General Description

The TP8100A is a precision, continuously self−calibrating Analog-to-Digital (A/D) converter with differential inputs and up to 16 bits of resolution in a small SOT23-6 package. The onboard 2.048V reference provides an input range of ±2.048V differentially. The ADS1110 uses an I^{2}C-compatible serial interface and operates from a single power supply ranging from 2.7V to 5.5V.

The TP8100A can perform conversions at rates of 15, 30, 60, or 240 samples per second. The onboard programmable gain amplifier (PGA), which offers gains of up to 8, allows smaller signals to be measured with high resolution. In single-conversion mode, the TPS8110 automatically powers down after a conversion, greatly reducing current consumption during idle periods.

The TP8100A is designed for applications requiring high-resolution measurement, where space and power consumption are major considerations. Typical applications include portable instrumentation, industrial process control, and smart transmitters.

Features

- COMPLETE DATA ACQUISITION SYSTEM IN A TINY SOT23-6 PACKAGE
- ONBOARD REFERENCE:
  Accuracy: 2.048V ±0.05%
  Drift: 5ppm/°C
- ONBOARD PGA
- ONBOARD OSCILLATOR
- 16-BITS NO MISSING CODES
- INL: 0.01% of FSR max
- CONTINUOUS SELF-CALIBRATION
- SINGLE-CYCLE CONVERSION
- PROGRAMMABLE DATA RATE: 15SPS TO 240SPS
- I^{2}C™INTERFACE—EIGHT AVAILABLE ADDRESSES
- POWER SUPPLY: 2.7V to 5.5V
- LOW CURRENT CONSUMPTION: 240μA

Applications

- PORTABLE INSTRUMENTATION
- INDUSTRIAL PROCESS CONTROL
- SMART TRANSMITTERS
- CONSUMER GOODS
- FACTORY AUTOMATION
- TEMPERATURE MEASUREMENT

Ordering Information

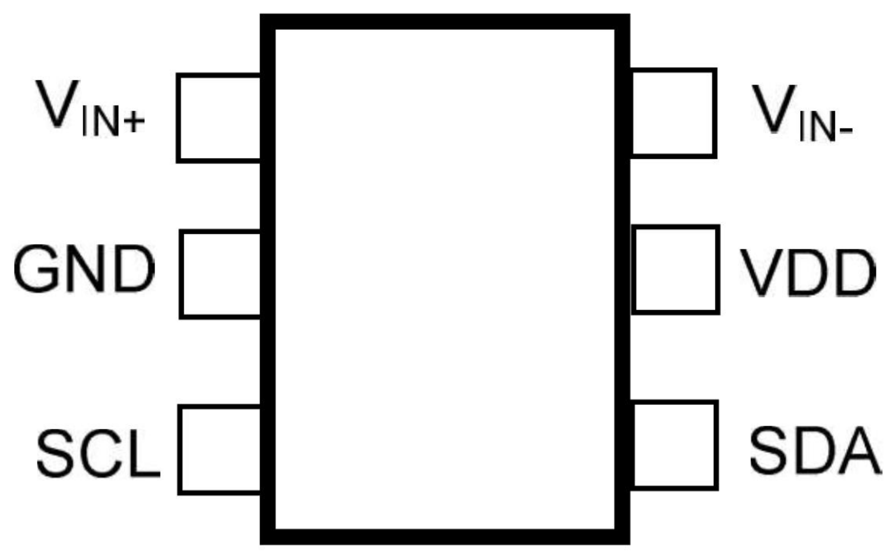
TP8100A1S6

S6=SOT23-6

I^{2}C ADDRESS:
A0= 1001000
A1= 1001001
A2= 1001002
A3= 1001003
A4= 1001004
A5= 1001005
A6= 1001006
A7= 1001007

PIN CONFIGURATION

SOT23-6



Marking: ED1

Absolute Maximum Rating **(T_A=25°C unless otherwise noted)**

V_{DD} to GND	−0.3V to +6V
Input Current	100mA, Momentary
Input Current	10mA, Continuous
Voltage to GND, V_{IN+}, V_{IN-}	−0.3V to V_{DD} + 0.3V
Voltage to GND, SDA, SCL	−0.5V to 6V
Maximum Junction Temperature	+150°C
Operating Temperature Range	−40°C to +125°C
Storage Temperature Range	−60°C to +150°C
Lead Temperature (soldering, 10s)	+300°C

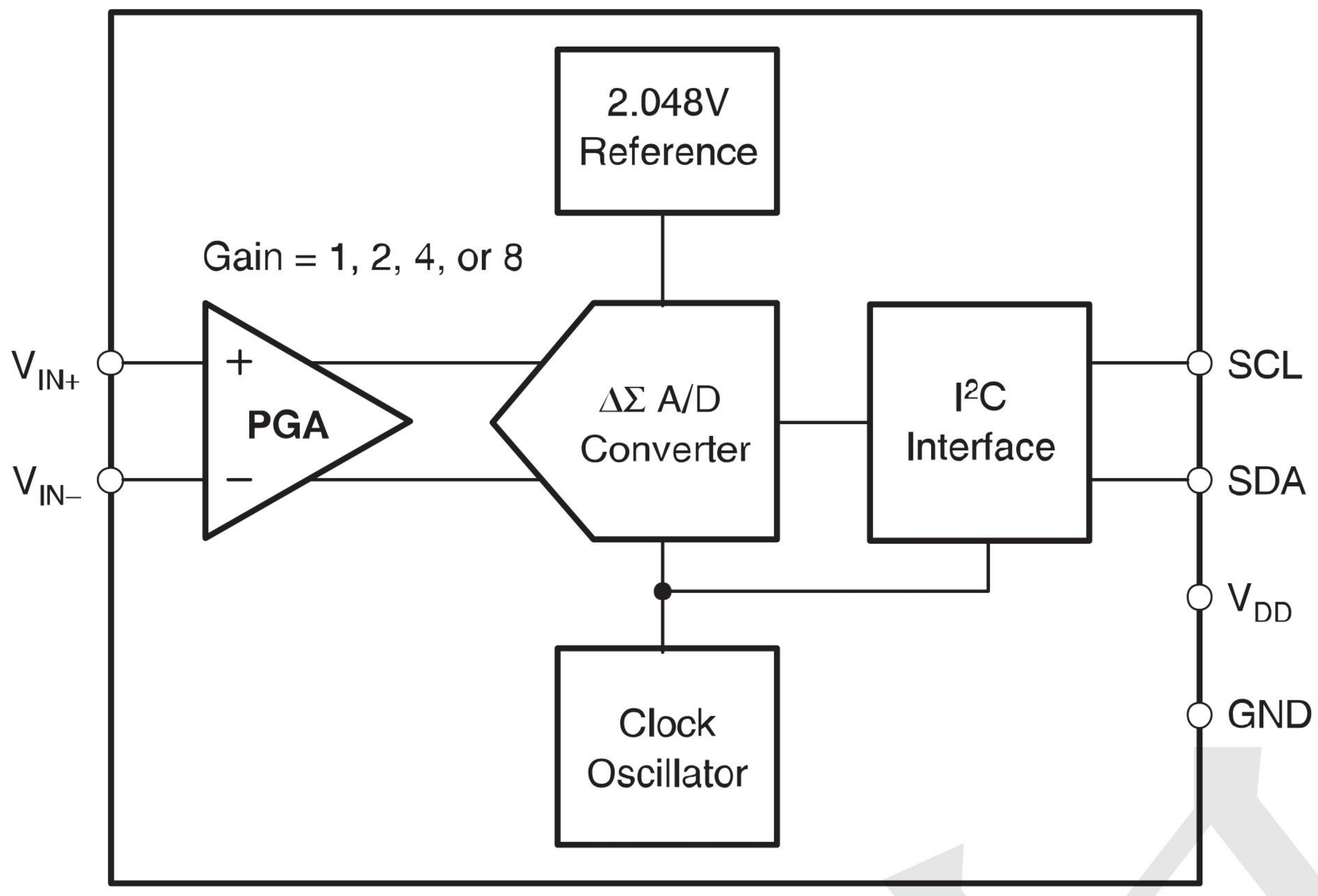
Electrical Characteristics (T_A=25°C unless otherwise noted)

All specifications at −40°C to +85°C, V_{DD} = 5V, and all PGAs, unless otherwise noted.

