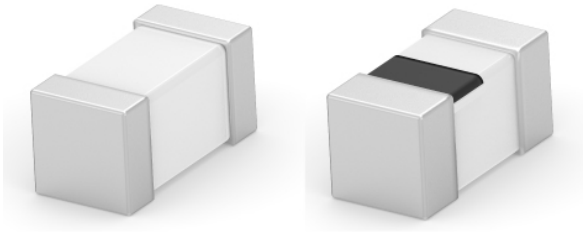
AUTOMOTIVE GRADE MULTILAYER CHIP INDUCTOR

TYPE 3655 SERIES

INTRODUCTION

TE Connectivity (TE) introduces its automotive grade multilayer chip inductors. The 3655 series inductors are designed with a low loss ceramic monolithic structure with high conductivity metal electrodes. The inductors are also designed for high frequency performance and are AEC-Q200 compliant and available in two package sizes.



FEATURES

- High frequency performance
- High self-resonant frequency
- High reliability
- AEC-Q200 qualified
- Moisture sensitivity level – MSL2

APPLICATIONS

- Automotive multi-media system
- Wireless connection system
- Automobile power system
- Safety management system

ELECTRICAL CHARACTERISTICS

36550402/HQ Material

Inductance (Nh)	Tolerance	Q minimum	Test frequency (MHz)	Test voltage (Mv)	SRF minimum (MHz)	RDC (Ω) maximum	IDC (Ma) maximum
1.0	±0.1nH,±0.2nH,±0.3nH	8	100	50	10000	0.06	1000
1.1	±0.1nH,±0.2 nH,±0.3nH	8	100	50	10000	0.07	1000
1.2	±0.1nH,±0.2 nH,±0.3nH	8	100	50	10000	0.07	1000
1.3	±0.1nH,±0.2 nH,±0.3nH	8	100	50	10000	0.07	1000
1.5	±0.1nH,±0.2 nH,±0.3nH	8	100	50	6000	0.08	1000
1.6	±0.1nH,±0.2 nH,±0.3nH	8	100	50	6000	0.08	1000
1.8	±0.1nH,±0.2 nH,±0.3nH	8	100	50	6000	0.08	900
2.0	±0.1nH,±0.2 nH,±0.3nH	8	100	50	6000	0.09	900
2.2	±0.1nH,±0.2 nH,±0.3nH	8	100	50	6000	0.09	900
2.4	±0.1nH,±0.2 nH,±0.3nH	8	100	50	6000	0.10	800
2.7	±0.1nH,±0.2 nH,±0.3nH	8	100	50	6000	0.12	800

ELECTRICAL CHARACTERISTICS

36550402/HQ Material

Inductance (Nh)	Tolerance	Q minimum	Test frequency (MHz)	Test voltage (Mv)	SRF minimum (MHz)	RDC (Ω) maximum	IDC (Ma) maximum
3.0	±0.1nH,±0.2 nH,±0.3nH	8	100	50	6000	0.12	800
3.3	±0.1nH,±0.2 nH,±0.3nH	8	100	50	6000	0.13	800
3.6	±0.1nH,±0.2 nH,±0.3nH	8	100	50	4000	0.15	700
3.9	±0.1nH,±0.2 nH,±0.3nH	8	100	50	4000	0.16	700
4.3	±0.1nH,±0.2 nH,±0.3nH	8	100	50	4000	0.16	700
4.7	±0.1nH,±0.2 nH,±0.3nH	8	100	50	4000	0.16	700
5.1	±0.1nH,±0.2 nH,±0.3nH	8	100	50	4000	0.16	600
5.6	±0.1nH,±0.2 nH,±0.3nH	8	100	50	4000	0.20	600
6.2	±0.1nH,±0.2 nH,±0.3nH	8	100	50	3900	0.20	600
6.8	±3%,±5%	8	100	50	3900	0.20	600
7.5	±3%,±5%	8	100	50	3700	0.24	500
8.2	±3%,±5%	8	100	50	3600	0.24	500
9.1	±3%,±5%	8	100	50	3400	0.26	500
10	±3%,±5%	8	100	50	3200	0.26	500
12	±3%,±5%	8	100	50	2700	0.50	400
15	±3%,±5%	8	100	50	2300	0.50	400
18	±3%,±5%	8	100	50	2100	0.60	350
20	±3%,±5%	8	100	50	2000	0.60	350
22	±3%,±5%	8	100	50	1900	0.60	350
27	±3%,±5%	8	100	50	1600	0.70	300
33	±3%,±5%	8	100	50	1300	0.80	300
39	±3%,±5%	8	100	50	1200	1.00	250
43	±3%,±5%	8	100	50	1100	1.10	250
47	±3%,±5%	8	100	50	1000	1.10	250
56	±3%,±5%	8	100	50	750	1.20	200
68	±3%,±5%	8	100	50	750	1.40	200
82	±3%,±5%	8	100	50	750	1.60	200
100	±3%,±5%	8	100	50	700	2.00	200
120	±3%,±5%	8	100	50	600	2.50	150
150	±3%,±5%	8	100	50	550	3.00	150
180	±3%,±5%	8	100	50	500	3.50	150
220	±3%,±5%	8	100	50	450	3.70	100
270	±3%,±5%	8	100	50	400	4.50	100
330	±3%,±5%	6	50	50	350	5.00	80
360	±3%,±5%	6	50	50	300	6.00	80

