FINE & LARGE COPPER WIRE BONDING CAPILLARY

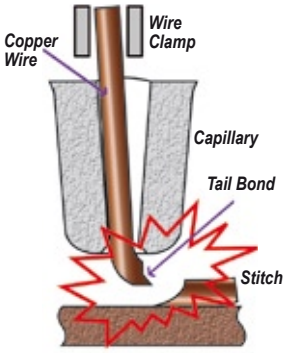
SU THE STANDARD

SPT small precision tools

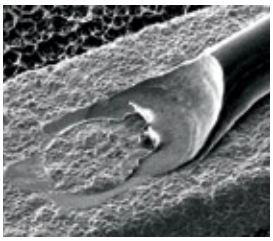
SU - COPPER WIRE BONDING CAPILLARY

The history of copper wire bonding packaging interconnect can be traced back to the eighties, spurred then as an alternative to the costly gold. And for decades, SPT has been a leading supplier for numerous customers bonding with large copper wire diameters. Today, copper wire bonding has regained momentum as the semiconductor packaging industry looks for cost reduction alternatives due to rise in gold price, and is commanding more foothold, not only in low pin count discrete packages but fine pitch IC.

Also, copper wire bonding offers other significant advantages over gold – superior performance in terms of electrical and thermal conductivity; better product reliability due to less intermetallic growth causing voids; and higher break load during wire pull testing. However, it also comes with various bonding and process challenges such as oxidation of copper wire at low temperature, 'short tail', and 'fish tail' which is commonly associated with copper wire bonding interconnect assembly.

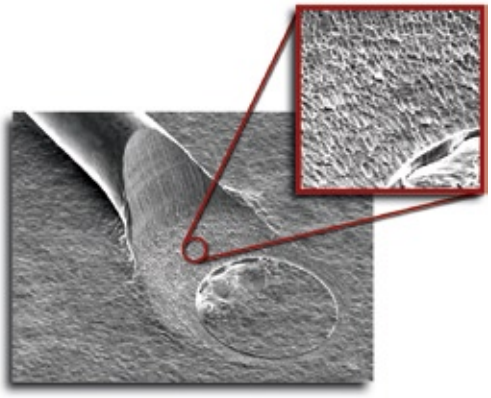


Short Tail

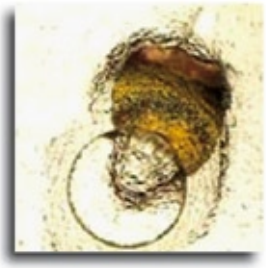

'Fish' Tail

A pioneer and a leader in wire bonding tool innovations, SPT has been in the forefront, involved in collaborations with many customers in their development of a new capillary for copper wire bonding application.

SPT has taken its highly successful series, SI (Stitch Integrator) developed for enhanced stitch bondability to the next level, introducing ***SU*** – the capillary solution specifically tailored for copper wire bonding.


Bonded with 'SU' Capillary

The ***SU*** capillary – the new Standard for Copper - incorporates an excellent durable material with SPT's proprietary enhanced surface finishing with superior 'gripping' features to deliver high reliability stitch bonds for a wide range of copper wire bonding applications from fine wire 20µm to large wire of 100µm wire sizes.


Copper remains after Stitch pull

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SOLUTION FOR A ROBUST COPPER WIRE BONDING PROCESS

BONDABILITY

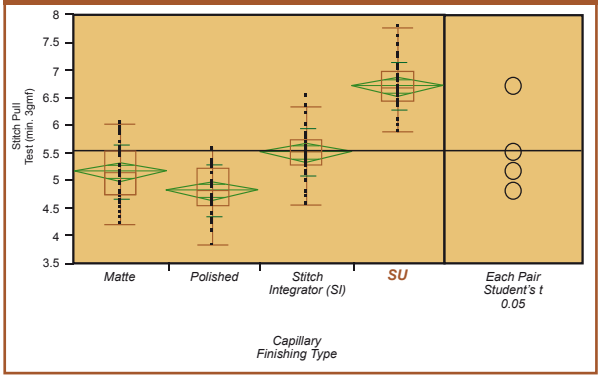
In copper wire bonding process, bond integrity at the interface between the stitch and leaded or laminate surface is measured by using a wire pull tester.

The bonded wire is pulled as close as possible to the stitch, and the pull test strength reading (in gram-force) is taken. Expectedly, the higher pull test strength value is desired, and a remaining stitch failure mode is indicative of a good bond at the interface.

