

# MC1378

## Color Television Composite Video Overlay Synchronizer

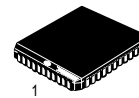
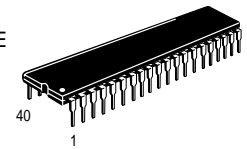
The MC1378 is a bipolar composite video overlay encoder and microcomputer synchronizer. The MC1378 contains the complete encoder function of the MC1377, i.e., quadrature color modulators, RGB matrix, and blanking level clamps, plus a complete complement of synchronizers to lock a microcomputer-based video source to any remote video source. The MC1378 can be used as a local system timing and encoding source, but it is most valuable when used to lock the microcomputer source to a remotely originated video signal.

- Contains All Needed Reference Oscillators
- Can Be Operated in PAL or NTSC Mode, 625 or 525 Line
- Wideband, Full-Fidelity Color Encoding
- Local or Remote Modes of Operation
- Minimal External Components
- Designed to Operate from 5.0 V supply
- Will Work with non standard Video

### COLOR TELEVISION COMPOSITE VIDEO OVERLAY SYNCHRONIZER

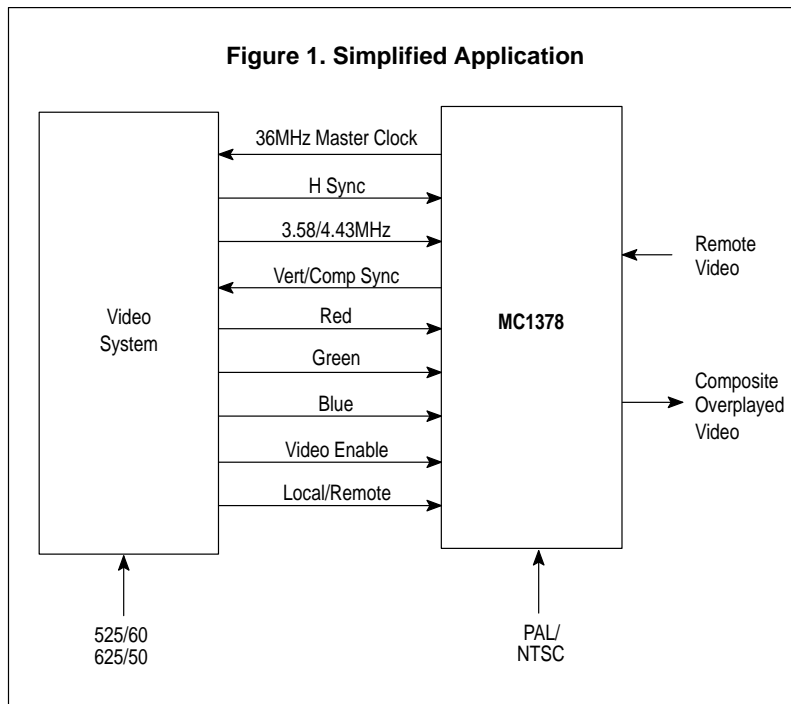
#### SEMICONDUCTOR TECHNICAL DATA

**P SUFFIX**  
PLASTIC PACKAGE  
CASE 711



**FN SUFFIX**  
PLASTIC PACKAGE  
CASE 777  
(PLCC-44)

**Figure 1. Simplified Application**



#### PIN CONNECTIONS

Local/Rem.	1 (1)	(44) 40	H. Sync In
H. PLL Filter	2 (2)	(43) 39	Comp. Sync Out
H. VCO	3 (3)	(42) 38	V. Out/Sync In
	4 (4)	(41) 37	Clock PLL Filter
Burst Gate Out	5 (5)	(40) 36	Clock V <sub>CC</sub>
