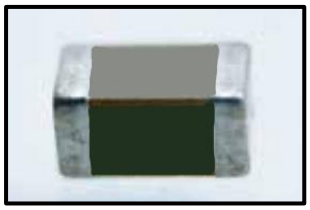
GMC Series

Dielectric: X7R



Features

- Large capacitance values in small sizes
- Excellent high frequency characteristics
- All PPI Caps conform to EIA Specifications

Applications

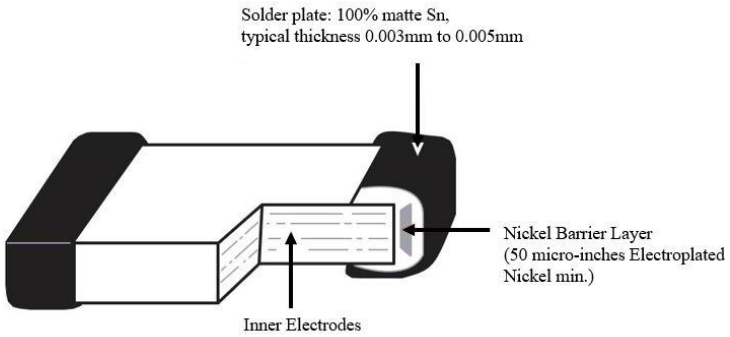
- Can be used on surface mount assembly equipment
- Our fully integrated manufacturing and total quality control systems ensure uprecedented high standards of quality and reliability.

Notes

- Capacitance Value & Tolerance are determined by circuit requirements
- Voltage is determined by circuit requirements
- Capacitor Size select the smallest unit permitted by the circuit constraints that provides the required capacitance and voltage rating
- Nickel Barrier is standard and recommended for units exposed to repeated solder cycles, to minimize leaching of the termination.
- All capacitors conform to EIA specifications.

Construction

Constructed by screen printing alternative layers of internal metallic electrodes onto ceramic dielectric materials and firing into a concrete monolithic body, then completed by application of metal end terminations which are fired to assure permanent bonding with the individual internal electrodes.



RoHS

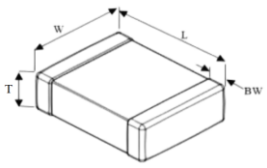
Dielectric: X7R

Part Numbering

PPI-GMC	31	X7R	103	J	500	NT	D
PPI Series	Case Size Code *See Table*	Dielectric CG=NP0 X7R XR5 Z5U Y5V *See Tables*	Capacitor Code 100=10x10⁰=10pF 1R0=1.0pF	Capacitance Tolerance: *See Table*	Rated Voltage *See Table*	Termination Type *See Table*	Packaging *See Table*

Dimensions (mm)

		Dimensions (mm)			
Code	**Size**	**L**	**W**	**T**	**BW**
01	**01005**	0.40 ± 0.02	0.20 ± 0.02	0.20 ± 0.02	0.07 ~ 0.14
02	**0201**	0.60 ± 0.03	0.30 ± 0.03	0.30 ± 0.03	0.15 ± 0.05
04	**0402**	1.00 ± 0.05	0.50 ± 0.05	0.50 ± 0.10	0.10 ~ 0.35
10	**0603**	1.60 ± 0.20	0.80 ± 0.20	1.0 max	0.10 ~ 0.40
21	**0805**	2.00 ± 0.30	1.25 ± 0.20	1.40	0.25 ~ 0.75
31	**1206**	3.20 ± 0.30	2.50 ± 0.20	2.20	0.25 ~ 0.75
32	**1210**	3.20 ± 0.30	1.60 ± 0.20	1.80	0.25 ~ 0.75
40	**1808**	4.50 ± 0.35	3.20 ± 0.30	2.20	0.25 ~ 0.75
43	**1812**	3.20 ± 0.30	1.6 ± 0.20	1.80	0.25 ~ 0.75
45	**1825**	5.70 ± 0.40	5.01 ± 0.40	1.80	0.25 ~ 0.75
55	**2220**	5.70 ± 0.40	6.30 ± 0.40	2.20	0.25 ~ 0.75
57	**2225**	4.50 ± 0.35	6.30 ± 0.40	2.20	0.25 ~ 0.75



