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***Wireless LAN Module***

**IEEE802.11b/g/n**

**WYSAGVDX7**

Data Report

**WYSAGVDX7**

TAIYO YUDEN

**Document constituent list**

Control name	Control No.	Document Page
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Rev. records

21 May-2015&gt;Ver.1.0 Released

**WYSAGVDX7**

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Control No. HD-AG-A131284	(1/6)	Control name General Items
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**Scope**

This specification ("Specification") applies to the hybrid IC for use Wireless LAN module ("Product") manufacture by TAIYO YUDEN Co., Ltd. ("TAIYO YUDEN")

1. Part Number: WYSAGVDX7
2. Function: Radio frequency transfer Module. (**IEEE802.11bgn** standard conformity)
3. Application: DSC, DSLR, DVC, Game, Audio-visual equipment, Digital home electrical appliance
4. Structure : Hybrid IC loaded with silicon and Gallium arsenide monolithic semiconductor

Containment of hazardous substance in this Product

\*This product conforms to RoHS Directive.

5. Terminal : Data input-output : 15pin FPC Connector  
503566-1500 (MOLEX)
6. Appearance: Label on the bottom side
7. Country of origin : Japan
8. Notes :
  - a. Limitation of Warranty
    - i) TAIYO YUDEN provide warranties only if the Product is operated under the condition set forth in this Specification.  
Please note that TAIYO YUDEN shall not be liable for any defect and/or malfunction arising from use of the Product under the terms and conditions other than the operating conditions hereof. In addition when this Product is used under environmental conditions such as over voltage which are not guaranteed, it may be destroyed in short mode. To ensure the security of customer's product, please add an extra fuse or/and a protection circuit for over voltage.
    - ii) This Product is designed for use in products which comply with **IEEE802.11bgn** Specifications. TAIYO YUDEN disclaims and is not responsible for any liability concerning infringement by this Product under any intellectual property right owned by third party in case the customer uses this Product in any product which does not comply with **IEEE802.11bgn** Specifications (the "non-complying products"). Furthermore, TAIYO YUDEN warrants only that this Product complies with this Specification and does not grant any other warranty including warranty for application of the non-complying products.
    - iii) In some cases, TAIYO YUDEN may use replacements as component parts of Products. Such replacement shall apply only to component part of Products, which TAIYO YUDEN deems it possible to replace or substitute according to (i) Scope of Warranty provided in this specification (e.g. Electric Characteristics, Outline, dimension, Conditions of Use, Reliability Tests, Official Standard (Type Approvals etc.)) and (ii) Quality of Products. TAIYO YUDEN also ensures traceability of such replacement on production lot basis.

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Control No. HD-AG-A131284	(2/6)	Control name General Items
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## b. Instruction for Use (CAUTION)

i) Because Product is not designed for radiation durability, please refrain from exposing Product to radiation in the use.

ii) Communication between this Product and other might not be established nor maintained depending upon radio environment or operating condition of this Product and other products with wireless technology.

iii) This Product operates in the unlicensed ISM band at 2.4GHz. In case this Product is used around the other wireless devices which operate in same frequency band of this Product, there is a possibility that interference occurs between this Product and such other devices. If such interference occurs, please stop the operation of other devices or relocate this Product before using this Product or do not use this Product around the other wireless devices.

iv) This Product mentioned in this Specification is manufactured for use in consumer products. Before using this product in any special equipment (such as medical equipment, space equipment, air craft, disaster prevention equipment), where higher safety and reliability are duly required, the applicability suitability, or fitness for particular purpose of this Product must be fully evaluated by the customer at its sole risk to ensure correct and safety operation of those special equipments. Also, evaluation of the safety function of this Product even for use in general electronics equipment shall be thoroughly made and when necessary, a protective circuit shall be added in design stage, all at the customer's sole risk.

## v) Japan Regulatory Information

This product with a specific antenna is a radio system approved for Type Approval. Please follow the instructions below on designing your product.

a) This module is certified by Type Approval as the device which has SDIO Interface.

Please do not use other purposes except that of certified.

Please contact TAIYO YUDEN for more details of purposes of this product.

b) Please notify clearly below sentences, on your product or in the product manual.

This product has a radio system which was approved as a radio station in a low power data communication system based on the Radio Law.

Name of the radio system: 001-A03958

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Control No. HD-AG-A131284	(3/6)	Control name General Items
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## vi) IC Regulatory Information

a) This device complies with Industry Canada licence-exempt RSS standards.

Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Le present appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisee aux deux conditions suivantes : (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioelectrique subi, meme si le brouillage est susceptible d'en compromettre le fonctionnement.

b) Please display label or permanent marking referring this product's ID on outside of your host equipment with either of below or similar words.

Veillez afficher l'étiquette ou le marquage permanent qui réfère la carte d'identité de ce produit sur en dehors de votre matériel de l'hôte avec l'un ou l'autre de dessous ou mots semblables.

-Contains Transmitter module IC : 4389B-WYSAGV DX7

-Contains IC : 4389B-WYSAGV DX7

c) For installation of this product, please note instruction for end user how to install or remove this product should not be indicated in user manual or customer documentation of your host equipment.

Pour l'installation de ce produit, veuillez noter que la methode d'installation ou d'enlevement de ce produit ne devraient pas être indiqués pour utilisateur final dans l'utilisateur manuel de votre matériel de l'hôte ou la documentation pour les clients.

d) NOTICE for OEM integrator

For installation of this product, please instruct host equipment manufacturer not to provide procedure to end user how to install or remove this product in their user manual or customer documentation.

Notification pour intégrateur de l'OEM

Pour l'installation de ce produit, veuillez instruire le fabricant du matériel de l'hôte de ne pas fournir la methode d'installation ou d'enlevement de ce produit pour utilisateur final dans leur utilisateur manuel ou la documentation pour les clients.