Note:

- Operating temperature range: -55°C~+125°C (including self heating temperature)

ELECTRICAL CHARACTERISTICS

36550603/H Material

Inductance (Nh)	Tolerance	Q minimum	Test frequency (MHz)	Test voltage (Mv)	SRF minimum (MHz)	RDC (Ω) maximum	IDC (Ma) maximum
1.0	±0.3nH,±0.5nH	8	100	50	10000	0.05	500
1.2	±0.3nH,±0.5nH	8	100	50	10000	0.05	500
1.5	±0.3nH,±0.5nH	8	100	50	6000	0.10	500
1.8	±0.3nH,±0.5nH	8	100	50	6000	0.10	500
2.0	±0.3nH,±0.5nH	8	100	50	6000	0.10	500
2.2	±0.3nH,±0.5nH	8	100	50	6000	0.10	500
2.4	±0.3nH,±0.5nH	8	100	50	6000	0.12	500
2.7	±0.3nH,±0.5nH	10	100	50	6000	0.12	500
3.3	±0.3nH,±0.5nH	10	100	50	6000	0.15	500
3.6	±0.3nH,±0.5nH	10	100	50	6000	0.16	500
3.9	±0.3nH,±0.5nH	10	100	50	6000	0.16	500
4.3	±0.3nH,±0.5nH	10	100	50	6000	0.18	500
4.7	±0.3nH,±0.5nH	10	100	50	6000	0.20	500
5.1	±0.3nH,±0.5nH	10	100	50	5500	0.25	500
5.6	±0.3nH,±0.5nH	10	100	50	5000	0.25	500
6.8	±5%,±10%	10	100	50	5000	0.30	500
7.5	±5%,±10%	10	100	50	4500	0.35	500
8.2	±5%,±10%	10	100	50	4500	0.35	500
9.1	±5%,±10%	10	100	50	3500	0.40	300
10	±5%,±10%	12	100	50	3500	0.40	300
12	±5%,±10%	12	100	50	3000	0.45	300
15	±5%,±10%	12	100	50	2300	0.50	300
18	±5%,±10%	12	100	50	2200	0.55	300
22	±5%,±10%	12	100	50	2000	0.60	300
27	±5%,±10%	12	100	50	1700	0.65	300
33	±5%,±10%	12	100	50	1500	0.70	300
39	±5%,±10%	12	100	50	1400	0.70	300
47	±5%,±10%	12	100	50	1200	0.70	300
56	±5%,±10%	12	100	50	1100	0.75	300
68	±5%,±10%	12	100	50	900	0.85	300
82	±5%,±10%	8	100	50	800	1.00	300
100	±5%,±10%	8	100	50	700	1.20	300
120	±5%,±10%	8	50	50	600	1.40	200
150	±5%,±10%	8	50	50	500	1.60	200
180	±5%,±10%	8	50	50	400	1.90	200
220	±5%,±10%	8	50	50	350	2.40	200
270	±5%,±10%	8	50	50	350	2.60	150
330	±5%,±10%	8	50	50	350	2.80	150
390	±5%,±10%	8	50	50	300	3.20	150
430	±5%,±10%	8	50	50	280	3.40	150
470	±5%,±10%	8	50	50	250	3.60	150

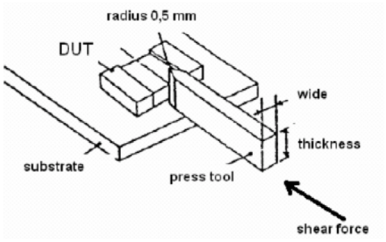
Note:

- Operating temperature range: -55°C~+125°C (including self heating temperature).

