Reverse Costing® CATALOGUE

LED | IC | MEMS | IMAGING | PACKAGING | SYSTEM | POWER

REVERSE COSTING®
A complete set of information to understand the technology and cost of the electronic devices on the market. System Plus Consulting Reverse Costing® reports are based on in-house developed methodology and costing tools which ensure their single format. The full collection is regularly updated on our website. These reports can be ordered individually or under our Annual Subscription.

IMAGING

Ref.	Date Pages	Manufacturer Product	Type of Product	Overview
		VISIBLE		
SP18387	2018/3 100	**ams** Apple iPhone 8	Color Sensor in the Apple iPhone 8	Full analysis of the package and sensor die,cost analysis and price estimate for the device. Comparison with the ams TCS3400.
SP18385	2018/5 102	**ams** AS726X Series	Color Sensor	Full analysis from sensor die to packaging along with a cost analysis and a price estimate for the device.
SP18355	2018/7 115	**Hamamatsu** C12880MA	Hamamatsu C12880MA Micro-spectrometer	Detailed physical analysis with process description and manufacturing cost analysis
SP17377	2017/12 99	**ams** Apple iPhone X	Multi-Spectral Sensor	Analysis of the complete multi-spectral ALS, from the sensor die to the custom packaging developed for the device. Complete cost analysis and a price estimate for the device
SP17348	2017/11 350	**Various**	Camera Module	Explanation of the main players' technology choices and comparison between competitors.
SP17343	2017/7 130	**Sony** IMX400	22MPix tri-layer stacked CIS	The first tri-layer stacked CIS on the market includes a 22 Mpixel array, a 1Gb DRAM die and a digital signal processor (DSP) on the same die footprint.
SP17338	2017/8 122	**Samsung** Galaxy S8	Iris Scanner	Description of the supply chain of the full system including the IR camera module, CIS and infrared LED. Comparison with the Fujitsu iris.
SP17334	2017/6 94	**NanoLambda** NSP32-V1	Nano Spectrometer	First plasmonic filter sensor for consumer devices could disrupt optical applications
SP17326	2017/3 113	**STMicroelectronics** iPhone7	Time of Flight Proximity Sensor	A look inside Single Photon Avalanche Diode (SPAD) Technology from STMicroelectronics entering the High-End Apple Handset
SP17304	2017/3 165	**Consumer Physics** Scio	Spectrometer	World's first pocket size Molecular sensor that can be integrated into consumer smartphones
SP16293	2016/11 145	**Apple** iPhone 7 Plus	Apple iPhone 7 Plus Rear-Facing Dual Camera Module	In the iPhone 7 Plus, Apple introduced a dual rear camera module. The module features two sensors, one with a totally new structure.
SP16278	2016/7 145	**Huawei** P9	Dual Camera Module	The P9 camera module is equipped with two sub-modules each including a Sony CIS, a closed loop voice coil motor (VCM) and a 6-element lens.
		INFRARED		
SP18405	2018/8 200	**Samsung & Apple** S8 and S9 and iPhone	ALS & Proximity Sensor	Analysis of the packaging and the sensor die along with a cost analysis calculation for all the devices.
SP18404	2018/5 90	**Intel** RealSense D435	3D Active IR Stereo Depth Camera	Complete teardown analysis of the RealSense D435, with high definition pictures of the vision processor, VCSEL IR projector and image sensor dies and the BOM.
SP18396	2018/4 121	**Heimann Sensor** HTPA32x32d	32 x 32-array thermopile LWIR	Detailed teardown and cost analysis of the thermopile die,the silicon lens, the EEPROM die,and the packaging.
SP18383	2018/1 172	**STMicroelectronics** Apple iPhone X	TOF Proximity Sensor & Flood Illuminator	Complete analysis of the microsystem, from the two illumination devices (VCSEL) to the collector (based on the SPAD developed by STMicroelectronics).

