

# 直流特性の仕様について:

入力容量、漏れ電流、入力インピーダンス  
リファレンス電圧範囲  
INL (積分非直線性) DNL (微分非直線性)

TIPL 4001

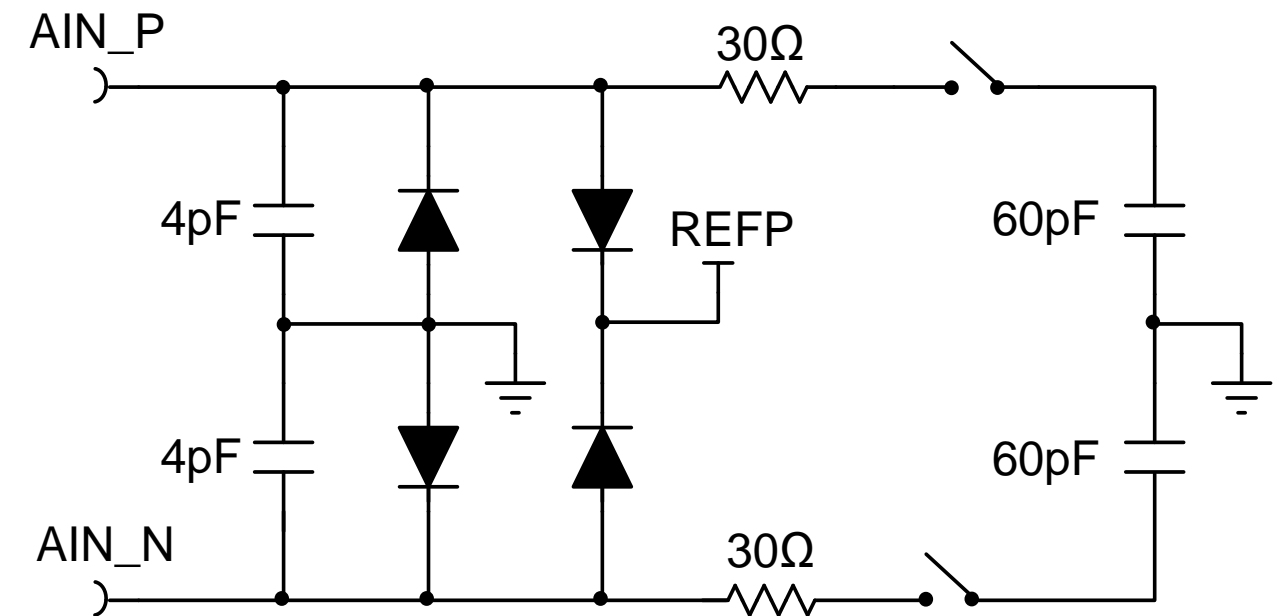
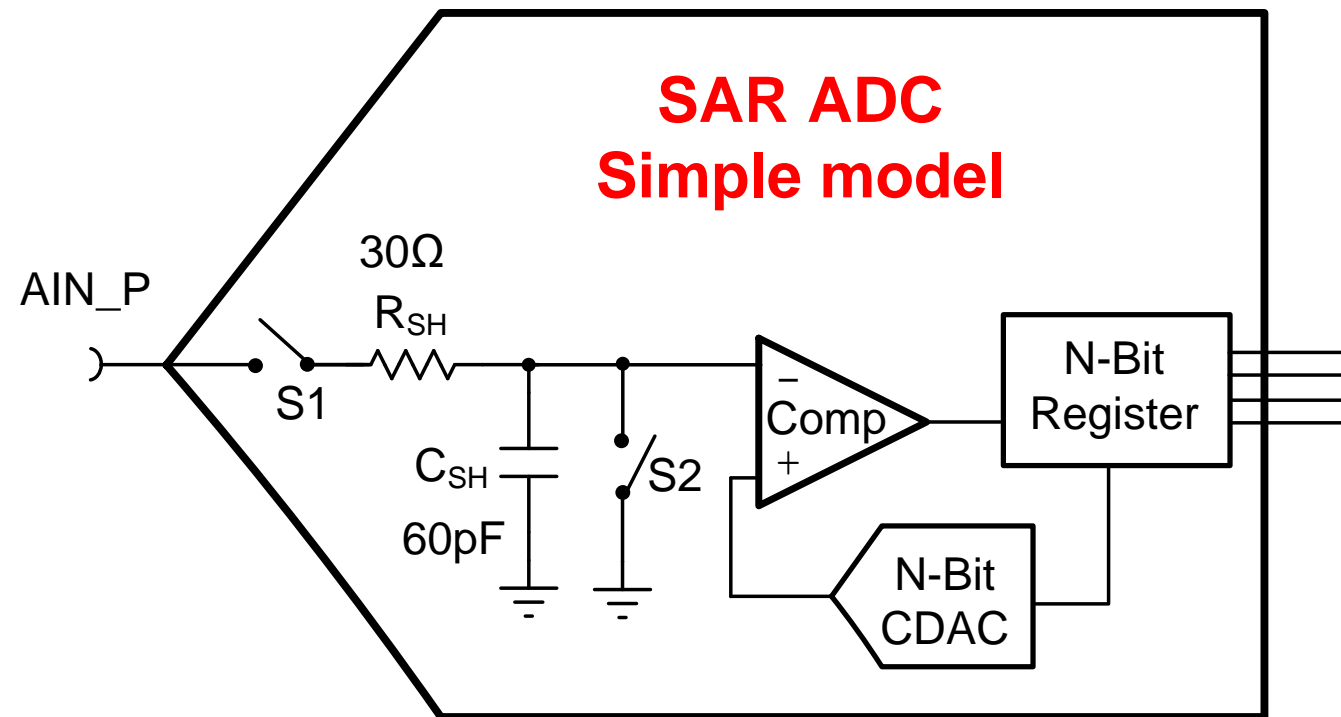
TI プレシジョン・ラボ - ADCs

