MEASAT SATELLITE SYSTEMS SDN. BHD.

MEASAT

MEASAT-3a
SATELLITE USERS
HANDBOOK

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Abbreviations

AZ	*Azimuth*
BW	*Bandwidth*
CW	*Clockwise*
CCW	*Counter Clockwise*
CSM	*Communication System Monitoring*
EL	*Elevation*
EIRP	*Equivalent Isotropic Radiated Power*
ESUT	*Earth Station Under Test*
GSVT	*Ground Station Verification Test*
HPA	*High Power Amplifier*
MEASAT	*MEASAT Satellite Systems Sdn. Bhd.*
NMC	*MEASAT Network Management Centre*
SAF	*Satellite Access Form*
SAP	*Satellite Access Procedure*
SSPA	*Solid State Power Amplifier*
ULPC	*Up Link Power Control*

Introduction

To ensure the performance of each satellite link is maintained at a high level, and a high quality of service is delivered to every customer, MEASAT requires the customers to test and register their equipment and links with NMC.

This handbook details these procedures:

Ground Station Verification Tests (GSVT): The tests customers are required to conduct to register a Ground Station with NMC

Satellite Access Procedures (SAP): The procedures customers are required to follow to register or modify their links with NMC.

Any questions regarding these procedures should be directed towards the NMC, the Customer Engineering team or to your individual account manager[1].

MEASAT NETWORK MANAGEMENT CENTRE (NMC)

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[1] See Appendix 4

Section A. Ground Station Verification Tests

1. Overview and Customer Responsibilities

This section describes the mandatory tests customers are required to conduct to register a Ground Station with NMC. These tests should be done before the Ground Station accesses the MEASAT system.

Customers are required to complete and send the GSVT Form (Appendix 2), via email or fax, to NMC to request a test date. This should be undertaken at least two [2] working days prior to the intended test date. NMC will confirm with the customer on the tests set up and the NMC engineer in-charge of co-ordinating the tests.

All tests should be performed with the active participation of an NMC engineer.

Customers are required to submit all measurements taken at the Ground Station for NMC to compile and verify. Test results will be sent to the customer within one [1] working day after all the measurements are received.

Every Ground Station that has passed all compulsory tests will be registered with MEASAT and a unique Ground Station ID assigned. Customers are required to mention the Ground Station ID in all communications with the NMC.

Note: MEASAT reserves the right to interrupt and/or terminate any operational transmission or test broadcast which are detrimental to, or may jeopardize and/or interfere with, the integrity and/or operation of MEASAT, and/or other carriers or users of MEASAT.

2. Antenna Pointing Verification

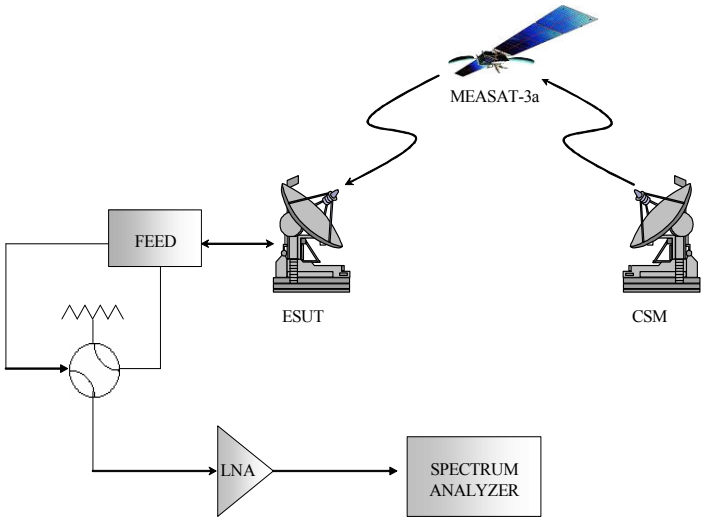
2.1 Antenna Alignment Procedure

Step 1: Calculate the EL and AZ angles for the ESUT. Adjust the ESUT ground antenna towards the satellite based on the calculated EL and AZ angles.

Appendix 1 provides a list of EL and AZ angels for key cities across the region.

Step 2: Set up the test equipment as shown in Figure 1 below.

Figure 1: Antenna Pointing / Receive Cross-Polarization Isolation Measurement Setup



Step 3: Set the Spectrum Analyser to the following settings:

Parameter	Setting
Centre Frequency	4,185 MHz or 4,186 MHz (12,200 MHz)
Span	5 MHz
Res. Bandwidth	10 kHz
Amplitude Scale	10 dB/Div.

