Travelling Merchant: A026

DATASHEET

Standard: **O25S-2607-10.00MHz**

P/N:

Plot			The Label
Drew	Audited	Approved	
Amway.wei	Carry.Wang	Jason Zhao	
Date: 2022.02.07			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

Building 5, No.24, Industrial East Road,
Songshanhu Park, Dongguan,
Guangdong, P.R. China
TEL:0086-0769-88010888
FAX:0086-0769-81800098

Table of amendment

Version	Revision contents	Prepared by	Revised date
1.0	The first issued (RTL 205 616/2)	Amway	2022.02.07

Building 5, No.24, Industrial East Road,
Songshanhu Park, Dongguan,
Guangdong, P.R. China
TEL:0086-0769-88010888
FAX:0086-0769-81800098

1、Electrical Parameters

MODEL：O25S-2607-10.00MHz

Item	Description	Parameters			Unit	Test Condition
		Min.	Typ.	Max.		
Output	Nominal Frequency		10.00		MHz	f_n
	Output Waveform		HCMOS			
	Output Low Voltage	0		0.8	V	I_{load}= -8mA
	Output High Voltage	3.4		4.6	V	I_{load}=8mA
	Duty Cycle	40	50	60	%	
	Rise / Fall Time		10	15	ns	C_{load} =15pF,10%~90%
	Load	14.25		15.75	pF	
	Reference Voltage Accuracy	3.8	4.0	4.2	Vdc	100kΩ load
	Reference Voltage Temperature Stability	-1	±0.5	+1	%	-40℃ to 85℃
	Output Impedance		142	150	Ω	
Frequency Stabilities	Frequency stability vs. data of EEPROM, $\Delta f_1/f_1$ Incl. all causes	>-0.229		＜+0.229	$\times 10^{-6}$	Oscillator mounted and soldered on a PCB using a reflow soldering process, relaxed 4 weeks and stored up to 5 years. Then put into power-on and measured after 5 min. This requirement is valid up to 10 years, minus storage time above, in continuous power on after starting the oscillator. Oscillator output frequency temperature compensated according to section 6.
		>-0.079		＜+0.079	$\times 10^{-6}$	Oscillator mounted and soldered on a PCB using a reflow soldering process, relaxed 24 h and stored up to 26 months. Then put into power-on and measured after 5 min. This requirement is valid up to 1 month in continuous power on after starting the oscillator. Oscillator output frequency temperature compensated according to section 6.

Building 5, No.24, Industrial East Road,
Songshanhu Park, Dongguan,
Guangdong, P.R. China
TEL:0086-0769-88010888
FAX:0086-0769-81800098

		>-0.029		＜+0.029	×10^{-6}	Oscillator mounted and soldered on a PCB using a reflow soldering process, relaxed 4 weeks and stored up to 1 month. Then put into power-on and measured after 1 hour. This requirement is valid for at least 68% of a population up to 1 month in continuous power on after starting the oscillator. Oscillator output frequency temperature compensated according to section 6.
		>-0.029		＜+0.029	×10^{-6}	Oscillator mounted and soldered on a PCB using a reflow soldering process, relaxed 4 weeks and stored up to 26 months. Then put into power-on and measured after 24 h. This requirement is valid for at least 95.4% of the population up to 1 month in continuous power on after starting the oscillator. Oscillator output frequency temperature compensated according to section 6.
	Initial Frequency Tolerance	-2		+2	×10^{-6}	Referenced to f_n
	Aging Tolerance Per Day	-3		+3	×10^{-9}	After 3 days in operation. (See also section 7)
	Over All Frequency Stability	-3		+3	×10^{-6}	Referenced to f_n including 20 years aging.
	Frequency Stability vs.EEPROM Parameters	-3		+0.3	×10^{-9}	Residual error according to section 6.
	Holdover stability, $\Delta f_h/f_h$ Incl. all causes	>-13		＜+13	×10^{-9}	After 1 h in continuous operation: Frequency drift measured during 24 h. Oscillator output frequency temperature compensated according to section 6.
						After 5 days in continuous operation: Frequency drift measured during 1 month. Oscillator output frequency temperature compensated according to section 6.
						After 30 days in continuous operation: Frequency drift measured during 4 months. Oscillator output frequency compensated according to section 6 and 7.

