

# D5-3W Series

3W Regulated Single & Dual output



## 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 83%
- -40 ~ 85°C Operation Temperature Range
- Plastic Case Standard, Optional Metal Case

The D5 series is a family of cost effective 3W 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 high 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, 24,  $\pm 3.3$ ,  $\pm 5$ ,  $\pm 7.2$ ,  $\pm 9$ ,  $\pm 12$ ,  $\pm 15$  and  $\pm 24$  Vdc. High performance features include high efficiency operation up to 83% and output voltage accuracy of  $\pm 2\%$  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                     | $\pm 2\%$                                                                                                                                                   |
| Line regulation                      | Single & Dual : $\pm 0.5\%$ , max.                                                                                                                          |
| Load regulation                      | Single (0% to 100%) : $\pm 1.0\%$ , max.<br>Dual (0% to 100%) : $\pm 0.5\%$ , max (balanced load)<br>Single & Dual (Output 3.3V Model) : $\pm 2.0\%$ , max. |
| Ripple & noise (20 MHz bandwidth)(1) | 75mV pk-pk, max.                                                                                                                                            |
| Short Circuit Protection             | Indefinite (Automatic Recovery)                                                                                                                             |
| Temperature coefficient              | $\pm 0.02\%/^\circ\text{C}$                                                                                                                                 |
| Capacitor load(2)                    | See table                                                                                                                                                   |
| Transient Recovery Time(3)           | $\pm 3\%$ , max.                                                                                                                                            |
| Transient Response                   | (3.3V Output $\pm 5\%$ , max.)                                                                                                                              |

| INPUT SPECIFICATIONS              |            |
|-----------------------------------|------------|
| Voltage Range                     | $\pm 10\%$ |
| Max. Input Current                | See table  |
| No-Load Input Current             | See table  |
| Input Filter                      | PI type    |
| Input Reflected Ripple Current(4) | 35mA pk-pk |

| GENERAL SPECIFICATIONS                       |                                     |
|----------------------------------------------|-------------------------------------|
| Efficiency                                   | See table                           |
| I/O Isolation Voltage (3 sec)                |                                     |
| Input/Output                                 | 1000~6000Vdc                        |
| Metal Case/Input&Output                      | 1000Vdc                             |
| I/O Isolation Capacitance                    | 60 pF Typ.                          |
| I/O Isolation Resistance                     | 1000M Ohm                           |
| Switching Frequency                          | Single 40kHz typ<br>Dual 250kHz typ |
| Humidity                                     | 95% rel H                           |
| Reliability Calculated MTBF (MIL-HDBK-217 F) | >1 Mhrs                             |
| Safety Standard : (designed to meet)         | IEC 60950-1                         |

| PHYSICAL SPECIFICATIONS |                                                                      |
|-------------------------|----------------------------------------------------------------------|
| Case Material           | Non-conductive Black Plastic (UL94V-0 rated)<br>Nickel-coated Copper |
| Base Material           | Non-conductive Black Plastic (UL94V-0 rated)                         |
| Pin Material            | 0.5mm Alloy42 Solder-coated<br>0.5mm Brass Solder-coated             |
| Potting Material        | Epoxy (UL94V-0 rated)                                                |
| Weight                  | 12.5g (Plastic Case)/15.0g (Metal Case)                              |
| Dimensions              | 1.25"x0.8"x0.4"                                                      |

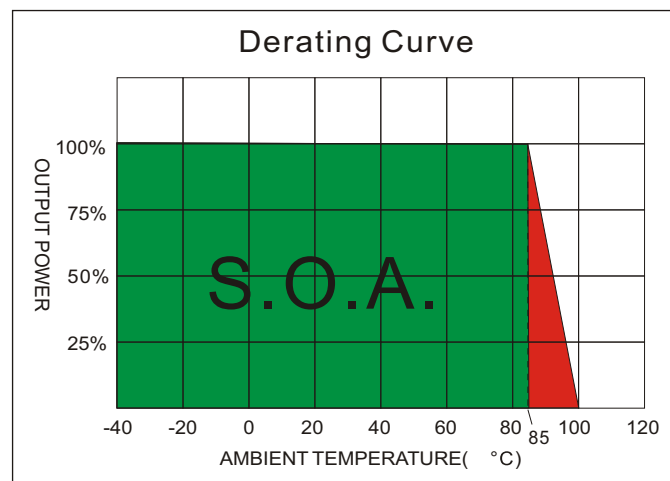
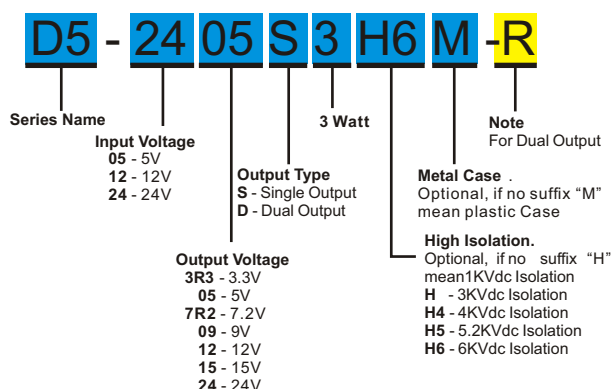
| ENVIRONMENT SPECIFICATIONS |                                 |
|----------------------------|---------------------------------|
| Operating Temperature      | -40°C~85°C (See Derating Curve) |
| Maximum Case Temperature   | 100°C                           |
| Storage Temperature        | -40°C~125°C                     |
| 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<br>(1.5mm from case 10 sec. max.)                                                              | 260°C, max.  |

