FORCE TECHNOLOGIES LTD

FT1124/FT1125

Dual/Quad Low Noise, High Speed Precision Op Amps

Features

- 100% Tested Low Voltage Noise: 2.7nV/$\sqrt{Hz}$ Typ
  4.2nV/$\sqrt{Hz}$ Max
- Slew Rate: 4.5V/μs Typ
- Gain Bandwidth Product: 12.5MHz Typ
- Offset Voltage, Prime Grade: 70μV Max
  Low Grade: 100μV Max
- High Voltage Gain: 5 Million Min
- Supply Current Per Amplifier: 2.75mA Max
- Common Mode Rejection: 112dB Min
- Power Supply Rejection: 116dB Min
- Available in 8-Pin SO Package

Applications

- Two and Three Op Amp Instrumentation Amplifiers
- Low Noise Signal Processing
- Active Filters
- Microvolt Accuracy Threshold Detection
- Strain Gauge Amplifiers
- Direct Coupled Audio Gain Stages
- Tape Head Preamplifiers
- Infrared Detectors

Description

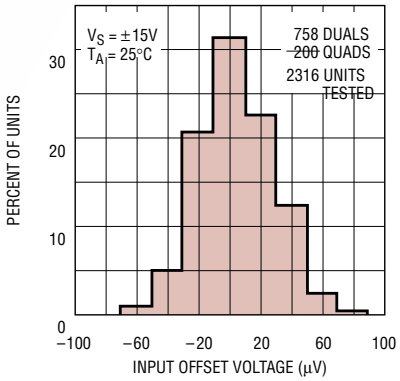
The FT1124 dual and FT1125 quad are high performance op amps that offer higher gain, slew rate and bandwidth than the industry standard OP-27 and competing OP-270/OP-470 op amps. In addition, the FT1124/FT1125 have lower I_B and I_{OS} than the OP-27; lower V_{OS} and noise than the OP-270/OP-470.

In the design, processing and testing of the device, particular attention has been paid to the optimisation of the entire distribution of several key parameters. Slew rate, gain bandwidth and 1kHz noise are 100% tested for each individual amplifier. Consequently, the specifications of even the lowest cost grades (the FT1124C and the FT1125C) have been spectacularly improved compared to equivalent grades of competing amplifiers.

Power consumption of the FT1124 is one half of two OP-27s. Low power and high performance in an 8-pin SO package make the FT1124 a first choice for surface mounted systems and where board space is restricted.

For a decompensated version of these devices, with three times higher slew rate and bandwidth, please see the FT1126/FT1127 data sheet.

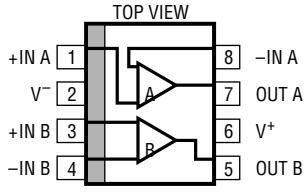
Input Offset Voltage Distribution
(All Packages, FT1124 and FT1125)



Absolute Maximum Ratings (Note 1)

Supply Voltage ..... ±22V
Input Voltages ..... Equal to Supply Voltage
Output Short-Circuit Duration ..... Indefinite
Differential Input Current (Note 6) ..... ±25mA
Lead Temperature (Soldering, 10 sec) ..... 300°C
Storage Temperature Range ..... −65°C to 150°C

Operating Temperature Range
FT1124AC/FT1124C
FT1125AC/FT1125C (Note 10) ..... −40°C to 85°C
FT1124AI/FT1124I ..... −40°C to 85°C
FT1124AM/FT1124M
FT1125AM/FT1125M ..... −55°C to 125°C

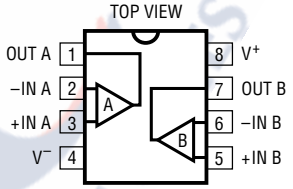


S8 PACKAGE
8-LEAD PLASTIC SO

T_{JMAX} = 140°C, θ_{JA} = 190°C/W

NOTE: THIS PIN CONFIGURATION DIFFERS FROM THE 8-PIN PDIP CONFIGURATION. INSTEAD, IT FOLLOWS THE INDUSTRY STANDARD FT1013DS8 SO PACKAGE PIN LOCATIONS

ORDER PART NUMBER
FT1124CS8
FT1124AIS8
FT1124IS8
S8 PART MARKING
1124
1124AI
1124I



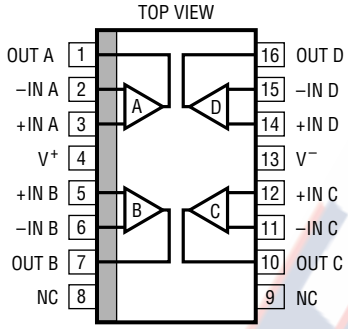
N8 PACKAGE
8-LEAD PDIP

T_{JMAX} = 140°C, θ_{JA} = 130°C/W

J8 PACKAGE
8-LEAD CERAMIC DIP

T_{JMAX} = 160°C, θ_{JA} = 100°C/W

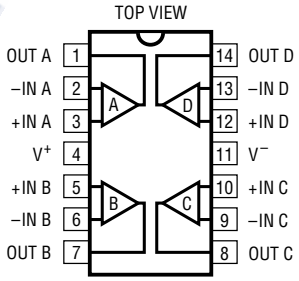
ORDER PART NUMBER
FT1124ACN8
FT1124CN8
FT1124CJ8
FT1124AMJ8
FT1124MJ8



