#### SLRS022A – DECEMBER 1976 – REVISED OCTOBER 1995

#### PERIPHERAL DRIVERS FOR HIGH-VOLTAGE, HIGH-CURRENT DRIVER APPLICATIONS

- Characterized for Use to 300 mA
- High-Voltage Outputs
- No Output Latch-Up at 30 V (After Conducting 300 mA)
- Medium-Speed Switching
- Circuit Flexibility for Varied Applications and Choice of Logic Function
- TTL-Compatible Diode-Clamped Inputs
- Standard Supply Voltages
- Plastic DIP (P) With Copper Lead Frame for Cooler Operation and Improved Reliability
- Package Options Include Plastic Small Outline Packages, Ceramic Chip Carriers, and Standard Plastic and Ceramic 300-mil DIPs

DEVICE	LOGIC	PACKAGES
SN55461	AND	FK, JG
SN55462	NAND	FK, JG
SN55463	OR	FK, JG
SN75461	AND	D, P
SN75462	NAND	D, P
SN75463	OR	D, P

#### description

These dual peripheral drivers are functionally interchangeable with SN55451B through SN55453B and SN75451B through SN75453B peripheral drivers, but are designed for use in systems that require higher breakdown voltages than those devices can provide at the expense of slightly slower switching speeds. Typical applications include logic buffers, power drivers, relay drivers, lamp drivers, MOS drivers, line drivers, and memory drivers.

The SN55461/SN75461, SN55462/SN75462, and SN55463/SN75463 are dual peripheral AND, NAND, and OR drivers respectively (assuming positive logic), with the output of the gates internally connected to the bases of the npn output transistors.

Series SN55461 drivers are characterized for operation over the full military temperature range of -55°C to 125°C. Series SN75461 drivers are characterized for operation from 0°C to 70°C.

PRODUCTION DATA information is 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.



1A		υ	8	] V <sub>CC</sub> ] 2B
1A 1B	2		7	] 2B
1Y			6	2A
GND	4		5	2Y
	- 1			

SN55461, SN55462, SN55463...FK PACKAGE (TOP VIEW)

	NC VCC NCC	
NC 1B NC 1Y NC	$\begin{bmatrix} 3 & 2 & 1 & 20 & 19 \\ 4 & & & 18 \\ 5 & & 17 \\ 6 & & 16 \\ 7 & & 15 \\ 8 & & 14 \\ 9 & 10 & 11 & 12 & 13 \\ \hline \end{bmatrix}$	NC 2B NC 2A NC
	NC NC NC NC NC	

NC - No internal connection

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### absolute maximum ratings over operating free-air temperature range (unless otherwise noted)<sup>†</sup>

		SN55'	SN75'	UNIT
Supply voltage, V <sub>CC</sub> (see Note 1)	7	7	V	
Input voltage, VI		5.5	5.5	V
Intermitter voltage (see Note 2)		5.5	5.5	V
Off-state output voltage, VO		35	35	V
Continuous collector or output current (see Note 3)	400	400	mA	
Peak collector or output current (t <sub>W</sub> $\leq$ 10 ms, duty cycle $\leq$ 50%, see N	500	500	mA	
Continuous total power dissipation		See Dissipation Rating Table		
Operating free-air temperature range, TA		-55 to 125	0 to 70	°C
Storage temperature range, T <sub>stg</sub>		-65 to 150	-65 to 150	°C
Case temperature for 60 seconds, T <sub>C</sub>	FK package	260		°C
Lead temperature 1,6 mm (1/16 inch) from case for 60 seconds	JG package	300		°C
Lead temperature 1,6 mm (1/16 inch) from case for 10 seconds	D or P package		260	°C

<sup>†</sup> 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.

NOTES: 1. Voltage values are with respect to network GND unless otherwise specified.

- 2. This is the voltage between two emitters A and B.
- 3. This value applies when the base-emitter resistance (R\_BE) is equal to or less than 500  $\Omega$ .
- 4. Both halves of these dual circuits may conduct rated current simultaneously; however, power dissipation averaged over a short time interval must fall within the continuous dissipation rating.

