

# CD54/74HC540, CD74HCT540, CD54/74HC541, CD54/74HCT541

## High-Speed CMOS Logic Octal Buffer and Line Drivers, Three-State

### Features

- 'HC540, CD74HCT540 ..... Inverting
- 'HC541, 'HCT541 ..... Non-Inverting
- Buffered Inputs
- Three-State Outputs
- Bus Line Driving Capability
- Typical Propagation Delay = 9ns at  $V_{CC} = 5V$ ,  
 $C_L = 15pF$ ,  $T_A = 25^{\circ}C$
- Fanout (Over Temperature Range)
  - Standard Outputs ..... 10 LSTTL Loads
  - Bus Driver Outputs ..... 15 LSTTL Loads
- Wide Operating Temperature Range ...  $-55^{\circ}C$  to  $125^{\circ}C$
- Balanced Propagation Delay and Transition Times
- Significant Power Reduction Compared to LSTTL Logic ICs
- HC Types
  - 2V to 6V Operation
  - High Noise Immunity:  $N_{IL} = 30\%$ ,  $N_{IH} = 30\%$  of  $V_{CC}$  at  $V_{CC} = 5V$
- HCT Types
  - 4.5V to 5.5V Operation
  - Direct LSTTL Input Logic Compatibility,  $V_{IL} = 0.8V$  (Max),  $V_{IH} = 2V$  (Min)
  - CMOS Input Compatibility,  $I_I \leq 1\mu A$  at  $V_{OL}$ ,  $V_{OH}$

### Description

The 'HC540 and CD74HCT540 are Inverting Octal Buffers and Line Drivers with Three-State Outputs and the capability to drive 15 LSTTL loads. The 'HC541 and 'HCT541 are Non-Inverting Octal Buffers and Line Drivers with Three-State Outputs that can drive 15 LSTTL loads. The Output Enables ( $\overline{OE1}$ ) and ( $\overline{OE2}$ ) control the Three-State Outputs. If either  $\overline{OE1}$  or  $\overline{OE2}$  is HIGH the outputs will be in the high impedance state. For data output  $\overline{OE1}$  and  $\overline{OE2}$  both must be LOW.

### Ordering Information

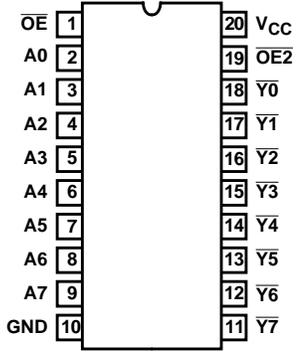
PART NUMBER	TEMP. RANGE ( $^{\circ}C$ )	PACKAGE
CD54HC540F3A	-55 to 125	20 Ld CERDIP
CD54HC541F3A	-55 to 125	20 Ld CERDIP
CD54HCT541F3A	-55 to 125	20 Ld CERDIP
CD74HC540E	-55 to 125	20 Ld PDIP
CD74HC540M	-55 to 125	20 Ld SOIC
CD74HC540M96	-55 to 125	20 Ld SOIC
CD74HC541E	-55 to 125	20 Ld PDIP
CD74HC541M	-55 to 125	20 Ld SOIC
CD74HC541M96	-55 to 125	20 Ld SOIC
CD74HC541PW	-55 to 125	20 Ld TSSOP
CD74HC541PWR	-55 to 125	20 Ld TSSOP
CD74HCT540E	-55 to 125	20 Ld PDIP
CD74HCT540M	-55 to 125	20 Ld SOIC
CD74HCT540M96	-55 to 125	20 Ld SOIC
CD74HCT541E	-55 to 125	20 Ld PDIP
CD74HCT541M	-55 to 125	20 Ld SOIC
CD74HCT541M96	-55 to 125	20 Ld SOIC

NOTE: When ordering, use the entire part number. The suffix 96 denotes tape and reel.