PARAMETER	CONDITIONS	ADS1110 MIN	ADS1110 TYP	ADS1110 MAX	UNIT
ANALOG INPUT					
Full-Scale Input Voltage	$(V_{IN+}) - (V_{IN-})$		±2.048/PGA		V
Analog Input Voltage	V_{IN+} to GND or V_{IN-} to GND	GND − 0.2		V_{DD} + 0.2	V
Differential Input Impedance			2.8/PGA		MΩ
Common-Mode Input Impedance	PGA = 1		3.5		MΩ
	PGA = 2		3.5		MΩ
	PGA = 4		1.8		MΩ
	PGA = 8		0.9		MΩ
SYSTEM PERFORMANCE					
Resolution and No Missing Codes	DR = 00	12		12	Bits
	DR = 01	14		14	Bits
	DR = 10	15		15	Bits
	DR = 11	16		16	Bits
Data Rate	DR = 00	180	240	308	SPS
	DR = 01	45	60	77	SPS
	DR = 10	22	30	39	SPS
	DR = 11	11	15	20	SPS
Output Noise			See Typical Characteristic Curves		
Integral Nonlinearity	DR = 11, PGA = 1, End Point Fit(1)		±0.004	±0.010	% of FSR(2)
Offset Error	PGA = 1		1.2	8	mV
	PGA = 2		0.7	4	mV
	PGA = 4		0.5	2.5	mV
	PGA = 8		0.4	1.5	mV
Offset Drift	PGA = 1		1.2		μV/°C
	PGA = 2		0.6		μV/°C
	PGA = 4		0.3		μV/°C
	PGA = 8		0.3		μV/°C
Offset vs V_{DD}	PGA = 1		800		μV/V
	PGA = 2		400		μV/V
	PGA = 4		200		μV/V
	PGA = 8		150		μV/V
Gain Error(3)			0.05	0.40	%
PGA Gain Error Match(3)	Match Between Any Two PGA Gains		0.02	0.10	%
Gain Error Drift(3)			5	40	ppm/°C
Gain vs V_{DD}			80		ppm/V
Common-Mode Rejection	At DC and PGA = 8	95	105		dB
	At DC and PGA = 1		100		dB
DIGITAL INPUT/OUTPUT					
Logic Level					
V_{IH}		0.7 • V_{DD}		6	V
V_{IL}		GND − 0.5		0.3 • V_{DD}	V
V_{OL}	I_{OL} = 3mA	GND		0.4	V
Input Leakage					
I_H	V_{IH} = 5.5V			10	μA
I_L	V_{IL} = GND	−10			μA
POWER-SUPPLY REQUIREMENTS					
Power-Supply Voltage	V_{DD}	2.7		5.5	V
Supply Current	Power Down		0.05	2	μA
	Active Mode		240	350	μA
Power Dissipation	V_{DD} = 5.0V		1.2	1.75	mW
	V_{DD} = 3.0V		0.675		mW

(1) 99% of full-scale.
(2) FSR = full-scale range = 2 × 2.048V/PGA = 4.096V/PGA.
(3) Includes all errors from onboard PGA and reference.

BLOCK DIAGRAM

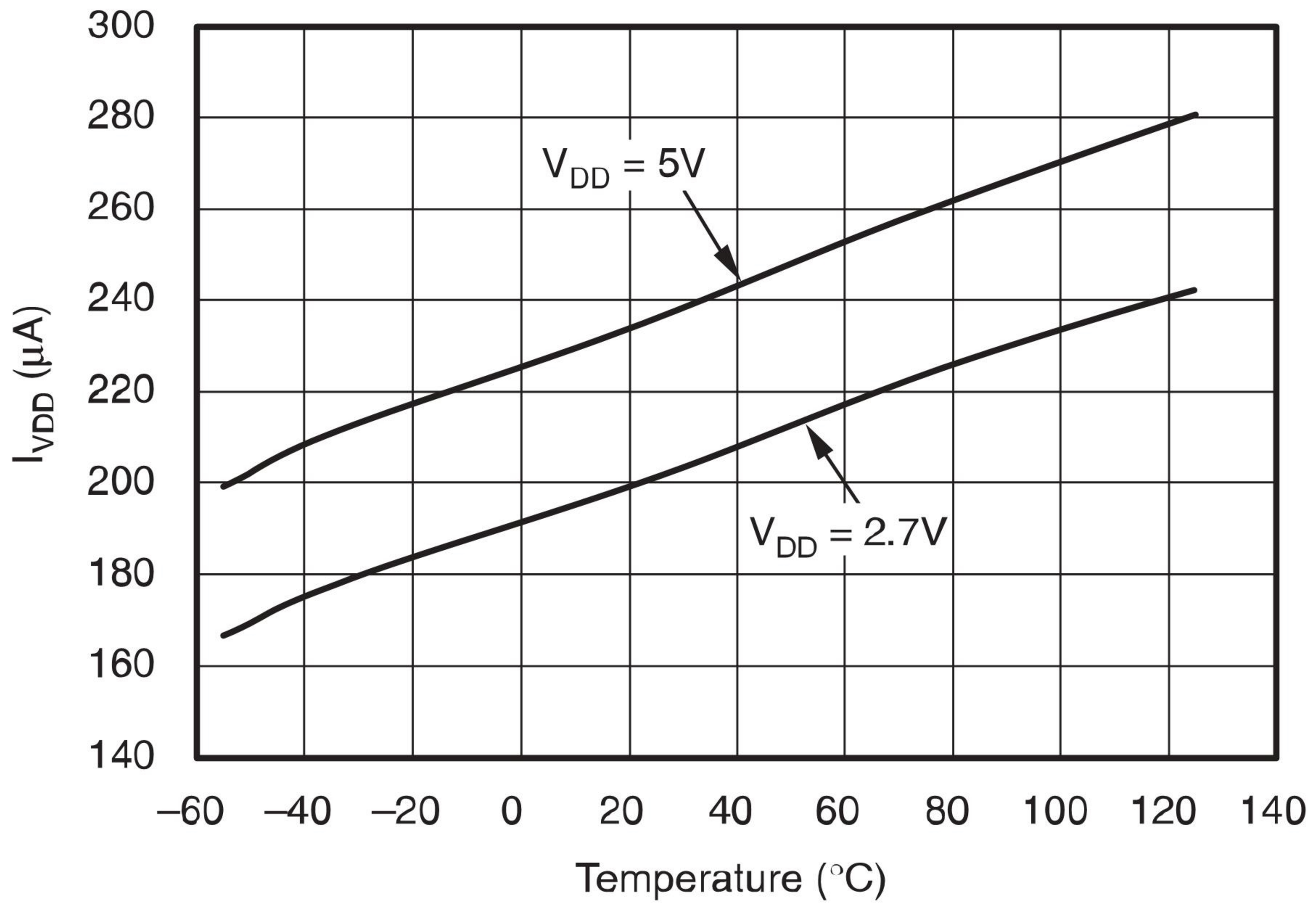


TYPICAL PERFORMANCE CHARACTERISTICS

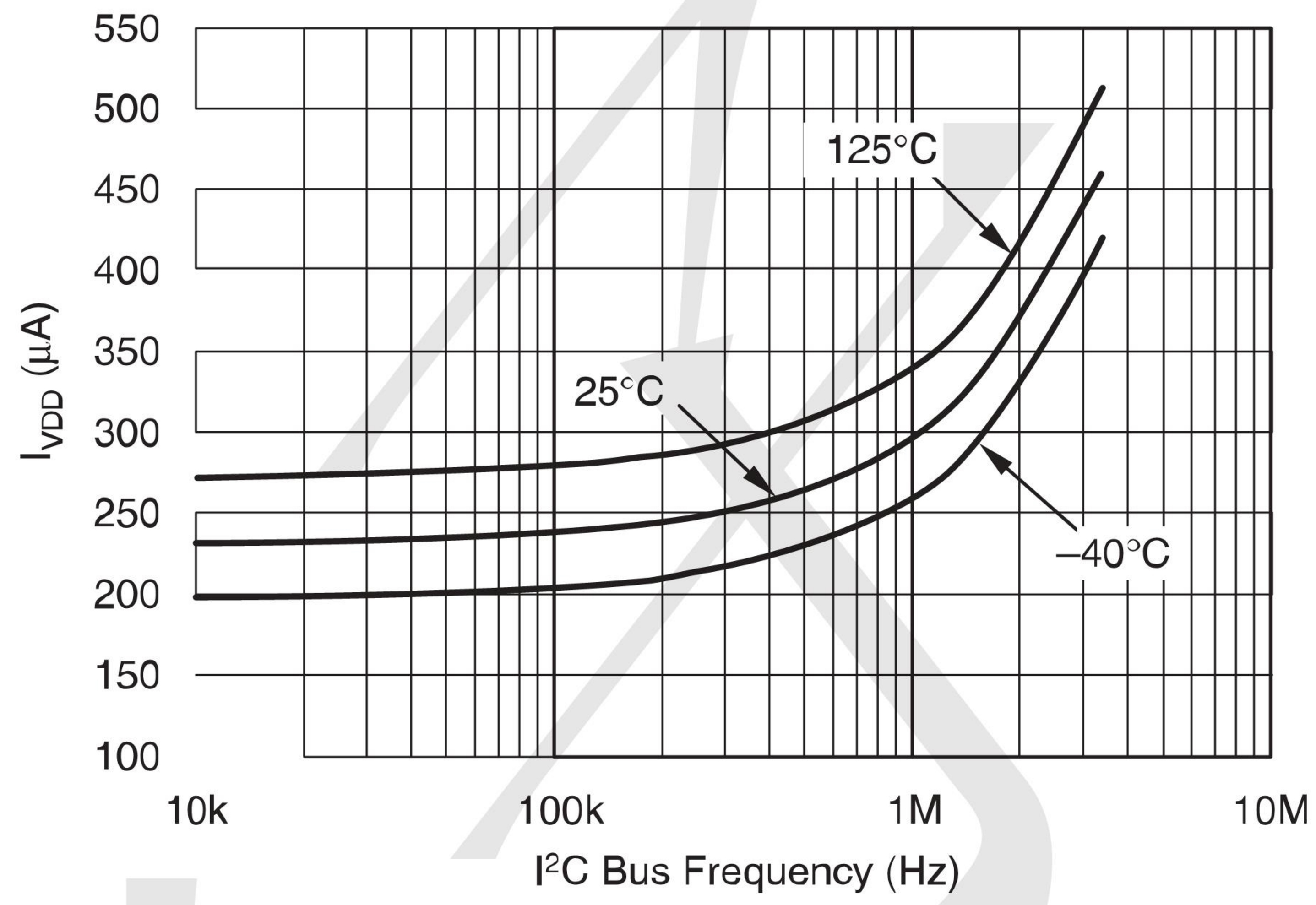
(T_A=25°C, unless otherwise noted)

