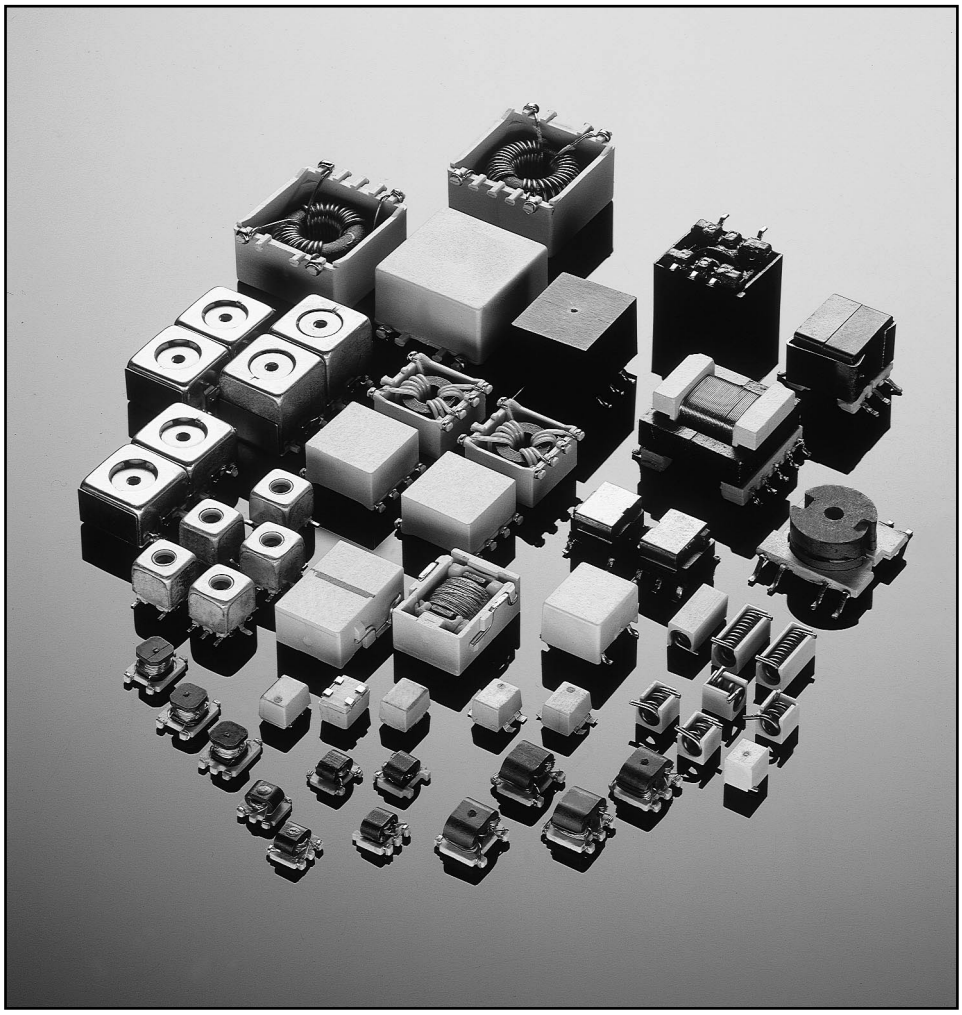
Sprague-Goodman

ENGINEERING BULLETIN
SG-890A
Supercedes SG-890.1

SURFCOIL® SMT INDUCTORS AND TRANSFORMERS
(PROFESSIONAL GRADE)



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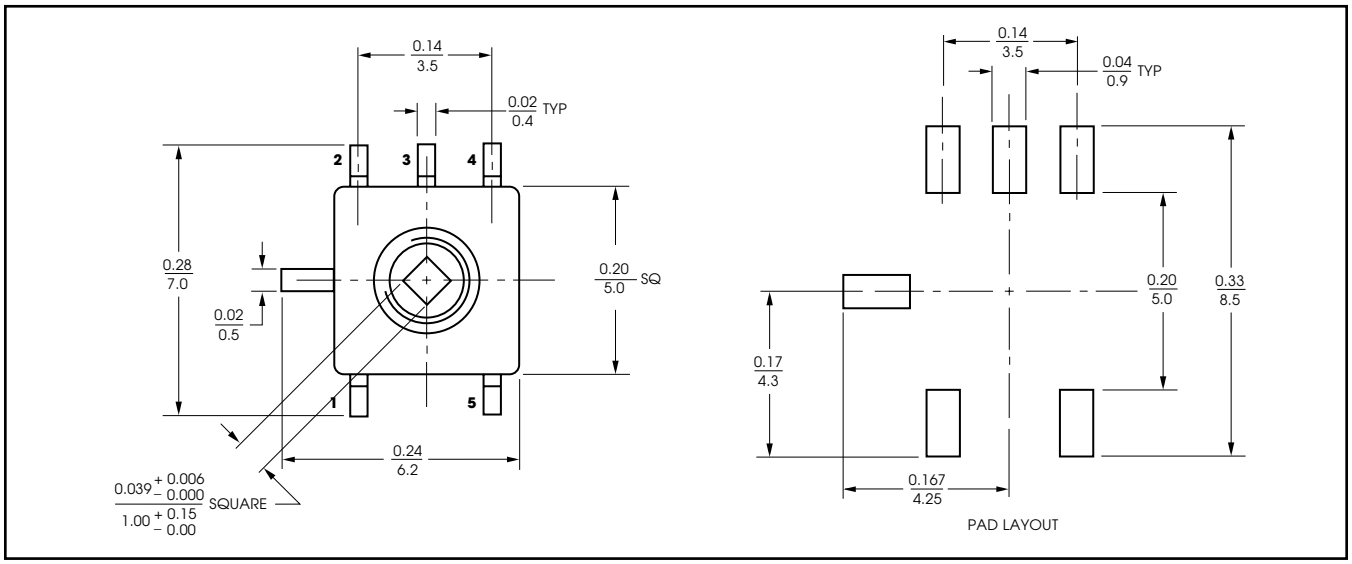
SMD TUNABLE RF COIL
5.0 x 5.0 x 5.1 mm — GLSV & GLSA SERIES

