

DME Mode Specifications

SIGNAL GENERATOR

A 5-minute warm-up period is required for all specifications.

Output Frequency

Reply Frequency

Range 962 to 1213 MHz
Accuracy ± 10 kHz

Output Level

Antenna Port

Range -67 to -2 dBm at Antenna port
Resolution 1 dB
Accuracy ± 2 dB
Distance to UUT antenna 6 to 300 ft. with supplied antenna

RF I/O Port

Range -115 to -47 dBm
Resolution 1 dB
Accuracy -95 dBm to -47 dBm, ± 1 dB
Accuracy -115 dBm to <-95 dBm, ± 2 dB

Reply Pulse Spacing

P1 to P2 12 μ s (± 100 ns) (X Channel) @ 50% peak
P1 to P2 30 μ s (± 100 ns) (Y Channel) @ 50% peak

Reply Pulse Width

P1/P2 3.5 μ s (± 0.5 μ s)

Echo Reply

Control On/Off
Position 30 nmi (± 1 nmi)
Amplitude -11 dB (± 1 dB) relative to reply level

Reply Pulse Rise and Fall Times

All Pulses

Rise Time 2.5 μ s (± 0.25 μ s) (10% to 90%)
Fall Time 2.5 μ s (± 0.25 μ s) (90% to 10%)

Reply Delay

X Channel

Fixed Reply Delay 50 μ s (± 100 ns)

Y Channel

Fixed Reply Delay 56 μ s (± 100 ns)

Range Delay

X and Y Channel

Range 0 to 450.00 nmi
Resolution 0.01 nmi
Accuracy ± 0.01 nmi

Range Rate

X and Y Channel

Range 10 to 6500 kts
Resolution 1 kts
Accuracy $\pm 0.01\%$ typical, tested to $\pm 0.5\%$

Squitter

PRF 2700 Hz
Accuracy $\pm 2\%$
Distribution Per ARINC 568

Reply Efficiency

Range 0 to 100%
Resolution 1% increments
Accuracy $\pm 0.5\%$

Ident Tone

Selection Selectable three letter code
Frequency 1350 Hz
Accuracy ± 2 Hz

UUT MEASUREMENTS

ERP

Range +47 to +64 dBm
Resolution 0.1 dB
Accuracy ± 2 dB

Direct Connection Peak Pulse Power

Range +47 to +64 dBm
Resolution 0.1 dB
Accuracy ± 1 dB

Frequency

Range 1025.00 to 1150.00 MHz
Resolution 10 kHz
Accuracy ± 20 kHz

Interrogation Pulse Width

P1 and P2 Pulse Widths

Range 2.00 to 5.00 ms
Resolution 1 ns
Accuracy ± 50 ns

Interrogation Pulse Spacing

<i>P1 to P2 Spacing</i>	10 to 14 μ s (X Channel)
<i>P1 to P2 Spacing</i>	34 to 38 μ s (Y Channel)
<i>Resolution</i>	10 ns
<i>Accuracy</i>	± 20 ns

Interrogation PRF

<i>Range</i>	1 to 300 Hz
<i>Resolution</i>	1 Hz
<i>Accuracy</i>	± 2 Hz

Transponder Mode Specifications

SIGNAL GENERATOR

RF Output Frequency

<i>Interrogation Frequency</i>	1030 MHz
<i>Accuracy</i>	± 10 kHz

RF Output Level

Antenna Connector

(MTL + 6 dB typical, automatically controlled for a MTL range of -83 to -68 dBm)

<i>Range</i>	-67 to -2 dBm at antenna connector
<i>Resolution</i>	0.5 dB
<i>Accuracy</i>	± 2 dB
<i>Distance to UUT antenna</i>	6 to 200 ft. with supplied antenna

RF I/O Connector

(MTL + 6 dB typical, automatically controlled)

<i>Range</i>	-115 to -47 dBm
<i>Resolution</i>	0.5 dB
<i>Accuracy</i>	-95 to -47 dBm, ± 1 dB
<i>Accuracy</i>	-115 to <-95 dBm, ± 2 dB

