Metal-film MELF 0204 & Metal thin-film chip 1206
Comparison chart

Doc. ID: RDAS-120914 / Prepared by: Johnny Wu / Date: 2012-09-14 / Rev.: 2013-05-01

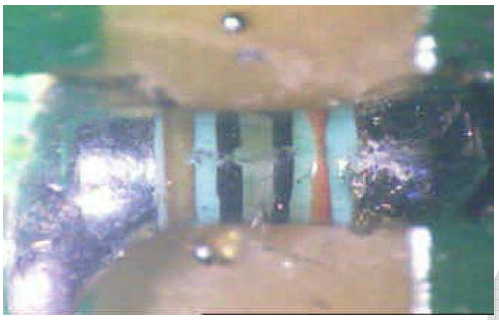
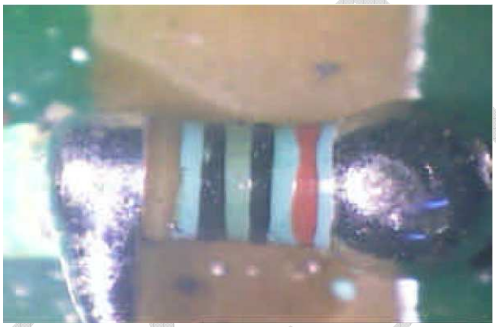
Mechanical Comparison			
	Metal-film MELF 0204	**Metal thin-film chip 1206**	**Reference**
Appearance	Cylindrical	Flat-plate	
Suitable for SMT process	Yes	Yes	
Size	1.35 x 3.52 mm	1.6 x 3.2 mm	Datasheet
Mechanical strength against thermal shock	Good	Fair	Surge stress test (P. 2, 3)
Mechanical strength against vibration and bending	Good	Fair	Discussion and conclusion (P. 3)
Thermal dissipation	Good	Fair	Heat dissipation test (P. 5, 6, 7)

Electrical Comparison			
	Metal-film Mini MELF 0204	**Metal thin-film chip 1206**	**Reference**
Anti-surge capacity	Good	Fair	Surge stress test and ref. (P. 2, 3, 4)
Power density	Achieves 1/2W	Achieves 1/4W	i.e. Thermal dissipation feature (P. 5, 6, 7)
Safety consideration	Good	Fair	Discussion and conclusion (P. 3)
Current noise (At low resistance range)	Lower	Higher	

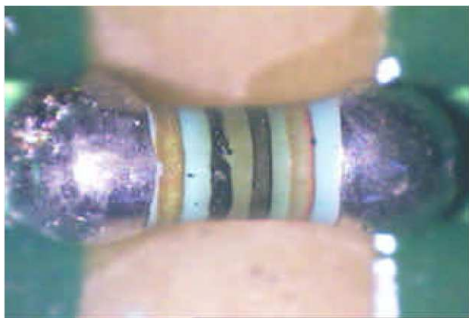
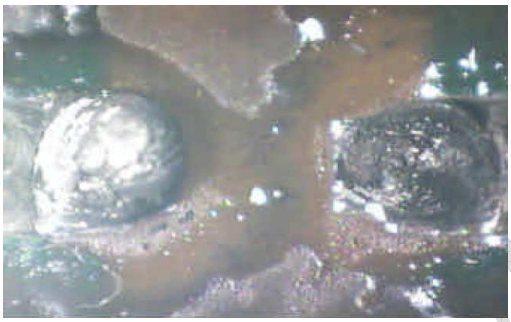
FIRST RESISTOR & CONDENSER CO., LTD. 9F, No. 233, Sec. 4, Sinyi Rd., Taipei 106, Taiwan
Telephone : +886-2-27051878 Fax: +886-2-27036701
Email: QR@Firstohm.com.tw http://www.Firstohm.com.tw

Surge stress test of 0204 MELF resistor and 1206 Chip resistor

Test condition：Voltage: 274 V / Time: 1.5 second
Sample resistance：10 K Ohm
Sample Q'ty：0204 MELF resistor 5 pcs, 1206 chip resistor 5 pcs.
Tested by: S.Y. Lee, RD Division
Test Result：

