



Size: 0.80in x 1.25in x 0.42in
(20.3mm x 31.8mm x 10.6mm)

FEATURES

- 2:1 Input Voltage Range
- 5000VAC Reinforced Insulation
- No Minimum Load Requirement
- Low Standby Power
- Low Leakage Current
- 2xMOPP
- RoHS & REACH Compliant
- Two Pin Connection Options
- Over Voltage, Over Load, and Short Circuit Protection
- Internal EN55032 Class A Filter
- IEC/EN/ANSI/AAMI ES 60601-1 and IEC/EN/UL 62368-1 Safety Approvals

APPLICATIONS

- Medical
- PV
- Automation
- Datacom/Telecom
- IPC
- Industrial

DESCRIPTION

The DCMLC06 series of DC/DC converters offers 6 watts of output power in a compact 0.80" x 1.25" x 0.42" package with two pin connection options. This series consists of single and dual output models with a 2:1 input voltage range. Each model in this series features low standby power, low leakage current, no minimum load requirement, and 5000VAC reinforced insulation. This series also has over voltage, over load, and short circuit protection as well IEC/EN/ANSI/AAMI ES 60601-1 and IEC/EN/UL 62368-1 safety approvals.

MODEL SELECTION TABLE

Single Output Models

Model Number ⁽¹⁾	Input Voltage Range	Output Voltage	Full Load Output Current	Efficiency	Maximum Capacitive Load	No Load Input Current	Output Power
DCMLC06-12S05A	12VDC (9~18VDC)	5VDC	1200mA	84%	1500µF	10mA	6 Watts
DCMLC06-12S12A		12VDC	500mA	87%	260µF	10mA	
DCMLC06-12S15A		15VDC	400mA	86%	210µF	10mA	
DCMLC06-24S05A	24VDC (18~36VDC)	5VDC	1200mA	84%	1500µF	6mA	6 Watts
DCMLC06-24S12A		12VDC	500mA	87%	260µF	6mA	
DCMLC06-24S15A		15VDC	400mA	87%	210µF	6mA	
DCMLC06-48S05A	48VDC (36~75VDC)	5VDC	1200mA	84%	1500µF	4mA	6 Watts
DCMLC06-48S12A		12VDC	500mA	87%	260µF	4mA	
DCMLC06-48S15A		15VDC	400mA	86%	210µF	4mA	

MODEL SELECTION TABLE

Dual Output Models

Model Number ⁽¹⁾	Input Voltage Range	Output Voltage	Full Load Output Current	Efficiency	Maximum Capacitive Load	No Load Input Current	Output Power
DCMLC06-12D05A	12VDC (9~18VDC)	±5VDC	±600mA	83%	±860µF	15mA	6 Watts
DCMLC06-12D12A		±12VDC	±250mA	87%	±150µF	10mA	
DCMLC06-12D15A		±15VDC	±200mA	86%	±110µF	14mA	
DCMLC06-24D05A	24VDC (18~36VDC)	±5VDC	±600mA	84%	±860µF	8mA	6 Watts
DCMLC06-24D12A		±12VDC	±250mA	86%	±150µF	6mA	
DCMLC06-24D15A		±15VDC	±200mA	86%	±110µF	8mA	
DCMLC06-48D05A	48VDC (36~75VDC)	±5VDC	±600mA	83%	±860µF	4mA	6 Watts
DCMLC06-48D12A		±12VDC	±250mA	87%	±150µF	4mA	
DCMLC06-48D15A		±15VDC	±200mA	85%	±110µF	4mA	

SPECIFICATIONS

All specifications are based on 25°C, Nominal Input Voltage, and Maximum Output Current unless otherwise noted.
 We reserve the right to change specifications based on technological advances.

