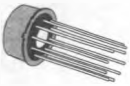
SGS-THOMSON MICROELECTRONICS

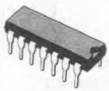
LM119 - LM219 LM319

HIGH SPEED DUAL COMPARATORS

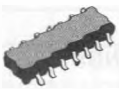
- TWO INDEPENDENT COMPARATORS
- OPERATION FROM A SINGLE + 5 V SUPPLY
- TYPICALLY 80 ns RESPONSE TIME AT ± 15 V
- MINIMUM FAN-OUT OF 2 EACH SIDE
- MAXIMUM INPUT CURRENT OF 1 μA OVER OPERATING TEMPERATURE RANGE
- INPUTS AND OUTPUTS CAN BE ISOLATED FROM SYSTEM GROUND
- HIGH COMMON-MODE SLEW RATE



H
TO-100
(Metal Can)



N
DIP14
(Plastic Package)
J
CERDIP14
(Cerdip Package)



D
SO14
(Plastic Micropackage)

GC
LCC20
(Tricecop (LCC))

DESCRIPTION

These products are precision high speed dual comparators designed to operate over a wide range of supply voltages down to a single 5 V logic supply and ground and have low input currents and high gains.

The open collector of the output stage makes compatible with TTL as well as capable of driving lamps and relays at currents up to 25 mA.

Although designed primarily for applications requiring operation from digital logic supplies, are fully specified for power supplies up to 15 V.

They feature faster response than the LM111 at the expense of higher power dissipation. However, the high speed, wide operating voltage range and low package count make the much more versatile.

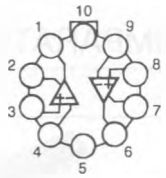
ORDER CODES

Part Number	Temperature Range	Package				
		H	N	J	D	GC
LM119	– 55 to + 125 °C	•		•		•
LM219	– 40 to + 105 °C	•	•	•	•	
LM319	0 to + 70 °C	•	•	•	•	

Note : Hi-Rel Versions Available.
Examples : LM119H, LM219N.

PIN CONNECTIONS (top views)

TO100

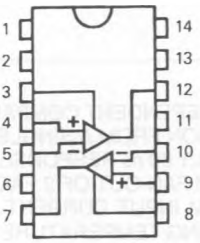


1 - Output 1
2 - Ground 1
3 - Non-inverting input 1
4 - Inverting input 1
5 - V_{CC}^-
6 - Output 2
7 - Ground 2
8 - Non-inverting input 2
9 - Inverting input 2
10 - V_{CC}^+

LCC20

1 - NC
2 - NC
3 - NC
4 - Ground 1
5 - NC
6 - Non-inverting input 1
7 - NC
8 - Inverting input 1
9 - V_{CC}^-
10 - Output 2
11 - NC
12 - Ground 2
13 - Non-inverting input2
14 - Inverting input 2
15 - NC
16 - V_{CC}^+
17 - NC
18 - Output 1
19 - NC
20 - NC

