

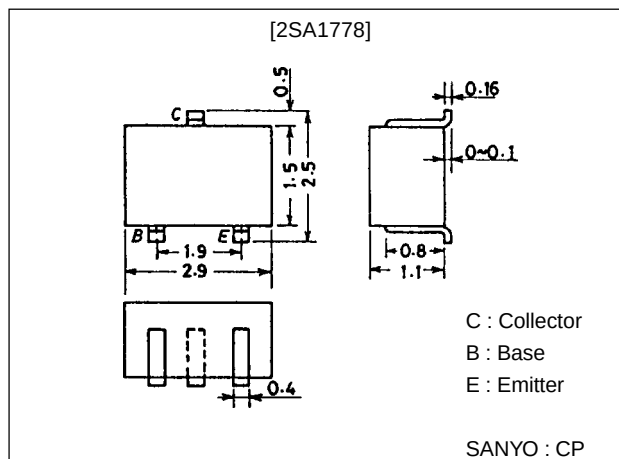
**2SA1778****VHF Converter, Local Oscillator Applications****Features**

- High power gain (PG=13dB typ ; f=0.4GHz).
- High cutoff frequency (f_T =1.2GHz typ).
- Low C_{ob} (C_{ob} =1.0pF typ).
- Complementary pair with the 2SC4269.

Package Dimensions

unit:mm

2018A

**Specifications****Absolute Maximum Ratings at Ta = 25°C**

Parameter	Symbol	Conditions	Ratings	Unit
Collector-to-Base Voltage	V_{CBO}		-15	V
Collector-to-Emitter Voltage	V_{CEO}		-15	V
Emitter-to-Base Voltage	V_{EBO}		-3	V
Collector Current	I_C		-50	mA
Collector Dissipation	P_C		250	mW
Junction Temperature	T_J		150	°C
Storage Temperature	T_{stg}		-55 to +150	°C

Electrical Characteristics at Ta = 25°C

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Collector Cutoff Current	I_{CBO}	$V_{CB} = -15V, I_E = 0$			-0.1	μA
Emitter Cutoff Current	I_{EBO}	$V_{EB} = -2V, I_C = 0$			-0.1	μA
DC Current Gain	h_{FE}	$V_{CE} = -10V, I_C = -5mA$	40*		200*	
Gain-Bandwidth Product	f_T	$V_{CE} = -10V, I_C = -5mA$	0.6	1.2		GHz
Output Capacitance	C_{ob}	$V_{CB} = -10V, f = 1MHz$		1.0	1.5	pF
Reverse Transfer Capacitance	C_{re}	$V_{CB} = -10V, f = 1MHz$		0.75		pF
Power Gain	PG	$V_{CE} = -10V, I_C = -5mA, f = 0.4GHz$		13		dB
Noise Figure	NF	$V_{CE} = -10V, I_C = -3mA, f = 0.4GHz$		2.5		dB

* : The 2SA1778 is classified by 5mA h_{FE} as follows :

40	2	80	60	3	120	100	4	200
----	---	----	----	---	-----	-----	---	-----

Note : Marking : HS

 h_{FE} rank : 2, 3, 4

■ Any and all SANYO products described or contained herein do not have specifications that can handle applications that require extremely high levels of reliability, such as life-support systems, aircraft's control systems, or other applications whose failure can be reasonably expected to result in serious physical and/or material damage. Consult with your SANYO representative nearest you before using any SANYO products described or contained herein in such applications.

■ SANYO assumes no responsibility for equipment failures that result from using products at values that exceed, even momentarily, rated values (such as maximum ratings, operating condition ranges, or other parameters) listed in products specifications of any and all SANYO products described or contained herein.

