Spaceborne Transponder Subsystem

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Spaceborne Transponder Technical Data Sheet

Features

- Dual-direction Signal Processing Capability
- Wide-frequency-band Coverage
- Excellent RF Performance
- Comprehensive External Interfaces
- Space-grade Radiation-hardened Capability

Applications

Military Communications	Radar	Instrumentation
Communication Systems	Space Systems	Test & Measurement

Description

It receives V-band uplink signals from the feed payload, Ku-band uplink signals from the phased array antenna and accompanying telemetry signals from the satellite platform. Processed by amplification, frequency conversion and filtering, the service signals are delivered to the Ku transmit phased array, satellite platform and Q-band feed transmit antenna.

Technical Specifications

Forward Service Specifications

No.	Test Item	Performance Indicator	Unit
1	Input Frequency	47.20GHz–49.20GHz	GHz
2	Output Frequency	10.70GHz–12.70GHz	GHz
3	Input Power	-15 to -45dBm	dBm
4	Output Power	-8dBm	dBm
5	Forward Gain	≥35dB	dB
6	Spurious Suppression	≥-50dBc (in-band)	dBc
		≥-60dBc (out-of-band)	dBc



7	In-band Flatness	≤1.5dB (within a single 240MHz channel)	dB
		≤3dB (across eight 240MHz channels)	dB
8	Group Delay	F0±25% bandwidth ≤10ns	ns
		F0±35% bandwidth ≤20ns	ns
		F0±50% bandwidth ≤50ns	ns
9	Phase Noise	≤-65dBc/Hz@100Hz	dBc
		≤-75dBc/Hz@1kHz	dBc
		≤-85dBc/Hz@10kHz	dBc
		≤-95dBc/Hz@100kHz	dBc
10	Out-of-band Rejection	F0±150MHz: ≤-15dBc	dBc
11	Third-order Intermodulation	≤-20dBc	dBc

Forward Accompanying Specifications

No.	Test Item	Performance Indicator	Unit
1	InputFrequency	49.70GHz–49.75GHz	GHz
2	Output Frequency	2030MHz–2080MHz	GHz
3	Input Power	-29 to -59dBm	dBm
4	Output Power	-40dBm	dBm
5	Reverse Gain	≥19dB	dB
6	Spurious Suppression	≥-50dBc (in-band)	dBc
		≥-60dBc (out-of-band)	dB
7	In-band Flatness	≤1.5dB	dB
8	Phase Noise	≤-65dBc/Hz@100Hz	dBc
		≤-75dBc/Hz@1kHz	dBc
		≤-85dBc/Hz@10kHz	dBc
		≤-95dBc/Hz@100kHz	dBc



Reverse Service Specifications

No.	Test Item	Performance Indicator	Unit
1	Input Frequency	14.0GHz–14.5GHz	GHz
2	Output Frequency	37.5GHz–38GHz	GHz
3	Input Power	-11 to -29dBm	dBm
4	Output Power	-5dBm	dBm
5	Reverse Gain	≥6dB	dB
6	Spurious Suppression	≥-50dBc (in-band), ≥-60dBc (out-of-band)	dBc
7	In-band Flatness	≤2dB	dB
8	Group Delay	F0±25% BW ≤10ns, F0±35% BW ≤20ns	ns
		F0±50% BW ≤50ns	ns
9	Phase Noise	≤-65dBc/Hz@100Hz, ≤-75dBc/Hz@1kHz	dBc
		≤-85dBc/Hz@10kHz, ≤-95dBc/Hz@100kHz	dBc
10	Out-of-band Rejection	F0±70MHz: ≤-15dBc	dBc

Reverse Accompanying Specifications

No.	Test Item	Performance Indicator	Unit
1	Input Frequency	2.240GHz–2.290GHz	GHz
2	Output Frequency	39.95GHz–40GHz	GHz
3	Input Power	-15dBm	dBm
4	Output Power	-15dBm	dBm
5	Reverse Gain	≥0dB	dB
6	Spurious Suppression	≥-50dBc (in-band)	dBc
		≥-60dBc (out-of-band)	dB
7	In-band Flatness	≤1dB	dB
8	Phase Noise	≤-65dBc/Hz@100Hz, ≤-75dBc/Hz@1kHz	dBc
		≤-85dBc/Hz@10kHz, ≤95dBc/Hz@100kHz	dBc



