1. Scope
This reference specification applies to DFE18SAN_G0 series, Chip coil (Chip Inductors).

2. Part Numbering
(ex) DF E 18 SA N 1R0 M G 0 L
Customer Part Number  Murata Part Number  Inductance (µH)  DC Resistance (Ω)  *3 Rated Current (Max.) (mA)
DFE18SANR24MG0L  0.24  0.030  4900  3500
DFE18SANR47MG0L  0.47  ±20%  0.054  3300  2600
DFE18SAN1R0MG0L  1.0  0.128  2100  1700

*1: The saturation allowable DC current value is specified when the decrease of the initial Inductance value at 30%.
*2: When applied Rated current to the Products, temperature rise caused by self-generated heat shall be limited to 40°C max.
*3: Keep the temperature (ambient temperature plus self-generation of heat) under 125°C.

3. Rating
Operating Temperature Range
(Ambient temperature; Self-temperature rise is not included) -40 to +85°C
(Product temperature; Self- temperature rise is included) -40 to +125°C
Storage Temperature Range. -40 to +85°C
Absolute maximum voltage 20V DC

4. Testing Conditions (Standard atmospheric conditions)
<Unless otherwise specified>  <In case of doubt>
Temperature : Ordinary Temperature (15 to 35°C)  Temperature : 20 ± 2°C
Humidity : Ordinary Humidity (25 to 85 %RH)  Humidity : 60 to 70 % (RH)
Atmospheric Pressure : 86 to 106 kPa

5. Appearance and Dimensions

MURATA MFG.CO., LTD
### 6. Electrical Performance

<table>
<thead>
<tr>
<th>No.</th>
<th>Item</th>
<th>Specification</th>
<th>Test Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.1</td>
<td>Inductance</td>
<td>Inductance shall meet item 3.</td>
<td>Measuring Equipment: Agilent 4287A or equivalent (0.5V) Measuring Frequency: 1MHz</td>
</tr>
<tr>
<td>6.2</td>
<td>DC Resistance</td>
<td></td>
<td>Measuring Equipment: Digital multi meter</td>
</tr>
<tr>
<td>6.3</td>
<td>Rated Current</td>
<td>Self temperature rise shall be limited to 40°C max.</td>
<td>The rated current is applied.</td>
</tr>
</tbody>
</table>

### 7. Mechanical Performance

<table>
<thead>
<tr>
<th>No.</th>
<th>Item</th>
<th>Specification</th>
<th>Test Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.1</td>
<td>Bonding Strength</td>
<td>Chip coil shall not be damaged.</td>
<td>It shall be soldered on the substrate. Applying Force(F) : 10N Hold Duration: 5s</td>
</tr>
<tr>
<td>7.2</td>
<td>Bending Strength</td>
<td>Substrate: Glass-epoxy substrate (100×40×1.0mm) Speed of Applying Force: 0.5mm / s Deflection: 2mm Hold Duration: 20s</td>
<td></td>
</tr>
<tr>
<td>7.3</td>
<td>Vibration</td>
<td>It shall be soldered on the substrate. Oscillation Frequency : 10 to 55 to 10Hz for 1m Total amplitude : 1.5 mm or Acceleration amplitude 98m/s² whichever is smaller. Testing Time: A period of 2 h in each of 3 mutually perpendicular directions. (Total 6 h)</td>
<td></td>
</tr>
<tr>
<td>7.4</td>
<td>Solderability</td>
<td>The wetting area of the electrode shall be at least 90% covered with new solder coating.</td>
<td>Flux:Ethanol solution of rosin,25(wt)% (Immersed for 5 to 10s) Solder : Sn-3.0Ag-0.5Cu Pre-Heating:150±10°C / 60 to 90s Solder Temperature:245±5°C Immersion Time:3 s</td>
</tr>
<tr>
<td>7.5</td>
<td>Resistance to Soldering Heat</td>
<td>Appearance:No damage Inductance Change : within ±10%</td>
<td>Rework soldering method Flux: Ethanol solution of rosin,25(wt)% Solder : Sn-3.0Ag-0.5Cu Pre-Heating: 150 to 180°C / 60 to 120s Solder Temperature: 230°C min. / 20 to 40s Peak Temperature: 250+5/-0°C Rework times: 2 times max. Test board shall be 0.8 mm thick. Base material shall be glass epoxy resin. Then measured after exposure Standard atmospheric conditions for 1~2 h.</td>
</tr>
</tbody>
</table>

---

**Note:** The specifications and test methods are provided as detailed as possible to ensure the quality and reliability of the components. Always refer to the latest updates or manuals for the most current information. **Reference Only**
8. Environmental Performance (It shall be soldered on the substrate.)