Capacitance Code

Cap Code	Value	Cap Code	Value	Cap Code	Value	Cap Code	Value
0R5	0.5pF	**100**	10pF	**104**	0.1uF	**106**	10uF
5R0	5.0pF	**103**	0.01uF	**105**	1.0uF	**107**	100uF

Capacitance Tolerances

Code	B	C	D	F	G	J	K	M	Z
Tol.	±0.1pF	±0.25pF	±0.5pF	±1%	±2%	±5%	±10%	±20%	-20% + 80%

Rated Voltages

Code	Voltage	Code	Voltage
4R0	4.0V	35	35V
6R3	6.3V	50	50V
10	10V	63	63V
16	16V	100	100V
25	25V	200	200V

Terminations

Nickel barrier is standard and recommended for units exposed to repeated solder cycles to minimize leaching of the termination.

Code	Description
NT	Sn/Ni
PT	Pd/Ag

Stable Class II Dielectric

Temperature variation of capacitance is within ±15% from -55°C to +125°C for X7R (-55°C to +85°C for X5R). The capacitance change is non-linear.

Electrical Specifications

Operating Temperature Range	X7R X5R	-55°C to +125°C -55°C to +85°C
Temperature Coefficient (TC)		±15%
Temperature Voltage Coefficient (ΔcMax @ V_{DCW})		Not Applicable
Dissipation Factor		2.5% Max, 1.80% Typical
Insulation Resistance (IR)		25°C, V_{DCW}; > 100GQF or 1000QF, whichever is less 125°C V_{DCW}; > 10GQF or 100QF, whichever is less
Dielectric Withstanding Voltage		2.5 X V_{DCW}
Aging Rate		< 2% per decade hour
Test Parameters		1KHz 1.0Vrms ±0.2Vrms 25°C values > or = to 10uF 1.0 Vrms 120Hz

01005: PPI-GMC01

Value	Code	Tol.	Rated WVDC	Value	Code	Tol.	Rated WVDC	Value	Code	Tol.	Rated WVDC
100 pF	101	J,K	6.3V or 10V	270	271	J,K	6.3V or 10V	680	681	J,K	6.3V or 10V
120	121			330	331			820	821		
150	151			390	391			1000	102		
180	181			470	470						
220	221			560	561						

0201: PPI-GMC02

Value	Code	Tol.	Rated WVDC	Value	Code	Tol.	Rated WVDC	Value	Code	Tol.	Rated WVDC
100 pF	101	J,K	6.3V or 10V or 16V or 25V or 50V	560	561	J,K	6.3V or 10V or 16V or 25V or 50V	3.3	332	J,K	6.3V or 10V or 16V
120	121			680	681			3.9	392		
150	151			820	821			4.7	472		
180	181			1.0 nF	102			5.6	562		
220	221			1.2	122		6.3V or 10V or 16V	6.8	682		
270	271			1.5	152			8.2	822		
330	331			1.8	182			10	103		
390	391			2.2	222						
470	471			2.7	272						

0402: PPI-GMC04

Value	Code	Tol.	Rated WVDC	Value	Code	Tol.	Rated WVDC	Value	Code	Tol.	Rated WVDC
100 pF	101	J,K	10V or 25V or 50V or 100V or 200V	1.0 nF	102	J,K	10V or 25V or 50V or 100V	33	333	J,K	10V or 25V or 50V
110	111			1.2	122			39	393		
120	121			1.5	152			47	473		
130	131			1.8	182			56	563		
150	151			2.2	222			68	683		
180	181			2.7	272			82	823		
200	221			3.3	332			100	104		
220	221			3.9	392			150	154		10V or 25V
240	241			4.7	472			220	224		
270	271			5.6	562			270	274		10V
300	301			6.8	682			390	394		
330	331			8.2	822			470	474		
390	391			10	103			560	564		
430	431			12	123		10V or 25V or 50V	680	684		
470	471			15	153			820	824		
560	561			18	183			1uF	105		10V or 25V
680	681			22	223						
820	821			27	273						

