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MLCC

General Purpose Series

NPO CERAMIC CHIPS
Surface Mount Chip



Size _ 0201 to 1812
Capacitance Range _ 0.47pF to 22nF
Capacitance Tolerance _
C < 10pF : $\pm 0.1\text{pF}$, $\pm 0.25\text{pF}$, $\pm 0.5\text{pF}$
C $\geq 10\text{pF}$: $\pm 1\%$, $\pm 2\%$, $\pm 5\%$

Rated Working Voltage _ 16Vdc to 4000Vdc
Operating Temp. Range _ -55°C to +125°C
Packaging _ Reel / Bulkcase

General Purpose Series

X7R/X5R CERAMIC CHIPS
Surface Mount Chip



Size _ 0201 to 1812
Capacitance Range _ 100pF to 4.7uF
Capacitance Tolerance _ $\pm 5\%$, $\pm 10\%$, $\pm 20\%$

Rated Working Voltage _ 6.3Vdc to 2000Vdc
Operating Temp. Range _ -55°C to +125°C
Packaging _ Reel / Bulkcase

General Purpose Series

Y5V CERAMIC CHIPS
Surface Mount Chip



Size _ 0402 to 1812
Capacitance Range _ 10nF to 22uF
Capacitance Tolerance _ $\pm 20\%$, $+80\%$ / -20%

Rated Working Voltage _ 10Vdc to 50Vdc
Operating Temp. Range _ -25°C to +85°C
Packaging _ Reel / Bulkcase

General Purpose Series

Z5U CERAMIC CHIPS



Size _ 0603 to 1210
Capacitance Range _ 10nF to 1uF
Capacitance Tolerance _ $\pm 20\%$, $+80\%$ / -20%

Rated Working Voltage _ 25Vdc, 50Vdc
Operating Temp. Range _ +10°C to +85°C
Packaging _ Reel / Bulkcase

Microwave Series

NPO CERAMIC CHIPS



Size _ 0603 to 1206
Capacitance Range _ 0.47pF to 120pF
Capacitance Tolerance _
C < 10pF : $\pm 0.1\text{pF}$, 0.25pF , $\pm 0.5\text{pF}$
C $\geq 10\text{pF}$: $\pm 10\%$, $\pm 2\%$, $\pm 5\%$

Rated Working Voltage _ 50V
Operating Temp. Range _ -55°C to 125°C
Packaging _ Reel / Bulkcase

4 x C Array Series

NPO, X7R, Y5V CERAMIC CHIPS
Surface Mount Chip



Size _ 0508, 0612
Capacitance Range _ 10pF to 100nF
Capacitance Tolerance _ $\pm 5\%$, $\pm 10\%$, $\pm 20\%$
 $+80\%$ / -20%

Rated Working Voltage _ 16Vdc to 50Vdc
Packaging _ Reel

2 x C Array Series

NPO, X7R CERAMIC CHIPS
Surface Mount Chip



Size _ 0405
Capacitance Range _ 47pF to 1uF
Capacitance Tolerance _ $\pm 10\%$, $\pm 20\%$

Rated Working Voltage _ 16Vdc to 50Vdc
Packaging _ Reel

Low Inductance Series

X7R CERAMIC CHIPS
Surface Mount Chip



Size _ 0508, 0612
Capacitance Range _ 10pF to 220nF
Capacitance Tolerance _ $\pm 10\%$, $\pm 20\%$

Rated Working Voltage _ 16Vdc to 50Vdc
Packaging _ Reel



MLCC

X2Y Series

NPO, X7R CERAMIC CHIPS



Size _ 0603 to 1812
 Capacitance Range _ 33pF to 470nF
 Capacitance Tolerance _ ±5%, ±10%, ±20%
 +80% / -20%

Rated Working Voltage _ 6.3Vdc to 100Vdc
 Packaging _ Reel

Feed-through Series

NPO, X7R CERAMIC CHIPS
 Surface Mount Chip



Size _ 1206
 Capacitance Range _ 47pF to 1uF
 Capacitance Tolerance _ ±2%, ±5%, ±10%, ±20%

Rated Working Voltage _ 16Vdc to 50Vdc
 Operating Temp. Range _ -55°C to +125°C
 Packaging _ Reel

Feed-through Array Series

NPO, X7R CERAMIC CHIPS
 Surface Mount Chip



Size _ 0612
 Capacitance Range _ 39pF to 10nF
 Capacitance Tolerance _ ±5%, ±10%, ±20%

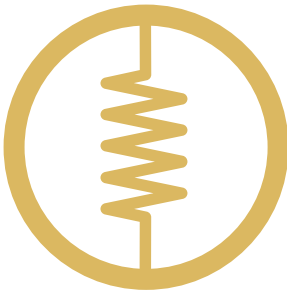
Rated Working Voltage _ 50Vdc
 Operating Temp. Range _ -55°C to +125°C
 Packaging _ Reel

Cross Reference

Manufacturer	Yageo	Phycomp	AVX	Kemet	Murata	NIC	Panasonic	Rohm	Samsung	TDK	Vishay Vitramon
1 Series	CC	-	-	C	GRM	NMC	ECU	MCH	CL	CC	VJ
2 Case Size											
0402	0402	0402	0402	0402	36	0402	Q	15	5	0402	0402
0603	0603	0603	0603	0603	39	0603	V	18	10	0603	0603
0805	0805	0805	0805	0805	40	0805	N/G	21	21	0805	0805
1206	1206	1206	1206	1206	42-6	1206	M/H	31	31	1206	1206
3 Temperature Coefficient											
NPO	NPO	CG	A	G	COG	NPO	C	A	C	NPO	A
X7R	X7R	2R	C	R	X7R	X7R	B	C	B	X7R	X
Z5U	Z5U	2E	E	U	Z5U	Z5U	-	E	E	Z5U	U
Y5V	Y5V	2F	G	V	Y5V	Y5V	F	F	F	Y5V	-
4 Nominal Capacitance	(Examples)										
	0.01µF = 103				470pF = 471					0.5pF = 0R5	
5 Capacitance Tolerance		B	C	D	F	G	J	K	M	Z	
		±0.1pF	±0.25pF	±0.50pF	±1.0%	±2.0%	±5.0%	±10%	±20%	80%~20%	
6 Rated Voltage											
16V	7	7	Y	4	016	16	1C	3	O	C	-
25V	B	8	3	3	025	25	1E	2	A	E	X
50V	9	9	5	5	050	50	1H	5	B	H	A
100V	0	0	1	1	100	100	-	-	C	-	B
7 Termination											
NiBar	B	B	T	C	(GRM)	-	-	(MCH)	N	-	X
AgPd	A	2c	1	-	(GR)	-	-	(MC)	-	-	F
8 Packing											
Bulk	-	-	B	-	B	-	X	-	B	B	B
Paper Tape 7" Reel	R	2	N	-	D	-	V	K	C	-	C
Paper Tape 13" Reel	P	3	S	-	J	-	Y	L	D	-	P
Blister Tape 7" Reel	K	B	M	-	L	-	W	P	E	T	T
Blister Tape 13" Reel	F	F	R	-	K	-	Z	O	F	-	R
Bulk Cassette	C	P	7	-	-	-	C	C	P	M	-

Company	Sample P/N	Description	MLCC	0402	20%	25V	Y5V	NiBar	22nF
Yageo	CC0402MRV5V7BN223	1	2	5	8	3	6	7	4
		CC	0402	M	R	Y5V	8	B	223
Phycomp	04022F223M8B20D	2	3	4	5	6	7	8	
		0402	2F	223	M	8	B	2	BME
AVX	04023E223AT2	2	6	3	4	-	7	8	
		0402	3	E	223	A	T	2	
Kemet	C0402C223M3VAC	1	2	Std.	4	5	6	3	7
		C	0402	C	223	M	3	V	N/A
Murata	GRM36Y5V223M016D	1	2	3	4	5	6	7	4
		GRM	36	Y5V	223	M	025	D	A
Panasonic	ECUE1E223MFQ	1	8	6	4	5	3	2	
		ECO	E	1E	223	M	F	O	
Rohm	MCH15016F223ZK	1	2	6	3	4	5	8	
		MCH	15	025	F	223	M	K	
Vishay Vitramon	VJ0402-223MXXC	1	2	3	4	5	7	6	8
		VJ	0402	-	223	M	X	X	C

For order codes, please check our web site.



General Purpose / Precision Resistors	SMD					R-Array (note)				R-Network	RC-Network
	Thick Film										
	1206	0805	0603	0402	0201	4 x 0603	8 x 0402	4 x 0402	2 x 0402	1206	1608
5%	RC01	RC11	RC21	RC31	RC41	ARC241	ARV381	ARV341	ARV321	RNA310	RCB210
1% (TC200)				RC32		ARV241					
1% (TC100)	RC02H	RC12H	RC22H			ARC242				RNA310	
1% (TC50)	RC02G	RC12G									

Note : TC = Temperature Coefficient; ARC = Concave Type Termination; ARV = Convex Type Termination

High Precision Resistors	Thick Film			Thin Film						
		0.5%	0.25%	0.1%	1%	0.5%	0.25%	0.1%	0.05%	
1210					TC50	TF520	TF521	TF522	TF523	TF524
					TC25	TF510	TF511	TF512	TF513	TF514
1208	TC100		RC04H	RC05H	TC50	TF020	TF021	TF022	TF023	TF024
	TC50	RC03G	RC04G	RC05G	TC25	TF010	TF011	TF012	TF013	TF014
0805	TC100		RC14H	RC15H	TC50	TF120	TF121	TF122	TF123	TF124
	TC50	RC13G	RC14G	RC15G	TC25	TF110	TF111	TF112	TF113	TF114
0603	TC100	RC23H	RC24H	RC25H	TC50	TF220	TF221	TF222	TF223	TF224
					TC25	TF210	TF211	TF212	TF213	TF214
0402	TC200	RC33			TC50	TF320	TF321	TF322	TF323	TF324
					TC25	TF310	TF311	TF312	TF313	TF314

