

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

FEATURES

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

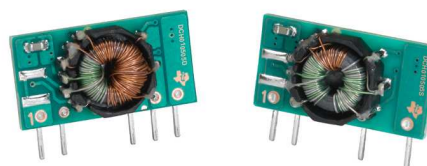
APPLICATIONS

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

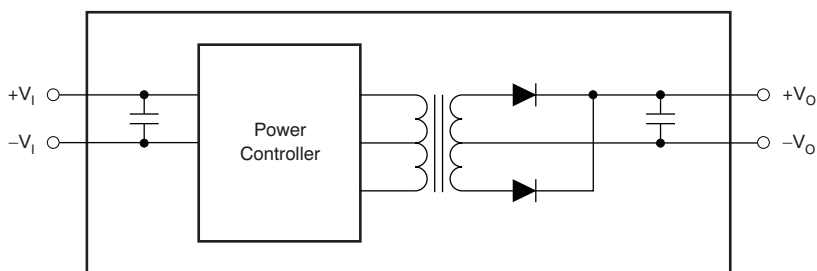
DESCRIPTION

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.

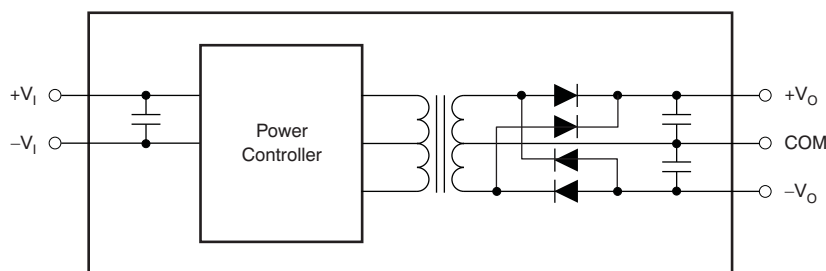
The use of a highly integrated package design results in highly reliable products with high power densities. High performance and small size makes the DCH01 suitable for a wide range of applications including signal chain applications and ground loop elimination.



Single Output Block Diagram



Dual Output Block Diagram



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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 $T_A = +25^{\circ}\text{C}$, $V_I = 5\text{V}$ 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; $T_A = +40^{\circ}\text{C}$	Single Output	18		FITS
		Dual Output	22		
TEMPERATURE RANGE					
Operating		−40		+85	$^{\circ}\text{C}$

(1) During UL60950 recognition tests only.

ELECTRICAL CHARACTERISTICS PER DEVICE

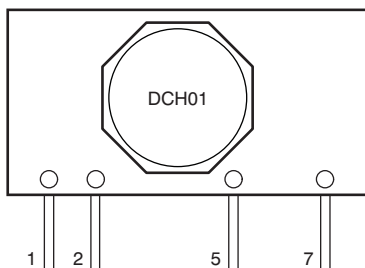
At $T_A = +25^{\circ}\text{C}$, $V_I = 5\text{V}$ unless otherwise noted.

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

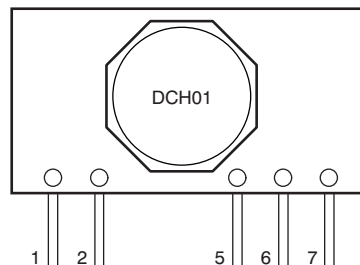
(1) 20MHz bandwidth.

(2) 100% load current = $1\text{W}/V_{\text{NOM}}$ typ.

(3) Load Regulation = $(V_O \text{ at } 10\% \text{ load} - V_O \text{ at } 100\% \text{ load}) / V_O \text{ at } 100\% \text{ load}$.

DEVICE INFORMATION**EDJ PACKAGE
SIP-7 (Single)
(Top View)****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

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

TYPICAL CHARACTERISTICS

At $T_A = +25^\circ\text{C}$, and $V_{IN} = 5\text{V}$ unless otherwise noted.