Upon completion, if correctly setup, the ESUT should be able to receive MEASAT-3a beacon signals in C-band at 4,185 MHz or 4,186 MHz with Horizontal Polarization, or the ULPC beacon signals in Ku-band at 12,200 MHz with Horizontal and Vertical Polarizations.

2.2 AZ and EL Angle Adjustment Procedure

Step 1: Check the C-Band beacon signals (4,185 MHz / 4,186 MHz) or the Ku-Band ULPC signal (12,200 MHz) are visible; if they are not visible, repeat the steps in Section 2.1 until the signals are visible.

Step 2: Adjust the ESUT antenna AZ and EL angles to maximize the signal level; record the corresponding AZ and EL angles.

Step 3: Rotate the ESUT antenna polarization to maximize the signal level and record the polarizer angle.

Step 4: Adjust the ESUT antenna AZ in the CW direction starting from the position determined in Step 2 above until the peak of the first side lobe is reached. This is indicated by the beacon level decreasing as the antenna pattern passes through the first pattern null, increasing again until it peaks at the first side lobe, and then begins to decrease again. Note that this first side lobe peak is smaller than the main lobe. Record the antenna pointing angle for this side lobe peak.

Step 5: Normalize the antenna pointing back to the peak of the main lobe.

Step 6: Repeat Step 4 for the CCW direction AZ. If no other higher peak is observed, lock the AZ axis at the highest peak of the main lobe as determined in Step 2.

Step 7: Adjust the ESUT antenna EL in the upward direction starting from the position determined in Step 2 above, until the peak of the first side lobe is reached. This is indicated by the beacon level decreasing as the antenna pattern passes through the first pattern null, increasing again until it peaks at the first side lobe, and then begins to decrease again. Note that this first side lobe peak is smaller than the main lobe. Record the antenna pointing angle for this side lobe peak.

Step 8: Normalize the antenna pointing back to the peak of the main lobe.

Step 9: Repeat Step 7 for the downward direction EL. If no other higher peak is observed, lock the EL axis at the highest peak of the main lobe as determined in Step 2.

Upon completion of the above, and provided no higher peak is observed during the adjustments, the antenna pointing is verified on the main lobe with regards to AZ and EL.

2.3 Polarizer Adjustment Procedure

C-Band

Step 1: Check the C-Band beacon signals (4,185 MHz / 4,186 MHz) are visible; if they are not visible, repeat the steps in Section 2.1 until the signals are visible.

Step 2: Receive the beacon signal with co-polarization receive antenna feed. Fine tune the polarizer angle to receive maximum beacon signal; record the received signal level and polarizer angle.

Step3a: ***If the ESUT is equipped to receive a cross-polarized downlink signal*** (antenna with two receiving ports, one for each polarization), measure the signal level at the output of the **cross**-polarization feed port. Adjust the polarizer angle so that a signal null (lowest possible signal) is achieved at the output of the cross-polarization feed port; record the received level and the polarizer angle. Return to the Co-Polarization feed port and record the received level.

Step3b: ***If the ESUT is not equipped to receive the cross-polarized downlink signal*** (antenna with only one receiving port), rotate the polarizer approximately 80 degrees from the angle recorded in step 2 and continue to adjust the polarizer so that a signal null is achieved at the output of the receiving feed port; record the signal level and the polarizer angle. Rotate the polarizer exactly 90º from the recorded Null angle and lock it there. Use proper angle measurement tool to ensure that it is exactly 90º. Verify the received signal is the same or better than that of Step 2.

Upon completion of the above, the polarizer is adjusted to the correct setting.

Ku-Band

Step 1: Check the **MEASAT-3** Ku-Band ULPC signal (12 200 MHz) is visible; if it is not visible, repeat the steps in Section 2.1 until the signals are visible.

Step 2: Request MEASAT to uplink clean carrier on transponder. Record the received signal level and polarizer angle.

Step 3: Co-ordinate with MEASAT NMC to receive the clean carrier signal with co-polarization receive antenna feed; record the received signal level.

Step 4a: ***If the ESUT is equipped to receive a cross-polarized downlink signal*** (antenna with two receiving ports, one for each polarization), measure the signal level at the output of the cross-polarization feed port. Adjust the polarizer angle so that a signal null is achieved at the output of the cross-polarization feed port; record the received level and the polarizer angle.

