Data Sheet

Customer:	
Product:	Thick Film Chip Resistor - CRT Series
Sizes:	0201/0402/0603/0805/1206/1210/2010/2512
Issued Date:	6-Jan-26
Edition:	REV.A2

RoHS Compliant

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6-Jan-26	6-Jan-26	6-Jan-26	6-Jan-26	
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Thick Film Chip Resistor

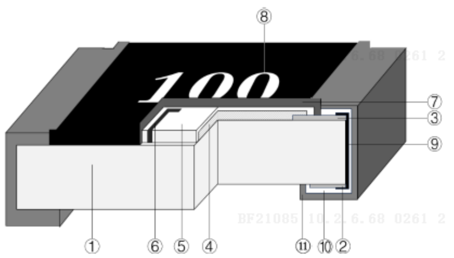
■Features

－Stable electrical performance and high reliability
－Small size and light weight
－SMT process compatible, low assembly cost
－High mechanical strength
－Compliant with RoHS directive requirements
－Compliant with halogen-free requirements
－Compliant with export-related indicators
－Compliant with halogen-free requirements

■Applications

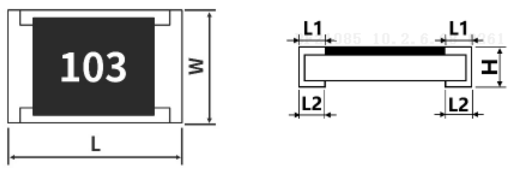
－Home Appliances
－Electronic Communications
－Computers
－Industrial Equipment
－Control Circuits
－Audio Amplifiers
－Other Consumer Electronics

■Construction For ≥1Ω



1	Ceramic Substrate	7	2nd Protective Coating
2	Bottom Inner Electrode	8	Marking
3	Top Inner Electrode	9	Terminal Inner Electrode
4	Resistor Layer	10	Ni Plating
5	1st Protective Coating	11	Sn Plating
6	Laser Trimmed		

■Dimensions



Unit: mm

Type	Size (Inch)	L	W	H	L1	L2
CRT01	0201	0.60±0.03	0.30±0.03	0.23±0.03	0.10±0.05	0.15±0.05
CRT01	0201 (Jumper)	0.60±0.05	0.30±0.05	0.23±0.03	0.10±0.05	0.15±0.05
CRT02	0402	1.00±0.10	0.50±0.05	0.30±0.05	0.20±0.10	0.25±0.10
CRT03	0603	1.60±0.10	0.80±0.10	0.45±0.10	0.30±0.15	0.25±0.15
CRT05	0805	2.00±0.10	1.25±0.10	0.50±0.10	0.35±0.20	0.35±0.20
CRT06	1206	3.05±0.10	1.55±0.10	0.50±0.10	0.45±0.20	0.40±0.20
CRT10	1210	3.05±0.10	2.60±0.15	0.55±0.10	0.45±0.20	0.50±0.20
CRT0A	2010	5.00±0.10	2.50±0.15	0.55±0.10	0.45±0.20	0.50±0.20
CRT12	2512	6.35±0.10	3.10±0.15	0.55±0.10	0.60±0.20	0.50±0.20

Part Numbering

CRT	01	F	0	F		1001
Product Type	Dimensions (L×W)	Resistance Tolerance	Packaging Code	TCR (PPM/°C)	Power Rating	Resistance
	01: 0201 02: 0402 03: 0603 05: 0805 06: 1206 10: 1210 0A: 2010 12: 2512	B: ±0.1% D: ±0.5% F: ±1% J: ±5%	0: 7"Reel 15Kpcs 4: 7"Reel 4Kpcs 6: 7"Reel 10Kpcs 7: 7"Reel 5Kpcs D: 13"Reel 20Kpcs G: 13"Reel 50Kpcs	-: No specified E: ±100 F: ±200 G: ±300	: Standard	0010: 1Ω 0100: 10Ω 1000: 100Ω 1001: 1KΩ 1004: 1MΩ