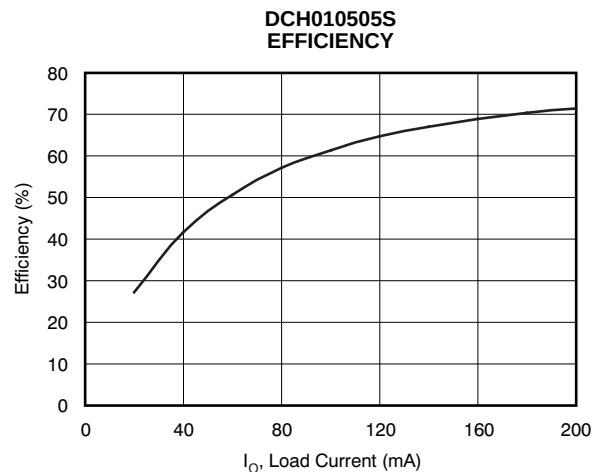


Figure 1.

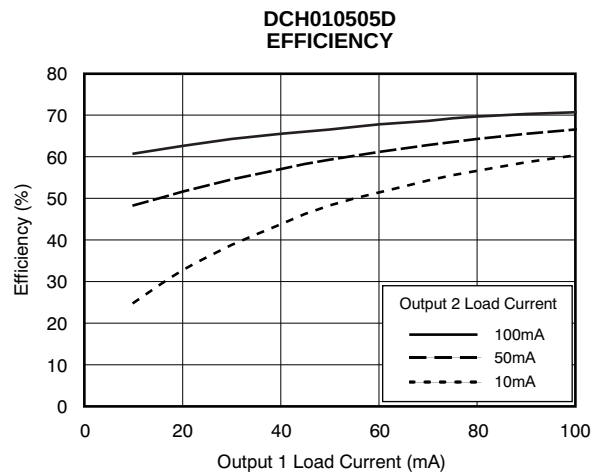


Figure 2.

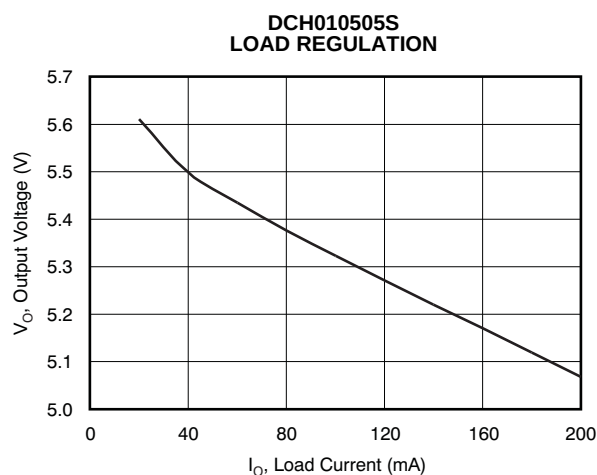


Figure 3.

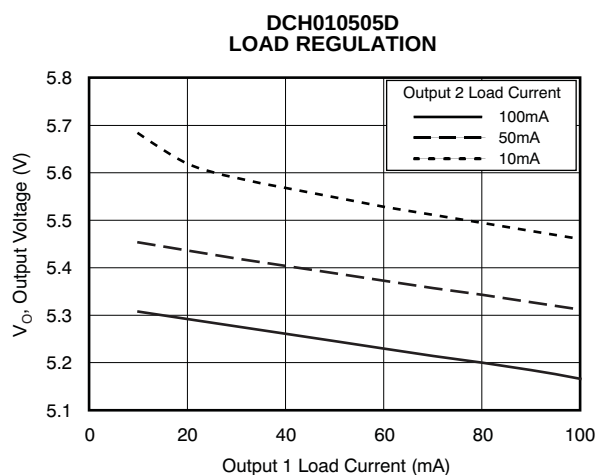


Figure 4.

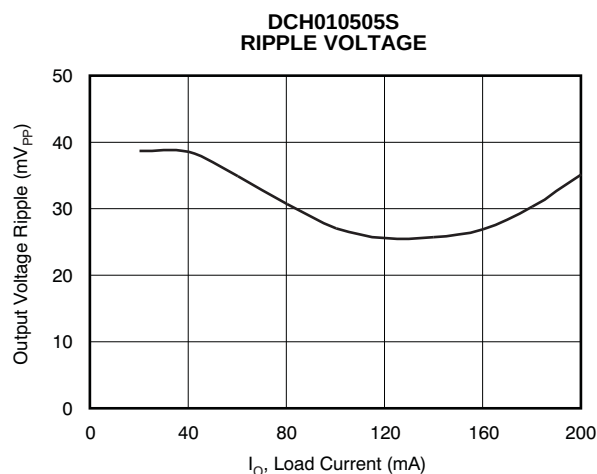


Figure 5.

