Avantek Products

Extended Temperature Hyperabrupt Varactor-Tuned Oscillators

Technical Data

HTO Series

Features

- **900 MHz to 18 GHz Coverage**
- **Buffered Fundamental Oscillator**
- **Extremely Fast Tuning**
- **Low Tuning Voltage (less than 20V)**
- **10 mW Minimum Output Power**
- **Hermetic Thin-Film Construction**
- **–54°C to +85°C Temperature Range**

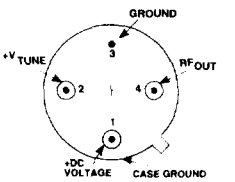
Description

HP HTO Series hyperabrupt varactor-tuned fundamental oscillators combine a negative-resistance transistor oscillator with a buffer amplifier (in most models) in a compact, hermetically-welded TO-8 or Avanpak package. The frequency of oscillation is determined by a hyperabrupt varactor diode acting as a voltage-variable capacitor in a thin-film microstripline resonant circuit. As with conventional (or abrupt) varactor-tuned oscllators, this design provides extremely high tuning rates, limited primarily by the internal impedance of the user-supplied tuning voltage source.

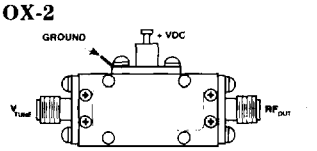
An integral buffer amplifier stage isolates the oscillator from variations in load impedance, minimizing frequency pulling while producing a full +10 dBm minimum output power level. This permits the HTO Series oscillator to be used without external amplifiers or isolators. In addition, the combination of lightly-loaded oscillator with matched buffer amplifier produces a clean output signal with low spurious levels.

Pin Configuration

TO-8V



OX-2



(See Section 5 for detailed case drawings.)

Applications

HTO Series oscillators have the frequency agility and reliability necessary for EW and ECM systems. They can be screened to high-reliability and military specifications appropriate to thin-film hybrid components.

HTO series oscillators are compatible with digital to analog converters. Their excellent tuning linearity (particularly for small frequency shifts) may eliminate the requirement for external linear-izers and support circuits that make tuning slower, increase system costs, and reduce reliability.

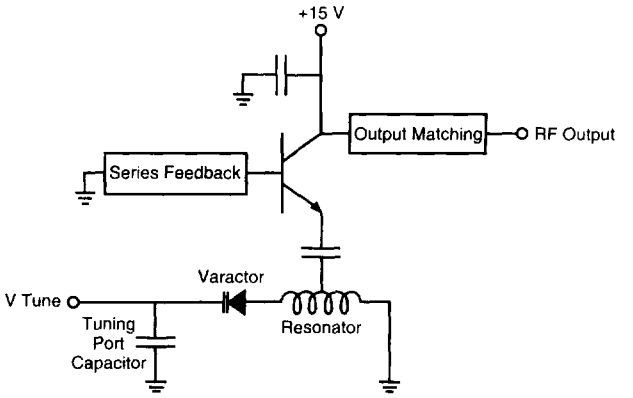
Electrical and Performance Specifications

Guaranteed Specifications @ –54° to +85°C Case Temperature

Model No.	HTO–0900	HTO–1000	HTO–2000	HTO–2600
Frequency Range, Min.	900–1600 MHz	1000–2000 MHz	2000–4000 MHz	2600–5200 MHz
Power Output into 50–ohm Load, Min.	10 mW/+10 dBm	10 mW/+10 dBm	10 mW/+10 d Bm	10 mW/+10 dBm
Power Output Variation, Max.	±2.5 dB	±2.5 dB	±2.5 dB	±2.5 dB
Operating Case Temperature Range	–54° to +85°C	–54° to +85°C	–54° to +85°C	–54° to +85°C
Frequency Drift Over Operating Temperature, Typ.	20 MHz	45 MHz	90 MHz	120 MHz
Pulling Figure (12 dB Return Loss), Typ.	25 MHz	25 MHz	10 MHz	15 MHz
Pushing Figure, +15 VDC Supply, Typ.	6 MHz/V	10 MHz/V	15 MHz/V	20 MHz/V
Harmonics, Below Carrier,Typ.	–8 dB	–7 dB	–12 dB	–12 dB
Spurious Output Below Carrier, Min.	–60 dB	–60 dB	–60 dB	–60 dB
Tuning Voltage				
Low Frequency	3+2/–1 VDC	2±1 VDC	1+2/–0.7 VDC	1+2/–0.7 VDC
High Frequency	16±2 VDC	15+5/–2 VDC	14±4 VDC	14±4 VDC
Maximum Tuning Voltage	+20 VDC	+20 VDC	+20 VDC	+20 VDC
Tuning Port Capacitance, Nom.	190 pF	190 pF	55 pF	55 pF
Phase Noise, Single Sideband, 1 Hz Bandwidth, Typ.				
50 kHz From Carrier	–100 dBc/Hz	–90 dBc/Hz	–87 dBc/Hz	–87 dBc/Hz
100 kHz From Carrier	–108 dBc/Hz	–98 dBc/Hz	–95 dBc/Hz	–95 dBc/Hz
Input Power, ±1% Regulation				
Voltage, Nom.	+15 VDC	+15 VDC	+15 VDC	+15 VDC
Current, Max.	50 mA	50 mA	100 mA	100 mA
Case Style	TO–8V	TO–8V	TO–8V	TO–8V

