

## WIDEBAND VCO w/ BUFFER AMPLIFIER MODULE, 4 - 8 GHz

12

CONNECTORIZED MODULES - VCOs

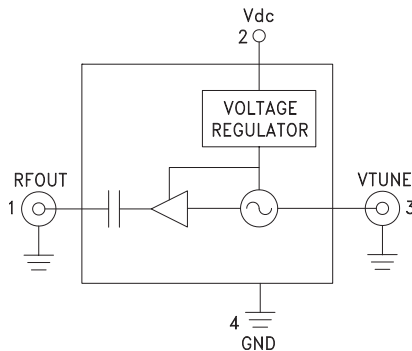


### Typical Applications

The HMC-C028 VCO Module is ideal for:

- Industrial/Medical Equipment
- Test & Measurement Equipment
- Military Radar, EW & ECM
- Lab Instrumentation

### Functional Diagram



### Features

- Wide Tuning Bandwidth
- High Output Power: +20 dBm
- Low SSB Phase Noise: -95 dBc/Hz @100 kHz
- No External Resonator Needed
- Single Positive Supply: +8 to +15V @ 185 mA
- RoHS Compliant Hermetically Sealed Module
- Field Replaceable SMA Connectors
- 40°C to +85°C Operating Temperature

### General Description

The HMC-C028 is a wideband GaAs InGaP Voltage Controlled Oscillator which incorporates the resonator, negative resistance device, and varactor diode. An internal voltage regulator provides excellent 0.2 MHz/V frequency pushing while the output buffer amplifier boosts output power to +20 dBm; which is enough to drive one or two mixers. Phase noise performance is excellent over temperature due to the oscillator's monolithic construction. The Vtune port accepts an analog tuning voltage from 0 to +18V. The HMC-C028 VCO operates from a single +8V to +15V supply, and is housed in a hermetically sealed module. This wideband VCO uniquely combines the attributes of small size, low phase noise, wide tuning range and high output power.

### Electrical Specifications, $T_A = +25^\circ\text{C}$ , $V_{dc} = +12\text{V}$

Parameter	Min.	Typ.	Max.	Min.	Typ.	Max.	Units
Frequency Range		4.0 - 8.0			5.0 - 8.0		GHz
Power Output	13	15		17	20		dBm
SSB Phase Noise @ 100 kHz Offset		-95			-95		dBc/Hz
SSB Phase Noise @ 10 kHz Offset		-75			-75		dBc/Hz
Tune Voltage (Vtune)	0		18	3		18	V
Supply Current (Idc) ( $V_{dc} = +12\text{V}$ )		185			185		mA
Tune Port Leakage Current ( $V_{tune} = +15\text{V}$ )			10			10	$\mu\text{A}$
Output Return Loss		15			15		dB
2nd Harmonic		-10			-10		dBc
Pulling (into a 2.0:1 VSWR)		1			1		MHz pp
Pushing @ $V_{tune} = +5\text{V}$		0.2			0.2		MHz/V
Frequency Drift Rate		0.8			0.8		MHz/ $^\circ\text{C}$

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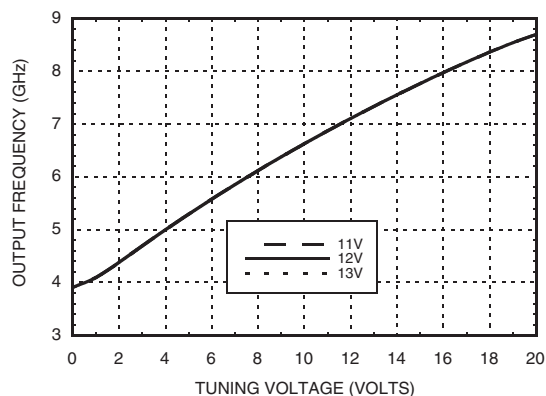
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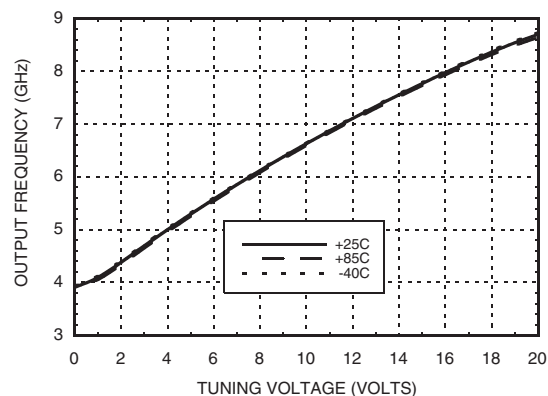
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CONNECTORIZED MODULES - VCOS

