

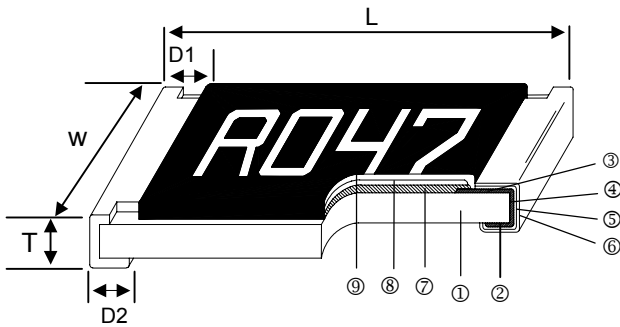
| | |
|------|------------|
| 系列号 | HoCS |
| 修订日期 | 2020-03-06 |
| 版本号 | Ho-A0 |



Features

- 3 Watts power rating in 1 Watt size, 1225 package
- Low TCR of ± 100 PPM/ $^{\circ}$ C
- Resistance values from 1m to 1 ohm
- High purity alumina substrate for high power dissipation
- Long side terminations with higher power rating
- RoHS Compliance

Construction



Applications

- Power Management Applications
- Switching Power Supply
- Over Current Protection in Audio Applications
- Voltage Regulation Module (VRM)
- DC-DC Converter, Battery Pack, Charger, Adaptor
- Automotive Engine Control
- Disk Driver

| | | |
|---------------------|----------------------|----------------------|
| ① Alumina Substrate | ④ Edge Electrode | ⑦ Resistor Layer |
| ② Bottom Electrode | ⑤ Barrier Layer | ⑧ Primary Overcoat |
| ③ Top Electrode | ⑥ External Electrode | ⑨ Secondary Overcoat |

Dimensions

| Type | Size (Inch) | L (mm) | W (mm) | T (mm) | D1 (mm) | D2 (mm) | Weight (g) (1000pcs) |
|---------|---------------------|-----------|-----------|-----------|-----------|-----------|----------------------|
| CS | 0201 | 0.60±0.03 | 0.30±0.03 | 0.23±0.05 | 0.12±0.05 | 0.15±0.05 | 0.18 |
| CS | 0402 | 1.00±0.05 | 0.50±0.05 | 0.32±0.10 | 0.25±0.10 | 0.20±0.10 | 0.7 |
| CS | 0603 | 1.60±0.10 | 0.80±0.10 | 0.45±0.10 | 0.30±0.20 | 0.30±0.20 | 1.99 |
| CS | 0805 | 2.00±0.10 | 1.25±0.10 | 0.55±0.10 | 0.30±0.20 | 0.40±0.25 | 5.3 |
| CS | 1206 | 3.10±0.10 | 1.55±0.10 | 0.55±0.10 | 0.50±0.30 | 0.40±0.25 | 8.82 |
| CS | 1210 | 3.10±0.10 | 2.60±0.15 | 0.55±0.10 | 0.50±0.30 | 0.50±0.25 | 15.5 |
| CS | 2010 | 5.00±0.10 | 2.50±0.15 | 0.60±0.15 | 0.60±0.30 | 0.50±0.25 | 27.03 |
| CS | 2512 | 6.35±0.10 | 3.10±0.15 | 0.60±0.10 | 0.60±0.30 | 0.55±0.25 | 43.08 |
| CS (2W) | 2512 (10 - 99mΩ) | 6.35±0.20 | 3.15±0.15 | 0.74±0.10 | 0.60±0.30 | 0.55±0.25 | 53.08 |
| CS (2W) | 2512 (100 - 1000mΩ) | 6.35±0.20 | 3.15±0.15 | 0.74±0.10 | 0.60±0.30 | 2.10±0.10 | 53.08 |
| CS | 1225 | 3.10±0.15 | 6.30±0.15 | 0.90±0.15 | 0.60±0.30 | 0.80±0.25 | 64.88 |
| CS | 3720 | 2.00±0.20 | 3.75±0.20 | 0.60±0.10 | 0.40±0.20 | 0.40±0.20 | 19.96 |
| CS | 7520 | 2.00±0.20 | 7.50±0.30 | 0.60±0.10 | 0.40±0.20 | 0.40±0.20 | 35.71 |
| CS | 0612 | 1.55±0.10 | 3.10±0.15 | 0.55±0.10 | 0.30±0.15 | 0.45±0.15 | 10.19 |