0603: PPI-GMC10

Value	Code	Tol.	Rated WVDC	Value	Code	Tol.	Rated WVDC	Value	Code	Tol.	Rated WVDC
100 pF	101	J,K	6.3V or 10V or 16V or 25V or 50V or 100V or 200V	1.0 nF	102	J,K	6.3V or 10V or 16V or 25V or 50V or 100V or 200V	56	563	J,K	6.3V or 10V or 16V or 25V or 50V or 100V
120	121			1.2	122			68	683		
130	131			1.5	152			82	823		
150	151			1.8	182			100	104		
160	161			2.2	222			120	124		
180	181			2.7	272			150	154		6.3V or 10V or 16V or 25V or 50V
200	221			3.3	332			220	224		
220	221			3.9	392			270	274		
240	241			4.7	472			330	334		
270	271			5.6	562			470	474		
300	301			6.8	682			560	564		6.3V or 10V or 16V or 25V
330	331			7.5	752			680	684		
390	391			8.2	822			820	824		
430	431			10	103			1.0 uF	105		6.3V or 10V or 16V or 25V or 50V
470	471			12	123		6.3V or 10V or 16V or 25V or 50V or 100V	2.2	225		6.3V or 10V or 16V
510	511			15	153			2.7	275		
560	561			18	183			3.3	335		
620	621			22	223			3.9	395		
680	681			27	273			4.7	475		6.3V or 10V
750	751			33	333			10	106		6.3V
820	821			39	393						
910	911			47	473						

0805: PPI-GMC21

Value	Code	Tol.	Rated WVDC	Value	Code	Tol.	Rated WVDC	Value	Code	Tol.	Rated WVDC
100 pF	101	J,K	6.3V or 10V or 16V or 25V or 35V or 50V or 100V or 200V	3.9	392	J,K	6.3V or 10V or 16V or 25V or 35V or 50V or 100V or 200V	150	154	J,K	6.3V or 10V or 16V or 25V or 35V or 50V or 100V
120	121			4.7	472			180	184		
150	151			5.6	562			220	224		
180	181			6.8	682			270	274		
220	221			8.2	822			330	334		
270	271			10	103			470	474		
330	331			12	123			560	564		6.3V or 10V or 16V or 25V or 35V or 50V
390	391			15	153			680	684		
470	471			18	183			820	824		
560	561			22	223			1.0 uF	105		
680	681			27	273			1.2	125		
820	821			33	333			1.5	155		
1.0 nF	102			39	393			1.8	185		
1.2	122			47	473			2.2	225		
1.5	152			56	563			3.3	335		
1.8	182			68	683		6.3V or 10V or 16V or 25V or 35V or 50V or 100V	4.7	475		6.3V or 10V or 16V or 25V
2.2	222			82	823			6.8	685		
2.7	272			100	104			10	106		
3.3	332			120	124						

1206: PPI-GMC31

Value	Code	Tol.	Rated WVDC	Value	Code	Tol.	Rated WVDC	Value	Code	Tol.	Rated WVDC
100 pF	101	J,K	6.3V or 10V or 16V or 25V or 50V or 100V or 200V	3.9	392	J,K	6.3V or 10V or 16V or 25V or 50V or 100V or 200V	180	184	J,K	6.3V or 10V or 16V or 25V or 50V
120	121			4.7	472			220	224		
150	151			5.6	562			270	274		
180	181			6.8	682			330	334		
220	221			8.2	822			470	474		
270	271			10	103			560	564		
330	331			12	123			680	684		
390	391			15	153			820	824		
470	471			18	183			1.0 uF	105		
560	561			22	223			1.2	125		
680	681			27	273			1.5	155		
820	821			33	333			1.8	185		
1.0 nF	102			47	473			2.2	225		
1.2	122			56	563			3.3	335		6.3V or 10V or 16V or 25V or 50V
1.5	152			68	683			4.7	475		
1.8	182			82	823			6.8	685		
2.2	222			100	104			10	106		
2.7	272			120	124			22	226		6.3V or 10V or 16V
3.3	332			150	154						