V_{DD} = 5V, unless otherwise noted.

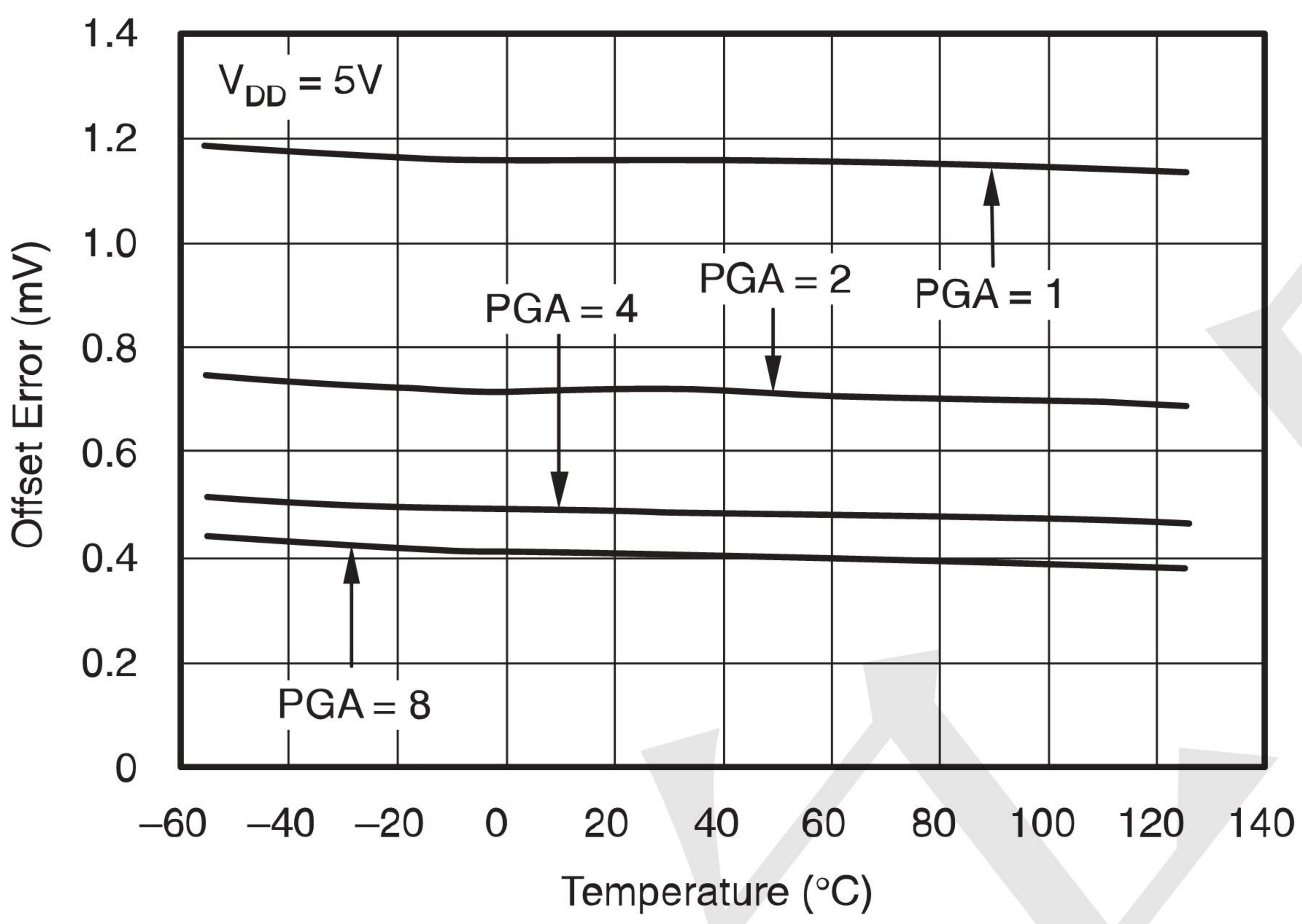
SUPPLY CURRENT vs TEMPERATURE



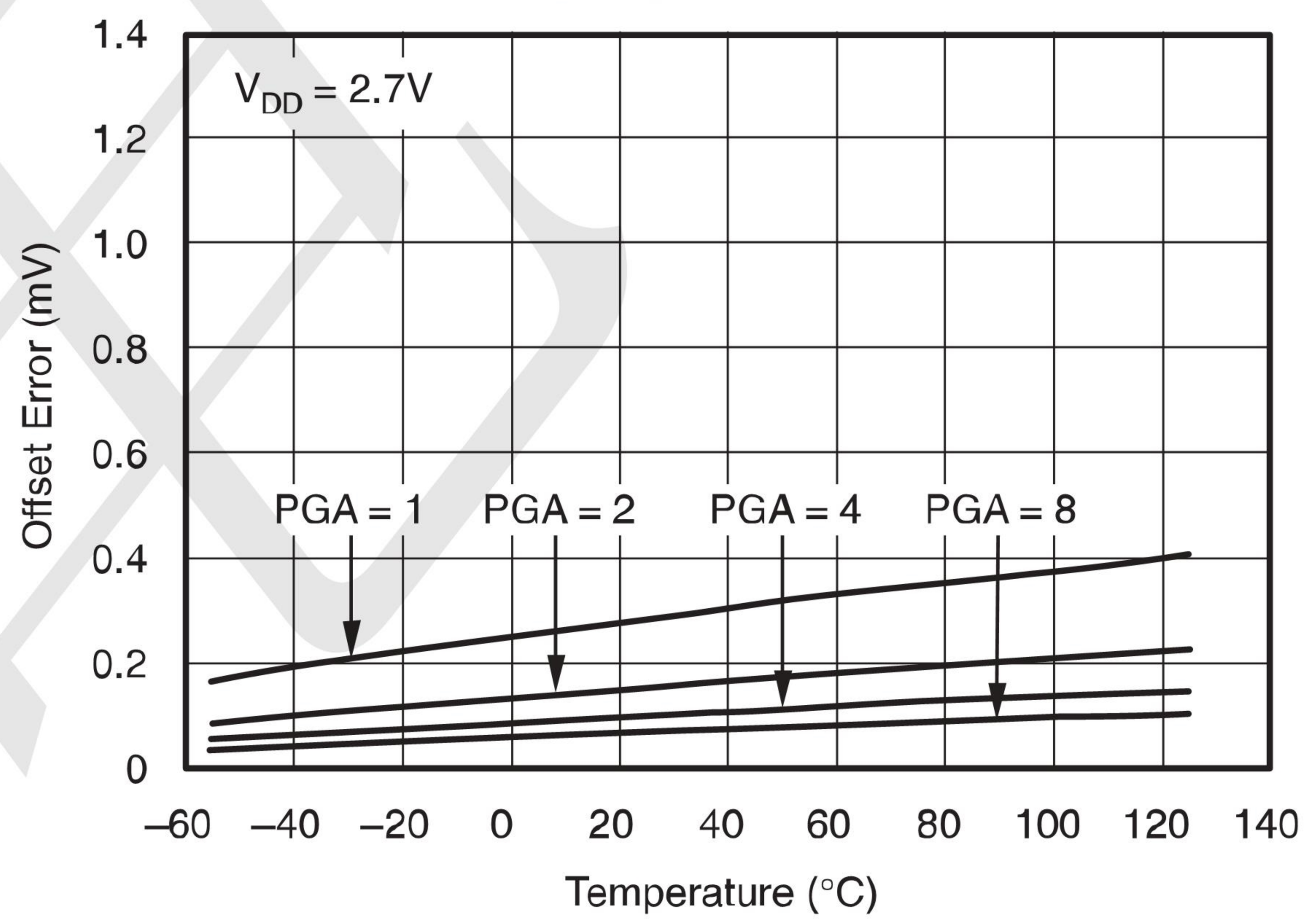
