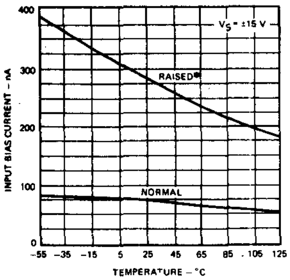
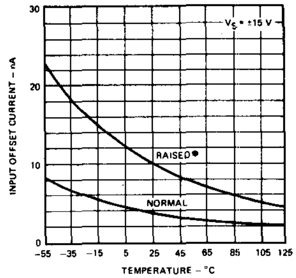
TYPICAL PERFORMANCE CURVES FOR μA111

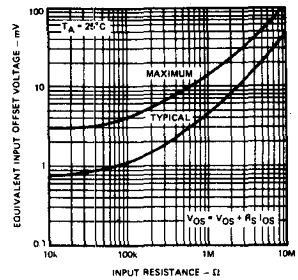
INPUT BIAS CURRENT AS A FUNCTION OF TEMPERATURE



INPUT OFFSET CURRENT AS A FUNCTION OF TEMPERATURE

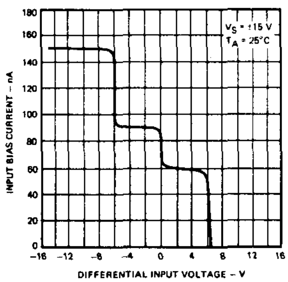


OFFSET VOLTAGE AS A FUNCTION OF INPUT RESISTANCE

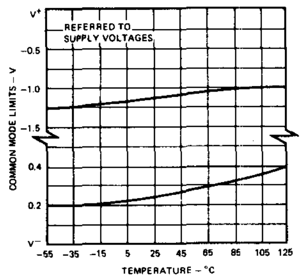


*Pins 5,6 and 8 are shorted.

