

## R8C/33T Group OCVREF characteristics

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Prepared on Jun. 30, 2010

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# I<sub>CC</sub> VS f(XIN) (High-speed clock mode)

Prepared on Jun. 30,

R8C/33T Group

V<sub>CC</sub>=5V

T<sub>opr</sub>=25degrees C

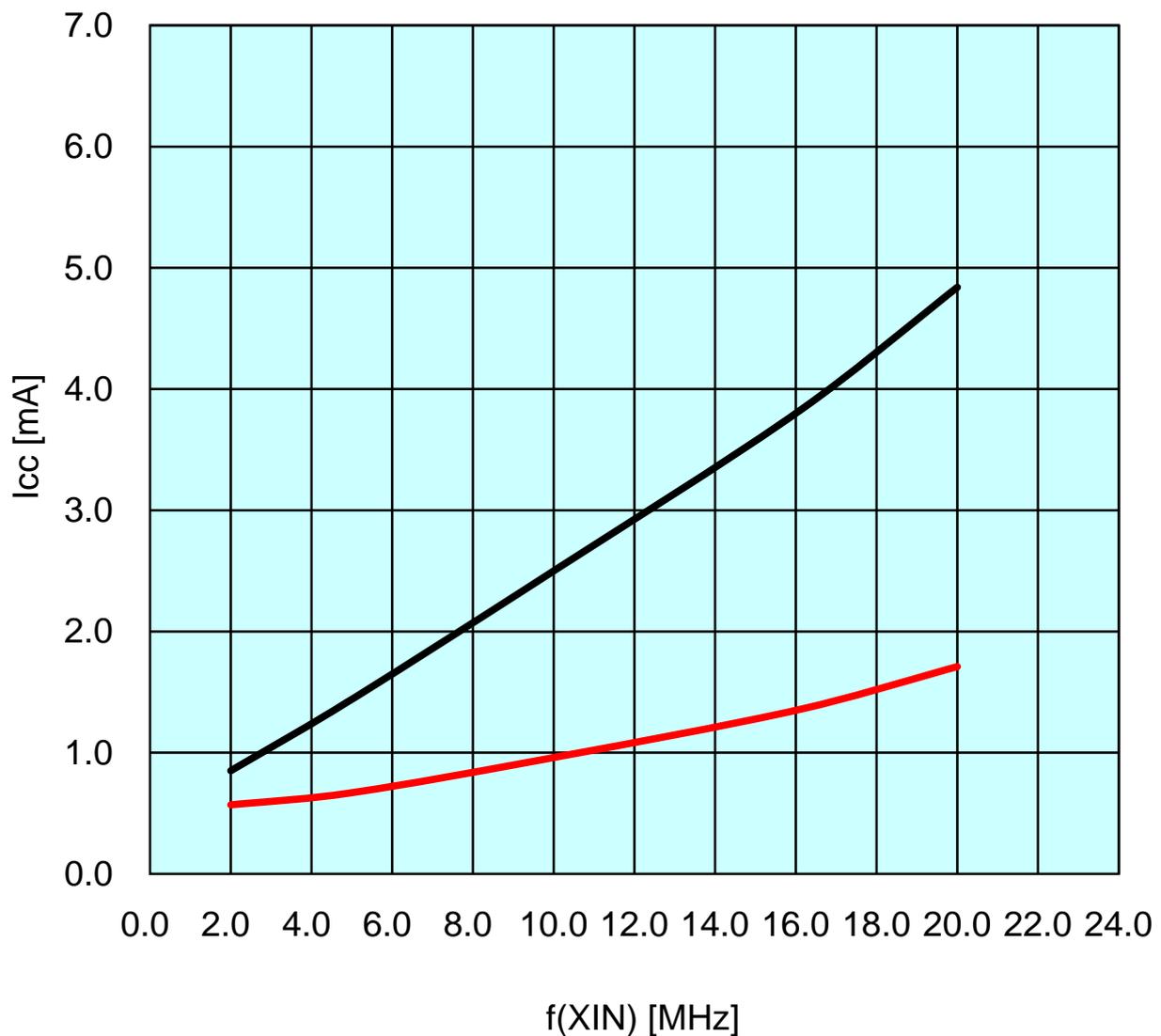
High-speed on-chip oscillator off

Low-speed on-chip oscillator on = 125 kHz

Sensor Control Unit on

— No division

— Divide-by-8



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

# I<sub>CC</sub> VS f(XIN) (High-speed clock mode)

Prepared on Jun. 30,

R8C/33T Group

V<sub>CC</sub>=5V

T<sub>opr</sub>=85degrees C

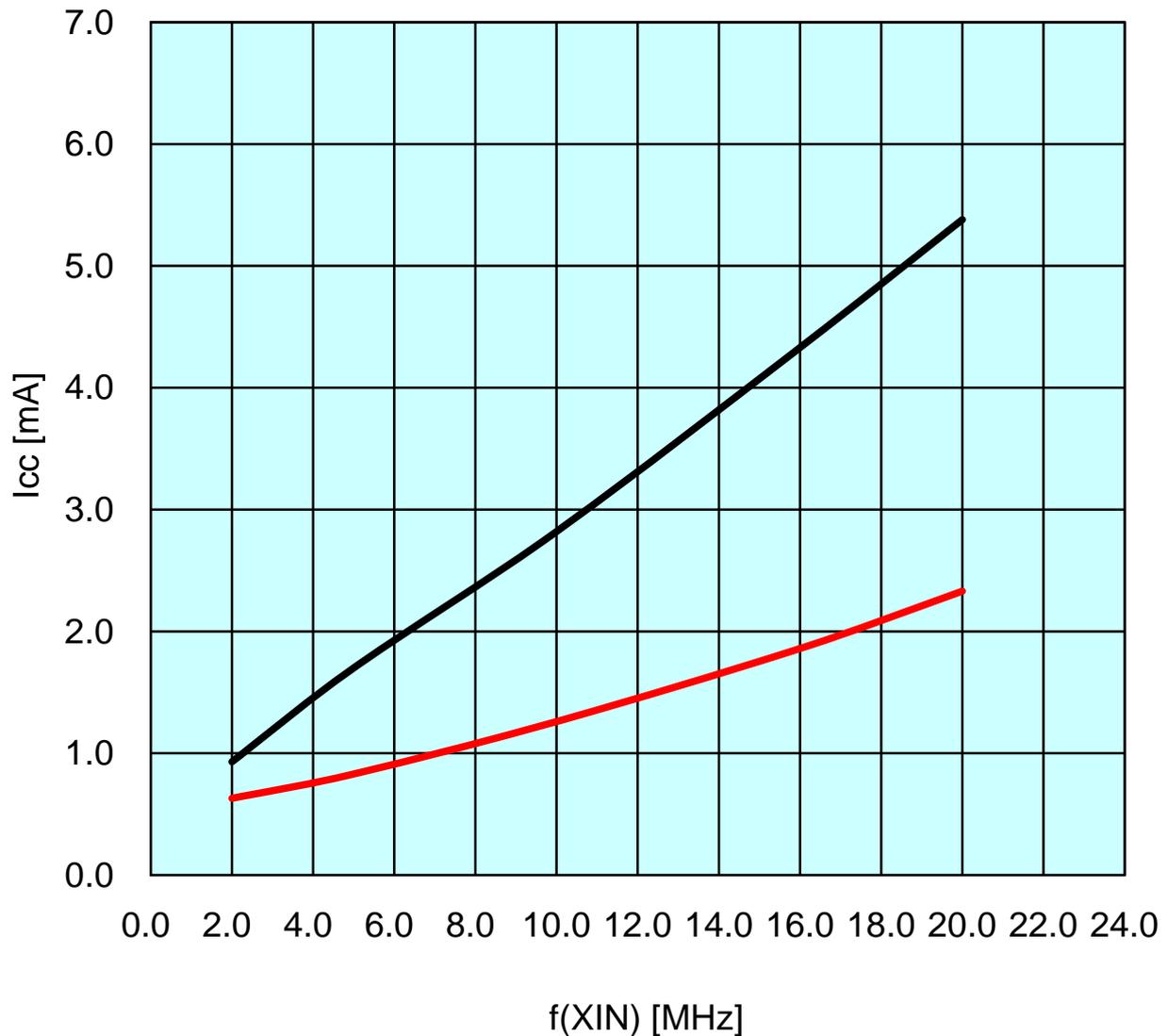
High-speed on-chip oscillator off

Low-speed on-chip oscillator on = 125 kHz

Sensor Control Unit on

— No division

— Divide-by-8



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# ICC vs f(XIN) (High-speed clock mode)

Prepared on Jun. 30,

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Vcc=5V

Topr=-40degrees C

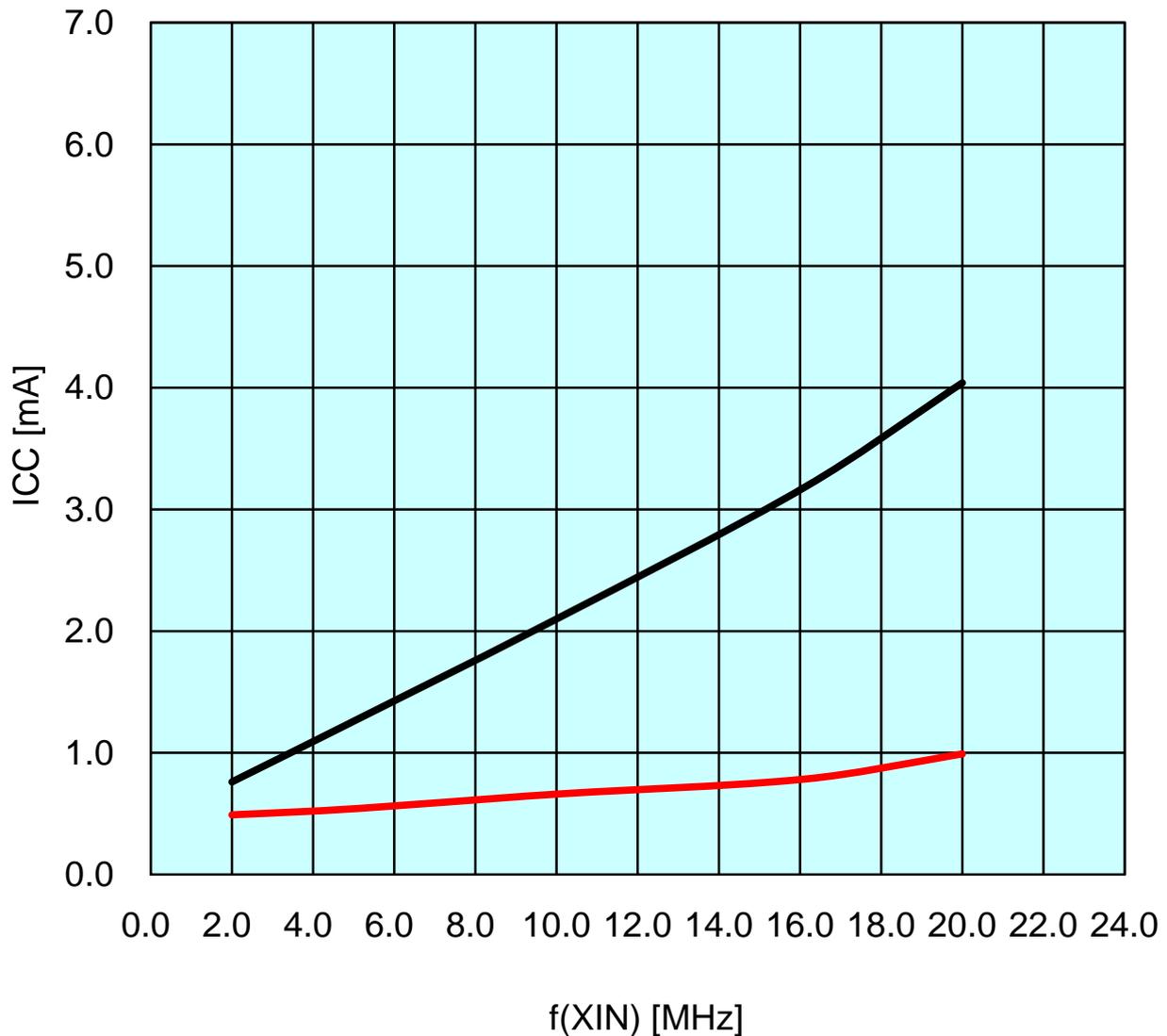
High-speed on-chip oscillator off

Low-speed on-chip oscillator on = 125 kHz

Sensor Control Unit on

— No division

— Divide-by-8



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# I<sub>CC</sub> VS f(XIN) (High-speed clock mode)

Prepared on Jun. 30,

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V<sub>CC</sub>=3V

T<sub>opr</sub>=25degrees C

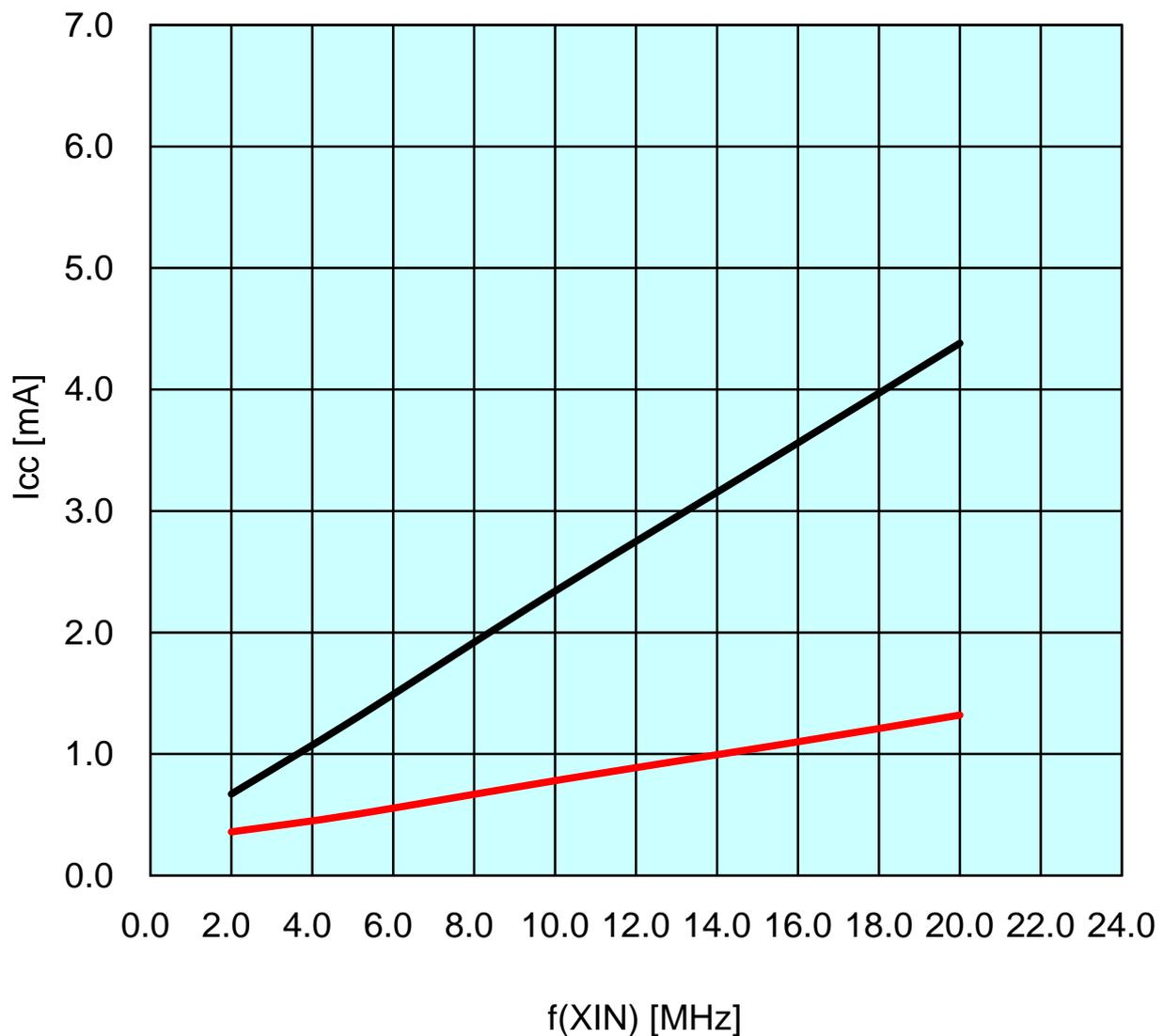
High-speed on-chip oscillator off

Low-speed on-chip oscillator on = 125 kHz

Sensor Control Unit on

— No division

— Divide-by-8



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# I<sub>CC</sub> VS f(XIN) (High-speed clock mode)

Prepared on Jun. 30,

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V<sub>CC</sub>=3V

T<sub>opr</sub>=85degrees C

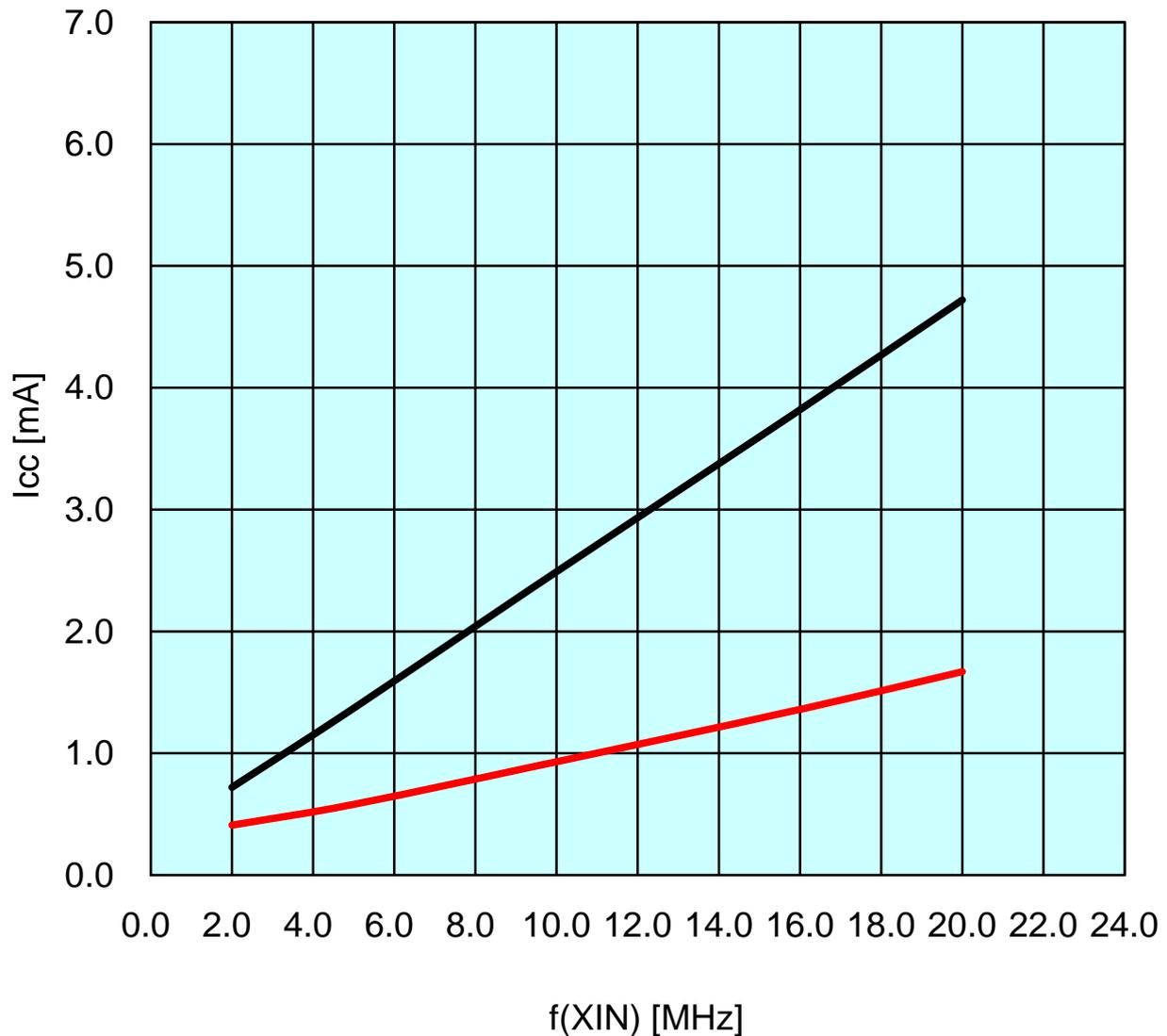
High-speed on-chip oscillator off

Low-speed on-chip oscillator on = 125 kHz

Sensor Control Unit on

— No division

— Divide-by-8



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

# ICC vs f(XIN) (High-speed clock mode)

Prepared on Jun. 30,

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Vcc=3V

Topr=-40degrees C

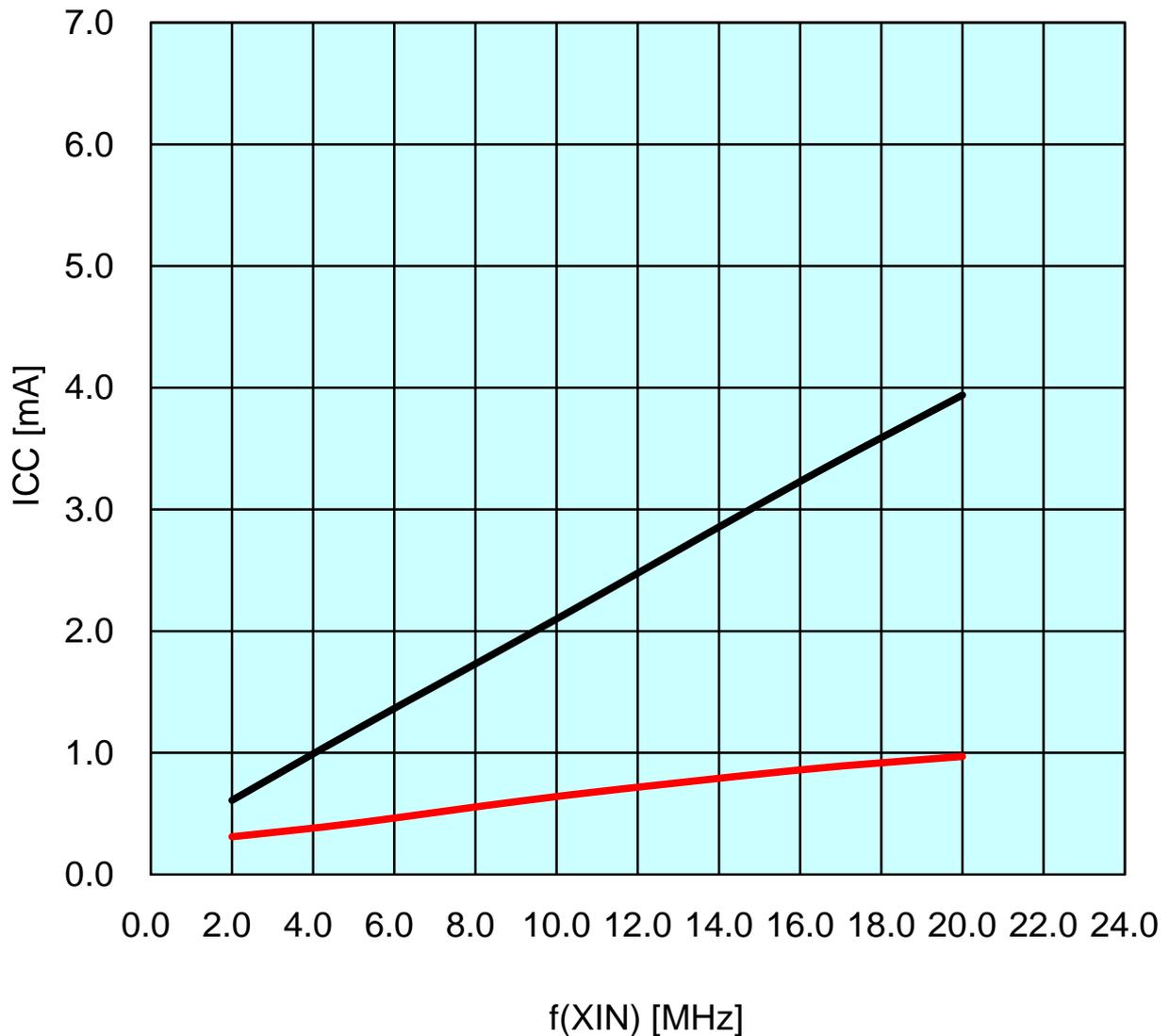
High-speed on-chip oscillator off

Low-speed on-chip oscillator on = 125 kHz

Sensor Control Unit on

— No division

— Divide-by-8



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# I<sub>CC</sub> VS f(XIN) (High-speed clock mode)

