Version:
December 1, 2022

(TCPWCH) Common Mode Chokes For USB, IEEE 394, Lan Interface

Token Electronics Industry Co., Ltd.

Taiwan: No.137, Sec. 1, Zhongxing Rd., Wugu District,
New Taipei City, Taiwan. 248012
Tel: +886 2981 0109 Fax: +886 2988 7487

China: 17P, Nanyuan Maple Leaf Bldg., Nanshan Ave.,
Nanshan Dist., Shenzhen, Guangdong, China. 518054
Tel: +86 755 26055363

Web: www.token.com.tw

Email: rfq@token.com.tw

Product Introduction

Token Extends Low-Profile Common Mode Choke Enhance Space Savings.

Features :

- Recommended solder profile: reflow.
- Low profile and very small size SMD Design.
- Wound Chip constructure with standard 0805 to 1812 size.
- Best EMI suppression effect but least impact to data signal wave form.

Applications :

- Preventive measure against high speed signal radiation emissions such as USB, IEEE 1394 (Firewire) or LAN interface.
- Best for NB, DSC, mobile device design.

Common mode chokes (TCPWCH) are used in order to filter common mode electromagnetic interference (EMI) currents without de-rating under high currents and without causing signal degradation. Common mode chokes are applied to supply and return pairs of conductors and are ideal for EMI filtering of signal lines.

Token Electronics offers SMD Common Mode Inductors & EMI Filters (TCPWCH) in standard 0805, 1206, 1810, and 1812 size, with a maximum height of 1.2 mm, 2.0 mm, 2.2 mm, and 2.8 mm making them low profile common mode chokes available.

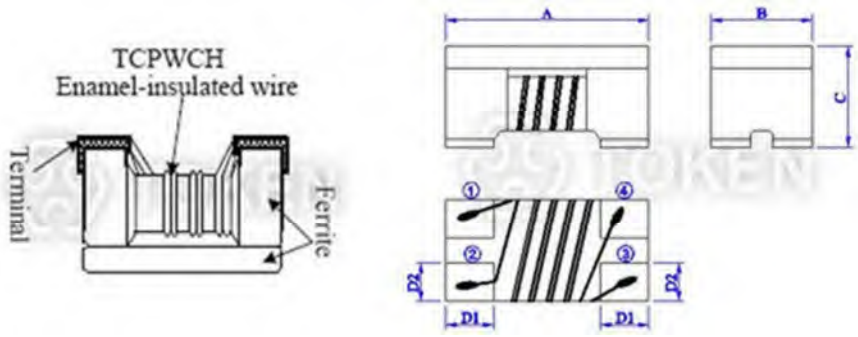
They provide high differential mode cutoff frequency and common mode noise attenuation across a wide frequency range, suiting them as ideal for noise suppression in super-high-speed signal lines such as DisplayPort, DVI, USB 3.x, and HDMI 2.0. The chokes are also suited for high-speed differential signal lines such as USB, IEEE1394, and LVDS, and are compatible with USB Type-C specification.

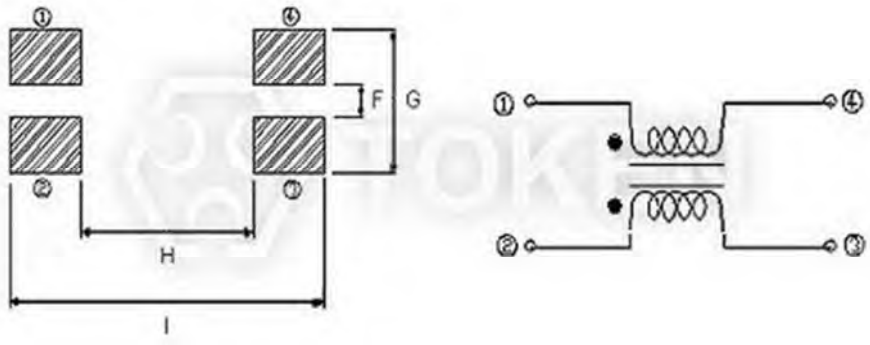
All (TCPWCH) series comes a wide variety of options to meet your needs with halogen free and feature RoHS Directive. Token is able to customize and manufacture your request. Please contact our sales or link to Token official website “SMD Balun Transformers” for more information.

