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FAIRCHILD SEMICONDUCTOR®

March 2008

MM74HCT05
Hex Inverter (Open Drain)

Features

- Open drain for wire-NOR function
- LS-TTL pinout and threshold compatible
- Fanout of 10 LS-TTL loads
- Typical propagation delays:
  - t_{PZL} (with 1kΩ resistor) 10ns
  - t_{PLZ} (with 1kΩ resistor) 8ns

General Description

The MM74HCT05 is a logic function fabricated by using advanced silicon-gate CMOS technology, which provides the inherent benefits of CMOS—low quiescent power and wide power supply range. The device is also input and output characteristic and pinout compatible with standard DM74LS logic families. The MM74HCT05 open drain Hex Inverter requires the addition of an external resistor to perform a wire-NOR function.

All inputs are protected from static discharge damage by internal diodes to V_{CC} and ground.

MM74HCT devices are intended to interface between TTL and NMOS components and standard CMOS devices. These parts are also plug-in replacements for LS-TTL devices and can be used to reduce power consumption in existing designs.

Ordering Information

Order Number	Package Number	Package Description
MM74HCT05M	M14A	14-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-012, 0.150" Narrow
MM74HCT05SJ	M14D	14-Lead Small Outline Package (SOP), EIAJ TYPE II, 5.3mm Wide
MM74HCT05MTC	MTC14	14-Lead Thin Shrink Small Outline Package (TSSOP), JEDEC MO-153, 4.4mm Wide
MM74HCT05N	N14A	14-Lead Plastic Dual-In-Line Package (PDIP), JEDEC MS-001, 0.300" Wide

Device also available in Tape and Reel. Specify by appending suffix letter “X” to the ordering number.

All packages are lead free per JEDEC: J-STD-020B standard.

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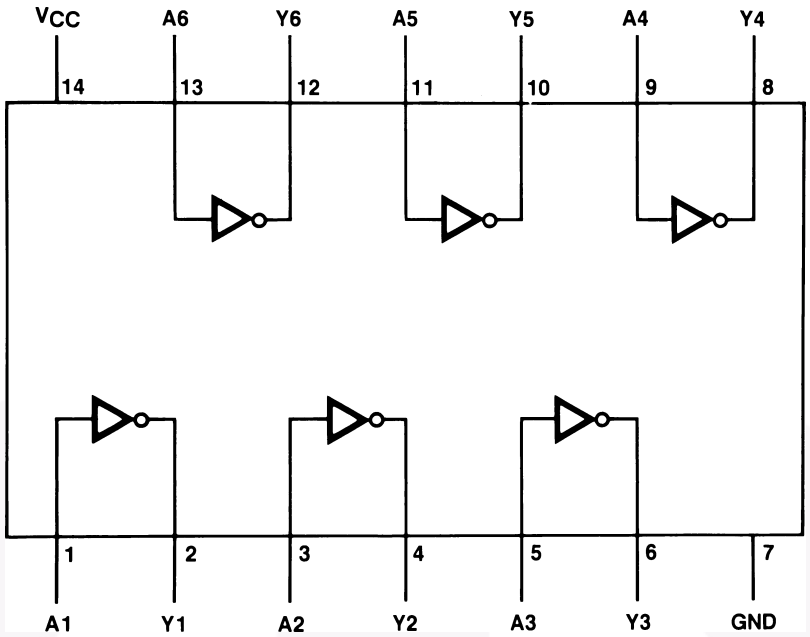
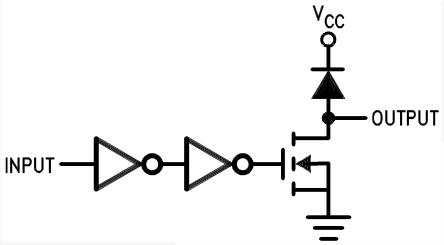
Connection Diagram

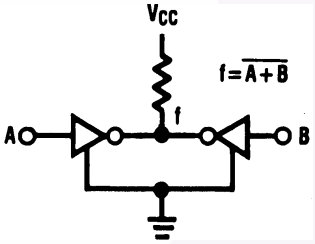


Top View

Logic Diagram



Typical Application



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Absolute Maximum Ratings(1)

Stresses exceeding the absolute maximum ratings may damage the device. The device may not function or be operable above the recommended operating conditions and stressing the parts to these levels is not recommended. In addition, extended exposure to stresses above the recommended operating conditions may affect device reliability. The absolute maximum ratings are stress ratings only.

