

# Metal Strip Current Sensing Resistor

## MCS/MCSE/MCSL Series

### Features

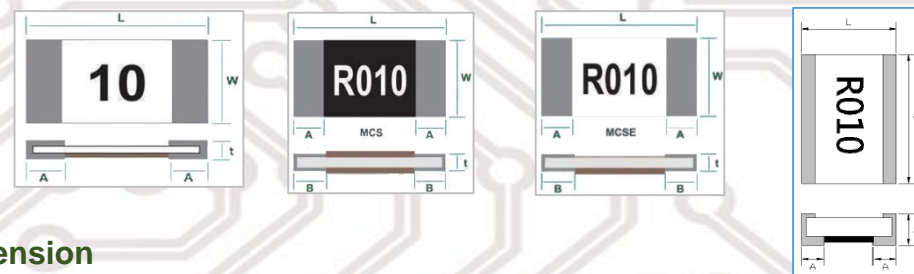
- ◆ Able to withstand higher temperature and higher current
- ◆ Ultra Low sensing resistance
- ◆ Excellent frequency response
- ◆ Chip size: 0402 to 2512
- ◆ Lead free, RoHS compliant for global applications and halogen free

### Application

- ◆ NB, Tablet Pad, PC, Smart Phone
- ◆ Battery Packs (N/B, Mobile Phone and Automobile)
- ◆ Switching power supply, Converter, Inverter
- ◆ Adapter and Chargers
- ◆ Power Module for LED Lighting and Backlights

### Electrical Specification

Size	Power Rating	Resistance Range(mΩ)	Operation Temp. Range	TCR (PPM/°C)	Tolerance
MCS0402	1/8w	M2.5~50 mΩ	-55~+170°C	±50	F=+/-1% G=+/-2% J=+/-5%
MCS0603	1/4W	M2.5~30 mΩ	-55~+170°C	±50	
MCSE0805	1/2W	1.0~100 mΩ	-55~+170°C	±50~±75	
MCSE1206	1W	1.0~200 mΩ	-55~+170°C	±50~±100	
MCS2512	1W,2W	10~300 mΩ	-55~+170°C	±100	
		1~9 mΩ	-55~+170°C	±100	
MCSE4320	5W	5.0~50 mΩ	-55~+170°C	±50	
MCSL0508	1/2W	5~30 mΩ	-55~+170°C	±75	
MCSL0612	1W	5~30 mΩ	-55~+170°C	±100	
MCSL1225	3W	5~10 mΩ	-55~+170°C	±50	
MCSL2043	6W	10~20 mΩ	-55~+170°C	±50	



### Dimension

Size	Dimensions(mm)				
	L	W	T	A	B
MCS0402	1.0±0.10	0.55±0.10	0.45±0.10	0.15±0.10	0.25±0.10
MCS0603	1.60±0.10	0.80±0.10	0.60±0.15	0.15±0.10	0.55±0.15
MCSE0805	2.10±0.20	1.30±0.15	0.70±0.15	0.40±0.20	0.40±0.20
MCSE1206(S)	3.10±0.20	1.55±0.20	0.70±0.15	0.50±0.20	0.55±0.20
MCSE1206(L)					1.10±0.20
MCS2512(S)	6.45±0.20	3.25±0.20	0.80±0.15	0.90±0.20	0.110±0.25
MCS2512(L)			1.00±0.20		2.20±0.25
MCSE4320	11.0±0.20	5.0±0.20	0.65±0.20	-	2.26±0.30
MCSL0508	1.30±0.20	2.0±0.20	0.60±0.20	-	0.30±0.20
MCSL0612	1.60±0.20	3.2±0.20	0.60±0.20	-	0.30±0.20
MCSL1225	3.10±0.15	6.3±0.15	0.80±0.15	-	0.55±0.15
MCSL2043	5.0±0.20	11.0±0.20	0.65±0.20	-	0.95±0.20