| EMC SPECIFICATIONS      |               |                  |
|-------------------------|---------------|------------------|
| Radiated Emissions      | EN55022       | CLASS A          |
| Conducted Emissions (7) | EN55022       | CLASS A          |
| ESD                     | IEC 61000-4-2 | Perf. Criteria A |
| RS                      | IEC 61000-4-3 | Perf. Criteria A |
| FT (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 |

## D5 - 3W Regulated Single & Dual output

### PART NUMBER STRUCTURE



## MODEL SELECTION GUIDE

| MODEL NUMBER | INPUT<br>Voltage Range<br>(Vdc) | INPUT Current   |                   | OUTPUT<br>Voltage<br>(Vdc) | OUTPUT Current    | EFFICIENCY<br>@FL(%) | Capacitor<br>Load(uF) |
|--------------|---------------------------------|-----------------|-------------------|----------------------------|-------------------|----------------------|-----------------------|
|              |                                 | No-Load<br>(mA) | Full Load<br>(mA) |                            | Full load<br>(mA) |                      |                       |
| D5-053R3S3   | 5                               | 62              | 683               | 3.3                        | 600               | 58                   | 470                   |
| D5-0505S3    | 5                               | 65              | 909               | 5                          | 600               | 66                   | 470                   |
| D5-057R2S3   | 5                               | 65              | 923               | 7.2                        | 417               | 65                   | 470                   |
| D5-0509S3    | 5                               | 70              | 882               | 9                          | 333               | 68                   | 470                   |
| D5-0512S3    | 5                               | 60              | 845               | 12                         | 250               | 71                   | 470                   |
| D5-0515S3    | 5                               | 70              | 833               | 15                         | 200               | 72                   | 470                   |
| D5-0518S3    | 5                               | 70              | 857               | 18                         | 167               | 70                   | 470                   |
| D5-0524S3    | 5                               | 100             | 896               | 24                         | 125               | 67                   | 470                   |
| D5-123R3S3   | 12                              | 30              | 232               | 3.3                        | 600               | 71                   | 470                   |
| D5-1205S3    | 12                              | 36              | 253               | 5                          | 600               | 66                   | 470                   |
| D5-127R2S3   | 12                              | 32              | 235               | 7.2                        | 417               | 71                   | 470                   |
| D5-1209S3    | 12                              | 32              | 235               | 9                          | 333               | 71                   | 470                   |
| D5-1212S3    | 12                              | 37              | 231               | 12                         | 250               | 72                   | 470                   |
| D5-1215S3    | 12                              | 35              | 225               | 15                         | 200               | 74                   | 470                   |
| D5-1218S3    | 12                              | 35              | 222               | 18                         | 167               | 75                   | 470                   |
| D5-1224S3    | 12                              | 55              | 235               | 24                         | 125               | 71                   | 470                   |
| D5-243R3S3   | 24                              | 10              | 158               | 3.3                        | 700               | 61                   | 470                   |
| D5-2405S3    | 24                              | 23              | 187               | 5                          | 600               | 67                   | 470                   |
| D5-247R2S3   | 24                              | 25              | 189               | 7.2                        | 417               | 66                   | 470                   |
| D5-2409S3    | 24                              | 27              | 184               | 9                          | 333               | 68                   | 470                   |
| D5-2412S3    | 24                              | 30              | 181               | 12                         | 250               | 69                   | 470                   |
| D5-2415S3    | 24                              | 28              | 179               | 15                         | 200               | 70                   | 470                   |
| D5-2418S3    | 24                              | 16              | 169               | 18                         | 167               | 74                   | 470                   |
| D5-2424S3    | 24                              | 20              | 167               | 24                         | 125               | 75                   | 470                   |
| D5-053R3D3-R | 5                               | 15              | 776               | ±3.3                       | ±400              | 68                   | ±1000                 |
| D5-0505D3-R  | 5                               | 20              | 845               | ±5                         | ±300              | 71                   | ±470                  |
| D5-057R2D3-R | 5                               | 20              | 811               | ±7.2                       | ±417              | 74                   | ±470                  |
| D5-0509D3-R  | 5                               | 25              | 789               | ±9                         | ±167              | 76                   | ±470                  |
| D5-0512D3-R  | 5                               | 40              | 822               | ±12                        | ±125              | 73                   | ±470                  |
| D5-0515D3-R  | 5                               | 30              | 811               | ±15                        | ±100              | 74                   | ±470                  |
| D5-0518D3-R  | 5                               | 45              | 822               | ±18                        | ±167              | 73                   | ±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 : info@zimtec-electronics.de

