

Data Sheet

Customer:

Product: Thick Film Chip Resistor - CR Series

Size: 01005/0201/0402/0603/0805/1206/1210/2010/2512/

1225/0612

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Edition: REV.C3





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Thick Film Chip Resistor



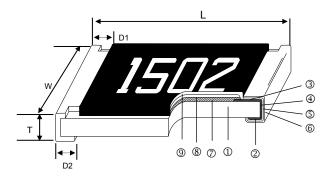
Scope

- This specification applies to all sizes of rectangular-type fixed chip resistors with Ruthenium-base as material.

Features

- -Small size and light weight
- Highly reliable multilayer electrode construction
- -Compatible with all soldering process
- ${\sf Long}$ side terminations

Construction



Applications

- Telecommunication Equipments
- -Radio and Tape Recorders, TV Tuners
- Digital Cameras, Watches, Pocket Calculators
- -Computers, Instruments
- Medical and Military Equipment

(D	Alumina Substrate	4	Edge Electrode	7	Resistor Layer
(2	Bottom Electrode	(5)	Barrier Layer	8	Primary Overcoat
(3	Top Electrode	6	External Electrode	9	Secondary Overcoat

Dimensions

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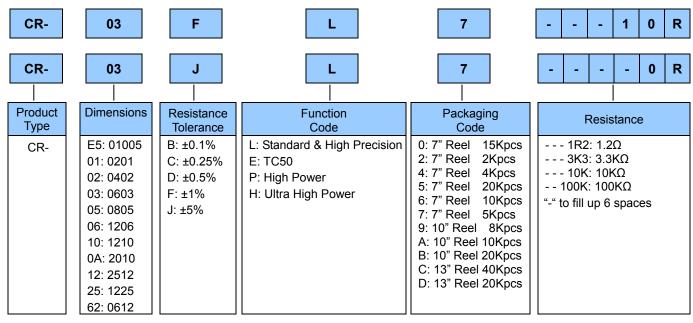
Туре	Size (Inch)	L (mm)	W (mm)	T (mm)	D1 (mm)	D2 (mm)	Weight (g) (1000pcs)
CR-E5	01005	0.40±0.02	0.20±0.02	0.13±0.02	0.10±0.03	0.10±0.03	0.037
CR-01	0201	0.60±0.03	0.30±0.03	0.23±0.03	0.15±0.05	0.15±0.05	0.150
CR-02	0402	1.00±0.05	0.50±0.05	0.35±0.05	0.20±0.10	0.20±0.10	0.620
CR-03	0603	1.60±0.10	0.80±0.10	0.45±0.10	0.30±0.20	0.30±0.20	2.042
CR-05	0805	2.00±0.10	1.25±0.10	0.50±0.10	0.35±0.20	0.40±0.20	4.368
CR-06	1206	3.10±0.10	1.55±0.10	0.55±0.10	0.50±0.25	0.50±0.20	8.947
CR-10	1210	3.10±0.10	2.60±0.15	0.55±0.10	0.50±0.25	0.50±0.20	15.959
CR-0A	2010	5.00±0.10	2.50±0.15	0.55±0.10	0.60±0.25	0.50±0.20	24.241
CR-12	2512	6.35±0.10	3.10±0.15	0.55±0.10	0.60±0.25	0.50±0.20	39.448
CR-25	1225	3.10±0.15	6.30±0.15	0.90±0.15	0.60±0.30	0.80±0.25	64.88
CR-62	0612	1.55±0.10	3.10±0.15	0.55±0.10	0.25±0.15	0.35±0.15	9.31