Prepared on Jun. 30,

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V<sub>CC</sub>=1.8V

T<sub>opr</sub>=25degrees C

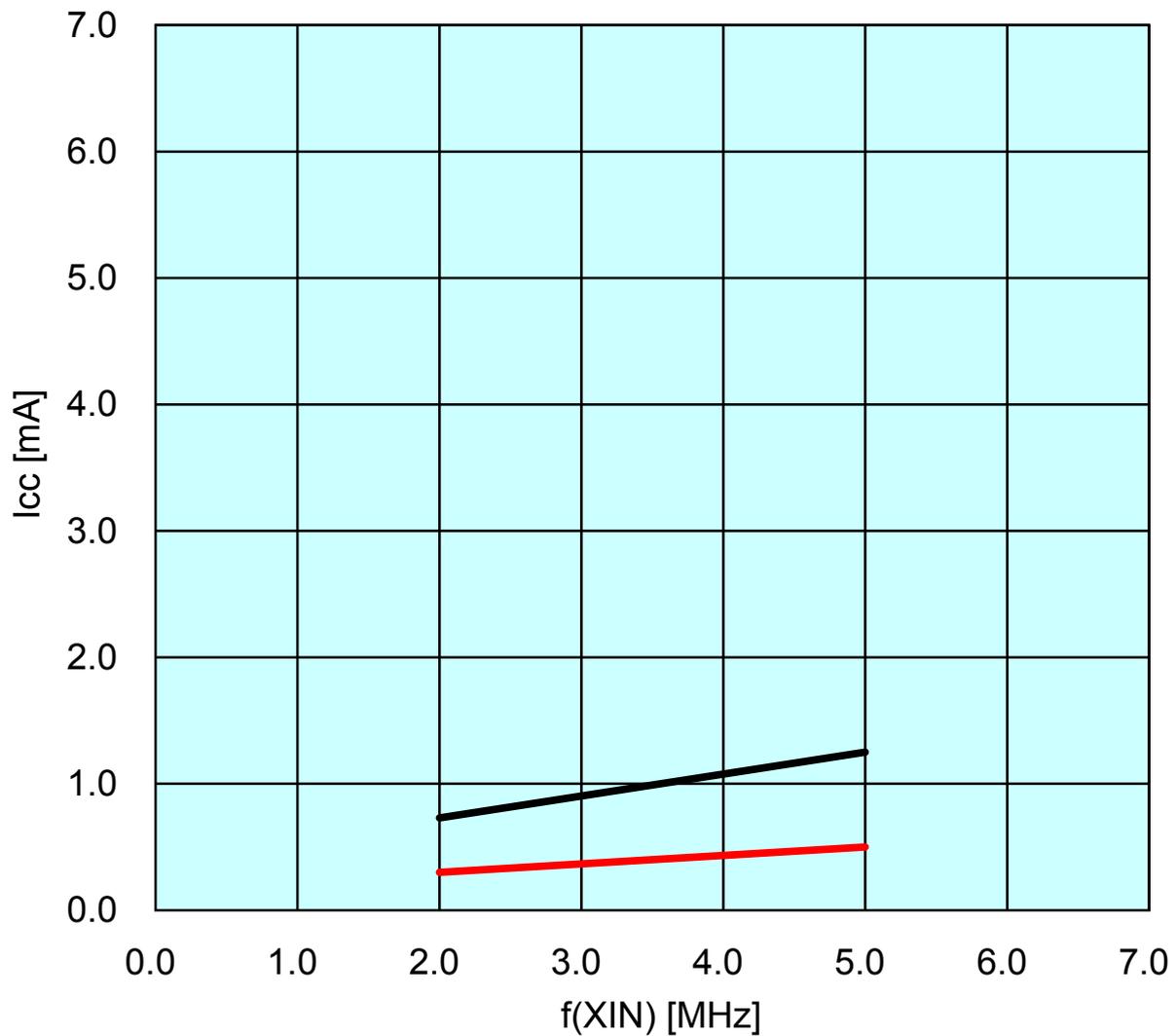
High-speed on-chip oscillator off

Low-speed on-chip oscillator on = 125 kHz

Sensor Control Unit on

— No division

— Divide-by-8



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# I<sub>cc</sub> vs f(XIN) (High-speed clock mode)

Prepared on Jun. 30,

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V<sub>cc</sub>=1.8V

T<sub>opr</sub>=85degrees C

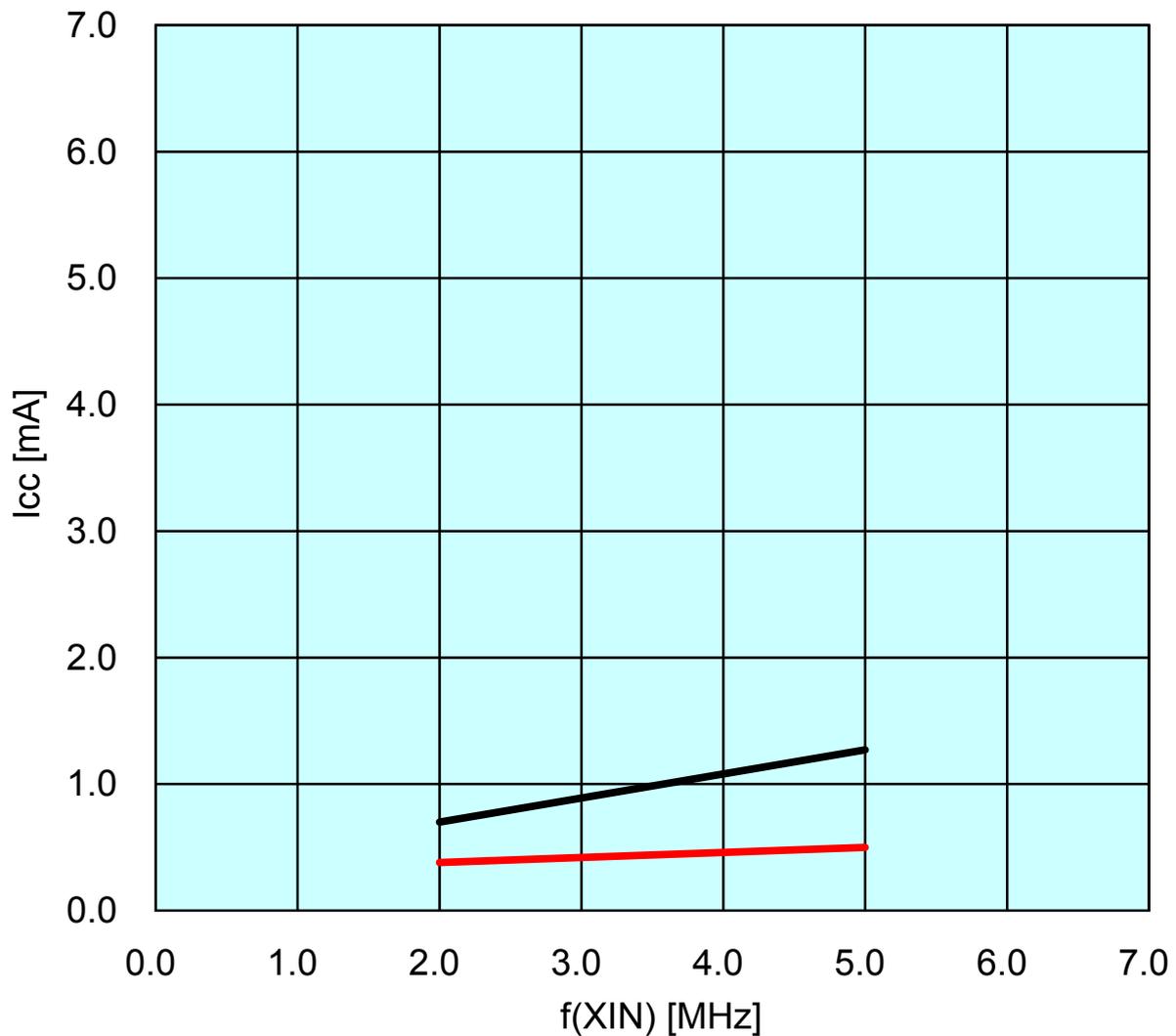
High-speed on-chip oscillator off

Low-speed on-chip oscillator on = 125 kHz

Sensor Control Unit on

— No division

— Divide-by-8



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# I<sub>CC</sub> VS f(XIN) (High-speed clock mode)

