



# Power Inductor EMP3225 L-T Series Product Specifications

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## ■ Power Inductor — EMP3225 L-T



### ● Application

- DC/DC converter
- Smart phone/PAD,HDD/SSD,DVC/DSC
- Mobile display panels, portable game devices, compact power supply modules, other.

### ● Features

- High magnetic flux saturation density characteristics by metal magnetic material.
- Low DC resistance by flat wire. and achieve high conversion efficiency and lower temperature rising.
- Magnetically shielded structure to accomplish high resolution in EMC protection.
- High mounting stability due to Chip shape.
- High reliability by original structure.
- For general electronic equipment

## ■ Parts Number Explanation

Example:

<b>EMP</b>	<b>322512</b>	<b>L</b>	<b>1R0</b>	<b>MT</b>	<b>T</b>	<b>L</b>	<b>Z</b>
<b>Product Type</b>	<b>Size (mm)</b>	<b>Application</b>	<b>Inductance (uH)</b>	<b>Tolerance</b>	<b>Package</b>	<b>Internal Code</b>	<b>Optional</b>
Mini Power Inductor	322512 322515 322520		R47=0.47uH R68=0.68uH 1R0=1.00uH 2R2=2.20uH 3R3=3.30uH	M : ±20%	T : Taping		Z : Default Code



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### Standard Electrical Specifications

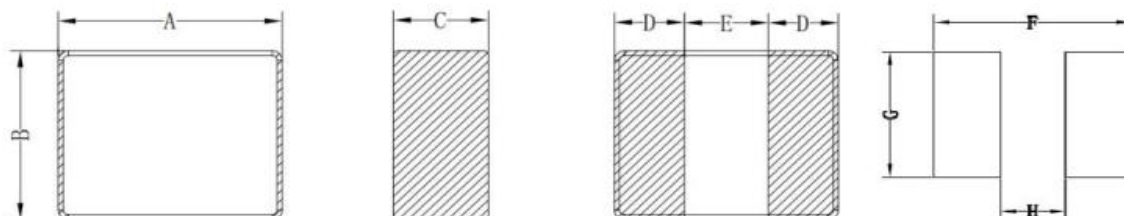
Part No.	Inductance	DC Resistance	Saturation Current	Heating Rating Current
	L0 ( $\mu$ H) $\pm$ 20 %	DCR (m $\Omega$ )	Isat (A)	Irms (A)
	1 MHz, 1V	Typ. (Max.)	Typ. (Max.)	Typ. (Max.)
EMP322512L-R47MT-TLZ	0.47	16.00 (19.00)	8.00 (7.50)	7.50 (7.00)
EMP322512L-R68MT-TLZ	0.68	34.00 (39.00)	6.30 (5.80)	5.90 (5.40)
EMP322512L-1R0MT-TLZ	1.00	42.00 (48.00)	6.20 (5.60)	5.50 (4.90)
EMP322512L-2R2MT-TLZ	2.20	65.00 (75.00)	4.50 (4.00)	4.20 (3.70)
EMP322512L-3R3MT-TLZ	3.30	100.00 (115.00)	3.50 (3.00)	3.00 (2.60)
EMP322515L-R47MT-TLZ	0.47	15.00 (17.50)	8.50 (8.00)	8.00 (7.50)
EMP322515L-R68MT-TLZ	0.68	24.00 (28.00)	7.00 (6.50)	6.50 (6.00)
EMP322515L-1R0MT-TLZ	1.00	40.00 (45.00)	6.50 (6.00)	6.00 (5.50)
EMP322515L-2R2MT-TLZ	2.20	55.00 (65.00)	5.00 (4.50)	4.60 (4.20)
EMP322515L-3R3MT-TLZ	3.30	90.00 (105.00)	4.00 (3.50)	3.50 (3.00)
EMP322520L-R47MT-TLZ	0.47	13.00 (15.50)	9.50 (9.00)	8.50 (8.00)
EMP322520L-R68MT-TLZ	0.68	20.00 (24.00)	8.00 (7.50)	7.50 (7.00)
EMP322520L-1R0MT-TLZ	1.00	36.00 (42.00)	7.50 (7.00)	7.00 (6.50)
EMP322520L-2R2MT-TLZ	2.20	45.00 (55.00)	5.50 (5.00)	5.00 (4.60)
EMP322520L-3R3MT-TLZ	3.30	85.00 (95.00)	4.50 (4.00)	4.00 (3.50)

