

# RPF series

## Thick Film High-Power Lead Free Chip Resistor

### ◆ Features

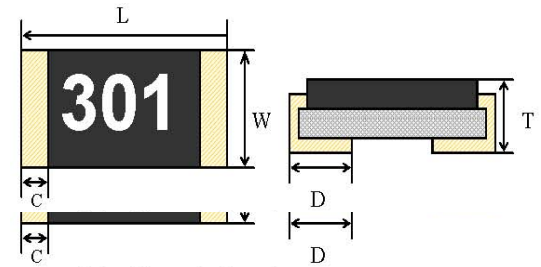
- » High Power rating and compact size
- » High reliability and stability
- » Reduced size of final equipment
- » Lead free product is upon customer requested
- » RoHS compliant & Halogen Free

### ◆ Application

- » Power supply
- » PDA
- » Digital meter
- » Computer

### ◆ Mechanical Dimensions

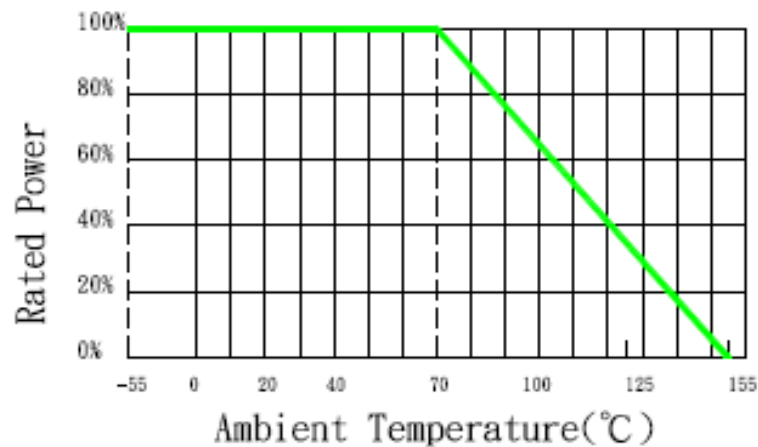
| Type    | DIMENSIONS |           |           |           |           |
|---------|------------|-----------|-----------|-----------|-----------|
|         | L          | W         | C         | D         | T         |
| RPF0402 | 1.00±0.10  | 0.50±0.05 | 0.30±0.05 | 0.20±0.10 | 0.25±0.10 |
| RPF0603 | 1.60±0.10  | 0.80±0.10 | 0.30±0.20 | 0.30±0.20 | 0.45±0.10 |
| RPF0805 | 2.00±0.10  | 1.25±0.10 | 0.40±0.20 | 0.40±0.20 | 0.50±0.10 |
| RPF1206 | 3.10±0.10  | 1.60±0.10 | 0.50±0.25 | 0.50±0.25 | 0.55±0.10 |
| RPF1210 | 3.10±0.10  | 2.60±0.10 | 0.50±0.25 | 0.50±0.25 | 0.55±0.10 |
| RPF2010 | 5.00±0.20  | 2.50±0.20 | 0.65±0.25 | 0.60±0.25 | 0.60±0.10 |
| RPF2512 | 6.30±0.20  | 3.10±0.20 | 0.60±0.25 | 1.80±0.25 | 0.60±0.15 |



Unit: mm.

### ◆ Power Derating Curve

Power Derating Curve by Ambient Temperature Rated Load (%)



## ◆ Part Number

| RPF  | 2512 | J         | □              | 10K         | □          | □□                          |
|------|------|-----------|----------------|-------------|------------|-----------------------------|
| Type | Size | Tolerance | Rated Power    | R Value     | Reel Size  | Package Quantity            |
| RPF  | 0402 | B: ± 0.1% | Blank=Standard | 10KΩ = 10K  | Blank = 7" | (standard package As below) |
|      | 0603 | D: ± 0.5% | E=1/3W         | 0Ω = 0R     | B= 13"     | 10= 10K per reel            |
|      | 0805 | F: ± 1%   | F=1/2W         | 2.2MΩ = 2M2 | C= 10"     | 20= 20K per reel            |
|      | 1206 | J: ± 5%   | G=3/4W         |             |            | 08= 8K per reel             |
|      | 1210 |           | K=3W           |             |            | 16= 16K per reel            |
|      | 2010 |           |                |             |            |                             |
|      | 2512 |           |                |             |            |                             |

