

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.

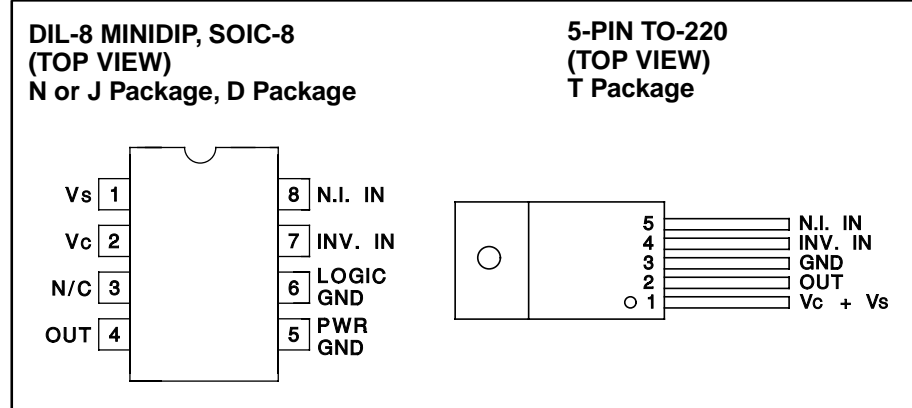
The UC1705 is packaged in an 8-pin hermetically sealed Cerdip for -55°C to +125°C operation. The UC3705 is specified for a temperature range of 0°C to +70°C and is available in either a plastic minidip or a 5-pin, power TO-220 package.

TRUTH TABLE

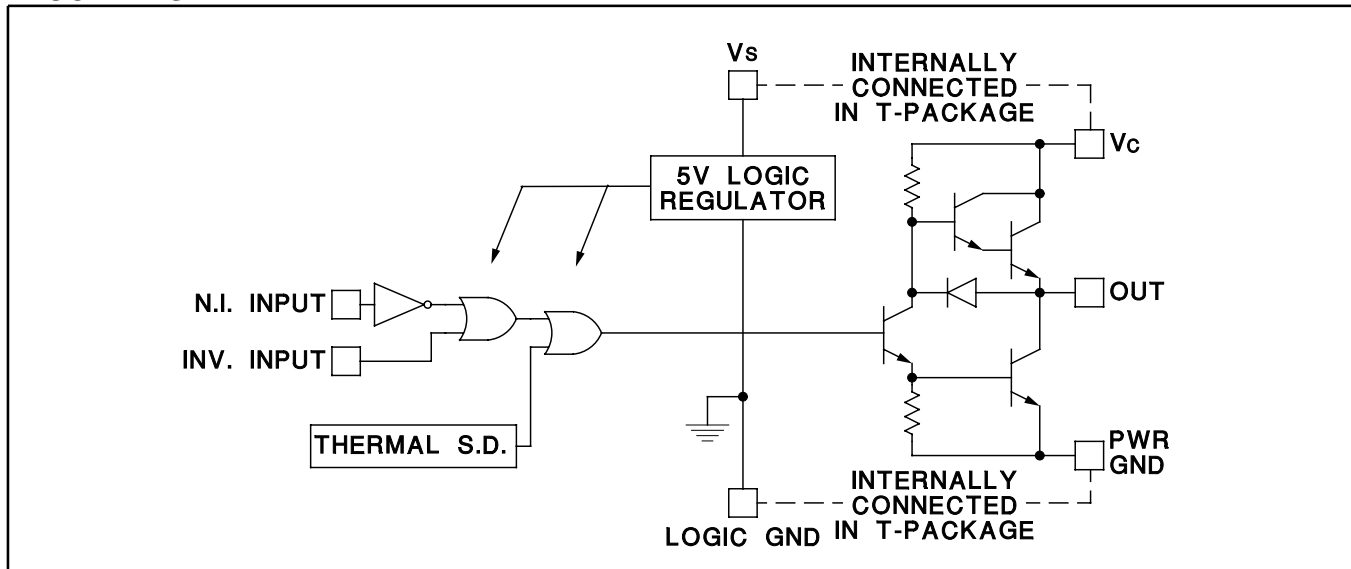
INV	N.I	OUT
H	H	L
L	H	H
H	L	L
L	L	L

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

CONNECTION DIAGRAMS



BLOCK DIAGRAM



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°C (See Note)	3W	2W	25W
Operating Temperature Range	0°C to $+70^\circ\text{C}$	-55°C to $+125^\circ\text{C}$	0°C to $+70^\circ\text{C}$
Storage Temperature Range	-65°C to $+150^\circ\text{C}$	-65°C to $+150^\circ\text{C}$	-65°C to $+150^\circ\text{C}$
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°C to $+85^\circ\text{C}$ for the UC2705, and 0°C to $+70^\circ\text{C}$ for the UC3705; $V_S = V_C = 20\text{V}$, $T_A = T_J$.

