

M16C/64A

Standard Characteristics (2)

Related Part No. :

R5F364AKNFA, R5F364AKNFB, R5F364AKDFA, R5F364AKDFB,
R5F364AMNFA, R5F364AMNFB, R5F364AMDFA, R5F364AMDFB

Standard Characteristics

Table of Contents

1. Input voltage	.....	p. 3 to p. 4
(1) "H" Input voltage		
(2) "L" Input voltage		
2. Hysteresis	.....	p. 5 to p. 6
(1) Interrupt pin		
(2) RESET pin		
3. Output voltage	.....	p. 7 to p. 8
(1) "H" Output voltage		
(2) "L" Output voltage		
4. Pull-up resistance	.....	p. 9
5. A/D Accuracy	.....	p. 10 to p. 13
6. D/A Accuracy	.....	p.14 to p. 15
7. Power supply current	.....	p.16 to p. 33
(1) High-speed mode f(Xin)		
(2) High-speed mode f(PLL)		
(3) 125kHz on-chip Oscillator mode		
(4) Low-Power mode f(Xcin)		
(5) Wait mode f(Xcin)		
(6) Wait mode f(OCO-S)		
(7) Stop mode		
(8) During A/D conversion		
(9) During flash memory erase / program		

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

■ 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

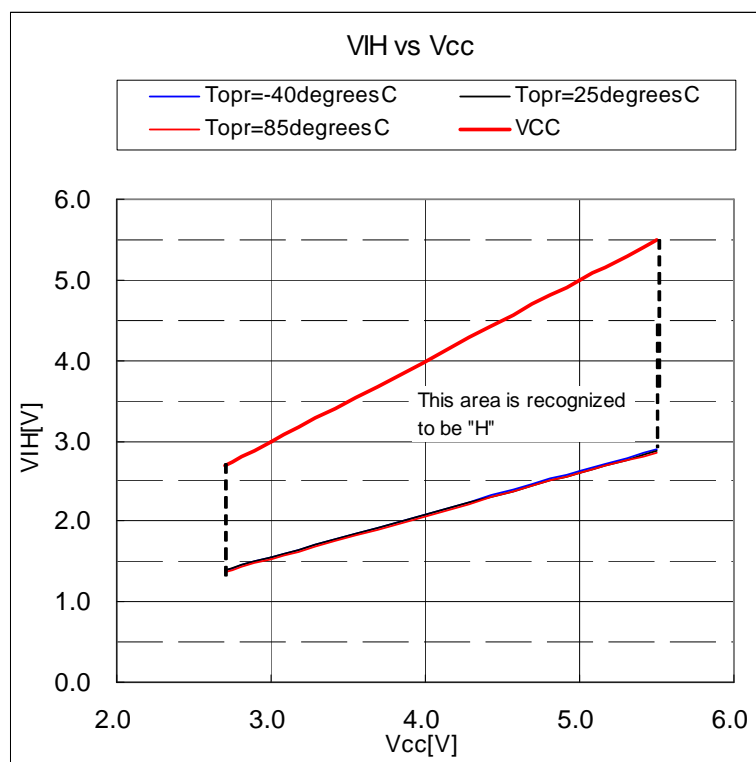


Figure1. VIH vs Vcc(in single-chip mode)

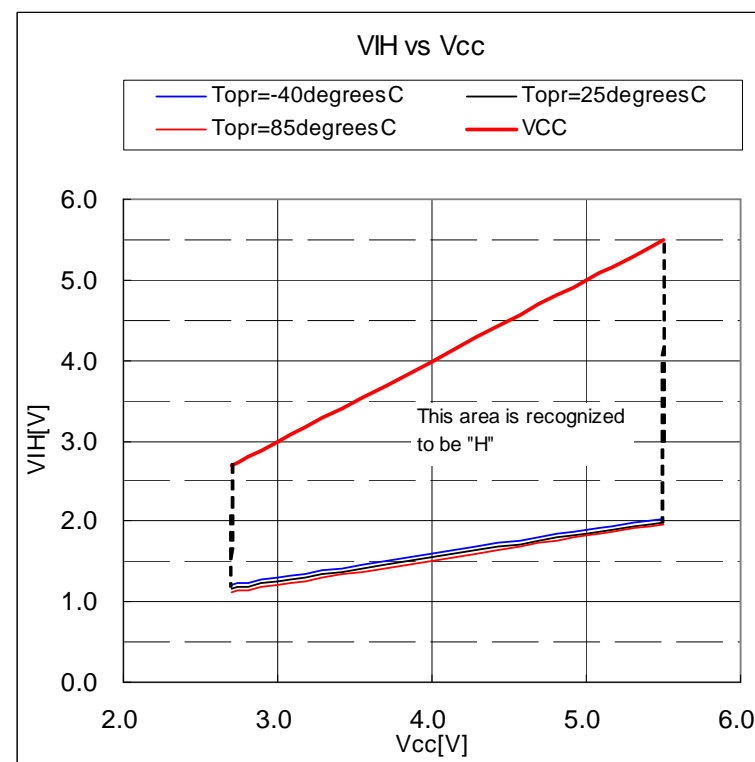


Figure2. VIH vs Vcc(data input in memory expansion and microprocessor mode)

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

■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

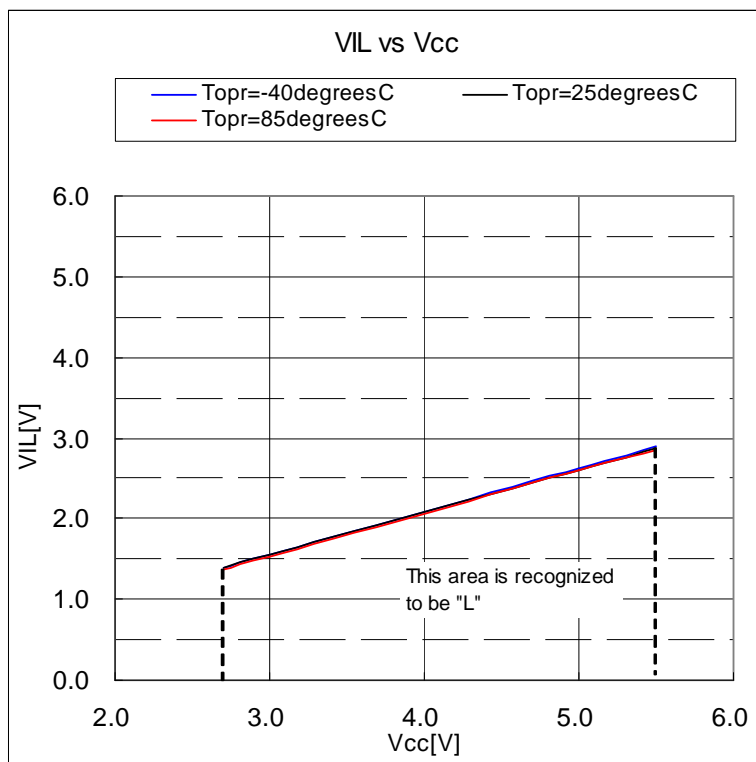


Figure3. VIL vs Vcc(in single-chip mode)

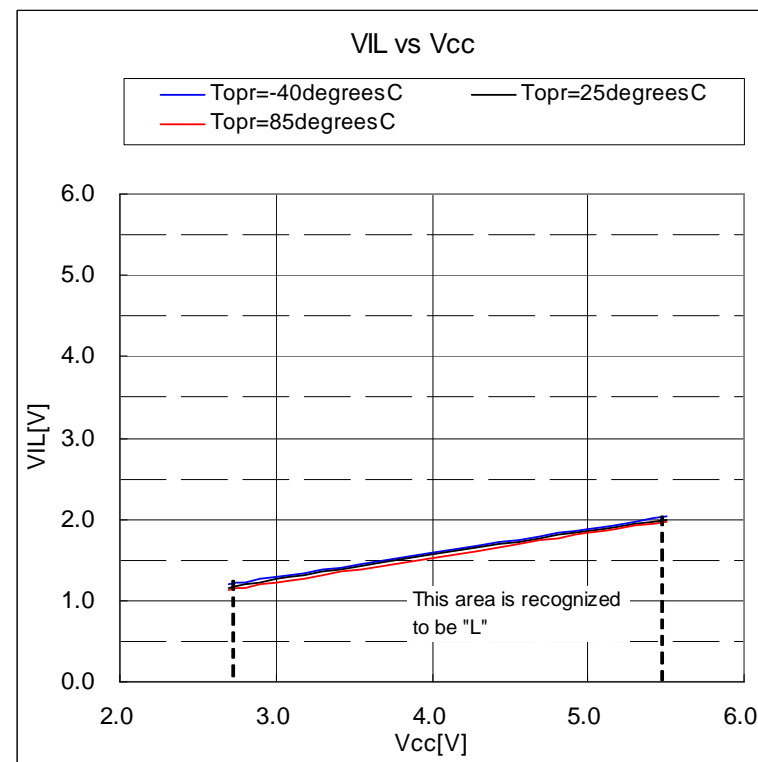


Figure4. VIL vs Vcc(data input in memory expansion and microprocessor mode)

