

Standard Characteristics Example

Standard characteristics described below are just examples of the M16C/26A group(M16C/26A,M16C/26T) characteristics and are not guaranteed. For rated values, refer to "M16C/26A Group Hardware manual".

(1) Power Supply Current Standard Characteristics Example (Vcc-Icc)

f(Xin)=20MHz (Pluse generator, Ta = 25°C, output transistor is in the cut-off state.*)

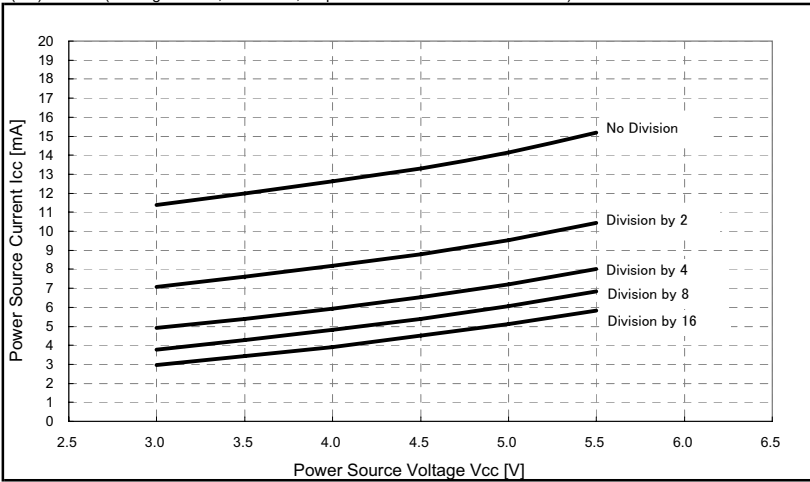


Fig. 1. Vcc-Icc(at Nomal Operation Mode)

Clock source

f(Xin) = Pulse Generator
Square wave
Xout:Open

Division setting

Main Clock	Timer	Serial I/O	AD con-version
1/1	f1	f1sio	fad/ 1
1/2	f2	f2sio	fad/ 2
1/4	f8	f8sio	fad/12
1/8	f8	f8sio	fad/12
1/16	f32	f32sio	fad/12

* Timer pulse and serial data is output

No division operation(Pluse generator, Ta = 25 °C, output transistor is in the cut-off state.*)

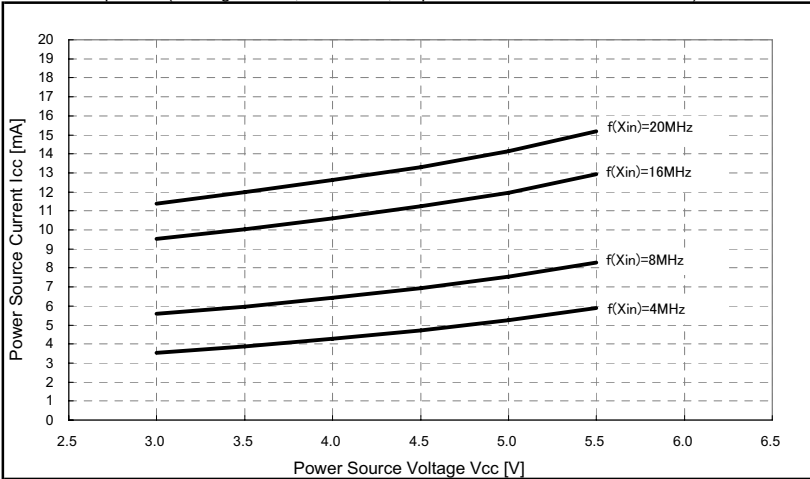


Fig. 2. Vcc-Icc(at Nomal Operation Mode)

Clock source

f(Xin) = Pulse Generator
Square wave
Xout:Open

Division setting

Main Clock	Timer	Serial I/O	AD con-version
1/1	f1	f1sio	fad/ 1

* Timer pulse and serial data is output

At WIT instruction executed (Pluse generator, Ta = 25 °C, output transistor is in the cut-off state.)

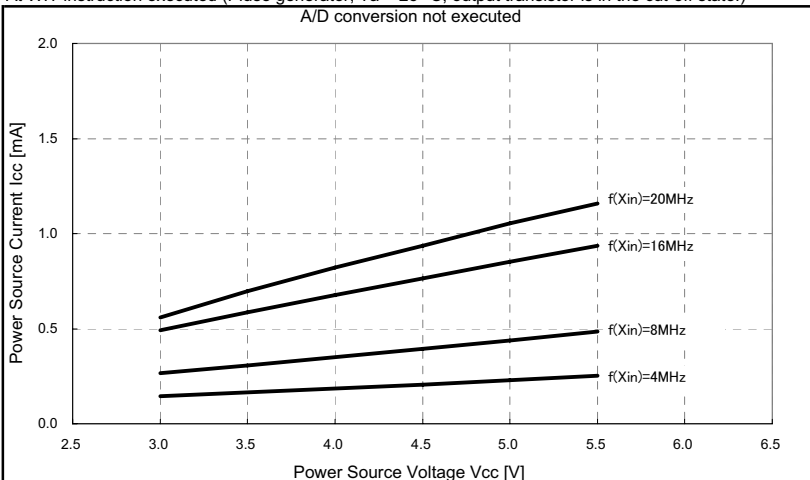


Fig. 3. Vcc-Icc (at WIT instruction executed)

Clock source

f(Xin) = Pulse Generator
Square wave
Xout:Open

Stop peripheral function clock.
Xin-Xout drive capacity : High

f(Xcin)=32kHz in low-power consumption mode, Program running on RAM
(Main clock oscillation stop, Ta = 25 °C, output transistor is in the cut-off state.)

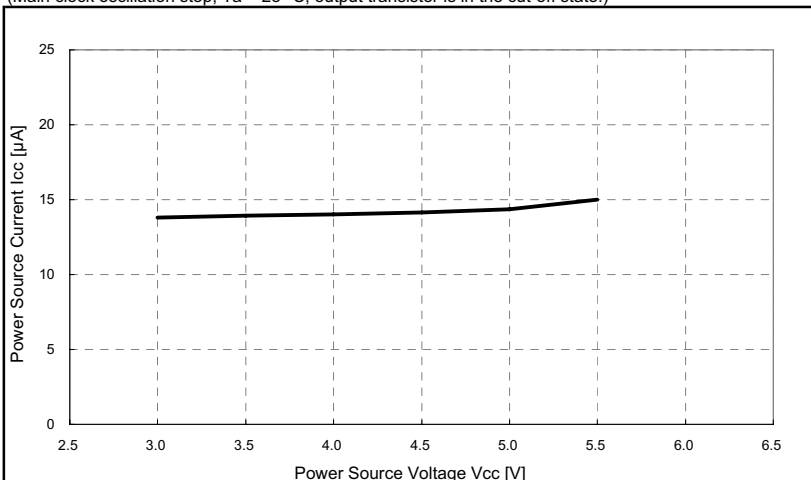
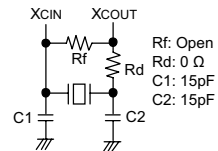


Fig. 4. Vcc-Icc (low-speed mode)

Clock source
f(Xcin) = Crystal oscillator
Frequency: 32.768kHz
Load capacitance:12.5pF

No Peripheral functions.
Xcin-Xcout drive capacity : High
Flash memory stop.



f(Xcin)=32kHz in low-power consumption mode, Program running on flash memory
(Main clock oscillation stop, Ta = 25 °C, output transistor is in the cut-off state.)

