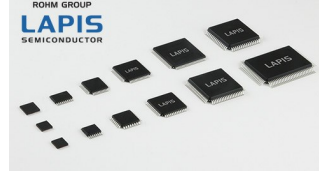


16-bit General-Purpose MCUs Equipped with Safety Functions

Class-leading lineup covers a broad range of applications from home appliances to industrial equipment

ROHM Group company LAPIS Semiconductor recently announced the availability of the ML62Q1300/1500/1700 Group of general-purpose microcontrollers featuring an original 16-bit CPU core ideal for consumer and home appliances, alarms, security devices, and small industrial equipment.



Microcontrollers used in home appliances and small industrial equipment in the rapidly growing Asian market require a wide variety of package types and program ROM capacities to quickly meet the constantly evolving needs of applications that progressively add new features and functions while delivering improved performance. And since many of these devices are used on a daily basis, safety is becoming an increasingly important factor, requiring that MCUs which comprise the core of home appliances include safety functions that can control the system under all conditions.

In response, LAPIS Semiconductor's noise-tolerant ML62Q1300/1500/1700 Group provides safety features that correspond to 13 industry-leading items (IEC60730 regulations) related to home appliances, including a self-diagnostic function for detecting internal faults. This makes it possible to protect systems from unexpected situations that occur in MCUs used in the consumer electronics field which is becoming more sophisticated as well as the compact industrial equipment sector that requires stable operation even under harsh conditions such as extreme noise and high temperatures.

ROM size	16pin - 20pin	24pin - 32pin	48pin - 52pin	64pin - 100pin
160KB - 512KB				Q1500/Q1700
96KB - 128KB				Q1500/Q1700
32KB - 64KB				Q1500/Q1700
16KB - 32KB	Q1300			Q1500/Q1700*

Broad package lineup, large capacity ROM
Supports everything from simple appliances to sophisticated multifunctional consumer and industrial equipment

A broad lineup comprised of a class-leading 120 models in a number of different package types and program ROM capacities is offered, ensuring support for a wide range of applications. In addition, starter kits are available that make it easy to evaluate LCD operation and capacitive switch on an application level, as well as a reference board that allows users to develop customized application programs.

The starter kits and reference board are compatible with LAPIS Semiconductor's new LEXIDE-U16 development environment (available for download on LAPIS Semiconductor's website) operating under the open source Eclipse platform which features an easy-to-use interface and enhanced functionality, ensuring not only high development efficiency but also seamless compatibility with Eclipse environments from other companies.

The MCUs along with the ML62Q1000 Capacitive Switch Starter Kit and the ML62Q1367 reference board will be sold from March through online distributors, and others will be available in order.

Key Features

1. Supports an industry-leading 13 safety items (IEC60730 regulations) to protect home appliances

Since the microcontroller controls peripheral components, it is possible to detect failures in advance and avoid malfunctions by performing periodic diagnosis. However, the MCU must also be able to detect internal faults and terminate operation before returning to the initial state.

- Covers an unprecedented 13 items related to hardware safety.
- Sample source code software for self-diagnosis provided utilizing the IEC60730-1 Class B Software Library

Safety Functions	8 Self-diagnostic functions	3 Error detection functions	2 Memory protection functions
	<ul style="list-style-type: none"> - Register test - Oscillator frequency test - UART / SSIO / I²C test - WDT test - GPIO test - A/D converter test - Program counter test - Interrupt test <p>Detects faults by performing diagnosis of peripheral circuits</p>	<ul style="list-style-type: none"> - Flash memory CRC calculation - RAM parity error - Invalid memory access <p>Detects malfunctions due to memory data errors and invalid memory access</p>	<ul style="list-style-type: none"> - RAM guard - SFR guard (Special Function Register) <p>RAM erroneous write prevention SFR erroneous write prevention</p>

2. Broad 120-model lineup offers unsurpassed compatibility

LAPIS Semiconductor's wide range of MCUs available in different package types and program ROM capacities supports the home appliance and compact industrial equipment markets which are becoming increasingly sophisticated and multi-functional, allowing users to select the ideal solution to fit system requirements (i.e. mounting area, costs).

ROM size	16 pin	20 pin	24 pin	32 pin	48 pin	52 pin	64 pin	80 pin	100 pin
ROM size	WQFN16 4mmX4mm 0.5mm pitch	TSSOP16 4.4mmX5.5mm 0.65mm pitch	WQFN24 4mmX4mm 0.5mm pitch	TQFP32 7mmX7mm 0.8mm pitch	TQFP48 7mmX7mm 0.5mm pitch	TQFP52 10mmX10mm 0.65mm pitch	QFP64 14mmX14mm 0.8mm pitch	QFP80 14mmX14mm 0.65mm pitch	QFP100 14mmX20mm 0.65mm pitch
Applications	Simple beauty and kitchen electronics			Sophisticated, multifunction consumer and home appliances					
512KB	Pin Compatibility Scalability ensured by taking into consideration the layout of the common and general-purpose input/output pins						Q1729	Q1739	Q1749
384KB							Q1559	Q1569	Q1579
256KB	Common pins such as VDD, GND, RESET, and external interrupt						Q1728	Q1738	Q1748
192KB	GPIO pins						Q1558	Q1568	Q1578
160KB							Q1727	Q1737	Q1747
128KB							Q1557	Q1567	Q1577
96KB							Q1726	Q1736	Q1746
64KB							Q1556	Q1566	Q1576
48KB							Q1725	Q1735	Q1745
32KB	Q1325	Q1335	Q1345	Q1365	Q1700	Q1710	Q1720	Q1743	Q1753
24KB	Q1324	Q1334	Q1704 Q1714 Q1724 Q1734 Q1744						
16KB	Q1323	Q1333	Q1534 Q1544 Q1554 Q1564 Q1574						

