DCR01 Series

SBVS013C – OCTOBER 2001 – REVISED MAY 2003

Miniature, 1W Isolated REGULATED DC/DC CONVERTERS

FEATURES

- UL1950 RECOGNIZED
- DIP-18, SO-28
- 53W/in³ (3.3W/cm³) POWER DENSITY
- DEVICE-TO-DEVICE SYNCHRONIZATION
- THERMAL PROTECTION
- 1000Vrms ISOLATION
- 400kHz SWITCHING
- 125 FITS AT 55°C
- ±10% INPUT RANGE
- SHORT-CIRCUIT PROTECTED
- 5V, 12V, 24V INPUTS
- 3.3V, 5V OUTPUTS
- HIGH EFFICIENCY

APPLICATIONS

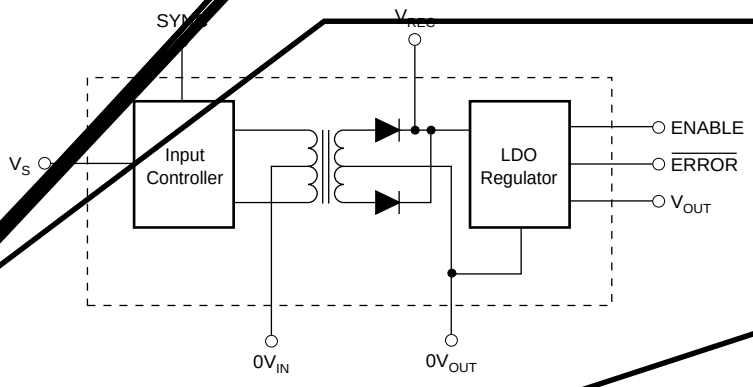
- POINT-OF-USE POWER CONVERSION
- DIGITAL INTERFACE POWER
- GROUND LOOP ELIMINATION
- POWER-SUPPLY NOISE REDUCTION

DESCRIPTION

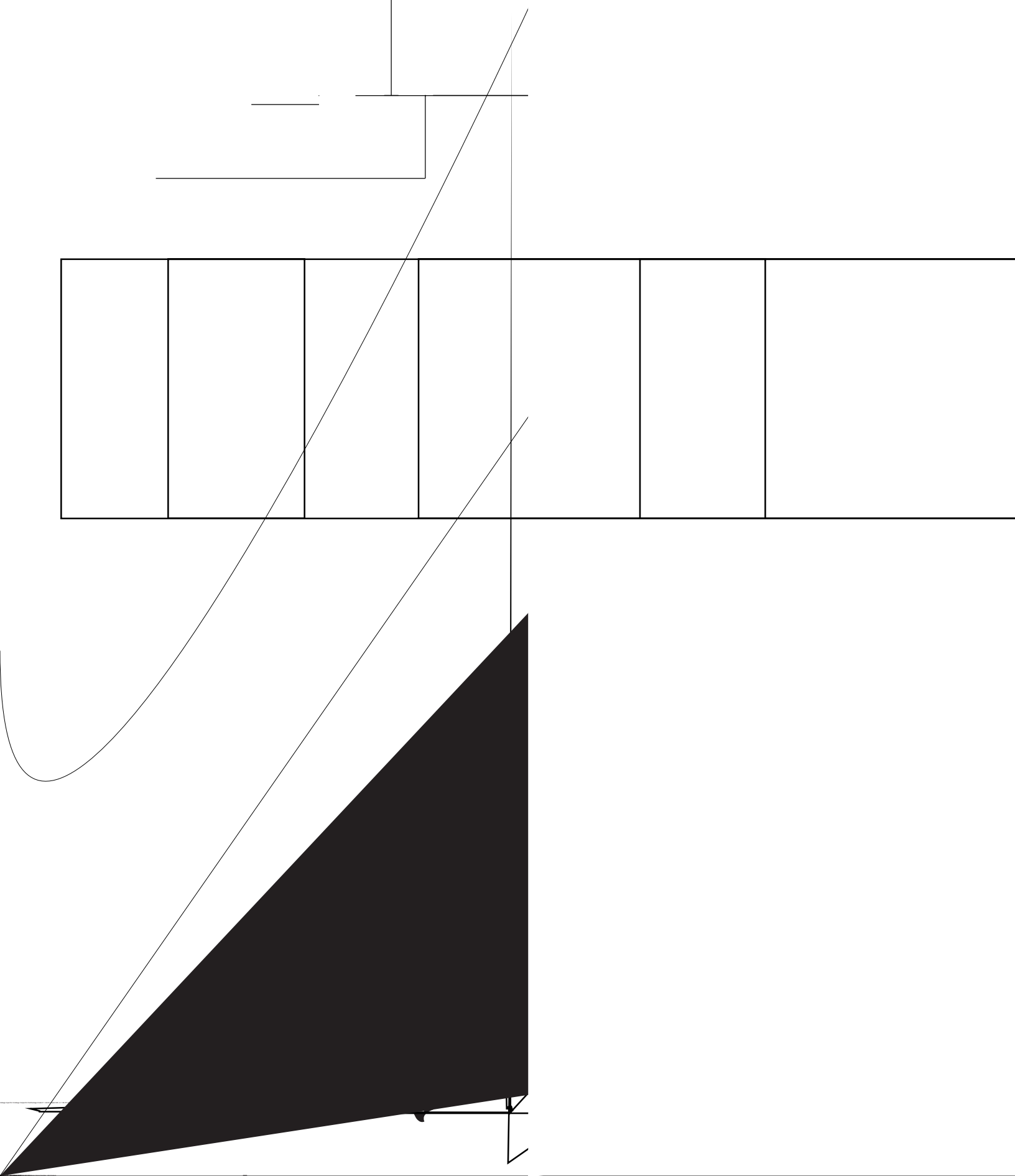
The DCR01 family is a series of high-efficiency, input-isolated, output-regulated DC/DC converters. In addition to 1W nominal, galvanically-isolated output power capability, this range of DC/DCs offer very low output noise, thermal protection, and high accuracy.

