

Evaluation of Subsystem Clock Oscillation Circuit

SSP-T7-F 12.5pF ATmega128RFA1 [P-VQFN-64-9x9-0.50]

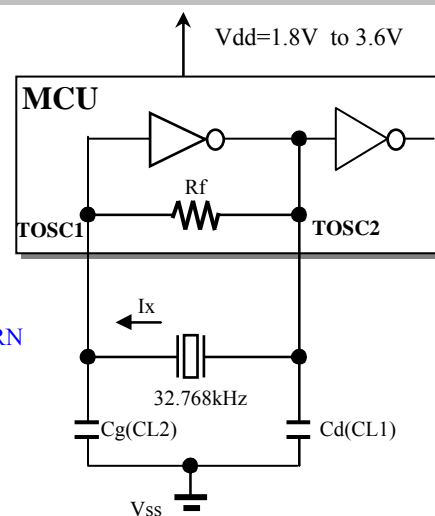
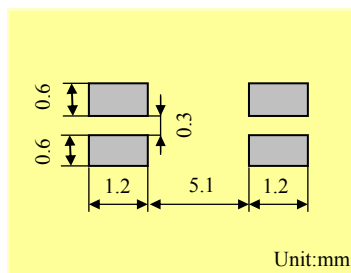
Conditions : Vdd=3.0V, 25°C

**SSP-T7-F**

Model	:SSP-T7-F
Nominal Frequency	:f_nom=32.768kHz
Frequency Tolerance	:f_tol=±20, ±10, ±5x10 ⁻⁶
Load Capacitance	:CL=12.5pF
Motional Resistance (ESR)	:R1=65kΩ max
Abusolute Max. Drive Level	:DLmax=1μW
Level of Drive	:DL=0.1μW typ

FEATURES

- 1.Ultra thin type with 1.4mm Max.
- 2.SMD type suitable for automatic & high density surface mounting.
- 3.Plastic mold package containing highly reliable tubular type quartz crystal.
- 4.Excellent shock and heat resistance.
- 5.Cellular phones,PDA,Radio communication equipment, Portable applications etc.

RECOMMENDED SOLDERING PATTERN

Remark) Ix : current through crystal
Cs : Stray capacitance

MODEL:SSP-T7-F 12.5pF with ATmega128RFA1 at 25°C

Recommended Constants	Vdd=3.0V	Remarks
Capacitance at gate : Cg (pF)	18	Optimal capacitance in response to CL
Capacitance at drain : Cd (pF)	18	CL = Cd // Cg +Cs Cs ≒ 3.0pF

Item	Vdd=3.0V	Remarks
Matching Accuracy : df / f_nom (x10 ⁻⁶)	3.23	Frequency offset volume at specified Vdd
Voltage Fluctuation : +/-df / V (x10 ⁻⁶)	0.06	Vdd ±10% (Standard operating voltage range)
Fluctuation by external. Cap : ±df / C (x10 ⁻⁶)	2.97	Cext ±5% (Standard operating Cg,Cd range)
Clock accuracy : ±df / Total (x10 ⁻⁶)	3.03	±df / Total=df / V + df / C
Drive Level : DL (μW)	0.01	DL=Ix ² Re < 1μW, Re=R1 (1 + Co / CL) ²
Negative resistance : - RL (kΩ)	662	RL = -750 ±450kΩ at Rfmin=5MΩ
Oscillation allowance : M (times)	10.2	Judgemental standard of oscillation stability
Voltage of oscillation start : Vstrat (V)	1.58	Time to reach 90% of output level from power on
Voltage of oscillation stop : Vstop (V)	0.81	
Oscillation start up time : Ts (sec.)	0.39	

Temperature Characteristics		Vdd=3.0V	Remarks
at -40°C	Variation : df / T (x10 ⁻⁶)	-126	Typ.Ti=25°C (B = -3.5×10 ⁻⁸ / °C ²)
at +85°C	Variation : df / T (x10 ⁻⁶)	-127	Typ.Ti=25°C (B = -3.5×10 ⁻⁸ / °C ²)

The above mentioned value is only for your reference. The value is for the arbitrary samples and does not guarantee the product's characteristics. Please review and check above parameters at customer's end.