#### ● L Test frequency : Test frequency at 1MHz, OSC LEVEL:1.0V

- (1) All test data is referenced to 25°C ambient .
- (2) When applying the heat rating current DC (Idc) to coil, it will cause an approximate  $\Delta$ T of 40°C.
- (3) When applying the saturation current DC(Isat) maximum to coil, it will cause the initial inductance value to drop 30%.
- (4) Operating Temperature Range -40°C to +125°C.

## ● Shape & Dimensions

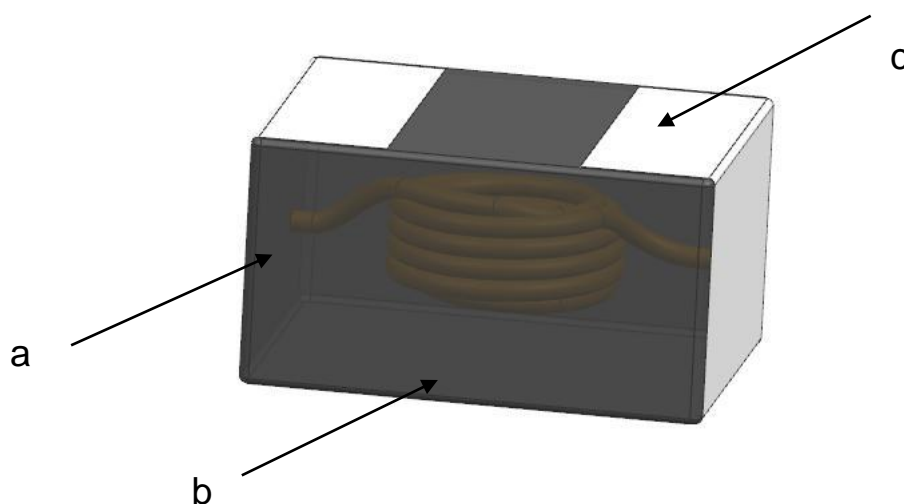
Unit: mm



Recommend Land Pattern

Type	A	B	C	D	E	F typ	G typ	H typ
EMP322512L	3.20 ±0.2	2.50 ±0.2	1.20 Max.	1.00 ±0.3	1.20 ±0.3	3.5	2.8	1.0
EMP322515L	3.20 ±0.2	2.50 ±0.2	1.50 Max.	1.00 ±0.3	1.20 ±0.3	3.5	2.8	1.0
EMP322520L	3.20 ±0.2	2.50 ±0.2	2.00 Max.	1.00 ±0.3	1.20 ±0.3	3.5	2.8	1.0

## ● Material List



No.	ITEM	Materials
a	Wire	Copper wire
b	Core	Metal alloy
c	Terminal	Sn



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### ● Storage conditions/Matters need attention:

- (1) The storage time is within 6 months, and the storage conditions (temperature 5°C~40°C, humidity 10%~75%RH or less), need be paid fully attention to. If the storage time is exceeded the required time limit, the solderability of the terminal electrodes may deteriorate.
- (2) Do not use and store in a gas corrosive environment (salt, acid, alkali, etc.)
- (3) Storage conditions after installation: -40°C ~ 125°C.
- (4) Welding corrections after installation shall be within the conditions specified in the acknowledgement..  
Excessive heating may cause short circuits、 performance degradation、 and shortened lifespan.
- (5) Do not use products that have been subjected to excessive mechanical shock due to dropping, etc.
- (6) When assembling the printed circuit with the chip mounted on the device, be careful not to apply residual stress to the chip due to the overall deformation of the printed circuit or local deformation such as the fastening part.
- (7) The device will self-heat (temperature rise) when energized, so allow sufficient leeway in thermal design.
- (8) Do not place this product near magnets or objects with magnetic force.
- (9) Please use it within the scope specified in the approval letter.



