

## GW4011

ANSI Type: GW4011 FR-4 UV Blocking

### 产品特点

- ◆  $T_g \geq 135^\circ\text{C}$
- ◆ UV blocking、AOI 兼容、良好焊接稳定性
- ◆ 优良的尺寸稳定性和冲孔性能、耐翘曲性能
- ◆ 优良的机械性能、电性能和化学性能
- ◆ 符合 IPC-4101A 标准
- ◆ 双层和多层板 PCB，用于电脑、器械、空间、通讯、军事、VCR、汽车等

### FEATURES

- ◆  $T_g \geq 135^\circ\text{C}$
- ◆ UV blocking and AOI compatibility, good soldering reliability
- ◆ Good dimensional stability, good punching and low warp property
- ◆ Excellent mechanical, electrical and chemical properties
- ◆ Conform to IPC-4101A standard
- ◆ Double and multi-layers PCB used in computer, instrument, space, communication, military, VCR, automobile etc.

### 基本性能 GENERAL PROPERTIES

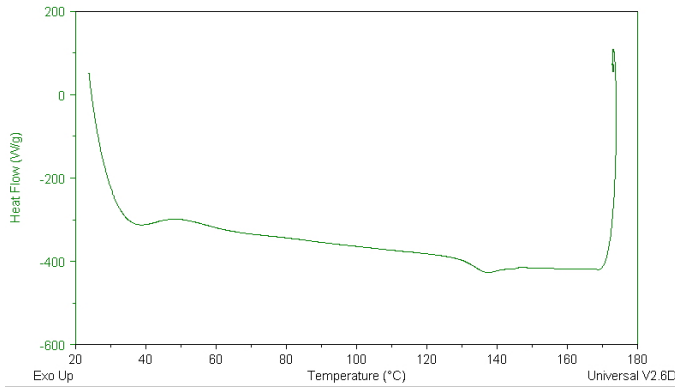
Characteristic Item	Treatment Condition	Unit	SPEC	Typical Value	Test Method
Thermal stress (unetched)	288°C 浮焊	S	20 秒后不起泡，不分层	150	2.4.13.1
Thermal stress (etched)	288°C 浮焊	S	10 秒后不起泡，不分层	120	2.4.13.1
Pressure Vessel	260°C 插焊	—	5 级×5	5 级×5	2.6.16
Tg (DSC)	E-2/105	°C	$\geq 135^\circ\text{C}$	137	2.4.25
Z-CTE (Before Tg/After Tg)	E-2/105	$\mu\text{m}/\text{m}^\circ\text{C}$	$\leq 60$ $\leq 300$	53/233	2.4.24
Moisture Absorption	E-1/105+des+D-24/23	%	$\leq 0.80$	0.07	2.6.2.1
Flexural strength	length direction	N/mm	415	512	2.4.4
	Cross direction		345	405	
Flammability	UL-94	—	V-0	V-0	UL94
Surface Receptivity	C-96/35/90	$\text{M}\Omega$	$\geq 104$	$1.41 \times 10^8$	2.5.17.1
Volume Receptivity	C-96/35/90	$\text{M}\Omega$ -CM	$\geq 106$	$8.18 \times 10^8$	2.5.17.1
Dielectric Breakdown	D-48/50+D-0.5/23	KV	$\geq 40$	49	2.5.6
Electric Strength	D-48/50+D-0.5/23	Kv/m	$\geq 3 \times 104$	$5.07 \times 10^4$	2.5.6.2
Arc Resistance	D-48/50+D-0.5/23	S	$\geq 60$	126	2.5.1
Dielectric Constant (1MHz)	C-40/23/50	-	$\leq 5.4$	4.3	2.5.5.9
Loss Tangent (1MHz)	C-40/23/50	-	$\leq 0.035$	0.017	2.5.5.9
(Peel Strength) 1OZ	288°C 浮焊 10S	Kg/m	107	185	2.4.8

