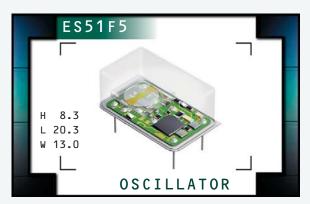
# **ES51F5 Series**

- Temperature Compensated Crystal Oscillator (TCXO)
- Clipped Sinewave Output
- 5.0V Supply Voltage
- Stability to 1.5ppm
- Internal mechanical trim
- External voltage control option available





NOTES

# **ELECTRICAL SPECIFICATIONS**

Operating Temperature Range         See Table 1           Storage Temperature Range         -55°C to 125°C           Supply Voltage (V₀₀)         5.0V₀c ±5%           Input Current         Measured at Steady State at 25°C, at Nominal V₀₀ at Nominal V₀₀ at Nominal V₀ at Nominal Vol At Nominal Vol At Nominal Vol At Nominal Vol At Nominal V	equency Range			9.600MHz to 4	/ 736MHz			
Storage Temperature Range  Supply Voltage (Vpo)  Input Current  Measured at Steady State at 25°C, at Nominal Vpo, and Vpo, at 25°C)  Frequency Stability  Vs. Initial Frequency Tolerance vs. Operating Temperature Range vs. Input Voltage (Vpo, ±5%) vs. Load (±10%)  Aging (at 25°C)  Lappm Maximum  Dutput Voltage Load Drive Capability  Control Voltage Range  Control Voltage (External)  Frequency Deviation  Linearity  Internal Trim  Measured at 25°C, Vpo = 5.0Vpc, Vp = 2.5Vpc  At 19pm Minimum (Top Access)  Input Impedance  Phase Noise (at 19.440MHz)  Measured at 25°C, at Nominal Vpo, at Nominal Vpo, at Nominal Vpo, at 10dBc/Hz Typical at 10Hz Offset	· · ·							
Supply Voltage (V₀₀)       5.0V₀c ±5%         Input Current       Measured at Steady State at 25°C, at Nominal V₀₀, at 10mA Maximum         Frequency Stability       vs. Initial Frequency Tolerance vs. Operating Temperature Range vs. Input Voltage (V₀₀ ±5%) vs. Load (±10%)       ±1.0ppm (at Nominal V₀₀ and V₀ at 25°C)         Aging (at 25°C)       ±1pm/ year Maximum vs. Load (±10%)       ±0.2ppm Maximum         Load Drive Capability       10kOhms//10pF         Control Voltage Range       0.0V₀c to V₀₀         Control Voltage (External)       Positive Transfer Characteristic       2.5V₀c ±2.0V₀c         Frequency Deviation       Referenced to F₀ at V₀ = 2.5V₀c, V₀₀ = 5.0V₀c       ±7ppm Minimum, ±20ppm Maximum         Linearity       ±10% Maximum         Input Impedance       10kOhms Typical         Phase Noise (at 19.440MHz)       Measured at 25°C, at Nominal V₀₀, at Nominal V₀₀, at Nominal V₀c at 10Hz Offset       -70dBc/Hz Typical         Again (at 25°C)       41 Drive (at Nominal V₀o, at Nominal V₀o, at 10Hz Offset       -130dBc/Hz Typical         Agin (at 25°C)       42 Drive (at Nominal V₀o, at Nominal V₀o, at 10Hz Offset       -145dBc/Hz Typical         Agin (at 25°C)       43 Drive (at Nominal V₀o, at Nominal V₀o, at 10Hz Offset       -145dBc/Hz Typical         Agin (at 25°C)       43 Drive (at Nominal V₀o, at 10Hz Offset       -145dBc/Hz Typical								
