

Specification No.	Rev. Symbol	Page	Distribution No.
LR20-D-0005		0 / 7	

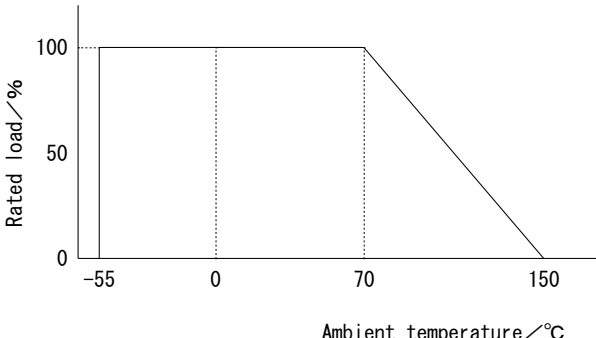
Specification

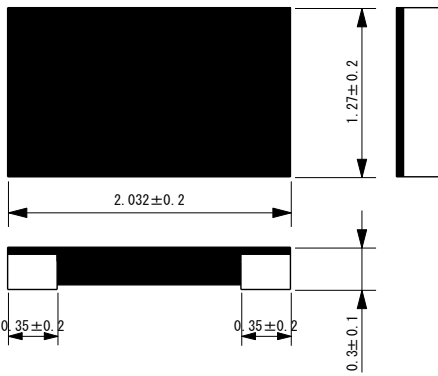
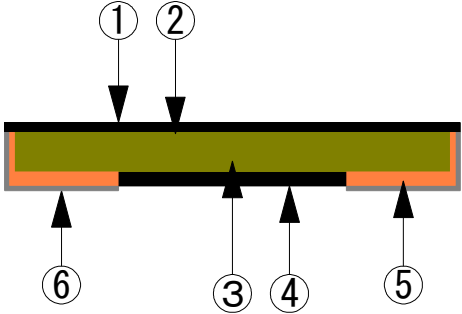
F o r C U R R E N T D E T E C T I N G M E T A L P L A T E C H I P R E S I S T O R

M o d e l L R 2 0 R 0 0 3 F E

HOKURIKU ELECTRIC INDUSTRY CO., LTD.
COMPONENTS DIVISION • FILM RESISTOR FACTORY

Established Date	Revised Date	Applied Date
1 SEP. 2016		5 SEP. 2016
To be kept at	Approved by	<i>S.Ueno</i>
E n g i n e e r i n g S e c t i o n	Checked by	<i>M.Urayama</i>
	Drawn up by	<i>H.Honda</i>

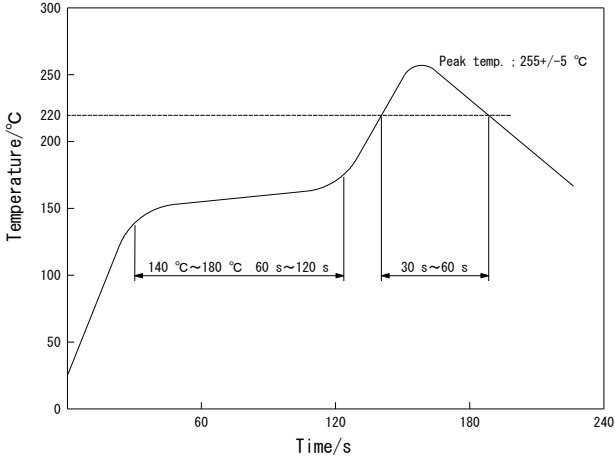
Products Specification; LR20 type		No.LR20-D-0005														
Items	Contents															
1.Application	This specification covers Current Detecting Metal Plate Chip Resistors; LR20 type.															
2.Model No. designation	<p>Model No. is designated as follows.</p> <p>Ex. <u>LR20</u> <u>R003</u> <u>F</u> <u>E</u></p> <p>Model resistance Nominal resistance Tolerance Taping type (Paper taping)</p> <p>Tolerance: Resistance tolerance is denoted by 1 alphabet capital letter. (F → Resistance tolerance ±1.0 %)</p>															
3.Ratings	Ratings are shown Table-1.															
1)Ratings	<p style="text-align: center;">Table-1. Ratings</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Item</th> <th>Contents</th> </tr> </thead> <tbody> <tr> <td>Nominal resistance</td> <td>0.003 Ω</td> </tr> <tr> <td>Resistance tolerance</td> <td>Class F(±1.0 %)</td> </tr> <tr> <td>Temperature coefficient</td> <td>±100 ppm/°C</td> </tr> <tr> <td>Rated ambient temperature</td> <td>70 °C</td> </tr> <tr> <td>Operating temperature range</td> <td>-55 °C to 150 °C</td> </tr> <tr> <td>Rated wattage</td> <td>0.5 W</td> </tr> </tbody> </table> <p>※Rated wattage is the maximum continuous power applicable at ambient temperature from -55 to 70 °C.</p>		Item	Contents	Nominal resistance	0.003 Ω	Resistance tolerance	Class F(±1.0 %)	Temperature coefficient	±100 ppm/°C	Rated ambient temperature	70 °C	Operating temperature range	-55 °C to 150 °C	Rated wattage	0.5 W
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2)Rated wattage	<p>In case of ambient temperature above 70 °C, power rating shall be in accordance with Fig 1.Derating curve.</p> <div style="text-align: center;">  <p style="text-align: center;">Fig 1. Derating curve</p> </div>															
3)Rated voltage	<p>Rated voltage is the D.C. or rms A.C. maximum voltage at ambient temperature from -55 °C to 70 °C. Rated voltage shall be determined from following formula.</p> $E = \sqrt{(P \times R)}$ <p style="margin-left: 400px;">E : Rated voltage[V] P : Rated wattage[W] R : Nominal resistance[Ω]</p>															