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

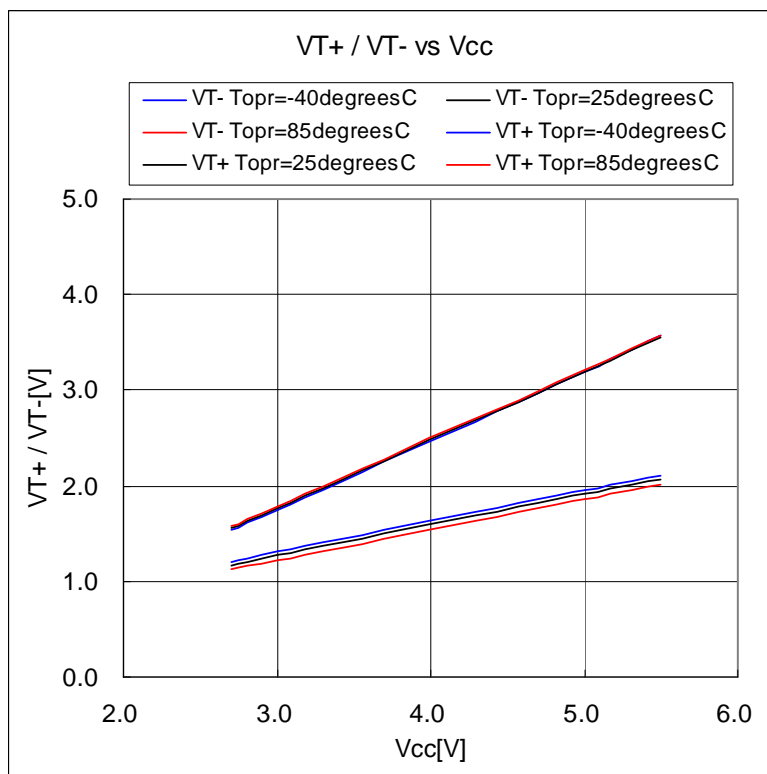


Figure5. VT+/VT- vs Vcc

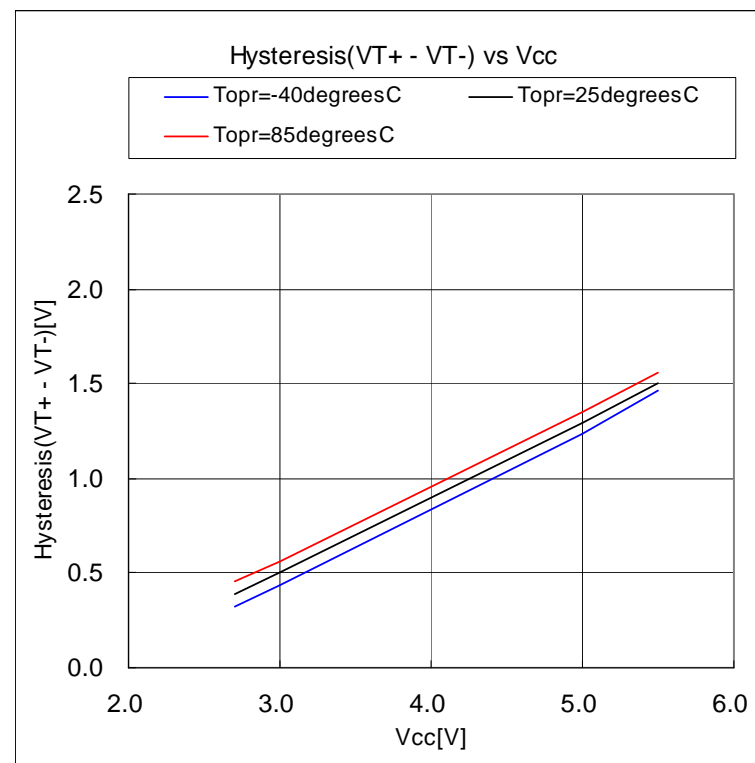


Figure6. Hysteresis (VT+-VT-) vs Vcc

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

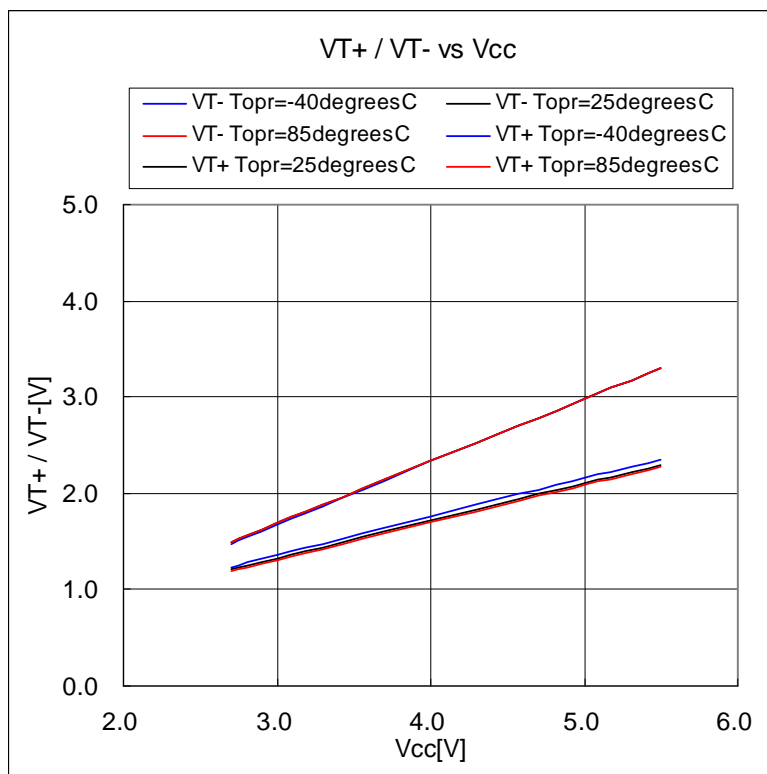


Figure7. VT+/VT- vs Vcc

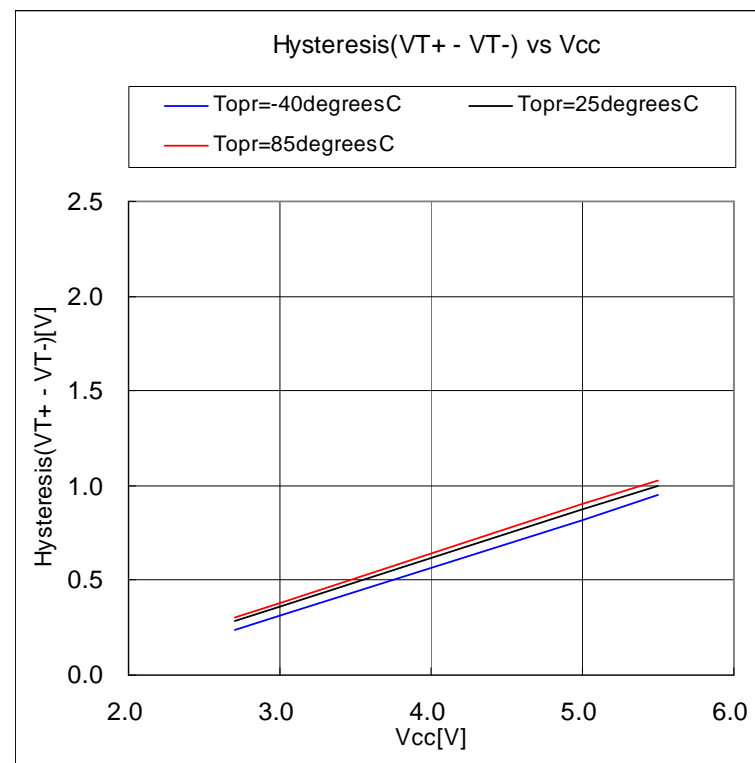


Figure8. Hysteresis (VT+;-VT-) vs Vcc

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

■ 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

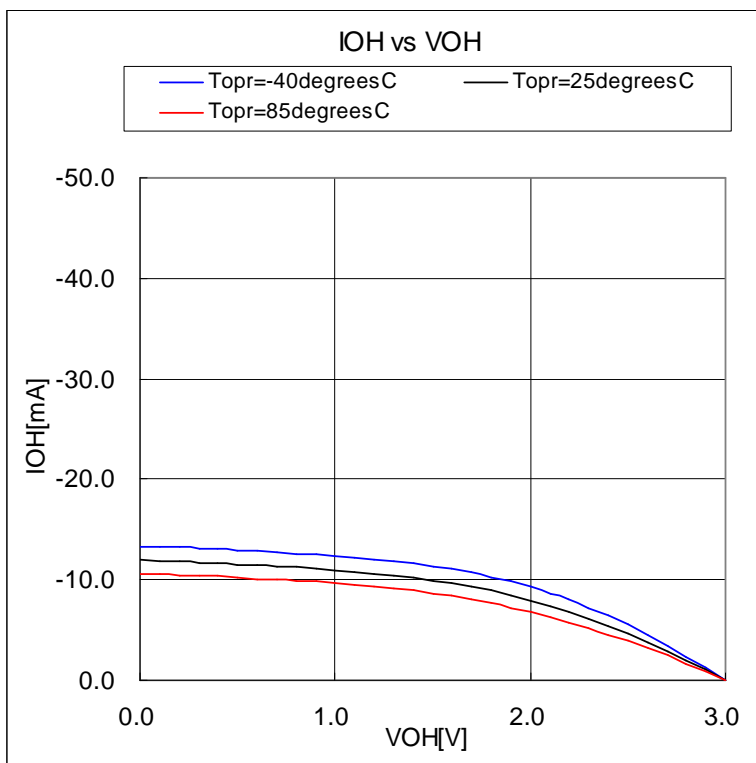


Figure9. IOH vs VOH (Vcc=3.0V)

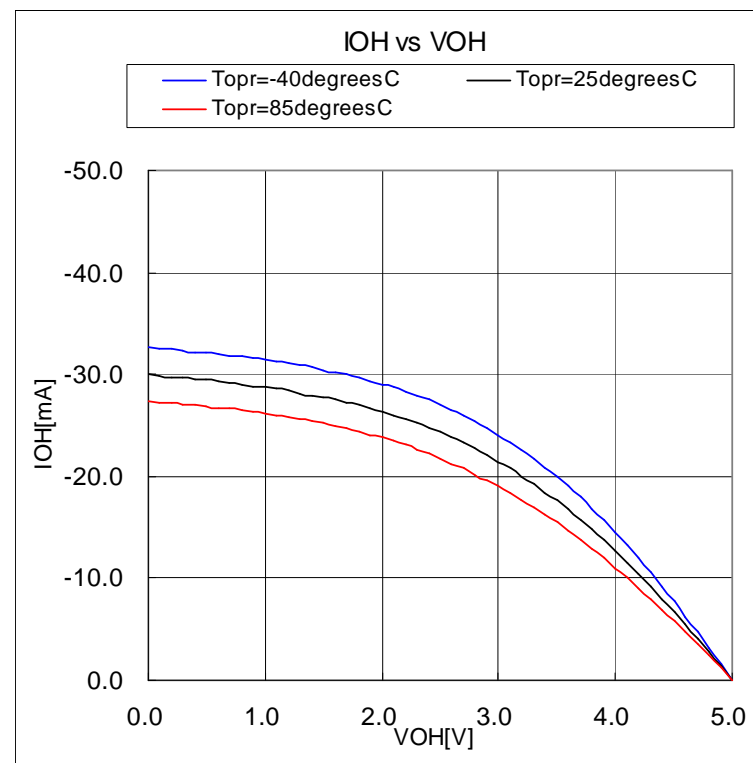


Figure10. IOH vs VOH (Vcc=5.0V)

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

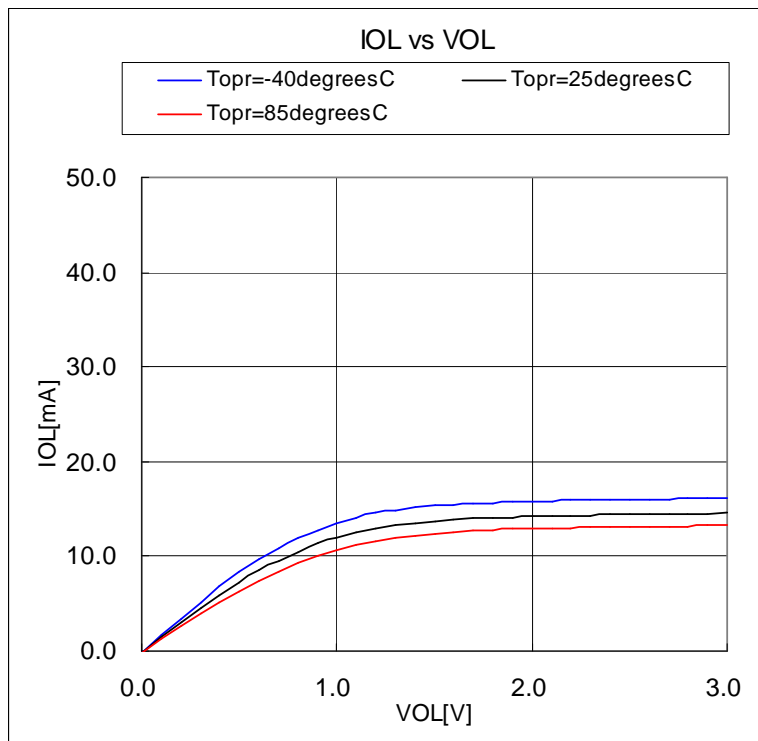


Figure11. IOL vs VOL (Vcc=3.0V)

■ 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

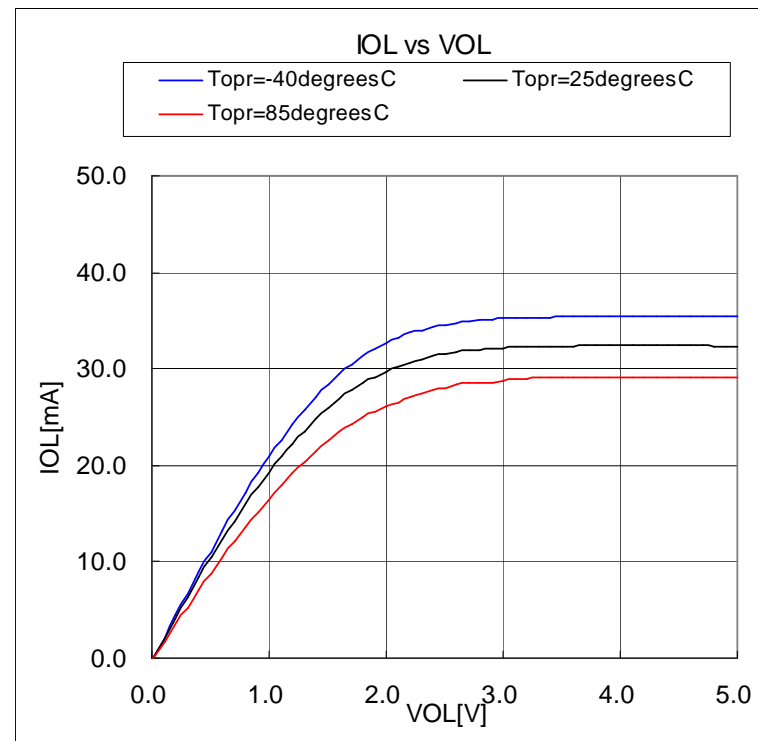


Figure12. IOL vs VOL (Vcc=5.0V)

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(-I_p) vs V_{cc}

- 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

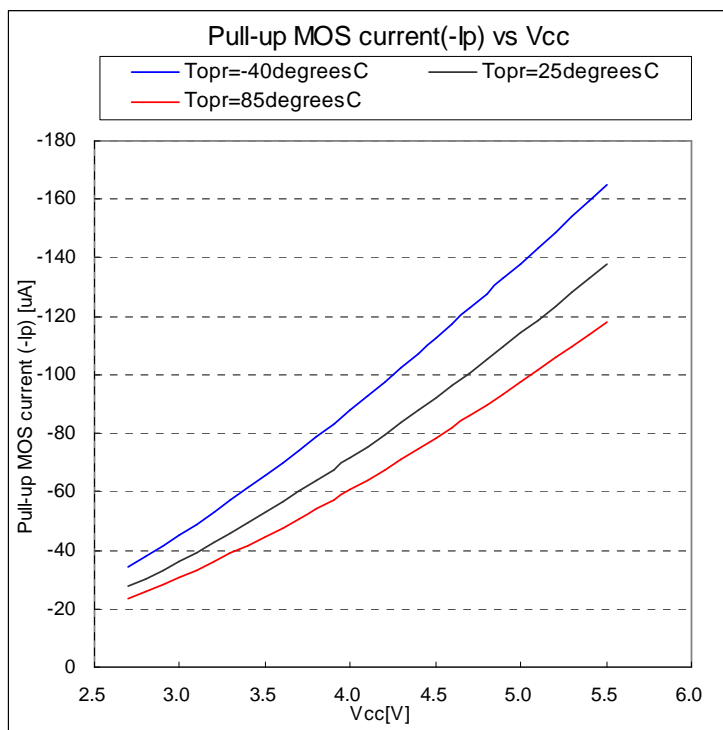


Figure13. Pull-up MOS current(-I_p) vs V_{cc}

(2) R_{pullup} vs V_{cc}

- 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

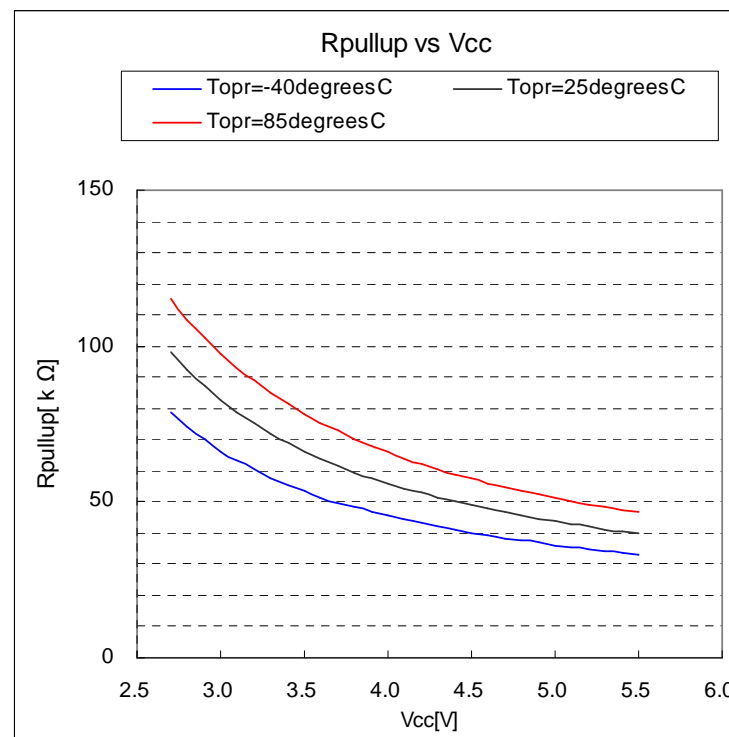


Figure14. R_{pullup} vs V_{cc}

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

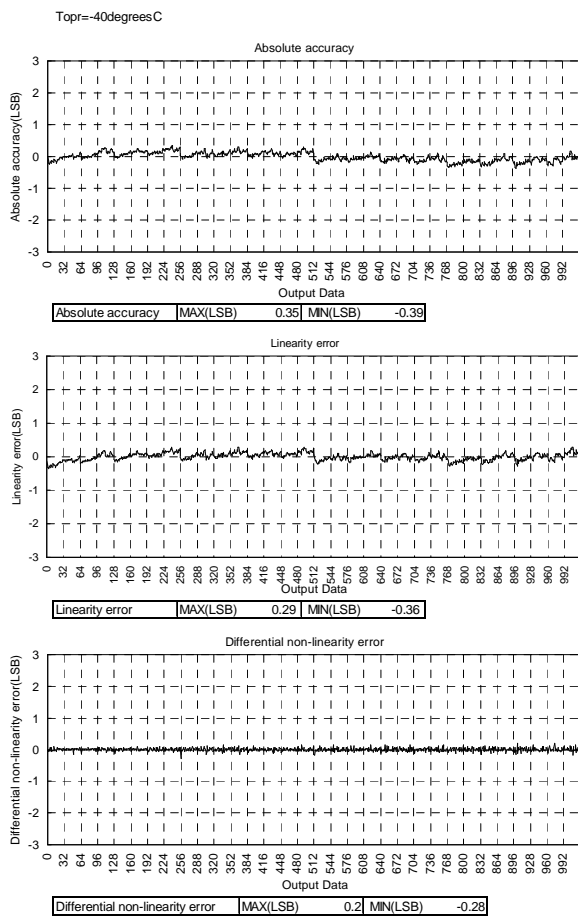


Figure15. Topr=-40(degrees C)

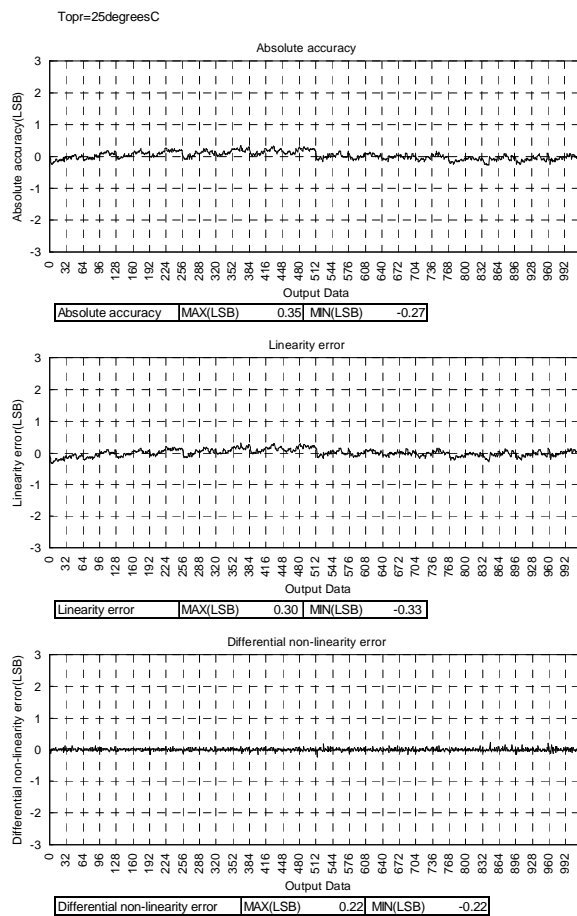


Figure16. Topr=25(degrees C)