## D5 - 3W Regulated Single & Dual output

| MODEL NUMBER | INPUT<br>Voltage Range<br>(Vdc) | INPUT Current   |                   | OUTPUT<br>Voltage<br>(Vdc) | OUTPUT Current    |    | EFFICIENCY<br>@FL(%) | Capacitor<br>Load(μF) |
|--------------|---------------------------------|-----------------|-------------------|----------------------------|-------------------|----|----------------------|-----------------------|
|              |                                 | No-Load<br>(mA) | Full Load<br>(mA) |                            | Full load<br>(mA) |    |                      |                       |
| D5-0524D3-R  | 5                               | 45              | 800               | ±24                        | ±62.5             | 75 | ±220                 |                       |
| D5-123R3D3-R | 12                              | 7               | 306               | ±3.3                       | ±400              | 72 | ±1000                |                       |
| D5-1205D3-R  | 12                              | 8               | 321               | ±5                         | ±300              | 78 | ±1000                |                       |
| D5-127R2D3-R | 12                              | 8               | 313               | ±7.2                       | ±417              | 80 | ±470                 |                       |
| D5-1209D3-R  | 12                              | 10              | 313               | ±9                         | ±167              | 80 | ±470                 |                       |
| D5-1212D3-R  | 12                              | 10              | 321               | ±12                        | ±125              | 78 | ±470                 |                       |
| D5-1215D3-R  | 12                              | 15              | 309               | ±15                        | ±100              | 81 | ±470                 |                       |
| D5-1218D3-R  | 12                              | 15              | 309               | ±18                        | ±167              | 81 | ±220                 |                       |
| D5-1224D3-R  | 12                              | 20              | 316               | ±24                        | ±62.5             | 79 | ±220                 |                       |
| D5-243R3D3-R | 24                              | 5               | 174               | ±3.3                       | ±455              | 72 | ±1000                |                       |
| D5-2405D3-R  | 24                              | 6               | 158               | ±5                         | ±300              | 79 | ±470                 |                       |
| D5-247R2D3-R | 24                              | 5               | 158               | ±7.2                       | ±417              | 79 | ±470                 |                       |
| D5-2409D3-R  | 24                              | 7               | 152               | ±9                         | ±167              | 82 | ±470                 |                       |
| D5-2412D3-R  | 24                              | 8               | 151               | ±12                        | ±125              | 83 | ±470                 |                       |
| D5-2415D3-R  | 24                              | 10              | 154               | ±15                        | ±100              | 81 | ±470                 |                       |
| D5-2418D3-R  | 24                              | 15              | 156               | ±18                        | ±167              | 80 | ±220                 |                       |
| D5-2424D3-R  | 24                              | 15              | 154               | ±24                        | ±62.5             | 81 | ±220                 |                       |

Suffix "H" means 3KVdc isolation

Suffix "H4" means 4KVdc isolation

Suffix "H5" means 5.2KVdc isolation

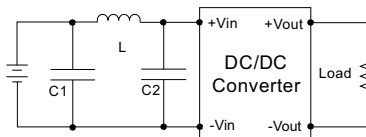
Suffix "H6" means 6KVdc isolation

Suffix "M" means Metal Case Up To 3KVdc isolation

### TEST CONFIGURATIONS

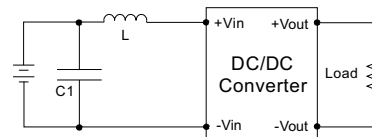
#### EMI Filter

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         |
|------------|------------|------|------------|
| D5-05XXXXX | 220μF/100V | 12μH | 220μF/100V |
| D5-12XXXXX | 220μF/100V | 12μH | 220μF/100V |
| D5-24XXXXX | 220μF/100V | 12μH | 220μF/100V |

