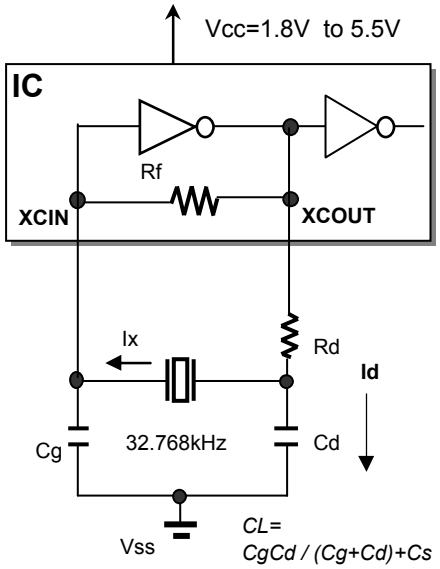
Evaluation of Subsystem Clock Oscillation Circuit

[R5F21356ANFP-52P] LQFP(10x10) 0.65mm pitch

Measurement conditions : 3.0V

Model	:VT-200
Frequency	:Fo=32.768kHz
Frequency tolerance	:dF/Fo= +/-20x10^{6}
Load capacitance	:CL=12.5pF
Equivalent series resistance	:R1=50kohm max
Max. drive level	:DL=1x10^{-6}W max
Level of drive	:DL=0.1x10^{-6}W typ

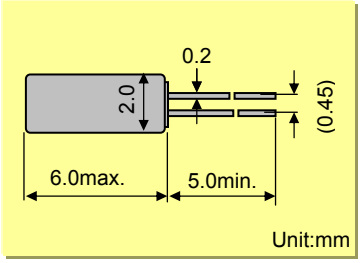


Remark) Ix : current through crystal

FEATURES

1.Compact tubular package
2.Photolithographic process
3.Excellent shock resistance and environmental characteristics.
4.Real time clocks, Timers, Portable applications

DIMENSIONS(VT-200)



(*1);standard consumption current XCIN1(XCIN:6,XCOUT:7)

(*2);standard consumption current XCIN2(XCIN:11,XCOUT:9)

MODEL:VT-200 12.5pF with R5F21356ANFP at 25°C

Key specifications	XCIN1(*1)	XCIN2(*2)	Remarks
Current control resistance : Rd (k ohm)	0	0	Control drive level & secure phase margin
Capacitance at gate : Cg (pF)	22	22	Optimal capacitance in response to CL
Capacitance at drain : Cd (pF)	22	22	(CL = Cd // Cg + stray capacitance)

Circuit characteristics (at 25°C)	XCIN1(*1)	XCIN2(*2)	Remarks
Matching Accuracy : df / f (x10^{-6})	2.9	1.7	Frequency offset volume at specified Vcc
Voltage Fluctuation : +/-df / V (x10^{-6})	0.2	0.2	Vcc +/-10% (Standard operating voltage range)
Drive Level : DL (x10^{-6}W)	0.08	0.10	DL=Ix^2 Re < 1x10^{-6}W,Re=R1(1 + Co / CL)^2
Negative resistance : | - RL | (kohm)	943	1033	5 times larger than R_{1MAX}
Oscillation allowance : M (times)	18.9	20.7	Judgemental standard of oscillation stability
consumption current : Id (nA)	852	871	Cd charge current, Id = ωCd*Vd
Voltage of oscillation start : Vstrat (V)	1.58	1.58	
Voltage of oscillation stop : Vstop (V)	1.56	1.56	
Oscillation start up time : Ts (sec)	0.51	0.45	Time to reach 90% of output level

Temperature characteristics of circuit		XCIN1(*1)	XCIN2(*2)	Remarks
at -40°C	Variation : df / T (x10^{-6})	-142	-142	Typ.Tp=25°C (K = -3.5×10^{-8} / °C^2)
at +85°C	Variation : df / T (x10^{-6})	-125	-125	Typ.Tp=25°C (K = -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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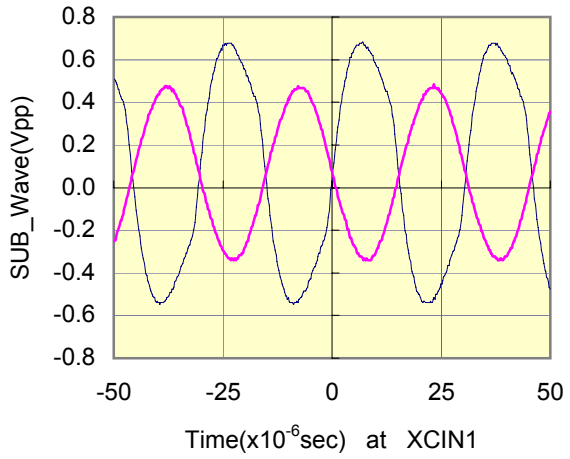
Evaluation of Subsystem Clock Oscillation Circuit

