

# Multi-Mode Telemetry Transmitters



## Fourth-Generation Powerhouse

Quasonix digital multi-mode telemetry transmitters are the benchmark of the industry, providing unparalleled performance and value in small, robust, power-efficient packages. We offer proven quality, with over 16,000 transmitters shipped. Quasonix is... Reinventing Telemetry™.

### TIMTER™

**Advanced Engineering** – TIMTER fourth-generation transmitters have a faster processor, improved frequency stability, and support for all six LDPC codes.

- LDPC forward error correction mode improves link margin, nearly tripling the operating distance of your telemetry link. Adopted by the Range Commander's Council, IRIG 106-17, Appendix 2-D.

### Band Combinations for All Your Needs

- L, S, or C Band TIMTER - When only single-band operation is needed.
- L/C Band TIMTER - Single transmitter configuration covering a frequency tuning range spanning L and C bands.
- S/C Band TIMTER - With output power up to 18 W, this configuration has a carrier frequency tuning range spanning S and C bands.
- L/S Band TIMTER - Highly flexible solution available with all three legacy TM bands: lower L, upper L, and full S.
- L/S/C Band TIMTER - Ultimate solution with lower L, upper L, full S, and full C bands.

**Exceptional DC-to-RF Conversion Efficiency** – Facilitates replacement of older 10 W transmitter with new 20 W transmitter at same current draw.

**Output Power from 10 mW to 25 W** – Several RF output choices, along with variable power and dual power options for software or hardware-based power adjustment.

### nanoTX™ and nanoPuck™

**Smallest ARTM Transmitters** – The 1.4 in<sup>3</sup> nanoTX and nanoPuck transmitters are ideal for applications with strict SWAP constraints. Available in S band, up to 5 W.

### All Quasonix Transmitters

**Automatic Data Rate Tracking** – Premod filtering and deviation automatically track the data rate, with no programming or configuration required.

**Clock-Free Input Option Available** – Ideal for replacing analog transmitters or for use with encoders or cryptos that provide a data output only.

# TIMTER Transmitter Specifications

Performance									
Modulation type	PCM/FM (ARTM Tier 0), SOQPSK-TG (ARTM Tier I), Multi-h CPM (ARTM Tier II), BPSK, QPSK, OQPSK, UQPSK,STC								
Carrier frequency tuning range	Band ID Code	Lower L band 1435.5-1534.5 MHz	Upper L band 1750.0-1855.0 MHz	Lower S band 2200.5-2300.5 MHz	Upper S band 2300.5-2394.5 MHz	C band 4400.0-4950.0 MHz	Mid C band 5091.0-5150.0 MHz	Euro Mid C band 5150.0 - 5250.0 MHz	Max Power
<p>(All frequency bands may be tuned 0.5 MHz above or below the stated frequency.)</p> <p><b>Note:</b> The MA option enables operation below Lower S band frequencies in the tuning range of (2025.0 MHz to 2110.0 MHz) for use in Space operations and Space research.</p> <p>For additional information about this option or about specific frequency bands, contact Quasonix.</p> <p>*Custom frequency ranges are available. Contact Quasonix for details.</p>	A			✓					25 W
	B						✓	✓	18 W
	C					✓			18 W
	D					✓	✓		18 W
	E	✓	✓	✓	✓	✓	✓	✓	10 W
	F			✓	✓	✓			18 W
	G							✓	18 W
	H	✓				✓			18 W
	J					✓	✓	✓	18 W
	K			✓	✓	✓	✓	✓	10 W
	L	✓							20 W
	M	✓	✓	✓	✓				20 W
	N					✓			25 W
	Q	✓	✓	✓	✓	✓	✓		10 W
	S			✓	✓				20 W
	T	✓				✓	✓		18 W
	V			✓	✓	✓	✓		18 W
	W			✓	✓		✓	✓	18 W
	X						✓		18 W
	Y	✓	✓			✓	✓		18 W
Z	✓					✓	✓	18 W	
RF output power	TIMTER L, S, C, L/S, L/C and S/C bands: 10 mW, 1 W, 2 W, 5 W, 10 W, 18 W, 20 W TIMTER S band: 10 mW, 1 W, 2 W, 5 W, 10 W, 20 W, 25 W TIMTER L/S/C band: 10 mW, 10 W Option DP: Dual power, 64 settings, user selects one for "high" and one for "low", chosen via baseband connector pin Option VP: Variable power, 64 settings approximately 0.5 dB apart  Note: Some older transmitter models have 32 1.0 dB steps. Contact Quasonix for additional information.								

