# V5-1.5W Series

*1.5W Regulated Single & Dual output*

MOTIEN TECHNOLOGY

## Features

- Regulated 24 Pin DIL Package
- Full SMD Technology
- 1000 VDC Isolation, Up to 6000 VDC(Metal Case Up To 3000Vdc)
- Continuous Short Circuit Protection
- Efficiency up to 79%
- -40 ~ 85°C Operation Temperature Range
- Plastic Case Standard, Optional Metal Case


CE

The V5 series is a family of cost effective 1.5W single & dual output DC-DC converters. These converters combine miniature package in a 24-pin DIL compatible case with high performance features such as 1000 VDC~6000 VDC input/output isolation voltage, continuous short circuit protection with automatic restart and tight line / load regulation. Devices are encapsulated using flame retardant resin. Input voltages of 5, 12, 24 with output voltage of 3.3, 5, 7.2, 9, 12, 15, 18, 24, ±3.3, ±5, ±7.2, ±9, ±12, ±15 ,±18 and ±24 Vdc. High performance features include high efficiency operation up to 79% and output voltage accuracy of ±2% maximum. Standard features include an input range of ±10% tolerance and low output noise and ripple.

All specifications typical at Ta=25°C, nominal input voltage and full load unless otherwise specified

### OUTPUT SPECIFICATIONS

| | |
|---|---|
| Voltage accuracy | ±2%,max. |
| Line regulation | Single & Dual : ±0.5%,max. |
| Load regulation | Single ( 0% to 100% ) : ±0.5%,max. |
| | Dual ( 0% to 100% ) : ±0.5%,max(balanced load) |
| | Single & Dual (Output 3.3V Model) : ±1.0%,max. |
| Ripple & noise (20 MHz bandwidth)(1) | 75mVpk-pk,max. |
| Short Circuit Protection | Indefinite(Automatic Recovery) |
| Temperature coefficient | |
| Capacitor load(2) | ±0.02%/°C |
| Transient Recovery Time(3) | See table |
| Transient Response | ±3%, max. |

### INPUT SPECIFICATIONS

| | |
|---|---|
| Voltage Range | ±10% |
| Max. Input Current | See table |
| No-Load Input Current | See table |
| Input Filter | PI type |
| Input Reflected Ripple Current(4) | 35mApk-pk |

### GENERAL SPECIFICATIONS

| | |
|---|---|
| Efficiency | See table |
| I/O Isolation Voltage(60sec) | |
| Input/Output | 1000~6000Vdc |
| Metal Case/Input&Ouput | 1000Vdc |
| I/O Isolation Capacitance | 60 pF Typ. |
| I/O Isolation Resistance | 1000M Ohm |
| Switching Frequency | Single 40kHz typ. |
| | Dual 350kHz typ. |
| Humidity | 95% rel H |
| Reliability Calculated MTBF(MIL-HDBK-217 F) | >1Mhrs |
| Safety Standard : ( designed to meet ) | IEC 60950-1 |

### PHYSICAL SPECIFICATIONS

| | |
|---|---|
| Case Material | Non-conductive Black Plastic(UL94V-0 rated) |
| | Nickel-coated Copper |
| Base Material | Non-conductive Black Plastic(UL94V-0 rated) |
| Pin Material | 0.5mm Alloy42 Solder-coated |
| | Φ0.5mm Brass Solder-coated |
| Potting Material | Epoxy (UL94V-0 rated) |
| Weight | 12.5g(Plastic Case)/17.0g(Metal Case) |
| Dimensions | 1.25"x0.8"x0.4" |

### ENVIRONMENT SPECIFICATIONS

| | |
|---|---|
| Operating Temperature | -40°C~85°C |
| Maximum Case Temperature | 100°C |
| Storage Temperature | -40°C~125°C |
| Cooling | Nature Convection |

### ABSOLUTE MAXIMUM RATINGS(5)

These are stress ratings. Exposure of devices to any of these conditions may adversely affect long-term reliability.

| | |
|---|---|
| Input Surge Voltage(100mS) | |
| 5 Models | 7 Vdc ,max. |
| 12 Models | 15 Vdc ,max. |
| 24 Models | 28 Vdc ,max. |
| Soldering Temperature (1.5mm from case 10sec max.) | 260°C ,max. |

