

MM74HCT138

TRUTH TABLE

Inputs												
Enable		Select			Outputs							
G1	$\overline{G2}$ (Note 1)	C	B	A	Y0	Y01	Y2	Y3	Y4	Y5	Y6	Y7
X	H	X	X	X	H	H	H	H	H	H	H	H
L	X	X	X	X	H	H	H	H	H	H	H	H
H	L	L	L	L	L	H	H	H	H	H	H	H
H	L	L	L	H	H	L	H	H	H	H	H	H
H	L	L	H	L	H	H	L	H	H	H	H	H
H	L	L	H	H	H	H	H	L	H	H	H	H
H	L	H	L	L	H	H	H	H	L	H	H	H
H	L	H	L	H	H	H	H	H	H	L	H	H
H	L	H	H	L	H	H	H	H	H	H	L	H
H	L	H	H	H	H	H	H	H	H	H	H	L

H = HIGH Level
L = LOW Level
X = Don't Care

$$1. \overline{G2} = \overline{G2A} + \overline{G2B}$$

Logic Diagram

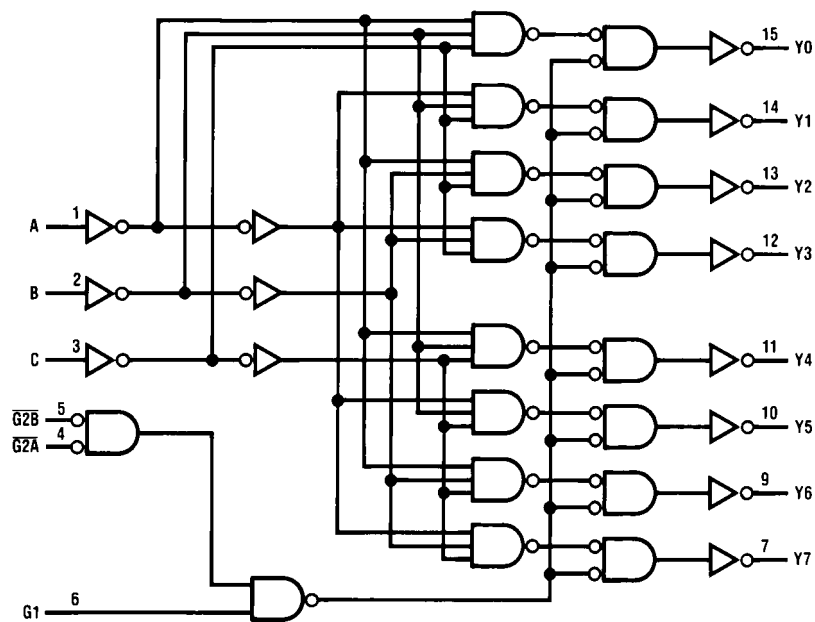


Figure 2. Logic Diagram

MM74HCT138

ABSOLUTE MAXIMUM RATINGS (Note 2)

Symbol	Parameter		Rating
V_{CC}	Supply Voltage		-0.5 to +6.5 V
V_{IN}	DC Input Voltage		-0.5 to $V_{CC} + 0.5$ V
V_{OUT}	DC Output Voltage		-0.5 to $V_{CC} + 0.5$ V
I_{IK}, I_{OK}	Clamp Diode Current		±20 mA
I_{OUT}	DC Output Current, per Pin		±25 mA
I_{CC}	DC V_{CC} or GND Current, per Pin		±50 mA
T_{STG}	Storage Temperature Range		-65 °C to +150 °C
P_D	Power Dissipation	S.O. Package Only	500 mW
T_L	Lead Temperature (Soldering 10 Seconds)		260 °C

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

2. Unless otherwise specified all voltages are referenced to ground.

RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter	Min	Max	Unit
V_{CC}	Supply Voltage	4.5	5.5	V
V_{IN}, V_{OUT}	DC Input or Output Voltage	0	V_{CC}	V
T_A	Operating Temperature Range	-55	+125	°C
t_r, t_f	Input Rise or Fall Times	–	500	ns

Functional operation above the stresses listed in the Recommended Operating Ranges is not implied. Extended exposure to stresses beyond the Recommended Operating Ranges limits may affect device reliability.