APPLICATIONS
- RF circuits
- Telecommunications
- Mobile radio

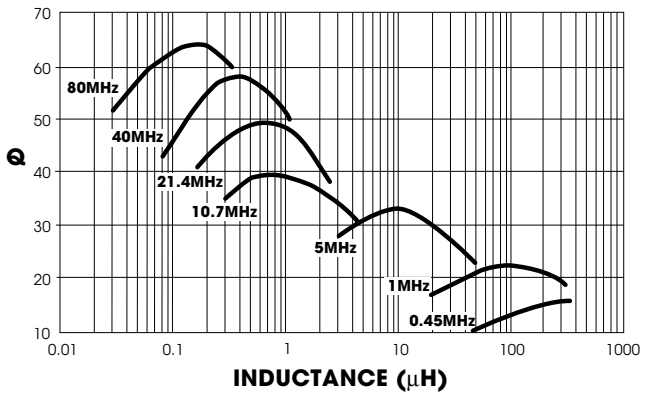
FEATURES
- Compact design
- Suitable for automatic insertion
- For reflow and vapor phase soldering
- Wide frequency range
- Max 5 connections

SPECIFICATIONS
Operating Temperature Range: –40°C to +85°C
Power Loss at 40°C: approx. 100 mW max
Soldering Heat Resistance: 260°C, 5 s
Inductance Range: 14 nH - 680 µH
Frequency Range: 0.5 - 300 MHz

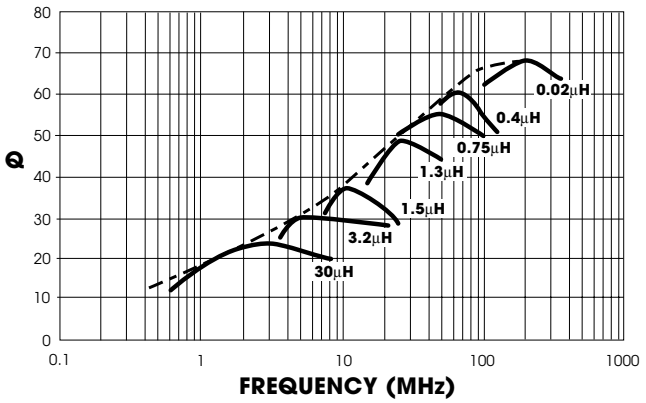


All dimensions are in / mm.
Unless otherwise specified, the tolerance on dimensions is ± 0.004 / 0.1.

TYPICAL Q vs. INDUCTANCE

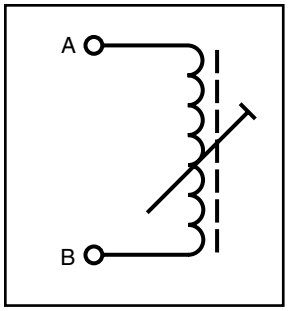


TYPICAL Q vs. FREQUENCY



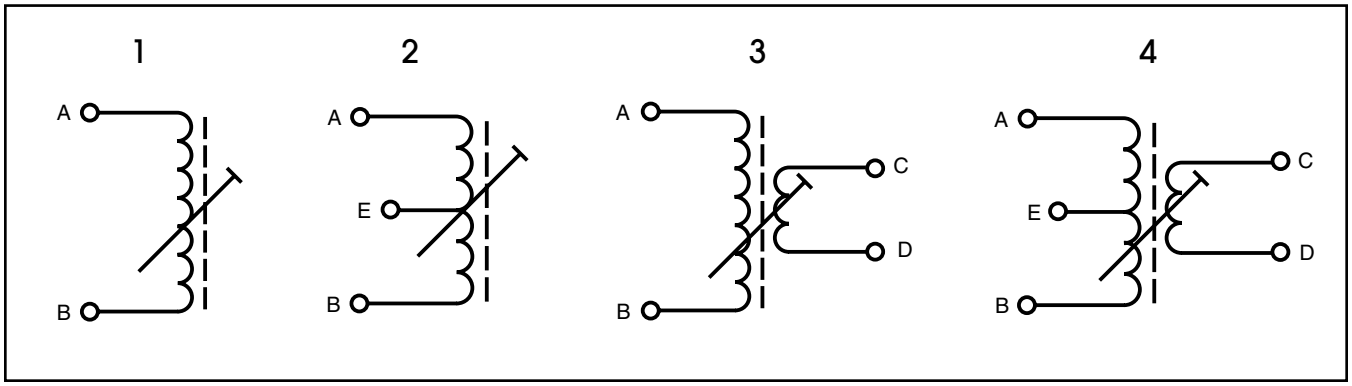
STANDARD VALUES (1 Winding)

Inductance (µH)	Inductance Test Freq. (MHz)	Frequency Range (MHz)	Adjustment Range	Q min	Q Test Frequency (MHz)	Pin Connection		Turns	Model Number
						A	B		
0.047	10	50 - 200	±3.0%	38	150	4	2	3 1/4	GLSV47N00
0.056	10	50 - 200	–6.0%	40	150	2	4	3 3/4	GLSV56N00
0.068	10	50 - 200	±3.0%	45	150	2	4	3 3/4	GLSV68N00
0.082	10	50 - 200	±3.5%	38	150	2	4	4 3/4	GLSV82N00
0.10	10	50 - 200	±4.0%	48	100	2	4	4 3/4	GLSVR1000
0.12	10	50 - 200	±5.0%	32	100	2	4	5 3/4	GLSVR1200
0.15	10	50 - 200	±5.0%	42	100	2	4	5 3/4	GLSVR1500
0.18	10	50 - 200	±5.0%	40	100	4	2	6 1/4	GLSVR1800
0.22	10	20 - 150	±7.5%	45	70	4	2	7 1/4	GLSVR2200
0.27	10	20 - 150	±7.5%	35	70	2	4	7 3/4	GLSVR2700
0.33	10	20 - 150	±7.5%	35	70	2	4	8 3/4	GLSVR3300
0.39	10	20 - 150	±7.5%	40	70	2	4	9 3/4	GLSVR3900
0.47	10	20 - 150	±7.5%	45	70	4	2	11 1/4	GLSVR4700
0.56	10	20 - 150	±7.5%	42	70	2	4	12 3/4	GLSVR5600
0.68	10	10 - 100	±7.5%	45	50	4	2	14 1/4	GLSVR6800
0.82	10	10 - 100	±7.5%	42	50	2	4	15 3/4	GLSVR8200
1.0	10	2 - 40	±7.5%	42	50	4	2	17 1/4	GLSV1R000
1.2	10	2 - 40	±7.5%	45	20	4	2	19 1/4	GLSV1R200
1.5	10	2 - 40	±7.5%	45	20	4	2	21 1/4	GLSV1R500
1.8	10	2 - 40	±7.5%	45	20	2	4	23 3/4	GLSV1R800
2.2	1	2 - 40	±5.0%	45	20	2	4	27 3/4	GLSV2R200
2.7	1	2 - 40	±5.0%	40	20	4	2	30 1/4	GLSV2R700
3.3	1	2 - 40	±5.0%	35	20	4	2	34 1/4	GLSV3R300
3.9	1	2 - 40	±5.0%	35	10	2	4	34 3/4	GLSV3R900
4.7	1	2 - 40	±5.0%	35	10	2	4	38 3/4	GLSV4R700
5.6	1	2 - 40	±5.0%	35	10	2	4	41 3/4	GLSV5R600
6.8	1	1 - 10	±5.0%	30	5	4	2	44 1/4	GLSV6R800
8.2	1	1 - 10	±5.0%	23	5	4	2	48 1/4	GLSV8R200
10.0	1	1 - 10	±5.0%	23	5	4	2	55 1/4	GLSV10000
12.0	1	1 - 10	±5.0%	23	5	4	2	61 1/4	GLSV12000
15.0	0.5	1 - 10	±5.0%	25	5	4	2	67 1/4	GLSV15000



