

Updated simplified assembly

Version 28.7 / September 20 native Fusion snapshot



A focused update to 28.6: revised shell details, LED housing and light guide, with hardware and wiring references now visible. The native play-cap and PCB-laminate static overlaps have cleared.

Upcoming prototype; fit review open. Battery, switch-seat and connected-fit issues remain. This package exports the supplied geometry without repair and documents the next physical review. Golden remains 28.1 / R3.4.

Includes original Fusion, current native-position STEP/STL, actual-CAD views, parts/materials, change and fit registers, assembly notes and a blank qualification log.

What changed from 28.6

Group	Native change	What it means
Front shell Body1	112.328 mm3 removed	Play-cap and board-laminate static overlaps clear; separate frame overlap remains.
Rear shell	42.192 mm3 removed; 58.381 added	Board-laminate static overlap clears; battery overlap remains and a small resistor contact appears. Supplied rear STL is stale.
LED housing	138.155 mm3 removed	Local shape changed. Hardware and wire contacts remain; no complete LED fit pass.
Optical body A	5.882 mm3 removed	Local trim. Second optical body is unchanged; optical performance untested.
Other 9 print bodies	No positive-volume difference	Direct Fusion difference checks found no changed solid region.
Reference visibility	47 solids made visible	15 hardware and 32 wire solids visible; one wire body remains hidden. This is a visibility change, not a wiring redesign.

Use the new rear-shell export. The supplied rear STL is unchanged from yesterday, while the native rear shell has changed. The new 07_Rear_Shell STEP/STL contains the updated native geometry.

Difference volumes come from temporary-copy Booleans in Fusion. They describe changed material regions, not manufacturing offsets. The nine unchanged print bodies exclude reference electronics/hardware.

Source and measured envelopes

Item	Verified description
Public identity	28.7 = September 20 snapshot. Original 28_1_R3_6 filename retained.
Bare shell	80 x 150 x 24 mm; unchanged from 28.6.
Rim envelope	84.2 x 154.2 x 28 mm; projecting details extend beyond bare shell.
Main PCB	Flat 60 x 80 x 1.33 mm laminate; not the tilted 28.5 layout.
Battery envelope	62 x 38.5 x 8.5 mm; real protection and lead clearance still needed.
Manufacturing bodies	13 solids represented by 11 supplied STL files.
Source state	Fusion 2705.1.15; millimetres; 221 timeline entries; five warnings.
Reference STEP	414 valid visible solids. One hidden wire body remains in original Fusion.

Original Fusion is the editable source. Import the generated individual files in millimetres at 100%. Reference assemblies are for engineering inspection, not slicing.

Raw Plus, Minus, Talk and both optical solids retain approximately +5 mm Y offsets. New derivatives use native assembly positions. Original files are kept unchanged for traceability.

Parts and proposed materials

ID	Body (CAD qty 1)	XYZ bounds, mm	Material intent
01	Play button	29.00 x 29.20 x 4.65	Rigid prototype
02	Volume plus	5.65 x 22.80 x 11.00	Rigid prototype
03	Volume minus	5.65 x 22.80 x 11.00	Rigid prototype
04	Talk grip	5.80 x 58.00 x 12.00	Flexible / TBD
05	Optical body A	3.82 x 4.05 x 5.55	Clear / TBD
06	Optical body B	5.40 x 5.40 x 3.92	Clear / TBD
07	Rear shell	80.00 x 150.00 x 14.00	Rigid prototype
08	Front shell Body1	80.00 x 150.00 x 14.00	Rigid prototype
09	Front frame Body2	48.00 x 50.00 x 1.00	Rigid prototype
10	Play-switch base	42.00 x 24.00 x 4.00	Rigid prototype
11	LED housing	19.00 x 14.00 x 10.00	Rigid prototype
12	Speaker frame	48.00 x 50.00 x 2.00	Rigid prototype
13	Rim	84.20 x 154.20 x 28.00	Flexible / TBD

Bounds are not tolerance drawings. CAD quantity is not a released procurement quantity. The overlapping front shell and frame require an integral/separate decision. Rigid process, flexible grade/hardness and clear optical finishing remain unqualified.

Use the native-position alternatives once per intended body. Do not combine the original stale rear STL with the updated set. Materials and source-body mapping are recorded in Parts_and_Materials.csv.

Assembly layout



Actual native geometry, separated for identification. Hardware and wiring groups are hidden in this exploded view; they remain visible in assembled/inside modes. Spacing is illustrative and does not prove service paths or tool access.

The 13 print bodies include the shells, frame, control pieces, LED housing, two optics and rim. Purchased/reference components remain distinct from manufacturing bodies.

Inside with reference connections



Rear shell and rim hidden. This snapshot includes 15 visible hardware solids and 32 visible wire solids, previously hidden in 28.6. Their presence is now explicit; the reference inventory does not constitute an approved wiring or fastening schedule.

One further wire body and 1360 non-solid PCB reference sheets are omitted from the viewer. Original Fusion retains them. Colours identify visual groups and must not be interpreted as an electrical pin map.

