

# Wire Wound SMD Power Inductors – SPH Series

Operating Temp. : -40°C~+125°C (Including self-heating)



## FEATURES

- Magnetic-resin shielded construction reduces buzz noise to ultra-low levels
- Metallization on ferrite core results in excellent shock resistance and damage-free durability
- Closed magnetic circuit design reduces leakage flux and Electro Magnetic Interference (EMI)
- Takes up less PCB real estate and save more power
- 30% lower DCR than SWPA series and larger current

## APPLICATIONS

- Smart phone, set top box, VR, AR
- Notebooks, desktop computers, servers
- Portable gaming devices, personal navigation systems, personal multimedia devices

## PRODUCT IDENTIFICATION

**SPH**

①

**252012**

②

**H**

③

**2R2**

④

**M**

⑤

**I**

⑥

□□□

⑦

① Type	
SPH	Wire Wound SMD Power Inductor

③ Material Code	
U	U Type Material
H	H Type Material

④ Nominal Inductance	
Example	Nominal Value
R47	0.47μH
2R2	2.2μH

⑥ Packing	
T	Tape & Reel

② External Dimensions (LxWxH) [mm]	
201610	2.0x1.6x1.0
252010	2.5x2.0x1.0
252012	2.5x2.0x1.2
3010	3.0x3.0x1.0
3012	3.0x3.0x1.2
3015	3.0x3.0x1.5
4012	4.0x4.0x1.2
4018	4.0x4.0x1.8
4020	4.0x4.0x2.0
4030	4.0x4.0x3.0

⑤ Inductance Tolerance	
M	±20%
N	±30%

⑦ Design Code	
□□□	Design Code
* Standard product is blank	

# SHAPE AND DIMENSIONS

Fig.1



Fig.2

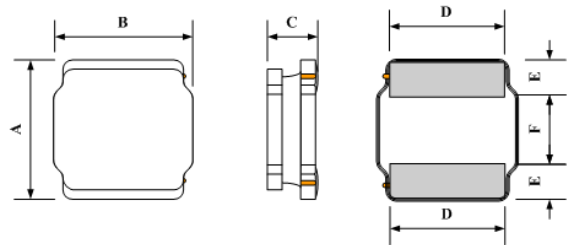


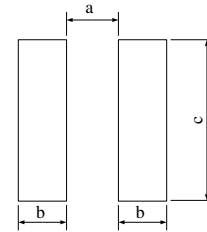
Fig.3



Fig.4



Recommended Land Pattern



Unit: mm

Series	Shape	A	B	C	D	E	F	a Typ.	b Typ.	c Typ.
SPH201610H	Fig.1	2.0±0.2	1.6±0.2	1.0 Max.	1.2±0.2	0.60±0.2	0.80±0.2	0.70	0.70	1.7
SPH201610U	Fig.4	2.0±0.2	1.6±0.2	1.0 Max.	1.6±0.2	0.60±0.2	0.80±0.2	0.70	0.70	1.7
SPH252010	Fig.1	2.5±0.2	2.0±0.2	1.0 Max.	2.0±0.2	0.80±0.2	0.80±0.2	0.80	0.85	2.0
SPH252012	Fig.1	2.5±0.2	2.0±0.2	1.2 Max.	2.0±0.2	0.80±0.2	0.80±0.2	0.80	0.85	2.0
SPH3010	Fig.2	3.0±0.2	3.0±0.2	1.0 Max.	2.5±0.2	0.75±0.2	1.5±0.2	1.5	0.8	2.7
SPH3012	Fig.2	3.0±0.2	3.0±0.2	1.2 Max.	2.5±0.2	0.75±0.2	1.5±0.2	1.5	0.8	2.7
SPH3015	Fig.2	3.0±0.2	3.0±0.2	1.5 Max.	2.5±0.2	0.75±0.2	1.5±0.2	1.5	0.8	2.7
SPH4012	Fig.3	4.0±0.2	4.0±0.2	1.2 Max.	3.3±0.2	0.95±0.2	2.1±0.2	1.9	1.1	3.7
SPH4018	Fig.3	4.0±0.2	4.0±0.2	1.8 Max.	3.3±0.2	0.95±0.2	2.1±0.2	1.9	1.1	3.7
SPH4020	Fig.3	4.0±0.2	4.0±0.2	2.0 Max.	3.3±0.2	0.95±0.2	2.1±0.2	1.9	1.1	3.7
SPH4030	Fig.3	4.0±0.2	4.0±0.2	3.0 Max.	3.3±0.2	0.95±0.2	2.1±0.2	1.9	1.1	3.7

