









SN54AHC138, SN74AHC138 SCLS258N - DECEMBER 1995 - REVISED JULY 2024

SNx4AHC138 3-Line to 8-Line Decoders/Demultiplexers

1 Features

- Operating range 2V to 5.5V V_{CC}
- Designed specifically for high-speed memory decoders and data-transmission systems
- Incorporate three enable inputs to simplify cascading and/or data reception
- Latch-up performance exceeds 250mA per JESD
- ESD protection exceeds JESD 22:
 - 2000V Human-Body Model (A114-A)
 - 1000V Charged-Device Model (C101)

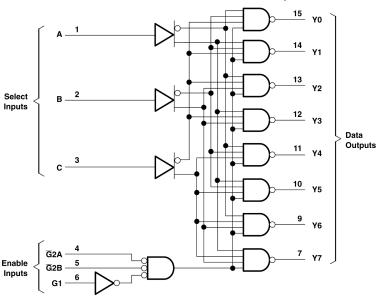
2 Description

SNx4AHC138 decoders/demultiplexers designed for high-performance memory-decoding and data-routing applications that require very short propagation-delay times. In high-performance memory systems, these decoders can be used to minimize the effects of system decoding. When employed with high-speed memories utilizing a fast enable circuit, the delay times of these decoders and the enable time of the memory usually are less than the typical access time of the memory. This means that the effective system delay introduced by the decoders is negligible.

Device Information

PART NUMBER	PACKAGE (1)	PACKAGE SIZE (2)	BODY SIZE (3)
SN74AHC138	RGY (VQFN, 16)	4mm x 3.5mm	4mm x 3.5mm
	N (PDIP, 16)	19.3mm × 9.4mm	19.32mm x 6.35 mm
	D (SOIC, 16)	9.9mm × 6mm	9.90mm x 3.90mm
	NS (SOP, 16)	10.2mm x 7.8mm	10.20mm x 5.30mm
	DB (SSOP, 16)	6.2mm × 7.8mm	6.20mm x 5.30mm
	PW (TSSOP, 16)	5mm × 6.4mm	5.00mm x 4.40mm
	DGV (TVSOP, 16)	3.6mm x 6.4mm	3.6mm x 4.4mm

- For more information, see Mechanical, Packaging, and Orderable Information.
- (2)The package size (length × width) is a nominal value and includes pins, where applicable.
- The body size (length × width) is a nominal value and does not include pins.



Logic Diagram (Positive Logic)



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3 Pin Configuration and Functions

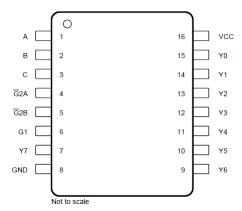


Figure 3-1. D, DB, DGV, N, NS, or PW Package, 16-Pin SOIC, SSOP, TVSOP, PDIP, SOP, or TSSOP (Top View)

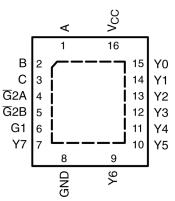
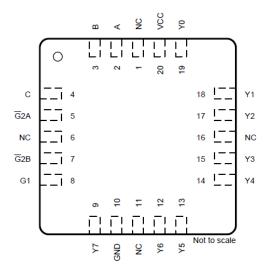


Figure 3-2. RGY Package, 16-Pin VQFN (Top View)



NC: No internal connection

Figure 3-3. FK Package, 20-Pin LCCC (Top View)



Table 3-1. Pin Functions

ı	PIN	TVDE(1)	DECORIDATION
NAME	NO.	TYPE ⁽¹⁾	DESCRIPTION
A ₀	1	I	Address select 0
A ₁	2	I	Address select 1
A ₂	3	I	Address select 2
Ḡ₀	4	I	Output strobe 0, active low
G ₁	5	I	Output strobe 1, active low
G ₂	6	I	Output strobe 2
Y ₇	7	0	Output 7
GND	8	G	Ground
Y ₆	9	0	Output 6
Y ₅	10	0	Output 5
Y ₄	11	0	Output 4
Y ₃	12	0	Output 3
Y ₂	13	0	Output 2
Y ₁	14	0	Output 1
Y ₀	15	0	Output 0
V _{CC}	16	Р	Positive supply
Thermal pa	ad ⁽²⁾		The thermal pad can be connected to GND or left floating. Do not connect to any other signal or supply.

⁽¹⁾ Signal Types: I = Input, O = Output, I/O = Input or Output, P = Power, G = Ground.

⁽²⁾ WBQB package only.



