VIAVI Solutions

Specification Sheet

VIAVI
IFR6000

Transponder/DME/TCAS Flight Line Test Set

DME Mode

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

DME Mode (continued)

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)	
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

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 (Automatically controlled in the SLS LEVEL test)	
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

Transponder Mode (continued)

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 to 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 ms
Accuracy	±10 ms
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

Signal Generator	
Output Frequency	
Reply Frequency	1090 MHz
Accuracy	±10 kHz
Output Level (simulated ERP)	
Antenna Connector [1]	
Radiated power at 0 dBi 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

1 - Simulates a 50.5 dBm XPDR ERP at 10 nMi range

TCAS Mode (continued)

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

TCAS Mode (continued)

UUT Measurements	
ERP (@ 1030 MHz)	
ATCRBS	
Rnge	+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

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

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

Misc. Inputs/Outputs (continued)

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.[2]	-20°C to 55°C (-4° to 131°F)
Storage Temp.[3]	-30°C to 71°C (-22° to 159.8°F)
Relative Humidity	95% (±5%) from 5° to 30°C (41° to 86°F) 75% (±5%) from 30° to 40°C (86° to 104°F) 45% (±5%) from 40° to 55°C (104° to 131°F)
Supplied External AC to DC Converter	
Use	Indoors
Altitude	<10,000 meters
Operating Temperature	0° to 40°C (32° to 104°F)
Storage Temperature	-20°C to 71°C (-4° to 159.8°F)

Physical Characteristics

Dimensions	
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
Safety Compliance	UL-61010B-1, EN 61010-1, CSA 22.2 No 61010-1
EMC	EN 61326
Relative Humidity	MIL-PRF-28800F, Class 2
Shock, Functional	MIL-PRF-28800F, Class 2
Vibration Limits	MIL-PRF-28800F, Class 2
Temp, operating [4]	MIL-PRF-28800F, Class 2
Temp, not operating [5]	MIL-PRF-28800F, Class 2
Transit Drop	MIL-PRF-28800F, Class 2
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

2 - Battery charging temperature range: 5°C to 40°C (41°F to 104°F) (controlled by internal charger)

3 - Li Ion Battery must be removed below -20°C (-4°F) and above 60°C (140°F)

4 - Temperature range extended to -20°C to 55°C (-4° to 131°F)

5 - Temperature range reduced to -30°C to 71°C (-22° to 159.8°F)

VIAVI Solutions

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