

CDx4HCx4316 高速 CMOS ロジック、レベルシフト機能搭載、クワッド、アナログスイッチ

1 特長

- 幅広いアナログ入力電圧範囲:
 $V_{CC} - V_{EE}: 0V \sim 10V$
- 低いオン抵抗:
 - 45Ω (標準値): $V_{CC} = 4.5V$
 - 35Ω (標準値): $V_{CC} = 6V$
 - 30Ω (標準値): $V_{CC} - V_{EE} = 9V$
- 高速なスイッチング / 伝搬遅延時間
- 低いオフリーク電流
- ブレイクビフォーメイクのスイッチングを内蔵
- ロジックレベル変換により、±5V のアナログ信号に対応する 5V ロジックを実現
- 広い動作温度範囲: $-55^{\circ}C \sim 125^{\circ}C$
- HC タイプ:
 - 2V ~ 10V で動作
 - 優れたノイズ耐性: V_{CC} に対して $N_{IL} = 30\%$ 、 $N_{IH} = 30\%$ ($V_{CC} = 5V$ 時)
- HCT タイプ:
 - LSTTL 入力ロジックと直接互換、 $V_{IL} = 0.8V$ (最大値)、 $V_{IH} = 2V$ (最小値)
 - CMOS 入力互換、 V_{OL} 、 V_{OH} で $I_L \leq 1 \mu A$

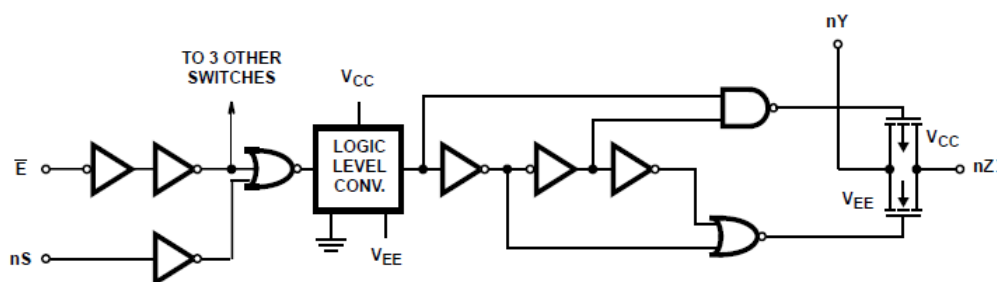
2 概要

'HC4316 および CD74HCT4316 デバイスは、4 つの独立したデジタル制御アナログスイッチを内蔵しており、シリコンゲート CMOS テクノロジーを使用し、標準 CMOS IC の低い消費電力で LSTTL と同様の動作速度を実現しています。

さらに、これらのデバイスはロジックレベル変換回路を内蔵しており、5V ロジックを介して ±5V の範囲内の電圧のアナログ信号スイッチングを行います。各スイッチは、共通のイネーブル (E) が Low のとき、選択入力 (S) の High レベル電圧によってオンになります。High E の場合、すべてのスイッチがディセーブルになります。デジタル入力は V_{CC} と GND の間でスイングできます。アナログ入力 / 出力は、正の制限値として V_{CC} 、負の制限値として V_{EE} の間でスイングできます。電圧範囲を [図 13-1](#) および [図 13-2](#) に示します。

製品情報

入力		スイッチ
E	S	オン / オフ
L	L	オフ
L	H	オン
H	H	オフ



1 つのスイッチ



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3 Pin Configurations and Functions

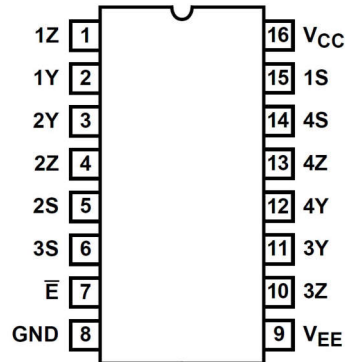


図 3-1. CD74HC4316 (TSSOP)

表 3-1. Pin Functions

PIN		TYPE	DESCRIPTION
NAME	NO.		
1Z	1	I/O	Input/Output for Switch 1
1Y	2	I/O	Input/Output for Switch 1
2Y	3	I/O	Input/Output for Switch 2
2Z	4	I/O	Input/Output for Switch 2
2S	5	I	Control pin for Switch 2
3S	6	I	Control pin for Switch 3
E	7	I	Enable Pin
GND	8	-	Ground Pin
V _{EE}	9	-	Power Pin
3Z	10	I/O	Input/Output for Switch 3
3Y	11	I/O	Input/Output for Switch 3
4Y	12	I/O	Input/Output for Switch 4
4Z	13	I/O	Input/Output for Switch 4
4S	14	I	Control pin for Switch 4
1S	15	I	Control pin for Switch 1
V _{CC}	16	-	Power Pin

4 Absolute Maximum Ratings

over operating free-air temperature range (unless otherwise noted)⁽¹⁾

			MIN	MAX	UNIT
$V_{CC} - V_{EE}$	DC Supply voltage		-0.5	10.5	V
V_{CC}			-0.5	7	V
V_{EE}			0.5	-7	V
I_{IK}	DC input diode current	$V_I < -0.5\text{ V}$ or $V_I > V_{CC} + 0.5\text{ V}$	-20	20	mA
I_{OK}	DC switch diode current	$V_I < V_{EE} - 0.5\text{ V}$ or $V_I < V_{CC} + 0.5\text{ V}$	-25	25	mA
I_{OK}	DC Output Diode Current	For $V_O < -0.5\text{ V}$ or $V_O > V_{CC} + 0.5\text{ V}$	-20	20	mA
I_O	DC Output Source or Sink Current per Output Pin	For $V_O > -0.5\text{ V}$ or $V_O < V_{CC} + 0.5\text{ V}$	-25	25	mA
I_{CC}	DC V_{CC} or ground current		-50	50	mA
T_{JMAX}	Maximum junction temperature			150	°C
T_{LMAX}	Maximum lead temperature	Soldering 10 s		300	°C
T_{stg}	Storage temperature		-65	150	°C

- (1) Stresses beyond those listed under *Absolute Maximum Rating* may cause permanent damage to the device. These are stress ratings only, which do not imply functional operation of the device at these or any other conditions beyond those indicated under *Recommended Operating Condition*. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

5 Thermal Information

THERMAL METRIC ⁽¹⁾		PW (TSSOP)	UNIT
		16 PINS	
$R_{\theta JA}$	Junction-to-ambient thermal resistance	127.9	°C/W

(1) For more information about traditional and new thermal metrics, see the [Semiconductor and IC Package Thermal Metrics](#) application report.

6 Recommended Operating Conditions

over operating free-air temperature range (unless otherwise noted)

			MIN	NOM	MAX	UNIT
V_{CC}	Supply voltage range (T_A = full package temperature range)(2)	CD54 and 74HC types	2		6	V
		CD54 and 74HCT types	4.5		5.5	
$V_{CC} - V_{EE}$ ⁽¹⁾	Supply voltage range (T_A = full package temperature range)(2)	CD54 and 74HC types, CD54 and 74HCT types	2		10	V
V_{EE}	Supply voltage range (T_A = full package temperature range)(3)	CD54 and 74HC types, CD54 and 74HCT types	0		–6	V
V_I	DC input control voltage		GND		V_{CC}	V
V_{IS}	Analog switch I/O voltage		V_{EE}		V_{CC}	V
T_A	Ambient temperature		–55		125	°C
t_r, t_f	Input rise and fall times	2 V	0		1000	ns
		4.5 V	0		500	
		6 V	0		400	

(1) V_{DD} and V_{SS} can be any value as long as $3\text{ V} \leq (V_{DD} - V_{SS}) \leq 24\text{ V}$, and the minimum V_{DD} is met.

