

Features

- Offset Voltage – Prime Grade: 60 μ V Max
- Offset Voltage – Low Cost Grade (Including Surface Mount Dual/Quad): 75 μ V Max
- Offset Voltage Drift: 0.5 μ V/ $^{\circ}$ C Max
- Input Bias Current: 250pA Max
- 0.1Hz to 10Hz Noise: 0.3 μ V_{P-P}, 2.2pA_{P-P}
- Supply Current per Amplifier: 400 μ A Max
- CMRR: 120dB Min
- Voltage Gain: 1 Million Min
- Guaranteed Specs with \pm 1.0V Supplies
- Guaranteed Matching Specifications
- SO-8 Package – Standard Pinout
- FT1114 in Narrow Surface Mount Package

Applications

- Picoampere/Microvolt Instrumentation
- Two and Three Op Amp Instrumentation Amplifiers
- Thermocouple and Bridge Amplifiers
- Low Frequency Active Filters
- Photo Current Amplifiers
- Battery-Powered Systems

Description

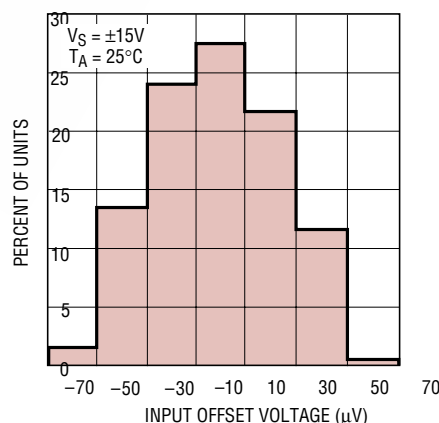
The FT1112 dual and FT1114 quad op amps achieve a new standard in combining low cost and outstanding precision specifications.

The performance of the selected prime grades matches or exceeds competitive devices. In the design of the FT1112/FT1114 however, particular emphasis has been placed on optimising performance in the low cost plastic and SO packages. For example, the 75 μ V maximum offset voltage in these low cost packages is the lowest on any dual or quad non-chopper op amp.

The FT1112/FT1114 also provide a full set of matching specifications, facilitating their use in such matching dependent applications as two and three op amp instrumentation amplifiers.

Another set of specifications is furnished at \pm 1V supplies. This, combined with the low 320 μ A supply current per amplifier, allows the FT1112/FT1114 to be powered by two nearly discharged AA cells.

Distribution of Input Offset Voltage
(In All Packages)



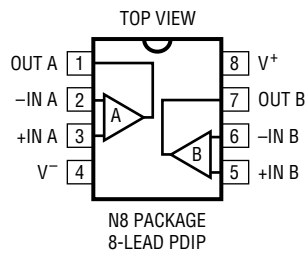
Absolute Maximum Ratings (Note 1)

Supply Voltage	$\pm 20V$
Differential Input Current (Note 2)	$\pm 10mA$
Input Voltage (Equal to Supply Voltage)	$\pm 20V$
Output Short-Circuit Duration	Indefinite
Storage Temperature Range	$-65^{\circ}C$ to $150^{\circ}C$
Lead Temperature (Soldering, 10 sec)	$300^{\circ}C$
Operating Temperature Range (Note 11)	
FT1112AM/FT1112M	
FT1114AM/FT1114M	$-55^{\circ}C$ to $125^{\circ}C$
FT1112AC/FT1112C/FT1112S8	
FT1114AC/FT1114C/FT1114S	$-40^{\circ}C$ to $85^{\circ}C$
FT1112I/FT1114I	$-40^{\circ}C$ to $85^{\circ}C$
FT1112MPS8	$-55^{\circ}C$ to $125^{\circ}C$

Specified Temperature Range (Note 12)

FT1112AM/FT1112M	
FT1114AM/FT1114M	$-55^{\circ}C$ to $125^{\circ}C$
FT1112AC/FT1112C/FT1112S8	
FT1114AC/FT1114C/FT1114S	$-40^{\circ}C$ to $85^{\circ}C$
FT1112I/FT1114I	$-40^{\circ}C$ to $85^{\circ}C$
FT1112MPS8	$-55^{\circ}C$ to $125^{\circ}C$

Package/Order Information

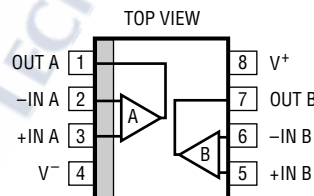


$T_{JMAX} = 150^{\circ}C$, $\theta_{JA} = 130^{\circ}C/W$
 J8 PACKAGE 8-LEAD CERDIP
 $T_{JMAX} = 160^{\circ}C$, $\theta_{JA} = 100^{\circ}C/W$

ORDER PART NUMBER

FT1112ACN8
 FT1112CN8
 FT1112IN8

FT1112AMJ8
 FT1112MJ8



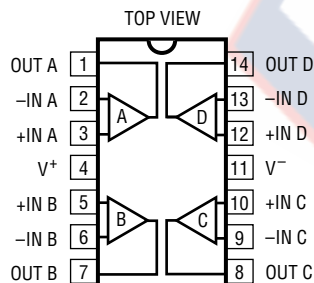
$T_{JMAX} = 150^{\circ}C$, $\theta_{JA} = 190^{\circ}C/W$