Symbol	Parameter	Rating
V_{CC}	Supply Voltage	–0.5 to +7.0V
V_{IN}	DC Input Voltage	–1.5 to V_{CC}+1.5V
V_{OUT}	DC Output Voltage	–0.5 to V_{CC}+0.5V
I_{IK}, I_{OK}	Clamp Diode Current	±20mA
I_{OUT}	DC Output Current, per pin	±25mA
I_{CC}	DC V_{CC} or GND Current, per pin	±50mA
T_{STG}	Storage Temperature Range	–65°C to +150°C
P_D	Power Dissipation Note 2	600mW
	S.O. Package only	500mW
T_L	Lead Temperature (Soldering 10 seconds)	260°C

Notes:

1. Unless otherwise specified all voltages are referenced to ground.
2. Power Dissipation temperature derating — plastic “N” package: –12mW/°C from 65°C to 85°C.

Recommended Operating Conditions

The Recommended Operating Conditions table defines the conditions for actual device operation. Recommended operating conditions are specified to ensure optimal performance to the datasheet specifications. Fairchild does not recommend exceeding them or designing to absolute maximum ratings.

Symbol	Parameter	Min.	Max.	Units
V_{CC}	Supply Voltage	4.5	5.5	V
V_{IN}	DC Input Voltage	0	V_{CC}	V
V_{OUT}	DC Output Voltage	0	5.5	V
T_A	Operating Temperature Range	–40	+85	°C
t_r, t_f	Input Rise or Fall Times		500	ns

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DC Electrical Characteristics

(V_{CC} = 5V ± 10% unless otherwise specified)

Symbol	Parameter	Conditions	T_A = 25°C	T_A = –40°C to 85°C		Units
			Typ.	Guaranteed Limits		
V_{IH}	Minimum HIGH Level Input Voltage			2.0	2.0	V
V_{IL}	Maximum LOW Level Input Voltage			0.8	0.8	V
V_{OL}	Maximum LOW Level Voltage	$V_{IN} = V_{IH}$, $\|I_{OUT}\|$ = 20μA	0	0.1	0.1	V
		$V_{IN} = V_{IH}$, $\|I_{OUT}\|$ = 4.0mA, V_{CC} = 4.5V	0.2	0.26	0.33	
		$V_{IN} = V_{IH}$, $\|I_{OUT}\|$ = 4.8mA, V_{CC} = 5.5V	0.2	0.26	0.33	
I_{IN}	Maximum Input Current	$V_{IN} = V_{CC}$ or GND, V_{IH} or V_{IL}		± 0.1	± 1.0	μA
I_{LKG}	Maximum HIGH Level Output Leakage Current	$V_{IN} = V_{IH}$ or V_{IL}, $V_{OUT} = V_{CC}$		0.5	5.0	μA
I_{CC}	Maximum Quiescent Supply Current	$V_{IN} = V_{CC}$ or GND, I_{OUT} = 0μA		2.0	20	μA
		V_{IN} = 2.4V or 0.5V(3)		0.3	0.4	mA
I_{OHZ}	Off State Current	V_{CC} = 4.5V–5.5V, V_O = 5.5V			10	μA

Note:

3. This is measured per input with all other inputs held at V_{CC} or ground.

AC Electrical Characteristics

V_{CC} = 5V, T_A = 25°C,C_L = 15pF, $t_r = t_f$ = 6ns unless otherwise noted.

Symbol	Parameter	Conditions	Typ.	Guaranteed Limit	Units
t_{PZL}	Maximum Propagation Delay	R_L = 1kΩ	8	15	ns
t_{PLZ}	Maximum Propagation Delay	R_L = 1kΩ	9	16	ns

AC Electrical Characteristics

V_{CC} = 5V, ± 10%, C_L = 50pF, $t_r = t_f$ = 6ns unless otherwise specified.