#### DISSIPATION RATING TABLE

PACKAGE	$T_A \le 25^{\circ}C$ POWER RATING	DERATING FACTOR ABOVE T <sub>A</sub> = 25°C	T <sub>A</sub> = 70°C POWER RATING	T <sub>A</sub> = 125°C POWER RATING
D	725 mW	5.8 mW/°C	464 mW	-
FK	1375 mW	11.0 mW/°C	880 mW	275 mW
JG	1050 mW	8.4 mW/°C	672 mW	210 mW
Р	1000 mW	8.0 mW/°C	640 mW	-

#### recommended operating conditions

		SN55'			SN75'		
	MIN	NOM	MAX	MIN	NOM	MAX	UNIT
Supply voltage, V <sub>CC</sub>	4.5	5	5.5	4.75	5	5.25	V
High-level input voltage, VIH	2			2			V
Low-level input voltage, VIL			0.8			0.8	V
Operating free-air temperature, T <sub>A</sub>	-55		125	0		70	°C



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### logic symbol<sup>†</sup>

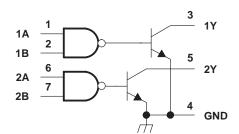


<sup>†</sup> This symbol is in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.

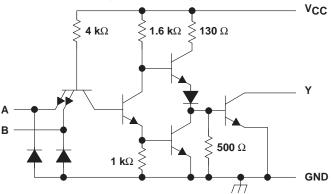
Pin numbers shown are for D, JG, and P packages.

Α	В	Y
L	L	L (on state)
L	Н	L (on state)
Н	L	L (on state)
Н	Н	H (off state)

### logic diagram (positive logic)



### schematic (each driver)



Resistor values shown are nominal.

#### electrical characteristics over recommended operating free-air temperature range

				5	SN55461		5	SN75461		
	PARAMETER		TEST CONDITIONS <sup>†</sup>		TYP‡	MAX	MIN	TYP‡	MAX	UNIT
VIK	Input clamp voltage	$V_{CC} = MIN,$	lj = -12 mA		-1.2	-1.5		-1.2	-1.5	V
Iон	High-level output current	V <sub>CC</sub> = MIN, V <sub>OH</sub> = 35 V	V <sub>IH</sub> = MIN,			300			100	μΑ
	V <sub>OL</sub> Low-level output voltage	$V_{CC} = MIN,$ $I_{OL} = 100 \text{ mA}$			0.25	0.5		0.25	0.4	
VOL		$V_{CC} = MIN,$ $I_{OL} = 300 \text{ mA}$			0.5	0.8		0.5	0.7	V
lj –	Input current at maximum input voltage	$V_{CC} = MAX,$	Vj = 5.5 V			1			1	mA
Iн	High-level input current	$V_{CC} = MAX,$	VI = 2.4 V			40			40	μΑ
۱ <sub>IL</sub>	Low-level input current	$V_{CC} = MAX,$	VI = 0.4 V		-1	-1.6		-1	-1.6	mA
ІССН	Supply current, outputs high	$V_{CC} = MAX,$	VI = 5 V		8	11		8	11	mA
ICCL	Supply current, outputs low	$V_{CC} = MAX,$	$V_{I} = 0$		56	76		56	76	mA

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

<sup>‡</sup> All typical values are at V<sub>CC</sub> = 5 V, T<sub>A</sub> = 25°C.

# switching characteristics, V<sub>CC</sub> = 5 V, T<sub>A</sub> = 25°C

	PARAMETER			TEST CONDITIONS			MAX	UNIT
t <sub>PLH</sub>	Propagation delay time, low-to-high-level o	utput				30	55	
<sup>t</sup> PHL	PHL Propagation delay time, high-to-low-level output		l <sub>O</sub> ≈ 200 mA,	C <sub>I</sub> = 15 pF,		25	40	
<sup>t</sup> TLH			R <sub>L</sub> = 50 Ω,	See Figure 1		8	20	ns
<sup>t</sup> THL	Transition time, high-to-low-level output		7			10	20	
Varia		SN55461	V <sub>S</sub> = 30 V,	I <u>O</u> ≈ 300 mA,		V <sub>S</sub> -10		
VOH	High-level output voltage after switching	SN75461	See Figure 2	-	V <sub>S</sub> -10			mV



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### logic symbol<sup>†</sup>



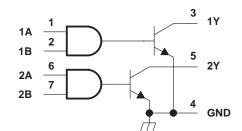
<sup>†</sup> This symbol is in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.

Pin numbers shown are for D, JG, and P packages.

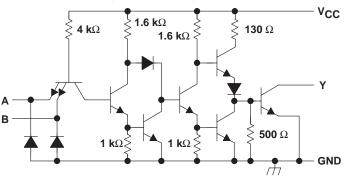
F١	JN	СТ	10	Ν	TA	BL	E
	-		-	-	-	-	

	(each driver)						
	Α	В	Y				
	L	L	H (off state)				
	L	Н	H (off state)				
	н	L	H (off state)				
	Н	Н	L (on state)				
I	positive logic: Y = $\overline{AB}$ or $\overline{A}$ + $\overline{B}$						
	Y = AB  or  A + B						

logic diagram (positive logic)



### schematic (each driver)



Resistor values shown are nominal.