Prepared on Jun. 30,

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V<sub>CC</sub>=1.8V

T<sub>opr</sub>=-40degrees C

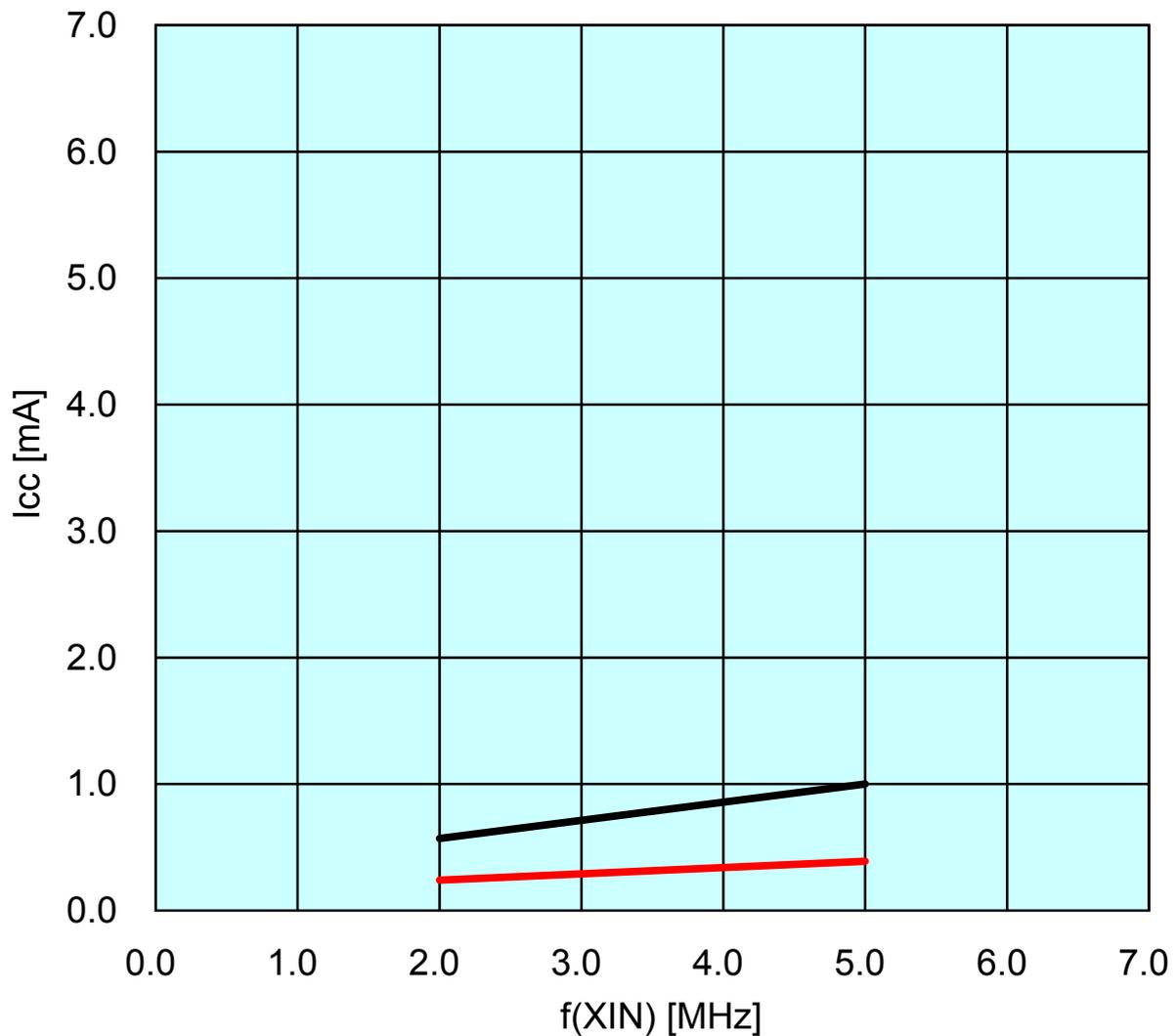
High-speed on-chip oscillator off

Low-speed on-chip oscillator on = 125 kHz

Sensor Control Unit on

— No division

— Divide-by-8



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# Icc vs Topr

## (Low-Speed On-Chip Oscillator mode)

Prepared on Jun. 30, 2010

R8C/33T Group

Divide-by-8

XIN clock off

High-speed on-chip oscillator off

Low-speed on-chip oscillator on = 125 kHz

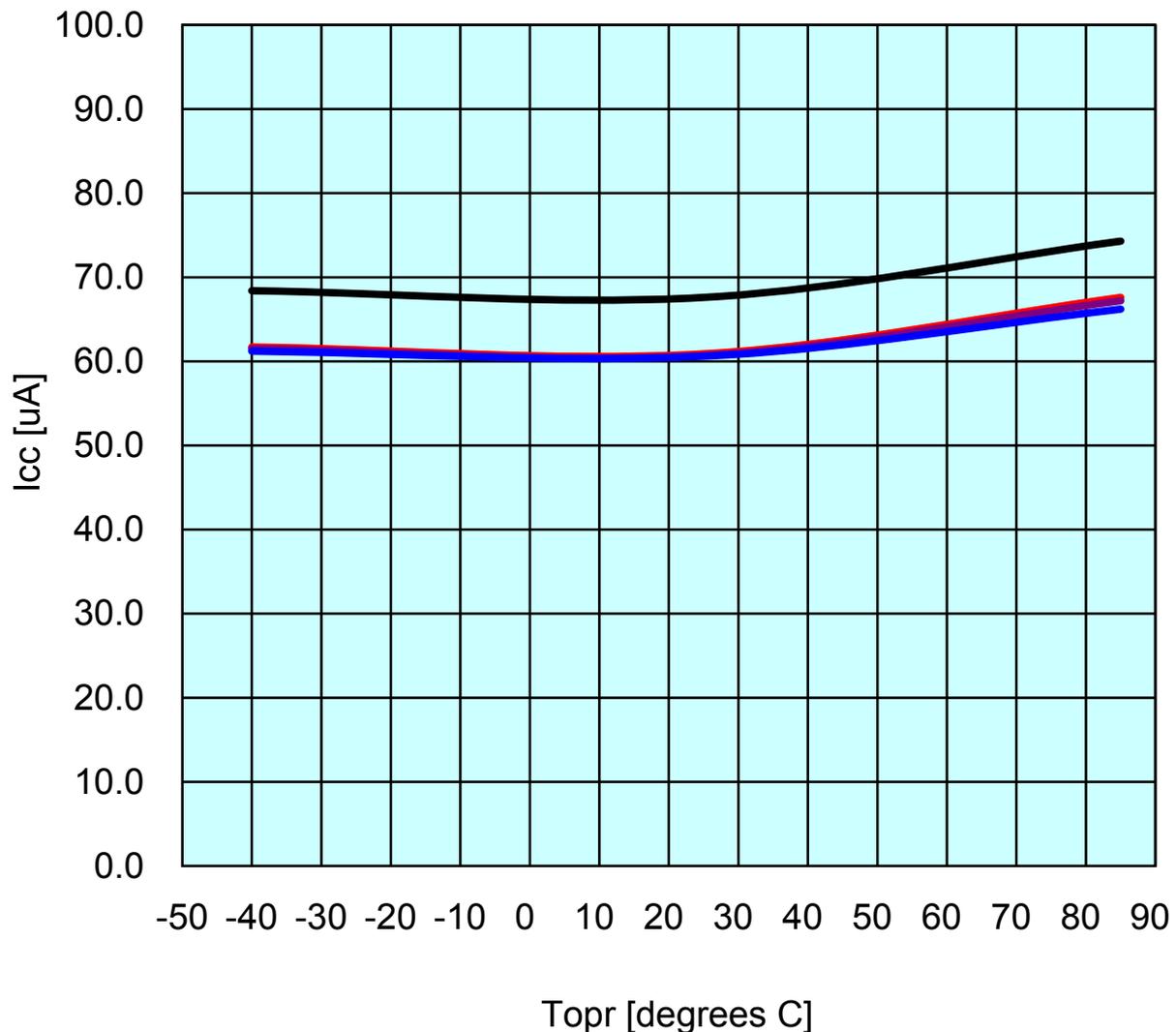
FMR27 = 1, VCA20 = 0

— Vcc=5V

— Vcc=3V

— Vcc=2.2V

— Vcc=1.8V



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

# Icc vs Topr (Stop mode)

Prepared on Jun. 30, 2010

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XIN clock off

High-speed on-chip oscillator off

Low-speed on-chip oscillator off

CM10 = 1

Peripheral clock off

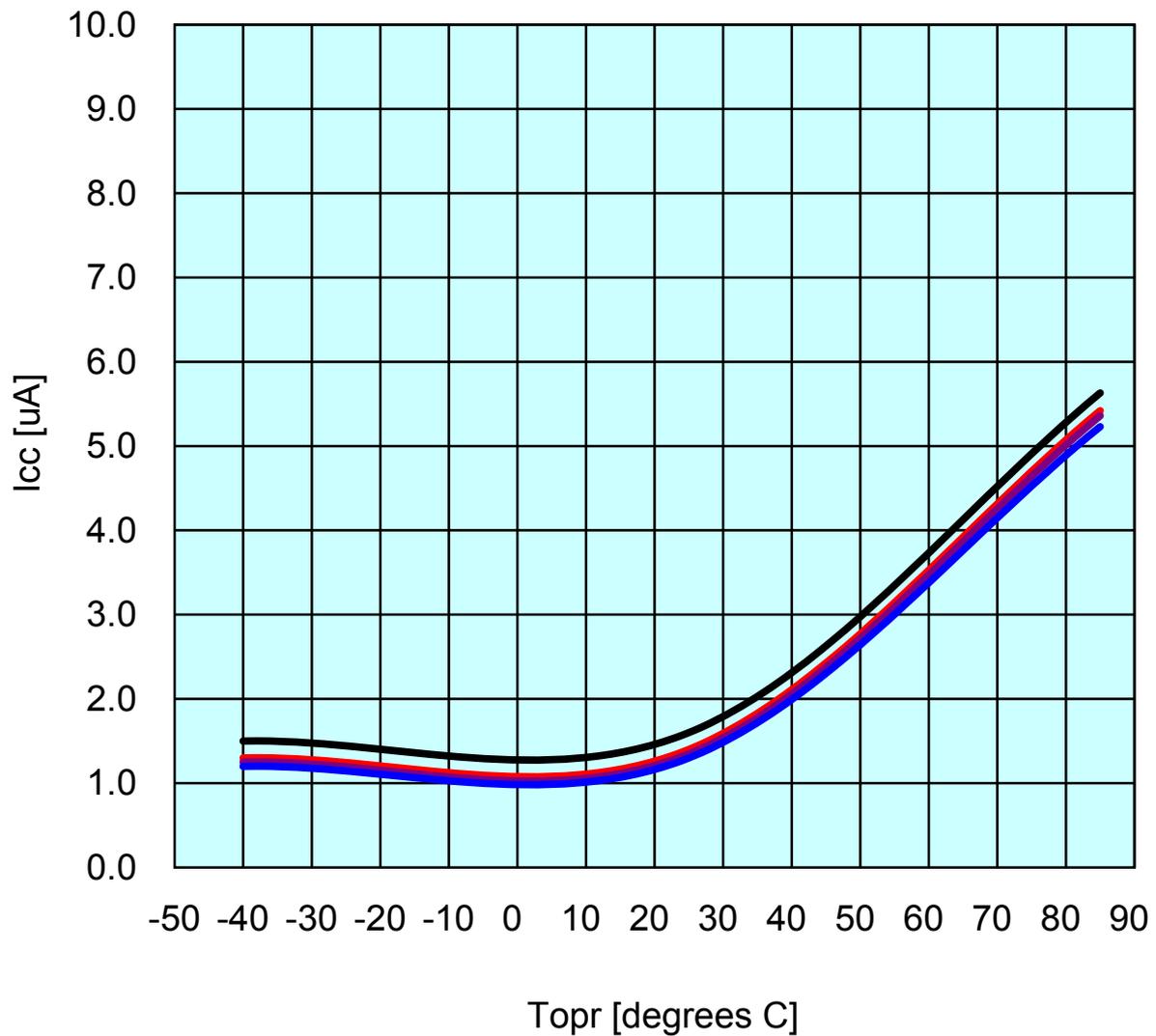
VCA27 = VCA26 = VCA25 = 0

— Vcc=5V

— Vcc=3V

— Vcc=2.2V

— Vcc=1.8V



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

# Icc vs Topr (Wait mode)

Prepared on Jun. 30, 2010

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XIN clock off

High-speed on-chip oscillator off

Low-speed on-chip oscillator on = 125 kHz

While a WAIT instruction is executed

Peripheral clock operation

VCA27 = VCA26 = VCA25 = 0

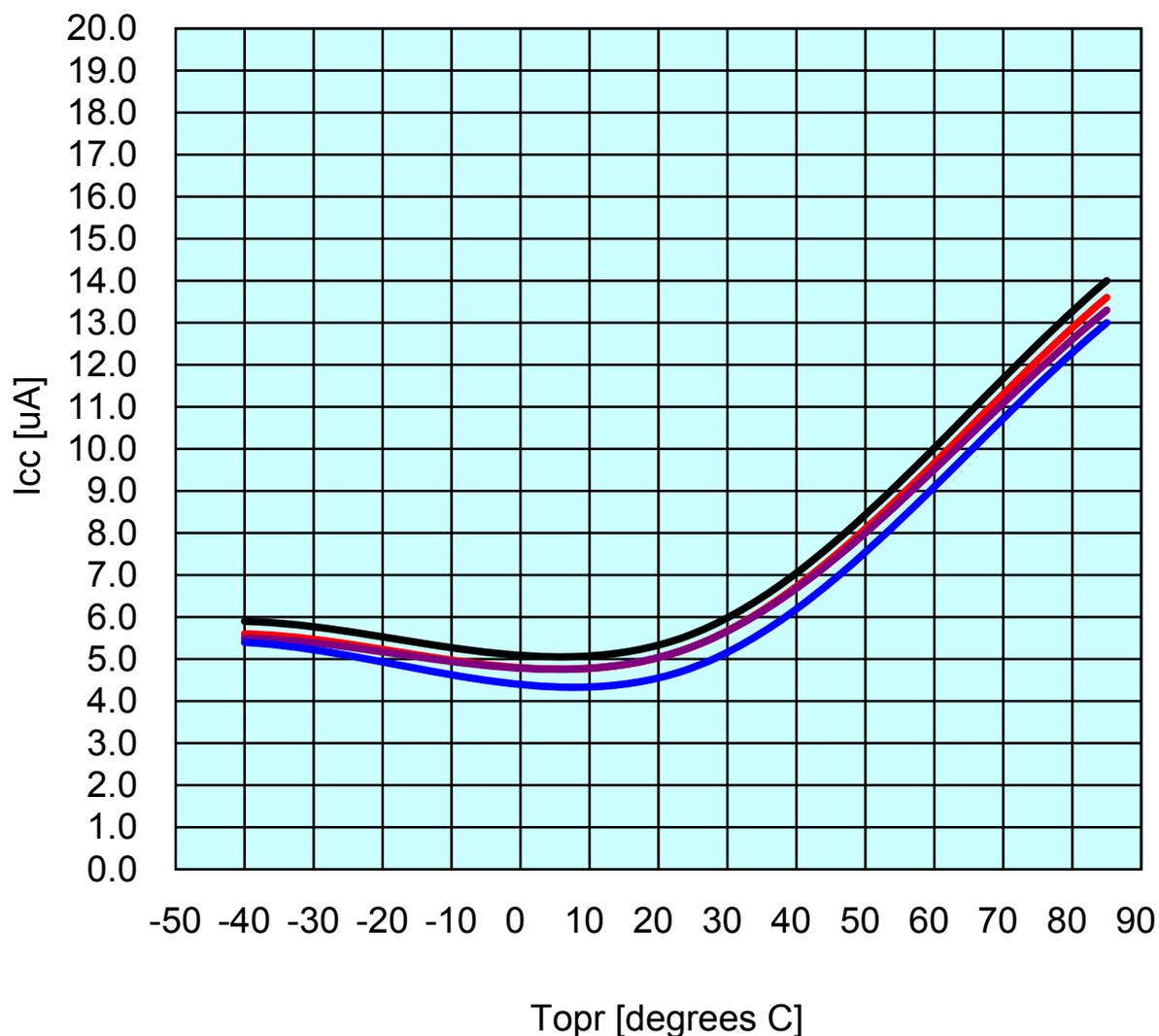
VCA20 = 1

— Vcc=5V

— Vcc=3V

— Vcc=2.2V

— Vcc=1.8V



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

# I<sub>cc</sub> vs Topr (Wait mode)

Prepared on Jun. 30, 2010

R8C/33T Group

XIN clock off

High-speed on-chip oscillator off

Low-speed on-chip oscillator on = 125 kHz

While a WAIT instruction is executed

Peripheral clock off

VCA27 = VCA26 = VCA25 = 0

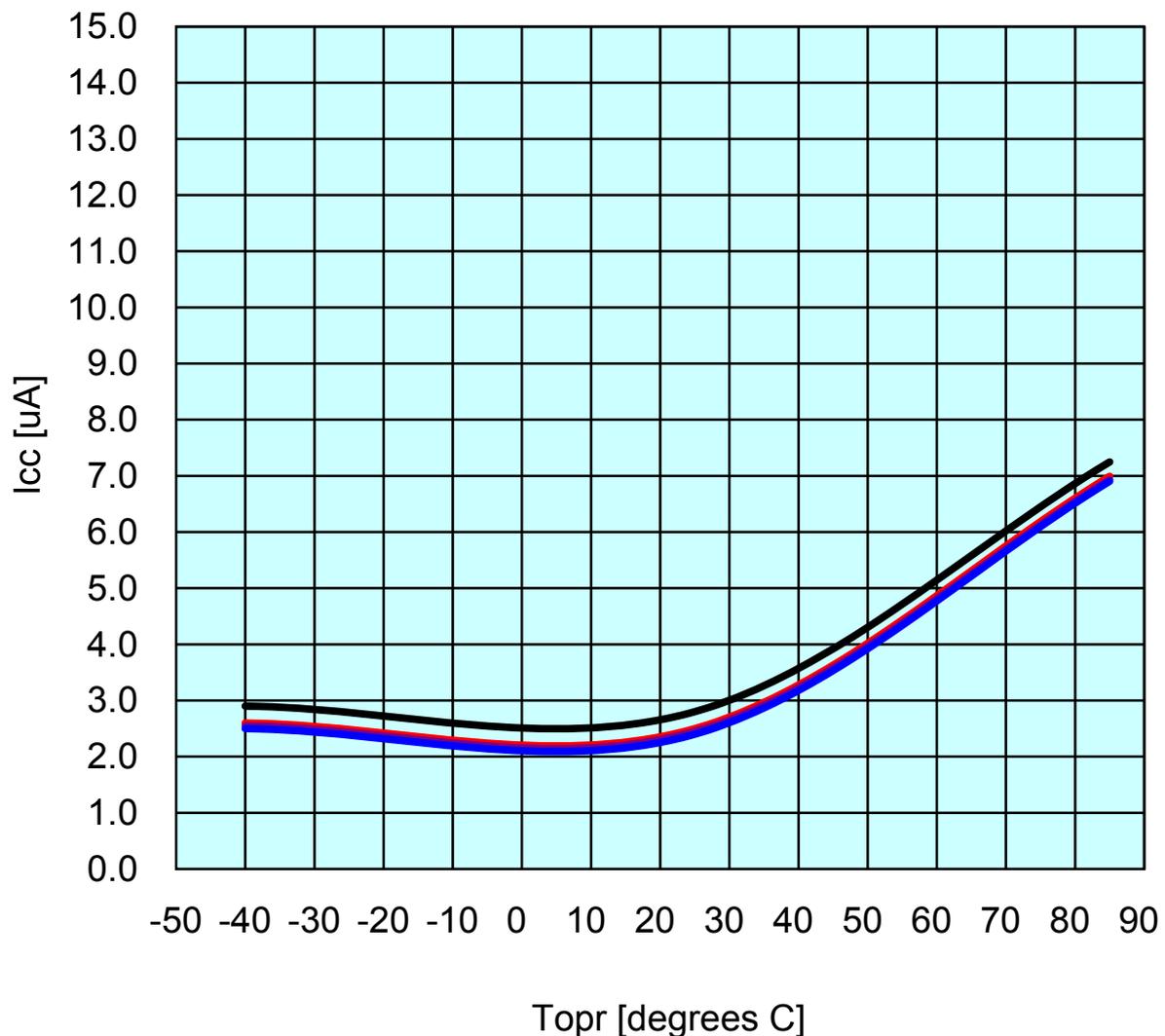
VCA20 = 1

— V<sub>cc</sub>=5V

— V<sub>cc</sub>=3V

— V<sub>cc</sub>=2.2V

— V<sub>cc</sub>=1.8V



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

# Icc vs Topr (Wait mode)

Prepared on Jun. 30, 2010

R8C/33T Group

XIN clock = 5MHz

High-speed on-chip oscillator off

Low-speed on-chip oscillator on = 125 kHz

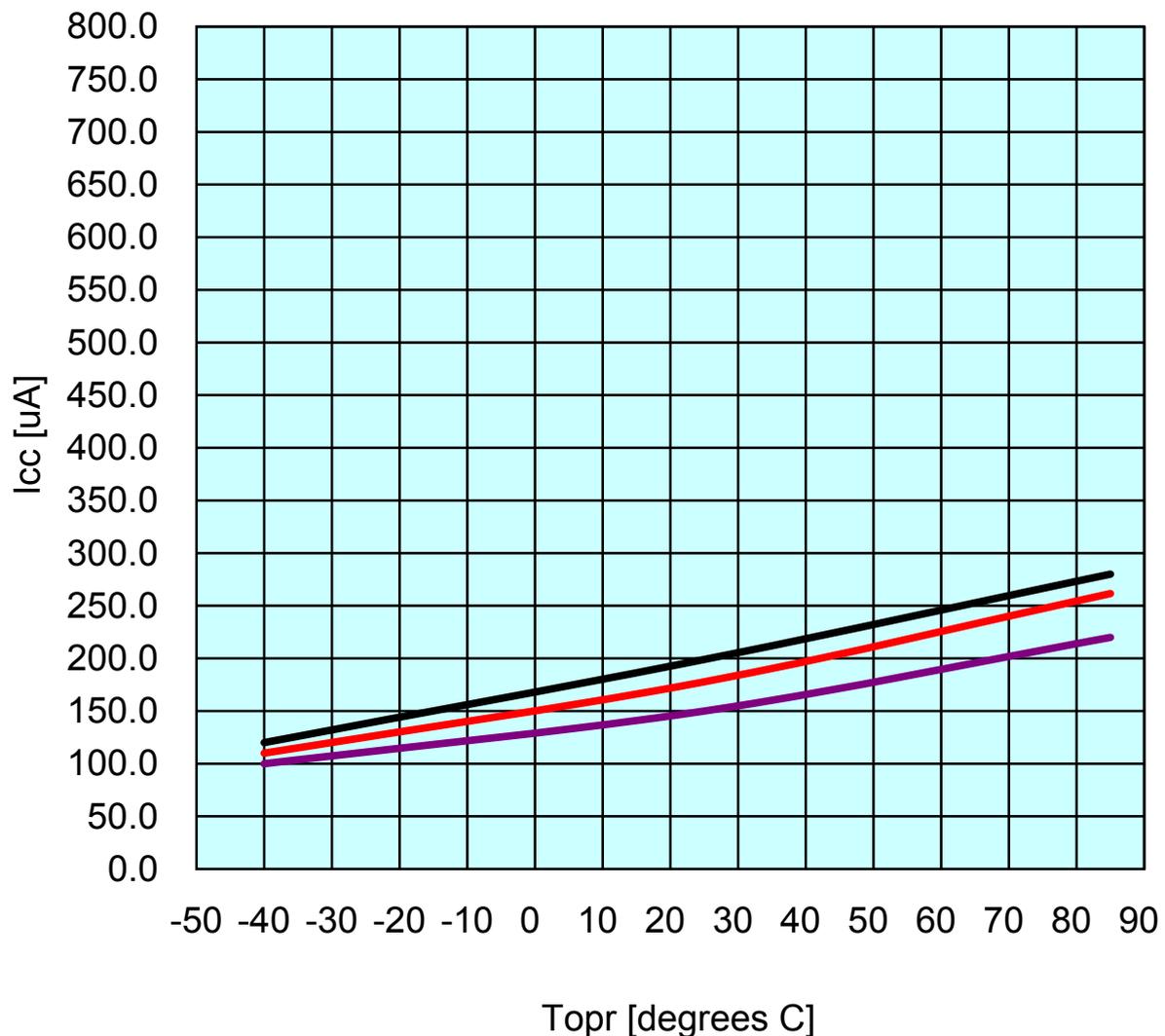
While a WAIT instruction is executed

Peripheral clock operation

VCA27 = VCA26 = VCA25 = VCA20 = 0

Sensor Control Unit on

— Vcc=5V  
— Vcc=3V  
— Vcc=2.2V



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# Icc vs Topr (Wait mode)

Prepared on Jun. 30, 2010

R8C/33T Group

XIN clock off

High-speed on-chip oscillator 5MHz

Low-speed on-chip oscillator on = 125 kHz

While a WAIT instruction is executed

Peripheral clock operation

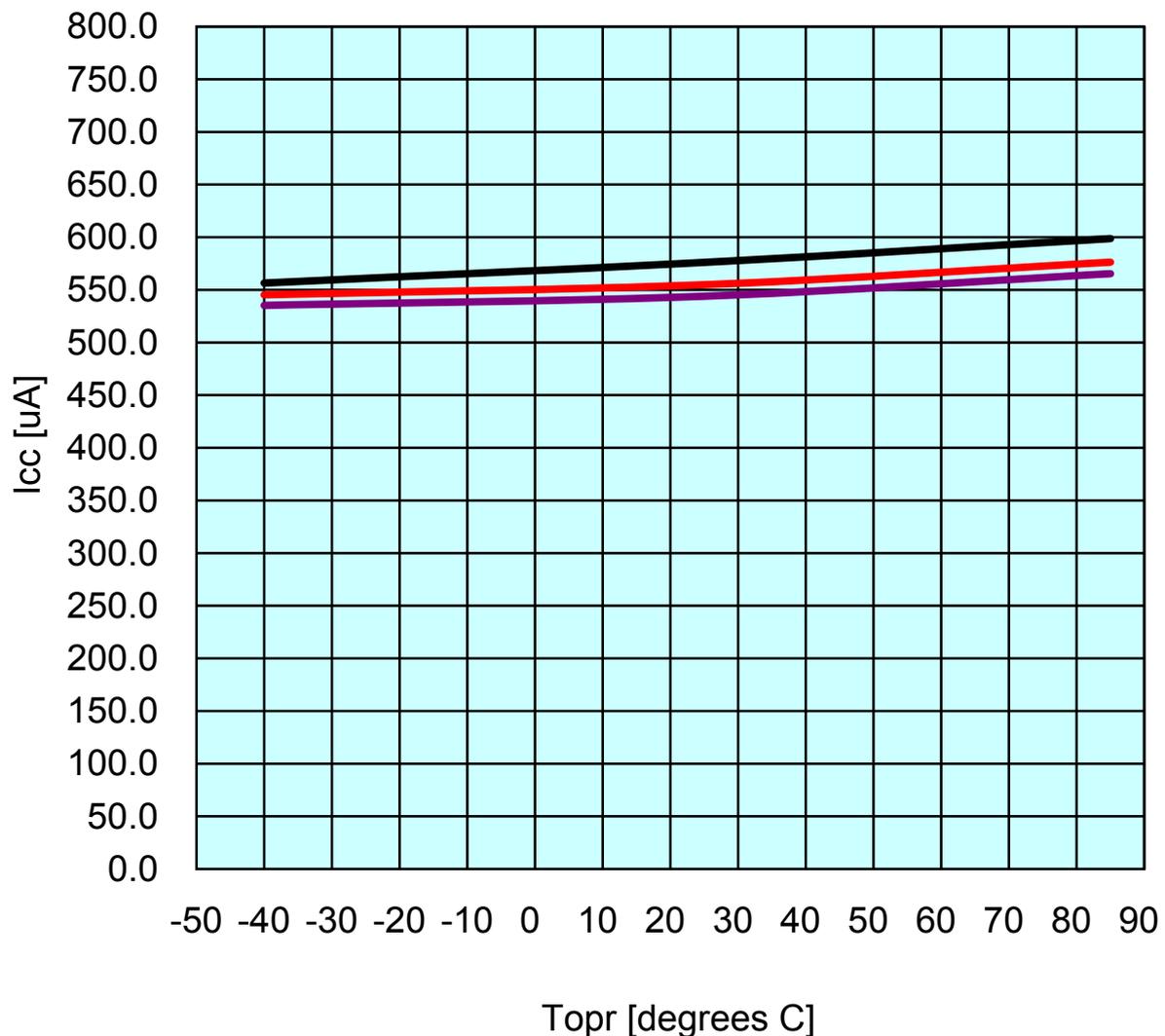
VCA27 = VCA26 = VCA25 = VCA20 = 0

Sensor Control Unit on

— Vcc=5V

— Vcc=3V

— Vcc=2.2V



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# Icc vs Topr (High-speed clock mode)

Prepared on Jun. 30, 2010

R8C/33T Group

Vcc=5V

XIN (square wave)

High-speed on-chip oscillator off

Low-speed on-chip oscillator on = 125 kHz

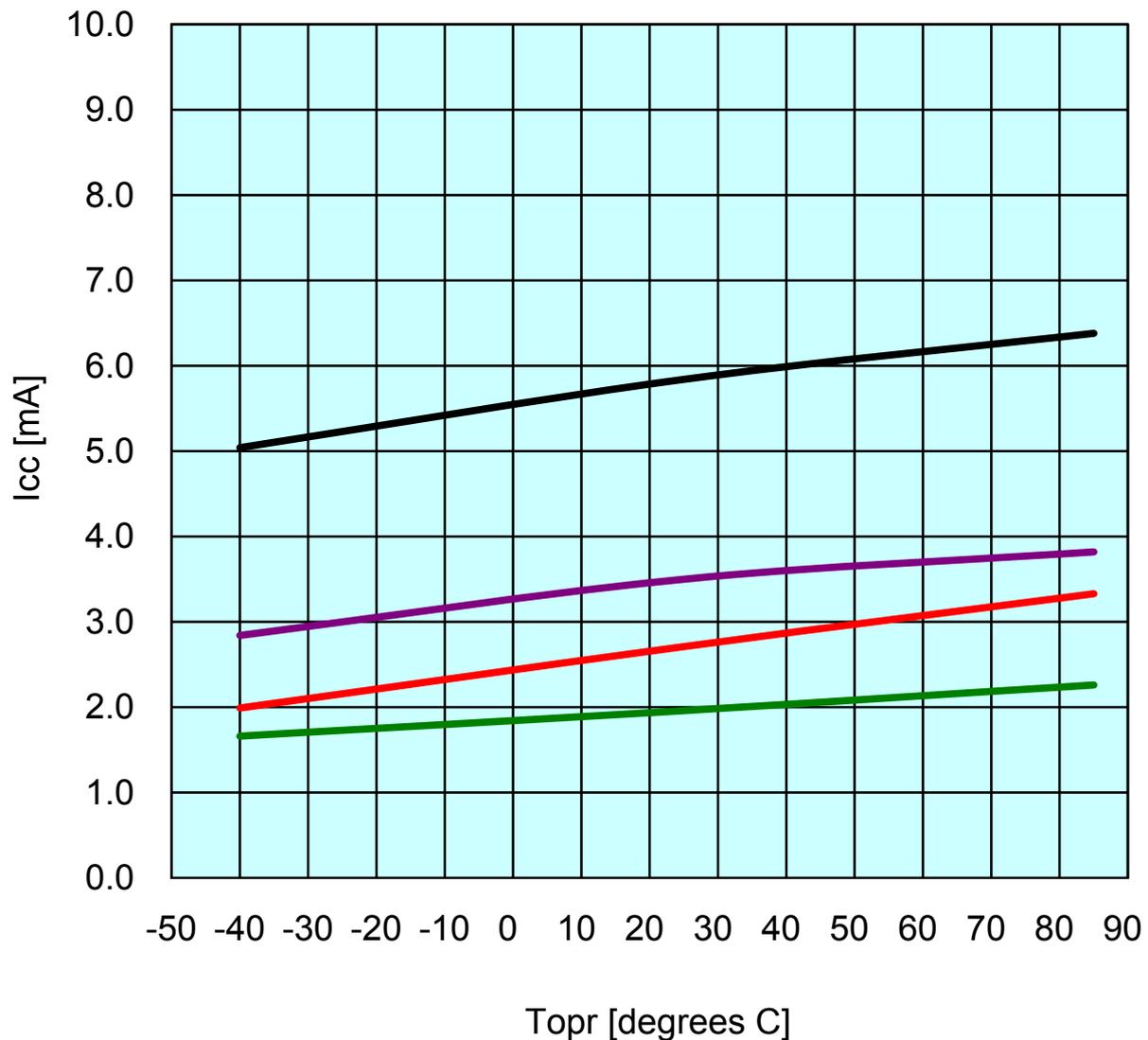
Sensor Control Unit on

— XIN=20MHz no division

— XIN=20MHz divide-by-8

— XIN=10MHz no division

— XIN=10MHz divide-by-8



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

# Icc vs Topr (High-speed clock mode)

Prepared on Jun. 30, 2010

R8C/33T Group

Vcc=3V

XIN (square wave)

