Surface Mount Metallized PPS Film Capacitor

LDB Series Unencapsulated Stacked Chip, Size 1206 – 1812, 16 and 50 VDC

Electronic Components
KEMET
CHARGED.

Overview

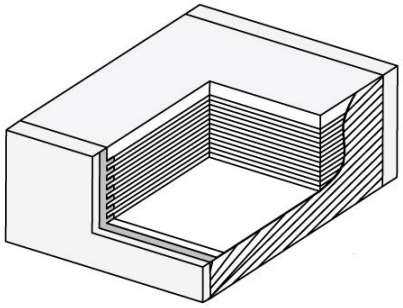
Polyphenylene sulphide (PPS) film capacitor for surface mounting.

Applications

Typical applications include timing, filtering and use as a memory capacitor. The LDB Series is designed for high stability, accuracy and temperature.

Benefits

- Rated voltage: 16 and 50 VDC
- Capacitance range: 0.0033 – 0.1 µF
- EIA size: 1206 – 1812
- Capacitance tolerance: ±2%, ±5%
- Climatic category: 55/125/56
- RoHS Complaint and lead-free terminations
- Operating temperature range of -55˚C to +125˚C



Part Number System

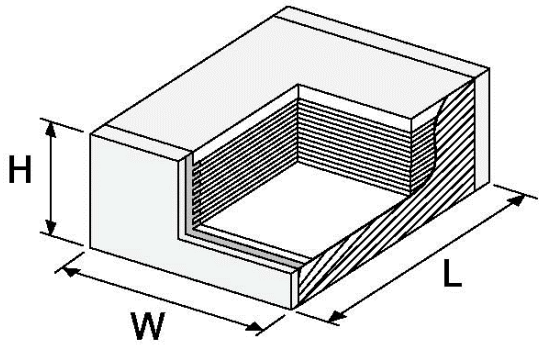
LDB	A	A	2120	G	C	5	N	0
Series	Rated Voltage (VDC)	Size Code	Capacitance Code (pF)	Capacitance Tolerance	Dielectric	Version	Packaging	Internal Use
Metallized PPS	A = 16 C = 50	See Dimension Table	Digits 2-4 indicate the first three digits of the capacitance value. First digit indicates the number of zeros to be added.	G = ±2% J = ±5%	C = PPS	5 = Standard	See Ordering Options Table	0 (Standard)

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Ordering Options Table

Packaging Type	Packaging Code
Standard Packaging Options	
Tape & Reel (Standard Reel)	N

Dimensions – Millimeters



Size Code	Chip Size (EIA)	W		H	L	
		Nominal	Tolerance		Nominal	Tolerance
A	1206	1.7	+/-0.2	See Part Number Table	3.3	+0.3/-0.1
B	1210	2.5	+/-0.3		3.3	+0.3/-0.1
C	1812	3.3	+/-0.3		4.7	+0.3/-0.2

