

HVR Series

High Voltage / Thick Film Leaded Resistors



- Resistances from 1M to 10TOhms
- Power Rating 1 to 3Watts
- Resistance Tolerances to $\pm 0.25\%$
- TCR's to $\pm 25\text{ppm/K}$
- Non-Magnetic
- High Value Thick Film Resistance Element

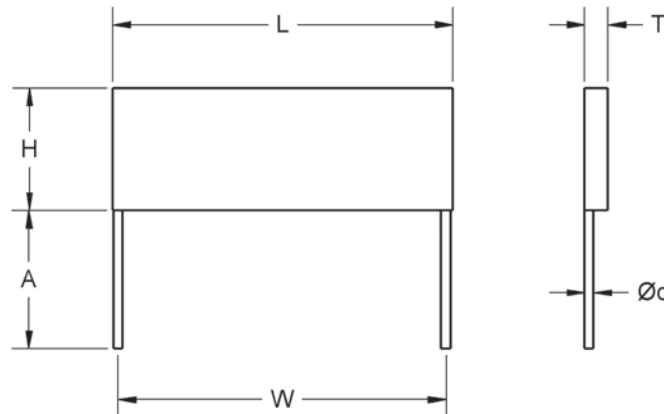
SPECIFICATIONS

Type	HVR 25	HVR 30	HVR 40	HVR 50
Power Rating (W) ¹	1.0	1.0	1.2	3.0
Working Voltage (VAC)	15KV	10KV	20KV	30KV
Resistance Range (Ω)	Tolerances Available (%) Temperature Coefficients Available (\pm ppm/K) ² Voltage Coefficient (ppm / V) ³			
1M - 100M	0.25% to 10% 25 / 50 / 100 <1ppm/V	0.25% to 10% 25 / 50 / 100 <2ppm/V	0.25% to 10% 25 / 50 / 100 <1ppm/V	0.25% to 10% 25 / 50 / 100 <1ppm/V
>100M - 1G	1% to 20% 50 / 100 / 250 <2ppm/V	1% to 20% 50 / 100 / 250 <5ppm/V	1% to 20% 50 / 100 / 250 <2ppm/V	1% to 20% 25 / 50 / 100 <1ppm/V
>1G - 100G	5% to 30% 250 / 500 <10ppm/V	5% to 30% 250 / 500 <20ppm/V	5% to 30% 250 / 500 <10ppm/V	5% to 30% 100 / 250 <5ppm/V
>100G - 1T	5% to 30% 500 / 1000 <50ppm/V	5% to 30% 500 / 1000 <100ppm/V	5% to 30% 500 / 1000 <50ppm/V	5% to 30% 250 / 500 <25ppm/V
>1T - 10T	-	-	-	10% to 30% 500 / 1000 <100ppm/V

¹ W @ 70 °C / 0W @ 125 °C
² 25 / 50 PPM : +25°C to +85°C
³ measured between 10 and 100V

SPECIFICATIONS (continued)

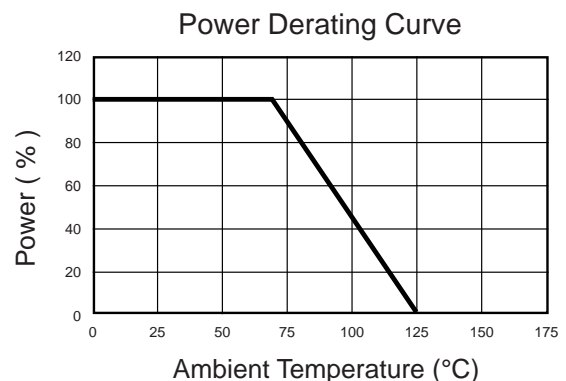
Specification	Value	
Temperature Range	-55°C to +125°C	
Climactic Category	55 / 125 / 56	
Long Term Stability	Max ΔR	
	$\leq 10 \text{ G}\Omega$	$> 10 \text{ G}\Omega$
Storage 125°C / 1000h	$\pm 1\%$	$\pm 2\%$
Maximum Voltage / 1000h	$\pm 1\%$	$\pm 2\%$



