# CORRESPONDENCE

## Marstech Limited

11 Kelfield Street
Etobicoke, Ontario, M9W 5A1
(416) 246-1116
Fax: (416) 246-1020, E-mail bob@marstechltd.com

*Testing For FCC Submissions/ Verifications*

*Engineering & Administrative*

*Authorized by:* Professional Engineers Ontario

*Approved Test Facility* Industry Canada / Industrie Canada

Qualified Facility

| | | | |
|---|---|---|---|
| **To:** | Mr. Joe Dichoso | **Date:** | January 7, 1999 |
| **Company:** | FCC Lab - Maryland (FCC Application Processing Branch) | **Pages:** | 12, including this cover sheet. |
| **From:** | Bob Marshall | | |
| **Reference:** | 98389D | **Fax Log:** | FCC-L002 |
| **Subject:** | FCC ID: AX292AJC215R<br>Applicant: Clarion Co. ltd.<br>**Correspondence Reference No.: 5436**<br>**731 Confirmation No.: EA92004**<br>Date of Original Email: 01/05/1999 | | |

COMMENTS:

1) Please see the attached Bank Draft dated October 13, 1998 and Fee Form submitted to Mellon Bank.

2) Please see attached E-mail from Jim Sims following your telecon with him Jan. 6/99.

3) Please see attached audio frequency response curves from Clarion.

4) & 5) Please see attached response from Clarion including transistor data sheets.

Please call us at (416) 246-1116, if you need further info.

Best Regards,

15538 (04/97) PART 3 CUSTOMER'S RECORD OF DRAFT PURCHASED FROM

# THE TORONTO-DOMINION BANK

THE TORONTO-DOMINION BANK
WOODBRIDGE, ONTARIO L4L 2Z7

1885 - 01527028

NO. 1527028

OCTOBER 13 98

19

PAYABLE TO FEDERAL COMMUNICATIONS COMMISSIO

U.S. $**********475.00

DOLLARS
UNITED STATES CURRENCY

RECEIPT ONLY - NOT NEGOTIABLE

AUTHORIZED OFFICER NUMBER

PLEASE RETAIN FOR PRESENTATION IN EVENT ORIGINAL LOST

COUNTERSIGNED

Clarion / JE-21JR #98390

(2)

READ INSTRUCTIONS CAREFULLY BEFORE PROCEEDING

ELECTRONIC FILING

1) LOCKBOX # 358315

FEDERAL COMMUNICATIONS COMMISSION

# REMITTANCE ADVICE

PAGE NO 1 OF 1

APPROVED BY OMB 3060-0589

SPECIAL USE

FCC USE ONLY

## SECTION A - PAYER INFORMATION

| (2) PAYER NAME (If paying by credit card, enter name exactly as it appears on your card) | | (3) TOTAL AMOUNT PAID (dollars and cents) |
|---|---|---|
| Marstech Limited | | $475.00U SD |
| (4) STREET ADDRESS LINE NO. 1: 11 Kelfield Street | | |
| (5) STREET ADDRESS LINE NO. 2: | | |
| (6) CITY: Etobicoke, Ontario | (7) STATE: | (8) ZIP CODE: M9W 5A1 |
| (9) DAYTIME TELEPHONE NUMBER (Include area code): (416) 246-1116 | (10) COUNTRY CODE (if not in U.S.A.): CAN (CANADA) | |

IF PAYER NAME AND THE APPLICANT NAME ARE DIFFERENT, COMPLETE SECTION B
IF MORE THAN ONE APPLICANT, USE CONTINUATION SHEETS (FORM 159-C)

## SECTION B - APPLICANT INFORMATION

| (11) APPLICANT NAME (If paying by credit card, enter name exactly as it appears on your card) | | |
|---|---|---|
| CLARION CO., LTD. | | |
| (12) STREET ADDRESS LINE NO. 1: 50 Kamitoda | | |
| (13) STREET ADDRESS LINE NO. 2: | | |
| (14) CITY: Toda Saitama | (15) STATE: | (16) ZIP CODE: 335-8511 |
| (17) DAYTIME TELEPHONE NUMBER (include area code): 81 48 443 1111 Ext. 665 | (18) COUNTRY CODE (if not in U.S.A.): JAPAN | |