Standard Electrical Specifications

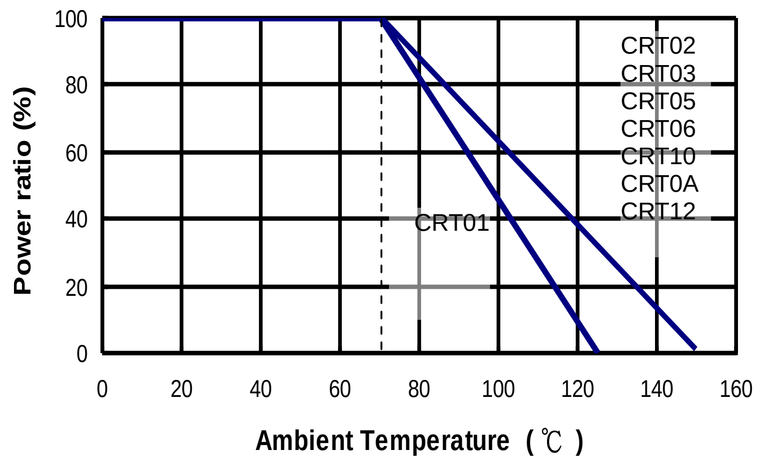
Item / Type	Power Rating at 70°C	Operating Temp. Range	Max. Operating Voltage	Max. Overload Voltage	Resistance Range ±0.1%, ±0.5%, ±1% (E24、E96)	Resistance Range ±5% (E24)	TCR (PPM/°C)
CRT01 (0201)	1/20W	-55 ~ +125°C	25V	50V	1Ω≤R<10Ω		±300
					10Ω≤R≤10MΩ		±200
CRT02 (0402)	1/16W	-55 ~ +155°C	50V	100V	1Ω≤R<10Ω		±200
					10Ω≤R<10MΩ		±100
					10MΩ≤R≤22MΩ		±200
CRT03 (0603)	1/10W	-55 ~ +155°C	75V	150V	1Ω≤R<10Ω		±200
					10Ω≤R<10MΩ		±100
					10MΩ≤R≤22MΩ		±200
CRT05 (0805)	1/8W	-55 ~ +155°C	150V	300V	1Ω≤R<10Ω		±200
					10Ω≤R<10MΩ		±100
					10MΩ≤R≤22MΩ		±200
CRT06 (1206)	1/4W	-55 ~ +155°C	200V	400V	1Ω≤R<10Ω		±200
					10Ω≤R<10MΩ		±100
					10MΩ≤R≤22MΩ		±200
CRT10 (1210)	1/2W	-55 ~ +155°C	200V	500V	1Ω≤R<10Ω		±200
					10Ω≤R<10MΩ		±100
					10MΩ≤R≤22MΩ		±200
CRT0A (2010)	3/4W	-55 ~ +155°C	200V	500V	1Ω≤R<10Ω		±200
					10Ω≤R<10MΩ		±100
					10MΩ≤R≤22MΩ		±200
CRT12 (2512)	1W	-55 ~ +155°C	200V	500V	1Ω≤R<10Ω		±200
					10Ω≤R<10MΩ		±100
					10MΩ≤R≤22MΩ		±200

Rated Voltage: The resistor shall have a DC continuous working voltage or a rms.
AC continuous working voltage at commercial-line frequency and wave form corresponding to the power rating, as determined fromthe following。
Rated Voltage=$\sqrt{}$(P*R)

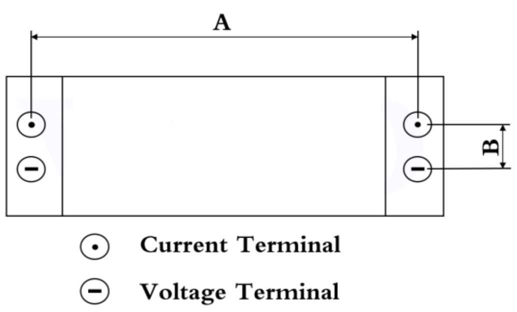
Jumper(0Ω)

