

CLH1110R1-R

Multi-phase power inductor



Product features

- High current multi-phase inductor
- 50 nH per phase coupled inductor
- Ferrite core material
- Patents pending
- 11.5 mm wide x 10.0 mm high footprint surface mount package with 23 mm, 30.8 mm, 38.3 mm and 45.8 mm lengths
- Moisture Sensitivity Level (MSL): 1
- Termination finish matte tin over nickel

Applications

- For exclusive use with Maxim® VPR-Devices

Environmental data

- Storage temperature range (Component): -40 °C to +125 °C
- Operating temperature range: -40 °C to +125 °C (ambient plus self-temperature rise)
- Solder reflow temperature: J-STD-020 (latest revision) compliant



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Product specifications

Part number ⁶	Inductor phases	OCL ¹ (nH) typical	OCL ¹ (nH) minimum	FLL ² (nH) minimum	I _{sat} ¹ (A)	SCL ⁴ (nH) ±20%	I _{sat} ² (A)	DCR (mΩ) maximum @ +20 °C
CLH1110R1-3-R050-R	3	300	240	200	25	50	140	0.23
CLH1110R1-4-R050-R	4	300	240	200	25	50	140	0.23
CLH1110R1-5-R050-R	5	300	240	200	25	50	140	0.23
CLH1110R1-6-R050-R	6	300	240	200	25	50	140	0.23

1. Open Circuit Inductance (OCL) test parameters: 1 MHz, 0.1 Vrms, 0.0 Adc, +105 °C
2. Full Load Inductance (FLL) test parameters: 1 MHz, 0.1 Vrms, I_{sat}¹, +105 °C
3. I_{sat}¹: Peak current at which OCL drops approximately 20% at +105 °C
4. Short Circuit Inductance (SCL) test parameters: 1 MHz, 0.1 Vrms, 0.0 Adc, +105 °C ±20%
CLH1110R1-3-R050-R short (1 & 4), (3 & 6) measure (2 & 5), and divide by 3.
CLH1110R1-4-R050-R short (1 & 4), (3 & 6), (5 & 8), measure (2 & 7), and divide by 4.
CLH1110R1-5-R050-R, short (1 & 4), (3 & 6), (5 & 8), (7 & 10), measure (2 & 9), and divide by 5.
CLH1110R1-6-R050-R, short (1 & 4), (3 & 6), (5 & 8), (7 & 10), (9 & 12), measure (2 & 11), and divide by 6
5. I_{sat}²: Peak current at which SCL drops approximately 20% at +105 °C