ORDER PART NUMBER

FT1112S8
 FT1112IS8
 FT1112MPS8

S8 PART MARKING

1112
 1112I
 1112MP



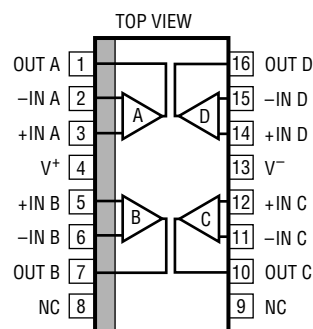
$T_{JMAX} = 150^{\circ}C$, $\theta_{JA} = 110^{\circ}C/W$

J PACKAGE 14-LEAD CERDIP
 $T_{JMAX} = 160^{\circ}C$, $\theta_{JA} = 80^{\circ}C/W$ (J)

ORDER PART NUMBER

FT1114ACN
 FT1114CN
 FT1114IN

FT1114AMJ
 FT1114MJ



$T_{JMAX} = 150^{\circ}C$, $\theta_{JA} = 150^{\circ}C/W$

ORDER PART NUMBER

FT1114S
 FT1114IS

Electrical Characteristics

$V_S = \pm 15V$, $V_{CM} = 0V$, $T_A = 25^\circ C$, unless otherwise noted.

SYMBOL	PARAMETER	CONDITIONS (Note 3)	FT1112AM/AC FT1114AM/AC			FT1112M/C/I FT1114M/C/I			UNITS
			MIN	TYP	MAX	MIN	TYP	MAX	
V_{OS}	Input Offset Voltage	$V_S = \pm 1.0V$		20 40	60 110		25 45	75 130	μV μV
$\frac{\Delta V_{OS}}{\Delta Time}$	Long Term Input Offset Voltage Stability			0.3			0.3		$\mu V/Mo$
I_{OS}	Input Offset Current	FT1114S/FT1114IS		50	180		60 75	230 330	pA pA
I_B	Input Bias Current	FT1114S/FT1114IS		± 70	± 250		± 80 ± 100	± 280 ± 450	pA pA
e_n	Input Noise Voltage	0.1Hz to 10Hz (Note 10)		0.3	0.9		0.3	0.9	μV_{P-P}
	Input Noise Voltage Density	$f_0 = 10Hz$ (Note 10) $f_0 = 1000Hz$ (Note 10)		16 14	28 18		16 14	28 18	nV/\sqrt{Hz} nV/\sqrt{Hz}
i_n	Input Noise Current	0.1Hz to 10Hz		2.2			2.2		pA_{P-P}
	Input Noise Current Density	$f_0 = 10Hz$ $f_0 = 1000Hz$		0.030 0.008			0.030 0.008		pA/\sqrt{Hz} pA/\sqrt{Hz}
V_{CM}	Input Voltage Range			± 13.5	± 14.3		± 13.5	± 14.3	V
CMRR	Common Mode Rejection Ratio	$V_{CM} = \pm 13.5V$		120	136		115	136	dB
PSRR	Power Supply Rejection Ratio	$V_S = \pm 1.0V$ to $\pm 20V$		116	126		114	126	dB
	Minimum Supply Voltage	(Note 5)		± 1.0			± 1.0		V
R_{IN}	Input Resistance Differential Mode Common Mode	(Note 4)		20	50 800		15	40 700	$M\Omega$ $G\Omega$
A_{VOL}	Large-Signal Voltage Gain	$V_O = \pm 12V$, $R_L = 10k\Omega$ $V_O = \pm 10V$, $R_L = 2k\Omega$		1000 800	5000 1500		800 600	5000 1300	V/mV V/mV
V_{OUT}	Output Voltage Swing	$R_L = 10k\Omega$ $R_L = 2k\Omega$		± 13.0 ± 11.0	± 14.0 ± 12.4		± 13.0 ± 11.0	± 14.0 ± 12.4	V V
SR	Slew Rate			0.16	0.30		0.16	0.30	V/ μs
GBW	Gain-Bandwidth Product	$f_0 = 10kHz$		450	750		450	750	kHz
I_S	Supply Current per Amplifier	$V_S = \pm 1.0V$		350 320	400 370		350 320	450 420	μA μA
	Channel Separation	$f_0 = 10Hz$		150			150		dB
ΔV_{OS}	Offset Voltage Match	(Note 6)		35	100		40	130	μV
ΔI_B^+	Noninverting Bias Current Match (Notes 6, 7)	FT1114S/FT1114IS		100	450		100 120	500 680	pA pA
$\Delta CMRR$	Common Mode Rejection Match	(Notes 6, 8)		117	136		113	136	dB
$\Delta PSRR$	Power Supply Rejection Match	(Notes 6, 8)		114	130		112	130	dB



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