



Stackpole Electronics, Inc.

Resistive Product Solutions



# Short Form Product Selector Guide

Thick Film Resistors

POWER

Thin Film Resistors

CURRENT SENSING

Chip Resistors Arrays and Networks

ANTI-SULFUR

Metal Film Oxide Resistors

ULTRA-PRECISION

Carbon Film and

Carbon Comp Resistors

FAIL SAFE

Wirewound Resistors

Single Layer Varistors (MOVs)

HIGH VOLTAGE

Multilayer Varistors

High Frequency Inductors

LOW TCR

SMD Power Inductors

TANTALUM NITRIDE

Power Resistors

FUSING



# Current Sense and Thin Film Resistors

Stackpole Series		AEC-Q200 Qualified	Description	Package Size	Resistance Range ( $\Omega$ )	Tolerance	TCR (ppm/ $^{\circ}$ C)	IRC/TT	KOA	Ohmite	RCD	Vishay
BR		No	Bare Element Current Sensing	1W - 5W	0.005 - 0.1	1% 2% 5%	$\pm$ 20 (best available)	OAR	-	60	OA	SR
CSNL		No	Metal Plate Current Sensing	1206 - 2512	0.0005 - 0.1	1% 5%	$\pm$ 50	ULR	TLR	-	-	WSL WSLP
CSR CSRN		No	Thick Film Current Sensing	0402 - 1225	0.001 - 8	1% 2% 5%	$\pm$ 100 to $\pm$ 600	LR PLR LRF3W	SR73 UR73	LVC	ML	CRCW LR
CSRF		Yes(*)	Foil on Ceramic Carrier Current Sensing	0402 - 2043	0.001 - 0.6	1% 5%	$\pm$ 50 to $\pm$ 300	-	-	MCS	-	-
CSS CSSH		Yes	Ultra Precision Current Sensing	0603 - 4527	0.00025 - 0.12	0.5% to 5%	$\pm$ 15 to $\pm$ 50	ULR	TLR	-	-	WSL WSLP WSLT
HCJ		Yes	Surface Mount High Current Jumper	0402 - 2512	<0.003 <0.0005	-	-	LRZ	-	-	-	-
HCS		Yes	High Current Shunt	1206 2512 3920 5930	0.0002 - 0.005	1% 5%	$\pm$ 50 to $\pm$ 300	LRMAP	PSJ	EBV CRS	-	WSL WSLF WSLP
MPR		No	Flameproof Metal Plate	3W 5W	0.01 - 0.47	5% 10%	$\pm$ 350	-	BPR	-	-	-
MR		No	Low Resistance Value	1W - 10W	0.005 - 0.5	1% 5%	$\pm$ 40 to $\pm$ 400	LOB	-	10	-	LVR
Stackpole Series	AEC-Q200 Qualified	Description	Package Size	Resistance Range ( $\Omega$ )	Tolerance	TCR (ppm/ $^{\circ}$ C)	IRC/TT	KOA	Panasonic	Vishay	Yageo	
MLF MLFM	No	Metal Film Precision Melf	0102 - 0207	0.1 - 10M	0.1% to 5%	$\pm$ 10 to $\pm$ 100	-	RN41 RM41	MGP	SMM MMU MMA MMB Precision	MMF	
MLFA	Yes	Metal Film Precision Melf AEC-Q200 Qualified	0204 0207	0.1 to 1M	0.1% to 5%	$\pm$ 15 to $\pm$ 100	-	-	-	MMA MMB Professional	-	
RNCF	Yes	Precision Thin Film	0201 - 2512	1 - 3M	0.01% to 1%	$\pm$ 2 to $\pm$ 50	PCF	RN73	ERA	TNPW PHR	TF 9T RT	
RNCP	No	High Power Anti-Sulfur Thin Film	0402 - 1206	1 - 100K	1% 5%	$\pm$ 100	-	-	-	-	-	
RNCS RNCH	Yes	Anti-Corrosive Tantalum Nitride Replacement	0402 - 2512	10 - 1M	0.1% to 0.5%	$\pm$ 15 to $\pm$ 50	PFC	-	-	PTN	-	
RTAN	Yes	Thin Film Tantalum Nitride	0402 - 1206	10 - 1M	0.05% to 1%	$\pm$ 25 $\pm$ 50	PFC	-	-	PTN	-	

