

# MMT

A decorative graphic consisting of several overlapping, wavy, translucent blue lines that flow across the top half of the page, creating a sense of motion and energy.

## DC/DC CONVERTER

A decorative graphic in the bottom left corner featuring a cluster of vibrant green leaves with water droplets, and several flowing, ribbon-like green shapes that sweep across the bottom of the page.

# 1 Watt

2019

<http://www.mmtmachrone.com>

**FEATURES :**

- 6PIN SIP Package
- High Efficiency up to 85%
- Unregulated Output Types
- Single Output 5/9/12/15V/24V Approved By UL60950-1
- Internal SMD Construction
- No External Component Required
- Operating Temperature:-40°C TO +85°C
- Industry Standard Pinout

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

Part Number	Output Voltage	Output Current	Efficiency	Package Style
	Vdc	mA	%TYP	
10D-XXS03NNL	3.3	303	70	1
★10D-XXS05NNL	5	200	70	1
★10D-XXS09NNL	9	112	75	1
★10D-XXS12NNL	12	84	78	1
★10D-XXS15NNL	15	67	80	1
★10D-XXS24NNL	24	42	82	1
10D-XXS05N2NL	5	200	70	2
10D-XXS09N2NL	9	112	75	2
10D-XXS12N2NL	12	84	78	2
10D-XXS15N2NL	15	67	80	2
10D-XXS24N2NL	24	42	82	2

**Note:**

- 1."XX" Is Input Voltage:03=3.3Vdc,05=5Vdc,09=9Vdc,12=12Vdc,15=15Vdc,24=24Vdc,48=48Vdc.
2. Over 48Vdc input voltage, using the 2nd package.
3. The input voltage increases, there will be an increase in efficiency.
4. " ★ " marked as recognized by UL 60950-1.

**Input Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	Vo,Io Nom			±10	%
Filter	Capacitor				

**Output Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	100% full load			±5	%
Short Circuit Protection	Short Term			1	Sec
Line Regulation	For 1.0% OF Vin		1.2		%
Load Regulation	3.3V,5V (10% To 100% F.L)			15	%
Load Regulation	9V,12V,15V,24V (10% To 100% F.L)			10	%
Ripple & Noise	BW=DC To 20MHZ			100	mVp-p
Transient response setting time	50% load step change		350		us



DC-DC Converter

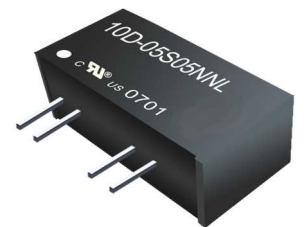
**10D SERIES**

1Watt

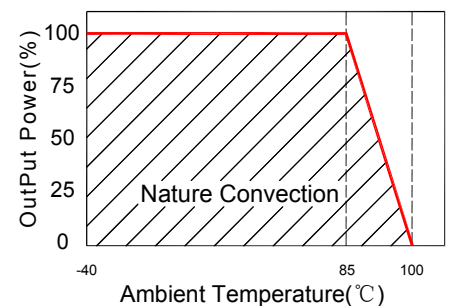
1KV Isolated

Single Output

SIP6



**Temperature Derating Graph**



General Specifications

Parameters	Conditions	Min	Typ	Max	Units
Isolation Resistance	500Vdc	1000			MΩ
Switching Frequency	Full load, nominal input		100		KHz
Operating Temperature		-40		+85	°C
Humidity	Non Condensing			95	%
Cooling	Free air Convection				
Case material	DAP				
MTBF	MIL-HDBK-217F@25°C	3500000			Hours
Weight	Package1 or Package2		2.1 or 2.7		g
Dimensions	Package 1		19.5x6.0x10.0		mm
Dimensions	Package 2		19.5x7.1x10.0		mm

Application Note

Filtering

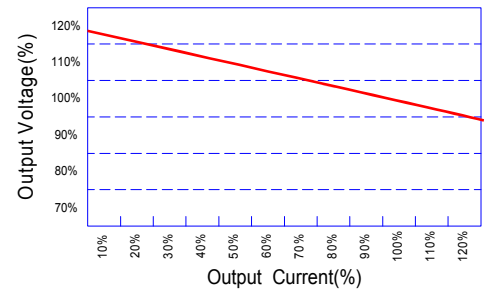
In some circuits which are sensitive to noise and ripple, a filtering capacitor may be added to the DC/DC output end and input end to reduce the noise and ripple. However, the capacitance of the output filter capacitor must proper. If the capacitance is too big, a startup problem might arise. For every channel of output, providing the safe and reliable operation is ensured, the greatest capacitance of its filter capacitor refer to the external capacitor table. To get an extreme low ripple, an "LC" filtering network may be connected to the input and output ends of the DC/DC converter, which may produce a more significant filtering effect. It should also be noted that the inductance and the frequency of the "LC" filtering network should be staggered with the DC/DC frequency to avoid mutual interference (see figure 1).



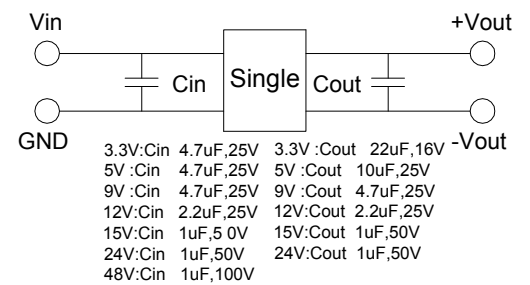
<Figure 1>  
External Capacitor Table

Vin	External Capacitor	Vout	External Capacitor
3.3VDC	4.7uF/25V	3.3VDC	22uF/16V
5VDC	4.7uF/25V	5VDC	10uF/25V
9VDC	4.7uF/25V	9VDC	4.7uF/25V
12VDC	2.2uF/25V	12VDC	2.2uF/25V
15VDC	1uF/50V	15VDC	1uF/50V
24VDC	1uF/50V	24VDC	1uF/50V
48VDC	1uF/100V	--	--

Tolerance Envelope Graph



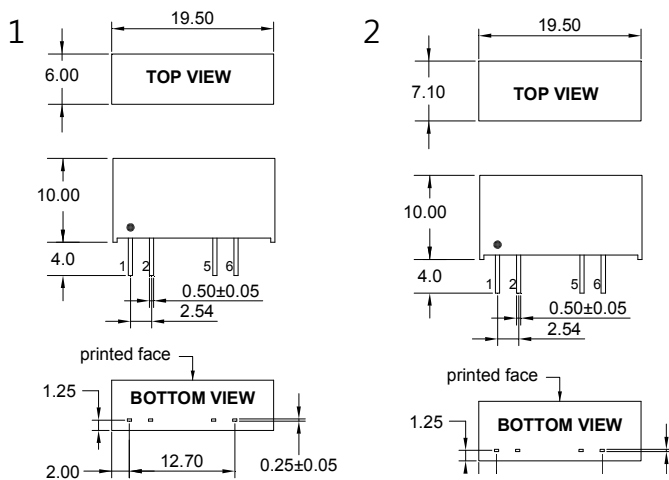
Recommended Test Circuit



Part Number

10D - 05 S 05 N 2 NL A:Series  
 A B C D E F G B:Input Voltage  
 C:Single(S)  
 D:Output Voltage  
 E:UNRegulated(N)  
 F:Packge  
 G:RoHS Version

Markings and dimensions

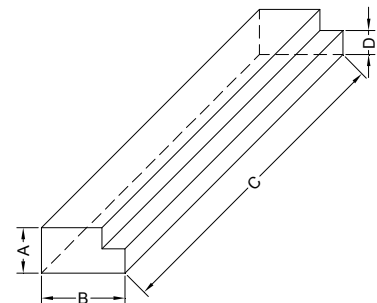


UNIT: mm Unless otherwise specified, all tolerances are ±0.25

PIN Connection

PIN	1	2	5	6
Single	+Vin	-Vin	-Vout	+Vout

Packaging



Size(mm)			
A	B	C	D
9.5	16.5	522	5.0

**FEATURES :**

- 7PIN SIP Package
- High Efficiency up to 80%
- Regulated Output Types
- Internal SMD Construction
- No External Component Required
- Industry Standard Pinout
- Operating Temperature:-40°C TO +85°C

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

Part Number	Output Voltage	Output Current	Efficiency
	Vdc	mA	%TYP
12D-XXS03RNL	3.3	303	65
12D-XXS05RNL	5	200	65
12D-XXS09RNL	9	112	70
12D-XXS12RNL	12	84	70
12D-XXS15RNL	15	67	70
12D-XXS24RNL	24	42	70

**Note:**

- 1."XX" Is Input Voltage:03=3.3Vdc, 05=5Vdc, 09=9Vdc 12=12Vdc,15=15Vdc,24=24Vdc.
- 2.The input voltage increases, there will be an increase in efficiency.
- 3.Input 3.3V, then output will be 12V MAX;Output 3.3V, then input will be 12V MAX

**Input Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	Vo, Io Nom			±10	%
Filter	Capacitor				

**Output Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	100% full load			±5	%
Short Circuit Protection	Continuous				
Line Regulation	Regulated			±0.5	%
Load Regulation	Regulated			±1.5	%
Ripple & Noise	Output:5V,9V TYPES BW=DC To 20MHz			100	mVp-p
Ripple & Noise	Output:12-24V TYPES BW=DC To 20MHz			1% of Vout	mVp-p
Transient response setting time	50% load step change		350		us



DC-DC Converter

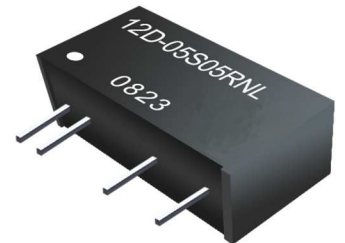
12D-R SERIES

1Watt

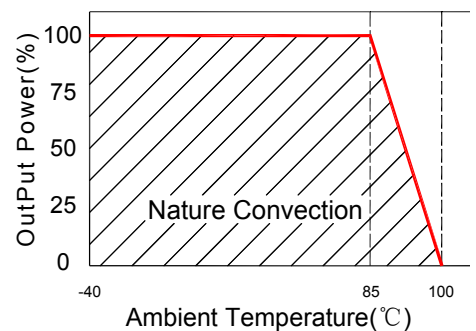
3KV Isolated

Single Output

SIP7



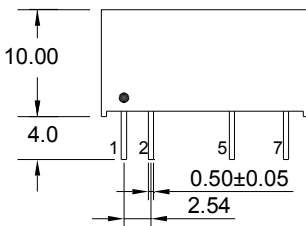
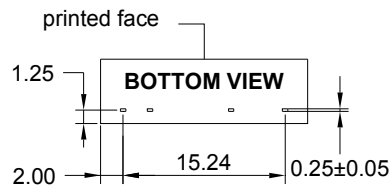
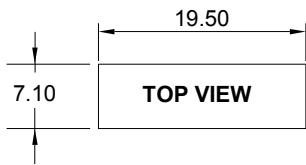
**Temperature Derating Graph**



**General Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Isolation Resistance	500Vdc	1000			MΩ
Switching Frequency	Full load, nominal input		100		KHz
Operation Temperature		-40		+85	°C
Humidity	Non Condensing			95	%
Cooling	Free air Convection				
Case material	DAP				
MTBF	MIL-HDBK-217F@25°C	1500000			Hours
Weight			2.7		g
Dimensions		19.5x7.1x10.0			mm

**Markings and dimensions**



UNIT: mm

Unless otherwise specified, all tolerances are ±0.25

**PIN Connection**

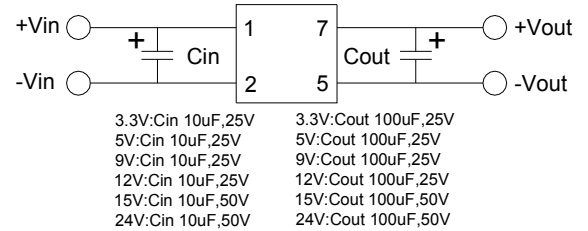
Pin	1	2	5	7
Single	+Vin	-Vin	-Vout	+Vout

**Part Number**

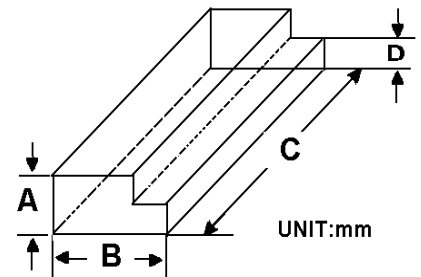
12D	-	05	S	05	R	NL
A		B	C	D	E	F

- A : Series
- B : Input Voltage
- C : Single(S);Dual(D)
- D : Output Voltage
- E : Regulated(R)
- F : RoHS Version

**Recommended Test Circuit**



**Packaging**



Size(mm)			
A	B	C	D
9.5	16.5	522	5.0

**FEATURES :**

- 7PIN SIP Package
- High Efficiency up to 85%
- Unregulated Output Types
- Single Output 5/9/12/15V Approved By UL 60950-1
- Internal SMD Construction
- No External Component Required
- Operating Temperature:-40°C TO +85°C
- Industry Standard Pinout

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

Part Number	Output Voltage	Output Current	Efficiency	Package Style
	Vdc	mA	%TYP	
12D-XXS03NNL	3.3	303	70	1
★12D-XXS05NNL	5	200	70	1
★12D-XXS09NNL	9	112	75	1
★12D-XXS12NNL	12	84	78	1
★12D-XXS15NNL	15	67	80	1
12D-XXS24NNL	24	42	82	1
12D-XXD03NNL	±3.3	±150	70	1
12D-XXD05NNL	±5	±100	70	1
12D-XXD09NNL	±9	±56	75	1
12D-XXD12NNL	±12	±42	78	1
12D-XXD15NNL	±15	±34	80	1
12D-XXD24NNL	±24	±21	82	1
12D-XXS05N2NL	5	200	70	2
12D-XXS09N2NL	9	112	75	2
12D-XXS12N2NL	12	84	78	2
12D-XXS15N2NL	15	67	80	2
12D-XXS24N2NL	24	42	82	2
12D-XXD05N2NL	±5	±100	70	2
12D-XXD09N2NL	±9	±56	75	2
12D-XXD12N2NL	±12	±42	78	2
12D-XXD15N2NL	±15	±34	80	2
12D-XXD24N2NL	±24	±21	82	2

**Note :**

- 1."XX" Is Input Voltage: 03=3.3Vdc 05=5Vdc, 09=9Vdc, 12=12Vdc, 15=15Vdc, 24=24Vdc, 48=48Vdc.
2. Over 48Vdc input voltage, using the 2nd package.
3. The input voltage increases, there will be an increase in efficiency.
- 4." ★" marked as recognized by UL 60950-1.

**Input Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	Vo, Io Nom			±5	%
Filter	Capacitor				



DC-DC Converter

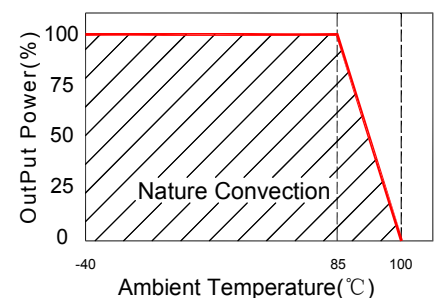
**12D-3KV SERIES**

1Watt

3KV Isolated

Single &amp; Dual Output

SIP7

**Temperature Derating Graph**

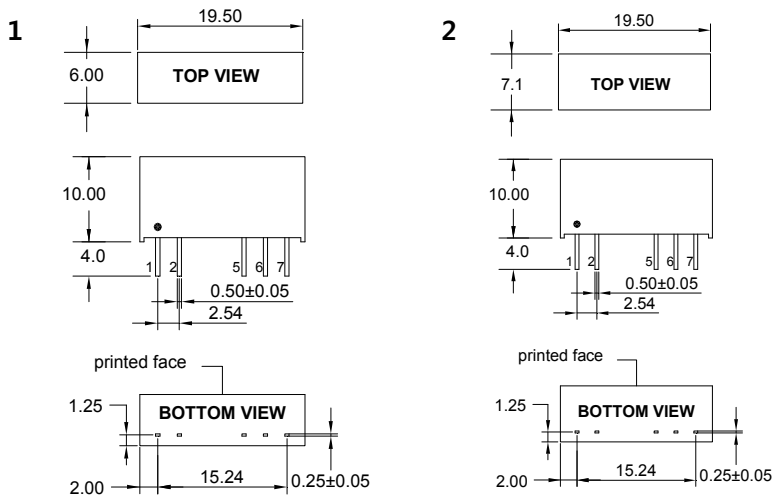
## Output Specifications

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	100% full load			±5	%
Short Circuit Protection	Short Term			1	Sec
Line Regulation	For 1.0% OF Vin		1.2		%
Load Regulation	3.3V,5V (10% To 100% F.L)			15	%
Load Regulation	9V,12V,15V,24V (10% To 100% F.L)			10	%
Ripple & Noise	BW=DC To 20MHz			100	mVp-p
Transient response setting time	50% load step change		350		us

## General Specifications

Parameters	Conditions	Min	Typ	Max	Units
Isolation Resistance	500Vdc	1000			MΩ
Switching Frequency	Full load, nominal input		100		KHz
Operating Temperature		-40		+85	°C
Humidity	Non Condensing			95	%
Cooling	Free air Convection				
Case material	DAP				
MTBF	MIL-HDBK-217F @25°C	3500000			Hours
Weight	Package 1 or Package2		2.1 or 2.7		g
Dimensions	Package 1		19.5x6.0x10.0		mm
Dimensions	Package 2		19.5x7.1x10.0		mm

## Markings and dimensions

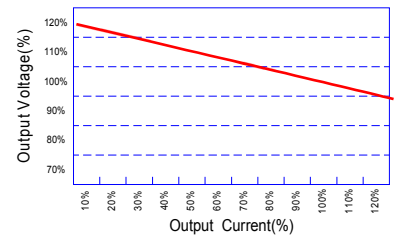


Unit:mm Unless otherwise specified, all tolerances are ±0.25

## PIN Connection

PIN	1	2	5	6	7
Single	+Vin	-Vin	-Vout	No Pin	+Vout
Dual	+Vin	-Vin	-Vout	Com	+Vout

## Tolerance Envelope Graph

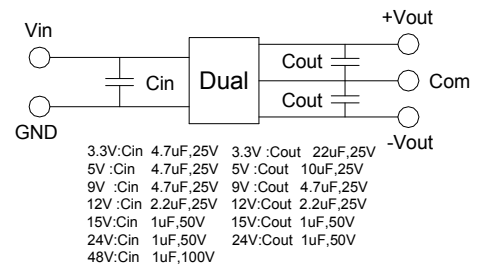
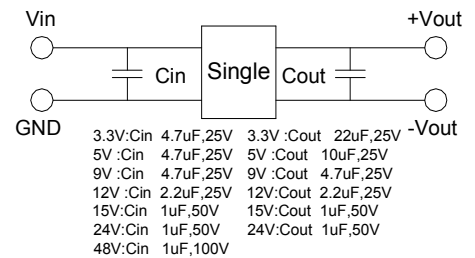


## Part Number

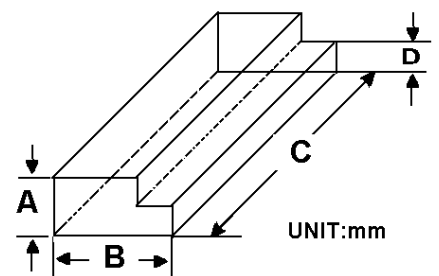
12D - 05 S 05 N 2 NL  
A B C D E F G

A:Series  
B:Input Voltage  
C:Single(S)Dual(D)  
D:Output Voltage  
E:Unregulated(N)  
F:Package  
G:RoHS Version

## Recommended Test Circuit



## Packaging



Size (mm)			
A	B	C	D
9.5	16.5	52.2	5.0

**FEATURES :**

- 7PIN SIP Package
- High Efficiency up to 85%
- Unregulated Output Types
- Internal SMD Construction
- No External Component Required
- Industry Standard Pinout
- Operating Temperature:-40°C TO +85°C

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

Part Number	Output Voltage	Output Current	Efficiency
	Vdc	mA	%TYP
12D-XXS05N6KVNL	5	200	70
12D-XXS09N6KVNL	9	112	75
12D-XXS12N6KVNL	12	84	78
12D-XXS15N6KVNL	15	67	80
12D-XXS24N6KVNL	24	42	82
12D-XXD05N6KVNL	±5	±100	70
12D-XXD09N6KVNL	±9	±56	75
12D-XXD12N6KVNL	±12	±42	78
12D-XXD15N6KVNL	±15	±34	80
12D-XXD24N6KVNL	±24	±21	82

**Note :**

- 1."XX" Is Input Voltage: 03=3.3Vdc,05=5Vdc,09=9Vdc,12=12Vdc,15=15Vdc,24=24Vdc.
2. The input voltage increases, there will be an increase in efficiency.

**Input Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	Vo,Io Nom			±10	%
Filter	Capacitor				

**Output Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	100% full load			±5	%
Short Circuit Protection	Short Term			1	Sec
Line Regulation	For 1.0% OF Vin		1.2		%
Load Regulation	5V (10% To 100% F.L)			15	%
Load Regulation	9V,12V,15V,24V (10% To 100% F.L)			10	%
Ripple & Noise	BW=DC To 20MHz			100	mVp-p
setting time	change		350		us



DC-DC Converter

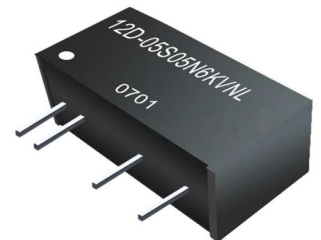
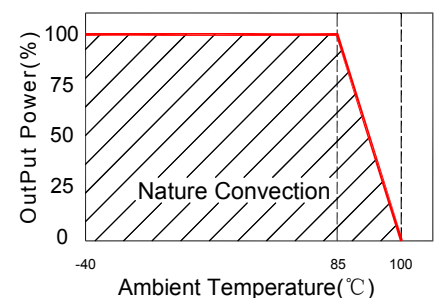
**12D-6KV SERIES**

1Watt

6KV Isolated

Single &amp; Dual Output

SIP7

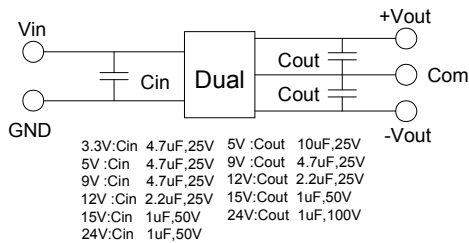
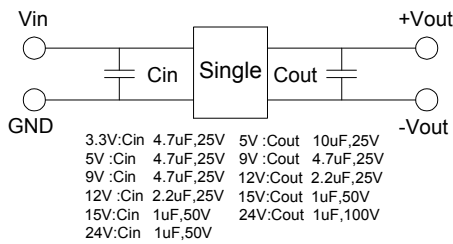
**Temperature Derating Graph**



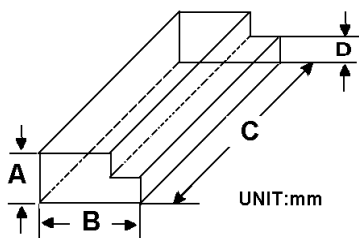
## General Specifications

Parameters	Conditions	Min	Typ	Max	Units
Isolation Resistance	500Vdc	1000			MΩ
Switching Frequency	Full load, nominal input		100		KHz
Operating Temperature		-40		+85	°C
Humidity	Non Condensing			95	%
Cooling	Free air Convection				
Case material	DAP				
MTBF	MIL-HDBK-217F @25°C	3500000			Hours
Weight			2.7		g
Dimensions		19.5x7.10x10.0			mm

## Recommended Test Circuit

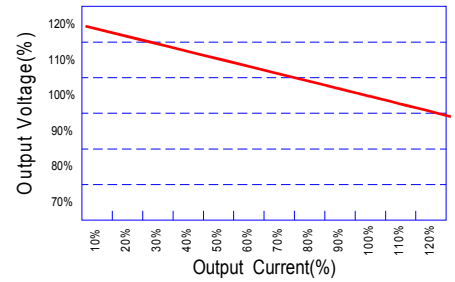


## Packaging



Size (mm)			
A	B	C	D
9.5	16.5	52.2	5.0

## Tolerance Envelope Graph

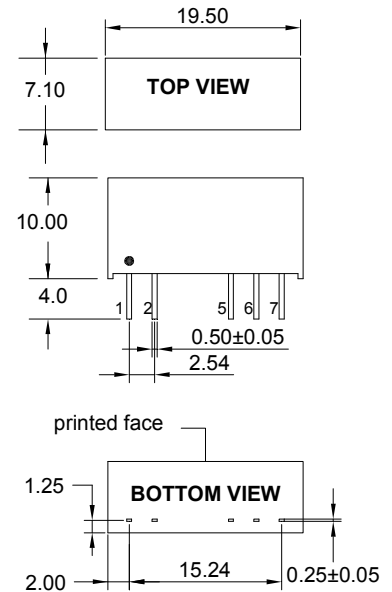


## Part Number

12D - 05 S 05 N 6KV NL  
 A B C D E F G

- A:Series
- B:Input Voltage
- C:Single(S)Dual(D)
- D:Output Voltage
- E:Unregulated(N)
- F:Isolation Voltage
- G:RoHS Version

## Markings and dimensions



Unit:mm Unless otherwise specified, all tolerances are ±0.25

## PIN Connection

PIN	1	2	5	6	7
Single	+Vin	-Vin	-Vout	No Pin	+Vout
Dual	+Vin	-Vin	-Vout	Common	+Vout

**FEATURES :**

- 7PIN SIP Package
- High Efficiency up to 81%
- Reinforced insulation
- The patient leakage current: Max 2µA
- Unregulated Output Types
- Internal SMD Construction
- Industry Standard Pinout
- Operating Temperature:-40°C TO +85°C
- Design refer to EN60601-1, ANSI/AAMI ES60601-1

12D1M series meet reinforced insulation requirements.

