# CHIP COMMON MODE CHOKE COIL
# HDC0504ST SERIES

## INTRODUCTION

The HDC0504ST series is wire wound type Common Mode Choke Coil which provides high effective suppressic characteristics without distorting the wave pattern of high speed differential signal interface. It is suitable for supe high speed differential signal such as USB 3.0, HDMI and so on.

## FEATURES

* Cut off frequency in differential mode is 8~10GHz
* Operating temperature -40°C to +105°C
* Excellent solderability and resistance to soldering heat.
* Suitable for flow and reflow soldering.
* Good dimensions, high reliability, and easy surface mount assembly.

## PART NUMBER

| HDC | 0504 | S | T | 600 | - S |
|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 |

**1** **Chip Common Mode Choke Coil**

**2** **Chip Size**

| CODE | L | W | H | UNIT |
|---|---|---|---|---|
| EIA | 0.047 | 0.039 | 0.035 | Inch |
| JIS | 1.20 | 1.00 | 0.90 | mm |

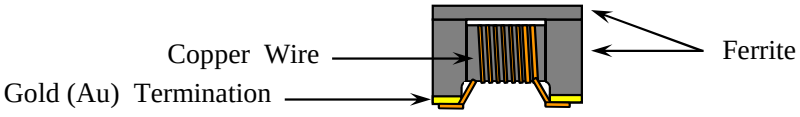
**3** **General Characteristics**

**4** **Taped In Reel. 3,000pcs/reel.**

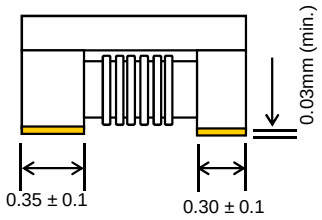
**5** **Typical Impedance at 100MHz**
600 = 60Ω