IMAGING

Ref.	Date Pages	Manufacturer Product	Type of Product	Overview
SP17378	2017/12 97	**STMicroelectronics** Apple iPhone X	Camera Sensor	Analysis of the complete NIR camera sensor (module and the sensor die) and cost analysis and a price estimate of the device.
SP17376	2017/12 150	**Apple** iPhone X	Infrared Dot Projector	Description of the full system's technology and manufacturing process, including the package, VCSEL, electronics, the folded optic and the DOE.
SP17349	2017/9 170	**FlIR** Boson	Camera and 12µm microbolometer	Detailed teardown and cost analysis of the microbolometer, lens and WLP. bIll-of-material (BOM) of the camera core, and manufacturing cost of the infraredcamera.
SP17337	2017/7 79	**Texas Instrument**	Time of Flight Image Sensor	A look into Texas Instruments' system-on-chip, including Sony/Softkinetic's time-of-flight pixel technology, for industrial applications
SP17336	2017/7 80	**Melexis** MLX75023	ToF imager	A cutting-edge ToF imager technology from Sony/Softkinetic, adapted by Melexis for automotive in-cabin applications
SP17330	2017/6 203	**Autoliv** ISC0901	Night Vision Automotive Camera	Autoliv's 3rd Generation Automotive Night Vision Camera with FLIR's ISC0901 Microbolometer
SP17305	2017/1 170	**Lenovo**	3D Time of Flight (ToF) Camera	World's first 3D tri-camera bundle including Infineon/pmd REAL3TM ToF image sensor integrated into a consumer smartphone
SP16264	2016/8 170	**i3system** Thermal Expert	IR camera and microbolometer	Based on a high definition microbolometer from I3system (I3BOL384_17A), the Thermal Expert infrared camera is a high-end product for smartphones.

INTEGRATED CIRCUITS

Ref.	Date Pages	Manufacturer Product	Type of Product	Overview
			MEMORY	
SP17341	2017/5 76	**Adesto** RM24C512C	CBRAM memory	Ultra-low power, ultra-fast memory die designed for the Internet-of-Things & Wearables
SP18427	2018/9 112	**Various** etooth 5: System-on-C	Bluetooth 5: System-on-Chip Comparison 2018	Complete cost analysis and a cost estimation of the SoCs. Exhaustive comparison between the studied samples.
SP17335	2017/8 146	**Various** Bipolar-CMOS-DMOS	BCD Technology & Cost review	Details on the manufacturing process and materials used, estimation of the cost structure highlighting the influence of the technological innovations.
SP16285	2016/10 60	**Texas Instruments** Jacinto DRA726	Infotainment IC	Cost-optimized in-vehicle infotainment for entry- to mid-level automobile segments.
SP16270	2016/5 60	**Broadcom** BCM89501	Ethernet Switch	The BCM89501 uses Broadcom's high-performance BroadR-Reach Ethernet technology to deliver 100Mbps over unshielded single-twisted pair cable.

MEMS & SENSOR

Ref.	Date Pages	Manufacturer Product	Type of Product	Overview
			PRESSURE SENSOR	
SP18385	2018/5 160	**Various** MEMS Pressure Senso	MEMS Pressure Sensor Comparison 2018	Multiple comparisons based on physical analyses of 34 MEMS pressure sensor components
SP17358	2017/11 108	**Bosch** BMP380	Digital Baromectric Pressure Sensor	Deep technological and cost analyses of the BMP380. Technical and price comparison with the LPS22HB from STMicroelectronics and Bosch BME280 and BME680.
SP17308	2017/2 104	**Infineon** DPS310	Capacitive Pressure Sensor	Tiny MEMS digital barometer for smartphones and wearables
SP16295	2016/11 128	**STMicroelectronics** LPS22HB	Nano Pressure Sensor	The new pressure sensor from ST, is compared with the 1st-generation STMicroelectronics LPS331AP pressure sensor and the Bosch Sensortec BMP280
SP16279	2016/9 96	**Melexis** MLX91802	TPMS	The Melexis MLX91802 is an absolute pressure sensor used in tire pressure monitoring systems (TPMS) for cars and trucks.