ATCRBS/MODE S Interrogation Pulse Spacing

Mode A

<i>P1 to P2</i>	2.00 μ s (± 25 ns)
<i>P1 to P3</i>	8.00 μ s (± 25 ns)

Mode C

<i>P1 to P2</i>	2.00 μ s (± 25 ns)
<i>P1 to P3</i>	21.00 μ s (± 25 ns)

Mode S

<i>P1 to P2</i>	2.00 μ s (± 25 ns)
<i>P1 to P6</i>	3.50 μ s (± 25 ns)
<i>P1 to SPR</i>	4.75 μ s (± 25 ns)
<i>P5 to SPR</i>	0.40 μ s (± 50 ns)

Intermode Interrogation Pulse Spacing

Mode A

<i>P1 to P3</i>	8.00 μ s (± 25 ns)
<i>P1 to P4</i>	10.00 μ s (± 25 ns)

Mode C

<i>P1 to P3</i>	21.00 μ s (± 25 ns)
<i>P1 to P4</i>	23.00 μ s (± 25 ns)

Interrogation Pulse Widths

Modes A, C, S, Intermode

<i>P1,P2,P3</i>	0.80 μ s (± 50 ns)
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Mode S

<i>P6 (Short DPSK Block)</i>	16.25 μ s (± 50 ns)
<i>P6 (Long DPSK Block)</i>	30.25 μ s (± 50 ns)
<i>P5</i>	0.80 μ s (± 50 ns)

Intermode

<i>P4 (Short)</i>	0.80 μ s (± 50 ns)
<i>P4 (Long)</i>	1.60 μ s (± 50 ns)

Interrogation Pulse Rise and Fall Times

All Modes

<i>Rise Time</i>	50 to 100 ns
<i>Fall Time</i>	50 to 200 ns

Phase Modulation

All Modes

<i>Transition Time</i>	<80 ns
<i>Phase Shift</i>	180° ($\pm 10^\circ$)

SLS Levels

ATCRBS

<i>SLS Level (P2)</i>	-9 dB, -1 to +0 dB relative to P1 level
	0 dB, -0 to +1 dB relative to P1 level
	OFF

MODE S

<i>SLS Level (P5)</i>	-12 dB, -1 to +0 dB relative to P6 level
	+3 dB, -0 to +1 dB relative to P6 level
	OFF

Note: SLS level is automatically controlled in the SLS LEVEL test.

Interrogation Test Signals**MODE S**

PRF 50 Hz (± 5 Hz)

ATCRBS

PRF 235 Hz (± 5 Hz)

UUT MEASUREMENTS**ERP (@ 1090 MHz)**

Range +45.5 to +59 dBm (35.5 to 800 watts)
Resolution 0.1 dB
Accuracy ± 2 dB

Direct Connection Peak Pulse Power (@ 1090 MHz)

Range +46.5 to +59 dBm (45 to 800 Watts)
Resolution 0.1 dB
Accuracy ± 1 dB

Transmitter Frequency

Range 1087.000 to 1093.000 MHz
Resolution 10 kHz
Accuracy ± 50 kHz

Receiver Sensitivity, Radiated MTL

Range -79 to -67 dBm into 0 dBi antenna
Resolution 0.1 dB
Accuracy ± 2 dB, typical

Reply Delay**ATCRBS**

Range 1.80 to 7.00 μ s
Resolution 10 ns
Accuracy ± 50 ns

Reply Delay, Mode S and ATCRBS Mode S ALL-CALL

Range 125.00 to 131.00 μ s
Resolution 10 ns
Accuracy ± 50 ns

Reply Delay Jitter**ATCRBS**

Range 0.00 to 2.30 μ s
Resolution 1 ns
Accuracy ± 20 ns

Mode S and ATCRBS Mode S ALL-CALL

Range 0.00 to 6.00 μ s
Resolution 1 ns
Accuracy ± 20 ns

Pulse Spacing**F1 to F2**

Range 19.70 to 21.60 μ s
Resolution 1 ns
Accuracy ± 20 ns

Mode S Preamble

Range, P1 to P2 0.8 to 1.2 μ s
Range, P1 to P3 3.3 to 3.7 μ s
Range, P1 to P4 4.3 to 4.7 μ s
Resolution 1 ns
Accuracy ± 20 ns

