SC2215

26.5 GHz Programmable Gain Amplifier Product Specification

Common Applications

- High Volume Production Test
- Benchtop Designer Verification Testing (DVT)
- RF/Microwave Design and Characterization
- Receiver Characterization

Summary

The SC2215 is a 2-Channel programmable gain amplifier that can operate from 10 MHz to 26.5 GHz. Each channel provides over 31.5 dB of programmable gain, controllable in 0.5 dB increments. Both channels have excellent low noise performance.

With the channels cascaded, the SC2215 can provide up to 70 dB of small signal gain and can achieve a maximum saturated output power of 28 dBm at 1 GHz and 20 dBm at 26.5 GHz.

Figure 1 - SC2215 – High Performance in a Compact 1U PXIe Module

Description

The SC2215 is a single-slot PXIe compliant module targeted at test and measurement applications requiring high output power and low noise performance. It is well suited for high volume production test applications.

Each SC2215 can be operated independently, or the two can be cascaded to provide a full 63 dB of programmable gain, controllable in 0.5 dB increments.

Channel 0 includes a direct path which bypasses the amplifier stages. This capability can be useful in high power applications requiring bi-directional signal measurement, like those present in devices sharing Tx and Rx paths on a common port. Channel 1 has higher drive capability and can generate 28 dBm of saturated output power at 1 GHz.

Use of solid-state switches minimizes reliability concerns associated with mechanical relays. On-board thermal measurement and in-circuit, high frequency power detectors are present on both channel outputs. These functions are accessible by the user and can be incorporated into systems requiring dynamic output power level monitoring and self-test functions, helping to minimize outages in production environments.

Definitions

The following definitions apply to these specifications:

- *Typical* values describe the expected performance for the majority of units. Typical values may not be verified on all units shipped from the factory.
- *Minimum* (*Min*) and *Maximum* (*Max*) values describe warranted product performance.
- *Calibration Temperature (T_{cal})* is the device temperature at the time of calibration, with an ambient temperature of 23 °C ± 5 °C and chassis fan speed set to high.
- *Device Temperature (T_{device})* is the current device temperature.

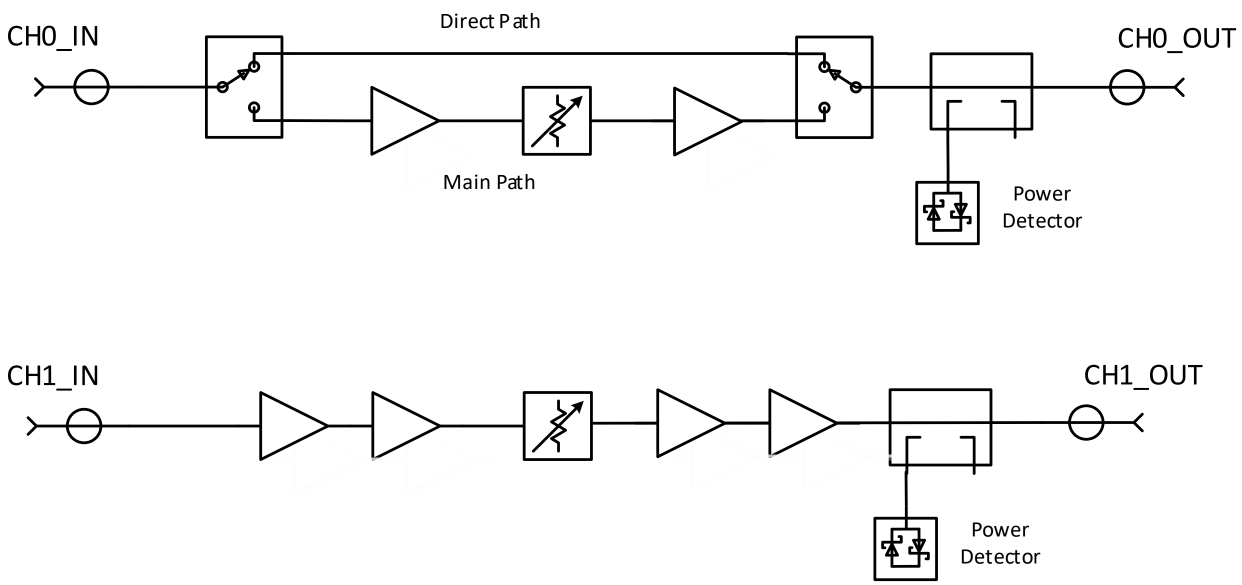
Specifications are subject to change without notice. For the most recent SC2215 specification, visit www.signalcraft.com.

Conditions

Unless specified otherwise, Typical and Warranted Specifications are valid under the following conditions.

- T_{device} within T_{cal} ± 5 °C
- Calibration cycles are maintained.
- Minimum warm up time of 30 minutes.

Block Diagram



Channel 0 Specifications

Parameter	Conditions	Min	Typical	Max	Comments
Frequency Range (MHz)		10	-	26500	
Power Detector Accuracy (dB)	$T_{device} = T_{cal} \pm 5$ °C	-1.00	-	+1.00	*For output power levels up to P1dB of the Main Path*
Minimum Power Detector Level (dBm)	*10 MHz ≤ F ≤ 50 MHz*	-	2.3	-	*Minimum output power for specified power detector accuracy*
	50 MHz < F ≤ 150 MHz	-	-2.9	-	
	150 MHz < F ≤ 10 GHz	-	0.0	-	
	10 GHz < F ≤ 18 GHz	-	1.1	-	
	18 GHz < F ≤ 26.5 GHz	-	0.0	-	
Power Detector Signal Settling Time (µs)		20	-	-	*Minimum time for level change to settle at power detector input*
Path Switch Time (µs)		8.4	-	-	*Minimum time for hardware to switch paths[1]*
P_{In} Max Power (dBm)		-	-	+15	*Input survival power*
P_{Out} Max Power (dBm)		-	-	+15	*Maximum reverse output power*
V_{In} Max (V)		-2.5	-	+2.5	*Maximum DC Offset at input*