Power Resistors	SMD	
	Thick Film	
Pnom at 70°C	5%	1%
0.5W	PRC111	PRC111
	PRC111 Low Ohmic	PRC111 Low Ohmic
1.0W	PRC201	PRC201
	PRC201 Low Ohmic	PRC201 Low Ohmic
	LPRC201	
	PRC221	PRC221
	PRC221 Low Ohmic	PRC221 Low Ohmic
	LPRC221	LPRC221
	VPRC221	
	Metal Strip	
	5%	1%
	MPRC221	MPRC221

Application Specific Resistors	1206	0805	0603	0402
High Ohmic / High Voltage	HRC01	HRC11	HRC21	
Low ohmic	LRC01 (5%) - LRC02 (1%)	LRC11 / 11P - LRC12 / 12P	LRC21(5%) - LRC22(1%)	
Fusible	FRC01		FRC21	
Surge	SRC01			
Trimmmable	RC02TR	RC12TR	RC22TR	RC32TR
High Voltage	VRC01 (5%) - VRC02 (1%)	VRC11 (5%) - VRC12 (1%)		
NI Au - Termination*	RC01 - RC02H		RC21 - RC22H	

* = Special Termination for Hybrid Board Gluing / Replace AgPd Termination



Chip Resistors

General Purpose

THICK FILM CHIP
Glass Passivated Surface Mount



Resistance Range (E24+E96) _ 1Ω to 22MΩ/ORO
Rated Power @ 70°C _ 1/20 to 1W
Temp. Coefficient _ ±100 to ±200ppm/°C
Resistance Tolerance _ ±1%, ±5%

Max. Working Voltage _ 25Vdc to 200Vdc
Max. Overload Voltage _ 50Vdc to 400Vdc
Case Sizes _ 0201, 0402, 0603, 0805
1206, 1210, 2010, 2512

Hi-Precision Series

THICK FILM CHIP
Glass Passivated Surface Mount



Resistance Range (E24+E96) _ 1Ω to 22MΩ/ORO
Rated Power @ 70°C _ 1/20 to 1W
Temp. Coefficient _ ±100 to ±200ppm/°C
Resistance Tolerance _ ±0.1%, ±0.5%, ±1%, ±5%

Max. Working Voltage _ 25Vdc to 200Vdc
Max. Overload Voltage _ 50Vdc to 400Vdc
Case Sizes _ 0402, 0603, 0805, 1206

Low Ohmic Series

THICK FILM CHIP
Glass Passivated Surface Mount



Resistance Range (E24+E96) _ 0.01Ω to 0.99Ω
Rated Power @ 70°C _ 1/10 to 1W
Temp. Coefficient _ ±75 to ±1500ppm/°C
Resistance Tolerance _ ±1%, ±5%

Case Sizes _ 0402, 0603, 0805, 1206
1210, 2010, 2512

Low Values for Current Sensing Applications

SMD Current Sensors

VERY LOW OHMIC
Metal Strip



Resistance Range (E24+E96) _ 0.001Ω to 0.01Ω
Rated Power @ 70°C _ 1W
Temp. Coefficient _ ±75 to ±200ppm/°C

Resistance Tolerance _ ±1%, ±5%
Case Sizes _ 2512

Low Values for Current Sensing Applications

Standard Thin Film Series

THIN FILM CHIP
Surface Mount



Resistance Range (E24+E96) _ 10Ω to 1MΩ
Rated Power @ 70°C _ 1/64 to 1W
Temp. Coefficient _ ±50ppm/°C
Resistance Tolerance _ 1%

Max. Working Voltage _ 50Vdc to 200Vdc
Max. Overload Voltage _ 100Vdc to 400Vdc
Case Sizes _ 0402, 0603, 0805, 1206

Precision Thin Film Series

THIN FILM CHIP
Surface Mount



Resistance Range (E24+E96) _ 10Ω to 1MΩ
Rated Power @ 70°C _ 1/16 to 0.5W
Temp. Coefficient _ ±15 to ±50ppm/°C
Resistance Tolerance _ ±0.1%, ±0.25%, ±0.5%, 1%

Max. Working Voltage _ 50Vdc
Max. Overload Voltage _ 100Vdc
Case Sizes _ 0402, 0603, 0805, 1206



Chip Arrays

0402 * 2 Series
0402 * 4 Series

THICK FILM ARRAY
Convex 0404/0408 Surface Mount



Resistance Range (E24) _ 10Ω to 1MΩ
Number of Resistors _ 2 and 4
Rated Power Per Element _ 1/16W
Temp. Coefficient _ ±200ppm/°C

Resistance Tolerance _ ±1%, ±5%
Max. Working Voltage _ 50Vdc
Max. Overload Voltage _ 100Vdc
Circuit Types _ Isolated

0603 * 4 Series

THICK FILM ARRAY
Convex 0612 Surface Mount



Resistance Range (E24) _ 10Ω to 1MΩ/0R0
Number of Resistors _ 4
Rated Power Per Element _ 1/16W
Temp. Coefficient _ ±200ppm/°C

Resistance Tolerance _ ±1%, ±5%
Max. Working Voltage _ 50Vdc
Max. Overload Voltage _ 100Vdc
Circuit Types _ Isolated

0603 * 4 Series

THICK FILM ARRAY
Concave 0612 Surface Mount



Resistance Range (E24) _ 10Ω to 1MΩ
Number of Resistors _ 4
Rated Power Per Element _ 1/16W
Temp. Coefficient _ ±200ppm/°C

Resistance Tolerance _ ±1%, ±5%
Max. Working Voltage _ 50Vdc
Max. Overload Voltage _ 100Vdc
Circuit Types _ Isolated

1206 * 4 Series

THICK FILM ARRAY
Convex 1220 Surface Mount



Resistance Range (E24) _ 10Ω to 1MΩ/0R0
Number of Resistors _ 4
Rated Power Per Element _ 0.125W
Temp. Coefficient _ ±200ppm/°C

Resistance Tolerance _ ±5%
Max. Working Voltage _ 200Vdc
Max. Overload Voltage _ 400Vdc
Circuit Types _ Isolated

Thin Film Arrays

0402 * 4 Series

THIN FILM ARRAY
Convex 0508 Surface Mount



Resistance Range (E24) _ 10Ω to 100KΩ
Number of Resistors _ 4
Rated Power Per Element _ 0.063W
Temp. Coefficient _ ±25ppm/°C, ±50ppm/°C

Resistance Tolerance _ 0.1%, 0.5%, 1%
Max. Working Voltage _ 50Vdc
Max. Overload Voltage _ 100Vdc
Circuit Types _ Isolated

0603 * 4 Series

THIN FILM ARRAY
Convex 0612 Surface Mount



Resistance Range (E24) _ 10Ω to 330KΩ
Number of Resistors _ 4
Rated Power Per Element _ 0.063W
Temp. Coefficient _ ±25ppm/°C, ±50ppm/°C

Resistance Tolerance _ 0.1%, 0.5%, 1%
Max. Working Voltage _ 75Vdc
Max. Overload Voltage _ 150Vdc
Circuit Types _ Isolated

Network

0402 * 8 Series

THICK FILM ARRAY
Convex 0616 Surface Mount



Resistance Range (E24) _ 10Ω to 1MΩ
Number of Resistors _ 8
Rated Power Per Element _ 1/16W
Temp. Coefficient _ ±200ppm/°C

Resistance Tolerance _ ±1%, ±5%
Max. Working Voltage _ 50Vdc
Max. Overload Voltage _ 100Vdc
Circuit Types _ Isolated

10P8R Series

THICK FILM ARRAY
Convex 0612 Surface Mount



Resistance Range (E24) _ 33Ω to 100KΩ
Number of Resistors _ 8
Rated Power Per Element _ 1/32W
Temp. Coefficient _ ±200ppm/°C

Resistance Tolerance _ ±5%
Max. Working Voltage _ 25Vdc
Max. Overload Voltage _ 50Vdc
Circuit Types _ Dual Common



Network

10P8R Series

THICK FILM ARRAY
Convex 1225 Surface Mount

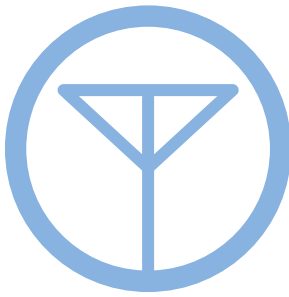


Resistance Range (E24) _ 33Ω to 100KΩ
Number of Resistors _ 8
Rated Power Per Element _ 1/16W
Temp. Coefficient _ ±200ppm/°C

Resistance Tolerance _ ±5%
Max. Working Voltage _ 50Vdc
Max. Overload Voltage _ 100Vdc
Circuit Types _ Dual Common

Cross Reference

Manufacturer	Yageo	Vitrohm	Phycomp	AVX	BC Comp	Kamaya	KOA	Panasonic	Rohm	Vishay	Vishay Dale	
1 Series	RC	RGC	RC	CR	DC.	RMC	RM73 / RK73	ERJ	MCR	D	CR / CRCW	
2	0402 1/16W	0402	512-0	31	05	–	RMC	1E	2GE	01	10	0402
	0603 1/16W	0603	513-0	21/22H	10	DCT 0603	1/16	1J	3GS	03	11	0603
	0805 1/10W	0805	503-0	11/12H	21	DCU 0805	1/10	2A	6GE	10	12	0805
	1206 1/8W	1206	502-0	01/02H	32	DCA 1206	–	2B	8GE	18	25	1206
	1206 1/4W	1206	502-0	01/02H	–	DCA1206	–	2B	8GC	–	25	1206
	1210 1/4W	1210	507-0	–	–	–	1/4	2E	14	25	–	1210
	2010 1/2W	2010	508-0	–	–	–	1/2	2H	12(1812)	50	–	1210
	2512 1W	2512	509-0	–	63	–	1	3A	1W	100	–	2512
3 Tolerances	K		J		G		F					
		±10%		±5%		±2%		±1%				
4 Nominal Resistance Value	3 Digit Code						4 Digit Code					
	103 = 10K, 471 = 470R						1002 = 10K, 1471 = 1K47					
5 Package												
Paper Tape	R	7A		T	PA	TP	TD	V	EZH		RT1	
Plastic Tape	K	7D		H	–	TE	TE	U	JZH		RT2	
7" Reel	07	7A			PA							
10" Reel	10	–		D	–	–	–	–	FZH		RT3	
13" Reel	13	7Q		S	–	–	–	–	OZH		–	
Cassette	C	–		–	–	–	–	–	PZHI		–	
6 Marking (Except 0402)												
Top	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Company	Sample P / N	Description	Chip Resistor	Chip Resistor	0603	1K47	1%					
Yageo	RC0603FR-071K47	1	2	3	5	5	4					
		RC	0603	F	R	07	1K47					
Vitrohm	513-0 1K47 1% 7A		1	2	4	3	5					
			513-0	1K47	1%	7A						
AVX	CR10-1471F-T	1	2	4	3	5						
		CR	10	1471	F	T						
KOA	RK73H1JT1471F	1	–	2	5	4	3					
		RK73	H	1J	T	1471	F					
Panasonic	ERJ3ENF1471V	1	2	6	3	4	5					
		ERJ	3E	N	F	1471	V					
Rohm	MCR3EZH1471	1	2	5	3	4						
		MCR	3	EZH	F	1471						
Vishay	D11 1K47 1% 7"	1	2	4	3	5						
		D	11	1K47	1%	7"						
Vishay Dale	CRCW06031471FR1	1	2	4	3	5						
		CRCW	0603	1471	F	RT1						



