M16C/64A

Standard Characteristics (1)

Related Part No. :
R5F364A6NFA、R5F364A6NFB、R5F364A6DFA、 R5F364A6DFB、
R5F364AENFA、R5F364AENFB、R5F364AEDFA、 R5F364AEDFB

R01ZZ0005EJ0100_M16C64A

Standard Characteristics

Table of Contents

1.Input voltage(1)

(1)“H” Input voltage

■Related Pin
P0_0-P0_7、P1_0-P1_7、P2_0-P2_7、P3_0
(in single-chip mode)
P3_1-P3_7、P4_0-P4_7、P5_0-P5_7、P6_0-P6_7
P7_0-P7_7、P8_0-P8_7、P9_0-P9_7、P10_0-P10_7
■Operating Condition
Topr=-40,25,85 (degreesC)
Vcc=2.7V to 5.5V

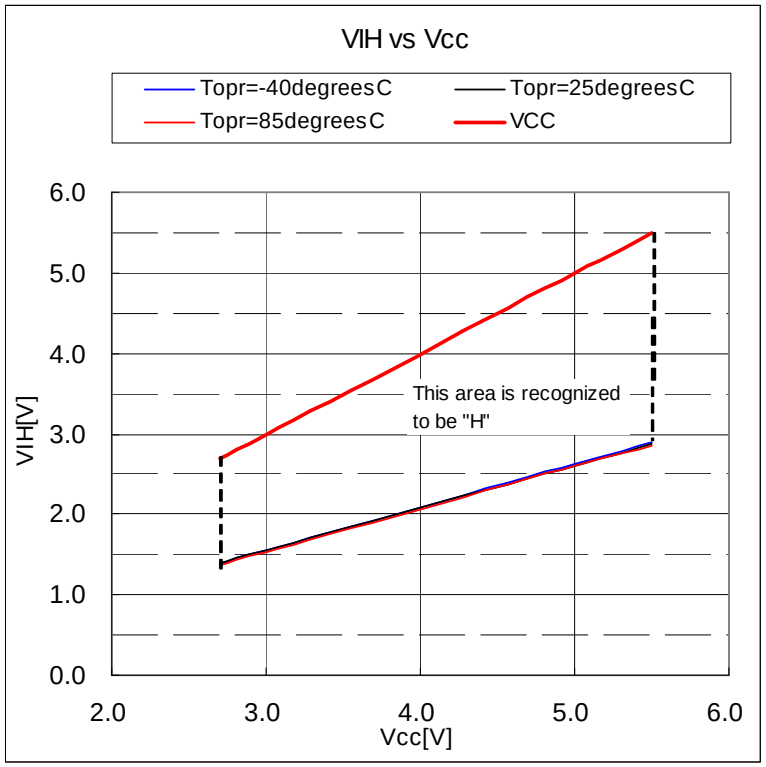


Figure1. VIH vs Vcc(in single-chip mode)

■Related Pin
P0_0-P0_7、P1_0-P1_7、P2_0-P2_7、P3_0
(data input in memory expansion and microprocessor mode)
■Operating Condition
Topr=-40,25,85 (degreesC)
Vcc=2.7V to 5.5V

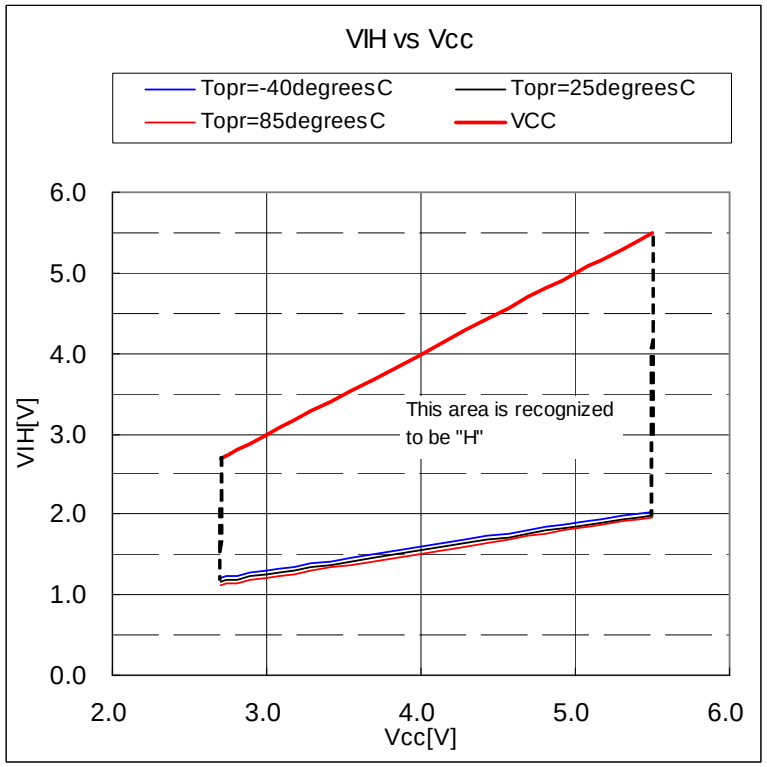


Figure2. VIH vs Vcc(data input in memory expansion and microprocessor mode)

The mentioned value is only for your reference. The value is for the arbitrary samples and does not guarantee the product's characteristics.

1.Input voltage(2)

(2)“L” Input voltage

■Related Pin
P0_0-P0_7、P1_0-P1_7、P2_0-P2_7、P3_0
(in single-chip mode)
P3_1-P3_7、P4_0-P4_7、P5_0-P5_7、P6_0-P6_7
P7_0-P7_7、P8_0-P8_7、P9_0-P9_7、P10_0-P10_7
■Operating Condition
Topr=-40,25,85 (degreesC)
Vcc=2.7V to 5.5V

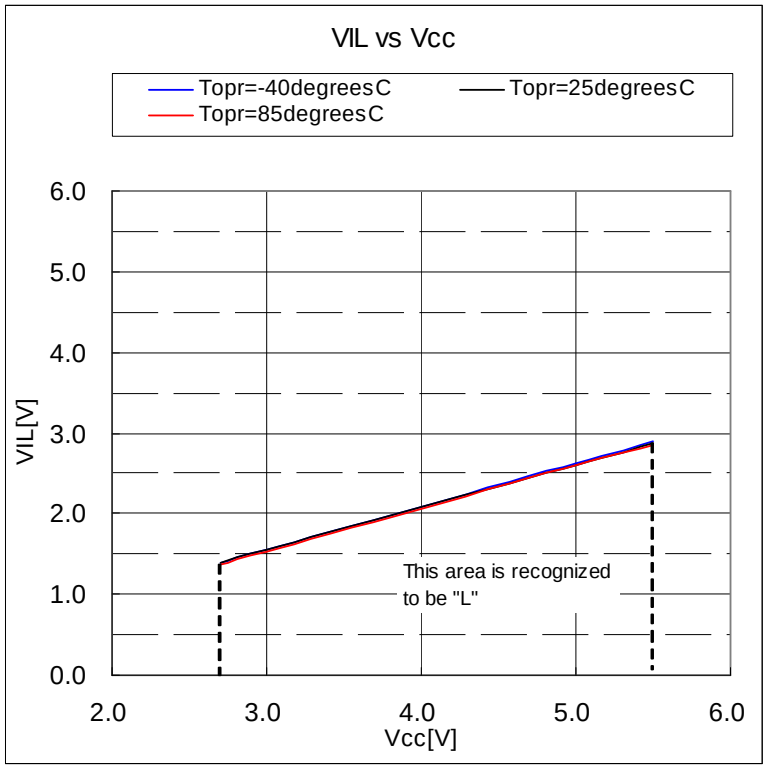


Figure3. VIL vs Vcc(in single-chip mode)

■Related Pin
P0_0-P0_7、P1_0-P1_7、P2_0-P2_7、P3_0
(data input in memory expansion and microprocessor mode)
■Operating Condition
Topr=-40,25,85 (degreesC)
Vcc=2.7V to 5.5V

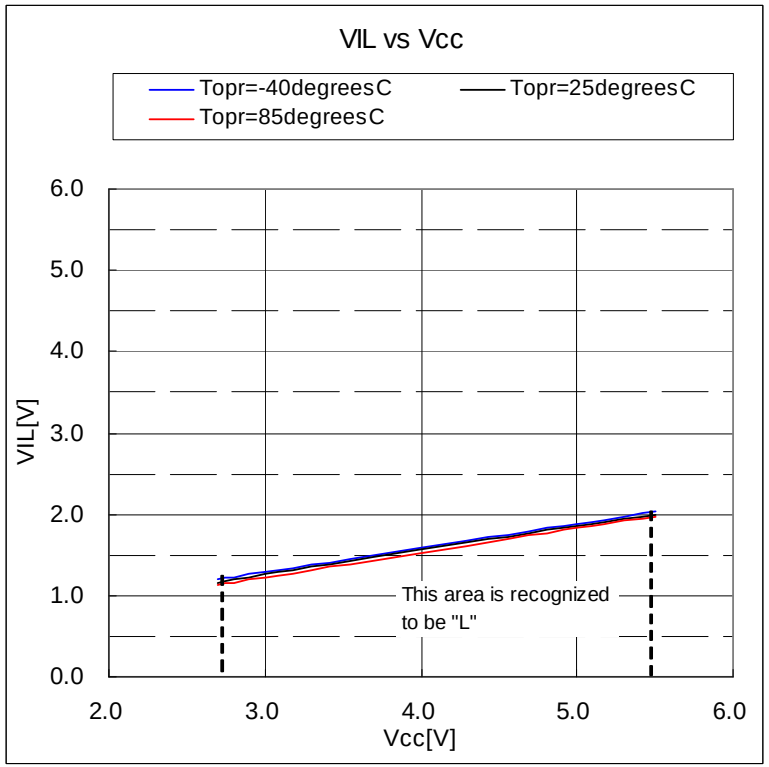


Figure4. VIL vs Vcc(data input in memory expansion and microprocessor mode)

The mentioned value is only for your reference. The value is for the arbitrary samples and does not guarantee the product's characteristics.

2.Hysteresis(1)

(1)Interrupt pin

■Related Pin

HOLD,RDY,TA0IN-TA4IN,TB0IN-TB5IN,INT0-INT7,NMI,ADTRG,CTS0-CTS2,CTS5-CTS7,SCL0-SCL2
SCL5-SCL7,SDA0-SDA2,SDA5-SDA7,CLK0-CLK7,TA0OUT-TA4OUT,KIO-KI3,RXD0-RXD2,RXD5-RXD7,SIN3,SIN4

■Operating Condition

Topr=-40,25,85 (degrees C)
Vcc=2.7V to 5.5V

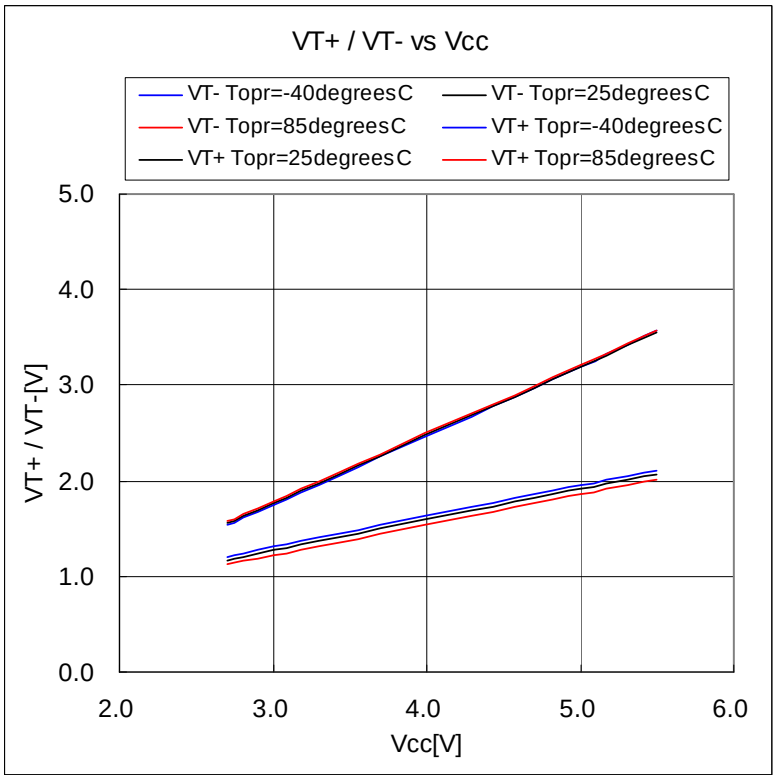


Figure5. VT+/VT- vs Vcc

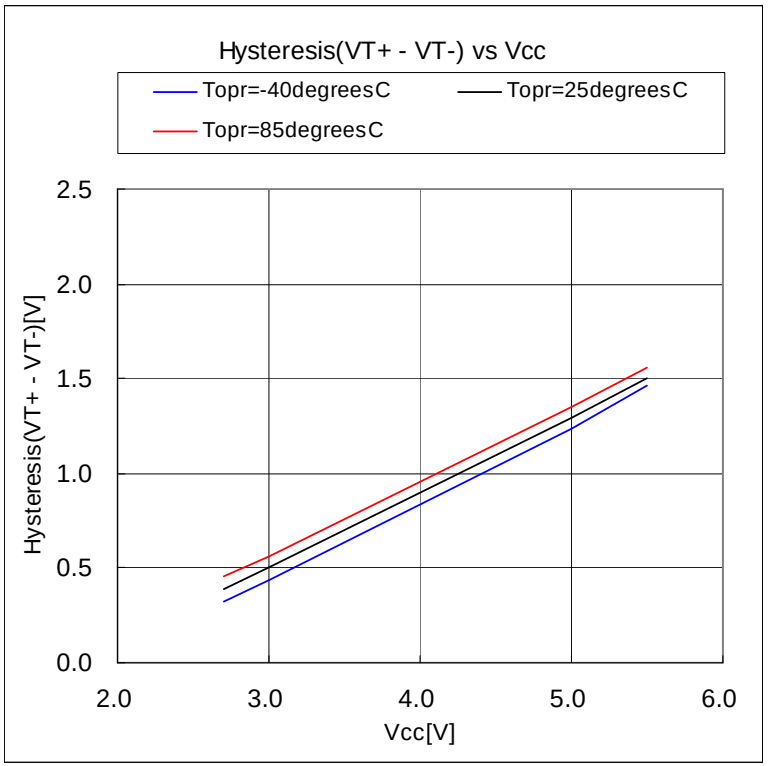


Figure6. Hysteresis (VT+-VT-) vs Vcc

The mentioned value is only for your reference. The value is for the arbitrary samples and does not guarantee the product's characteristics.

2.Hysteresis(2)

(2)RESET

■Related Pin

RESET

■Operating Condition

Topr=-40,25,85 (degrees C)

Vcc=2.7V to 5.5V

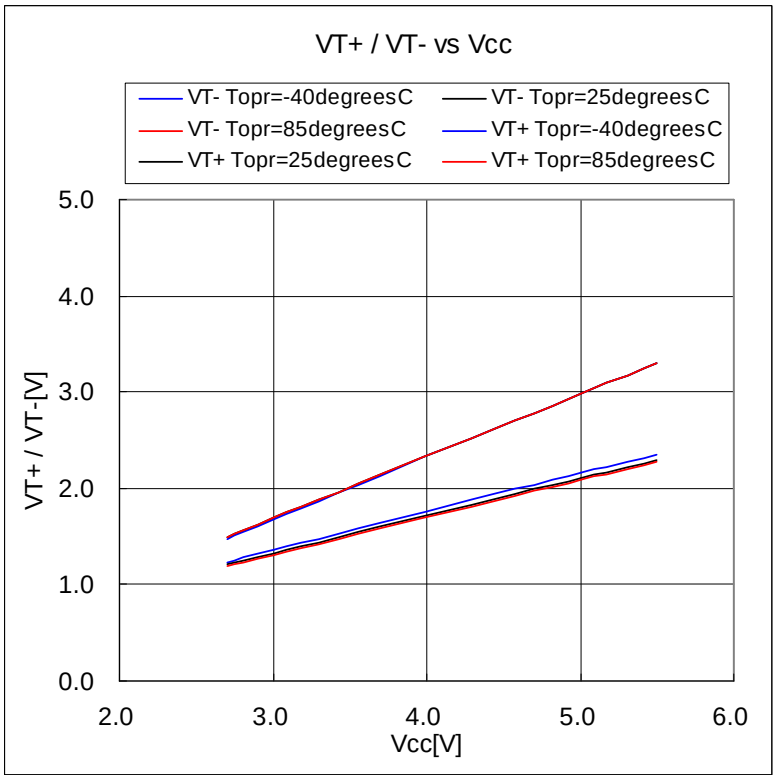


Figure7. VT+/VT- vs Vcc

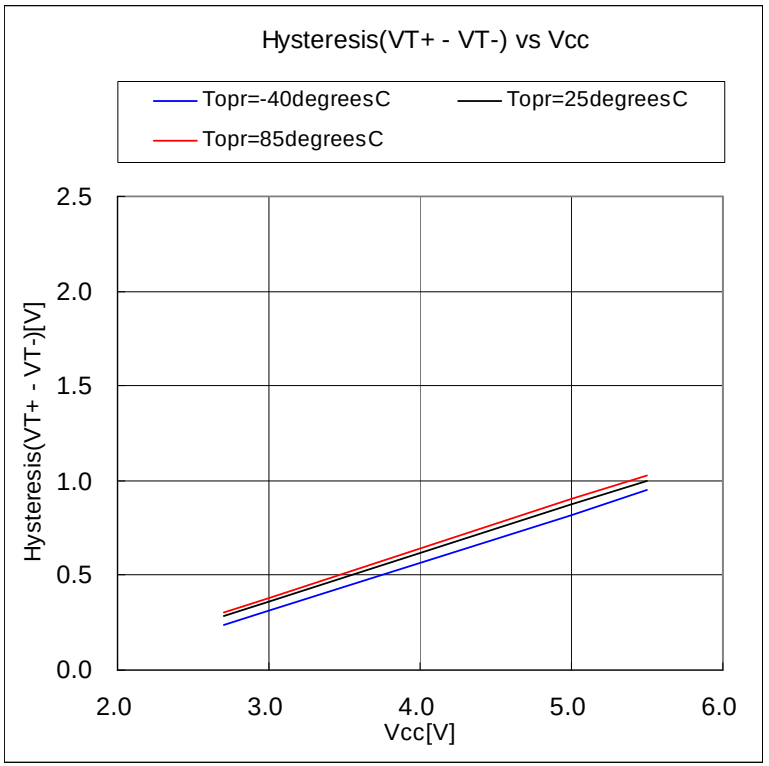


Figure8. Hysteresis (VT;-VT-) vs Vcc

The mentioned value is only for your reference. The value is for the arbitrary samples and does not guarantee the product's characteristics.

