

## DUAL NON-INVERTING POWER DRIVER

### FEATURES

- 3.0A Peak Current Totem Pole Output
- 5 to 35V Operation
- 25ns Rise and Fall Times
- 25ns Propagation Delays
- Thermal Shutdown and Under-Voltage Protection
- High-Speed, Power MOSFET Compatible
- Efficient High Frequency Operation
- Low Cross-Conduction Current Spike
- Enable and Shutdown Functions
- Wide Input Voltage Range
- ESD Protection to 2kV

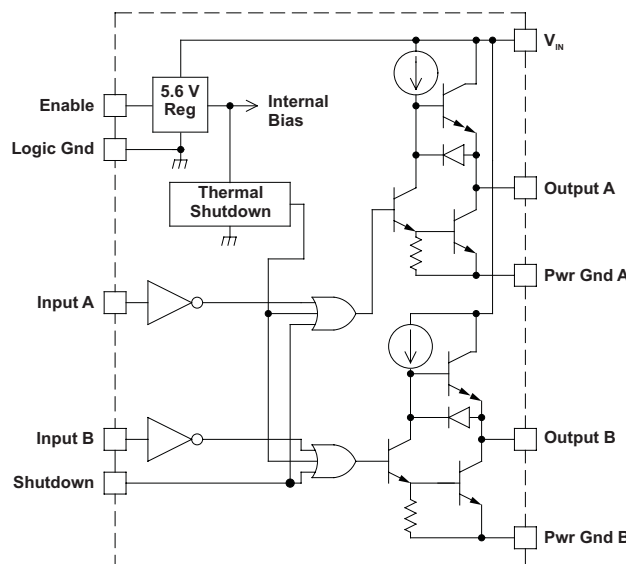
### DESCRIPTION

The UC1708 family of power drivers is made with a high-speed, high-voltage, Schottky process to interface control functions and high-power switching devices – particularly power MOSFETs. Operating over a 5 V to 35 V supply range, these devices contain two independent channels. The A and B inputs are compatible with TTL and CMOS logic families, but can withstand input voltages as high as  $V_{IN}$ . Each output can source or sink up to 3 A as long as power dissipation limits are not exceeded.

Although each output can be activated independently with its own inputs, they can be forced low in common through the action of either a digital high signal at the Shutdown terminal or by forcing the Enable terminal low. The Shutdown terminal will only force the outputs low, it will not effect the behavior of the rest of the device. The Enable terminal effectively places the device in under-voltage lockout, reducing power consumption by as much as 90%. During under-voltage and disable (Enable terminal forced low) conditions, the outputs are held in a self-biasing, low-voltage, state.

The UC3708 and UC2708 are available in plastic 8-pin MINI DIP and 16-pin *bat-wing* DIP packages for commercial operation over a 0°C to 70°C temperature range and industrial temperature range of –25°C to 85°C respectively. For operation over a –55°C to 125°C temperature range, the UC1708 is available in hermetically sealed 8-pin MINI CDIP, 16 pin CDIP and 20 pin CLCC packages. Surface mount devices are also available.

### BLOCK DIAGRAM



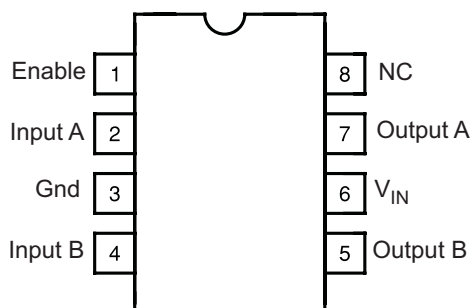
NOTE: Shutdown feature is not available in J or N packages only.



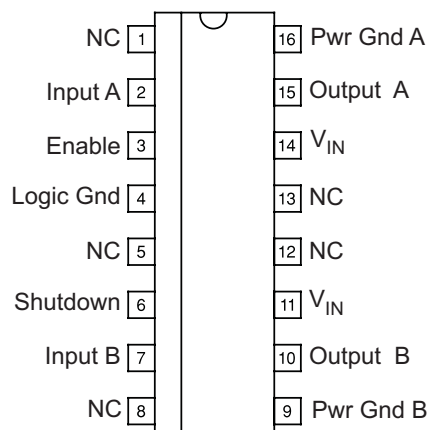
Please be aware that an important notice concerning availability, standard warranty, and use in critical applications of Texas Instruments semiconductor products and disclaimers thereto appears at the end of this data sheet.

