CM9-20W Series

20W 4:1 Regulated Single & Dual output

Features

- Ultra Wide 4:1 Input Range
- 3000 VDC Isolation
- Efficiency up to 91%
- Operating Temperature Range -40 ~ 100°C max.
- Adjustable Output Voltage
- Remote ON/OFF Control (CTRL)
- Continuous Short Circuit Protection
- Over Load Protection
- Over Voltage Protection
- Soft Start
- Built-in EMI filter meets EN55032 classA without external components

PART NUMBER STRUCTURE

CM9 - 24 12 S 20 SK

(1) (2) (3) (4) (5) (6)

(1) Series

(2) Input Voltage Range
- **24** - 9-36 V
- **48** - 18-75 V

(3) Output Voltage
- **3R3** - 3.3 V
- **05** - 5.0 V
- **12** - 12 V
- **15** - 15 V

(4) Output Type
- **S** - Single Output
- **D** - Dual Output

(5) Watt

(6) Heat-sink (Optional)
- **Blank** - Without Heat-sink
- **SK** - With Heat-sink

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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		Efficiency @FL (%, typ.)	Capacitive Load @FL (µF, max.)
		No-Load (mA, max.)	Full Load (mA, typ.)		Min. load (mA)	Full load (mA)		
CM9-243R3S20	9-36	10	855	3.3	0	5500	88.5	10000
CM9-2405S20	9-36	10	942	5	0	4000	88.5	6800
CM9-2412S20	9-36	10	936	12	0	1670	89	1000
CM9-2415S20	9-36	15	936	15	0	1330	89	680
CM9-483R3S20	18-75	8	423	3.3	0	5500	89.5	10000
CM9-4805S20	18-75	8	466	5	0	4000	89.5	6800
CM9-4812S20	18-75	8	463	12	0	1670	90	1000
CM9-4815S20	18-75	8	458	15	0	1330	91	680
CM9-2405D20	9-36	10	975	±5	0	±2000	85.5	±2200
CM9-2412D20	9-36	15	942	±12	0	±835	88.5	±470
CM9-2415D20	9-36	15	936	±15	0	±665	89	±330
CM9-4805D20	18-75	8	479	±5	0	±2000	87	±2200
CM9-4812D20	18-75	8	460	±12	0	±835	90.5	±470
CM9-4815D20	18-75	10	453	±15	0	±665	92	±330

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INPUT SPECIFICATIONS

Parameter	Conditions		Min.	Typ.	Max.	Unit
Input Voltage Range	24V Input		9	24	36	VDC
	48V Input		18	48	75	
Under Voltage Protection	24V Input	Module ON		8.8		VDC
		Module OFF		7.6		
	48V Input	Module ON		17.5		
		Module OFF		16.5		
Input Filter				Pi Type		
Input Reflected Ripple Current (1)				20		mApk-pk
Start up Time	Nominal Vin and constant resistive load			30		ms
Remote ON/OFF Control (2)	Module ON (Open Circuit)		3.0		12	VDC
	Module OFF (Short circuit pin 2 and pin 6)		0		1.2	
	OFF idle current			2.0		mA
Recommended input fuse (slow blow)	24V Input			4		A
	48V Input			2		

Note：
1. Measured with a simulated source inductance of 12μH and a source capacitor Cin (47μF, ESR<1.0Ω at 100kHz).
2. The remote ON/OFF control pin is referenced to –Vin (pin2).

OUTPUT SPECIFICATIONS

Parameter	Conditions		Min.	Typ.	Max.	Unit
Output Voltage Accuracy			-1.0		+1.0	%
Output Voltage Adjustability (Trim)	Single Output		-10		+10	%
Line Regulation			-0.5		+0.5	%
Load Regulation	From 0% to 100% Load	Single Output	-0.5		+0.5	%
		Dual Output	-1.0		+1.0	
Cross Regulation	Asymmetrical Load 25% / 100% for Dual Output		-5		+5	%
Ripple & Noise (1)	20MHz bandwidth	Single Output			75	mVpk-pk
		Dual Output			60	
Over Voltage Protection				140		% of Vout
Over Current Protection				170		% of FL
Short Circuit Protection				Indefinite (hiccup) (Automatic Recovery)		
Temperature Coefficient			-0.02		+0.02	%/°C
Maximum Capacitive Load	Minimum Vin and constant resistive load			See Table		
Transient Recovery Time	Nominal Vin and 25% load step change (75%-50%-25% of Io)	For All models		250		μs
Transient Response Deviation		3.3V Single Output	-5		+5	%
		Other Output	-3		+3	

Note：
1. Measured with a 10μF MLCC.

