MINIATURE, 1W, 3kV ISOLATED UNREGULATED DC/DC CONVERTERS

FEATURES

- **Up To 78% Efficiency**
- **3kVDC Isolation**
- **UL60950 Certified Product (pending)**
- **Industry Standard Footprint**
- **JEDEC SIP-7 Package**

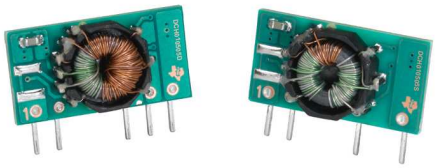
APPLICATIONS

- **Point-of-Use Power Conversion**
- **Ground Loop Elimination**
- **Data Acquisition**
- **Industrial Control and Instrumentation**
- **Test Equipment**

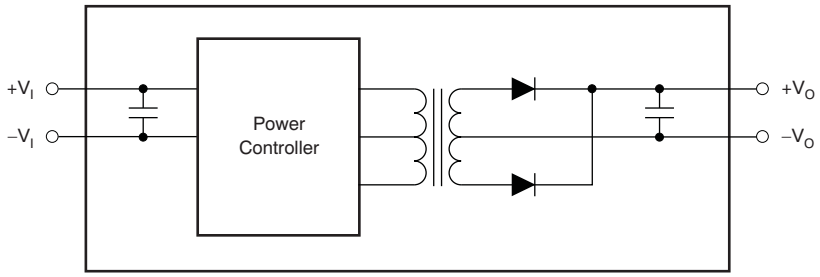
DESCRIPTION

The DCH01 series is a family of miniature, 1W, 3kV isolated DC/DC converters. Featured in an industry standard SIP-7 footprint, the DCH01 series requires minimal external components, reducing board space. The DCH01 series provides both single and dual split-supply outputs.

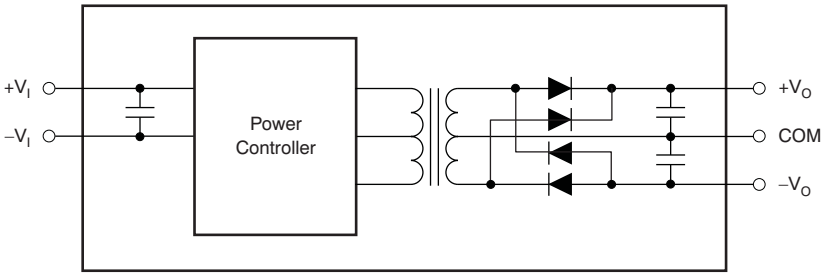
The use of a highly integrated package design results in highly reliable products with high power densities. High performance and small size makes the DCH01 suitable for a wide range of applications including signal chain applications and ground loop elimination.



Single Output Block Diagram



Dual Output Block Diagram



This integrated circuit can be damaged by ESD. Texas Instruments recommends that all integrated circuits be handled with appropriate precautions. Failure to observe proper handling and installation procedures can cause damage.

ESD damage can range from subtle performance degradation to complete device failure. Precision integrated circuits may be more susceptible to damage because very small parametric changes could cause the device not to meet its published specifications.

ORDERING INFORMATION

For the most current package and ordering information, see the Package Option Addendum at the end of this data sheet, or see the TI website at www.ti.com.

Part Numbering Scheme

PRODUCT LINE	POWER	INPUT VOLTAGE	OUTPUT VOLTAGE	SINGLE/DUAL	PACKAGE	PIN CONFIG	TRANSPORT MEDIA
DCH	01	05	05	S	N	7	
H = 3kV, unregulated output	01 = 1W	05 = 5V	05 = 5V 12 =12V 15 = 15V	S = Single D = Dual	N = SIP Thru-hole	7 = SIP-7	Blank = Tray T = Tape & Reel

DCH01 Products

MODEL	INPUT VOLTAGE (V)	OUTPUT VOLTAGE (V)	OUTPUT CURRENT (mA)	OUTPUT POWER (W)	ISOLATION VOLTAGE (kVDC)	PACKAGE-LEAD
DCH010505S	5 ± 10%	5	200	1	3	SIP-7
DCH010512S	5 ± 10%	12	83	1	3	SIP-7
DCH010515S	5 ± 10%	15	67	1	3	SIP-7
DCH010505D	5 ± 10%	±5	±100	1	3	SIP-7
DCH010512D	5 ± 10%	±12	±42	1	3	SIP-7
DCH010515D	5 ± 10%	±15	±33	1	3	SIP-7

ABSOLUTE MAXIMUM RATINGS

over operating free-air temperature range (unless otherwise noted) (1)

		DCH01 SERIES	UNIT
Input Voltage	5V input models	7	V
Storage temperature range		–40 to +125	°C

(1) 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 is not implied. Exposure to absolute maximum rated conditions for extended periods may affect device reliability.

