

Stratum III Timing Module : VCT1000B

Application: Dual Input Timing Module

1.0 DESCRIPTION AND APPLICATION

The VCT1000B is a hitless-switching dual-input stratum 3 low jitter timing module with status outputs and alarms. Dual 8 kHz references are independently selected to lock a digital phase lock loop resulting in excellent long and short-term stability. Two control inputs are used to steer the state machine decisions for the operation of the module. The state machine will enter and maintain the operation in the free run, holdover, or locked condition. The state machine operates under the requirements of section 3.4 of the Telcordia GR-1244-CORE. Four status pins indicate the condition, which the unit is operating, and two alarm outputs indicate the loss of lock and holdover or free run operation. The signal outputs are the low jitter oscillator output and the divided 8kHz output. Input phase rearrangement allows the output to remain hitless upon the switching of the references, regardless of input phase. Dimensions are 2" x 2" x 0.55". A state machine is used to assure that switching to a bad reference is not allowed, and that both references are qualified.

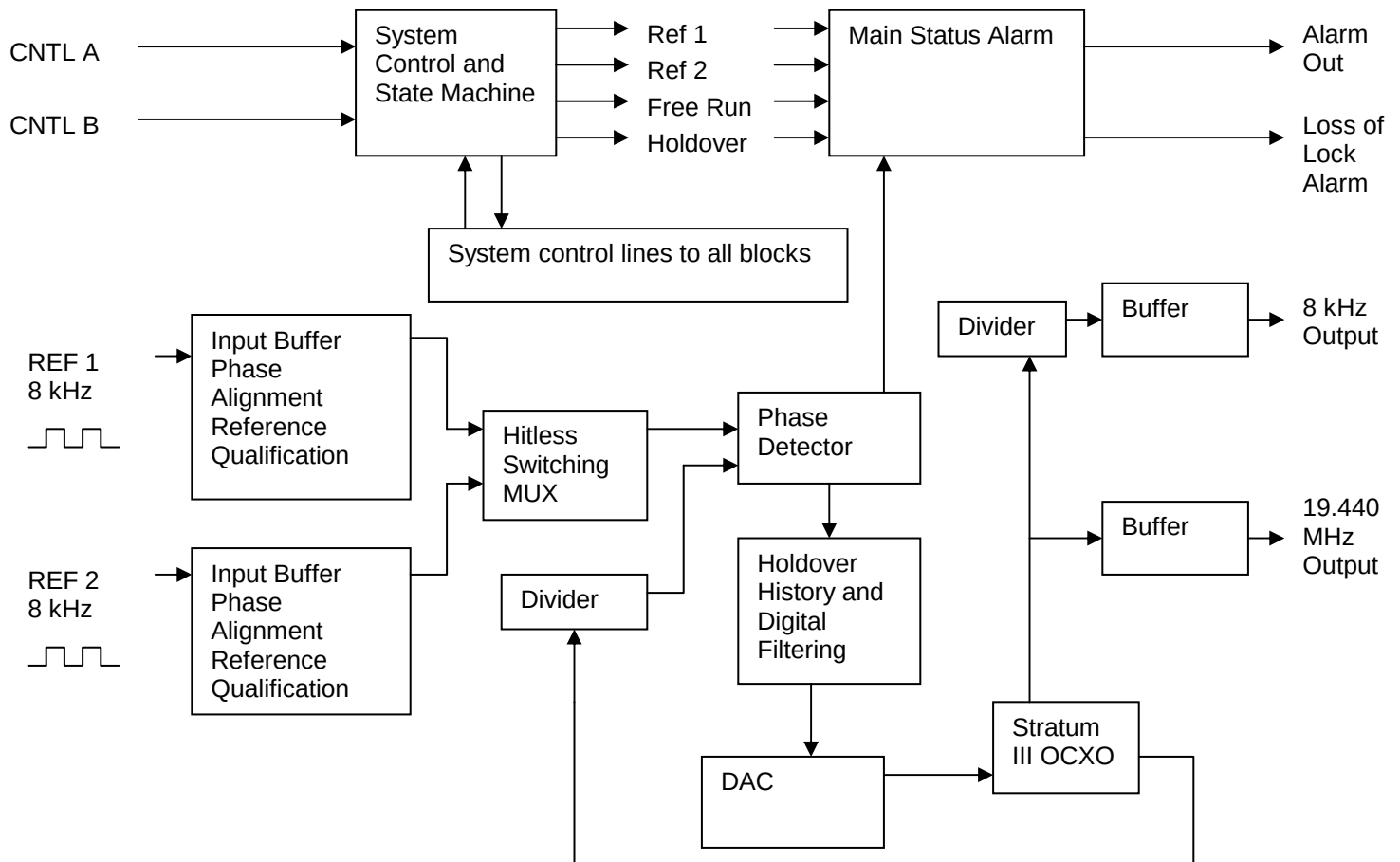


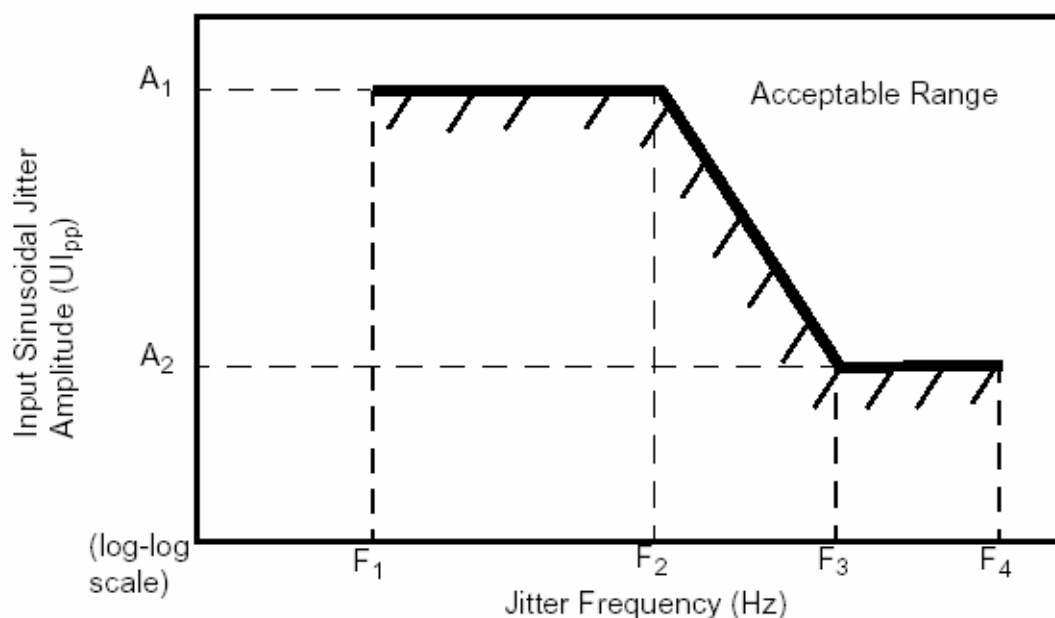