SUPPLY CURRENT vs I²C BUS FREQUENCY



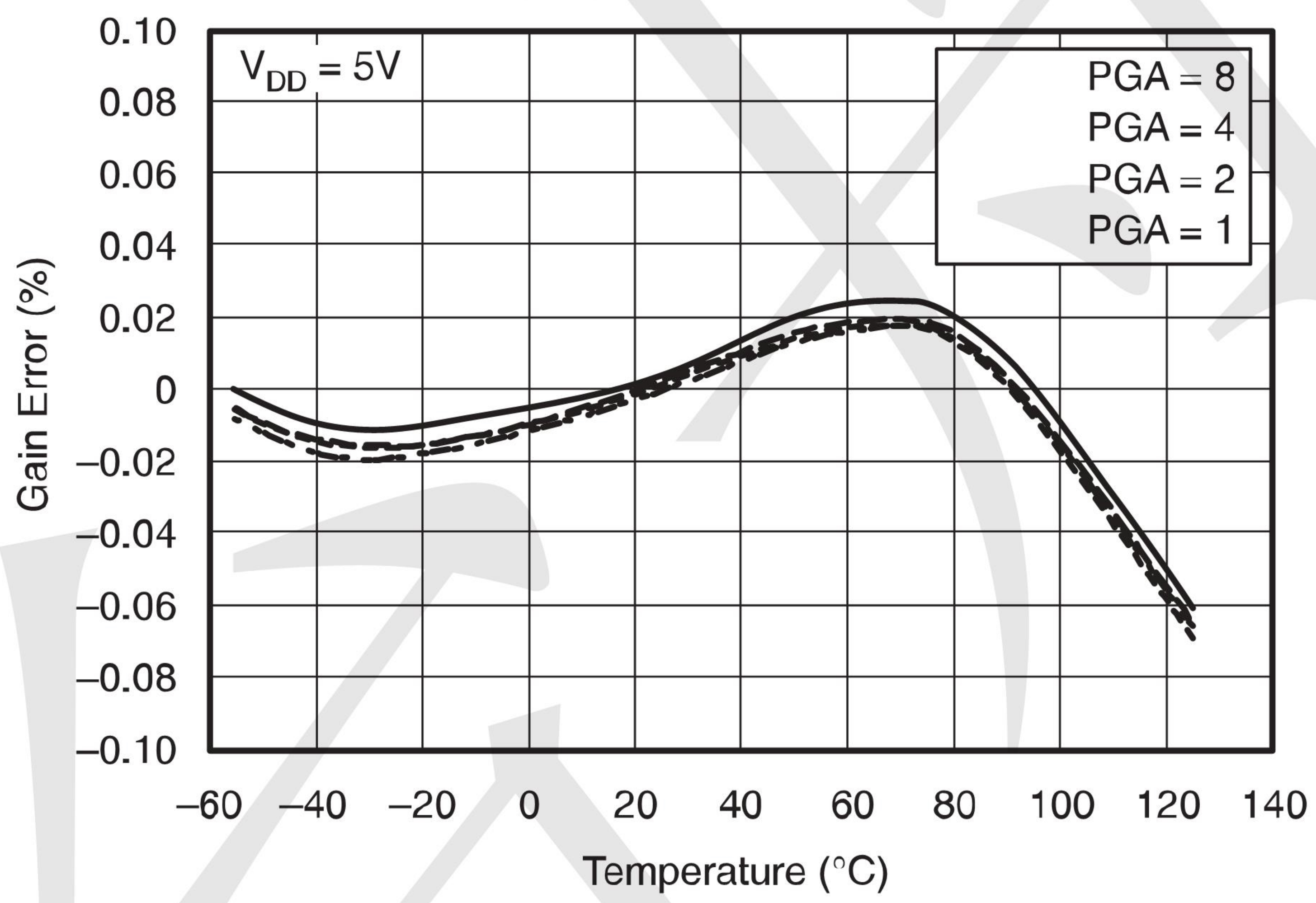
OFFSET ERROR vs TEMPERATURE



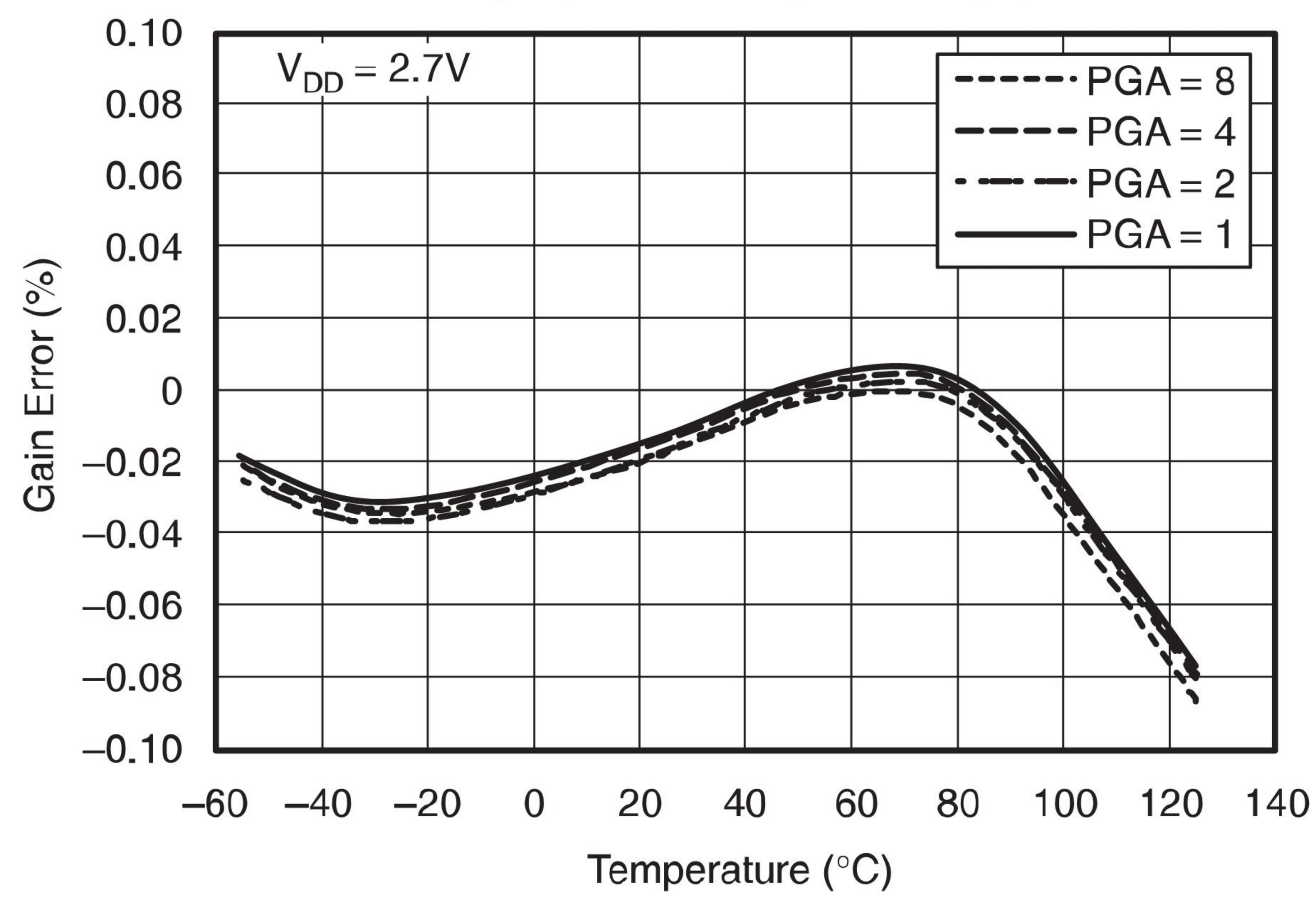
OFFSET ERROR vs TEMPERATURE