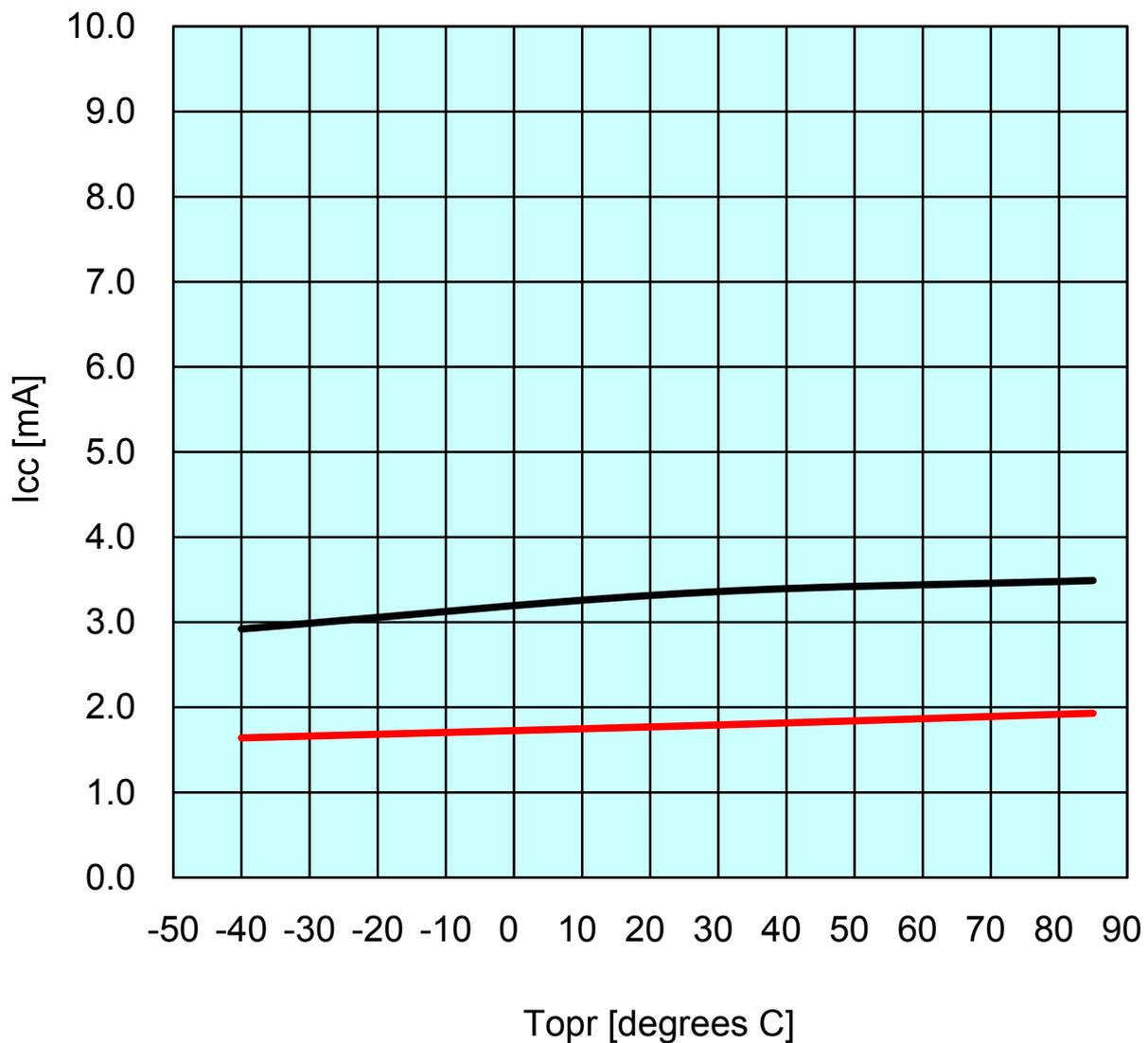
High-speed on-chip oscillator off

Low-speed on-chip oscillator on = 125 kHz

Sensor Control Unit on

— XIN=10MHz no division

— XIN=10MHz divide-by-8



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# Icc vs Topr (High-speed clock mode)

Prepared on Jun. 30, 2010

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Vcc=1.8V

XIN (square wave)

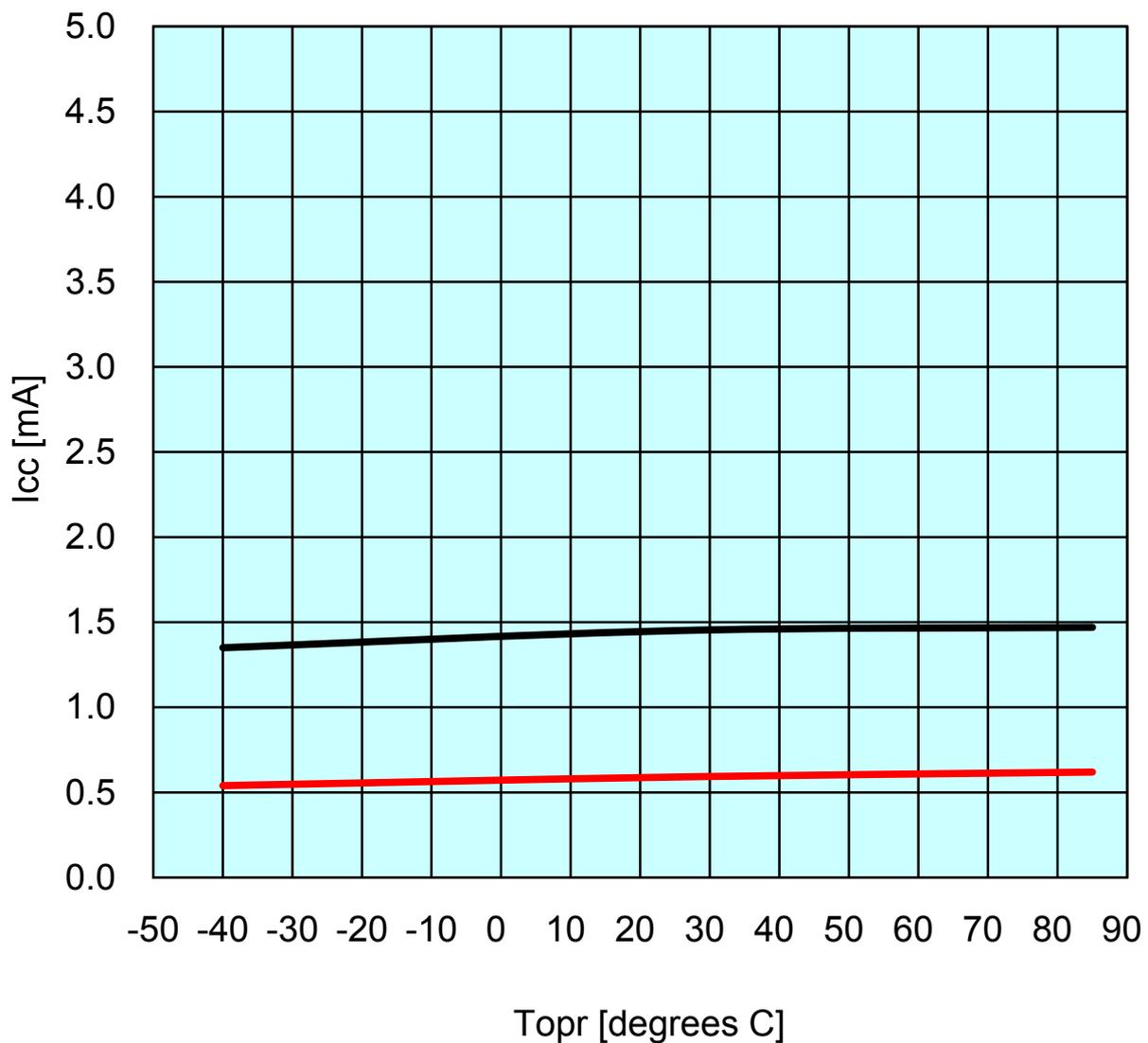
High-speed on-chip oscillator off

Low-speed on-chip oscillator on = 125 kHz

Sensor Control Unit on

— XIN=5MHz no division

— XIN=5MHz divide-by-8



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# Icc vs Topr (High-speed on-chip oscillator mode)

Prepared on Jun. 30, 2010

R8C/33T Group

Vcc=5V

XIN clock off

High-speed on-chip oscillator on

Low-speed on-chip oscillator on = 125 kHz

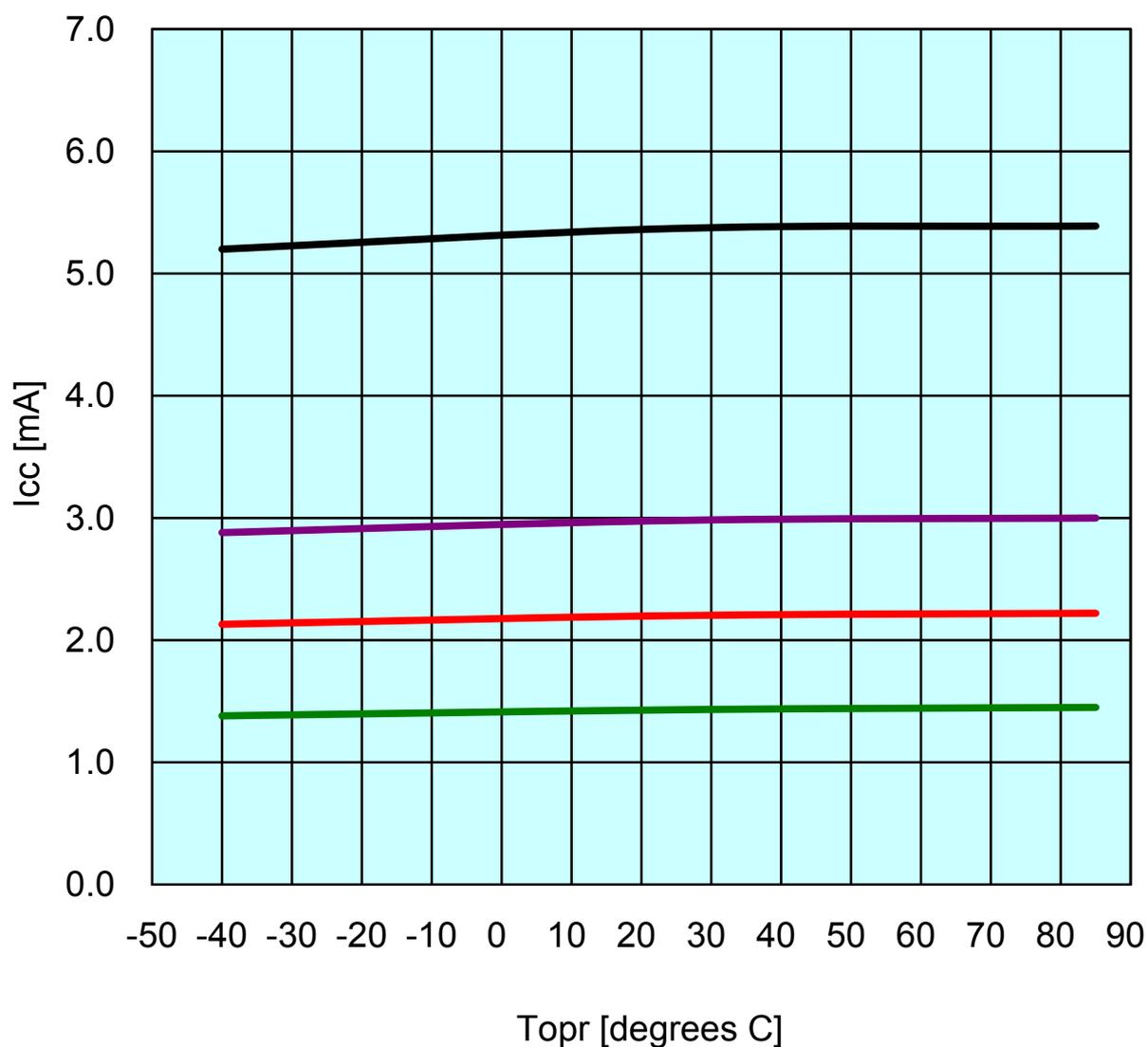
Sensor Control Unit on

— fOCO=20MHz no division

— fOCO=20MHz divide-by-8

— fOCO=10MHz no division

— fOCO=10MHz divide-by-8



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# Icc vs Topr (High-speed on-chip oscillator mode)

Prepared on Jun. 30, 2010

R8C/33T Group

Vcc=3V

XIN clock off

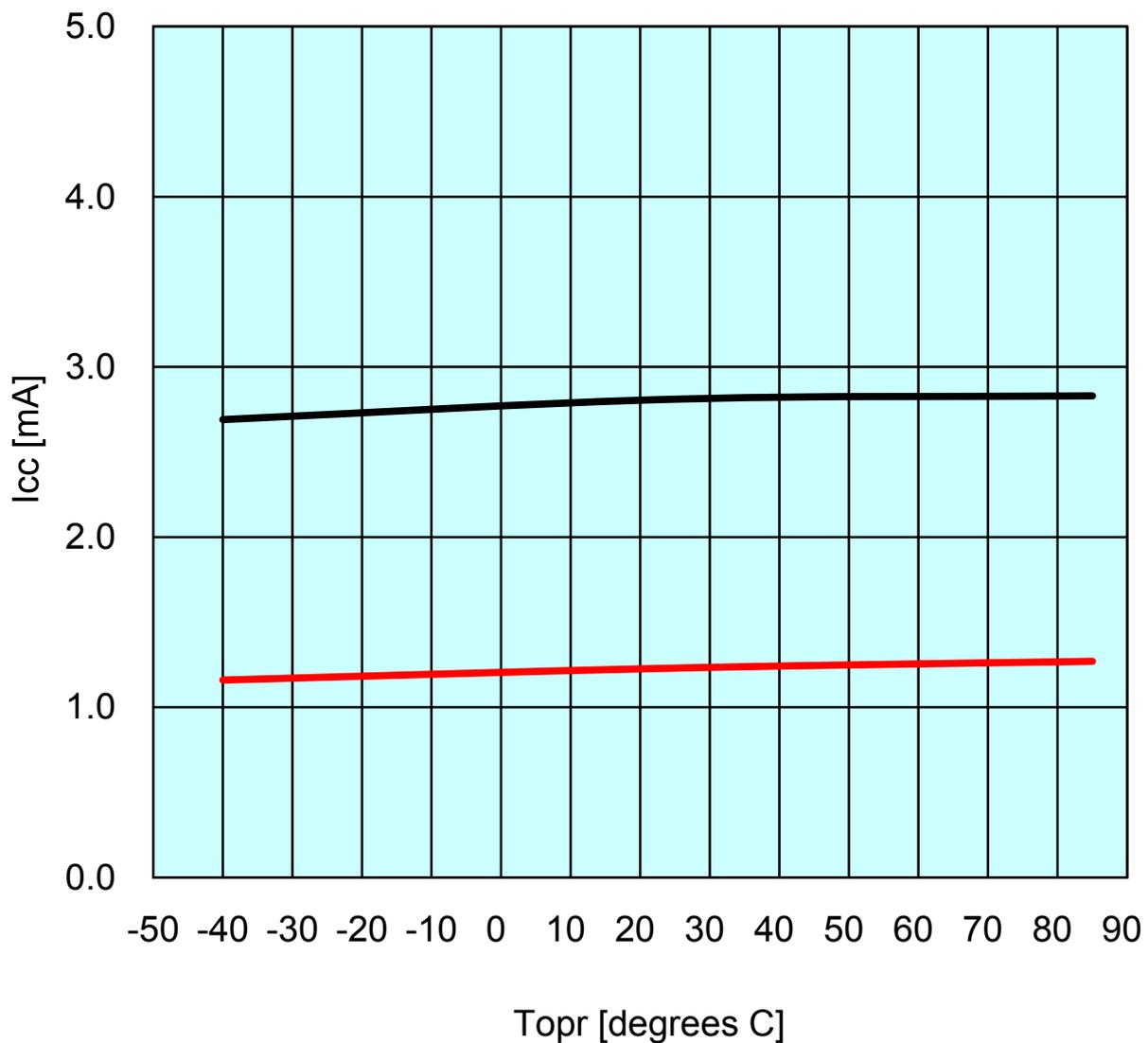
High-speed on-chip oscillator on

Low-speed on-chip oscillator on = 125 kHz

Sensor Control Unit on

— fOCO=10MHz no division

— fOCO=10MHz divide-by-8



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# Icc vs Topr (High-speed on-chip oscillator mode)

Prepared on Jun. 30, 2010

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Vcc=1.8V

XIN clock off

High-speed on-chip oscillator on

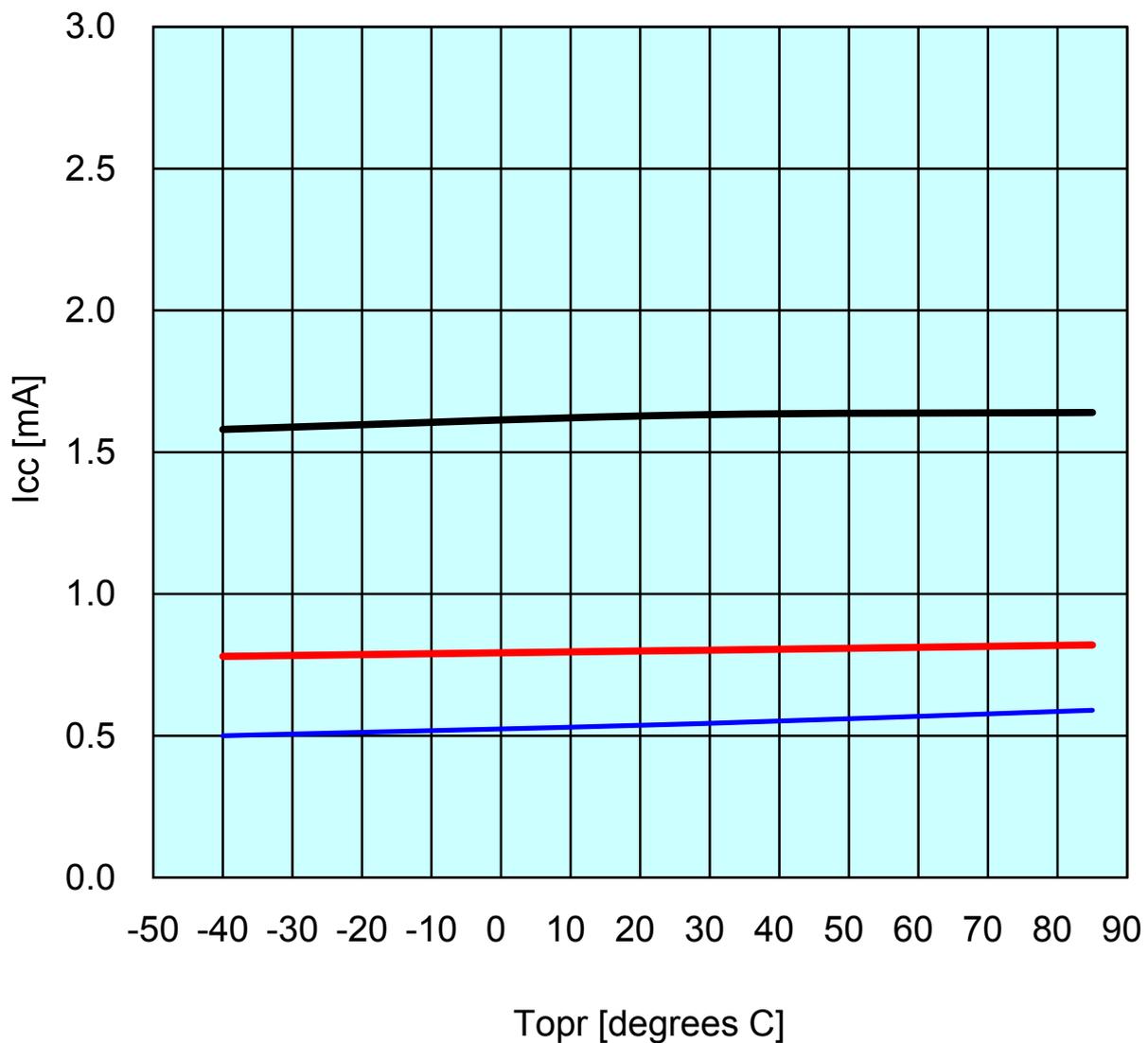
Low-speed on-chip oscillator on = 125 kHz

Sensor Control Unit on

— fOCO=5MHz no division

— fOCO=5MHz divide-by-8

— fOCO=4MHz divide-by-16 MSTTRC = 1



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# I<sub>cc</sub> vs V<sub>cc</sub> (Low-Speed On-Chip Oscillator mode)

Prepared on Jun. 30, 2010

R8C/33T Group

Divide-by-8

XIN clock off

High-speed on-chip oscillator off

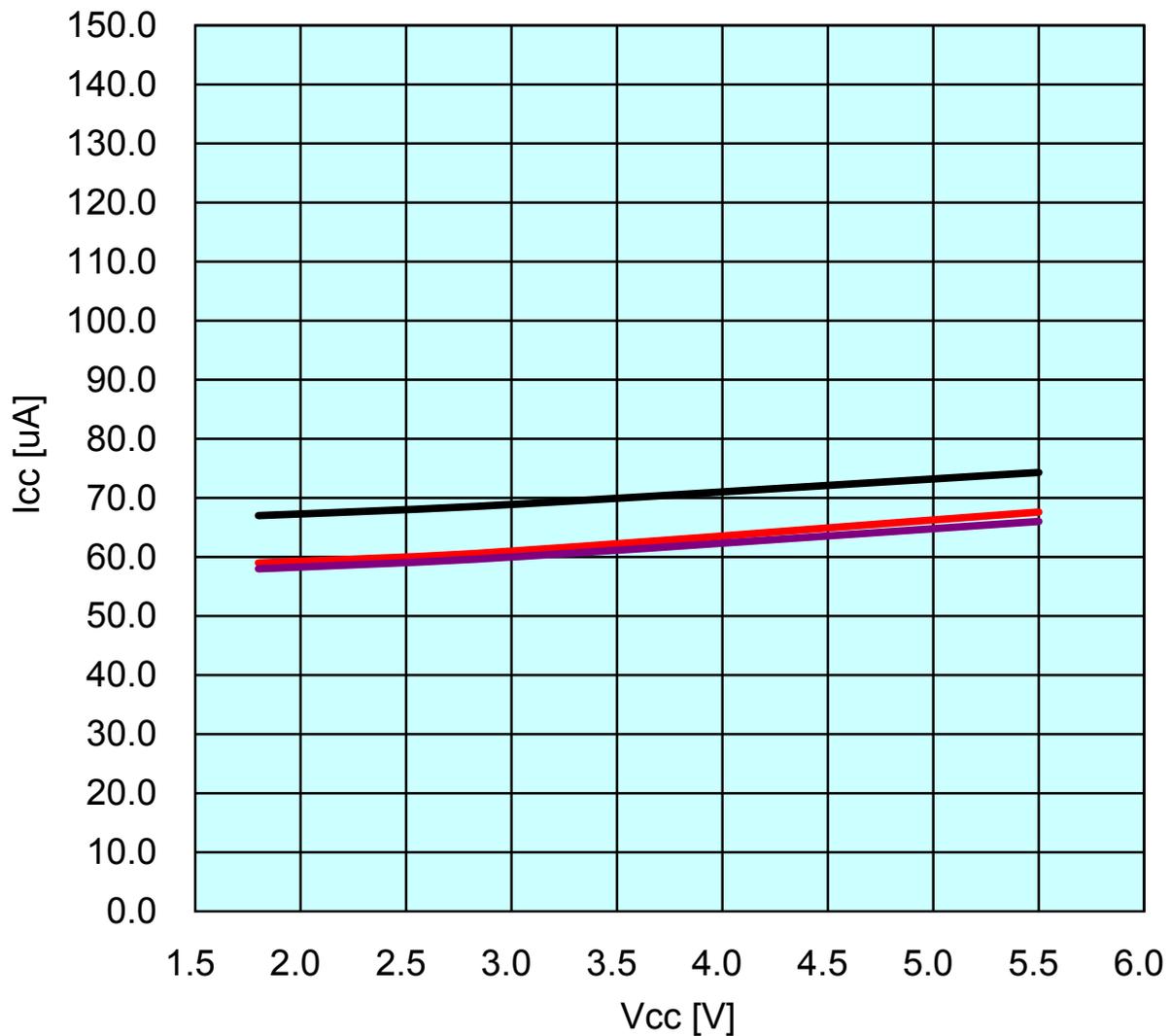
Low-speed on-chip oscillator on = 125 kHz

