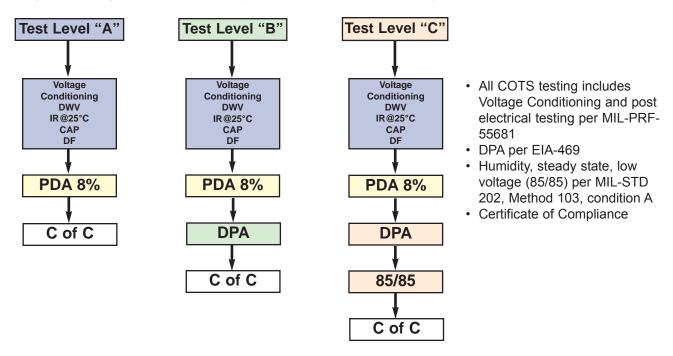


Product Bulletin

Ceramic Commercial-Off-The-Shelf Surface Mount Capacitors (COTS)

KEMET is a qualified supplier of various military and high reliability specifications. The COTS program is an extension of KEMET's knowledge of high reliability test regimes and requirements. KEMET has for years supplied product that has been "up-screened" by working with customer drawings and imposing the design and test requirements specified. The COTS program will offer the same high quality and reliability components "up-screened" to the ordered test level at a lower cost to the customer. It eliminates the need for customer specific drawings used to achieve the reliability level required for customer applications. The tests and inspections imposed by the COTS program have been selected to provide the accelerated conditioning and 100% screening to eliminate infant mortal failures from the population.

All COTS testing includes Voltage Conditioning and post electrical testing per MIL-PRF-55681, paragraph 4.8.3.1, Standard voltage conditioning. For enhanced reliability, KEMET also provides the following test options and conformance certification.



KEMET COTS MLCC surface mount capacitors are available in standard EIA case sizes from 0402 to 2225 and standard capacitance values in X7R and C0G dielectrics. Voltage ratings range from 6.3V to 200V. To order the COTS part number use a T in the 6th digit of the part number in conjunction with the desired test level A, B, or C in the 13th digit. A Tin/Lead termination option is also available with COTS by using a L in the 14th digit of the part number. For additional dielectrics and voltage ratings please contact the factory or local Sales personnel.

Applications

- Military Products
- Space Quality Products
- High Reliability Electronics



Outline Drawing

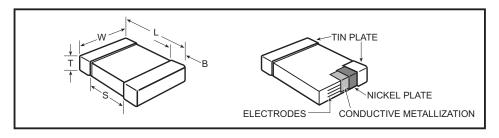
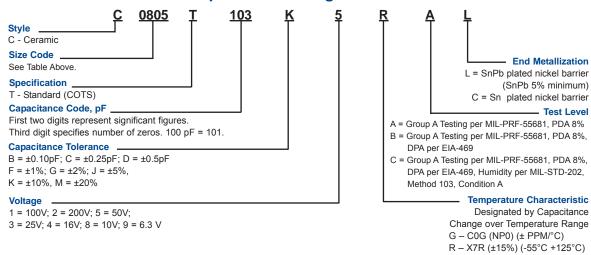


Table 1 – Dimensions - Millimeters (Inches)

Metric Code	EIA Size Code	L - Length	W - Width	B - Bandwidth	Band Separation
1005	0402	1.0 (.04) ± .05 (.002)	0.5 (.02) ± .05 (.002)	0.20 (0.008) -0.40 (0.016)	0.3 (.012)
1608	0603	1.6 (.063) ± 0.15 (.006	0.8 (.032) ± 0.15 (.006)	0.35 (.014) ± 0.15 (.006)	0.7 (.028)
2012	0805	2.0 (0.079) ± 0.2 (0.008)	1.2 (0.049 ± 0.2 (0.008)	0.5 (0.02) ± 0.25 (0.010)	0.75 (0.030)
3216	1206	3.2 (0.126) ± 0.2 (0.008)	1.6 (0.063) ± 0.2 (0.008)	0.5 (0.02) ± 0.25 (0.010)	N/A
3225	1210	3.2 (0.126) ± 0.2 (0.008)	2.5 (0.098) ± 0.2 (0.008)	0.5 (0.02) ± 0.25 (0.010)	N/A
4532	1812	4.5 (0.177) ± 0.3 (0.012)	3.2 (0.126) ± 0.3 (0.012)	0.6 (0.024) ± 0.35 (0.014)	N/A
4564	1825	4.5 (0.177) ± 0.3 (0.012)	6.4 (0.250) ± 0.4 (0.016)	0.6 (0.024) ± 0.35 (0.014)	N/A
5650	2220	5.6 (.220) ± 0.4 (.016)	5.0 (.197) ± 0.4 (.016)	0.6 (0.024) ± .35 (0.014)	N/A
5664	2225	5.6 (.220) ± 0.4 (.016)	6.3 (.248) ± 0.4 (.016)	0.6 (0.024) ± .35 (0.014)	N/A

Note: For thickness dimensions, see Tables 2 and 3.

Capacitor Ordering Information



General Performance Characteristics & Electrical Parameters

EIA Case Sizes	0402, 0603, 0805, 1206, 1210, 1812, 1825, 2220, 2225
Capacitance Range	0.5pF – 22.0μF
Test Parameters	Capacitance and Dissipation Factor measured at: C0G − 1kHz and 1 Vrms if capacitance 1000pF and 1MHz and 1 Vrms if capacitance ≤1000pF. X7R − 1kHz and 1 Vrms if capacitance ≤10µF and 120Hz and 0.5 Vrms if capacitance >10µF.
Operating Temperature Range	-55°C to +125°C, with no bias capacitance shift limited to ±15% over that range
Capacitance Tolerances	$B = \pm .10pF; C = \pm 0.25pF; D = \pm 0.5pF; F = \pm 1\%; G = \pm 2\%; J = \pm 5\%, K = \pm 10\%, M = \pm 20\%$
Aging Rate	C0G – 0% maximum; X7R –2.0% maximum % capacitance loss/decade hour
Voltage Rating	6.3; 10; 16; 25; 50; 100; 200 Volts
25°C IR @ Rated Voltage	1000M Ω –μF or 100G Ω , whichever is less
Dielectric Strength (DWV)	2.5 times rated DC voltage

Marking

These chips are supplied unmarked. If required, they can be laser-marked as an extra cost option. Details on the marking format are included in KEMET Surface Mount Catalog F3102.

Soldering Process

The 0402 size is suitable for solder reflow only. The 0603, 0805 and 1206 sizes are suitable for either reflow or wave soldering. Sizes 1210 and larger should be limited to reflow soldering only.

