SN54153, SN54LS153, SN54S153 SN74153, SN74LS153, SN74S153 DUAL 4-LINE TO 1-LINE DATA SELECTORS/MULTIPLEXERS

SDLS055A - DECEMBER 1972 - REVISED MAY 2007

- Permits Multiplexing from N lines to 1 line
- Performs Parallel-to-Serial Conversion
- Strobe (Enable) Line Provided for Cascading (N lines to n lines)
- High-Fan-Out, Low-Impedance, Totem-Pole Outputs
- Fully Compatible with most TTL Circuits

	Т	TYPICAL		
TYPE	PROPA	GATION DELA	Y TIMES	POWER
	FROM	FROM	FROM	DISSIPATION
	DATA	STROBE	SELECT	
153	14 ns	17 ns	22 ns	180 mW
LS153	14 ns	19 ns	22 ns	31 mW
'S153	6 ns	9.5 ns	12 ns	225 mW

description

Each of these monolithic, data selectors/multiplexers contains inverters and drivers to supply fully complementary, on-chip, binary decoding data selection to the AND-OR gates. Separate strobe inputs are provided for each of the two four-line sections.

FUNCTION TABLE

- F	LECT PUTS		ATA	INPUT:	3	STROBE	ООТРОТ
В	Α	CO	C1	C2	C3	Ğ	γ
×	×	X	X	Х	×	Н	L
L	L	L	Х	X	x	Ł.	L
L	L	н	Х	X	х	L	н
L	Н	х	L	×	×	L	L
L	н	×	Н	X	×	L	н
н	L	х	х	L	×	L	L
Н	L	x	Х	Н	×	L	н
Н	Н	×	Х	X	ㄴ	Ł	L
Н	H	Х	Х_	Х	н	L	н

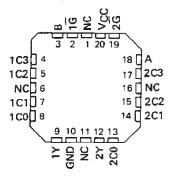
Select inputs A and B are common to both sections.

H = high level, L = low level, X = irrelevant

SN54153, SN54LS153, SN54S153...J OR W PACKAGE⁽¹⁾ SN74153...N PACKAGE SN74LS153, SN74S153...D OR N PACKAGE (TOP VIEW)

1 <u>G</u> [1	U ₁₆	∐ vcc
вС	2	15	2 G
1C3 🗆	3	14	□ A
1C2	4	13	2C3
1C1 🗆	5	12	2C2
1 CO [6	11	2C1
1Y 🗌	7	10	2C0
GND [8	9	_ 2Y

SN54LS153, SN54S153 . . . FK PACKAGE ⁽¹⁾ (TOP VIEW)



NC - No internal connection

(1) SN54S153, SN74153, and SN74S153 are obsolete.

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

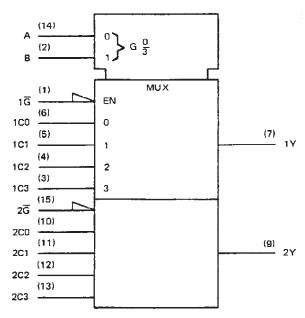
Supply voltage, VCC (See Note 1)		7 V
Input voltage: '153, '\$153		5.5 V
′LS153		7 V
Operating free-air temperature range:	SN54'55°	C to 125°C
	SN74' 0	°C to 70°C
Storage temperature range		C to 150°C

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

PRODUCTION DATA documents contain information current as of publication date. Products conform to specifications per the terms of Texas Instruments standard warranty. Production processing does not necessarily include testing of all parameters.

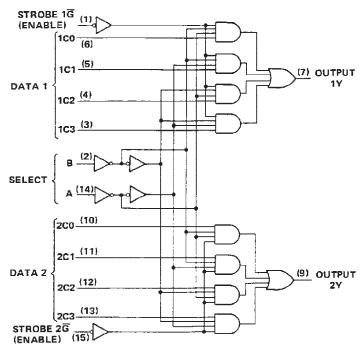


logic symbol[†]



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

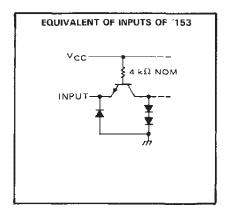
logic diagrams (positive logic)

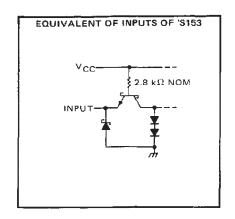


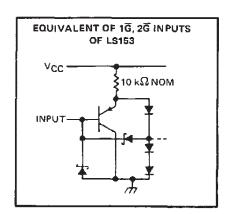
Pin numbers shown are for D, J, N, and W packages.