SPECIAL VALUES

Inductance (µH)	Induct. Freq. (MHz)	Freq. Range (MHz)	Adjustment Range	Q min	Q Test Freq. (MHz)	Pin Connection A	B	C	D	E	Turns 1	2	Turns A-E	Fig.	Model Number
0.014	10.0	100-200	±3%	65	200	4	2	—	—	—	1 1/4	—	—	1	GLSA14N00
0.092	10.0	50-200	±5%	40	100	4	2	—	—	—	4 1/4	—	—	1	GLSA92N00
0.117	1.0	20-200	±4%	40	100	2	4	—	—	—	4 3/4	—	—	1	GLSAR1170
0.137	10.0	20-150	±5%	35	100	4	2	—	—	—	5 1/4	—	—	1	GLSAR1370
0.17	1.0	20-150	±5%	25	70	2	5	4	3	1	4 1/2	6 3/4	2 1/4	4	GLSAR1700
0.24	1.0	20-150	±5%	30	70	1	5	4	2	—	7 1/4	5 1/4	—	3	GLSAR2400
0.24	1.0	20-150	+7/-4%	30	70	1	5	4	2	—	7 1/4	3 1/4	—	3	GLSAR2401
0.24	13.0	20-150	±5%	30	35	1	5	—	—	—	7 1/4	—	—	1	GLSAR2402
0.75	10.0	20-150	±5%	25	30	1	2	5	4	—	14 3/4	15 1/4	—	3	GLSAR7500
0.85	1.0	20-150	±7.5%	45	45	2	5	4	3	1	16 1/2	2 3/4	8 1/4	4	GLSAR8500
0.97	13.0	10-100	±5%	40	35	4	2	1	5	—	16	2	—	3	GLSAR9700
1.0	1.0	10-100	-7.5%	25	45	2	5	—	—	1	18 1/2	—	9 1/4	2	GLSA1R000
1.18	2.0	10-100	±5%	22	40	2	4	5	1	3	18 3/4	3 3/4	14 1/4	4	GLSA1R180
1.2	1.0	10-100	+16%	38	20	4	2	1	5	—	20 1/4	4 1/4	—	3	GLSA1R200
1.3	1.0	10-100	±7.5%	30	10	5	1	—	—	—	19 3/4	—	—	1	GLSA1R300
1.35	0.3	10-100	±5%	20	26	2	4	5	1	3	18 3/4	9 3/4	9 1/2	4	GLSA1R350
1.79	1.0	1 - 15	+3/–11%	25	12	2	4	5	1	—	22 3/4	4 3/4	—	3	GLSA1R790
2.0	0.2	5 - 50	±5%	35	21	4	2	—	—	—	25 1/4	—	—	1	GLSA2R000
2.15	13.0	5 - 40	±7.5%	45	35	1	5	—	—	—	26	—	—	1	GLSA2R150
2.5	13.0	5 - 40	±7.5%	40	35	1	5	—	—	—	29	—	—	1	GLSA2R500
3.0	0.2	5 - 40	±5%	30	21	2	4	—	—	3	30 3/4	—	9 1/2	2	GLSA3R000
3.1	0.2	5 - 40	±5%	32	21	4	2	—	—	—	32	—	—	1	GLSA3R100
9.0	0.1	1 - 10	+21/-3%	18	1.6	2	4	5	1	—	55 3/4	11 3/4	—	3	GLSA9R000
19.6	0.1	1 - 10	+10/-1%	24	5.0	4	2	—	—	—	78 1/4	—	—	1	GLSA19R60
28.0	0.1	1 - 10	+4/-16%	18	1.8	2	4	5	1	—	92 3/4	18 3/4	—	3	GLSA28000
32.0	1.0	1 - 10	+20%	14	1.0	1	5	4	2	—	108 1/4	36 1/4	—	3	GLSA32000
125.0	0.1	0.5 - 2	±7.5%	18	1.0	4	2	—	—	—	208	—	—	1	GLSA12100
150.0	0.03	0.5 - 2	+10/-1.5%	16	1.0	5	1	4	2	—	217 3/4	85 1/4	—	3	GLSA15100
390.0	0.1	0.5 - 2	±7.5%	20	1.0	1	5	—	—	—	365	—	—	1	GLSA39100
500.0	0.1	0.5 - 2	±7.5%	12	0.5	4	2	—	—	—	426	—	—	1	GLSA50100
680.0	0.05	0.5 - 2	±7.5%	12	0.45	4	2	—	—	—	490	—	—	1	GLSA68100



SURFACE MOUNT TRANSFORMER
4.5 x 3.4 x 3.1 mm — GLSZ SERIES

APPLICATIONS
- RF circuits
- Telecommunications
- Mobile radio

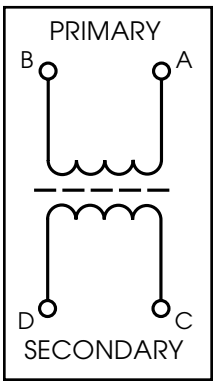
FEATURES
- Compact design
- Suitable for automatic insertion
- Suitable for all soldering methods
- Wide frequency range

SPECIFICATIONS
Frequency Range: 25 kHz - 1 GHz

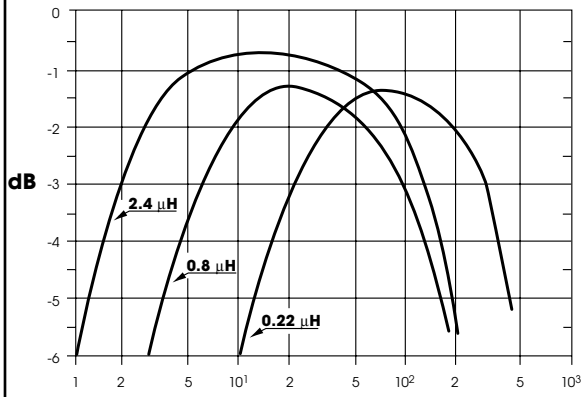
Operating Temperature Range: –40°C to +125°C

Power Loss at 40°C: 100 mW max.