» Standard Package Q'ty for each size is as following.

| TYPE    | Standard Package Q'ty |
|---------|-----------------------|
| RPF0402 | 10K per reel          |
| RPF0603 | 5K per reel           |
| RPF0805 | 5K per reel           |
| RPF1206 | 5K per reel           |
| RPF1210 | 5K per reel           |
| RPF2010 | 4K per reel           |
| RPF2512 | 4K per reel           |

## ◆ Rating

### Standard type

| Type    | Size | Power Rating At 70°C | Max. RCWV    | Max. Overload Voltage | Resistance Tolerance (%) | Temperature Coefficient (ppm/°C) | Resistance Range |       | Standard Resistance Values |
|---------|------|----------------------|--------------|-----------------------|--------------------------|----------------------------------|------------------|-------|----------------------------|
|         |      |                      |              |                       |                          |                                  | Min.             | Max.  |                            |
| RPF0402 | 0402 | 1/10W                | 50V          | 100V                  | ±0.1% (B)                | ±200                             | 10Ω              | 1MΩ   | E24                        |
|         |      |                      |              |                       | ±0.5% (D)                |                                  |                  |       |                            |
|         |      |                      |              |                       | ±1% (F)                  | ±100                             | 10Ω              | 1MΩ   | E96/E24                    |
| RPF0603 | 0603 | 1/8W                 | 75V          | 125V                  | ±0.1% (B)                | ±100                             | 10Ω              | 1MΩ   | E24                        |
|         |      |                      |              |                       | ±0.5% (D)                |                                  |                  |       |                            |
|         |      | 1/8W<br>1/3W         | 50V<br>75V   | 100V<br>125V          | ±1% (F)                  | ±100                             | 10Ω              | 1MΩ   | E96/E24                    |
|         |      |                      |              |                       | ±1% (F)                  | ±200                             | 1Ω               | 9.76Ω | E96/E24                    |
| ±5% (J) | ±200 | 1Ω                   | 1MΩ          | E24                   |                          |                                  |                  |       |                            |
| RPF0805 | 0805 | 1/4W                 | 150V         | 300V                  | ±0.1% (B)                | ±100                             | 10Ω              | 1MΩ   | E24                        |
|         |      |                      |              |                       | ±0.5% (D)                |                                  |                  |       |                            |
|         |      | 1/4W<br>1/2W         | 150V<br>200V | 300V<br>300V          | ±1% (F)                  | ±100                             | 10Ω              | 1MΩ   | E96/E24                    |
|         |      |                      |              |                       | ±1% (F)                  | ±200                             | 1Ω               | 9.76Ω | E96/E24                    |
| ±5% (J) | ±200 | 1Ω                   | 1MΩ          | E24                   |                          |                                  |                  |       |                            |
| RPF1206 | 1206 | 1/2W                 | 200V         | 400V                  | ±0.1% (B)                | ±100                             | 10Ω              | 1MΩ   | E24                        |
|         |      |                      |              |                       | ±0.5% (D)                |                                  |                  |       |                            |
|         |      | 1/2W<br>3/4W         | 200V<br>250V | 400V<br>500V          | ±1% (F)                  | ±100                             | 10Ω              | 1MΩ   | E96/E24                    |
| ±5% (J) | ±200 | 1Ω                   | 1MΩ          | E24                   |                          |                                  |                  |       |                            |
| RPF1210 | 1210 | 1/2W                 | 200V         | 400V                  | ±0.1% (B)                | ±100                             | 10Ω              | 1MΩ   | E24                        |
|         |      |                      |              |                       | ±0.5% (D)                |                                  |                  |       |                            |
|         |      |                      |              |                       | ±1% (F)                  | ±100                             | 10Ω              | 1MΩ   | E96/E24                    |
| ±5% (J) | ±200 | 1Ω                   | 1MΩ          | E24                   |                          |                                  |                  |       |                            |
| RPF2010 | 2010 | 1W                   | 200V         | 400V                  | ±0.1% (B)                | ±100                             | 10Ω              | 1MΩ   | E24                        |
|         |      |                      |              |                       | ±0.5% (D)                |                                  |                  |       |                            |
|         |      |                      |              |                       | ±1% (F)                  | ±100                             | 10Ω              | 1MΩ   | E96/E24                    |
| ±5% (J) | ±200 | 1Ω                   | 1MΩ          | E24                   |                          |                                  |                  |       |                            |
| RPF2512 | 2512 | 2W                   | 200V         | 400V                  | ±0.1% (B)                | ±100                             | 10Ω              | 1MΩ   | E24                        |
|         |      |                      |              |                       | ±0.5% (D)                |                                  |                  |       |                            |
|         |      | 2W<br>3W             | 200V<br>250V | 400V<br>500V          | ±1% (F)                  | ±100                             | 10Ω              | 1MΩ   | E96/E24                    |
| ±5% (J) | ±200 | 1Ω                   | 1MΩ          | E24                   |                          |                                  |                  |       |                            |

