Travelling Merchant: A026

DATASHEET

Standard: **O11F-2604-10.00MHz**

P/N:

Plot			The Label
Drew	Audited	Approved	
Date: 2023.06.14			Stamp, please! Thanks!

Guangdong Dapu Telecom Technology Co.,Ltd

Building 5, No.24, Industrial East Road, Songshanhu Park, Dongguan, Guangdong, P.R. China

TEL：0086-0769-88010888   FAX：0086-0769-81800098

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http://www.dptel.com

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Songshanhu Park, Dongguan,
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Table of amendment

Version	Revision contents	Prepared by	Revised date
1.0	The first issued	Amway	2023.02.16
1.1	The "Pin Function"changed	Amway	2023.06.14

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1、Electrical Parameters

MODEL：O11F-2604-10.00MHz					
Item	Description	Parameters			Unit	Test Condition
		Min.	Typ.	Max.		
Output	Nominal Frequency		10.00		MHz	f_n
	Output Waveform		LVTTL			
	Output Low Voltage	0		0.4	V	V_{cc}=3.3V, CL =15pF
	Output High Voltage	2.4		3.6	V	
	Duty Cycle	45	50	55	%	
	Rise / Fall Time		2	6	ns	CL =15pF,10%~90%
	Load	14.25		15.75	pF	
Frequency Stabilities	Reflow	-0.1		+0.1	$\times 10^{-6}$	After 2 hours of reflow relaxation, refer to the frequency change before reflow
	Initial Frequency Tolerance	-2		+2	$\times 10^{-6}$	Measurement referenced to frequency Observed with T_A=25℃ ,V_{cc}=3.3V, and after 5minutes of operation.
	Aging Tolerance Per Day	-3		+3	$\times 10^{-9}$	After 7 days in operation.
	Over All Frequency Stability	-3		+3	$\times 10^{-6}$	Referenced to f_n including 20 years aging.
	Short-Term Stability: Allan Variance		5	10	$\times 10^{-12}$	Temperature stability, no EMI\EMC or other interference，test after power for 1hour ref. to 25℃; 1s.
	Frequency Tolerance vs. Operating Temperature Range	-3		+3	$\times 10^{-9}$	T_A varied from -40℃ to 95℃, measurement referenced to frequency observed with f_{ref}=(f_{max}+f_{min})/2, V_{cc}=3.3V, O_{load}=15pF, temperature variable speed less than 2℃per minute.
	Hysteresis			0.3	$\times 10^{-9}$	
Power Supply	Supply Voltage range	3.13	3.3	3.47	Vdc	
	AC Ripple and Noise			50	mVp-p	10Hz to 1MHz
	Supply Voltage (Vcc) to GND	-0.3		5.5	V	Pin 3 and 6
	Digital Input Voltage (SDA, SCL) to GND	-0.3		5.5	V	Pin 2 and 7
	Current Consumption			400	mA	Steady state at +25°C in still air
				800	mA	
	Warm-Up Time Δf/f			＜10	sec	To be within ± 200ppm of the nominal frequency. At operating temperature range
				＜5	min	To be within ±40 ppb of the frequency after 1h of operation

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Jitter	Jitter			500	fs	Bandwidth 12KHz to 20MHz RMS
Phase Noise	Phase Noise			＜-80	dBc/Hz	1Hz
				＜-115		10Hz
				＜-138		100Hz
				＜-150		1KHz
				＜-155		10KHz
				＜-155		100KHz
				＜-155		≥1MHz
Spurious Level During Vibration	Spurious at offset from f₀ during vibration at 2g Vibration conditions: (sinus wave) Vibration in three perpendicular directions. 10 to 200Hz.			＜-55	dBc	≤ 200 Hz
				＜-75		≤ 500 Hz
				＜-95		> 500 Hz
Environmental Conditions	Operating Temperature Range	-40		+95	℃	Ambient temperature
	Non Destruct Operating Temperature Range	-40		+95	℃	
	Storage Temperature Range	-40		+95	℃	
	Relative Humidity during storage	0		95	%	
	Relative Humidity	0		95	%	Over operating temperature range
	Air flow			0	m/s	@-40℃～+85℃
	Temperature Rate Of Change	0		1	℃/minute	
	Moisture Sensitivity Level	Level 2.				
	ESD Level	Human Body Model, class2: 2000V to 4000V; ANSI/ESDA/JEDEC JS-001-2010.				
		Machine Model, class B: 200V to 400V; JEDEC JESD22-A115C				
	Vibration	Test Condition: 0.75mm ;acceleration:10g;10Hz～500Hz, one cycle per 30 min, test 2 hour. (3 times for each 3 directions X ,Y , Z), IEC 68-2-06 Test Fc.				
	Shock	1000g; 11ms; half sine wave (3 times for each 3 directions X ,Y, Z),IEC 68-2-27 Test Ea/Severity 50A.				