## CONNECTION DIAGRAMS

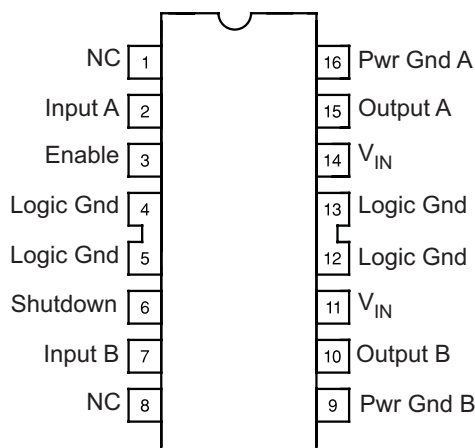
**DIL-8 (Top View)**  
J Or N Package



**SOIC-16 (Top View)**  
DW Package

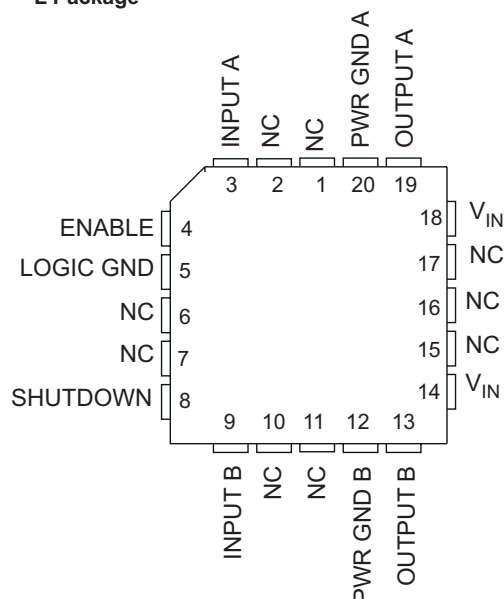


**DIL-16 (Top View)**  
JE Or NE Package



Note: In JE package, Pin 4 is Logic Ground.  
Pins 5, 12, and 13 are no connect.

**CLCC-20 (Top View)**  
L Package



## ABSOLUTE MAXIMUM RATINGS<sup>(1)</sup>

		VALUE	UNIT
Supply Voltage, $V_{IN}$		35	V
Output Current (Each Output, Source or Sink)	Steady-State	0.5	A
	Peak Transient	3	A
Output Voltage		–0.3 to ( $V_{IN} + 0.3$ )	V
Enable and Shutdown Inputs		–0.3 to 6.2	V
A and B Inputs		–0.3 to ( $V_{IN} + 0.3$ )	V
Operating Junction Temperature <sup>(2)</sup>		150	°C
Storage Temperature Range		–65 to 150	°C
Lead Temperature (Soldering, 10 Seconds)		300	°C

(1) All voltages are with respect to Logic Gnd pin. All currents are positive into, negative out of, device terminals.

(2) Consult Unitorde Integrated Circuits databook for information regarding thermal specifications and limitations of packages.

## ELECTRICAL CHARACTERISTICS

Unless otherwise stated,  $V_{IN}$  = 10V to 35V, and these specifications apply for:  $-55^{\circ}\text{C} < T_A < 125^{\circ}\text{C}$  for the UC1708,  $-25^{\circ}\text{C} < T_A < 85^{\circ}\text{C}$  for the UC2708, and  $0^{\circ}\text{C} < T_A < 70^{\circ}\text{C}$  for the UC3708,  $T_A = T_J$

PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT
$V_{IN}$	Supply current	Outputs low		18	26	mA
		Outputs high		14	18	
		Enable = 0 V		1	4	
	A, B and shutdown inputs low level				0.8	V
	A, B and shutdown inputs high level		2.0			V
	A, B Input current low	$V_{A,B} = 0.4\text{V}$	–1	–0.6		mA
	A, B Input current high	$V_{A,B} = 2.4\text{V}$	–200		50	A
	A, B Input leakage current high	$V_{A,B} = 35.3\text{V}$			200	A
	Shutdown input current low	$V_{SHUTDOWN} = 0.4\text{V}$		20	100	A
	Shutdown input current high	$V_{SHUTDOWN} = 2.4\text{V}$		170	500	A
		$V_{SHUTDOWN} = 6.2\text{V}$		0.6	1.5	mA
	Enable input current low	$V_{ENABLE} = 0\text{V}$	–600	–460	200	A
	Enable input current high	$V_{ENABLE} = 6.2\text{V}$			200	A
	Enable threshold rising			2.8	3.6	V
	Enable threshold falling		1.0	2.4	3.4	V
$V_{IN} - V_{OUT}$	Output High Saturation	$I_{OUT} = -50\text{mA}$			2.0	V
		$I_{OUT} = -500\text{mA}$			2.5	V
$V_{OUT}$	Output Low Saturation	$I_{OUT} = 50\text{mA}$			0.5	V
		$I_{OUT} = 500\text{mA}$			2.5	V
	Thermal Shutdown			155		°C

## SWITCHING CHARACTERISTICS (see [Figure 1](#))

(VIN = 20V, delays measured to 10% output change.)

PARAMETER	TEST CONDITIONS		MIN	TYP	MAX	UNIT
FROM A,B INPUT TO OUTPUT:						
Rise Time Delay (TPLH)	CL = 0pF		25	40	ns	
	CL = 1000pF	UC1708	25	45	ns	
		UC2708/UC3708	25	40		
	CL = 2200pF	UC1708	25	50	ns	
		UC2708/UC3708	25	45		
10% to 90% Rise (TTLH)	CL = 0pF		55	75	ns	
	CL = 1000pF <sup>(1)</sup>	UC1708	25	80	ns	
		UC2708/UC3708	25	50		
	CL = 2200pF	UC1708	40	85	ns	
		UC2708/UC3708	40	55		
Fall Time Delay (TPHL)	CL = 0pF		25	40	ns	
	CL = 1000pF <sup>(1)</sup>		25	45		
	CL = 2200pF		35	50		
90% to 10% Fall (TTHL)	CL = 0pF		15	20	ns	
	CL = 1000pF <sup>(1)</sup>		25	45		
	CL = 2200pF		40	55		

(1) These parameters, specified at 1000pF, although ensured over recommended operating conditions, are not tested in production.

## SWITCHING CHARACTERISTICS (see [Figure 1](#))

(VIN = 20V, delays measured to 10% output change.)

PARAMETER	TEST CONDITIONS		MIN	TYP	MAX	UNIT
FROM SHUTDOWN INPUT TO OUTPUT:						
Rise Time Delay (TPLH)	CL = 0pF		25	75	ns	
	CL = 1000pF <sup>(1)</sup>	UC1708	30	80	ns	
		UC2708/UC3708	30	75		
	CL = 2200pF	UC1708	35	85	ns	
		UC2708/UC3708	35	75		
10% to 90% Rise (TTLH)	CL = 0pF		50	75	ns	
	CL = 1000pF <sup>(1)</sup>	UC1708	25	80	ns	
		UC2708/UC3708	25	50		
	CL = 2200pF	UC1708	40	85	ns	
		UC2708/UC3708	40	55		
Fall Time Delay (TPHL)	CL = 0pF		25	45	ns	
	CL = 1000pF <sup>(1)</sup>		30	50		
	CL = 2200pF		35	55		
90% to 10% Fall (TTHL)	CL = 0pF		25	20	ns	
	CL = 1000pF <sup>(1)</sup>		25	45		
	CL = 2200pF		40	55		
Total Supply Current	F = 200kHz, 50% duty cycle, both channels; CL = 0pF		23	25	mA	
	F = 200kHz, 50% duty cycle, both channels; CL = 2200pF		38	45		

(1) These parameters, specified at 1000pF, although ensured over recommended operating conditions, are not tested in production.