High Frequency
Antenna

UHF-Antenna

CERAMIC



Size (mm) _ 37.5 x 6.8 x 0.9
Frequency Range _ 421 to 445 MHz
Bandwidth _ 20 MHz
Gain (Max.) _ 0.5 dBi
Polarization _ Linear

Azimuth _ Omni-Directional
VSWR _ < 2.0
Temp. Range _ -55 to 125°C
Packing _ Bulk, Tape

TDMA Antenna

CERAMIC



Size (mm) _ 16.5 x 14 x 0.9
Frequency Range _ 850 to 950 MHz
Bandwidth _ 80 MHz
Gain (Max.) _ 1.5 dBi
Polarization _ Linear

Azimuth _ Omni-Directional
VSWR _ < 2.0
Temp. Range _ -55 to 125°C
Packing _ Bulk, Tape

Dualband Antenna

(900/1800 MHz) PCB



Size (mm) _ 24 x 10 x 6
Frequency Range _ 880 to 960 MHz, 1710 to 1880 MHz
Bandwidth _ 80 MHz, 170 MHz
Gain (Max.) _ 0 to 0.5 dBi, 0.5 to 1 dBi
Polarization _ Linear

Azimuth _ Omni-Directional
VSWR _ < 2.7
Temp. Range _ -55 to 125°C
Packing _ Bulk

Dualband Antenna

(900/1800 MHz) CERAMIC



Size (mm) _ 21 x 12 x 0.9
Frequency Range _ 880 to 960 MHz, 1710 to 1880 MHz
Bandwidth _ 80 MHz, 170 MHz
Gain (Max.) _ 0 to 0.5 dBi, 0.5 to 1 dBi
Polarization _ Linear

Azimuth _ Omni-Directional
VSWR _ < 2.7
Temp. Range _ -55 to 125°C
Packing _ Bulk, Tape

Tripleband Antenna

(900/1800/1900 MHz) PCB VERTICAL



Size (mm) _ 30 x 9.4 x 0.8
Frequency Range _ 880 to 960 MHz, 1710 to 1990 MHz
Bandwidth _ 80 MHz, 280 MHz
Gain (Max.) _ 0 to 0.5 dBi, 0.5 to 1 dBi
Polarization _ Linear

Azimuth _ Omni-Directional
VSWR _ < 2.5
Temp. Range _ -55 to 125°C
Packing _ Bulk

GPS Antenna (CP Mode)

1.575 GHz



Size (mm) _ 12 x 12 x 4
Frequency Range _ 1.58 GHz
Bandwidth _ 6 MHz
Gain (Max.) _ 3 dBi

Polarization _ Right Hand Circular Polarization
VSWR _ < 2.5
Temp. Range _ -55 to 125°C
Packing _ Bulk

GPS Antenna (CP Mode)

1.575 GHz



Size (mm) _ 18 x 18 x 4
Frequency Range _ 1.58 GHz
Bandwidth _ 6 MHz
Gain (Max.) _ 4 dBi

Polarization _ Right Hand Circular Polarization
VSWR _ < 2.5
Temp. Range _ -55 to 125°C
Packing _ Bulk

GPS Antenna (LP Mode)

(1.575 GHz)



Size (mm) _ 12.5 x 6.6 x 0.9
Frequency Range _ 1.58 GHz
Bandwidth _ 100 MHz
Gain (Max.) _ 1.5 dBi
Polarization _ Linear

Azimuth _ Omni-Directional
VSWR _ < 2.0
Temp. Range _ -55 to 125°C
Packing _ Bulk



High Frequency Antenna

DECT / WCDMA

ANTENNA



Size (mm) _ 8.8 x 6.8 x 0.9
 Frequency Range _ 1.88 to 2.1 GHz
 Bandwidth _ 100 MHz
 Gain (Max.) _ 2 dBi
 Polarization _ Linear

Azimuth _ Omni-Directional
 VSWR _ < 2.0
 Temp. Range _ -55 to 125°C
 Packing _ Tape

Bluetooth Antenna

LONG SHAPE



Size (mm) _ 7.8 x 3.6 x 0.9
 Frequency Range _ 2.45 GHz
 Bandwidth _ > 100 MHz
 Gain (Max.) _ 2.5 dBi
 Polarization _ Linear

Azimuth _ Omni-Directional
 VSWR _ < 2.0
 Temp. Range _ -55 to 125°C
 Packing _ Tape

Bluetooth Antenna

LONG SHAPE



Size (mm) _ 7.8 x 3.6 x 0.9
 Frequency Range _ 2.60 GHz
 Bandwidth _ > 100 MHz
 Gain (Max.) _ 2.5 dBi
 Polarization _ Linear

Azimuth _ Omni-Directional
 VSWR _ < 2.0
 Temp. Range _ -55 to 125°C
 Packing _ Tape

Bluetooth Antenna

LONG SHAPE



Size (mm) _ 7.8 x 3.6 x 0.9
 Frequency Range _ 2.70 GHz
 Bandwidth _ > 100 MHz
 Gain (Max.) _ 2.5 dBi
 Polarization _ Linear

Azimuth _ Omni-Directional
 VSWR _ < 2.0
 Temp. Range _ -55 to 125°C
 Packing _ Tape

Bluetooth Antenna



Size (mm) _ 7.3 x 5.5 x 1.3
 Frequency Range _ 2.45 GHz
 Bandwidth _ > 100 MHz
 Gain (Max.) _ 1.2 dBi
 Polarization _ Linear

Azimuth _ Omni-Directional
 VSWR _ < 2.0
 Temp. Range _ -55 to 125°C
 Packing _ Tape

Bluetooth Antenna



Size (mm) _ 7.3 x 5.5 x 1.3
 Frequency Range _ 2.60 GHz
 Bandwidth _ > 100 MHz
 Gain (Max.) _ 1.2 dBi
 Polarization _ Linear

Azimuth _ Omni-Directional
 VSWR _ < 2.0
 Temp. Range _ -55 to 125°C
 Packing _ Tape

Bluetooth Antenna



Size (mm) _ 7.3 x 5.5 x 1.3
 Frequency Range _ 2.70 GHz
 Bandwidth _ > 100 MHz
 Gain (Max.) _ 1.2 dBi
 Polarization _ Linear

Azimuth _ Omni-Directional
 VSWR _ < 2.0
 Temp. Range _ -55 to 125°C
 Packing _ Tape

Bluetooth Antenna



Size (mm) _ 7.3 x 5.5 x 1.3
 Frequency Range _ 2.80 GHz
 Bandwidth _ > 100 MHz
 Gain (Max.) _ 1.2 dBi
 Polarization _ Linear

Azimuth _ Omni-Directional
 VSWR _ < 2.0
 Temp. Range _ -55 to 125°C
 Packing _ Tape



High Frequency Antenna

HyperLan

5.2 GHz



Size (mm) _ 3.6 x 2.7 x 0.9
 Frequency Range _ 5.150 to 5.350 GHz
 Bandwidth _ 200 MHz
 Gain (Max.) _ 4 dBi

Polarization _ Linear
 VSWR _ < 2.0
 Temp. Range _ -55 to 125°C
 Packing _ Bulk, Tape

IEEE 802.11b & 11a Dual Band

2.45/5.2 GHz



Size (mm) _ 8.7 x 8 x 0.9
 Frequency Range _ 2.45 / 5.2 GHz
 Bandwidth _ > 100 MHz
 Gain (Max.) _ 0 dBi
 Polarization _ Linear

Azimuth _ Omni-Directional
 VSWR _ < 2.0
 Temp. Range _ -55 to 125°C
 Packing _ Bulk, Tape

Bluetooth/WLAN IEEE 802.11b

IEEE802.11 ANTENNA
 FR4 with Cable/Connector



Size (mm) _ 28 x 5.6 x 0.8
 Frequency Range _ 2.4 to 2.5 GHz
 Bandwidth _ 100 MHz
 Gain (Max.) _ 1 dBi
 Polarization _ Linear

Azimuth _ Omni-Directional
 VSWR _ < 2.5
 Temp. Range _ -55 to 125°C
 Packing _ Bulk

IEEE 802.11b & 11a Dual Band

IEEE802.11 ANTENNA
 FR4 with Cable/Connector



Size (mm) _ 58 x 5.6 x 0.4
 Frequency Range _ 2.4 to 2.5 GHz, 5.1 to 5.3 GHz
 Bandwidth _ 100 MHz, 200 MHz
 Gain (Max.) _ 1 dBi
 Polarization _ Linear

Azimuth _ Omni-Directional
 VSWR _ < 2.5
 Temp. Range _ -55 to 125°C
 Packing _ Bulk

High Frequency Attenuator

ATV321 Series

ATTENUATOR



Case Size _ 0404
 Attenuation Range _ 1 dB to 20 dB
 Attenuation Tolerance _ 1 to 5 dB : ±0.3dB/±0.2dB
 Frequency Range _ 1 to 10 dB : DC to 2.5 GHz
 15 & 20 dB : DC to 2.0 GHz

Max. Permissible Vol. _ 50V
 Power Rating _ 40 mW
 Temp. Range _ -55 to 125°C
 Packing _ Tape

Attenuation Value (dB)	Standard Tolerance (dB)	Optional Tolerance (dB)
1	±0.3	±0.2
2	±0.3	±0.2
3	±0.3	±0.2
4	±0.3	±0.2
5	±0.3	±0.2
6	±0.5	±0.3
7	±0.5	±0.3
8	±0.5	±0.3
9	±0.5	±0.3
10	±0.5	±0.3
15	±1.0	±0.5
20	±2.0	±1.0



Aluminum Electrolytic Caps.