They are specially designed for applications where require compact size, high isolation, low isolation capacitor and low leakage current power. They are widely used in medical, electricity, IGBT driver and so on.

They are suitable for:

1. Where the voltage of the input power supply is stable (Voltage variation: ±10% Vin)
2. Where isolation is necessary between input and output (isolation voltage ≤4200VAC or 6000VDC)
3. Where do not has high requirement of line regulation and the ripple & noise of the output voltage

Such as: Medical collection and isolation, High voltage collection circuit, IGBT-driven circuits, etc.



DC-DC Converter

12D1M SERIES

1Watt

4.2KVac or 6KVdc Isolated

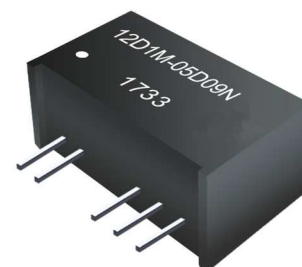
Single & Dual Output

SIP7

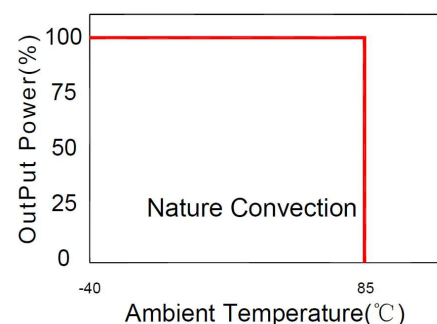
Specifications typical at TA=25°C, nominal input voltage and rated output current unless otherwise specified

Part Number	Output Voltage	Output Current	Efficiency	Max. Capacitive Load(Note)
	Vdc	mA	%Min/Typ	uF
12D1M-05S05N	5	200	74/78	1000
12D1M-05S12N	12	84	72/76	470
12D1M-05S15N	15	67	72/76	470
12D1M-12S05N	5	200	73/77	1000
12D1M-12S12N	12	84	77/81	470
12D1M-12S15N	15	67	77/81	470
12D1M-24S05N	5	200	72/76	1000
12D1M-24S12N	12	84	74/78	470
12D1M-24S15N	15	67	74/78	470
12D1M-05D05N	±5	±100	74/78	470
12D1M-05D09N	±9	±56	76/80	470
12D1M-05D12N	±12	±42	70/74	220
12D1M-05D15N	±15	±34	72/76	220
12D1M-12D05N	±5	±100	73/77	470
12D1M-12D09N	±9	±56	76/80	470
12D1M-12D12N	±12	±42	69/73	220
12D1M-12D15N	±15	±34	71/75	220
12D1M-24D05N	±5	±100	71/75	470
12D1M-24D09N	±9	±56	75/79	470
12D1M-24D12N	±12	±42	72/76	220
12D1M-24D15N	±15	±34	72/76	220

Note: The capacitive loads of positive and negative outputs are identical.



Temperature Derating Graph



**Input Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Types	Vo, Io Nom			±10	%
Filter	Capacitor				

**Output Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	100% full load			±5	%
Line Regulation	For 1.0% OF Vin		1.2		%
Load Regulation	5V (10% To 100% F.L)			20	%
Load Regulation	9V(10% To 100% F.L)			15	%
Load Regulation	12V (10% To 100% F.L)			15	%
Load Regulation	15V(10% To 100% F.L)			15	%
Ripple & Noise	20MHz bandwidth		70	120	mVp-p
Output Short Circuit	(NOTE)			3	S

**Note:**  
Supply voltage must be discontinued at the end of short circuit duration which less than 3s.

**General Specifications**

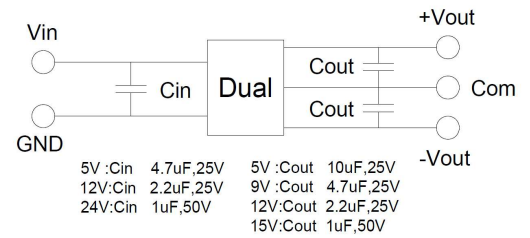
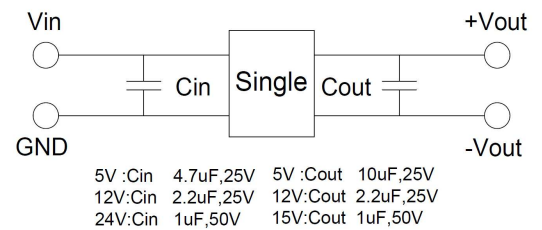
Parameters	Conditions	Min	Typ	Max	Units
Isolation Resistance	500Vdc	1000			MΩ
Isolation Capacitance	Input-output, 100KHz/0.1V		5		pF
Switching Frequency	Full load,nominal input		100		KHz
Operating Temperature		-40		+85	°C
Storage Temperature		-55		+125	°C
Humidity	Non Condensing			95	%
Cooling	Free air Convection				
Transformer Creepage		5			mm
Transformer Clearance		5			mm
PCB Creepage & Clearance		5.5			mm
Case material	DAP				
MTBF	MIL-HDBK-217F@25°C	3500000			Hours
Weight			4.0		g
Dimensions			19.5x9.8x12.5		mm

**Part Number**

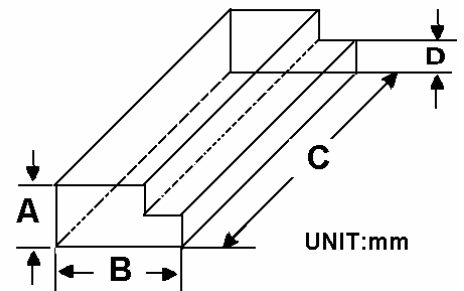
12D1M - 05 S 05 N  
A B C D E

- A: Series
- B: Input Voltage
- C: Single Output
- D: Output Voltage
- E: Unregulated (N)

**Recommended Test Circuit**

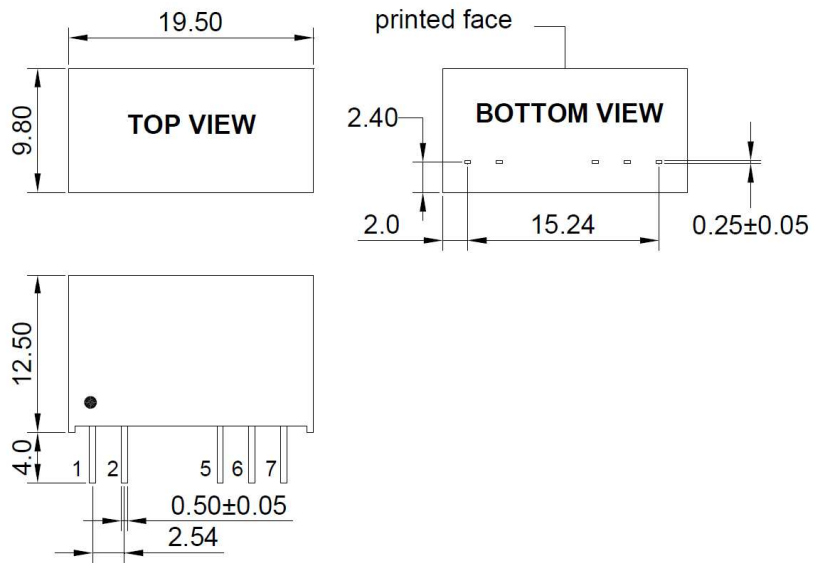


**Packaging**



Size(mm)			
A	B	C	D
12.0	28.55	550	6.00

Markings and Dimensions



UNIT: mm Unless otherwise specified, all tolerances are ±0.25

PIN Connection					
Pin	1	2	5	6	7
Single	+Vin	-Vin	-Vout	No Pin	+Vout
Dual	+Vin	-Vin	-Vout	Com	+Vout

**FEATURES :**

- 7PIN SIP Package
- High Efficiency up to 88%
- Unregulated Output Types
- Internal SMD Construction
- Industry Standard Pinout
- Operating Temperature:-40°C TO +85°C

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

Part Number	Output Voltage	Output Current	Ripple & Noise		Efficiency	Package Style
	Vdc	mA	Typ(mVp-p)	Max(mVp-p)	%TYP	
12DA-05S05N	5	200	25	50	82	1
12DA-05S09N	9	112	25	50	82	1
12DA-05S12N	12	84	25	50	82	1
12DA-05S15N	15	67	25	50	84	1
12DA-12S05N	5	200	25	50	82	1
12DA-12S09N	9	112	25	50	84	1
12DA-12S12N	12	84	25	50	86	1
12DA-12S15N	15	67	25	50	87	1
12DA-15S05N	5	200	25	50	83	1
12DA-15S09N	9	112	25	50	86	1
12DA-15S12N	12	84	25	50	87	1
12DA-15S15N	15	67	25	50	87	1
12DA-24S05N	5	200	25	50	84	1
12DA-24S09N	9	112	25	50	85	1
12DA-24S12N	12	84	25	50	86	1
12DA-24S15N	15	67	25	50	86	1
12DA-48S05N2	5	200	-	80	78	2
12DA-48S09N2	9	112	-	80	81	2
12DA-48S12N2	12	84	-	80	81	2
12DA-48S15N2	15	67	-	80	82	2
12DA-05D05N	±5	±100	25	50	84	1
12DA-05D09N	±9	±56	25	50	86	1
12DA-05D12N	±12	±42	25	50	86	1
12DA-05D15N	±15	±34	25	50	86	1
12DA-12D05N	±5	±100	25	50	85	1
12DA-12D09N	±9	±56	25	50	87	1
12DA-12D12N	±12	±42	25	50	88	1
12DA-12D15N	±15	±34	25	50	87	1
12DA-15D05N	±5	±100	25	50	83	1
12DA-15D09N	±9	±56	25	50	86	1
12DA-15D12N	±12	±42	25	50	87	1
12DA-15D15N	±15	±34	25	50	87	1
12DA-24D05N	±5	±100	25	50	84	1
12DA-24D09N	±9	±56	25	50	85	1
12DA-24D12N	±12	±42	25	50	86	1
12DA-24D15N	±15	±34	25	50	86	1
12DA-48D05N2	±5	±100	-	80	79	2
12DA-48D09N2	±9	±56	-	80	81	2
12DA-48D12N2	±12	±42	-	80	81	2
12DA-48D15N2	±15	±34	-	80	82	2



DC-DC Converter

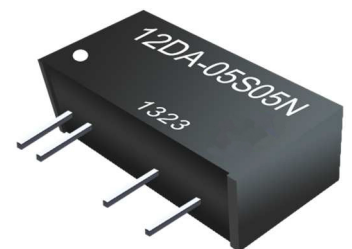
12DA SERIES

1Watt

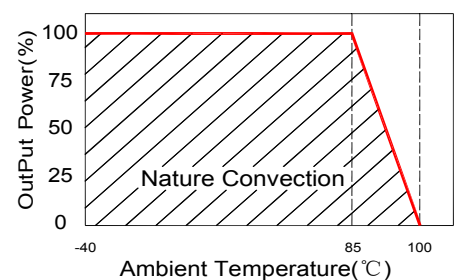
3KV Isolated

Single & Dual Output

SIP7



Temperature Derating Graph



## Input Specifications

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	$V_{o, Io}$ Nom			$\pm 10$	%
Filter	Capacitor				

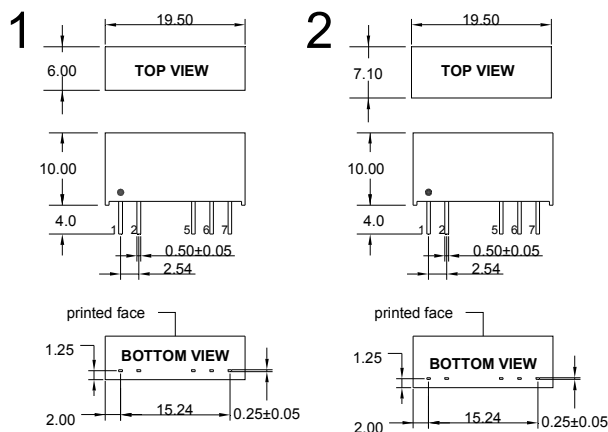
## Output Specifications

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	100% full load			$\pm 5$	%
Short Circuit Protection	Short Term			1	Sec
Line Regulation	For 1.0% OF $V_{in}$		1.2		%
Load Regulation	5V,9V (10% To 100% F.L)			7	%
Load Regulation	12V,15V (10% To 100% F.L)			5	%
Load Regulation	$\pm 5V, \pm 9V$ (10% To 100% F.L)			7	%
Load Regulation	$\pm 12V, \pm 15V$ (10% To 100% F.L)			5	%

## General Specifications

Parameters	Conditions	Min	Typ	Max	Units
Isolation Resistance	500Vdc	1000			MΩ
Isolation Voltage			3000		Vdc
Switching Frequency	Full load, nominal input		100		KHz
Operating Temperature		-40		+85	°C
Humidity	Non Condensing			95	%
Cooling	Free air Convection				
Case material	DAP				
MTBF	MIL-HDBK-217F @25°C	3500000			Hours
Weight	Package1 or Package2		2.1 or 2.7		g
Dimensions	Package1 or Package2	19.5x6.0x10.0 or 19.5x7.1x10.0			mm

## Markings and dimensions



Unit:mm Unless otherwise specified, all tolerances are  $\pm 0.25$

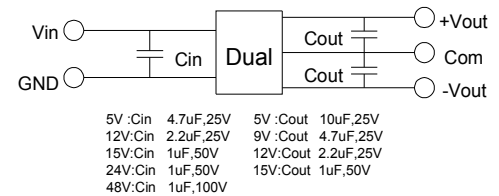
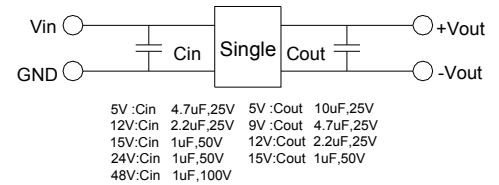
## Part Number

12DA - 05 S 05 N

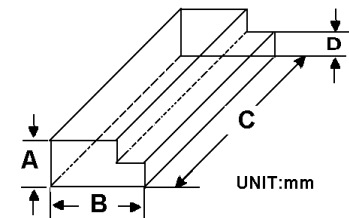
A B C D E

A:Series  
B:Input Voltage  
C:Single(S)Dual(D)  
D:Output Voltage  
E:Unregulated(N)

## Recommended Test Circuit



## Packaging



Size (mm)			
A	B	C	D
9.50	16.5	52.2	5.0

## PIN Connection

PIN	1	2	5	6	7
Single	+Vin	-Vin	-Vout	No Pin	+Vout
Dual	+Vin	-Vin	-Vout	Com	+Vout

## FEATURES :

- 7PIN SIP Package
- High Efficiency up to 82%
- Output Continuous Short Circuit Protection
- Unregulated Output Types
- Internal SMD Construction
- Industry Standard Pinout
- Operating Temperature:-40°C TO +105°C



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

Part Number	Output Voltage	Output Current	Ripple & Noise		Efficiency	Package Style
	Vdc	mA	Typ (mVp-p)	Max (mVp-p)	%TYP	
12DB-05S05N	5	200	60	100	80	1
12DB-05S09N	9	112	60	100	80	1
12DB-05S12N	12	84	60	100	80	1
12DB-05S15N	15	67	60	100	80	1
12DB-12S05N	5	200	60	100	80	1
12DB-12S09N	9	112	60	100	80	1
12DB-12S12N	12	84	60	100	82	1
12DB-12S15N	15	67	60	100	81	1
12DB-15S05N2	5	200	60	100	78	2
12DB-15S09N2	9	112	60	100	79	2
12DB-15S12N2	12	84	60	100	79	2
12DB-15S15N2	15	67	60	100	79	2
12DB-24S05N2	5	200	60	100	77	2
12DB-24S09N2	9	112	60	100	79	2
12DB-24S12N2	12	84	60	100	79	2
12DB-24S15N2	15	67	60	100	79	2
12DB-24S24N2	24	42	60	100	81	2
12DB-05D05N	±5	±100	60	100	80	1
12DB-05D09N	±9	±56	60	100	80	1
12DB-05D12N	±12	±42	60	100	80	1
12DB-05D15N	±15	±34	60	100	80	1
12DB-12D05N	±5	±100	60	100	80	1
12DB-12D09N	±9	±56	60	100	80	1
12DB-12D12N	±12	±42	60	100	82	1
12DB-12D15N	±15	±34	60	100	81	1
12DB-15D05N2	±5	±100	60	100	78	2
12DB-15D09N2	±9	±56	60	100	78	2
12DB-15D12N2	±12	±42	60	100	78	2
12DB-15D15N2	±15	±34	60	100	78	2
12DB-24D05N2	±5	±100	60	100	78	2
12DB-24D09N2	±9	±56	60	100	79	2
12DB-24D12N2	±12	±42	60	100	79	2
12DB-24D15N2	±15	±34	60	100	78	2

## Input Specifications

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	Vo, Io Nom			±10	%
Filter	Capacitor				

## DC-DC Converter

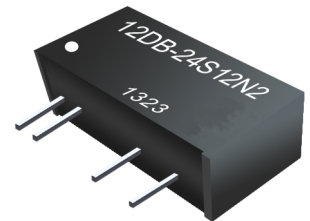
## 12DB SERIES

### 1Watt

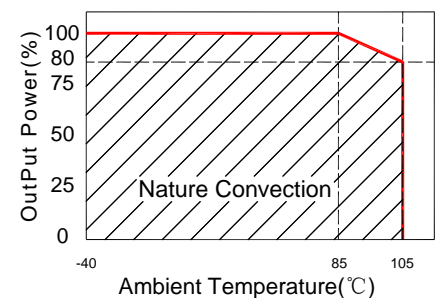
### 3KV Isolated

### Single & Dual Output

### SIP7



## Temperature Derating Graph



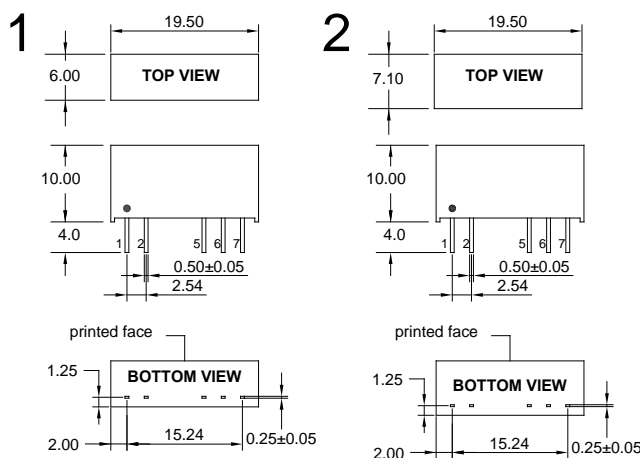
**Output Specifications**

Parameters	Conditions	Min	Typ	Max	Units
<b>Voltage Tolerance</b>	100% full load			±5	%
<b>Short Circuit Protection</b>	Continuous				
<b>Line Regulation</b>	For 1.0% OF Vin		1.2		%
<b>Load Regulation</b>	5V,9V (10% To 100% F.L)			15	%
<b>Load Regulation</b>	12~24V (10% To 100% F.L)			10	%
<b>Load Regulation</b>	±5V,±9V (10% To 100% F.L)			15	%
<b>Load Regulation</b>	±12V~±24V (10% To 100% F.L)			10	%

**General Specifications**

Parameters	Conditions	Min	Typ	Max	Units
<b>Isolation Resistance</b>	500Vdc	1000			MΩ
<b>Switching Frequency</b>	Full load, nominal input		100		KHz
<b>Operating Temperature</b>		-40		+105	°C
<b>Storage Temperature</b>		-55		+125	°C
<b>Humidity</b>	Non Condensing			95	%
<b>Cooling</b>	Free air Convection				
<b>Case material</b>	DAP				
<b>MTBF</b>	MIL-HDBK-217F @25°C	3500000			Hours
<b>Weight</b>	Package1 or Package2		2.1 or 2.7		g
<b>Dimensions</b>	Package1 or Package2	19.5x6.0x10.0 or 19.5x7.1x10.0			mm

**Markings and dimensions**



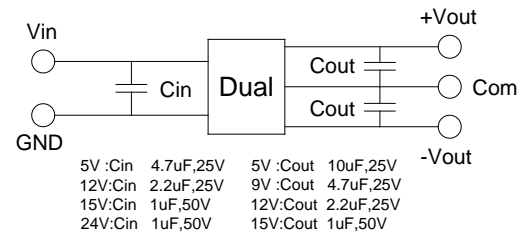
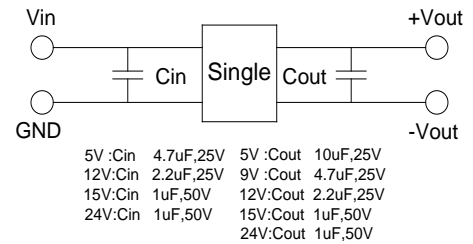
Unit:mm Unless otherwise specified, all tolerances are ±0.25