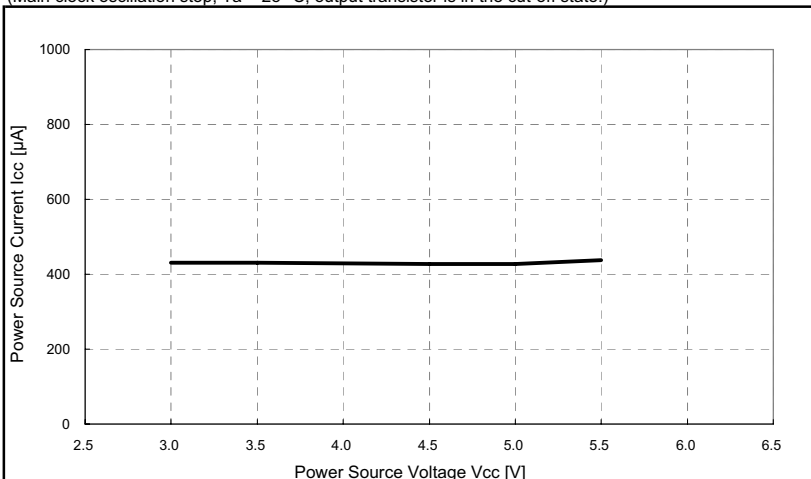
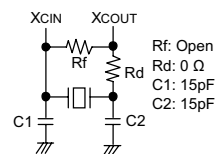


Fig. 5. Vcc-Icc (low-speed mode)

Clock source
f(Xcin) = Crystal oscillator
Frequency: 32.768kHz
Load capacitance:12.5pF

No Peripheral functions.
Xcin-Xcout drive capacity : High



On-chip oscillator operating, f2(ROC) selected, f(BCLK)=1MHz (external oscillation stop, output transistor is in the cut-off state.*)

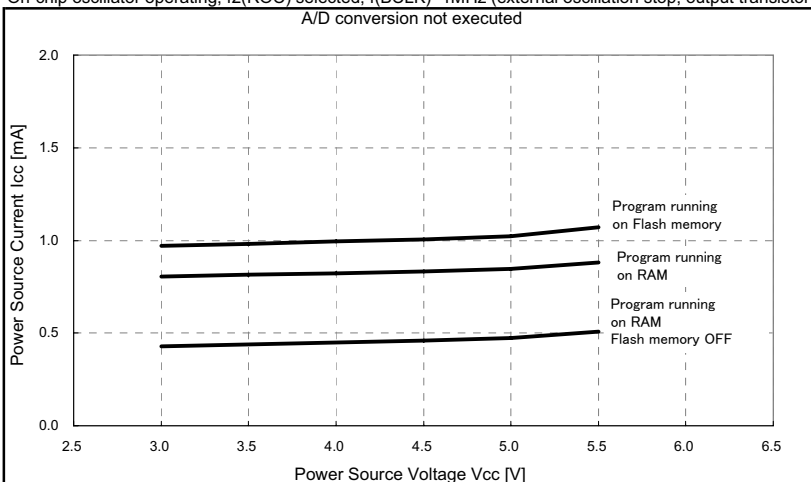


Fig. 6. Vcc-Icc (On-chip oscillator operating)

Clock source
On-chip oscillator
Select f2(ROC)

Division setting

ROC	Main	Timer
Divider	Clock	Timer
1/2	1/1	f1

* Timer pulse and serial data is output

f(Xcin)=32kHz in WIT instruction executed
(crystal oscillation, Xcin-Xcout drive capacity high, Ta = 25 °C, output transistor is in the cut-off state.)

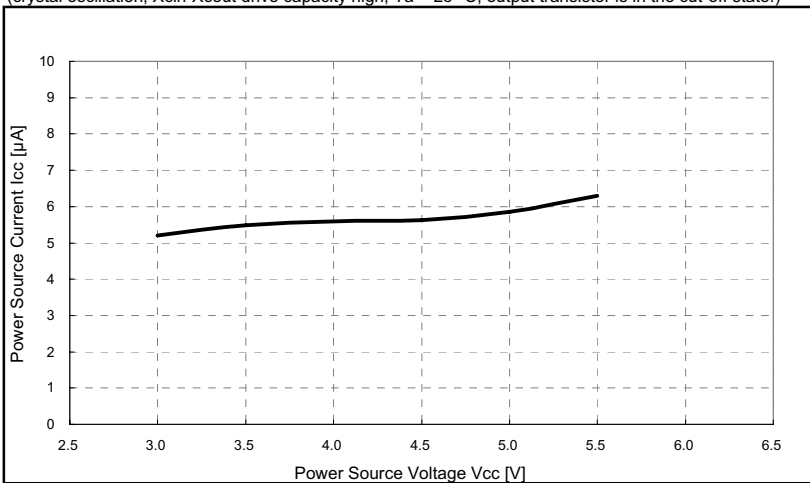
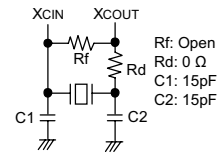


Fig. 7. Vcc-Icc (low-speed mode)

Clock source
f(Xcin) = Crystal oscillator
Frequency: 32.768kHz
Load capacitance:12.5pF

Xcin-Xcout drive capacity : High
Timer A0 running in timer mode from fc32.



f(Xcin)=32kHz in WIT instruction executed
(crystal oscillation, Xcin-Xcout drive capacity low, Ta = 25 °C, output transistor is in the cut-off state.)

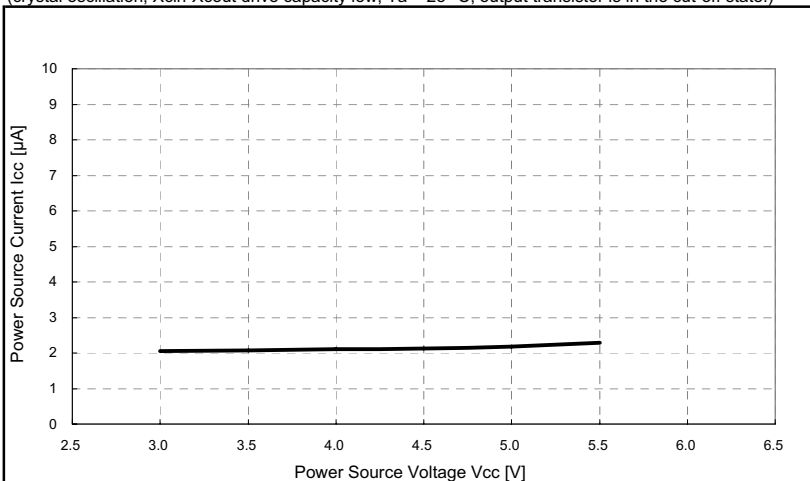
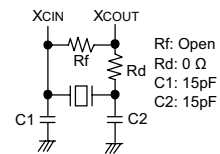


Fig. 8. Vcc-Icc (at WIT instruction executed)

Clock source
f(Xcin) = Crystal oscillator
Frequency: 32.768kHz
Load capacitance:12.5pF

Xcin-Xcout drive capacity : Low
Timer A0 running in timer mode from fc32.



Standard Characteristics Example

VOH-I_{OH} (V_{cc} = 5.5V, Ports P15-P17, P60-P67, P80-P87, P90-P93, P100-P107)

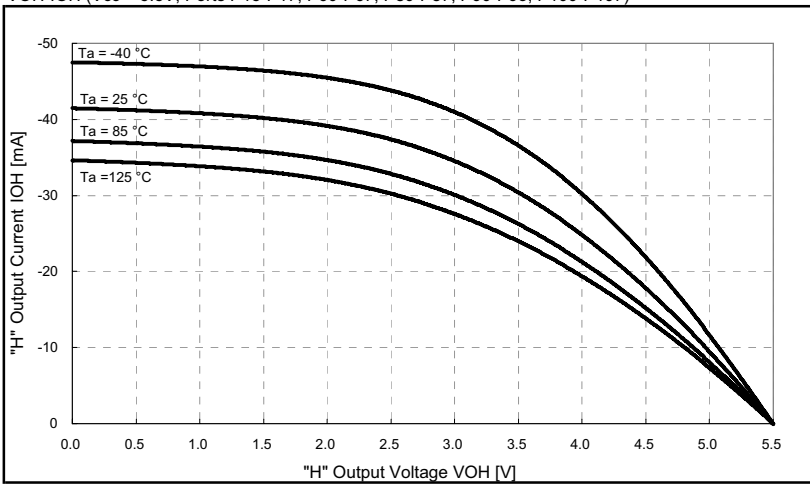


Fig. 9. VOH-I_{OH} (V_{cc} = 5.5V, Ports P15-P17, P60-P67, P80-P87, P90-P93, P100-P107)