Pulse Widths**F1 and F2**

Range 0.25 to 0.75 μ s
Resolution 1 ns
Accuracy ± 20 ns

Mode S Preamble

Range 0.25 to 0.75 μ s
Resolution 1 ns
Accuracy ± 20 ns

PULSE Amplitude Variation

Range
Mode S (Relative to P1) -3 to +3 dB
ATCRBS (Relative to F1) -3 to +3 dB
Resolution 0.1 dB (0.01 dB via RCI)
Accuracy ± 0.5 dB

DF 11 Squitter Period

Range 0.10 to 4.88 sec
Resolution 10 μ s
Accuracy ± 10 μ s

Diversity Isolation

Range 0 to >20 dB (Depending on Test Distance)
Test Distance 1.83 m (6ft) to 28.96 m (95 ft)
Resolution 0.1 dB
Accuracy ± 3 dB

TCAS Mode Specifications

SIGNAL GENERATOR

Output Frequency

Reply Frequency	1090 MHz
Accuracy	± 10 kHz

Output Level (simulated ERP)

Antenna Connector ^{NOTE 1}

Radiated power at 0dBi UUT antenna	
	-68 dBm typical @ 10 Nmi (Range, automatically controlled)
Range	-67 to -2 dBm at Antenna connector
Resolution	0.5 dB
Accuracy	± 2 dB
Distance to UUT antenna	6 to 300 ft. with supplied antenna

RF I/O Connector

Automatic mode	-68 dBm @ 10 Nmi range, automatically controlled
Manual Mode Range	-115 to -47 dBm
Resolution	0.5 dB
Accuracy	-95 to -47 dBm, ± 1 dB
Accuracy	-115 to <-95 dBm, ± 2 dB

Reply Pulse Spacing

Mode C	
F1 to F2	20.30 μ s (± 25 ns)
F1 to C1	1.45 μ s (± 25 ns)
F1 to A1	2.90 μ s (± 25 ns)
F1 to C2	4.35 μ s (± 25 ns)
F1 to A2	5.80 μ s (± 25 ns)
F1 to C4	7.25 μ s (± 25 ns)
F1 to A4	8.70 μ s (± 25 ns)
F1 to B1	11.60 μ s (± 25 ns)
F1 to D1	13.05 μ s (± 25 ns)
F1 to B2	14.50 μ s (± 25 ns)
F1 to D2	15.95 μ s (± 25 ns)
F1 to B4	17.40 μ s (± 25 ns)
F1 to D4	18.85 μ s (± 25 ns)
Mode S	
P1 to P2	1.00 μ s (± 25 ns)
P1 to P3	3.50 μ s (± 25 ns)
P1 to P4	4.50 μ s (± 25 ns)
P1 to D1	8.00 μ s (± 25 ns)
D1 to Dn (n=2 to 112)	1.00 μ s times (n-1) (± 25 ns)

Reply Pulse Widths

Mode C	
All Pulses	0.45 μ s (± 50 ns)
Mode S	
P1 through P4	0.50 μ s (± 50 ns)
D1 through D112	0.50 μ s (± 50 ns), 1 μ s chip width
Reply Modes	TCAS I / II Mode C (with altitude reporting) TCAS II Mode S formats 0, 11, 16

Reply Pulse Amplitudes

ATCRBS	± 1 dB relative to F1
Mode S	± 1 dB relative to P1

Reply Pulse Rise and Fall Times

All Modes	
Rise Time	50 to 100 ns
Fall Time	50 to 200 ns

Percent Reply

Range	0 to 100%
Resolution	10%
Accuracy	± 1 %

Reply Delay

ATCRBS	3.0 μ s (± 50 ns)
Mode S	128 μ s (± 50 ns)

Range Delay

Range	0 to 260 nmi
Resolution	0.1 nmi
Accuracy	± 0.02 nmi

Range Rate

Range	-1200 to +1200 kts
Resolution	10 kts
Accuracy	10%

Altitude Range

Range	-1000 to 126,000 ft.
Resolution, Mode C	100 ft.
Resolution, Mode S	25 ft.