PAL/NTSC Mode	6 (7)	(38) 35	Clock Output
Ground	7 (8)	(37) 34	Clock Ground
3.58/4.43 In	8 (9)	(36) 33	Clock VCO
Chroma PLL Filter	9 (10)	(35) 32	
Chroma VCO	10 (11)	(34) 31	Killer Filter
	11 (12)	(33) 30	Quad. Loop Filter
R-Y Clamp	12 (13)	(32) 29	PAL Indent. Cap
B-Y Clamp	13 (14)	(31) 28	V <sub>CC</sub>
R Input	14 (15)	(30) 27	Comp. Vid. Out
G Input	15 (16)	(29) 26	Ground
B Input	16 (18)	(27) 25	Overlay Enable
-Y Output	17 (19)	(26) 24	Rem. Vid. In
Chroma Out	18 (20)	(25) 23	ACC Filter
Loc. Vid. Clamp	19 (21)	(24) 22	-Y Input
Chroma In	20 (22)	(23) 21	Rem. Vid. Clamp

\* ( ) PLCC Pin Assignments

#### ORDERING INFORMATION

Device	Operating Temperature Range	Package
MC1378P	T <sub>A</sub> = 0° to +70°C	Plastic DIP
MC1378FN		PLCC-44

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## MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Supply Voltage	$V_{CC}$	6.0	Vdc
Operating Temperature	$T_A$	0 to +70	°C
Storage Temperature	$T_{stg}$	-65 to +150	°C
Junction Temperature	$T_{J(max)}$	150	°C
Power Dissipation, Package Derate above 25°C	$P_D$	1.25 10	W mW/°C

## RECOMMENDED OPERATING CONDITIONS

Condition	Pin	Value	Unit
Supply Voltage	28, 36	$5.4 \pm 0.25$	Vdc
RGB Input for 100% Saturation	14, 15, 16	1.0	Vpp
Color Oscillator Input Level	8	0.5	Vpp
Video Input, Positive	24	1.0	Vpp

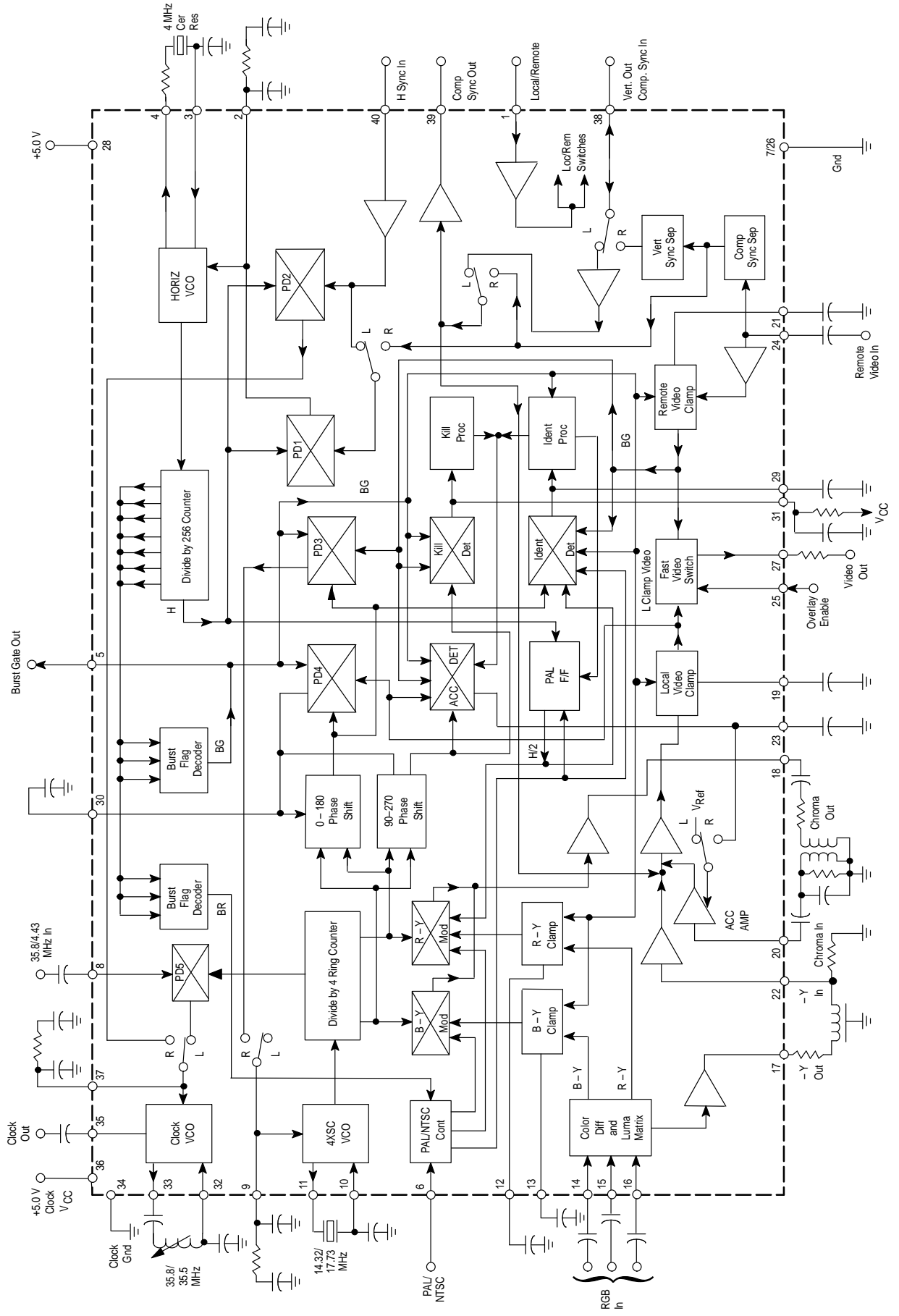
## ELECTRICAL CHARACTERISTICS ( $V_{CC} = 5.0$ V, $T_A = 25^\circ$ C, circuit of Figure 4 or 5)