SPECIFICATION	TEST CONDITIONS		Min	Typ	Max	Unit
INPUT SPECIFICATIONS						
Operating Input Voltage Range	12Vin (nom)		9	12	18	VDC
	24Vin (nom)		18	24	36	
	48Vin (nom)		36	48	75	
Start-Up Voltage	12Vin (nom)				9	VDC
	24Vin (nom)				18	
	48Vin (nom)				36	
Shutdown Voltage	12Vin (nom)		7	8	8.8	VDC
	24Vin (nom)		15	16	17.5	
	48Vin (nom)		31.5	33	34.5	
Input Surge Voltage	3 Second, max.	12Vin (nom)			25	VDC
		24Vin (nom)			50	
		48Vin (nom)			100	
Input Filter						Pi Type
OUTPUT SPECIFICATIONS						
Output Voltage						See Table
Voltage Accuracy			-1.0		+1.0	%
Line Regulation	Low Line to High Line at Full Load		Single		+0.2	%
			Dual		+0.5	
Load Regulation	No Load to Full Load		Single		+0.2	%
			Dual		+1.0	
Voltage Adjustability	Only for B-Type Pin Connection Option	Single Output	5Vout, 12Vout, 15Vout		+10	%
		Dual Output	±5Vout, ±12Vout, ±15Vout		+20	
Cross Regulation	Asymmetrical load 25%/100% FL, Dual Output		-5.0		5.0	%
Output Power						See Table
Output Current						See Table
Maximum Capacitive Load						See Table
Ripple & Noise (20MHz bandwidth)	Measured by 20MHz bandwidth With a 10µF/25V X7R MLCC		5Vout	50		mVp-p
			12Vout, 15Vout	75		
Transient Response Recovery Time	25% Load step change			250		µs
Start-Up Time	Constant resistive load		Power Up	35		ms
Temperature Coefficient			-0.02		+0.02	%/°C
Leakage Current	240VAC, 60Hz				2	µA
PROTECTION						
Short Circuit Protection						Continuous, Automatic Recovery
Over Load Protection	% of Iout rated; Hiccup Mode			150		%
Over Voltage Protection	Single	5Vout	5.6		7.0	VDC
		12Vout	13.5		16	
		15Vout	18.3		22.0	
	Dual	±5Vout	5.6		7.0	VDC
		±12Vout	13.5		18.2	
		±15Vout	17.0		22.0	
ENVIRONMENTAL SPECIFICATIONS						
Operating Ambient Temperature	With Derating		-40		+105	°C
Storage Temperature			-55		+125	°C
Maximum Case Temperature					+105	°C
Relative Humidity			5		95	%RH
Thermal Impedance				18		°C/W
Operating Altitude					5000	m
Thermal Shock						MIL-STD-810F
Vibration						MIL-STD-810F
MTBF	MIL-HDBK-217F, Full Load			3,942,000		Hours
GENERAL SPECIFICATIONS						
Efficiency						See Table
Switching Frequency			225	250	275	kHz
Isolation Voltage	Reinforced insulation for 250VAC working voltage, 1 minute, Input to Output		5000			VAC
Isolation Resistance	500VDC		10			GΩ
Isolation Capacitance				15	17	pF
Clearance/Creepage			8			mm

SPECIFICATIONS

All specifications are based on 25°C, Nominal Input Voltage, and Maximum Output Current unless otherwise noted.
We reserve the right to change specifications based on technological advances.

SPECIFICATION	TEST CONDITIONS		Min	Typ	Max	Unit
PHYSICAL SPECIFICATIONS						
Weight			0.47oz (13.5g)			
Dimensions (L x W x H)			0.80in x 1.25in x 0.42in (20.3mm x 31.8mm x 10.6mm)			
Case Material			Non-Conductive Black Plastic			
Base Material			Non-Conductive Black Plastic			
Potting Material			Silicone (UL94 V-0)			
SAFETY CHARACTERISTICS						
Safety Approvals ⁽²⁾	IEC/EN/ANSI/AAMI ES 60601-1 IEC/EN/UL 62368-1		CB: UL (Demko)			
EMI	EN5011, EN55032, EN60601-1-2	Without External Components With External Components	Class A Class B			
EMS	EN55035 and EN60601-1-2					
ESD	EN61000-4-2	Air ±15kV and Contact ±8kV	Perf. Criteria A			
Radiated Immunity	EN61000-4-3	10V/m	Perf. Criteria A			
Fast Transient ⁽³⁾	EN61000-4-4	±2kV	Perf. Criteria A			
Surge ⁽³⁾	EN61000-4-5	±2kV	Perf. Criteria A			
Conducted Immunity	EN61000-4-6	10Vr.m.s	Perf. Criteria A			
Power Frequency Magnetic Field	EN61000-4-8	100A/m continuous; 1000A/m 1 second	Perf. Criteria A			