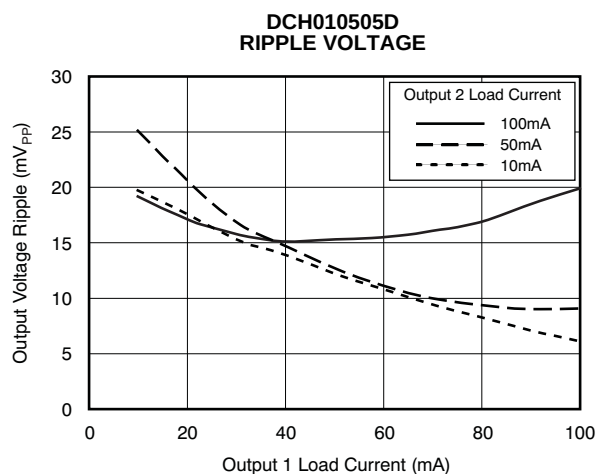
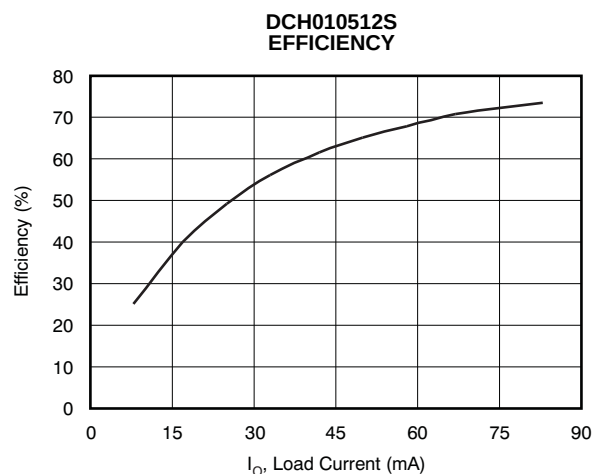
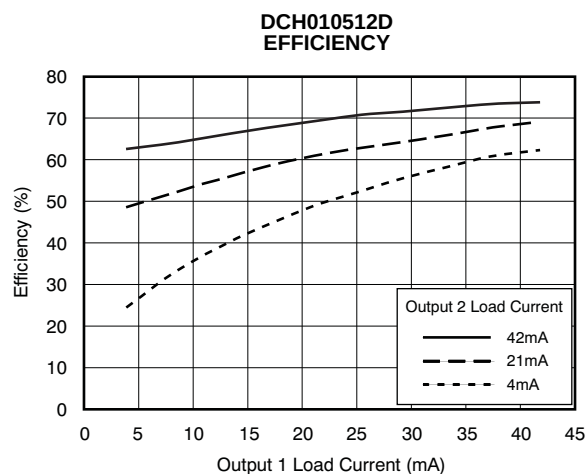
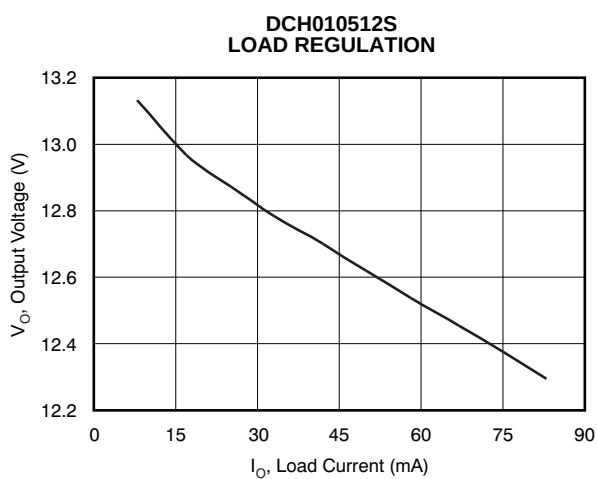
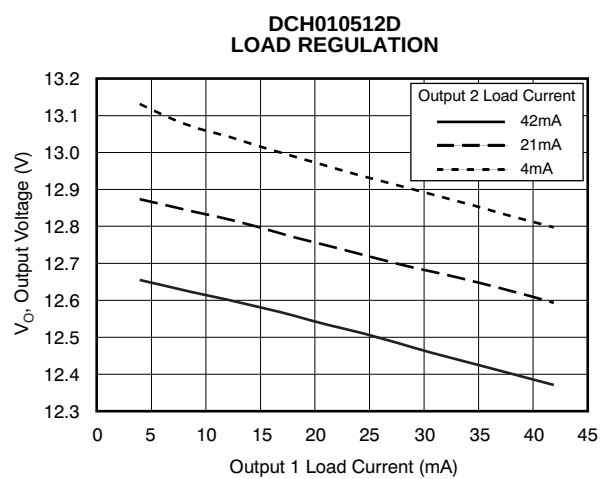
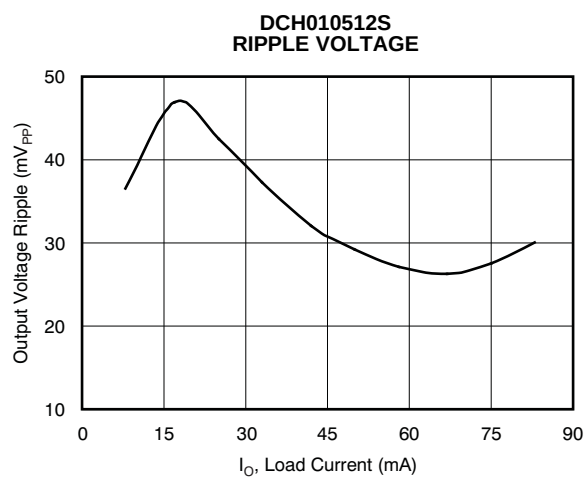
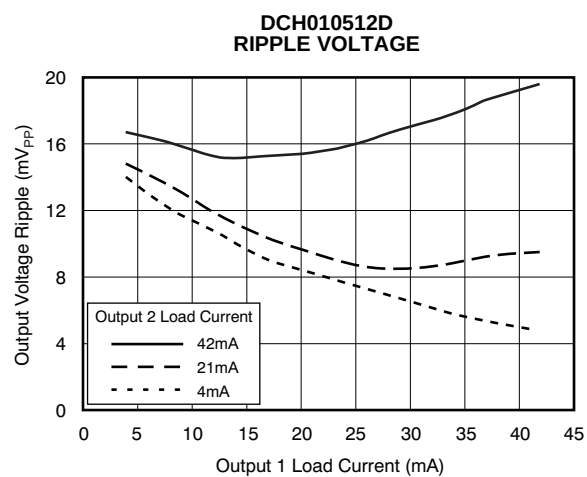


