

# ***IS201***

## ***RS-232C Control Specification***

**Category** : *Accessory*

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## 1. Introduction

### 1-1. Purpose

This document was written as a reference specification of products that are controlled by the host controller.

### 1-2. Scope

This document would be using by software or hardware engineers for production of the product.

### 1-3. Abbreviations

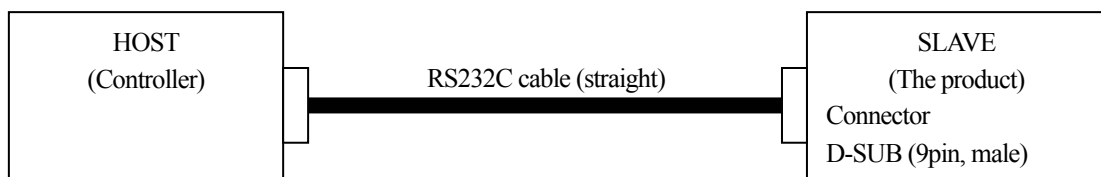
Abbreviation	Description

## 2. Global Description

### 2-1. Overview

A Host controller can control or watch out the product as a Slave very easily via the communication cable.

### 2-2. Block Diagram



\* The product connector is using D-SUB 9pin male.

\* RS232C cable must use D-SUB 9pin female to connect the products.

### 2-3. Interface connection specification of the product

uP Interface	Signal name	Connection device	D-Sub Pin	Connector
-	N.C.	-	1	<The product connector> RS232C D-SUB (9pin, Male)
UART	TxD (output)	RS232C Level shift driver	2	
	RxD (input)		3	
-	N.C.	-	4	 Stereo Mini Jack (Ø3.5mm)
-	GND	GND	5	
-	N.C.	-	6	
-	N.C.	-	7	
-	N.C.	-	8	
-	N.C.	-	9	

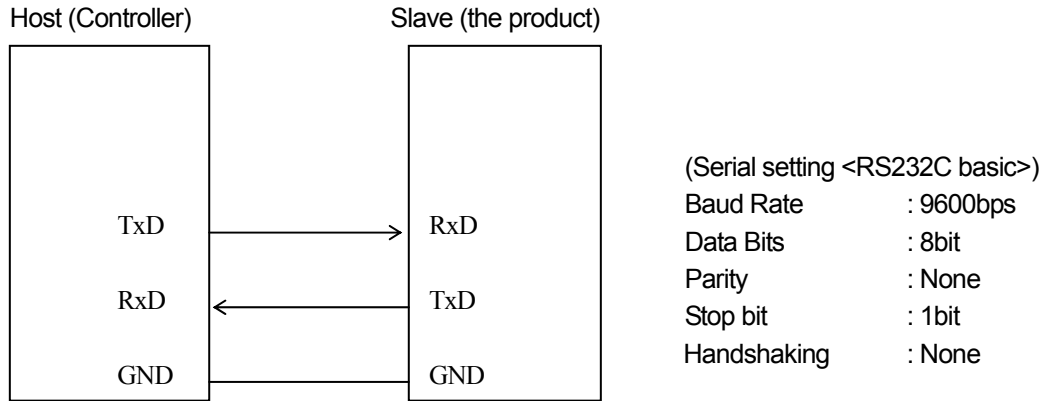
### 2-4. Assumptions and Dependencies

### 3. Detailed Description

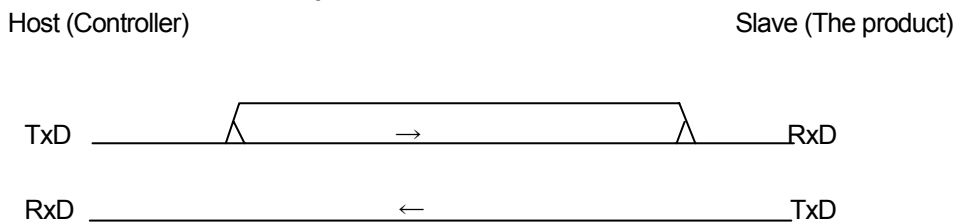
The interface specification between the product and a Host controller is described below.

