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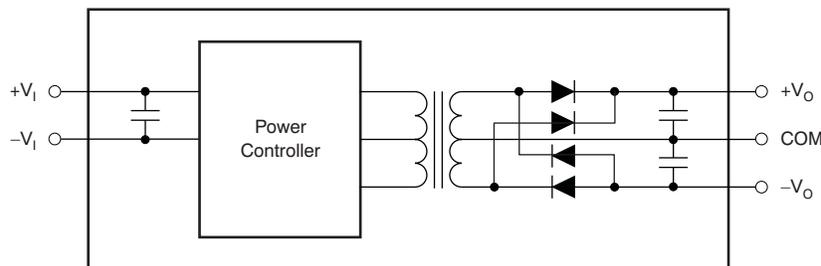
The use of a highly integrated package design results in highly reliable products with high power densities. High performance and small size makes the DCH01 suitable for a wide range of applications including signal chain applications and ground loop elimination.
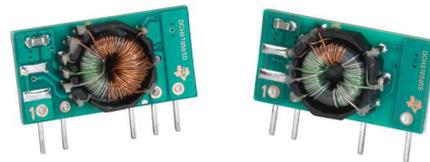
Single Output Block Diagram
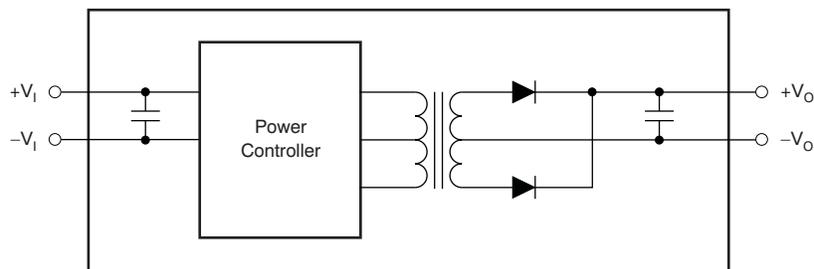
Dual Output Block Diagram

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DCH01 Series

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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	S = Single	N = SIP Thru-hole	7 = SIP-7	Blank = Tray
			12 =12V	D = Dual			T = Tape & Reel
			15 = 15V				

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.

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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.

	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]	
PRODUCT	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.

DCH01 Series

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DEVICE INFORMATION

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

DCH01

1   2   5   7
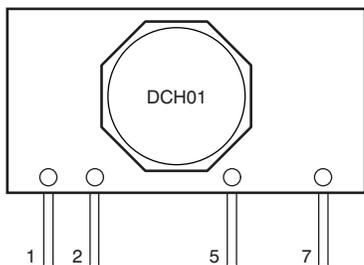
EDJ PACKAGE
SIP-7 (Dual)
(Top View)

DCH01

1   2   5   6   7
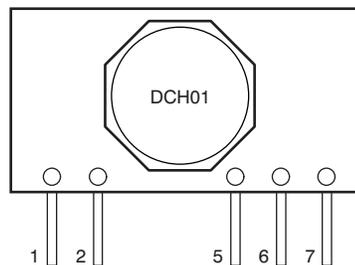
Pin Description (Single)

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

Pin Descriptions (Dual)

