

# Laboratory Test Report

## Class II Permissive Change

On the

TMAB1Z External Radio Frequency Power Amplifier

Tested In accordance with

FCC 47 CFR Parts 22 and 90

Report Revision: 1  
Issue Date: 24-July-2007  
FCC ID: CASTMAB1Z

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All tests reported herein have been performed in accordance with the laboratory's scope of accreditation

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## TABLE OF CONTENTS

<b>REVISION HISTORY</b> .....	<b>2</b>
<b>INTRODUCTION</b> .....	<b>3</b>
<b>REPORT PREPARED FOR</b> .....	<b>3</b>
<b>DESCRIPTION OF SAMPLE</b> .....	<b>3</b>
<b>STATEMENT OF COMPLIANCE</b> .....	<b>3</b>
<b>TEST CONDITIONS</b> .....	<b>3</b>
<b>NECESSARY BANDWIDTH AND EMISSION DESIGNATORS</b> .....	<b>4</b>
<b>TEST RESULTS</b> .....	<b>4</b>
TRANSMITTER OUTPUT POWER (CONDUCTED) .....	4
SPURIOUS EMISSIONS (CONDUCTED) .....	5
SPURIOUS EMISSIONS (RADIATED) .....	7
TRANSIENT FREQUENCY BEHAVIOR .....	9
<b>TEST EQUIPMENT USED</b> .....	<b>12</b>
<b>ANNEX A</b> .....	<b>13</b>
TEST SETUP DETAILS .....	13

## REVISION HISTORY

Date	Revision	Comments
24-July-2007	1	Initial test report

## INTRODUCTION

This report details a Class II permissive change (C2PC) to the TMAB1Z External Radio Frequency Power Amplifier (FCC ID: CASTMAB1Z), and thereby confirms continued compliance following changes to matching circuitry for improved thermal performance:

FCC CFR 47 Parts 22 & 90

The TMAB1Z was originally tested as Teltest Laboratories Report 2290 followed by Report 2472 (C2PC).

## REPORT PREPARED FOR

Tait Electronics Ltd  
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New Zealand

## DESCRIPTION OF SAMPLE

FCC ID: CASTMAB1Z  
Type: TMAB1Z  
Product code: TMAA42-B100  
Serial Numbers: 13148659

The TMAB1Z is an External Radio Frequency Power Amplifier designed to operate in the 136MHz to 174MHz band. It has a fixed output power of 110W, and output impedance of 50 ohms. It has been tested with the TMAB32-B101 (serial number 19050192) mobile transceiver, which has its output power fixed at 1 watt. The mobile performs all modulation, and the TMAB1Z is only used to increase the output power of the mobile.

## STATEMENT OF COMPLIANCE

The TMAA42-B100 External Radio Frequency Power Amplifier as tested in this report was found to conform to the following standards:

### **FCC CFR 47 Parts 22 & 90**

## TEST CONDITIONS

Unless otherwise stated, all testing was performed at the following conditions.

Ambient Temperature	15°C → 30°C
Relative Humidity	20% → 75%
Standard Test Voltage	13.8Vdc

## NECESSARY BANDWIDTH AND EMISSION DESIGNATORS

The TMAA42-B100 ERFPA does not provide any modulation.  
It is intended to be used with the following types of emissions as defined in 90.207

F3E – FM, Analogue Voice  
F1E – FM, Digital Voice  
F1D – FM, Digital Data, no subcarrier  
F2D – FM, Digital Data, modulated subcarrier  
F7E – FM, Two or more channels containing quantized or digital voice information  
F7D – FM, Two or more channels containing quantized or digital information

## TEST RESULTS

### TRANSMITTER OUTPUT POWER (CONDUCTED)

SPECIFICATION: FCC 47 CFR 2.1046

GUIDE: TIA/EIA-603C 2.2.1

#### MEASUREMENT PROCEDURE:

1. Refer Annex A for Equipment set up.
2. The coaxial attenuator has an impedance of 50 Ohms.
3. The unmodulated output power was measured with an RF Power meter.

#### MEASUREMENT RESULTS:

Manufacturer's Rated Output Power:

162.1 MHz	110 W nominal	W nominal
POWER (W)	108.6	
Variation from Nominal (%)	-1.3	
Measurement Uncertainty (dB)	±0.6	

LIMIT CLAUSE: FCC 47 CFR 90.205 (r)

Radio Type: Mobile Transceiver  
Frequency Band: 150 MHz → 174 MHz

The output power shall not exceed by more than 20% the manufacturer's rated output power for the particular transmitter.

