

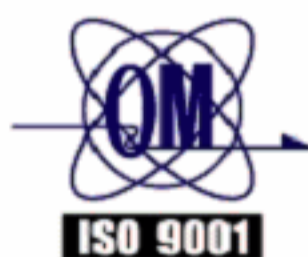
客戶名稱 CUSTOMERS:			
日期 DATE:			
產品名稱 PRODUCT:	Thick Film Chip Resistors (CR series)		
物料代號 PART NO.:	Customer		版本 REV.:
	Queen Mao	CR□□□□□□□□□□	

規 格 承 認 書

APPROVAL SHEET



客戶承認簽印 CUSTOMER APPROVED BY		核准 APPROVE	主管 CHIEF	承辦 RESPONSIBLE
APPROVED NO.:		ECN.:		/ /
MODEL:				/ /
CUSTOMER P/N:				/ /



昆 貿 電 子 股 份 有 限 公 司
QUEEN MAO ELECTRONIC CO., LTD.

台北縣 221 汐止市大安街 56 巷 35 號
No.35, LANE 56, DA-AN ST., SHIJR CITY 22178, TAIPEI, TAIWAN, R.O.C.

TEL: 886-2-8648-5566 FAX: 886-2-8648-0538

E-mail: service@queenmao.com.tw

URL: <http://www.queenmao.com.tw>

**1. SCOPE**

This specification applies for the CR series of Thick Film Chip Resistors made by Queen Mao Electronic Co., Ltd.

2. PART NUMBER SYSTEM

The part number is identified by series name, tolerance reel diameter and resistance value for customer to receive right products on each ordering.

Example:

<u>CR</u>	<u>0603</u>	<u>J</u>	<u>TR</u>	<u>103</u>
Product Code	Size Power Rating	Tolerance	Reel Diameter	Nominal Resistance
(1)	(2)	(3)	(4)	(5)

(1) Series Name

CR: Thick Film Chip Resistors

(2) Size / Power Rating

0201 (0603)	1/20W	1210 (3226)	1/3W
0402 (1005)	1/16W	1812 (4631)	1/2W
0603 (1608)	1/10W	2010 (5025)	1/2W
0805 (2012)	1/8W	1218 (3248)	1W
1206 (3216)	1/4W	2512 (6432)	1W

(3) Resistance Tolerance

B = $\pm 0.1\%$; C = $\pm 0.25\%$; D = $\pm 0.5\%$; F = $\pm 1\%$; G = $\pm 2\%$; J = $\pm 5\%$; K = $\pm 10\%$

(4) Reel Diameter

TR	Taping Reel / Paper Tape Reel	BC	Bulk Cassette
ET	Embossed Tape	SP	Special (0.6 ~ 2 mm pitch Paper Tape)