Config. & Dim.

Configurations & Dimensions (TCPWCH-2012/3216/4525/4532/453226/453228)
UNIT: mm (inch)

SIZE CODE	A	B	C	D1 TYP	D2 TYP	F TYP	G TYP	H TYP	I TYP
TCPWCH-2012 (0805)	2.00±0.20 (0.079±0.008)	1.20±0.20 (0.047±0.008)	1.20±0.20 (0.047±0.008)	0.45 (0.018)	0.40 (0.016)	0.40 (0.016)	1.20 (0.047)	0.80 (0.031)	2.60 (0.102)
TCPWCH-3216 (1206)	3.20±0.20 (0.126±0.008)	1.60±0.20 (0.063±0.008)	2.00±0.20 (0.079±0.008)	0.60 (0.024)	0.60 (0.024)	0.40 (0.016)	1.60 (0.063)	1.60 (0.063)	3.70 (0.146)
TCPWCH-4525 (1810)	4.80±0.20 (0.189±0.008)	2.80±0.20 (0.110±0.008)	2.20±0.20 (0.087±0.008)	0.75 (0.030)	0.75 (0.030)	0.70 (0.027)	2.70 (0.106)	3.00 (0.118)	5.50 (0.216)
TCPWCH-4532 (1812)	4.50±0.20 (0.177±0.008)	3.20±0.20 (0.126±0.008)	2.80±0.20 (0.110±0.008)	1.00 (0.039)	1.00 (0.039)	0.40 (0.016)	3.60 (0.141)	2.10 (0.082)	4.90 (0.192)
TCPWCH-453226 (1812)	4.50±0.20 (0.177±0.008)	3.20±0.20 (0.126±0.008)	2.60±0.20 (0.102±0.008)	1.00 (0.039)	1.00 (0.039)	0.40 (0.016)	3.60 (0.141)	2.10 (0.082)	4.90 (0.192)
TCPWCH-453228 (1812)	4.50±0.20 (0.177±0.008)	3.20±0.20 (0.126±0.008)	2.80±0.20 (0.110±0.008)	1.00 (0.039)	1.00 (0.039)	0.40 (0.016)	3.60 (0.141)	2.10 (0.082)	4.90 (0.192)