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Control No. HD-AG-A131284	(4/6)	Control name General Items
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e) Please include following or similar statement into user manual of your host equipment installs this product. The statement in French should be available for the user manual in Canadian area.

Incluez suivre ou déclaration semblable dans utilisateur manuel de votre matériel de l'hôte installe ce produit, s'il vous plaît. La déclaration en français devrait être disponible pour l'utilisateur manuel dans région canadienne.

e)-1.

[Model name of host equipment] is equipped with WLAN device with IC ID, "4389B-WYSAGV DX7".

[Nom modèle du matériel de l'hôte] est équipé d'un appareil WLAN avec IC ID, "4389B-WYSAGV DX7".

e)-2.

(1)This device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

(1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, mme si le brouillage est susceptible d'en compromettre le fonctionnement.

vii) FCC Regulatory Information

a) This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:

(1) This device may not cause harmful interference, and

(2) this device must accept any interference received, including interference that may cause undesired operation.

b) CAUTION: Changes or modifications not expressly approved by the party responsible for compliance could void the use's authority to operate the equipment.

c) Please display label or permanent marking referring this product's ID on outside of your host equipment with either of below or similar words.

-Contains Transmitter Module FCC ID: RYYWYSAGV DX7

-Contains FCC ID: RYYWYSAGV DX7

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Control No. HD-AG-A131284	(5/6)	Control name General Items
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- d) For installation of this product, please note instruction for end user how to install or remove this product should not be indicated in user manual or customer documentation of your host equipment.
- e) NOTICE for OEM integrator  
For installation of this product, please instruct host equipment manufacturer not to provide procedure to end user how to install or remove this product in their user manual or customer documentation.
- f) CAUTION  
To maintain compliance with FCC's RF exposure guidelines, use only the supplied antenna. Unauthorized antenna, modification, or attachments could damage the transmitter and may violate FCC regulations.
- g) Please include following or similar statement into user manual of your host equipment installs this product.
- g)-1.  
[Model name of host equipment] is equipped with WLAN device with FCC ID, "RYYWYSAGVDX7".
- g)-2.  
(1)This device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.
- g)-3.  
CAUTION: To maintain compliance with FCC's RF exposure guidelines, use only the supplied antenna. Unauthorized antenna, modification, or attachments could damage the transmitter and may violate FCC regulations.

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Control No. HD-AG-A131284	(6/6)	Control name General Items
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## c. Term of Support

- i) You are requested to fully check and confirm by the start of mass production of this Product that (1) no bug, defect or other failure is included in firmware and driver (collectively called "Software" in this document) used with this Product, (2) no bug, defect or other failure arising from installation of this Product into your product and (3) Software fully meets your intended use.
- ii) Do not alter Hardware and/or Software (OTP Data) of this Product.  
Please note that TAIYO YUDEN shall not be liable for any problem if it is caused by customer's alteration of Hardware or/and Software without Taiyo Yuden's prior approvals
- iii) Any failure arising out of this Product after mass production will be examined by TAIYO YUDEN. Customer agrees that once such failure is turned out not to be responsible for TAIYO YUDEN after aforesaid examination, some of the technical support shall be conducted by TAIYO YUDEN at customer's expense; provided however, exact cost of this technical support can be agreed through the negotiation by the parties.

## d. Caution for Export Control

This Product may be subject to governmental approvals, consents, licenses, authorizations, declarations, filings, and registrations for export or re-export of the Product, required by *Japanese Foreign Exchange and Foreign Trade Law (including related laws and regulations)* and/or any other country's applicable laws or regulations related to export control.

In case you will export or re-export this Product, you are strongly recommended to check and confirm, before exporting or re-exporting, necessary procedures for export or re-export of this Product which is required by applicable laws and regulations, and if necessary, you have to obtain necessary and appropriate approvals or licenses from governmental authority.

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Control No. HD-AM-A131284 (1/1)	Control name Absolute maximum ratings
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**Absolute maximum ratings**

Item	Symbol	Rating				Unit	Remark
		Min.	Typ.	Max.			
Supply voltage1	VCC33	-	-	4.0	V		
Supply voltage2	VCC18	-	-	1.98			
Supply voltage3	VIO	-	-	4.0			
Storage temperature range	Tstg	-40		85	Degrees C		
Operation temperature range	Topr	0	25	70	Degrees C	Note1	

\*Note1: Apply to the temperature at the PCB or shielding case or any part on module. If necessary, please operate the module with countermeasures for heat not to exceed the temperature range.

**Recommendation operating range**

Item	Symbol	Rating				Unit	Remark
		Min.	Typ.	Max.			
Supply voltage1	VCC33	3.0	3.3	3.6	V	Note2	
Supply voltage2	VCC18	1.71	1.8	1.89	V	Note2	
Supply voltage3	VIO	1.71/3.0	1.8/3.3	1.89/3.6	V	Note2	
Output Ripple Voltage1	Ripple_VCC33	-	-	60	mVpp	Note2	
Output Ripple Voltage2	Ripple_VCC18	-	-	30	mVpp	Note2	
Output Ripple Voltage3	Ripple_VIO	-	-	60	mVpp	Note2	

\*Note2: Apply to voltage at the contacts of connector on module

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**WYSAGVDX7**

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Control No. HD-AE-A131284 (1/3)	Control name Electrical characteristics
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Electrical characteristic

**DC Specifications**

Current / Power consumption

The Specification applies for Topr.=25 degrees C, Supply voltage=Typical voltage.

