

有关敝公司产品的注意事项

请务必在使用敝公司产品之前阅读。

注意

产品目录中的记载内容

本产品目录中所记载的内容为2021年10月的内容。因产品改良等原因，可能会不经预告而变更其记载内容，或是停止供应本产品目录中所记载的产品。所以，请务必在使用前先确认最新的产品信息。

未按照本产品目录中所记载的内容或交货规格说明书使用敝公司产品的，即便其致使用设备发生损害、不良情况等时，敝公司也不承担任何责任，敬请知悉。

签署交货规格说明书

就本产品目录中所记载产品的产品规格等相关内容，敝公司备有交货规格说明书，详情请向敝公司咨询。在使用敝公司产品前请务必就交货规格说明书之内容确认并批准之。

实装前的事前评估

使用敝公司产品时，请务必事先安装到使用设备之后，在实际使用的环境下进行评估和确认。

安全设计

需将敝公司的产品使用于对安全性和可靠性要求较高的设备、电路上时，请进行充分的安全性评估和可靠性评估。另外，请通过设置保护电路、保护装置的系统，设置冗余电路不会被单一故障影响安全性的系统等失效导向安全（fail-safe）设计，确保充分的安全性。

有关知识产权

本产品目录中所记载的信息是用于说明相关产品的典型操作以及相关应用。此类信息的使用不代表对于敝公司以及第三方的知识产权以及其他权利的使用许可或是不侵权保证。

保证范围

敝公司产品的保证范围仅限于符合交货规格说明书中所记载的产品规格且已经交付的敝公司产品本身，由敝公司产品的故障或不良情况所诱发的损害，敝公司不承担任何责任，敬请知悉。但是，仅限于敝公司的产品作为通用性，标准性用途使用于本产品目录或是交货规格说明书中另行注明的设备，且以书面形式另行签署了交易基本合同书，品质保证协定书等时，敝公司将根据该合同等的条件提供保证。

正规销售渠道

本产品目录中所记载的内容适用于从敝公司营业所、销售子公司、销售代理店（即“正规销售渠道”）购买的敝公司产品，并不适用于从其他渠道购买的敝公司产品，敬请知悉。

出口时的注意事项

本产品目录中所记载的部分产品在出口时须事先确认《外汇和对外贸易法》以及美国在出口管理方面的相关法规，并办理相关手续。如有不明之处，请向敝公司咨询。

▶ 由于篇幅有限，本产品目录中只记载了有代表性的产品规格，若考虑使用敝公司产品时，请确认交货规格说明书中的详细规格。另外，有关各产品的详细信息（特性图、可靠性信息、使用时的注意事项等），请参阅敝公司网站（<http://www.ty-top.com/>）。

■ 用途的限定

1. 可以使用的设备

本产品目录中所记载的产品预设为使用于一般民用电子设备〔音像设备、办公自动化设备、家电产品、办公设备、信息通讯设备（手机、电脑等）〕以及面向本产品目录或是交货规格说明书中另行注明的设备或是敝公司另行承诺的设备的通用性，标准性用途。另外，面向下述设备的应用，敝公司也备有预设的产品系列，请参考本产品目录或是交货规格说明书的内容，使用相对应的产品。

用途	产品系列		品质等级 ^(注释3)
	对象设备 ^(注释1)	规格号 (型号标记 ^(注释2))	
车载	汽车用电子设备（控制系 / 安全系）	A	1
	汽车用电子设备（车身系 / 情报系）	C	2
工业	通信基础设备 · 工业设备	B	2
医疗	医疗设备（国际（GHTF）第三类）	M	2
	医疗设备（国际（GHTF）第一类、第二类）	L	3
民用	一般电子设备	S	3

注释1：基于敝公司所认知的该类设备对于电子元器件所需的一般要求规格，对于该产品系列进行的应用推荐。在讨论将各个产品系列使用在对象设备以外的设备上时，请务必事先向敝公司咨询。

注释2：在产品型号中左起第2位标注有上表中所记载的规格号。对于相关的详细内容，请参照有关各产品型号标示法的说明资料。

注释3：在各产品系列中，都设定了从上至下1至3的“品质等级”。另外，在未得到敝公司的事前书面承诺之前，请勿将敝公司的产品使用于相对于该产品的品质等级被设定为上位品质等级的设备。

2. 需要另行确认的设备

若考虑将本产品目录中所记载的产品使用于当产品发生故障、品质不良，或是由此引起的运转失常而可能会危及生命、身体或是财产，以及有可能给社会造成深刻影响的以下设备（不包括本产品目录或是交货规格说明书中另行注明可以使用设备）等时，请务必事先向敝公司咨询。

- (1) 运输用设备（汽车驱动控制设备、火车控制设备、船舶控制设备等）
- (2) 交通信号设备
- (3) 防灾 / 保安设备
- (4) 医疗设备（国际（GHTF）第三类）
- (5) 高公共性信息通讯设备 / 信息处理设备（电话交换机、电话 / 无线 / 广播电视基站等）
- (6) 其他与上述设备有同等品质与可靠性要求的设备

3. 禁止使用的设备

请勿将敝公司产品使用于对安全性和可靠性有着极高要求的以下设备。

- (1) 航天设备（人工卫星、火箭等）
- (2) 航空设备^(注释1)
- (3) 医疗设备（国际（GHTF）第四类）、植体（体内植入型）医疗设备^(注释2)
- (4) 发电控制设备（面向核能 / 水力 / 火力发电厂等的设备）
- (5) 海底设备（海底中继设备、海中的作业设备等）
- (6) 军事设备
- (7) 其他与上述设备有同等品质与可靠性要求的设备

注释1：仅限于对航空设备的安全运行不产生直接干扰的设备〔机内娱乐设备、机内照明设备、电动座椅、餐饮设备等〕，在满足敝公司另行指定的相关条件时，亦可将敝公司产品用于以上用途。在贵公司考虑将敝公司的产品用于以上用途时，请务必事先向敝公司咨询相关的信息。

注释2：包括注入人体内的部分和与此相连接的体外部分。

4. 责任的限制

未经敝公司的事先书面同意，把本产品目录中所记载的产品使用于非敝公司预设用途的设备、前述需要向敝公司咨询的设备或敝公司禁止使用的设备，从而给客户或第三方造成损害的，敝公司不承担任何责任，敬请知悉。

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一般民生用 陶瓷 RF 元件 滤波器 / 分频器 / 三工器 / 耦合器

回流焊

■ 型号标示法

T	S	D	1	M	1	5	H	8	2	9	M	L	M	0	D	Z	T	
①	②	③	④	⑤	⑥	⑦	⑧	⑨										

① 系列

代码 (1) (2) (3) (4)	
TSB1	一般民生用 陶瓷 RF 元件 带通滤波器
TSC1	一般民生用 陶瓷 RF 元件 耦合器
TSC4	一般民生用 陶瓷 RF 元件 耦合器、双路耦合器
TSD1	一般民生用 陶瓷 RF 元件 分频器
TSH1	一般民生用 陶瓷 RF 元件 高通滤波器
TSL1	一般民生用 陶瓷 RF 元件 低通滤波器
TST1	一般民生用 陶瓷 RF 元件 三工器

