

DATA SHEET

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REPLACEMENT OF:
LM339

MIK339 • SINGLE SUPPLY QUAD COMPARATOR



MIK339

SINGLE SUPPLY QUAD COMPARATOR

CONTENTS	Page	CONTENTS	Page
GENERAL DESCRIPTION	1	COMPARING INPUT VOLTAGES OF OPPOSITE POLARITY	4
FEATURES	1	ORING THE OUTPUTS	5
APPLICATIONS	1	ZERO CROSSING DETECTOR (SINGLE POWER SUPPLY)	5
SCHEMATIC DIAGRAM	2	ONE-SHOT MULTIVIBRATOR	5
PIN DESCRIPTION	2	BI-STABLE MULTIVIBRATOR	5
INTERNAL BLOCK DIAGRAM	2	ONE-SHOT MULTIVIBRATOR WITH INPUT LOCK OUT	5
ABSOLUTE MAXIMUM RATINGS	2	TIME DELAY GENERATOR	5
SWITCHING CHARACTERISTICS	2	COMPARATOR WITH A NEGATIVE REFERENCE	5
ELECTRICAL CHARACTERISTICS	3	ZERO CROSSING DETECTOR	5
TYPICAL APPLICATIONS	3	MOS CLOCK DRIVER	5
INVERTING COMPARATOR WITH HYSTERESIS	3	TYPICAL CHARACTERISTICS	6
NONINVERTING COMPARATOR WITH HYSTERESIS	3	INPUT CURRENT VERSUS SUPPLY VOLTAGE	6
SQUARE-WAVE OSCILLATOR	4	LOW LEVEL OUTPUT VOLTAGE	6
PULSE GENERATOR	4	RESPONSE TIME FOR VARIOUS INPUT OVERDRIVES - POSITIVE TRANSITION	6
CRYSTAL CONTROLLED OSCILLATOR	4	RESPONSE TIME FOR VARIOUS INPUT OVERDRIVES - NEGATIVE TRANSITION	6
TWO-DECADE HIGH FREQUENCY VOLTAGE CONTROLLED OSCILLATOR (VCO)	4	PHYSICAL DIMENSIONS AND MARKING DIAGRAMS	7
DRIVING CMOS	4	DIP-14	7
DRIVING TTL	4	SOP-14	7
LOW FREQUENCY OP AMPLIFIER	4	ORDERING INFORMATION	8
OUTPUT STROBBING	4		
«AND» GATE	4		
«OR» GATE	4		
LARGE FAN-IN «AND» GATE	4		
LIMIT COMPARATORS	4		

DESCRIPTION

The MIK339 consists of four independent precision voltage comparators. These were designed specifically to operate from a single power supply over a wide range of voltages. Operation from split power supplies is also possible and the low power supply current drain is independent of the magnitude of the power supply voltage. These comparators also have a unique characteristic in that the input common-mode voltage range includes ground, even though operated from a single power supply voltage.

APPLICATIONS

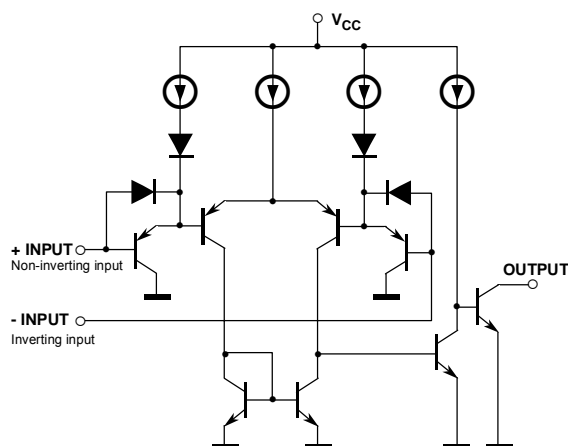
Application areas include limit comparators, simple analog to digital converters; pulse, squarewave and time delay generators; wide range VCO; multivibrators and high voltage digital logic gates.