(\*) See datasheet for specific sizes

# Surface Mount Chip Resistors and Arrays

Stackpole Series	AEC-Q200 Qualified	Description	Package Size	Resistance Range (Ω)	Tolerance	TCR (ppm/°C)	IRC/TT	KOA	Panasonic	Vishay	Yageo
FCR 	No	Trimmable Thick Film	0402 - 2512	10 - 1M	±5% to ±30%	±200	-	RK73N	-	CRCW-TR	TR
HGC 	No	Thick Film Precision High Resistance	0402 - 3512	10K - 50G	0.1% to 20%	±25 to ±200	-	-	-	-	-
HMC 	No	High Value Thick Film	0402 - 2512	11M - 10G	1% 5% 10%	±200 to ±1500	HR	-	-	CRCW_HR RCHR	-
HVC 	No	High Voltage Thick Film	0603 - 3512	10K - 50G	0.1% to 20%	±25 to ±200	HVC	HV73	-	CRHV	-
RACF 	Yes(*)	Concave Resistor Array	0402x2, 0402x4 0603x4, 0603x8 1206x4	1 - 10M	1% 2% 5%	±200 to ±650	-	CN CNB CND_Y CNZ	EXB	CRA/P	TC
RAF 	No	Flat Termination Chip Resistor Array	0201x2 0201x4	3 - 1M	1% 5%	±200 ±300	-	CNIH	EXB14 EXB18	-	YC102
RAVF 	Yes(*)	Convex Resistor Arrays	0201x2, 0402x2 0402x4, 0603x2 0603x4, 0603x8	1 - 10M	1% 2% 5%	±200 to ±500	WCA	CN_K/N CNZ	EXB	CRA/S	YC
RAVS 	No	Convex Anti-Sulfur Chip Array	102D - 324D	1 - 10M	1% 2% 5%	±200 ±300	-	-	-	-	-
RGC 	Yes(*)	Semi-Precision Thick Film	0201 - 2512	10 - 10M	0.1% 0.5% 1%	±50 to ±200	-	RK73G	ERJ_D	CRCW_P	RJ
RHC 	No	High Power Thick Film	2512 (2W)	0.1 - 1M	1% 5%	±100	-	-	-	-	-
RMCF 	Yes	General Purpose Thick Film	01005 - 2512	0.1 - 20M	1% 5%	±100 to ±600	WCR	RK73B RM73 RK 73Z	ERJ	CRCW	9C RC
RMCG 	No	Gold Barrier Sulfur Impervious	0402 - 2512	1 - 10M	1% 2% 5%	±100 to ±600	-	-	ERJS	-	AR
RMCP 	Yes	General Purpose High Power Thick Film	0201 - 2512	1 - 10M	1% 5%	±100 to ±400	-	-	-	-	RC High Power
RMCS 	No	Sulfur Resistant Thick Film	0201 - 2512	1 - 10M	0.5% 1% 5%	±100 ±200	-	RK73-RT	ERJU	RCA	-
RPC 	Yes(*)	Pulse Withstanding Thick Film	0603 - 2512	1 - 20M	0.5% to 20%	±100 ±200	PWC	SG73	ERJP ERJT	CRCW-IF	SRC
RVC 	No	Medium Voltage Thick Film	0402 - 2512	30K - 100M	1% 5%	±100 to ±400	-	HV73	-	RCV	RV