Products Specification; LR20 type		No.LR20-D-0005																					
Items	Contents																						
4. Marking	The product does not have the marking.																						
5. Weight, Dimensions and constructions,																							
1) Weight	The product weight changes with resistance; 0.004 g (typical)																						
2) Dimensions	<p>The product dimensions are as follows.</p> 																						
3) Constructions (Material)	<p>The product constructions are as follows.</p>  <table border="1"> <thead> <tr> <th>No.</th> <th>Part</th> <th>Material</th> </tr> </thead> <tbody> <tr> <td>①</td> <td>Surface coat</td> <td>Polyimide</td> </tr> <tr> <td>②</td> <td>Adhesive</td> <td>Adhesive Glue</td> </tr> <tr> <td>③</td> <td>Resistor Element</td> <td>Metal alloy for resistor</td> </tr> <tr> <td>④</td> <td>Over coat</td> <td>Insulation painting</td> </tr> <tr> <td>⑤</td> <td>Electrode</td> <td>Copper</td> </tr> <tr> <td>⑥</td> <td>Terminal plating</td> <td>Ni-under plated, Sn-surface plated</td> </tr> </tbody> </table>		No.	Part	Material	①	Surface coat	Polyimide	②	Adhesive	Adhesive Glue	③	Resistor Element	Metal alloy for resistor	④	Over coat	Insulation painting	⑤	Electrode	Copper	⑥	Terminal plating	Ni-under plated, Sn-surface plated
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Products Specification; LR20 type		No.LR20-D-0005		
Items	Contents			
6.Characteristics and Test method	Characteristics and test method are shown Table 2.			
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	No.	Items	Characteristics	Test method
	1	Resistance	Tolerance class F; within $\pm 1.0\%$	Measurement current; 1 A measured at 25 °C
	2	Temperature coefficient of resistance	within ± 100 ppm/°C	standard temperature; 25 °C measured temperature; 150 °C
	3	Short-time overload	Resistance change; within $\pm 0.5\%$	Be applied electric power equal to 3 times rated power in 5 s JIS C 5201-1 4.13
	4	Insulation resistance	Over $10^9 \Omega$	Be measured at terminals and center of resistor by d.c.100 V ± 15 V in 1 min. JIS C 5201-1 4.6
	5	Dielectric withstanding voltage	Without breakdown	Be applied at terminals and center of resistor on a.c.100V, 1min. JIS C 5201-1 4.7
	6	Resistance to soldering heat	Resistance change; within $\pm 0.5\%$ No remarkable outward damage	Place it on the copper sheet (t=0.2 mm) heated by solder Copper sheet temperature; 260 °C ± 5 °C Duration; 5 s ± 0.5 s
	7	Solder-ability	Over 95 % coverage	Be immersed terminal in solder (Sn3Ag0.5Cu) Temperature of solder; 245 °C ± 5 °C Duration of immersion; 3 s ± 0.5 s JIS C 5201-1 4.17
	8	Vibration	Resistance change; within $\pm 0.5\%$ No remarkable outward damage	Vibration frequency range; 10 Hz to 55 Hz Peak to peak amplitude; 1.5 mm Rate of sweeping; 1 min. XYZ 3 - direction each 2 h JIS C 5201-1 4.22
	9	Resistance to solvent	No remarkable outward damage	Solvent; Isopropyl alcohol Temperature; 20 to 25 °C Duration of immersion; 60 s ± 5 s
	10	High temp. exposure	Resistance change; within $\pm 2.0\%$	Temperature; 150 °C ± 2 °C Bias load; 0 % power. Duration; 1 000 h JIS C 5201-1 4.23.2
	11	Change of temperature	Resistance change; within $\pm 0.5\%$ No remarkable outward damage	-55 °C ± 3 °C(30 min.)/normal temp. (2 to 3 min.) /150 °C ± 2 °C (30 min.)/normal temp.(2 to 3 min.) Number of cycles; 5 cycles
	12	Moisture resistance	Resistance change; within $\pm 1.0\%$	Test condition is MIL-STD-202, method 106, 0 % power 7a and 7b not required, 1cycle=24 h, 10 cycles
13	Bias humidity	Resistance change; within $\pm 1.0\%$	Temperature; 85 °C ± 2 °C. Relative humidity; 85 %. 10 %-bias load; on time 90 min./off time 30 min. Duration; 1 000 h	
14	Endurance (Rated load)	Resistance change; within $\pm 2.0\%$	Temperature;70 °C ± 2 °C. Bias load; on time 90 min./off time 30 min. Duration; 1 000 h.	

