

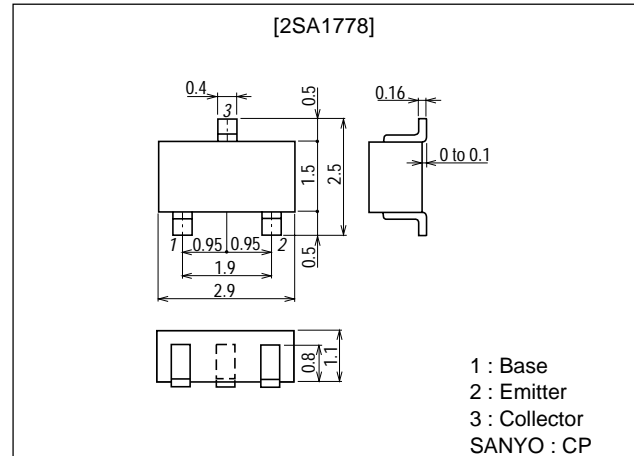
**2SA1778****VHF Converter, Local Oscillator Applications****Features**

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

Package Dimensions

unit:mm

2018B

**Specifications****Absolute Maximum Ratings** at $T_a = 25^\circ\text{C}$

Parameter	Symbol	Conditions	Ratings	Unit
Collector-to-Base Voltage	V_{CB0}		-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	$^\circ\text{C}$
Storage Temperature	T_{stg}		-55 to +150	$^\circ\text{C}$

Electrical Characteristics at $T_a = 25^\circ\text{C}$

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Collector Cutoff Current	I_{CB0}	$V_{CB}=-15\text{V}, I_E=0$			-0.1	μA
Emitter Cutoff Current	I_{EBO}	$V_{EB}=-2\text{V}, I_C=0$			-0.1	μA
DC Current Gain	h_{FE}	$V_{CE}=-10\text{V}, I_C=-5\text{mA}$	40*		200*	
Gain-Bandwidth Product	f_T	$V_{CE}=-10\text{V}, I_C=-5\text{mA}$	0.6	1.2		GHz
Output Capacitance	C_{ob}	$V_{CB}=-10\text{V}, f=1\text{MHz}$		1.0	1.5	pF
Reverse Transfer Capacitance	C_{re}	$V_{CB}=-10\text{V}, f=1\text{MHz}$		0.75		pF
Power Gain	PG	$V_{CE}=-10\text{V}, I_C=-5\text{mA}, f=0.4\text{GHz}$		13		dB
Noise Figure	NF	$V_{CE}=-10\text{V}, I_C=-3\text{mA}, f=0.4\text{GHz}$		2.5		dB