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

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TYPICAL CHARACTERISTICS

At T_A = +25°C, and V_{IN} = 5V unless otherwise noted.
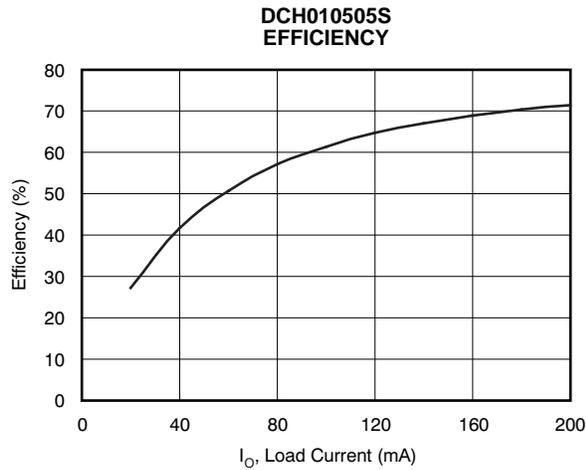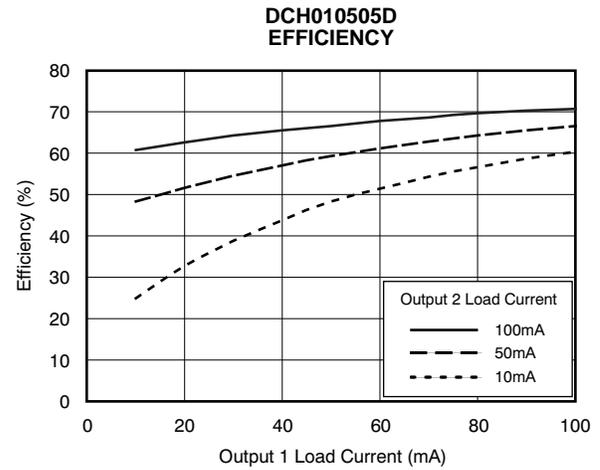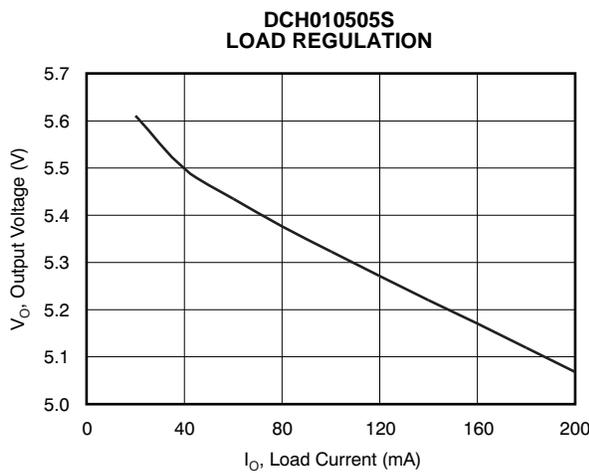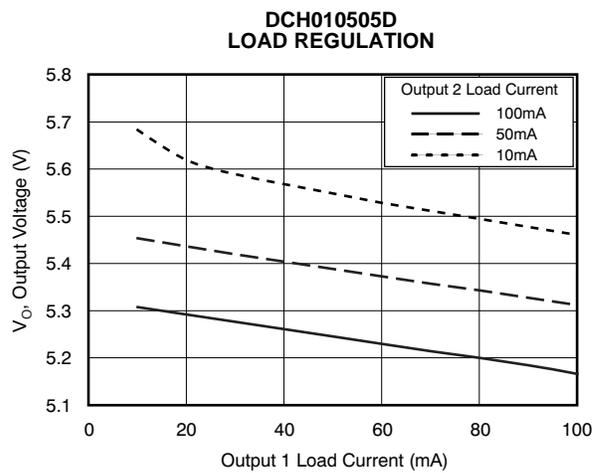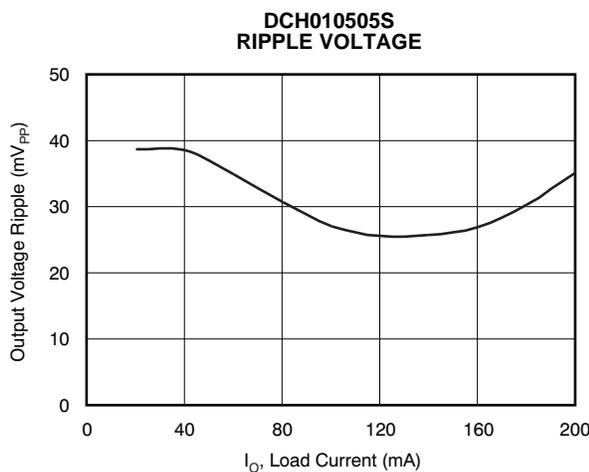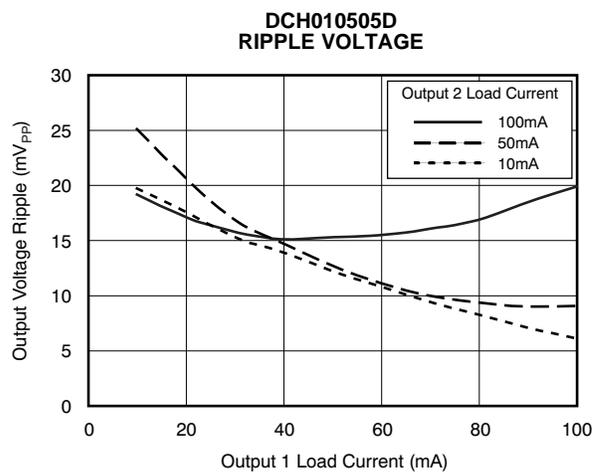
DCH010505S
EFFICIENCY

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.