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## Reliability and Test Condition

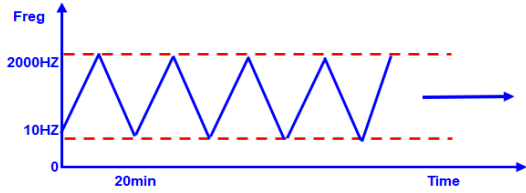
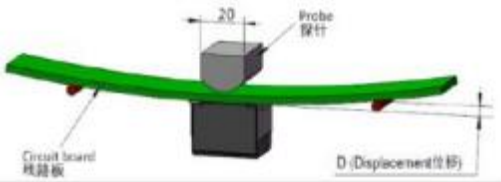

Item	Performance	Test Condition
<p><b>High Temperature Storage</b></p> <p>Reference documents: MIL-STD-202G Method 108 (Sample Q'ty:77PCS)</p>	<ol style="list-style-type: none"> <li>No significant defects in appearance.</li> <li><math>\Delta L/L \leq 10\%</math>.</li> <li><math>\Delta DCR/\Delta DCR \leq 10\%</math>.</li> </ol>	<p>Temperature: N°C (N: Follow the product specification for the setting.)</p> <p>1000 hrs. at rated operating temperature (eg.125°C part can be stored for 1000 hrs. @ 125°C. Same applies for 105°C and 85°C.Unpowered. Measurement at 24±4 hours after test conclusion.</p>
<p><b>Temperature Cycling</b></p> <p>Reference documents: JESD22 Method JA-104 (Sample Qty:77PCS)</p>	<ol style="list-style-type: none"> <li>No significant defects in appearance.</li> <li><math>\Delta L/L \leq 10\%</math></li> <li><math>\Delta DCR/\Delta DCR \leq 10\%</math></li> </ol>	<p>Temperature: N°C (N: Follow the product specification for the setting.)</p> <p>1000 cycles (-40°C to +125°C). Note: If 85°C part or 105°C part the 1000 cycles will be at that temperature. Measurement at 24±4 hours after test conclusion. 30min maximum dwell time at each temperature extreme. 1min. maximum transition time.</p>
<p><b>Biased Humidity</b></p> <p>Reference documents: MIL-STD-202G Method 103 (Sample Qty:77PCS)</p>	<ol style="list-style-type: none"> <li>No significant defects in appearance.</li> <li><math>\Delta L/L \leq 10\%</math></li> <li><math>\Delta DCR/\Delta DCR \leq 10\%</math></li> </ol>	<p>1000 hours 85°C/85%RH. Unpowered. Measurement at 24±4 hours after test conclusion.</p>
<p><b>Operational Life</b></p> <p>Reference documents: MIL-PRF-27 (Sample Qty:77PCS)</p>	<ol style="list-style-type: none"> <li>No significant defects in appearance.</li> <li><math>\Delta L/L \leq 10\%</math></li> <li><math>\Delta DCR/\Delta DCR \leq 10\%</math></li> </ol>	<p>1000 hrs. @105°C. If 125°C or 155°C parts should be tested at the temperature specified. Measurement at 24±4 hours after test conclusion.</p>



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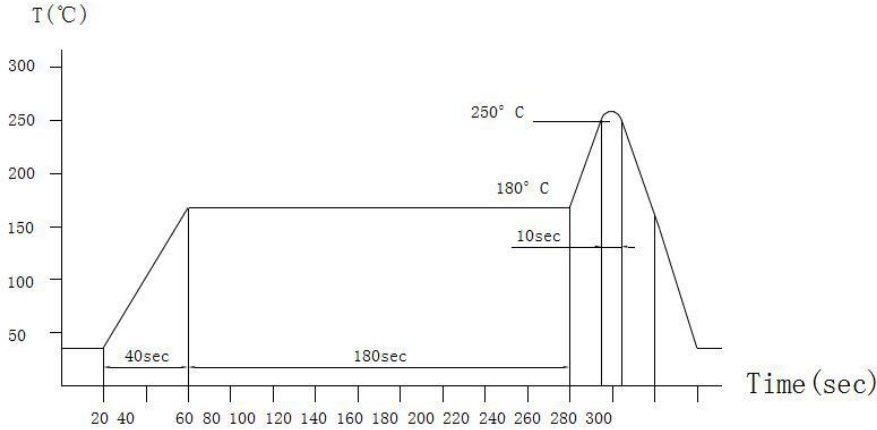
## ● Reliability Test (AEC-Q200)