<table>
<thead>
<tr>
<th>No.</th>
<th>Item</th>
<th>Specification</th>
<th>Test Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>8.1</td>
<td>Heat Resistance</td>
<td>Appearance: No damage</td>
<td>Temperature: 125±2°C</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Inductance Change: within ±10%</td>
<td>Time: 500h (±12h)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Then measured after exposure Standard atmospheric conditions for 1~2 h.</td>
</tr>
<tr>
<td>8.2</td>
<td>Cold Resistance</td>
<td></td>
<td>Temperature: -40±2°C</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Time: 500h (±12h)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Then measured after exposure Standard atmospheric conditions for 1~2 h.</td>
</tr>
<tr>
<td>8.3</td>
<td>Humidity</td>
<td></td>
<td>Temperature: 40±2°C</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Humidity: 90 to 95%(RH)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Time: 500h (±12h)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Then measured after exposure Standard atmospheric conditions for 1~2 h.</td>
</tr>
<tr>
<td>8.4</td>
<td>Temperature Cycle</td>
<td>1 cycle:</td>
<td>1 step: -40±2°C / 30±3 m</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2 step: Ordinary temp. / 3m max.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>3 step: +125±2°C / 30±3 m</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>4 step: Ordinary temp. / 3m max.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Total of 100 cycles</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Then measured after exposure Standard atmospheric conditions for 1~2 h.</td>
</tr>
</tbody>
</table>

9. Specification of Packaging

9.1 Appearance and Dimensions of plastic tape

Unreeling direction

9.2 Specification of Taping

(1) Packing quantity (standard quantity)
3,000 pcs / reel
(2) Packing Method
Products shall be packed in the each embossed cavity of plastic tape and sealed by cover tape.
(3) Sprocket hole
The sprocket holes are to the right as the tape is pulled toward the user.
(4) Spliced point
Plastic tape and Cover tape has no spliced point.
(5) Missing components number
Missing components number within 0.1 % of the number per reel or 1 pc., whichever is greater, and are not continuous. The specified quantity per reel is kept.

9.3 Pull Strength

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Embossed carrier tape</td>
<td>9.8N min.</td>
<td></td>
</tr>
<tr>
<td>Cover tape</td>
<td>10N min.</td>
<td></td>
</tr>
</tbody>
</table>

9.4 Peeling off force of cover tape

<table>
<thead>
<tr>
<th>Speed of Peeling off</th>
<th>Peeling off force</th>
</tr>
</thead>
<tbody>
<tr>
<td>300mm/min</td>
<td>0.1 to 0.7N (minimum value is typical)</td>
</tr>
</tbody>
</table>

9.6 Specification of Packaging

A | 1.15 ± 0.05 | P0 | 4.0 ± 0.1 |
B | 1.95 ± 0.05 | P1 | 4.0 ± 0.1 |
D0 | 1.5 ± 0.05  | P2 | 2.0 ± 0.05 |
D1 | 0.8 ± 0.05  | T1 | 0.25 ± 0.05 |
E | 1.75 ± 0.1  | T2 | 1.15 ± 0.06 |
F | 3.5 ± 0.05  | W  | 8.0 ± 0.2  |

(in mm)
9.5 Dimensions of Leader-tape, Trailer and Reel
There shall be leader-tape (cover tape) and trailer-tape (empty tape) as follows.

![Diagram of leader-tape and trailer-tape with dimensions][1]

9.6 Marking for reel
Customer part number, MURATA part number, Inspection number(∗1), RoHS marking(∗2), Quantity etc ・・・

∗1) <Expression of Inspection No.> □□ OOOO XXX
(1) Factory Code
(2) Date
First digit : Year / Last digit of year
Second digit : Month / Jan. to Sep. → 1 to 9, Oct. to Dec. → O, N, D
Third, Fourth digit : Day
(3) Serial No.

∗2) « Expression of RoHS marking » ROHS – Y (∆)
(1) RoHS regulation conformity
(2) MURATA classification number

9.7 Marking for Outside package (corrugated paper box)
Customer name, Purchasing order number, Customer part number, MURATA part number, RoHS marking (∗2), Quantity, etc ・・・

10.8. Specification of Outer Case

![Diagram of outer case dimensions][2]

<table>
<thead>
<tr>
<th>Outer Case Dimensions (mm)</th>
<th>Standard Reel Quantity in Outer Case (Reel)</th>
</tr>
</thead>
<tbody>
<tr>
<td>W</td>
<td>D</td>
</tr>
<tr>
<td>186</td>
<td>186</td>
</tr>
</tbody>
</table>

Above Outer Case size is typical. It depends on a quantity of an order.

10. **Caution**

Limitation of Applications
Please contact us before using our products for the applications listed below which require especially high reliability for the prevention of defects which might directly cause damage to the third party’s life, body or property.

(1) Aircraft equipment  (6) Transportation equipment (vehicles, trains, ships, etc.)
(2) Aerospace equipment  (7) Traffic signal equipment
(3) Undersea equipment  (8) Disaster prevention / crime prevention equipment
(4) Power plant control equipment  (9) Data-processing equipment
(5) Medical equipment  (10) Applications of similar complexity and/or reliability requirements to the applications listed in the above
11. Notice

This product is designed for solder mounting. Please consult us in advance for applying other mounting method such as conductive adhesive.

This product employs a core with low insulation resistance. Pay strict attention when use it.

a) Do not make any through holes and copper pattern under the coil except a copper pattern to the electrode.

b) Design/ mount any components not to contact this product.