7 Electrical Characteristics: HC Devices

Over operating free-air temperature range, $V_{\text{SUPPLY}} = \pm 5 \text{ V}$, and $R_L = 100 \, \Omega$, (unless otherwise noted)⁽¹⁾

PARAMETER	TEST CONDITIONS					MIN	TYP	MAX	UNIT	
SIGNAL INPUTS (V _{IS}) AND OUTPUTS (V _{OS})										
	V _{IS} (V)	V _I (V)	V _{EE} (V)	V _{CC} (V)	T _A					
Input High Voltage, V _{IH} , Min				2	25°C			1.5	V	
					−40°C to +85°C			1.5		
					−55°C to +125°C			1.5		
				4.5	25°C			3.15		
					−40°C to +85°C			3.15		
					−55°C to +125°C			3.15		
				6	25°C			4.2		
					−40°C to +85°C			4.2		
					−55°C to +125°C			4.2		
Input Low Voltage, V _{IL} , Max				2	25°C	0.5			V	
					−40°C to +85°C	0.5				
					−55°C to +125°C	0.5				
				4.5	25°C	1.35				
					−40°C to +85°C	1.35				
					−55°C to +125°C	1.35				
				6	25°C	1.8				
					−40°C to +85°C	1.8				
					−55°C to +125°C	1.8				

Over operating free-air temperature range, $V_{\text{SUPPLY}} = \pm 5 \text{ V}$, and $R_L = 100 \Omega$, (unless otherwise noted)⁽¹⁾

PARAMETER	TEST CONDITIONS					MIN	TYP	MAX	UNIT
r_{ON} ON resistance $I_O = 1 \text{ mA}$	V_{CC} or V_{EE}	V_{IH} or V_{IL}	0	4.5	25°C		30	180	Ω
					–40°C to +85°C			225	
					–55°C to +125°C			270	
			0	6	25°C		35	160	
					–40°C to +85°C			200	
					–55°C to +125°C			240	
	V_{CC} to V_{EE}	V_{IH} or V_{IL}	–4.5	4.5	25°C		30	135	Ω
					–40°C to +85°C			170	
					–55°C to +125°C			205	
			0	4.5	25°C		40	320	
					–40°C to +85°C			400	
					–55°C to +125°C			480	
Δr_{ON} Maximum ON resistance between any two channels			0	6	25°C		30	240	Ω
					–40°C to +85°C			300	
					–55°C to +125°C			360	
I_{IZ} Switch OFF leakage current	$V_{\text{CC}} - V_{\text{EE}}$	V_{IH} or V_{IL} $E = V_{\text{CC}}$	0	6	25°C			± 0.1	μA
					–55°C to 85°C			± 1	
			0	6	–55°C to 125°C			± 1	
					25°C			± 0.1	
			–5	5	–55°C to 85°C			± 1	
					–55°C to 125°C			± 1	
I_{IL} Control input leakage current		V_{CC} or GND	0	6	25°C			± 0.1	μA
					–55°C to 85°C			± 1	
					–55°C to 125°C			± 1	

Over operating free-air temperature range, $V_{\text{SUPPLY}} = \pm 5 \text{ V}$, and $R_L = 100 \, \Omega$, (unless otherwise noted)⁽¹⁾

PARAMETER		TEST CONDITIONS					MIN	TYP	MAX	UNIT
Quiescent Device Current, I _{DD} Max I _O = 1mA	When V _{IS} = V _{EE} , V _{OS} = V _{CC}	V _{CC} or GND	0	6	25°C			14	μA	
					–55°C to 85°C			80		
					–55°C to 125°C			160		
	When V _{IS} = V _{CC} , V _{OS} = V _{EE}	V _{CC} or GND	-5	5	25°C			30		
					–55°C to 85°C			160		
					–55°C to 125°C			320		
CONTROL (ADDRESS OR INHIBIT), V _C										

(1) For dual-supply systems theoretical worst case ($V_I = 2.4 \text{ V}$, $V_{\text{CC}} = 5.5 \text{ V}$) specification is 1.8mA

8 Electrical Characteristics: HCT Devices

Over operating free-air temperature range, $V_{\text{SUPPLY}} = \pm 5 \text{ V}$, and $R_L = 100 \, \Omega$, (unless otherwise noted)⁽¹⁾

PARAMETER		TEST CONDITIONS					MIN	TYP	MAX	UNIT	
SIGNAL INPUTS (V _{IS}) AND OUTPUTS (V _{OS})											
		V _{IS} (V)	V _I (V)	V _{CC} (V)	V _{EE} (V)	T _A					
High Level Input Voltage	V _{IH}			4.5 to 5.5		25°C	2		V		
						–40°C to +85°C	2				
						–55°C to +125°C	2				
Low Level Input Voltage	V _{IL}					25°C	0.8		V		
						–40°C to +85°C	0.8				
						–55°C to +125°C	0.8				
"ON" Resistance IO = 1mA	R _{ON}	V _{CC} or V _{EE}	V _{IH} or V _{IL}	4.5	0	25°C	30	180	Ω		
						–40°C to +85°C	45	225			
						–55°C to +125°C	270				
		V _{CC} to V _{EE}		4.5	–4.5	25°C	135				
						–40°C to +85°C	30	170			
						–55°C to +125°C	205				
		V _{CC} or V _{EE}		4.5	0	25°C	320				
						–40°C to +85°C	85	400			
						–55°C to +125°C	480				
		V _{CC} to V _{EE}		4.5	–4.5	25°C	35	170			
						–40°C to +85°C	215				
						–55°C to +125°C	255				
"ON" Resistance Between Any Two Switches	▲ R _{ON}		VCC	4.5	0	25°C	10	Ω			
				4.5	–4.5	25°C	5			Ω	
Off-Switch Leakage Current	I _{IZ}	V _{CC} - V _{EE}	V _{IH} or V _{IL}	6	0	25°C	±0.1		μA		
						–55°C to 85°C	±1				μA
						–55°C to 125°C	±1				μA
				5	–5	25°C	±0.1		μA		
						–55°C to 85°C	±1				
						–55°C to 125°C	±1				
Input Leakage Current (Any Control)	I _{IL}		V _{CC} or GND	5.5	0	25°C	±0.1		μA		
						–55°C to 85°C	±1				
						–55°C to 125°C	±1				

Over operating free-air temperature range, $V_{\text{SUPPLY}} = \pm 5 \text{ V}$, and $R_L = 100 \Omega$, (unless otherwise noted)⁽¹⁾

PARAMETER		TEST CONDITIONS					MIN	TYP	MAX	UNIT
Quiescent Device Current	I_{CC}	When $V_{IS} = V_{EE}$, $V_{OS} = V_{CC}$, When $V_{IS} = V_{CC}$, $V_{OS} = V_{EE}$	Any voltage between V_{CC} and GND	5.5	0	25°C			8	μA
						–55°C to 85°C			80	
						–55°C to 125°C			160	
				5.5	–4.5	25°C			16	
						–55°C to 85°C			160	
						–55°C to 125°C			320	
Additional Quiescent Device Current Per Input Pin: 1 Unit Load	ΔI_{CC} (1)	$V_{CC} - 2.1$	4.5 to 5.5		25°C		100	360	μA	
					–55°C to 85°C			450		
					–55°C to 125°C			490		
CONTROL (ADDRESS OR INHIBIT), V_C										

(1) For dual-supply systems theoretical worst case ($V_{\text{I}} = 2.4\text{V}$, $V_{\text{CC}} = 5.5\text{V}$) specification is 1.8mA

9 Switching Characteristics HC

over operating free-air temperature range (unless otherwise noted)

Parameter		V _{EE} (V)	V _{CC} (V)	Test Conditions		MIN	NOM	MAX	UNIT
Propagation Delay, Switch In to Out	t_{PLH} , t_{PHL}	0	2	50pF	25°C			60	ns
		0	2		–40°C to +85°C			75	
		0	2		–55°C to +125°C			90	
		0	4.5		25°C			12	
		0	4.5		–40°C to +85°C			15	
		0	4.5		–55°C to +125°C			18	
		0	6		25°C			10	
		0	6		–40°C to +85°C			13	
		0	6		–55°C to +125°C			15	
		–4.5	4.5		25°C			8	
		–4.5	4.5		–40°C to +85°C			10	
		–4.5	4.5		–55°C to +125°C			12	

over operating free-air temperature range (unless otherwise noted)

Parameter		VEE (V)	VCC (V)	Test Conditions		MIN	NOM	MAX	UNIT
Turn "ON" Time !E to Out	tPZH, tPZL	0	2	50pF	25°C			205	ns
		0	2		–40°C to +85°C			255	
		0	2		–55°C to +125°C			310	
		0	4.5		25°C			41	
		0	4.5		–40°C to +85°C			51	
		0	4.5		–55°C to +125°C			62	
		0	6		25°C			35	
		0	6		–40°C to +85°C			43	
		0	6		–55°C to +125°C			53	
		–4.5	4.5		25°C			37	
		–4.5	4.5		–40°C to +85°C			47	
		–4.5	4.5		–55°C to +125°C			56	
		–	5	15pF	25°C			8	
Turn "ON" Time nS to Out	tPZH, tPZL	0	2	50pF	25°C			175	ns
		0	2		–40°C to +85°C			220	
		0	2		–55°C to +125°C			265	
		0	4.5		25°C			35	
		0	4.5		–40°C to +85°C			44	
		0	4.5		–55°C to +125°C			53	
		0	6		25°C			30	
		0	6		–40°C to +85°C			37	
		0	6		–55°C to +125°C			45	
		–4.5	4.5		25°C			34	
		–4.5	4.5		–40°C to +85°C			43	
		–4.5	4.5		–55°C to +125°C			51	
		–	5	15pF	25°C			14	

over operating free-air temperature range (unless otherwise noted)