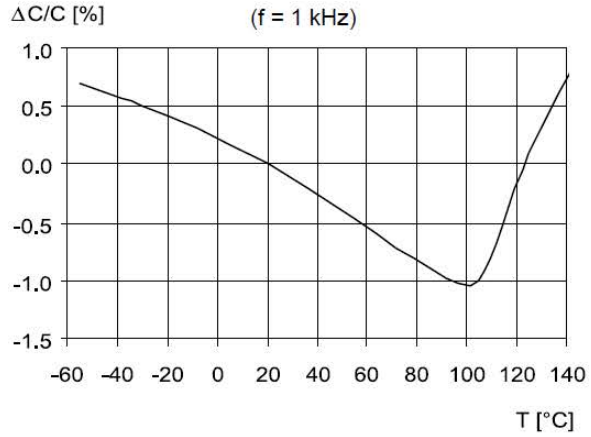
Performance Characteristics

Rated Voltage (VDC)	16	50
Capacitance Range (µF)	0.012 – 0.1	0.0033 – 0.1
Chip Size (EIA)	1206 – 1812	
Capacitance Values	E12 series	
Capacitance Tolerance	±2%, ±5%	
Category Temperature Range	-55°C to +125°C	
Rated Temperature	+105°C	
Voltage Derating	The rated voltage is decreased with 1.25%/°C from +105°C to +125°C	
Climatic Category	55/125/56	
Capacitance Drift	Maximum 1% after a 2 year storage period at a temperature of +10°C to +40°C and a relative humidity of 40% to 60%	
Reliability (Reference MIL-HDBK-217)	Failure rate ≤ 1 FIT, T = +40°C, V = 0.5 x V_R	
	1 FIT = 10^{-9} failures / (components * hours)	
	Failure criteria: open or short circuit, cap. change > 10%, DF 2 times the catalog limits, IR < 0.005 x initial limit	
Insulation Resistance	Measured at +25°C ±5°C	
	Minimum Value Between Terminals	
	3,000 MΩ	
	Charging time: 1 minute Charging voltage: 10 V_{DC} for VR = 16 V_{DC} 50 V_{DC} for VR = 50 V_{DC}	
Dissipation Factor	Maximum Values at 25°C ±5°C	
	1 kHz	0.6%
Surge Voltage Test	1.75 x V_R (5 seconds; T = 25 ± 5°C)	

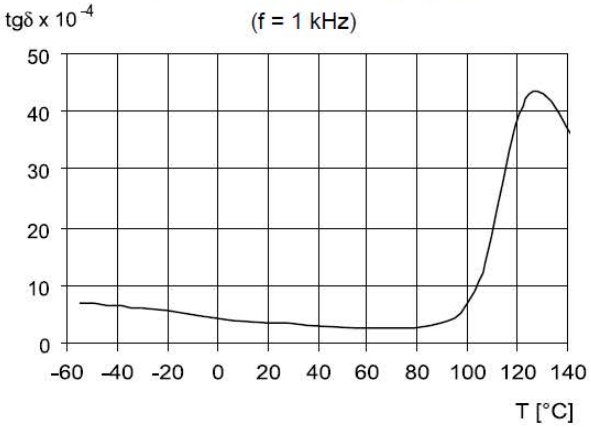
PPS Dielectric Typical Temperature Graphs