MEMS & SENSOR

MICROPHONE

Ref.	Date Pages	Manufacturer Product	Type of Product	Overview
SP18384	2018/3 215	**Various** Apple iPhone X	iPhone X – MEMS Microphones	Complete teardown and comparison between each supplier.
SP17314	2017/2 109	**Vesper** VM1000	Piezoelectric Microphone	Disruptive first Piezoelectric MEMS microphone for consumer applications.
SP16296	2016/10 106	**Goertek** iPhone7 Microphone	MEMS Microphone iPhone 7	Goertek MEMS Microphone (Infineon solution) in Apple iPhone 7 Plus
SP16294	2016/10 106	**STMicroelectronics** iPhone7 Microphone	MEMS Microphone iPhone 7	STMicroelectronics MEMS Microphone in Apple iPhone 7 Plus
SP16292	2016/10 113	**Knowles** iPhone7 Microphone	MEMS Microphone iPhone 7	Knowles MEMS Microphone in Apple iPhone 7 Plus

MEDICAL

Ref.	Date Pages	Manufacturer Product	Type of Product	Overview
SP17346	2017/7 130	**Thermo Fisher** Ion 520	Sequencing chip	Complete analysis of the Ion 520 chip from Thermo Fisher, featuring chip disassembly and die analyses, processes and cross-sections.

IMU/COMBO

Ref.	Date Pages	Manufacturer Product	Type of Product	Overview
SP18382	2018/1 190	**Bosch** 6-Axis IMU	6-Axis IMU in the Apple iPhone X	Physical analysis, with process description and manufacturing cost analysis. Comparison with Bosch Sensortec's BMI160, InvenSense and STMicroelectronics' latest 6axis IMUs.
SP17361	2017/10 175	**InvenSense** ICM-20789	Pressure Sensor Combo	Detailed technology and cost analysis of the ICM-20789 7-axis motion tracking device. Comparison with the previous generation of combo sensors from InvenSense
SP16297	2016/12 155	**STMicroelectronics** LSM6DSM	6-axis IMU dedicated to OIS	Complete reports and comparison of the latest generation of inertial measurement units for consumer optical image stabilization applications
SP16291	2016/12 136	**InvenSense** iPhone 7 Plus	6-axis IMU	Complete reports and comparison of the latest generation of inertial measurement units for consumer optical image stabilization applications
SP16261	2016/4 246	**BOSCH Sensortec** BMF055	9-axis IMU	The BMF055 is a new version of the BOSCH Sensortec 9-axis device (3-axis Gyroscope + 3-axis Accelerometer + 3-axis Magnetometer), with a MCU included in the package.

GYROSCOPE

Ref.	Date Pages	Manufacturer Product	Type of Product	Overview
SP18381	2018/1 141	**Tronics Microsystems** GYPRO3300	Angular Rate Sensor	Analysis of the complete component, including the package, MEMS, and ASIC dies description of the ASIC and MEMS functionalities.
SP16299	2016/11 87	**Invensense** IDG-2030	Gyroscope fo OIS	2-axis thin gyroscope for camera OIS
SP16298	2016/11 105	**STMicroelectronics** L2G2IS	Gyroscope fo OIS	2-axis thin gyroscope for camera OIS

FINGERPRINT

Ref.	Date Pages	Manufacturer Product	Type of Product	Overview
SP18419	2018/7 125	**Synaptics and Goodix** VIVO X21	Synaptics' Under-Display Fingerprint Scanner	Comparison with the latest Huawei FPC1268 fingerprint touch sensor and a physical comparison with the Goodix Version of Vivo's fingerprint scanner
SP17318	2017/4 115	**Fingerprint Cards** FPC1228	Capacitive under glass fingerprint sensor	Huawei P10 and Mate 9 pro capacitive fingerprint successfully integrated under glass in collaboration with TPK
SP16282	2016/8 130	**Qualcomm** Sense™ ID 3D	Ultrasonic Fingerprint	Powered by an ultrasonic-based fingerprint biometric solution, the sennsor provides a more secure, reliable alternative to capacitive-based fingerprint sensors.
SP16271	2016/5 105	**Next Biometrics** NB-1010-U	Fingerprint Sensor	The sensor die is manufactured on glass with LTPS technology and uses a very specific coating to ensure the device's functionality.
SP16248	2016/2 89	**EgisTec** ET300	Fingerprint Sensor	Philips integrates in its smartphone the innovative fingerprint sensor developed by EgisTec

ENVIRONMENT

Ref.	Date Pages	Manufacturer Product	Type of Product	Overview
SP18372	2018/2 125	**Sensirion** SGP30	SGP30 Gas Sensor	Analysis of the entire component, including the package, MEMS, and ASIC die. Full description of the ASIC and MEMS functionalities as well as manufacturing processes.