6. Part number definition: CLH1110R1-x-50-R

CLH1110R1 = Product code and size

x = Number of phases

50 = Inductance value per phase in nH

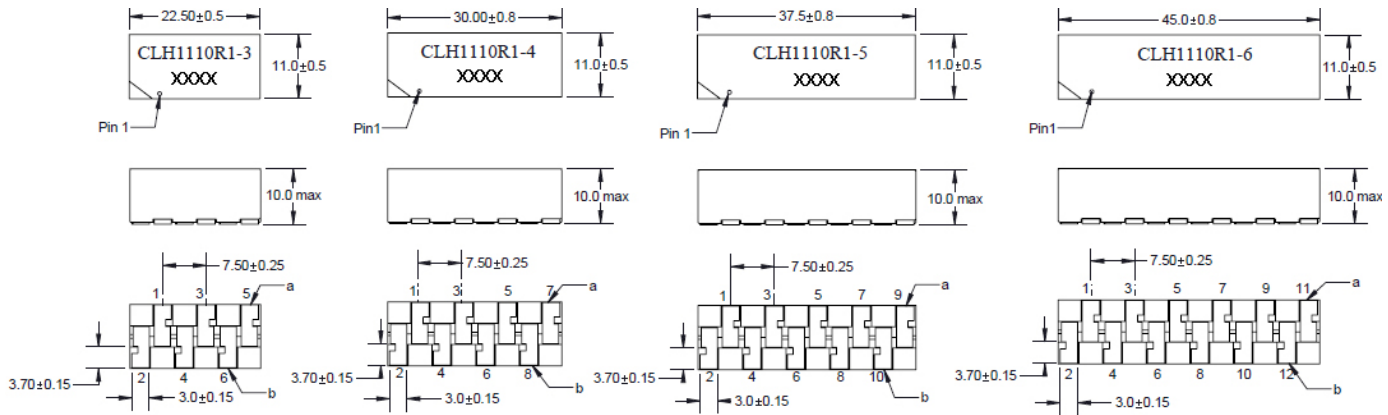
-R suffix = RoHS compliant

Note: The rated current and rated inductance per phase is determined by Maxim's testing and circuit design.

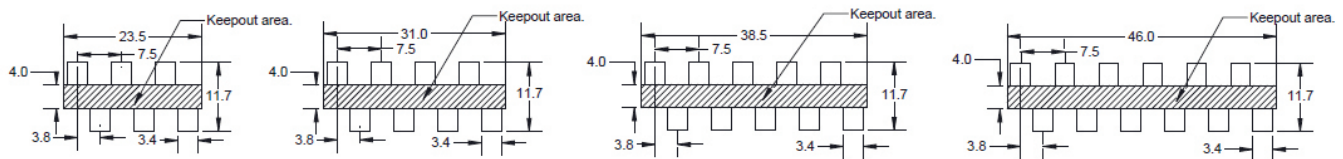
Additional information can be provided by contacting Maxim.

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Dimensions (mm)



Recommended pad layout



Part marking: CLH1110R1-x(x = number of phases), xxxx = lot code

Tolerances are ±0.15 millimeters unless stated otherwise

All soldering surfaces to be coplanar within 0.1 millimeters

Pad layout tolerances are ±0.1 millimeters unless stated otherwise

DCR measured from point "a" to point "b"

Do not route traces or vias underneath the inductor

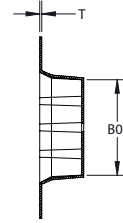
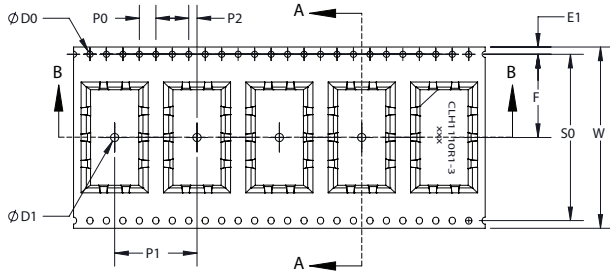
CLH1110R1-R
Multi-phase power inductor

Technical Data 11001
Effective September 2019

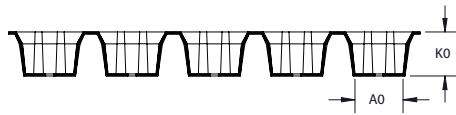
Packaging information (mm)

Supplied in tape and reel packaging on a 13" diameter reel
Drawing not to scale

CLH1110R1-3-R050-R
300 parts per reel



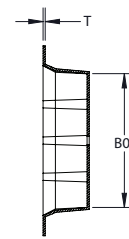
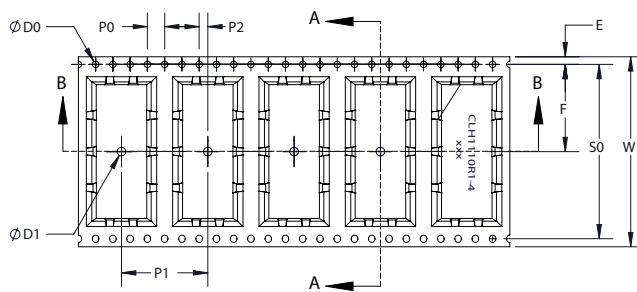
SECTION A-A