Soldering Heat Resistance: 230°C, 8 s



TYPICAL INSERTION LOSS



Impedance (Ω)	Turns Ratio	Insertion Loss (dB)	3 dB Band Limits (MHz)		Inductance Primary (µH)	Inductance Secondary (µH)	Figure	Model Number
50 : 1100	1 : 4.7	1.1	15	65	0.24	4.7	B	GLSZ112L4R7
50 : 140	1 : 1.66	1.6	0.2	5	32.7	79.0	B	GLSZ141L790
50 : 1.25	6.33 : 1	4.3	4	60	0.9	0.034	B	GLSZ1R3LR03
50 : 2000	1 : 6.33	2.7	100	340	0.036	0.98	B	GLSZ202LR98
50 : 2.2	4.7 : 1	2.0	1	20	5.1	0.255	B	GLSZ2R2LR26
50 : 370	1 : 2.71	1.6	30	400	0.15	0.9	B	GLSZ371LR90
50 : 450	1 : 3	0.9	30	380	0.14	1.1	A	GLSZ451L1R1
50 : 50	1 : 1	1.5	0.1	5	54.0	48.0	B	GLSZ500L480
50 : 50	1 : 1	1.4	15	450	0.22	0.22	A	GLSZ500LR22
50 : 500	1 : 3.15	1.5	0.7	28	6.5	55.0	A	GLSZ501L550
50 : 50	1 : 1	3.1	40	580	0.08	0.08	A	GLSZ500LR08
50 : 50	1 : 1	1.5	4	160	0.98	0.925	B	GLSZ500LR93
50 : 5.6	3 : 1	2.5	4	60	1.1	0.14	A	GLSZ5R6LR14
50 : 6.8	2.71 : 1	3.2	4	75	0.9	0.15	B	GLSZ6R8LR15
50 : 800	1 : 4	1.5	20	150	0.23	3.3	A	GLSZ801L3R3

FIGURE A

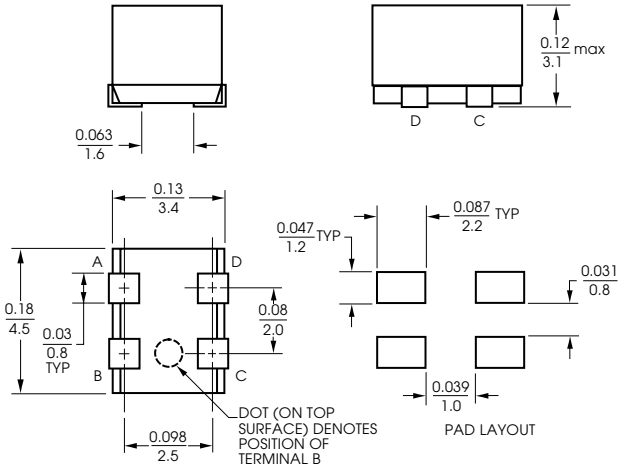
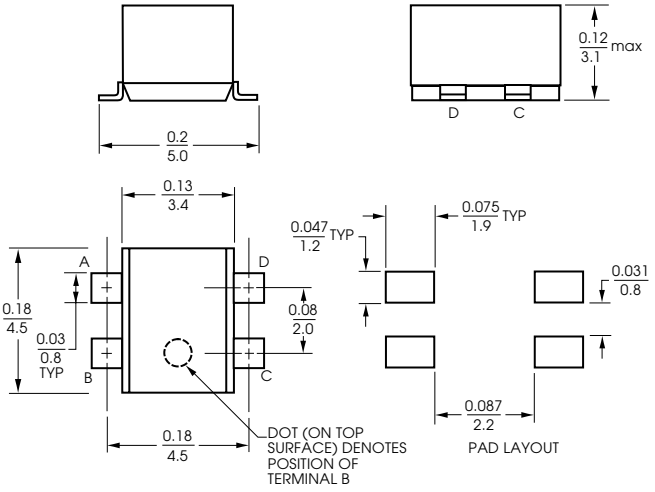


FIGURE B



All dimensions are in / mm.
Unless otherwise specified, the tolerance on dimensions is ± 0.004 / 0.1.

WIDEBAND TRANSFORMERS - 4.5 x 4.5 x 2.8 mm

APPLICATIONS

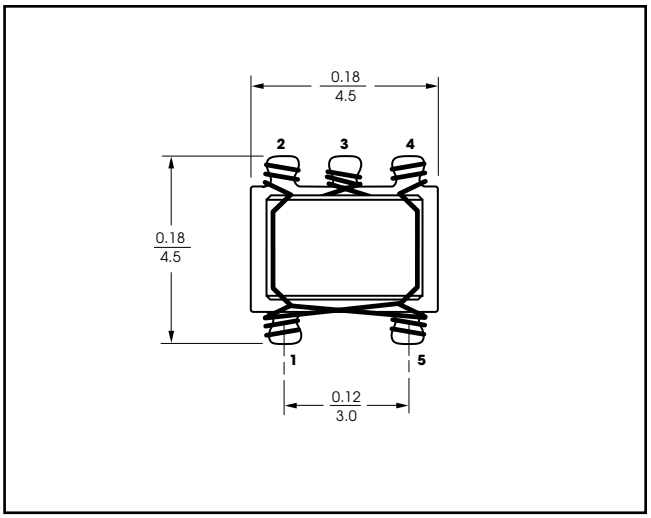
- RF circuits
- Mobile radio
- Satellite TV
- Cordless phones

FEATURES

- Compact design
- Suitable for automatic insertion
- For reflow and vapor phase soldering
- Ceramic base
- Terminals are formed from the ends of the coil windings, eliminating solder joints between the coil and the terminals which could open from the heat of circuit assembly.