### electrical characteristics over recommended operating free-air temperature range

					SN55462			SN75462		
	PARAMETER	TEST CON	TEST CONDITIONS <sup>†</sup>		MIN TYP <sup>‡</sup> MAX		MIN	MIN TYP <sup>‡</sup> MAX		UNIT
VIK	Input clamp voltage	$V_{CC} = MIN,$	l <sub>l</sub> = –12 mA		-1.2	-1.5		-1.2	-1.5	V
ЮН	High-level output current	V <sub>CC</sub> = MIN, V <sub>OH</sub> = 35 V	V <sub>IL</sub> = 0.8 V,			300			100	μA
	$V_{CC} = MIN,$ $I_{OL} = 100 \text{ mA}$			0.25	0.5		0.25	0.4	Ň	
VOL	Low-level output voltage	$V_{CC} = MIN,$ $I_{OL} = 300 \text{ mA}$			0.5	0.8		0.5	0.7	V
Ц	Input current at maximum input voltage	$V_{CC} = MAX,$	VI = 5.5 V			1			1	mA
Iн	High-level input current	$V_{CC} = MAX,$	V <sub>I</sub> = 2.4 V			40			40	μΑ
۱ <sub>IL</sub>	Low-level input current	$V_{CC} = MAX,$	VI = 0.4 V		-1.1	-1.6		-1.1	-1.6	mA
Іссн	Supply current, outputs high	$V_{CC} = MAX,$	$V_{I} = 0$		13	17		13	17	mA
ICCL	Supply current, outputs low	$V_{CC} = MAX,$	V <sub>I</sub> = 5 V		61	76		61	76	mA

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

### switching characteristics, $V_{CC} = 5 V$ , $T_A = 25^{\circ}C$

	PARAMETER	TEST CC	MIN	TYP	MAX	UNIT			
<sup>t</sup> PLH	Propagation delay time, low-to-high-level o	utput				45	65		
<sup>t</sup> PHL	tPHL Propagation delay time, high-to-low-level output			C <sub>L</sub> = 15 pF,		30	50		
<sup>t</sup> TLH	Transition time, low-to-high-level output	R <sub>L</sub> = 50 Ω,	See Figure 1		13	25	ns		
<sup>t</sup> THL	THL Transition time, high-to-low-level output					10	20		
Val	High lovel output veltage offer owitching	SN55462	V <sub>S</sub> = 30 V,	I <sub>O</sub> ≈ 300 mA,		V <sub>S</sub> -10		mV	
VOH	High-level output voltage after switching	SN75462	See Figure 2	-	V <sub>S</sub> -10			IIIV	



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### logic symbol<sup>†</sup>



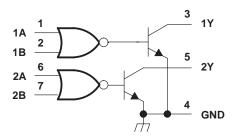
<sup>†</sup> This symbol is in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.

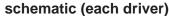
Pin numbers shown are for D, JG, and P packages.

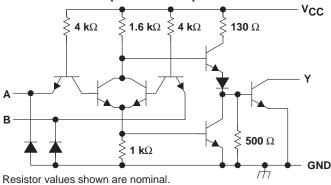
FUNC	τιο	Ν	TA	BLE	
,					

(each driver)										
Α	В	Y								
L	L	L (on state)								
L	Н	H (off state)								
н	L	H (off state)								
н	Н	H (off state)								
positive logic: Y = A + B or $\overline{A}\overline{B}$										