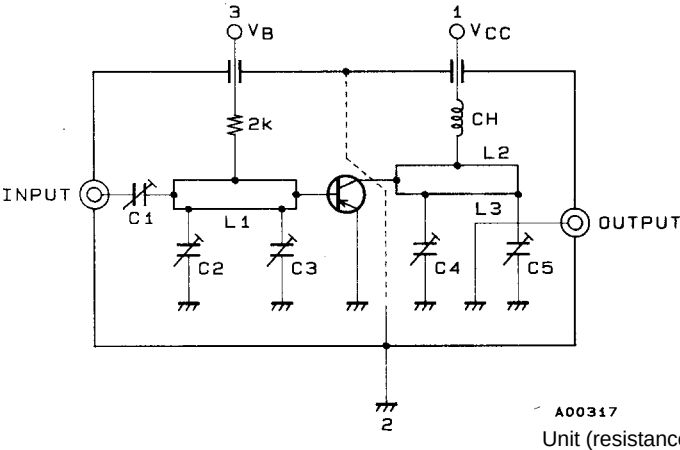
SANYO Electric Co.,Ltd. Semiconductor Business Headquarters

TOKYO OFFICE Tokyo Bldg., 1-10, 1 Chome, Ueno, Taito-ku, TOKYO, 110-8534 JAPAN

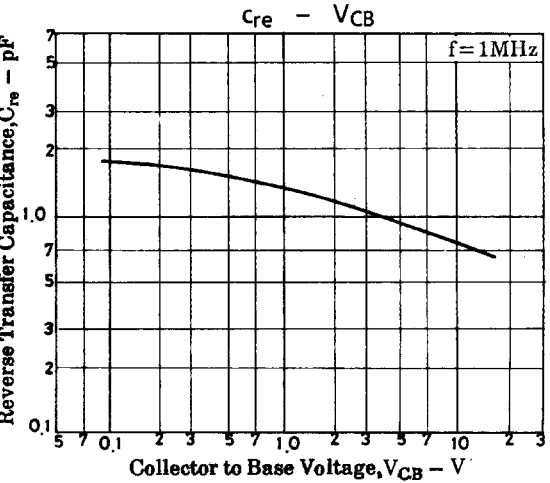
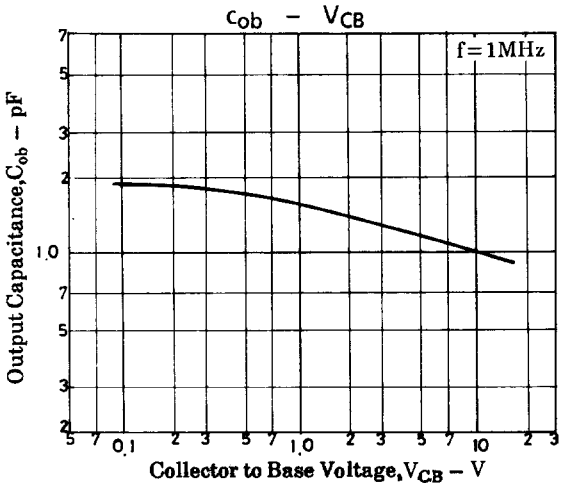
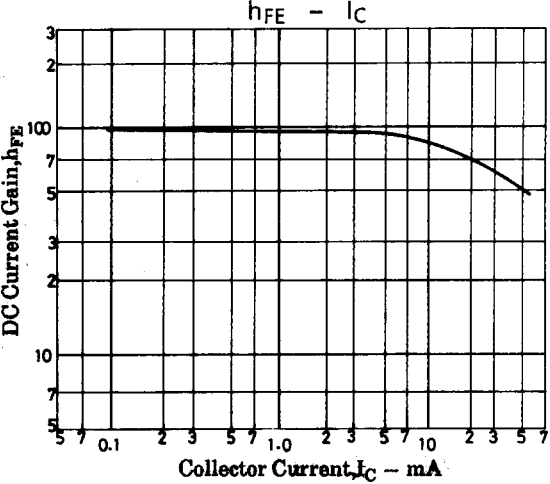
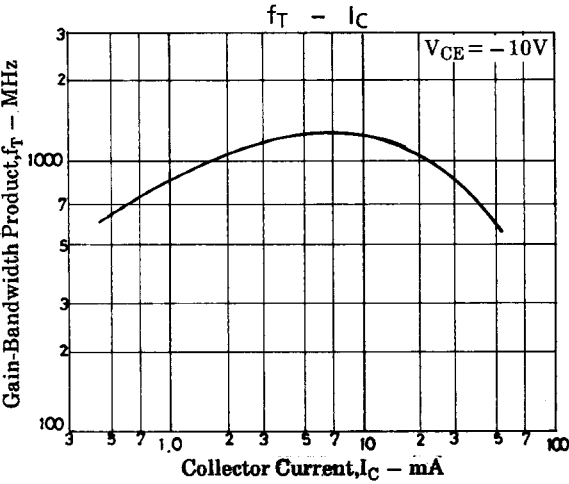
83198HA (KT)/20193YK (KOTO) No.3481-1/5