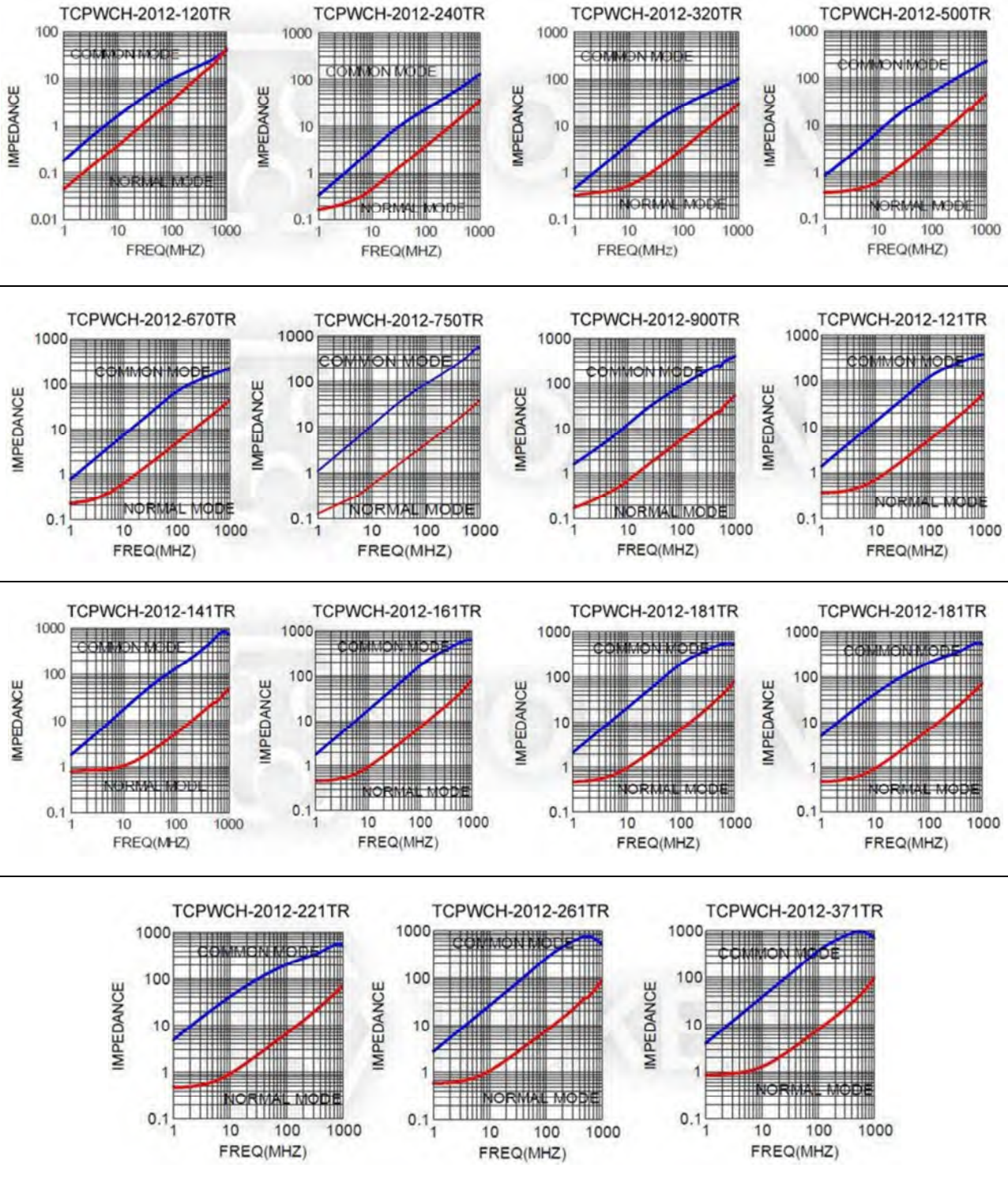
Common mode filter TCPWCH Structure diagram Unit: mm (Inch)

2012

Electrical Characteristics (TCPWCH-2012)

Part Number	Impedance (Ω)	Tolerance (±) %	Test Frequency (MHz)	DC Resistance (Ω) Max.	Rated Current (mA) Max.
TCPWCH-2012-120TR	12	25%	100	0.20	450
TCPWCH-2012-240TR	24	25%	100	0.25	420
TCPWCH-2012-320TR	32	25%	100	0.25	400
TCPWCH-2012-500TR	50	25%	100	0.25	400
TCPWCH-2012-670TR	67	25%	100	0.25	400
TCPWCH-2012-750TR	75	25%	100	0.70	280
TCPWCH-2012-900TR	90	25%	100	0.30	400
TCPWCH-2012-121TR	120	25%	100	0.30	370
TCPWCH-2012-141TR	140	25%	100	0.32	360
TCPWCH-2012-161TR	160	25%	100	0.35	350
TCPWCH-2012-181TR	180	25%	100	0.35	330
TCPWCH-2012-201TR	200	25%	100	0.40	300
TCPWCH-2012-221TR	220	25%	100	0.40	300
TCPWCH-2012-261TR	260	25%	100	0.40	300
TCPWCH-2012-371TR	370	25%	100	0.45	280

Impedance VS Frequency Graph (TCPWCH-2012)

