

SM4020Q Series



1. Features of SM4020Q series:

- AEC-Q200 Grade 1 Compliant .
- 11.50 x 10.30 mm foot Print, 5.40mm Max. height SMD Power Inductor for high frequency application, Operating frequency up to 5MHz.
- Inductance range from 10.0uH to 47.0uH. Custom values are welcomed.
- High saturation current characteristics by distributed gapped metal dust core.
- Ideal for portable device, Pad, E-reader and high density DC to DC Converter.
- Operating Temperature Range: -55°C to 165°C (ambient + self-temperature rise) .
- T & R Qty: 500 pcs , 13" Reel and Plastic tape: 24mm wide, 16mm pocket spacing.
- RoHS and HF Compliant.

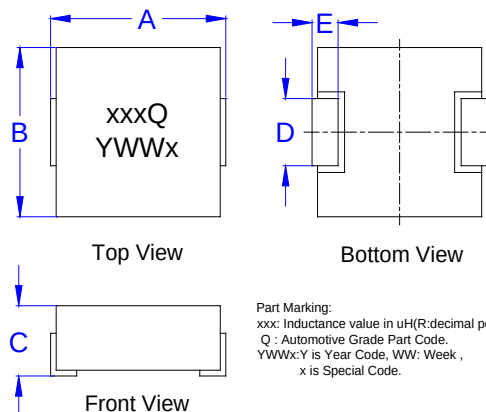


2. Electrical Characteristics of SM4020Q series:

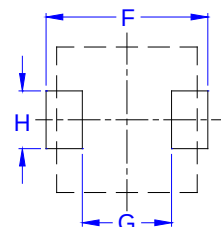
ITG Part Number	OCL ¹ (uH) ±20%	DCR (mΩ) Typ. @25°C	DCR (mΩ) Max. @25°C	Saturation Current Isat ² (A) Typ.	Heat Rating Current Irms ³ (A) Typ.
SM4020Q-100MHF	10.00	20.00	23.00	11.50	8.70
SM4020Q-150MHF	15.00	26.50	30.50	8.80	7.60
SM4020Q-220MHF	22.00	41.00	47.00	7.50	6.00
SM4020Q-330MHF	33.00	65.70	75.30	5.50	4.80
SM4020Q-470MHF	47.00	80.00	92.00	4.20	4.10

3. Mechanical Dimensions (unit: mm):

A Max.	B ± 0.30	C ± 0.20	D ± 0.50	E ± 0.50
11.50	10.00	5.20	3.00	2.00



Pad Dimension	SM4020Q
F	13.00 Typ.
G	6.00 Typ.
H	4.00 Typ.

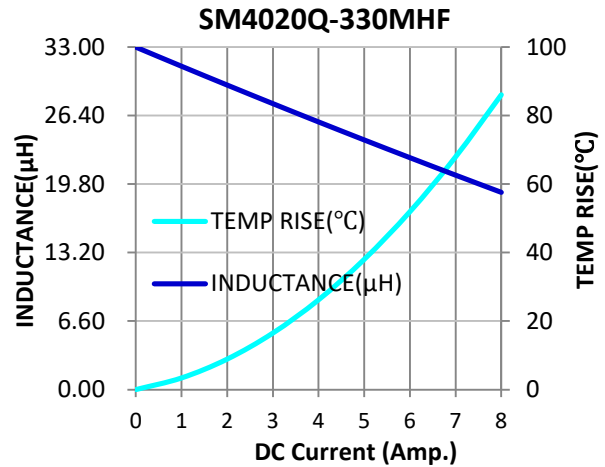
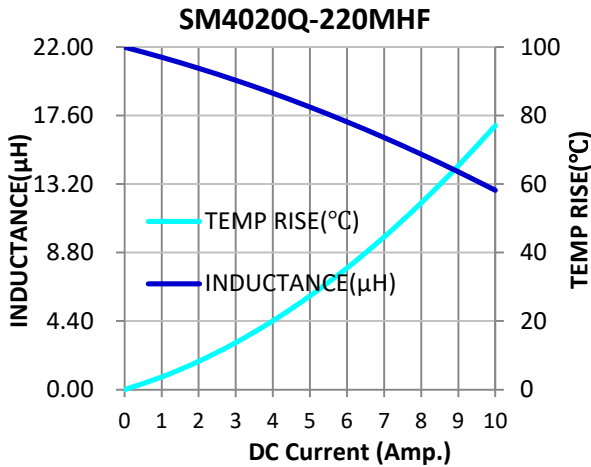
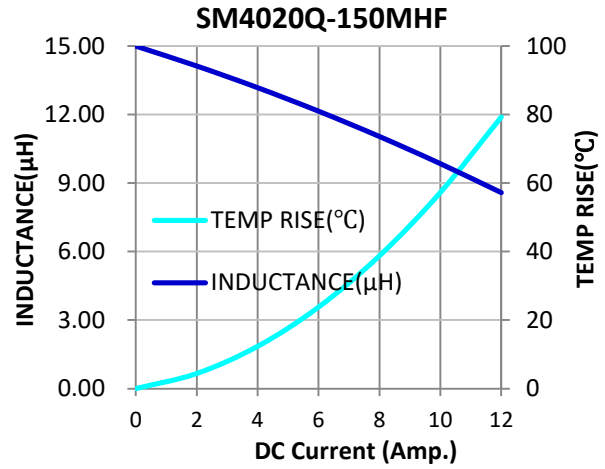
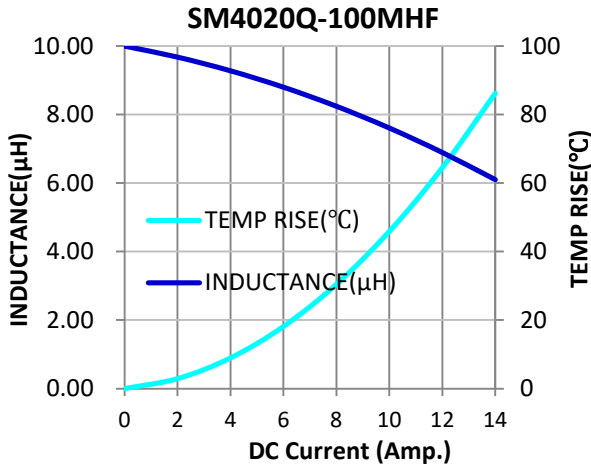