The DCR01 family is implemented in standard molded IC packaging, giving standard JEDEC outlines suitable for high-volume assembly.

The DCR01 is manufactured using the same technology as standard IC packages, thereby achieving very high reliability.



This integrated circuit can be damaged by ESD. Texas Instru-



ELECTRICAL CHARACTERISTICS (Cont.)

At T_A = +25°C, V_S = nominal, I_O = 10mA, C_O = 0.1µF, unless otherwise specified.

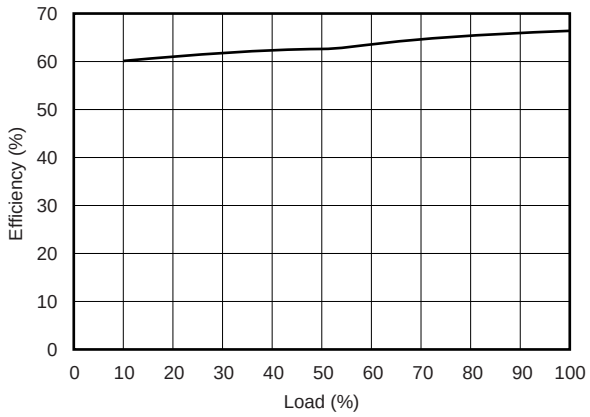
PARAMETER	CONDITIONS	DCR01 SERIES MIN	DCR01 SERIES TYP	DCR01 SERIES MAX	UNITS
Supply Current					
DCR010503P	I_O = 0mA		18		mA
	I_O = 10mA		28		mA
	I_O = 300mA		335		mA
DCR010503U	I_O = 0mA		24		mA
	I_O = 10mA		33		mA
	I_O = 300mA		339		mA
DCR010505P	I_O = 0mA		25		mA
	I_O = 10mA		40		mA
	I_O = 200mA		306		mA
DCR010505U	I_O = 0mA		25		mA
	I_O = 10mA		40		mA
	I_O = 200mA		306		mA
DCR011203P	I_O = 0mA		13		mA
	I_O = 10mA		17		mA
	I_O = 390mA		173		mA
DCR011203U	I_O = 0mA		13		mA
	I_O = 10mA		17		mA
	I_O = 390mA		136		mA
DCR011205P	I_O = 0mA		13		mA
	I_O = 10mA		18		mA
	I_O = 200mA		125		mA
DCR011205U	I_O = 0mA		14		mA
	I_O = 10mA		19		mA
	I_O = 200mA		123		mA
DCR012403P	I_O = 0mA		17		mA
	I_O = 10mA		18		mA
	I_O = 390mA		97		mA
DCR012403U	I_O = 0mA		15		mA
	I_O = 10mA		17		mA
	I_O = 390mA		75		mA
DCR012405P	I_O = 0mA		15		mA
	I_O = 10mA		18		mA
	I_O = 200mA		69		mA
DCR012405U	I_O = 0mA		15		mA
	I_O = 10mA		18		mA
	I_O = 200mA		67		mA
Reflected Ripple Current	20MHz Bandwidth, 100% Load C_{IN} = 2.2µF, C_{FILTER} = 1µF		8		mAp-p
ISOLATION					
Voltage	1s Flash Test	1			kVrms
	60s Test, UL1950[2]	1			kVrms
Input/Output Capacitance			25		pF
OUTPUT ENABLE CONTROL					
Logic High Input Voltage		2.0		V_{REC}	V
Logic High Input Current	2.0 < V_{ENABLE} < V_{REC}		100		nA
Logic Low Input Voltage		–0.2		0.5	V
Logic Low Input Current	0 < V_{ENABLE} < 0.5		100		nA
V_{REC}	All 3.3V Outputs		3.3		V
V_{REC}	All 5V Outputs		5		V
ERROR FLAG					
Logic High Open Collector Leakage	V_{ERROR} = 5V			10	µA
Logic Low Output Voltage	Sinking 2mA			0.4	V
THERMAL SHUTDOWN					
Junction Temperature					
Temperature Activated			150		°C
Temperature Deactivated			130		°C
SYNCHRONIZATION PIN					
Max External Capacitance on SYNC Pin				3	pF
Internal Oscillator Frequency		720	800	880	kHz
External Synchronization Frequency		720		880	kHz
External Synchronization Signal High		2.5	2.5	5.0	V
External Synchronization Signal Low		0		0.4	V
TEMPERATURE RANGE					
Operating		–40		+85	°C