DIP14/CERDIP14
SO14



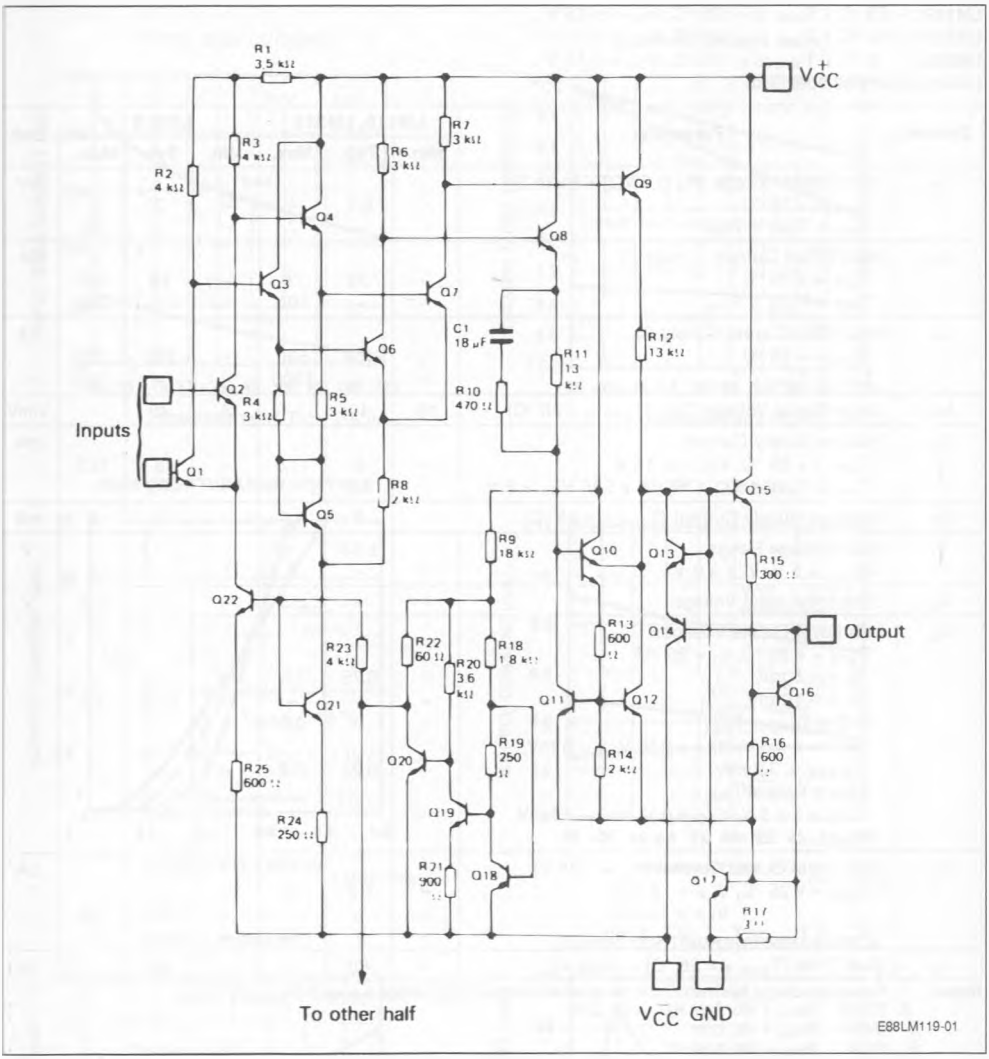
1 - NC
2 - NC
3 - Ground 1
4 - Non-inverting input 1
5 - Inverting input 1
6 - V_{CC}^-
7 - Output 2
8 - Ground 2
9 - Non- inverting input 2
10 - Inverting input 2
11 - V_{CC}^+
12 - Output 1
13 - NC
14 - NC

ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	LM119	LM219	LM319	Unit
$V_O - V_{CC}^-$	Output to Negative Supply Voltage	36	36	36	V
V_{CC}^-	Negative Supply Voltage	25	25	25	V
V_{CC}^+	Positive Supply Voltage	18	18	18	V
V_{ID}	Differential Input Voltage	± 5	± 5	± 5	V
V_I	Input Voltage – (note 1)	± 15	± 15	± 15	V
P_{tot}	Power Dissipation – (note 2)	500	500	500	mW
T_{oper}	Operating Free-air Temperature Range	– 55 to + 125	– 40 to + 105	0 to + 70	°C
T_{stg}	Storage Temperature Range	– 65 to + 150	– 65 to + 150	– 65 to + 150	°C

* All potentials referenced to ground unless otherwise specified.

SCHEMATIC DIAGRAM



CASE	Outputs	Inverting Inputs	Non-inverting Inputs	GND	V_{CC}^+	V_{CC}^-	N.C.
TO100	1, 6	4, 9	3, 8	2, 7	10	5	–
DIP14/ CERDIP14/ SO14	7, 12	5, 10	4, 9	3, 8	11	6	1, 2, 13, 14
LCC20	10, 18	8, 14	6, 13	4, 12	16	9	*

* LCC20 : Other pins are not connected.