SG Series

LONG LIFE-BALLAST USE
Radial



Capacitance Range _ 3.3 μ F to 330 μ F
Rated Working Voltage _ 160Vdc to 450Vdc
Operating Temp. Range _
160Vdc to 400Vdc -40°C to +105°C
450Vdc -25°C to +105°C

Capacitance Tolerance _ \pm 20%
Max. Leakage Current _ 0.06CV + 10 μ A
Load Life _ 5,000Hrs. @ 105°C
Packaging _ Bulk, Tape / Box

SN Series

NON-POLAR
Radial



Capacitance Range _ 0.47 μ F to 2,200 μ F
Rated Working Voltage _ 6.3Vdc to 100Vdc
Operating Temp. Range _ -40°C to +105°C
Capacitance Tolerance _ \pm 20%

Max. Leakage Current _ \leq 0.03CV + 3 μ A
Load Life _ 1,000Hrs. @ 105°C
Packaging _ Bulk, Tape / Box

SB Series

LOW LEAKAGE CURRENT
Radial



Capacitance Range _ 0.1 μ F to 4,700 μ F
Rated Working Voltage _ 6.3Vdc to 100Vdc
Operating Temp. Range _ -40°C to +105°C
Capacitance Tolerance _ \pm 20%

Max. Leakage Current _ \leq 0.002CV 0.4 μ A
Load Life _ 1,000Hrs. @ 105°C
Packaging _ Bulk, Tape / Box

SR Series

BI-POLAR
Horz. Deflection Radial



Capacitance Range _ 2.2 μ F to 47 μ F
Rated Working Voltage _ 25Vdc, 35Vdc, 50Vdc
Operating Temp. Range _ -40°C to +85°C
Capacitance Tolerance _ \pm 20%

Max. Leakage Current _ 100 μ A (after 5 Min.)
Load Life _ 1,000Hrs. @ 85°C
Packaging _ Bulk, Tape / Box

LH Series

GENERAL PURPOSE USE
Snap-In



Capacitance Range _ 56 μ F to 120,000 μ F
Rated Working Voltage _ 6.3Vdc to 450Vdc
Operating Temp. Range _ 6.3-100Vdc -40°C to 85°C
160-450Vdc -25°C to 85°C

Capacitance Tolerance _ 20%
Max. Leakage Current _ \leq 0.02CV or 3mA
Load Life _ 2,000Hrs. @ 85°C
Packaging _ Bulk

LG Series

GENERAL PURPOSE USE
Snap-In



Capacitance Range _ 150 μ F to 82,000 μ F
Rated Working Voltage _ 6.3Vdc to 450Vdc
Operating Temp. Range _ 6.3-100Vdc -40°C to 105°C
160-450Vdc -25°C to 105°C
Capacitance Tolerance _ \pm 20%

Max. Leakage Current _ I = 0.02CV, L = 20mm
 \leq 0.03CV or 3mA
Load Life _ 2,000Hrs. @ 105°C
Packaging _ Bulk

LXK Series

GENERAL PURPOSE USE
Snap-In



Capacitance Range _ 100 μ F to 22,000 μ F
Rated Working Voltage _ 16Vdc to 450Vdc
Operating Temp. Range _ -25°C to +85°C
Capacitance Tolerance _ \pm 20%

Max. Leakage Current _ \leq 0.01CV or 3mA
Load Life _ 2,000Hrs. @ 85°C
Packaging _ Bulk

CA Series

GENERAL PURPOSE USE
Surface Mount



Capacitance Range _ 0.1 μ F to 1000 μ F
Rated Working Voltage _ 4V to 100Vdc
Operating Temp. Range _ -40°C to +85°C
Capacitance Tolerance _ \pm 20%

Max. Leakage Current _ \leq 0.01CV or 3 μ A
Load Life _ 2000Hrs. @ 85°C
Packaging _ Reel


Aluminum Electrolytic Caps.
CB Series

GENERAL PURPOSE USE
Surface Mount



Capacitance Range _ 0.1 μ F to 470 μ F
Rated Working Voltage _ 6.3V to 100Vdc
Operating Temp. Range _ -40°C to +105°C
Capacitance Tolerance _ \pm 20%

Max. Leakage Current _ 0.01CV or 3 μ A
Load Life _ 1000Hrs. @ 105°C
Packaging _ Reel

CE Series

GENERAL PURPOSE USE
Surface Mount



Capacitance Range _ 0.1 μ F to 470 μ F
Rated Working Voltage _ 4V to 100Vdc
Operating Temp. Range _ -40°C to +105°C
Capacitance Tolerance _ \pm 20%

Max. Leakage Current _ 0.01CV or 3 μ A
Load Life _ 2000Hrs. @ 105°C
Packaging _ Reel

Film Capacitors
XG-H Series

METALLIZED
POLYPROPYLENE VDE 0565
X2-Class Non-Inductive Radial



Capacitance Range _ 0.0047 μ F to 4.7 μ F
Rated Working Voltage _ 250/275Vac; 50/60Hz
Operating Temp. Range _ -40°C to +100°C
Capacitance Tolerance _ \pm 5%, \pm 10%, \pm 20%

Dissipation Factor _ 0.1% Max. @ 1KHz
0.3% Max. @ 10KHz
Coating _ Plastic Case
Construction _ Polyurethane Resin Filled Box
Packaging _ Bulk

XG-V Series

METALLIZED
POLYPROPYLENE VDE 0565
X2-Class Non-Inductive Radial



Capacitance Range _ 0.0047 μ F to 4.7 μ F
Rated Working Voltage _ 250/275Vac; 50/60Hz
Operating Temp. Range _ -40°C to +85°C
Capacitance Tolerance _ \pm 5%, \pm 10%, \pm 20%

Dissipation Factor _ 0.1% Max. @ 1KHz
Coating _ Plastic Case
Construction _ Polyurethane Resin Filled Box
Packaging _ Bulk

XG-E Series

METALLIZED
POLYPROPYLENE VDE 0565
X1-Class Non-Inductive Radial



Capacitance Range _ 0.0047 μ F to 1.0 μ F
Rated Working Voltage _ 250Vdc; 50/60Hz
Operating Temp. Range _ -40°C to +85°C
Capacitance Tolerance _ \pm 5%, \pm 10%, \pm 20%

Dissipation Factor _ 0.1% Max. @ 1KHz
Coating _ Plastic Case
Construction _ Polyurethane Resin Filled Box
Packaging _ Bulk

YED/YFD Series

METALLIZED
POLYPROPYLENE VDE 0560-8
Plastic Case



Capacitance Range _ 0.1 μ F to 8 μ F (400V/450Vac)
0.1 μ F to 15 μ F (250Vac)
Rated Working Voltage _ 250V / 400V/450Vac
Operating Temp. Range _ -25°C to +70°C (450Vac)
-40°C to +85°C (250V/400Vac)

Capacitance Tolerance _ \pm 5%, \pm 10%, \pm 20%
Dissipation Factor _ 0.1% at 200Vac @ 60Hz
Packaging _ Bulk

YEE/YFE Series

METALLIZED
POLYPROPYLENE VDE 0560-8
Plastic Case



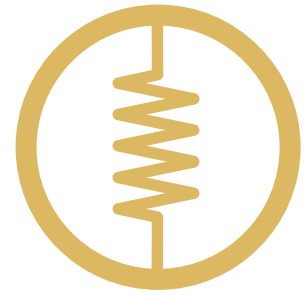
Capacitance Range _ 0.47 μ F to 5 μ F
Rated Working Voltage _ 400Vac 50/60Hz
Operating Temp. Range _ -25°C to +70°C

Capacitance Tolerance _ \pm 5%, \pm 10%, \pm 20%
Dissipation Factor _ 0.1% at 200Vac @ 60Hz
Packaging _ Bulk