[R5F21356ANFP-52P] LQFP(10x10) 0.65mm pitch

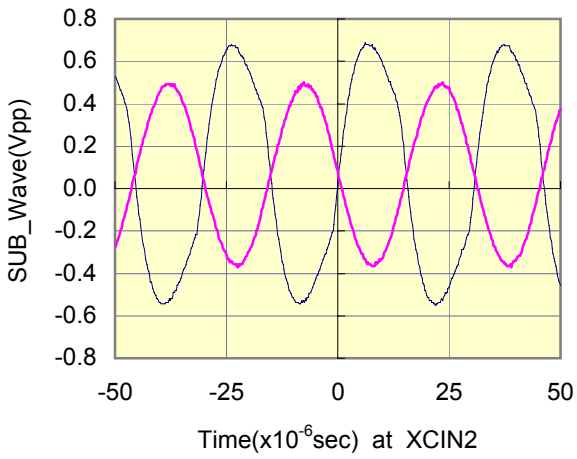
Measurement conditions : 3.0V

Test Data at 25°C

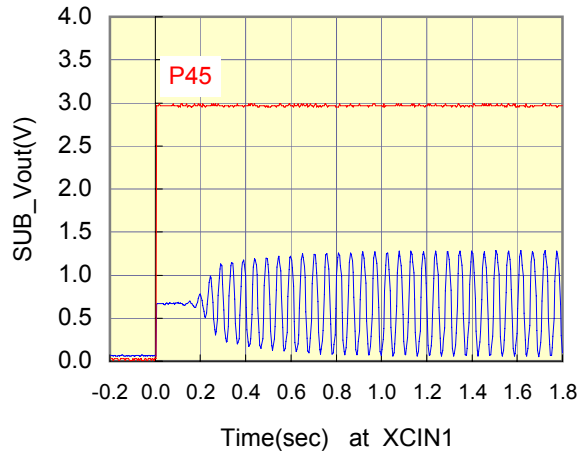
Signal wave from the oscillator
MODEL : VT-200 12.5pF with R5F21356A



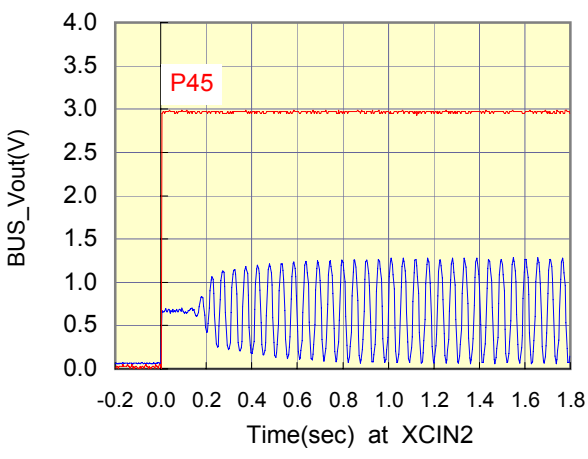
Signal wave from the oscillator
MODEL : VT-200 12.5pF with R5F21356A



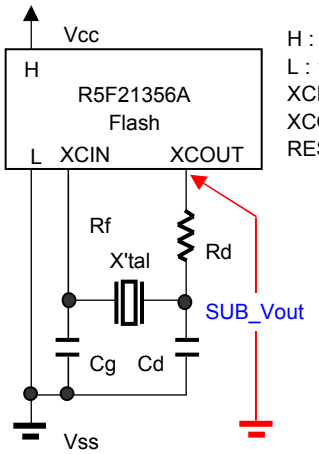
Start up time of SUB_Vout
MODEL : VT-200 12.5pF with R5F21356A



