

APPLICATION NOTE

RTL8169S-32 / RTL8169SC

128-pin QFP COMPATIBLE BOARD DESIGN GUIDELINES

(Rev. 1.00; 2005/12/20)



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INTRODUCTION

This application is written to help board layer designer to create a PCB layout which will be able to accept Realtek's Gigabit Single Chip solutions (RTL8169S-32 & RTL8169SC). Both chip packages will share similar pin assignments in order to achieve Pin-Compatibility feature that means they will be able to use a common footprint so that any one of these 2 ICs can be placed on the same PCB layout. Both Chip packages have been defined as 128 pins – QFP appearance.

Due to the functional differences, the particular surrounding components are also required to populate with corresponding IC. Through this application note, the information between these two designs consideration will be highlighted and discussed to help the board layer designer to achieve the pin-compatible layout in the shortest period.

DESIGN CONSIDERATIONS

Several Major points must be considered while designing a PCB that will accept both RTL8169S-32 and RTL8169SC ICs. Those points have been categorized as below and been detailed in the following chapters.

NOTES: To change from 8169S-32 to 8169SC. Remember to keep R54(0 ohm), R57(0 ohm) and C76(0.1 uF). Other parts remain the same.

- Power Distribution Circuitry
- RJ45 Jack & Magnetics Interfaces



Power Distribution Circuitries:

Due to the different Fabrication processes (0.18 micron for RTL8169S-32; 0.13 micron for RTL8169SC), the power requirement for both chips are slightly different from each due to smaller fabrication process requires smaller core voltage (i.e. 3.3V, 2.5V & 1.8V for RTL8169S-32; 3.3V, 2.5V & 1.2V for RTL8169SC). Moreover, the power is distributed as needed to various parts of chip and differential pair terminations (ex. V_DAC). Details of placing correct decoupling capacitors & beads on each application have been shown in the following Figures.