Direct Path

Parameter	Conditions	Min	Typical	Max	Comments
Level Calibration Accuracy (dB)[2]	*50 MHz ≤ F ≤ 6 GHz*	-0.76	-	+0.76	$T_{device} = T_{cal} \pm 5$ °C *Across gain settings.*
	6 GHz < F ≤ 14 GHz	-0.83	-	+0.83	
	14 GHz < F ≤ 18 GHz	-0.87	-	+0.87	
	18 GHz < F ≤ 26.5 GHz	-1.11	-	+1.11	
	50 MHz ≤ F ≤ 6 GHz	-0.68	-	+0.68	$T_{device} = T_{cal} \pm 2$ °C *Across gain settings.*
	6 GHz < F ≤ 14 GHz	-0.73	-	+0.73	
	14 GHz < F ≤ 18 GHz	-0.75	-	+0.75	
	18 GHz < F ≤ 26.5 GHz	-0.95	-	+0.95	
Input Return Loss (dB)	*10 MHz ≤ F ≤ 17 GHz*	-	14.7	-	
	17 GHz < F ≤ 25 GHz	-	9.2	-	
	25 GHz < F ≤ 26.5 GHz	-	8.1	-	
Output Return Loss (dB)	*10 MHz ≤ F ≤ 17 GHz*	-	15.2	-	
	17 GHz < F ≤ 25 GHz	-	11.2	-	
	25 GHz < F ≤ 26.5 GHz	-	13.2	-	
Gain (dB)	*10 MHz ≤ F ≤ 50 MHz*	-	-2.3	-	
	50 MHz < F ≤ 150 MHz	-2.1	-1.6	-	
	150 MHz < F ≤ 6 GHz	-3.7	-3.2	-	
	6 GHz < F ≤ 14 GHz	-6.0	-5.3	-	
	14 GHz < F ≤ 24 GHz	-9.1	-7.5	-	
	24 GHz < F ≤ 26.5 GHz	-9.9	-8.4	-	

Table 1 – Channel 0 Direct Path Performance

[1] Total time to switch paths will depend on system performance.
[2] See *Gain Variation by Temperature* for details regarding compensation for temperature drift.

Main Path

Parameter	Conditions	Min	Typical	Max	Comments
Level Calibration Accuracy (dB)[3]	50 MHz ≤ F ≤ 6 GHz	-0.96	-	+0.96	T_{device} = T_{cal} ± 5 °C Across gain settings.
	6 GHz < F ≤ 14 GHz	-1.24	-	+1.24	
	14 GHz < F ≤ 18 GHz	-1.32	-	+1.32	
	18 GHz < F ≤ 26.5 GHz	-1.48	-	+1.48	
	50 MHz ≤ F ≤ 6 GHz	-0.78	-	+0.78	T_{device} = T_{cal} ± 2 °C Across gain settings.
	6 GHz < F ≤ 14 GHz	-0.93	-	+0.93	
	14 GHz < F ≤ 18 GHz	-0.93	-	+0.93	
	18 GHz < F ≤ 26.5 GHz	-1.13	-	+1.13	
Power Detector Accuracy (dB)	T_{device} = T_{cal} ± 5 °C	-1.00	-	+1.00	For output power levels up to P1dB
Input Return Loss (dB)	10 MHz ≤ F ≤ 150 MHz	-	12.5	-	
	150 MHz < F ≤ 6 GHz	-	15.1	-	
	6 GHz < F ≤ 12 GHz	-	12	-	
	12 GHz < F ≤ 18 GHz	-	13.8	-	
	18 GHz < F ≤ 24 GHz	-	9.2	-	
	24 GHz < F ≤ 26.5 GHz	-	7.3	-	
Output Return Loss (dB)	10 MHz ≤ F ≤ 100 MHz	-	6.8	-	
	100 MHz < F ≤ 12 GHz	-	9.4	-	
	12 GHz < F ≤ 26.5 GHz	-	8.1	-	
Gain Control Range (dB)		-	31.5	-	
Gain Step Size (dB)		-	0.5	-	
Linear Gain (dB)	10 MHz ≤ F ≤ 50 MHz	-	32.4	-	At maximum gain setting
	50 MHz < F ≤ 150 MHz	30.9	33.5	-	
	150 MHz < F ≤ 6 GHz	31.5	34.1	-	
	6 GHz < F ≤ 14 GHz	30.2	32.5	-	
	14 GHz < F ≤ 24 GHz	24.0	28.5	-	
	24 GHz < F ≤ 26.6 GHz	22.2	27.0	-	
Noise Figure (dB)	10 MHz ≤ F ≤ 100 MHz	-	11.9	-	
	100 MHz < F ≤ 1 GHz	-	7.7	-	
	1 GHz < F ≤ 12 GHz	-	4.7	-	
	12 GHz < F ≤ 20 GHz	-	7.0	-	
	20 GHz < F ≤ 24 GHz	-	8.5	-	
	24 GHz < F ≤ 26.5 GHz	-	10.7	-	
Output P1dB (dBm)	10 MHz ≤ F ≤ 50 MHz	-	17.5	-	At maximum gain setting
	50 MHz < F ≤ 150 MHz	16.7	18.9	-	
	150 MHz < F ≤ 10 GHz	15.9	18.0	-	
	10 GHz < F ≤ 18 GHz	13.5	15.5	-	
	18 GHz < F ≤ 26.5 GHz	10.7	13.4	-	
Output P3dB (dBm)	10 MHz ≤ F ≤ 150 MHz	-	19.3	-	At maximum gain setting
	150 MHz < F ≤ 10 GHz	-	18.7	-	
	10 GHz < F ≤ 18 GHz	-	17.0	-	
	18 GHz < F ≤ 26.5 GHz	-	14.7	-	

[3] See *Gain Variation by Temperature* for details regarding compensation for temperature drift.

