

# VA-L Series

0.25W Unregulated Single output



## Features

- 4 Pin SIL / 8 Pin DIL Package
- 1000 VDC Isolation
- Up to 3000 VDC Isolation
- Low Ripple and Noise
- Efficiency up to 76%
- -40 ~ 85°C Operation Temperature Range
- Non-Conductive Black Plastic Case
- EMI Complies With EN55022 Class B



The VA series is a family of cost effective 0.25W single output DC-DC converters. These converters achieve low cost and ultra-miniature SIP 4 pin or DIP 8 pin size. Devices are encapsulated using flame retardant resin. The models operate from input voltage of 3.3, 5, 12, 15, 24, 48 Vdc with output voltage of 3.3, 5, 7.2, 9, 12, 15, 18, 24 Vdc. High performance features include 1000Vdc~3000Vdc input/output isolation, high efficiency operation and output voltage accuracy of  $\pm 3\%$  maximum. Standard features include an input range of  $\pm 10\%$  tolerance and low output noise and ripple.

All specifications typical at  $T_a = 25^\circ\text{C}$ , nominal input voltage and full load unless otherwise specified

| OUTPUT SPECIFICATIONS                |                                                                      |
|--------------------------------------|----------------------------------------------------------------------|
| Voltage accuracy                     | $\pm 3\%$                                                            |
| Line regulation                      | $\pm 1.2\% / \text{Per } 1\% \text{ Vin Change}$                     |
| Load regulation                      | (From 20% to 100% Load) $\pm 10\%$<br>(Output 3.3V Model) $\pm 20\%$ |
| Ripple & noise (20 MHz bandwidth)(1) | 100mV pk-pk                                                          |
| Temperature coefficient              | $\pm 0.02\% / ^\circ\text{C}$                                        |
| Capacitor load(2)                    | See table                                                            |

| INPUT SPECIFICATIONS              |            |
|-----------------------------------|------------|
| Voltage Range                     | $\pm 10\%$ |
| Max. Input Current                | See table  |
| No-Load Input Current             | See table  |
| Input Filter                      | Capacitors |
| Input Reflected Ripple Current(3) | 20mA pk-pk |

| GENERAL SPECIFICATIONS                      |                |
|---------------------------------------------|----------------|
| Efficiency                                  | See table      |
| I/O Isolation Voltage(3 sec)                |                |
| Input/Output                                | 1000~3000Vdc   |
| I/O Isolation Capacitance                   | 60 pF Typ.     |
| I/O Isolation Resistance                    | 1000M Ohm      |
| Switching Frequency                         | Variable 80kHz |
| Humidity                                    | 95% rel H      |
| Reliability Calculated MTBF(MIL-HDBK-217 F) | >1.121Mhrs     |
| Safety Standard : (designed to meet)        | IEC 60950-1    |

| ENVIRONMENT SPECIFICATIONS |                                                                |
|----------------------------|----------------------------------------------------------------|
| Operating Temperature      | $-40^\circ\text{C} \sim 85^\circ\text{C}$ (See Derating Curve) |
| Maximum Case Temperature   | 100°C                                                          |
| Storage Temperature        | $-40^\circ\text{C} \sim 125^\circ\text{C}$                     |
| Cooling                    | Nature Convection                                              |

| PHYSICAL SPECIFICATIONS |                                                          |
|-------------------------|----------------------------------------------------------|
| Case Material           | Non-conductive Black Plastic(UL94V-0 rated)              |
| Pin Material            |                                                          |
| SIP Case                | 0.5mm Alloy42 Solder-coated                              |
| DIP Case                | $\varnothing 0.5\text{mm}$ Brass Solder-coated           |
| Potting Material        | Epoxy (UL94V-0 rated)                                    |
| Weight                  | (SIP/1.5g) (DIP/1.8g)                                    |
| Dimensions              | SIP Case 0.46"x0.24"x0.40"<br>DIP Case 0.50"x0.40"x0.27" |