Characteristics	Pin	Min	Typ	Max	Unit	
Supply Current	28, 36	-	100	-	mAdc	
Video Output, Open Circuit, Positive	27	-	2.0	9.4	Vpp	
Modulation Angle (R - Y) to (B - Y)	-	87	90	93	Degrees	
RGB Input Impedance	14, 15, 16	-	10	-	k $\Omega$	
Local/Remote Switch (TTL)	High Low	1	Remote Local	-	-	
Horizontal Sync Input, Negative Going	(TTL)	40	-	4.3	-	Vpp
Vertical Sync Output, Negative Going, Remote Mode	(TTL)	38	-	4.3	-	Vpp
Composite Sync Output, Negative Going	(TTL)	39	-	4.3	-	Vpp
Burst Gate Output, Positive Going	(TTL)	5	-	4.3	-	Vpp

## Description of Operation – Refer to Figures 3, 4

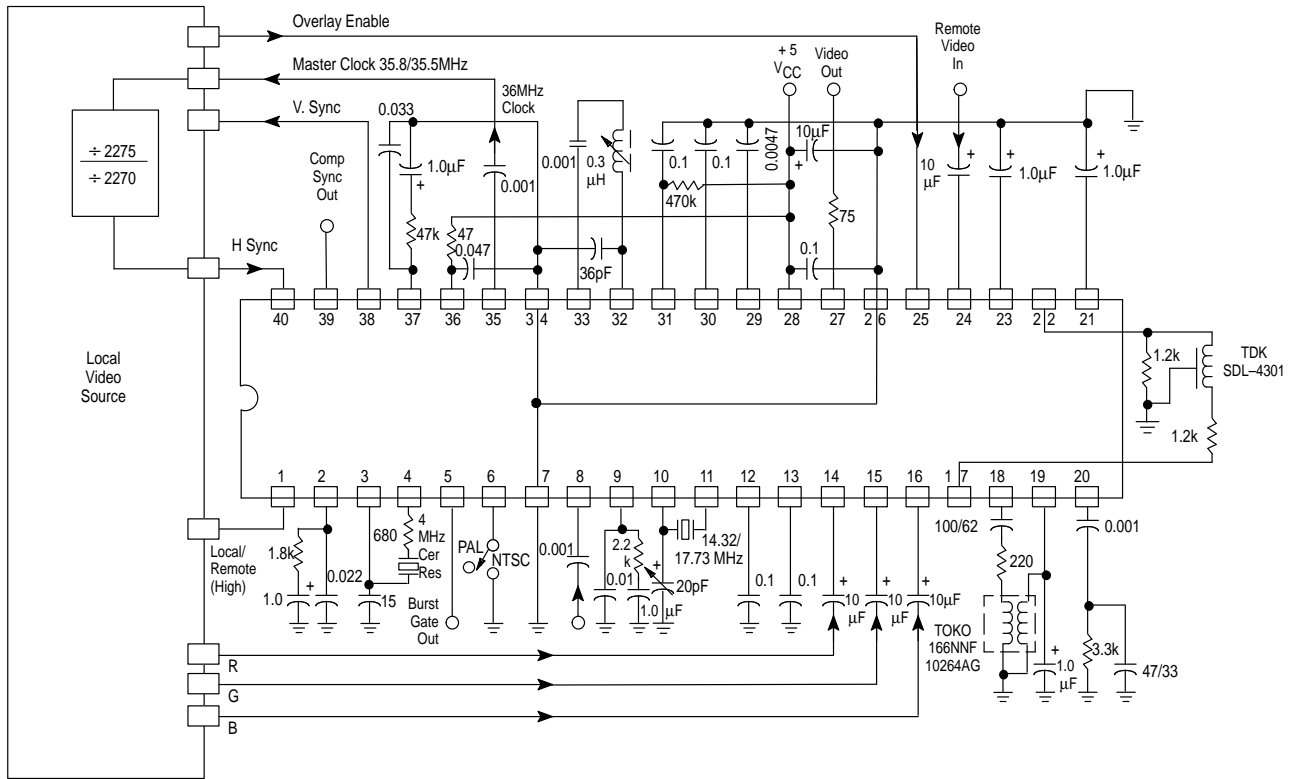
Remote Mode	Local Mode
<p>The incoming remote video signal (Pin 24) supplies all synchronizing information. A discussion of the function of the phase detectors helps to clarify the lockup method:</p> <p>PD1 — locks the internally counted-down 4 MHz horizontal VCO to the incoming horizontal sync. It is fast acting, to follow VCR source fluctuations.</p> <p>PD2 — locks the 36 MHz clock VCO, which is divided down by the video system, to the divided down horizontal VCO.</p> <p>PD3 — is a gated phase detector which locks the 14 MHz crystal oscillator, divided by 4, to the incoming color burst.</p> <p>PD4 — controls an internal phase shifter to assure that the outgoing color burst is the same phase as incoming burst at PD3.