

## Product Brief

**TOTAL 5100  
MGT5100 STANDARD  
DEVELOPMENT PLATFORM  
FOR TELEMATICS,  
HANDS-FREE PHONES, AND  
DRIVER INFORMATION SYSTEMS**

### BENEFITS

Speed time to market by creating, compiling, linking, assembling, and debugging within a single, integrated development environment. Use these tightly integrated tools to speed up development time. Create fast, highly optimized code with these compilers, or plug into a favorite third-party compiler or editor. Use the same powerful and flexible Integrated Development Environment (IDE) to create software for multiple processors and platforms – an important part of the long-term value of CodeWarrior development tools.

The mobileGT SDP provides the components needed to quickly develop scalable solutions while saving valuable software integration time, associated costs, and consistent quality. Re-use of common drivers and modules at lower levels allows leverage of the common elements

while focusing on the value-added application and HMI developments that distinguish the end products.

### CODEWARRIOR DEVELOPMENT TOOLS

CodeWarrior development tools for embedded systems, from Metrowerks, are powerful and easy-to-use, designed specifically to increase software development productivity. The CodeWarrior IDE provides an unparalleled, intuitive GUI for embedded development on Windows® hosted operating systems (OS). The state-of-the-art project manager and build system allow the writing of solid code and shortened compile-edit-debug cycles. With the tightly integrated development environment of CodeWarrior development tools, less time is spent navigating between tools and more time is spent generating code.

### OVERVIEW

mobileGT™ Standard Development Platforms (SDPs) are designed for fast set-up and installation, allowing users to be productive in minutes. This comprehensive out-of-the-box development environment tightly integrates Motorola's mobileGT SDPs with CodeWarrior™ development tools for embedded systems, the QNX™ Realtime Operating System (RTOS), Photon™ microGUI, OTI J9 Virtual Machine, Fonix™ Embedded Speech Software Development Kit (SDK), and associated device-level drivers, libraries, system configurations, and sample applications.



### SYSTEM SUMMARY

The MGT5100 SDP is a comprehensive automotive grade system solution for developers of rapid prototype and A-Sample telematics, Driver Information Systems (DIS), navigation systems, automotive gateways, hands-free phone modules and other automotive-centric applications with or without automotive network connectivity or cellular/wireless interfaces. It is based on the highly integrated, single-chip, 32-bit MGT5100 processor that implements the PowerPC instruction set architecture. The 12VDC-powered system, with a DIN-sized main board offers comprehensive hardware utilities, including a movable display (head) unit, automotive networking I/O, including CAN and MOST, power management, audio processing, wireless connectivity, and a rich set of varied I/O to accommodate a wide variety of designs.

### **JAVA™ TECHNOLOGY FROM OBJECT TECHNOLOGIES INTERNATIONAL AND IBM**

The J9 Virtual Machine with realtime Java2 technology supports multiple Java-class library configurations. Specific configuration optimized for DIS systems is included. J9 is highly optimized with the QNX RTOS at the thread level, providing optimal performance in embedded applications. Accurate compacting and garbage collection is supported. Alternative user interfaces include J3ML, AWT, and Micro View. The J9 Virtual Machine also supports OSGi bundle management for dynamic downloads and hot code replacement! It is configurable and flexible; build from a single source for all target platforms, improving usability over time and maintenance of code.

### **MOBILEGT DEVELOPMENT TEMPLATES**

This SDP is self-configurable to development environments through the use of scripts and utilities. A fully networked image using NFS and TCP/IP is supplied allowing compilation on the host and run on the target, all through an Ethernet connection – easy and fast! System configuration examples along with build files for hardware-supported configurations are included.

### **QNX RTOS AND QNX PHOTON MICROGUI**

The software foundation for the mobileGT platform, the QNX RTOS, combines a fault-tolerant architecture with a small memory footprint. Designed for dynamically upgradeable DIS systems, the QNX RTOS allows new applications and drivers to be downloaded and started on the fly — no reboot or user intervention required. Automotive OEMs can, as a result, add new revenue-generating services to a system long after it has been installed in a vehicle. QNX RTOS is POSIX compliant, enabling automotive OEMs and ISVs to leverage a large community of developers. The QNX Photon microGUI provides a customizable look-and-feel, full Unicode support, and a code-generating visual design tool – create comprehensive interfaces without writing a line of code. Sample applications are available.

