

ATMEL

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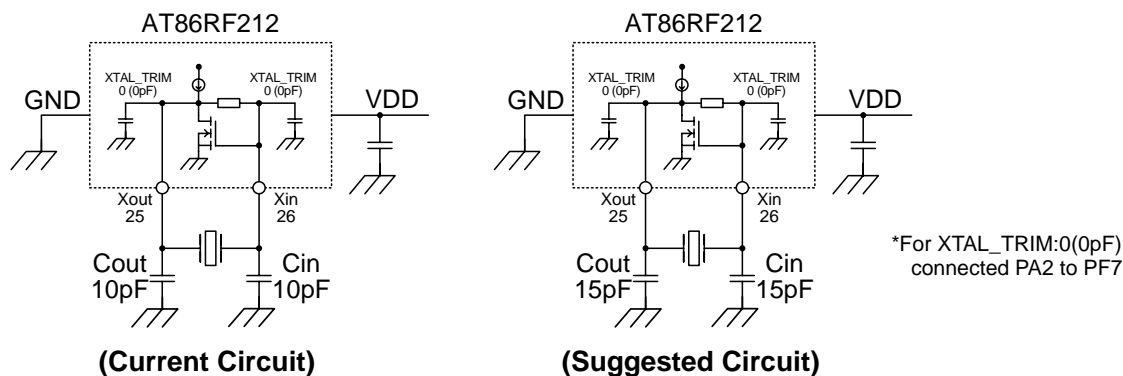
Thank you for your inquiry and we are pleased to report you our circuit analysis report as follows.

Circuit Analysis Report

1. CONDITION

| | | |
|--------------|------------------|--|
| Test IC | AT86RF212 | |
| Crystal | Holder | NX2520SA |
| | Frequency | 16.000MHz |
| | Load capacitance | CL=8pF[IEC] (Current) CL=10pF[IEC] (Suggested) |
| | NDK Spec. No. | STD-CSW-5(J) (*J:CL=10pF[IEC]) |
| Test Circuit | IC | ATRF212 58902-01 1018 PH 8S5817-9 |
| | VDD | +3V / +1.8V |
| | PCB | TB1_XMEGA_212 AVR2067 - Crystal Characterization for AVR RF |

2. CIRCUIT DIAGRAM



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) | +2ppm (CL=8pF[IEC]) | 3440 Ω | Less than 10uW | 2ms |
| Suggested | 15pF/15pF | 0 (0pF) | -4ppm (CL=10pF[IEC]) Ref.: -22ppm (CL=8pF[IEC]) | 1970 Ω | Less than 10uW | 2.5ms |

- 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.