FEATURES

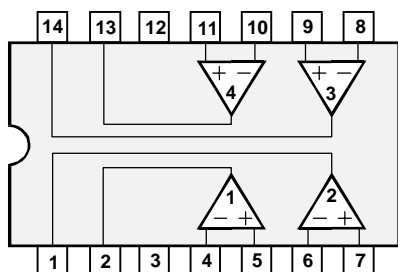
- Wide supply voltage range 2.0V to 32V.
- Low supply current drain independent of supply voltage.
- Low input biasing current: 25 nA typ.
- Low input offset current: 5 nA typ.
- Low input offset voltage: 2 mV typ.
- Input common-mode voltage range includes GND.
- Differential input voltage range equal to the power supply voltage.
- Low output saturation voltage.
- Output voltage compatible with TTL, MOS and CMOS logic.



SCHEMATIC DIAGRAM (1/4 MIK339)



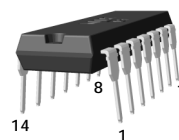
INTERNAL BLOCK DIAGRAM



PIN DESCRIPTION

MIK339N

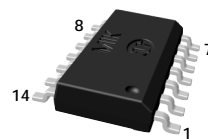
DIP-14



- 1 – Comp1- OUT1
- 2 – Comp1- OUT2
- 3 – V_{CC}
- 4 – Comp2- IN-
- 5 – Comp2- IN+
- 6 – Comp1- IN-
- 7 – Comp1- IN+
- 8 – Comp3- IN-
- 9 – Comp3- IN+
- 10 – Comp4- IN-
- 11 – Comp4- IN+
- 12 – GND
- 13 – Comp4- OUT4
- 14 – Comp3- OUT3

MIK339M

SOP-14



- 1 – Comp1- OUT1
- 2 – Comp1- OUT2
- 3 – V_{CC}
- 4 – Comp2- IN-
- 5 – Comp2- IN+
- 6 – Comp1- IN-
- 7 – Comp1- IN+
- 8 – Comp3- IN-
- 9 – Comp3- IN+
- 10 – Comp4- IN-
- 11 – Comp4- IN+
- 12 – GND
- 13 – Comp4- OUT4
- 14 – Comp3- OUT3

ABSOLUTE MAXIMUM RATINGS

SYMBOL	PARAMETER		VALUE	UNIT
V_{CC}	Supply Voltage		± 18 or 36	V
V_d	Differential Input Voltage		± 36	V
V_{IN}	Input Voltage		-0.3 to +36	V
	Output Short-circuit to Ground (Note 1)		Infinite	
P_d	Power Dissipation (Note 2)	DIP-14	1500	mW
		SOP-14	830	mW
T_{STG}	Storage Temperature Range		-65 to +150	$^{\circ}\text{C}$
T_J	Junction Temperature		+150	$^{\circ}\text{C}$

Note 1. Short-circuits from the output to V_{CC+} can cause excessive heating and eventual destruction. The maximum output current is approximately 20mA independent of the magnitude of V_{CC+} .

Note 2. P_d is calculated with $T_{AMB} = +25^{\circ}\text{C}$, $T_J = +150^{\circ}\text{C}$ and $R_{thja} = 80^{\circ}\text{C/W}$ for DIP-14 package
 $= 150^{\circ}\text{C/W}$ for SOP-14 package

SWITCHING CHARACTERISTICS ($V_{CC} = 5\text{V}$, $T_A = 25^{\circ}\text{C}$)

PARAMETER	TEST CONDITIONS		MIN	TYP	MAX	UNIT
Response time	R_L connected to 5V through 5.1k Ω , $C_L = 15\text{pF}$ * (See Note 1)	100-mV input step with 5-mV overdrive		1.3		μs
		TTL-level input step		0.3		



ELECTRICAL CHARACTERISTICS

AT SPECIFIED FREE-AIR TEMPERATURE, $V_{CC} = 5\text{ V}$ (UNLESS OTHERWISE NOTED)

