TFS14-15 - Frequency synthesizer

The TFS14-15 Frequency Synthesizer is a high-precision, ultra-wideband RF signal generator designed for applications requiring exceptional frequency resolution and rapid agility. Operating across 200 MHz to 15 GHz with a 1 Hz minimum step size, it leverages advanced digital phase-locked loop (PLL) technology to achieve ultra-fine tuning and stability.

The device delivers outstanding phase noise performance (e.g., -105 dBc/Hz @1 kHz at 1 GHz) and robust spurious/harmonic suppression (≤-60 dBc spurious, ≤-5 dBc harmonics).

Applications Include:

Wireless Communication Systems:
Local oscillators for 5G/6G transceivers, satellite modems, and microwave links.

Test & Measurement Equipment:
Signal sources for spectrum analyzers, vector network analyzers, and RF test benches.

Defense & Aerospace:
Radar systems, electronic warfare (EW), and frequency-hopping applications.

Embedded RF Solutions:
Integration into IoT devices, wireless sensors, and compact digital acquisition systems.

Consumer Electronics:
High-frequency modules for drones, automotive radar, and smart home devices.

Research & Prototyping:
Precision frequency synthesis in RF circuit

General Specifications

- Output frequency: 200MHz~15GHz;
- Frequency step: 1Hz;
- Small size: 38*38*10mm
- Control mode: SPI control;

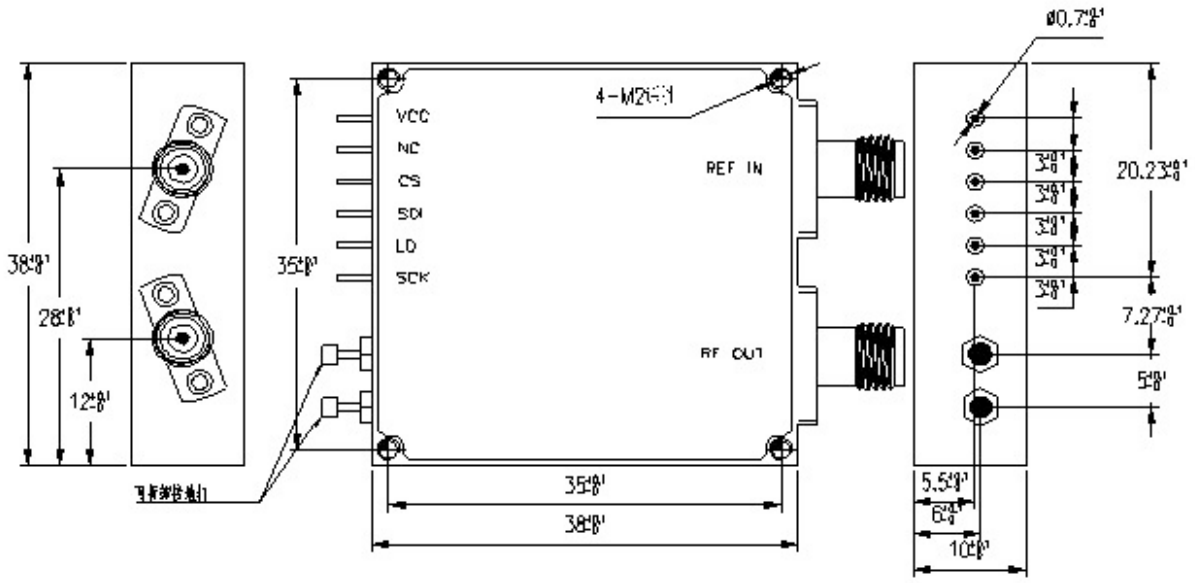
kTB Frequency synthesizer

The TFS10-15 housed in a compact 38×38×10 mm cavity, it supports SPI control for seamless integration into space-constrained systems. With industrial-grade temperature resilience (-40°C to +70°C) and rapid frequency switching (as low as 250 µs between 6–15 GHz), the TFS14-15 is ideal for demanding RF environments.