Spurious at offset from f₀ during vibration at 2g — f_0

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2、Temperature Sensor Output Characteristics

The product shall provide I2C temperature output information to detect the temperature change at the bottom of OCXO.

Temperature sensor details refer to SGMICRO SGM459.

Product Device Address：1001 000

3、EEPROM Interface (SDA, SCL) Characteristics

Parameter	Min.	Typ.	Max.	Units	Condition
DC Electrical Characteristics					
High Level Input Voltage (Vih)	2.4		3.6	Vdc	SDA and SCL
Low Level Input Voltage (Vil)	-0.6		0.8	Vdc	SDA and SCL
Input Leakage Current, SCL	-10		+10	µA	Vpin<0.4V or Vpin>0.9Vcc
Input Leakage Current, SDA	-230		+30	µA	Vpin<0.4V or Vpin>0.9Vcc (Note 1)
Low Level Output Voltage, SDA (Vol)	0		0.4	V	Ipin = 6mA
Electrical Characteristics (Note 2)					
SCL Clock Frequency	0		100	KHz	
Communication (Note 2, 3)					
Product Device Address		1010 011X			X denotes read/write bit
Note: 1) SDA requires a 20kΩ pull-up resistor to Vcc. 2) Product is to communicate via industry standard I²C™ bus timing. I²C™ is a Phillips Semiconductor registered trademark. 3) For manufacturing purposes vendors sometimes use other I²C™ addresses than Product Device Address above, therefore it is strongly recommended to have the OCXO on a separate I²C™ bus in the application.					

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4、EEPROM Data Format

The oscillator shall be provided with the following information in the EEPROM. After the data is written the EEPROM should be made read-only.

EEPROM Data Format			
Data format is internally organized with 256 words of 1 byte each			
Header Bits 0-255	**Memory Location**	**Description**	**Format**
0-7	00h	EEPROM data version number [Version=4]	HEX
8-135	01h-10h	Serial number (Note 1)	ASCII
136-223	11-1Bh	Ericsson part number [RTL205***/1]	ASCII
224-255	1Ch-1Fh	Set to [ ][ ][ ][ ] [4 spaces]	ASCII
Data Bits 256-1007	**Bytes**	**Description**	
256-319	20h-27h	Initial frequency (f_1) (At 40°C rounded to 0.001Hz)	32.32 unsigned
320-383	28h-2Fh	Temp coefficient A_3	32.32 2's complement
384-447	30h-37h	Temp coefficient A_2	32.32 2's complement
448-511	38h-3Fh	Temp coefficient A_1	32.32 2's complement
512-575	40h-47h	Temp coefficient A_0	32.32 2's complement
576-639	48h-4Fh	Tmax	32.32 2's complement
640-703	50h-57h	Tmin	32.32 2's complement
704-783	58h-61h	Date of calibration [YYYY-MM-DD]	ASCII/ISO-8601
784-1007	62h-7Dh	Reserved [set to all zeros]	HEX
Check Sum Bits 1008-1023	**Bytes**	**Description**	
1008-1015	7Eh	Most significant byte of the check sum (Note 4)	HEX
1016-1023	7Fh	Least significant byte of the check sum (Note 4)	HEX
Supplier Use Bits		**Description**	
1024-1983	80h-F7h	Supplier Product ID [O11F-2604-10.00MHz]	
Supplier Function Bits 1984-2039	**Bytes**	**Description**	
1984-1999	F8h-F9h	Reserved for Supplier	
2000-2007	Fah	Reserved for Supplier	
2008-2023	FBh-FCh	Reserved for Supplier	
2024-2039	FDh-FFh	Reserved for Supplier	
1) Serial number must be same serial number that is stated on Product package. Fill out with spaces (0x20) after serial number. 2) N/A 3) Check sum is a 16-bit word that will be calculated as a byte by byte unsigned summation of only the header and data bits. 4) Ericsson product number should be written and stored without spaces and in CAPITAL letters			

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5、 Frequency Versus Temperature

Manufacturer shall characterize each oscillator's frequency output (in ppb) over the operational temperature range. While performing this characterization, Supplier shall perform a least squares curve fit to this frequency versus temperature. The curve fit shall be a cubic polynomial of the form:

$$A_3 T^3 + A_2 T^2 + AT + A_0 = \frac{f(T) - f(1)}{f(1)} \qquad \textit{Equation 1}$$

The residual error shall be such that:

$$\left| \frac{f(T) - f(1)}{f(1)} - \sum_{i=0}^{3} A_i T^i \right| < 0.3 ppb \qquad \textit{Equation 2}$$