**Part Number**

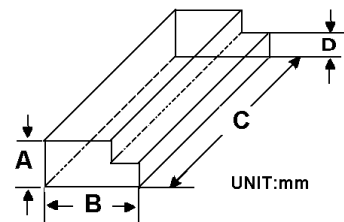
12DB - 05 S 05 N 2  
A B C D E F

A:Series  
B:Input Voltage  
C:Single(S)Dual(D)  
D:Output Voltage  
E:Unregulated(N)  
F:Packge

**Recommended Test Circuit**



**Packaging**



Size (mm)			
A	B	C	D
9.50	16.5	52.2	5.0

**PIN Connection**

PIN	1	2	5	6	7
<b>Single</b>	+Vin	-Vin	-Vout	No Pin	+Vout
<b>Dual</b>	+Vin	-Vin	-Vout	Com	+Vout



**FEATURES :**

- 7PIN SIP Package
- High Efficiency up to 82%
- Output Continuous Short Circuit Protection
- Unregulated Output Types
- Internal SMD Construction
- Industry Standard Pinout
- Operating Temperature:-40°C TO +105°C

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

Part Number	Output Voltage	Output Current	Ripple & Noise		Efficiency
	Vdc	mA	Typ (mVp-p)	Max (mVp-p)	%TYP
12DB-05S05N4KV	5	200	60	100	80
12DB-05S09N4KV	9	112	60	100	80
12DB-05S12N4KV	12	84	60	100	80
12DB-05S15N4KV	15	67	60	100	80
12DB-12S05N4KV	5	200	60	100	80
12DB-12S09N4KV	9	112	60	100	80
12DB-12S12N4KV	12	84	60	100	82
12DB-12S15N4KV	15	67	60	100	81
12DB-15S05N4KV	5	200	60	100	78
12DB-15S09N4KV	9	112	60	100	79
12DB-15S12N4KV	12	84	60	100	79
12DB-15S15N4KV	15	67	60	100	79
12DB-24S05N4KV	5	200	60	100	77
12DB-24S09N4KV	9	112	60	100	79
12DB-24S12N4KV	12	84	60	100	79
12DB-24S15N4KV	15	67	60	100	79
12DB-24S24N4KV	24	42	60	100	81
12DB-05D05N4KV	±5	±100	60	100	80
12DB-05D09N4KV	±9	±56	60	100	80
12DB-05D12N4KV	±12	±42	60	100	80
12DB-05D15N4KV	±15	±34	60	100	80
12DB-12D05N4KV	±5	±100	60	100	80
12DB-12D09N4KV	±9	±56	60	100	80
12DB-12D12N4KV	±12	±42	60	100	82
12DB-12D15N4KV	±15	±34	60	100	81
12DB-15D05N4KV	±5	±100	60	100	78
12DB-15D09N4KV	±9	±56	60	100	78
12DB-15D12N4KV	±12	±42	60	100	78
12DB-15D15N4KV	±15	±34	60	100	78
12DB-24D05N4KV	±5	±100	60	100	78
12DB-24D09N4KV	±9	±56	60	100	79
12DB-24D12N4KV	±12	±42	60	100	79
12DB-24D15N4KV	±15	±34	60	100	78

**Input Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	Vo, Io Nom			±10	%
Filter	Capacitor				



DC-DC Converter

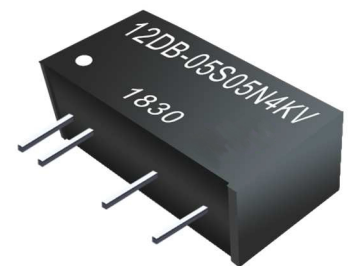
12DB-4KV SERIES

1Watt

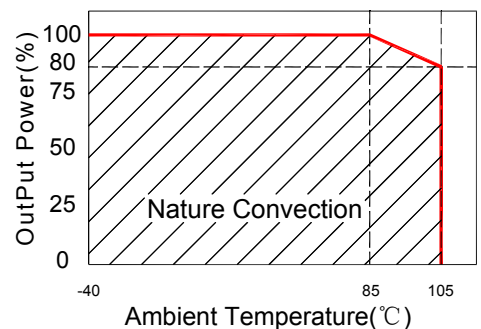
4KV Isolated

Single & Dual Output

SIP7



**Temperature Derating Graph**



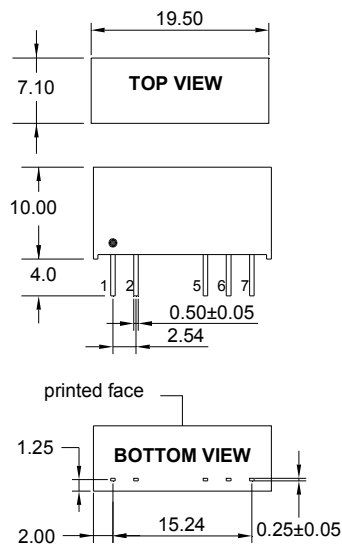
## Output Specifications

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	100% full load			±5	%
Short Circuit Protection	Continuous				
Line Regulation	For 1.0% of Vin		1.2		%
Load Regulation	5V,9V (10% To 100% F.L)			15	%
Load Regulation	12~24V (10% To 100% F.L)			10	%
Load Regulation	±5V,±9V (10% To 100% F.L)			15	%
Load Regulation	±12~±24V (10% To 100% F.L)			10	%

## General Specifications

Parameters	Conditions	Min	Typ	Max	Units
Isolation Resistance	500Vdc	1000			MΩ
Switching Frequency	Full load, nominal input		100		KHz
Operating Temperature		-40		+105	°C
Storage Temperature		-55		+125	°C
Humidity	Non Condensing			95	%
Cooling	Free air Convection				
Case material	DAP				
MTBF	MIL-HDBK-217F@25°C	3500000			Hours
Weight			2.7		g
Dimensions			19.5x7.1x10.0		mm

## Markings and dimensions



UNIT: mm Unless otherwise specified, all tolerances are ±0.25

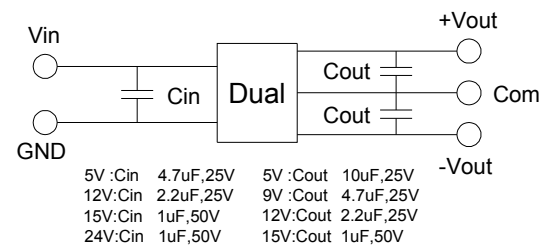
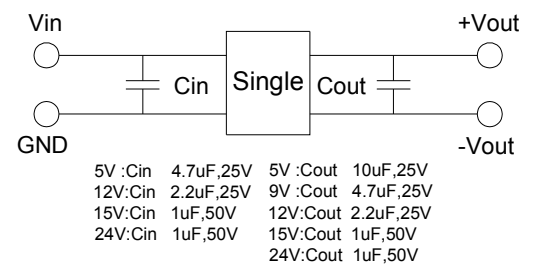
## PIN Connection

Pin	1	2	5	6	7
Single	+Vin	-Vin	-Vout	No Pin	+Vout
Dual	+Vin	-Vin	-Vout	Com	+Vout

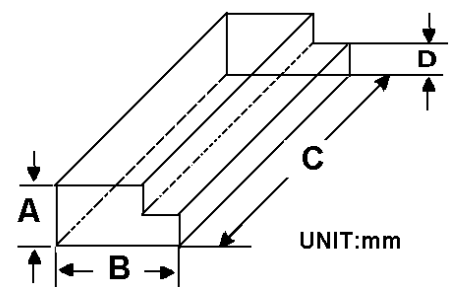
## Part Number

12DB	-	05	S	05	N	4KV
A	B	C	D	E	F	
A	:					Series
B	:					Input Voltage
C	:					Single(S);Dual(D)
D	:					Output Voltage
E	:					Unregulated(N)
F	:					Isolation Voltage

## Recommended Test Circuit



## Packaging



Size(mm)			
A	B	C	D
9.5	16.5	522	5.0

**FEATURES :**

- 2:1Wide Input Voltages Range
- 7PIN SIP Package
- High Efficiency up to 80%
- Regulated Output Types
- Internal SMD Construction
- No External Component Required
- Operating Temperature:-40°C TO +85°C
- Industry Standard Pinout

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

Part Number	Input Voltage	Output Voltage	Output Current	Efficiency
	Vdc	Vdc	mA	%TYP
12DZ-05S05R	4.5-9	5	200	65
12DZ-05S09R	4.5-9	9	112	70
12DZ-05S12R	4.5-9	12	84	70
12DZ-05S15R	4.5-9	15	67	70
12DZ-05S24R	4.5-9	24	42	75
12DZ-12S05R	9-18	5	200	70
12DZ-12S09R	9-18	9	112	72
12DZ-12S12R	9-18	12	84	73
12DZ-12S15R	9-18	15	67	75
12DZ-12S24R	9-18	24	42	80
12DZ-24S05R	18-36	5	200	75
12DZ-24S09R	18-36	9	112	75
12DZ-24S12R	18-36	12	84	78
12DZ-24S15R	18-36	15	67	78
12DZ-24S24R	18-36	24	42	80

**Input Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Types	Vo, Io Nom			2:1	
Filter	Capacitor				



DC-DC Converter

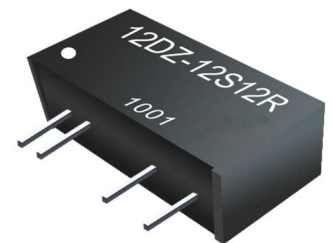
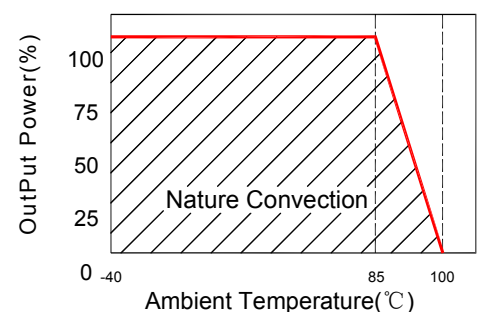
**12DZ SERIES**

1Watt 3KV Isolated

2 : 1 Input Voltage Range

Single Output

SIP7

**Temperature Derating Graph**

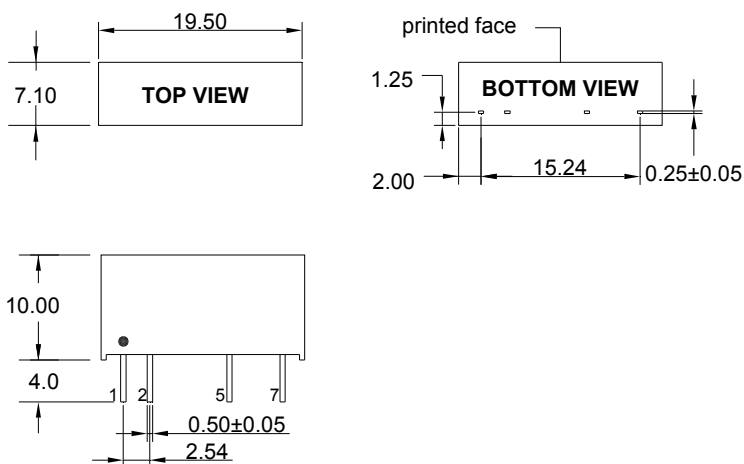
## Output Specifications

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	100% full load			±5	%
Short Circuit Protection	Continuous				
Line Regulation	Regulated			±0.5	%
Load Regulation	Regulated			±1.5	%
Ripple & Noise	Output:5V,9V TYPES BW=DC To 20MHz			100	mVp-p
Ripple & Noise	Output:12-24V TYPES BW=DC To 20MHz		1%	of Vout	mVp-p
Transient response setting time	50% load step change		350		us

## General Specifications

Parameters	Conditions	Min	Typ	Max	Units
Isolation Resistance	500Vdc	1000			MΩ
Switching Frequency	Full load, nominal input		100		KHz
Operating Temperature		-40		+85	°C
Humidity	Non Condensing			95	%
Cooling	Free air Convection				
Case material	DAP				
MTBF	MIL-HDBK-217F @25°C	1500000			Hours
Weight			2.7		g
Dimensions			19.5x7.1x10.0		mm

## Markings and dimensions



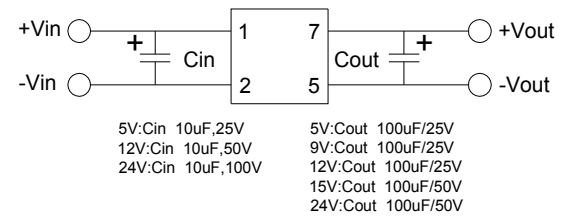
UNIT : mm Unless otherwise specified, all tolerances are ±0.25

## Part Number

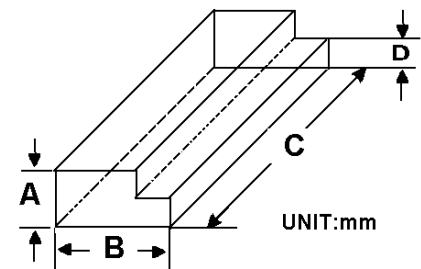
12DZ - 05 S 05 R  
A B C D E

A:Series  
B:Input Voltage  
C:Single Output  
D:Output Voltage  
E:Regulated(R)

## Recommended Test Circuit



## Packaging



Size(mm)			
A	B	C	D
9.5	16.5	52.2	5.0

## PIN Connection

Pin	1	2	5	7
Single	+Vin	-Vin	-Vout	+Vout

**FEATURES :**

- 4 PIN SIP and 8 PIN DIL Package
- High Efficiency up to 85%
- Unregulated Output Types
- Internal SMD Construction
- No External Component Required
- Operating Temperature:-40°C TO +85°C
- Industry Standard Pinout
- Output 3.3/5/9/12/15V Approved By UL60950-1

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

Part Number	Output Voltage	Output Current	Efficiency	Package Style
	Vdc	mA	%TYP	
★13D-XXS03NNL	3.3	303	70	1
★13D-XXS05NNL	5	200	70	1
★13D-XXS09NNL	9	110	75	1
★13D-XXS12NNL	12	84	78	1
★13D-XXS15NNL	15	67	80	1
★13D-XXS24NNL	24	42	82	1
13D-XXS03N2NL	3.3	303	70	2
13D-XXS05N2NL	5	200	70	2
13D-XXS09N2NL	9	110	75	2
13D-XXS12N2NL	12	84	78	2
13D-XXS15N2NL	15	67	80	2
13D-XXS24N2NL	24	42	82	2
13D-XXS03N3NL	3.3	303	70	3
13D-XXS05N3NL	5	200	70	3
13D-XXS09N3NL	9	110	75	3
13D-XXS12N3NL	12	84	78	3
13D-XXS03N4NL	3.3	303	70	4
13D-XXS05N4NL	5	200	70	4
13D-XXS09N4NL	9	110	75	4
13D-XXS12N4NL	12	84	78	4
13D-XXS15N4NL	15	67	80	4
13D-XXS24N4NL	24	42	82	4

**Note:**

- 1."XX" Is Input Voltage:03=3.3Vdc,05=05Vdc,09 =9Vdc,12=12Vdc,15=15Vdc,24=24Vdc
2. The input voltage increases, there will be an increase in efficiency.
- 3." ★" marked as recognized by UL 60950-1.

**Input Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	Vo,Io Nom			±10	%
Filter	Capacitor				



DC-DC Converter

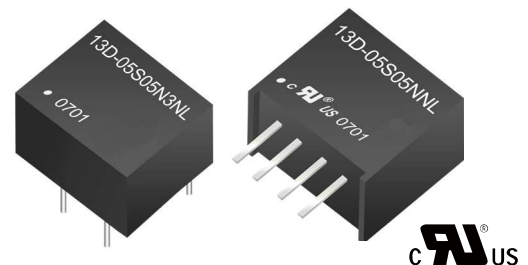
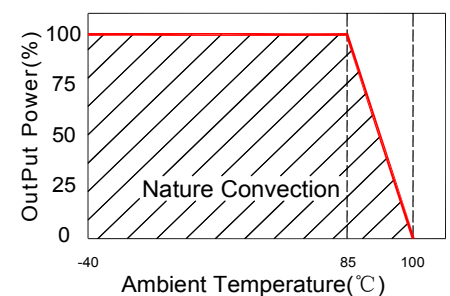
**13D SERIES**

1Watt

1KV Isolated

Single Output

SIP4 & DIL8

**Temperature Derating Graph**

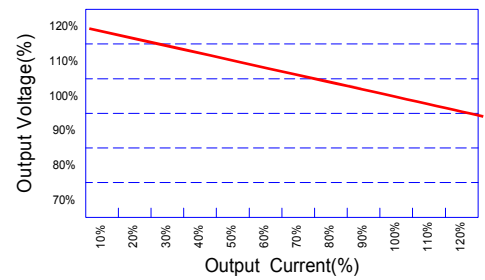
## Output Specifications

Parameters	Conditions	Min	Typ	Max	Units
<b>Voltage Tolerance</b>	100% full load			±5	%
<b>Short Circuit Protection</b>	Short Term			1	Sec
<b>Line Regulation</b>	For 1.0% OF Vin		1.2		%
<b>Load Regulation</b>	3.3V,5V (10% To 100% F.L)			15	%
<b>Load Regulation</b>	9V,12V,15V,24V (10% To 100% F.L)			10	%
<b>Ripple &amp; Noise</b>	BW=DC To 20MHz			100	mVp-p
<b>Transient response setting</b>	50% load step change		350		us

## General Specifications

Parameters	Conditions	Min	Typ	Max	Units
<b>Isolation Resistance</b>	500Vdc	1000			MΩ
<b>Switching Frequency</b>	Full load, nominal input		100		KHz
<b>Operating Temperature</b>		-40		+85	°C
<b>Humidity</b>	Non Condensing			95	%
<b>Cooling</b>	Free air Convection				
<b>Case material</b>	DAP				
<b>MTBF</b>	MIL-HDBK-217F @25°C	3500000			Hours
<b>Weight</b>	Package 1/2/3/4		1.5/1.9/1.5/2.7		g
<b>Dimensions</b>	Package 1		11.50x6.00x10.00		mm
<b>Dimensions</b>	Package 2		11.50x7.50x10.00		mm
<b>Dimensions</b>	Package 3		12.70x10.16x6.80		mm
<b>Dimensions</b>	Package 4		12.70x12.70x9.50		mm

## Tolerance Envelope Graph

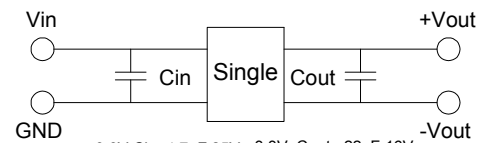


## Part Number

13D - 05 S 05 N 2 NL  
A B C D E F G

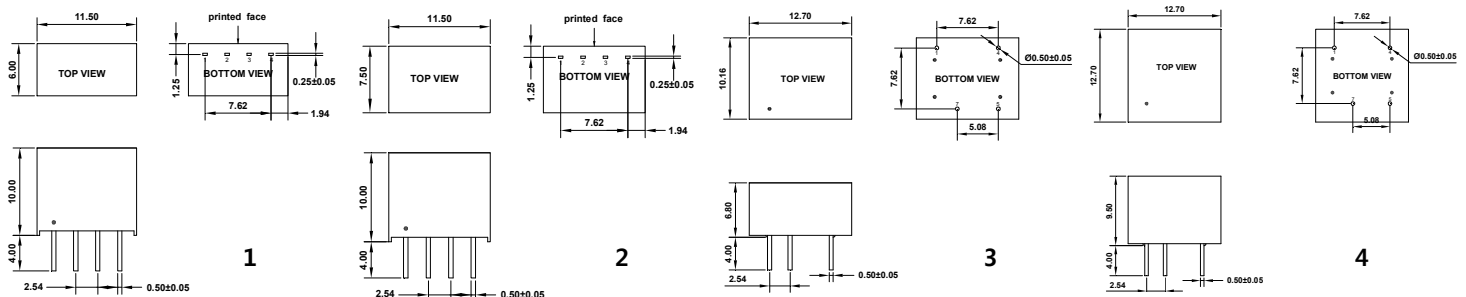
A:Series  
B:Input Voltage  
C:Single Output  
D:Output Voltage  
E:Unregulated(N)  
F:Package  
G:RoHS Version

## Recommended Test Circuit



3.3V:Cin 4.7uF,25V 3.3V:Cout 22uF,16V  
5V:Cin 4.7uF,25V 5V:Cout 10uF,25V  
9V:Cin 4.7uF,25V 9V:Cout 4.7uF,25V  
12V:Cin 2.2uF,25V 12V:Cout 2.2uF,25V  
15V:Cin 1uF,50V 15V:Cout 1uF,50V  
24V:Cin 1uF,50V 24V:Cout 1uF,50V

## Markings and dimensions



Unit:mm Unless otherwise specified, all tolerances are ±0.25

## PIN Connection

PIN	1	2	3	4	5	7
<b>4in</b>	-Vin	+Vin	-Vout	+Vout		
<b>8in</b>	-Vin			+Vin	+Vout	-Vout

**FEATURES :**

- 4 PIN SIP and 8 PIN DIL Package.
- High insulation 3000Vdc.
- High Efficiency up to 85%.
- Unregulated Output Types.
- Internal SMD Construction
- No External Component Required
- Operating Temperature:-40°C TO +85°C
- Industry Standard Pinout

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

Part Number	Output Voltage	Output Current	Efficiency	Package Style
	Vdc	mA	%TYP	"X"
13D1-XXS03NX	3.3	303	70	1/2/3/4
13D1-XXS05NX	5	200	70	1/2/3/4
13D1-XXS09NX	9	112	75	1/2/3/4
13D1-XXS12NX	12	84	78	1/2/3/4
13D1-XXS15NX	15	67	80	2/3/4
13D1-XXS24NX	24	42	82	2/3/4

**Note:**

- 1."XX" Is Input Voltage:03=3.3Vdc,05=05Vdc,09=09Vdc,12=12Vdc,15=15Vdc,24=24Vdc.
2. Vin:15Vdc, Vout:15Vdc, using the 2 package.
3. Vin:24Vdc, Vout:24Vdc, using the 3 package.
4. The input voltage increases, there will be an increase in efficiency.

