HEWLETT PACKARD

ITA-06318
MagIC™ Silicon Bipolar MMIC
1.5 Gb/s Transimpedance Amplifier

Features

- **High Transimpedance Gain: A_Z = 2800 Ω (69 dB)**
- **High Data Rates: 1.5 Gb/s NRZ**
- **Wide Bandwidth: 1.3 GHz**
- **Low Noise: 3.5 pA/√Hz at 100 MHz**
- **Single Power Supply: +5 V or -5.2 V**
- **Low Power Consumption: 170 mW**
- **Hermetic Glass Metal Surface Mount Package**

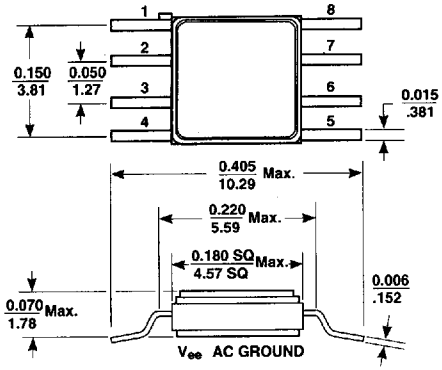
Description

The ITA-06318 is a high-performance transimpedance amplifier housed in a minature glass-metal hermetic surface- mount package. It is designed for use in fiber-optic receivers that require high transimpedance gain, wide bandwidth, reduced power consumption, and low noise.

Typical applications include fiber-optic systems such as high-speed data communications, point to point (Fiber Channel), networks (LAN, MAN), and telecommunications (SONET) with data rates up to 1.8 Gb/s.

The ITA series of transimpedance amplifiers is fabricated using HP's 10 GHz f_T, 25 GHz f_{max} ISOSAT™-1 silicon bipolar process which uses nitride self-alignment, submicrometer lithography, trench isolation, ion implantation, gold metalization and polyimide inter-metal dielectric and scratch protection to achieve excellent performance, uniformity and reliability.

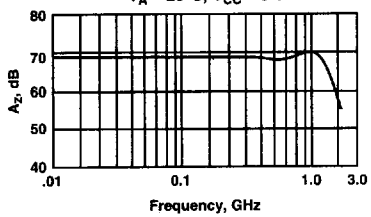
180 mil Package



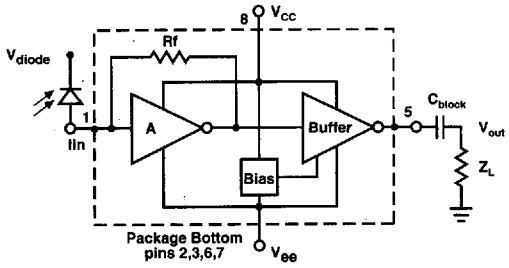
PIN DESCRIPTION	
1 Input	8 V_{CC}
2 V_{ee}, AC Ground	7 V_{ee}
3 V_{ee}, AC Ground	6 V_{ee}
4 NC	5 V_{out}
Bottom of Package is V_{ee} (AC Ground)	

Notes:
(unless otherwise specified)
1. Dimensions are in / mm
2. Tolerances
in .xxx = ±.005
mm .xx = ±.13

Typical Transimpedance Gain vs. Frequency
T_A = 25°C, V_{CC} = 5 V



Typical Biasing Configuration[8]



Electrical Specifications[1], T_A = 25°C

Symbol	Parameters and Test Conditions: V_{cc} = 5 V, V_{ee} = 0 V, Z_L = 50 Ω		Units	Min.	Typ.	Max.
A_Z	Transimpedance Gain	f = 100 MHz	ohms	2200	2800	
F_{3dB}	Small Signal -3 dB Bandwidth[2, 4]		GHz	0.9	1.3	
ΔA_Z	Frequency Response Gain Peak[2, 4]		dB	0.0	1.1	2.0
I_n	Input Current Noise Spectral Density[2]	f = 100 MHz	pA/√Hz		3.5	
V_{op-p}	Output Vo Swing (peak to peak)	f = 50 MHz	V_{p-p}		0.95	
VSWR	Output VSWR	f = 100 MHz			1.5:1	
I_{MAX}	Maximum Input Current Before Input Overload[3]	f = 50 MHz	μA_{p-p}		450	
I_d	Device Quiescent Current		mA		34	
V_{in}	Input Quiescent Voltage		Vdc		1.5	
V_{OUT}	Output Quiescent Voltage		Vdc		2.5	

