Supplementary Information Robert Stedtfeld

Supplementary figures

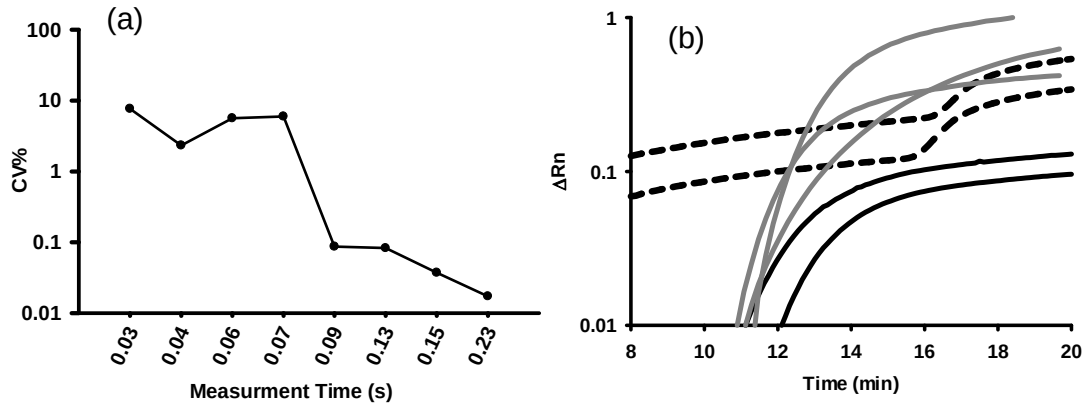

Fig S1. Results from initial experiments examining optics with Gene-Z. (a) Determination of the signal acquisition timing settings. The coefficient of variation (%) for 4 replicate readings (y-axis on log scale) taken within the same reaction channel versus time required to obtain a signal (settings for signal acquisition are listed in table 2 supplemental material). (b) Comparison of a low and high brightness LED. Amplification profiles (ΔRn on logarithmic scale) with $0.60 LED (0.7 lumen, gray lines) and $20 LED (145 lumen, solid black lines) with 20 μm of SYTO 81 dye, and using 0.7 lumen blue LED with calcein (dash black lines). LAMP was performed with approximately 7,600 copies of genomic DNA from *S. aureus* with a primer set targeting the *mecA* gene.