Start up time of SUB_Vout
MODEL : VT-200 12.5pF with R5F21356A



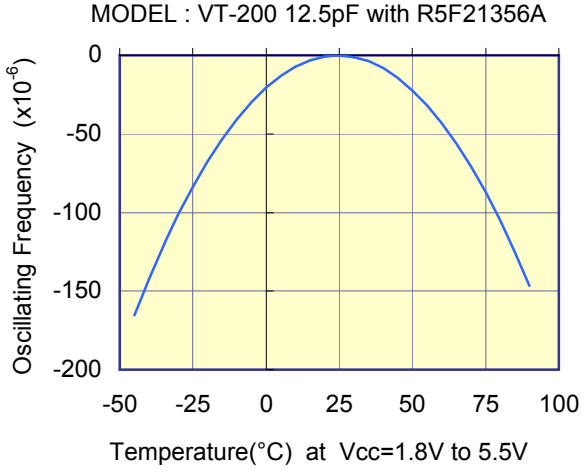
Test Circuit
MODEL : VT-200 12.5pF with R5F21356A



H : 12
L : 10
XCIN1 : 6 ,XCIN2 : 11
XCOUT1 : 7,XCOUT2: 9
RESET: 8

Recommended Values
X'tal :
VT-200 +/-20/12.5pF
Vcc=1.8V to 5.5V
Rd=0k ohm
Cg=22pF typ
Cd=22pF typ
Ta=-20 to 85°C

Temperature characteristics of oscillating frequency
MODEL : VT-200 12.5pF with R5F21356A



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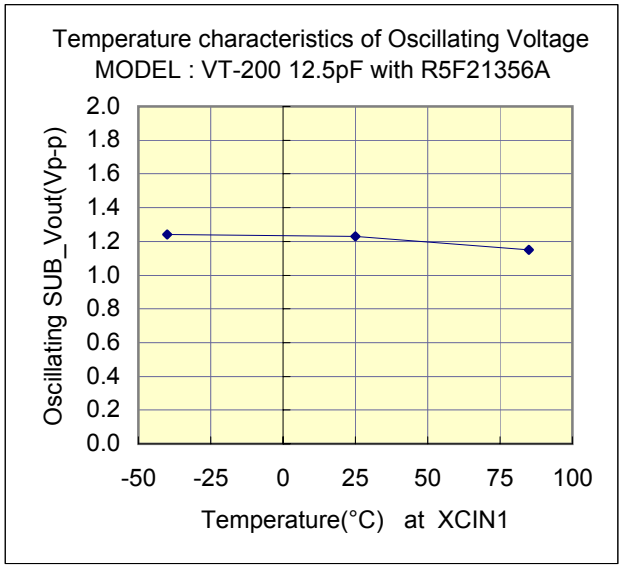
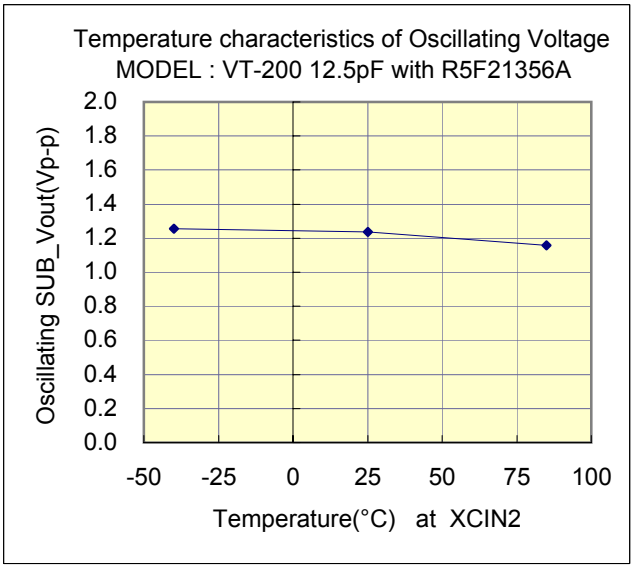
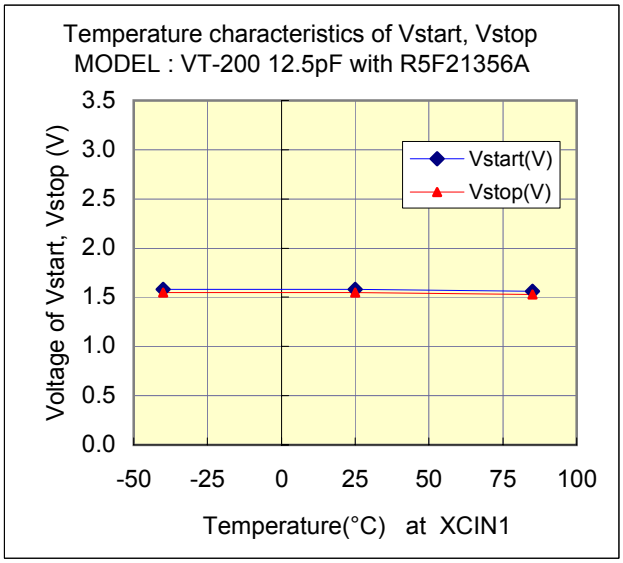
[R5F21356ANFP-52P] LQFP(10x10) 0.65mm pitch