Parameter		VEE (V)	VCC (V)	Test Conditions		MIN	NOM	MAX	UNIT
Turn "OFF" Time !E to Out	t_{PLZ} , t_{PHZ}	0	2	50pF	25°C			205	ns
		0	2		–40°C to +85°C			255	ns
		0	2		–55°C to +125°C			310	ns
		0	4.5		25°C			41	ns
		0	4.5		–40°C to +85°C			51	ns
		0	4.5		–55°C to +125°C			62	ns
		0	6		25°C			35	ns
		0	6		–40°C to +85°C			43	ns
		0	6		–55°C to +125°C			53	ns
		–4.5	4.5		25°C			37	ns
		–4.5	4.5		–40°C to +85°C			47	ns
		–4.5	4.5		–55°C to +125°C			56	ns
		–	5	15pF	25°C			8	ns
Turn "OFF" Time nS to Out	t_{PLZ} , t_{PHZ}	0	2	50pF	25°C			175	ns
		0	2		–40°C to +85°C			220	
		0	2		–55°C to +125°C			265	
		0	4.5		25°C			35	
		0	4.5		–40°C to +85°C			44	
		0	4.5		–55°C to +125°C			53	
		0	6		25°C			30	
		0	6		–40°C to +85°C			37	
		0	6		–55°C to +125°C			45	
		–4.5	4.5		25°C			34	
		–4.5	4.5		–40°C to +85°C			43	
		–4.5	4.5		–55°C to +125°C			51	
		–	5	15pF	25°C			14	

over operating free-air temperature range (unless otherwise noted)

Parameter		VEE (V)	VCC (V)	Test Conditions		MIN	NOM	MAX	UNIT
Input (Control) Capacitance	C _I	-	-	-	25°C			10	pF
Input (Control) Capacitance		-	-		-40°C to +85°C			10	
Input (Control) Capacitance		-	-		-55°C to +125°C			10	
Power dissipation capacitance(1)	C _{PD}	-	5		25°C		42		

10 Switching Characteristics HCT

over operating free-air temperature range (unless otherwise noted)

Parameter		VEE (V)	VCC (V)	Test Conditions		MIN	NOM	MAX	UNIT	
Propagation Delay, Switch In to Out	t _{PLH} , t _{PHL}	0	4.5	50pF	25°C			12	ns	
					−40°C to +85°C			15		
					−55°C to +125°C			18		
		−4.5	4.5		25°C			8		
					−40°C to +85°C			10		
					−55°C to +125°C			12		
Turn "ON" Time !E to Out	t _{PZH} , t _{PZL}	0	4.5	50pF	25°C			44	ns	
					−40°C to +85°C			55		
					−55°C to +125°C			66		
		−4.5	4.5		25°C			42		
					−40°C to +85°C			53		
					−55°C to +125°C			63		
		-	5	15pF	25°C		18			
		0	4.5	50pF	25°C			56		
					−40°C to +85°C			70		
					−55°C to +125°C			85		
		−4.5	4.5		25°C			42		
					−40°C to +85°C			53		
					−55°C to +125°C			63		
		-	5	15pF	25°C		24			

over operating free-air temperature range (unless otherwise noted)

Parameter		VEE (V)	VCC (V)	Test Conditions		MIN	NOM	MAX	UNIT	
Turn "ON" Time nS to Out	t _{PZH} , t _{PZL}	0	4.5	50pF	25°C			40	ns	
					–40°C to +85°C			53		
					–55°C to +125°C			60		
		–4.5	4.5		25°C			34		
					–40°C to +85°C			43		
					–55°C to +125°C			51		
		0	5	15pF	25°C			17		
		0	4.5	50pF	25°C			50		
					–40°C to +85°C			63		
					–55°C to +125°C			75		
		–4.5	4.5		25°C			34		
					–40°C to +85°C			43		
					–55°C to +125°C			51		
-	5	15pF	25°C			18				
Turn "OFF" Time !E to Out	t _{PLZ} , t _{PHZ}	0	4.5	50pF	25°C			50	ns	
					–40°C to +85°C			63		
					–55°C to +125°C			75		
		–4.5	4.5		25°C			46		
					–40°C to +85°C			58		
					–55°C to +125°C			69		
		-	5	15pF	25°C			21		
Turn "OFF" Time nS to Out	t _{PLZ} , t _{PHZ}	0	4.5	50pF	25°C			44	ns	
					–40°C to +85°C			55		
					–55°C to +125°C			66		
		–4.5	4.5		25°C			40		
					–40°C to +85°C			50		
					–55°C to +125°C			60		
		-	5	15pF	25°C			18		

over operating free-air temperature range (unless otherwise noted)

Parameter		VEE (V)	VCC (V)	Test Conditions		MIN	NOM	MAX	UNIT
Input (Control) Capacitance	C_i	-	-	-	25°C			10	pF
		-	-	-	-40°C to +85°C			10	
		-	-	-	-55°C to +125°C			10	
Power dissipation capacitance(1)	C_{PD}	-	5	-	25°C		47		

11 Analog Channel Specifications

over operating free-air temperature range (unless otherwise noted)

Parameter	Test Conditions		HC, HCT TYPES	V _{CC} (V)	MIN	NOM	MAX	UNIT
f_{MAX} Minimum switch frequency response at -3 dB			HC	4.5		200		MHz
			HCT	4.5		200		
THD Sine-wave distortion	1kHz, $V_{IS} = 4V_{P-P}$		HC	4.5		0.078		%
	1kHz, $V_{IS} = 8V_{P-P}$			9		0.018		
	1kHz, $V_{IS} = 4V_{P-P}$		HCT	4.5		0.078		
	1kHz, $V_{IS} = 8V_{P-P}$			9		0.018		
Switch "OFF" Signal Feedthrough			HC	4.5		-62		dB
			HCT	4.5		-62		
Switch Input Capacitance, C_S			HC	-		5		pF
			HCT	-		5		

12 HCT Input Loading Table

INPUT	UNIT LOADS ⁽¹⁾
All	0.5

(1) Unit Load is ΔI_{CC} limit specified in DC Electrical Table, e.g., 360 μ A max at 25°C

13 Recommended Operating Area as a Function of Supply Voltage

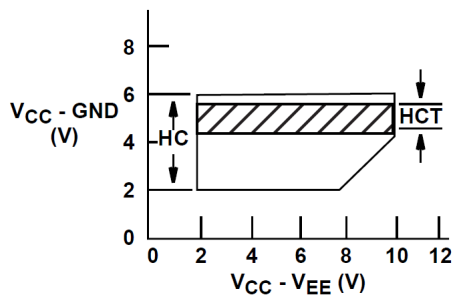


図 13-1.

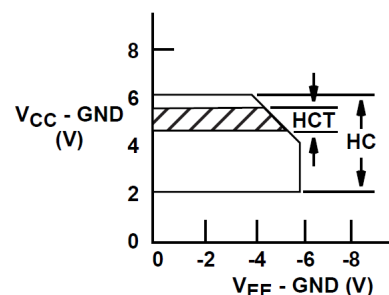


図 13-2.

