SN5438, SN54LS38, SN54S38
SN7438, SN74LS38, SN74S38
QUADRUPLE 2-INPUT POSITIVE-NAND BUFFERS WITH OPEN-COLLECTOR OUTPUTS

SDLS105 – DECEMBER 1983 – REVISED MARCH 1988

- **Package Options Include Plastic "Small Outline" Packages, Ceramic Chip Carriers and Flat Packages, and Plastic and Ceramic DIPs**
- **Dependable Texas Instruments Quality and Reliability**

description

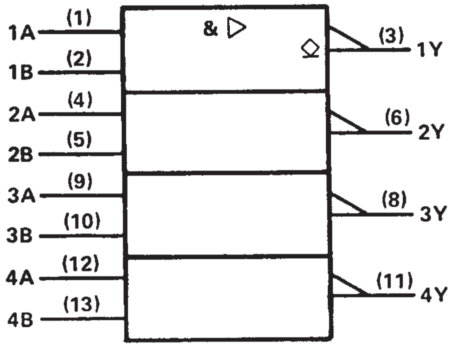
These devices contain four independent 2-input NAND buffer gates with open-collector outputs. The open-collector outputs require pull-up resistors to perform correctly. They may be connected to other open-collector outputs to implement active-low wired-OR or active-high wired-AND functions. Open-collector devices are often used to generate high V_{OH} levels.

The SN5438, SN54LS38, and SN54S38 are characterized for operation over the full military temperature range of −55°C to 125°C. The SN7438, SN74LS38, and SN74S38 are characterized for operation from 0°C to 70°C.

FUNCTION TABLE (each gate)

INPUTS		OUTPUT
A	B	Y
H	H	L
L	X	H
X	L	H

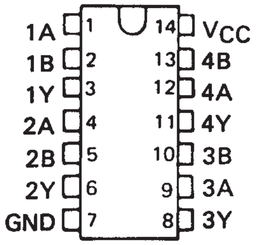
logic symbol†



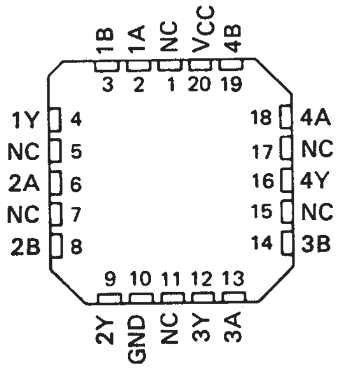
† This symbol is in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.

Pin numbers shown are for D, J, N, and W packages.

SN5438, SN54LS38, SN54S38 . . . J OR W PACKAGE
SN7438 . . . N PACKAGE
SN74LS38, SN74S38 . . . D OR N PACKAGE
(TOP VIEW)

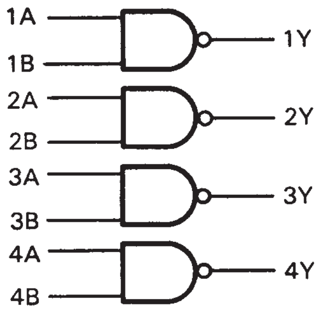


SN54LS38, SN54S38 . . . FK PACKAGE
(TOP VIEW)



NC – No internal connection

logic diagram

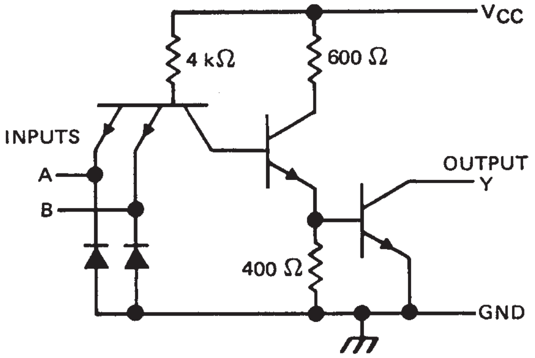


positive logic

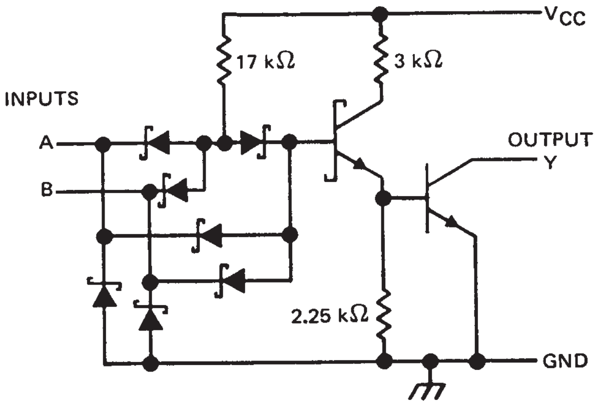
$$Y = \overline{A \cdot B} \text{ or } Y = \overline{A} + \overline{B}$$

schematics (each gate)

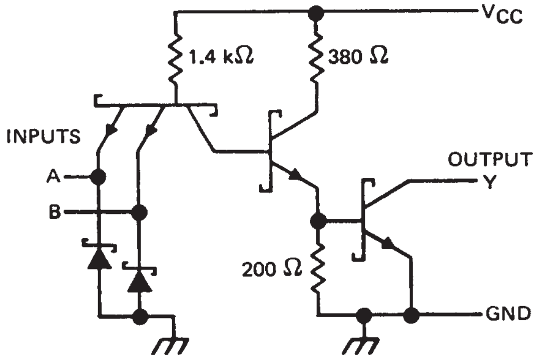
'38



'LS38



'S38



Resistor values shown are nominal.

absolute maximum ratings over operating free-air temperature (unless otherwise noted)

Supply voltage, V_{CC} (see Note 1)	7 V
Input voltage: '38	5.5 V
LS38	7 V
Off-state output voltage	7 V
Operating free-air temperature range: SN54'	– 55°C to 125°C
SN74'	0°C to 70°C
Storage temperature range	– 65°C to 150°C

NOTE 1: Voltage values are with respect to network ground terminal.

recommended operating conditions

		SN5438			SN7438			UNIT
		MIN	NOM	MAX	MIN	NOM	MAX	
V_{CC}	Supply voltage	4.5	5	5.5	4.75	5	5.25	V
V_{IH}	High-level input voltage	2			2			V
V_{IL}	Low-level input voltage			0.8			0.8	V
V_{OH}	High-level output voltage			5.5			5.5	V
I_{OL}	Low-level output current			48			48	mA
T_A	Operating free-air temperature	– 55		125	0		70	°C

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

PARAMETER	TEST CONDITIONS†	SN5438			SN7438			UNIT
		MIN	TYP‡	MAX	MIN	TYP‡	MAX	
V_{IK}	V_{CC} = MIN, I_I = – 12 mA			– 1.5			– 1.5	V
I_{OH}	V_{CC} = MIN, V_{IL} = 0.8 V, V_{OH} = 5.5 V						0.25	mA
	V_{CC} = MIN, V_{IL} = 0.7 V, V_{OH} = 5.5 V			0.25				
V_{OL}	V_{CC} = MIN, V_{IH} = 2 V, I_{OL} = 16 mA			0.4			0.4	V
I_I	V_{CC} = MAX, V_I = 5.5 V			1			1	mA
I_{IH}	V_{CC} = MAX, V_I = 2.4 V			40			40	μA
I_{IL}	V_{CC} = MAX, V_I = 0.4 V			– 1.6			– 1.6	mA
I_{CCH}	V_{CC} = MAX, V_I = 0		5	8.5		5	8.5	mA
I_{CCL}	V_{CC} = MAX, V_I = 4.5 V		34	54		34	54	mA

† For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions.
‡ All typical values are at V_{CC} = 5 V, T_A = 25 °C.

switching characteristics, V_{CC} = 5 V, T_A = 25°C (see note 2)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	TEST CONDITIONS	MIN	TYP	MAX	UNIT
t_{PLH}	A or B	Y	R_L = 133 Ω, C_L = 45 pF		14	22	ns
t_{PHL}					11	18	ns

NOTE 2: Load circuits and voltage waveforms are shown in Section 1.

recommended operating conditions

		SN54LS38			SN74LS38			UNIT
		MIN	NOM	MAX	MIN	NOM	MAX	
V_{CC}	Supply voltage	4.5	5	5.5	4.75	5	5.25	V
V_{IH}	High-level input voltage	2			2			V
V_{IL}	Low-level input voltage			0.7			0.8	V
V_{OH}	High-level output voltage			5.5			5.5	V
I_{OL}	Low-level output current			12			24	mA
T_A	Operating free-air temperature	– 55		125	0		70	°C