</p> <p>PD5 — not used in REMOTE MODE</p> <p>Vertical lock is obtained by continuously resetting the sync generator in the video system with separated vertical sync from the MC1378, Pin 38. This signal is TTL level vertical block sync, negative going. The horizontal sync from the video system to Pin 40 is also TTL level with sync negative going. The local/remote switch, Pin 1, is in local mode when grounded, remote mode when taken to 5.0 V. The overlay control, Pin 25, has an analog characteristic, centered about 1.0 V, which allows fading from local to remote.</p>	<p>The MC1378 and a video system combine to provide a fully synchronized standard signal source. In this case, composite sync must be supplied by the video system or other time base system. In the MC1378 the phase detectors operate as follows:</p> <p>PD1 — locks the internally counted-down 4 MHz horizontal VCO to a Horizontal Sync signal (at Pin 40) from the video system (counted down from 36 MHz)</p> <p>PD2 — not used in LOCAL MODE. PD3 — not used in LOCAL MODE.</p> <p>PD4 — active, but providing an arbitrary phase shift setting between the color oscillator and the output burst phase.</p> <p>PD5 — locks the 36 MHz clock VCO (which is divided down by the video system) to the 14 MHz (crystal) color oscillator. The 14 MHz is, therefore, the system standard in LOCAL MODE, and is not DC controlled.</p> <p><b>COMPOSITE VIDEO GENERATION</b> The color encoding at the RGB signals is done exactly as in the MC1377. Composite chroma is looped out at Pins 18 and 20 to allow the designer to choose band shaping. Luminance is similarly brought out (Pins 17 and 22) to permit installation of the appropriate delay. Composite sync output, Pin 39, and burst gate output, Pin 5, are provided for convenience only.</p>