3.Output voltage(1)

(1)“H” Output voltage

■ Related Pin

P0_0-P0_7、P1_0-P1_7、P2_0-P2_7、P3_0-P3_7、P4_0-P4_7、P5_0-P5_7、P6_0-P6_7、P7_2-P7_7、P8_0-P8_4、P8_6-P8_7、P9_0-P9_7、P10_0-P10_7、

■Operating Condition

Topr=-40,25,85 (degrees C)

Vcc=3.0V

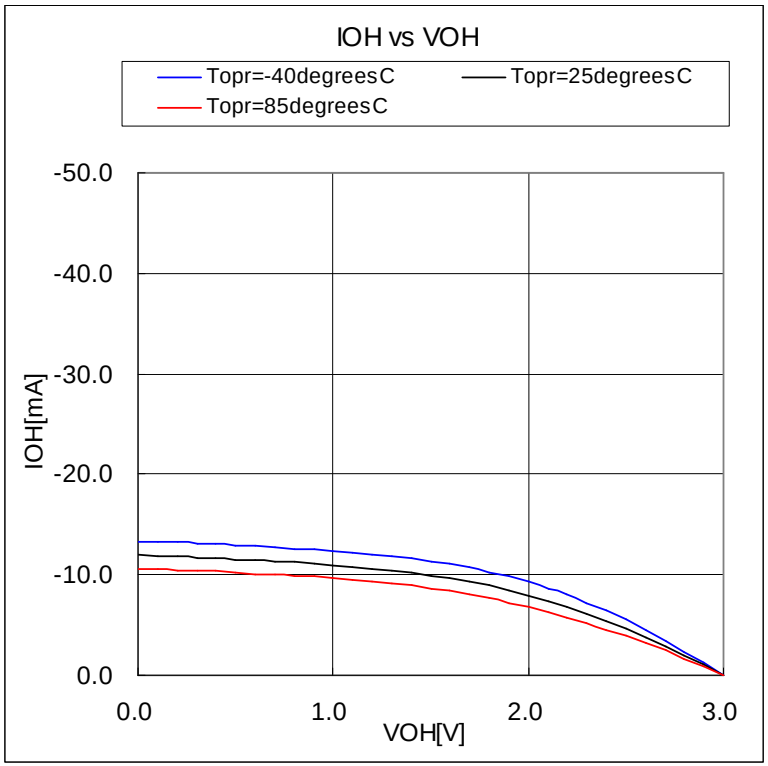


Figure9. IOH vs VOH (Vcc=3.0V)

■ Related Pin

P0_0-P0_7、P1_0-P1_7、P2_0-P2_7、P3_0-P3_7、P4_0-P4_7、P5_0-P5_7、P6_0-P6_7、P7_2-P7_7、P8_0-P8_4、P8_6-P8_7、P9_0-P9_7、P10_0-P10_7、

■Operating Condition

Topr=-40,25,85 (degrees C)

Vcc=5.0V

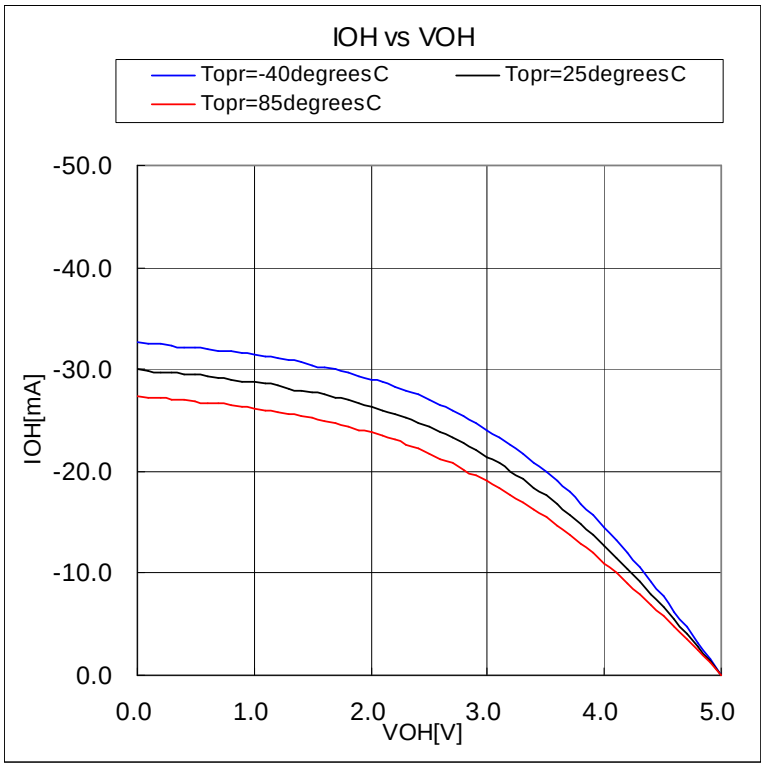


Figure10. IOH vs VOH (Vcc=5.0V)

The mentioned value is only for your reference. The value is for the arbitrary samples and does not guarantee the product's characteristics.

3.Output voltage(2)

(2)“L” Output voltage

■ Related Pin
P0_0-P0_7、P1_0-P1_7、P2_0-P2_7、P3_0-P3_7、P4_0-P4_7、P5_0-P5_7、P6_0-P6_7、P7_0-P7_7、P8_0-P8_7、P9_0-P9_7、P10_0-P10_7、
■Operating Condition
Topr=-40,25,85 (degrees C)
Vcc=3.0V

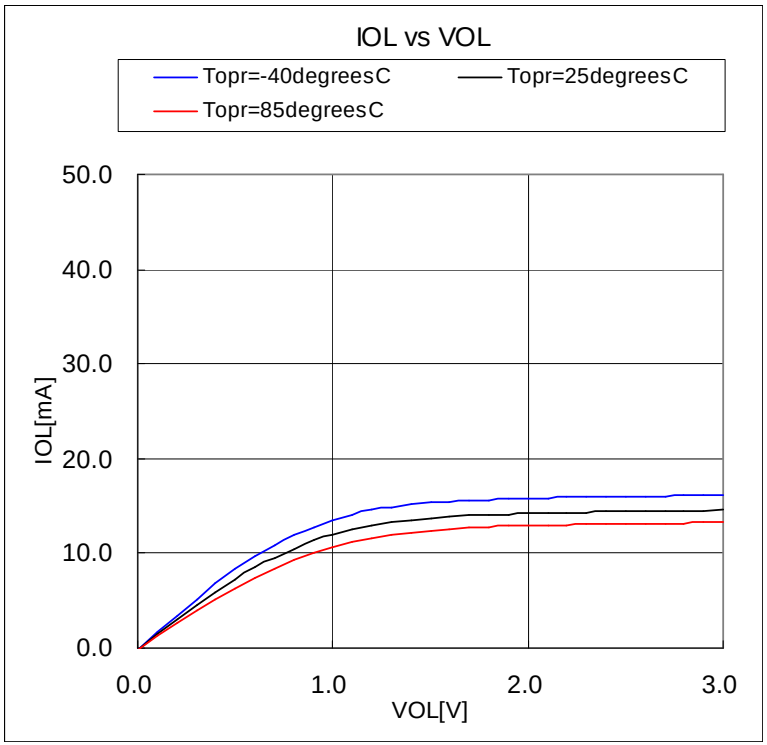


Figure11. IOL vs VOL (Vcc=3.0V)

■ Related Pin
P0_0-P0_7、P1_0-P1_7、P2_0-P2_7、P3_0-P3_7、P4_0-P4_7、P5_0-P5_7、P6_0-P6_7、P7_0-P7_7、P8_0-P8_7、P9_0-P9_7、P10_0-P10_7、
■Operating Condition
Topr=-40,25,85 (degrees C)
Vcc=5.0V

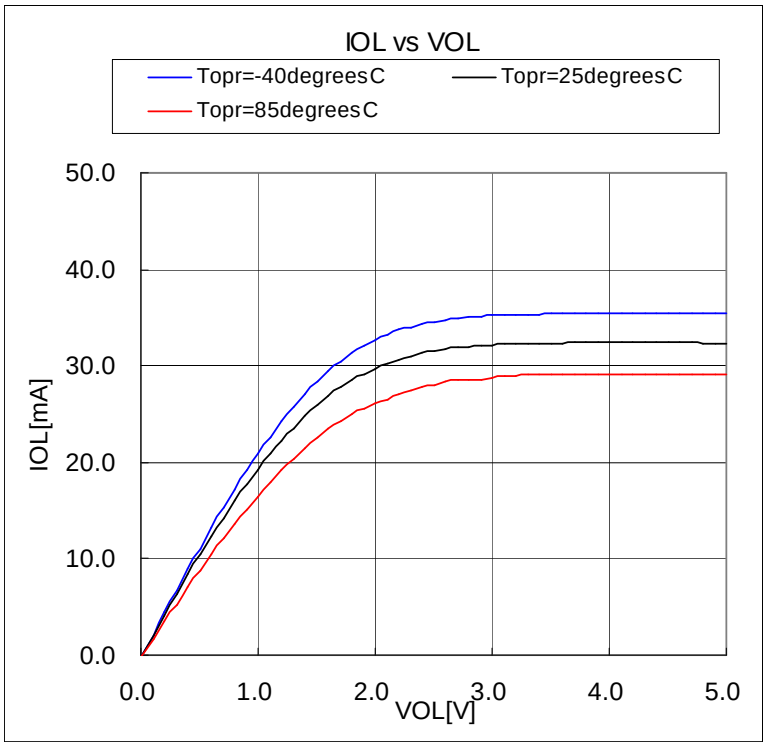


Figure12. IOL vs VOL (Vcc=5.0V)

The mentioned value is only for your reference. The value is for the arbitrary samples and does not guarantee the product's characteristics.

4.Pull-up resistance

(1)Pull-up MOS current(-Ip) vs Vcc

■ Related Pin

P0_0-P0_7、P1_0-P1_7、P2_0-P2_7、P3_0-P3_7、P4_0-P4_7、P5_0-P5_7、P6_0-P6_7、P7_2-P7_7、P8_0-P8_4、P8_6-P8_7、P9_0-P9_7、P10_0-P10_7、

■Operating Condition

Topr=-40,25,85 (degrees C)

Vcc=2.7V to 5.5V

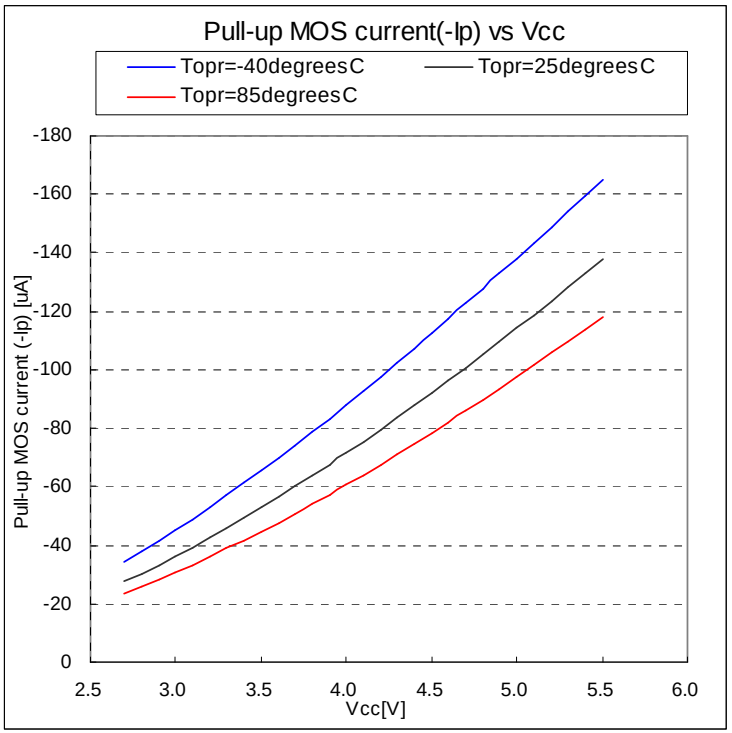


Figure13. Pull-up MOS current(-Ip) vs Vcc

(2)Rpullup vs Vcc

■ Related Pin

P0_0-P0_7、P1_0-P1_7、P2_0-P2_7、P3_0-P3_7、P4_0-P4_7、P5_0-P5_7、P6_0-P6_7、P7_2-P7_7、P8_0-P8_4、P8_6-P8_7、P9_0-P9_7、P10_0-P10_7、

■Operating Condition

Topr=-40,25,85 (degrees C)

Vcc=2.7V to 5.5V

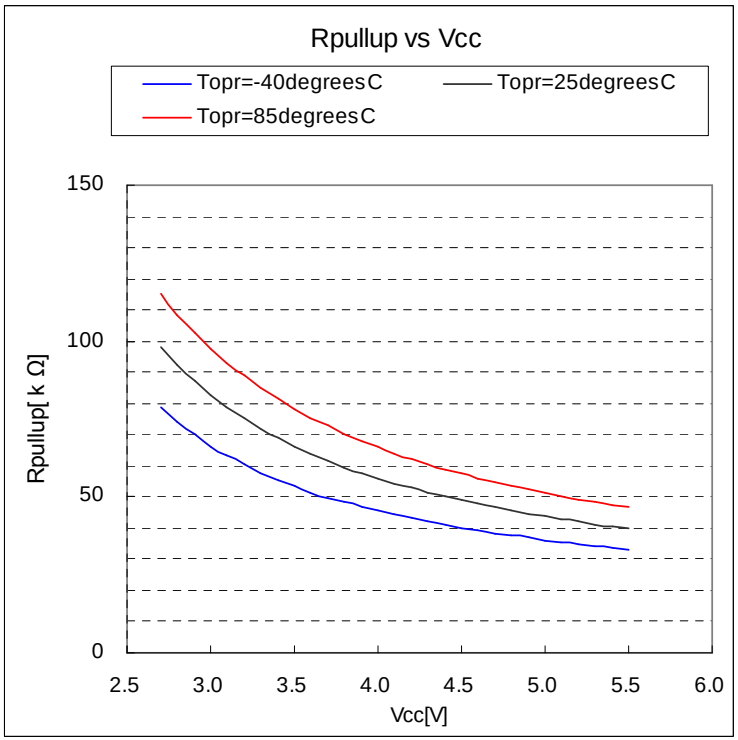


Figure14. Rpullup vs Vcc

The mentioned value is only for your reference. The value is for the arbitrary samples and does not guarantee the product's characteristics.

