A Novel Class－D Amplifiers Chip Design

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ABSTRACT

This paper presents the design and implementation of a novel Class-D amplifiers chip. With low-power, high-performance, small area, and high speed, these circuits are employed in portable computer systems, such as the power circuits, electronic circuits, video and music amplifiers circuits, communications and control circuits, wireless communication and high-frequency circuit systems. This Class-D chip followed the chip implementation center advanced design flow, and then was fabricated using Taiwan Semiconductor Manufacturing Company 0.35- μ m 2P4M mixed-signal CMOS process. The chip supply voltage is 3.3 V which can operate at a maximum frequency of 100 MHz. The total power consumption is 2.8307 mW, and the chip area size is 1.016 mm ×1.016 mm. Finally, the Class-D chip was tested and the experimental results are discussed. From the excellent performance of the chip verified that it can be applied to audio amplifiers, communications control, etc.

Keywords : Class-D、audio amplifier、pulse width modulation、control system

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符號說明 R：電阻(單位：歐姆Ω)。 L：電感(單位：亨利H)。 C：電容(單位：法拉F)。 V：電壓(單位：伏特V)。 I：電流(單位：安培A)。 P：功率(單位：瓦特W)。 L：長

度(單位：微米μm)。 W：寬度(單位：微米μm)。 Vt：臨界電壓或切入電壓(單位：伏特V)。 Vgs：閘-源電壓(Vgs =Vgate-Vsource)。 Vds：汲-源電壓(Vds =Vdrain- Vsource)。 ID：汲極電流。 f ：頻率(單位：赫茲Hz)。 ω：角頻率(ω=2πf)。 Av：電壓增益。 PM：相位角。 GB：增益頻寬。

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