ABSOLUTE MAXIMUM RATINGS

Parameter	Conditions	Min.	Typ.	Max.	Unit
Input Surge Voltage (100 ms)	24V Input			50	VDC
	48V Input			100	
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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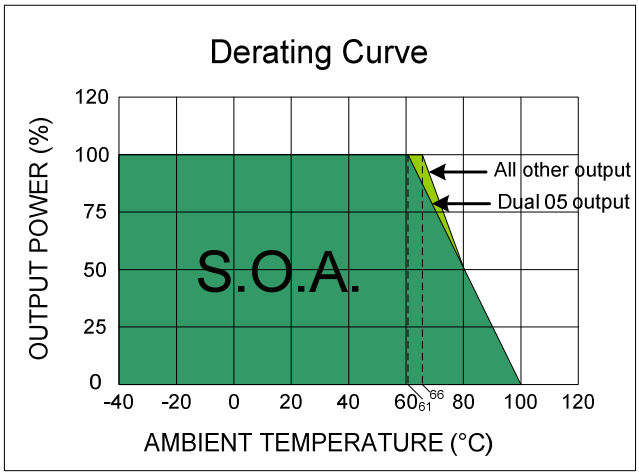
GENERAL SPECIFICATIONS					
Parameter	**Conditions**	**Min.**	**Typ.**	**Max.**	**Unit**
Isolation Voltage	Input-output, and rated for 60sec	3000			VDC
	Case-I/O, and rated for 60sec	1600			
Isolation Resistance	Input-output	1000			MΩ
Isolation Capacitance	Input-output		2000		pF
Switching Frequency	3.3 V & 5 V (Single) Output		270		kHz
	Other Output		330		
MTBF	MIL-HDBK-217 F @ 25°C	400			k hours
Safety Approval	IEC / EN / UL 62368-1	DK-68165-UL,E252573			
Environmental compliance		RoHS			

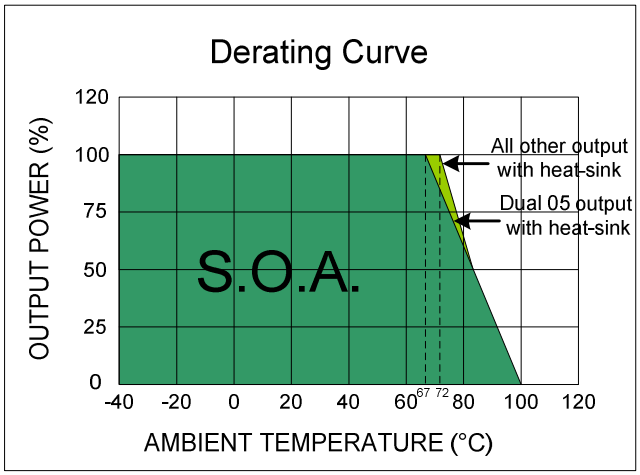
ENVIRONMENT SPECIFICATIONS					
Parameter	**Conditions**	**Min.**	**Typ.**	**Max.**	**Unit**
Operating Ambient Temperature	See the Derating Curve	-40		100	°C
Maximum Case Temperature				105	°C
Thermal Impedance	Without Heat-sink	12			°C/W
	With Heat-sink	11			
Storage Humidity				95	% rel. H
Storage Temperature		-55		125	°C
Cooling	Natural Convection	30-65 LFM			

EMC SPECIFICATIONS			
Parameter	**Standard**	**Condition**	Criterion
Conducted Emissions	EN55032		A
Radiated Emissions	EN55032		A
ESD	IEC 61000-4-2	Contact: ± 6kV	B
RS	IEC 61000-4-3	10V/m	A
EFT	IEC 61000-4-4	±2kV with external components	A
Surge	IEC 61000-4-5	±2kV with external components	A
CS	IEC 61000-4-6	10Vrms	A
PFMF	IEC 61000-4-8	100A/m	A

PHYSICAL SPECIFICATIONS	
Parameter	**Value**
Case Material	Copper
Base Material	Nonconductive Black Plastic (UL94V-0 rated)
Pin Material	Ø1.0mm Brass Solder-coated
Potting Material	Epoxy (UL94V-0 rated)
Weight	29.0 g, typ. (Without Heat-sink)
	35.5 g, typ. (With Heat-sink)
Dimensions	1.60" x 1.00" x 0.41"

ELECTRICAL CHARACTERISTIC CURVES

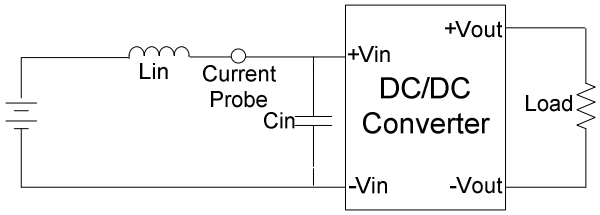




TEST CONFIGURATIONS

Input Reflected Ripple Current Test Step

Input reflected ripple current is measured with a source inductor Lin (12μH) and a source capacitor Cin (47μF, ESR<1.0Ω at 100kHz) at nominal input and full load.



DESIGN & FEATURE CONFIGURATIONS

Over Current Protection

The module includes an internal over current protection circuit, which will endure current limiting for an unlimited duration during output over load condition. If the output current exceeds the OCP set point, the module will shut down automatically (hiccup).The module will try to restart after shut down. If the over load condition still exists, the module will shut down again.

