



Semiconductor and Component
Shortform
Catalogue 2006

Welcome...

We are pleased that you are interested in our range of advanced technology high quality Semiconductors and Optical devices.

Oki utilises unique technologies to provide high performance semiconductor solutions focused on ultra-low power consumption, speed, miniaturisation and upgradeable flexibility for future product requirements.

Our range of low power devices is ideally suited for personal and mobile products. For Telecommunications we have a comprehensive range of CODECs and other integrated solutions. Oki continues to lead the market with first-class solutions for Speech ICs and its sound generators for mobile phones are recognised for their excellent sound quality. The ability to mix high voltage and high density enables Oki to realise products for the in-vehicle and information markets.

With large TFT display drivers OKI has achieved a significant share in the global flat panel TV market. Our OLED display devices meet highest expectations for excellent contrast and colour quality and provide a comfortable wide viewing angle for displays in portable products.

The original P2ROM™ technology implemented on our system memories have gained an excellent reputation in the market with benefits of security and a very short turn-around-time.

Based on Oki's design platform μ PLAT™ our ARM-based Microcontrollers integrating ARM7 and ARM9 cores have the capability for high data throughput and allow smooth future design upgrade.

Our optical transmitters and receivers are some of the highest performance available on the market for long-distance transmission in the telecommunication and network industry.

OKI's products fully comply with EU legal requirements for Waste from Electrical and Electronical Equipment (in force since Aug.13, 2004) and "RoHS" Restriction of Hazardous Substances (which will affect the industry from July 1st, 2006).

We hope your design will benefit from our leadership technologies and Oki will become part of your product solutions contributing to your future success.

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As a result of global concerns about the health of our environment and the impact of chemicals and pollutants on our air and water, a law was implemented to control the use of substances used in electrical and electronic devices to help and preserve the essential resources. Among other governments (US and Japan), the European Union Council of Ministers has adopted the RoHS Directive 2002/95/EC (Restriction on the Use of Certain Hazardous Substances in Electrical and Electronical Equipment). This RoHS directive, coming into effect on July 1, 2006, bans the use of certain materials, such as lead, mercury and cadmium in electronic products sold in the European Community.

OKI meets this RoHS directive for all Lead-Free devices. To fully comply with this mandatory requirement, OKI provides Lead-Free finishes for all devices and they are clearly marked for identification.

As Lead-Free coatings generally require a higher reflow temperature in the assembly process than traditional tin-lead compounds, the temperature characteristics of the assembly process have to be modified and require special attention. Consequently we strictly recommend verification and approval tests before starting any mass production. Samples for testing are available for each part of our product range. Please note, an inadequate soldering process may cause problems and might affect the quality and reliability of the end product.

We hope our information helps to smoothly switch to our Lead-Free products. For any question or more detailed information, you are always welcome to contact us.

*Quality Assurance Department
OKI Electric Europe GmbH*

innovation



ML6191 – Real-Time Clock with Automatic Time Correction

The ML6191 is a real-time clock that automatically corrects an internal clock with a built-in DCF77 German Long Wave Time Code receiver. Connected to the host microcontroller through a clock synchronous serial interface, it is able to set and reset the time as well as set and read the status of radio wave reception. The configuration of the ML6191 is simple and only needs the connection of an external antenna, capacitor and crystal.



ML7065 – ZigBee™ (IEEE 802.15.4) Single Chip 2.4 GHz RF, PHY, and MAC for Low-Data Rate Wireless Personal Area Networks

The ML7065 is a single-chip ZigBee™ device, integrating the 2.4GHz radio, Physical layer (PHY) and Media Access Controller (MAC). Targeting low-data rate wireless connectivity for the home, business and industrial applications, this low-power solution is fully IEEE 802.15.4 compliant. ML7065 includes the complete IEEE 802.15.4 MAC, which reduces the requirements for a network application processor. The device was developed to provide wireless connectivity for PAN gateways, remote control in digital homes and sensor data loggers.



ML86V7668 – NTSC/PAL/Secam Video Decoder

The ML86V7668 is an LSI that converts NTSC, PAL and SECAM analogue video signals into the YCbCr standard digital format (ITU-R BT.601/ BT.656) and RGB digital data. The device has two built-in 10-bit A/D converter channels and can accept composite video or S-video signal as input. Composite video signals are separated into luminance and chrominance signals by a 2-dimensional Y/C separation filter (2-line or 3-line adaptive comb filter). In addition to the asynchronous sampling, which is a special feature of Oki decoders, video signals can also be sampled using digital PLL for line lock clock sampling.

ML86V8208 – Single-Chip Video Decoder LCD Controller

The ML86V8208 offers a PAL/NTSC/SECAM decoder with video standard auto detection and a scan conversion circuit with programmable LCD controller interface in a single package. Therefore, an easy implementation of video systems with VGA or W-VGA resolution is possible. The video decoder part is equipped with 3 ADC channels allowing a combination of different video standards to be connected to the ML86V8208. This makes the ML86V8208 suitable for a variety of applications, i.e. for automotive entertainment systems and TV applications. Furthermore a digital video interface, complying with the 24bit RGB/YCbCr or 16bit 4:2:2 / 8bit ITU-R BT.656 standards are available. The scan conversion circuit accomplishes the intra field interlaced-to-progressive (I/P) conversion and the fade in of the OSD. In order to enhance the I/P conversion, an additional interface to OKI's ML87V2103 field recursive noise reduction FIFO with motion adaptive I/P conversion is integrated.



ML9208 and ML9209 – VFD Character Controllers/Drivers

OKI introduces two new vacuum fluorescent display (VFD) drivers: ML9208 and ML9209. ML9208 displays alphanumeric characters and symbols, while ML9209 displays alphanumeric characters, symbols, and bar charts.

A display system is easily realized by the internal ROM and RAM which is configured for character generation, display mapping and refresh cycles. Additional functions like display contrast adjustment and/or GPIOs are implemented too.

A standard character set is contained within the internal ROM, additional characters can be implemented through dedicated RAM area or custom mask codes.

ML9362 and ML9372 – OLED Anode/Cathode Drivers for small and mid-sized RGB Panels

With higher contrast levels, wider viewing angles, faster response, lower energy consumption, and sizes that are thinner than LCDs, the self-luminous organic EL panels are attracting attention as the next generation display technology.

Therefore OKI introduces a wide range of OLED drivers and driver/controller combinations dedicated to either mobile or automotive applications.

For example: The ML9362 is a 86 x RGB anode driver LSI for organic electroluminescent display (EL) panels, supporting 4096 colours. The anode outputs are designed to allow adjustment of current and pulse width individually for each line. ML9372 is a 64 cathodes driver LSI for organic electroluminescent display (EL) panels. With the combination of these two drivers a 86 x RGB x 64 pixel display can easily be realised.

ML67Q4060 – The World's Smallest ARM-based Microcontroller

The new Oki ML67Q4050/60 series offer low power, high performance and are the world's smallest packaged ARM processors. They contain a 33.333-MHz, 32-bit ARM7TDMI™ core with either 64 or 128KBytes of 32-bit wide zero-wait state FLASH memory (security function included) and 16KBytes of SRAM. The devices also contain multiple serial interfaces, like I²C, I²S, SPI, and UARTs (supporting 9-bit communications), along with many other peripheral functions. There are two versions, one with external memory interface (ML67Q4050 series) and one without external memory interface (ML67Q4060 series).





ML7037 – Dual Echo Canceller & Noise Canceller for Handsfree Systems

The new ML7037 enables full-duplex handsfree conversation using the latest echo and noise cancellation technology plus a dual codec in a single-chip solution. The device targets applications like speaker-phones, handsfree car kits, video-conferencing and intercom systems. Additionally to the analog interface, the ML7037 also incorporates a digital PCM interface on the line-side. The device can be used in stand-alone or MCU control mode, which increases the flexibility to match any system architecture. The new echo cancelling algorithm cancels echos of up to 100ms delay attenuating them by 35dB. Its outstanding characteristics together with a wide range of variable parameters make the ML7037 a state-of-the-art solution. The ML7037 Eva Kit is available for customer evaluation of this device.

ML2216/P16 – High Density P²ROM Sound and Speech Playback

The ML2216 is the first pre-programmed ADPCM/PCM playback device based on OKI's successful P²ROM storage technology, saving mask costs and shortening delivery time. With its 8Mbit built-in P²ROM this device is capable of almost 9 minutes of playback. It perfectly fits applications which require a simple and cost-effective solution to realise sound/voice playback, as it incorporates a simple 3-wire serial control interface and a built-in speaker amplifier. The ML2216 is 'feature rich' with all the usual functions supported by OKI's playback devices like: volume control, loop playback, phrase control table, etc. For prototyping and pre-development purposes OKI also provides an 8Mbit OTP version (ML22P16) together with easy-to-use programming tools.

ML8122 – RF Antenna Switch

The ML8122MD is designed for switching RF signals in wireless equipment. Developed on an UltraCMOS process and based on 0.5mm design rules, the ML8122 can switch signal paths via a single pin. The switch adopts the DTPT (Double Pole Double Throw) structure for switching between two antennas (where varying reception conditions exist), to ensure continued communication in a mobile phone or wireless LAN data communication application. It can be handled as a regular CMOS LSI on the production line with over 2000V ESD voltage based on the HBM method.



ML2871/72/73/74/63/65 – Pin Compatible Family of Polyphonic Sound Generators

The new pin and software compatible family of highly sophisticated MIDI sound generators are based on a PCM wavetable primarily designed for mobile phones and PDAs, although not exclusively. They also replay ADPCM/PCM speech and sound data. Based on a general MIDI sound set, plus traditional Chinese (except ML2872/65) and BRICs (ML2874 only) instruments, the family can cover playback of 16 to 64 polyphonic tones and 8 additional sound effect (ADPCM/PCM) channels. Using the on-chip FIFOs and 650mW speaker amplifier, a fantastic music ringer subsystem can readily be built around this chip. Also provided are ports to drive a ringing vibrator and LED. The devices offer both serial and parallel CPU interface and a comprehensive register structure allows easy programming. The chips contain an orchestra of musical instruments, a symphony on silicon.

ML2601 – Stereo Enhancement for Mobile Phones

ML2601 is the world's smallest 3D surround single-chip for stereo mobile phones, developed together with SRS Labs. It offers high-quality sound and low power consumption, while including two speaker amplifiers.

The 3D surround chip includes two of SRS Labs' technologies: SRS¹ 3D[®] (Extreme mode), a technology that delivers an incredibly wide 3D sound image to products with closely located speakers, and SRS Headphone^{TM2}, a technology that enhances stereo headphone playback.

The ML2601 features an I2S serial interface for the digital audio, whilst 3D processing control is via I2C.

By adopting W-CSP packaging technology, Oki also enabled a super-small package size of 3.2mm x 2.5mm.

ML8142 – GPS Down Converter

The ML8142 is a highly integrated GPS (Global Positioning System) down converter LSI, designed to receive the L1 signal at 1575.42MHz. The ML8142 integrates an LNA (Low Noise Amplifier), VCO (Voltage Controlled Oscillator), PLL (Phase Locked Loop), mixers, and IF sampling functions. The high level of integration reduces the external component count to just 5 passive components in addition to power supply de-coupling and a 16.368 MHz crystal. Furthermore, eliminating the need for an external VCO resonator and LNA matching components reduces the critical off-chip RF circuitry to zero. This, combined with the 5.0 x 5.0 mm QFN package, results in a very small circuit footprint.

¹ SRS is a registered trademark of SRS Labs, Inc. in the U.S. and selected foreign countries.

² SRS Headphone is a trademark of SRS Labs, Inc.





OF3242N – 10Gb/s Optical Receiver Module

The latest development in the line up of OKI's OC-192 optical receiver modules is the OF3242N. The device incorporates an InGaAs avalanche photo diode (APD) combined with a low noise transimpedance amplifier (TIA). With the new device the APD bias voltage has been reduced by over 20% to a value of 27V, achieving typical sensitivity of -27dBm. Changes in the TIA result in an improved noise figure and an increased output amplitude of 450mV (typ.). The package is compliant to the MSA standard which defines pin out and footprint of the device.

KGF4146 – 11.3Gb/s Modulator Driver

The KGL4146 is a Mach-Zehnder modulator driver for up to 11.7GHz NRZ signals with a maximum output amplitude of 6Vpp. An integrated bias inductor reduces the amount of external parts.