VOH-I_{OH} (V_{cc} = 4.0V, Ports P15-P17, P60-P67, P80-P87, P90-P93, P100-P107)

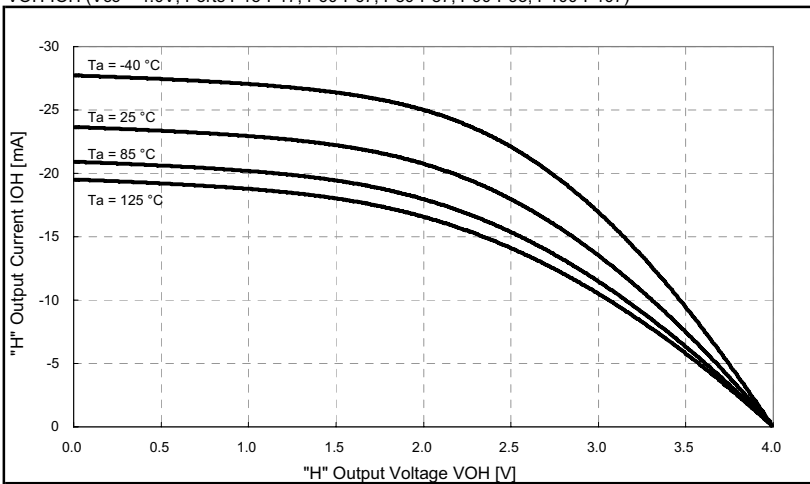


Fig. 10. VOH-I_{OH} (V_{cc} = 4.0V, Ports P15-P17, P60-P67, P80-P87, P90-P93, P100-P107)

VOH-I_{OH} (V_{cc} = 3.0V, Ports P15-P17, P60-P67, P80-P87, P90-P93, P100-P107)

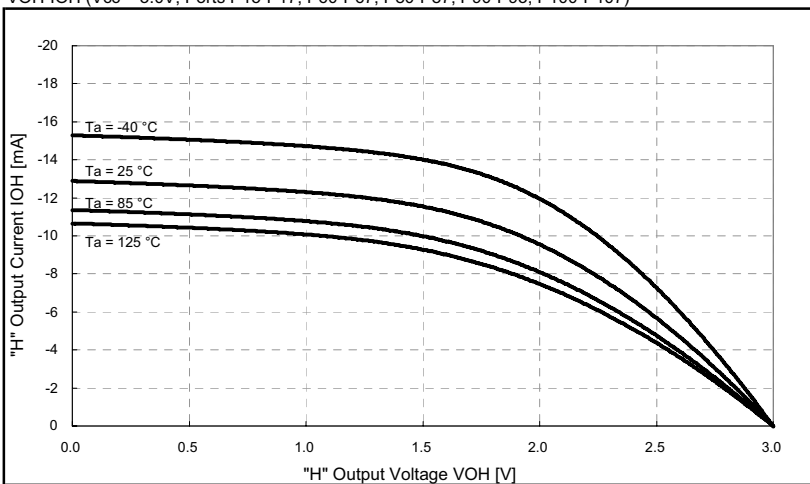


Fig. 11. VOH-I_{OH} (V_{cc} = 3.0V, Ports P15-P17, P60-P67, P80-P87, P90-P93, P100-P107)

(3) Port Standard Characteristics Example (VOL-IOL)

VOL-IOL (Vcc = 5.5V, Ports P15-P17, P60-P67, P80-P87, P90-P93, P100-P107)

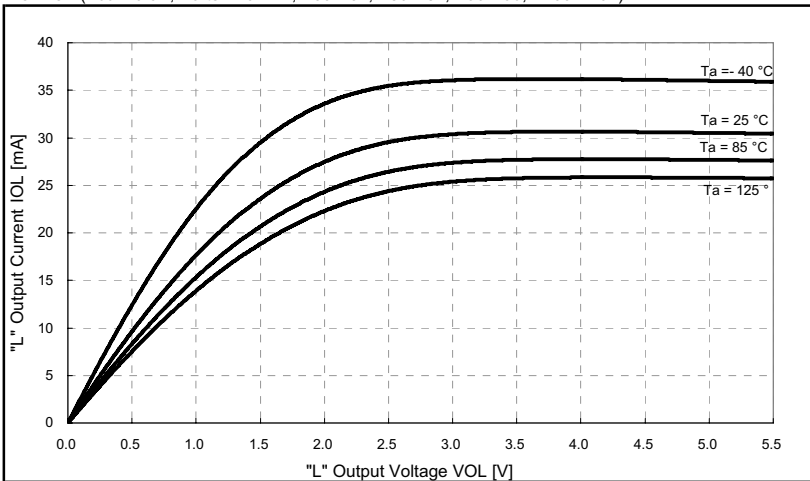


Fig. 12. VOL-IOL (Vcc = 5.5V, Ports P15-P17, P60-P67, P80-P87, P90-P93, P100-P107)

VOL-IOL (Vcc = 4.0V, Ports P15-P17, P60-P67, P80-P87, P90-P93, P100-P107)

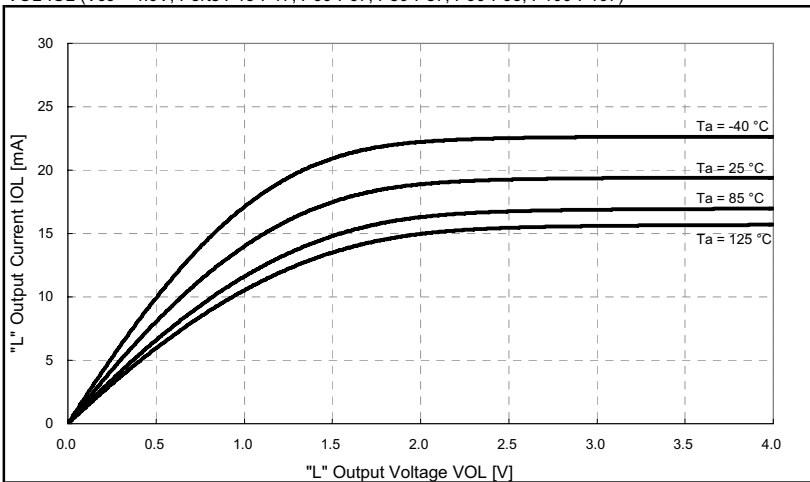


Fig. 13. VOL-IOL (Vcc = 4.0V, Ports P15-P17, P60-P67, P80-P87, P90-P93, P100-P107)

VOL-IOL (Vcc = 3.0V, Ports P15-P17, P60-P67, P80-P87, P90-P93, P100-P107)

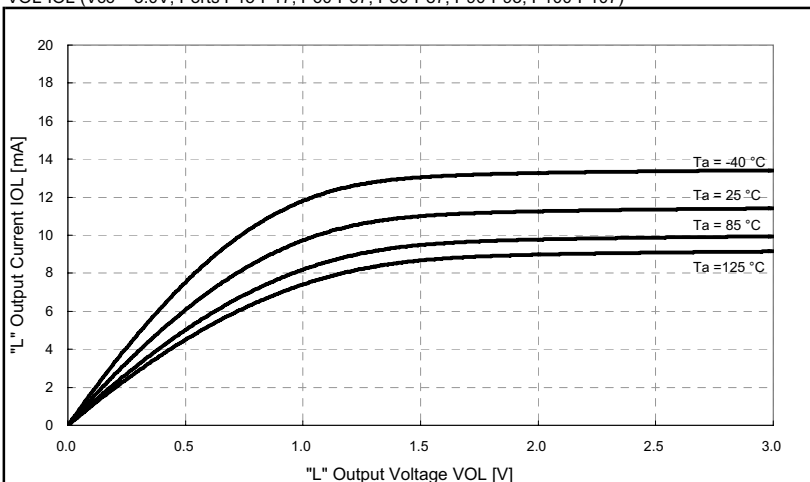


Fig. 14. VOL-IOL (Vcc = 3.0V, Ports P15-P17, P60-P67, P80-P87, P90-P93, P100-P107)

(4) Port Standard Characteristics Example (Vcc-IIL)

Vcc-IIL (Ports P15-P17, P60-P67, P70-P77, P80-P87, P90-P93, P100-P107 when connecting pull-up transistor.)