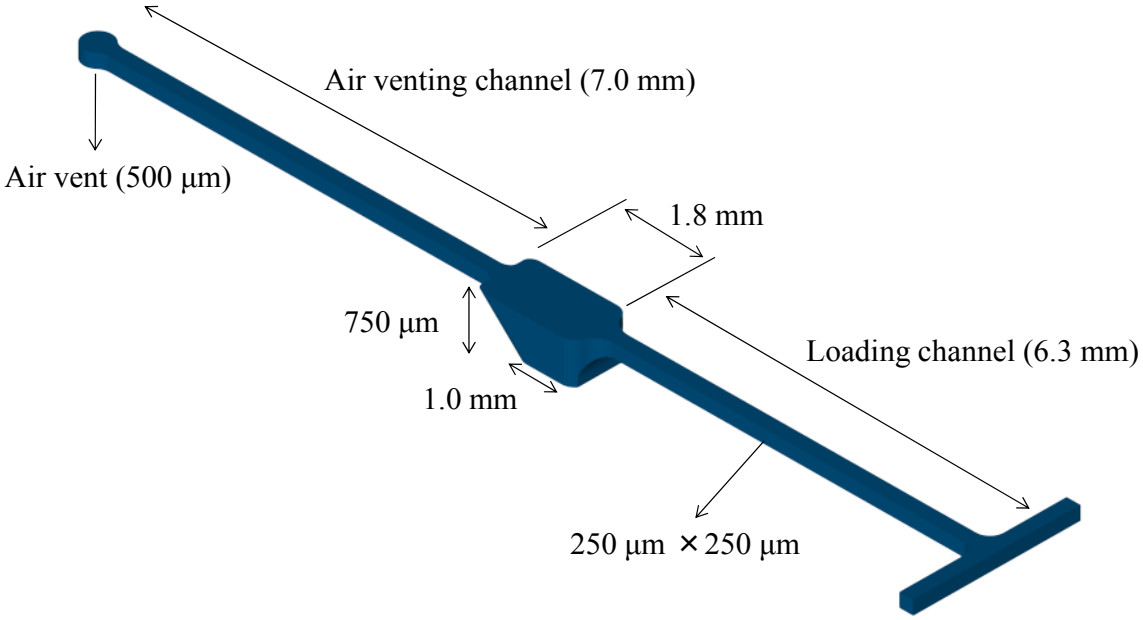

Fig S2. Schematic of a single reaction channel.

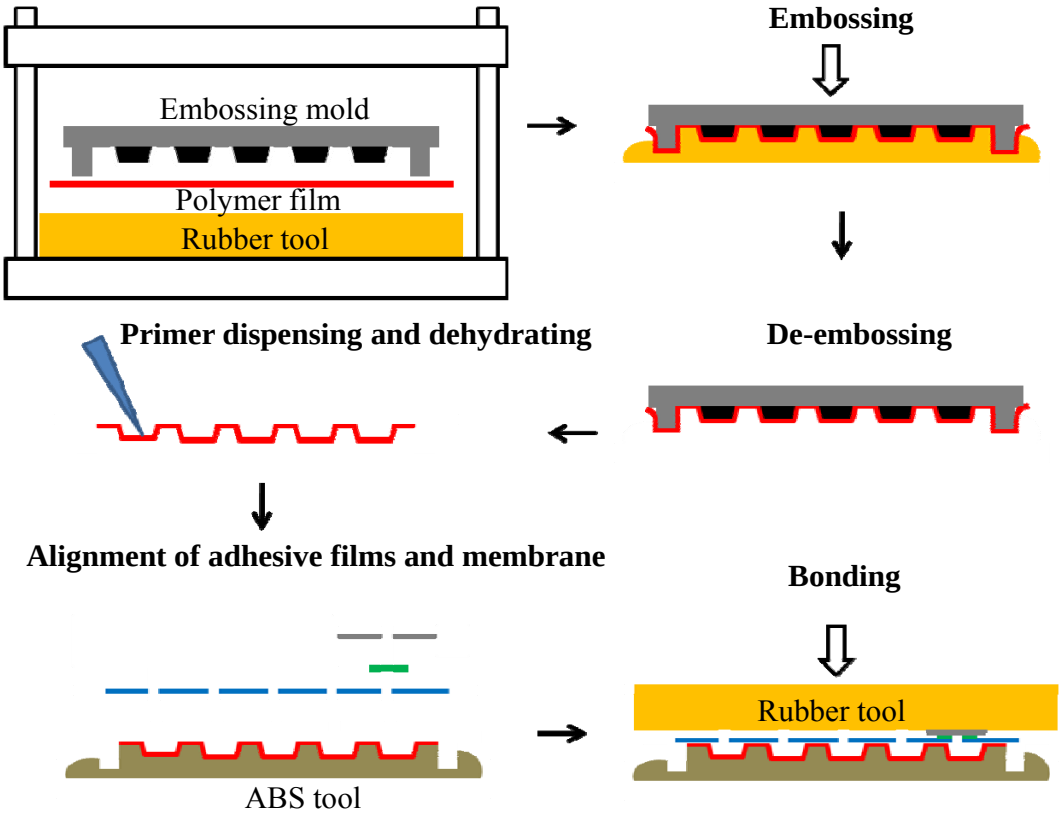

Fig S3. Pictorial of the chip fabrication process.