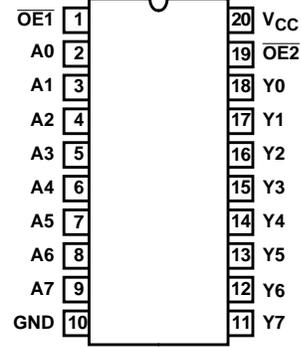
**CD54/74HC540, CD74HCT540, CD54/74HC541, CD54/74HCT541**

**Pinouts**

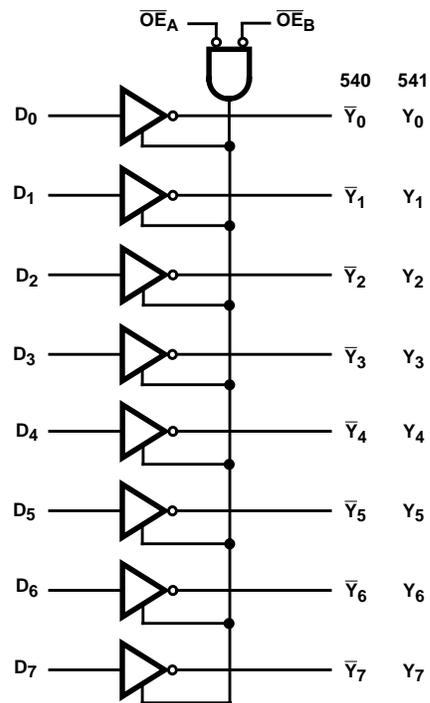
CD54HC540  
(CERDIP)  
CD74HC540, CD74HCT540  
(PDIP, SOIC)  
TOP VIEW



CD54HC541, CD54HCT541  
(CERDIP)  
CD74HC541  
(PDIP, SOIC, TSSOP)  
CD74HCT541  
(PDIP, SOIC)  
TOP VIEW



**Functional Diagram**



**CD54/74HC540, CD74HCT540, CD54/74HC541, CD54/74HCT541**

**TRUTH TABLE**

INPUTS			OUTPUTS	
$\overline{OE1}$	$\overline{OE2}$	An	540	541
L	L	H	L	H
H	X	X	Z	Z
X	H	X	Z	Z
L	L	L	H	L

H = HIGH Voltage Level

L = LOW Voltage Level

X = Don't Care

Z = High Impedance

# CD54/74HC540, CD74HCT540, CD54/74HC541, CD54/74HCT541

## Absolute Maximum Ratings

DC Supply Voltage, $V_{CC}$ .....	-0.5V to 7V
DC Input Diode Current, $I_{IK}$	
For $V_I < -0.5V$ or $V_I > V_{CC} + 0.5V$ .....	$\pm 20mA$
DC Output Diode Current, $I_{OK}$	
For $V_O < -0.5V$ or $V_O > V_{CC} + 0.5V$ .....	$\pm 20mA$
DC Drain Current, per Output, $I_O$	
For $-0.5V < V_O < V_{CC} + 0.5V$ .....	$\pm 35mA$
DC Output Source or Sink Current per Output Pin, $I_O$	
For $V_O > -0.5V$ or $V_O < V_{CC} + 0.5V$ .....	$\pm 25mA$
DC $V_{CC}$ or Ground Current, $I_{CC}$ .....	$\pm 50mA$

## Thermal Information

Thermal Resistance (Typical, Note 1)	$\theta_{JA}$ (°C/W)
E (PDIP) Package .....	69
M (SOIC) Package .....	58
PW (TSSOP) Package .....	83
Maximum Junction Temperature .....	150°C
Maximum Storage Temperature Range .....	-65°C to 150°C
Maximum Lead Temperature (Soldering 10s) .....	300°C
(SOIC - Lead Tips Only)	

## Operating Conditions

Temperature Range, $T_A$ .....	-55°C to 125°C
Supply Voltage Range, $V_{CC}$	
HC Types .....	.2V to 6V
HCT Types .....	4.5V to 5.5V
DC Input or Output Voltage, $V_I, V_O$ .....	0V to $V_{CC}$
Input Rise and Fall Time	
2V .....	1000ns (Max)
4.5V .....	500ns (Max)
6V .....	400ns (Max)

**CAUTION:** Stresses above those listed in "Absolute Maximum Ratings" may cause permanent damage to the device. This is a stress only rating and operation of the device at these or any other conditions above those indicated in the operational sections of this specification is not implied.

### NOTE:

- The package thermal impedance is calculated in accordance with JESD 51-7.