No.	Parameter	Condition	Symbol	Min.	Typ.	Max.	Unit	Remark
1	Peak Current1	VIO	Ip1	-	-	5	mA	
2	Peak Current2	VCC33	Ip2	-	-	300	mA	
3	Peak Current3	VCC18	Ip2	-	-	150	mA	
4	Power consumption1	Burst Tx (72Mbps)	Pc1	-	178		mW	Duty 2.4%
5	Power consumption2	Continuous Rx (72Mbps)	Pc2	-	188		mW	
6	Power consumption3	Burst Tx (54Mbps)	Pc3	-	265		mW	Duty 25.4%
7	Power consumption4	Continuous Rx (54Mbps)	Pc4	-	181		mW	
8	Power consumption5	Burst Tx (11Mbps)	Pc5	-	397		mW	Duty 43.4%
9	Power consumption6	Continuous Rx (11Mbps)	Pc6	-	173		mW	
10	Power consumption7	Deep Sleep	Pc7	-	2.4	-	mW	VIO=3.3V
11	Power consumption8	IEEE Power Save <sup>*1</sup> (DTIM=1 / Beacon Interval =100mS)	Pc8	-	8.6	-	mW	VIO=3.3V

\*1 AP:CG-WLR300GNH(COREGA)

## Digital Pad Ratings

No.	Parameter	Condition	Symbol	Min.	Typ.	Max.	Unit	Remark
1	Input Low Voltage	SD_D[3:0], SD_CLK,	VIL	-0.4	-	0.3*VIO	V	
2	Input High Voltage	SD_CMD	VIH	0.7*VIO	-	VIO+0.4	V	
3	Input Low Voltage	PDn	VIL	-0.4	-	0.3*VCC3.3	V	
4	Input High Voltage		VIH	0.7*VCC3.3	-	VCC3.3+0.4	V	
5	Output Low Voltage	SD_D[3:0],SD_CMD	VOL	-	-	0.4	V	
6	Output High Voltage		VOH	VIO-0.4	-	-	V	

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**WYSAGVDX7**

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Control No. HD-AE-A131284	(2/3)	Control name Electrical characteristics
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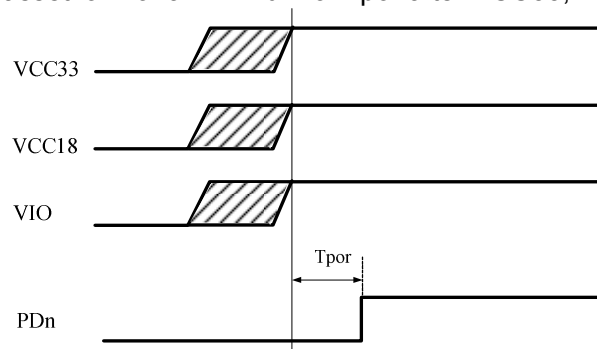
**AC Specifications**

## Power-on off timing

	Parameter	Condition	Symbol	Min	Typ	Max	Unit	Remark
1	Valid Power to PDn de-asserted		Tpor	100			mS	
2	PDn asserted before Power ramp down		Tpoff	100			mS	

## &lt;Power-on sequence&gt;

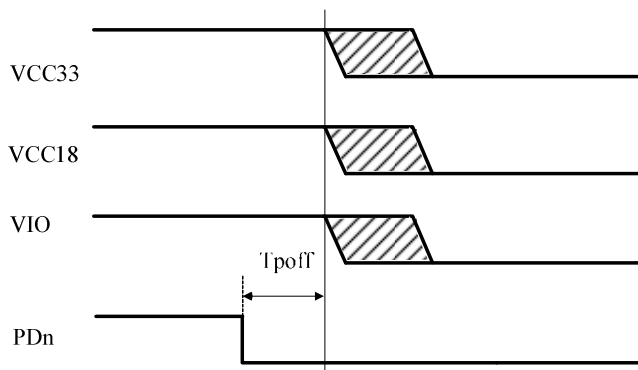
PDn should be asserted low (active) during VCC33, VCC18 and VIO ramp-up and must continue to asset low for a minimum of Tpor after VCC33, VCC18 and VIO are stable.



## &lt;Power-off sequence&gt;

PDn should be asserted low (active) for a minimum of Tpoff before VCC33, VCC18 and VIO start to ramp down.

PDn should be asserted low during VCC33, VCC18 and VIO ramp down.

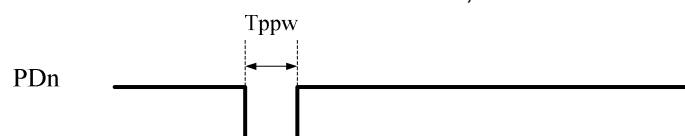


## External power down (PDn)

	Parameter	Condition	Symbol	Min	Typ	Max	Unit	Remark
1	PDn pulse width		Tppw	100			mS	

Note 1: PDn is pulled up to VCC33 internally.

PDn should be asserted while VCC33, VCC18 and VIO are stable.



For lowest current consumption, apply all power rails to the module during the assertion of PDn pin.