Figure 6.

TYPICAL CHARACTERISTICS (continued)

At $T_A = +25^\circ\text{C}$, and $V_{IN} = 5\text{V}$ unless otherwise noted.

**Figure 7.****Figure 8.****Figure 9.****Figure 10.****Figure 11.****Figure 12.**

TYPICAL CHARACTERISTICS (continued)

At $T_A = +25^\circ\text{C}$, and $V_{IN} = 5\text{V}$ unless otherwise noted.

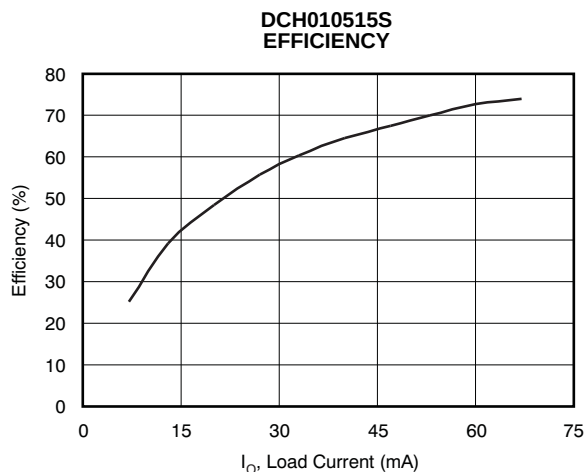


Figure 13.

