

CA-L-0.25W Series

0.25W Unregulated Single output



Features

- SIP4 / DIP8 Package
- 1000 VDC Isolation, Up to 3000 VDC
- Efficiency up to 74%
- Operation Temperature Range -40 ~ 91°C max.
- Non-Conductive Black Plastic Case
- EMI Complies With EN55032 Class B



PART NUMBER STRUCTURE

CA - **12** **05** **S** **L** **H**
(1) (2) (3) (4) (5) (6)

(1) Series

(2) Input Voltage Range

3R3 - 2.97-3.63 V
05 - 4.5-5.5 V
12 - 10.8-13.2 V
15 - 13.5-16.5 V
24 - 21.6-26.4 V

(3) Output Voltage

3R3 - 3.3 V
05 - 5.0 V
7R2 - 7.2 V
09 - 9.0 V
12 - 12 V
15 - 15 V
18 - 18 V
24 - 24 V

(4) Case Type

S - SIP Case
D - DIP Case

(5) Watt - 0.25W

(6) Isolation Voltage (Optional)

Blank - 1 KVDC
H - 3 KVDC

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ALL SPECIFICATIONS ARE TYPICAL AT 25°C, NOMINAL INPUT AND FULL LOAD UNLESS OTHERWISE NOTED

Model Number	Input Voltage Range (VDC)	Input Current		Output Voltage (VDC)	Output Current Full Load (mA)	Efficiency @FL (% , typ.)	Capacitive Load @ FL (μF, max.)
		No-Load (mA, max.)	Full Load (mA, typ.)				
CA-3R33R3SL	2.97-3.63	25	119	3.3	75.7	64	100
CA-3R305SL	2.97-3.63	25	114	5	50	67	100
CA-3R37R2SL	2.97-3.63	25	119	7.2	34.7	64	100
CA-3R309SL	2.97-3.63	32	110	9	27.7	69	100
CA-3R312SL	2.97-3.63	40	119	12	20.8	64	100
CA-3R315SL	2.97-3.63	25	119	15	16.6	64	100
CA-3R318SL	2.97-3.63	25	115	18	13.8	66	100
CA-3R324SL	2.97-3.63	20	115	24	10.4	66	100
CA-053R3SL	4.5-5.5	20	79	3.3	75.7	64	100
CA-0505SL	4.5-5.5	15	71	5	50	71	100
CA-057R2SL	4.5-5.5	18	71	7.2	34.7	71	100
CA-0509SL	4.5-5.5	15	68	9	27.7	74	100
CA-0512SL	4.5-5.5	14	69	12	20.8	73	100
CA-0515SL	4.5-5.5	20	68	15	16.6	74	100
CA-0518SL	4.5-5.5	17	70	18	13.8	72	100
CA-0524SL	4.5-5.5	18	69	24	10.4	73	100
CA-123R3SL	10.8-13.2	15	33	3.3	75.7	64	100
CA-1205SL	10.8-13.2	12	34	5	50	62	100
CA-127R2SL	10.8-13.2	10	31	7.2	34.7	69	100
CA-1209SL	10.8-13.2	12	34	9	27.7	63	100
CA-1212SL	10.8-13.2	15	33	12	20.8	65	100
CA-1215SL	10.8-13.2	13	33	15	16.6	65	100
CA-1218SL	10.8-13.2	13	32	18	13.8	66	100
CA-1224SL	10.8-13.2	18	38	24	10.4	55	100
CA-153R3SL	13.5-16.5	10	26	3.3	75.7	65	100
CA-1505SL	13.5-16.5	8	27	5	50	63	100
CA-157R2SL	13.5-16.5	12	28	7.2	34.7	60	100
CA-1509SL	13.5-16.5	12	27	9	27.7	63	100
CA-1512SL	13.5-16.5	12	27	12	20.8	62	100
CA-1515SL	13.5-16.5	13	29	15	16.6	58	100
CA-1518SL	13.5-16.5	12	30	18	13.8	57	100
CA-1524SL	13.5-16.5	15	28	24	10.4	60	100
CA-243R3SL	21.6-26.4	8	18	3.3	75.7	61	100
CA-2405SL	21.6-26.4	7	18	5	50	59	100
CA-247R2SL	21.6-26.4	8	19	7.2	34.7	57	100
CA-2409SL	21.6-26.4	8	18	9	27.7	61	100
CA-2412SL	21.6-26.4	10	19	12	20.8	57	100
CA-2415SL	21.6-26.4	10	18	15	16.6	58	100
CA-2418SL	21.6-26.4	10	19	18	13.8	56	100
CA-2424SL	21.6-26.4	10	18	24	10.4	61	100

