# Old Company Name in Catalogs and Other Documents

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Renesas Electronics website: http://www.renesas.com

April 1<sup>st</sup>, 2010 Renesas Electronics Corporation

Issued by: Renesas Electronics Corporation (http://www.renesas.com)

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# MOS Integrated Circuit µPD65881GB-P03

# *µ*PD71055-Compliant Parallel Interface Unit Gate Array

Following the phase-out of its popular  $\mu$ PD71055 standard programmable parallel interface unit, NEC Electronics is now offering the  $\mu$ PD65881GB-P03 programmable parallel interface gate array, a functional low-cost substitute for the  $\mu$ PD71055.

To verify the applicability of the  $\mu$ PD65881GB-P03 gate array as a replacement for the  $\mu$ PD71055, you must first test an equivalent prototype in the system being developed. If the in-system test is deemed successful, then you may proceed to purchase mass production versions of the product.

#### DESCRIPTION

Internal block functions and commands are the same as those of the  $\mu$ PD71055. Differences between the two products are listed below. Before adopting this product, carefully read the disclaimer below and the caution in section **3 (CAUTIONS WHEN CONSIDERING ADOPTION OF THIS PRODUCT)**.

The  $\mu$ PD65881GB-P03 integrates an NA55A IP macro in a CMOS-N5 gate array. With three I/O ports, the gate array is capable of operations ranging from basic input/output operations to high-level operations using handshaking protocols.

#### FEATURES

- Three 8-bit I/O ports
- Three programmable operation modes
- Bit manipulation command
- Microcontroller-compatible
- No-wait operation
- CMOS technology
- Single power supply: 5V ±10%
- Industrial temperature range (Ambient): –40 to 85°C
- 44-pin QFP package
- RoHS-compliant

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# Disclaimer

- This product is not functionally equivalent to any similar non-NEC Electronics product. NEC Electronics shall assume no responsibility for any loss or damage incurred by customers or third parties resulting from the replacement of products similar to, but other than, the µPD71055GB-10-3B4.
- NEC Electronics shall assume no responsibility for any loss or damage incurred by customers or third parties resulting from the use of this product outside the conditions described in the absolute maximum ratings, recommended operation range, and quality grades.

Feature	This Product	μPD71055	Reference	
Part number (mark)	μPD65881GB-P03-3BS-A (658N55)	μPD71055GB-10-3B4 (standard NEC Electronics mark)	_	
Package type	Only 44-pin QFP	QFP, DIP, QFJ	-	
Package shape (comparison of 44-pin QFP)	The body size and package width and pin bending method are diffe	are the same, but the pin lengths rent.	4. PACKAGE DRAWING	
Function of pin 1	IC (connection with external pin prohibited)	NC	1. PIN LAYOUT	
Lead-free support	Yes	No	ORDERING INFORMATION	
Recommended soldering IR60-207-3, partial heating IR35-00-3, VP15-00-3, vP15-00-3, WS60-00-1, partial heating VS60-00-1, partial		IR35-00-3, VP15-00-3, WS60-00-1, partial heating	5. RECOMMENDED SOLDERING CONDITIONS	
Absolute maximum ratings			2. ELECTRICAL	
Power supply voltage	-0.5 to +6.0 (V)	-0.5 to +7.0 (V)	SPECIFICATIONS	
Input voltage	ut voltage -0.5 to +6.0 (V) -0.5 to VDD+0.3 (V)			
Output voltage	-0.5 to +6.0 (V)	-0.5 to V <sub>DD</sub> +0.3 (V)		
Recommended operating $T_A = -40$ to $+85^{\circ}C$ , $V_{DD} = 5$ V $\pm 10\%$				
range	This product does not guarantee operation at less than 4.5 V.			
DC characteristics	Partially different			
AC characteristics	This product has the following res D7 to D0: 150 pF or less P07 to P00, P17 to P10, P27 to P			

# COMPARISON OF $\mu$ PD65881GB-P03 AND $\mu$ PD71055

# **ORDERING INFORMATION**

Part Number	Package
μPD65881GB-P03-3BS-A	44-pin plastic QFP (10 x 10 mm)

**Remark** Products with -A at the end of the part number are lead-free products.

# **QUALITY GRADES**

"Standard"

This product is intended to be used for applications such as computers, office equipment, communications equipment, test and measurement equipment, and home electronic appliances. It therefore cannot be used for the following applications.