### Performances

No	Item	Test Condition	Specification
1	Short Time Overload	Voltage equal to 5 time rated power for 5 sec (JIS-C5202-5.5)	ΔR: ±(1% + 0.0005Ω)
2	Temperature Coefficient or(T.C.R.)	+25°C/+125°C (JIS-C5202-5.2) $TCR(ppm/°C) = \frac{\Delta R}{R \times \Delta t} \times 10^6$	As Spec.
3	Damp Heat with Load	The specimens shall be placed in a chamber and subjected to a relative humidity of 90-95% and a temperature of 90-95% percent and a temperature of 40° ±2°C for the period of 1000 hrs. (MIL-STD-202, Method 103)	ΔR: ±(1% + 0.0005Ω)
4	High Temperature Exposure	The ship (mounted on board) is exposed in the heat chamber 125°C ±3°C for 1000 hrs. (JIS-C5202-7.2)	ΔR: ±(1% + 0.0005Ω)
5	Load Life	Apply rated power for 1000 hours with 1.5 hours ON and 0.5 hour OFF. (JIS-C5202-7.10)	ΔR: ±(1% + 0.0005Ω)
6	Bending Strength	Mount the chip to test substrate. Apply pressure in direction of arrow unit band width reaches 2mm(+0.2/-0mm) illustrated in the figure below and hold for 10 ± 1 sec. (JIS-C5202-6.1)	ΔR: ±(1% + 0.0005Ω)
7	Resistance to solder Heat	The specimen chip shall be immersed into the flux specified in the solder bath 260 ±5°C for 10 ± 1 sec. (MIL-STD 202,Method 210)	Solder shall be covered 95% or more of the electrode area.
8	Solder ability	The specimen chip shall be immersed into the flux specified in the solder bath 235 ±5°C for 2 ±0.5 sec. It shall be immersed to a point 10mm from its root. (Sn96.5/Ag3.0/Cu0.5) (JIS-C5202-6.11)	Solder shall be covered 95% or more of the electrode area.

# Metal Strip Current Sensing Resistor

## MCSH Series

### Features

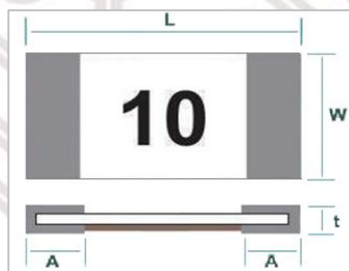
- ◆ Able to withstand higher temperature and higher current
- ◆ Ultra Low sensing resistance
- ◆ Excellent frequency response
- ◆ Chip size: 0603 to 2512
- ◆ Lead free, RoHS compliant for global applications and halogen free

### Application

- ◆ Portable Electronic Equipment-NB, Tablet PC, PC
- ◆ Battery Packs (N/B, Mobile Phone and Automobile)
- ◆ Switching power supply, Converter, Inverter
- ◆ Adapter and Chargers
- ◆ PCM for Li-on Battery pack

### Electrical Specification

Size	Power Rating	Resistance Range(mΩ)	Operation Temp. Range	TCR (PPM/°C)	Tolerance
0402	1/4W	2.5~30	-55~+170°C	±50	F=±1% G=±2% J=±5%
0603	1/2W				



### Dimension

Size	Dimensions(mm)			
	L	W	t	A
0402	1.00±0.10	0.55±0.10	0.45±0.10	0.25±0.10
0603	1.60±0.10	0.80±0.10	0.55±0.15	0.30±0.20

### Performances

No	Item	Test Condition	Specification
1	Short Time Overload	Voltage equal to 5 time rated power for 5 sec (JIS-C5202-5.5)	ΔR: ±(1% + 0.0005Ω)
2	Temperature Coefficient or(T.C.R.)	+25°C/+125°C (JIS-C5202-5.2) $TCR(ppm/^{\circ}C) = \frac{\Delta R}{R \times \Delta t} \times 10^6$	As Spec.
3	Damp Heat with Load	The specimens shall be placed in a chamber and subjected to a relative humidity of 90-95% and a temperature of 40±2°C for the period of 1000 hrs.. (MIL-STD-202, Method 103)	ΔR: ±(1% + 0.0005Ω)
4	High Temperature Exposure	The ship (mounted on board) is exposed in the heat chamber 125±2°C for 1000 hrs. (JIS-C5202-7.2)	ΔR: ±(1% + 0.0005Ω)
5	Load Life	Apply rated power at 70±2°C for 1000 hours with 1.5 hours ON and 0.5 hour OFF. (JIS-C5202-7.10)	ΔR: ±(1% + 0.0005Ω)
6	Bending Strength	Mount the chip to test substrate. Apply pressure in direction of arrow unit band width reaches 2mm(+0.2/-0mm) illustrated in the figure below and hold for 10 ± 1 sec. (JIS-C5202-6.1)	ΔR: ±(1% + 0.0005Ω)
7	Resistance to solder Heat	The specimen chip shall be immersed into the flux specified in the solder bath 260±5°C for 10±1 sec. (MIL-STD-202,Method 210)	ΔR: ±(1% + 0.0005Ω)
8	Solder ability	The specimen chip shall be immersed into the flux specified in the solder bath 235 ±5°C for 2 ±0.5 sec. It shall be immersed to a point 10mm from its root. (Sn96.5/Ag3.0/Cu0.5) (JIS-C5202-6.11)	Solder shall be covered 95% or more of the electrode area.