5.A/D Accuracy(1)

■ Related Pin

AN0-AN7、 AN0_0-AN0_7 、AN2_0-AN2_7、 ANEX0、ANEX1

■Operating Condition

Topr=-40,25,85 (degrees C)

Vcc=AVcc=VREF =5.12V

ϕAD=24MHz

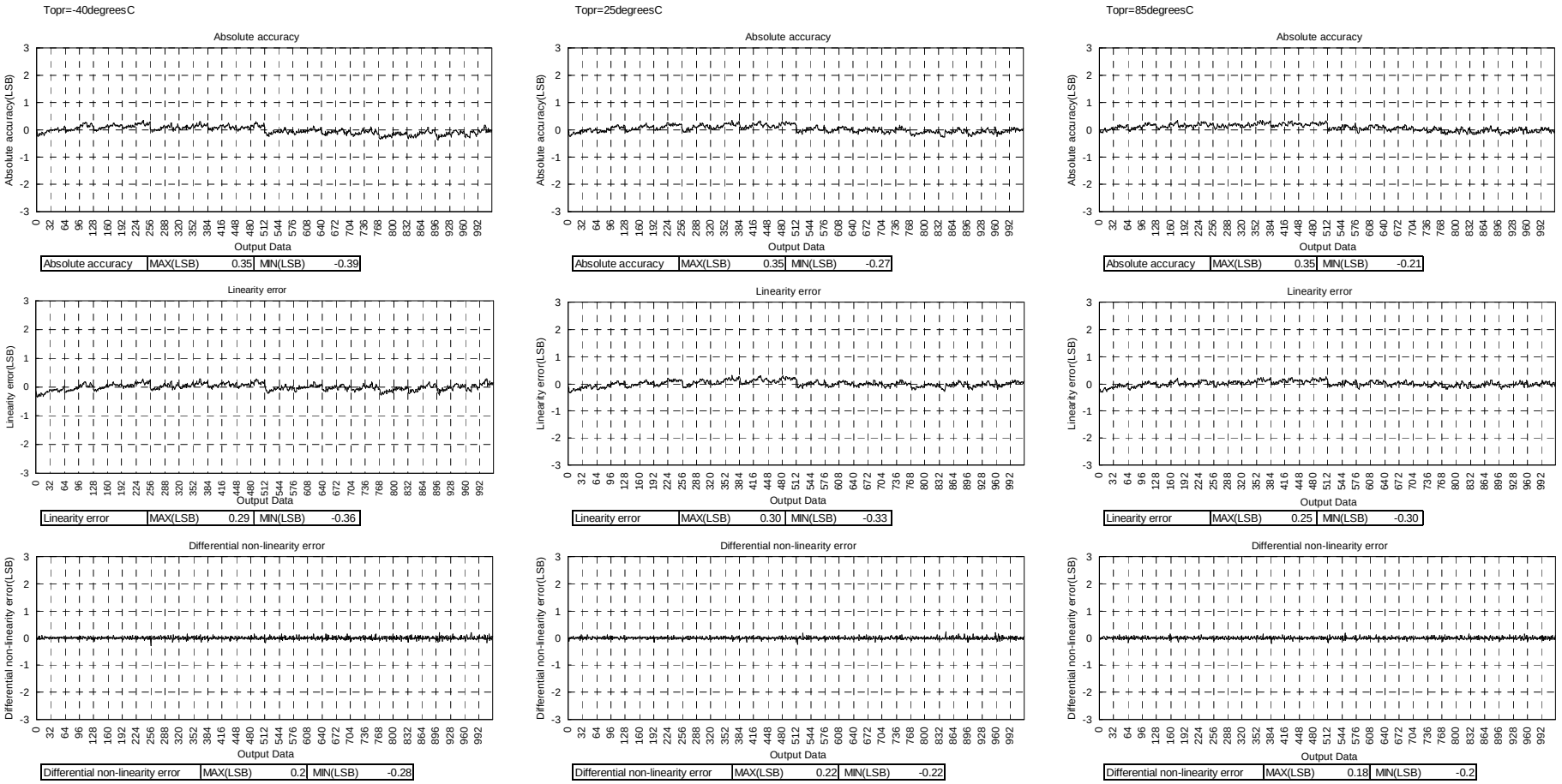


Figure15. Topr=-40(degrees C)

Figure16. Topr=25(degrees C)

Figure17. Topr=85(degrees C)

The mentioned value is only for your reference. The value is for the arbitrary samples and does not guarantee the product's characteristics.

5.A/D Accuracy(2)

■ Related Pin

AN0-AN7、 AN0_0-AN0_7 、AN2_0-AN2_7、 ANEX0、ANEX1

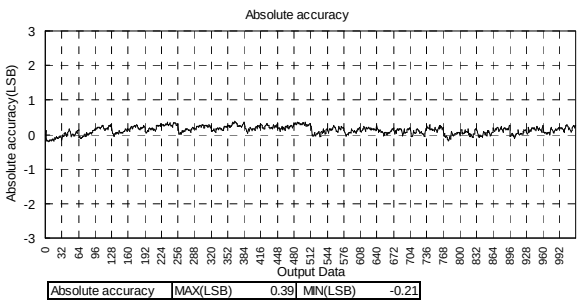
■Operating Condition

Topr=-40,25,85 (degrees C)

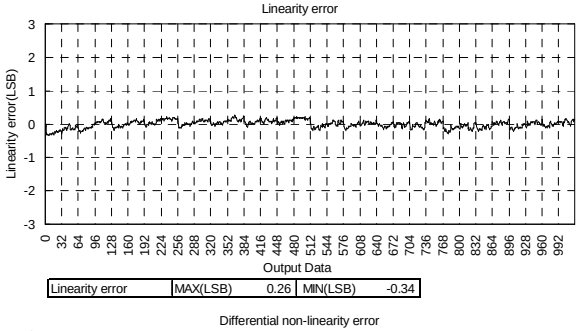
Vcc=AVcc=VREF =5.12V

ϕAD=20MHz

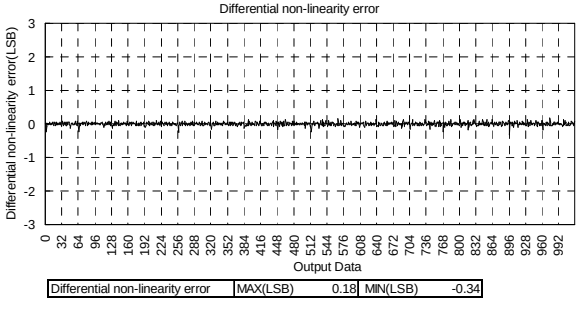
Topr=-40degreesC



Absolute accuracy	MAX(LSB)	0.39	MIN(LSB)	-0.21



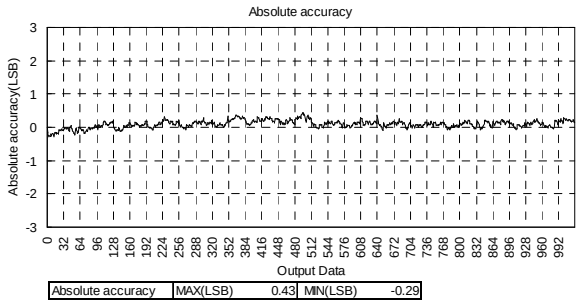
Linearity error	MAX(LSB)	0.26	MIN(LSB)	-0.34



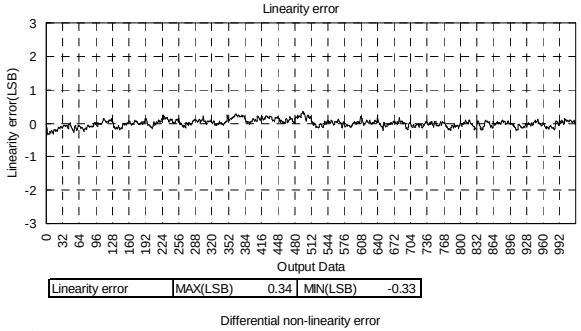
Differential non-linearity error	MAX(LSB)	0.18	MIN(LSB)	-0.34

Figure18. Topr=-40(degrees C)

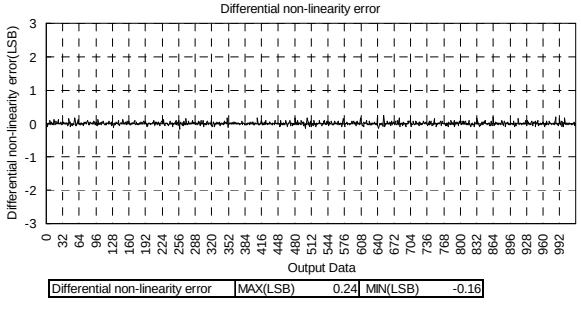
Topr=25degreesC



Absolute accuracy	MAX(LSB)	0.43	MIN(LSB)	-0.29



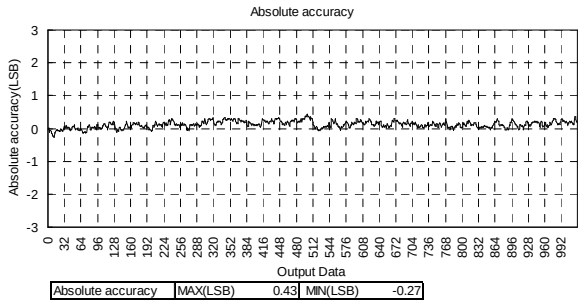
Linearity error	MAX(LSB)	0.34	MIN(LSB)	-0.33



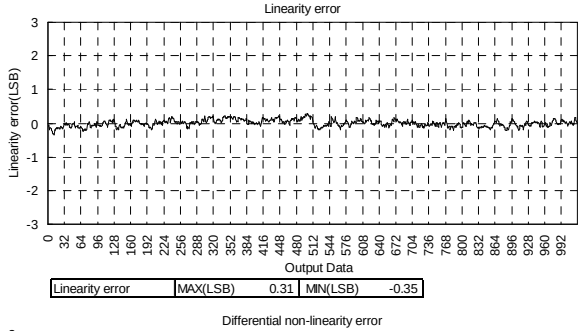
Differential non-linearity error	MAX(LSB)	0.24	MIN(LSB)	-0.16

Figure19. Topr=25(degrees C)

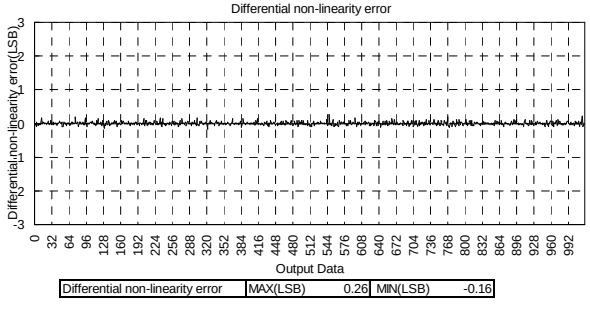
Topr=85degreesC



Absolute accuracy	MAX(LSB)	0.43	MIN(LSB)	-0.27



Linearity error	MAX(LSB)	0.31	MIN(LSB)	-0.35



Differential non-linearity error	MAX(LSB)	0.26	MIN(LSB)	-0.16

Figure20. Topr=85(degrees C)

The mentioned value is only for your reference. The value is for the arbitrary samples and does not guarantee the product's characteristics.

5.A/D Accuracy(3)

■ Related Pin

AN0-AN7、 AN0_0-AN0_7 、AN2_0-AN2_7、 ANEX0、ANEX1

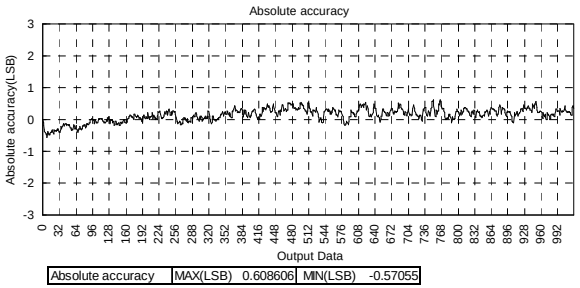
■Operating Condition

Topr=-40,25,85 (degrees C)

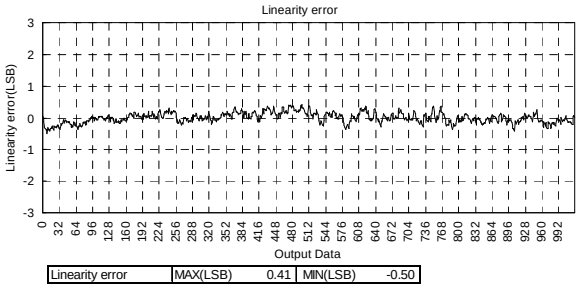
Vcc=AVcc=VREF =3.30V

ϕAD=16MHz

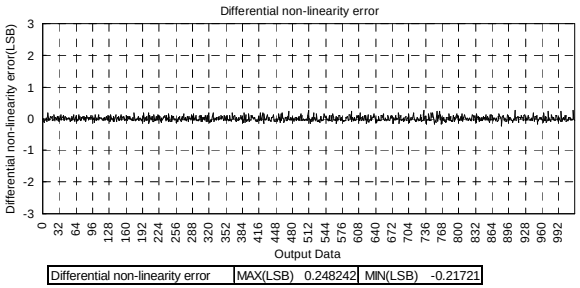
Topr=-40degreesC



Absolute accuracy	MAX(LSB) 0.608606	MIN(LSB) -0.57055



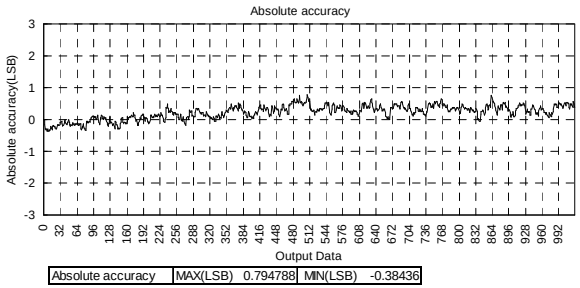
Linearity error	MAX(LSB) 0.41	MIN(LSB) -0.50



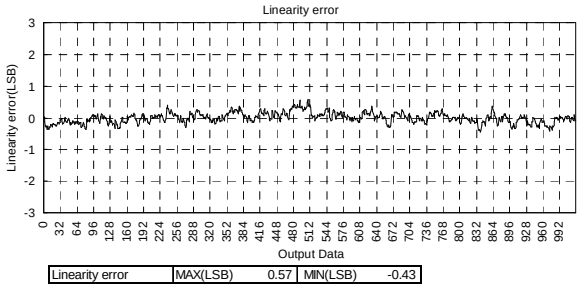
Differential non-linearity error	MAX(LSB) 0.248242	MIN(LSB) -0.21721

Figure21. Topr=-40(degrees C)

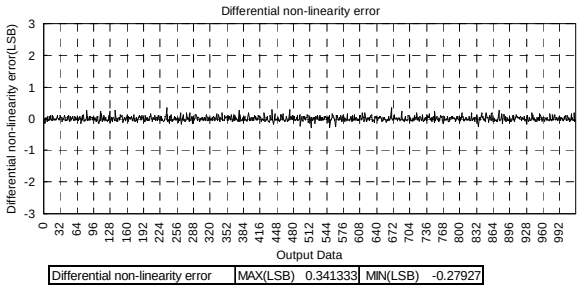
Topr=25degreesC



Absolute accuracy	MAX(LSB) 0.794788	MIN(LSB) -0.38436



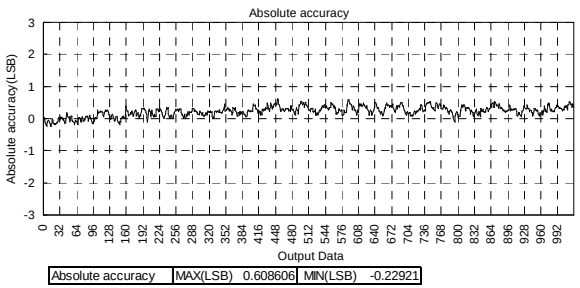
Linearity error	MAX(LSB) 0.57	MIN(LSB) -0.43



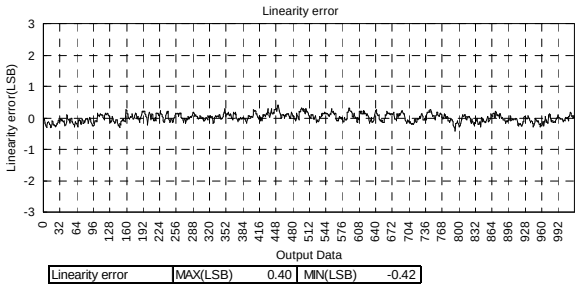
Differential non-linearity error	MAX(LSB) 0.341333	MIN(LSB) -0.27927

Figure22. Topr=25(degrees C)

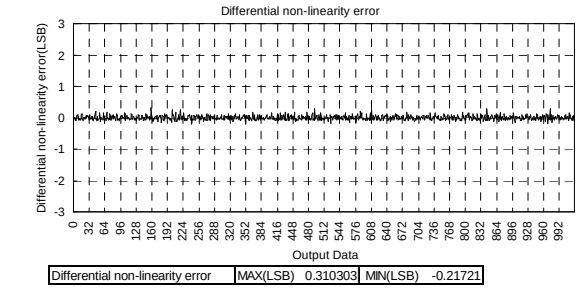
Topr=85degreesC



Absolute accuracy	MAX(LSB) 0.608606	MIN(LSB) -0.22921



Linearity error	MAX(LSB) 0.40	MIN(LSB) -0.42



Differential non-linearity error	MAX(LSB) 0.310303	MIN(LSB) -0.21721

Figure23. Topr=85(degrees C)

The mentioned value is only for your reference. The value is for the arbitrary samples and does not guarantee the product's characteristics.