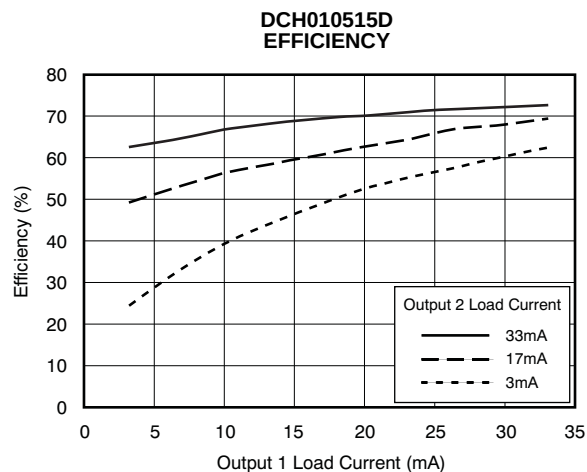


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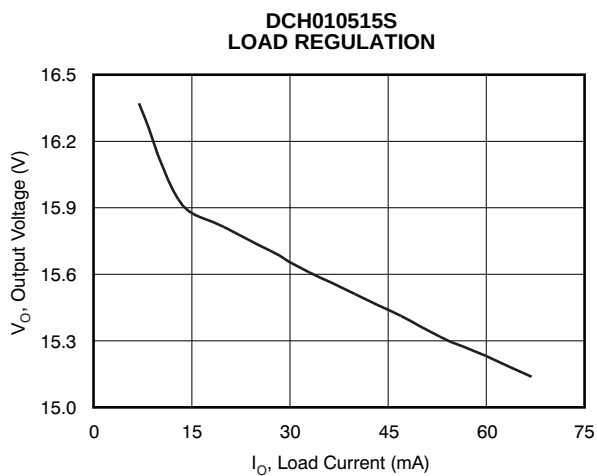


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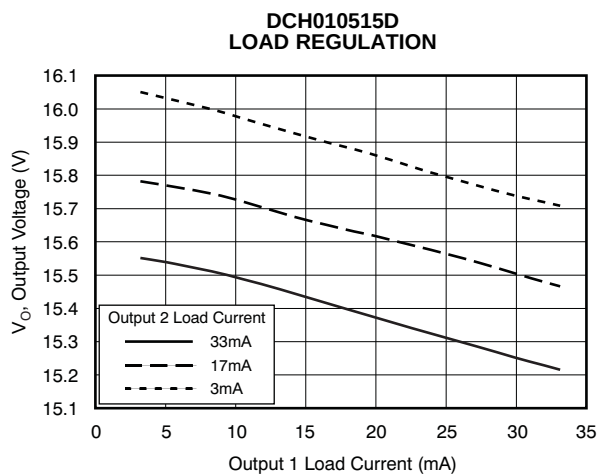


Figure 16.

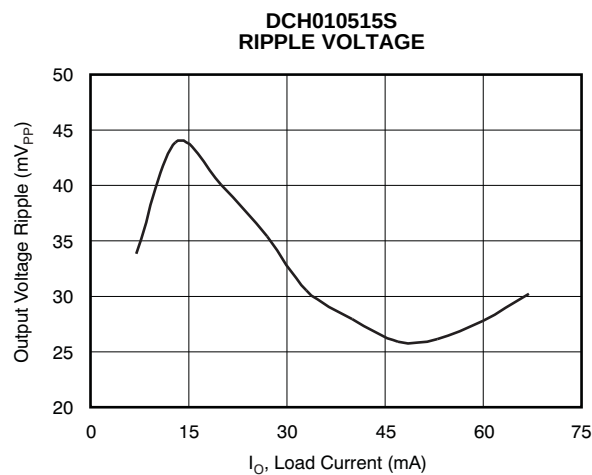


Figure 17.

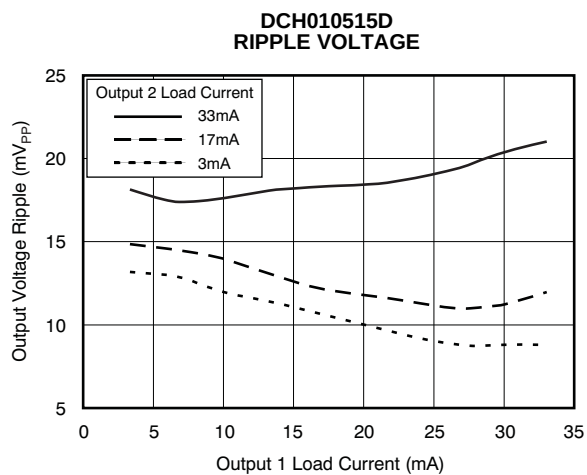


Figure 18.

