki Prefecture but remains suspended at Sony's Kanuma plant in Tochigi Prefecture. Sony's facility was not damaged; production stopped because of an automatic power shutdown and we think it will be restarted soon.

LED backlights

Japanese manufacturers have a high share of the market for LED-related backlight module parts/materials. Production appears to have been only minimally affected or completely unaffected in the following areas: LED chips (Nichia and Toyoda Gosei, etc.), LED phosphor (Denki Kagaku Kogyo), LED sealant materials (Shin-Etsu Chemical). However, Kuraray has suspended the production of Genestar, which has a high share of the market for LED reflectors, at its Kashima plant.

Recommended companies

Nitto Denko's western Japan focus

Best placed among electronics material/glass-related companies are Nitto Denko, Sumitomo Bakelite, and NEG. Nitto Denko's major polarizing film and ITO film factories are located in western Japan and have not been affected much by the earthquake. We expect polarizing film market share growth and profitability improvement in the large TV space and a sharp increase in ITO film sales to support earnings expansion. The shares have fallen sharply from their recent peak since the earthquake as investors have moved to lock in profits, increasing the appeal of valuations.

Sumitomo Bakelite suffered little damage

Sumitomo Bakelite suffered little damage in the earthquake. We look for expanding sales of IC package substrate material L&Z for smartphones and circuitry products business restructuring benefits to support earnings growth. The PBR has dropped below 1x and we believe the shares are attractive at this level.

NEG based in central Japan

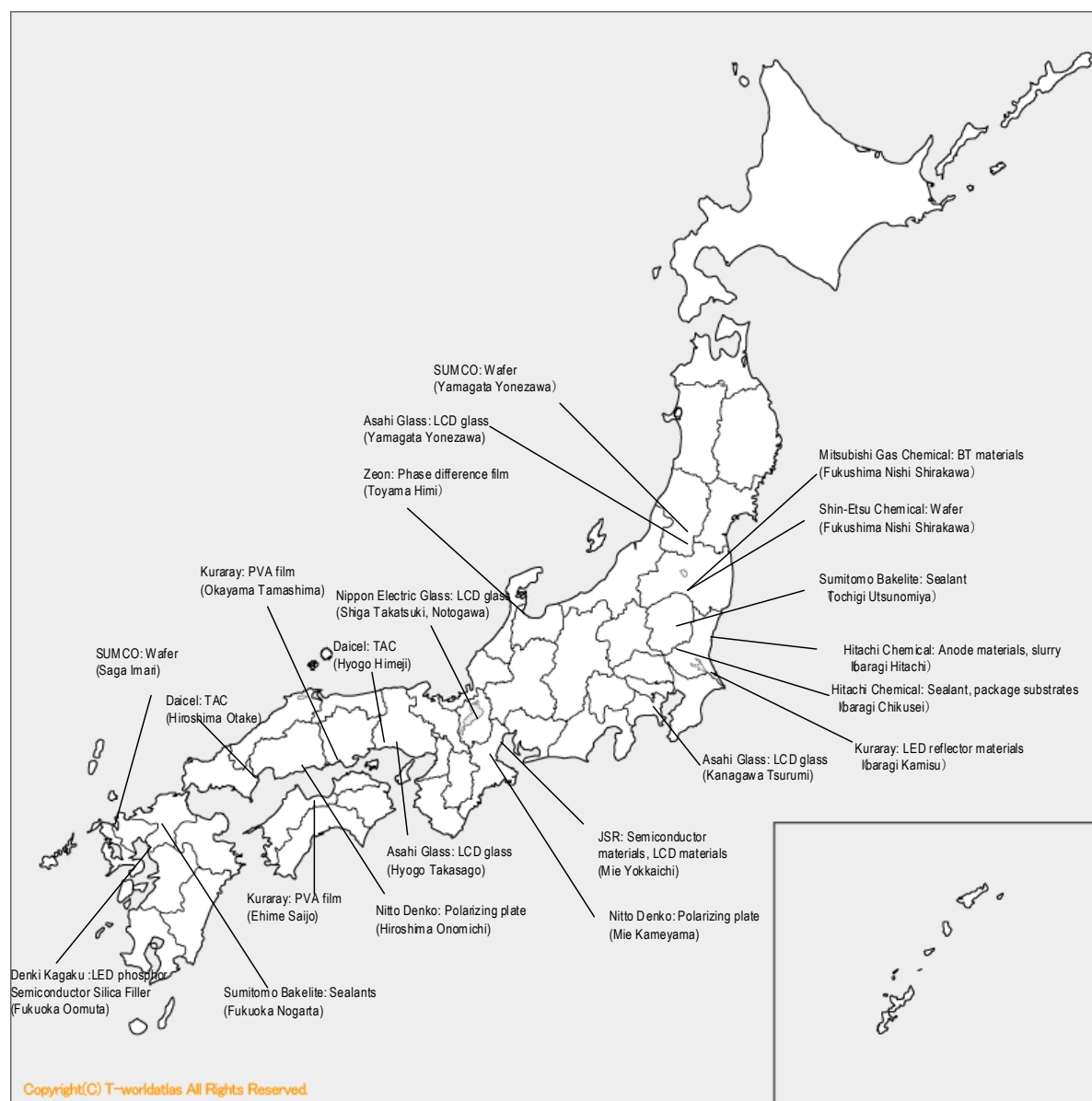
We highlight NEG in the glass field. All of the company's LCD glass substrate melting furnaces are located in Shiga Prefecture (Notogawa, Takatsuki) and we understand there was no earthquake damage. We believe NEG will be able to respond quickly to demand for thinner large glass substrates (the shift to 0.5mm from 0.7mm), reduce unit manufacturing costs, control new investment, and capture market share from glass makers that use the float production method. Recent yen strengthening should be relatively positive as glass substrate transactions are conducted in yen.

