



## ITU G.729/G.729+B Speech Coder

### SIGNALS+SOFTWARE



#### Processor

Texas Instruments TMS320C6000 DSP range.

#### Background

The algorithms implemented are the ITU-T recommendations G.729 and G.729 Annex B fixed rate speech coders for internet and multimedia communications. The encoder G.729 compresses linear narrowband speech data at a sample rate of 8kHz to a data rate of 8 000 bps.

G.729 Annex B comprises of G.729 with the additional option of Annex B. Annex B implements silence compression techniques to reduce the transmitted bit rate during the silent intervals of speech. Voice Activity Detection (VAD) and Comfort Noise Generation (CNG) algorithms are used to enable the transmission of Silence Descriptor (SID) frames during the periods of silence. This provides the additional advantage of using lower processing loads and DSP bandwidth resource during silence intervals.

#### Features and Performance

- TI eXpressDSP™ Compliant software available
- 12 channels of G.729 or G.729+B on 200MHz device
- Passes all ITU-T test vectors

G.729	Program Memory		Data Memory			Interrupt Latency (Cycles)	Typical call Period (ms)	Processing Load (MHz)
	Code (Kbytes)	Tables (Kbytes)	Static Memory		Stack Memory (Kbytes)			
			Heap (Kbytes)	Tables (Kbytes)				
Encoder	36.2	0.05	n * 1.8	6.3	2.6	42910	10	n * 13.4
Decoder	21.8	0.05	n * 1.3	5.8	1.6	16030	10	n * 2.5
Encoder + Decoder	50.3	0.10	n * 3.1	6.9	2.6	42910	10	n * 15.9

Table 1 : DSP Requirements of G729

G.729+B	Program Memory		Data Memory			Interrupt Latency (Cycles)	Typical call Period (ms)	Processing Load (MHz)
	Code (Kbytes)	Tables (Kbytes)	Static Memory		Stack Memory (Kbytes)			
			Heap (Kbytes)	Tables (Kbytes)				
Encoder	53.0	0.05	n * 2.1	6.9	2.7	42910	10	n * 13.6
Decoder	27.0	0.05	n * 1.3	6.4	1.7	16020	10	n * 2.5
Encoder + Decoder	69.1	0.10	n * 3.4	7.3	2.7	42910	10	n * 16.1

Table 2 : DSP Requirements of G729+B

**Note:** Processing loads quote worst-case scenarios with n representing the number of channels. Program memory table values are initialisation values. Kbytes equals 1024 bytes.

### Technical Notes

The software is written using only fixed-point instructions and is compatible with both the TMS320C6000 fixed-point family and the TMS320C6700 floating-point family. It is supplied in both big-endian and little-endian variants.

The ITU-T G.729 uses a linear predictive analysis-by-synthesis coding, Conjugate-Structure Algebraic-Code-Excited Linear Prediction (CS-ACELP). The coder operates on 10ms frames to extract the parameters of the CELP coding model. The decoder uses two filters. One is based on a 10th order Linear Prediction (LP) filter, the other is based on an adaptive-codebook approach. Additional performance enhancement is achieved by use of a Post Filter.

### Interface Details

The eXpressDSP™ G.729 and G.729+B software uses the IG729 interface specified by Texas Instruments in the eXpressDSP™ developers' kit.

The software is also available in a non-eXpressDSP version with a basic multi-channel interface. The DSP requirements for this version are similar to those given in Table 1.

### Availability

G.729 and G.729+B code is available now for a one-off payment and/or royalties depending on the commercial application.

Software for the TMS320C6000 is available for a full range of vocoders including G.711, G.722, G.723.1, G.726, G.728, G.729A, G.729A+B, and for other communication algorithms. G.729 and G.729+B are also available for the TMS320C5000.

## SIGNALS+SOFTWARE

**SIGNALS+SOFTWARE** was founded in 1992 as a developer of high quality Digital Signal Processing application software for the communications industry. Supplying to a whole range of customers, including large blue chip corporations, **SIGNALS+SOFTWARE** has quickly established itself as the world leader in DSP software design and production.

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