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# TOKEN

## **(LRE) Metal Strip Low Value Chip Resistors**

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## ► Product Introduction

**Token (LRE) Metal Strip Chips offer exclusive technology features and benefits for current-sensing.**

### Features :

- High power rating up to 5 Watts. Low TCR down to  $\pm 50$  ppm/ $^{\circ}$ C.
- Resistance values from 0.25m to 1 Ohm. Customized resistance available.
- Wide range package sizes 0805/1206/2010/2512/2725/2728/2817/4527.

### Applications :

- Power Management for NB, MB, Monitor.
- SWPS DC-DC Converter, Charger, Adaptor, Power Supplies.
- Hard Disk Drives: Solid-state hard drives (SSD), Solid-state hybrid drives (SSHD).

### Construction :

- The resistive layer is covered with a protective coat, and two external end terminations are added.
- Internal metal electrodes are added at each end and connected by a resistive paste that is applied to the top surface of the metal alloy.
- Wrap-around terminations have an electroplated nickel barrier and pure Tin (lead free) or matte-tin finish, ensuring excellent "leach" resistance properties and solderability.

For current sensing applications, metal strip (metal alloy) resistors provide a more robust technology than thick film and thin film devices. Both thin film and thick film resistor technologies need a ceramic substrate for support.

Power Metal Strip technologies are quite different from thick film or thin film technologies since it is an exciting-metal welded construction that's thick enough to become self-supporting (there's no substrate). It's because the big current transporting mass of the bulk alloy, which supplies greater surge capacity. The ability of power handling capacity offers greater power rating and/or extended really low resistance ranges.



In fast electrical transients such as mechanical switch closures or battery plug-in, the pulse capability of the resistor is limited to the amount of heat energy that causes a temperature rise in the resistor element. The more massive resistor element of the power metal strip device will have less temperature rise for the same pulse energy, which translates to superior pulse withstanding capability.

Unlike other manufacturers of metal element current sense resistors, Token (LRE) metal strip chip resistors design for applications that require high power handling (Up to 5W) and low resistance values from 0.25m $\Omega$  to 1 $\Omega$  at  $\pm 50$  ppm/ $^{\circ}$ C; and come with a range of advantages including a wide temperature range and a varied choice of wide range package sizes 0805/1206/2010/2512/2725/2728/2817/4527 with high current capability.

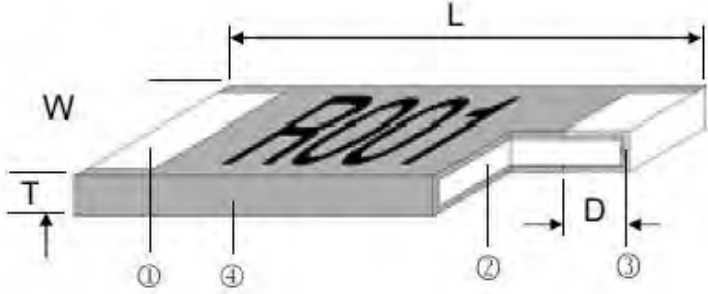
Token (LRE) series enable a wide range of design options and flexibility allows designers to specify the resistance value and tolerance that their circuits require, instead of designing their circuits to the resistance values available. At the same time, Token electronics also offers AEC-Q200 Automotive Grade (LREA) specifications by extending (LRE) series for vehicle applications such as electronic controls (anti-lock brakes, audio electronics, engine and transmission controls, climate controls, etc.).

Token electronics delivers the right chip for your low range, current-sense applications. For more detailed product information and data sheets or to discuss your specific requirements please contact Token electronics. Or link to Token official website "[Current Sense Resistors](http://www.token.com.tw)". Contact us with your specific needs.



## ► Dimensions

### Metal Strip Chip (LRE) Construction & Dimensions

 <p style="text-align: center;">Metal Alloy AEC-Q200 Chip (LREA) Construction &amp; Dimensions</p>	1	Solder Plating (Sn)
	2	Alloy Plate
	3	Barrier Layer (Cu, Ni)
	4	Overcoat