ELECTRICAL CHARACTERISTICS

At T_A = +25°C, V_I = 5V unless otherwise noted.

PARAMETER	TEST CONDITIONS		MIN	TYP	MAX	UNIT
OUTPUT						
Power	100% full load			1		W
INPUT						
Voltage range on V_I			–10		10	%
ISOLATION						
Voltage	60s test, UL60950 (1)		3			kVDC
	100% tested for 1s		3.5			kVDC
LINE						
Regulation	1% change in V_I			1		%
SWITCHING						
Switching frequency (f_{SW})				70		kHz
RELIABILITY						
Calculated	Per Telcordia SR-332; 50% stress; T_A = +40°C	Single Output	18			FITS
		Dual Output	22			
TEMPERATURE RANGE						
Operating			–40		+85	°C

(1) During UL60950 recognition tests only.

ELECTRICAL CHARACTERISTICS PER DEVICE

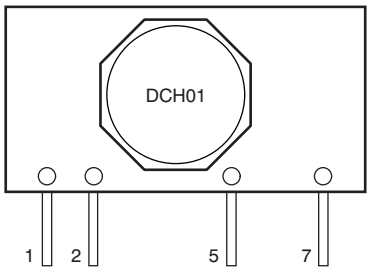
At T_A = +25°C, V_I = 5V unless otherwise noted.

PRODUCT	INPUT VOLTAGE (V)	OUTPUT VOLTAGE (V)	LOAD REGULATION (%)	OUTPUT RIPPLE(1) (mV_{PP})	NO LOAD INPUT CURRENT (mA)	EFFICIENCY (%)	BARRIER CAPACITANCE (pF)
	V_I	V_{NOM}			I_Q		C_{ISO}
	NOMINAL	100% LOAD(2)	10% TO 100% LOAD(3)	100% LOAD(2)	0% LOAD	100% LOAD(2)	
	TYP	TYP	TYP	TYP	TYP	TYP	TYP
DCH010505S	5	5.1	10	35	60	72	3
DCH010505D	5	±5.2	9	20	60	72	3
DCH010512S	5	12.4	6	18	65	74	4
DCH010512D	5	±12.5	5	19	65	75	4
DCH010515S	5	15.2	6	31	65	75	3
DCH010515D	5	±15.3	5	22	65	76	3

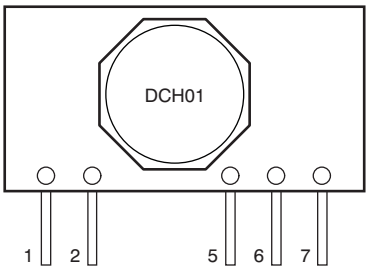
(1) 20MHz bandwidth.
(2) 100% load current = 1W/V_{NOM} typ.
(3) Load Regulation = (V_O at 10% load - V_O at 100% load) / V_O at 100% load.

DEVICE INFORMATION

EDJ PACKAGE
SIP-7 (Single)
(Top View)



EDJ PACKAGE
SIP-7 (Dual)
(Top View)



Pin Description (Single)

TERMINAL		
NAME	NO.	DESCRIPTION
$+V_I$	1	Voltage input
$-V_I$	2	Input side common
$-V_O$	5	–Voltage out
$+V_O$	7	+Voltage out

Pin Descriptions (Dual)

TERMINAL		
NAME	NO.	DESCRIPTION
$+V_I$	1	Voltage input
$-V_I$	2	Input side common
$-V_O$	5	–Voltage out
COM	6	Output side common
$+V_O$	7	+Voltage out

TYPICAL CHARACTERISTICS

At T_A = +25°C, and V_{IN} = 5V unless otherwise noted.

