



产品承认书  
PRODUCT SPECIFICATIONS

客户 :  
CUSTOMER

客户料号:  
CUSTOMER P/N

产品名称 :  
DESCRIPTION 网络变压器

产品型号:  
PART NUMBER HB1601SNL

版本:  
REVISION A0

日期:  
ISSUE DATE 2019/10/21

公司承认 COMPANY APPROVAL		
制作 PREPARED BY	审核 CHECKED BY	批准 APPROVED BY
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客户承认 CUSTOMER APPROVAL
批准签字 APPROVED SIGNATURES



深圳市格莱尔电子有限公司  
Shenzhen Glorious Electronic Co., Ltd.

变更记录 Record of Revision		
版本. Rev.	变更说明 Description of Changes	日期 Date
0.0 A0	初版发行	2015/8/26

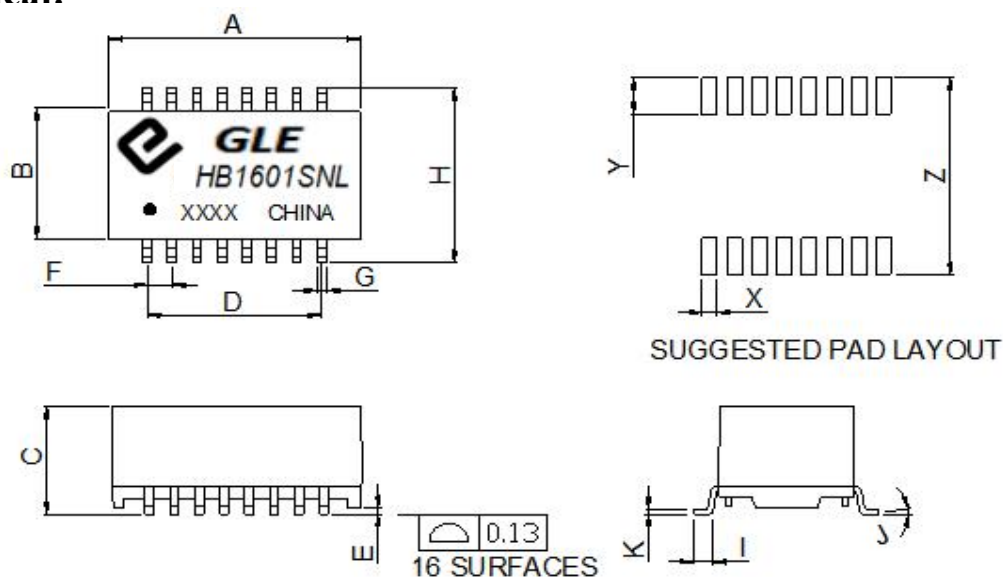


# 深圳市格莱尔电子有限公司

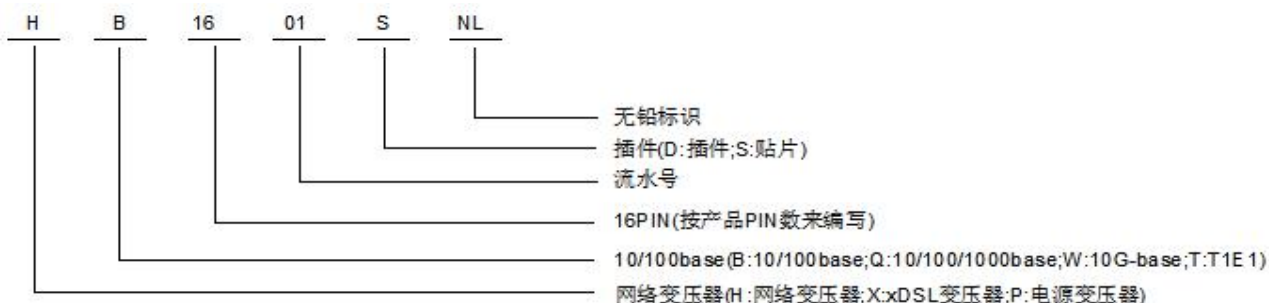
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## 1. 产品外观尺寸(单位mm)