Type	Power Rating at 70°C (W)	Resistance Range (mΩ)	Dimensions (Unit: mm)					
			L	W	T	D		
LRE0805	0.75	3.0 ~ 100.0	2.100±0.254	1.500±0.254	0.320±0.254	0.400±0.254		
	1.0	3.0 ~ 10.0						
LRE1206	0.5	51.0 ~ 100.0	3.200±0.254	1.650±0.254	0.300±0.254	0.508±0.254		
	0.75	21.0 ~ 50.0			0.390±0.254			
	1.0	1.0~2.0			0.670±0.254			
		3.0~100.0			0.490±0.254			
	1.5	1.0~2.0			0.670±0.254			
		3.0~100.0			0.490±0.254			
LRE2010	0.75	71.0~100.0	5.100±0.254	2.400±0.254	0.310±0.254	0.840±0.254		
	1	31.0~70.0			0.460±0.254			
	1.5	1.0~2.0			0.670±0.254			
		2.5~30.0			0.460±0.254			
		31.0~100.0			0.590±0.254			
LRE2512	1	0.5~1.0	6.350±0.254	3.050±0.254	0.670±0.254	2.200±0.254		
		1.5			2.000±0.254			
		2.0			1.400±0.254			
		2.5~100.0			1.100±0.254			
		101.0~680.0			0.490±0.254	0.850±0.254		
		0.5~1.0			0.670±0.254	2.200±0.254		
	2	1.5			2.000±0.254			
		2.0			1.400±0.254			
		2.5~100.0			1.100±0.254			
		101.0~450.0			0.610±0.254	0.850±0.254		
		0.5~1.0			0.670±0.254	2.200±0.254		
		3			0.5~1.0	6.350±0.254	3.050±0.254	0.670±0.254

Type	Power Rating at 70°C (W)	Resistance Range (mΩ)	Dimensions (Unit: mm)			
			L	W	T	D
		1.5				2.000±0.254
		2.0				1.400±0.254
		2.5~50.0				1.100±0.254
		51.0~100.0				
LRE2725	4	0.25	6.800±0.254	6.350±0.254		0.820±0.254
		0.5				2.300±0.254
		1				0.690±0.254
		1.5~3.0				0.690±0.254
LRE2728	4	4.0~50.0	6.600±0.254	6.700±0.254		0.610±0.254
		51.0~450.0				0.720±0.254
		451.0~600.0				0.840±0.254
LRE2817	3	1.0	7.300±0.254	4.400±0.254		0.770±0.254
		2.0~30.0				1.800±0.254
		31.0~100.0				1.500±0.254
		101.0~130.0				
		131.0~200.0				
LRE4527	3	501.0~680.0	11.300±0.500	6.600±0.500		0.690±0.254
		681.0m~1.0R				2.000±0.254
	5	1.0				0.790±0.254
		1.5				3.000±0.254
		2.0~500.0				0.840±0.254
						2.000±0.254

## ► Electrical Specifications

### Current Sensing Metal Strip Chip (LRE) Electrical Specifications

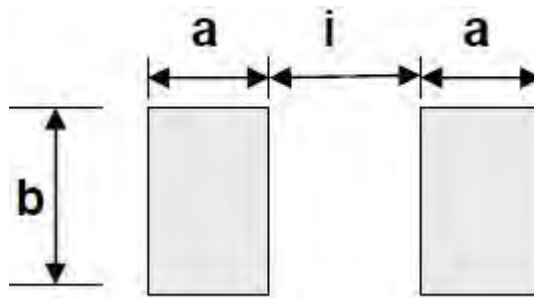
Type	Max. Rating Power (W)	Max. Rating Current (A)*	Max. Overload Current (A)	Resistance Range (mΩ)*		TCR (ppm/°C)	Operating Temperature (°C)
				D (±0.5%)	F (±1%); G (±2%); J (±5%)		
LRE0805	0.75	15.81	31.62	10.0~100.0	3.0~100.0	±50	-55~+170°C
	1	18.26	36.51	10.0	3.0~10.0		
LRE1206	0.50	3.13	6.26	51.0~100.0	51.0~100.0		
	0.75	5.98	11.95	21.0~50.0	21.0~50.0		
	1	31.62	63.25	7.0~100.0	1.0~100.0		
LRE2010	1.5	38.73	67.08	7.0~100.0	1.0~100.0		
	0.75	3.25	7.27	71.0~100.0	71.0~100.0		
	1	5.68	12.70	31.0~70.0	31.0~70.0		
LRE2512	1.5	38.73	77.46	7.0~100.0	1.0~100.0		
	1	44.72	100.00	7.0~680.0	0.5~680.0		
	2	63.25	141.42	7.0~450.0	0.5~450.0		
LRE2725	3	77.46	134.16	7.0~100.0	0.5~100.0		
	4	126.49	252.98	--	0.25~3.0		
LRE2728	4	31.62	54.77	7.0~600.0	4.0~600.0		
LRE2817	3	54.77	109.54	7.0~200.0	1.0~200.0		
LRE4527	3	2.45	4.24	501m~1.0R	501m~1.0R		
	5	70.71	122.47	7.0~500.0	1.0~500.0		

- Note: Rating Current  $I = \sqrt{P/R}$  or Max. Rating Current whichever is lower.  
Special tolerance and range of resistance are under requested.