MEMS & SENSOR

Ref.	Date Pages	Manufacturer Product	Type of Product	Overview
SP17342	2017/7 152	**Bosch** BME680	Environnement Sensor	The world's first environmental sensor combining gas, pressure, humidity and temperature sensing functions in a 3mm x 3mm footprint package.
SP16223	2016/2 99	**Humidity Sensors** Industry 2015	Relative Humidity Sensors Technology and Cost Review	Humidity Sensors from the main players analyzed and compared!
			COMPASS	
SP15222	2015/10 160	eCompass Review	3-Axis & 6-Axis	Over 20 eCompasses from the main players analyzed and compared !
			ACCELEROMETER	
SP17315	2017/3 130	**mCube** MC3672	WLCSP MEMS Accelerometer	Ultra-low power - Highly integrated WLCSP Accelerometer with Via-Middle TSV
SP17269	2017/1 110	**Safran Colibrys** VS1000	High End Accelerometer	Single-Axis High Performance Accelerometer with new ASIC design
SP16074	2016/7 97	**Bosch Sensortec** BMA250E	3-Axis Accelero–Consumer	The BM250E is a low power digital accelerometer packaged in in a tiny 2x2x0.9mm³ LGA package.
SP18421	2018/9 150	**Xaar** 1201 GS2p5 PZT	Xaar 1201 GS2p5 PZT Printhead	Insight into technological data, manu-facturing cost, and selling price of the MEMS inkjet manufactured by Ricoh and the 1201 printhead supplied by Xaar
SP18420	2018/9 158	**Epson** PrecisionCore	Epson PrecisionCore Printhead with MicroTFP Inkjet Dies	Insight into technological data,manufacturing cost, and selling price of the microTFP inkjet MEMS and the PrecisionCore printhead by Epson.

PACKAGING

Ref.	Date Pages	Manufacturer Product	Type of Product	Overview
			WLP	
SP16267	2016/4 93	**Qualcomm** WCD9335	FOWLP	The Qualcomm WDC9335 is an audio codec wafer-level packaged with fan-out technology. It is used in Samsung Galaxy S7.
			SIP	
SP16277	2016/7 130	**Intel** Curie	SiP Module	This tiny system-in-package (SiP) includes the Intel Quark chip, Bluetooth radio, sensors, and battery charging in less than 150mm3.
			EMBEDDED	
SP17306	2017/6 90	**TDK** PAN-T2541 bluetooth	embedded die bluetooth module	TDK SESUB-PAN-D14580 Module: world's smallest Bluetooth 4.1 low energy (LE)
			3D PACKAGING	
SP18406	2018/6 130	**Samsung, Qualcomm** os 9810 & Snapdragor	Samsung's Galaxy S9 Plus Processor Packages	Review of the Exynos 9810 and the Snapdragon 845, including a complete package analysis, cost analysis, and price estimate for the chips.
SP18393	2018/7 157	**Qualcomm** WiGig Chips	Qualcomm WiGig Chipset Smartphone Edition	Full investigation of the system, featuring a detailed study of the SiPs and the antenna board including die analyses, processes and board cross-sections
SP18374	2018/1 145	**Qualcomm** QCA9500	WiGig Chipset	Full investigation of the module, featuring a detailed study of the SiP and the antenna board including die analyses, processes and board cross-sections.
SP18373	2018/2 140	**TSMC** Apple A11 inFO PoP	Integrated Fan-Out (inFO) Packaging in iPhone X	Analysis of the packaging from the DRAM memory to the LSC developed by TSMC. Comprehensive cost analysis and price estimation of the device.
SP17360	2017/11 130	**AMD** eon Vega Frontier Edi	SPIL CoW last – Samsung HBM2	Complete physical analysis of the packaging process.Comparison with NVIDIA's Tesla P100 and AMD's Fury X.
SP17353	2017/10 130	**TSMC, Samsung** NVIDIA Tesla P100	GPU accelerator with HBM2	Complete physical analysis of the packaging process, description of the manufacturing supply chain and calculation of the manufacturing costs.

