

# Pushing Your DSP to the Limit with GSI Technology SRAMs

A broad range of digital signal processor applications in the telecommunications infrastructure feature large signal-processing tasks and require the very highest computational performance. New server modems, wireless base-stations, and smart antennas are just a few examples. Fortunately, DSP vendors have met the challenge pushing DSP speeds up to 2000MIPS with speeds upwards of 250 MHz. In order to harness all this power, designers must make wise choices in their SRAM selection. Fortunately, GSI Technology asynchronous and synchronous SRAMs focus on meeting these high speed needs.

## Texas Instruments

Texas Instruments has long been the leader in digital signal processing. TI offers several families of DSPs that can be interfaced with either synchronous SRAM, asynchronous SRAM, or both.

The TI 6000 series is Texas Instruments highest performing DSP platform for real time applications such as wired and wireless broadband networks and digitized imaging applications. It contains a simple, yet highly evolved SRAM interface called the EMIF (external memory interface). It can interface with either synchronous or asynchronous SRAMs.

The TI 5000 series was designed for low power applications such as personal and portable products like digital music players, 3G cell phones, and digital cameras. The 5000 series can interface with various 8-bit and 16-bit asynchronous SRAMs.

The control oriented TI 2000 series, specifically the 2400 family, was intended for control-specific applications allowing high efficiency and greater reliability in industrial automation applications and appliances. The external memory interface supports various sized 16-bit wide SRAMs.

Texas Instruments has numerous application notes illustrating how to interface synchronous and asynchronous SRAMs to many of their DSP families. These can be found on their web site at <http://www.ti.com/cgi-bin/sc/support.cgi>.

## Motorola

Motorola manufactures high performance DSPs for wireless commu-

nications, telecommunications, multimedia, and related applications. Motorola DSPs currently only supports an asynchronous SRAM interface.

The Motorola DSP56600 series was specifically designed for mobile wireless applications. The DSP56652 16-bit interface supports glue-less interaction with any GSI Technology 16-bit asynchronous SRAMs; the DSP56690 has a 24-bit interface supporting 24-bit asynchronous SRAMs.

The Motorola DSP56300 series dramatically boosts performance, simplifies system design, and drives system costs down in wireless communication, multimedia and telecom DSP applications. The DSP56300 is a 24-bit processor. GSI Technology produces several SRAMs in x8 and x24 configurations that can be used as program and data storage for this family of DSPs.

When interfacing a GSI SRAM to Motorola's DSP56300 series you may want to consult their application note, [http://www.mot-sps.com/cgi-bin/get?/books/apnotes/pdf/an1289\\*.pdf](http://www.mot-sps.com/cgi-bin/get?/books/apnotes/pdf/an1289*.pdf). This application note uses 32kx8 asynchronous SRAMs, but many of the same considerations can be used for GSI's x24 GS71024, GS73024, and GS76024.

## Analog Devices

The ADSP-2100 family was Analog Devices first generation DSP. It was designed to be used in multiple DSP applications and boasts a large internal cache. The x24 data bus supports asynchronous x24 SRAMs such as the GS71024.

The 32-bit SHARC DSP, also known as the ADSP-2106 family, is optimized to enable all variety of real-time embedded applications. The SHARC line's memory interface supports both asynchronous and synchronous 32-bit SRAMs.

Analog Devices offers a large selection of application notes and user manuals to help the design cycle move more quickly. You can find them at [http://www.analog.com/techsupt/application\\_notes/application\\_notes.html](http://www.analog.com/techsupt/application_notes/application_notes.html).

The days of choosing from a handful of DSP architectures are over. Today DSPs are as powerful and plentiful as the applications they are

designed into. The last thing a designer wants to worry about is what SRAM to choose. Luckily, GSI Technology is committed to providing fast, low power, industry standard SRAMs for all DSP application needs. Table 1 list many of the popular DSP families along with a cross reference to the GSI Technology part numbers that best suit the DSP.