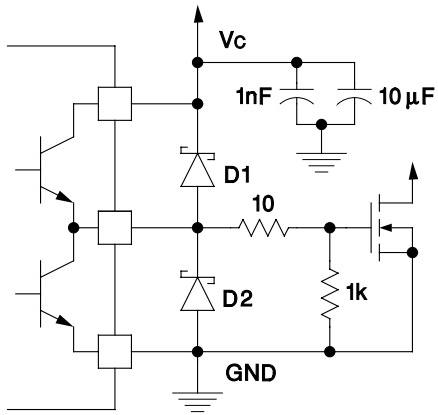
PARAMETERS	TEST CONDITIONS	MIN	TYP	MAX	UNITS
V_S Supply Current	$V_S = 40\text{V}$, (Outputs High, T Pkg)		6	8	mA
	$V_S = 40\text{V}$, (Outputs Low, T Pkg)		8	12	mA
V_C Supply Current (N, J Only)	$V_C = 40\text{V}$, Outputs Low		2	4	mA
V_C Leakage Current (N, J Only)	$V_S = 0$, $V_C = 30\text{V}$		0.05	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-H}	$I_O = -50\text{mA}$			2.0	V
	$I_O = -500\text{mA}$			2.5	V
Output Low Sat., V_{C-L}	$I_O = 50\text{mA}$			0.4	V
	$I_O = 500\text{mA}$			2.5	V
Thermal Shutdown			155		$^\circ\text{C}$

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 Current Spike Duration	Output Rise	25			ns
	Output Fall	0			ns