Product Features:	Specification name		Indicator parameters			remark
External references	Enter the frequency		100MHz			
	Input power		7±3dBm			
	Frequency stability		Synchronized with external references			
	Frequency accuracy		Synchronized with an external reference, the accuracy is 0.04Hz			
	Phase noise		-153dBc/Hz@1kHz			
	Input impedance		50 Ω			
Frequency output	Output frequency		200~15000MHz			
	Frequency stepping		1Hz			
	Frequency hopping time		500us			
	Phase noise	Frequency	1GHz	5GHz	10GHz	15GHz
		dBc/Hz@100Hz	≤-94	≤-80	≤-74	≤-70
		dBc/Hz@1kHz	≤-105	≤-91	≤-85	≤-81
		dBc/Hz@10kHz	≤-112	≤-98	≤-92	≤-88
		dBc/Hz@100kHz	≤-114	≤-100	≤-94	≤-90
		dBc/Hz@1MHz	≤-130	≤-116	≤-110	≤-106
	Spurious		≤ -60dBc/-65dBc (Typ)			
	harmonic wave		≤ -5 dBc			
	Output power		1 ± 6dBm			
Power supply requirements	Operating voltage		+3.3±0.1v			
	Maximum voltage		+3.4v			
	Operating current		0.6A (Stable)			
	Start-up time		2s			
Temperature and environmental characteristics	Operating temperature		-40° to +70° C			
	Storage temperature		-55° to +85° C			
Exterior volume	volume		38×38×10mm			
	weight		≤ 45g			

Remark: (1) Frequency hopping time: the output frequency switching time between 6GHz~15GHz ≤250uS, and the output frequency switching time between 2GHz~6GHz≤300uS; The output frequency switching time between 1GHz~2GHz ≤ 350uS, and the output frequency switching time between 200MHz~1GHz ≤500uS (2) The output power is at room temperature, and the output power is 1 ± 8 dBm under high temperature working conditions

Dimensions:

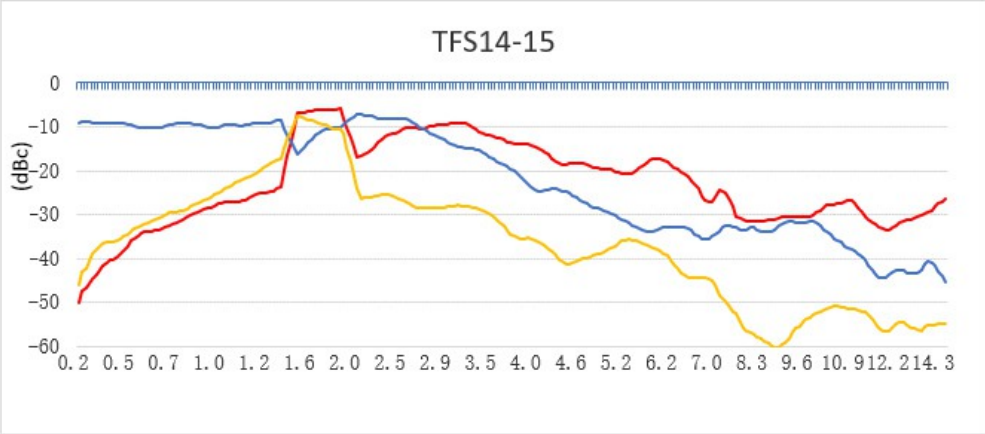


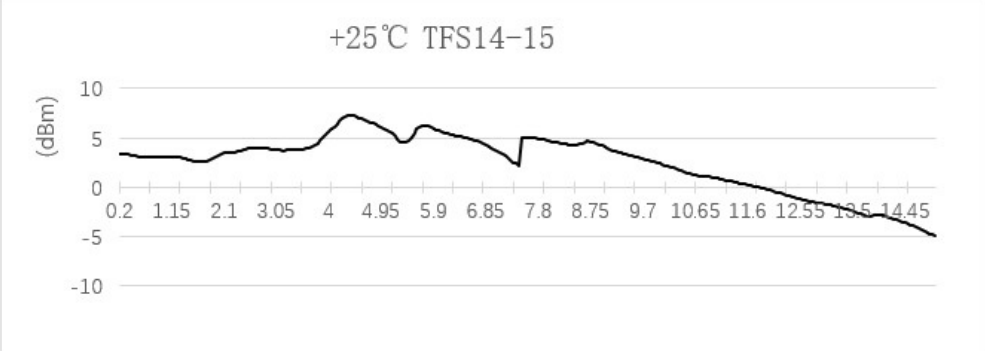
Connector definition	
RF in	SMA-K (detachable) (Φ0. 38).
RF out	SMA-K (detachable) (Φ0. 38).
Power supply	+3.3V（Φ0. 7）
NC	Insulator (Φ0.) 7)
CS	Insulator (Φ0.) 7)
SDI	Insulator (Φ0.) 7)
LD-out	Insulator (Φ0.) 7)
SCK	Insulator (Φ0.) 7)

Suggestion: According to the spurious distribution of this product, customers can filter some spurs for the frequency band used to obtain better spurious suppression.