Created by Art Kay

日本語版講師：宮崎 仁

# アナログ入力の入力容量

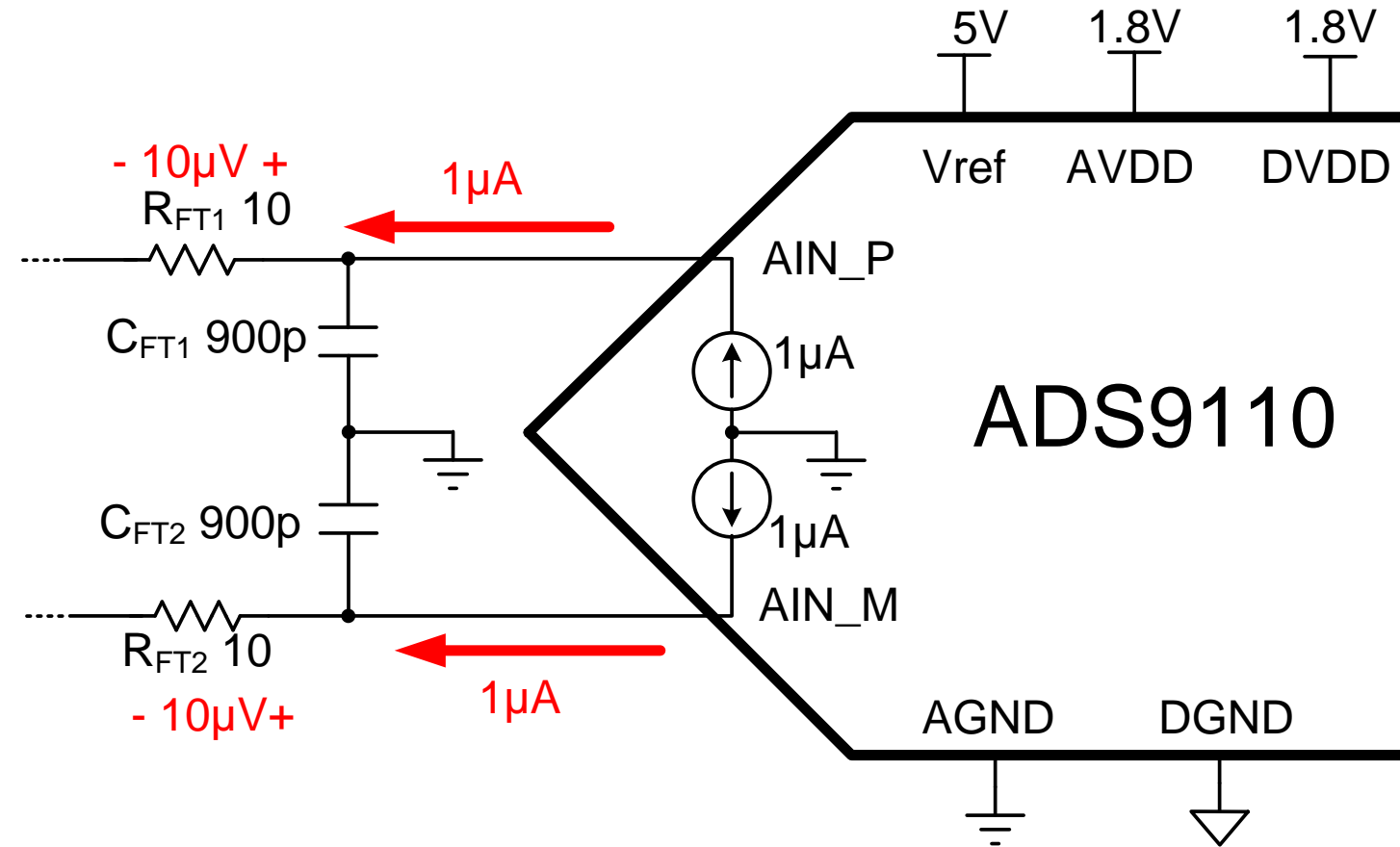
PARAMETER	TEST CONDITION	MIN	TYP	MAX	UNIT
<b>ANALOG INPUT</b>					
<b>CIN</b> Input capacitance	In sample mode		60		pF
	In hold mode		4		



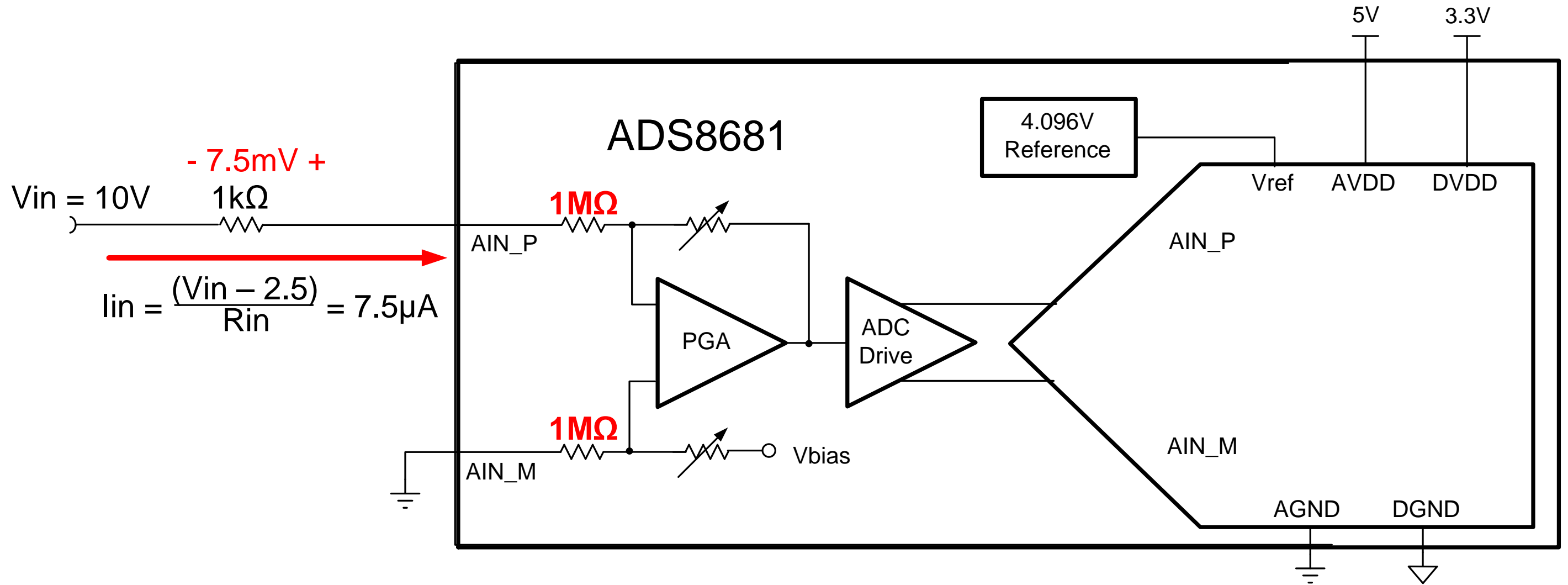
**Input stage detailed model**

# アナログ入力の入力漏れ電流

PARAMETER	TEST CONDITION	MIN	TYP	MAX	UNIT
<b>ANALOG INPUT</b>					
$I_{IL}$ Input leakage current			$\pm 1$		$\mu\text{A}$