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# WYSAGVDX7

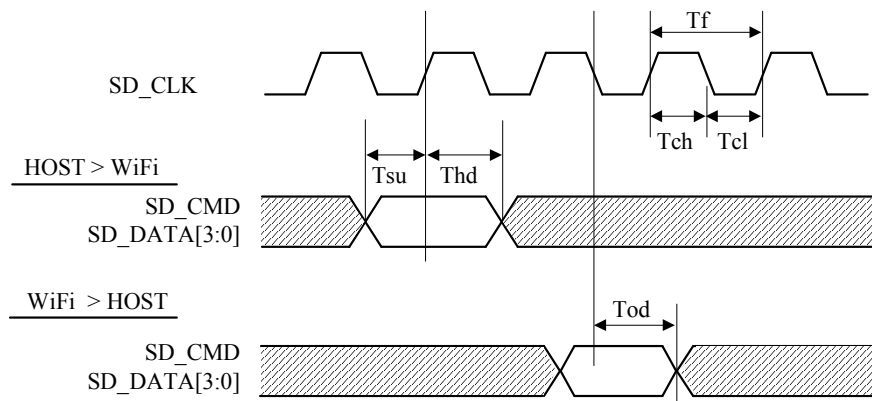
TAIYO YUDEN

Control No. HD-AE-A131284	(3/3)	Control name Electrical characteristics
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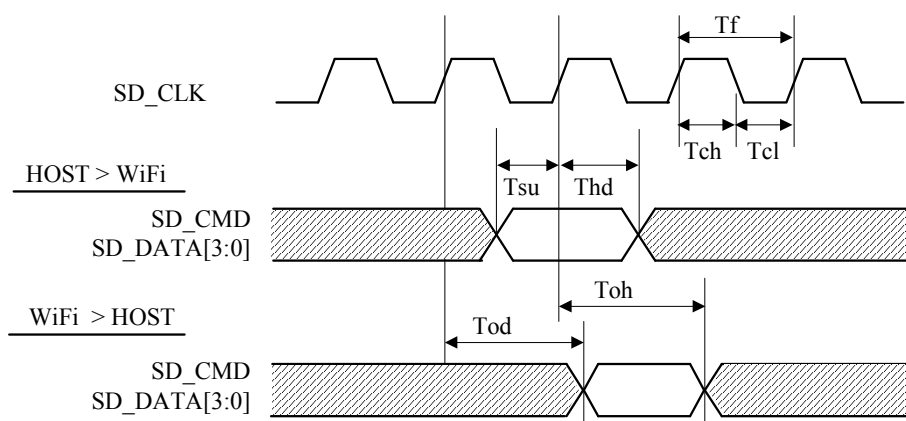
## SDIO Interface Specifications

	Parameter	Symbol	Condition	Min	Typ	Max	Unit	Remark
1	Input SDIO_CLK Frequency	Tf	Normal	0	-	25	MHz	
			High Speed	0	-	50		
2	Input SDIO_CLK High Time	Tch	Normal	10	-	-	ns	
			High Speed	7	-	-		
3	Input SDIO_CLK Low Time	Tcl	Normal	10	-	-	ns	
			High Speed	7	-	-		
4	Input SDIO_CMD, DATA[3:0] Setup time	Tsu	Normal	5	-	-	ns	
			High Speed	6	-	-		
5	Input SDIO_CMD, DATA[3:0] Hold time	Thd	Normal	5	-	-	ns	
			High Speed	2	-	-		
6	Output SDIO_CMD, DATA[3:0] Delay time	Tod	-	-	-	14	ns	
7	Output SDIO_CMD, DATA[3:0] Hold time	Toh	High Speed	2.5	-	-	ns	

### Normal Mode



### High Speed Mode



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**WYSAGVDX7**

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Control No. HD-AE-B131284 (1/3)	Control name Electrical characteristics
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RF Specifications (WLAN 11n/72.2Mbps, OFDM)

The Specification applies for Ta=25 degrees C, Supply voltage =Typical voltage.

No	Parameter	Condition	Symbol	Min	Typ	Max	Unit	Remark
1	RF frequency range		FREQ	2412		2472	MHz	
2	TX Power		Po	4	6	8	dBm	
3	Spectrum Mask	1 <sup>st</sup> Side Lobe	M1	-		-20	dBc	
		2 <sup>nd</sup> Side Lobe	M2	-		-28	dBc	
		3 <sup>rd</sup> Side Lobe	M3	-		-45	dBc	
4	Symbol clock tolerance		Ft	-25		25	ppm	
5	Frequency tolerance		Ft	-25		25	ppm	
6	EVM	Rms	EVM	-		-28	dB	
7	Rx sensitivity	PER<10%	SEN	-	-69	-64	dBm	
8	Maximum Input Level	PER<10%	MIL	-20		-	dBm	

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**WYSAGVDX7**

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Control No. HD-AE-B131284 (2/3)	Control name Electrical characteristics
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RF Specifications (WLAN 11g/54Mbps, OFDM)

The Specification applies for Ta=25 degrees C, Supply voltage =Typical voltage.

No	Parameter	Condition	Symbol	Min	Typ	Max	Unit	Remark
1	RF frequency range		FREQ	2412		2472	MHz	
2	TX Power		Po	4	6	8	dBm	
3	Spectrum Mask	1 <sup>st</sup> Side Lobe	M1	-		-20	dBc	
		2 <sup>nd</sup> Side Lobe	M2	-		-28	dBc	
		3 <sup>rd</sup> Side Lobe	M3	-		-40	dBc	
4	Symbol clock tolerance		Ft	-25		25	ppm	
5	Frequency tolerance		Ft	-25		25	ppm	
6	EVM	Rms	EVM	-		-25	dB	
7	Rx sensitivity	PER<10%	SEN	-	-72	-65	dBm	
8	Maximum Input Level	PER<10%	MIL	-20		-	dBm	

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**WYSAGV DX7**

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Control No. HD-AE-B131284 (3/3)	Control name Electrical characteristics
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RF Specifications (WLAN 11b/11Mbps, CCK)

The Specification applies for Ta=25 degrees C, Supply voltage=Typical voltage.

No	Parameter	Condition	Symbol	Min	Typ	Max	Unit	Remark
1	RF frequency range		FREQ	2412		2472	MHz	
2	TX Power		Po	4	6	8	dBm	
3	Spectrum Mask	1 <sup>st</sup> Side Lobe	M1	-		-30	dBc	
		2 <sup>nd</sup> Side Lobe	M2	-		-50	dBc	
4	Power up-down rump	Power up	TU	-		2	us	
		Power down	TD	-		2	us	
5	Frequency tolerance		Ft	-25		25	ppm	
6	EVM	Peak	EVM	-		35	%	
7	Rx sensitivity	PER< 8%	SEN		-86	-76	dBm	
8	Maximum Input Level	PER< 8%	MIL	-10			dBm	