## SPECIFICATIONS

### SPH201610H Series

Part Number	Inductance	DC Resistance		Saturation Current		Heat Rating Current	
	@1MHz,1V	Max.	Typ.	Max.	Typ.	Max.	Typ.
Units	μH	Ω		A		A	
Symbol	L	DCR		Isat		Irms	
SPH201610HR16MT	0.16±20%	0.031	0.026	4.30	4.80	3.20	3.50
SPH201610HR24MT	0.24±20%	0.040	0.033	3.70	4.10	2.90	3.20
SPH201610HR33MT	0.33±20%	0.040	0.033	2.50	3.10	2.90	3.20
SPH201610HR47MT	0.47±20%	0.059	0.049	2.30	2.85	2.35	2.60
SPH201610HR68MT	0.68±20%	0.076	0.063	1.95	2.45	2.05	2.25
SPH201610H1R0MT	1.0±20%	0.114	0.095	1.65	1.85	1.45	1.60
SPH201610H1R5MT	1.5±20%	0.174	0.145	1.35	1.65	1.25	1.40
SPH201610H2R2MT	2.2±20%	0.264	0.220	1.20	1.45	1.10	1.20
SPH201610H3R3MT	3.3±20%	0.335	0.279	0.90	1.05	0.88	0.98
SPH201610H4R7MT	4.7±20%	0.479	0.399	0.70	0.85	0.74	0.82
SPH201610H6R8MT	6.8±20%	0.816	0.680	0.60	0.70	0.52	0.58
SPH201610H100MT	10±20%	1.020	0.850	0.50	0.55	0.45	0.50

### SPH201610U Series

Part Number	Inductance	DC Resistance		Saturation Current		Heat Rating Current	
	@1MHz,1V	Max.	Typ.	Max.	Typ.	Max.	Typ.
Units	μH	Ω		A		A	
Symbol	L	DCR		Isat		Irms	
SPH201610U50NMT	0.05±20%	0.022	0.018	7.50	8.00	3.65	4.25
SPH201610UR10MT	0.10±20%	0.022	0.018	4.80	5.70	3.65	4.25
SPH201610UR16MT	0.16±20%	0.031	0.026	4.70	5.40	3.20	3.50
SPH201610UR24MT	0.24±20%	0.040	0.033	4.50	5.00	2.90	3.20
SPH201610UR33MT	0.33±20%	0.040	0.033	3.00	3.60	2.90	3.20
SPH201610UR47MT	0.47±20%	0.052	0.043	2.90	3.40	2.35	2.60
SPH201610UR47MTY01	0.47±20%	0.040	0.033	2.00	2.40	2.90	3.20
SPH201610UR68MT	0.68±20%	0.072	0.060	2.50	2.70	2.05	2.25
SPH201610U1R0MT	1.0±20%	0.072	0.060	1.30	1.50	2.05	2.25
SPH201610U2R2MT	2.2±20%	0.171	0.143	1.10	1.20	1.23	1.40

