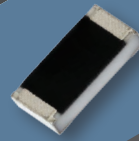


Thick Film Resistors

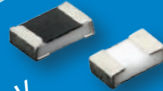
High Operating Voltage
Up to 500 V

RCV e3



Surge-Pulse Proof Up to 2 kV,
Power Rating Up to 0.5 W

RCS e3



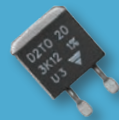
Sulfur-Impervious Chips
Manufactured Using
Non-Magnetic Materials

RCWP NON-MAGNETIC



**AEC-Q200 Qualified High
Power SMD**, 20 W and 35 W

D2T0



High Power in Reduced Space,
Two or Three Resistors in the
Same Package

RCEC 400, 500, 750, 850



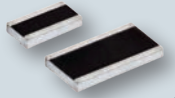
**Enhanced Power Rating
and Thermo-Cycling
Performance**

RCL e3



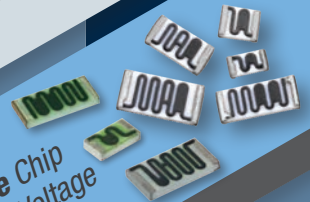
**Low Ohmic Shunt
With Enhanced
Power Dissipation**

RCWE e3



**High Voltage Chip
Resistors With Voltage
Handling Up to 3 kV**

CRHV





THICK FILM RESISTORS

Focus Products

Power Resistors									
Series	Resistance Range	Power Rating	Nominal Voltage	Temperature Range	Thermal Resistance	Inductance	Overload Capacity Short Duration	Dielectric Strength	Package
RPS250 RPS500	0.24 Ω to 1 MΩ	250 W and 500 W	5000 V _{RMS}	-55 °C to +125 °C	RPS250 = 0.22 °C/W RPS500 = 0.11 °C/W	< 50 nH	RPS250 = 4 PR / 10 s RPS500 = 2 PR / 10 s	L: 7000 V _{RMS} H: 12 000 V _{RMS}	n/a
Two models within range; custom designs available; connections: M4 screw; lead (Pb)-free and RoHS-compliant available									
LPS300 LPS600 LPS800 LPS1100	0.3 Ω to 900 kΩ	300 W, 600 W, 800 W, and 1100 W	5000 V _{RMS}	-55 °C to +200 °C	0.039 °C to 0.112 °C/W	≤ 0.1 μH	LPS300 = 4 PR / 10 s, LPS600 = 2 PR / 10 s, LPS800 = 1.5 PR / 10 s, LPS1100 = 1.6 PR / 10 s	12 000 V _{RMS}	n/a
Four models within range; connections: M4 screw; RoHS-compliant; weight: 79 g to 83 g									
RTOP	0.046 Ω to 1 MΩ	50 W to 200 W	500 V _{RMS} to 1500 V _{RMS}	-55 °C to +125 °C	0.5 °C/W to 1 °C/W	≤ 0.1 μH	2.5 PR / 5 s	2500 V _{RMS}	SOT-227 B
Four models within range; custom designs available; connections: screw or shunt; lead (Pb)-free and RoHS-compliant									
RTO20 RTO50	0.010 Ω to 1 MΩ	20 W and 50 W	500 V _{RMS}	-55 °C to +155 °C	RTO20 = 6.5 °C/W RTO50 = 2.6 °C/W	≤ 0.1 μH	2 PR / 5 s < 2 Ω 1.6 PR / 5 s ≥ 2 Ω	2000 V _{RMS}	TO-220
Two models within range; custom designs available; through-hole and SMD; lead (Pb)-free and RoHS available									
LTO30 LTO50 LTO100	0.010 Ω to 1 MΩ	30 W to 100 W	500 V _{RMS}	LTO 30-50: -55 °C to +150 °C LTO 100: -55 °C to +175 °C	4.2 °C/W to 1.5 °C/W	≤ 0.1 μH	1.5 PR / 5 s	1500 V _{RMS} to 3000 V _{RMS}	TO-220 and TO-247
Three models within range; direct mounting ceramic on heatsink; lead (Pb)-free and RoHS-compliant; custom designs available; AEC-Q200 qualified									
LTO150	0.030 Ω to 1.3 MΩ	150 W	500 V _{RMS}	-55 °C to +175 °C	0.87 °C/W	≤ 0.1 μH	1.5 PR / 5 s	3000 V _{RMS}	TO-247
Clip mounting ceramic on heatsink; lead (Pb)-free and RoHS-compliant; custom designs available; AEC-Q200 qualified									
D2TO20 D2TO35	0.010 Ω to 550 kΩ	20 W to 35 W	500 V _{RMS}	D2TO20: -55 °C to +155 °C D2TO35: -55 °C to +175 °C	D2TO20 = 6.5 °C/W D2TO35 = 4.28 °C/W	≤ 0.1 μH	D2TO20: 2 PR / 5 s < 2 Ω, 1.5 PR / 5 s ≥ 2 Ω D2TO35: 1.7 PR / 5 s < 2 Ω, 1.4 PR / 5 s ≥ 2 Ω	2000 V _{RMS}	TO-263 style (D ² PAK)
Two models within range; standard package for SMD; lead (Pb)-free and RoHS-compliant; solder reflow secure at 270 °C / 10 s; AEC-Q200 qualified									
DTO25	0.016 Ω to 700 kΩ	25 W	200 V _{RMS}	-55 °C to +150 °C	5 °C/W	≤ 0.1 μH	1.6 PR / 5 s	1500 V _{RMS}	TO-252 style (DPAK)
Standard package for SMD; lead (Pb)-free and RoHS-compliant; solder reflow secure at 270 °C / 10 s; AEC-Q200 qualified									
RCEC 400	1 Ω to 1 MΩ	400 W	4000 V _{RMS}	-55 °C to +150 °C	0.1875 °C/W	≤ 0.04 μH	800 W / 10 s	6000 V _{RMS}	n/a
Possibility of one, two, or three resistors; same footprint as RCEC 500									
RCEC 500 RCEC 750 RCEC 850	0.47 Ω to 1 MΩ	500 W, 750 W, and 850 W	5000 V _{RMS}	RCEC 500: -55 °C to +125 °C RCEC 750: -55 °C to +150 °C RCEC 850: -55 °C to +150 °C	RCEC 500 = 0.12 °C/W RCEC 750 = 0.10 °C/W RCEC 850 = 0.083 °C/W	≤ 0.04 μH	RCEC 500 = 1000 W / 10 s RCEC 750 = 1200 W / 10 s RCEC 850 = 1200 W / 10 s	6000 V _{RMS} to 12 000 V _{RMS}	n/a
Possibility of one, two, or three resistors; RCEC 850 same footprint as RCEC 500; three models within range; connections: M4 or M5 screw; RoHS-compliant; creeping distance up to 75 mm for HV									
RCMC	0.25 Ω to 18 Ω	500 W	5000 V _{RMS}	-55 °C to +125 °C	0.18 °C/W	≤ 0.04 μH	1000 W / 10 s	5000 V _{RMS} to 12 000 V _{RMS}	n/a
High pulse energy for snubbers 25 J / 50 μs									