11.1 Land pattern designing (Reflow Soldering)

Recommended land pattern for reflow soldering is as follows:
It has been designed for Electric characteristics and solderability.
Please follow the recommended patterns. Otherwise, their performance which includes electrical performance or solderability may be affected, or result to "position shift" in soldering process.

![Diagram of land pattern design](in mm)

11.2 Flux, Solder

| Flux | Use rosin-based flux.
|      | Don't use highly acidic flux with halide content exceeding 0.2(wt)% (chlorine conversion value).
|      | Don't use water-soluble flux.

| Solder | Use Sn-3.0Ag-0.5Cu solder
|        | Standard thickness of solder paste : 100μm to 150μm

Other flux (except above) Please contact us for details, then use.

11.3 soldering conditions (Reflow)

- Pre-heating should be in such a way that the temperature difference between solder and product surface is limited to 100°C max. Cooling into solvent after soldering also should be in such a way that the temperature difference is limited to 100°C max.

  Insufficient pre-heating may cause cracks on the product, resulting in the deterioration of product quality.

- Standard soldering profile profile is as follows.

![Soldering profile graph](in °C)

<table>
<thead>
<tr>
<th>Heating time</th>
<th>Standard Profile</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-heating</td>
<td>150°C~180°C , 90s±30s</td>
</tr>
<tr>
<td>Heating</td>
<td>above 230°C , 20s~40s</td>
</tr>
<tr>
<td>Peak temperature</td>
<td>250°C±5/0°C</td>
</tr>
<tr>
<td>Cycle of reflow</td>
<td>2 times</td>
</tr>
</tbody>
</table>
11.4 Solder Volume
- Solder shall be used not to be exceeded the upper limits as shown below.
- Accordingly increasing the solder volume, the mechanical stress to Chip is also increased.
Exceeding solder volume may cause the failure of mechanical or electrical performance.

\[ \frac{1}{3}T \leq t \leq T \]
\( T \): thickness of electrode

11.5 Product's location
The following shall be considered when designing and laying out P.C.B.’s.
(1) P.C.B. shall be designed so that products are not subject to the mechanical stress due to warping the board.

[Products direction]

(2) Components location on P.C.B. separation.
It is effective to implement the following measures, to reduce stress in separating the board.
It is best to implement all of the following three measures; however, implement as many measures as possible to reduce stress.

<table>
<thead>
<tr>
<th>Contents of Measures</th>
<th>Stress Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Turn the mounting direction of the component parallel to the board separation surface.</td>
<td>A &gt; D ( \ast ) 1</td>
</tr>
<tr>
<td>(2) Add slits in the board separation part.</td>
<td>A &gt; B</td>
</tr>
<tr>
<td>(3) Keep the mounting position of the component away from the board separation surface.</td>
<td>A &gt; C</td>
</tr>
</tbody>
</table>

1 A > D is valid when stress is added vertically to the perforation as with Hand Separation. If a Cutting Disc is used, stress will be diagonal to the PCB, therefore A > D is invalid.

11.6 Resin coating
The inductance value may change and/or it may affect on the product’s performance due to high cure-stress of resin to be used for coating/molding products. So please pay your careful attention when you select resin. In prior to use, please make the reliability evaluation with the product mounted in your application set.

11.7 Temperature rating of the circuit board and components located around
Temperature may rise up to max. 40 °C when applying the rated current to the Products.
Be careful of the temperature rating of the circuit board and components located around.

11.8 Caution for use
There is possibility that the inductance value change due to magnetism. Don’t use a magnet or a pair of tweezers with magnetism when chip coil are handled. (The tip of the tweezers should be molded with resin or pottery.)
11.9 Magnetic Saturation
When the excessive current over rated current is applied, the inductance value may change due to magnetism.

11.10 Handling of a substrate
After mounting products on a substrate, do not apply any stress to the product caused by bending or twisting to the substrate when cropping the substrate, inserting and removing a connector from the substrate or tightening screw to the substrate.
Excessive mechanical stress may cause cracking in the product.

11.11 Storage and Handling Requirements
(1) Storage period
Use the products within 6 months after delivered.
Solderability should be checked if this period is exceeded.

(2) Storage conditions
- Products should be stored in the warehouse on the following conditions.
  - Temperature: -10°C to 40°C
  - Humidity: 15% to 85% relative humidity
  - No rapid change on temperature and humidity
  - Don't keep products in corrosive gases such as sulfur, chlorine gas or acid, or it may cause oxidization of electrode, resulting in poor solderability.
  - Products should be stored on the palette for the prevention of the influence from humidity, dust and so on.
  - Products should be stored in the warehouse without heat shock, vibration, direct sunlight and so on.
  - Products should be stored under the airtight packaged condition.

(3) Handling Condition
Care should be taken when transporting or handling product to avoid excessive vibration or mechanical shock.

12. Note
(1) Please make sure that your product has been evaluated in view of your specifications with our product being mounted to your product.
(2) You are requested not to use our product deviating from the reference specifications.
(3) The contents of this reference specification are subject to change without advance notice.
Please approve our product specifications or transact the approval sheet for product specifications before ordering.