### SPURIOUS EMISSIONS (CONDUCTED)

SPECIFICATION: FCC 47 CFR 2.1051

GUIDE: TIA/EIA-603C 2.2.13

#### MEASUREMENT PROCEDURE:

1. Refer Annex A for equipment set up.
2. The frequency range examined was from the lowest frequency generated within the EUT, to a frequency higher than the 10<sup>th</sup> Harmonic:
3. Spurious emissions that were attenuated more than 20dB below the limit were not recorded.

#### MEASUREMENT RESULTS:

See the table on the following page for 12.5 kHz channel spacing.

LIMIT CLAUSE: FCC 47 CFR 90.210

SPURIOUS EMISSIONS (CONDUCTED)

SPECIFICATION: FCC CFR 2.1051

Tx FREQUENCY: 162.1 MHz

12.5 kHz Channel Spacing		162.1 MHz @ 110 W	Emission Mask D
Emission Frequency (MHz)	Level (dBm)		Level (dBc)
149.08	-34.9		-85.3
175.11	-34.5		-84.9
No other emissions were detected at a level greater than 20 dB below the limit.			
Measurement Uncertainty (dB)		±3	

LIMITS:

Carrier Output Power Watts	Emission Mask D 12.5 kHz Channel Spacing $50 + 10 \text{ Log}_{10} (P_{\text{Watts}})$	
110 W	-20 dBm	-70.4 dBc

## SPURIOUS EMISSIONS (RADIATED)

SPECIFICATION: FCC 47 CFR 2.1053

GUIDE: TIA/EIA-603C 2.2.12

### MEASUREMENT PROCEDURE:

1. Refer Annex A for equipment set up.
2. The EUT was placed on a wooden turntable at a distance of three metres from the test antenna. The output terminal was connected to an RF dummy load.
3. The turntable was rotated through 360° to obtain the maximum response of each spurious emission. Valid emissions were determined by switching the EUT on and off.
4. The EUT was replaced by a signal generator and substitution antenna to make measurements by the substitution method.

### MEASUREMENT RESULTS:

See the table on the following page

LIMIT CLAUSE: FCC 47 CFR 90.210

### Test Conditions on Open Area Test Site

Ambient Temperature	6 °C	
Relative Humidity	65 %	
Standard Test Voltage		13.8Vdc



## TRANSIENT FREQUENCY BEHAVIOR

SPECIFICATION: FCC 47 CFR 90.214

GUIDE: TIA/EIA-603C 2.2.19

### MEASUREMENT PROCEDURE:

1. Refer Annex A for equipment set up.
2. Measurements and plots were made following the TIA/EIA procedure.

### MEASUREMENT RESULTS:

See the tables and plots on the following pages for 12.5 kHz channel spacing.

LIMIT CLAUSE: FCC 47 CFR 90.214

TRANSIENT FREQUENCY BEHAVIOUR

SPECIFICATION: FCC 47 CFR 90.214

Tx FREQUENCY: 162.1 MHz 110 W 12.5 kHz Channel Spacing

FREQUENCY	162.1 MHz @ 110 W Tx	
TRANSIENT RESPONSE PERIOD	CARRIER PEAK VARIATION FROM NORMAL	
	Key ON (kHz)	Key OFF (kHz)
t1	-0.7	N/A
t2	-0.2	N/A
t3	N/A	0.3
t2 → t3 ppm	-1.9	
ERROR LIMIT (t2 → t3) ppm	5	
Measurement Uncertainty	Freq ± 130 Hz Time ± 0.2 %	

Confirm that during periods t1 and t3 the frequency difference does not exceed the value of one channel separation.	YES	NO
	Y	
Confirm that during the period t2 the frequency difference does not exceed half a channel separation.	YES	NO
	Y	
Confirm that during the period t2 to t3 the frequency difference does not exceed the frequency error limit.	YES	NO
	Y	