COMPLETE SECTION C FOR EACH SERVICE, IF MORE BOXES ARE NEEDED, USE CONTINUATION SHEETS (FORM 159-C)

## SECTION C - PAYMENT INFORMATION

| (19A) FCC CALL SIGN/OTHER ID | (20A) PAYMENT TYPE CODE (PTC) | (21A) QUANTITY | (22A) FEE DUE FOR (PTC) IN BLOCK 20A | FCC USE ONLY |
|---|---|---|---|---|
| | E F T | 1 | $475.00 USD | |
| (23A) FCC CODE 1 | (24A) FCC CODE 2 | | | |
| (19B) FCC CALL SIGN/OTHER ID | (20B) PAYMENT TYPE CODE (PTC) | (21B) QUANTITY | (22B) FEE DUE FOR (PTC) IN BLOCK 20B | FCC USE ONLY |
| | | | | |
| (23B) FCC CODE 1 | (24B) FCC CODE 2 | | | |
| (19C) FCC CALL SIGN/OTHER ID | (20C) PAYMENT TYPE CODE (PTC) | (21C) QUANTITY | (22C) FEE DUE FOR (PTC) IN BLOCK 20C | FCC USE ONLY |
| | | | | |
| (23C) FCC CODE 1 | (24C) FCC CODE 2 | | | |
| (19D) FCC CALL SIGN/OTHER ID | (20D) PAYMENT TYPE CODE (PTC) | (21D) QUANTITY | (22D) FEE DUE FOR (PTC) IN BLOCK 20D | FCC USE ONLY |
| | | | | |
| (23D) FCC CODE 1 | (24D) FCC CODE 2 | | | |

## SECTION D - TAXPAYER INFORMATION (REQUIRED)

(25) PAYER TIN: 4 1 6 2 4 6 1 1 1 6

(26) COMPLETE THIS BLOCK ONLY IF APPLICANT NAME IN B-11 IS DIFFERENT FROM PAYER NAME IN A-2) APPLICANT TIN: 8 1 4 8 4 4 3 11 11

## SECTION E - CERTIFICATION

(27) CERTIFICATION STATEMENT

I, Robert G. Marshall, P. Eng. (PRINT NAME), Certify under penalty of perjury that the foregoing and supporting information are true and correct to the best of my knowledge, information and belief. SIGNATURE Robert G Marshall

## SECTION F - CREDIT CARD PAYMENT INFORMATION

(28) ☐ MASTERCARD ☐ VISA

MASTERCARD/VISA ACCOUNT NUMBER:

EXPIRATION DATE: MONTH YEAR

I hereby authorize the FCC to charge my VISA or MASTERCARD for the service(s)/authorization(s) herein described. →

AUTHORIZED SIGNATURE

DATE

SEE PUBLIC BURDEN ESTIMATE ON REVERSE

FCC FORM 159 JULY 1997 (REVISED)

(3)

# --- E-MAIL ---

**TO:** **MR. BOB MARSHALL (Marstech Ltd.)**

**FROM:** **JIM SIMS (Com-Serve Corporation; *TEL VOICE: 519 748-4890*)**

**DATE:** **January 06, 1999**

**SUBJECT:** **Clarion JC215HMobile "CB" Transceiver** ..... **Page 1 of 1.**

BOB, AS PER OUR TELEPHONE CONVERSATION THIS MORNING, I HAVE THE FOLLOWING COMMENTS.

THE SPURIOUS RADIATED **LIMITS** WERE CALCULATED AS FOLLOWS:

- MAXIMUM TRANSMITTER OUTPUT TOTAL POWER or Pt = 3.4 Watts.
- ASSUME ALL MEASUREMENTS ARE RELATED TO ½ WAVE TUNED DIPOLE ANTENNAS AS PER FCC REGULATIONS.
- APPLY FORMULA TO ESTABLISH FIELD STRENGTH OF 3.4 W CARRIER (Pt) AT A DISTANCE OF 3 (THREE) METRES.
- FORMULA IS $\dfrac{\sqrt{49.2 * Pt}}{\text{Distance (M)}}$

- RESULTS = sqrt (49.2 * 3.4 =167.28) = 12.93368 ÷ 3 = 4.311227 V/M
- AS PER FCC PART 90, REDUCE THIS LEVEL BY AT LEAST -60dB = **4,311 $\mu$V/M**