Products Specification; LR20 type		No.LR20-D-0005
Items	Contents	
7.Taping	Taping dimensions are as follows.	
1)Taping dimensions		
2)Reel dimensions	<p>Reel dimensions are as follows.</p>	
3)Taping quantity	Taping quantity is 5 000 pcs. / reel.	
4)label	<p>The label mentioning contents are as follows.</p> <ul style="list-style-type: none"> ① Your part number ② Quantity ③ Our part number ④ Resistance value ⑤ Manufacturer mark ⑥ Shipment year and month, lot No. 	

Products Specification; LR20 type		No.LR20-D-0005	
Items	Contents		
8.Packaging	A reel is packaged in the following box.		
	Number of reel	D(mm)	Dimension of packaging box(mm)
	1	15	
	2	27	
	3	40	
4	48		

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Items	Contents	
10.Notice for application	<p>1)Circumstance Please avoid the corrosive circumstances like the Ammonium, Sulfur, and Halo genic gases. These kinds of gases erode the solder plating of electrodes to trouble soldering, and cause open circuit.</p> <p>2)Soldering iron operation (inclusive of repair) Soldering iron tip shall be slowly applied so as not to float the chip. Tip temperature shall be below 310 °C , time be within 3 s. each. Iron tip application to the same point shall be 2 times. For more than 2 times, please change the chip to fresh one.</p> <p>3)Reflow soldering As shown below, pre-heat shall be 140 to 180 °C, 60 to 120 s, and reflow peak temperature be 255+/-5 °C, 5 s. maximum, the number of times within 2 times.</p>  <p>4)Positioning The products shall be so laid out as to minimize the impact that they may receive from the bend or deflection of the board when it is divided. The products shall not be installed in places close to the dividing line or prone to strains. Low-resistance resistors shall be used with care because the resistance of the wiring may be a few percent of that of the resistor.</p> <p>5)Coating treatment Resin burying, coating, and similar operations may change the resistance greatly depending on the material used. The material shall therefore be checked before use.</p> <p>6)Thermal effect design Please confirm thermal effects in using conditions because resistor is heat-up part.</p>	

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11.Others	<p>1) Storing condition It is guaranteed that the product will retain normal solder-ability for one year in the standard state as per JIS C 5201-1, clause 4.2 (at temperatures between 15 and 35 °C and relative humidity between 25 and 75 %). It is not desirable that the Resistor are stored are at dusty, harmful gas, for example hydrogen chloride and sulfate gas etc.</p> <p>2) Power derating Even if have use it in a derating curve, in consideration of self-fever, ambient temperature of a resistor, heat influence from the other parts. We ask for enough load deratings in case of use in a stable state for a long term.</p> <p>3) Shock to the Resistor When the resistors are shocked, there is danger that the resistor breaks. So in use of surface mounter, please adjust it for no damaging to the resistor. Please avoid dropping in a high, too.</p> <p>4) RoHS directive This resistor is a product satisfying a RoHS.</p> <p>5) For environmental protection We don't use Class I ODC and PBBOs, PBBs in a products and the process.</p> <p>6) Off the subject of the restriction of export(COCOM) This product is off the subject of the restriction of export (COCOM) like the strategic material etc.</p> <p>7) Cautions for Resistors</p> <ul style="list-style-type: none"> • This specification shows the quality and performance as a resistor simple. Before adoption, please evaluate and check your product in which the resistor was mounted. • This products are designed and manufactured for general standard use in general electronic equipment (AV equipment, household electric appliances, office equipment, information and communication equipment, etc.).When there is a danger that a human life and other serious damage will occur by the fault of this products at transportation equipment (such as train, automobile, vessel, etc.), traffic signal, medical equipment, aerospace equipment, electric heating appliances, burning appliances, gas apparatus, rotation equipment, disaster prevention, and crime prevention equipment, please design fail-safe systems and ensure safety, such as the following. <p>*Systems with protective circuits and a protective equipment *Systems with redundant circuits and others to do not cause danger by failure.</p>	