PACKAGING

Ref.	Date Pages	Manufacturer Product	Type of Product	Overview
SP17352	2017/10 300	**Various** MEMS Packaging	Mems Packaging	Multiple comparisons based on physical analyses of over 100 MEMS components.
SP17339	2017/6 133	**NXP** SCM-i.MX6	Quad High Density Fan-Out Wafer-Level System-in-Package	NXP SCM-i.MX6 Quad High Density Fan-Out Wafer-Level System-in-Package
SP16303	2016/12 100	**Various**	Application Processors Comparison	Comparison of main players AP: Apple A10 with inFO vs. Qualcomm Snapdragon 820 with MCePpackaging technology vs. HiSiliconKirin 955 & Samsung Exynos8 with standard PoP
SP16290	2016/10 100	**TSMC** inFO	Package-on-Package	Deep Analysis and reverse costing of the new inFO packaging technology from TSMC used for the latest Apple's Application processor, the A10 found in the iPhone 7
SP16276	2016/6 113	**Qualcomm** Snapdragon 820	Package-on-Package	The Galaxy S7 integrates the Exynos 8 with classic PoP packaging or the Snapdragon 820, with Molded Core Embedded Package (MCeP) technology, developed by Shinko.

PASSIVE

Ref.	Date Pages	Manufacturer Product	Type of Product	Overview
SP17344	2017/9 140	**Various** Silicon Capacitor	Silicon Capacitor	Details on the manufacturing process and materials used, component design, and die size. Comparison of the components' sizes, materials and characteristics.
SP16300	2016/10 100	**TSMC** Silicon Capacitor	Deep Trench Capacitor	Deep analysis and Reverse Costing of the new silicon capacitor technology from TSMC used for the latest Apple's Application processor, the A10 found in the iPhone 7

POWER

Ref.	Date Pages	Manufacturer Product	Type of Product	Overview
			SiC	
SP18428	2018/8 95	**Rohm** Gen3 Trench Design Fam	Rohm SiC MOSFET Gen3 Trench Design Family	Analysis of the Gen3 trench MOSFETs at 650V and 1200V, with optical and scanning electron microscope (SEM) images of the complex SiC trench structure.
SP18413	2018/6 100	**STMicroelectronics** Tesla Model 3	Tesla Model 3 Inverter with SiC Power Module from STMicroelectronics	Estimation of the production cost of the SiC MOSFET and package.Technical and cost comparison with the Mitsubishi J-Series TP-M power module.
SP18410	2018/6 74	**UnitedSiC** UJN1205K	1200V SiC JFET	Analysis of the UJN1205K device, assembled in a TO247 package as well as production cost analysis, and comparisons with its JFET counterpart from SemiSouth
SP18390	2018/4 55	**Littelfuse** LSIC1MO120E0080	SiC MOSFET	Complete BoM, die manufacturing, and packaging processes. Estimated manufacturing cost,a comparison with similar products from STMicroelectronics and CREE.
SP18366	2018/2 140	**Infineon** DF11MR12W1M1_B11	1200V CoolSiC MOSFET Module	Full teardown of the module's components and housing.
SP17310	2017/4 65	**Rohm** SCT2H12NZGC11	1700V SiC MOSFET	In its new series of SiC MOSFETs, Rohm uses trench structures for 650V and 1200V products, while 1700V products use planar structures
SP17309	2017/1 66	**STMicroelectronics** STC30N120	1200V SiC MOSFET	The 1st generation 1200V SiC MOSFET device from STMicroelectronics has good current density at a very competitive cost
SP16262	2016/8 81	**Wolfspeed** C3M	900V SiC MOSFET	The SiC C3M™ Platform is the first 900V SiC MOSFET platform, designed by Wolfspeed for high-power applications like DC/DC converters, and telecom power supplies.
			MOSFET	
SP18380	2018/1 75	**Wolfspeed** C2M0025120D	1200V SiC MOSFET	Deep technology analysis of the package and components, with images of the planar SiC structure. Comparisons with Rohm and ST SiC MOSFETs and 1200V silicon IGBTs.
SP17350	2017/8 335	**Various** 100V MOSFET	100V MOSFET Comparison	Details on the manufacturing processes and materials used, packaging structures, component designs, die sizes, electrical performance and current densities, and cost structure
SP17333	2017/6 70	**ON Semiconductor** FDMS86181	100V 124A Trench MOSFET	The newest technical innovations in the device and package made by ON Semiconductor/Fairchild

