

# SNP1 Series

1W Unregulated Single & Dual output



## Features

- SIP7 Package
- Continuous Short Circuit Protection
- 3000 / 6000 VDC Isolation
- Efficiency up to 84%
- Operation Temperature Range -40 ~ 95°C max.
- Non-Conductive Black Plastic Case



## PART NUMBER STRUCTURE

**SNP1** - **24** **15** **S** **H**  
(1) (2) (3) (4) (5)

### (1) Series

### (2) Input Voltage Range

**3R3** - 2.97-3.63 V

**05** - 4.5-5.5 V

**12** - 10.8-13.2 V

**24** - 21.6-26.4 V

### (4) Output Type

**S** - Single Output

**D** - Dual Output

### (3) Output Voltage Range

**3R3** - 3.3 V

**05** - 5 V

**12** - 12 V

**15** - 15 V

### (5) Isolation Voltage

**Blank** - 3000 VDC

**H** - 6000 VDC

**X** - 3000 VDC, refer to  
Pin connections.

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ALL SPECIFICATIONS ARE TYPICAL AT 25°C, NOMINAL INPUT AND FULL LOAD UNLESS OTHERWISE NOTED

| Model Number | Input Voltage Range (VDC) | Input Current      |                      | Output Voltage (VDC) | Output Current Full Load (mA) | Efficiency @FL(%) | Capacitive Load (μF, max.) |
|--------------|---------------------------|--------------------|----------------------|----------------------|-------------------------------|-------------------|----------------------------|
|              |                           | No-Load (mA), max. | Full Load (mA), typ. |                      |                               |                   |                            |
| SNP1-3R33R3S | 2.97-3.63                 | 55                 | 393.55               | 3.3                  | 303                           | 77                | 3300                       |
| SNP1-3R305S  | 2.97-3.63                 | 55                 | 383.58               | 5                    | 200                           | 79                | 2200                       |
| SNP1-3R312S  | 2.97-3.63                 | 70                 | 369.55               | 12                   | 83.3                          | 82                | 470                        |
| SNP1-3R315S  | 2.97-3.63                 | 85                 | 388.46               | 15                   | 66.6                          | 78                | 470                        |
| SNP1-053R3S  | 4.5-5.5                   | 40                 | 259.71               | 3.3                  | 303                           | 77                | 3300                       |
| SNP1-0505S   | 4.5-5.5                   | 35                 | 246.91               | 5                    | 200                           | 81                | 2200                       |
| SNP1-0512S   | 4.5-5.5                   | 45                 | 243.90               | 12                   | 83.3                          | 82                | 470                        |
| SNP1-0515S   | 4.5-5.5                   | 55                 | 243.88               | 15                   | 66.6                          | 82                | 470                        |
| SNP1-123R3S  | 10.8-13.2                 | 20                 | 105.47               | 3.3                  | 303                           | 79                | 3300                       |
| SNP1-1205S   | 10.8-13.2                 | 25                 | 102.88               | 5                    | 200                           | 81                | 2200                       |
| SNP1-1212S   | 10.8-13.2                 | 30                 | 102.88               | 12                   | 83.3                          | 81                | 470                        |
| SNP1-1215S   | 10.8-13.2                 | 35                 | 105.47               | 15                   | 66.6                          | 79                | 470                        |
| SNP1-243R3S  | 21.6-26.4                 | 15                 | 53.41                | 3.3                  | 303                           | 78                | 3300                       |
| SNP1-2405S   | 21.6-26.4                 | 15                 | 50.81                | 5                    | 200                           | 82                | 2200                       |
| SNP1-2412S   | 21.6-26.4                 | 15                 | 49.60                | 12                   | 83.3                          | 84                | 470                        |
| SNP1-2415S   | 21.6-26.4                 | 20                 | 50.81                | 15                   | 66.6                          | 82                | 470                        |
| SNP1-3R33R3D | 2.97-3.63                 | 60                 | 393.55               | ±3.3                 | ±151.5                        | 77                | ±1680                      |
| SNP1-3R305D  | 2.97-3.63                 | 70                 | 388.50               | ±5                   | ±100                          | 78                | ±1000                      |
| SNP1-3R312D  | 2.97-3.63                 | 75                 | 393.54               | ±12                  | ±41.6                         | 77                | ±220                       |
| SNP1-3R315D  | 2.97-3.63                 | 75                 | 388.50               | ±15                  | ±33.3                         | 78                | ±220                       |
| SNP1-053R3D  | 4.5-5.5                   | 40                 | 256.41               | ±3.3                 | ±151.5                        | 78                | ±1680                      |
| SNP1-0505D   | 4.5-5.5                   | 40                 | 246.91               | ±5                   | ±100                          | 81                | ±1000                      |
| SNP1-0512D   | 4.5-5.5                   | 45                 | 253.16               | ±12                  | ±41.6                         | 79                | ±220                       |
| SNP1-0515D   | 4.5-5.5                   | 45                 | 256.41               | ±15                  | ±33.3                         | 78                | ±220                       |
| SNP1-123R3D  | 10.8-13.2                 | 25                 | 104.17               | ±3.3                 | ±151.5                        | 80                | ±1680                      |
| SNP1-1205D   | 10.8-13.2                 | 25                 | 101.63               | ±5                   | ±100                          | 82                | ±1000                      |
| SNP1-1212D   | 10.8-13.2                 | 30                 | 105.48               | ±12                  | ±41.6                         | 79                | ±220                       |
| SNP1-1215D   | 10.8-13.2                 | 25                 | 101.63               | ±15                  | ±33.3                         | 82                | ±220                       |
| SNP1-243R3D  | 21.6-26.4                 | 15                 | 52.08                | ±3.3                 | ±151.5                        | 80                | ±1680                      |
| SNP1-2405D   | 21.6-26.4                 | 15                 | 50.81                | ±5                   | ±100                          | 82                | ±1000                      |
| SNP1-2412D   | 21.6-26.4                 | 20                 | 53.42                | ±12                  | ±41.6                         | 78                | ±220                       |
| SNP1-2415D   | 21.6-26.4                 | 15                 | 54.11                | ±15                  | ±33.3                         | 77                | ±220                       |