## Performance (Continued)

Data (bit) rate, automatic rate adaptation	TIMTER: TIMTER option HR: TIMTER option LR:	0.1-28 Mbps (0.05-14 Mbps for PCM/FM) Extends upper limit to max of 46 Mbps for SOQPSK and ARTM CPM (23 Mbps for PCM/FM) Extends lower limit to min of 50 kbps for SOQPSK and ARTM CPM (25 kbps for PCM/FM)
Clock Free Data (bit) rate	With BR x command: With BR A command:	Allows user to enter a fixed bit rate in the range defined in the Data (bit) rate specifications above Automatically detects bit rate in the range defined in the Data (bit) rate specifications above; Quasonix guarantees automatic bit rate operation up to 35 Mbps; beyond that operation is dependent on input data signal quality (jitter, truly random data, etc.)
Input current @ +28 VDC	TIMTER L or S band, 10 mWatt	0.30 A max. 0.25 A typical
	TIMTER L or S band, 5 Watt	1.0 A max. 0.85 A typical
	TIMTER L or S band, 10 Watt (2in3 packages)	1.4 A max. 1.1 A typical
	TIMTER L or S band, 10 Watt (> 2in3 packages)	1.8 A max. 1.5 A typical
	TIMTER L/S band, 5 Watt	1.2 A max. 1.0 A typical
	TIMTER L/S band, 10 Watt	2.2 A max. 1.8 A typical
	TIMTER L/S band, 18 or 20 Watt	3.2 A max. 2.8 A typical
	TIMTER L band, 18 or 20 Watt	3.2 A max. 2.8 A typical
	TIMTER S band, 18 or 20 Watt	2.8 A max. 2.5 A typical
	TIMTER S band, 25 Watt	3.2 A max. 2.9 A typical
	TIMTER C band, 10 mWatt	0.30 A max. 0.25 A typical
	TIMTER C band, 5 Watt	1.5 A max. 1.3 A typical
	TIMTER C band, 10 Watt	2.4 A max. 1.9 A typical
	TIMTER C band, 18 Watt	3.4 A max. 3.0 A typical
	TIMTER L/C band and S/C band, 10 mWatt	0.30 A max. 0.25 A typical
	TIMTER L/C band and S/C band, 10 Watt	2.2 A max. 2.0 A typical
	TIMTER L/C band and S/C band, 18 Watt	3.5 A max. 3.2 A typical
	TIMTER L/S/C band, 10 mWatt	0.45 A max. 0.40 A typical
TIMTER L/S/C band, 10 Watt	2.5 A max. 1.8 A typical	
Input voltage	Standard: +28 ± 4 VDC  With optional wide voltage (WV option): +8.0 to +34 VDC for 10 mW, 1 W, 2 W models, all band combinations +12 to +34 VDC for 5 W model, all band combinations +21 to +34 VDC for 10 W, all band combinations except band codes F, H, K, Q, V, T, W, Y, and Z +24 to +34 VDC for 18 W and 20 W models, band codes A, L, N, S, and M only +24 to +34 VDC for 25 W models, band codes A and N only	
Power reversal	Reverse voltage protection	
Serial Control interface	2 - RS-232 serial control interface T - TTL serial control interface 4 - RS-422 serial control interface 6 - RS-422, 120 ohms differential, even when unit is powered off	

<b>Clock and Data signal interfaces</b> (Serial data with separate synchronous clock)  (Input impedances are only specified when unit is powered On, unless explicitly stated as being valid in the Off state.)	H - TTL (10K ohms to ground) T - TTL (75 ohms to ground) A - TTL selectable between 75 ohms to GND and 10k ohms to GND R - TIA/EIA-422 (RS-422) - 120 ohms differential B - TIA/EIA-422 (RS-422) - 120 ohms differential, even when unit powered off M - Dual mode selectable (TTL terminated 10k ohms to GND, RS-422 term 120 ohms diff.) D - Dual mode selectable (TTL terminated 75 ohms to GND, RS-422 term 120 ohms diff.) S - Tri-mode selectable (TTL term 75 ohms to GND, TTL term 10k ohms to GND, and RS-422 term 120 ohms differential) L - LVDS (Low Voltage Differential Signal)
<b>Carrier frequency tuning increment</b>	0.5 MHz minimum resolution unless FO option is installed, then 1Hz minimum
<b>Carrier frequency accuracy</b>	± 2.0 ppm over temperature ± 6.0 ppm, all causes, including aging over 5 years
<b>Randomizer</b>	15-stage LFSR, per IRIG 106. Selectable for bypass or enable CCSDS randomizer available if extended LDPC (LD6 option) is installed and enabled

