



# Anti-surge thin film chip resistors

■ MRG series

AEC-Q200 Compliant

## Features

- Significant improvement of anti-surge capability comparing to existing thin film resistors
- Precision resistance tolerance:  $\pm 0.5\%$ , very small TCR:  $\pm 10\text{ppm}/^\circ\text{C}$
- Thin film structure enabling low noise and anti-sulfur

## Applications

- Power source related devices
- Automotive electronics
- Robotics, Industrial control system



## ◆ Part numbering system

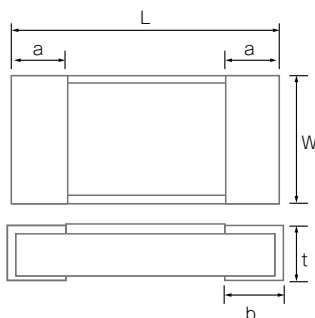
**MRG 2012 N - 104 - D - T5**

Series code	Size: MRG2012, MRG3216, MRG5025	Temperature coefficient of resistance	Resistance tolerance
			Nominal resistance value (E-24, E-96, MRG3216, MRG5025: all 4 digit)
			Packaging quantity: T5(5,000pcs) (MRG2012, MRG3216) T4(4,000pcs) (MRG5025)

## ◆ Electrical Specification

Type	Power ratings	Temperature coefficient of resistance	Resistance range( $\Omega$ ) Resistance tolerance	Maximum voltage	Resistance value series	Operating temperature	Packaging quantity
		(ppm/ $^\circ\text{C}$ )	$\pm 0.5\%$ (D)				
MRG2012	1/10W	$\pm 10$ (N)	$100 \leq R \leq 1\text{M}$	150V	E-24, E-96	$-55^\circ\text{C} \sim 155^\circ\text{C}$	T5
		$\pm 25$ (P)					
MRG3216	1/8W	$\pm 10$ (N)	$100 \leq R \leq 2\text{M}$	200V	E-24, E-96	$-55^\circ\text{C} \sim 155^\circ\text{C}$	T5
		$\pm 25$ (P)					
MRG5025	1/2W	$\pm 10$ (N)	$100 \leq R \leq 2\text{M}$	300V	E-24, E-96	$-55^\circ\text{C} \sim 155^\circ\text{C}$	T4
		$\pm 25$ (P)					

## ◆ Dimensions



Type	Size (inch)	L	W	a	b	t
MRG2012	0805	$2.00 \pm 0.20$	$1.25 + 0.25 / - 0.20$	$0.40 \pm 0.20$	$0.40 \pm 0.20$	$0.40 + 0.15 / - 0.10$
MRG3216	1206	$3.20 \pm 0.20$	$1.60 \pm 0.25$	$0.50 \pm 0.25$	$0.50 \pm 0.25$	$0.40 + 0.15 / - 0.10$
MRG5025	2010	$5.00 \pm 0.20$	$2.50 \pm 0.25$	$0.60 \pm 0.25$	$0.60 \pm 0.25$	$0.45 + 0.15 / - 0.10$

(unit : mm)

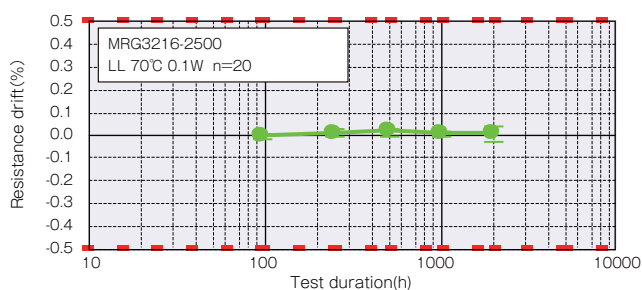
## ◆ Reliability specification

Test items	Condition (test methods (MIL-PRF-55342/JIS C5201-1))	Standard
Short time overload	2.5 x rated voltage,*1 5seconds	±(0.05%+0.01Ω)
Life (biased)	85°C, rated voltage,*1 90min on 30min off, 2000hours	±(0.25%+0.01Ω)
High temperature high humidity	85°C, 85%RH, 1/10 of rated power, 90min on 30min off, 2000hours	±(0.25%+0.01Ω)
Temperature shock	-55°C (30min) ~ 125°C (30min) 2000cycles	±(0.25%+0.01Ω)
High temperature exposure	155°C, no bias, 2000hours	±(0.5%+0.01Ω)
ESD (HBM)	4KV (Positive 3times, negative 3 times)	±(0.5%+0.05Ω)
Resistance to soldering heat	260±5°C, 10 seconds (reflow)	±(0.05%+0.01Ω)