# SNP1 1W Unregulated Single & Dual output

| INPUT SPECIFICATIONS                                                                                           |                                         |           |      |      |         |
|----------------------------------------------------------------------------------------------------------------|-----------------------------------------|-----------|------|------|---------|
| Parameter                                                                                                      | Conditions                              | Min.      | Typ. | Max. | Unit    |
| Input Voltage Range                                                                                            | 3.3 V Input                             | 2.97      | 3.3  | 3.63 | VDC     |
|                                                                                                                | 5 V Input                               | 4.5       | 5    | 5.5  |         |
|                                                                                                                | 12 V Input                              | 10.8      | 12   | 13.2 |         |
|                                                                                                                | 24 V Input                              | 21.6      | 24   | 26.4 |         |
| Input Filter                                                                                                   |                                         | Capacitor |      |      |         |
| Input Reflected Ripple Current (1)                                                                             |                                         |           | 20   |      | mApk-pk |
| Start up Time                                                                                                  | Nominal Vin and constant resistive load |           |      | 10   | ms      |
| Recommended input fuse ( slow blow )                                                                           | 3.3 V Input                             | 1         |      |      | A       |
|                                                                                                                | 05 V Input                              | 0.5       |      |      |         |
|                                                                                                                | 12 V Input                              | 0.25      |      |      |         |
|                                                                                                                | 24 V Input                              | 0.1       |      |      |         |
| Note :                                                                                                         |                                         |           |      |      |         |
| 1. Measured with a simulated source inductance of 12μH and a source capacitor Cin( 47μF, ESR<1.0Ω at 100kHz ). |                                         |           |      |      |         |