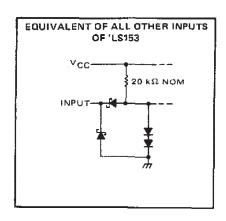


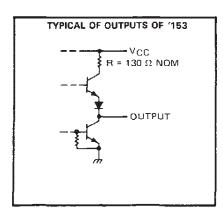
schematics of inputs and outputs

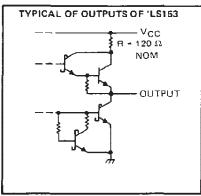


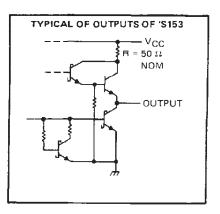












SN54153, SN74153 DUAL 4-LINE TO 1-LINE DATA SELECTORS/MULTIPLEXERS

recommended operating conditions

		SN54153			\$N74153			
	MIN	NOM	MAX	MIN	NOM	MAX	UNIT	
Supply voltage, V _{CC}	4.5	5	5.5	4.75	5	5.25	V	
High-level output current, IOH			-800			-800	μА	
Low-level output current, IOL		-	16		·	16	mA	
Operating free-air temperature, TA	-55		125	0		70	°C	

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

		TEST COMPLETIONS!	SN54153			SN74153			UNIT
	PARAMETER	TEST CONDITIONS [†]	MIN	TYP#	MAX	MIN	ТҮР‡	MAX	UNIT
VIH	High-level input voltage		2			2			٧
VIL	Low-level input voltage				8.0			8.0	V
VIK	Input clamp voltage	V _{CC} = MIN, I ₁ = -12 mA			-1.5			-1.5	V
voн	High-level output voltage	V _{CC} = MIN, V _{IH} = 2 V, V _{IL} = 0.8 V, I _{OH} = -800 μA	2.4	3.4		2.4	3.4		٧
VOL	Low-level output voltage	V _{CC} = MIN, V _{IH} = 2 V, V _{IL} = 0.8 V, I _{OL} = 16 mA		0.2	0.4		0.2	0.4	V
f g	Input current at maximum input voltage	V _{CC} = MAX, V _I = 5.5 V			1			1	mΑ
ίн	High-level input current	V _{CC} = MAX, V _I = 2.4 V			40			40	μΑ
IIL	Low-level input current	V _{CC} = MAX, V _I = 0.4 V			-1.6			-1.6	mA
los	Short-circuit output current §	V _{CC} = MAX	-20		-55	18		-57	mA
ICCL	Supply current, output low	V _{CC} = MAX, See Note 2		36	52		36	60	mA

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

switching characteristics, VCC = 5 V, TA = 25°C

PARAMETER¶	FROM	то	TEST CONDITIONS	MIN	TYP	MAX	LINIT
FARAWEIER	(INPUT)	(DUTPUT)	TEST CONDITIONS			IIII A	0
tPLH	Data	Y			12	18	ns
tPHL	Data	Y	7		15	23	កទ
^t PLH	Select	Y	C _L = 30 pF, R _L = 400 Ω,		22	34	ns
¹PHL	Select	Y	See Note 3		22	34	П\$
^t PLH	Strobe G	Y	7		19	30	กร
tpHL	Strobe G	Y	7		15	23	กร

 $[\]P_{tPLH} = propagation delay time, low-to-high-level output$

 $^{^{\}ddagger}$ All typical values are at $V_{CC} = 5 \text{ V}$, $T_{A} = 25 ^{\circ}\text{C}$.

SNot more than one output should be shorted at a time.

NOTE 2: I_{CCL} is measured with the outputs open and all inputs grounded.

tpHL = propagation delay time, high-to-low-level output

NOTE 3: Load circuits and voltage waveforms are shown in Section 1.

recommended operating conditions

		S	SN54LS153			SN74LS153			
		MIN	NOM	MAX	MIN	NOM	MAX	UNIT	
Vcc	Supply voltage	4.5	5	5,5	4.75	5	5.25	V	
VіН	High-level input voltage	2			2			٧	
VIL	Low-level input voltage			0.7			0.8	V	
ЮН	High-level output current			- 0.4			- 0.4	mΑ	
loL	Low-level output current			4			8	mΑ	
TA	Operating free-air temperature	55		125	0		70	°C	