Cross Reference

RADIAL												
FEATURES	LOAD	LIFE	YAGEO	RUBY-CON	NICHI-CON	PANASONIC	ELNA	EPCOS	BCC	SAMSUNG	SAMWHA	DAEWOO
Miniature 5 Max.	85°	1,000	S5	MS5	MA			B41820	222-134	SEM		REM
Miniature 5 Max.	105°	1,000	S5	MS5	MA	KS	RC3	B41820		STE	RE	REU
5.2 Max.	85°	1,000	S5	RE	MJ		RC4					
Low Leakage	85°	1,000	SB-Special		ML						LE	
	105°	1,000	SB-Special	MH5	MT			R3S				
Long Life	105°	5,000	SB		MV							
Low ESR	105°	1,000	SC									
Bi-Polar	85°	1,000	SN-Special	NW5	MP	KS-BP	RB3			NP5		
Bi-Polar	105°	1,000	SN-Special									
Miniature 7 Max.	85°	1,000	SS	MS7	SA/SL	K/KA	RC2		2222-097	SSM/SSM	SS	RSM/RSA
Miniature i7 Max.	105°	1,000	SS	MH7	ST/SV	KG/GA	R2S			STM	RK	RUM
Bi-Polar	85°	1,000	SN-Special	NW7	SP	KA-BP	RB2				NS	
Bi-Polar	105°	1,000	SN-Special							NP7		RMB
4 x 7 - 18 x 25	85°	1 - 2,000	Special	MS7/WA	SR/RS	SS						
4 x 7 - 18 x 25	105°	1,000	Design	WXA	RZ							
	85°	2,000	SK	TWSS	VX	SU	RE2	B41821	222-037	SSL	SG	RSS
Miniature	85°	2,000	SK	TK/USW	VR	M	RE3		2222-044	USL	SG/SV	RM
	105°	1,000	SEK		PE	GA			2222-047	ST	RV	RUS
	105°	2,000	SH					B41851	2222-116	SH		
Low Profile	105°	1 - 2,000	SEK	YXA	VZ/PV	GA/MH/NHG	RJ4			UST	RD	RMU
Bi-Polar	85°	1,000	SN	NA/NW	VP	SU-BP	R2B	B41822'5		NPL	NP	RND/RBD
Bi-Polar	105°	1,000	SN	NXA	ET	GA-BP				NPT	RN	RUB/RBU
Horization Deflection	105°	1,000	SR (70C)	HD	HA		RM			BPH/BHT	NF/NH	RHD
Standard	85°	1,000	SB (105C)	TWL	KL	MS/MSR		B41B25	2222-013	LN	RL	RSL
Low Leakage	85°	1,000	SB (105C)		ZA						LL	RL-2K hrs
5 - 7 L	105°	1 - 5,000		RC2JN	ML/V, SL/V	NXS				LN7		RSL
General	105°	1 - 2,000			PD					HT/HTS/STL	RX	RUF
	105°	5,000	SX	GXA	PF	HFE/HFS	RSG	B41856	2222-135			RFH
High CV	105°	2 - 5,000	SX	MXW/AXW	PS/PR/PY	HFG	RJ3/RSX	B41857				
Low Z	105°	2 - 5,000	SC	JXB	PJ	FB	RJJ	B41858	2222-136	TRF/TMZ	RZ	RSF
	105°	2 - 5,000	SC				RJH	B41859	2222-150		WD	RMF
	105°	2 - 5,000	SM	ZA/ZL							WG/WL	
Super Low Z	105°	2 - 5,000			PV/PM/PL/MF	FA/HFQ						
	105°	2 - 5,000		JXA/YXG	PW	FC						
	105°	5,000	SM	YXF								
	105°	5 - 7,000		YXB	PL	HFZ	RSH			TLA		
High Liability	105°/125°	5 - 7,000										
Long Life	105°	5 - 7,000				NE					RS	
Ballast	105°	5,000	SG							TRB	RH	
	125°	1 - 2,000	SQ	PX250	BD		RKA	B41866	2222-165	UHT	RW	RTL/RHL
SNAP IN												
General	85°	2,000	LX	USR	LQ/DM	UP	L/LH2/LH7					
Miniature	85°	2,000	LH	USC/USR	LU		LP5					FHS
General	105°	2,000	LG		GK-HH		LPG		2222-157	SMS	HC/LM	FHX
General	105°	2,000	LG	MXF/MXP/AXP	GO/GE/DO	HA	LPH/LPQ/LSF					
Miniature	105°	2,000	LG	MXR/MXC	GU/GJ	HB	LPT/LLH		2222-159	SMU	HE	FUH



Leaded Resistors

CFR Series

CARBON FILM
Std. & Reduced Sizes Axial Lead



Resistance Range _ 1Ω to 10MΩ/0R0
Rated Power @ 70°C _ 1/8W to 2W
Temp. Coefficient _ +350 to -1500ppm/°C
Resistance Tolerance _ ±2%, ±5%

Max. Working Voltage _ 150Vdc to 500Vdc
Max. Overload Voltage _ 300Vdc to 1KVdc
Packaging _ Bulk, Tape / Box, Tape / Reel
Meets _ EIA-RS 196A, JIS-C-6408

CF0 Series

POWER CARBON FILM
Std. Sizes Axial Lead



Resistance Range _ 1Ω to 10MΩ
Rated Power @ 70°C _ 0.4W & 0.6W
Temp. Coefficient _ +350 to -1500ppm/°C
Resistance Tolerance _ ±5%

Max. Working Voltage _ 200Vdc to 300Vdc
Max. Overload Voltage _ 400Vdc to 600Vdc
Packaging _ Tape / Box, Tape / Reel

FCR Series

CARBON FILM FLAME-PROOF
Std. & Reduced Sizes Axial Lead



Resistance Range _ 1Ω to 10MΩ
Rated Power @ 70°C _ 1/4W to 2W
Temp. Coefficient _ +350 to -1500ppm/°C
Resistance Tolerance _ ±5%

Max. Working Voltage _ 250Vdc to 500Vdc
Max. Overload Voltage _ 500Vdc to 1000Vdc
Packaging _ Tape / Box, Tape / Reel

FCO Series

**POWER CARBON FILM
FLAME-PROOF**
Std. Sizes Axial Lead



Resistance Range _ 1Ω to 10MΩ
Rated Power @ 70°C _ 0.4W & 0.6W
Temp. Coefficient _ +350 to -1500ppm/°C
Resistance Tolerance _ ±5%

Max. Working Voltage _ 200Vdc to 300Vdc
Max. Overload Voltage _ 400Vdc to 600Vdc
Packaging _ Tape / Box, Tape / Reel

NCR Series

NON-INDUCTIVE CARBON FILM
Std. & Reduced Size Axial Lead



Resistance Range _ 2.2Ω to 6KΩ
Rated Power @ 70°C _ 1/4W to 2W
Temp. Coefficient _ ±500ppm/°C

Resistance Tolerance _ ±5%, ±10%
Inductance _ < 1μH
Packaging _ Tape / Box, Tape / Reel

MFR Series

METAL FILM
Std. & Reduced Size Axial Lead



Resistance Range _ 10Ω to 1MΩ
Rated Power @ 70°C _ 1/8W to 2W
Temp. Coefficient _ ±50, ±100ppm/°C
Resistance Tolerance _ 0.1%, 0.25%, ±0.5%, ±1%, ±5%

Max. Working Voltage _ 150Vdc to 500Vdc
Max. Overload Voltage _ 300Vdc to 1KVdc
Packaging _ Bulk, Tape / Box, Tape / Reel
Meets _ JIS-C-5724, MIL-R-10509F

MF0 Series

POWER METAL FILM
Std. Size Axial Lead



Resistance Range _ 10Ω to 1MΩ
Rated Power @ 70°C _ 0.4W & 0.6W
Temp. Coefficient _ ±50ppm/°C
Resistance Tolerance _ ±1%

Max. Working Voltage _ 200Vdc to 300Vdc
Max. Overload Voltage _ 400Vdc to 600Vdc
Packaging _ Tape / Box, Tape / Reel

MFP Series

PRECISION METAL FILM
Std. & Reduced Size Axial Lead



Resistance Range _ 100Ω to 100KΩ
Rated Power @ 70°C _ 1/8W to 2W
Temp. Coefficient _ ±25ppm/°C
Resistance Tolerance _ ±0.1%, ±0.5%

Max. Working Voltage _ 150Vdc to 500Vdc
Max. Overload Voltage _ 300Vdc to 1000Vdc
Packaging _ Tape / Box, Tape / Reel



Leaded Resistors

FMF Series

METAL FILM FLAME-PROOF
Std. & Reduced Size Axial Lead



Resistance Range _ 10Ω to 1MΩ
Rated Power @ 70°C _ 1/4W to 2W
Temp. Coefficient _ ±50, ±100ppm/°C
Resistance Tolerance _ ±1%

Max. Working Voltage _ 250Vdc to 500Vdc
Max. Overload Voltage _ 500Vdc to 1000Vdc
Packaging _ Tape / Box, Tape / Reel

FMO Series

POWER METAL FILM FLAME-PROOF
Std. Size Axial Lead



Resistance Range _ 10Ω to 1MΩ
Rated Power @ 70°C _ 0.4W & 0.6W
Temp. Coefficient _ ±50ppm/°C
Resistance Tolerance _ ±1%

Max. Working Voltage _ 200Vdc to 300Vdc
Max. Overload Voltage _ 400Vdc to 600Vdc
Packaging _ Tape / Box, Tape / Reel

FRM Series

FUSIBLE METAL FILM
Std. & Reduced Size Axial Lead



Resistance Range _ 2.2Ω to 560Ω
Rated Power @ 70°C _ 1/4W to 2W
Temp. Coefficient _ ±350ppm/°C

Resistance Tolerance _ ±5%
Fusing Time _ Within 30 Sec.
At 16 Times of Rated Power

JPW Series

JUWPER WIRES



Material _ Soft Copper Wire with Tin Plating
Conductor Resistance _ 0.54MΩ/cm
Wire Diameter _ 0.5mm to 1.00mm ±0.05mm

Conductivity _ 96% Min.
Thickness of Plating _ 5μ ± 2μ
Packaging _ Tape / Box, Tape / Reel

RSF Series

METAL OXIDE FILM
Std. & Reduced Sizes Axial Lead



Resistance Range _ 1Ω to 510KΩ
Rated Power @ 70°C _ 1/4W to 5W
Temp. Coefficient _ +300ppm/°C Max.
Resistance Tolerance _ ±5%

Max. Working Voltage _ 250Vdc to 750Vdc
Max. Overload Voltage _ 300Vdc to 1KVdc
Packaging _ Tape / Box, Tape / Reel, Bulk
Meets _ UL-1412

KNP Series

CONFORMAL COATED WIRE-WOUND
Std. & Reduced Sizes Axial Lead



Resistance Range _ 0.1Ω to 1KΩ
Rated Power @ 70°C _ 1/2W to 5W
Temp. Coefficient _ ±400ppm/°C Max.
Resistance Tolerance _ ±5%

Dielectric Withstanding Voltage _ 300Vdc to 400Vdc
Packaging _ Tape / Box, Tape / Reel
Meets _ UL-1412

NKNP Series

NON-INDUCTIVE WIRE-WOUND (CONFORMAL COATED)
Std. & Reduced Size Axial Lead



Resistance Range _ 0.1Ω to 30Ω
Rated Power @ 70°C _ 1W to 5W
Temp. Coefficient _ ±400ppm/°C

Resistance Tolerance _ ±5%
Packaging _ Tape / Box, Tape / Reel

SQH Series

WIREWOUND
Ceramic Encased
Radial Lead-Clamp Mt.