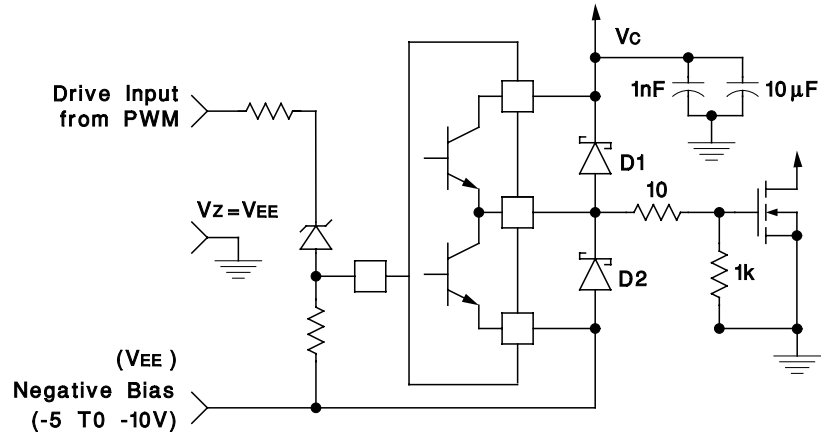
APPLICATIONS

Power MOSFET Drive Circuit



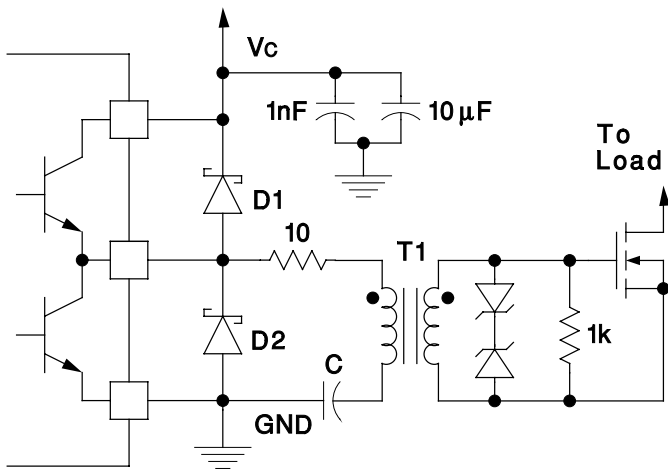
D1, D2: UC3611 Schottky Diodes

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



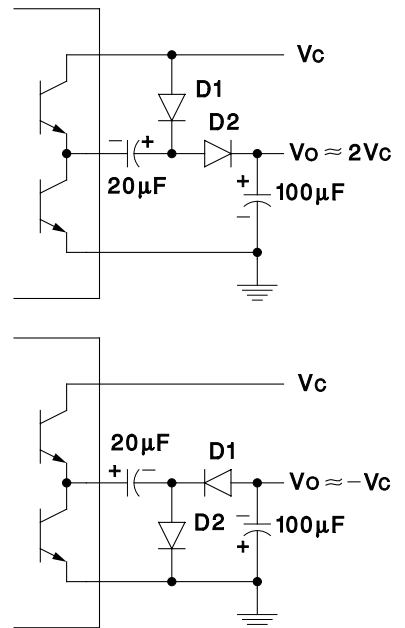
D1, D2: UC3611 Schottky Diodes

Transformer Coupled MOSFET Drive Circuit



D1, D2: UC3611 Schottky Diodes

Charge Pump Circuits



PACKAGING INFORMATION

Orderable Device	Status ⁽¹⁾	Package Type	Package Drawing	Pins	Package Qty	Eco Plan ⁽²⁾	Lead/Ball Finish	MSL Peak Temp ⁽³⁾
5962-9579801M2A	ACTIVE	LCCC	FK	20	1	TBD	POST-PLATE	N / A for Pkg Type
5962-9579801MPA	ACTIVE	CDIP	JG	8	1	TBD	A42 SNPB	N / A for Pkg Type
UC1705J	ACTIVE	CDIP	JG	8	1	TBD	A42 SNPB	N / A for Pkg Type
UC1705J883B	ACTIVE	CDIP	JG	8	1	TBD	A42 SNPB	N / A for Pkg Type
UC1705L883B	ACTIVE	LCCC	FK	20	1	TBD	POST-PLATE	N / A for Pkg Type
UC2705D	ACTIVE	SOIC	D	8	75	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1 YEAR
UC2705DG4	ACTIVE	SOIC	D	8	75	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1 YEAR
UC2705N	ACTIVE	PDIP	P	8	50	Green (RoHS & no Sb/Br)	CU NIPDAU	N / A for Pkg Type
UC2705NG4	ACTIVE	PDIP	P	8	50	Green (RoHS & no Sb/Br)	CU NIPDAU	N / A for Pkg Type
UC3705D	ACTIVE	SOIC	D	8	75	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1 YEAR
UC3705DG4	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	N / A for Pkg Type
UC3705N	ACTIVE	PDIP	P	8	50	Green (RoHS & no Sb/Br)	CU NIPDAU	N / A for Pkg Type
UC3705NG4	ACTIVE	PDIP	P	8	50	Green (RoHS & no Sb/Br)	CU NIPDAU	N / A for Pkg Type
UC3705T	ACTIVE	TO-220	KC	5	50	Green (RoHS & no Sb/Br)	CU SN	N / A for Pkg Type
UC3705TG3	ACTIVE	TO-220	KC	5	50	Green (RoHS & no Sb/Br)	CU SN	N / A for Pkg Type

⁽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.

OBSELETE: 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.

Important Information and Disclaimer:The information provided on this page represents TI's knowledge and belief as of the date that it is provided. TI bases its knowledge and belief on information provided by third parties, and makes no representation or warranty as to the accuracy of such information. Efforts are underway to better integrate information from third parties. TI has taken and continues to take reasonable steps to provide representative and accurate information but may not have conducted destructive testing or chemical analysis on incoming materials and chemicals. TI and TI suppliers consider certain information to be proprietary, and thus CAS numbers and other limited information may not be available for release.