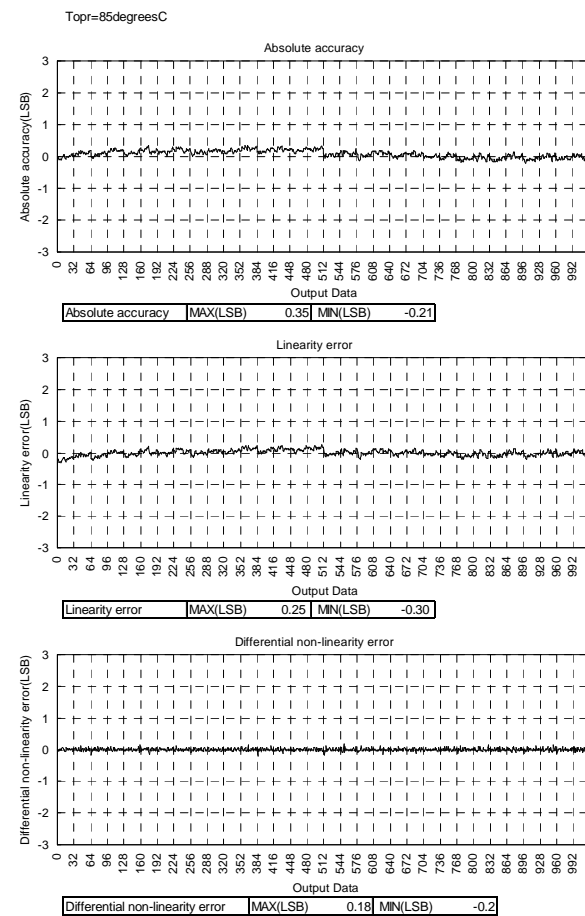


Figure17. Topr=85(degrees C)

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

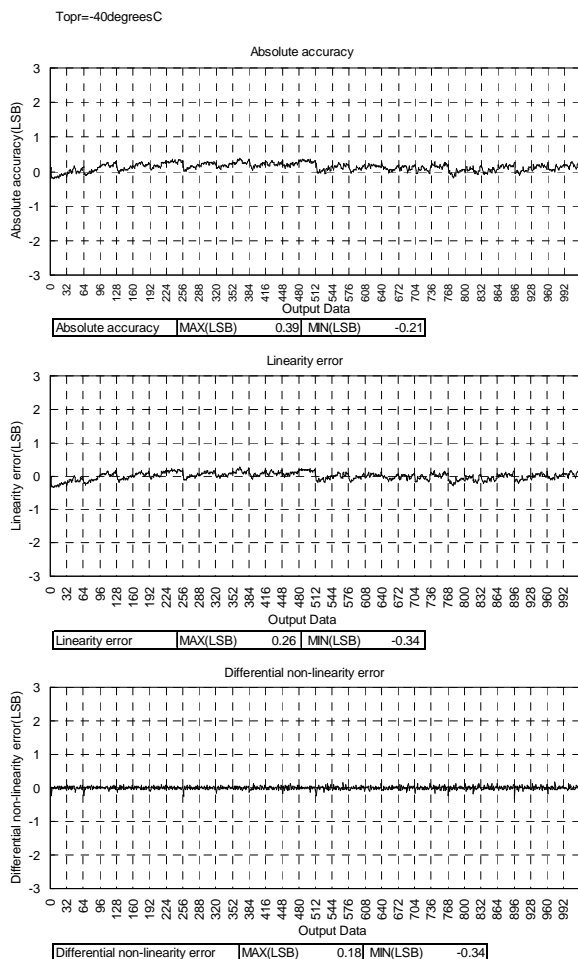


Figure18. Topr=-40(degrees C)

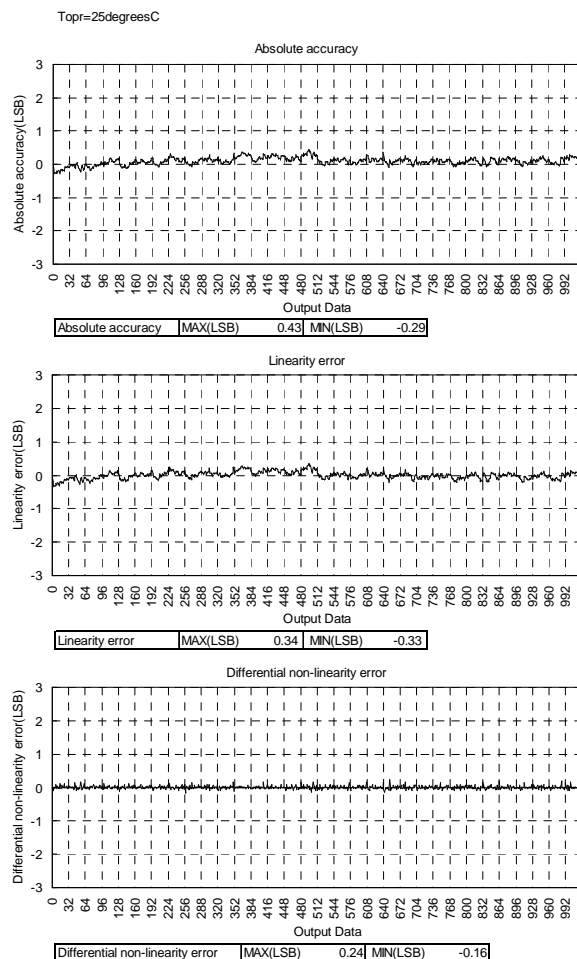


Figure19. Topr=25(degrees C)

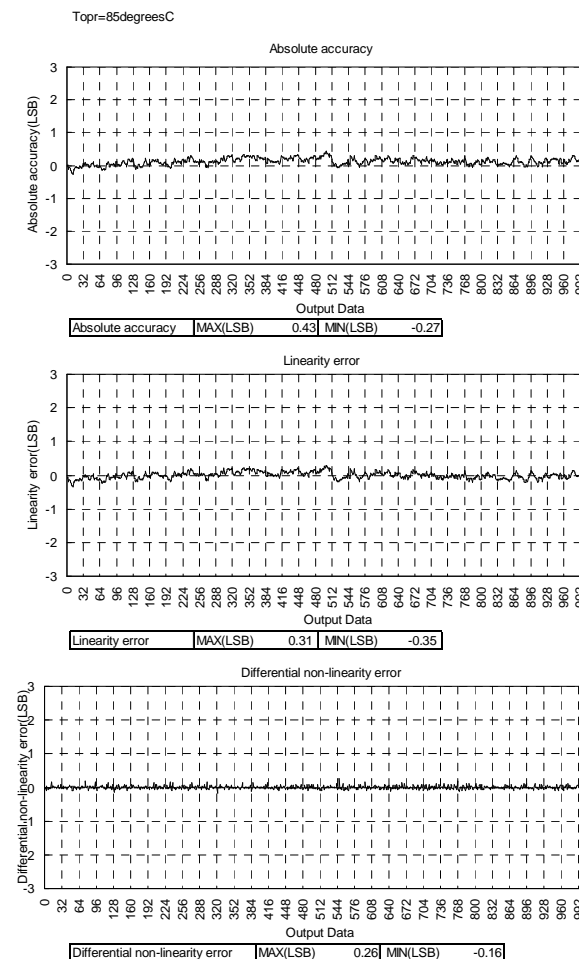


Figure20. Topr=85(degrees C)

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

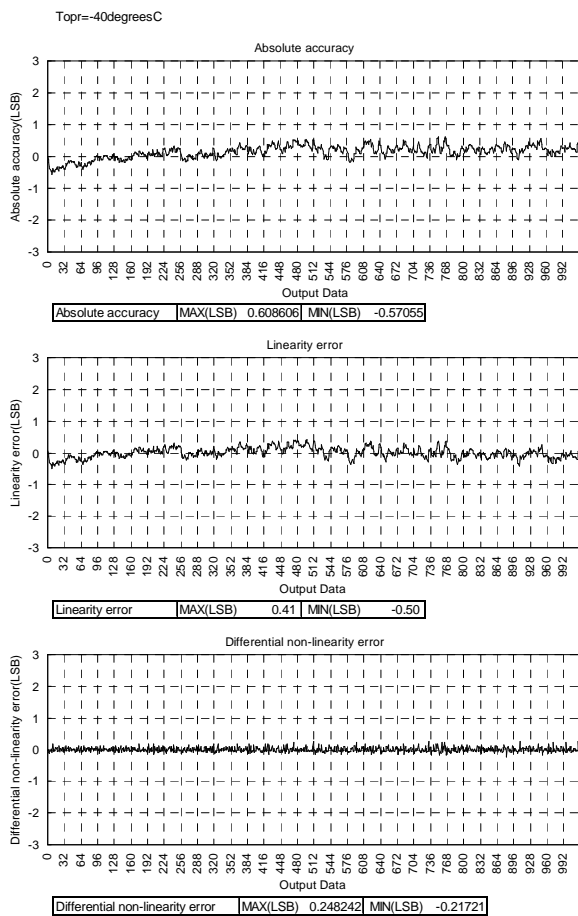


Figure21. Topr=-40(degrees C)

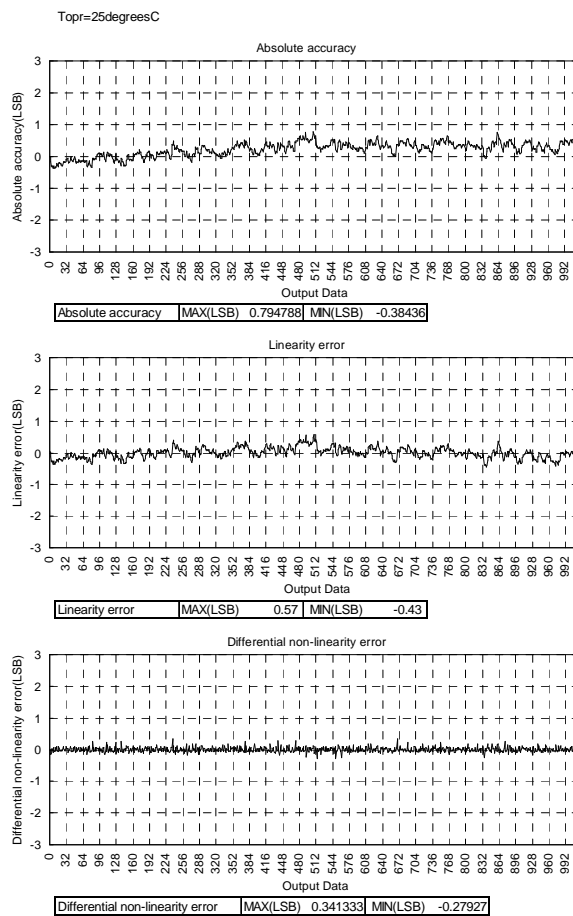


Figure22. Topr=25(degrees C)

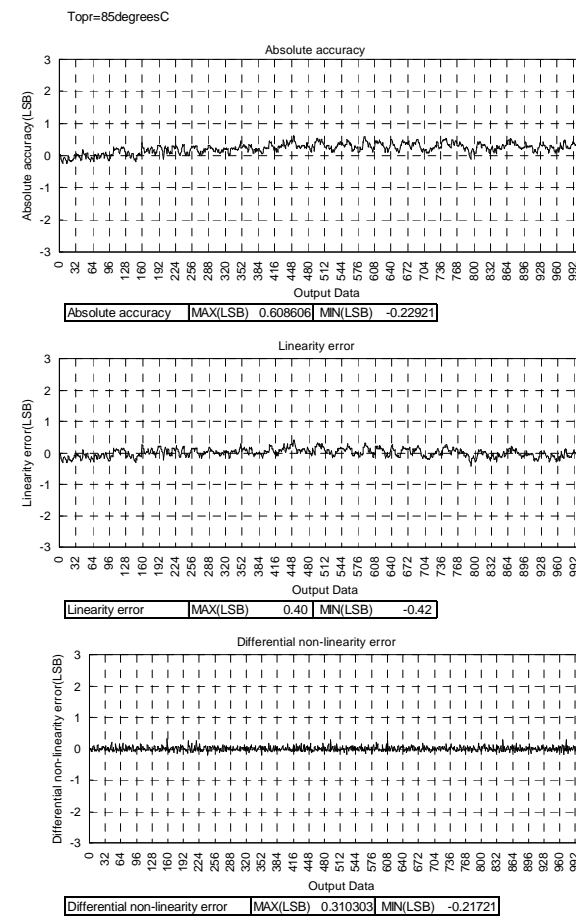


Figure23. Topr=85(degrees C)

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

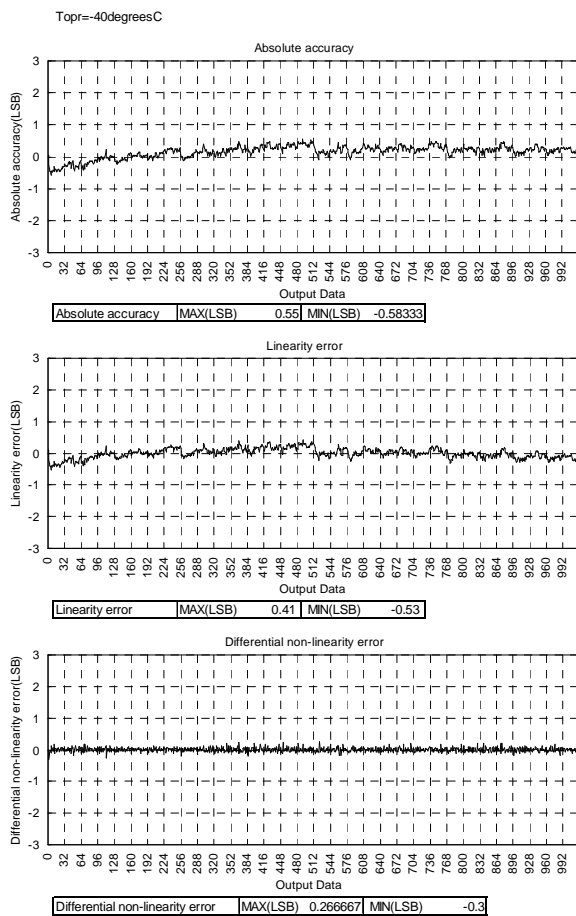


Figure24. Topr=-40(degrees C)