# Metal Strip Current Sensing Resistor

## CCSH Series

### Features

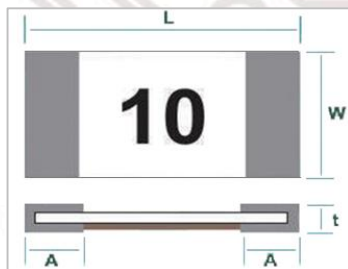
- ◆ Able to withstand higher temperature and higher current
- ◆ Ultra Low sensing resistance
- ◆ Excellent frequency response
- ◆ Chip size: 0603 to 2512
- ◆ Lead free, RoHS compliant for global applications and halogen free

### Application

- ◆ Portable Electronic Equipment-NB, Tablet PC, PC
- ◆ Battery Packs (N/B, Mobile Phone and Automobile)
- ◆ Switching power supply, Converter, Inverter
- ◆ Adapter and Chargers
- ◆ PCM for Li-on Battery pack

### Electrical Specification

Size	Power Rating	Resistance Range(mΩ)			Operation Temp. Range	TCR (PPM/°C)
		1%	2%	5%		
0603	1/8W	20~99			-55±155°C	±800
		100~499				±200
0805	1/4W	6~10				±800
		11~100				±400
		101~976				±200
1206	1/2W	6~10				±800
		11~100				±400
		101~976				±200
2512	2W	10~47				±300
		47~200				±200
		200~910				±100



### Dimension

Size	Dimensions(mm)				
	L	W	t	A	B
0603	1.55±0.10	0.85±0.10	0.45±0.10	0.30±0.20	0.35±0.20
0805	2.10±0.15	1.30±0.15	0.65±0.15	0.40±0.20	0.40±0.20
1206-S Type	3.10±0.20	1.65±0.10	0.65±0.15	0.50±0.30	0.45±0.20
1206-L Type				0.80±0.30	
2512-S Type	6.45±0.20	3.25±0.10	0.80±0.15	0.60±0.30	0.50±0.25
2512-L Type				1.80±0.30	

### Performances

No	Item	Test Condition	Specification
1	Short Time Overload	Voltage equal to 3 time rated power for 5 sec (JIS-C5202-5.5)	ΔR: ±(1% + 0.0005Ω)
2	Temperature Coefficient or(T.C.R.)	+25°C/+125°C (JIS-C5202-5.2) $TCR(ppm/°C) = \frac{\Delta R}{R \times \Delta t} \times 10^6$	As Spec.
3	Damp Heat with Load	The specimens shall be placed in a chamber and subjected to a relative humidity of 90-95% and a temperature of 40±2°C for the period of 1000 hrs.. (MIL-STD-202, Method 103)	ΔR: ±(1% + 0.0005Ω)
4	High Temperature Exposure	The ship (mounted on board) is exposed in the heat chamber 125±2°C for 1000 hrs. (JIS-C5202-7.2)	ΔR: ±(1% + 0.0005Ω)
5	Load Life	Apply rated power at 70±2°C for 1000 hours with 1.5 hours ON and 0.5 hour OFF. (JIS-C5202-7.10)	ΔR: ±(1% + 0.0005Ω)
6	Bending Strength	Mount the chip to test substrate. Apply pressure in direction of arrow unit band width reaches 2mm(+0.2/-0mm) illustrated in the figure below and hold for 10 ± 1 sec. (JIS-C5202-6.1)	ΔR: ±(1% + 0.0005Ω)
7	Resistance to solder Heat	The specimen chip shall be immersed into the flux specified in the solder bath 260±5°C for 10±1 sec. (MIL-STD-202, Method 210)	ΔR: ±(1% + 0.0005Ω)
8	Solder ability	The specimen chip shall be immersed into the flux specified in the solder bath 235 ±5°C for 2 ±0.5 sec. It shall be immersed to a point 10mm from its root. (Sn96.5/Ag3.0/Cu0.5) (JIS-C5202-6.11)	Solder shall be covered 95% or more of the electrode area.