## DC Electrical Specifications

PARAMETER	SYMBOL	TEST CONDITIONS		$V_{CC}$ (V)	25°C			-40°C TO 85°C		-55°C TO 125°C		UNITS	
		$V_I$ (V)	$I_O$ (mA)		MIN	TYP	MAX	MIN	MAX	MIN	MAX		
<b>HC TYPES</b>													
High Level Input Voltage	$V_{IH}$	-	-	2	1.5	-	-	1.5	-	1.5	-	V	
				4.5	3.15	-	-	3.15	-	3.15	-	V	
				6	4.2	-	-	4.2	-	4.2	-	V	
Low Level Input Voltage	$V_{IL}$	-	-	2	-	-	0.5	-	0.5	-	0.5	V	
				4.5	-	-	1.35	-	1.35	-	1.35	V	
				6	-	-	1.8	-	1.8	-	1.8	V	
High Level Output Voltage CMOS Loads	$V_{OH}$	$V_{IH}$ or $V_{IL}$	-0.02	-0.02	2	1.9	-	-	1.9	-	1.9	-	V
			-0.02	-0.02	4.5	4.4	-	-	4.4	-	4.4	-	V
			-0.02	-0.02	6	5.9	-	-	5.9	-	5.9	-	V
High Level Output Voltage TTL Loads	$V_{OH}$	$V_{IH}$ or $V_{IL}$	-	-	-	-	-	-	-	-	-	V	
			-6	-6	4.5	3.98	-	-	3.84	-	3.7	-	V
			-7.8	-7.8	6	5.48	-	-	5.34	-	5.2	-	V
Low Level Output Voltage CMOS Loads	$V_{OL}$	$V_{IH}$ or $V_{IL}$	0.02	0.02	2	-	-	0.1	-	0.1	-	0.1	V
			0.02	0.02	4.5	-	-	0.1	-	0.1	-	0.1	V
			0.02	0.02	6	-	-	0.1	-	0.1	-	0.1	V
Low Level Output Voltage TTL Loads	$V_{OL}$	$V_{IH}$ or $V_{IL}$	-	-	-	-	-	-	-	-	-	V	
			6	6	4.5	-	-	0.26	-	0.33	-	0.4	V
			7.8	7.8	6	-	-	0.26	-	0.33	-	0.4	V
Input Leakage Current	$I_I$	$V_{CC}$ or GND	-	-	6	-	-	$\pm 0.1$	-	$\pm 1$	-	$\pm 1$	$\mu A$

**CD54/74HC540, CD74HCT540, CD54/74HC541, CD54/74HCT541**

**DC Electrical Specifications (Continued)**

PARAMETER	SYMBOL	TEST CONDITIONS		V <sub>CC</sub> (V)	25°C			-40°C TO 85°C		-55°C TO 125°C		UNITS
		V <sub>I</sub> (V)	I <sub>O</sub> (mA)		MIN	TYP	MAX	MIN	MAX	MIN	MAX	
Quiescent Device Current	I <sub>CC</sub>	V <sub>CC</sub> or GND	0	6	-	-	8	-	80	-	160	μA
Three- State Leakage Current	I <sub>OZ</sub>	V <sub>IL</sub> or V <sub>IH</sub>	V <sub>O</sub> = V <sub>CC</sub> or GND	6	-	-	±0.5	-	±5.0	-	±10	μA
<b>HCT TYPES</b>												
High Level Input Voltage	V <sub>IH</sub>	-	-	4.5 to 5.5	2	-	-	2	-	2	-	V
Low Level Input Voltage	V <sub>IL</sub>	-	-	4.5 to 5.5	-	-	0.8	-	0.8	-	0.8	V
High Level Output Voltage CMOS Loads	V <sub>OH</sub>	V <sub>IH</sub> or V <sub>IL</sub>	-0.02	4.5	4.4	-	-	4.4	-	4.4	-	V
High Level Output Voltage TTL Loads			-6	4.5	3.98	-	-	3.84	-	3.7	-	V
Low Level Output Voltage CMOS Loads	V <sub>OL</sub>	V <sub>IH</sub> or V <sub>IL</sub>	0.02	4.5	-	-	0.1	-	0.1	-	0.1	V
Low Level Output Voltage TTL Loads			6	4.5	-	-	0.26	-	0.33	-	0.4	V
Input Leakage Current	I <sub>I</sub>	V <sub>CC</sub> and GND	0	5.5	-	-	±0.1	-	±1	-	±1	μA
Quiescent Device Current	I <sub>CC</sub>	V <sub>CC</sub> or GND	0	5.5	-	-	8	-	80	-	160	μA
Three- State Leakage Current	I <sub>OZ</sub>	V <sub>IL</sub> or V <sub>IH</sub>	V <sub>O</sub> = V <sub>CC</sub> or GND	5.5	-	-	±0.5	-	±5.0	-	±10	μA
Additional Quiescent Device Current Per Input Pin: 1 Unit Load	ΔI <sub>CC</sub> (Note 2)	V <sub>CC</sub> -2.1	-	4.5 to 5.5	-	100	360	-	450	-	490	μA

NOTE:

- For dual-supply systems theoretical worst case (V<sub>I</sub> = 2.4V, V<sub>CC</sub> = 5.5V) specification is 1.8mA.