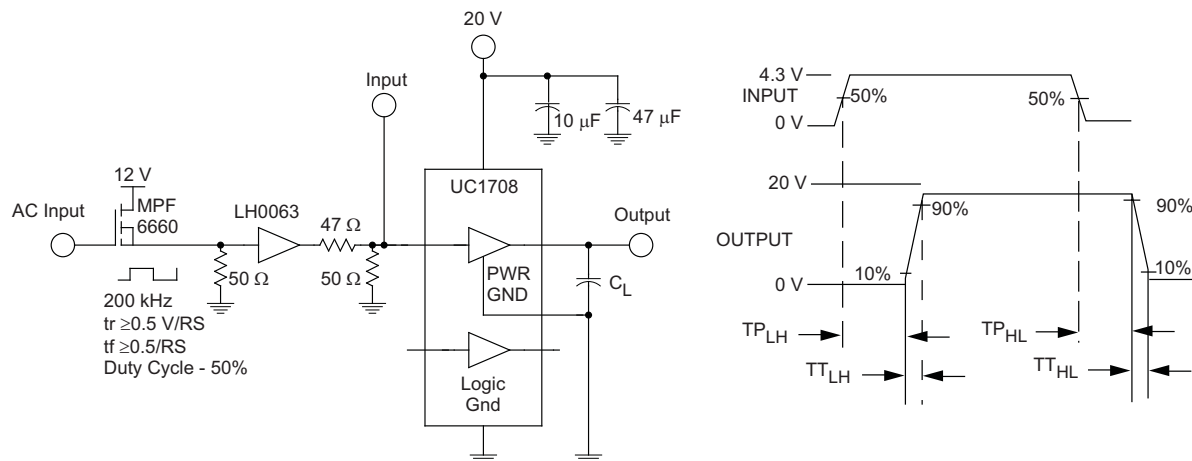
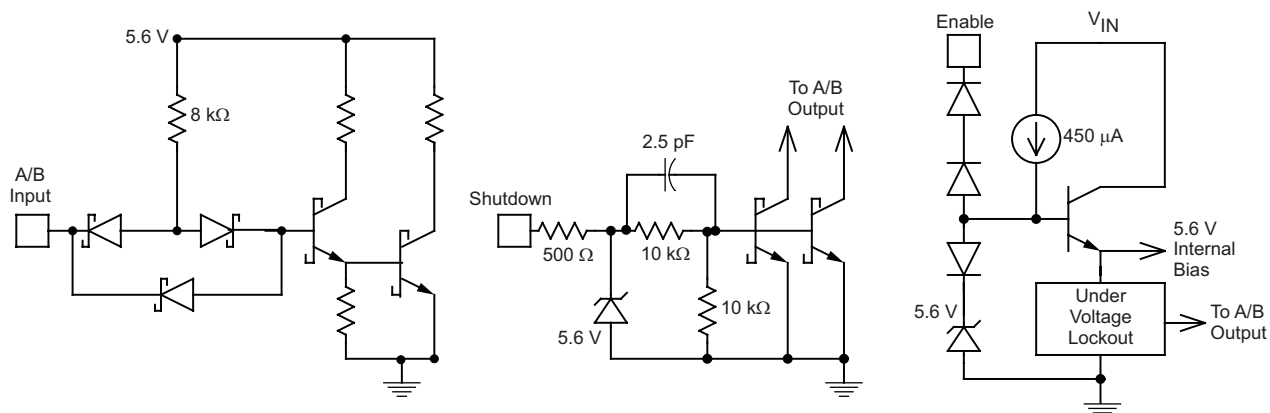


Figure 1. AC Test Circuit and Switching Time Waveforms



NOTE: Shutdown feature available only in JE, NE or DW Packages.

