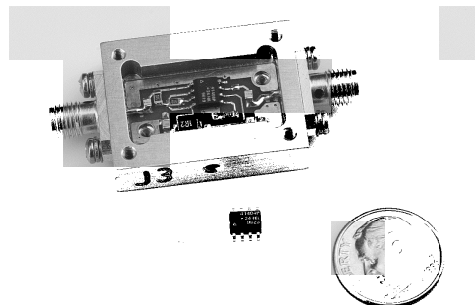


SCITEQ Components Group	12 GHz DIVIDE-BY-2	SEI-1202D/SEI-1202PG
	12 GHz DIVIDE-BY-4	SEI-1204D/SEI-1204PG
	12 GHz DIVIDE-BY-8	SEI-1208D/SEI-1208PG
	12 GHz DIVIDE-BY-32	SEI-1232D/SEI-1232PG
STATIC PRESCALERS		

FEATURES

- **Static Dividers**
- **Wide Frequency Range:** 2 — 12 GHz
- **Low Phase Noise Floor:** <-140 dBc/Hz
- **Low Power Dissipation**
- **Single Supply:** +6V or -6V(chip only)
- **Single-ended or Differential I/O**
- **Temperature Range:** $T_A = -25^{\circ}\text{C}$ to $+85^{\circ}\text{C}$



DESCRIPTION

The SEI-12XX is a family of very high speed, low cost GaAs dividers, capable of operating up to 12 GHz. These devices are **static** dividers and therefore will divide over a wide frequency range up to 12 GHz. Input and output are either single-ended or differential, and nominal output power is +2 dBm (-10 dBm for the SEI-1202).

The packaged versions of the prescalers are available in an 8-lead plastic SOIC package. Three frequency ranges are now available (2–10 GHz, 2–12 GHz, 2–14 GHz*). Pin assignments and ordering information are shown on page 3. The original ceramic flatpack devices (SEI-12XXP) are only available as a special order on a limited basis until the current inventory is exhausted.

ABSOLUTE MAXIMUM RATINGS ($T_A = +25^{\circ}\text{C}$)

Symbols	Parameters	Units	Ratings
V_{ee} or V_{cc}	Supply Voltage	V	-8 or +8
P_{in}	Input Power @ $V_{ee} = -6.0\text{V}$ or @ $V_{cc} = +6.0\text{V}$	dBm	+15
P_{max}	Maximum Power Dissipation	W	1.5
T_c	Case Temperature	$^{\circ}\text{C}$	-55 to +125
T_{st}	Storage Temperature	$^{\circ}\text{C}$	-65 to +175

Note: Operation in excess of any one of these conditions may result in permanent damage