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 UC1705, UC3705, UC3705M :

- Space: [UC1705-SP](#)

NOTE: Qualified Version Definitions:

- Space - Radiation tolerant, ceramic packaging and qualified for use in Space-based application

FK (S-CQCC-N**)

LEADLESS CERAMIC CHIP CARRIER

28 TERMINAL SHOWN

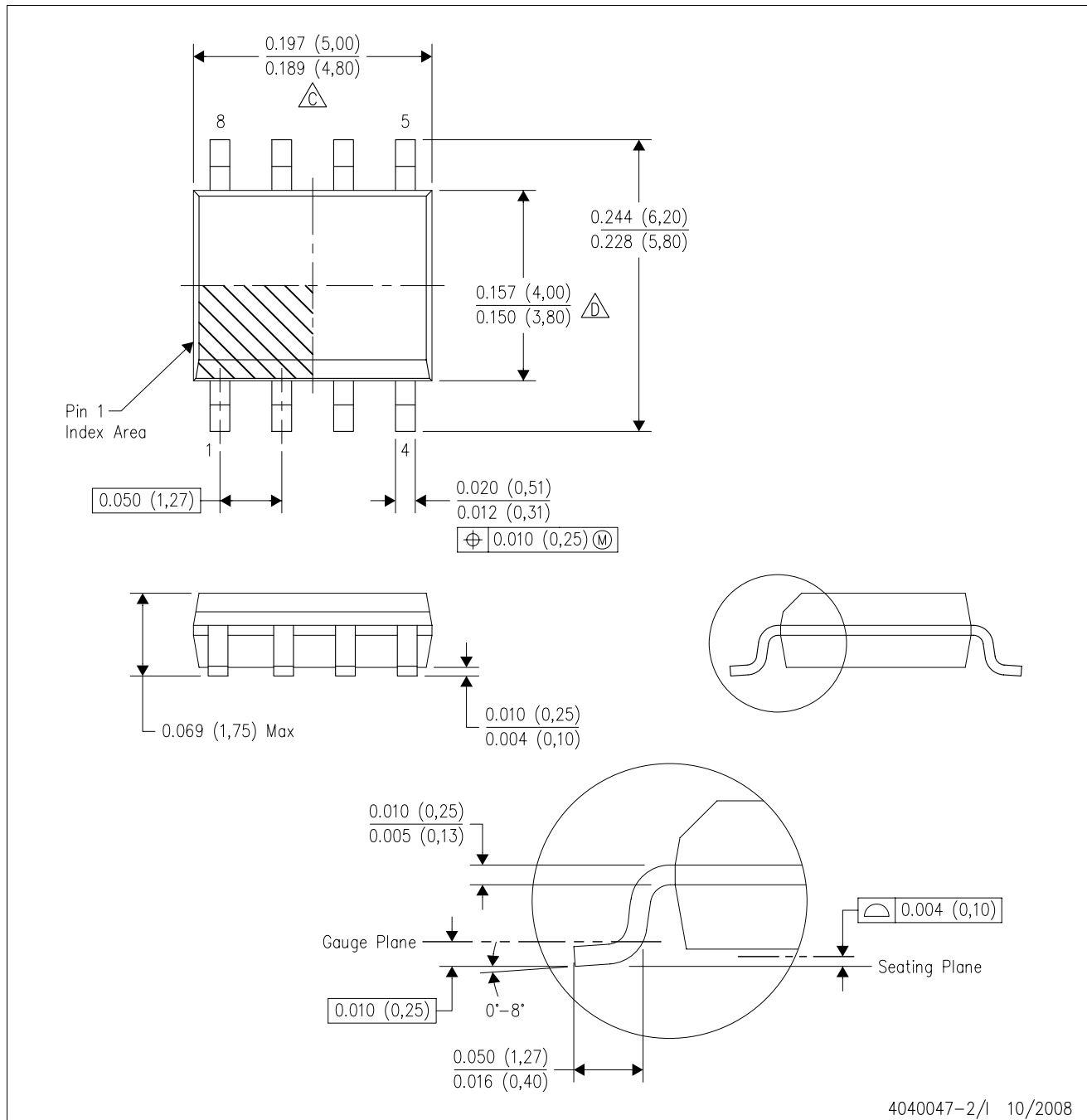


4040140/D 10/96

- 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

D (R-PDSO-G8)