Figure 1 VCT1000B Block Diagram

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2.0 ELECTRICAL CHARACTERISTICS

	Specification	Min	Typ	Max	Units
2.1	Regulated Input Supply Voltage, Vcc	4.75	5.00	5.25	V DC
2.2	Supply Current Drain...				
	At turn-on			550	mA
	Steady state Current @ 25C			250	mA
2.3	Frequency Output (at pin 11)		19.440		MHz
2.4	Temperature Ranges				
2.4.1	Operating Temp. Range	0		70	°C
2.4.2	Storage Temp. Range	-40		85	°C
2.5	Timing Parameters				
2.5.1	Jitter Generation and transfer	-0.05		0.05	UI
2.5.2	Jitter Tolerance (see Figure 2)				
2.5.3	Wander Tolerance (See figure 3)				
2.5.4	Wander Generation TDEV (see Figure 4)				
2.5.5	MTIE (see Figure 5 and 6)				
2.5.6	Holdover Frequency accuracy (for the initial 24 hours during holdover)	-0.37		0.37	ppm
2.5.7	Free-run Accuracy (under all conditions)	-4.6		4.6	ppm
2.5.8	Holdover History		30		sec
2.5.9	Correction period			125	usec
2.5.10	Lock time	40	60	90	sec
2.6	Input Logic Levels				
2.6.1	'0'	-0.5		0.8	V
2.6.2	'1'	2.4		5.5	V
2.7	Output Logic Levels				
2.7.1	'0'	-0.25		0.8	V
2.7.2	'1'	4.0		Vcc*0.9	V
2.7	Module tuning range	-9.2		9.2	ppm
2.8	Dual Reference input	-4.6		4.6	ppm
2.9	Output loads			30	pF
2.10	Output Signal Rise-time			3	n sec