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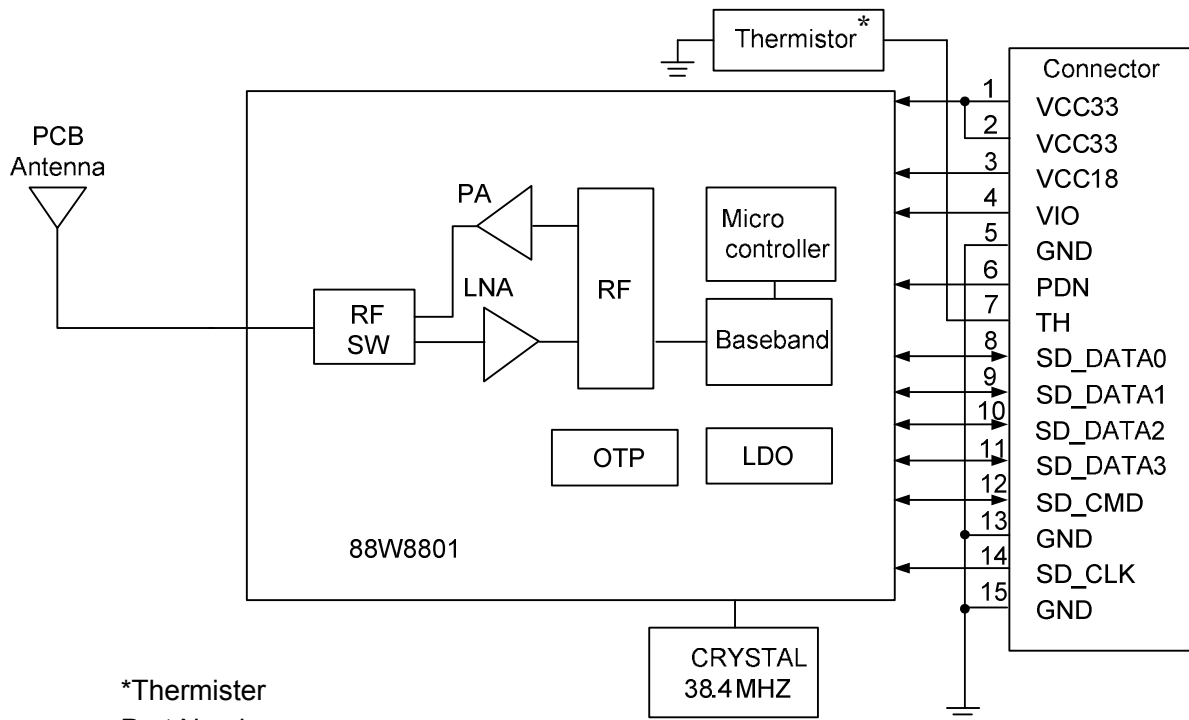


# WYSAGVDX7

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Control No. HD-MC-A131284	(1/1)	Control name Circuit Schematic
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## Block Diagram



\*Thermister  
Part Number;  
TH05-4F 104F  
Manufacturer;  
Mitsubishi Materials