(5) Resistance Value

Thick Film Chip Resistor nominal value denoted by 3 or 4 digits

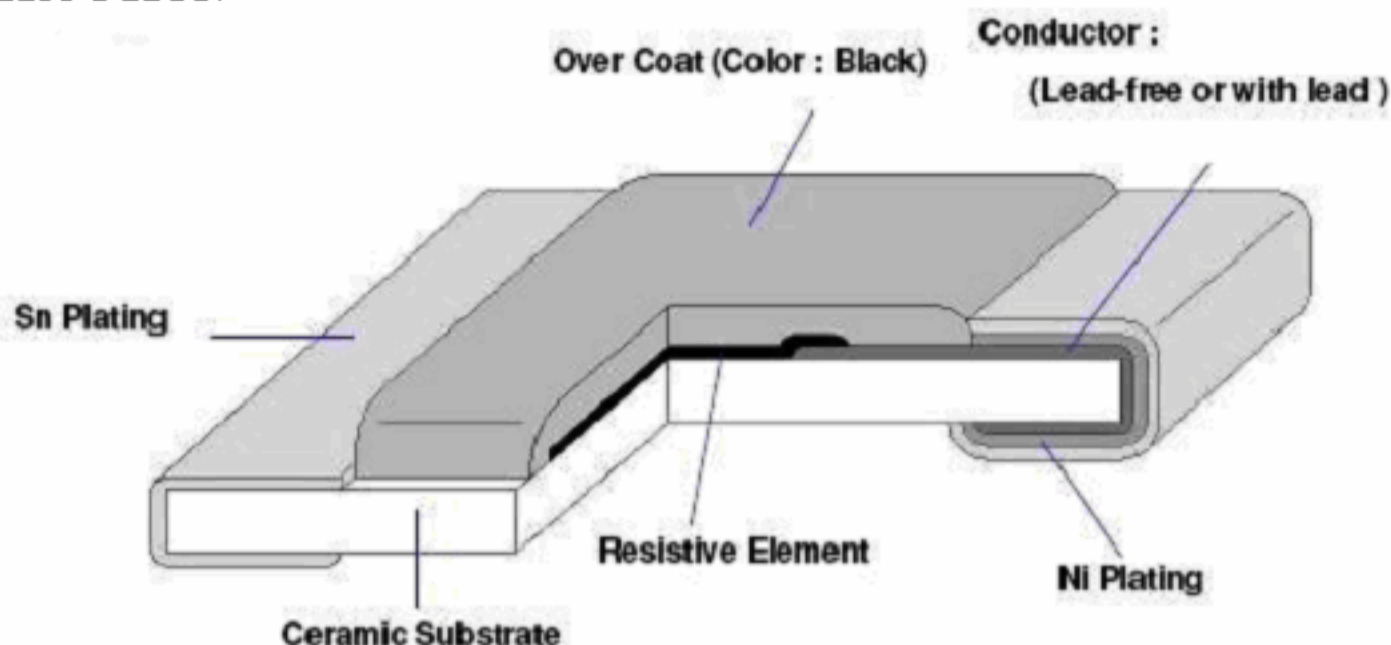
3 digits, according to IEC E-24 Series ($\pm 5\%$ & $\pm 10\%$), e.g.:

000 = 0Ω 102 = $1K\Omega$ 103 = $10K\Omega$ 104 = $100K\Omega$ 105 = $1M\Omega$

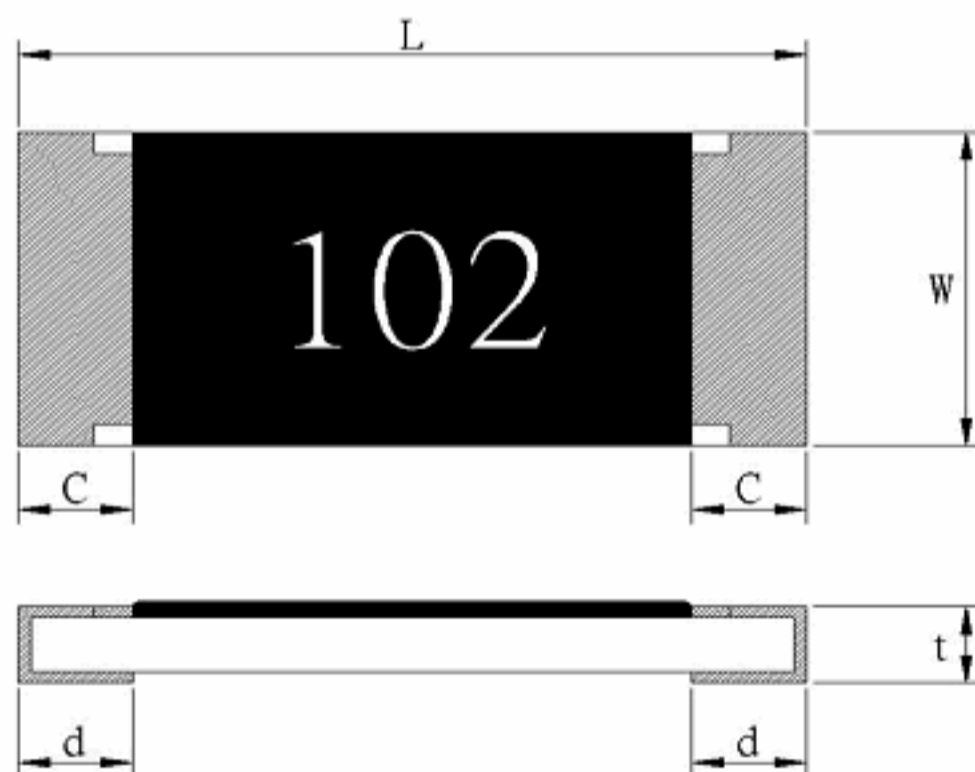
4 digits, according to IEC E-96 Series ($\pm 0.1\%$, $\pm 0.25\%$, $\pm 0.5\%$, $\pm 1\%$ & $\pm 2\%$), e.g.:

0000 = 0Ω 1001 = $1K\Omega$ 1002 = $10K\Omega$ 1003 = $100K\Omega$ 1004 = $1M\Omega$

3. CONSTRUCTION



4. CHIP DIMENSION & CONSTRUCTION



Unit: mm

Type	L	W	C	d	t
CR0201	0.60±0.03	0.30±0.03	0.10±0.05	0.15±0.05	0.25±0.05
CR0402	1.00±0.10	0.50±0.05	0.20±0.10	0.25±0.10	0.35±0.05
CR0603	1.60±0.10	0.80±0.10	0.30±0.20	0.30±0.20	0.45±0.10
CR0805	2.00±0.10	1.25±0.10	0.40±0.20	0.40±0.20	0.50±0.10
CR1206	3.20±0.20	1.60±0.15	0.50±0.30	0.40±0.20	0.60±0.10
CR1210	3.20±0.20	2.60±0.15	0.50±0.30	0.40±0.20	0.60±0.10
CR2010	5.00±0.20	2.50±0.15	0.60±0.30	0.50±0.25	0.60±0.10
CR2512	6.35±0.25	3.20±0.15	0.60±0.30	0.50±0.25	0.60±0.10



5. RESISTOR CHARACTERISTICS

Type	Power Rating at 70°C	Rating Voltage	Max. Working Voltage	Max. Overload Voltage	T.C.R. (PPM/°C)	Resistance Range (Ω)				
						B (±0.1%) E-96	D (±0.5%) E-96	F (±1%) E-96	G (±2%) E-24	J (±5%) E-24
CR0201	1/20W	Refer 5.2	25V	50V	±200			10~1M	10~1M	10~10M
					+600					1~9.1
					-200					
CR0402	1/16W	Refer 5.2	50V	100V	±200	10~200K	10~1M	10~10M	10~10M	10~10M
					+500			1~9.1	1~9.1	1~9.1
					-200					
CR0603	1/10W	Refer 5.2	50V	100V	±100	10~560K	10~1M	10~1M		
					±200			1M<R≤10M	10~10M	10~10M
					±400			1~9.1	1~9.1	1~9.1 10M<R≤20M
CR0805	1/8W	Refer 5.2	150V	300V	±100	10~560K	10~1M	10~1M		
					±200			1M<R≤10M	10~10M	10~10M
					±400			1~9.1	1~9.1	1~9.1 10M<R≤20M
CR1206	1/4W	Refer 5.2	200V	400V	±100	10~560K	10~1M	10~1M		
					±200			1M<R≤10M	10~10M	10~10M
					±400			1~9.1	1~9.1	1~9.1 10M<R≤20M
CR1210	1/3W	Refer 5.2	200V	400V	±100	10~560K	10~1M	10~1M		
					±200			1M<R≤10M	10~10M	10~10M
					±400			1~9.1	1~9.1	1~9.1 10M<R≤20M
CR2010	1/2W	Refer 5.2	200V	400V	±100	10~560K	10~1M	10~1M		
					±200			1M<R≤10M	10~10M	10~10M
					±400			1~9.1	1~9.1	1~9.1 10M<R≤20M
CR2512	1W	Refer 5.2	200V	400V	±100	10~560K	10~1M	10~1M		
					±200			1M<R≤10M	10~10M	10~10M
					±400			1~9.1	1~9.1	1~9.1 10M<R≤20M

0Ω Thick Film Chip Resistors

Type	Rated Current	Max. Overload Current	Resistance Range (Ω)
CR0201	0.5A	1A	50m Max.
CR0402	1A	2.5A	50m Max.
CR0603	1A	2.5A	50m Max.
CR0805	2A	5A	50m Max.
CR1206	2A	5A	50m Max.
CR1210	2A	5A	50m Max.
CR2010	2A	5A	50m Max.
CR2512	2A	5A	50m Max.