Resistance Range _ 0.39Ω to 10KΩ
Rated Power @ 70°C _ 10W to 40W
Temp. Coefficient _ ±300ppm/°C
Resistance Tolerance _ ±5%, ±10%

Load Life _ ΔRmax ±(5% + 0.05Ω)
Insulation Resistance _ > 100MΩ
Packaging _ Bulk



Leaded Resistors

SQM Series

POWER RESISTOR
Ceramic Encased Radial Lead



Resistance Range _ 0.15Ω to 10KΩ
Rated Power @ 70°C _ 2W to 10W
Temp. Coefficient _ ±300ppm/°C
Resistance Tolerance _ ±5%

Load Life _ ΔRmax ±(5% + 0.05Ω)
Insulation Resistance _ > 100MΩ
Packaging _ Bulk

SQP Series

POWER RESISTOR
Ceramic Encased Axial Lead



Resistance Range _ 0.15Ω to 10KΩ
Rated Power @ 70°C _ 1W to 20W
Temp. Coefficient _ ±300ppm/°C
Resistance Tolerance _ ±5%

Load Life _ ΔRmax ±(5% + 0.05Ω)
Insulation Resistance _ > 100MΩ
Packaging _ Bulk

SQZ Series

WIREWOUND
Ceramic Encased
Radial Lead-Clamp Mt.



Resistance Range _ 0.22Ω to 10KΩ
Rated Power @ 70°C _ 3W to 20W
Temp. Coefficient _ ±300ppm/°C
Resistance Tolerance _ ±5%

Load Life _ ΔRmax ±(5% + 0.05Ω)
Insulation Resistance _ > 100MΩ
Packaging _ Bulk

ZOR Series

ZERO RESISTOR



Max. Resistance Value _ 0.005Ω
Rated Power @ 70°C _ 1/8W to 1/4W
Packaging _ Tape / Box, Tape / Reel

SIP Network

RNL Series

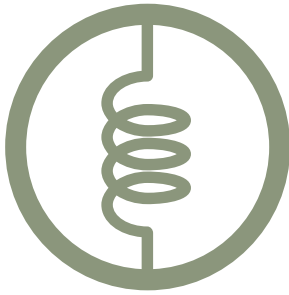
THICK FILM NETWORK
Conformal Coated Low Profile SIP



Resistance Range _ 10Ω to 1MΩ
Number of Pins _ 4 up to 14
Rated Power Per Pin _ 1/8W, 1/4W
Temp. Coefficient _ ±100ppm/°C or ±250ppm/°C

Resistance Tolerance _ ±2%, ±5%
Max. Working Voltage _ 100Vdc to 200Vdc
Circuit Types _ Common, Isolated

Remark : High and Low Values on Request



Inductor Chips

CL Series

INDUCTRO CHIP
Multilayer Low Frequency



Inductance Range _ 0.047 μ H to 18 μ H
L, Q Test Frequency _ 1MHz to 50MHz
Self Resonant Frequency _ 17MHz to 320MHz
Inductance Tolerance _ \pm 10%, \pm 20%

RDC _ 0.15 Ω to 2.55 Ω
Max. Rated D.C. Current _ 5mA to 300mA
EIA Case Sizes _ 0603, 0805, 1206
Packaging _ Tape / Reel

CLH Series

INDUCTRO CHIP
Multilayer High Frequency



Inductance Range _ 0.001 μ H to 0.47 μ H
L, Q Test Frequency _ 100MHz
Self Resonant Frequency _ 300MHz to 6GHz
Inductance Tolerance _ \pm 0.3nH, \pm 5%, \pm 10%, \pm 20%

RDC _ 0.1 Ω to 4.0 Ω
Max. Rated D.C. Current _ 200mA to 500mA
EIA Case Sizes _ 0402, 0603, 0805
Packaging _ Tape / Reel

NL/NLC Series

INDUCTRO CHIP
Wirewound Low Frequency



Inductance Range _ 0.1 μ H to 1,000 μ H
L, Q Test Frequency _ 0.796MHz to 25.2MHz
Self Resonant Frequency _ 2MHz to 700MHz
Inductance Tolerance _ \pm 5%, \pm 10%, \pm 20%

RDC _ 0.018 Ω to 50 Ω
Max. Rated D.C. Current _ 30mA to 1,800mA
EIA Case Sizes _ 1008, 1210, 1812, 2220
Packaging _ Tape / Reel

LCN Series

INDUCTRO CHIP
Wirewound High Frequency



Inductance Range _ 0.001 μ H to 3.3 μ H
L, Q Test Frequency _ 25MHz to 1.5GHz
Self Resonant Frequency _ 110MHz to 6GHz
Inductance Tolerance _ \pm 5%, \pm 10%, \pm 20%

RDC _ 0.06 Ω to 3.3 Ω
Max. Rated D.C. Current _ 200mA to 1000mA
EIA Case Sizes _ 0603, 0805, 1008
Packaging _ Tape / Reel

Ferrite Bead Chips

SB Series

FERRITE BEAD CHIP
Multilayer Low Current



Impedance Range _ 7 Ω to 2,200 Ω
Test Frequency _ 30MHz to 100MHz
Tolerance _ \pm 25%
RDC _ 0.1 Ω to 1.5 Ω

Max. Rated D.C. Current _ 100mA to 600mA
EIA Case Sizes _ 0402, 0603, 0805, 1206
1806, 1812
Packaging _ Tape / Reel

GB Series

FERRITE BEAD CHIP
Multilayer High Current



Impedance Range _ 7 Ω to 2,200 Ω
Test Frequency _ 100MHz
Tolerance _ \pm 25%
RDC _ 0.03 Ω to 0.55 Ω

Max. Rated D.C. Current _ 200mA to 1,000mA
EIA Case Sizes _ 0402, 0603, 0805, 1206
1806, 1812
Packaging _ Tape / Reel

PB Series

FERRITE BEAD CHIP
Multilayer High Current



Impedance Range _ 11 Ω to 1,500 Ω
Test Frequency _ 100MHz
Tolerance _ \pm 20%, \pm 25%
RDC _ 0.015 Ω to 0.03 Ω

Max. Rated D.C. Current _ 4,000mA to 7,000mA
EIA Case Sizes _ 0402, 0603, 0805, 1206
1806, 1812
Packaging _ Tape / Reel

NB Series

FERRITE BEAD CHIP
Multilayer Low Current



Impedance Range _ 6 Ω to 2,200 Ω
Test Frequency _ 100MHz
Tolerance _ \pm 25%
RDC _ 0.05 Ω to 1.2 Ω

Max. Rated D.C. Current _ 50mA to 800mA
EIA Case Sizes _ 0402, 0603, 0805, 1206
Packaging _ Tape / Reel



Ferrite Beads

FB Series

FERRITE BEAD CHIP
Molded Bead EMI Suppressor



Impedance Range _ 24Ω to 48Ω @ 25MHz
36Ω to 72Ω @ 100MHz
Test Frequency _ 25MHz & 100MHz
Tolerance _ ±20%, ±25%

Max. Rated D.C. Current _ 0.6Ω to 0.9Ω
Case Sizes _ 1612, 3220, 3412
Packaging _ Tape / Reel

SBC Series

EMI/RFI PC BEAD
Attenuator



Impedance Range _ 100Ω to 220Ω
Test Frequency _ 100MHz
Case Sizes _ 3343, 4343, 5343

Lead Pitch _ 2.5mm
Lead Style _ Gullwing
Packaging _ Bulk

Wire Wound
SMT Inductors**SBCB Series**

SMT TOROID
Wirewound Data Line Filter



Inductance Range _ 25μH to 50μH
Test Frequency _ 100KHz
Max. D.C. Resistance _ 0.07Ω

EIA Case Sizes _ 0603, 0805, 1206
Packaging _ Tape / Reel

STD Series

SMT POWER INDUCTOR
Wirewound High Current



Inductance Range _ 10μH to 1,200μH
Test Frequency _ 1KHz
Tolerance _ ±20%
RDC _ 0.06Ω to 3.5Ω

Max. Rated D.C. Current _ 350mA to 3,500mA
Size (L x W x H) _ 11.6 x 11.6 x 8.5
Packaging _ Tape / Reel

SCD Series

SMT POWER INDUCTOR
Wirewound High Current



Inductance Range _ 1.0μH to 820μH
Test Frequency _ 1.0KHz to 7.96KHz
RDC _ 0.033Ω to 2.55Ω
Max. Rated D.C. Current _ 240mA to 2600mA

Size (L x W x H) (mm) _ 4.0 x 4.5 x 3.2
5.2 x 5.8 x 4.5 7.0 x 7.8 x 3.5
7.0 x 7.8 x 5.0 9.0 x 10.0 x 4.2
9.0 x 10.0 x 5.4 10.5 x 7.8 x 7.0
Packaging _ Tape / Reel

SSL0802

SMT POWER INDUCTOR
Wirewound High Current



Inductance Range _ 10μH to 1,000μH
Test Frequency _ 100KHz
RDC _ 0.09Ω to 7.0Ω ±15%

Isat2 _ 100mA to 2,400mA
Size (L x W x H) (mm) _ 12.95 x 9.4 x 3.0
Packaging _ Tape / Reel



Wire Wound SMT Power Inductors

SSL0804

SMT POWER INDUCTOR
Wirewound High Current



Inductance Range _ 1.0 μ H to 1,000 μ H
Test Frequency _ 100KHz, 0.1V
RDC _ 0.009W to 3W

Isat2 _ 300mA to 9,000mA
Size (L x W x H) (mm) _ 12.95 x 9.4 x 5.08
Packaging _ Tape / Reel

SSL0810

SMT POWER INDUCTOR
Wirewound High Current



Inductance Range _ 10 μ H to 1,000 μ H
Test Frequency _ 100KHz, 0.1V
RDC _ 0.04W to 2.0W \pm 20%

Isat2 _ 800mA to 8,000mA
Size (L x W x H) (mm) _ 12.95 x 9.4 x 5.08
Packaging _ Tape / Reel

SSL1306

SMT POWER INDUCTOR
Wirewound High Current



Inductance Range _ 1 μ H to 1,000 μ H
Test Frequency _ 100KHz, 0.1V
RDC _ 0.09W to 1.8 Ω

