

# **Macao Funding Scheme for Key R & D Projects**

**2023**

## **Integrated Circuit**

### **Application Guideline for Projects of Chip Design**

#### **I. Background**

The chip industry is a comprehensive manifestation of a country's high-end manufacturing capabilities and is the strategic commanding elevation for competitions on global high-tech national strength. China attaches great importance to the chip manufacturing industry. The “14th Five-Year Plan” for Digital Economy Development Planning mentioned the “concentration on breakthroughs in key and core technologies such as high-end chips and operating systems” and the “focus on the deployment of emerging technologies such as next-generation mobile communication technology, neural chips, and third-generation semiconductors”. The “14th Five-Year Plan” for National Informatization Planning pointed out that “innovations in computing chips and memory chips shall be promoted” and the “research on the basic theoretical framework of chips shall be strengthened, and the cloud-side, edge-side, and end-side chip product iterations for scenarios such as supercomputing, cloud

computing, Internet of Things, and intelligent robots shall be accelerated.”

The Macao SAR Government has been actively fostering the development of high-tech, and proposed in the “Second Five-Year Plan for Economic and Social Development of the Macao Special Administrative Region (2021-2025)”, to “accelerate the construction of a microelectronics industry chain for the design, testing, and inspection of characteristic chips”, and proposed in the “Policy Address for the Fiscal Year 2023”, to “actively promote the implementation of semiconductor chip manufacturing projects”. In 2010, the Ministry of Science and Technology of the People’s Republic of China approved the establishment of the State Key Laboratory of Analog and Mixed-Signal VLSI in Macao. With the continuous support of the country and the SAR government in R&D, the design level of analog chips in Macao has reached an advanced level in the world.

In order to give full play to the leading role of the State Key Laboratories in Macao in scientific and technological innovation, further explore the development of high-tech industries, improve R&D capabilities and industrialization level, the Macao Science and Technology Development Fund (FDCT), based on soliciting opinions from research personnel in relevant fields in Macao and relying on the strength of Mainland experts, researched and proposed this key R&D project, meeting the needs of China and leveraging Macao’s R&D strength in the field of chip design in a

planned and step-by-step manner, through which the moderate diversification of Macao's economy through technological innovation is expected to be facilitated and the development of the chip design industry to be fostered, thereby assisting with the construction of an international innovation and technology hub in the Guangdong-Hong Kong-Macao Greater Bay Area, and further integrating into the overall development of the country.

## II. Overall Objectives

To leverage Macao's R&D advantages in the field of analog and mixed-signal chip design, combine the construction of an international innovation and technology hub in the Guangdong-Hong Kong-Macao Greater Bay Area and the focus on regional cooperation and development, carry out R&D of dedicated chips for mobile robots according to the characteristics and application needs of the chip design industry, and meet the application needs for product value-added extension to realize application demonstrations and promote the development of the industry.

## III. Research Field

**Research Field:** To carry out R&D and application demonstration of dedicated chips for mobile robots.

To carry out R&D of high precision, low delay and high-reliability analog-to-digital converters in view of the high precision and low power consumption requirements of mobile

robot sensor data conversion; the R&D of high-precision time-of-flight sensor chips in response to the requirements of mobile robots for ranging and scene perception accuracy; and the R&D of high-reliability high-voltage GaN switch driver chips in view of the anti-strong interference problems of mobile robots in motor drive.

**Performance Indicators:**

- (1) Implementing a high-precision, low latency, and highly reliable analog-to-digital converter chip, with an effective number of no less than 16 bits, a conversion delay of no more than 50ms, and a power consumption of no more than 2 mW.
  - (2) Implementing a high-precision flight time sensor chip with a distance measurement range of no less than 50 meters and a detection accuracy of  $\leq 2$  cm.
  - (3) Implementing a 650 V GaN switch driver chip with a common mode transient noise disturbance suppression capability of 100 V/ns and an output driving voltage no higher than 15 V.
  - (4) Applying for no less than 5 invention patents.
  - (5) Implementing application demonstration of three types of chips and providing application proof.
- \* The above performance indicators (1) - (3) must be certified by a recognized third-party test.

#### IV.Application Requirements

- (1) The applying entity shall file the application in the form of a project with the research topics of the research field listed in this Guideline. Unless otherwise specified, a project should include no more than 3 topics.
- (2) Each project should be submitted for the application as a whole, and all the research contents and performance indicators must be covered.
- (3) The lead unit shall be a Macao entity, Macao and Hengqin enterprises are welcome to participate in cooperation. The number of participating units for each project shall not exceed 6.
- (4) Every project leader or topic leader(s) must be qualified to work full-time in Macao.
- (5) Participation from joint ventures and provision of supporting funds are mandatory, and a formal cooperation agreement shall be provided.
- (6) The implementation period of the project is 3 years. The maximum application amount for each project is MOP 15 million.

## V. Experts Involved in the Formulation of the Guideline

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