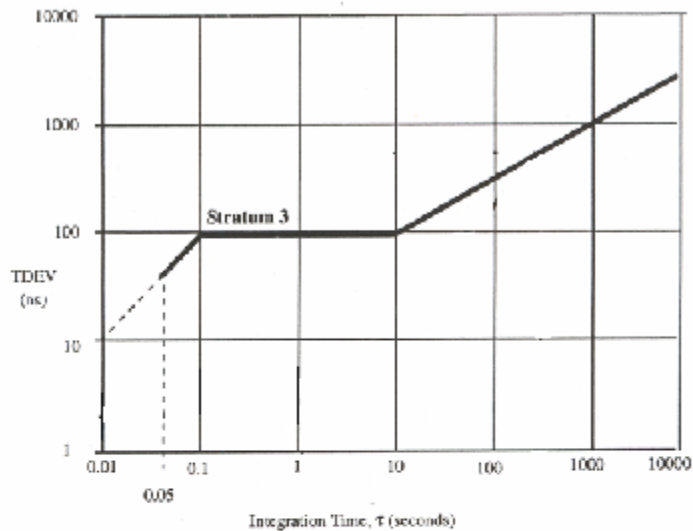
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Mask	A ₁ UI _{pp}	A ₂ UI _{pp}	F ₁ (Hz)	F ₂ (Hz)	F ₃ (Hz)	F ₄ (Hz)
External Timing	5	0.1	10	500	8000	40000
Line Timing	10	0.3	10	192.9	6430	40000

Figure 2 Jitter Input Tolerance

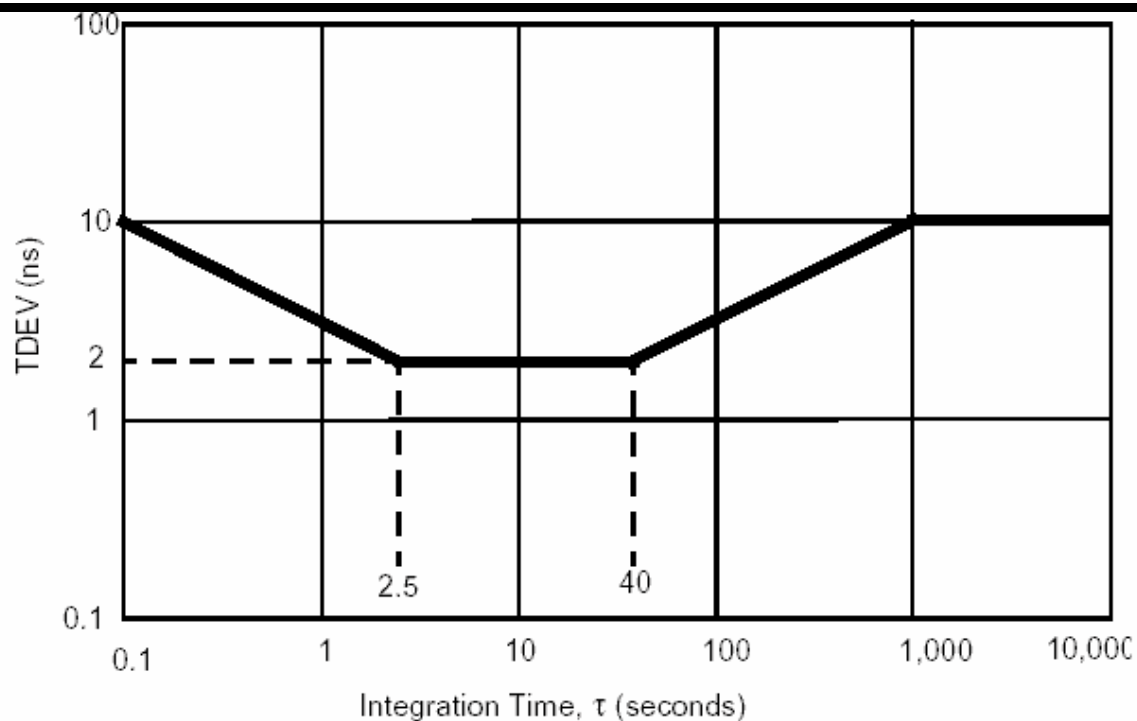
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Integration Time, τ (seconds)	Stratum 3 TDEV (nanoseconds)
$\tau < 0.05$	N/A
$0.05 < \tau < 0.1$	$1000 \times \tau$
$0.1 < \tau < 1.1$	100
$1.1 < \tau < 10$	100
$10 < \tau < 300$	$31.6 \times \tau^{0.5}$
$300 < \tau < 1000$	$31.6 \times \tau^{0.5}$
$1000 < \tau$	N/A