Recommended Solder Pad Dimensions

Chip Size		I Length	S - Sep	aration	W - Pad	d Width	L - Pad Length			
Chip Size	mm	in.	mm	in.	mm	in.	mm	in.		
0402	2.14	0.084	0.28	0.011	0.74	0.029	0.93	0.037		
0603	2.78	0.109	0.68	0.027	1.08	0.043	1.05	0.041		
0805	3.30	0.130	0.70	0.028	1.60	0.063	1.30	0.051		
1206	4.50	0.177	1.50	0.059	2.00	0.079	1.50	0.059		
1210	4.50	0.177	1.50	0.059	2.90	0.114	1.50	0.059		
1812	5.90	0.232	2.30	0.091	3.70	0.146	1.80	0.071		
1825	5.90	0.232	2.30	0.091	6.90	0.272	1.80	0.071		
2220	7.00	0.275	3.30	0.13	5.50	0.216	1.85	0.073		
2225	7.00	0.275	3.30	0.13	6.80	0.268	1.85	0.073		

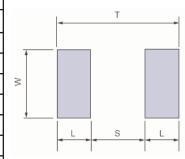


Table 2- C0G Dielectric Capacitance Values

			Ta	able	2-	C)G	Die	lec	tric	: Ca	pac	cita	nce	e Va	alu	es							
Сар	Сар	Сар		C04	_				CO	603*					CC	805*					_	1206*		
pF	Code	Tol.	10V	16V	25V	50V	10V	16V	25V	50V	100V CB	200V	10V DC	16V DC	25V	50V DC	100V	200V	10V	16V	25V	50V	100V	200V
0.50 0.75	508 758	C,D C,D	BB BB	BB BB	BB BB	BB BB	CB CB	CB CB	CB CB	CB CB	CB	CB CB	DC	DC	DC DC	DC	DC DC	DC DC				Н		
1.0	109 119	C,D	BB BB	BB BB	BB BB	BB BB	CB CB	CB CB	CB CB	CB CB	CB CB	CB CB	DC DC	DC DC	DC DC	DC DC	DC DC	DC DC	EB EB	EB EB	EB EB	EB EB	EB EB	EB EB
1.1	129	C,D C,D	BB	BB	BB	BB	СВ	СВ	СВ	СВ	СВ	СВ	DC	DC	DC	DC	DC	DC	EB	EB	EB	EB	EB	EB
1.5	159 169	C,D C,D	BB BB	BB BB	BB BB	BB BB	CB CB	CB CB	CB CB	CB CB	CB CB	CB CB	DC DC	DC DC	DC DC	DC DC	DC DC	DC DC	EB EB	EB EB	EB EB	EB EB	EB EB	EB EB
1.8	189	C,D	BB	BB	BB	BB	СВ	СВ	СВ	СВ	СВ	СВ	DC	DC	DC	DC	DC	DC	EB	EB	EB	EB	EB	EB
2.0	209 229	C,D C,D	BB BB	BB BB	BB BB	BB BB	CB CB	CB CB	CB	CB CB	CB CB	CB CB	DC DC	DC DC	DC DC	DC DC	DC	DC DC	EB EB	EB EB	EB EB	EB EB	EB EB	EB EB
2.4	249	C,D	BB	BB	BB	BB	СВ	СВ	СВ	СВ	СВ	СВ	DC	DC	DC	DC	DC	DC	EB	EB	EB	EB	EB	EB
2.7 3.0	279 309	C,D K,M C,D K,M	BB BB	BB	BB BB	BB	CB	CB	CB	CB CB	CB CB	CB	DC	DC DC	DC	DC DC	DC DC	DC DC	EB	EB EB	EB EB	EB EB	EB EB	EB EB
3.3	339	C,D K,M	BB	BB	BB	BB	СВ	СВ	СВ	СВ	СВ	СВ	DC	DC	DC	DC	DC	DC	EB	EB	EB	EB	EB	EB
3.9 4.3	399 439	C,D K,M C,D K,M	BB BB	BB BB	BB BB	BB	CB CB	CB	CB	CB CB	CB	CB CB	DC	DC DC	DC DC	DC DC	DC	DC DC	EB EB	EB EB	EB EB	EB EB	EB EB	EB EB
4.7	479	C,D K,M	BB	BB	BB	BB	СВ	СВ	СВ	СВ	СВ	СВ	DC	DC	DC	DC	DC	DC	EB	EB	EB	EB	EB	EB
5.1 5.6	519 569	C,D K,M C,D J,K,M	BB BB	BB BB	BB BB	BB BB	CB CB	CB CB	CB CB	CB CB	CB CB	CB CB	DC DC	DC DC	DC	DC DC	DC	DC DC	EB EB	EB EB	EB EB	EB EB	EB EB	EB EB
6.0	609	C,D J,K,M	BB	BB	BB	BB	СВ	CB	CB	СВ	CB	CB	DC	DC	DC	DC	DC	DC	EB	EB	EB	EB	EB	EB
6.2	629 689	C,D J,K,M C,D J,K,M	BB BB	BB BB	BB BB	BB	CB	CB CB	CB	CB CB	CB CB	CB CB	DC DC	DC DC	DC	DC DC	DC DC	DC DC	EB EB	EB EB	EB EB	EB EB	EB EB	EB EB
7.0	709	C,D J,K,M	BB	BB	BB	BB	СВ	СВ	CB	СВ	CB	CB	DC	DC	DC	DC	DC	DC	EB	EB	EB	EB	EB	EB
7.5 8.2	759 829	C,D J,K,M C,D J,K,M	BB	BB	BB BB	BB	CB	CB	CB	CB	CB	CB CB	DC	DC	DC	DC	DC	DC	EB	EB	EB EB	EB EB	EB EB	EB EB
9.1	919	C,D J,K,M	BB	BB	BB	BB	СВ	СВ	СВ	СВ	СВ	СВ	DC	DC	DC	DC	DC	DC	EB	EB	EB	EB	EB	EB
10.0 11.0	100 110	C,D J,K,M C,D J,K,M	BB BB	BB BB	BB BB	BB BB	CB CB	CB	CB	CB CB	CB CB	CB CB	DC	DC DC	DC DC	DC DC	DC DC	DC DC	EB EB	EB EB	EB EB	EB EB	EB EB	EB EB
12.0	120 130	C,D J,K,M	BB BB	BB BB	BB BB	BB BB	CB CB	CB CB	CB CB	CB CB	CB CB	CB CB	DC DC	DC DC	DC DC	DC DC	DC DC	DC DC	EB EB	EB EB	EB EB	EB EB	EB EB	EB EB
13.0 15.0	150	C,D J,K,M C,D G,J,K,M	BB	BB	BB	BB	СВ	СВ	СВ	СВ	СВ	СВ	DC	DC	DC	DC	DC	DC	EB	EB	EB	EB	EB	EB
16.0 18.0	160	C,D G,J,K,M C,D G,J,K,M	BB BB	BB BB	BB BB	BB BB	CB CB	CB CB	CB	CB CB	CB	CB CB	DC DC	DC	DC	DC DC	DC DC	DC DC	EB EB	EB	EB EB	EB EB	EB EB	EB EB
20.0	180 200	C,D G,J,K,M	BB	BB	BB	BB	СВ	СВ	CB CB	СВ	CB CB	CB	DC	DC DC	DC	DC	DC	DC	EB	EB	EB	EB	EB	EB
22.0 24.0	220 240	C,D G,J,K,M C,D G,J,K,M	BB BB	BB BB	BB BB	BB BB	CB CB	CB CB	CB CB	CB CB	CB CB	CB CB	DC DC	DC DC	DC DC	DC DC	DC DC	DC DC	EB EB	EB EB	EB EB	EB EB	EB EB	EB EB
27.0	270	D,F,G,J,K,M	BB	BB	BB	BB	СВ	СВ	СВ	СВ	СВ	CB	DC	DC	DC	DC	DC	DC	EB	EB	EB	EB	EB	EB
30.0 33.0	300 330	D,F,G,J,K,M D,F,G,J,K,M	BB BB	BB BB	BB BB	BB BB	CB CB	CB CB	CB CB	CB CB	CB CB	CB CB	DC DC	DC DC	DC DC	DC DC	DC DC	DC DC	EB EB	EB EB	EB EB	EB EB	EB EB	EB EB
36.0	360	D,F,G,J,K,M	BB	BB	BB	BB	СВ	СВ	СВ	СВ	СВ	СВ	DC	DC	DC	DC	DC	DC	EB	EB	EB	EB	EB	EB