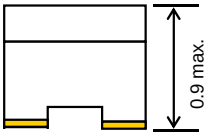
**6** **S = USB 3.0**
**H = HDMI**

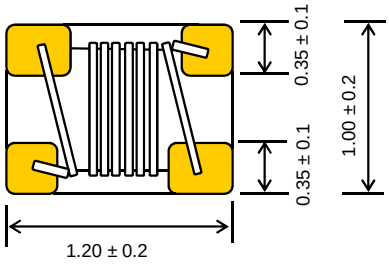
## MATERIAL STRUCTURE



# DIMENSION AND CONFIGURATION



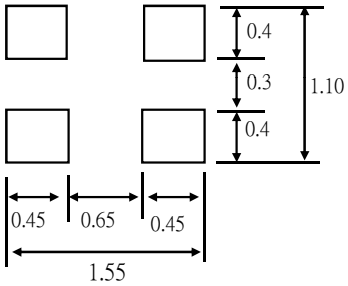



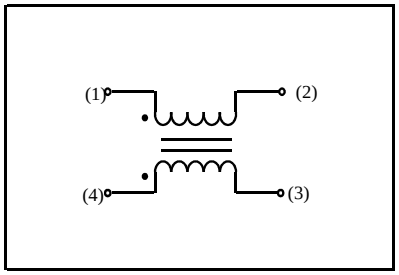

: Electrode

( ) : Reference Value

Unit: m/m




RECOMMENDED PCB PATTERN



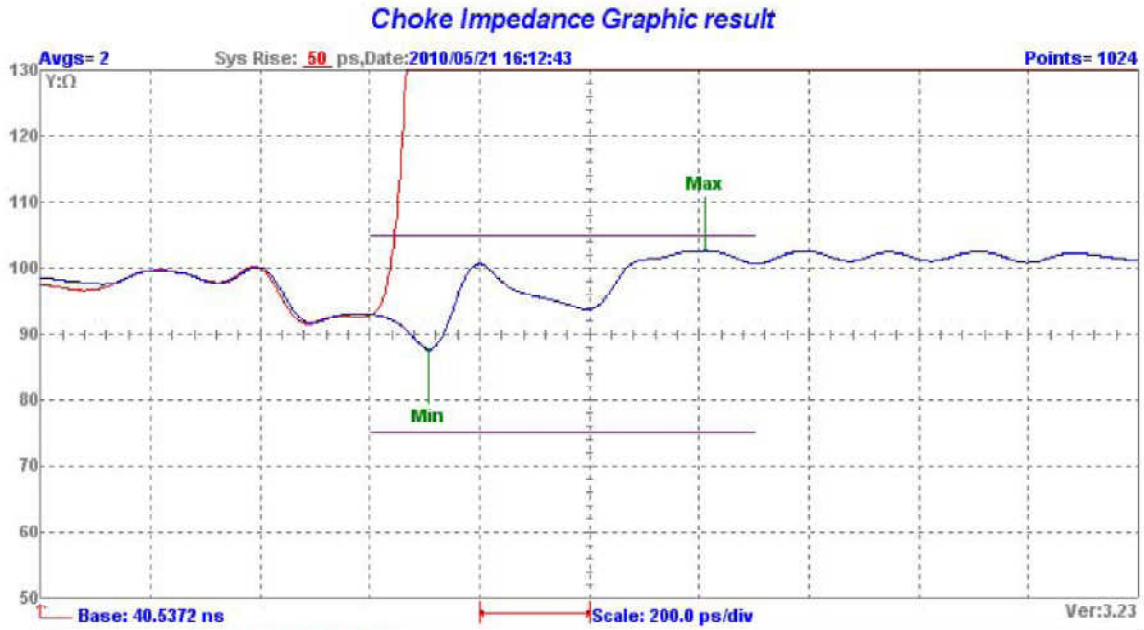

NO POLARITY

# SPECIFICATION

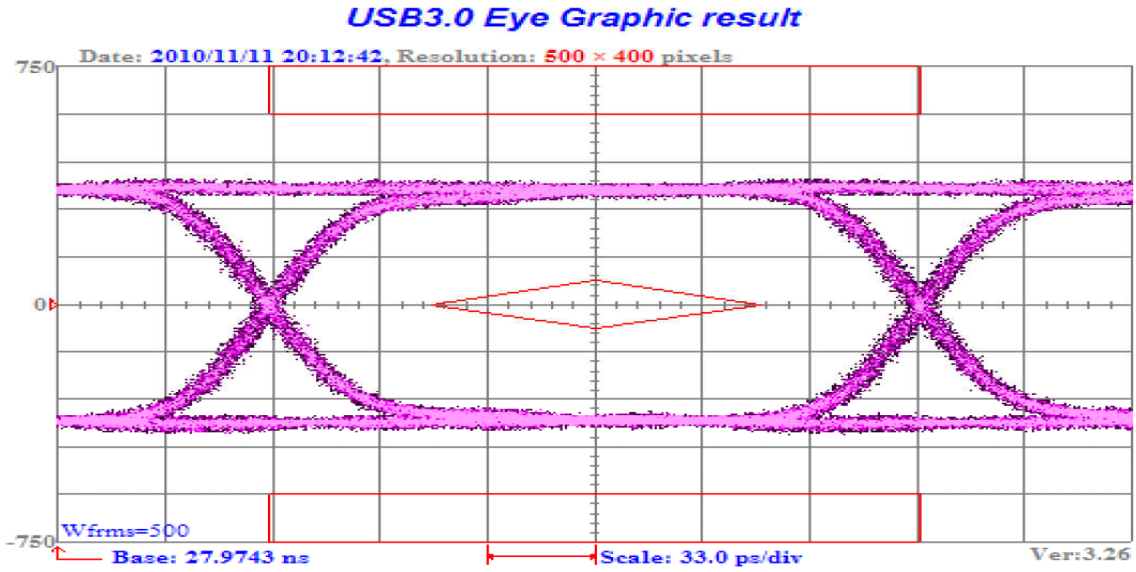
| Part Number | Common Mode Impedance (W) at 100MHz | DC Resistance max (W) | Rated Current (mA) | Rated Voltage (V DC) | Insulation Resistance (MW) | Cut off Frequency (GHz) |
|---|---|---|---|---|---|---|
| HDC0504ST600-S | 60 typ. (43 min) | 0.40 max. | 300 | 20 max. | 100 min | 10 typ. |
| HDC0504ST900-H | 90 typ. (65 min) | 0.50 max. | 280 | 20 max. | 100 min | 8 typ. |