Altitude Rate

Range	-10,000 to +10,000 fpm
Resolution	100 fpm
Accuracy	10%

Squitter

Control On/Off
 Rate 0.8 to 1.2 seconds, randomly distributed

Receiver

Pulse Spacing

ATCRBS (Mode C All Call)

S1 to P1 2.0 μ s
 Accepts < ± 200 ns
 Rejects > ± 1.0 μ s
 P1 to P3 21.0 μ s
 Accepts < ± 200 ns
 Rejects (<10% Replies) > ± 1.0 μ s
 P1 to P4 23.0 μ s
 Accepts < ± 200 ns
 Rejects (<10% Replies) > ± 1.0 μ s

Mode S

P1 to P2 2.0 μ s
 Accepts < ± 200 ns
 Rejects (<10% Replies) > ± 1.0 μ s
 P1 to SPR 4.75 μ s
 Accepts < ± 200 ns
 Rejects (<10% Replies) > ± 1.5 μ s

Suppression

ATCRBS (P2 or S1)
 >0.5 dB above level of P1 <10% Replies

UUT MEASUREMENTS

ERP (@ 1030 MHz)

ATCRBS

Range +43 to +58 dBm (20 to 631 watts)
 Resolution 0.1 dB
 Accuracy ± 2 dB

Mode S

Range +43 to +58 dBm (20 to 631 watts)
 Resolution 0.1 dB
 Accuracy ± 2 dB

Direct Connection Peak Pulse Power (@ 1030 MHz)

ATCRBS

Range +43 to +58 dBm (20 to 631 watts)
 Resolution 0.1 dB
 Accuracy ± 1 dB

Mode S

Range +43 to +58 dBm (20 to 631 watts)
 Resolution 0.1 dB
 Accuracy ± 1 dB

Frequency

Range 1029.900 to 1030.100 MHz
 Resolution 1 kHz
 Accuracy ± 10 kHz

TCAS Broadcast Interval

Range 1.0 to 12.0 sec
 Resolution 0.1 sec
 Accuracy ± 0.2 sec

UAT Mode Specifications

SIGNAL GENERATOR

RF Output Frequency

Transmit Frequency 978 MHz
 Accuracy ± 10 kHz

Output Level

Antenna Port

Radiated power at 0 dBi UUT antenna -85 dBm, automatically controlled
 Range -67 to -2 dBm at Antenna port
 Resolution 0.5 dB
 Accuracy ± 2 dB
 Distance to UUT antenna 6 to 150 ft. with supplied antenna

RF I/O Port

Automatic mode -85 dBm
 Accuracy ± 1 dB

Modulation

Type BPSK per RTCA DO-282B
 Deviation ± 312.5 kHz typical

UUT MEASUREMENTS

ERP (@978MHZ)

Range +35 to +57 dBm (3.16 to 500 watts)
 Resolution 0.1 dB
 Accuracy ± 2 dB

Direct Connection Power (@978 MHZ)

Range	+35 to +57 dBm (3.16 to 500 watts)
Resolution	0.1 dB
Accuracy	±1 dB

Frequency

Range	977.96 to 978.04MHz
Resolution	1 kHz
Accuracy	±10 kHz

Misc. Inputs/Outputs Specifications

RF I/O

Type	Input/Output
Impedance	50 Ω typical
Maximum Input Level	4 kW peak, 10 W average
VSWR	<1.3:1

Antenna

Type	Input/Output
Impedance	50 Ω typical
Maximum Input Level	10 W peak, 0.5 W average