| OUTPUT SPECIFICATIONS          |                                              |                                      |                                   |      |       |         |
|--------------------------------|----------------------------------------------|--------------------------------------|-----------------------------------|------|-------|---------|
| Parameter                      | Conditions                                   |                                      | Min.                              | Typ. | Max.  | Unit    |
| Output Voltage Accuracy        | Nominal Vin                                  |                                      | -3.0                              |      | +3.0  | %       |
| Line Regulation                | For 1% Vin Change                            |                                      | -1.2                              |      | +1.2  | %       |
| Load Regulation                | From 10% to 100% Load                        | 3.3V Input, 053R3S/D, 0505S/D, 0515D |                                   |      | 15    | %       |
|                                |                                              | The others                           |                                   |      | 10    |         |
|                                | From 0% to 100% Load                         |                                      |                                   |      | 35    |         |
| Cross Regulation               | Asymmetrical Load 25% / 100% for Dual Output | 3.3V, 5V Input                       | -6                                |      | +6    | %       |
|                                |                                              | 12V, 24V Input                       | -4                                |      | +4    |         |
| Ripple & Noise (1)             | 20MHz bandwidth                              |                                      |                                   |      | 150   | mVpk-pk |
| Short Circuit Protection       |                                              |                                      | Continuous and automatic recovery |      |       |         |
| Temperature Coefficient        |                                              |                                      | -0.02                             |      | +0.02 | %/°C    |
| Maximum Capacitive Load        | Nominal Vin and constant resistive load      |                                      | See Table                         |      |       |         |
| Note.                          |                                              |                                      |                                   |      |       |         |
| 1. Measured with a 0.1uF MLCC. |                                              |                                      |                                   |      |       |         |

| ABSOLUTE MAXIMUM RATINGS                                                                                                    |                            |      |      |      |      |
|-----------------------------------------------------------------------------------------------------------------------------|----------------------------|------|------|------|------|
| Parameter                                                                                                                   | Conditions                 | Min. | Typ. | Max. | Unit |
| Input Surge Voltage ( 100 ms )                                                                                              | 3.3 V Input                |      |      | 6    | VDC  |
|                                                                                                                             | 5 V Input                  |      |      | 9    |      |
|                                                                                                                             | 12 V Input                 |      |      | 18   |      |
|                                                                                                                             | 24 V Input                 |      |      | 30   |      |
| Soldering Temperature                                                                                                       | 1.5mm from case 10sec max. |      |      | 260  | °C   |
| Note : These are stress ratings. Exposure of devices to any of these conditions may adversely affect long-term reliability. |                            |      |      |      |      |