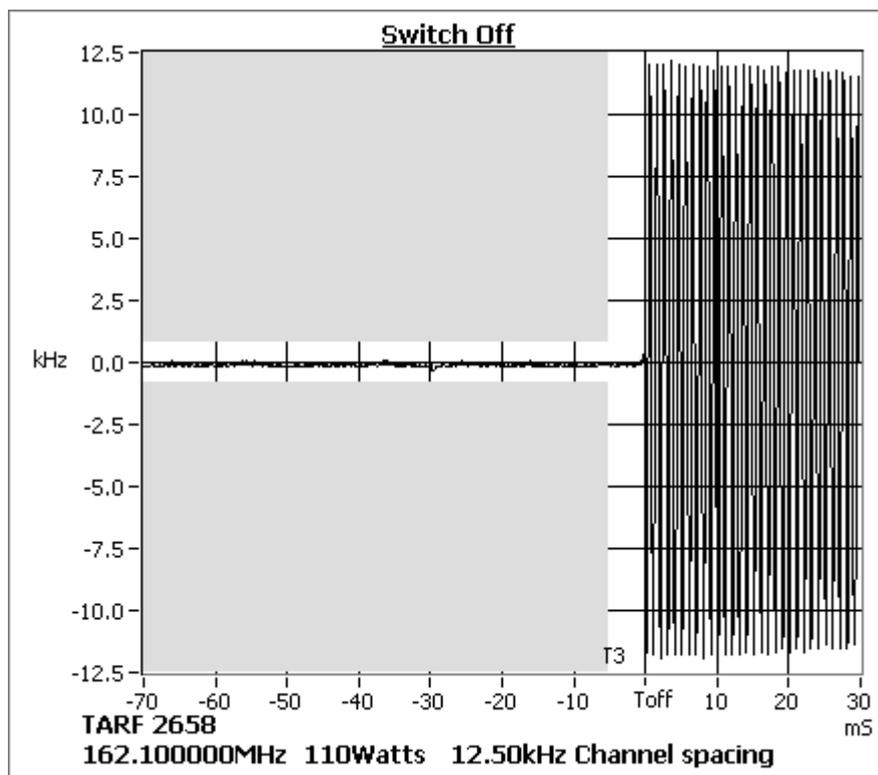
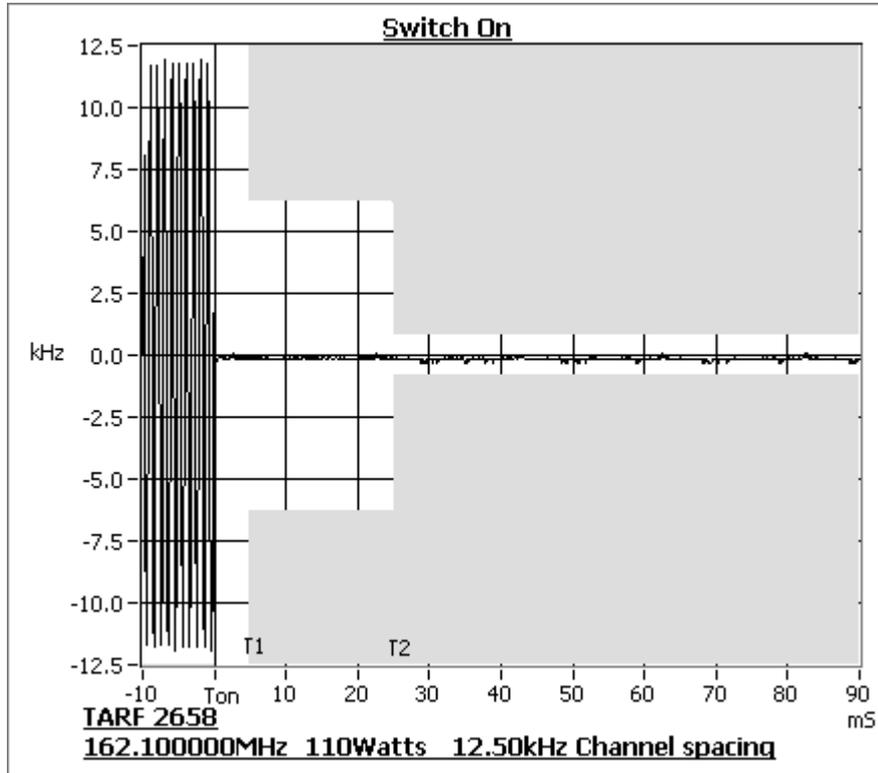
LIMIT:

TRANSIENT PERIODS	FREQUENCY RANGE 150MHz – 174 MHz	FREQUENCY RANGE 421MHz – 512 MHz
t1 (ms)	5 ms	10 ms
t2 (ms)	20 ms	25 ms
t3 (ms)	5 ms	10 ms