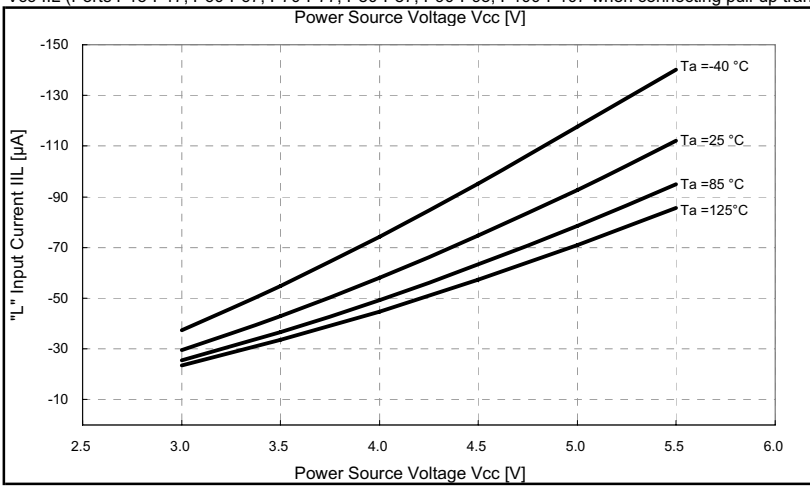


Fig. 15. Vcc-IIL (Ports P15-P17, P60-P67, P70-P77, P80-P87, P90-P93, P100-P107 when connecting pull-up transistor)

(5) Port Standard Characteristics Example (Vcc-VIH VIL)

Vcc-VIH VIL (I/O Ports (CMOS) , Ports P60-P67, P70-P77, P80, P81, P85-P87, P90-P93, P100-P107, Ta = 25°C)

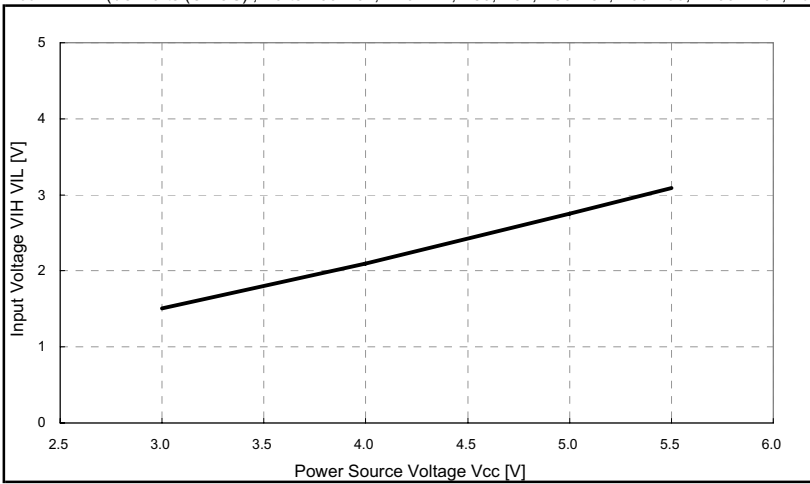


Fig. 16. Vcc-VIH VIL (I/O Ports (CMOS) , Ports P60-P67, P70-P77, P80, P81, P85-P87, P90-P93, P100-P107)

Vcc-VIH VIL (I/O Ports, Ports P15-P17, P82-P84, Ta = 25°C)

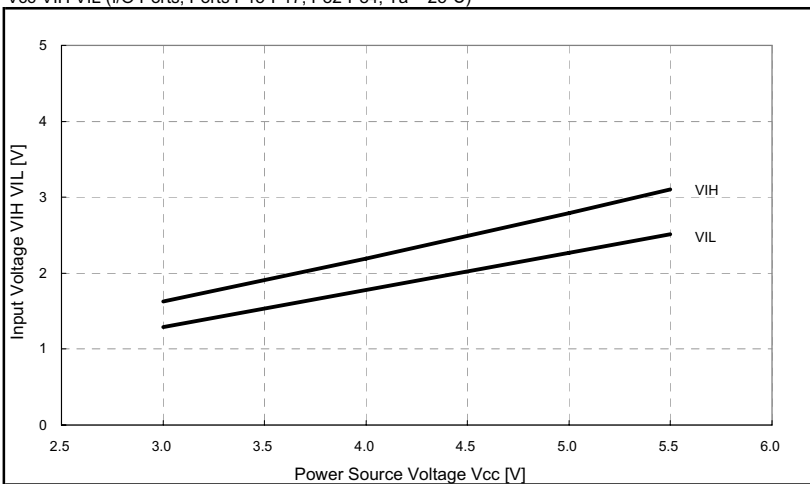


Fig. 17. Vcc-VIH VIL (I/O Ports, Ports P15-P17, P82-P84)

Vcc-VIH VIL (RESET pin, Ta = 25°C)

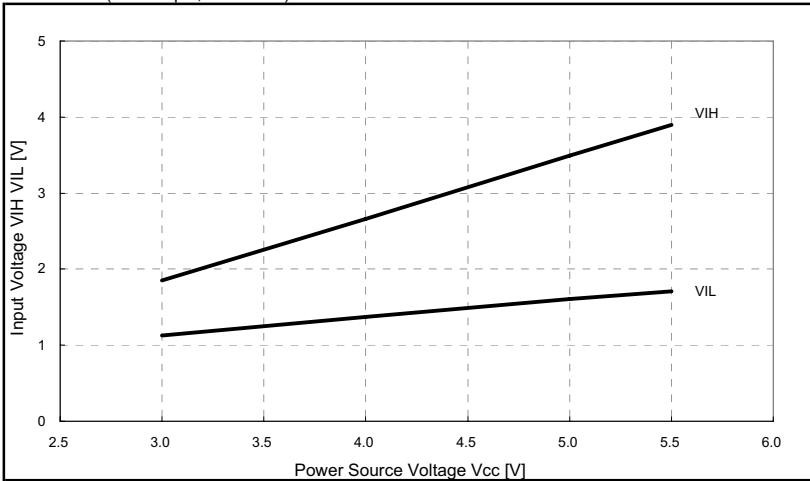


Fig. 18. Vcc-VIH VIL (RESET pin)

Vcc-VIH VIL (XIN pin, Ta = 25°C)

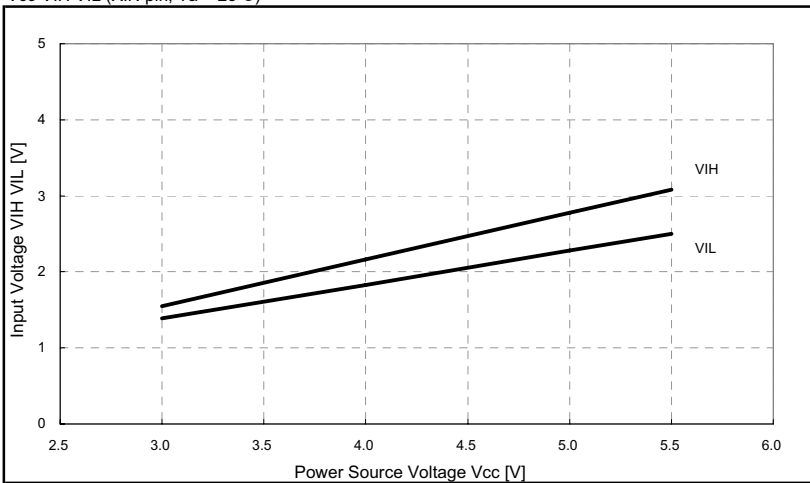


Fig. 19. Vcc-VIH VIL (XIN pin)

Vcc-HYS ($\overline{\text{RESET}}$ pin, Ta = 25°C)

