DC/DC CONVERTER

Non-Isolated

2019

http://www.mmtmachrone.com

FEATURES :

- 3PIN SIP Package
- Pin-out compatible with LM78XX Linear
- UL94V-0 Package Material
- Operating Temperature:-40℃ TO +85℃
- Efficiency up to 97%,Non isolated,no need for heatsink
- Short circuit protection, Thermal shutdown

Specifications typical at TA=25°C, nominal input voltage and rated output current unless otherwise specified

Part Number	Input Range	Output Voltage	Output Current	Efficiency	
	Vdc	Vdc	mA	Min.Vin(%)	Max.Vin(%)
01D-1R5-500	4.75-30	1.5	500	73	63
01D-1R8-500	4.75-34	1.8	500	82	71
01D-2R5-500	4.75-34	2.5	500	87	77
01D-3R3-500	4.75-34	3.3	500	91	81
01D-05-500	6.5-34	5.0	500	94	86
01D-6R5-500	8.0-34	6.5	500	95	88
01D-09-500	11-34	9.0	500	96	92
01D-12-500	15-34	12	500	97	94
01D-15-500	18-34	15	500	97	95

Output Specifications

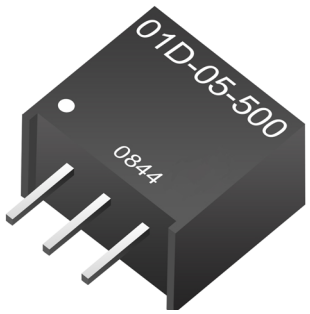
Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance				±3	%
Short Circuit Protection	Hiccup, automatic recovery				
Line Regulation	1.5V to 6.5V		0.2	0.4	%
Line Regulation	9V to 15.5V		0.1	0.2	%
Load Regulation	1.5V to 6.5V (10% To 100% F.L)		0.4	0.6	%
Load Regulation	9V to 15.5V (10% To 100% F.L.)		0.25	0.4	%
Ripple & Noise (without Output Capacitor)	1.5V to 6.5V (BW=DC To 20MHz)		20	30	mVp-p
	9V to 15.5V (BW=DC To 20MHz)		30	40	mVp-p
Transient response setting time	50% load step change		350		us

DC-DC Converter

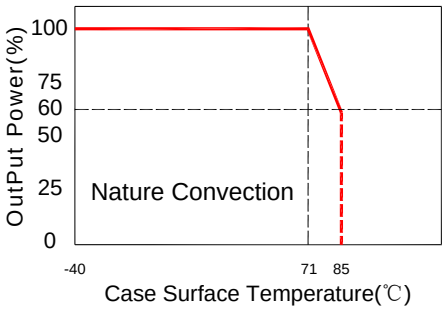
01D-500 SERIES

Non-Isolated

Single Output



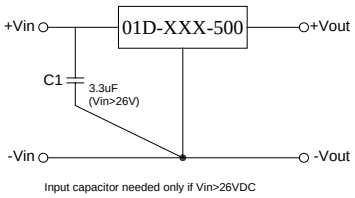
Temperature Derating Graph



General Specifications

Parameters	Conditions	Min	Typ	Max	Units
Switching Frequency			330		KHz
Operating Temperature	With derating	-40		85	℃
Humidity	Non Condensing			95	%
Cooling	Free air Convection				
Case material	Non-Conductive Black Plastic				
Weight			2.0		g
Dimensions			11.6x7.6x10.4		mm
MTBF(+25℃)	using MIL-HDBK 217F		$21098x10^3$		hours
MTBF(+71℃)	using MIL-HDBK 217F		$4212x10^3$		hours

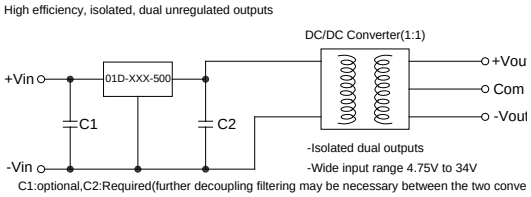
Application Examples

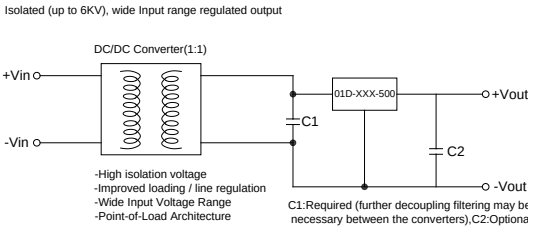


Input capacitor needed only if Vin>26VDC

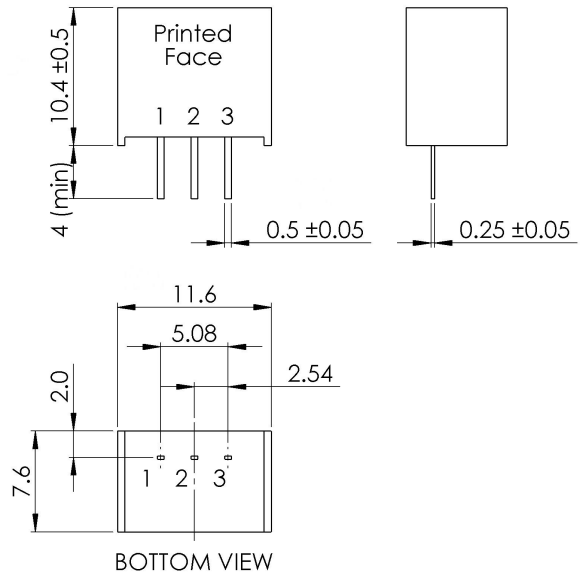
Add a blocking diode to Vout if current can flow backwards into the output, as this can damage the converter when it is powered down.
See Application Examples for details.