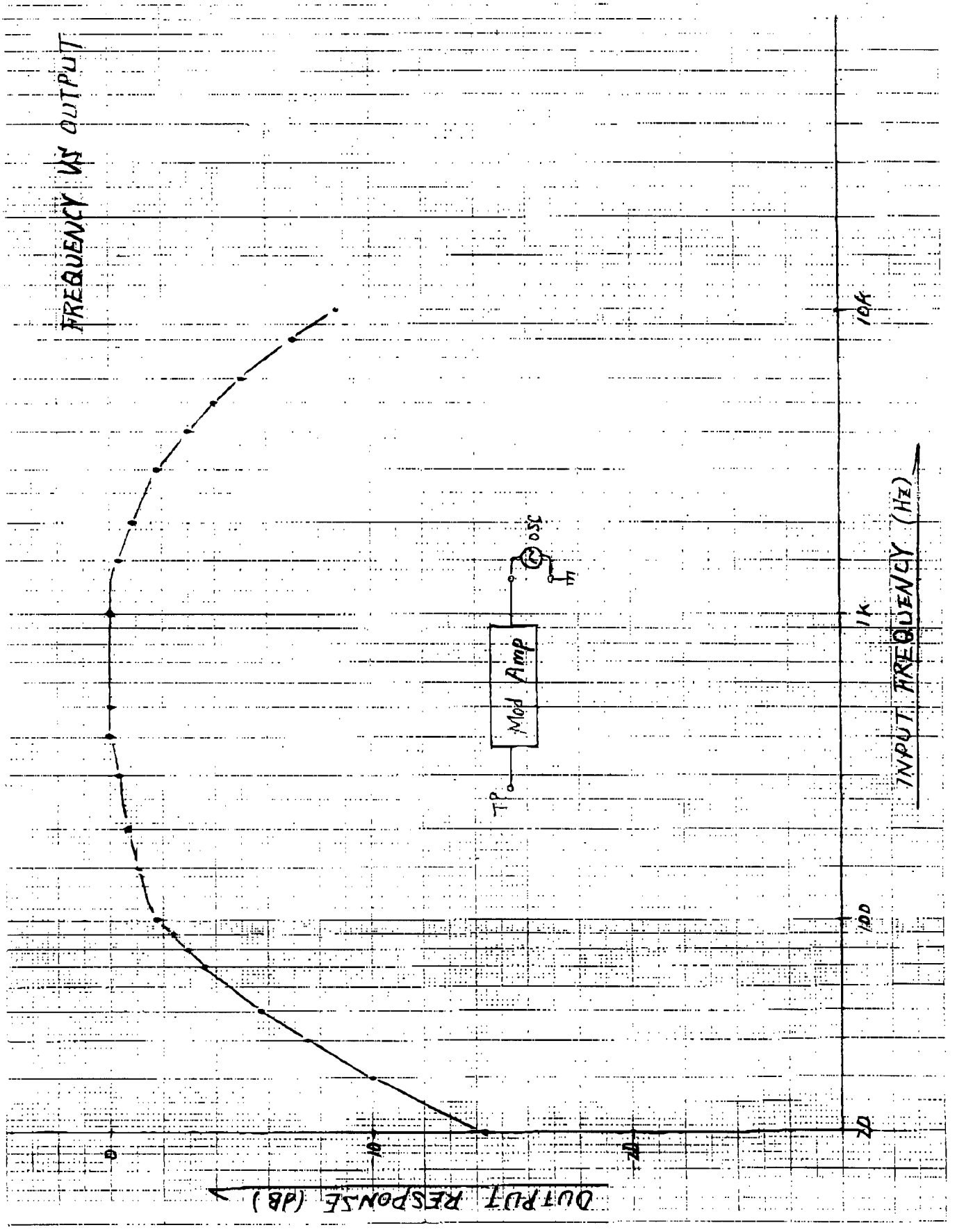
AS FAR AS THE RADIO RECEIVER L.O. IS CONCERNED, THE APPLICABLE BAND WAS SCANNED; NO EMISSIONS WERE FOUND. WE ALSO MEASURED 25 MHz TO 30 MHz CAREFULLY, ONCE AGAIN THERE WERE NO RECEIVER L.O. EMISSIONS FOUND.