No.	0204 MELF resistor	1206 chip resistor
1		
	MELF-1 before test 9.979K after test 10.063K	Chip-1 before test 9.979K after test BURN-OPEN
2		
	MELF-2 before test 9.983K after test 9.954K	Chip-2 before test 10.002K after test 13.2K
3		
	MELF-3 before test 9.998K after test 3M	Chip-3 before test 9.979K after test BURN-BROKEN

FIRST RESISTOR & CONDENSER CO., LTD. 9F, No. 233, Sec. 4, Sinyi Rd., Taipei 106, Taiwan
Telephone：+886-2-27051878 Fax: +886-2-27036701
Email: QR@Firstohm.com.tw http://www.Firstohm.com.tw

4		
	MELF-4 before test 10.014K after test 9.840K	Chip-4 before test 9.975K after test BURN-EXPLODE
5		
	MELF-5 before test 9.983K after test 9.858K	Chip-5 before test 9.974K after test BURN-EXPLODE

Discussion：

1. This test distinguishes surge-withstanding capability of the resistors tested as it impacted both the resistive film and mechanical structure of the resistors.
2. In the test above, the resistance values of 0204 MELF resistors changed less.
3. In the test above, the chip resistors were seriously damaged. This may be due to the weak mechanical structure of 1206 chip resistors as the fast heat accumulation on the conductive film sides of chip resistors possibly caused destructive bending of the resistors and the subsequent breaking.

Conclusion：

0204 MELF resistors are more reliable for electronic products with safety consideration under surge stress as 0204 MELF resistors withstand surge impact better than 1206 chip resistors do because of the advantageous mechanical structure. Additionally, 1206 chip resistors incur higher possibility of breaking during physical impact such as bending and vibration.

FIRST RESISTOR & CONDENSER CO., LTD. 9F, No. 233, Sec. 4, Sinyi Rd., Taipei 106, Taiwan
Telephone：+886-2-27051878 Fax: +886-2-27036701
Email: QR@Firstohm.com.tw http://www.Firstohm.com.tw

Reference:

Surge withstanding capability data extracted from Document Number 28802, Revision: 18-Jun-10, Vishay Intertechnology Inc.

FIRST RESISTOR & CONDENSER CO., LTD. 9F, No. 233, Sec. 4, Sinyi Rd., Taipei 106, Taiwan
Telephone : +886-2-27051878 Fax: +886-2-27036701
Email: QR@Firstohm.com.tw http://www.Firstohm.com.tw

Thermal dissipation feature test of 0204 MELF resistor and 1206 Chip resistor

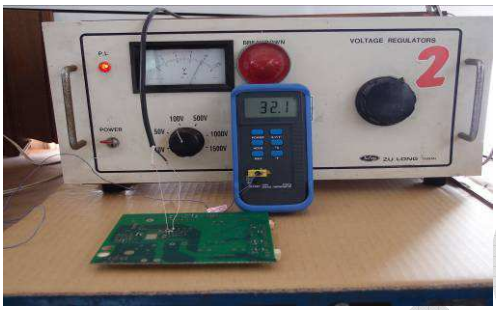
Test condition：0.4W / Voltage: 65 V / Time: 600 seconds

Sample resistance value：10K Ohm

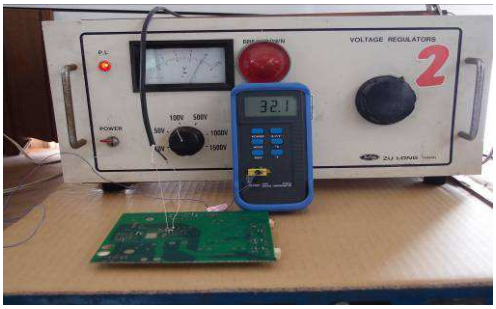
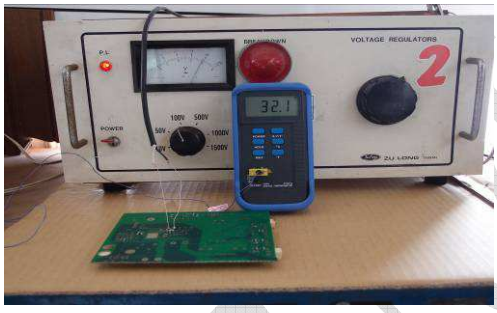
Sample Q'ty：0204 MELF resistor 1 pc, 1206 chip resistor 1 pc