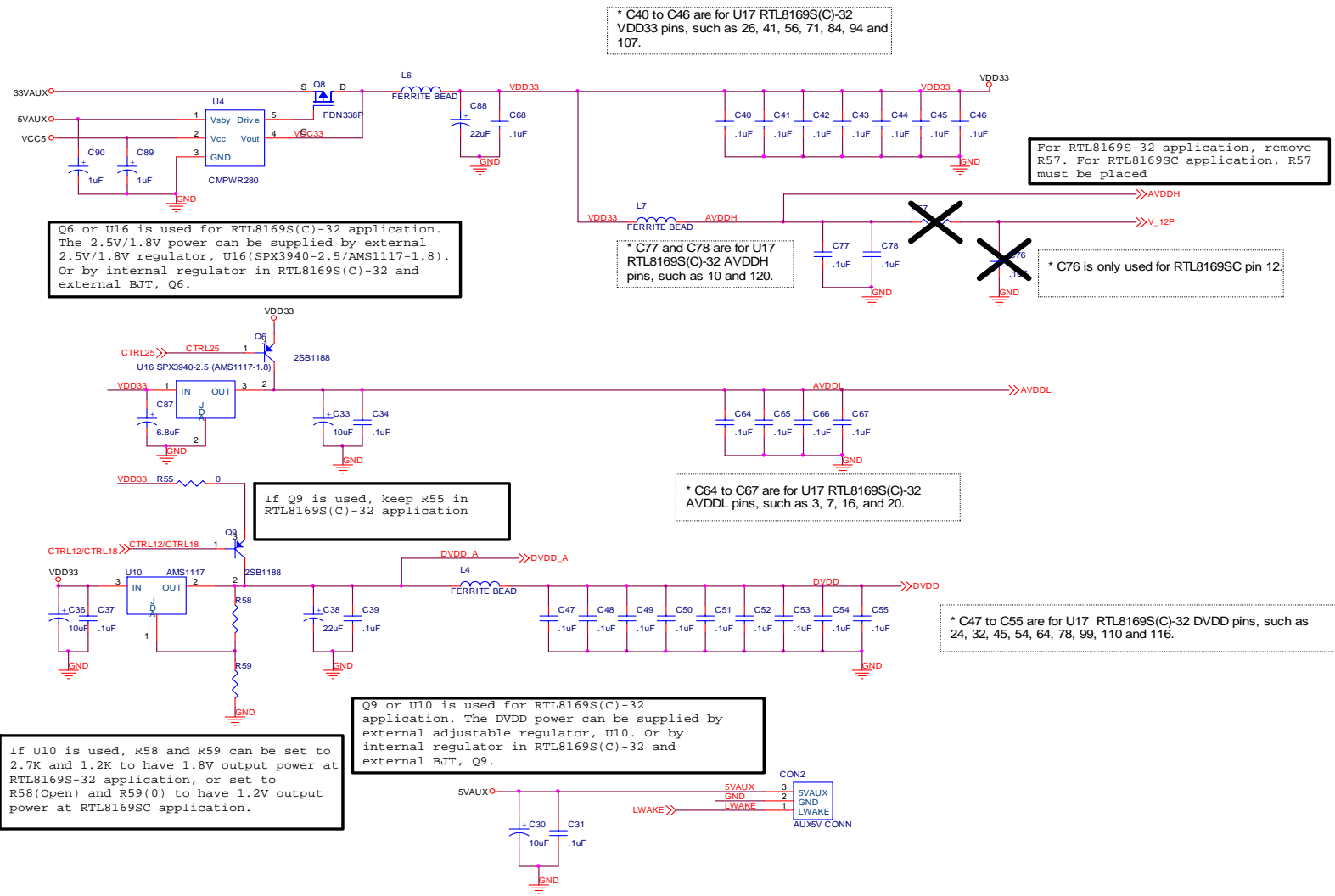


Fig.1 10/100/1000 Gigabit Ethernet Application Circuit – Power : [RTL8169S-32](#)

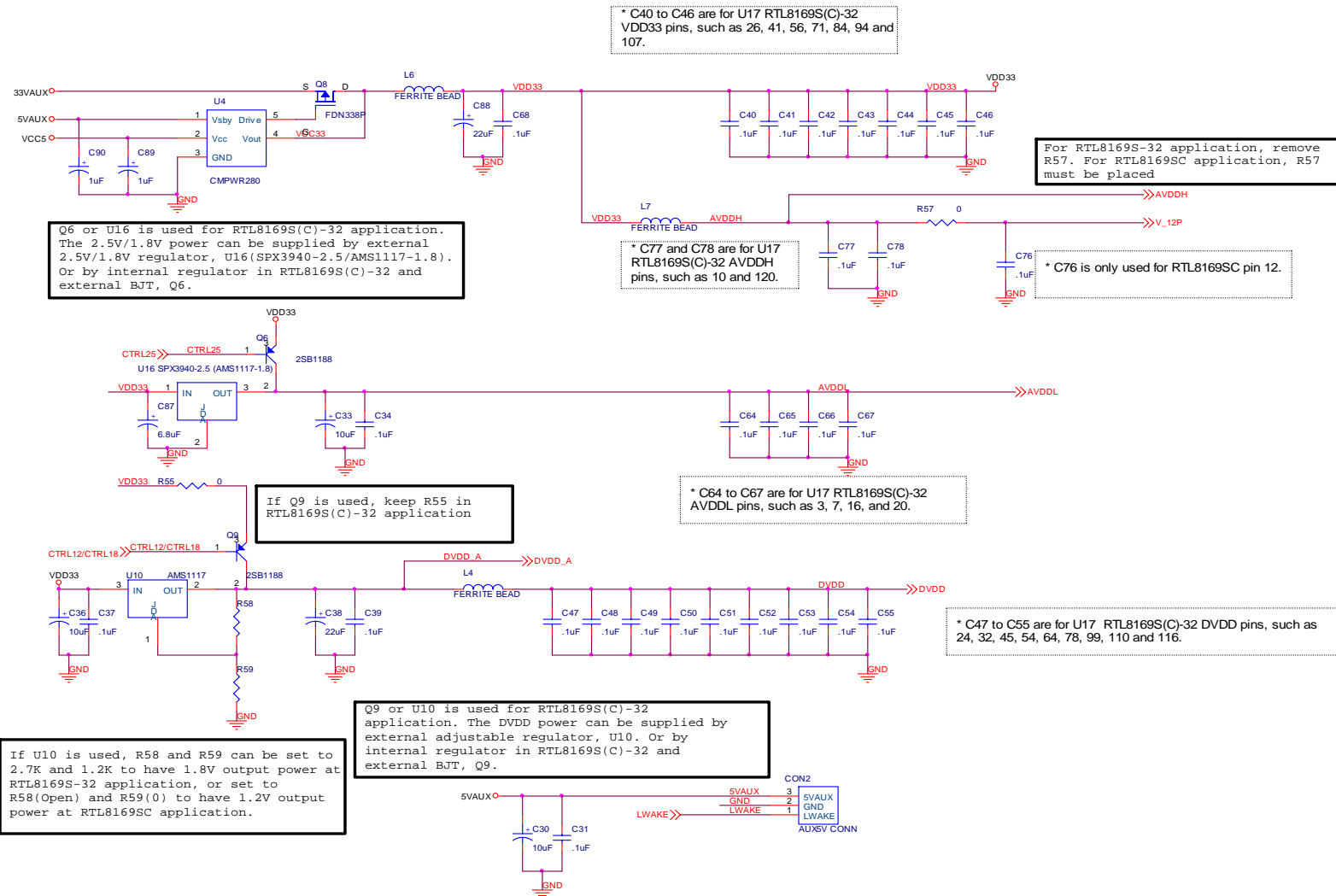


Fig.2 10/100/1000 Gigabit Ethernet Application Circuit – Power : RTL8169SC(L)