### SPH252010H Series

Part Number	Inductance	DC Resistance		Saturation Current		Heat Rating Current	
	@1MHz,1V	Max.	Typ.	Max.	Typ.	Max.	Typ.
Units	μH	Ω		A		A	
Symbol	L	DCR		Isat		Irms	
SPH252010HR24MT	0.24±20%	0.034	0.028	3.60	4.40	2.75	3.00
SPH252010HR33MT	0.33±20%	0.043	0.036	3.80	4.60	2.40	2.65
SPH252010HR47MT	0.47±20%	0.044	0.037	2.40	2.80	2.40	2.65
SPH252010HR68MT	0.68±20%	0.061	0.051	2.75	3.10	2.10	2.35
SPH252010HR68MTY01	0.68±20%	0.061	0.051	2.75	3.10	2.10	2.35
SPH252010HR68MTY02	0.68±20%	0.065	0.055	3.20	3.50	2.10	2.30
SPH252010H1R0MT	1.0±20%	0.080	0.067	2.05	2.45	1.80	2.00
SPH252010H1R5MT	1.5±20%	0.108	0.090	1.70	2.05	1.55	1.70
SPH252010H2R2MT	2.2±20%	0.137	0.114	1.55	1.80	1.40	1.55
SPH252010H3R3MT	3.3±20%	0.228	0.170	1.10	1.40	1.10	1.20
SPH252010H4R7MT	4.7±20%	0.323	0.269	1.00	1.15	0.91	1.00
SPH252010H6R8MT	6.8±20%	0.451	0.376	0.82	0.95	0.76	0.84

## SPECIFICATIONS

### SPH252010H Series

Part Number	Inductance	DC Resistance		Saturation Current		Heat Rating Current	
	@1MHz,1V	Max.	Typ.	Max.	Typ.	Max.	Typ.
Units	μH	Ω		A		A	
Symbol	L	DCR		Isat		Irms	
SPH252010H100MT	10±20%	0.584	0.487	0.65	0.75	0.67	0.74
SPH252010H150MT	15±20%	0.954	0.795	0.55	0.65	0.50	0.55
SPH252010H220MT	22±20%	1.548	1.290	0.45	0.55	0.40	0.45
SPH252010H330MT	33±20%	1.548	1.290	0.25	0.30	0.40	0.45

### SPH252012H Series

Part Number	Inductance	DC Resistance		Saturation Current		Heat Rating Current	
	@1MHz,1V	Max.	Typ.	Max.	Typ.	@1MHz,1V	Max.
Units	μH	Ω		A		A	
Symbol	L	DCR		Isat		Irms	
SPH252012HR16MT	0.16±20%	0.022	0.018	6.50	7.20	4.05	4.50
SPH252012HR24MT	0.24±20%	0.022	0.018	4.00	4.75	4.05	4.50
SPH252012HR33MT	0.33±20%	0.029	0.024	4.00	4.70	3.35	3.70
SPH252012HR47MT	0.47±20%	0.036	0.030	3.70	4.10	3.00	3.30
SPH252012HR47MTY01	0.47±20%	0.038	0.032	4.90	5.20	2.90	3.20
SPH252012HR68MT	0.68±20%	0.061	0.051	3.00	3.30	2.10	2.30
SPH252012HR68MTY01	0.68±20%	0.042	0.035	3.20	3.50	2.50	2.70
SPH252012HR68MTY02	0.68±20%	0.060	0.051	3.80	4.20	2.10	2.30
SPH252012H1R0MT	1.0±20%	0.044	0.037	1.70	1.90	2.20	2.40
SPH252012H1R2MT	1.2±20%	0.078	0.065	2.20	2.50	1.95	2.10
SPH252012H1R5MT	1.5±20%	0.078	0.065	2.00	2.35	1.95	2.10
SPH252012H2R2MT	2.2±20%	0.096	0.080	1.80	1.95	1.80	1.95
SPH252012H3R3MT	3.3±20%	0.144	0.120	1.15	1.25	1.40	1.50
SPH252012H4R7MT	4.7±20%	0.210	0.175	1.10	1.20	1.12	1.25
SPH252012H6R8MT	6.8±20%	0.360	0.300	0.80	1.00	0.95	1.05
SPH252012H100MT	10±20%	0.522	0.435	0.70	0.85	0.79	0.87
SPH252012H150MT	15±20%	1.000	0.830	0.65	0.75	0.57	0.63
SPH252012H180MT	18±20%	1.000	0.830	0.50	0.65	0.57	0.63
SPH252012H220MT	22±20%	1.090	0.910	0.45	0.55	0.54	0.60
SPH252012H330MT	33±20%	1.840	1.530	0.35	0.40	0.42	0.46
SPH252012H470MT	47±20%	2.220	1.850	0.25	0.30	0.30	0.35
SPH252012H680MT	68±20%	3.000	2.500	0.30	0.35	0.28	0.32
SPH252012H101MT	100±20%	5.400	4.500	0.22	0.25	0.25	0.24