1210: PPI-GMC32

Value	Code	Tol.	Rated WVDC	Value	Code	Tol.	Rated WVDC	Value	Code	Tol.	Rated WVDC
100 pF	101	J,K	6.3V or 10V or 16V or 25V or 50V or 100V or 200V	4.7	472	J,K	6.3V or 10V or 16V or 25V or 50V or 100V or 200V	220	224	J,K	6.3V or 10V or 16V or 25V or 50V or 100V or 200V
120	121			5.6	562			270	274		
150	151			6.8	682			330	334		
180	181			8.2	822			470	474		
220	221			10	103			560	564		6.3V or 10V or 16V or 25V or 50V or 100V
270	271			12	123			680	684		
330	331			15	153			820	824		
390	391			18	183			1.0 uF	105		
470	471			22	223			1.2	125		
560	561			27	273			1.5	155		
680	681			33	333			1.8	185		
820	821			39	393			2.2	225		
1.0 nF	102			47	473			3.3	335		6.3V or 10V or 16V or 25V or 50V
1.2	122			56	563			4.7	475		6.3V or 10V or 16V or 25V or 50V or 100V
1.5	152			68	683			6.8	685		
1.8	182			82	823			10	106		
2.2	222			100	104			22	226		
2.7	272			120	124			47	476		6.3V or 10V
3.3	332			150	154						
3.9	392			180	184						

1808: PPI-GMC40

Value	Code	Tol.	Rated WVDC	Value	Code	Tol.	Rated WVDC	Value	Code	Tol.	Rated WVDC
100 pF	101	J,K	25V or 50V or 100V or 200V	1.8	182	J,K	25V or 50V or 100V or 200V	33	333	J,K	25V or 50V or 100V or 200V
120	121			2.2	222			39	393		
150	151			2.7	272			47	473		
180	181			3.3	332			56	563		
220	221			3.9	392			68	683		
270	271			4.7	472			82	823		
330	331			5.6	562			100	104		
390	391			6.8	682			120	124		25V or 50V
470	471			8.2	822			150	154		
560	561			10	103			180	184		
680	681			12	123			220	224		
820	821			15	153			270	274		
1.0 nF	102			18	183			330	334		
1.2	122			22	223			470	474		25V
1.5	152			27	273						

1812: PPI-GMC43

Value	Code	Tol.	Rated WVDC	Value	Code	Tol.	Rated WVDC	Value	Code	Tol.	Rated WVDC
100 pF	101	J,K	10V or 16V or 25V or 50V or 100V or 200V	4.7	472	J,K	10V or 16V or 25V or 50V or 100V or 200V	220	224	J,K	10V or 16V or 25V or 50V or 100V or 200V
120	121			5.6	562			270	274		
150	151			6.8	682			330	334		
180	181			8.2	822			470	474		
220	221			10	103			560	564		10V or 16V or 25V or 50V or 100V
270	271			12	123			680	684		
330	331			15	153			820	824		
390	391			18	183			1.0 uF	105		
470	471			22	223			1.2	125		
560	561			27	273			1.5	155		
680	681			33	333			1.8	185		
820	821			39	393			2.2	225		
1.0 nF	102			47	473			3.3	335		
1.2	122			56	563			4.7	475		
1.5	152			68	683			6.8	685		10V or 16V or 25V or 50V
1.8	182			82	823			10	106		10V or 16V or 25V
2.2	222			100	104			22	226		
2.7	272			120	124			33	336		10V or 16V
3.3	332			150	154						
3.9	392			180	184						

