

Is Now Part of



ON Semiconductor®

To learn more about ON Semiconductor, please visit our website at
www.onsemi.com

Please note: As part of the Fairchild Semiconductor integration, some of the Fairchild orderable part numbers will need to change in order to meet ON Semiconductor's system requirements. Since the ON Semiconductor product management systems do not have the ability to manage part nomenclature that utilizes an underscore (_), the underscore (_) in the Fairchild part numbers will be changed to a dash (-). This document may contain device numbers with an underscore (_). Please check the ON Semiconductor website to verify the updated device numbers. The most current and up-to-date ordering information can be found at www.onsemi.com. Please email any questions regarding the system integration to Fairchild_questions@onsemi.com.

ON Semiconductor and the ON Semiconductor logo are trademarks of Semiconductor Components Industries, LLC dba ON Semiconductor or its subsidiaries in the United States and/or other countries. ON Semiconductor owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of ON Semiconductor's product/patent coverage may be accessed at www.onsemi.com/site/pdf/Patent-Marking.pdf. ON Semiconductor reserves the right to make changes without further notice to any products herein. ON Semiconductor makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does ON Semiconductor assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. Buyer is responsible for its products and applications using ON Semiconductor products, including compliance with all laws, regulations and safety requirements or standards, regardless of any support or applications information provided by ON Semiconductor. "Typical" parameters which may be provided in ON Semiconductor data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. ON Semiconductor does not convey any license under its patent rights nor the rights of others. ON Semiconductor products are not designed, intended, or authorized for use as a critical component in life support systems or any FDA Class 3 medical devices or medical devices with a same or similar classification in a foreign jurisdiction or any devices intended for implantation in the human body. Should Buyer purchase or use ON Semiconductor products for any such unintended or unauthorized application, Buyer shall indemnify and hold ON Semiconductor and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that ON Semiconductor was negligent regarding the design or manufacture of the part. ON Semiconductor is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

FAIRCHILD SEMICONDUCTOR®

February 2008

MM74HC08
Quad 2-Input AND Gate

Features

- Typical propagation delay: 7ns (t_{PHL}), 12ns (t_{PLH})
- Fanout of 10 LS-TTL loads
- Quiescent power consumption: 2μA maximum at room temperature
- Low input current: 1μA maximum

General Description

The MM74HC08 AND gates utilize advanced silicon-gate CMOS technology to achieve operating speeds similar to LS-TTL gates with the low power consumption of standard CMOS integrated circuits. The HC08 has buffered outputs, providing high noise immunity and the ability to drive 10 LS-TTL loads. The 74HC logic family is functionally as well as pin-out compatible with the standard 74LS logic family. All inputs are protected from damage due to static discharge by internal diode clamps to V_{CC} and ground.

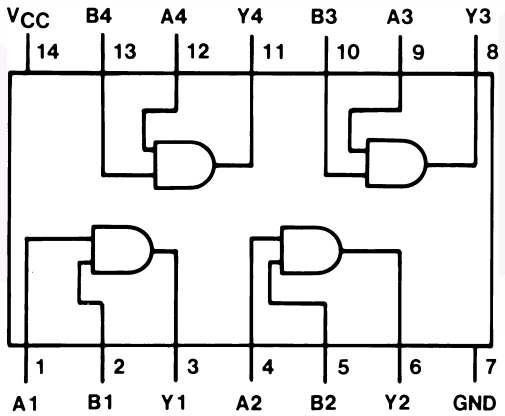
Ordering Information

Order Number	Package Number	Package Description
MM74HC08M	M14A	14-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-012, 0.150" Narrow
MM74HC08SJ	M14D	14-Lead Small Outline Package (SOP), EIAJ TYPE II, 5.3mm Wide
MM74HC08MTC	MTC14	14-Lead Thin Shrink Small Outline Package (TSSOP), JEDEC MO-153, 4.4mm Wide
MM74HC08N	N14A	14-Lead Plastic Dual-In-Line Package (PDIP), JEDEC MS-001, 0.300" Wide

Device also available in Tape and Reel except for N14A. Specify by appending suffix letter “X” to the ordering number.