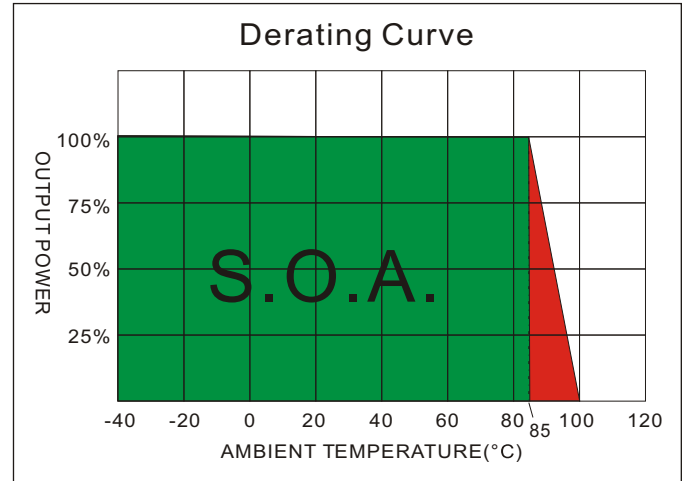
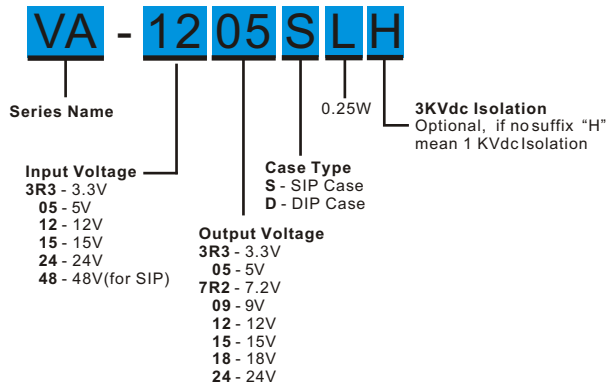
| ABSOLUTE MAXIMUM RATINGS(4)                                                                                          |             |
|----------------------------------------------------------------------------------------------------------------------|-------------|
| These are stress ratings. Exposure of devices to any of these conditions may adversely affect long-term reliability. |             |
| Input Voltage(100mS)                                                                                                 |             |
| 3.3 Models                                                                                                           | 0~5 Vdc     |
| 5 Models                                                                                                             | 0~7 Vdc     |
| 12 Models                                                                                                            | 0~15 Vdc    |
| 15 Models                                                                                                            | 0~18 Vdc    |
| 24 Models                                                                                                            | 0~28 Vdc    |
| 48 Models(for SIP)                                                                                                   | 0~54 Vdc    |
| Soldering Temperature<br>(1.5mm from case 10sec. max.)                                                               | 260°C ,max. |

| EMC SPECIFICATIONS      |               |                  |
|-------------------------|---------------|------------------|
| Radiated Emissions      | EN55022       | CLASS B          |
| Conducted Emissions (6) | EN55022       | CLASS B          |
| ESD                     | IEC 61000-4-2 | Perf. Criteria A |
| RS                      | IEC 61000-4-3 | Perf. Criteria A |
| EFT (7)                 | IEC 61000-4-4 | Perf. Criteria A |
| Surge (7)               | IEC 61000-4-5 | Perf. Criteria A |
| CS                      | IEC 61000-4-6 | Perf. Criteria A |
| PFMF                    | IEC 61000-4-8 | Perf. Criteria A |

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## VA - 0.25W Unregulated Single output