Video

Type	Output
Impedance	50 Ω typical
Generate Video Level	500 mV peak to peak typical into 50 Ω
Receive Video Level	Proportional to IF level
Baseline	±0.5 V referenced to ground

GPS Antenna

Type	Output
Impedance	50 Ω typical, DC short

Test Antenna

VSWR	<1.5:1
Gain	7.5 dB, Typical

Time Base (TCXO)

Temperature Stability	±1 ppm
Aging	±1 ppm per year
Accuracy	±1 ppm

Battery

Type	Li Ion
Duration	>4 hrs continuous operation >6 hrs, Typical

Input Power (Test Set)

Input Range	11 to 32 Vdc
Power Consumption	55 W Maximum 16 W Nominal at 18 Vdc with charged battery
Fuse Requirements	5 A, 32 Vdc, Type F

Input Power (Supplied External AC to DC Converter)

Input Range	100 to 250 VAC, 1.5 A Max, 47 to 63 Hz
Mains Supply Voltage Fluctuations	<10% of the nominal voltage
Transient Over-voltages	According to Installation Category II

Environmental

Test Set

Use	Pollution Degree 2
Altitude	<4800 meters
Operating Temp. ^{NOTE 2}	-20°C to 55°C
Storage Temp. ^{NOTE 3}	-30°C to 71°C
Relative Humidity	95% (±5%) from 5° to 30°C 75% (±5%) from 30° to 40°C 45% (±5%) from 40° to 55°C

Supplied External AC to DC Converter

Use	Indoors
Altitude	<10,000 meters
Operating Temperature	0° to 40°C
Storage Temperature	-20°C to 71°C

Physical Characteristics

Height

11.2 in. (28.5 cm)

Width

9.1 in. (23.1 cm)

Depth

2.7 in. (6.9 cm)

Weight (Test set only)

8 lbs. (3.6 kg)

Certifications

Test Set

Altitude, operating	MIL-PRF-28800F, Class 2
Altitude, not operating	MIL-PRF-28800F, Class 2
Bench Handling	MIL-PRF-28800F, Class 2
Blowing Dust	MIL-STD-810F, Method 510.4, Procedure 1
Drip-proof	MIL-PRF-28800F, Class 2
Explosive Atmosphere	MIL-STD-810F Method 511.4, Procedure 1
Relative Humidity	MIL-PRF-28800F, Class 2
Shock, Functional	MIL-PRF-28800F, Class 2
Vibration Limits	MIL-PRF-28800F, Class 2
Temp, operating ^{NOTE 4}	MIL-PRF-28800F, Class 2
Temp, not operating ^{NOTE 5}	MIL-PRF-28800F, Class 2
Transit Drop	MIL-PRF-28800F, Class 2

Safety Compliance	UL-61010B-1 EN 61010-1 CSA 22.2 No 61010-1
EMC	EN 61326

External AC-DC Converter

Safety Compliance	UL 1950 DS CSA 22.2 No. 234 VDE EN 60 950
EMI/RFI Compliance EMC	FCC Docket 20780 Curve "B" EN 61326

Transit Case

Drop Test	FED-STD-101C, Method 5007.1 Paragraph 6.3, Procedure A, Level A
Falling Dart Impact	ATA 300, Category I
Vibration, Loose Cargo	FED-STD-101C, Method 5019
Vibration, Sweep	ATA 300, Category I
Simulated Rainfall	MIL-STD-810F, Method 506.4 Procedure II of 4.1.2
FED-STD-101C	Method 5009.1, Sec 6.7.1
Immersion	MIL-STD-810F, Method 512.4

NOTES

- NOTE 1 - Simulates a 50.5 dBm XPDR ERP at 10 nMi range.
- NOTE 2 - Battery charging temperature range: 5°C to 40°C (controlled by internal charger).
- NOTE 3 - Li Ion Battery must be removed below -20°C and above 60°C.
- NOTE 4 - Temperature range extended to -20°C to 55°C.
- NOTE 5 - Temperature range reduced to -30°C to 71°C.

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