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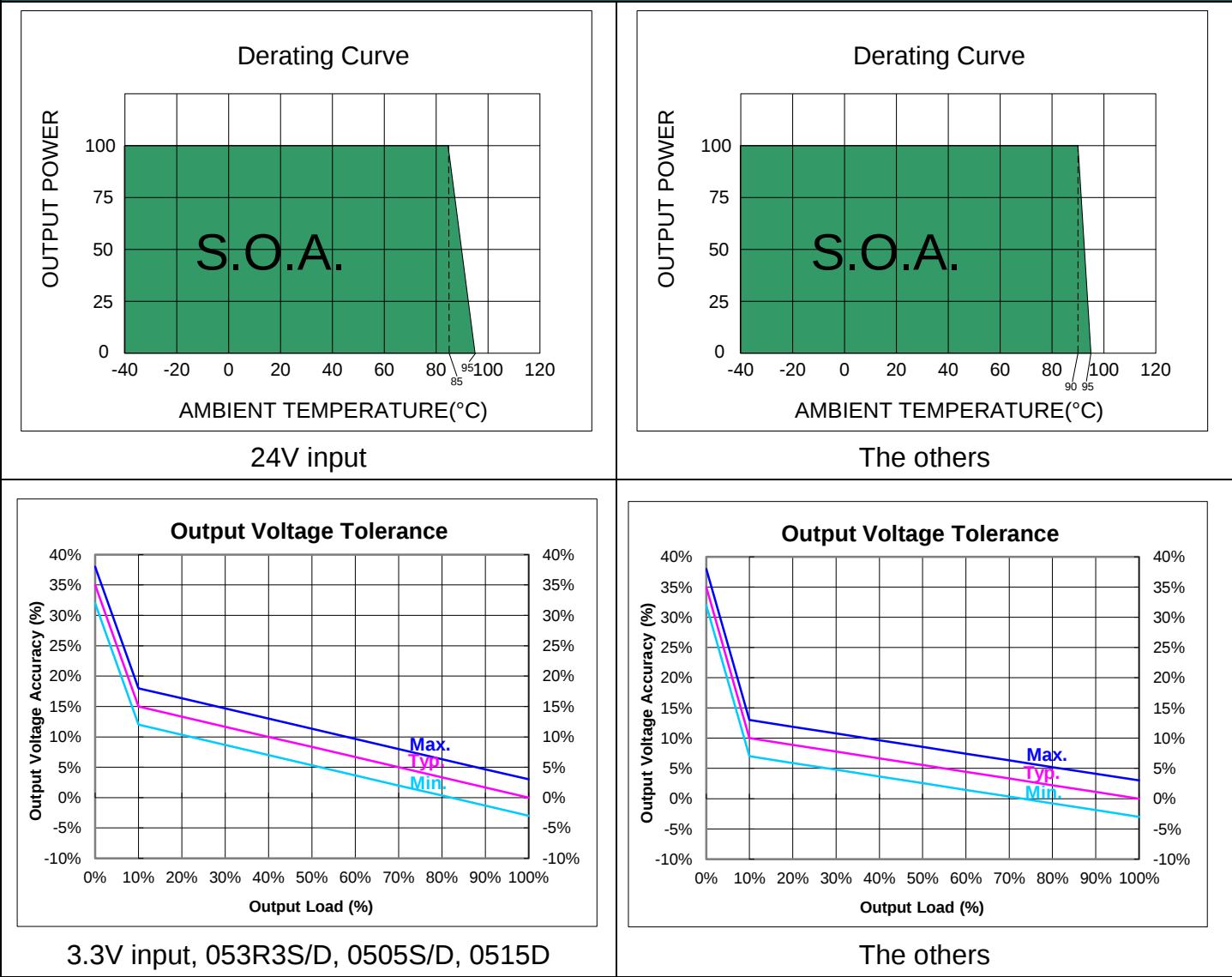
| GENERAL SPECIFICATIONS   |                                   |            |                  |      |      |         |
|--------------------------|-----------------------------------|------------|------------------|------|------|---------|
| Parameter                | Conditions                        |            | Min.             | Typ. | Max. | Unit    |
| Isolation Voltage        | Input-output, and rated for 60sec | The others | 3000             |      |      | VDC     |
|                          |                                   | Suffix “H” | 6000             |      |      |         |
| Isolation Resistance     | Input-output                      |            | 1000             |      |      | MΩ      |
| Isolation Capacitance    | Input-output                      |            |                  |      | 65   | pF      |
| Switching Frequency      |                                   |            |                  | 100  |      | kHz     |
| MTBF                     | MIL-HDBK-217 F @ 25°C             |            | 2.5              |      |      | M hours |
| Safety Standard          | IEC / EN / UL 62368-1             |            | Designed to meet |      |      |         |
| Environmental compliance |                                   |            | RoHS             |      |      |         |

| ENVIRONMENT SPECIFICATIONS    |                        |           |      |      |          |
|-------------------------------|------------------------|-----------|------|------|----------|
| Parameter                     | Conditions             | Min.      | Typ. | Max. | Unit     |
| Operating Ambient Temperature | See the Derating Curve | -40       |      | 95   | °C       |
| Maximum Case Temperature      |                        |           |      | 115  | °C       |
| Thermal Impedance             |                        | 45        |      |      | °C/W     |
| Storage Humidity              |                        |           |      | 95   | % rel. H |
| Storage Temperature           |                        | -55       |      | 125  | °C       |
| Cooling                       | Natural Convection     | 30-65 LFM |      |      |          |