Symbol	Parameter	Conditions	T_A=25°C	T_A = –40°C to 85°C		Units
			Typ.	Guaranteed Limits		
t_{PZL}	Maximum Propagation Delay	R_L = 1kΩ	10	22	28	ns
t_{PLZ}	Maximum Propagation Delay	R_L = 1kΩ	12	20	25	ns
t_{THL}	Maximum Output Fall Time		10	15	19	ns
C_{PD}	Power Dissipation Capacitance	(per gate), $R_L = \infty$, (4)		20		pF
C_{IN}	Maximum Input Capacitance			5	10	pF

Note:

4. C_{PD} determines the no load dynamic power consumption, $P_D = C_{PD} V_{CC}^2 f + I_{CC} V_{CC}$, and the no load dynamic current consumption, $I_S = C_{PD} V_{CC} f + I_{CC}$.

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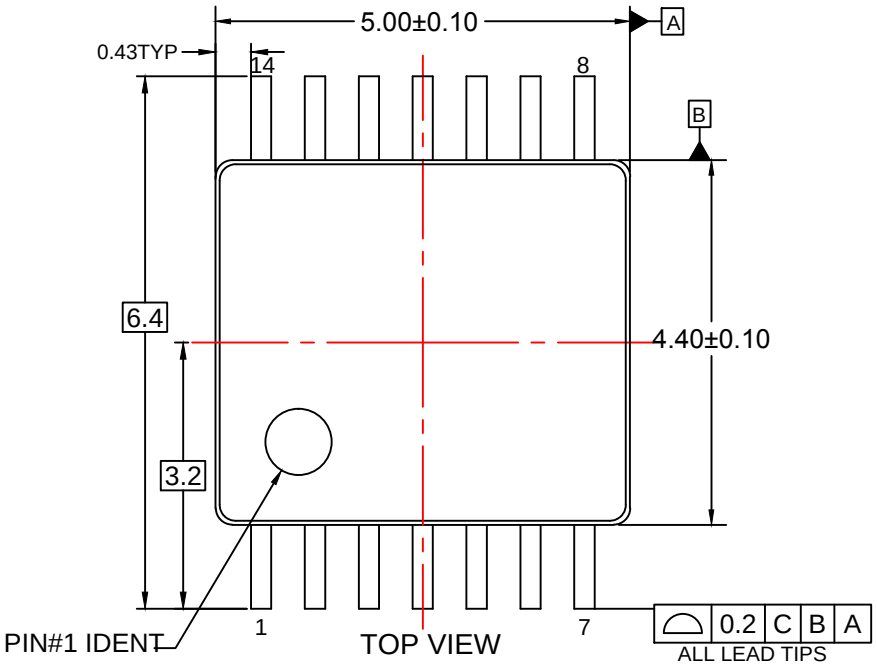
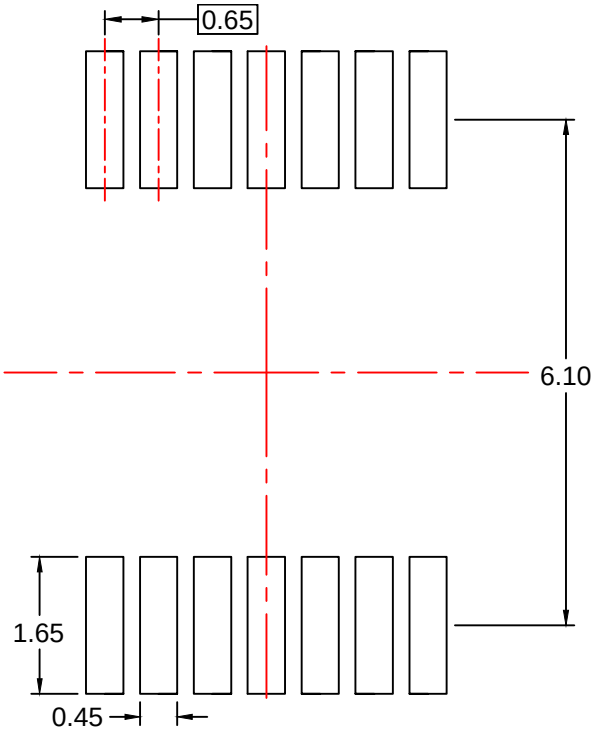
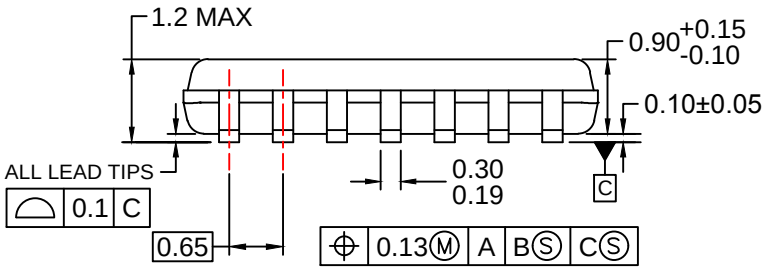


