Eco-product

Renesas semiconductor products have contributed to the customers for making their own products in terms of electricity and resource savings because of the packaging miniaturization technology and high performance. In the future, we will further address the chemical substance control, lead-free, and product assessments of the product flow (preliminary environmental load assessment) so as to increase the number of environmentally friendly products

Green procurement and chemical substance control

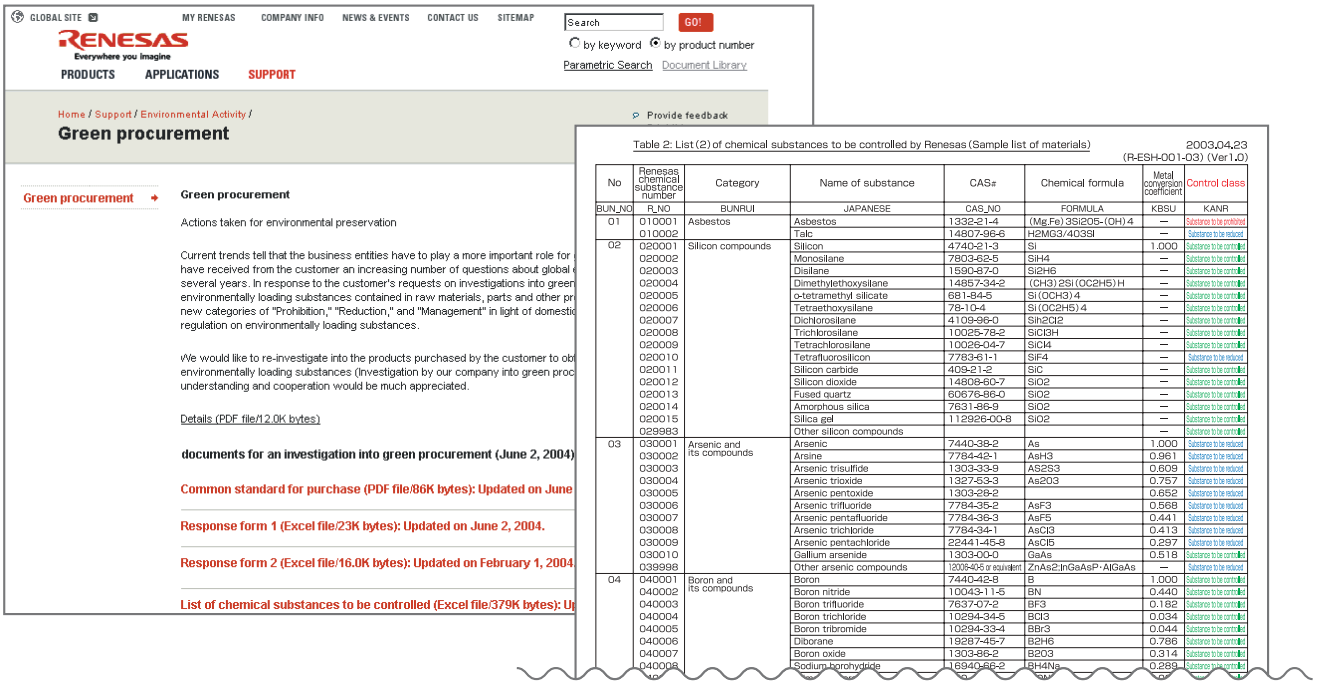
We thoroughly promote the chemical substance control based on our Green Procurement investigations.

Renesas have started to review and investigate the type of chemical substances contained in the procured material. We disclose all the chemical substances contained in the products on customers requirement.

In response to customers request for investigations of Green Procurement*1, we have picked up 925 kinds of chemical substances to be controlled, and classified into items of "prohibition", "reduction", and "management" by taking into consideration domestic and overseas laws and regulations on environmental load. The content of the "prohibition" and "reduction" items are further investigated and analyzed for the parts and components to be purchased. The information is disclosed to the customers.

*1. When procured, the products and materials are selected in terms of not only QCD (quality, cost and delivery) but also environmental friendliness, such as chemical substance content and easy recycling for reducing environmental load.

