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Close Proximity Wireless Transfer Technology TransferJet™-Compliant Products



SEMICONDUCTOR & STORAGE PRODUCTS

<http://toshiba.semicon-storage.com/>

Features and Applications of the TransferJet™ Close Proximity Wireless Transfer Technology

What is “TransferJet™”?

TransferJet™ is a close proximity wireless transfer technology featuring simple operation, safe communication and efficient transfer of data.

Features

Simple Operation

● Just touching two devices

Intuitive operation: two devices are brought close together so that files are transferred automatically. No need for complex setup, device pairing or the use of access points. Data transfer can take place between mobile phones and stationary PCs, as well as between two mobile/handheld devices.

* Some devices need dedicated software.

Safe Connection

● A short transmission distance means users can specify and restrict which other devices can be connected

Short transmission distance minimizes leakage of data, without the need for difficult security measures or setup procedures.

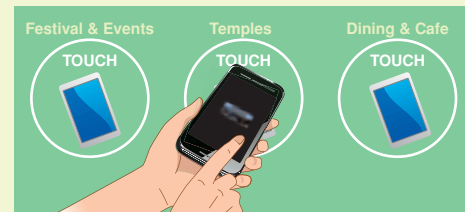
Users can register their electronic products to enable TransferJet™ to recognize and connect to specific devices only, minimizing the risk of unintended unauthorized access.

Efficient Transfer

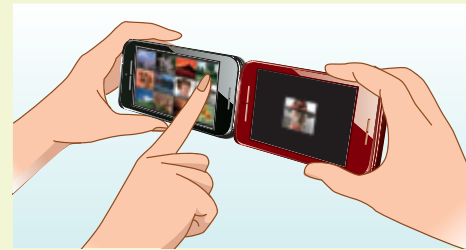
● Stable transfer

Physical layer transmission rate is 560 Mbps, maximum data throughput is 375 Mbps. Capable of adjusting the appropriate data transmission rate according to the quality of the wireless medium. Even if conditions deteriorate, TransferJet™ can maintain the highest possible wireless link by automatically adjusting the data transmission rate. As TransferJet™ is a close proximity wireless system that radiates very low-power radio waves, it causes virtually no interference to other wireless systems, and there is no impact on performance (no interference) even if multiple users simultaneously use TransferJet™ in nearby areas.

* The maximum transfer rate is not always guaranteed since transfer rates vary, depending on the devices used and the size of files transferred.



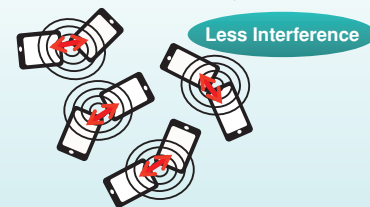
■ Create digital signage and digital kiosks



■ Photo exchange between two smartphones

Smooth Transfer

Transmission Rate: 560Mbps (max)
Effective Transmission Rate: 375Mbps (max)



TransferJet™ Specifications

Center Frequency	4.48 GHz
Transmission Power	Below -70 dBm/MHz (average) Corresponds to low-intensity radio wave regulation in Japan, and with local regulations in other countries and regions.
Transmission Rate	560 Mbps (max)/375 Mbps (effective throughput) System can adjust the transmission rate depending on the wireless environment.
Connection Distance	A few centimeters
Topology	1-to-1 (point-to-point)
Antenna Element	Electric induction field coupler

● International Standardization of TransferJet™

Since 2010, the TransferJet™ Consortium has been collaborating with Ecma International on international (ISO/IEC) standardization of the TransferJet™ PHY-CNL specification. In February 2011, the standardization work was completed by Ecma, and the TransferJet™ PHY-CNL specifications were published as ECMA-398 and ECMA-399 in June. The standard specifications were officially released on September 24, 2012 as ISO/IEC 17568 and ISO/IEC 17569.

TransferJet * “TransferJet” and “TransferJet” logos are licensed by the TransferJet Consortium.

