E-Tec

Test Summary

<u>0.50mm pitch</u>	
Probe code :	APP-040-0007
Socket codes:	BPW025-0591-05BB55 or LPW025-0591-05BB55
<u>0.80mm pitch</u>	
Probe code:	APP-080-0001
Socket codes:	BPW025-0891-05BB55 or LPW025-0891-05BB55
<u>1.00mm pitch</u>	
Probe code:	APP-080-0001
Socket codes:	BPW025-1091-05BB55 or LPW025-1091-05BB55
<u>1.27mm pitch</u>	
Probe code:	APP-100-0007
Socket codes:	BPW025-1291-05BB55 or LPW025-1291-05BB55

prepared by

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Objective

Gatewave Northern has conducted in-depth analysis of the E-tec high speed probe pin sockets to determine the performance under various conditions and test settings and the results can be summarized as follows :

1. RF tests

Pitch	0.50mm pitch				0.80mm pitch				1.00mm pitch				1.27mm pitch				
Probe code	APP-040-0007				APP-080-0001				APP-080-0001				APP-100-0007				
Socket code	BPW/LPW025-0591-05BB55				BPW/LPW025-0891-05BB55				BPW/LPW025-1091-05BB55				BPW/LPW025-1291-05BB55				
	Corner	Edge	Field	Diagonal	Corner	Edge	Field	Diagonal	Corner	Edge	Field	Diagonal	Corner	Edge	Field	Diagonal	
Delay	22.6	21.4	20.9		21.0	20.5	19.5		22.4	21.2	20.5		20.7	19.4	19.3		ps
Rise time open	30.0	54.0	54.0		31.5	34.5	49.5		34.5	30.0	30.0		31.5	55.5	54.0		ps
Rise time short	30.0	30.0	36.0		57.0	28.5	34.5		58.5	30.0	30.0		54.0	31.5	31.5		ps
Rise time thru, 50Ω	33.0	33.0	34.5		34.5	33.0	31.5		33.0	28.5	30.0		33.0	30.0	28.5		ps
Bandwidth																	
Insertion loss (-1 dB)	22.1	29.1	29.3		25.7	28.1	36.3		23.3	24.5	31.3		20.7	23.5	37.5		GHz
Insertion loss (-3 dB)	40.05	40.05	40.05		35.87	40.05	40.05		28.7	28.7	28.7		31.9	39.1	39.1		GHz
VSWR (2:1)	31.28	34.07	32.08		37.06	32.88	40.05		30.3	30.9	32.1		40	38.5	40		GHz
Inductance	1.14	0.95	0.89	0.89	1.27	1.06	0.93	0.93	1.39	1.12	1.01	1.01	1.12	0.89	0.82	0.82	nH
Mutual inductance	0.391	0.283	0.165	0.042	0.477	0.254	0.166	0.037	0.364	0.297	0.176	0.049	0.336	0.256	0.146	0.146	nH
Capacitance	0.413	0.456	0.480	0.480	0.395	0.440	0.465	0.465	0.346	0.379	0.394	0.394	0.377	0.405	0.424	0.424	pF
Mutual capacitance	0.108	0.109	0.072	0.024	0.121	0.096	0.082	0.019	0.084	0.076	0.061	0.037	0.087	0.084	0.088	0.014	pF
Impedance	55.2	40.8	38.3		43.2	41.7	38.8		56.6	47.1	46.3		43.7	43.2	41		Ohm

2. DC measurement results

A four terminal (Kelvin) measurement setup is used that includes a computer controlled current source capable of delivering 10A. The voltage developed across the contact is measured with a HP3456A DMM and yields a V-I record. A 4 terminal setup (Kelvin measurement) is used and the DMM is operated in compensated mode to remove the effects of thermo-electric voltages due to dissimilar metals. For the current handling tests the temperature rise in the center of the pin is measured with a thermocouple as drive current levels are gradually increased. The probe pads are thermally anchored to a large heat sink akin to them touching pads on PCBs with internal planes close to the surface. Based on these tests, the following « max » current carrying performance can be determined for the 3 probes tested

APP-040-0007 (0.50mm pitch):	1A recommended, 1.5A max. at 30 deg temperature rise when properly heat sunk
APP-080-0001 (0.80 and 1.00mm pitch)	1A recommended, 2A max. at 30 deg temperature rise when properly heat sunk
APP-100-0007 (1.27mm pitch):	1A recommended, 2A max. at 30 deg temperature rise when properly heat sunk

3. Cycling measurement results

The contact resistance of the below probes was monitored up to 100K cycles with the following test set-up:

- XYZ stage
- Au plated base for repeated touches
- Hard stop via base plate to avoid excessive overdrive
- Data acquisition and stepping every 100 cycles
- 4-terminal (Kelvin) compensated measurement
- 1 mA current drive

Test results in mOhms :

	APP-040-0007 0.50mm pitch	APP-080-0001 0.80 & 1.00mm pitch	APP-100-0007 1.27mm pitch
Mean	49.16	54.57	74.78
Standard error	0.22	0.22	0.27
Median	47.46	52.78	72.6
Standard Deviation	6.64	6.82	6.55
Sample Variance	44.06	46.51	42.93
Minimum	41.57	42.14	65.92
Maximum	74.66	76.38	96.44

In summary:

- All contacts performed up to 100K cycles
- Optical inspection did not indicate significant wear
- The tests were performed up to 100K cycles due to time constraints, but it is expected that these probes will perform without problems well above 100K cycles

4. Additional test data

Full line test reports of the various tests performed as well as SPICE models can be obtained from E-tec.