Sample Thickness: 0.27mm 、 1.6mm

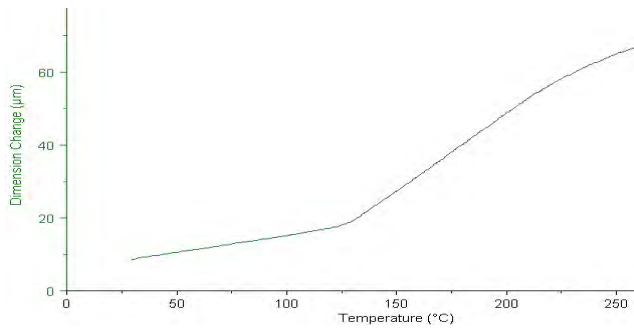
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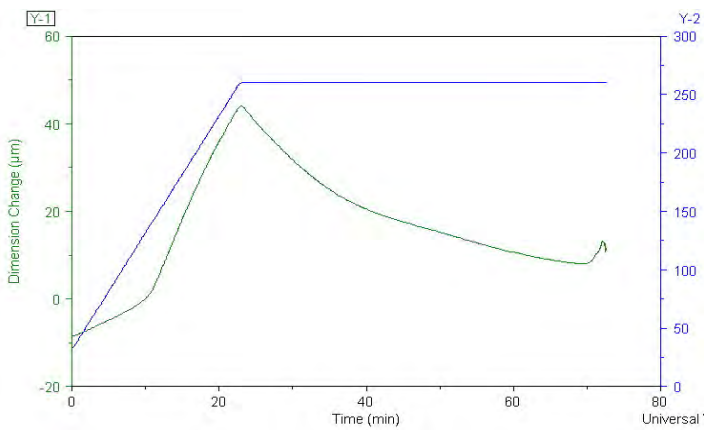
## T<sub>g</sub> (DSC)



## Z-CTE (TMA)



## TR



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### 规格 Specification

基板厚度(Thickness)		覆铜箔(Copper Foil)		尺寸(size) (L*W)	厚度公差标准 (Thickness Tolerance Standard)
inch	mm	oz	μm	inch	
0.0039~ 0.1181	0.1~ 3.0	0.5	17	37×49 41×49 43×49	IPC4101A CLASS B/L
		1.0	35		
		2.0	70		
		3.0	105		

#### Note:

1. 可根据客户要求提供其它板材尺寸和厚度  
Other sheet size and thickness could be available on request.
2. 我们可提供特殊性能的材料以满足客户需求  
We can supply special performance materials to satisfy the request of the customer.

### 菲林系数补偿表

芯板 \ 材料	FR-4	
	经向	纬向
0.1-0.4MM	3-5	2-3
0.4-0.6MM	2-3	1-2
0.6-0.8MM	1.5-3	1-2
0.8-1.0MM	1-2.5	0.5-1.5
1.0-1.2MM	0.5-1.5	0-1
1.2MM 以上	0.5-1.5	0-1

注：单位：mil/10inch

比表数据为制作首板时参考数据，大批量生产前应根据制程实际情况和板件具体结构、图形等制作首板获取实际涨缩系数。

The data above only for reference, before put into large production, should get the precise data according to the first trial production.



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### ◆ 多层板缩放系数参考（八层板以下）

#### 一、四层板

NO	1	2	3	4	5	6	7	8	9	10	11	12
面板厚度_inch	18	22	28	32	38	42	48	52	58	62	68	72
面板厚度_inch	18	22	28	32	38	42	48	52	58	62	68	72
芯板厚度_mil/0.01inch	0.9	2.2	3.8	5.0	6.2	7.8	9.2	10.8	12.2	13.8	15.2	16.8
芯板厚度_mil/0.01inch	0.9	2.2	3.8	5.0	6.2	7.8	9.2	10.8	12.2	13.8	15.2	16.8
叠层结构	1/2 oz 1000 RC63%	1/2 oz 1000 RC63%	1/2 oz 1000 RC63%	1/2 oz 1000 RC63%	1/2 oz 1000 RC63%	1/2 oz 1000 RC63%	1/2 oz 1000 RC63%	1/2 oz 1000 RC63%	1/2 oz 1000 RC63%	1/2 oz 1000 RC63%	1/2 oz 1000 RC63%	1/2 oz 1000 RC63%
	0.1mm R/W L2/L3	0.15mm R/W L2/L3	0.17mm R/W L2/L3	0.18mm R/W L2/L3	0.2mm R/W L2/L3	0.22mm R/W L2/L3	0.25mm R/W L2/L3	0.28mm R/W L2/L3	0.3mm R/W L2/L3	0.32mm R/W L2/L3	0.35mm R/W L2/L3	0.38mm R/W L2/L3
	0.1mm R/W L2/L3	0.15mm R/W L2/L3	0.17mm R/W L2/L3	0.18mm R/W L2/L3	0.2mm R/W L2/L3	0.22mm R/W L2/L3	0.25mm R/W L2/L3	0.28mm R/W L2/L3	0.3mm R/W L2/L3	0.32mm R/W L2/L3	0.35mm R/W L2/L3	0.38mm R/W L2/L3
	1/2 oz 1000 RC63%	1/2 oz 1000 RC63%	1/2 oz 1000 RC63%	1/2 oz 1000 RC63%	1/2 oz 1000 RC63%	1/2 oz 1000 RC63%	1/2 oz 1000 RC63%	1/2 oz 1000 RC63%	1/2 oz 1000 RC63%	1/2 oz 1000 RC63%	1/2 oz 1000 RC63%	1/2 oz 1000 RC63%