14 Typical Performance Curves

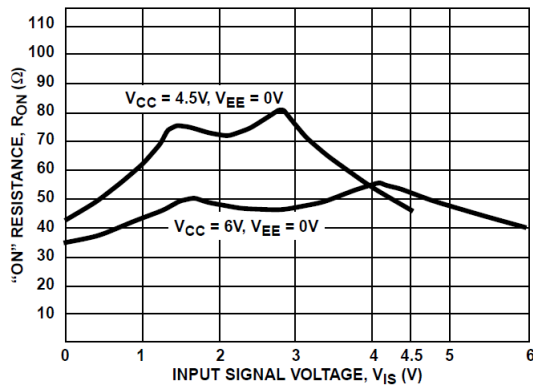


Figure 14-1. Typical On Resistance vs Input Signal Voltage

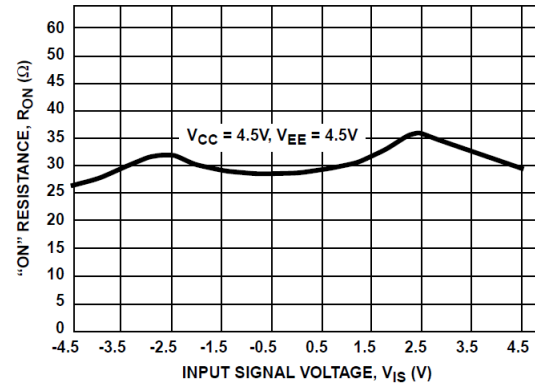


Figure 14-2. Typical On Resistance vs Input Signal Voltage

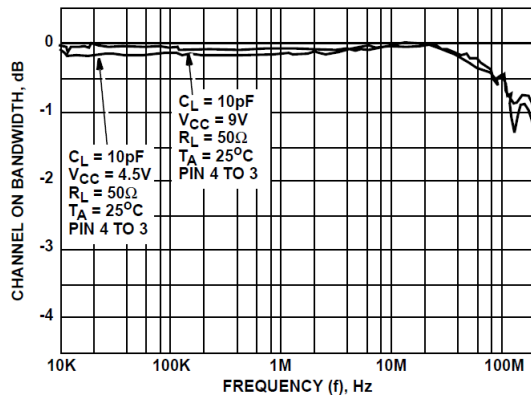


Figure 14-3. Switch Frequency Response

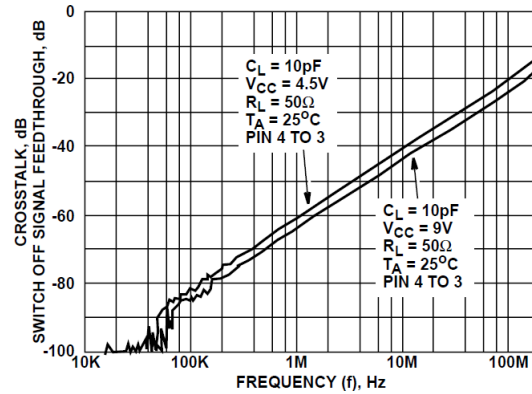


Figure 14-4. Switch-Off Signal Feedthrough and Crosstalk vs Frequency

15 Parameter Measurement Information

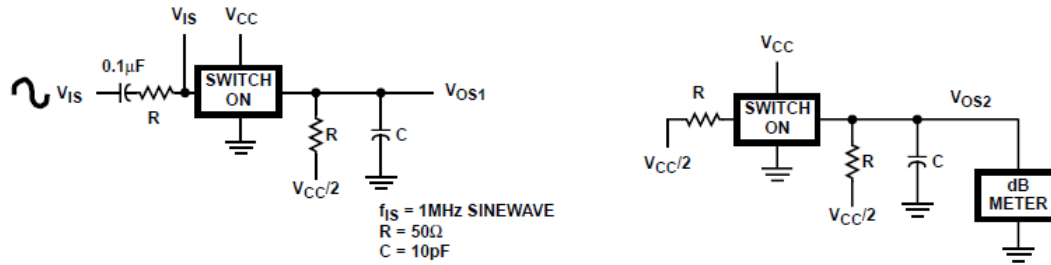


図 15-1. Crosstalk Between Two Switches Test Circuit

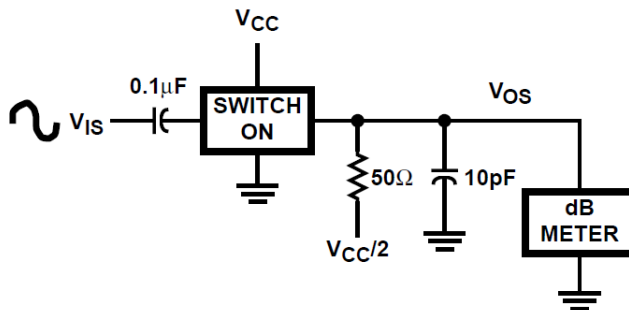


図 15-2. Frequency Response Test Circuit

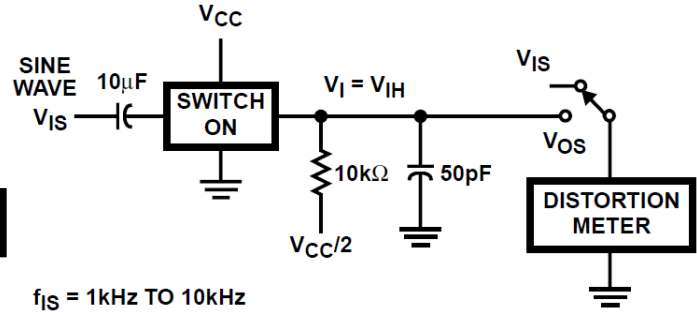


図 15-3. Total Harmonic Distortion Test Circuit

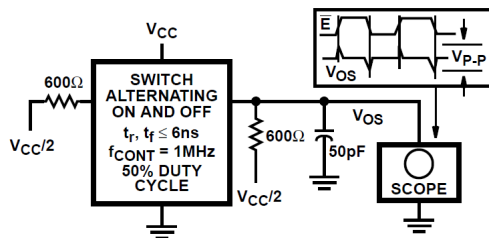


図 15-4. Control-To-Switch Feedthrough Noise Test Circuit

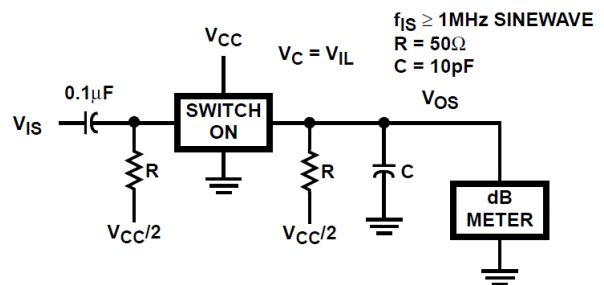


図 15-5. Switch Off Signal Feedthrough

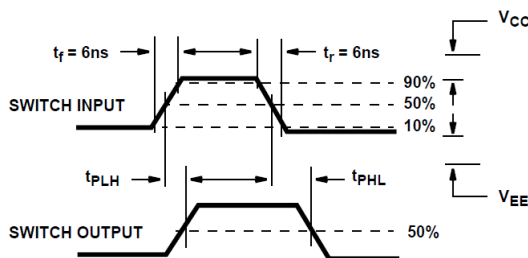


図 15-6. Switch Propagation Delay Times

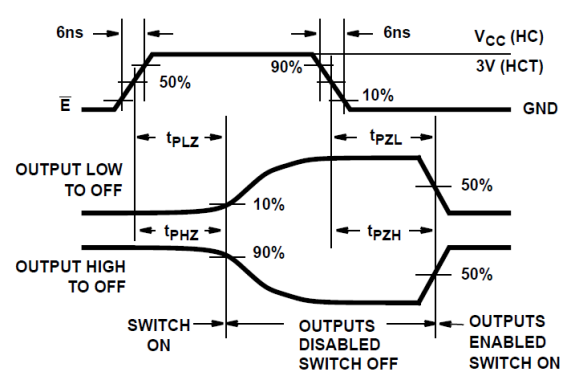
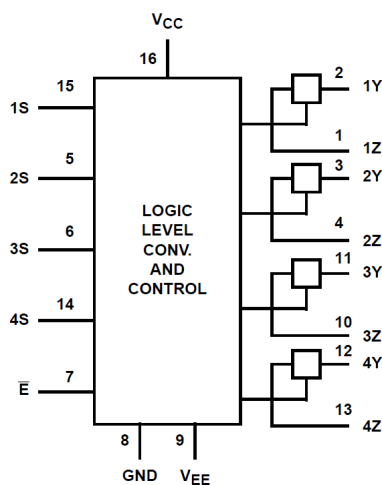


図 15-7. Switch Turn-On and Turn-Off Propagation Delay Times Waveforms

16 Detailed Description

16.1 Functional Block Diagram



16.2 Device Functional Modes

表 16-1. Truth Table ⁽¹⁾

INPUTS		SWITCH
E	S	
L	L	OFF
L	H	ON
H	X	OFF

(1) H = High Level Voltage, L = Low Level Voltage, X = Do not Care

17 Device and Documentation Support

TI offers an extensive line of development tools. Tools and software to evaluate the performance of the device, generate code, and develop solutions are listed below.