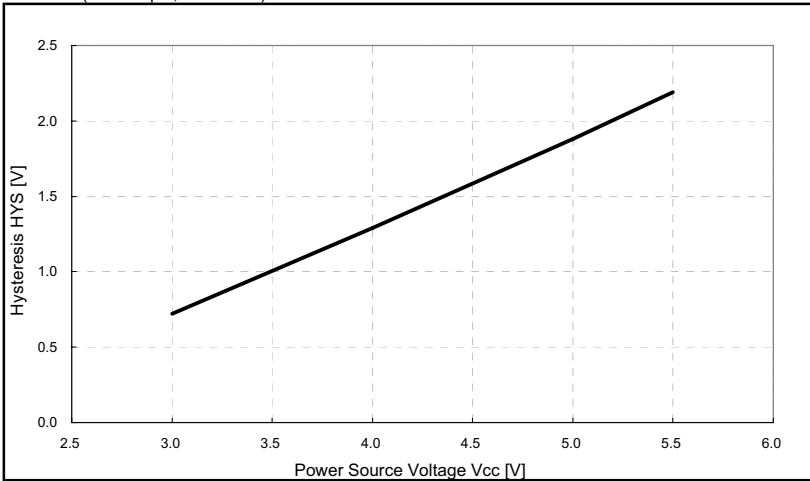


Fig. 20. Vcc-HYS ($\overline{\text{RESET}}$ pin)

Vcc-HYS (TA0IN-TA4IN, TB0IN-TB2IN, NMI, ADTRIG, CTS0-CTS2, CLK0-CLK2, TA2OUT-TA4OUT, KI0-KI3, RxD0-RxD2, Ta = 25 °C)

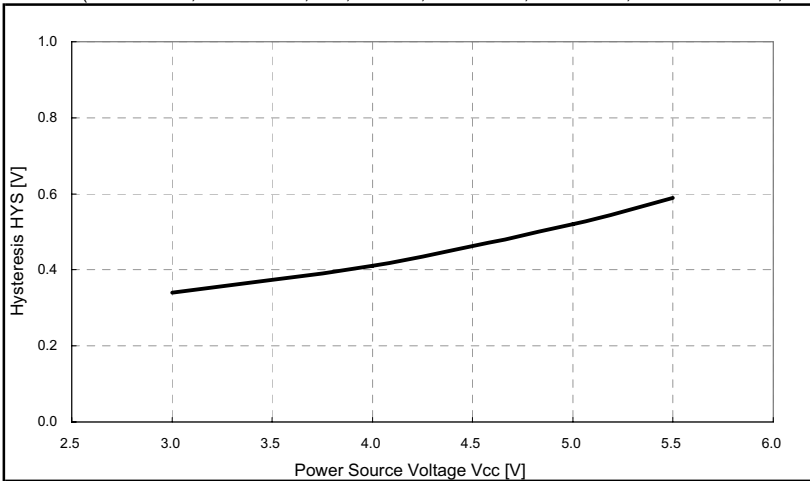


Fig. 21. Vcc-HYS (TA0IN-TA4IN, TB0IN-TB2IN, NMI, ADTRIG, CTS0-CTS2, CLK0-CLK2, TA2OUT-TA4OUT, KI0-KI3, RxD0-RxD2)

Vcc-HYS (INT0- INT5 Ta = 25°C)

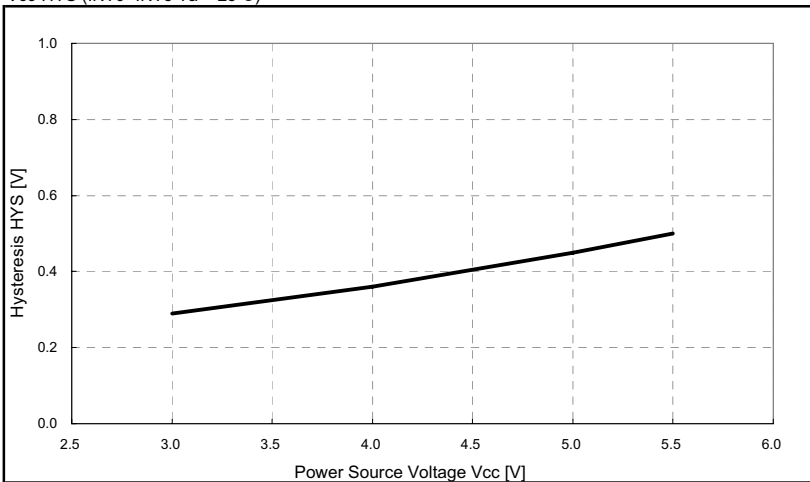


Fig. 22. Vcc-HYS (INT0- INT5)

Standard Characteristics Example
A/D conversion accuracy standard characteristics example-1

