

application
INFO
available

**UC1705**  
**UC2705**  
**UC3705**

## High Speed Power Driver

### FEATURES

- 1.5A Source/Sink Drive
- 100 nsec Delay
- 40 nsec Rise and Fall into 1000pF
- Inverting and Non-Inverting Inputs
- Low Cross-Conduction Current Spike
- Low Quiescent Current
- 5V to 40V Operation
- Thermal Shutdown Protection
- MINIDIP and Power Packages

### DESCRIPTION

The UC1705 family of power drivers is made with a high speed Schottky process to interface between low-level control functions and high-power switching devices - particularly power MOSFETs. These devices are also an optimum choice for capacitive line drivers where up to 1.5 amps may be switched in either direction. With both Inverting and Non-Inverting inputs available, logic signals of either polarity may be accepted, or one input can be used to gate or strobe the other.

Supply voltages for both  $V_s$  and  $V_c$  can independently range from 5V to 40V. For additional application details, see the UC1707/3707 data sheet.

The UC1705 is packaged in an 8-pin hermetically sealed Cerdip for -55°C to +125°C operation. The UC3705 is specified for a temperature range of 0°C to +70°C and is available in either a plastic minidip or a 5-pin, power TO-220 package.

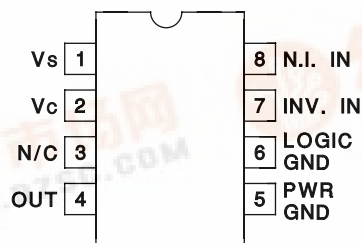
### TRUTH TABLE

INV	N.I	OUT
H	H	L
L	H	H
H	L	L
L	L	L

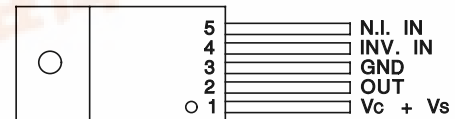
$\overline{OUT} = \overline{INV}$  and N.I.  
 $OUT = INV$  or N.I.

### CONNECTION DIAGRAMS

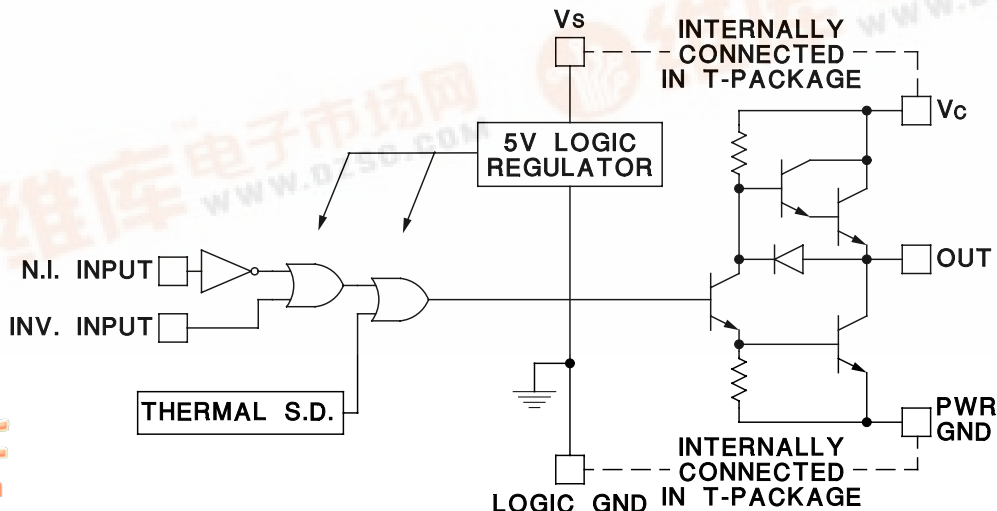
**DIL-8 MINIDIP, SOIC-8**  
**(TOP VIEW)**  
N or J Package, D Package