SPECIFICATIONS

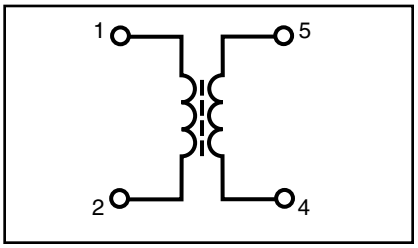
Operating Temperature Range: –40°C to +125°C
Soldering Heat Resistance: 230°C, 5 s

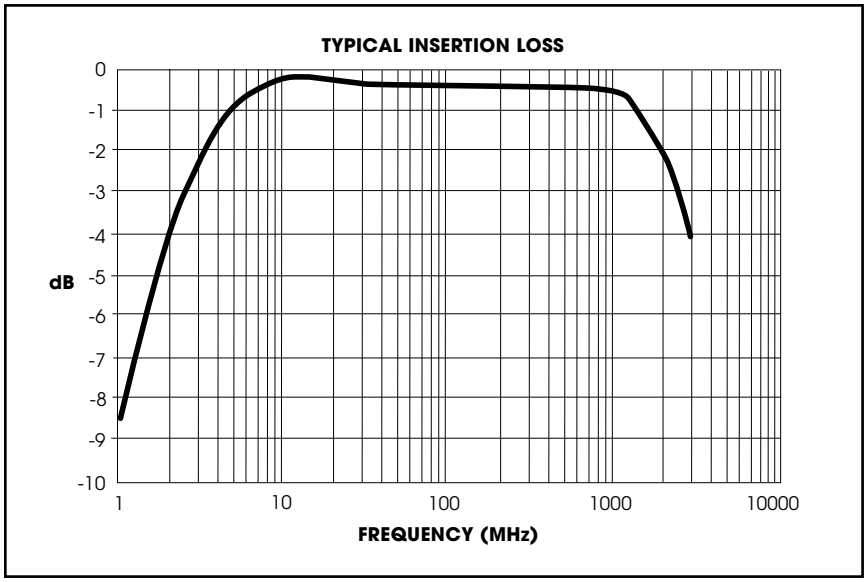


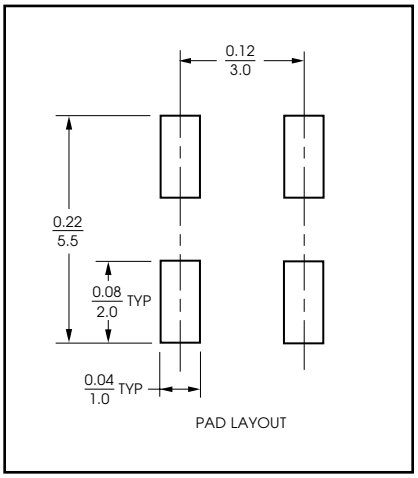
CONFIGURATION FOR BALUN TRANSFORMER (PAGE 7)

TRANSFORMER WITH 2 WINDINGS

Impedance (Ω)	Turns Ratio	3 dB Band Limits (MHz)	Loss at 20 MHz (dB) max	Model Number
50 : 50	1 : 1	4 - 2000	0.5	GLSW4M202







PAD LAYOUT

All dimensions are in / mm.
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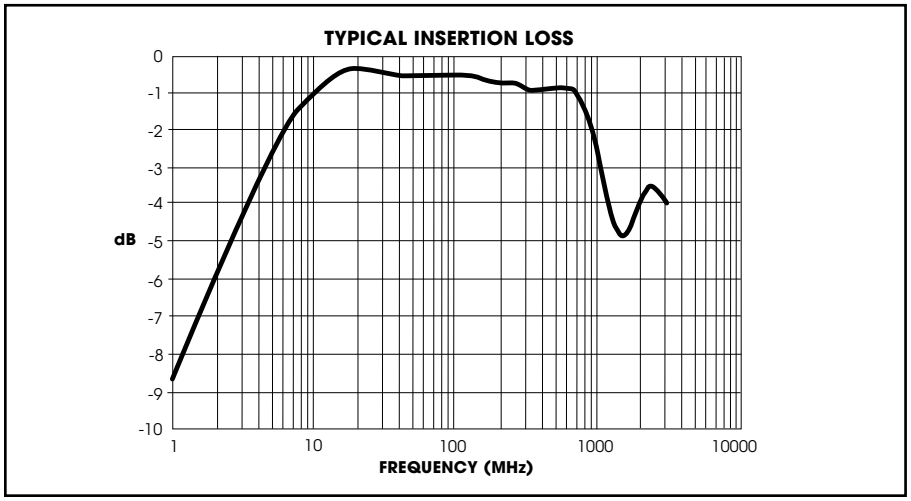
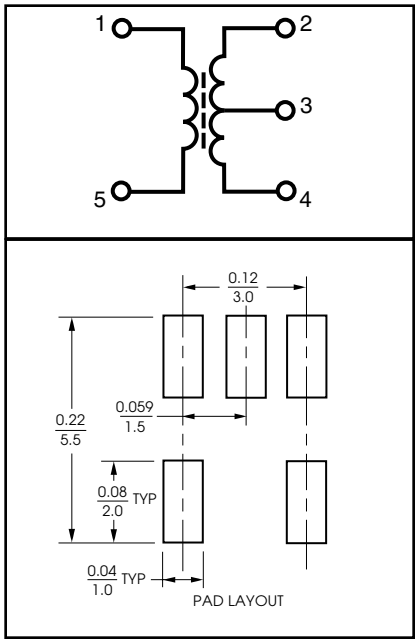
TRANSFORMER WITH 2 WINDINGS AND CENTER TAP