### SPH3010H Series

Part Number	Inductance	DC Resistance		Saturation Current		Heat Rating Current	
	@1MHz,1V	Max.	Typ.	Max.	Typ.	@1MHz,1V	Max.
Units	μH	Ω		A		A	
Symbol	L	DCR		Isat		Irms	
SPH3010H4R7MT	4.7±20%	0.18	0.15	0.85	0.95	1.10	1.25
SPH3010H100MT	10±20%	0.42	0.35	0.60	0.70	0.62	0.80
SPH3010H220MT	22±20%	0.92	0.77	0.40	0.50	0.48	0.56

## SPECIFICATIONS

### SPH3012H Series

Part Number	Inductance	DC Resistance		Saturation Current		Heat Rating Current	
	@1MHz, 1V	Max.	Typ.	Max.	Typ.	Max.	Typ.
Units	$\mu\text{H}$	$\Omega$		A		A	
Symbol	L	DCR		Isat		Irms	
SPH3012H1R0MT	1.0±20%	0.040	0.032	2.20	2.50	2.30	2.50
SPH3012H1R0MTY02	1.0±20%	0.056	0.047	2.80	3.20	1.90	2.00
SPH3012H2R2MT	2.2±20%	0.090	0.075	1.50	1.80	1.40	1.60
SPH3012H3R3MT	3.3±20%	0.134	0.112	1.23	1.55	1.40	1.60
SPH3012H100MT	10±20%	0.372	0.310	0.75	0.90	0.75	0.80
SPH3012H100MTY01	10±20%	0.495	0.413	1.00	1.10	0.90	1.00
SPH3012H100MTY02	10±20%	0.324	0.270	0.73	0.85	0.78	0.85
SPH3012H220MT	22±20%	0.840	0.700	0.50	0.60	0.50	0.55
SPH3012H220MTY01	22±20%	0.756	0.630	0.50	0.60	0.50	0.60

### SPH3015H Series

Part Number	Inductance	DC Resistance		Saturation Current		Heat Rating Current	
	@1MHz, 1V	Max.	Typ.	Max.	Typ.	Max.	Typ.
Units	$\mu\text{H}$	$\Omega$		A		A	
Symbol	L	DCR		Isat		Irms	
SPH3015HR22MT	0.22±20%	0.022	0.018	6.00	6.80	3.00	3.50
SPH3015HR24MT	0.24±20%	0.022	0.018	5.50	5.50	3.00	3.50
SPH3015HR47MT	0.47±20%	0.022	0.018	2.40	2.80	3.00	3.50
SPH3015HR22MT	0.22±20%	0.022	0.018	6.00	6.80	3.00	3.50
SPH3015HR24MT	0.24±20%	0.022	0.018	5.50	5.50	3.00	3.50
SPH3015HR47MT	0.47±20%	0.022	0.018	2.40	2.80	3.00	3.50
SPH3015HR55MT	0.55±20%	0.019	0.016	2.40	2.70	3.05	3.55
SPH3015H1R0MT	1.0±20%	0.040	0.033	2.70	3.00	2.20	2.50
SPH3015H1R5MT	1.5±20%	0.048	0.040	2.00	2.30	2.00	2.30
SPH3015H2R2MT	2.2±20%	0.060	0.050	1.50	1.70	1.80	2.05
SPH3015H3R3MT	3.3±20%	0.084	0.070	1.30	1.50	1.50	1.70
SPH3015H3R9MT	3.9±20%	0.115	0.096	1.30	1.60	1.30	1.50
SPH3015H4R7MT	4.7±20%	0.115	0.096	1.10	1.20	1.30	1.50
SPH3015H6R8MT	6.8±20%	0.144	0.120	0.80	0.90	1.16	1.35
SPH3015H100MT	10±20%	0.276	0.230	0.75	0.90	0.84	0.97
SPH3015H150MT	15±20%	0.360	0.300	0.60	0.70	0.73	0.84
SPH3015H220MT	22±20%	0.540	0.450	0.52	0.60	0.60	0.70
SPH3015H260MT	26±20%	0.768	0.640	0.40	0.50	0.45	0.55
SPH3015H330MT	33±20%	1.090	0.910	0.50	0.55	0.50	0.55
SPH3015H470MT	47±20%	1.250	1.040	0.35	0.42	0.45	0.50