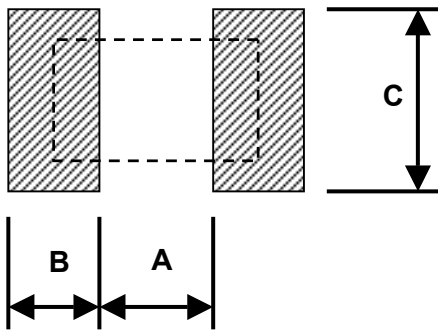
地址：深圳市龙华新区观澜大布头路南通邦高新产业园 A 栋 8 楼

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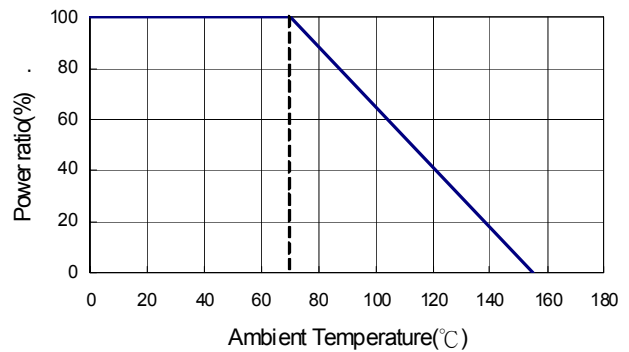
Part Numbering

| CS | 0603 | 1/4W | R100 | 1% | ±100 |
|--------------|--|--|---------------------------------------|----------------------------|---|
| Product Type | Dimensions (L×W) | Power Rating | Resistance | Resistance Tolerance | TCR (PPM/°C) |
| | 0201 0402 0603 0805 1206 1210 2010 2512 1225 3720 7520 0612 | 2W 1.5W 1W 3/4W 1/2W 1/4W 1/5W 1/8W | R010: 0.01Ω R100: 0.1Ω 1R00: 1Ω | ±0.5% ±1% ±2% ±5% | ±100 ±200 ±300 ±400 ±600 ±150 ±1000 |

Recommend Land Pattern



Derating Curve



Pad Layout (Except For CS12: Ultra High Power Rating Series)

| Type | A (mm) | B (mm) | C (mm) |
|--------|--------|--------|----------|
| CS0201 | 0.25 | 0.30 | 0.40±0.2 |
| CS0402 | 0.50 | 0.50 | 0.60±0.2 |
| CS0603 | 0.80 | 1.00 | 0.90±0.2 |
| CS0805 | 1.00 | 1.00 | 1.35±0.2 |
| CS1206 | 2.00 | 1.15 | 1.70±0.2 |
| CS1210 | 2.00 | 1.15 | 2.50±0.2 |
| CS2110 | 3.60 | 1.40 | 2.50±0.2 |
| CS2512 | 4.90 | 1.60 | 3.20±0.2 |
| CS1225 | 1.20 | 2.00 | 7.00±0.2 |
| CS3720 | 1.00 | 1.80 | 3.90±0.2 |
| CS7520 | 1.00 | 1.80 | 7.60±0.2 |
| CS0612 | 0.60 | 1.00 | 3.20±0.2 |

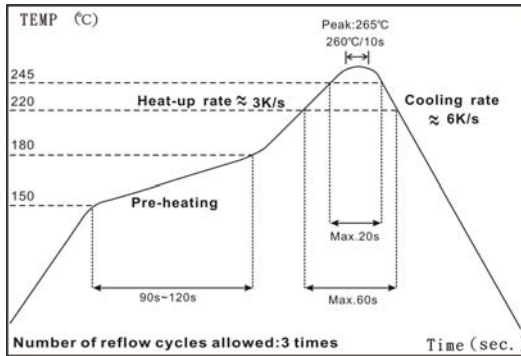
Marking for 0603

| Type | Code |
|------------|--------|
| 1R0 | 1.000Ω |
| R10 | 0.100Ω |
| R01 | 0.010Ω |
| <u>102</u> | 0.102Ω |
| <u>024</u> | 0.024Ω |

