

RESISTORS
FIXED COMPOSITION
RETMA STANDARD REC-116
MILITARY STANDARD MIL-R-11A

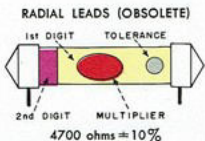
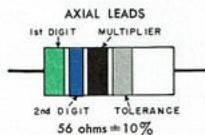
Color	Digits of Resistance (ohms)	Multiplier	Tolerance (%)
Black	0	1	—
Brown	1	10	—
Red	2	100	—
Orange	3	1000	—
Yellow	4	10,000	—
Green	5	100,000	—
Blue	6	1,000,000	—
Violet	7	10,000,000	—
Gray	8	100,000,000	—
White	9	—	±5
Gold	—	0.1	±10
Silver	—	0.01	±20
No color	—	—	—

INSULATION CODING

RETMA: Insulated fixed composition resistors with axial leads are designated by a background of any color except black. The usual color is natural tan. Noninsulated fixed composition resistors with axial leads are designated by a black background color.

MILITARY (MIL): Insulated resistors are designated by a background of any color except black. The usual color is natural tan. Noninsulated resistors with axial leads are designated by a black background color. Noninsulated resistors with radial leads are designated by a black background color or by a background the same color as the first significant figure of the resistance value.

EXAMPLES



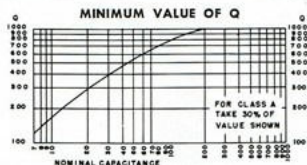
CAPACITORS
MICA DIELECTRIC

RETMA STANDARD REC-115A
(See example under MIL-C-5A)

Color	Digits of Capacitance (μf)	Class	Multiplier	Tolerance (%)
Black	0	A	1	±20
Brown	1	B	10	—
Red	2	C	100	±2
Orange	3	D	1000	±3
Yellow	4	E	10,000	—
Green	5	—	—	±5
Blue	6	—	—	—
Violet	7	—	—	—
Gray	8	I	—	—
White	9	J	—	—
Gold	—	—	0.1	—
Silver	—	—	0.01	±10

DESCRIPTION OF CLASS

Class	Temperature Coefficient (parts per million per °C)	Maximum Capacitance Drift	Minimum Insulation Resistance (megohms)
A	±1000	±(5% + 1 μf)	3000
B	±500	±(3% + 1 μf)	6000
C	±200	±(0.5% + 0.5 μf)	6000
D	±100	±(0.2% + 0.1 μf)	6000
E	+100 - 20	±(0.1% + 0.1 μf)	6000
I	+150 - 50	±(0.3% + 0.2 μf)	6000
J	+100 - 50	±(0.2% + 0.2 μf)	6000



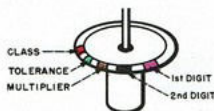
VOLTAGE RATING

(Indicated by dimensions rather than color coding)

Maximum Dimensions (inches)			Style	Capacitance (μf)	Voltage Rating (v d-c)
Length	Width	Thickness			
3/16	1/8	1/32	20	5-510	500
1 1/4	1 1/8	1/32	25	5-1000	300
3/16	3/16	1/32	30	1100-1500	300
3/16	3/16	9/32	35	470-6200	500
3/16	3/16	3/8	35	Over 6200	300
1 1/2	4 1/4	1 1/2	40	3300-6200	500
				Over 6200	300
				100-2400	1000
				2700-7500	500
				Over 7500	300

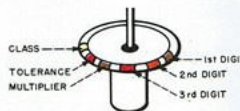
EXAMPLES

SILVER MICA BUTTON CAPACITORS (5-DOT)



700 μf ± 5%, Class C

SILVER MICA BUTTON CAPACITORS (6-DOT)



1320 μf ± 2%, Class E

CAPACITOR AND RESISTOR COLOR CODE CHART

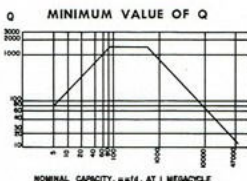
CAPACITORS MICA DIELECTRIC

MILITARY STANDARD MIL-C-5A

Color	Digits of Capacitance (μf)	Characteristic	Multiplier	Tolerance (%)
Black	0	A	1	± 20
Brown	1	B	10	—
Red	2	C	100	± 2
Orange	3	D	1000	—
Yellow	4	E	—	—
Green	5	F	—	—
Blue	6	G	—	—
Violet	7	—	—	—
Gray	8	—	—	—
White	9	—	—	—
Gold	—	—	0.1	± 5
Silver	—	—	0.01	± 10