(1) 产品群

代码	
T	陶瓷 RF 元件

(2) 范畴

代码	推荐设备	品质等级
S	一般民生用电子设备	3

(3) 类型

代码	
B	带通滤波器
C	耦合器
D	分频器
H	高通滤波器
L	低通滤波器
T	三工器

(4) 特效 / 特性

代码	
1	标准
4	双路耦合器

② 系列名称

代码	系列名称
N	标准品
M	小型高性能品

⑤ 频率

代码 (例)	频率 [MHz]
2G45	2400~2500
829M	698~960

③ 尺寸 (L×W)

代码	尺寸 (L×W) [mm]
22	2.5×2.0
21	2.0×1.25
18	1.6×0.8
15	1.0×0.5

⑥ 电极型

代码	电极型
N	外接电源
L	LGA 外接电源

④ 产品厚度

代码	产品厚度 [mm]
A	1.0
C	0.7
D	0.65
F	0.5
G	0.45
H	0.4

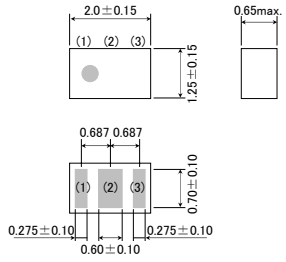
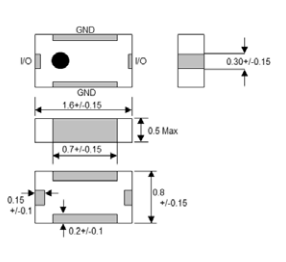
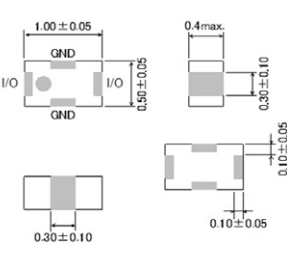
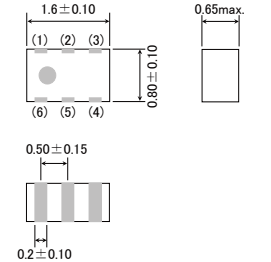
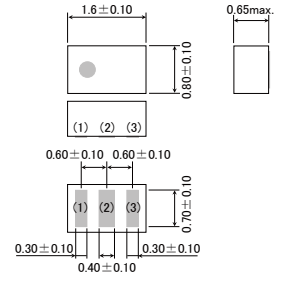
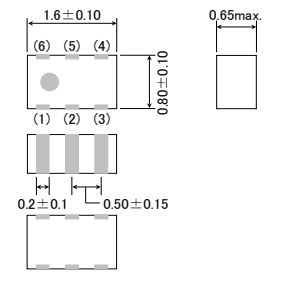
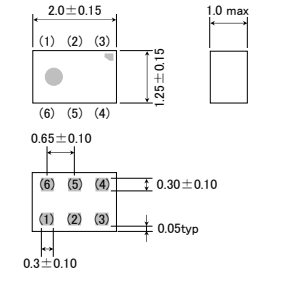
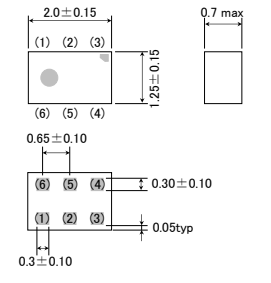
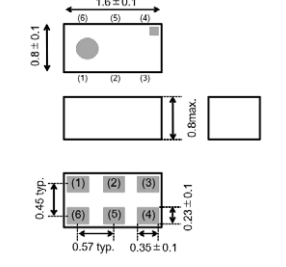
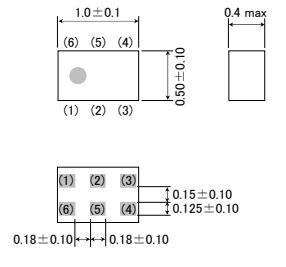
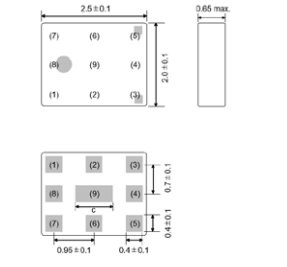
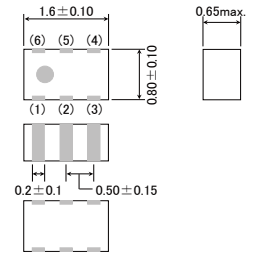
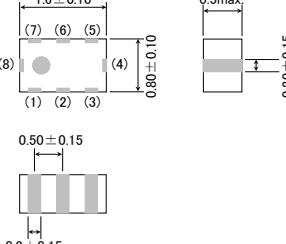
⑦ 管理记号

⑧ 包装

代码	包装
T	卷盘带装

⑨ 管理记号

■ 外型尺寸 / 标准数量

TSB1N21D LGA 3Pins type	TSB1N18F2G45NS001T	TSB1N15H / TSL1N15H Side 4Pins type	TSL1N18D628MNSOM4T
 <p>2.0±0.15 (1) (2) (3) 0.65max. 1.25±0.15 0.687±0.010 0.687±0.010 0.70±0.10 0.275±0.10 0.60±0.10</p>	 <p>GND I/O I/O 1.6±0.15 0.7±0.15 0.5 Max 0.30±0.15 0.15±0.1 0.8±0.15 0.2±0.1</p>	 <p>1.00±0.05 GND I/O I/O 0.4max. 0.50±0.05 0.30±0.10 0.10±0.05 0.10±0.05 0.30±0.10</p>	 <p>1.6±0.10 (1) (2) (3) 0.65max. 0.80±0.10 0.50±0.15 0.2±0.10</p>
TSB1N18B/TSL1N18D/TSH1N18D LGA 3Pins type	TSD1N18D2G45NS030T	TSD1N21A LGA 6Pins type	TSD1N21C LGA 6Pins type
 <p>1.6±0.10 (1) (2) (3) 0.65max. 0.80±0.10 0.60±0.10 0.60±0.10 0.70±0.10 0.30±0.10 0.30±0.10 0.40±0.10</p>	 <p>1.6±0.10 (6) (5) (4) 0.65max. (1) (2) (3) 0.80±0.10 0.2±0.1 0.50±0.15</p>	 <p>2.0±0.15 (1) (2) (3) 1.0 max. (6) (5) (4) 1.25±0.15 0.65±0.10 0.30±0.10 0.05typ 0.3±0.10</p>	 <p>2.0±0.15 (1) (2) (3) 0.7 max. (6) (5) (4) 1.25±0.15 0.65±0.10 0.30±0.10 0.05typ 0.3±0.10</p>
TSD1N18B LGA 6Pins type	TSD1M15H829MLMODZT	TST1N22D LGA 9Pins Type	TSC1N18D1G68NCOAAT
 <p>1.6±0.1 (6) (5) (4) 0.8±0.1 (1) (2) (3) 0.8max. 0.46 typ. 0.57 typ. 0.35±0.1 0.23±0.1</p>	 <p>1.0±0.1 (6) (5) (4) 0.4 max. (1) (2) (3) 0.50±0.10 0.15±0.10 0.125±0.10 0.18±0.10 0.18±0.10</p>	 <p>2.5±0.1 (7) (6) (5) (4) 0.65 max. (1) (2) (3) 2.0±0.1 0.4±0.1 0.7±0.1 0.95±0.1 0.4±0.1</p>	 <p>1.6±0.10 (6) (5) (4) 0.65max. (1) (2) (3) 0.80±0.10 0.2±0.1 0.50±0.15</p>
TSC4N18F1G69NS0B1T			
 <p>1.6±0.10 (7) (6) (5) 0.5max. (1) (2) (3) 0.80±0.10 0.20±0.15 0.50±0.15 0.2±0.15</p>			