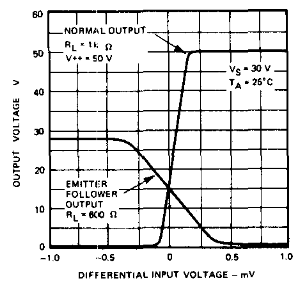
INPUT BIAS CURRENT AS A FUNCTION OF DIFFERENTIAL INPUT VOLTAGE



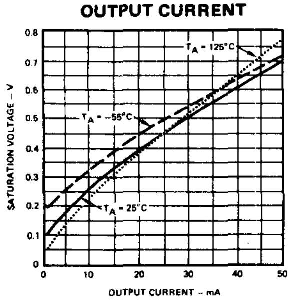
COMMON MODE LIMITS AS A FUNCTION OF TEMPERATURE



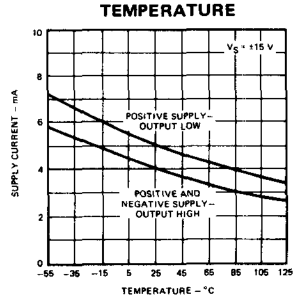
OUTPUT VOLTAGE AS A FUNCTION OF DIFFERENTIAL INPUT VOLTAGE



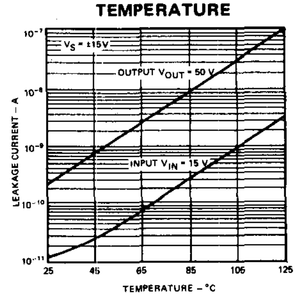
OUTPUT SATURATION VOLTAGE AS A FUNCTION OF OUTPUT CURRENT



SUPPLY CURRENT AS A FUNCTION OF TEMPERATURE

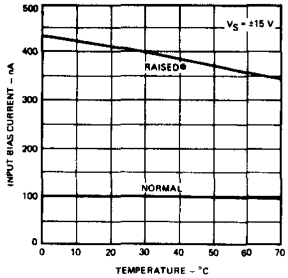


LEAKAGE CURRENTS AS A FUNCTION OF TEMPERATURE

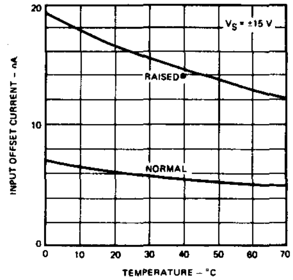


TYPICAL PERFORMANCE CURVES FOR μA311

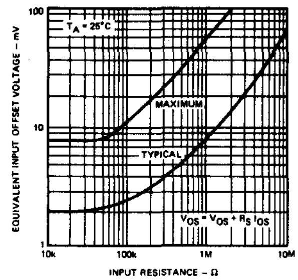
INPUT BIAS CURRENT AS A FUNCTION OF TEMPERATURE



INPUT OFFSET CURRENT AS A FUNCTION OF TEMPERATURE

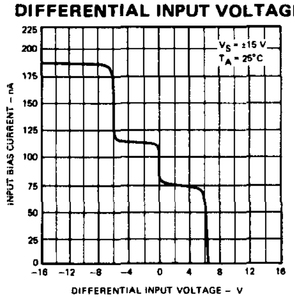


OFFSET VOLTAGE AS A FUNCTION OF INPUT RESISTANCE

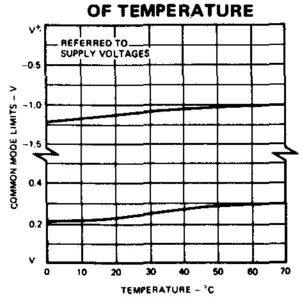


*Pins 5, 6 and 8 are shorted.

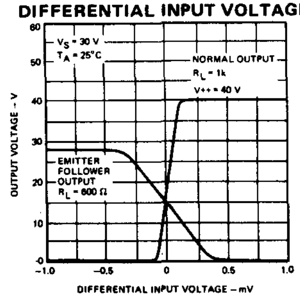
INPUT BIAS CURRENT AS A FUNCTION OF DIFFERENTIAL INPUT VOLTAGE



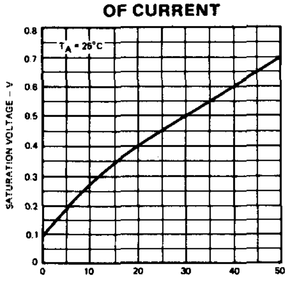
COMMON MODE LIMITS AS A FUNCTION OF TEMPERATURE



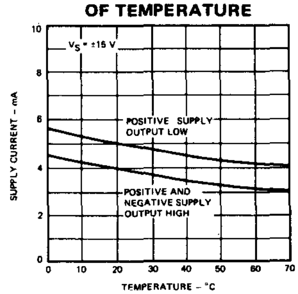
OUTPUT VOLTAGE AS A FUNCTION OF DIFFERENTIAL INPUT VOLTAGE



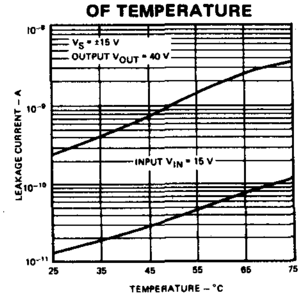
SATURATION VOLTAGE AS A FUNCTION OF CURRENT



SUPPLY CURRENT AS A FUNCTION OF TEMPERATURE

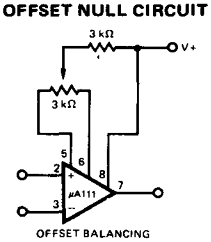


LEAKAGE CURRENT AS A FUNCTION OF TEMPERATURE

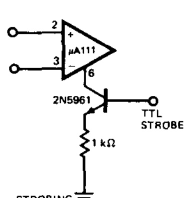


TYPICAL APPLICATIONS

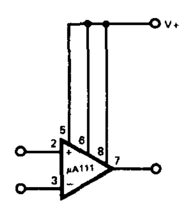
OFFSET NULL CIRCUIT



STROBE CIRCUIT



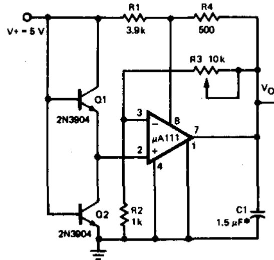
INCREASING INPUT STAGE CURRENT*



*Increases typical common mode slew rate from 7.0 V/μs to 18 V/μs.