(\*) See datasheet for specific sizes

# Through-Hole Resistors

Stackpole Series		AEC-Q200 Qualified	Description	Package Size	Resistance Range (Ω)	Tolerance	TCR (ppm/°C)	IRC/TT	KOA	NIC	Vishay	Yageo
ASR ASRM SPR		No	Anti-Surge	0.25W - 2W	3.3 - 22M	5%	+0/-500 +0/-1800	-	RCR	-	-	-
CF CFM CD		No	Carbon Film (zero ohm)	0.125W - 2W	1 - 22M (0.01 or less zero ohm)	2% 5%	±400	CF zero ohm	CF Z J	NCF	CCF FR5	CFR ZOR
FRN		No	Fusing Metal Film	0.166W - 2W	0.22 - 10K	5%	±350	WFF	-	-	CMF XX-39	FRM
HDM		No	Moisture Resistant Carbon Film	0.25W 0.5W	1 - 2.2M	1% 2% 5%	N/A	-	-	-	-	-
HVA		No	High Voltage Axial Leaded	0.5W 0.8W 1.2W	1M - 1G	1% 5% 10%	±200	-	-	-	ROX RMX	-
JW		No	Jumper Wire	24 - 20 gauge	3A to 4A max current	N/A	N/A	-	JL	-	-	JPW
MG MGM		No	High Voltage Metal Glaze	0.25W - 3W	1K - 1G	1% 5% 10%	±100	GC MH	GS	-	VR	HVR
RC		No	Carbon Composition	0.25W 0.5W	1 - 22M	5% 10%	N/A	IBT	RC	-	-	-
RNF RNMF		No	Metal Film	0.125W - 2W	1 - 10M	0.05% to 5%	±10 to ±100	GP RC	MF RK	NMR	CMF CCF	MFR
RNS		No	High Power Metal Film	0.5W 1W 2W	10 - 1M	0.5% to 5%	±50 to ±200	MFP	-	-	CPF SFR16S	-
RNV		No	High Voltage Anti-Moisture Metal Film	0.25W	100K - 15M	1% 5%	±100 ±200	-	RCR25	-	VR25 HVR25	-
RSF RSMF		No	Metal Oxide	0.5W - 5W	0.1 - 1M	1% 2% 5%	±200	MO MOM	MO MOS (RSS)	NMO	SXA CPF	RSF
RSPF RSPL		No	Flameproof Power	0.25W - 3W	0.1 - 1M	1% 2% 5%	-200/ +350	MO-S	SPR	-	FP PR	RSF
Stackpole Series	AEC-Q200 Qualified	Description	Package Size	Resistance Range (Ω)	Tolerance	TCR (ppm/°C)	Caddock	KOA	Ohmite	RCD	Vishay	
HVR		No	High Voltage Radial Leaded Plate Resistor	39 - 56	100K - 50G	0.1% to 20%	±25 to ±200	THV USP	RK92	-	-	FHV TR
TR		No	Power Resistor	20 - 100	0.05 - 1M	0.5% to 10%	±50 to ±300	MP820 821, 825 580, 915 916, 925 930	-	TAH, TBH, TCH, TDH, TEH, TFH	-	LTO RTO

# Wirewound and Power Resistors

Stackpole Series		AEC-Q200 Qualified	Description	Power Rating	Resistance Range ( $\Omega$ )	Tolerance	TCR (ppm/ $^{\circ}$ C)	IRC/TT	Ohmite	RCD	Riedon	Vishay
BVM		No	Bracket Vertical Mount Wirewound	5W - 25W	0.1 - 50K	5%	$\pm 300$	-	-	PWV	-	-
CB MCB		No	Ceramic Housed with Axial Leads	2W - 15W	0.056 - 51K	5% 10%	$\pm 200$ to $\pm 800$	PW PPW LPW	TUW TUM	PW ULV LOR	UW	CP CPL
KAL NKAL		No	Aluminum Housed Surface Mount	10W - 250W	0.05 - 150K	0.1% to 5%	$\pm 20$ to $\pm 100$	AL	89 HS	600	UAL	RH
LCB LCBF TCB		No	Ceramic Housed Current Sensing	2W - 15W	0.005 - 0.33	1% to 10%	$\pm 200$ (LCBF) $\pm 50$ to $\pm 400$ $\pm 40$ (TCB)	LPW 4LPW	TUW TUM	-	-	CPL CPSL
LVM NVM WVM		No	Vertical Mount Ceramic Housed Current Sensing	5W - 10W	0.01 - 8K	0.5% to 10%	$\pm 20$ to $\pm 400$	PWRL	TWW	-	PV	CPCL
MHL		No	Metal Clad Low Profile Power Wirewound	60W - 1000W	0.1 - 100K	1% 5% 10%	$\pm 260$	-	ARCOL ARF	-	-	VACR
NSZ		No	Specialty Lead Ceramic Housed	5W - 10W	0.22 - 51K	5% 10%	N/A	-	TVM	PWLL	-	CPR
RWT		No	Thermal Fusing Vertical Mount	2W - 7W	1 - 470	5%	$\pm 200$	-	-	-	-	-
SM SMH		No	Surface Mount Wirewound	1W - 4W	0.01 - 5K	0.1% to 5%	$\pm 20$ to $\pm 100$	WSM	RW RWS	MWM	S SL	WSC WSR
SP3A		No	Fusing Wirewound	4W	10 - 100	5%	$\pm 20$	ULW3	-	-	-	-
SWT EWT		No	Non-Flammable Edgewound Tubular	25W - 300W	0.1 - 240K	5% 10%	$\pm 100$ to $\pm 400$	-	270	T	TSC TVC	HLW
VM MVM		No	Ceramic Housed Vertical Mount	2W - 10W	0.056 - 51K	5% 10%	$\pm 200$ to $\pm 800$	PWR PWRG PWRL	TWM TWW	PV	UV	CPCC CPCF CPCL CPCP
WCB WCBF NWCB		No	Welded Ceramic Housed Axial Leaded	5W - 25W	0.1 - 20K	0.5% to 5%	$\pm 50 < 10\Omega$ $\pm 20 > 10\Omega$	PW PPW LPW	TUW	PW ULV LOR	UW	CPW CPL
WW MWW WRC		No	Precision Wirewound	0.4W - 11W	0.5 - 100K	0.1% to 5%	$\pm 20$ to $\pm 90$ , $-80 \sim +900$	AS SP20 SPH	40 80	100 RW	UT	RS/NS
Stackpole Series	AEC-Q200 Qualified	Description	Power Rating	Resistance Range ( $\Omega$ )	Tolerance	TCR (ppm/ $^{\circ}$ C)	Isotek	Vishay				
HCC		Yes	High Current Chassis Mount Shunt Resistor	15W	0.0001	5%	5%	BAS	8518			