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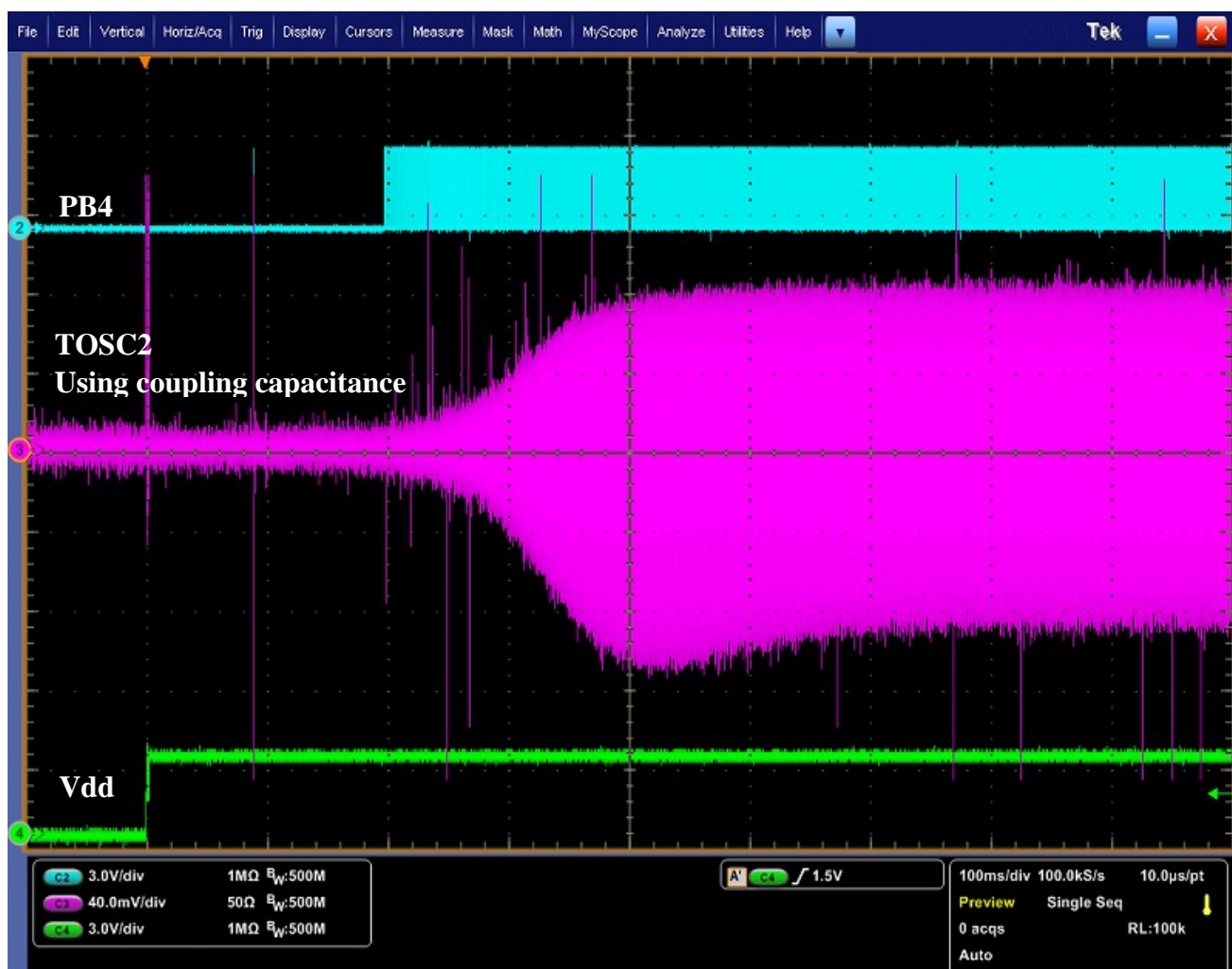