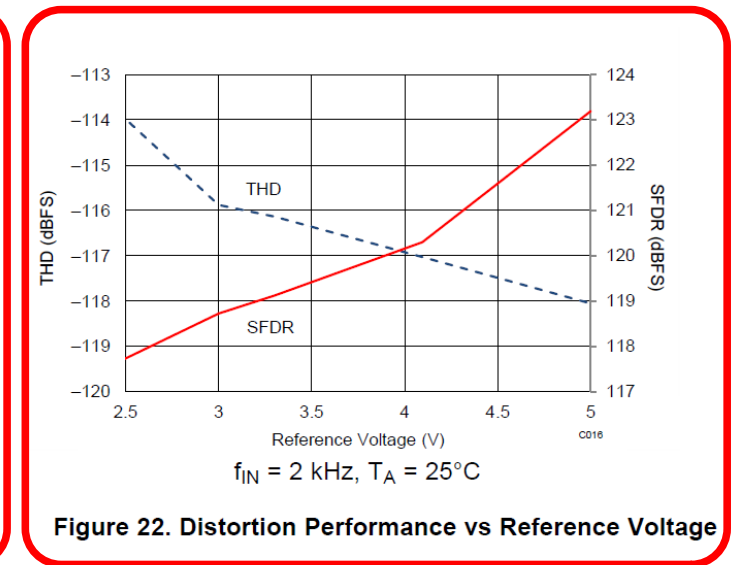
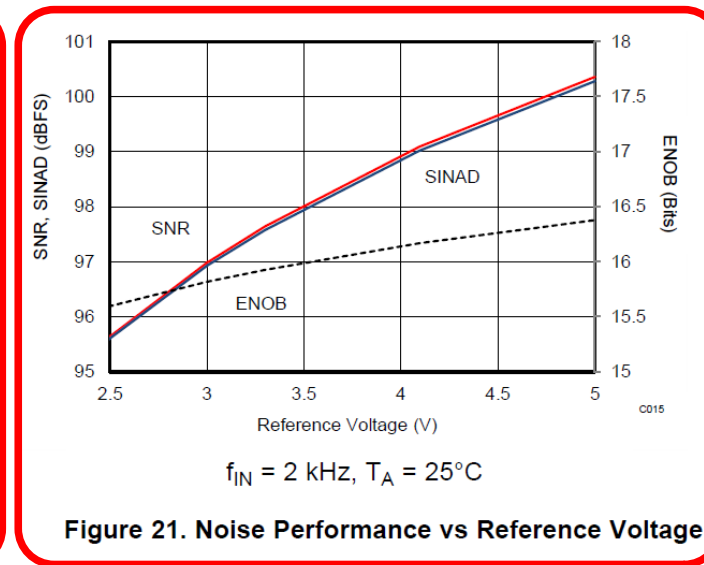
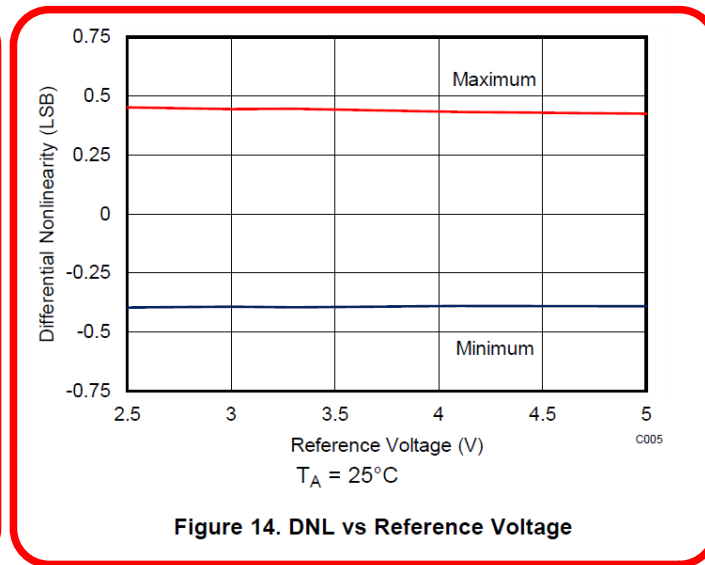
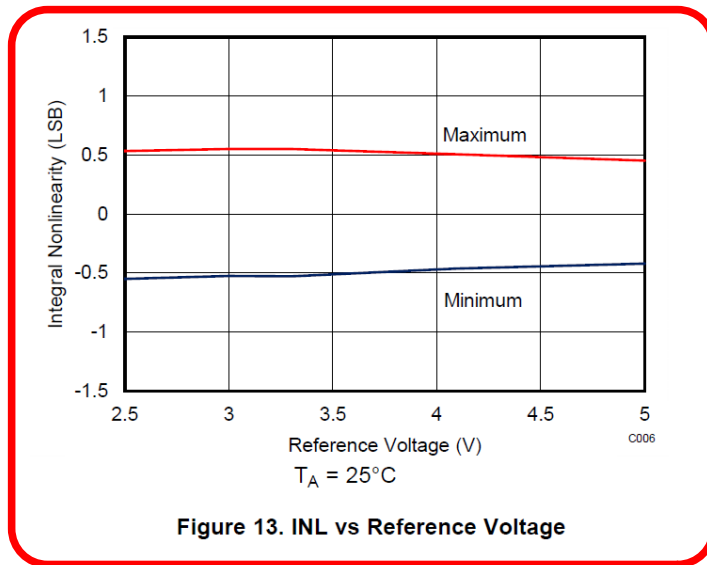
# アナログ入力の入力インピーダンス