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

PARAMETER		TEST CONDIT	IONE †		S	N54LS1	153	s			
PARAIVIETER		TEST CONDIT	IONS I		MIN	TYP‡	MAX	MIN	TYP‡	MAX	TINU
Vik	V _{CC} = MIN,	I ₁ = - 18 mA			1		- 1.5		-	- 1.5	V
Voн	V _{CC} = MIN, I _{OH} = - 0.4 mA	***	VIL = MAX		2.5	3.4		2,7	3.4		٧
Va	V _{CC} = MIN, V _{IH} = 2 V,		IOL = 4 mA		0.25	0.4		0.25	0.4	V	
VOL	VIL = MAX,		Ī	I _{OL} = 8 mA					0.35	0.5	.5
I4	VCC = MAX.	V ₁ = 7 V					0.1		-	0.1	mΑ
IrH	V _{CC} = MAX,	V ₁ = 2.7 V		•			20			20	μА
1G, 2G	V MAY	VI = 0.4 V					- 0.2			-0.2	
All other	AGC - MAY	CC = MAX, VI = 0.4 V					- 0.4			- 0.4	mA
loss	VCC = MAX				20		- 100	- 20		- 100	mA
1CCL	V _{CC} = MAX,	See Note 2				6.2	10		6.2	10	mΑ

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

NOTE 2: ICCL is measured with the outputs open and all inputs grounded.

switching characteristics, VCC = 5 V, TA = 25°C

PARAMETER¶	FROM (INPUT)	TO (OUTPUT)	TEST CONDITIONS	MIN	TYP	MAX	UNIT
tpLH	Data	Y			10	15	ns
tPHL.	Data	Y	C _L = 15 pF,		17	26	п\$
tPLH	Select	Y	$R_{L} = 2 k\Omega$,		19	29	пѕ
tPHL	Select	Y	See Note 3		25	38	ns
tPLH	Strobe G	Y	See Note S		16	24	ns
tPHL	Strabe G	Y			21	32	ns

 $[\]P_{\text{tpLH}}$ = propagation delay time, low-to-high-level output

NOTE 3: Load circuits and voltage waveforms are shown in Section 1.

 $[\]ddagger$ All typical values are at V $_{CC}$ = 5 V, T $_{A}$ = 25 $^{\circ}$ C.

[§]Not more than one output should be shorted at a time.

tpHL = propagation delay time, high-to-low-level output

SN54S153, SN74S153 DUAL 4-LINE TO 1-LINE DATA SELECTORS/MULTIPLEXERS

recommended operating conditions

	S	SN54S153			SN74S153		
	MIN	NOM	MAX	MIN	NOM	MAX	UNIT
Supply voltage, VCC	4.5	5	5.5	4.75	5	5.25	٧
High-level output current, IOH			-1			-1	mΑ
Low-level output current, IOL			20			20	mΑ
Operating free-air temperature, TA	-55		125	0		70	,C

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

	PARAMETER	TEST CONDITIONS†	MIN	TYP	MAX	UNIT
VIH	High-level input voltage		2			٧
VIL	Low-level input voltage				8.0	V
VIK	Input clamp voltage	V _{CC} = MIN, I ₁ = -18 mA			-1.2	٧
V	High lavel output valtage	V _{CC} = MIN, V _{IH} = 2 V, Series 54	2.5	3.4		V
VOH	High-level output voltage	V _{IL} = 0.8 V, IOH = -1 mA Series 74	3 2.7	3.4		ľ
	Low-level output voltage	V _{CC} = MIN, V _{IH} = 2 V,	- 1	_	0.5	V
OF	Low-level output vortage	V _{IL} = 0.8 V, I _{OL} = 20 mA			L	
T _I	Input current at maximum input voltage	V _{CC} = MAX, V _I = 5.5 V			1	mΑ
ЧН	High-level input current	V _{CC} = MAX, V _I = 2.7 V			50	μA
HL	Low-level input current	V _{CC} = MAX, V _I = 0.5 V			-2	mA
los	Short-circuit output current \$	V _{CC} = MAX	-40		-100	mΑ
CCL	Supply current, low-level output	V _{CC} = MAX, See Note 2		45	70	mΑ

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

switching characteristics, VCC = 5 V, TA = 25°C

PARAMETER¶	FROM (INPUT)	TO (OUTPUT)	TEST CONDITIONS	MIN	TYP	MAX	UNIT
^t PLH	Data	Y			6	9	ns
tPHL	Data	Y	7		6	9	ns
^t PLH	Select	Y	CL = 15 pF, RL = 280 Ω,		11.5	18	пѕ
tPHL	Select	Y	See Note 3		12	18	ns
tРLН	Strobe G	Y	7		10	15	пѕ
teht"	Strobe Ĝ	Y			9	13.5	ns

 $t_{PLH} = propagation delay time, low-to-high-level output$

NOTE 3: Load circuits and voltage waveforms are shown in Section 1.



 $[\]frac{1}{2}$ All typical values are at $V_{CC} = 5 \text{ V. } T_A = 25^{\circ}\text{C.}$

[§]Not more than one output should be shorted at a time and duration of short-circuit should not exceed one second.