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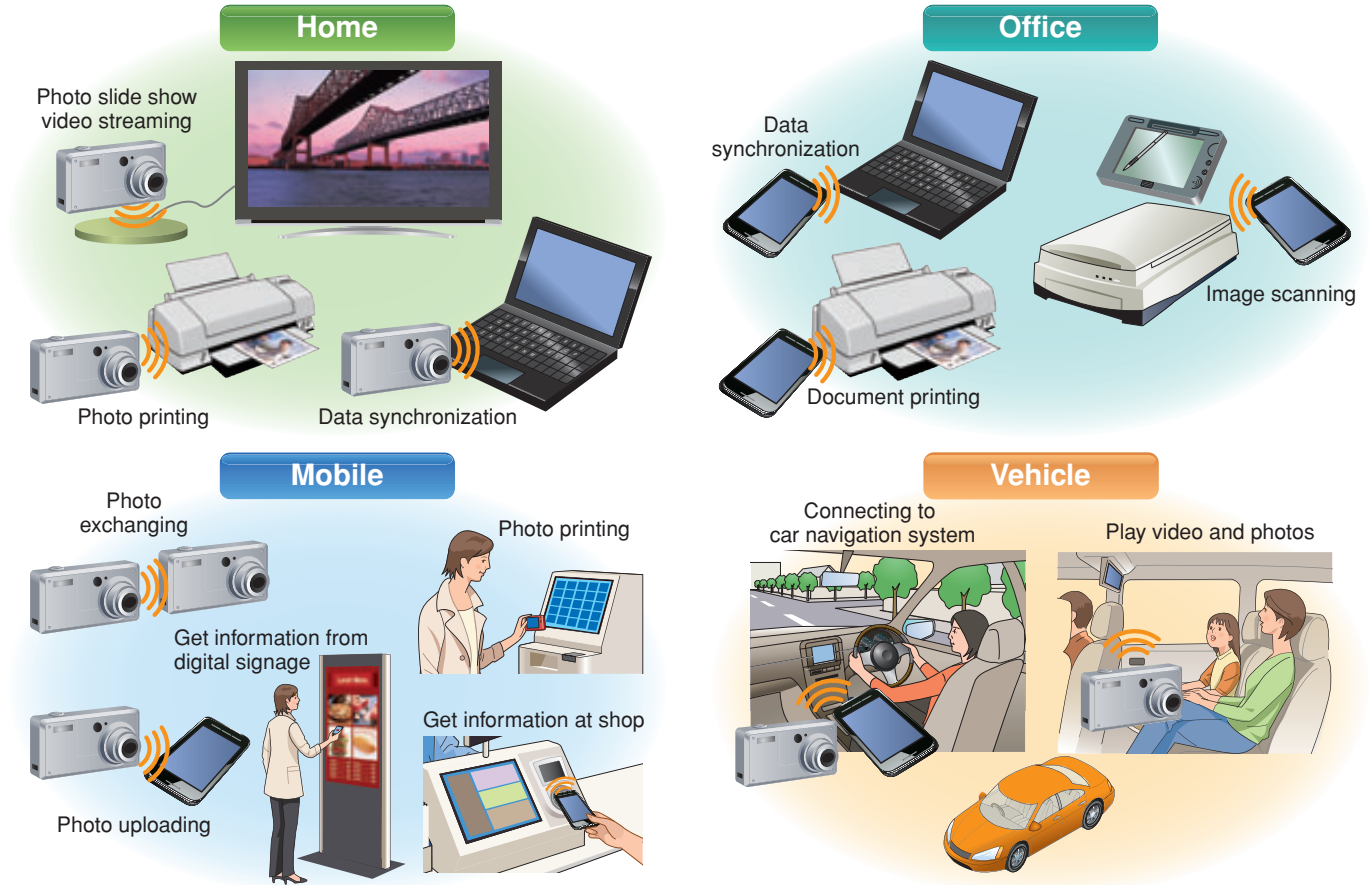
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Applications and Usage Situations

TransferJet™ is simple and fast; so it is finding increasingly widespread use in various applications such as home, office, mobile and automotive appliances.



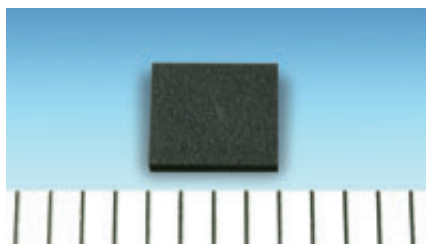
● Toshiba TransferJet™ Products and Applications

Toshiba's TransferJet™ products are widely used to provide wireless connection between various digital appliances and devices.



TransferJet™-Compliant Products

TransferJet™-Compliant Wireless IC: TC35420AXLG



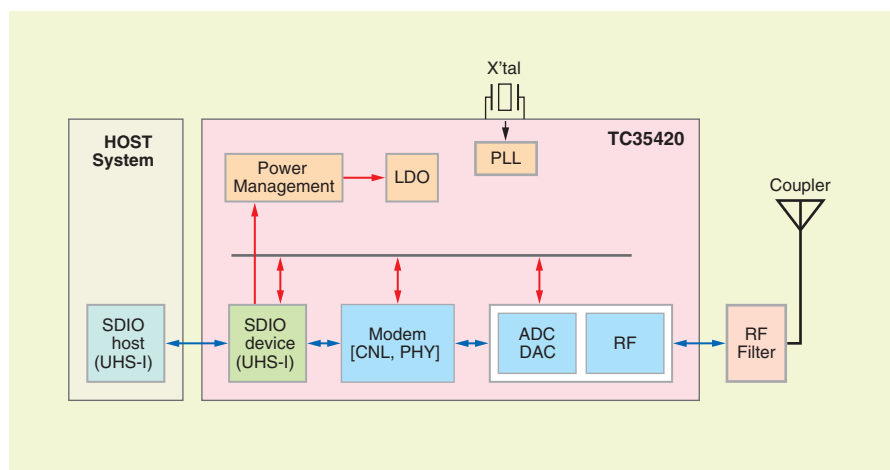
TC35420AXLG is a wireless IC product that supports the TransferJet™ standard for close proximity wireless transfer technology. The TransferJet Consortium has defined the standard for this technology.

This IC implements TransferJet™ functions with wireless, Digital-signal-processing and Host-Interface functions in a single chip using RF-CMOS process.