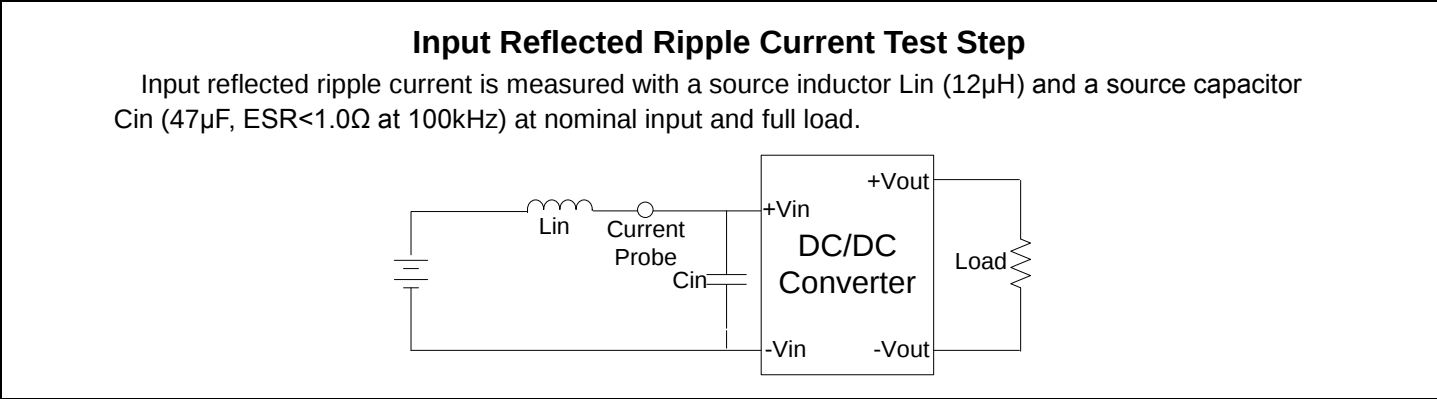
| EMC SPECIFICATIONS  |               |                               |                |
|---------------------|---------------|-------------------------------|----------------|
| Parameter           | Standard      | Condition                     | Perf. Criteria |
| Conducted Emissions | EN55032       | with external components      | B              |
| Radiated Emissions  | EN55032       |                               | B              |
| ESD                 | IEC 61000-4-2 | Air: ±15kV / Indirect: ±8kV   | A              |
| RS                  | IEC 61000-4-3 | 10V/m                         | A              |
| EFT                 | IEC 61000-4-4 | ±2kV with external components | A              |
| Surge               | IEC 61000-4-5 | ±2kV with external components | A              |
| CS                  | IEC 61000-4-6 | 10Vrms                        | A              |
| PFMF                | IEC 61000-4-8 | 100A/m                        | A              |

| PHYSICAL SPECIFICATIONS |                                               |
|-------------------------|-----------------------------------------------|
| Parameter               | Value                                         |
| Case Material           | Nonconductive Black Plastic ( UL94V-0 rated ) |
| Pin Material            | Tinned Copper                                 |
| Potting Material        | Silicone ( UL94V-0 rated )                    |
| Weight                  | 2.3 g, typ.                                   |
| Dimensions              | 0.76" x 0.24" x 0.39"                         |

ELECTRICAL CHARACTERISTIC CURVES



TEST CONFIGURATIONS



DESIGN & FEATURE CONFIGURATIONS

Isolation Voltage

This series is designed to meet the functional insulation of UL, both input and output should be maintained within SELV limits (less than 42.4V peak, or 60VDC).

The isolation test voltage represents a measure of immunity to transient voltages and the part should never be used as an element of a safety isolation system. The part could be expected to function correctly with hundreds of volts offset applied continuously across the isolation barrier; but then the circuitry on both sides of the barrier must be regarded as operating at an unsafe voltage and further isolation/insulation systems must form a barrier between these circuits and any user-accessible circuitry according to safety standard requirements.

Repeated High-Voltage Isolation Testing

Repeated high-voltage isolation testing of a barrier component can actually degrade isolation capability, to a lesser or greater degree depending on materials, construction and environment.

This series has isolation transformers without additional insulation between primary and secondary windings of enameled wire.