The device inherits an X-point control function as well as an output amplitude control function. The differential inputs are driven by a max. voltage of 1Vpp.

ations

4-bit Microcontrollers

4-bit OLMS63K Series

Part Number	Packages	ROM x16bit	RAM (nibbles)	Ports	LCD Out	Clock [KHz]	Supply Voltage	Typ. Current	Operating Temperature	Notes	OTP-Version
MSM63182A	128-QFP, 107-pad Chip	4064	384	36	1~16 x 32	32.768/2000	+0.9~5.5V	6μA	20~+70°C	Buzzer, battery monitor	MSM63P180
MSM63184A	128-QFP, 123-pad Chip	8160	640	44	1~16 x 40	32.768/2000	+0.9~5.5V	6μA	20~+70°C	Buzzer, battery monitor, serial I/O	MSM63P180
ML63187B	100-TQFP, 100-QFP, Chip	16352	1024	8	1~16 x 64	32.768/2000	+0.9~5.5V	6μA	20~+70°C	Melody, battery monitor, 412 instructions	-
MSM63188A	176-QFP, 159-pad Chip	16352	3584	56	1~16 x 64	32.768/2000	+0.9~5.5V	6μA	20~+70°C	Melody, battery monitor, mul/div, serial I/O	MSM63P180
ML63189B	128-QFP, Chip	32768	1536	20	1~16 x 64	32.768/2000	+0.9~5.5V	6μA	20~+70°C	Melody, battery monitor, 412 instructions	-
ML63193	144-LQFP, Chip	65504	2048	24	1~16 x 64	32.768/2000	+0.9~5.5V	7.5μA	20~+70°C	Melody, level detector, serial I/O, 30 or 80kHz RC oscillator	-
MSM63P180	176-LQFP	16352 (OTP)	3584	64	1~16 x 64	32.768/2000	+1.45~5.5V	60μA	0~+65°C	Melody, battery monitor, mul/div, serial I/O	-
ML63295A	240-QFP, 212-pad Chip	32768	2048	56	2~32 x 96	32.768/2000	+3.5~7.2V	20μA	20~+70°C	Melody, battery monitor, mul/div	-
ML63512A	48-TQFP, 64-TQFP	4096	128	32/36	-	32.768/1000	+0.9~5.5V	6μA	20~+70°C	Melody, level detector, serial I/O, 30 or 80kHz RC oscillator	-
ML63514A	48-TQFP, 64-TQFP	8160	256	32/36	-	32.768/1000	+0.9~5.5V	6μA	20~+70°C	Melody, level detector, serial I/O, 30 or 80kHz RC oscillator	-
ML63611A	116-pad Chip	8160	1024	24	1~4 x 64	32.768/700	+1.3~1.7V +1.8~3.6V	tbd	20~+70°C	Melody, ADC, battery monitor	-

4-bit OLMS64K Series

Part Number	Packages	ROM (bytes)	RAM (nibbles)	Ports	LCD Out	Clock [KHz]	Supply Voltage	Typ. Current	Operating Temperature	Notes	OTP-Version
MSM64162A	64-QFP, 80-QFP, Chip	2016	128	24	2/3/4 x 20	32.768/400	+1.25~1.7V +2.0~3.5V	5μA	-40~+85°C	2-ch temp. meas., buzzer, battery monitor	MSM64P164 (samples only)
MSM64164C	80-QFP, Chip	4064	256	28	2/3/4 x 30	32.768/400	+1.25~1.7V +2.0~3.5V	5μA	-40~+85°C	2-ch temp. meas., buzzer, 5V I/F	MSM64P164 (samples only)
ML64168	80-TQFP, 80-QFP, Chip	8160	512	20	2/3/4 x 120/93/64	32.768/700	+1.25~1.7V +2.0~3.5V	5μA	-40~+85°C	2-ch temp. meas., buzzer	ML64P168 (samples only)
MSM64167E	80-QFP, Chip	4064	256	20	2/3/4 x 29/28/27	32.768/700	+2.6~3.6V	5μA	-40~+85°C	Dual slope-ADC, buzzer, 5V I/F	-
MSM64152A	60-QFP, Chip	1504	128	12	3/4 x 26	32.768	+1.25~1.7V (A) +2.5~3.5V (AL)	3μA	-40~+70°C	Melody	MSM64P155 (samples only)
MSM64153A	80-QFP, Chip	3040	160	14	3/4 x 36	32.768	+1.25~1.7V (A) +2.5~3.5V (AL)	3μA	-40~+70°C	Melody x 2	MSM64P155 (samples only)
MSM64155A	100-QFP, Chip	4064	256	18	3/4 x 60	32.768	+1.25~1.7V (A) +2.5~3.5V (AL)	3μA	-40~+70°C	Melody x 2	MSM64P155 (samples only)
MSM64158A	64-QFP, Chip	2528	128	10	3/4 x 36	32.768	+2.5~3.5V (AL)	3μA	-40~+70°C	Melody	MSM64P155 (samples only)

8-/16-bit Microcontrollers

8-bit OLMS610K Series

	Part Number	Packages	ROM (bytes)	RAM (bytes)	Ports	ACD	Clock [KHz]	Cycle Time	Supply Voltage	Typ. Current	Operating Temperature	Notes	OTP-Version
New	ML610501	64-LFBGA	24K x 16bit	2048 x 8bit	41	10 x 10bit	32KHz/ 5MHz	200ns	+1.8~3.6V	6µA	-20~+70°C	PWM, I ² C	-
New	ML610Q501	64-LFBGA	24K x 16bit Flash	2048 x 8bit	41	10 x 10bit	32KHz/ 5MHz	200ns	+2.3~3.6V	50µA	-20~+70°C	PWM, I ² C	-

16-bit OLMS66K Series

	Part Number	Packages	ROM (bytes)	RAM (bytes)	Ports	ACD	Clock [KHz]	Cycle Time	Supply Voltage	Max. Current	Operating Temperature	Notes	OTP-Version
	ML66517	80-QFP	64K	2048	64	10bit/ 8-ch	1 ~ 25MHz	80ns	+4.5~5.5V	60mA	-20~+85°C	Serial I/O, WDT, RTO, FRC, PWM, 3-phase, PWM (6 outputs)	Flash: ML66Q517
	ML66525B	100-TQFP, 144 LFBGA	128K	6K	71	10bit/ 4-ch	12/16/ 24MHz	83ns	+2.4~3.6V	tbd	-30~+70°C	USB, serial port, 8bit PWM x 2, dual clock	Flash: ML66Q525B (MCP)
	MSM66573	100-TQFP	64K	4096	83	10bit/ 8-ch	DC ~ 30MHz	67ns	+2.4~5.5V	55mA	-30~+70°C	Serial I/O, RTC, WDT, ART, FRC	MSM66P573 Flash: MSM66Q573
	MSM66573L	100-TQFP, 144-LFBGA	64K	4096	83	10bit/ 8-ch	DC ~ 14MHz	67ns	+2.4~3.6V	20mA	-30~+70°C	Serial I/O, RTC, WDT, ART, FRC	Flash: MSM66Q573L
	MSM66577	100-TQFP	128K	4096	83	10bit/ 8-ch	DC ~ 30MHz	67ns	+2.4~5.5V	90mA	-30~+70°C	Serial I/O, RTC, WDT, ART, FRC	Flash: MSM66Q577
	MSM66577L	100-TQFP	128K	4096	83	10bit/ 8-ch	DC ~ 14MHz	67ns	+2.4~3.6V	25mA	-30~+70°C	Serial I/O, RTC, WDT, ART, FRC	Flash: MSM66Q577L



ARM Core-based 32-bit RISC Microcontrollers

ARM7 Core-based 32-bit RISC Microcontrollers

	Part Number	Packages	Supply Voltage	Standard Temperature Range	Flash ROM	RAM	Port Lines	Description
New	ML67Q4060	64-WCSP, 64-TQFP, 84-LFBGA	+3.0~+3.6V	-40~+85°C	64KB	16KB	42	General purpose μ PLAT™-MCU with secure embedded Flash
New	ML67Q4061	64-WCSP, 64-TQFP, 84-LFBGA	+3.0~+3.6V	-40~+85°C	128KB	16KB	42	General purpose μ PLAT™-MCU with secure embedded Flash
New	ML67Q4050	144-TQFP	+3.0~+3.6V	-40~+85°C	64KB	16KB	42	General purpose μ PLAT™-MCU with secure embedded Flash, external bus
New	ML67Q4051	144-TQFP	+3.0~+3.6V	-40~+85°C	128KB	16KB	42	General purpose μ PLAT™-MCU with secure embedded Flash, external bus
New	ML675050*	176-LQFP, 176-LFBGA	+3.0~+3.6V	-40~+85°C	-	16KB + 2KB	62	PoS MCU, modulo accelerator, EMV IC card, I/F, USB, host and device, LCD controller
	ML675001A	144-LQFP, 144-LFBGA	+3.0~+3.6V	-40~+85°C	-	32KB	42	General purpose μ PLAT™-MCU with 8KB unified cache, I²C, PWM, 10-bit-ADC, DMA, max 60MHz
	ML67Q5002	144-LQFP, 144-LFBGA	+3.0~+3.6V	-40~+85°C	256KB (MCP)	32KB	42	General purpose μ PLAT™-MCU with 8KB unified cache, I²C, PWM, 10-bit-ADC, DMA, max 60MHz
	ML67Q5003	144-LQFP, 144-LFBGA	+3.0~+3.6V	-40~+85°C	512KB (MCP)	32KB	42	General purpose μ PLAT™-MCU with 8KB unified cache, I²C, PWM, 10-bit-ADC, DMA, max 60MHz
	ML674000	128-lead TQFP, 144-LFBGA	+3.0~+3.6V	-40~+85°C	-	8KB	32	General purpose μ PLAT™-MCU with PWM, 10-bit-ADC, DMA controller
	ML674001	144-LQFP, 144-LFBGA	+3.0~+3.6V	-40~+85°C	-	32KB	42	General purpose μ PLAT™-MCU with I²C, PWM, 10-bit-ADC, DMA
	ML67Q4002	144-LQFP, 144-LFBGA	+3.0~+3.6V	-40~+85°C	256KB (MCP)	32KB	42	General purpose μ PLAT™-MCU with I²C, PWM, 10-bit-ADC, DMA
	ML67Q4003	144-LQFP, 144-LFBGA	+3.0~+3.6V	-40~+85°C	512KB (MCP)	32KB	42	General purpose μ PLAT™-MCU with I²C, PWM, 10-bit-ADC, DMA
	ML671000	128-QFP	+3.0~+3.6V	-40~+85°C	-	4KB	64	ARM7TDMI-MCU with full speed USB 1.1 device controller and DMA controller

ARM9 Core-based 32-bit RISC Microcontrollers

	Part Number	Packages	Supply Voltage	Standard Temperature Range	Flash ROM	RAM	Port Lines	Description
New	ML696201	272-LFBGA	2.7~3.6V	-30~+70°C	-	128KB	87	ARM946E-MCU with USB 2.0 High Speed and ATAPI/IDE
New	ML69Q6203	272-LFBGA	3.0~3.6V	-30~+70°C	512KB	128KB	87	ARM946E-MCU with USB 2.0 High Speed and ATAPI/IDE

*ML675050 – an ideal Microcontroller for EMV Applications

For applications requiring high performance and security the ARM7TDMI™ based MCU is the solution. This device was especially designed for EMV complying IC card reader/writers, for use in various IC card applications, such as Banking, ID, E-Ticket etc.

The main features of the ML675050 are:

- Modulo Calculation Accelerator for high speed encryption/decryption
- Battery Backup RAM for secure storing of crypto-key data
- Comprehensive peripherals that have been optimized for IC card reader/writers

Tools

OKI's AME-51

- easy prototyping with flexible plug and play
- includes all you need in one set:
Evaluation board, IAR EWARM C-compiler
and debugger, J-link JTAG-ICE
- attractive price

Advantages for the user:

- easier and more complete product evaluation
- quicker time to market,
- lower development costs



RealView® Developer Kit

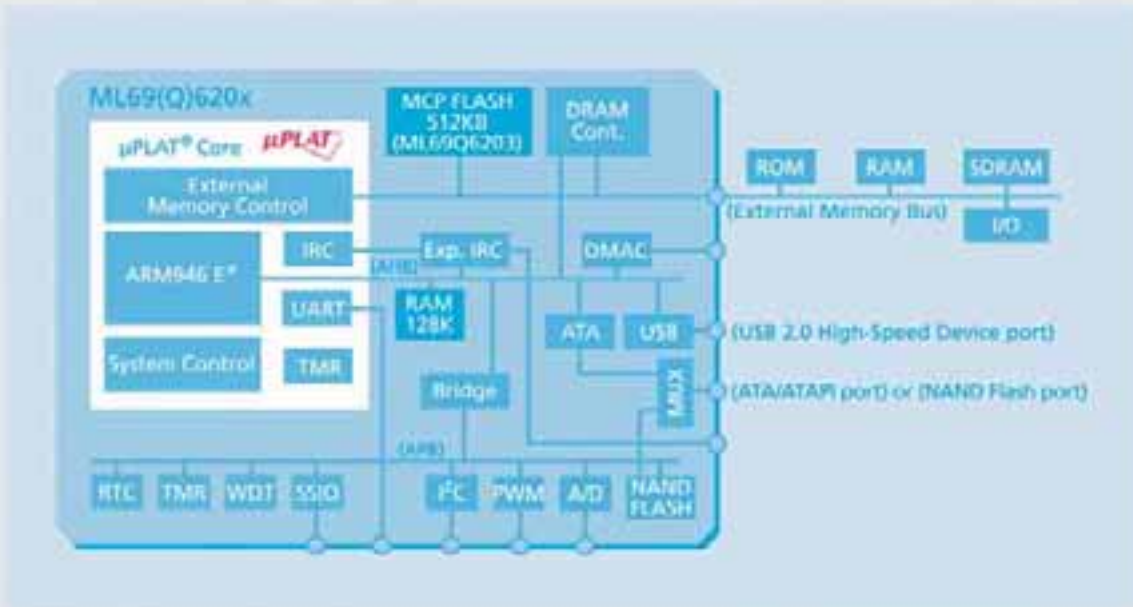
Jointly developed by ARM and Oki Electric as a complete, low-cost solution for Oki's ML674K/ML675K series ARM core general purpose microcontroller products, the RealView® Developer Kit for Oki is the leading edge tool suite for software development. Being the most comprehensive tool package for writing, compiling, debugging and integrating systems, the kit is based on components of the ARM RealView

development solution with functionality tailored to the specific requirements of Oki ARM7 MCU products. Comprised of the RealView targeted compiler and a powerful GUI-based RealView debugger, the complementary ARM RealView ICE Micro Edition module provides JTAG run control through a standard 8 MHz JTAG TAP at data rates of 100 KB/second. The industry-leading optimisation facilities of the RealView

Compiler help the developer to reduce system memory cost through smaller code size and increased system performance. A low price can be offered since the functionality is precisely tailored to Oki's ARM7 controllers. Moreover, a fully functional evaluation version restricted by the number of run cycles or by a 60 day time-out is available.



ARM Core-based Design Choices



ARM Core μPLAT™-based Design

Methodology

Oki's award-winning μPLAT™ design methodology reduces risk and significantly reduces design cycle time. Oki combines embedded ARM7™ and ARM9™ cores with AMBA™ bus-centric architecture with Oki's μPLAT™ integra-

tion platform and proven silicon technology to provide seamless and consistent system-on-chip development capabilities. Oki's rich library of IP blocks and fast prototyping supports a broad range of design possibilities.