Step 4b: ***If the ESUT is not equipped to receive the cross-polarized downlink signal*** (antenna with only one receiving port), rotate the polarizer approximately 80 degrees from the angle recorded in step 2 and continue to adjust the polarizer so that a signal null is achieved at the output of the receiving feed port; record the signal level and the polarizer angle. Rotate the polarizer exactly 90º from the recorded Null angle and lock it there. Use proper angle measurement tool to ensure that it is exactly 90º. Verify the received signal is the same or better than that of Step 2.

Upon completion of the above, the polarizer is adjusted to the correct setting.

3. Cross-Polarization Isolation Tests

Test Objective

The ESUT meets MEASAT's requirement if the cross-polarization isolation is at least 30 dB or more. However, under certain circumstances, if the result falls below the 30 dB requirement, it will be further analyzed. The acceptance of the result is subject to MEASAT's discretion.

Test Setup

For the cross-polarization isolation tests, the Spectrum Analyser should be set to the following settings:

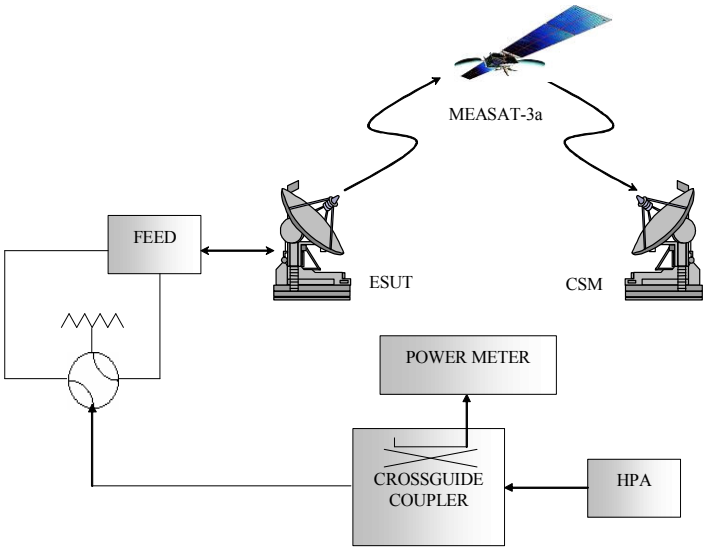
Parameter	Setting
Centre Frequency	Test Frequency
Span	200 kHz
Resolution BW	300 Hz
Video BW	300 Hz
Amplitude	10 dB/Div

The polarization isolation measurements described here do not characterize the Ground Station antenna alone; the measurements also include the effects of the satellite and propagation medium.

3.1. Transmit Cross-Polarization Isolation Test

Step 1: Set up the test equipment as shown in Figure 2 below.

Figure 2: Transmit Antenna Side lobe Pattern / Cross-Polarization Isolation Measurement Setup



Step 1: Set up the test equipment as shown in Figure 2 below.

Step 2: Contact the NMC engineer and, under his/her direction, transmit an unmodulated carrier from the ESUT at reduced power.

Step 3: Slowly increase the uplink power level until the NMC engineer reports the satellite downlink EIRP carrier is 15 dB below the saturation level of the operating transponder.

Step 4: Verify the linearity of the system by reducing the uplink by 1 dB; this should reduce the measured downlink signal by 1 dB; the NMC engineer will record the co-polarization signal level.

Step 5: Rotate the polarizer waveguide switch, or the feed, by 90º to transmit on the cross-polarization port; the NMC engineer will co-ordinate with the ESUT personnel to fine tune the polarizer angle to null the receive signal; record the cross-polarization signal level and the polarizer angle.

Step 6: Confirm with the NMC engineer that all the measurements have been recorded.

Step 7: Rotate the polarizer waveguide switch, or the feed, by 90º from angle recorded in Step 6 and verify the receive co-polarization signal level is the same or better than that recorded in Step 4. Bring down the carrier.

3.2. Receive Cross-Polarization Isolation Test

Note: While, the receive cross-polarization isolation test is not compulsory it is strongly recommended that the customer measure the receive characteristic of the ESUT.

Step 1: Set up the test equipment as shown in Figure 1 above.

Step 2: Contact the NMC engineer and arrange for an unmodulated carrier to be transmitted from NMC.

Step 3: Track the satellite for the maximum downlink co-polarization signal.

Step 4: Record the signal level on the spectrum analyser and verify the linearity of the system when the NMC engineer reduces the uplink by 1 dB; this should reduce the measured downlink signal by 1 dB.