17.1 ドキュメントの更新通知を受け取る方法

ドキュメントの更新についての通知を受け取るには、www.tij.co.jp のデバイス製品フォルダを開いてください。[通知] をクリックして登録すると、変更されたすべての製品情報に関するダイジェストを毎週受け取ることができます。変更の詳細については、改訂されたドキュメントに含まれている改訂履歴をご覧ください。

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17.5 用語集

[テキサス・インスツルメンツ用語集](#) この用語集には、用語や略語の一覧および定義が記載されています。

18 Revision History

資料番号末尾の英字は改訂を表しています。その改訂履歴は英語版に準じています。

Changes from Revision D (October 2003) to Revision E (July 2024)	Page
• ドキュメント全体にわたって表、図、相互参照の採番方法を更新.....	1
• Updated thermal information.....	5
• Updated electrical specifications.....	6
• Updated switching specifications.....	10
• Updated analog channel specifications.....	15
• Updated orderable information.....	19

19 Mechanical, Packaging, and Orderable Information

The following pages include mechanical, packaging, and orderable information. This information is the most current data available for the designated devices. This data is subject to change without notice and revision of this document. For browser-based versions of this data sheet, refer to the left-hand navigation.

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PACKAGING INFORMATION

Orderable part number	Status (1)	Material type (2)	Package Pins	Package qty Carrier	RoHS (3)	Lead finish/ Ball material (4)	MSL rating/ Peak reflow (5)	Op temp (°C)	Part marking (6)
CD54HC4316F3A	Active	Production	CDIP (J) 16	25 TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	CD54HC4316F3A
CD54HC4316F3A.A	Active	Production	CDIP (J) 16	25 TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	CD54HC4316F3A
CD74HC4316E	NRND	Production	PDIP (N) 16	25 TUBE	Yes	NIPDAU	N/A for Pkg Type	-55 to 125	CD74HC4316E
CD74HC4316E.A	NRND	Production	PDIP (N) 16	25 TUBE	Yes	NIPDAU	N/A for Pkg Type	-55 to 125	CD74HC4316E
CD74HC4316M	Obsolete	Production	SOIC (D) 16	-	-	Call TI	Call TI	-55 to 125	HC4316M
CD74HC4316M96	Active	Production	SOIC (D) 16	2500 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-55 to 125	HC4316M
CD74HC4316M96.A	Active	Production	SOIC (D) 16	2500 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-55 to 125	HC4316M
CD74HC4316NSR	NRND	Production	SOP (NS) 16	2000 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-55 to 125	HC4316M
CD74HC4316NSR.A	NRND	Production	SOP (NS) 16	2000 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-55 to 125	HC4316M
CD74HC4316PW	Obsolete	Production	TSSOP (PW) 16	-	-	Call TI	Call TI	-55 to 125	HJ4316
CD74HC4316PWR	Active	Production	TSSOP (PW) 16	2000 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-55 to 125	HJ4316
CD74HC4316PWR.A	Active	Production	TSSOP (PW) 16	2000 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-55 to 125	HJ4316
CD74HCT4316E	NRND	Production	PDIP (N) 16	25 TUBE	Yes	NIPDAU	N/A for Pkg Type	-55 to 125	CD74HCT4316E
CD74HCT4316E.A	NRND	Production	PDIP (N) 16	25 TUBE	Yes	NIPDAU	N/A for Pkg Type	-55 to 125	CD74HCT4316E
CD74HCT4316M	NRND	Production	SOIC (D) 16	40 TUBE	Yes	NIPDAU	Level-1-260C-UNLIM	-55 to 125	HCT4316M
CD74HCT4316M.A	NRND	Production	SOIC (D) 16	40 TUBE	Yes	NIPDAU	Level-1-260C-UNLIM	-55 to 125	HCT4316M
CD74HCT4316M96	NRND	Production	SOIC (D) 16	2500 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-55 to 125	HCT4316M
CD74HCT4316M96.A	NRND	Production	SOIC (D) 16	2500 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-55 to 125	HCT4316M

⁽¹⁾ **Status:** For more details on status, see our [product life cycle](#).

⁽²⁾ **Material type:** When designated, preproduction parts are prototypes/experimental devices, and are not yet approved or released for full production. Testing and final process, including without limitation quality assurance, reliability performance testing, and/or process qualification, may not yet be complete, and this item is subject to further changes or possible discontinuation. If available for ordering, purchases will be subject to an additional waiver at checkout, and are intended for early internal evaluation purposes only. These items are sold without warranties of any kind.

⁽³⁾ **RoHS values:** Yes, No, RoHS Exempt. See the [TI RoHS Statement](#) for additional information and value definition.

⁽⁴⁾ **Lead finish/Ball material:** Parts may have multiple material finish options. Finish options are separated by a vertical ruled line. Lead finish/Ball material values may wrap to two lines if the finish value exceeds the maximum column width.

⁽⁵⁾ **MSL rating/Peak reflow:** The moisture sensitivity level ratings and peak solder (reflow) temperatures. In the event that a part has multiple moisture sensitivity ratings, only the lowest level per JEDEC standards is shown. Refer to the shipping label for the actual reflow temperature that will be used to mount the part to the printed circuit board.

⁽⁶⁾ **Part marking:** There may be an additional marking, which relates to the logo, the lot trace code information, or the environmental category of the part.

Multiple part markings will be inside parentheses. Only one part marking contained in parentheses and separated by a "~" will appear on a part. If a line is indented then it is a continuation of the previous line and the two combined represent the entire part marking for that device.

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OTHER QUALIFIED VERSIONS OF CD54HC4316, CD74HC4316 :

- Catalog : [CD74HC4316](#)
- Military : [CD54HC4316](#)

NOTE: Qualified Version Definitions:

- Catalog - TI's standard catalog product
- Military - QML certified for Military and Defense Applications

TAPE AND REEL INFORMATION



*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
CD74HC4316M96	SOIC	D	16	2500	330.0	16.4	6.5	10.3	2.1	8.0	16.0	Q1
CD74HC4316NSR	SOP	NS	16	2000	330.0	16.4	8.1	10.4	2.5	12.0	16.0	Q1
CD74HC4316PWR	TSSOP	PW	16	2000	330.0	12.4	6.9	5.6	1.6	8.0	12.0	Q1
CD74HCT4316M96	SOIC	D	16	2500	330.0	16.4	6.5	10.3	2.1	8.0	16.0	Q1

TAPE AND REEL BOX DIMENSIONS



*All dimensions are nominal

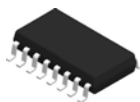
Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
CD74HC4316M96	SOIC	D	16	2500	353.0	353.0	32.0
CD74HC4316NSR	SOP	NS	16	2000	353.0	353.0	32.0
CD74HC4316PWR	TSSOP	PW	16	2000	353.0	353.0	32.0
CD74HCT4316M96	SOIC	D	16	2500	340.5	336.1	32.0

TUBE



*All dimensions are nominal

Device	Package Name	Package Type	Pins	SPQ	L (mm)	W (mm)	T (μm)	B (mm)
CD74HC4316E	N	PDIP	16	25	506	13.97	11230	4.32
CD74HC4316E	N	PDIP	16	25	506	13.97	11230	4.32
CD74HC4316E.A	N	PDIP	16	25	506	13.97	11230	4.32
CD74HC4316E.A	N	PDIP	16	25	506	13.97	11230	4.32
CD74HCT4316E	N	PDIP	16	25	506	13.97	11230	4.32
CD74HCT4316E	N	PDIP	16	25	506	13.97	11230	4.32
CD74HCT4316E.A	N	PDIP	16	25	506	13.97	11230	4.32
CD74HCT4316E.A	N	PDIP	16	25	506	13.97	11230	4.32
CD74HCT4316M	D	SOIC	16	40	507	8	3940	4.32
CD74HCT4316M.A	D	SOIC	16	40	507	8	3940	4.32

