Technical Data of Crystal Unit

MURATA Part No.: XRCGB26M000F1SBLR0

Applied to IN100

Introduction

InPlay IN100 NanoBeacon is transforming the future of the Industrial IoT and mobility industry with its ultra-low power, long-range Bluetooth solutions. Murata and InPlay have worked closely together to construct a reference design to allow customers to use one of Murata's crystals either the XRCGB26M000F1SBLR0 within the IN100. InPlay and Murata have designed a reference design with ideal components to transform any IIOT or TPMS application.

Purchasing links for Murata Parts

DigiKey link
Mouser link

Evaluation Data of Oscillation Circuit for Crystal Unit

■ Murata's recommendation 推荐电路常数

Item				Condition
IC name		IC名		IN100
Parts Number of Crystal Unit		村田型号		XRCGB26M000F1SBLR0
IC's setting value		Internal Capacitance Code		7
		Stable Time		36
		Strenght Code		16
Circuit Parameter	External load capacitance	负载电容	CL1	Open
		负载电容	CL2	Open
	Feedback resistance	反馈电阻	Rf	No mount
	Damping resistance	阻尼电阻	Rd	Short
InPlay IN100 NanoBeacon is transforming th		电源电压范围		3.3V
Temp. Range		温度范围		-40 to 105deg.C

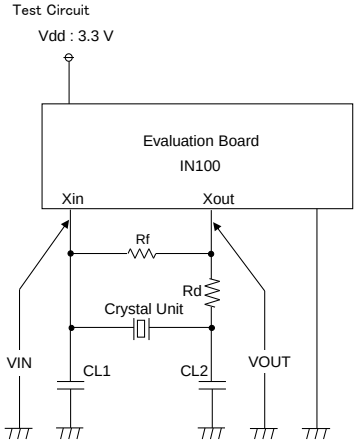
Purchasing links for Murata Parts

Murata standard Measurement equipment

Oscilloscope	DSO6052(K)
Current probe	CT-6(T)
Passive probe	P5100A(T) (40Mohm/2.5pF)
DC supply	E3631A(K)
Spectrum analyzer	N9010A(K)

(K) Keysight
(T) Tektronix

Test Circuit



■ Characteristics of oscillation circuit on above condition 推荐条件下的起振回路特性

Circuit Characteristics 特性	Value 测定值			Remarks 备注
Center Frequency and Difference 起振回路上起振频率与偏差量 (*1) (Typical sample at Vdd=3.3V,+25deg.C)	25.999905		[MHz]	Oscillating frequency and its shift against nominal frequency 在起振回路上的频率以及相对于公称频率之间的偏差量
	-4		[ppm]	
Load Capacitance on your PCB 负载容量值 (Typical sample at Vdd=3.3V,+25deg.C)	7.3		[pF]	This value shows load capacitance the evaluated circuit has 在起振回路上等价于连接在谐振器两端的容量
Negative Resistance and Oscillation margin 负性电阻/起振余裕度 (at Vdd=3.3V,+25deg.C)	|-R|	317	[Ω]	The details is explained in page 2 详细内容参见下页说明
	Ratio	5.3	[Times]	
Drive Level 激励功率 (Typical sample at Vdd=3.3V,+25deg.C)	11		[uW]	Drive power of crystal under circuit condition 起振回路在工作状态下谐振器消耗的功率
Oscillating Voltage 起振电压 (Typical sample at Vdd=3.3V,+25deg.C)	VINp-p	0.5	[V]	Swing level at input side 输入端起振振幅 (VIN_H - VIN_L)
	VOUTp-p	0.5	[V]	Swing level at output side 输出端起振振幅 (VOUT_H - VOUT_L)
Oscillation Start up Time 启动时间 (*2) (Typical sample at Vdd=3.3V,+25deg.C)	0.70		[ms]	Time to reach 90% of the oscillation level under steady state 达到稳定状态振幅的90%所需要时间

*1 Frequency difference means the oscillating frequency difference between your PCB and Murata's frequency sorting circuit.
频率偏差指在贵公司基板上的测定频率与本公司标准回路上测定频率间的偏差。
*2 The measurement results is affected by the rise-up characteristics of supplied voltage on your PCB.
测定结果受实装基板上电源启动方式的影响。

Notes
The characteristics of the crystal oscillation circuit is affected by the circuit constants and actual mounting conditions and so on.
Therefore, it is possible to get the different results from above one due to the production variation of the crystal oscillator circuitry.
In your company, please use this results after confirmation of the matching between our crystal unit and oscillator circuit.
And furthermore, since the above-mentioned evaluation results evaluate only an oscillating circuit block, please confirm the checking of operations of a set in your company.

