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Product Overview

Exosense SPECTRA-VCO Series is a compact analog wideband VCO-based RF exciter designed for fast frequency-agile signal generation across multiple RF bands. The module supports wide sweep bandwidths and high RF output power in a small form factor, enabling seamless integration into RF jamming and electronic warfare systems

1.Product Description

The Exosense SPECTRA-VCO Series is a compact, frequency-agile analog RF exciter designed for wideband signal generation and RF jamming applications. Based on a fully analog VCO architecture, it provides instantaneous frequency response with adjustable center frequency, sweep bandwidth, and sweep rate via multiturn potentiometers. With RF output power up to **+15 dBm**, the module can directly drive line amplifiers or HPA stages and supports scalable multi-band operation for portable, vehicle-mounted, and fixed RF systems.

2. Key Features

- Fully analog swept frequency VCO architecture
- Wideband frequency sweep capability
- Independent control of frequency, bandwidth, and sweep rate
- Multiturn potentiometer-based tuning
- Adjustable RF output power using internal attenuator
- RF output power up to **+15 dBm**
- Compact PCB size: **48 × 30 mm**
- 50 Ω RF output impedance
- Configurable RF output interface (SMA female or PCB pad)
- Wide operating temperature range: **–40°C to +85°C**
- Continuous duty operation

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Future Variant (Under Development – SPECTRA-VCO-D Series):

- DDS-based VCO exciter
- Software-controlled frequency, bandwidth, and sweep rate
- User-defined programmable frequency
- Arbitrary waveform generation
- Fully digital, system-friendly control interface

Figure 1: SPECTRA VCO Module

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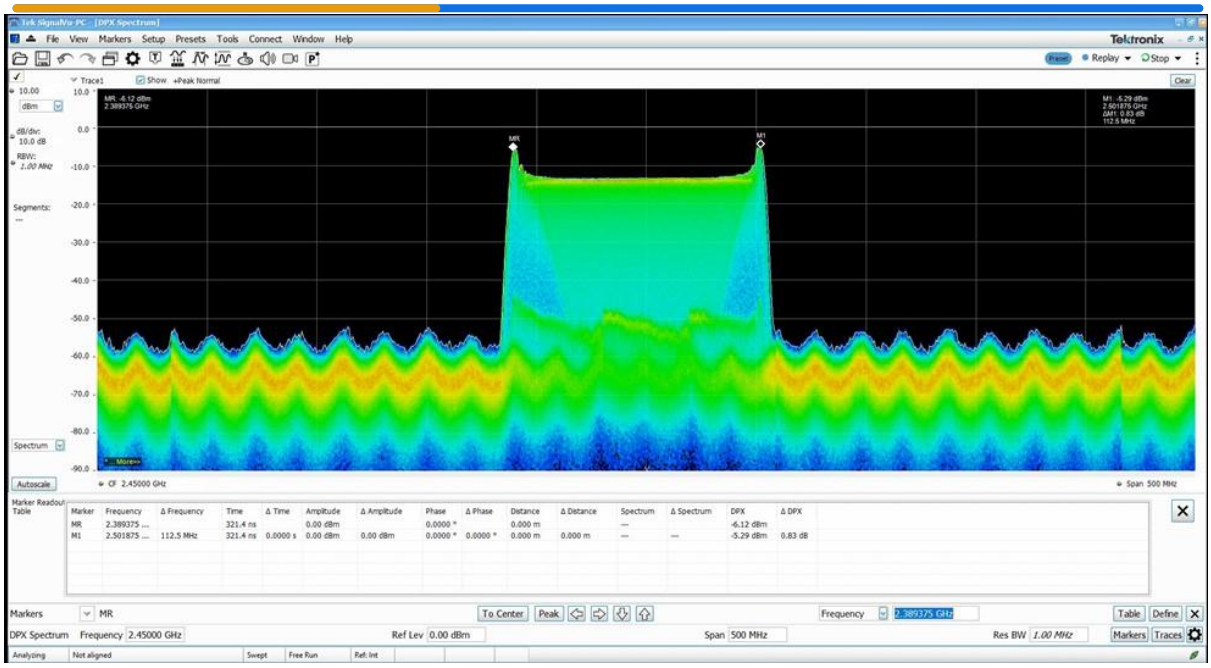