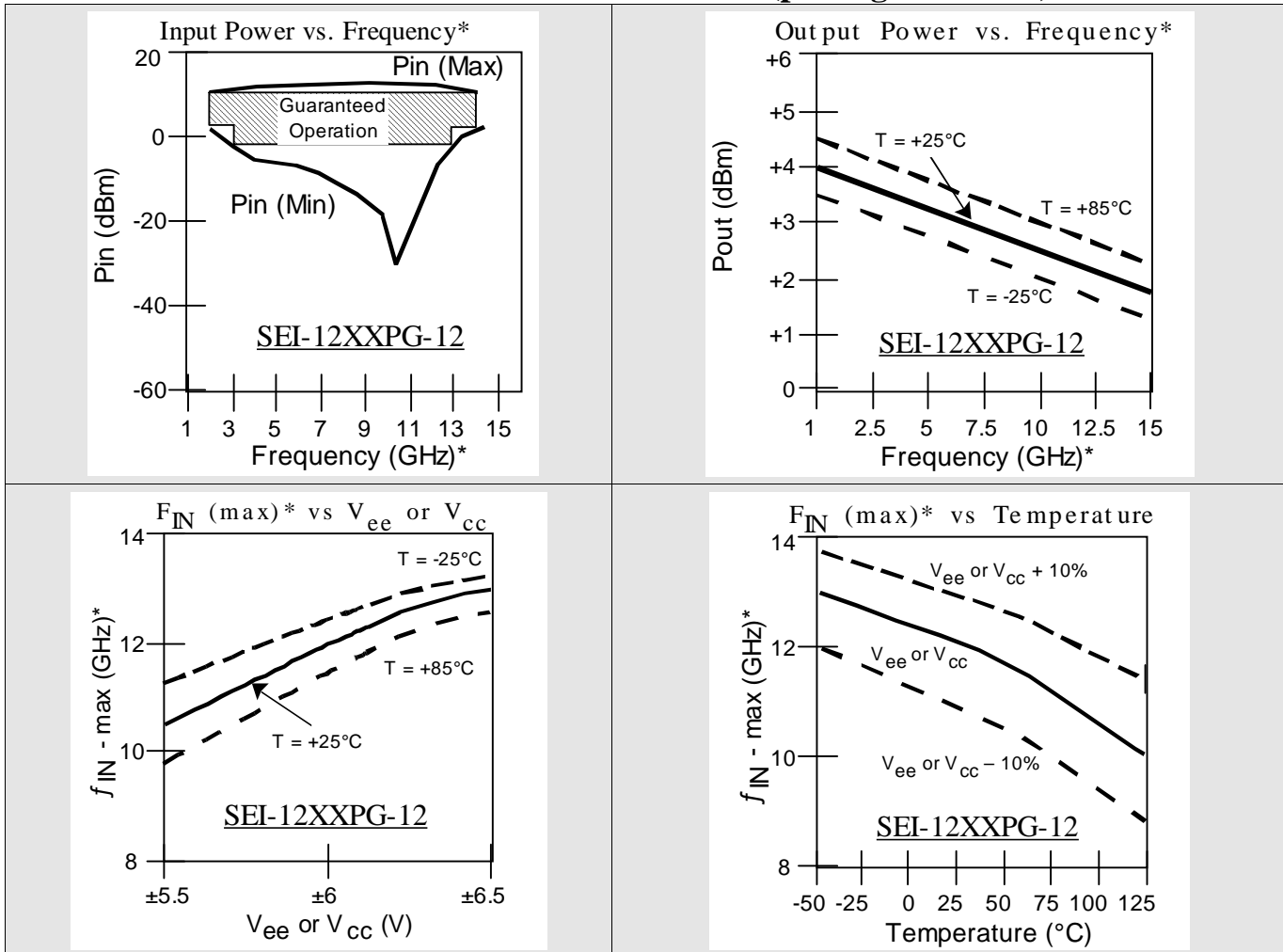
* 14 GHz packaged devices are only available in the SEI-1208PG and SEI-1232PG for a limited time.



Electrical Characteristics: $T_A = +25^\circ\text{C}$, $V_{CC} = +6\text{V}$ or $V_{EE} = -6\text{V}$ (chip only)

Part Number		SEI-1202 (±2)				SEI-1204 (±04)				SEI-1208 (±08)				SEI-1232 (±32)			
Symbols	Parameters and Test Conditions	Units	Min	Typ	Max	Units	Min	Typ	Max	Units	Min	Typ	Max	Units	Min	Typ	Max
I_{EE} / I_{CC}	Supply Current	mA		85		mA		80		mA		85		mA		85	
$f_{IN}(\text{max})$	Upper Limit of Input Frequency $P_{IN} = +2 \text{ dBm}$	GHz	12	12		GHz	12	12		GHz	12	12		GHz	12	12	
$f_{IN}(\text{min})$	Lower Limit of Input Frequency $P_{IN} = +2 \text{ dBm}$	GHz			2	GHz			2	GHz			2	GHz			2
P_{IN}	Input Power @ $V_{CC} = +6.0\text{V}$, $f_{IN} = 2 \text{ GHz}$ to Upper Freq $f_{IN} = 3 \text{ GHz}$ to Upper Freq - 1G	dBm	+2	+8	+10	dBm	+2	+8	+10	dBm	+2	+8	+10	dBm	+2	+8	+10
P_{OUT}	Output Power @ $V_{CC} = +6.0\text{V}$, $f_{IN} = \text{Upper Frequency}$	dBm	-10	-2		dBm	0	+4		dBm	0	+4		dBm	0	+4	
L	SSB Phase Noise @ 20 kHz offset from a 10 GHz carrier in a 1 Hz BW	dBc/ Hz	-130	-140		dBc/ Hz	-130	-140		dBc/ Hz	-130	-140		dBc/ Hz	-130	-140	