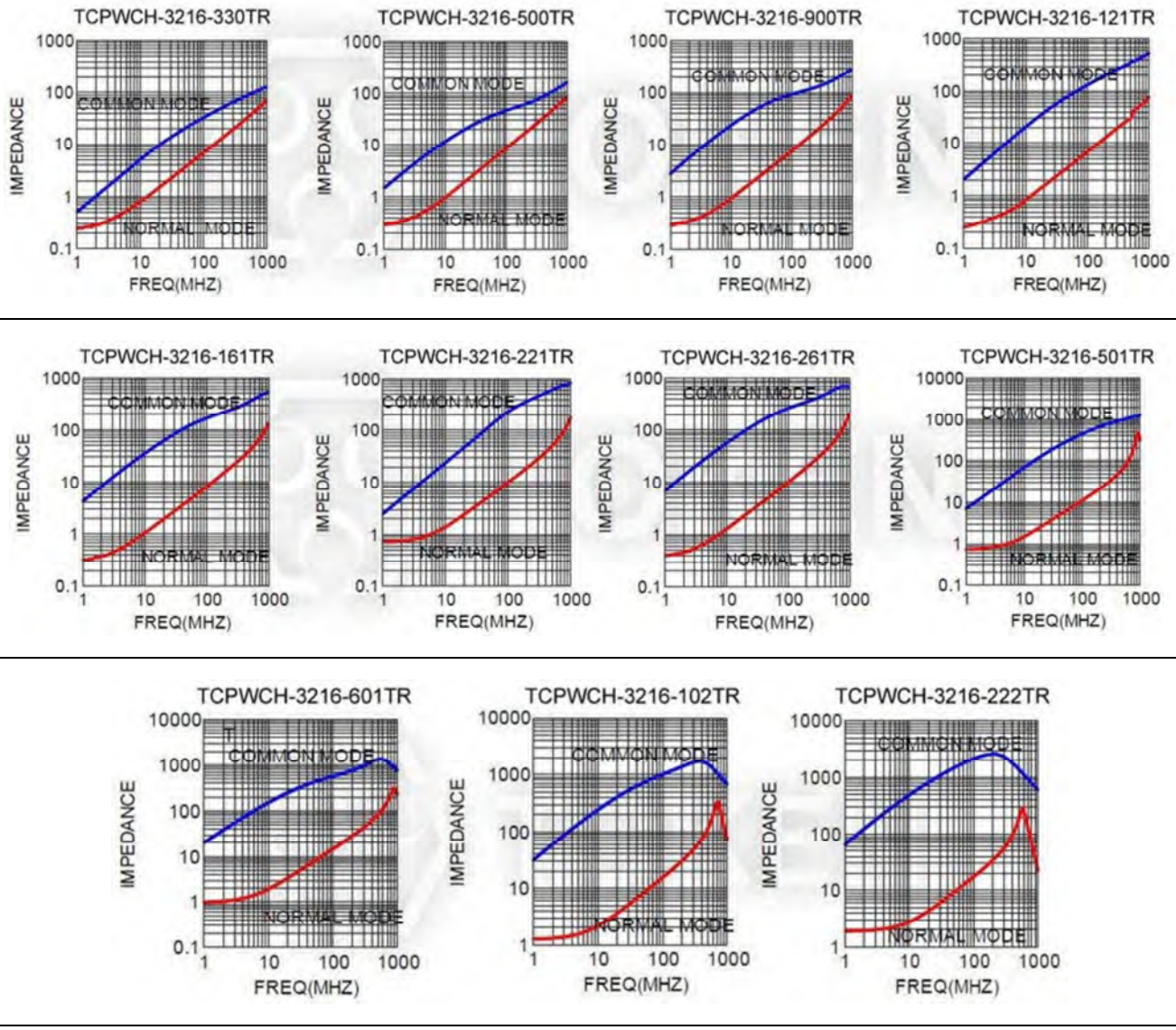


3216

Electrical Characteristics (TCPWCH-3216)

Part Number	Impedance (Ω)	Tolerance (±) %	Test Frequency (MHz)	DC Resistance (Ω) Max.	Rated Current (mA) Max.
TCPWCH-3216-330TR	33	25%	100	0.20	400
TCPWCH-3216-500TR	50	25%	100	0.25	400
TCPWCH-3216-900TR	90	25%	100	0.30	400
TCPWCH-3216-121TR	120	25%	100	0.30	400
TCPWCH-3216-161TR	160	25%	100	0.40	350
TCPWCH-3216-221TR	220	25%	100	0.45	300
TCPWCH-3216-261TR	260	25%	100	0.50	310
TCPWCH-3216-501TR	500	25%	100	0.80	260
TCPWCH-3216-601TR	600	25%	100	0.80	260
TCPWCH-3216-102TR	1000	25%	100	1.00	250
TCPWCH-3216-222TR	2200	25%	100	1.20	200

Impedance VS Frequency Graph (TCPWC-3216)