1. Impedance is measured in HP4287A at frequency of 100MHz.
2. For 15 $^{o}$C rise.

# HDC0504 (S) SERIES

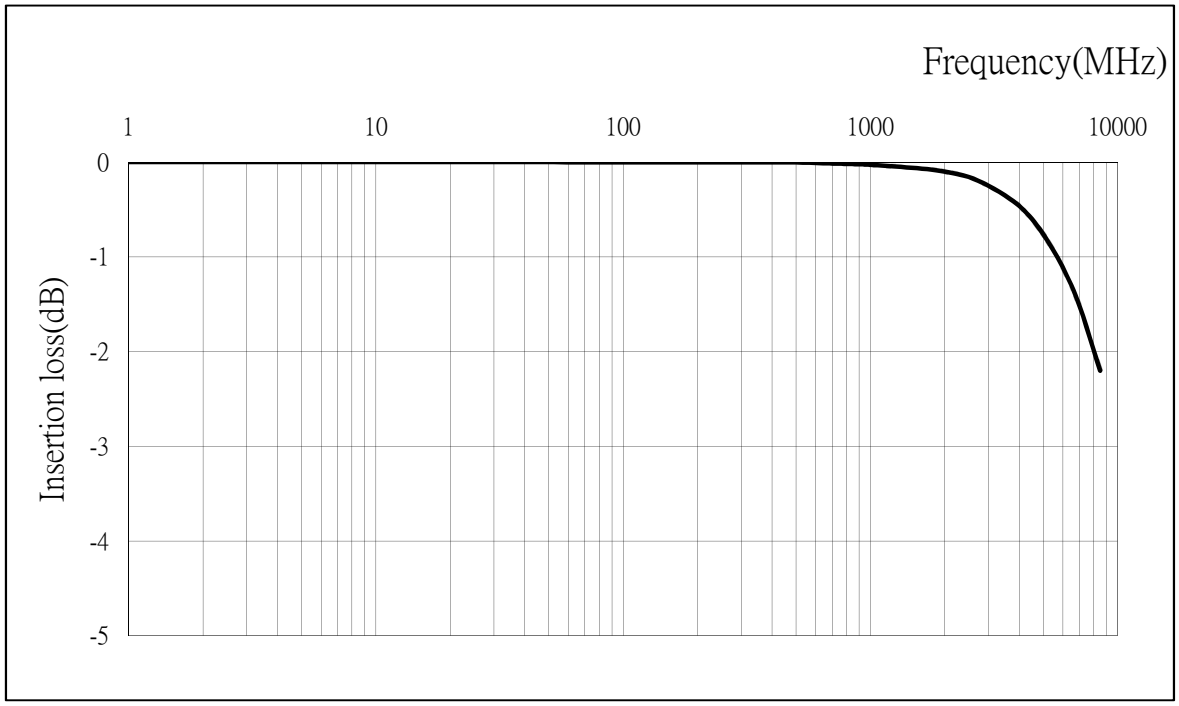



| Parameter Name: Choke Impedance C1 | |
|---|---|
| Spc Max: 105 Ω | Spc Min: 75 Ω |
| Max:102.64 Ohms at 41.7752 ns | Min:87.85 Ohms at 41.2612 ns |
| ΔΩ: 14.79 | Avg: 95.24 Ohms |
| | Result: Pass |