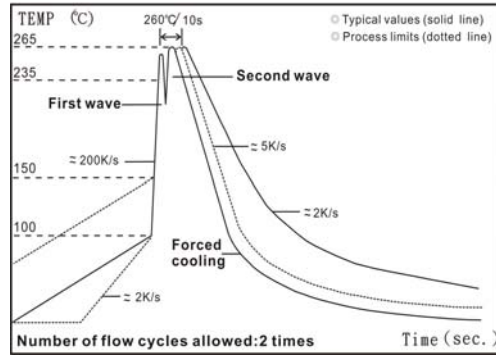
Pad Layout (For CS12: Ultra High Power Rating Series)

| Type | Resistance Range | A (mm) | B (mm) | C (mm) |
|--------|------------------|--------|--------|---------|
| CS2512 | 10~99 mΩ | 4.9 | 1.6 | 3.2±0.2 |
| CS2512 | 100~1000mΩ | 1.0 | 3.55 | 3.2±0.2 |

■ Soldering Condition



IR Reflow Soldering



Wave Soldering (Flow Soldering)

- (1) Time of IR reflow soldering at maximum temperature point 260°C : 10s
- (2) Time of wave soldering at maximum temperature point 260°C : 10s
- (3) Time of soldering iron at maximum temperature point 410°C : 5s

■ Standard Electrical Specifications

| Type | Item | Power Rating at 70°C | Operating Temp. Range | Max. Operating Current | Resistance Range (mΩ) | | | | TCR (PPM/°C) |
|---------|------|----------------------|-------------------------|------------------------|--|-----|--------------|-----|------------------------------|
| | | | | | ±0.5% | ±1% | ±2% | ±5% | |
| CS0201 | | 1/20W | -55 ~ +155°C | 0.70A | 100 - 147 150 - 500 510 - 1000 | | | | ±1000 ±600 ±300 |
| CS0402 | | 1/16W | | 1.11A | 50 - 100 102 - 500 510 - 1000 | | | | ±400 ±300 ±200 |
| CS0603 | | 1/10W | | 2.23A | 20 - 50 51 - 100 102 - 500 510 - 1000 | | | | ±600 ±400 ±300 ±200 |
| CS0805 | | 1/8W | | 2.50A | 20 - 50 51 - 100 102 - 196 200 - 1000 | | | | ±600 ±400 ±300 ±200 |
| CS1206 | | 1/4W | | 5.00A | 10 - 20 | | | | ±600 |
| CS1210 | | 1/2W | | 7.07A | 21 - 50 | | | | ±400 |
| CS2010 | | 3/4W | | 8.66A | 51 - 91 | | | | ±300 |
| CS12512 | | 1W | | 10.0A | 100 - 1000 | | | | ±200 |
| CS1225 | | 3W | | 31.6A | 3 - 5 6 - 20 21 - 30 33 - 8000 | | | | ±300 ±200 ±150 ±100 |
| CS3720 | | 1W | | 10.0A | 10 - 18 20 - 500 | | | | ±300 ±150 |
| CS7520 | | 2W | | 44.7A | — | | | | ±300 |
| | | | | | 1 - 4 | | | | ±300 |
| CS0612 | | 1W | | 10.0A | 5 - 10 11 - 350 | | | | ±200 ±150 |
| | | | | | 10 - 27 30 - 91 | | | | ±600 ±300 |
| | | | 100 - 499 500 - 1000 | | | | ±200 ±100 | | |

High Power & Ultra High Power Rating Electrical Specifications

| Type \ Item | Power Rating at 70°C | Operating Temp. Range | Max. Operating Current | Resistance Range (mΩ) | | | | TCR (PPM/°C) |
|-------------|----------------------|-----------------------|------------------------|-----------------------|-----------|------------|------------------------------|--------------|
| | | | | ±0.5% | ±1% | ±2% | ±5% | |
| CS0402 | 1/8W | -55 ~ +155°C | 1.56A | 51 - 100 | 102 - 500 | 510 - 1000 | ±400 ±300 ±200 | |
| CS0603 | 1/8W | | 1.98A | | | | | |
| CS0805 | 1/5W | | 2.21A | | | | | |
| CS1206 | 1/4W | | 7.07A | 10 - 20 | 21 - 50 | 51 - 91 | ±600 ±400 ±300 ±200 | |
| CS1210 | 3/4W | | 8.66A | | | | | |
| CS2010 | 1W | | 10.0A | | | | | |
| CS2512 | 1.5W | | 12.2A | | | | | |
| CS2512 | *2W | | 14.1A | | | | | |