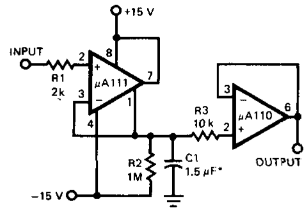
TYPICAL APPLICATIONS (Cont'd)

ADJUSTABLE LOW VOLTAGE REFERENCE SUPPLY



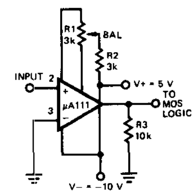
*Solid tantalum

POSITIVE PEAK DETECTOR

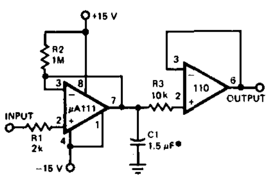


*Solid tantalum

ZERO CROSSING DETECTOR DRIVING MOS LOGIC

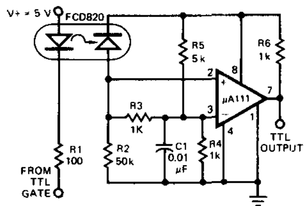


NEGATIVE PEAK DETECTOR

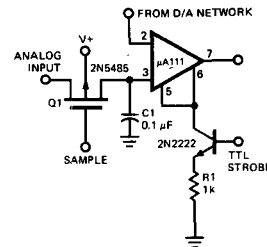


*Solid tantalum

DIGITAL TRANSMISSION ISOLATOR

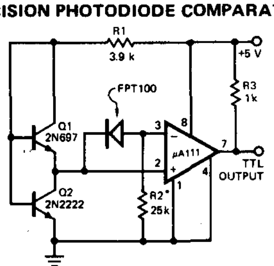


STROBING OF BOTH INPUT AND OUTPUT STAGES



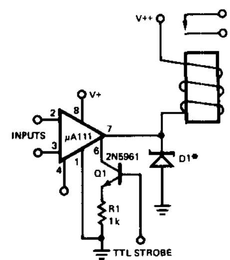
*Typical input current is 50 pA with inputs strobed off.

PRECISION PHOTODIODE COMPARATOR



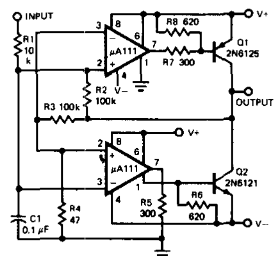
*R2 sets the comparison level. At comparison, the photodiode has less than 5 mV across it, decreasing leakages by an order of magnitude.

RELAY DRIVER WITH STROBE

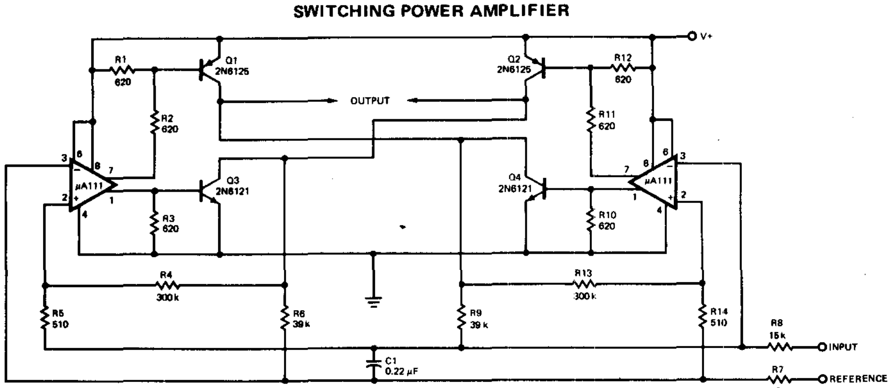


*Absorbs inductive kickback of relay and protects IC from severe voltage transients on V++ line.