Input Current       Measured at Steady State at 25°C, at Nominal Vop, at Nominal Vc       10mA Maximum         Frequency Stability       vs. Initial Frequency Tolerance vs. Operating Temperature Range vs. Input Voltage (Vop ±5%) ±0.3ppm Maximum vs. Load (±10%)       ±1.0ppm (at Nominal Vop and Vc) ±0.3ppm Maximum ±0.2ppm Maximum         Aging (at 25°C)       ±1ppm / year Maximum         Output Voltage       1.0Vpp Minimum Clipped Sinewave         Load Drive Capability       10k0hms//10pF         Control Voltage Range       0.0Vpc to Vpp         Control Voltage (External)       Positive Transfer Characteristic       2.5Vpc ±2.0Vpc         Frequency Deviation       Referenced to Fo at Vc = 2.5Vpc, Vpp = 5.0Vpc       ±7ppm Minimum, ±20ppm Maximum         Linearity       ±10% Maximum         Input Impedance       10k0hms Typical         Phase Noise (at 19.440MHz)       Measured at 25°C, at Nominal Vpp, at Nominal Vpp, at Nominal Vpp, at Nominal Vpp, at 10dBc/Hz Typical       -70dBc/Hz Typical         at 10Hz Offset       -130dBc/Hz Typical       -130dBc/Hz Typical         at 10Hz Offset       -140dBc/Hz Typical       -145dBc/Hz Typical         at 100kHz Offset       -145dBc/Hz Typical       -145dBc/Hz Typical	<u> </u>							
vs. Operating Temperature Range vs. Input Voltage (V <sub>DD</sub> ±5%) vs. Load (±10%)  Aging (at 25°C)  Dutput Voltage Load Drive Capability  Control Voltage Range  Control Voltage (External)  Frequency Deviation  Linearity  Internal Trim  Measured at 25°C, V <sub>DD</sub> =5.0V <sub>DC</sub> , V <sub>C</sub> =2.5V <sub>DC</sub> Input Impedance  Phase Noise (at 19.440MHz)  Measured at 25°C, at Nominal V <sub>DD</sub> , at Nominal V <sub>C</sub> at 10Hz Offset at 10Hz Offset at 10Hz Offset at 10KHz Offset	Input Current Measured at Steady State at 25°C, at Nominal V <sub>DD</sub> , at 10mA Maximum							
vs. Input Voltage (V <sub>DD</sub> ±5%) ±0.3ppm Maximum vs. Load (±10%) ±0.2ppm Maximum 40.2ppm Maximum 41.0vp.p Minimum Clipped Sinewave 40.0vp.c to V <sub>DD</sub> 40.0vp.c t	quency Stability	vs. Initial Frequency Tole	erance	$\pm 1.0$ ppm (at Nominal $V_{DD}$ and $V_{C}$ , at 25°C)				
Aging (at 25°C)  #1ppm / year Maximum  Dutput Voltage  Load Drive Capability  Control Voltage Range  Control Voltage (External)  Frequency Deviation  Internal Trim  Measured at 25°C, V <sub>DD</sub> =5.0V <sub>DC</sub> , V <sub>C</sub> =2.5V <sub>DC</sub> #23ppm Minimum (Top Access)  Input Impedance  Phase Noise (at 19.440MHz)  Measured at 25°C, at Nominal V <sub>DD</sub> , at Nominal V <sub>C</sub> at 10Hz Offset		vs. Operating Temperature Range See Table 1 (at Nominal $V_{DD}$ and $V_{C}$ )						
Aging (at 25°C) ±1ppm / year Maximum  Output Voltage 1.0V <sub>p-p</sub> Minimum Clipped Sinewave  Load Drive Capability 10k0hms//10pF  Control Voltage Range 0.0V <sub>pc</sub> to V <sub>pp</sub> Control Voltage (External) Positive Transfer Characteristic 2.5V <sub>pc</sub> ±2.0V <sub>pc</sub> Frequency Deviation Referenced to F <sub>0</sub> at V <sub>c</sub> = 2.5V <sub>pc</sub> , V <sub>pp</sub> = 5.0V <sub>pc</sub> ±7ppm Minimum, ±20ppm Maximum  Linearity ±10% Maximum  Internal Trim Measured at 25°C, V <sub>pp</sub> =5.0V <sub>pc</sub> , V <sub>c</sub> =2.5V <sub>pc</sub> ±3ppm Minimum (Top Access)  Input Impedance 10k0hms Typical  Phase Noise (at 19.440MHz) Measured at 25°C, at Nominal V <sub>pp</sub> , at Nominal V <sub>c</sub> at 10Hz 0ffset at 10Hz 0ffset 100Hz 0ffset 110Hz 17pical		vs. Input Voltage (V <sub>DD</sub> ±5	%)	±0.3ppm Maximum				
