

**ETSI AMR-GSM – Subscriber  
(Incorporating EFR-GSM and IS-641A)**



**Processor**

Motorola StarCore™ MSC8101 DSP.

**Background**

**SIGNALS+SOFTWARE** are developing a complete suite of communication software for the Motorola MSC8100 family of DSPs. The initial development platform, the MSC8101, utilizes the StarCore™ 140 four ALU (Algorithmic Logic Unit) DSP core. This device also has 512kb memory and a Communications Processor Module (CPM) making it a versatile device for communication applications.

The algorithm implemented is the ETSI Adaptive Multi-Rate (AMR) GSM recommendation, digital cellular telecommunications system. The encoder compresses linear-PCM (Pulse Code Modulated) speech input data, at a sample rate of 8kHz, to one of eight data rate modes 12 200, 10 200, 7 950, 7 400, 6 700, 5 900, 5 500 and 4 750 bps. There is also one mode to handle non-speech frames. The data rate is run-time selectable by the user.

The AMR-GSM algorithm 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**

- Integrated IS-641-A and EFR-GSM functionality.
- Subscriber and Infrastructure AMR-GSM solutions are available.

<b>AMR-GSM</b>	<b>Program Memory (Kbytes)</b>	<b>Tables (Kbytes)</b>	<b>Stack (Kbytes)</b>	<b>Data Memory (Kbytes)</b>	<b>Processing Load (MHz)</b>
Encoder	50.0	24.1	6.1	n * 3.3	n*14.0
Decoder	26.2	23.1	6.1	n * 1.6	n*2.8
Encoder + Decoder	72.7	25.3	6.1	n * 4.9	n*16.8

**Table 1 : DSP Requirements for AMR-GSM – Subscriber Solution**

**Note:** Processing loads quote worst-case scenarios and include VAD Options 1 & 2. n represents the number of channels. Program memory table values are initialisation values. Kbytes equals 1024 bytes.

**Technical Notes**

The AMR-GSM speech coding algorithm is a member of a subset of the linear predictive coders (LPC) known as the ACELP (Algebraic-Codebook-Excited Linear Predictive Coding) class of coders.

**Interface Details**

For convenience the individual software functions are supplied as a single library module. The library contains all

the object code that is required to link in to a user's top-level application code. The audio functions are either callable as C functions or as assembly functions.

### Availability

Fully memory optimised code is available now for a one-off payment and/or royalties depending on the commercial application.

Also available or in development for StarCore™ are a full range of vocoders including HR-GSM, FR-GSM, EFR-GSM as well as other communication algorithms.

### 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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