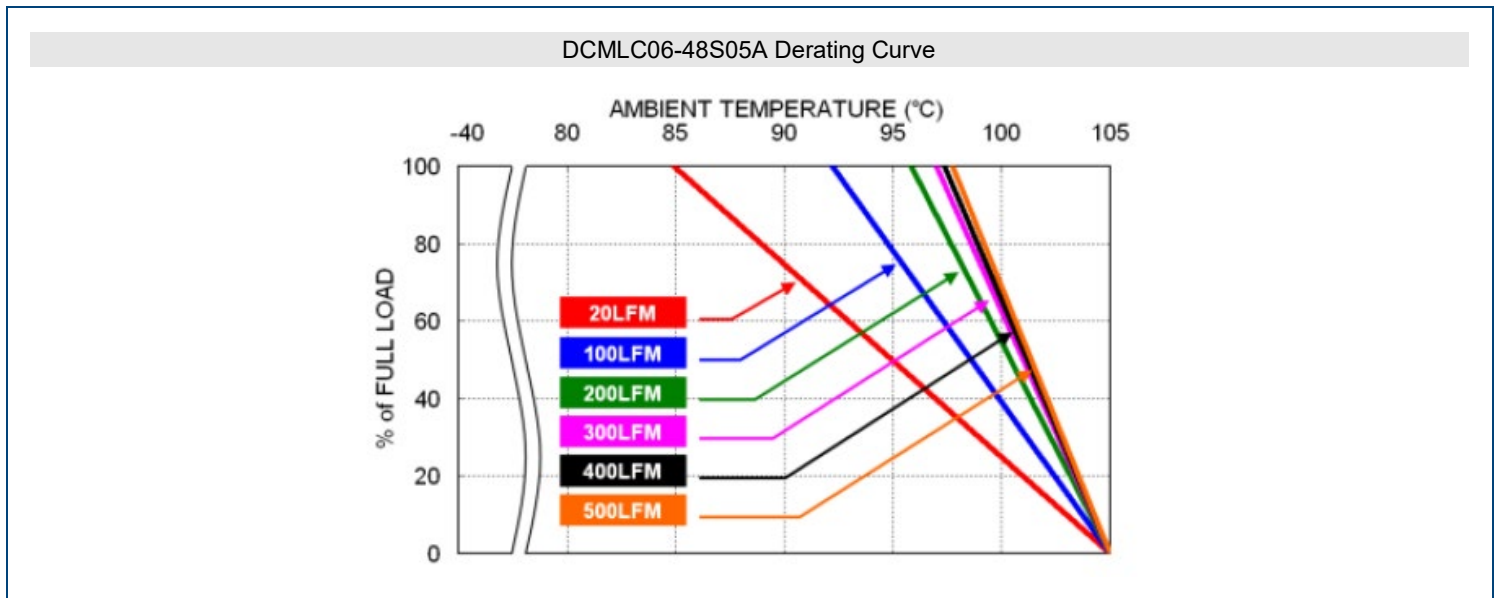
NOTES

- "A" in model number indicates standard pin connection. Substitute the "A" in model number with "B" to indicate B type pin connection. Ex: DCMLC06-24S12B
- This product is Listed to applicable standards and requirements by UL.
- 12VDC Input: With an aluminum electrolytic capacitor (Nippon chemi-con, KZN series, 3300µF/25V) and a TVS (SMBJ28A, 28V, 600 Watt peak pulse power) in parallel.
24VDC Input: With an aluminum electrolytic capacitor (Nippon chemi-con, KZN series, 1200µF/50V) and a TVS (SMBJ58A, 58V, 600 Watt peak pulse power) in parallel
48VDC Input: With an aluminum electrolytic capacitor (Nippon chemi-con, KZN series, 390µF/100V) and a TVS (SMBJ120A, 120V, 600 Watt peak pulse power) in parallel