Step 5: Rotate the polarizer waveguide switch, or the feed, by 90º and fine tune the polarizer angle to null the receive signal; measure the cross-polarization signal level and the polarizer angle.

Step 6: Record and plot the difference between the co-polarization and the cross-polarization signal levels.

Step 7: Rotate the polarizer waveguide switch or the feed, by 90º from angle recorded in Step 5 and verify the receive co-polarization signal is the same or better than that recorded in Step 3. Inform NMC to bring down the carrier.

Upon completion of the above, customer should send the results in Step 5 together with other test results to NMC for compilation.

4. Antenna Side Lobe Pattern Tests

Test Objective
The ESUT meets MEASAT's test requirement if 90% of the antenna transmit side lobe peaks do not exceed the 29 – 25 log (ɵ) [dB] over 1°≥ Iɵl ≥ 6°.

Test Setup
For the antenna side lobe pattern tests, the Spectrum Analyser should be set to the following settings:

Parameter	Setting
Centre Frequency	Test Frequency
Span	0
Resolution BW	100 Hz
Video BW	< 1 kHz (30 Hz)
Sweep time	Slew Time
Amplitude	10 dB/Div.
Trace A	Max Hold, Single Sweep

4.1. Transmit Antenna Side Lobe Pattern Test

Note: For antenna between 1.8m and 4.5m, and non-motorized antennas, this test can be replaced by submitting the manufacturer's datasheet, or previously conducted test results, to NMC for consideration. For antenna 4.5m and above this test is compulsory.

Do not allow the antenna to point toward neighbouring satellite while transmitting.

Step 1: Set up the test equipment as shown in Figure 2 above.

Step 2: Contact the NMC engineer and, under his/her direction, transmit an unmodulated carrier from the ESUT at reduced power.

Step 3: Slowly increase the uplink power level until the NMC engineer reports the satellite downlink EIRP carrier is 15 dB below the saturation level of the operating transponder.

Step 4: Verify the linearity of the system by reducing the uplink by 1 dB; this should reduce the measured downlink signal by 1 dB; the NMC engineer will record the received signal level.

Step 5: Slew the ESUT antenna off the satellite by 6º (corrected angle) in AZ ($\Delta AZ_{corrected}$) in a CCW direction at a constant rate (e.g. 0.02º/sec), while timing the movement. Record the time taken and provide the information to the NMC engineer

$$\Delta AZ_{corrected} = 2 \sin^{-1} [\sin (\Delta AZ/2) . \cos (EL)]$$

where,
ΔAZ = Indicated Azimuth angle from boresight
EL = Indicated elevation angle above true horizon

Step 6: At the same slew rate, while co-ordinating with the NMC engineer, move the main lobe of the ESUT antenna through the satellite in the CW direction over a 12º (corrected) range from its previous position.

Step 7: Confirm with the NMC engineer the pattern plot has been recorded. Return the antenna to the beam peak and bring down the carrier.

Step 8: Repeat Step 5 and Step 6 for the elevation axis over a range of ± 6º from the main lobe centre.

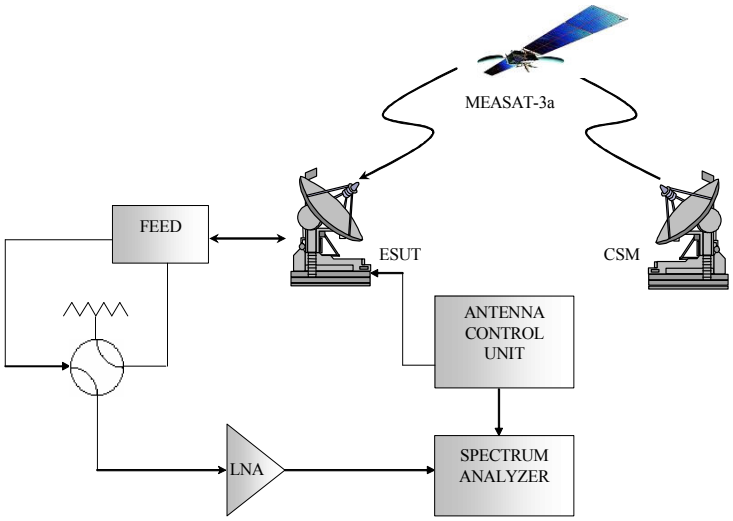
Step 9: Confirm with the NMC engineer the antenna patterns over the required range on both AZ and EL have been recorded and then bring down the carrier.