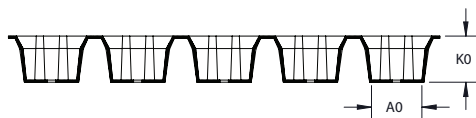
SECTION B-B

TABLE A	
Item	Dimensions
$W \pm 0.30$	44.00
$F \pm 0.15$	20.20
$E1 \pm 0.10$	1.75
$S0 \pm 0.10$	40.40
$P0 \pm 0.10$	4.00
$P1 \pm 0.10$	20.00
$P2 \pm 0.15$	2.00
$D0 + 0.10 / -0$	1.50
D1 Min	2.00
$A0 \pm 0.10$	11.70
$B0 \pm 0.10$	23.20
$K0 \pm 0.10$	10.20
$T \pm 0.05$	0.50

CLH1110R1-4-R050-R
300 parts per reel



SECTION A-A



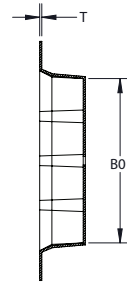
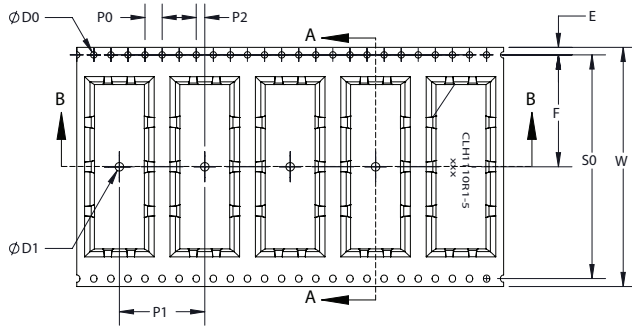
SECTION B-B

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Item	Dimensions
$W \pm 0.30$	44.00
$F \pm 0.15$	20.20
$E1 \pm 0.10$	1.75
$S0 \pm 0.10$	40.40
$P0 \pm 0.10$	4.00
$P1 \pm 0.10$	20.00
$P2 \pm 0.15$	2.00
$D0 + 0.10 / -0$	1.50
D1 Min	2.00
$A0 \pm 0.10$	11.70
$B0 \pm 0.10$	31.00
$K0 \pm 0.10$	10.20
$T \pm 0.05$	0.50

Packaging information (mm)

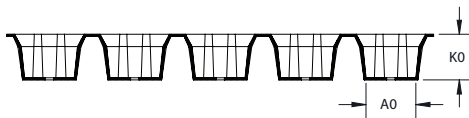
Supplied in tape and reel packaging on a 13" diameter reel
Drawing not to scale

CLH1110R1-5-R050-R
200 parts per reel



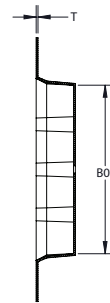
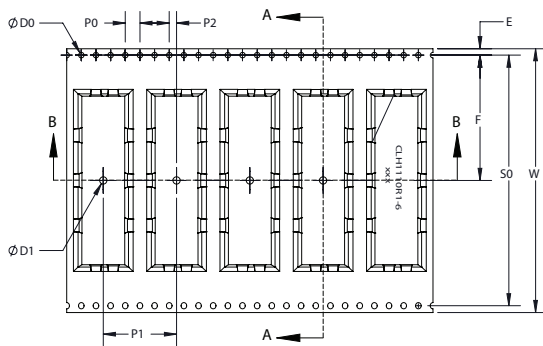
SECTION A-A

TABLE A	
Item	Dimensions
W±0.30	56.00
F±0.15	26.20
E1±0.10	1.75
S0±0.10	52.40
P0±0.10	4.00
P1±0.10	20.00
P2±0.15	2.00
D0+0.10/-0	1.50
D1 Min	2.00
A0±0.10	11.70
B0±0.10	38.50
K0±0.10	10.20
T±0.05	0.50