FMR27 = 1, VCA20 = 0

— 85degreesC

— 25degreesC

— -40degreesC



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

# Icc vs Vcc (Stop mode)

Prepared on Jun. 30, 2010

R8C/33T Group

XIN clock off

High-speed on-chip oscillator off

Low-speed on-chip oscillator off

CM10 = 1

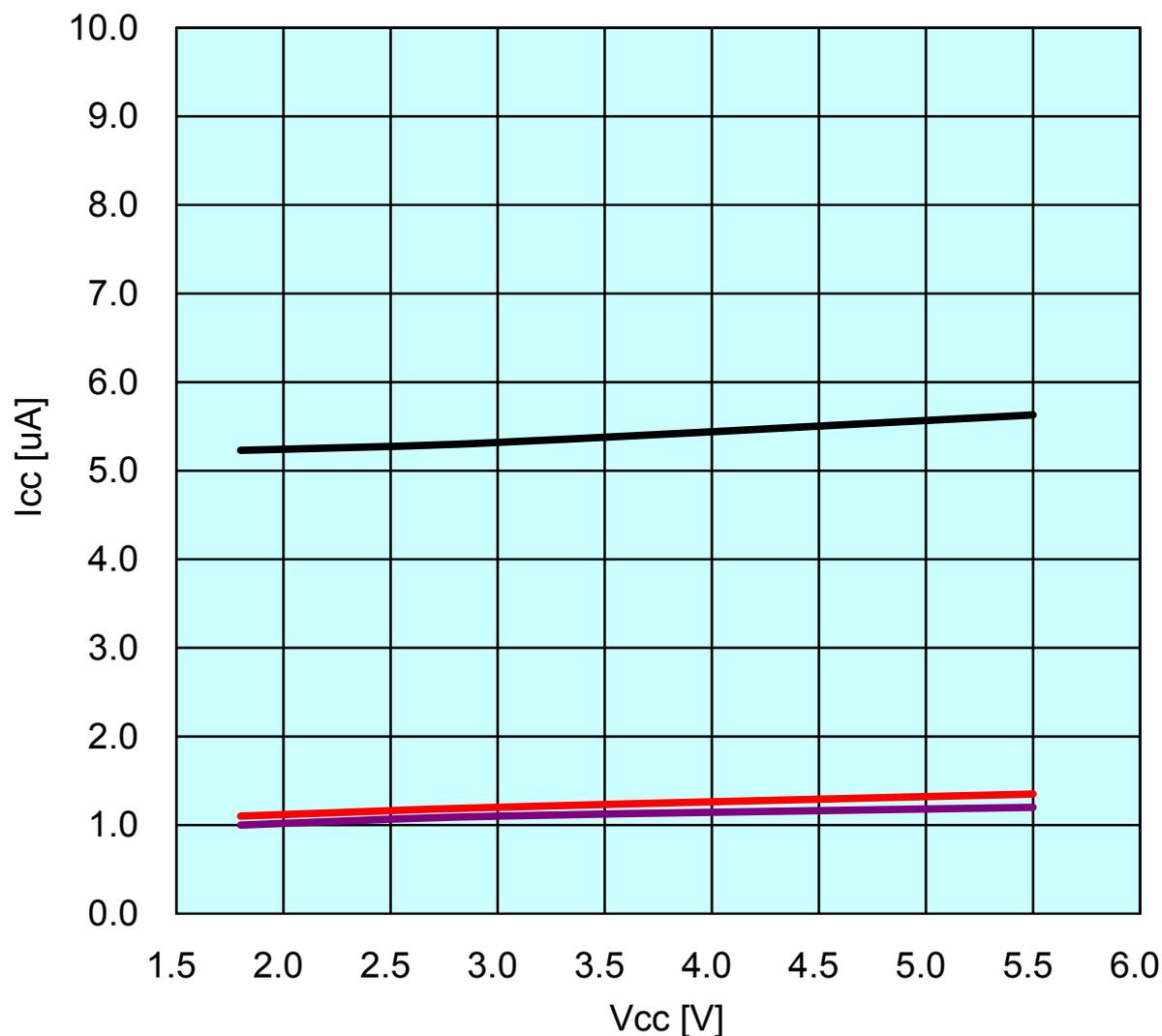
Peripheral clock off

VCA27 = VCA26 = VCA25 = 0

— 85degreesC

— 25degreesC

— -40degreesC



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# I<sub>cc</sub> vs V<sub>cc</sub> (Wait mode)

Prepared on Jun. 30, 2010

R8C/33T Group

XIN clock off

High-speed on-chip oscillator off

Low-speed on-chip oscillator on = 125 kHz

While a WAIT instruction is executed

Peripheral clock operation

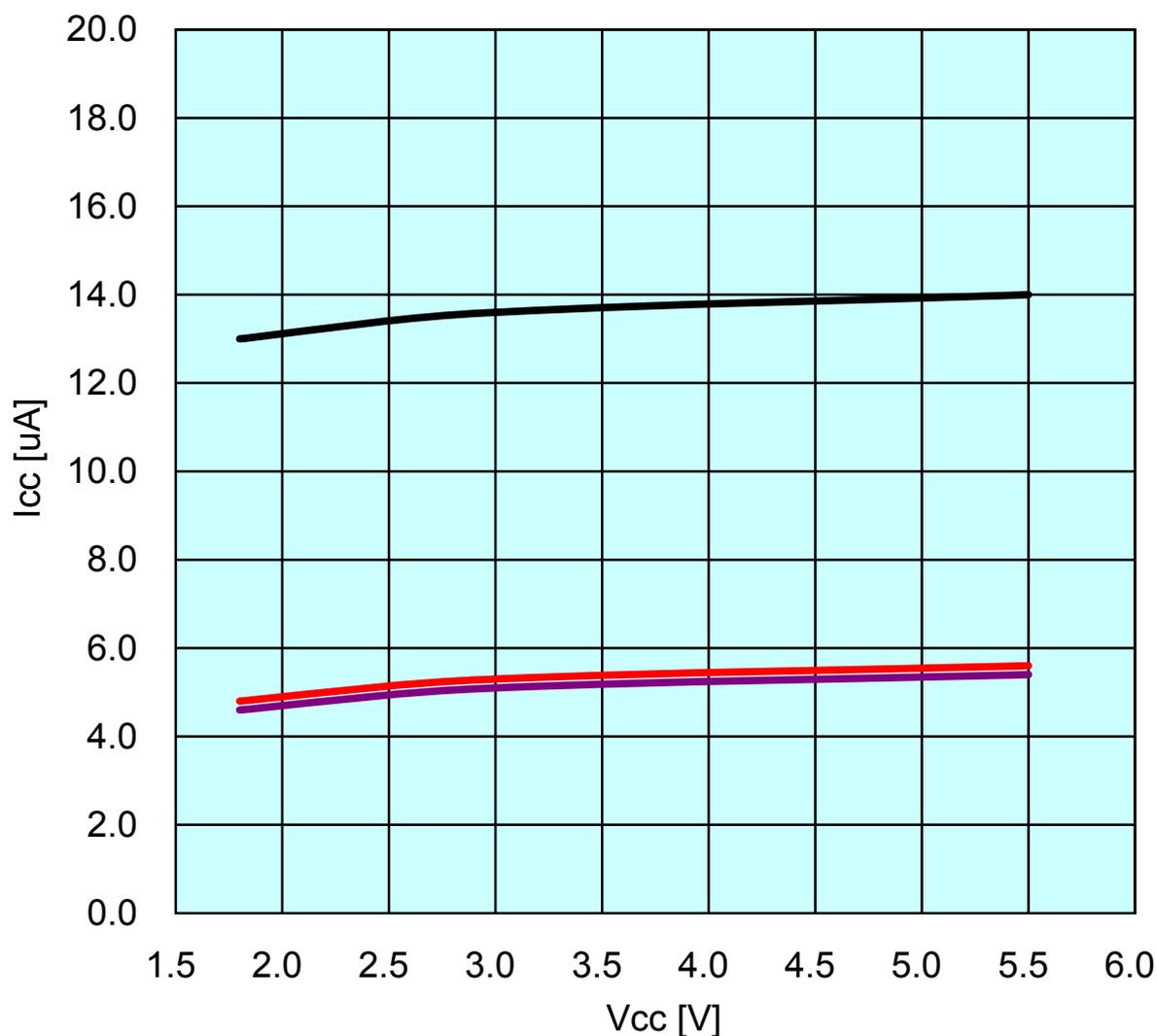
VCA27 = VCA26 = VCA25 = 0

VCA20 = 1

— 85degreesC

— 25degreesC

— -40degreesC



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

# Icc vs Vcc (Wait mode)

Prepared on Jun. 30, 2010

R8C/33T Group

XIN clock off

High-speed on-chip oscillator off

Low-speed on-chip oscillator on = 125 kHz

While a WAIT instruction is executed

Peripheral clock off

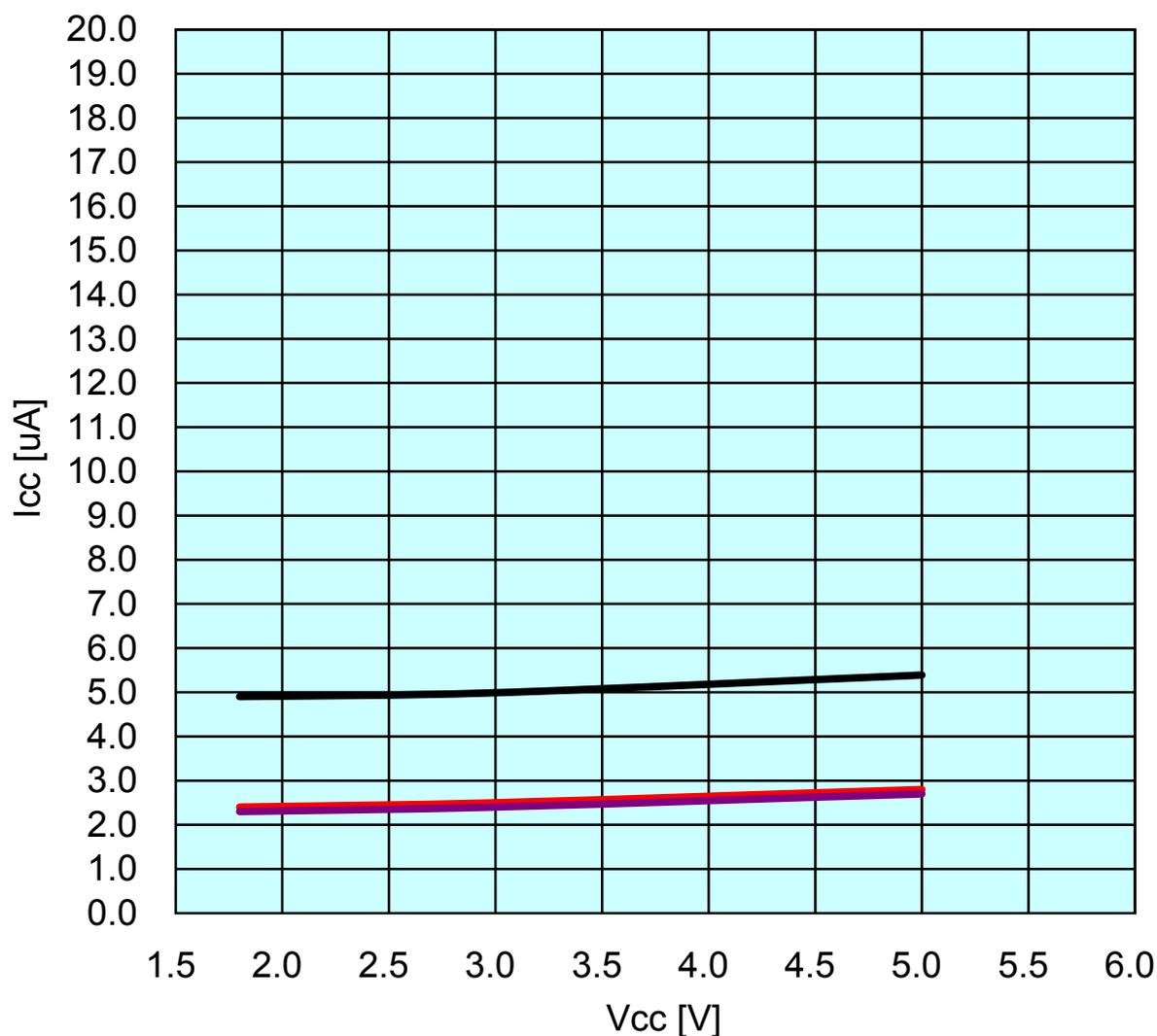
VCA27 = VCA26 = VCA25 = 0

VCA20 = 1

— 85degreesC

— 25degreesC

— -40degreesC



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# Icc vs Vcc (Wait mode)

Prepared on Jun. 30, 2010

R8C/33T Group

XIN clock = 5MHz

High-speed on-chip oscillator off

Low-speed on-chip oscillator on = 125 kHz

While a WAIT instruction is executed

Peripheral clock operation = 5MHz

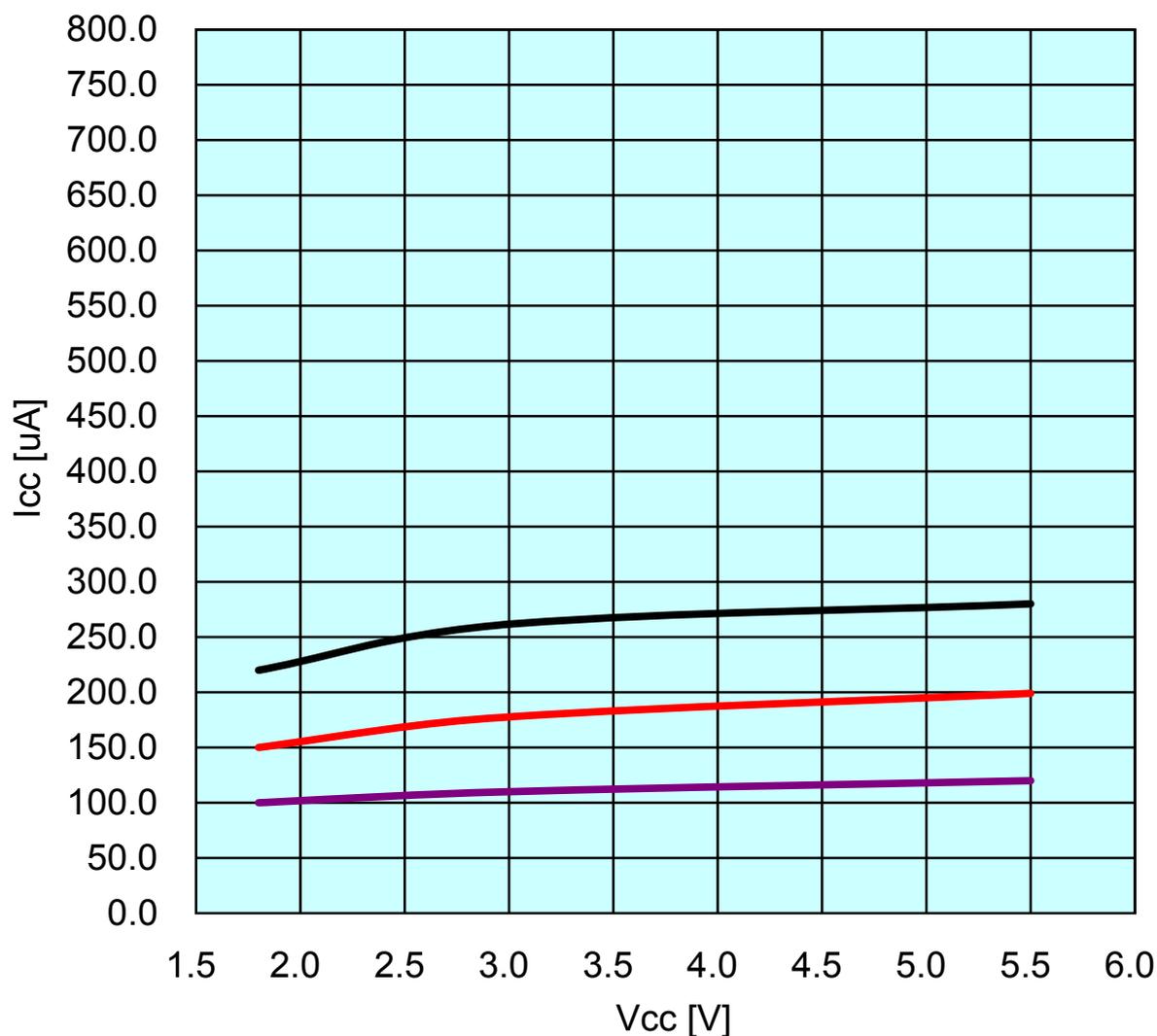
VCA27 = VCA26 = VCA25 = VCA20 = 0

Sensor Control Unit on

— 85degreesC

— 25degreesC

— -40degreesC



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# Icc vs Vcc (Wait mode)

Prepared on Jun. 30, 2010

R8C/33T Group

XIN clock off

High-speed on-chip oscillator = 5MHz

Low-speed on-chip oscillator on = 125 kHz

While a WAIT instruction is executed

Peripheral clock operation = 5MHz

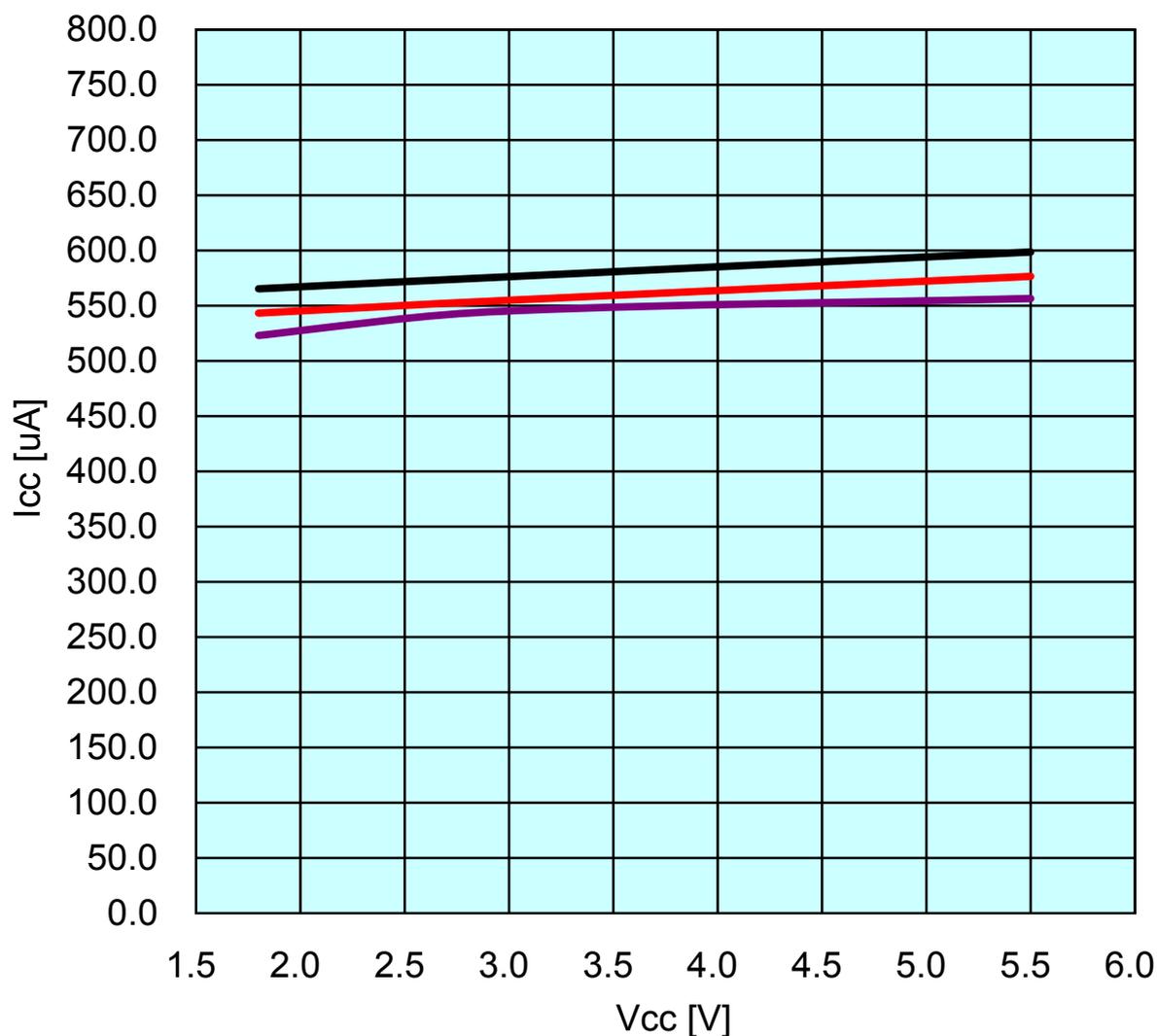
VCA27 = VCA26 = VCA25 = VCA20 = 0

Sensor Control Unit on

— 85degreesC

— 25degreesC

— -40degreesC



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# I<sub>cc</sub> vs V<sub>cc</sub> (High-speed clock mode)