39.0 43.0	390 430	D,F,G,J,K,M	BB BB	BB BB	BB BB	BB BB	CB CB	CB CB	CB CB	CB CB	CB CB	CB CB	DC DC	DC DC	DC DC	DC DC	DC DC	DC DC	EB EB	EB	EB EB	EB EB	EB EB	EB EB
47.0	470	D,F,G,J,K,M D,F,G,J,K,M	BB	BB	BB	BB	СВ	СВ	СВ	СВ	СВ	СВ	DC	DC	DC	DC	DC	DC	EB	EB EB	EB	EB	EB	EB
51.0 56.0	510 560	D,F,G,J,K,M F,G,J,K,M	BB	BB	BB	BB	CB CB	CB	CB	CB CB	CB	CB CB	DC	DC DC	DC DC	DC DC	DC DC	DC DC	EB	EB EB	EB EB	EB EB	EB EB	EB EB
62.0	620	F,G,J,K,M	BB	BB	BB	BB	СВ	СВ	СВ	СВ	СВ	СВ	DC	DC	DC	DC	DC	DC	EB	EB	EB	EB	EB	EB
68.0 75.0	680 750	F,G,J,K,M F,G,J,K,M	BB BB	BB BB	BB BB	BB	CB CB	CB	CB	CB CB	CB	CB CB	DC	DC DC	DC DC	DC DC	DC DC	DC DC	EB	EB EB	EB EB	EB EB	EB EB	EB EB
82.0	820	F,G,J,K,M	BB	BB	BB	BB	СВ	СВ	СВ	СВ	СВ	CB	DC	DC	DC	DC	DC	DC	EB	EB	EB	EB	EB	EB
91.0 100.0	910	F,G,J,K,M F,G,J,K,M	BB BB	BB	BB	BB	CB	CB	CB	CB	CB		DC	DC DC	DC	DC DC	DC DC	DC DC	EB	EB	EB	EB EB	EB EB	EB EB
110.0	111	F,G,J,K,M	00	00	00	00	СВ	СВ	СВ	СВ	СВ		DC	DC	DC	DC	DC	DC	EB	EB	EB	EB	EB	EB
120.0 130.0	121 131	F,G,J,K,M F,G,J,K,M					CB CB	CB	CB	CB CB	CB		DC	DC DC	DC	DC DC	DC	DC DC	EB	EB	EB EB	EB EB	EB EB	EB EB
150.0	151	F,G,J,K,M					СВ	СВ	СВ	СВ	СВ		DC	DC	DC	DC	DC	DC	EB	EB	EB	EB	EB	EB
160.0 180.0	161 181	F,G,J,K,M F,G,J,K,M	\vdash	\vdash			CB CB	CB	CB	CB CB	CB	_	DC	DC DC	DC DC	DC DC	DC	DC DC	EB	EB EB	EB EB	EB EB	EB EB	EB EB
200.0	201	F,G,J,K,M					СВ	СВ	СВ	СВ	СВ		DC	DC	DC	DC	DC	DC	EB	EB	EB	EB	EB	EB
220.0 240.0	221	F,G,J,K,M F,G,J,K,M					CB	CB	CB	CB	CB		DC	DC	DC	DC	DC	DC DC	EB	EB	EB EB	EB EB	EB EB	EB EB
270.0	271	F,G,J,K,M					СВ	СВ	СВ	СВ	СВ		DC	DC	DC	DC	DC	DC	EB	EB	EB	EB	EB	EB
300.0 330.0	301 331	F,G,J,K,M F,G,J,K,M					CB	CB	CB	CB			DC	DC	DC	DC	DC	DC	EB	EB EB	EB EB	EB EB	EB EB	EB EB
360.0 390.0	361 391	F,G,J,K,M					CB CB	CB CB	CB CB	CB CB			DC DC	DC DC	DC	DC DC	DC DC	DC DC	EB EB	EB	EB EB	EB EB	EB EB	EB EB
430.0	431	F,G,J,K,M F,G,J,K,M		\vdash			СВ	СВ	СВ	СВ			DC	DC	DC DC	DC	DC	DC	EB	EB EB	EB	EB	EB	EB
470.0 510.0	471 511	F,G,J,K,M F,G,J,K,M					CB CB	CB CB	CB CB	CB CB			DC DC	DC DC	DC DC	DC DC	DC DC	DD	EB EB	EB EB	EB EB	EB EB	EB EB	EB EB
560.0	561	F,G,J,K,M					СВ	СВ	СВ	CC			DC	DC	DC	DC	DC		EB	EB	EB	EB	EB	EB
620.0 680.0	621 681	F,G,J,K,M F,G,J,K,M					CB CB	CB CB	CB CB	CC			DC DC	DC DC	DC DC	DC DC	DC DC		EB EB	EB EB	EB EB	EB EB	EB EB	EC EC
750.0	751	F,G,J,K,M					СВ	СВ	СВ	CC			DC	DC	DC	DC	DC		EB	EB	EB	EB	EB	EC
820.0 910.0	821 911	F,G,J,K,M F,G,J,K,M					CB CB	CB CB	CB CB	CC			DC DC	DC DC	DC DC	DC DC	DC DD		EB EB	EB EB	EB EB	EB EB	EB EB	EC ED
1000.0	102	F,G,J,K,M					СВ	СВ	СВ	CC			DC	DC	DC	DC	DD		EB	EB	EB	EB	EB	EE
1100.0 1200.0	112 122	F,G,J,K,M F,G,J,K,M	F	F	二	F	\vdash	二	F	\vdash	F		DC DC	DC DC	DC DC	DC DC		\vdash	EB EB	EB EB	EB EB	EB EB	EB EB	EB EB
1300.0	132	F,G,J,K,M											DD	DD	DD	DD			EB	EB	EB	EB	EC	EC
1500.0 1600.0	152 162	F,G,J,K,M F,G,J,K,M	F										DD DD	DD DD	DD DD	DD DD			EB EB	EB EB	EB EB	EB EB	ED ED	EC ED
1800.0	182	F,G,J,K,M											DD	DD	DD	DD			EB	EB	EB	EB	ED	ED
2000.0 2200.0	202	F,G,J,K,M F,G,J,K,M											DC	DC DC	DC				EB	EB	EB	EB EB	ED	
2400.0	242	F,G,J,K,M											DC	DC	DC				EB	EB	EB	EB	EC	
2700.0 3000.0	272 302	F,G,J,K,M F,G,J,K,M	\vdash	\vdash	\vdash		\vdash	\vdash		\vdash	\vdash	<u> </u>	DC	DC DD	DC DD	\vdash		\vdash	EB	EB	EB	EB	EC	\vdash
3300.0	332	F,G,J,K,M											DD	DD	DD				EC	EC	EC	EC	EC	
3600.0 3900.0	362 392	F,G,J,K,M F,G,J,K,M	\vdash	\vdash	\vdash		\vdash	\vdash		\vdash	\vdash	<u> </u>	DD DE	DD DE	DD	\vdash		\vdash	EC	EC	EC EC	EC EC	EE EF	\vdash
4300.0	432	F,G,J,K,M											Ė	Ė	Ė				EC	EC	EC	EC		
4700.0 5100.0	472 512	F,G,J,K,M F,G,J,K,M																	EC ED	EC	EC ED	EC ED		
5600.0	562	F,G,J,K,M																	ED	ED	ED	ED		
6200.0 6800.0	622 682	F,G,J,K,M F,G,J,K,M	H											H					EB	EB	EB	H		
7500.0	752	F,G,J,K,M																	EB	EB	EB			
8200.0 9100.0	822 912	F,G,J,K,M F,G,J,K,M	\vdash	\vdash	\vdash		\vdash	\vdash		\vdash	\vdash	<u> </u>		\vdash	\vdash	\vdash		\vdash	EC	EC	EC EC	\vdash	-	
10,000.0	103	F,G,J,K,M																	ED	ED	ED			
* EIA pre	ferrec	I chip sizes	;	Se	e TI	nickı	ness	Cod	de Ta	able	on p	age 7	for	cera	mic	chip	thic	kness	din a	nens	ions	S.		