4.2. Receive Antenna Side Lobe Pattern Test

Note: While this test is not compulsory it is strongly recommended that the customer measure the receive characteristic of the ESUT. If the carrier used originates from the customer's hub, this operation still needs to be co-ordinated with NMC engineer.

Step 1: Set up the test equipment as shown in Figure 3 below.

Figure 3: Receive Antenna Side lobe Pattern Measurement Setup



Step 2: Contact the NMC engineer and request them to uplink an unmodulated carrier to the MEASAT-3 transponder at a power level 15 dB below saturation level of the operating transponders.

Step 3: Set the spectrum analyser to the appropriate downlink frequency and reduce the resolution bandwidth to 10 kHz; set the plotter to record the receive pattern.

Step 4: Slew the ESUT antenna off the satellite by 6º (corrected angle) in AZ ($\Delta AZ_{corrected}$) in a CCW direction at a constant rate (e.g. 0.02º/sec), while timing the movement. Record the time taken.

Step 5: At the same slew rate, move the main lobe of the ESUT antenna through the satellite in a CW direction over a 12º (corrected) range from its previous position.

Step 6: Calculate the corrected AZ angle using the following equation

$$\Delta AZ_{corrected} = 2 \sin^{-1} [\sin (\Delta AZ/2) . \cos (EL)]$$

where,
ΔAZ = Indicated Azimuth angle from boresight
EL = Indicated elevation angle above true horizon

Step 7: Repeat the above steps for the elevation axis over a range of ± 6º from the main lobe centre and plot the received antenna side lobe pattern.

Step 8: Draw the 29 - 25 Log θ [dB] curve on the plot for $1^{o} \geq |\theta| \geq 6^{o}$
Where, θ is the off-axis angle from satellite.

Upon completion of the above, customer should send the plots together with other test results to NMC for compilation.

5. Power and Frequency Stability Tests

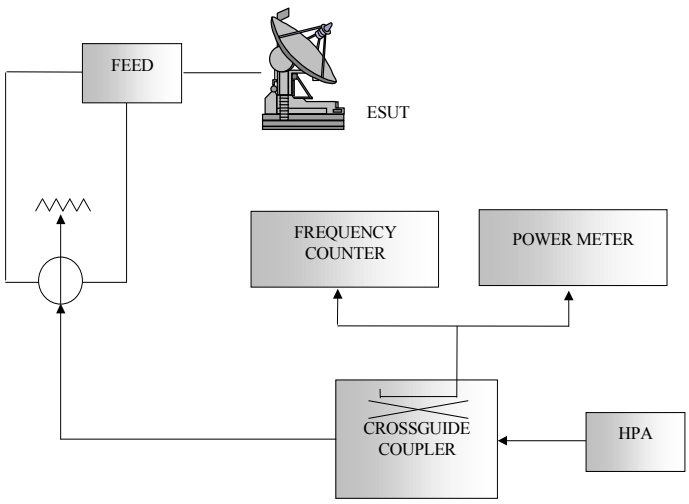
Note: This test is not compulsory for antenna < 4.5m.

Test Objective
The ESUT meets MEASAT's requirement if the variation in power is less than ±0.5dB and the variation in frequency is less than ±1kHz over 24 hrs period.

Test Setup

Step 1: Connect a power meter and a frequency counter through a directional coupler to the HPA as shown in Figure 4 below.

Figure 4: Power and Frequency Stability Measurement Setup



Step 2: Radiate an unmodulated carrier to a dummy load, **without uplinking to the satellite**, and plot or measure at regular interval the power and frequency stability of the uplink station over a period of 24 hours; record the initial power and the frequency of the radiated carrier for reference.

Step 3: Set Repeat the above procedures for any redundant uplink equipment.

Upon completion of the above, if the variation in power is less than ±0.5dB and the variation in frequency is less than ±1kHz over the 24 hrs period, then the Ground Station meets MEASAT requirements.