Output IP3 (dBm)	*10 MHz ≤ F ≤ 10 GHz*	-	27.7	-	
	10 GHz < F ≤ 18 GHz	-	23.4	-	
	18 GHz < F ≤ 26.5 GHz	-	16.5	-	
Second Harmonic (dBc)	*50 MHz ≤ F ≤ 10 GHz*	-	-33	-	*Measured with Pout at +4 dBm. Frequency listed is the fundamental at the input.*
	10 GHz < F ≤ 13 GHz	-	-27	-	
Third Harmonic (dBc)	*50 MHz ≤ F ≤ 6 GHz*	-	-57	-	*Measured with Pout at +4 dBm. Frequency listed is the fundamental at the input.*
	6 GHz < F ≤ 8 GHz	-	-53	-	
Non-Harmonic Spurious Output (dBm)	*10 MHz ≤ F ≤ 50 MHz*	-	-105	-	*Spurious output unrelated to input signal.*
	50 MHz < F ≤ 1 GHz	-	-95	-	
	1 GHz < F ≤ 6 GHz	-	-95	-	
	6 GHz < F ≤ 26.5 GHz	-	-98	-	
Isolation (dB)	*10 MHz ≤ F ≤ 500 MHz*	-	-47	-	*Channel 1 Input to Channel 0 Output*
	500 MHz < F ≤ 10 GHz	-	-55	-	
	10 GHz < F ≤ 16 GHz	-	-42	-	
	16 GHz < F ≤ 26.5 GHz	-	-26	-	
Level Settling Time (ns)		500	-	-	*Minimum time for signal to settle after gain setting change.*

Table 2 – Channel 0 Main Path Performance

Channel 1 Specifications

Parameter	*Conditions*	*Min*	*Typical*	*Max*	*Comments*
Frequency Range (MHz)		10	-	26500	
Level Calibration Accuracy (dB)[4]	*50 MHz < F ≤ 6 GHz*	-0.90	-	+0.90	$T_{device} = T_{cal} \pm 5$ °C *Across gain settings.*
	6 GHz < F ≤ 14 GHz	-1.19	-	+1.19	
	14 GHz < F ≤ 18 GHz	-1.25	-	+1.25	
	18 GHz < F ≤ 26.5 GHz	-1.47	-	+1.47	
	50 MHz < F ≤ 6 GHz	-0.74	-	+0.74	$T_{device} = T_{cal} \pm 2$ °C *Across gain settings.*
	6 GHz < F ≤ 14 GHz	-0.92	-	+0.92	
	14 GHz < F ≤ 18 GHz	-0.92	-	+0.92	
	18 GHz < F ≤ 26.5 GHz	-1.15	-	+1.15	
Power Detector Accuracy (dB)	$T_{device} = T_{cal} \pm 5$ °C	-1.00	-	+1.00	*For output power levels up to P1dB*
Minimum Power Detector Level (dBm)	*10 MHz ≤ F ≤ 50 MHz*	-	0.8	-	*Minimum output power for specified power detector accuracy*
	50 MHz < F ≤ 150 MHz	-	-2.9	-	
	150 MHz < F ≤ 8 GHz	-	-0.9	-	
	8 GHz < F ≤ 14 GHz	-	1.0	-	
	14 GHz < F ≤ 24 GHz	-	0.0	-	
	24 GHz < F ≤ 26.5 GHz	-	-3.0	-	
Input Return Loss (dB)	*10 MHz < F ≤ 100 MHz*	-	12.2	-	
	100 MHz < F ≤ 7 GHz	-	14.4	-	
	7 GHz < F ≤ 10 GHz	-	10.1	-	
	10 GHz < F ≤ 22 GHz	-	13.0	-	
	22 GHz < F ≤ 26.5 GHz	-	6.9	-	
Output Return Loss (dB)	*10 MHz < F ≤ 100 MHz*	-	14.4	-	
	100 MHz < F ≤ 8 GHz	-	15.2	-	
	8 GHz < F ≤ 13 GHz	-	10.1	-	
	13 GHz < F ≤ 18 GHz	-	8.3	-	
	18 GHz < F ≤ 26.5 GHz	-	10.1	-	
Gain Control Range (dB)		-	31.5	-	
Gain Step Size (dB)		-	0.5	-	
Linear Gain (dB)	*10 MHz ≤ F ≤ 50 MHz*	-	37.7	-	*At maximum gain setting*
	50 MHz < F ≤ 6 GHz	35.5	37.7	-	
	6 GHz < F ≤ 14 GHz	31.7	33.8	-	
	14 GHz < F ≤ 22 GHz	27.4	31.1	-	
	22 GHz < F ≤ 26.5 GHz	23.7	28.3	-	
Noise Figure (dB)	*10 MHz ≤ F ≤ 100 MHz*	-	13.3	-	
	100 MHz < F ≤ 1 GHz	-	10.2	-	
	1 GHz < F ≤ 14 GHz	-	4.1	-	
	14 GHz < F ≤ 22 GHz	-	6.3	-	
	22 GHz < F ≤ 26.5 GHz	-	9.5	-	

[4] See *Gain Variation by Temperature* for details regarding compensation for temperature drift.