Figure 2. Representative Block Diagram

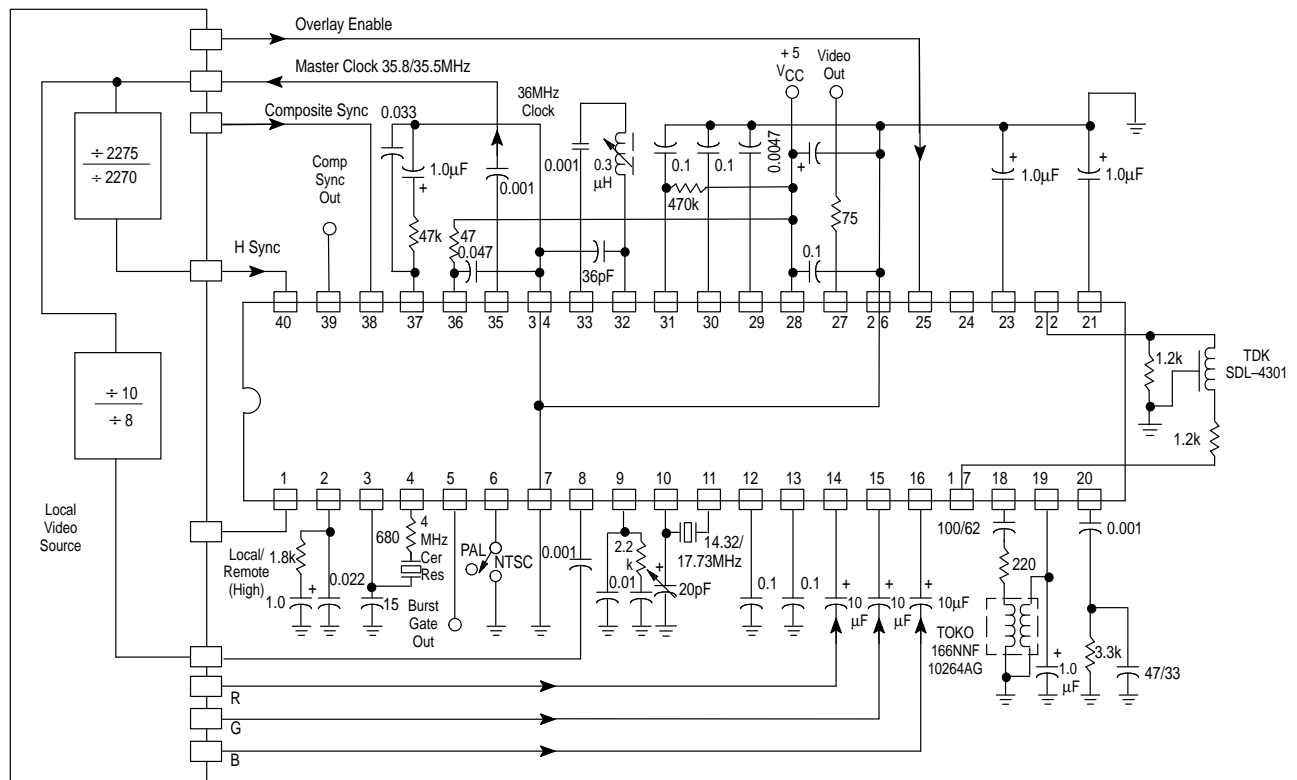


# MC1378

## Figure 3. Remote Mode



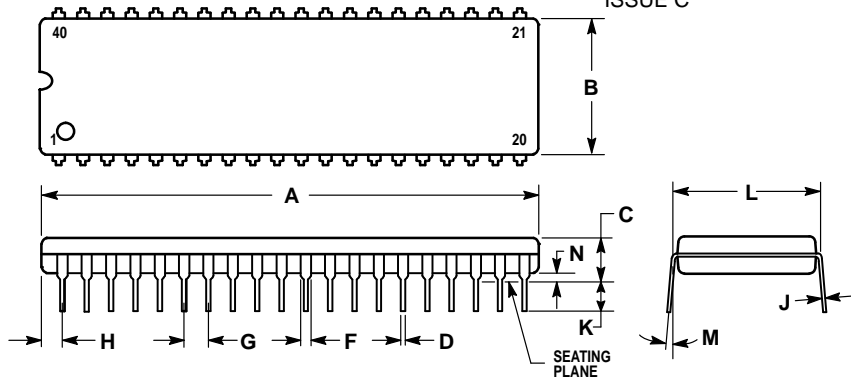
## Figure 4. Local Mode



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## OUTLINE DIMENSIONS