ARM ASIC solutions

The ARM7TDMI and the ARM946E-S is also available for ASIC implementations, using Oki's μPLAT™ Pack for 0.15μ and embedded arrays. Please contact your next Oki sales office for further details.

Wireless Solutions

ML7065

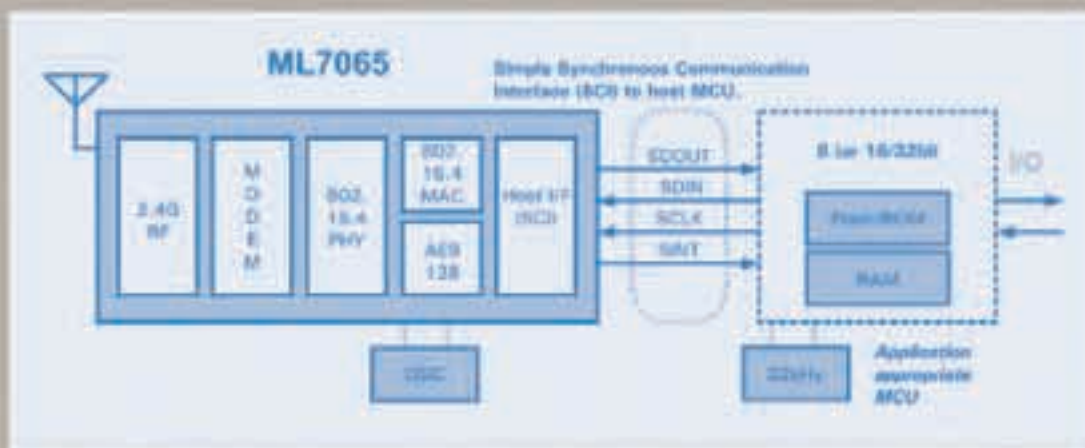
Okii's ML7065 is an integrated single chip solution, which has a 2.4GHz radio, Physical layer (PHY) and Media Access Control (MAC) layer for low-data rate wireless connectivity for home, business and industrial applications. This low-power wireless single chip solution is IEEE

802.15.4 compliant. The ML7065 includes the complete IEEE 802.15.4 MAC, which reduces the requirements for a network/application processor. This solution was developed to provide wireless connectivity for PAN gateways, remote control for digital homes, and sensor data loggers.



IEEE802.15.4/ZigBee

Part Number	Packages	Frequency Band	Interface type	Sleep Mode	Supply Voltage I/O	Supply Voltage (Core)	Operating Temperature	Notes
ML7065	48-VQFN	2.4GHz	Serial (SCI)	2uA	+3.3~2.0V	+2.75~2.0V	-25~+70°C	Complies to IEEE802.15.4-2003



- Devices based on Ultra Thin Silicon (UTSi®), a CMOS process made on an insulating substrate Sapphire
- Feasible in standard commercial CMOS/SOI
- Superior analog and RF performance
 - Low power & high frequency operation
 - High linearity & high isolation
 - Low parasitic capacity
 - Low cross-talk
 - High-Q passives (especially inductors)
 - Inherent EEPROM



RF Antenna Switch, Reflective DPDT MOSFET RF

Part Number	Package	Operating Frequency (MHz)	IIP3 (dBm)	Insertion loss (dBm)	Isolation (dB)	Supply Voltage (V)	Operating Temperature
ML8122GD	10pin QFN	900/1900	60/60	0.5/0.7	20/14	2.5~3.3	-40~+85°C
ML8122-1GD	12pin QFN	900/1901	60/61	0.4/0.5	30/25	2.5~3.3	-40~+85°C

GPS Down Converter

Part Number	Package	Input P1dB (dBm)	Noise Figure (dB)	IF Center Frequency (MHz)	Power Consumption (mW)	Supply Voltage (V)	Operating Temperature
ML8142GD	32pin QFN	-60	5 (typ.)	4.092	28.5	1.5	-40~+85°C



Interface and Protocol Controllers/ Time Code RF Receiver

Longwave Time Code RF Receiver

Part Number	Packages	Function	Sensitivity	Supply Voltage	Active Current Consumption	Standby Current Consumption	Operating Temperature
ML6190A	20-SSOP	RF amplifier, AGC, rectifier, slicer and time code output	1 μ Vrms	+1.1~3.6V	38 μ A max.	0.1 μ A max.	-40~+85°C
ML6190B	20-SSOP	RF amplifier, AGC, rectifier, slicer, TCO antenna switch	1 μ Vrms	+1.1~3.6V	38 μ A max.	0.1 μ A max.	-40~+85°C
ML6191	32-SSOP	RF amplifier, AGC, TCO, time code decoder, RTC	1 μ Vrms	+1.1~3.6V	50 μ A max.	5 μ A max.	-40~+85°C

Interface and Protocol Controllers

Part Number	Packages	Function	Supply Voltage	Max. Current	Operating Temperature
ML60842	100-BGA, 100-TQFP	USB 2.0 full speed, OTG controller	+2.7~3.6V	50mA	0~+70°C
MSM6636	18-DIP, 24-SOP, 18-QFJ	SAE J1850 PWM, serial host interface	+4.5~5.5V	10mA (f=16MHz)	-40~+125°C
MSM6636B	24-SOP	SAE J1850 PWM, parallel host interface	+4.5~5.5V	10mA	-40~+125°C

General Features

- **Extensive macrocell library including**
 - Phase locked loops (PLLs)
 - High density single- and dual-port RAM up to 600MHz (generated with ARTISAN™ or VIRAGE™ RAM compiler)
 - Real-time clock
 - JTAG boundary scan
 - Large IP database including: Ethernet 10/100 MAC, 1-Gigabit Ethernet MAC, ARM920T, ARM7TDMI, ARM946E-S, ARM926EJ-S (32b RISC CPU), IEEE1394 (Firewire), UART (with FIFO), USB 1.0 Device Controller, USB 2.0 Device Controller
 - Most IP's are available with AMBA Wrapper
- **Multiple options for testability**
 - Scan, JTAG, BIST
 - Automatic test pattern generation with scan flip-flop macrocells, obtaining fault coverage in excess to 95% (using TetraMax™)
 - Support of automated scan insertion by Synopsys DFT™
- **Flexible mixed 3/5 V operations**
 - Core Voltage: 3.3/5V operation in 0.5µm (1st generation & 2nd generation), 3.3V operation in 0.35µm, 2.5V operation in 0.25µm, 2.5V operation in 0.22µm, 1.5V operation in 0.15µm, 1.2V operation in 0.13µm
 - I/O Voltage: 3.3V / 5V operation in 0.5µm (1st generation), 3.3V operation in 0.5µm (2nd generation), 3.3V operation in 0.35µm, 3.3V operation in 0.25µm, 3.3V operation in 0.22µm, 3.3V operation in 0.15µm, 3.3V operation in 0.13µm
- **Flexible VSS/VDD pin locations**
- **Programmable output currents of 2, 4, 8, 16 and 24 mA**
- **Configurable I/O cells**
 - Output Macrocells: push pull, 3-state, open drain, slew-rate-controlled output options
- Input Macrocells: Input-Buffer LVTTTL/LVCMOS levels, Input-Buffer LVTTTL/LVCMOS Schmitt levels, pull-up resistor and pull-down resistor.
- Bi-directional Macrocells: I/O Buffer LVTTTL/LVCMOS input levels, I/O Buffer LVTTTL/LVCMOS Schmitt input levels
- Oscillator: low and medium-frequency oscillator
- **Clock-tree macrocells with clock skew guaranteed to be = 0.5 ns (for 0.5µ products) with a fan-out of = 9000 at 75 MHz**
- **Support of a wide range of design tools including Synopsys™, Cadence VerilogXL™, ModelSim™ etc.**
- **10 prototypes included in NRE, up to 500 prototypes possible at initial build and risc production option**

Major Gate Array Families

Family Name	Type ¹	Process ²	Core Voltage	I/O Voltage	Typ. Delay ³	Family Size	Raw Gate Range	Usable Gate Range	I/O Range
MG113P/114P/115P	SOG	0.25µm 3,4,5 LM	2.5V	3/5V tol.	61ps	4	657K to 2.5M	388K to 1.6M	308 to 588
MG33Q/34Q	CBA	0.35µm 3,4 LM	3.3V	3/5V tol.	62ps	7	28K to 346K	24K to 280K	108 to 348
MSM12R/13R	SOG	0.5µm 2,3 LM	3.3V	3/5V	80ps	5/9	17K to 500K	8K to 270K	104 to 504
MSM30R/32R	SOG	0.5µm 2,3 LM	3.3V	3/5V tol.	80ps	7/5	14K to 306K	7K to 174K	80 to 320
MG38R	SOG	0.5µm 3 LM	5V	3/5V	90ps	6	13K to 176K	10K to 105K	80 to 256

Embedded Array Families

Family Name	Type ¹	Process ²	Core Voltage	I/O Voltage	Typ. Delay ³	Family Size	Raw Gate Range	Usable Gate Range	I/O Range
MG87J5/6/7/8000	CS	0.13µm 5,6,7,8 LM	1.2V	3/5V tol.	17ps	n/a	331K to 37M	244K to 16M	88 to 912
MG74K/75K/76K	CSA	0.15µm 4,5,6 LM	1.5V	3/5V tol.	33ps	21	212K to 25M	161K to 10.4M	68 to 868
MG73N/74N/75N	CSA	0.22µm 3,4,5 LM	2.5V	3/5V tol.	50ps	21	44K to 9.3M	36K to 3.9M	68 to 868
MG73Q/74Q	CSA	0.35µm 3,4 LM	3.3V	3/5V tol.	77ps	21	9K to 2M	6K to 904K	68 to 868
MSM98Q/99Q	CSA	0.35µm 3,4 LM	3.3V	3/5V tol.	77ps	17	37K to 2.9M	24K to 1.3M	80 to 624
MSM92R	CSA	0.5µm 3 LM	3.3V	3/5V tol.	80ps	35	14K to 1.1M	11K to 500K	80 to 600
MSM98R	CSA	0.5µm 3 LM	3.3V	3/5V	80ps	36	14K to 714K	11K to 357K	96 to 624

1 SOG Sea of Gates Array use predefined diffusion patterns and are available in a smaller range of sizes.

CBA Cell Based Array architecture is from Silicon Architects of Synopsys which mixes two types of cells (8-transistor computer cells and 4-transistor driver cells) on the same die to deliver high gate density and high drives.

CSA Customer Structured Array use a predefined layout frame size but allow diffusion-level (all mask level) customisation of the array.

CS Standard Cell

2 Drawn geometries (effective geometries are smaller)

3 Internal gate propagation delays are quoted for a 4x-drive inverter driving two outputs and 0mm of wire.

Sound and Speech ICs

Sound Generators

Part Number	Packages	Function	Wavetable	Polyphony	Supply Voltage	Active/Standby Current (max.)	Operating Temperature
ML2860	48-W-CSP	GM sound generator, SMF support, internal headphone amplifier, ADPCM playback	Hi-Fi	24/32	+2.7~+3.3V IO:+1.65~DVDD	60mA/10µA	-20~+85°C
ML2870A	62-W-CSP, 48-QFN	GM sound generator, SMF support, ADPCM playback	Hi-Fi	32	+2.5~+3.6V IO:+1.65~DVDD	36mA/15µA	-20~+85°C
ML2864	49-W-CSP	GM sound generator, SMF support, ADPCM/PCM playback	Hi-Fi	64	+2.7~+3.6V IO:+1.65~DVDD	60mA/18µA	-20~+85°C
ML2863	32-QFN, 35-W-CSP	GM sound generator, 13 additional Chinese instruments, SMF support, ADPCM/PCM playback, speaker amplifier, stereo headphone out	Loud	64	+2.7~+3.6V IO:+1.65~DVDD	45mA/18µA	-20~+85°C
ML2865	32-QFN, 35-W-CSP	as ML2863 but without Chinese instruments	Hi-Fi	64	+2.7~+3.6V IO:+1.65~DVDD	45mA/18µA	-20~+85°C
ML2871	32-QFN, 35-W-CSP	as ML2863 but without stereo headphone out	Loud	32	+2.7~+3.6V IO:+1.65~DVDD	45mA/18µA	-20~+85°C
ML2872	32-QFN, 35-W-CSP	as ML2863 but without Chinese instruments	Hi-Fi	32	+2.7~+3.6V IO:+1.65~DVDD	45mA/18µA	-20~+85°C
ML2873	32-QFN, 35-W-CSP	as ML2863 but without ADPCM/PCM playback and without stereo headphone out	Loud	16	+2.7~+3.6V IO:+1.65~DVDD	45mA/18µA	-20~+85°C
New ML2874	32-QFN, 35-W-CSP	as ML2863 but with BRICs* instruments	Loud	32	+2.7~+3.6V IO:+1.65~DVDD	45mA/18µA	-20~+85°C

Note: Please appreciate that sound generators are not offered for musical instruments and toy applications, such as keyboards. Full detailed data sheets are provided against non-disclosure agreement.