DCH010505S EFFICIENCY

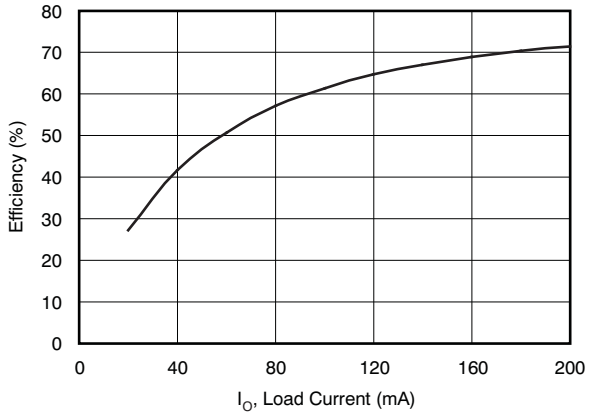


Figure 1.

DCH010505D EFFICIENCY

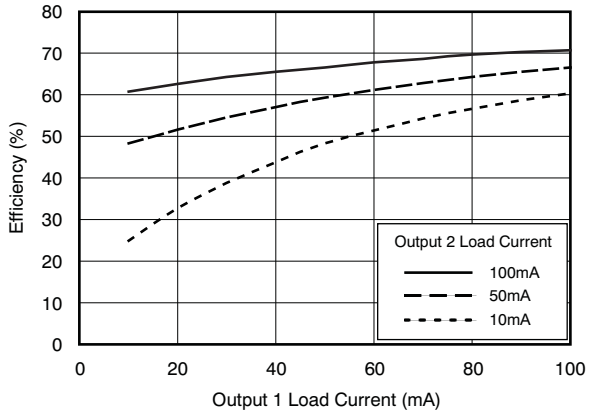


Figure 2.

DCH010505S LOAD REGULATION

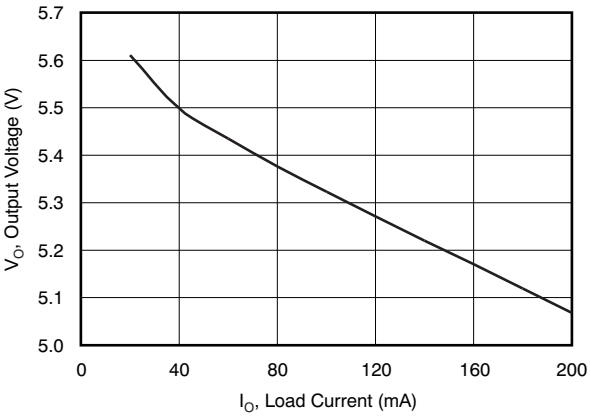


Figure 3.

DCH010505D LOAD REGULATION

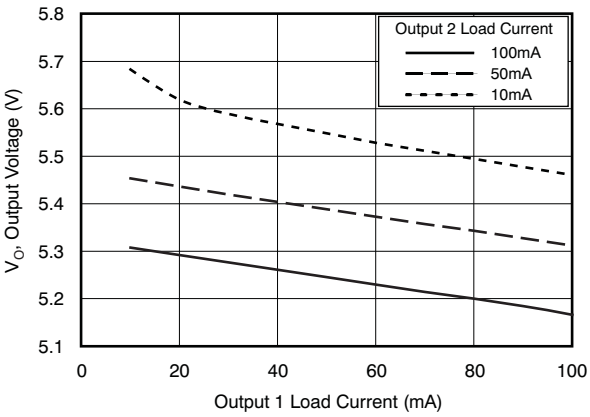


Figure 4.

DCH010505S RIPPLE VOLTAGE

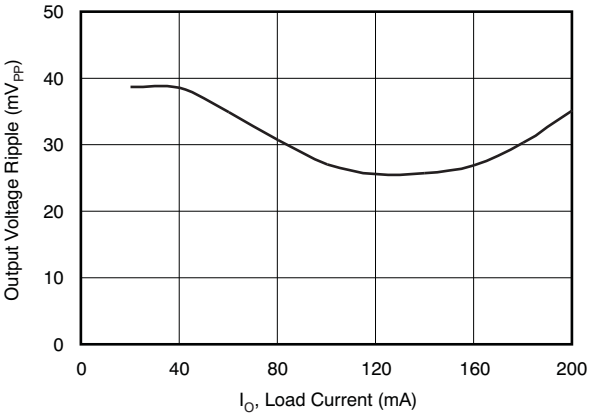


Figure 5.