Application Examples





Markings and Dimensions



Part Number

$$\frac{01D}{A} - \frac{05}{B} - \frac{500}{C}$$

A:Series
B:Output Voltage
C:Output Current

PIN Assignment

PIN	1	2	3
Function	+Vin	GND	+Vout

FEATURES :

- 3PIN SIP Package
- Pin-out compatible with LM78XX Linear
- UL94V-0 Package Material
- Operating Temperature:-40℃ TO +85℃
- Efficiency up to 96%,Non isolated, no need for heatsink
- Short circuit protection

Specifications typical at TA=25°C, nominal input voltage and rated output current unless otherwise specified

Part Number	Input Range	Output Voltage	Output Current	Efficiency	
	Vdc	Vdc	mA	Min.Vin(%)	Max.Vin(%)
01D-1R2-1A	4.6-36	1.2	1000	74	62
01D-1R5-1A	4.6-36	1.5	1000	78	65
01D-1R8-1A	4.6-36	1.8	1000	82	69
01D-2R5-1A	4.6-36	2.5	1000	87	75
01D-3R3-1A	4.75-36	3.3	1000	91	78
01D-05-1A	6.5-36	5.0	1000	92	84
01D-6R5-1A	9.0-36	6.5	1000	93	87
01D-09-1A	12-36	9.0	1000	95	90
01D-12-1A	15-36	12	1000	95	92
01D-15-1A	18-36	15	1000	96	94

Output Specifications

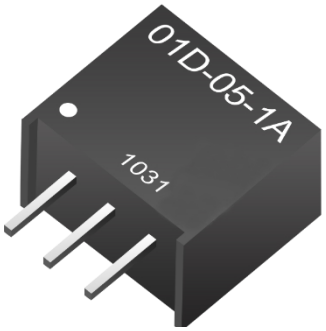
Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance				±2	%
Short Circuit Protection	Hiccup, automatic recovery				
Line Regulation	1.2V to 1.5V			0.3	%
Line Regulation	1.8V to 15V			0.3	%
Load Regulation	1.2V to 1.5V (10% To 100% F.L)			0.6	%
Load Regulation	1.8 V to 15V (10% To 100% F.L.)			0.4	%
Ripple & Noise (without Output Capacitor)	1.2V to 6.5V (BW=DC To 20MHz)			50	mVp-p
	9V to 15V (BW=DC To 20MHz)			75	mVp-p
Transient response setting time	50% load step change		250		us
Capacitive load				470	uF

DC-DC Converter

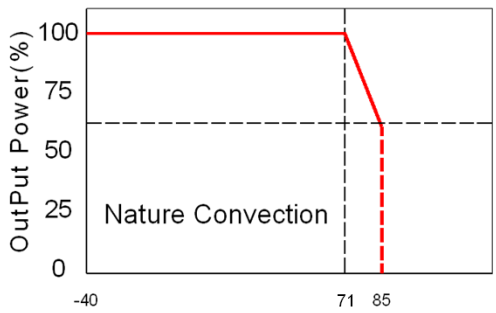
01D-1A SERIES

Non-Isolated

Single Output



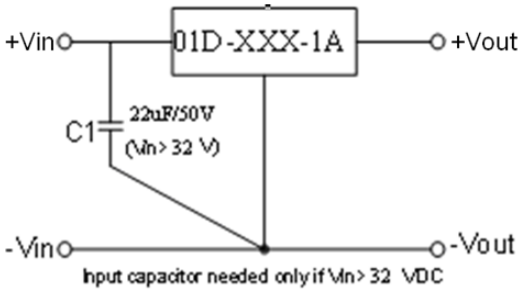
Temperature Derating Graph



General Specifications

Parameters	Conditions	Min	Typ	Max	Units
Switching Frequency			500		KHz
Operating Temperature	With derating	-40		85	℃
Storage Temperature		-55		125	℃
Humidity	Non Condensing			95	%
Cooling	Free air Convection				
Case material	Non-Conductive Black Plastic				
Weight			2.0		g
Dimensions			11.6x7.6x10.4		mm
MTBF(+25℃)	using MIL-HDBK 217F		$5000x10^3$		hours
MTBF(+71℃)	using MIL-HDBK 217F		$1000x10^3$		hours

Application Examples

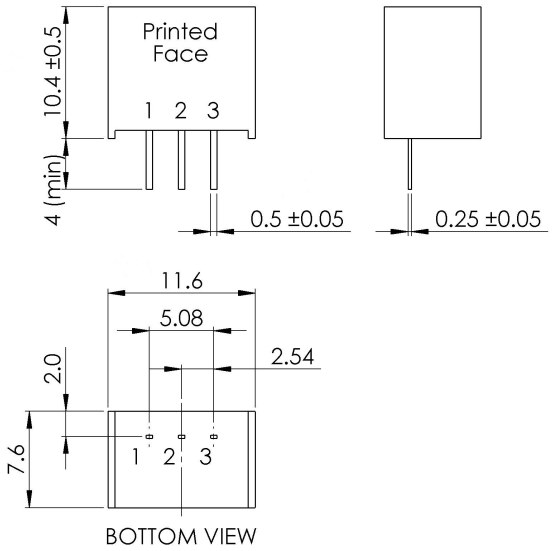


Part Number

$$\frac{01D}{A} - \frac{05}{B} - \frac{1A}{C}$$

A: Series
B: Output Voltage
C: Output Current

Markings and Dimensions



Unit：mm
Tolerance：XX.X ±0.5，XX.XX ±0.25

PIN Assignment

PIN	1	2	3
Function	+Vin	GND	+Vout

FEATURES :

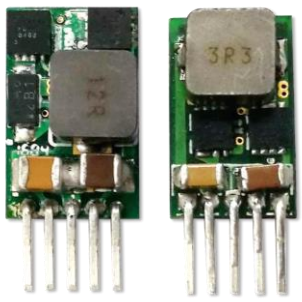
- Open frame packages
- Remote On/Off
- Adjustable output voltages
- Operating Temperature:-40℃ TO +85℃
- Efficiency up to 95%,Non isolated, no need for heatsink
- Short circuit protection
- Wide input voltage ranges 4.5~14VDC and 10~30 VDC

DC-DC Converter

01D-3A SERIES

Non-Isolated

Single Output



Specifications typical at TA=25°C, nominal input voltage and rated output current unless otherwise specified

Part Number	Input Range	Output Voltage	Output Current	Efficiency	
	Vdc	Vdc	mA	(%)	Output Voltage (Vdc)
01D-1206-3A	4.5-14	0.59-6.0	3000	93	3.3
01D-2406-3A	10-30	3.0-6.0	3000	91	5.0
01D-2415-3A	10-30	5.0-15	3000	95	12

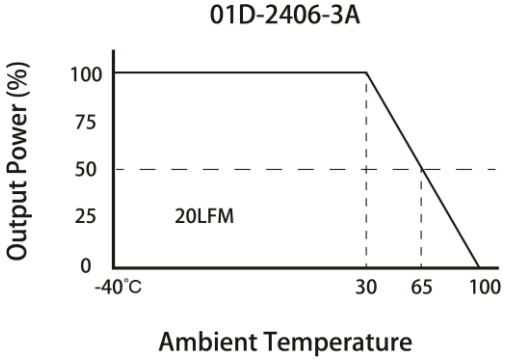
Input Specifications

Parameters	Conditions	Min	Typ	Max	Units
Input Voltage Range	See table	4.5	12	30	V
Internal Input Filter	Capacitors		10		uF
No Load Input Current			30		mA

