CG5 Clock Generator

Five-Channel Clock Generator (0.01 Hz - 128 MHz)

Key Features

- Broad frequency range
- Duty cycle adjustment
- Phase offset adjustment
- External reference input for frequency correction
- USB-powered
- GUI-controlled

Applications

- Troubleshooting
- Educational lab experimentation
- Engineering lab experimentation

Functional Description

The CG5 is a versatile, multi-channel signal source, which can provide five independent 3.3V, CMOS-compatible square wave output signals over the frequency range of 0.01 Hz to 128 MHz. Each output is uniquely settable for frequency, duty cycle and phase offset values. The onboard TCXO has an output frequency of 6.25 MHz, which is multiplied by 16 to obtain a 100 MHz time base, allowing the CG5 to offer a 10 nS resolution for phase and duty cycle adjustments.

The CG5 derives its power from the USB port of the computer, which is then regulated to 3.3 V using a low-noise voltage regulator. While providing a stable, low-noise voltage source for the CG5, the voltage regulator also incorporates internal current limiting (150 mA) and thermal protection circuitry, permitting indefinite, damage-free operation into short-circuit conditions. A PTC resettable thermal fuse also provides an additional layer of protection for both computer and instrument from accidental short-circuiting. Since the CG5 consumes less than 50 mA of current, screw terminals are provided to allow the user to access the reserve 100 mA of current from the 3.3V regulated supply to power external applications.

The CG5 is designed to accept a 10 MHz reference signal from a frequency standard or other precision source. This 50-ohm input requires a +7.0 dBm minimum power level. This reference is used to software-correct the set frequency to compensate for error between the onboard oscillator and the external reference. Frequency corrections are calculated and implemented whenever a change to any CG5 parameter is made.

Absolute Maximum Ratings[1]
(At room ambient conditions unless specified otherwise)

		MIN	MAX	UNIT
VCC	Supply Voltage Range[2]	-0.5	6.5	V
IO	Continuous Output Current	-40	40	mA
	Continuous Current Through VCC or GND	-200	200	mA
Tstg	Storage Temperature Range	-40	125	°C

Reccomended Operating Conditions
(At room ambient conditions unless specified otherwise)

			MIN	MAX	UNIT
VCC	Supply Voltage Range[2]		4.5	5.5	V
ICC	Input Current		N/A	50	mA
Output Adjust	Range	As Frequency	0.01	128 M	Hz
		As Period	7.8126 n	100	S
	Setability	As Frequency	0.01	N/A	Hz
		As Period	10 n	N/A	S
	Accuracy	At Duty=50%[3]	-7.6	7.6	ppm
		At Duty<>50%[4]	-1.22	1.22	%
Output Levels	V_{OL}	10K/10pF - DC Coupled	-0.05	0.05	V
		50 Ohm - DC Coupled	-0.05	0.05	V
	V_{OH}	10K/10pF - DC Coupled	3.2	3.5	V
		50 Ohm - DC Coupled	1.3	1.5	V
Duty Adjust[5]	Range	As Percent	10 nS/PeriodX100	N/A	%
		As Time	10 n	Period	S
	Setability	As Percent	10 nS/PeriodX100	N/A	%
		As Time	10 n	N/A	S
Phase Adjust	Range	As Degrees	0	N/A	°
		As Time	10 n	N/A	S
	Setability	As Degrees	0.1	N/A	°
		As Time	10 n	N/A	S
TA	Operating free-air temperature		0	+50	°C

Notes:

1. Stresses beyond those listed under Absolute Maximum Ratings in the table above may cause permanent damage to the device. The ratings listed are for stress evaluation purposes, and functional operation of the device at these or any other conditions beyond those indicated under Recommended Operating Conditions is not implied. Additionally, the exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

2. The CG5 is designed to derive its power from the computer's USB port, which can supply approximately 500 mA at 5.0 VDC. Therefore, when operated in this manner, the CG5 will never be subjected to voltage stresses which could induce failure.

3. The maximum error will occur at a set frequency of 1525.8673Hz. The error at other frequencies will be less.

4. This maximum error only occurs at non-50% duty cycles, resulting in a condition where some set frequencies cannot be generated.

5. Duty adjustment is only allowed at frequencies below 4.0 MHz. At frequencies of 4.0 MHz and above the duty cycle will be set to 50%.

Outline Drawing:
(All dimensions are in inches with a tolerance of ± 0.020").