Type	Dimensions					
	L ± 0.020 [± 0.5]	H ± 0.020 [± 0.5]	T ± 0.020 [± 0.5]	W ± 0.020 [± 0.5]	A ± 0.020 [± 0.5]	d ± 0.002 [± 0.05]
HVR 25	0.99 [25.0]	0.35 [9.0]	0.055 [1.4]	0.90 [22.9]	0.79 [20]	0.016 [0.4]
HVR 30	0.787 [30.0]	0.236 [6.0]	0.055 [1.4]	1.083 [27.5]	0.79 [20]	0.016 [0.4]
HVR 40	1.574 [40.0]	0.236 [6.0]	0.055 [1.4]	1.488 [37.8]	0.79 [20]	0.016 [0.4]
HVR 50	1.968 [50.0]	0.492 [12.5]	0.055 [1.4]	1.882 [47.8]	0.79 [20]	0.016 [0.4]

Ordering Information

Part Number - Resistance - Tolerance - TCR
 Example: HVR 30 10GOhm 10% 250ppm
 (Note: if no TCR is specified, the highest value will be supplied)





- Resistances from 1M to 1TOhms
- Power Rating 0.5 to 2Watts
- Resistance Tolerances to $\pm 0.5\%$
- TCR's to $\pm 25\text{ppm/K}$
- Non-Magnetic
- High Value Thick Film Resistance Element

SPECIFICATIONS

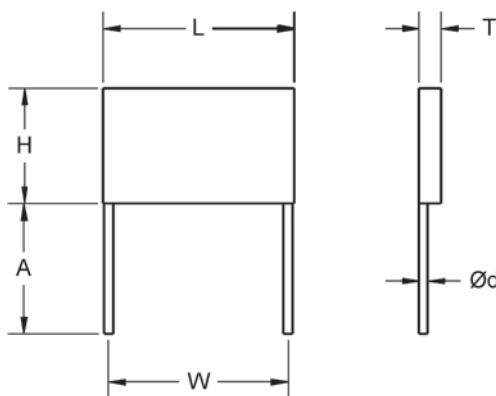
Type		1210	25	2512	4020
Power Rating (W) ¹		0.5	0.7	1.0	2.0
Working Voltage (VAC)	Trimmed	300	300	1200	4000
	Untrimmed	1000	500	2500	6000
Resistance Range (Ω)		Tolerances Available (%) Temperature Coefficients Available (\pm ppm/K) ² Voltage Coefficient (ppm / V)			
1M - 100M		0.5% to 10% 25 / 50 / 100 <50ppm/V	2% to 10% 50 / 100 <50ppm/V	0.5% to 10% 25 / 50 / 100 <10ppm/V	0.25% to 10% 25 / 50 / 100 <5ppm/V
>100M - 500M		2% to 20% 50 / 100 / 250 <100ppm/V	5% to 20% 100 / 250 <100ppm/V	1% to 20% 25 / 50 / 100 <25ppm/V	0.5% to 20% 25 / 50 / 100 <10ppm/V
>500M - 1G		5% to 20% 100 / 250 <100ppm/V	5% to 20% 100 / 250 <100ppm/V	1% to 20% 100 / 250 <25ppm/V	1% to 20% 25 / 50 / 100 <10ppm/V
>1G - 10G		5% to 30% 250 / 500 <500ppm/V	10% to 30% 250 / 500 <500ppm/V	2% to 20% 100 / 250 <100ppm/V	2% to 20% 50 / 100 <25ppm/V
>10G - 100G		5% to 30% 500 / 1000 <1000ppm/V	10% to 30% 500 / 1000 <1000ppm/V	5% to 30% 250 / 500 <250ppm/V	5% to 30% 100 / 250 <100ppm/V
>100G - 1T		-	-	10% to 50% 500 / 1000 <500ppm/V	5% to 30% 250 / 500 <250ppm/V

