

## Familiarization of TMS 320C6748

### Aim

To explore the architectural and functional capabilities of the TMS320C6748 DSP processor.

### TMS 320C6748

**Overview of the TMS320C6748 DSP Processor:** The TMS320C6748 DSP processor is designed to handle intensive digital signal processing tasks efficiently. At its core is the powerful C674x™ DSP CPU, optimized for real-time embedded applications, multimedia processing, and other high-computation requirements.

**DSP Subsystem and Memory Components:** The DSP subsystem includes several memory components for efficient storage and data handling. A 32 KB L1 Program Cache and 32 KBL1 RAM ensure quick access to frequently used data, while the 256 KB L2 RAM provides storage for larger datasets. Additionally, a BOOT ROM is available to facilitate the processor's startup sequence.

**System Control Features:** Essential to managing the processor's operation, the SystemControl section includes a PLL/Clock Generator with Oscillator (OSC) to supply clock signals, a General-Purpose Timer, and an RTC/32-kHz Oscillator for precise timing

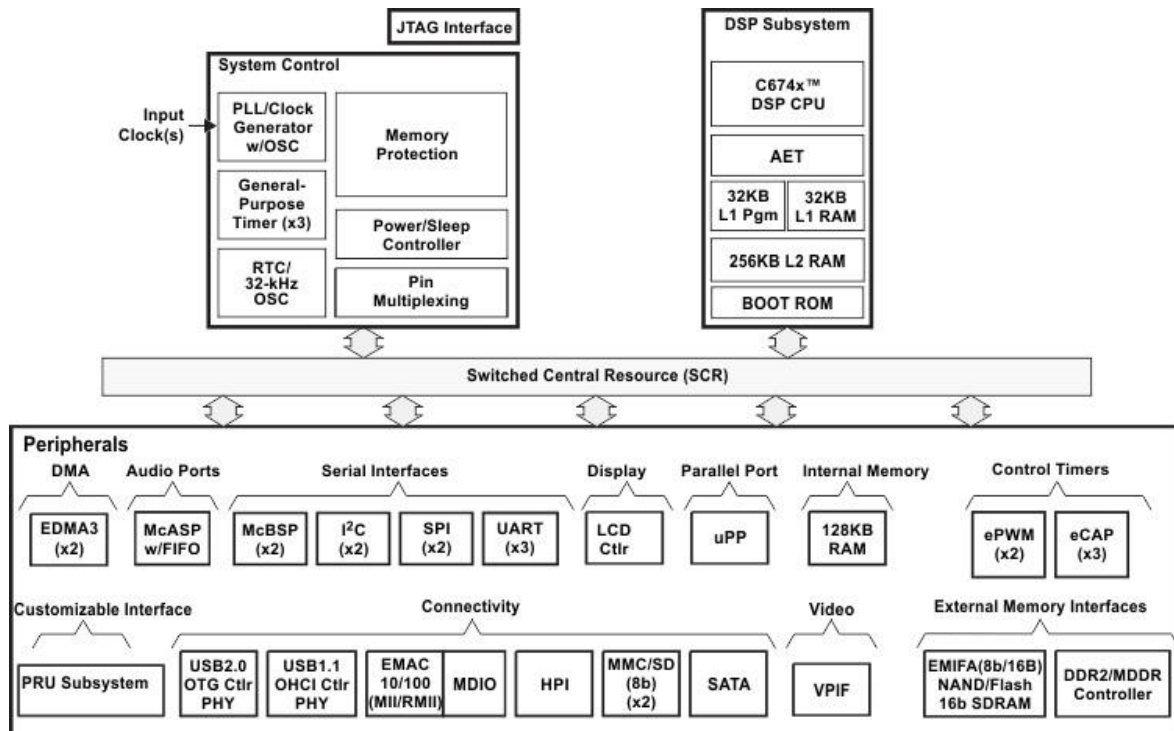
functions. This section also provides Memory Protection for secure data handling, aPower/Sleep Controller to optimize power consumption, and Pin Multiplexing for I/O configuration flexibility.

**Debugging and System Testing:** For system testing and troubleshooting, the TMS320C6748 includes a JTAG Interface. This interface supports connection to external debugging tools, allowing developers to perform in-depth analysis and testing.

**Switched Central Resource (SCR):** At the heart of data management, the SCR is a high-speed interconnect linking the DSP subsystem, system control, and various peripherals. The SCR efficiently manages data flow, facilitating smooth communication across the processor even when multiple subsystems are active.

**Peripherals and Interfaces:** The TMS320C6748 offers a versatile range of peripherals.

Direct Memory Access (DMA) through EDMA3 with two channels enables rapid data transfers without CPU involvement. Audio Ports, including McASP and McBSP, support audio data I/O, making the processor suitable for audio applications. Multiple Serial Interfaces (I2C, SPI, and UART) enable communication with devices like sensors and storage units, while the LCD Controller supports direct display interfacing. Additionally, the 128 K Internal RAM provides further data storage.



**PRU Subsystem for Real-Time Control:** The Programmable Real-time Unit (PRU) subsystem adds customization and flexibility, enabling the processor to handle specialized tasks in real-time.

**Connectivity Options:** For connectivity, the processor supports USB 2.0 OTG, USB 1.1, Ethernet (EMAC 10/100) for network connections, as well as MDIO and HPI interfaces. It also supports MMC/SD and SATA ports, enhancing its capability to interface with various storage devices.

**Video Port Interface (VPIF):** The VPIF feature makes the TMS320C6748 suitable for video applications by supporting video input and output functions.

**Control Timers:** The Control Timers section includes ePWM and eCAP timers, providing precise control over pulse-width modulation and capture events. These features are useful for motor control, sensor data acquisition, and other control-based applications.

**External Memory Interfaces:** To support additional memory, the processor includes interfaces for EMIFA (8b/16b), NAND/Flash 16b, and a DDR2/MDDR Controller, allowing the connection of external DRAM and flash memory for data-intensive applications.

### **Application**

The TMS320C6748 DSP processor is versatile, supporting applications across industries due to its powerful DSP core, real-time control, and connectivity options. It is ideal for audio processing in digital audio workstations and industrial automation tasks like motor control and robotics. In the medical field, it handles real-time bio-signal processing for imaging and monitoring, while in video and image processing, it's used for surveillance and computer vision. The processor also serves well in communication systems (e.g., modems and wireless networks), automotive ADAS, energy management, test and measurement equipment, and IoT applications, enabling smart devices and automation in home environments.

### **Result**

Studied and obtained a comprehensive overview of the TMS320C6748 DSP processor, highlighting its robust DSP CPU core, high-speed data handling through the Switched Central Resource (SCR), and its extensive set of peripherals and connectivity options.