Operating Temp. (°C): -55°C ~ +125°C

Note:

Except for the above standardized products, we also provide the customized products.



5.1 Derating Curve

For resistors operated at ambient over 70°C, power rating shall be derated in accordance with Figure 1.

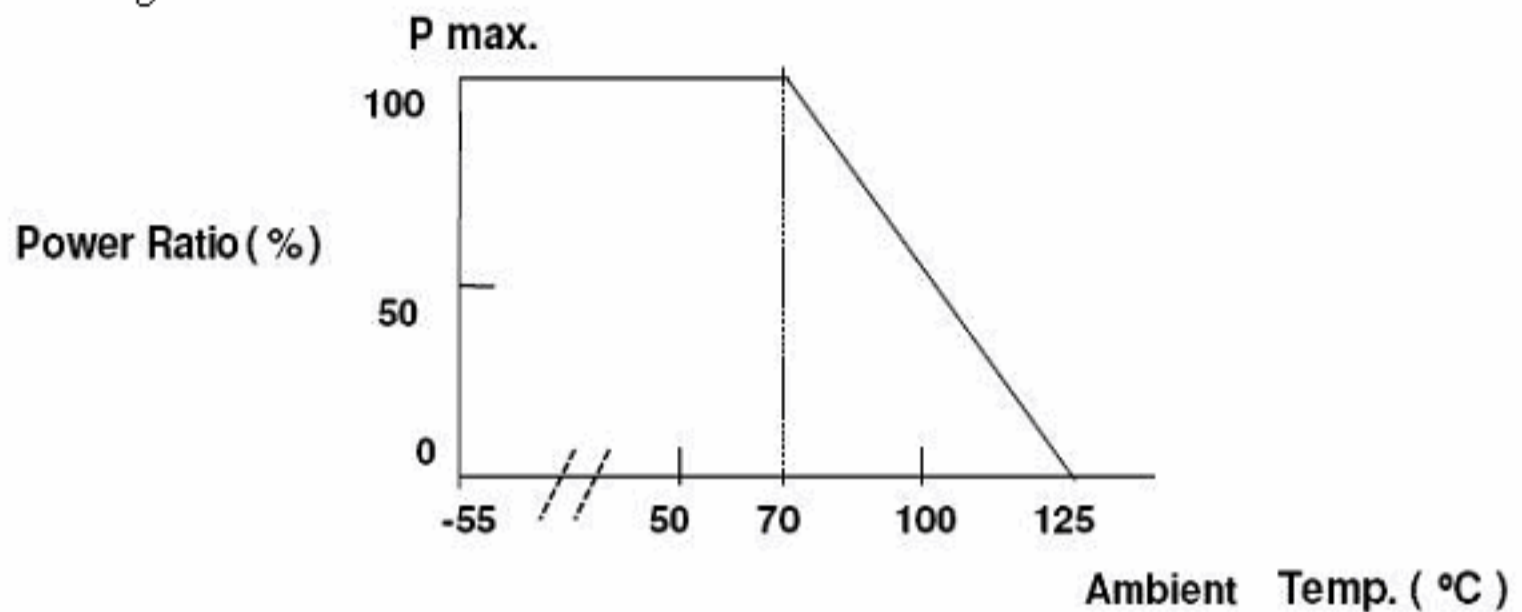


Figure 1

5.2 Rated Voltage

The rated voltage is calculated by the following formula:

$$E = \sqrt{P \times R}$$

E = Rated Voltage (V)
P = Rated Power (W)
R = Resistance Value (Ω)