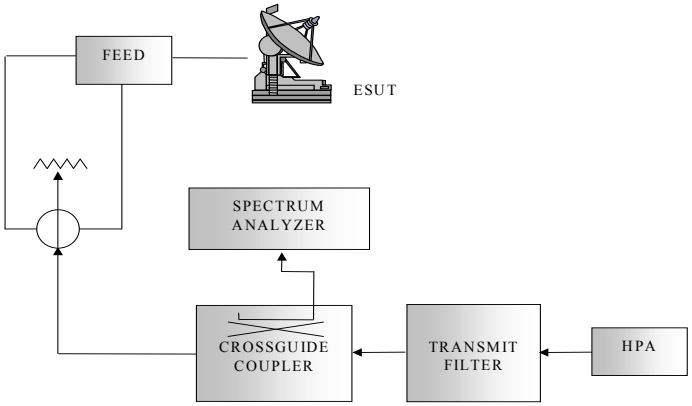
6. Out of Band Emission Tests

Note: This test is not compulsory for Ground Station antenna < 4.5m.

Test Objective
The ESUT meets MEASAT's requirement if out of band emission of the uplink chain does not exceed 4 dBW/4 KHz outside of the assigned Transponder bandwidth.

Step 1: Connect a power meter and a frequency counter through a directional coupler to the HPA as shown in Figure 4 below Connect a spectrum analyser through a directional coupler to the HPA as shown in Figure 5 below.

Figure 5: Out of Band Emission Measurement Setup



Step 2: Set the spectrum analyser to the following settings:

Parameter	Setting
Centre Frequency	Test Frequency
Span	100 MHz (±50 MHz from Centre Freq.)
Resolution BW	3 kHz
Video BW	3 kHz

Step 3: Transmit an unmodulated carrier to the dummy load, without **uplinking to the satellite**; measure the out-of-band emission of the uplink chain displayed on the spectrum analyser.

Step 4: Repeat the above procedure for any redundant uplink equipment.

Step 5: Plot the out-of-band emission and fax to NMC.

Upon completion of all the tests, customers are required to submit the measurements to NMC to be compiled and verified.

Section B. Satellite Access Procedures

1. Overview and Customer Responsibilities

This section describes the procedures customers are required to follow to register or modify their links with NMC.

Customers should complete and send the SAF (Appendix 3), via email or fax, to NMC to request a date/time to activate or modify a link. This process should be completed at least two [2] working days prior to the intended link activation/ modification date. The NMC will confirm with the customer on a date/time to complete the set up process.

Prior to activating a link, the customer should ensure their Ground Station is registered on the MEASAT system. This can be achieved by conducting the MEASAT GSVT with the NMC. The GSVT registration procedures are described in Section A of this handbook.

Note: MEASAT reserves the right to interrupt and/or terminate any operational transmission or test broadcast which are detrimental to, or may jeopardize and/or interfere with, the integrity and/or operation of MEASAT, and/or other carriers or users of MEASAT.

2. Link Activation Procedure

Step 1: Set Ensure the Ground Station is properly aligned to the intended satellite in AZ, EL and Polarizer using MEASAT satellite's beacon signals. Instructions for aligning the Ground Station antenna are available in Section A 2.1, 2.2 and 2.3 of this handbook.

Step 2: Set the SSPA/HPA to “Standby Mode”. Ensure all uplink equipment is warmed up and stable. Tune the equipment to the proper power level and frequency range and set the modulator to its maximum attenuation level. It is advisable to set this power level at the centre of the dynamic range of the modulator.

Step 3: Call the NMC Hotline Number to inform the NMC engineer the Ground Station is ready to transmit.

Step 4: When advised by the NMC engineer, transmit an unmodulated carrier at the lowest possible level. If instructed, fine tune the pointing of the Ground Station by moving the AZ, EL and Polarizer.

Step 5: Increase the power level slowly while NMC monitors the carrier, to the level indicated in the SAF and modulate the signal.

Step 6: Verify the performance (C/N, Eb/No or BER) at the receiving site and fine tune power level as instructed by NMC engineer.

Upon completion of these steps, the carrier has been validated and is registered in the MEASAT CSM database for immediate and continuous monitoring.

3. Link Modification Procedure

Step 1: Call NMC engineer at the allocated time and verify permission to adjust transmission parameters; change the transmission of the Ground Station to the new parameters.

Step 2: Verify the performance (C/N, Eb/No or BER) at the receiving site and fine tune the power level as instructed by NMC.

Upon completion of these steps, the modified carrier has been validated and is registered in the MEASAT CSM database for immediate and continuous monitoring.

4. Link Shutdown Procedure

Step 1: Inform NMC via email or telephone**,** at least one [1] working day prior to the intended time of shutdown. NMC will reconfigure the CSM system accordingly.