5.A/D Accuracy(4)

■ Related Pin

AN0-AN7、 AN0_0-AN0_7 、AN2_0-AN2_7、 ANEX0、ANEX1

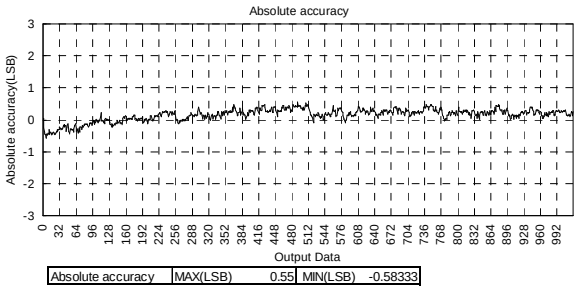
■Operating Condition

Topr=-40,25,85 (degrees C)

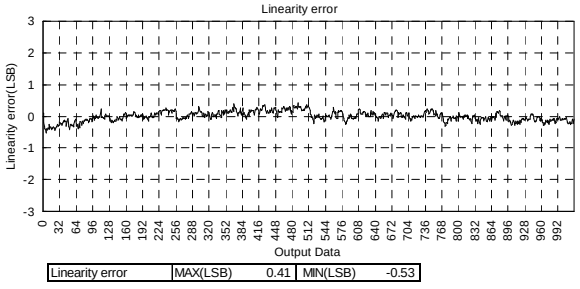
Vcc=AVcc=VREF =3.072V

ϕAD=10MHz

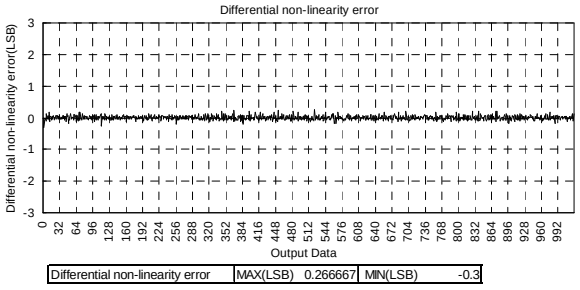
Topr=-40degreesC



Absolute accuracy	MAX(LSB)	0.55	MIN(LSB)	-0.58333

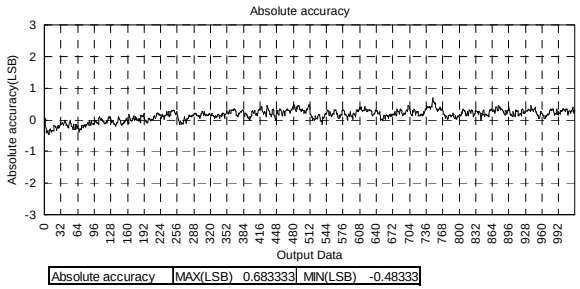


Linearity error	MAX(LSB)	0.41	MIN(LSB)	-0.53

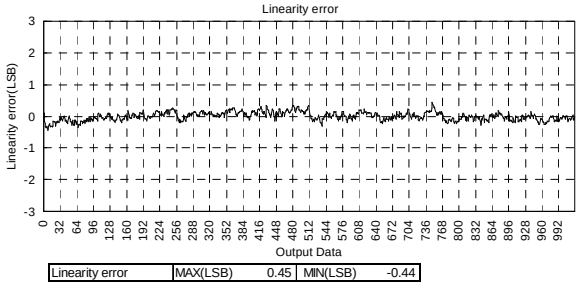


Differential non-linearity error	MAX(LSB)	0.266667	MIN(LSB)	-0.3

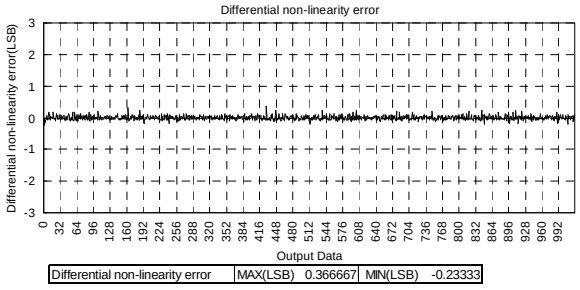
Topr=25degreesC



Absolute accuracy	MAX(LSB)	0.683333	MIN(LSB)	-0.48333

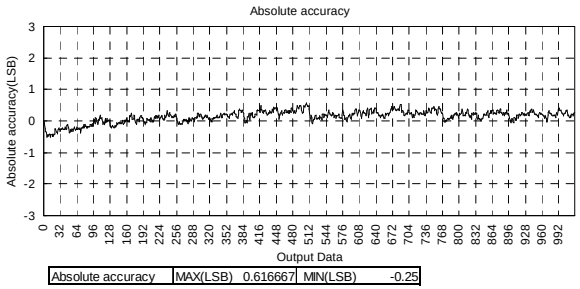


Linearity error	MAX(LSB)	0.45	MIN(LSB)	-0.44

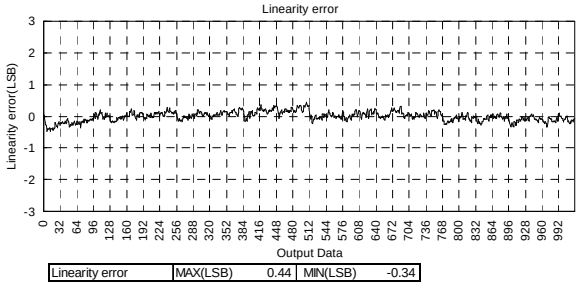


Differential non-linearity error	MAX(LSB)	0.366667	MIN(LSB)	-0.23333

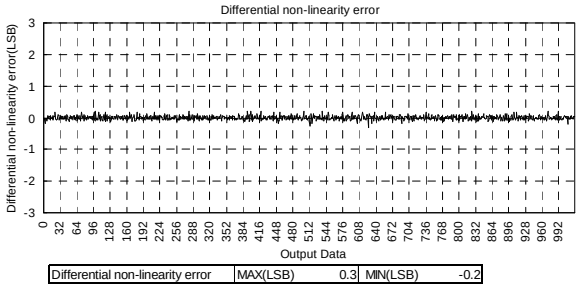
Topr=85degreesC



Absolute accuracy	MAX(LSB)	0.616667	MIN(LSB)	-0.25



Linearity error	MAX(LSB)	0.44	MIN(LSB)	-0.34



Differential non-linearity error	MAX(LSB)	0.3	MIN(LSB)	-0.2

Figure24. Topr=-40(degrees C)

Figure25. Topr=25(degrees C)

Figure26. Topr=85(degrees C)

The mentioned value is only for your reference. The value is for the arbitrary samples and does not guarantee the product's characteristics.

6.D/A Accuracy(1)

■ Related Pin
DA0、DA1

■Operating Condition
Topr=-40,25,85 (degrees C)
PLL CLOCK：24MHz
Vcc=5.12V

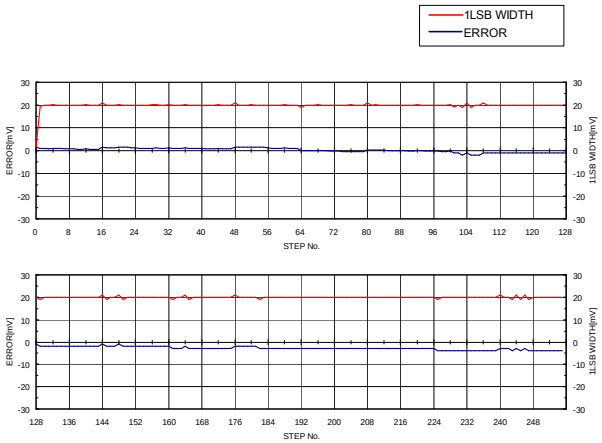


Figure27. Topr=-40(degrees C)

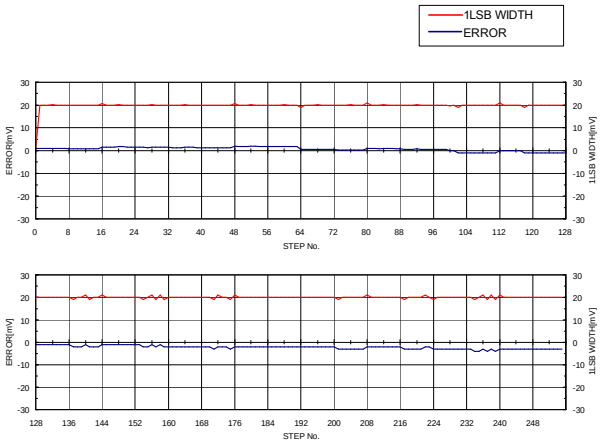


Figure28. Topr=25(degrees C)

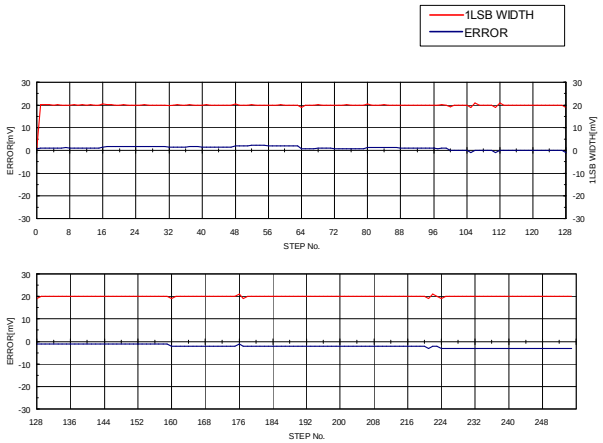


Figure29. Topr=85(degrees C)

The mentioned value is only for your reference. The value is for the arbitrary samples and does not guarantee the product's characteristics.

6.D/A Accuracy(2)

■ Related Pin
DA0、DA1

■Operating Condition
Topr=-40,25,85 (degrees C)
XIN CLOCK：10MHz
Vcc=3.072V

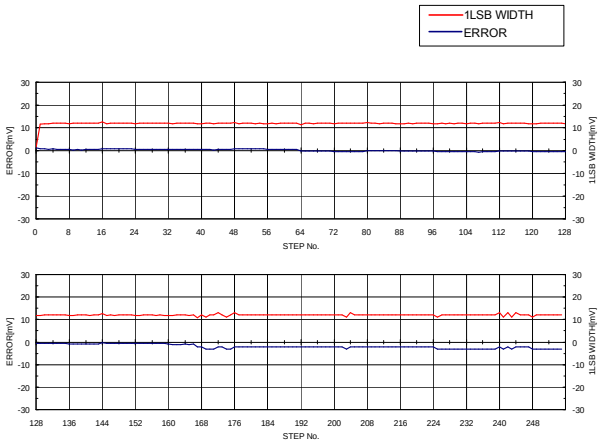


Figure30. Topr=-40(degrees C)

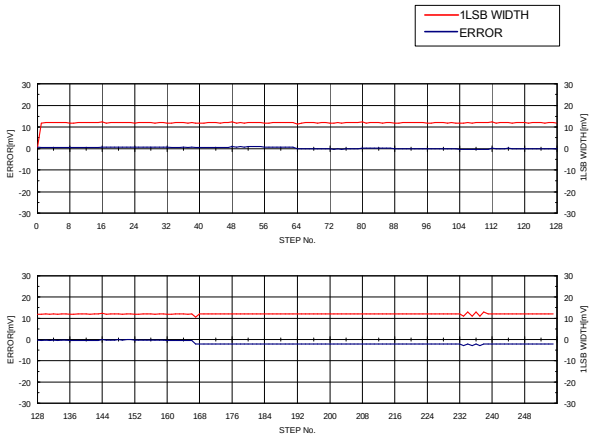


Figure31. Topr=25(degrees C)

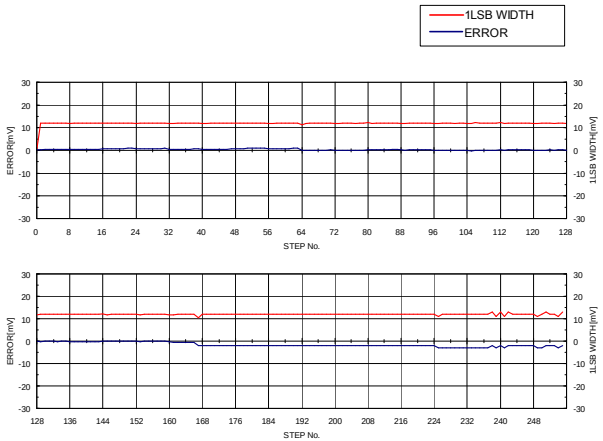


Figure32. Topr=85(degrees C)

The mentioned value is only for your reference. The value is for the arbitrary samples and does not guarantee the product's characteristics.

7.Power supply current(1)

(1)High-speed mode f(Xin)

1.Icc vs f(Xin)

■Operating Condition

XIN = 4 to 20 MHz (square wave)

125 kHz on-chip oscillator stop

Topr = 25(degrees C)

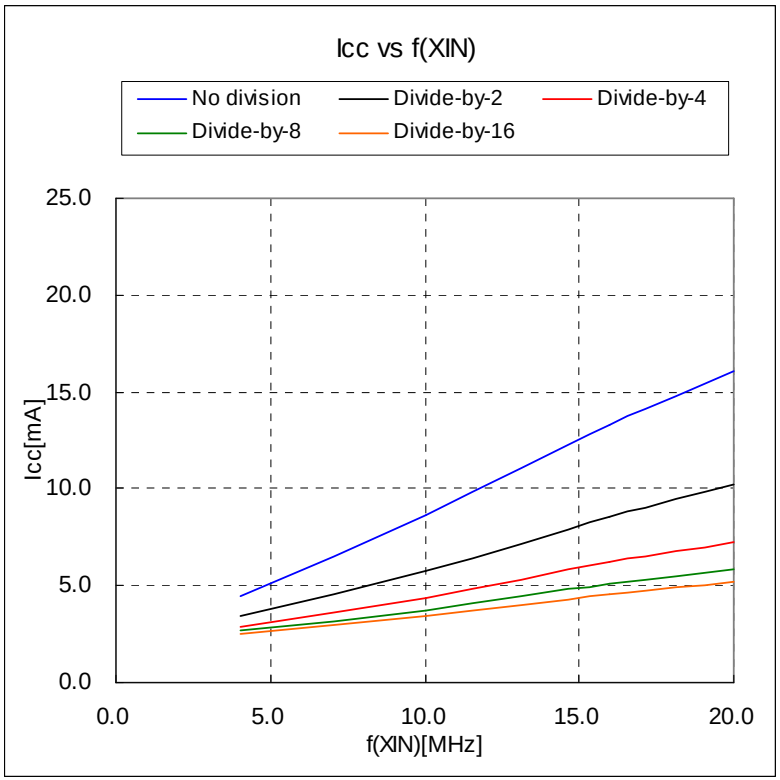


Figure33. Icc vs f(Xin) (Vcc=3.0V)

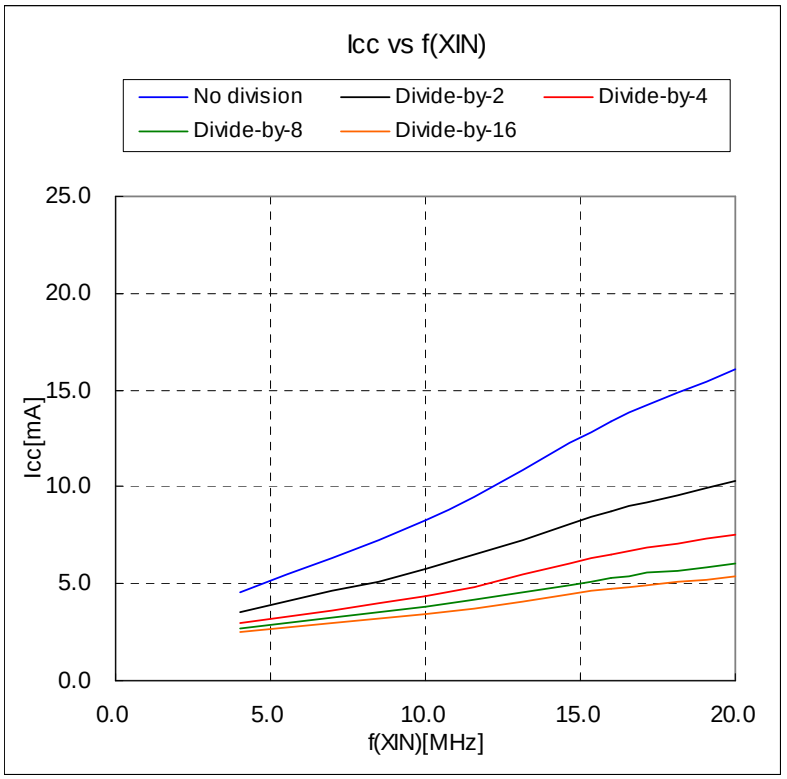


Figure34. Icc vs f(Xin) (Vcc=5.0V)

The mentioned value is only for your reference. The value is for the arbitrary samples and does not guarantee the product's characteristics.