1825: PPI-GMC45

Value	Code	Tol.	Rated WVDC	Value	Code	Tol.	Rated WVDC	Value	Code	Tol.	Rated WVDC
100 pF	101	J,K	16V or 25V or 50V or 100V or 200V	3.3	332	J,K	16V or 25V or 50V or 100V or 200V	100	104	J,K	16V or 25V or 50V or 100V or 200V
120	121			3.9	392			120	124		
150	151			4.7	472			150	154		
180	181			5.6	562			180	184		
220	221			6.8	682			220	224		
270	271			8.2	822			270	274		
330	331			10	103			330	334		
390	391			12	123			470	474		
470	471			15	153			560	564		
560	561			18	183			680	684		
680	681			22	223			820	824		
820	821			27	273			1.0 uF	105		
1.0 nF	102			33	333			1.2	125		
1.2	122			39	393			1.5	155		16V or 25V or 50V or 100V
1.5	152			47	473			1.8	185		
1.8	182			56	563			2.2	225		16V or 25V or 50V
2.2	222			68	683						
2.7	272			82	823						

2220: PPI-GMC55

Value	Code	Tol.	Rated WVDC	Value	Code	Tol.	Rated WVDC	Value	Code	Tol.	Rated WVDC
1.0 nF	102	J,K	16V or 25V or 50V or 100V or 200V	22	223	J,K	16V or 25V or 50V or 100V or 200V	560	564	J,K	16V or 25V or 50V or 100V or 200V
1.2	122			27	273			680	684		
1.5	152			33	333			820	824		
1.8	182			39	393			1.0 uF	105		
2.2	222			47	473			1.2	125		
2.7	272			56	563			1.5	155		16V Code 160 or 25V Code 250 or 50V Code 500 or 100V Code 101
3.3	332			68	683			1.8	185		
3.9	392			82	823			2.2	225		
4.7	472			100	104			3.3	335		
5.6	562			120	124			4.7	475		
6.8	682			150	154			6.8	685		
8.2	822			180	184			10	106		
10	103			220	224			22	226		16V Code 160 or 25V Code
12	123			270	274			33	336		
15	153			330	334			47	476		16V Code 160
18	183			470	474						

2225: PPI-GMC57

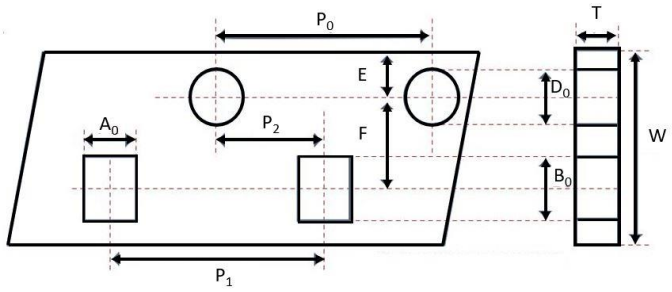
Value	Code	Tol.	Rated WVDC	Value	Code	Tol.	Rated WVDC	Value	Code	Tol.	Rated WVDC
1.0 nF	102	J,K	16V or 25V or 50V or 100V or 200V	15	153	J,K	16V or 25V or 50V or 100V or 200V	220	224	J,K	16V or 25V or 50V or 100V or 200V
1.2	122			18	183			270	274		
1.5	152			22	223			330	334		
1.8	182			27	273			470	474		
2.2	222			33	333			560	564		
2.7	272			39	393			680	684		
3.3	332			47	473			820	824		
3.9	392			56	563			1.0 uF	105		
4.7	472			68	683			1.2	125		
5.6	562			82	823			1.5	155		16V or 25V or 50V or 100V
6.8	682			100	104			1.8	185		
8.2	822			120	124			2.2	225		16V or 25V
10	103			150	154			3.3	335		
12	123			180	184			4.7	475		16V