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Model Number	Input Voltage Range (VDC)	Input Current		Output Voltage (VDC)	Output Current Full Load (mA)	Efficiency @FL (% , typ.)	Capacitive Load @ FL (μF, max.)
		No-Load (mA, max.)	Full Load (mA, typ.)				
CA-3R33R3DL	2.97-3.63	25	119	3.3	75.7	64	100
CA-3R305DL	2.97-3.63	25	114	5	50	67	100
CA-3R37R2DL	2.97-3.63	25	119	7.2	34.7	64	100
CA-3R309DL	2.97-3.63	32	110	9	27.7	69	100
CA-3R312DL	2.97-3.63	40	119	12	20.8	64	100
CA-3R315DL	2.97-3.63	25	119	15	16.6	64	100
CA-3R318DL	2.97-3.63	25	115	18	13.8	66	100
CA-3R324DL	2.97-3.63	20	115	24	10.4	66	100
CA-053R3DL	4.5-5.5	20	79	3.3	75.7	64	100
CA-0505DL	4.5-5.5	15	71	5	50	71	100
CA-057R2DL	4.5-5.5	18	71	7.2	34.7	71	100
CA-0509DL	4.5-5.5	15	68	9	27.7	74	100
CA-0512DL	4.5-5.5	14	69	12	20.8	73	100
CA-0515DL	4.5-5.5	20	68	15	16.6	74	100
CA-0518DL	4.5-5.5	17	70	18	13.8	72	100
CA-0524DL	4.5-5.5	18	69	24	10.4	73	100
CA-123R3DL	10.8-13.2	15	33	3.3	75.7	64	100
CA-1205DL	10.8-13.2	12	34	5	50	62	100
CA-127R2DL	10.8-13.2	10	31	7.2	34.7	69	100
CA-1209DL	10.8-13.2	12	34	9	27.7	63	100
CA-1212DL	10.8-13.2	15	33	12	20.8	65	100
CA-1215DL	10.8-13.2	13	33	15	16.6	65	100
CA-1218DL	10.8-13.2	13	32	18	13.8	66	100
CA-1224DL	10.8-13.2	18	38	24	10.4	55	100
CA-153R3DL	13.5-16.5	10	26	3.3	75.7	65	100
CA-1505DL	13.5-16.5	8	27	5	50	63	100
CA-157R2DL	13.5-16.5	12	28	7.2	34.7	60	100
CA-1509DL	13.5-16.5	12	27	9	27.7	63	100
CA-1512DL	13.5-16.5	12	27	12	20.8	62	100
CA-1515DL	13.5-16.5	13	29	15	16.6	58	100
CA-1518DL	13.5-16.5	12	30	18	13.8	57	100
CA-1524DL	13.5-16.5	15	28	24	10.4	60	100
CA-243R3DL	21.6-26.4	8	18	3.3	75.7	61	100
CA-2405DL	21.6-26.4	7	18	5	50	59	100
CA-247R2DL	21.6-26.4	8	19	7.2	34.7	57	100
CA-2409DL	21.6-26.4	8	18	9	27.7	61	100
CA-2412DL	21.6-26.4	10	19	12	20.8	57	100
CA-2415DL	21.6-26.4	10	18	15	16.6	58	100
CA-2418DL	21.6-26.4	10	19	18	13.8	56	100
CA-2424DL	21.6-26.4	10	18	24	10.4	61	100

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INPUT SPECIFICATIONS					
Parameter	Conditions	Min.	Typ.	Max.	Unit
Input Voltage Range	3.3 V Input	2.97	3.3	3.63	VDC
	5 V Input	4.5	5	5.5	
	12 V Input	10.8	12	13.2	
	15 V Input	13.5	15	16.5	
	24 V Input	21.6	24	26.4	
Input Filter		Capacitor			
Input Reflected Ripple Current (1)			20		mApk-pk
Start up Time	Nominal Vin and constant resistive load		20		ms
Recommended input fuse (slow blow)	3.3 V & 5 V Input	0.16			A
	12 V & 15 V & 24 V Input	0.1			
Note :					
1. Measured with a simulated source inductance of 12μH and a source capacitor Cin (47μF, ESR<1.0Ω at 100kHz).					