Key Features

- One-chip solution
Wireless, Digital signal-processing are implemented into monolithic
- RF-CMOS process
Built-in RF switch and LNA (Low-Noise Amplifier)
- Very High-Speed Host Interface
- SDIO UHS-I support
- Low power consumption
Power reduction architecture supporting low-leak cell
- Power supply
3.3 V/1.8 V or 1.8 V single power supply
- Small package
LGA81
4.0 mm x 4.0 mm x 0.75 mm (max)

System Block Diagram



Characteristics Examples

The TC35420AXLG, a TransferJet™-compliant wireless IC, is offered in a small package to help realize various electronic devices with TransferJet™ capability. Figure 1 shows transmission characteristics indicating its outstanding band characteristics. Additionally, Toshiba's original wireless technology provides excellent receiver sensitivity. Figure 2 shows throughput characteristics. Figure 3 shows the throughput-versus-distance performance.

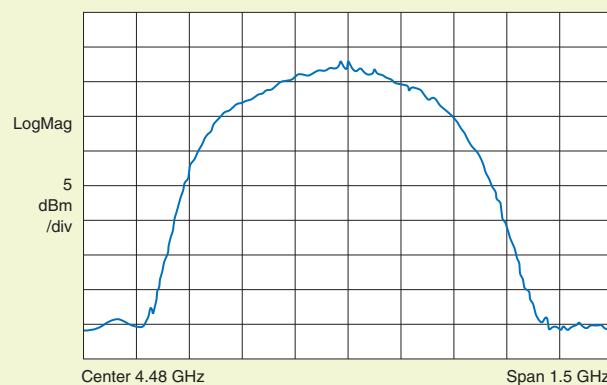


Figure 1 Transmission Characteristics

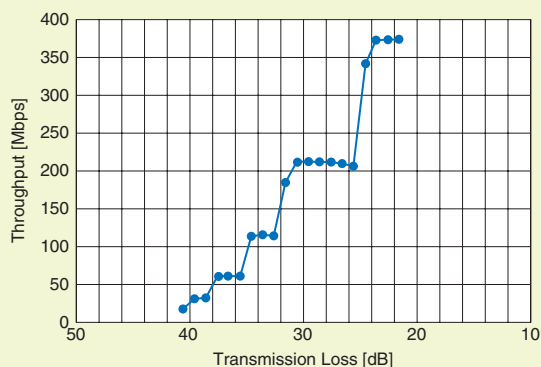


Figure 2 Throughput characteristics

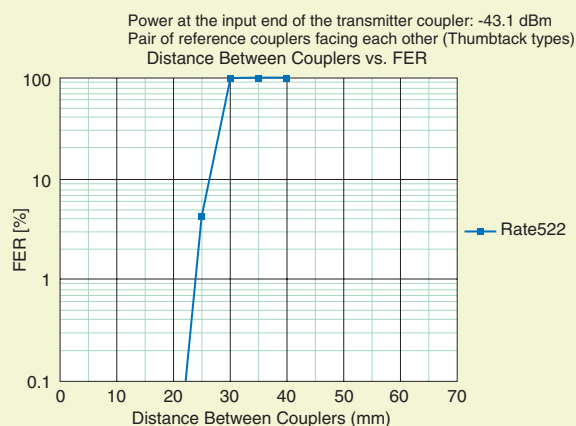
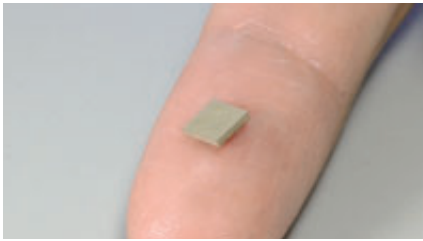


Figure 3 Throughput Versus Distance

TransferJet™-Compliant Wireless Module: TJM35420XLQ



To address the needs of the rapidly growing market for proximity wireless applications, Toshiba has developed a small TransferJet™ SDIO module. The smallest possible components are required for space-critical mobile devices such as smartphones. The small TransferJet™ SDIO module, which embodies Toshiba's radio-frequency (RF) design and hybrid integration technologies, helps save board space. The TJM35420XLQ module contains RF components and a crystal oscillator to simplify the designing of TransferJet™ applications.

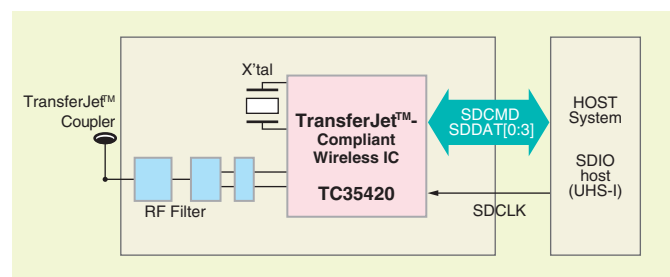
● Applications

Electronic devices such as smartphones, tablets, digital cameras and notebook PCs

