Capnography for the masses

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How new medical technology is being driven by volume growth opportunities

Almost every patient who enters a hospital can benefit from capnography. It’s a technology that has enabled better patient care through consistent monitoring, with measurement of carbon dioxide output, and feedback on ventilation, metabolism and circulation. Industry recognition of capnography is causing it to spread rapidly throughout the medical world. Increased demand for capnography combined with the drive for low power, high performance (especially in graphics) and cost reduction in medical electronics are driving volume growth opportunities for reliable NOR Flash memory.

Capnography as a vital technology
There are multiple medical situations where capnography is vital. For example, when an intubation tube has been inserted into the trachea, capnography provides medical professionals with immediate confirmation, showing a flatline at the first missed breath, not minutes later. The technology also helps medical professionals avoid patient hyperventilation, which can jeopardize a patient’s neurological recovery, by monitoring respiratory rates to ensure ventilation isn’t performed too fast. Capnography can also be used in CPR by monitoring compression effectiveness, which can decrease as a result of fatigue. Capnography alerts the rescuer to compression efficiency, indicating when it is time to switch who is performing compressions to maximize CPR effectiveness.

Beyond the safety push for using capnography, there is also a strong business case for it. A recent study at Riley Hospital for Children in Indiana found they were able to save almost $1 million over a six-month period after continuously monitoring all mechanically ventilated patients in pediatric ICU with capnography.

Industry recognition
In recent years, there have been several noteworthy changes regarding the

recognition of capnography. For example, the American Society of Anesthesiologists (ASA) and the Association of Anaesthetists of Great Britain and Ireland (AAGBI) now require capnography to be used to monitor ventilation during moderate to heavy sedation. Additionally, the American Heart Association (AHA) now recommends using capnography to judge the effectiveness of chest compression during CPR.

One of the biggest pushes for legislation mandating capnography comes from its role in monitoring Patient Controlled Analgesia (PCA) pumps. PCA pumps are one of the most common forms of pain treatment because they offer consistent relief; however, they also have a margin of error that can prove fatal. By monitoring a patient's C2O output, the Veterans Health Administration found that capnography could prevent more than 60 percent of adverse events related to PCA pumps.

It's clear why there is a push to have one of these for every hospital bed: capnography is an effective reliable technology – these characteristics of effectiveness and reliability also set the standard for the type of flash memory that powers it.

NOR Flash as an ideal technology for capnography

NOR Flash is ideally suited for the high demands placed on capnography equipment. NOR Flash's instant-on feature is vital for driving the fast boot time and NOR Flash provides high performance memory and processing power. It delivers the real-time feedback and high reliability required by the medical industry. Flash memory also enables communication functionality, which will be vital to the next generation of telecommunications infrastructure needed to enable future patient care models.

The bottom line is that NOR Flash memory provides the onboard storage needed for capnography to achieve its full potential. The performance and random access capabilities of NOR Flash fit the growing need for the graphics and displays to provide medical professionals with clear, fast visual access to data. This high-density flash memory supports large OS images, applications and graphics needed to elevate the human machine interaction (HMI) – because the last thing you want your doctor to be doing in an emergency is squinting at the monitor to determine where a problem is originating.

Cost reduction trends

The graphics available today in capnography devices seem to meet the needs of healthcare personnel. But the industry and electronics in general are trending toward cost reduction. Simultaneously, mobile systems (whether it be your smartphone or tablet or your coffee maker or home security system) are trending toward better graphics and higher-end processors. The challenge moving forward will be maintaining the current quality of graphics and performance while simultaneously improving other electronic components (such as the MCU) and reducing overall cost. The evolution of NOR Flash density will become a key factor in cost reduction.

With higher-end MCUs and higher density, higher performance NOR Flash, the need for dynamic random-access memory (DRAM) will be reduced. The speed of non-

volatile memory is increasing and reducing the need for external RAM. Essentially, RAM pulls more power than non-volatile memory. Every time RAM boots back up, it needs to be constantly refreshed to keep its data. This pulls more power than required by non-volatile memory, making NOR Flash a more practical solution. With the ability offered by larger onboard caches for lower-end applications (as a result of higher-end MCUs), more on-system processing is enabled that does not require access to RAM. These power requirements combined with the need for cost reduction will lead to an increased demand for non-volatile memory, particularly NOR flash, in capnography.

To sum it up

Capnography is just one example of the medical trends driving the need for low power consumption, high performance Flash memory. Electronics manufacturers are under pressure to build higher-density devices to capture more data, to encapsulate more software that can do more with the data collected and to manage power better. Wearable devices, like diabetic monitors, are just one other example of the manifestation of these trends – higher-end devices have the potential to offer more analytics and additional telemetric capabilities, allowing the device to talk to other machines. An increased demand for analytics in the medical field is driving a need to extend these capabilities.

The medical industry is ready for capnography. Legislation and other recommendations from industry associations are moving this trend forward at breakneck speed. These medical industry trends in combination with a push from electronics manufacturers to reduce costs and improve graphics and performance will lead to a high demand for NOR Flash memory in this growing space, as well as many others.

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