ELECTRICAL CHARACTERISTICS

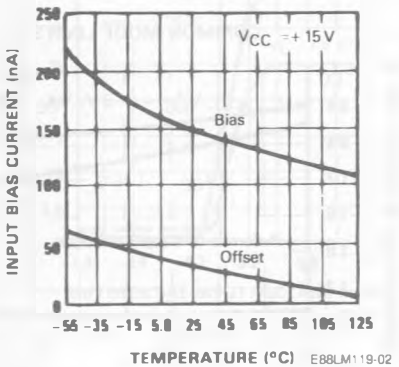
LM119 : $-55\ °C \leq T_{amb} \leq +125\ °C$, $V_{CC} = \pm 15\ V$
LM219 : $-40\ °C \leq T_{amb} \leq +105\ °C$, $V_{CC} = \pm 15\ V$
LM319 : $0\ °C \leq T_{amb} \leq +70\ °C$, $V_{CC} = \pm 15\ V$
(unless otherwise specified)

Symbol	Parameter	LM119, LM219			LM319			Unit
		Min.	Typ.	Max.	Min.	Typ.	Max.	
V_{IO}	Input Offset Voltage ($R_S \leq 5\ k\Omega$) – (note 3)							mV
	$T_{amb} = +25\ °C$	–	0.7	4	–	2	8	
	$T_{min} \leq T_{amb} \leq T_{max}$	–	–	7	–	–	10	
I_{IO}	Input Offset Current – (note 3)							nA
	$T_{amb} = +25\ °C$	–	30	75	–	80	200	
	$T_{min} \leq T_{amb} \leq T_{max}$	–	–	100	–	–	300	
I_{IB}	Input Bias Current – (note 3)							nA
	$T_{amb} = +25\ °C$	–	150	500	–	250	1000	
	$T_{min} \leq T_{amb} \leq T_{max}$	–	–	1000	–	–	1200	
A_{VD}	Large Signal Voltage Gain ($T_{amb} = +25\ °C$)	10	40	–	8	40	–	V/mV
$I_{\overline{CC}}$	Positive Supply Current							mA
	$T_{amb} = +25\ °C$, $V_{CC} = \pm 15\ V$	–	8	11.5	–	8	12.5	
	$T_{min} \leq T_{amb} \leq T_{max}$, $V_{\overline{CC}} = +5\ V$, $V_{\overline{CC}} = 0\ V$	–	4.3	–	–	4.3	–	
$I_{\overline{CC}}$	Negative Supply Current ($T_{amb} = +25\ °C$)	–	3	4.5	–	3	5	mA
V_I	Input Voltage Range	–	± 13	–	–	± 13	–	V
	($V_{\overline{CC}} = +5\ V$, $V_{\overline{CC}} = 0\ V$)	1	–	3	1	–	3	
V_{ID}	Differential Input Voltage	–	–	± 5	–	–	± 5	V
V_{OL}	Low Level Output Voltage							V
	$T_{amb} = +25\ °C$, $I_O = 25\ mA$							
	$V_I < -5\ mV$	–	0.75	1.5	–	–	–	
	$V_I < -10\ mV$	–	–	–	–	0.75	1.5	
	$0\ °C \leq T_{amb} \leq T_{max}$	–	–	0.6	–	–	–	
	$V_{\overline{CC}} > +4.5\ V$, $V_{\overline{CC}} = 0\ V$, $V_I < -6\ mV$,							
	$I_{O(sink)} < 3.2\ mA$	–	0.23	0.4	–	–	–	
	$T_{min} \leq T_{amb} \leq T_{max}$							
	$V_{\overline{CC}} > +4.5\ V$, $V_{\overline{CC}} = 0\ V$, $V_I < -10\ mV$,							
	$I_{O(sink)} < 3.2\ mA$	–	–	–	–	0.3	0.4	
I_{OH}	High Level Output Current ($V_O = +35\ V$)							µA
	$T_{amb} = +25\ °C$, $V_I > +5\ mV$	–	0.2	2	–	–	–	
	$V_I > +10\ mV$	–	–	–	–	0.2	10	
	$T_{min} \leq T_{amb} \leq T_{max}$, $V_I > 5\ mV$	–	1	10	–	–	–	
t_{re}	Rise Time ($T_{amb} = +25\ °C$) – (note 4)	–	80	–	–	80	–	ns