### SPH4012H Series

Part Number	Inductance	DC Resistance		Saturation Current		Heat Rating Current	
	@0.1MHz, 1V	Max.	Typ.	Max.	Typ.	Max.	Typ.
Units	$\mu\text{H}$	$\Omega$		A		A	
Symbol	L	DCR		Isat		Irms	
SPH4012HR33NT	0.33±30%	0.031	0.026	5.50	6.30	2.90	3.35
SPH4012HR47NT	0.47±30%	0.032	0.027	3.50	4.20	2.90	3.20
SPH4012HR82NT	0.82±30%	0.042	0.035	3.00	3.50	2.50	2.50
SPH4012H1R0NT	1.0±30%	0.050	0.042	2.80	3.30	2.20	2.90
SPH4012H1R5NT	1.5±30%	0.050	0.042	2.10	2.20	2.20	2.50
SPH4012H1R8NT	1.8±30%	0.066	0.055	2.10	2.40	2.00	2.30

# SPECIFICATIONS

## SPH4012H Series

Part Number	Inductance	DC Resistance		Saturation Current		Heat Rating Current	
	@0.1MHz,1V	Max.	Typ.	Max.	Typ.	Max.	Typ.
Units	$\mu$ H	$\Omega$		A		A	
Symbol	L	DCR		Isat		Irms	
SPH4012H2R2MT	2.2±20%	0.066	0.055	1.70	1.80	2.00	2.30
SPH4012H2R7MT	2.7±20%	0.084	0.070	1.90	2.20	1.70	2.00
SPH4012H3R3MT	3.3±20%	0.084	0.070	1.40	1.70	1.70	2.00
SPH4012H3R6MT	3.6±20%	0.090	0.075	1.20	1.60	1.70	2.00
SPH4012H4R3MT	4.3±20%	0.108	0.090	1.20	1.50	1.50	1.80
SPH4012H4R7MT	4.7±20%	0.108	0.090	1.20	1.30	1.50	1.80
SPH4012H5R1MT	5.1±20%	0.132	0.110	1.20	1.40	1.40	1.60
SPH4012H5R6MT	5.6±20%	0.132	0.110	1.10	1.40	1.40	1.60
SPH4012H6R8MT	6.8±20%	0.150	0.125	0.90	1.10	1.30	1.60
SPH4012H100MT	10±20%	0.204	0.170	0.80	0.90	1.10	1.30
SPH4012H100MTY01	10±20%	0.240	0.200	0.90	1.10	1.00	1.10
SPH4012H120MT	12±20%	0.312	0.260	0.85	1.00	0.90	1.00
SPH4012H150MT	15±20%	0.312	0.260	0.65	0.80	0.90	1.00
SPH4012H180MT	18±20%	0.432	0.360	0.65	0.80	0.78	0.90
SPH4012H220MT	22±20%	0.460	0.380	0.50	0.65	0.78	0.90
SPH4012H270MT	27±20%	0.672	0.560	0.50	0.60	0.63	0.73
SPH4012H330MT	33±20%	0.756	0.630	0.45	0.55	0.57	0.68
SPH4012H360MT	36±20%	0.756	0.630	0.40	0.50	0.57	0.68
SPH4012H390MT	39±20%	1.188	0.990	0.55	0.62	0.47	0.54
SPH4012H470MT	47±20%	1.188	0.990	0.40	0.50	0.47	0.54
SPH4012H560MT	56±20%	1.320	1.100	0.35	0.45	0.45	0.52
SPH4012H680MT	68±20%	1.800	1.500	0.38	0.45	0.38	0.44
SPH4012H820MT	82±20%	2.040	1.700	0.30	0.38	0.36	0.42
SPH4012H101MT	100±20%	2.040	1.700	0.25	0.31	0.36	0.42