### logic diagram (positive logic)







### electrical characteristics over recommended operating free-air temperature range

					SN55463		SN75463			
	PARAMETER	TEST CONDITIONS	ł	MIN	TYP <sup>‡</sup>	MAX	MIN	TYP <sup>‡</sup>	MAX	UNIT
VIK	Input clamp voltage	$V_{CC} = MIN$ , $I_I = -12 \text{ n}$	nA		-1.2	-1.5		-1.2	-1.5	V
IOH	High-level output current	$V_{CC} = MIN, V_{IH} = MIN$ $V_{OH} = 35 V$	۷,			300			100	μΑ
V <sub>OL</sub> Low-level output voltage		$V_{CC} = MIN, V_{IL} = 0.8$ $I_{OL} = 100 \text{ mA}$	V,		0.25	0.5		0.25	0.4	
	Low-level output voltage	$V_{CC} = MIN, V_{IL} = 0.8$ $I_{OL} = 300 \text{ mA}$	V,		0.5	0.8		0.5	0.7	V
Ιį	Input current at maximum input voltage	$V_{CC} = MAX, V_I = 5.5 V$	/			1			1	mA
IIН	High-level input current	$V_{CC} = MAX, V_I = 2.4 V$	/			40			40	μΑ
۱ <sub>IL</sub>	Low-level input current	$V_{CC} = MAX, V_I = 0.4 V$	/		-1	-1.6		-1	-1.6	mA
ICCH	Supply current, outputs high	$V_{CC} = MAX, V_I = 5 V$			8	11		8	11	mA
ICCL	Supply current, outputs low	$V_{CC} = MAX, V_I = 0$			58	76		58	76	mA

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

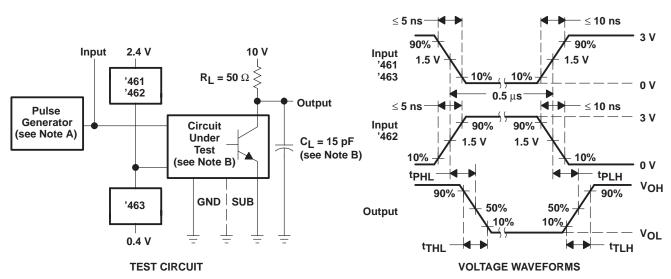
<sup>‡</sup> All typical values are at V<sub>CC</sub> = 5 V,  $T_A = 25^{\circ}C$ .

# switching characteristics, $V_{CC} = 5 V$ , $T_A = 25^{\circ}C$

	PARAMETER	TEST CC	TEST CONDITIONS			MAX	UNIT		
<sup>t</sup> PLH	Propagation delay time, low-to-high-level of	utput				30	55		
<sup>t</sup> PHL	PHL Propagation delay time, high-to-low-level output			C <sub>L</sub> = 15 pF, See Figure 1		25	40		
<sup>t</sup> TLH						8	25	ns	
<sup>t</sup> THL	tTHL Transition time, high-to-low-level output					10	25		
Varia		SN55463	V <sub>S</sub> = 30 V,	l <sub>O</sub> ≈ 300 mA,		V <sub>S</sub> -10		mV	
Vон	High-level output voltage after switching	SN75463	See Figure 2	-	V <sub>S</sub> -10			IIIV	



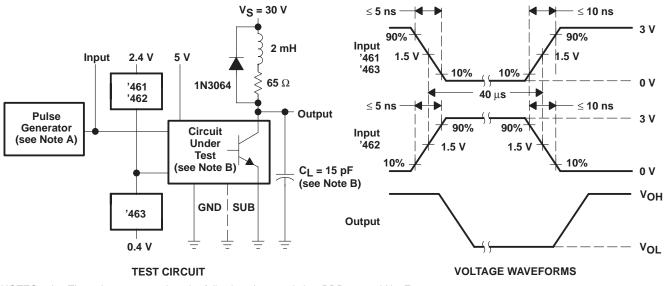
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### PARAMETER MEASUREMENT INFORMATION







NOTES: A. The pulse generator has the following characteristics: PRR  $\leq$  12.5 kHz, Z<sub>O</sub> = 50  $\Omega$ . B. C<sub>L</sub> includes probe and jig capacitance.