EIA preferred chip sizes See Thickness Code Table on page 7 for ceramic chip thickness dimensions.

Table 2- C0G Dielectric Capacitance Values

Сар	Сар	Сар		C1210	*		C1812	*		C1825	*		C2220			C2225	
pĖ	Code	Tol.	50V	100V	200V	50V	100V	200V	50V	100V	200V	50V	100V	200V	50V	100V	200V
10	100	D J,K,M	FB	FB	FB												
12	120	D J,K,M	FB	FB	FB												
15	150	D G,J,K,M	FB	FB	FB												
18	180	D G,J,K,M	FB	FB	FB												
22	220	D G,J,K,M	FB	FB	FB												
27	270	D,F,G,J,K,M	FB	FB	FB												
33	330	D,F,G,J,K,M	FB	FB	FB												
39	390	D,F,G,J,K,M	FB	FB	FB												
47	470	D,F,G,J,K,M	FB	FB	FB												
56	560	F,G,J,K,M	FB	FB	FB												
68	680	F,G,J,K,M	FB	FB	FB												
82	820	F,G,J,K,M	FB	FB	FB												
100	101	F,G,J,K,M	FB	FB	FB												
120	121	F,G,J,K,M	FB	FB	FB												
150	131	F,G,J,K,M	FB	FB	FB												
180	181	F,G,J,K,M	FB	FB	FB												
220	221	F,G,J,K,M	FB	FB	FB												
270	271	F,G,J,K,M	FB	FB	FB												
330	331	F,G,J,K,M	FB	FB	FB												
390	391	F,G,J,K,M	FB	FB	FB												
470	471	F,G,J,K,M	FB	FB	FB	GB	GB	GB									
560	561	F,G,J,K,M	FB	FB	FB	GB	GB	GB									
680	681	F,G,J,K,M	FB	FB	FB	GB	GB	GB									
820	821	F,G,J,K,M	FB	FB	FB	GB	GB	GB									
1000	102	F,G,J,K,M	FB	FB	FB	GB	GB	GB									
1200	122	F,G,J,K,M	FB	FB	FB	GB	GB	GB									
1500	152	F,G,J,K,M	FB	FB	FE	GB	GB	GB									
1800	182	F,G,J,K,M	FB	FB	FE	GB	GB	GB									
2200	222	F,G,J,K,M	FB	FC	FG	GB	GB	GB									
2700	272	F,G,J,K,M	FB	FC	FC	GB	GB	GB			<u> </u>	Щ.	\vdash		<u> </u>	<u> </u>	<u> </u>
3300	332	F,G,J,K,M	FB	FF	FF	GB	GB	GB									
3900	392	F,G,J,K,M	FB	FF		GB	GB	GB	НВ	НВ	HB						
4700	472	F,G,J,K,M	FF	FF		GB	GB	GD	НВ	НВ	HB				KB	KB	KB
5600	562	F,G,J,K,M	FB	FF		GB	GB	GH	HB	HB	HB		- 10		KB	KB	KB
6800	682	F,G,J,K,M	FB	FG		GB	GB	GJ	НВ	НВ	HB	JB	JB		KB	KB	KB
8200	822	F,G,J,K,M	FC			GB	GB	\vdash	НВ	НВ	HB	JB	JB		KB	KB	KB
10000	103	F,G,J,K,M	FF		\vdash	GB	GD	\vdash	HB	HB	HE	JB	JB		KB	KB	KB
12000	123	F,G,J,K,M	FG		⊢	GB	GD	\vdash	HB	HB	HE	JB	JB		KB	KB	KB
15000	153	F,G,J,K,M	\vdash		<u> </u>	├		\vdash	HB	HB	<u> </u>	JB	JB		KB	KB	KE
18000	183	F,G,J,K,M				_		\vdash	НВ	НВ		JB	JB		KB	KB	\vdash
22000	223	F,G,J,K,M				<u> </u>			НВ	HE		JB			KB	KB	
27000	273	F,G,J,K,M							НВ	HE		JB			KB	KB	
33000	333	F,G,J,K,M													KB		