7.Power supply current(2)

(1)High-speed mode f(Xin)

2.Icc vs Vcc

■Operating Condition
XIN = 10 MHz (square wave)
125 kHz on-chip oscillator stop
Topr = -40,25,85(degrees C)
No division

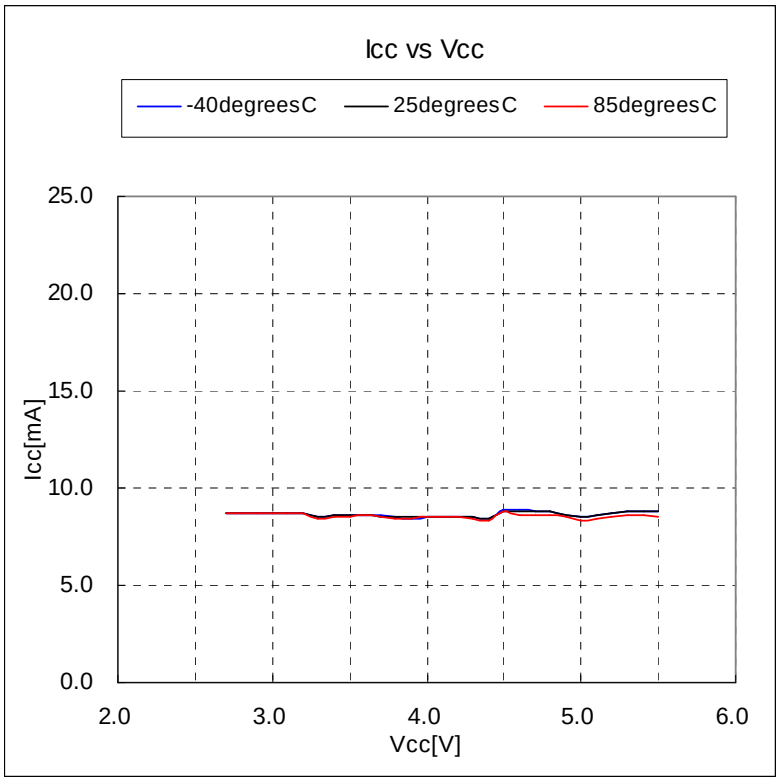


Figure35. Icc vs Vcc (f(Xin)=10MHz)

■Operating Condition
XIN = 20 MHz (square wave)
125 kHz on-chip oscillator stop
Topr = -40,25,85(degrees C)
No division

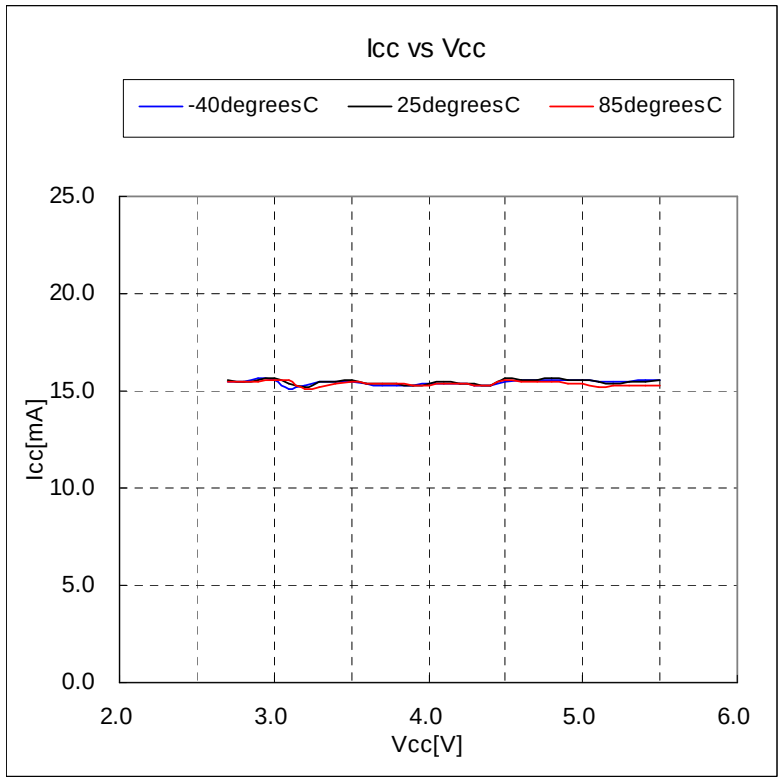


Figure36. Icc vs Vcc (f(Xin)=20MHz)

The mentioned value is only for your reference. The value is for the arbitrary samples and does not guarantee the product's characteristics.

7.Power supply current(3)

(1)High-speed mode f(Xin)

3.Icc vs Topr

■Operating Condition

XIN = 10,16,20 MHz (square wave)

125 kHz on-chip oscillator stop

Topr = -40 to 85(degrees C)

No division

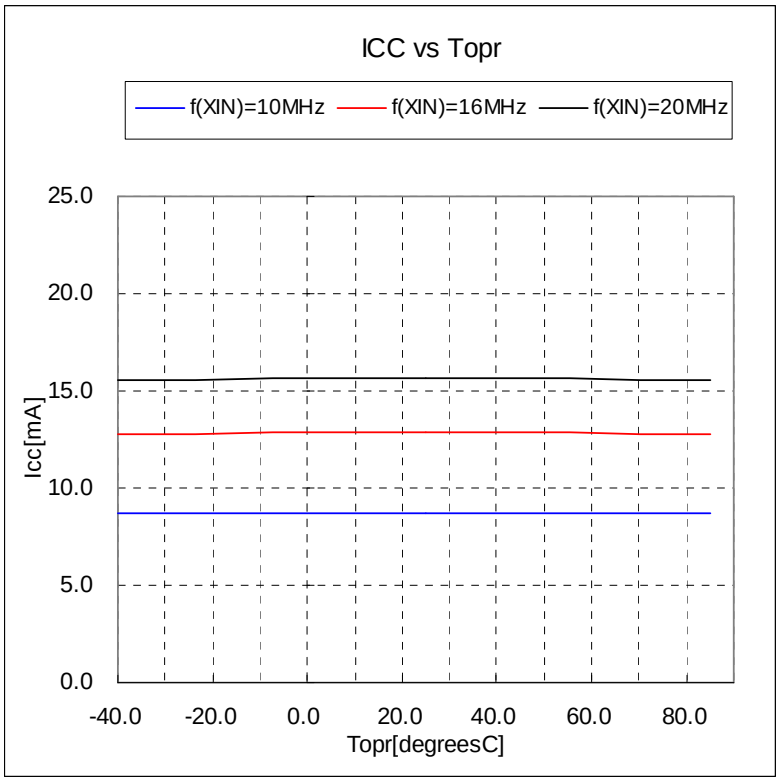


Figure37. Icc vs Topr (Vcc=3.0V)

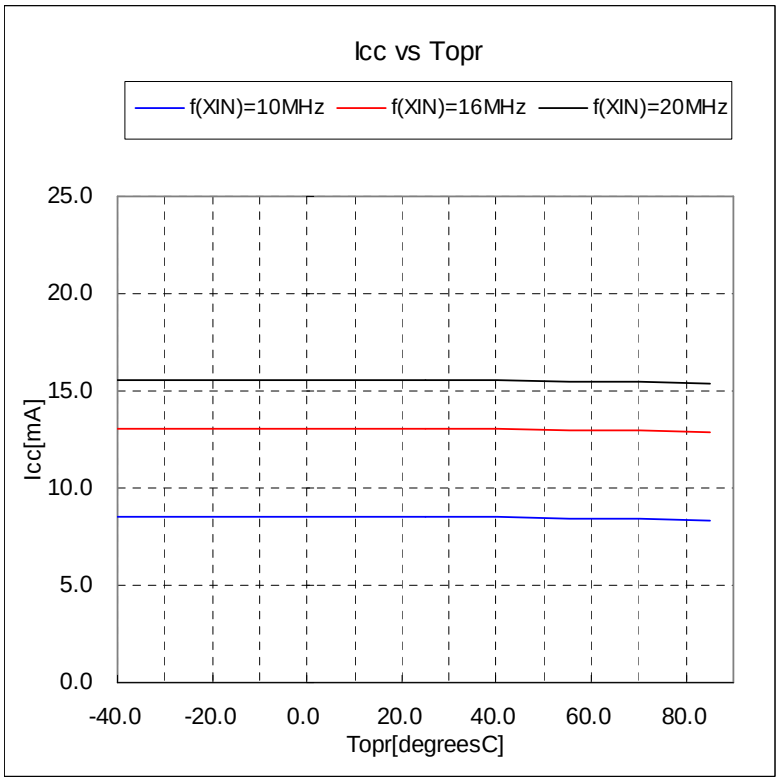


Figure38. Icc vs Topr (Vcc=5.0V)

The mentioned value is only for your reference. The value is for the arbitrary samples and does not guarantee the product's characteristics.

7.Power supply current(4)

(2)High-speed mode f(PLL)

1.Icc vs f(PLL)

■Operating Condition

f(PLL) = 10 to 25 MHz (square wave)

125 kHz on-chip oscillator stop

Topr = 25(degrees C)

No division

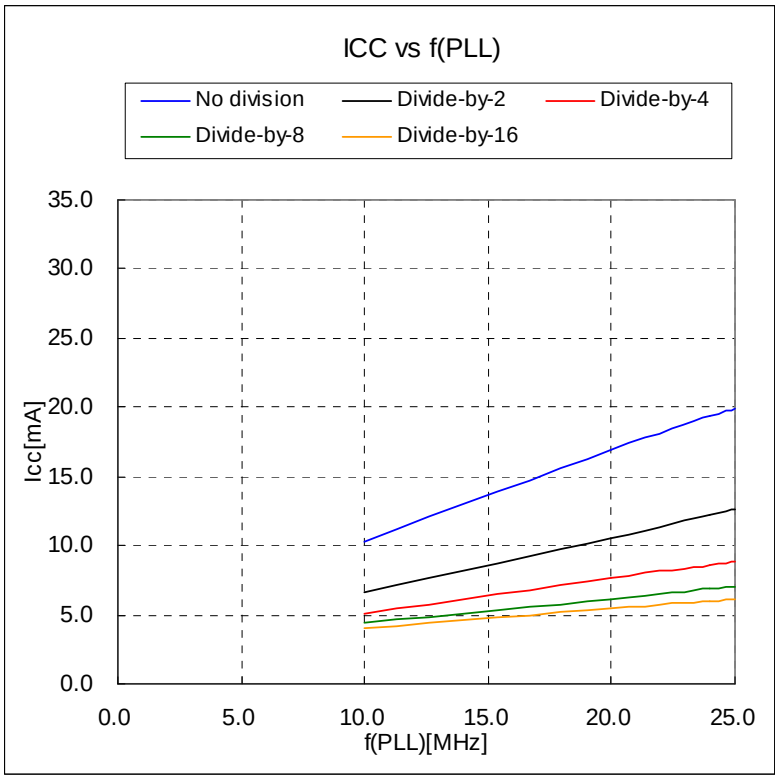


Figure39. Icc vs f(PLL) (Vcc=3.0V)

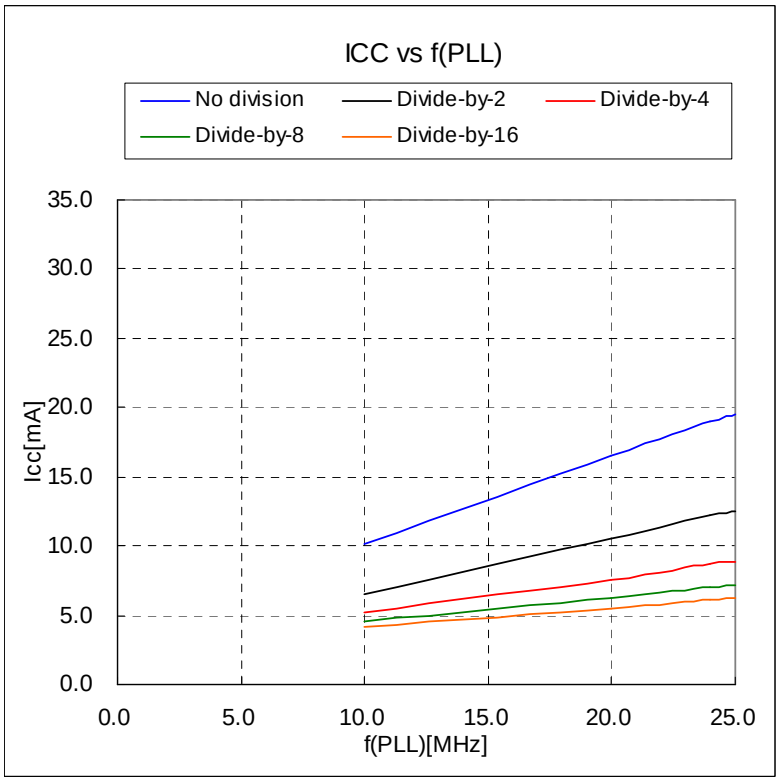


Figure40. Icc vs f(PLL) (Vcc=5.0V)

The mentioned value is only for your reference. The value is for the arbitrary samples and does not guarantee the product's characteristics.

7.Power supply current(5)

(2)High-speed mode f(PLL)

2.Icc vs Vcc

■Operating Condition
f(PLL) = 20MHz
XIN = 5 MHz (square wave)
PLL multiplied by 4
125 kHz on-chip oscillator stop
Topr = -40,25,85(degrees C)
No division

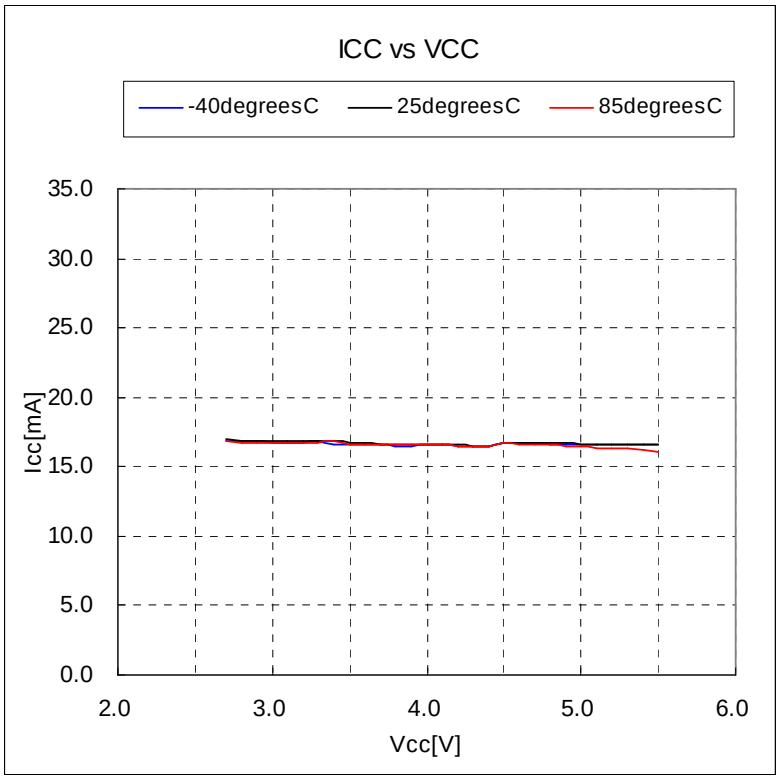


Figure41. Icc vs Vcc (f(PLL)=20MHz)

■Operating Condition
f(PLL) = 24MHz
XIN = 4 MHz (square wave)
PLL multiplied by 6
125 kHz on-chip oscillator stop
Topr = -40,25,85(degrees C)
No division

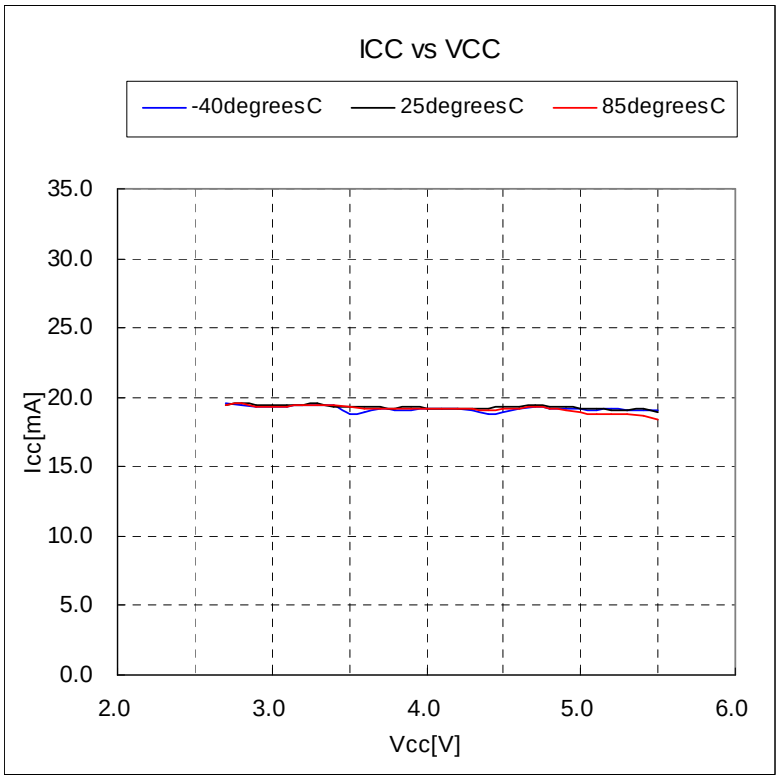


Figure42. Icc vs Vcc (f(PLL)=24MHz)

The mentioned value is only for your reference. The value is for the arbitrary samples and does not guarantee the product's characteristics.

