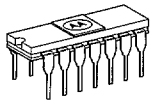
JANUARY, 1969

DUAL SENSE AMPLIFIERS

MC1414 L (0 to +75°C)
MC1514 L (−55 to +125°C)

. . . the MC1414 and MC1514 are monolithic dual differential voltage comparators designed for use in level detection, low-level sensing, and memory applications.

- Two Separate Outputs
- Strobe Capability
- High Output Sink Current — 2.8 mA min *Each* Comparator
- Differential Input Characteristics:
  Input Offset Voltage = 1.0 mV
  Offset Voltage Drift = 3.0 μV/°C
- Short Propagation Delay Time — 40 ns
- Output Compatible with All Saturating Logic Forms
  V_{out} = +3.2 V to −0.5 V typical



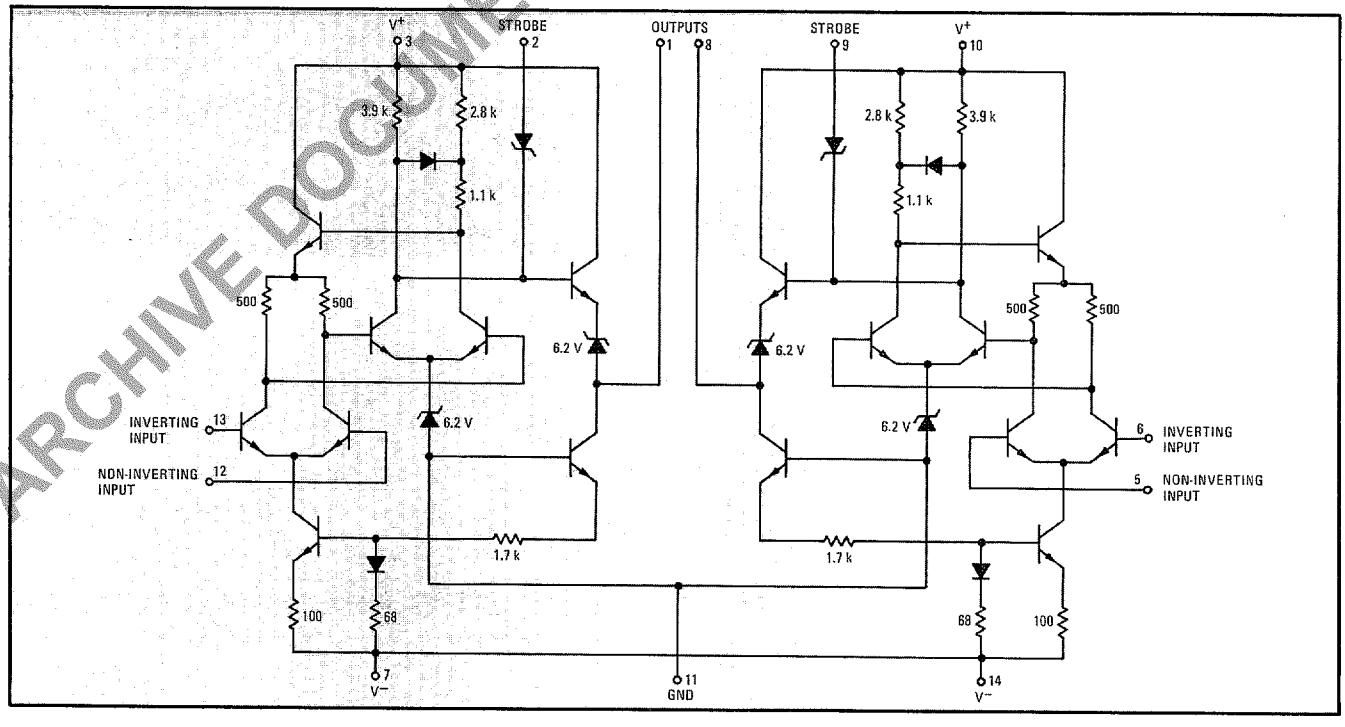
L SUFFIX
CERAMIC PACKAGE
CASE 605C
TO-116

MAXIMUM RATINGS (T_A = 25°C UNLESS OTHERWISE NOTED)