Output Voltage1.0Vp.p. Minimum Clipped SinewaveLoad Drive Capability10kOhms//10pFControl Voltage Range0.0Vpc to VpdControl Voltage (External)Positive Transfer Characteristic2.5Vpc ±2.0VpcFrequency DeviationReferenced to Fo at Vc = 2.5Vpc, Vpd = 5.0Vpc±7ppm Minimum, ±20ppm MaximumLinearity±10% MaximumInternal TrimMeasured at 25°C, Vpd = 5.0Vpc, Vc = 2.5Vpc±3ppm Minimum (Top Access)Input Impedance10kOhms TypicalPhase Noise (at 19.440MHz)Measured at 25°C, at Nominal Vpd, at Nominal Vpd, at Nominal Vpd, at 10Hz Offset-70dBc/Hz Typicalat 10Hz Offset-100dBc/Hz Typical-130dBc/Hz Typicalat 10Hz Offset-140dBc/Hz Typical-140dBc/Hz Typicalat 10kHz Offset-145dBc/Hz Typical-145dBc/Hz Typical		vs. Load (±10%) ±0.2ppm Maximum						
Load Drive Capability  Control Voltage Range  Control Voltage (External)  Positive Transfer Characteristic  Positive Transfer Characteristic  Erequency Deviation  Referenced to F <sub>0</sub> at V <sub>c</sub> = 2.5V <sub>DC</sub> , V <sub>DD</sub> = 5.0V <sub>DC</sub> #7ppm Minimum, ±20ppm Maximum  #10% Maximum  Internal Trim  Measured at 25°C, V <sub>DD</sub> =5.0V <sub>DC</sub> , V <sub>c</sub> =2.5V <sub>DC</sub> #3ppm Minimum (Top Access)  Input Impedance  Phase Noise (at 19.440MHz)  Measured at 25°C, at Nominal V <sub>DD</sub> , at Nominal V <sub>C</sub> at 10Hz Offset	ing (at 25°C)		±1ppm / year Maximum					
Control Voltage Range Control Voltage (External) Positive Transfer Characteristic 2.5V <sub>DC</sub> ±2.0V <sub>DC</sub> Frequency Deviation Referenced to F <sub>0</sub> at V <sub>C</sub> = 2.5V <sub>DC</sub> , V <sub>DD</sub> = 5.0V <sub>DC</sub> ±7ppm Minimum, ±20ppm Maximum  ±10% Maximum  Internal Trim Measured at 25°C, V <sub>DD</sub> =5.0V <sub>DC</sub> , V <sub>C</sub> =2.5V <sub>DC</sub> 10kOhms Typical  Measured at 25°C, at Nominal V <sub>DD</sub> , at Nominal V <sub>C</sub> at 10Hz Offset at 10kHz Offset at 100kHz Offset	tput Voltage			1.0V <sub>p-p</sub> Minimum Clipped Sinewave				
Control Voltage (External)Positive Transfer Characteristic2.5V <sub>DC</sub> ±2.0V <sub>DC</sub> Frequency DeviationReferenced to F₀ at V₀ = 2.5V <sub>DC</sub> , V <sub>DD</sub> = 5.0V <sub>DC</sub> ±7ppm Minimum, ±20ppm MaximumLinearity±10% MaximumInternal TrimMeasured at 25°C, V <sub>DD</sub> =5.0V <sub>DC</sub> , V₀ = 2.5V <sub>DC</sub> ±3ppm Minimum (Top Access)Input Impedance10kOhms TypicalPhase Noise (at 19.440MHz)Measured at 25°C, at Nominal V₀ at Nominal V₀ at 10Hz Offset-70dBc/Hz TypicalIndustry-70dBc/Hz TypicalIndustry-130dBc/Hz TypicalIndustry-130dBc/Hz TypicalIndustry-140dBc/Hz TypicalIndustry-145dBc/Hz TypicalIndustry-145dBc/Hz Typical	Load Drive Capability			10k0hms//10pF				