DESCRIPTION OF CHARACTERISTIC

Characteristic	Temperature Coefficient (parts per million per °C)	Maximum Capacitance Drift	Minimum Insulation Resistance (megohms)
B	Not specified	Not specified	7500
C	± 200	$\pm 0.5\%$	7500
D	± 100	$\pm 0.3\%$	7500
E	$+100 - 20$	$\pm (0.1\% + 0.1 \mu\text{f})$	7500
F	$+70$	$\pm (0.05\% + 0.1 \mu\text{f})$	7500



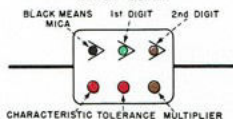
VOLTAGE RATING

(Indicated by dimensions rather than color coding)

Maximum Dimensions (inches)			Style CM	Capacitance (μf)	Voltage Rating (v d-c)
Length	Width	Thickness			
$1\frac{1}{4}$	$\frac{1}{16}$	$\frac{1}{32}$	15	5-510	300
$1\frac{1}{4}$	$1\frac{1}{2}$	$\frac{1}{32}$	20	5-510	500
$1\frac{1}{4}$	$1\frac{1}{2}$	$\frac{1}{32}$	25	560-1000	300
$1\frac{1}{4}$	$1\frac{1}{2}$	$\frac{1}{32}$	25	51-1000	500
$1\frac{1}{4}$	$1\frac{1}{2}$	$\frac{1}{32}$	30	560-3300	500
$1\frac{1}{4}$	$1\frac{1}{2}$	$\frac{1}{32}$	35	3600-6200	500
$1\frac{1}{4}$	$1\frac{1}{2}$	$\frac{1}{32}$	35	6800-10,000	300
$1\frac{1}{4}$	$1\frac{1}{2}$	$\frac{1}{32}$	40	3300-8200	500
$1\frac{1}{4}$	$1\frac{1}{2}$	$\frac{1}{32}$	40	9100-10,000	300

EXAMPLE

6-DOT CODE



510 μf $\pm 2\%$, Characteristic C, 500 v (Style 20)

The arrangement of dots under RETMA Standard REC-115A is the same as in the example above. The only difference is that the first dot is white instead of black.

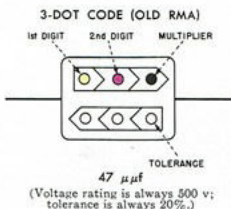
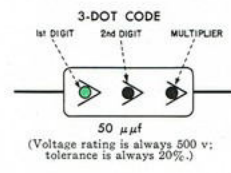
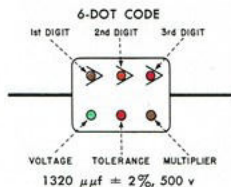
CAPACITORS MICA DIELECTRIC

OBSOLETE STYLES

Color	Digits of Capacitance (μf)	Multiplier	Tolerance (%)	Voltage Rating (v d-c)
Black	0	1	± 20	—
Brown	1	10	± 1	100
Red	2	100	± 2	200
Orange	3	1000	± 3	300
Yellow	4	10,000	± 4	400
Green	5	—	± 5	500
Blue	6	—	± 6	600
Violet	7	—	± 7	700
Gray	8	—	± 8	800
White	9	—	± 9	900
Gold	—	0.1	$\pm 5^*$	1000
Silver	—	0.01	± 10	2000
No color	—	—	$\pm 20^*$	500*

*Old 3-dot only.