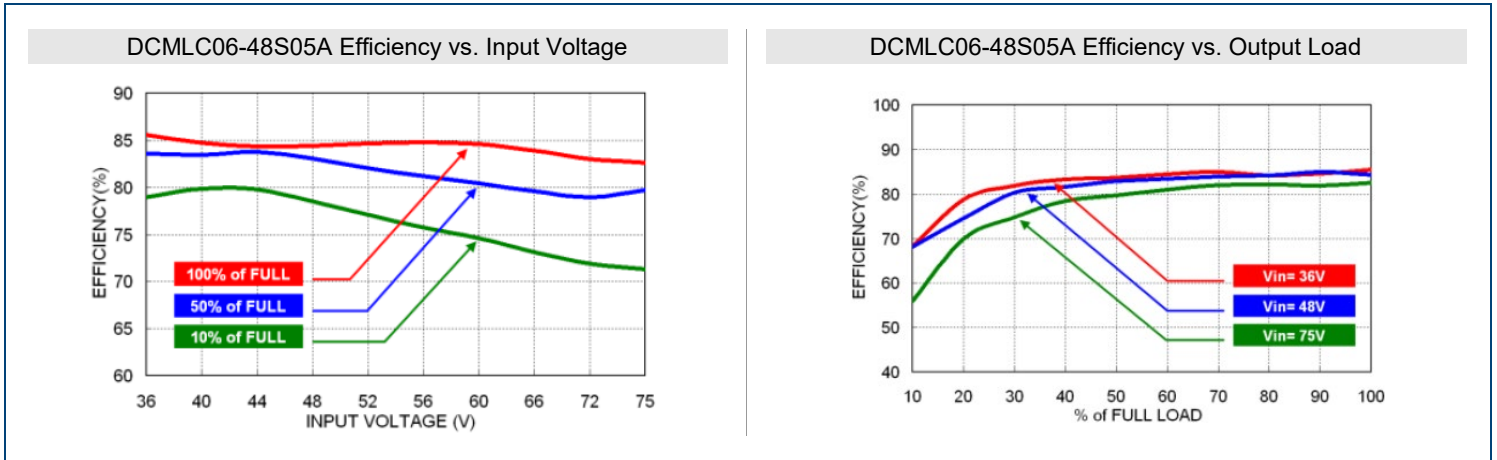
CAUTION: This power module is not internally fused. An input line fuse must always be used.