# Metal Strip Current Sensing Resistor

## CCS Series

### Features

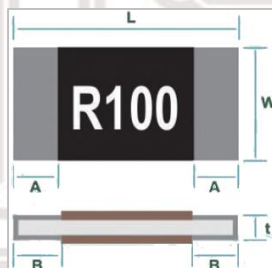
- ◆ Able to withstand higher temperature and higher current
- ◆ Ultra Low sensing resistance
- ◆ Excellent frequency response
- ◆ Chip size: 0603 to 2512
- ◆ Lead free, RoHS compliant for global applications and halogen free

### Application

- ◆ Portable Electronic Equipment-NB, Tablet PC, PC
- ◆ Battery Packs (N/B, Mobile Phone and Automobile)
- ◆ Switching power supply, Converter, Inverter
- ◆ Adapter and Chargers
- ◆ PCM for Li-on Battery pack

### Electrical Specification

Size	Power Rating	Resistance Range(mΩ)			Operation Temp. Range	TCR (PPM/°C)
		1%	2%	5%		
0402	1/16W	100~499			-55±155°C	±500
		500~976				±200
0603	1/10W	100~499				±500
		500~976				±200
1206	1/4W	50~99				±800
		100~499				±500
		500~976				±200
2512	1W	50~99				±800
		100~499				±500
		500~976				±200



### Dimension

Size	Dimensions(mm)				
	L	W	t	A	B
0603	1.55±0.10	0.85±0.10	0.45±0.10	0.30±0.20	0.35±0.20
0805	2.10±0.15	1.30±0.15	0.65±0.15	0.40±0.20	0.40±0.20
1206-S Type	3.10±0.20	1.65±0.10	0.65±0.15	0.50±0.30	0.45±0.20
1206-L Type				0.80±0.30	
2512-S Type	6.45±0.20	3.25±0.10	0.80±0.15	0.60±0.30	0.50±0.25
2512-L Type				1.80±0.30	

### Performances

No	Item	Test Condition	Specification
1	Short Time Overload	Voltage equal to 3 time rated power for 5 sec (JIS-C5202-5.5)	ΔR: ±(1% + 0.0005Ω)
2	Temperature Coefficient or(T.C.R.)	+25°C/+125°C (JIS-C5202-5.2) $TCR(ppm/^{\circ}C) = \frac{\Delta R}{R \times \Delta t} \times 10^{\circ}$	As Spec.
3	Damp Heat with Load	The specimens shall be placed in a chamber and subjected to a relative humidity of 90-95% and a temperature of 40±2°C for the period of 1000 hrs.. (MIL-STD-202, Method 103)	ΔR: ±(1% + 0.0005Ω)
4	High Temperature Exposure	The ship (mounted on board) is exposed in the heat chamber 125±2°C for 1000 hrs. (JIS-C5202-7.2)	ΔR: ±(1% + 0.0005Ω)
5	Load Life	Apply rated power at 70±2°C for 1000 hours with 1.5 hours ON and 0.5 hour OFF. (JIS-C5202-7.10)	ΔR: ±(1% + 0.0005Ω)
6	Bending Strength	Mount the chip to test substrate. Apply pressure in direction of arrow unit band width reaches 2mm(+0.2/-0mm) illustrated in the figure below and hold for 10 ± 1 sec. (JIS-C5202-6.1)	ΔR: ±(1% + 0.0005Ω)
7	Resistance to solder Heat	The specimen chip shall be immersed into the flux specified in the solder bath 260±5°C for 10±1 sec. (MIL-STD-202,Method 210)	ΔR: ±(1% + 0.0005Ω)
8	Solder ability	The specimen chip shall be immersed into the flux specified in the solder bath 235 ±5°C for 2 ±0.5 sec. It shall be immersed to a point 10mm from its root. (Sn96.5/Ag3.0/Cu0.5) (JIS-C5202-6.11)	Solder shall be covered 95% or more of the electrode area.