¹W @ 70 °C / 0W @ 125 °C

²25 / 50 PPM : +25°C to +85°C

SPECIFICATIONS (continued)

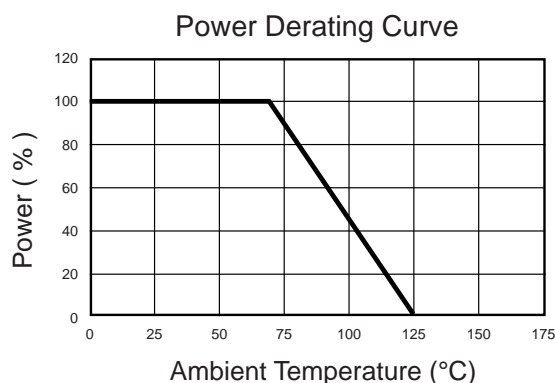
Specification	Value		
Temperature Range	-55°C to +125°C		
Climactic Category	55 / 125 / 56		
Long Term Stability	Max ΔR		
	<1 G Ω	1 G Ω - 10 G Ω	>10 G Ω
Storage 125°C / 1000h	$\pm 1\%$	$\pm 2\%$	$\pm 5\%$
Maximum Voltage / 1000h	$\pm 0.5\%$	$\pm 1\%$	$\pm 2\%$



Type	Dimensions					
	L ± 0.008 [± 0.2]	H ± 0.008 [± 0.2]	T ± 0.008 [± 0.2]	W ± 0.008 [± 0.2]	A $+0 / -0.08$ [$+0 / -2.0$]	d ± 0.002 [± 0.05]
GST 1210	0.126 [3.2]	0.098 [2.5]	0.035 [0.9]	0.079 [2.0]	0.79 [20]	0.016 [0.4]
GST 25	0.150 [3.8]	0.200 [5.0]	0.039 [1.0]	0.098 [2.5]	0.79 [20]	0.016 [0.4]
GST 2512	0.250 [6.3]	0.138 [3.5]	0.039 [1.0]	0.217 [5.5]	0.79 [20]	0.016 [0.4]
GST 4020	0.400 [10.2]	0.200 [5.1]	0.039 [1.0]	0.374 [9.5]	0.79 [20]	0.016 [0.4]

Ordering Information

Part Number - Resistance - Tolerance - TCR
 Example: GST 2512 10GOhms 10% 100ppm
 (Note: if no TCR is Specified / The highest value will be supplied)



HVS Series

High Resistance / Thick Film Chip Resistors



- Resistances from 100k to 1T Ohms
- Power Rating 0.125 to 1 Watt
- Resistance Tolerances to $\pm 5\%$
- TCR's to ± 50 ppm/K
- Non-Magnetic (contact PtAg)
- High Value Thick Film Resistance Element
- Sizes: 0805 / 1206 / 2512

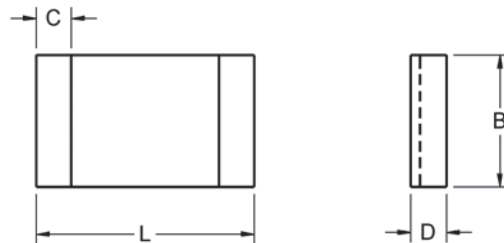
SPECIFICATIONS

Type	0805	1206	2512
Power Rating (W)	0.125	0.25	1.0
Working Voltage (VAC)	Untrimmed 600	1000	3000
Resistance Range (Ω)	Tolerances Available (%) Temperature Coefficients Available (\pm ppm/K) Voltage Coefficient (ppm / V) Other specifications available upon request		
100k - 100M	5% 50 <50ppm/V	5% 50 <50ppm/V	5% 50 <10ppm/V
>100M - 1G	5% 100 <250ppm/V	5% 100 <100ppm/V	5% 100 <25ppm/V
>1G - 10G	5% 100 <500ppm/V	5% 100 <250ppm/V	5% 100 <100ppm/V
>10G - 100G	10% 500 <1000ppm/V	10% 500 <1000ppm/V	5% 500 <250ppm/V
>100G - 1T	10% 1000 <2000ppm/V	10% 1000 <2000ppm/V	5% 1000 <500ppm/V