*: Ultra High Power

Low TCR Electrical Specifications

| Type \ Item | Power Rating at 70°C | Operating Temp. Range | Max. Operating Current | Resistance Range (mΩ) | | | | TCR (PPM/°C) |
|-------------|----------------------|-----------------------|------------------------|-----------------------|-----|-----|-----|--------------|
| | | | | ±0.5% | ±1% | ±2% | ±5% | |
| CS0805 | 1/8W | -55 ~ +155°C | 1.11A | 100 - 1000 | | | | ±100 |
| CS1206 | 1/4W | | 1.58A | 100 - 1000 | | | | ±100 |
| CS1210 | 1/2W | | 2.58A | 75 - 1000 | | | | ±100 |
| CS2010 | 3/4W | | 3.87A | 50 - 1000 | | | | ±100 |
| CS2512 | 1W | | 7.07A | 20 - 1000 | | | | ±100 |
| CS2512 | *2W | | 6.32A | 50 - 1000 | | | | ±100 |
| CS3720 | 1W | | 3.16A | 100 - 500 | | | | ±100 |
| CS7520 | 2W | | 6.32A | 50 - 350 | | | | ±100 |

Operating Current= $\sqrt{P/R}$

Environmental Characteristics

| Item | Requirement | Test Method |
|--|--|--|
| Temperature Coefficient of Resistance (T.C.R.) | As Spec. | JIS-C-5201-1 4.8 IEC-60115-1 4.8 -55°C~+125°C, 25°C is the reference temperature |
| Short Time Overload | ±(0.5%+0.05Ω) | JIS C 5201-1 4.13 IEC 60115-1 4.13 RCWV*2.5 or Max. Overload Voltage whichever is lower for 5 seconds |
| | ±(1.0%+0.05Ω) For High power rating | |
| Insulation Resistance | ≥ 10G | JIS-C-5201-1 4.6 IEC-60115-1 4.6 Max. Overload Voltage for 1 minute |
| Endurance | ±(1.0%+0.05Ω) | JIS-C-5201-1 4.25 IEC-60115-1 4.25.1 70±2°C, RCWV for 1000 hrs with 1.5 hrs "ON" and 0.5 hr "OFF" |
| Damp Heat with Load | ±(0.5%+0.05Ω) | JIS-C-5201-1 4.24 IEC-60115-1 4.24 40±2°C, 90~95% R.H., RCWV for 1000 hrs with 1.5 hrs "ON" and 0.5 hr "OFF" |
| Dry Heat | ±(0.5%+0.05Ω) | JIS-C-5201-1 4.23 IEC-60115-1 4.23.2 at +155°C for 1000 hrs |
| Bending Strength | ±(1.0%+0.05Ω) | JIS-C-5201-1 4.33 IEC-60115-1 4.33 Bending once for 5 seconds with 3mm 2010, 2512 sizes: 2mm |
| Solderability | 95% min. coverage | JIS-C-5201-1 4.17 IEC-60115-1 4.17 245±5°C for 3 seconds |
| Resistance to Soldering Heat | ±(0.5%+0.05Ω) | JIS-C-5201-1 4.18 IEC-60115-1 4.18 260±5°C for 10 seconds |
| Voltage Proof | No breakdown or flashover | JIS-C-5201-1 4.7 IEC-60115-1 4.7 1.42 times Max. Operating Voltage for 1 minute |
| Leaching | Individual leaching area ≤ 5% Total leaching area ≤ 10% | JIS-C-5201-1 4.18 IEC-60068-2-58 8.2.1 260±5°C for 30 seconds |
| Rapid Change of Temperature | ±(0.5%+0.05Ω) | JIS-C-5201-1 4.19 IEC-60115-1 4.19 -55°C to +155°C, 5 cycles |

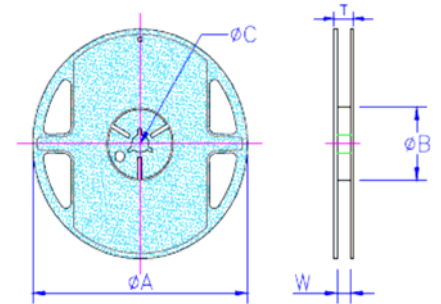
RCWV(Rated Continuous Working Voltage)= $\sqrt{P \cdot R}$ or Max. Operating Voltage whichever is lower.