Thick Film Chip Resistors									
Series	Resistance Min. (Ω)	Resistance Max. (Ω)	Tolerance Min. (± %)	Tolerance Max. (± %)	TCR Min. (± ppm/°C)	TCR Max. (± ppm/°C)	Size	Power	
RCWP	1	22 M	1	10	100	300	0201 to 2512	to 1 W	
Same materials and construction as fully MIL qualified chip resistors; sulfur impervious; customizable to customer requirements									
RCWP Non-Magnetic	1	22 M	1	10	100	300	0201 to 2512	to 1 W	
Manufactured using non-magnetic materials									
RCP	10	2 K	1	5	150	150	0505 to 2512	to 22 W	
Thick film resistive element on an aluminum nitride (AlN) substrate; very high thermal conductivity in a small package size									
RCWPM (Military M/D55342)	1	22 M	1	10	100	300	0302 to 2512	to 1 W	
Military qualified established reliability chip resistor manufactured to MIL-PRF-55342 (M/D55342); M, P, R, U, S, V, and T level failure rates; sulfur impervious									
RCWP Moisture Resistant	1	22 M	1	10	100	300	0201 to 2512	to 1 W	
Designed to be resistant to the degrading effects of moisture while under power; sulfur impervious									
RC	10	10 M	1	20	100	200	0504 to 2010	to 0.575 W	
Manufactured using special termination materials for use in epoxy-bondable or wire-bondable applications									
CRCW 01005 e3 CRCW 0201 e3	1 to 1 M		0.5, 1, 2, 5		100	600	01005, 0201	to 0.05 W	
Very small standard R-chip for commercial high volume applications									
D/CRCW e3 (lead (Pb)-bearing version is available)	1 to 10 M		1, 5		± 100 ppm/K, ± 200 ppm/K		0402 to 2512	0.063 W to 1 W	
Standard thick film resistor; stability ΔR/R = 1 % for 1000 h at 70 °C; AEC-Q200 qualified									
CRCW-HP e3	1 to 1 M		0.5, 1, 5		± 100 ppm/K, ± 200 ppm/K		0402 to 2512	0.2 W to 1.5 W	
Excellent pulse stability; enhanced power rating; AEC-Q200 qualified									
D/CRCW-P e3 (lead (Pb)-bearing version is available)	1 to 10 M		0.25, 0.5, 1		± 50 ppm/K, ± 100 ppm/K		0402 to 2512	0.063 W to 1 W	
Low temperature coefficient (50 ppm/K) and tight tolerances (± 0.25 %); AEC-Q200 qualified									
CRCW-IF e3	1 to 100 K		5, 10		± 200 ppm/K		0402 to 2512	0.063 W to 1 W	
High pulse performance; stability ΔR/R ≤ 1 % for 1000 h at 70 °C; AEC-Q200 qualified									
D AP, CRCW-AP	3.6 to 10 M		1, 5		± 100 ppm/K, ± 200 ppm/K		0402 to 2512	0.063 W to 1 W	
AgPd-terminations for conductive gluing; stability ΔR/R = 1 % for 1000 h at 70 °C									
RCG e3	1	10 M	0.5	5	100	200	0402 to 1206	0.063 W to 0.25 W	
Green resistor - does not use RoHS exemptions									
D/CRCW-TR e3 (lead (Pb)-bearing version is available)	0.47	10 M	10	20	100	200	0402 to 2512	0.063 W to 1.0 W	
Customer-trimtable for applications in precision circuitry where relative tolerances can be compensated by trimming. Asymmetric tolerances of +0 / -10 %, +0 / -20 %, and +0 / -30 % available									