¹W @ 70 °C / 0W @ 155 °C

SPECIFICATIONS (continued)

Specification	Value		
Temperature Range	-55°C to +155°C		
Climactic Category	55 / 155 / 56		
Solderability	250°C / 3s (up to 6 month after shipment resp. at storage in Nitrogen)		
Max. Soldering Temperature	260°C / 10s		
Long Term Stability	Max ΔR		
	<1 GΩ	1 GΩ - 10 GΩ	>10 GΩ
Storage 125°C / 1000h	±0.5%	±1%	±2%
Maximum Voltage / 1000h	±0.5%	±1%	±2%



Type	Dimensions			
	L	B	D	C
0805	0.080 +0.006 / -0.002 [2.0 +0.15 / -0.05]	0.050 +0.006 / -0.002 [1.25 +0.15 / -0.05]	0.016 +0.006 / -0.002 [0.4 +0.15 / -0.05]	0.012 +0.008 / -0.004 [0.3 +0.2 / -0.1]
1206	0.126 +0.006 / -0.002 [3.2 +0.15 / -0.05]	0.060 +0.008 / -0.002 [1.5 +0.2 / -0.05]	0.016 +0.006 / -0.002 [0.4 +0.15 / -0.05]	0.012 +0.008 / -0.004 [0.3 +0.2 / -0.1]
2512	0.250 +0.006 / -0.002 [6.3 +0.15 / -0.05]	0.138 +0.008 / -0.002 [3.5 +0.2 / -0.05]	0.024 +0.006 / -0.002 [0.6 +0.15 / -0.05]	0.035 ±0.008 [0.9 ±0.2]

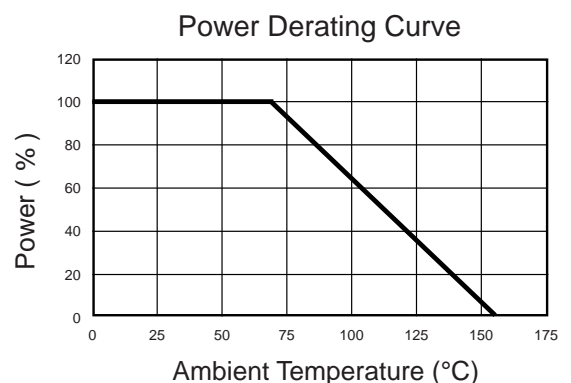
Packaging:

Bulk or Tape & Reel per IEC 286-3 / EIA 481-1-A

Tape width 8mm / Reel Diameter 180 or 330mm

Minimum quantity Bulk / 100 pieces per value

Minimum quantity Tape & Reel / 1000 pieces per value



Ordering Information

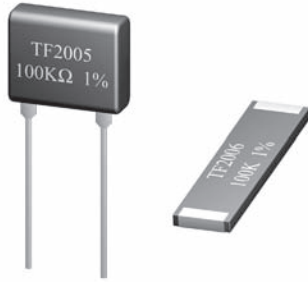
Part Number - Resistance - Tolerance - TCR - Packaging

Example: HVS 2512 10GOhms 10% 500ppm Tape

(Note: if no TCR is Specified / The highest value will be supplied)

TF2000 Series

Thick Film Resistors



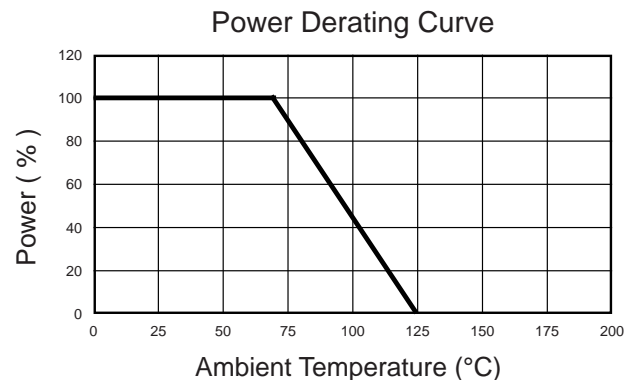
- Resistances from 100 to 20GOhms
- Power Rating 0.125 to 3Watts
- Resistance Tolerances to $\pm 1\%$
- TCR's to $\pm 100\text{ppm/K}$
- Voltage Ratings to 20KV
- Voltage Coefficient : 50ppm/V (MAX)
- Thick Film Resistance Element