单位: mm

一般民生用

射频元器件

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	TSB1N21D LGA 3Pins type	TSL1N18D628MNSOM4T	TSL1N18D / TSH1N18D LGA 3Pins type	TSD1N18D2G45NS030T	TSD1N21A829MLS0G2T TSD1N21A829MLV0H9T TSD1N21A1G95LV0ENT TSD1N21C1G70LVOCLT	TSD1N21A829MLV0JJT TSD1N21C1G70LVOHUT
(1)	RF IN/OUT	I/O Port	RF IN/OUT	GND	Low Band	High Band
(2)	GND	GND	GND	Common	GND	GND
(3)	RF IN/OUT	I/O Port	RF IN/OUT	GND	High Band	Low Band
(4)	-	GND	-	Low Band	GND	GND
(5)	-	GND	-	GND	Common Port	Common Port
(6)	-	GND	-	High Band	GND	GND
(7)	-	-	-	-	-	-
(8)	-	-	-	-	-	-

	TSD1N18B829MLV0D4T TSD1N18B1G79LS0FHT	TSD1N18B829MLV0CZT	TSD1M15H829MLMODZT	TST1N22D829MLV0H2T	TSC1N18D1G68NCOAAT	TSC4N18F1G69NS0B1T
(1)	GND	GND	High Band	High Band	CPL	RF1 IN/OUT
(2)	Common Port	Common Port	Common Port	GND	GND	CPL2 RF1
(3)	GND	GND	Low Band	Mid Band	Isolation	CPL2 RF2
(4)	High Band	Low Band	Low Band	GND	RF OUT	GND
(5)	GND	GND	GND	Low Band	GND	RF2 OUT/IN
(6)	Low Band	High Band	High Band	GND	RF IN	CPL1 RF2
(7)	-	-	-	Common Port	-	CPL1 RF1
(8)	-	-	-	GND	-	GND
(9)	-	-	-	GND	-	-

Type	标准数量 [pcs]
22	3000
21	3000~6000
18	4000~8000
15	10000

■ 型号一览

● 带通滤波器

用途	外型尺寸 [mm]	新型号	旧型号(参考用)	注释
2.4GHz W-LAN / Bluetooth®	1.6×0.8×0.5max.	TSB1N18F2G45NS001T	FI 168B245001-T	Side 4Pins
	1.0×0.5×0.4max.	TSB1N15H2G45NS024T	FI 105B245024-T	Side 4Pins
5GHz W-LAN	1.6×0.8×0.65max.	TSB1N18D5G53LVOHBT	FI 168B5538HB-T	LGA 3Pins
	2.0×1.25×0.65max.	TSB1N21D3G75LV0EQT	FI 212B3750EQ-T	LGA 3Pins
5G NR Sub 6	2.0×1.25×0.65max.	TSB1N21D4G70LV0DQT	FI 212B4700DQ-T	LGA 3Pins
	2.0×1.25×0.65max.	TSB1N21D4G15LV0HWT	FI 212B4150HW-T	LGA 3Pins

● 低通滤波器

用途	外型尺寸 [mm]	新型号	旧型号(参考用)	注释
Cellular	1.0×0.5×0.4max.	TSL1N15H1G86NS022T	FI 105L186822-T	Side 4Pins
	1.0×0.5×0.4max.	TSL1N15H829MLS0GZT	FI 105L0829GZ-T	LGA 6Pins
	1.0×0.5×0.4max.	TSL1N15H1G72LV0FLT	FI 105L1726FL-T	LGA 6Pins
	1.6×0.8×0.65max.	TSL1N18D628MNSOM4T	FI 168L0628M4-T	Side 6Pins
	1.6×0.8×0.65max.	TSL1N18D829MLV0FDT	FI 168L0829FD-T	LGA 3Pins
	1.6×0.8×0.65max.	TSL1N18D1G86LCOEDT	FI 168L1868ED-T	LGA 3Pins
	1.6×0.8×0.65max.	TSL1N18D2G20LS0G9T	FI 168L2200G9-T	LGA 3Pins
	1.6×0.8×0.65max.	TSL1N18D1G68LS0G6T	FI 168L1681G6-T	LGA 3Pins
	1.6×0.8×0.65max.	TSL1N18D1G68LV0DTT	FI 168L1681DT-T	LGA 3Pins

● 高通滤波器

用途	外型尺寸 [mm]	新型号	旧型号(参考用)	注释
Cellular	1.6×0.8×0.65max.	TSH1N18D2G49LS0FBT	FI 168H2495FB-T	LGA 3Pins

● 分频器

用途	外型尺寸 [mm]	新型号	旧型号(参考用)	注释
W-LAN	1.6×0.8×0.65max.	TSD1N18D2G45NS030T	FI 168P245030-T	Side 6Pins
	2.0×1.25×1.0max.	TSD1N21A829MLS0G2T	FI 212P0829G2-T	LGA 6Pin
	2.0×1.25×1.0max.	TSD1N21A829MLV0H9T	FI 212P0829H9-T	LGA 6Pin
	2.0×1.25×1.0max.	TSD1N21A829MLV0JJT	FI 212P0829JJ-T	LGA 6Pin
Cellular 4G, 5G NR	1.6×0.8×0.8max.	TSD1N18B829MLV0D4T	FI 168P0829D4-T	LGA 6Pin
	1.6×0.8×0.8max.	TSD1N18B829MLV0CZT	FI 168P0829CZ-T	LGA 6Pin
	1.0×0.5×0.4max.	TSD1M15H829MLMODZT	FQ 105P0829DZ-T	LGA 6Pin
	1.6×0.8×0.8max.	TSD1N18B1G79LS0FHT	FI 168P1795FH-T	LGA 6Pin
	2.0×1.25×1.0max.	TSD1N21A1G95LV0ENT	FI 212P1955EN-T	LGA 6Pin
	2.0×1.25×0.7max.	TSD1N21C1G70LV0CLT	FI 212P1700CL-T	LGA 6Pin
	2.0×1.25×0.7max.	TSD1N21C1G70LV0HUT	FI 212P1700HU-T	LGA 6Pin

● 三工器

用途	外型尺寸 [mm]	新型号	旧型号(参考用)	注释
Cellular 4G, 5G NR	2.5×2.0×0.65max.	TST1N22D829MLV0H2T	FI 252M0829H2-T	LGA 9Pin

● 耦合器

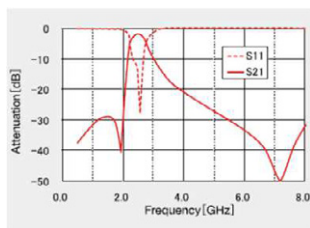
用途	外型尺寸 [mm]	新型号	旧型号(参考用)	注释
Cellular	1.6×0.8×0.5max.	TSC4N18F1G69NS0B1T	FI 168W1697B1-T	Side 8Pins
	1.6×0.8×0.65max.	TSC1N18D1G68NCOAAT	FI 168K1687AA-T	Side 6Pins