Model No.	HTO–4000	HTO–7500	HTO–8000	HTO–12000
Frequency Range, Min.	4000–8000 MHz	7500–11000 MHz	8000–12400 MHz	12400–18000 MHz
Power Output into 50–ohm Load, Min.	10 mW/+10 dBm	10 mW/+10 dBm	10 mW/+10 dBm	10 mW/+10 dBm
Power Output Variation, Max.	±2.5 dB	±2.5 dB	±2.5 dB	±2.5 dB
Operating Case Temperature Range	–54° to +85°C	–54° to +85°C	–54° to +85°C	–54° to +85°C
Frequency Drift Over Operating Temperature, Typ.	130 MHz	250 MHz	250 MHz	350 MHz
Pulling Figure (12 dB Return Loss), Typ.	12 MHz	50 MHz	40 MHz	40 MHz
Pushing Figure, +15 VDC Supply, Typ.	35 MHz/V	45 MHz/V	1 MHz/V	5 MHz/V
Harmonics, Below Carrier, Typ.	–12 dB	–15 dB	–20 dB	–20 dB
Spurious Output Below Carrier, Min.	–60 dB	–60 dB	–60 dB	–60 dB
Tuning Voltage				
Low Frequency	1+2/–0.5 VDC	1+2/–0.5 VDC	2.5±1.5 VDC	2.5±1.5 VDC
High Frequency	14±4 VDC	14±4 VDC	17±3 VDC	17±3 VDC
Maximum Tuning Voltage	+20 VDC	+20 VDC	+20 VDC	+20 VDC
Tuning Port Capacitance, Nom.	55 pF	50 pF	50 pF	50 pF
Phase Noise, Single Sideband, 1 Hz Bandwidth, Typ,				
50 kHz From Carrier	–80 dBc/Hz	–60 dBc/Hz	–50 dBc/Hz	–48 dBc/Hz
100 kHz From Carrier	–90 dBc/Hz	–70 dBc/Hz	–60 dBc/Hz	–57 dBc/Hz
Input Power, ±1% Regulation				
Voltage, Nom.	+15 VDC	+15 VDC	+10 to +15 VDC	+10 to +15 VDC
Current,Max.	100 mA	100 mA	150 mA	150 mA
Case Style	TO–8V	TO–8V	OX–2	OX–2

Schematic



Typical Performance @ -54° to +85°C Case Temperature

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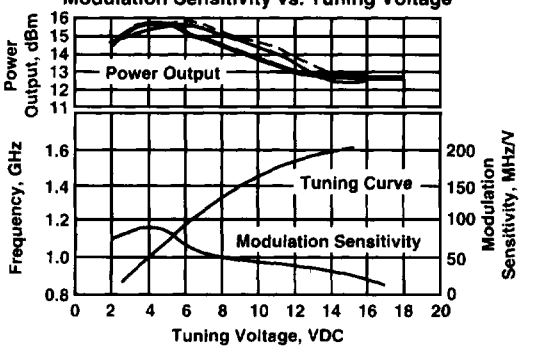
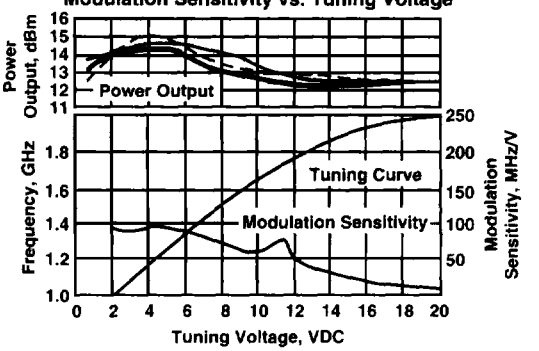
Key: +25°C
+85°C
-54°C