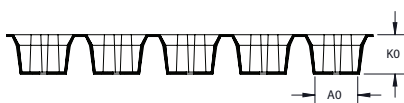
SECTION B-B

CLH1110R1-6-R050-R
200 parts per reel



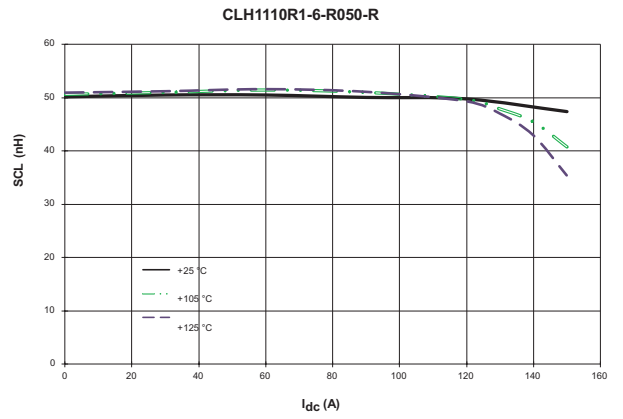
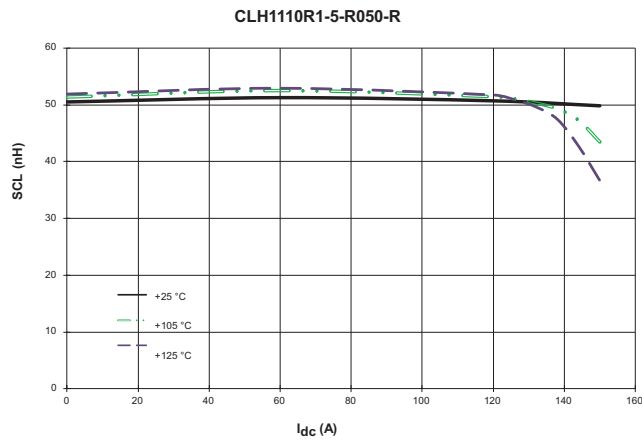
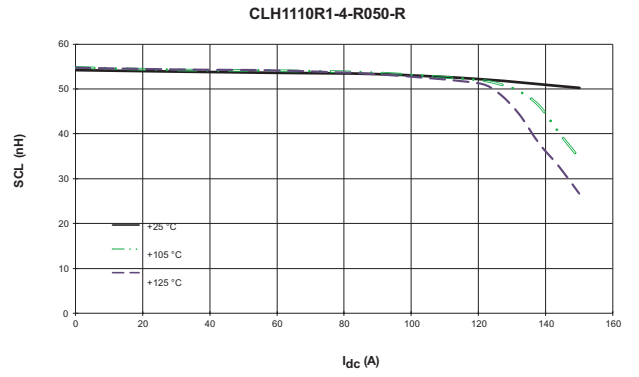
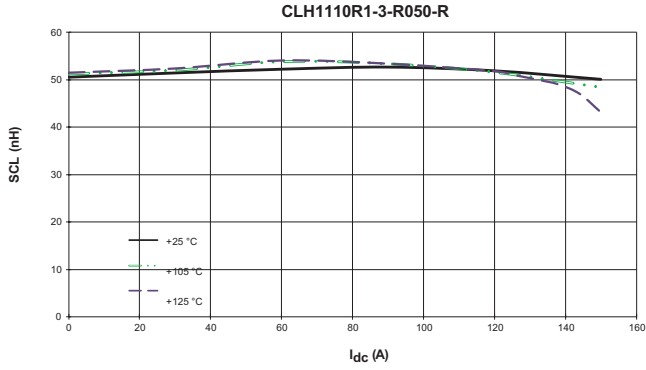
SECTION A-A

TABLE A	
Item	Dimensions
W±0.30	72.00
F±0.3	34.20
E1±0.10	1.75
S0±0.10	68.40
P0±0.10	4.00
P1±0.10	20.00
P2±0.2	2.00
D0+0.10/-0	1.50
D1 Min	2.00
A0±0.10	11.70
B0±0.10	46.00
K0±0.10	10.20
T±0.05	0.50