### EMC SPECIFICATIONS

| | | |
|---|---|---|
| Radiated Emissions | EN55032 | CLASS A |
| Conducted Emissions (7) | EN55032 | CLASS A |
| ESD | IEC 61000-4-2 | Perf. Criteria A |
| RS | IEC 61000-4-3 | Perf. Criteria A |
| EFT (8) | IEC 61000-4-4 | Perf. Criteria A |
| Surge (8) | 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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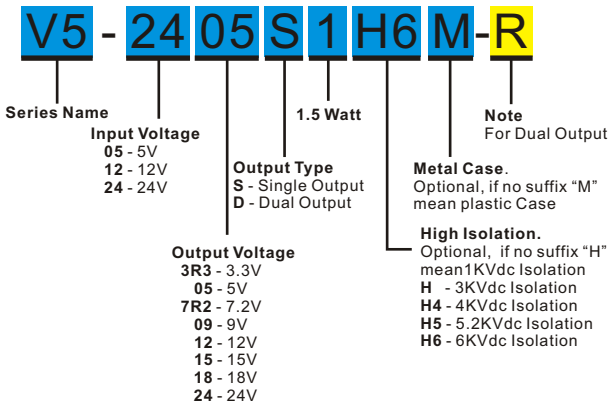
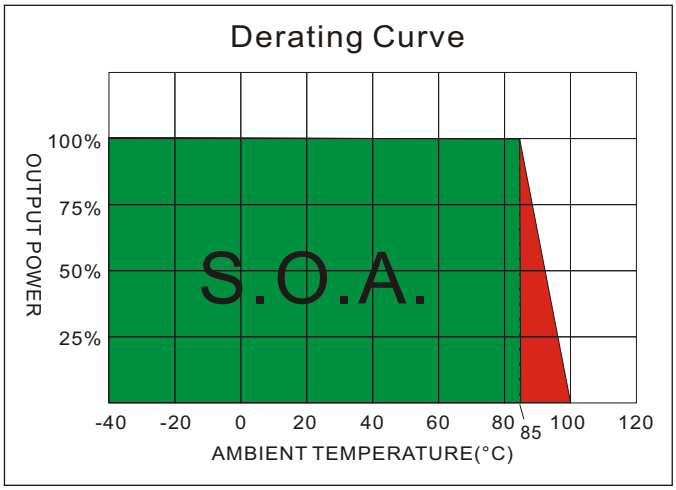
## PART NUMBER STRUCTURE




# MODEL SELECTION GUIDE

| MODEL NUMBER | INPUT Voltage Range (Vdc) | INPUT Current No-Load (mA, max.) | INPUT Current Full Load (mA, typ.) | OUTPUT Voltage (Vdc) | OUTPUT Current Full load (mA) | EFFICIENCY @FL (%, typ.) | Capacitor Load @FL (µF, max.) |
|---|---|---|---|---|---|---|---|
| V5-053R3S1 | 5 | 50 | 426 | 3.3 | 400 | 62 | 220 |
| V5-0505S1 | 5 | 42 | 448 | 5 | 300 | 67 | 220 |
| V5-057R2S1 | 5 | 50 | 462 | 7.2 | 208 | 65 | 220 |
| V5-0509S1 | 5 | 65 | 462 | 9 | 167 | 65 | 220 |
| V5-0512S1 | 5 | 50 | 429 | 12 | 125 | 70 | 220 |
| V5-0515S1 | 5 | 65 | 441 | 15 | 100 | 68 | 220 |
| V5-0518S1 | 5 | 60 | 448 | 18 | 83 | 67 | 220 |
| V5-0524S1 | 5 | 60 | 448 | 24 | 63 | 67 | 220 |
| V5-123R3S1 | 12 | 50 | 177 | 3.3 | 400 | 62 | 220 |
| V5-1205S1 | 12 | 25 | 187 | 5 | 300 | 67 | 220 |
| V5-127R2S1 | 12 | 50 | 189 | 7.2 | 208 | 66 | 220 |
| V5-1209S1 | 12 | 40 | 192 | 9 | 167 | 65 | 220 |
| V5-1212S1 | 12 | 26 | 179 | 12 | 125 | 70 | 220 |
| V5-1215S1 | 12 | 40 | 195 | 15 | 100 | 64 | 220 |
| V5-1218S1 | 12 | 45 | 198 | 18 | 83 | 63 | 220 |
| V5-1224S1 | 12 | 40 | 202 | 24 | 63 | 62 | 220 |
| V5-243R3S1 | 24 | 35 | 104 | 3.3 | 400 | 53 | 220 |
| V5-2405S1 | 24 | 20 | 98 | 5 | 300 | 64 | 220 |
| V5-247R2S1 | 24 | 35 | 98 | 7.2 | 208 | 64 | 220 |
| V5-2409S1 | 24 | 35 | 98 | 9 | 167 | 64 | 220 |
| V5-2412S1 | 24 | 16 | 93 | 12 | 125 | 67 | 220 |
| V5-2415S1 | 24 | 40 | 95 | 15 | 100 | 66 | 220 |
| V5-2418S1 | 24 | 40 | 96 | 18 | 83 | 65 | 220 |
| V5-2424S1 | 24 | 40 | 96 | 24 | 63 | 65 | 220 |
| V5-053R3D1-R | 5 | 15 | 377 | ±3.3 | ±200 | 70 | ±1000 |
| V5-0505D1-R | 5 | 40 | 417 | ±5 | ±150 | 72 | ±470 |
| V5-057R2D1-R | 5 | 35 | 429 | ±7.2 | ±208 | 70 | ±470 |
| V5-0509D1-R | 5 | 20 | 429 | ±9 | ±83 | 70 | ±470 |
| V5-0512D1-R | 5 | 25 | 423 | ±12 | ±63 | 71 | ±470 |
| V5-0515D1-R | 5 | 30 | 423 | ±15 | ±50 | 71 | ±470 |
| V5-0518D1-R | 5 | 30 | 429 | ±18 | ±83 | 70 | ±220 |