**Due to advances in technology, specifications subject to change without notice.*

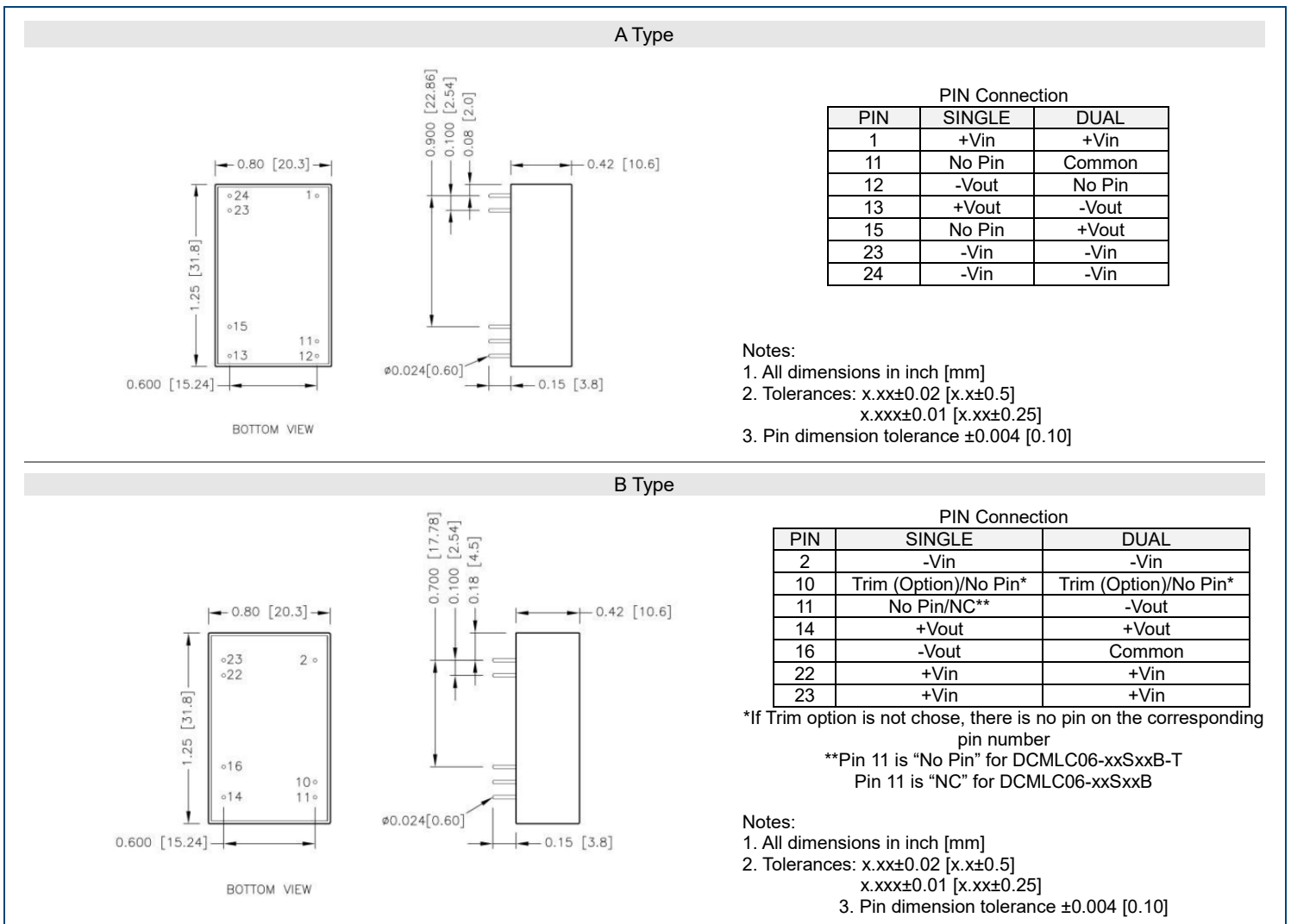
DERATING CURVES



EFFICIENCY GRAPHS



MECHANICAL DRAWINGS



RECOMMENDED PAD LAYOUT

A Type

All dimensions in inch[mm]
 Pad size (lead free recommended)
 Through hole 1.11.12.13.15.23.24: $\varnothing 0.035$ [0.90]
 Top view pad 1.11.12.13.15.23.24: $\varnothing 0.044$ [1.13]
 Bottom view pad 1.11.12.13.15.23.24: $\varnothing 0.07$ [1.80]

B Type

All dimensions in inch[mm]
 Pad size (lead free recommended)
 Through hole 2.10.11.14.16.22.23: $\varnothing 0.035$ [0.90]
 Top view pad 2.10.11.14.16.22.23: $\varnothing 0.044$ [1.13]
 Bottom view pad 2.10.11.14.16.22.23: $\varnothing 0.07$ [1.80]

Note: There should be at least 8mm distance between primary and secondary circuit.
 For further information, contact factory.

FUSE CONSIDERATIONS

This power module is not internally fused. An input line fuse must always be used.
 This encapsulated power module can be used in a wide variety of applications, ranging from simple stand-alone operation to an integrated part of sophisticated power architecture.
 To maximum flexibility, internal fusing is not included; however, to achieve maximum safety and system protection, always use an input line fuse.
 The input line fuse suggest as below :

Model	Fuse Rating (A)	Fuse Type
DCMLC06-12xxx	1.25	Slow-Blow
DCMLC06-24xxx	0.63	Slow-Blow
DCMLC06-48xxx	0.315	Slow-Blow

Table based on information provided in data sheet on inrush energy and maximum DC input current at low Vin.