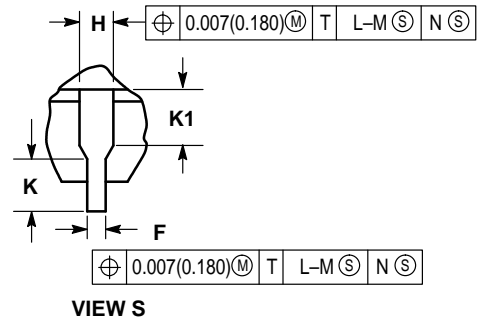
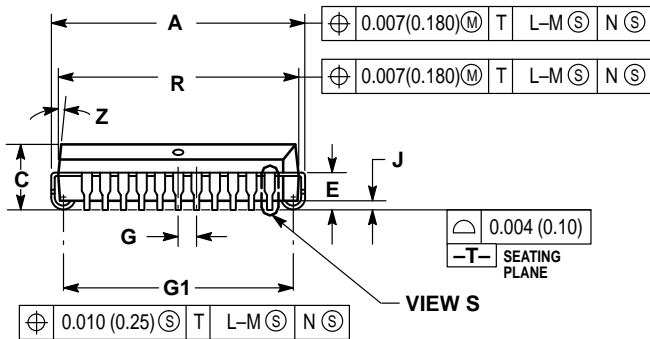
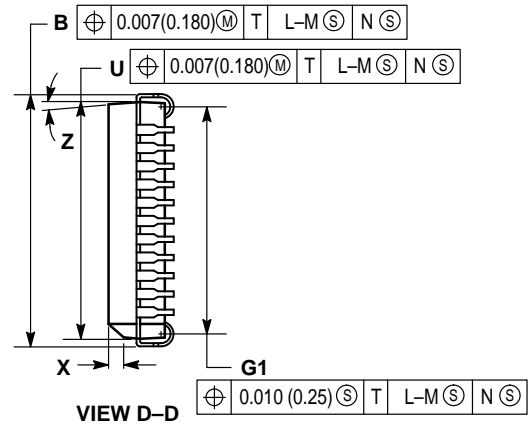
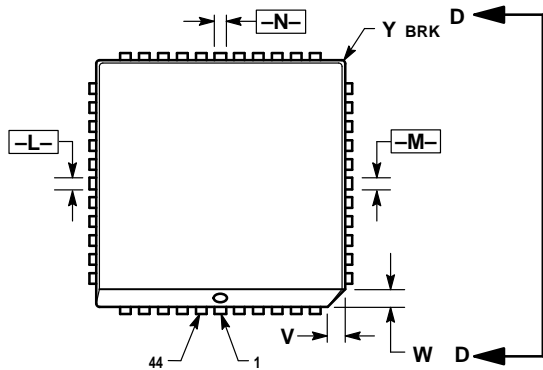
**P SUFFIX**  
**PLASTIC PACKAGE**  
**CASE 711-03**  
**ISSUE C**



