



# Kymeta™ u8 Terminal Environmental and Reliability Test Results

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## Revision history

Revision	Change
A	Initial release

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## 1 About this document

This document provides a summary of environmental and reliability tests that were performed on the Kymeta™ u8 terminal and peripheral products with the objective of introducing external partners to the durability testing of the product.

This document lists the environmental tests that were performed to meet various standards and summarizes the accelerated life tests (ALT) that were used to predict the reliability of the product. The tests presented herein were those performed on the systems and subsystems that are either designed completely by Kymeta, or integrated by Kymeta using custom off-the-shelf components, for example integration of BUC, LNB, and diplexer RF chain of the Kymeta u8 terminal.

For evaluating the results, a failure in the u8 product is defined as system or subsystem loss of function.

## 2 Standard environmental tests

The following tests were completed successfully to meet IEC and MIL standards.

### 2.1 Temperature tests

Item	Standard	Method	Results
u8 terminal	IEC 60068	+55 °C operational 16-hour dwell	Pass
		-25 °C operational 16-hour dwell	Pass
		-40 °C non-operational 72-hour dwell	Pass
		+85 °C non-operational 72-hour dwell	Pass

### 2.2 Salt Fog

Item	Standard	Method	Results
u8 external components / connectors	ASTM B117	1000 hours	Pass with only surface stains observed

### 2.3 Shock

Item	Standard	Method	Results
u8 terminal	ETS 300 019	Combined shock, operational: 40 shocks/axis; half-sine; 10 G for 11 ms	Pass
		Combined shock, non-operational: 6 shocks/axis; half-sine; 31 G, 11 ms	Pass

### 2.4 Vibration

Item	Standard	Method	Results
u8 terminal	ETS 300 019	Combined sine test, operational; 2–8 Hz frequency, 7.5 mm sine level; 8–500 Hz frequency, 1 G sine level; 1 octave/minute; 10 sweeps/axis	Pass
		Combined random vibration test, operational 120 minutes/axis	Pass

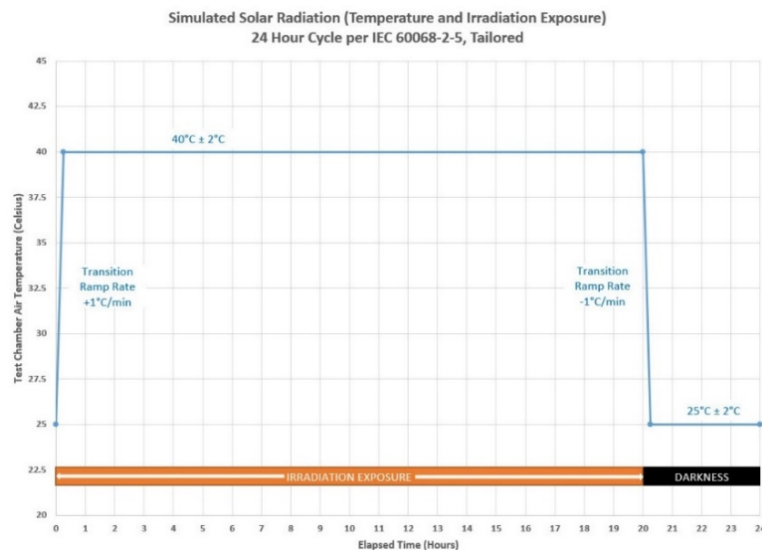
**Combined Random Vibration Test (Operational)**

Level: See chart below

Frequency (Hz)	PSD (G <sup>2</sup> /Hz)
1	0.001
5	0.01999
20	0.01999
26	0.01500
40	0.01500
66	0.00605
117	0.00344
200	0.00344
340	0.00119
500	0.00081

## 2.5 Solar loading

Item	Standard	Method	Results
u8 terminal	IEC 60068-2	4 cycles of exposure to 1100 W/m <sup>2</sup> solar matched radiation	Pass



## 2.6 Wind loading

Item	Standard	Method	Results
u8 terminal	ETS 300 019	40–120 mph winds at 0–30° inclination; operational	Pass

## 2.7 Ice loading

Item	Standard	Method	Results
u8 terminal	MIL-STD-810G	521.3 "Icing/Freezing Rain"	Pass

## 2.8 Ingress protection

Item	Standard	Method	Results
u8 terminal	IEC 60529, IP6x, dust-tight	Section 5.2, Table 2, First characteristic numeral 6 "Dust-Tight"	Pass
	IEC 60529, IPx6, Powerful jetting water, 100 L/min	Section 14.2.6, "Test for Second Characteristic Numeral 6 with the 12.5 mm nozzle"	Pass

## 2.9 Altitude

Item	Standard	Method	Results
u8 terminal	IEC 60068-2-13	Tailored to 3,600 meters; operational	Pass
	EN 50125-1:2014	Table 1, Class A1, 1,400m; operational	Pass
	STANAG 4370	9,144 meters; non-operational	Pass

## 3 Accelerated life test (ALT)

### 3.1 Thermal cycle ALT

Item	Method	Results
u8 terminal	Range from -40°C to +85°C, non-operational. 1-hour dwells at max/min temperatures	Tested to 21 cycles

### 3.2 High temperature high humidity ALT

Item	Method	Results
u8 terminal	Steady-state temperature and humidity at 85°C/95% RH, non-operational	Tested to 500 hours

### 3.3 Hail drop test

Item	Method	Results
u8 terminal	Steel Ball Drop, 68%, 81%, 90%, 95% cumulative hail energy percentile	Survived 2 consecutive drop impacts in same vicinity per energy; antenna performance did not change; no radome ruptures
	Steel Ball Drop, 98.5% cumulative hail energy percentile	Survived 8 consecutive drop impacts in same vicinity; antenna performance did not change, evidence of internal radome rupture at one impact point

Hail Diameter	Hail Mass	Terminal Velocity	Kinetic Energy	Cumulative Probability	Steel Ball Mass	Drop Height
3.2 cm (1.25 in.)	15.4 g (0.5 oz)	26.5 m/s (59 mph)	5.4 J	68%	360 g (12.7 oz)	1.5 m (5 ft)
3.8 cm (1.5 in.)	26.6 g (0.9 oz)	29.0 m/s (65 mph)	11.2 J	81%	530 g (1.2 lb.)	2.1 m (7 ft)
4.45 cm (1.75 in.)	42.2 g (1.5 oz)	31.3 m/s (70 mph)	20.7 J	90%	760 g (1.7 lb.)	2.8 m (9 ft 2 in)
5.08 cm (2 in.)	62.9 g (2.2 oz)	33.5 m/s (75 mph)	35.3 J	95%	1040 g (2.3 lb)	3.5 m (11 ft 4 in)
6.35 cm (2.5 in.)	122.9 g (4.3 oz)	37.5 m/s (84 mph)	86.2 J	98.50%	1800 g (4.0 lb)	4.9 m (16 ft)