Building 5, No.24, Industrial East Road,
Songshanhu Park, Dongguan,
Guangdong, P.R. China
TEL:0086-0769-88010888
FAX:0086-0769-81800098

		>-29		＜+29	×10^{-9}	After 30 days in continuous operation: Frequency drift measured during 12 months. Oscillator output frequency compensated according to section 6 and 7.
	Δf_1= Frequency deviation from the EEPROM value. f_1= Frequency according to EEPROM. Δf= Frequency deviation from the frequency after 1h of operation. f= Frequency after 1h of operation. f_h = Frequency at time of entering holdover mode Δf_h = Frequency deviation in holdover mode (deviation from frequency at time of entering hold over mode).					
Power Supply	Supply Voltage range	4.7	5.05	5.4	Vdc	
	AC Ripple and Noise			50	mVp-p	10Hz to 1MHz
	Supply Voltage (Vs) to GND	-0.3		6.0	V	Pin 19
	Digital Input Voltage (SDA, SCL) to GND	-0.3		6.0	V	Pin 2 and 7
	Current Consumption			300	mA	Steady state at +25°C in still air
				650	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
Jitter				400	ps	Bandwidth 12KHz to 20MHz Peak to peak
Phase Noise	Phase Noise			＜-75	dBc/Hz	1Hz
				＜-85		10Hz
				＜-110		100Hz
				＜-125		1KHz
				＜-130		10KHz
				＜-130		100KHz
				＜-145		≥1MHz
Spurious Level During Vibration	Spurious at offset from f_0 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

Building 5, No.24, Industrial East Road,
Songshanhu Park, Dongguan,
Guangdong, P.R. China
TEL:0086-0769-88010888
FAX:0086-0769-81800098

Environmental Conditions	Operating Temperature Range	-40		+85	℃	Ambient temperature
	Non Destruct Operating Temperature Range	-40		+90	℃	
	Storage Temperature Range	-40		+85	℃	
	Relative Humidity during storage	0		95	%	
	Relative Humidity	0		95	%	Over operating temperature range
	Air flow			0	m/s	@-40℃~ -25℃
		0		3		@-25℃~+85℃
	Temperature Rate Of Change	0		1	℃/minute	
	Moisture Sensitivity Level	Level 3.				
	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	50g; 11ms; half sine wave (3 times for each 3 directions X ,Y, Z),IEC 68-2-27 Test Ea/Severity 50A.				

2、Temperature Sensor Output (Vtemp) Characteristics

The Product shall provide an analog XO temperature output, Vtemp.

Vtemp shall be related to the output frequency according to section 6.

Parameter	Min.	Typ.	Max.	Unit	Condition
Operating Temperature Range	0.4		< Vref-0.2	Vdc	Note 1)
Functional Temperature Range	0		< Vref	Vdc	Note 2)
Minimum Frequency Resolution Over Operating Temperature			16	ppb/V	Note 3)

Note 1) Nominal range must account for min and max airflow.

Note 2) RF output not required to meet frequency stability during operation outside temperature range.

Note 3) This is to ensure that the voltage swing of Vtemp is large enough so that an ADC gives values over the full temperature range.

Building 5, No.24, Industrial East Road,
Songshanhu Park, Dongguan,
Guangdong, P.R. China
TEL:0086-0769-88010888
FAX:0086-0769-81800098

3、Min/Max Temperature Sensor Voltage Parameters

More details please refer to 《616 Vtmax、Vtmin alarm triggering mechanism description and verification》

4、EEPROM Interface (SDA, SCL) Characteristics

Parameter	Min.	Typ.	Max.	Units	Condition
DC Electrical Characteristics					
High Level Input Voltage (Vih)	2.9		4.12	Vdc	SDA and SCL
Low Level Input Voltage (Vil)	-0.3		0.8	Vdc	SDA and SCL
Input Leakage Current, SCL	-10		+10	μA	Vpin<0.4V or Vpin>0.9Vref
Input Leakage Current, SDA	-230		+30	μA	Vpin<0.4V or Vpin>0.9Vref (Note 1)
Low Level Output Voltage, SDA (Vol)	0		0.6	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 Vref.
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.

Building 5, No.24, Industrial East Road,
Songshanhu Park, Dongguan,
Guangdong, P.R. China
TEL:0086-0769-88010888
FAX:0086-0769-81800098

5、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 (Note 6) [RTL205616/2]	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 (Note 5)	32.32 2's complement
384-447	30h-37h	Temp coefficient A_2 (Note 5)	32.32 2's complement
448-511	38h-3Fh	Temp coefficient A_1 (Note 5)	32.32 2's complement
512-575	40h-47h	Temp coefficient A_0 (Note 5)	32.32 2's complement
576-639	48h-4Fh	Vtmax [V] (Note 3, 5)	32.32 2's complement
640-703	50h-57h	Vtmin [V] (Note 3, 5)	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 [O25S-2607-10.00MHz]	
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) Temperature sensor voltage measured by Manufacturer/Supplier across temperature range, in volts, rounded to the mV. See 3.
4) 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.
5) All Vtemp measurements shall account for the set point inaccuracy and temperature drift of VREF and measured with Vs = Vref*(1.2625 +/- 0.2%)
6) Ericsson product number should be written and stored without spaces and in CAPITAL letters.