## Low Resistance

| Type    | Power Rating at 70°C | Max. RCWV (mV) | Max. Overload Voltage (mV) | Resistance Tolerance (%) | Temperature Coefficient (ppm/°C) | Resistance Range (mΩ) |      | Standard Resistance Values |
|---------|----------------------|----------------|----------------------------|--------------------------|----------------------------------|-----------------------|------|----------------------------|
|         |                      |                |                            |                          |                                  | Min.                  | Max. |                            |
| RPF0603 | 1/8W                 | 477            | 1066                       | ±1%, ±5%                 | ±150*                            | 500                   | 910  | E-24                       |
| RPF0805 | 1/4W                 | 551            | 1232                       | ±1%, ±5%                 | ±100*                            | 500                   | 910  |                            |
| RPF1206 | 1/2W                 | 675            | 1508                       | ±1%, ±5%                 | ±100                             | 500                   | 910  |                            |
| RPF1210 | 1/2W                 | 675            | 1508                       |                          |                                  | 200                   | 910  |                            |
| RPF2010 | 1W                   | 954            | 2133                       |                          |                                  | 200                   | 910  |                            |
| RPF2512 | 2W                   | 1349           | 3017                       |                          |                                  | 200                   | 910  |                            |

## ◆ Specification Specification and Test Method

| TEST                      | SPECIFICATION   | TEST METHOD   |
|---------------------------|---|---|
| DC Resistance             | F : ±1% ; J : ±5%   | IEC 60115-1 / JIS C 5201-1 , Clause 4.5<br>Measure the resistance Value.  |
| Short Time Overload       | J: $\Delta R \leq \pm(2\% + 0.1\Omega)$<br>F: $\Delta R \leq \pm(1\% + 0.05\Omega)$                           | 5 x Rated power for 5 seconds   |
| Solderability             | Over 95% of termination must be covered with solder   | IEC 60115-1 / JIS C 5201-1, Clause 4.17<br>After immersing flux, dip in the $245 \pm 2^\circ\text{C}$ molten solder bath for $3 \pm 0.5$ sec.   |
| Resistance to solder Heat | J: $\Delta R \leq \pm(1\% + 0.1\Omega)$<br>F: $\Delta R \leq \pm(0.5\% + 0.05\Omega)$<br>No mechanical damage | IEC 60115-1 / JIS C 5201-1 , Clause 4.18<br>With $260 \pm 5^\circ\text{C}$ for $10 \pm 1$ sec   |
| Load Life Humidity        | J: $\Delta R \leq \pm(3\% + 0.1\Omega)$<br>F: $\Delta R \leq \pm(1\% + 0.05\Omega)$                           | IEC 60115-1 / JIS C 5201-1 , Clause 4.24<br>Maintain the temperature of the resistor at $40 \pm 2^\circ\text{C}$ and 90% ~ 95% R.H. with the rated voltage applied.<br>Cycle ON for 1.5 hours and OFF for 0.5 hour for 1000+48/ -0 hours.<br>After 1 ~ 4 hours, measure the resistance value. |