Over Voltage Protection

The module includes an internal output over voltage protection circuit, which monitors the voltage on the output terminals. If this voltage exceeds the over voltage set point, the module will activate the control loop of internal circuit to clamp the output voltage.

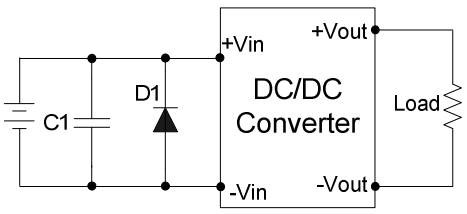
Remote Module ON / OFF

Positive logic turns on the module during high logic and off during low logic. Remote module ON/OFF can be controlled by an external switch between the CTRL terminal and -Vin terminal. For positive logic if the remote feature is not used, please leave the CTRL pin floating.

DESIGN & FEATURE CONFIGURATIONS

EMC Filter

The Circuit is used to meet Surge & EFT test.



	C1	D1
CM9-24XXX20	NIPPON Chemi-con KY series 330μF, 100V	SMDJ58A
CM9-48XXX20		SMDJ120A

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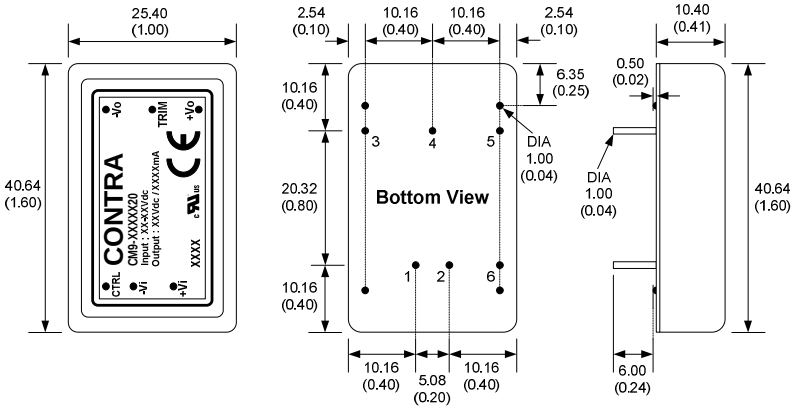
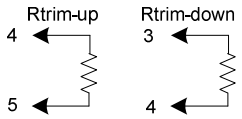
MECHANICAL SPECIFICATIONS



PIN CONNECTIONS		
PIN NUMBER	SINGLE	DUAL
1	+Vin	+Vin
2	-Vin	-Vin
3	+Vout	+Vout
4	Trim	COM
5	-Vout	-Vout
6	CTRL	CTRL

EXTERMAL OUTPUT TRIMMING

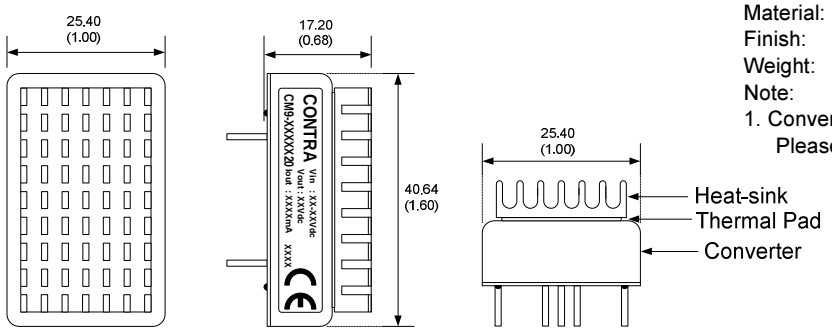
Output can be externally trimmed by using the method as below. (single output models only)



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

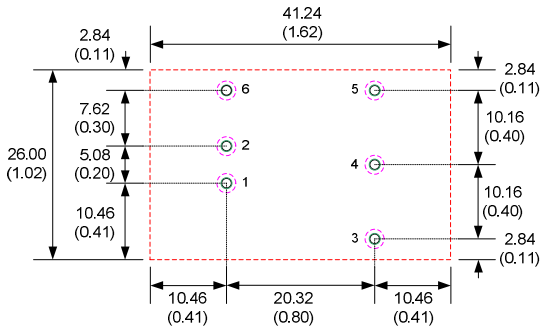
1. Pin diameter: 1.0±0.05 (0.04±0.002)
2. Pin pitch and length tolerance: ±0.35 (±0.014)
3. Case tolerance: ±0.5 (±0.02)
4. Stand-off tolerance: ±0.1 (±0.004)

With Heat-sink



Order code: CM9-XXXXX20SK (contain: heat-sink, thermal pad)
Material: Aluminum
Finish: Anodic treatment (black)
Weight: 6.5 g (0.23 oz) (without converter)
Note:
1. Converters will be supplied with heat-sinks already mounted. Please contact factory for quotation.

RECOMMENDED FOOTPRINT DETAILS



Notes：1. All dimensions are typical in millimeters (inches).
Through hole (black) 1~6: Ø1.3 (0.051)
Top view pad (green) 1~6: Ø1.5 (0.059)
Bottom view pad (pink) 1~6: Ø2.6 (0.098)