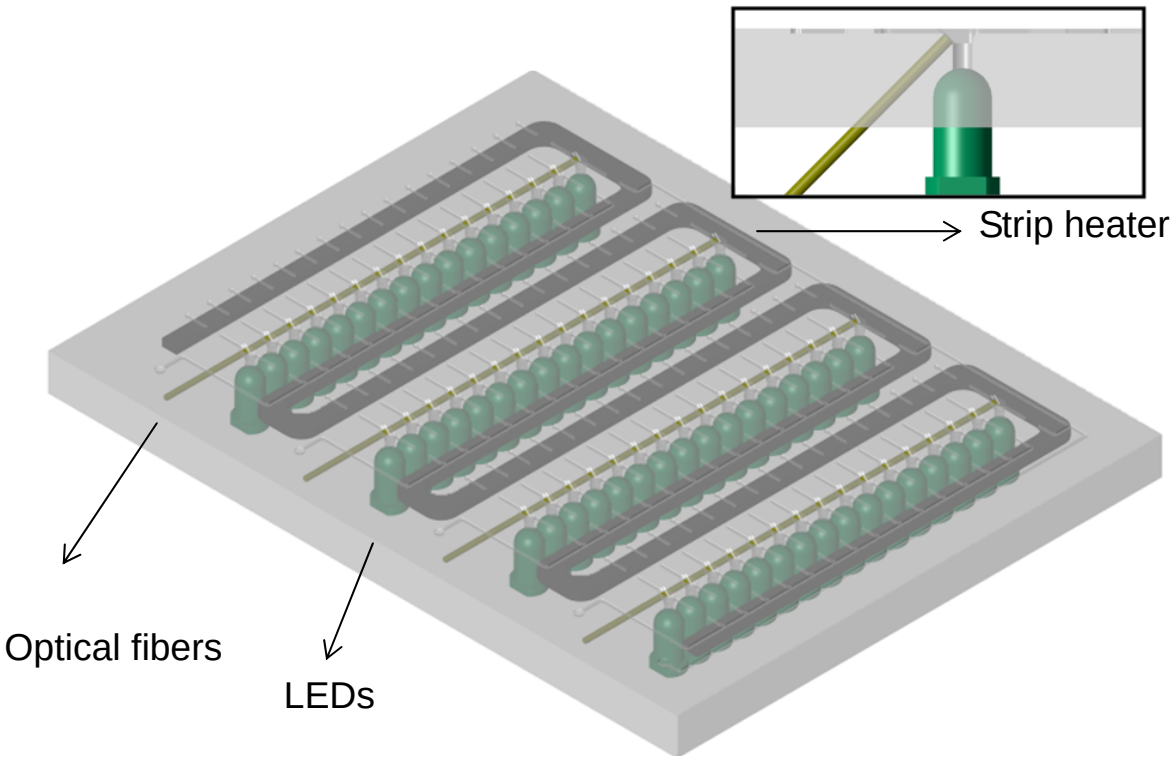

Fig S4. Rendering of the aluminum heater (also serves for alignment of optical components when chips are inserted) with embedded heater (dark gray), LEDs (green), and optical fibers (yellow). The inset shows the positing of the LEDS and optical fibers with respect to the shelled features of the chip.