Output Specifications

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance			±2	±3	%
Short Circuit Protection	Hiccup, automatic recovery				
Line Regulation	Vin=min to max at full load		±0.2		%
Load Regulation	0% To 100% F.L(Vo≧ 2.5V)		±0.8		%
Current Limit			220		%
Ripple & Noise	100% F.L BW=20MHz	60	75	150	mVp-p
Dynamic load response (Recovery time)	50% load step change		120		us
Capacitive load	ESR > 1m ohm			500	uF

Temperature Derating Graph



General Specifications

Parameters	Conditions	Min	Typ	Max	Units
Temperature Coefficient	-40℃ ~ +85℃ ambient	-1		+1	%/℃
Switching Frequency		270	300	330	KHz
Operating Temperature	With derating	-40		85	℃
Storage Temperature		-55		125	℃
Humidity	Non Condensing	5		95	%
Cooling	Free air Convection				
Case material	Open Frame				
Weight			2		g
Dimensions	01D-1206-3A		15.5x9.4x6.0		mm
	01D-2406-3A / 01D-2415-3A		16.5x10.4x6.0		
MTBF(+25℃)	Using MIL-HDBK 217F		$4.4x10^6$		Hours

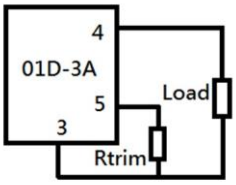
Part Number

01D - 24 06 - 3A

A B C D

A : Series
B : Input Voltage
C : Maximum Output Voltage
D : Output Current

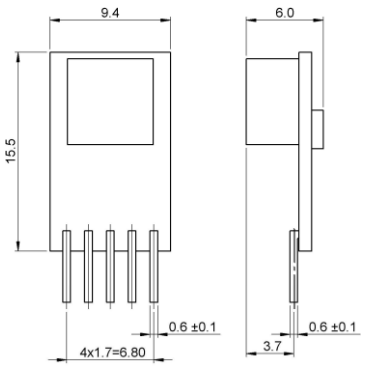
Trim Applications



Part Number	R trim [KΩ]
01D-1206-3A	1.18/(Vo-0.59)
01D-2406-3A	11.2/(Vo-3)
01D-2415-3A	8.4/(Vo-5)

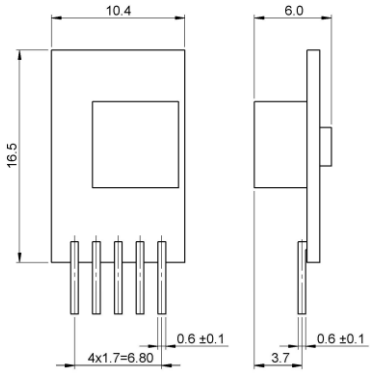
Markings and dimensions

01D-1206-3A



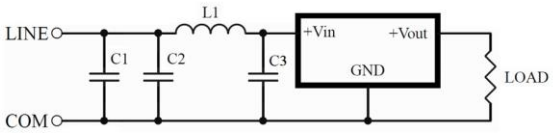
Unit：mm
Tolerance：XX.X ±0.5，XX.XX ±0.25

01D-2406-3A / 01D-2415-3A



Unit：mm
Tolerance：XX.X ±0.5，XX.XX ±0.25

Recommended Test Circuit Meets EN55032 Class A



C1=220uF/100V,ESR<0.1Ω ;
C2,C3=22uF/35V1210 MLCC
L1=10uH Molding inductor

PIN Assignment

Pin	1	2	3	4	5
Function	Remote On/Off	+Vin	GND	+Vout	Trim

FEATURES :

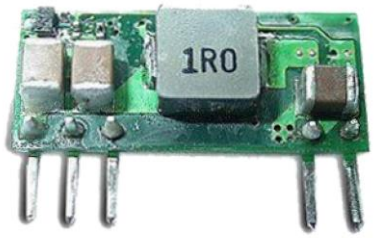
- OUTPUT CURRENT UP TO 6A
- INPUT RANGE 2.4VDC TO 5.5VDC, 8.3VDC TO 14VDC
- HIGH EFFICIENCY – 94% @5.0Vin 3.3V ,FULL LOAD
  – 89% @12.0Vin 3.3V FULL LOAD
- INPUT UNDER-VOLTAGE LOCKOUT
- SIP PACKAGES
- COMPLIANT TO RoHS EU DIRECTIVE 2002/95/EC
- SMALL SIZE AND LOW PROFILE : 22.9 X 10.2 X 5mm
- OUTPUT VOLTAGE PROGRAMMABLE FROM 0.75VDC TO 3.3VDC,0.75VDC TO 5VDC VIA EXTERNAL RESISTOR

DC-DC Converter

02D-6A SERIES

Non-Isolated

Single Output



Specifications typical at TA=25°C, nominal input voltage and rated output current unless otherwise specified

Part Number	ON/OFF Logic	Input Range	Output Voltage	Output Current Min. Load	Output Current Max. Load	Efficiency (%) 3.3Vdc @6A
02D-05-06S	Positive (option) Negative (standard)	2.4 ~ 5.5Vdc Vin(min) = Vo(Set)+0.5	0.75 ~3.3Vdc	0A	6A	94% @5.0Vin
02D-12-06S		Vo(set)<3.63V Vin=8.3~14Vdc Vo(set)>3.63V Vin=8.3~13.2Vdc	0.75 ~5.0Vdc			89% @12Vin

Input Specifications

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	05 Series Vo(set)	2.4	5	5.5	Vdc
	12 Series Vo(set)	8.3	12	14	
Input Current	Vin=Vin(min); Io=Io(max)			6	A
Input Filter(Note4)	C filter				
No Load Current	Vo(set)=0.75Vdc		20 @Vin=5		mA
	Vo(set)=0.75Vdc		19 @Vin=12		
	Vo(set)=3.3Vdc		45 @Vin=5		
	Vo(set)=5.0Vdc		100 @Vin=12		
Under Voltage Lockout	Start-up Voltage		2.2@Vin= 5		V
			4.5@Vin=12		
	Shutdown Voltage		2.0 @Vin=5		
			3.8 @Vin=12		

Input reflected ripple current 5~20MHz, 1uH source impedance:35mAp-p

Applications

- Wireless Network
- Telecom/Datacom
- Distributed Power Architectures
- Industry Control System
- Semiconductor Equipment
- Microprocessor Power Applications