Prepared on Jun. 30, 2010

R8C/33T Group

XIN = 20 MHz (square wave)

High-speed on-chip oscillator off

Low-speed on-chip oscillator on = 125 kHz

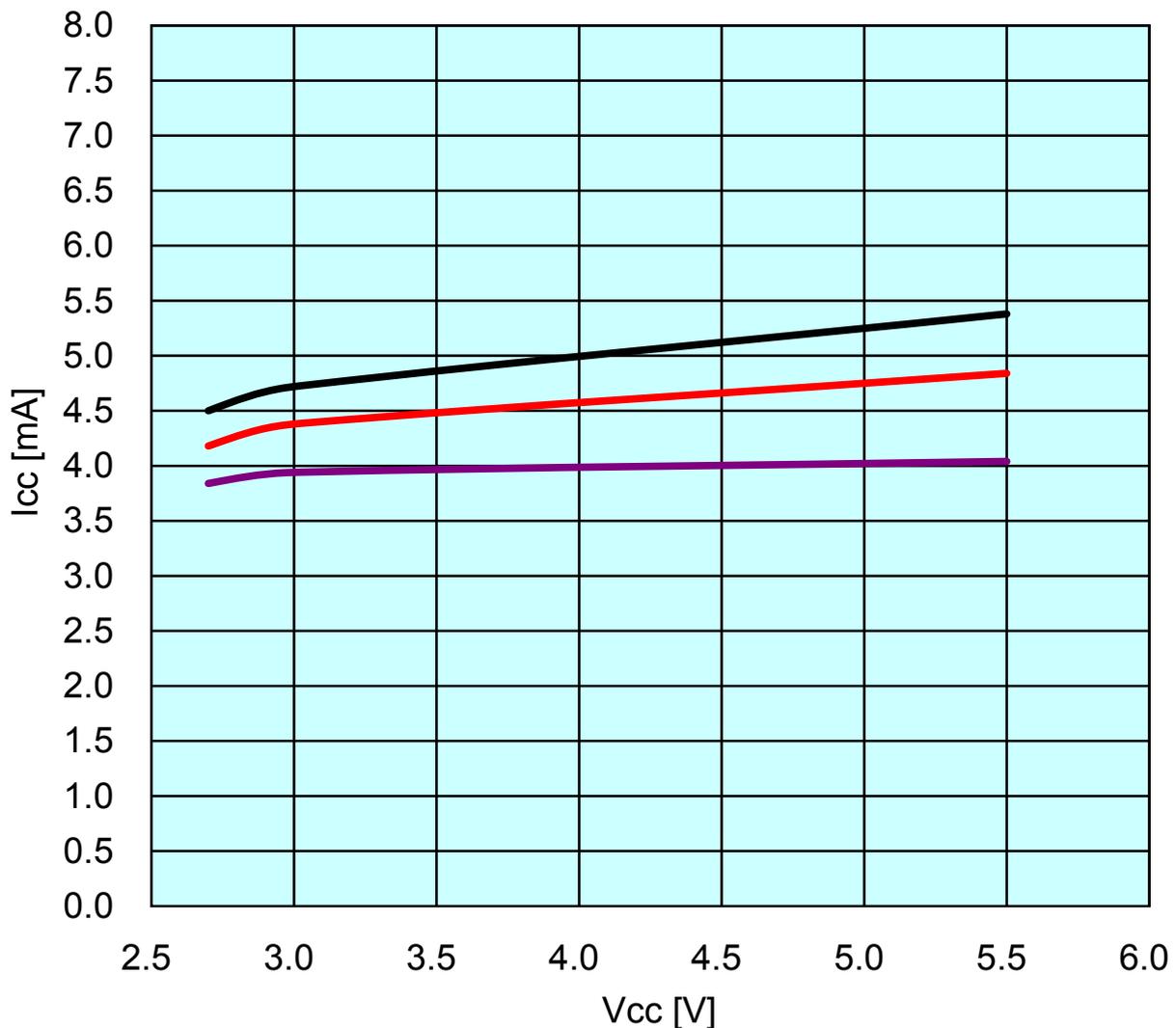
No division

Sensor Control Unit on

— 85degreesC

— 25degreesC

— -40degreesC



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

# I<sub>cc</sub> vs V<sub>cc</sub> (High-speed clock mode)

Prepared on Jun. 30, 2010

R8C/33T Group

XIN = 20 MHz (square wave)

High-speed on-chip oscillator off

Low-speed on-chip oscillator on = 125 kHz

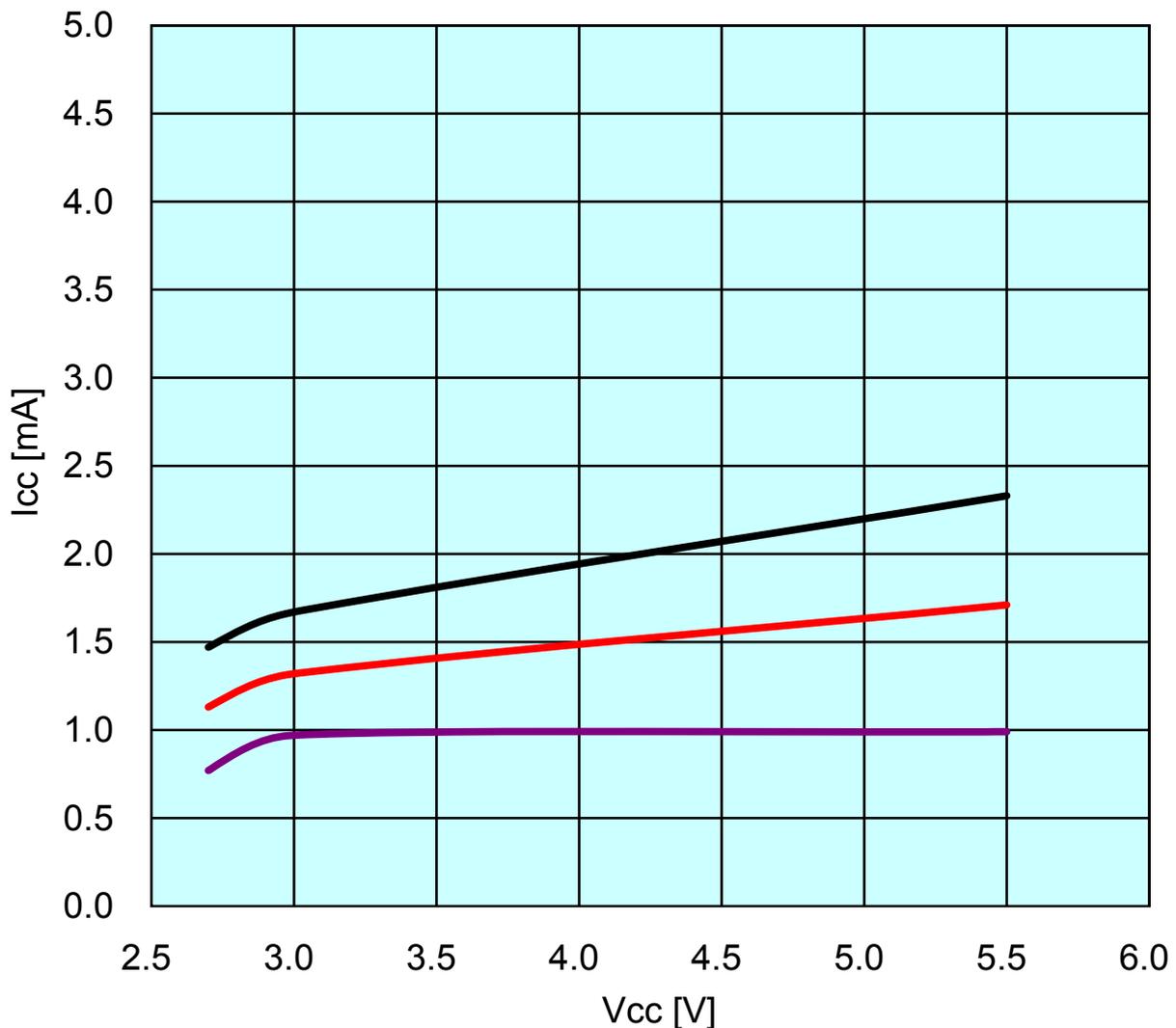
Divide-by-8

Sensor Control Unit on

— 85degreesC

— 25degreesC

— -40degreesC



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

# I<sub>cc</sub> vs V<sub>cc</sub> (High-speed clock mode)

Prepared on Jun. 30, 2010

R8C/33T Group

XIN = 16 MHz (square wave)

High-speed on-chip oscillator off

Low-speed on-chip oscillator on = 125 kHz

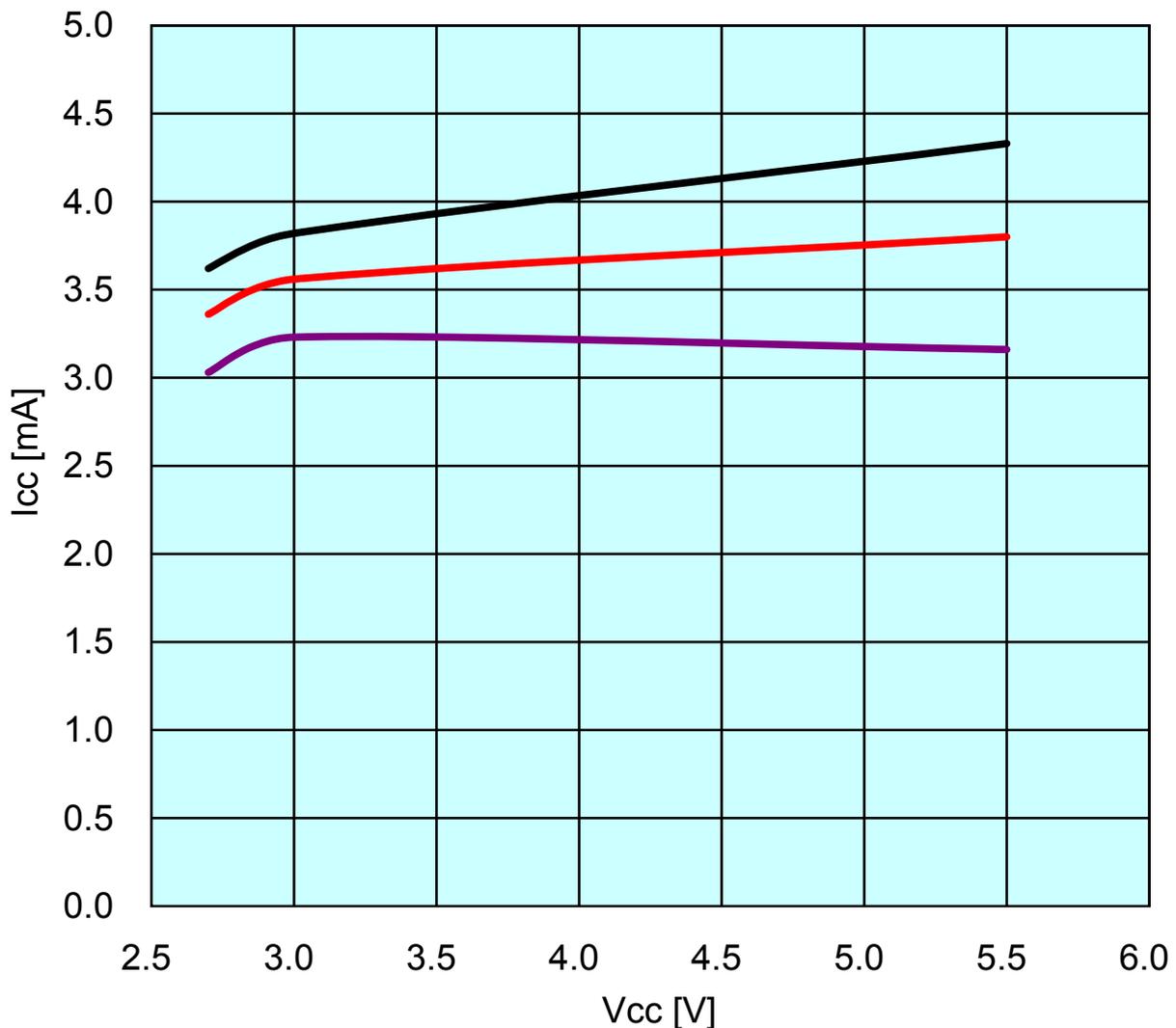
No division

Sensor Control Unit on

— 85degreesC

— 25degreesC

— -40degreesC



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

# I<sub>cc</sub> vs V<sub>cc</sub> (High-speed clock mode)

Prepared on Jun. 30, 2010

R8C/33T Group

XIN = 16 MHz (square wave)

High-speed on-chip oscillator off

Low-speed on-chip oscillator on = 125 kHz

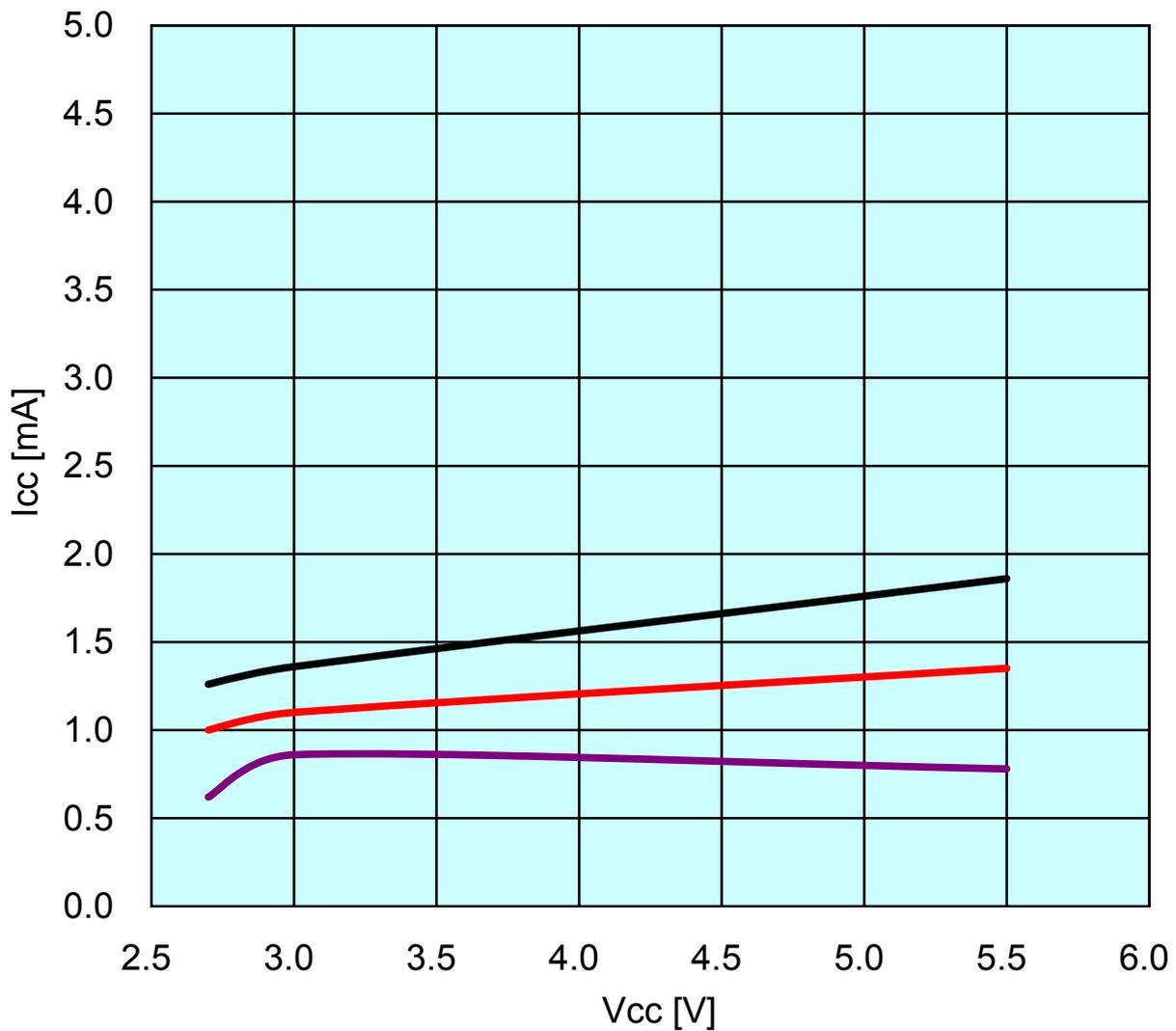
Divide-by-8

Sensor Control Unit on

— 85degreesC

— 25degreesC

— -40degreesC



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

# Icc vs Vcc (High-speed clock mode)

Prepared on Jun. 30, 2010

R8C/33T Group

XIN = 10 MHz (square wave)

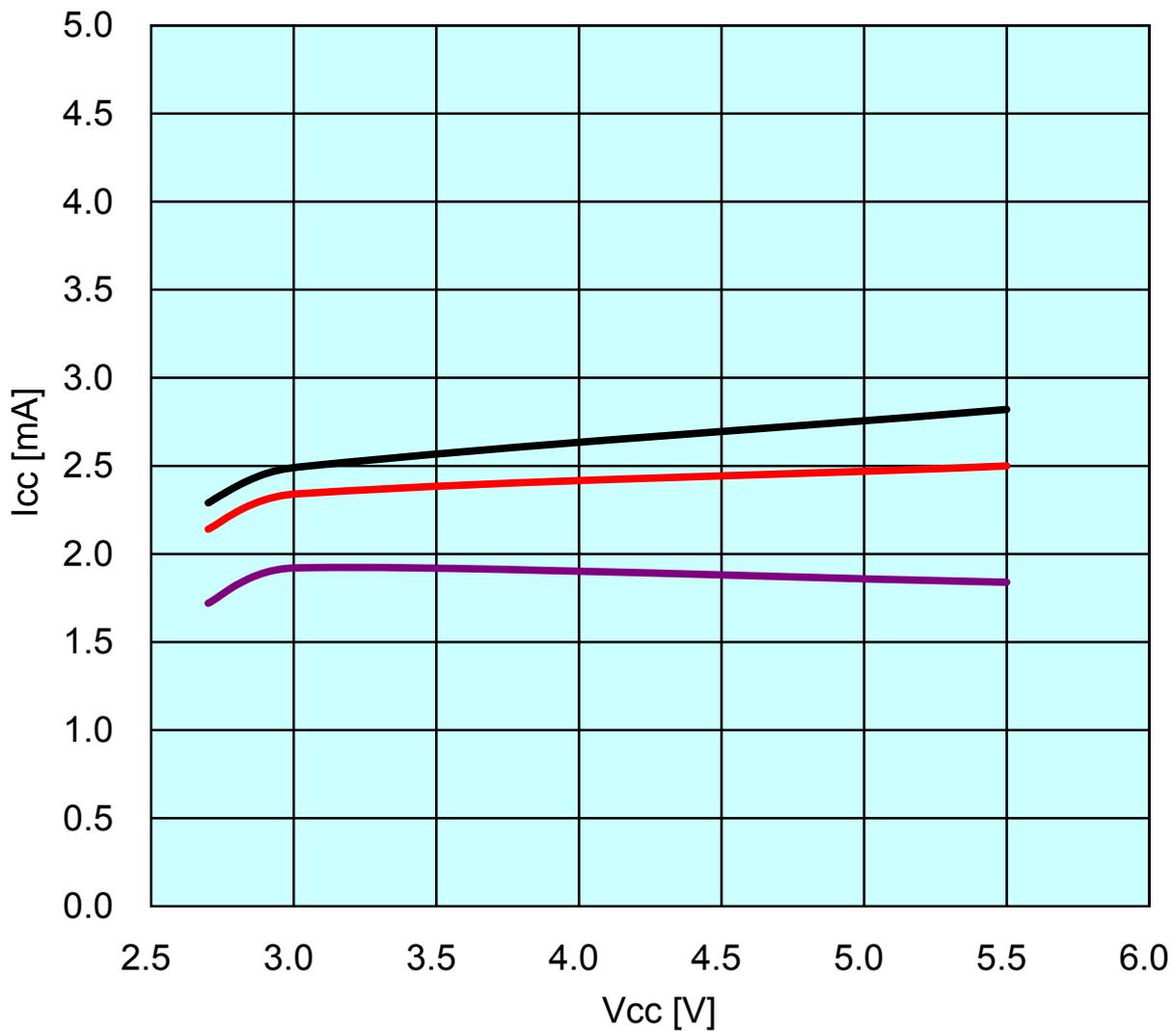
High-speed on-chip oscillator off

Low-speed on-chip oscillator on = 125 kHz

No division

Sensor Control Unit on

— 85degreesC  
— 25degreesC  
— -40degreesC



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

# I<sub>cc</sub> vs V<sub>cc</sub> (High-speed clock mode)

Prepared on Jun. 30, 2010

R8C/33T Group

XIN = 10MHz (square wave)

