



Power Inductor ENR60 F Series Product Specifications

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Power Inductor — ENR60 F Series



Parts Number Explanation

Example:

ENR	6028	F	R47	M	T	W	Z
Product Type	Size (mm)	Application	Inductance (uH)	Tolerance	Package	Internal Code	Optional
Wire-wound Power Inductor	6028 6045		R47 : 0.47uH R68 : 0.68uH	N : ±30% M : ±20% K : ±10%	T : Taping		Z : Default Code



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■ Standard Electrical Specifications

Part No.	Inductance	DCR (mΩ)	DCR (mΩ)	Isat (A)	Irms (A)
	L (μH)	MAX	TYP	$\Delta L/L_0 \leq 30\%$	$\Delta T \leq 40^\circ\text{C}$
ENR6028F-1R0N-TWZ	1.0	20	15	8.00	5.50
ENR6028F-1R5N-TWZ	1.5	25	18	7.00	5.20
ENR6028F-2R2M-TWZ	2.2	28	21	6.00	4.50
ENR6028F-3R3M-TWZ	3.3	40	32	4.50	3.50
ENR6028F-4R7M-TWZ	4.7	45	40	4.00	3.00
ENR6028F-5R6M-TWZ	5.6	60	50	3.50	2.50
ENR6028F-6R8M-TWZ	6.8	65	55	3.20	2.40
ENR6028F-100M-TWZ	10	85	70	2.50	2.00
ENR6028F-120M-TWZ	12	96	80	2.40	1.90
ENR6028F-150M-TWZ	15	125	100	2.30	1.80
ENR6028F-220M-TWZ	22	185	150	1.90	1.40
ENR6028F-270M-TWZ	27	210	185	1.60	1.30
ENR6028F-330M-TWZ	33	260	200	1.40	1.20
ENR6028F-470M-TWZ	47	410	350	1.30	1.00
ENR6028F-560M-TWZ	56	420	360	1.10	0.90
ENR6028F-680M-TWZ	68	500	400	1.00	0.85
ENR6028F-820M-TWZ	82	680	550	0.90	0.80
ENR6028F-101M-TWZ	100	750	620	0.85	0.75
ENR6028F-150M-TWZ	150	860	800	0.65	0.60
ENR6028F-220M-TWZ	220	1600	1300	0.55	0.50
ENR6028F-330M-TWZ	330	2400	1850	0.50	0.45
ENR6028F-470M-TWZ	470	3200	2400	0.35	0.32
ENR6028F-680M-TWZ	680	5500	4300	0.32	0.30
ENR6028F-820M-TWZ	820	5800	4500	0.26	0.25
ENR6028F-102M-TWZ	1000	7800	5950	0.23	0.22