2SA1778

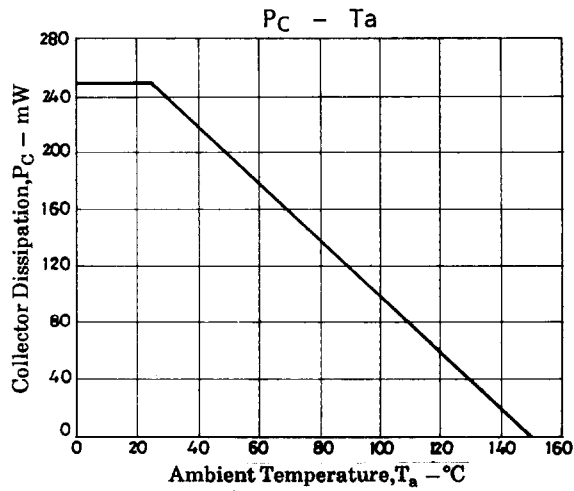
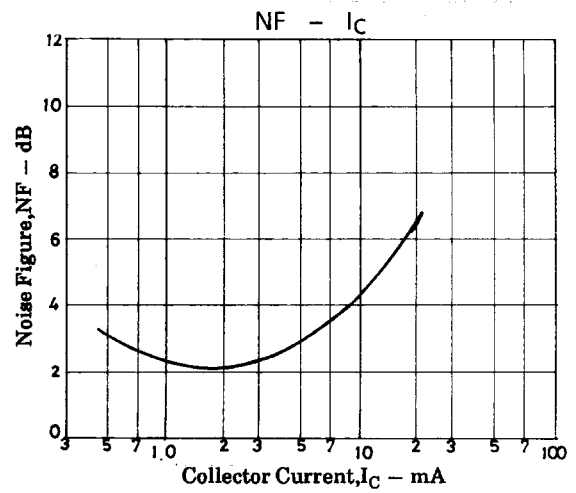
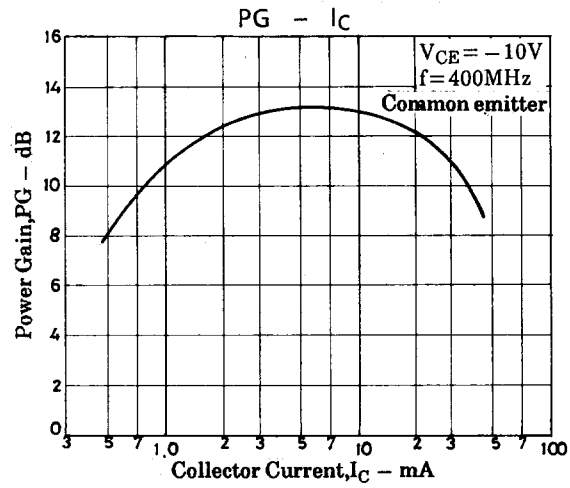
PG, NF Test Circuit



	400MHz
C1	~20pF
C2	~10pF
C3	~10pF
C4	~20pF
C5	~30pF
L1	2φ, 1≐40mm 2/3t
L2	2φ, 1≐40mm 2/3t
L3	1φ, 1≐40mm 1/2t
CH	3t+ Bead core

