

# Trends in Power converter ICs

*Electronic and electrical products have become an indispensable part of modern civilization. Where electricity is used, there is a need for power. The power unit is the heart of various systems which provides energy to support the whole system. Therefore, the strong demand for power has been promoting the development of power technology for nearly 70 years. It is considered that the power technology is one of the cornerstones of industry system.*

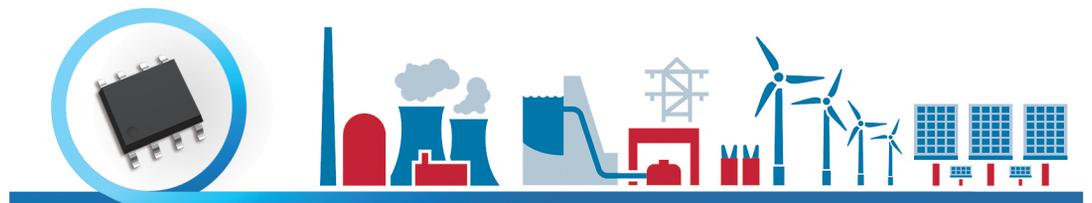
## Industry Overview

There are several general directions of power technology development. Such as higher efficiency, higher reliability, smaller dimension, better EMC performance, higher isolation and etc. Many of above factors are interinhibitive. For example, the pursuit of high efficiency drives the development of power technology from "Power Frequency & Silicon Rectification Technology" to "High Frequency Conversion Technology". Not only the efficiency of the power supply is improved, but also its dimension is greatly reduced. However, high operating frequency caused EMI problem that the interference from the power supply may disrupt the user's whole system. And, the EMI problem led to the research of the power soft-switching technology. At the same time, the small dimension make it more difficult to develop a high isolation power supply.

The complexity of the power technology has been increased so much and it became an independent discipline and industry. Engineers are facing great challenge because they are not only need to focus on the implementation of their system function, but also design a power unit that are suitable for their own system, in which they are not specialized.

The Power Management ICs are designed because of the wide range of needs. Knowing the engineer's difficulty of designing a power supply, the chip manufacturers separate the key control circuit with Circuit Integration Technology. Engineers only need to follow the simple instructions to design a power supply, so that they can focus on their system function implementation work. However, the problem with this mode is that the Power Management ICs are designed for general market demand, and the chip application instructions do not cover most of

Figure 1.  
MORNSUN IC application  
environments



the specificity of segmentation industries. As a result, most of the engineers have to use general power solutions but not optimal ones.

## Demand and Growth

As mentioned, the power industry is a relatively mature basic industry. The business volume grows with market demand. In recent years, the demand from traditional industry is stable and the growth rate of global economic has been slowing down. It is difficult to grow rapidly under this circumstance. Explosive growth will only happen when there is an industry revolution, especially in the consumer goods industry. For example, the global sales of smartphone were 1.4 billion in 2018 (Source: IDC). The demand of Power Management ICs for mobile was unpredictable 20 years ago.

## Key Trends

It's hard to predict great industry revolution and find new business opportunities. Therefore, the continuous success of MORNSUN is not only rely on industry revolution, but also on a more frequent industry upgrade. As mentioned earlier, the big Power Management ICs suppliers in the market provide general solutions to engineers, but not the optimal ones. IC manufacturers are pursuing the market share, but not better understanding engineers' demands. After the engineers' initial needs are basically met, they will raise the requirement in subsequent products and new projects. The IC giants often fail to take into account that. As a company with product innovation and product quality as its main business philosophy, MORNSUN is determined to understand the needs of customers and provide the best solutions accordingly. With the good interaction with customers, we have developed [PV series](#) (Ultra wide input range for solar industry), [URB1D series](#) (For railway transportation industry), [HO series](#) (Ultra-high voltage output for medical and measuring industry) , [QA series](#) (For IGBT/SiC/CaN driving power supply) and etc. We've got very good feedback from the market because the products help engineers to solve their problem.

Figure 2.  
Some of typical  
MORNSUN products



PV series



URB1D series



HO series



QA series

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Gradually, MORNSUN has felt some limitations, which is we found it more and more difficult to meet the increasing demands of customers by using Power Management ICs in the market. Therefore, we started developing our own ICs many years ago. Compared with traditional IC manufacturers, our advantage is "MORNSUN is the customer of Power Management ICs". With more than 20 years of experience in power supply design and application, we have become the one who knows the shortcomings of existing IC products and the needs of engineers. Based on a large amount of first-hand information, our IC group can design products that are more popular with engineers. At the same time, all ICs will be used in MORNSUN's own power supply modules. That means MORNSUN has sufficient stock to get a short lead time, and we can monitor all possible problems related to our ICs from production process to the failures in the field. Therefore, we are very confident that all power management IC products made by MORNSUN, can withstand the comparison with competitors and market trial.