### Mechanical:



### 产品编码定义

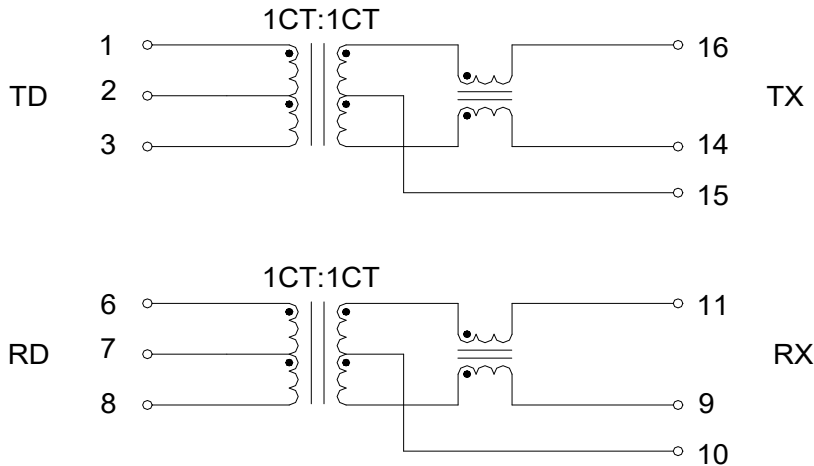


DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	12.40	12.90	0.488	0.508
B	6.70	7.20	0.264	0.283
C	5.00	5.50	0.197	0.217
D	8.89(typical)		0.350(typical)	
E	0.10	0.20	0.004	0.008
F	1.27(typical)		0.050(typical)	
G	0.46(typical)		0.018(typical)	
H	9.25	9.75	0.364	0.384
I	1.0(typical)		0.039(typical)	
J	0°	8°	0°	8°
X	0.76(typical)		0.024(typical)	
Y	2.03(typical)		0.074(typical)	
Z	10.67(typical)		0.420(typical)	
K	0.20	0.30	0.008	0.012



## 2. 线路图

### Schematic:



## 3. 产品电性参数@25°C

### Electrical Specification @25°C

Inductance OCL:	350uH Min @ 100KHz	0.1V	8mA	DC	BIAS
Leakage Inductance:	0.50uH Max @ 100KHz	0.2V			
Interwinding Capacitance:	28pF Max @ 100KHz	0.2V			
DC Resistance:	0.9 Ω	Max			
Turn Ratio:	1CT:1CT(TX)/1CT:1CT(RX)±5%				
Polarity:	1-16,6-11 In-Phase				
Insertion Loss:	0.5-100 MHz			-1.1dB	Max
Return Loss	1-30 MHz			-16dB	Min
	30.1-60MHz			-12dB	Min
	60.1-80MHz			-10dB	Min
Cross Talk:	1-60MHz			-42dB	Min
	60-100MHz			-35dB	Min
CMRR:	1-30MHz			-40dB	Min
	60MHz			-35dB	Min
	80-100MHz			-30dB	Min
Isolation HI-POT:	1500Vrms	1mA	1S		
Operating Temperature:	0°C to 70°C				
Storage Temperature:	-25°C TO +125°C				
Product Type:	Green Product				



