

To: Atmel

EPSON TOYOCOM CORPORATION
QD QUALITY ASSURANCE GROUP

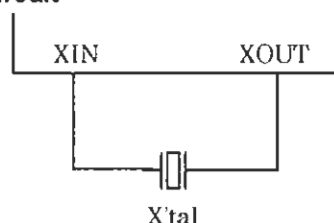
MC-306 (32.768 kHz) Quartz Crystal Circuit Evaluation

Thank you for considering our products, and we hope greatly you get useful information from our service.
With reference to the above subject, we would like to report as follows.

1. Details of Investigation

- We investigated the drive level, negative resistance and load capacitance of the PCB from your company.
- Quartz crystal : MC-306 · Frequency : 32.768 kHz · CL : 7.0 pF/12.5 pF $\pm 20 \times 10^{-6}$
- Input Voltage : +2.7 V ~ +5.5 V · IC : ATMEGA16L

2. Circuit



3. The Investigation results

(1) The oscillation of the Present constants.

- We used our standard CL value for this evaluation.
- The drive level and the negative resistance are fine.
But the oscillation frequency is low.
- Data are shown in the table below.

(D.L : Drive Level, -R: negative resistance)

PCB No.	VDD (V)	Oscillation Frequency ($\times 10^{-6}$)		DL (uW)	-R (k Ω)	Oscillation start up time. (ms)
		Based on CL 7.0 pF	Based on CL 12.5 pF			
1	+2.7	-69.9	-24.7	0.221	300	1400
	+3.3	-69.6	-24.4	0.223	330	1400
	+5.0	-68.0	-22.9	0.254	390	1200
	+5.5	-67.1	-22.0	0.286	430	1000
2	+2.7	-69.6	-24.4	0.196	330	1200
	+3.3	-69.0	-23.8	0.200	330	1200
	+5.0	-67.4	-22.3	0.229	390	1000
	+5.5	-66.2	-21.1	0.252	430	1000

* Recommendation for this product : D.L. is less than 1.0 uW, -R is more than 250 k Ω .]

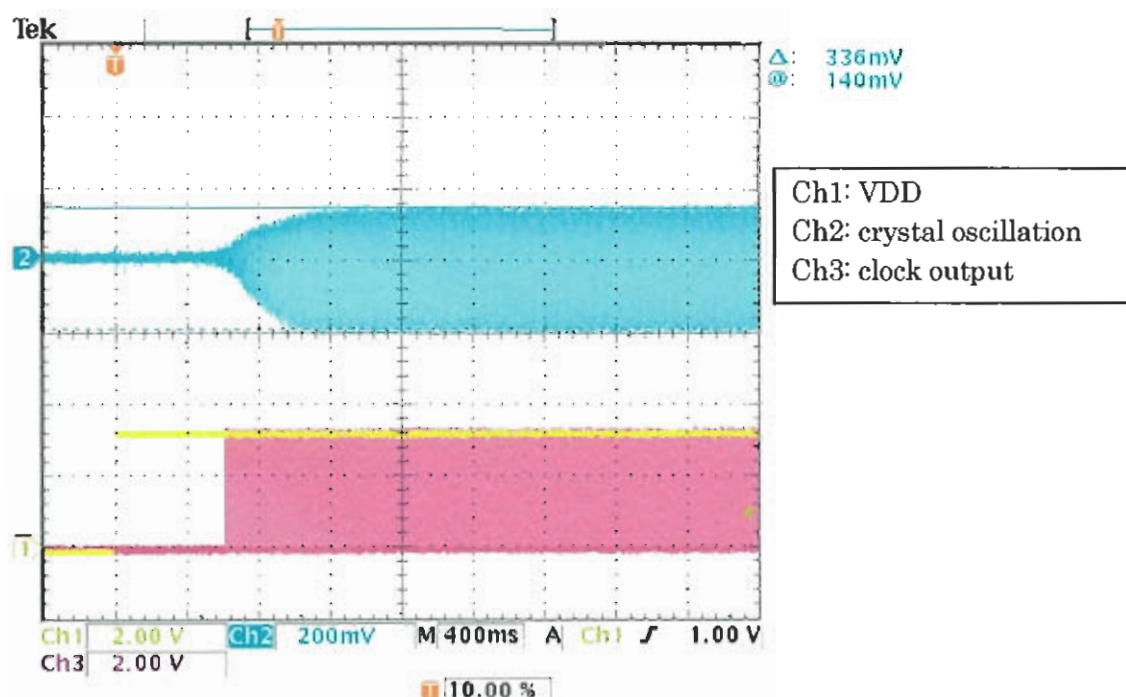
* All above "-R" do not include any CI values (30.4 k Ω) of the crystal units.

* Considering the temperature characteristics of crystal unit, we recommend to set up the crystal unit on the plus side.

(2) Oscillation start up time.

Measurement condition : VDD=+3.3 V , Ta=+25 °C , PCB No.1

Measurement result : Data were shown in the table and waveform figure.



[Notes]

This report describes the result of the examination using the set you offered us, and the tolerance of devices are not considered. We would like you to check the design about the frequency precision caused by parts deviation. In addition, content of this report is not guaranteed. Please understand it.

Thank you.

Approved by

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