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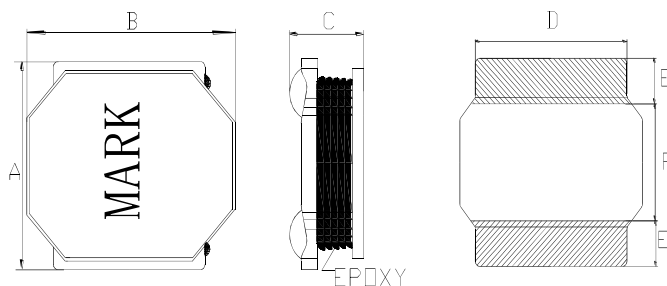
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Part No.	Inductance	DCR (mΩ)	DCR (mΩ)	Isat (A)	Irms (A)
	L (μH)	MAX	TYP	$\Delta L/L_0 \leq 30\%$	$\Delta T \leq 40^\circ\text{C}$
ENR6045F-1R0N-TWZ	1.0	15	11	12.50	6.00
ENR6045F-1R5N-TWZ	1.5	20	16	11.00	4.90
ENR6045F-1R8N-TWZ	1.8	20	16	10.00	4.50
ENR6045F-2R2M-TWZ	2.2	23	18	9.00	4.40
ENR6045F-3R3M-TWZ	3.3	30	23	7.50	4.00
ENR6045F-4R7M-TWZ	4.7	40	32	6.70	3.60
ENR6045F-5R6M-TWZ	5.6	48	39	6.00	3.10
ENR6045F-6R8M-TWZ	6.8	54	44	5.30	2.80
ENR6045F-8R2M-TWZ	8.2	70	55	4.80	2.50
ENR6045F-100M-TWZ	10	72	58	4.50	2.40
ENR6045F-120M-TWZ	12	95	74	3.80	2.20
ENR6045F-150M-TWZ	15	100	80	3.40	2.10
ENR6045F-180M-TWZ	18	130	110	3.10	1.80
ENR6045F-220M-TWZ	22	160	125	2.90	1.60
ENR6045F-330M-TWZ	33	210	175	2.30	1.50
ENR6045F-470M-TWZ	47	315	260	1.90	1.20
ENR6045F-680M-TWZ	68	420	345	1.60	1.00
ENR6045F-101M-TWZ	100	650	545	1.30	0.80
ENR6045F-151M-TWZ	150	1050	820	1.10	0.70
ENR6045F-181M-TWZ	180	1200	900	1.00	0.60
ENR6045F-221M-TWZ	220	2000	1550	0.90	0.50
ENR6045F-331M-TWZ	330	2500	2000	0.80	0.40
ENR6045F-471M-TWZ	470	3300	2500	0.70	0.35
ENR6045F-561M-TWZ	560	4400	3500	0.60	0.30
ENR6045F-681M-TWZ	680	4900	4000	0.50	0.28
ENR6045F-821M-TWZ	820	6500	5200	0.45	0.25
ENR6045F-102M-TWZ	1000	7500	6000	0.40	0.23

Notes :

1. Test Frequency : 100KHZ/0.25V
2. Tolerance : N: $\pm 30\%$; M: $\pm 20\%$; K: $\pm 10\%$

■ Dimensions



Note : Using Ink for marking

Recommend Land Pattern

Unit: mm

Type	A	B	C	D	E	F
ENR6028F	6.0 ±0.2	6.0 ±0.2	3.0 Max.	5.0 Ref.	1.85 Ref.	2.3 Ref.
ENR6045F	6.0 ±0.2	6.0 ±0.2	4.5 Max.	4.9 Ref.	1.55 Ref.	2.9 Ref.

■ Marking

- The inductor is marked with a 3-digit code

Nominal Inductance	
Example	Nominal Value
1R0	1.0 μ H
100	10 μ H
101	100 μ H



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● **Reliability test and requirement**

Mechanical		
Item	Specification and Requirement	Test Method
Substrate bending	$\Delta L/L_0 \leq \pm 5\%$ There shall be no mechanical damage or electrical damage.	<p>The sample shall be soldered onto the printed circuit board in figure 1 and a load applied until the figure in the arrow direction is made approximately 3 mm. (keep time 30 seconds).</p> <p style="text-align: center;">F(Pressurization)</p> <p style="text-align: center;">PRESSURE ROD figure-1</p>
Vibration	$\Delta L/L_0 \leq \pm 5\%$ There shall be no mechanical damage.	<p>The sample shall be soldered onto the printed circuit board and when a vibration having an amplitude of 1.52mm and a frequency of from 10 to 55Hz/1 minute repeated. Should be applied to the 3 directions (X, Y, Z) for 2 hours each. (A total of 6 hours)</p>
Solderability	New solder More than 90%.	<p>Flux (rosin, isopropyl alcohol {JIS-K-1522}) shall be coated over the whole of the sample before hard, the sample shall then be preheated for about 2 minutes in a temperature of 130~150°C and after it has been immersed to a depth 0.5mm below for 3±0.2 seconds fully in molten solder M705 with a temperature of 245±2°C.</p> <p>More than 90% of the electrode sections shall be covered with new solder smoothly when the sample is taken out of the solder bath.</p>