DCH010505D RIPPLE VOLTAGE

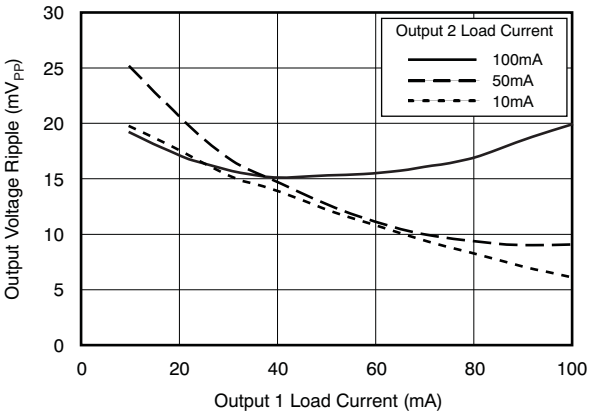


Figure 6.

TYPICAL CHARACTERISTICS (continued)

At T_A = +25°C, and V_{IN} = 5V unless otherwise noted.

DCH010512S EFFICIENCY

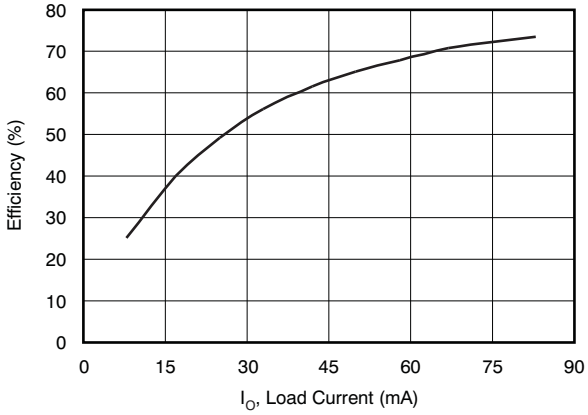


Figure 7.

DCH010512D EFFICIENCY

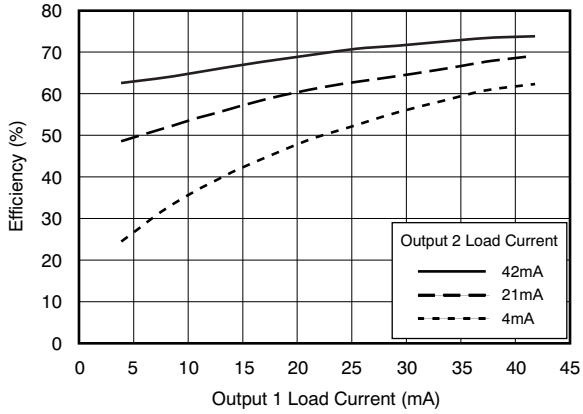


Figure 8.

DCH010512S LOAD REGULATION

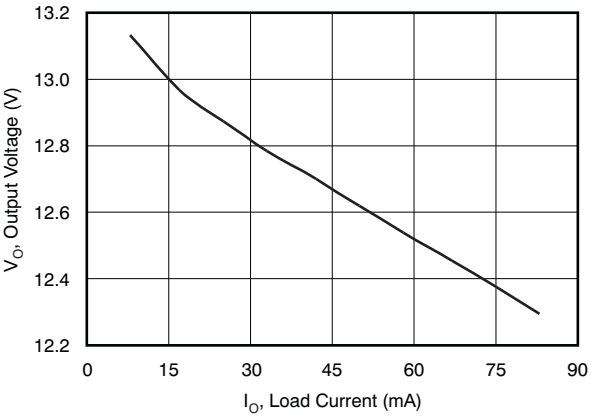


Figure 9.

DCH010512D LOAD REGULATION

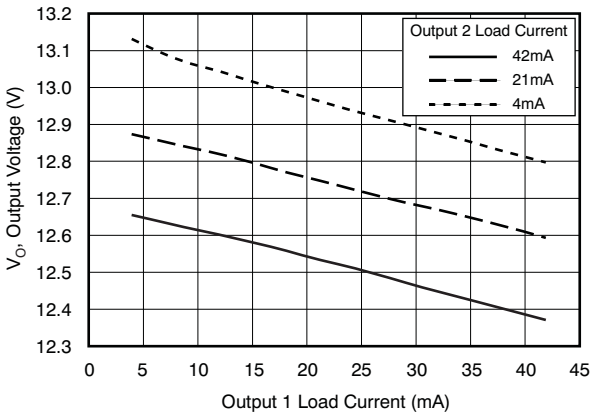


Figure 10.