*BRICs = Brazilian, Russian, Indian and Chinese instruments

Sound Enhancement

Part Number	Packages	Function	Interface	Supply Voltage	Clock Frequency	Operating Temperature
New ML2601	30-W-CSP	SRS™ 3D surround, stereo speaker amp.	I ² C, SAI, PCM	+2.25~+2.75V IO:+1.65~+3.6V	13MHz, 26MHz	-20~+85°C

Recording ICs

Part Number	Packages	Function	ADC/DAC	Sampling [kHz]	Max. Rec. Time*	Supply Voltage	Max. Current	Clock Frequency	Operating Temperature
ML2302	64-TQFP 71-W-CSP, Chip	ADPCM/ADPCM2/PCM, FIFO, DMA I/F, ext. DAC I/F, speaker amp.	14bit	4~25.6	depends on external memory size	+2.7~+3.6V	20mA	16.384MHz	-10~+70°C
ML2308	48-QFP	μ-law G.711/ADPCM2/PCM, data buffer, I ² S I/F, PWM speaker/headphones driver	1bit Δ -Σ (stereo)	4~32	depends on external memory size	+2.7~+3.6V	40mA	24.576MHz	-20~+70°C
MSM9841	56-QFP, Chip	ADPCM/ADPCM2/PCM, FIFO, DMA I/F, ext. DAC I/F, stereo	14bit (Two DACs)	4~16	depends on external memory size	+2.7~+5.5V	30mA	4.096MHz/ 5.6448MHz	-40~+85°C

*calculated for 4kHz sampling frequency

Analog Flash Recording ICs

Part Number	Packages	Function	Sampling [kHz]	Max. Rec. Time*	Supply Voltage	Max. Current	Clock Frequency	Operating Temperature
ML2500B	32-TSOP I, Chip	Analog Storage recorder; Internal 1 Megacell Flash	4~6.4	4.2min	+2.7~3.3V	45mA	Internal RC osc. or 4.0 - 8.192 MHz	-40~+70°C
ML2502	30-SSOP, Chip	Analog Storage recorder; Internal 128 Kilocell Flash, stand-alone, speaker driver	4~6.4	32sec	+2.7~3.3V	40mA	Internal RC osc.	-10~+70°C

*calculated for 4kHz sampling frequency

Playback ICs

Part Number	Packages	Function	Sampling [kHz]	Internal Memory	Max. Play Time*	Internal DAC	Supply Voltage	Max. Current	Clock Frequency	Operating Temperature
ML2201	8-SSOP	Non-linear PCM (shrink of MSM9831)	4~16	384Kbit ROM	12sec	10bit	+2.0~+5.5V	10mA	4.096MHz	-40~+85°C
ML2213	14-SSOP, 24-SOP,Chip	ADPCM/PCM, melody	4~16	1.5Mbit ROM	90sec	12bit	+2.2~+5.5V	4mA	4.096, 8.192, 16.384MHz	-40~+85°C
ML2215	20-SSOP, 24-SOP, Chip	ADPCM/PCM, melody	4~16	3Mbit ROM	180sec	12bit	+2.2~+5.5V	4mA	4.096, 8.192, 16.384MHz	-40~+85°C
New ML2216	44-QFP	ADPCM2/PCM, volume control, loop function, speaker amp.	4~16	8Mbit PPROM	522sec	12bit	+2.7~+3.6V +4.5~+5.5V	140mA	4.096MHz	-20~+85°C
New ML22P16	44-QFP	OTP version of the ML2216	4~16	8Mbit OTP	522sec	12bit	+2.7~+3.6V +4.5~+5.5V	140mA	4.096MHz	-20~+85°C
ML2240	80-TQFP	ADPCM2/PCM, 4-channel mixer, stereo, 128Mbit ext. ROM	4~48	-	variable	14bit	+2.7~+5.5V	40mA	4.096MHz	-40~+85°C
ML2251	44-QFP	ADPCM2/PCM, 2-channel mixer, volume control, loop function	4~48	512Kbit ROM	31.7sec	14bit	+2.7~+3.6V +4.5~+5.5V	35mA	4.096MHz	-40~+85°C
ML2252	44-QFP	ADPCM2/PCM, 2-channel mixer, volume control, loop function	4~48	1Mbit ROM	64.5sec	14bit	+2.7~+3.6V +4.5~+5.5V	35mA	4.096MHz	-40~+85°C
ML2253	44-QFP, 33-WCSP	ADPCM2/PCM, 2-channel mixer, volume control, loop function	4~48	3Mbit ROM	195.5sec	14bit	+2.7~+3.6V +4.5~+5.5V	35mA	4.096MHz	-40~+85°C
ML2254	44-QFP, 33-WCSP	ADPCM2/PCM, 2-channel mixer, volume control, loop function	4~48	4Mbit ROM	261sec	14bit	+2.7~+3.6V +4.5~+5.5V	35mA	4.096MHz	-40~+85°C
ML2256	44-QFP, 33-WCSP	ADPCM2/PCM, 2-channel mixer, volume control, loop function	4~48	6Mbit ROM	392sec	14bit	+2.7~+3.6V +4.5~+5.5V	35mA	4.096MHz	-40~+85°C
ML22Q54A	44-QFP	Internal Flash ROM version for ML225x family	4~48	4Mbit Flash ROM	261sec	14bit	+2.7~+3.6V	60mA	4.096MHz	0~+70°C
ML22Q58	44-QFP	Internal Flash ROM version for ML225x family	4~48	8Mbit Flash ROM	522sec	14bit	+2.7~+3.3V +4.5~+5.5V	60mA	4.096MHz	0~+70°C
MSM9831	8-SOP	non-linear PCM	4~16	384Kbit ROM	12sec	10bit	+2.0~+5.5V	8mA	3.5 - 4.5MHz	-40~+85°C
MSM9842	56-QFP	ADPCM/ADPCM2/PCM FIFO buffer, ext. DAC I/F, stereo	4~44.1	1.024bit FIFO	64ms buffering	14bit (Two DACs)	+2.7~+5.5V	30mA	4.096 MHz- 5.6448MHz	-40~+85°C

*Playback times are based on the lowest bit-rate and the devices own memory address range without expansions,calculated for 4 kHz sampling frequency

Display Drivers and Controllers

OLED Display Drivers

Part Number	Packages	Number of Driver Anode	Cathode	Power Supply Driver	Logic	Operating Temperature	Display RAM	Interface Parallel	Serial	Output Current Anode	Cathode
ML9352	Bare	128	32 (+1)	18 to 30V	2.7 to 5.5V	-40~+125°C	4096bit	6.0MHz	5.0MHz	0.8mA	100mA
ML9341	Bump Chip	96xRGB	96	10 to 20V	2.25 to 2.75V	-40~+105°C	165888bit	10MHz write cycle	-	270µA	-
ML9380A	Bare Gold Bump	96	1	8 to 30V	3.0 to 5.5V	-40~+125°C	-	-	10MHz	0.4mA	100mA
ML9362	Bare Gold Bump	86xRGB	-	8 to 20V	2.7 to 5.5V	-40~+125°C	-	-	10MHz	-0.4µA	-
ML9372	Bare Gold Bump	-	64	8 to 30V	2.7 to 5.5V	-40~+125°C	-	-	100kHz	-	150mA

VFD Front Panel Controllers / Drivers

Part Number	Packages	Duty	Data Clock [Hz]	Anode Driver	Grid Driver	Dimming	Display Voltage	Logic Supply	Operating Temperature	Notes
ML9212	56-QFP	1/2, 1/3	2M	32	Ext.	10-bit digital	8.0~18.0V	4.5 ~5.5V	-40~+105°C	-
ML9213	80-QFP	1/2, 1/3	2M	56	Ext.	10-bit digital	8.0~18.0V	4.5 ~5.5V	-40~+105°C	-
ML9226	80-QFP	1/2, 1/3	2M	32	Ext.	10-bit digital	8.0~18.5V	4.5 ~5.5V	-40~+85°C	ADC, keyscan, rotary encoder type switch
ML9227	64-QFP	1/2, 1/3	2M	27	Ext.	10-bit digital	8.0~18.5V	4.5 ~5.5V	-40~+85°C	ADC, keyscan, rotary encoder type switch
ML9228	128-QFP	1/2, 1/3	2M	82	Ext.	10-bit digital	8.0~18.5V	4.5 ~5.5V	-40~+85°C	keyscan
New ML9270	44-QFP	1/1	5M	33	Ext.	-	8.0~18.0V	3.3V +/- 10% 5.0V +/- 10%	-40~+105°C	-
New ML9271	64-QFP	1/1	5M	48	Ext.	-	8.0~18.0V	3.3V +/- 10% 5.0V +/- 10%	-40~+105°C	-
New ML9272	60-SSOP	1/1	5M	40	Ext.	-	10.0~65.0V	3.3V +/- 10% 5.0V +/- 10%	-40~+105°C	-

VFD Anode/Grid Drivers

Part Number	Packages	Type	Data Clock [Hz]	Outputs	Display Voltage	Logic Supply	Operating Temperature
ML9261/62	70-SSOP	Grid/Anode	4M	60	+20.0~+60.0V	+3.3 +/- 10% or +5.0V +/- 10%	-40~+85°C

VFD Clocks

Part Number	Packages	Duty	Functions	Display Voltage	Logic Supply	Operating Temperature
New ML9298	32-SSOP	1/2	12H AM/PM, 4 level Brightness, 64Hz output	+4.0~18.0V	+2.8 ~ 3.6V	-40~+85°C

VFD Character Controllers / Drivers

Part Number	Packages	Type	Digits	Anode Driver	Grid Driver	CG ROM/RAM	Data Clock	Driver Voltage	Logic Supply	Max. Logic Current	Operating Temperature	Notes
ML9203	100-QFP	5 x 7Dot	1~16 x 2	72	16	240/16Chr	1MHz	-20~60V	+3.0~5.5V	4mA (5V)	-40~+85°C	2 ports, 3bit dimming
ML9208	64-QFP, 64-SSOP	5 x 7Dot	16	35	16	248/8Chr	2MHz	Vdd-42V~ Vdd-20V	+3.3 or 5.0V	4mA (5V)	-40~+85°C	-
ML9209	44-QFP	alpha-numeric	16	16	16	240/16Chr	2MHz	Vdd-42V~ Vdd-20V	-	4mA (5V)	-40~+85°C	-

LCD Dashboard Panel Controllers / Drivers

Part Number	Packages	Duty	Display Voltage	Data in	Driver Outputs	Data Clock [MHz]	Logic Supply Voltage	Max. Logic Current	Operating Temperature	Notes
ML9060	Bump chip	1/1, 1/2	+4.5~16.0V	1	2Com, 160Seg	1	+2.7~5.5V	3.0mA	-40~+85°C	cascadable
MSM6786	56S-QFP	1/3, 1/4	+4.5~5.5V	1	4Com, 29Seg	2	+4.5~5.5V	0.4mA	-40~+85°C	LED, 5x6 keyscan, int bias resistors
MSM9006-01	64-QFP	01. Mar	+4.5~5.5V	1	3Com, 41Seg	2	+4.5~5.5V	0.45mA	-40~+85°C	5x5 keyscan, 1 LED, 5 I/O
MSM9006-02	64-QFP	01. Apr	+4.5~5.5V	1	4Com, 41Seg	2	+4.5~5.5V	0.45mA	-40~+85°C	5x5 keyscan, 1 LED, 5 I/O
ML9090A-01	128-QFP	1/8, 1/9, 1/10	+6.0~16.0V	1	10Com, 80Seg	1	+2.7~5.5V	0.95mA	-40~+85°C	5 x 5 keyscan, built-in bias voltage generation
ML9090A-02	128-QFP	1/16, 1/17, 1/18	+6.0~16.0V	1	18Com, 80Seg	1	+2.7~5.5V	0.95mA	-40~+85°C	5 x 5 keyscan, built-in bias voltage generation
ML9092	100-TQFP	1/8, 1/9, 1/10	+4.5~16.5V	1	10Com, 56 or 60Seg	2	+4.5~5.5V	2.0mA	-40~+85°C	keyscan, PWM, Rotary Encoder
ML9051-G	Bump Chip	Jan 49 1/49	+6.0~18.0V	01. Aug 1/8	49Com, 132Seg	5	+3.7~5.5V	1.0mA	-40~+85°C	cascadable int. bias voltage generation frame reversal/line reversal
ML9055A	TCP	Jan 16 1/16	+9.0~16.0V	01. Aug 1/8	128Com, 128Seg	9	+1.8~3.0V	0.5mA	-40~+85°C	4-level grey scale int. bias voltage generation
ML9058	Bump Chip	Jan 65 1/65	+6.0~18.0V	01. Aug 1/8	65Com, 132Seg	5	+3.7~5.5V	200µA	-40~+85°C	Internal Voltage Multiplier, Bias Generation and Voltage adjustment Circuit
ML9059	Bump Chip	Jan 49 1/49	+6.0~18.0V	01. Aug 1/8	49Com, 132Seg	5	+3.7~5.5V	220µA	-40~+85°C	Internal Voltage Multiplier, Bias Generation and Voltage adjustment Circuit

LCD Common and Segment Drivers

Part Number	Packages	Duty	Display Voltage	Data in	Shift Register	Driver Outputs	Ron [kOhm max.]	Data Clock [MHz]	Logic Supply Voltage	Max. Logic Current	Operating Temperature
MSM6778B	TCP	1/100~1/256	+18.0~28.0V	1	bidir	120Com	2	1	+2.7~5.5V	400µA	-40~+85°C
MSM6779B	TCP	1/64~1/256	+14.0~28.0V	4	bidir	160Seg	3	4	+2.7~5.5V	2.0mA	-40~+85°C

LCD Character Controllers / Drivers

Part Number	Packages	Duty	Display Voltage	Data in	Driver Outputs	Character ROM/RAM	Display Type	Logic Supply Voltage	Max. Logic Current	Operating Temperature
MSM6665C-02	128-QFP, Chip	1/9, 1/17	+3.0~8.0V	1	17Com, 80Seg	256patterns	5 x 7, cursor, arbitrator	+2.5~5.5V	1.3mA	-40~+85°C
ML9041A	Bump Chip	1/9, 1/12, 1/17	+2.8~7.0V	01.04.2008 1/4/8	17Com, 100Seg	192Chr/12Chr	5 x 7/5 x 10, cursor	+2.5~5.5V	1.2mA	-40~+85°C
ML9044	Bump Chip, TCP	1/9, 1/12, 1/17	+2.8~7.0V	01.04.2008 1/4/8	17Com, 120Seg	192Chr/12Chr	5 x 7/5 x 10	+2.5~5.5V	1.2mA	-40~+85°C
ML9040A/B	80-QFP	1/8, 1/11, 1/16	+3.0~6.0V	8	16Com, 40Seg	192Chr/12Chr	5 x 7/5 x 10	+4.5~5.5V	0.8mA	-20~+75°C
ML9042	Bump Chip	1/8, 1/9, 1/16, 1/17	+2.7~5.5V	8	17Com, 100Seg	2x240Chr ROM, 8Chr RAM	Dot Matrix 5 x 8	+2.7~5.5V	1.2mA	-40~+85°C
MSM9005	100-QFP	01. Aug	+4.0~8.0V	8	8Com, 65Seg	256Chr ROM, 8Chr RAM	5 x 7	+2.5~5.5V	0.8mA	-40~+85°C