#### 3-1. Connection format

##### 3-1-1. Physical connection

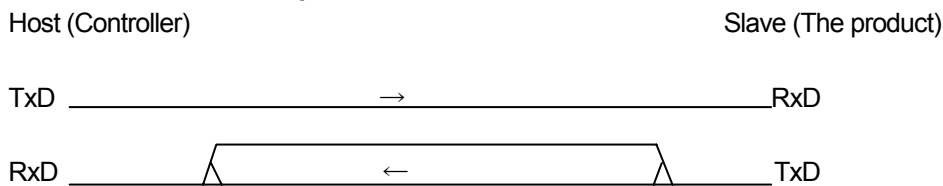


##### 3-1-1-1. Data transmission sequence from Host to Slave



1. Host starts a data transmission from TxD.
2. Host performs the data transmission of the number of required bytes, and ends a transmission.

##### 3-1-1-2. Data transmission sequence from Slave to Host



1. Slave starts a data transmission from TxD.
2. Slave performs the data transmission of the number of required bytes, and ends a transmission.

### 3-2. Transmission data format

#### 3-2-1. Transmission data format from Host to Slave

There are two kinds of transmission data form from Host shown below.

##### 3-2-1-1. Form1: Command

Command is a data that requests some status change.

Start character : '@'  
 COMMAND : see "Command list"  
 End character (CR) : 0Dh

start	command	end
'@'	"xxx:"+"..."	0Dh

##### 3-2-1-2. Form2: Status request

Status request is a data that requests a answer of some status.

Start character : '@'  
 Request status : see "Status request list"  
 Request character : '?'  
 End character (CR) : 0Dh

start	request status	end
'@'	"xxx:?"+"..."	0Dh

#### 3-2-2. Transmission data format from Slave to Host

There are two kinds of transmission data form from Slave shown below.

##### 3-2-2-1. Form1: ACK/NAK

ACK is a reply data from Slave when Slave got an acceptable command data from Host.  
 (ACK is sent to Host when Slave has no related status by the Command.)

Start character : '@', ACK : 06h, End character (CR) : 0Dh

start	ACK	CR
'@'	06h	0Dh

NAK is a reply data from Slave when Slave got an incorrect Command data, Status request data or some other data from Host.

Start character : '@', NAK : 15h, End character (CR) : 0Dh

start	NAK	CR
'@'	15h	0Dh

##### 3-2-2-2. Form2: Status answer and Auto status feedback

Status answers are reply data when Slave got an acceptable Request status or Command data from Host. Auto status feedbacks are send to Host data when a Slave's status is changed.

Start character : '@'  
 Answer character : see "Status list"  
 End character (CR) : 0Dh

start	status	end
'@'	"xxx:"+"..."	0Dh

### 3-3. The transaction sequences and the regulations

#### 3-3-1. The transaction sequences

The transactions have three kinds of sequence.

- \*A transaction is a Command from Host then Slave will be an answer by Status answer, ACK or NAK.
- \*A transaction is a Status request from Host then Slave will be an answer by Status answer or NAK.
- \*A transaction is Auto status feedback from Slave when a Slave's status changed. (If the auto status feedback is enabled.)

#### 3-3-2. The transaction regulations

The transactions have some kinds of regulation.

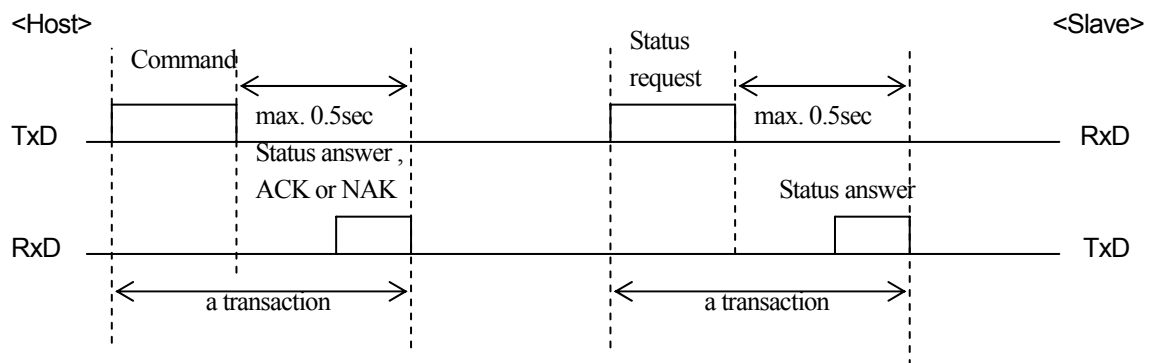
- \* An answer (ACK, NAK or Status answer) transmission by Slave has to finish within 500ms when got a Command or a Status request from Host.
- \* Host must not transmit an another Command or Status request until "it receives a answer by a previous Command or Status request" or "it passes a term of waiting time from a finishing of previous transmission of a Command or a Status request".
- \* Slave has to finish a transaction under 500ms when it sends Auto status feedback data.