DCH01 Series

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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.

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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
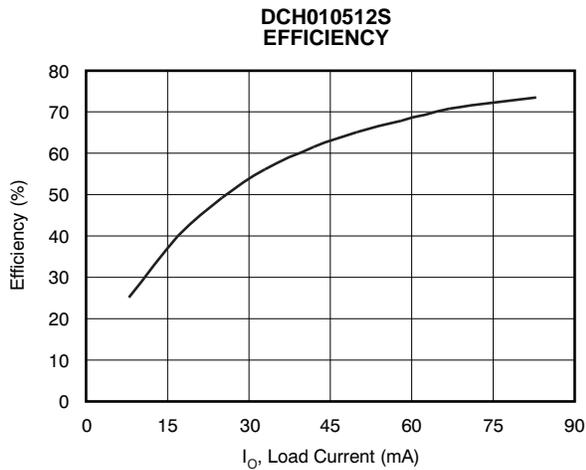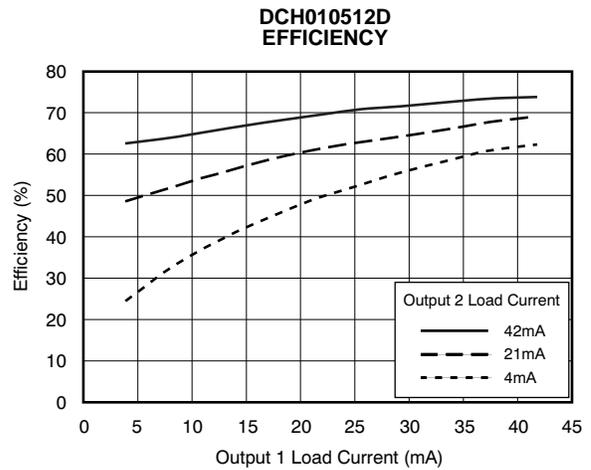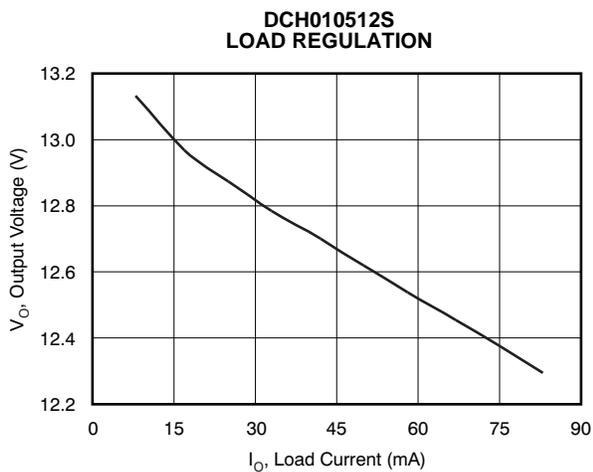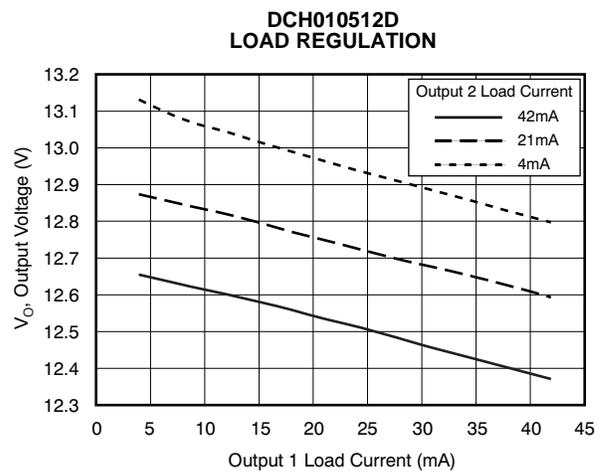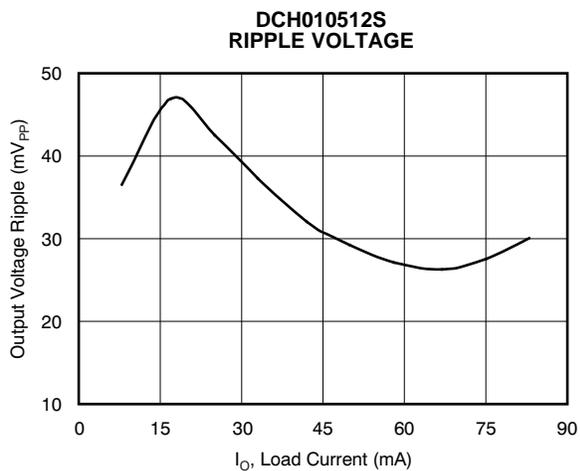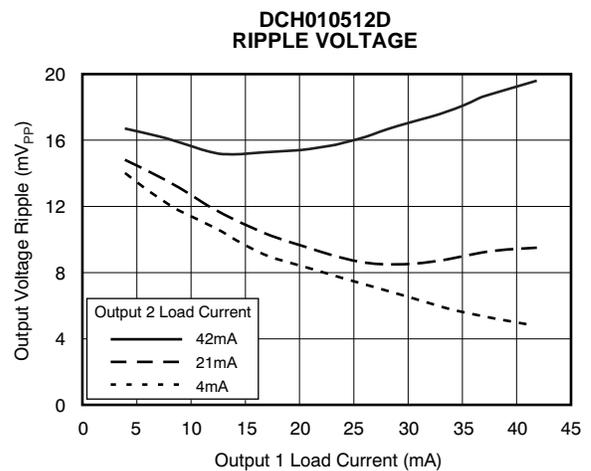