SYMBOL	PARAMETER	TEST CONDITIONS*	MIN	TYP	MAX	UNIT
V_{IO}	Input offset voltage	$V_{CC} = 5\text{ V to } 30\text{ V}$, $V_{IC} = V_{ICR\text{ min}}$, $V_O = 1.4\text{ V}$	25 °C	2	5	mV
		Full range			9	
I_{IO}	Input offset current	$V_O = 1.4\text{ V}$	25 °C	5	50	nA
		Full range			150	
I_{IB}	Input bias current	$V_O = 1.4\text{ V}$	25 °C	-25	-250	nA
		Full range			-400	
V_{ICR}	Common-mode input voltage range**		25 °C	0 to $V_{CC}-1.5$		V
		Full range		0 to $V_{CC} - 2$		
A_{VD}	Large-signal differential voltage amplification	$V_{CC} = 15\text{ V}$, $V_O = 1.4\text{ V to } 11.4\text{ V}$, $R_L \geq 15\text{ k}\Omega$ to V_{CC}	25 °C	50	200	V/mV
I_{OH}	High-level output current	$V_{OH} = 5\text{ V}$, $V_{ID} = 1\text{ V}$	25 °C	0.1	50	nA
		$V_{OH} = 30\text{ V}$, $V_{ID} = 1\text{ V}$	Full range		1	
V_{OL}	Low-level output voltage	$I_{OL} = 4\text{ mA}$, $V_{ID} = -1\text{ V}$	25 °C	150	400	mV
		Full range			700	
I_{OL}	Low-level output current	$V_{OL} = 1.5\text{ V}$, $V_{ID} = -1\text{ V}$	25 °C	6		mA
I_{CC}	Supply current	$R_L = \infty$, $V_{CC} = 5\text{ V}$	25 °C	0.8	2	mA
		$V_{CC} = 30\text{ V}$	Full range		2.5	

* Full range (MIN to MAX), for the MIK333 is 0°C to 70°C. All characteristics are measured with zero common-mode input voltage unless otherwise specified.

** The voltage at either input or common-mode should not be allowed to go negative by more than 0.3V. The upper end of the common-mode voltage range is $V_{CC} - 1.5\text{ V}$, but either or both inputs can go to 30V without damage.

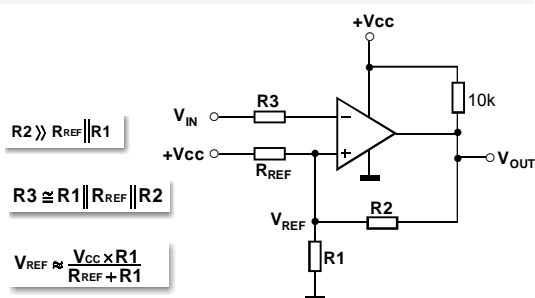
TYPICAL APPLICATIONS ($V_{CC} = 5\text{ V}$)

These quad comparators feature high gain, wide bandwidth characteristics. This gives the device oscillation tendencies if the outputs are capacitively coupled to the inputs via stray capacitance. This oscillation manifests itself during output transitions (V_{OL} to V_{OH}). To alleviate this situation, input resistors $< 10\text{ k}\Omega$ should be used.

The addition of positive feedback ($< 10\text{ mV}$) is also recommended. It is good design practice to ground all unused pins.

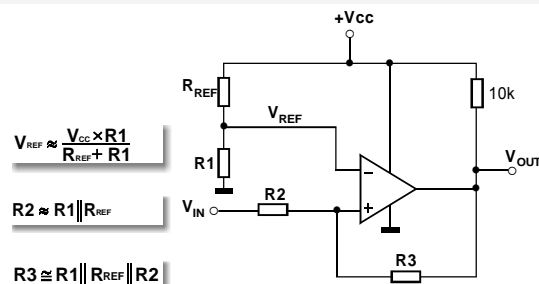
Differential input voltages may be larger than supply voltage without damaging the comparator's inputs. Voltages more negative than -0.3 V should not be used.

INVERTING COMPARATOR WITH HYSTERESIS



$$\text{Amount of Hysteresis } V_H = \frac{R1 \parallel R_{REF}}{R1 \parallel R_{REF} + R2} \times [V_{OUT(max)} - V_{OUT(min)}]$$

NON-INVERTING COMPARATOR WITH HYSTERESIS



$$\text{Amount of Hysteresis } V_H = \frac{R2}{R2 + R3} \times [V_{OUT(max)} - V_{OUT(min)}]$$