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Part Numbering

Part Number: CR-03FL7---10R Part Number: CR-03JL7----0R



Standard Electrical Specifications

Item	Power Rating at 70°C Jumper	Operating Temp. Range	Max. Operating	Max. Overload	Resistance Range	TCR (PPM/°C)
Туре	Rated Current	Temp. Range	Voltage	Voltage	±1%(E24 \ E96)	(FFIWIT C)
CR-E5 (01005)	1/32W	-55 ~ +125°C	15V	30V	10Ω - 1ΜΩ	±300
0.1 =0 (0.000)	Jumper: 0.5A	00 120 0			0Ω (<50mΩ)	-
CR-01 (0201)	1/20W	-55 ~ +125°C	25V	50V	1Ω - 10ΜΩ	±200
, ,	Jumper: 1A				0Ω (<50mΩ)	-
CR-02 (0402)	1/16W	-55 ~ +155°C	50V	100V	1Ω - 9.76Ω 10Ω - 1ΜΩ 1.02ΜΩ - 20ΜΩ 20.5ΜΩ - 100ΜΩ	±200 ±100 ±200 ±400
	Jumper: 1A				0Ω (<50mΩ)	-
CR-03 (0603)	1/10W	-55 ~ +155°C	75V	150V	1Ω - 9.76Ω 10Ω - 1ΜΩ 1.02ΜΩ - 20ΜΩ 20.5ΜΩ - 100ΜΩ	±200 ±100 ±200 ±400
	Jumper: 1A				0Ω (<50mΩ)	-
CR-05 (0805)	1/8W	1/8W -55 ~ +155°C		300V	1Ω - 9.76Ω 10Ω - 1ΜΩ 1.02ΜΩ - 20ΜΩ 20.5ΜΩ - 100ΜΩ	±200 ±100 ±200 ±400
	Jumper: 2A				0Ω (<50mΩ)	-
CR-06 (1206)	1/4W	-55 ~ +155°C	200V	400V	1Ω - 9.76Ω 10Ω - 1ΜΩ 1.02ΜΩ - 20ΜΩ 20.5ΜΩ - 100ΜΩ	±200 ±100 ±200 ±400
	Jumper: 2A				0Ω (<50mΩ)	-
CR-10 (1210)	1/3W		~ +155°C 200V		1Ω - 9.76Ω 10Ω - 1ΜΩ 1.02ΜΩ - 20ΜΩ 20.5ΜΩ - 39ΜΩ	±200 ±100 ±200 ±400
	Jumper: 2.5A				0Ω (<50mΩ)	-

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Item	Power Rating at 70°C Jumper	at 70°C Operating Operating Operating Overload Voltage		Resistanc	e Range	TCR (PPM/°C)	
Туре	Rated Current		voitage	voitage	±1%(E24 \ E96)	±5%(E24)	
CR-0A (2010)	3/4W	-55 ∼ +155°C	200V	400V	1Ω - 9 10Ω - 1.02ΜΩ - 20.5ΜΩ -	1MΩ - 20MΩ	±200 ±100 ±200 ±400
	Jumper: 3.5A				0Ω (<5	-	
CR-12 (2512)	1W	-55 ~ +155°C	250V	500V	1Ω - 9 10Ω - 1.02ΜΩ - 20.5ΜΩ -	1MΩ - 20MΩ	±200 ±100 ±200 ±400
	Jumper: 4A				0Ω (<5	0mΩ)	-
CD 25 (4225)	2W	FF .45500	2001/	400)/	10Ω – 2	20ΚΩ	±100
CR-25 (1225)	Jumper: 10A	-55 ~ +155°C	200V	400V	0Ω (<2	0mΩ)	-
CR-62 (0612)	0.75W	-55 ~ +155°C	200V	400V	1Ω~1	ΜΩ	±100

■High Precision Electrical Specifications

Item	Power Rating at 70°C	Operating	Max. Operating	Max. Overload	R	esistance (E24 · E		TCR (PPM/°C)
Туре	at 70 C	Temp. Range	Voltage	Voltage	±0.1% ±0.25%		±0.5%	(PPIVI/ C)
CR-02 (0402)	1/16W		50V	100V	,	-	10Ω - 1ΜΩ	±100
CR-02 (0402)	1/1000		307	100 V	,	_	1.02M - 10MΩ	±200
CR-03 (0603)	1/10W		75V	150V		10Ω - 1	ΜΩ	±100
CIX-03 (0003)	171000		730	130 V	ı	1.02	Μ - 10ΜΩ	±200
CR-05 (0805)	1/8W		150V	300V		10Ω - 1	ΜΩ	±100
CR-05 (0605)	1/000		1500	300 V	-	1.02	Μ - 10ΜΩ	±200
CR-06 (1206)	1/4W	55 .45500	200V	400V		10Ω - 1	ΜΩ	±100
CR-00 (1200)	1/400	-55 ∼ +155°C	2007	400 V	-	1.02	Μ - 10ΜΩ	±200
CD 40 (4240)	1/3W		200V	400V		10Ω - 1	ΜΩ	±100
CR-10 (1210)	1/344		2007	400 V	-	1.02	Μ - 10ΜΩ	±200
CD 04 (2010)	3/4W		200V	400V	10Ω - 1ΜΩ		ΜΩ	±100
CR-0A (2010)	3/444		2007	400 V	-	1.02	Μ - 10ΜΩ	±200
CR-12 (2512)	1W		250V	500V	10Ω - 1ΜΩ		±100	
GIN-12 (2512)	1 V V		2507	300 V	-	1.02	Μ - 10ΜΩ	±200