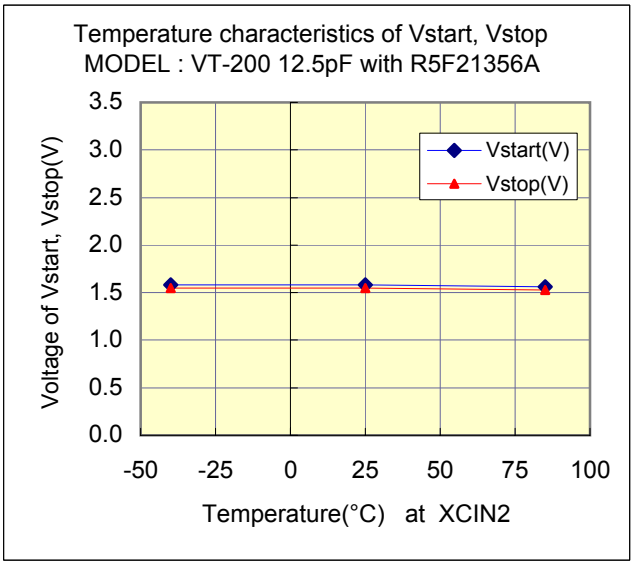
Measurement conditions : 3.0V

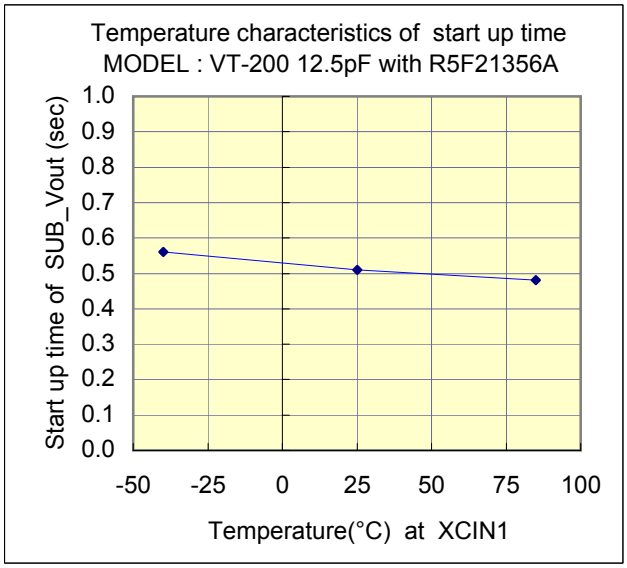
Test Data : Temperature characteristics

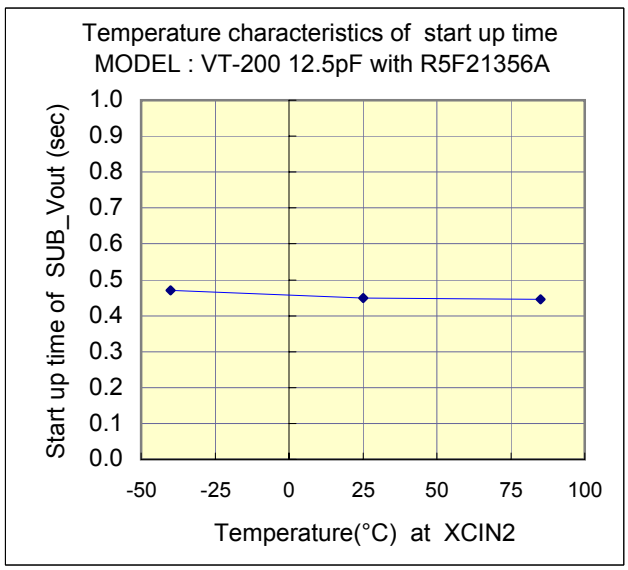












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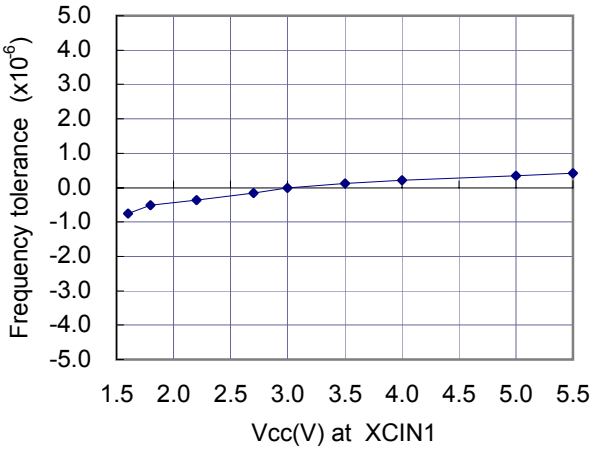