**5-PIN TO-220**  
**(TOP VIEW)**  
T Package



### BLOCK DIAGRAM



**UC1705**  
**UC2705**  
**UC3705**

**ABSOLUTE MAXIMUM RATINGS**

	N-Pkg	J-Pkg	T-Pkg
Supply Voltage, $V_{IN}$	40V	40V	40V
Collector Supply Voltage, $V_C$	40V	40V	40V
Output Current (Source or Sink)			
Steady-State	±500mA	±500mA	±1.0A
Peak Transient	±1.5A	±1.0A	±2.0A
Capacitive Discharge Energy	20μJ	15μJ	50μJ
Digital Inputs (See Note)	5.5V	5.5V	5.5V
Power Dissipation at $T_A = 25^\circ\text{C}$ (See Note)	1W	1W	3W
Power Dissipation at $T_A$ (Leads/Case) = $25^\circ\text{C}$ (See Note)	3W	2W	25W
Operating Temperature Range	0°C to +70°C	-55°C to +125°C	0°C to +70°C
Storage Temperature Range	-65°C to +150°C	-65°C to +150°C	-65°C to +150°C
Lead Temperature (Soldering, 10 seconds)	300°C	300°C	300°C

*Note: All currents are positive into, negative out of the specified terminal.*

*Digital Drive can exceed 5.5V if input current is limited to 10mA*

*Consult Packaging Section of Databook for thermal limitations and considerations of package.*

**ELECTRICAL CHARACTERISTICS:** Unless otherwise stated, these specifications apply for  $T_A = -55^\circ\text{C}$  to  $+125^\circ\text{C}$  for the UC1705,  $-25^\circ\text{C}$  to  $+85^\circ\text{C}$  for the UC2705, and  $0^\circ\text{C}$  to  $+70^\circ\text{C}$  for the UC3705;  $V_S = V_C = 20\text{V}$ ,  $T_A = T_J$ .

PARAMETERS	TEST CONDITIONS	MIN	TYP	MAX	UNITS
$V_S$ Supply Current	$V_S = 40\text{V}$ , (Outputs High, T Pkg)		6	8	mA
	$V_S = 40\text{V}$ , (Outputs Low, T Pkg)		8	12	mA
$V_C$ Supply Current (N, J Only)	$V_C = 40\text{V}$ , Outputs Low		2	4	mA
$V_C$ Leakage Current (N, J Only)	$V_S = 0$ , $V_C = 30\text{V}$		0.05	0.1	mA
Digital Input Low Level				0.8	V
Digital Input High Level		2.2			V
Input Current	$V_I = 0$		-0.6	-1.0	mA
Input Leakage	$V_I = 5\text{V}$		0.05	0.1	mA
Output High Sat., $V_{C-VO}$	$I_O = -50\text{mA}$			2.0	V
	$I_O = -500\text{mA}$			2.5	V
Output Low Sat., $V_O$	$I_O = 50\text{mA}$			0.4	V
	$I_O = 500\text{mA}$			2.5	V
Thermal Shutdown			155		°C

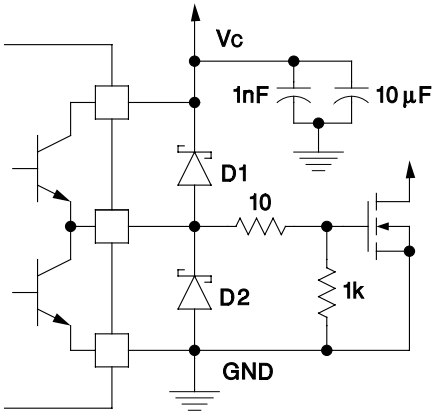
**TYPICAL SWITCHING CHARACTERISTICS:**  $V_S = V_C = 20\text{V}$ ,  $T_A = 25^\circ\text{C}$ . Delays measured to 10% output change.

PARAMETERS	TEST CONDITIONS	OUTPUT $C_L =$			UNIT
From Inv. Input to Output:		open	1.0	2.2	nF
Rise Time Delay		60	60	60	ns
10% to 90% Rise		20	40	60	ns
Fall Time Delay		60	60	60	ns
90% to 10% Fall		25	40	50	ns
From N. I. Input to Output:					
Rise Time Delay		90	90	90	ns
10% to 90% Rise		20	40	60	ns
Fall Time Delay		60	60	60	ns
90% to 10% Fall		25	40	50	ns
$V_C$ Cross-Conduction	Output Rise	25			ns
Current Spike Duration	Output Fall	0			ns