PPS

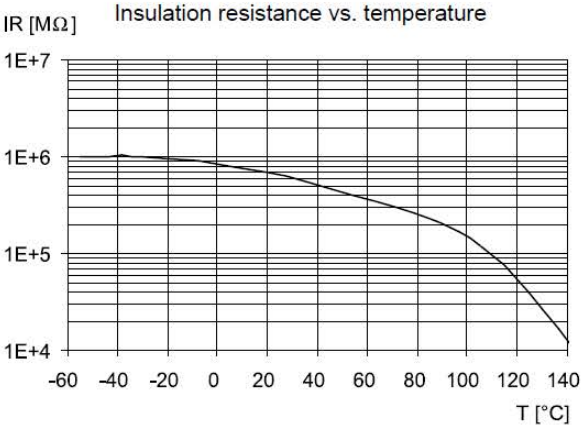
Capacitance vs. temperature



Dissipation factor vs. temperature



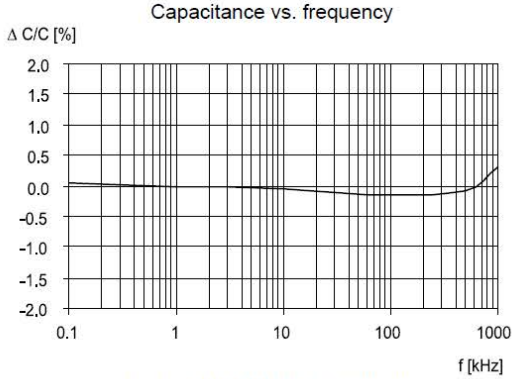
Insulation resistance vs. temperature



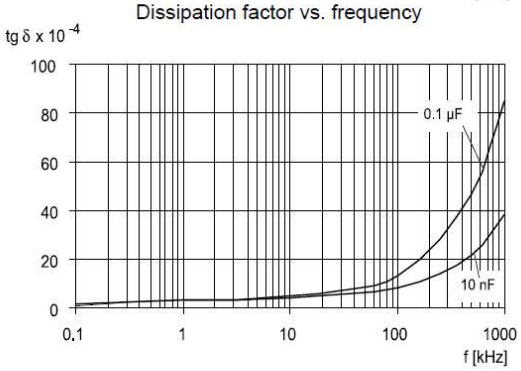
PPS Dielectric Typical Frequency Graphs

PPS

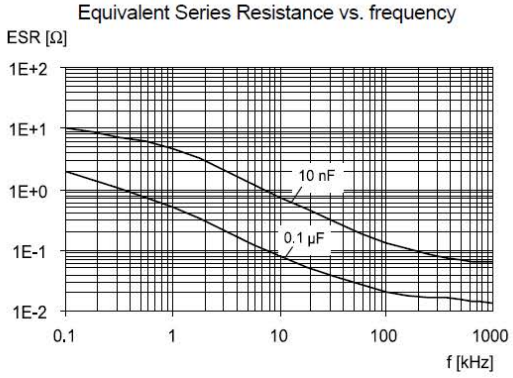
Capacitance vs. frequency



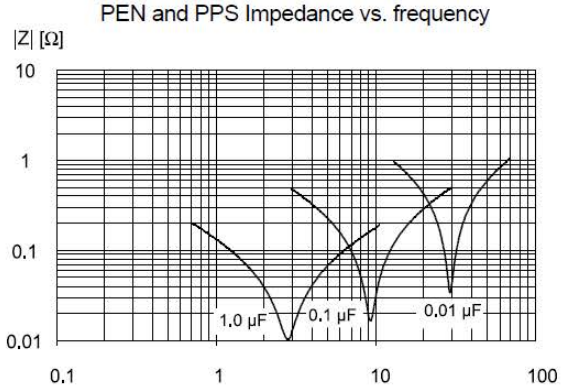
Dissipation factor vs. frequency



Equivalent Series Resistance vs. frequency



PEN and PPS Impedance vs. frequency



Note: measurements performed at T = 25 ± 5°C

Environmental Test Data

Damp Heat, Steady State	
Test Conditions	
Temperature	+40°C ±2°C
Relative Humidity (RH)	93% ±2%
Test Duration	56 days
Performance	
Capacitance Change |Δ C/C|	≤ 5%
DF Change (Δtgδ)	≤ 30 x 10^{-4} at 1 kHz
Insulation Resistance	≥ 50% of limit value

Endurance	
Test Conditions	
Temperature	125°C ±2°C
Test Duration	2,000 hours
Voltage Applied	1.25 x V_C
Performance	
Capacitance Change |Δ C/C|	≤ 3%
DF Change (Δtgδ)	≤ 30 x 10^{-4} at 1 kHz
Insulation Resistance	≥ 50% of limit value

Rapid Change of Temperature	
Test Conditions	
Temperature	1 hour at -55°C, 1 hour at +125°C
Number of Cycles	1,000
Performance	
Capacitance Change |Δ C/C|	≤ 3%
DF Change (Δtgδ)	≤ 50 x 10^{-4} at 1 kHz
Insulation Resistance	≥ limit value
No Mechanical Damage	

Reflow	
Test Conditions	See Solder Process
Performance	
Capacitance Change |Δ C/C|	≤ 3%
DF Change (Δtgδ)	≤ 50 x 10^{-4} at 1 kHz
Insulation Resistance	≥ limit value
No Mechanical Damage	

Bending	
Test Conditions	
Deflection	1 to 6 mm
Performance	
Capacitance Change |Δ C/C|	≤ 1%
No visible damage on the terminations (pealing) neither on the body (cracking)	

Environmental Compliance

All KEMET surface mount capacitors are RoHS Compliant.