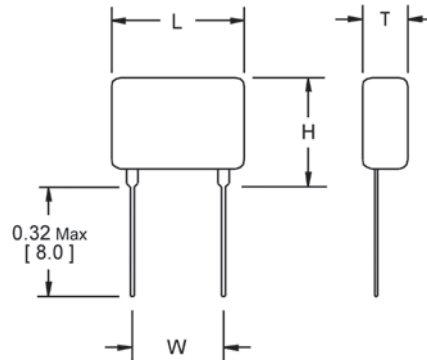
SPECIFICATIONS

Type	2003	2004	2005	2006	2007	2009
Power Rating (W @ 70 °C)	0.125	0.25	0.40	0.70	1.5	3.0
Working Voltage (rms)	100	250	750	2000	10000	20000
Available Resistances at each Tolerance Tolerance 0.5% upon request						
$\pm 1\%$	100 - 10M	10k - 10M	10k - 22M	100k - 100M	100k - 100M	100K - 100M
$\pm 2\%$	100 - 25M	10k - 100M	10k - 200M	100k - 250M	100k - 500M	100K - 500M
$\pm 5\%$	100 - 150M	10k - 250M	10k - 500M	100k - 1G	100k - 2G	100K - 2G
$\pm 10\%$	100 - 500M	10k - 1G	10k - 10G	100k - 10G	100k - 10G	100K - 20G
Available Resistances at each Temperature Coefficient						
$\pm 100\text{ ppm/K}$	$\leq 25\text{M}$	$\leq 50\text{M}$	$\leq 250\text{M}$	$\leq 250\text{M}$	$\leq 250\text{M}$	$\leq 250\text{M}$
$\pm 250\text{ ppm/K}$	$> 25\text{M}$	$> 50\text{M}$	$> 250\text{M}$	$> 250\text{M}$	$> 250\text{M}$	$> 250\text{M}$

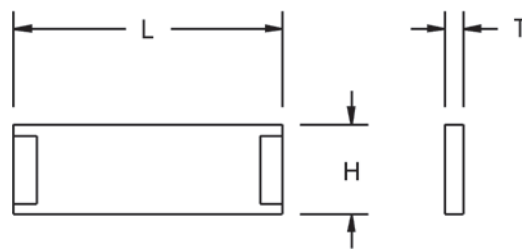
Specification	Value
Resistance Range	100 Ohms to 20G Ohms
Tolerances	$\pm 1\%$ to $\pm 10\%$
Temperature Coefficient	$\pm 100\text{ppm/K}$ / $\pm 250\text{ppm/K}$
Temperature Range	-55°C to $+125^\circ\text{C}$
Insulation Resistance	$> 10000\text{ MOhms}$
Shelf Life Stability	1% / 5 Years
Climatic Category	55/125/56
Max Soldering Temperature	$+260^\circ\text{C}$ / 10s
Voltage Coefficient	$< 5\text{ppm/V}$



SPECIFICATIONS (continued)



Type	H (MAX)	L (MAX)	T (MAX)	W ±0.015" [±0.4mm]
TF2003	0.236 [6.0]	0.197 [5.0]	0.100 [2.5]	0.100 [2.5]
TF2004	0.236 [6.0]	0.287 [7.3]	0.100 [2.5]	0.200 [5.1]
TF2005	0.236 [6.0]	0.492 [12.5]	0.100 [2.5]	0.400 [10.2]
TF2006	0.236 [6.0]	0.886 [22.5]	0.100 [2.5]	0.800 [20.3]
TF2007	0.354 [9.0]	1.535 [39.0]	0.100 [2.5]	1.400 [35.6]
TF2009	0.354 [9.0]	3.071 [78.0]	0.100 [2.5]	2.900 [73.7]