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ELECTRICAL CHARACTERISTICS / TYPICAL CHARACTERISTICS

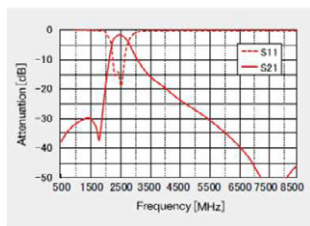
TSB1N18F2G45NS001T

Pass band frequency	2400 - 2500 MHz
Insertion loss at pass band	2.2 dB max. (+25°C)
	2.5 dB max. (-40~+85°C)
Ripple at pass band	1.0 dB max.
V. S. W. R. at pass band	2.1 max.
Attenuation	25 dB min. (800 - 960 MHz)
	25 dB min. (1710 - 1910 MHz)
	20 dB min. (4800 - 5000 MHz)
	20 dB min. (7200 - 7500 MHz)
Impedance	50 Ω



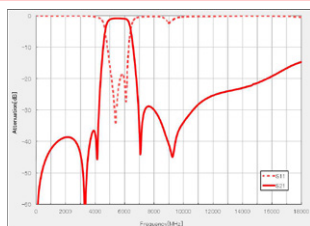
TSB1N15H2G45NS024T

Pass band frequency	2400 - 2500 MHz
Insertion loss at pass band	3.0 dB max. (+25°C)
	3.3 dB max. (-40~+85°C)
Ripple at pass band	1.0 dB max.
V. S. W. R. at pass band	2.2 max.
Attenuation	25 dB min. (800 - 960 MHz)
	22 dB min. (1710 - 1910 MHz)
	20 dB min. (4800 - 5000 MHz)
	20 dB min. (7200 - 7500 MHz)



TSB1N18D5G53LV0HBT

Pass band frequency	5150 - 5925 MHz
Insertion loss at pass band	1.4 dB max. (+25°C)
	1.5 dB max. (-40~+85°C)
V. S. W. R. at pass band	2.0 max.
Attenuation	35 dB min. (700 - 2690 MHz)
	28 dB min. (3300 - 4200 MHz)
	20 dB min. (7200 - 7800 MHz)
Impedance	50 Ω



TSB1N21D3G75LV0EQT

Pass band frequency	3300 - 4200 MHz
Impedance	50 Ω

TSB1N21D4G70LV0DQT

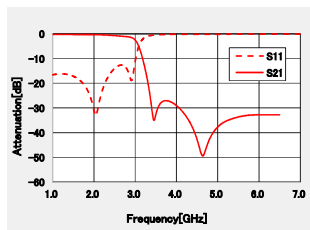
Pass band frequency	4400 - 5000 MHz
Impedance	50 Ω

TSB1N21D4G15LV0HWT

Pass band frequency	3300 - 5000 MHz
Impedance	50 Ω

TSL1N15H1G86NS022T

Pass band frequency	1710 - 2025 MHz
Insertion loss at 1710 - 2025 MHz	0.65 dB max. (-40~+85°C)
V. S. W. R. at 1710 - 2025 MHz	1.7 max.
Attenuation	22 dB min. (3420 - 3820 MHz)
	25 dB min. (3820 - 6075 MHz)
Impedance	50 Ω

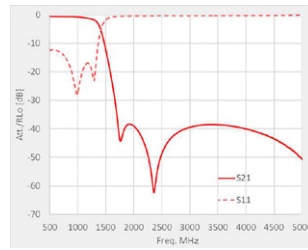


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ELECTRICAL CHARACTERISTICS / TYPICAL CHARACTERISTICS

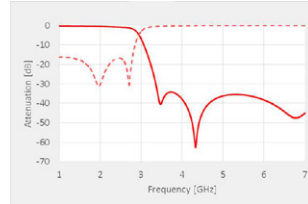
TSL1N15H829MLS0GZT

Pass band frequency	617 - 960 MHz
Insertion loss at 617 - 960 MHz	0.9 dB max. (+25°C) 0.95 dB max. (-40~+85°C)
V.S.W.R. at 617 - 960 MHz	2.0 max.
Attenuation	35 dB min. (1805 - 1830 MHz) 35 dB min. (2110 - 2170 MHz) 30 dB min. (1710 - 2700 MHz)
Impedance	50 Ω



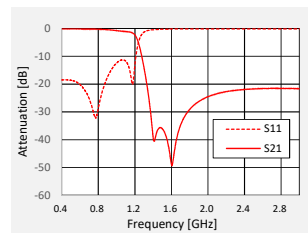
TSL1N15H1G72LV0FLT

Pass band frequency	1426 - 2200 MHz
Insertion loss at 1426 - 2200 MHz	0.65 dB max. (+25°C) 0.75 dB max. (-40~+85°C)
V.S.W.R. at 1426 - 2200 MHz	2.0 max.
Attenuation	15 dB min. (3300 - 4200 MHz) 25 dB min. (3400 - 3800 MHz) 25 dB min. (4200 - 5000 MHz) 25 dB min. (5150 - 5850 MHz)
Impedance	50 Ω



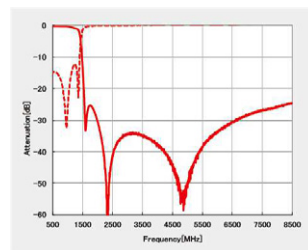
TSL1N18D628MNS0M4T

Pass band frequency	470 - 787 MHz
Insertion loss at pass band	0.5 dB max. (+25°C) 0.6 dB max. (-40~+85°C)
V.S.W.R. at pass band	2.0 max.
Attenuation	26 dB min. (1429 - 1501 MHz) 30 dB min. (1565 - 1607 MHz) 35 dB min. (1570 - 1580 MHz) 18 dB min. (1920 - 1980 MHz)
Impedance	50 Ω



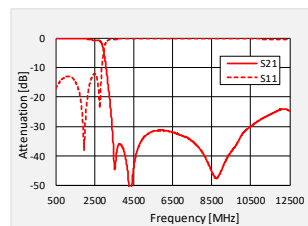
TSL1N18D829MLV0FDT

Pass band frequency	698 - 960 MHz
Insertion loss at 698 - 960 MHz	0.4 dB max. (+25°C) 0.45 dB max. (-40~+85°C)
V.S.W.R. at 698 - 960 MHz	2.0 max.
Attenuation	15 dB min. (1554 - 1610 MHz) 21 dB min. (1760 - 1830 MHz) 30 dB min. (2400 - 5950 MHz)
Impedance	50 Ω



TSL1N18D1G86LC0EDT

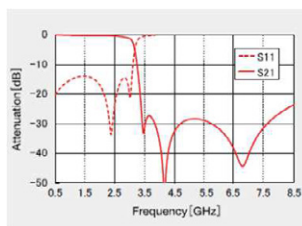
Pass band frequency	1710 - 2025 MHz
Insertion loss at 1710 - 2025 MHz	0.4 dB max. (+25°C) 0.5 dB max. (-40~+85°C)
V.S.W.R. at 1710 - 2025 MHz	2.0 max.
Attenuation	27 dB min. (3420 - 3840 MHz) 28 dB min. (4020 - 4050 MHz) 20 dB min. (4900 - 5950 MHz)
Impedance	50 Ω