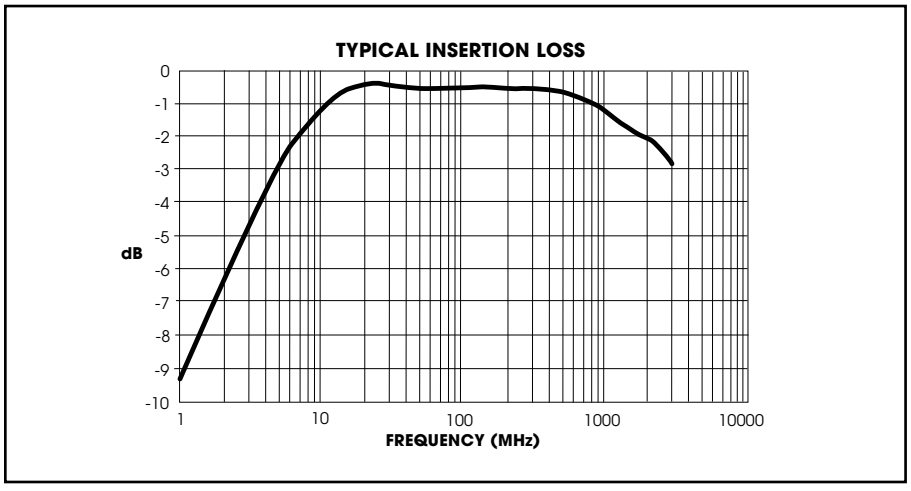
Turns Ratio	3 dB Band Limits (MHz)	Loss at 20 MHz (dB) max	Model Number
1 : 1 : 1	4.5 - 1000	0.7	GLSB4R5M102

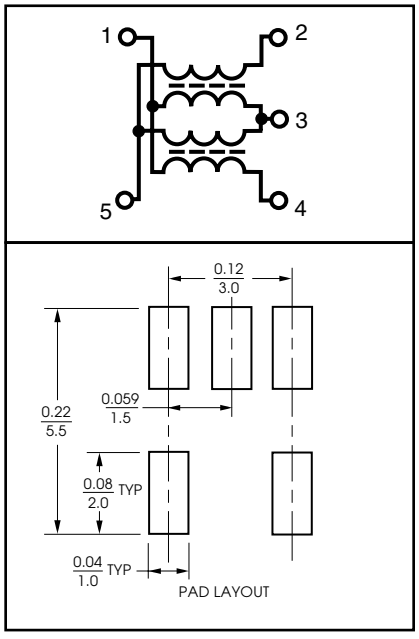




BALUN TRANSFORMER

Impedance (Ω)	Turns Ratio	3 dB Band Limits (MHz)	Loss at 20 MHz (dB) max	Model Number
50 : 200	1 : 2	10 - 1200	0.5	GLSU10M122





POWER SPLITTER

Number of Turns	Inductance (2 to 3) (µH)	Inductance (2 to 4) (µH)	Model Number
2 x 2	0.42 ± 25%	1.68 ± 25%	GLSD02/02H1R68

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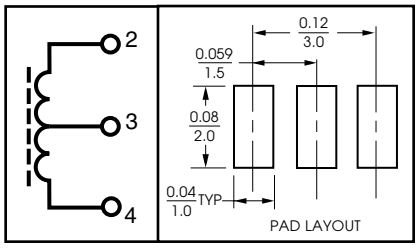
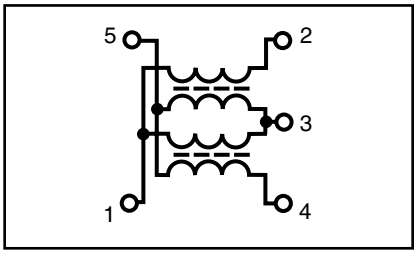


SMD WIDEBAND TRANSFORMER
6.5 x 5.7 x 4.0 mm — GLSJ SERIES

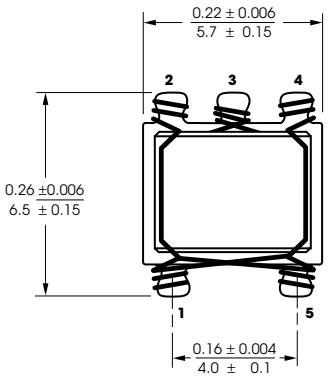
APPLICATIONS
- RF circuits
- Mobile Radio
- Satellite TV

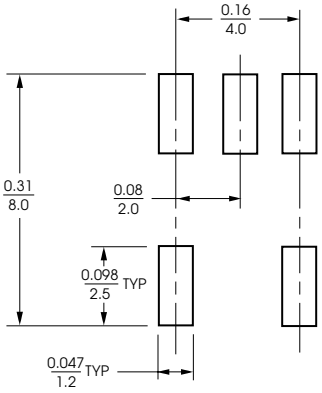
SPECIFICATIONS
Operating Temperature Range: –40°C to +125°C
Soldering Heat Resistance: 230°C, 5 s

FEATURES
- Compact design
- Suitable for automatic insertion
- For reflow and vapor phase soldering
- Ceramic base
- Terminals are formed from the ends of the coil windings, eliminating solder joints between the coil and the terminals which could open from the heat of circuit assembly.



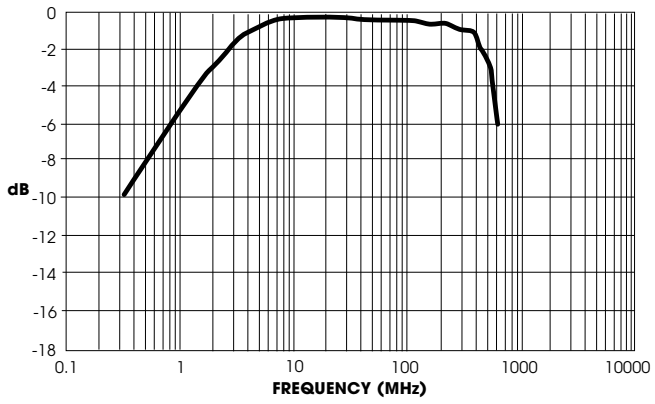
No. of Turns	1 dB Band Limits (MHz)	Loss at 20 MHz (dB) max	Model Number
4 x 4.5	20 - 400	0.8	GLSJ4/5T401
4 x 2.5	20 - 750	0.8	GLSJ4/3T751



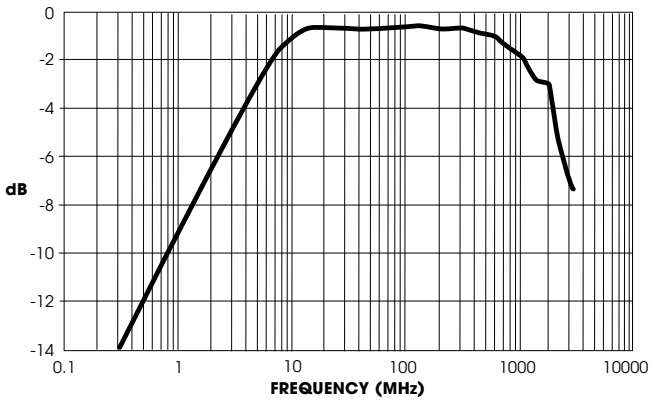


PAD LAYOUT

INSERTION LOSS - GLSJ4/5T401



INSERTION LOSS - GLSJ4/3T751



All dimensions are in / mm.
Unless otherwise specified, the tolerance on dimensions is ± 0.004 / 0.1.