#### Single Output



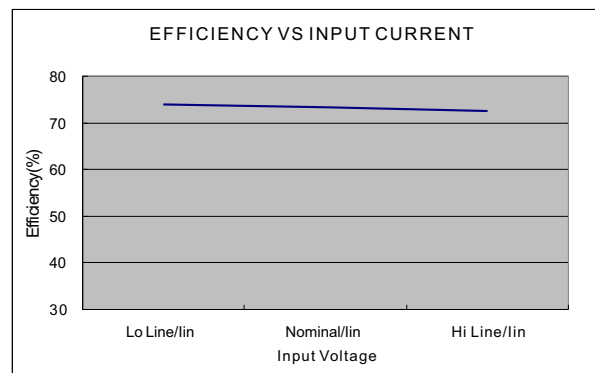
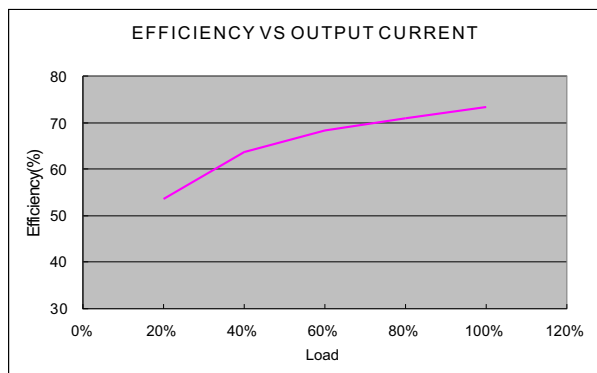
|            | C1         | L    |
|------------|------------|------|
| D5-05XXXXX | 220μF/100V | 12μH |
| D5-12XXXXX | 220μF/100V | 12μH |
| D5-24XXXXX | 220μF/100V | 12μH |

#### Dual Output

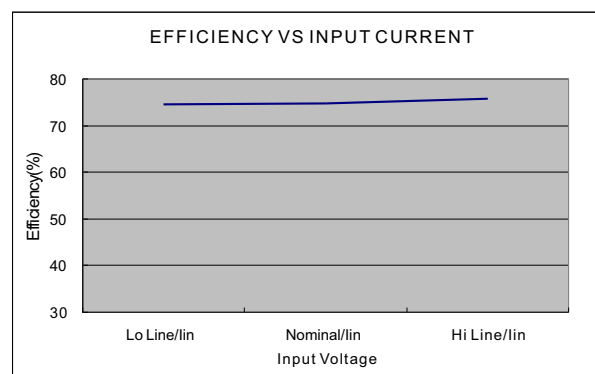
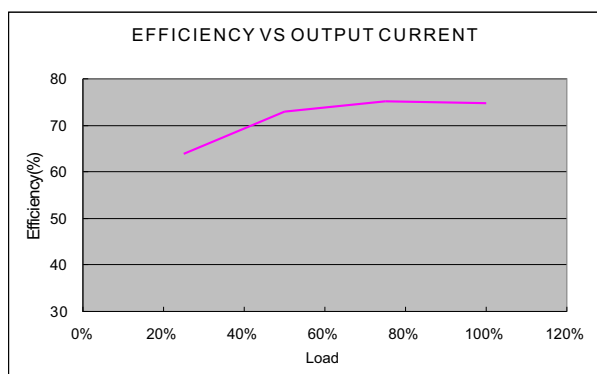
### NOTE

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 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 ZimTec Electronics suggest: Nippon - chemi - con KY series, 220μF/100V.