ELECTRICAL CHARACTERISTICS / TYPICAL CHARACTERISTICS

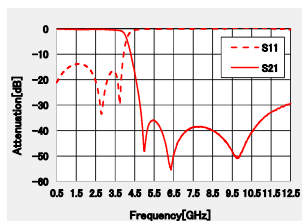
TSL1N18D2G20LS0G9T

Pass band frequency	1700 - 2170 MHz
	2170 - 2500 MHz
	2500 - 2700 MHz
Insertion loss at 1700 - 2170 MHz	0.5 dB max. (+25°C)
	0.55 dB max. (-40~+90°C)
Insertion loss at 2170 - 2500 MHz	0.65 dB max. (+25°C)
	0.75 dB max. (-40~+90°C)
Insertion loss at 2500 - 2700 MHz	0.9 dB max. (+25°C)
	1.0 dB max. (-40~+90°C)
Return loss. at 1700 - 2700 MHz	10 dB min.
Attenuation	25 dB min. (3400 MHz)
	22 dB min. (3400 - 5400 MHz)
	20 dB min. (5400 - 8100 MHz)
Impedance	50 Ω



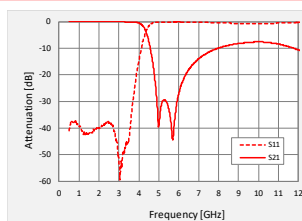
TSL1N18D1G68LS0G6T

Pass band frequency	617 - 2690 MHz
	0.5 dB max. (-40~+90°C)
Return loss. at 617 - 2690 MHz	10 dB min.
Attenuation	35 dB min. (4950 - 6000 MHz)
	35 dB min. (6000 - 7500 MHz)
	35 dB min. (7500 - 8100 MHz)
	35 dB min. (8100 - 10500 MHz)
	27 dB min. (10500 - 12500 MHz)
Impedance	50 Ω



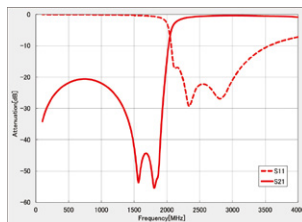
TSL1N18D1G68LV0DTT

Pass band frequency	617 - 2690 MHz
	0.2 dB max. (-40~+85°C)
Return loss. at 617 - 2690 MHz	10 dB min.
Attenuation	25 dB min. (5150 - 5950 MHz)
Impedance	50 Ω



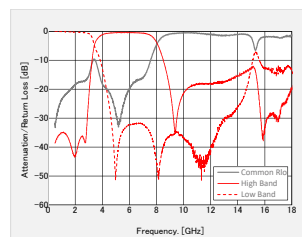
TSH1N18D2G49LS0FBT

Pass band frequency	2300 - 2690 MHz
Insertion loss at 2300 - 2690 MHz	1.5 dB max. (-40~+85°C)
V. S. W. R. at 2300 - 2690 MHz	2.0 max.
Attenuation	35 dB min. (1710 - 1880 MHz)
Impedance	50 Ω



TSD1N18D2G45NS030T

Low band	
Pass band frequency 1	1558 - 1610 MHz
Pass band frequency 2	2400 - 2500 MHz
Insertion loss at Pass band 1	0.50 dB max. (-40~+85°C)
Insertion loss at Pass band 2	0.60 dB max. (-40~+85°C)
V. S. W. R. at Pass band	2.0 dB max.
Attenuation	24 dB min. (4800 - 4900 MHz)
	26 dB min. (4900 - 6000 MHz)
Impedance	50 Ω



High band	
Pass band frequency	4900 - 5950 MHz
Insertion loss at Pass band	0.80 dB max. (-40~+85°C)
V. S. W. R. at Pass band	2.0 dB max.
Attenuation	32 dB min. (30 - 2700 MHz)
Impedance	50 Ω

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ELECTRICAL CHARACTERISTICS / TYPICAL CHARACTERISTICS

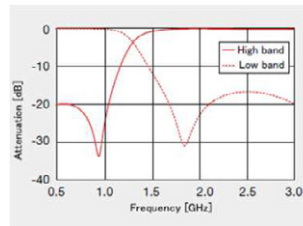
TSD1N21A829LNS0G2T

Low band

Pass band frequency	698 - 960 MHz
Insertion loss at 698 - 960 MHz	0.27 dB max. (+25°C) 0.32 dB max. (-40~+85°C)
V. S. W. R. at 698 - 960 MHz	2.0 max.
Attenuation	13 dB min. (1710 - 2690 MHz)
Impedance	50 Ω

High band

Pass band frequency	1710 - 2690 MHz
Insertion loss at 1710 - 2690 MHz	0.45 dB max. (+25°C) 0.55 dB max. (-40~+85°C)
V. S. W. R. at 698 - 960 MHz	2.0 max.
Attenuation	19 dB min. (698 - 960 MHz)
Impedance	50 Ω



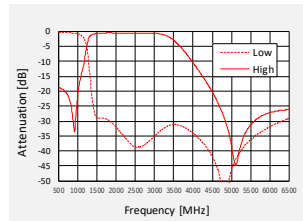
TSD1N18B829MLV0D4T/TSD1N18B829MLV0C2T

Low band

Pass band frequency	617 - 960 MHz
Insertion loss at 617 - 960 MHz	0.85 dB max. (-40~+85°C)
V. S. W. R. at 617 - 960 MHz	2.0 max.
Attenuation	22 dB min. (1427 - 1710 MHz) 25 dB min. (1710 - 2690 MHz) 25 dB min. (5150 - 5925 MHz)
Impedance	50 Ω

High band

Pass band frequency	1427 - 2690 MHz
Insertion loss at 1427 - 2690 MHz	1.05 dB max. (-40~+85°C)
V. S. W. R. at 1427 - 2690 MHz	2.0 max.
Attenuation	15 dB min. (617 - 699 MHz) 17 dB min. (699 - 960 MHz)
Impedance	50 Ω

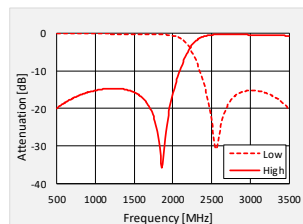


TSD1N18B1G79LS0FHT

Pass band frequency	1710 - 1920 MHz
Insertion loss at 1710 - 1880 MHz	0.6 dB max. (-40~+85°C)
Insertion loss at 1880 - 1920 MHz	0.7 dB max. (-40~+85°C)
V. S. W. R. at 617 - 960 MHz	2.0 max.
Attenuation	15 dB min. (2496 - 2690 MHz)
Impedance	50 Ω

High band

Pass band frequency	2496 - 2690 MHz
Insertion loss at 2496 - 2690 MHz	0.8 dB max. (-40~+85°C)
V. S. W. R. at 1427 - 2690 MHz	2.0 max.
Attenuation	15 dB min. (1710 - 1880 MHz) 15 dB min. (1880 - 1920 MHz)
Impedance	50 Ω



TSD1N21A829MLV0H9T/TSD1N21A829MLV0J2T

Pass band frequency 1	617 - 960 MHz
Pass band frequency 2	1427 - 5925 MHz
Impedance	50 Ω