Frequency Deviation Referenced to F <sub>o</sub> at V <sub>c</sub> = 2.5V <sub>DC</sub> , V <sub>DD</sub> = 5.0V <sub>DC</sub> ±7ppm Minimum, ±20ppm Maximum ±10% Maximum  Internal Trim Measured at 25°C, V <sub>DD</sub> =5.0V <sub>DC</sub> , V <sub>c</sub> =2.5V <sub>DC</sub> #3ppm Minimum (Top Access)  Input Impedance Input Impedance Phase Noise (at 19.440MHz) Measured at 25°C, at Nominal V <sub>DD</sub> , at Nominal V <sub>C</sub> at 10Hz Offset at 10Hz Offset 100dBc/Hz Typical at 10Hz Offset 110dBc/Hz Typical at 10kHz Offset 110dBc/Hz Typical	ntrol Voltage Range			$0.0V_{DC}$ to $V_{DD}$				
Linearity ±10% Maximum  Internal Trim Measured at 25°C, V <sub>DD</sub> =5.0V <sub>DC</sub> , V <sub>C</sub> =2.5V <sub>DC</sub> ±3ppm Minimum (Top Access)  Input Impedance 10kOhms Typical  Phase Noise (at 19.440MHz) Measured at 25°C, at Nominal V <sub>DD</sub> , at Nominal V <sub>C</sub> at 10Hz Offset -70dBc/Hz Typical at 10Hz Offset -100dBc/Hz Typical at 1kHz Offset -130dBc/Hz Typical at 10kHz Offset -140dBc/Hz Typical at 10kHz Offset -140dBc/Hz Typical	ntrol Voltage (External)	Positive Transfer Characteristic		$2.5V_{DC} \pm 2.0V_{DC}$				
Internal Trim  Measured at 25 °C, V <sub>DD</sub> =5.0V <sub>DC</sub> , V <sub>C</sub> =2.5V <sub>DC</sub> Input Impedance  Phase Noise (at 19.440MHz)  Measured at 25 °C, at Nominal V <sub>DD</sub> , at Nominal V <sub>C</sub> at 10Hz 0ffset at 10Hz 0ffset at 10Hz 0ffset at 1kHz 0ffset at 10kHz 0ffset -140dBc/Hz Typical at 10kHz 10ffset -145dBc/Hz Typical	quency Deviation	Referenced to $F_0$ at $V_c = 2$	$2.5V_{DC}, V_{DD} = 5.0V_{DC}$					
Input Impedance  Phase Noise (at 19.440MHz)  Measured at 25°C, at Nominal V <sub>DD</sub> , at Nominal V <sub>C</sub> at 10Hz 0ffset at 10Hz 0ffset at 10Hz 0ffset at 10KHz 0ffset at 10kHz 0ffset at 10kHz 0ffset at 10kHz 0ffset -145dBc/Hz Typical -145dBc/Hz Typical	earity							
Phase Noise (at 19.440MHz)  Measured at 25°C, at Nominal V <sub>DD</sub> , at Nominal V <sub>C</sub> at 10Hz Offset at 10Hz Offset -70dBc/Hz Typical -100dBc/Hz Typical -130dBc/Hz Typical at 10kHz Offset -140dBc/Hz Typical -140dBc/Hz Typical -145dBc/Hz Typical	ernal Trim	Measured at 25°C, $V_{DD}$ =5.0 $V_{DC}$ , $V_{C}$ =2.5 $V_{DC}$		±3ppm Minimum (Top Access)				
at 10Hz Offset -70dBc/Hz Typical at 100Hz Offset -100dBc/Hz Typical at 1kHz Offset -130dBc/Hz Typical at 10kHz Offset -140dBc/Hz Typical at 100kHz Offset -145dBc/Hz Typical	out Impedance				10k0hms Typical			
at 100Hz Offset -100dBc/Hz Typical at 1kHz Offset -130dBc/Hz Typical at 10kHz Offset -140dBc/Hz Typical at 100kHz Offset -145dBc/Hz Typical	ase Noise (at 19.440MHz)	Measured at $25^{\circ}$ C, at Nominal $V_{DD}$ , at Nominal $V_{C}$						
at 1kHz Offset -130dBc/Hz Typical at 10kHz Offset -140dBc/Hz Typical at 100kHz Offset -145dBc/Hz Typical		at 10Hz Offset		-70dBc/Hz Typical				
at 1kHz Offset -130dBc/Hz Typical at 10kHz Offset -140dBc/Hz Typical at 100kHz Offset -145dBc/Hz Typical		at 1kHz Offset		-130dBc/Hz Typical				
at 10kHz Offset -140dBc/Hz Typical at 100kHz Offset -145dBc/Hz Typical								
at 100kHz Offset -145dBc/Hz Typical								
MANUFACTURER CATEGORY SERIES PACKAGE VOLTAGE CLASS		at 100kHz Offset		,				
ECLIPTER CORP. OSCILLATOR E551F5 14-PIN DIP 5.0V OS3C		SERIES	PACKAGE 14 DIN DID	VOLTAGE	CLASS	REV = DATE 06/04		