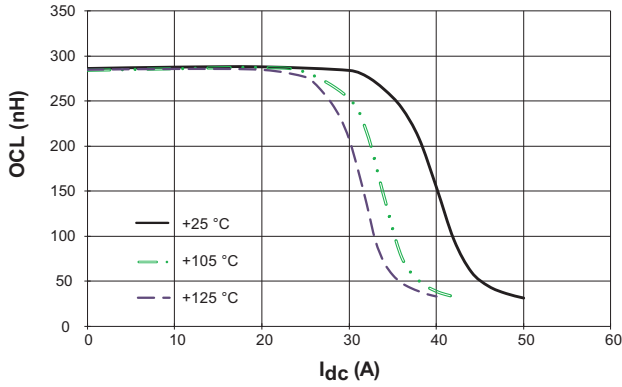
SECTION B-B

Inductance characteristics- SCL vs. current

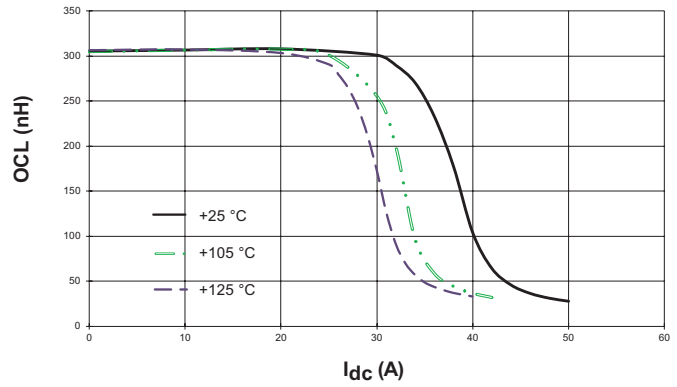


Inductance characteristics- OCL vs. current

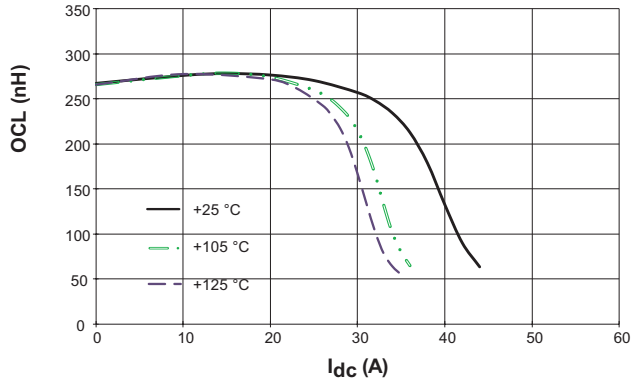
CLH1110R1-3-R050-R
(1-2)



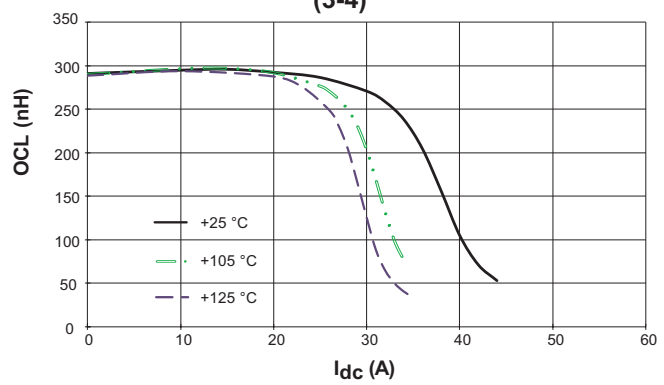
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(3-4)



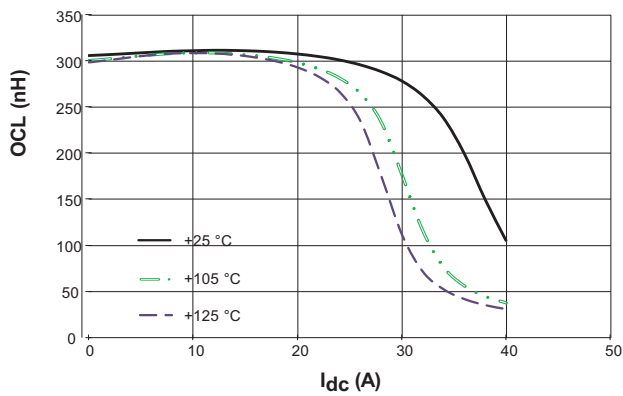
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(1-2)