E.G: Calculate Rated Voltage for CR0603JTR102

CR0603JTR102

P: 1/10W

R: 102 = 1K Ω = 1,000 Ω

$$E = \sqrt{0.1(W) \times 1,000(\Omega)} = 10 (V)$$



6. RELIABILITY TESTS (AS SPECIFIED IN JIS C 5202):

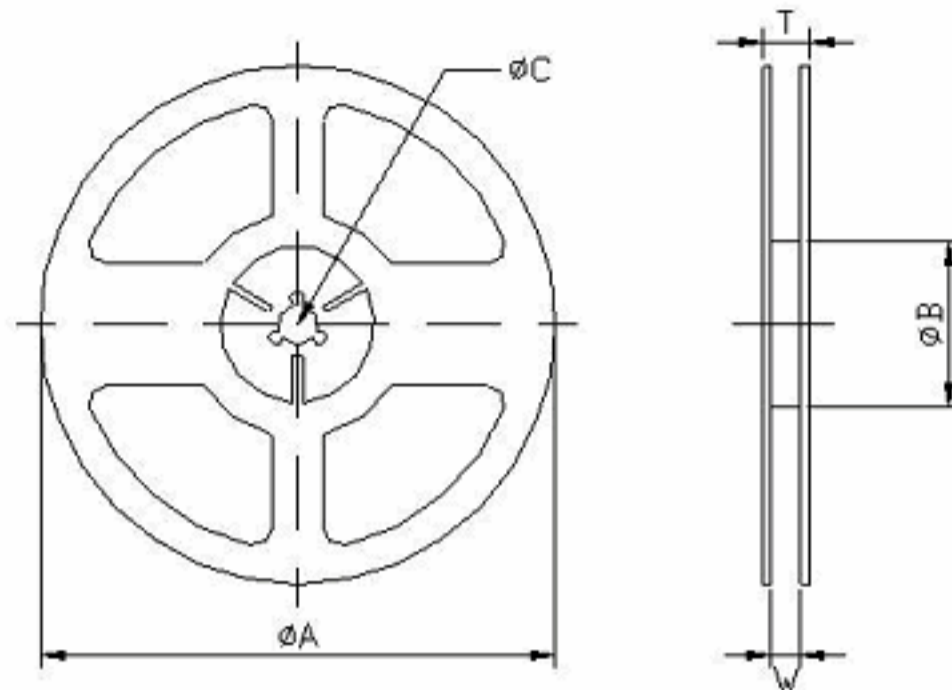
Test Items	Reference Standard	Condition of Test	Test Limits
Temperature Coefficient of Resistance	JIS-C5202-5.2	-55 ~ +125 °C	Refer 5.0
Short Time Overload	JIS-C5202-5.5	2.5 X rated voltage for 5 sec	+(1% + 0.05Ω) Remarks : 0201: +(3% + 0.1Ω) 0402: +(2% + 0.1Ω) 0Ω: 50mΩ or less
Intermittent Overload	JIS-C5202-5.8	3.0 X rated voltage or Max Overloading voltage ,1sec "ON", 25sec "OFF", 10000 cycles (Remarks : 0201 /0402 2.5 X RCWV *)	+(5.0% + 0.1Ω) 0Ω : 50mΩ or less
Load Life	JIS-C5202-7.10	1000 hours at rated voltage, 70℃ , 1.5hours "ON", 0.5hour "OFF"	0.5%,1%:(+1.0%+0.05Ω) 2%,5%:(+3.0%+0.1Ω)) Remarks : 0201 : +(5.0%+0.1Ω) 0402 : +(3.0%+0.1Ω) 0Ω : 100mΩ or less
Load Life with Humidity	JIS-C5202-7.9	1000 hours at rated voltage , 40±2℃, 90-95% RH 1.5hours "ON", 0.5hour "OFF"	0.5%,1%:(+1.0%+0.05Ω) 2%, 5%:(+3.0%+0.1Ω) Remarks : 0201: +(5.0%+0.1Ω) 0402: +(3.0%+0.1Ω) 0Ω : 100mΩ or less Without mechanical damage
Rapid Change of Temperature	JIS-C5202-7.4	-55℃ (30 min.) / +155 ℃(30 min.) 5 cycles	0.5%,1%:(+0.5%+0.05Ω) 2%, 5%:(+1.0%+0.05Ω) Remarks : 0201: +(3.0%+0.1Ω) 0Ω : 50mΩ or less
Solderability	JIS-C5202-6.11	245±5℃ solder, 2±0.5 sec dwell. Solder : Sn96.5 / Ag3.0 / Cu0.5	At least 95% of surface area of electrode shall be covered with new solder.
Robustness of Termination (Bending)	JIS-C5202-6.1	3mm deflection	0.5%,1%:(+0.5%+0.05Ω) 2%,5%:(+1.0%+0.05Ω) Remarks : 0201 +(1.0%+0.1Ω) 0Ω: 50mΩ or less
Dielectric Withstanding Voltage (Voltage Proof)	JIS-C5202-5.7	Applying voltage : 0201 : 50V , 0402 & 0603 : 300V The other 500V for a minute .	No abnormalities such
Insulation Resistance	JIS-C5202-5.6	Applying voltage 100V for 1 minute.	≥ 1 GΩ
Resistance to Dry Heat	JIS-C5202-7.2	125±5℃ for 96±4Hrs	0.5%,1%:(+1.0%+0.05Ω) 2%,5%:(+2.0%+0.1Ω) Remark 0201 : +(2.0%+0.1Ω) 0Ω: 50mΩ or less
Resistance to Solder Heat	JIS-C5202-6.10	270 ±5℃ solder , 10 ±1 sec dwell.	0.5%,1%:(+0.5%+0.05Ω) 2%, 5%:(+1.0%+0.05Ω) Remarks : 0201 +(3.0%+0.1Ω) 0Ω: 50mΩ or less