Output P1dB (dBm)	*10 MHz ≤ F ≤ 50 MHz*	-	22.9	-	*At maximum gain setting*
	50 MHz < F ≤ 150 MHz	22.6	24.5		
	150 MHz < F ≤ 8 GHz	23.2	24.8	-	
	8 GHz < F ≤ 14 GHz	21.3	22.9	-	
	14 GHz < F ≤ 24 GHz	17.9	20.4	-	
	24 GHz < F ≤ 26.5 GHz	16.8	19.5	-	
Output P3dB (dBm)	*10 MHz ≤ F ≤ 150 MHz*	-	26.8	-	*At maximum gain setting*
	150 MHz < F ≤ 8 GHz	-	25.8	-	
	8 GHz < F ≤ 14 GHz	-	23.8	-	
	14 GHz < F ≤ 24 GHz	-	21.5	-	
	24 GHz < F ≤ 26.5 GHz	-	20.5	-	
Output IP3 (dBm)	*10 MHz ≤ F ≤ 12 GHz*	-	33.0	-	*At maximum gain setting*
	12 GHz < F ≤ 20 GHz	-	28.1	-	
	20 GHz < F ≤ 26.5 GHz	-	23.7	-	
Second Harmonic (dBc)	*50 MHz ≤ F ≤ 4 GHz*	-	-48	-	*Measured with Pout at +4 dBm. Frequency listed is the fundamental at the input.*
	4 GHz < F ≤ 12 GHz	-	-40	-	
	12 GHz < F ≤ 13 GHz	-	-36	-	
Third Harmonic (dBc)	*50 MHz ≤ F ≤ 8 GHz*	-	-66	-	*Measured with Pout at +4 dBm. Frequency listed is the fundamental at the input.*
Non-Harmonic Spurious Output (dBm)	*10 MHz ≤ F ≤ 50 MHz*	-	-105	-	*Spurious output unrelated to input signal.*
	50 MHz < F ≤ 1 GHz	-	-95	-	
	1 GHz < F ≤ 6 GHz	-	-95	-	
	6 GHz < F ≤ 26.5 GHz	-	-98	-	
Isolation (dB)	*10 MHz ≤ F ≤ 500 MHz*	-	-47	-	*Channel 0 Input to Channel 1 Output*
	500 MHz < F ≤ 8 GHz	-	-60	-	
	8 GHz < F ≤ 14 GHz	-	-41	-	
	14 GHz < F ≤ 26.5 GHz	-	-36	-	
Level Settling Time (ns)		500	-	-	*Minimum time for signal to settle after gain setting change.*
P_{In} Max Power (dBm)		-	-	+15	*Maximum Input survival power*
P_{Out} Max Power (dBm)		-	-	+25	*Maximum reverse output power*
V_{In} Max (V)		-2.5	-	+2.5	*Maximum DC Offset at input*

Table 2 – Channel 1 Path Performance

Gain Variation by Temperature[5]

Channel	*Conditions*	*Gain Variation by Temperature*	*Comments*
Channel 0 Direct (dB/°C)	T_{device} = T_{cal} ± 20 °C	$(4.105 \times 10^{-11} \times F^2) - (1.253 \times 10^{-6} \times F) - 2.543 \times 10^{-3}$	*Across all frequencies and gain settings*
Channel 0 Main (dB/°C)	T_{device} = T_{cal} ± 20 °C	$(1.708 \times 10^{-10} \times F^2) - (7.204 \times 10^{-6} \times F) - 2.681 \times 10^{-2}$	
Channel 1 (dB/°C)	T_{device} = T_{cal} ± 20 °C	$(1.021 \times 10^{-10} \times F^2) - (4.946 \times 10^{-6} \times F) - 2.886 \times 10^{-2}$	

Calculate the gain correction factor using the following equation:

$\Delta Gain = (Gain\ Variation\ by\ Temperature) \times \Delta T$, where

- $\Delta T = T_{device} - T_{cal}$
- T_{device} = the current device temperature obtained by reading the onboard temperature sensor in degree Celsius
- T_{cal} = the device temperature at the time of calibration in degree Celsius, which can be queried through the SI2215 instrument driver
- F = frequency, in MHz

Example Calculation

$$Channel\ 0\ Main$$

$$T_{cal} = 40\ °C$$

$$T_{device} = 50\ °C$$

$$F = 5.8\ GHz$$

$$\Delta Gain = [(1.708 \times 10^{-10} \times 5800^2) - (7.204 \times 10^{-6} \times 5800) - 2.681 \times 10^{-2}] \frac{dB}{°C} \times (50 - 40)\ °C$$

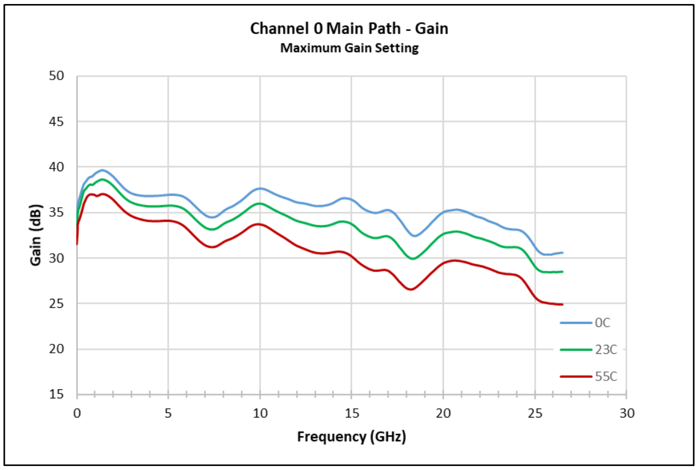
$$\Delta Gain = -0.0628\ \frac{dB}{°C} \times 10\ °C$$