|   |   |   |
|---|---|---|
| Temperature Coefficient of Resistance (TCR) | F : $\pm 100\text{ppm}/^{\circ}\text{C}$<br>J : $\pm 200\text{ppm}/^{\circ}\text{C}$                            | IEC 60115-1 / JIS C 5201-1 , Clause 4.8<br>Test temperature : $25^{\circ}\text{C}(\text{T1}) \rightarrow -55^{\circ}\text{C}(\text{T2})$<br>$25^{\circ}\text{C}(\text{T1}) \rightarrow +155^{\circ}\text{C}(\text{T2})$<br>$\text{TCR}(\text{ppm}/^{\circ}\text{C}) = \frac{R2 - R1}{R1} \times \frac{1}{T2 - T1} \times 10^6$<br>T1: $25^{\circ}\text{C}$<br>T2: Test temperature<br>R1: Resistance at reference temperature (T1)<br>R2: Resistance at test temperature (T2) |
| Load Life                                   | J : $\Delta R \leq \pm(3\% + 0.1\Omega)$<br>F : $\Delta R \leq \pm(1\% + 0.05\Omega)$                           | IEC 60115-1 / JIS C 5201-1 , Clause 4.25<br>Permanent resistance change after 1000+48/-0 hours (1.5 hours ON, 0.5hour OFF) at RCWV or Max.<br>Keep the resistor at $70 \pm 2^{\circ}\text{C}$ ambient.  |
| Temperature Cycle                           | J : $\Delta R \leq \pm(1\% + 0.1\Omega)$<br>F : $\Delta R \leq \pm(0.5\% + 0.05\Omega)$<br>No mechanical damage | IEC 60115-1 / JIS C 5201-1 , Clause 4.19<br>Repeat 5 cycles as follows<br>$-55^{\circ}\text{C}$ (30min.) $\rightarrow +25^{\circ}\text{C}$ (2~3min.)<br>$\rightarrow +155^{\circ}\text{C}$ (30min.) $\rightarrow +25^{\circ}\text{C}$ (2~3min.)   |
| Insulation Resistance                       | Between termination and coating must be over 1000M $\Omega$   | IEC 60115-1 / JIS C 5201-1 , Clause 4.6<br>Test voltage : $100 \pm 15\text{V}$  |
| Bending strength                            | J : $\Delta R \leq \pm(1\% + 0.1\Omega)$<br>F : $\Delta R \leq \pm(0.5\% + 0.05\Omega)$<br>No mechanical damage | IEC 60115-1 / JIS C 5201-1 , Clause 4.33<br>Resistance changes after bended on the 90mm PCB.<br>Bending width : 3mm for 0603, 0805, 2mm for 1206, 1210, 2010, 2512  |

## ◆ Specification

### RPF < 1 $\Omega$ Specification and Test Method

| TEST                      | SPECIFICATION  | TEST METHOD   |
|---------------------------|--|---|
| DC Resistance             | F : $\pm 1\%$ ; J : $\pm 5\%$  | IEC 60115-1 / JIS C 5201-1 , Clause 4.5<br>Measure the resistance Value.  |
| Short Time Overload       | J: $\Delta R \leq \pm(2\% + 0.5\text{m}\Omega)$<br>F: $\Delta R \leq \pm(1\% + 0.5\text{m}\Omega)$                           | 5 x Rated power for 5 seconds   |
| Solderability             | Over 95% of termination must be covered with solder  | IEC 60115-1 / JIS C 5201-1, Clause 4.17<br>After immersing flux, dip in the $245 \pm 2^{\circ}\text{C}$ molten solder bath for $3 \pm 0.5$ sec. |
| Resistance to solder Heat | J: $\Delta R \leq \pm(1\% + 0.5\text{m}\Omega)$<br>F: $\Delta R \leq \pm(0.5\% + 0.5\text{m}\Omega)$<br>No mechanical damage | IEC 60115-1 / JIS C 5201-1 , Clause 4.18<br>With $260 \pm 5^{\circ}\text{C}$ for $10 \pm 1$ sec   |

