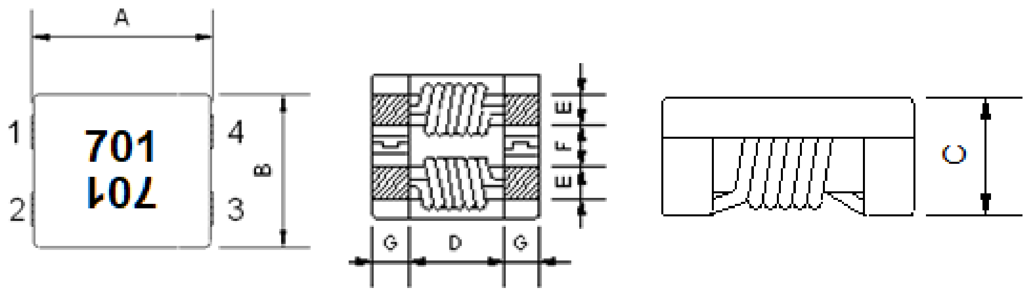
Wire Wound Power Common Mode Filter WCM5555FASV-SERIES-LM

1. Features

1. High reliability -Reliability tests comply with AEC-Q200
2. Operating temperature-40~+125℃ (Including self - temperature rise)

2. Dimension



Series	A(mm)	B(mm)	C(mm)	D(mm)	E(mm)	F(mm)	G(mm)
WCM5555	5.5±0.5	5.5±0.5	3.5 max.	3.3 typ.	1.2±0.5	1.9±0.5	1.1±0.5

Unit:mm

3. Part Numbering

WCM	5555	F	A	S	V	-	701	-	LM
A	B	C	D	E	F		G		H

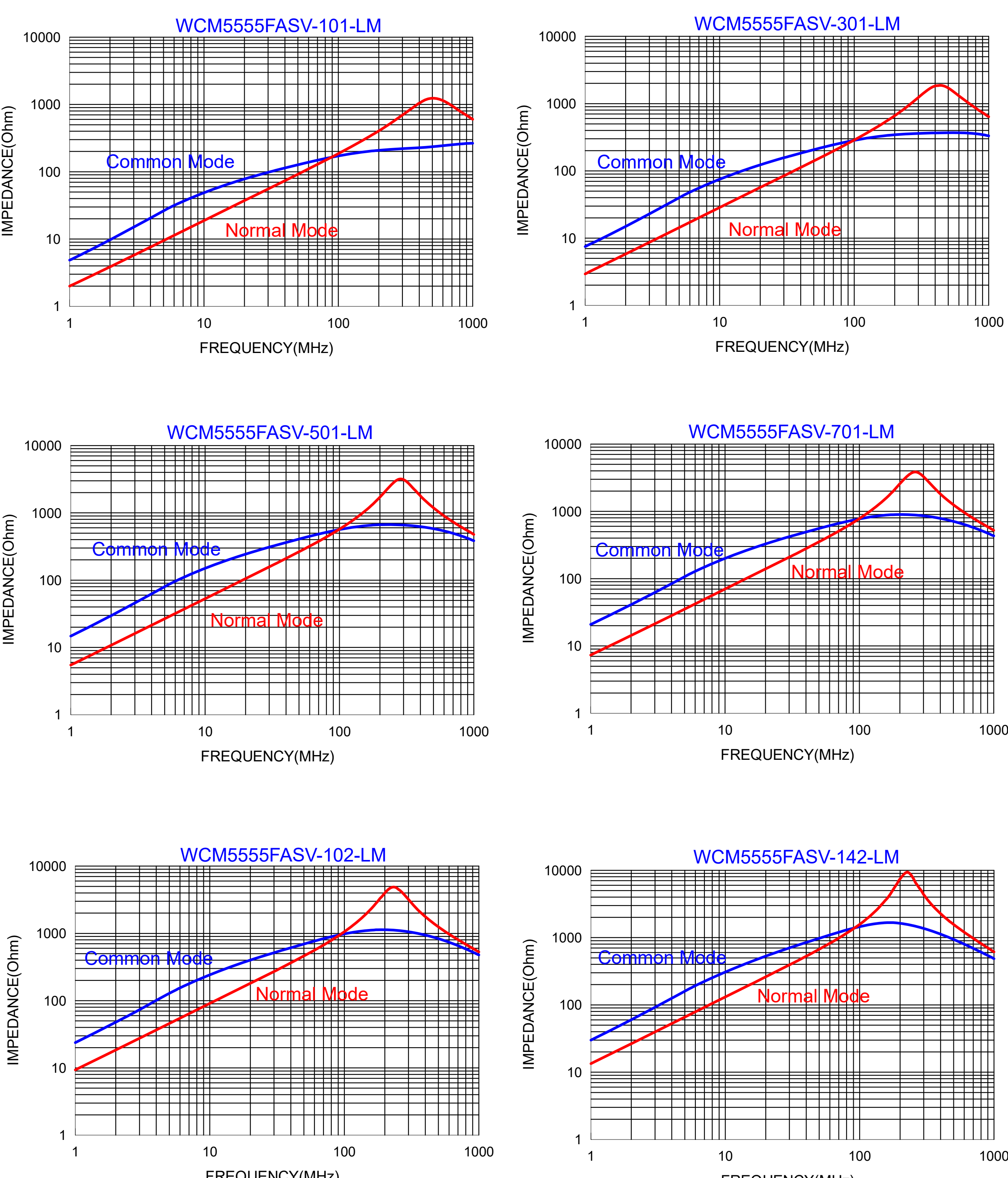
A: Series
B: Dimension
C: Material Ferrite Core
D: Process Asembled
E: Type S=Shielded , N=Unshielded
F: Category Code V=Vehicle
G: Impedance 701=700Ω
H: Laser Marking