DCH010512S RIPPLE VOLTAGE

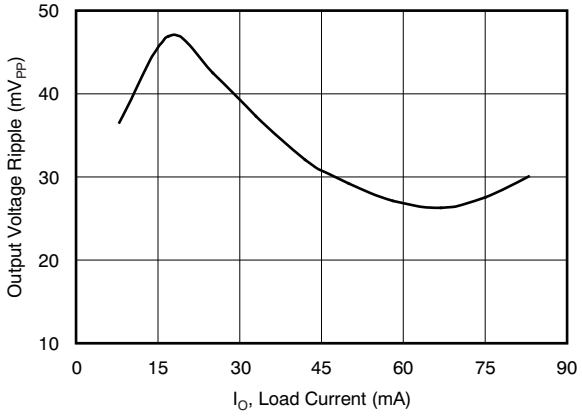


Figure 11.

DCH010512D RIPPLE VOLTAGE

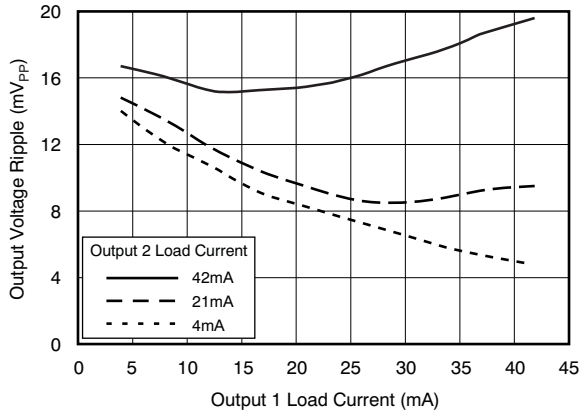


Figure 12.

TYPICAL CHARACTERISTICS (continued)

At T_A = +25°C, and V_{IN} = 5V unless otherwise noted.

DCH010515S EFFICIENCY

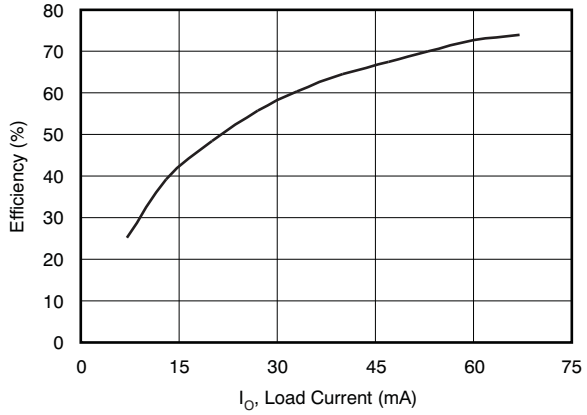


Figure 13.

DCH010515D EFFICIENCY

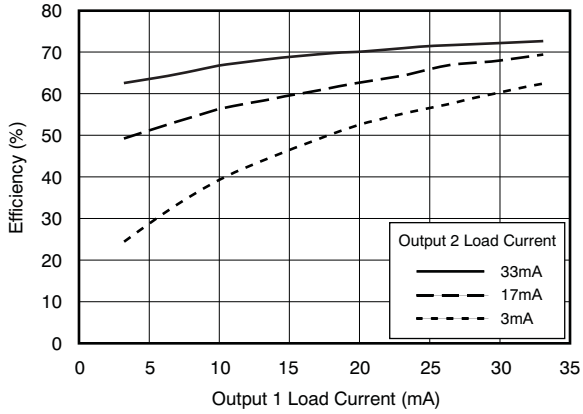


Figure 14.

DCH010515S LOAD REGULATION

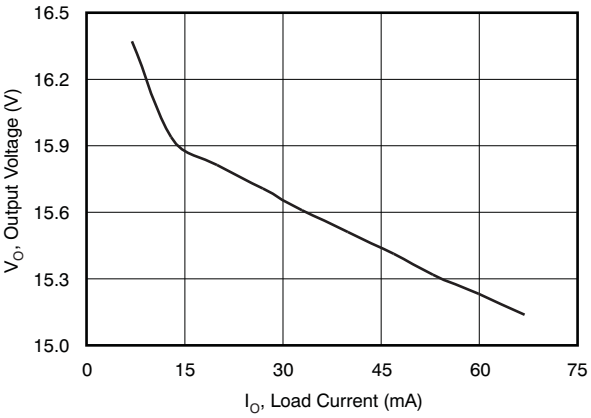


Figure 15.