Building 5, No.24, Industrial East Road,
Songshanhu Park, Dongguan,
Guangdong, P.R. China
TEL:0086-0769-88010888
FAX:0086-0769-81800098

6、Frequency Versus Temperature

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

$$A_3 v^3 + A_2 v^2 + A_1 v^1 + A_0 = \frac{f(v) - f_1}{f_1} \qquad \text{Equation 1}$$

The residual error shall be such that:

$$\left| \frac{f(v) - f_1}{f_1} - \sum_{i=0}^{3} A_i v^i \right| < 0.3\,ppb \qquad \text{Equation 2}$$

Where: f(v) = measured frequency, f_1 = initial frequency as per section 5 and v = temperature sensor voltage. Equation 2 applies regardless of airflow.

In the Application the Temperature Sensor Output will be measured relative to Vref, i.e. represented by a dimensionless value Vtemp/Vref with a value between 0 and 1. For compatibility with the values in this specification a scaling factor of 4V is used.

After this calculation is performed, the coefficients, Ai shall be saved to the EEPROM as specified in section5.

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℃~85℃. 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.

7、Frequency Aging Characteristics

The Product shall meet a maximum aging rate of +/- 3ppb per day after 3 days of power on time. The Product shall also have an aging characteristic after 5 days of power on time that is linear as a function of time over a 24h window.

To determine this linear aging characteristic the temperature effects need to be removed from the frequency data as suggested in section 6. Let f(v,t) be the measured frequency at time, t and temperature sensor voltage, v. Define the residual data, fR(t), as:

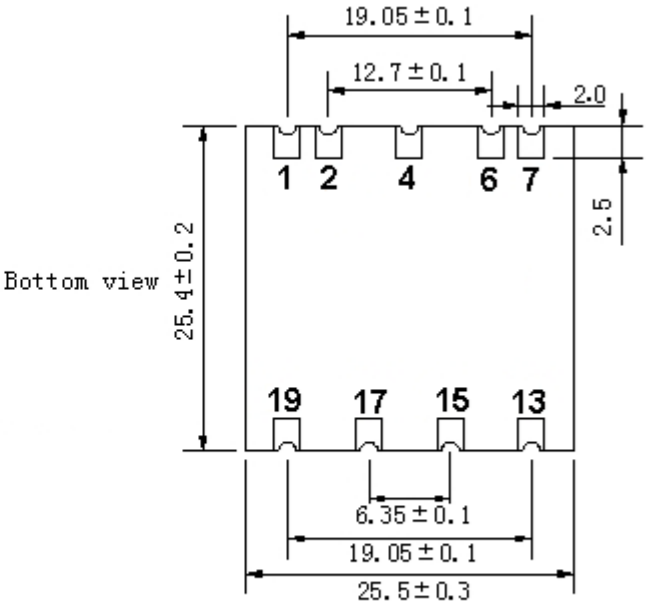
$$f_R(t) \equiv \frac{f(v,t) - f_1}{f_1} - \sum_{i=0}^{3} A_i v^i \qquad \text{Equation 3}$$

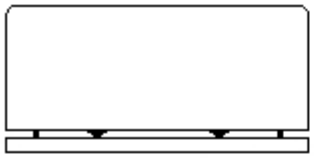
The residual data shall fit to a linear line with slope, M and an intercept, B such that:

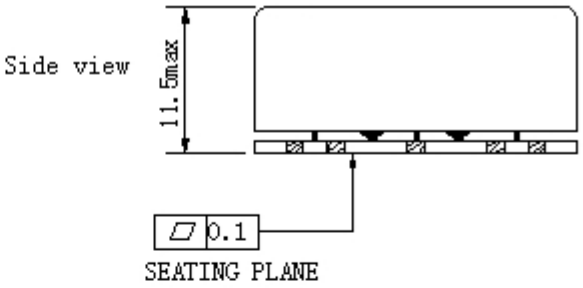
$$\left| f_R(t) - (Mt + B) \right| < 0.3\,ppb \qquad \text{Equation 4}$$

Building 5, No.24, Industrial East Road,
Songshanhu Park, Dongguan,
Guangdong, P.R. China
TEL:0086-0769-88010888
FAX:0086-0769-81800098