Applications requiring special or specific grades, such as transportation equipment (automobiles, trains, ships, etc.), traffic control systems, medical equipment, aircraft equipment, and aerospace equipment.

Remark For details of quality grades, refer to Quality Grades on NEC Semiconductor Devices (document number: C11531E).

# BLOCK DIAGRAM (µPD71055)



# 1. PIN LAYOUT

For a description of pin functions, refer to the  $\mu$ PD71055 Data Sheet (document number: IC-1921).

Pin No.	I/O	Pin Name	Name of Pin on	Pin No.	I/O	Pin Name	Name of Pin on
			μPD71055				μPD71055
1	-	IC (V <sub>DD</sub> ) Note	NC	23	-	Vdd	$\leftarrow$
2	I	CSB	CS	24	I/O	D7	$\leftarrow$
3	-	GND	$\leftarrow$	25	I/O	D6	$\leftarrow$
4	I	A1	$\leftarrow$	26	I/O	D5	$\leftarrow$
5	I	A0	$\leftarrow$	27	I/O	D4	$\leftarrow$
6	I/O	P27	$\leftarrow$	28	I/O	D3	$\leftarrow$
7	I/O	P26	$\leftarrow$	29	I/O	D2	$\leftarrow$
8	I/O	P25	$\leftarrow$	30	I/O	D1	$\leftarrow$
9	I/O	P24	$\leftarrow$	31	I/O	D0	$\leftarrow$
10	I/O	P20	$\leftarrow$	32	I	RESET	$\leftarrow$
11	I/O	P21	$\leftarrow$	33	-	NC	$\leftarrow$
12	I/O	P22	$\leftarrow$	34	-	NC	$\leftarrow$
13	I/O	P23	$\leftarrow$	35	I	WRB	WR
14	I/O	P10	$\leftarrow$	36	I/O	P07	$\leftarrow$
15	I/O	P11	$\leftarrow$	37	I/O	P06	$\leftarrow$
16	I/O	P12	$\leftarrow$	38	I/O	P05	$\leftarrow$
17	-	IC (GND) Note	$\leftarrow$	39	I/O	P04	$\leftarrow$
18	I/O	P13	$\leftarrow$	40	I/O	P03	$\leftarrow$
19	I/O	P14	$\leftarrow$	41	I/O	P02	$\leftarrow$
20	I/O	P15	$\leftarrow$	42	I/O	P01	$\leftarrow$
21	I/O	P16	$\leftarrow$	43	I/O	P00	$\leftarrow$
22	I/O	P17	$\leftarrow$	44	I	RDB	RD

**Note** This pin is connected to GND or  $V_{DD}$  in the chip. To enhance the power supply to handle noise, this pin can be connected to the power supply pin of the board to improve the noise resistance performance.

# 2. ELECTRICAL SPECIFICATIONS

This section describes only the differences with the  $\mu$ PD71055. For electrical specifications other than those below, refer to the  $\mu$ PD71055 Data Sheet (document number: IC-1921).

# **Absolute Maximum Ratings**

Parameter	Symbol	Conditions	Ratings	Unit
Power supply voltage	VDD		-0.5 to +6.0	V
Input voltage	Vi		-0.5 to +6.0	V
Output voltage	Vo		-0.5 to +6.0	V

Caution Product quality may suffer if the absolute maximum rating is exceeded even momentarily for any parameter. In other words, the absolute maximum ratings are values at which the product may begin to suffer degradation. Therefore the product must be used under conditions that ensure that the absolute maximum ratings are not exceeded.

#### **Recommended Operating Range**

This is the same as the  $\mu$ PD71055. This product does not guarantee operation at less than 4.5 V.

Parameter	Symbol	This Product			μPD71055			Unit		
		Condition	Min.	Тур.	Max.	Condition	Min.	Тур.	Max.	
Input voltage, high	Vін		2.29		VDD		2.2		V <sub>DD</sub> +0.3	V
Input voltage, low	VIL		0.00		0.77		-0.5		0.8	V
Output voltage, high	Vон	Іон =	VDD-0.1			Іон =	0.7×V <sub>DD</sub>			V
		0 mA				–400 μA				
		Іон =	VDD-0.4							
		3.0 mA								
Output voltage, low	Vol	Iol=			0.4	Iol=			0.4	V
		3 mA				2.5 mA				
Output current, low	Iol		3.0				2.5			mA

# DC Characteristics ( $V_{DD} = 5 V \pm 10\%$ , $T_A = -40 \text{ to } +85^{\circ}\text{C}$ )

#### **AC Characteristics**

These are similar to the  $\mu$ PD71055 characteristics, except for the following restrictions on load capacitance. Operation outside the range of these restrictions is not guaranteed.