4. Specification

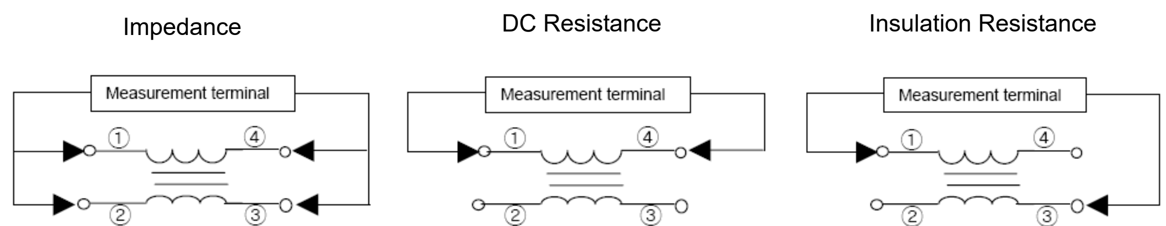
TAI-TECH Part Number	Impedance (Ω)		Test Frequency (MHz)	DC Resistance (mΩ) max. (1 line)	Rated Current (A) max.	Rated Volt. (Vdc) max.	Insulation Resistance (MΩ) min.
	min.	typ.					
WCM5555FASV-101-LM	100	140	100	6.0	8.5	80	10
WCM5555FASV-301-LM	150	300	100	7.5	4.8	80	10
WCM5555FASV-501-LM	300	500	100	10.5	4.5	80	10
WCM5555FASV-701-LM	500	700	100	13.0	3.8	80	10
WCM5555FASV-102-LM	750	1000	100	20.0	3.0	80	10
WCM5555FASV-142-LM	1000	1400	100	38.0	2.8	80	10

Note:

Measurement board data
Material : FR4
Board dimensions : 100 X 50 X 1.6t mm
Pattern dimensions: 45 X 30 mm (Double side board)
Pattern thickness : 50 μm

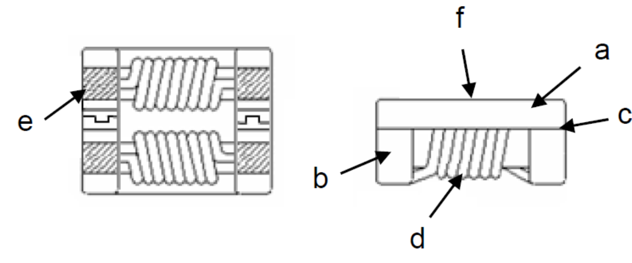

WCM5555FASV-101-LM
IMPEDANCE(Ohm)
FREQUENCY(MHz)
Common Mode
Normal Mode
WCM5555FASV-301-LM
IMPEDANCE(Ohm)
FREQUENCY(MHz)
Common Mode
Normal Mode
WCM5555FASV-501-LM
IMPEDANCE(Ohm)
FREQUENCY(MHz)
Common Mode
Normal Mode
WCM5555FASV-701-LM
IMPEDANCE(Ohm)
FREQUENCY(MHz)
Common Mode
Normal Mode
WCM5555FASV-102-LM
IMPEDANCE(Ohm)
FREQUENCY(MHz)
Common Mode
Normal Mode
WCM5555FASV-142-LM
IMPEDANCE(Ohm)
FREQUENCY(MHz)
Common Mode
Normal Mode