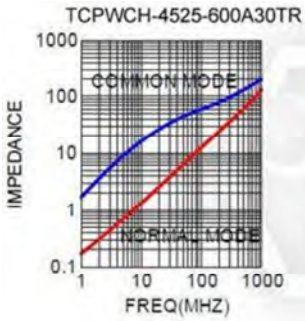


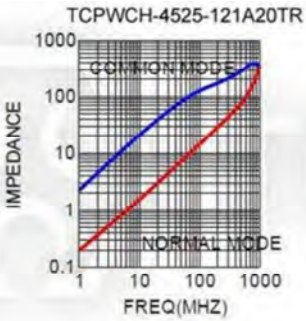
4525

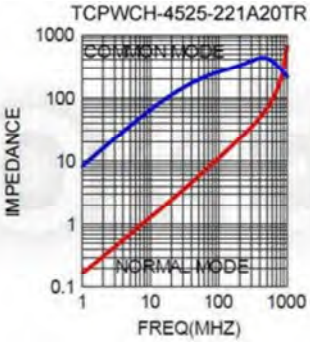
Electrical Characteristics (TCPWCH-4525)

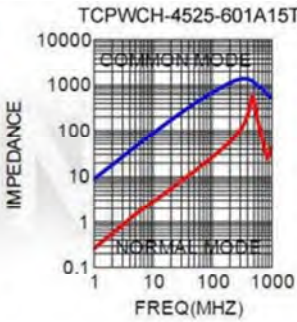
Part Number	Impedance (Ω)	Tolerance (±) %	Test Frequency (MHz)	DC Resistance (Ω) Max.	Rated Current (mA) Max.
TCPWCH-4525-600A30TR	60	25%	100	0.10	3000
TCPWCH-4525-121A20TR	120	25%	100	0.20	2000
TCPWCH-4525-221A20TR	220	25%	100	0.20	2000
TCPWCH-4525-601A15TR	600	25%	100	0.30	1500
TCPWCH-4525-601A20TR	600	25%	100	0.20	2000
TCPWCH-4525-701A20TR	700	25%	100	0.15	2000
TCPWCH-4525-102A10TR	1000	25%	100	0.40	1000
TCPWCH-4525-122A10TR	1200	25%	100	0.40	1000
TCPWCH-4525-142A10TR	1400	25%	100	0.40	1000

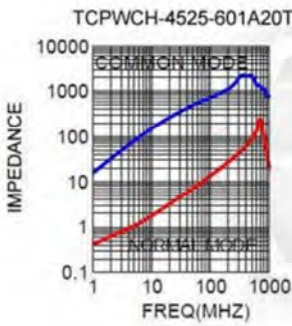
Impedance VS Frequency Graph (TCPWC-4525)