# Metal Strip Current Sensing Resistor

## MCSS Series

### Features

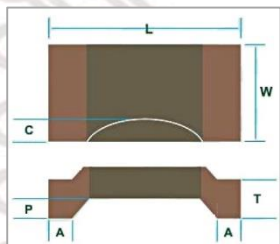
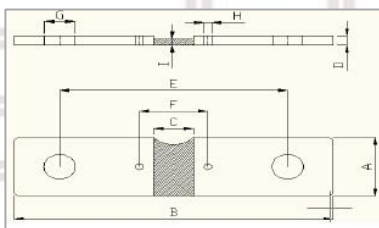
- ◆ Able to withstand higher temperature and higher current
- ◆ Excellent long term stability
- ◆ 5W up to 129A at 0.3mΩ
- ◆ Chip size: 2512, 3920, 59104 & 8420
- ◆ Lead free, RoHS compliant for global applications and halogen free

### Application

- ◆ Power modules
- ◆ Frequency converters
- ◆ Current sensor for power hybrid sources
- ◆ High current for automotive

### Electrical Specification

Size	Power Rating	Resistance Range(mΩ)	Operation Temp. Range	TCR (PPM/°C)
MCSS2512	1.5~3W	0.3~5.0	-55~+170°C	±50~±150
MCSS3920	2~5W	0.2~5.0	-55~+170°C	±50~±75
MCSS5930	6~10W	0.2~1.0	-55~+170°C	±50~±100
MCSS59104	10W	0.2	-55~+170°C	±100
MCSS8420	15W	0.1	-55~+170°C	±100



### Dimension

Size	Dimensions(mm)					
	L	W	T	A	C (Max.)	P
MCSS2512	6.50±0.2	3.25±0.2	0.72±0.15	0.90±0.2	0.4	0.35±0.2
MCSS3920	10.2±0.2	5.20±0.2	0.80±0.15	1.8±0.3	0.6	0.50±0.2
MCSS5930	15.0±0.2	7.75±0.2	0.58±0.15	4.20±0.2	1.0	0.50±0.2
MCSS59104	15.0±0.2	26.5±0.2	0.58±0.2	4.5±0.2	0.9	1.0±0.2
MCSS8420	84.0±0.2	20.0±0.2	3.0±0.2	-	-	-

### Performances

No	Item	Test Condition	Specification
1	Short Time Overload	Loading below condition for 5 cycles. Peak current equal 5 x rated power.	ΔR: ±(1% + 0.0005Ω)
2	Temperature Coefficient or(T.C.R.)	+25°C/+125°C (JIS-C5202-5.2) $TCR(ppm/^{\circ}C) = \frac{\Delta R}{R \times \Delta t} \times 10^{\circ}$	As Spec.
3	Moisture Resistance	The specimens shall be placed in a chamber and subjected to a relative humidity of 90-95% and a temperature of 25°C/65°C 10 cycles. (MIL-STD-202, Method 106)	ΔR: ±(1% + 0.0005Ω)
4	High Temperature Exposure	The ship (mounted on board) is exposed in the heat chamber 125°C for 1000 hrs. (JIS-C5202-7.2)	ΔR: ±(1% + 0.0005Ω)
5	Load Life	Apply rated power for 1000 hours with 1.5 hours ON and 0.5 hour OFF. (JIS-C5202-7.10)	ΔR: ±(1% + 0.0005Ω)
6	Bending Strength	Mount the chip to test substrate. Apply pressure in direction of arrow unit band width reaches 2mm(+0.2/-0mm) illustrated in the figure below and hold for 10 ± 1 sec. (JIS-C5202-6.1)	ΔR: ±(1% + 0.0005Ω)
7	Solder ability	The specimen chip shall be immersed into the flux specified in the solder bath 235 ±5°C for 2 ±0.5 sec. It shall be immersed to a point 10mm from its root. (Sn96.5/Ag3.0/Cu0.5) (JIS-C5202-6.11)	Solder shall be covered 95% or more of the electrode area.