GLOSSARY OF TECHNICAL TERMS

In this document, unless the context otherwise requires, explanations and definitions of certain terms used in this document in connection with our Group and our business shall have the meanings set out below. The terms and their meanings may not always correspond to standard industry meaning or usage of these terms.

"2.5D packaging"	a packaging method that integrates multiple dies side-by-side on an interposer for high-density interconnects without full 3D stacking
"3D-NAND"	three-dimensional NAND flash memory, a type of non-volatile storage where memory cells are stacked vertically to increase capacity and reduce cost per bit
"3D packaging"	a semiconductor packaging technology that stacks multiple chips vertically with TSVs for high-performance and compact integration
"ADAS"	advanced driver-assistance systems, vehicle systems that enhance safety by using sensors and AI to assist with driving tasks such as braking and lane-keeping
"Advanced multilayer PCB"	complex PCBs with many layers, incorporating advanced design features for signal routing, power distribution, and thermal management
"Advanced packaging"	a collection of packaging techniques beyond traditional wire bonding, such as 2.5D/3D, fan-out, and chiplet architectures, for improved performance
"Ag"	silver, a highly conductive metal used in some electronic finishes and pastes
"Aspect ratio"	the ratio of depth to width of a via or trench in PCBs or semiconductors, influencing the difficulty of fabrication and plating
"Au"	gold, a highly conductive and oxidation-resistant metal used in bonding and metallization in electronic packaging
"Automotive-grade chip"	semiconductor components qualified to meet the rigorous standards for use in automotive environments, including reliability and temperature tolerance

"BMS"	battery management system, an electronic system that monitors and manages battery charging, discharging, and safety
"Boards"	general term for printed circuit boards (PCBs), which mechanically support and electrically connect electronic components
"Bumps"	small solder or metal balls formed on chip pads for flip-chip bonding or wafer-level packaging
"Bumping"	the process of creating bumps
"Ceramic substrates"	substrates made from ceramic materials used for high thermal conductivity and insulation in power modules and RF applications
"Chiplet"	a small functional chip that can be combined with others in a package using advanced integration to form a complete system, enabling modular chip design
"Chip-level packaging"	the process of enclosing and protecting individual semiconductor chips after dicing, providing electrical connections to external circuitry
"CIS"	CMOS image sensor, a semiconductor device that converts light into electrical signals using complementary metal-oxide-semiconductor (CMOS) technology
"CIS chips"	CMOS image sensor chips, semiconductor devices that convert light into electrical signals, widely used in consumer electronics, cameras and machine vision
"Consumer-grade chip"	semiconductor chips designed for consumer electronics
"CoWoS packaging"	chip-on-wafer-on-substrate, an advanced 2.5D packaging technology developed by TSMC for integrating multiple chips with high bandwidth interconnects

"Cu-pillar"	copper pillars used as vertical electrical connections between a chip and its package or substrate, providing better conductivity, heat dissipation, and finer pitch than traditional solder bumps in advanced semiconductor packaging
"DC"	direct current, an electric current that flows in one direction only
"Dies"	individual, separated semiconductor chips obtained from dicing a processed wafer, each containing a complete circuit
"Display driver IC"	integrated circuit that controls pixels on a display panel, translating digital signals into analog voltages
"DRAM"	dynamic random-access memory, a type of volatile memory widely used for system memory in computing devices due to its speed and density
"Electrical signal connections"	pathways formed using conductive materials to transmit electrical signals between components in electronic systems
"Electroless plating"	a chemical plating process that deposits metal on a substrate without the use of electrical current
"Electronic ceramic housings"	protective enclosures made from ceramics that provide excellent electrical insulation and thermal conductivity for electronic components
"Electroplating"	a plating process that utilizes the principle of electrolysis, metal cations in the plating solution are reduced at the cathode, resulting in the formation of a metallic coating on the cathode surface
"ENEPIG"	electroless nickel electroless palladium immersion gold, a multilayer surface metallization used in semiconductor and PCB manufacturing that enhances wire bonding and solderability
"ENIG"	electroless nickel immersion gold, a two-layer metallic coating on semiconductors and PCBs providing good surface planarity and oxidation resistance