**Input Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	Vo,Io Nom			±10	%
Filter	Capacitor				

**Output Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	100% full load			±5	%
Short Circuit Protection	Short Term			1	Sec
Line Regulation	For 1.0% OF Vin		1.2		%
Load Regulation	3.3V & 5V (10% To 100% F.L)			15	%
Load Regulation	9V,12V,15V&24V (10% To 100% F.L)			10	%
Ripple & Noise	BW=DC To 20MHz (Package 1)			150	mVp-p
Ripple & Noise	BW=DC To 20MHz (Package 2/3/4)			100	mVp-p
Transient response setting time	50% load step change		350		us



DC-DC Converter

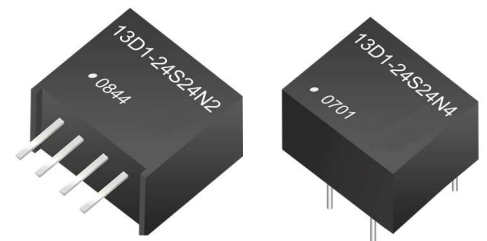
13D1 SERIES

1Watt

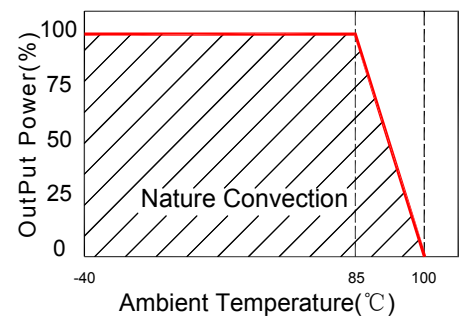
3KV Isolated

Single Output

SIP4 & DIL8



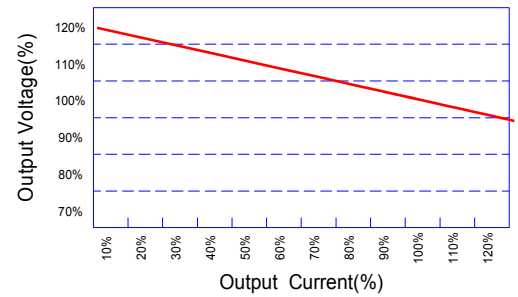
Temperature Derating Graph



General Specifications

Parameters	Conditions	Min	Typ	Max	Units
Isolation Resistance	500Vdc	1000			MΩ
Switching Frequency	Full load, nominal input		100		KHz
Operating Temperature		-40		+85	°C
Humidity	Non Condensing			95	%
Cooling	Free air Convection				
Case material	DAP				
MTBF	MIL-HDBK-217F @25°C	3500000			Hours
Weight	Package 1/2/3/4		1.1/1.5/1.9/1.9		g
Dimensions	Package 1		11.50x6.00x7.5		mm
Dimensions	Package 2		11.50x6.00x10.0		mm
Dimensions	Package 3		11.50x7.50x10.0		mm
Dimensions	Package 4		12.7x10.16x7.50		mm

Tolerance Envelope Graph

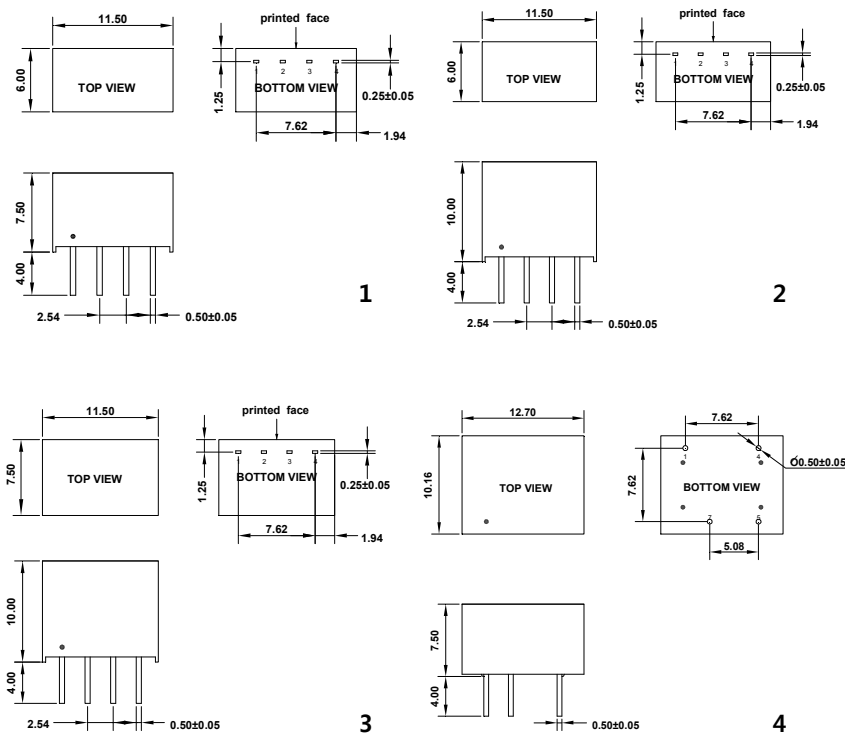


Part Number

13D1 - 03 S 05 N 2  
A B C D E F

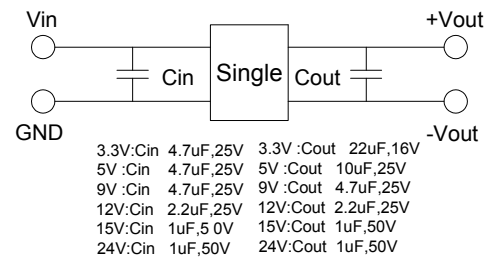
- A:Series
- B:Input Voltage
- C:Single Output
- D:Output Voltage
- E:Unregulated(N)
- F:Package

Markings and Dimensions



Unit:mm Unless otherwise specified, all tolerances are ±0.25

Recommended Test Circuit



PIN Connection

PIN	1	2	3	4	5	7
4in	-Vin	+Vin	-Vout	+Vout		
8in	-Vin			+Vin	+Vout	-Vout



**FEATURES :**

- Small Footprint
- 14PIN SMD Package
- High Efficiency up to 80%
- Unregulated Output Types
- High Power Density
- No External Component Required
- Operating Temperature:-40°C TO +85°C
- Industry Standard Pinout



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

Part Number	Output Voltage	Output Current	Efficiency
	Vdc	mA	%TYP
13DS-XXS03NNL	3.3	303	65
13DS-XXS05NNL	5	200	70
13DS-XXS09NNL	9	110	75
13DS-XXS12NNL	12	84	78
13DS-XXS15NNL	15	67	80

**Note:**

- 1."XX" Is Input Voltage:03=3.3Vdc,05=5Vdc,09=9Vdc,12=12Vdc,15=15Vdc.
2. The input voltage increases, there will be an increase in efficiency.

**Input Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	Vo,Io Nom			±5	%
Filter	Capacitor				

**Output Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	100% full load			±5	%
Short Circuit Protection	Short Term			1	Sec
Line Regulation	For 1.0% OF Vin		1.2		%
Load Regulation	3.3V (10% To 100% F.L)		15		%
Load Regulation	5V,9V (10% To 100% F.L)			15&9.0	%
Load Regulation	12V,15 V (10% To 100% F.L)			7.5&7.0	%
Ripple & Noise	BW=DC To 20MHz			100	mVp-p
Transient response setting time	50% load step change		350		us

DC-DC Converter

**13DS SERIES**

1Watt

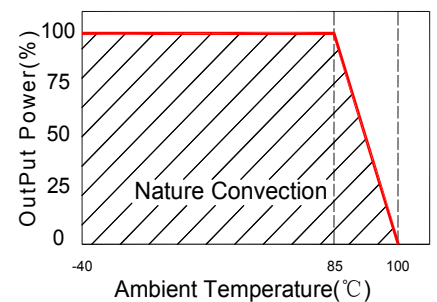
1KV Isolated

Single Output

SMD



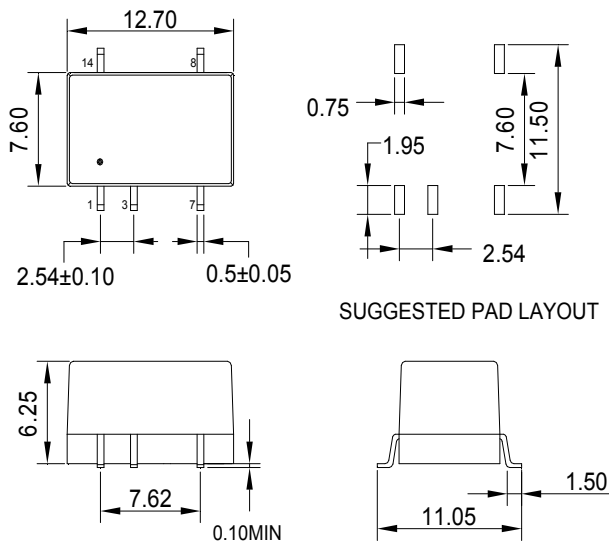
**Temperature Derating Graph**



**General Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Isolation Resistance	500Vdc	1000			MΩ
Switching Frequency	Full load, nominal input		100		KHz
Operating Temperature		-40		+85	°C
Humidity	Non Condensing			95	%
Cooling	Free air Convection				
Case material	DAP				
MTBF	MIL-HDBK-217F @25°C	3500000			Hours
Weight			1.2		g
Dimensions			12.70x7.6x6.25		mm

**Markings and dimensions**



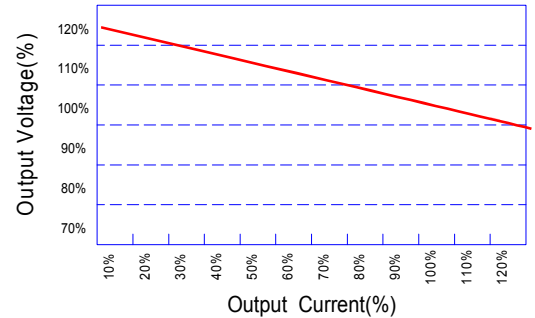
SUGGESTED PAD LAYOUT

Unit:mm Unless otherwise specified, all tolerances are ±0.25

**PIN Connection**

PIN	1	3	7	8	14
Single	-Vin	+Vin	-Vout	+Vout	NC

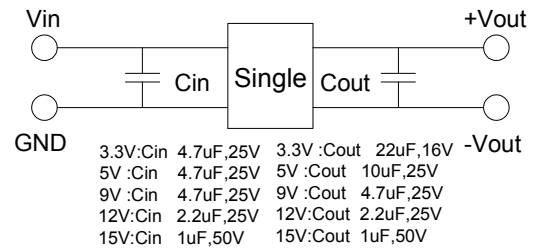
**Tolerance Envelope Graph**



**Part Number**

13DS - 05 S 05 N NL  
 A B C D E F  
 A:Series  
 B:Input Voltage  
 C:Single(S)  
 D:Output Voltage  
 E:Unregulated(N)  
 F:RoHS Version

**Recommended Test Circuit**



**FEATURES :**

- Small Footprint
- 22PIN SMD Package
- High Efficiency up to 80%
- Recognized By UL 60950-1
- Unregulated Output Types
- High Power Density
- Industry Standard Pinout
- Operating Temperature:-40°C TO +85°C
- No External Component Required



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

Part Number	Output Voltage	Output Current	Efficiency	Package Style
	Vdc	mA	%TYP	
13DS1-XXS03NNL	3.3	303	65	1
13DS1-XXS05NNL	5	200	70	1
13DS1-XXS09NNL	9	112	75	1
13DS1-XXS12N2NL	12	84	78	2
13DS1-XXS15N2NL	15	67	80	2
13DS1-XXD03NNL	±3.3	±150	65	1
13DS1-XXD05NNL	±5	±100	70	1
13DS1-XXD09NNL	±9	±56	75	1
13DS1-XXD12N2NL	±12	±42	78	2
13DS1-XXD15N2NL	±15	±34	80	2

**Note:**

- 1."XX" Is Input Voltage:03=3.3Vdc,05=5Vdc, 09=9Vdc,12=12Vdc,15=15Vdc.
- 2.Over 12Vdc,15Vdc input voltage, using the 2nd package.
- 3.The input voltage increases, there will be an increase in efficiency.

**Input Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	Vo,Io Nom			±10	%
Filter	Capacitor				

**Output Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	100% full load			±5	%
Short Circuit Protection	Short Term			1	Sec
Line Regulation	For 1.0% OF Vin		1.2		%
Load Regulation	3.3V (10% To 100% F.L)		15		%
Load Regulation	5V,9V (10% To 100% F.L)			12&8.0	%
Load Regulation	12V,15V (10% To 100% F.L)			8.5&7.0	%
Ripple & Noise	BW=DC To 20MHz			75	mVp-p
Transient response setting time	50% load step change		350		us

**DC-DC Converter**

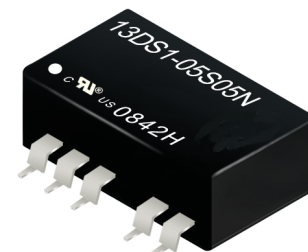
**13DS1 SERIES**

**1Watt**

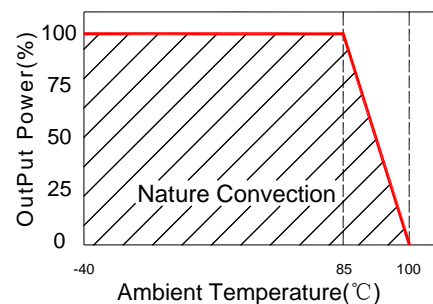
**3KV Isolated**

**Single & Dual Output**

**SMD**



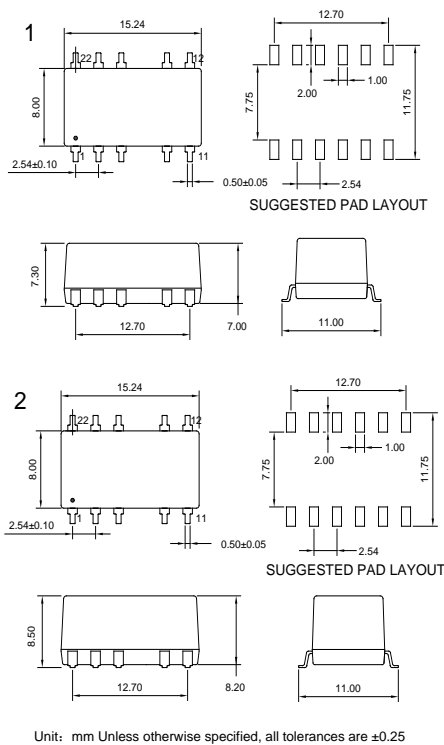
**Temperature Derating Graph**



General Specifications

Parameters	Conditions	Min	Typ	Max	Units
Isolation Resistance	500Vdc	1000			MΩ
Switching Frequency	Full load, nominal input		100		KHz
Operating Temperature		-40		+85	°C
Humidity	Non Condensing			95	%
Cooling	Free air Convection				
Case material	DAP				
MTBF	MIL-HDBK-217F @25°C	3500000			Hours
Weight	Package1 or Package2		1.8		g
Dimensions	Package 1		15.24x8.0x7.30		mm
Dimensions	Package 2		15.24x8.0x8.50		mm

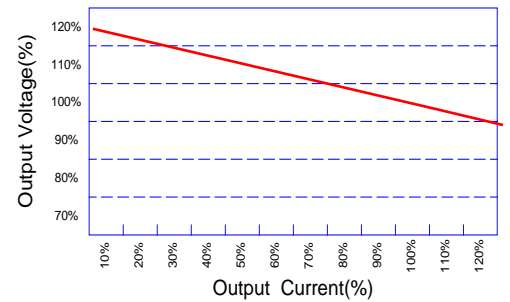
Markings and dimensions



PIN Connection

PIN	1	3	5	9	11	12	14	18	20	22
Single	-Vin	+Vin	NC	-Vout	NC	NC	+Vout	NC	NC	NC
Dual	-Vin	+Vin	NC	Com	-Vout	NC	+Vout	NC	NC	NC

Tolerance Envelope Graph

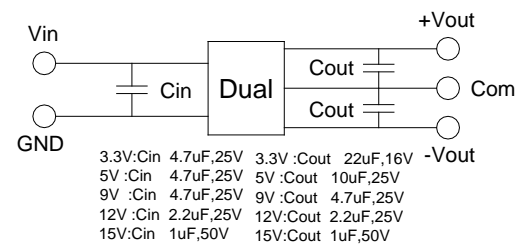
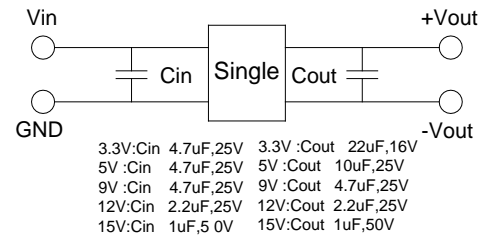


Part Number

13DS1 - 05 S 12 N 2 NL  
 A B C D E F G

A:Series  
 B:Input Voltage  
 C:Single(S)Dual(D)  
 D:Output Voltage  
 E:Unregulated(N)  
 F:Package  
 G:RoHS Version

Recommended Test Circuit



**FEATURES :**

- Small Footprint
- 18PIN SMD Package
- High Efficiency up to 80%
- Unregulated Output Types
- High Power Density
- No External Component Required
- Operating Temperature:-40°C TO +85°C
- Industry Standard Pinout



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

Part Number	Output Voltage	Output Current	Efficiency	Package Style
	Vdc	mA	%TYP	
13DS2-XXS03NNL	3.3	303	65	1
13DS2-XXS05NNL	5	200	70	1
13DS2-XXS09NNL	9	112	75	1
13DS2-XXS12N2NL	12	84	78	2
13DS2-XXS15N2NL	15	67	80	2
13DS2-XXD03NNL	±3.3	±150	65	1
13DS2-XXD05NNL	±5	±100	70	1
13DS2-XXD09NNL	±9	±56	75	1
13DS2-XXD12N2NL	±12	±42	78	2
13DS2-XXD15N2NL	±15	±34	80	2

**Note:**

- 1."XX" Is Input Voltage:03=3.3Vdc,05=5Vdc, 09=9Vdc,12=12Vdc, 15=15Vdc.
2. Over 12Vdc,15Vdc input voltage, using the 2nd package.
- 3.The input voltage increases, there will be an increase in efficiency.

**Input Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	Vo,Io Nom			±10	%
Filter	Capacitor				

**Output Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	100% full load			±5	%
Short Circuit Protection	Short Term			1	Sec
Line Regulation	For 1.0% OF Vin		1.2		%
Load Regulation	3.3V (10% To 100% F.L)		15		%
Load Regulation	5V, 9V (10% To 100% F.L)			12&8.0	%
Load Regulation	12V ,15V (10% To 100% F.L.)			8.5&7.0	%
Ripple & Noise	BW=DC To 20MHz			100	mVp-p
Transient response setting time	50% load step change		350		us

**DC-DC Converter**

**13DS2 SERIES**

**1Watt**

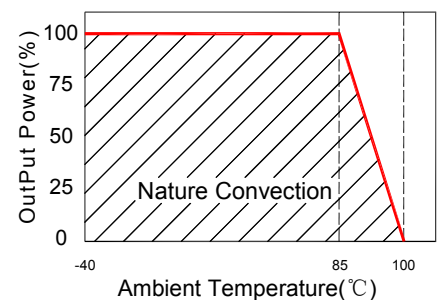
**1KV Isolated**

**Single & Dual Output**

**SMD**



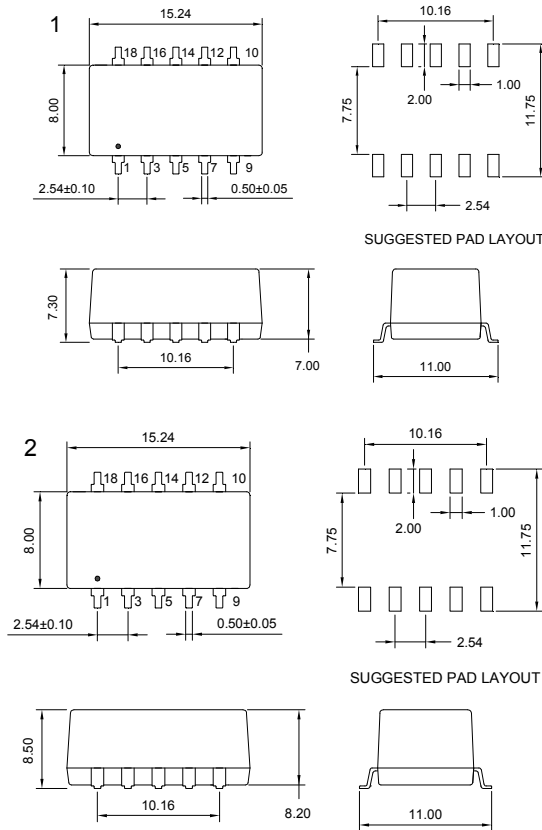
**Temperature Derating Graph**



General Specifications

Parameters	Conditions	Min	Typ	Max	Units
Isolation Resistance	500Vdc	1000			MΩ
Switching Frequency	Full load, nominal input		100		KHz
Operating Temperature		-40		+85	°C
Humidity	Non Condensing			95	%
Cooling	Free air Convection				
Case material	DAP				
MTBF	MIL-HDBK-217F @25°C	3500000			Hours
Weight	Package1 or Package2		1.36/1.5		g
Dimensions	Package 1	15.24x8.0x7.30			mm
Dimensions	Package 2	15.24x8.0x8.50			mm

Markings and dimensions

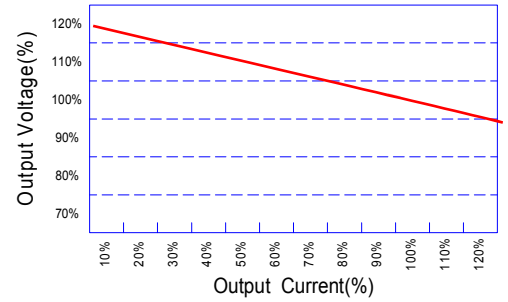


Unit : mm Unless otherwise specified, all tolerances are ±0.25

PIN Connection

PIN	1	3	5	7	9	10	12	14	16	18
Single	-Vin	+Vin	NC	-Vout	-Vout	NC	+Vout	NC	NC	NC
Dual	-Vin	+Vin	NC	Com	-Vout	NC	+Vout	NC	NC	NC

Tolerance Envelope Graph

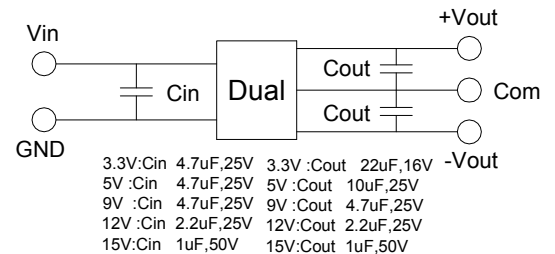
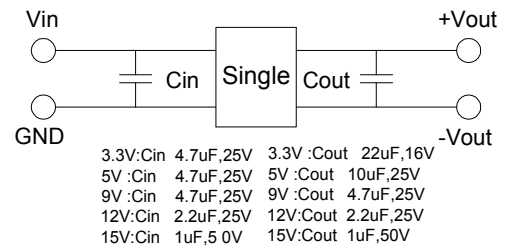


Part Number

13DS2 - 05 S 12 N 2 NL  
A B C D E F G

- A:Series
- B:Input Voltage
- C:Single(S)Dual(D)
- D:Output Voltage
- E:Unregulated(N)
- F:Package
- G:RoHS Version

Recommended Test Circuit



**FEATURES :**

- Small Footprint
- 18PIN SMD Package
- High Efficiency up to 75%
- Unregulated Output Types
- High Power Density
- Industry Standard Pinout
- Operating Temperature:-40°C TO +85°C
- No External Component Required



**DC-DC Converter**

**13DS2-N33KV SERIES**

**1Watt**

**3KV Isolated**

**Single & Dual Output**

**SMD**

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

Part Number	Output Voltage	Output Current	Efficiency
	Vdc	mA	%TYP
13DS2-XXS03N33KV	3.3	303	65
13DS2-XXS05N33KV	5	200	70
13DS2-XXS09N33KV	9	111	75
13DS2-XXD03N33KV	±3.3	±151	65
13DS2-XXD05N33KV	±5	±100	70
13DS2-XXD09N33KV	±9	±56	75

**Note:**

- 1."XX" Is Input Voltage:03=3.3,05=5Vdc,09=9Vdc
- 2.The input voltage increases, there will be an increase in efficiency.