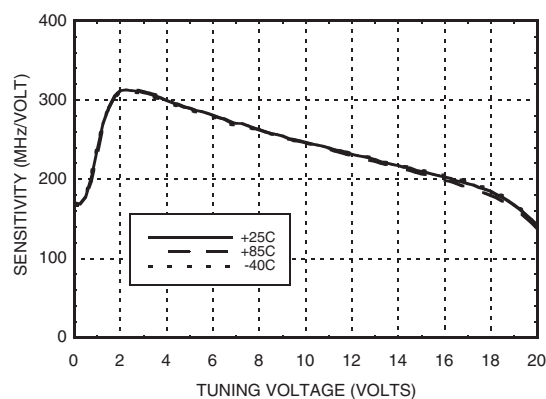
**Frequency vs. Tuning Voltage,  $V_{dc} = +12V$**



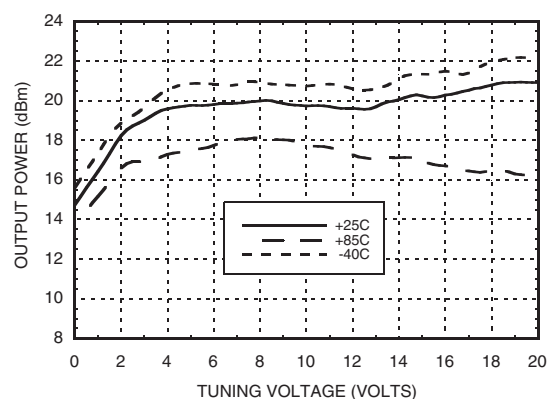
**Frequency vs. Tuning Voltage,  $T = +25^{\circ}C$**



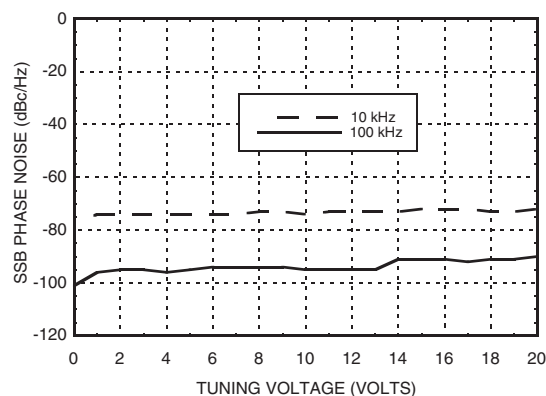
**Sensitivity vs. Tuning Voltage,  $V_{cc} = +12V$**



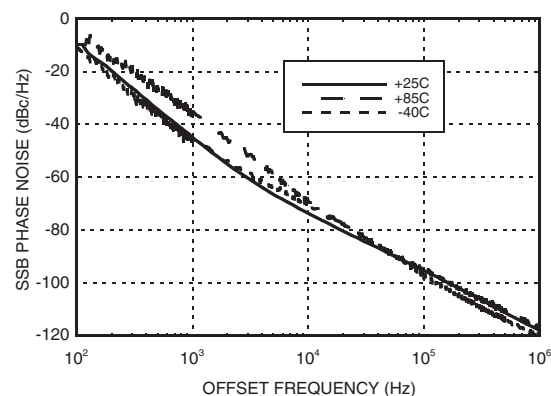
**Output Power vs.  
Tuning Voltage,  $V_{cc} = +12V$**



**SSB Phase Noise vs. Tuning Voltage**



**Typical SSB Phase Noise @  $V_{tune} = +12V$**



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Technical drawings of the HMC-C028 component, showing dimensions in inches and millimeters.