## Land Pattern

### Metal Strip Chip (LRE) Recommend Land Pattern

Type	Maximum Power Rating (Watts)	Resistance Range (mΩ)	Dimensions (mm)		
			a	b	i
LRE0805	0.75	3.0 ~ 100.0	1.80	2.18	0.66
	1.0	3.0 ~ 10.0	1.80	2.18	0.66
LRE1206	0.5 & 0.75 & 1.0 & 1.5	1.0 ~ 100.0	1.60	2.18	0.66
LRE2010	0.75 & 1.0 & 1.5	1.0 ~ 3.0	2.89	2.92	1.22
		3.1 ~ 100.0	2.29	2.92	2.41
LRE2512	1.0 & 2.0 & 3.0	0.5 ~ 1.5	3.05	3.68	1.27
		2.0 ~ 3.5	2.11	3.68	3.18
		3.6 ~ 680.0	1.90	3.68	3.50
LRE2725	4.0	0.25 ~ 0.5	3.18	6.86	1.32
	4.0	1.0 ~ 3.0	2.34	6.86	3.00
LRE2728	4.0	4.0 ~ 600.0	2.75	7.82	3.51
LRE2817	3.0	1.0 ~ 3.0	2.75	7.82	3.51
	3.0	3.5 ~ 200.0	2.45	7.82	3.11
LRE4527	3.0 & 5.0	1.0 ~ 3.0	4.50	8.74	4.50
		3.5 ~ 100.0	3.4	8.74	6.43
		101.0m ~ 1R	2.93	8.74	7.63

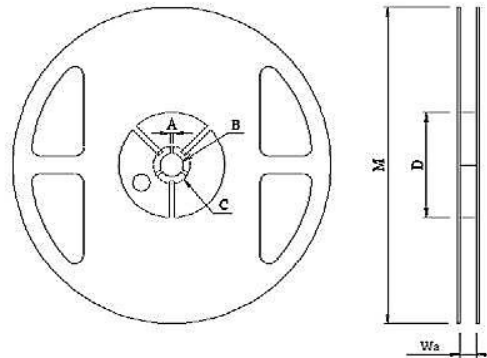


Metal Strip Chip (LRE) Recommend Land Pattern

## Reel & Type

### Reel Specifications (LRE) Unit: mm

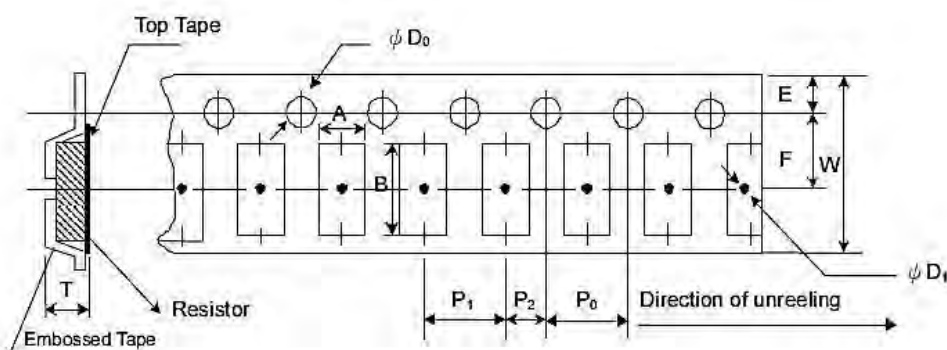
Reel Type / Tape	W	M	A	B	C	D
7" reel for 8 mm embossed (LREA0805 & 1206 series only)	12.00± 0.5	178 ± 1.0	2.0 ± 0.5	13.2 ± 0.5	17.7 ± 0.5	60.0 ± 0.5
7" reel for 12 mm embossed	16.2 ± 0.5	178 ± 1.0	2.5 ± 0.5	13.5 ± 0.5	17.7 ± 0.5	60.0 ± 0.5
7" reel for 24 mm embossed (LREA4527 series only)	24.4 +2/-0	178 ± 1.0	2.0 ± 0.5	13.2 ± 0.5	17.7 ± 0.5	60.0 ± 0.5