ENVIRONMENTAL CHARACTERISTICS

Item	Requirement	Test Condition
High temperature exposure (Storage)	No visible damage. Inductance: ΔL/L within ±10% Q: ΔQ/Q within ±20%	Temperature: 125°C, unpowered, duration 1000hrs. Examination at 250hrs, 500hrs and 1000hrs. Measurement at 24hrs ±4hrs after test conclusion.
Temperature cycle	No visible damage. Inductance: ΔL/L within ±10% Q: ΔQ/Q within ±20%	High temperature: 125°C; Low temperature: -55°C. Duration at each temperature 30min; Transition time: ≤1min; Severity: 1000 cycles. Measurement at 24hrs ±4hrs after test conclusion.
Biased humidity	No visible damage. Inductance: ΔL/L within ±10% Q: ΔQ/Q within ±20%	High temperature: 125°C; Low temperature: -55°C. Duration at each temperature 30min; Transition time: ≤1min; Severity: 1000 cycles. Measurement at 24hrs ±4hrs after test conclusion.
Operational life	No visible damage. Inductance: ΔL/L within ±10% Q: ΔQ/Q within ±20%	Temperature: 125°C. Testing current: rated current at normal temperature. Duration: 1000hrs. Measurement at 24hrs ±4hrs after test conclusion.
Mechanical shock	No visible damage. Inductance: ΔL/L within ±10% Q: ΔQ/Q within ±20%	Half sine wave. Peak value 100g. Normal duration 6ms Three shocks in each direction shall be applied along the three mutually perpendicular axes of the test specimen (18 shocks)
Vibration	No visible damage. Inductance: ΔL/L within ±10% Q: ΔQ/Q within ±20%	The entire frequency range of 10~2000Hz and return to 10Hz shall be traversed in 20minutes. This cycle shall be preformed 12 times in each of three mutually perpendicular directions (total of 36 times), so that the motion shall be applied for a total period of approximately 12hrs. Peak value 5g.
Resistance to soldering heat	No visible damage. Inductance: ΔL/L within ±10% Q: ΔQ/Q within ±20%	Solder bath temperature: 260°C ±5°C. Immersion time: 10s ±1s.
Solderability	95% or more of electrode area shall be coated by new solder.	Solder bath: Lead-free solder; Temperature: 245°C ±5°C. Immersion time: 3s ±0.3s.
Board flex	No visible damage. Inductance: ΔL/L within ±10% Q: ΔQ/Q within ±20%	The testing samples shall be mounted on a 100m x 40mm FR4 PCB board, which is 1.6mm ±0.2mm thick. Bending shall be applied to the 2.0mm with 1.0mm/sec. Duration: 60s ±5s.

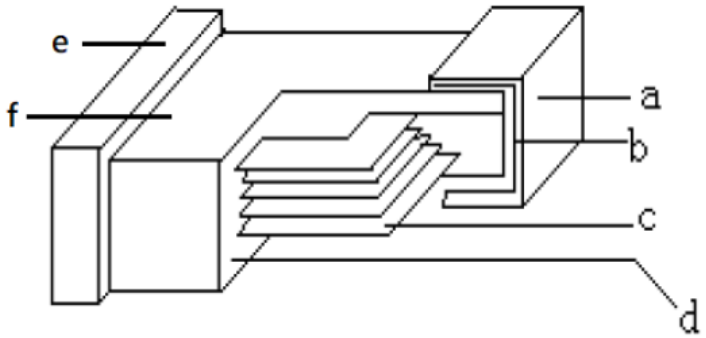
ELECTRICAL CHARACTERISTICS

Item	Requirement	Test Condition
Terminal strength (SMD)	No visible damage. Inductance: ΔL/L within ±10% Q: ΔQ/Q within ±20%	The testing samples shall be mounted on the testing boards. Apply a force of 0402 5N / 0603 10N to the side of the device being tested. Duration: 60s ±1s. 
ESD	No visible damage. Inductance: ΔL/L within ±10% Q: ΔQ/Q within ±20%	Direct contact discharge. Discharge voltage: 8000V. Positive and negative polarity tests once respectively.

Note:

- Storage temperature: -10°C~40°C; Humidity: 30%-70% RH.

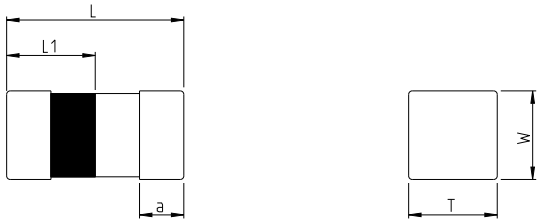
CONSTRUCTION



a	Ni/Sn Plating	**d**	Body
b	Ag Layer	**e**	Terminal Electrode
c	Inner Electrode	**f**	Ceramic