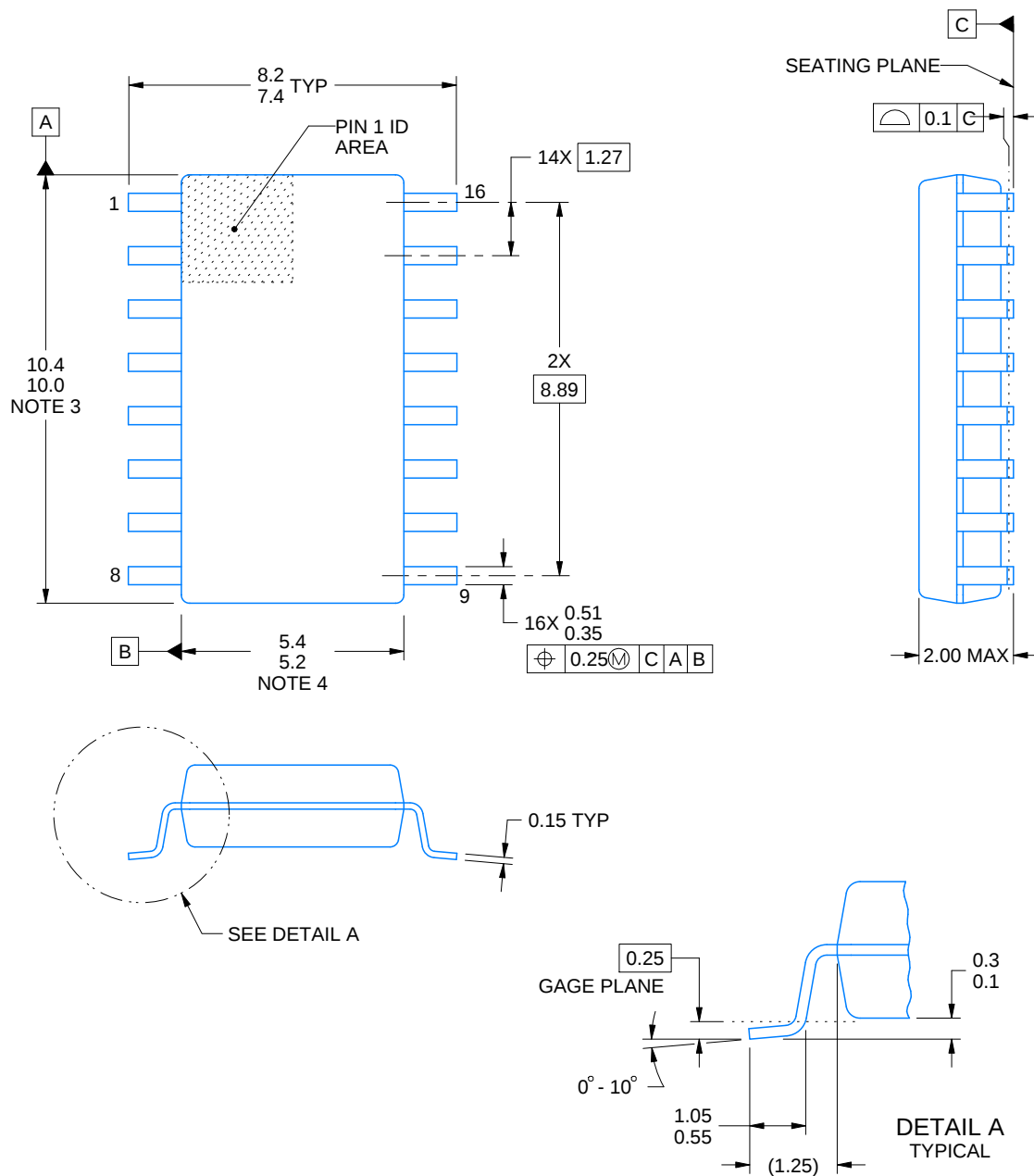


PACKAGE OUTLINE

NS0016A

SOP - 2.00 mm max height

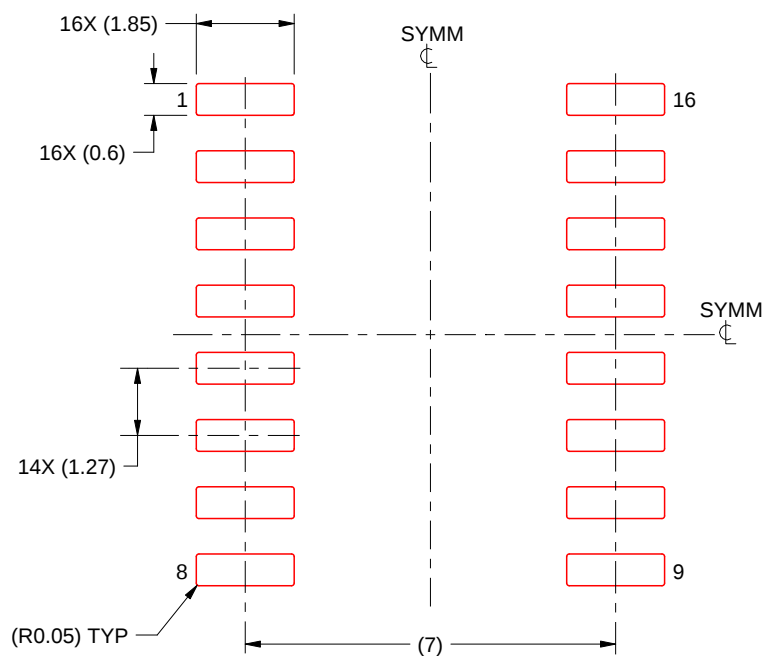
SOP



4220735/A 12/2021

NOTES:

1. All linear dimensions are in millimeters. Dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. This dimension does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0.15 mm, per side.
4. This dimension does not include interlead flash. Interlead flash shall not exceed 0.25 mm, per side.



SOLDER PASTE EXAMPLE
 BASED ON 0.125 mm THICK STENCIL
 SCALE:7X

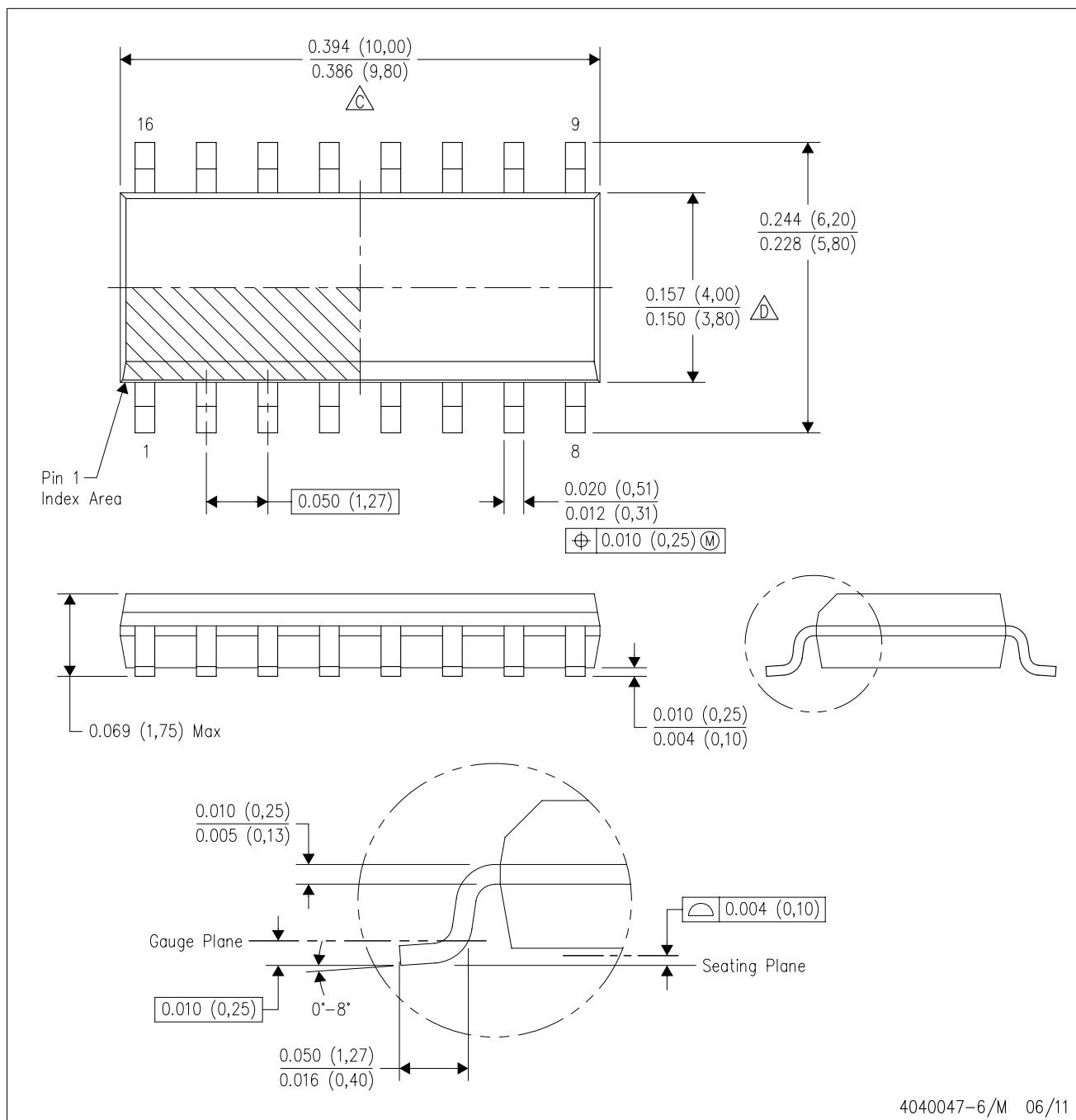
4220735/A 12/2021

NOTES: (continued)

7. Laser cutting apertures with trapezoidal walls and rounded corners may offer better paste release. IPC-7525 may have alternate design recommendations.
8. Board assembly site may have different recommendations for stencil design.