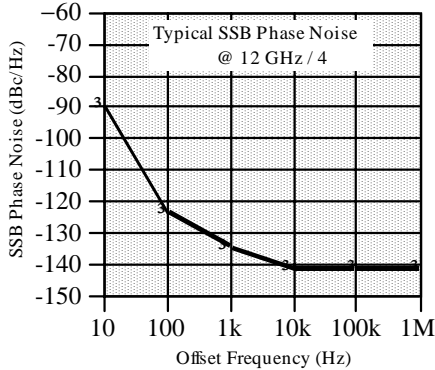
TYPICAL PERFORMANCE CURVES (packaged devices)



* Graphs shown for 12 GHz upper frequency. For the 10 GHz & 14 GHz versions, scale each number on the frequency axis by 10/12 or 14/12, respectively.



Typical Phase Noise Performance

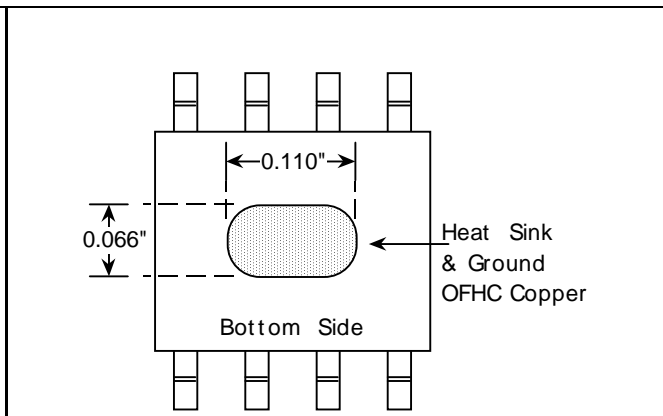
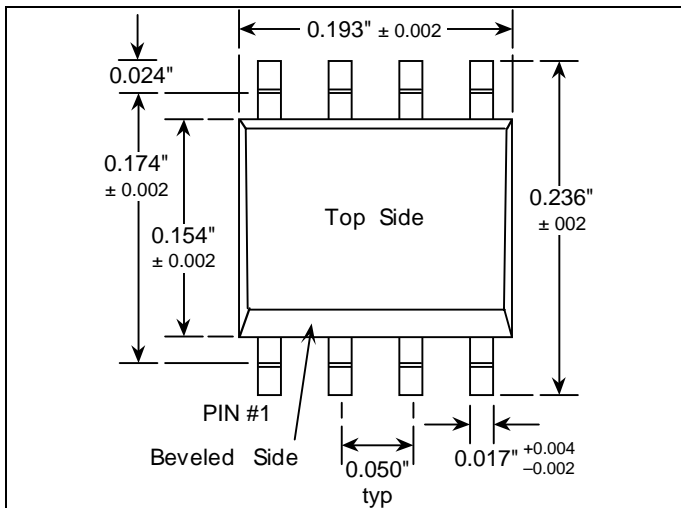


Pin Assignments

(for positive supply)

PIN	FUNCTION
1	RF _{out} (+)
2	V _{cc}
3	RF _{out} (-)
4	V _{cc}
5	RF _{in} (-)
6	V _{cc}
7	RF _{in} (+)
8	GND