RATING		SYMBOL	VALUE	UNIT
Power Supply Voltage		V^+ V^-	+14 −7.0	Vdc Vdc
Differential Input Signal		V_{in}	±5.0	Volts
Common Mode Input Swing		CMV_{in}	±7.0	Volts
Peak Load Current		I_L	10	mA
Power Dissipation (package limitation) Ceramic Dual In-Line Package Derate above T_A = 50°C		P_D	 750 6.0	 mW mW/°C
Operating Temperature Range	MC1414 MC1514	T_A	0 to +75 −55 to +125	°C
Shortage Temperature Range		T_{stg}	−65 to +150	°C

ELECTRICAL CHARACTERISTICS (T_A = 25°C)

TYPE	V^+ (Vdc)	V^- (Vdc)	V_{io} (mV)	A_{VOL} (V/V)	V_{OH} (Vdc)	V_{OL} (Vdc)	t_{pd} (ns)	CMV_{in} (Vdc)	TCV_{io} (μV/°C)
MC1414	+12	−6.0	1.5	1500	3.2	−0.5	40	±5.0	5.0
MC1514	+12	−6.0	1.0	1700	3.2	−0.5	40	±5.0	3.0



MC1440F,G,L,P (0 to +75°C)
MC1540F,G,L (−55 to +125°C)

. . . consisting of a wideband differential amplifier, a dc restoration circuit which also incorporates facilities to externally adjust the threshold, and an output gate which is strobed from saturated logic. It is designed to detect bipolar differential signals derived by a core memory with cycle times as low as 0.5 μs. MC1440 and MC1540 are identical circuits specified over different temperature ranges.

- Differential Threshold Characteristics:
  Adjustable Threshold — 10-25 mV
  Nominal Threshold — 17 mV @ $V_6 = -6$ V
  Input Offset Voltage — 1 mV
  Threshold Drift — +10 V/°C
- Fast Response Time — 20 ns
- Short Recovery Time
  50 ns @ e_{in} = 1.8 V Common Mode
  50 ns @ e_{in} = 400 mV Differential Mode

MAXIMUM RATINGS (T_A = 25°C UNLESS OTHERWISE NOTED)

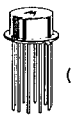
RATING	SYMBOL	VALUE	UNIT
Power Supply Voltage	V+ V-	+10 −10	Vdc Vdc
Differential Input Signal	V_{in}	±5.0	Volts
Common Mode Input Swing	CMV_{in}	±5.0	Volts
Peak Load Current	I_L	25	mA
Power Dissipation (Package Limitation) Metal Can Derate above 25°C Flat Package Derate above 25°C Ceramic Dual In-Line Pkg. Derate above 25°C Plastic Package Derate above 25°C	P_D	 680 4.6 500 3.3 625 5.0 415 3.3	 mW mW/°C mW mW/°C mW mW/°C mW mW/°C
Operating Temperature Range	MC1440G, F, P, L MC1540F MC1540G, L	T_A	0 to +75 −55 to +100 −55 to +125	°C
Storage Temperature Range		T_{stg}	−65 to +150	°C

ELECTRICAL CHARACTERISTICS (T_A = 25°C)

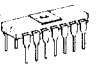
TYPE	V+ (Vdc)	V- (Vdc)	V_{th}* (mV)	A_V (V/V)	V_{OH} (Vdc)	V_{OL} (Vdc)	t_{pd} (ns)	t_R (ns)	CMV_{in} (Vpk)	TCV_{th} (μV/°C)
MC1540	+6.0	−6.0	17	85	5.9	0.35	10	20	±5.0	10
MC1440	+6.0	−6.0	17	85	5.8	0.4	10	20	±5.0	10

*Input Offset Voltage = 1.0 mV; V_{th} is adjustable.

