NEL FREQUENCY CONTROLS, INC.

K2691 Rev -

RoHS Compliant
Directive 2011/65/EU

SPECIFICATION

Item: CRYSTAL OSCILLATOR

Type: N-ENA5135A

Nominal Frequency: 40 MHz

Customer's Spec. No.: ---

Receipt

Revision Record

Rev.	Date	Items	Contents	Drawn	Checked	Approved
---	06/10/16	Issue	---			

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Email: nelsales@nelfc.com www.nelfc.com

1. Customer's Spec. No.: ---
2. NEL Spec. No.: K2691
3. Type : N-ENA5135A
4. Rating

Parameters		Symbol	Spec.				Notes
			Min.	Typ.	Max.	Unit	
4.1	Nominal Frequency	f_{nom}		40		MHz	2 digits
4.2	Supply Voltage	V_{CC}	+3.135	+3.3	+3.465	V	-
4.3	Control Voltage	V_{cont}	+0.2	+1.5	+2.8	V	
4.4	Load	C_L	13.5	15	16.5	pF	-
4.5	Operating Temperature Range	T_{opr}	-40	-	+85	°C	-
4.6	Storage Temperature Range	T_{str}	-40	-	+85	°C	-

5. Electrical Specifications

Unless otherwise specified, meaning condition.

T = +25 °C, V_{CC} = +3.3 V, V_{cont} = +1.5 V, C_L = 15 pF

Parameters			Symbol	Spec.				Conditions
				Min.	Typ.	Max.	Unit	
5.1	Power Consumption							
	5.1.1	During Warm-up	P_{CC}	-	1.3	2.0	W	-
	5.1.2	Steady State	P_{CC}	-	0.6	1.0	W	T = +25 °C
5.2	Frequency Stability							
	5.2.1	Frequency Tolerance	$\Delta f/f_{nom}$	-200	-	+200	ppb	At the shipment. (*1)
	5.2.2	Frequency / Temperature Characteristics	$\Delta f/f$	-10	-	+10	ppb	T = -40 ~ +85 °C (*2)
	5.2.3	Frequency / Voltage Coefficient	$\Delta f/f$	-10	-	+10	ppb	V_{CC} = +3.3 V ±5 %(*2)
	5.2.4	Long-term Frequency Stability	$\Delta f/f$	-5	-	+5	ppb/day	Based on Freq. after 30days operation. (*3)
				-300	-	+300	ppb/year	
	5.2.5	Overall Frequency tolerance	$\Delta f/f_{nom}$	-4.6	-	+4.6	ppm	Incl. Frequency Tolerance, vs. Temp: -40 ~ +85 °C vs. Voltage: +3.3 ±5 % vs. Long-term stability: /20years (*1)
	5.2.6	Short-term Frequency stability	$\Delta f/f$	-	0.05	0.1	ppb	Allan deviation τ = 1 s
	5.2.7	Stabilization Time	-	-	-	3	min	At +25 °C Within ±100 ppb, based on freq. after 1h.
	5.2.8	Start-up Time	-	-	-	50	ms	-

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Parameters			Symbol	Spec.				Conditions
				Min.	Typ.	Max.	Unit	
5.3	Frequency Control							
	5.3.1	Change Polarity	-		Positive		-	-
	5.3.2	Control Range	Δf/f	-5.0	-	-	ppm	V_{cont} = +0.2 V(*2)
				-	-	+5.0	ppm	V_{cont} = +2.8 V(*2)
	5.3.3	Slope	-	+3.7	-	-	ppm/V	-
	5.3.4	Input Impedance	-	100	-	-	kOhm	-
5.4	Output							
	5.4.1	Wave form	-		Square wave		-	-
	5.4.2	High level output voltage	V_{OH}	+3.0	-	-	V	C_L: 15 pF
		Low level output voltage	V_{OL}	-	-	+0.3	V	C_L: 15 pF
	5.4.3	Symmetry	-	45	-	55	%	at 50% V_{OUT}
	5.4.4	Rise / Fall time	tr, tf	-	-	6.5	ns	at 10 to 90 % V_{OUT}
5.4	Phase Noise		*L*(f)	-	-65	-	dBc/Hz	1 Hz offset
				-	-90	-	dBc/Hz	10 Hz offset
				-	-118	-	dBc/Hz	100 Hz offset
				-	-140	-	dBc/Hz	1 kHz offset
				-	-152	-	dBc/Hz	10 kHz offset
				-	-156	-	dBc/Hz	100 kHz offset
5.5	Phase Jitter		-	-	-	1.0	ps	10 k to 5MHz, RMS
	Period Jitter		-		T.B.D.		ps	-

(*1) $\Delta f/f_{nom}$: Frequency shift from the nominal frequency (f_{nom})
(*2) Δf/f : Frequency shift from the reference frequency
at T = +25°C, V_{CC} = +3.3 V, V_{cont} = +1.5 V, C_L = 15 pF
(*3) Δf/f : Frequency shift from the reference frequency.
Based on frequency after 30 days operation, at T = +25°C, V_{CC} = +3.3 V, V_{cont} = +1.5 V, C_L = 15 pF
(*4) Typ. Value is for reference only.