5. Schematic Diagram



6. Materials

No.	Description	Specification
a.	Upper Plate	Plastic
b.	Core	Ferrite Core
c	Adhesive	Epoxy
d	Wire	Enameled Copper
e	Termination	Ag/Ni/Sn + Sn Solder
f	Mark	Laser Marking



7. Reliability and Test Condition

Item	Performance	Test Condition
Operating temperature	-40~+125℃ (Including self - temperature rise)	
Storage temperature	-40~+125℃ (on board)	
Electrical Performance Test		
Z(common mode)	Refer to standard electrical characteristics list.	Agilent E4991A + Keysight 16092A
DCR		Agilent-34420A
I.R.		Chroma 19073
Temperature Rise Test	Rated Current ≧ 1A ΔT 40℃Max	1.Applied the allowed DC current. 2.Temperature measured by digital surface thermometer
Reliability Test		
High Temperature Exposure(Storage) AEC-Q200	Appearance：No damage. Impedance：within±15% of initial value RDC：within ±15% of initial value and shall not exceed the specification value	Preconditioning: Run through reflow for 3 times.(IPC/JEDEC J-STD-020E Classification Reflow Profiles) Temperature：125±2℃ Duration：1000hrs Min. Measured at room temperature after placing for 24±4 hrs.
Temperature Cycling AEC-Q200		Preconditioning: Run through reflow for 3 times.(IPC/JEDEC J-STD-020E Classification Reflow Profiles) Condition for 1 cycle Step1：-40±2℃ 30min Min. Step2：125±2℃ transition time 1min MAX. Step3：125±2℃ 30min Min. Step4：Low temp. Transition time 1min MAX. Number of cycles：1000 Measured at room temperature after placing for 24±4 hrs.
Moisture Resistance (AEC-Q200)		t=24 hours/cycle. Note: Steps 7a & 7b not required. Unpowered. Measurement at 24±2 hours after test conclusion.
Biased Humidity (AEC-Q200)		Preconditioning: Run through reflow for 3 times.(IPC/JEDEC J-STD-020E Classification Reflow Profiles) Humidity ：85±3% R.H, Temperature：85℃±2℃ Duration : 1000hrs Min. Measured at room temperature after placing for 24±4hrs.
High Temperature Operational Life (AEC-Q200)		Preconditioning: Run through reflow for 3 times.(IPC/JEDEC J-STD-020E Classification Reflow Profiles) Temperature：125±2℃ Duration：1000hrs Min. with 100% rated current. Measured at room temperature after placing for 24±4hrs.
External Visual	Appearance：No damage.	Inspect device construction, marking and workmanship. Electrical Test not required.
Physical Dimension	According to the product specification size measurement	According to the product specification size measurement
Resistance to Solvents	Appearance：No damage.	Add aqueous wash chemical - OKEM clean or equivalent.
Mechanical Shock	Appearance：No damage. Impedance：within±15% of initial value RDC：within ±15% of initial value and shall not exceed the specification value	Type / Peak value (g's) / Normal duration (D) (ms) / Wave form / Velocity change (Vi)ft/sec SMD / 100 / 6 / Half-sine / 12.3 Lead / 100 / 6 / Half-sine / 12.3 3 shocks in each direction along 3 perpendicular axes. (18 shocks).

<table>
<tr><th>Item</th><th>Performance</th><th>Test Condition</th></tr>
<tr><td>Vibration</td><td rowspan="2">Appearance：No damage.
Impedance：within±15% of initial value
RDC：within ±15% of initial value and shall not exceed the specification value</td><td>Preconditioning: Run through reflow for 3 times.(IPC/JEDEC J-STD-020E Classification Reflow Profiles)
Oscillation Frequency : 10Hz～2kHz～10Hz for 20 minutes
Equipment : Vibration checker
Total Amplitude : 5g
Testing Time : 12 hours (20 minutes, 12 cycles each of 3 orientations)</td></tr>
<tr><td>Resistance to Soldering Heat</td><td>Test condition ：
<table>
<tr><th>Temperature(℃)</th><th>Time(s)</th><th>Temperature ramp/immersion and emersion rate</th><th>Number of heat cycles</th></tr>
<tr><td>260 ±5
(solder temp)</td><td>10 ±1</td><td>25mm/s ±6 mm/s</td><td>1</td></tr>
</table>
Depth: completely cover the termination

