

ATMEL

Written by: W.Suemori
Checked by: ***
Attested by: S.Sunaba
Engineering Dept.1

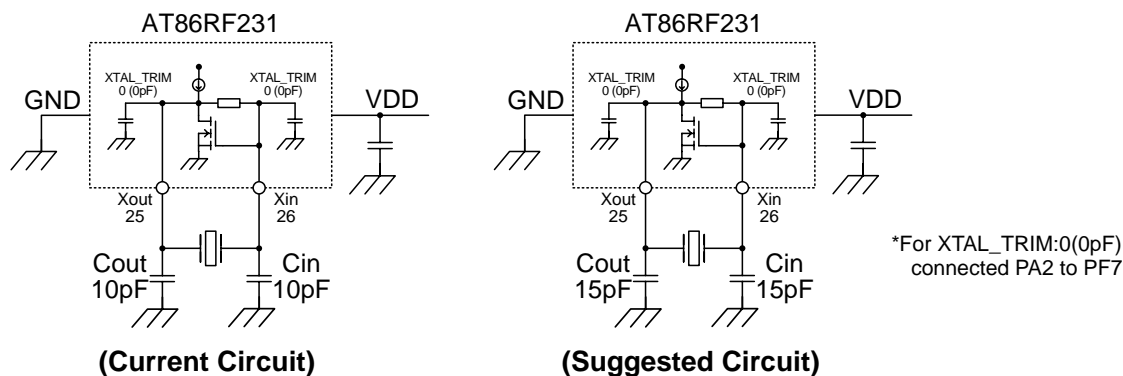
Thank you for your inquiry and we are pleased to report you our circuit analysis report as follows.

Circuit Analysis Report

1. CONDITION

Test IC	AT86RF231	
Crystal	Holder	NX3225SA
	Frequency	16.000MHz
	Load capacitance	CL=8pF[IEC] (Current) CL=10pF[IEC] (Suggested)
	NDK Spec. No.	STD-CSR-6(J) (*J:CL=10pF[IEC])
Test Circuit	IC	ATRF231 58901-03 1114 PH 0T7966-1
	VDD	+3V / +1.8V
	PCB	TB2-MEGA_231 AVR2067 - Crystal Characterization for AVR RF

2. CIRCUIT DIAGRAM



3. RESULTS

- 1) This crystal unit requires negative resistance of $-R = 800\Omega$ 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)	+6ppm (CL=8pF[IEC])	3270 Ω	Less than 10uW	1.5ms
Suggested	15pF/15pF	0 (0pF)	-1ppm (CL=10pF[IEC]) Ref.: -26ppm (CL=8pF[IEC])	2040 Ω	Less than 10uW	2ms

- 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.