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

Connection Diagram



Top View

©1983 Fairchild Semiconductor Corporation

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	2	6	V
V_{IN}, V_{OUT}	DC Input or Output Voltage	0	V_{CC}	V
T_A	Operating Temperature Range	–40	+85	°C
t_r, t_f	Input Rise or Fall Times V_{CC} = 2.0V		1000	ns
	V_{CC} = 4.5V		500	ns
	V_{CC} = 6.0V		400	ns

©1983 Fairchild Semiconductor Corporation

DC Electrical Characteristics[3]

Symbol	Parameter	V_{CC} (V)	Conditions	$T_A = 25°C$	$T_A = -40°C$ to 85°C	$T_A = -55°C$ to 125°C	Units
				Typ.	Guaranteed Limits		
V_{IH}	Minimum HIGH Level Input Voltage	2.0			1.5	1.5	1.5	V
		4.5			3.15	3.15	3.15	
		6.0			4.2	4.2	4.2	
V_{IL}	Maximum LOW Level Input Voltage	2.0			0.5	0.5	0.5	V
		4.5			1.35	1.35	1.35	
		6.0			1.8	1.8	1.8	
V_{OH}	Minimum HIGH Level Output Voltage	2.0	$V_{IN} = V_{IH}$, $\|I_{OUT}\| \leq 20\mu A$	2.0	1.9	1.9	1.9	V
		4.5		4.5	4.4	4.4	4.4	
		6.0		6.0	5.9	5.9	5.9	
		4.5	$V_{IN} = V_{IH}$, $\|I_{OUT}\| \leq 4.0mA$	4.2	3.98	3.84	3.7	
		6.0	$V_{IN} = V_{IH}$, $\|I_{OUT}\| \leq 5.2mA$	5.7	5.48	5.34	5.2	
V_{OL}	Maximum LOW Level Output Voltage	2.0	$V_{IN} = V_{IH}$ or V_{IL}, $\|I_{OUT}\| \leq 20\mu A$	0	0.1	0.1	0.1	V
		4.5		0	0.1	0.1	0.1	
		6.0		0	0.1	0.1	0.1	
		4.5	$V_{IN} = V_{IH}$ or V_{IL}, $\|I_{OUT}\| \leq 4.0mA$	0.2	0.26	0.33	0.4	
		6.0	$V_{IN} = V_{IH}$ or V_{IL}, $\|I_{OUT}\| \leq 5.2mA$	0.2	0.26	0.33	0.4	
I_{IN}	Maximum Input Current	6.0	$V_{IN} = V_{CC}$ or GND		±0.1	±1.0	±1.0	µA
I_{CC}	Maximum Quiescent Supply Current	6.0	$V_{IN} = V_{CC}$ or GND, $I_{OUT} = 0\mu A$		2.0	20	40	µA

Note:

3. For a power supply of 5V ±10% the worst case output voltages (V_{OH}, and V_{OL}) occur for HC at 4.5V. Thus the 4.5V values should be used when designing with this supply. Worst case V_{IH} and V_{IL} occur at $V_{CC} = 5.5V$ and 4.5V respectively. (The V_{IH} value at 5.5V is 3.85V.) The worst case leakage current (I_{IN}, I_{CC}, and I_{OZ}) occur for CMOS at the higher voltage and so the 6.0V values should be used.

©1983 Fairchild Semiconductor Corporation

AC Electrical Characteristics

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

Symbol	Parameter	Conditions	Typ.	Guaranteed Limit	Units
t_{PHL}	Maximum Propagation Delay, Output HIGH-to-LOW		12	20	ns
t_{PLH}	Maximum Propagation Delay, Output LOW-to-HIGH		7	15	ns

AC Electrical Characteristics

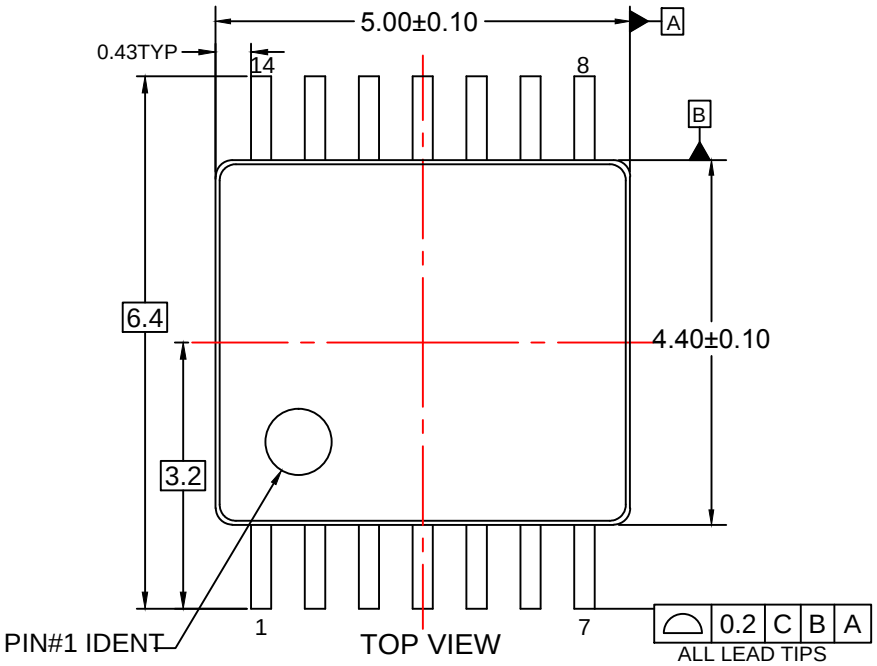
V_{CC} = 2.0V to 6.0V, C_L = 50pF, $t_r = t_f$ = 6ns (unless otherwise specified)