## 4.SAMPLE TEST DATA

SPEC	1	2	3	4	5
L:(AT 100KHz 0.2V 8mA)					
350uH Min					
1-3	519	543	503	526	527
6-8	561	519	513	543	535
LK:(AT 100KHz 0.2V)					
0.5uH Max					
1-3(16-14 short)	0.24	0.26	0.27	0.24	0.23
6-8(11-9 short)	0.25	0.23	0.28	0.25	0.21
CWW:(AT 100KHz 0.2V)					
15pF TYP					
1-3 TO 16-14	18.6	17.3	17.3	18.7	16.7
6-8 TO 11-9	16.9	16.3	16.1	17.5	17.4
DCR:(AT 25°C)					
1.2Ω Max					
16-14	0.73	0.69	0.67	0.73	0.71
11-9	0.71	0.74	0.69	0.70	0.77
URNS RATIO:					
(1-3):(16-14)=1CT:1CT±5%	OK	OK	OK	OK	OK
(6-8):(11-9)=1CT:1CT±5%	OK	OK	OK	OK	OK
HI -POT:					
AT:1500VAC 1mA 1S					
1-3 TO 16-14	OK	OK	OK	OK	OK
6-8 TO 11-9	OK	OK	OK	OK	OK
MAIN TEST EQUIPMENT <input checked="" type="checkbox"/> CHANGCHUANG CC2670 WITHSTANDING VOLTAGE TESTER <input type="checkbox"/> JINKAITAI 3250 AUTOMATIC TRANSFORMER TEST SYSTEM <input checked="" type="checkbox"/> TONGHUI TH-2829 AUTOMATIC TRANSFORMER TEST SYSTEM <input type="checkbox"/> RF NETWORK ANALYZERS 8712ET					



## 4.SAMPLE TEST DATA

SPEC	1	2	3	4	5
Insertion Loss:					
1.1dB Max(0.5-100MHz)					
TX(1-3):					
30MHz	0.21	0.29	0.27	0.29	0.33
40MHz	0.36	0.38	0.38	0.36	0.35
50MHz	0.45	0.42	0.46	0.40	0.43
60MHz	0.51	0.57	0.50	0.57	0.55
80MHz	0.75	0.75	0.74	0.74	0.71
100MHz	0.83	0.89	0.83	0.85	0.82
RX(6-8):					
30MHz	0.28	0.22	0.29	0.27	0.27
40MHz	0.38	0.38	0.37	0.36	0.35
50MHz	0.47	0.46	0.43	0.45	0.43
60MHz	0.54	0.57	0.54	0.54	0.51
80MHz	0.77	0.74	0.79	0.77	0.77
100MHz	0.85	0.86	0.87	0.82	0.85
Return Loss:					
0.5-30 MHz 18dB Min					
30.1-60 MHz 18-20log(f/30)dB Min					
60.1-80 MHz 12dB Min					
TX(1-3):					
30MHz	22.0	24.4	23.2	24.3	22.3
40MHz	19.5	24.2	23.2	23.2	23.5
60MHz	16.9	16.3	15.8	16.7	15.6
80MHz	14.3	13.5	13.8	13.6	14.1
RX(6-8):					
30MHz	23.1	23.2	23.6	24.3	22.3
40MHz	19.5	17.8	18.6	18.3	17.5
60MHz	16.5	16.5	15.6	16.6	15.6
80MHz	14.2	13.4	14.6	13.6	14.6
Cross Talk:					
0.5-40MHz 35dB Min					
40.1-100MHz 33-20*log(f/50)dB Min					
30MHz	46.0	47.2	45.5	47.5	48.6
60MHz	43.2	42.6	43.5	42.3	42.8
80MHz	38.9	39.6	38.1	38.8	38.6
100MHz	36.4	36.5	35.5	35.3	36.9