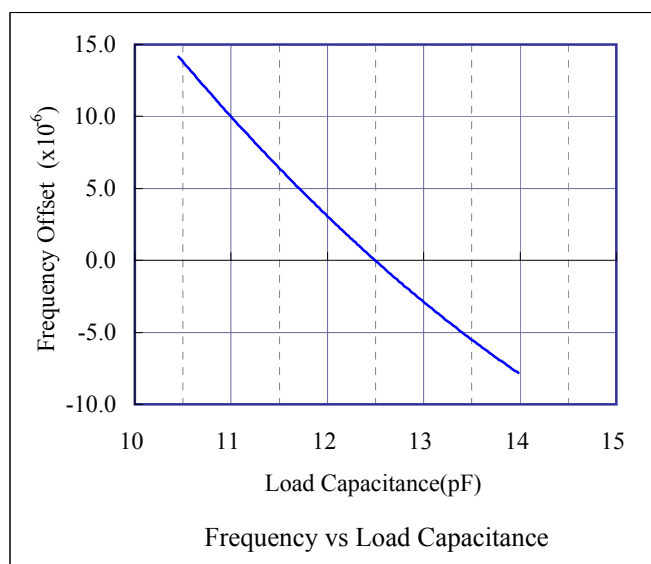
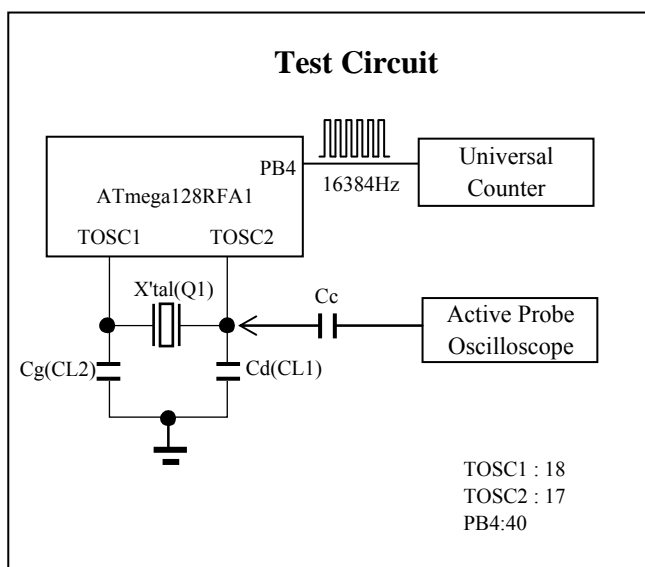
We value the "takumi" spirit.