THICK FILM RESISTORS

Focus Products

Thick Film High-Voltage Chip Resistors

Series	Resistance Min. (Ω)	Resistance Max. (Ω)	Tolerance Min. (± %)	Tolerance Max. (± %)	TCR Min. (± ppm/°C)	TCR Max. (± ppm/°C)	Size	Power
CRMV, CRHV	150	50 G	0.5	20	100	500	1206 to 2512	to 1 W
Medium and high voltage chip resistors (up to 3 kV); multiple styles, termination materials, and configurations allow wide design flexibility								
CDMV, CDHV	10 K	20 G	0.5	20	100	500	2512	1 W
Medium and high voltage divider (up to 3 kV); multiple styles, termination materials, and configurations allow wide design flexibility								
CDMM	10 K	50 M	0.5	5	100	150	4527	1.5 W
Molded divider; high voltage or high precision; surface-mount utilizing thick film technology; high voltage up to 1500 V; high precision to ± 0.5 % with low TC of resistance to 100 ppm/°C								
CRMA	150	75 M	0.5	10	100	100	1206 to 2512	0.3 W to 1.0 W
Thick film chip resistor; medium voltage; AEC-Q200 qualified; voltages up to 1415 V with a variety of termination styles								
RCV e3	100 K	10 M	1	5	± 100 ppm/K	± 200 ppm/K	0805, 1206	0.125 W, 0.25 W
High operating voltage up to 500 V in small sizes								

Thick Film Chip Jumpers

Series	Resistance Max. (Ω)	Current Rating Max.	Size	Power
RCWP Jumper	Up to 50 m	Up to 6.3 A	0201 to 2512	to 1 W
Same materials and construction as fully MIL-qualified chip jumpers; customizable to customer requirements				
RCWPM Jumper (Military M32159)	Up to 30 m	Up to 6.3 A	0302 to 2512	to 1 W
Military-qualified high-reliability chip jumper manufactured to MIL-PRF-32159 (M32159); M (military grade) level failure rate				

Thick Film Low-Resistance Chip Resistors

Series	Resistance Min. (Ω)	Resistance Max. (Ω)	Tolerance Min. (± %)	Tolerance Max. (± %)	TCR Min. (± ppm/°C)	TCR Max. (± ppm/°C)	Size	Power
RCWE e3	0.01	0.976	0.5	5	100	700	0402 to 2512	0.125 W to 2 W
Extremely low resistance values down to 0.01 Ω; enhanced power rating on some sizes due to long side terminal construction; suitable for current sensing and shunts; AEC-Q200 qualified								
RCWL e3 (lead (Pb)-bearing version is available)	0.1	0.91	5	5	200	600	0402 to 2512	0.063 W to 1 W
Low resistance values down to 0.1 Ω; suitable for current sensing and shunts								
RCWP Low Value	0.0499	0.999	1	10	100	300	0402 to 2512	to 1 W
Extremely low resistance values down to 0.0499 Ω; manufactured to DLA land and maritime (former DSCC) drawings for military low value chip resistors								

Thick Film Array

Series	Type	Dimensions l x w (mm)	Resistance Range	Rated Dissipation, P ₇₀	Maximum Voltage	Tolerance	Temperature Coefficient	Load-Life Stability (1000 h at P ₇₀)	Operating Temp. Range
CRA12E/S, CRA06E/S, CRA06P, CRA04S, CRA04P, CRAS0606/0612/ CRAE0612	Wraparound concave, Wraparound convex	1.0 x 1.0 (4 pins) to 6.4 x 3.05 (10 pins)	1 Ω to 1 MΩ	0.063 W to 0.125 W	50 V	± 1 % ± 2 % ± 5 %	± 100 ppm/K ± 200 ppm/K	ΔR/R max.: ≤ 1.0 % ΔR/R max.: ≤ 2.0 %	-55 °C to +155 °C
Array with square corners; scalloped corners (E version) available for CRA 06E and CRA 12E; convex terminal array with different resistance values									