Figure 2. Equivalent Input Circuits

**PACKAGING INFORMATION**

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead/Ball Finish	MSL Peak Temp (3)	Op Temp (°C)	Device Marking (4/5)	Samples
5962-0051401Q2A	ACTIVE	LCCC	FK	20	1	TBD	POST-PLATE	N / A for Pkg Type	-55 to 125	5962-0051401Q2A UC1708L/ 883B	<a href="#">Samples</a>
5962-0051401QEA	ACTIVE	CDIP	J	16	1	TBD	A42	N / A for Pkg Type	-55 to 125	5962-0051401QE A UC1708JE/883B	<a href="#">Samples</a>
5962-0051401QPA	ACTIVE	CDIP	JG	8	1	TBD	A42	N / A for Pkg Type	-55 to 125	0051401QPA UC1708	<a href="#">Samples</a>
5962-0051401V2A	ACTIVE	LCCC	FK	20	1	TBD	POST-PLATE	N / A for Pkg Type	-55 to 125	5962-0051401V2A UC1708L QMLV	<a href="#">Samples</a>
5962-0051401VEA	ACTIVE	CDIP	J	16	1	TBD	A42	N / A for Pkg Type	-55 to 125	5962-0051401VE A UC1708JEQMLV	<a href="#">Samples</a>
5962-0051401VPA	ACTIVE	CDIP	JG	8	1	TBD	A42	N / A for Pkg Type	-55 to 125	0051401VPA UC1708	<a href="#">Samples</a>
UC1708J	ACTIVE	CDIP	JG	8	1	TBD	A42	N / A for Pkg Type	-55 to 125	UC1708J	<a href="#">Samples</a>
UC1708J883B	ACTIVE	CDIP	JG	8	1	TBD	A42	N / A for Pkg Type	-55 to 125	0051401QPA UC1708	<a href="#">Samples</a>
UC1708JE	ACTIVE	CDIP	J	16	1	TBD	A42	N / A for Pkg Type	-55 to 125	UC1708JE	<a href="#">Samples</a>
UC1708JE883B	ACTIVE	CDIP	J	16	1	TBD	A42	N / A for Pkg Type	-55 to 125	5962-0051401QE A UC1708JE/883B	<a href="#">Samples</a>
UC1708L883B	ACTIVE	LCCC	FK	20	1	TBD	POST-PLATE	N / A for Pkg Type	-55 to 125	5962-0051401Q2A UC1708L/ 883B	<a href="#">Samples</a>
UC2708D	OBSOLETE		UTR			TBD	Call TI	Call TI	-40 to 85		
UC2708DW	ACTIVE	SOIC	DW	16	40	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1 YEAR	-40 to 85	UC2708DW	<a href="#">Samples</a>
UC2708DWG4	ACTIVE	SOIC	DW	16	40	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1 YEAR	-40 to 85	UC2708DW	<a href="#">Samples</a>

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead/Ball Finish	MSL Peak Temp (3)	Op Temp (°C)	Device Marking (4/5)	Samples
UC2708DWTR	ACTIVE	SOIC	DW	16	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1 YEAR	-40 to 85	UC2708DW	<a href="#">Samples</a>
UC2708DWTRG4	ACTIVE	SOIC	DW	16	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1 YEAR	-40 to 85	UC2708DW	<a href="#">Samples</a>
UC2708J	OBSOLETE		UTR			TBD	Call TI	Call TI	-40 to 85		
UC2708JE	OBSOLETE		UTR			TBD	Call TI	Call TI	-40 to 85		
UC2708N	ACTIVE	PDIP	P	8	50	Green (RoHS & no Sb/Br)	CU NIPDAU	N / A for Pkg Type	-40 to 85	UC2708N	<a href="#">Samples</a>
UC2708NG4	ACTIVE	PDIP	P	8	50	Green (RoHS & no Sb/Br)	CU NIPDAU	N / A for Pkg Type	-40 to 85	UC2708N	<a href="#">Samples</a>
UC2708Q	OBSOLETE		UTR			TBD	Call TI	Call TI	-40 to 85		
UC3708DW	ACTIVE	SOIC	DW	16	40	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1 YEAR	0 to 70	UC3708DW	<a href="#">Samples</a>
UC3708DWG4	ACTIVE	SOIC	DW	16	40	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1 YEAR	0 to 70	UC3708DW	<a href="#">Samples</a>
UC3708DWTR	ACTIVE	SOIC	DW	16	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1 YEAR	0 to 70	UC3708DW	<a href="#">Samples</a>
UC3708DWTRG4	ACTIVE	SOIC	DW	16	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1 YEAR	0 to 70	UC3708DW	<a href="#">Samples</a>
UC3708N	ACTIVE	PDIP	P	8	50	Green (RoHS & no Sb/Br)	CU NIPDAU	N / A for Pkg Type	0 to 70	UC3708N	<a href="#">Samples</a>
UC3708NE	ACTIVE	PDIP	N	16	25	Green (RoHS & no Sb/Br)	CU NIPDAU	N / A for Pkg Type	0 to 70	UC3708NE	<a href="#">Samples</a>
UC3708NEG4	ACTIVE	PDIP	N	16	25	Green (RoHS & no Sb/Br)	CU NIPDAU	N / A for Pkg Type	0 to 70	UC3708NE	<a href="#">Samples</a>
UC3708NG4	ACTIVE	PDIP	P	8	50	Green (RoHS & no Sb/Br)	CU NIPDAU	N / A for Pkg Type	0 to 70	UC3708N	<a href="#">Samples</a>
UC3708Q	OBSOLETE		UTR			TBD	Call TI	Call TI	0 to 70		

(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)

(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.