### PARTNUMBER STRUCTURE



## MODEL SELECTION GUIDE

| MODEL NUMBER | INPUT<br>Voltage Range<br>(Vdc) | INPUT Current   |                   | OUTPUT<br>Voltage<br>(Vdc) | OUTPUT Current<br>Full Load<br>(mA) | EFFICIENCY<br>@FL(%) | Capacitor<br>Load(μF) |
|--------------|---------------------------------|-----------------|-------------------|----------------------------|-------------------------------------|----------------------|-----------------------|
|              |                                 | No-Load<br>(mA) | Full Load<br>(mA) |                            |                                     |                      |                       |
| VA-3R33R3SL  | 3.3                             | 30              | 120               | 3.3                        | 75.7                                | 63                   | 100                   |
| VA-3R305SL   | 3.3                             | 25              | 115               | 5                          | 50                                  | 66                   | 100                   |
| VA-3R37R2SL  | 3.3                             | 25              | 118               | 7.2                        | 34.72                               | 64                   | 100                   |
| VA-3R309SL   | 3.3                             | 25              | 118               | 9                          | 27.77                               | 64                   | 100                   |
| VA-3R312SL   | 3.3                             | 32              | 113               | 12                         | 20.83                               | 67                   | 100                   |
| VA-3R315SL   | 3.3                             | 25              | 118               | 15                         | 16.67                               | 64                   | 100                   |
| VA-3R318SL   | 3.3                             | 25              | 115               | 18                         | 13.88                               | 66                   | 100                   |
| VA-3R324SL   | 3.3                             | 20              | 115               | 24                         | 10.41                               | 66                   | 100                   |
| VA-053R3SL   | 5                               | 20              | 78                | 3.3                        | 75.7                                | 64                   | 100                   |
| VA-0505 SL   | 5                               | 17              | 70                | 5                          | 50                                  | 71                   | 100                   |
| VA-057R2SL   | 5                               | 18              | 74                | 7.2                        | 34.72                               | 68                   | 100                   |
| VA-0509 SL   | 5                               | 15              | 68                | 9                          | 27.77                               | 73                   | 100                   |
| VA-0512 SL   | 5                               | 14              | 66                | 12                         | 20.83                               | 76                   | 100                   |
| VA-0515 SL   | 5                               | 20              | 70                | 15                         | 16.67                               | 71                   | 100                   |
| VA-0518 SL   | 5                               | 17              | 69                | 18                         | 13.88                               | 72                   | 100                   |
| VA-0524 SL   | 5                               | 18              | 65                | 24                         | 10.41                               | 77                   | 100                   |
| VA-123R3SL   | 12                              | 10              | 32                | 3.3                        | 75.7                                | 65                   | 100                   |
| VA-1205 SL   | 12                              | 12              | 31                | 5                          | 50                                  | 67                   | 100                   |
| VA-127R2SL   | 12                              | 10              | 31                | 7.2                        | 34.72                               | 67                   | 100                   |
| VA-1209 SL   | 12                              | 12              | 33                | 9                          | 27.77                               | 64                   | 100                   |
| VA-1212 SL   | 12                              | 15              | 33                | 12                         | 20.83                               | 63                   | 100                   |
| VA-1215 SL   | 12                              | 13              | 31                | 15                         | 16.67                               | 67                   | 100                   |
| VA-1218 SL   | 12                              | 13              | 32                | 18                         | 13.88                               | 65                   | 100                   |
| VA-1224 SL   | 12                              | 18              | 38                | 24                         | 10.41                               | 55                   | 100                   |
| VA-153R3SL   | 15                              | 12              | 26                | 3.3                        | 75.7                                | 63                   | 100                   |
| VA-1505 SL   | 15                              | 8               | 27                | 5                          | 50                                  | 62                   | 100                   |
| VA-157R2SL   | 15                              | 12              | 28                | 7.2                        | 34.72                               | 60                   | 100                   |
| VA-1509 SL   | 15                              | 12              | 28                | 9                          | 27.77                               | 60                   | 100                   |
| VA-1512 SL   | 15                              | 12              | 27                | 12                         | 20.83                               | 62                   | 100                   |
| VA-1515 SL   | 15                              | 10              | 27                | 15                         | 16.67                               | 61                   | 100                   |
| VA-1518 SL   | 15                              | 12              | 29                | 18                         | 13.88                               | 57                   | 100                   |
| VA-1524 SL   | 15                              | 12              | 29                | 24                         | 10.41                               | 57                   | 100                   |