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

PARAMETER	TEST CONDITIONS†	SN54LS38			SN74LS38			UNIT
		MIN	TYP‡	MAX	MIN	TYP‡	MAX	
V_{IK}	V_{CC} = MIN, I_I = – 18 mA			– 1.5			– 1.5	V
I_{OH}	V_{CC} = MIN, V_{IL} = MAX, V_{OH} = 5.5 V			0.25			0.25	mA
V_{OL}	V_{CC} = MIN, V_{IH} = 2 V, I_{OL} = 12 mA		0.25	0.4		0.25	0.4	V
	V_{CC} = MIN, V_{IH} = 2 V, I_{OL} = 24 mA					0.35	0.5	
I_I	V_{CC} = MAX, V_I = 7 V			0.1			0.1	mA
I_{IH}	V_{CC} = MAX, V_I = 2.7 V			20			20	µA
I_{IL}	V_{CC} = MAX, V_I = 0.4 V			– 0.4			– 0.4	mA
I_{CCH}	V_{CC} = MAX, V_I = 0		0.9	2		0.9	2	mA
I_{CCL}	V_{CC} = MAX, V_I = 4.5 V		6	12		6	12	mA

† For conditons shown as MIN or MAX, use the appropriate value specified under recommended operating conditions.
‡ All typical values are at V_{CC} = 5 V, T_A = 25°C.

switching characteristics, V_{CC} = 5 V, T_A = 25°C (see note 2)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	TEST CONDITIONS	MIN	TYP	MAX	UNIT
t_{PLH}	A or B	Y	R_L = 667 Ω, C_L = 45 pF		20	32	ns
t_{PHL}					18	28	ns

NOTE 2: Load circuits and voltage waveforms are shown in Section 1.

recommended operating conditions

		SN54S38			SN74S38			UNIT
		MIN	NOM	MAX	MIN	NOM	MAX	
V_{CC}	Supply voltage	4.5	5	5.5	4.75	5	5.25	V
V_{IH}	High-level input voltage	2			2			V
V_{IL}	Low-level input voltage			0.8			0.8	V
V_{OH}	High-level output voltage			5.5			5.5	V
I_{OL}	Low-level output current			60			60	mA
T_A	Operating free-air temperature	– 55		125	0		70	°C

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

PARAMETER	TEST CONDITIONS†	SN54S38			SN74S38			UNIT
		MIN	TYP‡	MAX	MIN	TYP‡	MAX	
V_{IK}	V_{CC} = MIN, I_I = – 18 mA			– 1.2			– 1.2	V
I_{OH}	V_{CC} = MIN, V_{IL} = 0.8 V, V_{OH} = 5.5 V						0.25	mA
	V_{CC} = MIN, V_{IL} = 0.7 V, V_{OH} = 5.5 V			0.25				
V_{OL}	V_{CC} = MIN, V_{IH} = 2 V, I_{OL} = 60 mA			0.5			0.5	V
I_I	V_{CC} = MAX, V_I = 5.5 V			1			1	mA
I_{IH}	V_{CC} = MAX, V_I = 2.4 V			0.1			0.1	mA
I_{IL}	V_{CC} = MAX, V_I = 0.5 V			– 4			– 4	mA
I_{CCH}	V_{CC} = MAX, V_I = 0		20	36		20	36	mA
I_{CCL}	V_{CC} = MAX, V_I = 4.5 V		46	80		46	80	mA

† For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions.

‡ All typical values are at V_{CC} = 5 V, T_A = 25°C.

switching characteristics, V_{CC} = 5 V, T_A = 25°C (see note 2)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	TEST CONDITIONS		MIN	TYP	MAX	UNIT
t_{PLH}	A or B	Y	R_L = 93 Ω,	C_L = 50 pF		6.5	10	ns
t_{PHL}						6.5	10	ns
t_{PLH}			R_L = 93 Ω,	C_L = 150 pF		9		ns
t_{PHL}						8.5		ns

NOTE 2: Load circuits and voltage waveforms are shown in Section 1.

PACKAGING INFORMATION

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead finish/ Ball material (6)	MSL Peak Temp (3)	Op Temp (°C)	Device Marking (4/5)	Samples
JM38510/00303BCA	ACTIVE	CDIP	J	14	25	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	JM38510/ 00303BCA	Samples
JM38510/30203B2A	ACTIVE	LCCC	FK	20	55	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	JM38510/ 30203B2A	Samples
JM38510/30203B2A	ACTIVE	LCCC	FK	20	55	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	JM38510/ 30203B2A	Samples
JM38510/30203BDA	ACTIVE	CFP	W	14	25	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	JM38510/ 30203BDA	Samples
JM38510/30203BDA	ACTIVE	CFP	W	14	25	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	JM38510/ 30203BDA	Samples
M38510/00303BCA	ACTIVE	CDIP	J	14	25	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	JM38510/ 00303BCA	Samples
M38510/00303BCA	ACTIVE	CDIP	J	14	25	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	JM38510/ 00303BCA	Samples
M38510/30203B2A	ACTIVE	LCCC	FK	20	55	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	JM38510/ 30203B2A	Samples
M38510/30203B2A	ACTIVE	LCCC	FK	20	55	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	JM38510/ 30203B2A	Samples
M38510/30203BDA	ACTIVE	CFP	W	14	25	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	JM38510/ 30203BDA	Samples
M38510/30203BDA	ACTIVE	CFP	W	14	25	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	JM38510/ 30203BDA	Samples
SN5438J	ACTIVE	CDIP	J	14	25	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	SN5438J	Samples
SN5438J	ACTIVE	CDIP	J	14	25	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	SN5438J	Samples
SN54S38J	ACTIVE	CDIP	J	14	25	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	SN54S38J	Samples
SN54S38J	ACTIVE	CDIP	J	14	25	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	SN54S38J	Samples
SN7438D	OBSOLETE	SOIC	D	14		TBD	Call TI	Call TI	0 to 70	7438	
SN7438D	OBSOLETE	SOIC	D	14		TBD	Call TI	Call TI	0 to 70	7438	

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead finish/ Ball material (6)	MSL Peak Temp (3)	Op Temp (°C)	Device Marking (4/5)	Samples
SN7438DR	ACTIVE	SOIC	D	14	2500	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	0 to 70	7438	Samples
SN7438DR	ACTIVE	SOIC	D	14	2500	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	0 to 70	7438	Samples
SN7438N	ACTIVE	PDIP	N	14	25	RoHS & Green	NIPDAU	N / A for Pkg Type	0 to 70	SN7438N	Samples
SN7438N	ACTIVE	PDIP	N	14	25	RoHS & Green	NIPDAU	N / A for Pkg Type	0 to 70	SN7438N	Samples
SN7438NSR	ACTIVE	SOP	NS	14	2000	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	0 to 70	SN7438	Samples
SN7438NSR	ACTIVE	SOP	NS	14	2000	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	0 to 70	SN7438	Samples
SN74LS38D	OBSOLETE	SOIC	D	14		TBD	Call TI	Call TI	0 to 70	LS38	
SN74LS38D	OBSOLETE	SOIC	D	14		TBD	Call TI	Call TI	0 to 70	LS38	
SN74LS38DBR	ACTIVE	SSOP	DB	14	2000	RoHS & Green	NIPDAU	Level-1-260C-UNLIM		LS38	Samples
SN74LS38DBR	ACTIVE	SSOP	DB	14	2000	RoHS & Green	NIPDAU	Level-1-260C-UNLIM		LS38	Samples
SN74LS38DR	ACTIVE	SOIC	D	14	2500	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	0 to 70	LS38	Samples
SN74LS38DR	ACTIVE	SOIC	D	14	2500	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	0 to 70	LS38	Samples
SN74LS38N	ACTIVE	PDIP	N	14	25	RoHS & Green	NIPDAU	N / A for Pkg Type	0 to 70	SN74LS38N	Samples
SN74LS38N	ACTIVE	PDIP	N	14	25	RoHS & Green	NIPDAU	N / A for Pkg Type	0 to 70	SN74LS38N	Samples
SN74LS38NE4	ACTIVE	PDIP	N	14	25	RoHS & Green	NIPDAU	N / A for Pkg Type	0 to 70	SN74LS38N	Samples
SN74LS38NE4	ACTIVE	PDIP	N	14	25	RoHS & Green	NIPDAU	N / A for Pkg Type	0 to 70	SN74LS38N	Samples
SN74LS38NSR	ACTIVE	SOP	NS	14	2000	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	0 to 70	74LS38	Samples
SN74LS38NSR	ACTIVE	SOP	NS	14	2000	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	0 to 70	74LS38	Samples
SN74S38D	OBSOLETE	SOIC	D	14		TBD	Call TI	Call TI	0 to 70	S38	
SN74S38D	OBSOLETE	SOIC	D	14		TBD	Call TI	Call TI	0 to 70	S38	
SN74S38DR	ACTIVE	SOIC	D	14	2500	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	0 to 70	S38	Samples
SN74S38DR	ACTIVE	SOIC	D	14	2500	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	0 to 70	S38	Samples