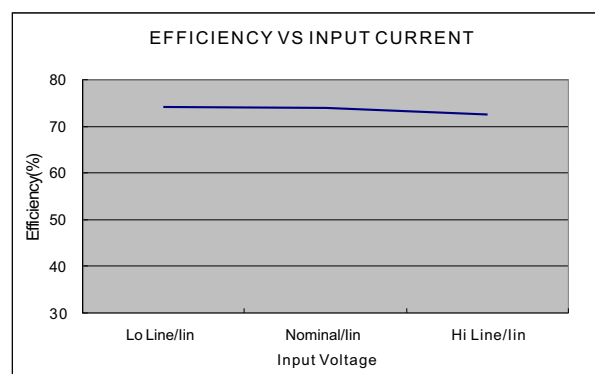
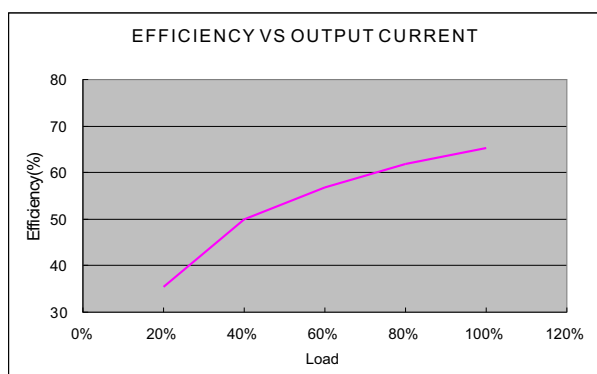
The models listed above is just for standard type. If you need the special specification product, please contact our service member by telephone presented in shortform cover or e-mail to : [info@zimtec-electronics.de](mailto:info@zimtec-electronics.de)



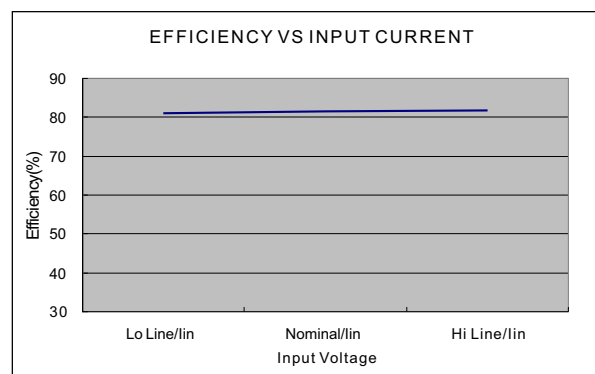
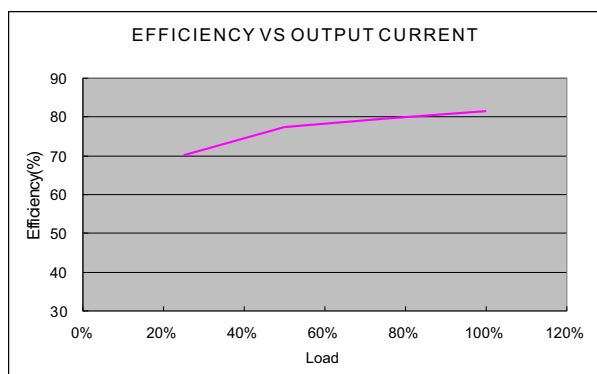
### 05 Single Output Models



### 05 Dual Output Models

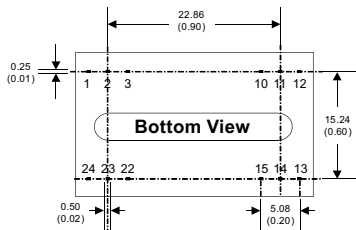
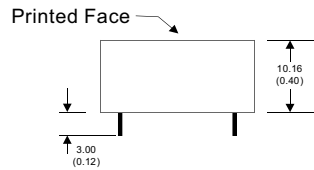
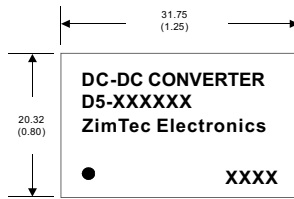


### 24 Single Output Models



### 24 Dual Output Models

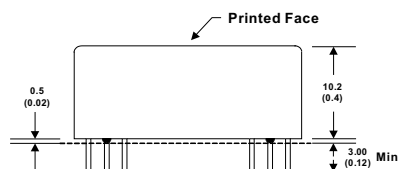
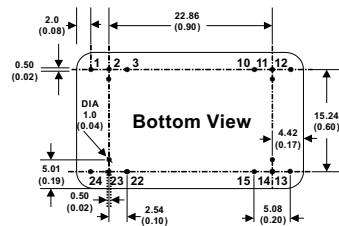
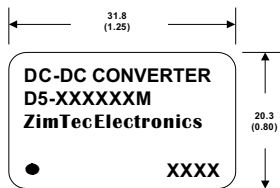
## MECHANICAL SPECIFICATIONS



### 24 Pin DIL Package Non-Conductive Plastic

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    | 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:  $0.5 \pm 0.05$  (  $0.02 \pm 0.002$  )  
2. Pin pitch and length tolerance:  $\pm 0.35$  (  $\pm 0.014$  )  
3. Case Tolerance:  $\pm 0.5$  (  $\pm 0.02$  )  
4. Stand-off tolerance:  $\pm 0.1$  (  $\pm 0.004$  )

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  |