8、Mechanical Structure(mm)

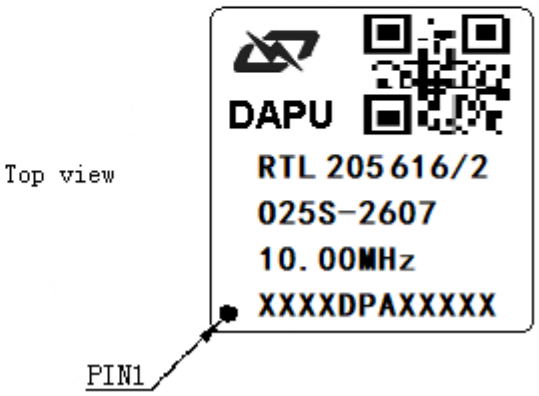






PIN FUNCTION

Terinal	Function
1	OUTPUT
2	EEPROM SDA(SDA)
4	GND(CASE)
6	NC
7	EEPROM SCL(SCL)
13	VREF
15	NC
17	VTEMP(Temperature Sensor Output)
19	Vs



Note1: Tolerance ±0.1mm without mark

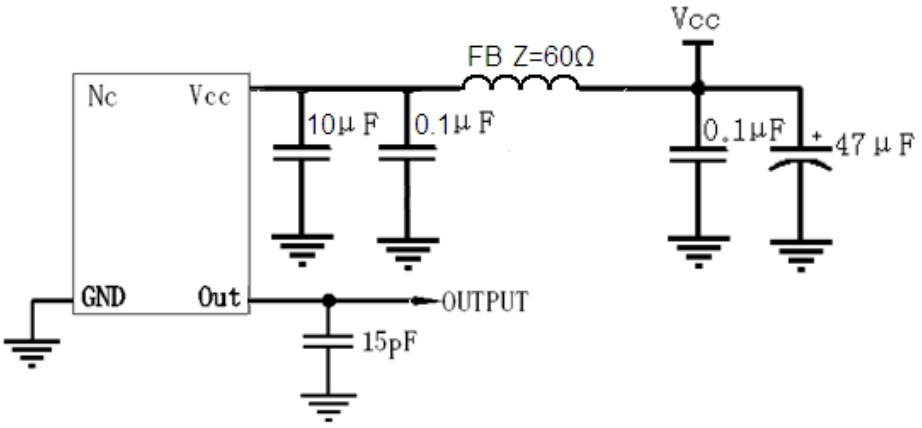
Note2: Referential weight 13g

Note3: NC is not connect

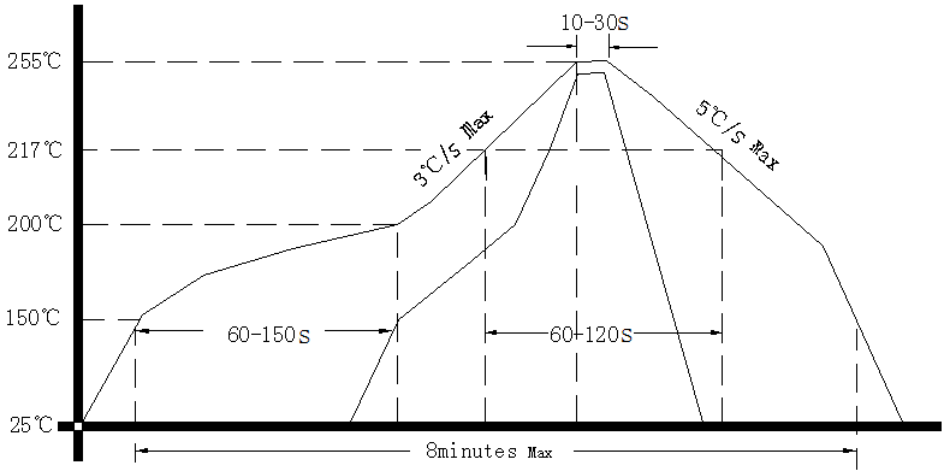
Note4: The first two xx representative: week
After two xx representative: year
At last five Axxxxx representative: serial number，
A is a letter, A~ Z cycle, xxxxx It is the number 00001 ~ 99999 cycle,
And the next serial number of A99999 is B00001.

Building 5, No.24, Industrial East Road,
Songshanhu Park, Dongguan,
Guangdong, P.R. China
TEL:0086-0769-88010888
FAX:0086-0769-81800098

9、Test Circuit



10、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

11、Package（mm）