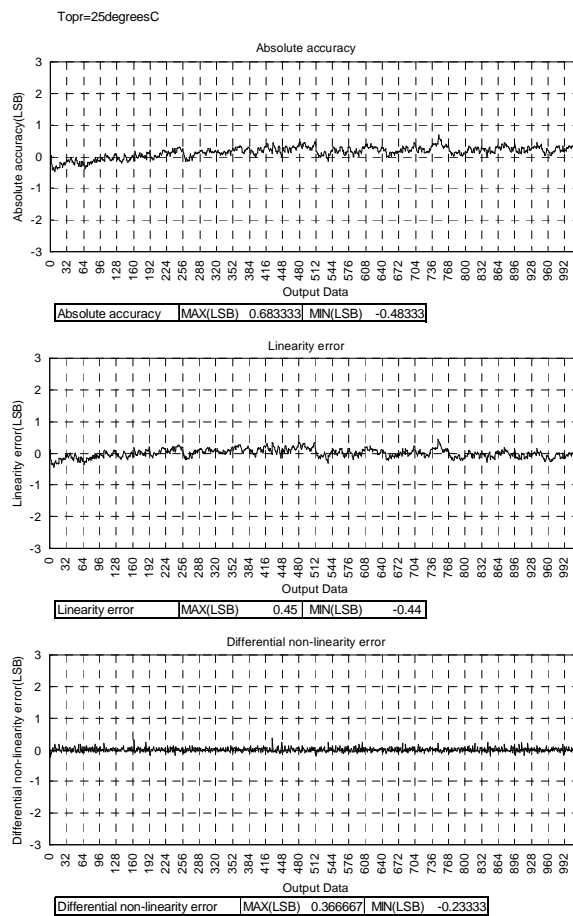


Figure25. Topr=25(degrees C)

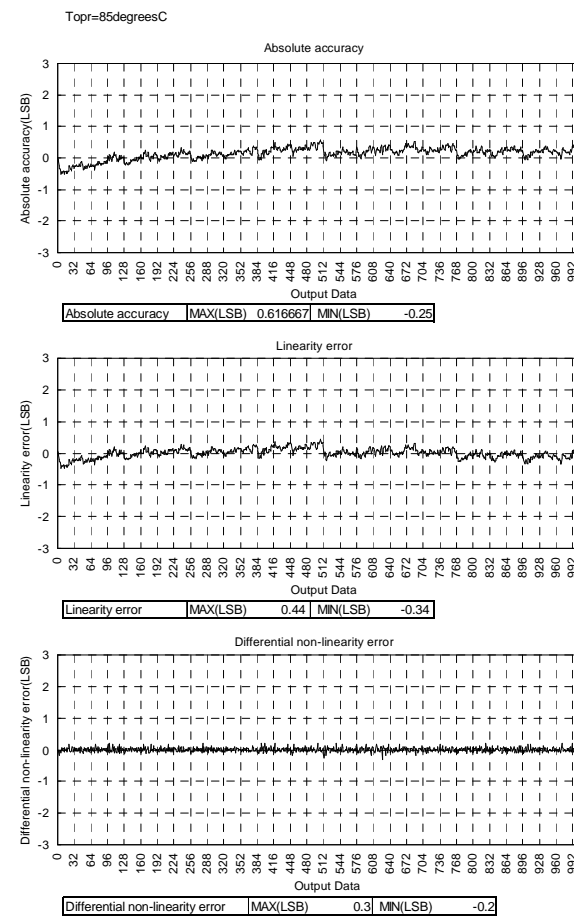


Figure26. Topr=85(degrees C)

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

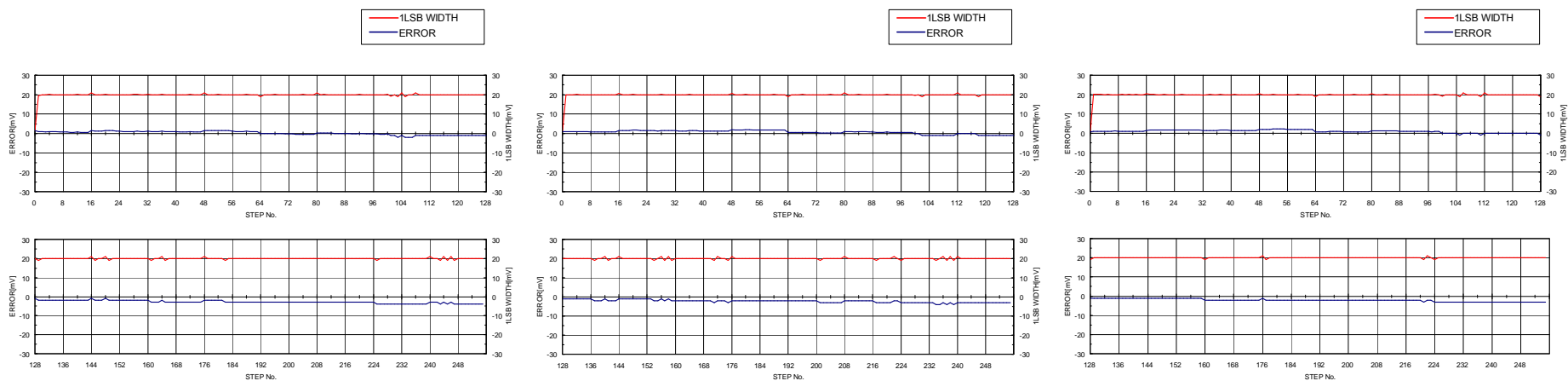


Figure27. Topr=-40(degrees C)

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

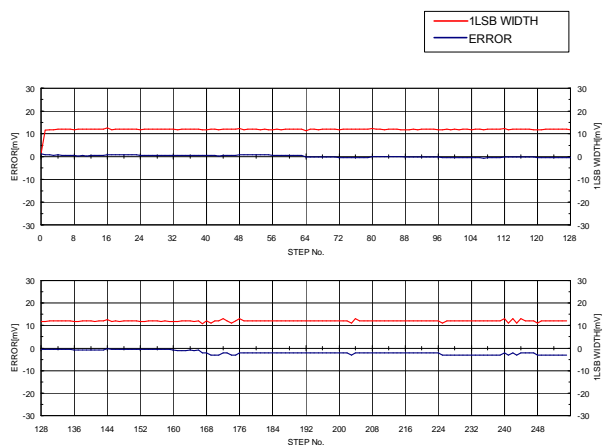


Figure30. Topr=-40(degrees C)

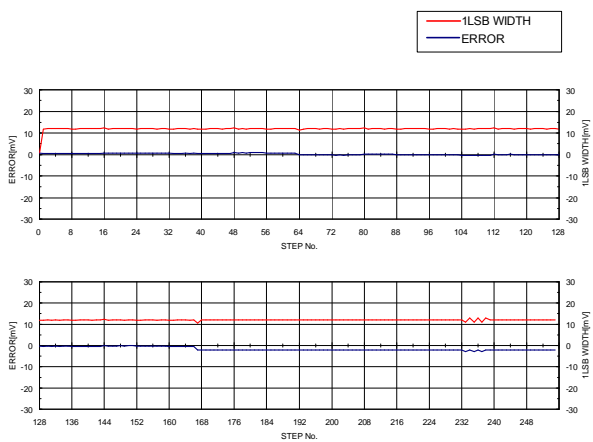


Figure31. Topr=25(degrees C)

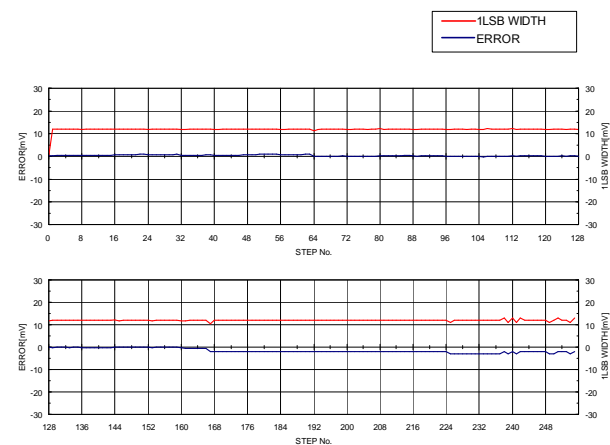


Figure32. Topr=85(degrees C)

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. I_{cc} vs f(Xin)

■ Operating Condition

XIN = 4 to 20 MHz (square wave)

125 kHz on-chip oscillator stop

Topr = 25(degrees C)

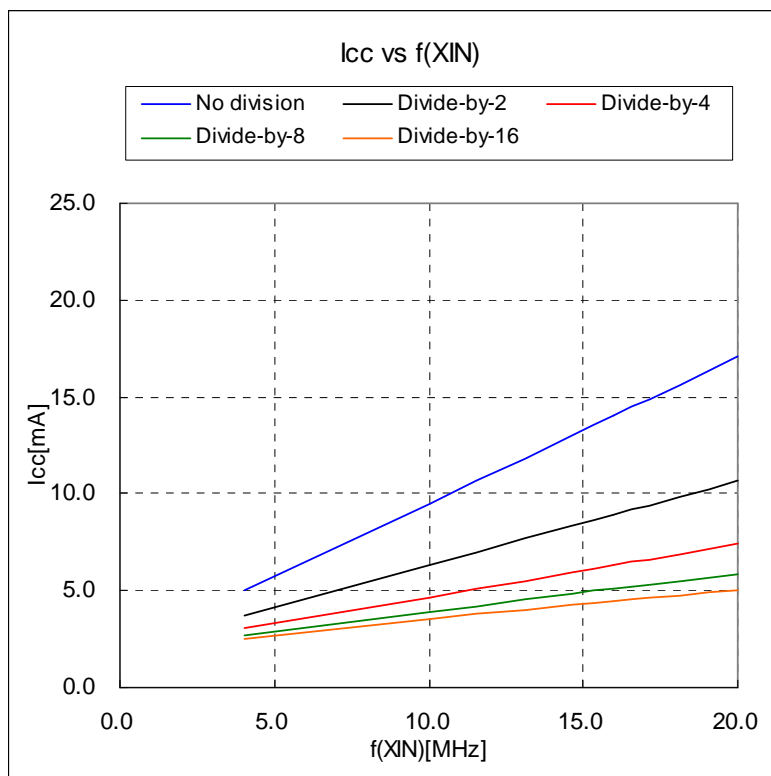


Figure33. I_{cc} vs f(Xin) (V_{cc}=3.0V)

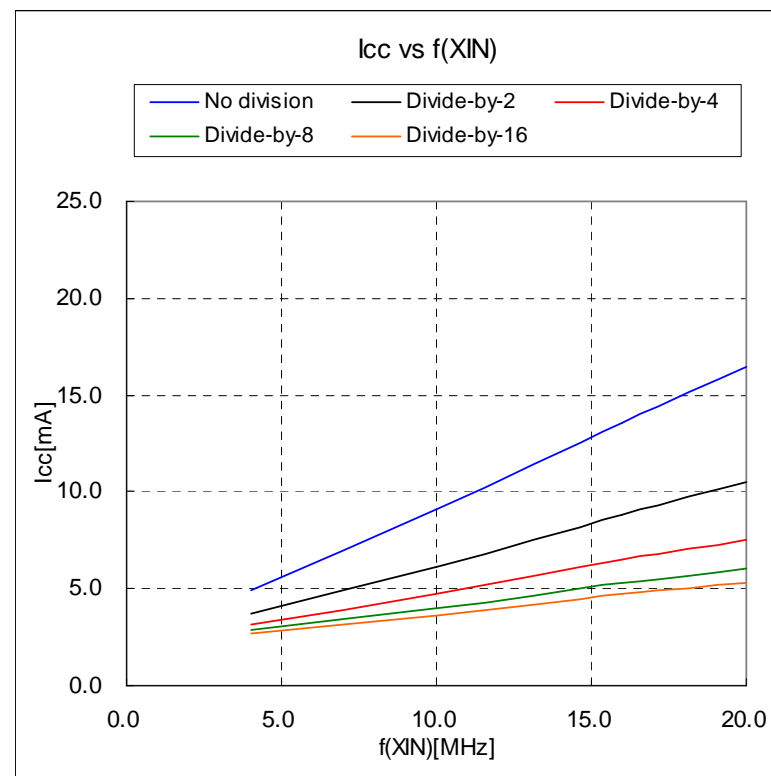


Figure34. I_{cc} vs f(Xin) (V_{cc}=5.0V)

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

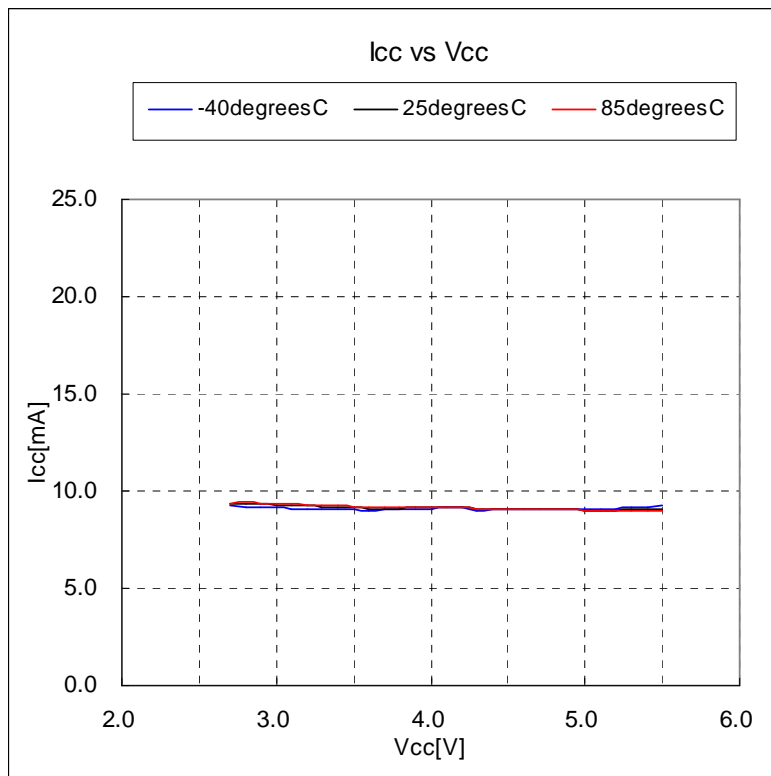


Figure35. Icc vs Vcc (f(Xin)=10MHz)

■ Operating Condition

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

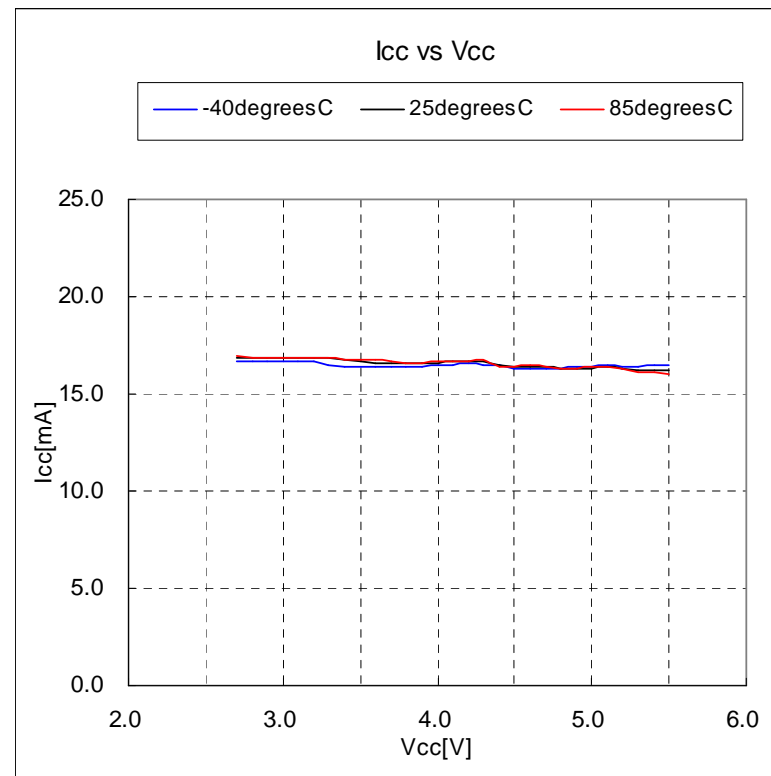


Figure36. Icc vs Vcc (f(Xin)=20MHz)