## SPH4018H Series

Part Number	Inductance	DC Resistance		Saturation Current		Heat Rating Current	
	@0.1MHz,1V	Max.	Typ.	Max.	Typ.	Max.	Typ.
Units	$\mu$ H	$\Omega$		A		A	
Symbol	L	DCR		Isat		Irms	
SPH4018HR33NT	0.33±30%	0.016	0.012	6.50	8.00	4.20	4.70
SPH4018HR47NT	0.47±30%	0.020	0.017	6.50	7.20	3.50	4.00
SPH4018H1R0NT	1.0±30%	0.032	0.027	4.00	4.80	3.20	3.70
SPH4018H1R5NT	1.5±30%	0.037	0.031	3.60	4.30	2.95	3.30
SPH4018H2R2MT	2.2±20%	0.050	0.042	3.00	3.40	2.20	2.90
SPH4018H3R3MT	3.3±20%	0.066	0.055	2.30	2.90	2.00	2.50
SPH4018H4R7MT	4.7±20%	0.084	0.070	2.00	2.20	1.70	2.10
SPH4018H6R8MT	6.8±20%	0.118	0.098	1.60	1.80	1.45	1.70
SPH4018H100MT	10±20%	0.180	0.150	1.30	1.50	1.20	1.50
SPH4018H150MT	15±20%	0.252	0.210	1.10	1.20	0.85	1.20
SPH4018H220MT	22±20%	0.348	0.290	0.90	1.10	0.70	1.00
SPH4018H330MT	33±20%	0.552	0.460	0.70	0.90	0.55	0.82
SPH4018H470MT	47±20%	0.744	0.620	0.57	0.70	0.50	0.66
SPH4018H680MT	68±20%	0.972	0.810	0.53	0.62	0.40	0.60
SPH4018H101MT	100±20%	1.560	1.300	0.49	0.57	0.40	0.47
SPH4018H151MT	150±20%	3.120	2.600	0.41	0.47	0.28	0.33
SPH4018H221MT	220±20%	3.840	3.200	0.33	0.38	0.25	0.29
SPH4018H331MT	330±20%	5.880	4.900	0.26	0.31	0.20	0.23

## SPECIFICATIONS

### SPH4020H Series

Part Number	Inductance	DC Resistance		Saturation Current		Heat Rating Current	
	@0.1MHz,1V	Max.	Typ.	Max.	Typ.	Max.	Typ.
Units	$\mu\text{H}$	$\Omega$		A		A	
Symbol	L	DCR		Isat		Irms	
SPH4020HR33NT	0.33 $\pm$ 30%	0.016	0.013	7.50	8.50	3.30	4.90

### SPH4030H Series

Part Number	Inductance	DC Resistance		Saturation Current		Heat Rating Current	
	@0.1MHz,1V	Max.	Typ.	Max.	Typ.	Max.	Typ.
Units	$\mu\text{H}$	$\Omega$		A		A	
Symbol	L	DCR		Isat		Irms	
SPH4030HR10NT	0.10 $\pm$ 30%	0.006	0.005	17.00	18.50	4.60	6.30
SPH4030HR22NT	0.22 $\pm$ 30%	0.007	0.006	11.50	12.50	3.90	5.20
SPH4030HR47NT	0.47 $\pm$ 30%	0.013	0.011	8.20	9.20	4.50	5.20

※1: All test data is referenced to 20°C ambient;

※2: Rated current: Isat or Irms, whichever is smaller;

※Isat: DC current at which the inductance drops approximate 30% from its value without current;

※Irms: DC current that causes the temperature rise ( $\Delta T = 40^\circ\text{C}$ ) from 20°C ambient.