DCH010515D LOAD REGULATION

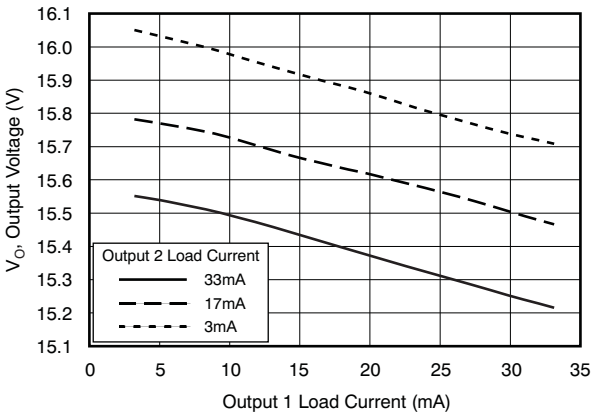


Figure 16.

DCH010515S RIPPLE VOLTAGE

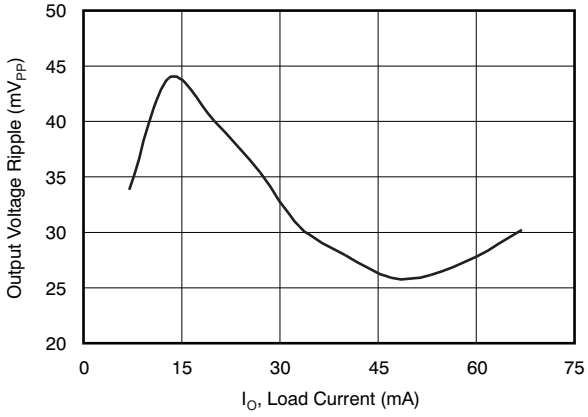


Figure 17.

DCH010515D RIPPLE VOLTAGE

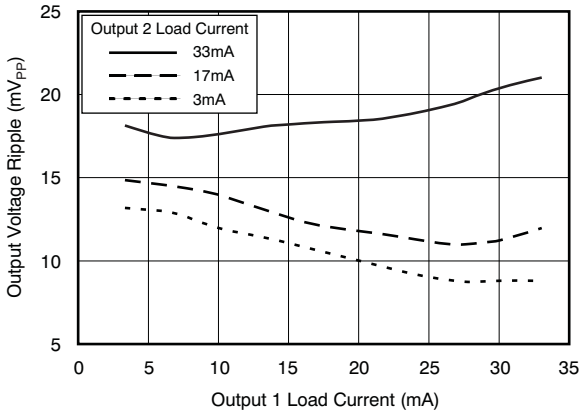


Figure 18.

TYPICAL CHARACTERISTICS (continued)

At T_A = +25°C, and V_{IN} = 5V unless otherwise noted.

SAFE OPERATING AREA
(All DCH0105 Products)

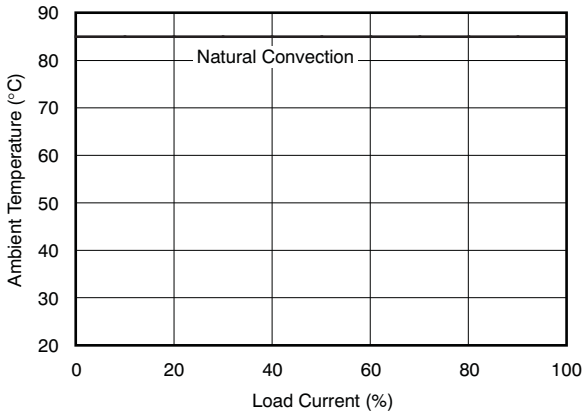


Figure 19.