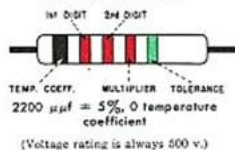
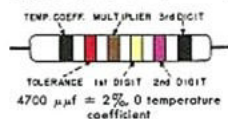
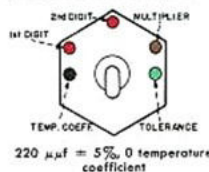
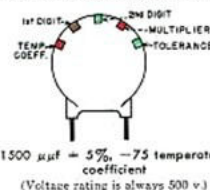
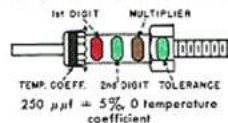
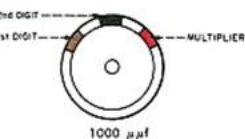
EXAMPLES



**CAPACITORS
CERAMIC DIELECTRIC
RETMA STANDARD REC-107A
MILITARY STANDARD MIL-C-20A**

Color	Digits of Capacitance (μf)	Multiplier	Tolerance		Temperature Coefficient (parts per million per °C)	
			10 μf or Less (μf)	Over 10 (μf) (%)	RETMA	MIL
Black	0	1	± 2.0	± 20	0	0
Brown	1	10	$\pm 0.1\ddagger$	± 1	-33	-30
Red	2	100	—	-2	-75	-80
Orange	3	1000	—	$\pm 2.5\ddagger$	-150	-150
Yellow	4	10,000 $\ddagger$	—	—	-220	-220
Green	5	—	± 0.5	± 5	-330	-330
Blue	6	—	—	—	-470	-470
Violet	7	—	—	—	-750	-750
Gray	8	0.01	± 0.25	—	+150 to -1500	+30
White	9	0.1	± 1.0	± 10	+100 to -750	-330
Gold	—	—	—	—	—	+100

†RETMA only.

EXAMPLES**TUBULAR CAPACITORS****TUBULAR CAPACITORS (OLD RMA)****FEED-THROUGH CAPACITORS (RETMA ONLY)****5-DOT DISC CAPACITORS (RETMA ONLY)****STAND-OFF CAPACITORS (RETMA ONLY)****3-DOT BUTTON CAPACITORS (RETMA ONLY)**

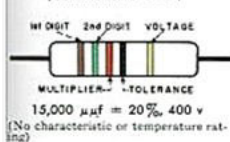
**CAPACITORS
PAPER DIELECTRIC
MILITARY STANDARD MIL-C-91A**
(Commercial codes are same except as noted)

Color	Digits of Capacitance (μf)	Multiplier	Tolerance (%)	Voltage Rating* (v d-c)	Characteristic	Temperature Rating (°C)
Black	0	1	± 20	—	A	85
Brown	1	10	—	100	A	85
Red	2	100	—	200	—	—
Orange	3	1000	± 30	300	—	—
Yellow	4	10,000	—	400	—	—
Green	5	—	—	500	—	—
Blue	6	—	—	600	—	—
Violet	7	—	—	700	—	—
Gray	8	—	—	800	—	—
White	9	—	—	900	—	—
Gold	—	—	—	1000	—	—
Silver	—	—	± 10	—	—	—

*Tubular capacitors only; for rectangular capacitors see table below.

VOLTAGE RATING FOR RECTANGULAR CAPACITORS
(Indicated by dimensions rather than color coding)

Maximum Dimensions (inches)			Style C&M	Capacitance (μf)	Voltage Rating (v d-c)
Length	Width	Thickness			
$1\frac{1}{4}$	$1\frac{1}{2}$	$\frac{1}{32}$	20	1000 2000-6000 10,000	400 200 120
$1\frac{1}{4}$	$1\frac{3}{4}$	$\frac{1}{16}$	22	2000-3000 6000-10,000 20,000	400 300 120
$1\frac{1}{4}$	$2\frac{1}{4}$	$\frac{1}{32}$	30	1000-2000 3000 6000-10,000 20,000	800 600 400 120
$1\frac{3}{4}$	$2\frac{1}{4}$	$\frac{1}{32}$	35	3000 6000-10,000 20,000	800 600 300
$1\frac{3}{4}$	$2\frac{3}{4}$	$\frac{1}{32}$	41	3000-6000 10,000 20,000 30,000	600 400 300 120
$1\frac{1}{2}$	$2\frac{3}{4}$	$\frac{1}{32}$	42	1000-6000 10,000-20,000 30,000 50,000 100,000	1000 600 400 300 120
$1\frac{1}{2}$	$2\frac{3}{4}$	$\frac{1}{32}$	43	10,000 20,000-30,000 50,000-100,000 200,000	1000 600 400 120

EXAMPLES**TUBULAR CAPACITORS (COMMERCIAL ONLY)****RECTANGULAR CAPACITORS**