Silver TELECOM

Summer 2006 Issue 3

NEWSLETTER

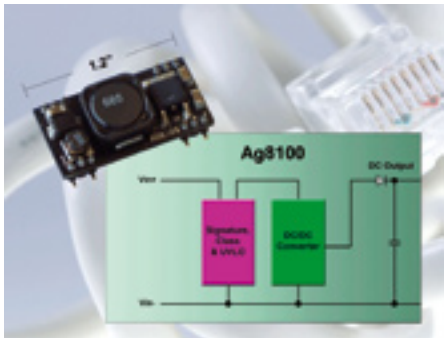
Is this the smallest PoE solution available?

Building on the successes of the Ag9000 and Ag8000 ranges, Silver Telecom has released the Ag8100 – a complete Power Over Ethernet solution in a single SMT package.

Covering just 0.7 square inches (4.6 cm2) Ag8100 is ideal for any ethernet peripheral up to 12W, such as IP phones and gateways, wireless access points, web cameras and security cameras, door entry systems, RFID tag readers, security systems (PIR, fire detectors, etc), network drives, Bluetooth access points and media servers.

The device is a fully self-contained 12-pin device, providing a DC-DC converter with signature recognition compliant to IEEE 802.3af. Available with outputs of 3.3V, 5.0V or 12.0V, the Ag8100 requires only one external decoupling capacitor and a diode bridge. The combination of features and packaging provides extremely efficient use of board area, saving significant system size and cost, and minimising time to market.

This new product contains an IEEE802.3af compliant signature circuit; this ensures that it will inter-operate with any PSE (power sourcing equipment) midspan or endspan that conforms to the same standard. Also included is a DC-DC converter, which takes the 48V, fed by the PSE via the Cat5 ethernet cable, over either the spare pairs or the signal pairs. It is a complete solution in a single package with emphasis on small size, low cost and ease of use.



Additional features include the ability to program the IEEE 802.3af power classification (default is class 0), and the ability to vary the output voltage, so that the range covers any output from 2.5V to 13V. Ag8100 makes up to 12W of power available to the powered device.

18 MONTHS OF ROHS

As an early adopter of the RoHS and WEEE initiatives, 1 year has now passed since all Silver Telecom products have been compliant. QA Manager Rob Lane said, “environmental issues are a big priority for Silver Telecom, so all of our products were brought into line as soon as possible – well in advance of the July 2006 threshold”.

The Running MD

Steve Edwards (pictured in blue) completed the London Marathon in 4hrs 26 mins. In the process Steve managed to earn £1800 for Cancer Research. Well done Steve!

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POWER OVER ETHERNET
the reality of designing a Powered Device

By Tony Morgan, Senior Applications Engineer

There have been many technical articles, white papers and product application notes that explain the theory on how to make a powered device. They give an overview of the IEEE 802.3af standard for Power over Ethernet and explain how to extract the power from the CAT5e cable. The following is a practical guide to help take that information and to design a PoE enabled powered device.

The first block is “Polarity Protection” or “Auto-polarity Circuit”. This is required as the IEEE specification allows the power to be injected onto the Cat5e cable in a number of ways. “Alternative A” shown in Figure 2, injects and extracts the power using the centre tap of the data transformers (Medium Dependant Interface or MDI). The PSE can apply the positive to the centre tap of the TX pair transformer or the RX pair transformer (or a crossover cable could be used). Therefore the PD must be able to handle the unknown polarity and operate normally. A simple bridge rectifier will do the job and the IEEE specification allows for such a component to be used in the PD’s input.

The other alternatives methods detailed in the IEEE specification are shown in Figure 3 and Figure 4. Were the power is supplied by the PSE over the Power Interface (PI), or the spare pairs in 10BASE-T and 100BASE-T networks.