### **FONIX EMBEDDED SPEECH SDK FOR MOBILEGT**

Speech is a natural interface to provide users access to vehicle functions, entertainment systems, and cellular phones without taking their eyes off the road or their hands off the wheel. The Fonix Embedded Speech SDK, a Windows OS-based rapid prototype development environment, generates speech applications that can be directly downloaded and run on the mobileGT 5100 SDP. The Fonix Embedded Speech SDK is the most efficient way to develop production-ready, voice-enabled applications.



**DEVELOPMENT SYSTEM EXPANSION  
I/O EXTENDS WITH THE FOLLOWING:**

- Expansion for PCI, ATA/IDE, and Flash Card
- Expansion to 9 serial channels
- Expansion for extra GPIO lines
- MOST subsystem (asynchronous/synchronous in parallel combined mode) using Oasis OS8104AQR
- DSP co-processor interface
- Comprehensive audio subsystem based on Crystal CS4299 Codecs
- Comprehensive audio/visual head unit support w/graphics co-processor; additional S-video and CRT outputs

**SINGLE-CHIP, HIGHLY INTEGRATED 32-BIT PROCESSOR  
WITH FPU THAT IMPLEMENTS POWERPC INSTRUCTION SET  
ARCHITECTURE**

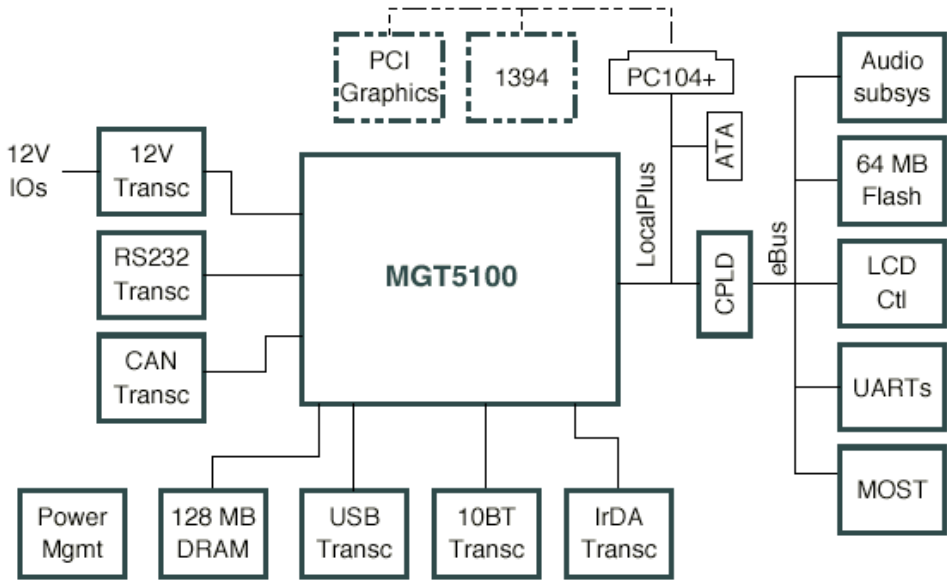
- 233 MHz MGT5100 DIS processor that implements the PowerPC instruction set architecture
- Pin-compatible 400 MHz MGT5200 DIS processor available in 2003
- 603e RISC Core with Dual Precision Floating Point Unit (FPU), crucial for GPS, Voice Recognition/Text-to-Speech, and AEC operations
- 440 MIPS @ 231 MHz for plenty of application headroom
- PCI, Dual CAN, I<sup>2</sup>C, Serial, USB, SPI, AC97, IrDA COP/JTAG, and Memory Controller *on chip* for easy expansion. MOST and Audio Subsystem off-chip
- On-Chip SmartComm DMA I/O Control reduces CPU I/O management overhead
- -40 to +85C Automotive Qualified, QS9000 Certified assures production quality and availability



**TOTAL 5100  
mobileGT  
Target Hardware  
System**

**COMPREHENSIVE ON-CHIP I/O**

- Multi-serial (UART) for maximum design flexibility
- SPI (useful for Touchscreen, A/D Input, etc.)
- Dual USB (Version 2.2 PCI master compatibility)
- Dual CAN 2.0A/B (High Speed and Low Speed Fault Tolerant, Standard and Extended Frames, Programmable bit rate to 1Mbps)
- Ethernet 10 BaseT (7 Wire Industrial Standard Interface)
- Dual I<sup>2</sup>C (to 520Kbps) for thermometer, interchip and DSP communication, E2PROM, etc.
- Version 4 5V ATA (Compact Flash with True IDE mode)
- PCI interface with PC104+ connector plus separate PCI clock drivers
- IR and IrDA (1.0 SIR mode to 115.2Kbps; 1.1 MIR and FIR modes to 4.0 Mbps)
- AC 97 Audio Codec Interface
- Multiple, reconfigurable GPIO pins