REGARDS

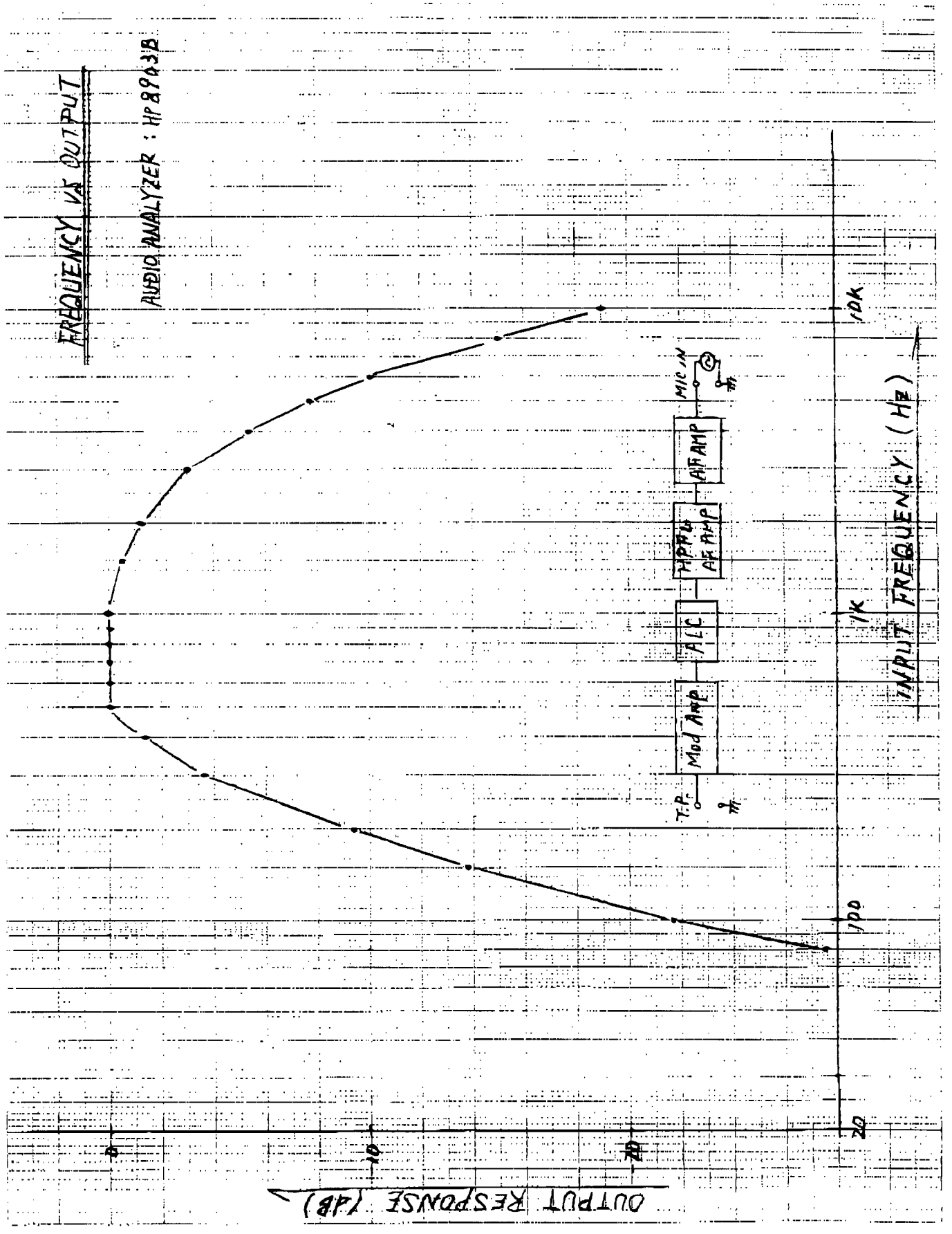
*Jim*

In response to your Fax CLA 002

I attached two curves of the audio frequency response.
One is the curve of the response for Mod Amp in the block diagram which is located ALC and the modulated stage.
The other is one between the microphone input and the modulated stage.
But I don't quit understand what FCC intends by knowing the curve.
Usually an audio limiter followed by a low pass filter are provided in the audio circuit cause some harmonic distortion due to clipping signal when it is large enough. I assumed that this was concerned by FCC.
But our CB unit does't has an audio limiter. Instead of the limiter it has a ALC automatic level control circuit to control the audio level without generating any harmonic distortion.