DC ELECTRICAL CHARACTERISTICS ($V_{CC} = 5$ V ±10% (unless otherwise specified))

Symbol	Parameter	Conditions	T _A = 25 °C		T _A = −40 °C to 85 °C	T _A = −55 °C to 125 °C	Unit
			Typ	Guaranteed Limits			
V _{IH}	Minimum HIGH Level Input Voltage		–	2.0	2.0	2.0	V
V _{IL}	Maximum LOW Level Input Voltage		–	0.8	0.8	0.8	V
V _{OH}	Minimum HIGH Level Output Voltage	V _{IN} = V _{IH} or V _{IL}					
		I _{OUT} = 20 μA	V _{CC}	V _{CC} − 0.1	V _{CC} − 0.1	V _{CC} − 0.1	V
		I _{OUT} = 4.0 mA, V _{CC} = 4.5 V	4.2	3.98	3.84	3.7	V
		I _{OUT} = 4.8 mA, V _{CC} = 5.5 V	5.2	4.98	4.84	4.7	V
V _{OL}	Maximum LOW Level Voltage	V _{IN} = V _{IH} or V _{IL}					
		I _{OUT} = 20 μA	0	0.1	0.1	0.1	V
		I _{OUT} = 4.0 mA, V _{CC} = 4.5 V	0.2	0.26	0.33	0.4	V
		I _{OUT} = 4.8 mA, V _{CC} = 5.5 V	0.2	0.26	0.33	0.4	V
I _{IN}	Maximum Input Current	V _{IN} = V _{CC} or GND, V _{IH} or V _{IL}	–	±0.1	±1.0	±1.0	μA
I _{CC}	Maximum Quiescent Supply Current	V _{IN} = V _{CC} or GND, I _{OUT} = 0 μA	–	8.0	80	160	μA
		V _{IN} = 2.4 V or 0.5 V (Note 3)	–	1.2	1.4	1.5	mA

3. This is measured per input pin. All other inputs are held at V_{CC} or ground.

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AC ELECTRICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$, $V_{CC} = 5.0\text{ V}$, $t_r = t_f = 6\text{ ns}$, $C_L = 15\text{ pF}$ (unless otherwise specified))

Symbol	Parameter	Conditions	Typ	Guaranteed Limit	Unit
t_{PHL}	Maximum Propagation Delay, A, B, or C to Output		20	35	ns
t_{PLH}	Maximum Propagation Delay, A, B, or C to Output		13	25	ns
t_{PHL}	Maximum Propagation Delay, G1 to Y Output		14	25	ns
t_{PLH}	Maximum Propagation Delay, G1 to Y Output		13	25	ns
t_{PHL}	Maximum Propagation Delay, $\overline{G2A}$ or $\overline{G2B}$ to Y Output		17	30	ns
t_{PLH}	Maximum Propagation Delay, $\overline{G2A}$ or $\overline{G2B}$ to Y Output		13	25	ns

AC ELECTRICAL CHARACTERISTICS ($V_{CC} = 5\text{ V} \pm 10\%$, $C_L = 50\text{ pF}$, $t_r = t_f = 6\text{ ns}$ (unless otherwise specified))