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

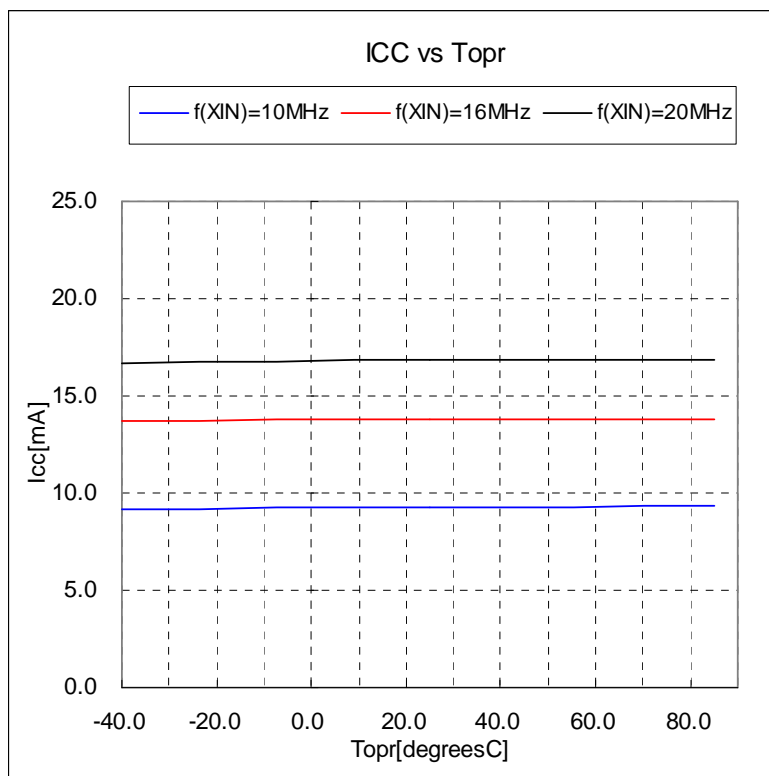


Figure37. Icc vs Topr (Vcc=3.0V)

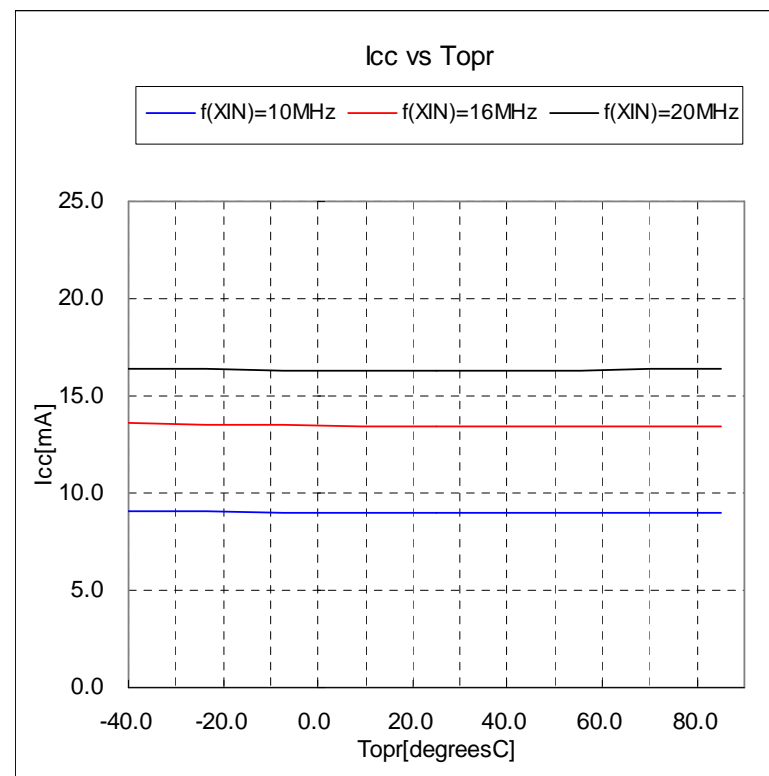


Figure38. Icc vs Topr (Vcc=5.0V)

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

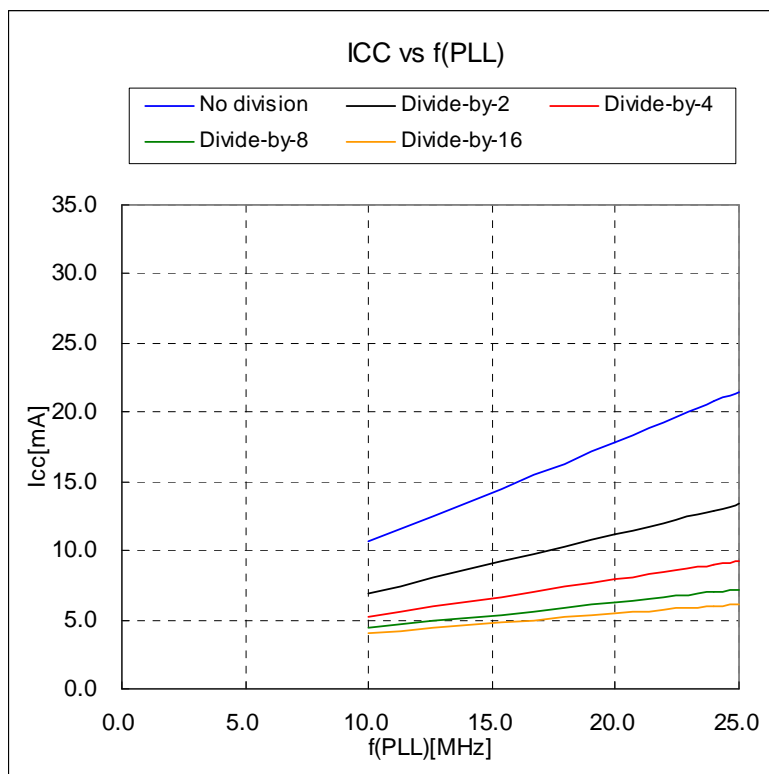


Figure39. Icc vs f(PLL) (Vcc=3.0V)

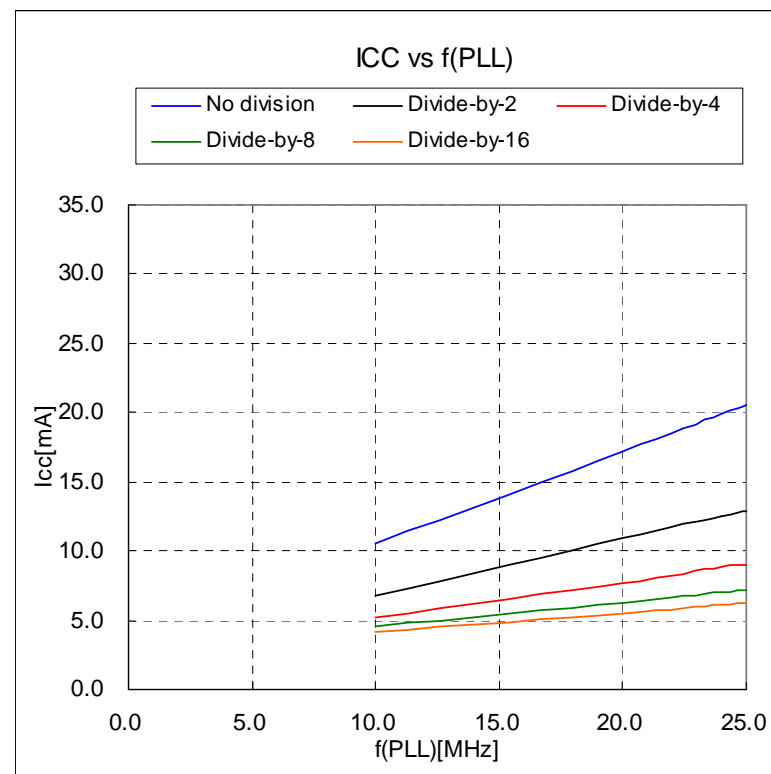


Figure40. Icc vs f(PLL) (Vcc=5.0V)

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

■ 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

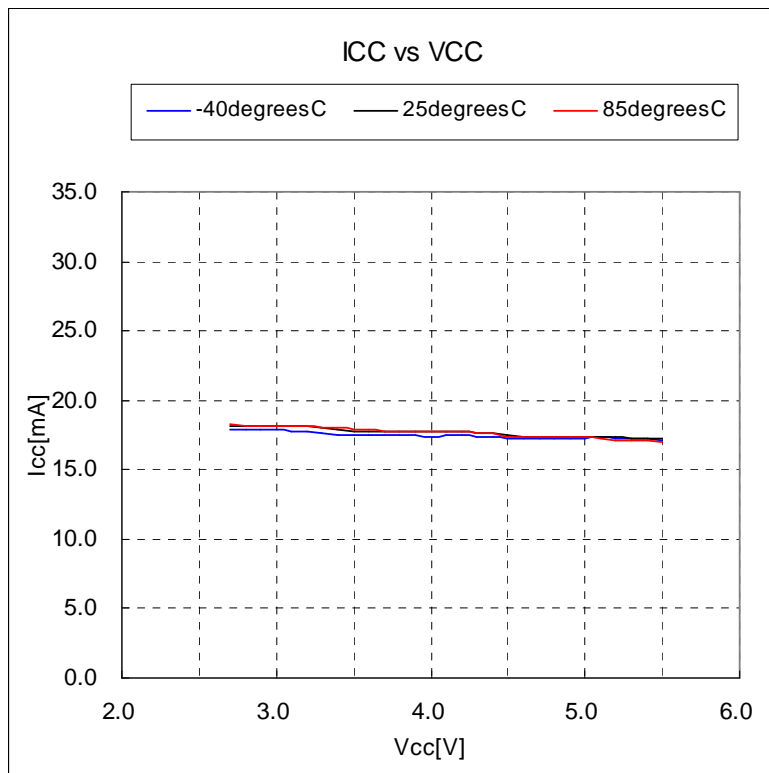


Figure41. Icc vs Vcc (f(PLL)=20MHz)

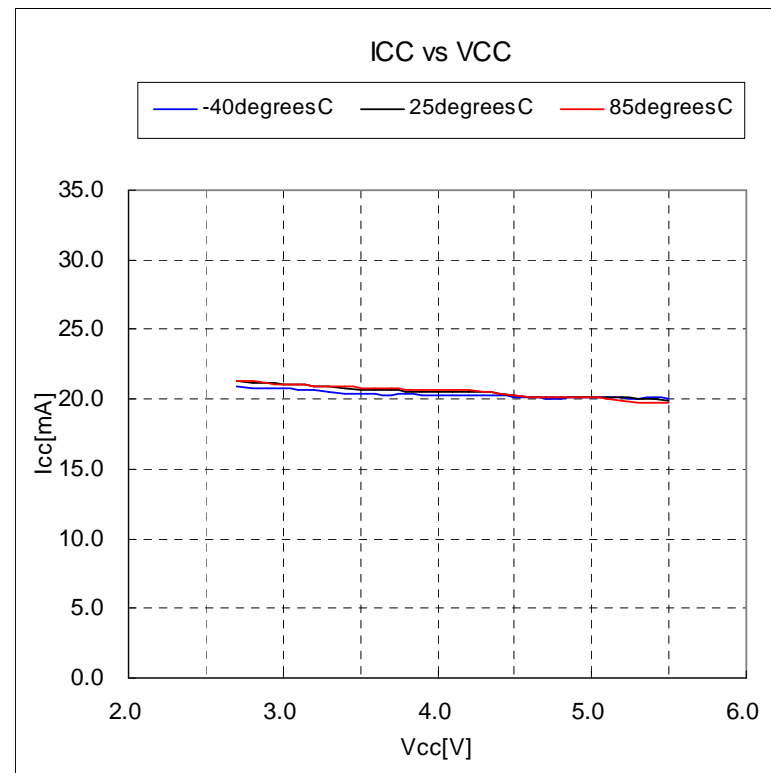


Figure42. Icc vs Vcc (f(PLL)=24MHz)

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

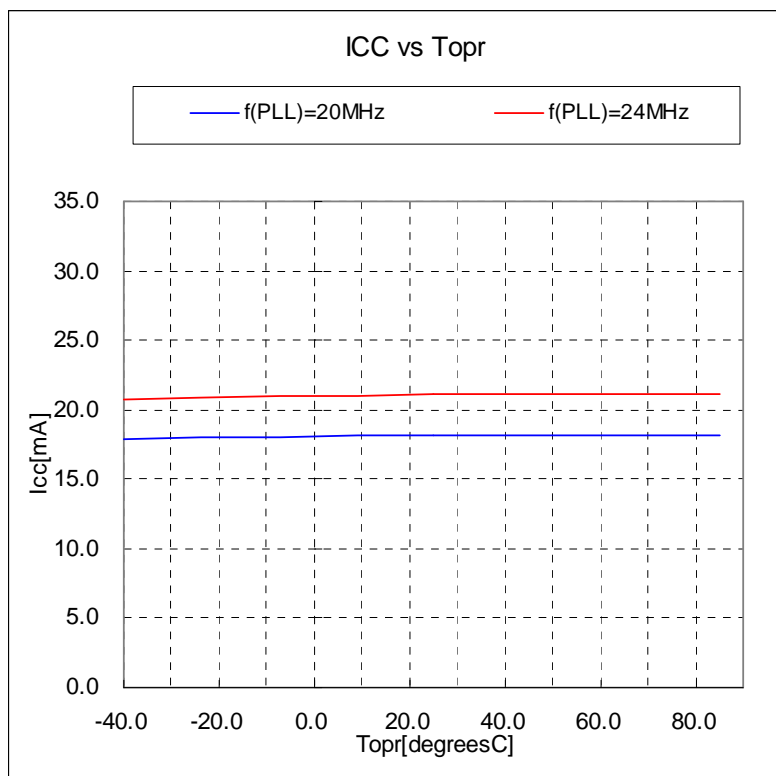


Figure43. Icc vs Topr (Vcc=3.0V)