F SUFFIX
CASE 606
(Formerly Case 72)
TO-91

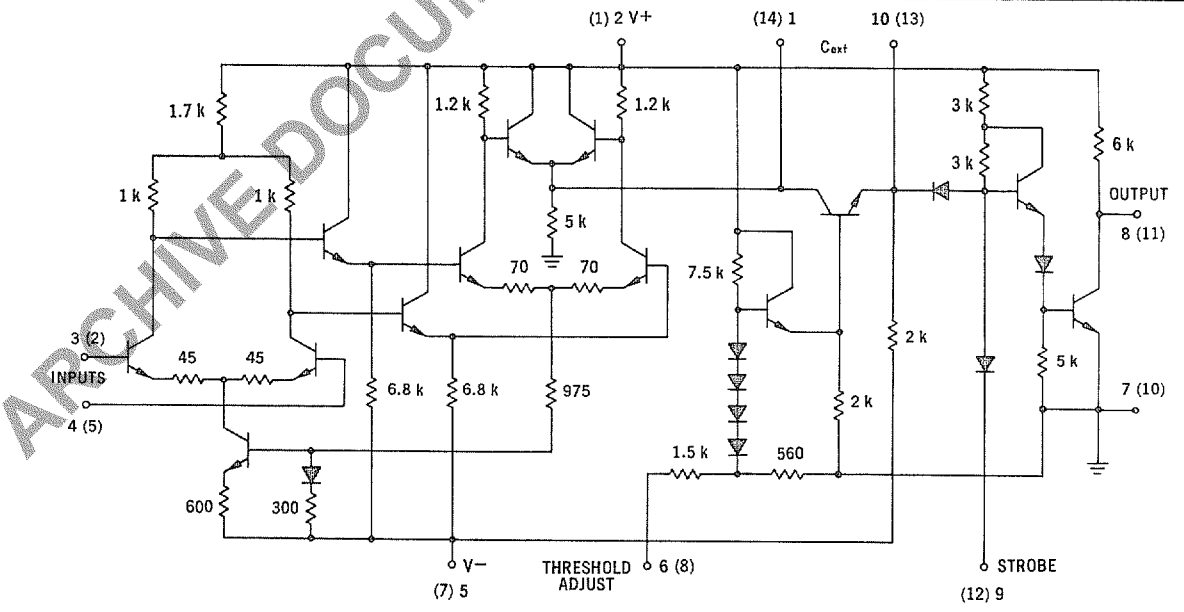


G SUFFIX
CASE 602B
(Formerly Case 71)



L SUFFIX
CERAMIC PACKAGE
CASE 605C
TO-116

P SUFFIX
PLASTIC PACKAGE
CASE 605
(Formerly Case 93)
TO-116



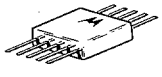
Number at terminal end represents pin number for devices in flat package and metal can. Number in parenthesis represents pin number for dual in-line ceramic and plastic packages.

MC1711CF,G,L,P (0 to +75°C)
MC1711F,G,L (−55 to +125°C)

. . . the MC1711 and MC1711C monolithic dual differential comparators are similar circuits specified over different temperature ranges. They are designed for use in level detection, low-level sensing, and memory applications.

Typical Characteristics:

- Differential Input
  Input Offset Voltage = 1.0 mV
  Offset Voltage Drift = 5.0 μV/°C
- Fast Response Time — 40 ns
- Output Compatible with All Saturating Logic Forms — V_{out} = +4.5 V to −0.5 V typical
- Low Output Impedance — 200 ohms



F SUFFIX
CASE 606
(Formerly Case 72)
TO-91

MAXIMUM RATINGS (T_A = 25°C unless otherwise noted)

RATING	SYMBOL	VALUE	UNIT
Power Supply Voltage	V+ V−	+14 −7.0	Vdc Vdc
Differential Input Signal	V_{in}	±5.0	Volts
Common Mode Input Swing	CMV_{in}	±7.0	Volts
Peak Load Current	I_L	50	mA
Power Dissipation (Package Limitation) Metal Can Derate above 25°C Flat Package Derate above 25°C Ceramic Dual In-Line Package Derate above 25°C Plastic Package Derate above 25°C	P_D	 680 4.6 500 3.3 650 5.0 400 3.3	 mW mW/°C mW mW/°C mW mW/°C mW mW/°C
Operating Temperature Range MC1711C MC1711	T_A	0 to +75 −55 to +125	°C
Storage Temperature Range G,F,&L Pkgs. P Pkg.	T_{stg}	−65 to +150 −65 to +125	°C