Item / Type	Rated Current	Max. Overload Current	Operating Temp. Range	Resistance Range	
				1%	5%
CRT01 (0201)	0.5A	1.0A	-55 ~ +125°C	≤40mΩ	≤50mΩ
CRT02 (0402)	1.0A	2.0A	-55 ~ +155°C	≤30mΩ	≤50mΩ
CRT03 (0603)	1.0A	3.0A	-55 ~ +155°C	≤30mΩ	≤50mΩ
CRT05 (0805)	2.0A	5.0A	-55 ~ +155°C	≤30mΩ	≤50mΩ
CRT06 (1206)	2.0A	5.0A	-55 ~ +155°C	≤30mΩ	≤50mΩ
CRT10 (1210)	2.0A	5.0A	-55 ~ +155°C	≤30mΩ	≤50mΩ
CRT0A (2010)	2.0A	5.0A	-55 ~ +155°C	≤30mΩ	≤50mΩ
CRT12 (2512)	2.0A	5.0A	-55 ~ +155°C	≤30mΩ	≤50mΩ

Derating Curve



Resistance Test Package Standard Measurement Location (Bottom Electrode)



Type	A (mm)	B (mm)
CRT01	0.44±0.05	0.22±0.05
CRT02	0.80±0.05	0.24±0.05
CRT03	1.35±0.05	0.35±0.05
CRT05	1.80±0.05	0.35±0.05
CRT06	2.90±0.05	0.35±0.05
CRT10	2.90±0.05	0.35±0.05
CRT0A	4.50±0.05	1.15±0.05
CRT12	5.90±0.05	1.60±0.05