Reel Specifications Dimensions

### Emboss Plastic Tape Specifications (LRE)

Type	A±0.1	B±0.1	W±0.3	E±0.1	F±0.1	P0±0.1	P1±0.3	P2±0.1	ΦD0±0.05	ΦD1±0.1	T±0.1
LRE0805	1.70	2.45	8.0	1.75	3.5	4.0	4.0	2.0	1.55	1.00	0.50
LRE1206	2.03	3.55	8.0	1.75	3.5	4.0	4.0	2.0	1.55	1.00	0.70
LRE2010	2.85	5.55	12.0	1.75	5.5	4.0	4.0	2.0	1.55	1.55	0.82
LRE2512	3.50	6.75	12.0	1.75	5.5	4.0	4.0	2.0	1.55	1.55	0.90
LRE2725	6.81	7.16	12.0	1.75	5.5	4.0	8.0	2.0	1.55	1.55	1.05
LRE2728	7.10	7.05	12.0	1.75	5.5	4.0	8.0	2.0	1.55	1.55	0.95
LRE2817	4.60	7.50	12.0	1.75	5.5	4.0	8.0	2.0	1.55	1.55	1.20
LRE4527	7.38	12.0	24.0	1.75	11.5	4.0	12.0	2.0	1.55	1.55	1.05



Low Ohm Metal Strip (LRE) Emboss Plastic Tape Specifications

- The cumulative tolerance of 10 sprockets hole pitch is ± 0.2mm.
- Carrier camber shall be not more than 1mm per 100mm through a length of 250mm.
- A & B measured 0.3mm from the bottom of the packet
- T measured at a point on the inside bottom of the packet to the top surface of the carrier.
- Pocket position relative to sprocket hole is measured as the true position of the pocket and not the pocket hole.

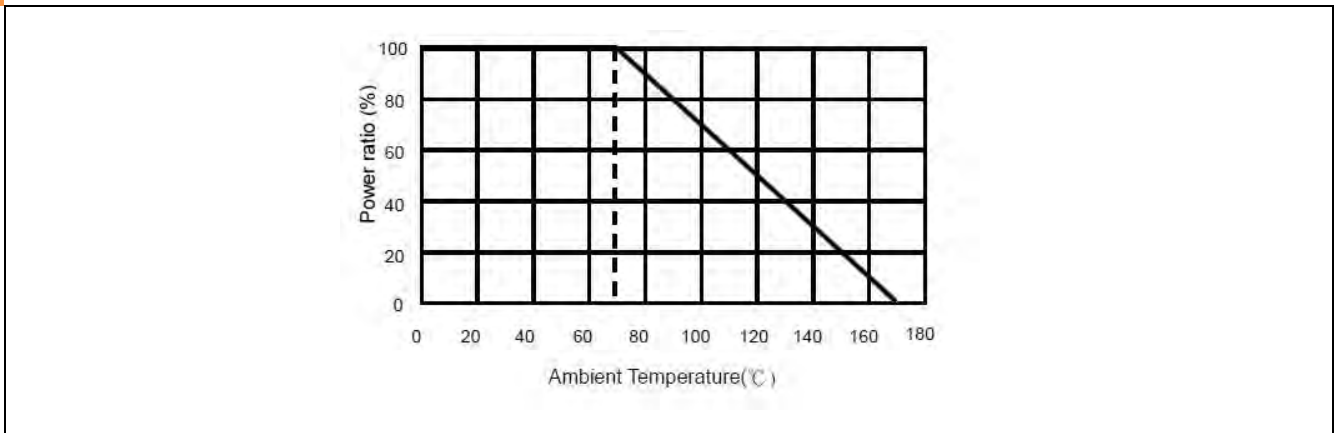
## Packaging Quantity (LRE)

Type	Tape Width	Diameter	Pieces/Reel
LRE0805	8 mm/embossed plastic	178 mm/7"	5,000
LRE1206	8 mm/embossed plastic	178 mm/7"	5,000
LRE2010	12 mm/embossed plastic	178 mm/7"	4,000
LRE2512	12 mm/embossed plastic	178 mm/7"	4,000
LRE2725	12 mm/embossed plastic	178 mm/7"	2,000
LRE2728	12 mm/embossed plastic	178 mm/7"	2,000
LRE2817	12 mm/embossed plastic	178 mm/7"	1,000
LRE4527	24 mm/embossed plastic	178 mm/7"	1,000