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Mechanical

Item	Specification and Requirement	Test Method
Resistance to soldering heat. (reflow soldering)	There shall be no damage or problems.	<p style="text-align: center;">Temperature profile of reflow soldering</p> <p style="text-align: center;">Soldering (Peak temperature 260±3°C 10 sec)</p> <p style="text-align: center;">30 sec Min 230 (230⁺⁰ °C)</p> <p style="text-align: center;">Pre-heating 150 ~ 180°C 2 min</p> <p style="text-align: center;">10sec</p> <p style="text-align: center;">Slow cooling (Stored at room temperature) 2 min. or more</p> <p>The specimen shall be passed through the reflow oven with the condition shown in the above profile for 1 time. The specimen shall be stored at standard atmospheric conditions for 1 hour, after which the measurement shall be made.</p>

ELECTRICAL

Item	Specification and Requirement	Test Method
Insulation resistance	There shall be no other damage or problems.	DC 100V voltage shall be applied across this sample of top surface and the terminal. The insulation resistance shall be more than $1 \times 10^8 \Omega$.
Dielectric withstand voltage	There shall be no other damage or problems.	AC 100V voltage shall be applied for 1minute across set the top surface and the terminal of this sample.
Temperature characteristics	$\Delta L / L 20^\circ C \leq \pm 10\%$ $0 \sim 2000 \text{ ppm}/^\circ C$	The test shall be performed after the sample has stabilized in an ambient temperature of - 40 to + 125°C, and the value calculated based on the value applicable in a normal temperature and normal humidity shall be $\Delta L / L 20^\circ C \leq \pm 10\%$.



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ENVIROMENT CHARACTERISTICS

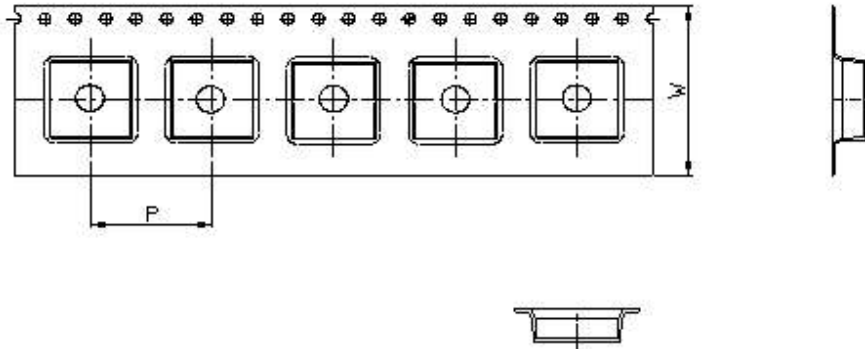
Item	Specification and Requirement	Test Method															
High temperature storage.	$\Delta L/Lo \leq \pm 5\%$ There shall be no mechanical damage.	The sample shall be left for 500 hours in an atmosphere with a temperature of $125 \pm 2^\circ\text{C}$ and a normal humidity. Upon completion of the measurement shall be made after the sample has been left in a normal temperature and normal humidity for 1 hour.															
Low temperature storage.	$\Delta L/Lo \leq \pm 5\%$ There shall be no mechanical damage.	The sample shall be left for 500 hours in an atmosphere with a temperature of $-40 \pm 3^\circ\text{C}$. Upon completion of the test, the measurement shall be made after the sample has been left in a normal temperature and normal humidity for 1 hour.															
Change of temperature.	$\Delta L/Lo \leq \pm 5\%$ There shall be no other damage of problems.	The sample shall be subject to 5 continuous cycles, such as shown in the table 2 below and then it shall be subjected to standard atmospheric conditions for 1 hour, after which measurement shall be made. <div style="text-align: center;">Table 2</div> <table border="1" style="margin-left: auto; margin-right: auto; border-collapse: collapse;"> <thead> <tr> <th style="width: 5%;"></th> <th style="width: 30%;">Temperature</th> <th style="width: 65%;">Duration</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">1</td> <td style="text-align: center;">$-40 \pm 3^\circ\text{C}$ (Thermostat No.1)</td> <td style="text-align: center;">10 min.</td> </tr> <tr> <td style="text-align: center;">2</td> <td style="text-align: center;">Standard atmospheric</td> <td style="text-align: center;">5 sec. or less No.1→No.2</td> </tr> <tr> <td style="text-align: center;">3</td> <td style="text-align: center;">$125 \pm 2^\circ\text{C}$ (Thermostat No.2)</td> <td style="text-align: center;">30 min.</td> </tr> <tr> <td style="text-align: center;">4</td> <td style="text-align: center;">Standard atmospheric</td> <td style="text-align: center;">5 sec. or less No.2→No.1</td> </tr> </tbody> </table>		Temperature	Duration	1	$-40 \pm 3^\circ\text{C}$ (Thermostat No.1)	10 min.	2	Standard atmospheric	5 sec. or less No.1→No.2	3	$125 \pm 2^\circ\text{C}$ (Thermostat No.2)	30 min.	4	Standard atmospheric	5 sec. or less No.2→No.1
	Temperature	Duration															
1	$-40 \pm 3^\circ\text{C}$ (Thermostat No.1)	10 min.															
2	Standard atmospheric	5 sec. or less No.1→No.2															
3	$125 \pm 2^\circ\text{C}$ (Thermostat No.2)	30 min.															
4	Standard atmospheric	5 sec. or less No.2→No.1															
Moisture storage.	$\Delta L/Lo \leq \pm 5\%$ There shall be no mechanical damage.	The sample shall be left for 500 hours in a temperature of $40 \pm 2^\circ\text{C}$ and a humidity(RH) of 90~95%. Upon completion of the test, the measurement shall be made after the sample has been left in a normal temperature and normal humidity more than 1 hour.															