4 Specifications

4.1 Absolute Maximum Ratings

over operating free-air temperature range (unless otherwise noted)⁽¹⁾

			MIN	MAX	UNIT
V _{CC}	Supply voltage range		-0.5	7	V
V _I (2)	Input voltage range	-0.5	7	V	
V _O ⁽²⁾	Output voltage range	-0.5	V _{CC} + 0.5	V	
I _{IK}	Input clamp current	(V ₁ < 0)		-20	mA
I _{OK}	Output clamp current	$(V_O < 0 \text{ or } V_O > V_{CC})$		±20	mA
Io	Continuous output current	$(V_O = 0 \text{ to } V_{CC})$		±25	mA
	Continuous current through V _{CC} or GNI		±75	mA	
T _{stg}	Storage temperature range		-65	150	°C

⁽¹⁾ Stresses beyond those listed under "absolute maximum ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under "recommended operating conditions" is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

4.2 Recommended Operating Conditions

over operating free-air temperature range (unless otherwise noted)(1)

			SN54AH	C138	SN74AH	C138	UNIT	
			MIN	MAX	MIN	MAX	UNII	
V _{CC}	Supply voltage		2	5.5	2	5.5	V	
		V _{CC} = 2 V	1.5		1.5			
V _{IH}	High-level input voltage	V _{CC} = 3 V	2.1		2.1		V	
		V _{CC} = 5.5 V	3.85		3.85			
		V _{CC} = 2 V		0.5		0.5		
VIL	Low-level input voltage	V _{CC} = 3 V		0.9		0.9	V	
		V _{CC} = 5.5 V		1.65		1.65		
VI	Input voltage			0 5.5		0 5.5	V	
Vo	Output voltage		0	V_{CC}	0	V _{CC}	V	
		V _{CC} = 2 V		-50		-50	mA	
I _{OH}	High-level output current	$V_{CC} = 3.3 \text{ V} \pm 0.3 \text{ V}$		-4		-4	^	
V _I III V _O C		$V_{CC} = 5 V \pm 0.5 V$		-8		-8	mA	
		V _{CC} = 2 V		50		50	mA	
I _{OL}	Low-level output current	$V_{CC} = 3.3 \text{ V} \pm 0.3 \text{ V}$		4		4	m A	
		$V_{CC} = 5 V \pm 0.5 V$		8		8	mA	
A+/A>/	Innut transition rise or fall rate	$V_{CC} = 3.3 \text{ V} \pm 0.3 \text{ V}$		100		100	na/\/	
ΔυΔν	Input transition rise or fall rate	$V_{CC} = 5 V \pm 0.5 V$		20		20	ns/V	
T _A	Operating free-air temperature	<u>.</u>	-55	125	-40	85	°C	

⁽¹⁾ All unused inputs of the device must be held at V_{CC} or GND to ensure proper device operation. Refer to the TI application report, Implications of Slow or Floating CMOS Inputs, literature number SCBA004.

²⁾ The input and output voltage ratings may be exceeded if the input and output current ratings are observed.



4.3 Thermal Information

		SN74AHC138								
THERMAL METRIC(1)		D (SOIC)	DB (SSOP)	DGV (TVSOP)	N (PDIP)	NS (SOP)	PW (TSSOP)	RGY (VQFN)	UNIT	
						16				
R _{θJA}	Junction-to-ambient thermal resistance	93.8	82	120	67	64	135.9	39	°C/W	

For more information about traditional and new thermal metrics, see the Semiconductor and IC package thermal metrics application report.

4.4 Electrical Characteristics

over recommended operating free-air temperature range (unless otherwise noted)

PARAMETER	TEST CONDITIONS	V	T	= 25°C		SN54AH	IC138	SN74AH	C138	UNIT
PARAMETER	TEST CONDITIONS	V _{CC}	MIN	TYP	MAX	MIN	MAX	MIN	MAX	UNII
		2 V	1.9	2		1.9		1.9		
	I _{OH} = -50μA	3 V	2.9	3		2.9		2.9		
V _{OH}		4.5 V	4.4	4.5		4.4		4.4		V
	I _{OH} = -4 mA	3 V	2.58			2.48		2.48		
	I _{OH} = -8 mA	4.5 V	3.94			3.8		3.8		
		2 V		0.1			0.1		0.1	
	I _{OL} = 50μA	3 V		0.1			0.1		0.1	
V _{OL}		4.5 V		0.1			0.1		0.1	V
	I _{OL} = 4 mA	3 V		0.36			0.5		0.44	
	I _{OL} = 8 mA	4.5 V		0.36			0.5		0.44	
I _I	V _I = 5.5 V or GND	0 V to 5.5 V		±0.1			±1 ⁽¹⁾		±1	μA
Icc	$V_I = V_{CC}$ or GND, $I_O = 0$	5.5 V		4		40		40		μA
C _i	V _I = V _{CC} or GND	5 V	2	10					10	pF

⁽¹⁾ On products compliant to MIL-PRF-38535, this parameter is not production tested at V_{CC} = 0 V.

4.5 Switching Characteristics: $V_{CC} = 3.3V \pm 0.3V$

over recommended operating free-air temperature range, V_{CC} = 3.3V \pm 0.3V (unless otherwise noted) (see Load Circuit and Voltage Waveforms)