SWITCHING POWER AMPLIFIER



SWITCHING POWER AMPLIFIER



μA111 • μA311

VOLTAGE COMPARATORS

FAIRCHILD LINEAR INTEGRATED CIRCUITS

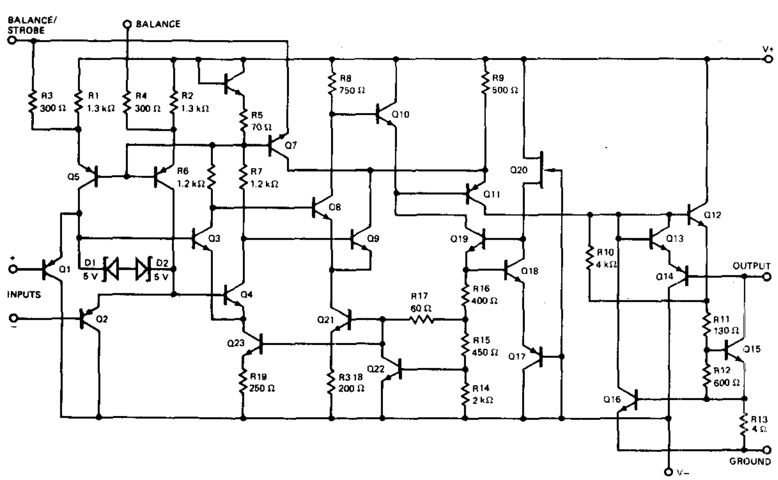
GENERAL DESCRIPTION — The 111 and 311 are monolithic, low input current Voltage Comparators, each constructed using the Fairchild Planar* epitaxial process. The 111 series operates from the single 5 V integrated circuit logic supply to the standard ±15 V operational amplifier supplies. The 111 series is intended for a wide range of applications including driving lamps or relays and switching voltages up to 50 V at currents as high as 50 mA. The output stage is compatible with RTL, DTL, TTL and MOS logic. The input stage current can be raised to increase input slew rate.

- **LOW INPUT BIAS CURRENT — 150 nA MAX (111), 250 nA MAX (311)**
- **LOW INPUT OFFSET CURRENT — 20 nA MAX (111), 50 nA MAX (311)**
- **DIFFERENTIAL INPUT VOLTAGE — ±30 V**
- **POWER SUPPLY VOLTAGE SINGLE 5.0 V SUPPLY TO ±15 V**
- **OFFSET VOLTAGE NULL CAPABILITY**
- **STROBE CAPABILITY**

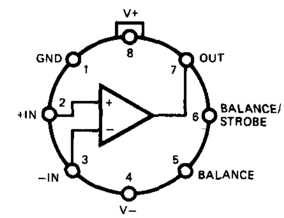
ABSOLUTE MAXIMUM RATINGS

Voltage Between V+ and V− Terminals	36 V
Output to V− (μA111)	50 V
(μA311)	40 V
Ground to V−	30 V
Differential Input Voltage	±30 V
Input Voltage (Note 1)	±15 V
Internal Power Dissipation (Note 2)	500 mW
Output Short Circuit Duration	10 s
Storage Temperature Range (Metal Can and Hermetic Mini DIP)	−65°C to +150°C
(Molded Mini DIP)	−55°C to +125°C
Operating Temperature Range	
Military (μA111)	−55°C to +125°C
Commercial (μA311)	0°C to +70°C

EQUIVALENT CIRCUIT



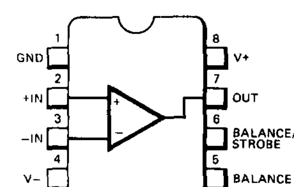
CONNECTION DIAGRAMS
8-LEAD METAL CAN
(TOP VIEW)
PACKAGE OUTLINE 5S
PACKAGE CODE H