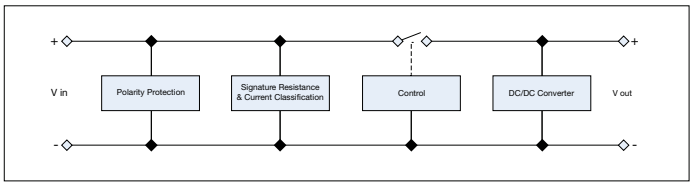


Figure 1: Building Blocks of a Powered Device (PD)

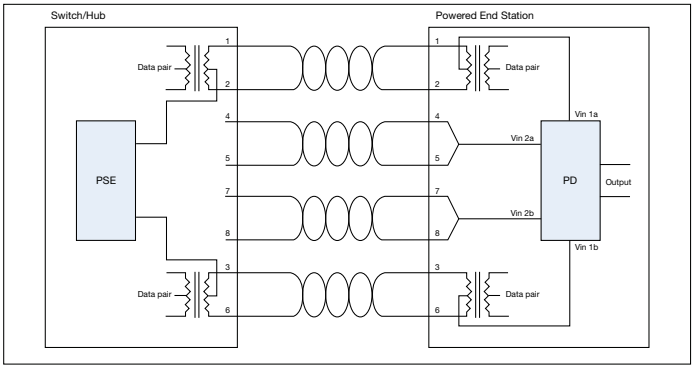


Figure 2: Endpoint PSE, Alternate A

In Figure 3 and Figure 4 the IEEE specification states that the PSE positive must be connected to 4 & 5 and the negative connected to 7 & 8. So if the polarity is fixed does the Vin2 input to the PD require a bridge rectifier? It doesn’t need a full bridge rectifier but it would be worth putting two diodes in-line to match the way the Signature circuit responds to either input method.

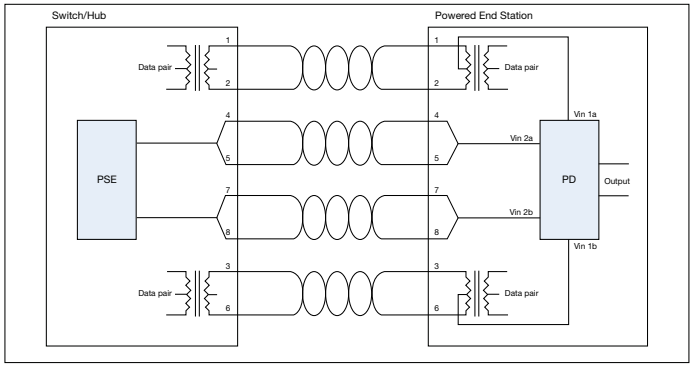


Figure 3: Endpoint PSE, Alternate B

The IEEE specification details 10BASE-T and 100BASE-T networks, but only makes references to 1000BASE-T networks. 1000BASE-T network topology differs from 10BASE-T and 100BASE-T networks in that it uses all four pairs within the cable to transfer data. If a powered device using one of the methods shown above is connected to