DIMENSIONS

36550402



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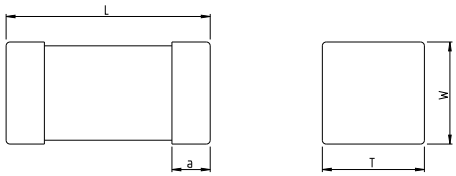
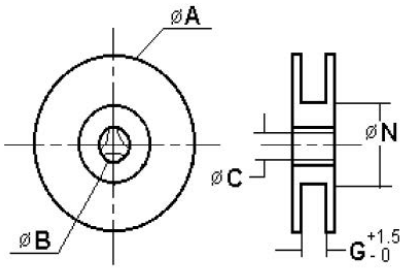


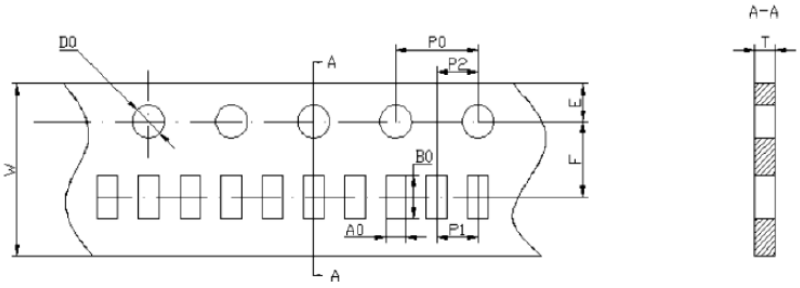
Type	Size (Inch)	L (mm)	W (mm)	T (mm)	a (mm)	L1 (mm)	Weight (g) 1000pcs
3655	0402	1.00±0.15	0.50 ±0.15	0.50 ±0.15	0.25 ±0.10	0.50 ±0.15	1
3655	0603	1.60±0.20	0.80 ±0.20	0.80 ±0.20	0.30 ±0.20	-	3

PACKAGING SPECIFICATIONS



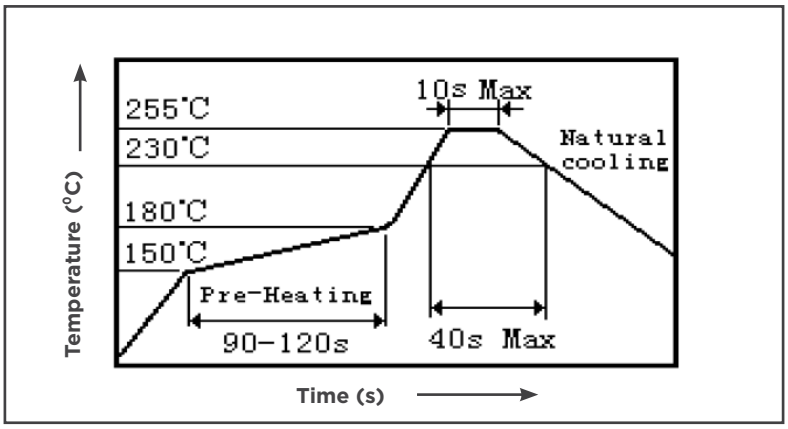
Type	Size (Inch)	A (mm)	B (mm)	C (mm)	N (mm)	G (mm)	Quantity (EA)
3655	0402	178 ±2	22 ±2	12.5 ±1.5	57 ±2	8	10,000
3655	0603	178 ±2	22 ±2	12.5 ±1.5	57 ±2	8	4,000

Tape Specifications



Type	Size (Inch)	A0 (mm)	B0 (mm)	W (mm)	F (mm)	E (mm)	P1 (mm)	P2 (mm)	P0 (mm)	D0 (mm)	T (mm)
3655	0402	0.65±0.1	1.15±0.1	8.0±0.2	3.5±0.1	1.75±0.2	2.0±0.1	2.0±0.1	4.0±0.2	1.55±0.1	0.60±0.1
3655	0603	1.10±0.2	1.90±0.2	8.0±0.2	3.5±0.1	1.75±0.2	4.0±0.2	2.0±0.1	4.0±0.2	1.55±0.1	0.95±0.1

REFLOW SOLDERING PROFILE



ORDERING INFORMATION

Part Number
3655 0402 S 1N0 T

Product type

3655	Multilayer Chip Inductor

Packaging size (LxWxT)

0402	1.0mm X 0.5mm X 0.5mm
0603	1.6mm X 0.8mm X 0.8mm

Inductance tolerance

B	±0.1nH
C	±0.2nH
S	±0.3nH
D	±0.5nH
H	±3%
J	±5%
K	±10%

Packaging type

T	Taped & Reeled (0402 size - 10000 pieces/reel) (0603 size - 4000 pieces/reel)

Inductance value

1N0	1.0nH
10N	10nH
R10	100nH
R36	360nH

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