■Environmental Characteristics

Item	Requirement			Test Method
	±1% and Below	±5%	Jumper	
Temperature Coefficient of Resistance (T.C.R.)	As Spec.			**JIS-C5201-1 4.8** At +25°C /-55°C or +25°C/+125°C
Short Time Overload	±(1.0%+0.05Ω)	±(2.0%+0.05Ω)	0201 size: 5%: ≤50mΩ;1%: ≤30 mΩ Other sizes: 5%: ≤50mΩ;1%: ≤25mΩ	**JIS-C5201-1 4.13** 2.5 times RCWV or maximum overload voltage which is less for 5 seconds at room temperature
~~Endurance~~ Load Life	±(1.0%+0.05Ω)	±(2.0%+0.05Ω)	0201 size: 5%: ≤50mΩ;1%: ≤30mΩ Other sizes: 5%: ≤50mΩ;1%: ≤25mΩ	**JIS-C5201-1 4.25** 70±2°C apply rated voltage (take the smaller value of rated voltage or component limit voltage), for 1000 hrs with 1.5 hrs "ON" and 0.5 hr "OFF"
Damp Heat with Load	±(1.0%+0.05Ω)	±(2.0%+0.05Ω)	0201 size: 5%: ≤100mΩ;1%: ≤80mΩ Other sizes: 5%: ≤100mΩ;1%: ≤60mΩ	**JIS-C5201-1 4.24** 40±2°C, 90~95% R.H., apply the rated voltage for 1000 hrs with 1.5 hrs "ON" and 0.5 hr "OFF"
Thermal Shock	±(1.0%+0.05Ω)	±(2.0%+0.05Ω)	0201 size: 5%: ≤50mΩ;1%: ≤40mΩ Other sizes: 5%: ≤50mΩ;1%: ≤30mΩ	**MIL-STD-202 Method 107** -55 to +125°C, 300 cycles
Bending Strength	±(1.0%+0.05Ω)		0201 size: 5%: ≤50mΩ;1%: ≤40mΩ Other sizes: 5%: ≤50mΩ;1%: ≤30mΩ	**JIS-C5201-1 4.33** Bending once for 60 seconds 0201, 0402, 0603, 0805 sizes: 5mm； 1206, 1210 sizes: 4mm 2010, 2512 sizes: 2mm
Solderability	95% min. coverage			**JIS-C5201-1-4.17** 245±5°C, 2 seconds
Resistance to Soldering Heat	±(1.0%+0.05Ω)		0201 size: 5%: ≤50mΩ;1%: ≤40mΩ Other sizes: 5%: ≤50mΩ;1%: ≤30mΩ	**JIS-C5201-1-4.18** 260±5°C, 10 seconds
High Temperature Exposure	±(1.0%+0.05Ω)	±(2.0%+0.05Ω)	0201 size: 5%: ≤100mΩ;1%: ≤80mΩ Other sizes: 5%: ≤100mΩ;1%: ≤60mΩ	**JIS-C5201-1-4.25** 0201 size: at +125±3°C for 1000+48/-0 hrs other sizes: at +155±5°C for 1000+48/-0 hrs
Intermittent Overload	±(5.0%+0.05Ω)		0201 size: 5%: ≤100mΩ;1%: ≤80mΩ Other sizes: 5%: ≤100mΩ;1%: ≤60mΩ	**JIS-C5201-1-4.13** Place within an oven maintained at a constant temperature. Apply either 2.5 times the rated voltage or the maximum overload voltage (whichever is lower), cycling at 1 second ON and 25 seconds OFF for 10,000 + 400 / -0 cycles. Remove and allow to rest for 60 minutes before measuring the change in resistance. (The jumper shall be subjected to the maximum overload current.)
Terminal Strength	Item 1: No damage to appearance, no side guide detachment or body fracture. Item 2: Tensile strength ≥ 5N			**JIS-C5201-1-4.16** Test item 1: Solder the resistor onto the circuit board, apply a force of 5N to the back of the resistor for 10 seconds, and then check the appearance of the side conductor. Test item 2: Solder the resistor onto the circuit board, gradually apply force to the back of the resistor, and test the maximum peel strength of the test end electrode.
Component Solvent Resistance	±(1.0%+0.05Ω)		0201 size: 5%: ≤50mΩ;1%: ≤40mΩ Other sizes: 5%: ≤50mΩ;1%: ≤30mΩ	**JIS-C5201-1-4.29** Immerse in an isopropyl alcohol solvent at 20–25℃ for 5 ± 0.5 minutes, remove and let stand for more than 48 hours, then measure the resistance change rate.
	No damage to appearance, no G2 protective layer or tin layer leaching phenomenon.			
Insulation Resistance	1000M Min			**JIS-C5201-1-4.16** Apply a direct current voltage of 100V ± 15V between the electrode and the substrate, maintain for 1 minute, and then measure the insulation resistance value
Voltage Proof	No breakdown or flashover			**JIS-C5201-1-4.17** Apply an AC voltage with an effective value equal to the maximum overload voltage at a rate of approximately 100 V/s between the electrode and the substrate, and maintain for 60 ± 5 seconds.

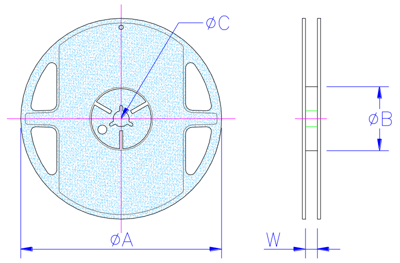
■Storage Temperature: 5~40°C; Humidity: 20~75%RH