A_x: **Temperature compensation parameters (see register list)**

T: **This parameter is read by Temperature sensor**
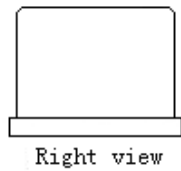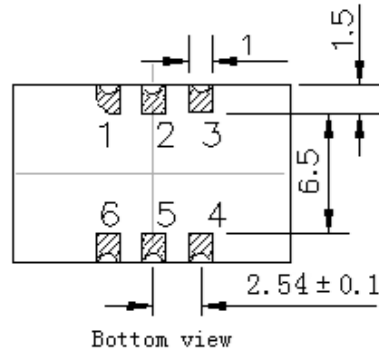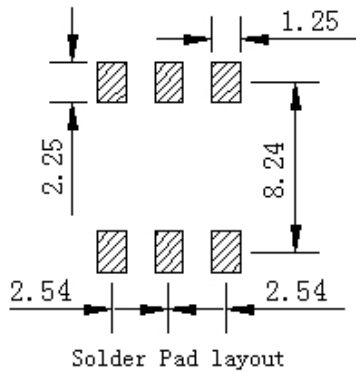
f(T): **measured frequency.**

f(1): **Parameter variables associated with the reference Temperature (40℃)**

After this calculation is performed, the coefficients, Ai shall be saved to the EEPROM as specified in section 4.

The oscillator shall be able to meet this performance over any 30°C window within the operating temperature range and at a operating temperature range-40℃~95℃. Manufacturer understands that these coefficients represent a curve that is a measurement of the frequency versus temperature characteristic of the oscillator. The extent to which the results of Equation 2 are repeatable (+/- a vertical shift) is an indication of the thermal hysteresis or "retrace" of the characteristic.

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6、 Mechanical Structure(mm)

Solder Pad layout

Bottom view

Right view

Side view
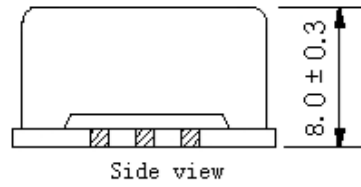
PIN FUNCTION

PIN	FUNCTION
1	Not Connect
2	SCL
3	GND
4	RF Output
5	SDA
6	Supply Voltage

Top view

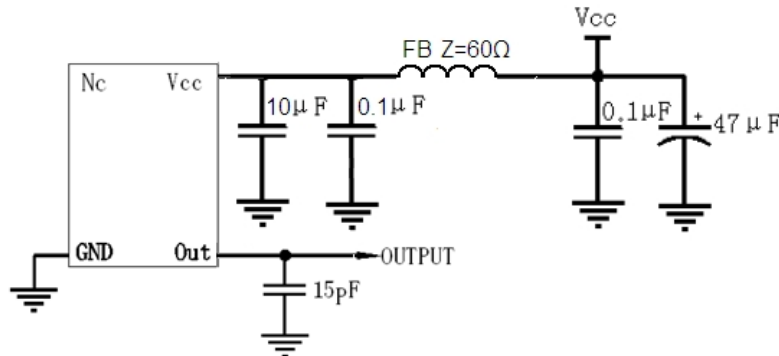**Note1:**   Tolerance ±0.1mm without mark

Note2:   The first two xx representative: week

   After two xx representative: year

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7、Test Circuit

8、Reflow Soldering Curve (RoHS)
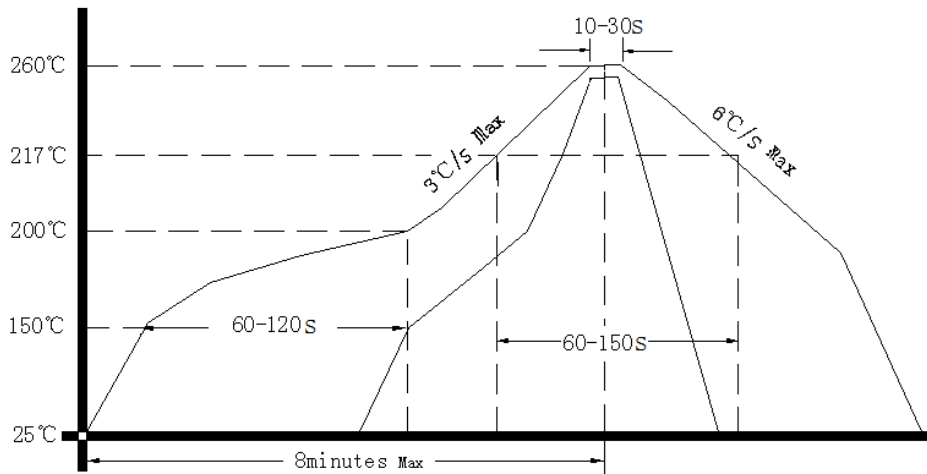
Additional requirement:

The oscillator shall withstand a temperature of +255°C measured at the solder joints and on the top surface of the package.

The oscillator shall also withstand at least 90 seconds above +220°C.

Passing through reflow upside down is not supported

9、Package（mm）