Test conditions :

The sample shall be reflow soldered onto the printed circuit board in every test.

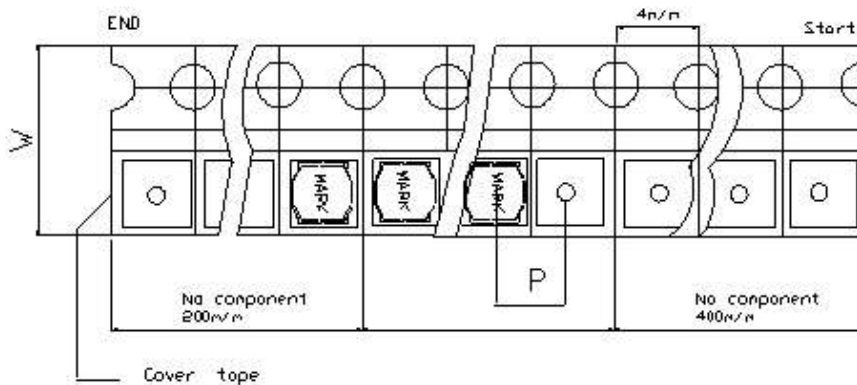
■ Packaging

(1) CARRIER TAPE DIMENSIONS (Unit : mm)



W	16
P	8

(2) TAPING DIMENSIONS (Unit : mm)



Note : Note: After the product is ready, the outermost layer of the reel is 400mmMIN and the innermost layer is 400mmMIN.

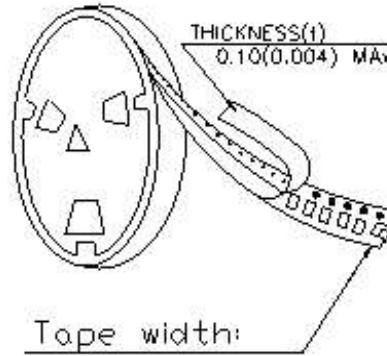
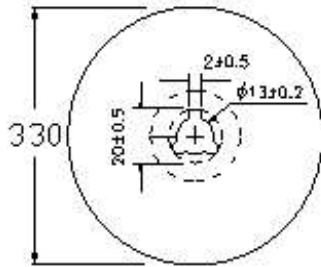
Type	Outermost Layer	Innermost Layer
ENR6028F	400	400
ENR6045F	400	400



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(3) REEL DIMENSIONS (Unit : mm)



Tape Width : 16mm

(4) Quantity (PCS)

Type	pcs / Reel
ENR6028F	2000
ENR6045F	1500