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

Rank	2	3	4
h_{FE}	40 to 80	60 to 120	100 to 200

Note : Marking : HS

 h_{FE} rank : 2, 3, 4

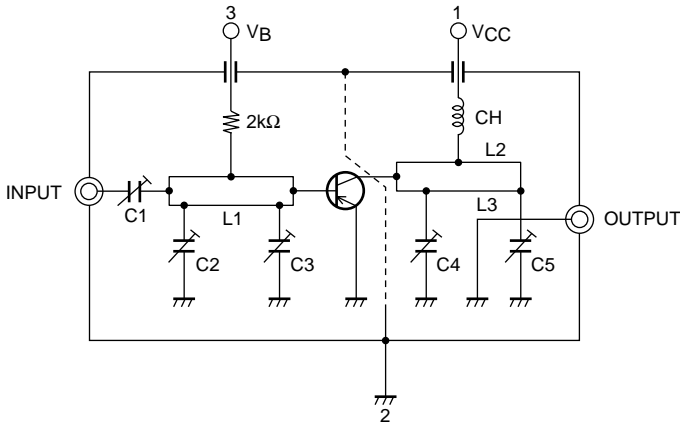
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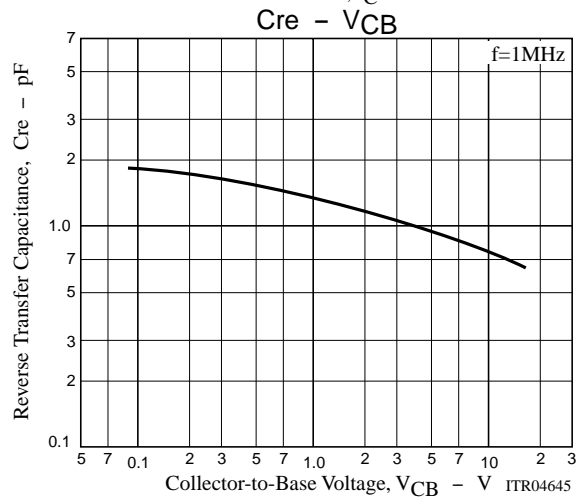
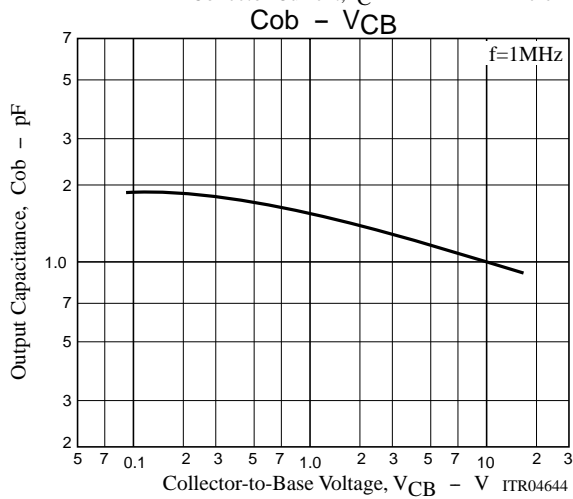
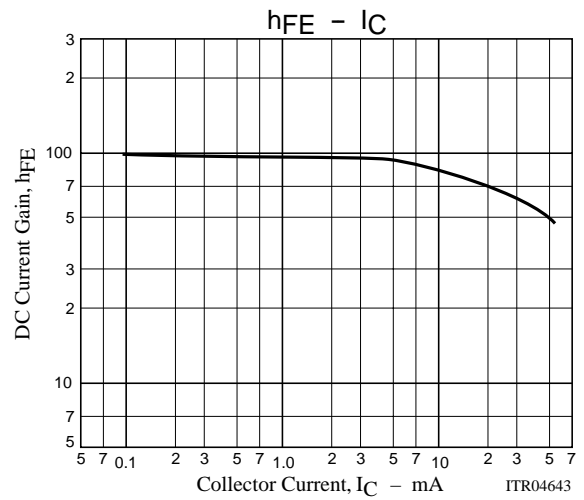
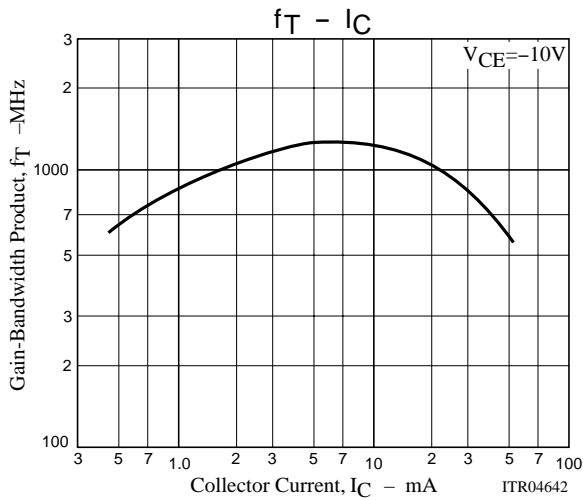
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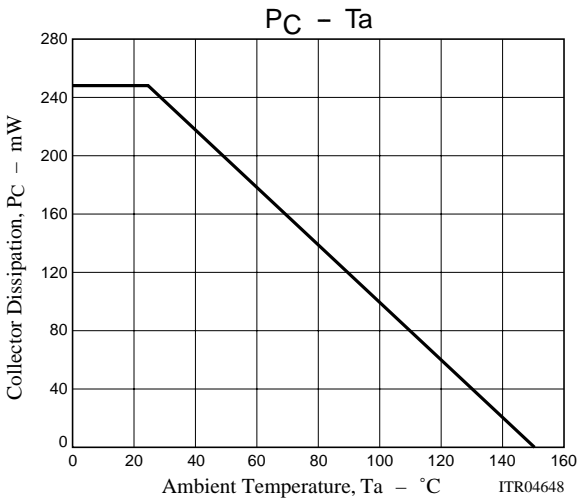
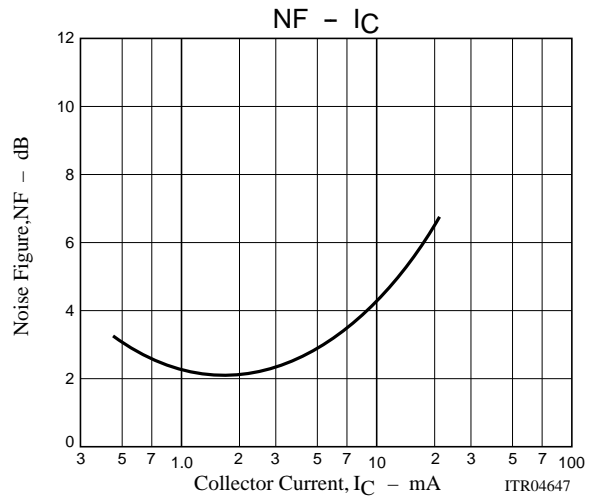
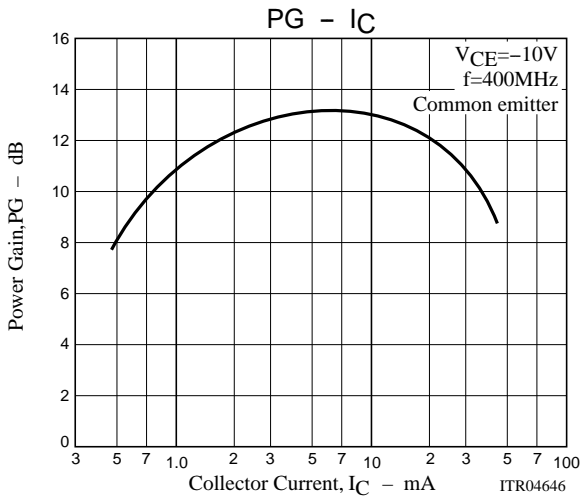
PG, NF Test Circuit