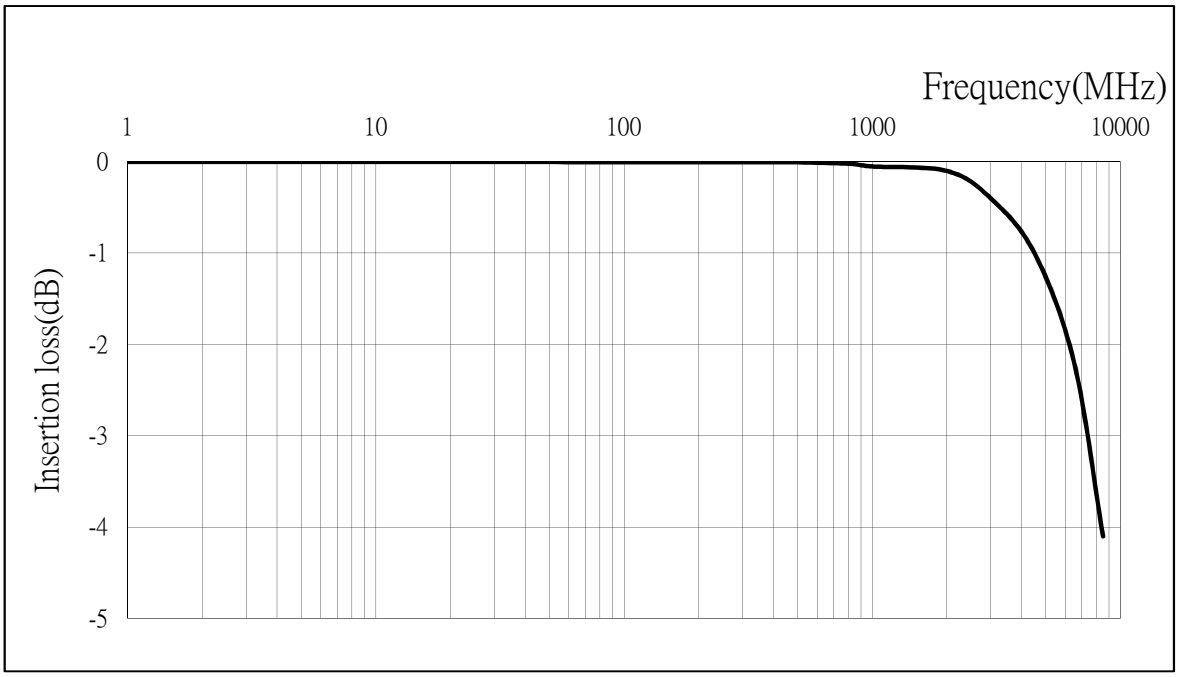



| Parameter Name: USB3.0 Eye Aoba | |
|---|---|
| Display Mode: USB3.0 5Gpbs | |
| dRate: 5 Gbits/s; 200.0 ps | V: 400 mV;Gain: 0 dB;Off: 0 mV |
| JGen: OFF | Result: Pass |

## HDC0504ST (S) SERIES




## HDC0504ST (H) SERIES



# RELIABILITY SPECIFICATION

## 1. Scope

This specification applies to wired wounded chip common mode choke of the following types used in electronic equipment :

Material : Ferrite

## 2. Construction

Configuration & Dimension : Please refer to the attached figures and tables.

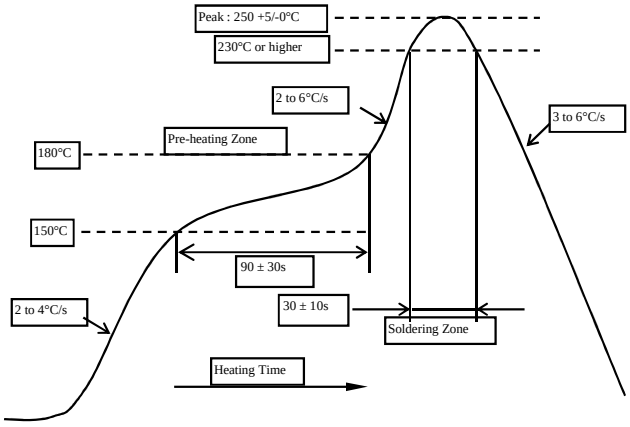
Terminals : HDC0504 (S) series shall consist of Ag followed by Nickel, then Gold (Au) plating.

## 3. Operating Temperature Range

Operating Temperature Range is the scope of ambient temperature at which the common choke can be operated continuously at rated current.

Temp. Range : - 40 °C to + 105 °C

## 4. Recommended Soldering Conditions




## 5 Characteristics

Standard Atmospheric Conditions

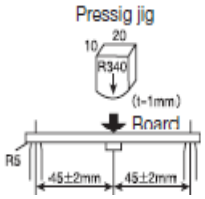
Unless otherwise specified, the standard range of atmospheric conditions for making measurements and tests are as follows :

Ambient Temperatu : 25 °C ( 20 °C ) ± 2 °C

Relative Humidity : 60% to 70% (RH)