Symbol	Parameter	V_{CC} (V)	Conditions	T_A = 25°C		T_A = –40°C to 125°C	Units
				Typ.	Guaranteed Limits		
t_{PHL}	Maximum Propagation Delay, Output HIGH-to-LOW	2.0		77	121	175	ns
		4.5		15	24	35	
		6.0		13	20	30	
t_{PLH}	Maximum Propagation Delay, Output LOW-to-HIGH	2.0		30	90	134	ns
		4.5		10	18	27	
		6.0		8	15	23	
t_{TLH}, t_{THL}	Maximum Output Rise and Fall Time	2.0		30	75	110	ns
		4.5		8	15	22	
		6.0		7	13	19	
C_{PD}	Power Dissipation Capacitance(4)		(per gate)	38			pF
C_{IN}	Maximum Input Capacitance			4	10	10	pF

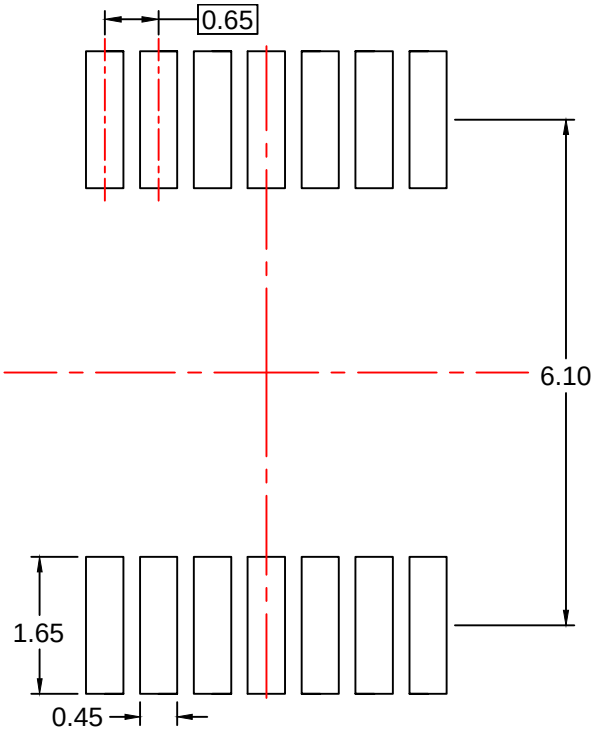
Note:

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, $I_S = C_{PD} V_{CC} f + I_{CC}$.

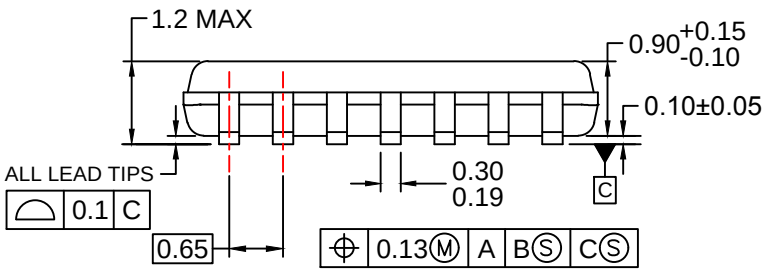
©1983 Fairchild Semiconductor Corporation