While parts can be expected to withstand several times the stated test voltage, the isolation capability does depend on the wire insulation.

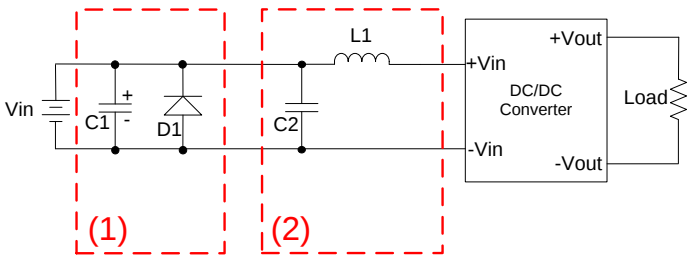
Any material including the enamel (typically polyurethane) is susceptible to eventual chemical degradation when subject to very high applied voltage, thus implying that the number of tests should be strictly limited.

We strongly advise against repeated high voltage isolation testing, but if it is absolutely required, the isolation test voltage should be reduced by 20% from specified test voltage.

DESIGN & FEATURE CONFIGURATIONS

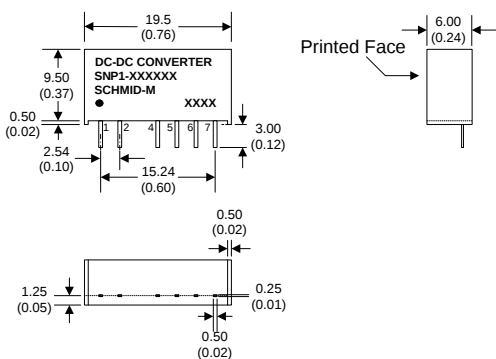
EMC Filter

The part (1) Circuit is used to meet Surge & EFT test, and the part (2) Circuit is used to meet EMI test.



| Vin  | C1                                               | D1        | C2                 | L1   |
|------|--------------------------------------------------|-----------|--------------------|------|
| 3.3V | NIPPON<br>Chemi-con<br>KY series<br>470µF / 100V | SMDJ6.0A  | MLCC<br>10µF / 50V | 10µH |
| 5V   | NIPPON<br>Chemi-con<br>KY series<br>470µF / 100V | SMDJ9.0A  | MLCC<br>10µF / 50V | 10µH |
| 12V  | NIPPON<br>Chemi-con<br>KY series<br>470µF / 100V | SMDJ18.0A | MLCC<br>10µF / 50V | 10µH |
| 24V  | NIPPON<br>Chemi-con<br>KY series<br>680µF / 100V | SMDJ30.0A | MLCC<br>10µF / 50V | 10µH |

MECHANICAL SPECIFICATIONS



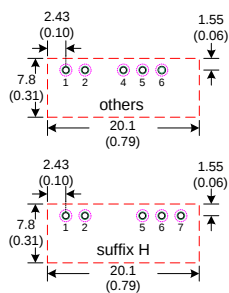
PIN CONNECTIONS

| PIN NUMBER | SINGLE SINGLE-H | DUAL DUAL-H | SINGLE-X | DUAL-X |
|------------|-----------------|-------------|----------|--------|
| 1          | +Vin            | +Vin        | +Vin     | +Vin   |
| 2          | -Vin            | -Vin        | -Vin     | -Vin   |
| 4          | N.P.            | N.P.        | -Vout    | -Vout  |
| 5          | -Vout           | -Vout       | N.P.     | COM    |
| 6          | N.P.            | COM         | +Vout    | +Vout  |
| 7          | +Vout           | +Vout       | N.P.     | N.P.   |

\*N.P. : No pin.

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

RECOMMENDED FOOTPRINT



- Notes : All dimensions are typical in millimeters ( inches ).
1. Through hole 1,2,4,5,6,7 :  $\varnothing 0.8$  (0.031)
  2. Top view pad 1,2,4,5,6,7 :  $\varnothing 1.0$  (0.039)
  3. bottom view pad 1,2,4,5,6,7 :  $\varnothing 1.6$  (0.063)