NOTES: (1) C_{IN} = 2.2µF, C_{FILTER} = 1µF, C_{OUT} = 0.1µF. (2) During UL approval only.

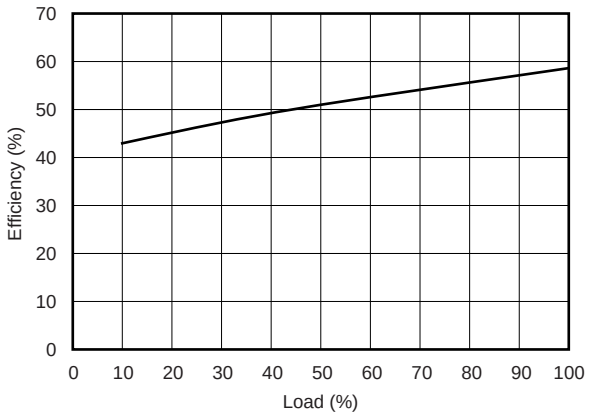
TYPICAL CHARACTERISTICS (Cont.)

At T_A = +25°C, V_S = 5V, I_O = 10mA, C_{FILTER} = 1µF, C_O = 0.1µF, unless otherwise specified.

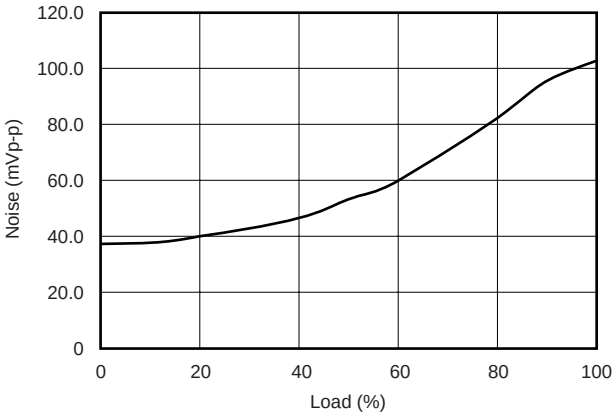
EFFICIENCY FOR 5V AND 12V INPUT
"U" DEVICES, 5V OUTPUT



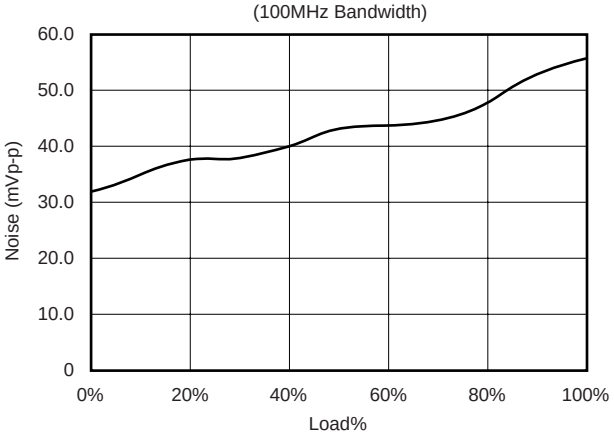
EFFICIENCY vs LOAD
DCR0112405 "P" and "U" DEVICES