#### Figure 2. Test Circuit and Voltage Waveforms for Latch-Up Test





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25-Jan-2012

### **PACKAGING INFORMATION**

Orderable Device	Status <sup>(1)</sup>	Package Type	Package Drawing	Pins	Package Qty	Eco Plan <sup>(2)</sup>	Lead/ Ball Finish	MSL Peak Temp <sup>(3)</sup>	Samples (Requires Login)
JM38510/12908BPA	ACTIVE	CDIP	JG	8	1	TBD	A42	N / A for Pkg Type	
JM38510/12909BPA	OBSOLETE	CDIP	JG	8		TBD	Call TI	Call TI	
M38510/12908BPA	ACTIVE	CDIP	JG	8	1	TBD	A42	N / A for Pkg Type	
SN55461JG	OBSOLETE	CDIP	JG	8		TBD	Call TI	Call TI	
SN55462JG	OBSOLETE	CDIP	JG	8		TBD	Call TI	Call TI	
SN55463JG	OBSOLETE	CDIP	JG	8		TBD	Call TI	Call TI	
SN75461D	OBSOLETE	SOIC	D	8		TBD	Call TI	Call TI	
SN75461P	OBSOLETE	PDIP	Р	8		TBD	Call TI	Call TI	
SN75462D	ACTIVE	SOIC	D	8	75	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
SN75462DE4	ACTIVE	SOIC	D	8	75	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
SN75462DG4	ACTIVE	SOIC	D	8	75	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
SN75462DR	ACTIVE	SOIC	D	8	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
SN75462DRE4	ACTIVE	SOIC	D	8	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
SN75462DRG4	ACTIVE	SOIC	D	8	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
SN75462P	ACTIVE	PDIP	Р	8	50	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type	
SN75462PE4	ACTIVE	PDIP	Р	8	50	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type	
SN75463D	OBSOLETE	SOIC	D	8		TBD	Call TI	Call TI	
SN75463DR	OBSOLETE	SOIC	D	8		TBD	Call TI	Call TI	
SN75463P	ACTIVE	PDIP	Р	8	50	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type	
SN75463PE4	ACTIVE	PDIP	Р	8	50	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type	
SNJ55461FK	OBSOLETE	LCCC	FK	20		TBD	Call TI	Call TI	
SNJ55461JG	OBSOLETE	CDIP	JG	8		TBD	Call TI	Call TI	
SNJ55462FK	ACTIVE	LCCC	FK	20	1	TBD	POST-PLATE	N / A for Pkg Type	
SNJ55462JG	ACTIVE	CDIP	JG	8	1	TBD	A42	N / A for Pkg Type	
SNJ55463JG	OBSOLETE	CDIP	JG	8		TBD	Call TI	Call TI	



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(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) Eco Plan - The planned eco-friendly classification: Pb-Free (RoHS), Pb-Free (RoHS Exempt), or Green (RoHS & no Sb/Br) - please check http://www.ti.com/productcontent for the latest availability information and additional product content details.

**TBD:** The Pb-Free/Green conversion plan has not been defined.

**Pb-Free (RoHS):** TI's terms "Lead-Free" or "Pb-Free" mean semiconductor products that are compatible with the current RoHS requirements for all 6 substances, including the requirement that lead not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, TI Pb-Free products are suitable for use in specified lead-free processes.

Pb-Free (RoHS Exempt): This component has a RoHS exemption for either 1) lead-based flip-chip solder bumps used between the die and package, or 2) lead-based die adhesive used between the die and leadframe. The component is otherwise considered Pb-Free (RoHS compatible) as defined above.

Green (RoHS & no Sb/Br): TI defines "Green" to mean Pb-Free (RoHS compatible), and free of Bromine (Br) and Antimony (Sb) based flame retardants (Br or Sb do not exceed 0.1% by weight in homogeneous material)

<sup>(3)</sup> MSL, Peak Temp. -- The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.

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#### OTHER QUALIFIED VERSIONS OF SN55461, SN55462, SN55463, SN75461, SN75462, SN75463 :

• Catalog: SN75461, SN75462, SN75463

• Military: SN55461, SN55462, SN55463

NOTE: Qualified Version Definitions:

- Catalog TI's standard catalog product
- Military QML certified for Military and Defense Applications

### TAPE AND REEL INFORMATION





# QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE



*All dimensions a	are nominal
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Device		Package Drawing			Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
SN75462DR	SOIC	D	8	2500	330.0	12.4	6.4	5.2	2.1	8.0	12.0	Q1



# PACKAGE MATERIALS INFORMATION

19-Mar-2008



\*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
SN75462DR	SOIC	D	8	2500	340.5	338.1	20.6

# **MECHANICAL DATA**

MCER001A - JANUARY 1995 - REVISED JANUARY 1997



#### **CERAMIC DUAL-IN-LINE**



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.
- E. Falls within MIL STD 1835 GDIP1-T8



LEADLESS CERAMIC CHIP CARRIER

FK (S-CQCC-N\*\*) 28 TERMINAL SHOWN



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 metal lid.
- D. Falls within JEDEC MS-004



P(R-PDIP-T8)

PLASTIC DUAL-IN-LINE PACKAGE



- A. All linear dimensions are in inches (millimeters).B. This drawing is subject to change without notice.
- C. Falls within JEDEC MS-001 variation BA.



D (R-PDSO-G8)

PLASTIC SMALL OUTLINE



NOTES: 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 AA.



# LAND PATTERN DATA



NOTES: 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.



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