Suffix "H" means 3 KVdcisolation

The models listed above is just for standard type.If you need the special specification product, please contact our service member by telephone presented in shortform cover or e-mail to : sales@motien.com.tw

## VA - 0.25W Unregulated Single output

| MODEL NUMBER | INPUT Voltage Range (Vdc) | INPUT Current |                | OUTPUT Voltage (Vdc) | OUTPUT Current Full Load (mA) | EFFICIENCY @FL (%) | Capacitor Load (uF) |
|--------------|---------------------------|---------------|----------------|----------------------|-------------------------------|--------------------|---------------------|
|              |                           | No-Load (mA)  | Full Load (mA) |                      |                               |                    |                     |
| VA-243R3SL   | 24                        | 8             | 17             | 3.3                  | 75.7                          | 60                 | 100                 |
| VA-2405 SL   | 24                        | 7             | 17             | 5                    | 50                            | 61                 | 100                 |
| VA-247R2SL   | 24                        | 8             | 18             | 7.2                  | 34.72                         | 57                 | 100                 |
| VA-2409 SL   | 24                        | 8             | 17             | 9                    | 27.77                         | 62                 | 100                 |
| VA-2412 SL   | 24                        | 10            | 19             | 12                   | 20.83                         | 56                 | 100                 |
| VA-2415 SL   | 24                        | 7             | 19             | 15                   | 16.67                         | 55                 | 100                 |
| VA-2418 SL   | 24                        | 10            | 18             | 18                   | 13.88                         | 57                 | 100                 |
| VA-2424 SL   | 24                        | 10            | 18             | 24                   | 10.41                         | 59                 | 100                 |
| VA-483R3SL   | 48                        | 8             | 9              | 3.3                  | 75.7                          | 55                 | 100                 |
| VA-4805 SL   | 48                        | 8             | 10             | 5                    | 50                            | 53                 | 100                 |
| VA-487R2SL   | 48                        | 8             | 10             | 7.2                  | 34.72                         | 54                 | 100                 |
| VA-4809 SL   | 48                        | 8             | 10             | 9                    | 27.77                         | 54                 | 100                 |
| VA-4812 SL   | 48                        | 8             | 9              | 12                   | 20.83                         | 55                 | 100                 |
| VA-4815 SL   | 48                        | 8             | 10             | 15                   | 16.67                         | 54                 | 100                 |
| VA-4818 SL   | 48                        | 8             | 11             | 18                   | 13.88                         | 49                 | 100                 |
| VA-4824 SL   | 48                        | 10            | 11             | 24                   | 10.41                         | 49                 | 100                 |
| VA-3R3 3R3DL | 3.3                       | 25            | 124            | 3.3                  | 75.7                          | 61                 | 100                 |
| VA-3R3 05DL  | 3.3                       | 25            | 118            | 5                    | 50                            | 64                 | 100                 |
| VA-3R3 7R2DL | 3.3                       | 25            | 118            | 7.2                  | 34.72                         | 64                 | 100                 |
| VA-3R3 09DL  | 3.3                       | 25            | 118            | 9                    | 27.77                         | 64                 | 100                 |
| VA-3R3 12DL  | 3.3                       | 25            | 120            | 12                   | 20.83                         | 63                 | 100                 |