6. Marking
6.1 NEL Spec. No.
6.2 Nominal Frequency
6.3 NEL symbol mark
6.4 Date code (Year and week)
6.5 Dot mark
It might be printed NEL management code to the oscillator bottom by the laser trimming.

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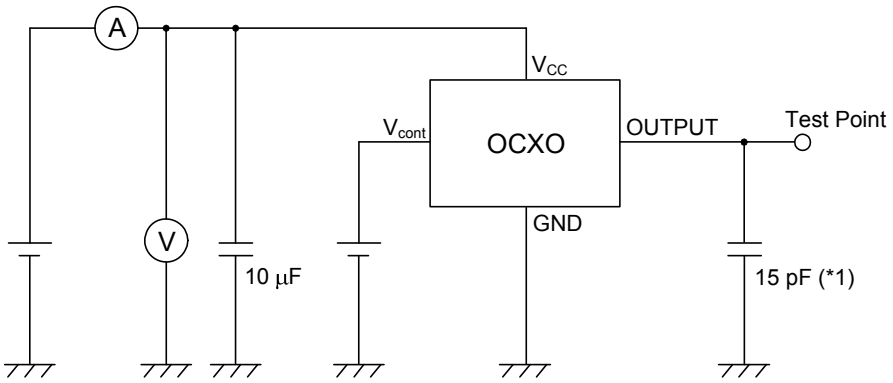
7. Drawing

7.1 External Dimension : See drawing

8. Recommended Measurement Circuit



(*1) Including capacitance of measurement jig and probe

9. Handling

9.1 Please do not add strong shock to the oscillator. In the time of transportation or installing the equipment, please do not drop or add shock to it. If strong shock is added, it may not operate normally. In that case, please use it after checking the characteristics.

9.2 Because of Oven Controlled Crystal Oscillator (OCXO), please do not place this product near heat sources, signal and noise sources that may affect the oscillator, and transmitter-receivers.

9.3 In OCXO, It is not recommended that some metal like a heat sink is placed on it directly, which is controlled by a specific high temperature, so that the characteristics cause unstable temperature control. Moreover, the ambient wind could affect characteristics by the same reason. The characteristic degradation by changing may occur according to ambient environment in the low temperature especially. Therefore, in the case of use of these products, please kindly do sufficient evaluation in advance on your side.

9.4 After soldering process, OCXO's characteristics may not be stable immediately because internal parts are influenced by the heat when soldering. For that reason, please avoid immediately using of these products after soldering and evaluate sufficiently in advance on your side.

9.5 If GND impedance of wiring pattern is high, OCXO's characteristics may not be stable because current consumption of OCXO greatly changes by the ambient temperature. In the case of use of these products, please kindly design GND impedance of wiring pattern to be sufficiently lower.

10. Notice

10.1 Order items are manufactured according to specification. As to conditions, which are not indicated in this specification and unpredictable such as applied condition and oscillation margin, please check them beforehand.

10.2 Unless we receive request for modification within 3 weeks from the issue date of this NEL specification sheet, we will supply products according to this specification. Also, if you'd like to modify specification of order, which has been placed with delivery request within 3 weeks from the issue data of this specification sheet, we would like to discuss with you separately.

10.3 In no event shall the company be liable for any product failure resulting from an inappropriate handling or operation of the product beyond the scope of its guarantee.

10.4 Where any change to the process condition is made due to the change(s) in the production line, inform personnel of the specifications.

10.5 Should this specification data give rise to any disputes relating to any intellectual property rights or any other rights of a third person, the company shall not indemnify anyone for any damage.
Their disclosure must not be construed as the grant of a license to use any of the intellectual property rights owned by the company.

10.6 If you intend to use products listed on this specification for applications that may result in loss of life or assets (controls relating to safety, medical equipment, aeronautical equipment, space equipment, etc.), please do not fail to advise us of your intention beforehand.

10.7 In the company's production process whatever amount of ozone depleting substances (ODS) as specified in the Montreal protocol is not used.