# リファレンス入力を入力電圧範囲

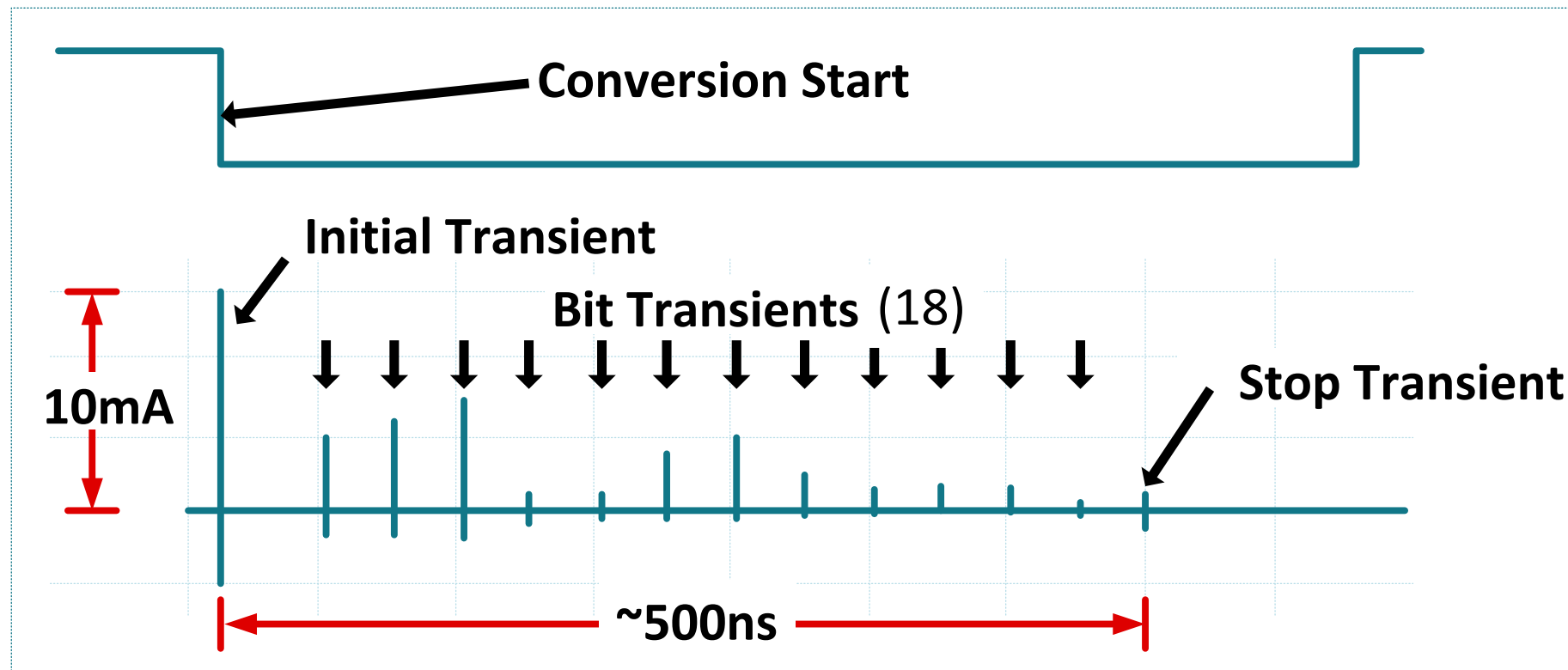
All specifications are for AVDD = 1.8V, DVDD = 1.8V,  $V_{REF} = 5V$ , and  $f_{DATA} = 2\text{Mps}$ , unless otherwise noted

PARAMETER	TEST CONDITION	MIN	TYP	MAX	UNIT
<b>ANALOG INPUT</b>					
$V_{REF}$ Reference Input Voltage Range		2.5		5.0	V



# リファレンス入力の入力電流

PARAMETER	TEST CONDITION	MIN	TYP	MAX	UNIT
<b>EXTERNAL REFERENCE INPUT</b>					
Reference input current	During conversion, 1MHz sample rate, midcode		300		$\mu\text{A}$
Input leakage Current			250		$\text{pA}$
$C_{\text{REF}}$ Decoupling capacitor at the reference input		10	22		$\mu\text{F}$



# システム性能: 理想的な伝達関数

$$\text{Number of Codes} = 2^N$$

$$V_{LSB} = \frac{FSR}{2^N}$$

Where

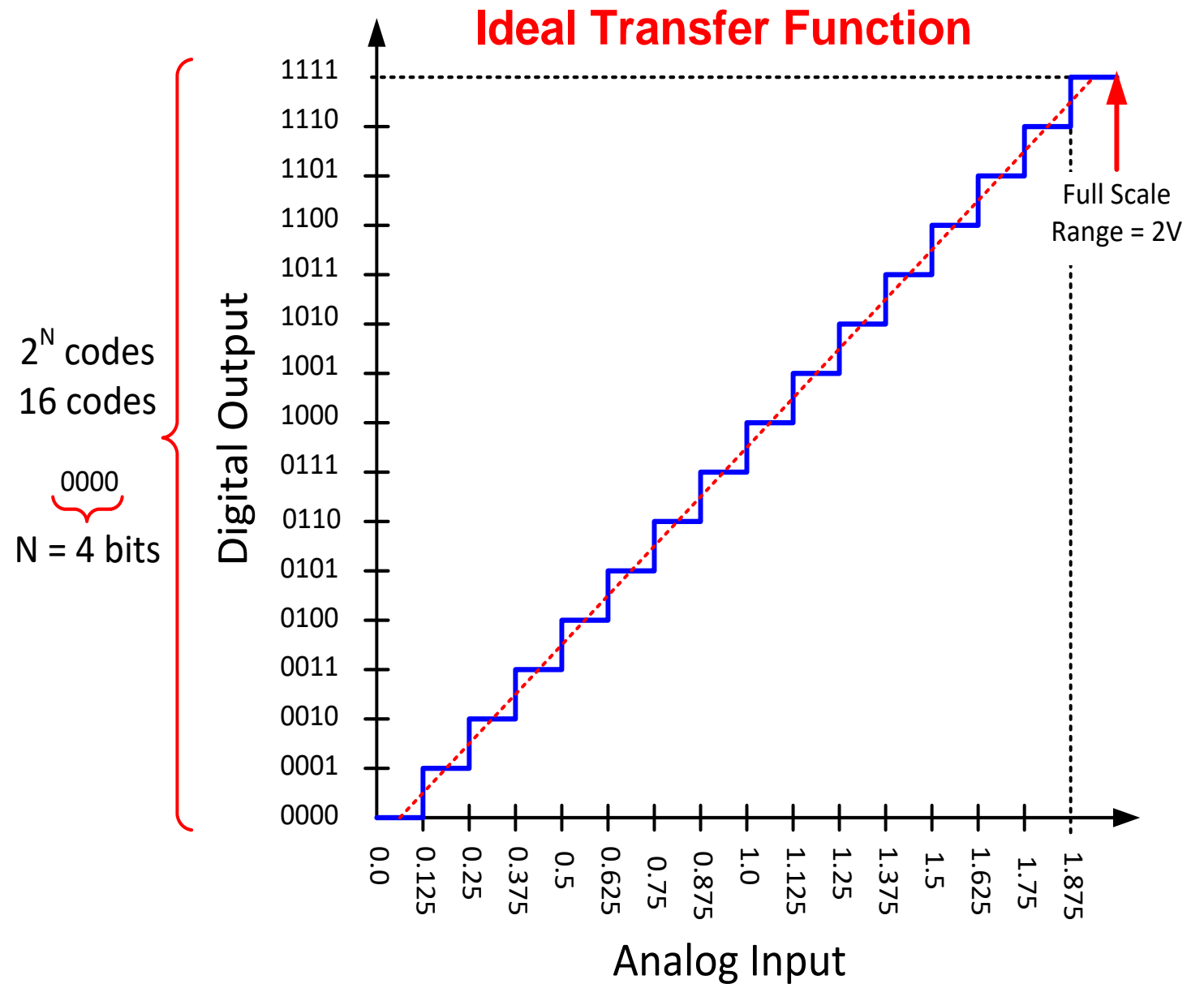
$V_{LSB}$  = The minimum resolvable voltage width