Tested by: Mark Chen, Hualien factory

Test Result：

With no air flow		
No	0204 MELF resistor	1206 chip resistor
1		
	MELF before test: 32.1℃	Chip before test: 32.1℃
2		
	MELF at 600 seconds: 35.4℃	Chip at 600 seconds: 36.4℃

FIRST RESISTOR & CONDENSER CO., LTD. 9F, No. 233, Sec. 4, Sinyi Rd., Taipei 106, Taiwan
Telephone：+886-2-27051878 Fax: +886-2-27036701
Email: QR@Firstohm.com.tw http://www.Firstohm.com.tw

With air flow		
No.	0204 MELF resistor	1206 chip resistor
1		
	MELF before test: 32.1℃	Chip before test: 32.1℃
2		
	MELF at 300 seconds: 32.8℃	Chip at 300 seconds: 33.1℃
3		
	MELF at 600 seconds: 32.9℃	Chip at 600 seconds: 33.6℃

FIRST RESISTOR & CONDENSER CO., LTD. 9F, No. 233, Sec. 4, Sinyi Rd., Taipei 106, Taiwan
Telephone : +886-2-27051878 Fax: +886-2-27036701
Email: QR@Firstohm.com.tw http://www.Firstohm.com.tw

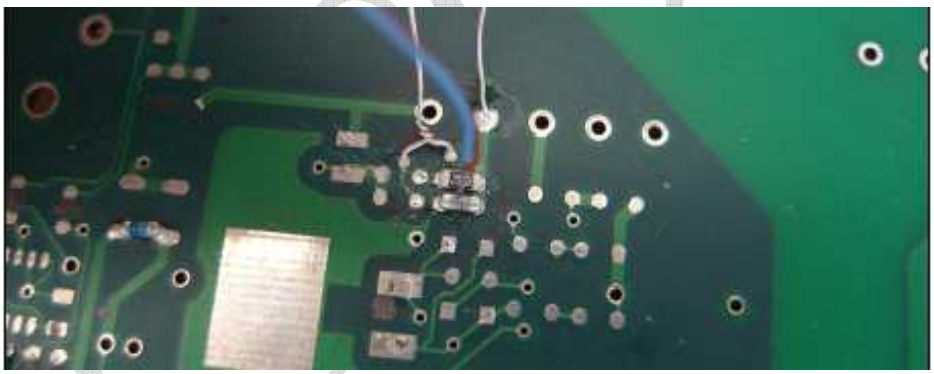
Discussion：

It is seen that after loading voltage is applied on resistors, 0204 MELF resistor demonstrated lower surface temperature than 1206 chip resistor.

Conclusion：

1. In the test above, heat dissipation capability of 0204 MELF resistor was better than that of 1206 chip resistor.
2. Larger outer surface of 0204 MELF resistor provides better heat dissipation performance. When used in circuit, this feature of 0204 MELF resistor can maintain lower temperature on PCB, so as to prolong electronic product life.
3. When used on the same PCB, more MELF resistors can be mounted and achieve higher power density. This advantage is favorable for applications that require small sizes, high power, and high heat generation, such as power supplies.

Note: Resistor layout in the tests above is as seen below where 1206 chip resistor might be positioned for better heat dissipation because of its closer proximity to the copper input wire:



FIRST RESISTOR & CONDENSER CO., LTD. 9F, No. 233, Sec. 4, Sinyi Rd., Taipei 106, Taiwan
Telephone：+886-2-27051878 Fax: +886-2-27036701
Email: QR@Firstohm.com.tw http://www.Firstohm.com.tw