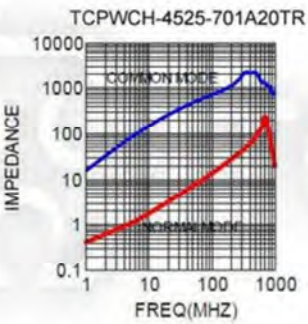


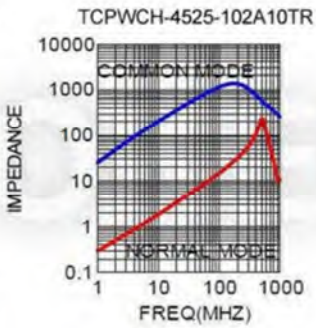


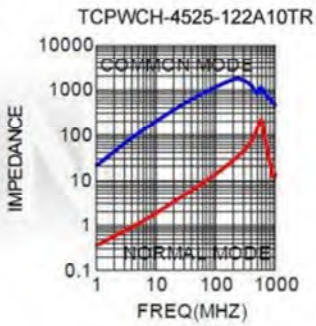


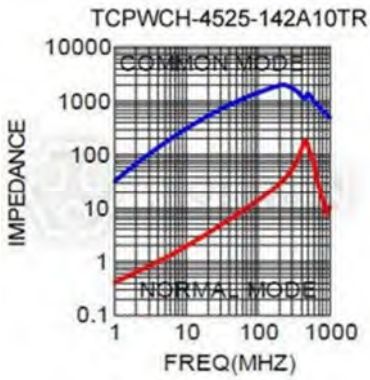










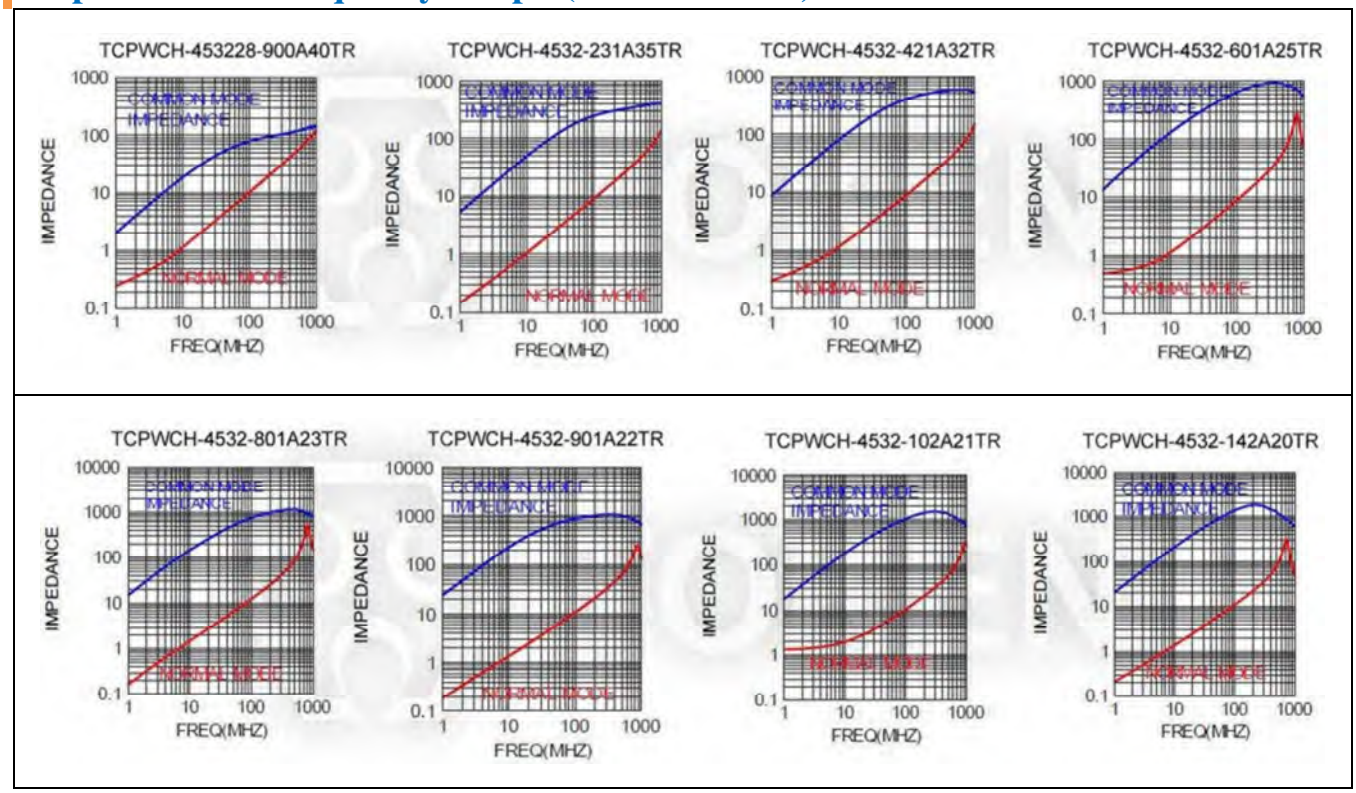


4532

Electrical Characteristics (TCPWCH-4532)

Part Number	Impedance (Ω)	Tolerance (±) %	Test Frequency (MHz)	DC Resistance (Ω) Max.	Rated Current (mA) Max.
TCPWCH-453228-900A40TR	90	25%	100	0.050	4000
TCPWCH-4532-231A35TR	230	25%	100	0.051	3500
TCPWCH-4532-421A32TR	420	25%	100	0.052	3200
TCPWCH-4532-601A25TR	600	25%	100	0.065	2500
TCPWCH-4532-801A23TR	800	25%	100	0.100	2300
TCPWCH-4532-901A22TR	900	25%	100	0.100	2200
TCPWCH-4532-102A21TR	1000	25%	100	0.110	2100
TCPWCH-4532-142A20TR	1400	25%	100	0.120	2000