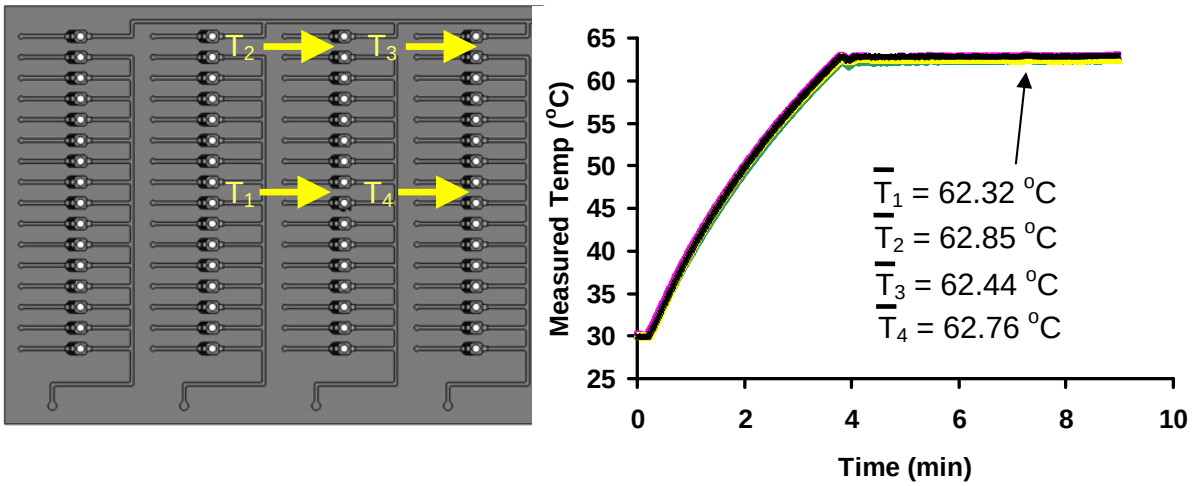

Fig S5. Rendering of the aluminum heater shows placement of four thermocouple to test temperature uniformity. T_1 is the where the set-point temperature is measured for all experiments described in this study. The graph shows temperature of the four thermocouples as the heater in the device is ramped to reaction temperature and the average temperature once the set-point is reached. It should be noted that the standard error of measurement, determined by placing thermocouples propinquity on a heat plate is 0.22 °C.