PACKAGING INFORMATION

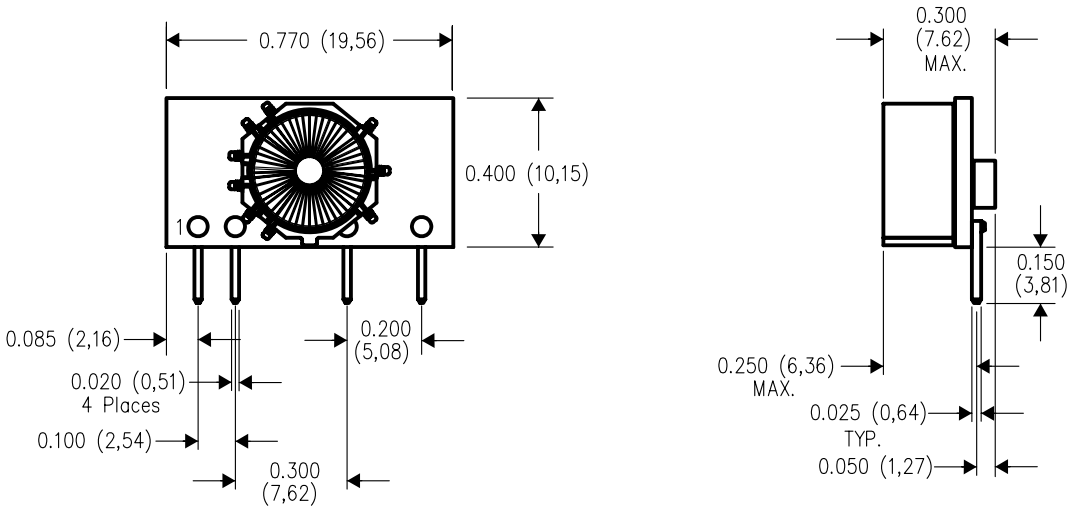
Orderable Device	Status [1]	Package Type	Package Drawing	Pins	Package Qty	Eco Plan [2]	Lead/Ball Finish	MSL Peak Temp [3]
DCH010505DN7	ACTIVE	SIP MOD ULE	EDJ	5	70	Pb-Free (RoHS)	Call TI	N / A for Pkg Type
DCH010505SN7	ACTIVE	SIP MOD ULE	EDJ	4	70	Pb-Free (RoHS)	Call TI	N / A for Pkg Type
DCH010512DN7	ACTIVE	SIP MOD ULE	EDJ	5	70	Pb-Free (RoHS)	Call TI	N / A for Pkg Type
DCH010512SN7	ACTIVE	SIP MOD ULE	EDJ	4	70	Pb-Free (RoHS)	Call TI	N / A for Pkg Type
DCH010515DN7	ACTIVE	SIP MOD ULE	EDJ	5	70	Pb-Free (RoHS)	Call TI	N / A for Pkg Type
DCH010515SN7	ACTIVE	SIP MOD ULE	EDJ	4	70	Pb-Free (RoHS)	Call TI	N / A for Pkg Type

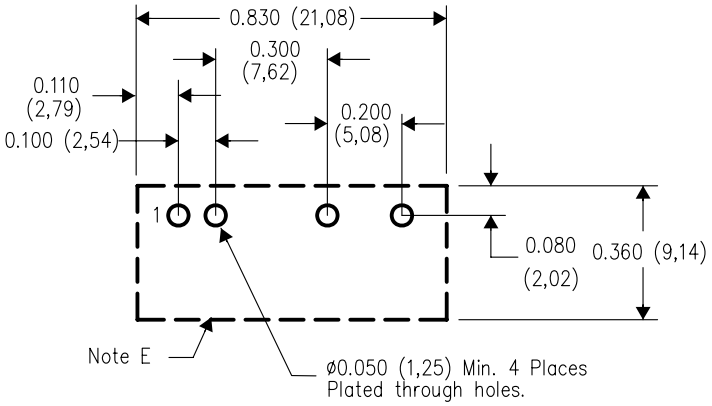
[1] The marketing status values are defined as follows:
ACTIVE: Product device recommended for new designs.
LIFEBUY: TI has announced that the device will be discontinued, and a lifetime-buy period is in effect.
NRND: Not recommended for new designs. Device is in production to support existing customers, 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.
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.