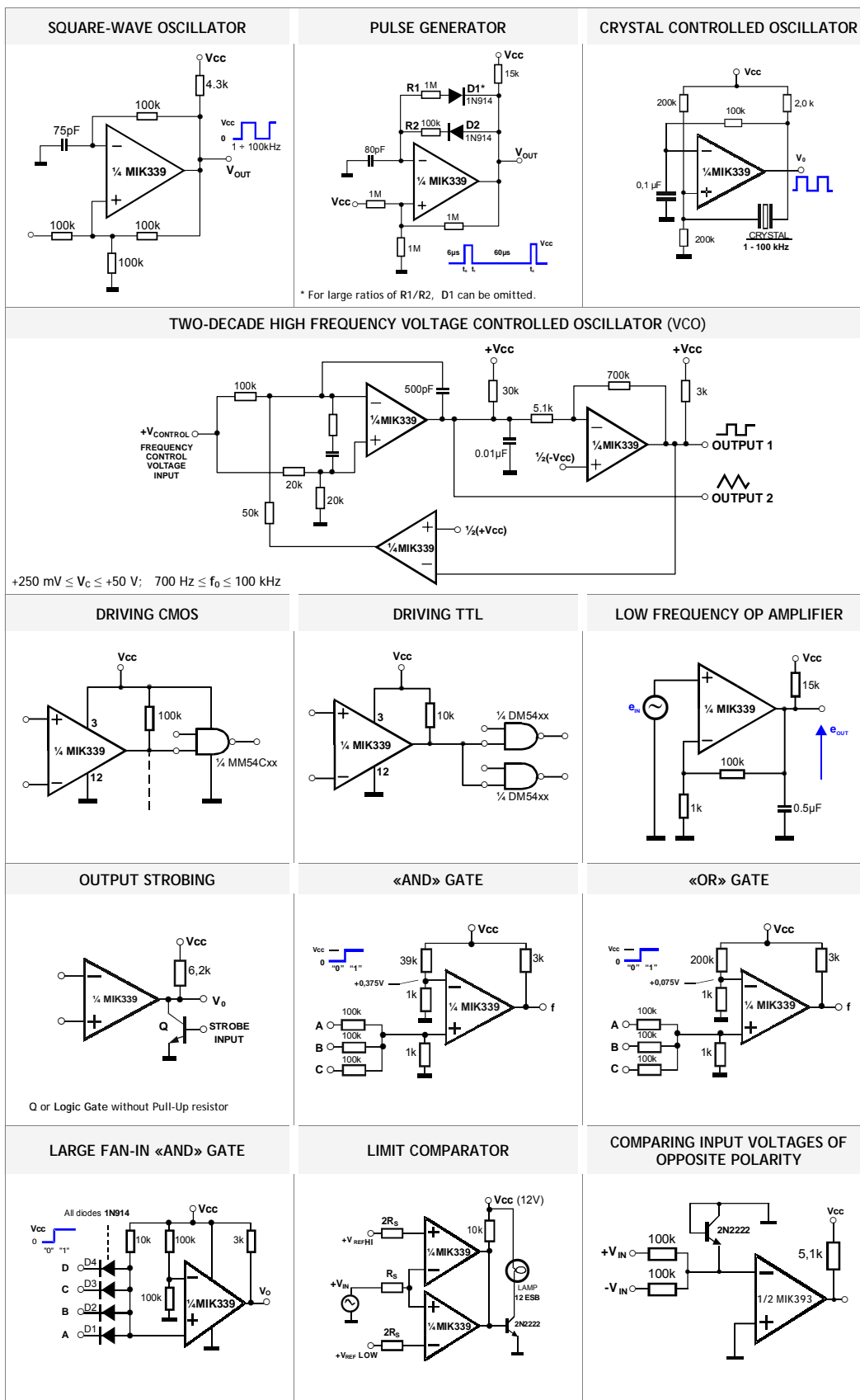


TYPICAL APPLICATIONS (CONTINUED)