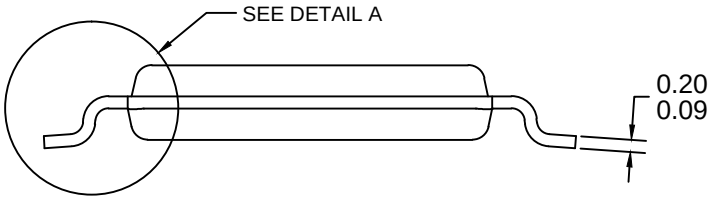
TOP VIEW

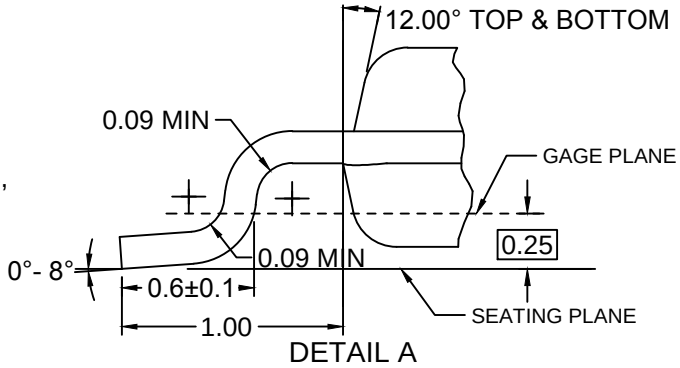


RECOMMENDED LAND PATTERN



FRONT VIEW





DETAIL A

NOTES:

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

B. DIMENSIONS ARE IN MILLIMETERS.

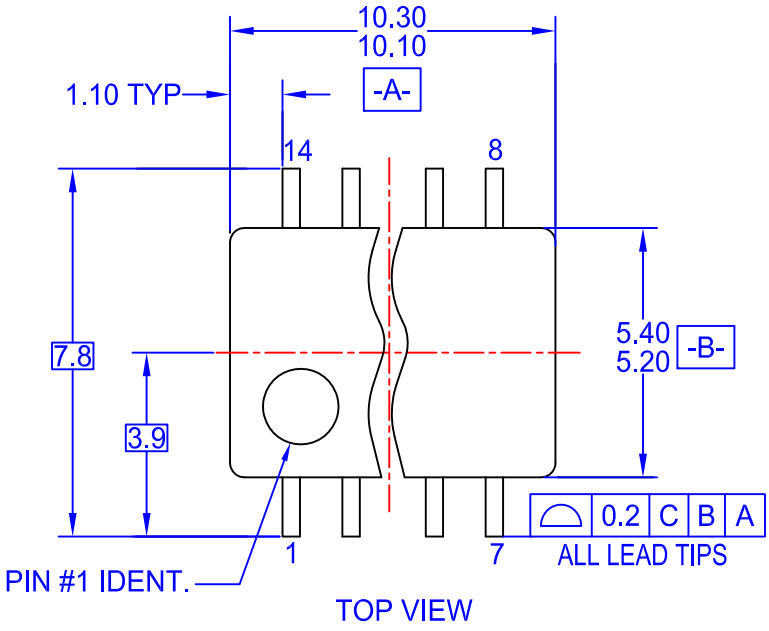
C. DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH, AND TIE BAR EXTRUSIONS

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

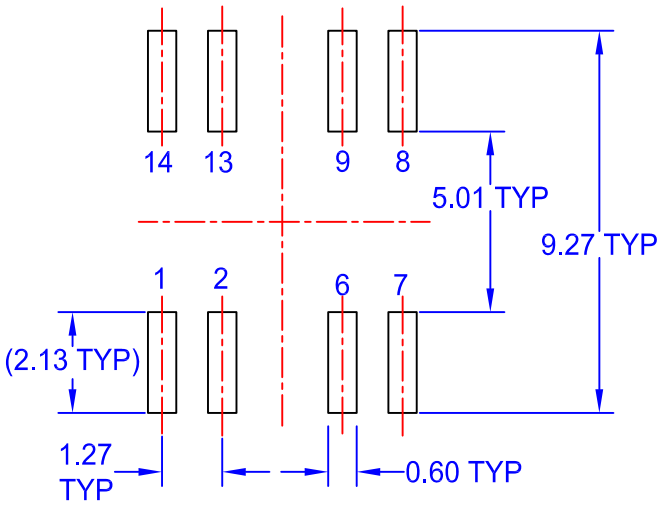
E. LANDPATTERN STANDARD: SOP65P640X110-14M.

