VIAVI
IFR6015

Military Flight Line Test Set

VIAVI Solutions

TACAN/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
	Variable Channel Selection: 1 to 126 (X & Y)
	Preset Channel Selection
	Preset 1 (DoD)
	T/R Mode 17X, 18X
	A/A Mode 17X, 17Y
	Inverse A/A Mode 80X, 80Y
	Preset 2 (AN/ASM-663)
	5X, 5Y, 47X, 47Y, 89X, 89Y
	Preset 3 (AN/ARM-184) No Preset
	Preset 4 (2650/2655)
	18X, 18Y, 47X, 47Y, 100X, 100Y, 123X, 123Y

Output Level	
Antenna Port	Range: -67 to -5 dBm (T/R Norm, T/R Inv, A/A Beacon, A/A Inv) -67 to -2 dBm (T/R Rng Only, A/A Rng Only)
	Resolution: 0.5 dB
	Accuracy: ±2 dB
	Distance to UUT antenna: 6 to 250 ft. with supplied antenna
RF I/O Port	Range: -115 to -50 dBm (T/R Norm, T/R Inv, A/A Beacon, A/A Inv) -115 to -47 dBm (T/R Rng Only, A/A Rng Only)
	Resolution: 0.5 dB
	Accuracy: -95 dBm to –50 dBm @ ±1 dB
	Accuracy: -115 dBm to <-95 dBm @ ±2 dB
Reply Pulse Spacing	
P1 to P2	12 µs ± 0.1 µs (T/R X Channel) @ 50% peak
P1 to P2	30 µs ± 0.1 µs (T/R 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: 2.0 µs ± 0.25 µs (10% to 90%)
	Fall Time: 2.5 µs ± 0.25 µs (90% to 10%)
Reply Delay	
T/R X Channel	Fixed Reply Delay: 50 µs ± 100 ns
T/R Y Channel	Fixed Reply Delay: 56 µs ± 100 ns
A/A X Channel	Fixed Reply Delay: 62 µs ± 100 ns
A/A Y Channel	Fixed Reply Delay 74 µs ± 100 ns

TACAN/DME Mode (continued)

Variable Range Delay	
X and Y Channel	
Range	0 to 450.00 nmi
Resolution	0.01 nmi
Accuracy	±0.01 nmi

Preset Range Delay	
X and Y Channel	
Preset 1 (DoD) Range	0, 3, 10, 30, 100, 200, 300, 400 nmi
Preset 2 (AN/ASM-663) Range	0, 10, 150, 297 nmi
Preset 3 (AN/ARM-184) Range	0, 50, 100, 150, 200, 250, 300, 350, 400 nmi
Preset 4 (2650/2655) Range	0, 5, 125, 283 nmi
Resolution	0.01 nmi
Accuracy	±0.01 nmi

Variable Range Rate	
X and Y Channel	
Range	0 to 6500 kts
Resolution	1 kts
Accuracy	±0.01% typical, tested to ± 0.5%

Preset Range Rate	
X and Y Channel	
Preset 1 (DoD) Rate	0, 250 kts (1000 kts in A/A modes)
Preset 2 (AN/ASM-663) Rate	No rate
Preset 3 (AN/ARM-184) Rate	0, 2400 kts
Preset 4 (2650/2655) Rate	No rate
Resolution	1 kts
Accuracy	±0.01% typical, tested to ± 0.5%

Squitter PRF	
T/R(X) & T/R(Y) NORM, INVERSE, RNG ONLY	2700 Hz
A/A RNG ONLY, BEACON, INVERSE	1350 Hz
Accuracy	±2%
Distribution	Per MIL STD 291C and ARINC 568

Reply Efficiency	
Range	0 to 100%
Resolution	1% increments
Accuracy	±0.5%

Ident Tone Pulse Pair	
T/R(X) & T/R(Y) Modes Selection (Selectable four letter code or tone)	
Frequency	1350 Hz
Accuracy	±2 Hz
Equalizer pulse pair	Spacing from Ident pair 100 µs ± 10 µs

