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 µs (±100 ns) (X Channel) @ 50% peak*
P1 to P2	*30 µs (±100 ns) (Y Channel) @ 50% peak*

Reply Pulse Width

P1/P2	*3.5 µs (±0.5 µs)*

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 µs (±0.25 µs) (10% to 90%)*
Fall Time	*2.5 µs (±0.25 µs) (90% to 10%)*

Reply Delay

X Channel

Fixed Reply Delay	*50 µs (±100 ns)*

Y Channel

Fixed Reply Delay	*56 µs (±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	*±0.01% typical, tested to ±0.5%*

Squitter

PRF	*2700 Hz*
Accuracy	*±2%*
Distribution	*Per ARINC 568*

Reply Efficiency

Range	*0 to 100%*
Resolution	*1% increments*
Accuracy	*±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

P1 to P2 Spacing	*10 to 14 µs (X Channel)*
P1 to P2 Spacing	*34 to 38 µs (Y Channel)*
Resolution	*10 ns*
Accuracy	*±20 ns*

Interrogation PRF

Range	*1 to 300 Hz*
Resolution	*1 Hz*
Accuracy	*±2 Hz*

Transponder Mode Specifications

SIGNAL GENERATOR

RF Output Frequency

Interrogation Frequency	*1030 MHz*
Accuracy	*±10 kHz*

RF Output Level

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

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

RF I/O Connector
(MTL + 6 dB typical, automatically controlled)

Range	*-115 to -47 dBm*
Resolution	*0.5 dB*
Accuracy	*-95 to –47 dBm, ±1 dB*
Accuracy	*-115 to <-95 dBm, ±2 dB*

ATCRBS/MODE S Interrogation Pulse Spacing

Mode A

P1 to P2	*2.00 µs (±25 ns)*
P1 to P3	*8.00 µs (±25 ns)*

Mode C

P1 to P2	*2.00 µs (±25 ns)*
P1 to P3	*21.00 µs (±25 ns)*

Mode S

P1 to P2	*2.00 µs (±25 ns)*
P1 to P6	*3.50 µs (±25 ns)*
P1 to SPR	*4.75 µs (±25 ns)*
P5 to SPR	*0.40 µs (±50 ns)*

Intermode Interrogation Pulse Spacing

Mode A

P1 to P3	*8.00 µs (±25 ns)*
P1 to P4	*10.00 µs (±25 ns)*

Mode C

P1 to P3	*21.00 µs (±25 ns)*
P1 to P4	*23.00 µs (±25 ns)*

Interrogation Pulse Widths

Modes A, C, S, Intermode

P1,P2,P3	*0.80 µs (±50 ns)*

Mode S

P6 (Short DPSK Block)	*16.25 µs (±50 ns)*
P6 (Long DPSK Block)	*30.25 µs (±50 ns)*
P5	*0.80 µs (±50 ns)*

Intermode

P4 (Short)	*0.80 µs (±50 ns)*
P4 (Long)	*1.60 µs (±50 ns)*

Interrogation Pulse Rise and Fall Times

All Modes

Rise Time	*50 to 100 ns*
Fall Time	*50 to 200 ns*

Phase Modulation

All Modes

Transition Time	*<80 ns*
Phase Shift	*180° (±10°)*

SLS Levels

ATCRBS

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

MODE S

SLS Level (P5)
-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 µs*
Resolution	*10 ns*
Accuracy	*±50 ns*

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

Range	*125.00 to 131.00 µs*
Resolution	*10 ns*
Accuracy	*±50 ns*

Reply Delay Jitter

ATCRBS

Range	*0.00 to 2.30 µs*
Resolution	*1 ns*
Accuracy	*±20 ns*

Mode S and ATCRBS Mode S ALL-CALL

Range	*0.00 to 6.00 µs*
Resolution	*1 ns*
Accuracy	*±20 ns*

Pulse Spacing

F1 to F2

Range	*19.70 to 21.60 µs*
Resolution	*1 ns*
Accuracy	*±20 ns*

Mode S Preamble

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

Pulse Widths

F1 and F2

Range	*0.25 to 0.75 µs*
Resolution	*1 ns*
Accuracy	*±20 ns*

Mode S Preamble

Range	*0.25 to 0.75 µs*
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 µs*
Accuracy	*±10 µs*

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 µs (±25 ns)*
F1 to C1	*1.45 µs (±25 ns)*
F1 to A1	*2.90 µs (±25 ns)*
F1 to C2	*4.35 µs (±25 ns)*
F1 to A2	*5.80 µs (±25 ns)*
F1 to C4	*7.25 µs (±25 ns)*
F1 to A4	*8.70 µs (±25 ns)*
F1 to B1	*11.60 µs (±25 ns)*
F1 to D1	*13.05 µs (±25 ns)*
F1 to B2	*14.50 µs (±25 ns)*
F1 to D2	*15.95 µs (±25 ns)*
F1 to B4	*17.40 µs (±25 ns)*
F1 to D4	*18.85 µs (±25 ns)*

Mode S

P1 to P2	*1.00 µs (±25 ns)*
P1 to P3	*3.50 µs (±25 ns)*
P1 to P4	*4.50 µs (±25 ns)*
P1 to D1	*8.00 µs (±25 ns)*
D1 to Dn (n=2 to 112)	*1.00 µs times (n-1) (±25 ns)*

Reply Pulse Widths

Mode C

All Pulses	*0.45 µs (±50 ns)*

Mode S

P1 through P4	*0.50 µs (±50 ns)*
D1 through D112	*0.50 µs (±50 ns), 1 µs 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 µs (±50 ns)*
Mode S	*128 µs (±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 µs*
Accepts	*< ±200 ns*
Rejects	*> ±1.0 µs*
P1 to P3	*21.0 µs*
Accepts	*< ±200 ns*
Rejects	*(<10% Replies) >±1.0 µs*
P1 to P4 23.0 µs	
Accepts	*< ±200 ns*
Rejects	*(<10% Replies) > ±1.0 µs*

Mode S

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

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	*BPFSK per RTCA DO-282B*
Deviation	*±312.5kHz 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*
VSWR	*≤ 1.7:1*

Video

Type	*Output*
Impedance	*50 Ω typical*
Generate Video Level	*0.2 to 1.5 V peak to peak into 50 Ω*
Receive Video Level	*Proportional to IF level*
Baseline:	*±0.5 V referenced to ground*

GPS Antenna

Type	*Input*
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	*FCC Docket 20780 Curve "B"*
EMC	*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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