Whisker	SONY SS-00254-8	<p>Component , Lead-Free Soldering part 8 : Solder Heat Resistance Test for SMD. Lead- Free Soldering "</p> <p>Temp. Cycles : -35 ± 5℃ / 125 ± 5℃ , Keep 7 min Testing duration : 500±4 hours</p> <p>Temp. Humidity Chambers: Temperature : 85℃ Humidity : 85% RH Testing duration : 500±4 hours .</p>	Whisker formation : 50 um or less .
Resistance to Solder Heat	SONY SS-00254-5	<p>Component , Lead-Free Soldering part 5 : Solder Heat Resistance Test for SMD. Lead- Free Soldering "</p> <p>Flow Solder : Pre – heat : 100 to 105 ℃ 30±5 sec Temperature : 260±3℃ 10 +1/-0 sec The entire sample shall be dipped in solder. The specimen shall be stored at standard atmospheric conditions for 1 hour .</p> <p>Iron Solder : Bit temperature : 350 ±10℃ Application time of soldering iron: 3 +1/- 0sec Apply the soldering iron to the electrode . The specimen shall be stored at standard atmospheric conditions for 1 hour , after which the measurements shall be made</p>	Electrical characteristics shall be Satisfied . Without distinct deformation in appearance



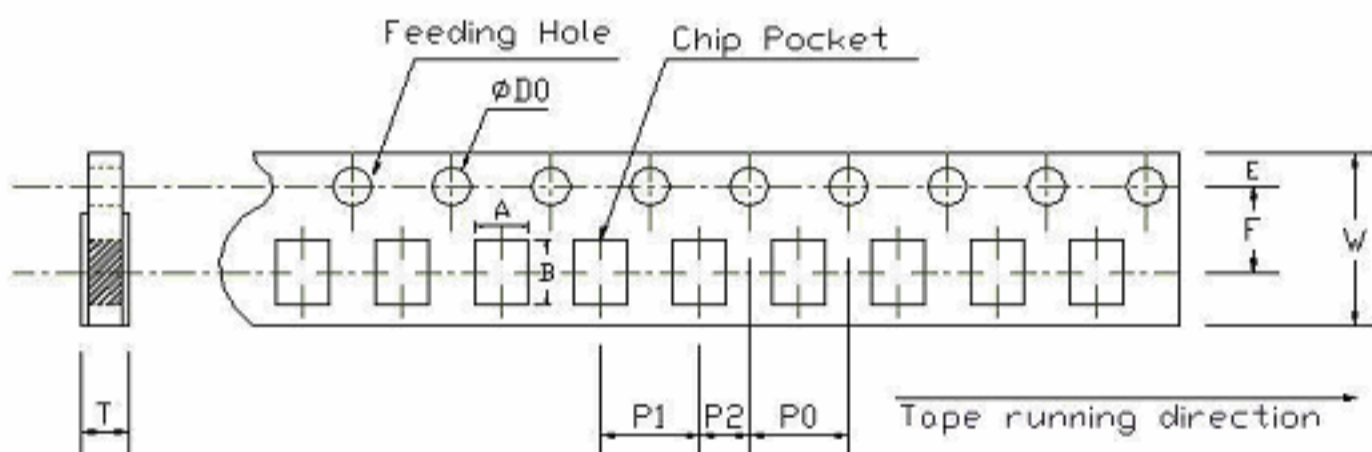
7. TAPING REEL



Unit: mm

Style	Packing	Tape Width	Reel Dia.	ϕA	ϕB	ϕC	W	T
CR0402 CR0603 CR0805 CR1206 CR1210	Paper	8	7" 10" 13"	180 ⁺⁰ ₋₃ 254±1 330±1	60 ⁺¹ ₋₀ 100±1 100±1	13.0±0.2 13.0±0.2 13.0±0.2	9.0±0.3 9.5±0.3 9.5±0.3	11.4±1 13.5±1 13.5±1
CR2010 CR2512	Embossed	12	7"	180 ⁺⁰ ₋₃	60 ⁺¹ ₋₀	13.0±0.2	13.0±0.3	15.4±1

