To our customers,

Old Company Name in Catalogs and Other Documents

   On April 1st, 2010, NEC Electronics Corporation merged with Renesas Technology Corporation, and Renesas Electronics Corporation took over all the business of both companies. Therefore, although the old company name remains in this document, it is a valid Renesas Electronics document. We appreciate your understanding.

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Hitachi Semiconductor Technical Bulletin

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Subject	H8S/2238 F-ZTAT version electrical characteristic specification changes		Issue No.		TN-H8*-218A/E		
			Category	① Specification change ② Document amendment/addition, etc. 3. Usage notes			
Applicable Products	HD64F2238M Series	Relevant Lot, Etc.	Related Documentation	H8S/2238 Series Hardware Manual		Revision	Effective Until
		From Lot No. 1D1 or 0114				Second Revision	No limit

This is to notify you of changes in the electrical characteristics of the A/D and D/A converters in Hitachi's H8S/2238M F-ZTAT version single-chip microcomputer, as detailed below.

1. Changes in the electrical characteristic specifications of the A/D and D/A converters in the H8S/2238M F-ZTAT version (product model name: HD64F2238M Series) are shown below.

(1) Before Change

product model name: HD64F2238MFA13, HD64F2238MF13, HD64F2238MTE13, HD64F2238MTF13
HD64F2238MFA13i, HD64F2238MF13i, HD64F2238MTE13i, HD64F2238MTF13i

Item	Vcc	AVcc	Vref	Conversion Time	Absolute Accuracy	Ta
A/D converter	3.0 to 5.5 V	3.2 to 5.5 V	3.2 to AVcc	9.9 µs	±8 LSB	−40 to 85°C[2]
		3.1 to 5.5 V	3.1 to AVcc	19.7 µs	±8 LSB	−20 to 75°C
		3.0 to 5.5 V	3.0 to AVcc	39.2 µs	±8 LSB	−20 to 75°C
D/A converter	3.0 to 5.5 V	3.3 to 5.5 V	3.3 to AVcc	10 µs	±3 LSB[1]	−40 to 85°C[2]
		3.2 to 5.5 V	3.2 to AVcc	10 µs	±3 LSB[1]	−20 to 75°C

(2) After Change

product model name: HD64F2238BFA13, HD64F2238BF13, HD64F2238BTE13, HD64F2238BTF13
HD64F2238BFA13i, HD64F2238BF13i, HD64F2238BTE13i, HD64F2238BTF13i

Item	Vcc	AVcc	Vref	Conversion Time	Absolute Accuracy	Ta
A/D converter	3.0 to 5.5 V	3.6 to 5.5 V	3.6 to AVcc	9.9 µs	±8 LSB	−40 to 85°C[2]
D/A converter	3.0 to 5.5 V	3.6 to 5.5 V	3.6 to AVcc	10 µs	±3 LSB[1]	−40 to 85°C[2]

Notes: *1. The absolute accuracy of the D/A converter is ±3 LSB with a 2 MΩ resistive load and ±2 LSB with a 4 MΩ resistive load.

*2. Wide-range specification products (-40 to +85°C) also include regular specification products (-20 to +75°C).

2. **With the above changes in the electrical characteristics, the devices cannot be used in a voltage range of AVcc < 3.6 V. For use in this range, users are requested to switch to the HD6432238 Series or HD6432238R Series currently in mass production. The electrical characteristics of the mask ROM versions remain unchanged, as follows.**

(1) Mask ROM Version HD6432238 Series

Package: FP-100A, FP-100B, TFP-100B, TFP-100G

Item	Vcc	AVcc	Vref	Conversion Time	Absolute Accuracy	Ta
A/D converter	2.7 to 5.5 V	3.2 to 5.5 V	3.2 to AVcc	9.9 µs	±8 LSB	–40 to 85°C*[2]
		3.1 to 5.5 V	3.1 to AVcc	19.7 µs	±8 LSB	–40 to 85°C*[2]
		3.0 to 5.5 V	3.0 to AVcc	39.2 µs	±8 LSB	–40 to 85°C*[2]
D/A converter	2.7 to 5.5 V	3.3 to 5.5 V	3.3 to AVcc	10 µs	±3 LSB*[1]	–40 to 85°C*[2]
		3.2 to 5.5 V	3.2 to AVcc	10 µs	±3 LSB*[1]	–20 to 75°C

(2) Mask ROM Version HD6432238R Series (13.5 MHz Frequency Version)

Package: FP-100B, TFP-100B, TFP-100G

Item	Vcc	AVcc	Vref	Conversion Time	Absolute Accuracy	Ta
A/D converter	2.7 to 3.6 V	2.7 to 3.6 V	2.7 to AVcc	9.9 µs	±8 LSB	–40 to 85°C*[2]
D/A converter	2.7 to 3.6 V	2.7 to 3.6 V	2.7 to AVcc	10 µs	±3 LSB*[1]	–40 to 85°C*[2]

3. **For use of the F-ZTAT version in the voltage range AVcc ≤ 3.6 V, users are requested to use the HD64F2238R Series currently under development (scheduled for mass production in October 2001). Note that the maximum voltage for both Vcc and AVcc is 3.6 V, as shown in the following tables. Connect the external power supply to the Vcc pin and CVcc pin.**

F-ZTAT Version HD64F2238R Series (13.5 MHz Frequency Version)

Package: FP-100B, TFP-100B, TFP-100G

Item	Vcc=CVcc	AVcc	Vref	Conversion Time	Absolute Accuracy	Ta
A/D converter	2.7 to 3.6 V	2.7 to 3.6 V	2.7 to AVcc	9.9 µs	±8 LSB	–40 to 85°C*[2]
D/A converter	2.7 to 3.6 V	2.7 to 3.6 V	2.7 to AVcc	10 µs	±3 LSB*[1]	–40 to 85°C*[2]

Notes: *1. The absolute accuracy of the D/A converter is ±3 LSB with a 2 MΩ resistive load and ±2 LSB with a 4 MΩ resistive load.

*2. Wide-range specification products (-40 to +85°C) also include regular specification products (-20 to +75°C).