UC1705  
UC2705  
UC3705

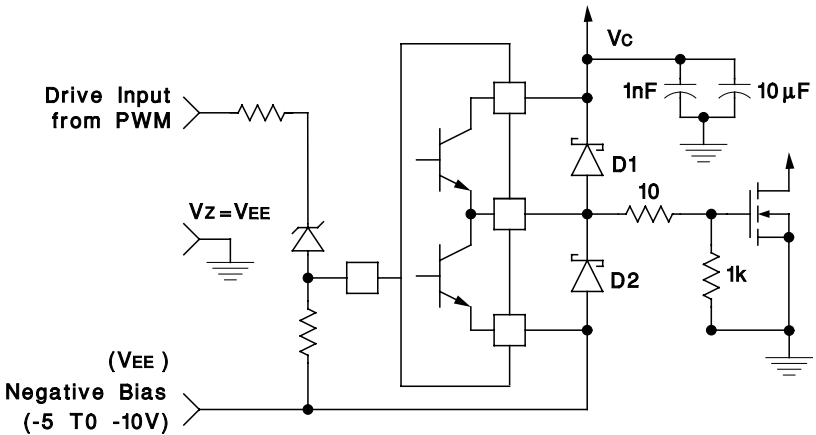
# APPLICATIONS

Power MOSFET Drive Circuit



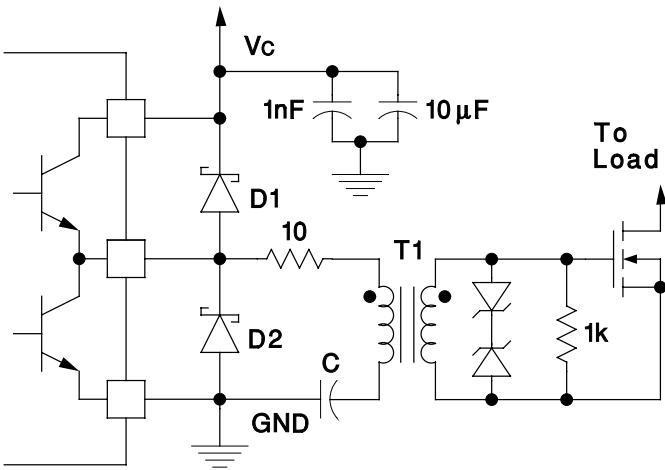
D1, D2: UC3611 Schottky Diodes

Power MOSFET Drive Circuit using Negative Bias Voltage and Level Shifting to Ground Referenced PWMs.



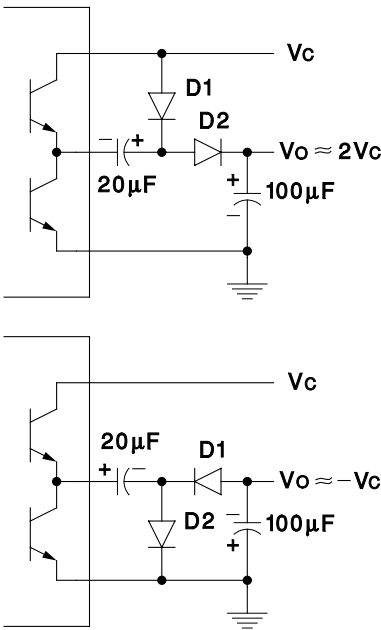
D1, D2: UC3611 Schottky Diodes

Transformer Coupled MOSFET Drive Circuit



D1, D2: UC3611 Schottky Diodes

Charge Pump Circuits



## 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>
5962-9579801M2A	ACTIVE	LCCC	FK	20	1	TBD	POST-PLATE	Level-NC-NC-NC
5962-9579801MPA	ACTIVE	CDIP	JG	8	1	TBD	A42 SNPB	Level-NC-NC-NC
5962-9579801VPA	ACTIVE	CDIP	JG	8	1	TBD	A42	Level-NC-NC-NC
UC1705J	ACTIVE	CDIP	JG	8	1	TBD	A42 SNPB	Level-NC-NC-NC
UC1705J883B	ACTIVE	CDIP	JG	8	1	TBD	A42 SNPB	Level-NC-NC-NC
UC1705L883B	ACTIVE	LCCC	FK	20	1	TBD	POST-PLATE	Level-NC-NC-NC
UC2705D	ACTIVE	SOIC	D	8	75	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1 YEAR
UC2705J	ACTIVE	CDIP	JG	8	1	TBD	A42 SNPB	Level-NC-NC-NC
UC2705N	ACTIVE	PDIP	P	8	50	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-NC-NC-NC
UC3705D	ACTIVE	SOIC	D	8	75	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1 YEAR
UC3705DTR	ACTIVE	SOIC	D	8	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1 YEAR
UC3705DTRG4	ACTIVE	SOIC	D	8	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1 YEAR
UC3705J	ACTIVE	CDIP	JG	8	1	TBD	A42 SNPB	Level-NC-NC-NC
UC3705N	ACTIVE	PDIP	P	8	50	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-NC-NC-NC
UC3705NG4	ACTIVE	PDIP	P	8	50	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-NC-NC-NC
UC3705T	ACTIVE	TO-220	KC	5	50	Green (RoHS & no Sb/Br)	CU SN	Level-NC-NC-NC
UC3705TG3	ACTIVE	TO-220	KC	5	50	Green (RoHS & no Sb/Br)	CU SN	Level-NC-NC-NC

<sup>(1)</sup> 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.