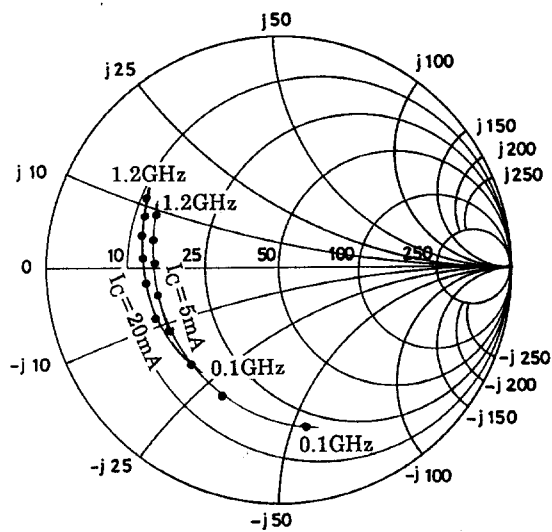


2SA1778

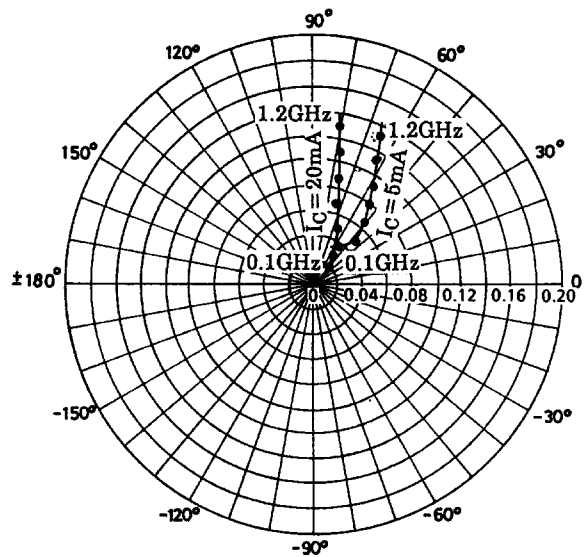


S Parameter

S11e: $V_{CE} = -10V$
 $f = 100MHz, 200 \text{ to } 1200MHz (200MHz \text{ step})$

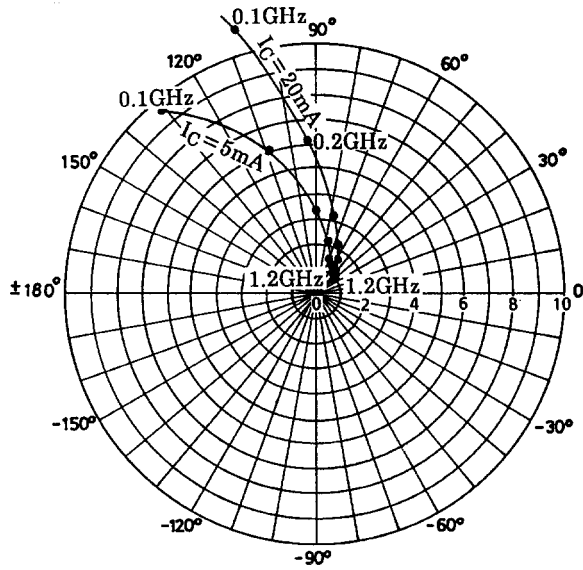


S12e: $V_{CE} = -10V$
 $f = 100MHz, 200 \text{ to } 1200MHz (200MHz \text{ step})$

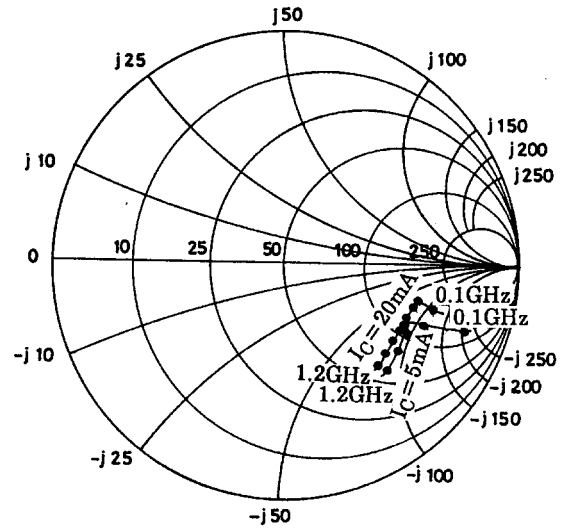


2SA1778

S21e: $V_{CE} = -10V$
 $f = 100\text{MHz}, 200 \text{ to } 1200\text{MHz} (200\text{MHz step})$