Air Pressure : 86 Kpa to 106 Kpa

# RELIABILITY SPECIFICATION

| | ITEM | CONDITION | SPECIFICATION |
|---|---|---|---|
| **Electrical Characteristics** | Common Mode Impedance (Zc) and Tolerance | Measuring Equipment : HP-4287A or equivalent.<br>Measuring Frequency : 100 ± 1MHz<br>Measuring Temperature : 25 ± 5°C<br>(Refer to Measurement Diagram ) | 600-S: Minimum 43Ω.<br>Typical: 50~60Ω.<br>900-H: Minimum 65Ω.<br>Typical: 80~100Ω. |
| | Insulation Resistance | Measuring Voltage : Rated Voltage<br>Measuring Time : 1 minute max.<br>(Refer to Measurement Diagram ) | 100 MΩ minimum |
| | Dielectric Withstanding Voltage | Test Voltage : 2.5 times to Rated Voltage<br>Time : 1 to 5 seconds.<br>Charge current : 1mA max.<br>(Refer to Measurement Diagram ) | No damage occurs when the test voltage is applied. |
| | Rated Current | Test Current : Rated Current<br>(Refer to Measurement Diagram ) | Temperature Rise : ≤ 15°C |
| | DC Resistance (RDC) | Measured with current of 100mA max.<br>In case of doubt, measured by four terminal method.<br>(Refer to Measurement Diagram ) | Within Specified Tolerance. |
| **Mechanical Characteristics** | Flexure Strength |  <br>Warp = 2mm<br>Pressing Speed = 0.5mm/sec<br>Duration = 5 ± 1 sec | **Table 1.**<br>Change In Appearance<br>Without distinct damage<br>Change In Common Mode Impedance: Within ± 20%<br>Insulation Resistance:<br>10MΩ min<br>Withstanding Voltage:<br>No damaged |
| | Drop Test | Components shall be dropped three times on a concrete or steel board at height of 1 M naturally at any directions. | |
| | Vibration (Random) | Components shall be randomly vibrated at amplitude of 1.5mm and frequency of 10 - 55 Hz: 0.04 G / Hz, 1 minute at a period of 2 hours in each of the three mutually perpendicular directions. | |
| | Solderability | Dip pads in flux and then in a solder bath at 240 °C ± 5°C for 5 seconds. | A minimum of 80% of the metalized area must be covered with new solder. |
| | Resistance to Soldering Heat | Preheat components at 80 to 120 °C for 1 minute. Dip components into flux and then into a melted solder bath at 255 ± 5°C for 5 ± 1 seconds. Then components are to be tested after 4-48 hours at room temperature. | Meet Table 1. |

# RELIABILITY SPECIFICATION

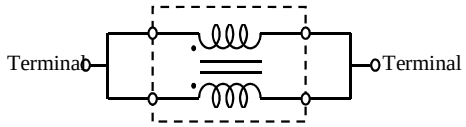
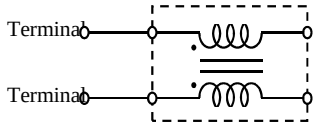
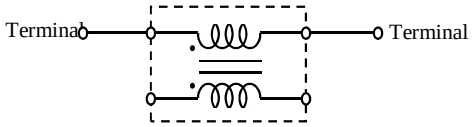
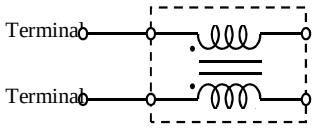
| | ITEM | CONDITION | SPECIFICATION |
|---|---|---|---|
| **Endurance Characteristics** | Cold Temperature Storage | Components shall be stored at temperature of -40 °C ± 2 °C for 1000 (+48 hours -0 hour). Then components shall be subjected to standard atmospheric conditions for 4-48 hours. After that, measurement shall be made. | Table 1.<br>Change In Appearance<br>Without distinct damage |
| | High Temperature Storage | Components shall be stored at temperature of +85 °C ± 2 °C for 1000 (+48 hours -0 hour). Then components shall be subjected to standard atmospheric conditions for 4-48 hour. After that, measurement shall be made. | Change In Common Mode Impedance:<br>Within ± 20% |
| | Moisture Resistance | Components shall be stored in the chamber at 40 °C at 90 - 95% R. H. for 1000 (+48 hours -0 hour). Then components are to be tested after 4-48 hours at room temperature. | Insulation Resistance:<br>100MΩ min |
| | Temperature Cycle | Each cycle shall consist of 30 minutes at -40°C followed by 30 minutes at 85°C with a 10-15 minutes maximum transition time between temperature extremes. Test duration is 100 cycles, then components are to be tested after 4-48 hours at room temperature. | Withstanding Voltage:<br>No damaged |
| | High Temperature With Loaded (Rated Current) | Components shall be stored at temperature of +85 °C ± 2 °C for 1000 (+48 hours -0 hour) with rated current applied. Then components shall be subjected to standard atmospheric conditions for 4-48 hour. After that, measurement shall be made. | |