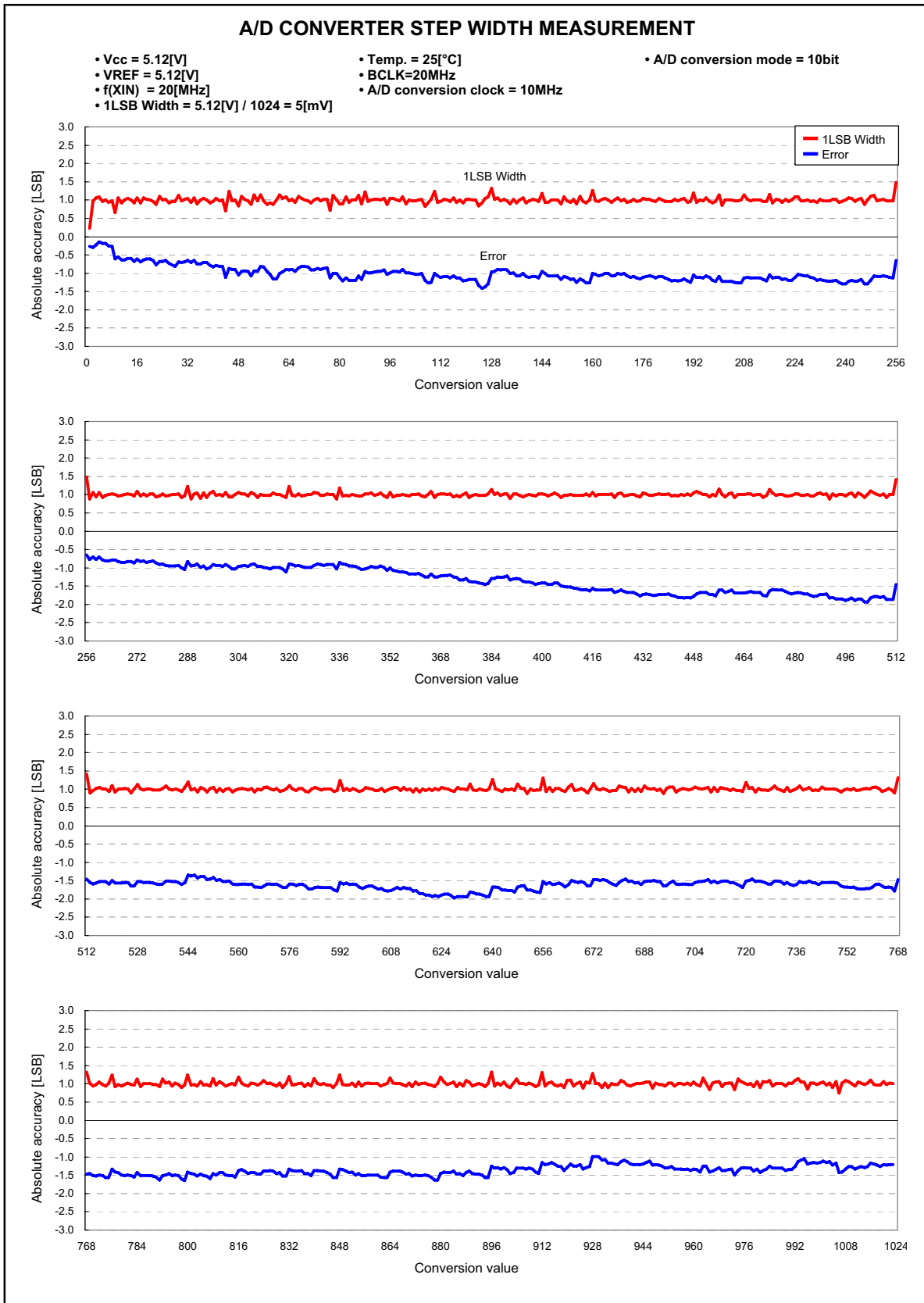


Fig. 23. A/D conversion accuracy standard characteristics example-1

A/D conversion accuracy standard characteristics example-2

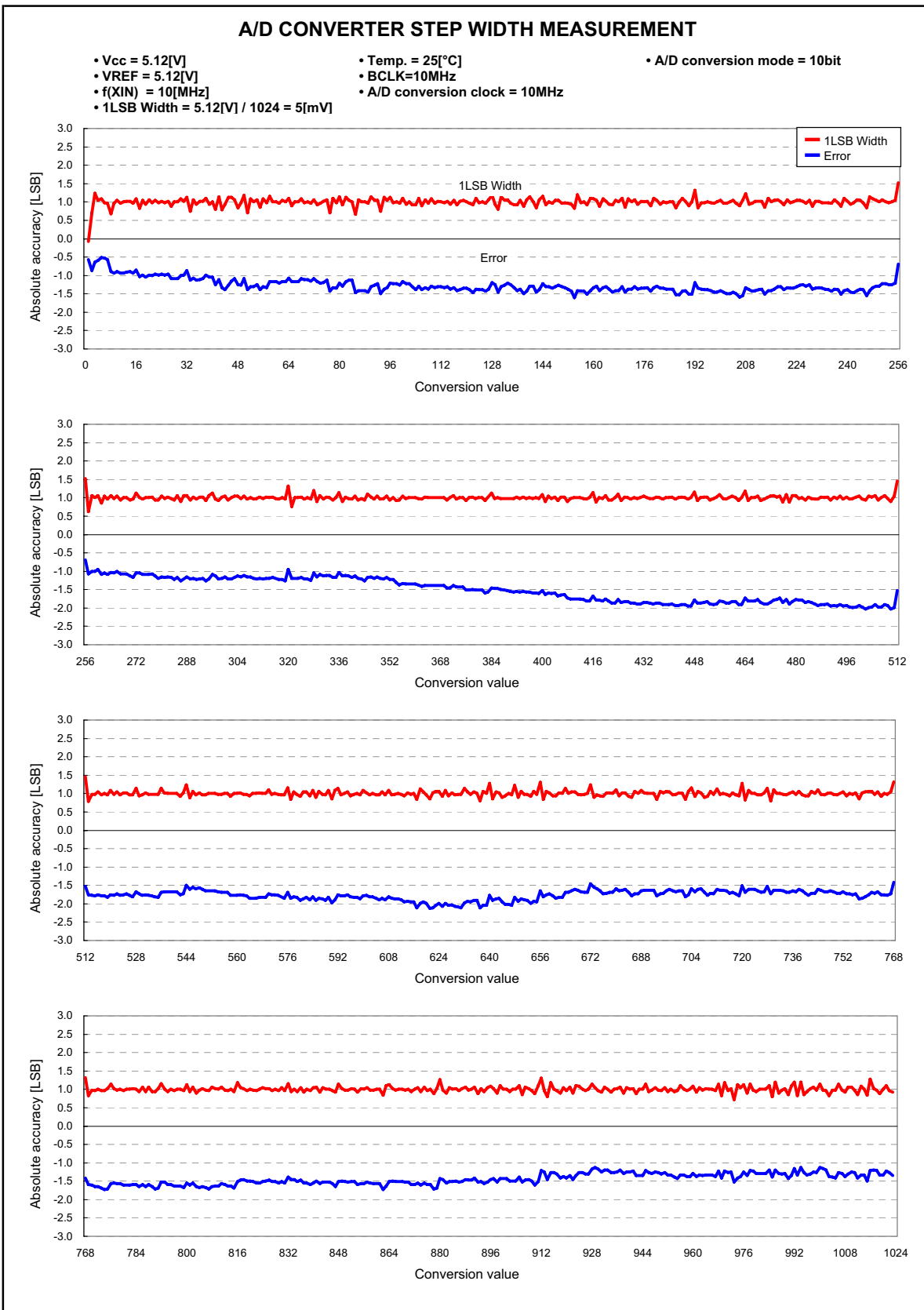


Fig. 24. A/D conversion accuracy standard characteristics example-2

A/D conversion accuracy standard characteristics example-3

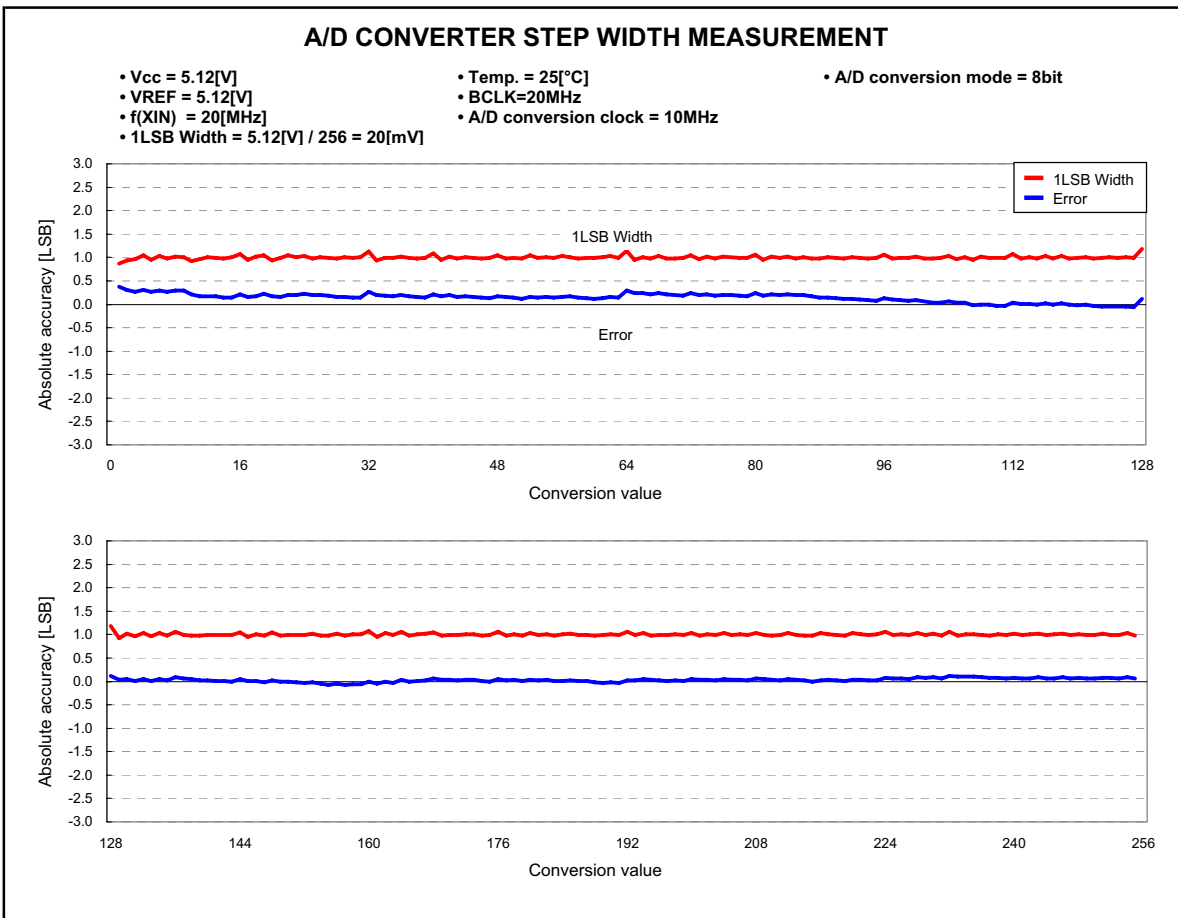


Fig. 25. A/D conversion accuracy standard characteristics example-3