TYPICAL CHARACTERISTICS (continued)

At $T_A = +25^{\circ}\text{C}$, and $V_{IN} = 5\text{V}$ unless otherwise noted.

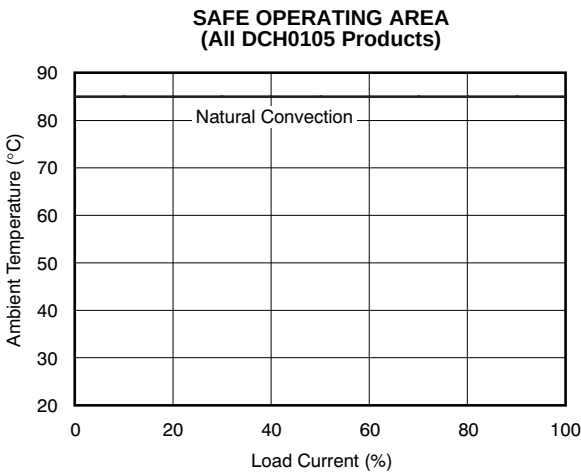


Figure 19.

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)

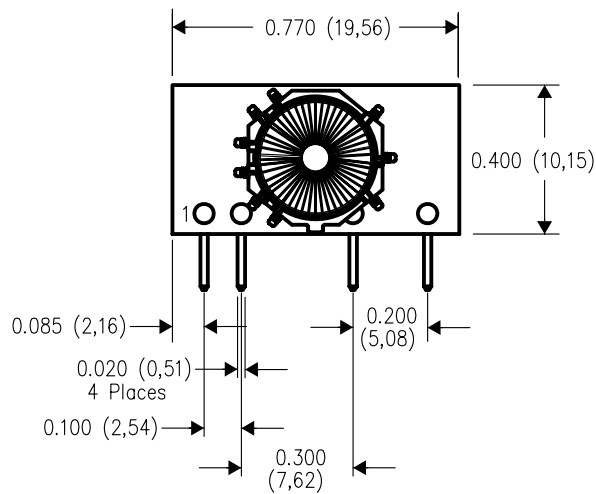
⁽³⁾ MSL, Peak Temp. -- The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.

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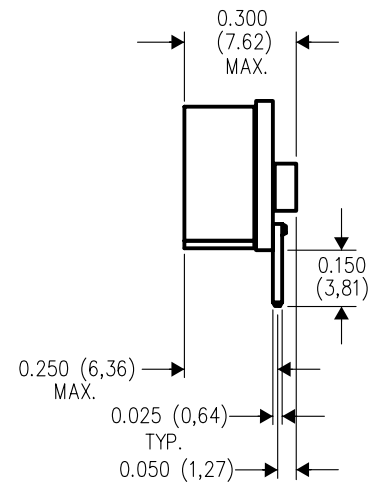
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EDJ (R-PDSS-T4)