Sulfur Resistant

Series	Type	Size	Resistance Range	Rated Dissipation, P ₇₀	Maximum Voltage	Tolerance	Temperature Coefficient	Load-Life Stability (1000 h at P ₇₀)	Operating Temp. Range
RCA e3 (lead (Pb)-bearing version is available)	Wraparound	0402 to 2512	1 Ω to 10 MΩ	0.063 W to 1.0 W	50 V up to 500 V	± 0.5 % ± 1 % ± 5 %	± 50 ppm/K ± 100 ppm/K ± 200 ppm/K	ΔR/R max.: ≤ 0.5 % ΔR/R max.: ≤ 1.0 %; (for RCA 0402)	-55 °C to +155 °C
Superior resistance against H ₂ S-atmosphere; stability ΔR/R ≤ 1 % for 1000 h at 70 °C; AEC-Q200 qualified									

Long Side Termination

Series	Type	Size	Resistance Range	Rated Dissipation, P ₇₀	Maximum Voltage	Tolerance	Temperature Coefficient	Load-Life Stability (1000 h at P ₇₀)	Operating Temp. Range
RCL e3	Wraparound	0406, 0612, 1020, 1218, 1225	1 Ω to 2.2 MΩ	0.25 W to 2.0 W	50 V up to 200 V	± 1 % ± 5 %	± 100 ppm/K ± 200 ppm/K	ΔR/R max.: ≤ 1.0 % ΔR/R max.: ≤ 2.0 %	-55 °C to +155 °C
Enhanced power rating and thermo cycling performance in 0406 size; AEC-Q200 qualified									

Surge Pulse Proofed

Series	Type	Size	Resistance Range	Rated Dissipation, P ₇₀	Maximum Voltage	Tolerance	Temperature Coefficient	Load-Life Stability (1000 h at P ₇₀)	Operating Temp. Range
RCS e3	Wraparound	0402 to 1206	1 Ω to 10 MΩ	0.2 W to 0.5 W	50 V up to 200 V	± 0.5 % to ± 5 %	± 100 ppm/K ± 200 ppm/K	ΔR/R max.: ≤ 1.0 %	-55 °C to +155 °C
Surge pulse proofed thick film resistor with significantly higher power rating (up to 0.5 W)									

High Ohmic

Series	Type	Size	Resistance Range	Rated Dissipation, P ₇₀	Maximum Voltage	Tolerance	Temperature Coefficient	Load-Life Stability (1000 h at P ₇₀)	Operating Temp. Range
D/CRCW-HR e3 (lead (Pb)-bearing version is available)	Wraparound	0603 to 1206	11 MΩ to 470 MΩ	0.10 W to 0.25 W	75 V up to 200 V	± 5 %	± 500 ppm/K	ΔR/R max.: ≤ 2.0 %	-55 °C to +155 °C
High resistance values up to 470 MΩ; suitable for voltage dividers and power supplies									
RCHR	Wraparound Flip chip	0805, 1005, 1206	500 kΩ to 3 GΩ	Contact factory	175 V to 300 V	± 5 %, ± 10 %, ± 25 %	± 500 ppm/°C	ΔR/R max.: ≤ 0.5 %	-55 °C to +155 °C
High resistance values up to 3 GΩ									



Vishay Resistors Offer Robust and Stable Performance in Many Applications

Advantages of Vishay Thick Film Resistors

- Broad product portfolio
- SMD, leaded, and screw terminal types
- Standard, AEC-Q200 qualified, and customized solutions available
- Widely recognized in military, industrial, and custom applications

For the Following Applications

- Power supplies for industrial and automotive
- Power inverters for windmill and railway drives
- HVDC / SVC valves, large drives, and HEV / EV battery management
- Standard R-chip for commercial as well as for high reliability applications



Custom high voltage products are available from Vishay



Vishay thick film resistors offer outstanding performance for applications with high reliability requirements



Save space and increase reliability with Vishay's LPS / RCEC high power resistors



RoHS
COMPLIANT



AEC-Q200
QUALIFIED



GREEN
(5-2008)

HALOGEN
FREE

Approved to
EN 140401-802

Useful Links

- Thick Film Power Resistors Selector Guide
www.vishay.com/doc?49243
- Resistors 101 - Instructional Guide
www.vishay.com/doc?49873
- Vishay Draloric SMD Resistor Selector Guide
www.vishay.com/doc?49252