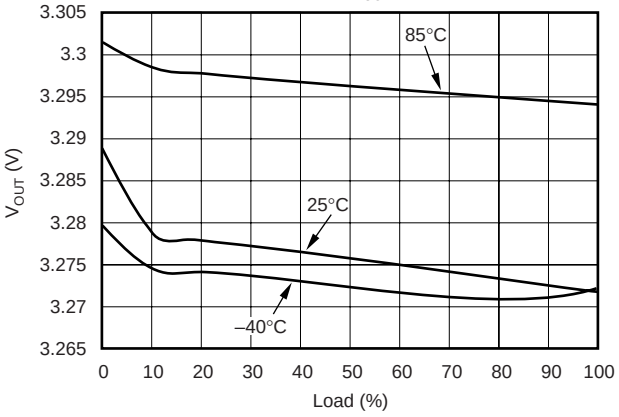
DCR011203P OUTPUT NOISE
(100MHz Bandwidth)



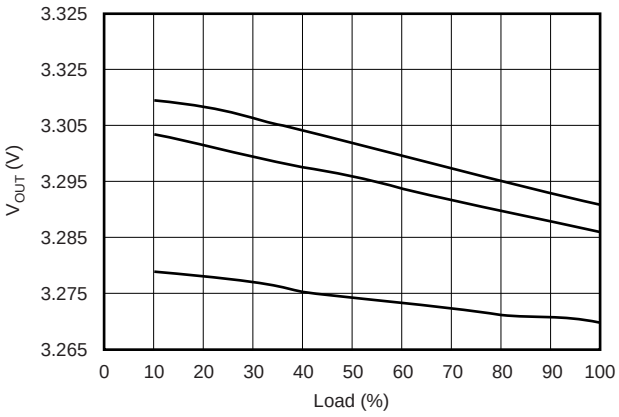
DCR011205P OUTPUT NOISE
(100MHz Bandwidth)



DCR010503P V_{OUT} vs LOAD



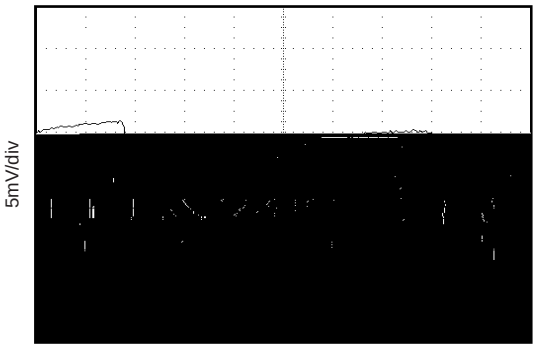
3V OUTPUT vs LOAD
(all devices except DCR010503P)



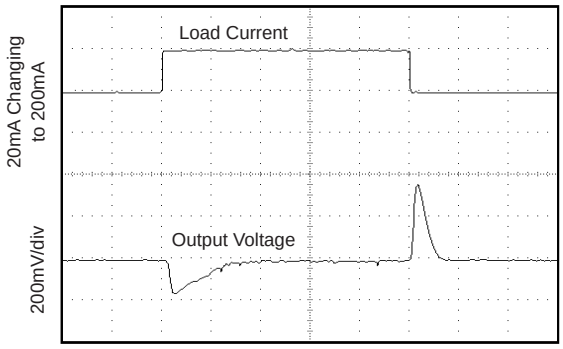
TYPICAL CHARACTERISTICS (Cont.)

At T_A = +25°C, V_S = 5V, I_O = 10mA, C_{FILTER} = 1µF, C_O = 0.1µF, unless otherwise specified.