Ident Tone Single Pulse	
A/A(X) & A/A(Y) Modes Selection (Selectable four letter code or tone)	
Frequency	1350 Hz
Accuracy	±2 Hz

Inverse Mode	
A/A(X), A/A(Y), T/R(X), T/R(Y) (Active Low North Reference Trigger Sync Output)	

A/A Mode Interrogation	
P1 to P2	12 µs ± 0.1 µs (A/A X Channel) @ 50% peak
P1 to P2	24 µs ± 0.1 µs (A/A Y Channel) @ 50% peak
Interrogation Rate	150 PPS, ± 5 Hz

15/135 HZ Bearing Signal	
Modulation Levels	15 Hz: 20% ± 2.5%
	135 Hz: 20% ± 2.5%
Frequency	15/135 Hz: <± 0.2%
Distortion	<2.5%

Bearing	
Variable	0 to 359.5° in 0.5° increments
Accuracy	±0.1°

Preset	
Preset 1 (DoD) Range	0°, 45°, 90°, 135°, 180°, 225°, 270°, 315°
Preset 2 (AN/ASM-663) Range	0°, 45°, 180°, 225°
Preset 3 (AN/ARM-184) Range	0°, 90°, 180°, 337.5°
Preset 4 (2650/2655) Range	90°, 230°, 320°

Interrogation Pulse Decoding	
Must Reply nominal code pair spacing	< ± 0.5 µs
Must Not Reply nominal code pair spacing	> ± 1.0 µs

MRB T/R(X)	
Group	12 pairs of pulses
Pulse Spacing	12 µs ± 0.1 µs
Pulse Pair Spacing	12 µs ± 0.1 µs

MRB T/R(Y)	
Group	13 single pulses
Pulse Spacing	30 µs ± 0.1 µs

MRB A/A Beacon (X & Y)	
Group	10 single pulses
Pulse Spacing	30 µs ± 0.1 µs

ARB T/R(X)	
Group	6 pairs of pulses
Pulse Spacing	12 µs ± 0.1 µs
Pulse Pair Spacing	24 µs ± 0.1 µs

ARB T/R(Y)	
Group	13 single pulses
Pulse Spacing	15 µs ± 0.1 µs

TACAN/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 Pulse Widths	
Range	2.00 to 5.00 µs
Resolution	1 ns
Accuracy	±50 ns
Interrogation Pulse Spacing	
P1 to P2 Spacing	10 to 14 µs (T/R X and A/A X Channel)
P1 to P2 Spacing	22 to 26 µs (A/A Y Channel)
P1 to P2 Spacing	34 to 38 µs (T/R Y Channel)
Resolution	10 ns
Accuracy	±20 ns
Interrogation PRF	
Range	1 to 300 Hz
Resolution	1 Hz
Accuracy	±2 Hz
A/A Reply Delay	
A/A(X)	62 µs (-2 +4 µs accept)
A/A(Y)	74 µs (-2 +4 µs accept)
Resolution	10 ns
Accuracy	±100 ns

Transponder Mode

Signal Generator	
RF Output Frequency	
Interrogation Frequency	1030 MHz
Accuracy	±10 kHz

RF Output Level	
Antenna Port (MTL + 6 dB typical, automatically controlled for a MTL range of -83 to -68 dBm)	
Range	-67 to -2 dBm at antenna port
Resolution	0.5 dB
Accuracy	±2 dB
Distance to UUT antenna	6 to 200 ft with supplied antenna
RF I/O Port (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/SIF/Mode S Interrogation Pulse Spacing	
Mode 1	
P1 to P2	2.00 µs ± 25 ns
P1 to P3	3.00 µs ± 25 ns
Mode 2	
P1 to P2	2.00 µs ± 25 ns
P1 to P3	5.00 µs ± 25 ns
Mode 3A	
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