FREQUENCY VS OUTPUT
OUTPUT RESPONSE (dB)
0
-10
-20
-30
10K
1K
100
20
INPUT FREQUENCY (Hz)
OSC
Mod Amp
TP

(6)


FREQUENCY VS OUTPUT
AUDIO ANALYZER : HP8903B
MIC IN
AF AMP
HPF&LPF AF AMP
ALC
Mod AMP
T.P.
OUTPUT RESPONSE (dB)
0
-10
-20
20
100
1K
10K
INPUT FREQUENCY (Hz)

In response to your Fax CLA 001,

1. Protection against out-of-band operation

First the generation of the radio waves in the CB band are performed by a PLL (phased locked loop) synthesizer based on the fully strict timebase of the crystal oscillator. The setting of the channel is performed by sending the channel data from the microprocessor to the PLL circuit in accordance with the user operation in the controller unit. The microprocessor has a memory table with a relation between the channel numbers and frequency datas sent to the PLL just listed as CB transmitter channel frequencies in Section 95.625.

So it is impossible to generate to send out-of-band frequencies.

Secondly when something wrong happened with the PLL synthesizer, unlock signal is detected by the microprocessor and the transmission should be prohibited automatically.

2. CB transmitter power

I attached a datasheet for 2SC1945.

We designed the collector supply voltage between 6 and 7volts and input power is around 0.2w. That concludes that the transmitter power can not exceed 10 watts from the curve of output power vs. collector supply voltage .

# 2SC1945

## NPN EPITAXIAL PLANAR TYPE

### DESCRIPTION

2SC1945 is a silicon NPN epitaxial planar type transistor designed for RF power amplifiers on HF band mobile radio applications.

### FEATURES

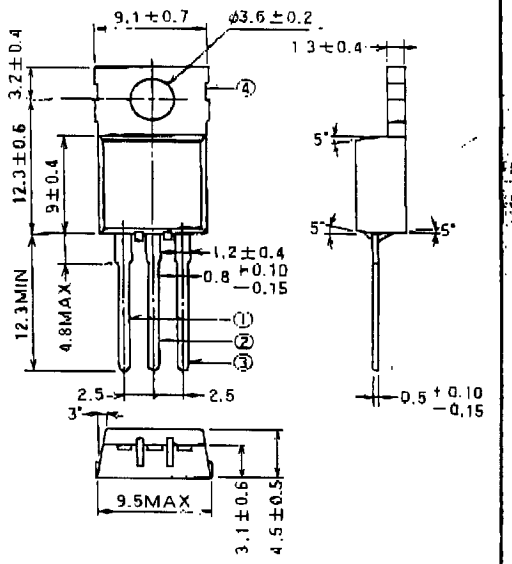
- High power gain: $G_{pe} \geqq 14.5dB$
  @$V_{CC}$ = 12V, $P_O$ = 14W, f = 27MHz
- Emitter ballasted construction for high reliability and good performances.
- TO-220 package similarly is combinient for mounting.
- Ability of withstanding infinite load VSWR when operated at $V_{CC}$ = 16V, $P_O$ = 18W, f = 27MHz.

### APPLICATION

10 to 14 watts output power class AB amplifiers applications in HF band.

### OUTLINE DRAWING

Dimensions in mm




### ABSOLUTE MAXIMUM RATINGS ($T_C$ = 25°C unless otherwise specified)

| Symbol | Parameter | Conditions | Ratings | Unit |
|---|---|---|---|---|
| $V_{CBO}$ | Collector to base voltage | | 80 | V |
| $V_{EBO}$ | Emitter to base voltage | | 5 | V |
| $V_{CEO}$ | Collector to emitter voltage | $R_{BE}$ = ∞ | 40 | V |
| $I_C$ | Collector current | | 6 | A |
| $P_C$ | Collector dissipation | $T_a$ = 25°C | 1.5 | W |
| | | $T_C$ = 25°C | 20 | W |
| $T_j$ | Junction temperature | | +150 | °C |
| $T_{stg}$ | Storage temperature | | −55 ~ +150 | °C |
| $R_{th-a}$ | Thermal resistance | Junction to ambient | 83.3 | °C/W |
| $R_{th-c}$ | | Junction to case | 6.25 | °C/W |