F. DRAWING FILE NAME: MKT-MTC14rev7.

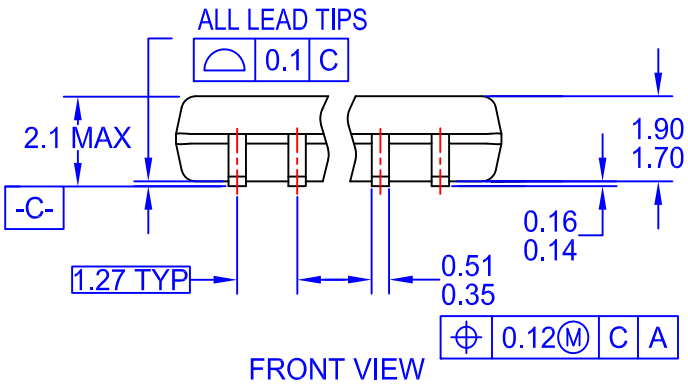
FAIRCHILD



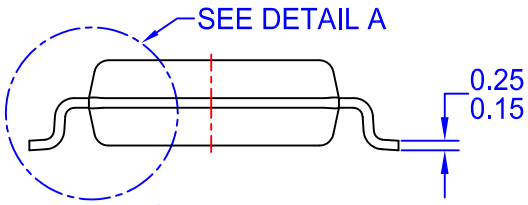
TOP VIEW



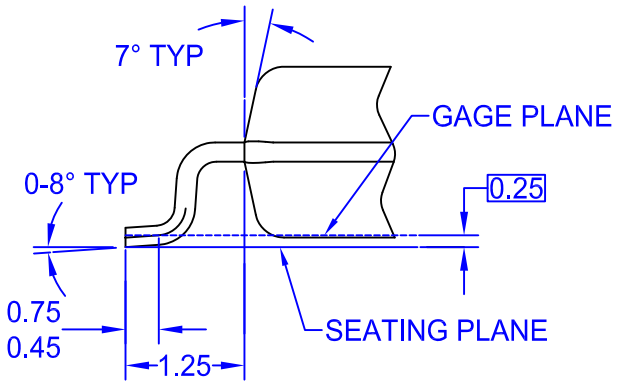
LAND PATTERN RECOMMENDATION



FRONT VIEW



SIDE VIEW

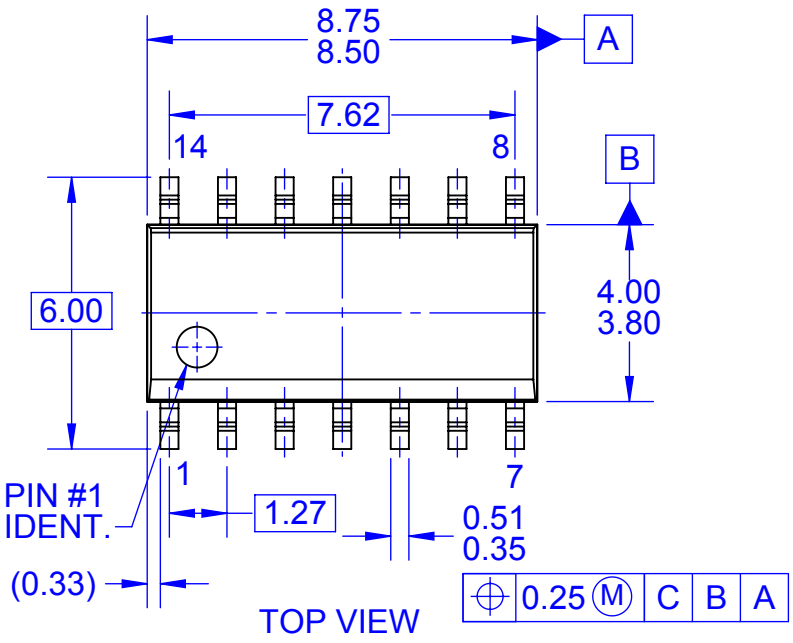


DETAIL A

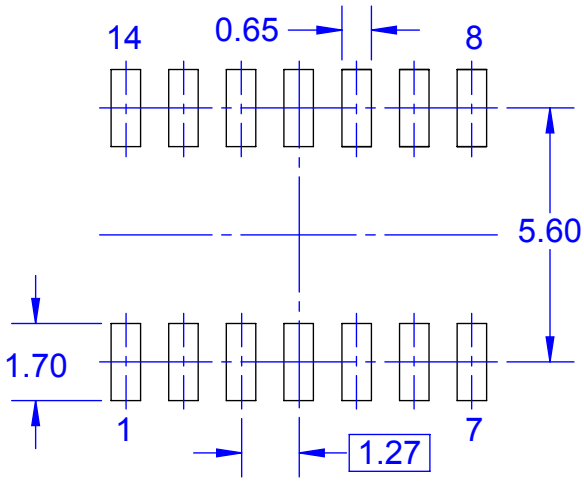
NOTES:

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.