TRANSIENT FREQUENCY BEHAVIOUR

SPECIFICATION: FCC 47 CFR 90.214

Tx FREQUENCY: 162.1 MHz 110 W 12.5 kHz Channel Spacing



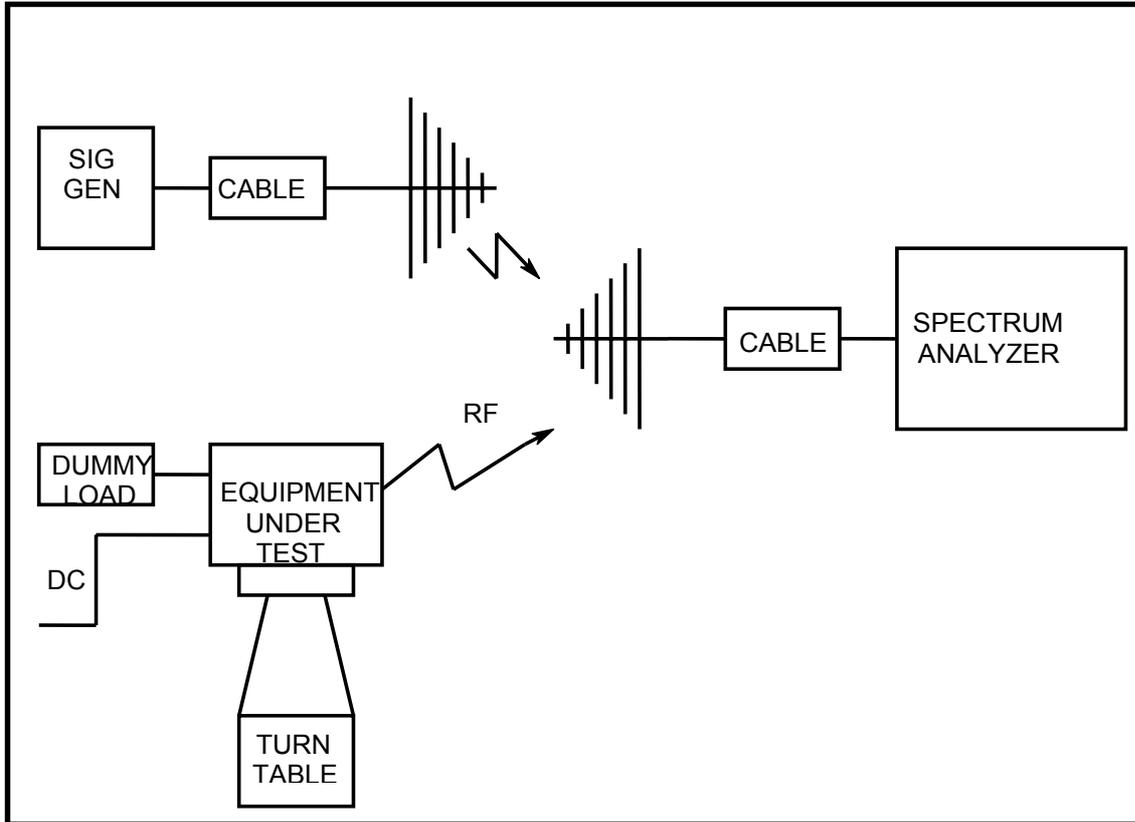
## TEST EQUIPMENT USED

Equipment	Manufacturer	Model No	Serial No#	Tait ID	Cal Due
Power Supply	Rohde & Schwarz	NGS M32/10 192.0810.31	Fnr 434	E3556	16/10/2007
Modulation Analyser	Hewlett Packard	HP8901B (Opt 002)	3704A05837	E3786	02/11/2007
RF Attenuator	Weinschel	Model 1	BL9950	E4080	28/11/2007
RF Attenuator 150W Treva	Weinschel	40-20-23	MF817	E4082	30/10/2007
RF Splitter Combiner	Minicircuits	ZFSC-4-1	-	E4084	-
Spectrum Analyser	Agilent	HP8562E	3821A00779	E3715	31/10/2007
1m Multiflex Cable	Suhner	MF141	TT007	E4443	30/10/2007
1m Multiflex Cable	Suhner	MF141	TT086	E4444	30/10/2007
Attenuator	Weinschel	67-30-33	BR0531	E4280	10/01/2008
S-LINE TEM CELL	Rohde & Schwarz	1089.9296.0 2	338232/003	E3636	20-Mar-09
Reference Dipoles	Emco	3121C DB1	9510-1164	E3559	23/11/2009
Log Periodic Antenna	Schwarzbeck	VUSLP	9111-219	-	-

## ANNEX A

### TEST SETUP DETAILS

#### Radiated Emissions.



Conducted Measurements

The Spectrum Analyser is connected to the EUT via a 30dB attenuator for Conducted Emissions testing.