POWER

Ref.	Date Pages	Manufacturer Product	Type of Product	Overview
SP16289	2016/11 171	**Various**	40V Silicon MOSFET	Technology and Cost Review of 40V Si MOSFET
		IGBT		
SP18375	2018/1 115	**Infineon** FF400R07A01E3	Double Side Cooled IGBT Module	Estimation of the production cost of the IGBT, diode and package and technical and cost comparison between Infineon's design and the Toyota Prius inverter's DSC power module
SP17332	2017/6 87	**Infineon** FS820R08A6P2B	750V IGBT Module	The HybridPACK™ Drive is a very compact power module optimized for hybrid and electric vehicle.
SP16288	2016/12 195	**Various**	IGBT vs SiC MOSFET comparison	1200V SiCMOSFET vs Silicon IGBT: Technology and cost comparison
SP16281	2016/9 80	**Infineon** CooliR²	IGBT module	The CooliR²Die™ power module from Infineon is an IGBT module for automotive applications integrated into different vehicles' Traction Power Inverter Module (TPIM).
		GaN		
SP18391	2018/6 97	**GaN Systems** GS61004B	100V GaN HEMT	Estimated production cost for the epitaxy and the package. Comparison of the standard 100V Si MOSFETs and low-voltage GaN on Si HEMT.
SP18365	2018/4 200	**Various**	GaN-on-Silicon Transistor Comparison 2018	Estimated production cost for the integrated circuit gate driver,transistor,andpackage. Comparison of the different components available on the market.
SP18363	2018/2 100	**Texas Instruments** LMG5200	80V GaN FET Power Stage	Estimated production cost for the IC gate driver, FET, and package. Comparison with the packaging and epitaxy from GaN Systems, Transphorm, and Panasonic.
SP17362	2017/9 82	**EPC** EPC2045	100V GaNon-silicon Transistor	Estimation of the production cost of the epitaxy and the package,comparison with previous EPC devices and epitaxy.
SP17331	2017/7 104	**Texas Instruments** LMG3410	600V GaN-on-Silicon HEMT	The LMG3410 Single-Channel Gallium-Nitride (GaN) Power Stage contains a 70-mΩ, 600-V GaN power transistor and specialized driver in an 8-mm by 8-mm QFN package.
SP17322	2017/5 72	**Panasonic** PGA26E19BA	600V GaN-on-Silicon HEMT	Panasonic abandons the TO220 package for its GaN HEMTs and proposes the DFN 8x8 package for the latest 600V device.
SP17319	2017/5 98	**Transphorm** TPH3208PS	650V GaN HEMT	A new 650V GaN HEMT from Transphorm with a simplified cascode structure and enhanced electrical characteristics.
SP17311	2017/2 78	**Panasonic** PGA26C09	600V GaN-on-SiliconHEMT	The first 600V GaN HEMT of Panasonic is designed with an innovative structure to integrate a normally Off transistor in a standard package without cascode.
SP16302	2016/11 120	**Transphorm** TPH3206PS	GaN-on-Silicon HEMT	Transphorm's TPH3206PS transistor has a new die design and manufacturing process. The die contacts are optimized on the die area to save space, and increase current density.
SP16286	2016/10 66	**Wolfspeed** CGHV40100F	GaN-on-Sic HEMT	The CGHV40100 includes a single GaN-on-SiC HEMT die for RF applications. The device is assembled in a SOT467C package;
SP18399	2018/7 110	**Various** tive Power Module Pa	Automotive Power Module Packaging Comparison 2018	Comparison of the structures and costs of the different technological choices made by key manufacturers of the automotive industry
SP18359	2018/5 115	**Various** ›wer Discrete Packagi	Power Discrete Packaging Comparison 2018	Summary of the state of the art of packaging power semiconductors at a discrete level. Comparison of 20 types of packages.