 $V_{CC} = 5V$

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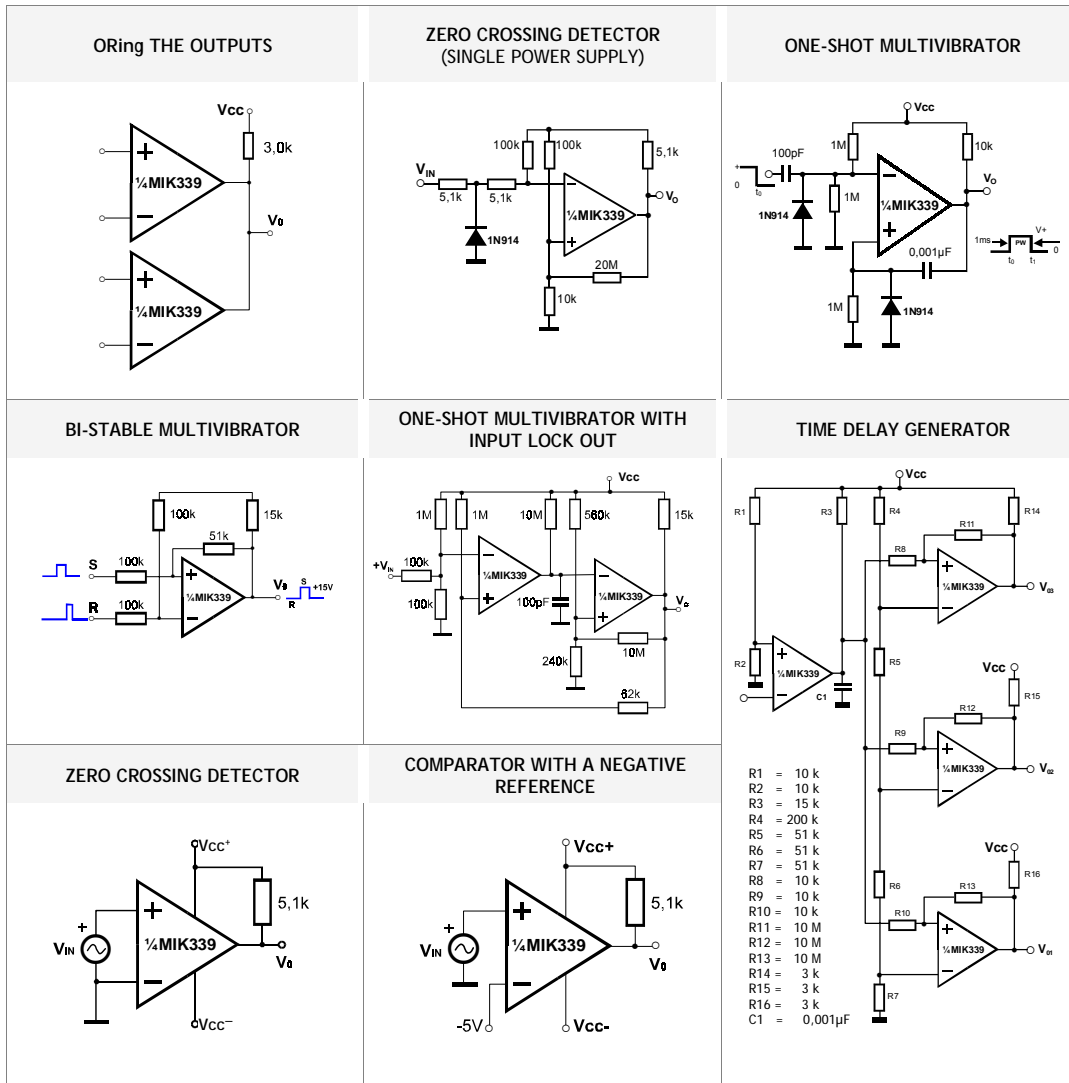
MIKRON JSC



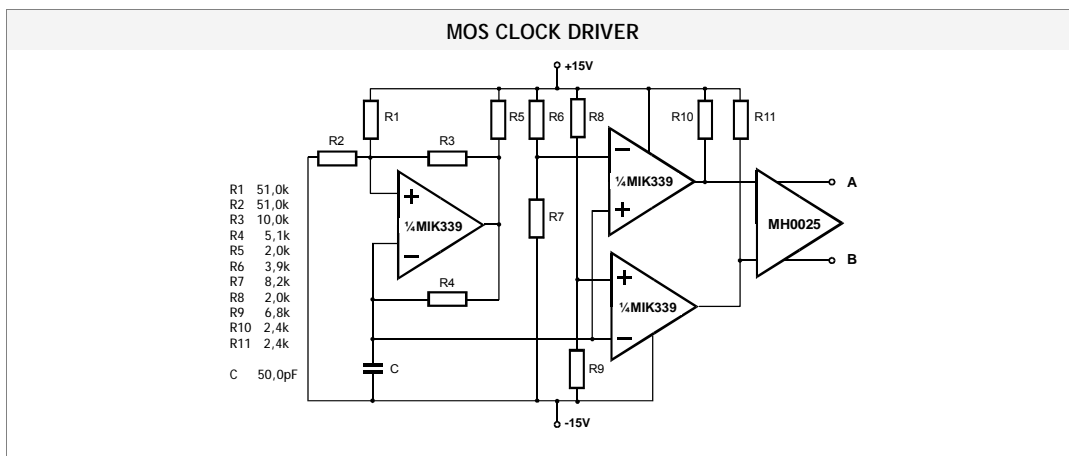


TYPICAL APPLICATIONS (CONTINUED)