注意事项
起振回路的特性收到回路常数和实装状态等的影响。上述结果由于回路基板的偏差可能会有所不同。
请贵公司在确认水晶谐振器与起振回路的匹配结果后进行使用。同时上述评价结果仅针对于起振回路部分的评价，整块基板的动作请贵公司确认。

Evaluation Data of Oscillation Circuit for Crystal Unit

muRata

■ Test Data : Characteristics of recommended conditions

Center Frequency **25.999905 MHz**

Purchasing links Center frequency difference -4 ppm from 26MHz

This frequency difference causes imbalance of initial frequency tolerance on your PCB, because of load capacitance difference.

Load capacitance of the circuit **7.3 pF**

This value shows load capacitance the evaluated circuit has.

Our crystal proposed in this report is sorted with 7pF as load capacitance

Negative resistance

Ratio of negative resistance |-R| to R1spec.

Ratio 5.3 times

Ratio = |-R| / R1spec.

|-R| 317 ohm
Negative resistance |-R| = Rs_max + Re

Rs_max: 270 ohm
Maximum series resistance for Crystal Unit to keep oscillation

Re: 46.6 ohm
Effective resistance of Crystal Unit at actual oscillation frequency

R1spec. 60 ohm
Equivalent series resistance

Drive level

Drive power of crystal under circuit condition shown in page 1

Drive level 11 uW

Drive level = I^2 x R1

I: 0.53 mA (RMS)
Current through Crystal Unit measured by current probe

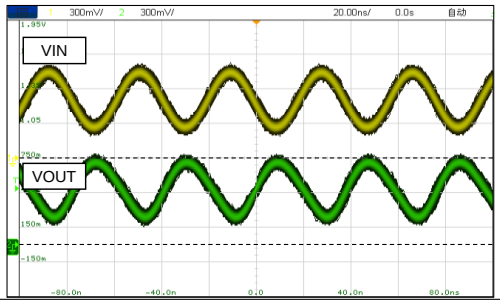
R1: 39.1 ohm

Evaluation Data of Oscillation Circuit for Crystal Unit

■ Test Data : Characteristics of recommended conditions

Oscillation waveform

MODEL : XRCGB26M000F1SBLR0 with IN100



VIN [V]			VOUT [V]		
High	Low	p-p	High	Low	p-p
0.8	0.3	0.5	0.8	0.2	0.5

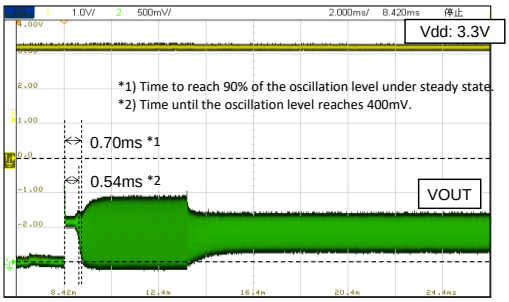
Typical sample at Vdd=3.3V, +25deg.C

[VIN] 'ertical: 0.25V/div., Horizontal: 20ns/div.
Broken line: GND

[VOUT] 'ertical: 0.25V/div., Horizontal: 20ns/div.
Broken line: GND

Oscillation start up waveform

MODEL : XRCGB26M000F1SBLR0 with IN100



Start up time
The time takes to become 90% of steady amplitude of Vout(Xout) after oscillation circuit starts working.

Typical sample at Vdd=3.3V, +25deg.C

[Vdd] Vertical: 1V/div., Horizontal: 2ms/div.
[VOUT] Vertical: 0.5V/div., Horizontal: 2ms/div.
Broken line: GND