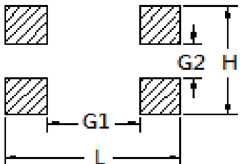
Continental
Temperature
time 25°C to peak temperature
T_{peak}
component
t_p
T_L
T_{Smax}
t_L
T_{Smin}
t_s
ramp down
ramp up
reflow process
Time
<table>
<tr><th>Component Size</th><th>Ramp up to 150°C</th><th>T_{Smin}</th><th>t_S</th><th>T_{Smax}</th><th>T_L</th><th>t_L</th><th>T_{peak}*</th><th>t_p**</th><th>time 25°C to peak</th><th>Ramp down</th></tr>
<tr><td>Thickness < 1.6mm or Thickness 1.6mm-2.5mm and Volume < 350 mm3</td><td rowspan="3">3.0±0.1°C/s (The component shall be specified for usage in serial production with up to 3.0°C/s)</td><td rowspan="3">≥190°C</td><td rowspan="3">≥110s</td><td rowspan="3">≥200°C</td><td rowspan="3">≥217°C</td><td rowspan="3">≥90s</td><td>≥260°C</td><td>≥40s</td><td rowspan="3">≥300s</td><td rowspan="3">6.0±0.1°C/s (The component shall be specified for usage in serial production with up to 6.0°C/s)</td></tr>
<tr><td>Thickness 1.6mm-2.5mm and Volume 350-2000 mm^3 or Thickness > 2.5mm and Volume < 350 mm3</td><td>≥250°C</td><td rowspan="2">≥30s</td></tr>
<tr><td>Thickness 1.6mm-2.5mm and Volume > 2000 mm^3 or Thickness > 2.5mm and Volume > 350 mm3</td><td>≥245°C</td></tr>
</table>
Table 1: Minimum requirements for lead-free soldering
*peak temperature is measured on the centre top of the component package
** tp measured @ Tpeak-5°C</td></tr>
<tr><td>Thermal shock
(AEC-Q200)</td><td rowspan="2">Appearance：No damage.
Impedance：within±15% of initial value
RDC：within ±15% of initial value and shall not exceed the specification value</td><td>Preconditioning: Run through reflow for 3 times.(IPC/JEDEC J-STD-020E Classification Reflow Profiles)
Condition for 1 cycle
Step1：-40±2℃ 15±1min
Step2：125±2℃ within 20Sec.
Step3：125±2℃ 15±1min
Number of cycles：300
Measured at room temperature after placing for 24±4hrs.</td></tr>
<tr><td>ESD</td><td>Ip
90%
10%
t_r
Time (ns)
t
Direct Contact and Air Discharge PASSIVE COMPONENT HBM ESD Discharge Waveform to a Coaxial Target
Test method : AEC-Q200-002
Test mode：Contact Discharge
Discharge level：4 KV (Level: 2)</td></tr>
<tr><td>Solderability</td><td>More than 95% of the terminal electrode should be covered with solder</td><td>a. Method B, 4hrs @155°C dry heat @235°C±5°C
Testing Time : 5 +0/-0.5 seconds
b. Method D category 3. (8hours ± 15 min)@ 260°C±5°C
Testing Time : 30 +0/-0.5 seconds</td></tr>
<tr><td>Electrical Characterization</td><td>Refer Specification for Approval</td><td>Summary to show Min, Max, Mean and Standard deviation.</td></tr>
<tr><td>Flammability</td><td>Electrical Test not required.</td><td>V-0 or V-1 are acceptable.</td></tr>
</table>