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#### **OTHER QUALIFIED VERSIONS OF UC1708, UC1708-SP, UC3708 :**

● Catalog: [UC3708](#), [UC1708](#)

● Military: [UC1708](#)

● Space: [UC1708-SP](#)

NOTE: Qualified Version Definitions:

- Catalog - TI's standard catalog product
- Military - QML certified for Military and Defense Applications
- Space - Radiation tolerant, ceramic packaging and qualified for use in Space-based application



**TAPE AND REEL INFORMATION**


\*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
UC2708DWTR	SOIC	DW	16	2000	330.0	16.4	10.75	10.7	2.7	12.0	16.0	Q1
UC3708DWTR	SOIC	DW	16	2000	330.0	16.4	10.75	10.7	2.7	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)
UC2708DWTR	SOIC	DW	16	2000	367.0	367.0	38.0
UC3708DWTR	SOIC	DW	16	2000	367.0	367.0	38.0

## JG (R-GDIP-T8)

## CERAMIC DUAL-IN-LINE



- NOTES:
- All linear dimensions are in inches (millimeters).
  - This drawing is subject to change without notice.
  - This package can be hermetically sealed with a ceramic lid using glass frit.
  - Index point is provided on cap for terminal identification.
  - Falls within MIL STD 1835 GDIP1-T8

J (R-GDIP-T\*\*)

14 LEADS SHOWN

# CERAMIC DUAL IN-LINE PACKAGE



PINS ** DIM	14	16	18	20
A	0.300 (7,62) BSC	0.300 (7,62) BSC	0.300 (7,62) BSC	0.300 (7,62) BSC
B MAX	0.785 (19,94)	.840 (21,34)	0.960 (24,38)	1.060 (26,92)
B MIN	—	—	—	—
C MAX	0.300 (7,62)	0.300 (7,62)	0.310 (7,87)	0.300 (7,62)
C MIN	0.245 (6,22)	0.245 (6,22)	0.220 (5,59)	0.245 (6,22)



4040083/F 03/03

- NOTES:
- 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.

FK (S-CQCC-N\*\*)

LEADLESS CERAMIC CHIP CARRIER

28 TERMINAL SHOWN



NO. OF TERMINALS **	A		B	
	MIN	MAX	MIN	MAX
20	0.342 (8,69)	0.358 (9,09)	0.307 (7,80)	0.358 (9,09)
28	0.442 (11,23)	0.458 (11,63)	0.406 (10,31)	0.458 (11,63)
44	0.640 (16,26)	0.660 (16,76)	0.495 (12,58)	0.560 (14,22)
52	0.740 (18,78)	0.761 (19,32)	0.495 (12,58)	0.560 (14,22)
68	0.938 (23,83)	0.962 (24,43)	0.850 (21,6)	0.858 (21,8)
84	1.141 (28,99)	1.165 (29,59)	1.047 (26,6)	1.063 (27,0)



4040140/D 01/11

- NOTES:
- All linear dimensions are in inches (millimeters).
  - This drawing is subject to change without notice.
  - This package can be hermetically sealed with a metal lid.
  - Falls within JEDEC MS-004

P (R-PDIP-T8)

PLASTIC DUAL-IN-LINE PACKAGE



- NOTES:
- 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.