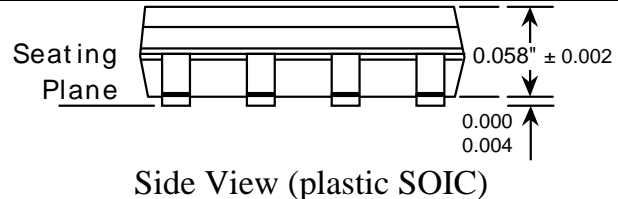
OUTLINE DIMENSIONS (units in inches)



**Thermal Heatsink/RF Ground & Lead finish:
85 Pb/15 Sn**

SOIC Notes:

1. Devices must be baked @ +125°C for 12 hours to remove any accumulated moisture prior to soldering if the units have been exposed to a relative humidity >20% for more than 24 hours.
2. Maximum reflow solder temperature is +260°C for 10 seconds and no greater than 5°C/second thermal shock should be applied.
3. Handle only at certified static-safe work station.



4. Flash is 0.010 max
5. Lead Coplanarity: 0.004" max

ORDERING INFORMATION

EXAMPLE: SEI-12 04 PG - 1 0 EB

Division Ratio	
02	divide-by-2
04	divide-by-4
08	divide-by-8
32	divide-by-32

Package Type	
PG	Plastic SOIC
D	Die

Evaluation Board (opt)
EB if Eval Bd is ordered

Frequency Range	
10	2 - 10 GHz
12	2 - 12 GHz

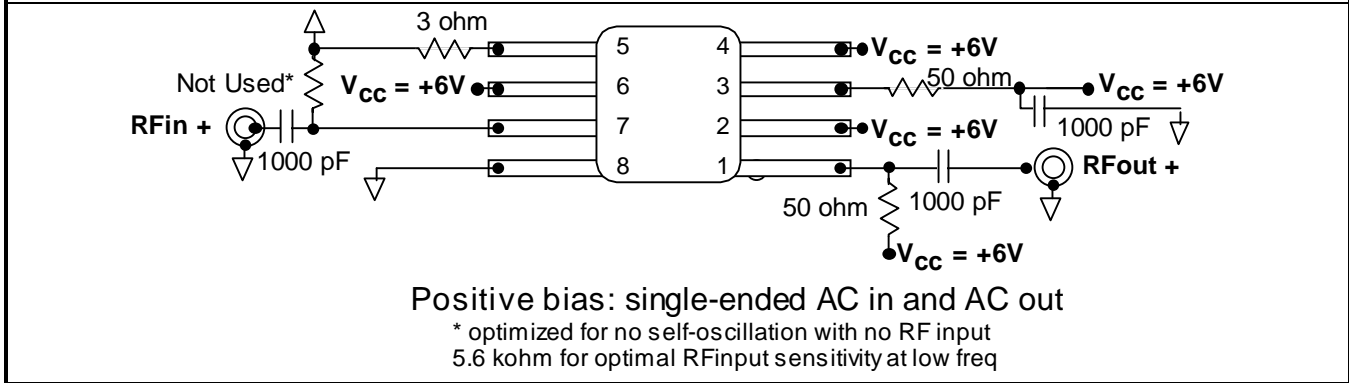
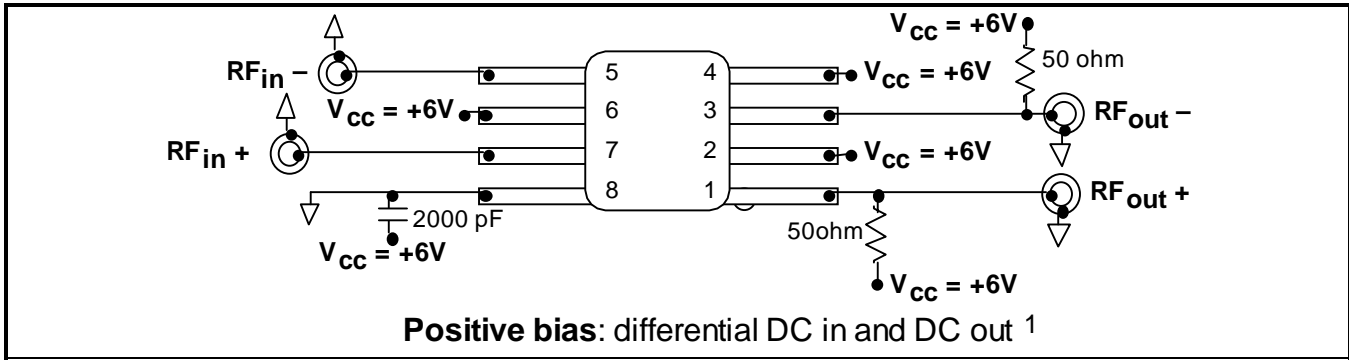
PACKAGE MARKING