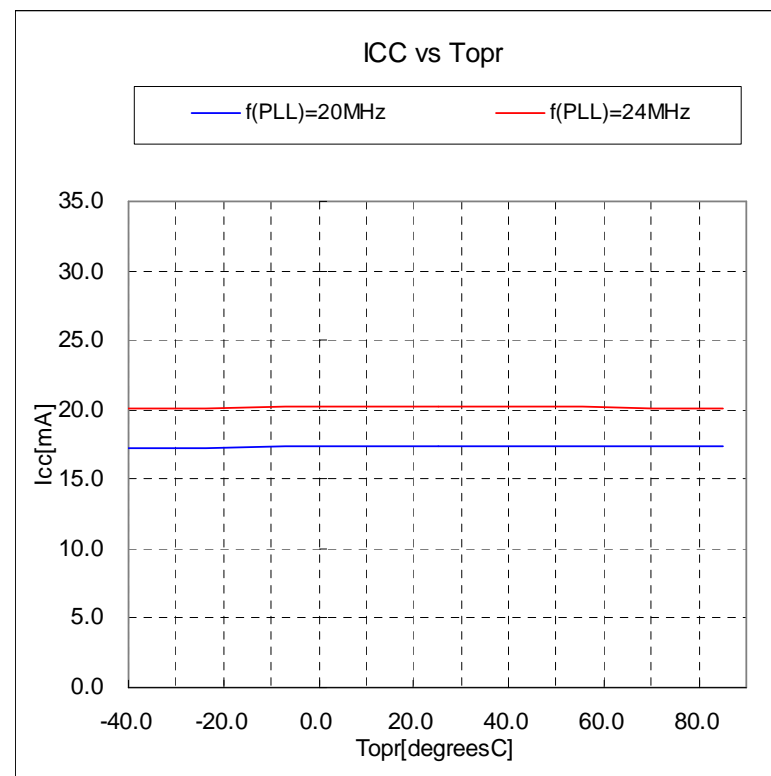


Figure44. Icc vs Topr (Vcc=5.0V)

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)

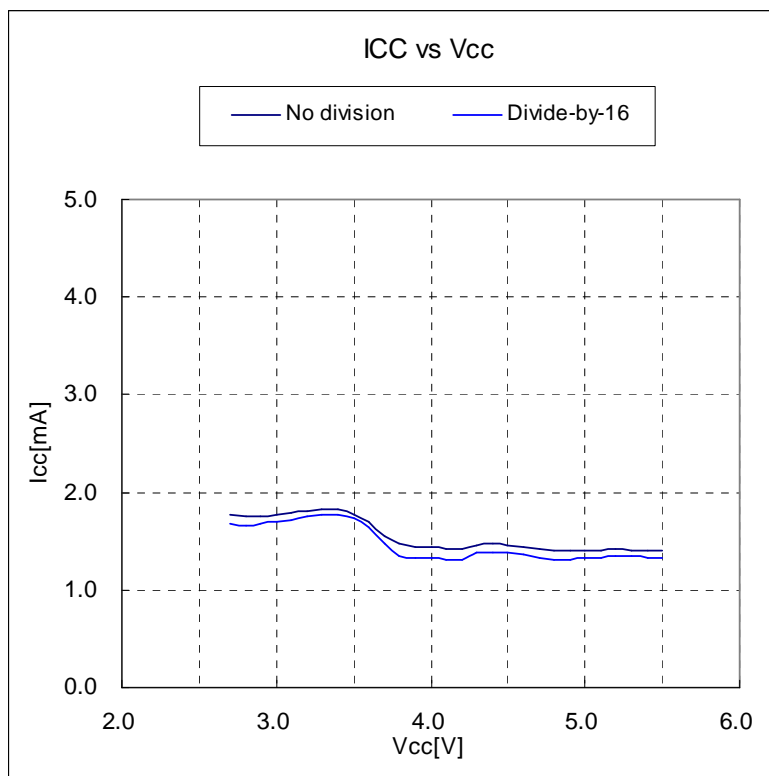


Figure45. Icc vs Vcc

■ Operating Condition

Main clock stop

125kHz on-chip oscillator on

FMR22=1

Topr = 25(degrees C)

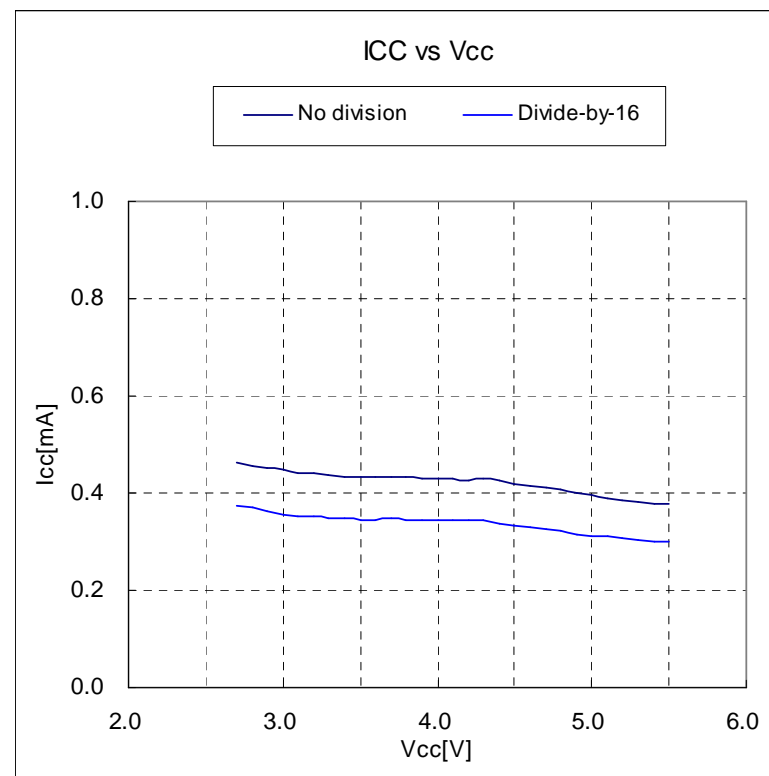


Figure46. Icc vs Vcc

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)

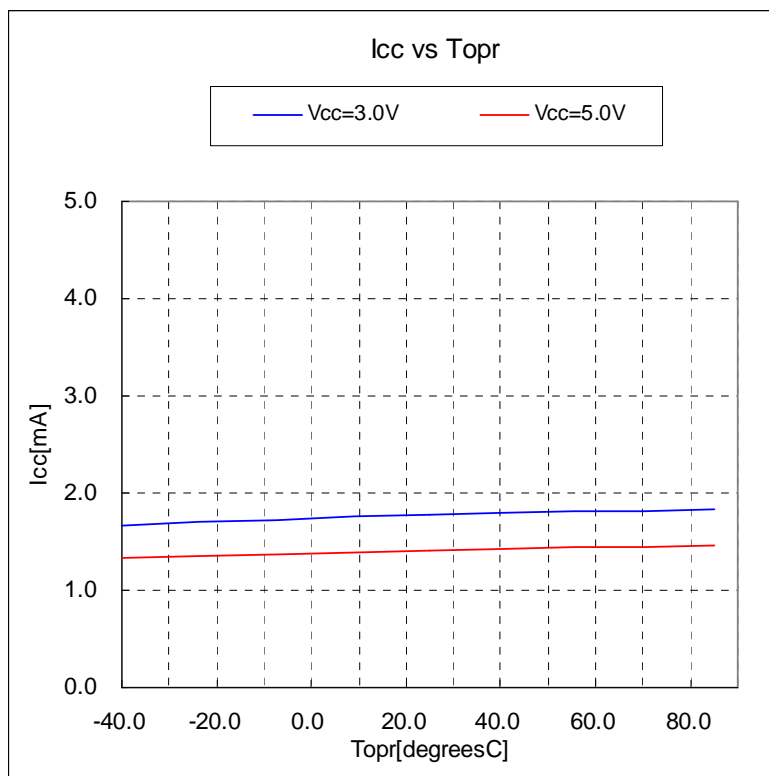


Figure47. Icc vs Topr

■ Operating Condition

Main clock stop

125kHz on-chip oscillator on, no division

FMR22=1

Topr = -40 to 85(degrees C)

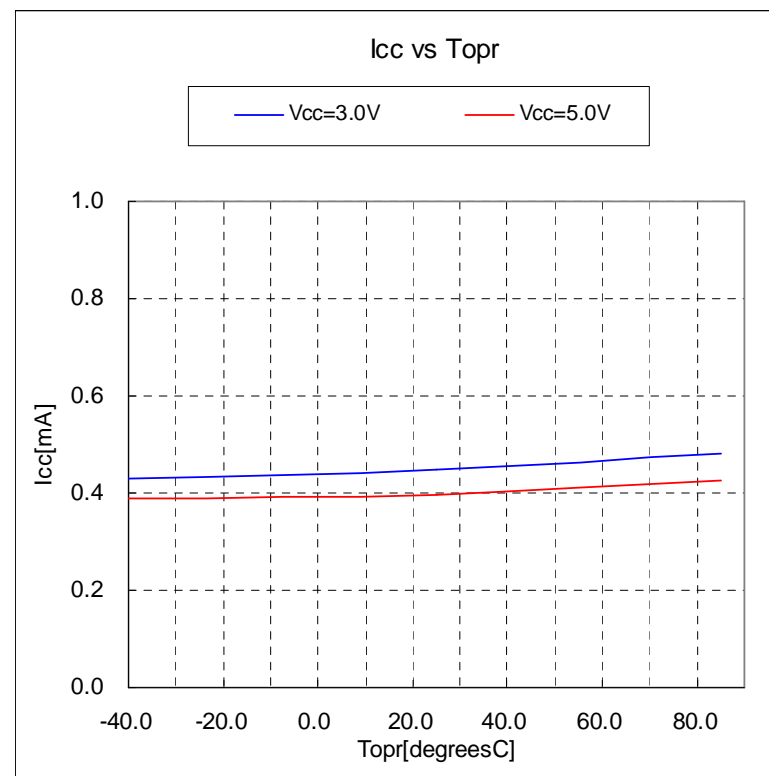


Figure48. Icc vs Topr

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. I_{cc} vs V_{cc}

■ Operating Condition

f(Xcin) = 32kHz

In low-power mode

FMR22 = FMR23 = 1

on flash memory

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

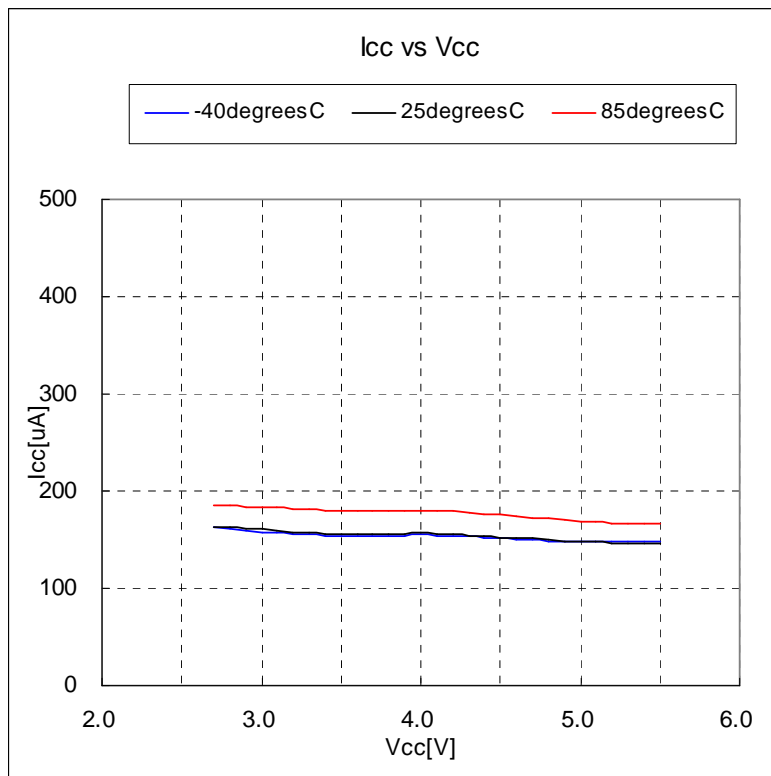


Figure49. I_{cc} vs V_{cc}

■ Operating Condition

f(Xcin) = 32kHz

In low-power mode,

FMR22 = FMR23 = 1

on RAM

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

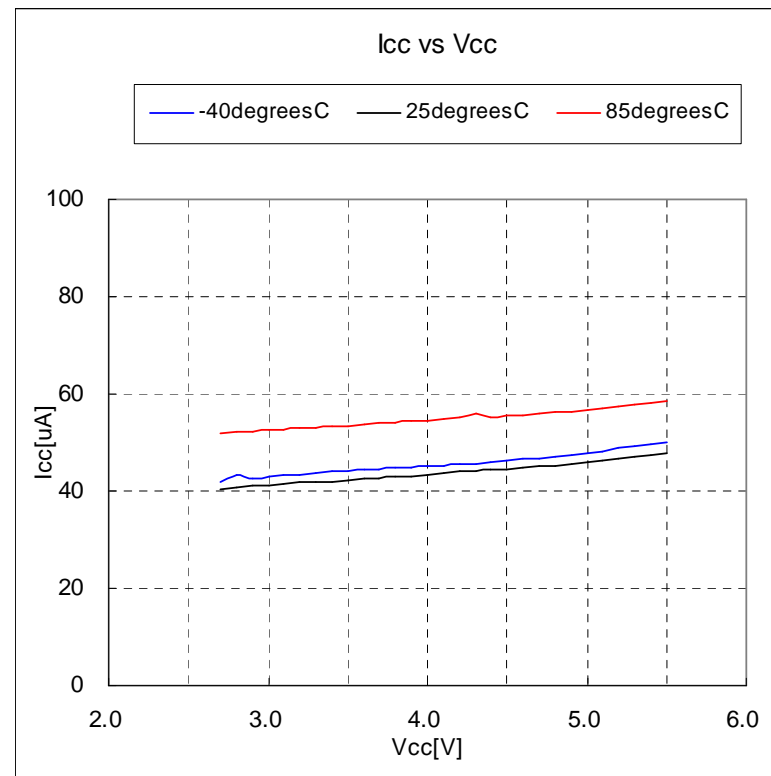


Figure50. I_{cc} vs V_{cc}

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)

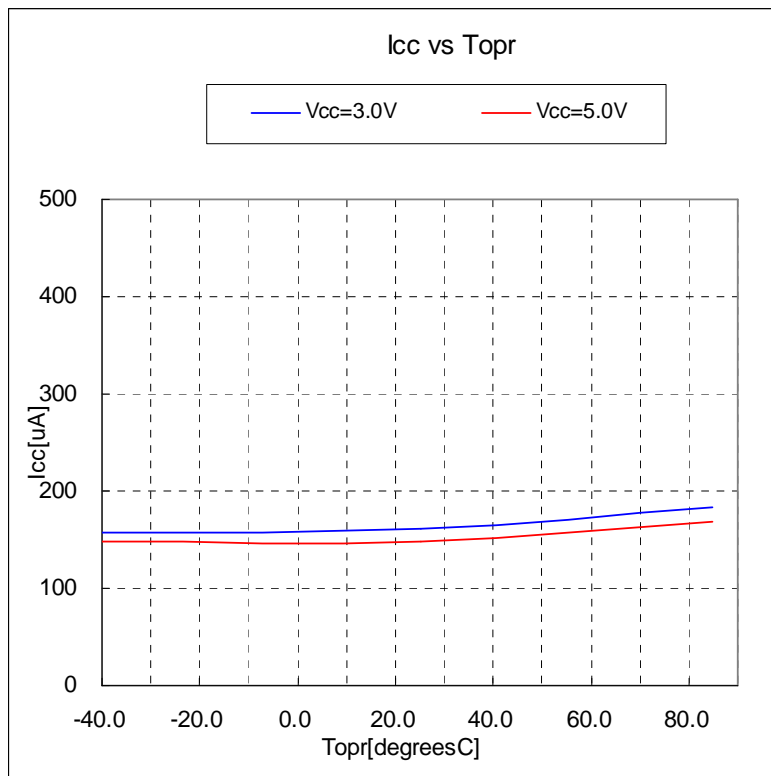


Figure51. Icc vs Topr

■ Operating Condition

f(Xcin) = 32kHz

In low-power mode

FMSTP = 1

on RAM

Topr = -40 to 85(degrees C)