Notes: 1. The recommended operating voltage range for this device is 4.5 to 5.5 V.
2. Assumes photodiode capacitance, C_{PD}<0.3 pF.
3. Output duty cycle distortion ≤ ±10%.
4. Referenced from 100 MHz.

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Absolute Maximum Ratings

Parameter	Absolute Maximum[1]
Device Voltage	8 V
Power Dissipation[2, 3]	700 mW
V_{in}-V_{ee}	2.0 V
Junction Temperature	200°C
Storage Temperature	-65 to 200°C

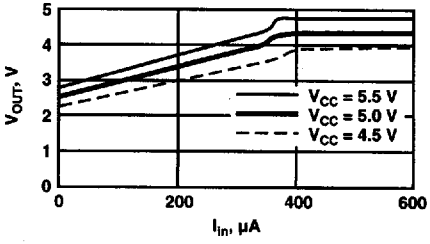
Thermal Resistance: θ_{jc} = 50°C/W

Notes:
1. Permanent damage may occur if any of these limits are exceeded.
2. T_{case} = 25°C.
3. Derate at 20 mW/°C for T_{case} > 165°C.

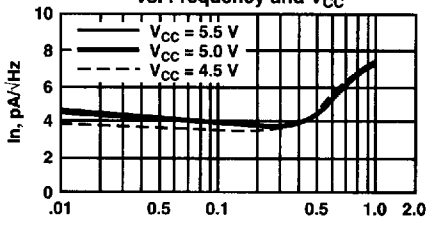
Typical Performance, T_A = 25°C, V_{cc} = 5 V, V_{ee} = 0 V, Z_L = 50 Ω, C_{PD} < 0.3 pF

(Unless otherwise noted)

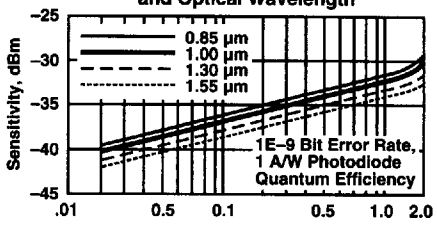
DC Input/Output Characteristics
No Load



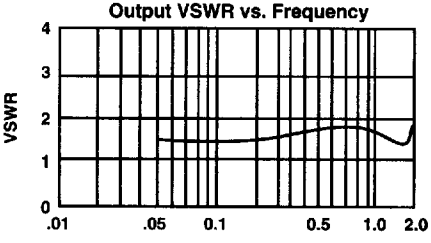
Equivalent Input Current Noise vs. Frequency and V_{CC}



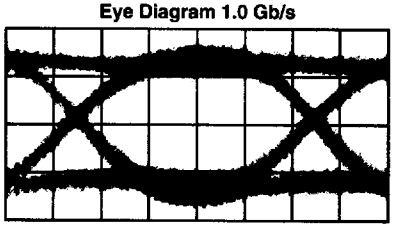
Calculated Sensitivity vs. Frequency and Optical Wavelength



Output VSWR vs. Frequency



Eye Diagram 1.0 Gb/s

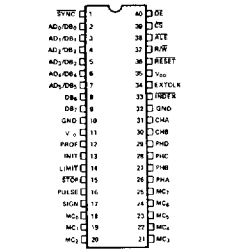
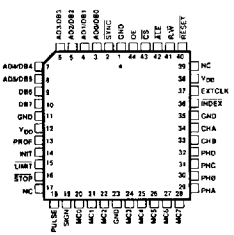
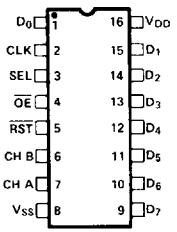
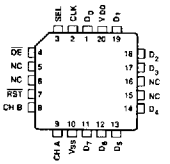
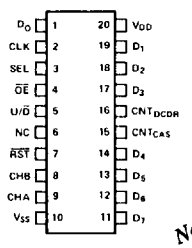
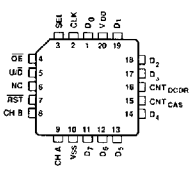