#### 3-3-3. Specification of Auto status feedback

There are some specific regulations about Auto status feedback.

- \* The product status has segmented into **four layers of 1, 2, 3 and 4**.
- \* The status of layer 1 are assigned most kindly status to Host. (The statuses of layer 2 are assigned kindly status, the statuses of layer 3 are not so need status to Host and the statuses of layer 4 are probably no wished statuses.)
- \* Each layer status can control transmit enable or disable by Host command. (The product default would be all disables.)
- \* Slave sends auto status feedback by itself when the status is changed and if the status feedback is enabled.
- \* The product defined and segmented layers are taking in status list.

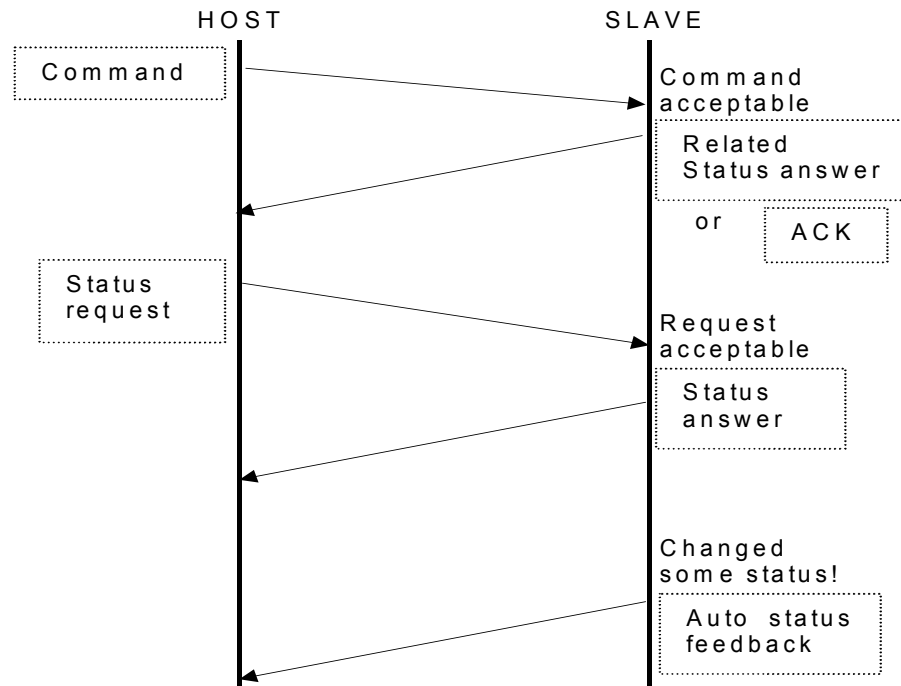
#### 3-3-4. Example of the transactions



Example of the transactions

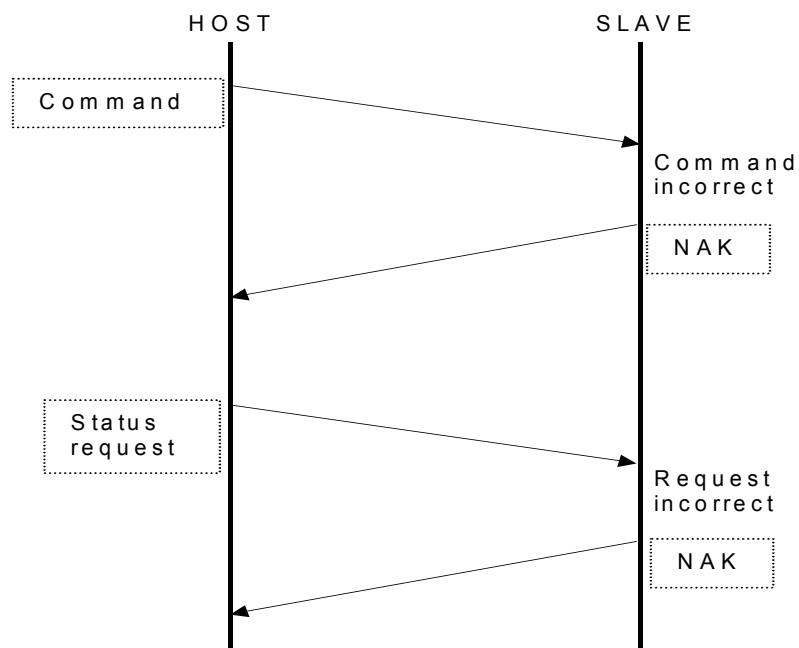
### 3-3-5. Examples of the handshaking flowchart