RF

Ref.	Date Pages	Manufacturer Product	Type of Product	Overview
		RF MODULE		
SP18389	2018/4 600	**Various** RF Front-End Modules	RF Front-End Modules Comparison 2018	Description of each component and statistical analyses for most front-end modules.
SP18379	2018/2 160	**Broadcom** AFEM-8072	Mid&High Band LTE FEM	Analysis of the full FEM SiP, including the RF IC and its IPDs, the filtering dies and the internal and external EMI shielding.
SP17364	2017/11 140	**Various**	RF SiPs	Description of each component and important data, including type of substrate, proportion of silicon in the module and line spacing.

RF

Ref.	Date Pages	Manufacturer Product	Type of Product	Overview
			RF IC	
SP18418	2018/8 150	**Peraso** X710	Peraso X710 Chipset 60GHz Outdoor Wireless Broadband Solution	Full investigation of the system, with a detailed study of the baseband processor, the RFIC and the antenna board including die analyses, processes and board cross-sections.
SP18394	2018/4 85	**Texas Instruments** AWR1642	77 & 79 GHz RFCMOS Radar Chipset	Single-chip radar (76 - 81 GHz) in an SoC device featuring MCU and DSP
SP16263	2016/3 126	**Freescale** NXP MR2001	Radar Rx/Tx/VCO Fan-Out RCP Chipset	The new 77 GHz Radar Chipset for ADAS from NXP/Freescale. SiGe:C xHBT technology & Fan-Out RCP Wafer-Level Packaging.
			RF FILTER	
SP17327	2017/5 122	**Taiyo Yuden**	SAW and BAW Band 7 Duplexer	Taiyo Yuden's Well-Proven Metal Seal Packaging and SAW/BAW technology in LTE Band 7 high isolation duplexer used in Skyworks' PAMiD
SP16283	2016/8 93	**Murata** FAJ15	SAW filter	The Samsung Galaxy S7 smartphone is the latest one to integrate Murata's front-end module with the FAJ15, featuring Murata's thermo-compensated technology
SP16274	2016/6 112	**Avago** AFEM9040	FBAR-BAW	Avago has introduced a new generation of film bulk acoustic resonator (FBAR-BAW) technology in the Samsung Galaxy S7
SP16254B	2016/3 86	**Qorvo** TQF6405	SMR BAW High Band Filter	Apple integrates in its smartphone the innovative solid mounted resonators developed by Qorvo
SP17328	2017/12 300	**Various** RF IPD	RF Integrated Passive Devices	Description of each component, its major characteristics (substrate type (GaAs, silicon, glass), passivation layers, passive integration, etc.) and a comparison of all devices.

SOLID STATE LIGHTING

Ref.	Date Pages	Manufacturer Product	Type of Product	Overview
			WHITE/BLUE LED	
SP17317	2017/3 70	**Samsung** LM101A	Chip Scale Package LED	The first Samsung Chip Scale Package LED is developed according to technical choices to reduce the manufacturing cost.
			UV LED	
SP16273	2016/6 170	**SETi** UVTOP270TO39HS	UV LED	The UVTOP270TO39HS and SS35DF227513 are two 275nm UVC LEDs from Sensor Electronic Technology Inc. (SETi).
SP16272	2016/6 115	**Crystal IS** OPTAN280K-BL	UV LED	The OPTAN280K-BL and OPTAN-265N-SMD are two UVC LEDs, of 280nm and 265nm respectively, from Crystal IS.