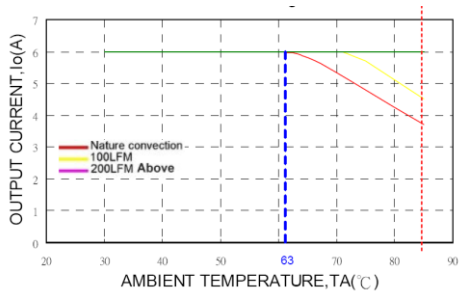
Output Specifications

Parameters	Conditions		Min	Typ	Max	Units
Output current					6	A
Voltage Tolerance	Full load and Vin(min)				±2	%
Minimum load					0	A
Line Regulation	Vin=Vin (min) to Vin (max) at Full Load			±0.3		%
Load Regulation	No Load to Full Load			±0.5		%
Ripple & Noise (Note2)	20MHz bandwidth				60	mVp-p
Temperature coefficient				±0.4		%
Dynamic load response(Note 2)	ΔIo /Δt = 2.5A/uS ,Vin(nom)	Peak deviation		200		mV
	Load change step (50% to 100% or 100% to 50% of Io(max))	Setting time (Vo<10%peak deviation)		25		uS
Dynamic load Response(Note 3)	ΔIo /Δt = 2.5A/uS ,Vin(nom)	Peak deviation		50		mV
	Load change step (50% to 100% or 100% to 50% of Io(max))	Setting time (Vo<10%peak deviation)		50		uS
Output current limit				220		%
Output short-circuit current	Hiccup, automatic recovery					
External load capacitance	ESR≧1mΩ				1000	uF
	ESR≧10mΩ				3000	uF
Output voltage overshoot-startup	Vin=Vin(min) to Vin(max);F.L			1		%
Voltage adjustability (see fig.1)	05 Series		0.7525		3.3 @Vin=5	V
	12 Series		0.7525		5.0 @Vin=12	V

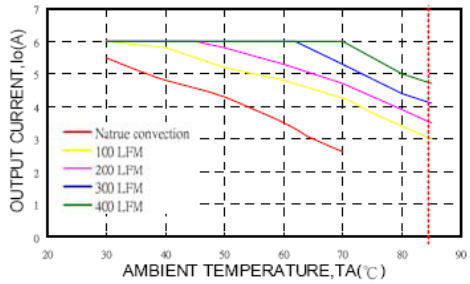
General Specifications

Parameters	Conditions	Min	Typ	Max	Units
Switching Frequency			300		KHz
Isolation voltage			None		
Efficiency			See table		
Dimensions	As figure of marking and dimension				mm
Weight			2.8		g
MTBF (Note 1)	MIL-HDBK-217F		3.247 x 10^6		hrs

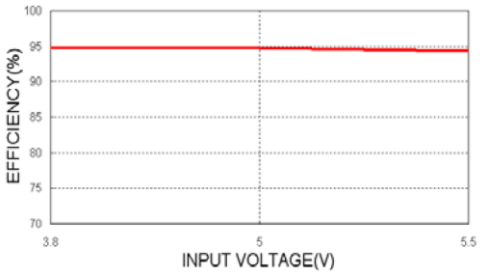
02D-05-06S,Vo=3.3V,Derating Curve



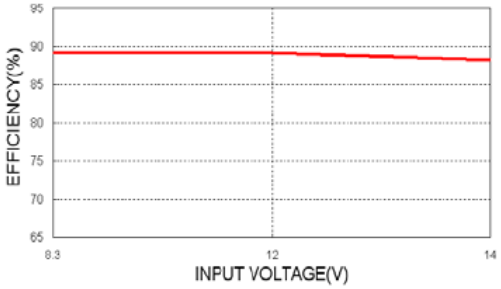
02D-12-06S,Vo=3.3V,Derating Curve



02D-05-06S,Vo=3.3V Efficiency VS Input Voltage



02D-12-06S,Vo=3.3V Efficiency VS Input Voltage



Environmental Specifications

Parameters	Conditions	Min	Typ	Max	Units
Operating temperature range	with derating	-40		85	℃
Storage temperature range	With derating	-55		125	℃
Thermal shock			MIL-STD-810F		
Over temperature protection			135		℃

Feature Specifications

Parameters	Conditions	Min	Typ	Max	Units
Remote ON/OFF					
Positive logic(option)	ON=(Vin-4)<Vr<Vin(Max)			10	uA
	OFF=0V<Vr<0.3V			1	mA
Negative logic(standard)	ON=0V<Vr<0.3V@I_{IN}			10	uA
	OFF=1.5V<Vr<Vin(Max)@I_{IN}			1	mA
Input current of Remote control pin		0.01		1.0	mA
Remote off state input current Nominal Vin			5		mA
Rise time (Time for Vo to rise from 10% to 90%of Vo(set))				6	ms
Turn-on delay time	Case 1 (Note 5)		3		ms
	Case 2 (Note 6)		3		ms

Note :

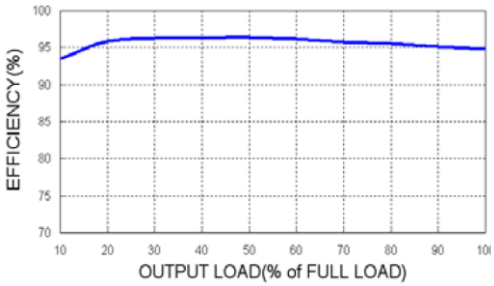
1. MIL-HDBK-217F Notice2 @Ta=25 °C, Full load(Ground, Benign, controlled environment).
2. External with Cout = 1uF ceramic//10uF tantalum capacitors.
3. External with Cout = 2×150uF polymer capacitors.
4. It's necessary to equip the external input capacitors at the input of the module. The capacitors should connect as close as possible to the input terminals that ensuring module stability. The external Cin is 2×150μF low-ESR polymer capacitors // 2×47μF ceramic capacitors at least.
5. Case 1 :On/Off input is set to logic low (module on) and then input power is applied (delay from instant at which Vin=Vin(min) until Vo=10% of Vo(set))
6. Case 2 :Input power is applied for at least one second and then the On/Off input is set to logic low (delay from instant at which Von/off=0.3V until Vo=10% of Vo(set))

CAUTION :

This power module is not internally fused.

An input line fuse must always be used.