■Shelf Life: 2 year from production date

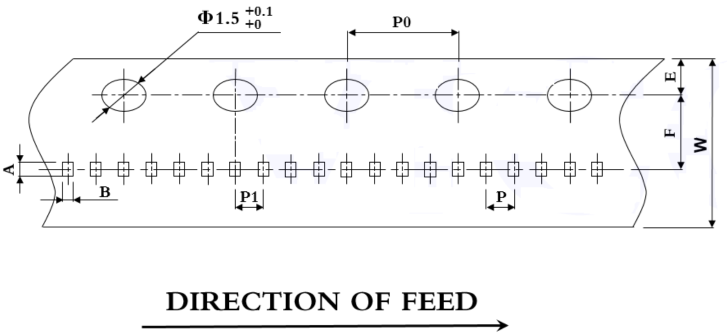
■Packaging

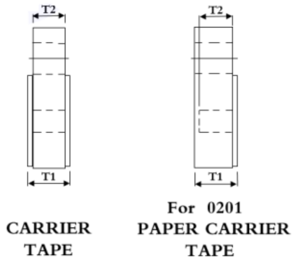
Reel Specifications & Packaging Quantity

Type	Packaging Quantity		Tape Width	Reel Diameter	ΦA (mm)	ΦB (mm)	ΦC (mm)	W (mm)
CRT01	Paper	15K	8mm	7 inch	178±0.5	60±1.0	13.5±0.5	9.0±0.5
		50K	8mm	13 inch	330±0.5	100±1.0	13.5±0.5	10.0±0.5
CRT02	Paper	10K	8mm	7 inch	178±0.5	60±1.0	13.5±0.5	9.0±0.5
		50K	8mm	13 inch	330±0.5	100±1.0	13.5±0.5	10.0±0.5
CRT03 CRT05 CRT06 CRT10	Paper	5K	8mm	7 inch	178±0.5	60±1.0	13.5±0.5	9.0±0.5
		20K	8mm	13 inch	330±0.5	100±1.0	13.5±0.5	10.0±0.5
CRT0A CRT12	Embossed	4K	12mm	7 inch	178±0.5	80±1.0	13.5±0.5	13.80.5



