

# TOSHIBA

**Complete system solution for  
hands-free Telematic systems**

## **Hands-free Telematics**

 **Bluetooth™**





## Bluetooth Solution

As a founding member of the Bluetooth™ Special Interest Group, Toshiba is deeply committed to making Bluetooth connectivity a reality. Our adaptive business model delivers everything you need for today's products and tomorrow's designs by providing a secure set path of modules, ASSPs and software.



### Bluetooth Baseband TC356510

The Complete Model (using Toshiba Baseband IC TC356510) is optimised for total system solutions. Toshiba provides chip and prequalified lower layer, upper layer and application profile firmware. The firmware is stored in the external Flash and executed by the internal ARM7 RISC processor. The Interface between Baseband and user application is hooked via UART to the embedded Application Profile Interface (API) linking to profiles such as SPP, DUN, FAX, OPP, FTP, HID, PAN, BIP, HCRP, HSP, HFP, PAP, SIMA, A2DP/AVRCP. The complete model minimises the cost and T-t-M for development, evaluation and qualification dramatically. Alternatively this device may be run in HCI-H4 standard mode as well. The SD I/F embeds full SDAV1.0 compliant Flash Data access. The 7-line digital (BlueRF-compliant) Radio Transceiver Interface allows easy connectivity to TB31296 RF-IC or those of various other vendors. Automotive quality level is specified.

### Complete Model / TC356510

- 32-bit ARM™ Processor Core / 13/26MHz
- UART Host Interface /max. 921.6kbps
- PCM (A-law/u-law/linear&CVSD) and SD I/O
- LP 1.5V core design & sniff/park/hold/sleep modes
- Built-In Data Buffer RAM /96kB
- External Flash Memory Interface /max.8Mb
- Pure digital Radio Modem Interface /BlueRF1
- FPGA113(8x8x0.8/1.2) & LQFP100(14x14x2,7)
- -20/80 & -40/85 °C operating temperature range
- Fully compliant to BT V1.1 and BT 1.2(\*)

### Bluetooth Baseband TC35651

The HCI model (Bluetooth Baseband TC35651) supports a Host Control Interface (via UART/USB) to connect to the user application. The UART/USB interface allows an easy integration to computing and peripheral applications. The pure digital (BlueRF-compliant) Radio Modem Interface allows easy connectivity to TSB RF Modem IC T(TB31296) or those of other vendors.

### HCI Model / TC35651

- 32-bit ARM™ processor core /13MHz
- USB Host Control Interface /USB 1.1
- UART Host Control Interface /max. 921.6kbps
- PCM Codec Interface with A-law, u-law, linear&CVSD
- 1.5V core design & sniff/park/hold/sleep modes
- Built-In Data Buffer RAM /64kB
- External Flash Memory Interface /max. 2Mb
- Pure digital Radio Modem Interface /BlueRF1
- FBGA113(8x8x1.2)

### Bluetooth Radio TB31296

The TB31296 is Toshiba's high sensitivity, low current consumption and small package size Bluetooth Radio Transceiver IC. It requires a minimum of additional passive components and offers a real cost optimised automotive quality solution.

### RF-Transceiver / TB31296

- Digital 7-line Radio Modem Interface /BlueRF1
- Low current consumption
- High sensitivity -83dBm
- Fully integrated LNA, MIX, BPF, MultiCLock PLL
- Serial control I/F
- Programmable PA for class 2 + RSSI
- FBGA48 package (5x5x1.2)
- Fully compliant to BT V1.1 and BT 1.2(\*)

### Bluetooth™ Single Chip TC35654

The Bluetooth single chip TC35654 is Toshiba's highly integrated pure CMOS Bluetooth solution. The device is a single chip offering the functionality of the TC356510 Bluetooth Baseband and the TB31296 Bluetooth Radio Modem. A high speed HCI-H4 compliant UART builds the interface between the Bluetooth single chip and the user's host CPU. The very high integration level of the single chip solution is tuned for size sensitive applications such as wireless terminals with minimised BOM.

### Single Chip / TC35654

- 32-bit ARM™ processor core / 13 MHz
- UART Host Control Interface (HCI-H4)
- Master/Slave PCM I/F (A-law/u-law/linear&CVSD)
- 1.5V core design & sniff/park/hold/sleep modes
- 2.5V RF design
- Built-In Data Buffer RAM/48kB
- Internal Mask ROM (optional)
- External Flash Memory Interface/4Mbit
- JTAG I/F for FW update
- EEPROM I/F
- High sensitivity <-80dBm
- On-chip LNA, MIX, VCO, PLL, IF filter
- Multi Input BT Clock (10-40MHz)
- 32KHz sleep mode clock
- Power Amp. for Class 2/3 output power
- RSSI & PA control function
- PFLGA 113(7x7x0.8)
- Fully compliant to BT 1.2(\*)

*(Bluetooth is a Trade Mark owned by the Bluetooth SIG, inc.)  
(\*: full BT V1.2 version after SIG spec. release)*

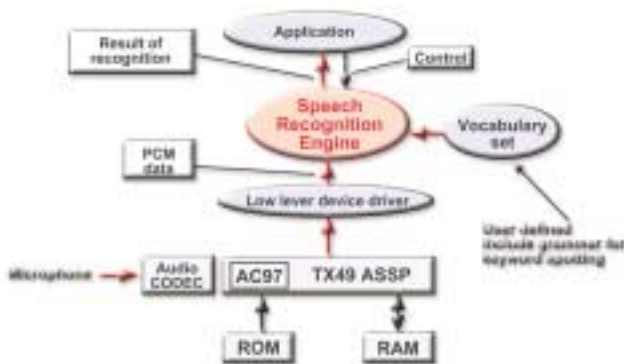
## Speech Technology

Toshiba developed Automatic Speech Recognition (ASR) and Text-to-Speech Synthesis (TTS) systems for automotive applications. The systems are realised as middleware running with small memory and computational cost on Toshiba's TX-RISC processors.

### Key Features

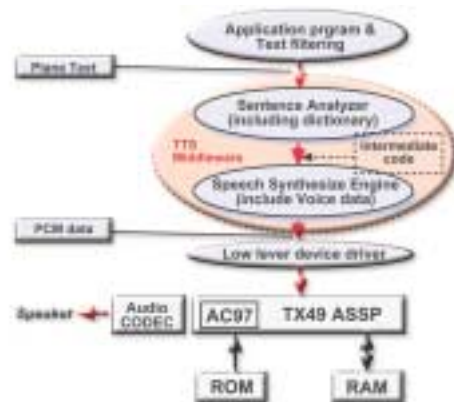
- Minimum components count  
One processor for speech and system control

### Speech Recognition



- High flexibility  
Easy change of language
- Multilingual  
Language independent speech recognition engine libraries for: UK & US English, French, German, Italian, Spanish, Dutch, Chinese, Japanese.  
(More languages are under development)
- Speaker independent

### Text-to-Speech Synthesis



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