Figure 2: 2.4 Ghz Band VCO output spectrum

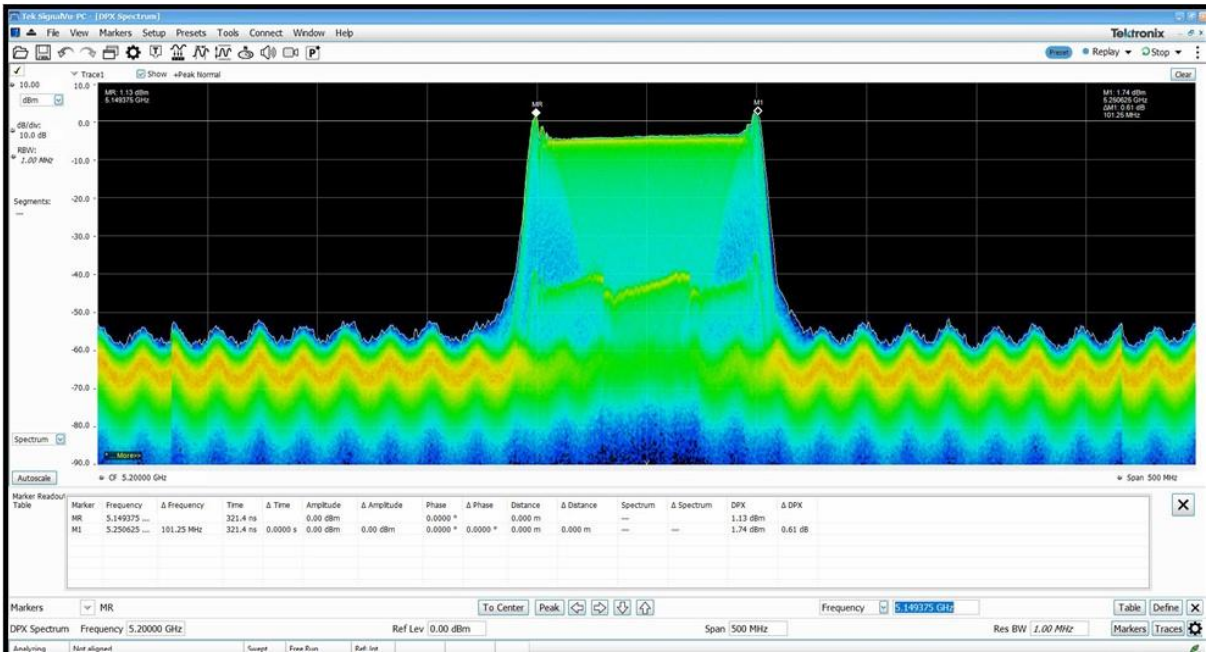

Figure 3: 5.1Ghz Band VCO Output Spectrum

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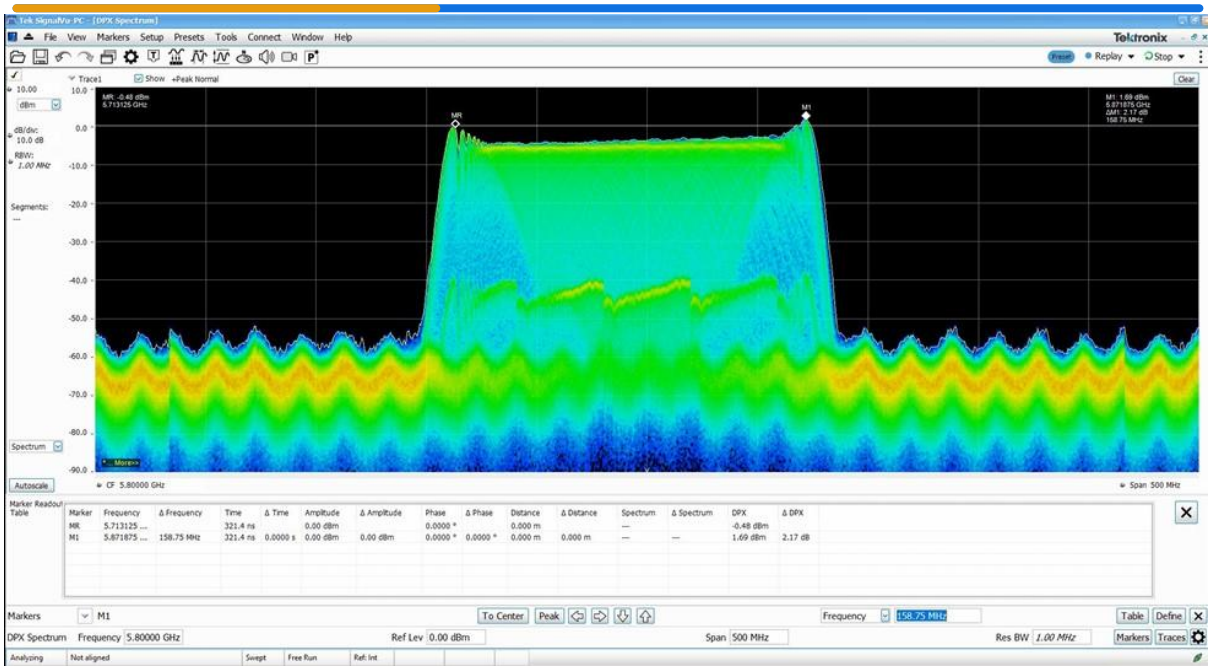