Table 1 – Ratings & Part Number Reference

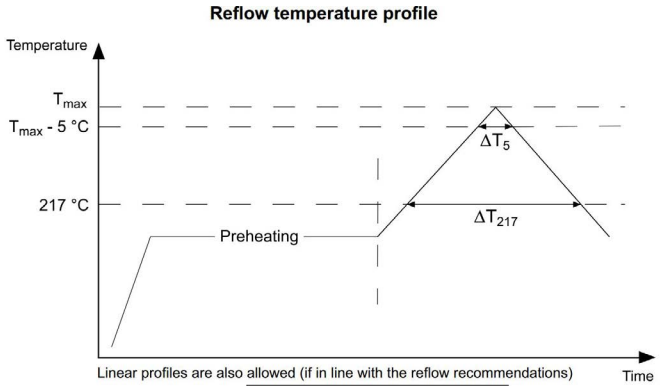
VDC	Capacitance Value (µF)	Size Code	Dimensions in mm			Chip Size	New KEMET Part Number	Legacy Part Number
			B	H	L			
16	0.012	A	1.7	1.1	3.3	1206	DBAA2120(1)C5N0	LDBAA2120(1)C5N0
16	0.015	A	1.7	1.1	3.3	1206	DBAA2150(1)C5N0	LDBAA2150(1)C5N0
16	0.018	A	1.7	1.1	3.3	1206	DBAA2180(1)C5N0	LDBAA2180(1)C5N0
16	0.022	A	1.7	1.1	3.3	1206	DBAA2220(1)C5N0	LDBAA2220(1)C5N0
16	0.027	A	1.7	1.1	3.3	1206	DBAA2270(1)C5N0	LDBAA2270(1)C5N0
16	0.033	A	1.7	1.1	3.3	1206	DBAA2330(1)C5N0	LDBAA2330(1)C5N0
16	0.039	A	1.7	1.2	3.3	1206	DBAA2390(1)C5N0	LDBAA2390(1)C5N0
16	0.047	A	1.7	1.3	3.3	1206	DBAA2470(1)C5N0	LDBAA2470(1)C5N0
16	0.056	B	2.5	1.7	3.3	1210	DBAB2560(1)C5N0	LDBAB2560(1)C5N0
16	0.068	B	2.5	1.7	3.3	1210	DBAB2680(1)C5N0	LDBAB2680(1)C5N0
16	0.082	B	2.5	1.7	3.3	1210	DBAB2824(1)C5N0	LDBAB2824(1)C5N0
16	0.10	B	2.5	2.0	3.3	1210	DBAB3100(1)C5N0	LDBAB3100(1)C5N0
50	0.0033	A	1.7	1.1	3.3	1206	DBCA1330(1)C5N0	LDBCA1330(1)C5N0
50	0.0039	A	1.7	1.1	3.3	1206	DBCA1390(1)C5N0	LDBCA1390(1)C5N0
50	0.0047	A	1.7	1.1	3.3	1206	DBCA1470(1)C5N0	LDBCA1470(1)C5N0
50	0.0056	A	1.7	1.1	3.3	1206	DBCA1560(1)C5N0	LDBCA1560(1)C5N0
50	0.0068	A	1.7	1.1	3.3	1206	DBCA1680(1)C5N0	LDBCA1680(1)C5N0
50	0.0082	A	1.7	1.1	3.3	1206	DBCA1820(1)C5N0	LDBCA1820(1)C5N0
50	0.010	A	1.7	1.1	3.3	1206	DBCA2100(1)C5N0	LDBCA2100(1)C5N0
50	0.012	A	1.7	1.1	3.3	1206	DBCA2120(1)C5N0	LDBCA2120(1)C5N0
50	0.015	B	2.5	1.4	3.3	1210	DBCB2150(1)C5N0	LDBCB2150(1)C5N0
50	0.018	B	2.5	1.5	3.3	1210	DBCB2180(1)C5N0	LDBCB2180(1)C5N0
50	0.022	B	2.5	1.5	3.3	1210	DBCB2220(1)C5N0	LDBCB2220(1)C5N0
50	0.027	B	2.5	1.5	3.3	1210	DBCB2270(1)C5N0	LDBCB2270(1)C5N0
50	0.033	B	2.5	1.7	3.3	1210	DBCB2330(1)C5N0	LDBCB2330(1)C5N0
50	0.039	B	2.5	1.9	3.3	1210	DBCB2390(1)C5N0	LDBCB2390(1)C5N0
50	0.047	B	2.5	2.3	3.3	1210	DBCB2470(1)C5N0	LDBCB2470(1)C5N0
50	0.056	C	3.3	1.7	4.7	1812	DBCC2560(1)C5N0	LDBCC2560(1)C5N0
50	0.068	C	3.3	1.7	4.7	1812	DBCC2680(1)C5N0	LDBCC2680(1)C5N0
50	0.082	C	3.3	1.7	4.7	1812	DBCC2824(1)C5N0	LDBCC2824(1)C5N0
50	0.10	C	3.3	2.0	4.7	1812	DBCC3100(1)C5N0	LDBCC3100(1)C5N0
VDC	**Capacitance Value (µF)**	**Size Code**	**B (mm)**	**H (mm)**	**L (mm)**	**Chip Size**	**New KEMET Part Number**	**Legacy Part Number**

(1) G = ±2%, J = ±5%.