* EIA preferred chip sizes See Thickness Code Table on page 7 for ceramic chip thickness dimensions.

Table 3- X7R Dielectric Capacitance Values

Cap	Cap	Сар		(C0402	*				C0603* C0805*					C1206*													
рF	Code	Tol.	6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	50V	100V	200V	6.3V	10V	16V	25V	50V	100V	200V	6.3V	10V	16V	25V	50V	100V	200V
150	151	K,M,J	BB	BB	BB	BB	BB									-	-					-	-					
180	181	K,M,J	BB	BB	BB	BB	BB	СВ	СВ	СВ	СВ	СВ	СВ	СВ		_												
220	221	K,M,J	BB	BB	BB	BB	BB	CB	СВ	СВ	СВ	СВ	СВ	СВ	DC	DC	DC	DC	DC	DC	DC						_	
270	271	K,M,J	BB	BB	BB	BB	ВВ	CB	СВ	СВ	СВ	СВ	СВ	СВ	DC	DC	DC	DC	DC	DC	DC	-					-	-
330	331	K,M,J	BB	BB	BB	BB	BB	CB	СВ	СВ	СВ	СВ	СВ	СВ	DC	DC	DC	DC	DC	DC	DC							
390	391	K,M,J	BB	BB	BB	ВВ	ВВ	СВ	СВ	СВ	СВ	СВ	СВ	СВ	DC	DC	DC	DC	DC	DC	DC	-	-	-		-	-	
470	471	K,M,J	BB	ВВ	BB	ВВ	ВВ	СВ	СВ	СВ	СВ	СВ	СВ	СВ	DC	DC	DC	DC	DC	DC	DC		-	\vdash	-			\vdash
560	561	K,M,J	ВВ	ВВ	BB	ВВ	ВВ	CB	СВ	СВ	СВ	СВ	СВ	СВ	DC	DC	DC	DC	DC	DC	DC			\vdash				
680	681	K,M,J	BB	BB	BB	BB	ВВ	CB	СВ	СВ	СВ	СВ	СВ	СВ	DC	DC	DC	DC	DC	DC	DC	-	\vdash	\vdash			-	
820	821	K,M,J	ВВ	ВВ	BB	ВВ	ВВ	СВ	СВ	СВ	СВ	СВ	СВ	СВ	DC	DC	DC	DC	DC	DC	DC		-	\vdash	-			\vdash
1,000	102	K,M,J	BB	BB	BB	BB	BB	CB	СВ	СВ	СВ	СВ	CB	СВ	DC	DC	DC	DC	DC	DC	DC	EB	EB	EB	EB	EB	EB	EB
1,200	122	K,M,J	BB	BB	BB	BB	ВВ	СВ	СВ	СВ	СВ	СВ	СВ	CC	DC	DC	DC	DC	DC	DC	DC	EB	EB	EB	EB	EB	EB	EB
1,500	152	K,M,J	BB	BB	BB	BB	ВВ	СВ	СВ	СВ	СВ	СВ	СВ	СС	DC	DC	DC	DC	DC	DC	DC	EB	EB	EB	EB	EB	EB	EB
1,800	182	K,M,J	BB	BB	BB	BB	BB#	СВ	СВ	СВ	СВ	СВ	СВ	CC	DC	DC	DC	DC	DC	DC	DC	EB	EB	EB	EB	EB	EB	EB
2,200	222	K,M,J	BB	BB	BB	BB	BB#	СВ	СВ	СВ	СВ	СВ	СВ	CC	DC	DC	DC	DC	DC	DC	DC	EB	EB	EB	EB	EB	EB	EB
2,700	272	K,M,J	ВВ	ВВ	BB	ВВ	BB#	СВ	СВ	СВ	СВ	СВ	СВ	CC	DC	DC	DC	DC	DC	DC	DC	EB	EB	EB	EB	EB	EB	EB
3,300	332	K,M,J	BB	BB	BB	ВВ	BB#	СВ	СВ	СВ	СВ	СВ	СВ	CC	DC	DC	DC	DC	DC	DC	DC	EB	EB	EB	EB	EB	EB	EB
3,900	392	K,M,J	ВВ	ВВ	BB	ВВ	BB#	CB	СВ	СВ	СВ	СВ	СВ	CC	DC	DC	DC	DC	DC	DC	DC	EB	EB	EB	EB	EB	EB	EB
4,700	472	K,M,J	BB	ВВ	BB	ВВ	BB#	СВ	СВ	СВ	СВ	СВ	СВ	CC	DC	DC	DC	DC	DC	DC	DC	EB	EB	EB	EB	EB	EB	EB
5,600	562	K,M,J	BB	BB	BB	ВВ	BB#	СВ	СВ	СВ	СВ	СВ	СВ	CC	DC	DC	DC	DC	DC	DC	DC	EB	EB	EB	EB	EB	EB	EB
6,800	682	K,M,J	BB	BB	BB	BB	BB#	СВ	СВ	СВ	СВ	СВ	СВ	CC	DC	DC	DC	DC	DC	DC	DC	EB	EB	EB	EB	EB	EB	EB
8,200	822	K,M,J	BB	BB	BB	BB	BB#	СВ	СВ	СВ	СВ	СВ	СВ	CC	DC	DC	DC	DC	DC	DC	DC	EB	EB	EB	EB	EB	EB	EB
10,000	103	K,M,J	BB	BB	BB	BB	BB#	СВ	СВ	СВ	СВ	СВ	СВ	CC	DC	DC	DC	DC	DC	DC	DC	EB	EB	EB	EB	EB	EB	EB
12,000	123	K,M,J	BB	BB	BB			СВ	СВ	СВ	СВ	СВ	CC		DC	DC	DC	DC	DC	DC	DC	EB	EB	EB	EB	EB	EB	EB
15,000	153	K,M,J	BB	BB	BB			СВ	СВ	СВ	СВ	СВ	CC		DD	DD	DD	DD	DD	DD	DC	EB	EB	EB	EB	EB	EB	EB
18,000	183	K,M,J	BB	BB	BB		$\overline{}$	СВ	СВ	СВ	СВ	СВ	CC		DC	DC	DC	DC	DC	DD	DC	EB	EB	EB	EB	EB	EB	EB
22,000	223	K,M,J	BB	BB	BB	$\overline{}$	т	СВ	СВ	СВ	СВ	СВ	CC		DC	DC	DC	DC	DC	DD	DC	EB	EB	EB	EB	EB	EB	EB