<sup>(2)</sup> Eco Plan - The planned eco-friendly classification: Pb-Free (RoHS) 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.

**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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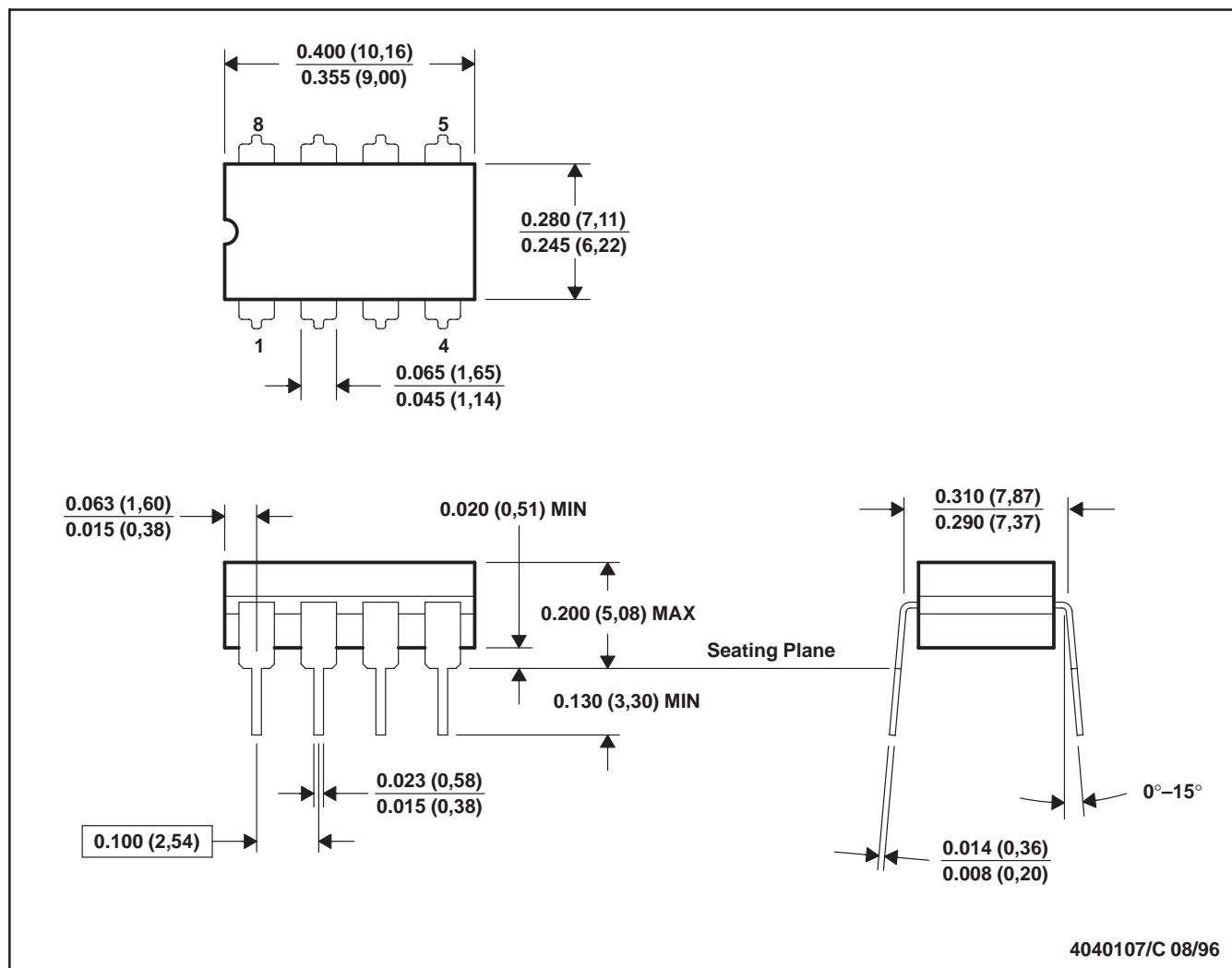
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# MECHANICAL DATA

