

# REWIRE

YOUR WIRELESS THINKING

Join the forward thinkers who rely on Toshiba for wireless connectivity ICs.



**TOSHIBA**  
Leading Innovation >>>

## Toshiba is Connectivity-Focused

Wireless technology – commonly based on invisible radio waves that provide secure, reliable and fast connectivity – is everywhere you look. From Wi-Fi® and Bluetooth® to transformative TransferJet™, wireless charging and Near Field Communication (NFC), these connectivity technologies are enabling a fast flow of new consumer and industrial wireless products.

As one of the world's leading suppliers of semiconductor products, Toshiba offers wireless connectivity solutions for most applications, ensuring that its products are compliant with important global standards. These ICs feature multiple technologies and enable high-speed, low power and flexible media sharing, HD video streaming, and data transfer between mobile and stationary devices. Toshiba is seeing rapid adoption in a range of point-to-point connections to the Internet of Things (IoT) and to the Internet of Everything (IoE). With wireless sensor networks on the rise, Toshiba wireless ICs are driving connectivity more than ever. Is it time to rethink your wireless design strategy?

- ▶ WIRELESS POWER CHARGING
- ▶ BLUETOOTH®
- ▶ NEAR FIELD COMMUNICATION
- ▶ TRANSFERJET™
- ▶ WI-FI®



### Hundreds of millions of ICs sold

Toshiba offers wireless connectivity solutions for many applications, across all primary standards and technologies. These ICs enable high-speed, low-power media sharing, HD video streaming, data transfer between mobile and stationary devices, and easy Internet connectivity. Hundreds of millions of Toshiba wireless ICs are in use.

### Designing a wireless product?

Are you designing for smartphones, tablets, NFC readers/writers, wearables, cameras, automotive applications, handheld medical products, contactless transactions, home appliance with wireless functions, or other industrial applications? Join the forward thinkers who rely on Toshiba for wireless connectivity ICs.

### Transfer Technology Considerations

TECHNOLOGY CONSIDERATION	Bluetooth® Classic/Low Energy	Wi-Fi® 802.11	TransferJet™	Near Field Communication
Transmission Distance	mid-range 10 m typ. (Class 2)	mid-range 6-30 m	close proximity a few cm	proximity 3-12 cm typ.
Transfer Rate	low- to mid-speed 732-3000 Kbps	very high speed up to 600 Mbps	very high speed 560* Mbps	low speed 424-847 Kbps
Data Transfer Volume	low- to mid-volume	high volume	high volume	small volume
Power Consumption	very low 6-30 mW	high typ. 600 mW	low 100-200 mW	low 30 mW
Connection Setup Time	BT Classic: 30-120 msec BT LE: 2.5 msec	up to 10 sec.	0.1 sec.	0.1 sec.
Security	secure	very secure	secure due to proximity	very secure due to embedded security element
Ease of Use	simple	complicated	very simple: touch and get	simple
Network Applicability	applicable	applicable	peer to peer	peer to peer

\*375 Mbps effective data transfer rate

## WIRELESS POWER SOLUTION

01



### HIGHLIGHTS

- 0.13µm mixed signal semiconductor process
- Excellent power and thermal performance
- Ultra-compact ICs
- WPC Qi standard compliant

### Up to 15-Watt power transfer for mobile devices with high-power density batteries

Toshiba wireless power solutions enable wireless mobile device charging without the use of a cable. The devices effectively manage up to 15-Watt power transfer necessary for wireless charging of smartphones, tablets, or mobile devices.