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead finish/ Ball material (6)	MSL Peak Temp (3)	Op Temp (°C)	Device Marking (4/5)	Samples
SN74S38N	ACTIVE	PDIP	N	14	25	RoHS & Green	NIPDAU	N / A for Pkg Type	0 to 70	SN74S38N	Samples
SN74S38N	ACTIVE	PDIP	N	14	25	RoHS & Green	NIPDAU	N / A for Pkg Type	0 to 70	SN74S38N	Samples
SN74S38NSR	ACTIVE	SOP	NS	14	2000	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	0 to 70	74S38	Samples
SN74S38NSR	ACTIVE	SOP	NS	14	2000	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	0 to 70	74S38	Samples
SNJ5438J	ACTIVE	CDIP	J	14	25	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	SNJ5438J	Samples
SNJ5438J	ACTIVE	CDIP	J	14	25	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	SNJ5438J	Samples
SNJ5438W	ACTIVE	CFP	W	14	25	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	SNJ5438W	Samples
SNJ5438W	ACTIVE	CFP	W	14	25	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	SNJ5438W	Samples
SNJ54LS38FK	ACTIVE	LCCC	FK	20	55	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	SNJ54LS 38FK	Samples
SNJ54LS38FK	ACTIVE	LCCC	FK	20	55	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	SNJ54LS 38FK	Samples
SNJ54S38FK	ACTIVE	LCCC	FK	20	55	Non-RoHS & Non-Green	SNPB	N / A for Pkg Type	-55 to 125	SNJ54S 38FK	Samples
SNJ54S38FK	ACTIVE	LCCC	FK	20	55	Non-RoHS & Non-Green	SNPB	N / A for Pkg Type	-55 to 125	SNJ54S 38FK	Samples
SNJ54S38J	ACTIVE	CDIP	J	14	25	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	SNJ54S38J	Samples
SNJ54S38J	ACTIVE	CDIP	J	14	25	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	SNJ54S38J	Samples
SNJ54S38W	ACTIVE	CFP	W	14	25	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	SNJ54S38W	Samples
SNJ54S38W	ACTIVE	CFP	W	14	25	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	SNJ54S38W	Samples

[1] The marketing status values are defined as follows:
ACTIVE: Product device recommended for new designs.
LIFEBUY: TI has announced that the device will be discontinued, and a lifetime-buy period is in effect.
NRND: Not recommended for new designs. Device is in production to support existing customers, but TI does not recommend using this part in a new design.
PREVIEW: Device has been announced but is not in production. Samples may or may not be available.

OBSOLETE: TI has discontinued the production of the device.

[2] **RoHS:** TI defines "RoHS" to mean semiconductor products that are compliant with the current EU RoHS requirements for all 10 RoHS substances, including the requirement that RoHS substance do not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, "RoHS" products are suitable for use in specified lead-free processes. TI may reference these types of products as "Pb-Free".
RoHS Exempt: TI defines "RoHS Exempt" to mean products that contain lead but are compliant with EU RoHS pursuant to a specific EU RoHS exemption.
Green: TI defines "Green" to mean the content of Chlorine (Cl) and Bromine (Br) based flame retardants meet JS709B low halogen requirements of <=1000ppm threshold. Antimony trioxide based flame retardants must also meet the <=1000ppm threshold requirement.

[3] MSL, Peak Temp. - The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.

[4] There may be additional marking, which relates to the logo, the lot trace code information, or the environmental category on the device.

[5] Multiple Device Markings will be inside parentheses. Only one Device Marking contained in parentheses and separated by a "~" will appear on a device. If a line is indented then it is a continuation of the previous line and the two combined represent the entire Device Marking for that device.

[6] Lead finish/Ball material - Orderable Devices 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.

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In no event shall TI's liability arising out of such information exceed the total purchase price of the TI part(s) at issue in this document sold by TI to Customer on an annual basis.

OTHER QUALIFIED VERSIONS OF SN5438, SN54LS38, SN54S38, SN7438, SN74LS38, SN74S38 :

- Catalog : SN7438, SN74LS38, SN74S38

- Military : SN5438, SN54LS38, SN54S38

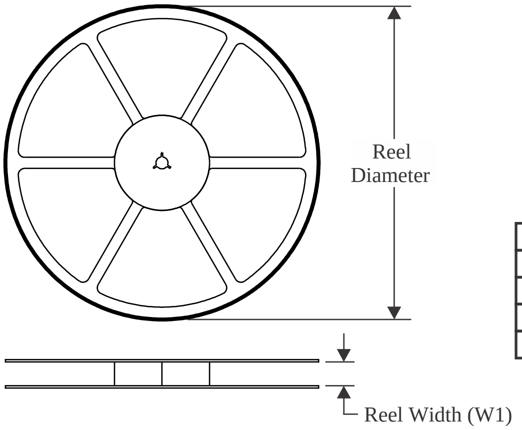
NOTE: Qualified Version Definitions:

- Catalog - TI's standard catalog product

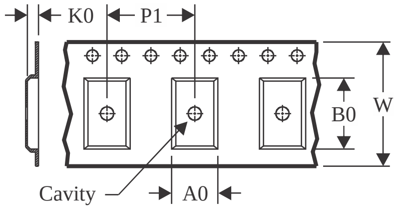
- Military - QML certified for Military and Defense Applications

TAPE AND REEL INFORMATION

REEL DIMENSIONS

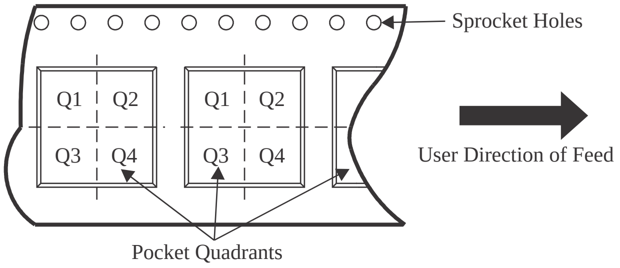


TAPE DIMENSIONS



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

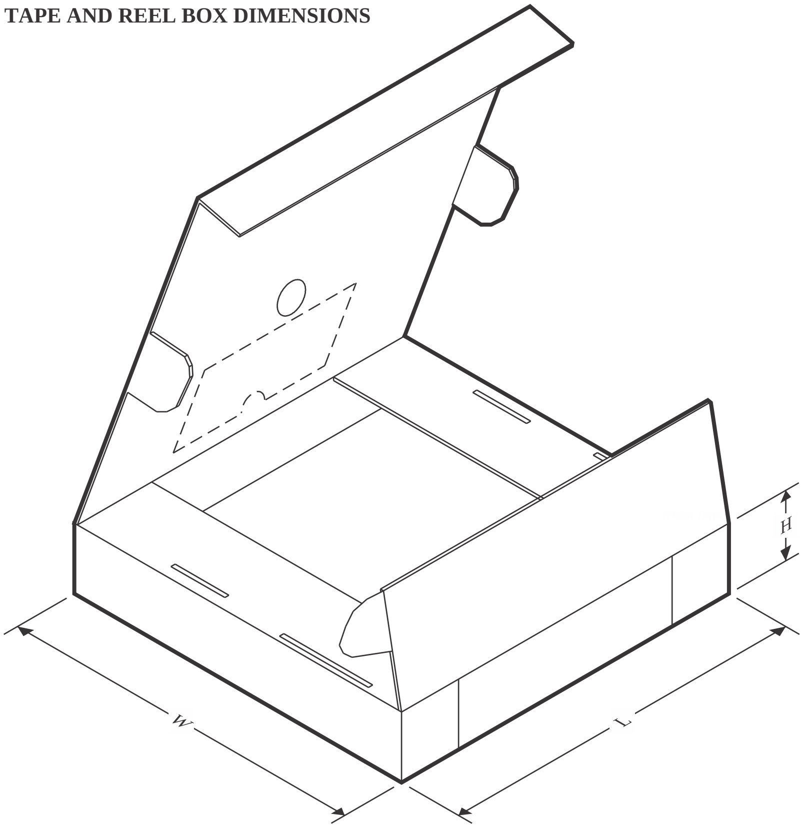
QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE



*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
SN7438DR	SOIC	D	14	2500	330.0	16.4	6.5	9.0	2.1	8.0	16.0	Q1
SN7438NSR	SOP	NS	14	2000	330.0	16.4	8.2	10.5	2.5	12.0	16.0	Q1
SN74LS38DBR	SSOP	DB	14	2000	330.0	16.4	8.35	6.6	2.4	12.0	16.0	Q1
SN74LS38DR	SOIC	D	14	2500	330.0	16.4	6.5	9.0	2.1	8.0	16.0	Q1
SN74LS38NSR	SOP	NS	14	2000	330.0	16.4	8.2	10.5	2.5	12.0	16.0	Q1
SN74S38DR	SOIC	D	14	2500	330.0	16.4	6.5	9.0	2.1	8.0	16.0	Q1
SN74S38NSR	SOP	NS	14	2000	330.0	16.4	8.2	10.5	2.5	12.0	16.0	Q1

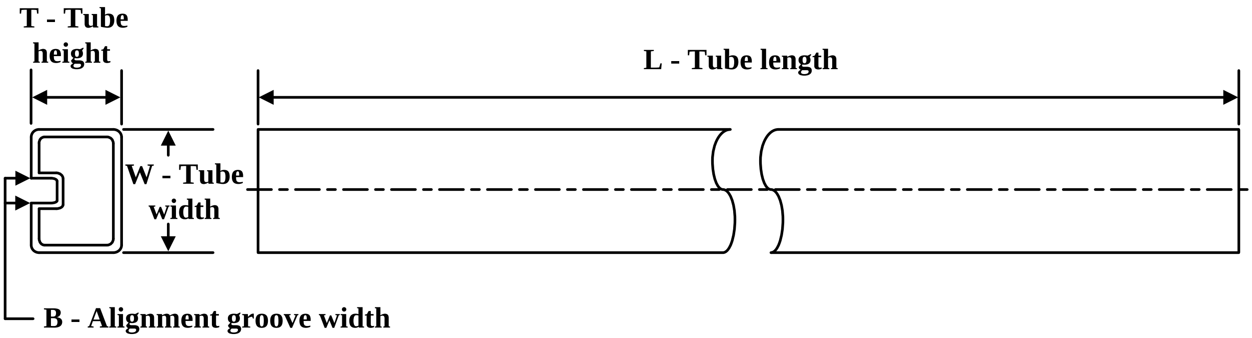
TAPE AND REEL BOX DIMENSIONS



*All dimensions are nominal

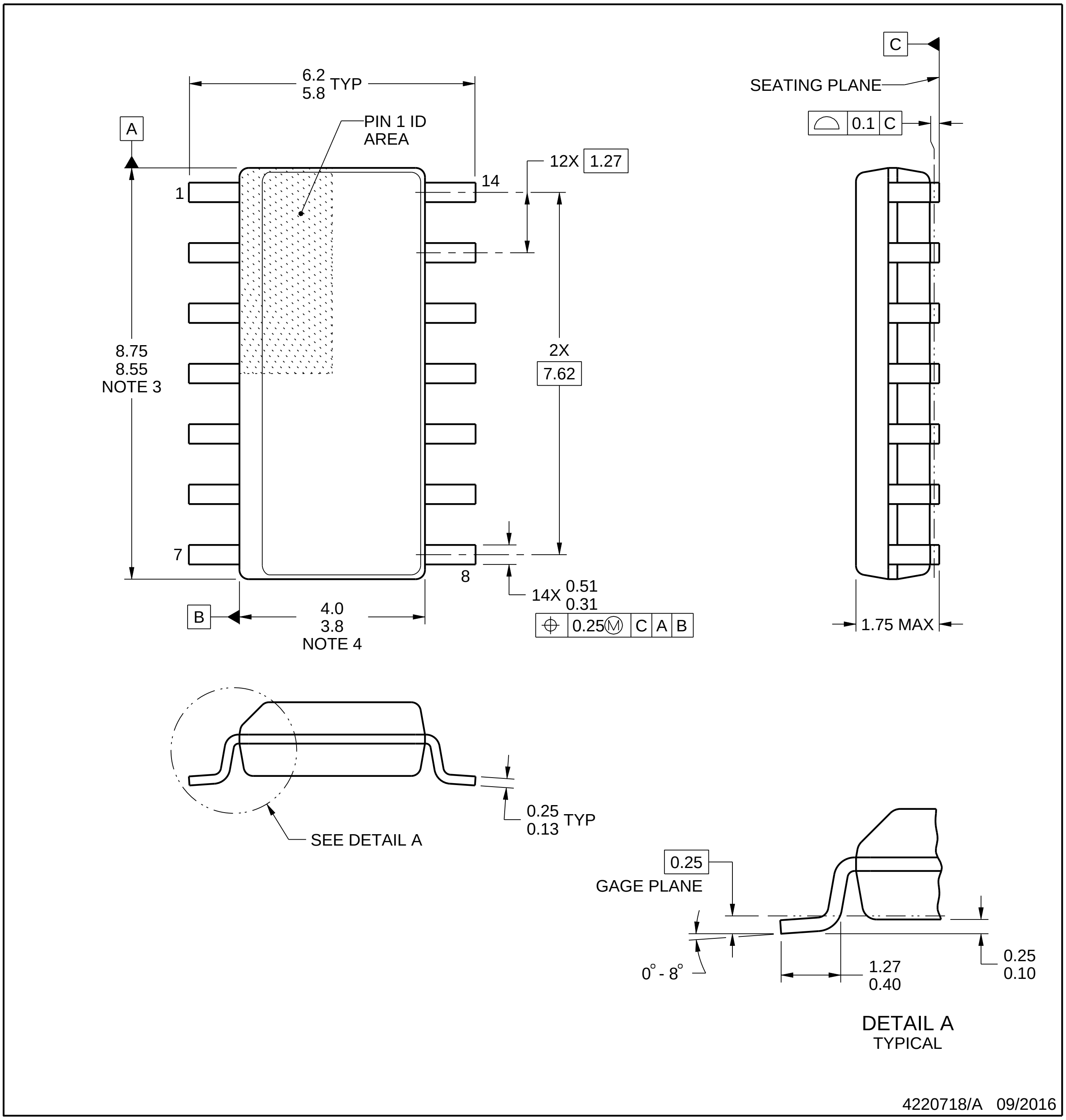
Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
SN7438DR	SOIC	D	14	2500	356.0	356.0	35.0
SN7438NSR	SOP	NS	14	2000	356.0	356.0	35.0
SN74LS38DBR	SSOP	DB	14	2000	356.0	356.0	35.0
SN74LS38DR	SOIC	D	14	2500	356.0	356.0	35.0
SN74LS38NSR	SOP	NS	14	2000	356.0	356.0	35.0
SN74S38DR	SOIC	D	14	2500	356.0	356.0	35.0
SN74S38NSR	SOP	NS	14	2000	356.0	356.0	35.0