■TC50 Electrical Specifications

Item		Operating Temp.	Max. Operating	Max. Overload	Resis	tance Rai	nge (E24	· E96)	TCR
Туре	at 70°C	Range	Voltage	Voltage	±0.1%	±0.25%	±0.5%	±1%	(PPM/°C)
CR-02 (0402)	1/16W		50V	100V		-	100Ω	- 1MΩ	
CR-03 (0603)	1/10W		75V	150V					
CR-05 (0805)	1/8W		150V	300V					±50
CR-06 (1206)	1/4W	-55 ~ +155°C	200V	400V	10Ω -		400 40140		
CR-10 (1210)	1/3W		200V	400V	1ΜΩ	10Ω - 10ΜΩ			
CR-0A (2010)	3/4W		200V	400V					
CR-12 (2512)	1W		250V	500V					

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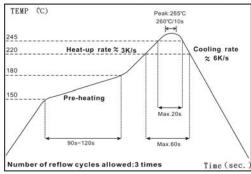
■High Power & Ultra High Power Rating Electrical Specifications

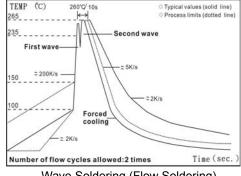
Item	Power Rating at 70°C	Operating Temp.	Max. Operating	Max. Overload	Resistand	Resistance Range	
Туре	at 70°C	Kange	Voltage	Voltage	±1% (E24 \ E96)	±5% (E24)	(PPM/°C)
CR-02 (0402)	1/8W Jumper: 1.5A		50V	100V			
CR-03 (0603)	1/4W		75V	150V			
OIX-03 (0003)	Jumper: 2A	750					
CR-05 (0805)	1/3W		150V	300V			±200 ±100
CIX-03 (0003)	Jumper: 2.5A		150 V	300 V	1Ω - 9		
CR-06 (1206)	1/3 *1/2W	-55 ~ +155°C	200V	400V	10Ω -		
CIX-00 (1200)	Jumper: 3.5A		200 V	400 V	0Ω (<2	-	
CR-10 (1210)	1/2 *3/4W		200V	400V	,		
OIX-10 (1210)	Jumper: 5A		200 V	400 V			
CR-0A (2010)	1W		200V	400V			
OIX-0A (2010)	Jumper: 6A		200 V	400 V			
CR-12 (2512)	2W		250V	500V			
CR-12 (2512)	Jumper: 7A		250 V	300 V			

^{*:} Ultra High Power

■ Viking is capable of manufacturing the optional spec based on customer's requirement.

Soldering Condition



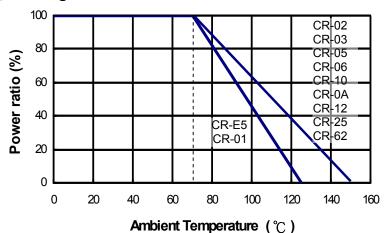


IR Reflow Soldering

Wave Soldering (Flow Soldering)

- (1) Time of IR reflow soldering at maximum temperature point 260°C: 10s
- (2) Time of wave soldering at maximum temperature point 260°C: 10s
- (3) Time of soldering iron at maximum temperature point 410°C: 5s

Derating Curve



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Operating Voltage=√(P*R) or Max. Operating Voltage listed above, whichever is lower.

Overload Voltage=2.5*\(\sigma(P*R)\) or Max. Overload Voltage listed above, whichever is lower.