## TYPICAL ELECTRICAL CHARACTERISTICS

### SPH201610H Series

Temperature vs. DC Current Characteristics



Inductance vs. DC Current Characteristics



### SPH252010H Series

Temperature vs. DC Current Characteristics



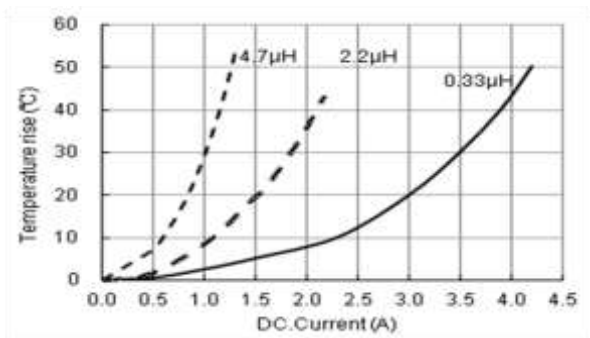
Inductance vs. DC Current Characteristics



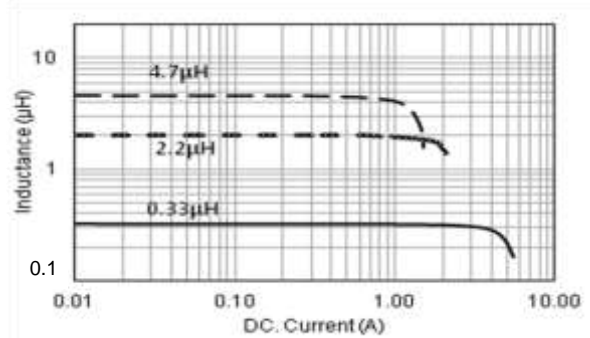
# TYPICAL ELECTRICAL CHARACTERISTICS

## SPH252012H Series

Temperature vs. DC Current Characteristics

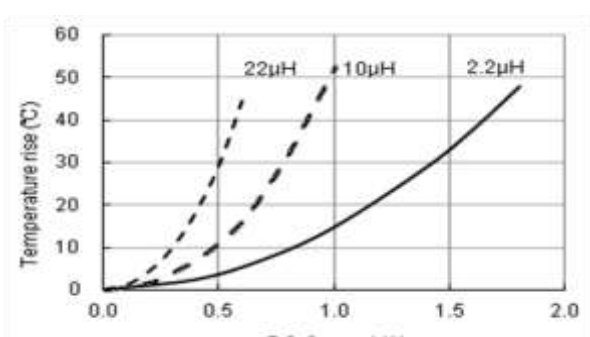


Inductance vs. DC Current Characteristics

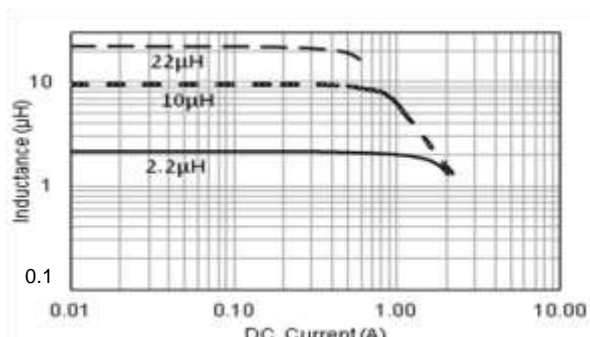


## SPH3012H Series

Temperature vs. DC Current Characteristics

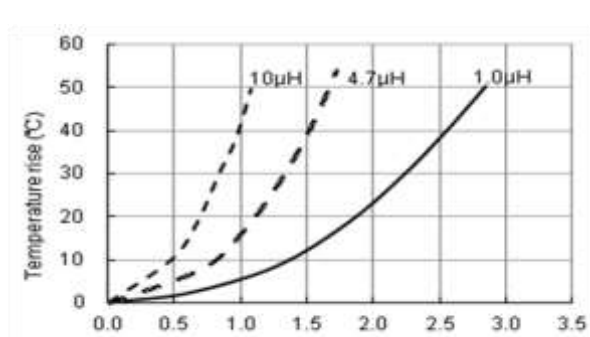


Inductance vs. DC Current Characteristics

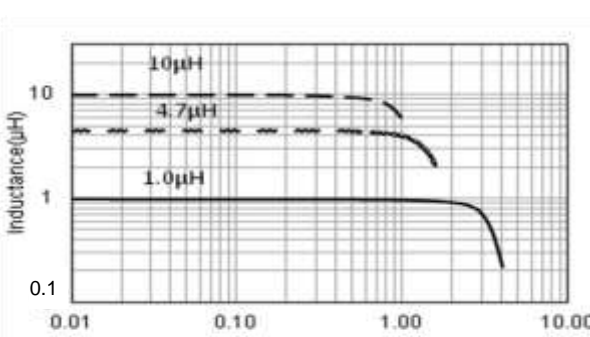