#### 二、六层板

NO	1	2	3	4	5	6	7
面板厚度_inch	18	22	28	32	38	42	48
面板厚度_inch	22	28	32	38	42	48	52
芯板厚度_mil/0.01inch	3.0	3.0	3.0	3.0	3.0	3.0	3.0
芯板厚度_mil/0.01inch	3.0	3.0	3.0	3.0	3.0	3.0	3.0
叠层结构	1/2 oz 1000 RC63%	1/2 oz 1000 RC63%	1/2 oz 1000 RC63%	1/2 oz 1000 RC63%	1/2 oz 1000 RC63%	1/2 oz 1000 RC63%	1/2 oz 1000 RC63%
	0.17mm R/W L2/L3	0.17mm R/W L2/L3	0.17mm R/W L2/L3	0.17mm R/W L2/L3	0.17mm R/W L2/L3	0.17mm R/W L2/L3	0.17mm R/W L2/L3
	0.17mm R/W L2/L3	0.17mm R/W L2/L3	0.17mm R/W L2/L3	0.17mm R/W L2/L3	0.17mm R/W L2/L3	0.17mm R/W L2/L3	0.17mm R/W L2/L3
	1/2 oz 1000 RC63%	1/2 oz 1000 RC63%	1/2 oz 1000 RC63%	1/2 oz 1000 RC63%	1/2 oz 1000 RC63%	1/2 oz 1000 RC63%	1/2 oz 1000 RC63%

#### 三、八层板

NO	1	2	3	4	5	6	7	8	9	10	11
面板厚度_inch	18	22	28	32	38	42	48	52	58	62	68
面板厚度_inch	22	28	32	38	42	48	52	58	62	68	72
芯板厚度_mil/0.01inch	0.9	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2
芯板厚度_mil/0.01inch	0	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2
叠层结构	1/2 oz 1000 RC63%	1/2 oz 1000 RC63%	1/2 oz 1000 RC63%	1/2 oz 1000 RC63%	1/2 oz 1000 RC63%	1/2 oz 1000 RC63%	1/2 oz 1000 RC63%	1/2 oz 1000 RC63%	1/2 oz 1000 RC63%	1/2 oz 1000 RC63%	1/2 oz 1000 RC63%
	0.17mm R/W L2/L3	0.17mm R/W L2/L3	0.17mm R/W L2/L3	0.17mm R/W L2/L3	0.17mm R/W L2/L3	0.17mm R/W L2/L3	0.17mm R/W L2/L3	0.17mm R/W L2/L3	0.17mm R/W L2/L3	0.17mm R/W L2/L3	0.17mm R/W L2/L3
	0.17mm R/W L2/L3	0.17mm R/W L2/L3	0.17mm R/W L2/L3	0.17mm R/W L2/L3	0.17mm R/W L2/L3	0.17mm R/W L2/L3	0.17mm R/W L2/L3	0.17mm R/W L2/L3	0.17mm R/W L2/L3	0.17mm R/W L2/L3	0.17mm R/W L2/L3
	1/2 oz 1000 RC63%	1/2 oz 1000 RC63%	1/2 oz 1000 RC63%	1/2 oz 1000 RC63%	1/2 oz 1000 RC63%	1/2 oz 1000 RC63%	1/2 oz 1000 RC63%	1/2 oz 1000 RC63%	1/2 oz 1000 RC63%	1/2 oz 1000 RC63%	1/2 oz 1000 RC63%

表中的缩放系数为经验值，受 PCB 多层板制造工艺（如烘板条件、层压条件、磨板条件）、基铜厚度、残铜率、图形设计、叠层结构、完成板厚等因素影响，以上数值仅供参考。建议刚开始使用我司板料生产多层板时每个生产编号均先制作首板收集涨缩数据。