**HCT Input Loading Table**

INPUT	UNIT LOADS	
	HCT540	HCT541
A0 - A7	1	0.4
$\overline{OE}2$	0.75	0.75
$\overline{OE}1$	1.15	1.15

NOTE: Unit Load is ΔI<sub>CC</sub> limit specific in DC Electrical Specifications Table, e.g., 360μA max. at 25°C.

**CD54/74HC540, CD74HCT540, CD54/74HC541, CD54/74HCT541**

**Switching Specifications**  $C_L = 50\text{pF}$ , Input  $t_r, t_f = 6\text{ns}$

PARAMETER	SYMBOL	TEST CONDITIONS	$V_{CC}$ (V)	25°C			-40°C TO 85°C		-55°C TO 125°C		UNITS
				MIN	TYP	MAX	MIN	MAX	MIN	MAX	
<b>HC TYPES</b>											
Propagation Delay Data to Outputs (540)	$t_{PLH}, t_{PHL}$	$C_L = 50\text{pF}$	2	-	-	110	-	140	-	165	ns
			4.5	-	-	22	-	28	-	33	ns
		$C_L = 15\text{pF}$	5	-	9	-	-	-	-	-	ns
		$C_L = 50\text{pF}$	6	-	-	19	-	24	-	28	ns
Data to Outputs (541)	$t_{PLZ}, t_{PHZ}$	$C_L = 50\text{pF}$	2	-	-	115	-	145	-	175	ns
			4.5	-	-	23	-	29	-	35	ns
		$C_L = 15\text{pF}$	5	-	9	-	-	-	-	-	ns
		$C_L = 50\text{pF}$	6	-	-	20	-	25	-	30	ns
Output Enable and Disable to Outputs (540)	$t_{PLZ}, t_{PHZ}$	$C_L = 50\text{pF}$	2	-	-	160	-	200	-	240	ns
			4.5	-	-	32	-	40	-	48	ns
		$C_L = 15\text{pF}$	5	-	13	-	-	-	-	-	ns
		$C_L = 50\text{pF}$	6	-	-	27	-	34	-	41	ns
Output Enable and Disable to Outputs (541)	$t_{PLZ}, t_{PHZ}$	$C_L = 50\text{pF}$	2	-	-	160	-	200	-	240	ns
			4.5	-	-	32	-	40	-	48	ns
		$C_L = 15\text{pF}$	5	-	14	-	-	-	-	-	ns
		$C_L = 50\text{pF}$	6	-	-	23	-	29	-	35	ns
Output Transition Time	$t_{THL}, t_{TLH}$	$C_L = 50\text{pF}$	2	-	-	60	-	75	-	90	ns
			4.5	-	-	12	-	15	-	18	ns
			6	-	-	10	-	13	-	15	ns
Input Capacitance	$C_I$	$C_L = 50\text{pF}$	-	10	-	10	-	10	-	10	pF
Three-State Output Capacitance	$C_O$	-	-	20	-	20	-	20	-	20	pF
Power Dissipation Capacitance (Notes 3, 4) (540)	$C_{PD}$	$C_L = 15\text{pF}$	5	-	50	-	-	-	-	-	pF
Power Dissipation Capacitance (Notes 3, 4) (541)	$C_{PD}$	$C_L = 15\text{pF}$	5	-	48	-	-	-	-	-	pF
<b>HCT TYPES</b>											
Propagation Delay Data to Outputs (540)	$t_{PHL}, t_{PLH}$	$C_L = 50\text{pF}$	4.5	-	-	24	-	30	-	36	ns
		$C_L = 15\text{pF}$	5	-	9	-	-	-	-	-	ns
Data to Outputs (541)	$t_{PHL}, t_{PLH}$	$C_L = 50\text{pF}$	4.5	-	-	28	-	35	-	42	ns
		$C_L = 15\text{pF}$	5	-	11	-	-	-	-	-	ns
Output Enable and Disable to Outputs (540, 541)	$t_{PLZ}, t_{PHZ}$	$C_L = 50\text{pF}$	4.5	-	-	35	-	44	-	53	ns
		$C_L = 15\text{pF}$	5	-	14	-	-	-	-	-	ns
Output Transition Time	$t_{TLH}, t_{THL}$	$C_L = 50\text{pF}$	4.5	-	-	12	-	15	-	18	ns
Input Capacitance	$C_I$	$C_L = 50\text{pF}$	-	10	-	10	-	10	-	10	pF