Environmental Characteristics

Item		Requirement		Test Method
item	±1% and Below	±5%	Jumper	- rest wethou
Temperature Coefficient of	As Spec.			JIS-C-5201-1 4.8 IEC-60115-1 4.8
Resistance (T.C.R.)				-55°C~+125°C, 25°C is the reference temperature
				JIS-C-5201-1 4.13 IEC-60115-1 4.13
Short Time Overload	$\pm (1.0\% \text{+} 0.05\Omega)$	$\pm (2.0\% \text{+} 0.05\Omega)$	<50mΩ	RCWV*2.5 or Max. Overload Voltage whichever is lower for 5 seconds, 2 seconds for high power series
Insulation Resistance	≥10G			JIS-C-5201-1 4.6 IEC-60115-1 4.6
				Max. Overload Voltage for 1 minute
Endurance	±(1.0%±0.100)	±(2.0%+0.10Ω)	<100mO	JIS-C-5201-1 4.25 IEC-60115-1 4.25.1
Endurance	±(1.0%+0.10 <u>12</u>)	±(2.0%+0.10Ω)	< 100HI2	70±2°C, RCWV for 1000 hrs with 1.5 hrs "ON" and 0.5 hr "OFF"
		(2.00)	.100	JIS-C-5201-1 4.24 IEC-60115-1 4.24
Damp Heat with Load	$\pm (1.0\% + 0.10\Omega)$	±(2.0%+0.10Ω)	<100mΩ	40±2°C, 90~95% R.H., RCWV for 1000 hrs with 1.5 hrs "ON" and 0.5 hr "OFF"
		. (4.50(.0.400)	.500	JIS-C-5201-1 4.23 IEC-60115-1 4.23.2
Dry Heat	$\pm (1.0\% + 0.05\Omega)$	±(1.5%+0.10Ω)	<50mΩ	at +125/+155°C for 1000 hrs
				JIS-C-5201-1 4.33 IEC-60115-1 4.33
Bending Strength	±(1.0%+0.05Ω)	$\pm (1.0\% + 0.05\Omega)$	<50mΩ	Bending once for 5 seconds
				2010, 2512 sizes: 2mm Other sizes: 3mm
Solderability	95% min. cover	age		JIS-C-5201-1 4.17 IEC-60115-1 4.17
•				245±5°C for 3 seconds
Resistance to Soldering Heat	+(0.5%+0.05Ω)	+(1.0%+0.05Ω)	<50mΩ	JIS-C-5201-1 4.18 IEC-60115-1 4.18
3	_(=:=:;	_(,		260±5°C for 10 seconds
Voltage Proof	No breakdown	or flashover		JIS-C-5201-1 4.7 IEC-60115-1 4.7
voltage i 1001	no broancom	5do6.0.		1.42 times Max. Operating Voltage for 1 minute
Leaching	Individual leach	ing area ≦5%		JIS-C-5201-1 4.18 IEC-60068-2-58 8.2.1
Leading	Total leaching a	rea ≦ 10%		260±5°C for 30 seconds
Rapid Change of Temperature	±(0.5%+0.05Ω)	±(1.0%+0.05Ω)	<50mΩ	JIS-C-5201-1 4.19 IEC-60115-1 4.19
romperature		·		-55°C to +125/+155°C, 5 cycles

RCWV(Rated Continuous Working Voltage)= $\sqrt{(P^*R)}$ or Max. Operating Voltage whichever is lower.

■Storage Temperature: 15~28°C; Humidity < 80%RH

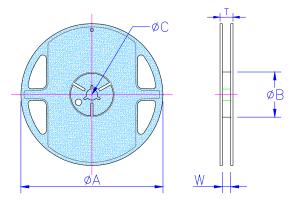
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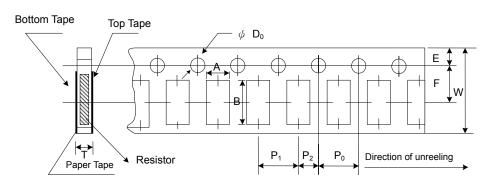
■Packaging