TUBE



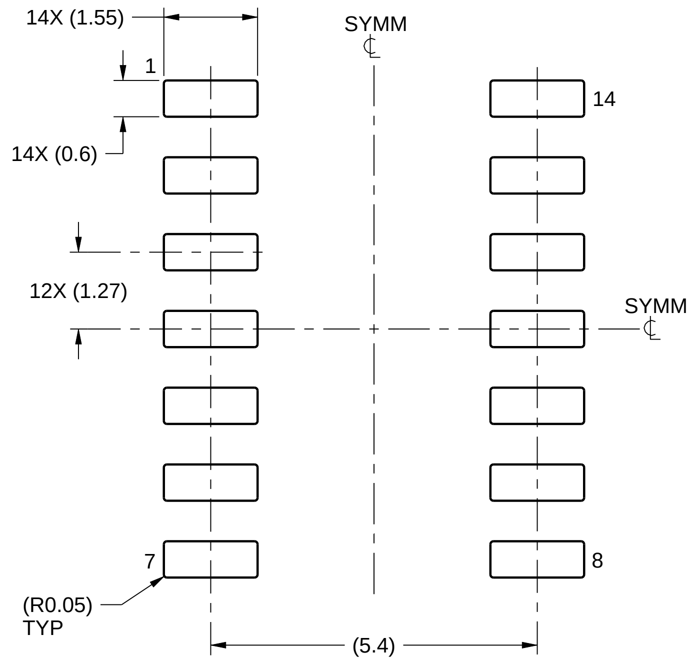
*All dimensions are nominal

Device	Package Name	Package Type	Pins	SPQ	L (mm)	W (mm)	T (µm)	B (mm)
JM38510/30203B2A	FK	LCCC	20	55	506.98	12.06	2030	NA
JM38510/30203BDA	W	CFP	14	25	506.98	26.16	6220	NA
M38510/30203B2A	FK	LCCC	20	55	506.98	12.06	2030	NA
M38510/30203BDA	W	CFP	14	25	506.98	26.16	6220	NA
SN7438N	N	PDIP	14	25	506	13.97	11230	4.32
SN74LS38N	N	PDIP	14	25	506	13.97	11230	4.32
SN74LS38N	N	PDIP	14	25	506	13.97	11230	4.32
SN74LS38NE4	N	PDIP	14	25	506	13.97	11230	4.32
SN74LS38NE4	N	PDIP	14	25	506	13.97	11230	4.32
SN74S38N	N	PDIP	14	25	506	13.97	11230	4.32
SN74S38N	N	PDIP	14	25	506	13.97	11230	4.32
SNJ5438W	W	CFP	14	25	506.98	26.16	6220	NA
SNJ54LS38FK	FK	LCCC	20	55	506.98	12.06	2030	NA
SNJ54S38FK	FK	LCCC	20	55	506.98	12.06	2030	NA
SNJ54S38W	W	CFP	14	25	506.98	26.16	6220	NA

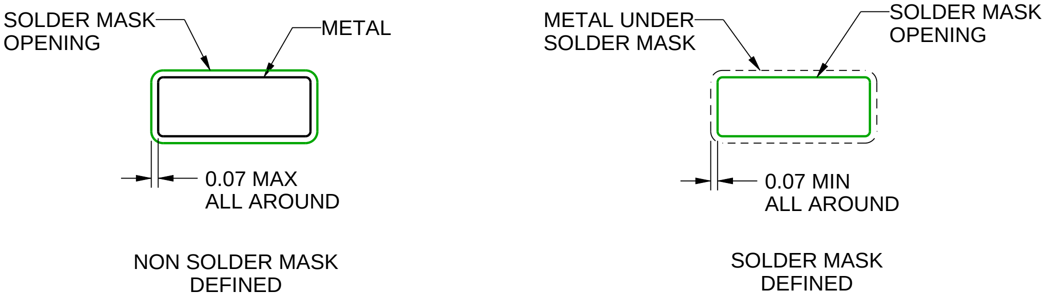


NOTES:

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 0.43 mm, per side.
5. Reference JEDEC registration MS-012, variation AB.



LAND PATTERN EXAMPLE
SCALE:8X

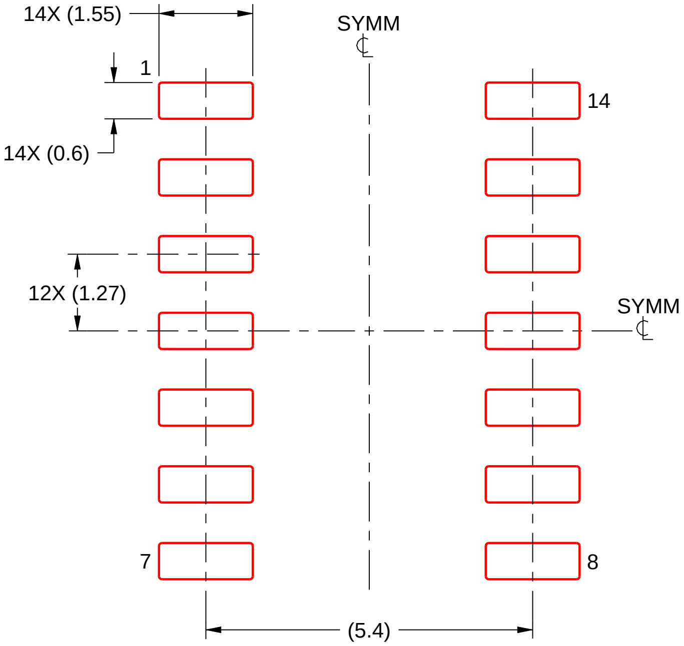


SOLDER MASK DETAILS

4220718/A 09/2016

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.



SOLDER PASTE EXAMPLE
BASED ON 0.125 mm THICK STENCIL
SCALE:8X

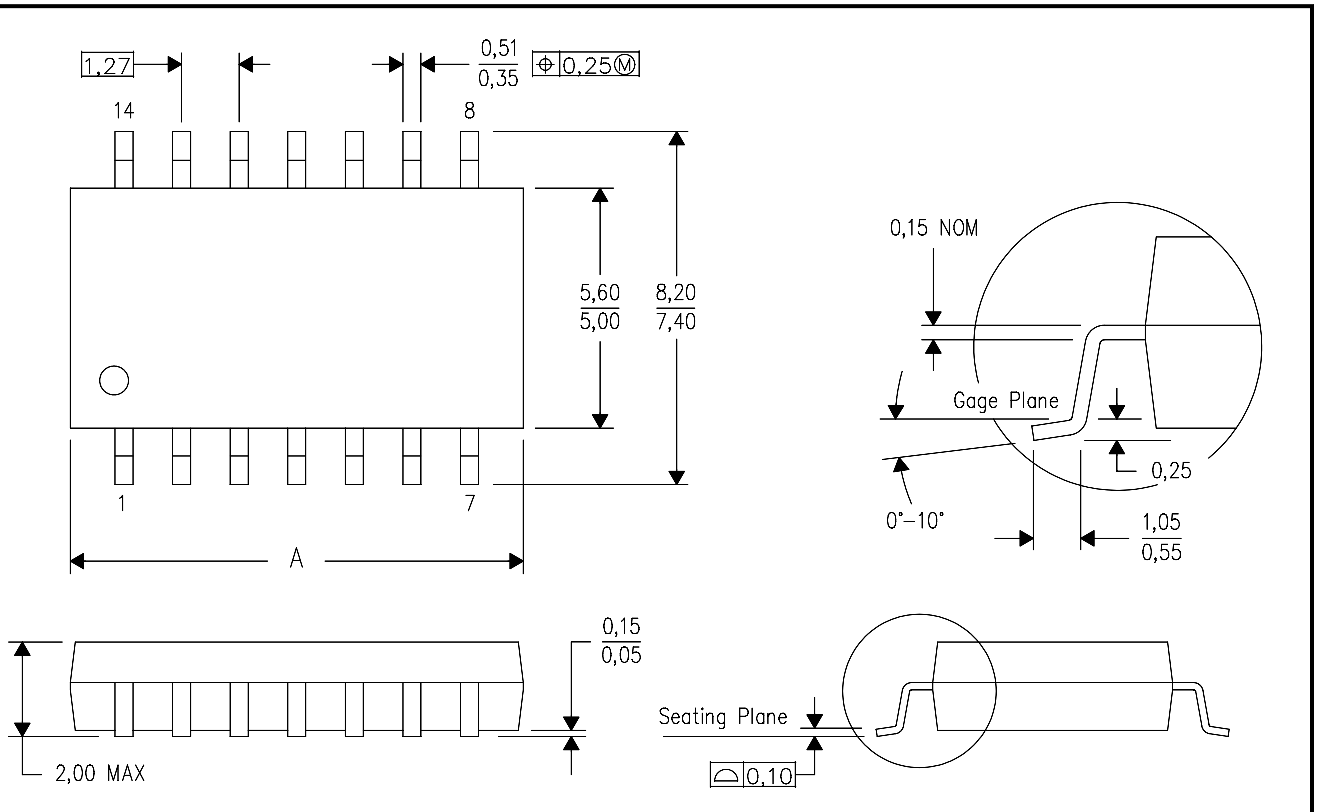
NOTES: (continued)

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.