S22e: $V_{CE} = -10V$
 $f = 100\text{MHz}, 200 \text{ to } 1200\text{MHz} (200\text{MHz step})$



S Parameter (Common emitter)

$V_{CE} = -10V, I_C = -5\text{mA}, Z_0 = 50\Omega$

Freq. (MHz)	S ₁₁		S ₂₁		S ₁₂		S ₂₂	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100	0.685	-79.5	9.506	130.8	0.039	55.5	0.770	-19.6
200	0.594	-117.7	6.031	108.6	0.052	45.9	0.670	-21.2
400	0.554	-154.4	3.349	89.0	0.065	48.3	0.599	-22.8
600	0.551	-170.6	2.331	76.1	0.079	53.9	0.579	-26.4
800	0.555	179.4	1.823	65.9	0.095	58.8	0.575	-31.4
1000	0.568	169.6	1.496	57.0	0.112	62.5	0.576	-37.3
1200	0.581	162.5	1.292	48.9	0.132	65.8	0.579	-43.6

$V_{CE} = -10V, I_C = -20\text{mA}, Z_0 = 50\Omega$

Freq (MHz)	S ₁₁		S ₂₁		S ₁₂		S ₂₂	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100	0.566	-134.4	11.446	110.0	0.022	51.6	0.660	-16.2
200	0.579	-159.2	6.160	92.9	0.030	56.4	0.600	-14.3
400	0.599	-175.8	3.152	77.2	0.047	66.3	0.586	-16.4
600	0.613	174.8	2.128	65.9	0.066	71.2	0.591	-21.4
800	0.632	167.3	1.618	56.4	0.084	75.3	0.601	-27.8
1000	0.645	160.0	1.305	47.6	0.106	77.8	0.610	-34.7
1200	0.663	153.9	1.097	40.4	0.130	79.9	0.620	-42.0

- Specifications of any and all SANYO products described or contained herein stipulate the performance, characteristics, and functions of the described products in the independent state, and are not guarantees of the performance, characteristics, and functions of the described products as mounted in the customer's products or equipment. To verify symptoms and states that cannot be evaluated in an independent device, the customer should always evaluate and test devices mounted in the customer's products or equipment.
- SANYO Electric Co., Ltd. strives to supply high-quality high-reliability products. However, any and all semiconductor products fail with some probability. It is possible that these probabilistic failures could give rise to accidents or events that could endanger human lives, that could give rise to smoke or fire, or that could cause damage to other property. When designing equipment, adopt safety measures so that these kinds of accidents or events cannot occur. Such measures include but are not limited to protective circuits and error prevention circuits for safe design, redundant design, and structural design.
- In the event that any and all SANYO products described or contained herein fall under strategic products (including services) controlled under the Foreign Exchange and Foreign Trade Control Law of Japan, such products must not be exported without obtaining export license from the Ministry of International Trade and Industry in accordance with the above law.
- No part of this publication may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopying and recording, or any information storage or retrieval system, or otherwise, without the prior written permission of SANYO Electric Co., Ltd.
- Any and all information described or contained herein are subject to change without notice due to product/technology improvement, etc. When designing equipment, refer to the "Delivery Specification" for the SANYO product that you intend to use.
- Information (including circuit diagrams and circuit parameters) herein is for example only ; it is not guaranteed for volume production. SANYO believes information herein is accurate and reliable, but no guarantees are made or implied regarding its use or any infringements of intellectual property rights or other rights of third parties.

This catalog provides information as of August, 1998. Specifications and information herein are subject to change without notice.