# CD54/74HC540, CD74HCT540, CD54/74HC541, CD54/74HCT541

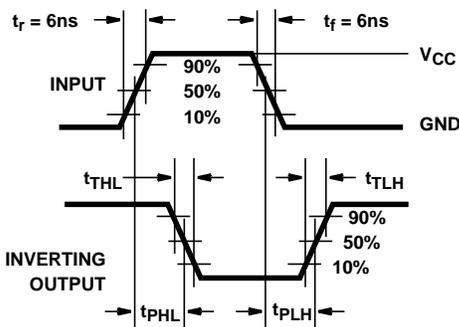
## Switching Specifications $C_L = 50\text{pF}$ , Input $t_r, t_f = 6\text{ns}$ (Continued)

PARAMETER	SYMBOL	TEST CONDITIONS	$V_{CC}$ (V)	25°C			-40°C TO 85°C		-55°C TO 125°C		UNITS
				MIN	TYP	MAX	MIN	MAX	MIN	MAX	
Three-State Output Capacitance	$C_O$	-	-	20	-	20	-	20	-	20	pF
Power Dissipation Capacitance (Notes 3, 4) (540, 541)	$C_{PD}$	$C_L = 15\text{pF}$	5	-	55	-	-	-	-	-	pF

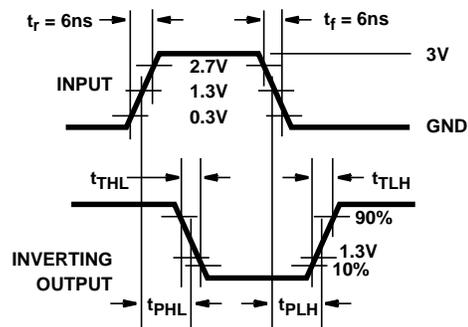
**NOTES:**

3.  $C_{PD}$  is used to determine the dynamic power consumption, per channel.
4.  $P_D = V_{CC}^2 f_i (C_{PD} + C_L)$  where  $f_i$  = Input Frequency,  $C_L$  = Output Load Capacitance,  $V_{CC}$  = Supply Voltage.

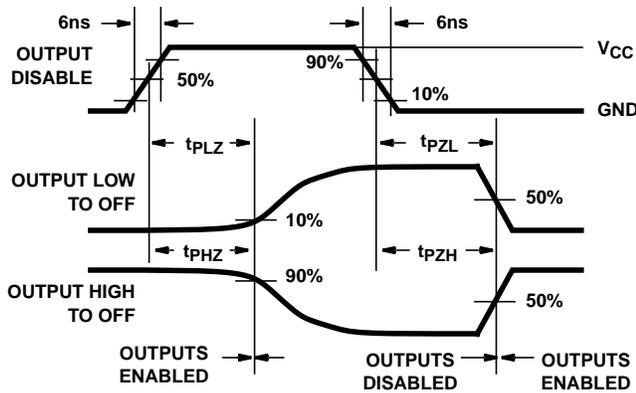
## Test Circuits and Waveforms



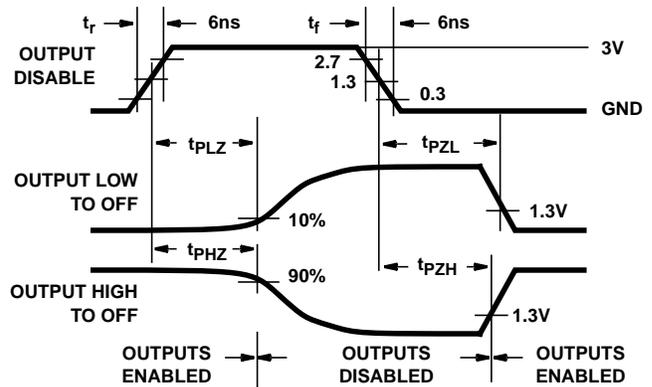
**FIGURE 1. HC TRANSITION TIMES AND PROPAGATION DELAY TIMES, COMBINATION LOGIC**