Type	H (MAX)	L (MAX)	T (MAX)
TFC2004	0.153 [3.9]	0.260 [6.6]	0.032 [0.8]
TFC2005	0.153 [3.9]	0.465 [11.8]	0.032 [0.8]
TFC2006	0.153 [3.9]	0.866 [22.0]	0.032 [0.8]
TFC2007	0.26 [6.6]	1.512 [38.4]	0.032 [0.8]

Ordering Information

Part Number - Resistance - Tolerance - TCR

Example: TF2009 100 MOhms 2% 100ppm

(Note: If no TCR is specified / the highest value will be supplied)

HTE Series

High Voltage / Thick Film Resistors

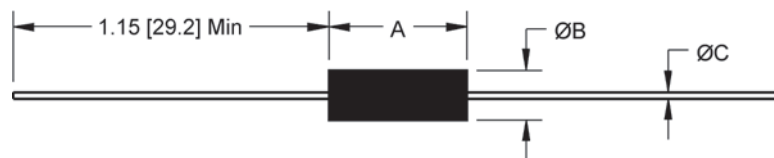


- Resistances from 200Ohms to 700MOhms
- Power Rating 0.7 to 17Watts
- Resistance Tolerances to $\pm 1\%$
- Low TCR: $\pm 100\text{ppm/K}$ Standard
- Voltage Ratings to 48KV
- Non-Inductive Design
- SMD upon request



SPECIFICATIONS

Type	Wattage Rating (Watts)	Dimensions (special dimensions possible)			Maximum Working Voltage (KV ACrms)
		A $\pm 0.062''$ [$\pm 1.6\text{mm}$]	B $\pm 0.031''$ [$\pm 0.8\text{mm}$]	C $\pm 0.002''$ [$\pm 0.05\text{mm}$]	
HTE15	0.7	0.590 [15.0]	0.197 [5.0]	0.032 [0.8]	2.5
HTE19	1	0.748 [19.0]	0.197 [5.0]	0.032 [0.8]	3.5
HTE24	2	0.944 [24.0]	0.314 [8.0]	0.040 [1.0]	5.5
HTE25	1.2	1.00 [25.4]	0.197 [5.0]	0.032 [0.8]	5.5
HTE39	3	1.535 [39.0]	0.314 [8.0]	0.040 [1.0]	10
HTE52	5	2.05 [52.0]	0.314 [8.0]	0.040 [1.0]	15
HTE76	8	2.99 [76.0]	0.354 [9.0]	0.040 [1.0]	22.5
HTE102	12	4.02 [102]	0.354 [9.0]	0.040 [1.0]	32
HTE127	12	5.00 [127]	0.354 [9.0]	0.040 [1.0]	40
HTE152	15	5.98 [152]	0.354 [9.0]	0.040 [1.0]	48



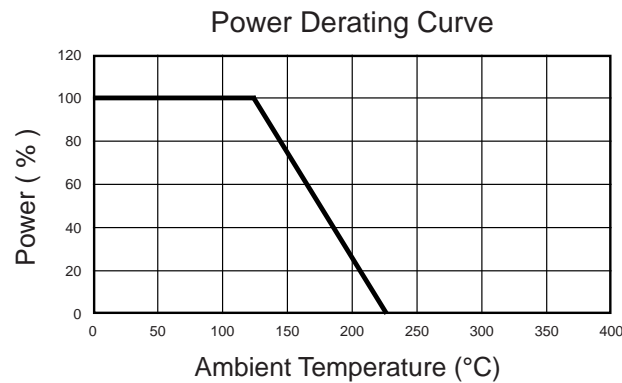
Ordering Information

Part Number - Resistance - Tolerance - TCR (If not standard)

Example: HTE39 10MOhm 1%

SPECIFICATIONS (continued)