## GW4011P

ANSI Type: GW4011 PREPREG

### 半固化片性能表 Performance list for prepreg

Glass style	Resin content (%)	Resin flow (%)	Gel time (s)	Volatile (%)
7630HR50	50 ± 3	30 ± 5	140 ± 20	0.5 ↓
7628HR50	50 ± 3	30 ± 5		
7628HR48	48 ± 3	27 ± 5		
7628R43	43 ± 3	21 ± 5		
7628LR41	41 ± 3	20 ± 5		
1506HR50	50 ± 3	25 ± 5		
1506HR47	47 ± 3	25 ± 5		
1506R43	43 ± 3	20 ± 5		
2116HR55	55 ± 3	33 ± 5		
2116R52	52 ± 3	39 ± 5		
1080HR68	68 ± 3	45 ± 5		
1080R63	63 ± 3	36 ± 5		
106HR70	70 ± 3	45 ± 5		
106R68	68 ± 3	42 ± 5		

#### Note:

- 我们能提供特殊性能的材料以满足客户需求  
we can supply special performance materials to satisfy the request of customer.
- 以上数据仅供参考，因为层压后的 PP 厚度在不同状况下会变化  
Data shown above are nominal values for reference only because the thickness of PP after press will be different on different status.

#### 产品尺寸

- ◆产品宽度: 1255<sup>+10</sup><sub>-0</sub> mm
- ◆产品长度: 1080 及 106 每卷 300 码 (274.2 米), 其它 150 码 (137.1 米)

#### Product size

- ◆ Prepreg width is 1255<sup>+10</sup><sub>-0</sub> mm
- ◆ 1080 and 106 is 300 yard (274.2m) per roll, the others is 150 yard (137.1m) per roll



## GW4011P

ANSI Type: GW4011 PREPREG

### 单张 PP 成形厚度测量数据      Single PP 's thickness

规格	布基重, g/m <sup>2</sup>	RC, %	半固化片成形厚度 (mm), +/-0.005mm						
			全铜面	10Z 铜厚残铜率			H0Z 铜厚残铜率		
				75%	50%	25%	75%	50%	25%
7628M/43	210	43	0.192	0.183	0.175	0.166	0.188	0.183	0.179
7628M/45	210	45	0.201	0.192	0.184	0.175	0.197	0.192	0.188
7628M/50	210	50	0.229	0.220	0.212	0.203	0.225	0.220	0.216
7628L/41	203	41	0.177	0.168	0.160	0.151	0.173	0.168	0.164
7628L/43	203	43	0.185	0.176	0.168	0.159	0.181	0.176	0.172
7628L/45	203	45	0.195	0.186	0.178	0.169	0.191	0.186	0.182
1506/45	165	45	0.158	0.149	0.141	0.132	0.154	0.149	0.145
1506/48	165	48	0.171	0.162	0.154	0.145	0.167	0.162	0.158
2116/52	105	52	0.121	0.112	0.104	0.095	0.117	0.112	0.108
2116/53	105	53	0.124	0.115	0.107	0.098	0.120	0.115	0.111
2116/54	105	54	0.128	0.119	0.111	0.102	0.124	0.119	0.115
2116/55	105	55	0.131	0.122	0.114	0.105	0.127	0.122	0.118
2116/56	105	56	0.135	0.126	0.118	0.109	0.131	0.126	0.122
2313/55	81	55	0.101	0.092	0.084	0.075	0.097	0.092	0.088
2313/57	81	57	0.107	0.098	0.090	0.081	0.103	0.098	0.094
1080/62	48	62	0.074	0.065	0.057	0.048	0.070	0.065	0.061
1080/63	48	63	0.077	0.068	0.060	0.051	0.073	0.068	0.064
1080/68	48	68	0.091	0.082	0.074	0.065	0.087	0.082	0.078