**FIGURE 2. HCT TRANSITION TIMES AND PROPAGATION DELAY TIMES, COMBINATION LOGIC**

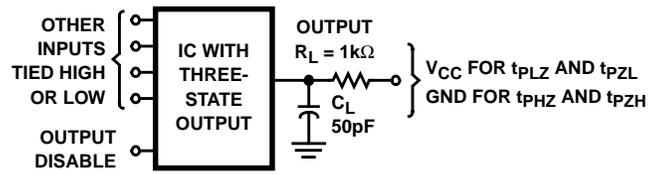


**FIGURE 3. HC THREE-STATE PROPAGATION DELAY WAVEFORM**



**FIGURE 4. HCT THREE-STATE PROPAGATION DELAY WAVEFORM**

**Test Circuits and Waveforms** (Continued)



NOTE: Open drain waveforms  $t_{pLZ}$  and  $t_{pZL}$  are the same as those for three-state shown on the left. The test circuit is Output  $R_L = 1k\Omega$  to  $V_{CC}$ ,  $C_L = 50pF$ .

**FIGURE 5. HC AND HCT THREE-STATE PROPAGATION DELAY TEST CIRCUIT**

**PACKAGING INFORMATION**

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead finish/ Ball material (6)	MSL Peak Temp (3)	Op Temp (°C)	Device Marking (4/5)	Samples
CD54HC540F3A	ACTIVE	CDIP	J	20	1	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	CD54HC540F3A	<a href="#">Samples</a>
CD54HC541F	ACTIVE	CDIP	J	20	1	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	CD54HC541F	<a href="#">Samples</a>
CD54HC541F3A	ACTIVE	CDIP	J	20	1	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	CD54HC541F3A	<a href="#">Samples</a>
CD54HCT541F	ACTIVE	CDIP	J	20	1	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	CD54HCT541F	<a href="#">Samples</a>
CD54HCT541F3A	ACTIVE	CDIP	J	20	1	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	CD54HCT541F3A	<a href="#">Samples</a>
CD74HC540E	ACTIVE	PDIP	N	20	20	RoHS & Non-Green	NIPDAU	N / A for Pkg Type	-55 to 125	CD74HC540E	<a href="#">Samples</a>
CD74HC540M	ACTIVE	SOIC	DW	20	25	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-55 to 125	HC540M	<a href="#">Samples</a>
CD74HC540M96	ACTIVE	SOIC	DW	20	2000	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-55 to 125	HC540M	<a href="#">Samples</a>
CD74HC541E	ACTIVE	PDIP	N	20	20	RoHS & Green	NIPDAU	N / A for Pkg Type	-55 to 125	CD74HC541E	<a href="#">Samples</a>
CD74HC541EE4	ACTIVE	PDIP	N	20	20	RoHS & Green	NIPDAU	N / A for Pkg Type	-55 to 125	CD74HC541E	<a href="#">Samples</a>
CD74HC541M	ACTIVE	SOIC	DW	20	25	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-55 to 125	HC541M	<a href="#">Samples</a>
CD74HC541M96	ACTIVE	SOIC	DW	20	2000	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-55 to 125	HC541M	<a href="#">Samples</a>
CD74HC541M96G4	ACTIVE	SOIC	DW	20	2000	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-55 to 125	HC541M	<a href="#">Samples</a>
CD74HC541PW	ACTIVE	TSSOP	PW	20	70	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-55 to 125	HJ541	<a href="#">Samples</a>
CD74HC541PWR	ACTIVE	TSSOP	PW	20	2000	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-55 to 125	HJ541	<a href="#">Samples</a>
CD74HCT540E	ACTIVE	PDIP	N	20	20	RoHS & Non-Green	NIPDAU	N / A for Pkg Type	-55 to 125	CD74HCT540E	<a href="#">Samples</a>
CD74HCT540M	ACTIVE	SOIC	DW	20	25	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-55 to 125	HCT540M	<a href="#">Samples</a>
CD74HCT540M96	ACTIVE	SOIC	DW	20	2000	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-55 to 125	HCT540M	<a href="#">Samples</a>