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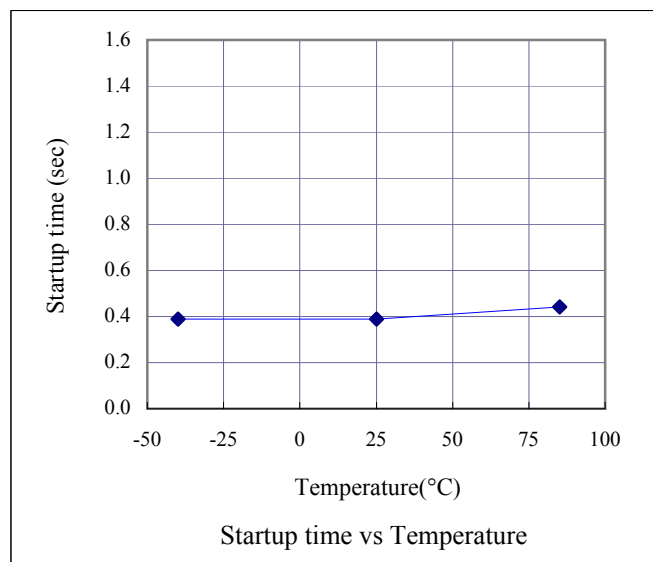
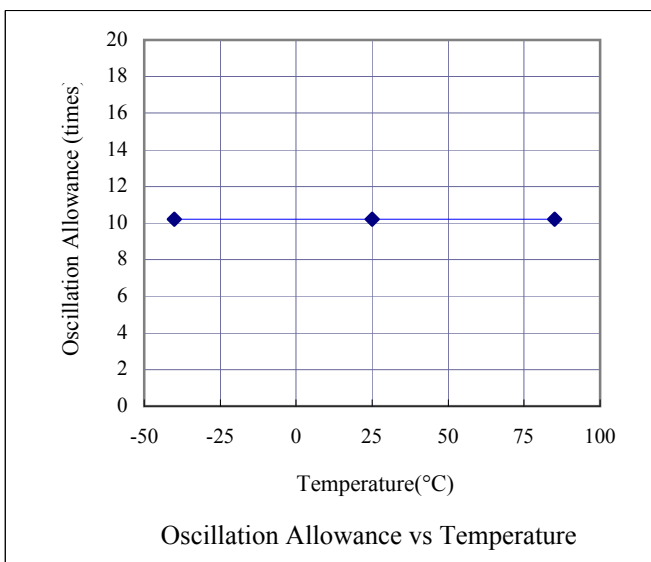
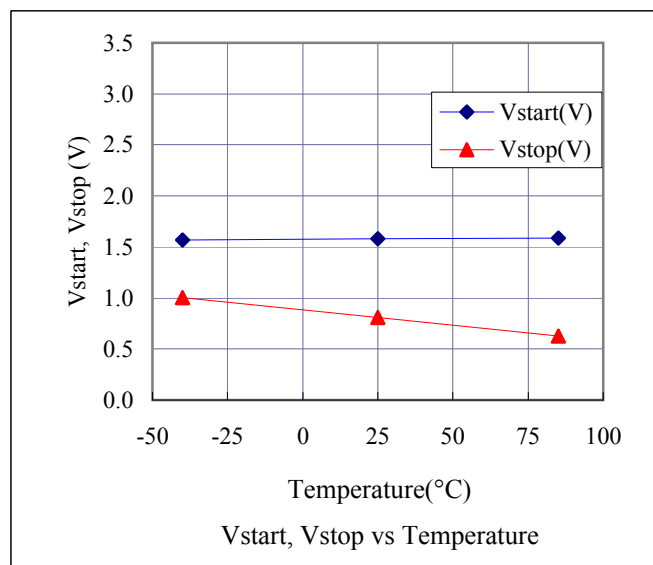