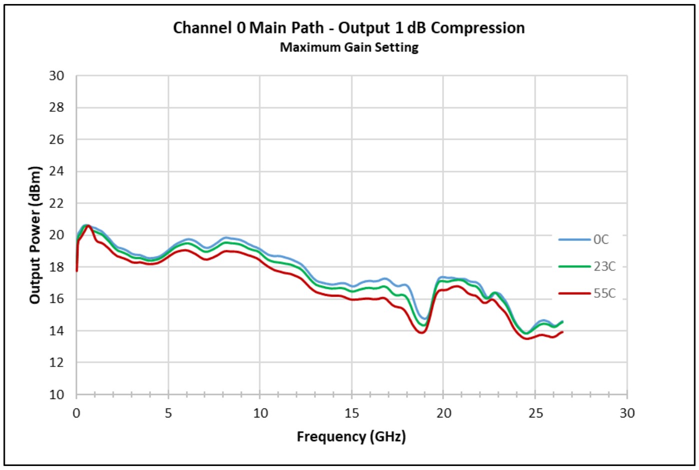
$$\Delta Gain = -0.628\ dB$$

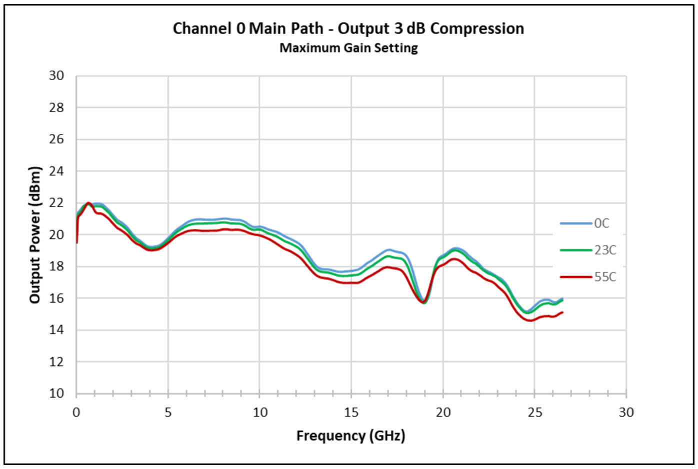
[5] By default, temperature compensation for gain is enabled in the SI2215 driver. No additional compensation is required by the user unless it is explicitly disabled.