| VA-3R3 15DL  | 3.3                       | 25            | 118            | 15                   | 16.67                         | 64                 | 100                 |
| VA-3R3 18DL  | 3.3                       | 25            | 115            | 18                   | 13.88                         | 66                 | 100                 |
| VA-3R3 24DL  | 3.3                       | 20            | 115            | 24                   | 10.41                         | 66                 | 100                 |
| VA-05 3R3DL  | 5                         | 20            | 83             | 3.3                  | 75.7                          | 60                 | 100                 |
| VA-05 05DL   | 5                         | 15            | 72             | 5                    | 50                            | 69                 | 100                 |
| VA-05 7R2DL  | 5                         | 18            | 71             | 7.2                  | 34.72                         | 70                 | 100                 |
| VA-05 09DL   | 5                         | 18            | 71             | 9                    | 27.77                         | 70                 | 100                 |
| VA-05 12DL   | 5                         | 20            | 74             | 12                   | 20.83                         | 68                 | 100                 |
| VA-05 15DL   | 5                         | 20            | 74             | 15                   | 16.67                         | 68                 | 100                 |
| VA-05 18DL   | 5                         | 17            | 68             | 18                   | 13.88                         | 73                 | 100                 |
| VA-05 24DL   | 5                         | 23            | 72             | 24                   | 10.41                         | 69                 | 100                 |
| VA-12 3R3DL  | 12                        | 12            | 31             | 3.3                  | 75.7                          | 67                 | 100                 |
| VA-12 05DL   | 12                        | 10            | 32             | 5                    | 50                            | 65                 | 100                 |
| VA-12 7R2DL  | 12                        | 15            | 32             | 7.2                  | 34.72                         | 65                 | 100                 |
| VA-12 09DL   | 12                        | 12            | 35             | 9                    | 27.77                         | 60                 | 100                 |
| VA-12 12DL   | 12                        | 13            | 31             | 12                   | 20.83                         | 68                 | 100                 |
| VA-12 15DL   | 12                        | 16            | 37             | 15                   | 16.67                         | 57                 | 100                 |
| VA-12 18DL   | 12                        | 16            | 38             | 18                   | 13.88                         | 55                 | 100                 |
| VA-12 24DL   | 12                        | 18            | 41             | 24                   | 10.41                         | 51                 | 100                 |
| VA-15 3R3DL  | 15                        | 12            | 26             | 3.3                  | 75.7                          | 63                 | 100                 |
| VA-15 05DL   | 15                        | 10            | 26             | 5                    | 50                            | 63                 | 100                 |
| VA-15 7R2DL  | 15                        | 12            | 28             | 7.2                  | 34.72                         | 60                 | 100                 |
| VA-15 09DL   | 15                        | 12            | 28             | 9                    | 27.77                         | 60                 | 100                 |
| VA-15 12DL   | 15                        | 12            | 28             | 12                   | 20.83                         | 60                 | 100                 |
| VA-15 15DL   | 15                        | 13            | 28             | 15                   | 16.67                         | 59                 | 100                 |
| VA-15 18DL   | 15                        | 12            | 29             | 18                   | 13.88                         | 57                 | 100                 |