8. PAPER TAPING

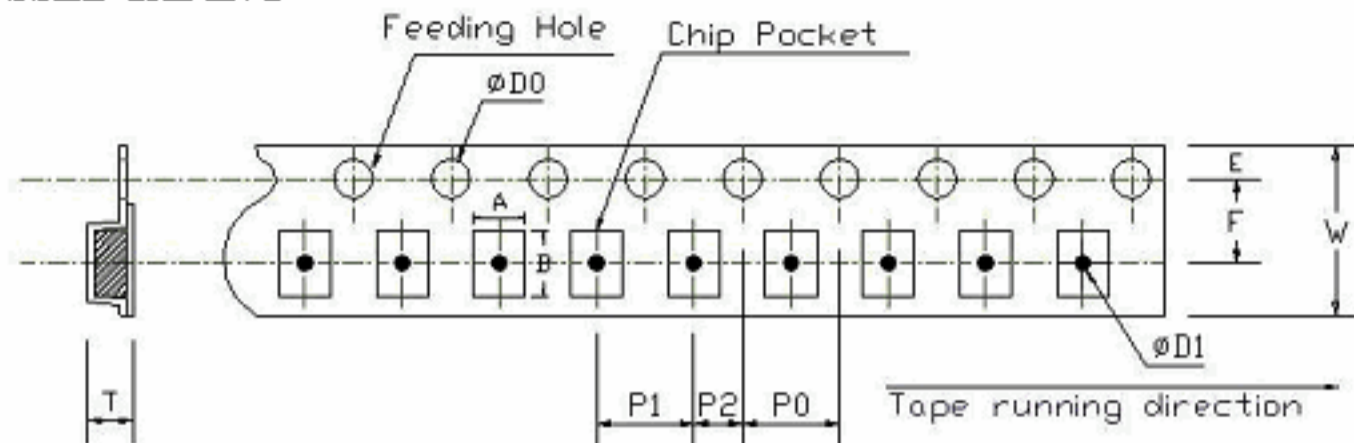


Unit: mm

Dimension	A	B	W	E	F	P0	P1	P2	$\phi D0$	T
CR0402	0.65±0.1	1.15±0.1	8.0±0.2	1.75±0.1	3.5±0.05	4.0±0.1	2.0±0.05	2.0±0.05	1.5 ^{+0.1} ₋₀	0.45±0.1
CR0603	1.10±0.1	1.90±0.1	8.0±0.2	1.75±0.1	3.5±0.05	4.0±0.1	4.0±0.05	2.0±0.05	1.5 ^{+0.1} ₋₀	0.70±0.1
CR0805	1.65±0.1	2.40±0.1	8.0±0.2	1.75±0.1	3.5±0.05	4.0±0.1	4.0±0.05	2.0±0.05	1.5 ^{+0.1} ₋₀	0.85±0.1
CR1206	1.90±0.1	3.50±0.1	8.0±0.2	1.75±0.1	3.5±0.05	4.0±0.1	4.0±0.05	2.0±0.05	1.5 ^{+0.1} ₋₀	0.85±0.1
CR1210	2.80±0.1	2.50±0.1	8.0±0.2	1.75±0.1	3.5±0.05	4.0±0.1	4.0±0.05	2.0±0.05	1.5 ^{+0.1} ₋₀	0.85±0.1