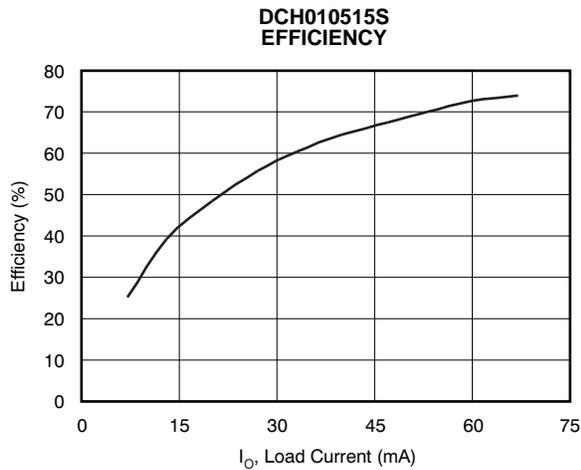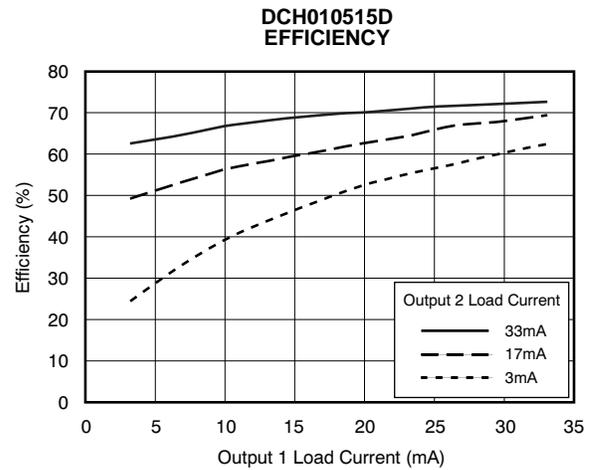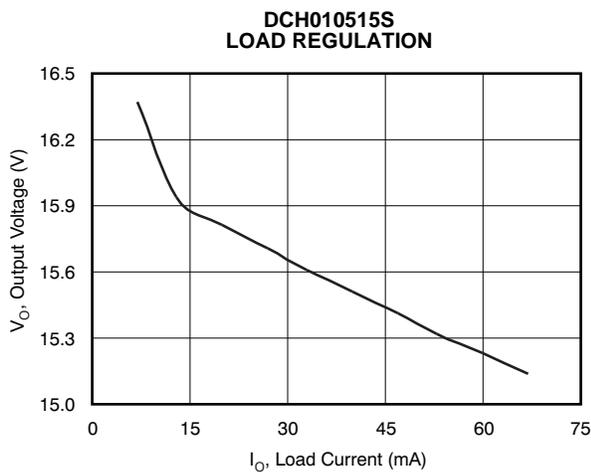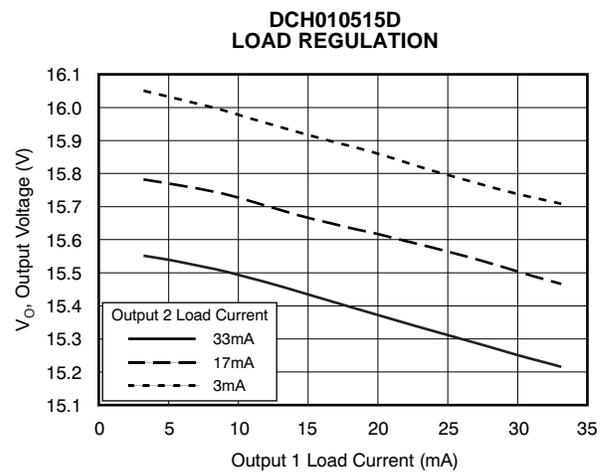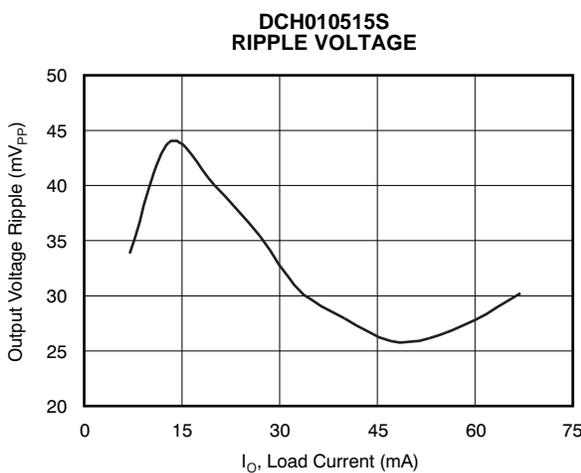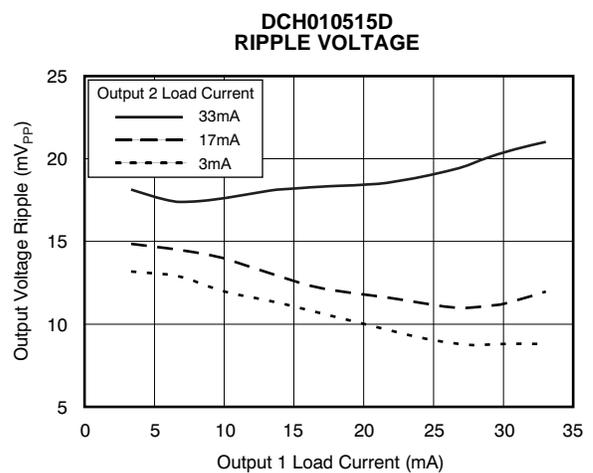
Figure 18.