A/D conversion accuracy standard characteristics example-4

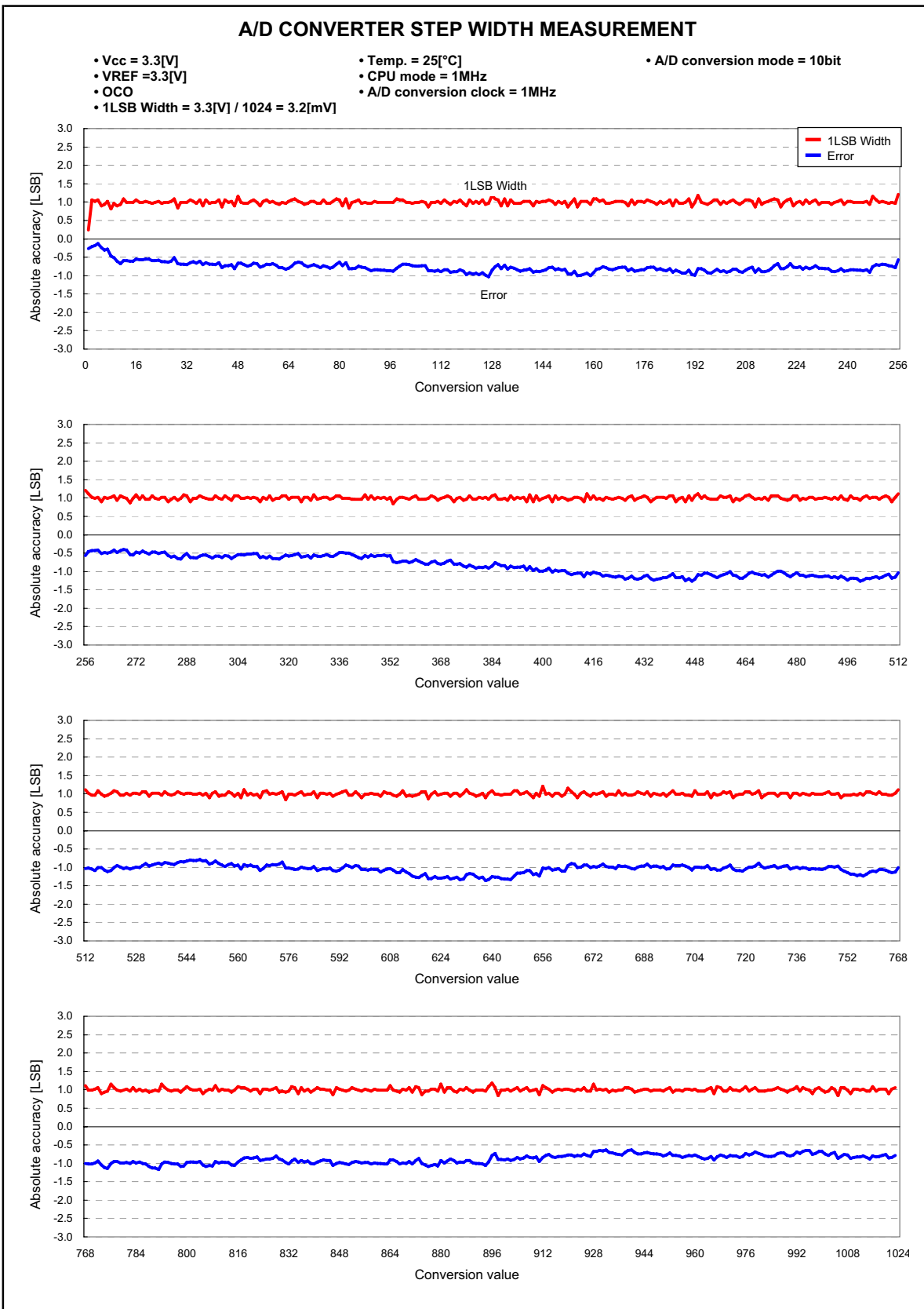


Fig. 26. A/D conversion accuracy standard characteristics example-4

A/D conversion accuracy standard characteristics example-5

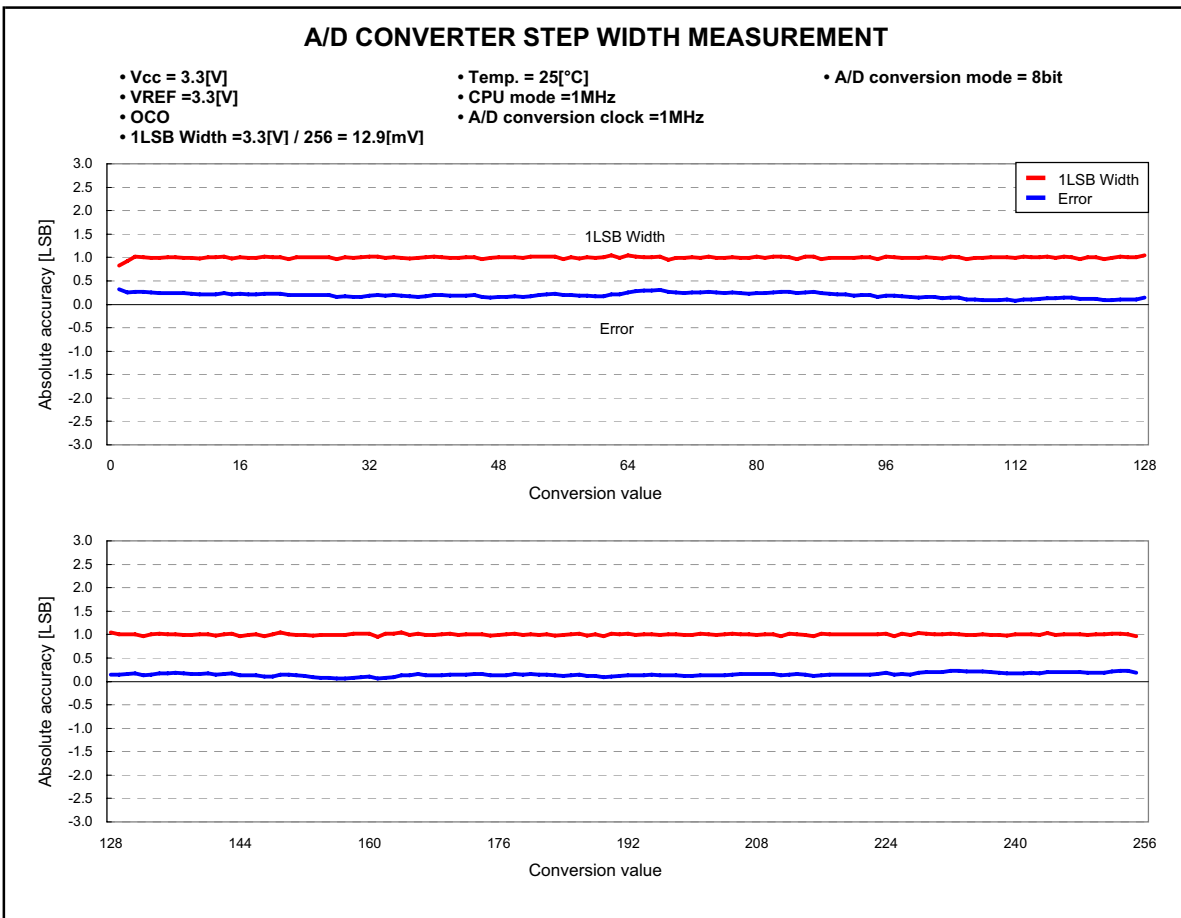


Fig. 27. A/D conversion accuracy standard characteristics example-5

Standard Characteristics Example

On-chip oscillator frequency characteristics (Vcc-f1(ROC))