TSD1M15H829MLMODZT

Pass band frequency 1	699 - 960 MHz
Pass band frequency 2	1710 - 2690 MHz
Impedance	50 Ω

TSD1N21A1G95LV0ENT

Pass band frequency 1	1427 - 2200 MHz
Pass band frequency 2	2496 - 5000 MHz
Impedance	50 Ω

TSD1N21C1G70LV0CLT/TSD1N21C1G70LV0HUT

Pass band frequency 1	699 - 2690 MHz
Pass band frequency 2	3300 - 5000 MHz
Impedance	50 Ω

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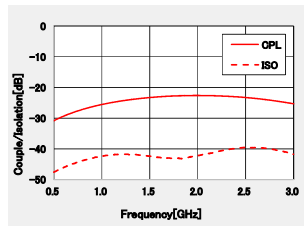
ELECTRICAL CHARACTERISTICS / TYPICAL CHARACTERISTICS

TSC4N18F1G69NS0B1T

Pass band frequency	699 - 2690 MHz
Insertion loss at 699 - 960 MHz	0.15 dB max. (+40~+85°C)
	0.1 dB max. (+15~+35°C)
	0.1 dB max. (-20~+15°C)
Insertion loss at 1000 - 2025 MHz	0.25 dB max. (+40~+85°C)
	0.2 dB max. (+15~+35°C)
	0.2 dB max. (-20~+15°C)
Insertion loss at 2110 - 2690 MHz	0.38 dB max. (+40~+85°C)
	0.28 dB max. (+15~+35°C)
	0.28 dB max. (-20~+15°C)
Ripple	0.1 dB max. (699 - 746 MHz)
	0.1 dB max. (791 - 862 MHz)
	0.1 dB max. (824 - 960 MHz)
	0.1 dB max. (1710 - 2170 MHz)
	0.1 dB max. (2500 - 2690 MHz)
RF Coupling	28.1~29.5 dB (699MHz)
	25.8~27.2 dB (915MHz)
	20.7~22.1 dB (1710MHz)
	19.9~21.3 dB (1880MHz)
	19.3~20.7 dB (2025MHz)
	18.3~19.7 dB (2300MHz)
	17.1~18.5 dB (2690MHz)
Coupling ratio mismatch between Coupler branch 1 and Coupler branch 2	-1~1 dB (699 - 2690 MHz)
Directivity	18 dB min. (699 - 2690 MHz)
Impedance	50 Ω

TSC1N18D1G68NC0AAT

Pass band frequency	698 - 2690 MHz
Insertion loss at 699 - 2690 MHz	0.25 dB max. (+25°C)
	0.30 dB max. (-40~+85°C)
RF Coupling	26.5~29.0 dB (698MHz)
	24.0~27.0 dB (915MHz)
	21.5~24.5 dB (1710MHz)
	21.5~24.5 dB (2025MHz)
	21.5~24.5 dB (2300MHz)
	21.5~25.5 dB (2690MHz)
Isolation	35 dB min. (698 - 2690 MHz)
Impedance	50 Ω



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Ceramic RF Devices Filter / Diplexers / Triplexer / Coupler

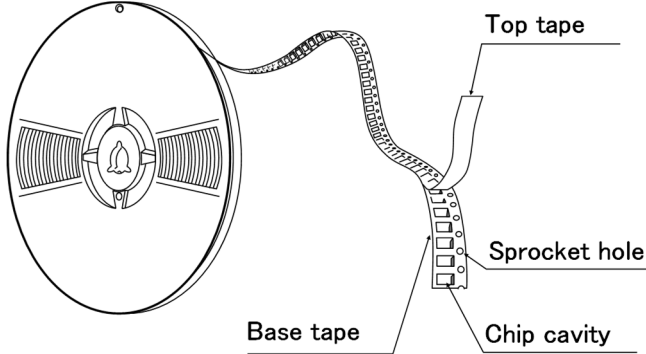
PACKAGING

① Minimum Quantity

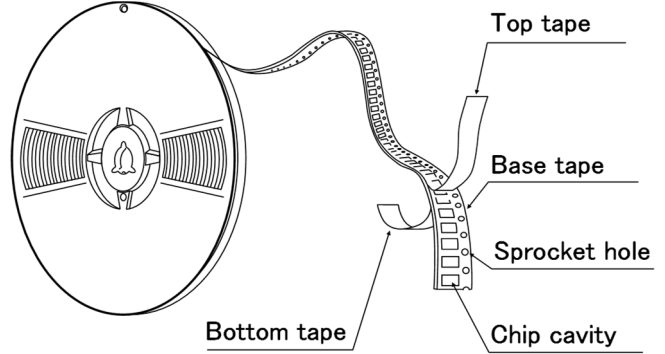
Type	L × W × T	Embossed tape / Paper tape [pcs]
TSD1N21A	2.0 × 1.25 × 1.0	3000
TST1N22D	2.5 × 2.0 × 1.0	
TSB1N18F	1.6 × 0.8 × 0.5	4000
TSB1N18D	1.6 × 0.8 × 0.65	
TSB1N21D	2.0 × 1.25 × 0.65	5000
TSC1N18D	1.6 × 0.8 × 0.65	
TSD1N21C	2.0 × 1.25 × 0.7	
TSD1N18B	1.6 × 0.8 × 0.8	
TSD1N18D	1.6 × 0.8 × 0.65	
TSH1N18D	1.6 × 0.8 × 0.65	
TSC4N18F	1.6 × 0.8 × 0.5	8000
TSB1N15H	1.0 × 0.5 × 0.4	10000
TSD1N15H	1.0 × 0.5 × 0.4	
TSL1M15H	1.0 × 0.5 × 0.4	

② Tape Material

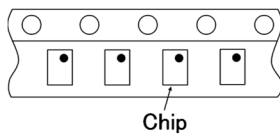
● Embossed Tape



● Card Board Carrier Tape



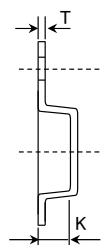
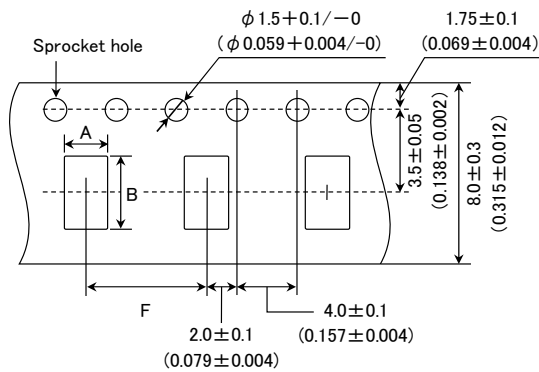
Chip Filled



③ Taping Dimensions

● Embossed tape 0.315 inches wide

Unit: mm (inch)

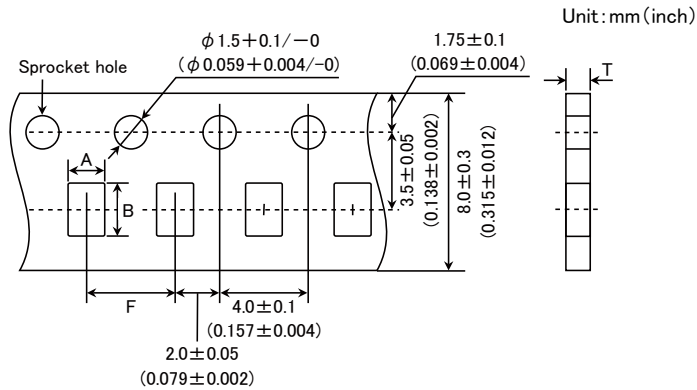


▶ This catalog contains the typical specification only due to the limitation of space. When you consider the purchase of our products, please check our specification. For details of each product (characteristics graph, reliability information, precautions for use, and so on), see our Web site (<http://www.ty-top.com/>).