SYSTEM

Ref.	Date Pages	Manufacturer Product	Type of Product	Overview
			ENERGY	
SP17307	2017/1 81	**Enphase** S280	Solar microinverter	Best in class SmartGrid-ready 280VA inverter with new generation ASIC-based topology for lighter design and enhanced solar power management
SP16253	2016/3 94	**SMA** Sunny Island 6.0H	Off-grid and on-grid PV Inverter	The Sunny Island 6.0H supports a wide range of on-grid and off-grid applications from operation in remote off-grid areas to home energy management
			CONSUMER	
SP17325	2017/3 132	**Oculus** Rift	Virtual Reality Head-Mounted Display	Detailed analysis of Oculus's HMD for VR experience
SP17280	2017/2 131	**HTC** Vive	VR Head-Mounted Display	HTC Vive Virtual Reality Head-Mounted Display

SYSTEM

Ref.	Date Pages	Manufacturer Product	Type of Product	Overview
				AUTOMOTIVE
SP18386	2018/3 80	**Continental** SRR3-B	Continental SRR3-B Blind Spot Radar	Complete teardown analysis including BOM andmanufacturing cost.
SP17357	2017/10 76	**Continental** SRL1	Short Range Lidar	Details on the full Continental SRL1 system's manufacturing and packaging processes, estimation of the manufacturing cost and selling price.
SP17354	2017/8 64	**Bosch** Ultrasonic sensor	Ultrasonic Sensor	Bill-of-material(BOM) and manufacturing cost physical analysis and manufacturing cost estimation of the Bosch transceiver IC.
SP17340	2017/6 35	**LG** _G LA080WV3 – 8-inch	Display with Touch Panel for Car Navigation	LG LA080WV3 – 8-inch Display with Touch Panel for Car Navigation
SP17329	2017/4 80	**Continental** MFC430	Forward Automotive Camera	Continental attempts to penetrate the forward camera market with a distinctive architecture and cost effective solution
SP17324	2017/4 62	**Bosch** MPC2	Forward Automotive Camera	Bosch attempts to penetrate the forward camera market with a distinctive architecture and cost effective solution
SP17323	2017/4 77	**TRW** S-Cam3	Forward Automotive Camera	Third and latest version of TRW's best-selling S-Cam series forward camera
SP17321	2017/3 85	**Continental** ARS4A	77GHz Radar	Simultaneous long and short range 77GH7 radar
SP17320	2017/4 192	**Leddartech** LeddarVU	solid state high-definition LiDAR module	Without moving part, smallest form factor on the market and integrating the latest solid state technology, the LeddarVU8 is ready to compete with radars.
SP17313	2017/4 88	**Bosch** LRR4	77GHz Long Range Radar Sensor	The fourth generation of Bosch long range radar sensor set new boundaries for a more elegant, compactness and cost effectiveness module
SP17312	2017/1 80	**Autoliv** MRR	77GHz Multi Mode Radar	A compact, cost-effective (combining Long and Middle Range detection) and high-performance driving assistance system
SP16287	2016/9 135	**Toyota** Prius 4	Power control Unit	The Prius 4 module integrates Toyota's latest power card packaging, with double side cooling.
SP16284	2016/9 82	**Delphi** RSDS	76Ghz radar	Delphi's Rear and Side Detection System (RSDS) utilizes 76Ghz single-beam mono-pulse radar. Its compact design enables simplified vehicle integration.

TEARDOWN

Ref.	Date Pages	Manufacturer Product	Type of Product	Overview
SP18412	2018/5 50	**Huawei** P20Pro	Huawei P20 Pro	Teardown photos,detailed package identifications and descriptions. Excel file summarizing the P20 Pro chipset and breaking down the devices by supplier,packages.
SP18409	2018/5 50	**Apple** iPhone X	Apple iPhone X	Teardown photos,detailed package identifications and descriptions. Excel file summarizing the Iphone X chipset and breaking down the devices by supplier,packages.
SP18402	2018/3 50	**Samsung** Galaxy S9+	Galaxy S9+	Teardown photos,detailed package identifications and descriptions. Excel file summarizing the S9+ chipset and breaking down the devices by supplier,packages.
SP17369	2017/11 150	**Various**	Thermal Management in Smartphones	Multiple comparisons based on physical analyses of the latest flagship smartphones. Evolution of thermal management technology tracked by manufacturer.

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