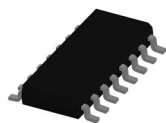
Symbol	Parameter	Conditions	T _A = 25 °C		T _A = −40 °C to 85 °C	T _A = −55 °C to 125 °C	Unit
			Typ	Guaranteed Limits			
t _{PHL}	Maximum Propagation Delay A, B, or C to Output		24	40	50	60	ns
t _{PLH}	Maximum Propagation Delay A, B, or C to Output		18	30	38	45	ns
t _{PHL}	Maximum Propagation Delay G1 to Y Output		17	30	38	45	ns
t _{PLH}	Maximum Propagation Delay G1 to Y Output		20	30	38	45	ns
t _{PHL}	Maximum Propagation Delay G2A or G2B to Y Output		23	35	43	52	ns
t _{PLH}	Maximum Propagation Delay G2A or G2B to Y Output		18	30	38	45	ns
t _{THL} , t _{TLH}	Maximum Output Rise and Fall Time		–	15	19	22	ns
C _{IN}	Input Capacitance		–	5	10	10	pF
C _{PD}	Power Dissipation Capacitance	(Note 4)	55	–	–	–	pF

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

ORDERING INFORMATION

Part Number	Package	Shipping [†]
MM74HCT138M	SOIC-16, Case 751B-05 (Pb-Free)	48 Units / Tube
MM74HCT138MTC	TSSOP-16, Case 948F-01 (Pb-Free)	96 Units / Tube
MM74HCT138MX	SOIC-16, Case 751BG-01 (Pb-Free)	2500 / Tape & Reel
MM74HCT138MTCX	TSSOP-16, Case 948F-01 (Pb-Free)	2500 / Tape & Reel

- [†] For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, [BRD8011/D](#).

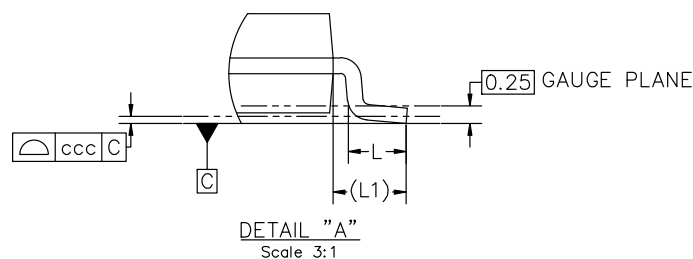
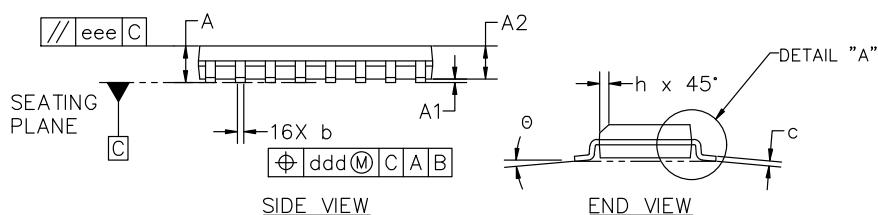
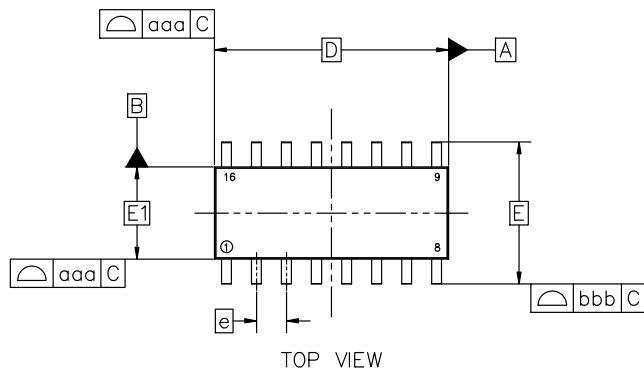