#### Receiver ICs

- **TC7766WBG** – 15W wireless power receiver IC
  - WPC Qi standard mid-power V1.2 specification
  - Combines modulation and control circuitry with a rectifier power pick-up, I2C interface and circuit protection
  - Ultra compact WCSP-28 2.4mm x 3.67mm x 0.5mm package
- **TC7763/64WBG** – 5W/1-5W wireless power receiver IC
  - WPC Qi standard low-power V1.1 specification
  - Ultra compact WCSP-28 2.4mm x 3.67mm x 0.5mm package

#### Transmitter ICs

- **TC7718FTG** – 15W wireless power transmitter IC
  - WPC Qi standard mid-power V1.2 specification
  - User preferred host or Toshiba MCU for implementing Qi protocol function
  - Compact QFN36 5mm x 5mm package
- **TB6865AFG** – 5W to 15W multi-coil capable wireless power transmitter IC
  - WPC Qi standard low-power V1.1 specification for single Rx device 5W operation
  - Supports 2 coils for two Rx devices 5W operation
  - Also supports 3-coil free positioning for single Rx device 15W operation
  - QFN100 14mm x 14mm package

## BLUETOOTH®

02



### HIGHLIGHTS

- Multiple profiles - embedded, standalone, host-based
- One chip - single and dual mode
- Full customization
- High-quality, cost-effective
- Low energy (LE)

### Single chip supports dual-mode and Bluetooth Low Energy (LE)

Toshiba Bluetooth solutions are perfectly suitable for sharing small amounts of data and digital/audio between mobile devices. Toshiba offers a true, one-chip integrated solution for both single and dual mode that supports a variety of Bluetooth features including Bluetooth Low Energy (BLE), effectively reducing costs associated with incorporating two wireless technologies. Multiple FCC/IC-certified module options for ICs from Toshiba partners.

- **TC35667/TC35676** – low power IC for Bluetooth smart devices
  - Adopts Bluetooth Core Specification v4.1 enabling use with scatternet<sup>1</sup> devices for the IoT
  - Integrates a DC-DC converter
  - Reduces consumption for peak current to below 6mA and deep sleep to below 100nA
  - Promotes small cell battery longevity and facilitates adoption of Bluetooth LE for small devices, such as wearable healthcare sensors and toys
  - Integrates an ARM® processor with mask-ROM and 192K flash options enabling download and execution of custom programs
- **TC35661** – dual-mode Bluetooth controller IC
  - Dual Mode core for legacy and new Bluetooth standards
  - Optional embedded on-chip Bluetooth stack and profile(s)
  - Reference circuit and schematic available with BOM for speedier board development
  - Minimal number of external components
  - Multiple IO options
  - On-chip voltage controller & low-power modes
- **TC35670** – Bluetooth Low Energy and NFC tag combo chip
  - Supports NFC pairing for easy Bluetooth connection setup
  - Wakeup from nearly zero current standby state
  - Innovative digitally-rich RF architecture for low current consumption
  - Over the air (OTA) update of system software
  - Mask-ROM and 192KB flash options available

## NEAR FIELD COMMUNICATION

03



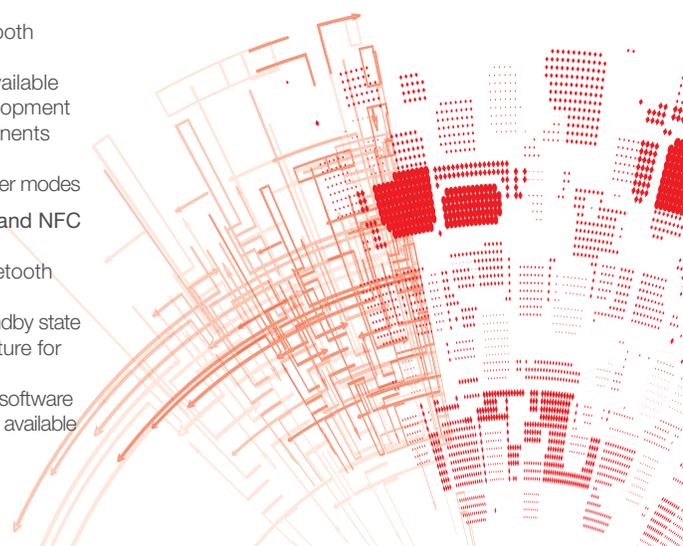
### HIGHLIGHTS

- High security
- Quick pairing
- Low power
- Controller SiP options with SE
- Wide resonance frequency range

### Short range, highly secure data transfer with no set up required

Toshiba Near Field Communication (NFC) solutions are designed to facilitate data transfer with very short-range, highly secure communication. The Toshiba NFC controller chip enables small amounts of data to be shared confidentially between two electronic devices and supports multiple connections with 3 Secure Elements. Cashless payment, access management, point-of-sale, ticketing – this technology enables seamless interaction with the mobile user.