D7 to D0: 150 pF or less P07 to P00, P17 to P10, P27 to P20: 40 pF or less

# 3. CAUTIONS WHEN CONSIDERING ADOPTION OF THIS PRODUCT

When considering the adoption of this product, note the following points.

#### (1) Functional check using product samples

Before adopting this product, make sure to request product samples from NEC Electronics to check the functions. Product samples are available free of charge.

When mounting this product onto different multiple printed circuit boards, extensively check the functions by changing the supply voltage to be supplied to the printed circuit boards as well as the temperature conditions for all printed circuit boards.

The standard number of product samples is five. When requesting product samples, provide the following information to your NEC Electronics sales representative.

Your company name, your name, product application, the period of starting adoption, the number of products to be adopted

#### (2) Submitting the Approval Sheet

When normal operation has been confirmed and the adoption has been decided, complete a copy of the Approval Sheet (Appendix of this document) and submit it to NEC Electronics.

#### (3) Shipment inspection

Shipment inspection is performed for this product using the  $\mu$ PD71055GB-10-3B4 shipment test pattern. The DC characteristics satisfy the gate array shipment inspection.

#### (4) Order amount

Orders from a minimum of 100 units, and in units of 100 are accepted.

#### (5) Package, packing form

The dimensions are partially different from the  $\mu$ PD71055GB-10-3B4. Refer to the package drawing and confirm that the product can actually be mounted. Dry pack tray packing is used for packing.

#### (6) Price

Contact your local NEC Electronics sales representative for pricing information.

#### (7) Obtaining the $\mu$ PD71055 Data Sheet<sup>Note</sup>

The  $\mu$ PD71055 (original product) Data Sheet is available from the NEC Electronics Web site (http://www.necel.com/) at

http://www.necel.com/nesdis/image/IC-1921B.pdf

**Note** Please make this data sheet a standalone document. Do not refer customers to the data sheet for an obsolete device.

# 4. PACKAGE DRAWING

#### 44-PIN PLASTIC QFP (10x10)



NOTE Each lead centerline is located within 0.16 mm of its true position (T.P.) at maximum material condition



# 5. RECOMMENDED SOLDERING CONDITIONS

These products should be soldered and mounted under the following recommended conditions.

For soldering methods and conditions other than those recommended below, please contact an NEC Electronicssales representative.

For technical information, see the following website.

Semiconductor Device Mount Manual (http://www.necel.com/pkg/en/mount/index.html)

Soldering Method	Soldering Conditons	Recommended Condition Symbol
Infrared reflow	Package peak temperature: 260°C Time: 60 seconds max. (at 220°C or higher) Count: 3 times or less Exposure limit: 7 days <sup>Note</sup> (after that, prebake at 125°C for 20 to 72 hours)	IR60-207-3
Partial heating	Pin temperature: 350°C max. Time: 3 seconds max. (per pin row)	-

Note After opening the dry pack, store it at 25°C or less and 65% RH or less for the allowable storage period.

#### Caution Do not use different soldering methods together (except for partial heating).

# APPENDIX APPROVAL SHEET

Copy this page and complete and confirm the required items. If you accept the conditions, sign and submit this sheet to NEC Electronics.

	Арр	roval Sh	neet	
O: NEC Electronics	<u>(_)</u>			
We have confirmed t	hrough sample evaluations that the c	levice functio	ons as stated in the specifications and agree to use the	
device in accordance	with the boxes checked below in the	"Confirmed I	tems" section.	
Company :		Date (yy	//mm/dd):	
Name:			Department:	
Signature:			Title:	
pplications (Set)				
heck the boxes b	elow, to indicate confirmation	of related	matters.	
(Part-Number)	$\mu$ PD65881GB-P02-3BS-A ( $\mu$ PD71051 function compatible)			
× ,	$\mu$ PD65881GB-P03-3BS-A ( $\mu$ PD71055 function compatible)			
NEC Electronics	Office			
Counterpart	Name			
Confirmed Items	Confirm the contents below and check the confirmed items.			
	All items must be confirmed and checked.			
	$\Box$ 1. Differences from the original product ( $\mu$ PD71051/71054/71055) and notes for use of the			
	function-compatible device	(s) in the dat	a sheet	
	2. Proper operation in the act	ual applicatio	on environment, using samples	
	$\Box$ 3. Necessity of re-evaluation before using in a new or different board or application set			
	4. Necessity of using the board with at least four layers and a stable power supply.			
	Conventionally ignored nois	se entering c	hips may be interpreted as being normal signals when	
	the function-equivalent pro-	duct is emplo	byed in a more advanced design process.	
dditional Informat	ion roquiradu			
Demanu/TUIECast				