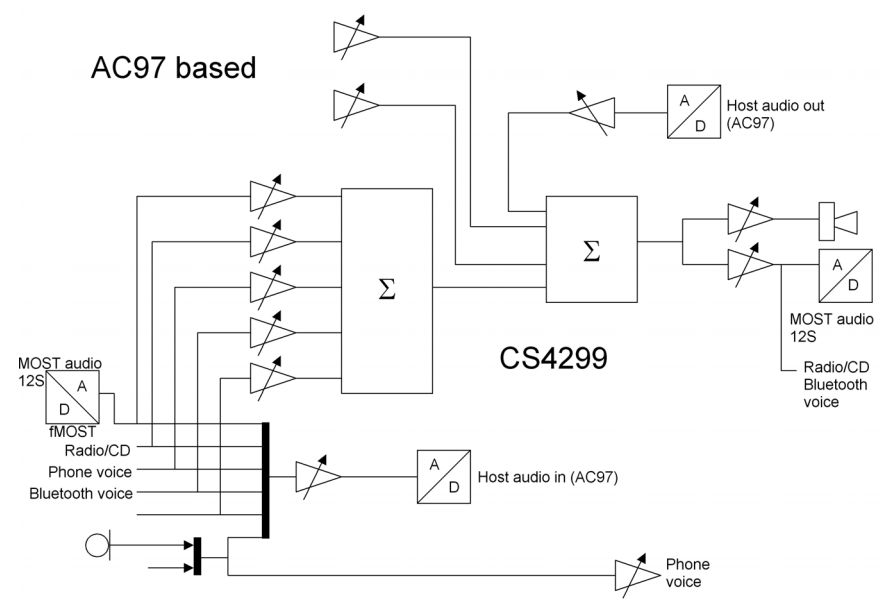


# MGT5100 SDP Block Diagram

### AUDIO SUBSYSTEM DAUGHTER CARD

- Audio subsystem based on Crystal CS4299 Codec
- Full connectivity to car radio
- Two microphone inputs, Bluetooth™, stereo, radio, phone, MOST/Video, aux and line inputs
- 16-bit stereo speaker out
- Headphone out
- Amplifier
- On-board A/Ds

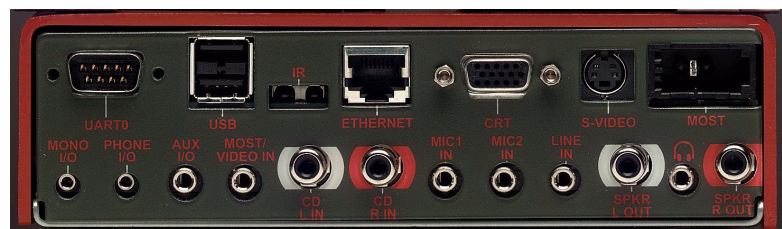
# Audio Subsystem Daughter Card Block Diagram