Suffix "H" means 3KVdc isolation  Suffix "H4" means 4KVdc isolation  Suffix "H5" means 5.2KVdc isolation  Suffix "H6" means 6KVdc isolation

Suffix "M" means Metal Case Up To 3KVdc 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

| MODEL NUMBER | INPUT Voltage Range (Vdc) | INPUT Current No-Load (mA, max.) | INPUT Current Full Load (mA, typ.) | OUTPUT Voltage (Vdc) | OUTPUT Current Full load (mA) | EFFICIENCY @FL (%, typ.) | Capacitor Load @FL (µF, max.) |
|---|---|---|---|---|---|---|---|
| V5-0524D1-R | 5 | 35 | 435 | ±24 | ±31.5 | 69 | ±220 |
| V5-123R3D1-R | 12 | 15 | 147 | ±3.3 | ±200 | 75 | ±1000 |
| V5-1205D1-R | 12 | 6 | 162 | ±5 | ±150 | 77 | ±470 |
| V5-127R2D1-R | 12 | 8 | 167 | ±7.2 | ±208 | 75 | ±470 |
| V5-1209D1-R | 12 | 10 | 158 | ±9 | ±83 | 79 | ±470 |
| V5-1212D1-R | 12 | 24 | 164 | ±12 | ±63 | 76 | ±470 |
| V5-1215D1-R | 12 | 20 | 169 | ±15 | ±50 | 74 | ±470 |
| V5-1218D1-R | 12 | 20 | 169 | ±18 | ±83 | 74 | ±220 |
| V5-1224D1-R | 12 | 20 | 164 | ±24 | ±31.5 | 76 | ±220 |
| V5-243R3D1-R | 24 | 8 | 76 | ±3.3 | ±200 | 72 | ±1000 |
| V5-2405D1-R | 24 | 5 | 83 | ±5 | ±150 | 75 | ±470 |
| V5-247R2D1-R | 24 | 8 | 83 | ±7.2 | ±208 | 75 | ±470 |
| V5-2409D1-R | 24 | 10 | 82 | ±9 | ±83 | 76 | ±470 |
| V5-2412D1-R | 24 | 10 | 81 | ±12 | ±63 | 77 | ±470 |
| V5-2415D1-R | 24 | 10 | 82 | ±15 | ±50 | 76 | ±470 |
| V5-2418D1-R | 24 | 13 | 89 | ±18 | ±83 | 70 | ±220 |
| V5-2424D1-R | 24 | 16 | 87 | ±24 | ±31.5 | 72 | ±220 |