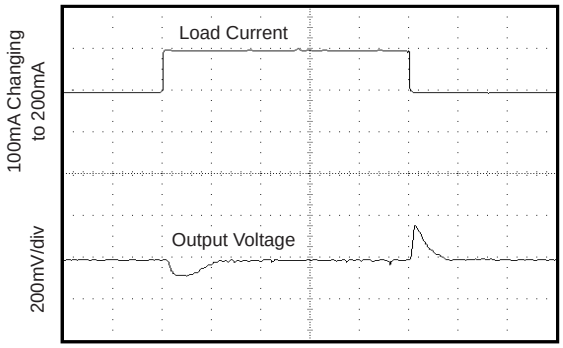
DCR010503P OUTPUT VOLTAGE RIPPLE
AT 100% LOAD (20MHz Bandwidth)



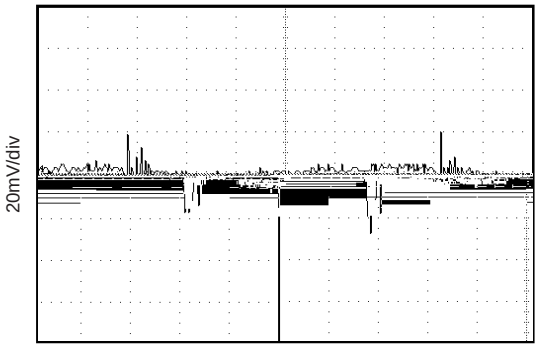
DCR010505P LOAD TRANSIENT RESPONSE