**Top View:**

- Overall width: 0.64 [16.26]
- Distance from left edge to center pin: 0.43 [10.87]
- Distance from center pin to right edge: 0.22 [5.54]
- Distance from left edge to mounting hole center: 0.11 [2.79]
- Distance from center pin to mounting hole center: 0.42 [10.62]
- Pin dimensions: +V BIAS SUPPLY, 0.03 [0.76] DIA PIN X 0.12 LG.
- Ground connection: GROUND
- RFOUT and VTUNE labels are present.
- Mounting holes: #0-80 HARDWARE THRU, .074 [1.88] DIA THRU (REMOVE HARDWARE TO MOUNT ASSEMBLY)

**Side View:**

- Overall height: 0.59 [14.99]
- Distance from top edge to center pin: 0.29 [7.38]
- Distance from center pin to bottom edge: 0.18 [4.57]
- Distance from top edge to mounting hole center: 0.35 [8.89]
- Distance from mounting hole center to bottom edge: 0.70 [17.78]

**Bottom View:**

- Overall width: 1.39 [35.31]
- Field replaceable SMA connectors are indicated.
- Bottom to be held at 85° C MAX.
- Lot number (LOT NO.) and part number (XXXX) are marked.

**Front View:**

- Overall width: 0.64 [16.26] REF
- Distance from left edge to center pin: 0.094 [2.39]
- Distance from center pin to right edge: 2X 0.075 [1.90]
- Pin dimensions: 2X 0.06 [1.52]
- Distance from left edge to mounting hole center: 2X 0.18 [4.57]
- Distance from center pin to mounting hole center: 0.36 [9.14]
- Pin dimensions: 2X Ø0.015 PIN X 0.05 LG
- RFOUT and VTUNE labels are present.
- Mounting holes: R0.04 [R0.93]

Package Type	C-1
Package Weight <sup>[1]</sup>	10.2 gms <sup>[2]</sup>
Spacer Weight	N/A

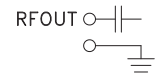
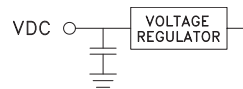
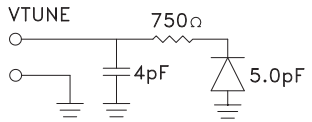
[2]  $\pm 1$  gms Tolerance

1. PACKAGE, LEADS, COVER MATERIAL: KOVART™
2. BRACKET MATERIAL: ALUMINUM.
3. PLATING: ELECTROLYTIC GOLD 50 MICROINCHES MIN.,  
OVER ELECTROLYTIC NICKEL 75 MICROINCHES MIN.
4. ALL DIMENSIONS ARE IN INCHES [MILLIMETERS].
5. TOLERANCES: ±.010 [0.25] UNLESS OTHERWISE SPECIFIED.
6. MARK LOT NUMBER ON LABEL WHERE SHOWN,  
WITH .030" MIN TEXT HEIGHT.

**WIDEBAND VCO w/ BUFFER  
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**Absolute Maximum Ratings**

Vdc	-0.3 Vdc to +25 Vdc
Vtune	0 to +22V
Storage Temperature	-65 to +150 °C
Operating Temperature	-40 to +85 °C

**Pin Descriptions**

Pin Number	Function	Description	Interface Schematic
1	RFOUT	RF output (AC coupled) uses a female SMA connector.	
2	Vdc	Supply Voltage Vdc = +8V to +15V.	
3	VTUNE	Control Voltage and Modulation Input uses a female SMA connector. Modulation bandwidth dependent on drive source impedance. See "Determining the FM Bandwidth of a Wideband Varactor Tuned VCO" application note.	
4	GND	Must be connected to power supply ground.	