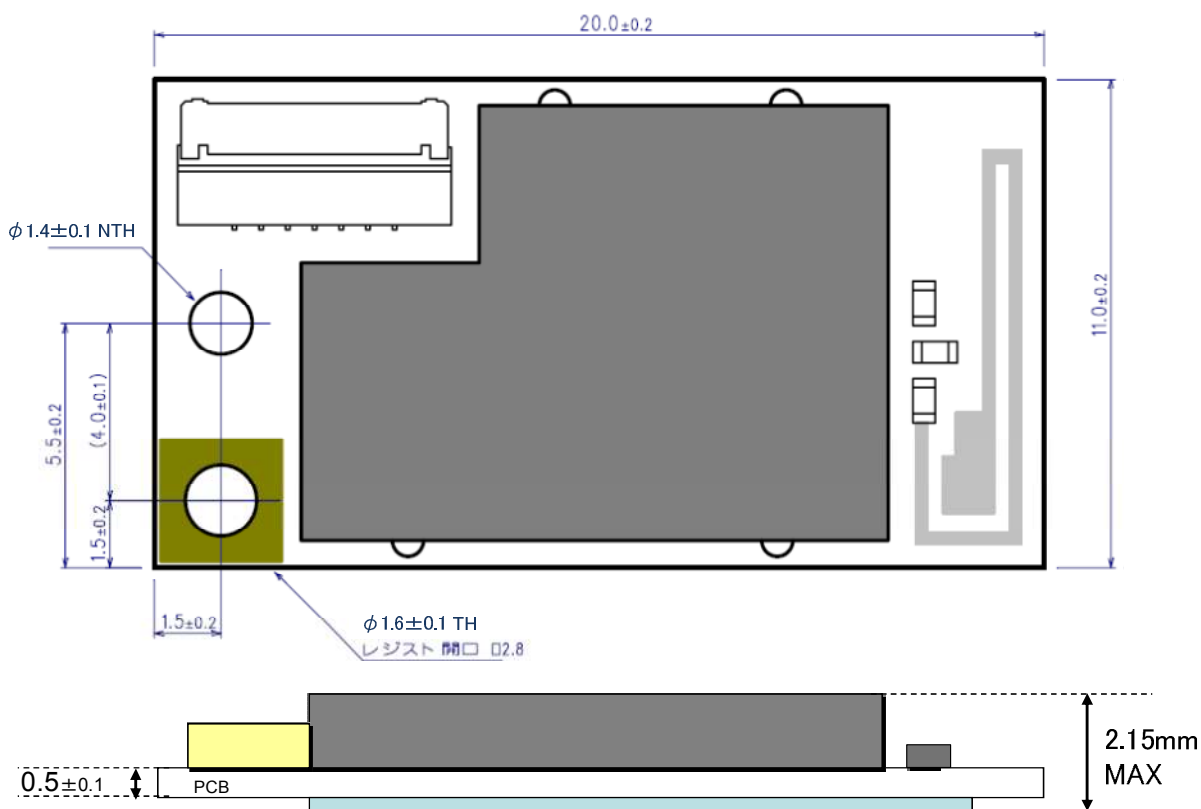
# WYSAGVDX7

TAIYO YUDEN

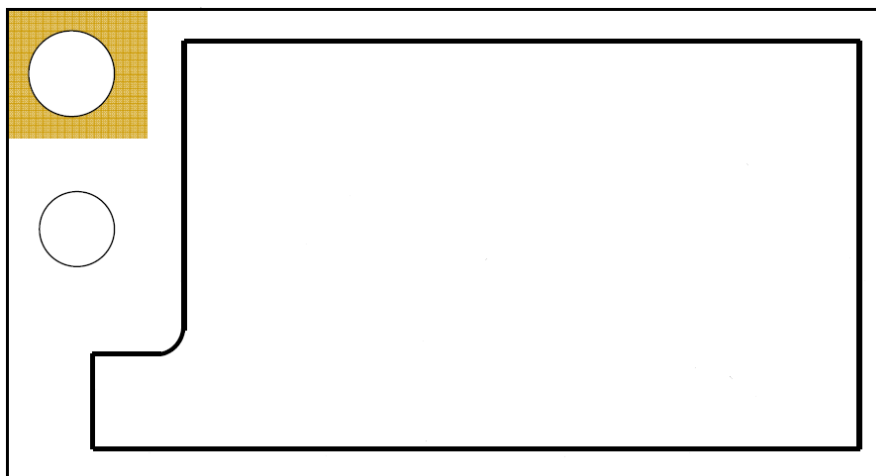
Control No. HD-AD-A131284	(1/2)	Control name Outline/Appearance
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Unit: mm, Tolerances unless otherwise specified:  $\pm 0.2$ mm

(Top View)



(Bottom View)



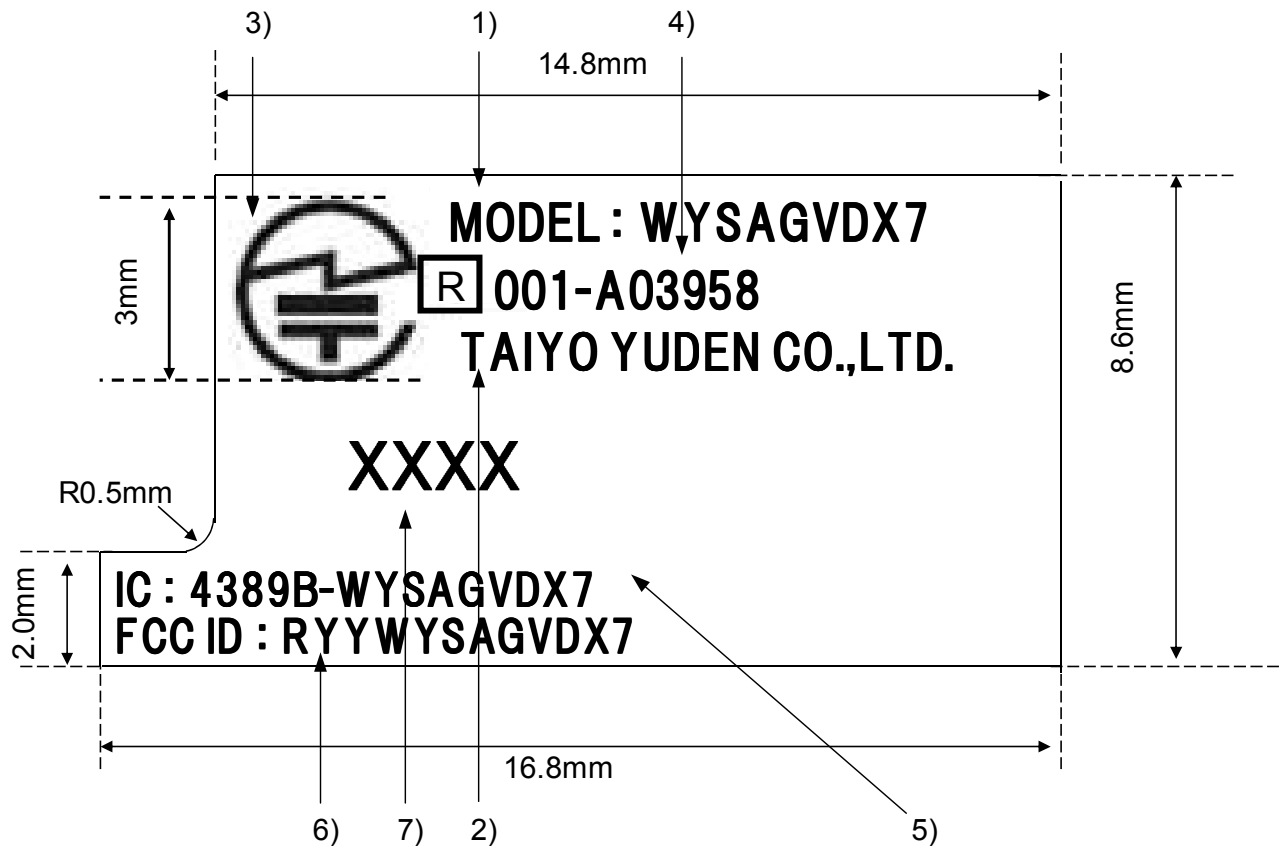
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**WYSAGV DX7**

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Control No. HD-AD-A131284	(2/2)	Control name Outline/Appearance
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## Label



Material : PET / Label color : White / Printing : Black

## Indication Label description

- 1) Model : WYSAGV DX7
- 2) Manufacture : TAIYO YUDEN CO., LTD.
- 3) Japan logo mark : Specified logo mark
- 4) Japan ID : 001-A03958
- 5) IC ID : 4389B-WYSAGV DX7
- 6) FCC ID : RYYWYSAGV DX7
- 7) Product Lot number : XXXX(Year, month, date and Classification)