27,000	273	K,M,J	BB	BB	BB	$\overline{}$	$\overline{}$	СВ	СВ	СВ	СВ	СВ	CC		DC	DC	DC	DC	DC	DD	DE	EB	EB	EB	EB	EB	EB	EB
33,000	333	K,M,J	BB	BB	BB	\vdash	\vdash	СВ	СВ	СВ	СВ	СВ	CC		DC	DC	DC	DC	DC	DD	DE	EB	EB	EB	EB	EB	EB	EB
39,000	393	K,M,J	BB	BB	BB	$\overline{}$	т	СВ	СВ	СВ	СВ	СВ	CC		DD	DD	DD	DD	DD	DD	DE	EB	EB	EB	EB	EB	EC	EB
47,000	473	K,M,J	BB	BB	BB			CB	СВ	СВ	СВ	СВ			DD	DD	DD	DD	DD	DE	DG	EB	EB	EB	EB	EB	EC	ED
56,000	563	K,M,J	BB	BB	BB			СВ	СВ	СВ	СВ	CC			DD	DD	DD	DD	DD#	DE	DG	EB	EB	EB	EB	EB	EB	ED
68,000	683	K,M,J	BB	BB	BB			СВ	СВ	СВ	СВ	CC			DD	DD	DD	DD	DD#	DE		EB	EB	EB	EB	EB	EB	ED
82,000	823	K,M,J	BB	BB	BB			СВ	СВ	СВ	СВ	CC			DD	DD	DD	DD	DD#	DE		EB	EB	EB	EB	EB	EB	ED
100,000	104	K,M,J	BB	BB	BB			CB#	CB#	CB#	CB#	CC#			DD	DD	DD	DD	DD#	DE		EB	EB	EB	EB	EB	EB	EM
120,000	124	K,M,J	П			$\overline{}$	${}^{-}$	CB#	CB#	CB#	${}^{-}$				DC	DC	DC	DC	DD#	DG		EC	EC	EC	EC	EC	EC	EM
150,000	154	K,M,J	П	\Box		$\overline{}$	$\overline{}$	CB#	CB#	CB#	$\overline{}$				DC	DC	DC	DC	DD#			EC	EC	EC	EC	EC	EC	EG
180,000	184	K,M,J	П	\Box				CB#	CB#	CB#	\vdash				DC	DC	DC	DC	DD#			EC	EC	EC	EC	EC#	EC#	
220,000	224	K,M,J	П					CB#	CB#	CB#					DC	DC	DC	DC	DD#			EC	EC	EC	EC	EC#	EC#	
270,000	274	K,M,J	\Box	\Box			Т	CB	СВ	СВ					DD	DD	DD	DD	\Box			EB	EB	EB	EB	EC#	EM	
330,000	334	K,M,J						CB	СВ	СВ					DE	DE	DE	DE				EB	EB	EB	EB	EC#	EG	
390,000	394	K,M,J						СВ	СВ	СВ					DG	DG	DG	DG				EB	EB	EB	EB	EG#	EG	
470,000	474	K,M,J						СВ	СВ	СВ					DG	DG	DG	DG				EC	EC	EC	EC	EC#		
560,000	564	K,M,J													DG	DG	DG	DG				ED	ED	ED	ED	EC#		
680,000	684	K,M,J													DG	DG	DG					EE	EE	EE	EE	ED#		
820,000	824	K,M,J													DG	DG	DG					EF	EF	EF	EF			
1,000,000	105	K,M,J													DG	DG	DG					EE	EE	EF	EG			
1,200,000	125	K,M,J													DE	DE	DE					ED	ED	ED	EG			
1,500,000	155	K,M,J													DG	DG	DG					EF	EF	EF	EG			
1,800,000	185	K,M,J													DG	DG	DG					EF	EF	EF				
2,200,000	225	K,M,J													DG	DG	DG					EG	EG	EG				
2,700,000	275	K,M,J																				EN	EN	EK				
3,300,000	335	K,M,J																				ED	ED	ED				
3,900,000	395	K,M,J																				EL	EL	EL				
4,700,000	475	K,M,J																				EM	EM	EM				
5,600,000	565	K,M,J																				EH	EΗ	EH				
6,800,000	685	K,M,J	Н	Н		\vdash	\Box		-	-	\vdash		-		\vdash	\vdash	\vdash	\vdash	\vdash		\vdash	EH	EH	EH			\vdash	
8,200,000	825	K,M,J	\vdash	\vdash	-	$\overline{}$	$\overline{}$				\vdash					\vdash	-	$\overline{}$				EH	EH	EH			\vdash	$\overline{}$
							_		-	-					_		-	-	_	$\overline{}$	_	EH	EH	EH				-

^{*} EIA preferred chip sizes
X7R Dielectric - Extended Range Values or Voltages-Cap and DF measured @ 0.5 Vrms.
See Thickness Code Table on page 7 for ceramic chip thickness dimensions.