10.8 Information contained in this specification must not be quoted, reproduced or used for other purposes including processing either in part or in full without obtaining prior approval from the company.

10.9 The appearance color and so on have a different case by purchasing it more than 2 suppliers of the component, but characteristic and reliability are guaranteed.

10.10 In case of the product long time keep at high temperature and humidity, may affect product characteristic (solder ability) and a packing condition.
Please keep at storage condition of temperature +5°C ~+35°C, humidity ~85%RH.

11. Prohibited items

11.1 Be sure to use the product under the following conditions. Otherwise, the characteristics deterioration or destruction of the product may result.
[Reflow soldering heat resistance]
No application.
[Hand soldering heat resistance]
Press a soldering iron of 350 °C on the lead electrode for five seconds (twice).

11.2 OCXO is designed to keep the performance by continuous operation. Therefore, please avoid use of OCXO which repeats ON-OFF of a power supply frequently

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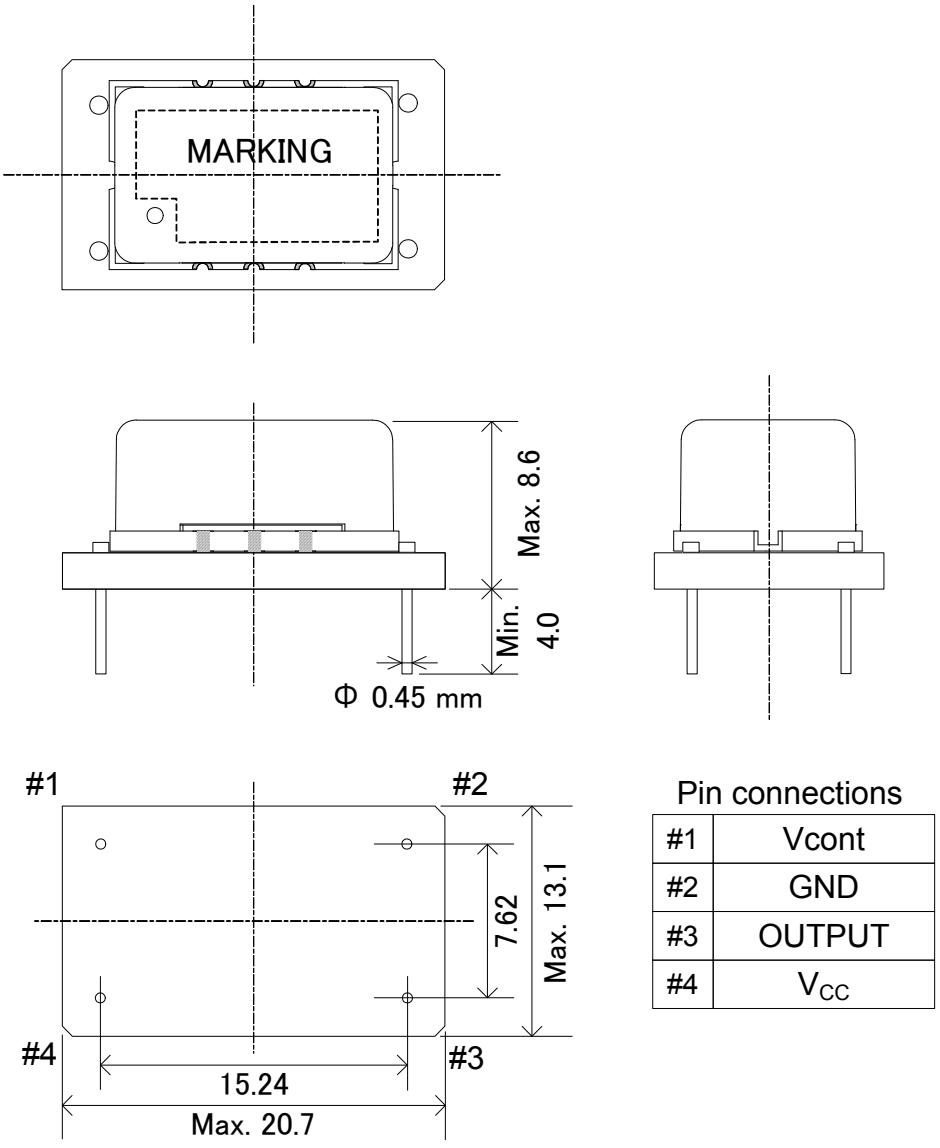

Pin connections

#1	Vcont
#2	GND
#3	OUTPUT
#4	V_{CC}

Dimensions in mm
Tolerance +/-0.2

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