Item	Performance	Test Condition
Board Flex	Appearance：No damage. Impedance：within±15% of initial value RDC：within ±15% of initial value and shall not exceed the specification value	Preconditioning: Run through reflow for 3 times.(IPC/JEDEC J-STD-020E Classification Reflow Profiles) Place the 100mm X 40mm board into a fixture similar to the one shown in below Figure with the component facing down. The apparatus shall consist of mechanical means to apply a force which will bend the board (D) x = 2 mm minimum. The duration of the applied forces shall be 60 (+ 5) sec. The force is to be applied only once to the board. Support Solder Chip Printed circuit board before testing 45±2 45±2 20 Probe to exert bending force Radius 340 1.6 D Printed circuit board under test Displacement
Terminal Strength(SMD)	Appearance：No damage. Impedance：within±15% of initial value RDC：within ±15% of initial value and shall not exceed the specification value	Preconditioning: Run through reflow for 3 times.(IPC/JEDEC J-STD-020E Classification Reflow Profiles) With the component mounted on a PCB with the device to be tested, apply a 17.7 N (1.8 Kg) force to the side of a device being tested. This force shall be applied for 60 +1 seconds. Also the force shall be applied gradually as not to apply a shock to the component being tested. radius 0,5 mm DUT wide thickness substrate press tool shear force

8. Soldering and Mounting

8-1. Recommended PC Board Pattern

	WCM5555
L(mm)	5.9
H(mm)	4.3
G1(mm	3.3
G2(mm	1.9



8-2. Soldering

Mildly activated rosin fluxes are preferred. TAI-TECH terminations are suitable for re-flow soldering systems. If hand soldering cannot be avoided, the preferred technique is the utilization of hot air soldering tools.

8-2.1 Soldering Reflow:

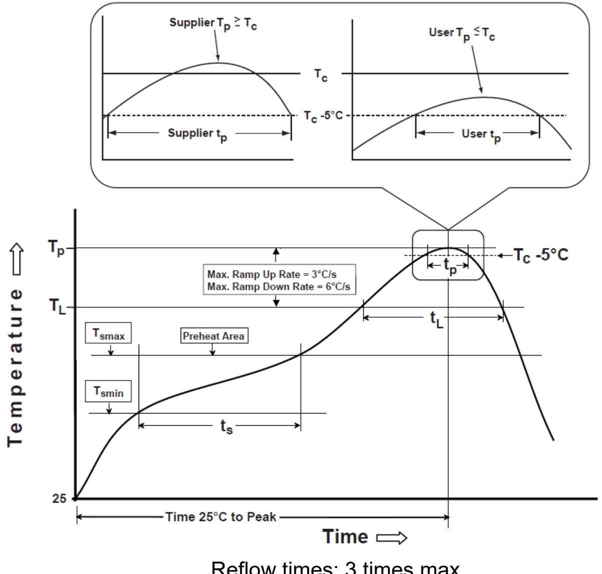
Recommended temperature profiles for lead free re-flow soldering in Figure 1. Table 1.1&1.2 (J-STD-020E)

8-2.2 Soldering Iron:

Products attachment with a soldering iron is discouraged due to the inherent process control limitations. In the event that a soldering iron must be employed the following precautions are recommended. (Figure 2.)

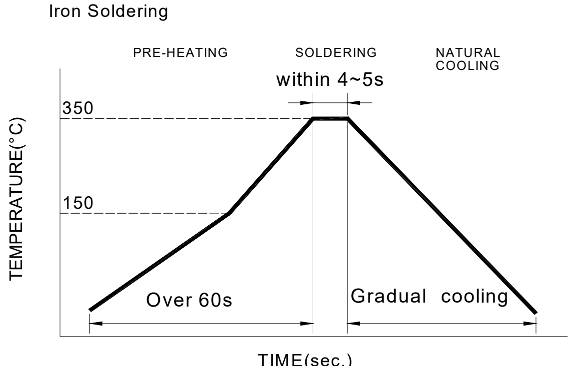
- Preheat circuit and products to 150℃
- 350℃ tip temperature (max)
- Never contact the ceramic with the iron tip
- 1.0mm tip diameter (max)
- Use a 20 watt soldering iron with tip diameter of 1.0mm
- Limit soldering time to 4~5sec.

Fig.1 Soldering Reflow



Reflow times: 3 times max

Fig.2 Iron soldering temperature profiles



Iron Soldering times：1 times max

Table (1.1): Reflow Profiles

Profile Type:	Pb-Free Assembly
Preheat -Temperature Min(T_{smin}) -Temperature Max(T_{smax}) -Time(t_s)from(T_{smin} to T_{smax})	 150℃ 200℃ 60-120seconds
Ramp-up rate($T_L$to T_p)	3℃ /second max.
Liquidus temperature(T_L) Time(t_L)maintained above T_L	217℃ 60-150 seconds
Classification temperature(T_c)	See Table (1.2)
Time(t_p) at Tc- 5℃ (Tp should be equal to or less than Tc.)	< 30 seconds
Ramp-down rate(T_p to T_L)	6℃ /second max.
Time 25℃ to peak temperature	8 minutes max.