Type	Chip cavity		Insertion Pitch	Tape Thickness max.	
	A	B		K	T
TSB1N21D	1.45±0.2 (0.057±0.008)	2.25±0.2 (0.089±0.008)	4.0±0.1 (0.157±0.004)	0.95 Max (0.037 Max)	0.3 (0.012)
TSD1N21A	1.45±0.2 (0.057±0.008)	2.25±0.2 (0.089±0.008)	4.0±0.1 (0.157±0.004)	1.1 Max (0.043 Max)	0.3 (0.012)
TSD1N21C	1.45±0.2 (0.057±0.008)	2.25±0.2 (0.089±0.008)	4.0±0.1 (0.157±0.004)	0.95 Max (0.037 Max)	0.3 (0.012)
TDT1N22D	2.3±0.1 (0.091±0.004)	2.7±0.1 (0.106±0.004)	4.0±0.1 (0.157±0.004)	0.9 Max (0.035 Max)	0.35 Max (0.014)

Unit: mm (inch)

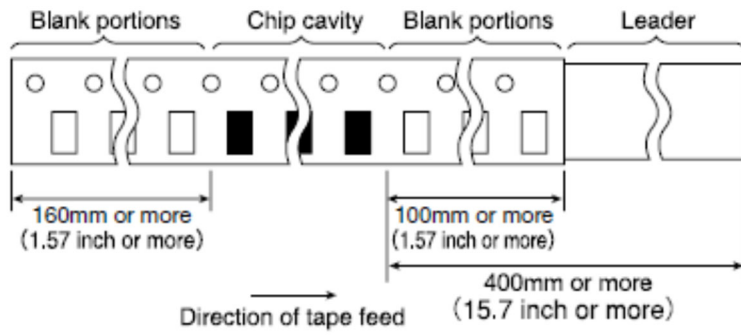
● Paper tape 0.315 inches wide



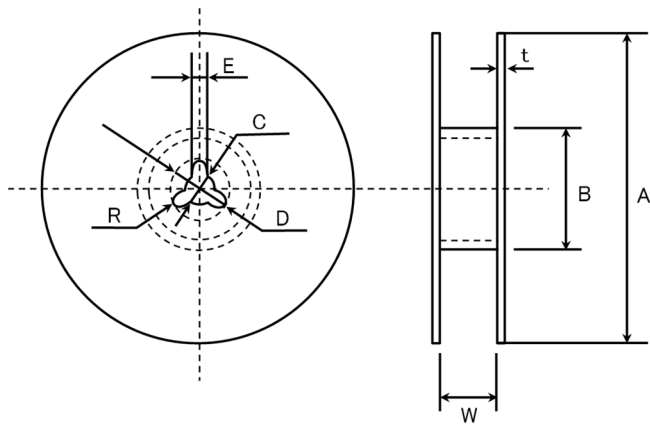
Type	Chip cavity		Insertion Pitch	Tape Thickness max.
	A	B		
TSB1N18F	1.00±0.05 (0.039±0.002)	1.80±0.05 (0.071±0.002)	4.0±0.1 (0.157±0.004)	0.55 (0.022)
TSC4N18F	1.00±0.05 (0.039±0.002)	1.80±0.05 (0.071±0.002)	4.0±0.1 (0.157±0.004)	0.55 (0.022)
TSB1N18D	0.95±0.05 (0.037±0.002)	1.80±0.05 (0.071±0.002)	4.0±0.1 (0.157±0.004)	0.80 (0.031)
TSC1N18D	0.95±0.05 (0.037±0.002)	1.80±0.05 (0.071±0.002)	4.0±0.1 (0.157±0.004)	0.55 (0.022)
TSD1N18D	0.95±0.05 (0.037±0.002)	1.80±0.05 (0.071±0.002)	4.0±0.1 (0.157±0.004)	0.90 (0.035)
TSD1N18D	0.95±0.05 (0.037±0.002)	1.80±0.05 (0.071±0.002)	4.0±0.1 (0.157±0.004)	0.80 (0.031)
TSH1N18D	0.95±0.05 (0.037±0.002)	1.80±0.05 (0.071±0.002)	4.0±0.1 (0.157±0.004)	0.80 (0.031)
TSL1N18D	0.95±0.05 (0.037±0.002)	1.80±0.05 (0.071±0.002)	4.0±0.1 (0.157±0.004)	0.80 (0.031)
TSB1N15H	0.62±0.03 (0.024±0.001)	1.12±0.03 (0.044±0.001)	2.0±0.05 (0.079±0.002)	0.45 (0.018)
TSD1N15H	0.62±0.03 (0.024±0.001)	1.12±0.03 (0.044±0.001)	2.0±0.05 (0.079±0.002)	0.45 (0.018)
TSL1M15H	0.62±0.03 (0.024±0.001)	1.12±0.03 (0.044±0.001)	2.0±0.05 (0.079±0.002)	0.45 (0.018)

Unit: mm (inch)

④ Leader and Blank Portion



⑤ Reel size

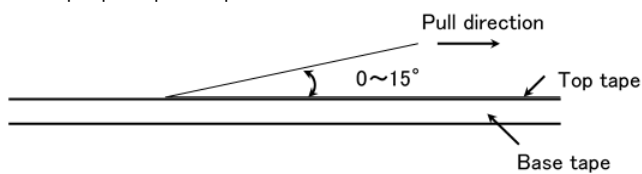


A	B	C	D	E	R
$\phi 178 \pm 2.0$ ($\phi 7.01 \pm 0.079$)	$\phi 50 \text{ min.}$ ($\phi 1.97 \text{ min.}$)	$\phi 13.0 \pm 0.2$ ($\phi 0.512 \pm 0.008$)	$\phi 21.0 \pm 0.8$ ($\phi 0.827 \pm 0.031$)	2.0 ± 0.5 (0.079 ± 0.020)	1.0
	t	W			
8mm width tape (0.315 inches width)	2.5max. (0.098max.)	10 ± 1.5 (0.394 ± 0.059)			

Unit: mm (inch)

⑥ Top Tape Strength

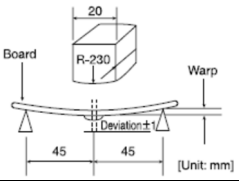
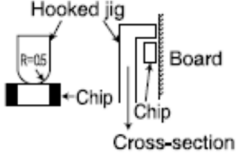
The top tape requires a peel-off force of 0.1~0.7N in the direction of the arrow as illustrated below.