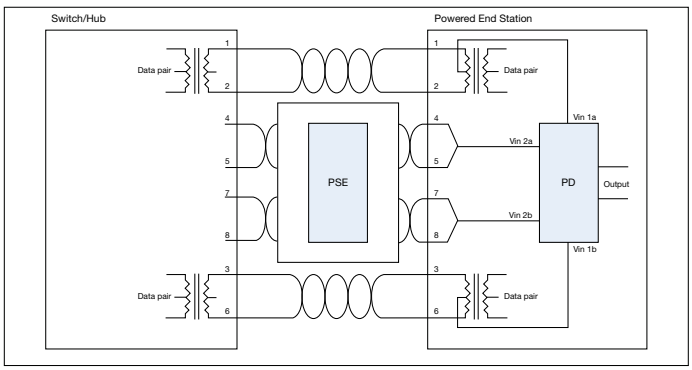


Figure 4: Midspan PSE, Alternate B

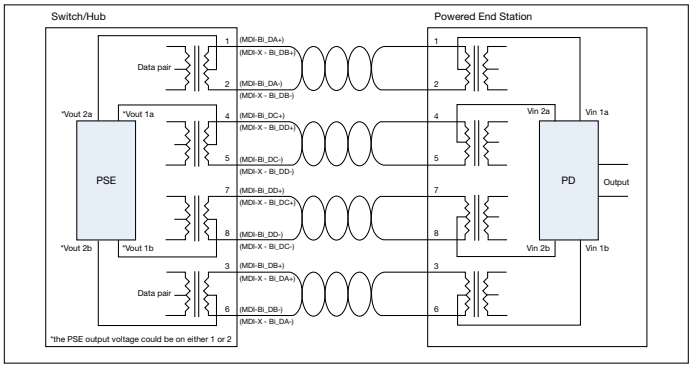


Figure 5: 1000BASE-T Configuration

a 1000BASE-T network, then two of the data pairs will be shorted. Figure 5 shows how to configure the PD to work with a 1000BASE-T network.

The second building block is the Signature and Class circuitry. To ensure that the PSE does not apply 48V to a non POE enabled device, the PSE will initially apply a low voltage (2.7V to 10.1V) and look for a Signature Resistance of 25K Ohms. The PSE will expect that the Signature Resistance will be after some form of Auto-polarity Circuit and will compensate for the DC offset in the Signature. The maximum input capacitance of the PD must be <150nF. There are a number of PSE's that don't check this parameter, but some do. It is important to remember that if the Signature Resistance is not switched out when the full PSE voltage is applied, it will need to dissipate ~130mW (25K @ 57V).

The "Current Classification" or "Class Circuitry" is used to inform the PSE of the maximum power used by the PD. This is useful for power management in larger switch/hubs. After a valid Signature the PSE will increase it output voltage between 14.5V and 20.5V and measure the current. Table 1 shows the different Class ranges available, this is optional and providing the measure current is <=4mA the PSE will default to Class 0. Class 4 has been reserved and may be used in the future.

Class	Measured Current (mA)	PD Power Max (W)	Comment
0	0 to 4	0.44 to 12.95	Default
1	9 to 12	0.44 to 3.84	Optional
2	17 to 20	3.84 to 6.49	Optional
3	26 to 30	6.49 to 12.95	Optional
4	36 to 44	Reserved	Not Allowed

Table 1: PD Power Classification

The third building block is the under-voltage lock-out or control stage. It is important that the DC/DC converter does not operate when the PSE is validating the Signature and Current Classification. The control stage must be ON when the PD input voltage = 35V, the PSE output voltage (Von) = 42V with 20 Ohms series resistance (cabling and connectors) at 350mA.

The IEEE specification does contradict itself with the Voff voltage. It states that control must be OFF if the PSE output voltage = 30V with 20 Ohms series resistance, implying that it can go down to 23V. But in the recommended PD power supply test procedure the specification states that the input current must be <1.14mA at 30V. So to ensure that the PD complies with the specification set the control switch threshold between 30V to 35V.

The forth and final building block is the DC/DC converter. A nominal 48V is not the most practical voltage and most applications would require a lower voltage such as 3.3V, 5V or 12V. An effective way of achieving this would be to use a DC/DC (Buck) converter. This converter must be capable of operating normally over a wide input range 36V to 57V, under minimum to maximum load conditions.

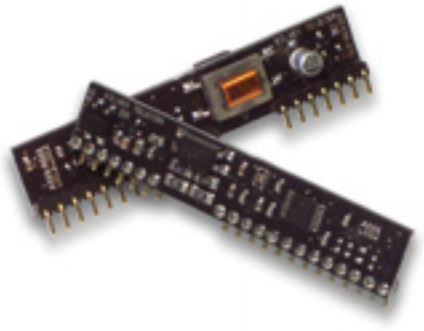
A question often asked is "How much power is available?" The PSE will be capable of outputting 15.4W (350mA @ 44V). But the IEEE 802.3af specification states that with 20 Ohms series resistance, the maximum input power to the PD = 12.95W (350mA @ 37V). If the DC/DC converter is 80% efficient then the available output power = 10.36W. This is something to be aware of this when working out the actual power, under worse case conditions. The IEEE have set-up a new task force to progress POE further with a higher power standard IEEE 802.3at. This is still in progress and the new standard is not expected to be ratified in the near future.