EIA Case Sizes: 01005, 0201, 0402, 0603, 0805, 1206

Packaging

Size		Code	Description	
		D	**G**	**Q**
	Qty per 7" Reel	*Qty per 10/13" Reel*		
01005	20K	50K		
0201	10K/ 15K	50K		
0402	10K	40K	50K	
0603	4K	10K	15K	
0805	2K, 3K, 4K	10K	15K	20K
1206	2K, 3K, 4K	10K	15K	20K
1210	500,1K, 2K, 3K	4K	8K	
1808	1K, 2K, 3K			
1812	500, 1K	3K		
1825	500, 1K			
2220	500, 1K			
2225	500, 750			

Tape & Reel Specifications



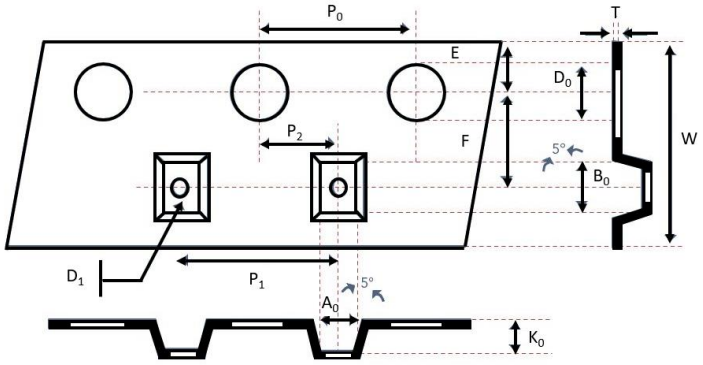
Cardboard carrier tape for EIA case sizes: 01005, 0201, 0402, 0603, 0805, 1206

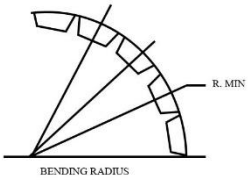
Unit: mm

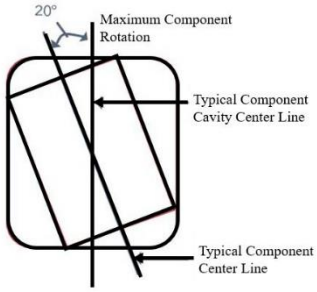
Size	A_0	B_0	T	K_0	W	P_0	10XPo	P_1	P_2	Do	D_1	E	F
01005	0.25 ± 0.04	0.45 ± 0.04	0.36 ± 0.05	*	8.00 ± 0.30	4.00 ± 0.10	40.00 ± 0.10	2.00 ± 0.05	2.00 ± 0.05	1.50 ± 0.10	*	1.75 ± 0.10	3.50 ± 0.05
0201	0.39 ± 0.07	0.69 ± 0.07	<0.50	*	8.00 ± 0.10	4.00 ± 0.10	40.00 ± 0.10	2.00 ± 0.05	2.00 ± 0.05	1.55 ± 0.05	*	1.75 ± 0.05	3.50 ± 0.05
0402	0.70 ± 0.20	1.20 ± 0.20	<0.80	*	8.00 ± 0.10	4.00 ± 0.10	40.00 ± 0.10	2.00 ± 0.05	2.00 ± 0.05	1.55 ± 0.05	*	1.75 ± 0.05	3.50 ± 0.05
0603	1.10 ± 0.20	1.90 ± 0.20	<1.20	*	8.00 ± 0.10	4.00 ± 0.10	40.00 ± 0.10	2.00 ± 0.05	2.00 ± 0.05	1.55 ± 0.05	*	1.75 ± 0.05	3.50 ± 0.05
0805	1.65 ± 0.20	2.40 ± 0.20	<1.30	*	8.00 ± 0.10	4.00 ± 0.10	40.00 ± 0.10	2.00 ± 0.05	2.00 ± 0.05	1.55 ± 0.05	*	1.75 ± 0.05	3.50 ± 0.05
1206	2.00 ± 0.20	3.60 ± 0.20	<1.30	*	8.00 ± 0.10	4.00 ± 0.10	40.00 ± 0.10	2.00 ± 0.05	2.00 ± 0.05	1.55 ± 0.05	*	1.75 ± 0.05	3.50 ± 0.05