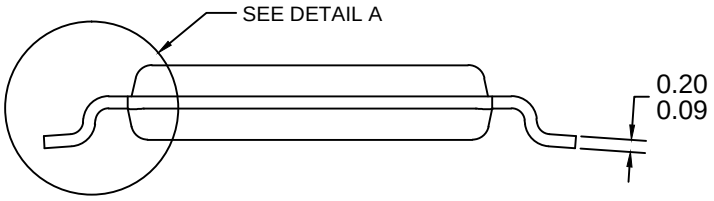
TOP VIEW

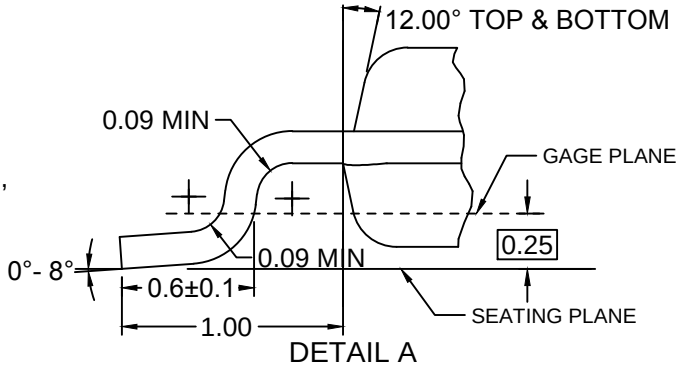


RECOMMENDED LAND PATTERN



FRONT VIEW





DETAIL A

NOTES:

A. CONFORMS TO JEDEC REGISTRATION MO-153, VARIATION AB, REF NOTE 6

B. DIMENSIONS ARE IN MILLIMETERS.

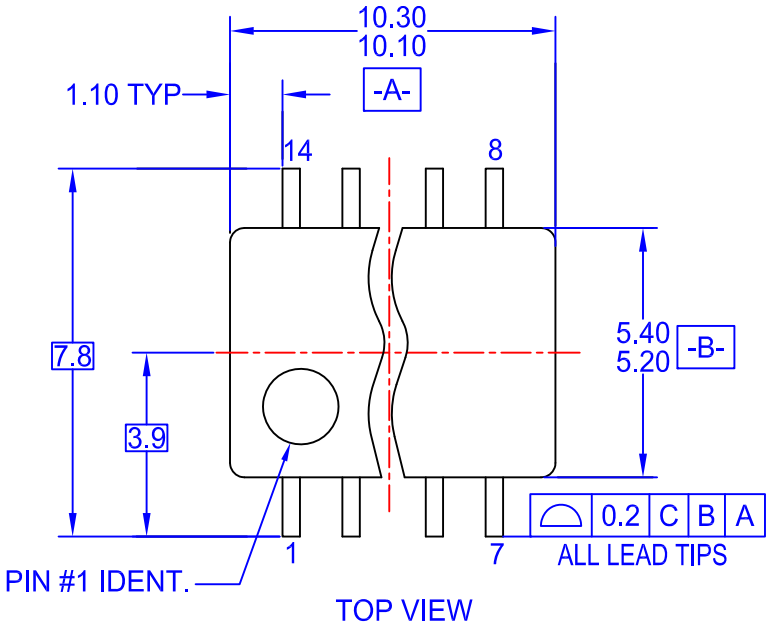
C. DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH, AND TIE BAR EXTRUSIONS