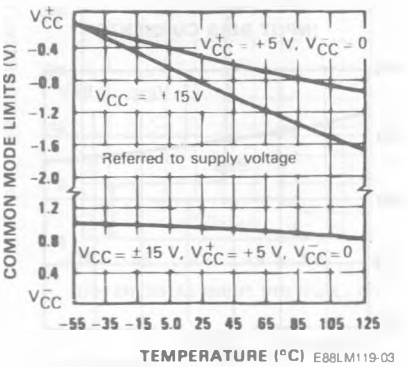
Notes :
1. For supply voltages less than ± 15 V, the absolute maximum input voltage is equal to the supply voltage.
2. TO100 : $R_{th(j-a)} = 160\ °C/W$, $R_{th(j-c)} = 45\ °C/W$
   DIP14 : $R_{th(j-a)} = 150\ °C/W$
   SO14 : $R_{th(j-a)} = 250\ °C/W$
3. These specifications apply for $V_{CC} = \pm 15\ V$, unless otherwise stated. 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.
   The offset voltages and offset current given are the maximum values required to drive the output down to 1 V or up to + 14 V with a 1 mA load current.
   Thus, these parameters define an error band and take into account the worst case effects of voltage gain and input impedance.
4. The response time specified is for a 100 mV input step with 5 mV overdrive.