■ "Green Procurement" homepage showing environmental protection activity



Disclosure of some data may require the appropriate password.

■ Chemical substances contained in products (semiconductor standard response format by JEITA*)

The following table is an example of chemical substances contained in Renesas products shown by component.

Product name: ABCDE12345

Weight of product (mg)	60.00

Component name	Component mass (mg)	Substance Groupe	Substance	CAS No	Purposes of use	Content (mg)	Composition Percentage(%)	Rate on whole(%)
Chip	6.8688	Silicon and its inorganic compounds	Silicon	7440-21-3	Main material of Chip	6.83	99.42%	11.38%
		Aluminum and its compounds	Aluminum	7429-90-5	Circuit forming	0.04	0.58%	0.07%
Chip bonded part	0.4105	Tin and its compounds	Tin	7440-31-5	Chip bonding	0.02	4.99%	0.03%
		Lead and its compounds	Lead	7439-92-1	Chip bonding	0.39	95.01%	0.65%
Lead frame	14.7002	Iron and its compounds	Iron	7439-89-6	Alloy material	6.52	44.36%	10.87%
		Nickel and its compounds	Nickel	7440-02-0	Material of alloy	8.10	55.10%	13.49%
		Silver and its compounds	Silver	7440-22-3	Material of alloy	0.08	0.54%	0.13%
Outer terminal plating	0.2998	Tin and its compounds	Tin	7440-31-5	Material of terminal plating	0.27	90.00%	0.45%
		Lead and its compounds	Lead	7439-92-1	Material of terminal plating	0.03	10.00%	0.05%
Encapsulating	37.1496	Phosphor and its compounds	Organic phosphorus compound	—	Curing catalyst for resin	0.42	1.13%	0.70%
		Organic bromine compounds	Brominated flame retardant	—	Flame retardant for resin	0.42	1.13%	0.70%
		Antimony and its compounds	Antimony trioxide	1309-64-4	Flame retardant agent	0.42	1.13%	0.70%
		Resin	Epoxy resin etc.	—	Sealant	10.77	28.98%	17.94%
		Glass	Silica dioxide etc.	—	SealantI	25.12	67.63%	41.87%
Bonding wire	0.5710	Gold and its compounds	Gold	7440-57-5	Chip and outer terminal wiring	0.57	100.00%	0.95%
Summation of ingredient						60.00		100.00%
Weight of product - Summation of ingredient						0.00		

※2. Japan Electronic and Information Technology Association

Environmentally friendly design

Our products are manufactured considering environmental friendliness from the design phase.

We have introduced product environmental assessment into the product design flow to evaluate the improvement degree of environmental load to ensure the environmental friendliness.

Product environmental assessment

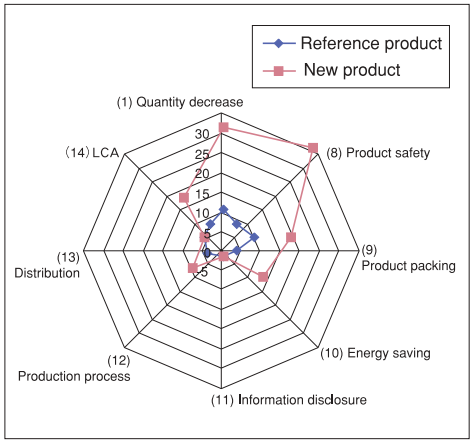
Renesas product environmental assessment is carried out on each phase of material procurement,production,use,reuse, recycling and disposal, and the results are compared with reference products.Applicable items and methods are shown in the "Product assessment sheet".This system indicates the comprehensive improvement ratio and the assessment score of each item in the radar chart,along with the environmental factors (factor X*1) of energy and resource savings and chemical substances.Thus, environmental load is aimed to reduce based on the data.

*1. An index of environmental effectiveness, which compares the assessed product with the reference product in terms of energy saving, resource saving and chemical substances. The larger the difference, the less environmental load.