● Key Features

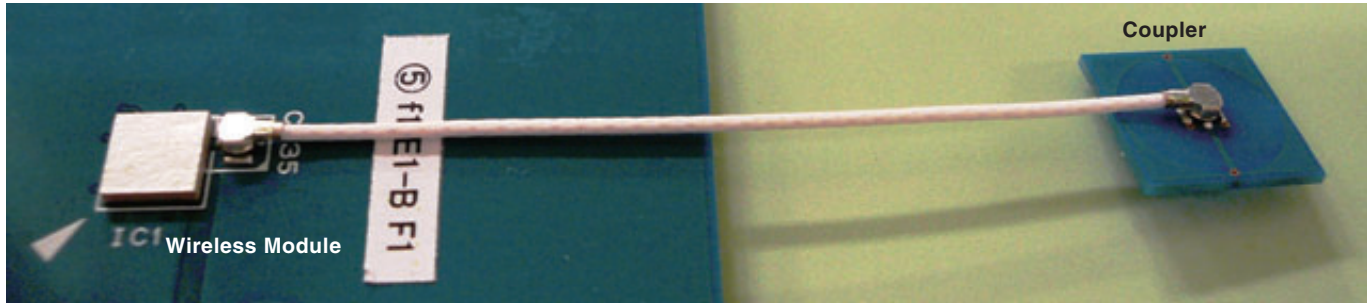
- Package: LGA
- Incorporates the TC35420, a TransferJet™-compliant wireless IC
- Built-in RF components
- Built-in X'tal
- Host interface: SDIO UHS-I support
- TransferJet™-compliant
- Power supply
 - 3.3 V/1.8 V or 1.8 V single power supply
- Outline dimensions: 4.8 mm × 4.8 mm × 1.0 mm (max)

● Wireless Module and System Block Diagram



● Wireless Module Implementation Example

The wireless module mounted on a motherboard is connected to a coupler via a cable.



TransferJet™-Compliant microSDIO Card: TJM35420USQ



To address the needs of the rapidly growing market for proximity wireless applications, Toshiba has developed a TransferJet™ microSDIO card. For high-speed wireless data transfer, a TransferJet™ card if an electronic device has a microSD slot and dedicated application software installed on it. The TJM35420USQ integrates a coupler, RF components and a X'tal and facilitates the use of a TransferJet™ capability.

* This product is for evaluation purposes only. For volume production, contact your Toshiba sales representative.

● Key Features

- Incorporates the TC35420, a TransferJet™-compliant IC
- Built-in RF components
- Built-in X'tal
- Built-in TransferJet™ coupler
- Host interface: SDIO UHS-I support
- TransferJet™-compliant
- Outline dimensions: 11.0 mm × 16.0 mm × 0.7 mm (max)

TransferJet™-Compliant Products

TransferJet™ Adapter

TransferJet™ is a close proximity wireless transfer technology that allows you to transfer data just by choosing it on a mobile device and bringing the mobile device close to a peer device. The following are TransferJet™-compliant adapters that are capable of transferring photos, videos, applets and digital content at high speed.

USB Adapter for Windows® PCs: TJM35420AUX



TJM35420AUX

USB is a high-speed data communications standard widely used by PCs and many other devices. Dedicated application software enables them to use TransferJet™ wireless communications via USB connection.

● Key Features

- Incorporates the TC35420AXLG, a TransferJet™-compliant IC
- Built-in RF components
- Built-in RF filter
- Built-in X'tal
- Built-in TransferJet™ coupler
- USB 2.0-compliant
- TransferJet™-compliant
- Outline dimensions: 15.0 mm × 24.3 mm × 7.0 mm (typ.)

MicroUSB Adapter for Android™ Smartphones: TJM35420AMU



TJM35420AMU

The market for proximity wireless applications used for quick transfer of large data among smartphones and tablet PCs is growing rapidly. A MicroUSB adapter makes it possible to quickly transfer large data from one digital device to another.

● Key Features

- Incorporates the TC35420AXLG, a TransferJet™-compliant IC
- Built-in RF components
- Built-in RF filter
- Built-in X'tal
- Built-in TransferJet™ coupler
- USB 2.0-compliant
- TransferJet™-compliant
- Outline dimensions: 19.5 mm × 21.0 mm × 6.8 mm (typ.)

TransferJet™ Adapter for iPod, iPhone and iPad: TJM35420LT



TJM35420LT

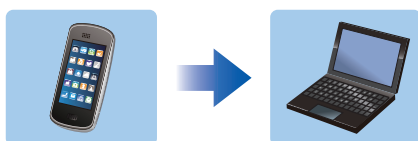
The TJM35420LT allows devices with a Lightning connector such as iPod, iPhone and iPad to use TransferJet™ wireless communications.

● Key Features

- Incorporates the TC35420AXLG, a TransferJet™-compliant IC
- Built-in RF components
- Built-in RF filter
- Built-in X'tal
- Built-in TransferJet™ coupler
- Lightning iAP2-compliant
- TransferJet™-compliant
- Outline dimensions: 24.1 mm × 23.1 mm × 6.1 mm (typ.)

This is where TransferJet™ comes in! Direct wireless transfer without using a memory stick

Without TransferJet™, it would be a tedious task to transfer data from a PC to a smartphone or vice versa because you would have to connect them together with a cable or use a USB memory stick. Now, TransferJet™ allows you to send data wirelessly.

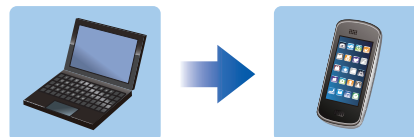


Submitting homework without printing

You may struggle to finish big homework assignments just before deadlines, with no time left to print them out. Now, TransferJet™ allows you to send your homework files directly to your teacher.