LM119-LM219

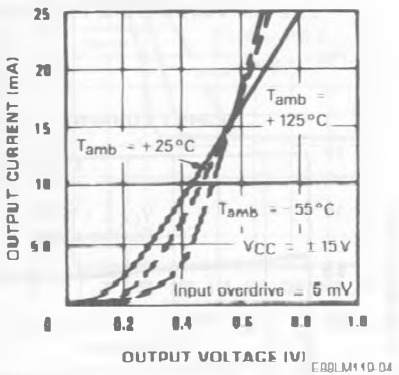
INPUT BIAS CURRENTS



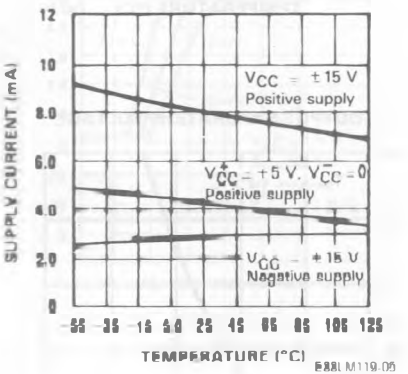
COMMON MODE LIMITS



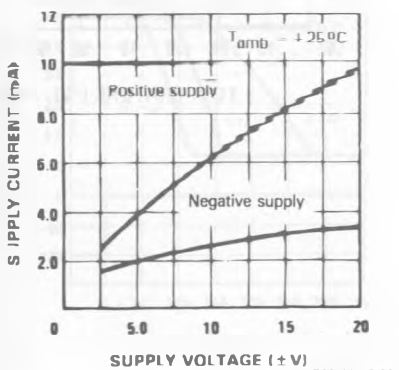
OUTPUT SATURATION VOLTAGE



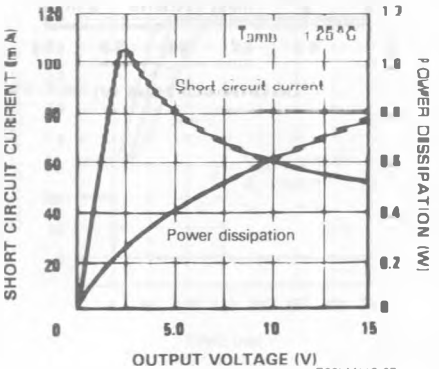
SUPPLY CURRENT



SUPPLY CURRENT

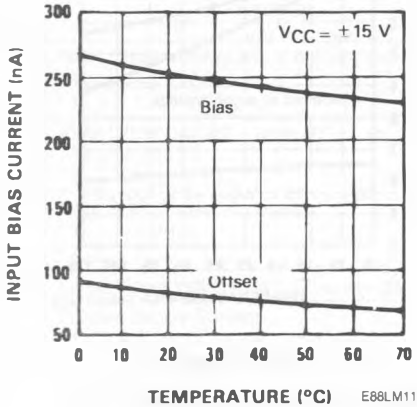


OUTPUT LIMITING CHARACTERISTICS

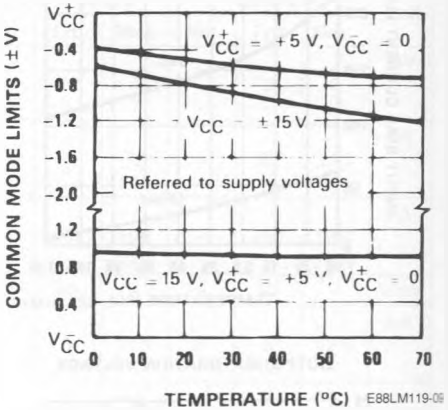


LM319

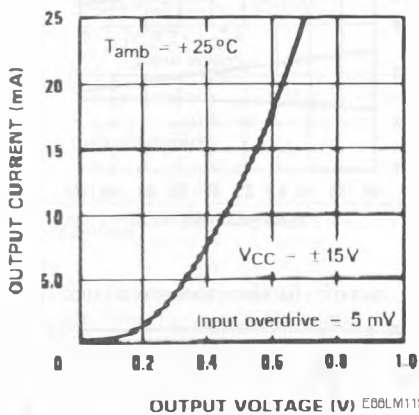
INPUT BIAS CURRENTS



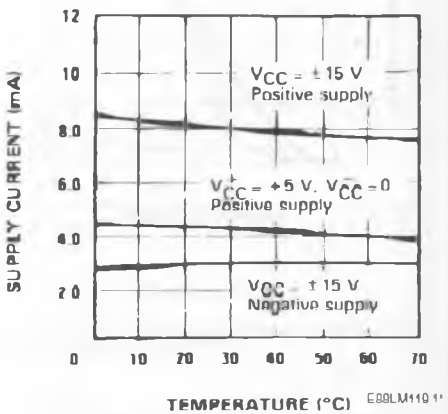
COMMON MODE LIMITS



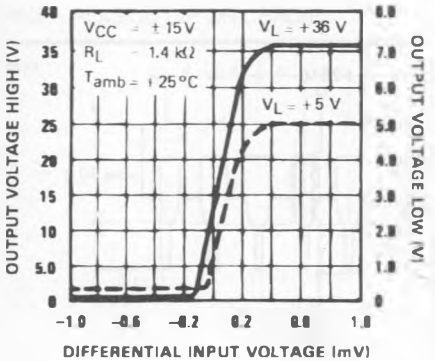