OUTPUT SPECIFICATIONS					
Parameter	Conditions	Min.	Typ.	Max.	Unit
Output Voltage Accuracy		-3		+3	%
Line Regulation	For 1% Vin Change	CA-3R33R3SL CA-053R3SL	-1.3	+1.3	%
		Other Output	-1.2	+1.2	
Load Regulation	From 20% to 100% Load	Other Output		8	%
Ripple & Noise	20MHz bandwidth			100	mVpk-pk
Short Circuit Protection		Short Term (1sec)			
Temperature Coefficient		-0.02		+0.02	%/°C
Maximum Capacitive Load	Minimum Vin and constant resistive load	See Table			

ABSOLUTE MAXIMUM RATINGS					
Parameter	Conditions	Min.	Typ.	Max.	Unit
Input Surge Voltage (100 ms)	3.3 V Input			6	VDC
	5 V Input			7	
	12 V Input			15	
	15 V Input			18	
	24 V Input			28	
Soldering Temperature	1.5mm from case 10sec max.			260	°C
Note : These are stress ratings. Exposure of devices to any of these conditions may adversely affect long-term reliability.					

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GENERAL SPECIFICATIONS

Parameter	Conditions		Min.	Typ.	Max.	Unit
Isolation Voltage	Input-output, and rated for 60sec	Standard Type	1000			VDC
		Suffix "H"	3000			
Isolation Resistance	Input-output		1000			MΩ
Isolation Capacitance	Input-output			60		pF
Switching Frequency				80		kHz
MTBF	MIL-HDBK-217 F @ 25°C		1121			k hours
Safety Standard	IEC / EN / UL 62368-1		Designed to meet			
Environmental compliance			RoHS			

ENVIRONMENT SPECIFICATIONS

Parameter	Conditions	Min.	Typ.	Max.	Unit
Operating Ambient Temperature	See the Derating Curve	-40		91	°C
Maximum Case Temperature				100	°C
Thermal Impedance		70			°C/W
Storage Humidity				95	% rel. H
Storage Temperature		-55		125	°C
Cooling	Natural Convection	30-65 LFM			

EMC SPECIFICATIONS

Parameter	Standard	Condition	Criterion
Conducted Emissions	EN55032	with external components	B
Radiated Emissions	EN55032		B
ESD	IEC 61000-4-2	Air: ±8kV / Indirect: ±6kV	A
RS	IEC 61000-4-3	10V/m	A
EFT	IEC 61000-4-4	±2.0kV with external components	A
Surge	IEC 61000-4-5	±0.5kV with external components	A
CS	IEC 61000-4-6	10Vrms	A
PFMF	IEC 61000-4-8	1A/m	A

PHYSICAL SPECIFICATIONS

Parameter		Value
Case Material		Nonconductive Black Plastic (UL94V-0 rated)
Pin Material	SIP Case	Alloy 42
	DIP Case	Ø0.5mm Brass Solder-coated
Potting Material		Epoxy (UL94V-0 rated)
Weight	SIP Case	1.5 g, typ.
	DIP Case	1.8 g, typ.
Dimensions	SIP Case	0.46" x 0.24" x 0.40"
	DIP Case	0.50" x 0.40" x 0.27"

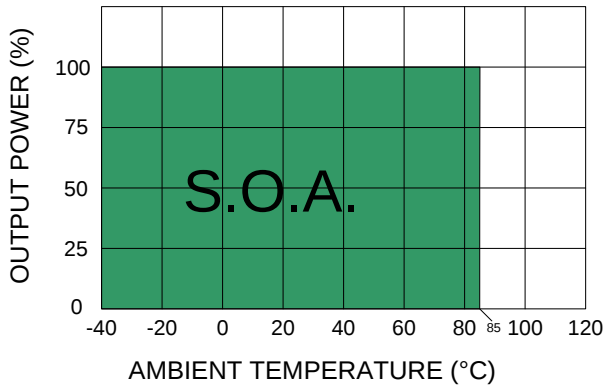
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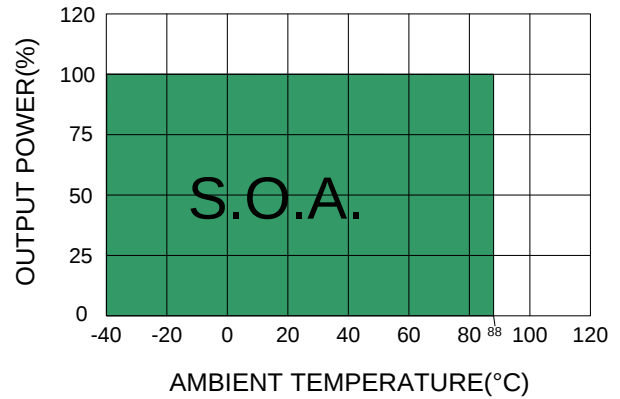
ELECTRICAL CHARACTERISTIC CURVES