# Varistors and Circuit Protection

Stackpole Series		AEC-Q200 Qualified	Description	Package Size	Voltage Range (Vrms) (V)	Max Energy (J)	Peak Current (Amps)	Epcos	Littelfuse	Maida	Panasonic
AVL AVYL		No	Automotive Leaded Varistor AVY - High Temperature	6mm - 40mm	14V - 40V	76J	2KA	S - AUTO	ZA	-	-
C3V		No	Voltage Suppressor and Broadband EMI Filter	12mm x 12mm	14 - 30	4.5J	800A	-	-	-	-
MV		No	Low Voltage Leaded Dual Function Varicon RFI Suppressors	6mm x 9mm	2V - 95V	2.5J	150A	-	-	-	-
OV		No	Automotive Leaded Dual Function Varicon RFI Suppressors	7.3mm x 9mm 7.8mm x 12mm	14V - 40V	12J	1.2KA	SHCV	-	-	-
RV		No	Standard Metal Oxide Varistor	5mm - 20mm	11V - 1000V	625J	6500A	S	ZA/LA	D_ZOV	ERZV
RV-HE		No	Standard Metal Oxide High-Energy Varistor	10mm - 25mm	130V - 1000V	990J	18000A	S-E2 S-E3	ZA/LA UltraMOV	D_ZOV	ERZV
SV		No	Special Medium Voltage Leaded Varistor	5mm - 23mm	60V - 680V	980J	15KA	Q	-	R_ZOV	-
ZOV		No	Square Shaped High Energy Varistor	23mm - 60mm	60V - 680V	4140J	80KA	LS	DHB HB HF HG	D_ZOV	ERZC
ZVL ZVYL		No	Low Voltage Leaded Varicon ZVY - High Temperature	5mm - 20mm	2V - 40V	37.8J	2KA	-	-	-	-
Stackpole Series		AEC-Q200 Qualified	Description	Package Size	Operating Voltage (VDC)	ESD Capability	Trigger Voltage (V)	Clamping Voltage (V)	Bourns	Cooper Bussman	
ESD ESDU		No	Low and Ultra Low Capacitance ESD Suppressor	0402 0603	3.3 - 24	8kV Direct Discharge 15kV Air Discharge	150V - 250V (typical)	17 - 25 (typical)	CG0402MLE CG0603MLE	0402 ESDA 0603 ESDA	
Stackpole Series		AEC-Q200 Qualified	Description	Package Size	Voltage Range (Vrms) (V)	Max Energy (J)	Peak Current (Amps)	AVX	Epcos	Littelfuse	Maida
AV AVY		No	Automotive SMD Varistor Grade 12 and 24 Volt Power Supply AVY - High Temperature	0805 - 3225	14V - 40V	21J	2KA	-	CN CT AUTO	AUML	-
DV		No	Low and Medium Voltage SMD Varistor	3225 4032	11V - 300V	30J	1.2KA	VC	-	CH	8S
PV		No	Low and Medium Voltage Plastic Encapsulated SMD Varistor	3225 4032	11V - 300V	30J	1.2KA	-	CU	-	-
ZV ZVY		No	Low Voltage SMD Varicon ZVY - High Temperature	0603 - 2220	2V - 130V	12.2J	1.2KA	transguard	CN CT	ML	AV PV SV
ZVE ZVX		No	ESD Suppression SMD Varicon	0603 - 1210	14V (ZVE) 2V - 30V (ZVX)	0.1J	2A (ZVE) 40A (ZVX)	staticguard	-	MLE MLA	TV