Figure 4: 5.8Ghz Band VCO output Spectrum

3.Exosense SPECTRA-VCO Specifications

Parameter	VCO Module 1	VCO Module 2	VCO Module 3	Notes
Frequency Range	2.4 – 2.5 GHz	5.15 – 5.25 GHz	5.72 – 5.85 GHz	Fully tunable via potentiometers
Centre Frequency	2.45Ghz	5.2Ghz	5.8Ghz	
Sweep Frequency Range	2 – 2.6 GHz	4.8 – 5.5 GHz	5.5– 6.2 GHz	Adjustable via potentiometers (Tune bandwidth and Tune Frequency)
Sweep Rate	0.5 – 170 kHz	0.5 – 180 kHz	10 – 200 kHz	Adjustable via RC value
RF Output Power (Adjustable)	+5 to +15 dBm	+5 to +15 dBm	+5 to +15 dBm	Internal attenuator for adjustable RF power; can drive line amplifier to feed HPA
`Output Impedance	50 Ohm	50 Ohm	50 Ohm	

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Parameter	VCO Module 1	VCO Module 2	VCO Module 3	Notes
Input Voltage (DC)	12 V	12 V	12 V	DC supply adjustable for system requirement
Supply Current	150mA	150mA	150 mA	
Phase Noise	≤ –115 dBc/Hz (@100 kHz)	≤ –103 dBc/Hz (@100 kHz)	≤ –102 dBc/Hz (@100 kHz)	Typical values
Frequency & Bandwidth Control	Multiturn potentiometers	Multiturn potentiometers	Multiturn potentiometers	Fully analog
RF Output Connector	SMA female / PCB pad	SMA female / PCB pad	SMA female / PCB pad	Connector customizable per system
Dimensions (PCB)	48 × 30 mm	48 × 30 mm	48 × 30 mm	Compact module
Mounting Holes	4 x M2.5mm	4 x M2.5mm	4 x M2.5mm	
Environmental	–40°C to +85°C	–40°C to +85°C	–40°C to +85°C	Continuous duty operation
Modularity	Multi-band support, modular DC voltage, modular connector	Multi-band support, modular DC voltage, modular connector	Multi-band support, modular DC voltage, modular connector	Modules can be scaled in banks

Available Frequency Variants

Frequency Band	Sweep Bandwidth	Module Reference
2.4 GHz	0.5 – 120 MHz	Module 1
5.1 GHz	0.5 – 180 MHz	Module 2
5.8 GHz	10 – 200 MHz	Module 3
915 MHz	0.5 – 50 MHz	Custom Module
430 MHz	0.5 – 50 MHz	Custom Module

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4. Applications

- Counter-drone RF jamming systems
- GNSS denial and interference systems
- Electronic Warfare (EW) exciters
- Frequency-hopping signal disruption
- Local oscillator (LO) source for RF up-conversion
- RF test and signal generation platforms
- Portable, vehicle-mounted, and fixed jammer systems
- Custom RF research and development platforms

5. Exosense Systems – Company Introduction

Exosense Systems is an indigenous defence technology company focused on the design and development of advanced RF and electronic warfare subsystems. The company specializes in counter-drone RF solutions, including handheld RF gun jammers, portable GNSS jammers, modular RF exciters, and RF processing hardware.

Exosense products have been demonstrated and evaluated by multiple defence agencies and shortlisted in TEC evaluations and tenders. The company is a **DRDO Dare to Dream 4 Winner** under the Counter-Drone Technology category.

Exosense has successfully supplied RF hardware, including **multi-channel amplitude and phase detectors** and **RF processing boards**, to **Raja Ramanna Centre for Advanced Technology (RRCAT), Indore**, and is currently executing RF module development and supply programs for **ISRO – Space Applications Centre (SAC), Ahmedabad**.

6. Ordering Information

Product Series	Frequency Band	Sweep Bandwidth	Ordering Part Number	Remarks
SPECTRA-VCO	2.4 GHz Band	0.5 – 120 MHz	**SPECTRA-VCO-2400**	Standard configuration
SPECTRA-VCO	5.1 GHz Band	0.5 – 180 MHz	**SPECTRA-VCO-5100**	Standard configuration
SPECTRA-VCO	5.8 GHz Band	10 – 200 MHz	**SPECTRA-VCO-5800**	Standard configuration
SPECTRA-VCO	915 MHz Band	0.5 – 50 MHz	**SPECTRA-VCO-915**	Custom configuration
SPECTRA-VCO	430 MHz Band	0.5 – 50 MHz	**SPECTRA-VCO-430**	Custom configuration

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7. Ordering Notes

- Standard operating supply: **12 V DC**, unless otherwise specified
- RF output interface: **SMA female** as standard; **PCB pad or alternate connectors** available on request
- Custom frequency bands, sweep bandwidths, and tuning ranges can be provided based on system requirements
- Digitally controlled (DDS-based) variants are under development and can be offered upon request
- Multi-module assemblies, matched sets, and volume procurement options are supported