Reel Specifications & Packaging Quantity



Туре	Packag Quanti		Tape Width	Reel Diameter	ΦA (mm)	ФВ (mm)	ΦC (mm)	W (mm)	T (mm)
CR-E5	Donor	10K	8mm	7 inch	178.5±1.5	60+1/-0	13.0±0.2	9.0±0.5	12.5±0.5
CR-ES	Paper	20K	8mm	7 inch	178.5±1.5	60+1/-0	13.0±0.2	9.0±0.5	12.5±0.5
CR-01	Paper	15K	8mm	7 inch	178.5±1.5	60+1/-0	13.0±0.2	9.0±0.5	12.5±0.5
		10K	8mm	7 inch	178.5±1.5	60+1/-0	13.0±0.2	9.0±0.5	12.5±0.5
CR-01 CR-02	Paper	20K	8mm	10 inch	254±1.0	100±0.5	13.0±0.2	9.5±0.5	13.5±0.5
CR-02		40K	8mm	13 inch	330±1.0	100±0.5	13.0±0.2	9.5±0.5	13.5±0.5
CR-03		5K	8mm	7 inch	178.5±1.5	60+1/-0	13.0±0.2	9.0±0.5	12.5±0.5
CR-05	Paper	10K	8mm	10 inch	254±1.0	100±0.5	13.0±0.2	9.5±0.5	13.5±0.5
CR-06 CR-10		20K	8mm	13 inch	330±1.0	100±0.5	13.0±0.2	9.5±0.5	13.5±0.5
CR-0A	Embossed	4K	12mm	7 inch	178.5±1.5	60+1/-0	13.0±0.5	13.0±0.5	15.5±0.5
CR-12	Embossed	8K	12mm	10 inch	250±1.0	62±0.5	13.0±0.5	12.5±0.5	16.5±0.5
CR-25	Embossed	2K	12mm	7 inch	178.5±1.5	60+1/-0	13.0±0.5	13.0±0.5	15.5±0.5
CR-62	Paper	5K	8mm	7 inch	178.5±1.5	60+1/-0	13.0±0.2	9.0±0.5	12.5±0.5

Paper Tape Specifications

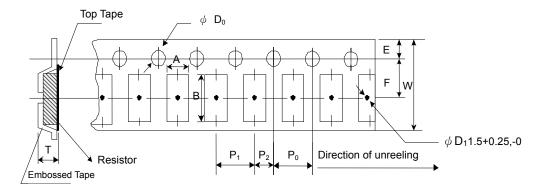


Туре	A (mm)	B (mm)	W (mm)	E (mm)	F (mm)	P₀ (mm)	P ₁ (mm)	P ₂ (mm)	ФD₀ (mm)	T (mm)
CR-E5	0.24±0.05	0.45±0.05	8.0±0.20	1.75±0.10	3.50±0.05	4.00±0.10	2.00±0.05	2.00±0.05	1.50+0.1,-0	0.40±0.10
CR-01	0.38±0.05	0.68±0.05	8.0±0.20	1.75±0.10	3.50±0.05	4.00±0.10	2.00±0.05	2.00±0.05	1.50+0.1,-0	0.42±0.20
CR-02	0.65±0.10	1.15±0.10	8.0±0.20	1.75±0.10	3.50±0.05	4.00±0.10	2.00±0.05	2.00±0.05	1.50+0.1,-0	0.45±0.10
CR-03	1.10±0.10	1.90±0.10	8.0±0.20	1.75±0.10	3.50±0.05	4.00±0.10	4.00±0.05	2.00±0.05	1.50+0.1,-0	0.70±0.10
CR-05	1.60±0.10	2.40±0.20	8.0±0.20	1.75±0.10	3.50±0.05	4.00±0.10	4.00±0.05	2.00±0.05	1.50+0.1,-0	0.85±0.10
CR-06	1.90±0.10	3.50±0.20	8.0±0.20	1.75±0.10	3.50±0.05	4.00±0.10	4.00±0.05	2.00±0.05	1.50+0.1,-0	0.85±0.10
CR-10	2.90±0.10	3.50±0.20	8.0±0.20	1.75±0.10	3.50±0.05	4.00±0.10	4.00±0.05	2.00±0.05	1.50+0.1,-0	0.85±0.10
CR-62	1.90±0.10	3.50±0.20	8.0±0.20	1.75±0.10	3.50±0.05	4.00±0.10	4.00±0.05	2.00±0.05	1.50+0.1,-0	0.85±0.10

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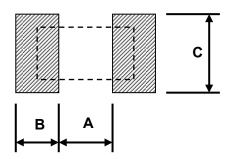


Embossed Plastic Tape Specifications



Туре	A (mm)	B (mm)	W (mm)	E (mm)	F (mm)	P₀ (mm)	P ₁ (mm)	P ₂ (mm)	ФD₀ (mm)	T (mm)
CR-0A	2.8±0.10	5.5±0.10	12.0±0.30	1.75±0.10	5.5±0.05	4.00±0.10	4.00±0.10	2.00±0.05	1.50+0.1, -0	1.2+0
CR-12	3.5±0.10	6.7±0.10	12.0±0.30	1.75±0.10	5.5±0.05	4.00±0.10	4.00±0.10	2.00±0.05	1.50+0.1, -0	1.2+0
CR-25	3.38±0.10	6.68±0.10	12.0±0.30	1.75±0.10	5.5±0.10	4.00±0.10	4.00±0.10	2.00±0.05	1.55+0.05	1.45±0.20