High-speed on-chip oscillator off

Low-speed on-chip oscillator on = 125 kHz

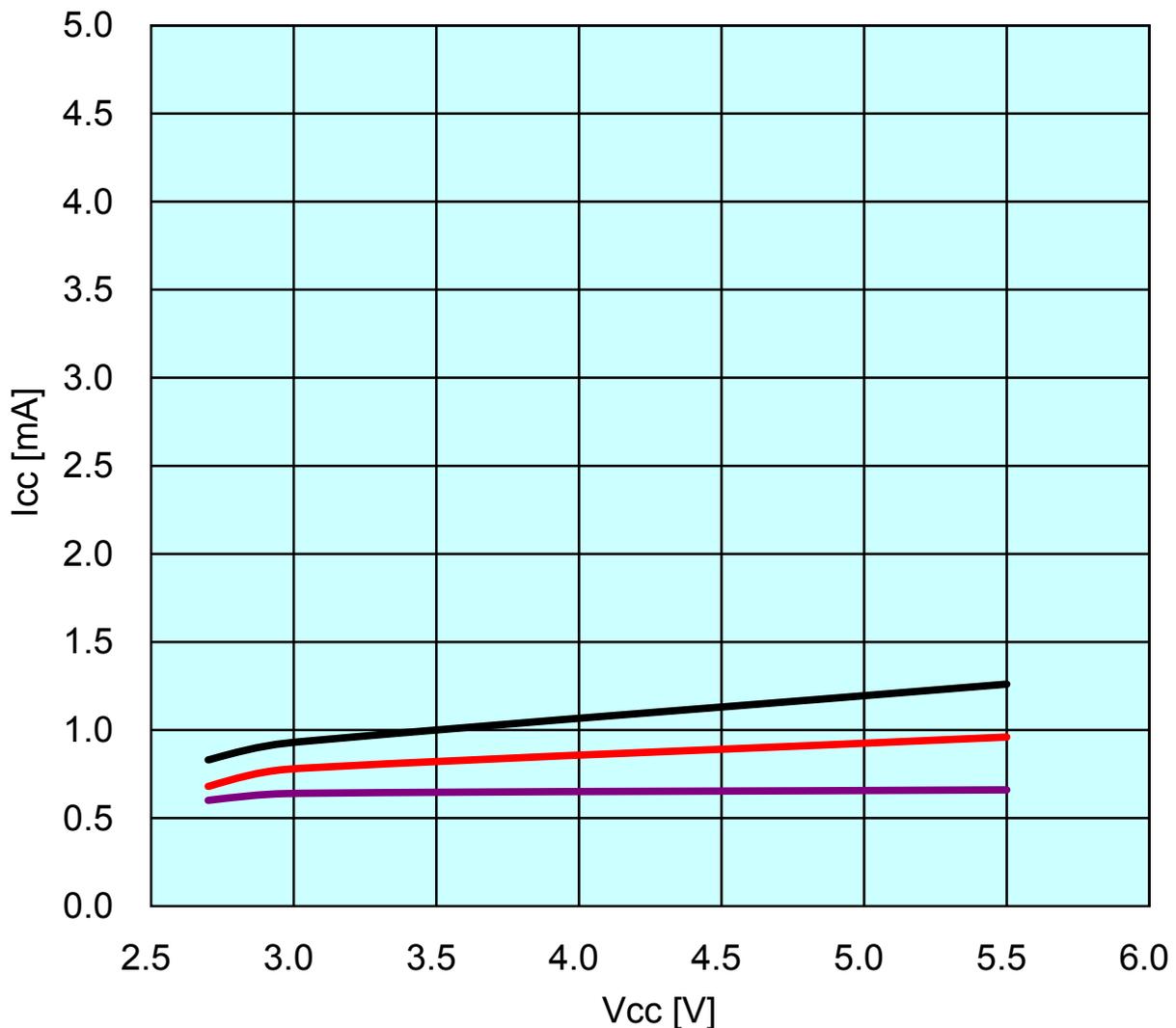
Divide-by-8

Sensor Control Unit on

— 85degreesC

— 25degreesC

— -40degreesC



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# I<sub>cc</sub> vs V<sub>cc</sub> (High-speed clock mode)

Prepared on Jun. 30, 2010

R8C/33T Group

XIN = 5 MHz (square wave)

High-speed on-chip oscillator off

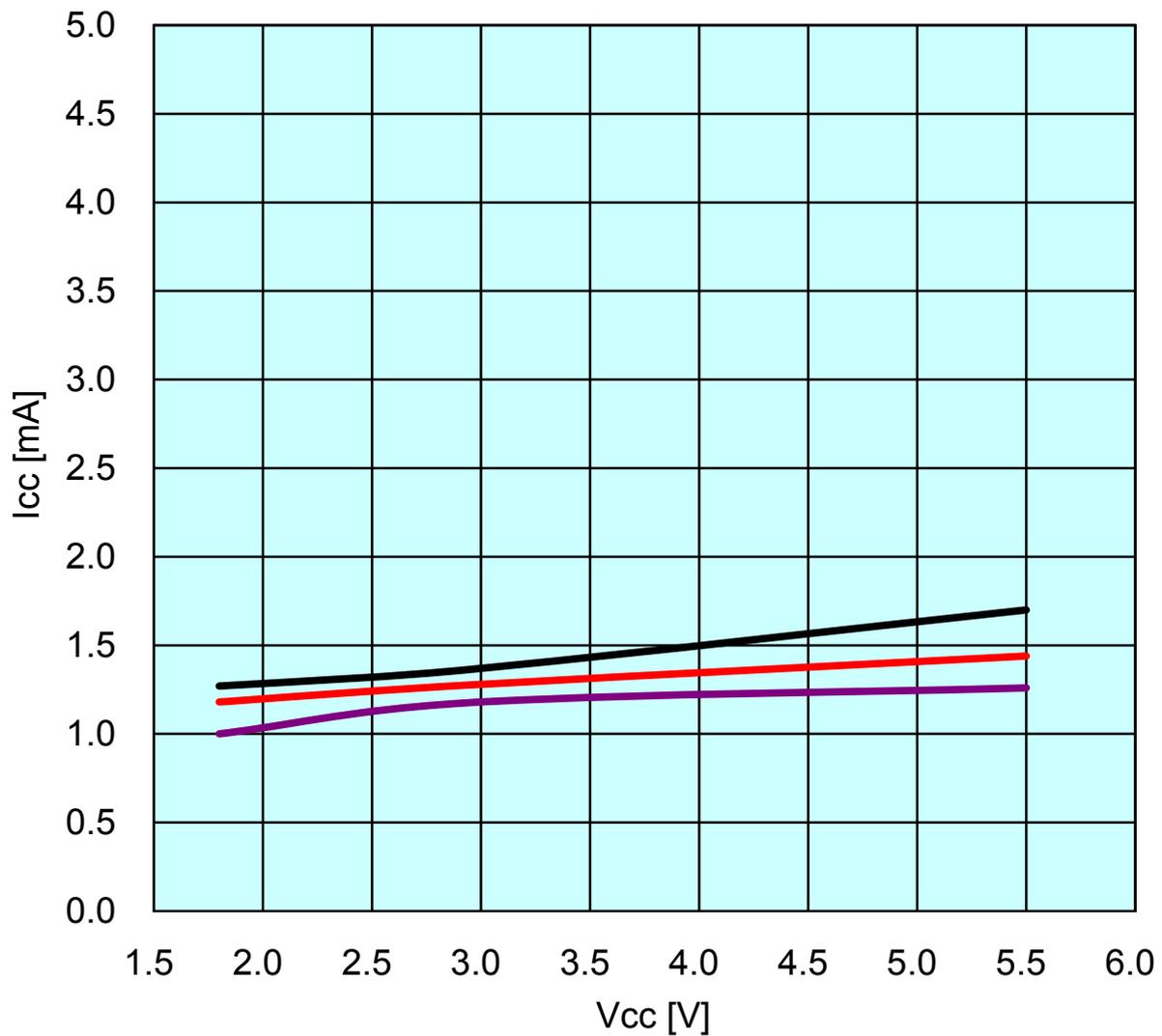
Low-speed on-chip oscillator on = 125 kHz

No division

— 85degreesC

— 25degreesC

— -40degreesC



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# I<sub>cc</sub> vs V<sub>cc</sub> (High-speed clock mode)

Prepared on Jun. 30, 2010

R8C/33T Group

XIN = 5 MHz (square wave)

High-speed on-chip oscillator off

Low-speed on-chip oscillator on = 125 kHz

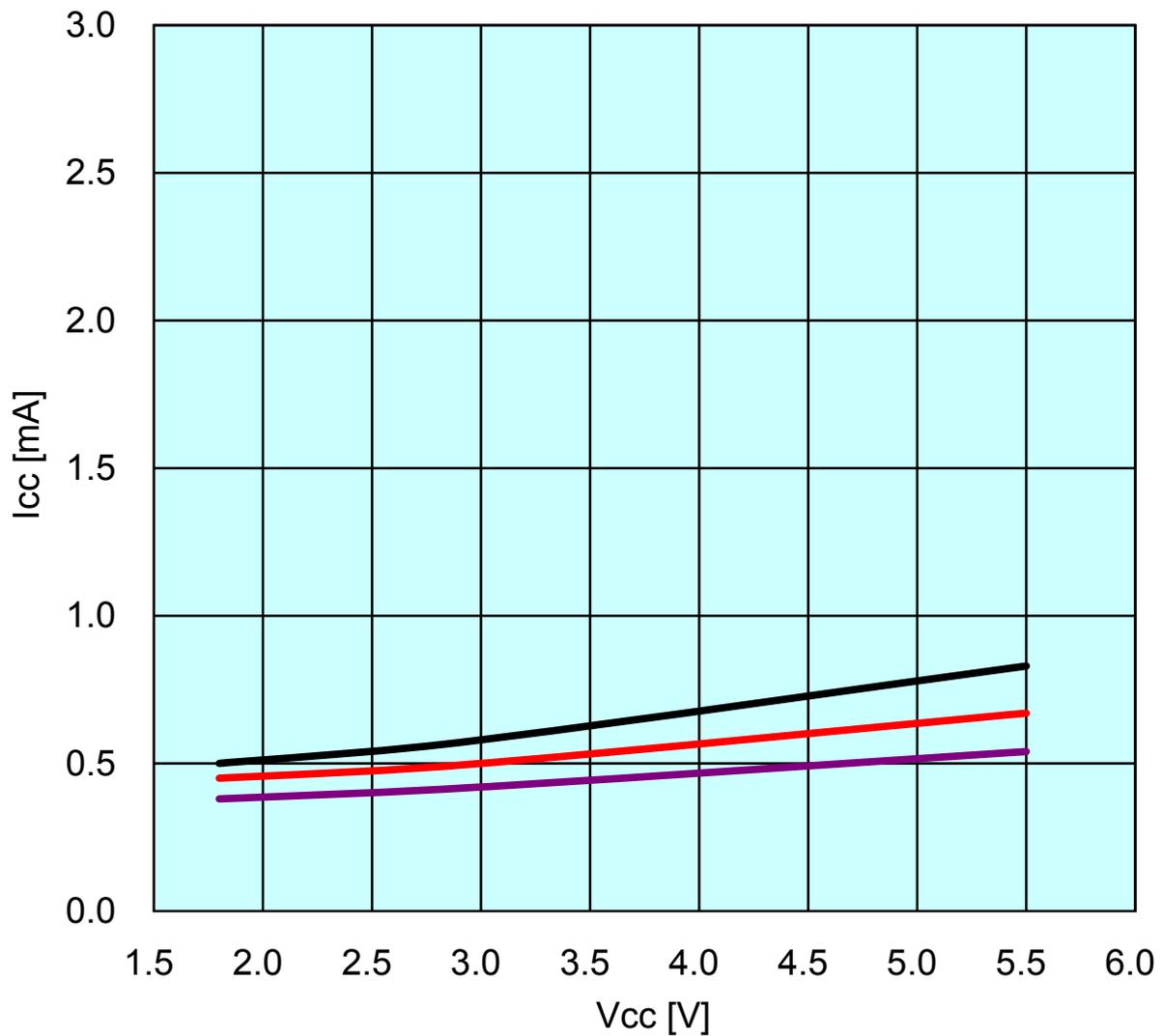
Divide-by-8

Sensor Control Unit on

— 85degreesC

— 25degreesC

— -40degreesC



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# I<sub>cc</sub> vs V<sub>cc</sub>

## (High-speed on-chip oscillator mode)

Prepared on Jun. 30, 2010

R8C/33T Group

XIN clock off

High-speed on-chip oscillator on = 20MHz

Low-speed on-chip oscillator on = 125 kHz

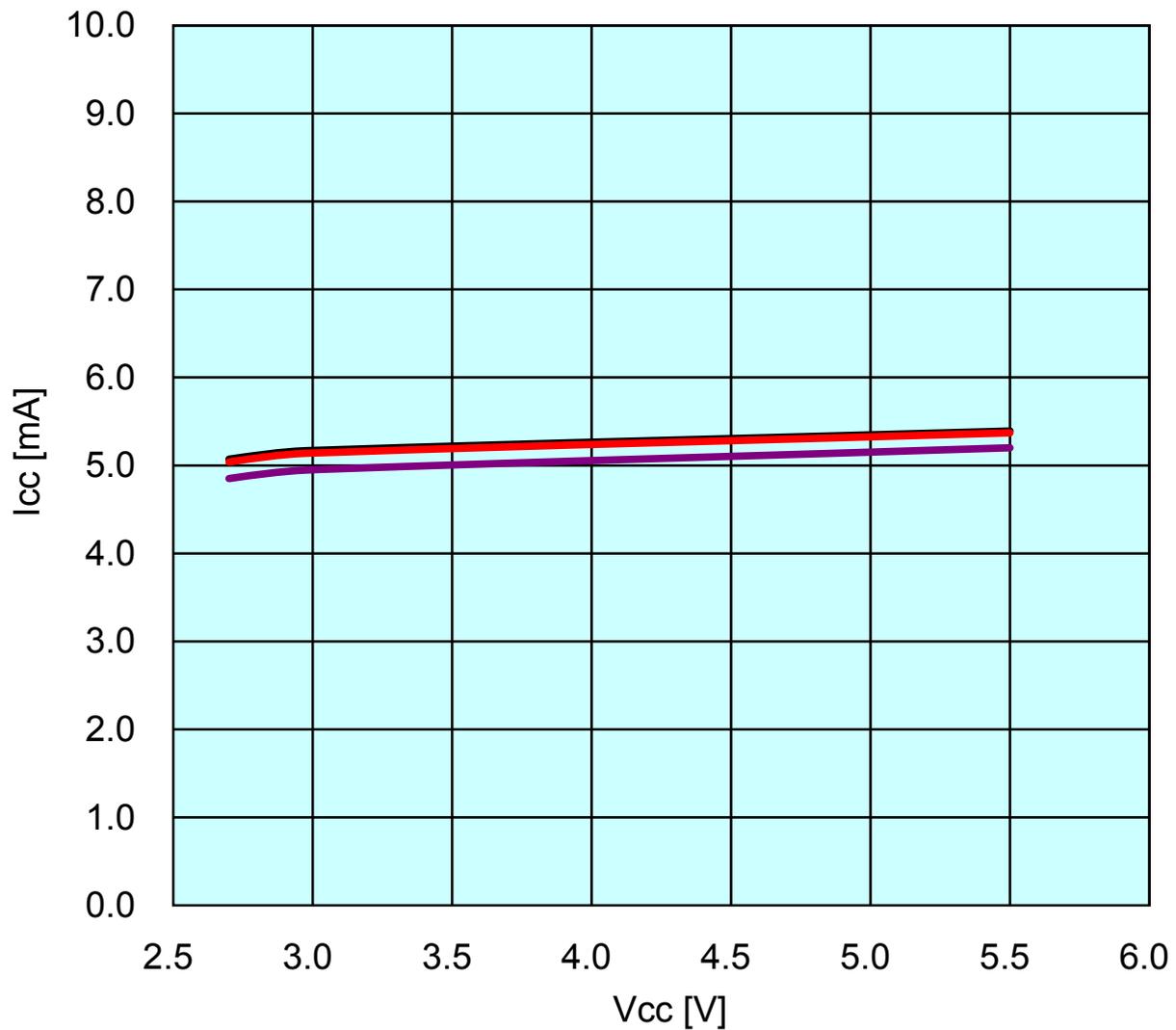
No division

Sensor Control Unit on

— 85degreesC

— 25degreesC

— -40degreesC



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# I<sub>cc</sub> vs V<sub>cc</sub> (High-speed on-chip oscillator mode)

Prepared on Jun. 30, 2010

R8C/33T Group

XIN clock off

High-speed on-chip oscillator on = 20MHz

Low-speed on-chip oscillator on = 125 kHz

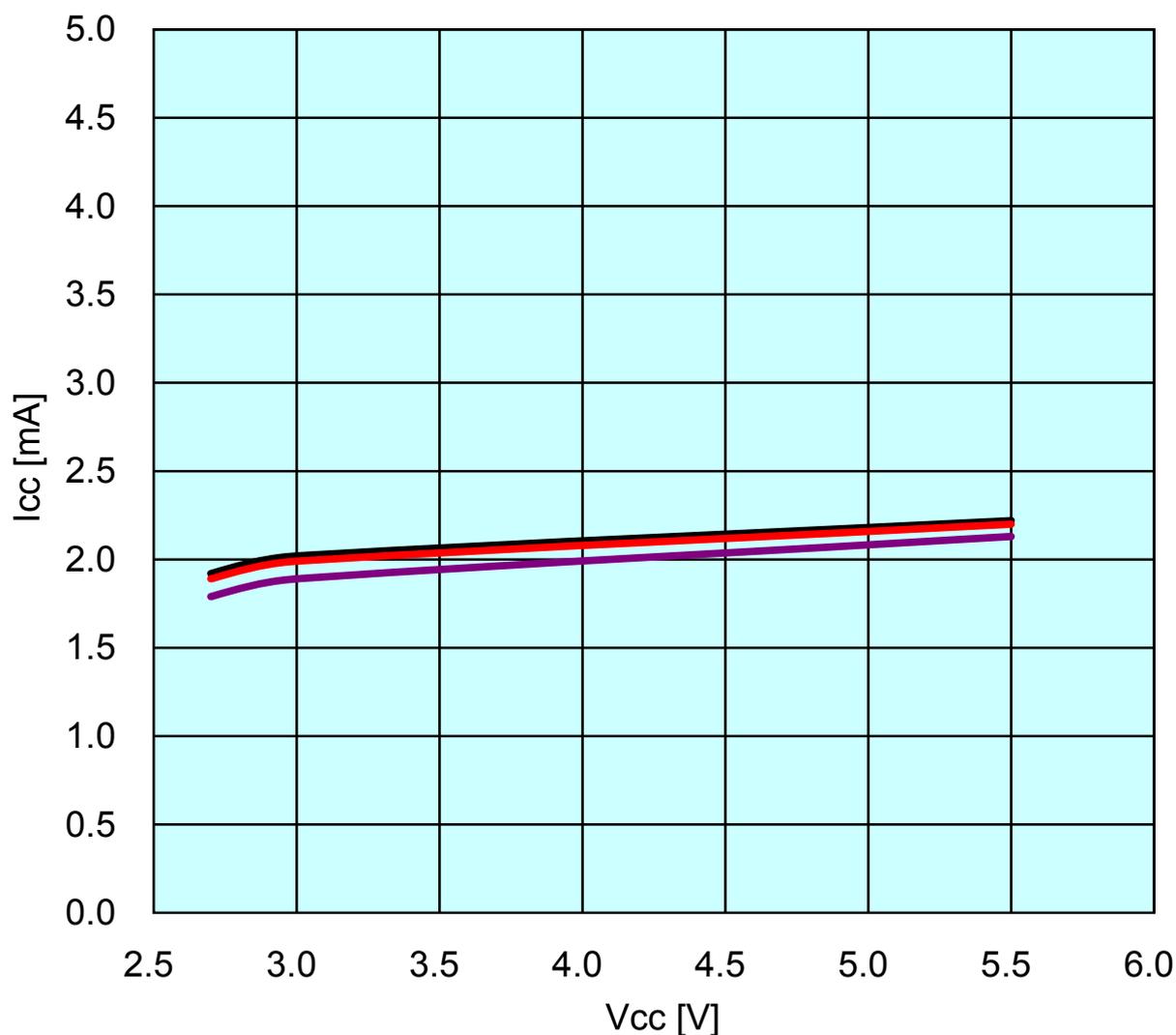
Divide-by-8

Sensor Control Unit on

— 85degreesC

— 25degreesC

— -40degreesC



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# I<sub>cc</sub> vs V<sub>cc</sub> (High-speed on-chip oscillator mode)

Prepared on Jun. 30, 2010

R8C/33T Group

XIN clock off

High-speed on-chip oscillator on = 10MHz

Low-speed on-chip oscillator on = 125 kHz

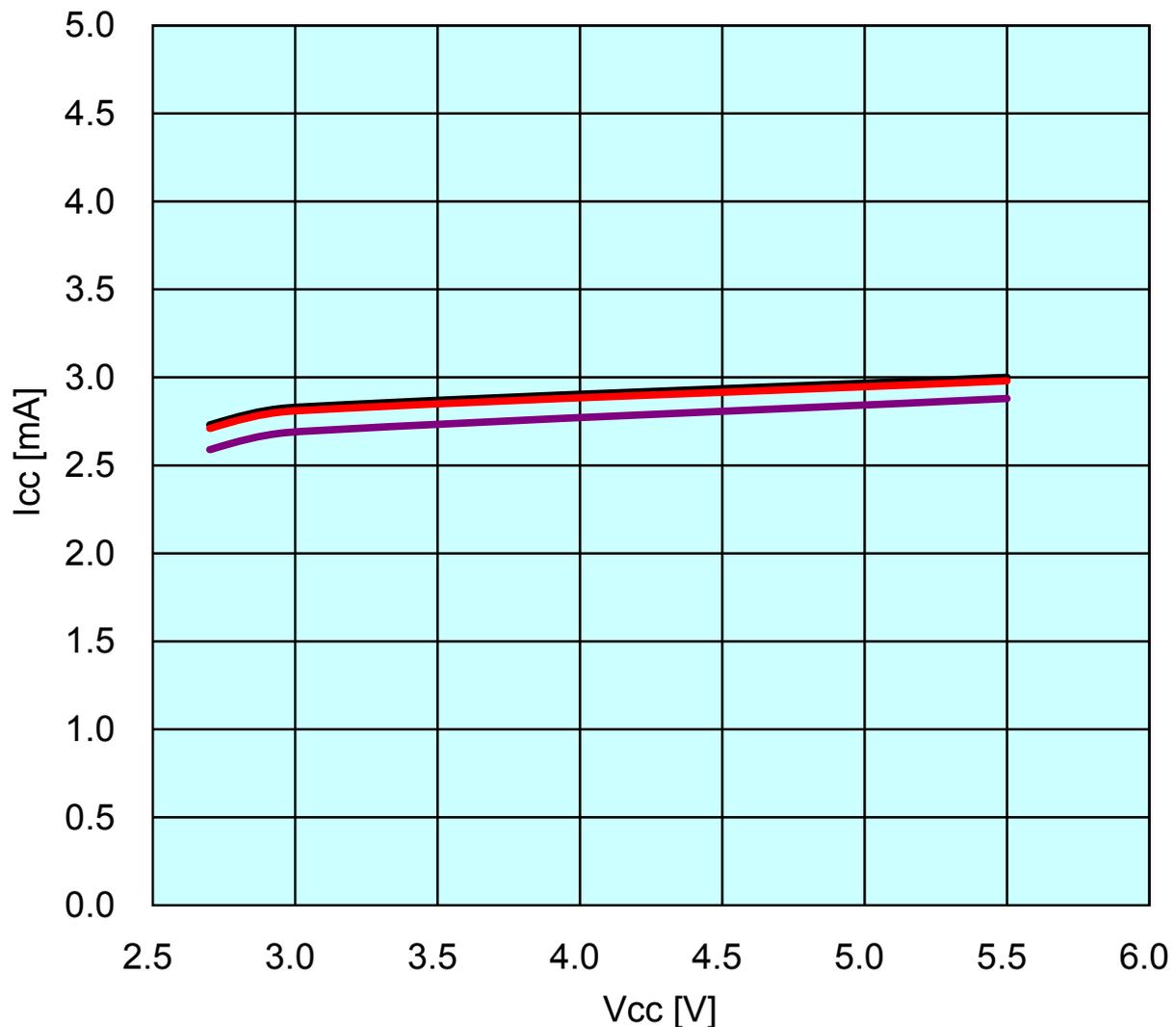
No division

Sensor Control Unit on

— 85degreesC

— 25degreesC

— -40degreesC



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# Icc vs Vcc (High-speed on-chip oscillator mode)