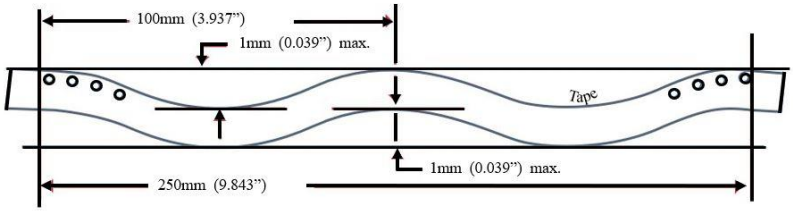
0805, 1206, 1210, 1808, 1812, 1825, 2220, 2225

Tape & Reel Specifications









Embossed plastic carrier tape for case sizes: 0805, 1206, 1210, 1808, 1812, 1825, 2220, 2225

Unit: mm

Size	A_0	B_0	T	K_0	W	P_0	10XPo	P_1	P_2	Do	D_1	E	F
0805	<1.80	<2.70	0.23 ± 0.10	<2.50	8.00 ± 0.20	4.00 ± 0.10	40.00 ± 0.20	2.00 ± 0.05	2.00 ± 0.05	1.50 ± 0.10	1.00 ± 0.10	1.75 ± 0.10	3.50 ± 0.05
1206	<2.30	<4.00	0.23 ± 0.10	<2.50	8.00 ± 0.20	4.00 ± 0.10	40.00 ± 0.20	2.00 ± 0.05	2.00 ± 0.05	1.50 ± 0.10	1.00 ± 0.10	1.75 ± 0.10	3.50 ± 0.05
1210	<3.20	<3.95	0.23 ± 0.10	<3.00	8.00 ± 0.20	4.00 ± 0.10	40.00 ± 0.20	2.00 ± 0.05	2.00 ± 0.05	1.50 ± 0.10	1.00 ± 0.10	1.75 ± 0.10	3.50 ± 0.05
1808	<2.50	<5.30	0.25 ± 0.10	<2.50	12.00 ± 0.20	4.00 ± 0.10	40.00 ± 0.20	2.00 ± 0.05	2.00 ± 0.05	1.50 ± 0.10	1.00 ± 0.10	1.75 ± 0.10	5.50 ± 0.10
1812	<3.90	<5.30	0.25 ± 0.10	<3.50	12.00 ± 0.20	4.00 ± 0.10	40.00 ± 0.20	2.00 ± 0.05	2.00 ± 0.05	1.50 ± 0.10	1.50 ± 0.10	1.75 ± 0.10	5.50 ± 0.10
1825	<6.80	<5.30	0.30 ± 0.10	<3.10	12.00 ± 0.20	4.00 ± 0.10	40.00 ± 0.20	2.00 ± 0.05	2.00 ± 0.05	1.50 ± 0.10	1.50 ± 0.10	1.75 ± 0.10	5.50 ± 0.10
2220	<5.80	<6.50	0.30 ± 0.10	<3.10	12.00 ± 0.20	4.00 ± 0.10	40.00 ± 0.20	2.00 ± 0.05	2.00 ± 0.05	1.50 ± 0.10	1.50 ± 0.10	1.75 ± 0.10	5.50 ± 0.10
2225	<6.80	<6.50	0.30 ± 0.10	<3.10	12.00 ± 0.20	4.00 ± 0.10	40.00 ± 0.20	2.00 ± 0.05	2.00 ± 0.05	1.50 ± 0.10	1.50 ± 0.10	1.75 ± 0.10	5.50 ± 0.10