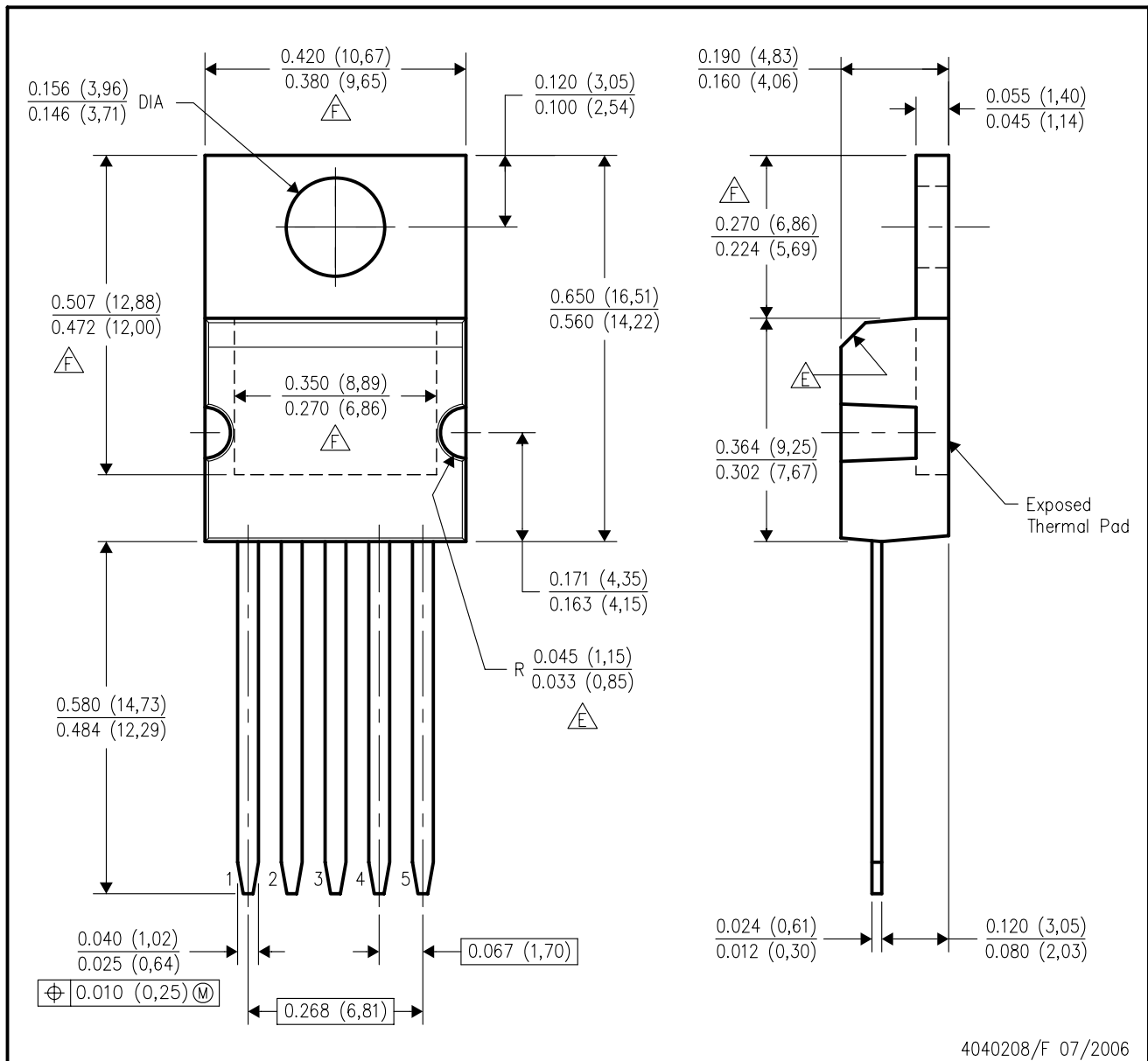
PLASTIC SMALL-OUTLINE PACKAGE



- NOTES:
- A. All linear dimensions are in inches (millimeters).
 - B. This drawing is subject to change without notice.
 - C. Body length does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed .006 (0,15) per end.
 - D. Body width does not include interlead flash. Interlead flash shall not exceed .017 (0,43) per side.
 - E. Reference JEDEC MS-012 variation AA.

KC (R-PSFM-T5)

PLASTIC FLANGE-MOUNT PACKAGE



- NOTES:
- A. All linear dimensions are in inches (millimeters).
 - B. This drawing is subject to change without notice.
 - C. All lead dimensions apply before solder dip.
 - D. The center lead is in electrical contact with the mounting tab.
 - These features are optional.
 - Thermal pad contour optional within these dimensions.