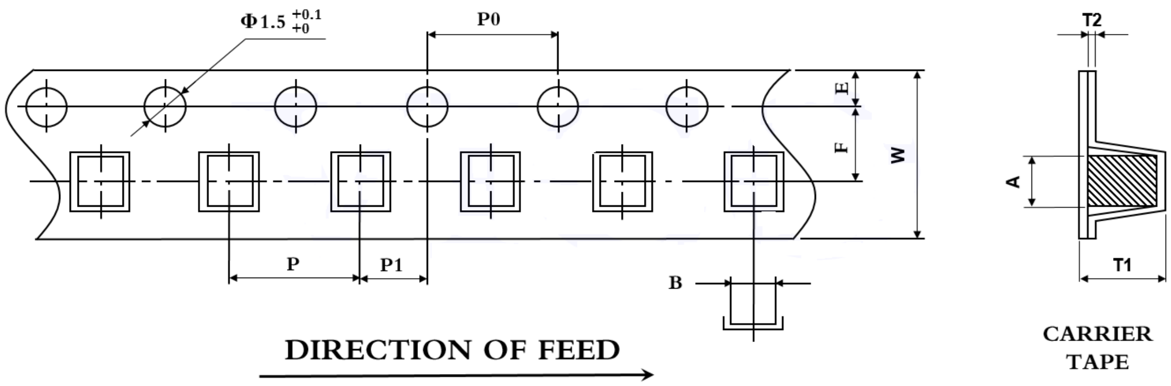
Paper Tape Specifications





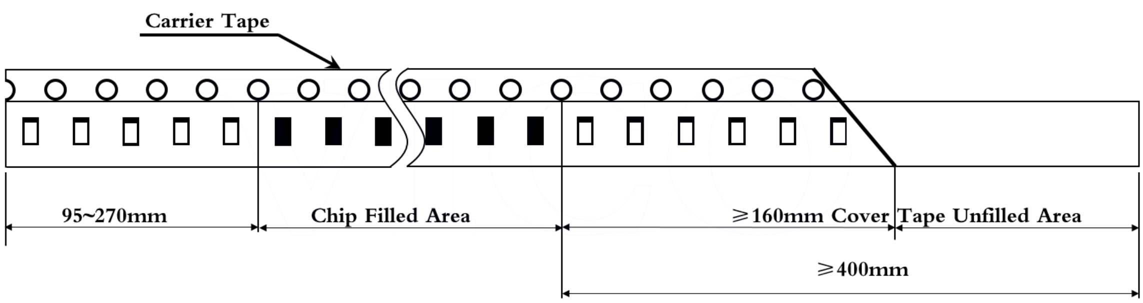
Type	A (mm)	B (mm)	W (mm)	E (mm)	F (mm)	T1 (mm)	T2 (mm)	P (mm)	P0 (mm)	P1 (mm)
CRT01	0.68±0.05	0.38±0.03	8.00±0.10	1.75±0.10	3.50±0.05	0.42+0.1/-0	0.28±0.02	2.00±0.05	4.00±0.05	2.00±0.05
CRT02	1.15±0.05	0.65±0.05	8.00±0.20	1.75±0.10	3.50±0.05	0.40+0.2/-0	0.40±0.05	2.00±0.10	4.00±0.05	2.00±0.05
CRT03	1.80±0.10	1.00±0.10	8.00±0.20	1.75±0.10	3.50±0.05	0.60+0.2/-0	0.60±0.10	4.00±0.10	4.00±0.05	2.00±0.05
CRT05	2.30±0.10	1.55±0.10	8.00±0.20	1.75±0.10	3.50±0.05	0.75+0.2/-0	0.75±0.10	4.00±0.10	4.00±0.05	2.00±0.05
CRT06	3.50±0.20	1.90±0.20	8.00±0.20	1.75±0.10	3.50±0.05	0.75+0.2/-0	0.75±0.10	4.00±0.10	4.00±0.05	2.00±0.05
CRT10	3.50±0.20	2.80±0.20	8.00±0.20	1.75±0.10	3.50±0.05	0.75+0.2/-0	0.75±0.10	4.00±0.10	4.00±0.05	2.00±0.05

Embossed Plastic Tape Specifications

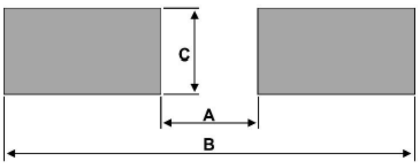


Type	A (mm)	B (mm)	W (mm)	E (mm)	F (mm)	T1 (mm)	T2 (mm)	P (mm)	P0 (mm)	P1 (mm)
CRT0A	5.50±0.20	2.80±0.20	12.00±0.20	1.75±0.10	5.50±0.05	1.10±0.15	0.23±0.15	4.00±0.10	4.00±0.05	2.00±0.05
CRT12	6.70±0.20	3.40±0.20	12.00±0.20	1.75±0.10	5.50±0.05	1.10±0.15	0.23±0.15	4.00±0.10	4.00±0.05	2.00±0.05

Front and Rear Guide Belt Dimensions



■Recommend Land Pattern



Unit: mm

Type	A	B	C
CRT01	0.23±0.05	0.84±0.05	0.38±0.05
CRT02	0.45±0.05	1.45±0.05	0.60±0.05
CRT03	0.80±0.05	2.50±0.05	0.95±0.05
CRT05	1.05±0.10	3.25±0.10	1.40±0.10
CRT06	1.90±0.10	4.50±0.10	1.75±0.10
CRT10	2.00±0.10	4.60±0.10	2.70±0.10
CRT0A	3.50±0.10	6.50±0.10	2.70±0.10
CRT12	4.80±0.10	7.80±0.10	3.40±0.10

■Marking

No Marking for 0201 and 0402

Jumper for all: Letter “0”

Example: 

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

Example:

Resistance	5.6Ω	97.6Ω	100Ω	2.2KΩ	10KΩ	49.9KΩ	100KΩ
Marking	5R60	97R6	1000	2201	1002	4992	1003

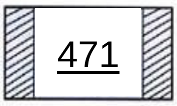
5% for 0603/0805/1206/1210/2010/2512: 3 digits marking in E24

Example: 101=100Ω 102=1KΩ (1st and 2nd are E24 code and 3rd code is multiplier)

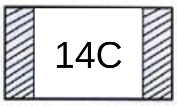
E24 code	10	11	12	13	15	16	18	20	22	24	27	30	33	36	39	43	47	51	56	62	68	75	82	91

1% for 0603(E24): 3 digits marking in E24

Example: one short bar under marking letter



1% for 0603(E96): 3 digits marking in E96



3 digits marking for Example: 14C=13K7Ω 13C=13K3Ω

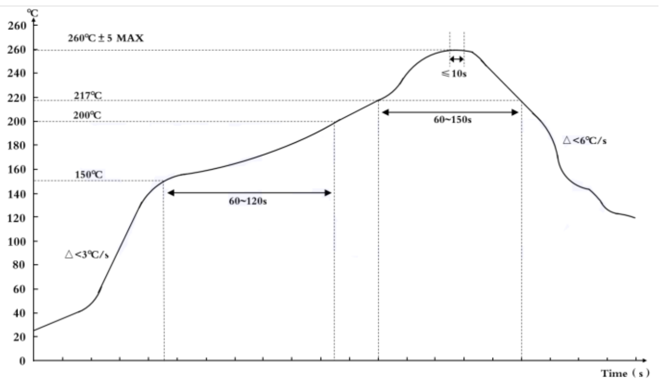
68B=4K99Ω 68X=49.9Ω

Marking Table

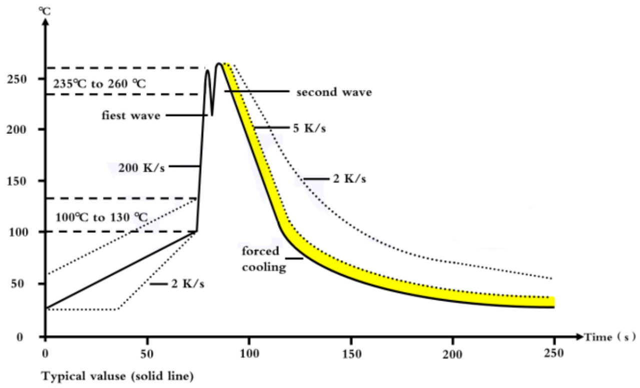
Code	E96	Code	E96	Code	E96	Code	E96
01	100	25	178	49	316	73	562
02	102	26	182	50	324	74	576
03	105	27	187	51	332	75	590
04	107	28	191	52	340	76	604
05	110	29	196	53	348	77	619
06	113	30	200	54	357	78	634
07	115	31	205	55	365	79	649
08	118	32	210	56	374	80	665
09	121	33	215	57	383	81	681
10	124	34	221	58	392	82	698
11	127	35	226	59	402	83	715
12	130	36	232	60	412	84	732
13	133	37	237	61	422	85	750
14	137	38	243	62	432	86	768
15	140	39	249	63	442	87	787
16	143	40	255	64	453	88	806
17	147	41	261	65	464	89	825
18	150	42	267	66	475	90	845
19	154	43	274	67	487	91	866
20	158	44	280	68	499	92	887
21	162	45	287	69	511	93	909
22	165	46	294	70	523	94	931
23	169	47	301	71	536	95	953
24	174	48	309	72	549	96	976

Code	A	B	C	D	E	F	G	X	Y		
Multiplier	10^0	10^1	10^2	10^3	10^4	10^5	10^6	10^{-1}	10^{-2}		

■Soldering Condition



Recommended reflow soldering curve



Recommended wave soldering curve