

## Hitachi Releases Three Diode Products Using World's Smallest CSD Package

—0.3 mm thick 0603 type package for portable devices, reducing mounting area to approximately 1/5—

Tokyo, November 26, 2001 — Hitachi, Ltd. (TSE: 6501) today announced the development of the CSD (Chip Scale Diode: Hitachi package code) package as the industry's smallest diode package for portable products, and the release of the HVZ500 and HVZ501 variable capacitance diodes\*<sup>1</sup> ideal for voltage controlled oscillator (VCO)\*<sup>2</sup> use in mobile phones, and the HVZ800 PIN diode\*<sup>3</sup> for RF switch use, as the initial products using this package. Sample shipments will begin in December 2001 in Japan.

The CSD package features a 0.6 × 0.3 (mm) level size--generally called 0603 type--that offers a mounting area approximately 1/5 that of the previous 1406 type. The new package is also only 0.3 mm (typ.) thick, enabling application products to be made smaller and thinner.

### [Background]

There is a growing demand for smaller, slimmer models in the field of portable products such as mobile phones, bringing calls for smaller and thinner electronic devices for various modules such as VCOs and antenna switches installed in such products. Hitachi has previously had a variety of small-package diodes in mass production, and is now releasing three diode products that achieve ultra-small and thin dimensions of 0.62 × 0.32 × 0.3 (mm) (typ.) through new package development and a revised chip structure.

### [About these Products]

The newly developed CSD employs a structure in which both electrodes, anode and cathode, are located on the same surface. The CSD can be directly mounted on a board, and the elimination of leads as required by previous packages has resulted in the world's smallest size for a diode of 0.62 × 0.32 × 0.3 (mm)(typ.). This represents an approximately 80% reduction in mounting area and approximately 45% reduction in thickness compared with the currently smallest 1406 type SFP (Hitachi package code), enabling end products to be made smaller and slimmer.

The electrodes also have a lead-free specification that makes them ideal from an environmental viewpoint.

The following three diode products are being released as initial CSD products.

- (1) Variable capacitance diodes for VCO use
  - HVZ500: 10 V maximum rating, 2.43 (min.) capacitance ratio
  - HVZ501: 15 V maximum rating, 2.0 (min.) capacitance ratio
- (2) PIN diode for RF switch use
  - HVZ800: 0.7 Ω (max.) on-resistance at 2 mA, 1.0 pF (max.) inter-pin capacitance

Ongoing CSD developments will include models such as PIN diodes for antenna switch use. In addition, future plans call for extension of the lineup of various diodes to cover a wider application area including PDAs and notebook PCs.

- Notes: 1. Variable capacitance diode: Characterized by variation of capacitance according to the applied reverse voltage. This property is used for VCO frequency regulation.
2. VCO: Voltage controlled oscillator. A unit that performs frequency regulation by means of voltage variation.
  3. PIN diode: A diode in which an I layer (Intrinsic layer) is inserted between a P-type semiconductor and N-type semiconductor to form a PIN junction. Mainly used in digital cellular phone system antenna switches and multimedia tuner source switching applications.

< Typical Applications >

(1) Variable capacitance diodes

- Voltage controlled oscillators (VCOs) for mobile phones
- Voltage controlled crystal oscillators (VCXOs) for mobile phones

(2) PIN diode

- RF switches

< Prices in Japan >(For Reference)

Part Number	Type	Package	Sample Price (Yen)
HVZ500	Variable capacitance diode	CSD	15
HVZ501	for VCO use		15
HVZ800	PIN diode for RF switch use		15

< Specifications >

(1) HVZ500 and HVZ501 variable capacitance diodes for VCO use

Part Number	Package	Maximum Rated Reverse Voltage VR (V)	Inter-Pin Capacitance C (pF)	Capacitance Ratio	Series Resistance rs (Ω)
HVZ500	CSD	10	C0.5 = 7.20 to 7.70 C2.5 = 2.70 to 3.20	2.43 (min.) @C0.5/C2.5	0.75 (max.)
HVZ501	CSD	15	C1 = 15.0 to 17.0 C4 = 7.0 to 8.5	2.0 (min.) @C1/C4	0.4 (max.)

(2) HVZ800 PIN diode for RF switch use

Part Number	Package	Maximum Rated Reverse Voltage VR (V)	Forward Voltage VF (V)	Inter-Pin Capacitance C (pF)	On-Resistance rf (Ω)
HVZ800	CSD	30	0.85 (max.) @2 mA	C1 = 1 (max.)	0.7 (max.) @IF = 2 mA f = 100 MHz