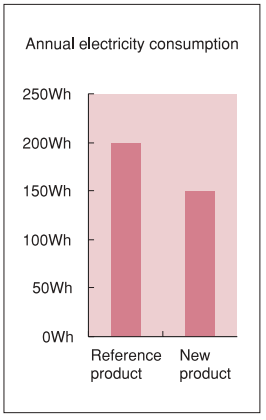
■Product assessment sheet (example of Renesas 16 bit microcomputer assessment)

No	Category	Evaluation item	Evaluation standard (The item shaded in yellow must be subject to evaluation.)	Scheme for evaluation	Weight (X)	Evaluation points (Y) Three points	Two points	One point	Zero points	Minus one point	Fail	Reference product data	New product data	Reference product evaluation Points (X and Y)	New product evaluation according to step 1 Points (X and Y)	New product evaluation according to step 2 Points (X and Y)
1	(1)Weight reduction	1. Small product size and low product weight	Rate of product volume reduction	(1−downsizing rate) ×100%	2	≧30%	≧20%	≧10%	≧0%	<0%		400mm3	181mm3	0	6	
2			Rate of product mass reduction	(1−weight reduction rate) ×100%	3	≧30%	≧20%	≧10%	≧0%	<0%		1230mg	388mg	0	9	
3		3. Resource saving	Rate of package material usage reduction	(1−PKG material usage reduction rate) ×100%	2	≧20%	≧10%	≧5%	≧0%	<0%		875mg	221mg	0	6	
4		4. Standardization	Is the standard (MMP) package adopted?	Standardized or not standardized	1		Standardized		Not standardized			Adopted	Adopted	2	2	
5	(2)Longer life	1. Longer life	Has the new product passed the format test?	Result of format testing	3		Pass				Fail	-	Not implemented	0	0	
6	(8)Product safety	1. Harmfulness and toxicity	Use of a substance despite prohibition	Presence or absence of a substance prohibited from being used	3				Absence		Presence	-	Absence	0	0	
7			(1−reduction rate) ×100%							<0%		0.6mg	0.0mg	0	9	

■Radar chart compared reference product with new product



■Annual electricity consumption (to grasp energy saving)



■Environmental effectiveness (factor X)

"Environmental load by new product (compared with reference product)"

Resource saving	0.24
Energy saving	0.75
Chemical substances	0.00

"Environmental effectiveness calculation (factor X)"

Environmental load item	Environmental load reduction level of new product	Environmental load reduction of reference product	Environmental load reduction of new product (general)
Resource saving	0.76		
Energy saving	0.25	$\sqrt{3}$	0.786
Chemical substances	1.00	1.732	
Factor X=environmental effectiveness of new product/environmental effectiveness of reference product			Factor X 2.20

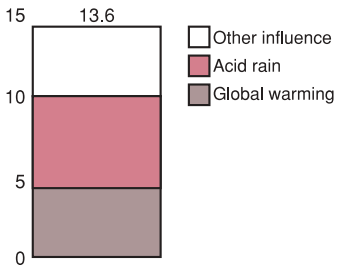
LCA approach

For the effective environmental load reduction, LCA*2 software is used to quantitatively grasp the "load of each factory" and the "load of each product". The following chart shows an example of LCA carried out for one of our domestic factories and the microcomputers. It shows semiconductor factories and products contribute largely to acid rain and global warming. LCA enables us to estimate the amounts of CO_2, NOx and SOx emitted during the product lifecycle. The data is submitted to customers at request.

*2. Life Cycle Assessment: environmental assessment during the product lifecycle, from "material" to "disposal".

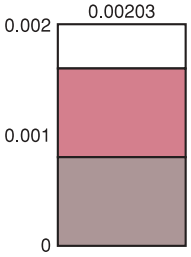
■Factory's environmental load index

(*per 1kg of production)



■Microcomputer's environmental load index

(*assumed that the service duration of one unit of product is 10 years)



■Substances emitted by microcomputer

(*assumes that the service duration of one unit of product is 10 years)

Substances	Weight (kg)
CO_2	0.153
NOx	0.00104
SOx	0.00212
SPM	0.0000661

CO_2 : carbon dioxide
NOx : nitrogen oxide
SOx : sulfur oxide
SPM : Suspended particulate Matter

*The "Eco-indicator 95/Europe g" developed in Europe is used for evaluation of environmental influence and emission amount.