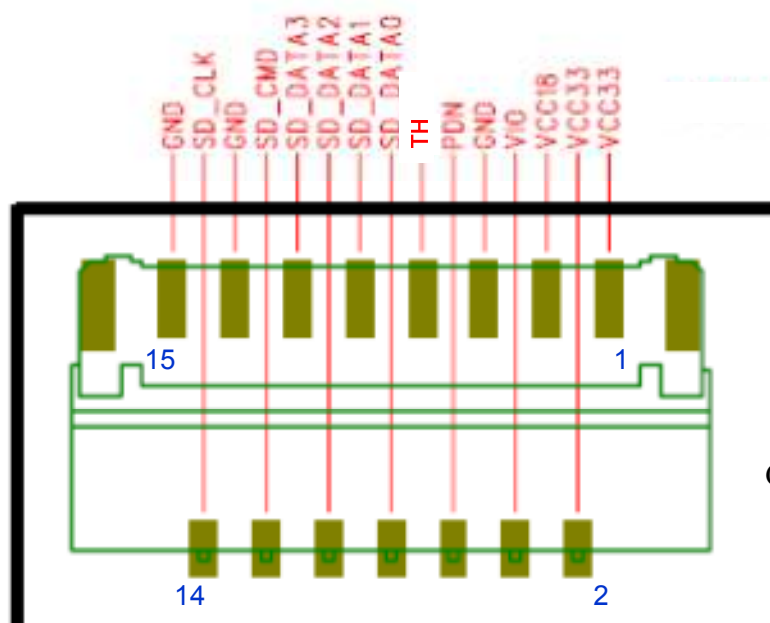
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**WYSAGVDX7**

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Control No. HD-BA-A131284	(1/1)	Control name Pin Layout
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(TOP VIEW)



Connector: 503566-1500(Molex)

No.	Pin Name	I/O	I/O Vol-Ivl	Description
1	VCC33	I	VCC33	Main Power Supply (3.3V)
2	VCC33	I	VCC33	Main Power Supply (3.3V)
3	VCC18	I	VCC18	1.8V Power Supply
4	VIO	I	VIO	1.8V/3.3V I/O Power Supply
5	GND	-	GND	GND
6	PDn	I	VCC33	Power Down (H:normal operation, L:power down) Pulled up to VCC33
7	TH	-	-	Terminal of thermistor
8	SD_DATA0	I/O	VIO	SDIO DATA0
9	SD_DATA1	I/O	VIO	SDIO DATA1
10	SD_DATA2	I/O	VIO	SDIO DATA2
11	SD_DATA3	I/O	VIO	SDIO DATA3
12	SD_CMD	I/O	VIO	SDIO Command
13	GND	-	GND	GND
14	SD_CLK	I	VIO	SDIO CLOCK
15	GND	-	GND	GND

TAIYO YUDEN

**WYSAGVDX7**

TAIYO YUDEN

Control No. HQ-BA-521-A	(1/1)	Control name Handling Precaution
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This document describes Handling Instructions for Taiyo Yuden module.

#### 1. Storage conditions

- 1) Store the device in the range of 5~30 deg-C / 40~60%RH.
- 2) The device should be stored where there is no toxic gas that damages the device and little dust.
- 3) The device should be stored under shipping conditions.
- 4) Dew condensation during storage can damage the device.  
Rapid temperature change or other factors which may cause dew condensation should be avoided.
- 5) Long-term storage should be avoided because package quality can be reduced or contact characteristics of device terminals may degrade.

#### 2. Transporting Conditions

- 1) Avoid any mechanical vibration and shock which can damage the device. Also avoid dropping the device.
- 2) Static charge from container friction or vibration can damage the device and should be avoided.
- 3) Static charge from the worker (human body) can damage the device and should be avoided.  
The worker who handles the device should discharge static electricity through high resistance (1M to 100Mohm) before handling the device.

#### 3. Assembly Conditions

- 1) In order to avoid stress to the components on the device don't warp / bend the device / the motherboard to which the device is attached.
- 2) Extra stress to attaching parts such as a connector on the device should be avoided.  
The number of times to fit the connector in a socket is 10 times maximum.
- 3) The device should not be reworked such as soldering or resin coating.

#### 4. Conditions of Use

- 1) The device should not be used under the conditions, such as the Maximum Absolute Ratings, and for the purposes other than specified in this document.
- 2) The device is moisture and ionic-material sensitive.  
The device should not be used under the condition where dew condensation or dust attaches.
- 3) Please do not wash the device and the motherboard with the device.

TAIYO YUDEN

# WYSAGVDX7

TAIYO YUDEN

Control No. HD-BB-A131284 (1/1)	Control name Packaging Specification
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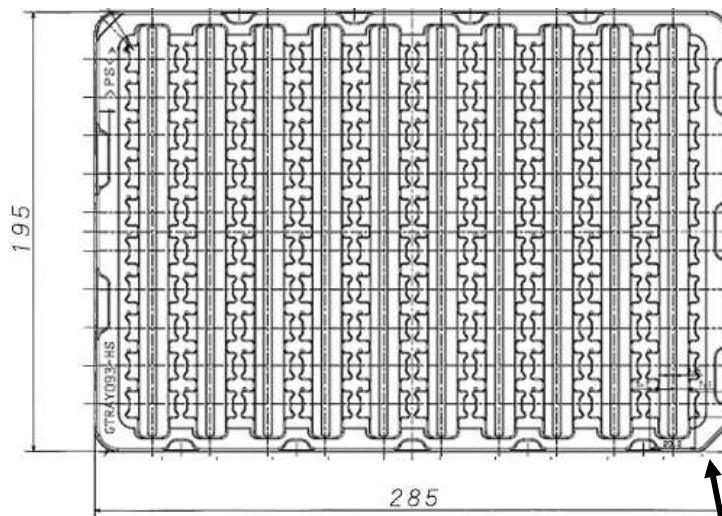
(1) Packaging Material

Name	Outline	Materials	Note
Outer box	454x306x230mm	Corrugated fiberboard.	
Inner box	290x 215x100(mm)	Corrugated fiberboard.	
Tray	285x195(mm)	Conductive PS	100pieces/tray
Corrugated fiberboard board		Corrugated fiberboard.	
Air-Cap	285x195(mm)	Antistatic PE	
Rubber Bands			
Tape			
Label	454x 306 x230mm		