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### PART NUMBERING GUIDE

## ES51F5 G 15 A V - 12.800M - G



One Letter Code Per Table 1

**AVAILABLE OPTIONS** 

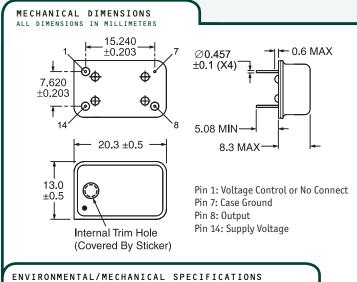
Blank=None (Standard) CB=Cut Leads to 2.540 ±0.500 (0.100" ±0.020") CC=Cut Leads to 3.175 ±0.500 (0.125" ±0.020") CD=Cut Leads to 3.810 ±0.500 (0.150" ±0.020") CE=Cut Leads to 4.445 ±0.500 (0.175" ±0.020") G=Full Size Gull Wing

**FREQUENCY** 

**EXTERNAL TRIM** 

N=None (No Connection on Pin 1) V=Voltage Control on Pin 1

	TABLE 1: PART NUMBERING CODES										
Range		Frequency Stability X = Available from 9.600MHz to 32.768MHz Y = Available at any Frequency									
			±1.5ppm	±2.0ppm	±3.0ppm	±5.0ppm					
Operating Temperature		Code	15	20	30	50					
	0°C to +50°C	Α	Υ	Υ	Υ	Υ					
	0°C to 70°C	В	Х	Υ	Y	Y					
	-20°C to +70°C	С		Х	Υ	Y					
	-30°C to +75°C	D			Y	Y					
	-40°C to +85°C	Е			Х	Υ					



#### MARKING SPECIFICATIONS

Line 1: ECLIPTEK

Line 2: XX.XXX M M=MHz

Frequency (5 Digits Maximum + Decimal)

Line 3: XX Y ZZ Week of Year Last Digit of Year Ecliptek Manufacturing Identifier

Note: Pin 1 shall be designated with a dot

**Characteristic Specification** MIL-STD-883, Method 1014, Condition A (Internal Crystal Only) Fine Leak Test **Gross Leak Test** MIL-STD-883, Method 1014, Condition C (Internal Crystal Only) Mechanical Shock MIL-STD-202, Method 213, Condition C MIL-STD-883, Method 2007, Condition A Vibration

MIL-STD-883, Method 2004 Lead Integrity Solderability MIL-STD-883, Method 2002 Temperature Cycling Resistance to Soldering Heat MIL-STD-883, Method 1010 MIL-STD-883, Method 210 Resistance to Solvents MIL-STD-883, Method 215

MANUFACTURER PACKAGE VOLTAGE CLASS ECLIPTEK CORP. OSCILLATOR 14 pin DIP ES51F5 5.0V 0530 06/04