"EV"	electric vehicle, a vehicle powered by one or more electric motors using energy typically stored in rechargeable batteries
"FCBGA"	flip-chip ball grid array, a type of semiconductor package where the chip is mounted face-down using bumps, with a ball grid array for board connection
"Flip-chip packaging"	a packaging method where a semiconductor die is mounted face-down on the substrate, enabling high I/O density and improved electrical performance
"Foveros"	a 3D chip stacking technology developed by Intel that enables logic-on-logic integration through fine-pitch die-to-die interconnects
"FOWLP"	fan-out wafer-level packaging, an advanced packaging technology that redistributes I/O connections beyond the chip footprint to improve thermal/electrical performance
"FPC"	flexible printed circuit board, a bendable and lightweight circuit board used in compact and dynamic electronic applications
"FRD"	fast recovery diode, a type of diode that quickly switches from conducting to non-conducting state, used in power applications to reduce losses
"Glass substrates"	thin glass layers used as a base for building circuits or interposers, offering thermal and dimensional stability
"GPU"	graphics processing unit, a specialized processor designed for rapid image rendering and parallel processing, widely used in AI and scientific computing
"HBM"	high bandwidth memory, a type of high-performance RAM used in GPUs and AI chips, offering fast data transfer through 3D stacking and wide interfaces
"HDI"	high-density interconnect, a type of printed circuit board with very fine wiring and closely spaced components, used to achieve compact size and high performance in smartphones, wearables, and other advanced electronics

"Heterogeneous integration"	the integration of different types of chips (e.g., logic, memory, analog) into a single package, enhancing performance and system-level efficiency
"high-frequency and high-speed board"	PCBs designed to carry signals that switch or travel very quickly, used in applications like 5G, radar, high-speed data communication, and advanced computing to ensure stable and low-loss signal transmission
"High-layer count boards"	PCBs with a large number of conductive layers (typically 10 or more), used in high-performance computing and communication systems for signal integrity and dense routing.
"High-speed digital PCB"	PCBs optimized for signal integrity and low jitter in digital circuits with fast data rates, commonly used in networking and computing
"HPC"	high performance computing, systems designed to process and compute complex data quickly, used in AI, scientific research, and simulations
"IC"	integrated circuit, a circuit in which many elements are fabricated and interconnected on a single substrate, typically silicon, to perform an electronic function
"IC Substrate"	an intermediate layer in semiconductor packaging that connects the chip to the PCB, providing signal routing and mechanical support. Refer to organic substrate, excluding ceramic/glass variants unless specified
"IDM"	integrated device manufacturer, a company that designs, manufactures, and sells semiconductor devices under one roof
"IGBT"	insulated-gate bipolar transistor, a semiconductor device used in power electronics for high-efficiency switching at high voltages
"Industrial-grade chip"	chips designed for industrial applications with higher durability, extended temperature ranges, and long-term reliability

"Interposers"	intermediate substrate used to connect, adapt, or integrate chips and substrates, especially when fine-pitch, high-density, or multi-chip connections are needed
"I/O"	input/output, the interface through which a device communicates with the external environment or other devices
"I/O density"	the number of I/O connections per unit area on a semiconductor device or package, affecting signal bandwidth and integration level
"I/O pitch"	the distance between adjacent I/O terminals or bumps on a semiconductor package, impacting packaging density
"IVI"	in-vehicle infotainment, integrated systems in vehicles providing entertainment, navigation, and connectivity features to passengers and drivers
"Laser diode chips"	semiconductor devices that emit coherent light when electrically biased, used in optical communication, sensors, and display applications
"LED"	light-emitting diode, a semiconductor device that produces light when an electric current passes through it, widely used for lighting, displays, and indicators due to its high efficiency and long lifespan
"LLC"	a type of resonant converter that uses an inductor-inductor-capacitor topology for high-efficiency power conversion at variable load
"MEMS"	micro-electro-mechanical systems, miniature devices integrating electrical and mechanical components at the microscale for sensors and actuators
"Metallization and interconnection plating chemicals"	chemical solutions used to form thin metal layers and metal connections on chips and PCBs, enabling electrical conductivity and signal transmission during electronic manufacturing
"Moore's Law"	the observation that the number of transistors on a chip doubles approximately every two years, historically driving exponential growth in computing power