**TABLE 1: DSP and SRAM Cross-Reference**

**Texas Instruments Digital Signal Processors**

**Synchronous Interface**

DSP P/N	EMIF Clock Speed	External SBSRAM	I/O Interface	GSI Technology P/N
TMS320C6201/C6701	1/2x CPU or 1x CPU	Max. 1Mx32	3.3 V	GS84032A, GS88032, GS816032
TMS320C6202	1/2x CPU or 1x CPU	Max. 1Mx32	3.3 V	GS84032A, GS88032, GS816032
TMS320C6211/C6711	100 MHz	Max. 1Mx32	3.3 V	GS84032A, GS88032, GS816032

**Asynchronous Interface**

DSP P/N	External ASRAM	I/O Interface	GSI Technology P/N
TMS320C6201/C6701	Max. 1Mx32	3.3 V	GS72116, GS74116, GS78116, GS78132
TMS320C6202	Max. 1Mx32	3.3 V	GS72116, GS74116, GS78116, GS78132
TMS320C6211/C6711	Max. 1Mx32	3.3 V	GS72116, GS74116, GS78116, GS78132
TMS320C541/2/3/5/6	64kx16 data, 64kx16 program	3.3 V	GS71116, GS72116
TMS320C548/9/10	8Mx16 data, 8Mx16 program	3.3 V	GS72116, GS74116, GS78108, GS78116
TMS320C5402	1Mx16 data, 1Mx16 program	3.3 V	GS72116, GS74116, GS78108, GS78116
TMS320C5420	256kx16 data, 256kx16 program	3.3 V	GS72116, GS74116, GS78116
TMS320C50/51	64kx16 data, 64kx16 program	3.3 V	GS71116, GS72116
TMS320C24x	64kx16 data, 64kx16 program	3.3 V	GS71116, GS72116

## Motorola Digital Signal Processors

### Asynchronous Interface

DSP P/N	Type	I/O Interface	GSI Technology P/N
DSP56301	Fixed point, x24 data bus	3.3 V	GS71024, GS73024, GS76024
DSP56303	Fixed point, x24 data bus	3.3 V	GS71024, GS73024, GS76024
DSP56307	Fixed point, x24 data bus	3.3 V	GS71024, GS73024, GS76024
DSP56309	Fixed point, x24 data bus	3.3 V	GS71024, GS73024, GS76024
DSP56311	Fixed point, x24 data bus	3.3 V	GS71024, GS73024, GS76024
DSP56362	Fixed point, x24 data bus	3.3 V	GS71024, GS73024, GS76024
DSP56364	Fixed point, x8 data bus	3.3 V	GS71208, GS72108, GS4108
DSP56366	Fixed point, x24 data bus	3.3 V	GS71024, GS73024, GS76024
DSP56652	x16 data bus	3.3 V	GS78116
DSP56690	x24 data bus	3.3 V	GS71024

## Analog Devices Digital Signal Processors

### Synchronous Interface

DSP P/N	Type	I/O Interface	GSI Technology P/N
ADSP-2106x	x32 bit access	3.3 V	GS880Z36, GS8160Z36
ADSP-2106xL	x32 bit access	3.3 V	GS880Z36, GS8160Z36

### Asynchronous Interface

DSP P/N	Type	I/O Interface	GSI Technology P/N
ADSP-2189M	x24 data bus	3.3 V	GS71024
ADSP-2187L	x24 data bus	3.3 V	GS71024
ADSP-2186L	x24 data bus	3.3 V	GS71024
ADSP-2185L	x24 data bus	3.3 V	GS71024
ADSP-2184L	x24 data bus	3.3 V	GS71024
ADSP-2106x	x32 bit access	3.3 V	GS78132
ADSP-2106xL	x32 bit access	3.3 V	GS78132

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**Supported Models:**

Denali: <http://www.gsitechnology.com/denali.htm>  
IBIS: <http://www.gsitechnology.com/ibis.htm>  
Verilog: <http://www.gsitechnology.com/verilog.htm>  
Spice: [bzeller@gigasemi.com](mailto:bzeller@gigasemi.com)