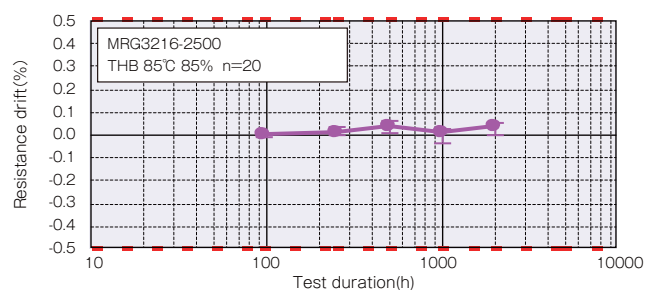
\*1 Rated voltage is given by  $E = \sqrt{R \times P}$  E= rated voltage (V), R=nominal resistance value(Ω), P=rated power(W)  
If rated voltage exceeds maximum voltage /element, maximum voltage/element is the rated voltage.

## ◆ Reliability test data

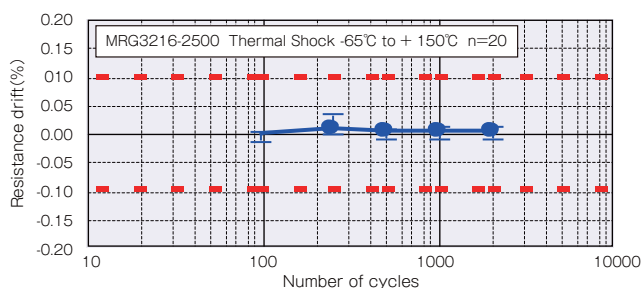
### ○ Biased life test



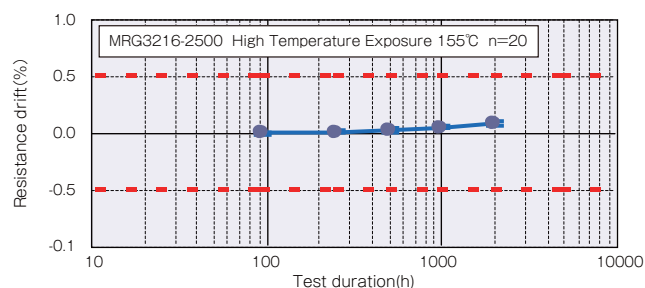
### ○ High temperature high humidity (biased)



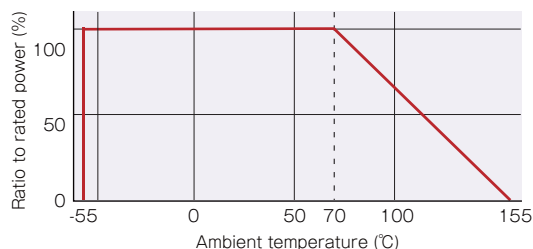
### ○ Temperature shock



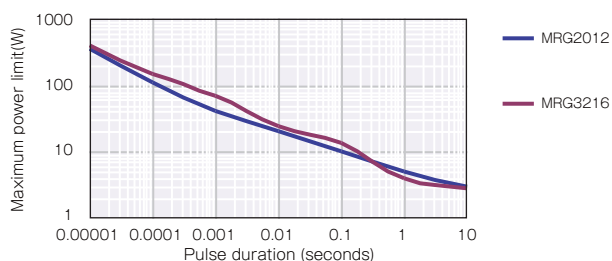
### ○ High temperature exposure



## ◆ Derating Curve



## ◆ Maximum pulse power limit (single pulse)



## ◆ Maximum pulse power limit (multiple pulses)

