Quartzdyne, Inc.

3V Analog Hybrid Circuit Specifications

6/1/2010

Features:

The circuit is based on custom Oscillator and Voltage Regulator ASIC's. The Oscillator features automatic gain-boosting, designed specifically to kick-start sluggish or drive-level sensitive crystals. The gain boost drives the crystal hard until oscillation is achieved, then reduces the drive level to nominal levels for best measurement performance. With historic circuits, sluggish (drive level sensitive) crystals would have eventually failed to start up, resulting in no data. The voltage regulator minimizes supply voltage sensitivity and allows low voltage operation.

The circuit is assembled using in-house hybrid circuit technologies, providing long life at high temperature, and operation in extreme shock environments. Circuit life is extrapolated using 250°C un-powered temperature cycling and 225°C continuously powered testing. Shock resistance is tested with a metal-to-metal, high-impact shock test.

Absolute Maximum Ratings

Supply Voltage(V_{CC})[1]	-0.5 V to 6.2 V @ 50 mA max
Pressure Output [1]	-0.5 V to Vcc+0.5 V @ 20 mA max
Temperature Output [1]	-0.5 V to Vcc+0.5 V @ 20 mA max
Reference Output [1]	-0.5 V to Vcc+0.5 V @ 20 mA max
Storage Temperature[1]	-40°C to 225°C
Mean time to failure [4]	>1 year @ 225 °C, >5 years @ 200 °C
ESD	± 2kV (MIL-STD-883)

Electrical Characteristics

	Min	Typ	Max	Units
Recommended Operating Temperature	0		225	°C
Recommended Supply Voltage (V_{CC})	2.70		5.50	V
Icc (30°C, Vin=2.7V) [7]	1.8	2.25	2.8	mA
Icc (225°C, Vin=5.5V) [7]	3.8	4.6	5.4	mA
Icc (est. ±750uA)	$I_{CC} \approx 1.0$ mA + V_{CC} • 7.2 MHz • (65 pF + C_{Load}) + 5.0 µA/°C • (T – 30°C)			mA
Supply Voltage Sensitivity			0.150	Hz/V
Supply Ripple(1 kHz < 200 kHz) [5]			200	mV_{pp}
Start-up Time		75	300	mS
Inrush Current (est. ±750 µA) [6]	$I_{CCpk} \approx 2.5$ mA + V_{CC} • 7.2 MHz • 50 pF + 5.5 µA/°C • (T – 30°C)			mA
Output Low (V_{OL}) [9]		0.1	0.5	V
Output High (V_{OH}) [9]	Vcc-0.5	V_{cc}-0.1		V
Pressure Frequency [2,9]	10		100	kHz
Temperature Frequency [2,9]	10		100	kHz
Reference Frequency [9]	7.193	7.200	7.207	MHz
Pressure Duty Cycle	40		60	%
Temperature Duty Cycle	40		60	%
Reference Duty Cycle	40		60	%
Pressure Signal Period Jitter [8]			300	nS
Temperature Signal Period Jitter [8,10]			750	nS
Load Capacitance [3]			300	pF
Load Resistance [3]	1.0			kΩ
Output Coupling	Series DC @ 50 Ohms			

Notes:

1. Absolute Maximum Ratings are value limits beyond which permanent damage to the device may occur and/or it useful life reduced. Device performance is not guaranteed outside recommended operating conditions, Quartzdyne does not recommend operating the device in this region. CAUTION: The DC-coupled outputs are subject to permanent damage if improperly wired. Always use current-limited power supplies to protect against circuit damage.
2. Pressure and temperature frequency ranges may vary by transducer model.
3. Long-term life may be reduced if worst-case loads are applied at maximum operating temperature.
4. Extrapolated from powered and un-powered circuit life tests. See www.quartzdyne.com for test methods and results.
5. Supply ripple above maximum can increase signal jitter, decreasing transducer resolution.
6. Inrush current is the peak current drawing during transducer startup. Estimate assumes no load on circuit.
7. Supply current measurements assumes no wires soldered to the output(no load condition).
8. Period jitter measured with 100Mhz O-Scope 10nS sample rate, and 1 second persistence.
9. Signal outputs are driven with a CMOS logic buffer. Pressure and Temperature signals are square waves. The Reference signal shape is dependant on load conditions; at 300pF the amplitude is significantly reduced.
10. Temperature Signal Jitter 0°C to 175°C is 300nS max.