## SPH3015H Series

Temperature vs. DC Current Characteristics

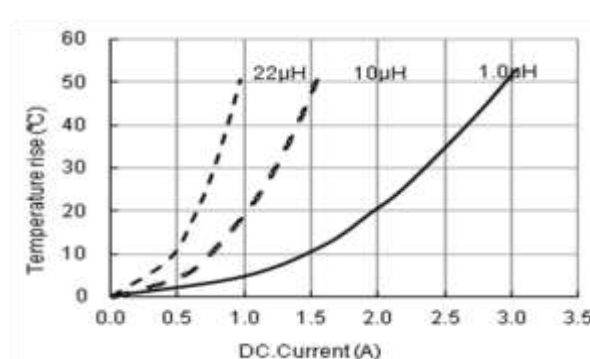


Inductance vs. DC Current Characteristics

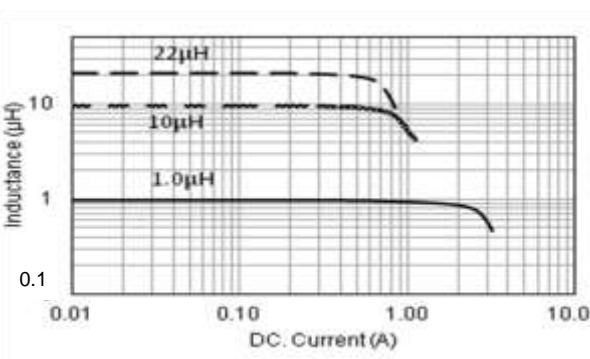


## SPH4012H Series

Temperature vs. DC Current Characteristics



Inductance vs. DC Current Characteristics





# TYPICAL ELECTRICAL CHARACTERISTICS

## SPH4018H Series

Temperature vs. DC Current Characteristics



Inductance vs. DC Current Characteristics



## SPH4020H Series

Temperature vs. DC Current Characteristics

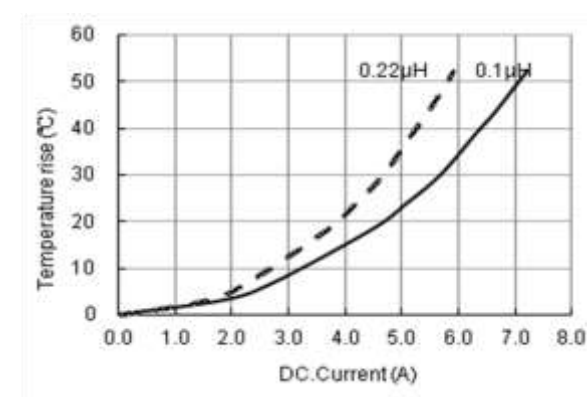


Inductance vs. DC Current Characteristics

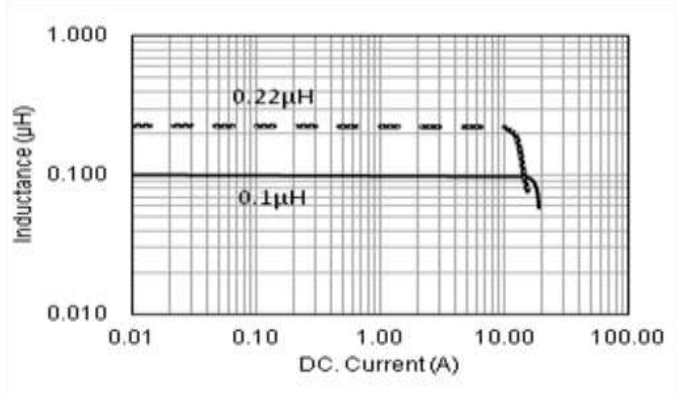


## SPH4030H Series

Temperature vs. DC Current Characteristics



Inductance vs. DC Current Characteristics



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