Transponder Power Interface Definition

Connector Name: X21 (Power）			Connector Model: J30JA-9ZJ			
Pin No.	Designation	Description	Voltage (V)	Current (A)	Signal Type	Input/Output
1,2	PGND	PGND	0			
3,4	P+	Power +	+12V	2.5	Power	Input
5,6	GND	Power -	0			
7,8	Reset	Transponder Reset	0~12V			
9	PGND	Chassis Ground	0			

Dimensions and Weight

1) Envelope Dimensions: ≤233mm (W) × 188mm (L) × 86mm (H）

2) Weight: ≤3.5kg

External Interfaces

The transponder has a total of 23 external interfaces, including 4 high-frequency 2.4-K interfaces, 12 SMA-K interfaces for the transmit/receive phased array antenna, 2 SMA-K interfaces for the telemetry link, 2 CAN bus interfaces, 1 power interface, 1 test interface, 1 RS422 interface, etc.

The detection interface includes 10 ADC voltage detection channels and 2 TTL control interfaces.



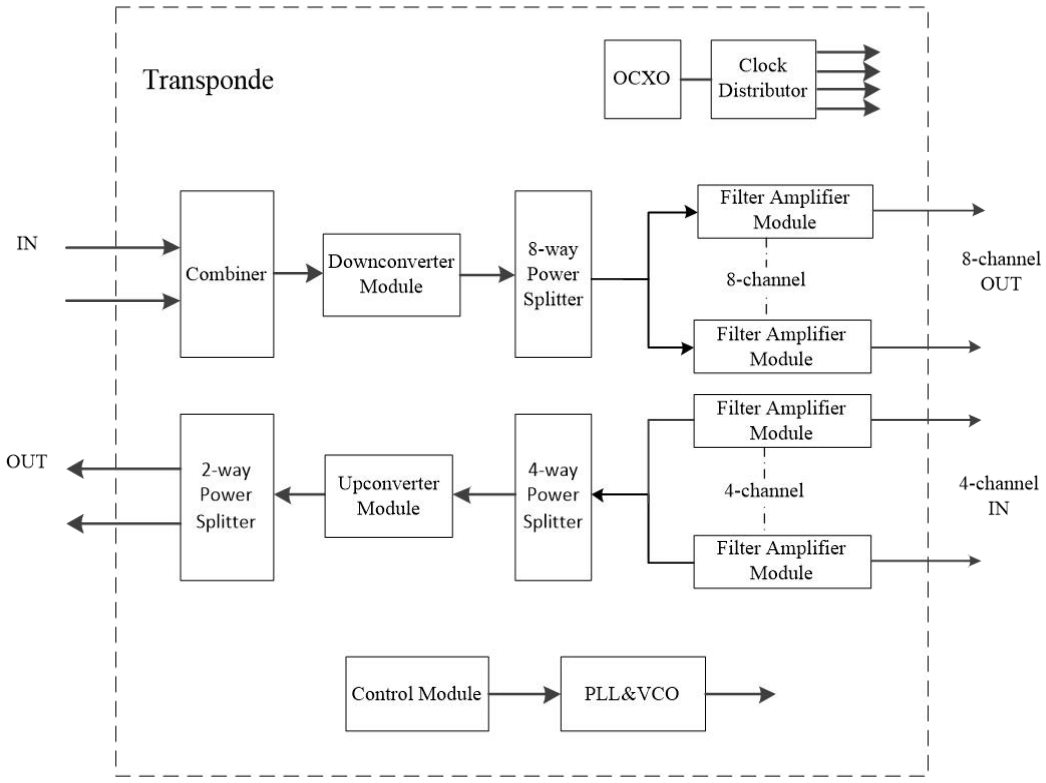
Recommended Temperature

1) Storage temperature range: -20°C to +55°C.
2) Operating temperature range: -15°C to +45°C.
3) Ground storage temperature: -10°C to +45°C.

Radiation Resistance

Total Ionizing Dose (TID): ≥43krad(Si);

Single Event Latch-up (SEL): 37MeV·cm²/mg.



Block Diagram of the Transponde