Impedance VS Frequency Graph (TCPWC-4532)

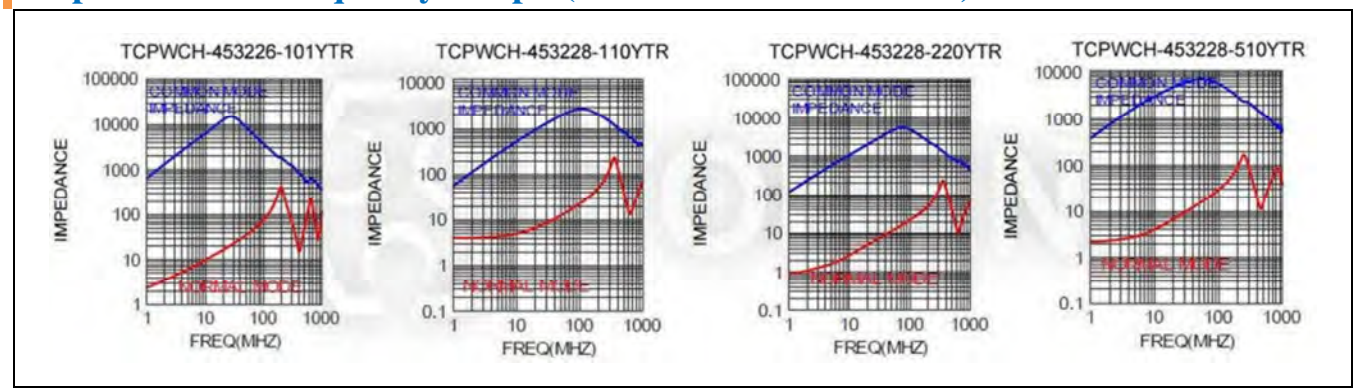


453226/453228

Electrical Characteristics (TCPWCH-453226/453228)

Part Number	Inductance (μH) 100KHz/100mV	Impedance (Ω) TYP 10MHz	DC Resistance (Ω) Max.	Rated Current Max.	Rated Voltage (V) (DC)	Insulation Resistance (MΩ) Min.
TCPWCH-453226-101YTR	100 (+50/-30%)	5800	2.0	250	50	10
TCPWCH-453228-110YTR	11 (+50/-30%)	600	0.6	250	50	10
TCPWCH-453228-220YTR	22 (+50/-30%)	1200	1.0	200	50	10
TCPWCH-453228-510YTR	51 (+50/-30%)	5800	1.0	200	50	10

Impedance VS Frequency Graph (TCPWC-453226/453228)



Environ. Characteristics

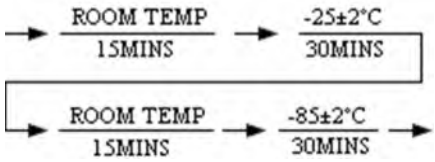
Electrical Performance Test (TCPWCH)

Test Items	Specifications	Test Conditions / Test Methods
Impedance	Refer to standard electrical characteristic spec.	LCR Meter HP 4291B
DC Resistance (RDC)		Micro-Ohm meter (GOM-801G)
Withstand Voltage (VDC)	Component should not be damaged	Test Voltage: 2.5 Times Rated Voltage Testing Time: 60 sec. Charge Current: 0.5mA
Rated Voltage (VDC)		Test Voltage: Rated Voltage Testing Time: 1 to 5 sec. Charge Current: 1mA
Insulation Resistance (I.R.)		Charge Current: 1 minute 10M ohm Min.