# Inductors

Stackpole Series		Description	Package Size	Inductance Range (uH)	Rated Current (A)	DCR Range (Ω)	Coil Craft	Coiltronics	NIC	Pulse	Vishay
LDRS		Shielded SMD Power Inductor	2424 - 4949	1 - 1500	13 - 0.13	0.0117 - 4.78	MSS	-	MPIS_T	-	-
LP		Unshielded SMD Power Inductor	2618 - 7360	0.47 - 1000	40 - 0.1	0.008 - 13.8	DO	UP0.4C	NPI_W	P0770 PO751/2 PF0382 PF0762	IDC
LPC		Unshielded SMD Power Inductor	1412 - 3935	0.5 - 1000	9.5 - 0.09	0.008 - 26	-	LD	NPI_C	PF0580 PF0581 PG0015	IDCP
LPCS		Shielded SMD Power Inductor	2624 - 4747	1 - 1000	25.5 - 0.14	0.007 - 9.44	MSS	DR	NPIS_H	PF0601 PF1166/7/8/9 P1170 - P1173	-
LPS		Shielded SMD Power Inductor	2618 - 7360	1 - 10000	20 - 0.02	0.021 - 32.8	DS	-	NIPS_R	P1174	IDCS
Stackpole Series	Description	Package Size	Inductance Range (nH)*	Rated Current (mA)	DCR Range (Ω)	SRF Range (GHz)	Murata	TDK	Toko	Vishay	
FB		Multilayer Ferrite Chip Bead Inductor	02 - 12	Impedance (Ω) 5 - 2700	6000 - 50	0.01 - 2	-	-	-	-	-
LPM		Miniature SMD Power Inductor	1008 - 2220	0.12 - 10000	6 - 0.03	0.0098 - 140	100 - 8	-	-	-	-
LTF		Thin Film Chip Inductor	0201 0402	0.1 - 33	800 - 75	0.1 - 4.5	14 - 2	LQP	MLF	-	IMC
LWF		SMD Ferrite Wirewound Inductor	0603 - 2220	0.047 - 1000	3200 - 25	0.03 - 150	2000 - 0.5	LQH	NL NLC	LLM	IMC ISC
LWW		Wirewound Ceramic Chip Inductor	0402 - 1206	1 - 15000	2400 - 50	0.02 - 11.5	16 - 0.015	LQW	ACL MLF	LLQ	IFC IMC