Suffix "H" means 3 KVdc isolation

The models listed above is just for standard type. If you need the special specification product, please contact our service member by telephone presented in shortform cover or e-mail to : [sales@motien.com.tw](mailto:sales@motien.com.tw)

## VA - 0.25W Unregulated Single output

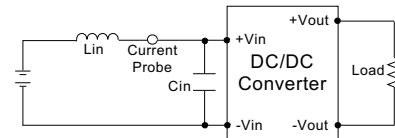
| MODEL NUMBER | INPUT Voltage Range (Vdc) | INPUT Current |                | OUTPUT Voltage (Vdc) | OUTPUT Current Full load (mA) | EFFICIENCY @FL(%) | Capacitor Load(uF) |
|--------------|---------------------------|---------------|----------------|----------------------|-------------------------------|-------------------|--------------------|
|              |                           | No-Load (mA)  | Full Load (mA) |                      |                               |                   |                    |
| VA-15 24DL   | 15                        | 12            | 29             | 24                   | 10.41                         | 57                | 100                |
| VA-24 3R3DL  | 24                        | 8             | 18             | 3.3                  | 75.7                          | 58                | 100                |
| VA-24 05DL   | 24                        | 7             | 17             | 5                    | 50                            | 60                | 100                |
| VA-24 7R2DL  | 24                        | 8             | 18             | 7.2                  | 34.72                         | 59                | 100                |
| VA-24 09DL   | 24                        | 8             | 18             | 9                    | 27.77                         | 58                | 100                |
| VA-24 12DL   | 24                        | 10            | 19             | 12                   | 20.83                         | 55                | 100                |
| VA-24 15DL   | 24                        | 7             | 18             | 15                   | 16.67                         | 59                | 100                |
| VA-24 18DL   | 24                        | 10            | 20             | 18                   | 13.88                         | 53                | 100                |
| VA-24 24DL   | 24                        | 10            | 19             | 24                   | 10.41                         | 55                | 100                |

Suffix "H" means 3 KVDc isolation

### TEST CONFIGURATIONS

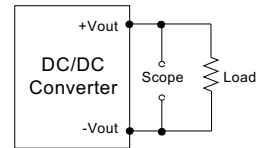
#### Input Reflected Ripple Current Test Step

Input reflected ripple current is measured through a source inductor  $L_{in}$  (12uH) and a source capacitor  $C_{in}$  (47uF, ESR<1.0Ω at 100KHz) at nominal input and full load.



#### Output Ripple & Noise Measurement Test

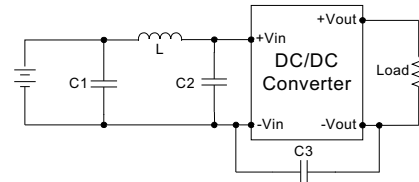
The Scope measurement bandwidth is 20MHz .



#### EMI Filter

Input filter components ( $C_1$ ,  $L$ ,  $C_2$ ,  $C_3$ ) are used to help meet conducted emissions requirement for the module.

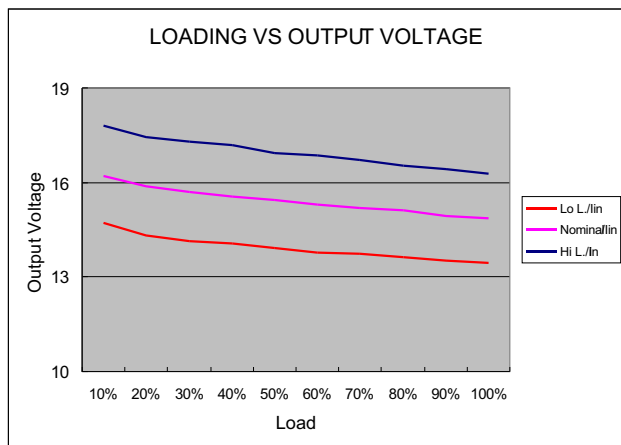
These components should be mounted as close as possible to the module; and all leads should be minimized to decrease radiated noise.



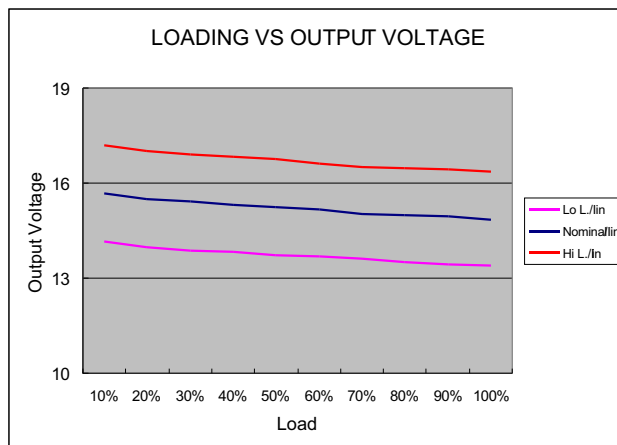
|             | C1                                | L    | C2               | C3              |
|-------------|-----------------------------------|------|------------------|-----------------|
| VA-3R3XXXXX | 1210, 2.2uF/100V                  | 18uH |                  |                 |
| VA-05XXXXXX | 1210, 2.2uF/100V                  | 18uH |                  |                 |
| VA-12XXXXXX | 1210, 2.2uF/100V                  | 18uH |                  |                 |
| VA-15XXXXXX | 1210, 2.2uF/100V                  | 18uH |                  |                 |
| VA-24XXXXXX | 1210, 2.2uF/100V                  | 18uH | 1210, 2.2uF/100V | 1206, 470pF/2KV |
| VA-48XXXXXX | Electrolytic capacitor, 10uF/100V | 18uH | 1210, 2.2uF/100V | 1206, 470pF/2KV |