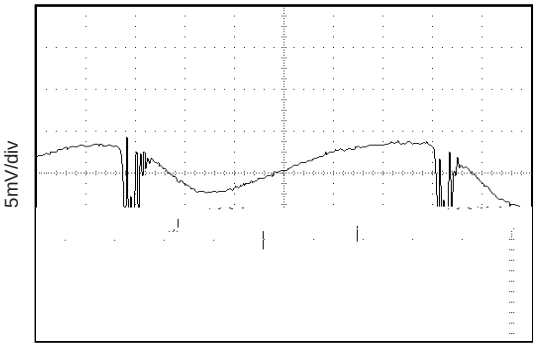
DCR010505P LOAD TRANSIENT RESPONSE

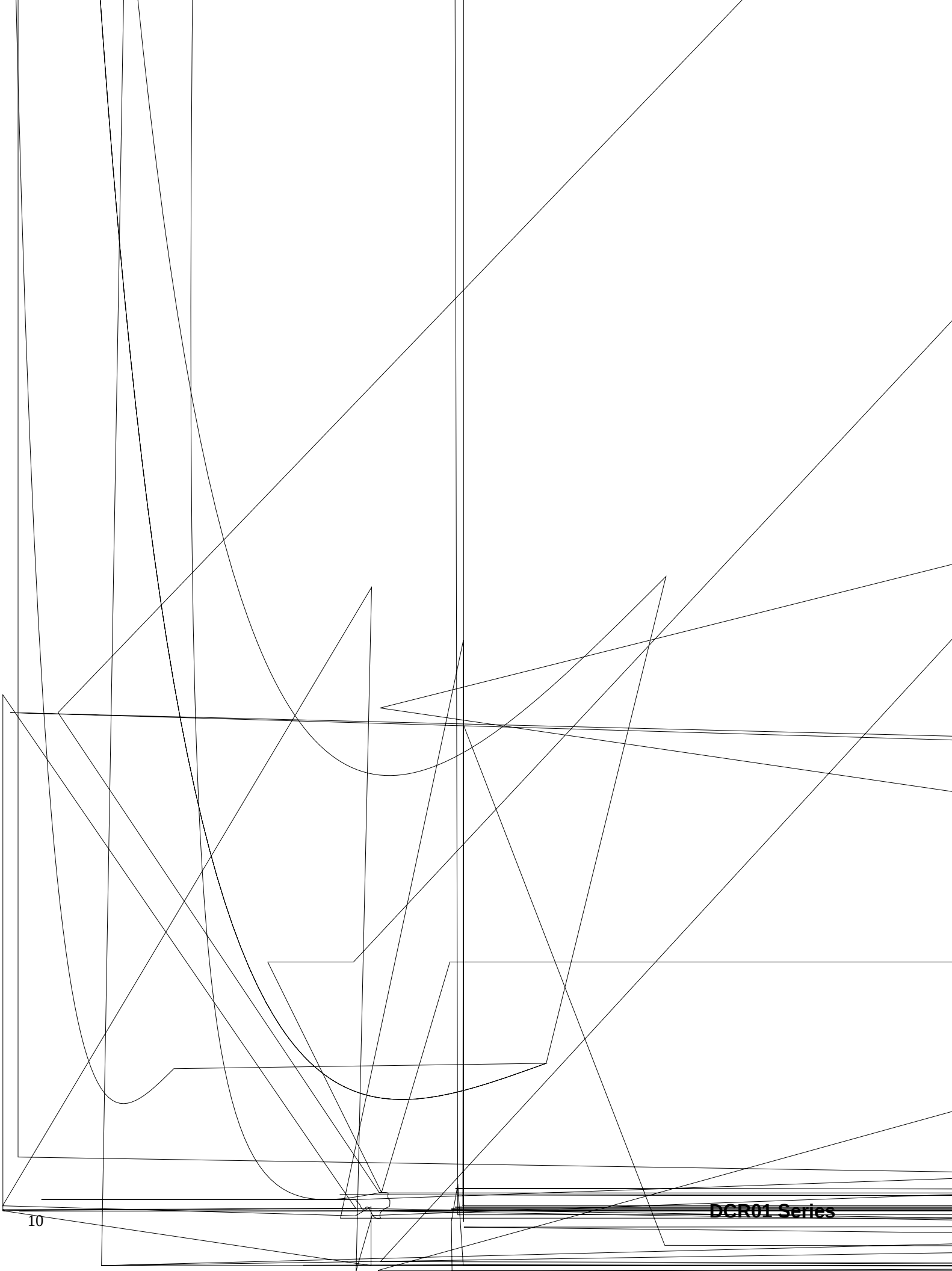


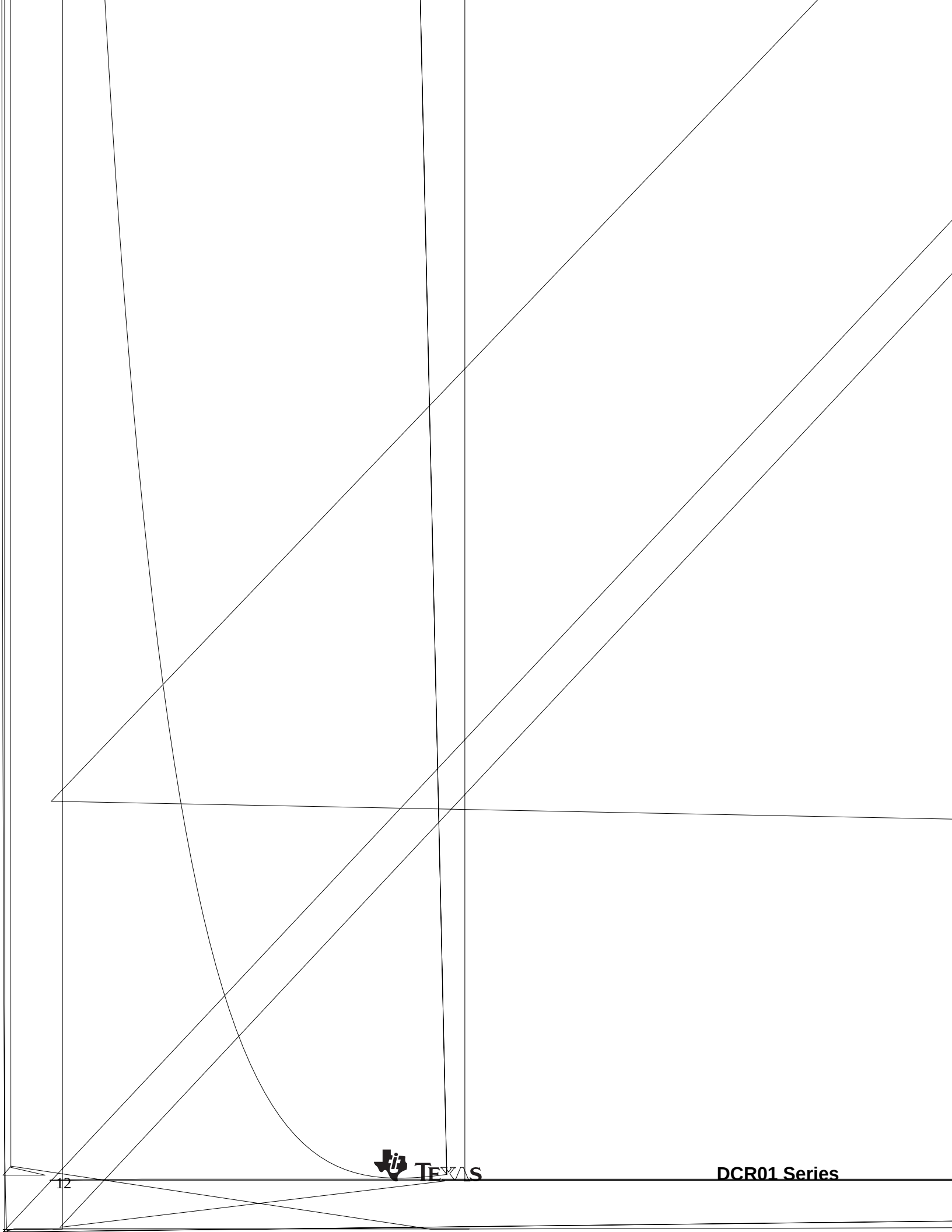
DCR010505P OUTPUT VOLTAGE NOISE
AT 100% LOAD (100MHz Bandwidth)