VoIP CODECs

Part Number	Packages	ITU-T	Coding	Analog Output	Channels	Supply Voltage	Maximum Power dissipation	Operating Temperature	Notes
ML7204	64-QFP, 100-TQFP	G.729.A, G.711	A-Law, μ -Law	1,3 Ω Vpp, 10k	1	3.0~3.6V	350mW	-20~+60°C	32ms echo canceller V.23 1200bqs FSK modulator and demodulator for caller ID, tone generator and detector (1650Hz, 2100Hz)DTMF, dial pulse generator and detector, G.729.A royalty fee
ML7204A	64-QFP, 100-TQFP	G.729.A, G.711	A-Law, μ -Law	1,3 Ω Vpp, 10k	1	3.0~3.6V	350mW	-20~+60°C	as above but excluding G.729.A licence fee

IP Phone Application Example



ADPCM CODECS

Part Number	Packages	ITU-T	Interface	Analog Output	Clock [MHz]	Supply Voltage	Max. Current	Operating Temperature	Notes
ML7029B	30-SSOP	G.711, G.726	μ -Law	1.3Vpp, 20k Ω	10.368	+2.7~3.6V	12mA	-25~+70°C	MCU control, programmable gain, evaluation board same as B version but with sampling frequency limited to 8kHz
ML7029									-
MSM7540	28-SOP	G.711, G.721	A-Law, 14bit linear	2.226Vpp	10.368	+4.5~5.5V	24mA	-25~+70°C	
MSM7540L	28-SOP	G.711, G.721	A-Law, 14bit linear	1.3Vpp, 350 Ω	10.368	+2.7~3.6V	12mA	-25~+70°C	Low power
MSM7560	28-SOP	G.711, G.721	μ -Law, 14bit linear	2.226Vpp	10.368	+4.5~5.5V	24mA	-25~+70°C	
MSM7560L	28-SOP	G.711, G.721	μ -Law, 14bit linear	1.3Vpp, 350 Ω + 120nF	10.368	+2.7~3.6V	12mA	-25~+70°C	Low power
MSM7570-01	32-TSOP I	G.711, G.726	A-Law, μ -Law	2.226Vpp, 350 Ω + 120nF	19.2/12.288	+4.5~5.5V	28mA	-25~+70°C	DTMF, MCU control, VOX
MSM7570L-01	32-TSOP I	G.711, G.726	A-Law, μ -Law	1.3Vpp, 350 Ω + 120nF	19.2/12.288	+2.7~3.6V	14mA	-25~+70°C	DTMF, VOX, 01/02 differ in ringing tone frequencies
MSM7590L-01	32-TSOP I	G.711, G.726	A-Law, μ -Law	1.3Vpp, 350 Ω + 120nF	10.368	+2.7~3.6V	14mA	-25~+70°C	Low power, DTMF, VOX, MCU control
MSM7580	28-SOP	G.721	A-Law, μ -Law	-	-	+4.5~5.5V	10mA	-30~+80°C	2-ch transcoder
MSM7581	100-TQFP	G.721	A-Law, μ -Law	-	-	+2.7~5.5V	8mA	-30~+80°C	4-ch transcoder



PCM Voice CODECs

Part Number	Packages	ITU-T	Coding	Analog Output	Channels	Supply Voltage	Max. Current	Operating Temperature	Notes
MSM7507-01 MSM7507-02 MSM7507-03	24-SOP, 20-SSOP	G.714	μ -Law/A-Law μ -Law A-Law	2.6Vpp, 1.2k Ω	1	+4.75~5.25V	10mA	-30~+85°C	Balanced output
MSM7578V MSM7578H MSM7579	24-SOP, 20-SSOP	G.711	μ -Law/A-Law μ -Law A-Law	2.4Vpp, 600 Ω	1	+4.75~5.25V	9mA	-30~+85°C	Single-ended output
MSM7702-01 MSM7702-02 MSM7702-03	24-SOP	G.711	μ -Law/A-Law μ -Law A-Law	2.0Vpp, 1.2k Ω	1	+2.7~3.8V	9mA	-30~+85°C	Single-ended output
MSM7704-01 MSM7704-02 MSM7704-03	24-SOP	G.711	μ -Law/A-Law μ -Law A-Law	2.0Vpp, 1.2k Ω	2	+2.7~3.8V	14mA	-30~+85°C	Single-ended output
MSM7705-01	44-QFP	G.711	μ -Law/A-Law	3.4Vpp, 600 Ω	4	+4.75~5.25V	28mA	-30~+85°C	Single-ended output
MSM7717-01 MSM7717-02	24-SOP, 20-SSOP	G.711	μ -Law/A-Law μ -Law	4.0Vpp, 1.2k Ω	1	+2.7~3.8V	14mA	-30~+85°C	Balanced output
ML7000-01	24-SOP, 20-SSOP	G.714	μ -Law/A-Law	5.2Vpp, 1.2k Ω	1	+4.75~5.25V	12mA	-30~+85°C	Balanced output, short frame sync. only
ML7001-01	24-SOP, 20-SSOP	G.714	μ -Law/A-Law	4.0Vpp, 1.2k Ω	1	+2.7~3.3V	10mA	-30~+85°C	Balanced output, short frame sync. only
MSM7716	30-SSOP, 32-TSOP	G.714 @ 8kHz	14bit linear, 2's complement	2.0Vpp, 500 Ω	1	+2.7~3.6V	14mA	-30~+85°C	Balanced output
ML7022-01	30-SSOP	G.711	μ -Law	3.4Vpp, 600 Ω	2	+4.75~5.25V	18mA	-40~+85°C	Line card CODEC, SLIC I/F latches
ML7048-1	44-QFP	G.711	μ -Law	3.4Vpp, 600 Ω	3	+4.75~5.25V	33mA	-30~+85°C	Balanced output
ML7033	64-QFP	-	μ -Law/A-Law 14bit linear	3.4Vpp, 20k Ω	2	+4.75~5.25V	35mA (2ch) 22mA (1ch)	-40~+85°C	Line card CODEC, SLIC I/F (best solution with Intersil's RSLIC series), time slot management
ML7041	48-TPQFP	-	μ -Law/A-Law 14bit linear, 2's complement	2.6Vpp, 8k Ω 1.3Vpp, 32k Ω x 2 1.3Vpp, 20k Ω	1	+2.4~3.3V	11mA (Codec only)	-40~+85°C	Balanced output, low-dropout regulator, speaker amplifier 12C-MCU I/F, short-frame-sync.
MSM6895	80-QFP	G.711	μ -Law	3.0Vpp, 3k Ω	1	+4.75~5.25V	10mA	-10~+70°C	Balanced output DTMF/TONE
MSM7732-01	30-SSOP, 48-BGA	-	μ -Law/A-Law, 14bit linear, 2's complement	1.3Vpp, 32 Ω	1	+2.4~3.3V	11mA	-40~+85°C	Audio CODEC, balanced, DTMF generator, direct earphone connection, short frame sync.

Telecom ICs

Echo/Noise Cancellers

Part Number	Packages	Function	Max. Echo	Coding Format	Echo Type	Clock [MHz]	Supply Voltage	Max. Current	Operating Temperature	Notes
ML7021	28-SSOP	Single EC	8ms	μ-Law	Line + Acoustic	19. Feb	+2.7~5.5V	30mA	-40~+85°C	2100Hz tone detector
MSM7602-001	28-SSOP	Single EC	23ms	μ-Law	Line + Acoustic	19. Feb	+2.7~5.5V	45mA	-40~+85°C	-
MSM7602-011	56-QFP	Single EC (cascadable)	23ms master 31ms slave (209ms max.)	μ-Law	Line + Acoustic	19. Feb	+2.7~5.5V	45mA	-40~+85°C	cascadable
MSM7603B-003	28-SSOP	Single EC	55ms	μ-Law/ A-Law	Line + Acoustic	19. Feb	+2.7~5.5V	70mA	-40~+85°C	-
MSM7617-001	64-QFP	Dual EC	55ms/channel	μ-Law	Line + Acoustic	17.5~20	+4.5~5.5V	130mA	-40~+85°C	-
New ML7037-002	64-TQFP	Dual EC, NC (18dB max), dual Codec, Auto Level Controller, slope filter, GPIOs	100ms (Acoustic), 20ms (Line)	μ-Law, 16-bit linear	Line + Acoustic	12.288	+3.0~3.6V	60mA	-40~+85°C	selectable MCU and stand-alone modes, normal- and short-frame-sync

Modem Circuits

Part Number	Packages	Function	Modulation	Standard	Clock [MHz]	Supply Voltage	Max. Current	Operating Temperature	Notes
MSM7532	56-QFP	1200-2400bps modem, baseband filter	MSK	-	36.864	+1.8~5.5V	33mA	-30~+70°C	Companer, highpass, limiter, splatter, deemphasis
ML7020	32-SSOP	1200bps, modem	FSK	ITU-T V.23	3.579.545	+4.5~5.5V	6mA	-40~+85°C	DTMF generator/detector, built-in call progress tone generator/detector, three analog input systems (switchable), single/diff.output for 1.2KΩ/600Ω

Audio Video Solutions

Noise Reduction FIFOs

Part Number	Packages	Function	Embedded Memory	Supply Voltage	Active Current	Standby Current	Operating Temperature
ML87V2103	100-QFP	Noise reduction (field-recursive), I/P conversion	3.9Mbit FIFO	+3.0~3.6V	120mA max.	5mA max.	0~+70°C
ML87V2104	100-QFP	Noise reduction (field-recursive), flicker-free mode	4.4Mbit FIFO	+3.0~3.6V	100mA max.	10mA max.	0~+70°C
ML87V2105	100-TQFP	Noise reduction (frame-recursive)	5.3Mbit FIFO	+3.0~3.6V	80mA max.	5mA max.	0~+70°C
New ML87V2107	100-TQFP	Noise reduction (adaptive frame-recursive), frame synchronization	7Mbit FIFO	+3.0~3.6V	252mA max.	22mA max.	0~+70°C
New ML87V21071	100-TQFP	Noise reduction (adaptive frame-recursive), cross colour cancellation	7Mbit FIFO	+3.0~3.6V	360mA max.	18mA max.	0~+70°C

LCD Graphic Display Controllers

Part Number	Packages	Embedded Memory	Operating Frequency	Display Memory	Display Size	Display Colors	Supply Voltage	Active Current	Notes	Operating Temperature
ML87V3104	100-TQFP	4Mbit DRAM	15MHz max.	1M pixel (max.)	1024x1024 (restricted)	STN: 4096 TFT: 65535	+3.0~3.6V	55mA max.	Scroll, subscreen, hardware cursor	40~+85°C
ML87V3116	176-LQFP	8Mbit SDRAM	~33MHz (tbd)	4M pixel	VGA or TV	TFT: 65535	Core: 2.0V ± 0.15V IIO: 3.3V ±0.3V	50mA	MJPEG/JPEG (de)-compression, rotation and shrinking function	0~+70°C

Video Decoders/Encoders

Part Number	Type	Features	Package	Operating Temperature
ML86V7655	NTSC/PAL Encoder	NTSC/PAL, 6ch 10bit DAC, I/P-Conversion Output, Macrovision	100-TQFP	-40~+85 °C
ML86V7666	NTSC/PAL Decoder	NTSC/PAL, 2ch 10bit ADC, YCbCr/RGB Output, Line Lock	100-TQFP	-40~+85 °C
ML86V7667	NTSC/PAL Decoder	NTSC/PAL, 1ch 10bit ADC, YCbCr/ITU.Bt.656, Low Power	64-TQFP	-40~+85 °C
ML86V7668	NTSC/PAL/SECAM Decoder	as ML86V7667+SECAM, I/P-Conversion	80-TQFP	-40~+85 °C

Single Chip Decoder LCD Controller

Part Number	Type	Features	Package	Operating Temperature
New ML86V8208	NTSC/PAL/SECAM Decoder with Scan Converter and LCD Controller	NTSC/PAL/SECAM, 3ch ADC, VGA/W-VGA, YCbCr/RGB/ITU.BT.656 Output, I/P Conversion, Scaling, OSD	176-LQFP	-40~+85 °C

Audio Delay Processor

Part Number	Packages	Function	Embedded Memory	Supply Voltage	Active Current	Standby Current	Operating Temperature
New ML87V5002	32-TSOP	Audio Delay Processor, 32kHz up to 192kHz, stereo up to 7.1 channels, up to 2s total delay	2Mbit	+3.0~3.6V	30mA max.	4.5mA	0~+70°C