Derating Curve



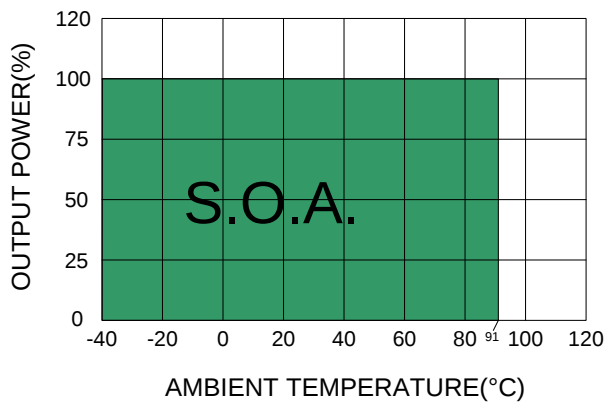
Efficiency 55 ~ 61 % Models

Derating Curve



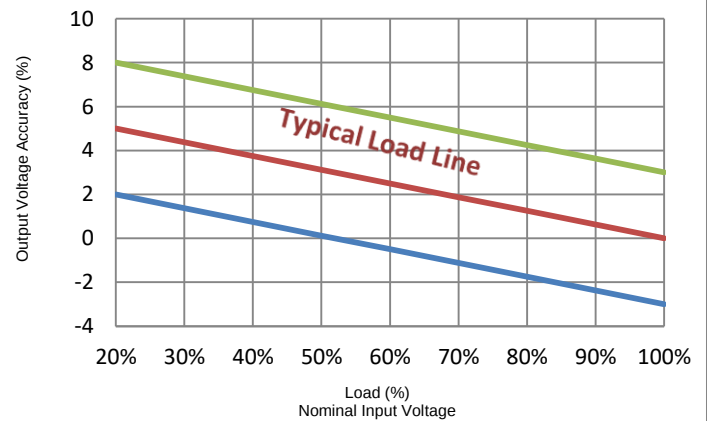
Efficiency 62 ~ 67 % Models

Derating Curve



Efficiency 68 ~ 74 % Models

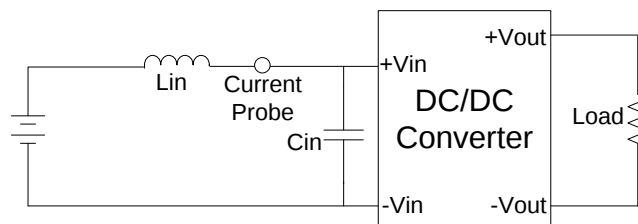
Output Voltage Tolerance Envelope Curve



TEST CONFIGURATIONS

Input Reflected Ripple Current Test Step

Input reflected ripple current is measured with a source inductor L_{in} ($12\mu H$) and a source capacitor C_{in} ($47\mu F$, $ESR < 1.0\Omega$ at $100kHz$) at nominal input and full load.



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DESIGN & FEATURE CONFIGURATIONS

Isolation Voltage

This series is designed to meet the functional insulation of UL, both input and output should be maintained within SELV limits (less than 42.4V peak, or 60VDC).

The isolation test voltage represents a measure of immunity to transient voltages and the part should never be used as an element of a safety isolation system. The part could be expected to function correctly with hundreds of volts offset applied continuously across the isolation barrier; but then the circuitry on both sides of the barrier must be regarded as operating at an unsafe voltage and further isolation/insulation systems must form a barrier between these circuits and any user-accessible circuitry according to safety standard requirements.

Repeated High-Voltage Isolation Testing

Repeated high-voltage isolation testing of a barrier component can actually degrade isolation capability, to a lesser or greater degree depending on materials, construction and environment.

This series has isolation transformers without additional insulation between primary and secondary windings of enameled wire.

While parts can be expected to withstand several times the stated test voltage, the isolation capability does depend on the wire insulation.