## Environmental

<b>Operating temperature</b>	-40°C to +85°C (10 mW, 1 W, 2 W, 5 W, 10 W models) -40°C to +70°C (20 W, 25 W)
<b>Storage temperature</b>	-55°C to +100°C (all models)
<b>Operating humidity</b>	0 to 95% (non-condensing)
<b>Altitude</b>	Up to 100,000 ft.

## Physical

Dimensions	TIMTER Package	Volume	Width	Length	Height
(Typical sizes of transmitters listed. For the latest information about your transmitter package code, visit <a href="http://www.quasonix.com/resources">www.quasonix.com/resources</a> .)	02XX	2.40 in <sup>3</sup>	2.00"	3.00"	0.40"
	04XX	4.50 in <sup>3</sup>	2.00"	3.00"	0.75"
	05XX	4.50 in <sup>3</sup>	2.00"	3.00"	0.75"
	06XX	6.07 in <sup>3</sup>	2.00"	3.00"	1.01"
	07XX	6.55 in <sup>3</sup>	2.00"	3.00"	1.09"
		6.67 in <sup>3</sup>	2.00"	3.00"	1.11"
	08XX	7.59 in <sup>3</sup>	2.00"	3.00"	1.00"
		8.42 in <sup>3</sup>	2.00"	3.00"	1.40"
	09XX	9.18 in <sup>3</sup>	2.00"	3.00"	1.53"
<b>Vibration</b>	19.6 G (RMS) random, 20 Hz to 2,000 Hz, 3 axes				
<b>Shock</b>	60 G (PK), 1/2 sine, 5 ms duration, 3 axes				
<b>Acceleration</b>	100 G, 3 axes				
<b>Connector - RF</b>	All TIMTER: SMA female				
<b>Connector - Baseband / Primary</b>	TIMTER: MDM-15 (male for TTL or female for RS-422 interface)				

# nanoTX Transmitter Specifications

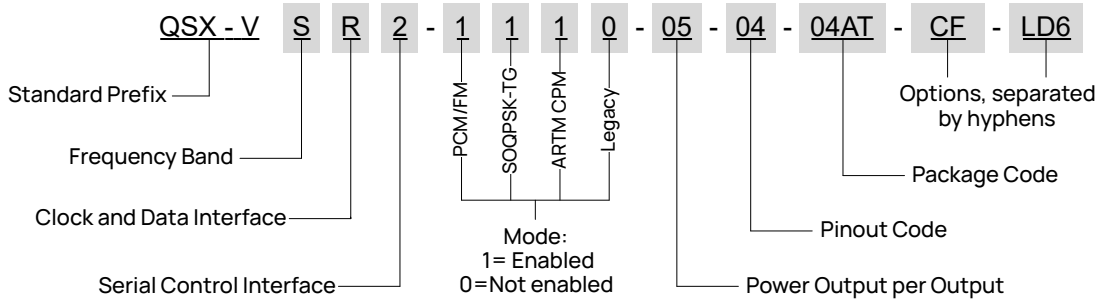
Performance		
Modulation type	PCM/FM (ARTM Tier 0), SOQPSK-TG (ARTM Tier I), Multi-h CPM (ARTM Tier II), BPSK, QPSK, OQPSK, UQPSK	
Carrier frequency tuning range <small>(All nanoTX models)</small>	Lower S band	Upper S band
	2200.5 - 2300.5 MHz	2289.5 - 2394.5 MHz
RF output power	nanoTX and nanoPuck: 1 W, 2 W, and 5 W Option DP: Dual power, 64 settings, user selects one for “high” and one for “low”, chosen via baseband connector pin Option VP: Variable power, 64 settings approximately 0.5 dB apart  Note: Some older transmitter models have 32 1.0 dB steps. Contact Quasonix for additional information.	
Carrier frequency tuning increment	0.5 MHz	
Carrier frequency accuracy	$\pm 2.0$ ppm over temperature $\pm 6.0$ ppm, all causes, including aging over 5 years	
Data (bit) rate, automatic rate adaptation	nanoTX, nanoPuck: 0.1-28 Mbps (0.05-14 Mbps for PCM/FM) nanoTX option HR: Extends upper limit to max of 46 Mbps (23 Mbps for PCM/FM) nanoTX option LR: Extends lower limit to min of 50 kbps (25 kbps for PCM/FM)	
Input voltage	nanoTX, nanoPuck: $+28 \pm 4$ VDC Standard nanoTX, nanoPuck with optional wide voltage (WV option): +8.0 to +34 VDC for 1 Watt models +8.0 to +34 VDC for 2 Watt models +12 to +34 VDC for 5 Watt models	
Input current @ +28 VDC	nanoTX, nanoPuck	1 Watt 450 mA max; 350 mA typical 2 Watt 570 mA max; 480 mA typical 5 Watt 1.0 A max; 800 mA typical
Power reversal	Reverse voltage protection	
Control interface	1 - LVTTTL serial control interface (nanoPuck) 2 - RS-232 serial control interface (nanoTX)	
Signal interfaces	H - TTL 10k ohms to ground T - TTL 75 ohms to ground R - TIA/EIA-422 (RS-422) - 120 ohms differential B - TIA/EIA-422 (RS-422) - 120 ohms differential, even when unit powered off	
Randomizer	15-stage LFSR, per IRIG 106. Selectable for bypass or enable	