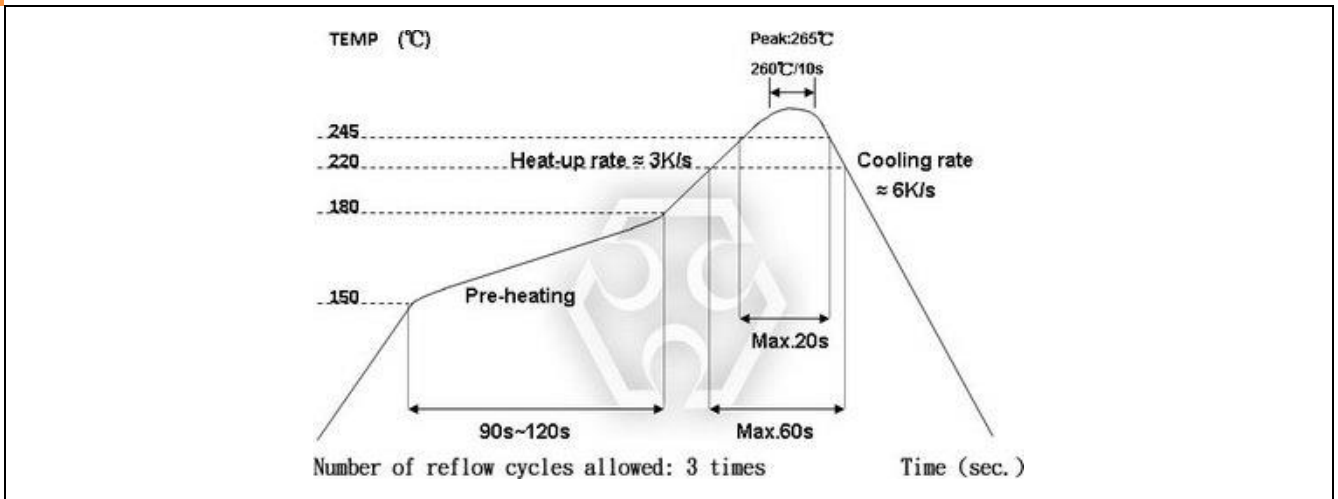


## Derating & Soldering Condition

### Derating Curve (LRE)



### Soldering Condition (Reflow soldering only) (LRE)



## Environmental Characteristics

### Environmental Characteristics (LRE)

Item	Requirement	Test Method																																	
Temperature Coefficient of Resistance (T.C.R.)	As Spec.	JIS C 5201-1 4.8 +25/+125°C																																	
Short Time Overload	LRE4527: $\Delta R/R_0 \leq \pm 2.0\%$ The others: $\Delta R/R_0 \leq \pm 0.5\%$	JIS C 5201-1 4.13 Rating power duration: 5secs.																																	
		<table border="1"> <thead> <tr> <th>Type</th> <th>Power</th> <th>Multiple</th> </tr> </thead> <tbody> <tr> <td>LRE0805</td> <td>0.75W, 1.0W</td> <td>4 times</td> </tr> <tr> <td>LRE1206</td> <td>0.5W, 0.75W, 1.0W</td> <td>4 times</td> </tr> <tr> <td>LRE1206</td> <td>1.5W</td> <td>3 times</td> </tr> <tr> <td>LRE2010</td> <td>0.75W, 1.0W</td> <td>5 times</td> </tr> <tr> <td>LRE2010</td> <td>1.5W</td> <td>4 times</td> </tr> <tr> <td>LRE2512</td> <td>1.0W, 2.0W, 3.0W</td> <td>5 times</td> </tr> <tr> <td>LRE2725</td> <td>4.0W</td> <td>4 times</td> </tr> <tr> <td>LRE2728</td> <td>4.0W</td> <td>3 times</td> </tr> <tr> <td>LRE2817</td> <td>3.0W</td> <td>4 times</td> </tr> <tr> <td>LRE4527</td> <td>3.0W, 5.0W</td> <td>3 times</td> </tr> </tbody> </table>	Type	Power	Multiple	LRE0805	0.75W, 1.0W	4 times	LRE1206	0.5W, 0.75W, 1.0W	4 times	LRE1206	1.5W	3 times	LRE2010	0.75W, 1.0W	5 times	LRE2010	1.5W	4 times	LRE2512	1.0W, 2.0W, 3.0W	5 times	LRE2725	4.0W	4 times	LRE2728	4.0W	3 times	LRE2817	3.0W	4 times	LRE4527	3.0W, 5.0W	3 times
		Type	Power	Multiple																															
		LRE0805	0.75W, 1.0W	4 times																															
		LRE1206	0.5W, 0.75W, 1.0W	4 times																															
		LRE1206	1.5W	3 times																															
		LRE2010	0.75W, 1.0W	5 times																															
		LRE2010	1.5W	4 times																															
		LRE2512	1.0W, 2.0W, 3.0W	5 times																															
		LRE2725	4.0W	4 times																															
LRE2728	4.0W	3 times																																	
LRE2817	3.0W	4 times																																	
LRE4527	3.0W, 5.0W	3 times																																	
Solderability	95% Min. coverage	JIS-C5201-1 4.17 245±5°C for 3 seconds																																	
Resistance to Soldering Heat	$\Delta R/R_0 \leq \pm 0.5\%$	JIS-C5201-1 4.18 260±5°C for 10 seconds																																	
Temperature Cycling	$\Delta R/R_0 \leq \pm 0.5\%$	JIS-C5201-1 4.19 -55°C ~ 150°C, 100 cycles																																	
Bias Humidity	$\Delta R/R_0 \leq \pm 0.5\%$	JIS-C5201-1 4.24 +85°C/85%RH for 1,000Hrs. with 1.5Hrs "ON", 0.5Hr "OFF".																																	
High Temperature Exposure (Storage)	LRE4527: $\Delta R/R_0 \leq \pm 2.0\%$ The others: $\Delta R/R_0 \leq \pm 1.0\%$	JIS-C5201-1 4.23.2 +170°C for 1000 Hrs.																																	
Load Life	LRE4527: $\Delta R/R_0 \leq \pm 2.0\%$ The others: $\Delta R/R_0 \leq \pm 1.0\%$	JIS-C5201-1 4.25 70±2°C, RCWV for 1000 Hrs. with 1.5 Hrs. "ON" and 0.5 Hr. "OFF"																																	