#### 3-3-5-1. Example of successful handshaking



The product can reply ACK instead of related status, if the product can not send the related status immediatly.

#### 3-3-5-2. Examples of handshaking error



#### 4. Recommendations of Command, Status and Layer definition

- All Commands, Statuses and Layers will be defined other specific document.
- **[MANDATORY]** The product **MUST** have Commands and the Statuses same as a remote controller buttons (IR controller) of the product.
- All Commands are required working by discrete as ON/OFF commands. (It means that do not support TOGGLE command only.)
- All Commands and Statuses are defined same character size except ACK/NAK on the product. ( Recommended character length : 3~6 characters )
- It permits attaching 0x0A character to a reply characters from the product. In this case, must suppose that the object is followed altogether.
- Recommend to supports numbers or values direct setting command, if it has variable numbers or values.



## 5. Commands

	Request Commands	AST Layer	Reply from IS201 (status) in OSD mode		Notes		Display Mode	
							LCD Mode	OSD Mode
POWER	@ PWR:0		@ PWR:1 or PWR:2		TOGGLE (same as RC)		Available	Available
	@ PWR:1	1	@ PWR:1	OFF	OFF		Available	Available
	@ PWR:2	1	@ PWR:2	ON	ON		Available	Available
	@ PWR?		@ PWR:1 or PWR:2		Status Request		Available	Available
AUDIO MUTE	@ AMT:0		@ AMT:1 or AMT:2		TOGGLE (same as RC)		Available	Available
	@ AMT:1	1	@ AMT:1	OFF	OFF		Available	Available
	@ AMT:2	1	@ AMT:2	ON	ON		Available	Available
PLAY MODE	@ PMD:1	1	@ PMD:1 or NAK	STOP	STOP		Available	Available
	@ PMD:2	1	@ PMD:2 or NAK	PAUSE	PAUSE		Available	Available
	@ PMD:3	1	@ PMD:3 or NAK	PLAY	PLAY		Available	Available
	@ PMD:?		@ PMD:1 or 2 or 3		Status Request		Not available	Available
GO TO TRACK	@ GOT:0		@ ACK		NEXT		Available	Available
	@ GOT:1		@ ACK		PREV		Available	Available
MENU	@ MNU:0		@ ACK		MENU or Return		Available	Available
CURSOR	@ CUR:1		@ CUR:text data on cursor	MAX 18 digits	UP		Available	Available
	@ CUR:2		@ CUR:text data on cursor	MAX 18 digits	DOWN		Available	Available
ENTER	@ ENT:0		@ ACK		OK, enter		Available	Available
RANDOM MODE	@ RDM:0		@ RDM:1 – RDM:4		TOGGLE (same as RC)	select shuffle play mode	Available	Available
	@ RDM:1	1	@ RDM:1	Shuffle OFF	Shuffle OFF		Not available	Available
	@ RDM:2	1	@ RDM:2	Shuffle SONG	Shuffle Songs		Not available	Available
	@ RDM:4	1	@ RDM:4	Shuffle ALBUM	Shuffle Albums		Not available	Available
	@ RDM:?		@ RDM:1 – RDM:4		Status Request		Not available	Available
REPEAT MODE	@ REP:0		@ REP:1 – REP:4		TOGGLE (same as RC)	select Repeat Play mode	Available	Available
	@ REP:1	1	@ REP:1	Repeat OFF	Repeat OFF		Not available	Available
	@ REP:2	1	@ REP:2	Repeat TRACK	Repeat Track		Not available	Available
	@ REP:4	1	@ REP:4	Repeat ALL	Repeat All		Not available	Available
	@ REP:?		@ REP:1 – REP:4		Status Request		Not available	Available
DISPLAY MODE	@ MOD:0		@ MOD:1 or MOD:2		TOGGLE (same as RC)		Available	Available
	@ MOD:1		@ MOD:1	OSD mode	OSD mode		Available	Available
	@ MOD:2		@ MOD:2	LCD mode	LCD mode		Available	Available
	@ MOD:?		@ MOD:1 or MOD:2		Status Request		Available	Available