DCR010505P OUTPUT VOLTAGE RIPPLE
AT 100% LOAD (20MHz Bandwidth)







PACKAGE OPTION ADDENDUM

www.ti.com

28-Aug-2010

PACKAGING INFORMATION

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead/ Ball Finish	MSL Peak Temp (3)	Samples (Requires Login)
DCR010503P	ACTIVE	PDIP	NVE	10	20	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type	Request Free Samples
DCR010503U	ACTIVE	SOP	DVB	12	28	Pb-Free (RoHS)	CU NIPDAU	Level-3-260C-168 HR	Request Free Samples
DCR010503U/1K	ACTIVE	SOP	DVB	12	1000	Pb-Free (RoHS)	CU NIPDAU	Level-3-260C-168 HR	Purchase Samples
DCR010503UE4	ACTIVE	SOP	DVB	12	28	Pb-Free (RoHS)	CU NIPDAU	Level-3-260C-168 HR	Request Free Samples
DCR010505P	ACTIVE	PDIP	NVE	10	20	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type	Request Free Samples
DCR010505U	ACTIVE	SOP	DVB	12	28	Pb-Free (RoHS)	CU NIPDAU	Level-3-260C-168 HR	Request Free Samples
DCR010505U/1K	ACTIVE	SOP	DVB	12	1000	Pb-Free (RoHS)	CU NIPDAU	Level-3-260C-168 HR	Purchase Samples
DCR010505U/1KE4	ACTIVE	SOP	DVB	12	1000	Pb-Free (RoHS)	CU NIPDAU	Level-3-260C-168 HR	Purchase Samples
DCR010505UE4	ACTIVE	SOP	DVB	12	28	Pb-Free (RoHS)	CU NIPDAU	Level-3-260C-168 HR	Request Free Samples
DCR011203P	ACTIVE	PDIP	NVE	10	20	TBD	CU NIPDAU	Level---	Request Free Samples
DCR011203U	ACTIVE	SOP	DVB	12	28	Pb-Free (RoHS)	CU NIPDAU	Level-3-260C-168 HR	Request Free Samples
DCR011203U/1K	ACTIVE	SOP	DVB	12	1000	Pb-Free (RoHS)	CU NIPDAU	Level-3-260C-168 HR	Purchase Samples
DCR011203U/1KE4	ACTIVE	SOP	DVB	12	1000	Pb-Free (RoHS)	CU NIPDAU	Level-3-260C-168 HR	Purchase Samples
DCR011203UE4	ACTIVE	SOP	DVB	12	28	Pb-Free (RoHS)	CU NIPDAU	Level-3-260C-168 HR	Request Free Samples
DCR011205P	ACTIVE	PDIP	NVE	10	20	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type	Request Free Samples
DCR011205U	ACTIVE	SOP	DVB	12	28	Pb-Free (RoHS)	CU NIPDAU	Level-3-260C-168 HR	Request Free Samples
DCR011205U/1K	ACTIVE	SOP	DVB	12	1000	Pb-Free (RoHS)	CU NIPDAU	Level-3-260C-168 HR	Purchase Samples
DCR011205U/1KE4	ACTIVE	SOP	DVB						