MCER001A – JANUARY 1995 – REVISED JANUARY 1997

JG (R-GDIP-T8)

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

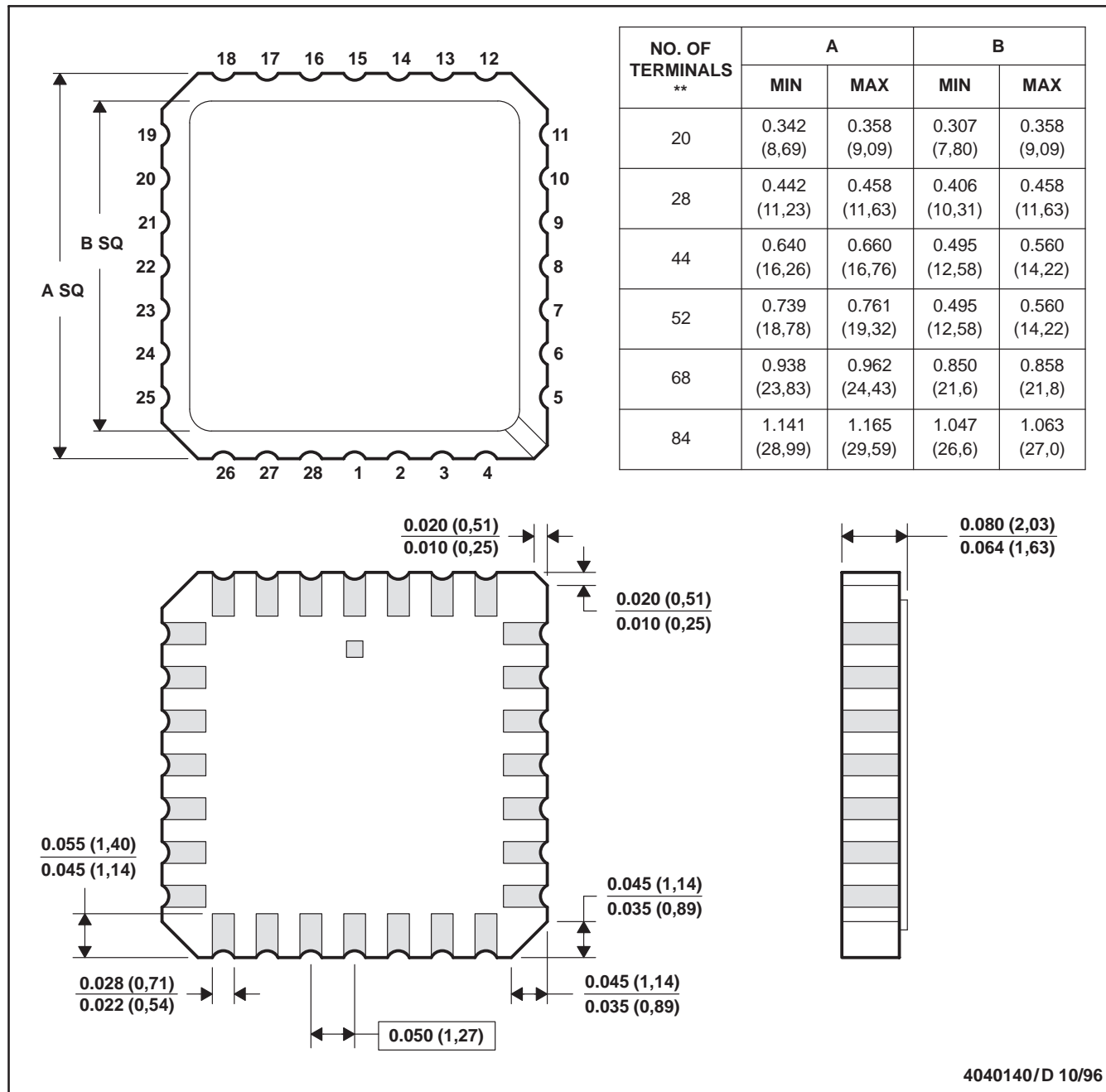
# MECHANICAL DATA

MLCC006B – OCTOBER 1996

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

LEADLESS CERAMIC CHIP CARRIER

28 TERMINAL SHOWN



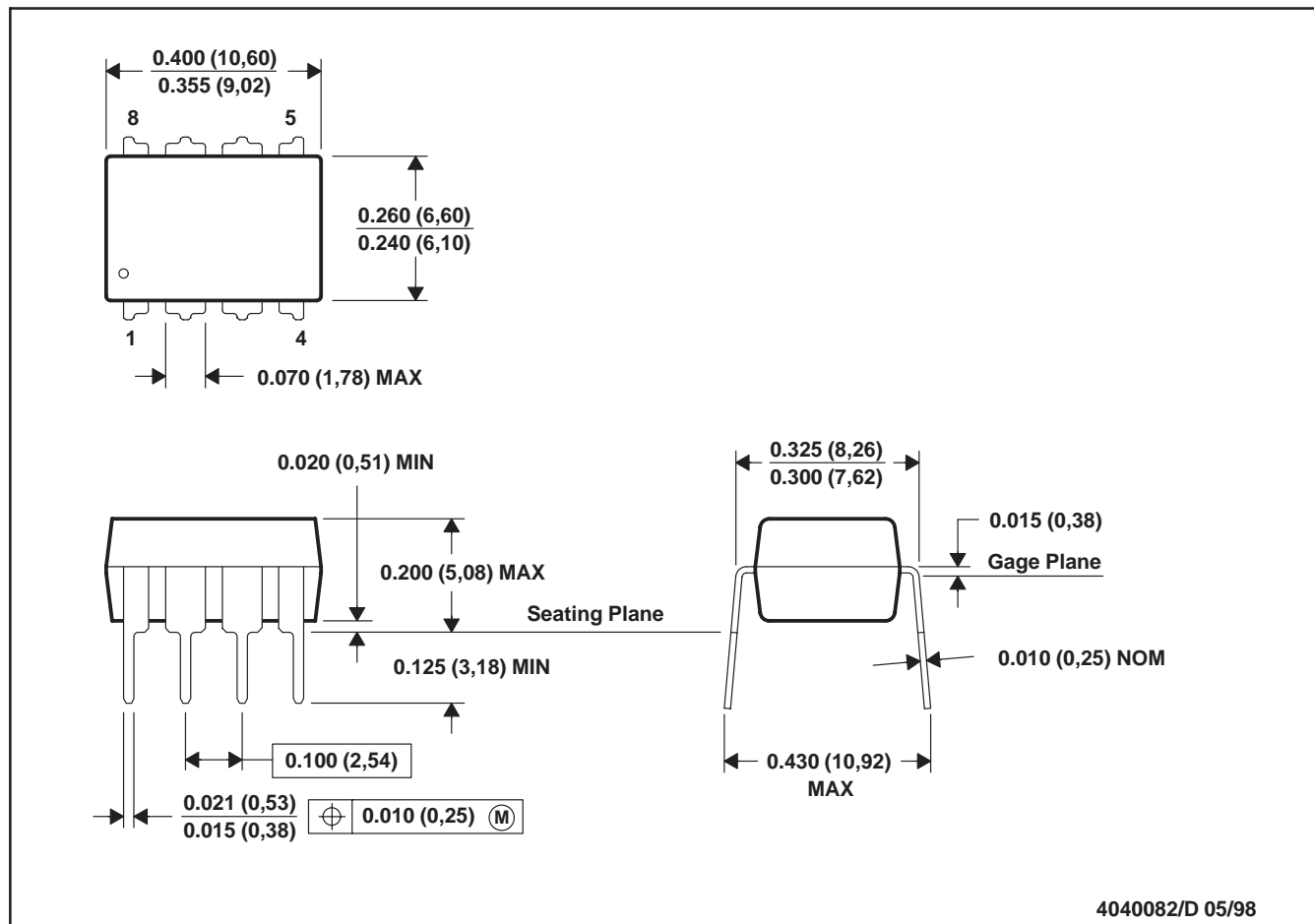
- NOTES:
- A. All linear dimensions are in inches (millimeters).
  - B. This drawing is subject to change without notice.
  - C. This package can be hermetically sealed with a metal lid.
  - D. The terminals are gold plated.
  - E. Falls within JEDEC MS-004

# MECHANICAL DATA

MPDI001A – JANUARY 1995 – REVISED JUNE 1999

P (R-PDIP-T8)