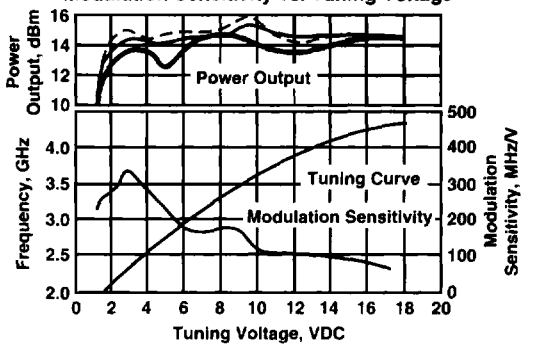
HTO–0900 Power Output, Frequency and Modulation Sensitivity vs. Tuning Voltage



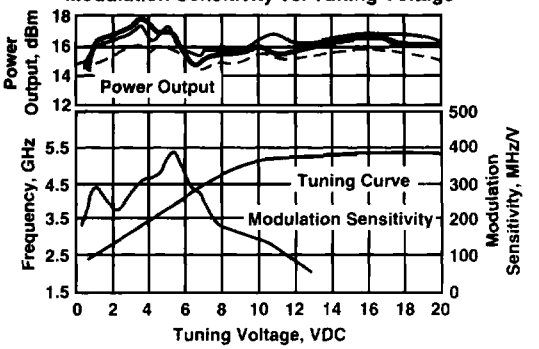
HTO–1000 Power Output, Frequency and Modulation Sensitivity vs. Tuning Voltage



HTO–2000 Power Output, Frequency and Modulation Sensitivity vs. Tuning Voltage



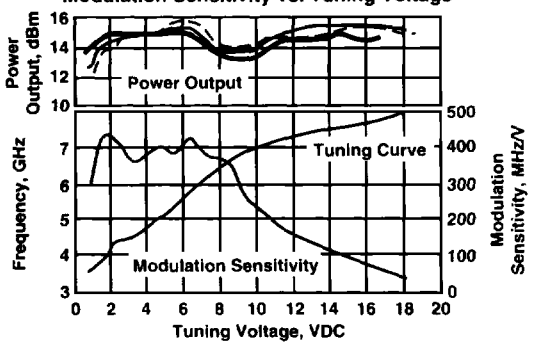
HTO–2600 Power Output, Frequency and Modulation Sensitivity vs. Tuning Voltage



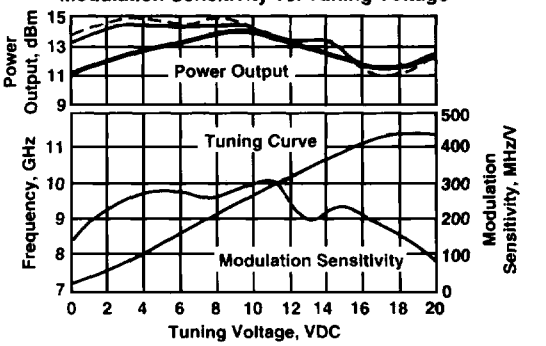
Typical Performance (continued)

Key: +25°C ———
+85°C – – – –
-54°C ▬▬▬

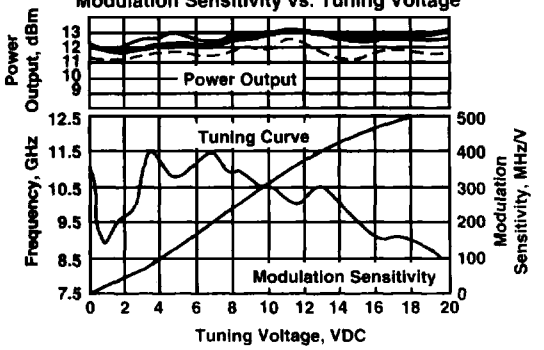
HTO–4000 Power Output, Frequency and Modulation Sensitivity vs. Tuning Voltage



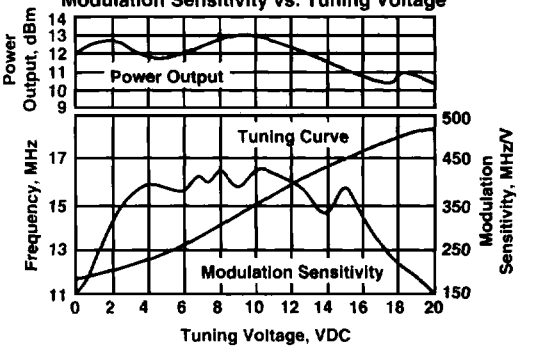
HTO–7500 Power Output, Frequency and Modulation Sensitivity vs. Tuning Voltage



HTO-8000 Power Output, Frequency and Modulation Sensitivity vs. Tuning Voltage



HTO-12000 Power Output, Frequency and Modulation Sensitivity vs. Tuning Voltage



Noise Comparison
Single Sideband Phase Noise