$V_{CC} = 5V$



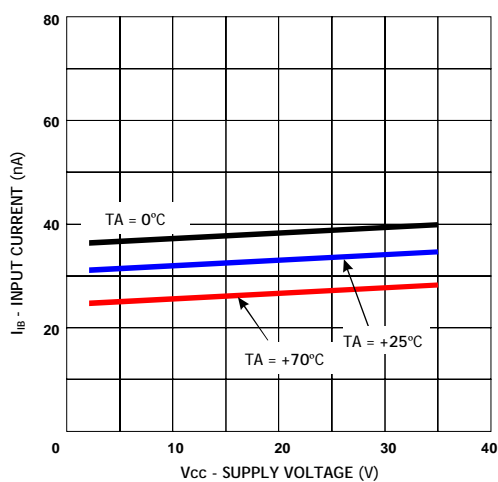
SPLIT-SUPPLY APPLICATIONS



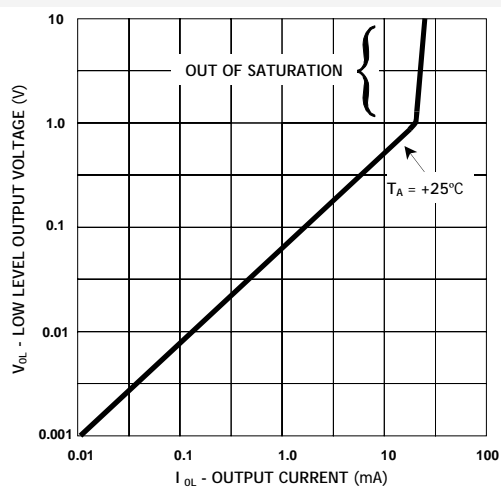


TYPICAL CHARACTERISTICS

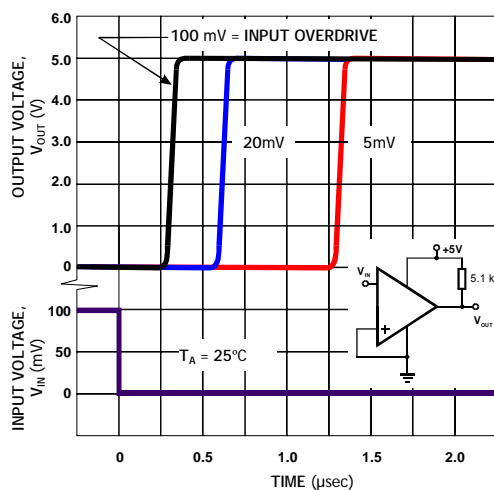
INPUT CURRENT



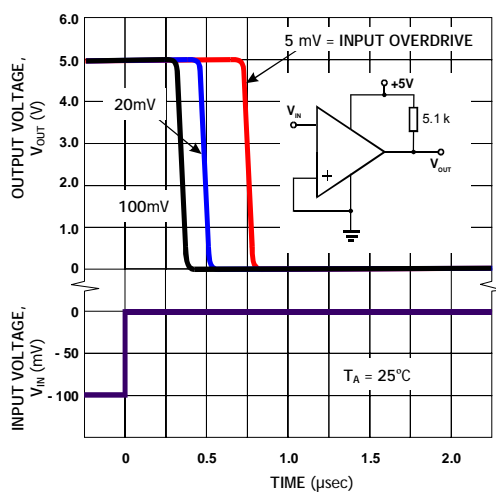
LOW LEVEL OUTPUT VOLTAGE



RESPONSE TIME FOR VARIOUS INPUT OVERDRIVES - POSITIVE TRANSITION



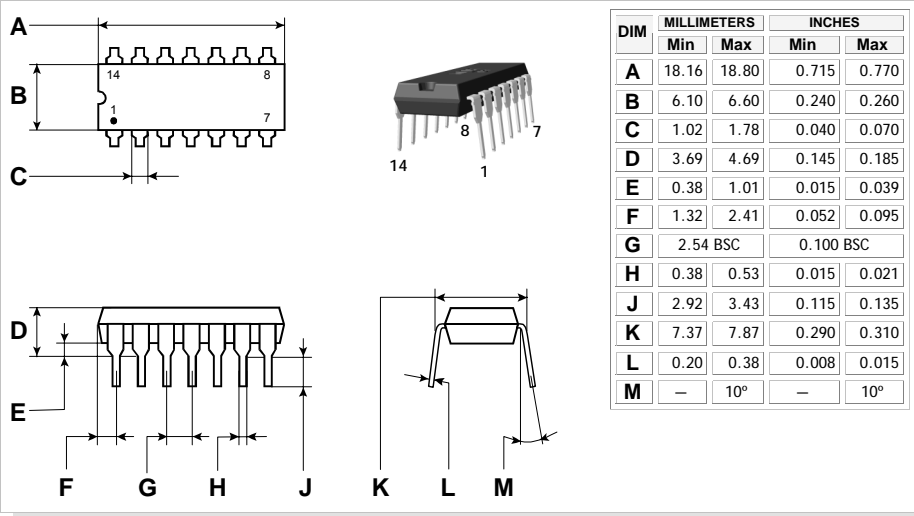
RESPONSE TIME FOR VARIOUS INPUT OVERDRIVES - NEGATIVE TRANSITION





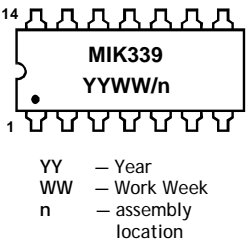
PHYSICAL DIMENSIONS AND MARKING DIAGRAMS

DIP-14 PACKAGE

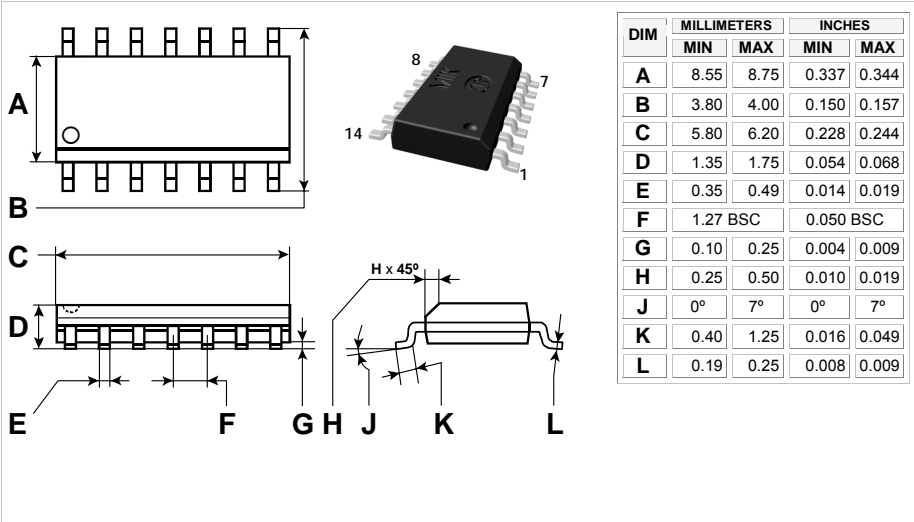


DIP-14

MARKING DIAGRAM

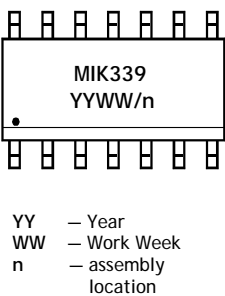


SOP-14 PACKAGE



SOP-14

MARKING DIAGRAM





ORDERING INFORMATION





(THE FORM OF PACKING IS STIPULATED IN THE CONTRACT)

ORDERING NUMBER	PACKAGE	OPERATING TEMPERATURE RANGE	SHIPPING
MIK339 N	DIP-14	$T_A = 0^{\circ}\text{C}$ to $+70^{\circ}\text{C}$	25 Units/Rail
MIK339 M	SOP-14		55 Units/Rail 2500 Tape & Reel




The information presented in this Data sheet is believed to be accurate and reliable. Application circuits shown are typical examples illustrating the operation of the device. MIKRON can assume no responsibility for use of any application circuits.

In the interest of product improvement, MIKRON reserves the right to change specifications and data without notice.

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