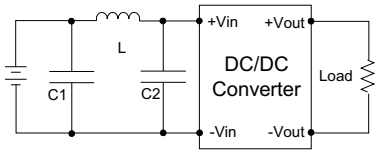
Suffix “H” means 3KVdc isolation Suffix “H4” means 4KVdc isolation Suffix “H5” means 5.2KVdc isolation Suffix “H6” means 6KVdc isolation

Suffix “M” means Metal Case Up To 3KVdc isolation

## TEST CONFIGURATIONS

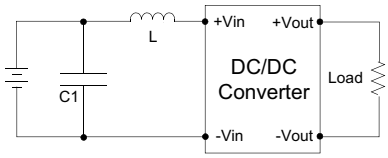
### EMI Filter

Input filter components (C1,C2, L) 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 |
|---|---|---|---|
| V5-05XXXXX | 220µF/100V | 12µH | 220µF/100V |
| V5-12XXXXX | 220µF/100V | 12µH | 220µF/100V |
| V5-24XXXXX | 220µF/100V | 12µH | 220µF/100V |

Single Output




| | C1 | L |
|---|---|---|
| V5-05XXXXX | 220µF/100V | 12µH |
| V5-12XXXXX | 220µF/100V | 12µH |
| V5-24XXXXX | 220µF/100V | 12µH |

Dual Output

## NOTE

1.Ripple/Noise measured with 20MHz bandwidth.
2.Tested by minimal Vin and constant resistive load.
3.Tested by normal Vin and 25% load step change ( 75%-50%-25% of Io )
4.Measured Input reflected ripple current with a simulated source inductance of 12µH.
5.Exceeding the absolute ratings of the unit could cause damage. It is not allowed for continuous operating.
6.Operation under no-load conditions will not damage these devices, however they may not meet all listed specifications.
7.Input filter components are be required to help meet conducted emission class A, which application refer to the EMI Filter of design & feature configuration.
8.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, 220µF/100V.

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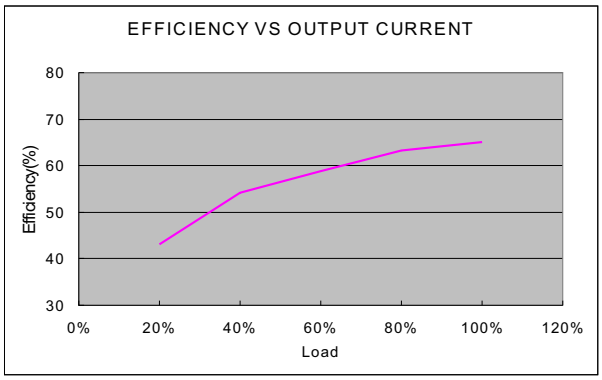
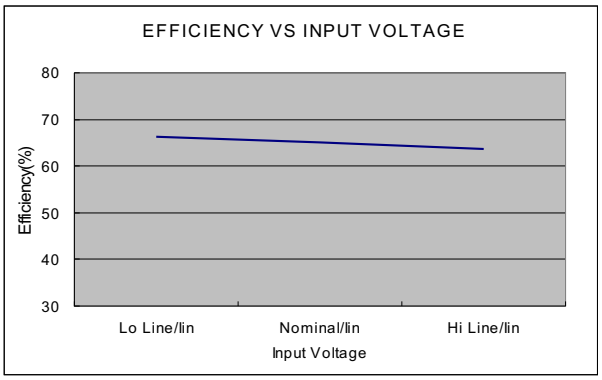
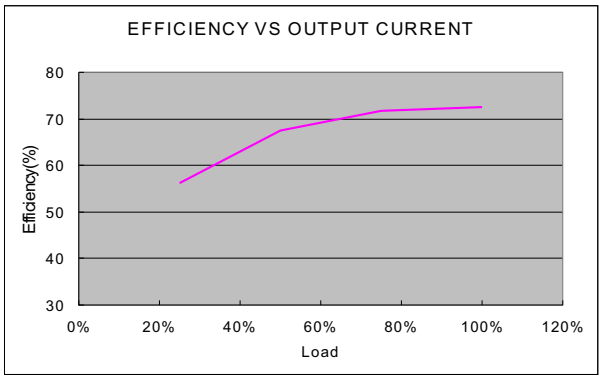
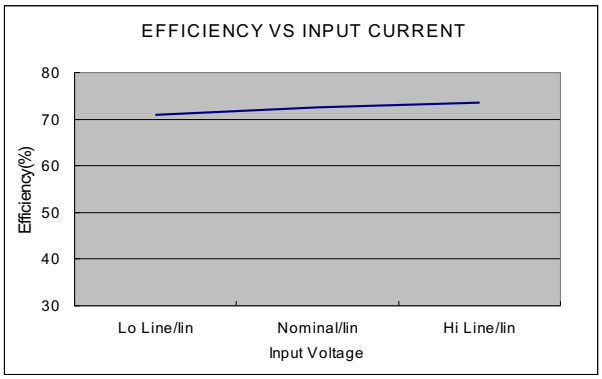