Evaluation of Subsystem Clock Oscillation Circuit

[R5F21356ANFP-52P] LQFP(10x10) 0.65mm pitch

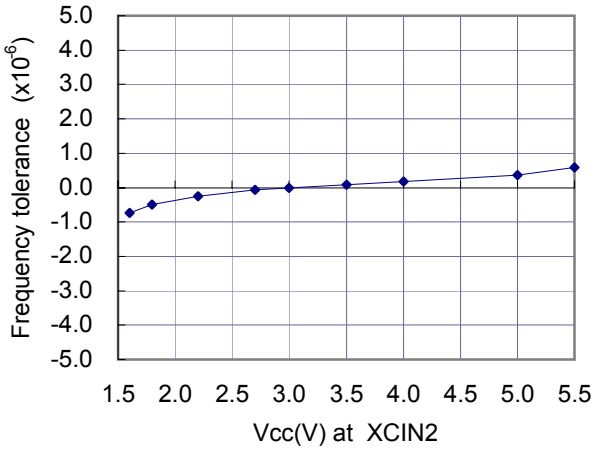
Measurement conditions : Vcc=(1.6V) to 5.5V at 25°C

Referential Data(1) : Voltage characteristics

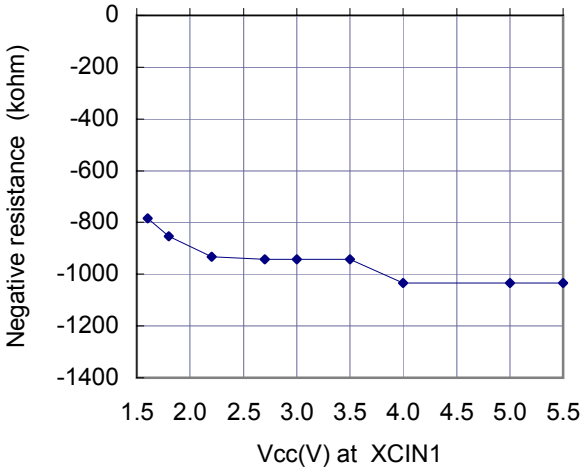
Frequency / voltage coefficient
MODEL : VT-200 12.5pF with R5F21356AFP