### ELECTRICAL CHARACTERISTICS ($T_C$ = 25°C unless otherwise specified)

| Symbol | Parameter | Test conditions | Limits | | | Unit |
|---|---|---|---|---|---|---|
| | | | Min | Typ | Max | |
| $V_{(BR)EBO}$ | Emitter to base breakdown voltage | $I_E$ = 5mA, $I_C$ = 0 | 5 | | | V |
| $V_{(BR)CBO}$ | Collector to base breakdown voltage | $I_C$ = 1mA, $I_E$ = 0 | 80 | | | V |
| $V_{(BR)CEO}$ | Collector to emitter breakdown voltage | $I_C$ = 10mA, $R_{BE}$ = ∞ | 40 | | | V |
| $I_{CBO}$ | Collector cutoff current | $V_{CB}$ = 30V, $I_E$ = 0 | | | 100 | μA |
| $I_{EBO}$ | Emitter cutoff current | $V_{EB}$ = 4V, $I_C$ = 0 | | | 100 | μA |
| $h_{FE}$ | DC forward current gain * | $V_{CE}$ = 10V, $I_C$ = 0.1A | 10 | 50 | 180 | — |
| $P_O$ | Output power | $V_{CC}$ = 12V, Pin = 0.5W, f = 27MHz | 14 | 16 | | W |
| $\eta_C$ | Collector efficiency | | 60 | 70 | | % |

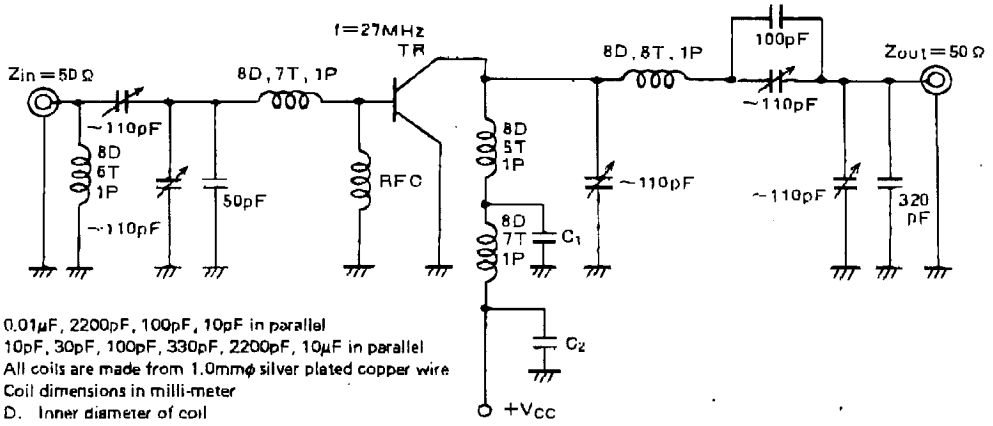
* Note: Pulse test, $P_W$ = 150μs, duty = 5%

MITSUBISHI ELECTRIC

# 2SC1945

## NPN EPITAXIAL PLANAR TYPE

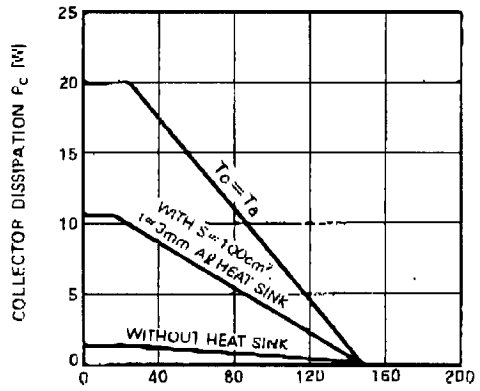
### TEST CIRCUIT



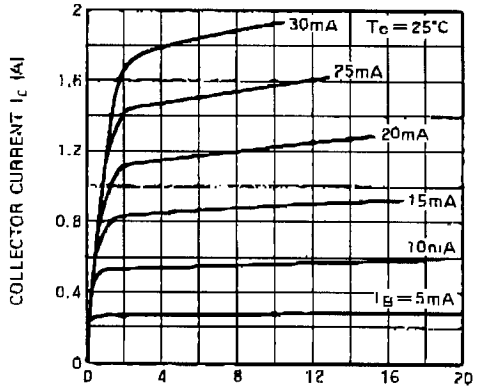

$C_1$: 0.01μF, 2200pF, 100pF, 10pF in parallel
$C_2$: 10pF, 30pF, 100pF, 330pF, 2200pF, 10μF in parallel
Notes: All coils are made from 1.0mmφ silver plated copper wire
Coil dimensions in milli-meter
D. Inner diameter of coil
T: Turn number of coil
P: Pitch of coil