PARAMETER	FROM	то	LOAD	T	= 25°C		SN54Al	HC138	SN74AH	IC138	UNIT	
PARAMETER	(INPUT)	(OUTPUT)	CAPACITANCE	MIN	TYP	MAX	MIN	MAX	MIN	MAX	UNII	
t _{PLH}	A, B, C	Any Y	C ₁ = 15pF		8.2 ⁽¹⁾	11.4 ⁽¹⁾	1 ⁽¹⁾	13 ⁽¹⁾	1	13	ns	
t _{PHL}	А, В, С	Ally I	CL = 13pr		8.2 ⁽¹⁾	11.4 ⁽¹⁾	1 ⁽¹⁾	13 ⁽¹⁾	1	13	1115	
t _{PLH}	G1	Any Y	C _L = 15pF		8.1 ⁽¹⁾	12.8 ⁽¹⁾	1 ⁽¹⁾	15 ⁽¹⁾	1	15	ne	
t _{PHL}	01	Ally I	C _L = 15pr		8.1 ⁽¹⁾	12.8 ⁽¹⁾	1 ⁽¹⁾	15 ⁽¹⁾	1	15	ns	
t _{PLH}	G2A, G2B	Any Y	C ₁ = 15pF		8.2 ⁽¹⁾	11.4 ⁽¹⁾	1 ⁽¹⁾	13.5 ⁽¹⁾	1	13.5	ns	
t _{PHL}	GZA, GZB	Ally I	CL = 13pi		8.2 ⁽¹⁾	11.4 ⁽¹⁾	1 ⁽¹⁾	13.5 ⁽¹⁾	1	13.5	113	
t _{PLH}	A, B, C	Any Y	C ₁ = 50pF		10	15.8	1	18	1	18	ns l	
t _{PHL}	А, Б, С	Ally I	С[– 30рг		10	15.8	1	18	1	18		
t _{PLH}	- G1	Any Y	C ₁ = 50pF		10.6	16.3	1	18.5	1	18.5	20	
t _{PHL}	Gi	Ally f	CL - 50PF		10.6	16.3	1	18.5	1	18.5	ns	
t _{PLH}	G2A, G2B	Any Y	C ₁ = 50pF		10.7	14.9	1	17	1	17	ne	
t _{PHL}	GZA, GZB	Ally f	CL – Supr		10.7	14.9	1	17	1	17	ns	

⁽¹⁾ On products compliant to MIL-PRF-38535, this parameter is not production tested.

4.6 Switching Characteristics: $V_{CC} = 5V \pm 0.5V$

over recommended operating free-air temperature range, V_{CC} = 5V ± 0.5V (unless otherwise noted) (see Load Circuit and Voltage Waveforms)

voitage wave	1011113)											
	FROM	то	LOAD CAPACITAN CE	Т	T _A = 25°C		SN54AHC138		SN74AH	IC138		
PARAMETER	(INPUT)	(OUTPUT)		MIN	TYP	MAX	MIN	MAX	MIN	MAX	UNIT	
t _{PLH}	A, B, C	Any Y	C ₁ = 15pF		5.7 ⁽¹⁾	8.1 ⁽¹⁾	1 ⁽¹⁾	9.5 ⁽¹⁾	1	9.5	ns	
t _{PHL}	А, Б, С	Ally I	CL = 15pr		5.7 ⁽¹⁾	8.1 ⁽¹⁾	1 ⁽¹⁾	9.5 ⁽¹⁾	1	9.5	115	
t _{PLH}	G1	Any Y	C = 15pE		5.6 ⁽¹⁾	8.1 ⁽¹⁾	1 ⁽¹⁾	9.5 ⁽¹⁾	1	9.5	no	
t _{PHL}	Gi	Ally I	C _L = 15pF		5.6 ⁽¹⁾	8.1 ⁽¹⁾	1 ⁽¹⁾	9.5 ⁽¹⁾	1	9.5	ns	
t _{PLH}	G2A, G2B	Amy V	C _L = 15pF		5.8 ⁽¹⁾	8.1 ⁽¹⁾	1 ⁽¹⁾	9.5 ⁽¹⁾	1	9.5	ns	
t _{PHL}	GZA, GZB	Any Y			5.8 ⁽¹⁾	8.1 ⁽¹⁾	1 ⁽¹⁾	9.5 ⁽¹⁾	1	9.5		
t _{PLH}	A, B, C	Any V	C ₁ = 50pF		7.2	10.1	1	11.5	1	11.5	no	
t _{PHL}	А, Б, С	Any Y	CL = 50pr		7.2	10.1	1	11.5	1	11.5	ns	
t _{PLH}	G1	Amy V	C = 50pF		7.1	10.1	1	11.5	1	11.5		
t _{PHL}	GI	Any Y	C _L = 50pF		7.1	10.1	1	11.5	1	11.5	ns	
t _{PLH}	G2A, G2B	Any V	0 50 5		7.3	10.1	1	11.5	1	11.5	ns	
t _{PHL}	GZA, GZD	Any Y	$C_L = 50pF$		7.3	10.1	1	11.5	1	11.5		

⁽¹⁾ On products compliant to MIL-PRF-38535, this parameter is not production tested.

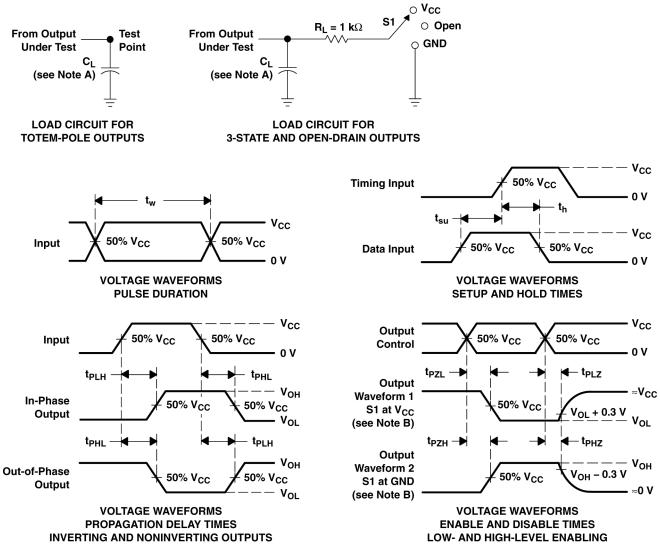
4.7 Operating Characteristics

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

	PARAMETER	TES	T CONDITIONS	TYP	UNIT
C_{pd}	Power dissipation capacitance	No load,	f = 1 MHz	13	pF