Item	Performance	Test Condition
Mechanical Shock Reference documents: MIL-STD-202Method 213 (Sample Qty:30PCS)	1. No significant defects in appearance. 2. $\Delta L/L \leq 10\%$ 3. $\Delta DCR/\Delta DCR \leq 10\%$	Condition C: PGA: 100g.s; Duration: 6ms; Using half-sine waveform with max velocity change of 12.3ft/sec
Vibration test Reference documents: MIL-STD-202 Method 204 (Sample Qty:30PCS)	1. No significant defects in appearance. 2. $\Delta L/L \leq 10\%$ 3. $\Delta DCR/\Delta DCR \leq 10\%$	Test from 10-2000 Hz.5g's for 20 minutes, 12 cycles each of 3 orientations. 
Solderability Reference documents: IPC J-STD-002D (Sample Qty: 15PCS)	1. No significant defects in appearance. 2. $\Delta L/L \leq 10\%$ 3. $\Delta DCR/\Delta DCR \leq 10\%$	1.Steam aging: 8 hours; (93°C) 2.In solder pot at 245±5°C for 5 second
Board Flex Reference documents: AEC-Q200-005 (Sample Qty:30 PCS)	No significant defects in appearance.	The apparatus shall consist of mechanical means to apply a force which will bend the board (D) x = 2 mm minimum (or as defined in the customer specification or Q200). The duration of the applied forces shall be 60 (+ 5) Sec. The force is to be applied only once to the board. 
Terminal Strength (SMD) Reference documents: AEC-Q200-006 (Sample Qty: 30 PCS)	No significant defects in appearance.	Apply a 17.7N (1.8Kg) force to the side of a device being tested. This force shall be applied for 60 (+1) seconds. 

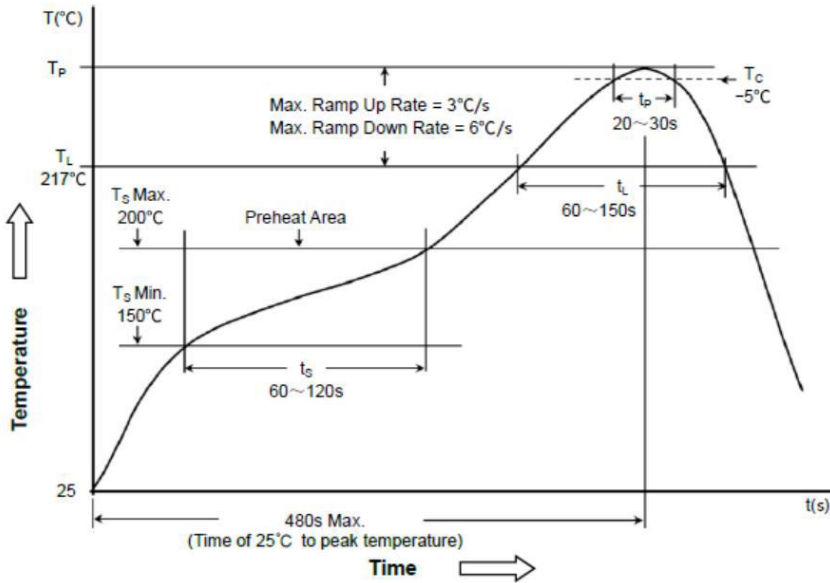
## ● Recommended Reflow Profile

### Soldering and Mounting

(1). Recommended Reflow Conditions (Lead-free)



Reflow profile for SMT components



Classification of peak package body temperature ( $T_p$ )

	Package Thickness	Package Volume		
		<350 mm <sup>3</sup>	350~2000 mm <sup>3</sup>	>2000 mm <sup>3</sup>
PB-Free Assembly	<1.6mm	260°C	260°C	260°C
	1.6~2.5mm	260°C	250°C	245°C
	≥2.5mm	250°C	245°C	245°C

- a. Reflow soldering is carried out under this condition and placed under normal temperature and humidity conditions
- b. Twice reflow test is acceptable with the test interval remaining 1 hour under the normal conditions.
- c. The reflow test profile may vary with the testing instruments.