Isat2 _ 1,000mA to 20,000mA
Size (L x W x H) (mm) _ 18.54 x 15.24 x 7.11
Packaging _ Tape / Reel

Leaded Inductors

BC-IR Series

TOROID LINE FILTER
Wirewound High Current



Inductance Range _ 33 μ H to 140 μ H
Max. D.C. Resistance _ 22 Ω to 69 Ω
Turns _ 25 to 40
Size (D x T) _ 12.0 x 7.0 to 40.0 x 17.0

Packaging _ Bulk
Design as Customer's Requested Specifications

BC-FH Series

EMI PC BEAD
Ferrite Bead EMI Filter



Impedance Range _ 15 Ω to 175 Ω @ 25MHz
100 Ω to 270 Ω @ 100MHz
Impedance _ 25MHz and 100MHz

Lead Pitch _ 2.5mm
Packaging _ Bulk

SL Series

RADIAL CHOKE
Wirewound High Current



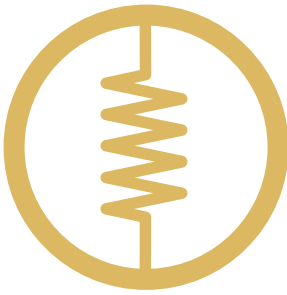
Inductance Range _ 1.0 μ H to 22,000 μ H
Test Frequency _ 1.0KHz to 252MHz
Max. D.C. Resistance _ 0.01 Ω to 190 Ω
Size _ 8.0 x 12.0 13.0 x 18.0

Packaging _ Tape / Reel, Bulk
Design as Customer's Requested Specifications



Cross Reference

YAGEO	SB201209	SB321611	SB321616	SB322513	SB451616	SB453215	CL3216	CL3225
DIM.	0805	1206	1206	1210	1806	1812	1206	1210
TDK	□□ACB201209	□□ACB321611	-	□□ACB322513	-	□□ACB453215	MLF-3216	MLF-3225
	MMZ20125	MMZ32165		CB□□-1210		CB□□-1812		
	CB□□-0805	CB□□-1206				HF50ACC453215		
Murata	BLM21□05-55	BLM31A02	BLM32A06-07	-	BLM41A01-04	-	LOG21N	LOG21C
Tokin	N2012Z	N3216Z	N3216Z	N3225Z	N4516Z	N4516Z	-	-
ACT	□CB-0805	□CB-1206	□CB-1206	□CB-1210	□CB-1806	□CB-1812	MIC1206	-
CTC	HB-1□2012	-	HB-1□3216	-	HB-1□4516	HB-1□4532	FI-A3216	-
MAG. LAYER	MLB-201209	MLB-321611	MLB-321616	MLB-322513	MLB-451616	MLB-453215	MLI3216	MLI3225
TAI-TECH	TAEB□□-201209	TAEB□□-321611	-	TAEB□□-322513	-	TAEB□□-453215	TAEI3216	TAEI3225
TAIYOYUDEN	BK2125	BK3216	-	-	FBM4516	-	LK3216	LK3225
	FBM2125	FBM3216						
YAGEO		FB423226		FB784729		FB863226		
Fair-Rite		2743019446		2743037447		2743021446		
Tokin		M-500 Siers		-		-		
ACT		FB423226		FB784729		FB863226		
CCE		FB423226		FB784729		FB863226		
MAG. LAYER		SMB-403025		SMB-784729		SMB-853025		
TAI-TECH		BPH-C8-403025		BPH-C8-784729		BPH-C8-853025		
TAIYOYUDEN		TTY8DP12		-		-		
		CIRCLE TYPE						
YAGEO		NL453232		NL322522		NLS		
ABC		CM453232		CM322522		-		
TDK		NL453232		NL322522		NLF		
PANASONIC		ELJ-FB		ELJ-FA		-		
KOA		-		LFC32		-		
ACT		IC1812		IC1210		-		
CCE		NL453232		NE322522		-		
MAG. LAYER		SIM453232		-		-		
TAI-TECH		WI453232		-		-		
TAIYOYUDEN		LEM4532		LEM3225		-		
YAGEO		LCN0805 (Ceramic)		LCN1008 (Ceramic)				
Pulse		-		1008CX				
Gang Song		CH		F				
Murata		LQ		LQ				
KOA		KQ0805		KQ1008				
COILCRAFT		0808CS (ceramic)		1008CS (ceramic)				
				1008LS (ferrite)				



**Wire Wound R.
Ceramic Housed**

KH Series

WIREWOUND
Ceramic Axial Lead



Resistance Range _ R056 to 82K
Rated Power @ 70°C _ 4W to 17W
Temp. Coefficient _ -80 to +500ppm/°C
Resistance Tolerance _ ±5%, ±10%
Load Life _ ±3.0% Average

Temp. Range _ -55 to 350°C
Case Sizes _ 6.4 x 20, 6.4 x 25, 6.4 x 38
9 x 25, 9 x 38, 9 x 50, 9 x 75
Packaging _ Bulk, Tape / Reel

KV Series

WIREWOUND
Ceramic Vertical Lead



Resistance Range _ R056 to 82K
Rated Power @ 70°C _ 4W to 17W
Temp. Coefficient _ -80 to +500ppm/°C
Resistance Tolerance _ ±5%, ±10%
Load Life _ ±3.0% Average

Temp. Range _ -55 to 350°C
Case Sizes _ 7 x 20, 7 x 25, 7 x 38
9 x 25, 9 x 38, 9 x 50, 9 x 75
Packaging _ Bulk

KT Series

WIREWOUND
Ceramic Vertical, Circuit Breaker



Resistance Range _ R075 to 82K
Rated Power @ 70°C _ 2W to 4.5W
Temp. Coefficient _ -80 to +500ppm/°C
Resistance Tolerance _ ±5%, ±10%

Load Life _ ±3.0% Average
Temp. Range _ -55 to 150°C
Case Sizes _ 9 x 25, 9 x 38, 9 x 50, 9 x 75
Packaging _ Bulk

KF Series

WIREWOUND
Ceramic Axial, Circuit Breaker



Resistance Range _ R10 to 82K
Rated Power @ 70°C _ 1.2W to 6W
Temp. Coefficient _ -80 to +500ppm/°C
Resistance Tolerance _ ±5%, ±10%
Load Life _ ±3.0% Average

Temp. Range _ -55 to 150°C
Case Sizes _ 7 x 20, 7 x 25, 7 x 38
9 x 25, 9 x 38, 9 x 50, 9 x 75
Packaging _ Bulk

KWP Series

WIREWOUND
Ceramic Radial Terminals



Resistance Range _ R20 to 36K
Rated Power @ 70°C _ 2W to 8W
Temp. Coefficient _ -80 to +500ppm/°C
Resistance Tolerance _ ±5%, ±10%
Load Life _ ±3.0% Average

Temp. Range _ -55 to 275°C
Case Sizes _ 10 x 23, 10 x 28, 10 x 35
10 x 43, 10 x 48, 13 x 50, 13 x 65
Packaging _ Bulk

KWA Series

POWER WIREWOUND
Ceramic Quick Tape Terminals



Resistance Range _ R20 to 16K
Rated Power @ 70°C _ 15W to 40W
Temp. Coefficient _ -80 to +500ppm/°C
Resistance Tolerance _ ±5%, ±10%

Load Life _ ±5.0% Average
Temp. Range _ -55 to 350°C
Case Sizes _ 13 x 48, 13 x 64, 19 x 75, 19 x 90
Packaging _ Bulk



Wire Wound R.
Coated

KC Series

WIREWOUND
Coated Axial Lead



Resistance Range _ R056 to 20K
Rated Power @ 70°C _ 1W to 2W
Temp. Coefficient _ -80 to +500ppm/°C
Resistance Tolerance _ ±5%, ±10%

Load Life _ ±3.0% Average
Temp. Range _ -55 to 350°C
Case Sizes _ 0416, 0424
Packaging _ Tape / Box

KP Series

WIREWOUND
Coated Radial Terminals



Resistance Range _ R10 to 36K
Rated Power @ 70°C _ 2W to 8W
Temp. Coefficient _ -80 to +500ppm/°C
Resistance Tolerance _ ±5%, ±10%

Load Life _ ±3.0% Average
Temp. Range _ -55 to 350°C
Case Sizes _ 0518, 0523, 0533, 0543, 0553
Packaging _ Bulk

CR Series

WIREWOUND
Coated Axial Lead



Resistance Range _ R10 to 2K0
Rated Power @ 70°C _ 1W to 6.5W
Temp. Coefficient _ ±20 to ±40ppm/°C
Resistance Tolerance _ ±0.5%, ±1%, ±2%, ±5%
Load Life _ ±3.0% Average

Temp. Range _ -55 to 350°C
Case Sizes _ 0309, 0415, 0613, 0915
0617, 0918, 0922, 0927
Packaging _ Tape / Box

CRF Series

WIREWOUND
Safety Version at 220V Flame Retardant



Resistance Range _ 1R0 to 330R
Rated Power @ 70°C _ 2W to 4.3W
Temp. Coefficient _ 120 ±50ppm/°C
Resistance Tolerance _ ±5%

Load Life _ ±5.0% Average
Temp. Range _ -55 to 350°C
Case Sizes _ 0415, 0613, 0617, 0919
Packaging _ Tape / Box

Moulded

BW Series

WIREWOUND
Moulded Axial Lead



Resistance Range _ R10 to 2K4
Rated Power @ 70°C _ 0.75W to 1.5W
Temp. Coefficient _ -400 to +1000ppm/°C
Depends on Value
Resistance Tolerance _ ±5%, ±10%

Load Life _ ±5.0% Average
Temp. Range _ -55 to 175°C
Case Sizes _ 0411, 0614
Packaging _ Tape / Box

BWF Series

WIREWOUND
Failsafe Flame Retardant



Resistance Range _ R10 to 1K0
Rated Power @ 70°C _ 0.75W to 1.5W
Temp. Coefficient _ -400 to +1000ppm/°C
Depends on Value
Resistance Tolerance _ ±5%, ±10%

Load Life _ ±5.0%, ±10% Average
Temp. Range _ -55 to 175°C
Case Sizes _ 0411, 0614
Packaging _ Tape / Box