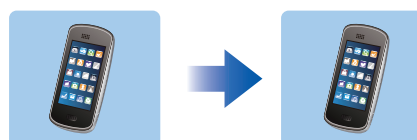
From a shared PC to a smartphone

At present, you may be copying materials you have used in classrooms from a school PC to your own home PC via a USB memory stick and then sending them to your smartphone. TransferJet™ will save all that trouble.



From a smartphone to a smartphone

TransferJet™ allows you to send all sorts of data such as text, pictures and video clips from one smartphone to another.



● The communication distance is up to roughly 3 cm. ● The receiving device must have a TransferJet™ device inserted (TransferJet™ USB adapter, TransferJet™ MicroUSB adapter, TransferJet™ adapter for iPhone/iPad/iPod) or must be a device with TransferJet™ functionality. ● Dedicated receive/transmit software is necessary.

TransferJet™ Product Lineup and Applications Software

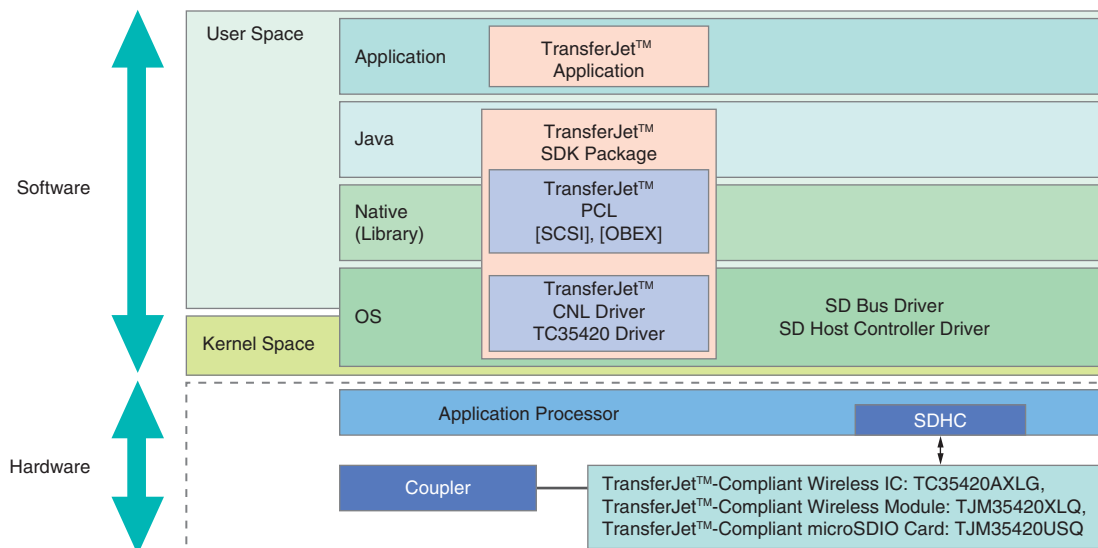
TransferJet™ - Compliant Product Lineup

Product Lineup

	ICs/Modules		Accessories			
	TC35420AXLG Wireless IC	TJM35420XLQ Wireless Module	TJM35420USQ microSDIO Card	TJM35420AUX USB Adapter	TJM35420AMU MicroUSB Adapter	TJM35420LT TransferJet™ Adapter
Built-in TC35420	—	✓	✓	✓	✓	✓
Built-in Coupler	—	—	✓	✓	✓	✓
Built-in X'tal	—	✓	✓	✓	✓	✓
Built-in RF Filter	—	✓	✓	✓	✓	✓
Host Interface	SDIO UHS-I support	SDIO UHS-I support	SDIO UHS-I support	USB 2.0	USB 2.0	Lightning iAP2

Software Development Kit (SDK)

Toshiba provides a TransferJet™ SDK. The SDK is available in Linux® and Android system. The SDK can be combined with customer-developed TransferJet™ applications.



Utility Software

Toshiba offers utility software for Windows®, Android and iOS that supports TransferJet™-compliant adapter and simplifies data transfer using TransferJet™.



* The screen and other characteristics are design subject to change without notice.

TransferJet™-integrated Products

Smartphones

FUJITSU Smartphone: **ARROWS NX F-04G**

● 2015 model: F-04G

Make everything smart and efficient.

The F-04G is the first smartphone with integrated TransferJet® functionality, which allows ultra-high-speed transfer of big size data.

ARROWS F-04G is the world's first smartphone to provide TransferJet, a close proximity wireless transfer technology, that allows users to exchange big size data, such as movies and pictures, just by bringing their smartphones close together.

TransferJet provides an easy means of sharing movies and pictures with your friends.

* Available only in Japan



*1 In the smartphone market as of April 7, 2015. FUJITSU survey.