ITA-06318 Scattering Parameters: VCC - Vee = 5V

Freq.	S_{11}		S_{21}		S_{12}		S_{22}	
GHz	Mag	Ang	Mag	Ang	Mag	Ang	Mag	Ang
0.05	.10	-24	62.0	-6	.002	-104	.38	168
0.10	.07	-21	63.3	-14	.003	-86	.35	166
0.20	.04	39	64.3	-30	.003	-75	.33	165
0.30	.08	90	66.1	-45	.003	-63	.33	161
0.40	.17	92	67.4	-67	.003	-57	.33	155
0.50	.28	84	67.0	-86	.003	-44	.32	147
0.60	.38	74	64.1	-107	.002	-30	.32	139
0.70	.48	61	58.6	-128	.002	-14	.29	129
0.80	.55	50	51.8	-147	.002	0	.28	122
0.90	.60	39	44.7	-165	.002	16	.26	110
1.00	.64	31	38.3	179	.002	27	.25	103
1.25	.69	16	25.6	146	.003	61	.21	86
1.50	.71	6	17.9	118	.004	93	.21	73
1.75	.71	-2	12.9	94	.006	141	.21	66
2.00	.71	-9	9.8	70	.007	164	.20	63
2.50	.69	-25	6.3	28	.015	178	.14	69

FIBER OPTICS

Motion Control ICS – HCTL-XXXX Series

Package Outline Drawing	Part No.	Package	Description	Page No.
	HCTL-1100	PDIP	CMOS General Purpose Motion Control IC	1-104
	HCTL-1100 OPT PLC	PLCC	CMOS General Purpose Motion Control IC	
	HCTL-2000	PDIP	CMOS Quadrature Decoder/Counter IC, 12-bit Counter	1-86
	HCTL-2016	PDIP	CMOS Quadrature Decoder/Counter IC, 16-bit Counter	
	*New* HCTL-2016 OPT PLC	PLCC	CMOS Quadrature Decoder/Counter IC, 16-bit Counter	1-102
	HCTL-2020	PDIP	CMOS Quadrature Decoder/Counter IC, 16-bit Counter, Quadrature Decoder Output Signals, Cascade Output Signals	1-86
	*New* HCTL-2020 OPT PLC	PLCC	CMOS Quadrature Decoder/Counter IC, 16-bit Counter, Quadrature Decoder Output Signals, Cascade Output Signals	1-102

Accessories for Encoders and Encoder Modules

Package Outline Drawing	Part No.	Description	Page No.
	HEDS-8902	4-wire connector with 15.5 cm (6.1 in.) flying leads. Locks into HEDS-5500 and HEDS-5600 2 channel encoders. Also fits HEDS-9000, HEDS-9100, and HEDS-9200 2 channel encoder modules.	1-61 1-22 1-28
	HEDS-8903	5-wire connector with 15.5 cm (6.1 in.) flying leads. Locks into HEDS-5540 and HEDS-5640 three channel encoders. Also fits HEDS-9040 and HEDS-9140 three channel encoder modules.	1-61 1-32
	HEDS-8905	Alignment Tool for HEDS-9140	1-32
	HEDS-8906	Alignment Tool for HEDS-9040	1-32
	HEDS-8901	Gap Setting shown for film codewheels	1-51
	HEDS-8932	Gap Setting shown for glass codewheels	1-51
	HEDS-8910 OPT 0 □□	Alignment Tool for HEDS-5540/5545 and HEDS-5640/5645. Order in appropriate shaft size.	1-61