Field Memories

FIFO Memories

Total Capacity	Organisation	Part Number	Packages	Cycle Times [ns]	Refresh	Supply Voltage	Max. Current Operating	Current Standby	Operating Temperature	Notes
2MBit	512R x 512C x 8	MSM518221A	28-ZIP, 28-SOJ, 28-SOP	25/30	Self	+4.5~5.5V	60/50	5	0~+70°C	FIFO-type, write mask, data skip
2MBit	512R x 512C x 8	MSM51V8221A	28-ZIP, 28-SOJ, 28-SOP	30	Self	+3.0~3.6V	35	3	0~+70°C	FIFO-type, write mask, data skip
2MBit	512R x 512C x 8	MSM518222A	28-ZIP, 28-SOJ, 28-SOP	25/30	Self	+4.5~5.5V	60/50	5	0~+70°C	FIFO-type, write mask, cascable, data skip
2MBit	512R x 512C x 8	MSM51V8222A	28-ZIP, 28-SOJ, 28-SOP	30	Self	+3.0~3.6V	35	3	0~+70°C	FIFO-type, write mask, cascable, data skip
3MBit	512R x 512C x 12	MSM5412222B	40-SOJ, 44-TSOP(2)	23/25	Self	+4.5~5.5V	60/50	5	0~+70°C	FIFO-type, write mask, cascable, data skip
3MBit	512R x 512C x 12	MSM54V12222B	40-SOJ, 44-TSOP(2)	30	Self	+3.0~3.6V	60	3	0~+70°C	FIFO-type, write mask, cascable, data skip
4MBit	261214 x 8 x 2	MS8104160A	100-TQFP	20/25/30	Self	+4.5~5.5V	170/150/120	5	0~+70°C	FIFO-type
4MBit	261214 x 8 x 2	MS81V04160A	100-TQFP	25/30	Self	+3.0~3.6V	80	3	0~+70°C	FIFO-type
4MBit	261214 x 8 x 2	MS8104166A	100-TQFP	20/25/30	Self	+4.5~5.5V	170/150/120	5	0~+70°C	FIFO-type
4MBit	261214 x 8 x 2	MS81V04166A	100-TQFP	25/30/40	Self	+3.0~3.6V	80/80/60	3	0~+70°C	FIFO-type
5.6MBit	583680 x 10	MS81V05200	70-TSOP(2)	14	Self	+3.0~3.6V	150	6	0~+70°C	FIFO-type
6MBit	401408 x 16	MS81V06160	70-TSOP(2)	83/66	Self	+3.0~3.6V	210/170	6	0~+70°C	FIFO-type
10MBit	663552 x 16	MS81V10160	70-TSOP(2)	83/66	Self	+3.0~3.6V	210/170	6	0~+70°C	FIFO-type
26MBit	1114112 x 24	MS81V26000	100-TQFP	12	Self	+3.0~3.6V	200	5	0~+70°C	FIFO-type
New 32MBit	1114112 x 32	MS81V32320	128-TQFP	6,6/7	Self	+3.0~3.6V	200 (tbd)	5	0~+70°C	LVTTL, high speed async. R/W 150MHz
New 32MBit	1114112 x 32	MS81V32321	128-TQFP	6,6/7	Self	+3.0~3.6V	200 (tbd)	5	0~+70°C	SSTL3, high speed async. R/W 150MHz

Line by Line Access Memories

Total Capacity	Organisation	Part Number	Packages	Cycle Times [ns]	Refresh	Supply Voltage	Max. Current Operating	Current Standby	Operating Temperature	Notes
2.7MBit	768 x 304 x 12	MSM548331	44-TSOP(2)	30	Self	+3.0~3.6V	50	10	0~+70°C	LINE-type, cascable, write mask, data skip
3.3MBit	960 x 290 x 12	MSM548332	44-TSOP(2)	30/50	Self	+3.0~3.6V	75/50	10	0~+70°C	LINE-type, cascable, write mask, data skip

Line Memory

Total Capacity	Organisation	Part Number	Packages	Cycle Times [ns]	Refresh	Supply Voltage	Max. Current Operating	Current Standby	Operating Temperature	Notes
40KB	5048 x 8	MSM514212	28-ZIP	28/34	-	+4,5~5,5V	42/36/31	-	0~+70°C	Serial line memory, delay bits 40 to 5048

Graphic Memories

Multiport Video DRAMs

Total Capacity	Organisation	Part Number	Packages	RAM-Port	SAM-Port	Cycle Times [ns]	Refresh	Supply Voltage	Max. Current Operating	Standby	Operating Temperature	Notes
1MBit	256K x 4	MSM514252A	28-ZIP, 28-SOJ	512 x 512 x 4	512 x 4	70/80/100	512/ 8ms	+4.5~5.5V	120/110/100	8	0~+70°C	FPM, Basic Functions
1MBit	256K x 4	MSM514262	28-ZIP, 28-SOJ	512 x 512 x 4	512 x 4	70/80/100	512/ 8ms	+4.5~5.5V	120/110/100	8	0~+70°C	FPM, Extd Functions 1
1MBit	128K x 8	MSM518121A	40-ZIP, 40-SOJ	512 x 256 x 8	256 x 8	70/80/100	512/ 8ms	+4.5~5.5V	120/110/100	8	0~+70°C	FPM, Basic Functions
1MBit	128K x 8	MSM518122	40-ZIP, 40-SOJ	512 x 256 x 8	256 x 8	70/80/100	512/8ms	+4.5~5.5V	120/110/100	8	0~+70°C	FPM, Extd Functions 1
2MBit	256K x 8	MSM548262	40-ZIP, 44(40)-TSOP(2)	512 x 512 x 8	512 x 8	60/70/80	512/8ms	+4.5~5.5V	140/130/120	8	0~+70°C	FPM, Basic Functions
2MBit	256K x 8	MSM548263	40-ZIP, 44(40)-TSOP(2)	512 x 512 x 8	512 x 8	60/70/80	512/8ms	+4.5~5.5V	140/130/120	8	0~+70°C	FPM, Extd Functions 1
4MBit	256K x 16	MSM5416273	64-SSOP	512 x 512 x 16	512 x 16	50/60/70	512/8ms	+4.5~5.5V	180/170/160	8	0~+70°C	FPM, 2CAS, Extd Functions 2
4MBit	256K x 16	MSM54V16273	64-SSOP	512 x 512 x 16	512 x 16	60/70	512/8ms	+3.0~3.6V	160/150	8	0~+70°C	Extd PM, 2CAS, Extd Functions 2
4MBit	256K x 16	MSM5416282	64-SSOP	512 x 512 x 16	512 x 16	50/60/70	512/8ms	+4.5~5.5V	180/170/160	8	0~+70°C	FPM, 2WE, Extd Functions 1
4MBit	256K x 16	MSM5416283A	64-SSOP	512 x 512 x 16	512 x 16	50/60/70	512/8ms	+4.5~5.5V	180/170/160	8	0~+70°C	Extd PM, 2WE, Extd Functions 2
4MBit	256K x 16	MSM54V16283	64-SSOP	512 x 512 x 16	512 x 16	60/70	512/8ms	+3.0~3.6V	160/150	8	0~+70°C	Extd PM, 2WE, Extd Functions 2

P²ROMs

High Speed P²ROMs

Total Capacity	Organisation	Part Number	Packages	Access [ns]	Supply Voltage	Max. Current Operating	Standby
8MBit	512K x 16/1M x 8	MR27V802F	42-DIP, 44-SOP, 44-TSOP(2)	100/80	+2.7~3.3V, +3.0~3.6V	35mA	50µA
16MBit	1M x 16/2M x 8	MR27V1602F/L	44-SOP, 44-TSOP(2), 48-TSOP(1)	90	+3.0~3.6V	30mA	50µA
32MBit	2M x 16/4M x 8	MR27V3202F/J/L	44-SOP, 44-TSOP(2), 48-TSOP(1)	90	+5.0V	50mA	50µA
32MBit	2M x 16/4M x 8	MR27T3202F/L	44-SOP, 44-TSOP(2), 48-TSOP(1)	90	+3.0V	50mA	50µA
64MBit	4M x 16/8M x 8	MR27V6402G/L	44-SOP, 44-TSOP(1), 48-TSOP(2)	80	+3.0~3.6V	30mA	10µA
64MBit	4M x 16/4M x 8	MR27T6402G/L	44-SOP, 44-TSOP(1), 48-TSOP(2)	90	+2.7~3.6V	30mA	10µA
128MBit	8M x 16/16M x 8	MR27V12800J/L	48-TSOP(1)	80	+3.0~3.6V	25mA	10µA
128MBit	8M x 16/16M x 8	MR27T12800J/L	48-TSOP(1)	90	+2.7~3.6V	25mA	10µA
256MBit	8M x 32/16M x 16	MR27V25603L/N	70-SSOP	90	+3.0~3.6V	60mA	50µA
256MBit	16M x 16/32M x 8	MR27T25603L	50-TSOP, 70-SSOP	100~120	+2.7~3.6V	35mA	10µA

3.3V Page Mode P²ROMs

Total Capacity	Organisation	Part Number	Packages	Page	Access [ns]	Supply Voltage	Max. Current Operating	Standby
16MBit	1M x 16/ 2M x 8	MR27V1652F/L	48 TSOP, 44-SOP	8w	100 (random) 30 (page)	+3.0~3.6V	60mA	50µA
32MBit	2M x 16/4M x 8	MR27V3252J	48 TSOP, 44-SOP	8w	70 (random) 25 (page)	+3.0~3.6V	50mA	-
64MBit	4M x 16/8M x 8	MR27V6452G/L	48 TSOP, 44-SOP	8w	100 (random) 30 (page)	+3.0~3.6V	50mA	-
128MBit	8M x 16/16M x 8	MR27V12850J/L	48 SOP	8w	100 (random) 25 (page)	+3.0~3.6V	50mA	-
256MBit	8M x 32/16M x 16	MR27V25653L	70 SSOP	8w	120 (random)35 (page)	+3.0~3.6V	100mA	-
512MBit	32M x 16/64M x 8	MR27V51254N	70 SSOP	8w	120 (random)35 (page)	+3.0~3.6V	80mA	-

Gallium Arsenide Devices for Radio Frequency

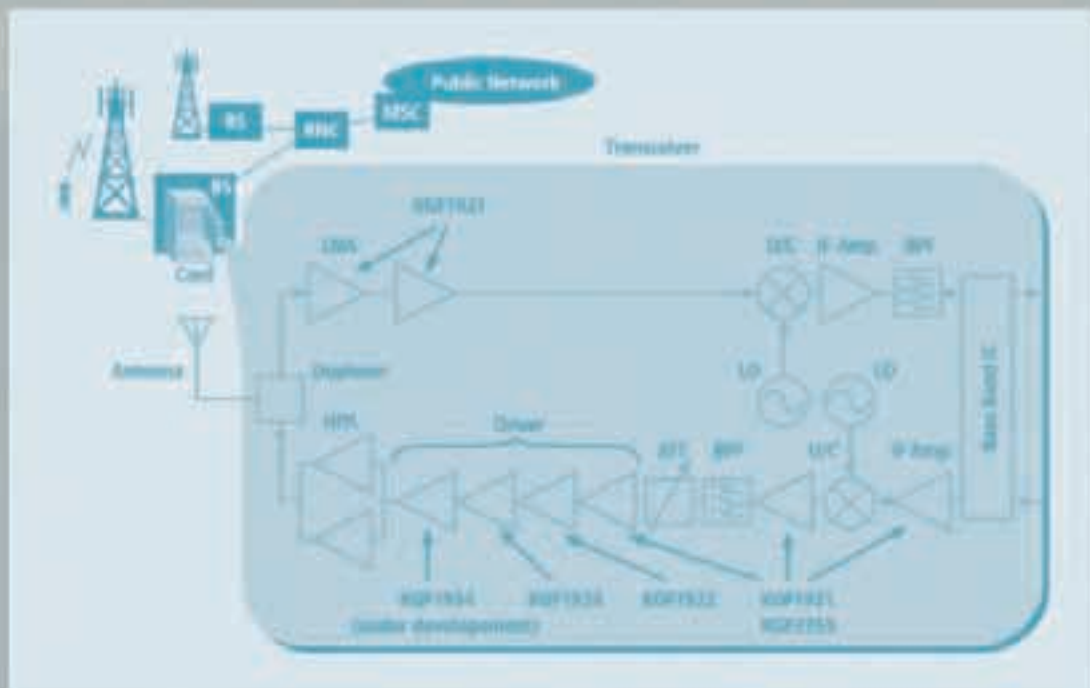
L-Band Small-Signal Amplifiers/Mixer ICs

	Part Number	Band Width	Application	V _D	I _D (max.)	P _O (min.)	GC (min.)	Package	Remark
New	KGF1531P	1.9GHz	Receiver Mixer	3V	8mA	0dBm	10dB	SOT-23-5	Dual Gate FET Lead-Free

L-Band Medium-Power Amplifiers

	Part Number	Band Width	Application	V _D	I _D (max.)	P _O (min.)	Gain (min.)	NF (max.)	Package	Remark
New	KGF1256P	500MHz-3GHz	Pre-Driver Amplifier	5V	40mA	16dBm	14dB	2.5dB	SOT-23-5	Lead-Free
New	KGF1283P	850MHz	Driver Amplifier	5.8V	0.45A	26.5dBm	17dB	1.2dB	SOT-89	Lead-Free
New	KGF1284	1.9GHz	Driver Amplifier	3.4V	0.45A	21.5dBm	12dB	2.9dB	SOT-89	Lead-Free
New	KGF1312	850MHz	Driver Amplifier	5.8V	1.3A	31.5dBm	16dB	1.4dB	SOT-89	Lead-Free
New	KGF1313	1.9GHz	Driver Amplifier	3.4V	1.3A	27dBm	9.5dB	2.5dB	SOT-89	Lead-Free
New	KGF1323	500MHz-3GHz	Driver Amplifier	5.8V	2A	33dBm	15dB	2.2dB	SOT-89	Lead-Free
New	KGF1921	100MHz-3GHz	Driver Amplifier	10V	0.45A	27dBm	14dB	1.3dB	SOT-89	Lead-Free
New	KGF1922	100MHz-3GHz	Driver Amplifier	10V	0.5A	30dBm	13dB	1.8dB	SOT-89	Lead-Free
New	KGF1924	100MHz-3GHz	Driver Amplifier	10V	4.0A	37dBm	10dB	2.1dB	Ceramic Package	Lead-Free

UMTS* Base Station Application Example



*Universal Mobile Telecommunications System (3G)



Power Amplifier Monolithic Microwave Integrated Circuit

	Part Number	Band Width	Application	V _o	I _o (max.)	P _o (min.)	Gain (min.)	Package
New	KGF2841	1.9GHz	PHS Power Amplifier	3V	180mA	22dB	23dB	6pin HSON