Transponder Mode (continued)

Signal Generator (continued)	
Interrogation Pulse Widths	
Mode 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)	
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
Interrogation Test Signals	
Mode S	
PRF	50 Hz ± 5 Hz
ATCRBS/SIF	
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	-67 to -79 dBm into 0 dBi antenna
Resolution	0.1 dB
Accuracy	±2 dB, typical
Receiver Sensitivity, Direct Connection MTL	
Range	-67 to -79 dBm
Resolution	0.1 dB
Accuracy	±2 dB
Reply Delay (ATCRBS/SIF)	
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/SIF	
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 Decoder	
Modes 1,2,3/A	4096 code and binary equivalent displayed, including X pulse. Ident & Emergency Replies displayed.
Mode C	Altitude

Transponder Mode (continued)

UUT Measurements (continued)	
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
Range, ATCRBS/SIF (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	1.83m (6ft) to 28.96m (95ft)
Resolution	0.1 dB
Accuracy	±3 dB

TCAS/E-TCAS Mode

Signal Generator	
Output Frequency	
Reply Frequency	1090 MHz
Accuracy	±10 kHz
Output Level (Simulated ERP)	
Antenna Port [1]	
Radiated power at 0 dbi UUT antenna	-68 dBm typical @ 10 nmi range, automatically controlled
Range	-67 to -2 dBm at antenna port
Resolution	0.5 dB
Accuracy	±2 dB
Distance to UUT antenna	6 to 300 ft. with supplied antenna
RF I/O Port	
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

1 – Simulates a 50.5 dBm XPDR ERP at 10 nmi range.

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
	E-TCAS Modes formats 0, 4, 5, 11, 16, 20, 21
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

TCAS/E-TCAS Mode (continued)

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 us
Accepts	< ±200 ns
Rejects	> ±1.0 us
P1 to P3	21.0 us
Accepts	< ±200 ns
Rejects (<10% Replies)	> ±1.0 us
P1 to P4	23.0 us
Accepts	< ±200 ns
Rejects (<10% Replies)	>±1.0 us
Mode S	
P1 to P2	2.0 us
Accepts	< ±200 ns
Rejects (<10% Replies)	> ±1.0 us
P1 to SPR	4.75 us
Accepts	< ±200 ns
Rejects (<10% Replies)	> ±1.5 us
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

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

UAT Mode (continued)

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	<1.35:1
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	0.2 V to 1.5 V peak to peak into 50 Ω
Receive Video Level	Proportional to IF level
Baseline	±0.5 V referenced to ground
Test Antenna	
VSWR	<1.5:1
Gain	6 dB, typical
Time Base (TCXO)	
Temperature Stability	±1 ppm
Aging	±1 ppm per year
Accuracy	±1 ppm
Test Limit	±0.3 ppm
Battery	
Type	Li Ion
Duration	> 4 hrs continuous operation > 6 hrs, typical

Input Power (Test Set)	
Input Range	11 VDC 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, 47-63 Hz
Mains Supply Voltage Fluctuations	<10% of the nominal voltage
Transient Over-voltages	According to Installation Category II

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 [2]	MIL-PRF-28800F, Class 2
Temp., not operating [3]	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

2 – Temperature range extended to –20°C to 55°C
3 – Temperature range reduced to –30°C to 71°C

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	8 lbs. (3.6 kg), test set only 34 lbs. (15.4 kg), shipping weight

Environmental

Test Set	
Altitude	< 4800 meters
Operating Temp. [4]	-20° to 55°C (-4° to 131°F)
Storage Temp. [5]	-30° 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	
Altitude	< 10,000 meters
Operating Temperature	0° to 40°C (32° to 104°F)
Storage Temperature	-20° to 71°C (-4° to 159.8°F)

4 – Battery charging temperature range: 5° to 40°C (41° to 104°F), controlled by internal charger

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

VIAVI Solutions

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