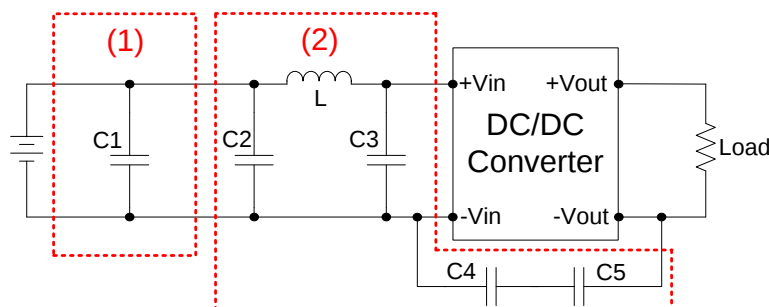
Any material including the enamel (typically polyurethane) is susceptible to eventual chemical degradation when subject to very high applied voltage, thus implying that the number of tests should be strictly limited.

We strongly advise against repeated high voltage isolation testing, but if it is absolutely required, the isolation test voltage should be reduced by 20% from specified test voltage.

DESIGN & FEATURE CONFIGURATIONS

EMC Filter

The part (1) Circuit is used to meet Surge & EFT test, and the part (2) Circuit is used to meet EMI test.

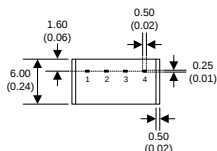
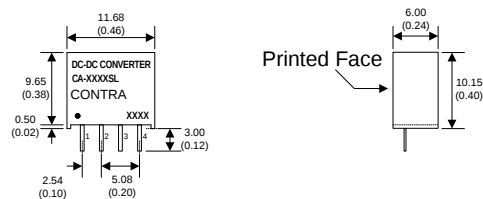


	C1	C2	L	C3	C4	C5
CA-3R3XXXL	NIPPON Chemi-con KY Series 470µF, 100V	MLCC 2.2µF, 100V	18µH			
CA-05XXXL						
CA-12XXXL						
CA-15XXXL						
CA-24XXXL				MLCC 2.2µF, 100V	MLCC 470pF, 2kV MLCC 820pF, 2kV	MLCC 820pF, 2kV
CA-24XXXLH						

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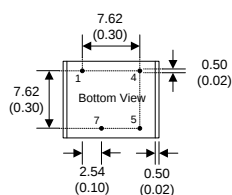
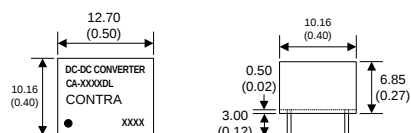
MECHANICAL SPECIFICATIONS



Notes : All dimensions are typical in millimeters (inches).

1. Pin dimension tolerance: ± 0.05 (± 0.002)
2. Pin pitch and length tolerance: ± 0.35 (± 0.014)
3. Pin to case tolerance: ± 0.5 (± 0.02)
4. Case Tolerance: ± 0.5 (± 0.02)

PIN CONNECTIONS	
PIN NUMBER	SINGLE
1	-Vin
2	+Vin
3	-Vout
4	+Vout



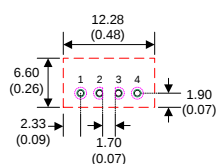
Notes : All dimensions are typical in millimeters (inches).

1. Pin diameter: 0.5 ± 0.05 (0.02 ± 0.002)
2. Pin pitch and length tolerance: ± 0.35 (± 0.014)
3. Pin to case tolerance: ± 0.5 (± 0.02)
4. Case Tolerance: ± 0.5 (± 0.02)

PIN CONNECTIONS	
PIN NUMBER	SINGLE
1	-Vin
4	+Vin
5	+Vout
7	-Vout

RECOMMENDED FOOTPRINT DETAILS

SIP4 Package



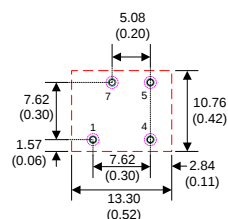
Notes : 1. All dimensions are typical in millimeters (inches).

Through hole (black) 1~4:Ø0.80 (0.031)

Top view pad (green) 1~4:Ø1.00 (0.039)

Bottom view pad (pink) 1~4:Ø1.60 (0.063)

DIP8 Package



Notes : 1. All dimensions are typical in millimeters (inches).

Through hole (black) 1~7:Ø0.80 (0.031)

Top view pad (green) 1~7:Ø1.00 (0.039)

Bottom view pad (pink) 1~7:Ø1.60 (0.063)