Environmental	
Operating temperature	-40°C to +85°C (all models)
Storage temperature	-55°C to +100°C (all models)
Operating humidity	0 to 95% (non-condensing)
Altitude	Up to 100,000 ft.

## Physical

Dimensions	nanoTX 01Ax packages: 1.40 in <sup>3</sup> , 1.25" (W) x 3.40" (L) x 0.33" (H) nanoPuck 01Px packages: 2.30" (Dia) x 0.33" (H)
Vibration	19.6 G (RMS) random, 20 Hz to 2,000 Hz, 3 axes
Shock	60 G (PK), 1/2 sine, 5 ms duration, 3 axes
Acceleration	100 G, 3 axes
Connector - RF	nanoTX (all packages): Female MMCX nanoPuck (all packages): Female MMCX
Connector - Baseband / Primary	nanoTX 01Ax package: Female 15 Pin or 21 pin nano nanoPuck 01Px package: SAMTEC FTSH-108-04-F-D

## TIMTER, nanoTX, and nanoPuck Part Numbering Example



## TIMTER Optional Features

<b>AC:</b>	Automatic Carrier Wave Output	<b>LC:</b>	Low current in the RF Off state, < 10 mA (hdw opt.)
<b>AI:</b>	Auxiliary Input for digital data that is already premod filtered	<b>LD6:</b>	Extended LDPC
<b>AP:</b>	Adapter Plate (hardware accessory)	<b>LR:</b>	Low Bit Rate - Decreases default min bit rate to 50 kbps (25 kbps for Tier 0)
<b>BRx:</b>	Baud Rate	<b>MA:</b>	Below Lower S band, 2025.0 MHz to 2110.0 MHz (for Space operation and Space research applications)
<b>C7:</b>	Quasonix interpretation of IRIG 106-17 Appendix 2-C serial control protocol	<b>MK:</b>	Randomizer Hardware Control (hardware option)
<b>CE:</b>	Convolutional Encoder (k=7 rate 1/2)	<b>MS:</b>	Modulation Scaling
<b>CF:</b>	Clock-free Baseband Interface	<b>P9:</b>	MDM-9 Accessory Board (hardware accessory)
<b>CG:</b>	Clock Generator Output to Baseband Connector	<b>PF:</b>	Parallel Port Frequency Programming
<b>DP:</b>	Dual Power, 64 settings, user selects one for "high" and one for "low", chosen via baseband conn. pin	<b>PM:</b>	Parallel Port Mode Selection
<b>EN:</b>	Ethernet Payload Capability	<b>PS:</b>	Hardware Preset (PS2, PS4, PS8, or PS16)
<b>FM:</b>	Allows the TIMTER to function as an analog FM transmitter	<b>RH:</b>	Recall Holdoff
<b>FO:</b>	Frequency Offset	<b>STDN:</b>	Supports Spacecraft Tracking and Data Network (PM/BPSK) mode
<b>GN:</b>	GPS Notch (lowers noise at L1 and L2)	<b>SWBX:</b>	Switch Box (hardware accessory)
<b>HR:</b>	High Bit Rate - Increases default max bit rate to 46 Mbps (23 Mbps for Tier 0)	<b>VF:</b>	Variable FIFO Depth, controls transmitter latency
<b>ID:</b>	Internal Clock and Data can be saved as a power- up default	<b>VP:</b>	Variable power (31 settings, spanning 24 dB)
		<b>WV:</b>	Wide input voltage range