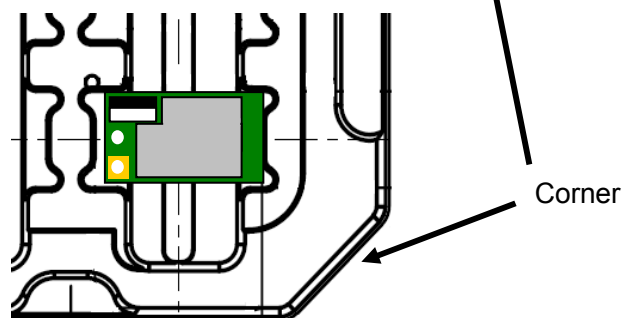
(2) Packaging Unit

100 pieces/tray X 10 tray = 1000 pieces Max

(3) Packaging Figure



Note: The tray shall be alternatively placed



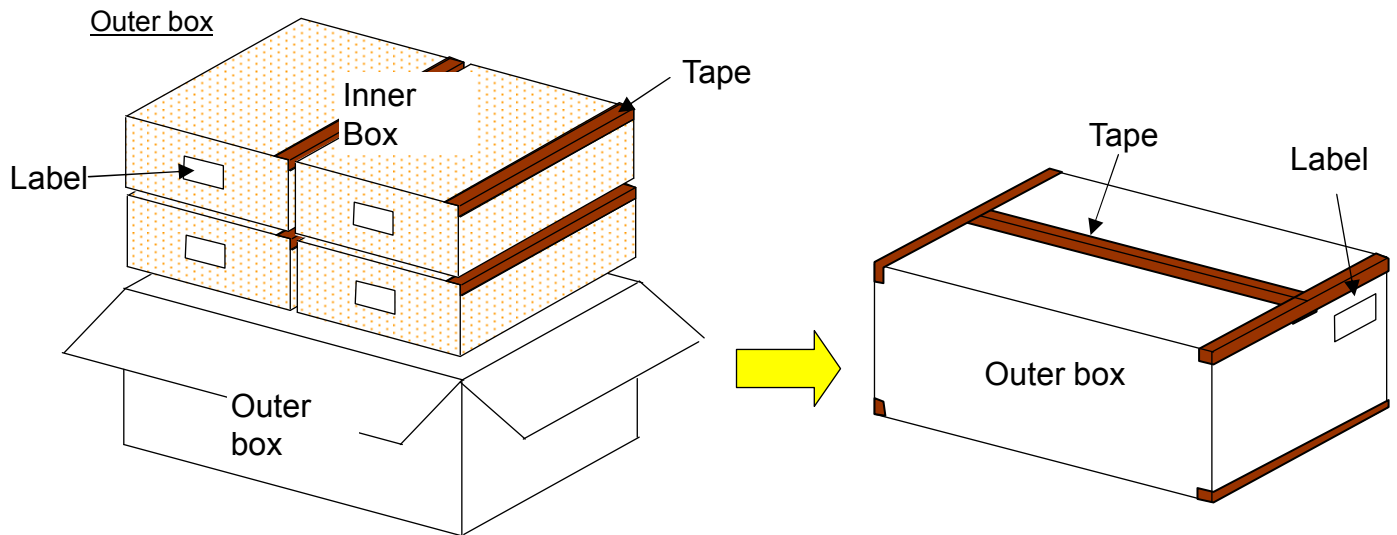
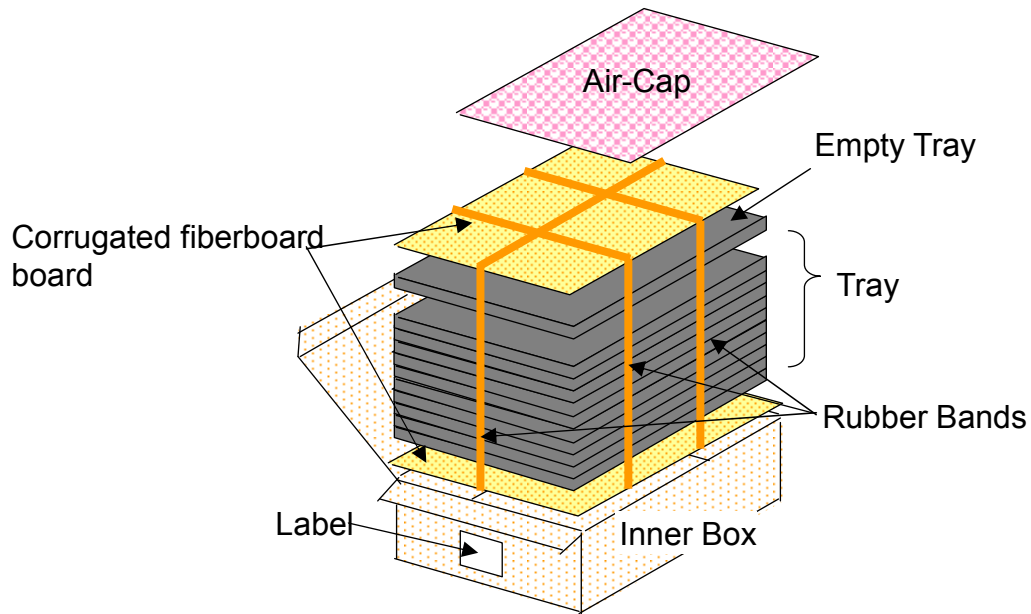
TAIYO YUDEN

# WYSAGV DX7

TAIYO YUDEN

Control No. HD-BB-A131284	(2/2)	Control name Packaging Specification
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## Inner Box



### (4) Label

The entry item to a label

- COMPANY NAME
- DESCRIPTION
- QUANTITY
- LotNo.
- NOTE

TAIYO YUDEN