02D-05-06S,Vo=3.3V Efficiency VS Output Load



02D-12-06S,Vo=3.3V Efficiency VS Output Load

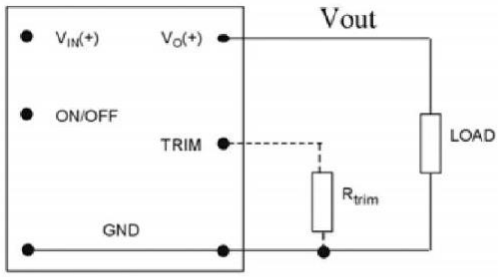
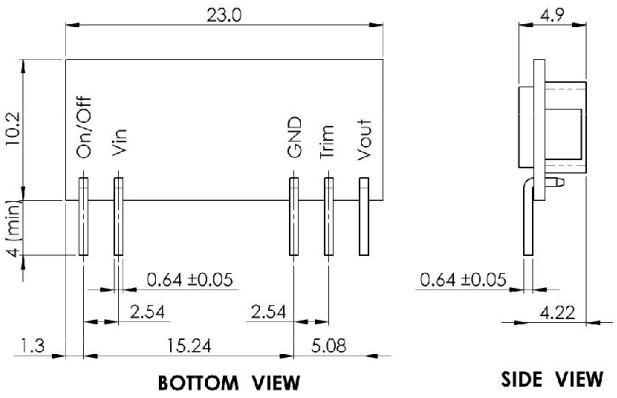


Fig. 1

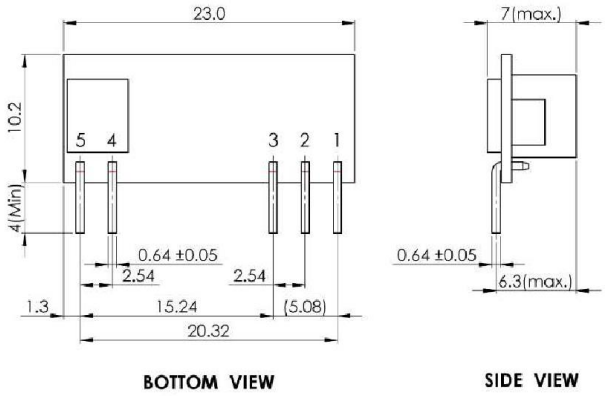
Markings and Dimensions

02D-05-06S



Unit : mm
Tolerance : XX.X ±0.5 , XX.XX ±0.25

02D-12-06S



Unit : mm
Tolerance : XX.X ±0.5 , XX.XX ±0.25

FEATURES :

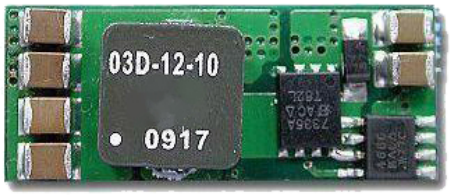
- OUTPUT CURRENT UP TO 10A
- INPUT RANGE FROM 8.3VDC TO 14.0VDC
- HIGH EFFICIENCY - 93% @ 3.3V FULL LOAD
- INPUT UNDER-VOLTAGE LOCKOUT
- SMD PACKAGES
- COMPLIANT TO RoHS EU DIRECTIVE 2002/95/EC
- SMALL SIZE AND LOW PROFILE : 33.0X 13.5 X 7.7mm
- OUTPUT VOLTAGE PROGRAMMABLE FROM 0.75VDC TO 5.0VDC VIA EXTERNAL RESISTOR

DC-DC Converter

03D-10A SERIES

Non-Isolated

Single Output



Specifications typical at TA=25°C, nominal input voltage and rated output current unless otherwise specified

Part Number	ON/OFF Logic	Input Range	Output Voltage	Output Current		Efficiency (%) 12Vin, 3.3Vdc @10A
				Min. Load	Max. Load	
03D-12-10	Negative	Vo(set)≦ 3.63V Vin = 8.3-14Vdc	0.75 ~ 5.0Vdc	0A	10A	93%

Input Specifications

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	Vo(set) ≦3.63V	8.3	Vin(nom)=12V	14	Vdc
	Vo(set) >3.63V	8.3	Vin(nom)=12V	13.2	Vdc
Input Current	Vin=8.3 to 14.0Vdc; Io(max.)			7	A
Input Filter(Note4)	C filter				
No Load Current (Vin=12V,Io=0, Module enabled)	Vo(set)=0.75Vdc		40		mA
	Vo(set)=5.0Vdc		100		mA
Under Voltage Lockout	Start-up Voltage		7.9		V
	Shutdown Voltage		7.8		V

Input reflected ripple current 5~20MHz, 1uH source impedance:20mAp-p

Applications

- Wireless Network
- Telecom/Datacom
- Distributed Power Architectures
- Industry Control System
- Semiconductor Equipment
- Microprocessor Power Applications

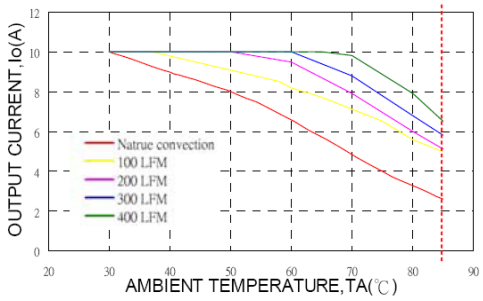
Output Specifications

Parameters	Conditions		Min	Typ	Max	Units
Output current					10	A
Voltage Tolerance	Full load and Vin(nom.)				±2	%
Minimum load					0	A
Line Regulation	Vin=Vin (min) to Vin (max) at Full Load			±0.3		%
Load Regulation	No Load to Full Load			±0.4		%
Ripple & Noise (Note2)	20MHz bandwidth				75	mVp-p
Temperature coefficient				±0.4		%
Dynamic load response (Note 2)	ΔIo /Δt = 2.5A/uS ,Vin(nom)	Peak deviation		200		mV
	Load change step (50% to 100% or 100% to 50% of Io(max)	Setting time (Vo<10%peak deviation)		25		uS
Dynamic load Response (Note 3)	ΔIo /Δt = 2.5A/uS ,Vin(nom)	Peak deviation		100		mV
	Load change step (50% to 100% or 100% to 50% of Io(max))	Setting time (Vo<10%peak deviation)		25		uS
Output current limit			200			%
Output short-circuit current	Hiccup, automatic recovery					
External load capacitance	ESR≧1mΩ				1000	uF
	ESR≧10mΩ				5000	uF
Output voltage overshoot-startup	Vin=Vin(min) to Vin(max);F.L			1		%
Voltage adjustability (see fig.1)			0.7525		5.0	V

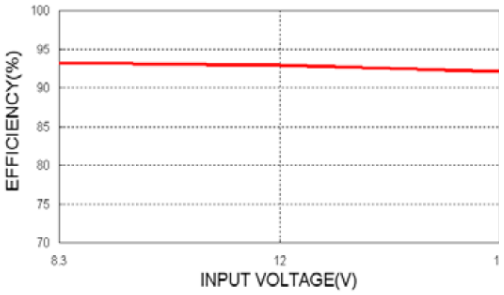
General Specifications

Parameters	Conditions	Min	Typ	Max	Units
Switching Frequency			300		KHz
Isolation voltage			None		
Efficiency			See table		
Dimensions			33.0 X 13.5 X 7.7		mm
Weight			6.0		g
MTBF (Note 1)	MIL-HDBK-217F		1.048 x 10^6		hrs