D. DIMENSIONING AND TOLERANCES PER ANSI Y14.5M, 2009.

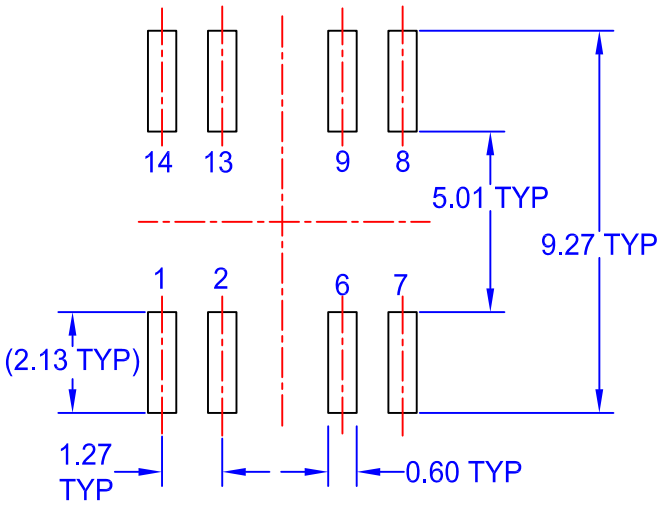
E. LANDPATTERN STANDARD: SOP65P640X110-14M.