## Order Codes

### Order Codes (LRE)

LRE	2728	F	TR	D	4	R010								
Part Number	Dimensions (L×W) (mm)		Resistance Tolerance (%)		Package		TCR (PPM/°C)		Power Rating (W)		Resistance (Ω) Ex:		Marking	
	0805	2.10*1.50	J	±5	TR	Taping Reel	D	±50	U	0.5W	0m50	0.00050		Black Coating
	1206	3.20*1.65	G	±2			W	±75	Q	0.75W	0m75	0.00075	*0805	No Marking
	2010	5.10*2.40	F	±1			E	±100	T	1W	1m50	0.00150		
	2512	6.35*3.05	D	±0.5			K	±150	A	1.5W	R002	0.00200		
	2725	6.80*6.35					F	±200	S	2W	R010	0.01000		
	2728	6.60*6.70							R	3W	R100	0.10000		
	2817	7.30*4.40							4	4W				
	4527	11.30*6.60							5	5W				

● Note: There is no marking on 0805 series.

## ► General Information

### Your Current Options - Token Current Sense

As the world becomes more and more technology-driven, the uses for current sensing components will continue to increase. The need for even lower resistance value ranges is already becoming evident, as is the need for these resistors to handle more power. The industry-wide trend is the emergence of smaller and smaller products.

Token Electronics offers a wide variety of current sensing products from the industry to military standards, such as current sense in Thin-Film / Thick-Film Technology, Bare Element Resistors, and Open Air Shunts. This enables Token to present an astounding number of possible solutions for any circuit design needs.

### Applications of Current Detecting Components

Token's TCS and CS Series unique form factor provides automotive designers with several advantages. Both TCS and CS Series are ideal for applications involving window lift motors, fuel pump systems, seat belt pretensioners, and pulse width modulator feedback.

The wider resistive element and lower resistance enables higher current to pass through the device. Token's LRC ultra low Ohmic metal strip chip series provides the inherent ability to flex slightly and offers stress relief during extreme temperature cycling on typical or metal substrates. This LRC series is suitable for switch power supply applications (DC-DC Converter, Charger, and Adaptor) and power management of monitor.

The open air design of bare element resistor LRA and LRB Series provide a far cooler operation by allowing more air flow under the resistive element to keep excess heat from being transmitted to the PC board. They are suitable for high power AC/DC detection of power supply circuit.

Token axial moulded BWL series provides power rating up to 10 watts and lower resistance  $0.005\Omega$ , is ideal for all types of current sensing applications including switching and linear power supplies, instruments and power amplifiers.

Token standard current sensing components can be replacement for Vishay, IRC, Ohmite, KOA, Yageo devices with fast delivery and more competitive price. Contact us with your specific needs.