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### ● Temperature Range

- Operating Temperature range:  $-40^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$ 
  - ※ Operating temperature range includes self-temperature rise.
  - ※ The part temperature (ambient + temp rise) should not exceed  $125^{\circ}\text{C}$  under worst case operating conditions. Circuit design, component placement, PCB trace size and thickness, airflow and other cooling provisions all affect the part temperature. Part temperature should be verified in the end application.
- Taping Package Storage Temperature range:  $+5^{\circ}\text{C}$  to  $+40^{\circ}\text{C}$

### ● Reminders

- Do not use for a purpose outside of the contents regulated in the delivery specifications.
- Do not exceed the rated current
  - ※ If it is used exceeding the rated current, insulation resistance may decrease and excessive heat generation may occur.
  - ※ In case of any abnormality or malfunction of our products, be sure to add the appropriate Fail safe function to the finished product to prevent secondary disasters.
- The storage period is less than 6 months. Be sure to follow the storage conditions (Temperature:  $5$  to  $40^{\circ}\text{C}$ , humidity: 20 to 75% RH or less).
  - ※ If the storage period elapses, the soldering of the terminal electrodes may deteriorate
  - ※ Avoid storage in places subject to direct sunlight, vibration, etc.
  - ※ Do not use or store in an environment (chlorine gas, acid, alkali, sulfide gas, etc.) that is affected by gas corrosion.
- Please do not give excessive vibration and impact.
- Do not design Through hole or Pattern under Coil.
- Please arrange so that Coil does not touch each other.
- When incorporating the circuit board into the SET, be sure not to apply stress to the Coil due to distortion of the board due to Screw fastening part or the like.
- Self heating (temperature increase) occurs when the power is turned ON, so the tolerance should be sufficient for the set thermal design.
- Soldering correction method
  - Pre Heat :  $150^{\circ}\text{C}$  2min.
  - Soldering tip temperature:  $350^{\circ}\text{C}$  or less
  - Correction work time: within 3 seconds
  - Soldering tip power: 80 W or less
  - Soldering tip diameter:  $\Phi$  3 mm or less
- Use a wrist band to discharge static electricity in your body through the grounding wire.
- Do not expose the products to magnets or magnetic fields.
- For resin Coating, pay attention to resin selection and perform reliability evaluation in the mounted state.



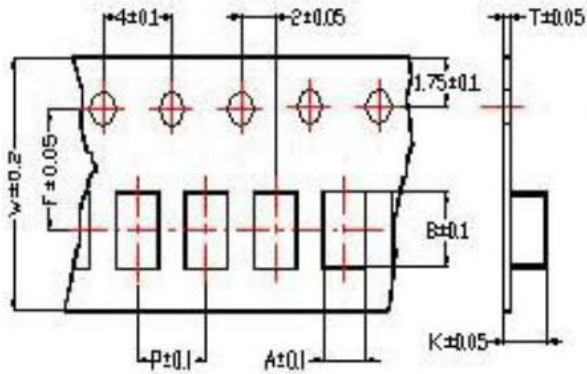


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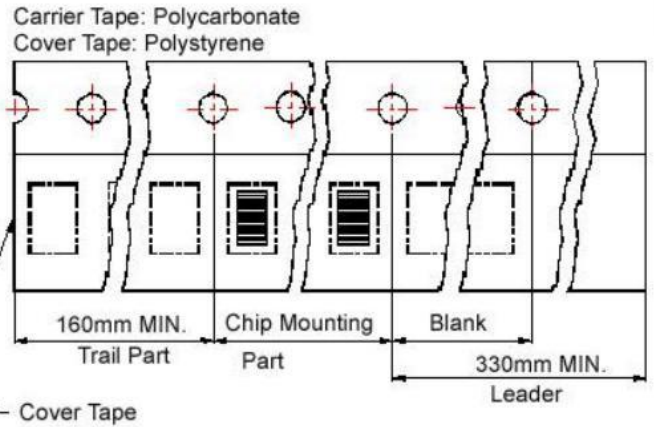
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## ● Packaging Style