EDJ (R–PDSS–T4) DOUBLE SIDED MODULE



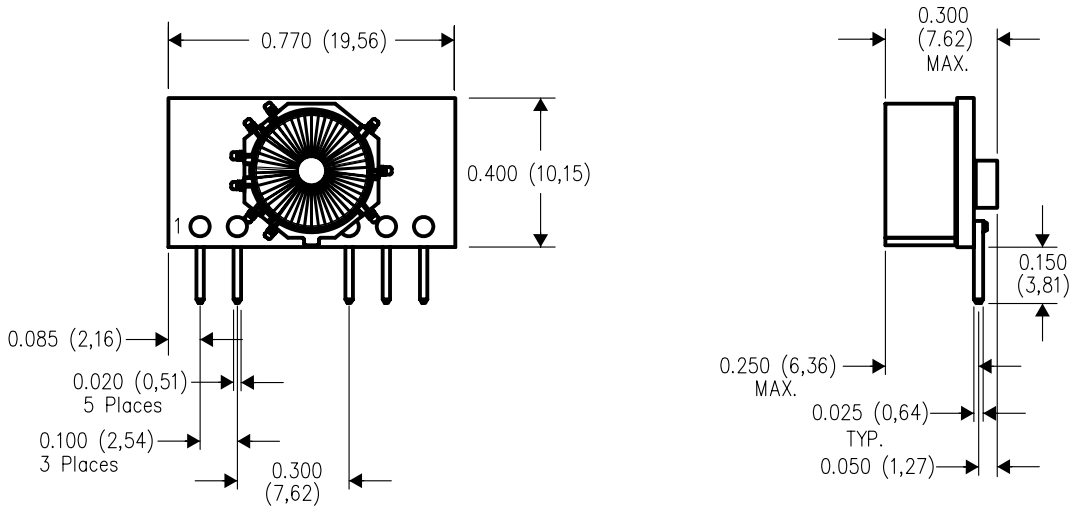


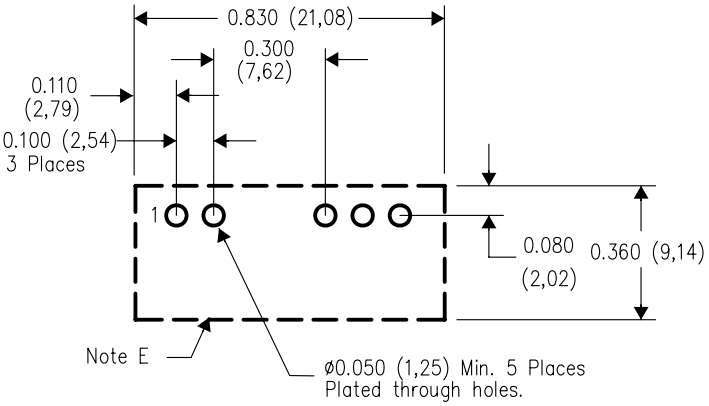
PC LAYOUT

4207975–2/B 06/06

NOTES:
A. All linear dimensions are in inches (mm).
B. This drawing is subject to change without notice.
C. 2 place decimals are ±0.030 (±0,76mm).
D. 3 place decimals are ±0.010 (±0,25mm).
E. Recommended keep out area for user components.
F. Pins are 0.020" (0,51) x 0.025" (0,64).
G. All pins: Material – Copper Alloy
Finish – Tin (100%) over Nickel plate

EDJ (R–PDSS–T5) DOUBLE SIDED MODULE





PC LAYOUT

4207975–3/B 06/06

NOTES:
A. All linear dimensions are in inches (mm).
B. This drawing is subject to change without notice.
C. 2 place decimals are ±0.030 (±0,76mm).
D. 3 place decimals are ±0.010 (±0,25mm).
E. Recommended keep out area for user components.
F. Pins are 0.020" (0,51) x 0.025" (0,64).
G. All pins: Material – Copper Alloy
Finish – Tin (100%) over Nickel plate

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 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.

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.

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

Products		**Applications**	
Amplifiers	amplifier.ti.com	Audio	www.ti.com/audio
Data Converters	dataconverter.ti.com	Automotive	www.ti.com/automotive
DSP	dsp.ti.com	Broadband	www.ti.com/broadband
Interface	interface.ti.com	Digital Control	www.ti.com/digitalcontrol
Logic	logic.ti.com	Military	www.ti.com/military
Power Mgmt	power.ti.com	Optical Networking	www.ti.com/opticalnetwork
Microcontrollers	microcontroller.ti.com	Security	www.ti.com/security
Low Power Wireless	www.ti.com/lpw	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