Note that the packaged parts are marked as 414XX with XX designating the division ratio as shown to the left. A green dot indicates a 10 GHz range. The "HK" indicates assembly in Hong Kong and the "24" or "34" are assembly codes.

There is a 5 piece minimum for packaged prescalers and a 10 piece minimum for die. Die orders are sold in multiples of 10 only up to 100 pieces and then multiples of 25 above 100.



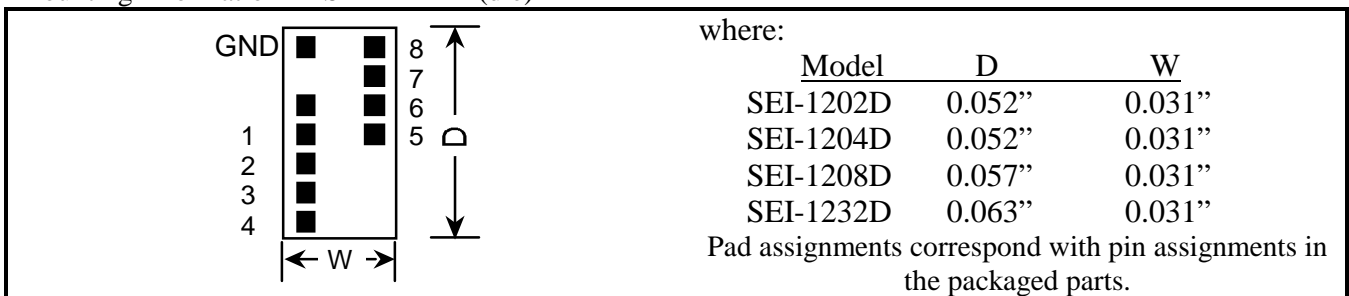
Typical Test Circuits



Notes:

- 1.) Can be used if DC levels Ω are Current Mode Level (CML) compatible and no input level is undefined. Differential inputs/outputs provides for Maximum Frequency
- 2.) Operation up to 8 GHz is possible on FR-4 type PWB material but above this range it may be necessary to use a better material. Duroid is recommended.
- 3.) The oval slug in the bottom plate is **case and die** ground and must be grounded for thermal and RF considerations.
- 4.) Bypass capacitor of 1000 pF should be used on all connections to V_{cc} or V_{ee} .

Mounting Information — SEI-12XXD (die)



Notes:

1. Ground Pad must be connected to circuit (or hybrid) ground in the positive bias configuration. In the negative bias configuration, it is connected to V_{ee} .
2. If using epoxy to attach die to substrate, use an epoxy with low thermal resistance. The total thermal resistance of the die is $\sim 3^{\circ}\text{C}/\text{W}$ and the normal package thermal resistance is $9^{\circ}\text{C}/\text{W}$.
3. The pads are on 0.006" centers (150 μM) with 0.0125" (32 μM) free space between them. The pad itself measures 0.0046" (118 μM) x 0.0046" (118 μM).
4. The die has a gold passivation layer
5. All die are tested for operation > 10 GHz.
6. All die are 100% inspected and tested and **unfortunately, we are unable to accept any returns on die.**

