

TO: Microchip Corporation

Report No.	UKY1C-C3-16831-00(40)	1/2
Date Issued	25-Nov-16	

Crystal oscillation circuits report

Dear Sirs,

We are pleased to submit a report on the above subject as follows:

Yours faithfully

Board name	SAME54 Xplained Pro kit
IC name	ATSAME54P20A
Specification	CX5032GA8000H0KPS02
Specification NO.	--
Crystal unit type	CX5032GA
Frequency	8000 kHz
Frequency tolerance	± 30 PPM
Temperature	-40~+85 °C
Temperature characteristic	± 50 PPM
Equivalent series resistance	300 Ω
Load capacitance	12 pF
Drive level	500 uW

Circuit examination history

2016.11.25 First edition UKY1C-C3-16831-00(40)

Crystal Units design section		Crystal oscillation circuit evaluation section		
Approved by	Checked by	Approved by	Checked by	Prepared
T.Nitobe	-	A.Hisako	Y.Yuki	M.Tanigawa

The reference about the above

KYOCERA Crystal Device Corporation Marketing Division
5850 Higashine-koh , Higashine-shi , Yamagata 999-3701

Tel:+81-237-43-5747 Fax:+81-237-43-5651

Note:The characteristics of crystal oscillating circuits vary according to a circuit constant, installed condition,etc.

Before use,please confirm matching of the crystal unit with the crystal oscillator circuits.Please also note that the results of reviewing the circuits may not meet the characteristics of your product.

○Measurement Circuit Diagram

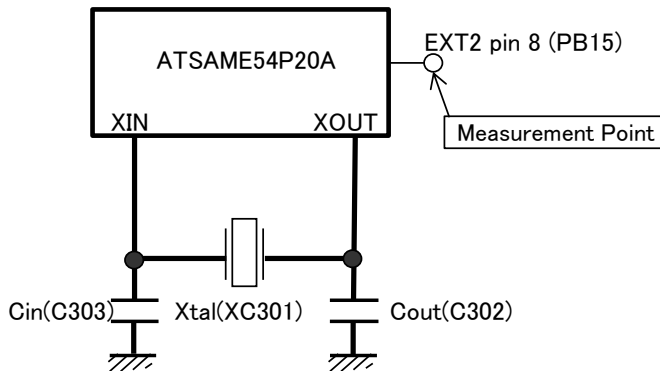
SAME54 Xplained Pro kit

IC: ATSAME54P20A

Vcc: USB (V)

Xtal(XC301): CX5032GA 8000kHz

CL= 12pF



Measurement Item	Instrument
Frequency	Anritsu MS2661C Spectrum Analyzer
Negative Resistance	Anritsu MS2661C Spectrum Analyzer
Drive Level	Tektronix Digital Oscilloscope TDS5052B
	Tektronix AC Current Probe P6022

○Characteristics at Recommended Constants

CL= 12pF

Circuit Constants		Power Voltage (V)	Automatic Loop Control	Negative Resistance (Ω)	Circuit load Capacitance (pF)	Frequency Deviation (PPM)	Drive Level (μ W)	3rd Negative Resistance (Ω)
Cin(C303)	Cout(C302)							
13pF	13pF	USB	Enabled	-7356	10.88	+9.13	4.1	-890
13pF	13pF	USB	Disabled	-7353	13.43	-9.63	176	-900

•Negative resistance

<Automatic loop control enabled>

The negative resistance for 8000kHz at the present circuit constants is -7356Ω , which is enough to assure stable operation of the circuits.

<Automatic loop control disabled>

The negative resistance for 8000kHz at the present circuit constants is -7353Ω , which is enough to assure stable operation of the circuits.

•Circuit load capacitance and Frequency tolerance

<Automatic loop control enabled>

The load capacitance of the oscillator circuit is 10.88pF with a frequency deviation of +9.13PPM. This is based on the fact that this quartz crystal has a frequency deviation of ± 0 by using a load capacitance of 12pF.

<Automatic loop control disabled>

The load capacitance of the oscillator circuit is 13.43pF with a frequency deviation of -9.63PPM. This is based on the fact that this quartz crystal has a frequency deviation of ± 0 by using a load capacitance of 12pF.

•Drive level

<Automatic loop control enabled>

The drive level of the oscillation circuit is $4.1\mu W$, when a quartz crystal unit with 42.18Ω equivalent series resistance and 56.26Ω load resonance resistance is used.

This is a good value without the possibility to cause trouble.

<Automatic loop control disabled>

The drive level of the oscillation circuit is $176\mu W$, when a quartz crystal unit with 42.18Ω equivalent series resistance and 53.43Ω load resonance resistance is used.

This is a good value without the possibility to cause trouble.

•3rd Over tone Negative resistance

<Automatic loop control enabled>

The 3rd over tone (= 24000kHz) negative resistance of the oscillation circuit is -890Ω .

The value is guaranteed to stable oscillation in the circuit.

<Automatic loop control disabled>

The 3rd over tone (= 24000kHz) negative resistance of the oscillation circuit is -900Ω .

The value is guaranteed to stable oscillation in the circuit.

•Conclusion

We recommend use of the product at the present constants.

However, please check whether it is satisfactory enough in your company.

The results of testing the mounted board we borrowed from you this time are as described above.

Please also check and review them on your side before use.

KYOCERA Crystal Device Corporation	Date Issued 2016.11.25	Circuit Diagram Recommended constants	Report No. UKY1C-C3-16831-00(40)	2/2
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