MECHANICAL DATA

NS (R-PDSO-G)** **PLASTIC SMALL-OUTLINE PACKAGE**

14-PINS SHOWN

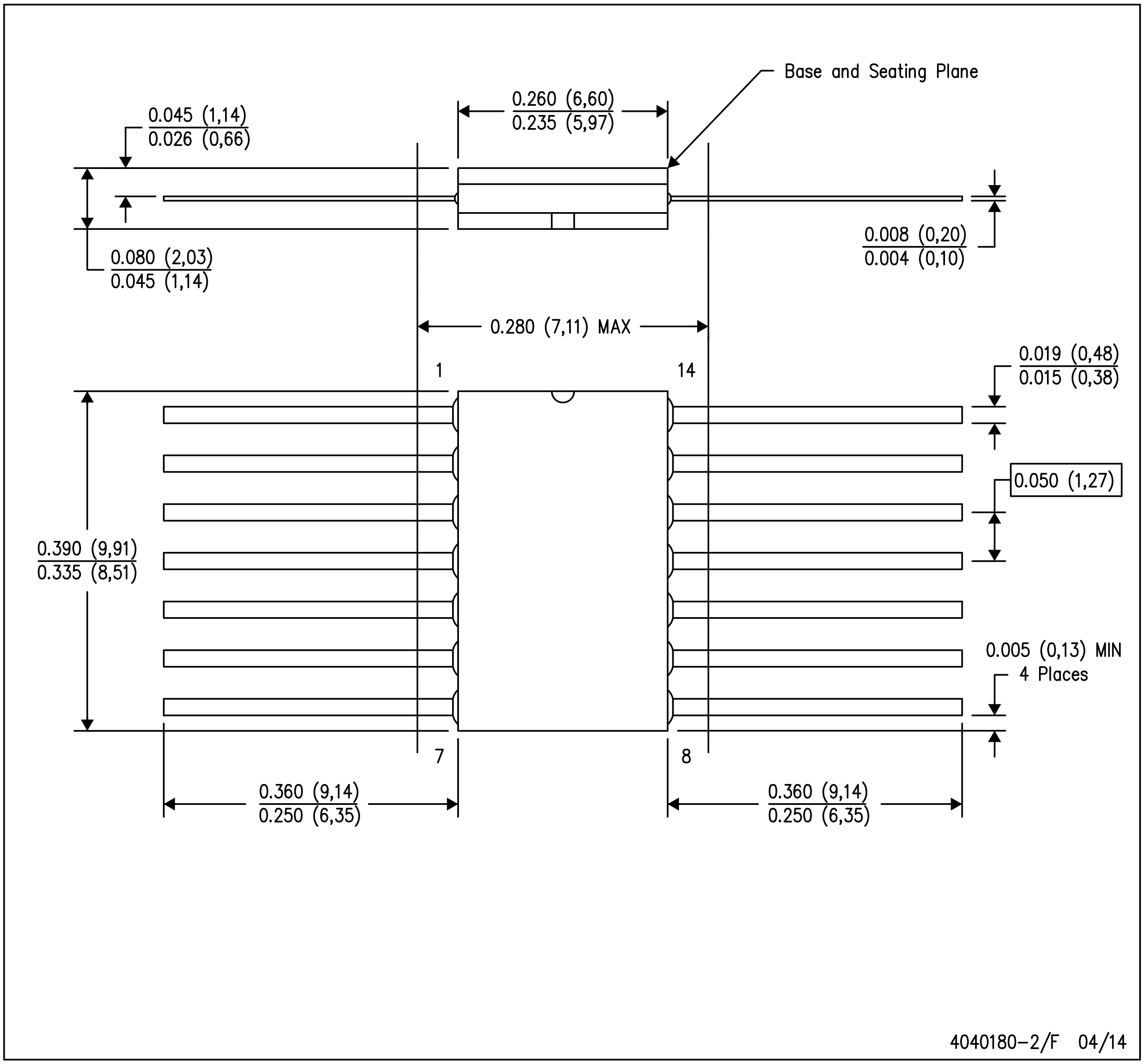


PINS ** / DIM	14	16	20	24
A MAX	10,50	10,50	12,90	15,30
A MIN	9,90	9,90	12,30	14,70

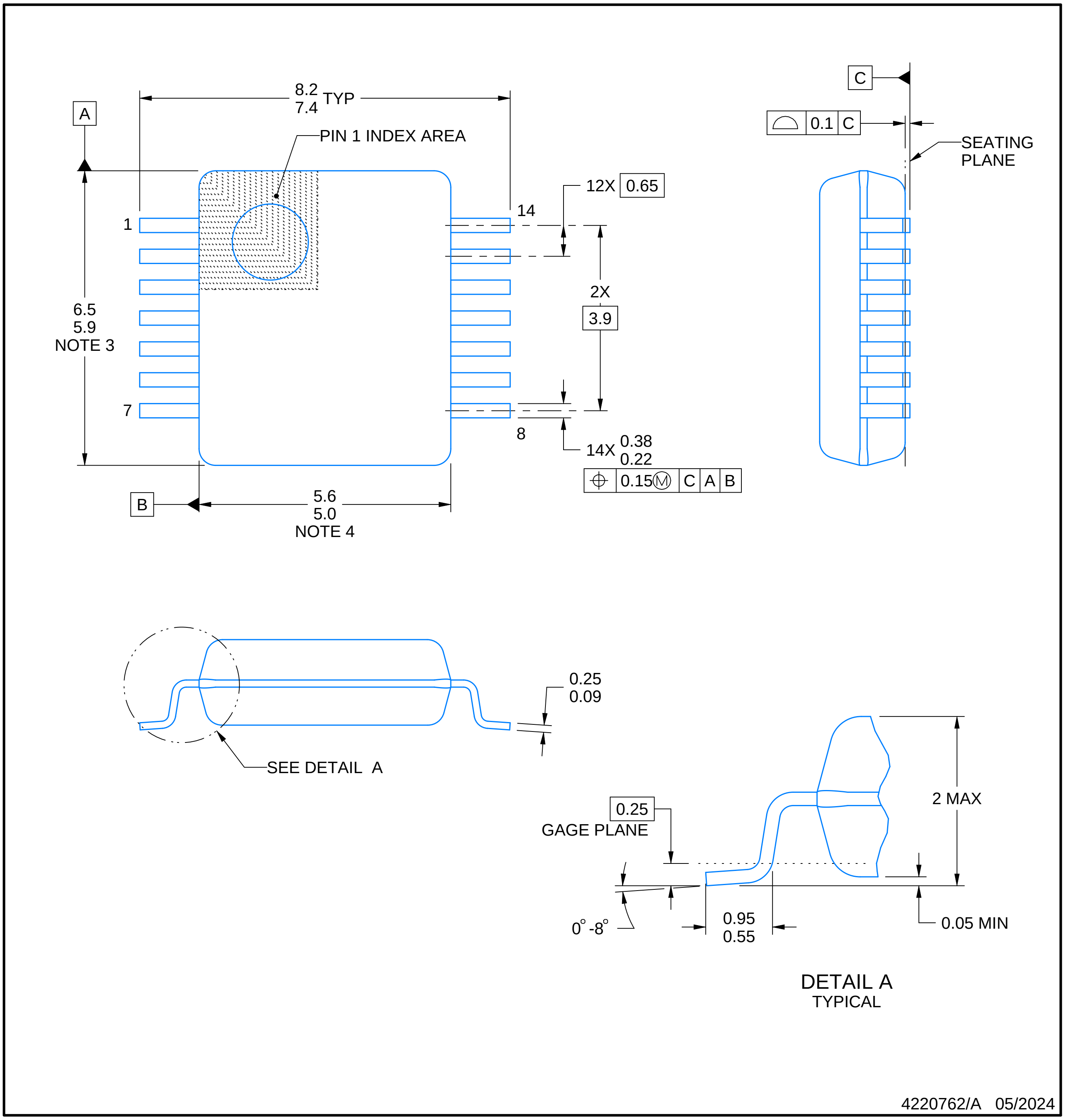
4040062/C 03/03

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.

W (R–GDFP–F14) CERAMIC DUAL FLATPACK



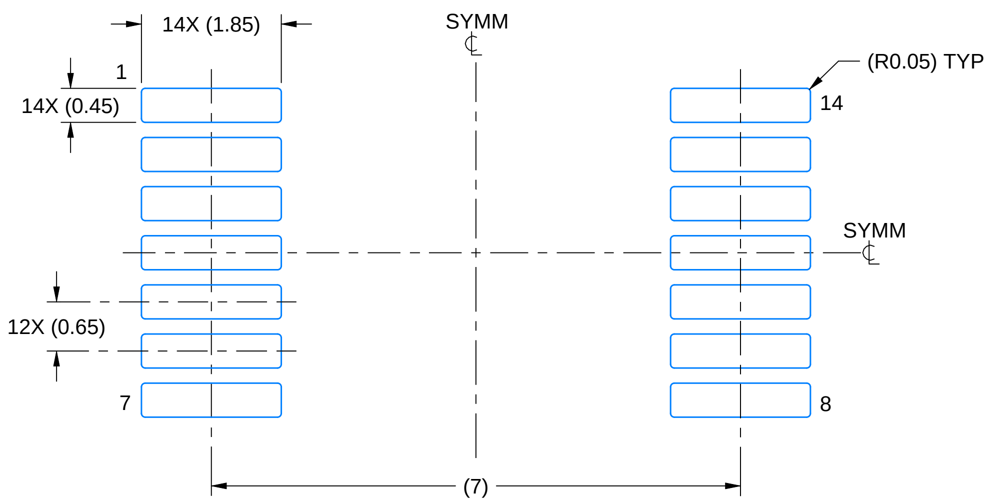
NOTES:
- A. All linear dimensions are in inches (millimeters).
- B. This drawing is subject to change without notice.
- C. This package can be hermetically sealed with a ceramic lid using glass frit.
- D. Index point is provided on cap for terminal identification only.
- E. Falls within MIL STD 1835 GDFP1–F14



NOTES:

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.