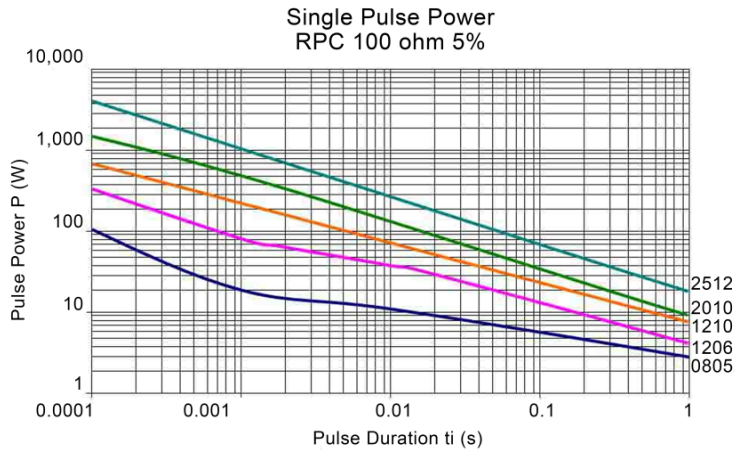
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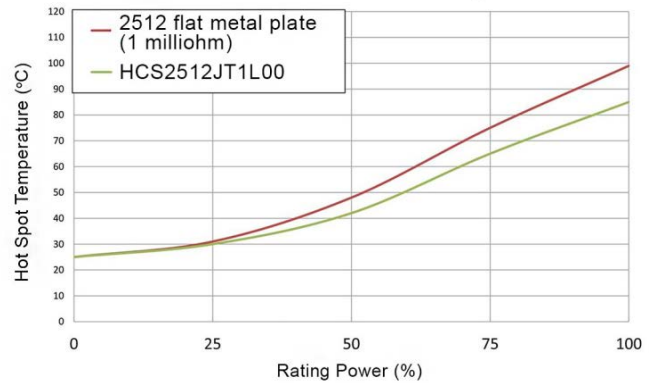
## HCS High Power Current Shunt

### Raised Element for Lower PCB Temperatures and More Accurate Sensing

The HCS series is an all metal surface mount current sense resistor series designed for high power and high current handling. For the 2512 chip size, the HCS series will run typically 15°C cooler than a comparable metal flat chip. Larger case sizes will have more dramatic improvement. Resistance values for the HCS range from 0.2 milliohm up to 5 milliohm in tolerances as low as 1%. TCR ranges from 50 ppm/°C to 300 ppm/°C depending on resistance value and size. The HCS5930 in a 0.2 milliohm value can handle up to 10 Watts of power which is among the highest in the industry for a surface mount shunt.



## Rated Power vs. Surface Temperature



## RPC Series Industry Leading Pulse Withstanding Chip Resistor

The RPC series of film based chip resistors offer tight tolerances with outstanding pulse handling. This performance is achieved by using a more robust film element with a limited laser trim. Standard commercial chip resistors may have a significant laser trim to calibrate them to their required resistance value. Trimming a chip resistor can greatly reduce the amount of pulse power that each size chip can handle and may lead to wide variations in surge handling from part to part. The RPC series has a tightly controlled laser trim yielding superior pulse handling characteristics that are very consistent. For select sizes and resistance values, the RPC is also available in 0.5% tolerances. For 5% and wider tolerances the RPC series has no laser calibration trim at all to maximize the pulse handling of each chip size.

## AEC-Q200 Qualification

### A widely accepted industry standard for component qualification.

AEC-Q200 qualification standard requires resistors to have an operating temperature range of -55°C to +150°C and survive a wide range of electrical and mechanical stress tests including exposure to high temperatures, temperature cycling, high temperature operational life, biased humidity, ESD, board flex, and terminal strength. Components qualified to AEC-Q200 provide engineers additional assurance that they are designing in a robust and reliable component. Additional products are being qualified to AEC.

### AEC-Q200 Qualified Series

- CSRF 0402, 0603, 0805, 1206 and 2512
- CSRF 0402 and 0603 High Power
- CSS all sizes
- CSSH all sizes
- HCC 8420
- HCJ all sizes
- HCS all sizes
- RAVF 102D, 104D and 164D
- RACF 164D
- RGC 0402 and 0603
- RMCF 0402 size and larger
- RMCS-AS 0402 size and larger
- RNCS 0603 and 1206
- RNCS-AS all sizes, except 1210
- RPC 0603 and larger, 1% and wider tolerance

## HVC High Voltage Precision Chip Resistors

### High Voltage, High Performance, High Precision

#### Features:

- Available resistance values from 10K ohms to 50G.
- 0603 chip size rated at 400V working voltage, 5KV max
- 0805 chip size rated at 600V working voltage, 10KV max
- 1206 chip size rated at 1500V working voltage, 15KV max
- 2010 chip size rated at 2000V working voltage, 20KV max
- 2512 chip size rated at 3000V working voltage, 25KV max
- 3512 chip size rated at 3500V working voltage, 40KV max
- Tolerances as low as 0.1%
- TCR as low as 25 ppm/°C
- Low VCR, low noise
- Custom sizes available