D (R-PDSO-G16)

PLASTIC SMALL OUTLINE



4040047-6/M 06/11

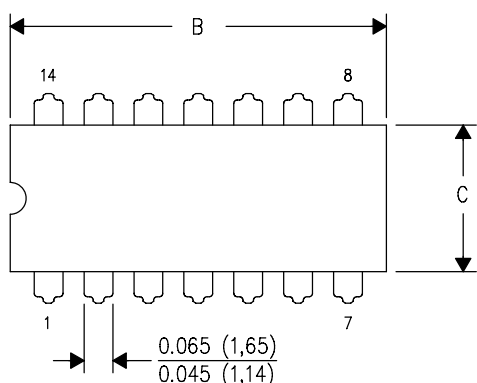
NOTES:

- A. All linear dimensions are in inches (millimeters).
- B. This drawing is subject to change without notice.
- C. Body length does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0.006 (0,15) each side.
- D. Body width does not include interlead flash. Interlead flash shall not exceed 0.017 (0,43) each side.
- E. Reference JEDEC MS-012 variation AC.

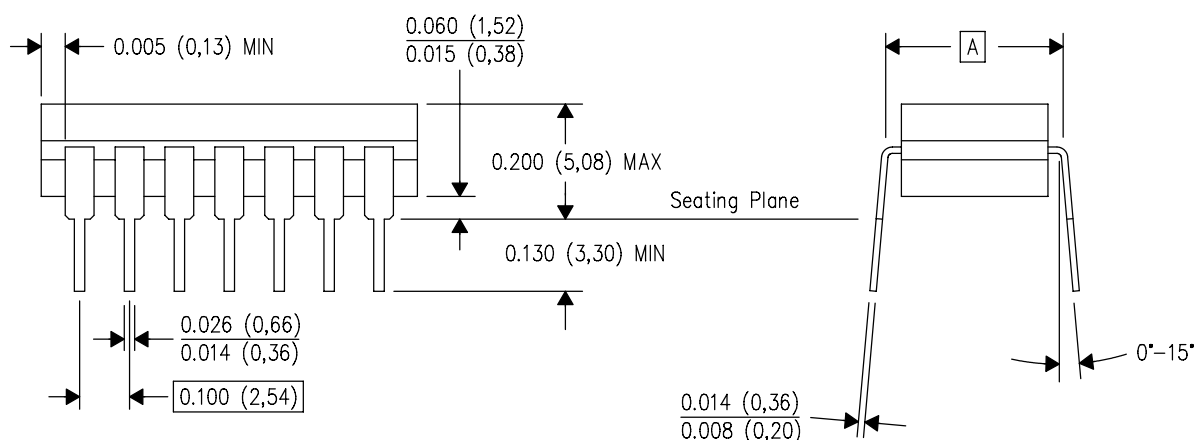
J (R-GDIP-T**)

14 LEADS SHOWN

CERAMIC DUAL IN-LINE PACKAGE

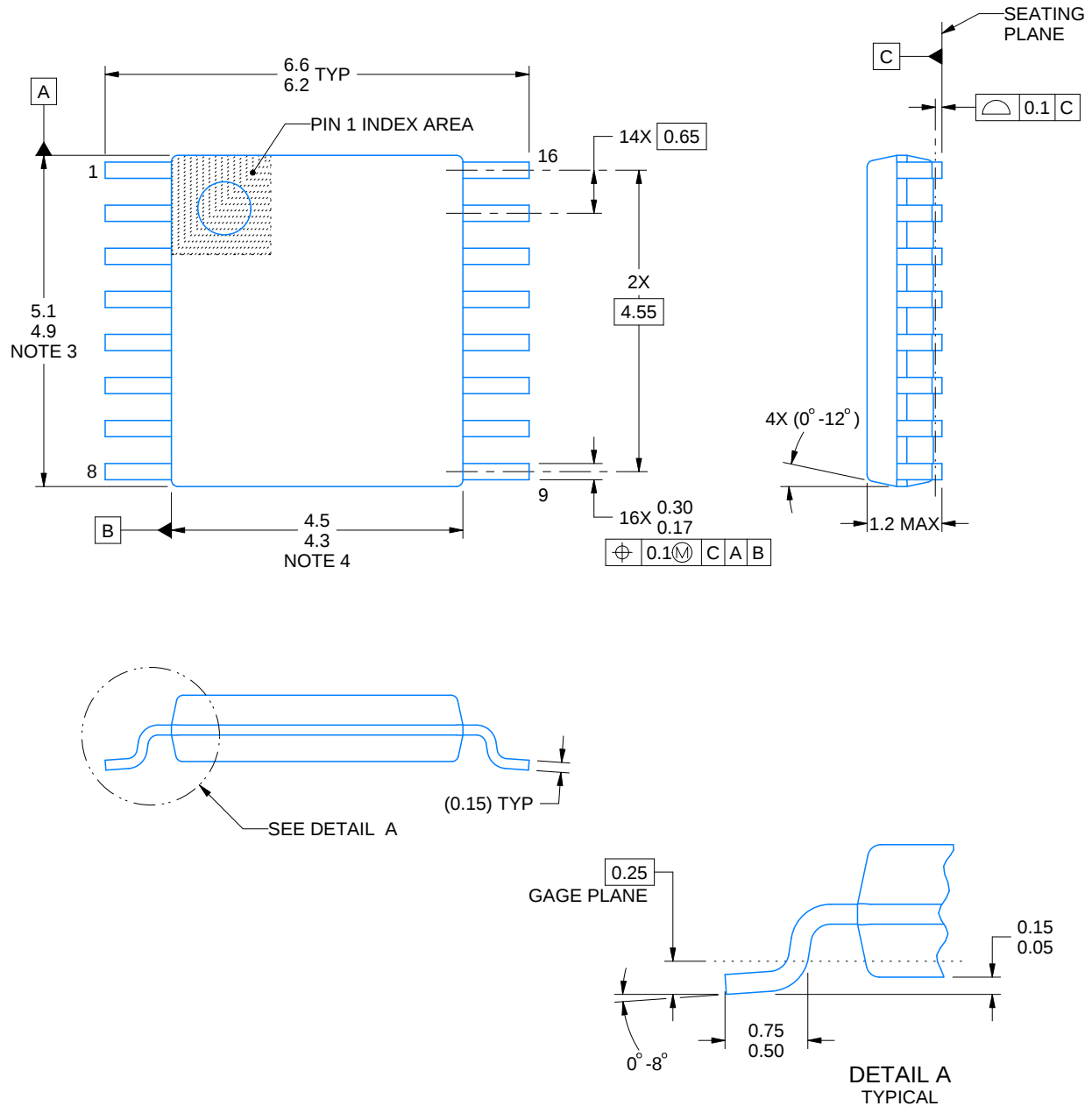
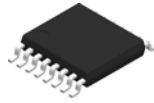


PINS ** DIM	14	16	18	20
A	0.300 (7,62) BSC	0.300 (7,62) BSC	0.300 (7,62) BSC	0.300 (7,62) BSC
B MAX	0.785 (19,94)	.840 (21,34)	0.960 (24,38)	1.060 (26,92)
B MIN	—	—	—	—
C MAX	0.300 (7,62)	0.300 (7,62)	0.310 (7,87)	0.300 (7,62)
C MIN	0.245 (6,22)	0.245 (6,22)	0.220 (5,59)	0.245 (6,22)



4040083/F 03/03

- NOTES:
- A. All linear dimensions are in inches (millimeters).
 - B. This drawing is subject to change without notice.
 - C. This package is hermetically sealed with a ceramic lid using glass frit.
 - D. Index point is provided on cap for terminal identification only on press ceramic glass frit seal only.
 - E. Falls within MIL STD 1835 GDIP1-T14, GDIP1-T16, GDIP1-T18 and GDIP1-T20.