GAIN ERROR vs TEMPERATURE

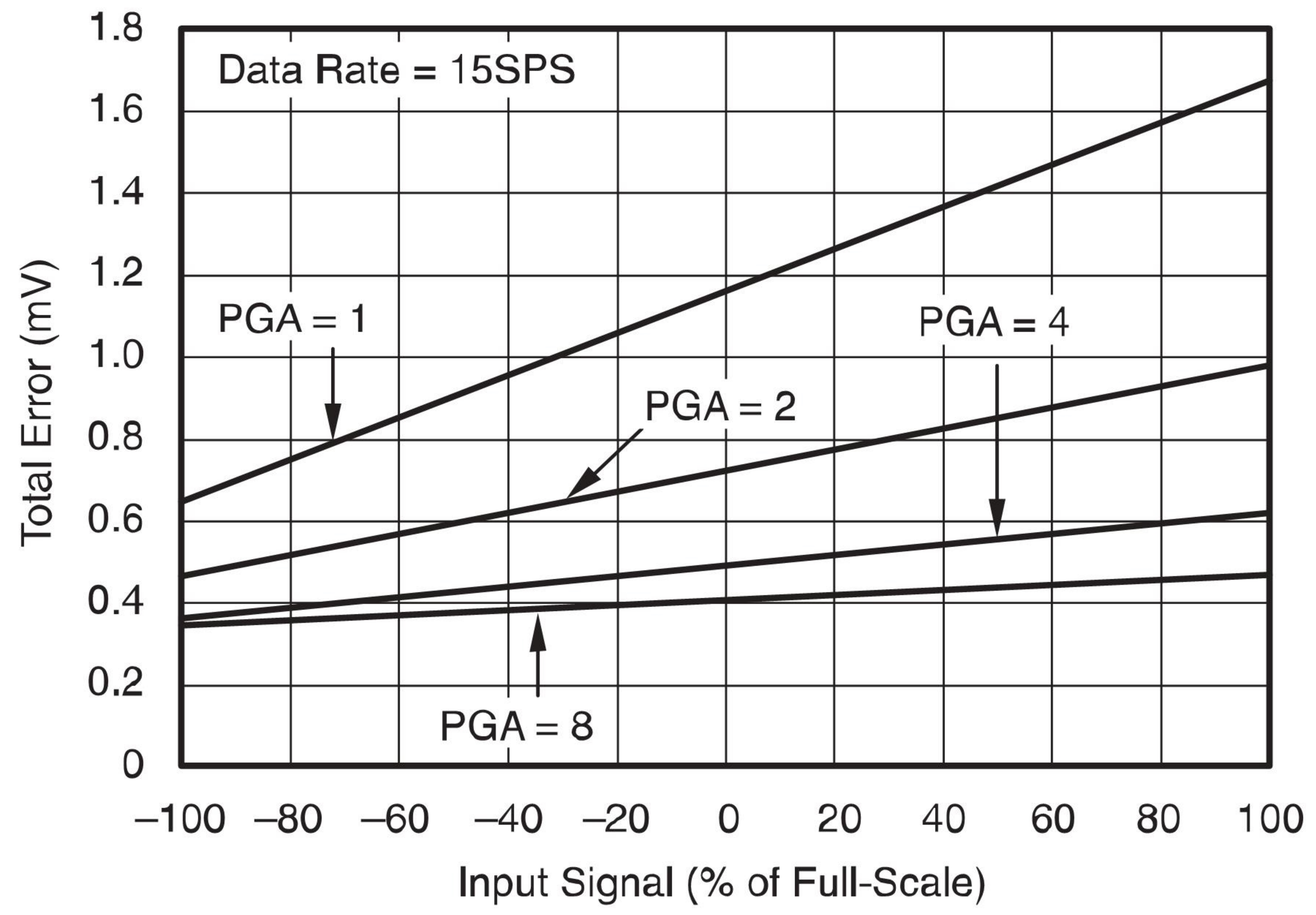


GAIN ERROR vs TEMPERATURE

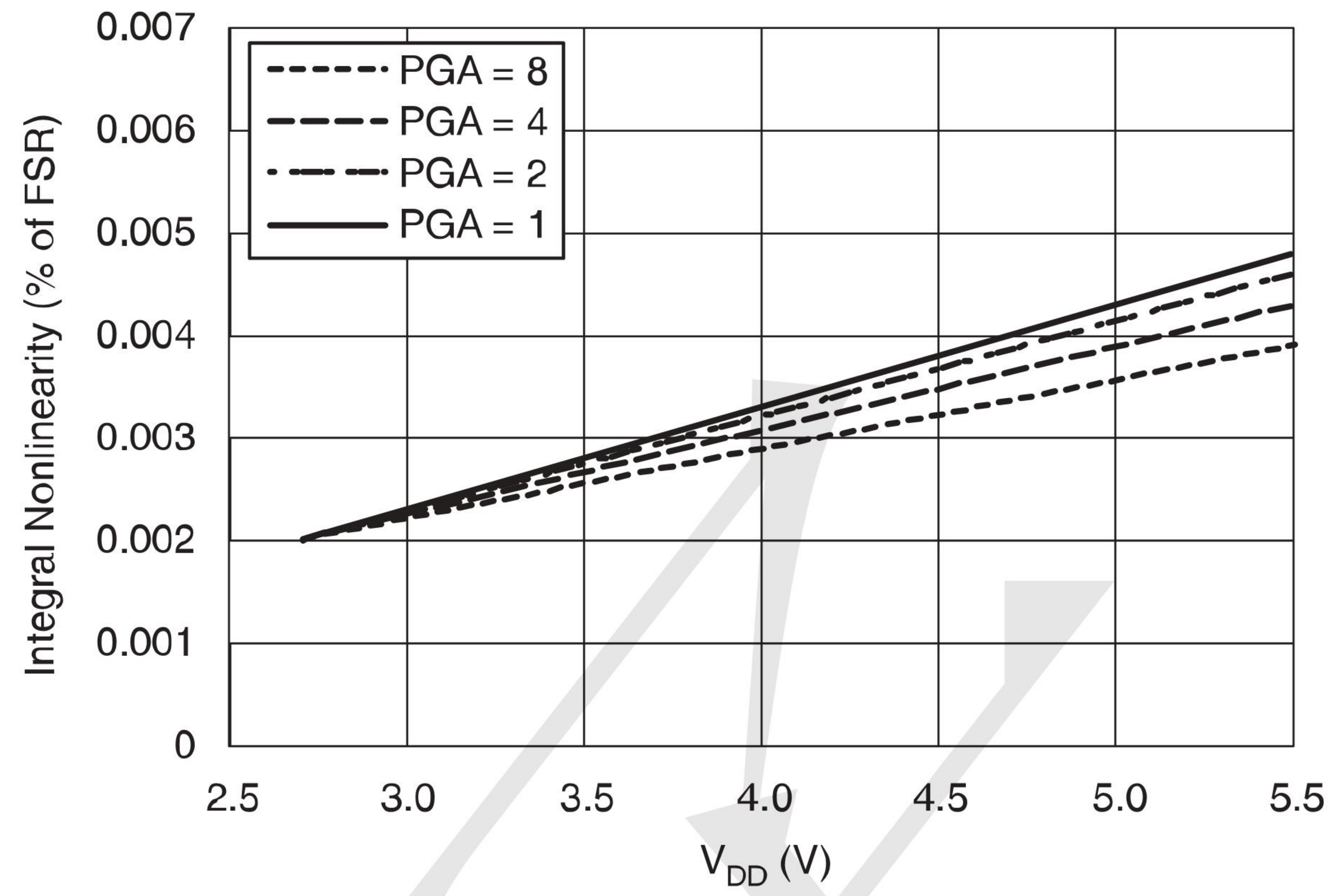


VDD = 5V, unless otherwise noted.