NOTE 2: ICCL is measured with the outputs open and all inputs grounded.

tpHL = propagation dalay time, high-to-low-level output

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8-Sep-2023

PACKAGING INFORMATION

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead finish/ Ball material (6)	MSL Peak Temp	Op Temp (°C)	Device Marking (4/5)	Samples
76011012A	ACTIVE	LCCC	FK	20	1	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	76011012A SNJ54LS 153FK	Samples
7601101EA	ACTIVE	CDIP	J	16	1	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	7601101EA SNJ54LS153J	Samples
7601101FA	ACTIVE	CFP	W	16	1	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	7601101FA SNJ54LS153W	Samples
JM38510/30902BEA	ACTIVE	CDIP	J	16	1	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	JM38510/ 30902BEA	Samples
M38510/30902BEA	ACTIVE	CDIP	J	16	1	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	JM38510/ 30902BEA	Samples
SN54153J	ACTIVE	CDIP	J	16	1	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	SN54153J	Samples
SN54LS153J	ACTIVE	CDIP	J	16	1	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	SN54LS153J	Samples
SN74LS153D	LIFEBUY	SOIC	D	16	40	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	0 to 70	LS153	
SN74LS153DG4	LIFEBUY	SOIC	D	16	40	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	0 to 70	LS153	
SN74LS153DR	ACTIVE	SOIC	D	16	2500	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	0 to 70	LS153	Samples
SN74LS153N	ACTIVE	PDIP	N	16	25	RoHS & Green	NIPDAU	N / A for Pkg Type	0 to 70	SN74LS153N	Samples
SN74LS153NSR	ACTIVE	SO	NS	16	2000	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	0 to 70	74LS153	Samples
SNJ54153J	ACTIVE	CDIP	J	16	1	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	SNJ54153J	Samples
SNJ54LS153FK	ACTIVE	LCCC	FK	20	1	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	76011012A SNJ54LS 153FK	Samples
SNJ54LS153J	ACTIVE	CDIP	J	16	1	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	7601101EA SNJ54LS153J	Samples
SNJ54LS153W	ACTIVE	CFP	W	16	1	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	7601101FA SNJ54LS153W	Samples

⁽¹⁾ The marketing status values are defined as follows: **ACTIVE:** Product device recommended for new designs.

PACKAGE OPTION ADDENDUM

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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 (CI) 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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OTHER QUALIFIED VERSIONS OF SN54LS153, SN74LS153:

Catalog: SN74LS153

Military: SN54LS153

NOTE: Qualified Version Definitions:

Catalog - TI's standard catalog product

PACKAGE OPTION ADDENDUM

www.ti.com 8-Sep-2023

• Military - QML certified for Military and Defense Applications

PACKAGE MATERIALS INFORMATION

www.ti.com 1-Jul-2023

TAPE AND REEL INFORMATION





A0	Dimension designed to accommodate the component width
В0	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
SN74LS153DR	SOIC	D	16	2500	330.0	16.4	6.5	10.3	2.1	8.0	16.0	Q1
SN74LS153NSR	so	NS	16	2000	330.0	16.4	8.2	10.5	2.5	12.0	16.0	Q1

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*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
SN74LS153DR	SOIC	D	16	2500	340.5	336.1	32.0
SN74LS153NSR	SO	NS	16	2000	356.0	356.0	35.0

PACKAGE MATERIALS INFORMATION

www.ti.com 1-Jul-2023

TUBE



*All dimensions are nominal

Device	Package Name	Package Type	Pins	SPQ	L (mm)	W (mm)	T (µm)	B (mm)
76011012A	FK	LCCC	20	1	506.98	12.06	2030	NA
7601101FA	W	CFP	16	1	506.98	26.16	6220	NA
SN74LS153D	D	SOIC	16	40	507	8	3940	4.32
SN74LS153DG4	D	SOIC	16	40	507	8	3940	4.32
SN74LS153N	N	PDIP	16	25	506	13.97	11230	4.32
SN74LS153N	N	PDIP	16	25	506	13.97	11230	4.32
SNJ54LS153FK	FK	LCCC	20	1	506.98	12.06	2030	NA
SNJ54LS153W	W	CFP	16	1	506.98	26.16	6220	NA

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.



D (R-PDSO-G16)

PLASTIC SMALL OUTLINE



- 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. 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 other stencil recommendations.
- E. Customers should contact their board fabrication site for solder mask tolerances between and around signal pads.



MECHANICAL DATA

NS (R-PDSO-G**)

14-PINS SHOWN

PLASTIC SMALL-OUTLINE PACKAGE



- 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.



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.





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.



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.



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.

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