Recommend PCB Layout

Notes:

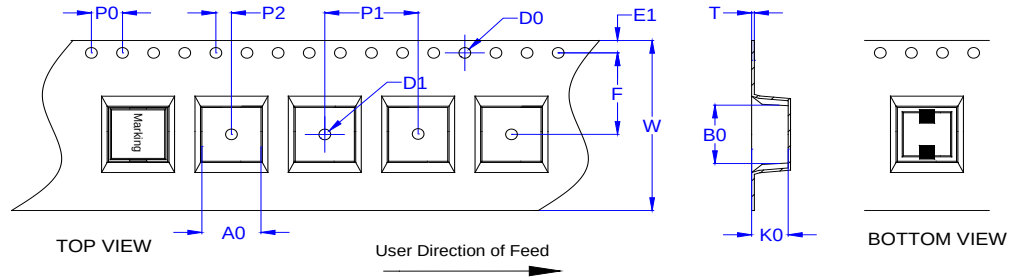
1. Test conditions: 100KHz, 1.0V, 25°C ambient temperature .
 2. Isat: DC current that causes inductance to drop 30% (Typ.) from OCL (Ta=25°C).
 3. Irms: DC current for an approximate temperature rise of 40°C without core loss. Derating is necessary for AC currents.
- PCB pad layout, trace thickness and width, air-flow and proximity of other heat generating components will affect the temperature rise. It is recommended the part temperature not exceed 165° C under worst case operating conditions as verified in the end application.

4. Inductance vs. Temperature Rise Characteristics of SM4020Q Series:



5. PACKAGE SPECIFICATION.(UNIT:mm):

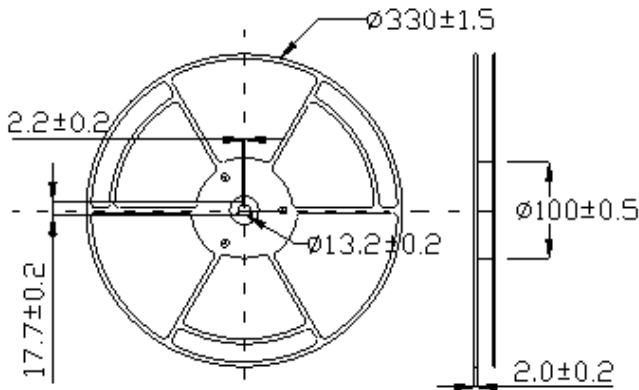
(1).ENCAPSULATION MODE:



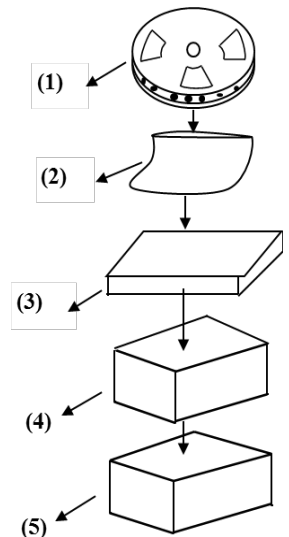
(2).DIMENSION(mm):

W	A0	B0	K0	P1	P0	P2	D0	D1	F	E1	T
24.0±0.30	10.7±0.10	12.0±0.10	6.0±0.15	16.0±0.10	4.0±0.10	2.0±0.10	1.5±0.10	1.5+0.10/-0	11.5±0.10	1.75±0.10	0.50±0.05