ORDER INFORMATION

TYPE	PART NO.
μA111	μA111H
μA311	μA311H

8-LEAD MINI DIP
(TOP VIEW)
PACKAGE OUTLINE 9T
PACKAGE CODE T



ORDER INFORMATION

TYPE	PART NO.
μA111	μA111R
μA311	μA311R
μA311	μA311T

μA111

ELECTRICAL CHARACTERISTICS (V_S = ±15 V, T_A = −55°C to +125°C unless otherwise specified) Note 3

PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
Input Offset Voltage (Note 4)	T_A = 25°C, $R_S \leq$ 50 kΩ		0.7	3.0	mV
Input Offset Current (Note 4)	T_A = 25°C		4.0	10	nA
Input Bias Current	T_A = 25°C		60	100	nA
Voltage Gain	T_A = 25°C		200		V/mV
Response Time (Note 5)	T_A = 25°C		200		ns
Saturation Voltage	$V_{IN} \leq$ −5 mV, I_{OUT} = 50 mA T_A = 25°C		0.75	1.5	V
Strobe On Current	T_A = 25°C		3.0		mA
Output Leakage Current	$V_{IN} \geq$ 5 mV, V_{OUT} = 35 V T_A = 25°C		0.2	10	nA
Input Offset Voltage (Note 4)	$R_S \leq$ 50 kΩ			4.0	mV
Input Offset Current (Note 4)				20	nA
Input Bias Current				150	nA
Input Voltage Range			±14		V
Saturation Voltage	$V^+ \geq$ 4.5 V, V^- = 0 $V_{IN} \leq$ −6 mV, $I_{SINK} \leq$ 8 mA		0.23	0.4	V
Output Leakage Current	$V_{IN} \geq$ 5 mV, V_{OUT} = 35 V		0.1	0.5	μA
Positive Supply Current	T_A = 25°C		5.1	6.0	mA
Negative Supply Current	T_A = 25°C		4.1	5.0	mA

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μA311

ELECTRICAL CHARACTERISTICS (V_S = ±15 V, T_A = 0°C to 70°C unless otherwise specified) Note 3

PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
Input Offset Voltage (Note 4)	T_A = 25°C, $R_S \leq$ 50 kΩ		2.0	7.5	mV
Input Offset Current (Note 4)	T_A = 25°C		6.0	50	nA
Input Bias Current	T_A = 25°C		100	250	nA
Voltage Gain	T_A = 25°C		200		V/mV
Response Time (Note 5)	T_A = 25°C		200		ns
Saturation Voltage	$V_{IN} \leq$ −10 mV, I_{OUT} = 50 mA T_A = 25°C		0.75	1.5	V
Strobe On Current	T_A = 25°C		3.0		mA
Output Leakage Current	$V_{IN} \geq$ 10 mV, V_{OUT} = 35 V T_A = 25°C		0.2	50	nA
Input Offset Voltage (Note 4)	$R_S \leq$ 50 kΩ			10	mV
Input Offset Current (Note 4)				70	nA
Input Bias Current				300	nA
Input Voltage Range			±14		V
Saturation Voltage	$V^+ \geq$ 4.5 V, V^- = 0 $V_{IN} \leq$ −10 mV, $I_{SINK} \leq$ 8 mA		0.23	0.4	V
Positive Supply Current	T_A = 25°C		5.1	7.5	mA
Negative Supply Current	T_A = 25°C		4.1	5.0	mA

NOTES:

1. This rating applies for ±15 V supplies. The positive input voltage limit is 30 V above the negative supply. The negative input voltage limit is equal to the negative supply voltage or 30 V below the positive supply, whichever is less.
2. Rating applies to ambient temperatures up to 70°C. Above 70°C ambient derate linearly at 6.3 mW/°C for metal can; 8.3 mW/°C for mini DIP.
3. The offset voltage, offset current and bias current specifications apply for any supply voltage from a single 5 V supply up to ±15 V supplies.
4. The offset voltages and offset currents given are the maximum values required to drive the output within a volt of either supply with a 1 mA load. Thus, these parameters define an error band and take into account the worst case effects of voltage gain and input impedance.
5. The response time specified (see definitions) is for a 100 mV input step with 5 mV overdrive.