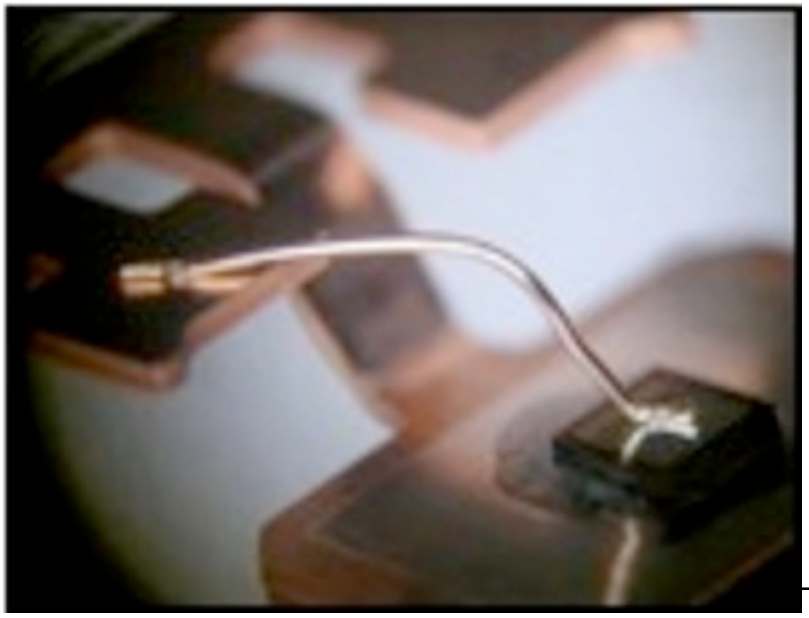
Thick copper wire bonding technology provides high-quality reliability



Tokyo Japan, May 24, 2012 - New Japan Radio Co., Ltd. (New JRC) has introduced to the market, the technology of the thick copper wire bonding to aluminum electrodes on chip. Due to the reliability problem in conventional methods, this technology has been difficult to use in mass production. New JRC is the first in the world[*1] to provide the established mass production technology about the thick copper wire bonding.

We have been putting our energies into research and development focusing a high reliability and an environmental load reduction. They are suitable for various applications requiring high voltage and high current such as industry equipments, electric vehicles, hybrid cars and smart grid power transmission/distribution.

[DESCRIPTIONS]
New JRC has been researching and developing the thick copper wire bonding technology to apply it to our semiconductor products. Generally, the direct bonding to aluminum electrodes on chip with the thick copper wire has been difficult to use in mass production. In combination with bonding machine and material manufacturers[*2], we have achieved the thick copper wire (over 200µm wire diameter) bonding to aluminum electrodes on chip as the established mass production technology using wedge bonding technology[*3].

[FEATURES]
No.1 The bonding technology has passed over 5,000-cycle in the temperature cycle test, providing a high quality reliability in industrial and electric vehicle applications, a longer temperature cycle life is required due to a higher temperature operation request than consumer products. Our test results have shown that the temperature cycle life in the copper wire bonding is over 5,000-cycle, and around 2,000-cycle in the aluminum wire bonding.

No.2 Providing an environmental load reduction with saving wire materialCompared with aluminum wire, the copper wire has a higher fusing current. The copper wire of 200µm diameter has the same characteristics as the aluminum wire of aroun 300µm diameter, so that the copper wire bonding saves wire material and reduces an environmental load. Moreover the copper thermal conductivity of 397W/mK is higher than the aluminum thermal conductivity of 238W/mK, so that the copper wire bonding has a higher heat dissipation and provides a low loss.

We will develop a lot of power devices such as a SiC-SBD and others applied this technology.

*1: As a technology of bonding to aluminum electrode using over 200µm diameter copper wire / Our check as of May, 2012

*2: Bonding machine manufacturer : ULTRASONIC ENGINEERING CO., LTD.

Material manufacturer : TANAKA DENSHI KOGYO K.K.

*3 : One of the wire bonding method, it directly connects a wire to the electrode using an ultrasonic and a heating, without making

a ball at wire end.

*4 : Temperature cycle test : the test for semiconductors checking there are no destructions or failures after the process of cycling

through two temperature extremes.

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http://www.ecnmag.com/products/2012/06/thick-copper-wire-bonding-technology-provides-high-quality-reliability