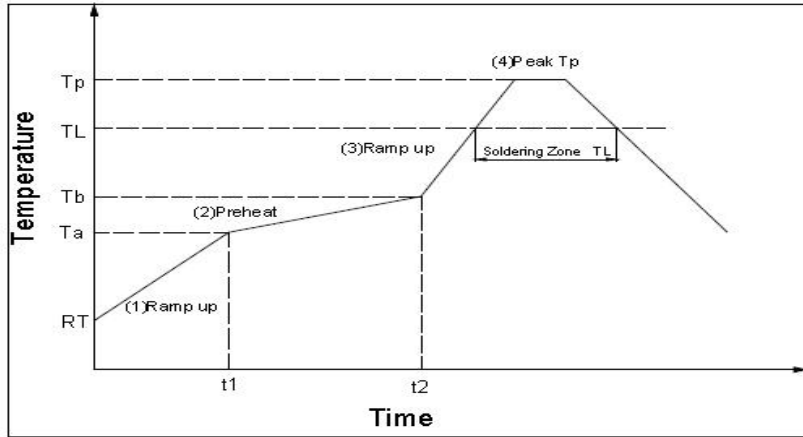
### MAIN TEST EQUIPMENT

- CHANGCHUANG CC2670 WITHSTANDING VOLTAGE TESTER
- JINKAITAI 3250 AUTOMATIC TRANSFORMER TEST SYSTEM
- TONGHUI TH-2818XB AUTOMATIC TRANSFORMER TEST SYSTEM
- RF NETWORK ANALYZERS 8712ET



### 5. Recommended Reflow Soldering Curve:

**IR reflow graph**



**IR reflow profile**

**Form-1 (Reference JEDEC J-STD-020C Table 5-2)**

IR reflow profile		Sn-Pb	Pb-free
step#	Profile Feature	Condition/Duration	Condition/Duration
step1	Ramp-up rate	1.5-3°C/sec.	1.5-3°C/sec.
step2	Preheat : 100~150°C (Ta-Tb)	t1-t2 : 60~120 sec.	t1-t2 : 60~180 sec.
step3	Ramp-up rate(T <sub>L</sub> to T <sub>p</sub> )	1.5-3°C/sec.	1.5-3°C/sec.
	Temperature maintained above 183°C(T <sub>L</sub> )	T <sub>L</sub> : 60-150sec.	T <sub>L</sub> : 80-150sec.
step4	Peak temperature(T <sub>p</sub> )	230 +5/-10 °C	260 +0/-5 °C
	Time within 5°C of actual peak temperature	30±10 sec.	30±10 sec.
step5	Ramp-down rate	6°C/sec.Max	6°C/sec.Max
Note1	Subject the samples to 3 cycles of the above defined reflow conditions		Subject the samples to 3 cycles of the above defined reflow conditions
Note2	Time 25°C to peak temperature : 6 minutes max.		Time 25°C to peak temperature : 8 minutes max.
Note3			The time between reflows shall be 5 minutes minimum and 60minutes maximum

**SnPb Eutectic Process - "Package Peak Reflow Temperature"**

**Form-2 (Reference JEDEC J-STD-020C Table 4-1)**

产品厚度	产品体积 < 350mm <sup>3</sup>	产品体积 ≥ 350mm <sup>3</sup>
< 2.5mm	240 +0/-5 °C	225 +0/-5 °C
≥ 2.5mm	225 +0/-5 °C	225 +0/-5 °C

**Pb-free Process - "Package Peak Reflow Temperature"**

**Form-3 (Reference JEDEC J-STD-020C Table 4-2)**

产品厚度	产品体积 < 350mm <sup>3</sup>	产品体积 350mm <sup>3</sup> - 2000mm <sup>3</sup>	产品体积 > 2000mm <sup>3</sup>
< 1.6mm	260 +0/-5 °C	260 +0/-5 °C	260 +0/-5 °C
1.6mm - 2.5mm	260 +0/-5 °C	250 +0/-5 °C	245 +0/-5 °C
> 2.5mm	250 +0/-5 °C	245 +0/-5 °C	245 +0/-5 °C