Storage Temperature: 15~28°C; Humidity < 80%RH

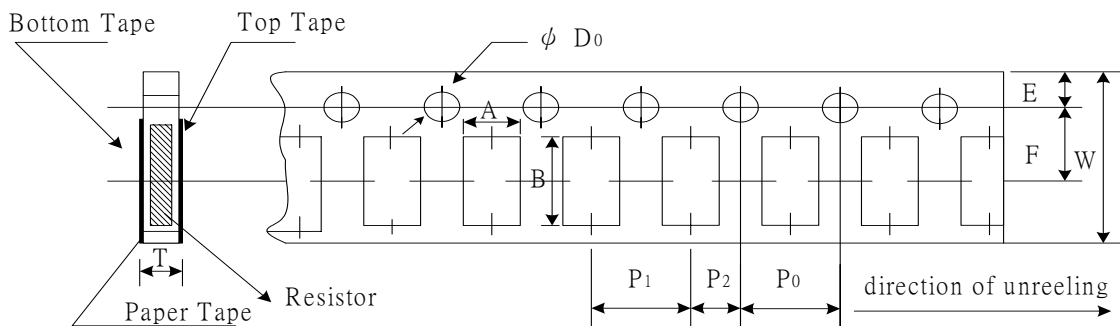
■Packaging

Packaging Quantity & Reel Specifications

| Type | ΦA (mm) | ΦB (mm) | ΦC (mm) | W (mm) | T (mm) | Paper Tape (EA) | Embossed Plastic Tape (EA) |
|-------------|-----------|----------|----------|----------|----------|-----------------|----------------------------|
| CS0201 | 178.0±1.0 | 60.0+1.0 | 13.5±0.7 | 9.5±0.1 | 11.5±1.0 | 10,000 | |
| CS0402 | 178.0±1.0 | 60.0+1.0 | 13.5±0.7 | 9.5±0.1 | 11.5±1.0 | 10,000 | - |
| CS0603 | 178.0±1.0 | 60.0+1.0 | 13.5±0.7 | 9.5±0.1 | 11.5±1.0 | 5,000 | - |
| CS0805 | 178.0±1.0 | 60.0+1.0 | 13.5±0.7 | 9.5±0.1 | 11.5±1.0 | 5,000 | - |
| CS1206 | 178.0±1.0 | 60.0+1.0 | 13.5±0.7 | 9.5±0.1 | 11.5±1.0 | 5,000 | - |
| CS1210 | 178.0±1.0 | 60.0+1.0 | 13.5±0.7 | 9.5±0.1 | 11.5±1.0 | 5,000 | |
| CS2010 | 178.0±1.0 | 60.0+1.0 | 13.5±0.7 | 13.5±1.0 | 15.5±1.0 | - | 4,000 |
| CS2512 | 178.0±1.0 | 60.0+1.0 | 13.5±0.7 | 13.5±1.0 | 15.5±1.0 | - | 4,000 |
| CS2512 (2W) | 178.0±1.0 | 60.0+1.0 | 13.5±0.7 | 13.5±1.0 | 15.5±1.0 | - | 2,000 |
| CS1225 | 178.0±1.0 | 60.0+1.0 | 13.5±0.7 | 13.5±1.0 | 15.5±1.0 | - | 2,000 |
| CS3720 | 178.0±1.0 | 60.0+1.0 | 13.5±0.7 | 13.5±1.0 | 15.5±1.0 | - | 2,000 |
| CS7520 | 178.0±1.0 | 60.0+1.0 | 13.5±0.7 | 17.5±1.0 | 19.5±1.0 | - | 2,000 |
| CS0612 | 178.0±1.0 | 60.0+1.0 | 13.5±0.7 | 9.5±0.1 | 11.5±1.0 | 5,000 | - |