5 Parameter Measurement Information



- A. C_I includes probe and jig capacitance.
- B. Waveform 1 is for an output with internal conditions such that the output is low except when disabled by the output control. Waveform 2 is for an output with internal conditions such that the output is high except when disabled by the output control.
- C. All input pulses are supplied by generators having the following characteristics: PRR \leq 1 MHz, Z_{Ω} = 50 Ω , $t_r \leq$ 3 ns, $t_f \leq$ 3 ns.
- D. The outputs are measured one at a time with one input transition per measurement.
- E. All parameters and waveforms are not applicable to all devices.

Figure 5-1. Load Circuit and Voltage Waveforms

TEST	S1
t _{PLH} /t _{PHL}	Open
t _{PLZ} /t _{PZL}	V _{CC}
t _{PHZ} /t _{PZH}	GND
Open Drain	V _{CC}

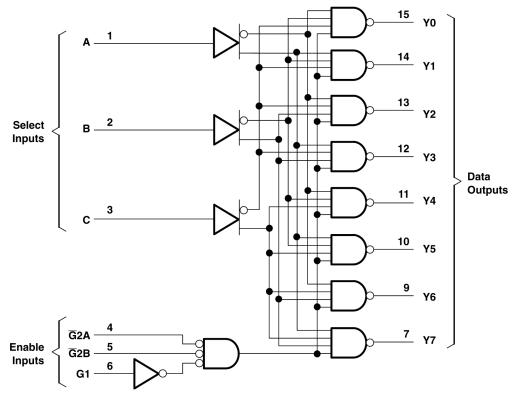
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6 Detailed Description

6.1 Overview

The conditions at the binary-select inputs and the three enable inputs select one of eight output lines. Two active-low and one active-high enable inputs reduce the need for external gates or inverters when expanding. A 24-line decoder can be implemented without external inverters, and a 32-line decoder requires only one inverter. An enable input can be used as a data input for demultiplexing applications.

6.2 Functional Block Diagram



Pin numbers shown are for the D, DB, DGV, J, N, NS, PW, RGY, and W packages.

6.3 Function Table

	ENABLE INPUT	rs	SEL	ECT INP	UTS	OUTPUTS							
G1	G2A	G2B	С	В	Α	Y0	Y1	Y2	Y3	Y4	Y5	Y6	Y7
Х	Н	Х	Х	Х	Х	Н	Н	Н	Н	Н	Н	Н	Н
Х	X	Н	Х	Х	Х	Н	Н	Н	Н	Н	Н	Н	Н
L	X	Х	Х	Х	Х	Н	Н	Н	Н	Н	Н	Н	Н
Н	L	L	L	L	L	L	Н	Н	Н	Н	Н	Н	Н
Н	L	L	L	L	Н	Н	L	Н	Н	Н	Н	Н	Н
Н	L	L	L	Н	L	Н	Н	L	Н	Н	Н	Н	Н
Н	L	L	L	Н	Н	Н	Н	Н	L	Н	Н	Н	Н
Н	L	L	Н	L	L	Н	Н	Н	Н	L	Н	Н	Н
Н	L	L	Н	L	Н	Н	Н	Н	Н	Н	L	Н	Н
Н	L	L	Н	Н	L	Н	Н	Н	Н	Н	Н	L	Н
Н	L	L	Н	Н	Н	Н	Н	Н	Н	Н	Н	Н	L



7 Application and Implementation

Note

Information in the following applications sections is not part of the TI component specification, and TI does not warrant its accuracy or completeness. TI's customers are responsible for determining suitability of components for their purposes, as well as validating and testing their design implementation to confirm system functionality.