Step 2: After the carrier is shutdown, switch the output of the SSPA/HPA to the dummy load, or put the unit on STANDBY mode, to avoid noise or other unwanted signal from being transmitted. There should be no RF transmission from the Ground Station to MEASAT satellite.

Appendices

List of Appendices

Appendix 1 - Elevation and Azimuth Angles Cities Table

COUNTRY	CITY	LONGITUDE (°E)	LATITUDE (°N)	ELEVATION (°)	AZIMUTH (°)
Malaysia	Kuala Lumpur	101.7	3.15	77.4	253.0
	Langkawi	99.67	6.42	77.8	232.1
	Penang	100.33	5.42	77.8	238.7
	Kota Bharu	102.23	6.13	75.5	240.6
	Kuching	110.35	1.58	67.8	265.4
	Kota Kinabalu	116.07	5.98	60.5	257.2
	Kuala Terengganu	103.15	5.33	75.0	245.7
Singapore	Singapore	103.67	1.25	75.6	264.2
Brunei	Brunei	115.33	5.08	61.5	258.7
Philippines	Manila	120.97	14.62	52.1	245.9
	Davao	125.63	7.08	49.6	259.7
	Zamboanga	122.08	6.92	53.6	258.5
Indonesia	Jakarta	106.48	-6.1	71.0	291.7
	Banda Aceh	95.33	5.50	82.1	214.9
	Medan	98.65	3.58	80.6	243.5
	Bandung	107.57	-6.95	69.5	292.8
	Bali	115.00	-8.50	60.9	288.8
Thailand	Bangkok	100.31	13.45	71.2	213.7
	Hat Yai	100.42	7.00	76.7	232.2
	Phuket	98.37	7.87	77.7	221.3
	Chiang Mai	98.98	18.80	66.3	202.2
Myanmar	Yangoon	96.17	16.78	69.6	195.8
	Putao	97.45	27.37	57.4	192.8
Cambodia	Phnom Penh, Cambodia	104.92	11.58	69.3	229.9
Vietnam	Ho Chi Minh	106.72	10.77	68.2	235.2
	Hanoi	105.51	21.2	60.5	214.6
Laos	Vientiane	102.63	17.98	65.3	212.5
Australia	Darwin	130.73	-12.38	42.8	284.7
	Cairns	145.72	-16.85	26.2	281.8
	Perth	115.82	-31.97	44.4	319.5
	Sydney	151.17	-33.92	16.4	288.1
	Melbourne	144.97	-37.75	19.9	294.4
sTaiwan	Taipei	121.53	25.08	45.6	233.7
Hong Kong	Hong Kong	114.00	22.17	53.7	227.7

COUNTRY	CITY	LONGITUDE (°E)	LATITUDE (°N)	ELEVATION (°)	AZIMUTH (°)
China	Guangzhou	113.33	23.13	53.4	225.6
	Harbin	126.68	45.75	27.0	224.5
	Xi'an	108.90	34.27	46.0	209.1
	Shanghai	121.37	31.10	41.4	228.0
	Beijing	116.43	39.92	37.1	215.9
Saudi Arabia	Makkah	39.82	21.43	27.5	106.1
	Ar Riyad	46.77	24.65	32.9	112.8
Iran	Tehran	51.43	35.67	31.0	124.7
UAE	Dubai	55.28	25.23	40.2	120.2
Tanzania	Dar Es Salaam	39.30	-6.85	30.0	84.7
Kenya	Nairobi	36.83	-1.28	27.6	89.1
Uganda	Kampala	32.58	0.32	23.1	90.2
Ethiopia	Addis Ababa	38.70	9.05	29.1	96.8
Egypt	Cairo	31.25	30.03	17.1	106.0
Turkey	Istanbul	28.95	41.03	11.8	108.8
South Africa	Cape Town	18.47	-33.93	5.4	80.3
	Johannesburg	28.03	-26.17	15.2	77.6
Japan	Tokyo	139.45	35.41	25.2	242.4
S.Korea	Seoul	127	37.34	33.1	229.6
India	Delhi	77.23	28.62	53.1	152.0
	Calcutta	88.33	22.50	63.4	171.8
	Madras	80.30	13.08	69.9	138.8
	Bombay	72.85	18.93	59.2	133.9
	Bangalore	77.58	12.97	67.8	132.2
Sri Lanka	Colombo	79.87	6.92	74.1	120.3
Pakistan	Islamabad	73.13	33.67	46.2	149.1
	Karachi	67.03	24.85	50.1	132.7
New Guinea	Port Moresby*	147.17	-9.30	26.0	276.3
	Lae	147.00	-6.45	26.5	274.4