Typical Performance

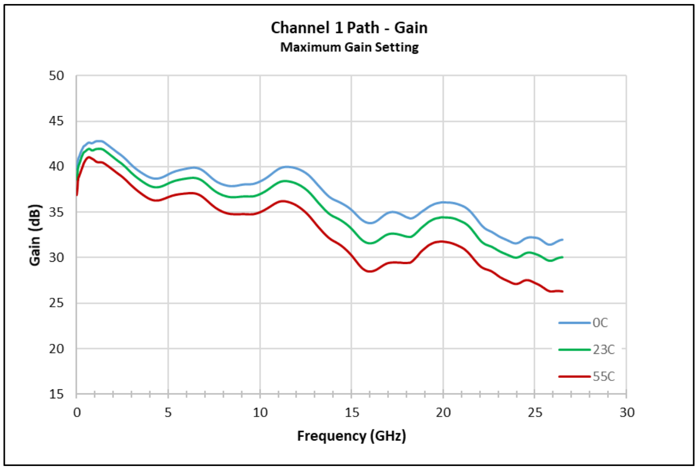
Channel 0

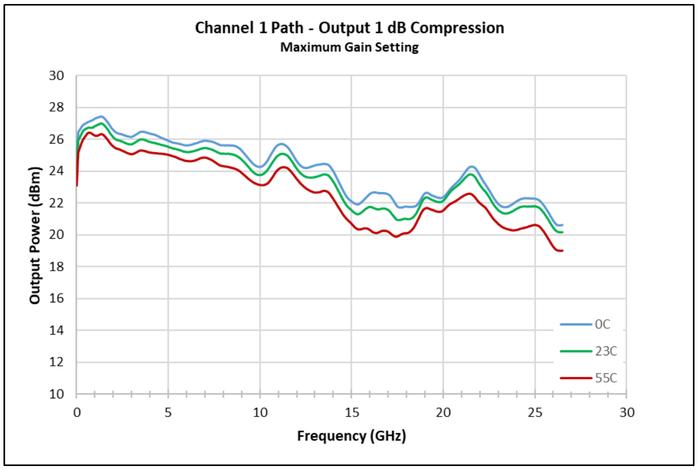


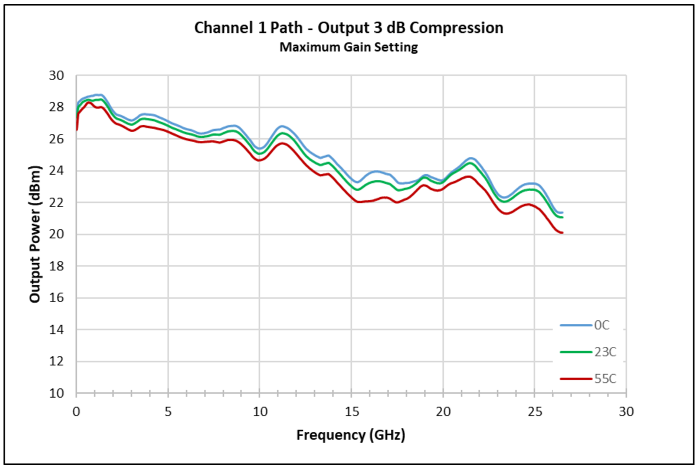


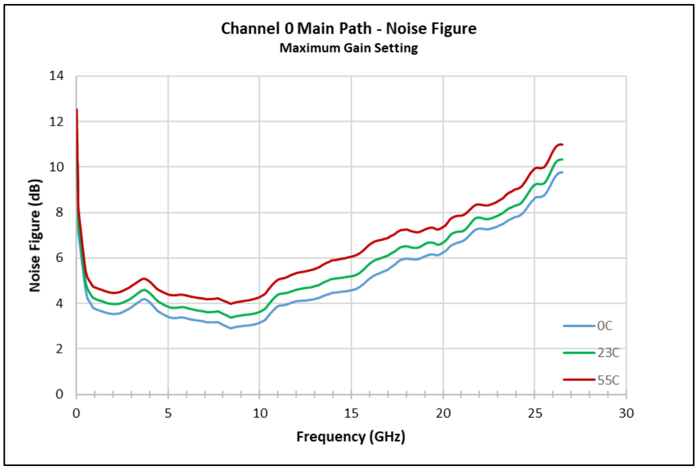


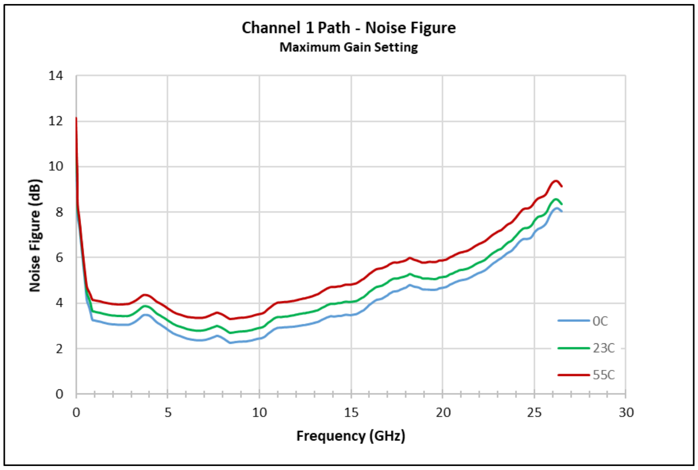
Channel 1

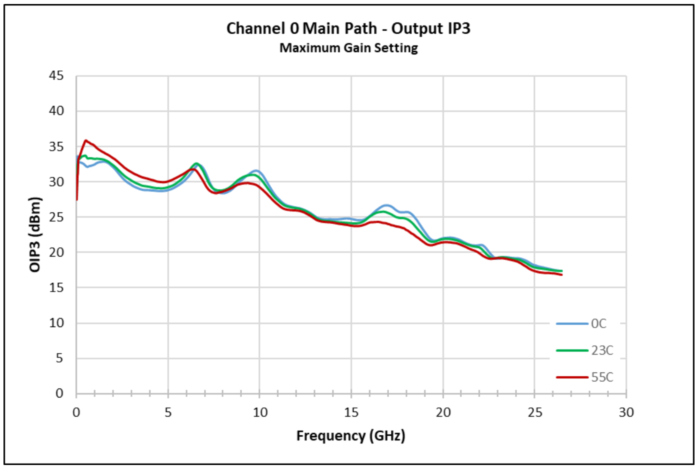


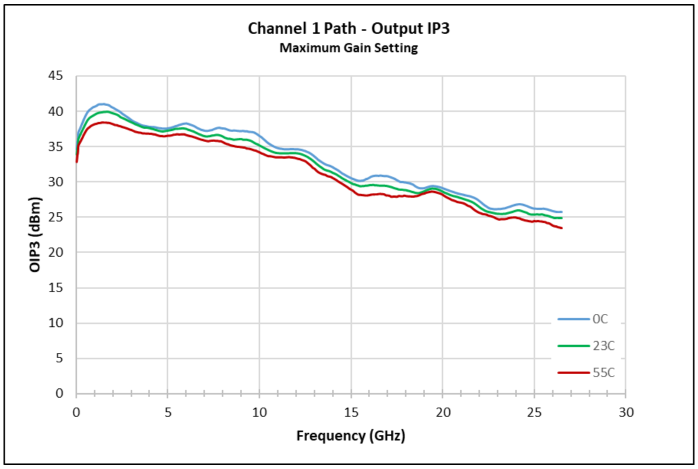


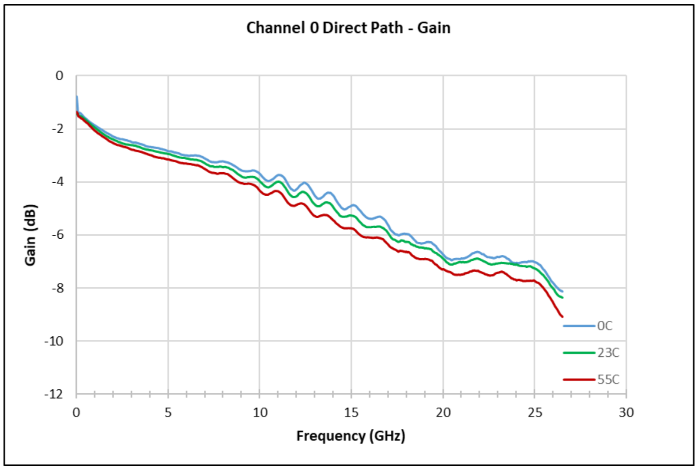


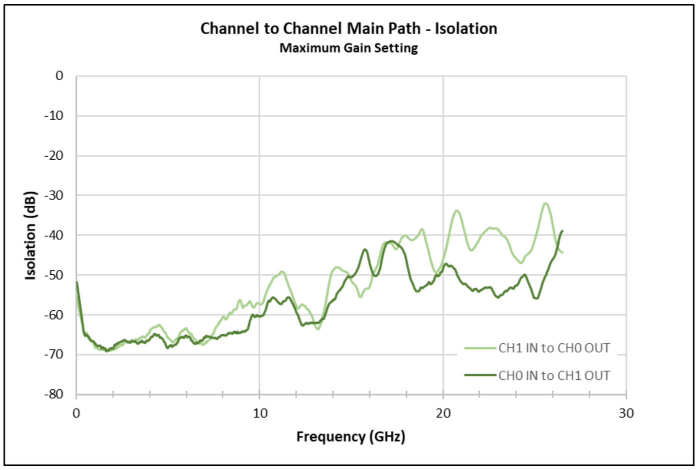

Channel 0 Main Path - Noise Figure
Maximum Gain Setting
Noise Figure (dB)
Frequency (GHz)
0C
23C
55C

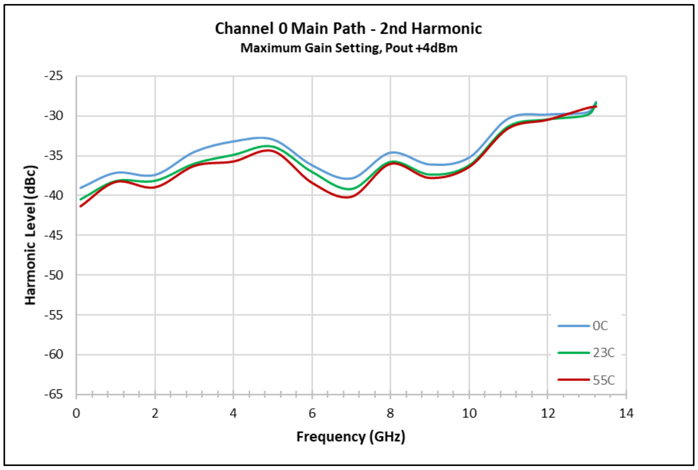

Channel 1 Path - Noise Figure
Maximum Gain Setting
Noise Figure (dB)
Frequency (GHz)
0C
23C
55C