Specification	Value
Resistance Range	200 Ohms to 700MOhms
Tolerances	±1% to ±10%
Temperature Coefficient	±100ppm/K : -25°C to +125°C (Standard) ±20 to ±150 ppm/K (On Request)
Temperature Range	-55°C to +195°C
Insulation Resistance	>10000 MOhms
Encapsulation	Epoxy Conformal Coating / silicon or glass upon request
Environmental Performance (MIL-STD 202)	ΔR
Load Life	±0.7%
Moisture Resistance	±0.4%
Thermal Shock	±0.4%
5X Overload (5s)	±0.5%



CHM Series

High Resistance / Thick Film Chip Resistors



- Resistances from 100k to 10T Ohms
- Power Rating 0.05 to 1.5 Watt
- Resistance Tolerances to $\pm 0.25\%$
- TCR's to ± 25 ppm/K
- Non-Magnetic (contact PtAg)
- High Value Thick Film Resistance Element
- Sizes: 0402 / 0603 / 0805 / 1206 / 1210 / 2010 / 2512 / 4020



SPECIFICATIONS

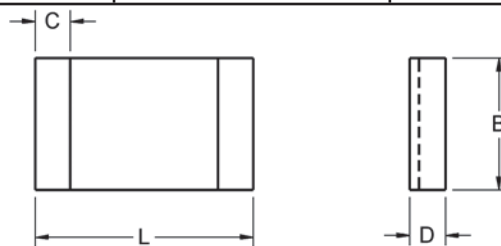
Type	0402	0603	0805	1206	1210	2010	2512	4020	
Power Rating (W)	0.05	0.10	0.125	0.25	0.35	0.5	1.0	1.5	
Working Voltage (VAC)	Trimmed	30	75	200	600	1000	1500	2000	4000
	Untrimmed	100	220	600	1000	1200	2000	3000	6000
Resistance Range (Ω)	Tolerances Available (%) Temperature Coefficients Available (\pm ppm/K) Voltage Coefficient (ppm / V)								
100k - 100M	5% to 20% 50 / 100 <500ppm/V	2% to 20% 50 / 100 <100ppm/V	0.5% to 10% 25 / 50 / 100 <50ppm/V	0.5% to 10% 25 / 50 / 100 <50ppm/V	0.5% to 10% 25 / 50 / 100 <25ppm/V	0.5% to 10% 25 / 50 / 100 <10ppm/V	0.25% to 10% 25 / 50 / 100 <5ppm/V		
>100M - 1G	5% to 20% 250 / 500 <1000ppm/V	5% to 20% 100 / 250 <500ppm/V	2% to 20% 50 / 100 / 250 <250ppm/V	2% to 20% 50 / 100 / 250 <100ppm/V	1% to 10% 25 / 50 / 100 <50ppm/V	1% to 10% 25 / 50 / 100 <25ppm/V	1% to 10% 25 / 50 / 100 <10ppm/V		
>1G - 10G	10% to 30% 1000 / 2000 <2000ppm/V	5% to 30% 500 / 1000 <2000ppm/V	5% to 20% 100 / 250 <500ppm/V	5% to 20% 100 / 250 <250ppm/V	2% to 20% 50 / 100 <100ppm/V	2% to 20% 50 / 100 <100ppm/V	2% to 20% 50 / 100 <25ppm/V		
>10G - 100G	-	10% to 30% 1000 / 2000 <10000ppm/V	10% to 30% 500 / 1000 <1000ppm/V	10% to 30% 500 / 1000 <1000ppm/V	5% to 20% 500 / 1000 <500ppm/V	5% to 20% 100 / 250 <250ppm/V	5% to 20% 100 / 250 <100ppm/V		
>100G - 1T	-	-	10% to 30% 1000 / 2000 <2000ppm/V	10% to 30% 1000 / 2000 <2000ppm/V	10% to 30% 500 / 1000 <1000ppm/V	5% to 20% 250 / 500 <500ppm/V	5% to 20% 250 / 500 <250ppm/V		
>1T - 10T	-	-	-	10% to 30% 2000 <3000ppm/V	10% to 30% 1000 / 2000 <2000ppm/V	10% to 30% 500 / 1000 <1000ppm/V	10% to 30% 500 / 1000 <1000ppm/V		