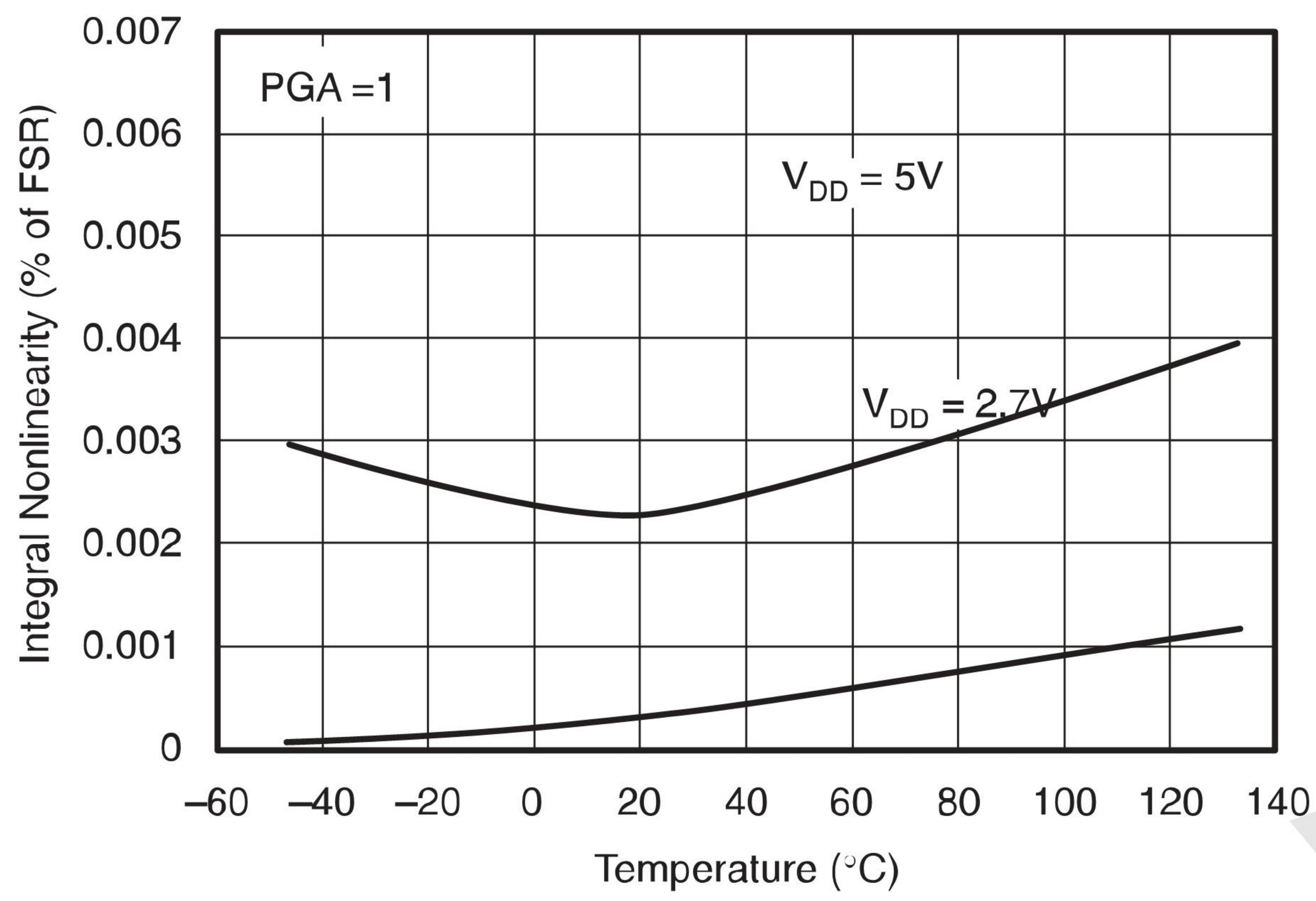
TOTAL ERROR vs INPUT SIGNAL



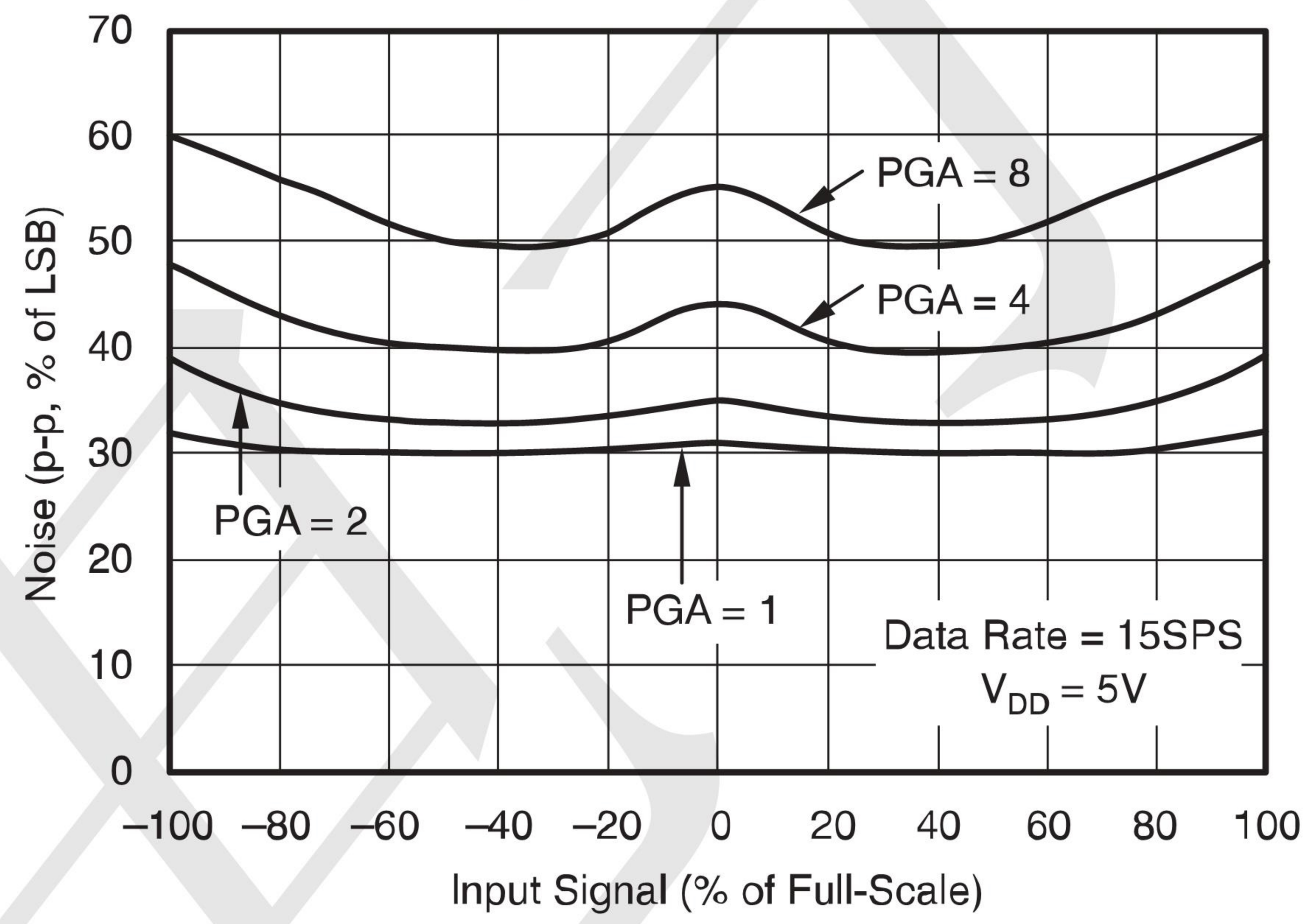
INTEGRAL NONLINEARITY vs SUPPLY VOLTAGE



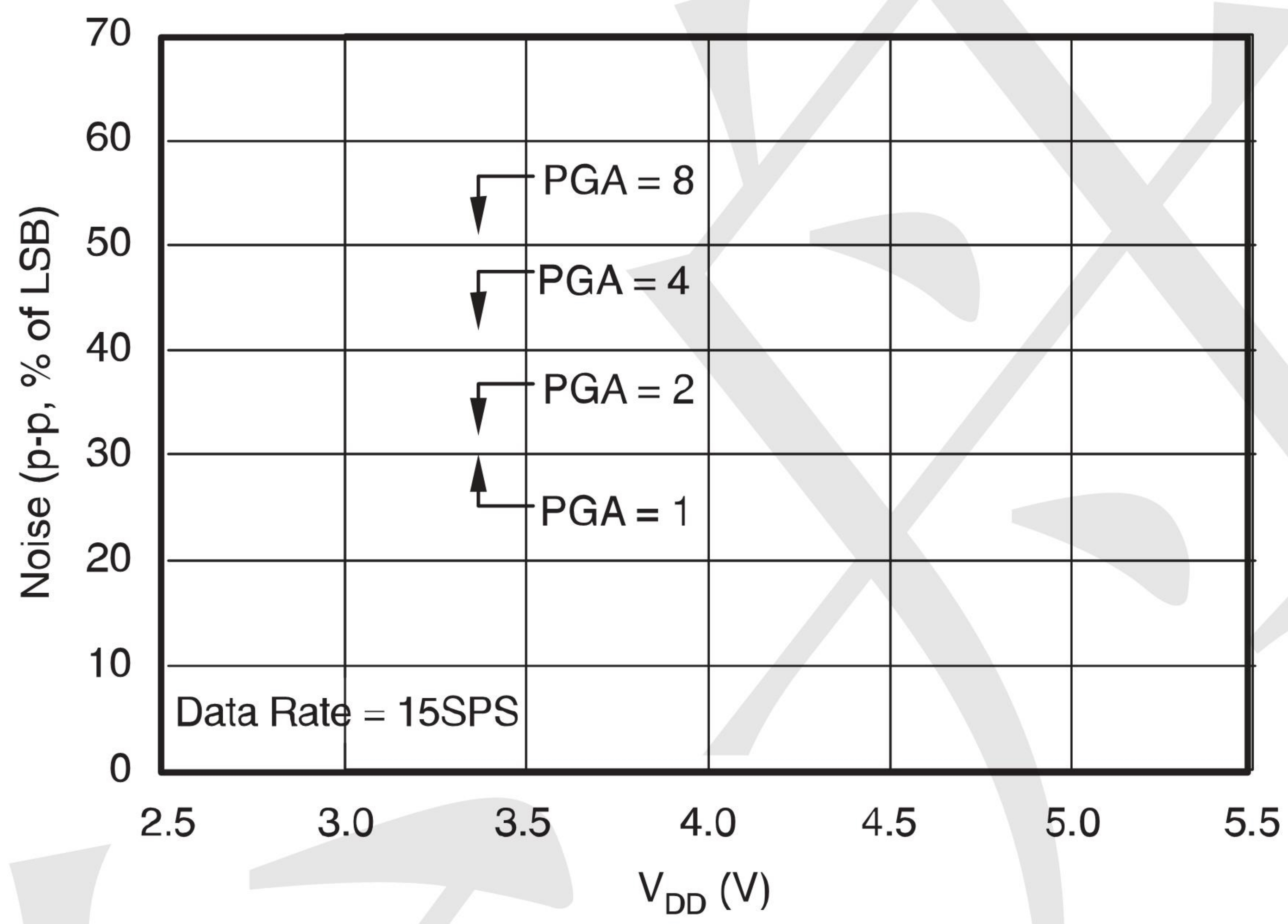
INTEGRAL NONLINEARITY vs TEMPERATURE