**Input Specifications**

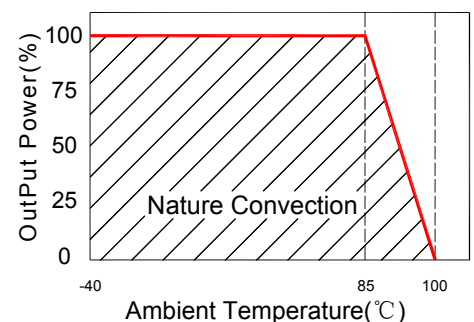
Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	Vo,Io Nom			±10	%
Filter	Capacitor				

**Output Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	100% full load			±5	%
Short Circuit Protection	Short Term			1	Sec
Line Regulation	For 1.0% OF Vin		1.2		%
Load Regulation	10% To 100% F.L			15	%
Ripple & Noise	BW=DC To 20MHz			75	mVp-p
Transient response setting time	50% load step change		350		us



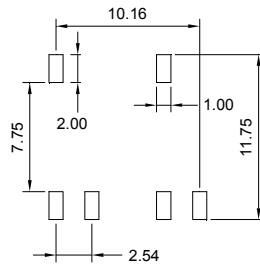
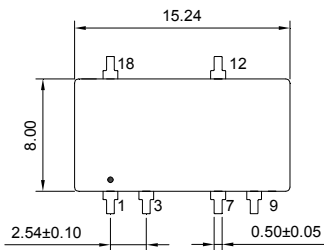
**Temperature Derating Graph**



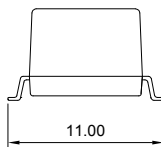
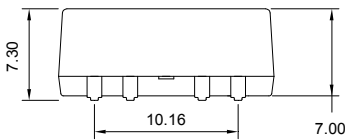
**General Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Isolation Resistance	500Vdc	1000			MΩ
Switching Frequency	Full load, nominal input		100		KHz
Operating Temperature		-40		+85	°C
Humidity	Non Condensing			95	%
Cooling	Free air Convection				
Case material	DAP				
MTBF	MIL-HDBK-217F @25°C	3500000			Hours
Weight			1.36		g
Dimensions		15.24x8.0x7.3			mm

**Markings and dimensions**



SUGGESTED PAD LAYOUT

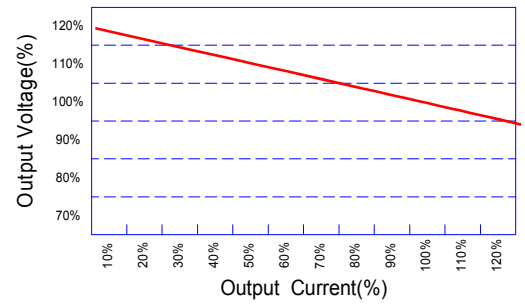


Unit : mm Unless otherwise specified, all tolerances are ±0.25

**PIN Connection**

PIN	1	3	7	9	12	18
Single	-Vin	+Vin	-Vout	-Vout	+Vout	NC
Dual	-Vin	+Vin	Com	-Vout	+Vout	NC

**Tolerance Envelope Graph**

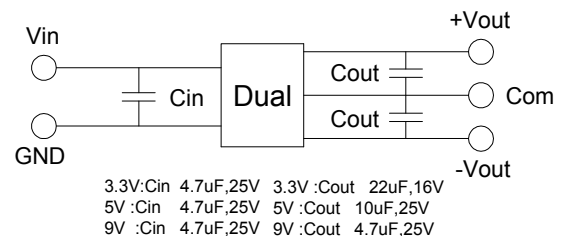
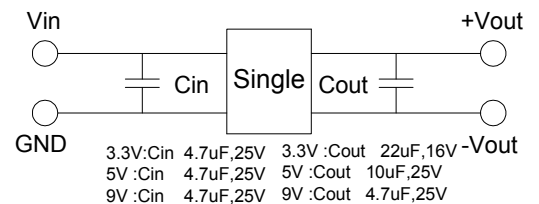


**Part Number**

13DS2 - 05 S 05 N 3 3KV  
A B C D E F G

- A:Series
- B:Input Voltage
- C:Single Output
- D:Output Voltage
- E:Unregulated(N)
- F:Package
- G:Isolation Voltage

**Recommended Test Circuit**





**FEATURES :**

- Small Footprint
- 14PIN SMD Package
- High Efficiency up to 80%
- Unregulated Output Types
- High Power Density
- No External Component Required
- Operating Temperature:-40°C TO +85°C
- Industry Standard Pinout



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

Part Number	Output Voltage	Output Current	Efficiency
	Vdc	mA	%TYP
13DS3-XXS03NNL	3.3	303	65
13DS3-XXS05NNL	5	200	70
13DS3-XXS09NNL	9	111	75
13DS3-XXS12NNL	12	84	78
13DS3-XXS15NNL	15	67	80

**Note:**

- 1."XX" Is Input Voltage: 03=3.3Vdc,05=5Vdc,09=9Vdc,12=12Vdc,15=15Vdc.
2. The input voltage increases, there will be an increase in efficiency.

**Input Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	Vo,Io Nom			±10	%
Filter	Capacitor				

**Output Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	100% full load			±5	%
Short Circuit Protection	Short Term			1	Sec
Line Regulation	For 1.0% OF Vin		1.2		%
Load Regulation	3.3V (10% To 100% F.L)		15		%
Load Regulation	5V,9V (10% To 100% F.L)			15&9.0	%
Load Regulation	12V,15V (10% To 100% F.L)			7.5&7.0	%
Ripple & Noise	BW=DC To 20MHz			100	mVp-p
Transient response setting time	50% load step change		350		us

DC-DC Converter

**13DS3 SERIES**

1Watt

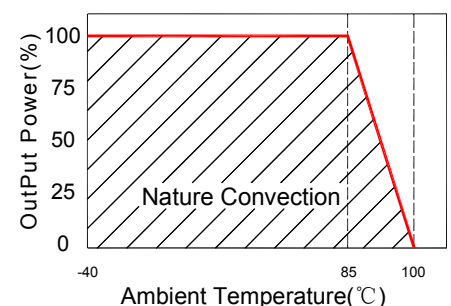
1KV Isolated

Single Output

SMD



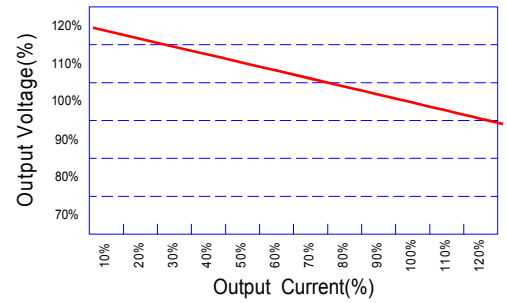
**Temperature Derating Graph**



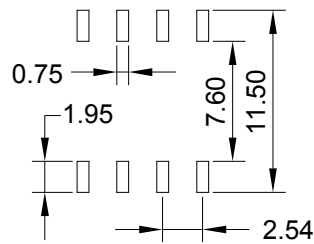
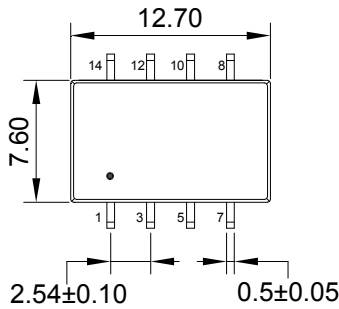
**General Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Isolation Resistance	500Vdc	1000			MΩ
Switching Frequency	Full load, nominal input		100		KHz
Operating Temperature		-40		+85	°C
Humidity	Non Condensing			95	%
Cooling	Free air Convection				
Case material	DAP				
MTBF	MIL-HDBK-217F @25°C	3500000			Hours
Weight			1.2		g
Dimensions		12.7x7.6x6.25			mm

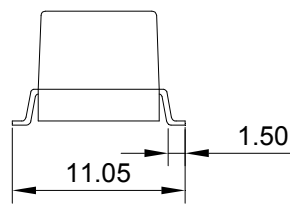
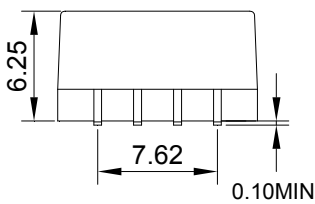
**Tolerance Envelope Graph**



**Markings and dimensions**



SUGGESTED PAD LAYOUT



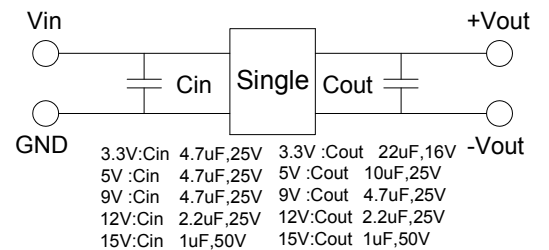
Unit : mm Unless otherwise specified, all tolerances are ±0.25

**Part Number**

13DS3 - 05 S 05 N NL  
A B C D E F

- A:Series
- B:Input Voltage
- C:Single(S)
- D:Output Voltage
- E:Unregulated(N)
- F:RoHS Version

**Recommended Test Circuit**



**PIN Connection**

PIN	1	3	7	8	Other
Single	-Vin	+Vin	-Vout	+Vout	NC

**FEATURES :**

- Small Footprint
- 22PIN SMD Package
- High Efficiency up to 80%
- Unregulated Output Types
- High Power Density
- No External Component Required
- Operating Temperature:-40°C TO +85°C
- Industry Standard Pinout



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

Part Number	Output Voltage	Output Current	Efficiency	Package Style
	Vdc	mA	%TYP	
13DS4-XXS03NNL	3.3	303	65	1
13DS4-XXS05NNL	5	200	70	1
13DS4-XXS09NNL	9	112	75	1
13DS4-XXS12N2NL	12	84	78	2
13DS4-XXS15N2NL	15	67	80	2
13DS4-XXD03NNL	±3.3	±150	65	1
13DS4-XXD05NNL	±5	±100	70	1
13DS4-XXD09NNL	±9	±56	75	1
13DS4-XXD12N2NL	±12	±42	78	2
13DS4-XXD15N2NL	±15	±34	80	2

**Note:**

- 1."XX" Is Input Voltage:03=3.3Vdc,05=5Vdc, 09=9Vdc,12=12Vdc, 15=15Vdc.
2. Over 12Vdc,15Vdc input voltage, using the 2nd package.
- 3.The input voltage increases, there will be an increase in efficiency.

**Input Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	Vo,Io Nom			±10	%
Filter	Capacitor				

**Output Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	100% full load			±5	%
Short Circuit Protection	Short Term			1	Sec
Line Regulation	For 1.0% OF Vin		1.2		%
Load Regulation	3.3V (10% To 100% F.L)		15		%
Load Regulation	5V,9V (10% To 100% F.L)			12&8.0	%
Load Regulation	12V,15V (10% To 100% F.L)			8.5&7.0	%
Ripple & Noise	BW=DC To 20MHz			75	mVp-p
Transient response setting time	50% load step change		350		us

DC-DC Converter

13DS4 SERIES

1Watt

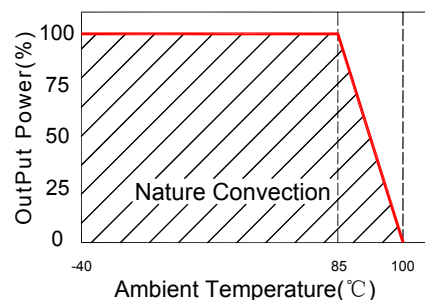
1KV Isolated

Single & Dual Output

SMD



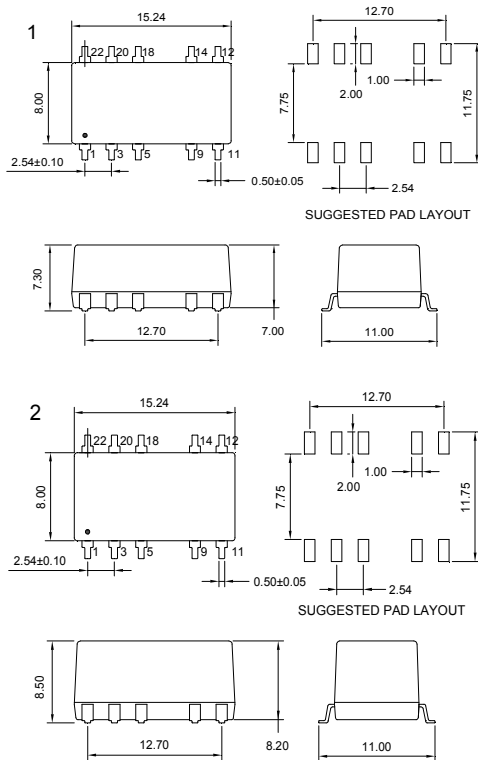
Temperature Derating Graph



General Specifications

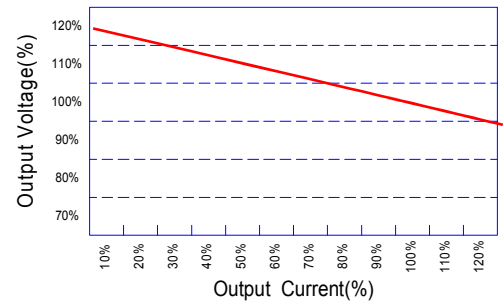
Parameters	Conditions	Min	Typ	Max	Units
Isolation Resistance	500Vdc	1000			MΩ
Switching Frequency	Full load, nominal input		100		KHz
Operating Temperature		-40		+85	°C
Humidity	Non Condensing			95	%
Cooling	Free air Convection				
Case material	DAP				
MTBF	MIL-HDBK-217F @25°C	3500000			Hours
Weight	Package1 or Package2		1.36/1.5		g
Dimensions	Package 1		15.24x8.0x7.30		mm
Dimensions	Package 2		15.24x8.0x8.50		mm

Markings and dimensions



Unit : mm Unless otherwise specified, all tolerances are ±0.25

Tolerance Envelope Graph

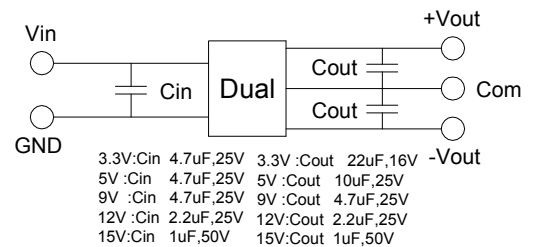
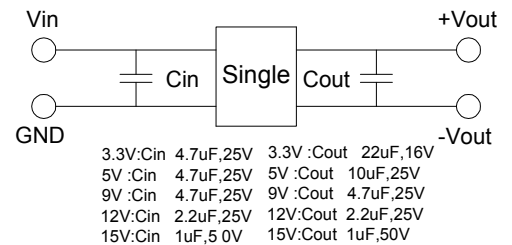


Part Number

13DS4 - 05 S 12 N 2 NL  
A B C D E F G

- A:Series
- B:Input Voltage
- C:Single(S)Dual(D)
- D:Output Voltage
- E:Unregulated(N)
- F:Packge
- G:RoHS Version

Recommended Test Circuit



PIN Connection

PIN	1	3	5	9	11	12	14	18	20	22
Single	-Vin	+Vin	NC	-Vout	NC	NC	+Vout	NC	NC	NC
Dual	-Vin	+Vin	NC	Com	-Vout	NC	+Vout	NC	NC	NC

**FEATURES :**

- 7PIN SIP Package
- High Efficiency up to 85%
- Unregulated Output Types
- Internal SMD Construction
- 1KVDC & 1.5KVDC Isolation
- No External Component Required
- Industry Standard Pinout
- Operating Temperature:-40°C TO +85°C



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

Part Number	Output Voltage	Output Current	Efficiency	Package Style
	Vdc	mA	%TYP	
14D-XXS03N (NL/1.5KV)	3.3	303	70	1
14D-XXS05N (NL/1.5KV)	5	200	70	1
14D-XXS09N (NL/1.5KV)	9	112	75	1
14D-XXS12N (NL/1.5KV)	12	84	78	1
14D-XXS15N (NL/1.5KV)	15	67	80	1
14D-XXS24N (NL/1.5KV)	24	42	82	1
14D-XXD03N (NL/1.5KV)	±3.3	±150	70	1
14D-XXD05N (NL/1.5KV)	±5	±100	70	1
14D-XXD09N (NL/1.5KV)	±9	±56	75	1
14D-XXD12N (NL/1.5KV)	±12	±42	78	1
14D-XXD15N (NL/1.5KV)	±15	±34	80	1
14D-XXD24N (NL/1.5KV)	±24	±21	82	1
14D-XXS05N2 (NL/1.5KV)	5	200	70	2
14D-XXS09N2 (NL/1.5KV)	9	112	75	2
14D-XXS12N2 (NL/1.5KV)	12	84	78	2
14D-XXS15N2 (NL/1.5KV)	15	67	80	2
14D-XXS24N2 (NL/1.5KV)	24	42	82	2
14D-XXD05N2 (NL/1.5KV)	±5	±100	70	2
14D-XXD09N2 (NL/1.5KV)	±9	±56	75	2
14D-XXD12N2 (NL/1.5KV)	±12	±42	78	2
14D-XXD15N2 (NL/1.5KV)	±15	±34	80	2
14D-XXD24N2 (NL/1.5KV)	±24	±21	82	2

**Note:**

- 1."XX" Is Input Voltage:03 = 3.3Vdc,05=5Vdc,09=9Vdc,12=12Vdc,15=15Vdc,24=24Vdc,48=48Vdc.
2. Over 48Vdc input voltage, using the 2nd package.
3. The input voltage increases, there will be an increase in efficiency.
4. No suffix is standard isolation (1KVDC) e.g. 14D-05S05N,14D-05S05N2NL  
\*add suffix /1.5KV for 1.5KVDC isolation, e.g. 14D-05S05N1.5KV,14D-05S05N21.5KV

**Input Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	Vo,Io Nom			±10	%
Filter	Capacitor				

DC-DC Converter

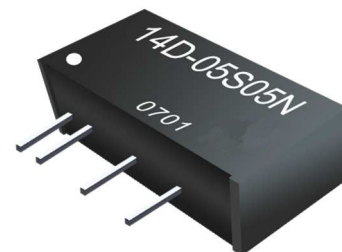
14D SERIES

1Watt

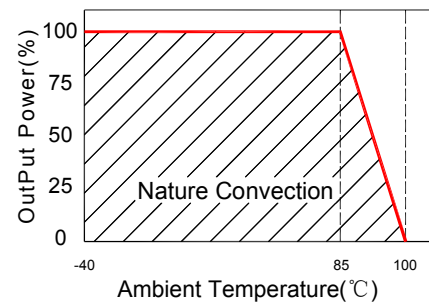
1KV & 1.5KV Isolated

Single & Dual Output

SIP7



**Temperature Derating Graph**



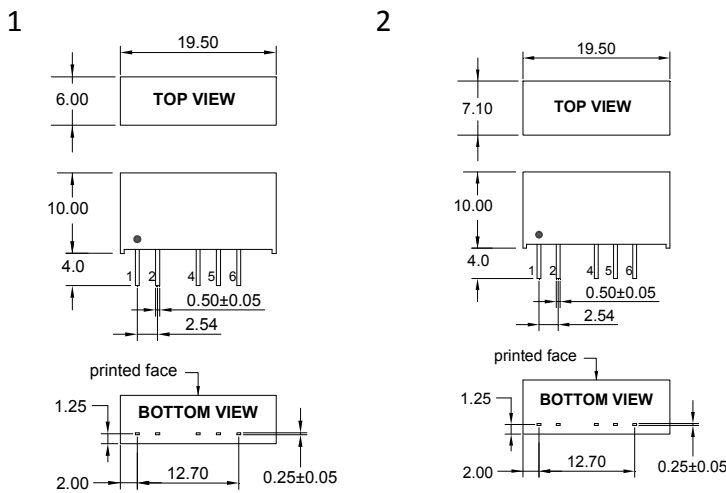
**Output Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	100% full load			±5	%
Short Circuit Protection	Short Term			1	Sec
Line Regulation	For 1.0% OF Vin		1.2		%
Load Regulation	3.3V,5V (10% To 100% F.L)			15	%
Load Regulation	9V,12V,15V,24V (10% To 100% F.L)			10	%
Ripple & Noise	BW=DC To 20MHz			100	mVp-p
Transient response setting time	50% load step change		350		us

**General Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Isolation Resistance	500Vdc	1000			MΩ
Switching Frequency	Full load, nominal input		100		KHz
Operating Temperature		-40		+85	°C
Humidity	Non Condensing			95	%
Cooling	Free air Convection				
Case material	DAP				
MTBF	MIL-HDBK-217F @25°C	3500000			Hours
Weight	Package1 or Package2		2.1 or 2.7		g
Dimensions	Package 1		19.5x6.0x10.0		mm
Dimensions	Package 2		19.5x7.1x10.0		mm

**Markings and dimensions**

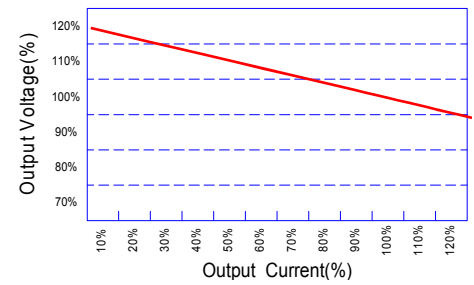


Unit : mm Unless otherwise specified, all tolerances are ±0.25

**PIN Connection**

PIN	1	2	4	5	6
Single	+Vin	-Vin	-Vout	NO PIN	+Vout
Dual	+Vin	-Vin	-Vout	Common	+Vout

**Tolerance Envelope Graph**



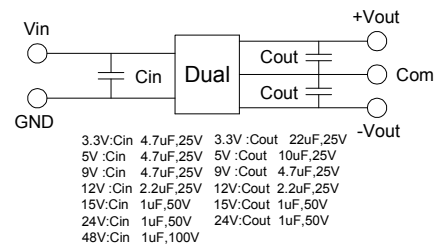
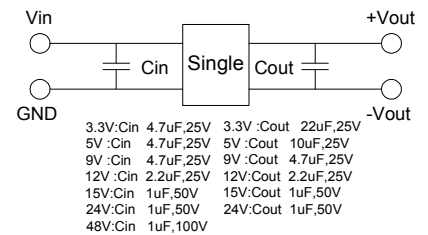
**Part Number**

14D - 05 S 05 N 2 NL     14D - 24 S 24 N 2 1.5KV  
 A B C D E F G            A B C D E F G

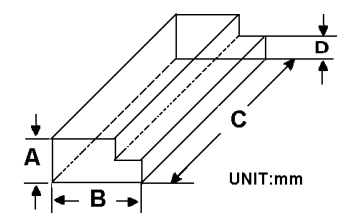
A:Series  
 B:Input Voltage  
 C:Single(S)Dual(D)  
 D:Output Voltage  
 E:Unregulated(N)  
 F:Package  
 G:RoHS Version

A:Series  
 B:Input Voltage  
 C:Single(S) Dual(D)  
 D:Output Voltage  
 E:Unregulated(N)  
 F:Package  
 G:Isolation Voltage

**Recommended Test Circuit**



**Packaging**



Size(mm)			
A	B	C	D
9.50	16.50	522	5.00

## FEATURES :

- 7PIN SIP Package
- High Efficiency up to 88%
- Unregulated Output Types
- Internal SMD Construction
- Industry Standard Pinout
- Operating Temperature:-40°C TO +85°C