FSR = Full Scale Range

N = Number of bits

$$V_{LSB} = \frac{FSR}{2^N} = \frac{2V}{2^4} = 0.125V$$

$$\text{Number of Codes} = 2^N = 2^4 = 16$$



# システム性能: 微分非直線性 (DNL)

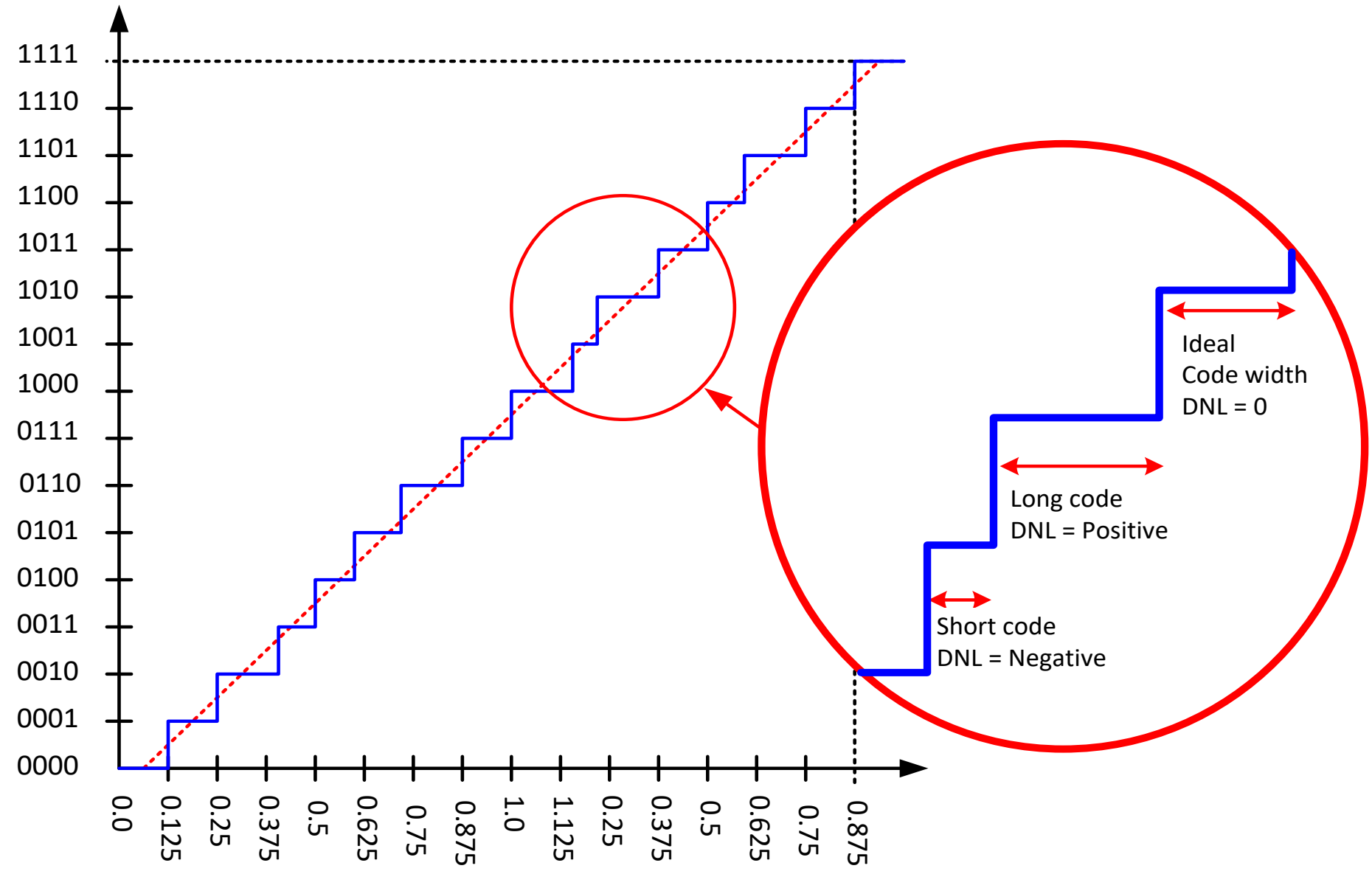
$$DNL[k] = \frac{W[k] - Q}{Q}$$

$$W[k] = T[k + 1] - T[k]$$

$W[k]$  the measured code width.