THERMAL CONSIDERATIONS

The power module operates in a variety of thermal environments.
 However, sufficient cooling should be provided to help ensure reliable operation of the unit.
 Heat is removed by conduction, convection, and radiation to the surrounding environment.
 Proper cooling can be verified by measuring the point as the figure below.
 The temperature at this location should not exceed "Maximum case temperature".
 When operating, adequate cooling must be provided to maintain the test point temperature at or below "Maximum case temperature".

- Thermal test condition with vertical direction by natural convection (20LFM).

Temp. Measurement Point

Top View

OUTPUT VOLTAGE ADJUSTMENT

t allows the user to increase or decrease the output voltage of the module.

This is accomplished by connecting an external resistor between the Trim pin and either the +Vout or -Vout pins. With an external resistor between the Trim and -Output pin, the output voltage increases.

With an external resistor between the Trim and +Output pin, the output voltage decreases.

The external Trim resistor needs to be at least 1/16W of rated power.

■ Trim Up Equation

$$R_U = \left[\frac{G \times L}{(V_{o,up} - L - K)} - H \right] \Omega$$

■ Trim Up Equation

$$R_D = \left[\frac{(V_{o,down} - L) \times G}{(V_o - V_{o,down})} - H \right] \Omega$$

■ Trim Constants

Module	G	H	K	L
DCMLC06-xxS05B-T	5110	2050	2.5	2.5
DCMLC06-xxS12B-T	10000	5110	9.5	2.5
DCMLC06-xxS15B-T	10000	5110	12.5	2.5

Module	G	H	K	L
DCMLC06-xxD05B-T	3000	3000	7.5	2.5
DCMLC06-xxD12B-T	56000	13000	21.5	2.5
DCMLC06-xxD15B-T	30000	13000	27.5	2.5

External Output Trimming

Output can be externally trimmed using the method shown below

Trim-Up

Single Output	DCMLC06-xxS05B-T	1	2	3	4	5	6	7	8	9	10
	ΔV (%)	5.05	5.10	5.15	5.20	5.25	5.30	5.35	5.40	5.45	5.50
	Vout (V)	5.05	5.10	5.15	5.20	5.25	5.30	5.35	5.40	5.45	5.50
	RU (kΩ)	253.450	125.700	83.117	61.825	49.050	40.533	34.450	29.888	26.339	23.500

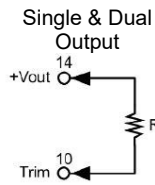
Dual Output	DCMLC06-xxS12B-T	1	2	3	4	5	6	7	8	9	10
	ΔV (%)	12.12	12.24	12.36	12.48	12.60	12.72	12.84	12.96	13.08	13.20
	Vout (V)	12.12	12.24	12.36	12.48	12.60	12.72	12.84	12.96	13.08	13.20
	RU (kΩ)	203.223	99.057	64.334	46.973	36.557	29.612	24.652	20.932	18.038	15.723

Dual Output	DCMLC06-xxS15B-T	1	2	3	4	5	6	7	8	9	10
	ΔV (%)	15.15	15.30	15.45	15.60	15.75	15.90	16.05	16.20	16.35	16.50
	Vout (V)	15.15	15.30	15.45	15.60	15.75	15.90	16.05	16.20	16.35	16.50
	RU (kΩ)	161.557	78.223	50.446	36.557	28.223	22.668	18.700	15.723	13.409	11.557

Dual Output	DCMLC06-xxD05B-T	1	2	3	4	5	6	7	8	9	10
	ΔV (%)	±5.05	±5.10	±5.15	±5.20	±5.25	±5.30	±5.35	±5.40	±5.45	±5.50
	Vout (V)	±5.05	±5.10	±5.15	±5.20	±5.25	±5.30	±5.35	±5.40	±5.45	±5.50
	RU (kΩ)	72.000	34.500	22.000	15.750	12.000	9.500	7.714	6.375	5.333	4.500