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

For the latest package information, go to http://www.ti.com/sc/docs/package/pkg_info.htm

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

IMPORTANT NOTICE

Texas Instruments Incorporated and its subsidiaries (TI) reserve the right to make corrections, modifications, enhancements, improvements, and other changes to its products and services at any time and to discontinue any product or service without notice. Customers should obtain the latest relevant information before placing orders and should verify that such information is current and complete. All products are sold subject to TI's terms and conditions of sale supplied at the time of order acknowledgment.

TI warrants performance of its hardware products to the specifications applicable at the time of sale in accordance with TI's standard warranty. Testing and other quality control techniques are used to the extent TI deems necessary to support this warranty. Except where mandated by government requirements, testing of all parameters of each product is not necessarily performed.

TI assumes no liability for applications assistance or customer product design. Customers are responsible for their products and applications using TI components. To minimize the risks associated with customer products and applications, customers should provide adequate design and operating safeguards.

TI does not warrant or represent that any license, either express or implied, is granted under any TI patent right, copyright, mask work right, or other TI intellectual property right relating to any combination, machine, or process in which TI products or services are used. Information published by TI regarding third-party products or services does not constitute a license from TI to use such products or services or a warranty or endorsement thereof. Use of such information may require a license from a third party under the patents or other intellectual property of the third party, or a license from TI under the patents or other intellectual property of TI.

Reproduction of TI information in TI data books or data sheets is permissible only if reproduction is without alteration and is accompanied by all associated warranties, conditions, limitations, and notices. Reproduction of this information with alteration is an unfair and deceptive business practice. TI is not responsible or liable for such altered documentation. Information of third parties may be subject to additional restrictions.

Resale of TI products or services with statements different from or beyond the parameters stated by TI for that product or service voids all express and any implied warranties for the associated TI product or service and is an unfair and deceptive business practice. TI is not responsible or liable for any such statements.

TI products are not authorized for use in safety-critical applications (such as life support) where a failure of the TI product would reasonably be expected to cause severe personal injury or death, unless officers of the parties have executed an agreement specifically governing such use. Buyers represent that they have all necessary expertise in the safety and regulatory ramifications of their applications, and acknowledge and agree that they are solely responsible for all legal, regulatory and safety-related requirements concerning their products and any use of TI products in such safety-critical applications, notwithstanding any applications-related information or support that may be provided by TI. Further, Buyers must fully indemnify TI and its representatives against any damages arising out of the use of TI products in such safety-critical applications.

TI products are neither designed nor intended for use in military/aerospace applications or environments unless the TI products are specifically designated by TI as military-grade or "enhanced plastic." Only products designated by TI as military-grade meet military specifications. Buyers acknowledge and agree that any such use of TI products which TI has not designated as military-grade is solely at the Buyer's risk, and that they are solely responsible for compliance with all legal and regulatory requirements in connection with such use.

TI products are neither designed nor intended for use in automotive applications or environments unless the specific TI products are designated by TI as compliant with ISO/TS 16949 requirements. Buyers acknowledge and agree that, if they use any non-designated products in automotive applications, TI will not be responsible for any failure to meet such requirements.

Following are URLs where you can obtain information on other Texas Instruments products and application solutions:

Products

Amplifiers	amplifier.ti.com
Data Converters	dataconverter.ti.com
DLP® Products	www.dlp.com
DSP	dsp.ti.com
Clocks and Timers	www.ti.com/clocks
Interface	interface.ti.com
Logic	logic.ti.com
Power Mgmt	power.ti.com
Microcontrollers	microcontroller.ti.com
RFID	www.ti-rfid.com
RF/IF and ZigBee® Solutions	www.ti.com/lprf

Applications

Audio	www.ti.com/audio
Automotive	www.ti.com/automotive
Broadband	www.ti.com/broadband
Digital Control	www.ti.com/digitalcontrol
Medical	www.ti.com/medical
Military	www.ti.com/military
Optical Networking	www.ti.com/opticalnetwork
Security	www.ti.com/security
Telephony	www.ti.com/telephony
Video & Imaging	www.ti.com/video
Wireless	www.ti.com/wireless

Mailing Address: Texas Instruments, Post Office Box 655303, Dallas, Texas 75265
Copyright © 2009, Texas Instruments Incorporated