Channel 0 Main Path - Output IP3
Maximum Gain Setting
OIP3 (dBm)
Frequency (GHz)
0C
23C
55C

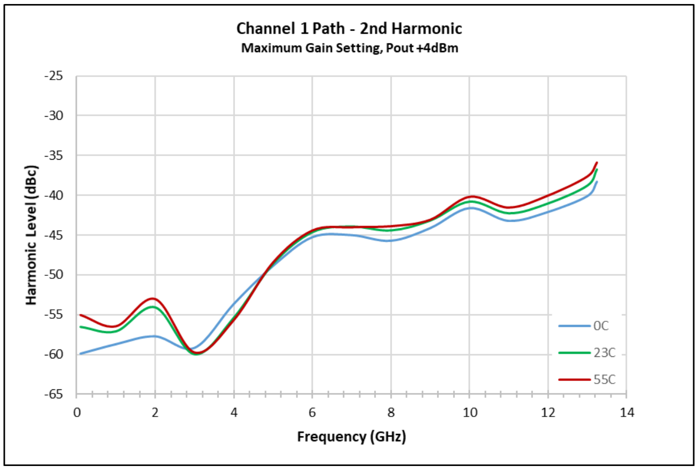

Channel 1 Path - Output IP3
Maximum Gain Setting
OIP3 (dBm)
Frequency (GHz)
0C
23C
55C


Channel 0 Direct Path - Gain
Gain (dB)
Frequency (GHz)
0C
23C
55C

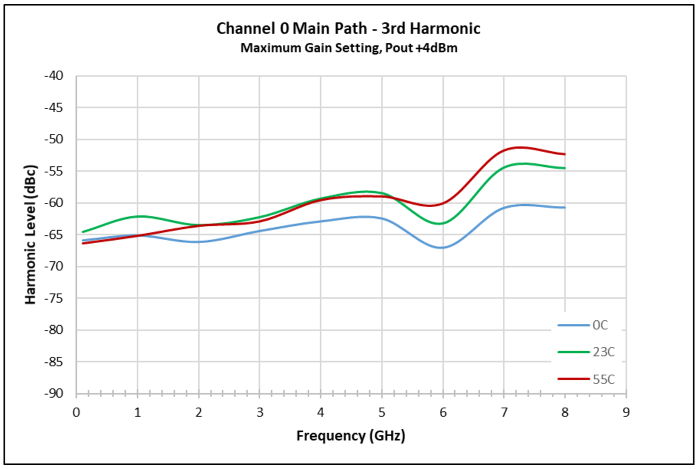

Channel to Channel Main Path - Isolation
Maximum Gain Setting
Isolation (dB)
Frequency (GHz)
CH1 IN to CH0 OUT
CH0 IN to CH1 OUT



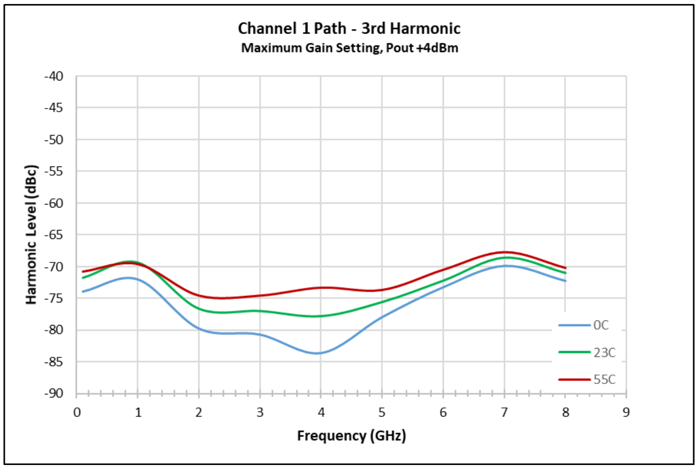
Channel 0 Main Path - 2nd Harmonic
Maximum Gain Setting, Pout +4dBm
Harmonic Level (dBc)
-25
-30
-35
-40
-45
-50
-55
-60
-65
0
2
4
6
8
10
12
14
Frequency (GHz)
0C
23C
55C



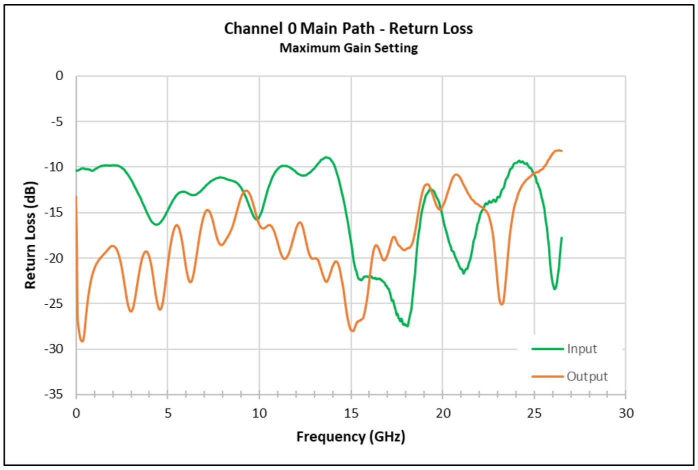
Channel 1 Path - 2nd Harmonic
Maximum Gain Setting, Pout +4dBm
Harmonic Level (dBc)
-25
-30
-35
-40
-45
-50
-55
-60
-65
0
2
4
6
8
10
12
14
Frequency (GHz)
0C
23C
55C