7.Power supply current(6)

(2)High-speed mode f(PLL)

3.Icc vs Topr

■Operating Condition

f(PLL) = 20,24 MHz (square wave)

125 kHz on-chip oscillator stop

Topr = -40 to 85(degrees C)

No division

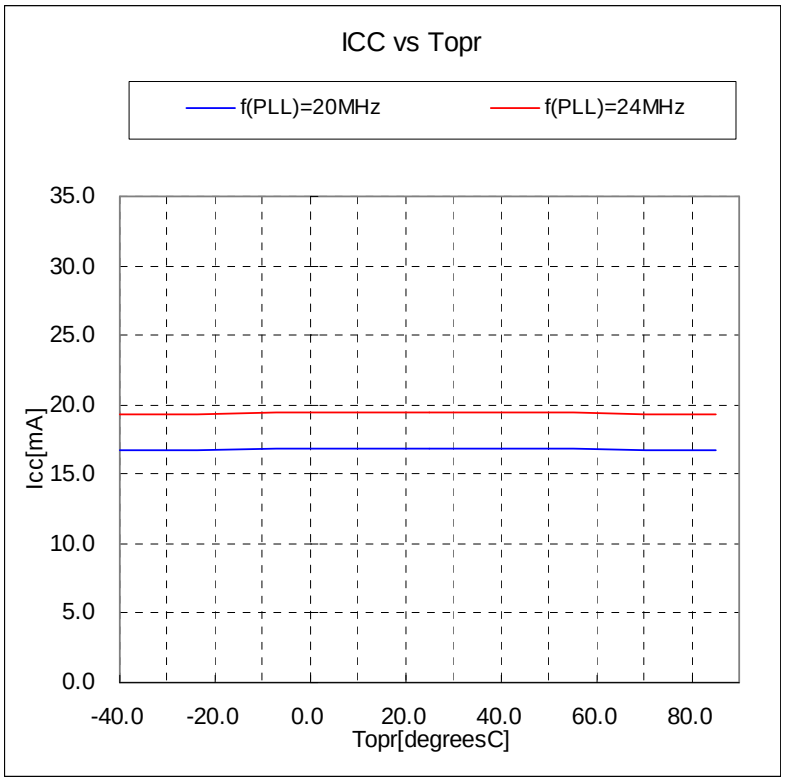


Figure43. Icc vs Topr (Vcc=3.0V)

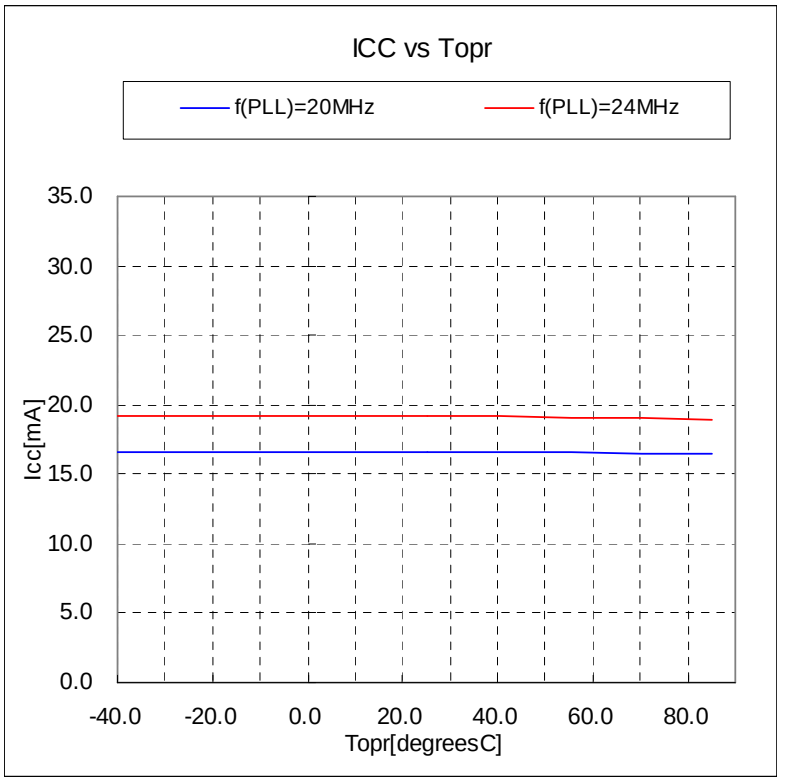


Figure44. Icc vs Topr (Vcc=5.0V)

The mentioned value is only for your reference. The value is for the arbitrary samples and does not guarantee the product's characteristics.

7.Power supply current(7)

(3)125kHz on-chip Oscillator mode

1.Icc vs Vcc

■Operating Condition
Main clock stop
125kHz on-chip oscillator on
Topr = 25(degrees C)

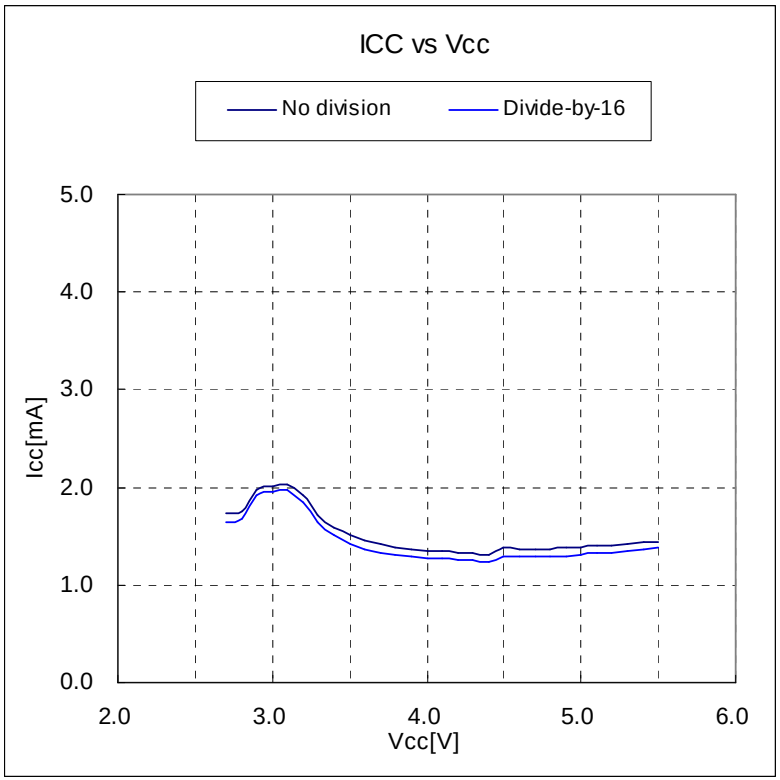


Figure45. Icc vs Vcc

■Operating Condition
Main clock stop
125kHz on-chip oscillator on
FMR22=1
Topr = 25(degrees C)

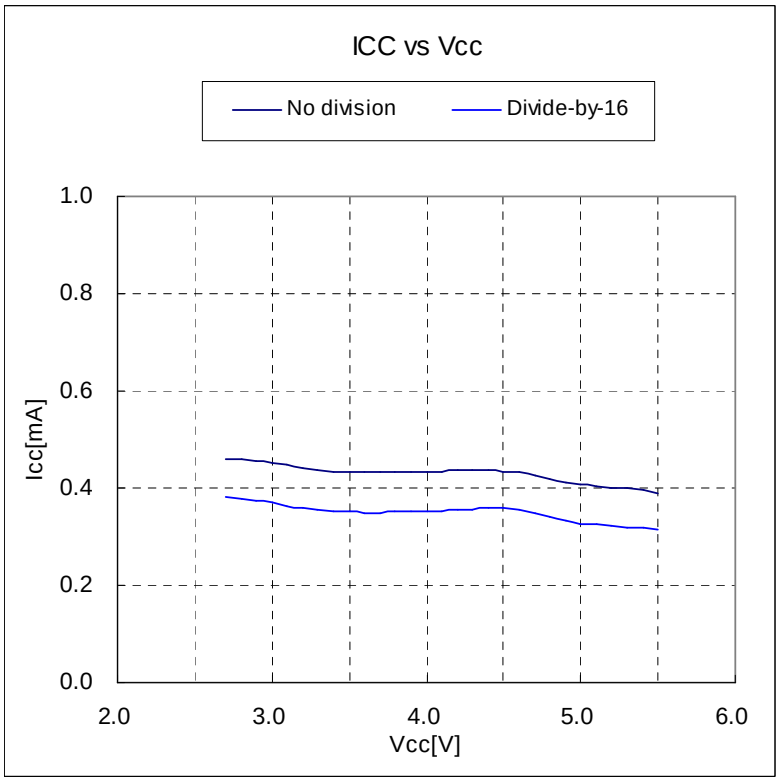


Figure46. Icc vs Vcc

The mentioned value is only for your reference. The value is for the arbitrary samples and does not guarantee the product's characteristics.

7.Power supply current(8)

(3)125kHz on-chip Oscillator mode

2.Icc vs Topr

■Operating Condition
Main clock stop
125kHz on-chip oscillator on, no division
Topr = -40 to 85(degrees C)

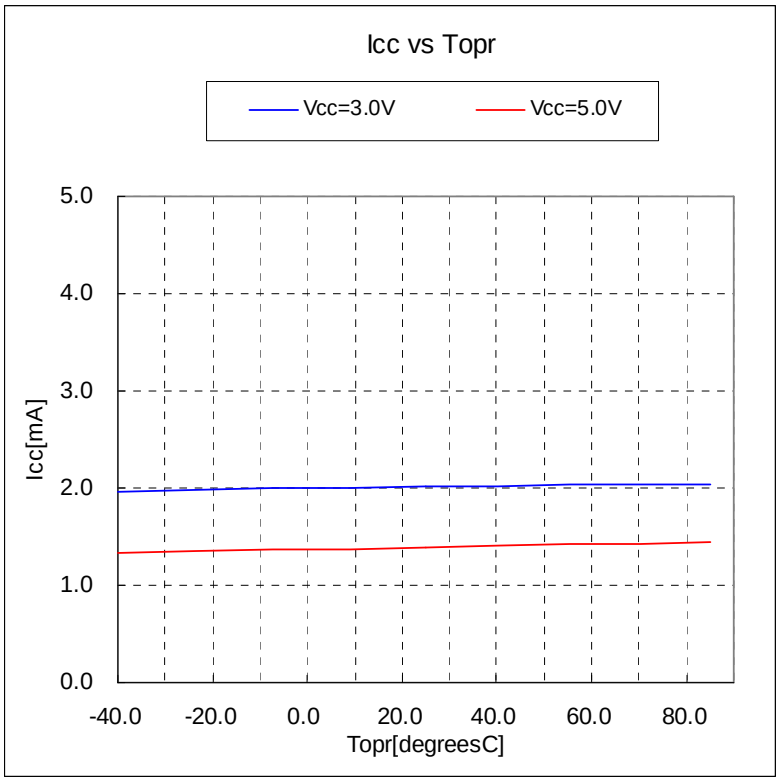


Figure47. Icc vs Topr

■Operating Condition
Main clock stop
125kHz on-chip oscillator on, no division
FMR22=1
Topr = -40 to 85(degrees C)

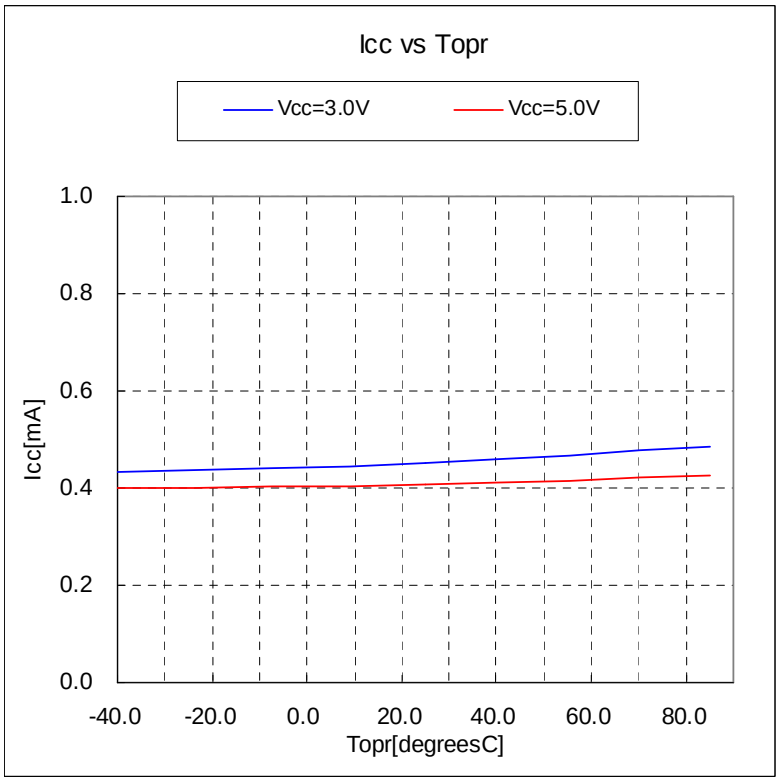


Figure48. Icc vs Topr

The mentioned value is only for your reference. The value is for the arbitrary samples and does not guarantee the product's characteristics.

7.Power supply current(9)

(4)Low-Power mode f(Xcin)

1.Icc vs Vcc

■Operating Condition
f(Xcin) = 32kHz
In low-power mode
FMR22 = FMR23 = 1
on flash memory
Topr = -40,25,85(degrees C)

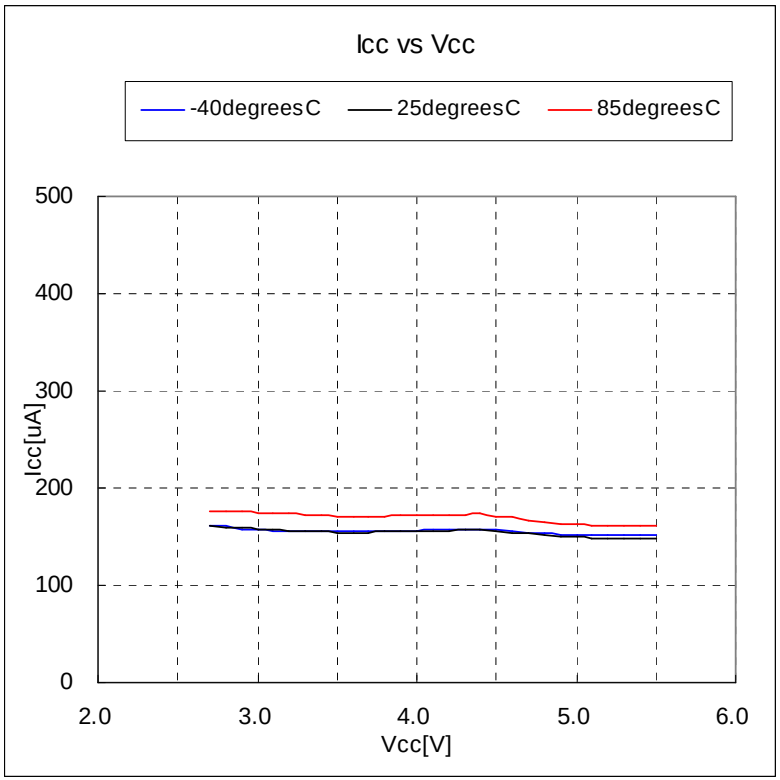


Figure49. Icc vs Vcc

■Operating Condition
f(Xcin) = 32kHz
In low-power mode,
FMR22 = FMR23 = 1
on RAM
Topr = -40,25,85(degrees C)

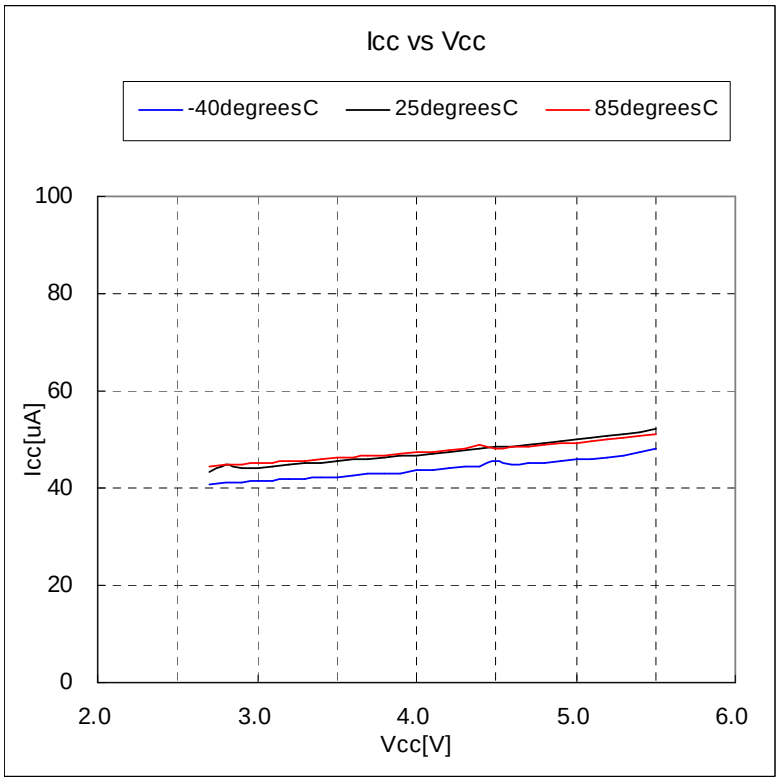


Figure50. Icc vs Vcc

The mentioned value is only for your reference. The value is for the arbitrary samples and does not guarantee the product's characteristics.