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

Part Number	Output Voltage	Output Current	Ripple & Noise		Efficiency	Package Style
	Vdc	mA	Typ (mVp-p)	Max (mVp-p)	%Typ	
14DA-05S05N	5	200	25	50	82	1
14DA-05S09N	9	112	25	50	82	1
14DA-05S12N	12	84	25	50	82	1
14DA-05S15N	15	67	25	50	84	1
14DA-12S05N	5	200	25	50	82	1
14DA-12S09N	9	112	25	50	84	1
14DA-12S12N	12	84	25	50	86	1
14DA-12S15N	15	67	25	50	87	1
14DA-15S05N	5	200	25	50	83	1
14DA-15S09N	9	112	25	50	86	1
14DA-15S12N	12	84	25	50	87	1
14DA-15S15N	15	67	25	50	87	1
14DA-24S05N	5	200	25	50	84	1
14DA-24S09N	9	112	25	50	85	1
14DA-24S12N	12	84	25	50	86	1
14DA-24S15N	15	67	25	50	86	1
14DA-48S05N2	5	200	-	100	78	2
14DA-48S09N2	9	112	-	100	81	2
14DA-48S12N2	12	84	-	100	81	2
14DA-48S15N2	15	67	-	100	82	2
14DA-05D05N	±5	±100	30	60	84	1
14DA-05D09N	±9	±56	30	60	86	1
14DA-05D12N	±12	±42	30	60	86	1
14DA-05D15N	±15	±34	30	60	86	1
14DA-12D05N	±5	±100	30	60	85	1
14DA-12D09N	±9	±56	30	60	87	1
14DA-12D12N	±12	±42	30	60	88	1
14DA-12D15N	±15	±34	30	60	87	1
14DA-15D05N	±5	±100	30	60	83	1
14DA-15D09N	±9	±56	30	60	86	1
14DA-15D12N	±12	±42	30	60	87	1
14DA-15D15N	±15	±34	30	60	87	1
14DA-24D05N	±5	±100	30	60	84	1
14DA-24D09N	±9	±56	30	60	85	1
14DA-24D12N	±12	±42	30	60	86	1
14DA-24D15N	±15	±34	30	60	86	1
14DA-48D05N2	±5	±100	-	100	79	2
14DA-48D09N2	±9	±56	-	100	81	2
14DA-48D12N2	±12	±42	-	100	81	2
14DA-48D15N2	±15	±34	-	100	82	2

## DC-DC Converter

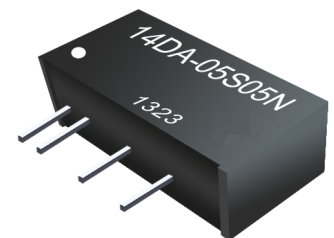
## 14DA SERIES

### 1Watt

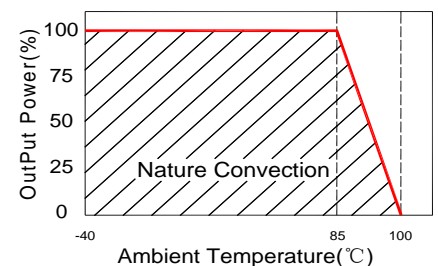
### 1KV Isolated

### Single & Dual Output

### SIP7



## Temperature Derating Graph



**Input Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	Vo,Io Nom			±10	%
Filter	Capacitor				

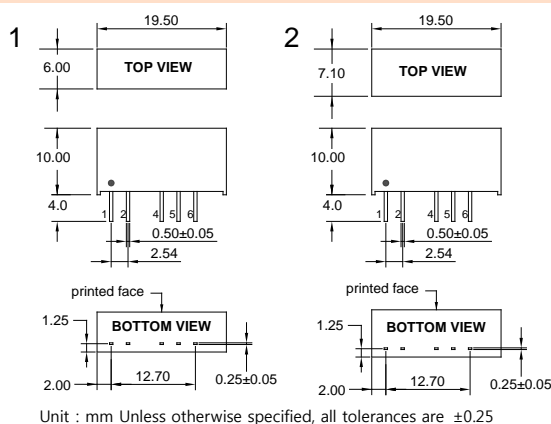
**Output Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	100% full load			±5	%
Short Circuit Protection	Short Term			1	Sec
Line Regulation	For 1.0% OF Vin		1.2		%
Load Regulation	5V,9V (10% To 100% F.L)			7	%
Load Regulation	12V,15V (10% To 100% F.L)			5	%
Load Regulation	±5V,±9V (10% To 100% F.L)			7	%
Load Regulation	±12V,±15V (10% To 100% F.L)			5	%

**General Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Isolation Resistance	500Vdc	1000			MΩ
Switching Frequency	Full load, nominal input		100		KHz
Operating Temperature		-40		+85	°C
Humidity	Non Condensing			95	%
Cooling	Free air Convection				
Case material	DAP				
MTBF	MIL-HDBK-217F @25°C	3500000			Hours
Weight	Package1 or Package2		2.1 or 2.7		g
Dimensions	Package1 or Package2		19.5x6.0x10.0 or 19.5x7.1x10.0		mm

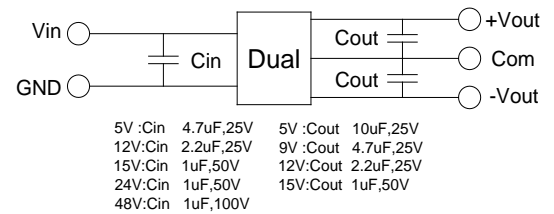
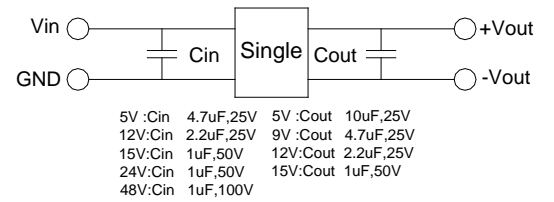
**Markings and dimensions**



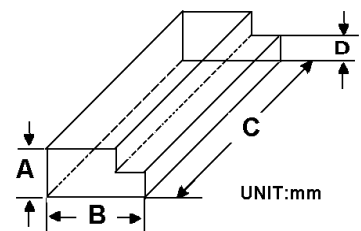
**Part Number**

14DA - 05 S 05 N  
 A B C D E  
 A:Series  
 B:Input Voltage  
 C:Single(S)Dual(D)  
 D:Output Voltage  
 E:Unregulated(N)

**Recommended Test Circuit**



**Packaging**



Size(mm)			
A	B	C	D
9.50	16.50	522	5.00

**PIN Connection**

PIN	1	2	4	5	6
Single	+Vin	-Vin	-Vout	No Pin	+Vout
Dual	+Vin	-Vin	-Vout	Com	+Vout



**FEATURES :**

- 7PIN SIP Package
- High Efficiency up to 82%
- Output Continuous Short Circuit Protection
- Unregulated Output Types
- Internal SMD Construction
- 1KVDC & 1.5KVDC Isolation
- Industry Standard Pinout
- Operating Temperature:-40°C TO +105°C



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

Part Number	Output Voltage	Output Current	Ripple & Noise		Efficiency	Package Style
	Vdc	mA	Typ (mVp-p)	Max (mVp-p)	%Typ	
14DB-05S05N (1.5KV)	5	200	60	100	80	1
14DB-05S09N (1.5KV)	9	112	60	100	80	1
14DB-05S12N (1.5KV)	12	84	60	100	80	1
14DB-05S15N (1.5KV)	15	67	60	100	80	1
14DB-12S05N (1.5KV)	5	200	60	100	80	1
14DB-12S09N (1.5KV)	9	112	60	100	80	1
14DB-12S12N (1.5KV)	12	84	60	100	82	1
14DB-12S15N (1.5KV)	15	67	60	100	81	1
14DB-15S05N2 (1.5KV)	5	200	60	100	78	2
14DB-15S09N2 (1.5KV)	9	112	60	100	79	2
14DB-15S12N2 (1.5KV)	12	84	60	100	79	2
14DB-15S15N2 (1.5KV)	15	67	60	100	79	2
14DB-24S05N2 (1.5KV)	5	200	60	100	77	2
14DB-24S09N2 (1.5KV)	9	112	60	100	79	2
14DB-24S12N2 (1.5KV)	12	84	60	100	79	2
14DB-24S15N2 (1.5KV)	15	67	60	100	79	2
14DB-24S24N2 (1.5KV)	24	42	60	100	81	2
14DB-05D05N (1.5KV)	±5	±100	60	120	80	1
14DB-05D09N (1.5KV)	±9	±56	60	120	80	1
14DB-05D12N (1.5KV)	±12	±42	60	120	80	1
14DB-05D15N (1.5KV)	±15	±34	60	120	80	1
14DB-12D05N (1.5KV)	±5	±100	60	120	80	1
14DB-12D09N (1.5KV)	±9	±56	60	120	80	1
14DB-12D12N (1.5KV)	±12	±42	60	120	82	1
14DB-12D15N (1.5KV)	±15	±34	60	120	81	1
14DB-15D05N2 (1.5KV)	±5	±100	60	120	78	2
14DB-15D09N2 (1.5KV)	±9	±56	60	120	78	2
14DB-15D12N2 (1.5KV)	±12	±42	60	120	78	2
14DB-15D15N2 (1.5KV)	±15	±34	60	120	78	2
14DB-24D05N2 (1.5KV)	±5	±100	60	120	78	2
14DB-24D09N2 (1.5KV)	±9	±56	60	120	79	2
14DB-24D12N2 (1.5KV)	±12	±42	60	120	79	2
14DB-24D15N2 (1.5KV)	±15	±34	60	120	78	2

**NOTE :**

No suffix is standard isolation (1KVDC) e.g, 14DB-05S05N,14DB-15S05N2  
 \*add suffix /1.5KV for 1.5KVDC isolation, e.g, 14DB-05S05N1.5KV,14DB-15S05N21.5KV

DC-DC Converter

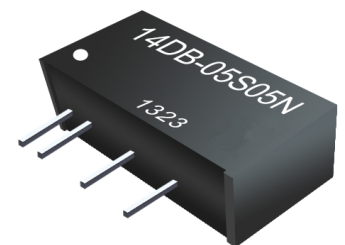
**14DB SERIES**

1Watt

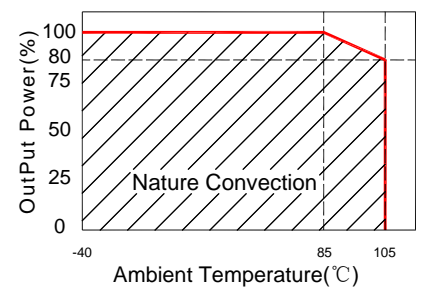
1KV & 1.5KV Isolated

Single & Dual Output

SIP7



**Temperature Derating Graph**



## Input Specifications

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	Vo,Io Nom			±10	%
Filter	Capacitor				

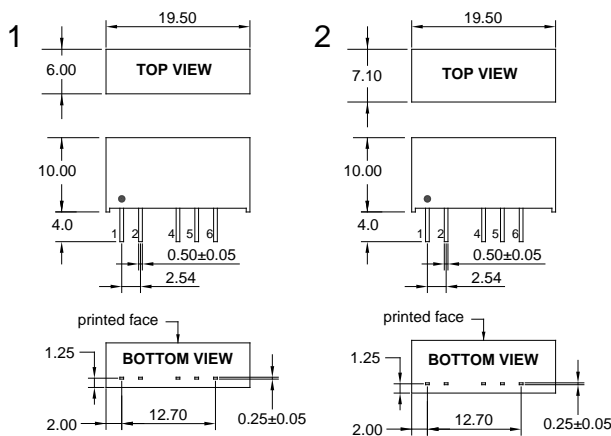
## Output Specifications

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	100% full load			±5	%
Short Circuit Protection	Continuous				
Line Regulation	For 1.0% OF Vin		1.2		%
Load Regulation	5V,9V (10% To 100% F.L)			15	%
Load Regulation	12~24V (10% To 100% F.L)			10	%
Load Regulation	±5V,±9V (10% To 100% F.L)			15	%
Load Regulation	±12~±24V (10% To 100% F.L)			10	%

## General Specifications

Parameters	Conditions	Min	Typ	Max	Units
Isolation Resistance	500Vdc	1000			MΩ
Switching Frequency	Full load, nominal input		100		KHz
Operating Temperature		-40		+105	°C
Storage Temperature		-55		+125	°C
Humidity	Non Condensing			95	%
Cooling	Free air Convection				
Case material	DAP				
MTBF	MIL-HDBK-217F @25°C	3500000			Hours
Weight	Package1 or Package2		2.1 or 2.7		g
Dimensions	Package1 or Package2	19.5x6.0x10.0 or 19.5x7.1x10.0			mm

## Markings and dimensions

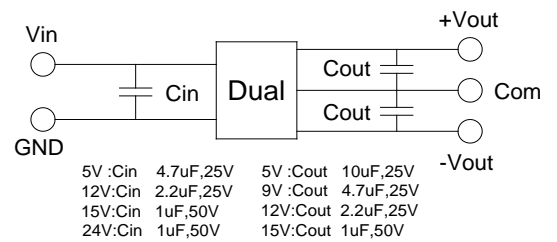
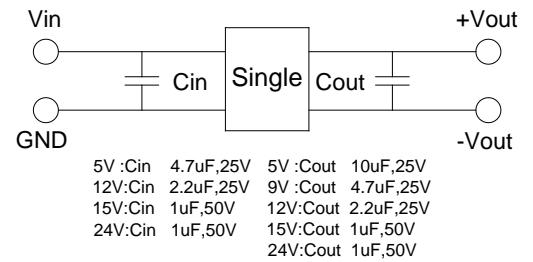


Unit : mm Unless otherwise specified, all tolerances are ±0.25

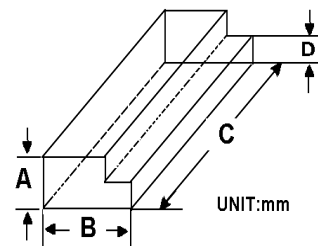
## Part Number

14DB - 05	S	05	N	2	14DB - 24	S	24	N	2	1.5KV		
A	B	C	D	E	F	A	B	C	D	E	F	G
A:Series						A:Series						
B:Input Voltage						B:Input Voltage						
C:Single(S)Dual(D)						C:Single(S) Dual(D)						
D:Output Voltage						D:Output Voltage						
E:Unregulated(N)						E:Unregulated(N)						
F:Package						F:Package						
						G:Isolation Voltage						

## Recommended Test Circuit



## Packaging



Size(mm)			
A	B	C	D
9.50	16.50	522	5.00

## PIN Connection

PIN	1	2	4	5	6
Single	+Vin	-Vin	-Vout	No Pin	+Vout
Dual	+Vin	-Vin	-Vout	Com	+Vout

**FEATURES :**

- 2:1Wide Input Voltages Range
- 7PIN SIP Package
- High Efficiency up to 80%
- Regulated Output Types
- Internal SMD Construction
- No External Component Required
- Operating Temperature:-40°C TO +85°C
- Industry Standard Pinout



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

Part Number	Input Voltage	Output Voltage	Output Current	Efficiency
	Vdc	Vdc	mA	%TYP
14DZ-05S05R	4.5-9	5	200	65
14DZ-05S09R	4.5-9	9	112	70
14DZ-05S12R	4.5-9	12	84	70
14DZ-05S15R	4.5-9	15	67	70
14DZ-05S24R	4.5-9	24	42	75
14DZ-12S05R	9-18	5	200	70
14DZ-12S09R	9-18	9	112	72
14DZ-12S12R	9-18	12	84	73
14DZ-12S15R	9-18	15	67	75
14DZ-12S24R	9-18	24	42	80
14DZ-24S05R	18-36	5	200	75
14DZ-24S09R	18-36	9	112	75
14DZ-24S12R	18-36	12	84	78
14DZ-24S15R	18-36	15	67	78
14DZ-24S24R	18-36	24	42	80

**Input Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Types	Vo, Io Nom			2:1	
Filter	Capacitor				

DC-DC Converter

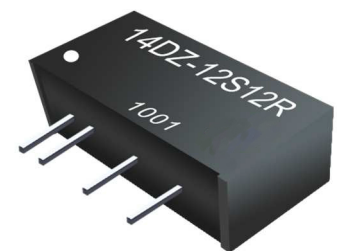
**14DZ SERIES**

1Watt 3KV Isolated

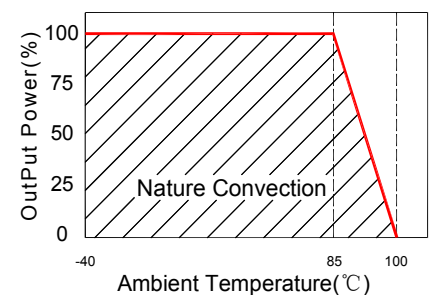
2 : 1 Input Voltage Range

Single Output

SIP7



**Temperature Derating Graph**



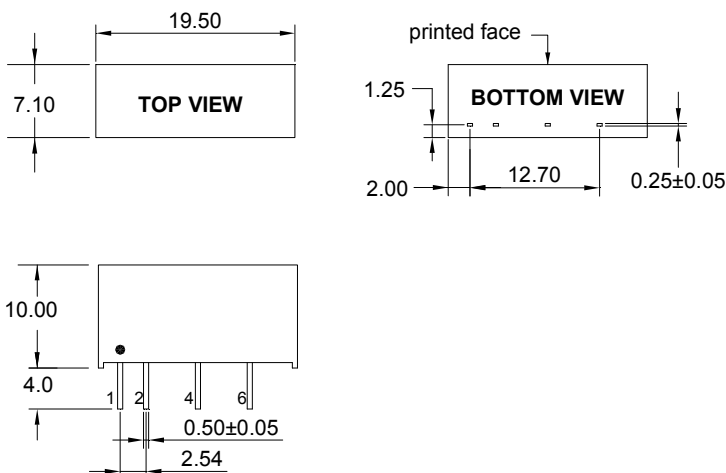
**Output Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	100% full load			±5	%
Short Circuit Protection	Continuous				
Line Regulation	Regulated			±0.5	%
Load Regulation	Regulated			±1.5	%
Ripple & Noise	Output:5V,9V TYPES BW=DC To 20MHz			100	mVp-p
Ripple & Noise	Output:12-24V TYPES BW=DC To 20MHz		1% of Vout		mVp-p
Transient response setting time	50% load step change		350		us

**General Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Isolation Resistance	500Vdc	1000			MΩ
Switching Frequency	Full load, nominal input		100		KHz
Operating Temperature		-40		85	°C
Humidity	Non Condensing			95	%
Cooling	Free air Convection				
Case material	DAP				
MTBF	MIL-HDBK-217F @25°C	1500000			Hours
Weight			2.7		g
Dimensions			19.5x7.1x10.0		mm

**Markings and dimensions**

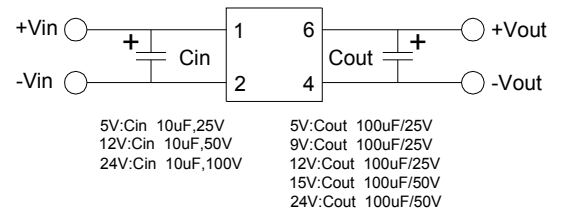


UNIT : mm Unless otherwise specified, all tolerances are ±0.25

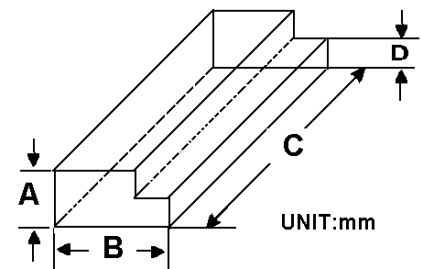
**Part Number**

14DZ - 05 S 05 R  
 A B C D E  
 A:Series  
 B:Input Voltage  
 C:Single Output  
 D:Output Voltage  
 E:Regulated(R)

**Recommended Test Circuit**



**Packaging**



Size(mm)			
A	B	C	D
9.5	16.5	52.2	5.0

**PIN Connection**

Pin	1	2	4	6
Single	+Vin	-Vin	-Vout	+Vout

**FEATURES :**

- 7PIN SIP & 14PIN DIL Package
- High Efficiency up to 70%
- Output Regulation <1.5%
- Internal SMD Construction
- No External Component Required
- Industry Standard Pinout
- Operating Temperature:-40°C TO +85°C



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

Part Number	Output Voltage	Output Current	Efficiency	Package Style
	Vdc	mA	%Typ	
15D-XXS03RNL	3.3	100	45	1
15D-XXS05RNL	5	100	45	1
15D-XXS09RNL	9	100	55	1
15D-XXS12RNL	12	84	55	1
15D-XXS15RNL	15	67	60	1
15D-XXS03R2NL	3.3	100	45	2
15D-XXS05R2NL	5	100	45	2
15D-XXS09R2NL	9	100	55	2
15D-XXS12R2NL	12	84	55	2
15D-XXS15R2NL	15	67	60	2
15D-XXS24R2NL	24	42	60	2
15D-XXS03R3NL	3.3	100	45	3
15D-XXS05R3NL	5	100	45	3
15D-XXS09R3NL	9	100	55	3
15D-XXS12R3NL	12	84	55	3
15D-XXS15R3NL	15	67	60	3
15D-XXS03R4NL	3.3	100	45	4
15D-XXS05R4NL	5	100	45	4
15D-XXS09R4NL	9	100	55	4
15D-XXS12R4NL	12	84	55	4
15D-XXS15R4NL	15	67	60	4
15D-XXS24R4NL	24	42	60	4

DC-DC Converter

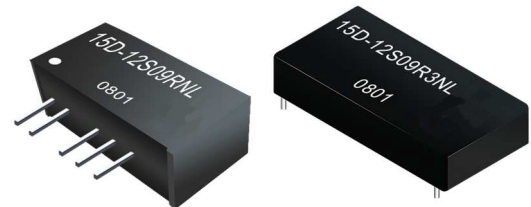
**15D SERIES**

1Watt

1KV Isolated

Single Output

SIP7 & DIL14



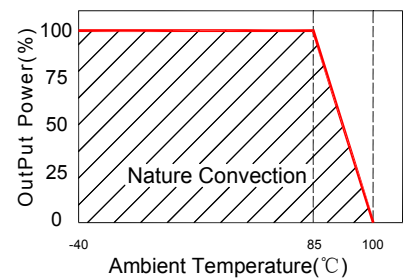
**Note:**

- 1."XX" Is Input Voltage: 03=3.3Vdc, 05=5Vdc, 09=9Vdc, 12=12Vdc, 15=15Vdc, 24=24Vdc
2. Over 24Vdc input voltage, using the 2nd or 4nd package
3. The input voltage increases, there will be an increase in efficiency.
4. Input 3.3V, then output will be 12V MAX Output 3.3V, then input will be 12V MAX

**Input Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	Vo,Io Nom			±5	%
Filter	Capacitor				

**Temperature Derating Graph**



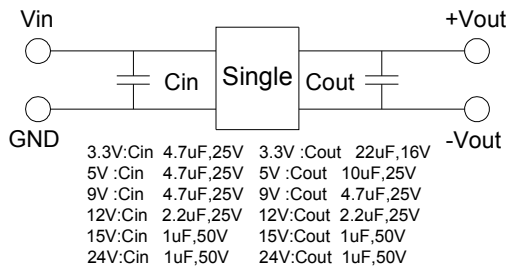
**Output Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	100% full load			±5	%
Short Circuit Protection	Continuous				
Line Regulation	For 1.0% OF Vin		0.25		%
Load Regulation	10% To 100% F.L			1.5	%
Ripple & Noise	BW=DC To 20MHz			100	mVp-p
Transient response setting time	50% load step change		350		