Mechanical Performance Test (TCPWCH)

Test Items	Specifications	Test Conditions / Test Methods
Component Adhesion (push Test)	Base: 0805 ≥ 2 Lbs Cover: 0805 ≥ 1 Lbs Base: 1206 ≥ 4 Lbs Cover: 1206 ≥ 2 Lbs	The component should be soldered (232℃±5℃ for 10 sec.) totinned copper substrate. Applied force gauge to the side of component It must withstand force of 2 or 4 pounds without failure of the component.
Drop Test	Component should not be damaged	Dropping chip by each side and corner. Drop 10 times in total Drop height:100cm Drop weight:125g
Solderability Test	The terminal should at least be 90% covered with solder	The component shall be dipped in a melted solder bath at 235℃±5℃ for 5 seconds.
Vibration Test (Low Frequency)	Component should not be damaged	1. Amplitude: 1.5 m/m 2. Frequency: 10-55-10 Hz(1Min.) 3. Direction: X, Y, Z 4. Duration: 2 Hrs/X, Y, Z

Climatic Test (TCPWCH)

Test Items	Specifications	Test Conditions / Test Methods
Low Temperature Storage Test	Impedance change: Within±20% Without distinct damage in ppearance.	1. Temp: -40℃±2℃ 2. Time: 1000±48 Hours 3. Component should be tested after 1 hour at room temperature.
Thermal Shock Test		 Total: 5 Cycles
High Temperature Storage Test		1. Temp: 85℃±2℃ 2. Time: 1000±48 Hours 3. Component should be tested after 1 hour at room temperature.
Humidity Test		1. Temp: 40℃±2℃ 2. R.H.: 90%~95% 3. Time: 48±2 Hours
High Temperature Load Life Test	There should be no evidence of short or open circuit	1. Temp: 85℃±2℃ 2. Time: 96±12 Hours 3. Load: Allowed DC Current
Low Temperature Load Life Test		1. Temp: -40℃±2℃ 2. Time: 96±12 Hours 3. Load: Allowed DC Current

- **Note: Storage Temperature: 25℃; Humidity:<80%RH**

Order Codes

Order Codes (TCPWCH-2012/3216)

TCPWC	H	-	2012	-	120	TR

Part Number
TCPWC

Shielding Type	
H	Shielding

Dimensions (mm)		
2012	2.00×1.20×1.20	EIA0805
3216	3.20×1.60×2.00	EIA1206

Impedance (Ω)	
120	12Ω
121	120Ω
371	370Ω

Package	
P	Bulk
TR	Taping Reel

Order Codes (TCPWCH-4525/4532)

TCPWC	H	-	4525	-	600	A30	TR

Part Number
TCPWC

Shielding Type	
H	Shielding

Dimensions (mm)		
4525	4.80×2.80×2.20	EIA1810
4532	4.50×3.20×2.80	EIA1812

Impedance (Ω)	
600	60Ω
601	600Ω
102	1000Ω

Stop current (mA)	
A30	3000mA
A25	2500mA
A10	1000mA

Package	
P	Bulk
TR	Taping Reel

Order Codes (TCPWCH-453226/453228)

TCPWC	H	-	453226	-	101	Y	TR

Part Number
TCPWC

Shielding Type	
H	Shielding

Dimensions (mm)		
453226	4.50×3.20×2.60	EIA1812
453228	4.50×3.20×2.80	EIA1812

Inductance (µH)	
101	100µH
110	11µH
510	51µH

Tolerance (%)	
Y	+50/-30%

Package	
P	Bulk
TR	Taping Reel

General Information

Applications of Baluns

In a **RF balun transformer**, one pair of terminals is balanced, that is, the currents are equal in magnitude and opposite in phase. The other pair of terminals is unbalanced; one side is connected to electrical ground and the other carries the signal. Balun transformers can be used between various parts of a wireless or cable communications system. Some common applications denotes as following:

- Television receiver (Balanced) - coaxial cable network or Coaxial antenna system (Unbalanced)
- FM broadcast receiver (Balanced) - Coaxial antenna system (Unbalanced)
- Dipole antenna (Balanced) - Coaxial transmission line (Unbalanced)
- Parallel-wire transmission line (Balanced) - Coaxial transmitter output, or Coaxial receiver input (Unbalanced)

Token's baluns provide impedance transformation in addition to conversion between balanced and unbalanced signal modes. Most television and FM broadcast receivers are designed for 300-ohm balanced systems, while coaxial cables have characteristic impedances of 50 or 75 ohms. Impedance-transformer baluns with larger ratios are available and used to match high-impedance balanced antennas to low-impedance unbalanced wireless receivers, transmitters, or transceivers.