Soldering Process

Reflow Recommendations	
Preheating	
Maximum Preheating Time	180 seconds
Minimum Temperature	150°C
Maximum Temperature	200°C
Maximum Time within T_{max} and T_{max} – 5°C (ΔT_5)	30 seconds ($T_{max} \leq 250°C$)
	10 seconds (250 °C < $T_{max} \leq 260°C$)
Maximum Time Over 217°C (ΔT_{217})	150 seconds
Maximum Temperature Ramp Rate	3°C/seconds (heating)
	6°C/seconds (cooling)
Second reflow	
If two reflow processes are needed, be sure that before the second reflow, the temperature on the capacitor's surface is lower than 50°C.	

** For LDB series this value is 260 °C.*



Maximum Temperature on Component Body (T_{max})

Capacitor	Capacitor Volume (mm^3)		
H_{max} (mm)	< 350	350 – 2,000	> 2,000
< 1.6	255°C *	255°C *	255°C *
1.6 – 2.5	255°C *	250°C	245°C
> 2.5	250°C	245°C	245°C

**In line with JEDEC STD 020D ed. June 2007 with some limitations.*
** For LDB series this value is 260 °C.*

Flux/Cleaning/Storage and Moisture

Flux suggestions

We suggest to use a no-clean flux with a halogen content lower than 0.1%.

Cleaning suggestions

To clean the PCB assembly we suggest to use a suitable solvent like Isopropyl Alcohol, deionized water or neutral pH detergents. Solvents like Toluene, Xylene and Trichloroethylene should not be used.

Flux/Cleaning/Storage and Moisture cont'd

Storage and moisture recommendations

KEMET SMD Film Capacitors are supplied in a MBB (Moisture Barrier Bag) Class 1. We can guarantee a 24 months shelf life (temperature ≤ 40°C/relative humidity ≤ 90%). After the MBB has been opened, components may stay in areas with controlled temperature and humidity (temperature ≤ 30°C/relative humidity ≤ 60%) for 168 hours [MSL 3] (rated voltage ≤ 100 VDC) or 696 hours [MSL 2a] (rated voltage > 100 VDC). For longer periods of time and/or higher temperature and/or higher relative humidity values, it is absolutely necessary to protect the components against humidity. If the reel inside the MBB is partially used, KEMET recommends to re-use the same MBB or to avoid areas without controlled temperature and humidity (see above). If the above conditions are not respected, components require a baking (minimum time: 48 hours at 55 ± 5°C) before the reflow.

Manual assembly recommendations

If PCBs are assembled manually, care must be taken to avoid any mechanical damage to the components. Our recommendations are the following (see Fig. 1):

1. When using tweezers, the components should be gripped across the two terminations (A);
2. Avoid any contact with the two cutting surfaces (C);
3. A vacuum pen is recommended on the top and bottom surfaces (B).

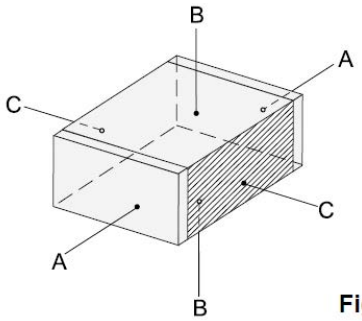


Fig. 1

Manual soldering recommendations

LDE and LDB series have been designed for Surface Mount Technology, pick & place machines and reflow soldering systems. Using a manual soldering iron, issues may occur because the typical temperature for manual soldering is around 350°C. Therefore please pay careful attention:

- Never touch the capacitor body with the soldering iron but rather touch the soldering iron and the end termination with the tin wire edge (see Fig. 2);
- If the soldering iron is equipped with a temperature controller device:
  Set the temperature to 250 ± 3°C and proceed as per Fig. 2 (the maximum soldering time, on both terminations, is 5 seconds);
- If the soldering iron is NOT equipped with a temperature controller device:
  This is the worst situation. The following are a few practical suggestions but, clearly, the operator's experience is extremely important:
  1. Proceed as per Fig. 2;
  2. As soon as the tin wire starts melting, move the soldering iron away as quickly as possible;
  3. Wait a few seconds and check that the soldering joint has been properly created;
- If the soldering iron is equipped with a hot air flow device:
  Set the hot air temperature to 250 ± 3°C and do not send the hot air directly onto the capacitor plastic body. In this situation, the operator's experience is very important;
- In any case, avoid mass-mounting SMD Film Capacitors manually.