Recommend Land Pattern



Туре	A (mm)	B (mm)	C (mm)			
CR-E5	0.14	0.18	0.25			
CR-01	0.30	0.25	0.30			
CR-02	0.50	0.45	0.60			
CR-03	0.90	0.60	0.90			
CR-05	1.20	0.70	1.30			
CR-06	2.00	0.90	1.60			
CR-10	2.00	0.90	2.80			
CR-0A	3.80	0.90	2.80			
CR-12	3.80	1.60	3.50			
CR-25	1.20	2.00	7.00			
CR-62	0.70	1.20	3.20			

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Marking

No Marking for 01005, 0201 and 0402

Jumper for all: Letter "0"

1% for 0805/1206/1210/2010/2512/1225/0612: 4 digits marking

Example:

Resistance	100Ω	2.2ΚΩ	10ΚΩ	49.9ΚΩ	100ΚΩ
Marking	1000	2201	1002	4992	1003

5% for 0603/0805/1206/1210/2010/2512/1225/0612: 3 digits marking in E24

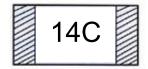
Example: $101=100\Omega$ $102=1K\Omega$ (1st and 2nd are E24 code and 3rd code is multiplier)

	E24 code	10	11	12	13	15	16	18	20	22	24	27	30	33	36	39	43	47	51	56	62	68	75	82	91	
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1% for 0603(E24): 3 digits marking in E24, When the E24 and E96 are the same resistance, this marking in E96

Example: $01A = 100\Omega$ $05C = 11K\Omega$ $123 = 12K\Omega$ $273 = 27K\Omega$

1% for 0603: 3 digits marking in E96



3 digits marking for Example: $14C=13K7\Omega$ $13C=13K3\Omega$

68B=4K99Ω 68X=49.9Ω

Marking Table

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Code	Е	96	Code	E	96	Code	Е	96	Code	E	96						
01	1	00	25	178		178 49 316		316		50	62						
02	1	02	26	182		50	3	324		5	76						
03	1	05	27	187		51	3	32	75	590							
04	1	07	28	19	91	52			76	6	04						
05	1	10	29	19	96	53	3	48	77	6	19						
06	1	13	30	20	00	54	3	57	78	6	34						
07	1	15	31	20	05	55	3	65	79	64	49						
08	1	18	32	2	10	56	3	74	80	6	35						
09	1:	21	33	2	15	57	3	83	81	681							
10	1:	24	34	221		58	392		82	69	98						
11	1:	27	35	226		59	402		402		83	7	15				
12	1:	30	36	232		60	412		84	7:	32						
13	1:	33	37	237		61	422		85	7:	50						
14	1	37	38	243		62	4	32	86	70	38						
15	1	40	39	24	49	63	4	42	87	78	37						
16	1	43	40	2	255		4	453		80	06						
17	1	47	41	26	31	65	464		89	825							
18	1:	50	42	26	67	66	475		475		90	84	45				
19	1:	54	43	274		67	487		91	866							
20		58	44	280		68	499		92	887							
21		62	45	287		69	511		93	_	09						
22		65	46	294		70	523		94		31						
23	169		169		47	301		301		301		71		536		953	
24	1	74	48	309		309		309		72	549		96	9.	76		
Code	Α	В	С	D	Е	F	G	Х	Υ								
Multiplier	10 ⁰	10 ¹	10 ²	10 ³	10 ⁴	10 ⁵	10 ⁶	10 ⁻¹	10 ⁻²								

For detail questions, contact: sales@viking.com.tw Edition: REV.C3

8 Revision: 15-Jul-2016



REVISION HISTORY

REVISION	DATE	CHANGE NOTIFICATION	DESCRIPTION
Version C	Jun 03, 2014	-	Environmental Characteristics updatedSize CR-25 specifications added
Version C1	Apr 30, 2015	-	- High Power & Ultra High Power Rating Electrical Increase Jumper Specifications
Version C2	Jun 09, 2015	-	- Increase 0603(E24) 1% marking description
Version C3	Jul 15, 2016	-	Remove Material DescriptionSize CR-62 specifications addedModify Storage Temperature

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9 Revision: 15-Jul-2016