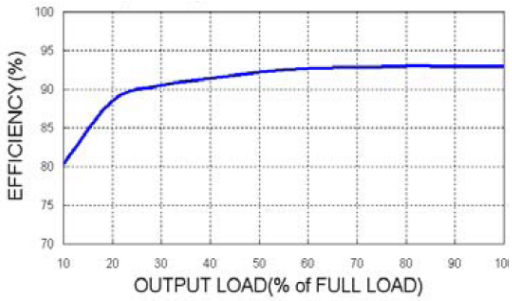
03D-12-10,Vo=3.3V,Derating Curve



03D-12-10,Vo=3.3V Efficiency VS Input Voltage



03D-12-10,Vo=3.3V Efficiency VS Output Load



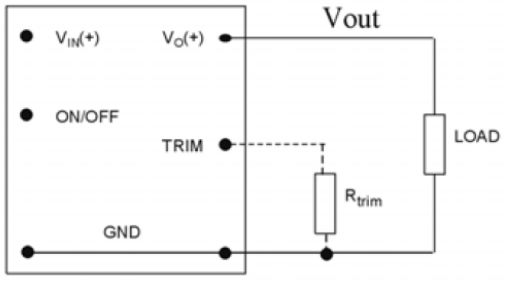


Fig. 1

Environmental Specifications

Parameters	Conditions	Min	Typ	Max	Units
Operating temperature range	with derating	-40		85	℃
Storage temperature range		-55		125	℃
Thermal shock			MIL-STD-810F		
Over temperature protection			125		℃

Feature Specifications

Parameters	Conditions	Min	Typ	Max	Units
Remote ON/OFF					
Negative logic(standard)	ON = 0V<Vr< 0.3V@I_{IN}			10	uA
	OFF=2.5V<Vr<Vin(Max)@I_{IN}			1	mA
Input current of Remote control pin		0.01		1.0	mA
Remote off state input current Nominal Vin			2.0		mA
Remote sense range				0.5	V
Rise time (Time for Vo to rise from 10% to 90%of Vo(set))				6	ms
Turn-on delay time	Case 1 (Note 5)		3		ms
	Case 2 (Note 6)		3		ms

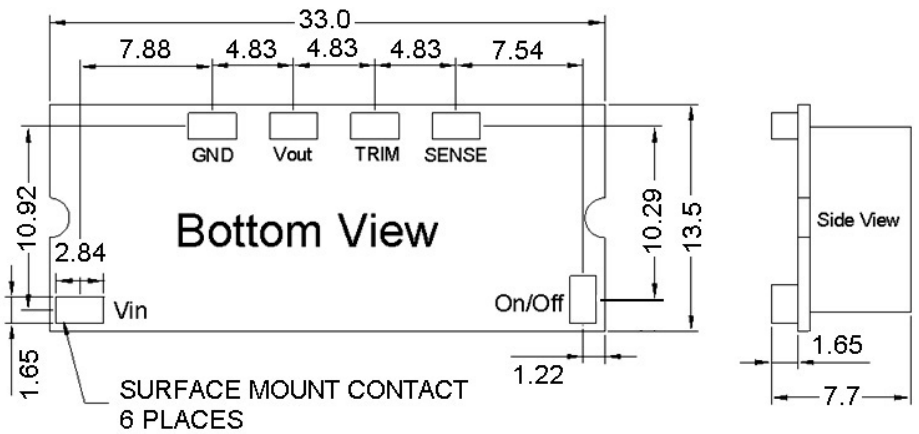
Note :

1. MIL-HDBK-217F Notice2 @Ta=25 °C, Full load(Ground, Benign, controlled environment).
2. External with Cout = 1μF ceramic//10μF tantalum capacitors.
3. External with Cout = 2×150μF polymer capacitors.
4. It's necessary to equip the external input capacitors at the input of the module. The capacitors should connect as close as possible to the input terminals that ensuring module stability. The external Cin is 4×47μF ceramic capacitors at least.
5. Case 1 :On/Off input is set to logic low (module on) and then input power is applied (delay from instant at which Vin=Vin(min.) until Vo=10% of Vo(set))
6. Case 2 :Input power is applied for at least one second and then the On/Off input is set to logic low (delay from instant at which Von/off=0.3V until Vo=10% of Vo(set))

CAUTION :

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

Markings and Dimensions



Unit : mm
Tolerance : XX.X ±0.5 • XX.XX ±0.25

FEATURES :

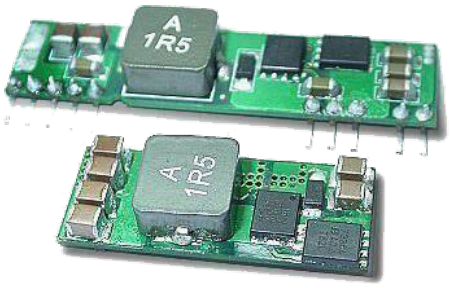
- OUTPUT CURRENT UP TO 16A
- INPUT RANGE FROM 8.3VDC TO 14.0VDC
- HIGH EFFICIENCY – 92% @ 3.3V FULL LOAD
- INPUT UNDER-VOLTAGE LOCKOUT
- SIP & SMD PACKAGES
- COMPLIANT TO RoHS EU DIRECTIVE 2002/95/EC
- SMALL SIZE AND LOW PROFILE : 50.8X 12.7 X 7.2mm
- OUTPUT VOLTAGE PROGRAMMABLE FROM 0.75VDC TO 5.0VDC VIA EXTERNAL RESISTOR

DC-DC Converter

04D-16A SERIES

Non-Isolated

Single Output



Specifications typical at TA=25°C, nominal input voltage and rated output current unless otherwise specified

Part Number	ON/OFF Logic	Input Range	Output Voltage	Output Current		Efficiency (%) 12Vin, 3.3Vdc @16A
				Min. Load	Max. Load	
04D-12-16	Negative	Vo(set)≦ 3.63V Vin = 8.3-14Vdc	0.75 ~ 5.0Vdc	0A	16A	92%
04D-12-16-SIP						