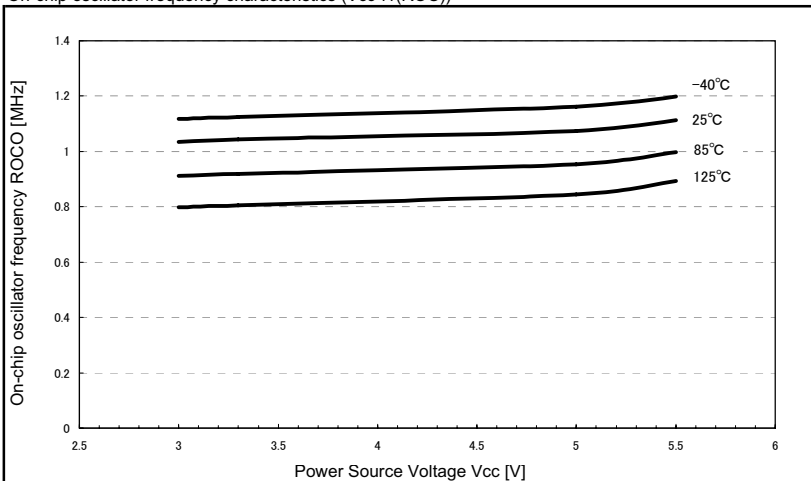


Fig. 28. Vcc-f1(ROC)

On-chip oscillator frequency characteristics (Ta-f1(ROC))

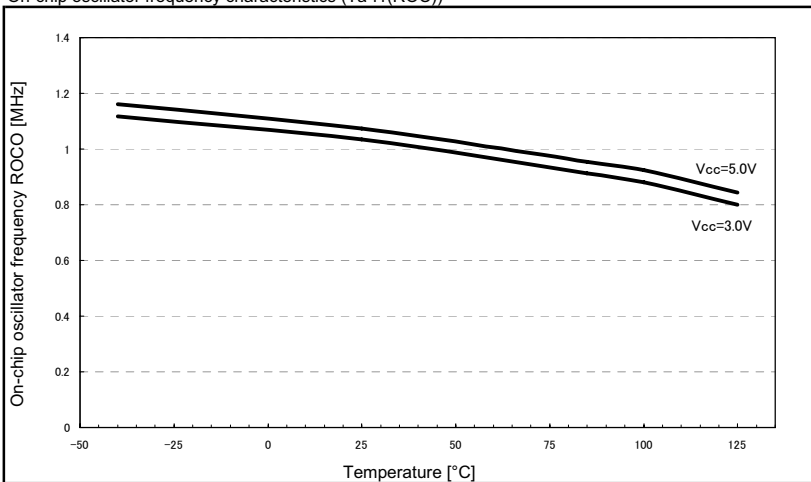


Fig. 29. Ta-f1(ROC)

On-chip oscillator frequency characteristics (Vcc-f2(ROC))

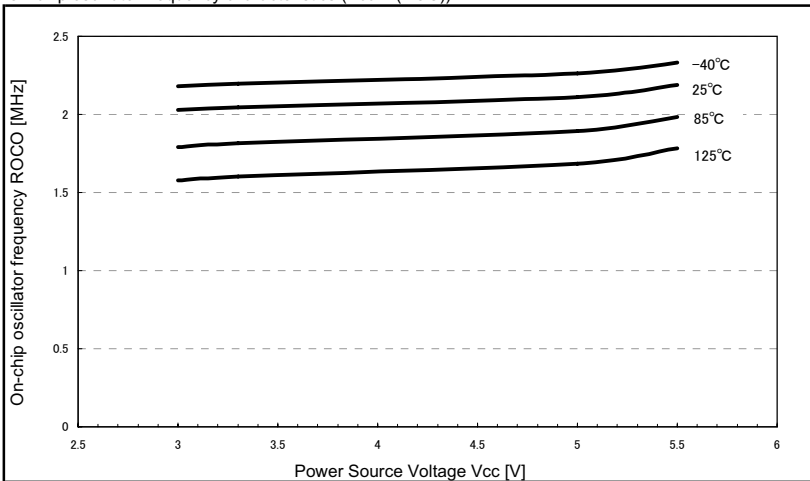


Fig. 30. Vcc-f2(ROC)

On-chip oscillator frequency characteristics (Ta-f2(ROC))

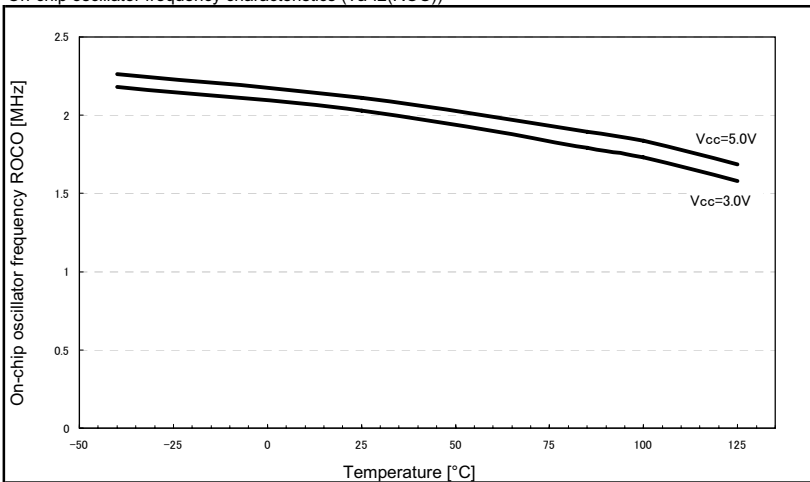


Fig. 31. Ta-f2(ROC)

On-chip oscillator frequency characteristics (Vcc-f3(ROC))

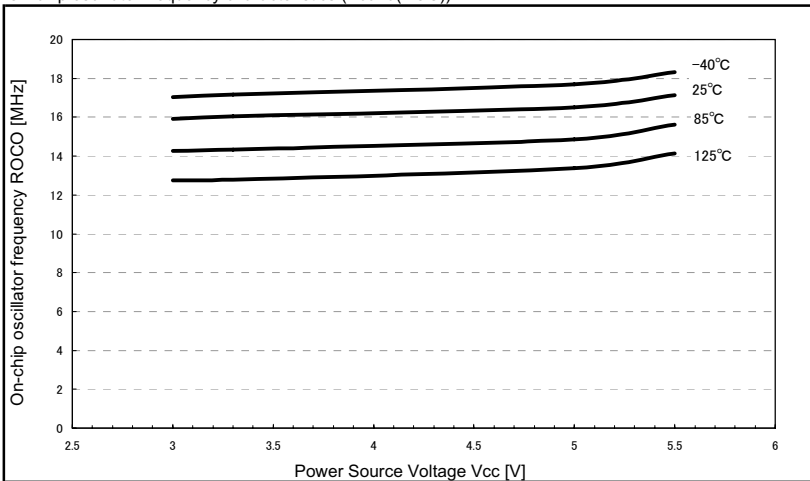


Fig. 32. Vcc-f3(ROC)

On-chip oscillator frequency characteristics (Ta-f3(ROC))

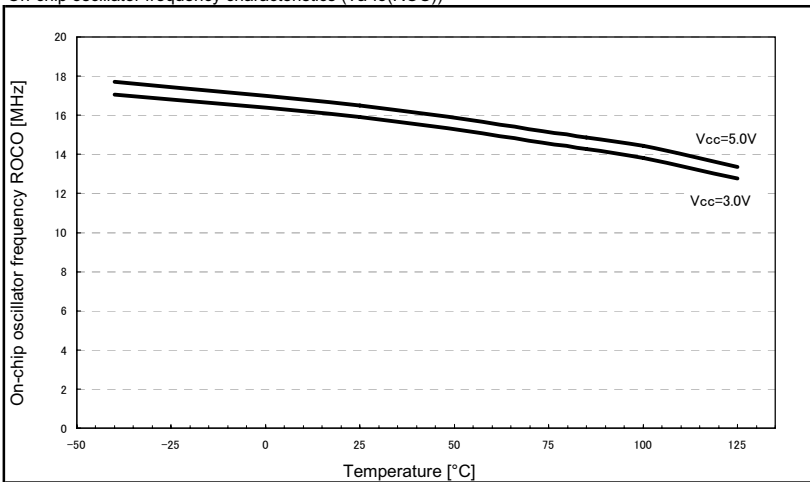


Fig. 33. Ta-f3(ROC)