

## ATMEL

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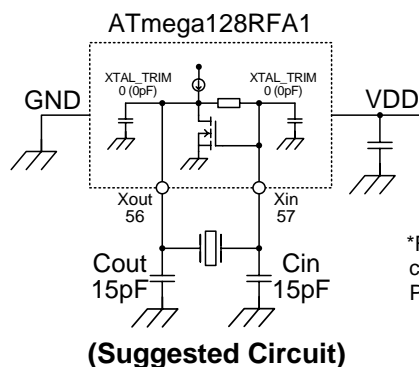
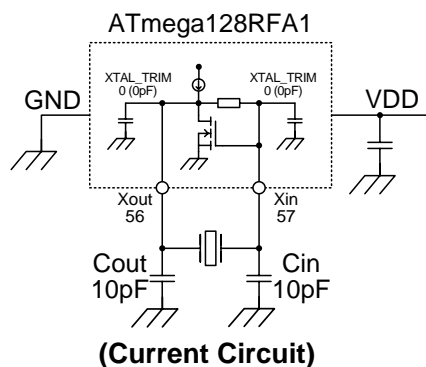
Thank you for your inquiry and we are pleased to report you our circuit analysis report as follows.

## Circuit Analysis Report

### 1. CONDITION

Test IC	ATmega128RFA1	
Crystal	Holder	NX2520SA
	Frequency	16.000MHz
	Load capacitance	CL=8pF[IEC] (Current) <b>CL=10pF[IEC] (Suggested)</b>
	NDK Spec. No.	STD-CSW-5(J) (*J:CL=10pF[IEC])
Test Circuit	IC	MEGA128RFA1-ZU 1105D 0T6227
	VDD	+3V / +1.8V
	PCB	TB1_MEGA_RF AVR2067 - Crystal Characterization for AVR RF

### 2. CIRCUIT DIAGRAM



\*For XTAL\_TRIM:0(0pF)  
connected PF0 to PB7 and  
PF1 was open (not connected)

### 3. RESULTS

- 1) This crystal unit requires negative resistance of  $-R = 900\Omega$  minimum for stable oscillation
- 2) Circuit characteristics

Circuit	Cout/Cin	XTAL_TRIM (Internal Cap)	Frequency deviation dF/F	Negative Resistance -R	Drive Level DL	Startup time Tstr
Current	10pF/10pF	0 (0pF)	+4ppm (CL=8pF[IEC])	3290 $\Omega$	Less than 10uW	2.5ms
Suggested	15pF/15pF	0 (0pF)	<b>-4ppm (CL=10pF[IEC])</b> Ref.: -22ppm (CL=8pF[IEC])	1750 $\Omega$	Less than 10uW	3ms

- 3) Although the negative resistance of the current circuit is over our target, it seems too large.
- 4) In order to improve negative resistance, we recommend changing external capacitance values from Cout/Cin=10pF/10F to **Cout/Cin=15pF/15pF**. Besides, we recommend changing crystal load capacitance value from CL=8pF to **CL=10pF** in order to improve frequency deviation.