**General Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Isolation Resistance	500Vdc	1000			MΩ
Switching Frequency	Full load, nominal input		100		KHz
Operating Temperature		-40		+85	°C
Humidity	Non Condensing			95	%
Cooling	Free air Convection				
Case material	DAP				
MTBF	MIL-HDBK-217F @25°C	1500000			Hours
Weight	Package 1/2/3/4	2.1/2.7/2.3/3.0			g
Dimensions	Package 1	19.50x6.00x10.00			mm
Dimensions	Package 2	19.5x7.10x10.00			mm
Dimensions	Package 3	20.32x10.16x6.80			mm
Dimensions	Package 4	20.32x10.16x7.70			mm

**Recommended Test Circuit**



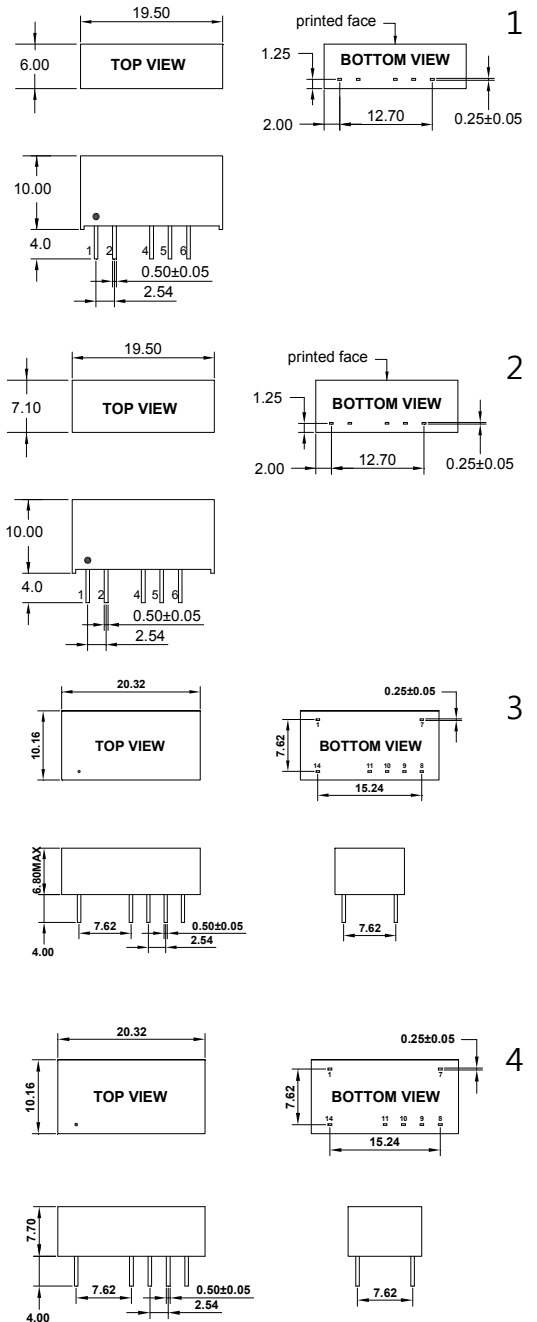
**PIN Connection**

PIN	1	2	4	5	6	7	8	9	10	11	14
7PIN	+Vin	-Vin	-Vout	CTRL	+Vout						
14PIN	-Vin					NC	NC	+Vout	CTRL	-Vout	+Vin

**Part Number**

15D - 05 S 05 R 2 NL  
 A B C D E F G  
 A:Series  
 B:Input Voltage  
 C:Single(S)  
 D:Output Voltage  
 E:Regulated(R)  
 F:Packge  
 G:RoHS Version

**Markings and dimensions**



Unit : mm Unless otherwise specified, all tolerances are ±0.25

**FEATURES :**

- 2:1Wide Input Voltages Range
- High Efficiency up to 85%
- Regulated Output Types
- Low Ripple And Noise
- Internal SMD Construction
- Operating Temperature:-40~+85°C
- Industry Standard Pinout
- Continuous Short Circuit Protection With Current Foldback



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

Part Number	Input Voltage	Output Voltage	Output Current	Efficiency
	Vdc	Vdc	mA	%TYP
16D-05S05RNL	5-9	5	200	60
16D-05S09RNL	5-9	9	111	70
16D-05S12RNL	5-9	12	84	70
16D-05S15RNL	5-9	15	67	70
16D-05S24RNL	5-9	24	42	70
16D-12S05RNL	9-18	5	200	70
16D-12S09RNL	9-18	9	111	80
16D-12S12RNL	9-18	12	84	80
16D-12S15RNL	9-18	15	67	80
16D-12S24RNL	9-18	24	42	80
16D-24S05RNL	18-36	5	200	75
16D-24S09RNL	18-36	9	111	80
16D-24S12RNL	18-36	12	84	80
16D-24S15RNL	18-36	15	67	80
16D-24S24RNL	18-36	24	42	80
16D-48S05RNL	36-72	5	200	70
16D-48S09RNL	36-72	9	111	80
16D-48S12RNL	36-72	12	84	80
16D-48S15RNL	36-72	15	67	80
16D-48S24RNL	36-72	24	42	80

**Input Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Types	Vo, Io Nom			2:1	
Filter	Capacitor				

DC-DC Converter

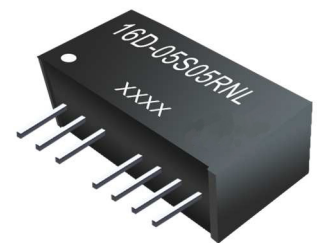
**16D-Single SERIES**

1Watt 1KV Isolated

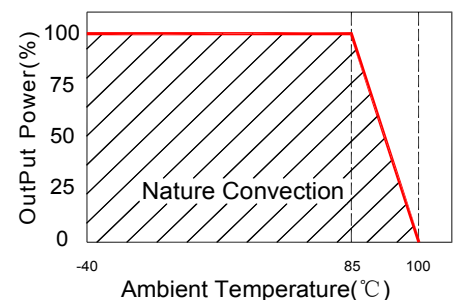
2 : 1 Input Voltage Range

Single Output

SIP8



**Temperature Derating Graph**



**Output Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	100% full load			±3	%
Short Circuit Protection	Continuous				
Line Regulation	Regulated			±0.5	%
Load Regulation	Regulated			±0.8	%
Ripple & Noise	Output:5V-9V TYPES BW=DC To 20MHZ			100	mVp-p
Ripple & Noise	Output:12-24V TYPES BW=DC To 20MHZ		1% of Vout		mVp-p
Transient response setting time	50% load step change		350		us

**General Specifications**

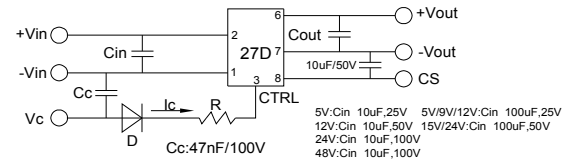
Parameters	Conditions	Min	Typ	Max	Units
Isolation Resistance	500Vdc	1000			MΩ
Switching Frequency	Full load, nominal input		100		KHz
Operating Temperature		-40		85	°C
Humidity	Non Condensing			95	%
Cooling	Free air Convection				
Case material	DAP				
MTBF	MIL-HDBK-217F @25°C	1500000			Hours
Weight			4.5		g
Dimensions			21.8x9.2x11.1		mm

**Part Number**

16D - 05 S 05 R NL  
A B C D E F

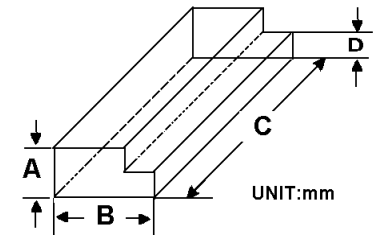
A:Series  
B:Input Voltage  
C:Single(S)  
D:Output Voltage  
E:Regulated(R)  
F:RoHS Version

**Recommended Test Circuit**



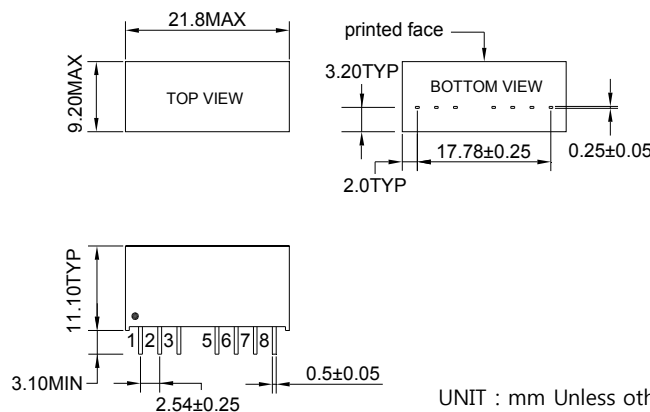
- When open or high impedance, the converter works well; When this pin is 'high', the converter shut down. It should be note that the input current should be between 5-10mA,exceeding the maximum 20mA will cause permanent damage to the converter.
- To make sure the product work at perfect operation status with full loading external capacitor is necessary and it is recommended to use high frequency low resistance electrolytic capacitor.

**Packaging**



Size(mm)			
A	B	C	D
12.0	28.55	550	6.00

**Markings and dimensions**



UNIT : mm Unless otherwise specified, all tolerances are ±0.25

**PIN Connection**

Pin	1	2	3	5	6	7	8
Single	-Vin	+Vin	Ctrl-Control input can (can be left open)	NE-No external connection allowed	+Vout	-Vout	CS Optional External capacitor



**FEATURES :**

- 2:1Wide Input Voltages Range
- High Efficiency up to 85%
- Regulated Output Types
- Low Ripple And Noise
- Internal SMD Construction
- Operating Temperature:-40~+85°C
- Industry Standard Pinout
- Continuous Short Circuit Protection With Current Foldback



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

Part Number	Input Voltage	Output Voltage	Output Current	Efficiency
	Vdc	Vdc	mA	%TYP
16D-05D05RNL	5-9	±5	±100	60
16D-05D09RNL	5-9	±9	±56	70
16D-05D12RNL	5-9	±12	±42	70
16D-05D15RNL	5-9	±15	±34	70
16D-05D24RNL	5-9	±24	±21	70
16D-12D05RNL	9-18	±5	±100	70
16D-12D09RNL	9-18	±9	±56	80
16D-12D12RNL	9-18	±12	±42	80
16D-12D15RNL	9-18	±15	±34	80
16D-12D24RNL	9-18	±24	±21	80
16D-24D05RNL	18-36	±5	±100	75
16D-24D09RNL	18-36	±9	±56	80
16D-24D12RNL	18-36	±12	±42	80
16D-24D15RNL	18-36	±15	±34	80
16D-24D24RNL	18-36	±24	±21	80
16D-48D05RNL	36-72	±5	±100	70
16D-48D09RNL	36-72	±9	±56	80
16D-48D12RNL	36-72	±12	±42	80
16D-48D15RNL	36-72	±15	±34	80
16D-48D24RNL	36-72	±24	±21	80

**Input Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Types	Vo, Io Nom			2:1	
Filter	Capacitor				

DC-DC Converter

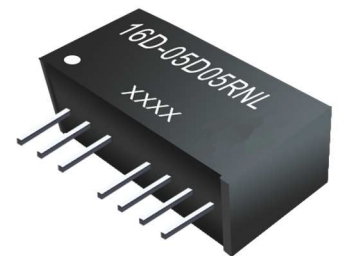
**16D-Dual SERIES**

1Watt 1KV Isolated

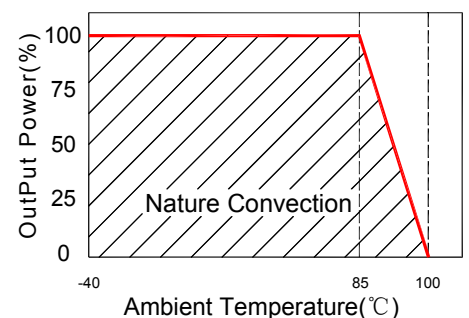
2 : 1 Input Voltage Range

Dual Output

SIP8



**Temperature Derating Graph**



Output Specifications

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	100% full load			±3	%
Short Circuit Protection	Continuous				
Line Regulation	Regulated			±0.5	%
Load Regulation	Regulated			±0.8	%
Ripple & Noise	Output:5-9V TYPES BW=DC To 20MHz			100	mVp-p
Ripple & Noise	Output:12-24V TYPES BW=DC To 20MHz		1% of Vout		mVp-p
Transient response setting time	50% load step change		350		us

General Specifications

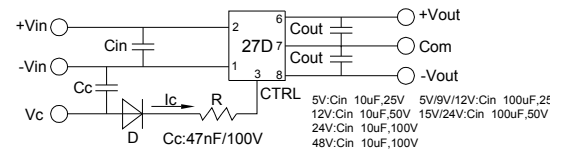
Parameters	Conditions	Min	Typ	Max	Units
Isolation Resistance	500Vdc	1000			MΩ
Switching Frequency	Full load, nominal input		100		KHz
Operating Temperature		-40		85	°C
Humidity	Non Condensing			95	%
Cooling	Free air Convection				
Case material	DAP				
MTBF	MIL-HDBK-217F @25°C	1500000			Hours
Weight			4.5		g
Dimensions			21.8x9.2x11.1		mm

Part Number

16D - 05 D 05 R NL  
A B C D E F

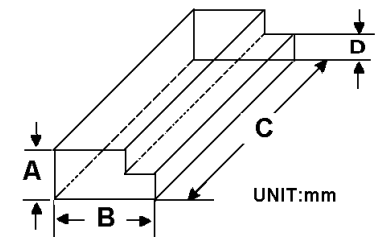
A:Series  
B:Input Voltage  
C: Dual Output  
D: Output Voltage  
E: Regulated(R)  
F: RoHS Version

Recommended Test Circuit



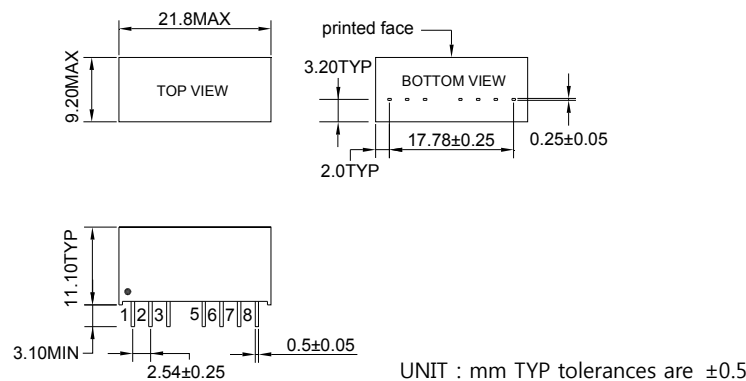
- When open or high impedance, the converter works well; When this pin is 'high', the converter shut down. It should be note that the input current should be between 5-10mA,exceeding the maximum 20mA will cau permanent damage to the converter.
- To make sure the product work at perfect operation status with full loading external capacitor is necessary and it is recommended to use high frequency low resistance electrolytic capacitor.

Packaging



Size(mm)			
A	B	C	D
12.0	28.55	550	6.00

Markings and dimensions



PIN Connection

Pin	1	2	3	5	6	7	8
Dual	-Vin	+Vin	Ctrl-Control input can (can be left open)	NE-No external connection allowed	+Vout	COM	-Vout

**FEATURES :**

- 7PIN SIP Package
- High Efficiency up to 85%
- Unregulated Output Types
- Internal SMD Construction
- No External Component Required
- Operating Temperature:-40°C TO +85°C
- Industry Standard Pinout



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

Part Number	Output2		Efficiency	Recognized By UL 60950-1
	Voltage (Vdc)	Current (mA)	%Typ	
17D-XXDXX03NNL	3.3	150	70	17D-05D0505NNL 17D-05D0512NNL 17D-12D0512NNL 17D-12D1212NNL 17D-24D0505NNL 17D-24D2424NNL
17D-XXDXX05NNL	5	100	70	
17D-XXDXX09NNL	9	56	70	
17D-XXDXX12NNL	12	42	70	
17D-XXDXX15NNL	15	34	70	
17D-XXDXX24N2NL	24	21	70	

**Note:**

- 1."XX" Is Voltage:03 = 3.3Vdc,05=5Vdc,09=9Vdc 12=12Vdc,15=15Vdc,24=24Vdc.
2. 3.3V for output only, not for input.
3. The input voltage increases, there will be an increase in efficiency.
4. Over 24Vdc input voltage or Output voltage, using the 2nd package.

**Input Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	Vo,Io Nom			±5	%
Filter	Capacitor				

**Output Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	100% full load			±5	%
Short Circuit Protection	Short Term			1	Sec
Line Regulation	For 1.0% OF Vin		1.2		%
Load Regulation	3.3V,5V (10% To 100% F.L)			15	%
Load Regulation	9V,12V,15V (10% To 100% F.L.)			10	%
Ripple & Noise	BW=DC To 20MHz			100	mVp-p
Transient response setting time	50% load step change		350		us

DC-DC Converter

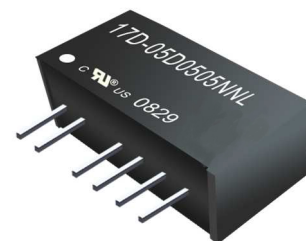
**17D SERIES**

1Watt

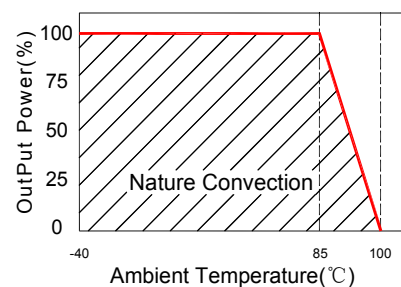
1KV Isolated

Twin Output

SIP7



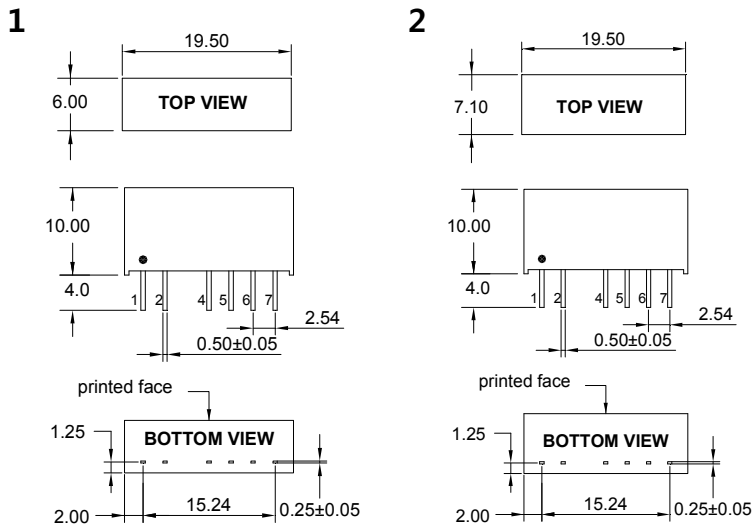
**Temperature Derating Graph**



**General Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Isolation Resistance	500Vdc	1000			MΩ
Switching Frequency	Full load, nominal input		100		KHz
Operating Temperature		-40		+85	°C
Humidity	Non Condensing			95	%
Cooling	Free air Convection				
Case material	DAP				
MTBF	MIL-HDBK-217F @25°C	3500000			Hours
Weight			2.1 or 2.7		g
Dimensions			19.5x6.0x10.0		mm
Dimensions			19.5x7.1x10.0		mm

**Markings and dimensions**

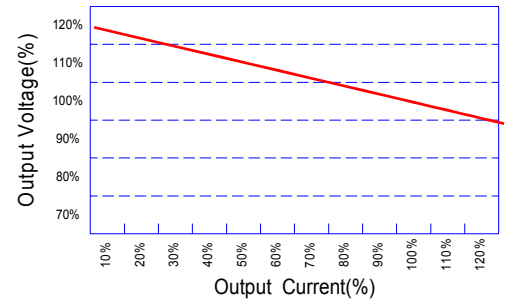


Unit : mm Unless otherwise specified, all tolerances are ±0.25

**PIN Connection**

PIN	1	2	4	5	6	7
Dual	+Vin	-Vin	+Vout1	- Vout1	+Vout2	-Vout2

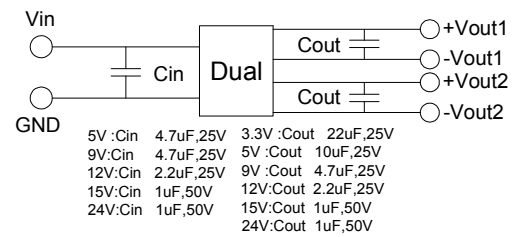
**Tolerance Envelope Graph**



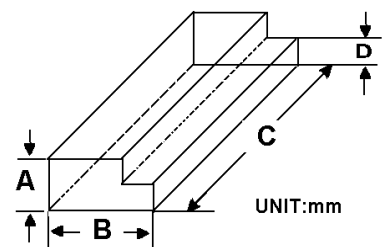
**Part Number**

17D - 05 D 0503 N NL  
 A B C D E F  
 A:Series  
 B:Input Voltage  
 C:Dual(D)  
 D:Output Voltage  
 E:Unregulated(N)  
 F:RoHS Version

**Recommended Test Circuit**



**Packaging**



Size(mm)			
A	B	C	D
9.50	16.50	522	5.00

**FEATURES :**

- 14PIN DIL Package
- High Efficiency up to 85%
- Internal SMD Construction
- Unregulated Output Types
- No External Component Required
- Operating Temperature:-40°C TO +85°C
- Industry Standard Pinout



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

Part Number	Output Voltage	Output Current	Efficiency	Package Style	Recognized By UL 60950-1
	Vdc	mA	%Typ		
22D-XXS03NNL	3.3	303	70	1	
22D-XXS05NNL	5	200	70	1	
22D-XXS09NNL	9	112	75	1	
22D-XXS12NNL	12	84	78	1	
22D-XXS15NNL	15	67	80	1	
22D-XXS24NNL	24	42	82	1	22D-05D05NNL
22D-XXD03NNL	±3.3	±150	70	1	22D-05D12NNL
22D-XXD05NNL	±5	±100	70	1	22D-05D15NNL
22D-XXD09NNL	±9	±56	75	1	22D-05D24NNL
22D-XXD12NNL	±12	±42	78	1	22D-12D12NNL
22D-XXD15NNL	±15	±34	80	1	22D-12D15NNL
22D-XXD24NNL	±24	±21	82	1	22D-24D05NNL
22D-XXS05N2NL	5	200	70	2	22D-24D12NNL
22D-XXS09N2NL	9	112	75	2	22D-24D24NNL
22D-XXS12N2NL	12	84	78	2	
22D-XXS15N2NL	15	67	80	2	
22D-XXS24N2NL	24	42	82	2	
22D-XXD05N2NL	±5	±100	70	2	
22D-XXD09N2NL	±9	±56	75	2	
22D-XXD12N2NL	±12	±42	78	2	
22D-XXD15N2NL	±15	±34	80	2	
22D-XXD24N2NL	±24	±21	82	2	

**Note:**

- 1."XX" Is Input Voltage:03 = 3.3Vdc,05=5Vdc,09=9Vdc,12=12Vdc,15=15Vdc.24=24Vdc, 48=48Vdc.
2. Over 48Vdc input voltage, using the 2nd package.
3. The input voltage increases, there will be an increase in efficiency.