Lead-free approach

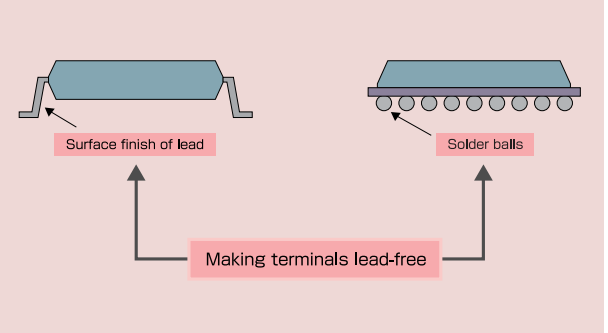
We address lead-free products toward the 2005 target.

We realized approx. 20% lead-free out of our entire products (quantity base) in Apr. 2004.

We have positively addressed lead-free products (switching to outer terminal lead-free plating). Plating materials of SnBi (tin & bitmuth) and SnCu (tin & copper) have started to be used in the products, instead of traditional SnPb (tin & lead). The heat-resistance of packages has also been improved to comply with JEITA standard. As of Apr. 2004, approx. 20% of lead-free products (quantity base) have been realized and the target for 100% is set for Dec. 2005. The following Fig. shows comparison of the bonding strength between SnPb plating and SnBi & SnCu plating. The results show equal strength between them.

*1. Lead-free pamphlet (PDF) of our product information can be obtained at the following
URL:http://www.renesas.com/avs/resource/japan/jpn/pdf/others/rjj01k0001_leadfree.pdf

■Making package terminals lead-free

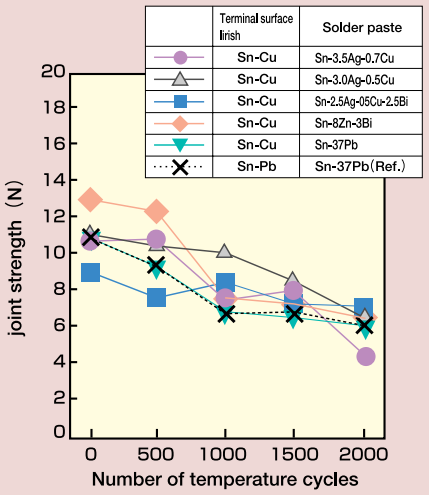


■Joint strength test results of lead-free plating products

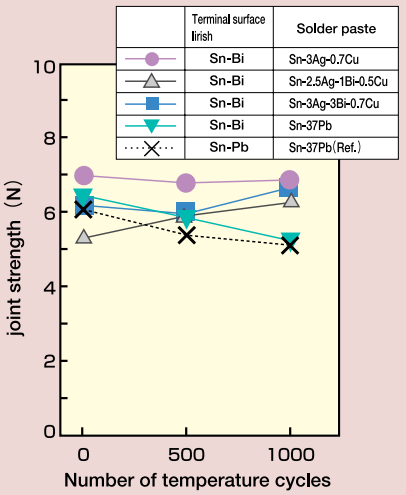
The joint strengths for both Alloy 42 and Cu lead frames are equivalent to conventional products (using Sn-Pb plating and Su-Pb solder paste).

Joint strength test results

Package: 100-pin QFP (Alloy 42)
Temperature cycle test conditions: -40/125℃

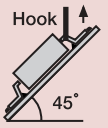


Package: 208-pin QFP (Alloy 42)
Temperature cycle test conditions: -40/125℃



Test method

45 pull



Packing and distribution

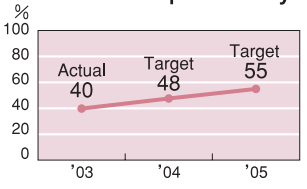
We address the environmental load reduction of packing materials.

Plastic trays and magazines for shipment are collected and reused by customers' cooperation.

In 2003, approx. 40% reuse of plastic trays enabled 870 tons material reduction. 2004 onward, we will increase the reuse-rate and the recycled material use-rate*2 for newly procured plastic trays.

*2. Increase both in the recycled material use-rate per tray and the number of trays using recycled materials.

■Reusable material use-rate for plastic tray



■Total recycled material use-rate for plastic trays