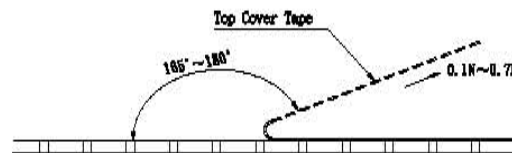
|   |  |   |
|---|--|---|
| Load Life<br>Humidity                       | J: $\Delta R \leq \pm(3\% + 0.5m\Omega)$<br>F: $\Delta R \leq \pm(1\% + 0.5m\Omega)$                         | IEC 60115-1 / JIS C 5201-1 , Clause 4.24<br>Maintain the temperature of the resistor at $40 \pm 2^\circ\text{C}$ and 90% ~ 95% R.H. with the rated voltage applied.<br>Cycle ON for 1.5 hours and OFF for 0.5 hour for 1000+48/ -0 hours.<br>After 1 ~ 4 hours, measure the resistance value.   |
| Temperature Coefficient of Resistance (TCR) | Refer to the rating table information.   | IEC 60115-1 / JIS C 5201-1 , Clause 4.8<br>Test temperature : $25^\circ\text{C}(T1) \rightarrow -55^\circ\text{C}(T2)$<br>$25^\circ\text{C}(T1) \rightarrow +155^\circ\text{C}(T2)$<br>$\text{TCR}(\text{ppm}/^\circ\text{C}) = \frac{R2 - R1}{R1} \times \frac{1}{T2 - T1} \times 10^6$<br>T1: $25^\circ\text{C}$<br>T2: Test temperature<br>R1: Resistance at reference temperature (T1)<br>R2: Resistance at test temperature (T2) |
| Load Life                                   | J : $\Delta R \leq \pm(3\% + 0.5m\Omega)$<br>F : $\Delta R \leq \pm(1\% + 0.5m\Omega)$                       | IEC 60115-1 / JIS C 5201-1 , Clause 4.25<br>Permanent resistance change after 1000+48/ -0 hours (1.5 hours ON, 0.5hour OFF) at RCWV or Max.<br>Keep the resistor at $70 \pm 2^\circ\text{C}$ ambient.   |
| Temperature Cycle                           | J : $\Delta R \leq \pm(1\% + 1m\Omega)$<br>F : $\Delta R \leq \pm(0.5\% + 1m\Omega)$<br>No mechanical damage | IEC 60115-1 / JIS C 5201-1 , Clause 4.19<br>Repeat 5 cycles as follows<br>$-55^\circ\text{C}$ (30min.) $\rightarrow$ $+25^\circ\text{C}$ (2~3min.)<br>$\rightarrow$ $+155^\circ\text{C}$ (30min.) $\rightarrow$ $+25^\circ\text{C}$ (2~3min.)   |
| Insulation Resistance                       | Between termination and coating must be over 1000M $\Omega$  | IEC 60115-1 / JIS C 5201-1 , Clause 4.6<br>Test voltage : $100 \pm 15\text{V}$  |
| Bending strength                            | J : $\Delta R \leq \pm(1\% + 1m\Omega)$<br>F : $\Delta R \leq \pm(0.5\% + 1m\Omega)$<br>No mechanical damage | IEC 60115-1 / JIS C 5201-1 , Clause 4.33<br>Resistance changes after bended on the 90mm PCB.<br>Bending width : 3mm for 0603 0805, 2mm for 1206, 1210, 2010, 2512   |