Figure 3 Wander Input Tolerance

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Integration Time, τ (seconds)	TDEV (nanoseconds)
$0.1 \leq \tau < 2.5$	$3.2 \times \tau^{-0.5}$
$2.5 \leq \tau < 40$	2
$40 \leq \tau < 1000$	$0.32 \times \tau^{0.5}$
$1000 \leq \tau < 10000$	10

Figure 4 Wander Generation

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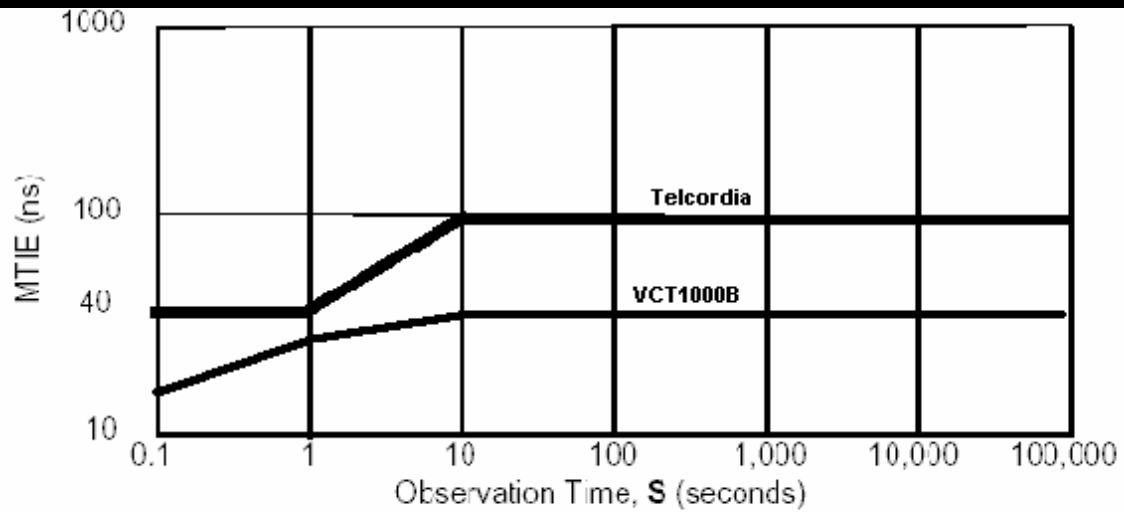


