

Stock vs. Ghost Shell System (Z11 • Z9 • Z9-Mini)

Healthy 3-board full-miner projections from top bench-verified boards alongside per-chip tuned mixed/degraded bench hardware

Up to +63.5% Peak Hashrate • Up to +25.7% Better J/KSol

Z11

135k • C43 / 9× BM1744

+18.3%

3 × 53.24 KSol/s @ 750 MHz

+24.7 KSOL/S GAINED (HEALTHY 9/9 PROJECTION)

FACTORY STOCK SPEC

135.0 KSol/s

10.50 J/KSol • 1,418 W

GHOST SHELL (9/9 HEALTHY)

159.7 KSol/s

~9.70 J/KSol • 750 MHz / 830mV

DEGRADED BOARD RESCUE (8/9 ACTIVE CHIPS BENCH MEASURED)

131.9 KSol/s @ 1,390 W (10.54 J/KSol)

Per-chip map (706,675,706; 750,750,750; 712,718,712 MHz) hits 97.7% of a full 9-chip factory Z11 with 1 dead core!

Healthy 9/9 Efficiency Gain

+7.6% Better (~9.70 J/KSol)

Z9

42k • C43 / 48× BM1740

+32.2%

+40.4% Peak (59.0 KSol/s)

+13.5 KSOL/S SUSTAINED / +17.0 KSOL/S PEAK OVER STOCK

FACTORY STOCK SPEC

42.0 KSol/s

27.38 J/KSol • 1,150 W

GHOST SHELL (3-BOARD BEST)

55.5 KSol/s

59.0k Peak • 575–600 MHz

BENCH UNIT MEASURED (48/48 CHIPS MIXED-BIN TUNED)

52.42 KSol/s Settled / 52.75 KSol/s Peak @ 1,259 W

+24.8% to +25.6% over sticker at 24.02 J/KSol (575/583/593 MHz per-chain, 0 HW errors; stock 500 MHz measured 43.9k @ 1,056 W).

Efficiency Improvement

+15.3% Better (~23.2 J/KSol)

Z9-Mini

10k • C43 / 12× BM1740

+59.6%

+63.5% Peak (16.35 KSol/s)

+6.0 KSOL/S SUSTAINED / +6.35 KSOL/S PEAK OVER STOCK

FACTORY STOCK SPEC

10.0 KSol/s

30.00 J/KSol • 300 W

GHOST SHELL (3-BOARD BEST)

16.0 KSol/s

16.35k Peak • 687–725 MHz

BENCH UNIT MEASURED (12/12 CHIPS + ULTRA-EFF MODE)

15.16 KSol/s Settled / 15.24 KSol/s Burst @ 357 W

+51.6% to +52.4% over sticker (23.55 J/KSol, 0 HW err) • 500 MHz Eco Mode: 11.85 KSol/s @ 264 W (22.28 J/KSol, +25.7% eff.)

Efficiency Improvement

+24.0% to +25.7% Better (22.3–22.8 J/K)

MINER MODEL (C43)	FACTORY STOCK SPEC	GHOST SHELL OS (HEALTHY 3-BOARD)	HEALTHY % GAIN	BENCH UNIT MEASURED (PER-CHIP TUNED)	STOCK EFF.	GHOST SHELL EFF.	EFFICIENCY GAIN
Z11 (135k) 9× BM1744 •ISL68127 PMBus	135.0 KSol/s 1,418 W Wall	159.7 KSol/s 3× 53.24k (Chain 2 @ 750 MHz)	+18.3% (+24.7k)	131.9 KSol/s @ 1,390 W 8/9 Chips (97.7% of full 9-chip stock!)	10.50 J/KSol	~9.70 J/KSol 10.54 J/K on 8/9 bench	+7.6% Better
Z9 (42k) 48× BM1740 • 3×16-Chip Boards	42.0 KSol/s 1,150 W (43.9k @ 1,056W meas.)	55.5k Sust. / 59.0k Peak 3× 18.51k (600MHz) / 3× 19.66k (575MHz)	+32.2% / +40.4%	52.42k Settled / 52.75k Peak 48/48 Chips @ 1,259 W (+24.8%–25.6%, 0 HW)	27.38 J/KSol	~23.2 J/KSol 24.02 J/K on bench	+15.3% Better

Per-Chip Clock & Voltage Optimization (C43 Zynq-7007S): Unlocks full silicon headroom on healthy 3-board units while isolating weak/dead cores to rescue degraded hashboards.

GHOST SHELL SYSTEM v0.9.0 • C43 BENCH VERIFIED