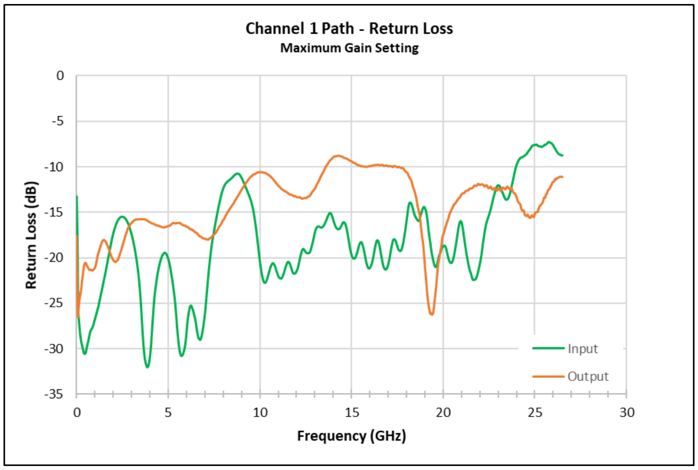
Channel 0 Main Path - 3rd Harmonic
Maximum Gain Setting, Pout +4dBm
Harmonic Level (dBc)
-40
-45
-50
-55
-60
-65
-70
-75
-80
-85
-90
0
1
2
3
4
5
6
7
8
9
Frequency (GHz)
0C
23C
55C



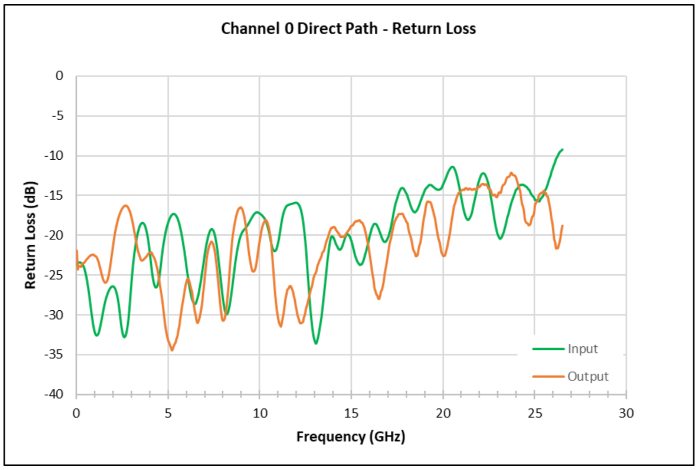
Channel 1 Path - 3rd Harmonic
Maximum Gain Setting, Pout +4dBm
Harmonic Level (dBc)
-40
-45
-50
-55
-60
-65
-70
-75
-80
-85
-90
0
1
2
3
4
5
6
7
8
9
Frequency (GHz)
0C
23C
55C



Channel 0 Main Path - Return Loss
Maximum Gain Setting
Return Loss (dB)
0
-5
-10
-15
-20
-25
-30
-35
0
5
10
15
20
25
30
Frequency (GHz)
Input
Output



Channel 1 Path - Return Loss
Maximum Gain Setting
Return Loss (dB)
0
-5
-10
-15
-20
-25
-30
-35
0
5
10
15
20
25
30
Frequency (GHz)
Input
Output


Channel 0 Direct Path - Return Loss
0
-5
-10
-15
-20
-25
-30
-35
-40
Return Loss (dB)
0
5
10
15
20
25
30
Frequency (GHz)
Input
Output

Hardware Front Panel

Figure 2 – SC2215 Front Panel

CH0

RF IN		
	Connector	2.92 mm Female
	Impedance	50 Ω
	Coupling	AC
	Maximum Input Power	+15 dBm
	DC voltage at input	±2.5 V DC Maximum
RF OUT		
	Connector	2.92 mm Female
	Impedance	50 Ω
	Coupling	AC
	Maximum Output Power	+30 dBm
	Maximum Reverse Input	+15 dBm

CH1

RF IN		
	Connector	2.92 mm Female
	Impedance	50 Ω
	Coupling	AC
	Maximum Input Power	+15 dBm
	DC voltage at input	±2.5 V DC Maximum
RF OUT		
	Connector	2.92 mm Female
	Impedance	50 Ω
	Coupling	AC
	Maximum Output Power	+33 dBm
	Maximum Reverse Input	+25 dBm

Power Requirements

PXIe Power Rail (V DC)	Typical Current (mA)	Typical Power (W)
+3.3	1388	4.6
+12	1100	13.2

Table 2 – DC Power Requirements

Calibration

Interval	1 Year
Shelf Life	6 Months

Physical Characteristics

Dimensions	3U, Single Slot, PXIe Module (21.6 × 2.0 × 13.0) cm
Weight	700 g

Environmental

Operating

Ambient Temperature Range	0 °C to 55 °C
Relative Humidity Range	10% to 90%, noncondensing

Storage

Ambient Temperature Range	-40 °C to 70 °C
Relative Humidity Range	5% to 95%, noncondensing

Compliance and Certifications

Refer to the Declaration of Conformance (DoC) for additional regulatory compliance information. The DoC for this product can be obtained from the support section of our website, located at www.signalcraft.com/support

Electromagnetic Compatibility

This product meets the requirements of the following EMC standards for electrical equipment for measurement, control, and laboratory use:

- EN 61326-1:2013: Class A emissions; Basic Immunity
- AS/NZS CISPR 11: Group 1, Class A
- FCC Part 15/B: Class A emissions
- ICES-001: Group 1, Class A
- KN11: Group 1, Class A

Environmental Management

SCT is committed to designing and manufacturing products in an environmentally responsible manner. We believe that eliminating hazardous substances from our products is beneficial to the environment and our customers.

At the end of the product's life cycle, customers are responsible to ensure that all materials must be disposed of according to local laws and regulations.

	ROHS Directive 2011/65/EU
	WEEE
	China RoHS

Support

Technical support is available through our website, www.signalcraft.com/support, or by contacting us at support@signalcraft.com.

Warranty

Full one-year parts and labor when used under normal installation and operation conditions. Repair services are available for products no longer covered under warranty.

Ordering Information

Send inquiries to info@signalcraft.com.