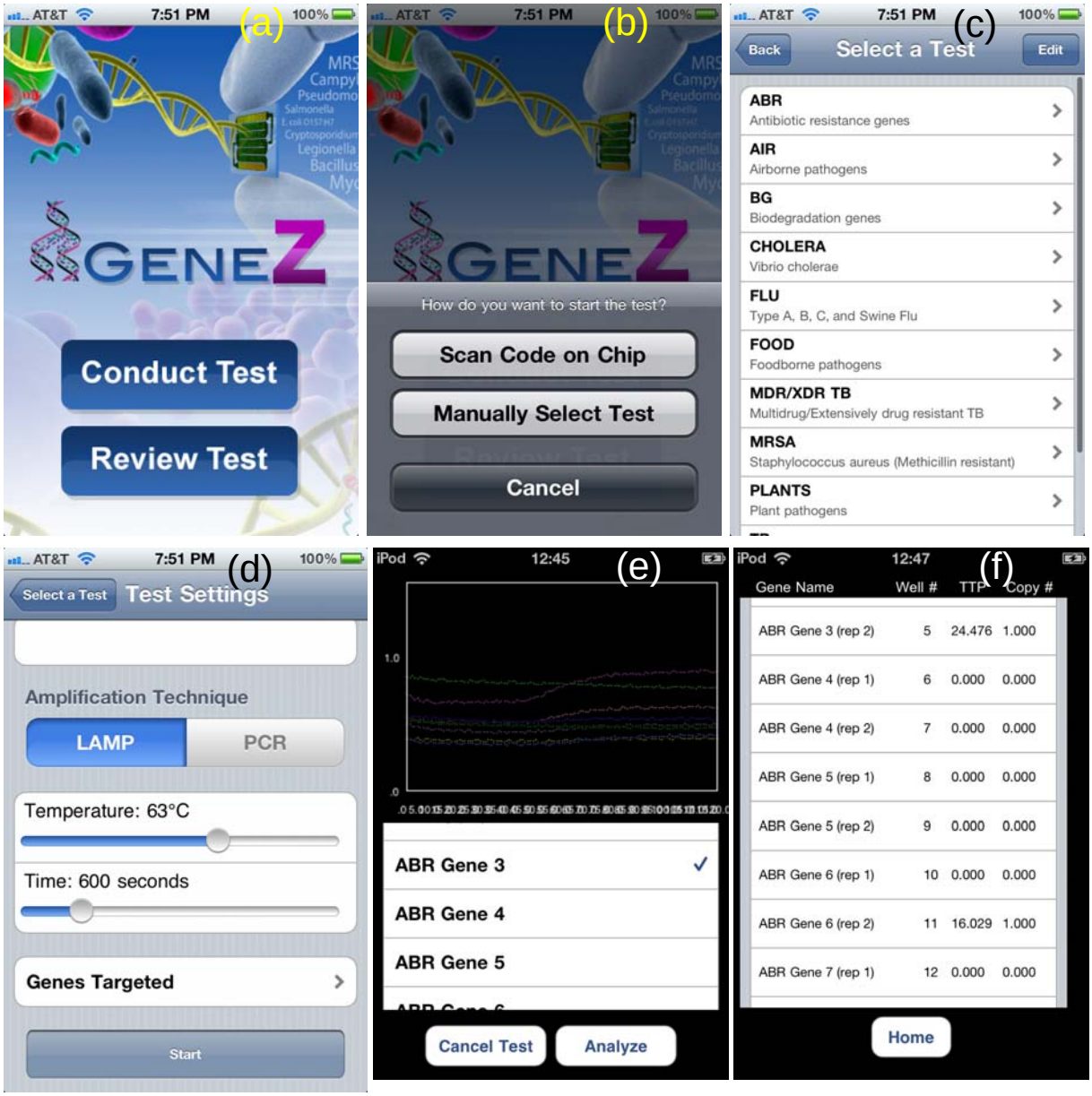

Fig S6. Screen shots of iPod application menus. (a) Home screen. (b) Screen to help user select chip assay. (c) Example screen shot showing tests that can be selected manually. (d) Manual selection of temperature and time to run the reaction. (e) Example screen shot showing amplification profiles plotted in real-time. (f) Example screen shot showing analyzed data.