Input Specifications

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	Vo(set) ≦3.63V	8.3	Vin(nom)=12V	14	Vdc
	Vo(set) >3.63V	8.3	Vin(nom)=12V	13.2	Vdc
Input Current	Vin=8.3 to 14.0Vdc; Io(max.)			10	A
Input Filter(Note4)	C filter				
No Load Current (Vin=12V,Io=0, Module enabled)	Vo(set)=0.75Vdc		40		mA
	Vo(set)=5.0Vdc		100		mA
Under Voltage Lockout	Start-up Voltage		7.9		V
	Shutdown Voltage		7.8		V

Input reflected ripple current 5~20MHz, 1uH source impedance:20mAp-p

Applications

- Wireless Network
- Telecom/Datacom
- Distributed Power Architectures
- Industry Control System
- Semiconductor Equipment
- Microprocessor Power Applications

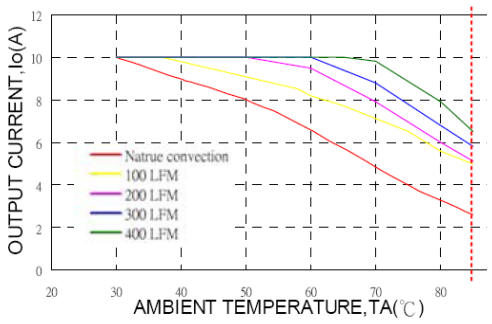
Output Specifications

Parameters	Conditions		Min	Typ	Max	Units
Output current					16	A
Voltage Tolerance	Full load and Vin(nom.)				±2	%
Minimum load					0	A
Line Regulation	Vin=Vin (min) to Vin (max) at Full Load			±0.3		%
Load Regulation	No Load to Full Load			±0.4		%
Ripple & Noise (Note2)	20MHz bandwidth				75	mVp-p
Temperature coefficient				±0.4		%
Dynamic load response (Note 2)	ΔIo /Δt = 2.5A/uS ,Vin(nom)	Peak deviation		200		mV
	Load change step (50% to 100% or 100% to 50% of Io(max)	Setting time (Vo<10%peak deviation)		25		uS
Dynamic load Response (Note 3)	ΔIo /Δt = 2.5A/uS ,Vin(nom)	Peak deviation		100		mV
	Load change step (50% to 100% or 100% to 50% of Io(max))	Setting time (Vo<10%peak deviation)		25		uS
Output current limit			200			%
Output short-circuit current	Hiccup, automatic recovery					
External load capacitance	ESR≧1mΩ				1000	uF
	ESR≧10mΩ				5000	uF
Output voltage overshoot-startup	Vin=Vin(min) to Vin(max);F.L			1		%
Voltage adjustability (see fig.1)			0.7525		5.0	V

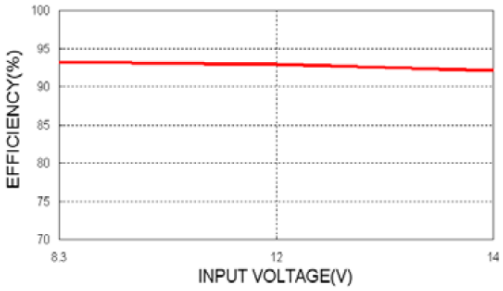
General Specifications

Parameters	Conditions	Min	Typ	Max	Units
Switching Frequency			300		KHz
Isolation voltage	None				
Efficiency	See table				
Dimensions			50.8 X 12.7 X 7.2		mm
Weight			6.0		g
MTBF (Note 1)	MIL-HDBK-217F		6.704 x 10^5		hrs

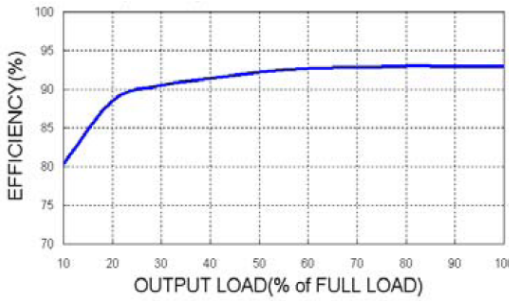
04D-12-16-SIP,Vo=3.3V,Derating Curve



04D-12-16-SIP,Vo=3.3V Efficiency VS Input Voltage



04D-12-16-SIP,Vo=3.3V Efficiency VS Output Load



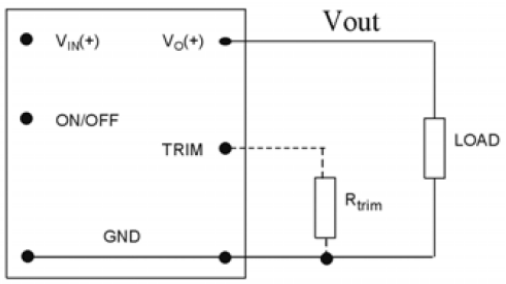


Fig. 1

Environmental Specifications

Parameters	Conditions	Min	Typ	Max	Units
Operating temperature range	with derating	-40		85	℃
Storage temperature range		-55		125	℃
Thermal shock			MIL-STD-810F		
Over temperature protection			125		℃

Feature Specifications

Parameters	Conditions	Min	Typ	Max	Units
Remote ON/OFF					
Negative logic(standard)	ON = 0V<Vr< 0.3V@I_{IN}			10	uA
	OFF=2.5V<Vr<Vin(Max)@I_{IN}			1	mA
Input current of Remote control pin		0.01		1.0	mA
Remote off state input current Nominal Vin			2.0		mA
Remote sense range				0.5	V
Rise time (Time for Vo to rise from 10% to 90%of Vo(set))				6	ms
Turn-on delay time	Case 1 (Note 5)		3		ms
	Case 2 (Note 6)		3		ms

Note :

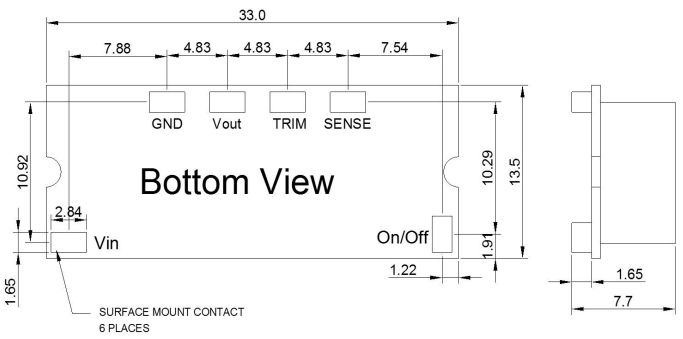
1. MIL-HDBK-217F Notice2 @Ta=25 °C, Full load(Ground, Benign, controlled environment).
2. External with Cout = 1μF ceramic//10μF tantalum capacitors.
3. External with Cout = 2×150μF polymer capacitors.
4. It's necessary to equip the external input capacitors at the input of the module. The capacitors should connect as close as possible to the input terminals that ensuring module stability. The external Cin is 6×47μF ceramic capacitors at least.
5. Case 1 :On/Off input is set to logic low (module on) and then input power is applied (delay from instant at which Vin=Vin(min.) until Vo=10% of Vo(set))
6. Case 2 :Input power is applied for at least one second and then the On/Off input is set to logic low (delay from instant at which Von/off=0.3V until Vo=10% of Vo(set))