EXAMPLE BOARD LAYOUT



LAND PATTERN EXAMPLE
EXPOSED METAL SHOWN
SCALE: 10X

NON-SOLDER MASK
DEFINED
(PREFERRED)

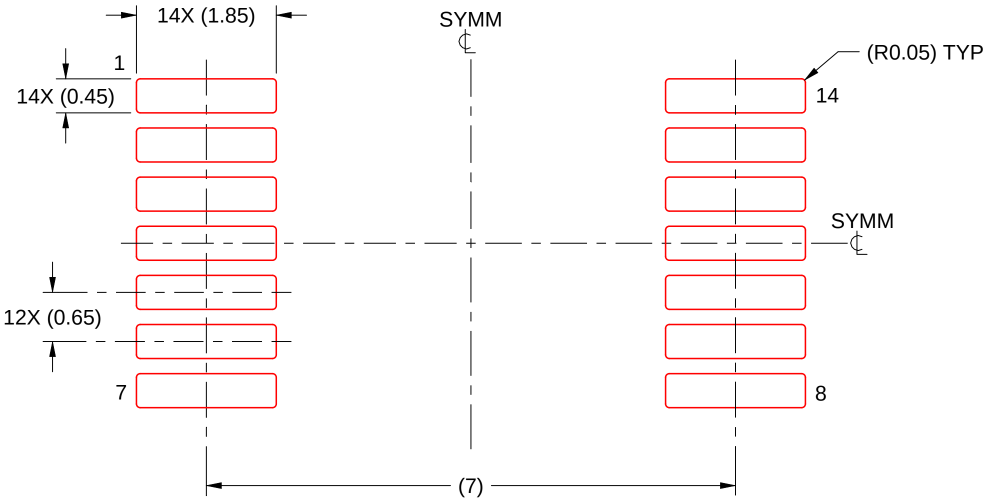
SOLDER MASK
DEFINED

SOLDER MASK DETAILS

4220762/A 05/2024

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.



SOLDER PASTE EXAMPLE
BASED ON 0.125 mm THICK STENCIL
SCALE: 10X

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.

GENERIC PACKAGE VIEW

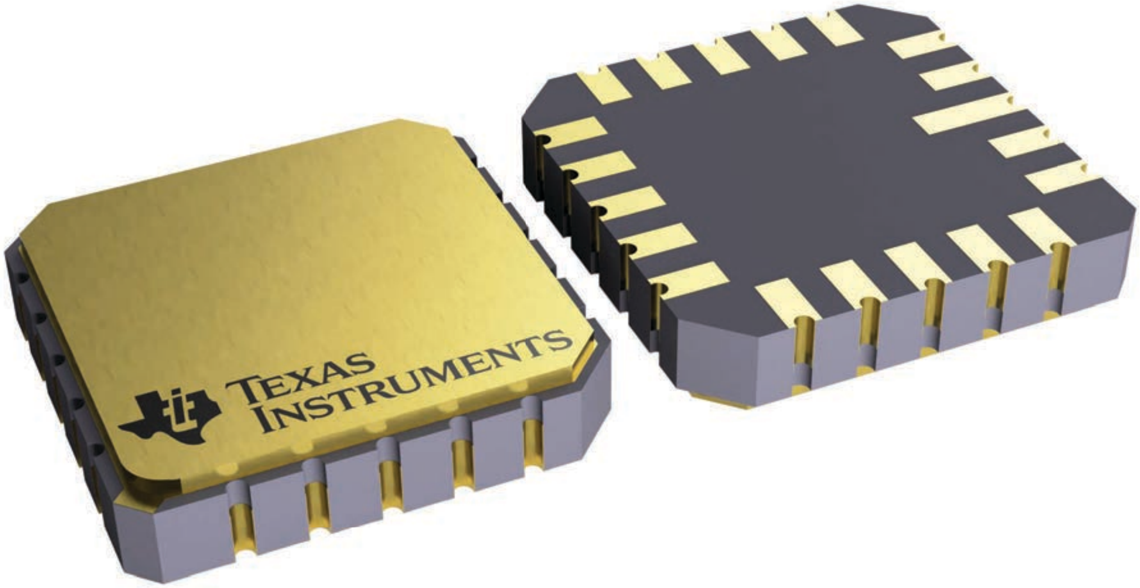
FK 20

LCCC - 2.03 mm max height

8.89 x 8.89, 1.27 mm pitch

LEADLESS CERAMIC CHIP CARRIER

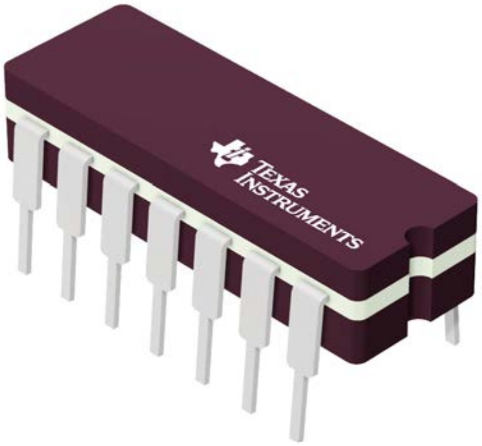
This image is a representation of the package family, actual package may vary.
Refer to the product data sheet for package details.



4229370\A\

J 14 CDIP - 5.08 mm max height

CERAMIC DUAL IN LINE PACKAGE



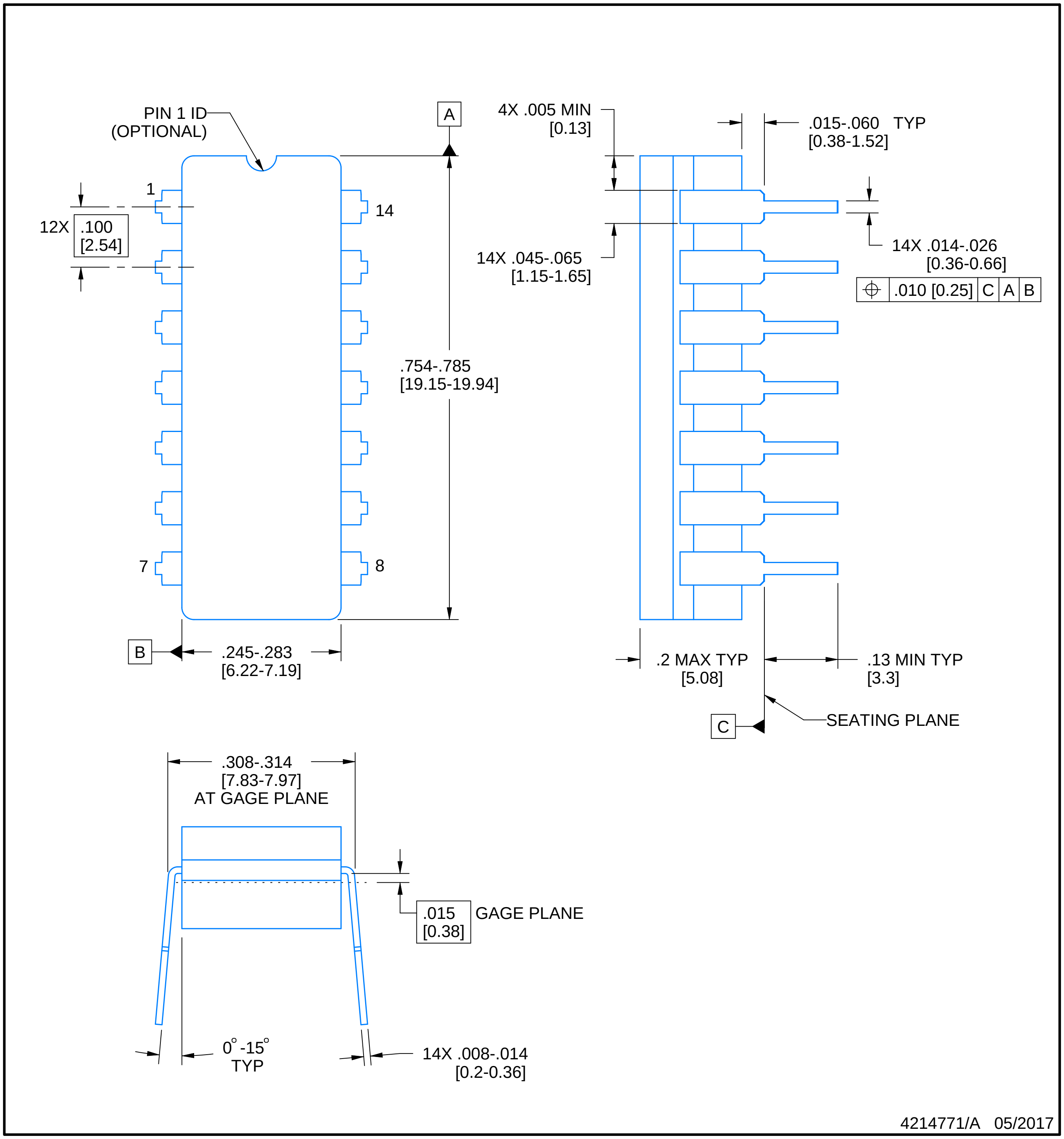
Images above are just a representation of the package family, actual package may vary.
Refer to the product data sheet for package details.