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

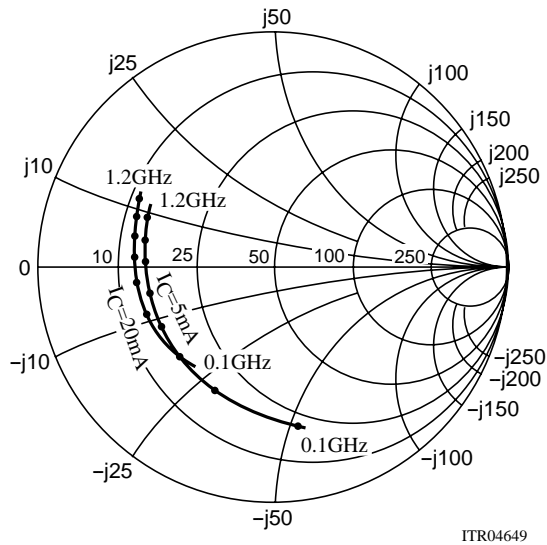


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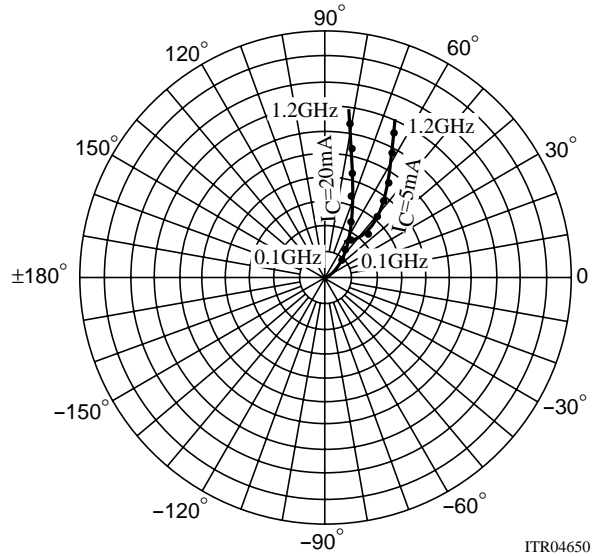


S Parameter

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

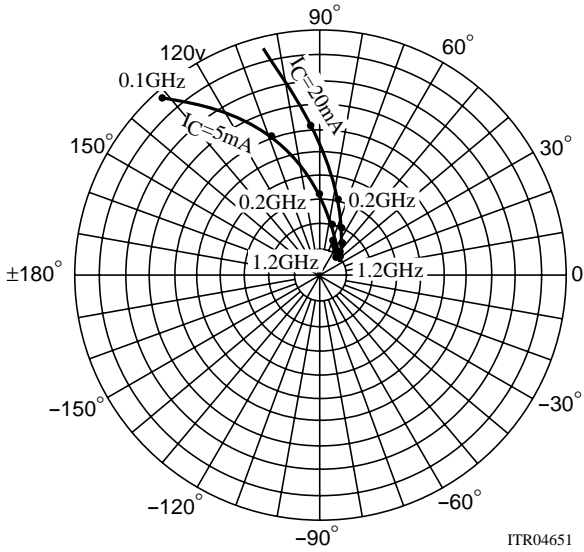


S12e : $V_{CE} = -10V$
 $f = 100MHz, 200$ to $1200MHz$ (200MHz step)



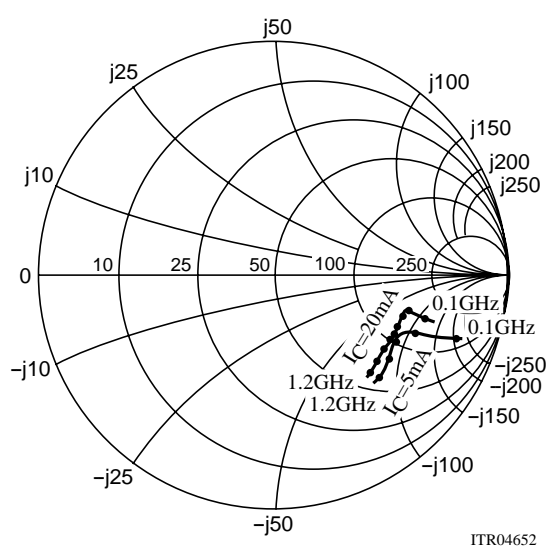
2SA1778

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



ITR04651

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



ITR04652

S Parameters (Common Emitter)

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

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

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

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

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