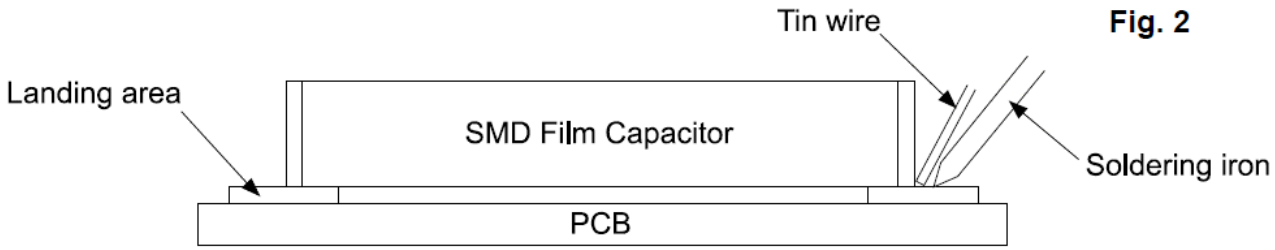
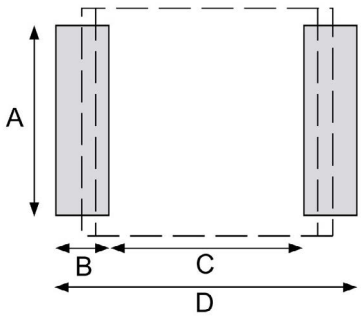


Fig. 2

Packaging Quantities

Chip Size (EIA)	Height (mm)	Reel
1206	1.1	3000
1206	1.2	3000
1206	1.3	3000
1210	1.4	2250
1210	1.5	2250
1210	1.7	2250
1210	1.9	2250
1210	2.0	2250
1210	2.3	2250
1812	1.7	4000
1812	2.0	3000

Landing

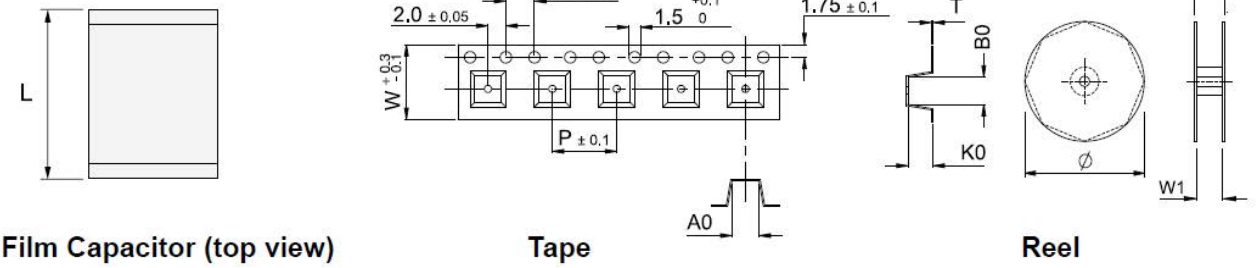


Size	Dimensions in mm			
	A	B	C	D
1206	1.5	1.1	2.3	4.5
1210	2.3	1.1	2.3	4.5
1812	3	1.7	3.1	6.5

These landing area dimensions have the aim of taking full advantage of the new RoHS 6 terminations design.
We suggest to use a Sn/Ag/Cu solder paste (suggested thickness: 0.10 – 0.15 mm).
If a NOT Lead Free solder paste is used, a minimum peak temperature of 210°C on the component's body is suggested.

Carrier Taping & Packaging (IEC 60286–2)

Horizontal Taping Orientation



SMD Film Capacitor (top view) **Tape** **Reel**

Chip Size (EIA) Horizontal Mounting	Dimensions in mm			Taping Specification							
	W	H	L	W	P_1	A_0	B_0	K_0	D	W_1	W_2
	Nominal	Nominal	Nominal	-0.1/+0.3	+/-0.1	Nominal	Nominal	Nominal	-/+2.0	-0/+2	Maximum
1206	1.7	All	3.3	8	4	2	3.8	1.3	180	8	12
1210	2.5	All	3.3	8	4	3	3.8	2.1	180	8	12
1812	3.3	≤ 1.9	4.7	12	8	3.8	5.3	2	330	12	16
1812	3.3	2.1 – 2.6	4.7	12	8	3.9	5.2	2.6	330	12	16

In accordance with IEC 60286-3
Materials:
- carrier tape: antistatic material
- cover tape: polyester + polythene
- reel: recyclable polystyrene

All parts in reels are packed in hermetically sealed Moisture Barrier Bag (MBB) Class 1.

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