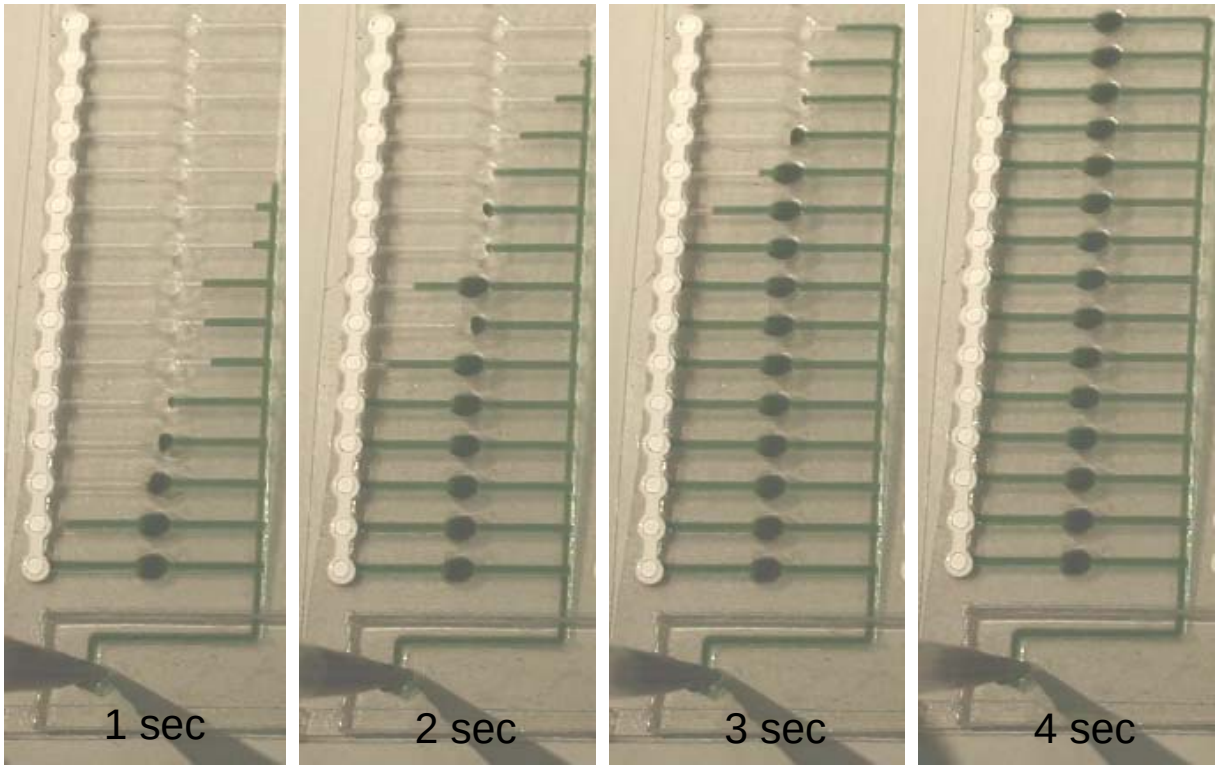

Fig S7. Time lapse images of chip filled with sample (colored dye used to aid in visualization).

Supplementary tables

Table S1. Results from experiment to determine the time required to obtain a reproducible voltage reading from the photodiode.

Number of readings per measurement	Reading frequency (Hz)	Total time per measurement (ms)	Coefficient of variation for 4 replicate measurements (%)
10^4	10^5	234	0.017
10^3	10^4	156	0.037
5×10^3	10^4	140	0.082
5×10^2	10^4	93.0	0.087
10^3	10^5	78.0	5.87
10	10^3	62.5	5.63
100	10^4	46.8	2.33
10	10^4	46.8	6.12
10	10^4	31.3	4.60

[a] The output of a single measurement is calculated as the average of the different readings per measurement.

Table S2. LAMP primers used in this study.

Pathogen (Gene)	Primer	Sequence
S. aureus (*vicK*)	F3	GTCAAGAAATTGGAGAAATTCG
	B3	ACCAATTACCTTTTTATCGACTT
	FIP	GGACAGAACTATCATTCGCTTTTTGGACCAAATTATTATTGCGACGAC
	BIP	GCACTATCACTAGGACAATCAAACGATATTATATACCCAGACACGGT
	LF	ATTGATTAGACTACGGTTAGACTGC
	LB	TTAAAAGATTATGGCGGTGGTAAGG
S. aureus (*mecA*)	F3	AAAAAACGAGTAGATGCTCAA
	B3	TGGCCAATTCCACATTGT
	FIP	TCCCAATCTAACTTCCACATACCATAAAACAAACTACGGTAACATTGA
	BIP	CATAGCGTCATTATTCCAGGAATGCCGGTCTAAAATTTTACCACGT
	LF	TTTAACAAAATTAAATTGAACGTTGCGA
	LB	AGAAAGACCAAAGCATACATATTGAAAA
E. coli (*stx2*)	F3	GAGATATCGACCCCTCTTG
	B3	AATCTGAAA AACGGT AGA AAGT
	FIP	TCCACAGCA AAATAACTGCCCAAC ATATATCTCAGGGGACCA
	BIP	GATGTCTATCAGGCGCGTTTTGCCGTATTAACGAACCCG G
	LF	TGT GGTTAATAACAGACACCGATG
	LB	ACCATCTTCGTCTGATTATTGAGC
E. coli (*eaeA*)	F3	AGCTCTAACAATGTACAGCT
	B3	AGTTGCAGTTCCTGA AACA
	FIP	GTCTTATCCGCCGTA AAGTCCGCCGTTCTGTCGAATGGTC
	BIP	CTAAAGCGGATA ACGCCGATACCCAGGGACATTAGCCTGAG
	LF	CCCAACCTGGTCGACAACTT
	LB	ATTACTTATACCGCGACGGTGAA