- **T6NE2XBG** – NFC controller LSI
  - Multiple current connections with 3 Secure Elements (SE)
  - Integrates an adjustment circuit and records each parameter into embedded EEPROM
  - Offers multiple RF modulation options (Type A, B and F)
- **T6NE7** – NFC tag LSI
  - NFC Forum Type 3 tag
  - Integrates 2 KB of non-volatile memory
  - Automatic detection of 212/424 Kbps transfer speeds
  - Supports 3 modes - wireless, wired and tunnel/through modes



TRANSFERJET™

04



HIGHLIGHTS

- Fast 375 Mbps (5X faster than Wi-Fi) effective data transfer rate
- Safe and secure
- Easy to add to smartphones, tablets and laptops
- Integrated on industry-leading reference SoC platforms
- Low power
- Supports both Android™ and iOS®
- Available open-source reference software and mobile apps

Fast touch-transfer file sharing with market's smallest<sup>2</sup> chip

Toshiba TransferJet™ IC modules and accessories enable high-speed communication between two devices positioned next to each other. This wireless technology allows large volumes of data, media or video to be shared securely and quickly. There is no need for complex setup, device pairing or the use of access points. Simply touching together two TransferJet-enabled devices can transfer large files.

- **TJM35420XLQ** – TransferJet module for highly optimized embedded design
  - High-integration module contains the TC35420XLQ transceiver IC, RF components and crystal oscillator
  - Super small size (4.8 x 4.8 x 1.0 mm) for portable designs
  - Software development kit also available
- **TransferJet Accessories** – Toshiba offers a range of SDIO cards and USB adapters that allow any Android or iOS-based product to easily become TransferJet-enabled by simply plugging in the device into your tablet, smartphone or laptop computer. Simple drivers need to be downloaded. Two devices must be TransferJet-enabled to quickly and easily transfer large files between the devices.

WI-FI®

05



HIGHLIGHTS

- High performance
- Low power
- Novel coexistence algorithms for BT/Wi-Fi contention resolution

Wireless LAN chips transmitting long distances with high speed

Toshiba Wi-Fi solutions can handle high-speed, high-volume data transfer between every imaginable variety of devices. The wireless local-area solution operates reliably over long transmitting distances.

- **TC35662XBG** – Combo chip supporting Wi-Fi, Bluetooth classic and Low Energy
  - 802.11a/b/g/n compliant
  - 32-bit CPU supporting maximum 150Mbps throughput
  - Reference software stack for Linux® and Android platforms
  - Standalone solution with no Host MCU is possible using external serial flash

Toshiba plans to offer integrated devices that feature multiple types of connectivity including Bluetooth, NFC and Wi-Fi. Additionally, Toshiba partners can offer FCC-certified TC35662 based modules for standalone (no Host processor) and Hosted modes.

MEDICAL

VEHICLE

MOBILE

OFFICE

INDUSTRIAL

PUBLIC

HOME

<sup>1</sup>Scatternet is a group of independent and non-synchronized piconets that share at least one common Bluetooth device. <sup>2</sup>Smallest as of 1/15/2015. Wi-Fi is a registered trademark of the Wi-Fi Alliance. Bluetooth is a trademark of the Bluetooth SIG and is used under license by Toshiba. TransferJet is a trademark of the TransferJet Consortium. iOS is a trademark of Apple Inc. Android is a trademark of Google Inc. Qi is a trademark of the Wireless Power Consortium. ARM is a trademark of ARM Ltd. Linux is a trademark of Linus Torvalds in the U.S. and other countries. © 2016 Toshiba America Electronic Components, Inc. All rights reserved. V1.2 4/5/16

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2595 Junction Avenue, San Jose, CA 95134  
toshiba.semicon-storage.com/us