## ◆ Packing

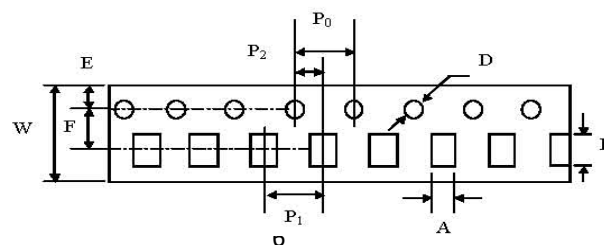
### Peel Strength of Top Cover Tape

The peel speed shall be about 300 mm/min

The peel force of top cover tape shall between 0.1 to 0.7N



### Tape Packaging Dimensions

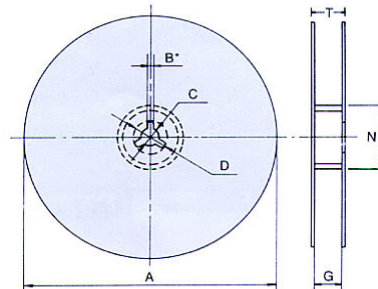


### Accumulated dimensional tolerance $40\pm 0.2\text{mm}$

| Size | A              | B              | W               | F              | E              | P1             | P2             | P0             | D              |
|------|----------------|----------------|-----------------|----------------|----------------|----------------|----------------|----------------|----------------|
| 0402 | $0.70\pm 0.1$  | $1.20\pm 0.1$  | $8.0\pm 0.2$    | $1.75\pm 0.1$  | $3.5\pm 0.05$  | $4.0\pm 0.1$   | $2.0\pm 0.05$  | $0.45\pm 0.1$  | $1.5\pm 0.1$   |
| 0603 | $1.10\pm 0.20$ | $1.90\pm 0.20$ | $8.00\pm 0.30$  | $3.50\pm 0.05$ | $1.75\pm 0.10$ | $4.00\pm 0.10$ | $2.00\pm 0.05$ | $4.00\pm 0.10$ | $1.50+0.10/-0$ |
| 0805 | $1.65\pm 0.20$ | $2.40\pm 0.20$ | $8.00\pm 0.30$  | $3.50\pm 0.05$ | $1.75\pm 0.10$ | $4.00\pm 0.10$ | $2.00\pm 0.05$ | $4.00\pm 0.10$ | $1.50+0.10/-0$ |
| 1206 | $2.00\pm 0.20$ | $3.57\pm 0.20$ | $8.00\pm 0.30$  | $3.50\pm 0.05$ | $1.75\pm 0.10$ | $4.00\pm 0.10$ | $2.00\pm 0.05$ | $4.00\pm 0.10$ | $1.50+0.10/-0$ |
| 1210 | $3.00\pm 0.20$ | $3.57\pm 0.20$ | $8.00\pm 0.30$  | $3.50\pm 0.05$ | $1.75\pm 0.10$ | $4.00\pm 0.10$ | $2.00\pm 0.05$ | $4.00\pm 0.10$ | $1.50+0.10/-0$ |
| 2010 | $2.80\pm 0.20$ | $5.50\pm 0.20$ | $12.00\pm 0.30$ | $5.50\pm 0.05$ | $1.75\pm 0.10$ | $4.00\pm 0.10$ | $2.00\pm 0.05$ | $4.00\pm 0.10$ | $1.50+0.10/-0$ |
| 2512 | $3.50\pm 0.20$ | $6.70\pm 0.20$ | $12.00\pm 0.30$ | $5.50\pm 0.05$ | $1.75\pm 0.10$ | $4.00\pm 0.10$ | $2.00\pm 0.05$ | $4.00\pm 0.10$ | $1.50+0.10/-0$ |

Unit: mm

### Reel Dimensions



| Size         | Packing Q'ty      | A              | N              | C             | D        | B            | G             | T        |
|--------------|-------------------|----------------|----------------|---------------|----------|--------------|---------------|----------|
| 0402         | 10kpcs/Reel (7")  | $178.0\pm 2.0$ | $60.0\pm 0.5$  | $13.0\pm 0.5$ | 20(Min.) | $2.0\pm 0.5$ | $10.0\pm 1.5$ | 14.9max. |
| 0603         | 5kpcs/Reel (7")   | $178.0\pm 2.0$ | $60.0\pm 0.5$  | $13.0\pm 0.5$ | 20(Min.) | $2.0\pm 0.5$ | $10.0\pm 1.5$ | 14.9max. |
| 0805         | 10kpcs/Reel (10") | $254.0\pm 2.0$ | $100.0\pm 1.0$ | $13.5\pm 0.5$ | 20(Min.) | $2.0\pm 0.5$ | $10.0\pm 1.5$ | 14.9max. |
| 1206         |                   |                |                |               |          |              |               |          |
| 1210         | 20kpcs/Reel (13") | $330.0\pm 2.0$ | $100.0\pm 1.0$ | $13.5\pm 0.5$ | 20(Min.) | $2.0\pm 0.5$ | $10.0\pm 1.5$ | 14.9max. |
| 2010<br>2512 | 4kpcs/Reel (7")   | $178.0\pm 2.0$ | $60.0\pm 0.5$  | $13.0\pm 0.5$ | 20(Min.) | $2.0\pm 0.5$ | $13.8\pm 1.5$ | 16.7max. |
|              | 8kpcs/Reel (10")  | $254.0\pm 2.0$ | $100.0\pm 1.0$ | $13.0\pm 0.5$ | 20(Min.) | $2.0\pm 0.5$ | $13.8\pm 1.5$ | 20.0max. |
|              | 16kpcs/Reel (13") | $330.0\pm 2.0$ | $100.0\pm 1.0$ | $13.5\pm 0.5$ | 20(Min.) | $2.0\pm 0.5$ | $13.8\pm 1.5$ | 20.0max. |

Unit: mm

All product specification and data are subject to change without notice.