FUJITSU Smartphone: **arrows NX F-02H**

● 2015 model: F-02H

Experience the everlasting beauty and wonder of instantaneous sharing of movies and pictures

TransferJet™

Iris Passport, iris authentication

* Available only in Japan



DTB Taking Out Solution

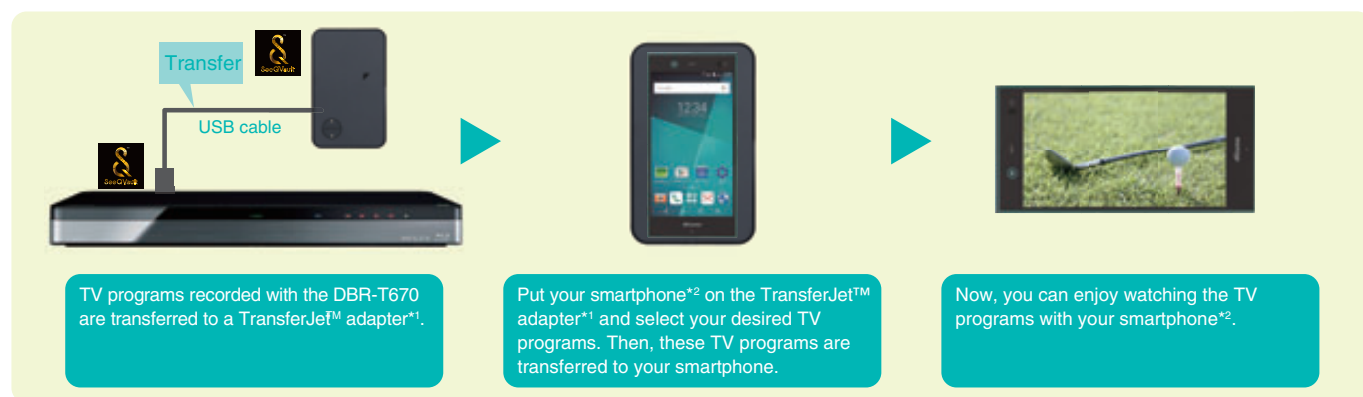
TOSHIBA REGZA Server: **DBR-T670**

Compatible with a SeeQVault™-Support TransferJet™ adapter*¹

The TOSHIBA DBR-T670 REGZA server allows the dedicated TransferJet™ adapter*¹ to transfer recorded TV programs to a smartphone easily. Once the transfer is completed, you can download desired TV programs simply by placing the TransferJet™-integrated smartphone*² on the TransferJet™ adapter and selecting them.



REGZA Server DBR-T670



*¹) Compatible with the following adapter: SeeQVault™-support TransferJet™ adapter BUFFALO INC. SeeQVault™-support TransferJet™ adapter BSCRTQ01/V

*²) Compatible with the following smartphone: FUJITSU F-02H

For details, see the websites of respective vendors.

* The smartphone compliant with SeeQVault™ and TransferJet™ is necessary. * A SeeQVault™-compliant microSD card must be inserted into a smartphone.

* In order to transfer TV programs from the TransferJet™ adapter*¹ to a smartphone and view them, SeeQVault Player TJPlus, a SeeQVault™-compliant video player app for Android™, is necessary.

BUFFALO SeeQVault™-Support TransferJet Adapter: **BSCRTQ01/V**

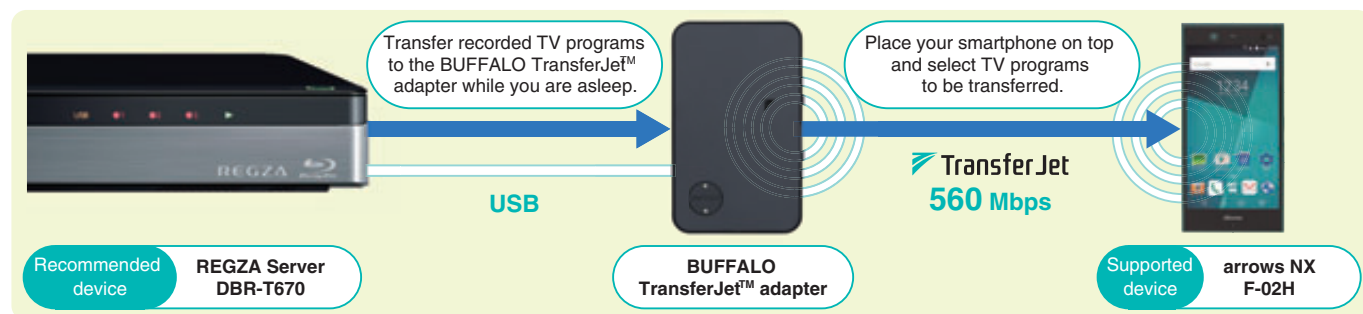
Just put your smartphone on top, select TV programs you want to transfer to it and bring out with you.

High-speed transfer of recorded TV programs to a smartphone

You only need to put your smartphone on top and select TV programs you want to transfer to it. You can transfer recorded TV programs without inserting an SD card or connecting a cable. Owing to a high transfer rate, TransferJet™ can complete the transmission of a one-hour TV program in roughly two minutes*.



SeeQVault™-Compliant
TransferJet™ Adapter:
BSCRTQ01/V



* Time required to transfer a one-hour TV program that has been converted to a format recommended by Buffalo for this purpose (2.4 Mbps).

This is the setting recommended by TOSHIBA REGZA server.

TransferJet™-integrated Products

TransferJet™ SDHC Memory Card

TOSHIBA SDHC Memory Card: **SD-TJA016G**

You can transfer movies and pictures just by bringing your camera close to a PC or a smartphone.