PLASTIC DUAL-IN-LINE



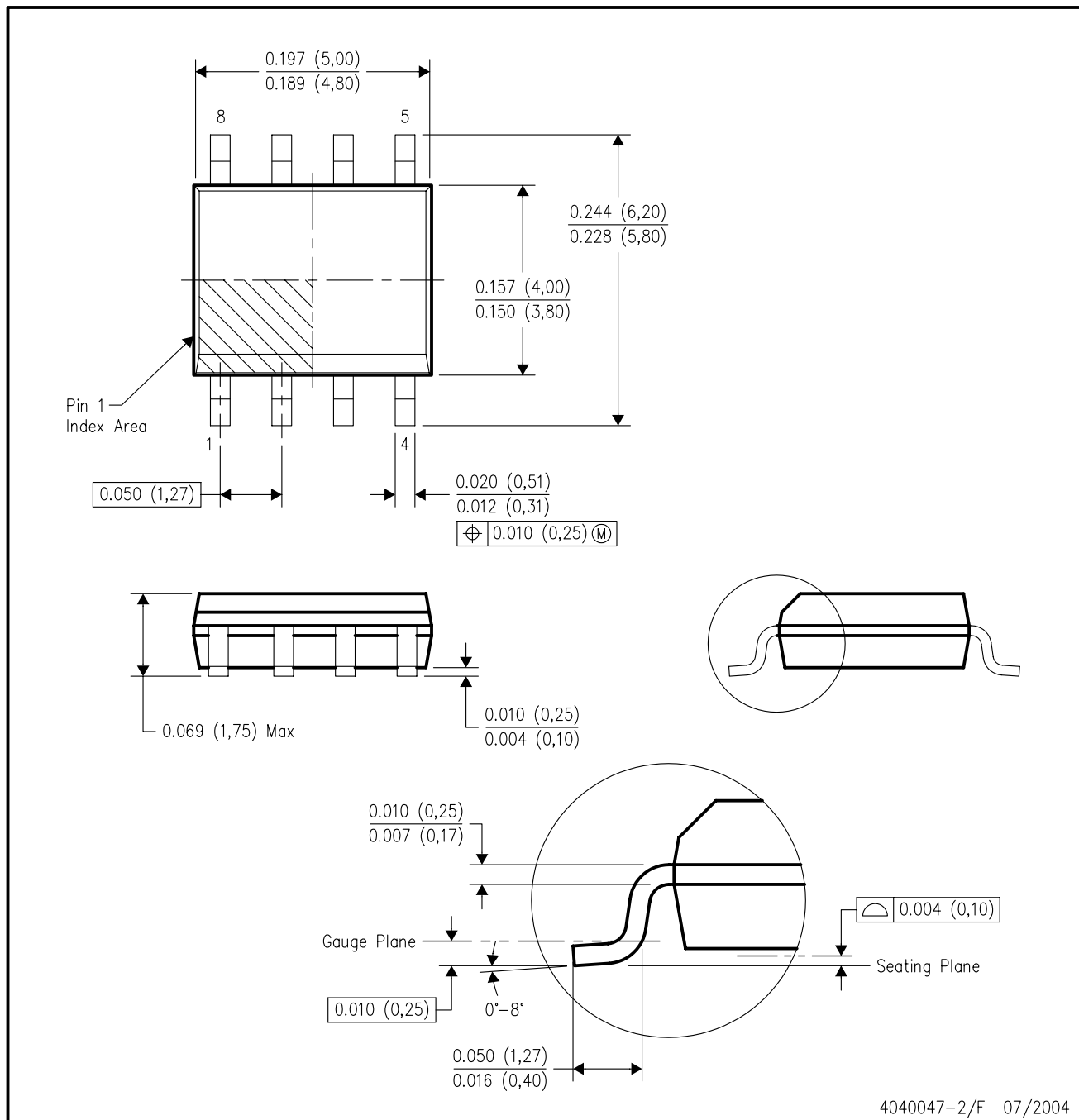
- NOTES: A. All linear dimensions are in inches (millimeters).  
 B. This drawing is subject to change without notice.  
 C. Falls within JEDEC MS-001



# MECHANICAL DATA

D (R-PDSO-G8)