OUTPUT SATURATION VOLTAGE



SUPPLY CURRENT

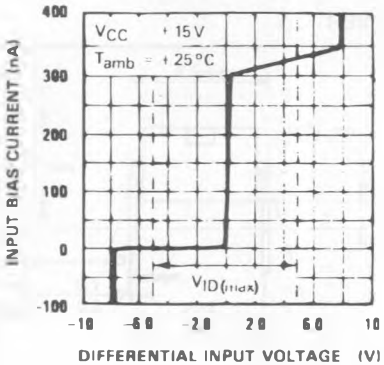


TRANSFER FUNCTION



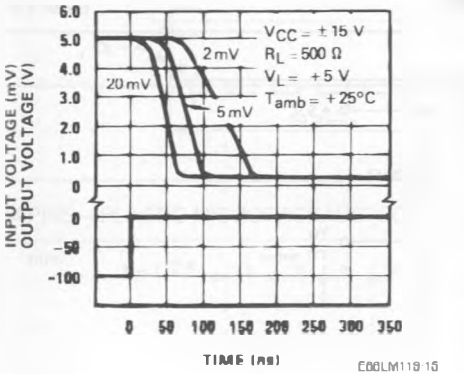
E88LM119-12

INPUT CHARACTERISTICS



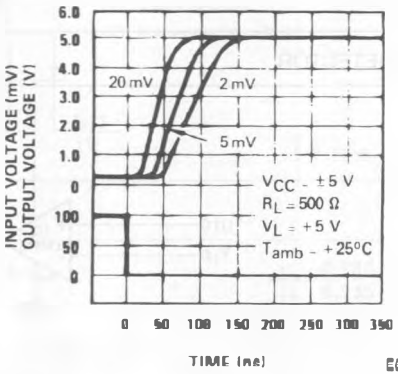
E88LM119-13

RESPONSE TIME FOR VARIOUS INPUT OVERDRIVES



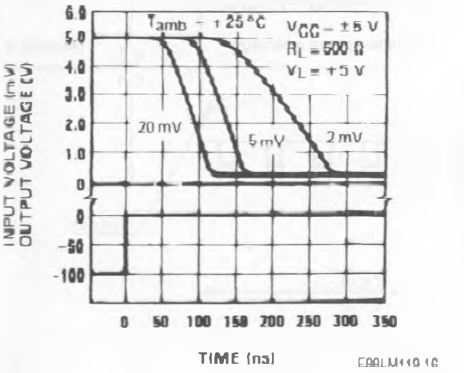
E88LM119-15

RESPONSE TIME FOR VARIOUS INPUT OVERDRIVES



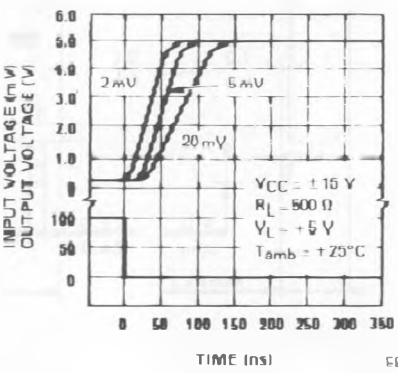
E88LM119-16

RESPONSE TIME FOR VARIOUS INPUT OVERDRIVES



E88LM119-18

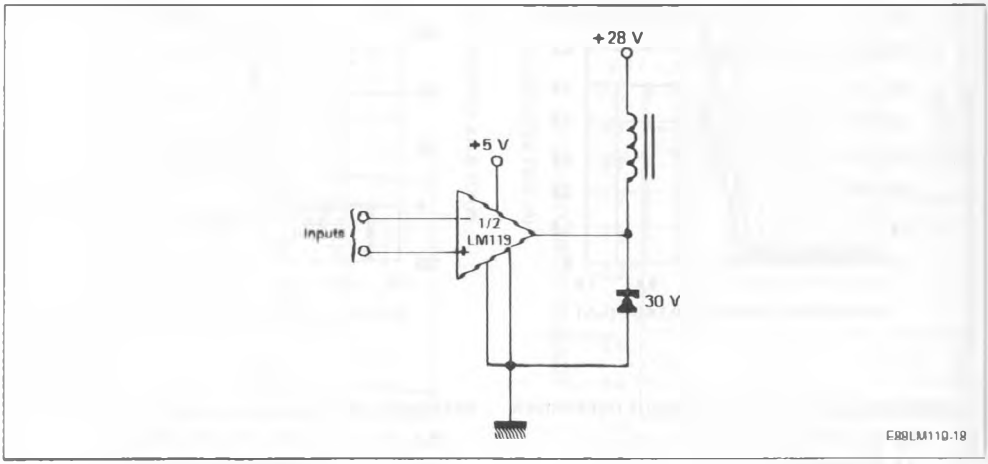
RESPONSE TIME FOR VARIOUS INPUT OVERDRIVES