Wide Band Amplifiers

	Part Number	Band Width	Application	V _o	I _o (max.)	P _o (min.)	Gain (min.)	NF (max.)	Packages
New	KGF2701	800MHz-4GHz	Gain Block	5V	90mA	14dBm	16dB	4.5dB	8pin Ceramic
New	KGF2755	100MHz-3GHz	Gain Block	5.8V	180mA	22dBm	22.5dB	2.4dB @3GHz	6pin HOSN

AGC Amplifiers

	Part Number	Band Width	Application	V _o	I _o (max.)	Gain (min.)	Dynamic Range (typ.)	Package
New	KGF2441P	130MHz	IF AGC	5V	10mA	-50dB to +30dB	8pin SOP	Lead-Free

Gallium Arsenide Devices for Optical Networks

10G EAM (Electro Absorption Modulator) Driver

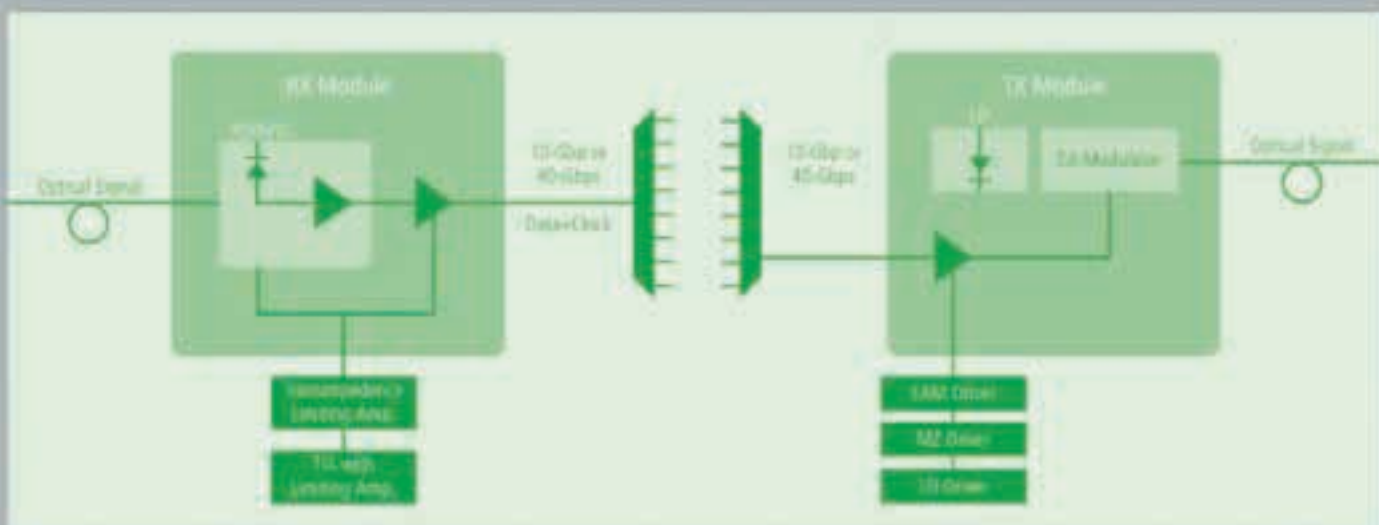
Part Number	Data Rate	Application	Vs (typ.)	Circuit Current@max. Amplitude (typ.)	Maximum Output Amplitude (typ.)	Tr/Tf (typ.)	X point Control	Package	Remark
KGA4145	11.1Gbps	OC-192Tx	-5.2V	220mA	3.0Vpp	25ps	35 to 80%	Die	Output Amplitude Control: 1Vpp to 3Vpp
KGL4145KW	11.1Gbps	OC-192Tx	-5.2V	220mA	3.0Vpp	25ps	35 to 80%	4x4mm QFN	Output Amplitude Control: 1Vpp to 3Vpp
KGA4195	11.3Gbps	OC-192Tx 10G Ethernet Tx	+3.3V/+5V or +3.3V	90/160mA or 90/120mA	3.0Vpp	27ps	35 to 80%	Die	Differential Output
KGL4195KD	11.3Gbps	OC-192Tx 10G Ethernet Tx	+3.3V/+5V or +3.3V	90/160mA or 90/120mA	3.0Vpp	27ps	35 to 80%	4x4mm QFN	Differential Output

10G MZ (Mach-Zehnder) Driver

New

Part Number	Data Rate	Application	Vs (typ.)	Power Dissipation (typ.)	Maximum Output Amplitude (typ.)	Tr/Tf (typ.)	X point Control	Package
KGL4126HA	11.3Gbps	OC-192Tx	-5.2/+4V	1.45W	6.0Vpp	30ps	45 to 55%	32pin QFP (7mm sq.)
KGL4146	11.3Gbps	OC-192Tx	-5.2/+5V	1.3W	6.0Vpp	25ps	40 to 60%	SMT PKG (10.9x8)
KGL4136HD	10.7Gbps	OC-192Tx	-5.2V	1.0W	4.0Vpp (8.0Vpp Diff.)	32ps	40 to 60%	32pin QFP (7mm sq.)

10-Gbps and 40-Gbps Tx/Rx GaAs ICs



10G LD (Laser Diode) Driver

Part Number	Data Rate	Application	Vs (typ.)	Circuit Current@max. Amplitude (typ.)	Modulation Current (typ.)	Tr/Tf (typ.)	Bias Current (typ.)	Package
KGA4175	10.7Gbps	OC-192Tx 10G Ethernet Tx	3.3V	150mA	20 to 50mA pp	25ps	0 to 45mA	Die
KGL4175JW	10.7Gbps	OC-192Tx 10G Ethernet Tx	3.3V	150mA	20 to 50mA pp	25ps	0 to 45mA	26pin QFP (5 x 5.2mm)
KGA4185	11.3Gbps	OC-192Tx 10G Ethernet Tx	+3.3V/+5V or +3.3V	90/130mA	20 to 80mA pp	27ps	2 to 85mA	Die
KGL4185KD	11.3Gbps	OC-192Tx 10G Ethernet Tx	+3.3V/+5V or +3.3V	90/130mA	20 to 80mA pp	27ps	2 to 85mA	4x4mmQFN

10G Transimpedance Amplifier

Part Number	Data Rate	Application	V _D (typ.)	Power Dissipation (typ.)	Transimpedance (typ.)	Optical Sensitivity (typ.)	Package	Remark
KGA4133	12.5Gbps	OC-192Tx	+3.3V /-2.0V	0.2W	560kΩ	-20.5dBm	Die	Single Ended Output
KGA4143	10.7Gbps	OC-192Tx	+3.3V	0.4W	2.0kΩ (differential)	-19dBm	Die	Differential Output, Output Offset Adjustment, Power Monitor
New KGA4153	10.7Gbps	OC-192Tx	+3.3V	0.2W	4.5kΩ (differential)	-21dBm	Die	Differential Output, Output Offset Adjustment, Threshold Control
New KGA4163	11.3Gbps	OC-192Tx	+3.3V	0.2W	1.4kΩ (differential)	-20.5dBm	Die	Linear TIA, Differential Output, Output Offset Adjustment, Threshold Control
KGA4141	10.7Gbps	OC-192Tx	+3.3V	0.5W	36kΩ (differential)	-19.5dBm	Die	TIA with LA, Differential Output, Threshold Control, Power Monitor

10GHZ AGC Amplifier

Part Number	Data Rate	Application	Vs (typ.)	Power Dissipation (typ.)	Maximum Gain (typ.)	Minimum Gain (typ.)	Dynamic Range (typ.)	Package
KGL4132F	12.5GHz	OC-192Rx	-5.2V	1.13W	25dB	-	30dB	20pin QFP (12x12mm)
New KGL4142KD	11.3GHz	OC-192Rx	+5V	0.6W	22dB	-10dB	-	24pin QFN (4x4mm)
New KGL4152KD	11.3GHz	OC-192Rx	+3.3V	0.3W	23dB	0dB	-	24pin QFN (4x4mm)

14GHz Broadband Amplifier

Part Number	Band Width	Application	Vs (typ.)	I _{ss} (typ.)	Small Signal Gain (typ.)	Output Amplitude (typ.)	Package
KGA4117N	15GHz	OC-192Rx	-5.2V	140mA	14dB@1GHz	1.0Vpp	Die
KGL4117H	14GHz	OC-192Rx	-5.2V	140mA	15dB@1GHz	1.0Vpp	32pin QFP (7mm sq.)

40G Broadband Amplifier

Part Number	Band Width (typ.)	Application	V _D (typ.)	Power Dissipation (typ.)	Gain (typ.)	Output Power Amplitude (typ.)	Package
KGA8010	>50GHz	OC-768Tx	+3.3V	0.25W	11.5dB	12dBm	Die
KGA8011	>40GHz	OC-768Tx	+3.3V	0.34W	14.0dB	14dBm	Die

Optical Components

2.5G APD ROSA*

New

Part Number	Data Rate	Application	Wave-length	TIA Supply Voltage	APD Break-down Voltage	Band Width (typ.)	Responsivity (typ.)	Sensitivity (typ.)	Overload (typ.)	Output	Package	Remark
OF3638R-C3	2.5Gbps	OC-48 Gb-Ethernet SFP or SFF	1250nm to 1620nm	+3.3V	<40V	2.0GHz	23KV/W	-34dBm	-3dBm	Differential	5 lead coax Ø 1.25mm Ferrule	w/TIA

*ROSA: Receiver Optical Sub Assembly

2.5G LD TOSA*

Part Number	Data Rate	Application	Wavelength	Operating Temperature	Fiber Output Power	LD Type	Package	Remark
OL3415L-2	2.5Gbps	OC-48, Gb-Ethernet SFP or SFF	1310nm	0~+85°C	min. 2.2mW	DFB	4 lead coax Ø 1.25mm Ferrule	Monitor PD, Isolator
OL5415L-2	2.5Gbps	OC-48, Gb-Ethernet SFP or SFF	1550nm	0~+85°C	min. 2.2mW	DFB	4 lead coax Ø 1.25mm Ferrule	Monitor PD, Isolator
OLx415L-2-Wnnn	2.5Gbps	OC-48, Gb-Ethernet SFP or SFF	1470-1610nm 8 wavelength	0~+70°C	min. 2.2mW	DFB	4 lead coax Ø 1.25mm Ferrule	Monitor PD, Isolator

*TOSA: Transmitter Optical Sub Assembly

2.5G LD Coax

Part Number	Data Rate	Application	Wavelength	Operating Temperature	Fiber Output Power	LD Type	Package	Remark
OL341xL-2	2.5Gbps	OC-48, Gb-Ethernet	1310nm	0~+85°C	min. 2.2mW	DFB	4 lead coax Ø 1.25mm Ferrule	Monitor PD, Isolator
OL545xL-2	2.5Gbps	OC-48, Gb-Ethernet	1550nm	0~+85°C	min. 2.2mW	DFB	4 lead coax Ø 1.25mm Ferrule	Monitor PD, Isolator
OLx45xL-2-Wnn	2.5Gbps	OC-48, Gb-Ethernet	1470-1610nm 8 wavelength	0~+70°C	2.0mW	DFB	4 lead coax Ø 1.25mm Ferrule	Monitor PD, Isolator

1.25~2.5G PIN-PD and APD

Part Number	Data Rate	Application	Wave-length	TIA Supply Voltage	Band Width (typ.)	Responsivity (typ.)	Sensitivity (typ.)	Overload (typ.)	Output	Package	Remark
OD8621B	1.25Gbps	Gb-Ethernet Fiber Channel	1250nm to 1620nm	+3.3V	1.6GHz	2.2KV/W	-27dBm	0dBm	Differential	5 lead coax w/SMF	w/TIA
OD8623B	2.5Gbps	OC-48 2xFC	1250nm to 1620nm	+3.3V	1.9GHz	2.6KV/W	-25dBm	1dBm	Differential	5 lead coax w/SMF	w/TIA
OF3621B-C3	1.25Gbps	Gb-Ethernet Fiber Channel	1250nm to 1620nm	+3.3V	1.1GHz	18KV/W	-36.5dBm	-5dBm	Differential	5 lead coax w/SMF	w/TIA
OF3634B-C3	2.5Gbps	OC-48 2xFC	1250nm to 1620nm	+3.3V	1.85GHz	23KV/W	-34dBm	-3dBm	Differential	5 lead coax w/SMF	w/TIA

10G PIN-PD

Part Number	Data Rate	Application	Wave-length	TIA Supply Voltage	Sensitivity (typ.)	Overload (typ.)	Output	Package	Remark
OD9243N	10.7Gbps	OC-192 Transponder	1250nm to 1620nm	+3.3V	-21dBm	2dBm	Differential	MSA w/SMF	w/TIA
New OD9245N	10.7Gbps	OC-192 Transponder	1250nm to 1620nm	+3.3V	-19.5dBm	2dBm	Differential	MSA w/SMF	w/TIA Linear Gain

Optical Components

10G APD-Pre-Amplifier

Part Number	Data Rate	Application	Wave-length	TIA Supply Voltage	Sensitivity (typ.)	Overload (typ.)	Output	Package	Remark
New OF3242N	10.7Gbps	OC-192 Transponder	1250nm to 1620nm	+3.3V	-27.0dBm	-5dBm	Differential	MSA w/SMF	w/TIAL

10G EML (Electro Absorption Modulated Laser)

Part Number	Data Rate	Application	Wave-length	Operating Temperature	Average Output Power	Extinction Ratio (typ.)	Package	Remark
New OL5170M	10.7Gbps	OC-192 Transponder 40km	1550nm	0~+75°C	min. 0dBm	10dB	cooled TOSA	w/Isolator
OL5171M*	10.7Gbps	OC-192 Transponder 80km	1550nm	0~+75°C	min. 0dBm	10dB	cooled TOSA	w/Isolator

*under development

40G EAM (Electro Absorption Modulator)