### NOTE

1. Ripple/Noise measured with 20MHz bandwidth.
2. Tested by minimal  $V_{in}$  and constant resistive load.
3. Measured Input reflected ripple current with a simulated source inductance of 12uH.
4. Exceeding the absolute ratings of the unit could cause damage. It is not allowed for continuous operating.
5. Operation under no-load conditions will not damage these devices, however they may not meet all listed specifications.
6. Input filter components are required to help meet conducted emission class B, which application refer to the EMI Filter of design & feature configuration.
7. An external filter capacitor is required if the module has to meet IEC61000-4-4 and IEC61000-4-5.  
The filter capacitor Motien suggest: Nippon- chemi - con KY series, 470uF/100V.

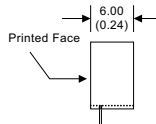
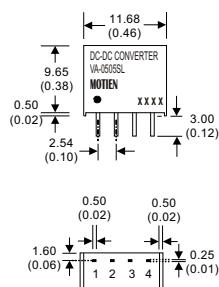


5 Models



12 Models

## MECHANICAL SPECIFICATIONS



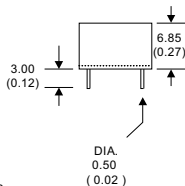
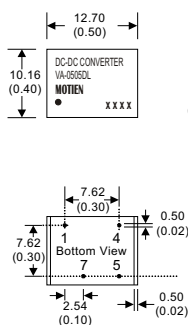
\* The thickness of 48V input voltage model is 7.50(0.29)

### 4 Pin SIL Package

Notes : All dimensions are typical in millimeters ( inches ).  
1. Pin diameter:  $0.5 \pm 0.05$  (  $0.02 \pm 0.002$  )  
2. Pin pitch and length tolerance:  $\pm 0.35$  (  $\pm 0.014$  )  
3. Case Tolerance:  $\pm 0.5$  (  $\pm 0.02$  )

| PIN CONNECTIONS |           |
|-----------------|-----------|
| PIN NUMBER      | SINGLE    |
| 1               | -V Input  |
| 2               | +V Input  |
| 3               | -V Output |
| 4               | +V Output |

(The Pin Connection of high isolation one is the same with normal one.)



### 8 Pin DIL Package

Notes : All dimensions are typical in millimeters ( inches ).  
1. Pin diameter:  $0.5 \pm 0.05$  (  $0.02 \pm 0.002$  )  
2. Pin pitch and length tolerance:  $\pm 0.35$  (  $\pm 0.014$  )  
3. Case Tolerance:  $\pm 0.5$  (  $\pm 0.02$  )

| PIN CONNECTIONS |           |
|-----------------|-----------|
| PIN NUMBER      | SINGLE    |
| 1               | -V Input  |
| 4               | +V Input  |
| 5               | +V Output |
| 7               | -V Output |

(The Pin Connection of high isolation one is the same with normal one.)



**MOTIEN**



ISO 9001 . ISO 14001 . IECQ QC-080000

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DRAWING:

APPROVED:

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