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NOTES:

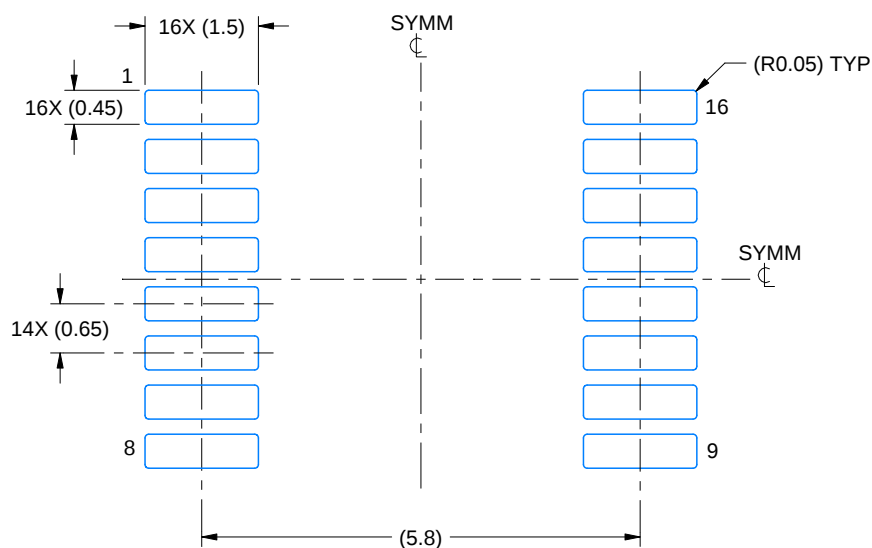
1. All linear dimensions are in millimeters. Any dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. This dimension does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0.15 mm per side.
4. This dimension does not include interlead flash. Interlead flash shall not exceed 0.25 mm per side.
5. Reference JEDEC registration MO-153.

EXAMPLE BOARD LAYOUT

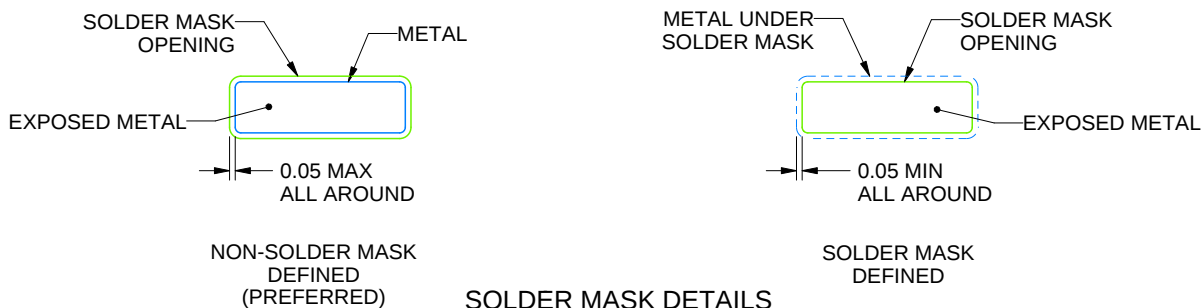
PW0016A

TSSOP - 1.2 mm max height

SMALL OUTLINE PACKAGE



LAND PATTERN EXAMPLE
EXPOSED METAL SHOWN
SCALE: 10X



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NOTES: (continued)

6. Publication IPC-7351 may have alternate designs.

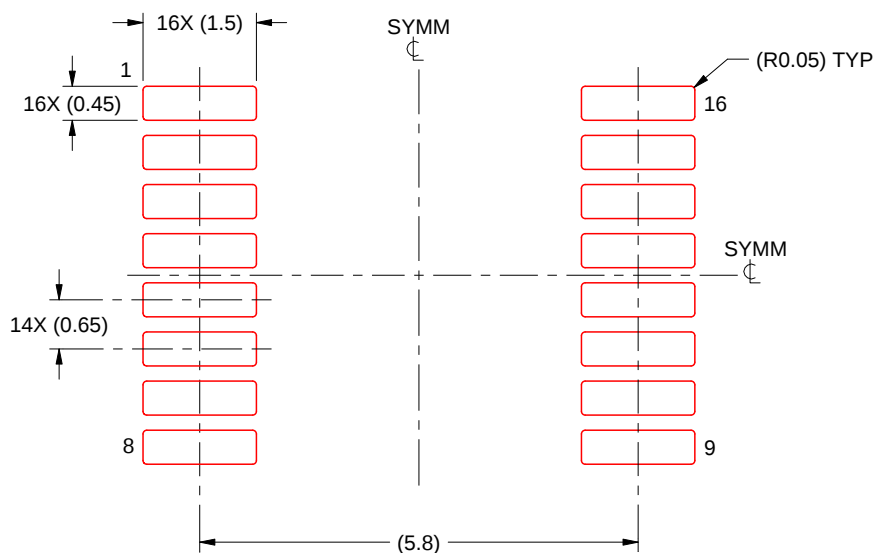
7. Solder mask tolerances between and around signal pads can vary based on board fabrication site.

EXAMPLE STENCIL DESIGN

PW0016A

TSSOP - 1.2 mm max height

SMALL OUTLINE PACKAGE



SOLDER PASTE EXAMPLE
BASED ON 0.125 mm THICK STENCIL
SCALE: 10X

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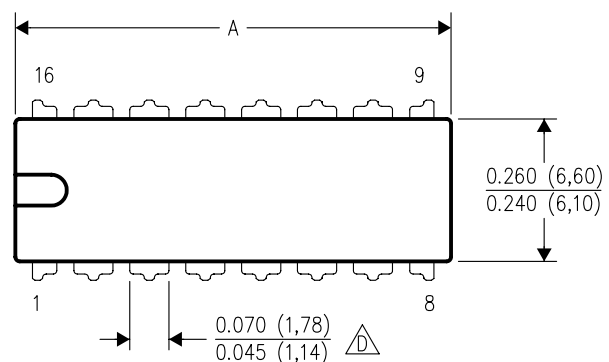
NOTES: (continued)

8. Laser cutting apertures with trapezoidal walls and rounded corners may offer better paste release. IPC-7525 may have alternate design recommendations.
9. Board assembly site may have different recommendations for stencil design.

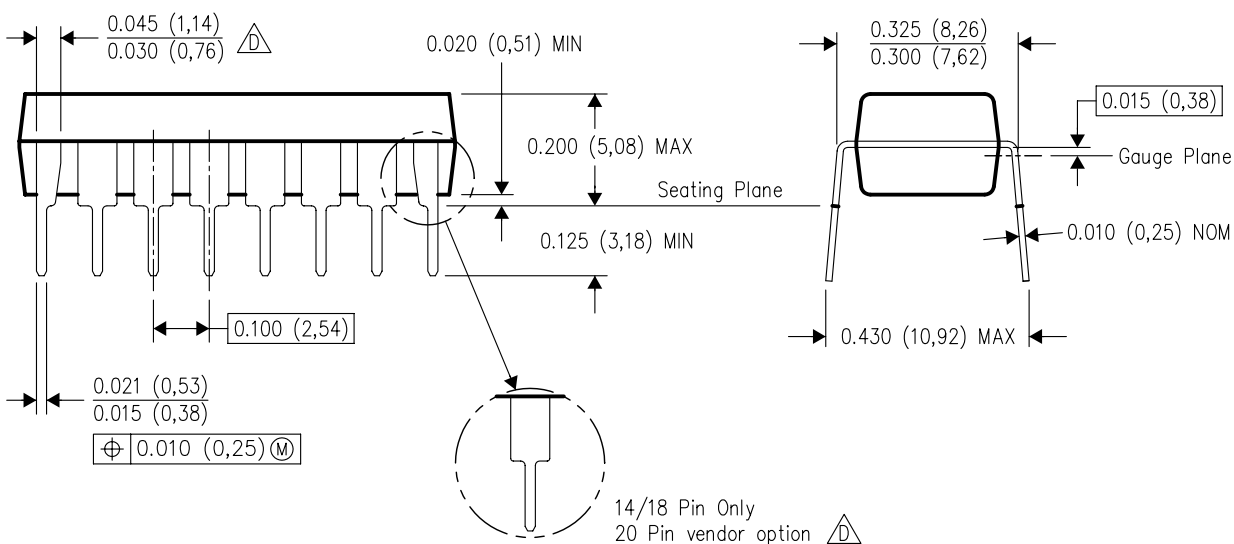
N (R-PDIP-T**)

16 PINS SHOWN

PLASTIC DUAL-IN-LINE PACKAGE



PINS ** DIM	14	16	18	20
A MAX	0.775 (19,69)	0.775 (19,69)	0.920 (23,37)	1.060 (26,92)
A MIN	0.745 (18,92)	0.745 (18,92)	0.850 (21,59)	0.940 (23,88)
MS-001 VARIATION	AA	BB	AC	AD



4040049/E 12/2002

NOTES:

- A. All linear dimensions are in inches (millimeters).
B. This drawing is subject to change without notice.
-  Falls within JEDEC MS-001, except 18 and 20 pin minimum body length (Dim A).
 The 20 pin end lead shoulder width is a vendor option, either half or full width.

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