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead finish/ Ball material (6)	MSL Peak Temp (3)	Op Temp (°C)	Device Marking (4/5)	Samples
CD74HCT541E	ACTIVE	PDIP	N	20	20	RoHS & Non-Green	NIPDAU	N / A for Pkg Type	-55 to 125	CD74HCT541E	<a href="#">Samples</a>
CD74HCT541M	ACTIVE	SOIC	DW	20	25	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-55 to 125	HCT541M	<a href="#">Samples</a>
CD74HCT541M96	ACTIVE	SOIC	DW	20	2000	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-55 to 125	HCT541M	<a href="#">Samples</a>
CD74HCT541M96E4	ACTIVE	SOIC	DW	20	2000	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-55 to 125	HCT541M	<a href="#">Samples</a>
CD74HCT541M96G4	ACTIVE	SOIC	DW	20	2000	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-55 to 125	HCT541M	<a href="#">Samples</a>

(1) The marketing status values are defined as follows:

**ACTIVE:** Product device recommended for new designs.

**LIFEBUY:** TI has announced that the device will be discontinued, and a lifetime-buy period is in effect.

**NRND:** Not recommended for new designs. Device is in production to support existing customers, but TI does not recommend using this part in a new design.

**PREVIEW:** Device has been announced but is not in production. Samples may or may not be available.

**OBSOLETE:** TI has discontinued the production of the device.

(2) **RoHS:** TI defines "RoHS" to mean semiconductor products that are compliant with the current EU RoHS requirements for all 10 RoHS substances, including the requirement that RoHS substance do not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, "RoHS" products are suitable for use in specified lead-free processes. TI may reference these types of products as "Pb-Free".

**RoHS Exempt:** TI defines "RoHS Exempt" to mean products that contain lead but are compliant with EU RoHS pursuant to a specific EU RoHS exemption.

**Green:** TI defines "Green" to mean the content of Chlorine (Cl) and Bromine (Br) based flame retardants meet JS709B low halogen requirements of <=1000ppm threshold. Antimony trioxide based flame retardants must also meet the <=1000ppm threshold requirement.

(3) MSL, Peak Temp. - The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.

(4) There may be additional marking, which relates to the logo, the lot trace code information, or the environmental category on the device.

(5) Multiple Device Markings will be inside parentheses. Only one Device Marking contained in parentheses and separated by a "~" will appear on a device. If a line is indented then it is a continuation of the previous line and the two combined represent the entire Device Marking for that device.

(6) Lead finish/Ball material - Orderable Devices 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.

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continues to take reasonable steps to provide representative and accurate information but may not have conducted destructive testing or chemical analysis on incoming materials and chemicals. TI and TI suppliers consider certain information to be proprietary, and thus CAS numbers and other limited information may not be available for release.

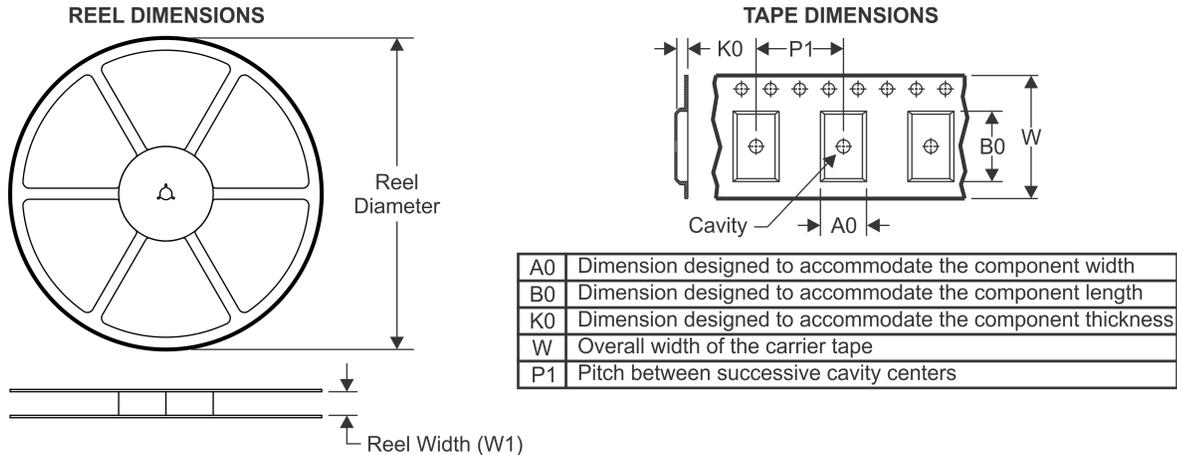
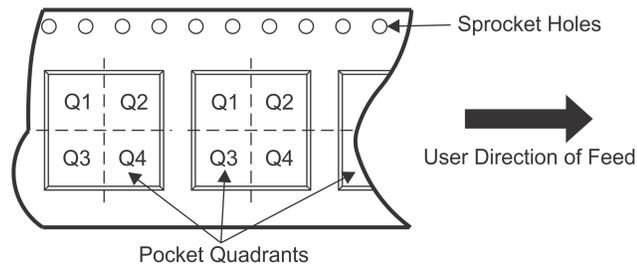
In no event shall TI's liability arising out of such information exceed the total purchase price of the TI part(s) at issue in this document sold by TI to Customer on an annual basis.