Static improvements and open fits

Interface	28.6 / 28.7 mm3	Meaning
Play cap / front	11.536 / below 0.001	Static contact clears; full travel and return untested.
PCB laminate / rear	36.336 / below 0.001	Laminate contact clears; whole-board check still needed.
PCB laminate / front	1.290 / below 0.001	Static contact clears; connected closure untested.
Battery / rear	40.761 / 40.761	Remains open; do not compress battery.
Play base / switch	10.800 / 10.800	Reconcile nominal reference with the received switch.
Front shell / frame	16.997 / 16.997	Resolve integral or separate manufacturing intent.
Front / acoustic film	99.463 / 99.463	Define trim, installed placement and thickness.
Resistor / rear	below 0.001 / 0.114	New local contact; check small board component clearance.

Intersection volumes are not penetration depths or machining offsets. Passing a static pair does not establish clearance throughout motion, tolerance variation or a complete connected assembly.

Rim, wiring and source warnings

Item	Finding / next action
Rim	Rear 1549.969 mm3 and front 2684.020 mm3 overlap. Specify flexible material, hardness and intended compression before acceptance.
Side controls	Plus/rear and minus/rear about 0.0093 mm3 each; talk/rear 0.0733 mm3. Review local fit and real return behaviour.
Optics and LED housing	No optical/printed interference above 0.001 mm3. LED housing still contacts modeled hardware and LED/battery leads; classify and resolve these.
Hardware and wires	6 print/print and 33 print/reference contacts are recorded. Distinguish intentional screw seats from rigid, wire and moving-part conflicts.
Five source warnings	Sketch3 (77), Sketch9 (95), Sketch23 (181), Extrude23 (182), Sketch28 (184). Repair missing references and verify regeneration.

All 78 print-body pairs and checks against 401 visible / 402 total reference solids were screened and tested. No native Boolean errors were recorded. Source inventory: 1775 bodies, including 415 solids and 1360 non-solid PCB sheets.

This is not a full reference/reference, motion, strength, tooling or physical performance audit. Sheet-volume API errors are not manufacturing failures.

First-article assembly plan

1 / Use the matched dated set

Read Start Here; use the regenerated rear shell. Settle front-frame integration and material/film/rim requirements with the shop.

2 / Inspect and dry-fit

Record process and dimensions. Fit the whole board and a battery dummy; resolve the battery and resistor contacts without force.

3 / Check controls and optics

Verify play-switch seat, full button travel and free return. Fit speaker/film, microphone/seal and both optical pieces.

4 / Reconcile fasteners and wiring

Use actual part drawings and the authoritative schematic/pin map. Confirm engagement, access, insulation, bends and factory lead slack.

5 / Close and test

The shell must seat by hand before fastening. Check rim compression, USB seating and every control. Complete the proposed qualification record.

Physical qualification record

Every result remains **NOT RUN**. Record the actual process, measured values, date and tester in Physical_Qualification_Log.csv.

ID	Check	Proposed record / criterion
T01	File authority	Use regenerated rear shell and the complete dated native-position set.
T02	Process record	Record material, printer, orientation, layer settings, finishing and measured dimensions.
T03	Battery and full PCB	Dry-fit without battery compression or board bow; resolve battery and resistor contact.
T04	Play and side controls	Check full travel, edge presses, talk ends, simultaneous inputs and free return.
T05	Connections and hardware	Verify actual fasteners, engagement, tools, harness pin maps, insulation and slack.
T06	Closure and USB	Case seats by hand; no wire pinch; actual USB plug seats fully.
T07	Service endurance	Proposed 10 assembly/service cycles; inspect cracking, wear and loosening.
T08	Control endurance	Proposed 1000 actuations per control; record binding and unintended activation.
T09	Functional checks	Record electrical, charging, acoustic, optical and RF results using approved project procedures.
T10	Release review	Disposition all open issues before production or Golden promotion.

Ten service cycles and 1000 actuations per control are proposed first-article targets carried forward from the project. They are not production lifetime or certification claims.

Package map and verification

Folder / record	Use
Original_Source/	Unchanged supplied native F3D and 11 STL files, including the stale rear export.
CAD/	Current individual STEP/STL, 13-body review STEP, visible reference STEP, GLB and validation/source mapping.
Documents/	Change/fit registers, parts and materials, assembly/process, hardware/wiring review and test log.
Images/ and Video/	Actual CAD views and 45-second silent visual overview.
Evidence/	Native current/source comparison and static fit data.
SHA256SUMS.txt	Integrity record for all packaged files except itself.

All 13 individual STEP files reopen as valid single solids and all 13 STL files are watertight, with mesh bounds within 0.03 mm of native bounds. Full reference STEP reimports as 414 valid solids; review STEP contains 13 valid solids.

Default Fusion and independent STEP volume integrations may differ numerically; detailed values are recorded. Old/new geometry change claims use Fusion native difference checks, not cross-kernel subtraction.

Next release: resolve remaining fits and warnings, document actual material/hardware/harness decisions, regenerate any changed parts and complete a measured first article. Golden promotion remains a separate decision.