### TYPICAL PERFORMANCE DATA

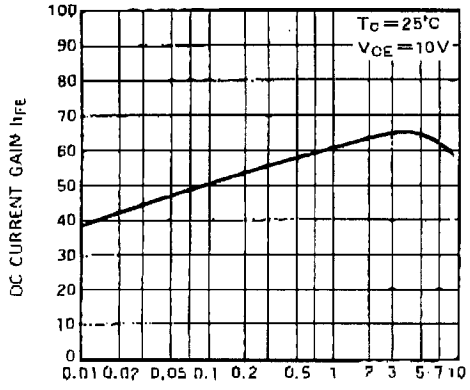
**COLLECTOR DISSIPATION VS. AMBIENT TEMPERATURE**



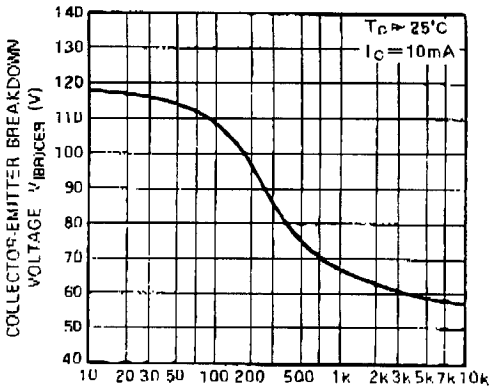

**OUTPUT CHARACTERISTICS, COMMON EMITTER**



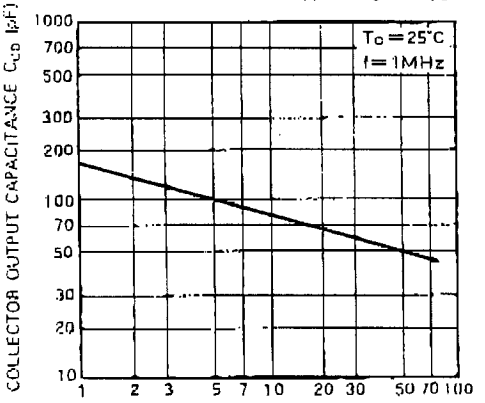

**DC CURRENT GAIN VS. COLLECTOR CURRENT**



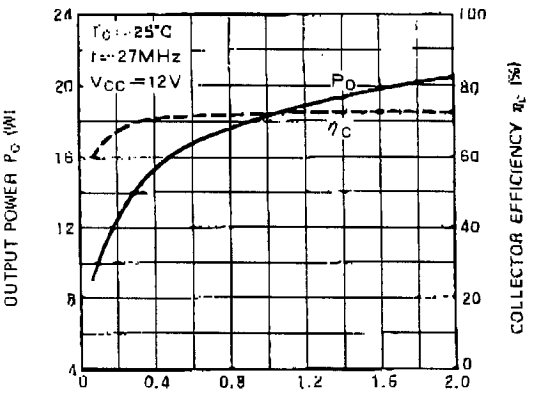

**COLLECTOR-EMITTER BREAKDOWN VOLTAGE VS. BASE-EMITTER RESISTANCE**



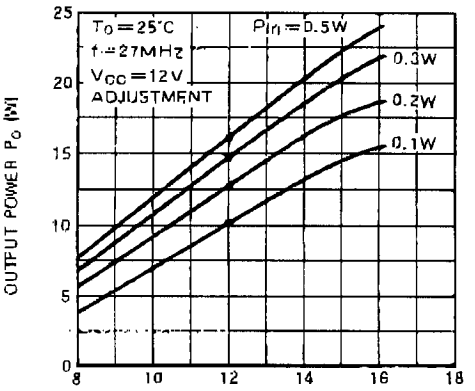