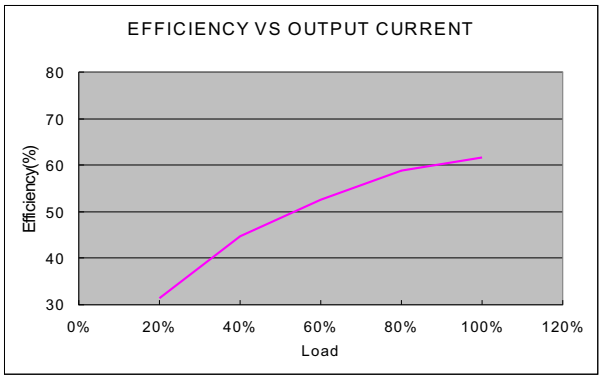



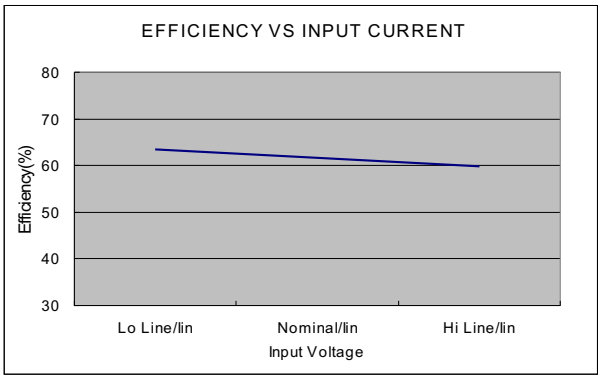

05 Single Output Models



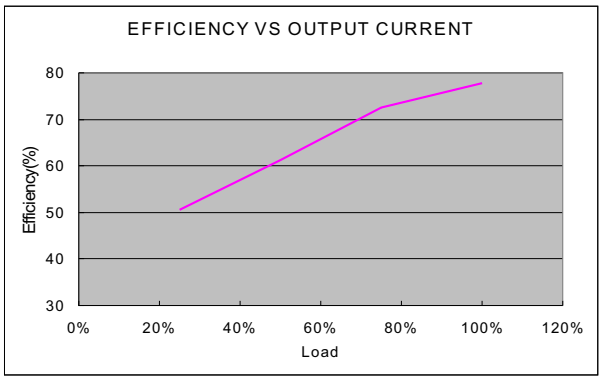



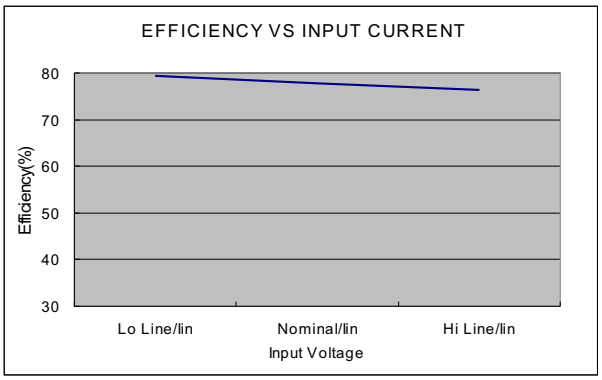

05 Dual Output Models




24 Single Output Models




24 Dual Output Models

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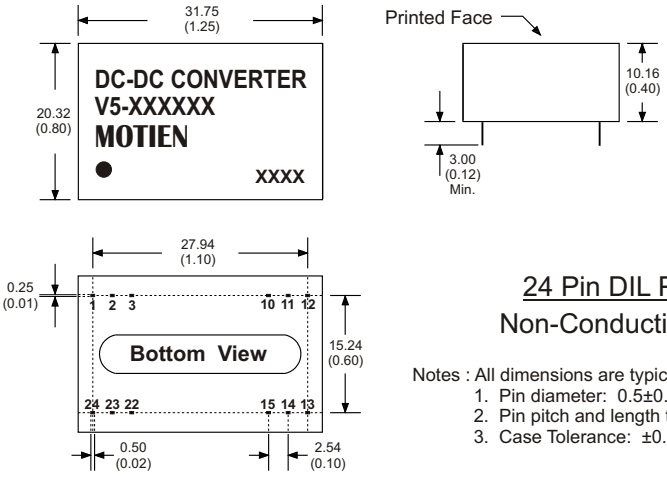
## MECHANICAL SPECIFICATIONS

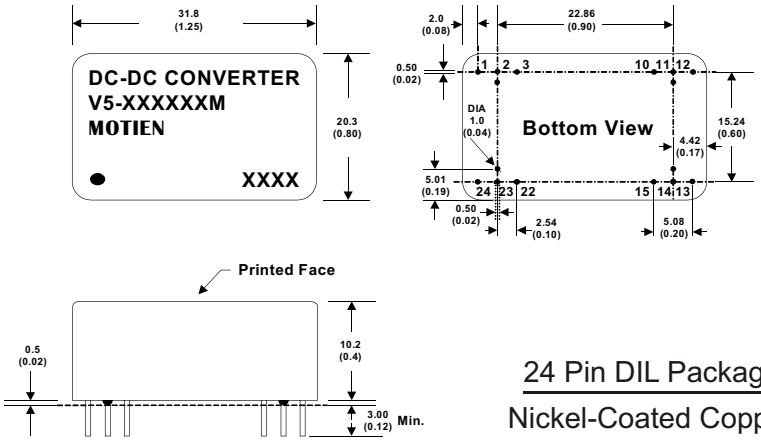



24 Pin DIL Package

Non-Conductive Plastic

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

| PIN CONNECTIONS | | | | |
|---|---|---|---|---|
| PIN NUMBER | SINGLE | DUAL | SINGLE-H | DUAL-H |
| 1 | +V Input | +V Input | +V Input | +V Input |
| 2 | N.C. | −V Output | +V Input | +V Input |
| 3 | N.C. | Common | N.P. | N.P. |
| 10 | −V Output | Common | N.P. | Common |
| 11 | +V Output | +V Output | N.P. | Common |
| 12 | −V Input | −V Input | −V Output | N.P. |
| 13 | −V Input | −V Input | +V Output | −V Output |
| 14 | +V Output | +V Output | N.P. | N.P. |
| 15 | −V Output | Common | N.P. | +V Output |