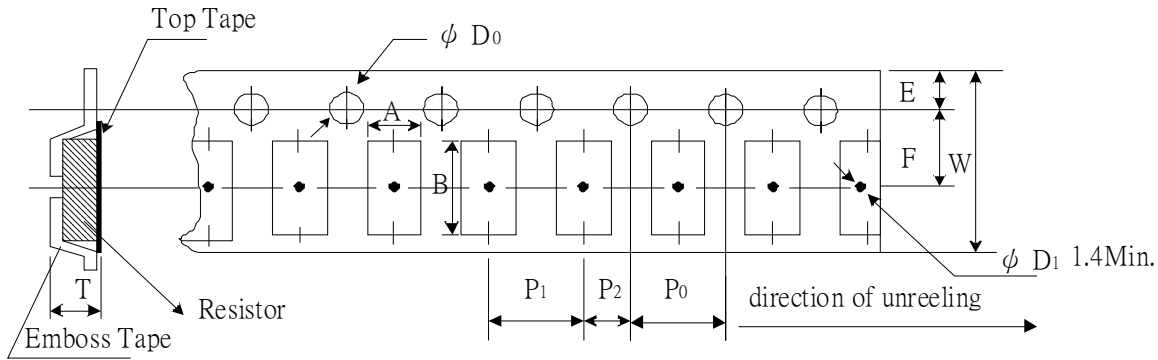


Paper Tape Specifications



| Type | A (mm) | B (mm) | W (mm) | E (mm) | F (mm) | P0 (mm) | P1 (mm) | P2 (mm) | ΦD ₀ (mm) | T (mm) |
|--------|-----------|-----------|----------|-----------|-----------|-----------|-----------|-----------|----------------------|-----------|
| CS0201 | 0.38±0.05 | 0.68±0.05 | 8.0±0.20 | 1.75±0.10 | 3.50±0.05 | 4.00±0.10 | 2.00±0.05 | 2.00±0.05 | 1.50+0.1,-0 | 0.42±0.20 |
| CS0402 | 0.65±0.10 | 1.15±0.10 | 8.0±0.20 | 1.75±0.10 | 3.50±0.05 | 4.00±0.10 | 2.00±0.05 | 2.00±0.05 | 1.50+0.1,-0 | 0.45±0.10 |
| CS0603 | 1.10±0.10 | 1.90±0.10 | 8.0±0.20 | 1.75±0.10 | 3.50±0.05 | 4.00±0.10 | 4.00±0.05 | 2.00±0.05 | 1.50+0.1,-0 | 0.70±0.10 |
| CS0805 | 1.60±0.10 | 2.40±0.20 | 8.0±0.20 | 1.75±0.10 | 3.50±0.05 | 4.00±0.10 | 4.00±0.05 | 2.00±0.05 | 1.50+0.1,-0 | 0.85±0.10 |
| CS1206 | 1.90±0.10 | 3.50±0.20 | 8.0±0.20 | 1.75±0.10 | 3.50±0.05 | 4.00±0.10 | 4.00±0.05 | 2.00±0.05 | 1.50+0.1,-0 | 0.85±0.10 |
| CS1210 | 2.90±0.10 | 3.50±0.20 | 8.0±0.20 | 1.75±0.10 | 3.50±0.05 | 4.00±0.10 | 4.00±0.05 | 2.00±0.05 | 1.50+0.1,-0 | 0.85±0.10 |
| CS0612 | 1.90±0.10 | 3.50±0.20 | 8.0±0.20 | 1.75±0.10 | 3.50±0.05 | 4.00±0.10 | 4.00±0.05 | 2.00±0.05 | 1.50+0.1,-0 | 0.85±0.10 |

Emboss Plastic Tape Specifications



| Type | A (mm) | B (mm) | W (mm) | E (mm) | F (mm) | P ₀ (mm) | P ₁ (mm) | P ₂ (mm) | ΦD ₀ (mm) | T (mm) |
|-------------|-----------|-----------|-----------|-----------|----------|---------------------|---------------------|---------------------|----------------------|------------|
| CS2010 | 2.80±0.10 | 5.50±0.10 | 12.0±0.30 | 1.75±0.10 | 5.5±0.05 | 4.00±0.05 | 4.00±0.10 | 2.00±0.05 | 1.50+0.10 | 1.00±0.20 |
| CS2512 | 3.50±0.10 | 6.70±0.10 | 12.0±0.30 | 1.75±0.10 | 5.5±0.05 | 4.00±0.05 | 4.00±0.10 | 2.00±0.05 | 1.50+0.10 | 1.00±0.20 |
| CS2512 (2W) | 3.38±0.10 | 6.68±0.10 | 12.0±0.30 | 1.75±0.10 | 5.5±0.10 | 4.00±0.10 | 4.00±0.10 | 2.00±0.05 | 1.55+0.05 | 1.45±0.20 |
| CS1225 | 3.38±0.10 | 6.68±0.10 | 12.0±0.30 | 1.75±0.10 | 5.5±0.10 | 4.00±0.10 | 4.00±0.10 | 2.00±0.05 | 1.55+0.05 | 1.45±0.20 |
| CS3720 | 2.50±0.20 | 4.45±0.20 | 12.0±0.30 | 1.75±0.10 | 5.5±0.05 | 4.00 ±0.05 | 4.00±0.10 | 2.00±0.05 | 1.50+0.10 | 1.20 ±0.20 |
| CS7520 | 2.50±0.20 | 8.30±0.20 | 16.0±0.30 | 1.75±0.10 | 7.8±0.05 | 4.00±0.05 | 4.00±0.10 | 2.00±0.05 | 1.50+0.10 | 1.20 ±0.20 |

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