

## **Octasic OCT6100 Series FAQ**

### **OCT6100 Voice Quality/Echo Cancellation**

*Increasing system density while improving voice quality.*

#### **1. How many channels can the OCT6100 support?**

The OCT6100 Series of products is available in 672, 512, 256, 128, 64, 32 or 16 channel devices. The OCT6100 is offered in different flavours, with various features and tail lengths.

The **OCT61x2 series** is available in all capacities and delivers echo cancellation and gain control functionality with a 64ms tail length.

In the **OCT61x4 series**, all capacities have a 128ms tail length and deliver echo cancellation and gain control functionality.

In addition to all OCT61x4 functionality, the **OCT61x6 series** offers noise reduction, with a maximal capacity of 512 channels.

#### **2. What is the package spec of the OCT6100 Series?**

All devices in the OCT6100 Series are delivered in a 280 BGA package. The dimensions are 16mm x 16mm x 1.2 mm. The ball pitch is 0.8mm.

#### **3. Does the OCT6100 Series come in a Lead-free version?**

Today lead-free versions of the OCT6100 Series of devices are available, with all the same features, functionality and pin-out as the leaded version. The lead-free version is identified with an 'E' in the part number.

#### **4. What are the power dissipation and supply requirements for the devices?**

The maximum estimated power dissipation of the OCT6100 device, at maximal capacity of 672 channels is 2 W, including external memory with all features enabled at 128ms tail. For 32 channel use, the OCT6100 device powered by a 1.8V source dissipates 0.75W. Power scales linearly with the number of channels delivered. The devices must be powered with 1.8V / 2.5V / 3.3V.

The low power OCT6100L device is powered at 1.2V and dissipates 1W at its maximum capacity of 672 channels and 0.32W at 16 channels.

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#### **5. What do I gain by using a smaller tail length?**

The OCT6100 Series technology has been designed to minimize the overall cost of processing large tails. The design architecture chosen for the product does not require trade-off between channel capacity and echo tail length for any tails up to 128ms. The tail length is adjustable per channel from 32ms to 128 ms in steps of 4 ms.

#### **6. Do you support tones? If yes, which ones?**

The OCT6100 Series is equipped with G.168 compliant tone detectors (1100Hz and 2100Hz, with and without phase reversal) in order to disable the echo canceller on Fax or Data calls. The OCT6114, OCT6116, OCT6124 and OCT6126 are also equipped with signaling tone detection and playback features that are programmed by the API to support tones from networks worldwide such as DTMF, MF R1 and MF R2.

#### **7. What measures are taken to reduce the software load on my system?**

Octasic recognizes the load problems related to high-density systems. The OCT6100 Series communicates with the API through a messaging queue. The queue may be polled or the processor may be interrupted as new messages arrive. Functions such as tone detection are highly integrated in the device so that action may be taken without direct involvement of the control processor. Furthermore, the message interface to the CPU is sufficiently abstracted to limit the processing power required.

#### **8. Do you have tests that prove the quality of your echo canceller?**

Octasic has developed a complete test plan for the echo cancellation device which includes: ITU G.168, automated tests with measurements, simulated echo points and real world conversational tests. Subjective listening tests are also part of the Octasic testing plan for echo cancellation.

Reports are available for G.168 tests, MOS competitive comparisons, and comparative evaluations from third party labs.

#### **9. Are you G.165 and G.168 compliant?**

Our echo canceller is fully G.165 and G.168 compliant; however, we believe that echo cancellation devices should exceed these minimum requirements. Octasic actively participated in the G.168 (2002) definition and tests show the OCT6100's compliance to G.168 (2002) as it is published.

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## **10. Can the OCT6100 echo cancellation algorithm be adjusted to respond to specific network situations?**

The OCT6100 echo cancellation algorithm is designed to be software upgradeable. The echo cancellation algorithm has had extensive testing through a range of network situations and is designed so that no compromise must be made between performance in a specific situation and the wide variety of network conditions possible. However, in the unlikely event of a carrier encountering a particular situation where the performance is sub-optimal, it is possible to upload a new algorithm, through an API upgrade, to better respond to this situation.

## **11. When is the part available?**

The part is currently generally available and shipping in a number of designs. If you are interested in evaluating the algorithm itself, a hardware test platform has been put in place to allow customers to evaluate the OCT6100 using T1/E1 before integrating it into their products.

## **12. What kind of external memory is required?**

For use at 672 channels, the OCT6100 requires one 64MB DDR SDRAM part with a 16 bit wide interface or two 32MB SDR SDRAM 16 bit wide interfaces. This leaves 5MB available for playback buffer storage. It is possible to install up to 128MB to increase the buffer size for tone and message playback. Smaller density parts require less memory. Up to four memory devices can be connected to the OCT6100 in order to use smaller memory chips and still reach the 64-128 MB range.