Low-Ohmic Power Resistors

BWL Series

LOW OHMIC POWER
Moulded Axial Lead



Resistance Range _ R005 to R062
Rated Power @ 70°C _ 1.5W
Temp. Coefficient _ < 200ppm/°C, Depends on Value
Resistance Tolerance _ ±1%, ±5%

Load Life _ ±0.5% Average
Temp. Range _ -55 to 175°C
Case Sizes _ 0614
Packaging _ Tape / Box

KN Series

LOW OHMIC POWER
Open Frame Axial and Radial



Resistance Range _ R003 to R10
Rated Power @ 70°C _ 1W to 3W
Temp. Coefficient _ +200 to +1,200ppm/°C
Depends on Value
Resistance Tolerance _ ±1%, ±3%, ±5%

Load Life _ ±3.0% Average
Temp. Range _ -55 to 300°C
Case Sizes _ 0313, 0312, 0332
Packaging _ Bulk

KN Series

LOW OHMIC POWER
Ceramic Case Axial



Resistance Range _ R003 to R10
Rated Power @ 70°C _ 4W to 9W
Temp. Coefficient _ +200 to +1,200ppm/°C
Depends on Value
Resistance Tolerance _ ±1%, ±3%, ±5%

Load Life _ ±3.0% Average
Temp. Range _ -55 to 300°C
Case Sizes _ 6.4 x 18, 6.4 x 25
6.4 x 38, 9 x 25, 9 x 38
Packaging _ Bulk

LPS Series

LOW OHMIC POWER
Open Frame Radial



Resistance Range _ R0005 to R075
Rated Power @ 70°C _ Depends on Style
Temp. Coefficient _ -80 to +400ppm/°C
Resistance Tolerance _ ±5%
Load Life _ < 3.0% Average

Temp. Range _ -55 to 350°C
Case Sizes _ Radial Pitch 5, 10, 15, 20
25mm, 2 and 4 Pin Style
Packaging _ Bulk

Power Film Resistors

RG Series

METALGLAZE FILM
Moulded Axial



Resistance Range _ R30 to 3M3
Rated Power @ 70°C _ 0.5W to 0.9W
Temp. Coefficient _ ±25, ±50, ±100ppm/°C
Resistance Tolerance _ ±0.5%, ±1%, ±2%

Max. Cont. Work. Voltage _ 350V_{eff}
Temp. Range _ -65 to 175°C
Case Sizes _ 0207, 0309
Packaging _ Tape / Box

RGU Series

METALGLAZE FILM
Moulded Vertical



Resistance Range _ R30 to 3M3
Rated Power @ 70°C _ 0.5W
Temp. Coefficient _ ±25, ±50, ±100ppm/°C
Resistance Tolerance _ ±0.5%, ±1%, ±2%

Max. Cont. Work. Voltage _ 350V_{eff}
Temp. Range _ -55 to 175°C
Case Sizes _ 4 x 7.3mm
Packaging _ Bulk

PO Series

METALOXIDE FILM
Coated, Higher Voltage Axial



Resistance Range _ R22 to 10M
Rated Power @ 70°C _ 1W to 4W
Temp. Coefficient _ ±50, ±200ppm/°C
Resistance Tolerance _ ±1%, ±2%, ±5%

Max. Cont. Work. Voltage _ 500 to 750V_{eff}
Temp. Range _ -55 to 250°C
Case Sizes _ 0207, 0414, 0617, 0922
Packaging _ Tape / Box



SMD Melf
Resistors

ZGC Series

SMD METAL FILM
Melf Style Surface Mount



Resistance Range _ R22 to 10M
Rated Power @ 70°C _ 0.25W to 1W
Depends on Mounting Conditions
Temp. Coefficient _ $\pm 15, \pm 25, \pm 50, \pm 100$ ppm/°C
Resistance Tolerance _ $\pm 0.1\%, \pm 0.25\%, \pm 0.5\%$
 $\pm 1\%, \pm 2\%, \pm 5\%$

Max. Cont. Work. Voltage _ 200 to 500V_{eff}
Temp. Range _ -55 to 155°C
Case Sizes _ 0204, 0207
Packaging _ Blister Tape

SMD Power
Resistors

RWN/RWC Series

LOW-OHMIC WW.
SMD Power Surface Mount



Resistance Range _ R003 to 82R
Rated Power @ 70°C _ 1.6W to 2.5W
Temp. Coefficient _ ± 200 ppm/°C
Resistance Tolerance _ $\pm 1\%, \pm 5\%$

Max. Cont. Work. Voltage _ $\sqrt{P \times R}$
Temp. Range _ -55 to 200°C
Case Sizes _ 5020
Packaging _ Blister Tape

RWP Series

METAL FILM
SMD Power Surface Mount



Resistance Range _ 10R to 10M
Rated Power @ 70°C _ 1.6W to 2.2W
Depends on Mounting Conditions
Temp. Coefficient _ $\pm 50, \pm 200$ ppm/°C
Resistance Tolerance _ $\pm 1\%, \pm 5\%$

Max. Cont. Work. Voltage _ 350V_{eff}
Temp. Range _ -55 to 155°C
Case Size _ 5020
Packaging _ Blister Tape



YAGEO

A Global Company
www.yageo.com

Global Headquarters

Yageo Corporation

3F, 233-1, Pao Chiao Road
Hsin Tien, Taipei, Taiwan
Tel. 886-2 2917 7555 Fax. 886-2 2917 4286

Asia

Taiwan, Kaohsiung

11, Min Chung Road, Ta Sheh Hsiang
Kaohsiung Hsien, Taiwan
Tel. 886-7 351 4117 Fax. 886-7 351 2075

China, Suzhou

10, Zhu Yuan Road, Suzhou New District
Kiangsu, China
Tel. 86-512 825 5568 Fax. 86-512 825 5386

China, Dongguan

7-1, Gaoli Road, Gaoli Industrial Zone
Tangxia Zhen, Dongguan, Guangdong, China
Tel. 86-769 772 0275 Fax. 86-769 772 0295

China, Beijing

606, Jingguang Center, Hujia Lou
Chao Yang Ou, Beijing, China
Tel. 86-10 6597 3960 Fax. 86-10 6597 3962

Hong Kong

Flat 801, 8/F, Prosperity Ctr., 25 Chong Yip St.
Kwun Tong, Kowloon, Hong Kong
Tel. 852-2342 6833 Fax. 852-2342 6588

Japan

Bldg. New Meiji, 4F, 1-9-3, Izumicho, Kanda
Chiyoda-ku, Tokyo 101-0024, Japan
Tel. 81-3 5833 3331 Fax. 81-3 5833 3116

Korea

Soam Bldg
44-10, Samsung-dong, Kangnam-ku
Seoul 135-092, Korea
Tel. 82-2 515 0783 Fax. 82-2 3444 3979

Singapore

514, Chai Chee Lane
#04-14 Bedok Industrial Estate
Singapore 469029
Tel. 65-6244 7800 Fax. 65-6244 4943

Malaysia, KL

23B, 2nd Floor, JLN Kenari 3
Bandar Puchong Jaya
47100 Puchong, Malaysia
Tel. 60-3 5882 2854 Fax. 60-3 5882 8700

Malaysia, Penang

16-A, 1st Floor, JLN Todak 3
Seberang Jaya
13700 Prai, Penang, Malaysia
Tel. 60-4 397 3317 Fax. 60-4 397 3272

North America

Addison

16750 Westgrove Drive, Suite 600
Addison, TX 75001-5156, U.S.A.
Tel. 1-214 561 2020 Fax. 1-214 561 2019

El Paso

12375-B Pine Springs Drive
El Paso, TX 79928, U.S.A.
Tel. 1-915 860 3200 Fax. 1-915 860 3205

**Europe****Finland, Espoo**

Sinkalliontie 3, Espoo 02631, Finland
Tel. 358-9 615 00 350 Fax. 358-9 615 00 351

France, Paris

2, rue Salvador Allende, Nanterre 92000
Paris, France
Tel. 33-1 55 51 84 00 Fax. 33-1 55 51 84 24

Germany, Hamburg

Ramskamp 70
Elmshorn 25337, Hamburg, Germany
Tel. 49-4121 870 0 Fax. 49-4121 870 271

Hungary, Budapest

Multi Plaza
Fehérvári út 89-95. I/125-126
Budapest H-1119, Hungary
Tel. 36-1 382 2173 Fax. 36-1 382 2172

Italy, Monza

Via T. Tasso 29
Sesto San Giovanni (MI) 20099, Italy
Tel. 39-02 2411 3055 Fax. 39-02 2411 3051

Russia, Moscow

Yunnatov St. 4
125083, Moscow, Russia
Tel. 7-501 430 96 27 Fax. 7-095 567 02 66

Spain, Barcelona

Diputacio, 238, 2^o 1^a
Barcelona 08007, Spain
Tel. 34-93 317 2503 Fax. 34-93 302 3387

Sweden, Stockholm

Dalvägen 26
Solna SE-169 56, Stockholm, Sweden
Tel. 46-8 514 933 55 Fax. 46-8 514 933 51

Benelux, Roermond

Bredeweg 10
Roermond 6042 GG
The Netherlands
Tel. 31-475 385 563 Fax. 31-475 385 589

UK, Leatherhead

Phycomp House
2, Upper Fairfield Road, Leatherhead
Surrey KT22 7HH, U.K.
Tel. 44-1372 364 500 Fax. 44-1372 364 567

Ferroxcube**Asia**

4F, 233-1, Pao Chiao Road
Hsin Tien, Taipei, Taiwan
Tel. 886-2 8665 0099 Fax. 886-2 8665 0145

North America

12375-B Pine Springs Drive
El Paso, TX 79927, U.S.A.
Tel. 1-915 859 5661 Fax. 1-915 859 5661

Europe, Guadalajara

Poligono Industrial (El Henares)
Apartado Correos 91, 19004 Guadalajara, Spain
Tel. 34-949 24 7200 Fax. 34-949 24 7166

Europe, Hamburg

Valvo Park, Essener Str. 4
D-22419 Hamburg, Germany
Tel. 49-40 5272 8302 Fax. 49-40 5272 8306