7.Power supply current(10)

(4)Low-Power mode f(Xcin)

2.Icc vs Topr

■Operating Condition
f(Xcin) = 32kHz
In low-power mode,
FMR22 = FMR23 = 1
on flash memory
Topr = -40 to 85(degrees C)

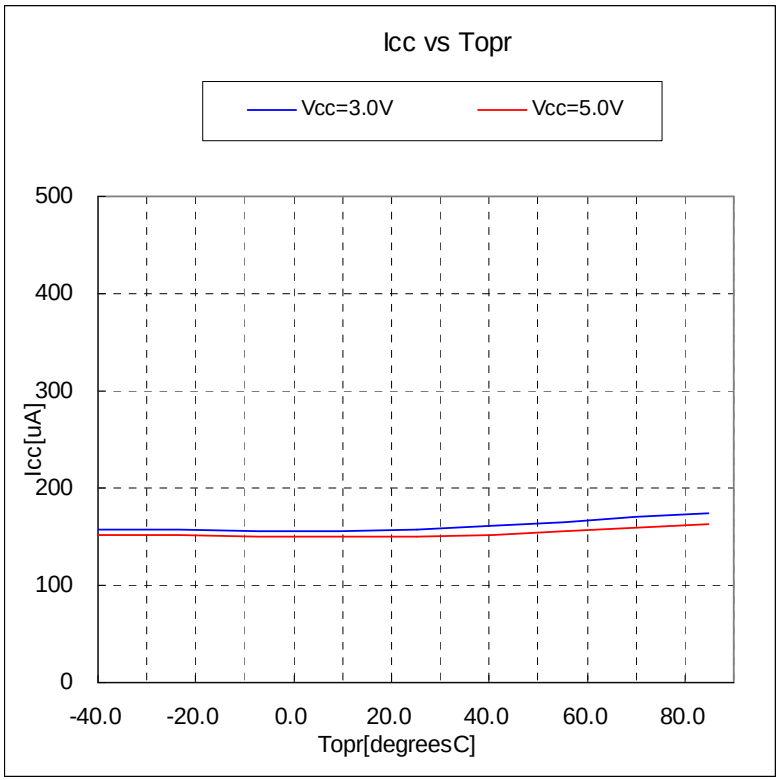


Figure51. Icc vs Topr

■Operating Condition
f(Xcin) = 32kHz
In low-power mode
FMSTP = 1
on RAM
Topr = -40 to 85(degrees C)

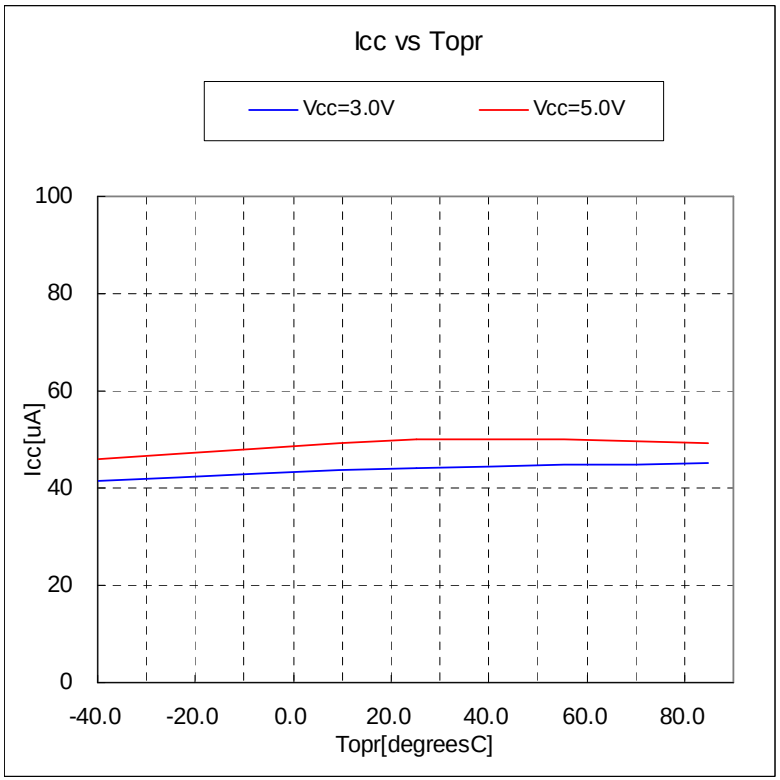


Figure52. Icc vs Topr

The mentioned value is only for your reference. The value is for the arbitrary samples and does not guarantee the product's characteristics.

7.Power supply current(11)

(5)Wait mode f(Xcin)

1.Icc vs Vcc

■Operating Condition
f(Xcin) = 32kHz (oscillation capacity High)
125kHz on-chip oscillator stop
Peripheral clock operation
Topr =-40,25,85(degrees C)

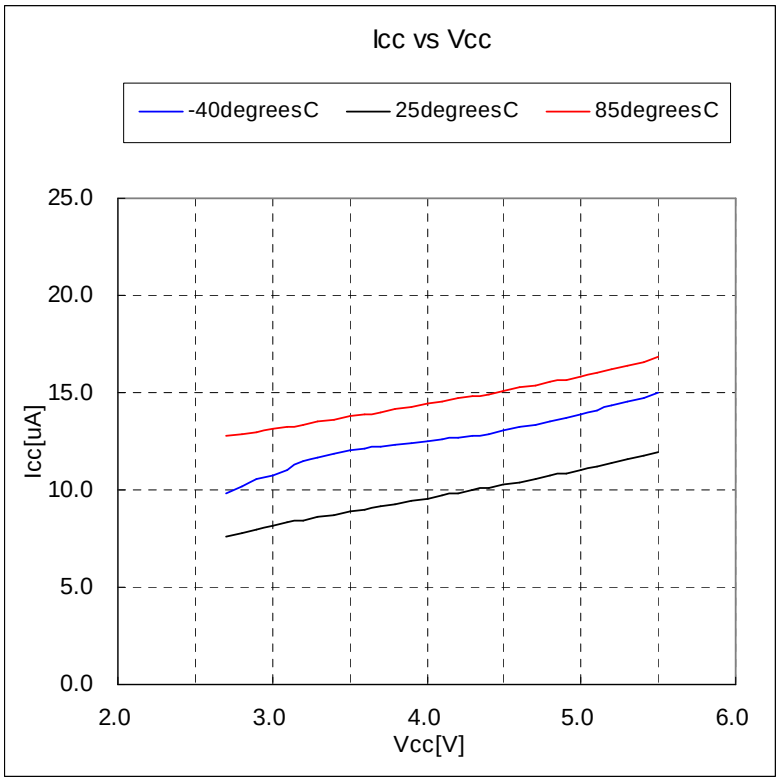


Figure53. Icc vs Vcc

■Operating Condition
f(Xcin) = 32kHz (oscillation capacity Low)
125kHz on-chip oscillator stop
Peripheral clock operation
Topr = -40,25,85(degrees C)

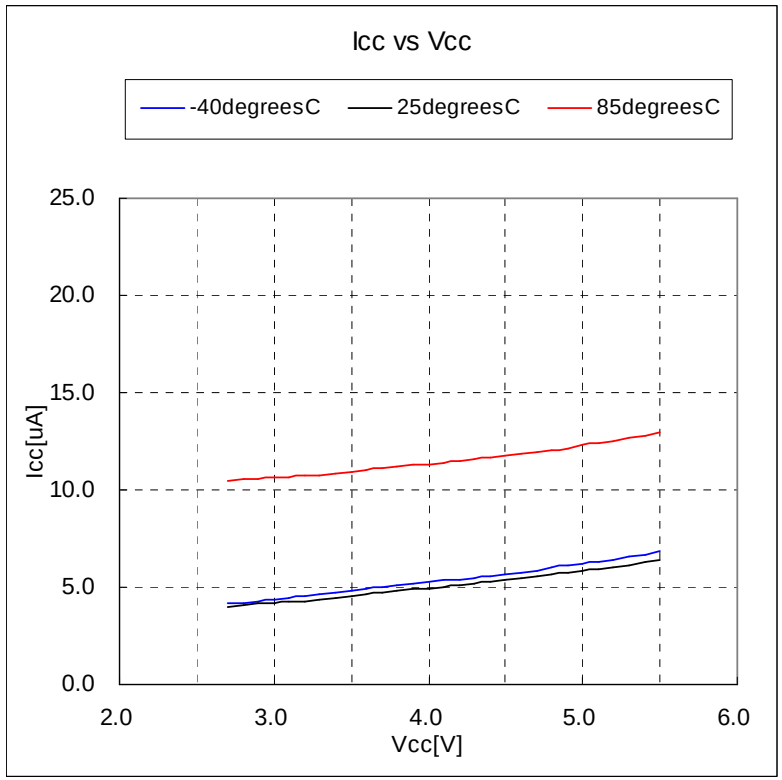


Figure54. Icc vs Vcc

The mentioned value is only for your reference. The value is for the arbitrary samples and does not guarantee the product's characteristics.

7.Power supply current(12)

(5)Wait mode f(Xcin)

2.Icc vs Topr

■Operating Condition
f(Xcin) = 32kHz (oscillation capacity High)
125kHz on-chip oscillator stop
Peripheral clock operation
Topr = -40 to 85(degrees C)

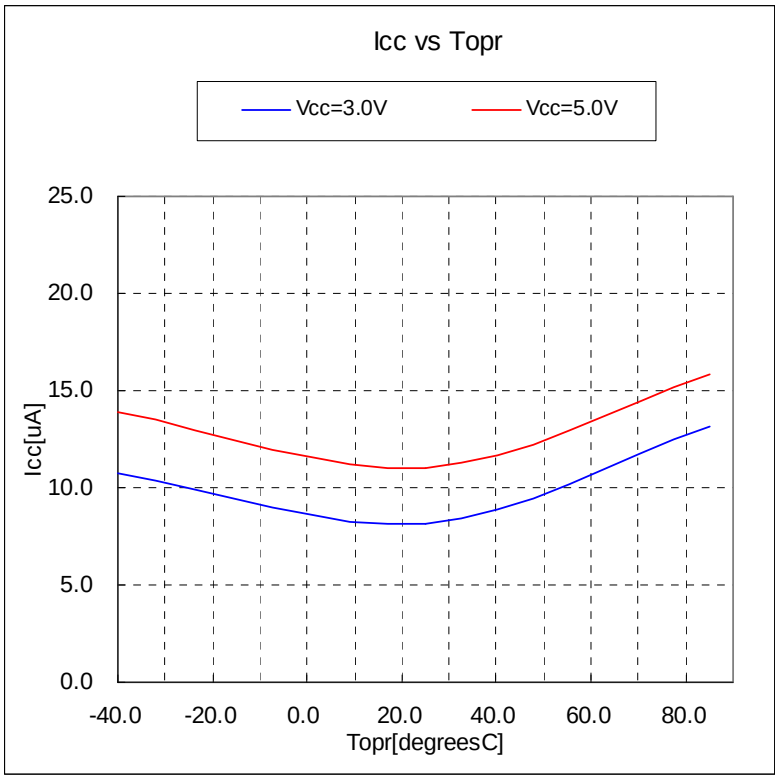


Figure55. Icc vs Topr

■Operating Condition
f(Xcin) = 32kHz (oscillation capacity Low)
125kHz on-chip oscillator stop
Peripheral clock operation
Topr = -40 to 85(degrees C)

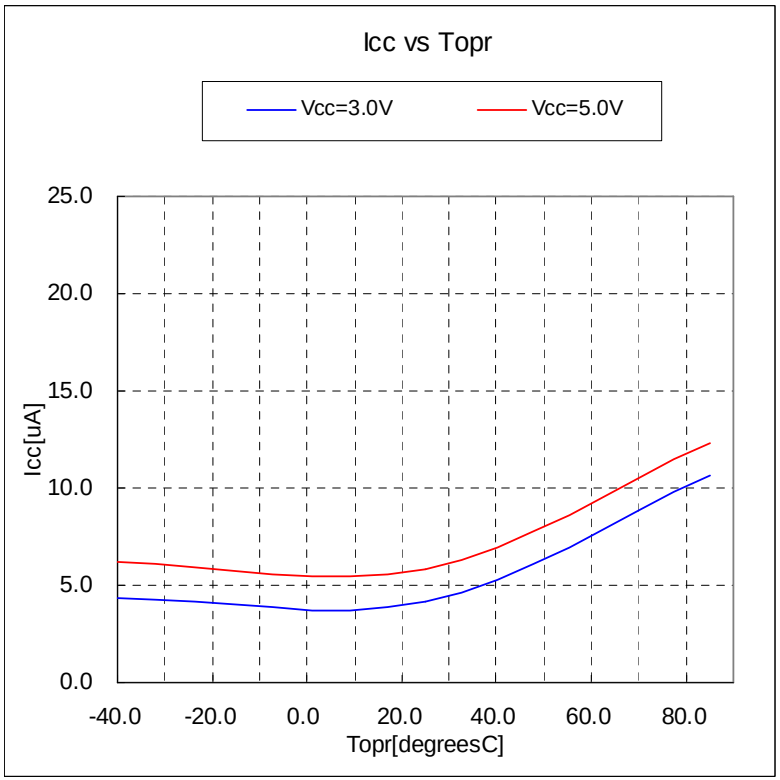


Figure56. Icc vs Topr

The mentioned value is only for your reference. The value is for the arbitrary samples and does not guarantee the product's characteristics.

7.Power supply current(13)

(6)Wait mode f(OCO-S)

1.Icc vs Vcc

■Operating Condition
Main clock stop
125kHz on-chip oscillator on
Peripheral clock operation
Topr = -40,25,85(degrees C)

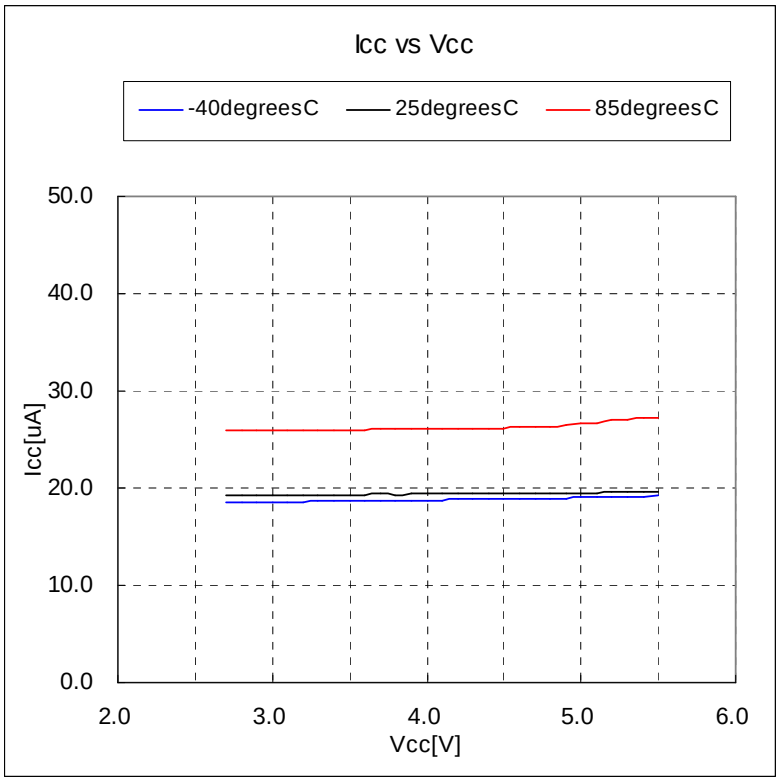


Figure57. Icc vs Vcc

■Operating Condition
Main clock stop
125kHz on-chip oscillator on
Peripheral clock stop
Topr = -40,25,85(degrees C)

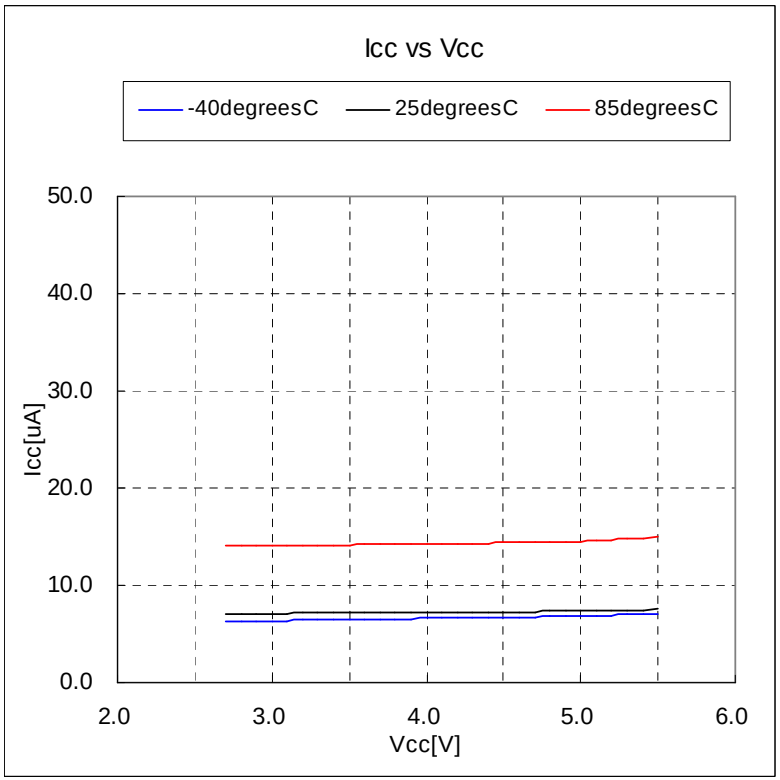


Figure58. Icc vs Vcc

The mentioned value is only for your reference. The value is for the arbitrary samples and does not guarantee the product's characteristics.