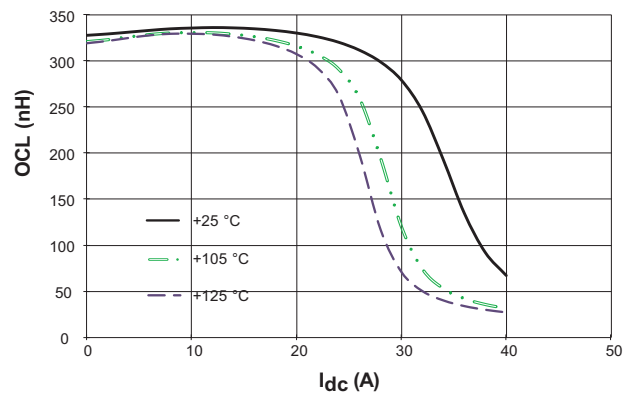
CLH1110R1-4-R050-R
(3-4)



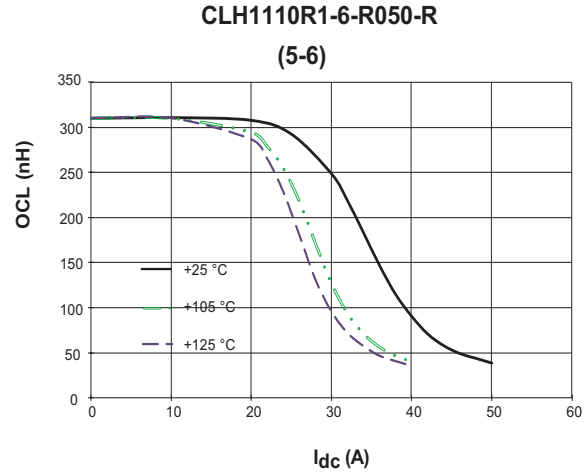
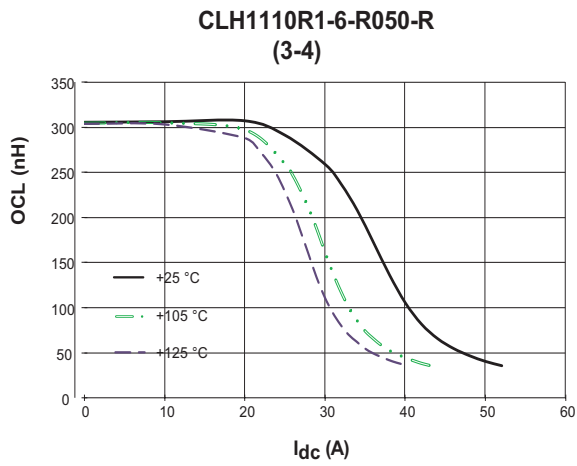
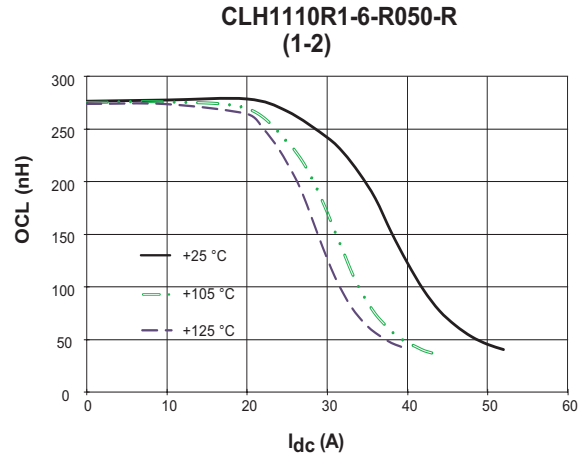
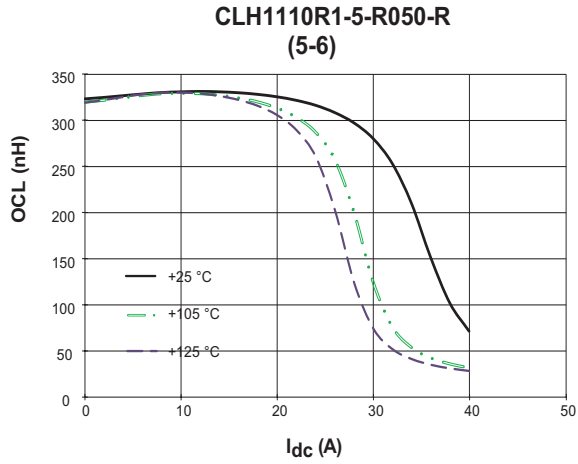
CLH1110R1-5-R050-R
(1-2)