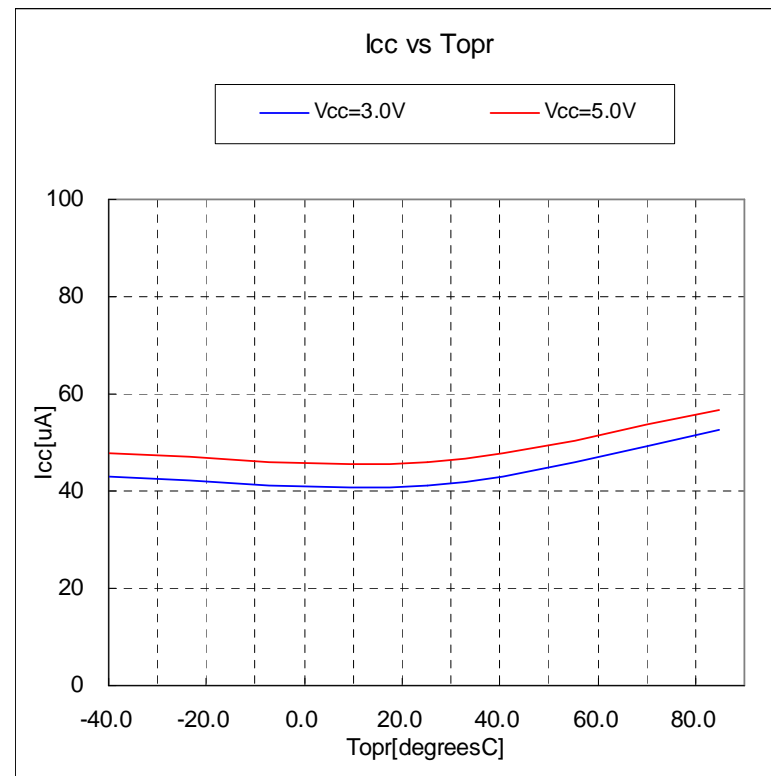


Figure52. Icc vs Topr

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)

■ Operating Condition

f(Xcin) = 32kHz (oscillation capacity Low)

125kHz on-chip oscillator stop

Peripheral clock operation

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

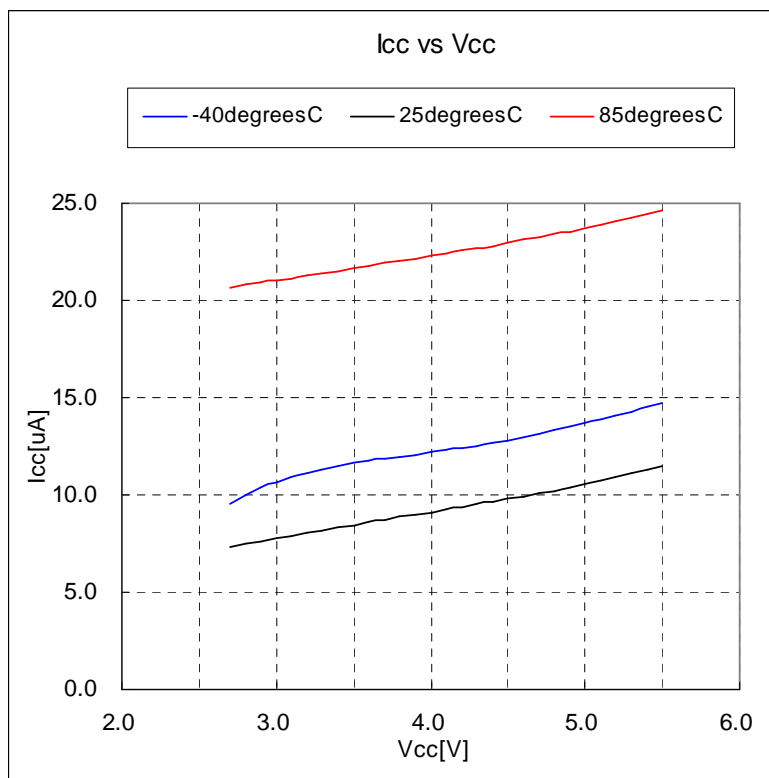


Figure53. Icc vs Vcc

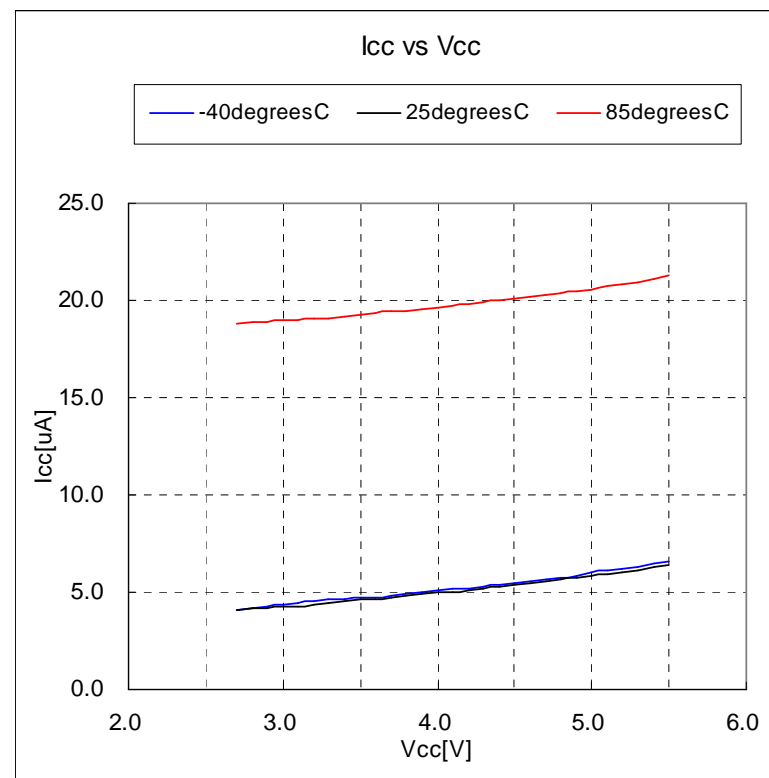


Figure54. Icc vs Vcc

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)

■ Operating Condition

f(Xcin) = 32kHz (oscillation capacity Low)

125kHz on-chip oscillator stop

Peripheral clock operation

Topr = -40 to 85(degrees C)

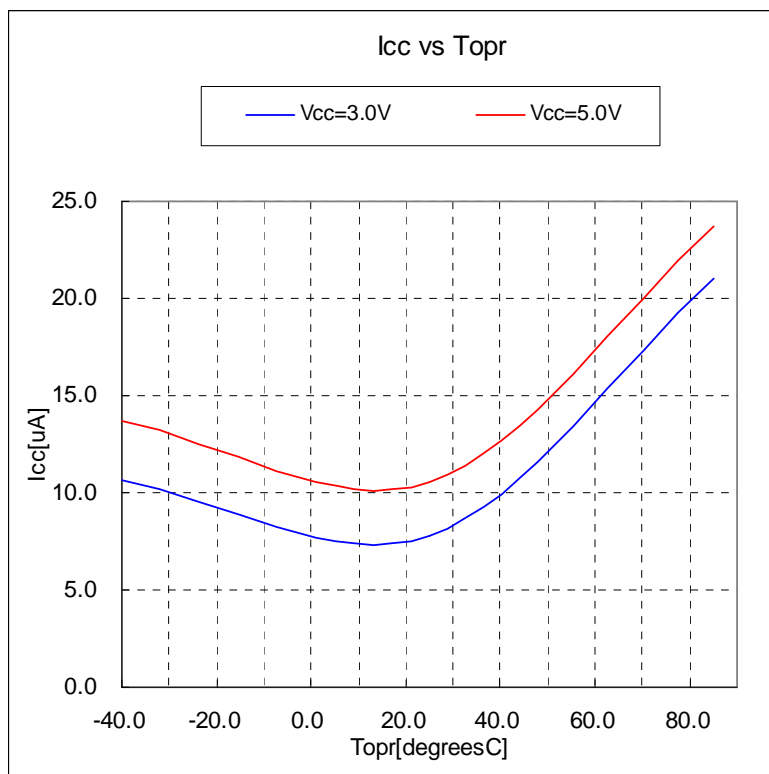


Figure55. Icc vs Topr

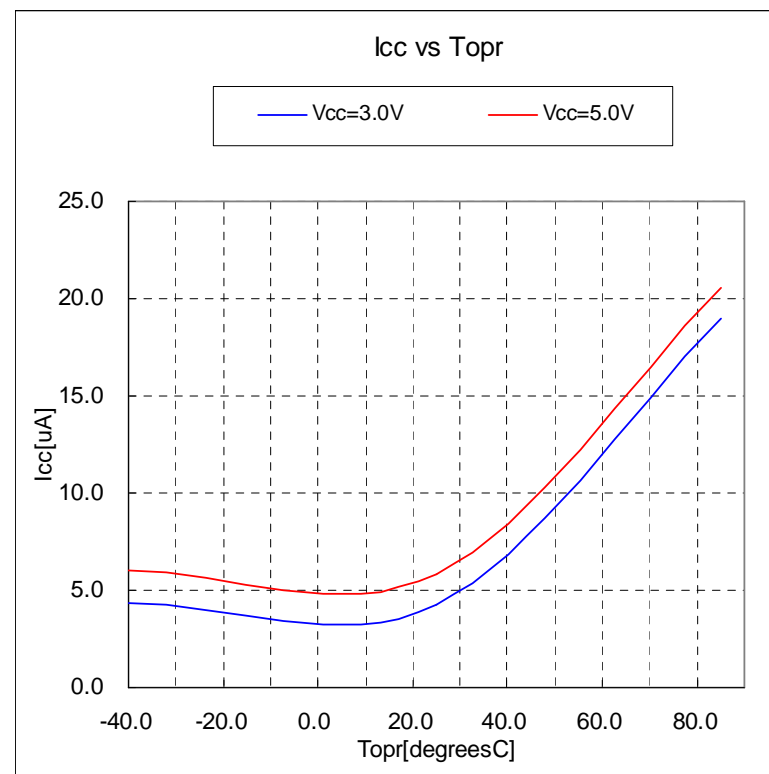


Figure56. Icc vs Topr

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. I_{cc} vs V_{cc}

■ Operating Condition

Main clock stop

125kHz on-chip oscillator on

Peripheral clock operation

T_{opr} = -40,25,85(degrees C)

■ Operating Condition

Main clock stop

125kHz on-chip oscillator on

Peripheral clock stop

T_{opr} = -40,25,85(degrees C)

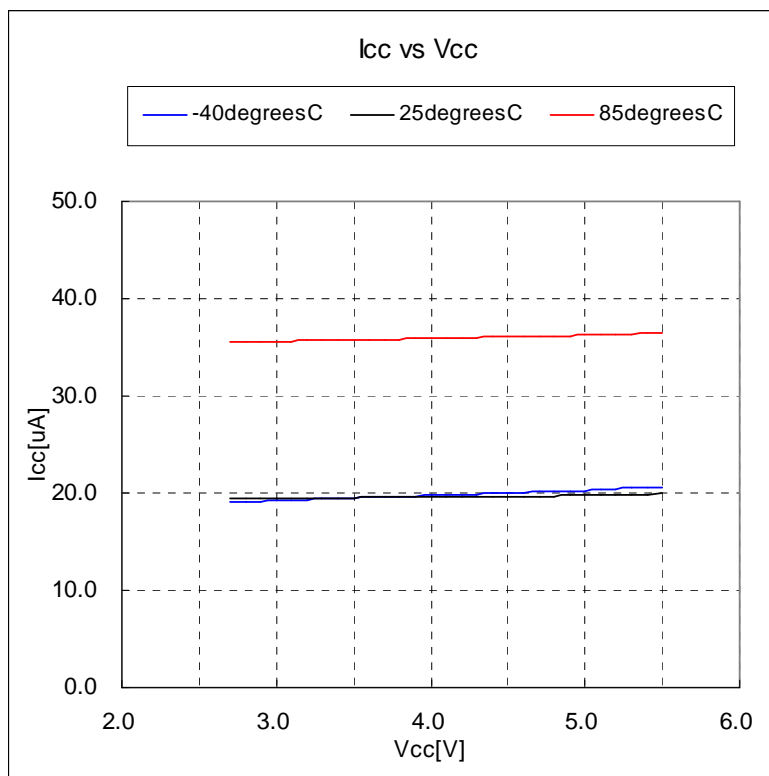


Figure57. Icc vs Vcc

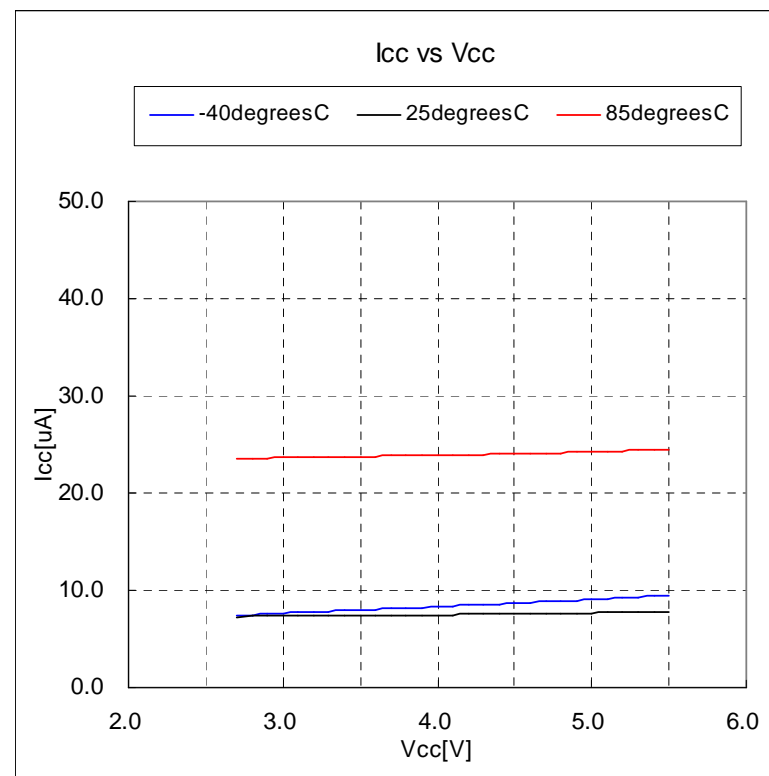


Figure58. Icc vs Vcc

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. I_{cc} vs T_{opr}

■ Operating Condition

Main clock stop

125kHz on-chip oscillator on

Peripheral clock operation

T_{opr} = -40 to 85(degrees C)

■ Operating Condition

Main clock stop

125kHz on-chip oscillator on

Peripheral clock stop

T_{opr} = -40 to 85(degrees C)