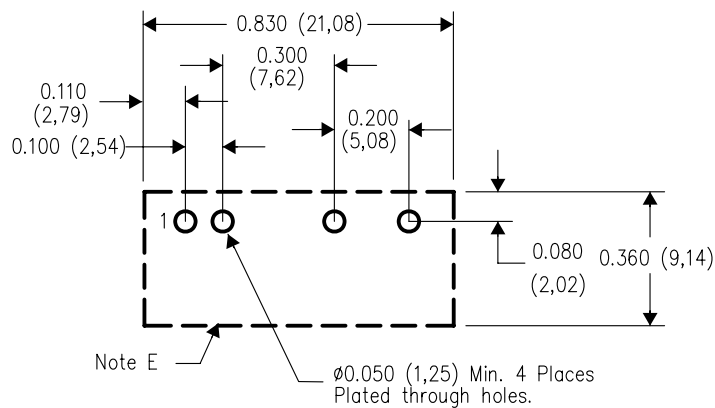
DOUBLE SIDED MODULE



TOP VIEW



SIDE VIEW



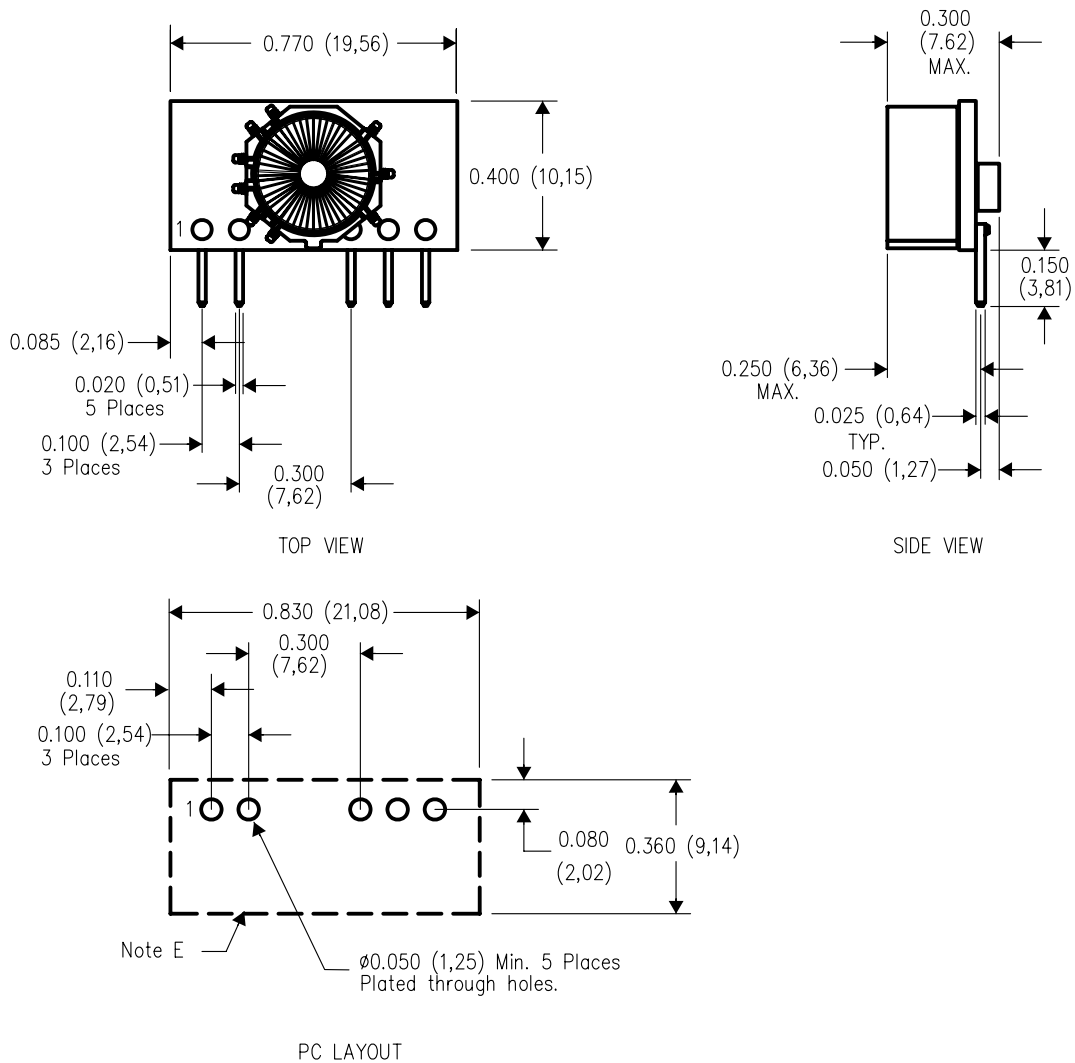
PC LAYOUT

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 ($\pm 0,76$ mm).
 - D. 3 place decimals are ± 0.010 ($\pm 0,25$ mm).
 - 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



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 ($\pm 0,76$ mm).
 - D. 3 place decimals are ± 0.010 ($\pm 0,25$ mm).
 - 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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