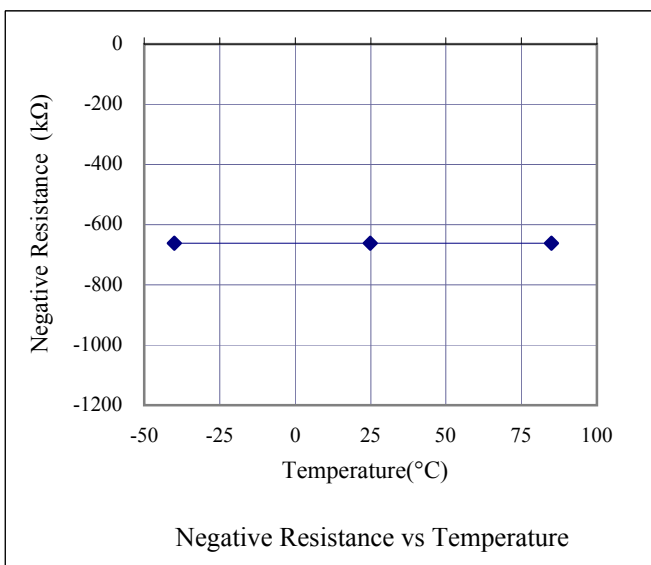
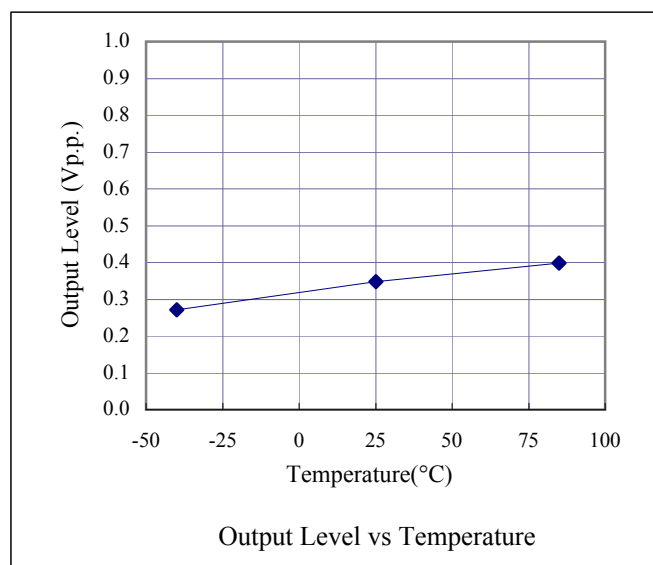
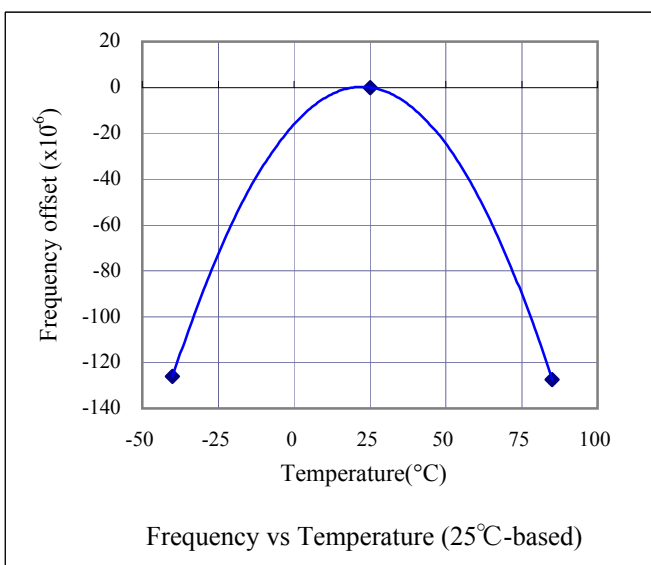
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**Startup Waveform**