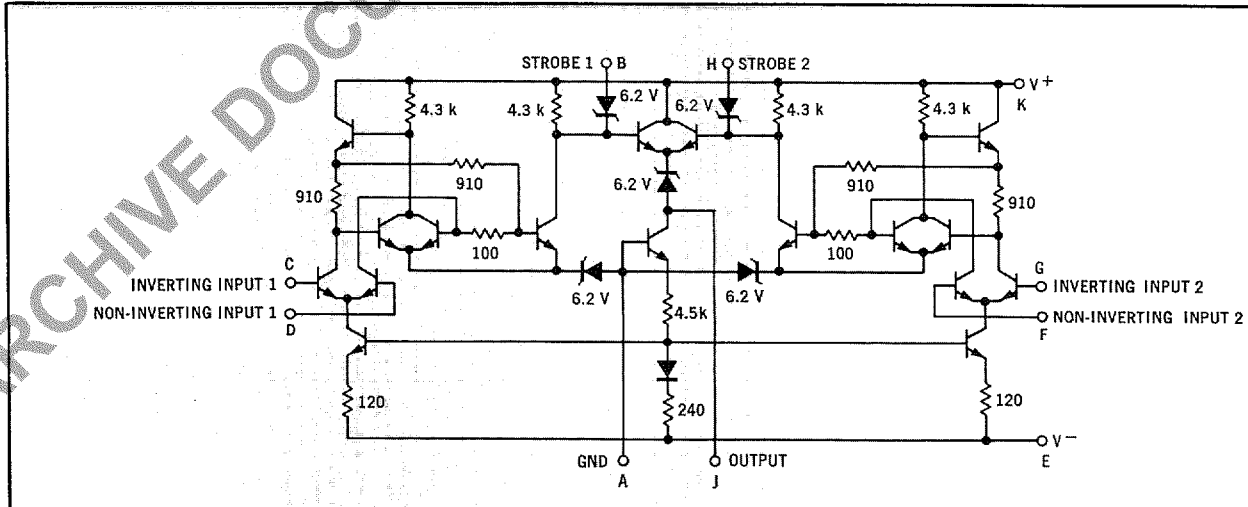
ELECTRICAL CHARACTERISTICS (T_A = 25°C)

TYPE	V+ (Vdc)	V− (Vdc)	V_{io} (mV)	A_{VOL} (V/V)	V_{OH} (Vdc)	V_{OL} (Vdc)	t_R (ns)	CMV_{in} (V_{pk})	TCV_{io} (μV/°C)
MC1711	+12	−6.0	1.0	1500	3.2	−0.5	40	±5.0	5.0
MC1711C	+12	−6.0	1.0	1500	3.2	−0.5	40	±5.0	5.0

G SUFFIX
CASE 602A
(Formerly Case 71A)

P SUFFIX
PLASTIC PACKAGE
CASE 605
(Formerly Case 93)
TO-116

L SUFFIX
CERAMIC PACKAGE
CASE 605C
TO-116



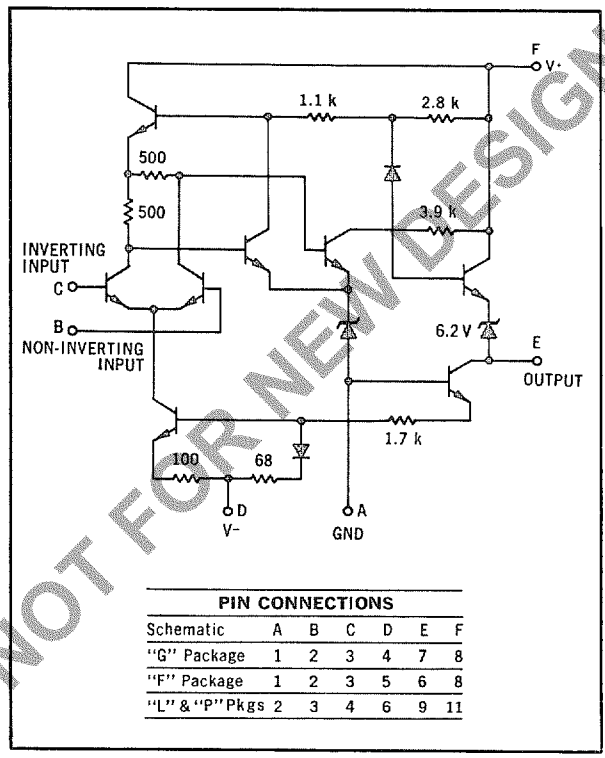
PIN CONNECTIONS

Schematic	A	B	C	D	E	F	G	H	J	K
"G" Package	1	2	3	4	5	6	7	8	9	10
"F" Package	9	10	1	2	3	4	5	6	7	8
"L"&"P"Pkgs	12	13	2	3	4	5	6	9	10	11

MC1710C F,G,L,P (0 to +75°C)
MC1710F,G,L (−55 to +125°C)

. . . the MC1710 and MC1710C are identical circuits specified over different temperature ranges. These devices are differential voltage comparators for use in level detection, low-level sensing, and memory applications. Features:

- Differential Input Characteristics:
  Input Offset Voltage = 1 mV
  Offset Voltage Drift = 3 μV/°C
- Fast Response Time — 40 ns
- Low Output Impedance — 200 ohms
- Output Compatible with All Saturating Logic Forms — +3.2 V to −0.5 V typical



PIN CONNECTIONS						
Schematic	A	B	C	D	E	F
"G" Package	1	2	3	4	7	8
"F" Package	1	2	3	5	6	8
"L" & "P" Pkgs	2	3	4	6	9	11

F SUFFIX
CASE 606
(Formerly Case 72)
TO-91

G SUFFIX
CASE 601
(Formerly Case 96)
TO-99

L SUFFIX
CERAMIC PACKAGE
CASE 605C
TO-116

P SUFFIX
PLASTIC PACKAGE
CASE 605
(Formerly Case 93)
TO-116

MAXIMUM RATINGS (T_A = 25°C UNLESS OTHERWISE NOTED)

RATING	SYMBOL	VALUE	UNIT
Power Supply Voltage	V+ V−	+14 −7.0	Vdc Vdc
Differential Input Signal	V_{in}	±5.0	Volts
Common Mode Input Swing	CMV_{in}	±7.0	Volts
Peak Load Current	I_L	10	mA
Power Dissipation (Package Limitation) Metal Can Derate above 25°C Flat Package Derate above 25°C Ceramic Dual In-Line Package Derate above 25°C Plastic Package Derate above 25°C	P_D	 680 4.6 500 3.3 600 4.8 400 3.3	 mW mW/°C mW mW/°C mW mW/°C mW mW/°C
Operating Temperature Range MC1710C MC1710	T_A	0 to +75 −55 to +125	°C
Storage Temperature Range G, F, & L Pkgs. P Pkg.	T_{stg}	−65 to +150 −65 to +125	°C

ELECTRICAL CHARACTERISTICS (T_A = 25°C)

TYPE	V^+ (Vdc)	V^- (Vdc)	V_{io} (mV)	A_{VOL} (V/V)	V_{OH} (Vdc)	V_{OL} (Vdc)	t_R (ns)	CMV_{in} (Vdc)	TCV_{io} (μV/°C)
MC1710	+12	−6.0	1.0	1700	3.2	−0.5	40	±5.0	3.0
MC1710C	+12	−6.0	1.5	1500	3.2	−0.5	40	±5.0	5.0

MC1441F,L,P (0 to +75°C)
MC1541F,L (−55 to +125°C)

. . . consisting of a dual-channel gated sense amplifier with separate wideband differential input amplifiers. Either can be gated on from saturated logic levels. The sense amplifier features adjustable threshold, saturated logic output levels, and a strobe input that accommodates saturated logic levels. Designed to detect bipolar signals from either of two sense lines. Operates with core memory cycle times less than 0.5 μs.

- Nominal Threshold — 17 mV
- Input Offset Voltage — 1.0 mV typical
- Propagation Delay
  - Input to Gate-Output — 20 ns
  - Input to Amplifier-Output — 10 ns
  - Gate Response Time — 15 ns
  - Strobe Response Time — 15 ns
- Common Mode Input Range — 1.5 Volts
- Differential Mode Input Range
  - With Gate On — 600 mV
  - With Gate Off — 1.5 Volts
- Power Dissipation — 140 mW typical

MAXIMUM RATINGS (T_A = 25°C UNLESS OTHERWISE NOTED)

RATING	SYMBOL	VALUE	UNIT
Power Supply Voltage	V^+ V^-	+10 −10	Vdc Vdc
Differential Input Signal	V_{in}	±5	Vdc
Common Mode Input Voltage	CMV_{in}	±5	Vdc
Load Current	I_L	25	mA
Power Dissipation (Package Limitation) Flat Package Derate above 25°C Ceramic Dual In-Line Package Derate above 25°C Plastic Package Derate above 25°C	P_D	 500 3.3 600 4.8 415 3.3	 mW mW/°C mW mW/°C mW mW/°C
Operating Temperature Range MC1541F, MC1541L MC1441F, MC1441L, MC1441P	T_A	 −55 to +125 0 to +75	°C
Storage Temperature Range Ceramic Packages Plastic Package	T_{stg}	 −65 to +150 −55 to +125	°C