RJ45 Jack & Magnetics Interface

The Realtek RTL8169S-32/ RTL8169SC are 10/100/1000 BASE-T Gigabit Ethernet Single Chips. Therefore, all four pairs will be used when interfacing the Magnetics Transformer in all three applications. The choice of transformer would be Pulse Engineer's H5007 or similar gigabit transformer. RTL8169S-32/RTL8169SC shares the same RJ45 Jack and Magnetics Interface shown below. R60 must be reserved for future upgrade.

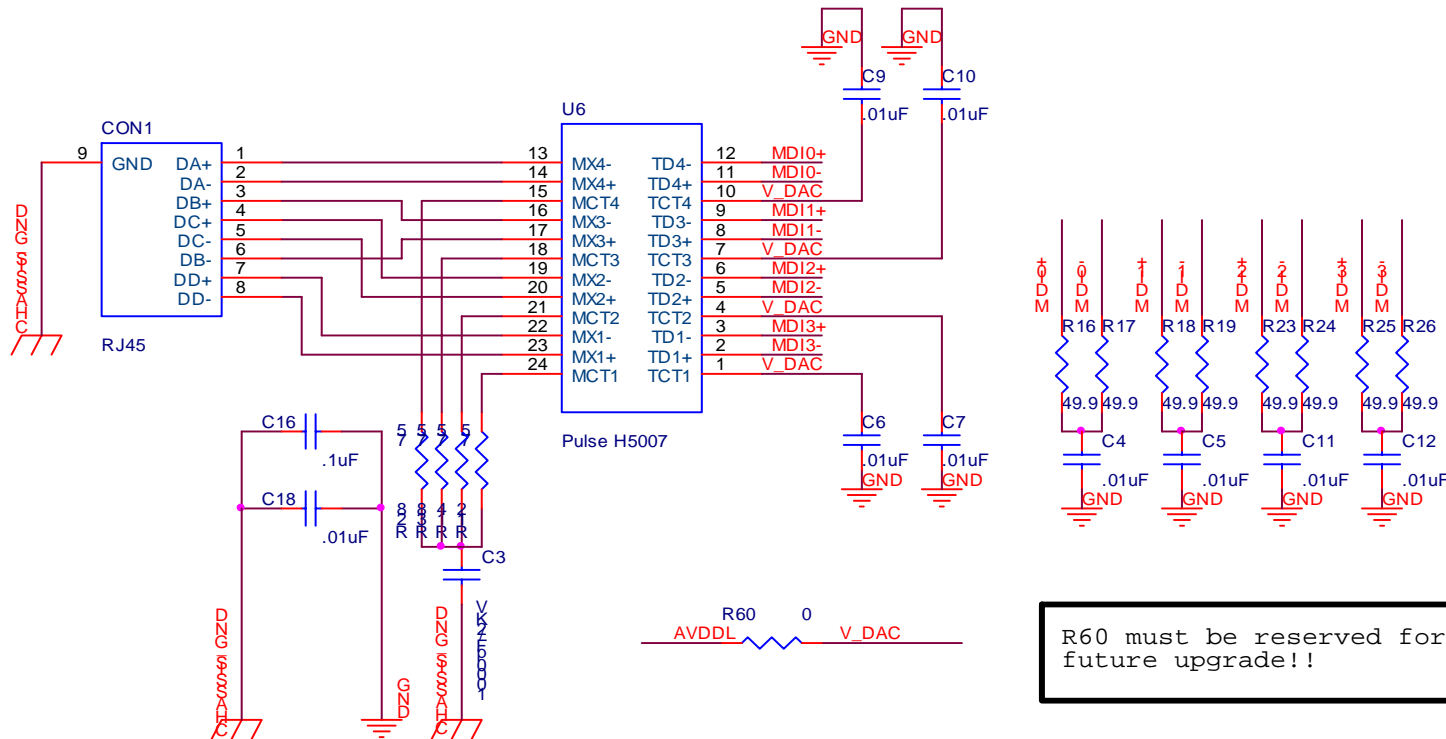


Fig 4: RJ45 Jack & Magnetics Interface



HISTORIES OF REVISION

- (0129) Rev. 1.00: Initial Release: 2005/12/20