CLH1110R1-5-R050-R
(3-4)

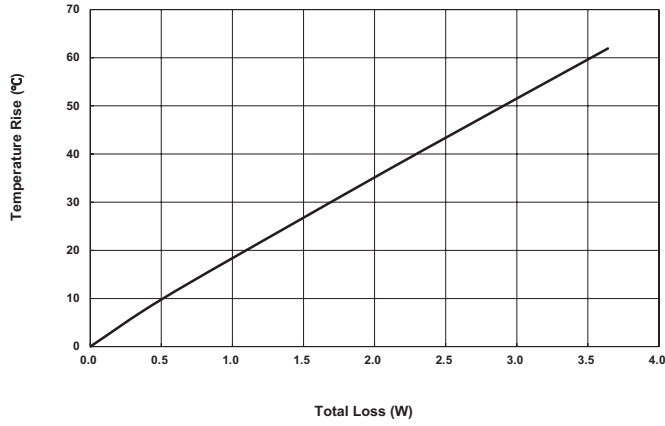


Inductance characteristics- OCL vs. current

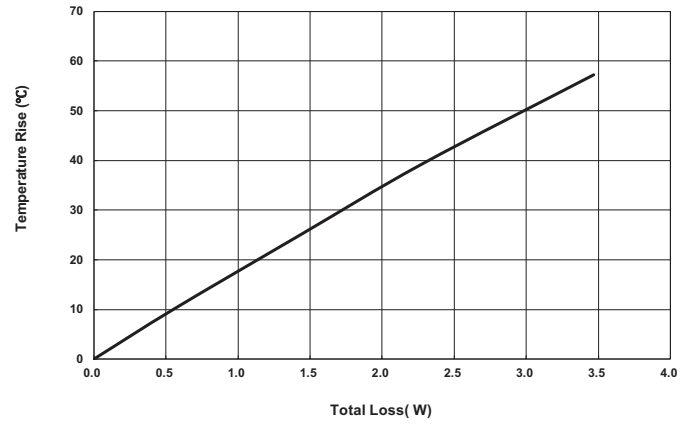


Temperature rise vs total loss

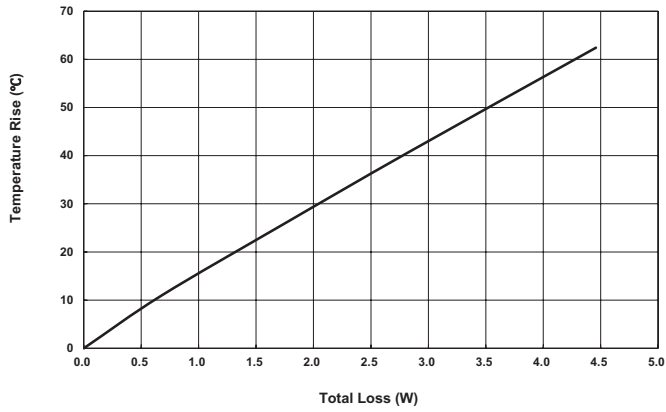
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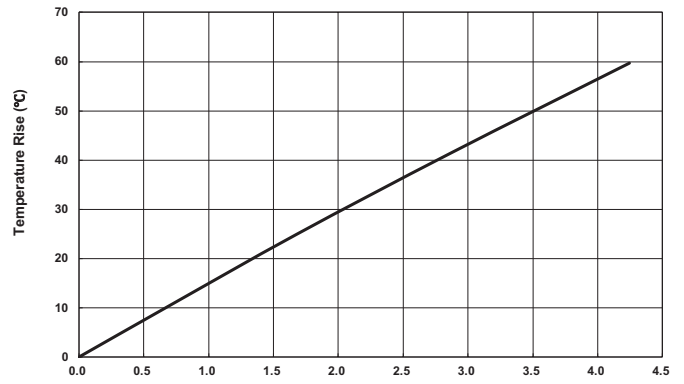
CLH1110R1-4-R050-R