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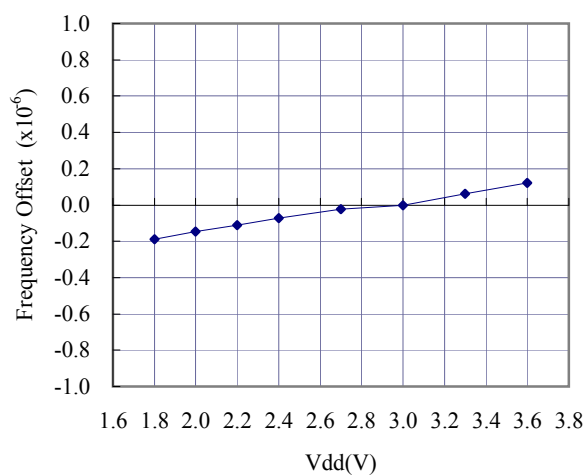
Conditions : Temperature=-40°C to 85°C, Vdd=3.0V

Temperature Characteristics at Vdd=3.0V

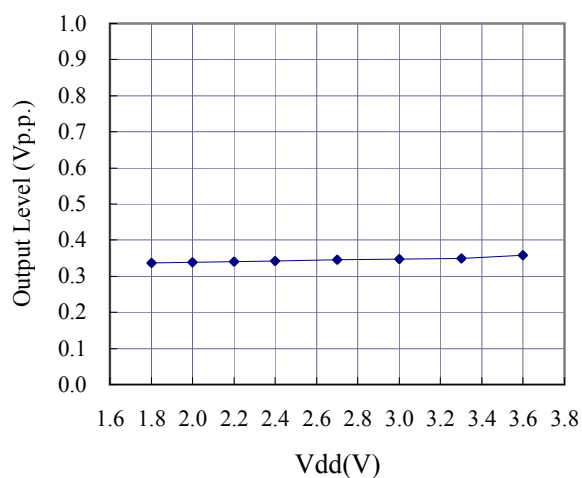
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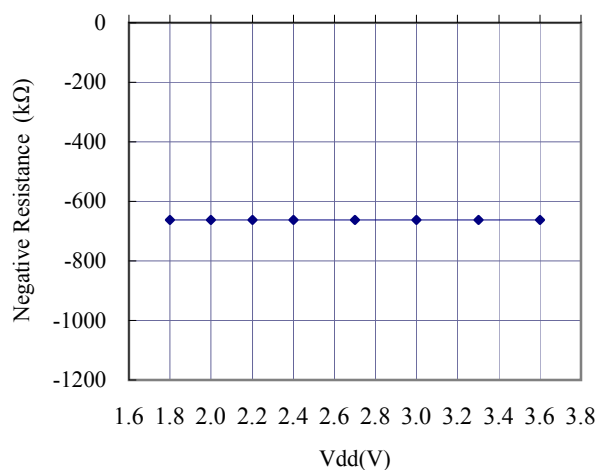
Measurement conditions : Vdd=1.8V to 3.6V at 25°C

Voltage Characteristics at 25°C

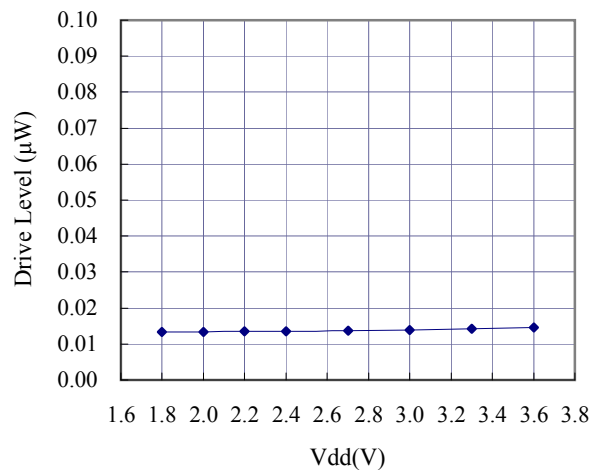
Frequency vs Vdd (3.0V-based)



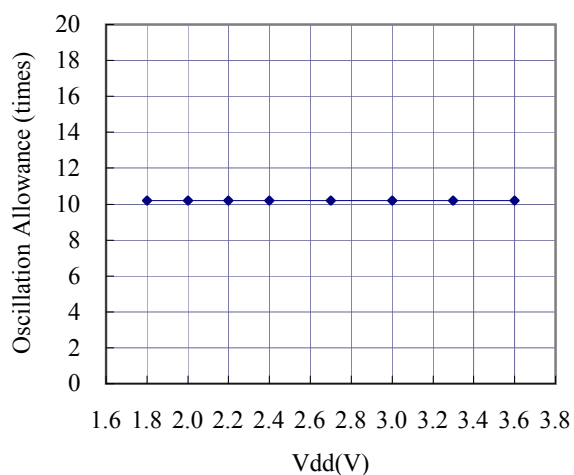
Output Level vs Vdd



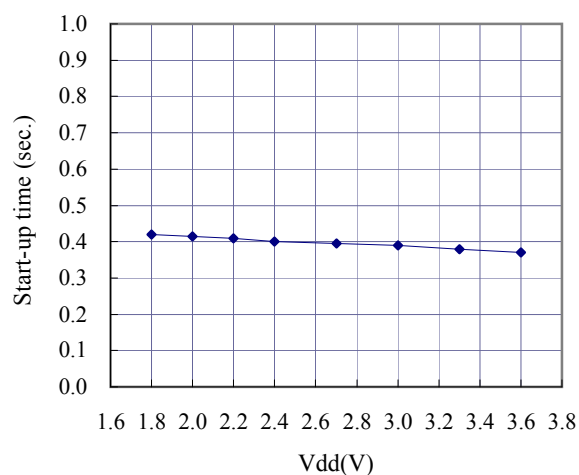
Negative Resistance vs Vdd



Drive Level vs Vdd



Oscillation Allowance vs Vdd



Startup time vs Vdd