N (R-PDIP-T\*\*)

16 PINS SHOWN

## PLASTIC DUAL-IN-LINE PACKAGE



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)
MS-001 VARIATION	AA	BB	AC	AD

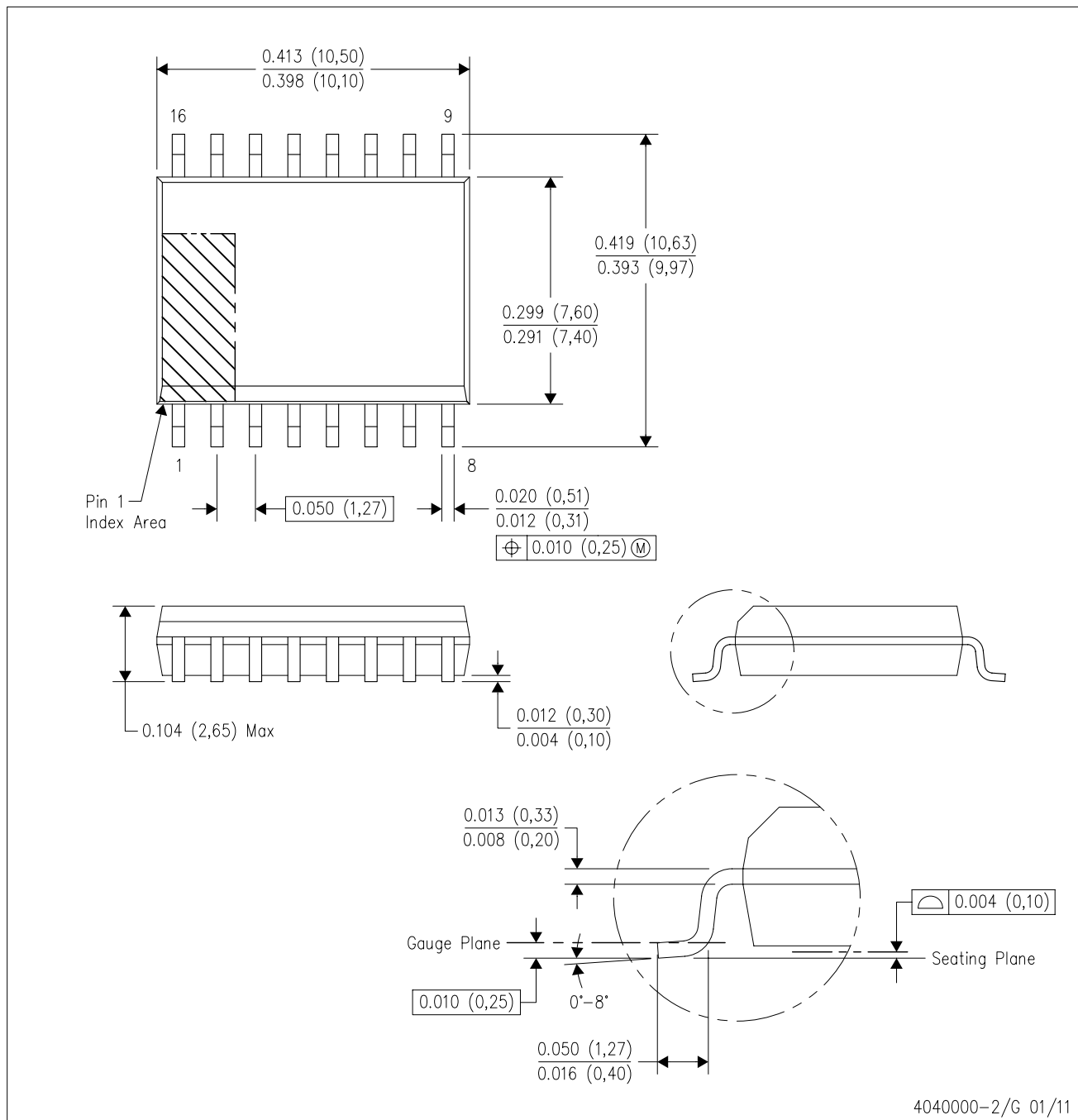


4040049/E 12/2002

- NOTES:
- A. All linear dimensions are in inches (millimeters).
  - B. This drawing is subject to change without notice.
  -  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.