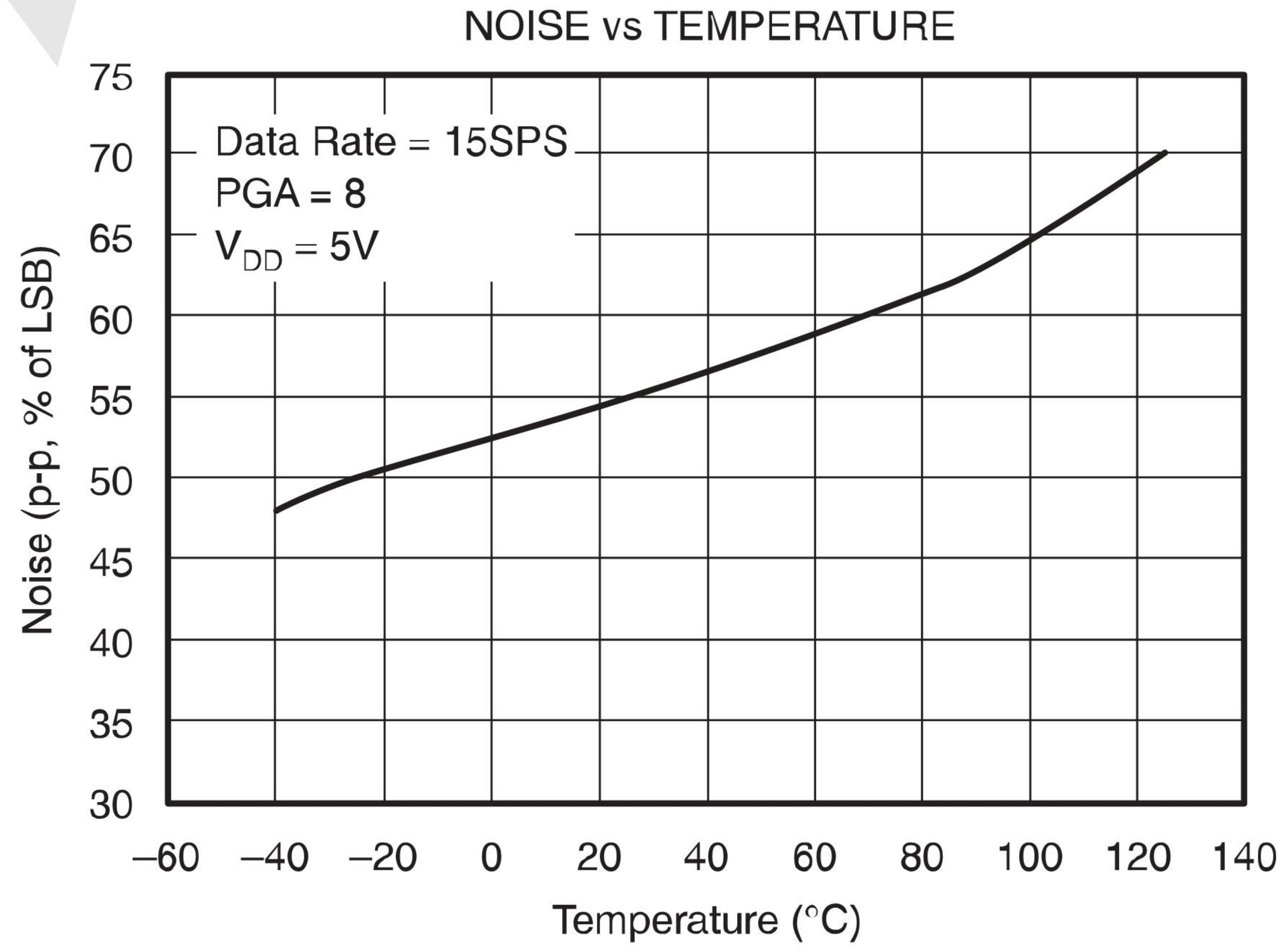
NOISE vs INPUT SIGNAL



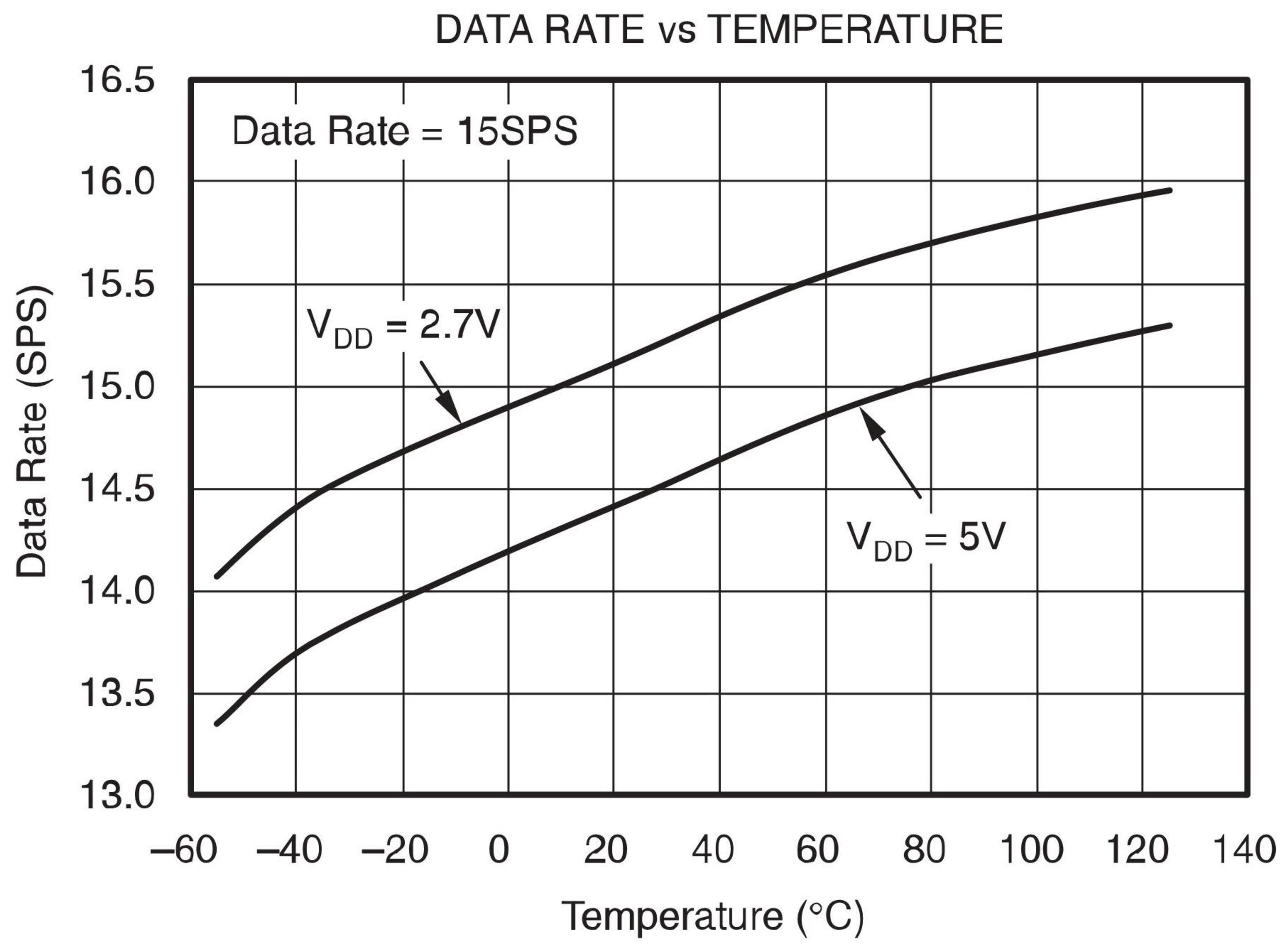
NOISE vs SUPPLY VOLTAGE

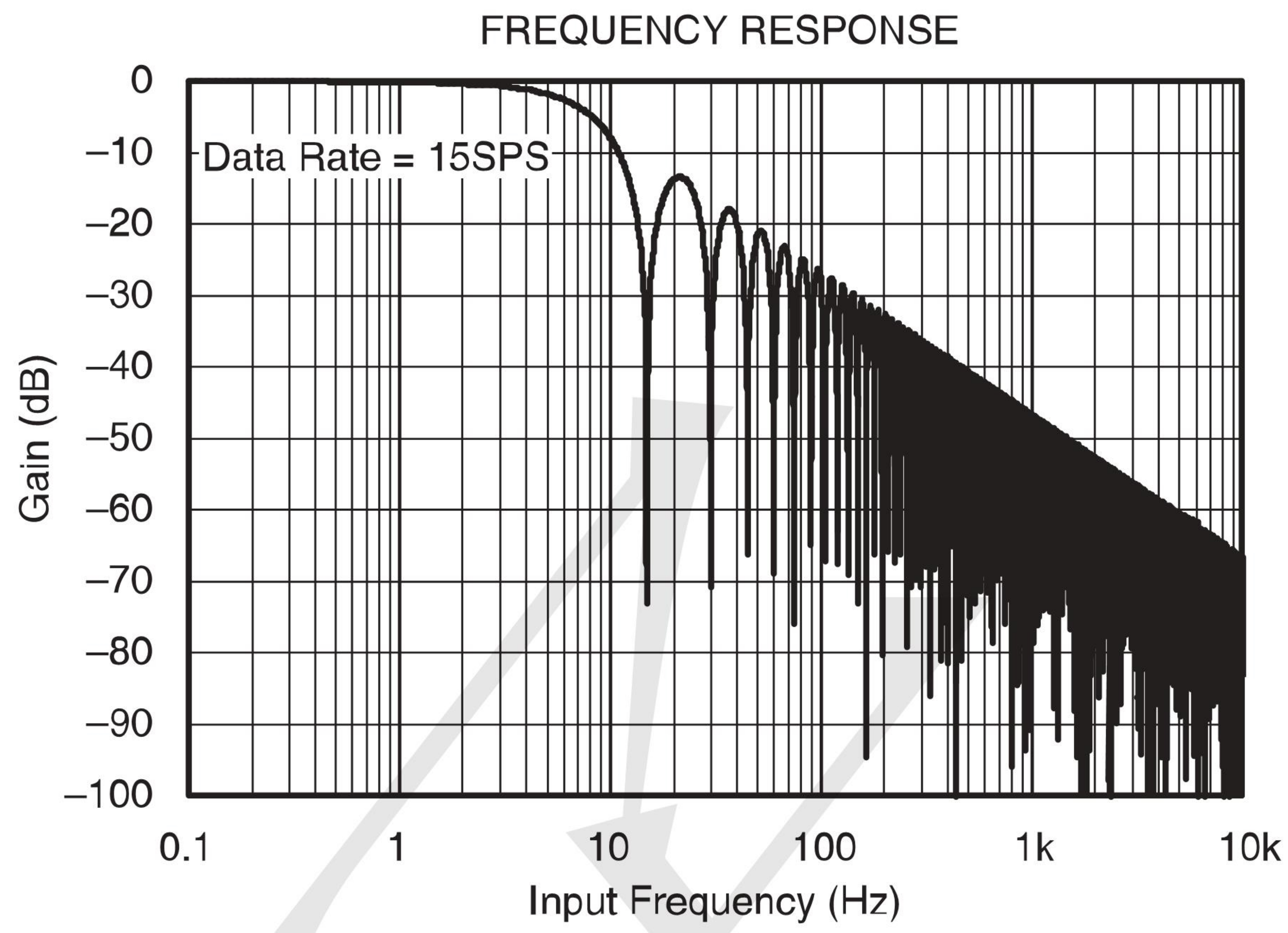


NOISE vs TEMPERATURE



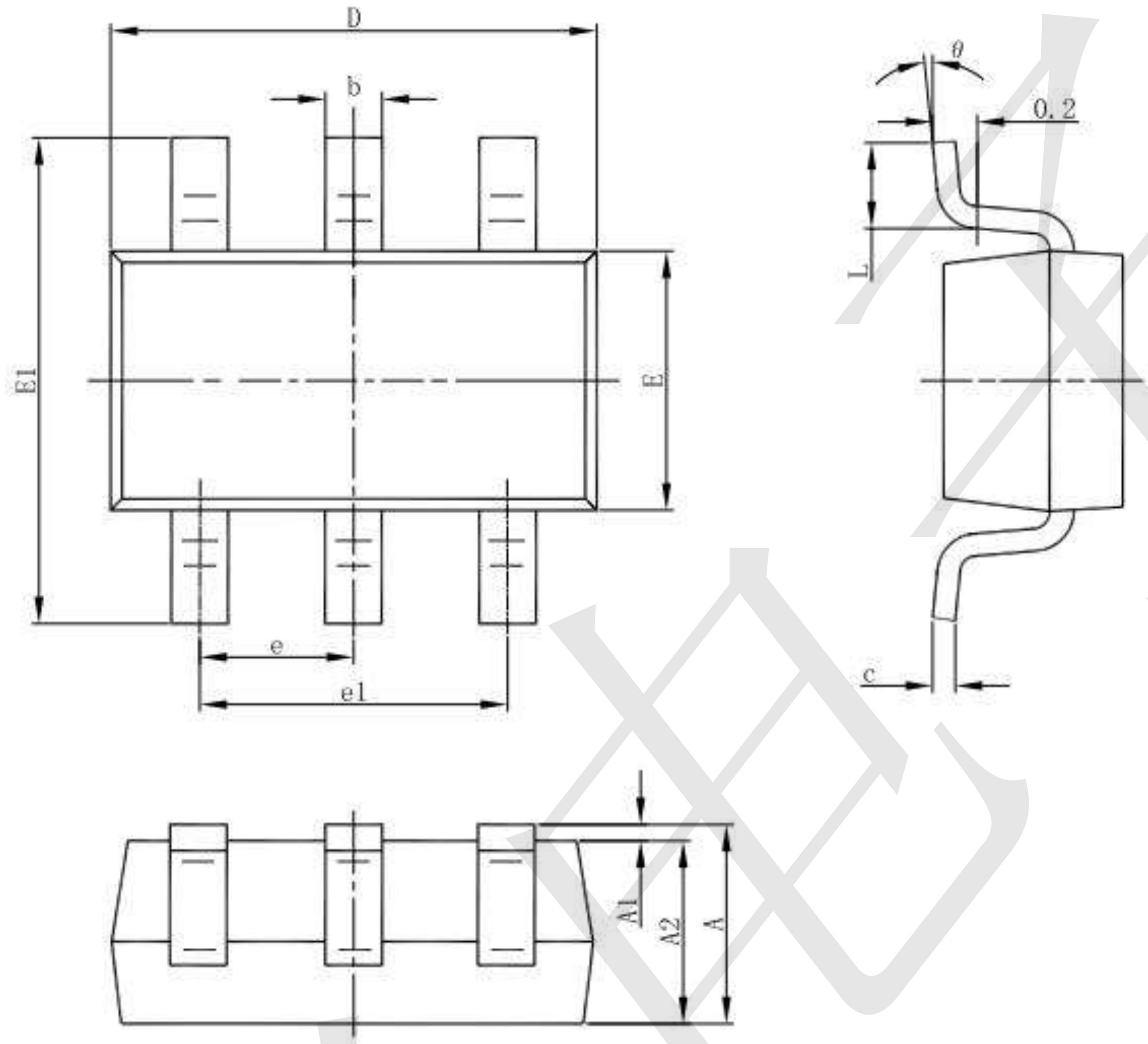
V_{DD} = 5V, unless otherwise noted.





Package informantion

SOT23-6



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	1.500	1.700	0.059	0.067
E1	2.650	2.950	0.104	0.116
e	0.950(BSC)		0.037(BSC)	
e1	1.800	2.000	0.071	0.079
L	0.300	0.600	0.012	0.024
θ	0°	8°	0°	8°