Note: This note only proposes distal spurs, which can be suppressed by internal optimization to 70dBc, and it is recommended to use a suitable high-pass absorption filter for better spurious suppression when using frequencies above 11 Ghz.

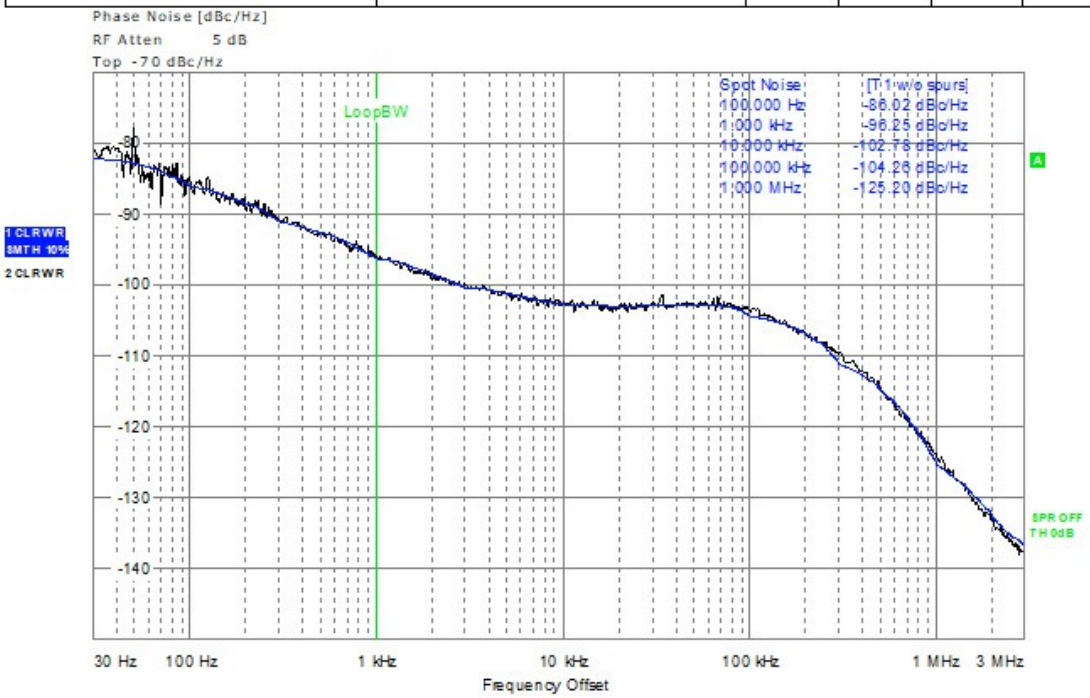
Typical Test Curves:





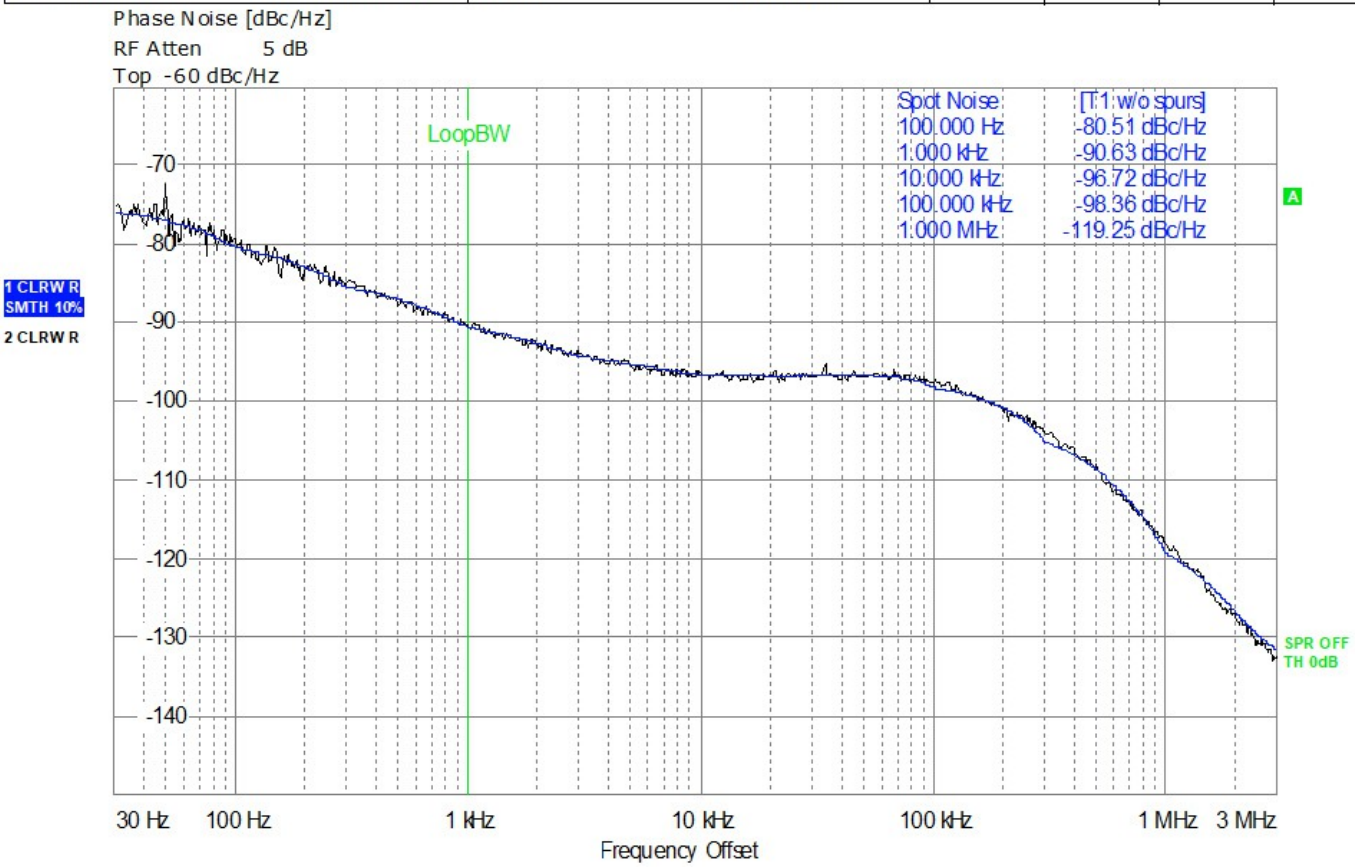
R&S FSUP 26 Signal Source Analyzer — LOCKED

Settings		Residual Noise [T1 w/o spurs]		Phase Detector + 20 dB			
Signal Frequency:	5.000000 GHz	Int PHN (30.0 .. 3.0 M)	-49.1 dBc				
Signal Level:	4.41 dBm	Residual PM	0.283 °				
Cross Corr Mode	Harmonic 1	Residual FM	1.474 kHz				
Internal Ref Tuned	Internal Phase Det	RMS Jitter	0.1570 ps				



5GHz phase noise test graph:

R&S FSUP 26 Signal Source Analyzer				LOCKED
Settings		Residual Noise [T1 w/o spurs]		Phase Detector +0 dB
Signal Frequency:	9.999999 GHz	Int PHN (30.0 .. 3.0 M)	-43.2 dBc	
Signal Level:	1.92 dBm	Residual PM	0.559 °	
Cross Corr Mode	Harmonic 1	Residual FM	2.889 kHz	
Internal Ref Tuned	Internal Phase Det	RMS Jitter	0.1554 ps	



10GHz phase noise test graph:

Deliverables

When the product is delivered, the documents specified in the following table will be provided:

serial number	Attachments	quantity	remark
1	Factory inspection report	1	
2	Product Certificate	1	
3	Instruction manual for the product	1	Paper/electronic version