- NOTES:
1. POSITIONAL TOLERANCE OF LEADS (D), SHALL BE WITHIN 0.25 (0.010) AT MAXIMUM MATERIAL CONDITION, IN RELATION TO SEATING PLANE AND EACH OTHER.
  2. DIMENSION L TO CENTER OF LEADS WHEN FORMED PARALLEL.
  3. DIMENSION B DOES NOT INCLUDE MOLD FLASH.


DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	51.69	52.45	2.035	2.065
B	13.72	14.22	0.540	0.560
C	3.94	5.08	0.155	0.200
D	0.36	0.56	0.014	0.022
F	1.02	1.52	0.040	0.060
G	2.54 BSC		0.100 BSC	
H	1.65	2.16	0.065	0.085
J	0.20	0.38	0.008	0.015
K	2.92	3.43	0.115	0.135
L	15.24 BSC		0.600 BSC	
M	0°		15°	
N	0.51	1.02	0.020	0.040

**FN SUFFIX**  
**PLASTIC PACKAGE**  
**CASE 777-02**  
**(PLCC-44)**  
**ISSUE C**



- NOTES:
1. DATUMS -L-, -M-, AND -N- ARE DETERMINED WHERE TOP OF LEAD SHOULDER EXITS PLASTIC BODY AT MOLD PARTING LINE.
  2. DIMENSION G1, TRUE POSITION TO BE MEASURED AT DATUM -T-, SEATING PLANE.
  3. DIMENSIONS R AND U DO NOT INCLUDE MOLD FLASH. ALLOWABLE MOLD FLASH IS 0.010 (0.25) PER SIDE.
  4. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
  5. CONTROLLING DIMENSION: INCH.
  6. THE PACKAGE TOP MAY BE SMALLER THAN THE PACKAGE BOTTOM BY UP TO 0.012 (0.300). DIMENSIONS R AND U ARE DETERMINED AT THE OUTERMOST EXTREMES OF THE PLASTIC BODY EXCLUSIVE OF MOLD FLASH, TIE BAR BURRS, GATE BURRS AND INTERLEAD FLASH, BUT INCLUDING ANY MISMATCH BETWEEN THE TOP AND BOTTOM OF THE PLASTIC BODY.
  7. DIMENSION H DOES NOT INCLUDE DAMBAR PROTRUSION OR INTRUSION. THE DAMBAR PROTRUSION(S) SHALL NOT CAUSE THE H DIMENSION TO BE GREATER THAN 0.037 (0.940). THE DAMBAR INTRUSION(S) SHALL NOT CAUSE THE H DIMENSION TO BE SMALLER THAN 0.025 (0.635).

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.685	0.695	17.40	17.65
B	0.685	0.695	17.40	17.65
C	0.165	0.180	4.20	4.57
E	0.090	0.110	2.29	2.79
F	0.013	0.019	0.33	0.48
G	0.050 BSC		1.27 BSC	
H	0.026	0.032	0.66	0.81
J	0.020	—	0.51	—
K	0.025	—	0.64	—
R	0.650	0.656	16.51	16.66
U	0.650	0.656	16.51	16.66
V	0.042	0.048	1.07	1.21
W	0.042	0.048	1.07	1.21
X	0.042	0.056	1.07	1.42
Y	—	0.020	—	0.50
Z	2°		10°	
G1	0.610	0.630	15.50	16.00
K1	0.040	—	1.02	—

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