TYPICAL CHARACTERISTICS (continued)

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

SAFE OPERATING AREA
(All DCH0105 Products)

Natural Convection

Ambient Temperature (°C) vs Load Current (%)
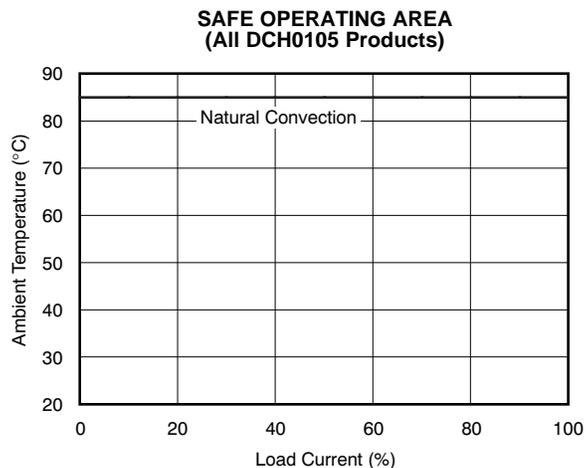
Figure 19.

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 MODULE	EDJ	5	70	Pb-Free (RoHS)	Call TI	N / A for Pkg Type
DCH010505SN7	ACTIVE	SIP MODULE	EDJ	4	70	Pb-Free (RoHS)	Call TI	N / A for Pkg Type
DCH010512DN7	ACTIVE	SIP MODULE	EDJ	5	70	Pb-Free (RoHS)	Call TI	N / A for Pkg Type
DCH010512SN7	ACTIVE	SIP MODULE	EDJ	4	70	Pb-Free (RoHS)	Call TI	N / A for Pkg Type
DCH010515DN7	ACTIVE	SIP MODULE	EDJ	5	70	Pb-Free (RoHS)	Call TI	N / A for Pkg Type
DCH010515SN7	ACTIVE	SIP MODULE	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)
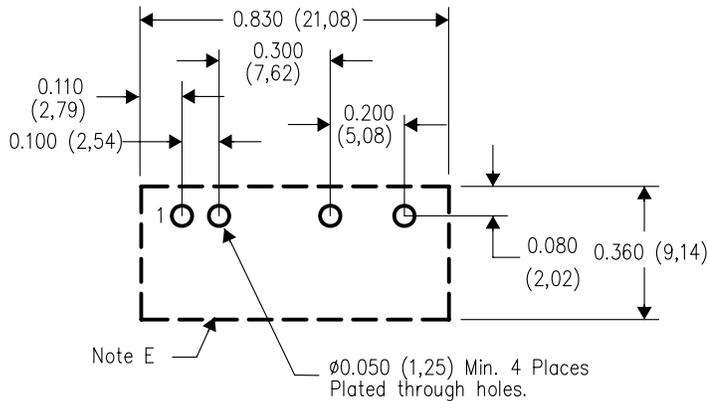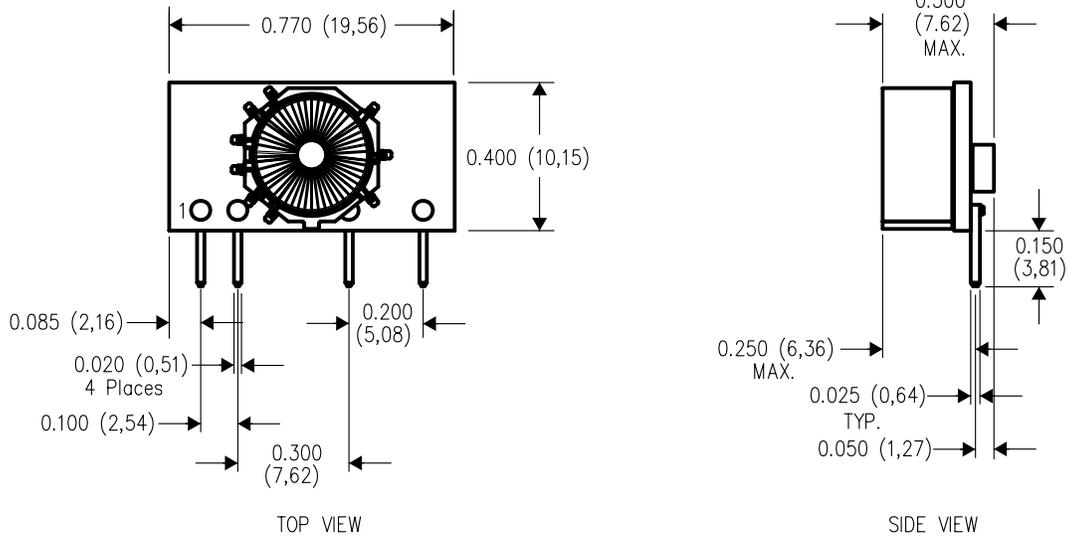
[3] MSL, Peak Temp. -- The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.

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EDJ (R–PDSS–T4)   DOUBLE SIDED MODULE

0.770 (19,56)

0.400 (10,15)

0.300
(7,62)
MAX.

1

0.085 (2,16)

0.020 (0,51)
4 Places

0.100 (2,54)

0.200
(5,08)

0.300
(7,62)

TOP VIEW

0.250 (6,36)
MAX.

0.025 (0,64)
TYP.

0.050 (1,27)

0.150
(3,81)

SIDE VIEW

0.830 (21,08)

0.110
(2,79)

0.100 (2,54)

0.300
(7,62)

0.200
(5,08)

1

0.080
(2,02)

0.360 (9,14)

Note E

Ø0.050 (1,25) Min. 4 Places
Plated through holes.

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

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EDJ (R–PDSS–T5)   DOUBLE SIDED MODULE

0.770 (19,56)

0.400 (10,15)

1

0.085 (2,16)

0.020 (0,51)
5 Places

0.100 (2,54)
3 Places

0.300
(7,62)

TOP VIEW

0.300
(7,62)
MAX.

0.250 (6,36)
MAX.