## nanoTX Optional Features

<b>AC:</b>	Automatic Carrier Wave Output	<b>LC:</b>	Low current in the RF Off state, < 10 mA (hdw option)
<b>BRx:</b>	Baud Rate	<b>LD:</b>	Forward Error Correction / Low Density Parity Check
<b>C7:</b>	Quasonix interpretation of IRIG 106-17 Appendix 2-C serial control protocol	<b>LD6:</b>	Extended Low Density Parity Check (LDPC)
<b>CE:</b>	Convolutional Encoder (k=7 rate 1/2)	<b>LR:</b>	Low Bit Rate - Decreases default min bit rate to 50 kbps (25 kbps for Tier 0)
<b>CF:</b>	Clock-free Baseband Interface	<b>MS:</b>	Modulation Scaling
<b>DP:</b>	Dual Power, 64 settings, user selects one for "high" and one for "low", chosen via baseband connector pin	<b>PS:</b>	Hardware Preset (PS2, PS4, PS8, or PS16)
<b>FO:</b>	Frequency Offset	<b>STDN:</b>	Supports Spacecraft Tracking and Data Network (PM/BPSK) mode
<b>GN:</b>	GPS Notch (lowers noise at L1 and L2)	<b>VF:</b>	Variable FIFO Depth controls transmitter latency
<b>HR:</b>	High Bit Rate - Increases default max bit rate to 46 Mbps (23 Mbps for Tier 0)	<b>VP:</b>	Variable power (31 settings, spanning 24 dB)
<b>ID:</b>	Internal Clock and Data can be saved as a power- up default	<b>WV:</b>	Wide input voltage range

## Transmitter Accessories



### Adapter Plate (P/N: QSX-AC-AP96)

Adapts the 2" x 3" TIMTER transmitter footprint to a larger 2.5" x 3.5" mounting footprint



### Bench Heat Sink (P/N: QSX-AC-32-HS-12V)

Heat sink with fan for TIMTER and nanoTX models. Includes power supply for North American operation.



### Airborne IntelliCool™ Heat Sink (P/N: QSX-AC-32-HS-28V-SP)

Heat sink with integral fan, power supply, and temperature-controlled power on at +37°C. Draws power directly from a TIMTER transmitter. External power supply not needed



### MDM-15 Connector and Pigtails (P/N: QSX-AC-MDM15-36-PIN or QSX-AC-MDM15-36-SOCK)

Mating connector prewired with 36" non-terminated, color-coded pigtail cables for transmitter connections. Pin connector required for standard RS-422 transmitters, socket connector for standard TTL transmitters



### MDM-15 Wiring Harness (P/N: QSX-AC-MDM15-HARNESS-PIN or QSX-MDM15-HARNESS-SOCK)

Mating connector prewired and terminated with BNC connectors for clock and data, banana plugs for power and ground, and a DB-9 connector for serial control. Pin connector required for standard RS-422 transmitters, socket connector for standard TTL transmitters



### 2nd Generation Digital Frequency and Mode Switch Box (P/N: QSX-AC-DSWBX)

Small aluminum digital switch box for use with transmitters equipped with the 9-pin parallel port. Provides frequency and mode programming capability. LED display supports modes 0-14 and five frequency digits. Channel selector for use with Quasonix Dual Transmitters.



### USB to Serial Adapter (P/N: QSX-AC-USBSER-CONV)

Converts USB interface to serial interface for controlling transmitters from a PC that does not have a DB-9 connector

# Quasonix

All Quasonix products are under U.S. Dept. of Commerce jurisdiction. Transmitters are categorized as EAR99.  
ISO 9001:2015 Certified | Specifications subject to change without notice.

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