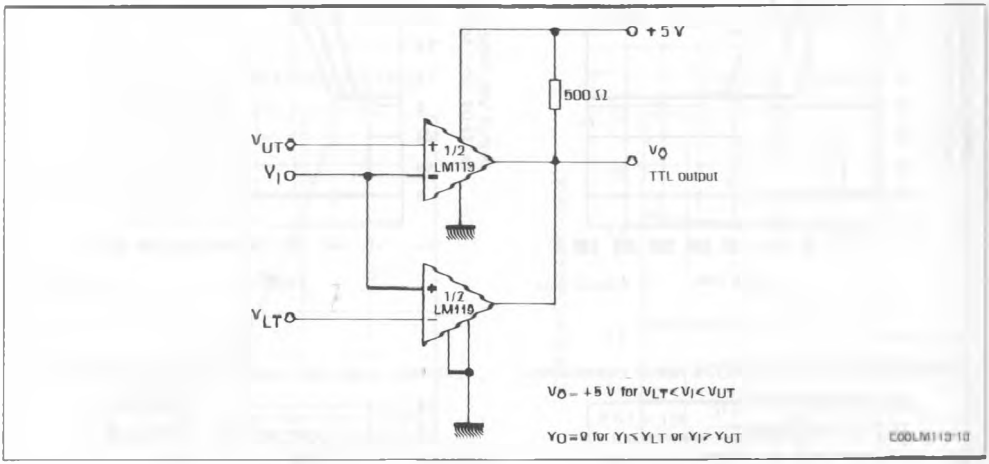
E88LM119-17

TYPICAL APPLICATION DIAGRAMS

RELAY DRIVER

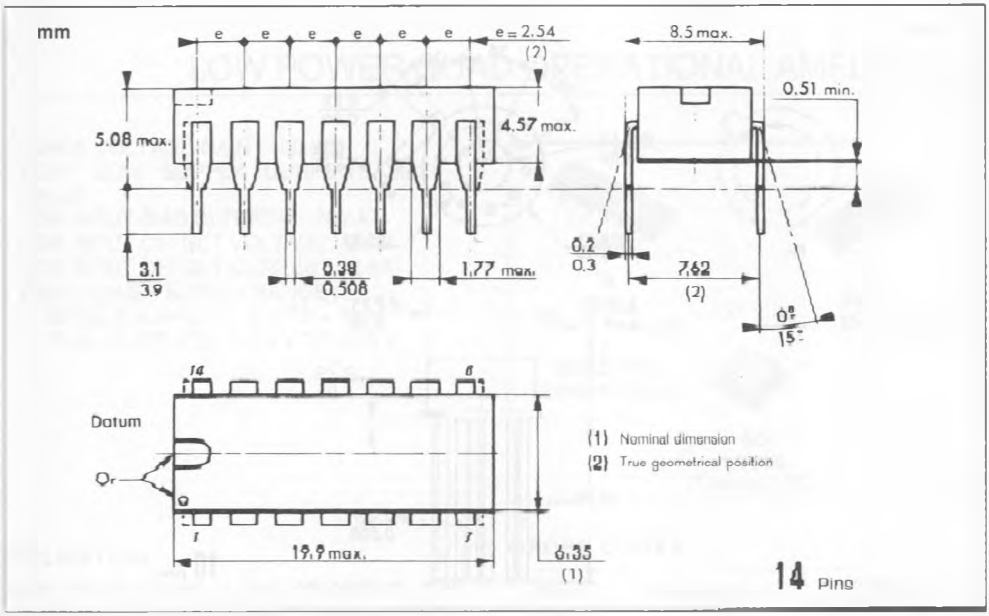


WINDOW DETECTOR

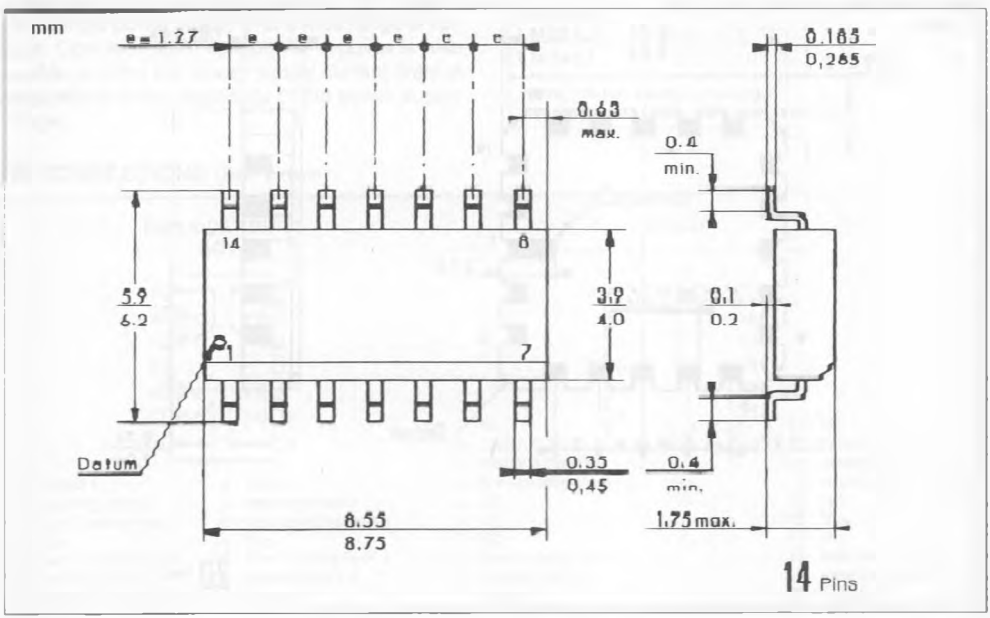


PACKAGE MECHANICAL DATA