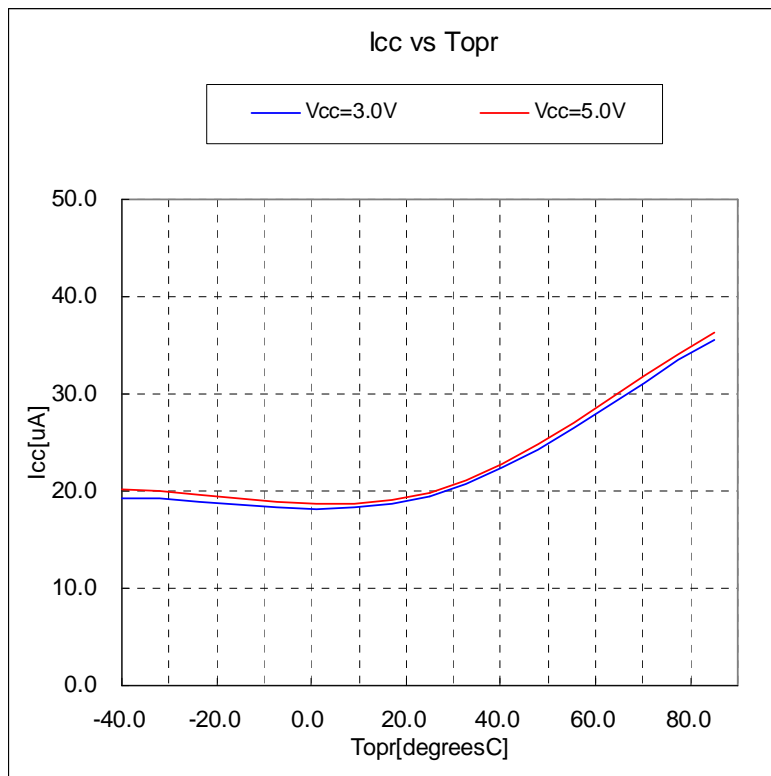


Figure59. I_{cc} vs Topr

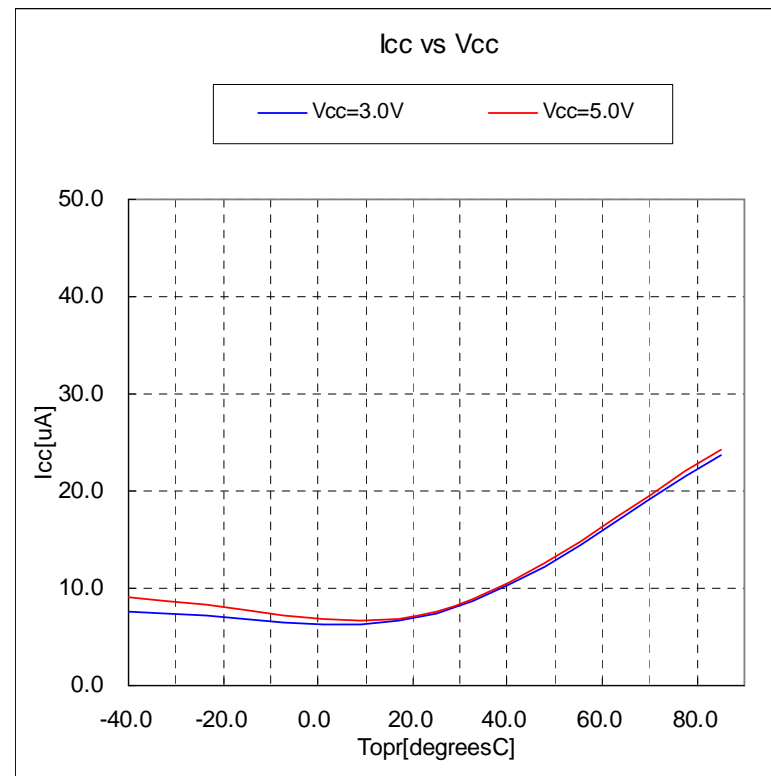


Figure60. I_{cc} vs Topr

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. I_{cc} vs V_{cc}

■ Operating Condition

Main clock stop

125kHz on-chip oscillator stop

Peripheral clock stop

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

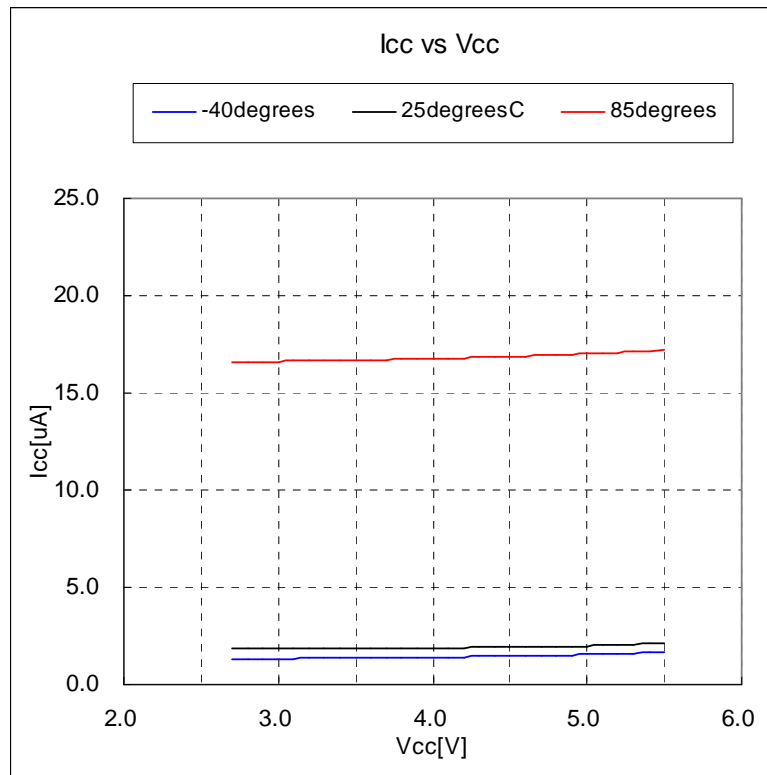


Figure61. I_{cc} vs V_{cc}

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)

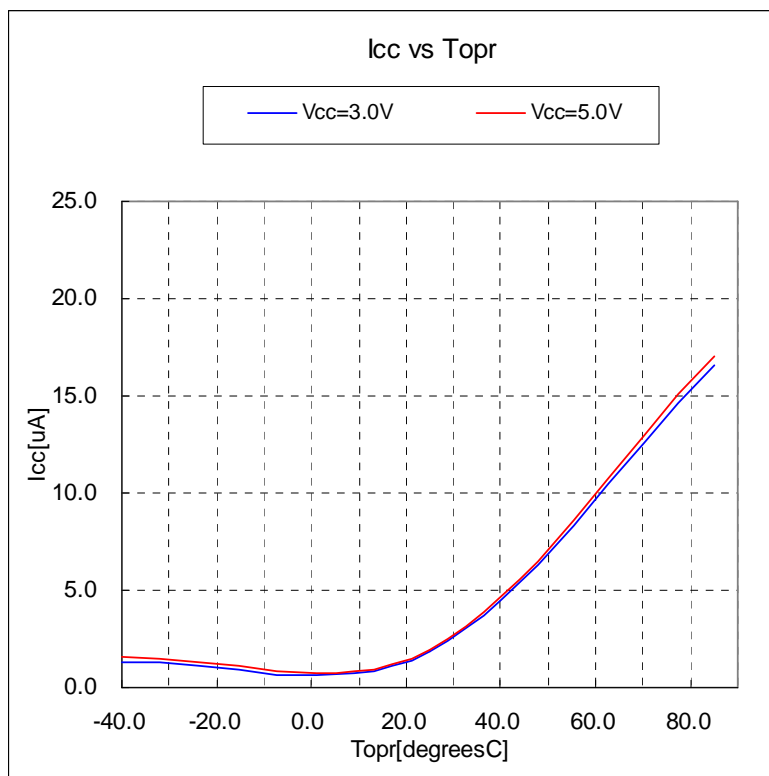


Figure62. Icc vs Topr

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) = ϕ AD = 10MHz
Vcc1 = Vcc2 = VREF
Topr = 25(degrees C)
No division

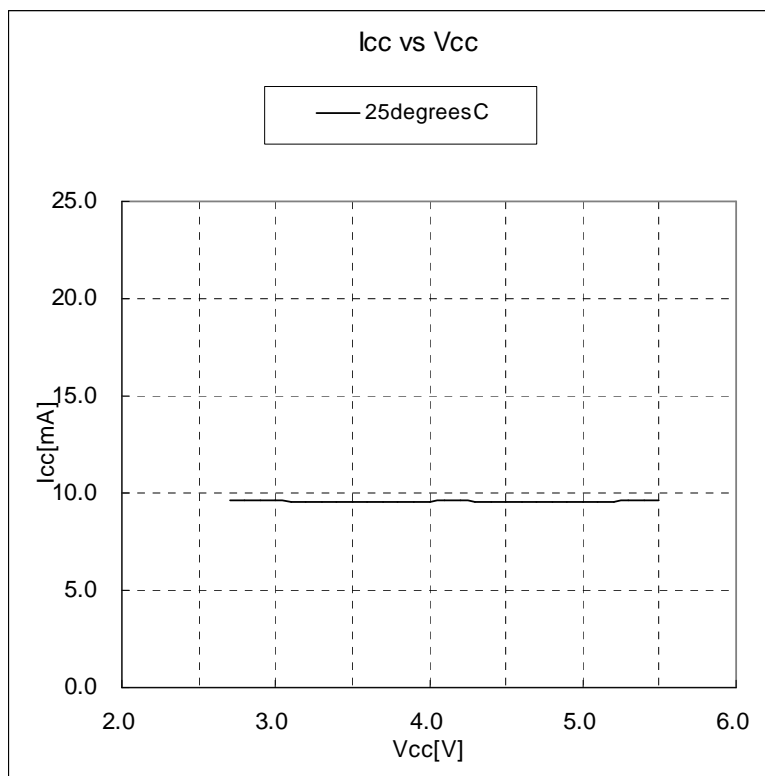


Figure63. Icc vs Vcc

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

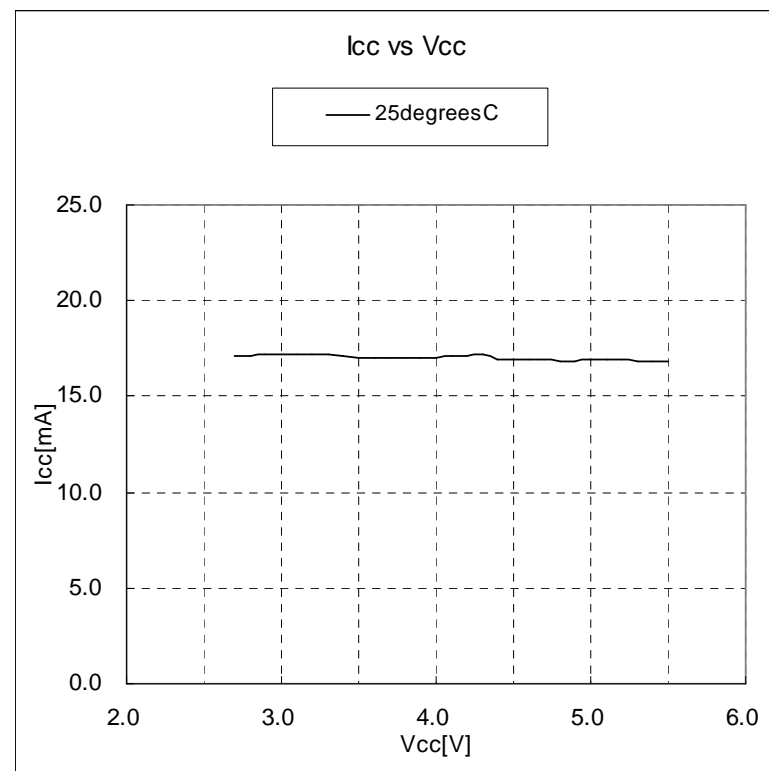


Figure64. Icc vs Vcc

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

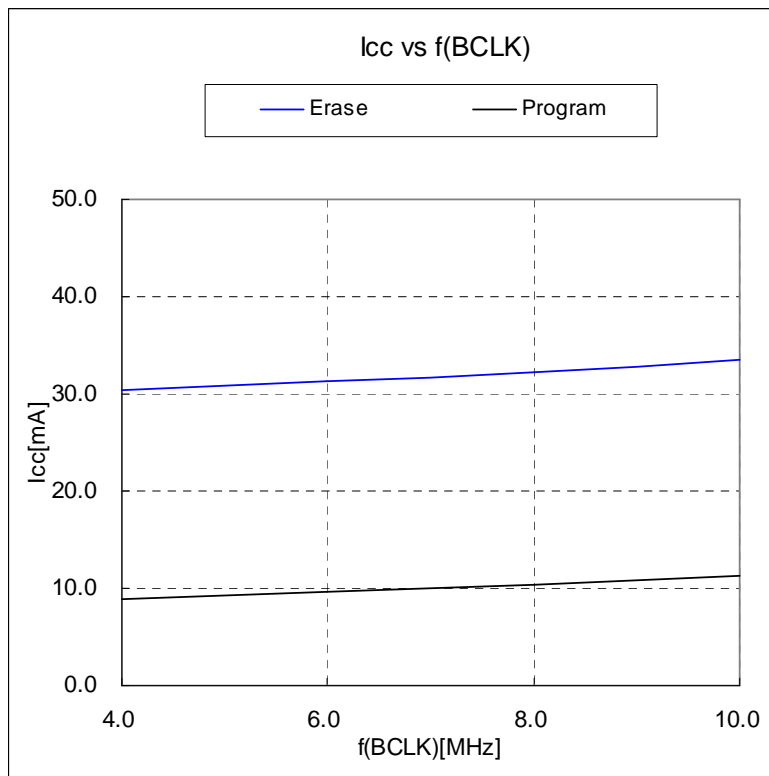


Figure65. Icc vs f(BCLK) (Vcc=3.0V)

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

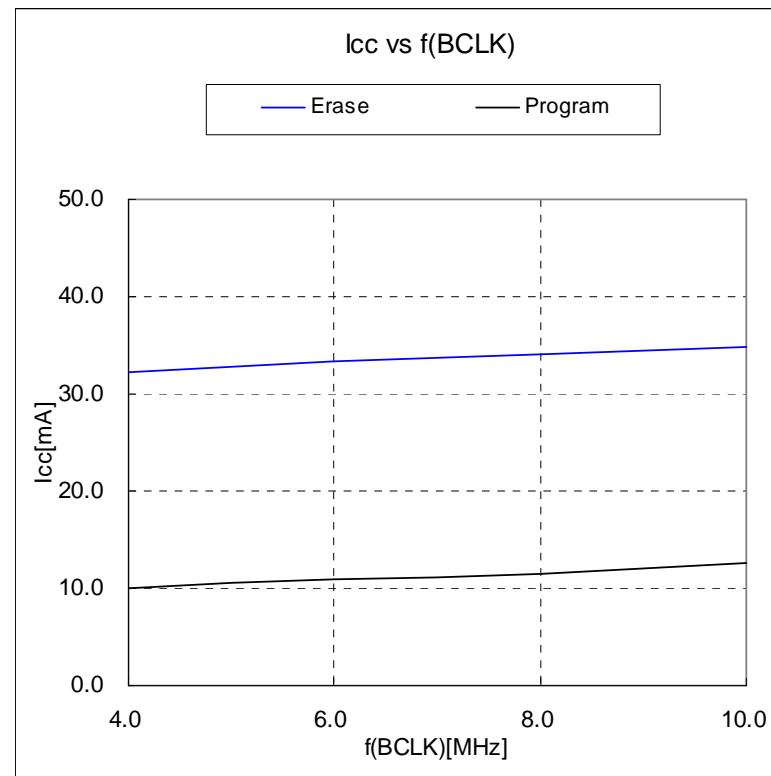


Figure66. Icc vs f(BCLK) (Vcc=5.0V)

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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