Appendix 2 – Ground Station Verification Tests Form

GROUND STATION VERIFICATION TESTS FORM

Please complete this form and fax to **+60 (3) 8213 2299** or
e-mail to **technical.support@measat.com**

(To be filled by Customer)

CUSTOMER DETAILS

COMPANY	
REQUESTED BY	
DATE	
CONTACT NUMBER	

TEST LOCATION

NEAREST LOCATION	
LONGITUDE (deg)	
LATITUDE (deg)	

GROUND STATION DETAILS

ANTENNA SIZE (m)		RECEPTION VIA	LNA / LNB
ANTENNA MANUFACTURER		LNA / LNB NOISE TEMPERATURE (K)	
ANTENNA MODEL		G/T (dB/K)	
TRANSMIT GAIN (dBi)		HPA TYPE	SSPA / TWTA / KLYSTRON
RECEIVE GAIN (dBi)		NO. OF HPAs	
NO. TX. FEED PORT		SIZE / RATING OF HPAs	
NO. RX. FEED PORT		UPLINK POWER CONTROL (IF ANY) in dB	

(To be filled by MEASAT)

SATELLITE INFORMATION

SATELLITE	
U/L POLARIZATION	
D/L POLARIZATION	
BEACON FREQUENCIES	

TEST FREQUENCY

U/L FREQ RANGE (MHz)	
D/L FREQ RANGE (MHz)	
U/L CENTRE FREQ (MHz)	
D/L CENTRE FREQ (MHz)	

TESTS SCHEDULE

TEST DESCRIPTION		ANTENNA POINTING
		CROSS-POLARIZATION ISOLATION (CPI)
		ANTENNA PATTERN VERIFICATION
		POWER & FREQUENCY STABILITY
		OTHER TESTS :
DATE		
SCHEDULED START TIME		LOCAL/GMT
PERSON IN-CHARGE		

TESTS PERFORMED

TEST DESCRIPTION		ANTENNA POINTING
		CROSS-POLARIZATION ISOLATION (CPI)
		ANTENNA PATTERN VERIFICATION
		POWER & FREQUENCY STABILITY
		OTHER TESTS :
DATE		
ACTUAL START TIME		LOCAL/GMT
REMARKS		

Appendix 3 – Satellite Access Form

SATELLITE ACCESS FORM

Please complete this form and fax to **+60 (3) 8213 2299** or
e-mail to **technical.support@measat.com**

(To be filled by Customer)

CUSTOMER DETAILS

COMPANY		
REQUESTED BY		
DATE		
CONTACT NO.		

SATELLITE INFORMATION

SATELLITE	
ORBITAL LOCATION (deg)	
TRANSPONDER NO.	
U/L POLARIZATION	
D/L POLARIZATION	

CARRIER INFORMATION

CARRIER TYPE		
DATA RATE (kbps)		
MODULATION TYPE		
FEC / TURBO		
ADD. CODING (RS)		
MIN Eb/No REQUIRED (dB)		
U/L EIRP (dBW)		
NOMINAL TX. POWER (W)		
ALLOCATED BANDWIDTH (MHz)		
U/L CENTRE FREQ. (MHz)		
D/L CENTRE FREQ. (MHz)		

GROUND STATION INFORMATION

GROUND STATION ID	
LOCATION	
ANTENNA SIZE (m)	
ANTENNA MANUFACTURER	
MODEM MODEL	

(To be filled by MEASAT)

ACTIVATION

ACTIVATION DATE / TIME		

CARRIER INFORMATION

TRANSMISSION ID		
C/N (dB)		

CLOSURE

PERFORMED BY	
SIGNATURE	
DATE	

VERIFIED BY	
SIGNATURE	
DATE	

REMARKS	

Appendix 4 – Overview of Customer Helpline Support

In case of service interruption, the customer should report the problem immediately to an NMC engineer by contacting the MEASAT Hotline.

MEASAT NETWORK MANAGEMENT CENTRE (NMC)

24 HRS HOTLINE: +60 (3) 8213 2288 / +60 (3) 8319 2833
FACSIMILE: +60 (3) 8213 2299
EMAIL: technical.support@measat.com

To ensure any service interruption is dealt with in a prompt manner, MEASAT has put in place an internal problem resolution process as detailed in Figure 6.

Figure 6: MEASAT Problem Resolution Escalation Process