## GW4011P

ANSI Type: GW4011 PREPREG

### 单张 PP 介电常数及介质损耗数据

Dielectric constant & dielectric loss of single PP

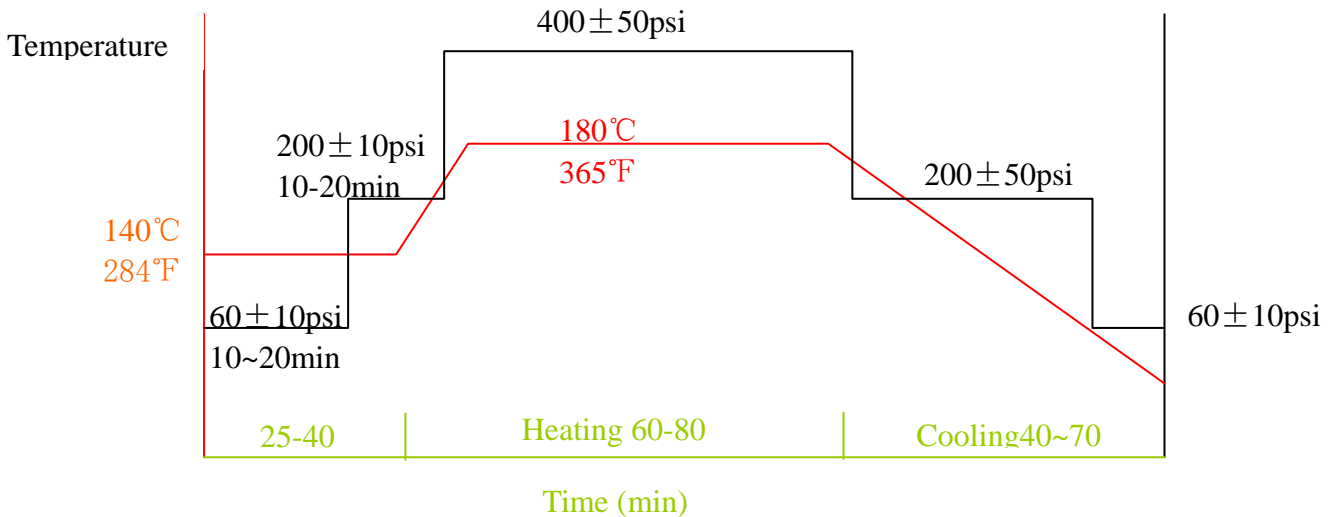
类型: GW4011

规格型号/RC, %	芯板厚度 (不带铜) mm	性能	1GHZ
1080/58	0.065	$\epsilon$	3.8
		$\text{tg } \delta$	0.016
1080/61	0.071	$\epsilon$	3.8
		$\text{tg } \delta$	0.015
1080/63	0.075	$\epsilon$	3.7
		$\text{tg } \delta$	0.016
2116/46	0.103	$\epsilon$	4.2
		$\text{tg } \delta$	0.014
2116/52	0.121	$\epsilon$	4
		$\text{tg } \delta$	0.015
2116/56	0.133	$\epsilon$	4
		$\text{tg } \delta$	0.014
2313/50	0.087	$\epsilon$	4.1
		$\text{tg } \delta$	0.015
2313/55	0.099	$\epsilon$	4
		$\text{tg } \delta$	0.015
2313/57	0.104	$\epsilon$	4
		$\text{tg } \delta$	0.015
1506/42	0.141	$\epsilon$	4.3
		$\text{tg } \delta$	0.015
1506/45	0.152	$\epsilon$	4.2
		$\text{tg } \delta$	0.014
7628/43	0.188	$\epsilon$	4.2
		$\text{tg } \delta$	0.014
7628/45	0.198	$\epsilon$	4.1
		$\text{tg } \delta$	0.014
7628/50	0.222	$\epsilon$	4
		$\text{tg } \delta$	0.014

## GW4011P

ANSI Type: GW4011 PREPREG

### 推荐层压程式 recommended pressing cycle



#### 建议

- ◇ 半固化片如果存放在低温仓库里，必须在使用前存放于室温下并且密封好
- ◇ 1080、2116PP 的升温速率必须控制在 1.5~2.5°C/min。当 7628 的料温在 80~140°C，升温速率必须控制在 1.5°C/min 左右
- ◇ 料温 170°C 以上,保温至少 40 分钟, 确保树脂完全固化
- ◇ 以上所列数据仅供参考，它们随着加压产品的设备和材料结构、质量状况变化
- ◇ 料温在 100-150°C，材料的冷却速率必须保持在 2.5°C/min 以下，以防止产品扭曲

#### Suggestions

- ◇ The prepreg should be kept under room temperature and with sealed pack well before use if it stored in low temperature warehouse
- ◇ The heating rate for 1080 and 2116PP should be controlled in 1.5~2.5°C/min. When temperature of material range 80~140°C, the heating rate should be controlled at about 1.5°C/min for 7628
- ◇ Temperature of material over 170°C must be held for at least 40minutes to ensure resin to fully cure
- ◇ These datum shown above for reference only, they may be changed depending on machine and material structure and the quality status of the pressed product
- ◇ Cooling rate of material should be kept under 2.5°C/min when temperature of material range 100-150°C to avoid product twist

#### 储存条件

- ◆ 在 23±2°C, 50%RH 以下环境中, 储存 3 个月
- ◆ 在低于 5°C 环境中, 储存期为 6 个月

#### Storage Condition

- ◆ Below 23±2°C, 50% RH for 3 months
- ◆ Below 5°C for 6 months

#### 储存性能 Prepreg Storage Stability