Figure 13. Situation at semiconductor and consumer electronics makers

Code	Company	Earthquake impact
3405	Kuraray	Production suspended at the Kashima plant, which makes LED reflector material Genestar. There is no timeframe for restoration
3436	SUMCO	Production suspended at the Yonezawa plant, which makes crystal for 300mm and sub-200mm wafers. We believe the loss can be covered by production increases at other plants
4004	Showa Denko	There has been no damage to the Ichihara plant (hard disks), but considering power supply information we believe production was down until the 3/16. We do not expect a major impact
4063	Shin-Etsu Chemical	Production suspended at the Shirakawa plant, the main 300mm wafer base. Damage is being assessed and there is no timeframe for restoration. The entire Kashima petrochemical complex, which includes a Shin-Etsu PVC plant, has been closed. The Gunma plant (silicone) has already restarted production
4182	Mitsubishi Gas Chemical	Some buildings and equipment at a BT laminate production subsidiary have been damaged. Production and shipments have been suspended. MGC's copper-clad laminate has a c60% market share for high-performance IC package substrates and is the de facto product for mobile device-use ICs. If the shut down is protracted it could effect the entire supply chain
4185	JSR	The electronics materials business has not been affected. Production is suspended at the Kashima plant (rubber, etc.) The Chiba plant (rubber, etc.) has already restarted production
4203	Sumitomo Bakelite	Wafer coat resin facilities at the Utsunomiya plant were damaged but this should be covered by a production increase at the Kyushu plant
4217	Hitachi Chemical	Some facilities have been damaged at the plant in Hitachi (CMP slurry, LiB negative electrode materials) and restoration is expected to take a little time. The plant in western Ibaraki (semiconductor package substrate materials, anisotropic conductive film, etc) suffered little damage and preparation has started for the resumption of operations
5201	Asahi Glass	Temporary suspension at the Yonezawa plant, a smaller glass substrate polishing facility. Production facilities at partner companies have been damaged
5214	Nippon Electric Glass	No impact, including major LCD glass substrate melting furnaces
6988	Nitto Denko	No impact on electronics materials. Some medical products and tape facilities have been affected by overall damage is limited

Source: Company data, Citi Investment Research and Analysis.

Figure 14. Electronic materials/chemicals/textiles/glass: Main production facilities



Source: Company data, Citi Investment Research and Analysis.

Tech industry earthquake reports to date

Consumer electronics, electronic components, semiconductors: Kota Ezawa and Tsubasa Sasaki

Eastern Japan Earthquake / Consumer electronics/electronic components - Primary damage from quake limited

Eastern Japan Earthquake/Consumer electronics and electronic components - Update 1 – Restoring infrastructure is key

Eastern Japan earthquake/Consumer electronics/electronic components - Update 2 – Potential indirect damage gradually becoming clearer

Industrial electronics: Shinji Harada and Yuta Fukasawa

Eastern Japan Earthquake / Industrial electronics - Quake could impact nuclear policy worldwide

Precision equipment and SPE: Masahiro Shibano

Eastern Japan earthquake: Precision/SPE equipment sector - Complete picture unclear, but direct damage looks limited

Eastern Japan earthquake: Precision/SPE sector - Canon to halt production at domestic digital camera base for three days

Eastern Japan earthquake: Precision/SPE sector - Magnitude 6.0+ quake in eastern Shizuoka

Eastern Japan earthquake: Precision/SPE sector - Update on conditions at Tokyo Electron and Fujifilm

Electronic materials, chemicals, textiles, glass: Takao Kanai and Atsushi Ikeda

Eastern Japan earthquake/Chemicals synthetic fibers sector - Operations may have been suspended at petrochemical plants in Kashima, Chiba, and Kawasaki

Eastern Japan earthquake/Chemicals and synthetic fibers sector (2) - Kashima and Shirakawa plant closures could be slightly protracted

Eastern Japan earthquake/Chemical and semiconductor sectors - Mitsubishi Gas Chemical: Impact of suspended BT materials supply on the semiconductor industry

Figure 15. Companies mentioned in this memo

Company	Ticker	Investment rating	Share price (Mar 17, ¥)
Sumitomo Bakelite	4203	1M	481
Fujifilm Holdings	4901	2M	2,250
Nippon Electric Glass	5214	1M	1,102
Sharp	6753	2H	741
Casio Computer	6952	1M	603
Shinko Electric	6967	1H	800
Nitto Denko	6988	1M	4,085
Canon	7751	1M	3,470

Source: Citi Investment Research and Analysis.

Appendix A-1

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