7.1 Application Information

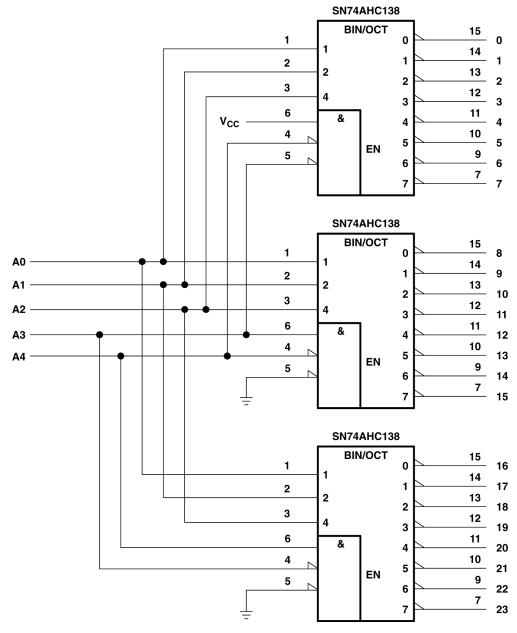


Figure 7-1. 24-Bit Decoding Scheme

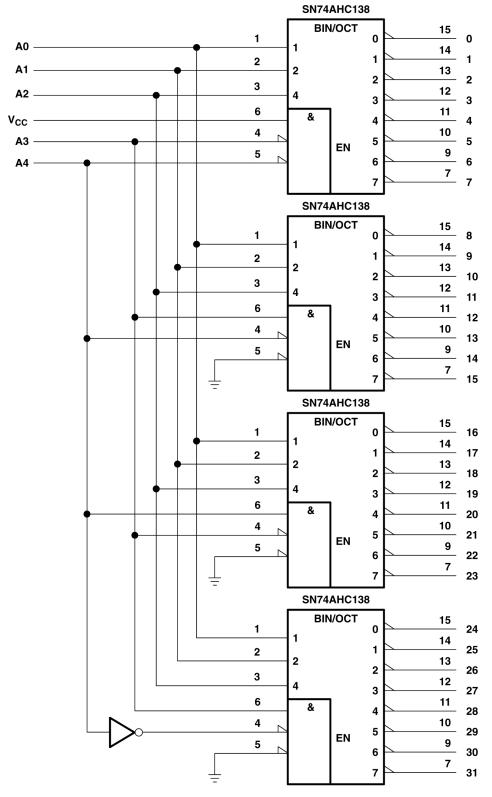


Figure 7-2. 32-Bit Decoding Scheme

7.2 Power Supply Recommendations

7.3 Layout

7.3.1 Layout Guidelines

When using multiple-input and multiple-channel logic devices, inputs must never be left floating. In many cases, functions or parts of functions of digital logic devices are unused; for example, when only two inputs of a triple-input AND gate are used or only 3 of the 4 buffer gates are used. Such unused input pins must not be left unconnected because the undefined voltages at the outside connections result in undefined operational states. All unused inputs of digital logic devices must be connected to a logic high or logic low voltage, as defined by the input voltage specifications, to prevent them from floating. The logic level that must be applied to any particular unused input depends on the function of the device. Generally, the inputs are tied to GND or V_{CC} , whichever makes more sense for the logic function or is more convenient.

7.3.2 Layout Example

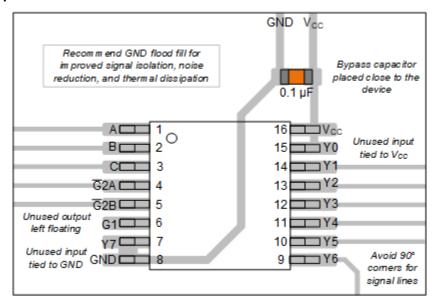


Figure 7-3. Example Layout for the SN74AHC138

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8 Device and Documentation Support

TI offers an extensive line of development tools. Tools and software to evaluate the performance of the device, generate code, and develop solutions are listed below.

8.1 Documentation Support (Analog)

8.1.1 Related Links

The table below lists quick access links. Categories include technical documents, support and community resources, tools and software, and quick access to sample or buy.

Table 8-1. Related Links

PARTS	PRODUCT FOLDER	SAMPLE & BUY	TECHNICAL DOCUMENTS	TOOLS & SOFTWARE	SUPPORT & COMMUNITY
SN54AHC138	Click here	Click here	Click here	Click here	Click here
SN74AHC138	Click here	Click here	Click here	Click here	Click here

8.2 Receiving Notification of Documentation Updates

To receive notification of documentation updates, navigate to the device product folder on ti.com. Click on *Notifications* to register and receive a weekly digest of any product information that has changed. For change details, review the revision history included in any revised document.

8.3 Support Resources

TI E2E™ support forums are an engineer's go-to source for fast, verified answers and design help — straight from the experts. Search existing answers or ask your own question to get the quick design help you need.

Linked content is provided "AS IS" by the respective contributors. They do not constitute TI specifications and do not necessarily reflect TI's views; see TI's Terms of Use.

8.4 Trademarks

TI E2E[™] is a trademark of Texas Instruments.

All trademarks are the property of their respective owners.

8.5 Electrostatic Discharge Caution



This integrated circuit can be damaged by ESD. Texas Instruments recommends that all integrated circuits be handled with appropriate precautions. Failure to observe proper handling and installation procedures can cause damage.

ESD damage can range from subtle performance degradation to complete device failure. Precision integrated circuits may be more susceptible to damage because very small parametric changes could cause the device not to meet its published specifications.

8.6 Glossary

TI Glossary

This glossary lists and explains terms, acronyms, and definitions.

9 Revision History

NOTE: Page numbers for previous revisions may differ from page numbers in the current version.

Changes from Revision M (April 2024) to Revision N (July 2024)

Page

Updated thermal values for D package from RθJA = 73 to 93.8, all values in °C/W6

Changes from Revision L (July 2003) to Revision M (April 2024)

Page

 Added Package Information table, Pin Functions table, ESD Ratings table, Thermal Information table, Device Functional Modes, Application and Implementation section, Device and Documentation Support section, and Mechanical, Packaging, and Orderable Information section



•	Removed references to machine model	1
•	Updated thermal values for PW package from RθJA = 108 to 135.9, all values in °C/W	6

10 Mechanical, Packaging, and Orderable Information

The following pages include mechanical, packaging, and orderable information. This information is the most current data available for the designated devices. This data is subject to change without notice and revision of this document. For browser-based versions of this data sheet, refer to the left-hand navigation.