Table 3- X7R Dielectric Capacitance Values

Сар	Сар	Сар				C1210	*				C1812	*		C1825	*		C2220)	C2225			
pF	Code	Tol.	6.3V	10V	16V	25V	50V	100V	200V	50V	100V	200V	50V	100V	200V	50V	100V	200V	50V	100V	200V	
2.200	222	K.M.J	FB	FB	FB	FB	FB	FB	FB													
2,700	272	K,M,J	FB	FB	FB	FB	FB	FB	FB							\vdash	\vdash	_		_		
3,300	332	K,M,J	FB	FB	FB	FB	FB	FB	FB				_			-	\vdash					
3,900	392	K.M.J	FB	FB	FB	FB	FB	FB	FB							-						
4,700	472	K,M,J	FB	FB	FB	FB	FB	FB	FB					 			 					
5,600	562	K,M,J	FB	FB	FB	FB	FB	FB	FB		-	-	-	-	-	-	-	-	П	-	-	
6,800	682	K,M,J	FB	FB	FB	FB	FB	FB	FB	GB	GB	GB	-	-		\vdash	-	-	$\overline{}$	-		
8,200	822	K,M,J	FB	FB	FB	FB	FB	FB	FB	GB	GB	GB				\vdash			\vdash			
10,000	103	K,M,J	FB	FB	FB	FB	FB	FB	FB	GB	GB	GB	$\overline{}$	-		$\overline{}$	-		т			
12,000	123	K,M,J	FB	FB	FB	FB	FB	FB	FB	GB	GB	GB	-	-		\vdash	-	-	$\overline{}$	-		
15,000	153	K,M,J	FB	FB	FB	FB	FB	FB	FB	GB	GB	GB										
18,000	183	K,M,J	FB	FB	FB	FB	FB	FB	FB	GB	GB	GB										
22,000	223	K,M,J	FB	FB	FB	FB	FB	FB	FB	GB	GB	GB	НВ	НВ	НВ							
27,000	273	K,M,J	FB	FB	FB	FB	FB	FB	FB	GB	GB	GB	НВ	НВ	НВ							
33,000	333	K,M,J	FB	FB	FB	FB	FB	FB	FB	GB	GB	GB	НВ	НВ	НВ							
39,000	393	K,M,J	FB	FB	FB	FB	FB	FB	FB	GB	GB	GB	НВ	НВ	НВ							
47,000	473	K,M,J	FB	FB	FB	FB	FB	FB	FC	GB	GB	GB	НВ	НВ	HB	\vdash			KC	KC	KC	
56,000	563	K,M,J	FB	FB	FB	FB	FB	FB	FC	GB	GB	GB	НВ	НВ	HB				KC	KC	KC	
68,000	683	K,M,J	FB	FB	FB	FB	FB	FB	FC	GB	GB	GB	НВ	НВ	HB				KC	KC	KC	
82,000	823	K,M,J	FB	FB	FB	FB	FC	FC	FF	GB	GB	GB	НВ	НВ	HB				KC	KC	KC	
100,000	104	K,M,J	FB	FB	FB	FB	FB	FD	FG	GB	GB	GB	НВ	HB	HB				KC	KC	KC	
120,000	124	K,M,J	FB	FB	FB	FB	FB	FD		GB	GB	GB	НВ	НВ	HB				KC	KC	KC	
150,000	154	K,M,J	FC	FC	FC	FC	FC	FD		GB	GB	GE	НВ	НВ	HB				KC	KC	KC	
180,000	184	K,M,J	FC	FC	FC	FC	FC	FD		GB	GB	GG	HB	НВ	HB				KC	KC	KC	
220,000	224	K,M,J	FC	FC	FC	FC	FC	FD		GB	GB		HB	HB	HB				KC	KC	KC	
270,000	274	K,M,J	FC	FC	FC	FC	FC#	FD#		GB	GH		HB	HB	HB	JC	JC	JC	KB	KC	KC	
330,000	334	K,M,J	FD	FD	FD	FD	FD#	FD#	Г	GB	GH		HB	HB	HB	JC	JC	JC	KB	KC	KC	
390,000	394	K,M,J	FD	FD	FD	FD	FD#			GB	GG		HB	HB	HD	JC	JC	JC	KB	KC	KC	
470,000	474	K,M,J	FD	FD	FD	FD	FD#			GB	GG		НВ	HB		JC	JC		KB	KC	KD	
560,000	564	K,M,J	FD	FD	FD	FD	FD#			GC	GG		HB	HD		JC	JC		KB	KC		
680,000	684	K,M,J	FD	FD	FD	FD	FD#			GC	GG		HB	HD		JC	JD		KB	KC		
820,000	824	K,M,J	FF	FF	FF	FF	FF#			GE	GG		НВ			JC	JF		KB	KC		
1,000,000	105	K,M,J	FH	FH	FH	FH	FH#			GE	GG		HB			JC			KB	KD		
1,200,000	125	K,M,J	FH	FH	FH	FH							HB			JC			KB			
1,500,000	155	K,M,J	FH	FH	FH	FH							НВ			JC			KC			
1,800,000	185	K,M,J	FH	FH	FH	FH	\Box	$ldsymbol{ldsymbol{eta}}$	_	\vdash		$oxed{\Box}$	HD	\Box	$oxed{\Box}$	JD		$ldsymbol{ldsymbol{ldsymbol{eta}}}$	KD			
2,200,000	225	K,M,J	FJ	FJ	FJ	FJ				\vdash	oxdot	oxdot	HF		oxdot	JF			KD			
2,270,000	275	K,M,J	FG	FG	FG	\vdash	<u> </u>	$oxed{oxed}$		\vdash	$ldsymbol{ldsymbol{eta}}$	\vdash		<u> </u>	\vdash		<u> </u>	Ь	$oldsymbol{oldsymbol{\sqcup}}$			
3,300,000	335	K,M,J	FG	FG	FG	\vdash	<u> </u>			\vdash	\vdash	\vdash		<u> </u>	\vdash		<u> </u>	<u> </u>	\vdash		<u> </u>	
3,900,000	395	K,M,J	FH	FH	FH	\vdash	_			\vdash	$oxed{\Box}$		_	_							\vdash	
4,700,000	475	K,M,J	FJ	FJ	FJ																	
5,600,000	565	K,M,J																				
6,800,000	685	K,M,J																				
8,200,000	825	K,M,J					<u> </u>							<u> </u>								
10,000,000	106	K,M,J																				
12,000,000	126	K,M,J	Ь.	\vdash	\vdash	\vdash	<u> </u>	\vdash	Ь—	\vdash	\vdash	\vdash	<u> </u>	<u> </u>	\vdash	<u> </u>	<u> </u>	Ь—	\vdash	<u> </u>	⊢	
15,000,000	156	K,M,J	⊢	\vdash	<u> </u>	<u> </u>	├	\vdash	Ь—	<u> </u>	<u> </u>	\vdash	<u> </u>	-	\vdash	<u> </u>	<u> </u>	⊢	_		⊢	
18,000,000	186	K,M,J	⊢	\vdash	<u> </u>	—	—	<u> </u>	—	—	<u> </u>	\vdash	<u> </u>	—	\vdash	<u> </u>	—	⊢	\vdash		⊢	
22,000,000	226	K,M,J									L			<u> </u>								

^{*} EIA preferred chip sizes # X7R Dielectric - Extended Range Values or Voltages-Cap and DF measured @ 0.5 Vrms. See Thickness Code Table on page 7 for ceramic chip thickness dimensions.