Table A- shows the stitch bond superiority of the ***SU*** capillary as the stitch pull test reading is significantly better compared with other capillary finishing types using the same wire bonding parameters, package & device, and copper wire size.

Table A

Oneway Analysis of Stitch Pull Test (min.3gmf) By capillary Finishing Type



Means Comparisons

Comparisons for each pair using Student's t

t	Alpha
1.97928	0.05

Abs(Dif)-LSD

	SU	Stitch Integrator (SI)	Matte	Polished
SU	-0.2285	0.9874	1.3217	1.6779
Stitch Integrator (SI)	0.9874	0.2285	0.1058	0.4620
Matte	1.3217	0.1058	-0.2285	0.1277
Polished	1.6779	0.4620	0.1277	-0.2285

Positive values show pair of means that are significantly different.

Level		Mean
SU	A	6.7190000
Stitch Integrator (SI)	B	5.5030625
Matte	C	5.1687500
Polished	D	4.8125313

Levels not connected by same letters are significantly different.

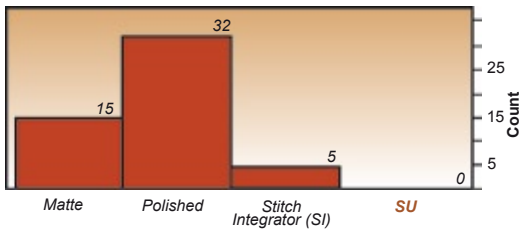
PRODUCTIVITY & RELIABILITY

SU capillary has been proven to improve the bondability of the stitch bond while minimizing the occurrence of short tail defects and non-sticking on lead during wire bonding process as shown in *Table B*. The significant reduction of short tail and non-stick on leads result into increased production output due to lower mean time before assist (MTBA).

Table B

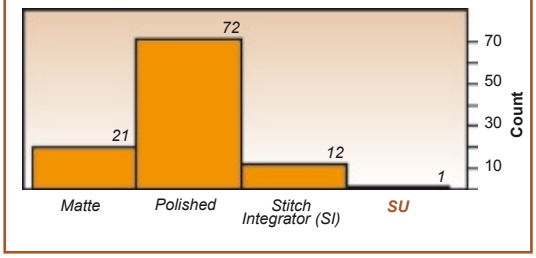
Distributions

Capillary Finishing Type: Short Tail



Distributions

Capillary Finishing Type: Non Stick On Lead



CUSTOMER TESTED

SPT's new ***SU*** capillary is the result of extensive research & customer tested solutions to meet today's copper wire bonding packaging process. ***SU*** is the new standard for a robust copper wire bonding process.

SU - COPPER WIRE BONDING CAPILLARY

HOW TO ORDER

SU — 33 — 090 — 43 — 5 — F — Z — U — 3 — 4 — T — P

- Tip Style, ***SU***
- Hole Diameter, H
- Tip Diameter, T
- Chamfer Diameter, CD
- Chamfer Angle, CA
- Face Angle, FA
- Material
- Finishing
- Length
- Main Taper Angle, MTA
- Bottle Neck Angle, BNA
- PI Capillary Design : P

	Bond Pad Pitch µm	Useable Wire Diameter µm	H µm	CD µm	FA °	T µm	Recommended SPT Part Number
Fine Wire	50	20	25	30	11	63	SU-25063-305F-ZU34TP
	60	23	28	35	11	80	SU-28080-355F-ZU34TP
	60	25	30	38	11	80	SU-30080-385F-ZU34TP
	70	25	33	43	8	90	SU-33090-435E-ZU34TP
	80	25	33	48	8	100	SU-33100-485E-ZU34TP
	80	30	38	51	8	100	SU-38100-515E-ZU34TP
	90	25	35	51	8	110	SU-35110-515E-ZU36TS
	90	30	38	53	8	110	SU-38110-535E-ZU36TS
	100	30	38	55	8	130	SU-38130-555E-ZU36TS
	110	33	41	58	8	165	SU-41165-585E-ZU36TS
Large Wire	140	38	48	64	8	180	SU-48180-645E-CM34
	150	38	51	68	8	200	SU-51200-685E-CM34
	170	38	51	78	8	225	SU-51225-7881E-CM34
	150	51	64	86	8	180	SU-64180-8681E-CM34
	180	51	64	97	8	225	SU-64225-9781E-CM34
	220	51	64	114	8	300	SU-64300-11481E-CM34
	250	75	100	140	8	330	SU-100330-14081E-CM34

For more information and trial samples, contact your local SPT sales.

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