



Quartzdyne, Inc.

Digital SMT/Hybrid Circuit Specifications

7/1/2011

2-Wire I²C Series Interface with Frequency Counter and Coefficient Storage

Features:

The Quartzdyne Digital Pressure Transducer circuit is available in either surface-mount for low temperature applications or hybrid construction for high temperature or high reliability applications. The circuit includes oscillators, frequency counters and coefficient storage. Communications is via an I²C compatible 2-wire digital serial interface. The serial interface is appropriate for short (board-to-board) connection of up to four Digital Transducers directly to the customer's micro-controller. Shielded cables up to 10 feet may be used where the micro-controller cannot be mounted near the transducer. The Digital Transducer is not designed for direct connection to a PC. The Quartzdyne QCom is recommended for this purpose.

Absolute Maximum Ratings

	Surface-mount	Hybrid
Supply Voltage ¹	-0.5 V to 6.2 V @ 50 mA max	-0.5 V to 6.2 V @ 50 mA max
SDA, SCL ¹	-0.5 V to V _{CC} +0.5V @ 20 mA max	-0.5 V to V _{CC} +0.5V @ 20 mA max
A1,A2 ¹	-0.5 V to V _{CC} +0.5V @ 20 mA max	-0.5 V to V _{CC} +0.5V @ 20 mA max
Storage Temperature ¹	-40°C to 150°C	-40°C to 225°C
Mean time to failure ^{1,2}	6 months @ 150 °C (2 yrs @ 125°C)	>1 year @225°C, >5 years @ 200 °C
ESD	± 2kV (MIL-STD-883)	± 2kV (MIL-STD-883)

Electrical Characteristics

Recommended Conditions	Surface Mount Version			Hybrid Version		
Operating Temperature	-40°C to 150°C			0°C to 225°C		
Supply Voltage (V _{CC})	2.7 V _{DC} to 5.5 V _{DC}			2.7 V _{DC} to 5.5 V _{DC}		
Operating Specifications	Min	Typ	Max	Min	Typ	Max
Operating Current (I _{CC}) 25°C	6.5 mA	7.5 mA	8.5 mA	3.0 mA	6.2 mA	7.2 mA
Operating Current (I _{CC}) @ T _{max}	7.0 mA	8.25 mA	10.5 mA	3.0 mA	11.1 mA	12.1 mA
Start-Up Time		0.35 sec	0.60 sec		0.15 sec	0.350 Sec
Peak Inrush Current @25°C ³			11.0 mA		7.2 mA	9.8 mA
Peak InRush Current @ T _{max} ³			13.0 mA		13.0 mA	15.2 mA
Supply Voltage Sensitivity			0.150Hz/V			0.150 Hz/V
Supply Ripple (1 kHz-200 kHz) ⁴			200 mV _{pp}			200 mV _{pp}
Reference Frequency	7.193 MHz	7.200 MHz	7.207 MHz	7.193 MHz	7.200 MHz	7.207 MHz
Pressure Frequency ⁵	10 kHz		100 kHz	10 kHz		100 kHz
Temperature Frequency ⁵	10 kHz		100 kHz	10 kHz		100 kHz
Frequency Counter						
Counter Type	Dual Period Counter					
Gating Mode	Continuous (zero dead time between samples)					
Gate Time	0.001 seconds to 2.3 seconds (determined by query rate)					
Reference	24 bits (2.3 seconds max with 7.2 MHz Reference Frequency)					
Pressure, Temperature	18 bits (110 kHz max with 2.3 second Gate Time)					
Resolution (Hz)	Frequency / (Reference Frequency * Gate Time)					
EEPROM ⁶	I ² C 8192 bytes (x 8 bit)					
Memory Type	24C64 EEPROM					
Data Retention ⁷	Data retention cannot be guaranteed above 150°C					
Serial Interface						
I ² C Compatible						
V _{IL} (SCL, SDA)	-0.5V to V _{CC} x 0.3					
V _{IH} (SCL, SDA)	V _{CC} x 0.7 to V _{CC} + 0.5V					
Output Type	Open Drain with 2-20 kΩ pull-up resistor supplied by host controller					
Clock Frequency (SCL)	100 kHz max					
Address Interface	Multi-function pins A1 and A2 internally pulled up to V _{CC}					

Notes:

1. Absolute Maximum Ratings are value limits beyond which permanent damage to the device may occur and/or its useful life reduced. Device performance is not guaranteed above recommended operating conditions, Quartzdyne does not recommend operating the device in this region. CAUTION: Improperly wired devices can be damaged, always use current-limited power supplies for protection.
2. Extrapolated from powered and un-powered circuit life tests. See www.quartzdyne.com for test methods and results.
3. Peak Inrush current is the maximum current drawing during transducer startup.
4. Supply ripple above max can increase signal jitter, decreasing transducer resolution.
5. Pressure and temperature frequency ranges may vary by transducer model.
6. The EEPROM is for storage of the Quartzdyne coefficients in the lower 256 bytes only. Use of this memory for any other applications not guaranteed. The capacity and technology of this device are subject to change without notice. The user is advised to verify the provided checksum prior to using the coefficient data. Multiple copies of the coefficients are stored in the lower 1024 bytes for redundancy.
7. For chip versions 4.03 and higher (hybrid only) a new EEPROM is being used. Data retention of 5000 hours at 225°C is expected, but this has not yet been verified.