The SD-TJA016G is the world's first*¹ TransferJet™ SDHC memory card. This card allows you to easily transfer*³ high-resolution pictures and movies from a digital camera to a smartphone, tablet or Windows® PC just by bringing them close*² together.

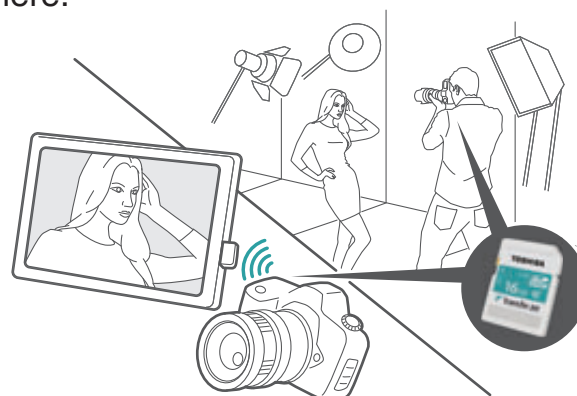


TransferJet™
SDHC Memory Card
CLASS 10
16GB

Just bring two devices close together!
TransferJet™ can be conveniently used anywhere.



For backup
From camera to Windows® PC



You can check out photos immediately after shooting them!
The TransferJet™ SDHC memory card is
ideal for professional use.
From a camera to a tablet or a Windows® PC



Share trip photos with your companions.
From a camera to a smartphone

SD cards are for sending only.

*¹ The SD-TJA016G is the world's first TransferJet™ SDHC memory card compliant with the SDA standards. (as of June 30, 2015)

*² The connection distance is up to approx. 3 cm. Bring the receiver (a device with a TransferJet™ adapter inserted or a device with an embedded TransferJet™ function) as close as possible to the camera's SD card slot.

*³ The transfer time depends on the file size and the connection distance.

Windows Mobile PC

TOSHIBA Windows 10 Mobile PC dynaPad N72

12-inch mobile PC that doubles as a Windows tablet

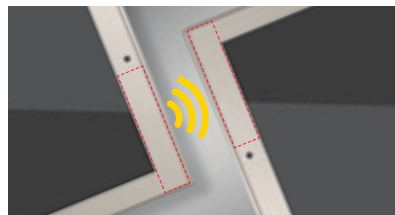
The dynaPad N72 incorporates the TransferJet™ close proximity wireless transfer technology that allows data to be transferred from one device to another simply by bringing them close together. TransferJet™ eliminates the need for USB memory since it allows exchange of data through close proximity wireless transfer.

* Available only in Japan

- You can exchange movies and pictures at high speed simply by bringing two devices close together*¹

The dynaPad N72 comes with TransferJet™. Other dynabook models can perform high-speed wireless transfer by using an optional TransferJet™ adapter.

* The maximum size per file to be transferred is 4 GB (1 GB = 1,024 × 1,024 × 1,024 bytes).



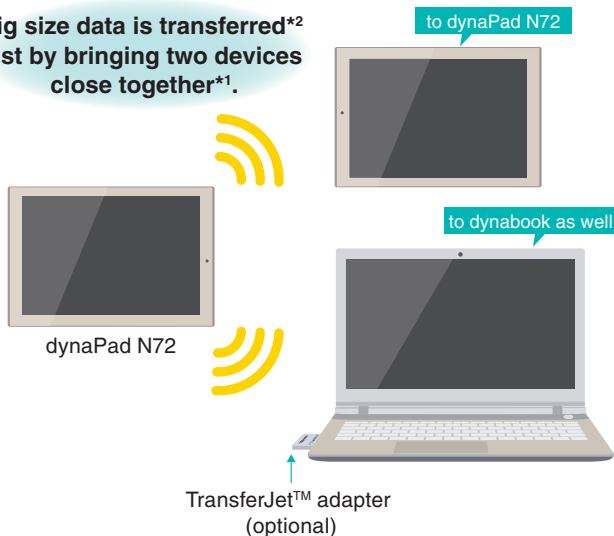
The dynaPad N72 comes with TransferJet™.



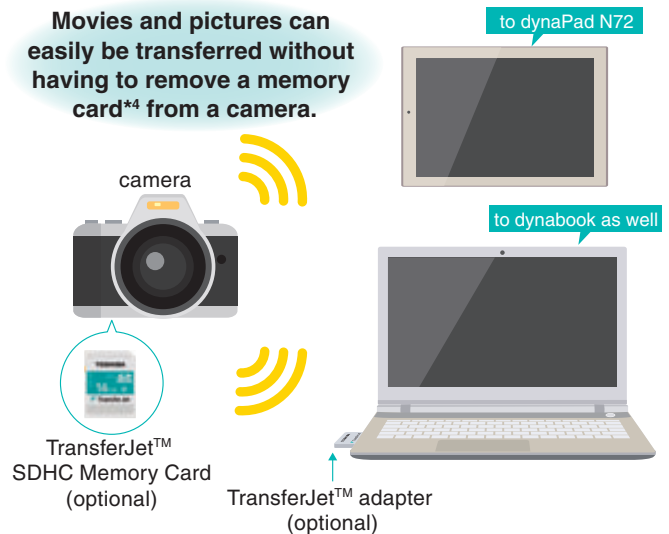
What can TransferJet™ do?

