

2. 項目簡介

(項目所屬科學技術領域、主要技術內容、授權專利情況、技術經濟指標、應用推廣、人才培養及對澳門科技進步的推動作用等)

Universal Serial Bus (USB) is the world's most popular wired interconnect standard that has enjoyed wide adoption in almost every computing device and SoC (system on chip). People expect USB will continue to be integrated as the primary external interface for peripherals and data. This means that PCs, tablets, phones, set top boxes, and TVs will have USB alongside WiFi and Bluetooth. Moreover, Most Automotive ADAS (Advanced Driver Assistance Systems) processors will need a fast interface for debugging. This will often be USB or PCIe. USB, in particular, is a fast-easy way to debug a platform or update the firmware because every laptop has a USB port and it's designed for external connects. It is foreseeable that the great asset of USB technology will continue to benefit the ecosystem for years to come. Meantime, silicon technology continues to scale for more devices can be packed onto a single integrated chip. TSMC and Samsung already has mass production with 7nm generation, and 5nm process is also under development and scheduled volume production coming future. However, USB standards evolution kept the original 3.3-V I/O USB 1.0 interface intact for backward compatibility, helping enable wider adoption and a larger ecosystem while also preserving device interoperability. The manufacturing cost for an advanced process technology to support 3.3V IO signaling has grown exponentially. Eventually leading process nodes would advance to a point where the USB standard of 3.3V signally wouldn't work anymore.

To address these challenges, the USB Implementers Forum released the eUSB2 specification in 2018. eUSB2 has two different modes of operation: Native and Repeater mode. Native mode provides permanent onboard chip-to-chip communications with direct eUSB2 low voltage signal connections and taking advance of the lower voltage reduces the power consumption in a design. In Repeater mode, this will be an eUSB2 repeater to “bridge” and “boost” the signal from a chip with low voltage to any standard USB hosts or devices.

From this applied R&D project, there are ~13 key advanced innovations have been developed. The innovations at both architecture and circuit-level perspectives have been well deployed for the eUSB Repeater PHY IP Platforms. Being the world No. 1 USB PHY IP provider with about total world market share of 82% USB2.0 and 79% USB 3.0 according to IP vendor market share ranking 2019 (IPnest). Such IP platform development enables directly around 86.3 Million USD sales value (690 Million MOP) for > 118 applying units which are all world leading electronics companies from USA, Europe, Japan, mainland China and Taiwan. Most of their products are in mass production and employed in market well-known consumer electronic devices and other brand-named Tablet, smart phone, computer and so on. The very conservative estimation of mass production chip volume is > 540 Million and the corresponding market value > 2,700 Million USD (>21.6 Billion MOP). The production of the advanced IP technology developed by Macau team by well-known national/international brand-named customer bases at a cutting-edge semiconductor industry have created highest promotion and elevated world widely Macau high-technology development position.

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