$T[k]$  The voltage level where a code transitions

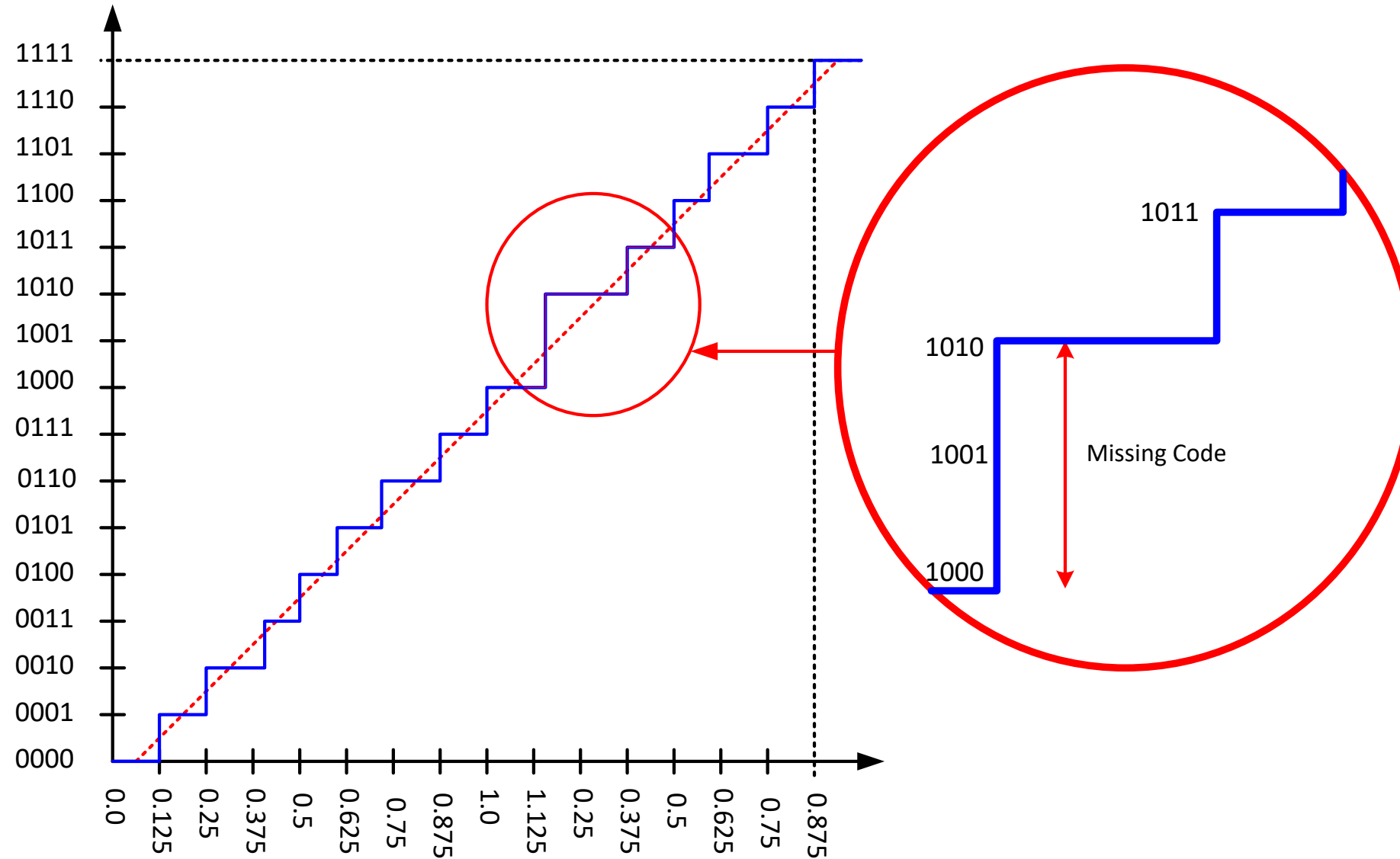
$Q$  Ideal code width





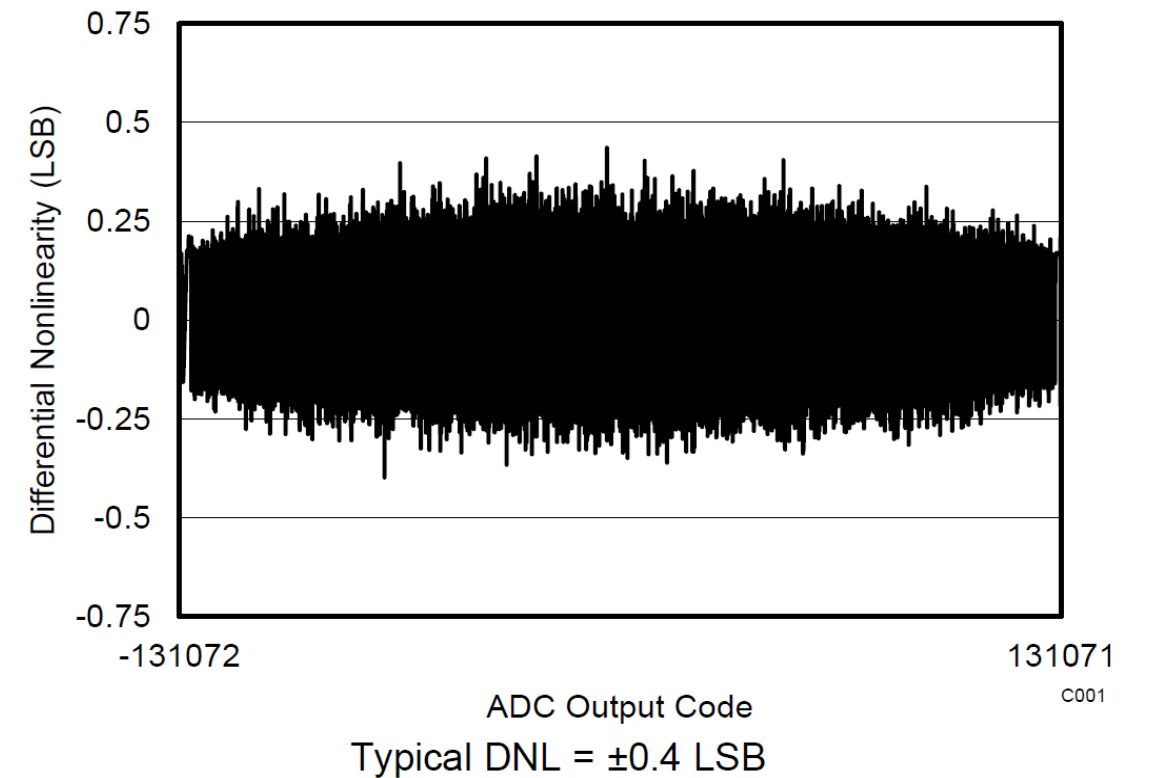
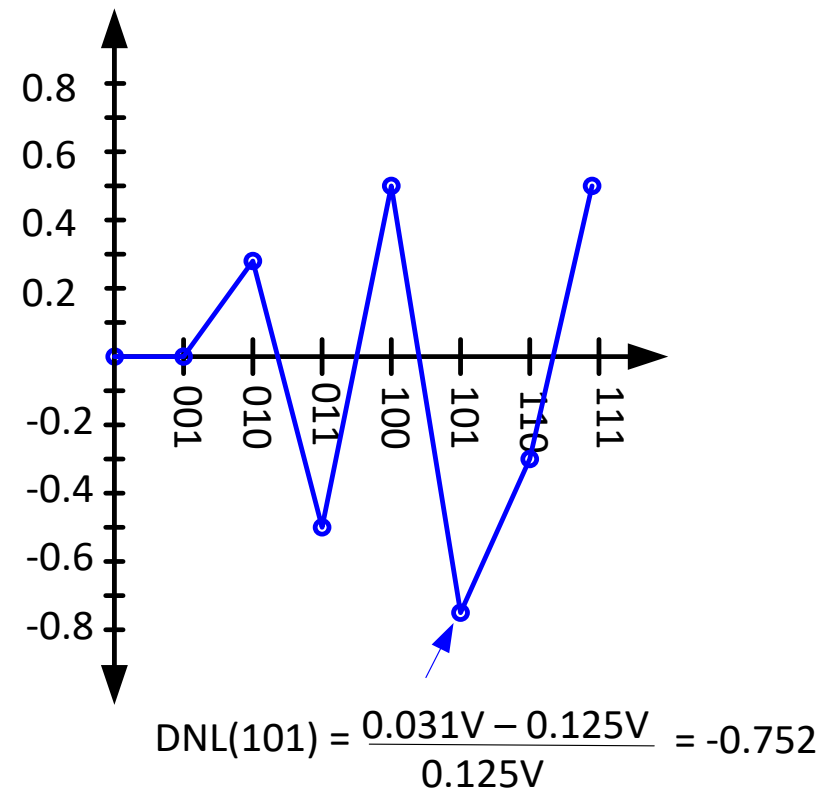
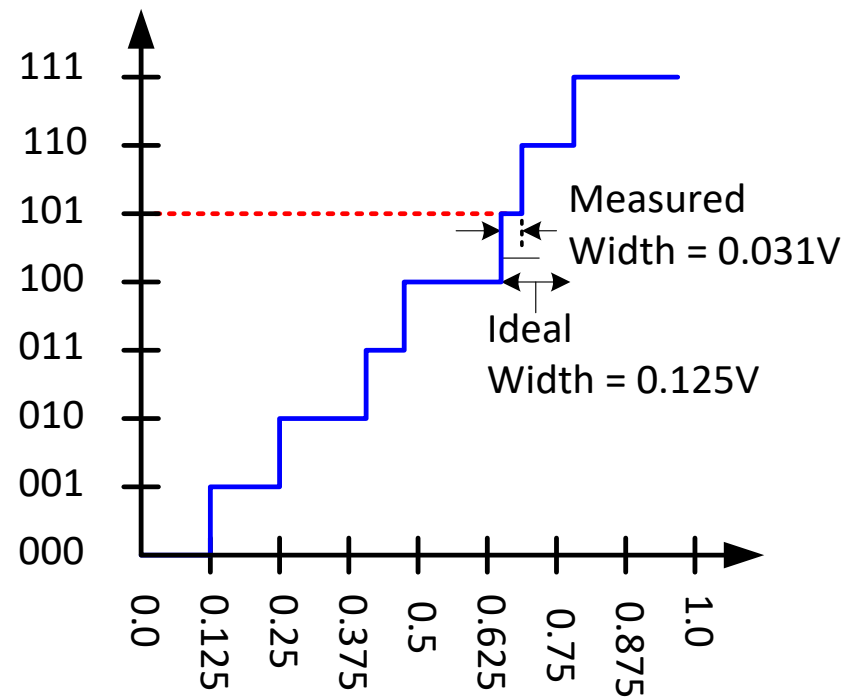
# システム性能: ノー・ミッシング・コード (NMC)