**Input Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	Vo,Io Nom			±10	%
Filter	Capacitor				

DC-DC Converter

**22D SERIES**

1Watt

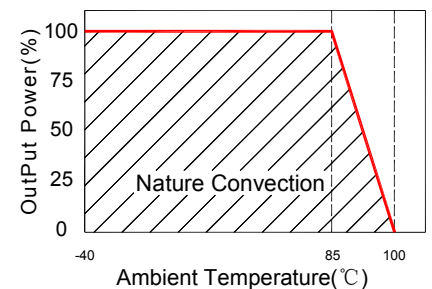
1KV Isolated

Single & Dual Output

DIL14



**Temperature Derating Graph**



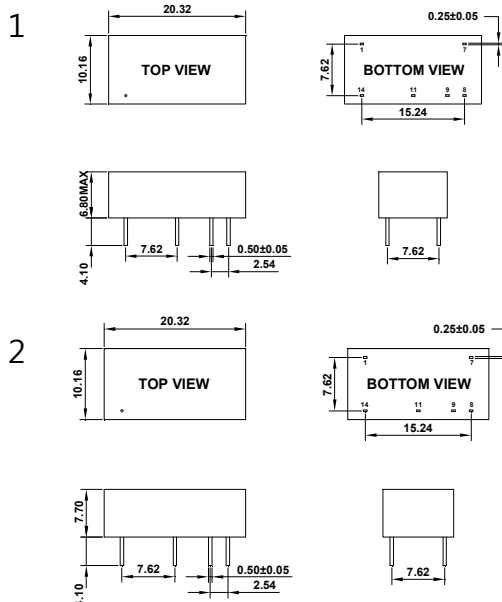
**Output Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	100% full load			±5	%
Short Circuit Protection	Short Term			1	Sec
Line Regulation	For 1.0% OF Vin		1.2		%
Load Regulation	3.3V,5V (10% To 100% F.L.)			15	%
Load Regulation	9V,12V,15V,24V (10% To 100% F.L.)			10	%
Ripple & Noise	BW=DC To 20MHz			100	mVp-p
Transient response setting time	50% load step change		350		us

**General Specifications**

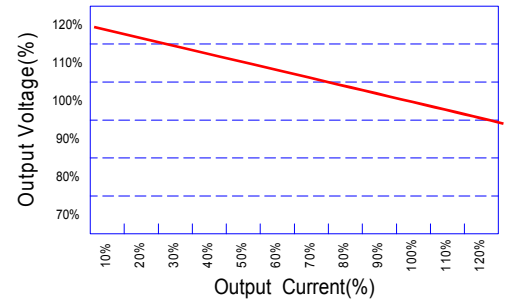
Parameters	Conditions	Min	Typ	Max	Units
Isolation Resistance	500Vdc	1000			MΩ
Switching Frequency	Full load, nominal input		100		KHz
Operating Temperature		-40		+85	°C
Humidity	Non Condensing			95	%
Cooling	Free air Convection				
Case material	DAP				
MTBF	MIL-HDBK-217F @25°C	3500000			Hours
Weight	Package 1 or Package 2		2.3 or 2.8		g
Dimensions	Package 1		20.32x10.16x6.80		mm
Dimensions	Package 2		20.32x10.16x7.70		mm

**Markings and dimensions**



Unit : mm Unless otherwise specified, all tolerances are ±0.25

**Tolerance Envelope Graph**

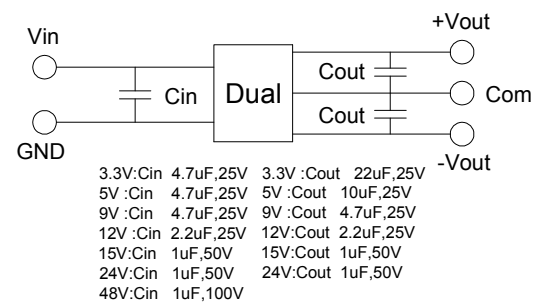
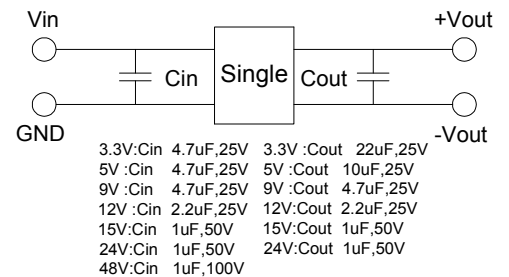


**Part Number**

22D - 05 D 05 N 2 NL  
A B C D E F G

- A:Series
- B:Input Voltage
- C:Single(S)Dual(D)
- D:Output Voltage
- E:Unregulated(N)
- F:Package
- G:RoHS Version

**Recommended Test Circuit**



**PIN Connection**

PIN	1	7	8	9	11	14
Single	-Vin	NC	-Vout	+Vout	NC	+Vin
Dual	-Vin	NC	COM	+Vout	-Vout	+Vin

**FEATURES :**

- 14PIN DIL Package
- High Efficiency up to 85%
- Internal SMD Construction
- Unregulated Output Types
- Operating Temperature:-40°C TO +85°C
- No External Component Required
- Industry Standard Pinout



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

Part Number	Output2		Efficiency
	Voltage (VDC)	Current (mA)	%Typ
25D-XXDXX03NNL	3.3	150	70
25D-XXDXX05NNL	5	100	75
25D-XXDXX09NNL	9	56	75
25D-XXDXX12NNL	12	42	75
25D-XXDXX15NNL	15	34	75
25D-XXDXX24N2NL	24	21	75

**Note:**

- 1."XX" Is Voltage:03= 3.3Vdc,05=5Vdc,09=9Vdc 12=12Vdc,15=15Vdc,24=24Vdc.
2. 3.3V for output only, not for input.
3. The input voltage increases, there will be an increase in efficiency.
4. Over 24Vdc input voltage or Output voltage, using the 2nd package

**Input Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	Vo,Io Nom			±5	%
Filter	Capacitor				

**Output Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	100% full load			±5	%
Short Circuit Protection	Short Term			1	Sec
Line Regulation	For 1.0% OF Vin		1.2		%
Load Regulation	3.3V,5V (10% To 100% F.L)			15	%
Load Regulation	9V,12V,15V,24V (10% To 100% F.L)			10	%
Ripple & Noise	BW=DC To 20MHz			100	mVp-p
Transient response setting time	50% load step change		350		us

DC-DC Converter

**25D SERIES**

1Watt

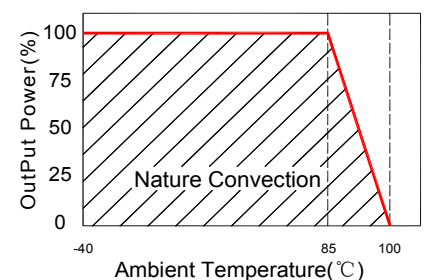
1KV Isolated

Twin Output

DIL14



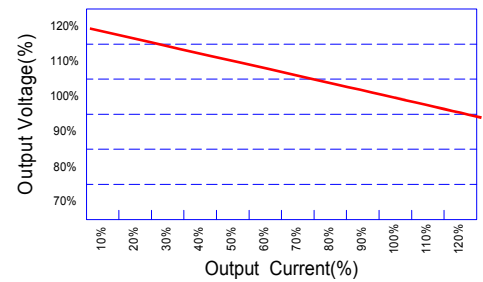
**Temperature Derating Graph**



General Specifications

Parameters	Conditions	Min	Typ	Max	Units
Isolation Resistance	500Vdc	1000			MΩ
Switching Frequency	Full load, nominal input		100		KHz
Operating Temperature		-40		+85	°C
Humidity	Non Condensing			95	%
Cooling	Free air Convection				
Case material	DAP				
MTBF	MIL-HDBK-217F @25°C	3500000			Hours
Weight			2.3 or 2.8		g
Dimensions			20.32x10.16x6.80		mm
Dimensions			20.32x10.16x7.70		mm

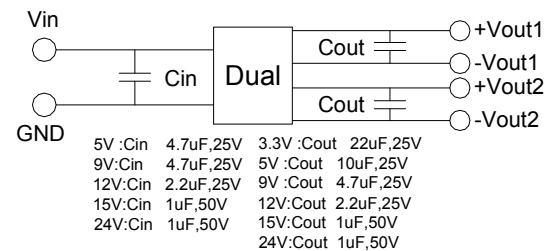
Tolerance Envelope Graph



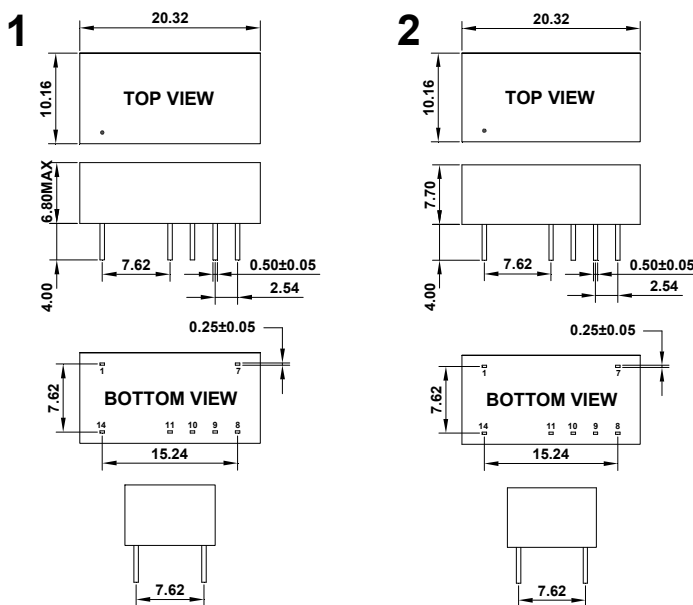
Part Number

25D - 12 D 0505 N NL  
 A B C D E F  
 A:Series  
 B:Input Voltage  
 C:Dual Output  
 D:Output Voltage  
 E:Unregulated(N)  
 F:RoHS Version

Recommended Test Circuit

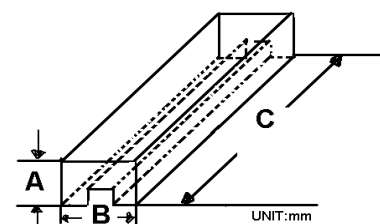


Markings and dimensions



Unit : mm Unless otherwise specified, all tolerances are ±0.25

Packaging



Size(mm)		
A	B	C
13.23	12.30	530

PIN Connection

PIN	1	7	8	9	10	11	14
Dual	-Vin	NC	-Vout2	+Vout2	-Vout1	+Vout1	+Vin



**FEATURES :**

- 14PIN DIL Package
- High Efficiency up to 85%
- Internal SMD Construction
- Unregulated Output Types
- No External Component Required
- Operating Temperature:-40°C TO +85°C
- Industry Standard Pinout



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

Part Number	Output Voltage	Output Current	Efficiency	Package Style
	Vdc	mA	%Typ	
26D-XXS03NNL	3.3	303	70	1
26D-XXS05NNL	5	200	70	1
26D-XXS09NNL	9	112	75	1
26D-XXS12NNL	12	84	78	1
26D-XXS15NNL	15	67	80	1
26D-XXS24NNL	24	42	82	1
26D-XXD03NNL	±3.3	±150	70	1
26D-XXD05NNL	±5	±100	70	1
26D-XXD09NNL	±9	±56	75	1
26D-XXD12NNL	±12	±42	78	1
26D-XXD15NNL	±15	±34	80	1
26D-XXD24NNL	±24	±21	82	1
26D-XXS03N2NL	3.3	303	70	2
26D-XXS05N2NL	5	200	70	2
26D-XXS09N2NL	9	112	75	2
26D-XXS12N2NL	12	84	78	2
26D-XXS15N2NL	15	67	80	2
26D-XXS24N2NL	24	42	82	2
26D-XXD03N2NL	±3.3	±150	70	2
26D-XXD05N2NL	±5	±100	70	2
26D-XXD09N2NL	±9	±56	75	2
26D-XXD12N2NL	±12	±42	78	2
26D-XXD15N2NL	±15	±34	80	2
26D-XXD24N2NL	±24	±21	82	2

Recognized By UL 60950-1

26D-05S05NNL,26D-05S09NNL,26D-05S12NNL,26D-05S15NNL,26D-05S24NNL,  
26D-24S05NNL,26D-24S24NNL

**Note:**

- 1."XX" Is Input Voltage:03 = 3.3Vdc,05=5Vdc,09=9Vdc,12=12Vdc,15=15Vdc,24=24Vdc,.
2. The input voltage increases, there will be an increase in efficiency.

**Input Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	Vo,Io Nom			±10	%
Filter	Capacitor				

DC-DC Converter

**26D SERIES**

1Watt

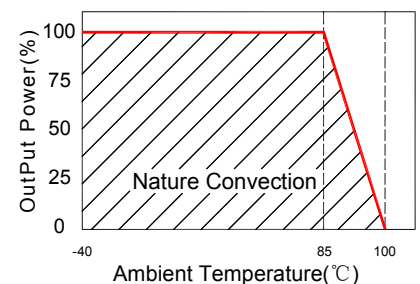
3KV Isolated

Single & Dual Output

DIL14



**Temperature Derating Graph**



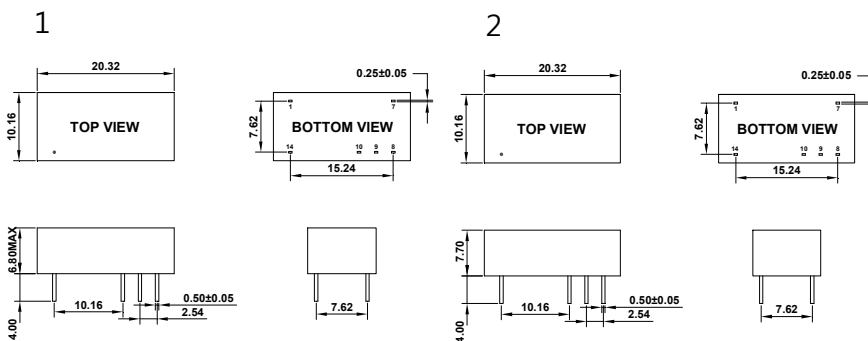
**Output Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	100% full load			±5	%
Short Circuit Protection	Short Term			1	Sec
Line Regulation	For 1.0% OF Vin		1.2		%
Load Regulation	3.3V,5V (10% To 100% F.L)			15	%
Load Regulation	9V,12V,15V,24V (10% To 100% F.L)			10	%
Ripple & Noise	BW=DC To 20MHz			100	mVp-p
Transient response setting time	50% load step change		350		us

**General Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Isolation Resistance	500Vdc	1000			MΩ
Switching Frequency	Full load, nominal input		100		KHz
Operating Temperature		-40		+85	°C
Humidity	Non Condensing			95	%
Cooling	Free air Convection				
Case material	DAP				
MTBF	MIL-HDBK-217F @25°C	3500000			Hours
Weight	Package 1 or Package 2		2.3 or 3.0		g
Dimensions	Package 1		20.32x10.16x6.80		mm
Dimensions	Package 2		20.32x10.16x7.70		mm

**Markings and Dimensions**

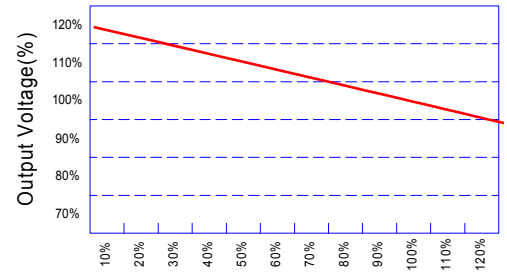


Unit : mm Unless otherwise specified, all tolerances are ±0.25

**PIN Connection**

PIN	1	7	8	9	10	14
Single	-Vin	NC	+Vout	No Pin	-Vout	+Vin
Dual	-Vin	NC	+Vout	Com	-Vout	+Vin

**Tolerance Envelope Graph**

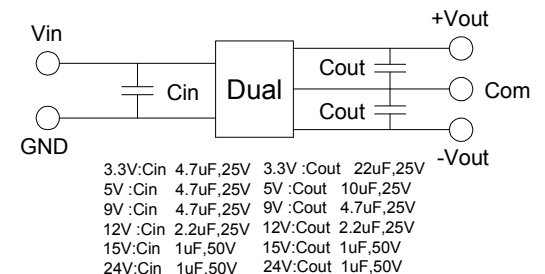
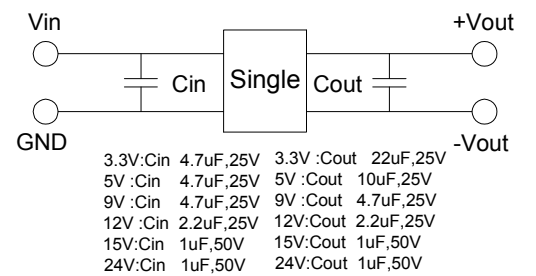


**Part Number**

26D - 05 S 05 N 2 NL  
A B C D E F G

- A:Series
- B:Input Voltage
- C:Single(S)Dual(D)
- D:Output Voltage
- E:Unregulated(N)
- F:Package
- G:RoHS Version

**Recommended Test Circuit**



**FEATURES :**

- 2:1 Wide Input Voltages Range
- 16PIN SMD Package
- High Efficiency up to 83%
- Regulated Output Types
- Internal SMD Construction
- No External Component Required
- Operating Temperature:-40°C TO +85°C
- Industry Standard Pinout

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

Part Number	Input Voltage Range	Output Voltage	Output Current	Efficiency
	Vdc	Vdc	mA	%TYP
28D-05S03R1W	4.5-9	3.3	303	68
28D-05S05R1W	4.5-9	5	200	71
28D-05S12R1W	4.5-9	12	84	73
28D-05S15R1W	4.5-9	15	67	71
28D-05D05R1W	4.5-9	±5	±100	68
28D-05D12R1W	4.5-9	±12	±42	70
28D-05D15R1W	4.5-9	±15	±34	71
28D-12S03R1W	9-18	3.3	303	71
28D-12S05R1W	9-18	5	200	75
28D-12S12R1W	9-18	12	84	78
28D-12S15R1W	9-18	15	67	78
28D-12D05R1W	9-18	±5	±100	71
28D-12D12R1W	9-18	±12	±42	78
28D-12D15R1W	9-18	±15	±34	76
28D-24S03R1W	18-36	3.3	303	71
28D-24S05R1W	18-36	5	200	78
28D-24S12R1W	18-36	12	84	82
28D-24S15R1W	18-36	15	67	83
28D-24D05R1W	18-36	±5	±100	74
28D-24D12R1W	18-36	±12	±42	78
28D-24D15R1W	18-36	±15	±34	80
28D-48S03R1W	36-75	3.3	303	70
28D-48S05R1W	36-75	5	200	74
28D-48S12R1W	36-75	12	84	80
28D-48S15R1W	36-75	15	67	80
28D-48D05R1W	36-75	±5	±100	74
28D-48D12R1W	36-75	±12	±42	77
28D-48D15R1W	36-75	±15	±34	78

**Input Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	Vo, Io Nom			2:1	
Filter	Capacitor				



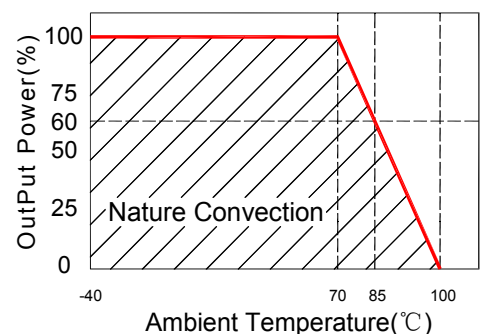
DC-DC Converter

**28D-1W SERIES**

1Watt 1.5KV Isolated  
2 : 1 Input Voltage Range  
Single & Dual Output  
SMD



**Temperature Derating Graph**



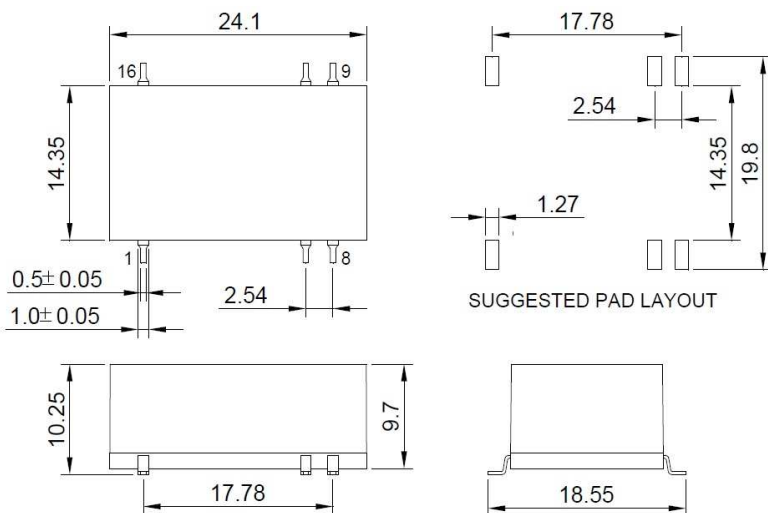
**Output Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	100% full load			±2	%
Short Circuit Protection	Continuous				
Line Regulation	Regulated			±0.5	%
Load Regulation	Regulated			±0.8	%
Ripple & Noise	BW=DC To 20MHz			100	mVp-p
Transient response setting time	50% load step change		350		us

**General Specifications**

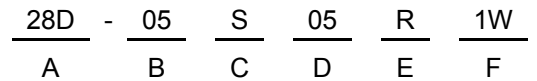
Parameters	Conditions	Min	Typ	Max	Units
Isolation Resistance	500Vdc	1000			MΩ
Switching Frequency	Full load, nominal input		100		KHz
Operating Temperature		-40		+85	°C
Humidity	Non Condensing			95	%
Cooling	Free air Convection				
Case material	DAP				
MTBF	MIL-HDBK-217F@25°C	1000000			Hours
Weight			3.9		g
Dimensions			24.1x14.35x10.25		mm

**Markings and dimensions**



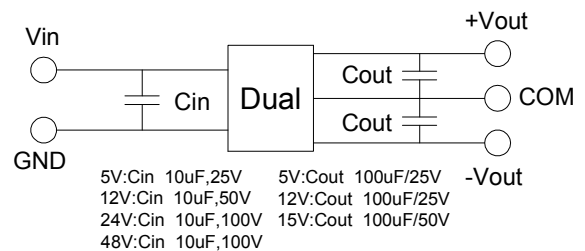
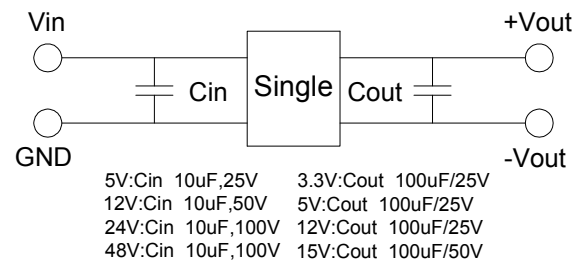
UNIT:mm Unless otherwise specified,all tolerances are ±0.25

**Part Number**



- A : Series
- B : Input Voltage
- C : Single(S);Dual(D)
- D : Output Voltage
- E : Regulated(R)
- F : Output Power

**Recommended Test Circuit**



**PIN Assignment**

Pin	1	7	8	9	10	16
Single	-Vin	NC	NC	+Vout	-Vout	+Vin
Dual	-Vin	NC	Com	+Vout	-Vout	+Vin