Part Number	Data Rate	Application	Wave-length	Insertion Loss	Extinction Ratio	PDL	Parameter	Cut-off Frequency	Package
OM5642W-30B	40Gbps	Optical Gating	1550nm	Typ. 9dB max. 10dB	Typ. 20dB min. 17dB (0 to -4V)	Typ. 0.5dB max. 1dB	-	min. 30GHz	w/TEC V- Connector
OM5653C-30B	40Gbps	OC-768 Transmitter	1550nm	Typ. 7.5dB max. 9dB	Typ. 20dB min. 17dB (0 to -4V)	-	< 0.5	min. 30GHz	w/TEC V- Connector
OM5753C-30B	40Gbps	OC-768 Transmitter	1550nm	Typ. 7.5dB max. 9dB	Typ. 20dB min. 17dB (0 to -4V)	-	< 0.5	min. 30GHz	w/TEC DC Bias circuit, V- Connector

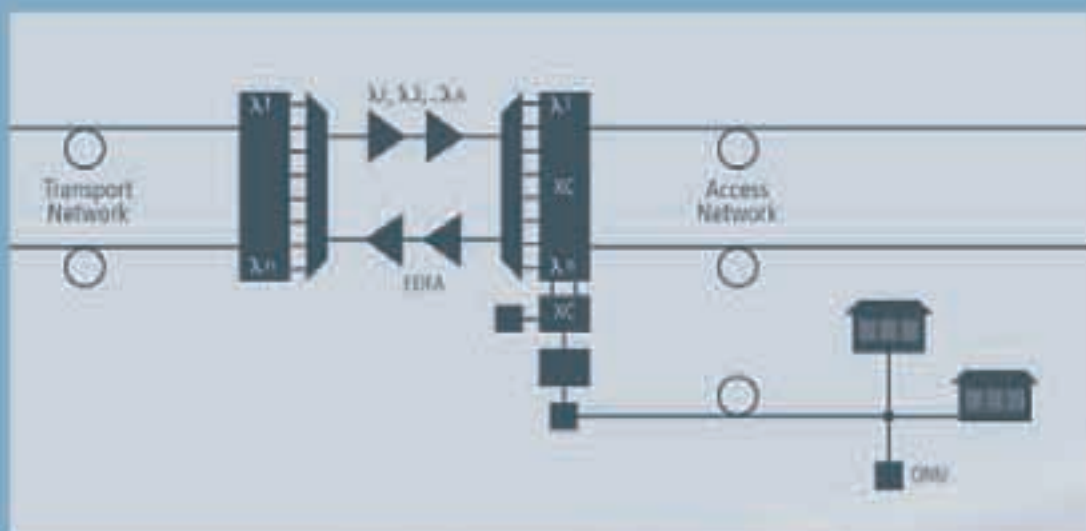
Pulsed LD for Test Measurement

Part Number	Output Power	Wavelength	Wave Tolerance	Fiber	TEC	Package
OL3204N-100-P20	100mW	1310nm	+/-20nm	SMF	yes	DIL
OL3204N-150-P20	150mW	1310nm	+/-20nm	SMF	yes	DIL
OL4204N-50-P10-W10	50mW	1410nm	+/-10nm	SMF	yes	DIL
OL5204N-100-P20	100mW	1550nm	+/-20nm	SMF	yes	DIL
OL5204N-120-P20	120mW	1550nm	+/-20nm	SMF	yes	DIL
OL5206N-120-P20	120mW	1550nm	+/-20nm	SMF	no	DIL
OL6204N-30-AP10	30mW	1625nm	+/-10nm	SMF	yes	DIL
OL6204N-50-AP10	50mW	1625nm	+/-10nm	SMF	yes	DIL
OL6204N-100-AP10	100mW	1625nm	+/-10nm	SMF	yes	DIL
OL6206N-100-AP15	100mW	1625nm	+/-15nm	SMF	no	DIL
OL3489N-150-P20	150mW	1300nm	+/-20nm	MMF 62.5	no	Coax
OL399N-150-P20	150mW	1300nm	+/-20nm	MMF 50	no	Coax
OL395N-80-P20	80mW	1310nm	+/-20nm	SMF	no	Coax
OL395N-100-P20	100mW	1310nm	+/-20nm	SMF	no	Coax
OL495N-60-P20	60mW	1490nm	+/-20nm	SMF	no	Coax
OL595N-40-P20	40mW	1550nm	+/-20nm	SMF	no	Coax
OL595N-60-P20	60mW	1550nm	+/-20nm	SMF	no	Coax
OL595N-70-P20	70mW	1550nm	+/-20nm	SMF	no	Coax

Optical Service Channel LD

Part Number	Wavelength	LD Type	Output Power	Operating Temperature	TEC	Package
OL6201N-5A10	1625nm	FP	5mW	-20~+65°C	yes	DIL
OL6492N-A	1625nm	FP	2mW	0~+65°C	no	Coax
OL4109L-5	1480nm	DFB	5mW	-20~+65°C	yes	Butterfly
OL5109L-5A	1510nm	DFB	5mW	-20~+65°C	yes	Butterfly
OL6109L-5A	1625nm	DFB	5mW	-20~+65°C	yes	Butterfly
OL6109L-5B	1650nm	DFB	5mW	-20~+65°C	yes	Butterfly
OL4207L-5	1480nm	DFB	5mW	-20~+65°C	yes	DIL
OL4207L-5-W90	1490nm	DFB	5mW	-20~+65°C	yes	DIL
OL5207L-5A	1510nm	DFB	5mW	-20~+65°C	yes	DIL
OL6207L-5A	1625nm	DFB	5mW	-20~+65°C	yes	DIL
OL6207L-5B	1650nm	DFB	5mW	-20~+65°C	yes	DIL
OL545xL-A	1510nm	DFB	2mW	0~+70°C	no	Coax
OL645xL-A	1625nm	DFB	2mW	0~+70°C	no	Coax

Fibre Optic Devices for Network Systems



About Lead-Free

Solderability

One of the most important properties of a semiconductor termination is its solderability behaviour.

Unlike many other semiconductor manufacturers, OKI still continues offering the standard tin lead coating besides the new Lead-Free surface finish. Please be aware of the fact, that OKI's Non-Lead-Free parts cannot meet the RoHS direction due to the lead in the pin coating.

To ensure a proper processing of Lead-Coated and Lead-Free products, applicable soldering temperature profiles have to be met.

Available surface finishes

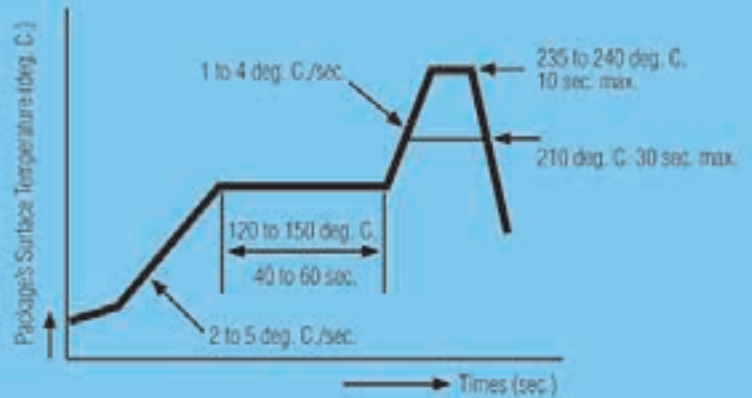
	Non-Lead-Free Version	Lead-Free Version
Through hole	SnPb	SnBi
SMD	SnPb	SnBi
BGA	SnPb	SnAgCu

RoHS Compliance

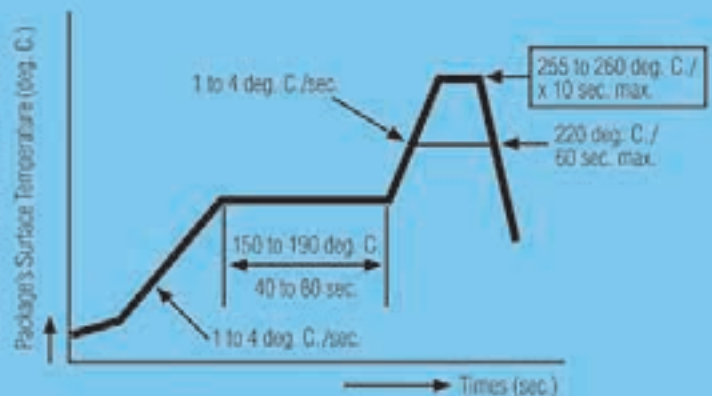
OKI's Lead-Free product range fully meets the European Restriction of the use of certain Hazardous Substance (RoHS) declaration (EU directive 2002/95/EC) and do not contain any of the described substances in measurable reasonable quantities.

Materials regulated by RoHS:

- Pb
- Cd and its compounds
- Hg and its compounds
- Hexavalent Cr and its compounds
- PBB
- PBDE

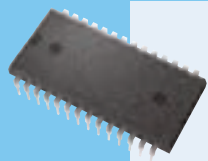


1. Recommended Soldering Profile for Lead-Coated Products



2. Recommended Soldering Profile for Lead-Free Products

Major Packages



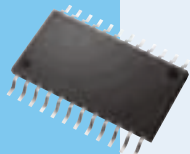
DIP
Dual-in-line Package
Pin Counts 8, 16, 18, 20, 24, 28, 32, 36, 40, 42, 48
Pitches 2.5mm
OKI Suffix RA
Remarks 100mil pitch type



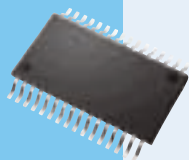
SDIP
Shrink Dual-in-line Package
Pin Counts 30, 42, 64
Pitches 1.778mm
OKI Suffix RC
Remarks 70mil pitch type



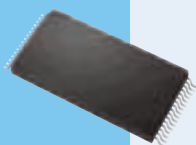
ZIP
Zig-Zag In-line Package
Pin Counts 20, 24, 28, 40
Pitches 1.27mm
OKI Suffix RD
Remarks 50mil pitch type



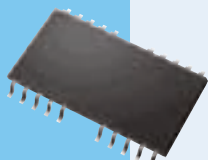
SOP
Small Outline Package
Pin Counts 8, 10, 16, 24, 28, 32, 40
Pitches 1.27mm
OKI Suffix MA
Remarks heat resistant



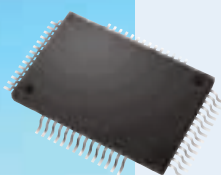
SSOP
Shrink Small Outline Package
Pin Counts 8, 14, 20, 30, 32, 64, 70
Pitches 0.65, 0.80, 0.95, 1.00mm
OKI Suffix MB
Remarks under 50mil pitch



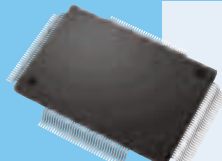
TSOP Type I
Thin Small Outline Package Type I
Pin Counts 32
Pitches 0.50mm
OKI Suffix TA
Remarks Leads on short side



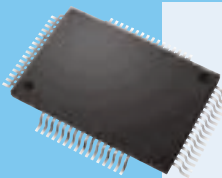
TSOP Type II
Thin Small Outline Package Type II
Pin Counts 26(20), 26(24), 28, 28(24), 40, 44, 48, 50, 50(44), 54, 66, 70(64), 86
Pitches 0.65, 0.80, 1.27mm
OKI Suffix TA
Remarks Leads on long side



QFP
Quad Flat Package
Pin Counts 44, 56, 64, 80, 100, 128, 136, 144, 160, 176, 208, 240, 272, 304
Pitches 0.50, 0.65, 0.80, 1.00mm
OKI Suffix GA
Remarks heat resistant



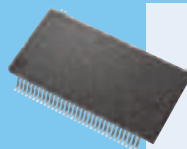
LQFP
Low Profile Quad Flat Package
Pin Counts 144, 176, 208
Pitches 0.50, 0.65, 0.80mm
OKI Suffix GS
Remarks 1.20mm or 1.27mm body thickness



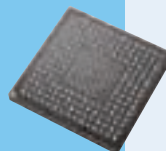
TQFP
Thin Quad Flat Package
Pin Counts 44, 48, 64, 80, 100, 120
Pitches 0.50, 0.65, 0.80mm
OKI Suffix TB
Remarks 1.20mm or 1.27mm body thickness



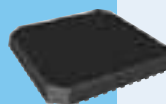
SOJ
Small Outline J-Lead
Pin Counts 26(20), 26(24), 28, 28(24), 32, 36, 40, 42, 50
Pitches 0.80, 1.27mm
OKI Suffix JA
Remarks Two J-lead rows



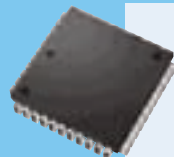
SHP
Surface Horizontal Package
Pin Counts 20, 30, 32, 64, 70
Pitches 0.65, 0.80, 0.95, 1.00mm
OKI Suffix MB
Remarks under 50mil pitch



BGA / FBGA / W-CSP
Ball Grid Array
Pin Counts 48 - 352
Pitches 0.5 - 1.27mm
OKI Suffix LA, HB
Remarks Epoxy package, Lead-Free balls possible



QFN
Quad Flat No Leads
Pin Counts 48
Pitches 0.5mm
OKI Suffix GD
Remarks No gull-wing leads, improved EMI performance, co-planarity, heat dissipation



QFJ
Quad Flat J-Lead
Pin Counts 18, 20, 22, 28, 32, 44, 68, 84
Pitches 1.27mm
OKI Suffix JB
Remarks 4 J-lead rows, formerly known as PLCC, 50mil pitch type



TCP
Tape Carrier Package
Base film material Upilex®, Kapton® V
OKI Suffix VA
Remarks Tape widths: 35/48/70mm (wide/super wide)
Film thickness 75/125µm

A particular strength of OKI is its IC packaging technology. The variations range from DIP, SDIP, ZIP, BGA, SOP, SSOP, TSOP, QFP, TQFP, LQFP, QFJ, SOJ, SHP, FBGA and TCP all the way up to special packaging forms, such as Memory Modules,

Tape Carrier Package, Ball Grid Array, Bump Chip and more. For information about further packages and more detailed specification, please refer to our information on our website: www.okisemi.com/eu/1.Products/Packages.html

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