Frequency / voltage coefficient
MODEL : VT-200 12.5pF with R5F21356AFP



Negative resistance / voltage coefficient
MODEL : VT-200 12.5pF with R5F21356AFP



Negative resistance / voltage coefficient
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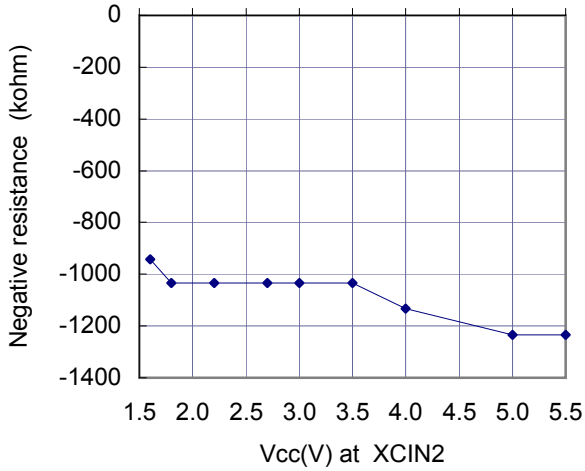
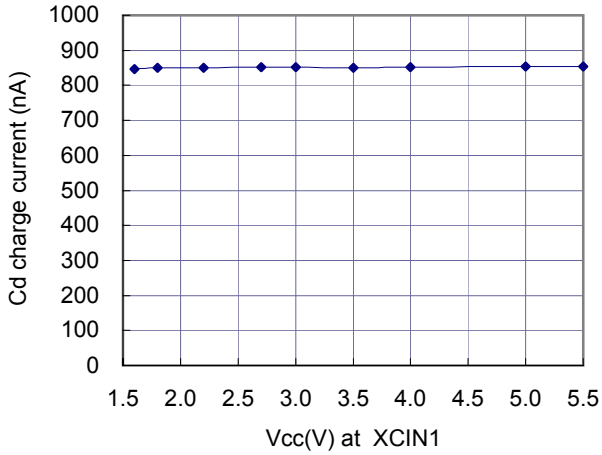
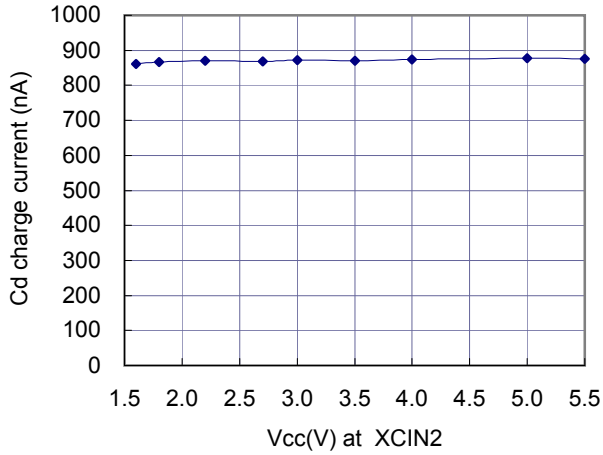


Cd charge current / voltage coefficient
MODEL : VT-200 12.5pF with R5F21356AFP



Cd charge current / voltage coefficient
MODEL : VT-200 12.5pF with R5F21356AFP



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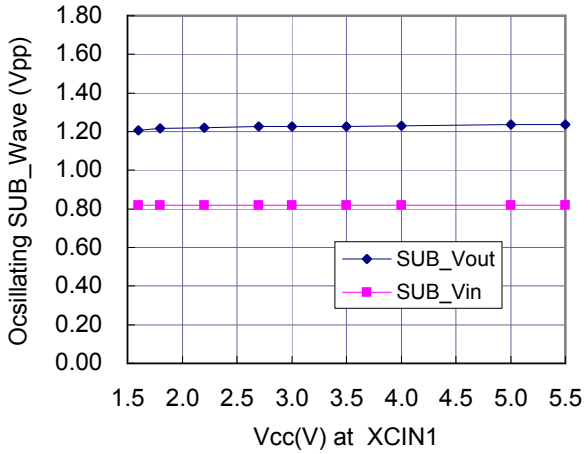
SUB_Wave / voltage coefficient
MODEL : VT-200 12.5pF with R5F21356AFP