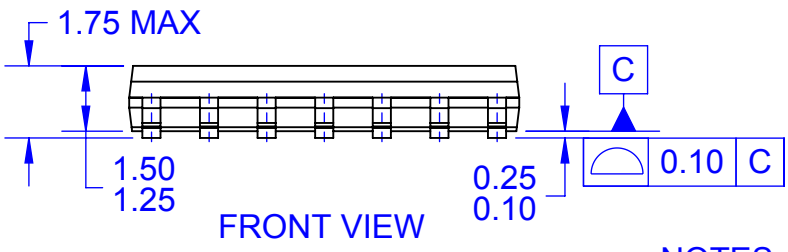
FAIRCHILD ™



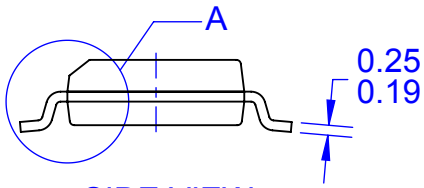
TOP VIEW



LAND PATTERN RECOMMENDATION



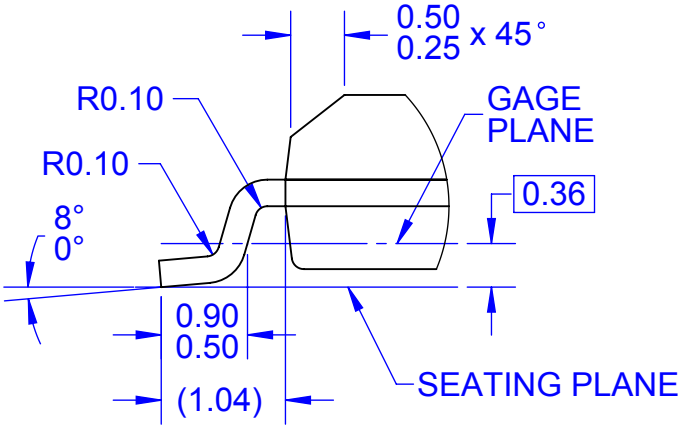
FRONT VIEW



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

FAIRCHILD ™

ON Semiconductor and ON are trademarks of Semiconductor Components Industries, LLC dba ON Semiconductor or its subsidiaries in the United States and/or other countries. ON Semiconductor owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of ON Semiconductor's product/patent coverage may be accessed at www.onsemi.com/site/pdf/Patent−Marking.pdf. ON Semiconductor reserves the right to make changes without further notice to any products herein. ON Semiconductor makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does ON Semiconductor assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. Buyer is responsible for its products and applications using ON Semiconductor products, including compliance with all laws, regulations and safety requirements or standards, regardless of any support or applications information provided by ON Semiconductor. "Typical" parameters which may be provided in ON Semiconductor data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. ON Semiconductor does not convey any license under its patent rights nor the rights of others. ON Semiconductor products are not designed, intended, or authorized for use as a critical component in life support systems or any FDA Class 3 medical devices or medical devices with a same or similar classification in a foreign jurisdiction or any devices intended for implantation in the human body. Should Buyer purchase or use ON Semiconductor products for any such unintended or unauthorized application, Buyer shall indemnify and hold ON Semiconductor and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that ON Semiconductor was negligent regarding the design or manufacture of the part. ON Semiconductor is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

PUBLICATION ORDERING INFORMATION

LITERATURE FULFILLMENT:
Literature Distribution Center for ON Semiconductor
19521 E. 32nd Pkwy, Aurora, Colorado 80011 USA
Phone: 303−675−2175 or 800−344−3860 Toll Free USA/Canada
Fax: 303−675−2176 or 800−344−3867 Toll Free USA/Canada
Email: orderlit@onsemi.com

N. American Technical Support: 800−282−9855 Toll Free USA/Canada
Europe, Middle East and Africa Technical Support:
Phone: 421 33 790 2910
Japan Customer Focus Center
Phone: 81−3−5817−1050

ON Semiconductor Website: **www.onsemi.com**

Order Literature: http://www.onsemi.com/orderlit

For additional information, please contact your local Sales Representative