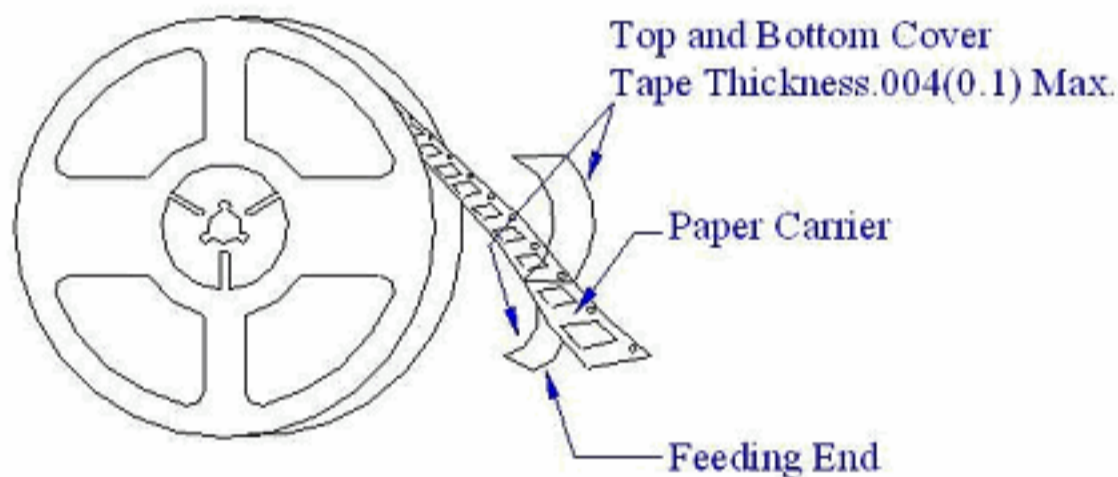
9. EMBOSSED TAPING



Unit: mm

Dimension	A	B	W	E	F	P0	P1	P2	φD0	φD1	T
CR2010	2.9±0.2	5.4±0.2	12±0.1	1.75±0.1	5.5±0.5	4.0±0.1	4.0±0.1	2.0±0.05	1.5 ^{+0.1} ₋₀	1.5 ^{+0.1} ₋₀	1.0±0.1
CR2512	3.6±0.2	6.9±0.2	12±0.1	1.75±0.1	5.5±0.5	4.0±0.1	4.0±0.1	2.0±0.05	1.5 ^{+0.1} ₋₀	1.5 ^{+0.1} ₋₀	1.0±0.1

10. PACKING METHOD



Unit: PCS

Packing Style	Paper Taping Reel		
	7" (178mm)	10" (254mm)	13" (330mm)
CR0402	10,000	20,000	40,000
CR0603 CR0805 CR1206 CR1210	5,000	10,000	20,000
CR2010 CR2512	4,000	—	—