

### Features

- Trimmed Output  $\pm 0.3\%$
- Low Drift— $5\text{ppm}/^\circ\text{C}$  Typ
- Low Noise— $3\text{ppm}_{(P-P)}$
- High Line Rejection
- Temperature Output—FTREF-02
- Low Supply Current 1.4mA Max

### Applications

- A/D and D/A Converters
- Precision Regulators
- Constant Current Sources
- V/F Converters
- Bridge Excitation

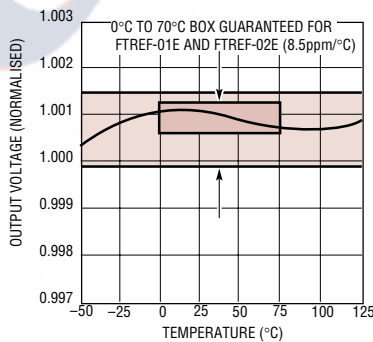
### Description

FTREF-01/FTREF-02 are precision 10V and 5V bandgap references which provide stable output voltages over a wide range of operating conditions. Output voltage is accurate to  $\pm 0.3\%$  with a low  $5\text{ppm}/^\circ\text{C}$  typical temperature coefficient. The FTREF-01 and FTREF-02 are excellent choices for applications where low drift, moderate accuracy, low power consumption and low cost are considerations.

The FTREF-02 includes a temperature output pin which provides a linear voltage proportional to absolute temperature.

For lower drift and higher accuracy references, please see the FT1019 and FT1021 data sheets.

Output Voltage Temperature Drift

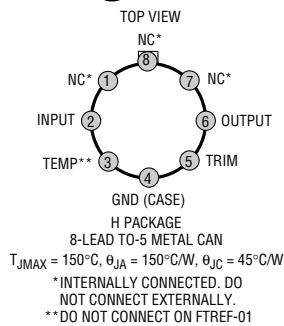


FULL TEMP RANGE BOX GUARANTEED FOR FTREF-01A AND FTREF-02A (8.5ppm/°C)

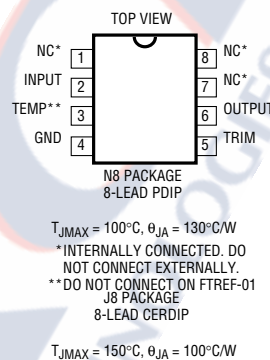
### Absolute Maximum Rating

Storage Temperature Range ..... -65°C to 150°C  
 Operating Temperature  
 FTREF-01/FTREF-02, FTREF-01A/FTREF-02A.. -55°C to 125°C  
 FTREF-01E/FTREF-02E, FTREF-01H/FTREF-02H,  
 FTREF-01C/FTREF-02C, FTREF-01D/FTREF-02D.. 0°C to 70°C  
 Lead Temperature (Soldering, 10 sec)..... 300°C

### Package/Order Information



FTREF01AH FTEF02AH  
 FTREF01H FTREF02H  
 FTREF01EH FTREF02EH  
 FTREF01HH FTREF02HH  
 FTREF01CH FTREF02CH  
 FTREF02DH



ORDER PART NUMBER

FTREF01EN8 FTREF02EN8  
 FTREF01HN8 FTREF02HN8  
 FTREF01CN8 FTREF02CN8  
 FTREF02DN8  
 FTREF01EJ8 FTREF02EJ8  
 FTREF01HJ8 FTREF02HJ8  
 FTREF01CJ8 FTREF02CJ8  
 FTREF02DJ8

### Electrical Characteristics

$V_{IN} = 15V$ ,  $T_A = 25^{\circ}C$  unless otherwise noted.

SYMBOL	PARAMETER	CONDITIONS	FTREF-01A/E, FTREF-02A			FTREF-01H, FTREF-02H			UNITS			
			MIN	TYP	MAX	MIN	TYP	MAX				
$V_O$	Output Voltage	$I_L = 0mA$	FTREF-01	9.97	10	10.03	FTREF-01H	9.95	10	10.05	V	
			FTREF-02	4.985	5	5.015	FTREF-02H	4.975	5	5.025	V	
	Output Adjustment Range	$R_P = 10k\Omega$	FTREF-01	$\pm 3$	5, -27		FTREF-01H	$\pm 3$	5, -27		%	
			FTREF-02	$\pm 3$	5, -13		FTREF-02H	$\pm 3$	5, -13		%	
$e_{nP-P}$	Output Voltage Noise	0.1Hz to 10Hz (Note 7)	FTREF-01	20			FTREF-01H	20			$\mu V_{P-P}$	
			FTREF-02	10			FTREF-02H	10			$\mu V_{P-P}$	
$V_{IN}$	Input Voltage Range		FTREF-01	12		40	FTREF-01H	12		40	V	
			FTREF-02	7		40	FTREF-02H	7		40	V	
$\frac{\Delta V_{OUT}}{\Delta V_{IN}}$	Line Regulation (Note 2)	$(V_{OUT} + 3V) \leq V_{IN} \leq 33V$		0.0001	0.010		0.0001	0.010		%/V		
$\frac{\Delta V_{OUT}}{\Delta I_{OUT}}$	Load Regulation (Note 2)	$I_L = 0mA$ to 10mA	FTREF-01	0.0005			0.008	FTREF-01H	0.0005			0.010
			FTREF-02	0.0010			0.010	FTREF-02H	0.001			0.010
$I_Q$	Quiescent Supply Current	No Load		0.65	1.4		0.65	1.4		mA		
$I_{OUT}$	Load Current Sink Current			10	20			10	20		mA	
				-0.3	-20			-0.3	-20		mA	
$I_{SC}$	Short-Circuit Current	$V_O = 0V$		25			25			mA		
$V_T$	Temperature Voltage Output	(Note 3)	FTREF-02 Only	620			620			mV		



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