M/P starting time	(yy/mm/dd)	
Monthly Run-Rate	(units)	
Comment		

## - NOTES FOR CMOS DEVICES -

#### **1** VOLTAGE APPLICATION WAVEFORM AT INPUT PIN

Waveform distortion due to input noise or a reflected wave may cause malfunction. If the input of the CMOS device stays in the area between  $V_{IL}$  (MAX) and  $V_{IH}$  (MIN) due to noise, etc., the device may malfunction. Take care to prevent chattering noise from entering the device when the input level is fixed, and also in the transition period when the input level passes through the area between  $V_{IL}$  (MAX) and  $V_{IH}$  (MIN).

#### (2) HANDLING OF UNUSED INPUT PINS

Unconnected CMOS device inputs can be cause of malfunction. If an input pin is unconnected, it is possible that an internal input level may be generated due to noise, etc., causing malfunction. CMOS devices behave differently than Bipolar or NMOS devices. Input levels of CMOS devices must be fixed high or low by using pull-up or pull-down circuitry. Each unused pin should be connected to V<sub>DD</sub> or GND via a resistor if there is a possibility that it will be an output pin. All handling related to unused pins must be judged separately for each device and according to related specifications governing the device.

#### **③** PRECAUTION AGAINST ESD

A strong electric field, when exposed to a MOS device, can cause destruction of the gate oxide and ultimately degrade the device operation. Steps must be taken to stop generation of static electricity as much as possible, and quickly dissipate it when it has occurred. Environmental control must be adequate. When it is dry, a humidifier should be used. It is recommended to avoid using insulators that easily build up static electricity. Semiconductor devices must be stored and transported in an anti-static container, static shielding bag or conductive material. All test and measurement tools including work benches and floors should be grounded. The operator should be grounded using a wrist strap. Semiconductor devices must not be touched with bare hands. Similar precautions need to be taken for PW boards with mounted semiconductor devices.

#### **④** STATUS BEFORE INITIALIZATION

Power-on does not necessarily define the initial status of a MOS device. Immediately after the power source is turned ON, devices with reset functions have not yet been initialized. Hence, power-on does not guarantee output pin levels, I/O settings or contents of registers. A device is not initialized until the reset signal is received. A reset operation must be executed immediately after power-on for devices with reset functions.

#### 5 POWER ON/OFF SEQUENCE

In the case of a device that uses different power supplies for the internal operation and external interface, as a rule, switch on the external power supply after switching on the internal power supply. When switching the power supply off, as a rule, switch off the external power supply and then the internal power supply. Use of the reverse power on/off sequences may result in the application of an overvoltage to the internal elements of the device, causing malfunction and degradation of internal elements due to the passage of an abnormal current.

The correct power on/off sequence must be judged separately for each device and according to related specifications governing the device.

#### **(6)** INPUT OF SIGNAL DURING POWER OFF STATE

Do not input signals or an I/O pull-up power supply while the device is not powered. The current injection that results from input of such a signal or I/O pull-up power supply may cause malfunction and the abnormal current that passes in the device at this time may cause degradation of internal elements. Input of signals during the power off state must be judged separately for each device and according to related specifications governing the device.

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- NEC Electronics products are classified into the following three quality grades: "Standard", "Special" and "Specific".

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- "Special": Transportation equipment (automobiles, trains, ships, etc.), traffic control systems, anti-disaster systems, anti-crime systems, safety equipment and medical equipment (not specifically designed for life support).
- "Specific": Aircraft, aerospace equipment, submersible repeaters, nuclear reactor control systems, life support systems and medical equipment for life support, etc.

The quality grade of NEC Electronics products is "Standard" unless otherwise expressly specified in NEC Electronics data sheets or data books, etc. If customers wish to use NEC Electronics products in applications not intended by NEC Electronics, they must contact an NEC Electronics sales representative in advance to determine NEC Electronics' willingness to support a given application.

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