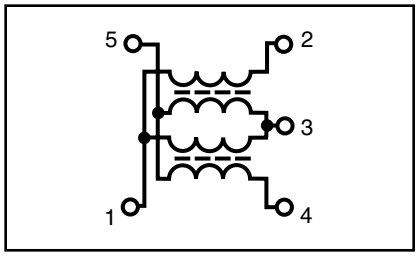
SMD DIRECTIONAL COUPLER
5.7 x 5.7 x 4.0 mm — GLSN SERIES

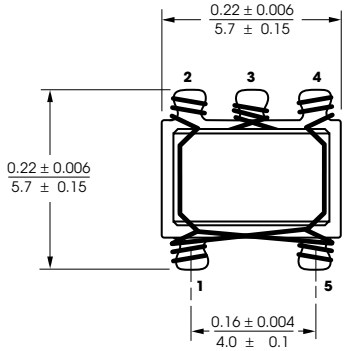
APPLICATIONS
- RF circuits
- Mobile Radio
- Satellite TV

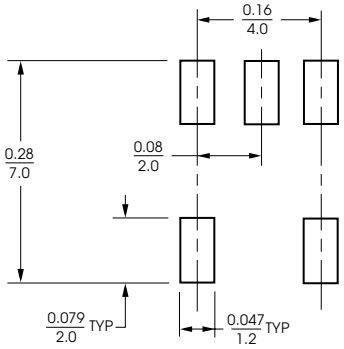
SPECIFICATIONS
Operating Temperature Range: –40°C to +125°C
Soldering Heat Resistance: 230°C, 5 s

FEATURES
- Compact design
- Suitable for automatic insertion
- For reflow and vapor phase soldering
- Ceramic base
- Terminals are formed from the ends of the coil windings, eliminating solder joints between the coil and the terminals which could open from the heat of circuit assembly.

Coupling (dB)	3 dB Band Limits (MHz)	Loss at 20 MHz (dB) max	Model Number
6	0.8 - 1100	2.8	GLSN2/6D112
8	0.8 - 1200	2.0	GLSN1/8D122
10	0.5 - 900	1.2	GLSN10D901
16	0.5 - 1500	0.6	GLSN16D152

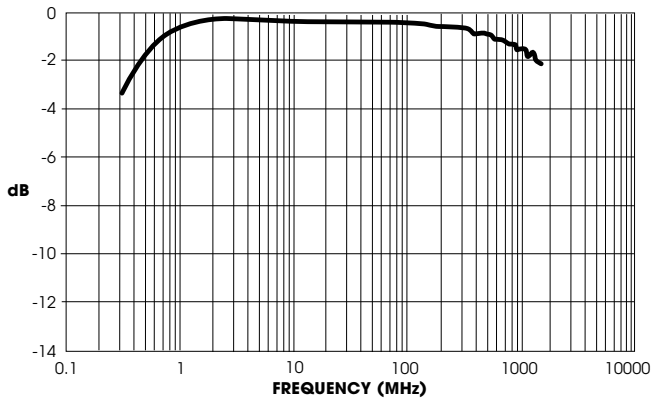




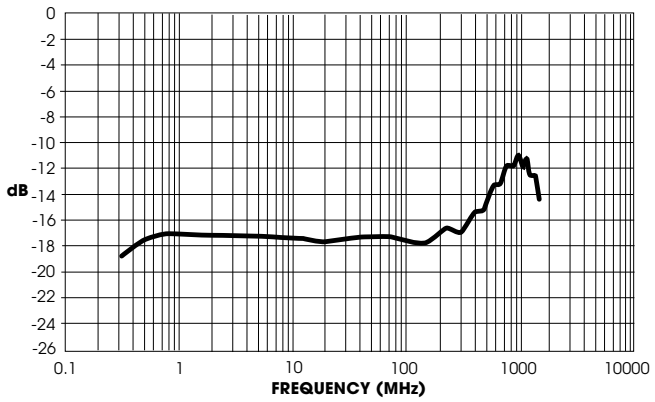


PAD LAYOUT

LOSS - GLSN16D152



COUPLING - GLSN16D152



All dimensions are in / mm.
Unless otherwise specified, the tolerance on dimensions is ± 0.004 / 0.1.

SMD DIRECTIONAL COUPLER
4.5 x 4.5 x 2.8 mm — GLSL SERIES

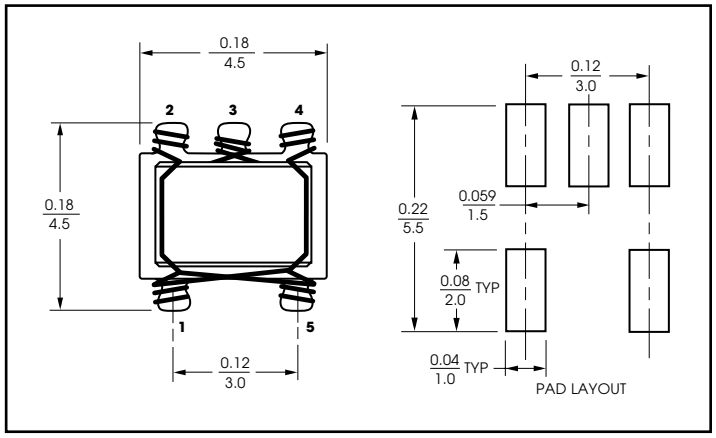
APPLICATIONS
- RF circuits
- Mobile Radio
- Satellite TV

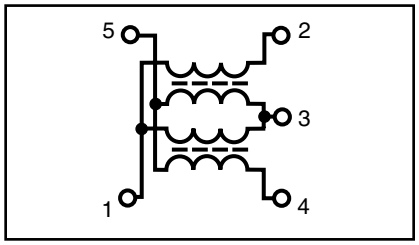
FEATURES
- Compact design
- Suitable for automatic insertion
- For reflow and vapor phase soldering
- Ceramic base
- Terminals are formed from the ends of the coil windings, eliminating solder joints between the coil and the terminals which could open from the heat of circuit assembly.

