# TOSHIBA

# TC90407XBG Reference Modules

## Highlights

- ATSC digital TV modules to convert analog CRT and LCD TV to be ATSC compliant per the FCC mandate.

- Production-ready modules enable rapid adaptation into existing TV chassis.

- Field proven and mature ATSC software is provided.

- Protocol for interfacing to the TV micro is provided.

- Modules are compliance CE tested with Sarnoff streams and audio is Dolby certified

## Description

Toshiba has designed two application-specific modules based on the TC90407XBG digital TV SoC that can reduce design-to-production time:
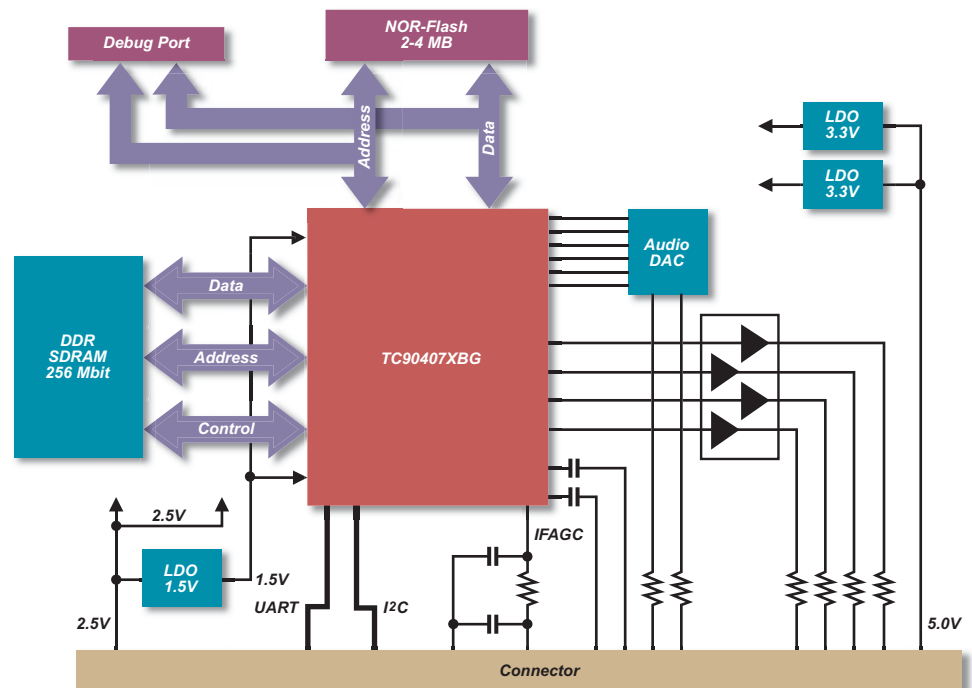
– DLVM-GC

– DLVM-GL

The DLVM-GC module is designed for digital CRT TV applications and the DLVM-GL module is designed for LCD TV applications. Both modules decode digital transmission content and provide analog or digital output to existing backend processors in TV systems that decode analog transmissions for display. The DLVM-GC module can be plugged into an existing analog CRT chassis or mother-board through a connector. Similarly, the DLVM-GL module can be plugged into an existing LCD TV backend processor system that decodes analog transmission for display.

## Features

Hardware Structure: The block diagram of the DLVM-GC module is based on the Toshiba TC90407XBG digital TV SoC. The digital tuner IF output is connected to the VSB demodulator input of the TC90407XBG chip on the module. The DLVM-GC can decode HD or SD stream and provide analog output in 480i format (CVBS, S-Video or Component Video) for digital CRT TV applications. It can also provide component analog output in 480p/720p/1080i format. This module generates analog stereo audio output and digital audio output (SPDIF). The DLVM-GC module design can also be used for digital converter box applications.
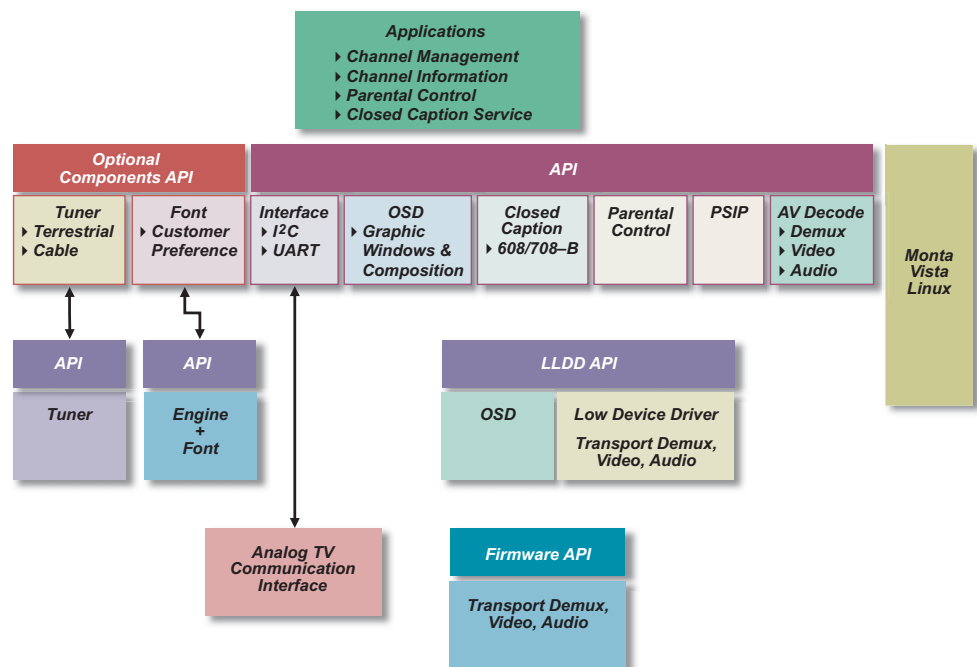
### TC90407XBG/FG Block Diagram

The DLVM-GL module is very similar to the DLVM-GC module, and in addition to the above functionality, it provides 8/16-bit digital video output to interface to a LCD TV chip that accepts digital video. It also provides 1 channel of I$^2$S digital output.

Software Structure: These modules use a software stack as shown in the diagram below. The firmware and device drivers are ported for a Linux® operating system.

Toshiba's industry-proven ATSC middleware, driver and application adaptation layer software along with sample application code are available for quick product deployment. The software stack can upgrade an existing NTSC LCD/CRT TV chassis to be ATSC compliant. The interface between analog TV and an ATSC module, over a UART or I$^2$C bus, can be easily customized by the system integrator or ODM. The Software Kit also comes with complete documentation of the API and sample code for easy integration with an analog TV chassis. The Software Kit comes with a font engine and fonts, which can be replaced by the user if different fonts are required. Similarly, the tuner driver can also be replaced for a different tuner. The software has gone through extensive qualification including Dolby certification and is Sarnoff compliant.

## Software Structure for an ATSC Digital TV Application

## TOSHIBA
**TOSHIBA AMERICA ELECTRONICS COMPONENTS, INC.**

## TC90407XBG Reference Modules