(3).REEL SIZE:



(4).PACKAGE MODE:



(5).PACKAGING LIST:

No.	Packing Part	Dimension (mm)	Material	Quantity
1	Reel	330	Plastic	500Pcs / Reel
2	Bag	450 X 360 X 0.075	Plastic	1Reel / Bag
3	Small Box	340 X 335 X 45	Paper	1Bag / Small Box
4	Middle Box	356 X 350 X 226	Paper	4Small Boxes / Middle Box
5	Outer Box	378 X 362 X 252	Paper	1Middle Box / Outer Box

(6).WEIGHT: N.W: 3.24 g/pcs (APPROX), TOTAL 6.48 Kg(APPROX),G.W:TOTAL 9.98Kg (APPROX).

(7).Storage conditions: -40°C~85°C ,75%RH (Max.).

6.RELIABILITY TEST:

6.1 Mechanical Reliability		
Item	Specification and Requirement	Test Method
Solderability	The surface of terminal immersed shall be minimum of 95% covered with a new coating of solder	Solder heat proof: 1.Precondition: 8 hours steam aging 2.Retention time: 255 ± 5 °C for 5 ± 0.5 seconds
Vibration	Inductance change: Within $\pm 10\%$ Without mechanical damage such as break	1.Vibration frequency:(10 Hz to 2000 Hz) 2.Vibration time:Each four hours (12 times) in X, Y, Z direction: 12 hours in total 3.Amplitude: 1mm or 10 G
Shock	Inductance change: Within $\pm 10\%$ Without mechanical damage such as break	1.Peak value: 100 G 2.Duration of pulse: 6ms 3.Waveform: Half-sine Shocks; 3 times in X, Y, Z direction, 9 times in total
6.2 Endurance Reliability		
Thermal Shock	Inductance change: Within $\pm 10\%$ Without distinct damage in appearance	1.Repeat 1000 cycles as follow: (-55 ± 2 °C; 30 ± 3 min) → ($+165 \pm 2$ °C, 30 ± 3 min) change over time of temperature: ≤ 10 s 2.Recovery: $24 + 4 / -0$ hours of recovery under the standard condition after the test.
High Temperature & Humidity	Inductance change: Within $\pm 10\%$ Without distinct damage in appearance	$85^{\circ}\text{C}85\%\text{RH}$, Duration: $240+4/-0$ hours
Operational Life	Inductance change: Within $\pm 10\%$ Without distinct damage in appearance	1.Rated current (I _{dc}) Environment condition: 85°C 2.Duration: $1000 + 4 / -0$ hours
Low Temperature Store	Inductance change: Within $\pm 10\%$ Without distinct damage in appearance	Store temperature: -55 ± 2 °C, $1000 + 4 / -0$ hours
High Temperature Store	Inductance change: Within $\pm 10\%$ Without distinct damage in appearance	Store temperature: $+165 \pm 2$ °C, $1000 + 4 / -0$ hours

Soldering Reflow Chart

Solder Reflow Profile:

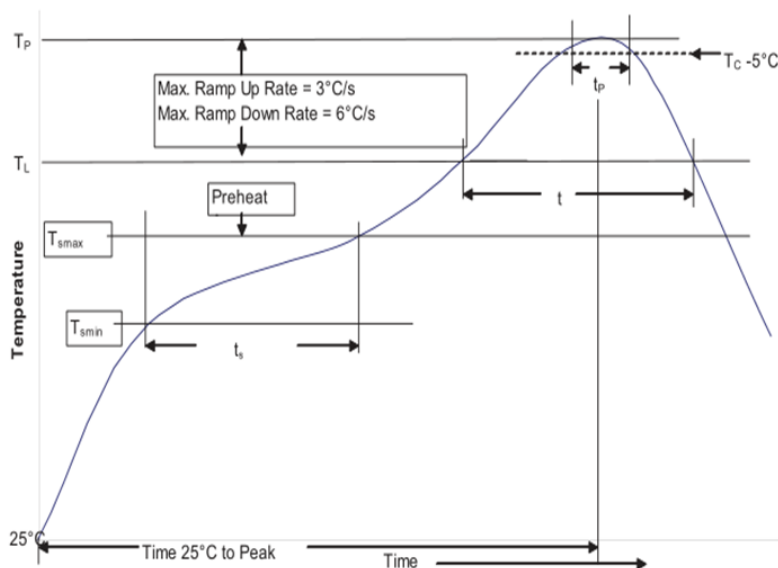


Table 1 - Standard SnPb Solder (T_C)

Package Thickness	Volume mm^3 <350	Volume mm^3 ≥ 350
<2.5mm	235°C	220°C
$\geq 2.5\text{mm}$	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
<1.6mm	260°C	260°C	260°C
1.6 - 2.5mm	260°C	250°C	245°C
>2.5mm	250°C	245°C	245°C

Reference JEDEC J-STD-020E:

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.