To view the complete article, please visit www.silvertel.com and select "Technical Articles" from the side menu.

Focus on Logistics

A big focus for Silver Telecom is customer support. In addition to a world-class applications team, there is also a highly trained logistics team working behind the scenes to ensure that our service remains the very best in the industry. From left to right these include Rob Lane (Quality Manager), Elaine Wilson (Logistics Administrator), Emma Jones (Operations Supervisor), Clive Smith (Project Manager), Robert Smith (Quality Technician, not pictured). To get in touch with our logistics team please e-mail: logistics@silvertel.com.

Our lowest cost DAA – Ag2130



Launched in June, Silver Telecom has added to its' range of PSTN interfaces with the Ag2130. Designed for low cost FXO applications such as IP Phones and Gateways, PSTN lifeline, Point of Sale terminals and analog modems, Ag2130 includes all the features required for a complete DAA solution and requires just 6 passive components for full functionality.

Features include operation from either 3.3V or 5V supply, Ag2130 also has transformer isolation for exceptional common mode performance, or use in un-grounded systems. Also included are loop switch, diode bridge, ringing detect, line detect, parallel phone detect and on-hook reception. Ag2130 conforms to all major telecom safety specifications including UL60950 and FCC Pt.68, there is also the ability to add low cost power cross protection and off-hook protection.

Ag2130 ships in a SIL package occupying just 6.7 cm^2 (1.0 in^2), is available in volume now, and datasheet and applications information are available on our web site.

COMING SOON – POE PLUS!

Silver Telecom are due to release the Ag5000 series towards the end of 2006. To be supplied in the standard 1/8 brick format, Ag5000 will operate with any PoE plus power sourcing equipment (PSE) currently available, thereby providing up to 25W to the powered device (PD). As with all Silver Telecom products the focus is on low cost, small size and ease of use.

Market Expansion Grows

The signing of LDS as our distributor for South Korea, and 2 new reps in USA: NCTS in California, and QoS in the Mid-Atlantic, has been a significant factor in our further sales growth. In order to continue this trend we are recruiting into our sales team, and also looking for distributors in Australia, Brazil and Chile.

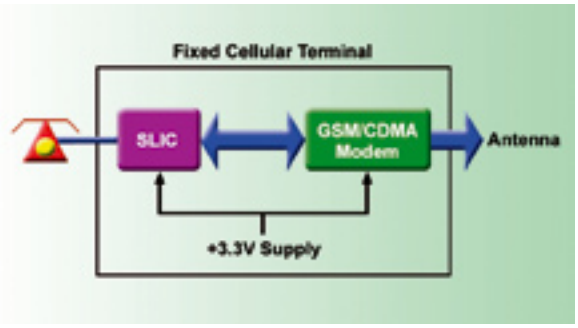
For further information please visit our web site: www.silvertel.com.

Case Study

Ag1170 and Fixed Cellular Terminals (FCT)

In regions where traditional copper lines are not available, the Ag1170 has once again shown its versatility in the fixed cellular terminal market.

The Ag1170 is well suited for fixed cellular terminal applications as an interface between a conventional telephone and a GSM or CDMA solution. The 4 wire pins of the SLIC connect to the RF chipset (or module) without the need for a codec interface, whilst the 2 Wire pins connect to a conventional telephone.



The Ag1170 is powered from a single supply, either +3.3V or +5V versions are available. Its DC/DC converter provides the line voltage and supplies the power to its on-board ringing generator, thus removing the need for an external 48V battery and ringing generator.

The power down feature can be used to conserve power, which is becoming increasingly important with rising fuel costs and is especially useful if the unit has a battery backup.

Available in either SIL or DIL formats the Ag1170 offers a simple but efficient solution for fixed cellular terminal applications.

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