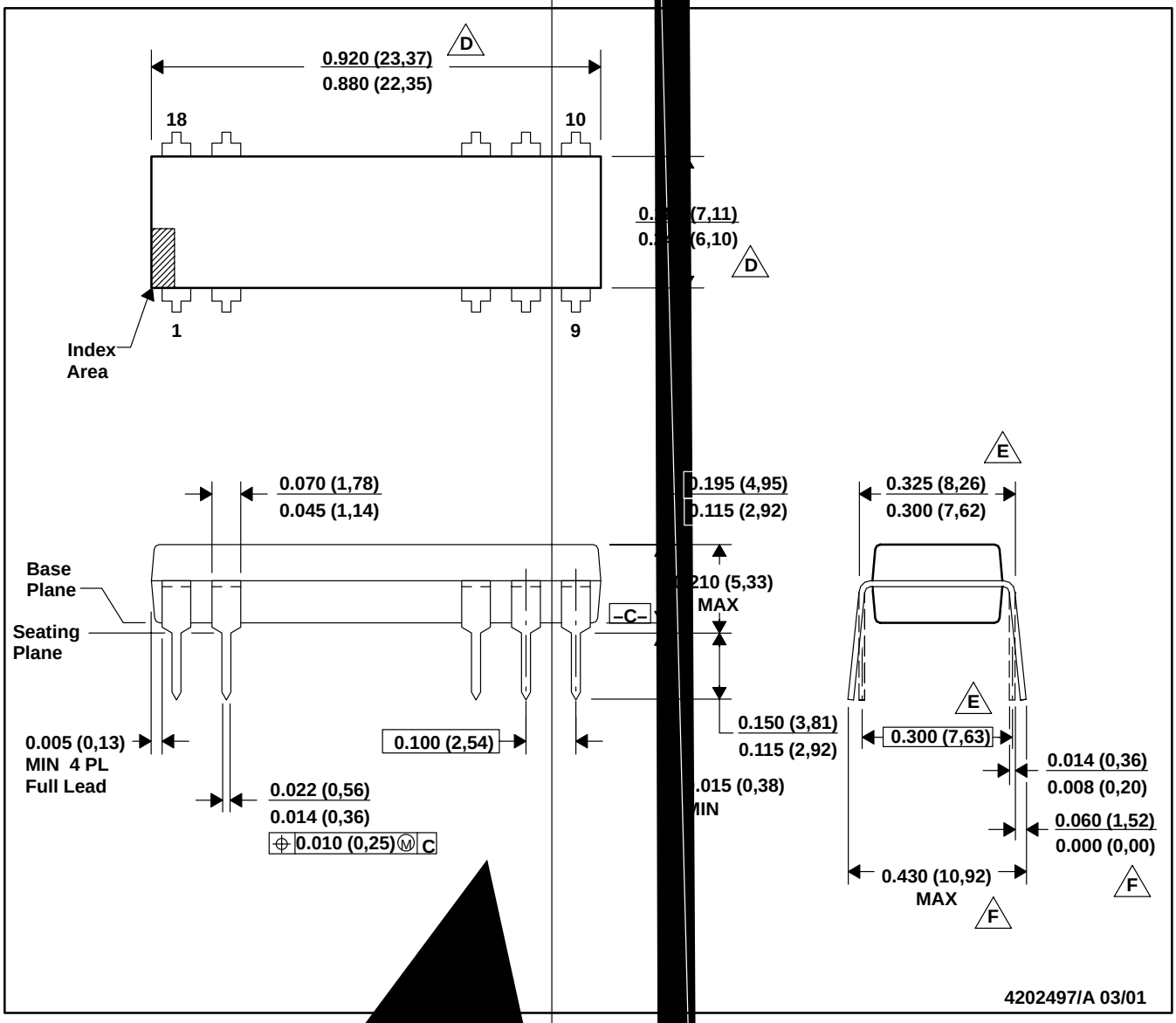
DCR010505UE4

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.

MPDI055 – APRIL 2001



MPDS106A – AUGUST 2001 – REVISED NOVEMBER 2001

DVB(R-PDSO-G12/28) **PLASTIC SMALL-OUTLINE**

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