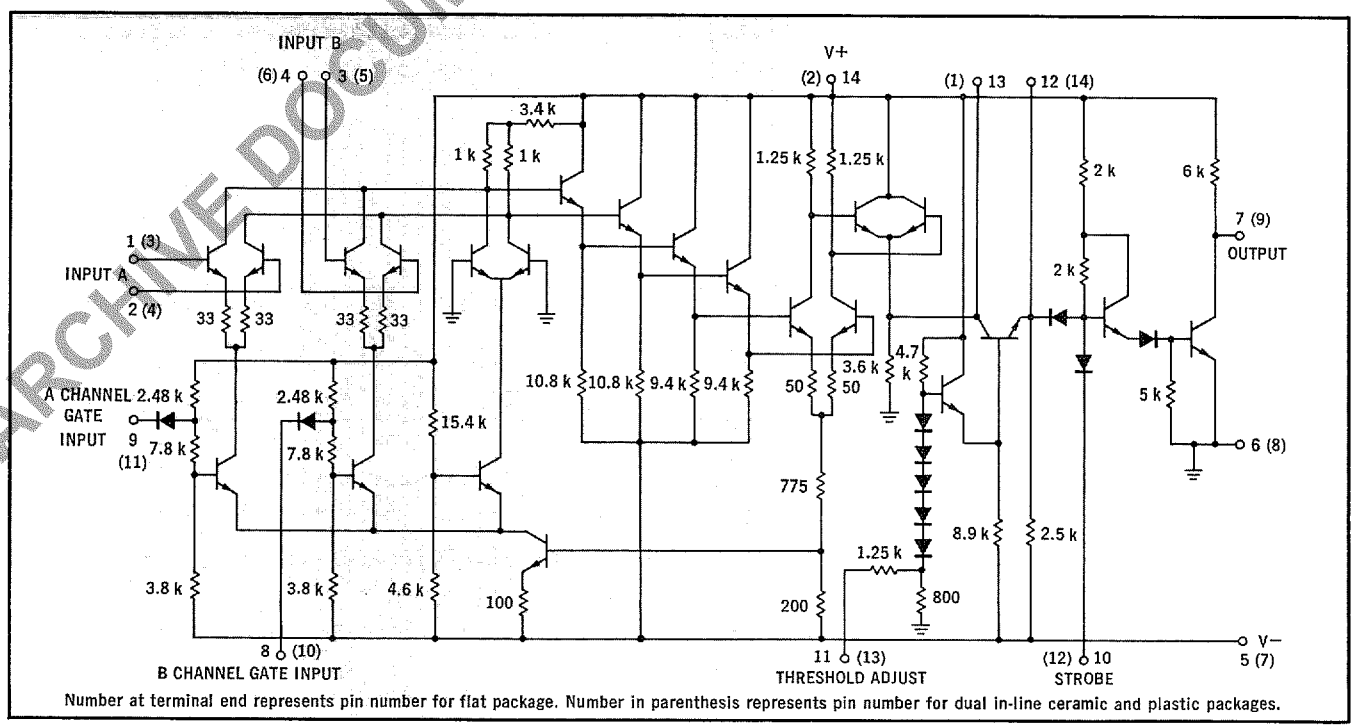
ELECTRICAL CHARACTERISTICS (T_A = 25°C)

TYPE	V^+ (Vdc)	V^- (Vdc)	V_{th}* (mV)	A_V (V/V)	V_{OH} (Vdc)	V_{OL} (mVdc)	t_{pd} (ns)	t_R (ns)	CMV_{in} (Vpk)
MC1541	+5.0	−5.0	17	75	4.9	350	20	30	±5.0
MC1441	+5.0	−5.0	17	75	4.9	350	20	30	±5.0

F SUFFIX
CASE 607
(Formerly Case 83)
TO-86

L SUFFIX
CERAMIC PACKAGE
CASE 605C
TO-116

P SUFFIX
PLASTIC PACKAGE
CASE 605
(Formerly Case 93)
TO-116



Number at terminal end represents pin number for flat package. Number in parenthesis represents pin number for dual in-line ceramic and plastic packages.

MOTOROLA Semiconductor Products Inc.

BOX 20912 • PHOENIX, ARIZONA 85036 • A SUBSIDIARY OF MOTOROLA INC.

2191-35 PRINTED IN USA 2-69 IMPERIAL LITHO B984D 15M

I/C-L5.1 R2 SG 5