"MOSFET"	metal-oxide-semiconductor field-effect transistor, a fundamental semiconductor device used for switching and amplifying signals
"Ni"	nickel, a metal used in semiconductor and PCB plating processes for its good corrosion resistance and electrical properties
"Optical communication modules"	devices that convert electrical signals into optical signals and vice versa for high-speed data transmission over fiber networks
"Oxidation resistance"	the capability of a material or surface finish to resist degradation caused by exposure to oxygen, essential for maintaining solderability and electrical conductivity
"PCB"	printed circuit board, a board that mechanically supports electronic components and provides electrical pathways between them through printed conductive tracks, used in nearly all electronic devices
"PCB assembly"	printed circuit board assembly, the process of soldering electronic components onto a fabricated PCB to form functional electronic devices
"Pd"	palladium, a metal with excellent conductivity and oxidation resistance
"PFC"	power factor correction, a circuit technique to improve the power factor of electronic devices, reducing wasted energy and harmonics
"PTH"	Plated Through Hole, a fundamental PCB manufacturing process where conductive metal (typically copper) is chemically deposited on the drilled hole walls to establish electrical connections between multilayer boards.
"pH"	a measure of the acidity or alkalinity of a solution, crucial in controlling chemical bath properties in wet processing and plating

"Power Chips"	semiconductor devices designed for power management and conversion, typically operating at high voltages or currents
"Power IC"	power integrated circuit, a type of IC designed to control and convert electrical power in systems such as chargers, converters, and motor drivers
"Power management chips"	integrated circuits that regulate, distribute, and manage power within electronic devices to ensure stable and efficient operation
"R&D"	research and development
"RDL"	redistribution layer process, a semiconductor packaging process that forms additional metal layers to reroute and extend the chip's input/output (I/O) pads to new locations, enabling higher I/O density, finer pitch, and compatibility with advanced packaging methods such as fan-in and fan-out packaging
"Redox reactions"	chemical reactions involving the transfer of electrons, fundamental to plating and etching processes in semiconductor and PCB manufacture
"Reducing agents"	substances that donate electrons in redox reactions, used in plating chemicals to facilitate metal deposition
"RF chips"	radio frequency chips, semiconductor devices that transmit and receive high-frequency signals in wireless communication systems
"RFPC"	rigid-flex printed circuit, a hybrid PCB combining rigid and flexible layers, enabling complex 3D circuit designs with enhanced reliability and space efficiency
"Server-grade processor"	high-performance processor designed for data centers and servers, optimized for reliability, scalability, and multi-core workloads
"SGT MOSFET"	super gate trench metal-oxide-semiconductor field-effect transistor, a power MOSFET with a trench structure for reduced resistance and faster switching

"SiC Power Devices"	silicon carbide power devices, semiconductors made from SiC material offering higher efficiency, thermal performance, and voltage tolerance
"SJ MOSFET"	super junction MOSFET, a high-voltage power transistor with alternating p- and n-type layers for reduced on-resistance and higher efficiency
"Sn"	tin, a soft metal commonly used in soldering materials for electronic assembly and surface finishes and metallization
"Solderability"	the ability of a surface to be wetted by molten solder, critical for forming strong, reliable electrical and mechanical connections
"sq.m."	square meters
"Surface Metalization"	a process of depositing a metal layer on a substrate surface to enable electrical conductivity, or soldering and bonding
"Synchronous rectifiers"	power conversion circuits that use MOSFETs instead of diodes for rectification, improving efficiency in DC-DC converters
"Telecom"	telecommunications, the transmission of information over significant distances through electronic means, including voice, data, and video
"Thermo-Compression Bonding (TCB)"	A bonding technique that utilizes heat and pressure to promote metal-to-metal interconnection, commonly used for direct bonding between bumps and pads. It offers high reliability and enables high-density packaging, and is widely applied in advanced packaging
"TGV"	through-glass via, a vertical interconnect formed through a glass substrate for high-density interposer or package integration
"Transmission efficiency"	the effectiveness with which electrical signals or power are transferred through a medium or circuit with minimal loss

"TSV"	through-silicon via, a vertical electrical connection that passes completely through a silicon wafer or die to enable 2.5D/3D chip stacking
"UBM"	under-bump metallization, a metal layer deposited between the chip pad and solder bump to improve adhesion and reliability
"μm"	micrometer, a unit of length equal to one-millionth of a meter, commonly used to measure feature sizes in semiconductor and PCB manufacturing
"Utilization rate"	utilization rate is calculated as dividing production volume by the production capacity for the same year/period
"V"	basic unit of voltage
"Via"	a micro conductive hole in semiconductor, substrate and PCB that connects different layers electrically
"Voltage range"	voltage range of a device or system refers to the span of voltages within which it can operate safely and effectively
"WLP"	wafer-level packaging, a method of packaging semiconductor chips while they are still on the wafer, allowing smaller size, better performance, and lower cost compared with traditional chip-by-chip packaging
"X-Cube"	an advanced 3D IC packaging technology