## CONNECTORS

NAME	DESCRIPTION	PHYSICAL CONNECTOR
JTAG Programming	Classic interface for Xilinx JTAG	10 pin PCB header
COP	Standard COP (Lauterbach or Abatron interface)	8 x 2 pin PCB header
MOST	Media oriented systems transport	Bigfoot connector, 2-way
USB (x2)	Universal serial bus (x2)	Dual USB connector
CAN (HS)	High speed controller area network (CAN)	10-pin PCB header
CAN (LS)	Low speed fault tolerant CAN	10-pin PCB header
Wakeup	Wakeup from deep sleep mode	Minifix connector (5x2)
GPIO	8 bits of general purpose I/O	Minifix connector (5x2)
Timer	Timers/input catch/output compare/PWM	Minifix connector (5x2)
Touch screen	4-wire resistive touch screen input	5 pin PCB header
LCD Power	5V power for TFT-LCD twin backlights	5 pin PCB header
SPI	Serial peripheral interface	4 pin PCB header
LCD	Thin-film-transistor liquid crystal display	32 pin Hiroshi connector
LCD GPIO	General purpose I/O on Epson™ LCD controller	10-pin PCB header
UART0	Serial port that supports HW flow control	DB9, male
UART1	Serial port with comprehensive MODEM signals	Minifix connector (5x2)
UART 2+3	Serial ports (2) that support SW flow control	Minifix connector (5x2)
UART 4	Serial port that supports HW flow control	Minifix connector (5x2)
UART 5+6	Serial ports (2) that support SW flow control	Minifix connector (5x2)
UART 7+8	Serial ports (2) that support SW flow control	Minifix connector (5x2)
Button Interface	Panel button interface control	Minifix connector (5x2)
Ethernet	10 Base-T Ethernet	10-pin RJ-45 jack
Compact Flash	External flash memory card	50 pin Compact Flash slot
ATA	Ultra ATA 100 (ultra direct memory access)	40 pin ATA slot
PC104	Slots for stackable PC-104 sized card	4 x 30 (120) slot connector
Bluetooth™	Audio output for Bluetooth™ wireless technology	Stereo Jack – 2.5mm
Phone	Audio I/O for telephone	Stereo Jack – 2.5mm
AUX IN	Audio input from auxiliary source	Stereo Jack – 3.5mm
MOST/Video	Audio output to MOST system	Stereo Jack – 3.5mm
Radio IN	Audio input from radio source	RCA Jacks (left and right)
Mono-Microphone 1	Audio input from microphone with amplifier	Stereo Jack – 3.5mm
Mono-Microphone 2	Audio input from microphone	Stereo Jack – 3.5mm
Line-level IN	Line-level input (2 channels)	Stereo Jack – 3.5mm
Headphone	Audio output to headphones	Stereo Jack – 3.5mm
Speaker OUT	Audio output to external speakers	RCA™ Jacks (left and right)
S-Video	S-Video standard video output	S-Video Mini DIN connector
VGA	Video graphics adapter output	15-pin VGA connector

## Front Panel Connections



### MEMORY

- 128 Mbytes SDRAM, processor can also support Double Data Rate (DDR) memory
- 64 Mbytes Flash organized as 2 x 32 bit-wide banks

### ON-BOARD POWER MANAGEMENT

- Support of MGT5100 sleep and deep sleep (real-time clock only) modes
- Sequenced power on (1.8, 2.5, 3.3 then 5V sequence)
- SDRAM self refresh
- Selective transceiver shutdown
- DC/DC converters stay on with minimal load
- ATA level shifters enabled only by ATA chip select

### DIMENSIONS

- Board enclosure: 186mm x 180mm x 84mm
- Main board: 172mm (width) x 165mm (depth), excluding connectors
- Audio subsystem board: 172mm (width) x 60mm (depth), excluding connectors
- Power subsystem board: 172mm (width) x 60mm (depth)
- Audio/visual display head: 213mm x 175mm x 57mm

### TECHNICAL SUPPORT

Various standard training courses are available. Annual technical support contracts are available to help keep projects on track. For further product development, support contracts can be customized to meet specific training, consulting, or custom engineering needs.

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Click for additional OTI information:  
[www.oti.com](http://www.oti.com)

Click for additional Fonix Embedded Speech SDK information:  
[www.fonix.com](http://www.fonix.com)

### COLOR GRAPHIC HEAD UNIT

- 16-bit TGT LCD controller (640 x 800, 64K colors) based on Epson S1D13806/Seiko SED1386
- 6.5 in. TFT color LCD display; 640 x 480 pixels; 18-bit color
- 16 general purpose buttons; two general purpose rotary-push knobs; five navigation buttons
- Resistive touch screen

### POWER REQUIREMENTS

- Single 12VDC @ 2A direct automotive connection (will accommodate 6-20V)
- All required voltages derived from single source
- 2.5 A fuse
- 1.8V, 2.5V, 3.3V, and 5V rails may be introduced separately, if desired

### DIMENSIONS

- mobileGT QuickStart Development CD from Motorola, DIS
- mobileGT CodeWarrior IDE CD
- mobileGT QNX SDK CD
- IBM VisualAge Micro Edition Java Tools CD
- Motorola DIN1 form-factor hardware system with separate head unit and integrated power supply
- Documentation and start-up support



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**MGT5100PB/D, REV 0**