Prepared on Jun. 30, 2010

R8C/33T Group

XIN clock off

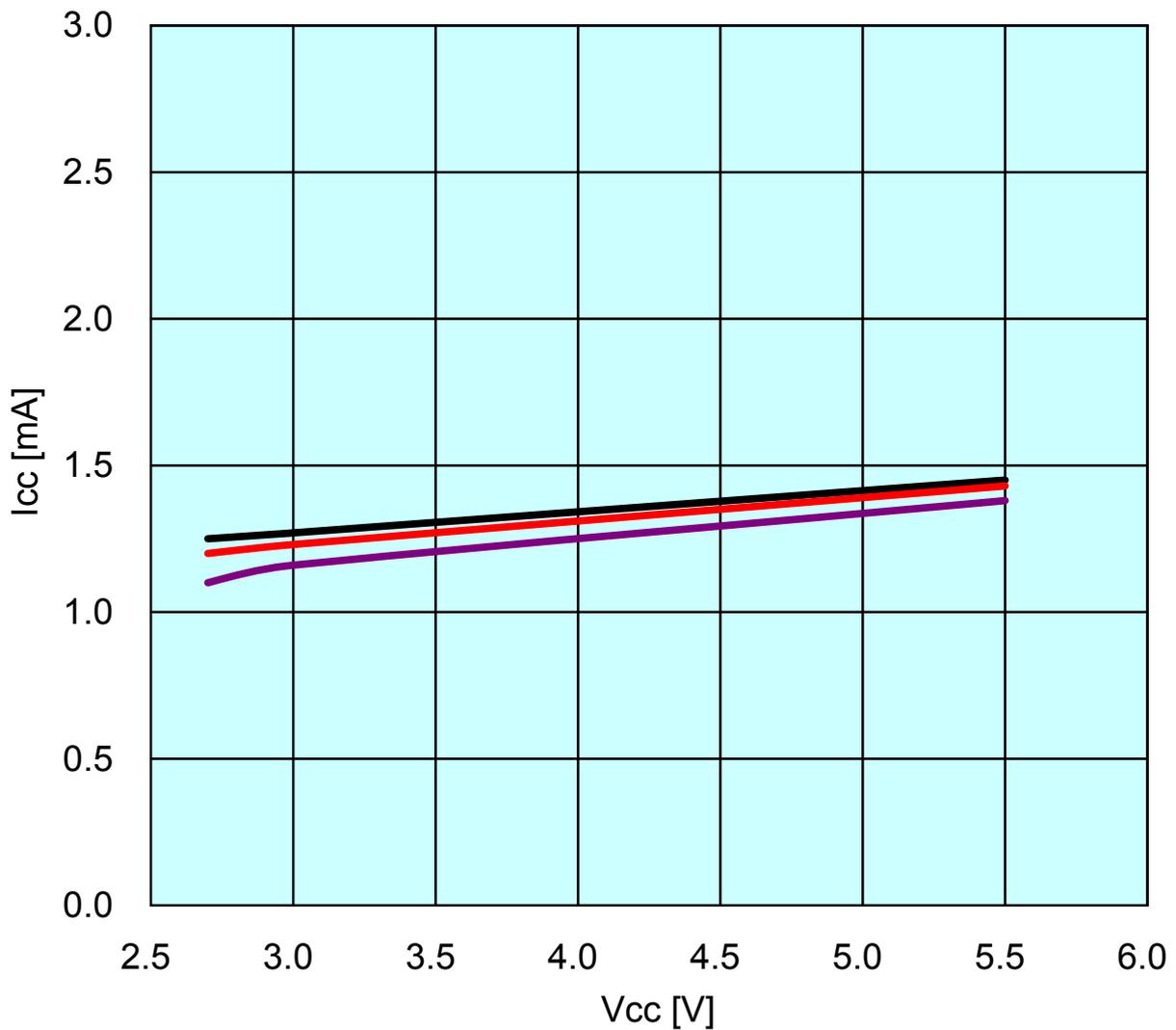
High-speed on-chip oscillator on = 10MHz

Low-speed on-chip oscillator on = 125 kHz

Divide-by-8

Sensor Control Unit on

— 85degreesC  
— 25degreesC  
— -40degreesC



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# I<sub>cc</sub> vs V<sub>cc</sub> (High-speed on-chip oscillator mode)

Prepared on Jun. 30, 2010

R8C/33T Group

XIN clock off

High-speed on-chip oscillator on = 5MHz

Low-speed on-chip oscillator on = 125 kHz

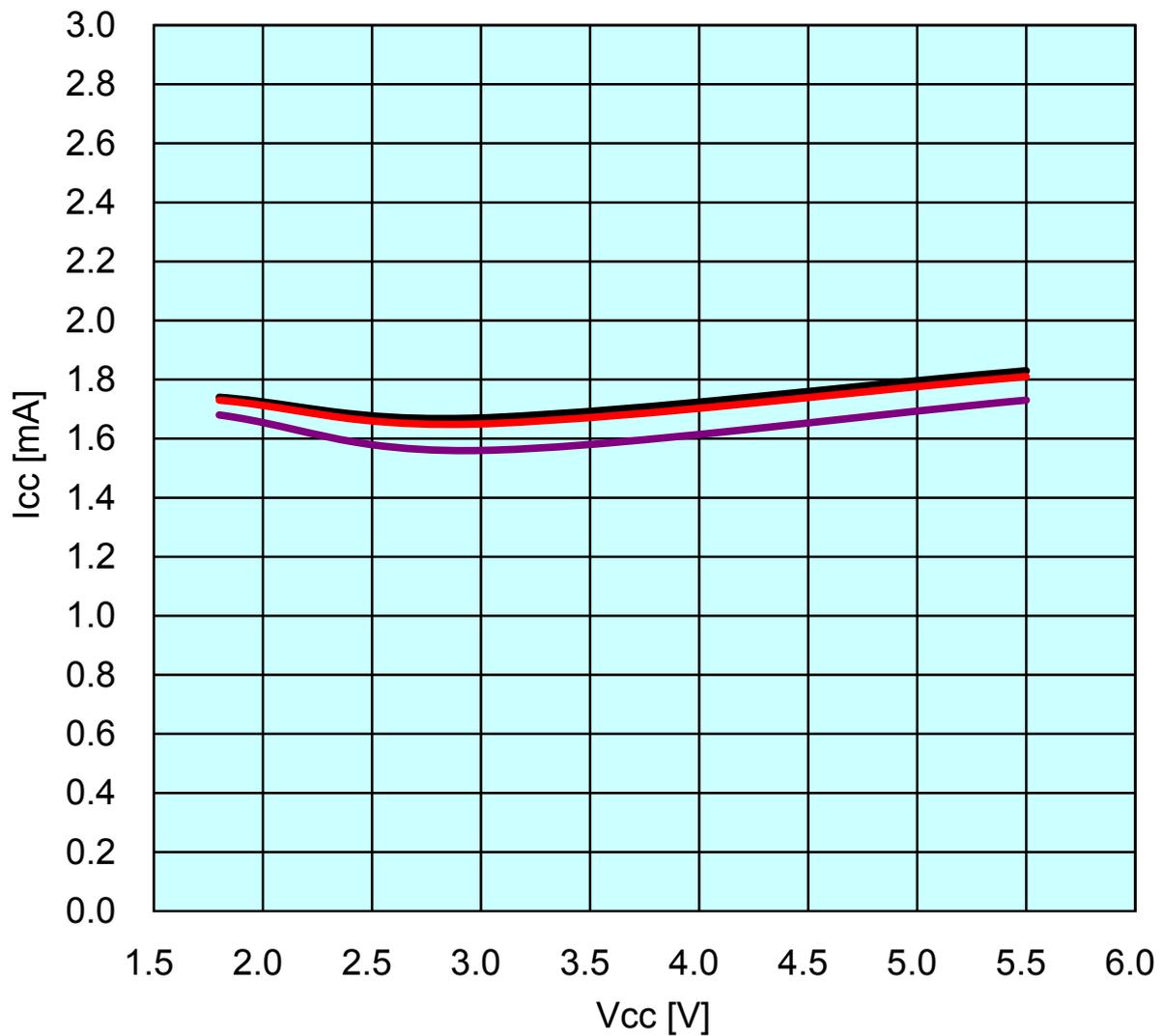
No division

Sensor Control Unit on

— 85degreesC

— 25degreesC

— -40degreesC



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# Icc vs Vcc (High-speed on-chip oscillator mode)

Prepared on Jun. 30, 2010

R8C/33T Group

XIN clock off

High-speed on-chip oscillator on = 5MHz

Low-speed on-chip oscillator on = 125 kHz

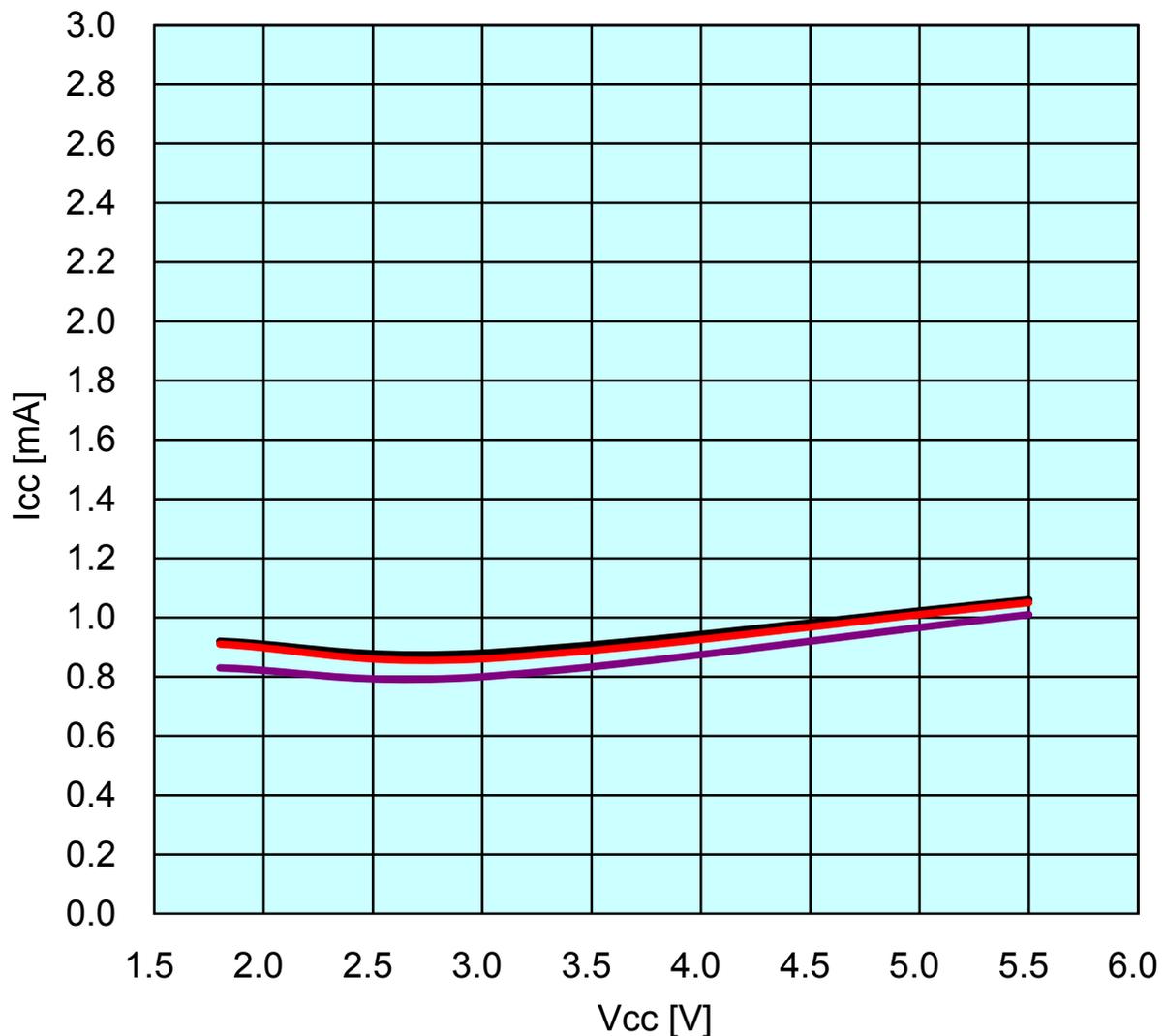
Divide-by-8

Sensor Control Unit on

— 85degreesC

— 25degreesC

— -40degreesC



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# Icc vs Vcc (High-speed on-chip oscillator mode)

Prepared on Jun. 30, 2010

R8C/33T Group

XIN clock off

High-speed on-chip oscillator on = 4MHz

Low-speed on-chip oscillator on = 125 kHz

Divide-by-16

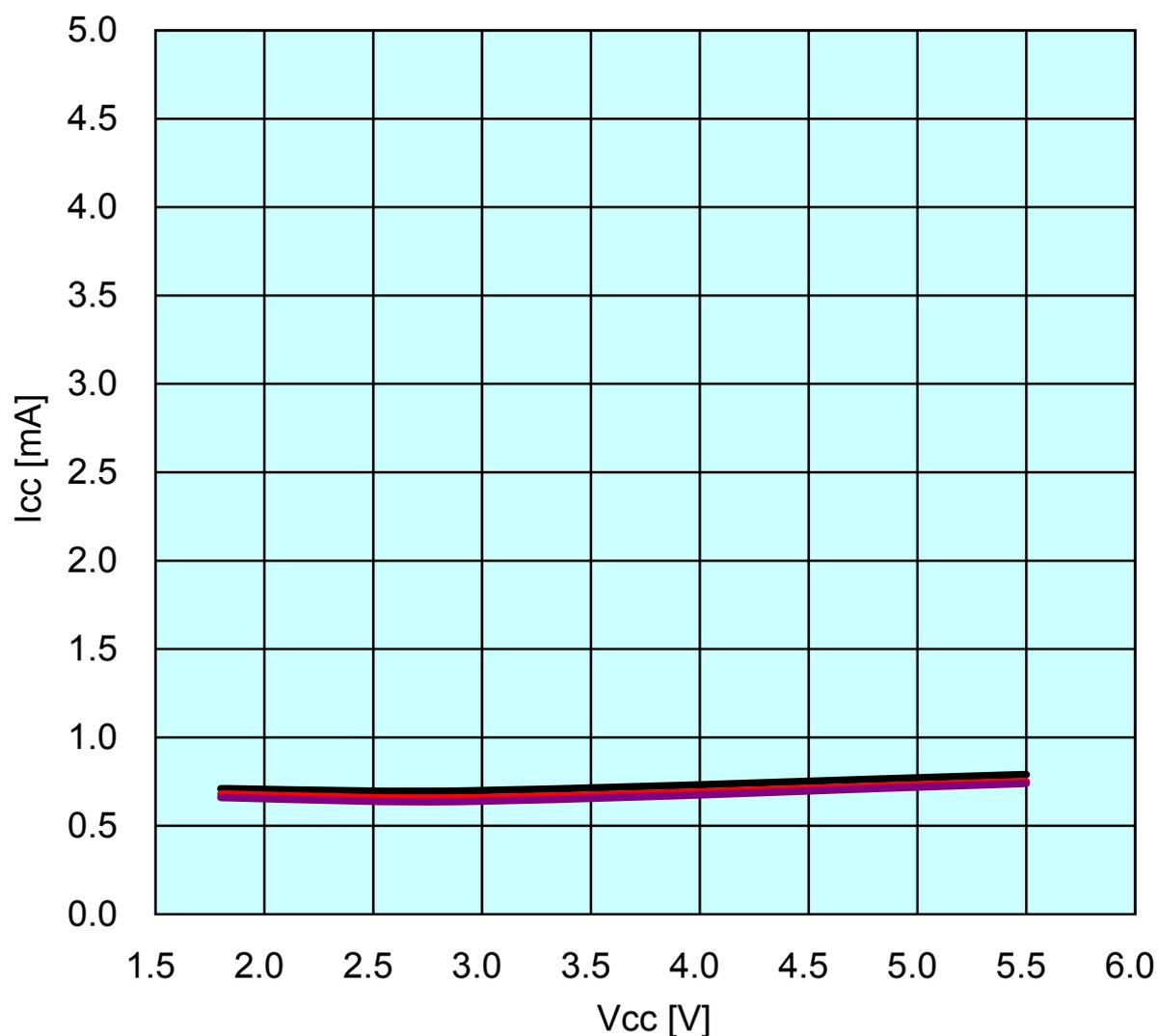
MSTTRC = 1

Sensor Control Unit on

— 85degreesC

— 25degreesC

— -40degreesC



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# Alcc vs AVcc

(during A/D conversion)

Prepared on Jun. 30, 2010

R8C/33T Group

Topr = 25 degrees C

AVcc-Vss:0.1uF Vref-Vss:0.1uF

ANIN-Vss:0.1uF

10-bit mode

Repeat mode 0

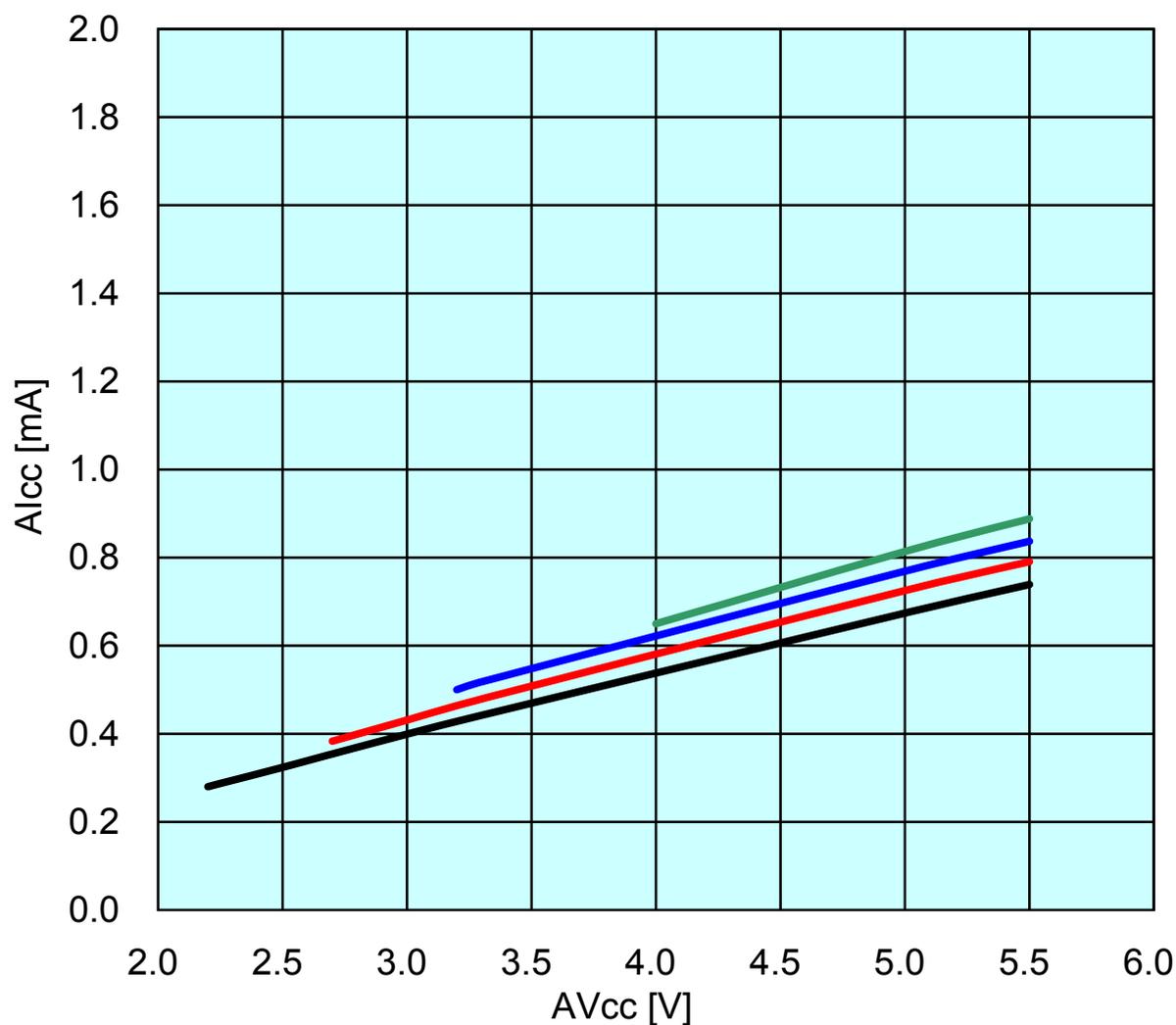
The ICC amount of increase when analog to digital conversion operates

— XIN=5MHz, φAD=5MHz

— XIN=10MHz, φAD=10MHz

— XIN=16MHz, φAD=16MHz

— XIN=20MHz, φAD=20MHz



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