Thickness Code Reference Chart Packaging Quantity Based on Finished Chip Thickness Specifications

Thickness Code	Chip Size	Chip Thickness Range (mm)	Qty per Reel 7" Plastic	Qty per Reel 13" Plastic	Qty per Reel 7" Paper	Qty per Reel 13" Paper	Qty per Bulk Cassette
AA	0201	.30 ± .03	N/A	N/A	15,000	N/A	N/A
BB	0402	.50 ± .05	N/A	N/A	10,000	50,000	50,000
СВ	0603	.80 ± .07	N/A	N/A	4,000	10,000	15,000
CC	0603	.80 ± .10	N/A	N/A	4,000	10,000	N/A
CD	0603	.80 ± .15	N/A	N/A	4,000	10,000	N/A
DB	0805	.60 ± .10	N/A	N/A	N/A	N/A	10,000
DC	0805	.78 ± .10	4,000	10,000	4,000	10,000	N/A
DD	0805	.90 ± .10	4,000	10,000	N/A	N/A	N/A
DE	0805	1.00 ± .10	2,500	10,000	N/A	N/A	N/A
DF	0805	1.10 ± .10	2,500	10,000	N/A	N/A	N/A
DG	0805	1.25 ± .15	2,500	10,000	N/A	N/A	N/A
DH	0805	1.25 ± .20	2,500	10,000	N/A	N/A	N/A
DJ	0805	1.25 ± .20	3,000	10,000	N/A	N/A	N/A
EB	1206	.78 ± .10	4,000	10,000	4,000	10,000	N/A
EC	1206	.90 ± .10	4,000	10,000	N/A	N/A	N/A
ED EE	1206 1206	1.00 ± .10	2,500	10,000	N/A N/A	N/A N/A	N/A
EF	1206	1.10 ± .10	2,500	10,000	N/A N/A	N/A N/A	N/A N/A
EG EG	1206	1.20 ± .15 1.60 ± .15	2,500 2,000	10,000 8,000	N/A N/A	N/A N/A	N/A N/A
EH	1206	1.60 ± .15 1.60 ± .20	2,000	8,000	N/A N/A	N/A N/A	N/A N/A
EJ	1206	1.60 ± .20 1.70 ± .20	2,000	8,000	N/A N/A	N/A N/A	N/A N/A
EK	1206	.80 ± .10	2,000	8,000	N/A N/A	N/A N/A	N/A
EL	1206	1.15 ± .15	2,000	8,000	N/A	N/A	N/A
EM	1206	1.25 ± .15	2,500	10,000	N/A	N/A	N/A
EN	1206	0.95 ± .10	4,000	10,000	N/A	N/A	N/A
FB	1210	.78 ± .10	4,000	10,000	N/A	N/A	N/A
FC	1210	.90 ± .10	4,000	10,000	N/A	N/A	N/A
FD	1210	.95 ± .10	4,000	10,000	N/A	N/A	N/A
FE	1210	1.00 ± .10	2,500	10,000	N/A	N/A	N/A
FF	1210	1.10 ± .10	2,500	10,000	N/A	N/A	N/A
FG	1210	1.25 ± .15	2,500	10,000	N/A	N/A	N/A
FH	1210	1.55 ± .15	2,000	8,000	N/A	N/A	N/A
FJ	1210	1.85 ± .20	2,000	8,000	N/A	N/A	N/A
FK	1210	2.10 ± .20	2,000	8,000	N/A	N/A	N/A
FL	1210	1.40 ± .15	2,000	8,000	N/A	N/A	N/A
FM	1210	1.70 ± .20	2,000	8,000	N/A	N/A	N/A
FN	1210	1.85 ± .20	2,000	8,000	N/A	N/A	N/A
FO	1210	1.50 ± .20	2,000	8,000	N/A	N/A	N/A
FP	1210	1.60 ± .20	2,000	8,000	N/A	N/A	N/A
GB	1812	1.00 ± .10	1,000	4,000	N/A	N/A	N/A
GC	1812	1.10 ± .10	1,000	4,000	N/A	N/A	N/A
GD	1812	1.25 ± .15	1,000	4,000	N/A	N/A	N/A
GE	1812	1.30 ± .10	1,000	4,000	N/A	N/A	N/A
GF	1812	1.50 ± .10	1,000	4,000	N/A	N/A	N/A
GG	1812	1.55 ± .10	1,000	4,000	N/A	N/A	N/A
GH	1812	1.40 ± .15	1,000	4,000	N/A	N/A	N/A
GJ	1812	1.70 ± .15	1,000	4,000	N/A	N/A	N/A
GK	1812	1.60 ± .20	1,000	4,000	N/A	N/A	N/A
GL	1812	1.90 ± .20	1,000	4,000	N/A	N/A	N/A
GM	1812	2.00 ± .20	1,000	4,000	N/A	N/A	N/A
HB	1825	1.10 ± .15	1,000	4,000	N/A	N/A	N/A
HC	1825	1.15 ± .15	1,000	4,000	N/A	N/A	N/A N/A
HD HE	1825 1825	1.30 ± .15 1.40 ± .15	1,000 1,000	4,000 4,000	N/A N/A	N/A N/A	N/A N/A
HF			· · · · · · · · · · · · · · · · · · ·	4,000	N/A N/A	N/A N/A	N/A N/A
JB	1825 2220	1.50 ± .15 1.00 ± .15	1,000 1,000	4,000	N/A N/A	N/A N/A	N/A N/A
JC JC	2220	1.00 ± .15 1.10 ± .15	1,000	4,000	N/A N/A	N/A N/A	N/A N/A
JD	2220	1.10 ± .15 1.30 ± .15	1,000	4,000	N/A N/A	N/A N/A	N/A N/A
JE	2220	1.30 ± .15 1.40 ± .15	1,000	4,000	N/A N/A	N/A N/A	N/A N/A
JF	2220	1.40 ± .15 1.50 ± .15	1,000	4,000	N/A	N/A N/A	N/A
KB	2225	1.50 ± .15 1.00 ± .15	1,000	4,000	N/A N/A	N/A N/A	N/A N/A
KC	2225	1.00 ± .15 1.10 ± .15	1,000	4,000	N/A N/A	N/A N/A	N/A N/A
KD KD	2225	1.10 ± .15 1.30 ± .15	1,000	4,000	N/A N/A	N/A N/A	N/A N/A
KE	2225	1.40 ± .15	1,000	4,000	N/A	N/A	N/A