Figure 5 MTIE for Wander Generation

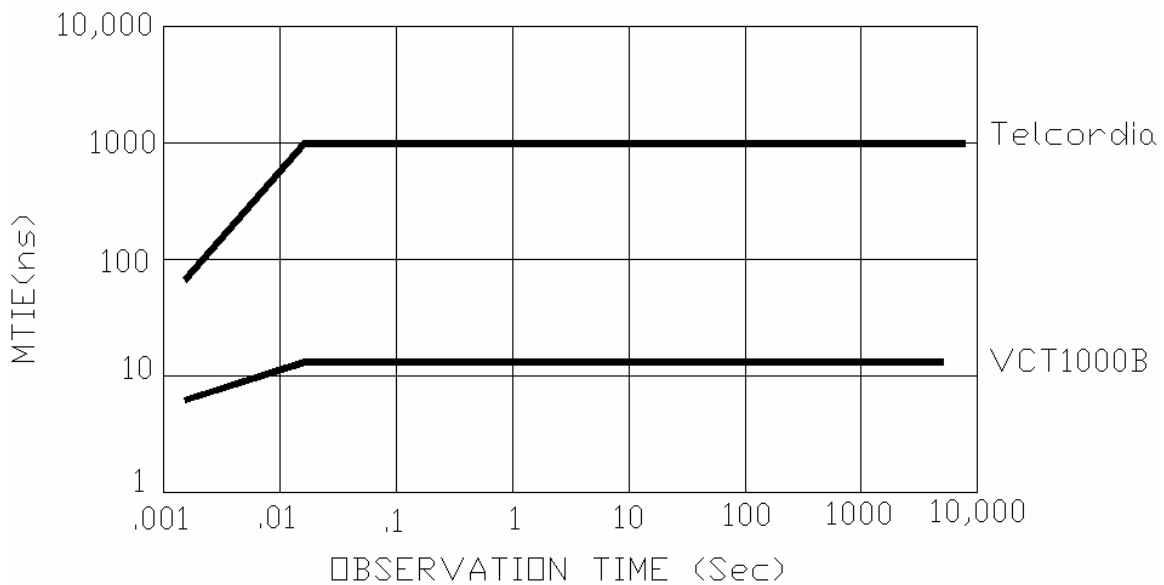


Figure 6 MTIE for Rearrangement

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3.0 MECHANICAL CHARACTERISTICS

- 3.1 Pkg. size is 2 in (50.80 mm) X 2 in (50.80 mm) X 0.56 in (14.22mm)
max. 18 pin DIP style.