CAUTION :

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

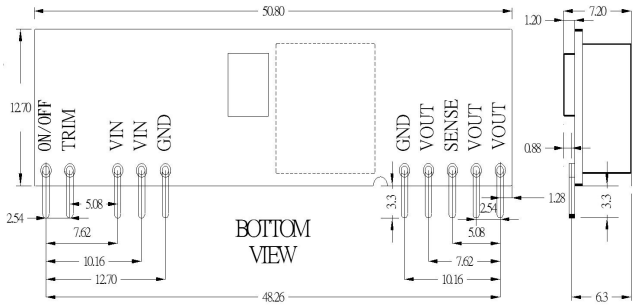
Markings and Dimensions

04D-12-16



Unit：mm
Tolerance：XX.X ± 0.5，XX.XX ± 0.25

04D-12-16-SIP



Unit：mm
Tolerance：XX.X ± 0.5，XX.XX ± 0.25

FEATURES :

- 3PIN SIP Package
- Pin-out compatible with LM78XX Linear
- UL94V-0 Package Material
- Operating Temperature:-40℃ TO +85℃
- Efficiency up to 96%,Non isolated, no need for heatsink
- Low Profile (L*W*H = 11.5 * 8.5 * 17.5mm)
- Short circuit protection, Thermal Shutdown
- Wide input voltage ranges, up to 72V

Specifications typical at TA=25°C, nominal input voltage and rated output current unless otherwise specified

Part Number	Input Range	Output Voltage	Output Current	Efficiency	
	Vdc	Vdc	mA	Min.Vin(%)	Max.Vin(%)
08D-3R3-500	9 ~ 72	3.3	500	81	72
08D-05-500	9 ~ 72	5.0	500	87	80
08D-6R5-500	9 ~ 72	6.5	500	91	80
08D-09-500	14~ 72	9.0	500	92	85
08D-12-500	17 ~ 72	12	500	94	88
08D-15-500	21 ~ 72	15	500	94	90
08D-24-300	36 ~ 72	24	300	96	92

Input Specifications

Parameters	Conditions	Min	Typ	Max	Units
Input Voltage Range	See table	9	48	72	V
Internal Input Filter	Capacitors			2.2	uF
No Load Input Current	Vin=48V	1	5	7	mA

Output Specifications

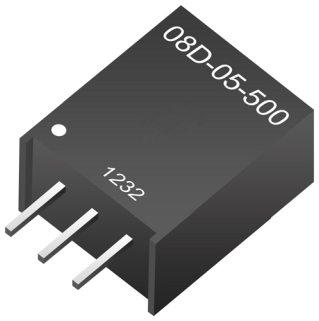
Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance			±2	±3	%
Short Circuit Protection	Hiccup, automatic recovery				
Line Regulation	Vin=min to max at full load		±0.3	±0.5	%
Load Regulation	10% To 100% F.L		±0.4	±0.5	%
Ripple & Noise (without Output Capacitor)	10% TO 100% F.L BW=20MHz			60	mVp-p
Transient response setting time	50% load step change		350	500	us
Capacitive load				100	uF

DC-DC Converter

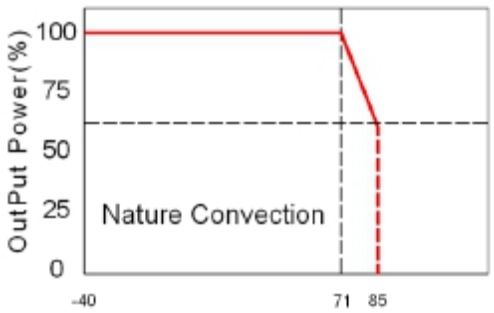
08D-500 SERIES

Non-Isolated

Single Output



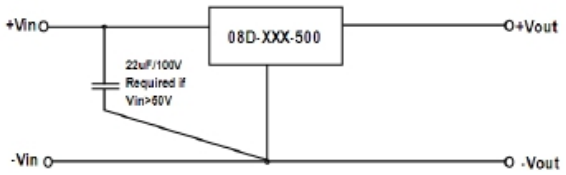
Temperature Derating Graph



General Specifications

Parameters	Conditions	Min	Typ	Max	Units
Temperature Coefficient	-40℃ ~ +85℃ ambient			0.015	%/℃
Switching		150		500	KHz
Operating Temperature	With derating	-40		85	℃
Storage Temperature		-55		125	℃
Humidity	Non Condensing			95	%
Cooling	Free air Convection				
Case material	Non-Conductive Black Plastic				
Potting Material			Epoxy(UL94V-0)		
Weight			4.0		g
Dimensions			11.5x8.5x17.5		mm
MTBF(+25℃)	using MIL-HDBK 217F		$7395x10^3$		hours

Application Examples

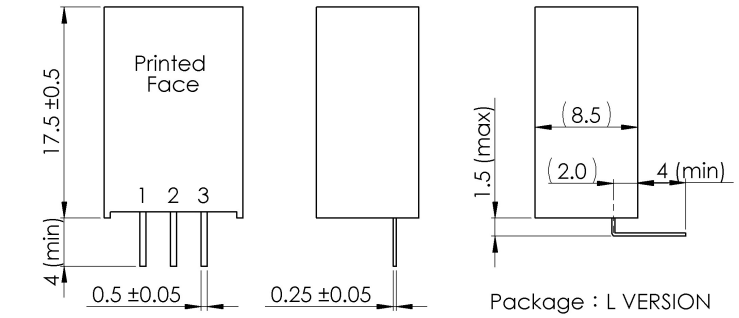


Part Number

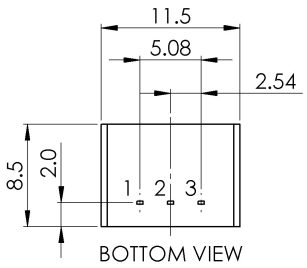
$$\frac{08D}{A} - \frac{05}{B} - \frac{500}{C}$$

A: Series
B: Output Voltage
C: Output Current

Markings and Dimensions



Package : L VERSION



Unit : mm
Tolerance : XX.X ±0.5 , XX.XX ±0.25

PIN Assignment

PIN	1	2	3
Function	+Vin	GND	+Vout