0.150
(3,81)

0.025 (0,64)
TYP.

0.050 (1,27)

SIDE VIEW

0.830 (21,08)

0.110
(2,79)

0.300
(7,62)

0.100 (2,54)
3 Places

1

0.080
(2,02)

0.360 (9,14)

Note E

Ø0.050 (1,25) Min. 5 Places
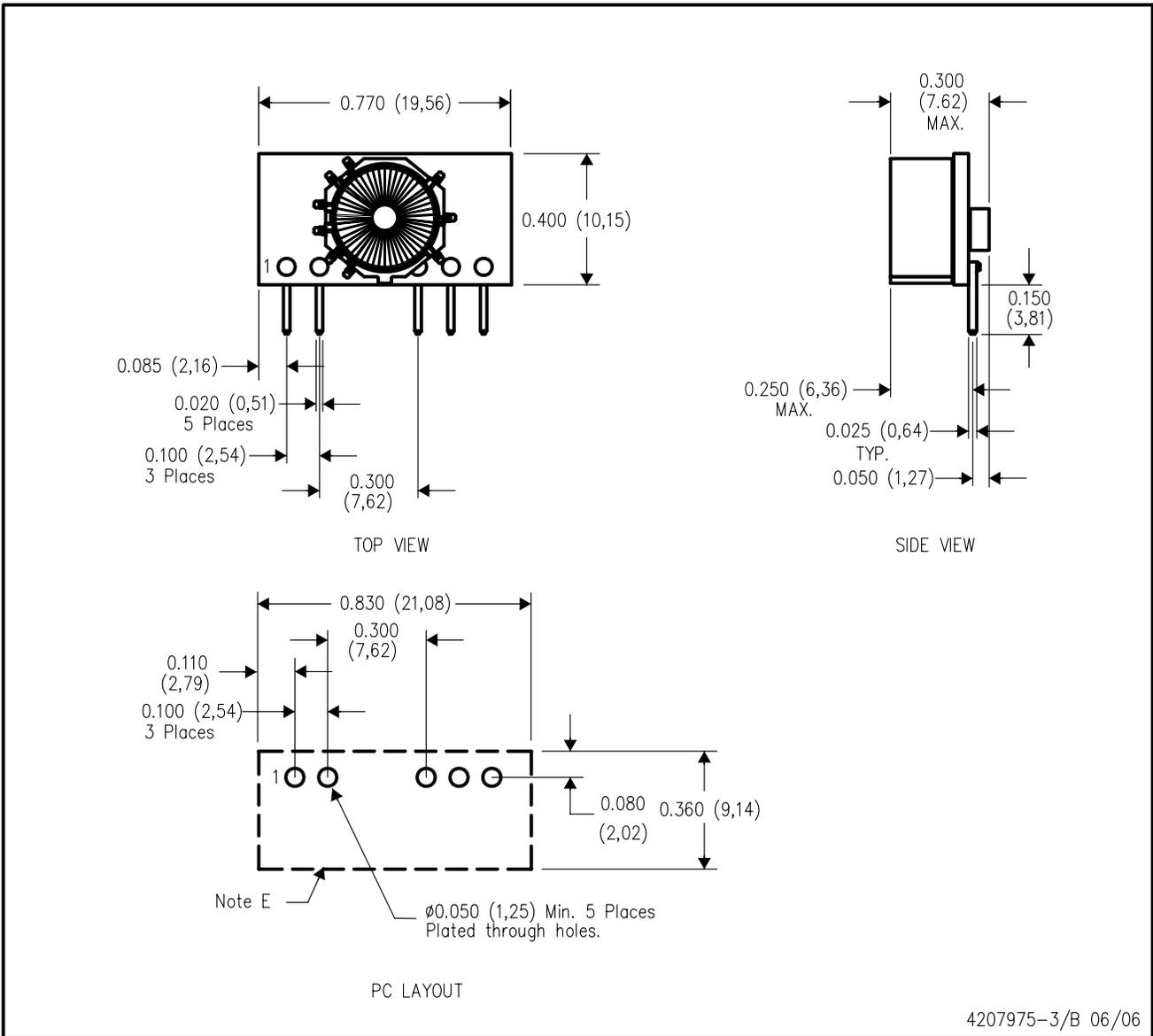Plated through holes.

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

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Microcontrollers	microcontroller.ti.com	Security	www.ti.com/security
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		Wireless	www.ti.com/wireless

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