Tp: maximum peak package body temperature, **Tc**: the classification temperature.
For user (customer) **Tp** should be equal to or less than **Tc.**

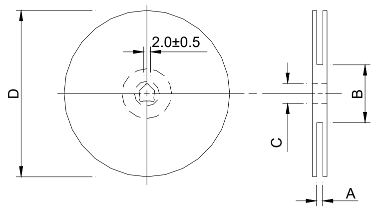
Table (1.2) Package Thickness/Volume and Classification Temperature (T_c)

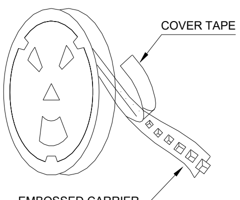
	Package Thickness	Volume mm^3 <350	Volume mm^3 350-2000	Volume mm^3 >2000
PB-Free Assembly	<1.6mm	260℃	260℃	260℃
	1.6-2.5mm	260℃	250℃	245℃
	≥2.5mm	250℃	245℃	245℃

Reflow is referred to standard IPC/JEDEC J-STD-020E。

9. Packaging Information

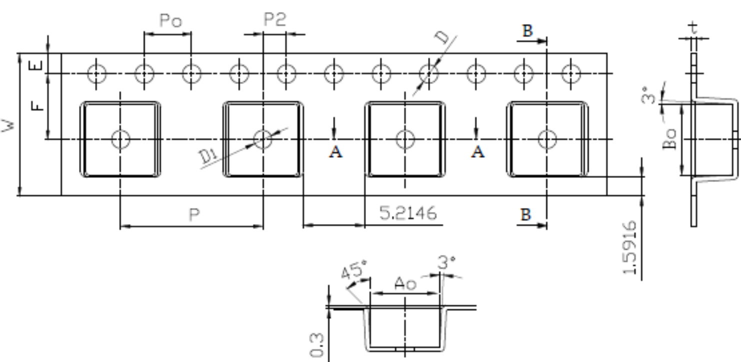
9-1. Reel Dimension





Type	A(mm)	B(mm)	C(mm)	D(mm)
13"x12mm	12.5±0.5	100.0±2.0	13.5±0.5	330

9-2. Tape Dimension

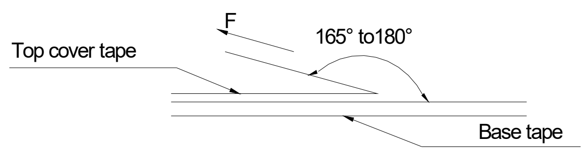


Series	W(mm)	Bo(mm)	Ao(mm)	Ko(mm)	D(mm)	D1(mm)	P0(mm)	P2(mm)	F(mm)	E(mm)	P(mm)	t(mm)
WCM5555	12.00±0.3	5.95±0.1	5.85±0.1	3.50±0.1	1.50+0.1/-0.00	1.50±0.1	4.00±0.1	2.00±0.1	5.50±0.1	1.75±0.1	12.00±0.1	0.40±0.05

9-3. Packaging Quantity

Size	Chip/Reel	Inner Box	Carton
WCM5555	1500	3000	15000

9-4. Tearing Off Force



The force for tearing off cover tape is 15 to 80 grams in the arrow direction under the following conditions.

Room Temp. (℃)	Room Humidity (%)	Room atm (hPa)	Tearing Speed mm/min
5~35	45~85	860~1060	300

Application Notice

- Storage Conditions(component level)
  To maintain the solderability of terminal electrodes:
  1. TAI-TECH products meet IPC/JEDEC J-STD-020E standard-MSL, level 1.
  2. Temperature and humidity conditions: Less than 40℃ and 60% RH.
  3. Recommended products should be used within 12 months form the time of delivery.
  4. The packaging material should be kept where no chlorine or sulfur exists in the air.

- Transportation
  1.Products should be handled with care to avoid damage or contamination from perspiration and skin oils.
  2. The use of tweezers or vacuum pick up is strongly recommended for individual components.
  3. Bulk handling should ensure that abrasion and mechanical shock are minimized.