SW PACKAGE
16-LEAD PLASTIC SO WIDE

T_{JMAX} = 140°C, θ_{JA} = 130°C/W

FT1125CSW



N PACKAGE
14-LEAD PDIP

T_{JMAX} = 140°C, θ_{JA} = 110°C/W (N)

J PACKAGE
14-LEAD CERAMIC DIP

T_{JMAX} = 160°C, θ_{JA} = 80°C/W

FT1125ACN
FT1125CN
FT1125CJ
FT1125AMJ
FT1125MJ

ELECTRICAL CHARACTERISTICS $T_A = 25°C$, $V_S = \pm15V$, unless otherwise noted.

SYMBOL	PARAMETER	CONDITIONS (Note 2)	FT1124AC/AI/AM FT1125AC/AM MIN	TYP	MAX	FT1124C/I/M FT1125C/M MIN	TYP	MAX	UNITS
V_{OS}	Input Offset Voltage	FT1124 FT1125		20 25	70 90		25 30	100 140	µV µV
$\frac{\Delta V_{OS}}{\Delta Time}$	Long-Term Input Offset Voltage Stability			0.3			0.3		µV/Mo
I_{OS}	Input Offset Current	FT1124 FT1125		5 6	15 20		6 7	20 30	nA nA
I_B	Input Bias Current			±7	±20		±8	±30	nA
e_n	Input Noise Voltage	0.1Hz to 10Hz (Notes 8, 9)		70	200		70		nV_{P-P}
	Input Noise Voltage Density	f_O = 10Hz (Note 5) f_O = 1000Hz (Note 3)		3.0 2.7	5.5 4.2		3.0 2.7	5.5 4.2	$nV/\sqrt{Hz}$ $nV/\sqrt{Hz}$
i_n	Input Noise Current Density	f_O = 10Hz f_O = 1000Hz		1.3 0.3			1.3 0.3		$pA/\sqrt{Hz}$ $pA/\sqrt{Hz}$
V_{CM}	Input Voltage Range		±12	±12.8		±12	±12.8		V
CMRR	Common Mode Rejection Ratio	V_{CM} = ±12V	112	126		106	124		dB
PSRR	Power Supply Rejection Ratio	V_S = ±4V to ±18V	116	126		110	124		dB
A_{VOL}	Large-Signal Voltage Gain	$R_L \geq 10k$, V_{OUT} = ±10V $R_L \geq 2k$, V_{OUT} = ±10V	5 2	17 4		3.0 1.5	15 3		V/µV V/µV
V_{OUT}	Maximum Output Voltage Swing	$R_L \geq 2k$	±13	±13.8		±12.5	±13.8		V
SR	Slew Rate	$R_L \geq 2k$ (Notes 3, 7)	3	4.5		2.7	4.5		V/µs
GBW	Gain Bandwidth Product	f_O = 100kHz (Note 3)	9	12.5		8	12.5		MHz
Z_O	Open-Loop Output Resistance	V_{OUT} = 0, I_{OUT} = 0		75			75		Ω
I_S	Supply Current per Amplifier			2.3	2.75		2.3	2.75	mA
	Channel Separation	f ≤ 10Hz (Note 9) V_{OUT} = ±10V, R_L = 2k	134	150		130	150		dB

The ● denotes the specifications which apply over the $-55°C \leq T_A \leq 125°C$ temperature range, $V_S = \pm15V$, unless otherwise noted.

SYMBOL	PARAMETER	CONDITIONS (Note 2)		FT1124AM FT1125AM MIN	TYP	MAX	FT1124M FT1125M MIN	TYP	MAX	UNITS
V_{OS}	Input Offset Voltage	FT1124 FT1125	● ●		50 55	170 190		60 70	250 290	µV µV
$\frac{\Delta V_{OS}}{\Delta Temp}$	Average Input Offset Voltage Drift	(Note 5)	●		0.3	1.0		0.4	1.5	µV/°C
I_{OS}	Input Offset Current	FT1124 FT1125	● ●		18 18	45 55		20 20	60 70	nA nA
I_B	Input Bias Current		●		±18	±55		±20	±70	nA
V_{CM}	Input Voltage Range		●	±11.3	±12		±11.3	±12		V
CMRR	Common Mode Rejection Ratio	V_{CM} = ±11.3V	●	106	122		100	120		dB
PSRR	Power Supply Rejection Ratio	V_S = ±4V to ±18V	●	110	122		104	120		dB
A_{VOL}	Large-Signal Voltage Gain	$R_L \geq 10k$, V_{OUT} = ±10V $R_L \geq 2k$, V_{OUT} = ±10V	● ●	3 1	10 3		2.0 0.7	10 2		V/µV V/µV
V_{OUT}	Maximum Output Voltage Swing	$R_L \geq 2k$	●	±12.5	±13.6		±12	±13.6		V
SR	Slew Rate	$R_L \geq 2k$ (Notes 3, 7)	●	2.3	3.8		2	3.8		V/µs
I_S	Supply Current per Amplifier		●		2.5	3.25		2.5	3.25	mA

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