## **13. What is the largest echo tail supported?**

In line echo mode, the OCT6100 can process echo on a 128ms tail. It is possible, however, to use tail displacement of up to 512ms if a known network delay is added (i.e. satellite or encrypted communications).

As for Acoustic Echo Control, echo tails of up to 512ms can be supported.

## **14. What is the algorithm convergence time?**

ITU G.168 defines a clear test to measure convergence. The G.168 test 2b requires echo cancellers to converge in less than 10 seconds. The full adaptive filter convergence on CSS signal is achieved within one CSS burst (0.25 seconds).

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### **15. What is the algorithm steady state ERLE?**

As mentioned above, -36 dB steady state cancellation is achieved after one CSS burst. The G.168 test 2b requires echo cancellers to remove echo at levels at least between 25 and 30 dB attenuation depending on the strength of the  $R_{in}$  signal.

### **16. How does double talk affect the behavior of the Adaptive Filter?**

Double talk has no effect once the OCT6100 echo canceller has converged. The requirements for G.168 test 3b are therefore exceeded by more than 10 dB.

As for convergence during double talk as defined in G.168 test 3a, the OCT6100 echo canceller surpasses the requirements by up to 10 dB by converging below the level of local talk. Convergence time is also considerably less than the required 5 second maximum: it is usually one and at most two CSS bursts (0.25-0.50 seconds).

### **17. Does the OCT6100 offer any conferencing functionalities?**

An optional **Advanced Conferencing Functions** package is offered with the OCT6100. These functions are specially-tailored to conferencing applications, to ensure delivery of the highest voice quality possible. The features are: Tone Removal for Conferencing applications, Conferencing Noise Reduction, Conferencing Prime Speaker and Conference Supervisor.

### **18. How well does the OCT6100 perform when there is music on the line?**

The OCT6100 echo canceller has a special feature called **Music Protection** (particularly useful in IP PBX applications) that is expressly designed to handle music. When music is played on a phone line (such as is frequently the case when callers are put on hold) and a person speaks into the phone at the same time, a generic echo canceller would usually harshly damage the music's sound quality by failing to distinguish between the voice and music. The result is often choppy and very unpleasant to the ear. In contrast, the OCT6100's performance in the presence of music is excellent: the Music Protection feature is sensitive to music and eliminates echo without altering the music's sound quality.

### **19. Do you have a chart of channel capacity vs echo tail length?**

The following chart lists the parts available in the Octasic OCT6100 Series of echo cancellation devices:

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The part number for each device is built using the following format: 61ABLE-YYY

Where:

**A** stands for the feature content

**B** stands for the VQE functions\* (2 for 64ms, 4 for 128ms, 6 for 128ms and Noise Reduction)

**L** is added to the part number when the Low Power version is required

**E** is added to the part number when a Lead-free part is required

**YYY** stands for the capacity

The low power and lead-free options are not included in the following chart. Their part numbers are simply formed by adding 'L' and/or 'E' to the desired part number listed.

\* For detailed feature content, please consult the OCT6100 Product Brief.

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<u>Part Number</u>	<u>Channel</u>	<u>Tail Length</u>
OCT6102-672	672	64
OCT6104-672	672	128
OCT6102-512	512	64
OCT6104-512	512	128
OCT6106-512	512	128
OCT6102-256	256	64
OCT6104-256	256	128
OCT6106-256	256	128
OCT6102-128	128	64
OCT6104-128	128	128
OCT6106-128	128	128
OCT6102-064	64	64
OCT6104-064	64	128
OCT6106-064	64	128
OCT6102-032	32	64
OCT6104-032	32	128
OCT6106-032	32	128
OCT6102-016	16	64
OCT6104-016	16	128
OCT6106-016	16	128
OCT6114-672	672	128
OCT6114-512	512	128
OCT6116-512	512	128
OCT6114-256	256	128
OCT6116-256	256	128
OCT6114-128	128	128
OCT6116-128	128	128
OCT6114-064	64	128
OCT6116-064	64	128
OCT6114-032	32	128
OCT6116-032	32	128
OCT6112-016	16	64
OCT6114-016	16	128
OCT6116-016	16	128
OCT6124-672	672	128
OCT6124-512	512	128
OCT6126-512	512	128
OCT6124-256	256	128
OCT6126-256	256	128
OCT6124-128	128	128
OCT6126-128	128	128
OCT6124-064	64	128
OCT6126-064	64	128
OCT6124-032	32	128
OCT6126-032	32	128
OCT6122-016	16	64
OCT6124-016	16	128
OCT6126-016	16	128

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