SOIC-16 9.90x3.90x1.37 1.27P
CASE 751B
ISSUE M

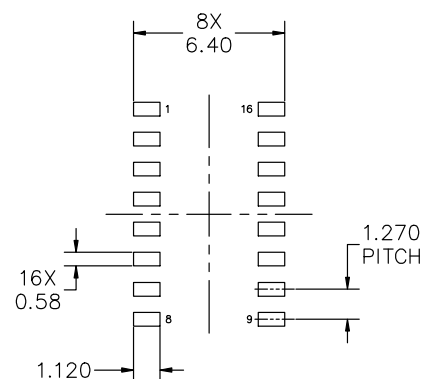
DATE 18 OCT 2024

NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 2018.
2. DIMENSION IN MILLIMETERS. ANGLE IN DEGREES.
3. DIMENSIONS D AND E1 DO NOT INCLUDE MOLD PROTRUSION.
4. MAXIMUM MOLD PROTRUSION 0.15mm PER SIDE.
5. DIMENSION b DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.127mm TOTAL IN EXCESS OF THE b DIMENSION AT MAXIMUM MATERIAL CONDITION.



MILLIMETERS			
DIM	MIN	NOM	MAX
A	1.35	1.55	1.75
A1	0.10	0.18	0.25
A2	1.25	1.37	1.50
b	0.35	0.42	0.49
c	0.19	0.22	0.25
D	9.90 BSC		
E	6.00 BSC		
E1	3.90 BSC		
e	1.27 BSC		
h	0.25	---	0.50
L	0.40	0.83	1.25
L1	1.05 REF		
θ	0°	---	7°
TOLERANCE OF FORM AND POSITION			
aaa	0.10		
bbb	0.20		
ccc	0.10		
ddd	0.25		
eee	0.10		



RECOMMENDED MOUNTING FOOTPRINT

*FOR ADDITIONAL INFORMATION ON OUR PB-FREE STRATEGY AND SOLDERING DETAILS, PLEASE DOWNLOAD THE onsemi SOLDERING AND MOUNTING TECHNIQUES REFERENCE MANUAL, SOLDERM/D

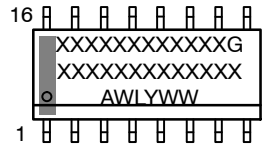
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SOIC-16 9.90x3.90x1.37 1.27P
CASE 751B
ISSUE M

DATE 18 OCT 2024

GENERIC
MARKING DIAGRAM*



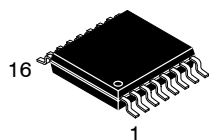
XXXXX = Specific Device Code
A = Assembly Location
WL = Wafer Lot
Y = Year
WW = Work Week
G = Pb-Free Package

*This information is generic. Please refer to device data sheet for actual part marking. Pb-Free indicator, “G” or microdot “▪”, may or may not be present. Some products may not follow the Generic Marking.