SPECIFICATIONS

Operating Temperature Range: –40°C to +125°C

Soldering Heat Resistance: 230°C, 5 s





Coupling (db)	3 dB Band Limits (MHz)	Loss at 20 MHz (dB) max	Model Number
20	0.6 - 1700	0.2	GLSL20D102

SMD DIRECTIONAL COUPLER
6.5 x 5.7 x 4.0 mm — GLSY SERIES

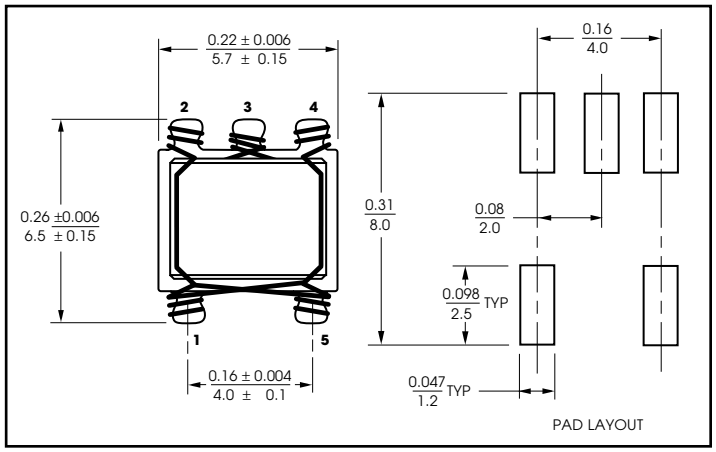
APPLICATIONS
- RF circuits
- Mobile Radio
- Satellite TV

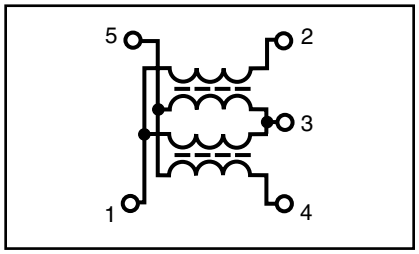
FEATURES
- Compact design
- Suitable for automatic insertion
- For reflow and vapor phase soldering
- Ceramic base
- Terminals are formed from the ends of the coil windings, eliminating solder joints between the coil and the terminals which could open from the heat of circuit assembly.

SPECIFICATIONS

Operating Temperature Range: –40°C to +125°C

Soldering Heat Resistance: 230°C, 5 s





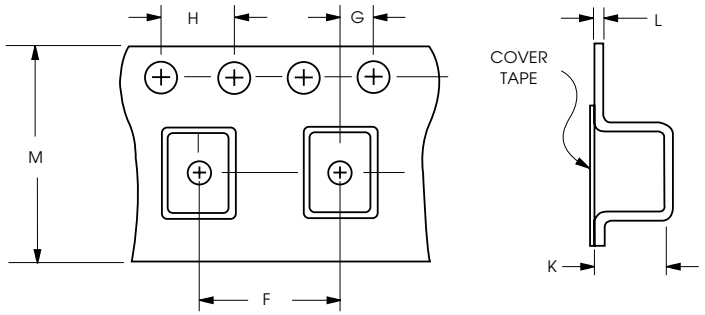
Coupling (db)	3 dB Band Limits (MHz)	Loss at 20 MHz (dB) max	Model Number
10	0.5 - 900	1.2	GLSY10D901
20	0.5 - 1500	0.4	GLSY20D152

All dimensions are in / mm.
Unless otherwise specified, the tolerance on dimensions is ± 0.004 / 0.1.

CARRIER SPECIFICATIONS

Dimension / Model Series	F	G	H	K	L	M
GLSA, GLSV	0.47 / 12.0	0.08 / 2.0	0.16 / 4.0	0.22 / 5.6	0.012 / 0.3	0.63 / 16.0
GLSZ	0.31 / 8.0	0.08 / 2.0	0.16 / 4.0	0.13 / 3.2	0.012 / 0.3	0.47 / 12.0
GLSB, GLSD, GLSU, GLSW	0.31 / 8.0	0.08 / 2.0	0.16 / 4.0	0.12 / 3.1	0.012 / 0.3	0.47 / 12.0
GLSJ, GLSY	0.31 / 8.0	0.08 / 2.0	0.16 / 4.0	0.17 / 4.4	0.012 / 0.3	0.63 / 16.0

Carrier Outline Drawing

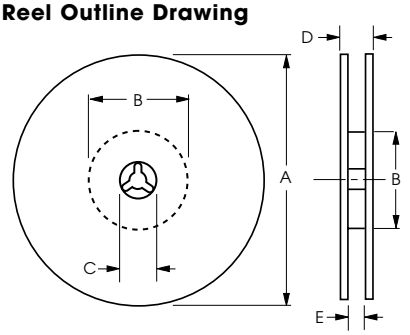


Not to scale. All dimensions are in/mm.

REEL SPECIFICATIONS

Dimension / Model Series	A	B	C	D	E	Qty. Per Reel
GLSA, GLSV	7 / 180	2.36 / 60.0	0.51 / 13.0	0.724 / 18.4	0.488 / 12.4	1000
GLSZ	7 / 180	2.36 / 60.0	0.51 / 13.0	0.724 / 18.4	0.488 / 12.4	2000
GLSB, GLSD, GLSU, GLSW	7 / 180	2.36 / 60.0	0.51 / 13.0	0.724 / 18.4	0.488 / 12.4	2000
GLSJ, GLSY	7 / 180	2.36 / 60.0	0.51 / 13.0	0.882 / 22.4	0.646 / 16.4	1000

Reel Outline Drawing



Not to scale. All dimensions are in/mm.

Engineering Bulletin SG-890 describes a wide range of fixed and variable surface mount inductors, coils, transformers and filters. Parts are wound as air coils, or on a selection of ferrite cores, and can be used up to the GHz frequency range.

The SURFCOIL® models operate over the professional grade temperature of –40° to +125°C. (Sprague Goodman's selection of SURFCOIL SMT chip inductors, which operate over the temperature range of –25° to +85°C, are described in Engineering Bulletin SG-800.)

Our products are used in telecommunications and electronic engineering as frequency-selective components consisting of individual or coupled resonant circuits. Non-tunable tapped coils and coils with multiple windings are also required for applications such as DC isolation,voltage and current transformations and impedance matching (between amplifier stages, for example).

Fixed inductors are used in all areas of telecommunications, video and medical electronic equipment. They are ideal in radio interference suppression devices, filters, and decoupling of oscillator and amplifier stages.

If the component you need for your design is not shown in this bulletin, let us know—the design you need may already be in our design file, or we will design a special to your specifications.

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