	Request Commands	AST Layer	Reply from IS201 (status) in OSD mode		Notes		Display Mode	
							LCD Mode	OSD Mode
PLAY LIST	@ PLL:1		@ ACK		Play List UP		Available	Not available
	@ PLL:2		@ ACK		Play List DOWN		Available	Not available
ALBUM LIST	@ ABL:1		@ ACK		Album List UP		Available	Not available
	@ ABL:2		@ ACK		Album List DOWN		Available	Not available
SORT ORDER	@ SOS:0		@ SOS:0	Main menu	Main MENU		Not available	Available
	@ SOS:1		@ SOS:1	Sort PLAY LIST	SORT PLAY LIST		Not available	Available
	@ SOS:2		@ SOS:2	Sort ARTIST	SORT ARTIST		Not available	Available
	@ SOS:3		@ SOS:3	Sort ALBUM	SORT ALBUM		Not available	Available
	@ SOS:5		@ SOS:5	Sort SONG(Track)	SORT SONG(Track)		Not available	Available
	@ SOS:7		@ SOS:7	Sort AudioBook	SORT AudioBook		Not available	Available
	@ SOS:8		@ SOS:8	Sort PODCAST	SORT Podcast		Not available	Available
	@ SOS:?		@ SOS:0 – SOS:8	Status back	Status Request		Not available	Available
TRACK #	@ IND:?	2	@ IND:xxxxxxxx	Number of Playing Track	Max digits are 10 digits		Not available	Available
Database #	@ NDB:?	2	@ NDB:xxxxxxxx	Number of database	Max digits are 10 digits		Not available	Available
SONG TITLE	@ SON:?	2	@ SON:xxx...X	MAX Song Title 18 digits	Not same as OSD limitation for text digit		Not available	Available
ARTIST NAME	@ ARN:?	2	@ ARN:xxx...X	MAX Artist Name 18 digits	Not same as OSD limitation for text digit		Not available	Available
ALBUM NAME	@ ALN:?	2	@ ALN :xxx...X	MAX Alubum name 18 digits	Not same as OSD limitation for text digit		Not available	Available
CONTENTS DATA	@ CD1:		@ CD1:xxx...X	MAX text = 18 digits	Text data of selected Menu title		Not available	Available
	@ CD2:		@ CD2:xxx...X	MAX text = 18 digits	Text data of selected list title		Not available	Available
	@ CD3:		@ CD3:xxx...X	MAX 10 digits	Number of selected contents		Not available	Available
	@ CD4:		@ CD4:xxx...X	MAX 10 digits	Number of data base contents		Not available	Available
	@ CDR?		@ CD1:xxx...X CD2:xxx...X CD3:xxx...X CD4:xxx...X	If IS201 receives "CDR?", send the data of CD1, CD2, CD3, CD4	Status Request		Not available	Available

	Request Commands	AST Layer	Reply from IS201 (status) in OSD mode		Notes	Display Mode	
						LCD Mode	OSD Mode
<b>AST (Auto Status Feedback)</b>  (Default value = '0') It means disable all.	@ AST:0		@ AST:0		0=Disable all status feedback	Not available	Available
	@ AST:1		@ AST:1	(same as commad define)	1=Enable only Layer 1 status feedback	Not available	Available
	@ AST:2		@ AST:2		2=Enable only Layer 2 status feedback	Not available	Available
	@ AST:3		@ AST:3		3=Enable Layer 1 & 2 status feedback	Not available	Available
	@ AST:F		@ AST:F		F=Enable all Layer status feedback	Not available	Available
<b>Communication status with iPod (Only IS201 send via RS232C )</b>			@ UHS:		Under 1st Hand Shaking with iPod	Available	Available
			@ FHS:		Finished 1st Hand Shaking with iPod	Available	Available
			@ NIP:		No iPod Connect	Available	Available

## 6. Revision history

Ver.	Date	Owner	Change description
1.0	08/30/06	Marantz America, Inc.	Issued Revision1.0