CLH1110R1-5-R050-R



CLH1110R1-6-R050-R



Solder reflow profile

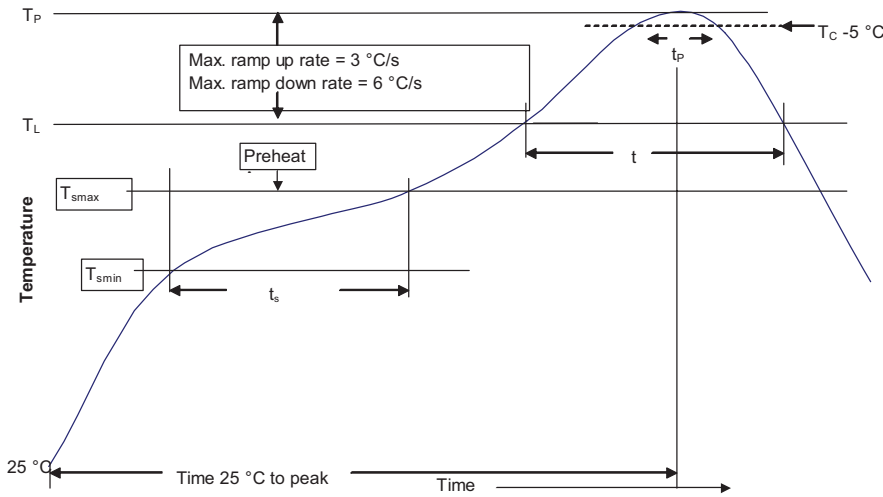


Table 1 - Standard SnPb Solder (T_C)

Package thickness	Volume mm ³ <350	Volume mm ³ ≥350
<2.5 mm)	235 °C	220 °C
≥2.5 mm	220 °C	220 °C

Table 2 - Lead (Pb) free solder (T_C)

Package thickness	Volume mm ³ <350	Volume mm ³ 350 - 2000	Volume mm ³ >2000
<1.6 mm	260 °C	260 °C	260 °C
1.6 – 2.5 mm	260 °C	250 °C	245 °C
>2.5 mm	250 °C	245 °C	245 °C

Reference J-STD-020

Profile feature	Standard SnPb solder	Lead (Pb) free solder
Preheat and soak		
• Temperature min. (T_{smin})	100 °C	150 °C
• Temperature max. (T_{smax})	150 °C	200 °C
• Time (T_{smin} to T_{smax}) (t_s)	60-120 seconds	60-120 seconds
Average ramp up rate T_{smax} to T_p	3°C/ second max.	3 °C/ second max.
Liquidous temperature (T_L)	183 °C	217 °C
Time at liquidous (t_L)	60-150 seconds	60-150 seconds
Peak package body temperature (T_p)*	Table 1	Table 2
Time (t_p)** within 5 °C of the specified classification temperature (T_C)	20 seconds**	30 seconds**
Average ramp-down rate (T_p to T_{smax})	6 °C/ second max.	6 °C/ second max.
Time 25 °C to peak temperature	6 minutes max.	8 minutes max.

* Tolerance for peak profile temperature (T_p) is defined as a supplier minimum and a user maximum.
 ** Tolerance for time at peak profile temperature (t_p) is defined as a supplier minimum and a user maximum.

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