DW (R-PDSO-G16)

PLASTIC SMALL OUTLINE

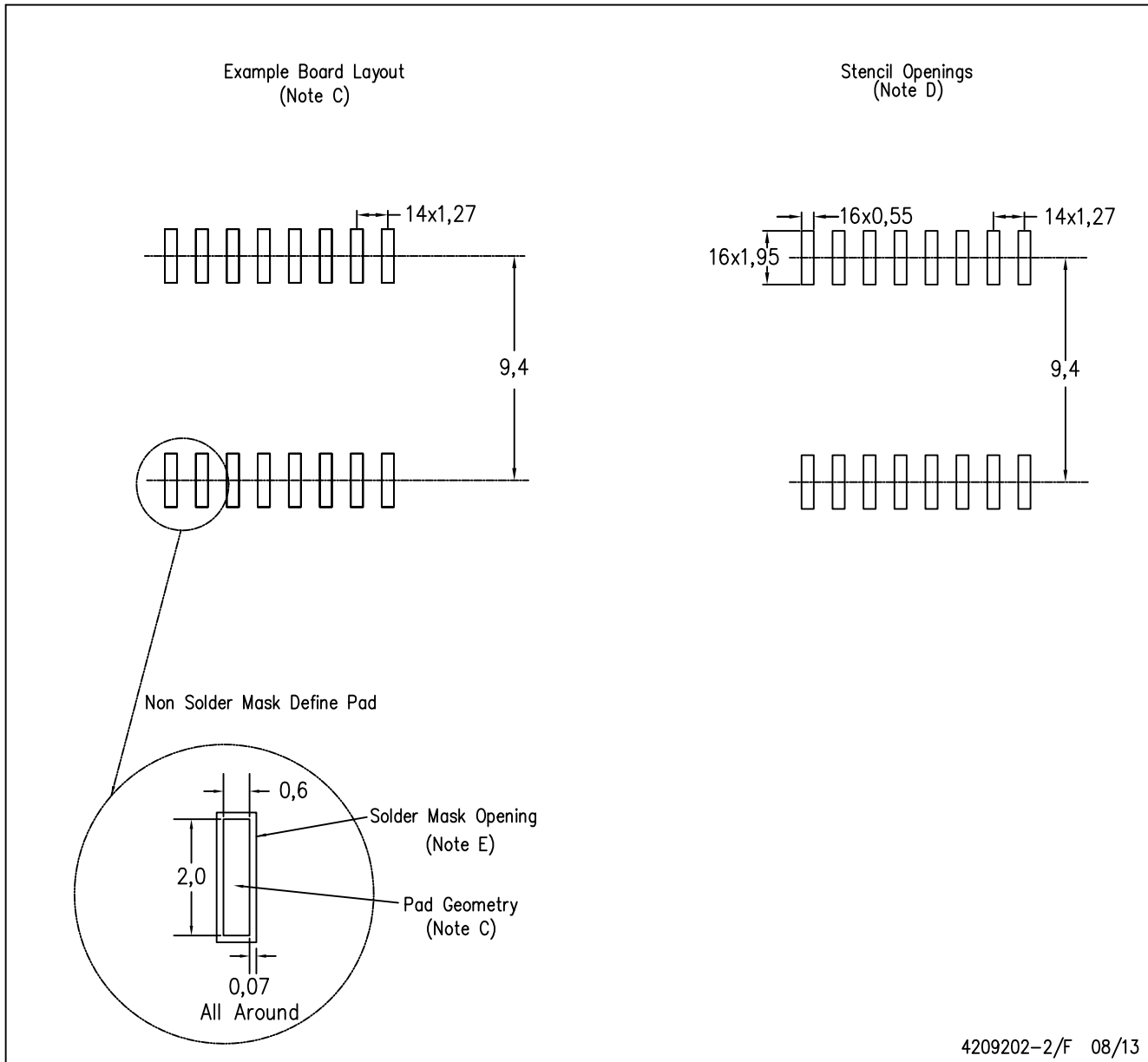


- NOTES:
- A. All linear dimensions are in inches (millimeters). Dimensioning and tolerancing per ASME Y14.5M-1994.
  - B. This drawing is subject to change without notice.
  - C. Body dimensions do not include mold flash or protrusion not to exceed 0.006 (0,15).
  - D. Falls within JEDEC MS-013 variation AA.



DW (R-PDSO-G16)

PLASTIC SMALL OUTLINE



- NOTES:
- A. All linear dimensions are in millimeters.
  - B. This drawing is subject to change without notice.
  - C. Refer to IPC7351 for alternate board design.
  - 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
  - E. Customers should contact their board fabrication site for solder mask tolerances between and around signal pads.

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