STYLE 1: PIN 1. COLLECTOR 2. BASE 3. EMITTER 4. NO CONNECTION 5. EMITTER 6. BASE 7. COLLECTOR 8. COLLECTOR 9. BASE 10. EMITTER 11. NO CONNECTION 12. EMITTER 13. BASE 14. COLLECTOR 15. EMITTER 16. COLLECTOR	STYLE 2: PIN 1. CATHODE 2. ANODE 3. NO CONNECTION 4. CATHODE 5. CATHODE 6. NO CONNECTION 7. ANODE 8. CATHODE 9. CATHODE 10. ANODE 11. NO CONNECTION 12. CATHODE 13. CATHODE 14. NO CONNECTION 15. ANODE 16. CATHODE	STYLE 3: PIN 1. COLLECTOR, DYE #1 2. BASE, #1 3. EMITTER, #1 4. COLLECTOR, #1 5. COLLECTOR, #2 6. BASE, #2 7. EMITTER, #2 8. COLLECTOR, #2 9. COLLECTOR, #3 10. BASE, #3 11. EMITTER, #3 12. COLLECTOR, #3 13. COLLECTOR, #4 14. BASE, #4 15. EMITTER, #4 16. COLLECTOR, #4	STYLE 4: PIN 1. COLLECTOR, DYE #1 2. COLLECTOR, #1 3. COLLECTOR, #2 4. COLLECTOR, #2 5. COLLECTOR, #3 6. COLLECTOR, #3 7. COLLECTOR, #4 8. COLLECTOR, #4 9. BASE, #4 10. EMITTER, #4 11. BASE, #3 12. EMITTER, #3 13. BASE, #2 14. EMITTER, #2 15. BASE, #1 16. EMITTER, #1
STYLE 5: PIN 1. DRAIN, DYE #1 2. DRAIN, #1 3. DRAIN, #2 4. DRAIN, #2 5. DRAIN, #3 6. DRAIN, #3 7. DRAIN, #4 8. DRAIN, #4 9. GATE, #4 10. SOURCE, #4 11. GATE, #3 12. SOURCE, #3 13. GATE, #2 14. SOURCE, #2 15. GATE, #1 16. SOURCE, #1	STYLE 6: PIN 1. CATHODE 2. CATHODE 3. CATHODE 4. CATHODE 5. CATHODE 6. CATHODE 7. CATHODE 8. CATHODE 9. ANODE 10. ANODE 11. ANODE 12. ANODE 13. ANODE 14. ANODE 15. ANODE 16. ANODE	STYLE 7: PIN 1. SOURCE N-CH 2. COMMON DRAIN (OUTPUT) 3. COMMON DRAIN (OUTPUT) 4. GATE P-CH 5. COMMON DRAIN (OUTPUT) 6. COMMON DRAIN (OUTPUT) 7. COMMON DRAIN (OUTPUT) 8. SOURCE P-CH 9. SOURCE P-CH 10. COMMON DRAIN (OUTPUT) 11. COMMON DRAIN (OUTPUT) 12. COMMON DRAIN (OUTPUT) 13. GATE N-CH 14. COMMON DRAIN (OUTPUT) 15. COMMON DRAIN (OUTPUT) 16. SOURCE N-CH	

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TSSOP-16 WB
CASE 948F
ISSUE B

DATE 19 OCT 2006



NOTES:

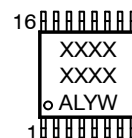
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DIMENSION A DOES NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS. MOLD FLASH OR GATE BURRS SHALL NOT EXCEED 0.15 (0.006) PER SIDE.
4. DIMENSION B DOES NOT INCLUDE INTERLEAD FLASH OR PROTRUSION. INTERLEAD FLASH OR PROTRUSION SHALL NOT EXCEED 0.25 (0.010) PER SIDE.
5. DIMENSION K DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.08 (0.003) TOTAL IN EXCESS OF THE K DIMENSION AT MAXIMUM MATERIAL CONDITION.
6. TERMINAL NUMBERS ARE SHOWN FOR REFERENCE ONLY.
7. DIMENSION A AND B ARE TO BE DETERMINED AT DATUM PLANE -W-.

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	4.90	5.10	0.193	0.200
B	4.30	4.50	0.169	0.177
C	---	1.20	---	0.047
D	0.05	0.15	0.002	0.006
F	0.50	0.75	0.020	0.030
G	0.65 BSC		0.026 BSC	
H	0.18	0.28	0.007	0.011
J	0.09	0.20	0.004	0.008
J1	0.09	0.16	0.004	0.006
K	0.19	0.30	0.007	0.012
K1	0.19	0.25	0.007	0.010
L	6.40 BSC		0.252 BSC	
M	0°	8°	0°	8°

RECOMMENDED
SOLDERING FOOTPRINT*



GENERIC
MARKING DIAGRAM*



XXXX = Specific Device Code
A = Assembly Location
L = Wafer Lot
Y = Year
W = Work Week
G or ■ = Pb-Free Package

*This information is generic. Please refer to device data sheet for actual part marking. Pb-Free indicator, "G" or microdot "■", may or may not be present. Some products may not follow the Generic Marking.

*For additional information on our Pb-Free strategy and soldering details, please download the onsemi Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

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