# RELIABILITY SPECIFICATION

**Measurement Diagram**

Terminal to be Tested

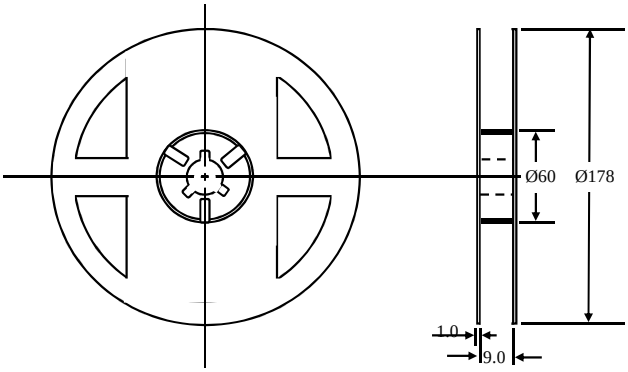
When measuring and supplying the voltage, the following terminal is applied.

| No. | Item | Terminal to be Tested |
|---|---|---|
| 1 | Common Mode Impedance (Measurement Terminal) |  |
| 2 | Withstanding Voltage (Measurement Terminal) |  |
| 3 | DC Resistance (Measurement Terminal) |  |
| 4 | Rated Current | |
| 5 | Insulation Resistance |  |

# PACKAGING INFORMATION

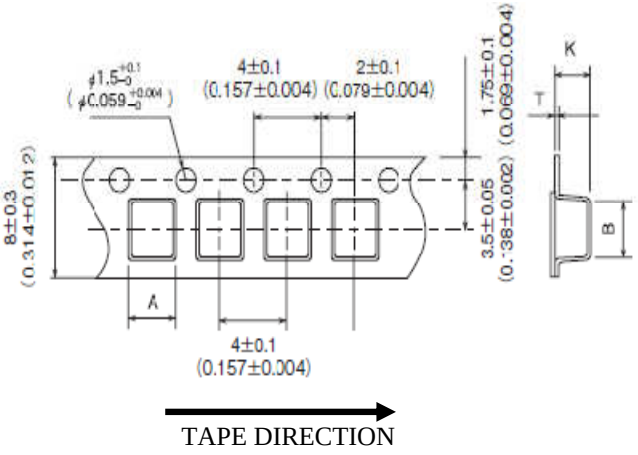
**Packing Quantity**

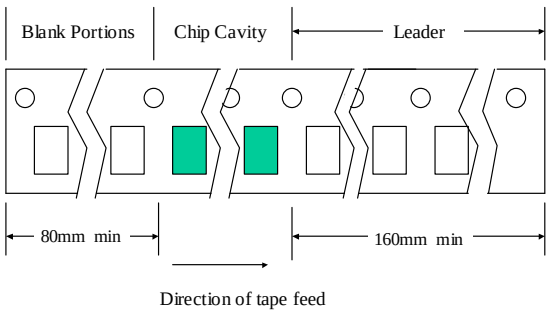
| Type | Pcs / Reel |
|---|---|
| HDC0504 | 3,000 |




**Dimensions (unit: m/m)**

| Type | Chip Cavity | | Insert Pitch | Tape Thickness | |
|---|---|---|---|---|---|
| | A | B | F | K | T |
| Tolerance | ± 0.10mm | | | | |
| HDC0504 | 1.16 | 1.41 | 4.00 | 0.98 | 0.23 |




Top Tape Strength

The top tape requires a peel-off force of 0.2 to 0.7N in the direction of the arrow as illustrated below.