SUB_Wave / voltage coefficient
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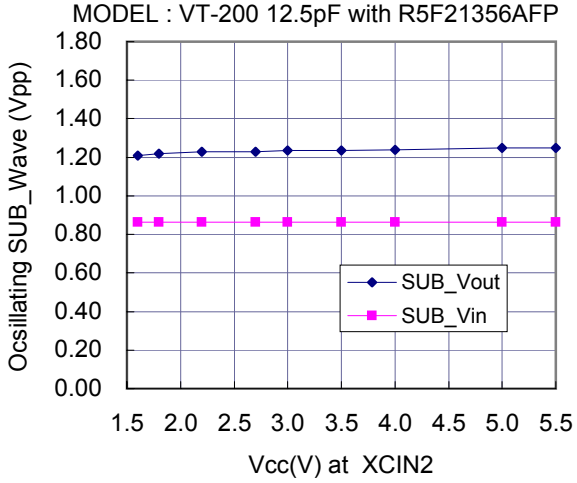
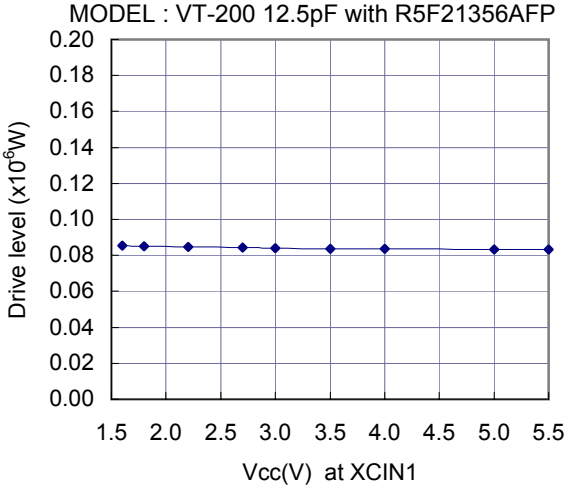


Drive level / voltage coefficient
MODEL : VT-200 12.5pF with R5F21356AFP



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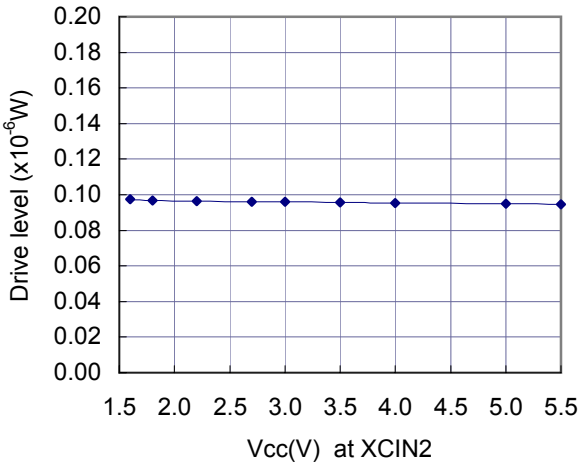
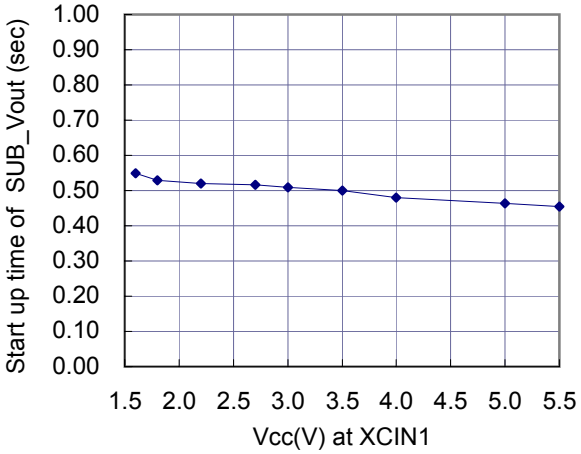


Start up time / voltage coefficient
MODEL : VT-200 12.5F with R5F21356AFP



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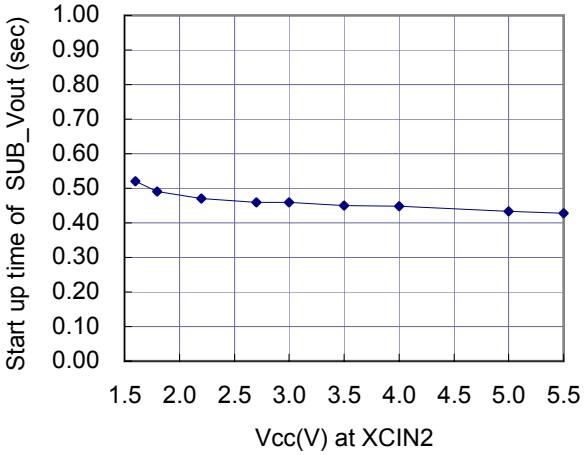

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