F. DRAWING FILE NAME: MKT-MTC14rev7.

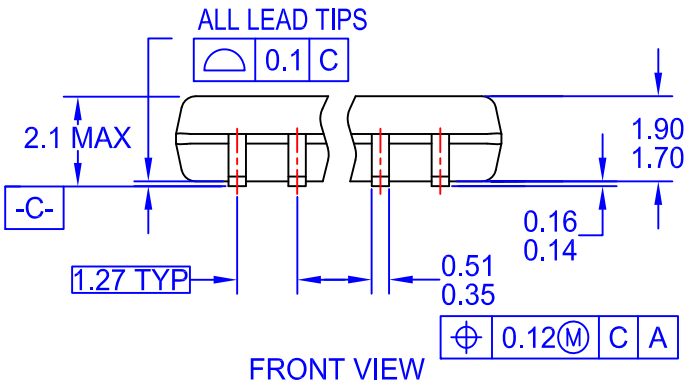
FAIRCHILD



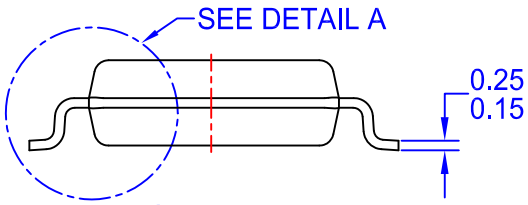
TOP VIEW



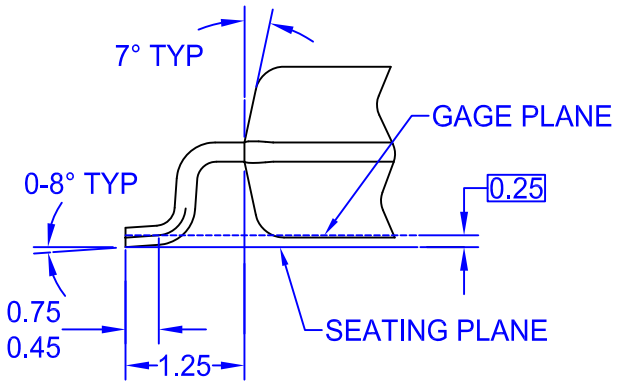
LAND PATTERN RECOMMENDATION



FRONT VIEW



SIDE VIEW

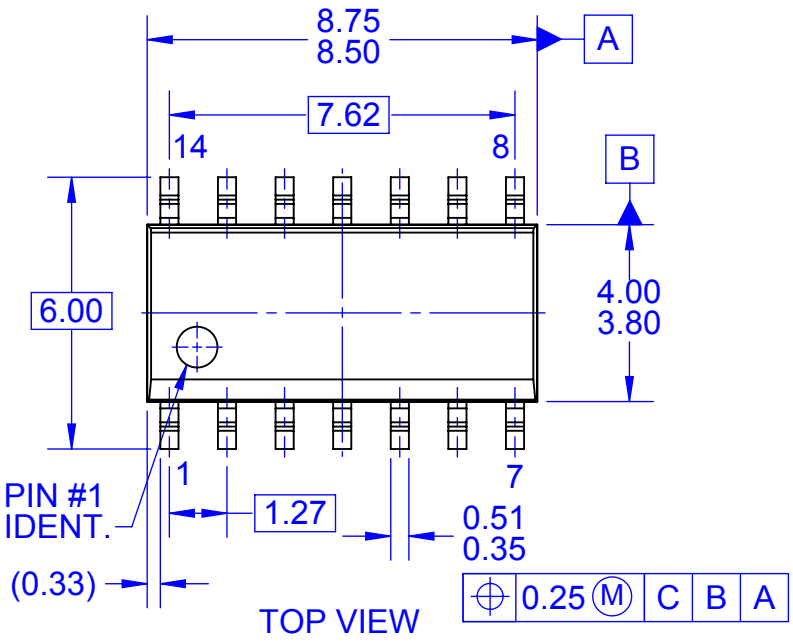


DETAIL A

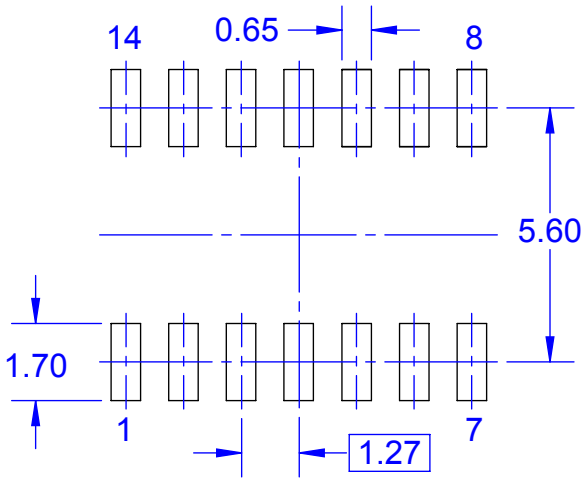
NOTES:

A. CONFORMS TO EIAJ EDR-7320 REGISTRATION, ESTABLISHED IN DECEMBER, 1998.
B. DIMENSIONS ARE IN MILLIMETERS.
C. DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH, AND TIE BAR EXTRUSIONS.
D. DRAWING FILENAME: MKT-M14Drev4.

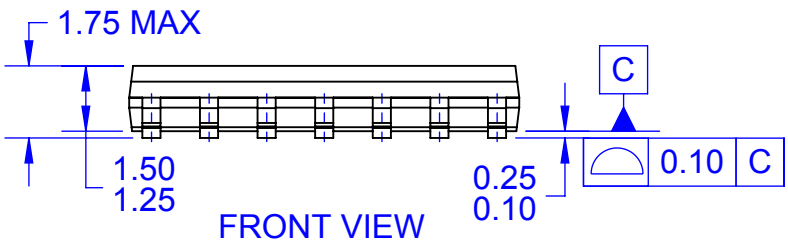
FAIRCHILD ™



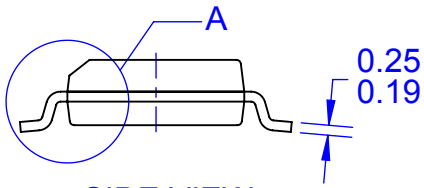
TOP VIEW



LAND PATTERN RECOMMENDATION



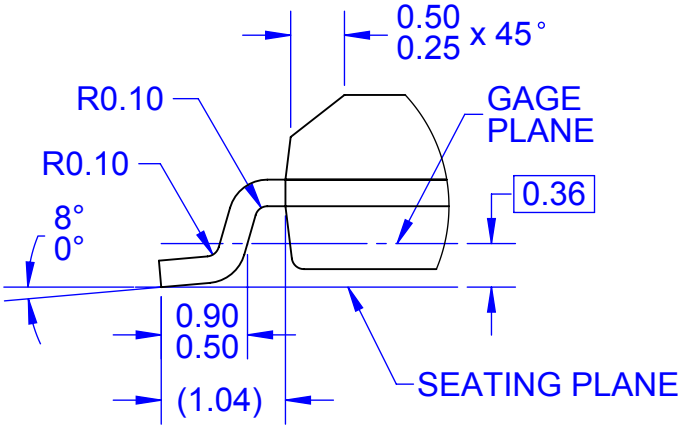
FRONT VIEW



SIDE VIEW

NOTES:

A. CONFORMS TO JEDEC MS-012, VARIATION AB, ISSUE C
B. ALL DIMENSIONS ARE IN MILLIMETERS
C. DIMENSIONS DO NOT INCLUDE MOLD FLASH OR BURRS
D. LAND PATTERN STANDARD: SOIC127P600X145-14M
E. CONFORMS TO ASME Y14.5M, 2009
D. DRAWING FILENAME: MKT-M14Arev14



DETAIL A
SCALE 16 : 1

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