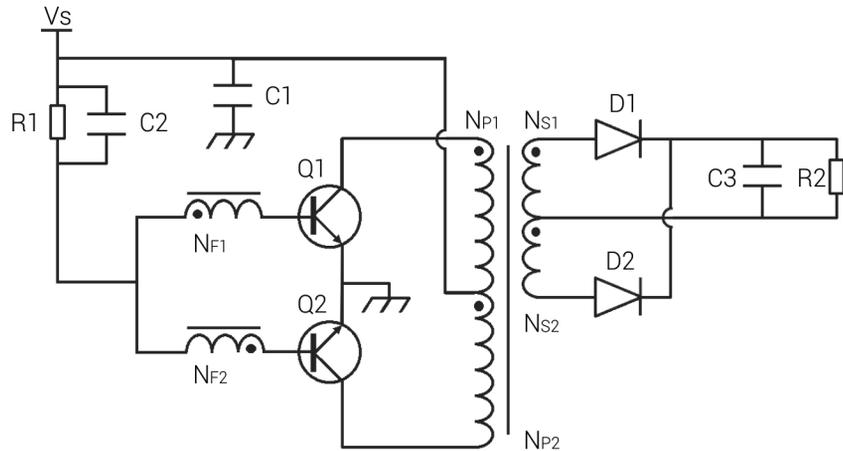
Figure 3.  
MORNSUN ICs family

**MORNSUN Products**

MORNSUN is basically a power supply and signal interface solution provider. Our major product lines are 1~540W AC-DC converters, 0.25~200W DC-DC converters, 5~65W adapters, CAN/RS485/RS232 transceiver modules and EMC auxiliary devices. All the ICs MORNSUN selling were designed for self-use purpose initially. Therefore, our ICs lines are 0.1~60W AC-DC power management ICs, 0.1~40W DC-DC power management ICs, wide input range start-up power ICs, RS485 interface ICs, power saving ICs for contactors and etc.

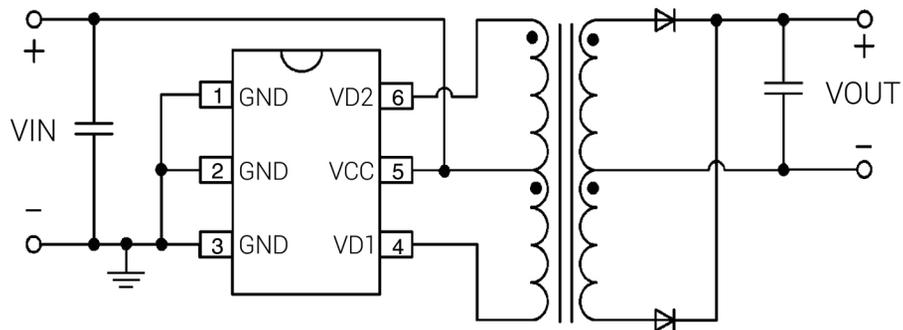
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Figure 4.  
Typical block diagram



Above is typical Self-excited Push-pull circuit, also known as Royer circuit. It looks pretty simple but it's widely used by engineers in low voltage applications such as RS-485, CAN bus, relays, etc. You can use only 10 components to get an isolated power supply, so it's normally used in low cost, space limited designs. It's open-loop and thus the output is unregulated. Therefore engineers often use a LDO with it to get a regulated output. As we can see from the circuit, it's not controlled by ICs but the feedback winding ( $N_{F1}$  &  $N_{F2}$ ), which makes it very difficult to produce the transformer and keep the consistency of its performance. Moreover, it is hard to enhance the low temperature start-up ability and capacitance load driving ability with this circuit. The engineers have to be careful when they are using it because there's no protection from this power design. And it would damage their circuit if the power is not correctly connected.

Figure 5.  
Typical block diagram



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MORNSUN has been designing and producing this push-pull power module for the last 20 years. We know the customer's application and every detail of this circuit. Then MORNSUN design SCM1201A and now release it to the market. There are build-in constant current source, 2 mosfets inside. With the constant current source, the power supply can start-up with high capacitance load in a wide range of temperature. Its over temperature protection & recovery, short circuit protection, soft start-up technology features, make the whole design more reliable and more applicable in different applications. The total number of components decreased from 10 to 6, saving the PCB space and costs for the customers. Of course, it's much easier to design and manufacture a 2 windings transformer instead of 3 windings. If customers do not want to handle it, MORNSUN provide customized transformer as well.

Part of MORNSUN ICs are not available to the customer yet. But all of them are designed with special features. For more information, please visit [MORNSUN homepage](#) and check. Engineers can find lots of usable information such as special industry applications, power technology instructions from the web other than our products and distribution information.