¹W @ 70 °C / 0W @ 155 °C

SPECIFICATIONS (continued)

Specification	Value		
Temperature Range	-55°C to +155°C (extended range up to 250°C upon request)		
Climactic Category	55 / 155 / 56		
Solderability	250°C / 3s (up to 6 month after shipment resp. at storage in Nitrogen)		
Max. Soldering Temperature	260°C / 10s		
Long Term Stability	Max ΔR		
	<1 GΩ	1 GΩ - 10 GΩ	>10 GΩ
Storage 125°C / 1000h	±0.5%	±1%	±2%
Maximum Voltage / 1000h	±0.5%	±1%	±2%

Type	Dimensions			
	L	B	D	C
CHM 0402	0.041 ±0.002 [1.04 ±0.05]	0.020 ±0.002 [0.50 ±0.05]	0.012 ±0.002 [0.3 ±0.05]	0.012 +0.008 / -0.004 [0.1 +0.1 / -0.05]
CHM 0603	0.059 +0.006 / -0.002 [1.5 +0.15 / -0.05]	0.032 +0.006 / -0.002 [0.80 +0.15 / -0.05]	0.016 +0.006 / -0.002 [0.4 +0.15 / -0.05]	0.008 +0.008 / -0.004 [0.2 +0.2 / -0.1]
CHM 0805	0.080 +0.006 / -0.002 [2.0 +0.15 / -0.05]	0.050 +0.006 / -0.002 [1.25 +0.15 / -0.05]	0.016 +0.006 / -0.002 [0.4 +0.15 / -0.05]	0.012 +0.008 / -0.004 [0.3 +0.2 / -0.1]
CHM 1206	0.126 +0.006 / -0.002 [3.2 +0.15 / -0.05]	0.060 +0.008 / -0.002 [1.5 +0.2 / -0.05]	0.016 +0.006 / -0.002 [0.4 +0.15 / -0.05]	0.012 +0.008 / -0.004 [0.3 +0.2 / -0.1]
CHM 1210	0.126 +0.006 / -0.002 [3.2 +0.15 / -0.05]	0.098 +0.008 / -0.002 [2.5 +0.2 / -0.05]	0.020 +0.006 / -0.002 [0.5 +0.15 / -0.05]	0.032 ±0.008 [0.8 ±0.2]
CHM 2010	0.20 +0.008 / -0.002 [5.1 +0.2 / -0.05]	0.098 +0.008 / -0.002 [2.5 +0.2 / -0.05]	0.024 +0.006 / -0.002 [0.6 +0.15 / -0.05]	0.05 ±0.008 [1.2 ±0.2]
CHM 2512	0.250 +0.006 / -0.002 [6.3 +0.15 / -0.05]	0.138 +0.008 / -0.002 [3.5 +0.2 / -0.05]	0.024 +0.006 / -0.002 [0.6 +0.15 / -0.05]	0.035 ±0.008 [0.9 ±0.2]
CHM 4020	0.40 +0.006 / -0.002 [10.20 +0.15 / -0.05]	0.20 +0.008 / -0.002 [5.1 +0.2 / -0.05]	0.024 +0.006 / -0.002 [0.6 +0.15 / -0.05]	0.035 ±0.008 [0.9 ±0.2]



Packaging:

Bulk or Tape & Reel per IEC 286-3 / EIA 481-1-A

Tape width 8mm / Reel Diameter 180 or 330mm

Minimum quantity Bulk / 100 pieces per value

Minimum quantity Tape & Reel / 1000 pieces per value

Ordering Information

Part Number - Resistance - Tolerance - TCR - Packaging

Example: CHM 2512 10GOhms 10% 50ppm Tape

(Note: if no TCR is specified, the highest value will be supplied)

Power Derating Curve