7.Power supply current(14)

(6)Wait mode f(OCO-S)

2.Icc vs Topr

■Operating Condition
Main clock stop
125kHz on-chip oscillator on
Peripheral clock operation
Topr = -40 to 85(degrees C)

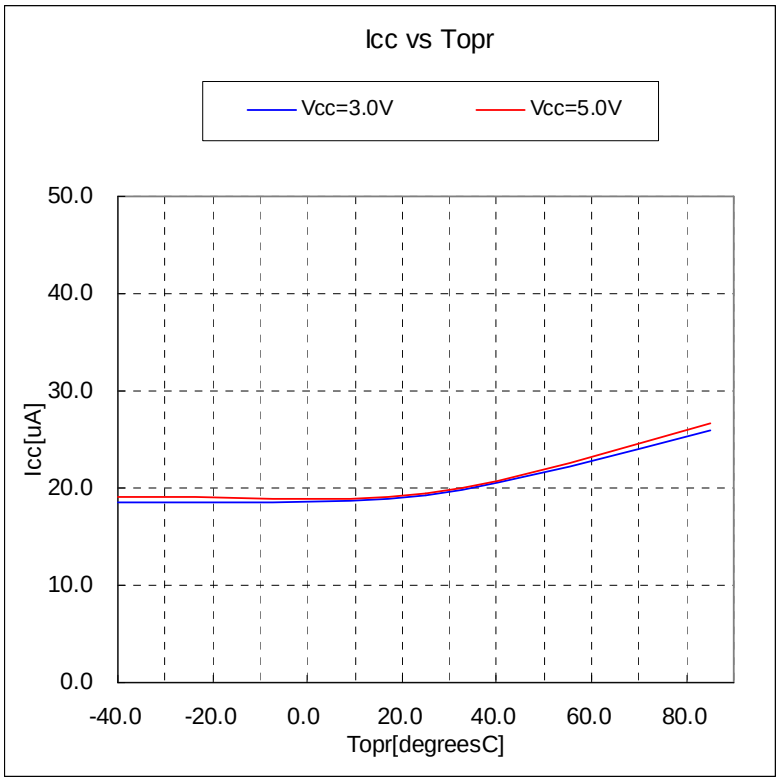


Figure59. Icc vs Topr

■Operating Condition
Main clock stop
125kHz on-chip oscillator on
Peripheral clock stop
Topr = -40 to 85(degrees C)

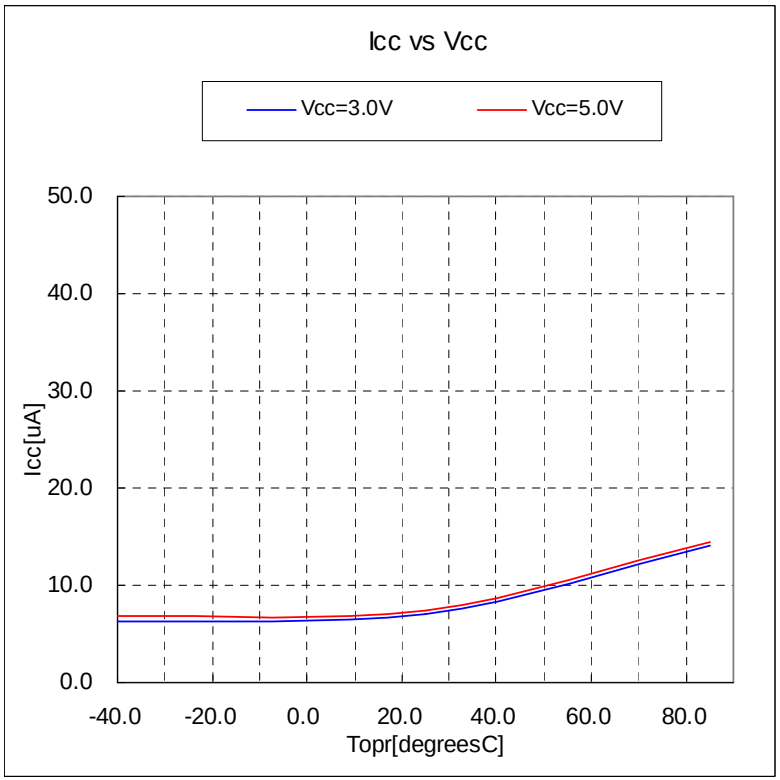


Figure60. Icc vs Topr

The mentioned value is only for your reference. The value is for the arbitrary samples and does not guarantee the product's characteristics.

7.Power supply current(15)

(7)Stop mode

1.Icc vs Vcc

■Operating Condition
Main clock stop
125kHz on-chip oscillator stop
Peripheral clock stop
Topr = -40,25,85(degrees C)

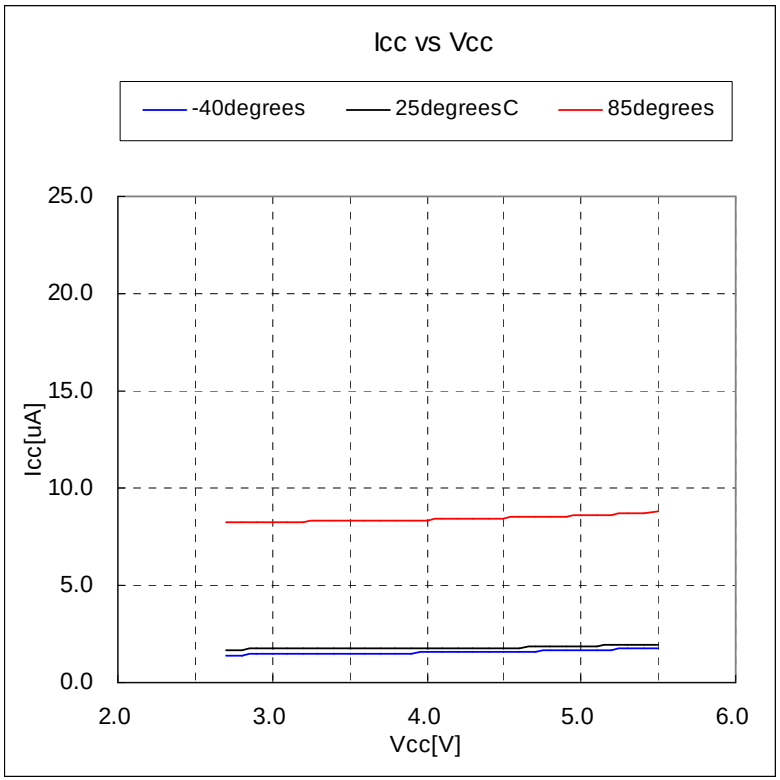


Figure61. Icc vs Vcc

The mentioned value is only for your reference. The value is for the arbitrary samples and does not guarantee the product's characteristics.

7.Power supply current(16)

(7)Stop mode

2.Icc vs Topr

■Operating Condition
Main clock stop
125kHz on-chip oscillator stop
Peripheral clock stop
Topr = -40 to 85(degrees C)

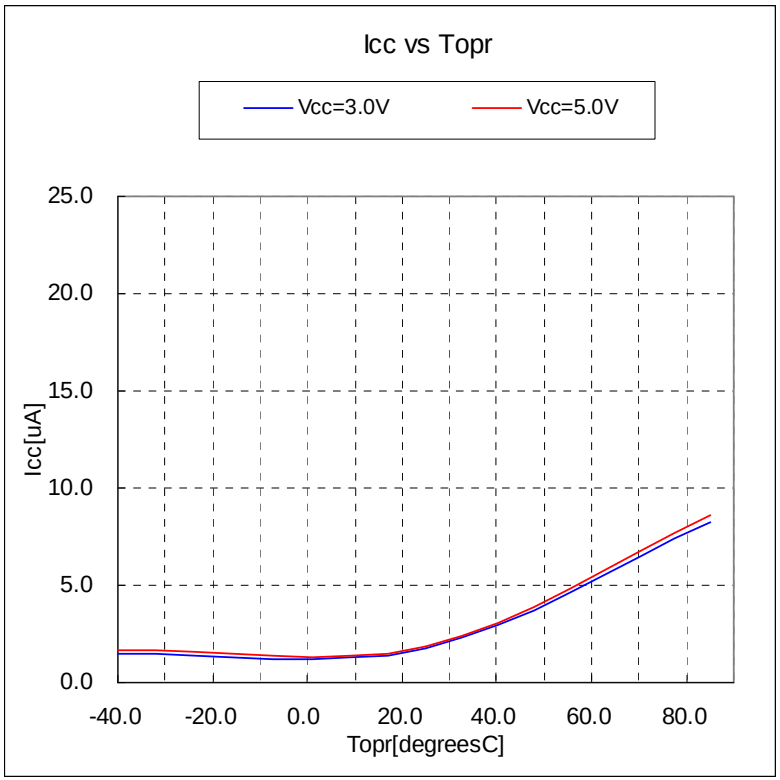


Figure62. Icc vs Topr

The mentioned value is only for your reference. The value is for the arbitrary samples and does not guarantee the product's characteristics.

7.Power supply current(17)

(8)During A/D conversion

■Operating Condition
f(BCLK) = φAD = 10MHz
Vcc1 = Vcc2 = VREF
Topr = 25(degrees C)
No division

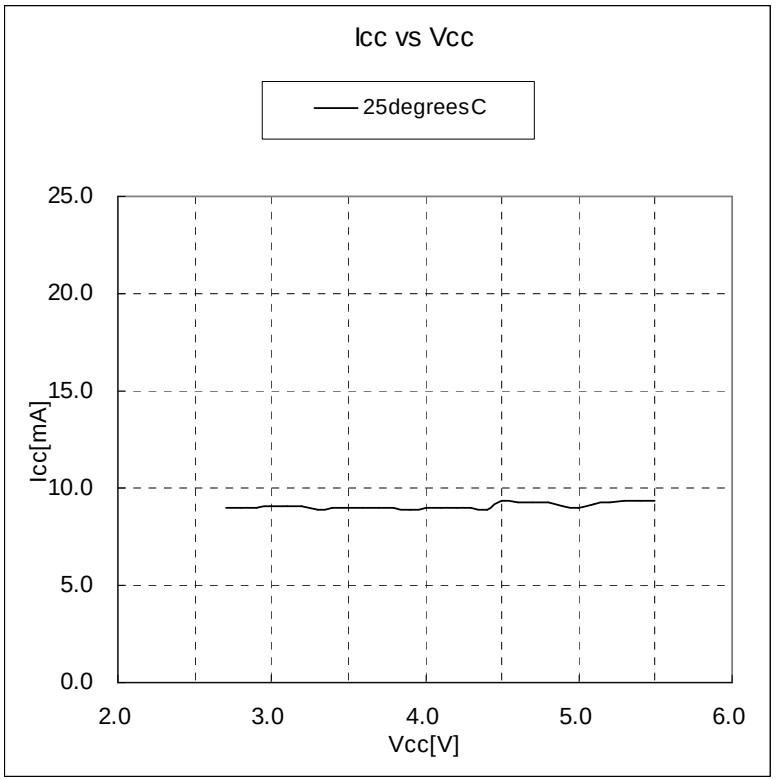


Figure63. Icc vs Vcc

■Operating Condition
f(BCLK) = φAD = 20MHz
Vcc1 = Vcc2 = VREF
Topr = 25(degrees C)
No division

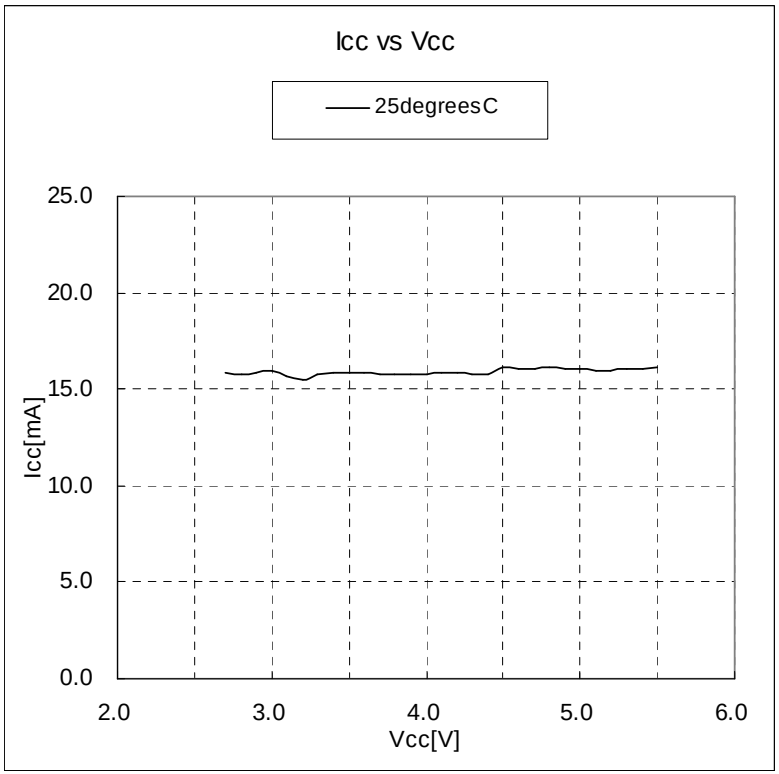


Figure64. Icc vs Vcc

The mentioned value is only for your reference. The value is for the arbitrary samples and does not guarantee the product's characteristics.

7.Power supply current(18)

(9)During flash memory erase / program

■Operating Condition
f(BCLK) = 4 to 10MHz
PM17 = 1 (one wait)
Vcc=3.0V
Topr = 25(degrees C)
No division

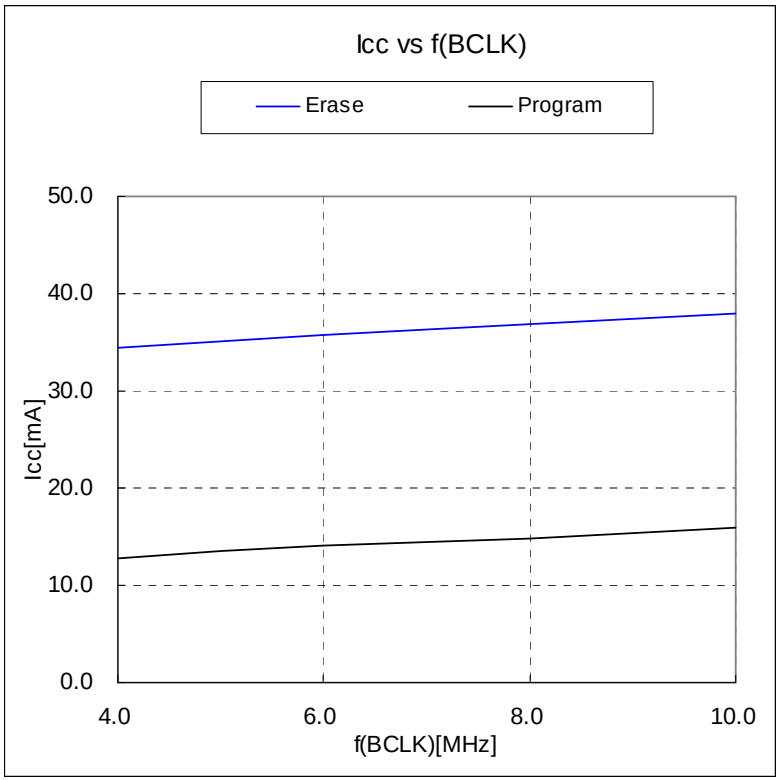


Figure65. Icc vs f(BCLK) (Vcc=3.0V)

■Operating Condition
f(BCLK) = 4 to 10MHz
PM17 = 1 (one wait)
Vcc=5.0V
Topr = 25(degrees C)
No division

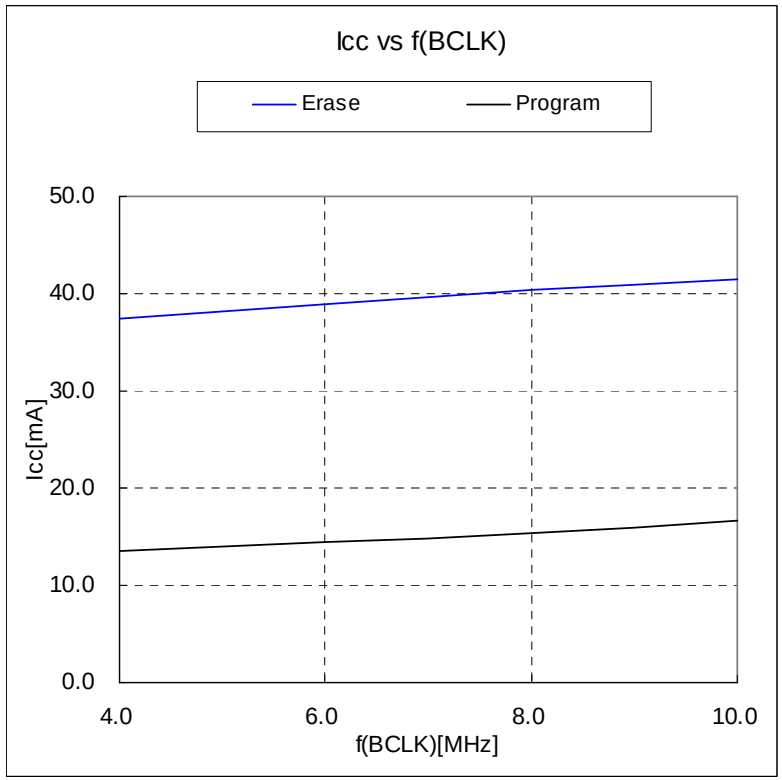


Figure66. Icc vs f(BCLK) (Vcc=5.0V)

The mentioned value is only for your reference. The value is for the arbitrary samples and does not guarantee the product's characteristics.

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