14 PINS – PLASTIC DIP OR CERDIP

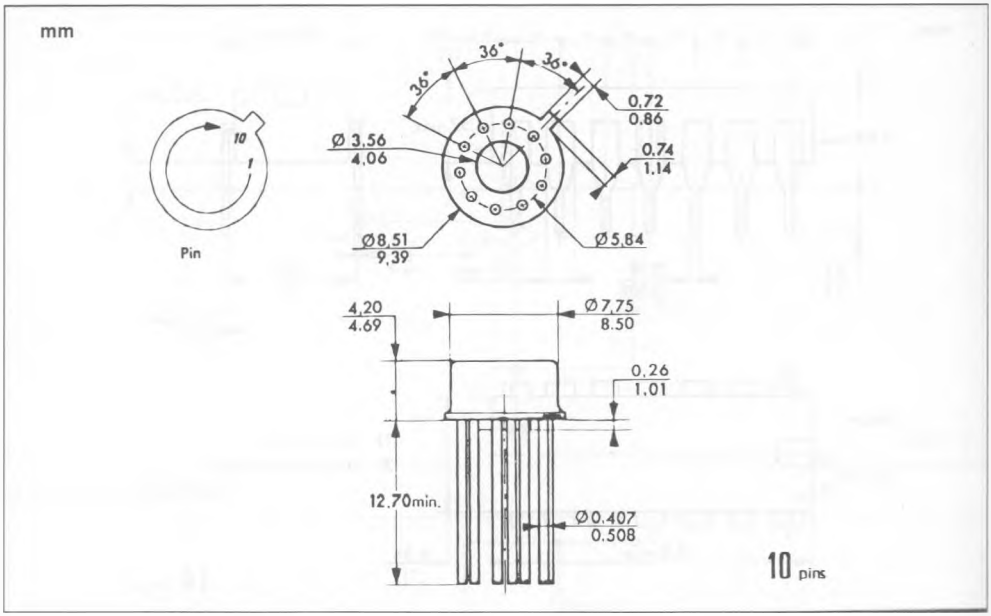


14 PINS – PLASTIC MICROPACKAGE (SO)



PACKAGE MECHANICAL DATA (continued)

10 PINS – METAL CAN TO100



20 PINS – TRICECOP (LCC)