4040083-5/G

PACKAGE OUTLINE

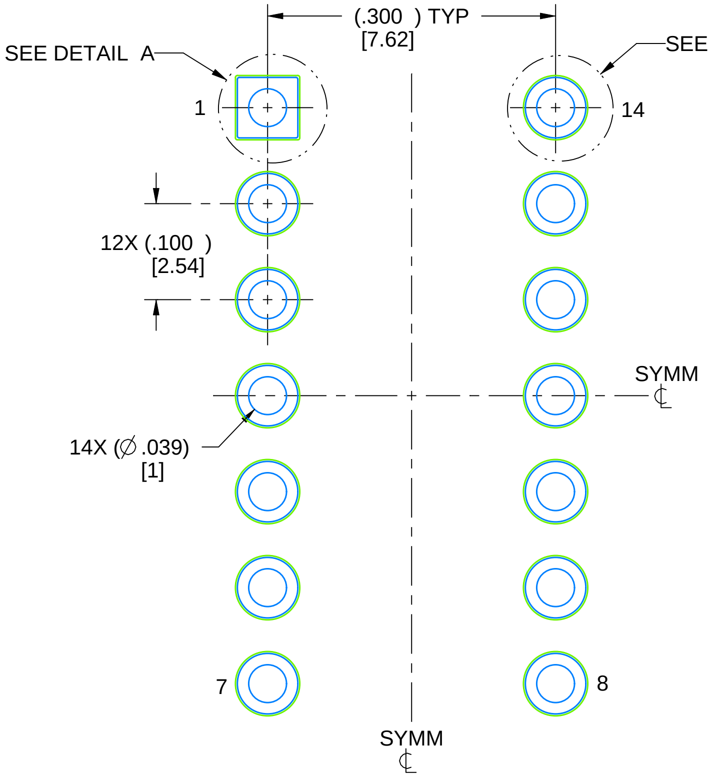
CDIP - 5.08 mm max height

CERAMIC DUAL IN LINE PACKAGE

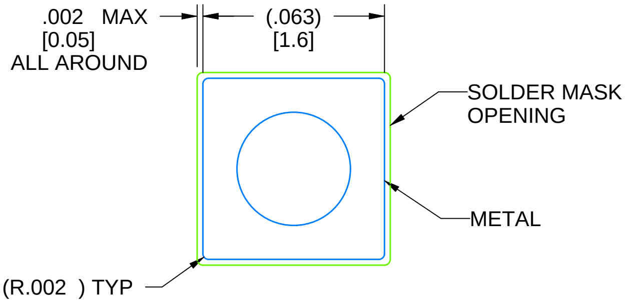


NOTES:

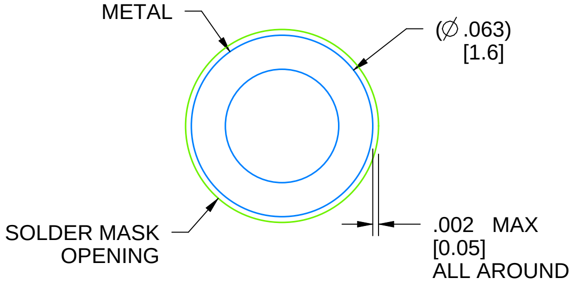
1. All controlling linear dimensions are in inches. Dimensions in brackets are in millimeters. Any dimension in brackets or parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. This package is hermitically sealed with a ceramic lid using glass frit.
4. Index point is provided on cap for terminal identification only and on press ceramic glass frit seal only.
5. Falls within MIL-STD-1835 and GDIP1-T14.



LAND PATTERN EXAMPLE
NON-SOLDER MASK DEFINED
SCALE: 5X



DETAIL A
SCALE: 15X

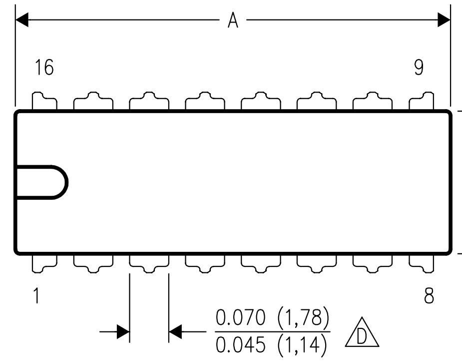


DETAIL B
13X, SCALE: 15X

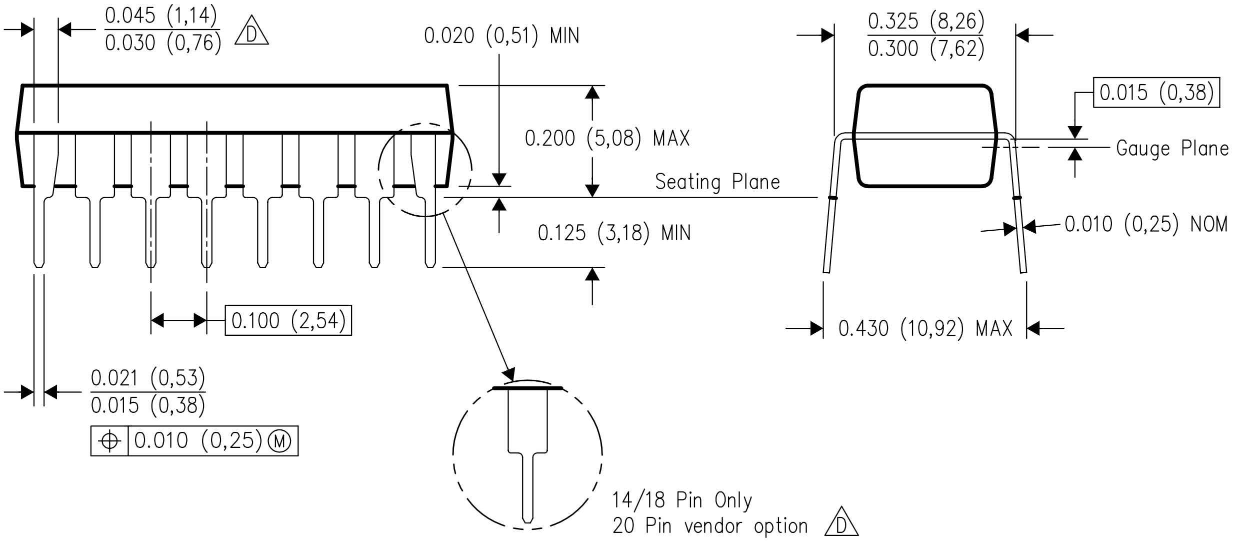
4214771/A 05/2017

N (R–PDIP–T**) PLASTIC DUAL–IN–LINE PACKAGE

16 PINS SHOWN



PINS ** / DIM	14	16	18	20
A MAX	0.775 (19,69)	0.775 (19,69)	0.920 (23,37)	1.060 (26,92)
A MIN	0.745 (18,92)	0.745 (18,92)	0.850 (21,59)	0.940 (23,88)
△C MS–001 VARIATION	AA	BB	AC	AD



4040049/E 12/2002

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

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