| 22 | N.C. | Common | N.P. | N.P. |
| 23 | N.C. | −V Output | −V Input | −V Input |
| 24 | +V Input | +V Input | −V Input | −V Input |




24 Pin DIL Package

Nickel-Coated Copper

Notes: All dimensions are typical in millimeters ( inches ).
1. Pin diameter: 0.5 ±0.05 ( 0.02 ±0.002 )
2. Pin pitch and length tolerance: ±0.35 ( ±0.014 )
3. Case Tolerance: ±0.5 ( ±0.02 )
4. Stand-off tolerance: ±0.1 ( ±0.004 )

For “M” Case

| PIN CONNECTIONS | | | | |
|---|---|---|---|---|
| PIN NUMBER | SINGLE | DUAL | SINGLE-H | DUAL-H |
| 1 | +V Input | +V Input | +V Input | +V Input |
| 2 | N.C. | −V Output | +V Input | +V Input |
| 3 | N.C. | Common | N.P. | N.P. |
| 10 | −V Output | Common | N.P. | Common |
| 11 | +V Output | +V Output | N.P. | Common |
| 12 | −V Input | −V Input | −V Output | N.P. |
| 13 | −V Input | −V Input | +V Output | −V Output |
| 14 | +V Output | +V Output | N.P. | N.P. |
| 15 | −V Output | Common | N.P. | +V Output |
| 22 | N.C. | Common | N.P. | N.P. |
| 23 | N.C. | −V Output | −V Input | −V Input |
| 24 | +V Input | +V Input | −V Input | −V Input |