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PACKAGING INFORMATION

Orderable part number	Status (1)	Material type (2)	Package Pins	Package qty Carrier	RoHS (3)	Lead finish/ Ball material	MSL rating/ Peak reflow	Op temp (°C)	Part marking (6)
5962-9851601Q2A	Active	Production	LCCC (FK) 20	55 TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	5962- 9851601Q2A SNJ54AHC 138FK
5962-9851601QEA	Active	Production	CDIP (J) 16	25 TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	5962-9851601QE A SNJ54AHC138J
5962-9851601QFA	Active	Production	CFP (W) 16	25 TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	5962-9851601QF A SNJ54AHC138W
SN74AHC138D	Obsolete	Production	SOIC (D) 16	-	-	Call TI	Call TI	-40 to 85	AHC138
SN74AHC138DBR	Active	Production	SSOP (DB) 16	2000 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	HA138
SN74AHC138DBR.A	Active	Production	SSOP (DB) 16	2000 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	HA138
SN74AHC138DGVR	Active	Production	TVSOP (DGV) 16	2000 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	HA138
SN74AHC138DGVR.A	Active	Production	TVSOP (DGV) 16	2000 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	HA138
SN74AHC138DR	Active	Production	SOIC (D) 16	2500 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	AHC138
SN74AHC138DR.A	Active	Production	SOIC (D) 16	2500 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	AHC138
SN74AHC138N	Active	Production	PDIP (N) 16	25 TUBE	Yes	NIPDAU	N/A for Pkg Type	-40 to 85	SN74AHC138N
SN74AHC138N.A	Active	Production	PDIP (N) 16	25 TUBE	Yes	NIPDAU	N/A for Pkg Type	-40 to 85	SN74AHC138N
SN74AHC138NSR	Active	Production	SOP (NS) 16	2000 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	AHC138
SN74AHC138NSR.A	Active	Production	SOP (NS) 16	2000 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	AHC138
SN74AHC138PW	Obsolete	Production	TSSOP (PW) 16	-	-	Call TI	Call TI	-40 to 85	HA138
SN74AHC138PWR	Active	Production	TSSOP (PW) 16	2000 LARGE T&R	Yes	NIPDAU SN	Level-1-260C-UNLIM	-40 to 85	HA138
SN74AHC138PWR.A	Active	Production	TSSOP (PW) 16	2000 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	HA138
SN74AHC138RGYR	Active	Production	VQFN (RGY) 16	3000 LARGE T&R	Yes	NIPDAU	Level-2-260C-1 YEAR	-40 to 85	HA138
SN74AHC138RGYR.A	Active	Production	VQFN (RGY) 16	3000 LARGE T&R	Yes	NIPDAU	Level-2-260C-1 YEAR	-40 to 85	HA138
SNJ54AHC138FK	Active	Production	LCCC (FK) 20	55 TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	5962- 9851601Q2A SNJ54AHC 138FK



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Orderable part number	Status (1)	Material type	Package Pins	Package qty Carrier	RoHS (3)	Lead finish/ Ball material	MSL rating/ Peak reflow	Op temp (°C)	Part marking (6)
SNJ54AHC138FK.A	Active	Production	LCCC (FK) 20	55 TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	5962- 9851601Q2A SNJ54AHC 138FK
SNJ54AHC138J	Active	Production	CDIP (J) 16	25 TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	5962-9851601QE A SNJ54AHC138J
SNJ54AHC138J.A	Active	Production	CDIP (J) 16	25 TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	5962-9851601QE A SNJ54AHC138J
SNJ54AHC138W	Active	Production	CFP (W) 16	25 TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	5962-9851601QF A SNJ54AHC138W
SNJ54AHC138W.A	Active	Production	CFP (W) 16	25 TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	5962-9851601QF A SNJ54AHC138W

⁽¹⁾ Status: For more details on status, see our product life cycle.

Multiple part markings will be inside parentheses. Only one part marking contained in parentheses and separated by a "~" will appear on a part. If a line is indented then it is a continuation of the previous line and the two combined represent the entire part marking for that device.

⁽²⁾ Material type: When designated, preproduction parts are prototypes/experimental devices, and are not yet approved or released for full production. Testing and final process, including without limitation quality assurance, reliability performance testing, and/or process qualification, may not yet be complete, and this item is subject to further changes or possible discontinuation. If available for ordering, purchases will be subject to an additional waiver at checkout, and are intended for early internal evaluation purposes only. These items are sold without warranties of any kind.

⁽³⁾ RoHS values: Yes, No, RoHS Exempt. See the TI RoHS Statement for additional information and value definition.

⁽⁴⁾ Lead finish/Ball material: Parts may have multiple material finish options. Finish options are separated by a vertical ruled line. Lead finish/Ball material values may wrap to two lines if the finish value exceeds the maximum column width.

⁽⁵⁾ MSL rating/Peak reflow: The moisture sensitivity level ratings and peak solder (reflow) temperatures. In the event that a part has multiple moisture sensitivity ratings, only the lowest level per JEDEC standards is shown. Refer to the shipping label for the actual reflow temperature that will be used to mount the part to the printed circuit board.