PLASTIC SMALL-OUTLINE PACKAGE



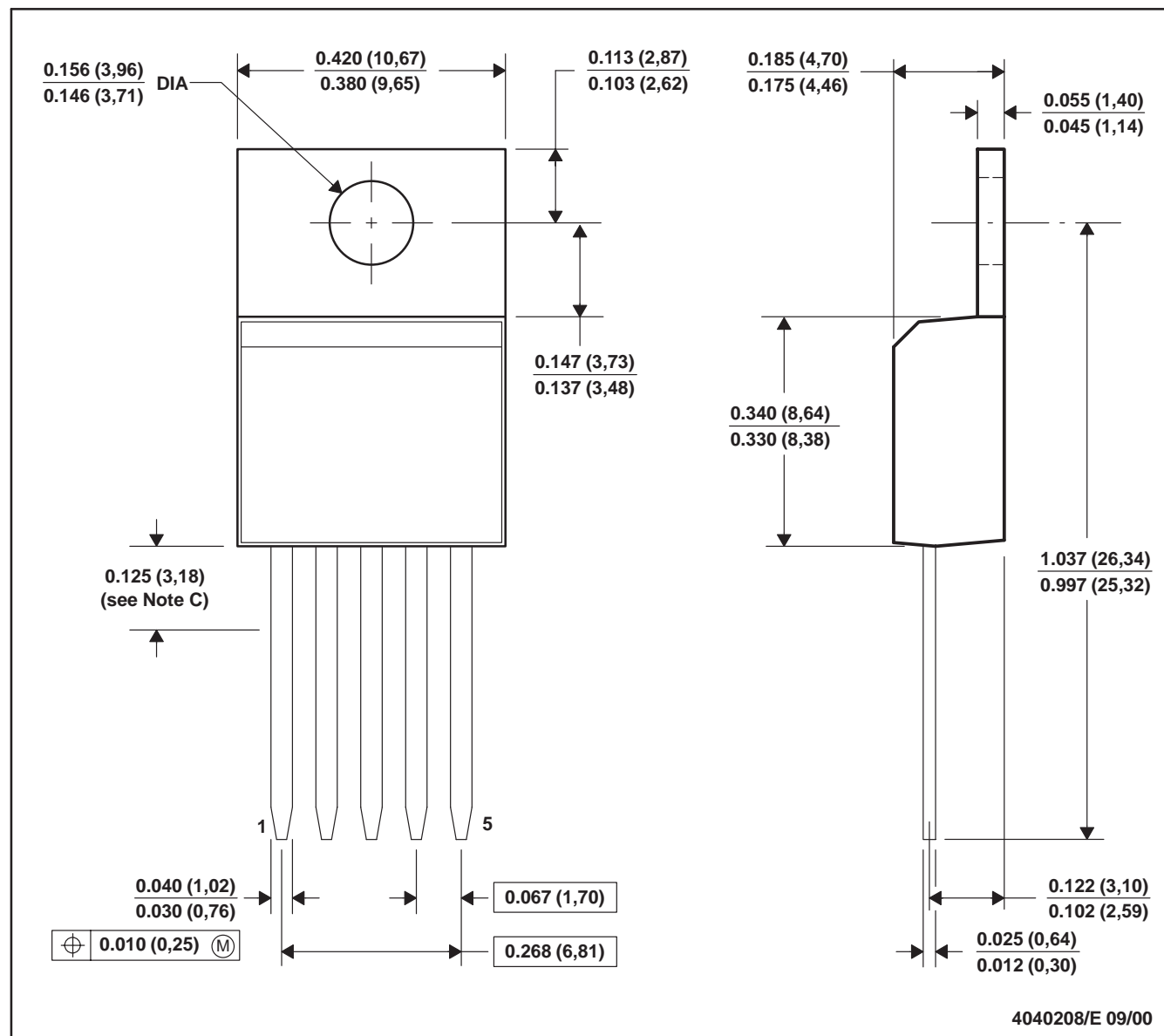
- NOTES:
- A. All linear dimensions are in inches (millimeters).
  - B. This drawing is subject to change without notice.
  - C. Body dimensions do not include mold flash or protrusion not to exceed 0.006 (0,15).
  - D. Falls within JEDEC MS-012 variation AA.

# MECHANICAL DATA

MSOT008B – JANUARY 1995 – REVISED SEPTEMBER 2000

KC (R-PSFM-T5)

PLASTIC FLANGE-MOUNT



- NOTES:
- A. All linear dimensions are in inches (millimeters).
  - B. This drawing is subject to change without notice.
  - C. Lead dimensions are not controlled within this area.
  - D. All lead dimensions apply before solder dip.
  - E. The center lead is in electrical contact with the mounting tab.

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