**6. Reliability:**

Reliability																								
No.	Test Item	Refer To Standard	Test Condition																					
1	Resistance To Soldering Heat-- Convection Reflow	IPC/JEDEC J-STD-020D	1).Peak Temperature: Refer to Specification According to Package Body Thickness And Volume 2).Preheat Temperature and Soak Time: 150~200℃,60~120 Seconds 3).Average Ramp-up Rate: 3℃/Second Max 4).Above 217℃: 60~150 Seconds 5).Peak Temperature-5℃: Over 30 S																					
2	Thermal Shock	IEC68-2-14 Method A	1.Low Temperature:-40℃ 2.High Temperature:125 3.Dwell Time:30 Minutes 4.Transition Time: Less Than 5Minutes 5.Number of Cycles: 10																					
3	High Temperature	IEC68-2-2 Method A	125℃ ,96Hours																					
4	Low Temperature	IEC68-2-1 Method A	-40℃ ,96Hours																					
5	Temperature Humidity Cycle	IEC68-2-38	<table border="1"> <thead> <tr> <th>Temp</th> <th>Humidity</th> <th>soak time</th> </tr> </thead> <tbody> <tr> <td>25~65℃</td> <td>93+/-3%RH</td> <td>1.5 hr</td> </tr> <tr> <td>65℃</td> <td>93+/-3%RH</td> <td>4 hr</td> </tr> <tr> <td>65~25℃</td> <td>80~96%RH</td> <td>2.5 hr</td> </tr> <tr> <td>25~65℃</td> <td>93+/-3%RH</td> <td>1.5hr</td> </tr> <tr> <td>65℃</td> <td>93+/-3%RH</td> <td>4hr</td> </tr> <tr> <td>65~25℃</td> <td>80~96%RH</td> <td>2</td> </tr> </tbody> </table>	Temp	Humidity	soak time	25~65℃	93+/-3%RH	1.5 hr	65℃	93+/-3%RH	4 hr	65~25℃	80~96%RH	2.5 hr	25~65℃	93+/-3%RH	1.5hr	65℃	93+/-3%RH	4hr	65~25℃	80~96%RH	2
Temp	Humidity	soak time																						
25~65℃	93+/-3%RH	1.5 hr																						
65℃	93+/-3%RH	4 hr																						
65~25℃	80~96%RH	2.5 hr																						
25~65℃	93+/-3%RH	1.5hr																						
65℃	93+/-3%RH	4hr																						
65~25℃	80~96%RH	2																						
6	Vibration	IEC68-2-6	1.Sine Wave 2.Amplitude:0.75mm 3.Frequence:5~500~5Hz 4.Direction: X,Y,Z 5.Number of Sweep Cycles Per Direction:10 6.Duration: 2 Hours Each Direction																					
7	Mechanical Shock	MIL-STD-202	1).Half -Sine Wave 2).Peak Acceleration:50G 3).Duration:11mS 4).Direction: X,Y,Z,-X,-Y,-Z 5).Number of Shock Per Direction:3																					
8	Free Drop	ISO4180	1) Height: Refer to Specification According to Production weight 2).1Corner,3Edges,6Faces .Total Are 10 Times																					
9	Solderability	JESD22-B102D	1).Precondition:150±5℃,16±0.5Hours 2).Flux Type:ROL1 3).Immersion Flux Time: 5~10 Seconds 4).Solder Temperature:245±5℃ 5).Solder Immersion Time:5±0.5 Seconds 6).Solder Immersion/Emersion Speed:25.4±6.4mm/Second																					
10	Accelerated Moisture Resistance--- Unbiased Autoclave	JESD22-A102-C	1.Temperature:121℃ 2. Humidity: 100% 3. Vapor Pressure: 29.7 Psia or 205KPa 4.Duration:96 hours																					





# 深圳市格莱尔电子有限公司

Shenzhen Glorious Electronic Co., Ltd.

## 7.主要材料清单

### Material List:

No.	Item	Material	Rating	Supplier of material	UL
1	Transformer Core磁芯	Mn-Zn锰锌 Ni-Zn镍锌	/	YST(研鑫)	NA
2	Wire铜线	QPN/180聚胺脂	180°C	SUNTEK (松田)	E234867
3	Case膠殼	phenolic moulding powder (電木粉)	94V-0	fengqiang(丰强)	E150608
4	Varnish 绝缘油	绝缘油1032	180°C	KIaweiai (格桑)	E213437
5	Solder 焊料	SnCu锡铜	/	YIK SHING TAT (亿诚达)	NA
6	Flux 助焊剂	Water solubility 水溶性松香	/	Tongfang (同方)	NA