PARAMETER	TEST CONDITION	MIN	TYP	MAX	UNIT
<b>SYSTEM PERFORMANCE</b>					
NMC Integral Nonlinearity	AVDD = 3V	12			Bits

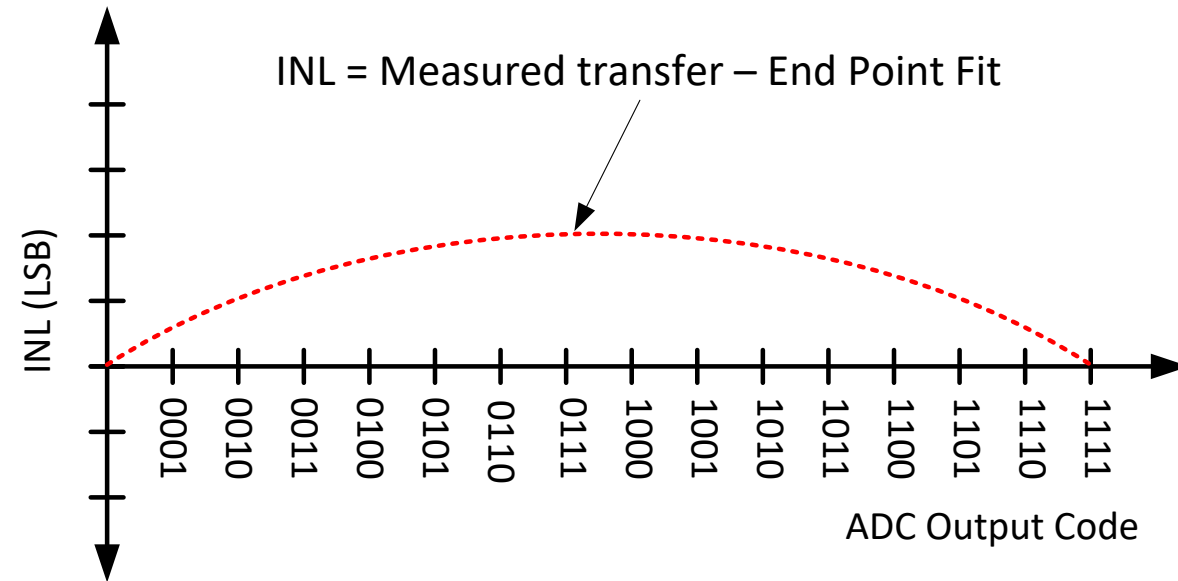
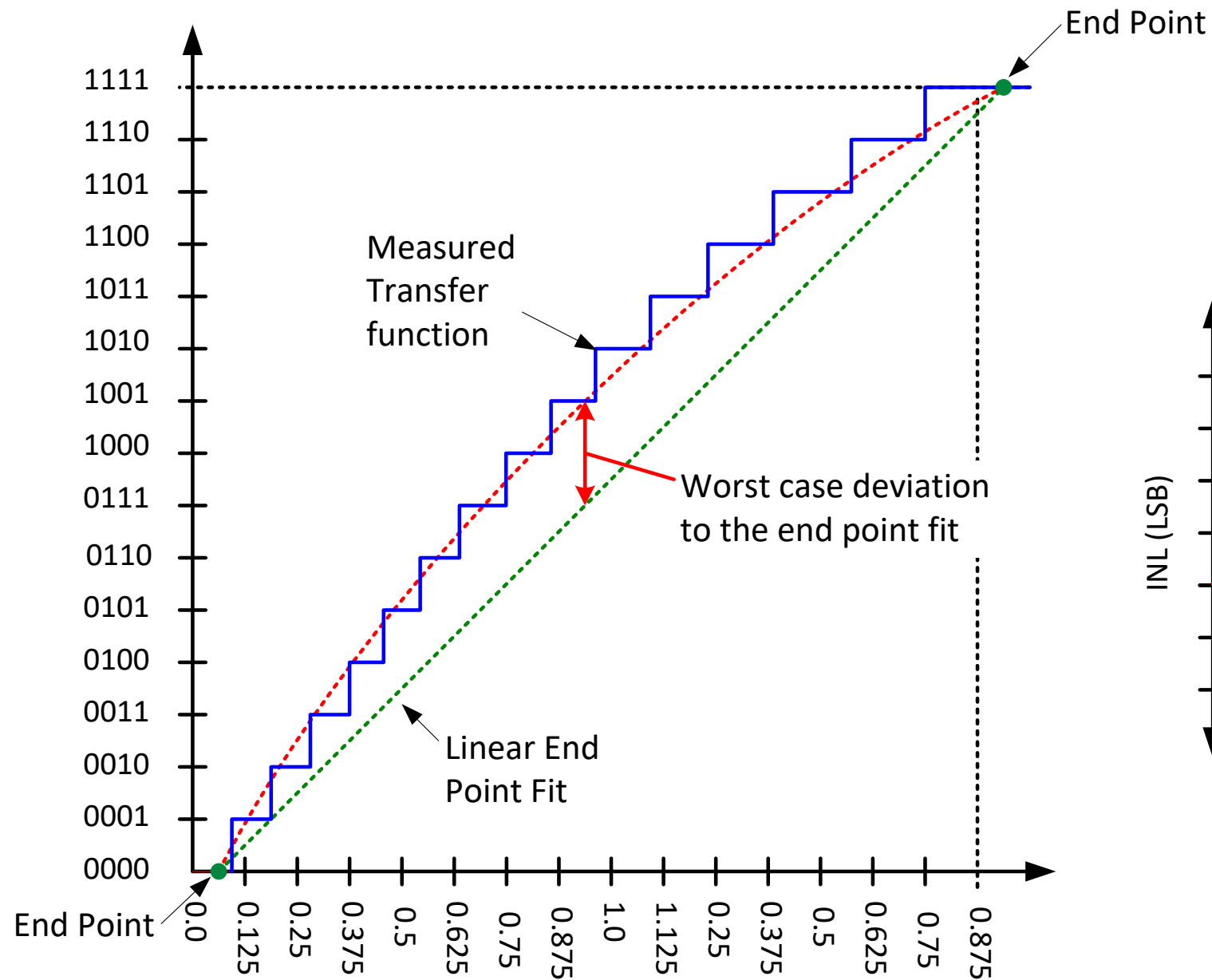