Function Comparison vs Competitor Products

Item	LAPIS	Company A	Company B
Internal Clock Accuracy (-40°C to +85°C)	1% (Very Good)	1.5% (Good)	3.5% (No Good)
D/A Conversion Bit Length	8-bits	None	None
Low Current Startup	Provided	Non	None
Supply Voltage	1.6V to 5.5V	1.6V to 5.5V	1.8 to 5.5V

ROM Capacity / Package	64-pins	80-pins	100-pins	64-pins	80-pins	100-pins	64-pins	80-pins	100-pins
512 KB	Available	Available	Available	Available	Available	Available			
384KB	Available	Available	Available	Available	Available	Available			
256KB	Available	Available	Available	Available	Available	Available			
192KB	Available	Available	Available	Available	Available	Available			
160KB	Available	Available	Available						
128KB	Available	Available	Available	Available	Available	Available		Available	Available
96KB	Available	Available	Available	Available	Available	Available	Available		

Development Tools

LAPIS Semiconductor offers starter kits and a reference board for creating application programs that reduce development load.

Product Name	Part Number	Description
ML62Q1000 MCU Starter Kit	SK-BS01-D62Q1577TB	ML62Q1577 reference board EASE1000 V2 emulator, software, etc.
ML62Q1000 LCD Starter Kit	SK-AD02-D62Q1747TB	ML62Q1747 reference board ML62Q1600 LCD board EASE1000 V2 emulator, software, etc.
ML62Q1000 Capacitive Switch Starter Kit	SK-AD01-D62Q1367TB	ML62Q1367 Capacitive Switch application board EASE1000 V2 emulator, software, etc.
ML62Q1000 Reference Board	RB-D62Q1367TB32 RB-D62Q1562GA64 RB-D62Q1722GA64 RB-D62Q1577TB100 RB-D62Q1747TB100	Reference board (with onboard MCU)
On-chip Emulator EASE1000 V2	EASE1000 V2	On-chip emulator



3. Original LEXIDE-U16 IDE (Integrated Development Environment) utilizes the popular Eclipse platform

LAPIS Semiconductor's original LEXIDE-U16 development environment is based on the open source Eclipse IDE with CDT (C/C++ Development Tooling) plug-in. Compared to our existing IDEU8, the editor function has been enhanced, file operability improved, and a stack size calculation tool has been added. It is now possible to call our proprietary DTU8 debugger, LCD image tool, MWU16 Flash multi-writer, SCU16 stack size calculation tool, and other programs, allowing the LEXIDE-U16 to achieve not only high development efficiency but also ensure compatibility with Eclipse environments from other companies.

Easy-to-use, Full-Function Editor

Code Auto-Completion Function: Complementary variable names, function names, etc. (with spell check)

Code Navigation Function: Include chain, browser, function call hierarchy, jump to function/variable declaration

Folding Function: Fold and display functions and structures

Refactoring Function: Bulk change of function name and variable name

Syntactic Color Function: Color-coded grammar, SFR (Special Function Register), condition compilation, etc.

Easily Calculate the Stack Size

Output the maximum stack size and the relevant call tree on the console window of LEXIDE-U16 or as a file format. Makes it easy to port existing IDEU8 integration projects to LEXIDE-U16

Launch LAPIS Semiconductor's proprietary tool from the LAPIS drop-down menu

Maximum stack usage and function call tree

Easy-to-use editor with robust functionality

LEXIDE-U16 can be downloaded from the Customer Support Page on LAPIS Semiconductor's website.

(Requires users to register the serial number of LAPIS Semiconductor's development tool)

English URL: <https://www.lapis-semi.com/cgi-bin/MyLAPIS/regi/login.cgi>

Japanese URL: https://www.lapis-semi.com/cgi-bin/MyLAPIS/regi/login_j.cgi

ML62Q1300/1500/1700 Group Specifications

Parameter	Specifications
CPU	Original Lapis Semiconductor with High-Performance 16-bit RISC Cores
Safety Features	Supports 13 safety functions compliant to IEC60730 regulations
High noise immunity	Above ±30 kV (indirect contact discharge, Lapis Semiconductor investigation)
Flash ROM	16KB-512KB
RAM	2KB-32KB
Data Flash	2KB-8KB
10-bits ADC	6-16ch
Analog comparator	1ch-2ch
8-bits DAC	1ch
LCD Driver	3com-8com × 24seg to 60seg (ML62Q1700.groups only)
Operating temperature	-40°C ~ 105°C
Power Supply Voltage	1.6V ~ 5.5V
Number of pins	16, 20, 24, 32, 48, 52, 64, 80, and 100 pins
Package type	WQFN16, SSOP16, TSSOP20, WQFN24, WQFN32, TQFP32, TQFP48, TQFP52, TQFP64, QFP64, QFP80, QFP100, TQFP100

Sales Information

Part No.	ML62Q13xx, ML62Q15xx, ML62Q17xx	
Sales Plans	Mass Production	Now
Application Examples	Various types of home appliances, personal care, housing equipment, alarm and security equipment, small industrial equipment, consumer electronics equipment, and IoT devices	

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