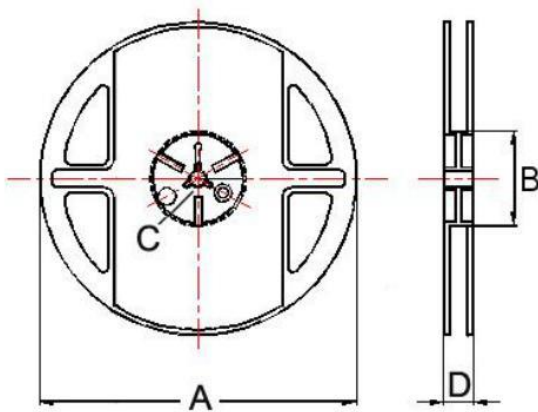
Tape Dimensions



Tape Material



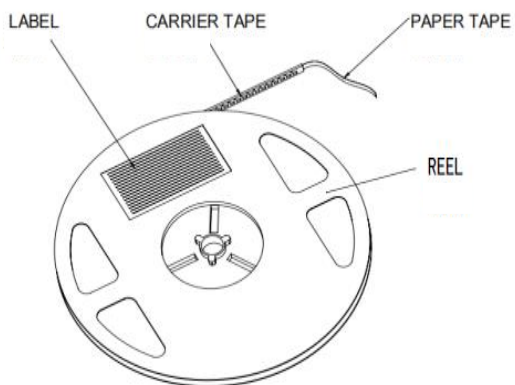
Reel Dimensions



Type	Tape Dimensions (mm)							Reel Dimensions (mm)				PCS/ REEL
	A	B	T	W	P	F	K	A	B	C	D	
EMP322512L	2.80±0.1	3.50±0.1	0.23±0.05	8.00±0.1	4.00±0.1	3.50±0.1	1.34±0.05	178	60	12	10	3000
EMP322515L	2.80±0.1	3.50±0.1	0.23±0.05	8.00±0.1	4.00±0.1	3.50±0.1	1.65±0.05	178	60	12	10	2500
EMP322520L	2.80±0.1	3.50±0.1	0.23±0.05	8.00±0.1	4.00±0.1	3.50±0.1	2.20±0.05	178	60	12	10	2000

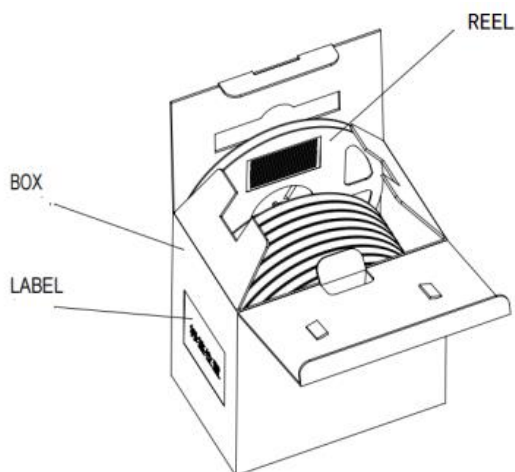
●The packing way and quantity

(A)



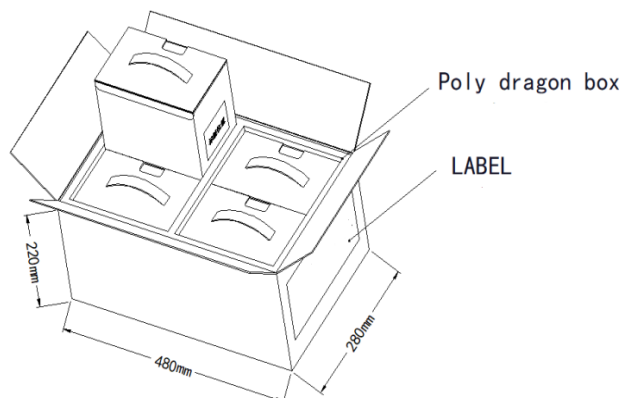
Type	Qty per pcs/Reel
EMP322512L	3000
EMP322515L	2500
EMP322520L	2000

(B)



Type	Qty per pcs/ Inner box
EMP322512L	30000
EMP322515L	25000
EMP322520L	20000

(C)



Type	Qty per pcs/ Carton
EMP322512L	120000
EMP322515L	100000
EMP322520L	80000