# コードによる微分非直線性 (DNL) の変動

PARAMETER ADS9110	TEST CONDITION	MIN	TYP	MAX	UNIT
<b>SYSTEM PERFORMANCE</b>					
DNL Differential Nonlinearity	AVDD = 1.8V	-0.75	±0.4	+0.75	LSB

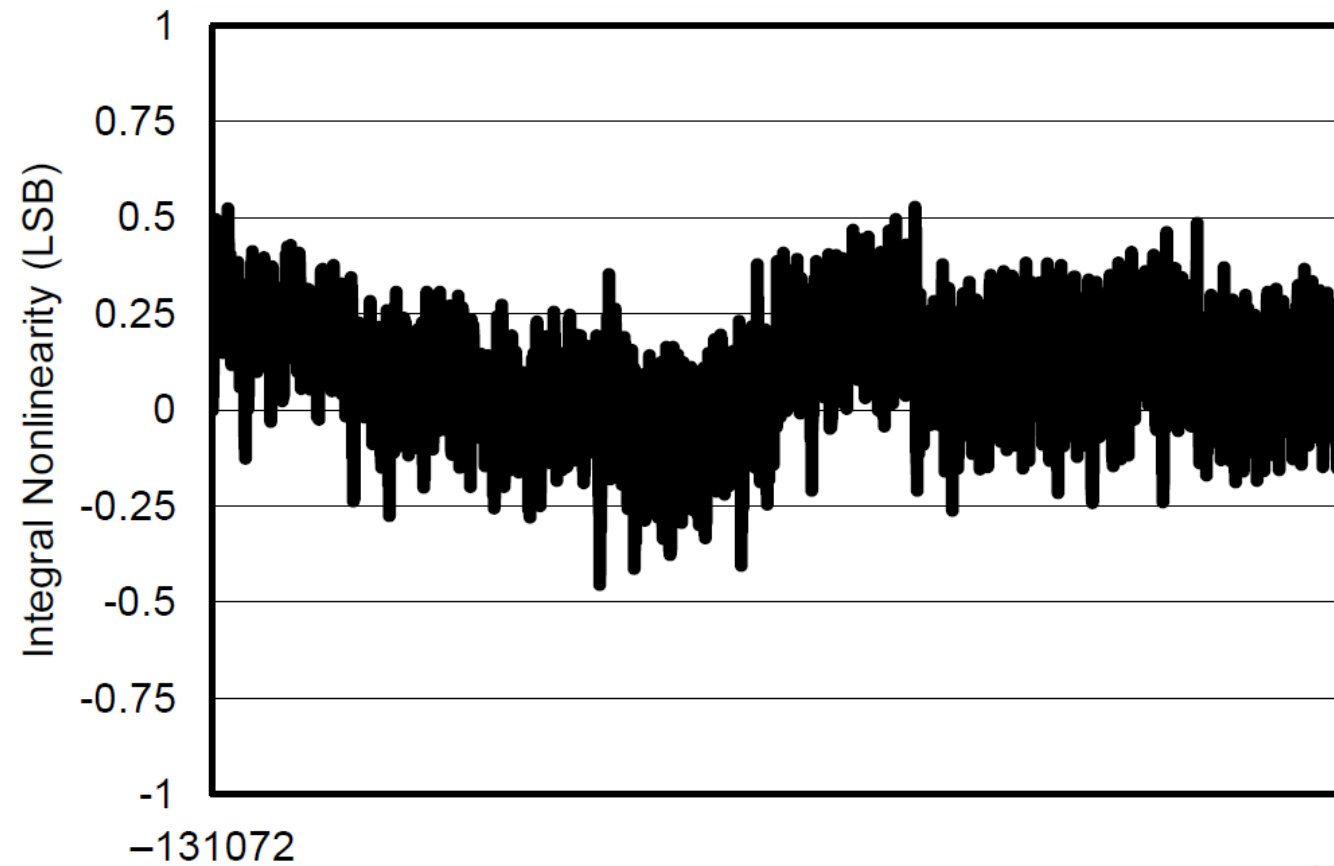


# システム性能: 積分非直線性 (INL)



# データシートでのINLの規定

PARAMETER ADS9110	TEST CONDITION	MIN	TYP	MAX	UNIT
<b>SYSTEM PERFORMANCE</b>					
INL Integral Nonlinearity	AVDD = 3V	-1.5	±0.5	1.5	LSB



ADC Output Code  
Typical INL of ±0.5 LSB