⁽⁶⁾ Part marking: There may be an additional marking, which relates to the logo, the lot trace code information, or the environmental category of the part.

PACKAGE OPTION ADDENDUM

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OTHER QUALIFIED VERSIONS OF SN54AHC138, SN74AHC138:

Catalog: SN74AHC138

Automotive: SN74AHC138-Q1, SN74AHC138-Q1

Military: SN54AHC138

NOTE: Qualified Version Definitions:

Catalog - TI's standard catalog product

Automotive - Q100 devices qualified for high-reliability automotive applications targeting zero defects

Military - QML certified for Military and Defense Applications



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TAPE AND REEL INFORMATION





4.0	TS
A0	Dimension designed to accommodate the component width
B0	Dimension designed to accommodate the component length
K0	Dimension designed to accommodate the component thickness
W	Overall width of the carrier tape
P1	Pitch between successive cavity centers

QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE



*All dimensions are nominal

Device	Package Type	Package Drawing		SPQ	Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
SN74AHC138DBR	SSOP	DB	16	2000	330.0	16.4	8.35	6.6	2.4	12.0	16.0	Q1
SN74AHC138DGVR	TVSOP	DGV	16	2000	330.0	12.4	6.8	4.0	1.6	8.0	12.0	Q1
SN74AHC138DR	SOIC	D	16	2500	330.0	16.4	6.5	10.3	2.1	8.0	16.0	Q1
SN74AHC138DR	SOIC	D	16	2500	330.0	12.4	3.75	3.75	1.15	8.0	12.0	Q1
SN74AHC138NSR	SOP	NS	16	2000	330.0	16.4	8.1	10.4	2.5	12.0	16.0	Q1
SN74AHC138PWR	TSSOP	PW	16	2000	330.0	12.4	6.9	5.6	1.6	8.0	12.0	Q1
SN74AHC138RGYR	VQFN	RGY	16	3000	330.0	12.4	3.8	4.3	1.5	8.0	12.0	Q1



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*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
SN74AHC138DBR	SSOP	DB	16	2000	353.0	353.0	32.0
SN74AHC138DGVR	TVSOP	DGV	16	2000	353.0	353.0	32.0
SN74AHC138DR	SOIC	D	16	2500	353.0	353.0	32.0
SN74AHC138DR	SOIC	D	16	2500	340.5	336.1	32.0
SN74AHC138NSR	SOP	NS	16	2000	353.0	353.0	32.0
SN74AHC138PWR	TSSOP	PW	16	2000	353.0	353.0	32.0
SN74AHC138RGYR	VQFN	RGY	16	3000	353.0	353.0	32.0



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TUBE



*All dimensions are nominal

Device	Package Name	Package Type	Pins	SPQ	L (mm)	W (mm)	T (µm)	B (mm)
5962-9851601Q2A	FK	LCCC	20	55	506.98	12.06	2030	NA
5962-9851601QFA	W	CFP	16	25	506.98	26.16	6220	NA
SN74AHC138N	N	PDIP	16	25	506	13.97	11230	4.32
SN74AHC138N	N	PDIP	16	25	506	13.97	11230	4.32
SN74AHC138N.A	N	PDIP	16	25	506	13.97	11230	4.32
SN74AHC138N.A	N	PDIP	16	25	506	13.97	11230	4.32
SNJ54AHC138FK	FK	LCCC	20	55	506.98	12.06	2030	NA
SNJ54AHC138FK.A	FK	LCCC	20	55	506.98	12.06	2030	NA
SNJ54AHC138W	W	CFP	16	25	506.98	26.16	6220	NA
SNJ54AHC138W.A	W	CFP	16	25	506.98	26.16	6220	NA



SOP



- 1. All linear dimensions are in millimeters. Dimensions in parenthesis are for reference only. Dimensioning and tolerancing
- per ASME Y14.5M.

 2. This drawing is subject to change without notice.

 3. This dimension does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0.15 mm, per side.
- 4. This dimension does not include interlead flash. Interlead flash shall not exceed 0.25 mm, per side.



SOF



NOTES: (continued)

- 5. Publication IPC-7351 may have alternate designs.
- 6. Solder mask tolerances between and around signal pads can vary based on board fabrication site.



SOF



NOTES: (continued)

- 7. Laser cutting apertures with trapezoidal walls and rounded corners may offer better paste release. IPC-7525 may have alternate design recommendations.
- 8. Board assembly site may have different recommendations for stencil design.



D (R-PDS0-G16)

PLASTIC SMALL OUTLINE



- A. All linear dimensions are in inches (millimeters).
- B. This drawing is subject to change without notice.
- Body length does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0.006 (0,15) each side.
- Body width does not include interlead flash. Interlead flash shall not exceed 0.017 (0,43) each side.
- E. Reference JEDEC MS-012 variation AC.







- 1. All linear dimensions are in millimeters. Any dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.

 2. This drawing is subject to change without notice.

 3. This dimension does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not
- exceed 0.15 mm per side.
 4. Reference JEDEC registration MO-150.





NOTES: (continued)

- 5. Publication IPC-7351 may have alternate designs.
- 6. Solder mask tolerances between and around signal pads can vary based on board fabrication site.