COLLECTOR OUTPUT CAPACITANCE VS. COLLECTOR TO BASE VOLTAGE

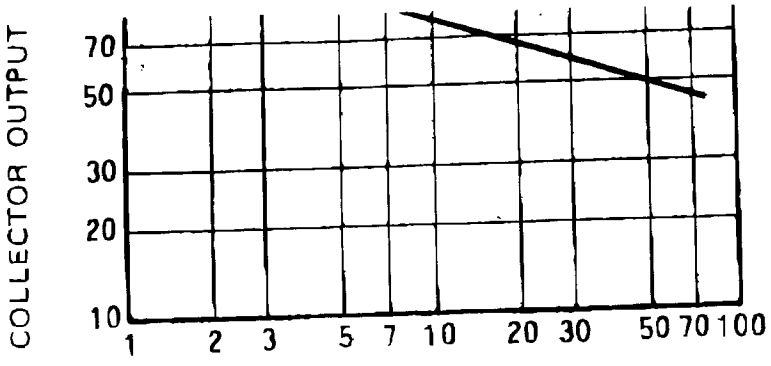



OUTPUT POWER, COLLECTOR EFFICIENCY VS. INPUT POWER

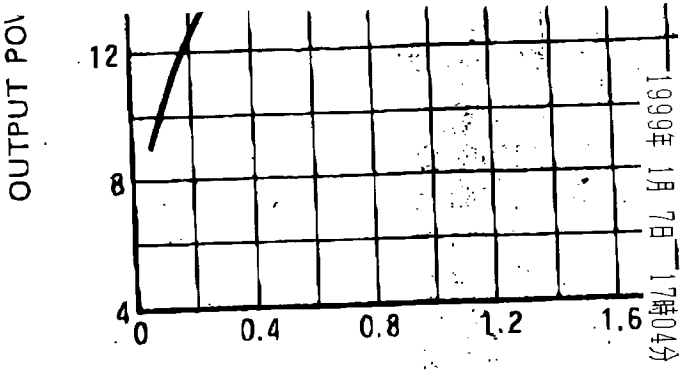



OUTPUT POWER VS. COLLECTOR SUPPLY VOLTAGE



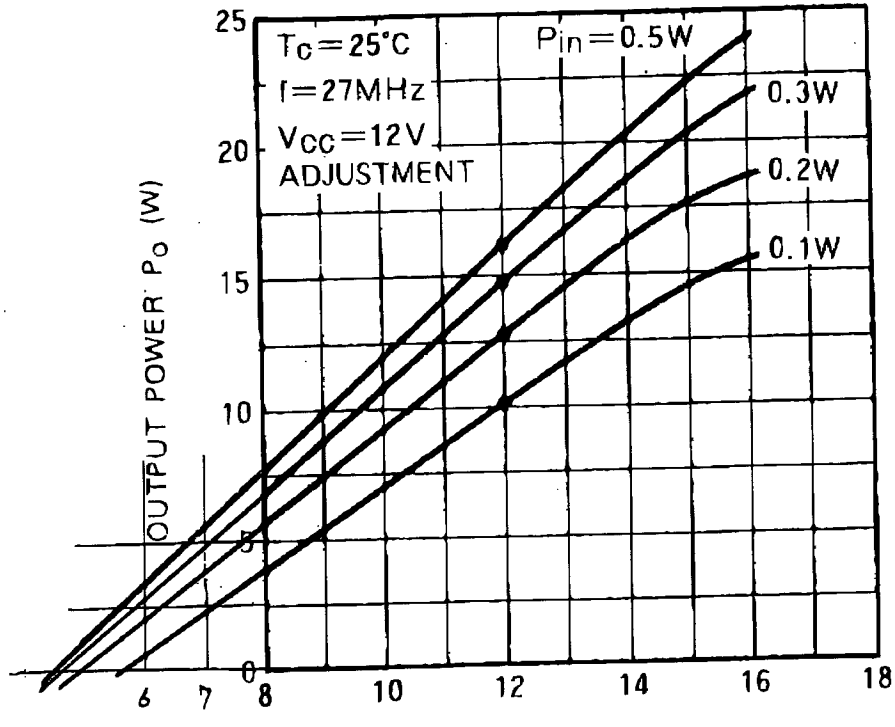



COLLECTOR TO BASE VOLTAGE $V_{CB}$ (V)




INPUT POWER $P_{in}$ (W)

## OUTPUT POWER VS. COLLECTOR SUPPLY VOLTAGE




COLLECTOR SUPPLY VOLTAGE $V_{CC}$ (V)

(12)