Dual Output	DCMLC06-xxD12B-T	1	2	3	4	5	6	7	8	9	10
	ΔV (%)	±12.12	±12.24	±12.36	±12.48	±12.60	±12.72	±12.84	±12.96	±13.08	±13.20
	Vout (V)	±12.12	±12.24	±12.36	±12.48	±12.60	±12.72	±12.84	±12.96	±13.08	±13.20
	RU (kΩ)	570.333	278.667	181.444	132.833	103.667	84.222	70.333	59.917	51.815	45.333

Dual Output	DCMLC06-xxD15B-T	1	2	3	4	5	6	7	8	9	10
	ΔV (%)	±15.15	±15.30	±15.45	±15.60	±15.75	±15.90	±16.05	±16.20	±16.35	±16.50
	Vout (V)	±15.15	±15.30	±15.45	±15.60	±15.75	±15.90	±16.05	±16.20	±16.35	±16.50
	RU (kΩ)	237.000	112.000	70.333	49.500	37.000	28.667	22.714	18.250	14.778	12.000

Trim Down

DCMLC06-xxS05B-T

ΔV	(%)	1	2	3	4	5	6	7	8	9	10
Vout	(V)	4.950	4.900	4.850	4.800	4.750	4.700	4.650	4.600	4.550	4.500
RU	(k Ω)	248.340	120.590	78.007	56.715	43.940	35.423	29.340	24.778	21.229	18.390

DCMLC06-xxS12B-T

ΔV	(%)	1	2	3	4	5	6	7	8	9	10
Vout	(V)	11.880	11.760	11.640	11.520	11.400	11.280	11.160	11.040	10.920	10.800
RU	(k Ω)	776.557	380.723	248.779	182.807	143.223	116.834	97.985	83.848	72.853	64.057

DCMLC06-xxS15B-T

ΔV	(%)	1	2	3	4	5	6	7	8	9	10
Vout	(V)	14.850	14.700	14.550	14.400	14.250	14.100	13.950	13.800	13.650	13.500
RU	(k Ω)	818.223	401.557	266.668	193.223	151.557	123.779	103.938	89.057	77.483	68.223

DCMLC06-xxD05B-T

ΔV	(%)	1	2	3	4	5	6	7	8	9	10
Vout	(V)	± 4.950	± 4.900	± 4.850	± 4.800	± 4.750	± 4.700	± 4.650	± 4.600	± 4.550	± 4.500
RU	(k Ω)	219.000	106.500	69.000	50.250	39.000	31.5000	26.143	22.125	19.000	16.500

DCMLC06-xxD12B-T

ΔV	(%)	1	2	3	4	5	6	7	8	9	10
Vout	(V)	± 11.880	± 11.760	± 11.640	± 11.520	± 11.400	± 11.280	± 11.160	± 11.040	± 10.920	± 10.800
RU	(k Ω)	4947.667	2439.333	1603.222	1185.167	934.333	767.111	647.667	558.083	488.407	432.667

DCMLC06-xxD15B-T

ΔV	(%)	1	2	3	4	5	6	7	8	9	10
Vout	(V)	± 14.850	± 14.700	± 14.550	± 14.400	± 14.250	± 14.100	± 13.950	± 13.800	± 13.650	± 13.500
RU	(k Ω)	2707.000	1332.000	873.667	644.500	507.000	415.333	415.333	349.857	262.556	232.000

COMPANY INFORMATION

Wall Industries, Inc. has created custom and modified units for over 50 years. Our in-house research and development engineers will provide a solution that exceeds your performance requirements on-time and on budget. Our ISO9001: 2015 certification is just one example of our commitment to producing a high quality, well-documented product for our customers.

Our past projects demonstrate our commitment to you, our customer. Wall Industries, Inc. has a reputation for working closely with its customers to ensure each solution meets or exceeds form, fit and function requirements. We will continue to provide ongoing support for your project above and beyond the design and production phases. Give us a call today to discuss your future projects.

Contact **Wall Industries** for further information:

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