Ceramic RF Devices for General Electronic Equipment for Consumer

Filter / Diplexers / Triplexer / Coupler

RELIABILITY DATA

1. Operating Temperature Range	
Specified Value	-40~+85°C
2. Storage Temperature Range	
Specified Value	-40~+85°C
Test Methods and Remarks	※Note : -20 to +40°C in taped packaging
3. Resistance to Flexure of Substrate	
Specified Value	No mechanical damage.
Test Methods and Remarks	<p>Warp : 2mm Testing board : Glass epoxy-resin substrate Thickness : 0.8mm</p> 
4. Adhesion of Electrode	
Specified Value	Characteristics : shall satisfy the electrical characteristics. Appearance : No significant abnormality.
Test Methods and Remarks	<p>Applied force : 5N Duration : 10 sec.</p> 
5. Solderability	
Specified Value	75% or more of immersed surface of terminal electrode shall be covered with fresh solder.
Test Methods and Remarks	<p>Solder temperature : 240±5°C Duration : 3±1 sec Preconditioning : Immersion into flux. Immersion and Removal speed : 25mm/sec.</p>
6. Resistance to Solder Heat	
Specified Value	Characteristics : shall satisfy the electrical characteristics. Appearance : No significant abnormality.
Test Methods and Remarks	<p>Preheating : 150°C for 2 min. Solder temperature : 260±5°C Duration : 5±0.5 sec. Preconditioning : Immersion into flux. Immersion and Removal speed : 25mm/sec. Recovery : 2 to 3hrs of recovery under the standard condition after the removal from test chamber.</p>

▶ This catalog contains the typical specification only due to the limitation of space. When you consider the purchase of our products, please check our specification. For details of each product (characteristics graph, reliability information, precautions for use, and so on), see our Web site (<http://www.ty-top.com/>).

7. Thermal Shock

Specified Value	Characteristics : shall satisfy the electrical characteristics. Appearance : No significant abnormality.															
Test Methods and Remarks	According to JIS C60068-2-14. Conditions for 1 cycle <table border="1" style="margin: 5px auto; border-collapse: collapse; text-align: center;"> <thead> <tr> <th style="padding: 2px 5px;">Step</th> <th style="padding: 2px 5px;">Temperature (°C)</th> <th style="padding: 2px 5px;">Duration (min)</th> </tr> </thead> <tbody> <tr> <td style="padding: 2px 5px;">1</td> <td style="padding: 2px 5px;">-40±3</td> <td style="padding: 2px 5px;">30±3</td> </tr> <tr> <td style="padding: 2px 5px;">2</td> <td style="padding: 2px 5px;">Room Temperature</td> <td style="padding: 2px 5px;">Within 3</td> </tr> <tr> <td style="padding: 2px 5px;">3</td> <td style="padding: 2px 5px;">85±2</td> <td style="padding: 2px 5px;">30±3</td> </tr> <tr> <td style="padding: 2px 5px;">4</td> <td style="padding: 2px 5px;">Room Temperature</td> <td style="padding: 2px 5px;">Within 3</td> </tr> </tbody> </table> Number of cycles : 100 Mounting method : Soldering onto PC board. Recovery : 2 to 3hrs of recovery under the standard condition after the removal from test chamber.	Step	Temperature (°C)	Duration (min)	1	-40±3	30±3	2	Room Temperature	Within 3	3	85±2	30±3	4	Room Temperature	Within 3
Step	Temperature (°C)	Duration (min)														
1	-40±3	30±3														
2	Room Temperature	Within 3														
3	85±2	30±3														
4	Room Temperature	Within 3														

8. Humidity (steady state)

Specified Value	Characteristics : shall satisfy the electrical characteristics. Appearance : No significant abnormality.
Test Methods and Remarks	Temperature : +85±2°C Humidity : 85±5%RH Duration : 1000 hrs Recovery : 2 to 3hrs of recovery under the standard condition after the removal from test chamber.

9. High temperature life test

Specified Value	Characteristics : shall satisfy the electrical characteristics. Appearance : No significant abnormality.
Test Methods and Remarks	Temperature : +85±2°C Duration : 1000 hrs Recovery : 2 to 3hrs of recovery under the standard condition after the removal from test chamber.

10. Low temperature life test

Specified Value	Characteristics : shall satisfy the electrical characteristics. Appearance : No significant abnormality.
Test Methods and Remarks	Temperature : -40±2°C Duration : 1000 hrs Recovery : 2 to 3hrs of recovery under the standard condition after the removal from test chamber.

Note on standard condition:

“standard condition” referred to herein is defined as follows :
 5 to 35°C of temperature, 45 to 85% relative humidity and 86 to 106kPa of air pressure.

When there are questions concerning measurement result :
 In order to provide correlation data, the test shall be conducted under condition of 20±2°C of temperature, 60 to 70% relative humidity and 86 to 106kPa of air pressure.

Unless otherwise specified, all the tests are conducted under the “standard condition”.

► This catalog contains the typical specification only due to the limitation of space. When you consider the purchase of our products, please check our specification.
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Ceramic RF Devices Filter / Diplexers / Triplexer / Coupler

PRECAUTIONS

1. PCB Design

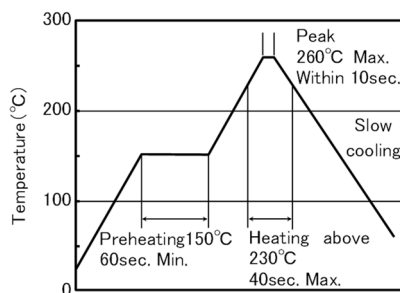
◆ Land pattern design
Land pattern dimension examples

Technical considerations	TSD1M15H/TSL1N15H LGA 6Pins Type	TSB1N15H/TSL1N15H Side 4Pins Type	TSB1N18F Side 4Pins Type	TSB1N18D/TSL1N18D /TSH1N18D LGA 3Pins Type
	Unit: mm	Unit: mm	Unit: mm	Unit: mm
	TSD1N18B LGA 6Pins Type	TSD1N18D/TSL1N18D /TSC1N18D Side 6Pins Type	TSC4N18F Side 8Pins Type	TSB1N21D LGA 3Pins Type
	Unit: mm	Unit: mm	Unit: mm	Unit: mm
TSD1N21A829MLS0G2T /TSD1N21C LGA 6Pins Type	TSD1N21 LGA 6Pins Type	TST1N22D LGA 9Pins Type		
Unit: mm	Unit: mm	Unit: mm		

2. Soldering

◆ Conditions for Reflow soldering (for reference)

• Pb Free Reflow Profile



- ※ Components should be preheated to within 100 to 130°C from soldering temperature.
- ※ Assured to be reflow soldering for 2 times.

Note : The above profiles are the maximum allowable soldering condition, therefore these profiles are not always recommended.

3. Storage conditions

Precautions

◆ Storage conditions

1. The Products must not be used in the following environments :

- exposure to special gases such as (C12, NH3, SOx, NOx)
- exposure to volatile gas or inflammable gas
- exposure to a lot of dust
- exposure to water or condensation
- exposure to direct sunlight or freezing

2. The Products should be kept in the following conditions :

- Temperature : $-10\sim +40^{\circ}\text{C}$
- Humidity : $15\sim 85\%RH$ max.

3. The products should be used within 6 months after delivery. In case of storage over 6 months, solderability shall be checked before actual usage.

■ Please contact of our offices for further details of specifications.

All of the standard values listed here are subject to change without notice.

Therefore, please check the specifications carefully before use.