NOTES: (continued)

- 7. Laser cutting apertures with trapezoidal walls and rounded corners may offer better paste release. IPC-7525 may have alternate design recommendations.
- 8. Board assembly site may have different recommendations for stencil design.



DGV (R-PDSO-G**)

24 PINS SHOWN

PLASTIC SMALL-OUTLINE



NOTES: A. All linear dimensions are in millimeters.

B. This drawing is subject to change without notice.

C. Body dimensions do not include mold flash or protrusion, not to exceed 0,15 per side.

D. Falls within JEDEC: 24/48 Pins – MO-153 14/16/20/56 Pins – MO-194

W (R-GDFP-F16)

CERAMIC DUAL FLATPACK



- A. All linear dimensions are in inches (millimeters).
- B. This drawing is subject to change without notice.
- C. This package can be hermetically sealed with a ceramic lid using glass frit.
- D. Index point is provided on cap for terminal identification only.
- E. Falls within MIL STD 1835 GDFP2-F16



8.89 x 8.89, 1.27 mm pitch

LEADLESS CERAMIC CHIP CARRIER

This image is a representation of the package family, actual package may vary. Refer to the product data sheet for package details.



INSTRUMENTS www.ti.com

14 LEADS SHOWN



- A. All linear dimensions are in inches (millimeters).
- B. This drawing is subject to change without notice.
- C. This package is hermetically sealed with a ceramic lid using glass frit.
- D. Index point is provided on cap for terminal identification only on press ceramic glass frit seal only.
- E. Falls within MIL STD 1835 GDIP1-T14, GDIP1-T16, GDIP1-T18 and GDIP1-T20.





- 1. All linear dimensions are in millimeters. Any dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.

 2. This drawing is subject to change without notice.

 3. This dimension does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not
- exceed 0.15 mm per side.
- 4. This dimension does not include interlead flash. Interlead flash shall not exceed 0.25 mm per side.
- 5. Reference JEDEC registration MO-153.





NOTES: (continued)

- 6. Publication IPC-7351 may have alternate designs.
- 7. Solder mask tolerances between and around signal pads can vary based on board fabrication site.





NOTES: (continued)

- 8. Laser cutting apertures with trapezoidal walls and rounded corners may offer better paste release. IPC-7525 may have alternate design recommendations.
- 9. Board assembly site may have different recommendations for stencil design.



N (R-PDIP-T**)

PLASTIC DUAL-IN-LINE PACKAGE

16 PINS SHOWN



- A. All linear dimensions are in inches (millimeters).
- B. This drawing is subject to change without notice.
- Falls within JEDEC MS-001, except 18 and 20 pin minimum body length (Dim A).
- The 20 pin end lead shoulder width is a vendor option, either half or full width.





NOTES: A. All linear dimensions are in millimeters. Dimensioning and tolerancing per ASME Y14.5M-1994.

- B. This drawing is subject to change without notice.
- C. QFN (Quad Flatpack No-Lead) package configuration.
- D. The package thermal pad must be soldered to the board for thermal and mechanical performance.
- E. See the additional figure in the Product Data Sheet for details regarding the exposed thermal pad features and dimensions.
- Pin 1 identifiers are located on both top and bottom of the package and within the zone indicated. The Pin 1 identifiers are either a molded, marked, or metal feature.
- G. Package complies to JEDEC MO-241 variation BA.



RGY (R-PVQFN-N16)

PLASTIC QUAD FLATPACK NO-LEAD

THERMAL INFORMATION

This package incorporates an exposed thermal pad that is designed to be attached directly to an external heatsink. The thermal pad must be soldered directly to the printed circuit board (PCB). After soldering, the PCB can be used as a heatsink. In addition, through the use of thermal vias, the thermal pad can be attached directly to the appropriate copper plane shown in the electrical schematic for the device, or alternatively, can be attached to a special heatsink structure designed into the PCB. This design optimizes the heat transfer from the integrated circuit (IC).

For information on the Quad Flatpack No-Lead (QFN) package and its advantages, refer to Application Report, QFN/SON PCB Attachment, Texas Instruments Literature No. SLUA271. This document is available at www.ti.com.

The exposed thermal pad dimensions for this package are shown in the following illustration.



Bottom View

Exposed Thermal Pad Dimensions

4206353-3/P 03/14

NOTE: All linear dimensions are in millimeters



RGY (R-PVQFN-N16)

PLASTIC QUAD FLATPACK NO-LEAD



- A. All linear dimensions are in millimeters.
- B. This drawing is subject to change without notice.
- C. Publication IPC-7351 is recommended for alternate designs.
- D. This package is designed to be soldered to a thermal pad on the board. Refer to Application Note, Quad Flat—Pack QFN/SON PCB Attachment, Texas Instruments Literature No. SLUA271, and also the Product Data Sheets for specific thermal information, via requirements, and recommended board layout. These documents are available at www.ti.com http://www.ti.com.
- E. Laser cutting apertures with trapezoidal walls and also rounding corners will offer better paste release. Customers should contact their board assembly site for stencil design recommendations. Refer to IPC 7525 for stencil design considerations.
- F. Customers should contact their board fabrication site for minimum solder mask web tolerances between signal pads.



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