TransferJet™ allows you to transfer data by bringing two devices close together* even if no network environment is available.

Big size data is transferred*² just by bringing two devices close together*¹.

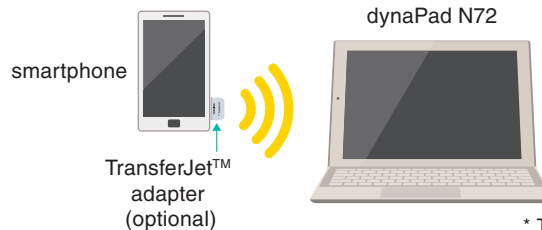


Movies and pictures can easily be transferred without having to remove a memory card*⁴ from a camera.



* The maximum size per file to be transferred is 4 GB (1 GB = 1,024 × 1,024 × 1,024 bytes). * The above images represent a concept. * TransferJet™ provides a point-to-point connection.

You can enjoy viewing movies and pictures taken with a smartphone on a large screen*².



* The above images represent a concept.

*¹ The connection distance is up to 3 cm. Bring two devices as close as possible to each other. *² Content-protected files may not be sent or received. On a Windows PC, the maximum number of files that can be selected with the Add button in the file selection dialog box is 100. If you want to send more than 100 files at a time, you can drag-and-drop them into the TransferJet™ file transfer dialog box. iOS allows exchange of video, image and contact information files with the following filename extensions: bmp, gif, jpeg, jpg, png, tiff, tif, m4v, mp4, mov, 3gp, vcf *³ Only those files that are stored in the DCIM folder in a memory card can be transferred. * The transfer rate of TransferJet™ depends on the positions and usage conditions of the two TransferJet™ devices.

Toshiba America**Electronic Components, Inc.**

- Irvine, Headquarters
Tel: (949)462-7700 Fax: (949)462-2200
- Buffalo Grove (Chicago)
Tel: (847)484-2400 Fax: (847)541-7287
- Duluth/Atlanta
Tel: (770)931-3363 Fax: (770)931-7602
- El Paso
Tel: (915)533-4242
- Marlborough
Tel: (508)481-0034 Fax: (508)481-8828
- Parsippany
Tel: (973)541-4715 Fax: (973)541-4716
- San Jose
Tel: (408)526-2400 Fax: (408)526-2410
- Wixom (Detroit)
Tel: (248)347-2607 Fax: (248)347-2602

TOSHIBA América do Sul Ltda.

Tel: (011)4083-7978

Toshiba India Private Ltd.

- New Delhi Office
Tel: (0124)499-6600 Fax: (0124)499-6611
- Bangalore Office
Tel: (080)251-90800 Fax: (080)490-91945

Toshiba Electronics Europe GmbH

- Düsseldorf Head Office
Tel: (0211)5296-0 Fax: (0211)5296-400
- France Branch
Tel: (1)47282181
- Italy Branch
Tel: (039)68701 Fax: (039)6870205
- Munich Office
Tel: (089)20302030 Fax: (089)203020310
- Spain Branch
Tel: (91)660-6798 Fax: (91)660-6799
- Sweden Branch
Tel: (08)704-0900 Fax: (08)80-8459
- U.K. Branch
Tel: (1932)841600

Toshiba Vietnam Consumer Products Co.,Ltd.

Tel: (043)776-5950 Fax: (043)776-5956

Toshiba Electronics Asia (Singapore) Pte. Ltd.

Tel: (6278)5252 Fax: (6271)5155

Toshiba Electronics Service (Thailand) Co., Ltd.

Tel: (02)835-3491 Fax: (02)835-3490

Toshiba Electronics Trading (Malaysia) Sdn. Bhd.

- Kuala Lumpur Head Office
Tel: (03)5631-6311 Fax: (03)5631-6307
- Penang Office
Tel: (04)226-8523 Fax: (04)226-8515

Toshiba Electronics (China) Co., Ltd.

- Shanghai Head Office
Tel: (021)6139-3888 Fax: (021)6190-8288
- Beijing Branch
Tel: (010)6590-8796 Fax: (010)6590-8791
- Chengdu Branch
Tel: (028)8675-1773 Fax: (028)8675-1065
- Hangzhou Office
Tel: (0571)8717-5004 Fax: (0571)8717-5013
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Tel: (025)8689-0070 Fax: (025)8689-0125
- Qingdao Branch
Tel: (532)8579-3328 Fax: (532)8579-3329
- Shenzhen Branch
Tel: (0755)3686-0880 Fax: (0755)3686-0816
- Dalian Branch
Tel: (0411)8368-6882 Fax: (0411)8369-0822
- Xiamen Branch
Tel: (0592)226-1398 Fax: (0592)226-1399
- Dongguan Branch
Tel: (0769)8155-6858 Fax: (0769)8155-6368

Toshiba Electronics Asia, Ltd.

Tel: 2375-6111 Fax: 2375-0969

Toshiba Electronics Korea Corporation

Tel: (02)3484-4334 Fax: (02)3484-4302

Toshiba Electronic Components Taiwan Corporation

Tel: (02)2508-9988 Fax: (02)2508-9999

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