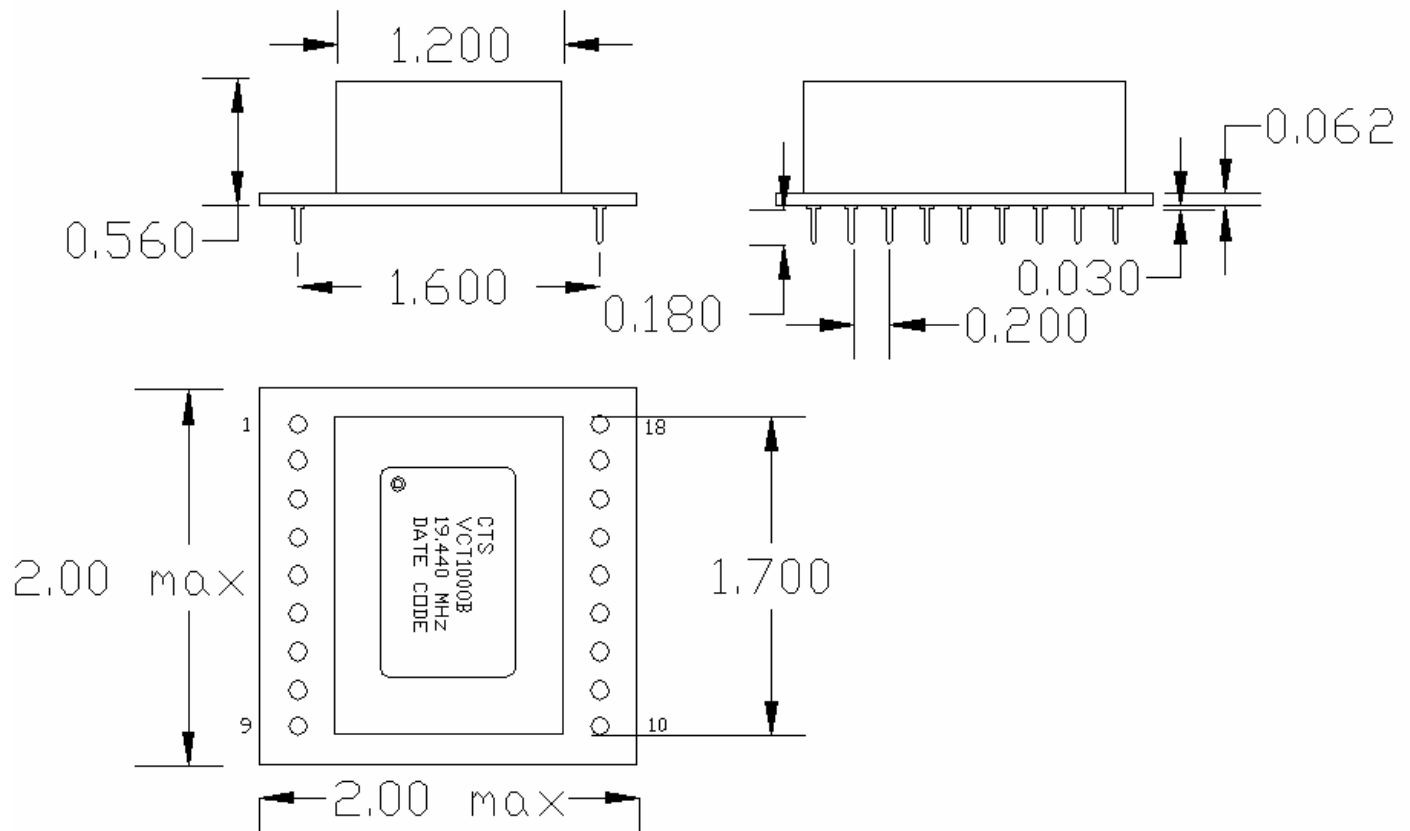


Figure 6 VCT1000B Outline

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VCT1000B Pin Functions

Pin #	Name	Description
1	HOLDOVER	Holdover Signal -> the output is high when the unit is in holdover mode
2	REF 1	Reference 1 Signal -> the output is high when the unit is using the reference 1
3	REF 2	Reference 2 Signal -> the output is high when the unit is using the reference 2
4	FREERUN	Free-run Signal -> the output is high when the unit is in the free run mode
6	ALARM OUT	Alarm signal -> the output is high when there is an alarm in the module, alarm condition is during free-run mode, holdover mode,
7	CNTL A	Control Input 1 -> the external input for selecting mode of the unit – see table.
8	CNTL B	Control Input 2 -> the external input for selecting mode of the unit – see table.
9	PLL UNLOCK	PLL Unlocked Signal -> the output is high when the unit is not locked to any of the references
5,10,12, 14,16	GND	Ground
18	+5V	Positive Voltage Supply
11	OUT	Synchronized Output -> the output of the synchronized signal
13	OPT OUT	Optional Output -> the secondary output of the synchronized signal, Pre-defined as OUT/N where N is a integer
17	EX REF 1	External Reference 1 Input -> the input signal from reference 1
15	EX REF 2	External Reference 2 Input -> the input signal from reference 2

Control Functions

CNTL B	CNTL A	MODE OF OPERATION
0	0	Free-run
0	1	Locked to REF1
1	0	Locked to REF2
1	1	Holdover

4.0 STANDARD ENVIRONMENTAL LIMITS

This product is capable of operating within the following environmental conditions:

4.1 Operating Temperature	0 to +70 °C.
4.2 Storage Temperature	-40 to +85°C.
4.3 Humidity (non- Condensing)	95% Relative humidity max @ 40°C.
4.4 Atmospheric Pressure	730 to 780 mm Hg.
4.5 Vibration	10 to 60 Hz with double amplitude of 1.52mm max. (1/2 hour in each of 3 perpendicular planes).
4.6 Shock	1/2 sine pulse, 7000G, with pulse width 0.3mSec. (1 shock in each of 6 directions of 3 perpendicular planes).

5.0 MAXIMUM SOLDERING PROFILE

Temperature	110 to150 °C	>183°C	>235°C	240°C
Time	6min	2.5min	0.25min	Max temperature