**OTHER QUALIFIED VERSIONS OF CD54HC540, CD54HC541, CD54HCT541, CD74HC540, CD74HC541, CD74HCT541 :**

- Catalog : [CD74HC540](#), [CD74HC541](#), [CD74HCT541](#)
- Military : [CD54HC540](#), [CD54HC541](#), [CD54HCT541](#)

NOTE: Qualified Version Definitions:

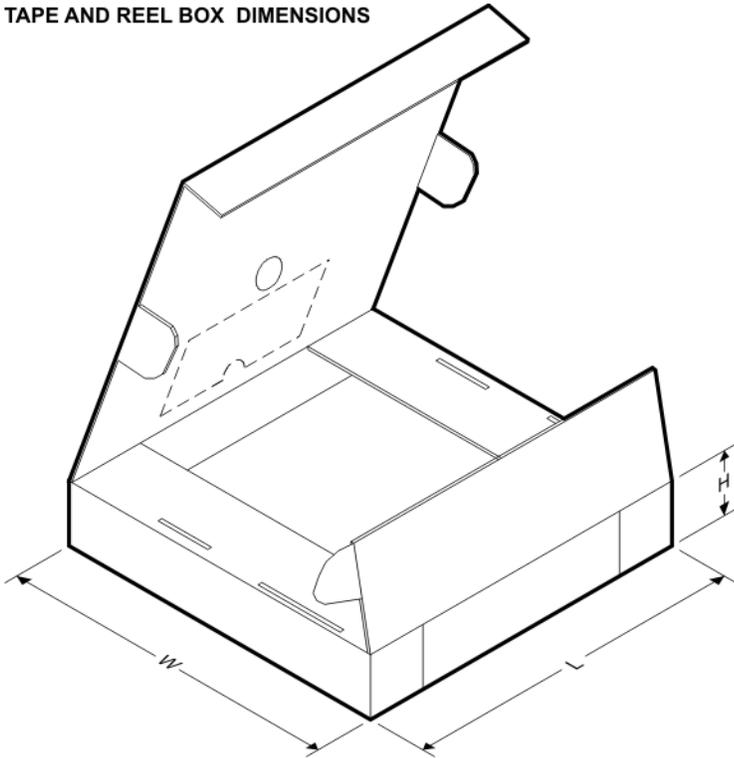
- Catalog - TI's standard catalog product
- Military - QML certified for Military and Defense Applications

**TAPE AND REEL INFORMATION**

**QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE**


\*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
CD74HC540M96	SOIC	DW	20	2000	330.0	24.4	10.8	13.3	2.7	12.0	24.0	Q1
CD74HC541M96	SOIC	DW	20	2000	330.0	24.4	10.8	13.3	2.7	12.0	24.0	Q1
CD74HC541PWR	TSSOP	PW	20	2000	330.0	16.4	6.95	7.1	1.6	8.0	16.0	Q1
CD74HCT540M96	SOIC	DW	20	2000	330.0	24.4	10.8	13.3	2.7	12.0	24.0	Q1
CD74HCT541M96	SOIC	DW	20	2000	330.0	24.4	10.8	13.3	2.7	12.0	24.0	Q1

## TAPE AND REEL BOX DIMENSIONS



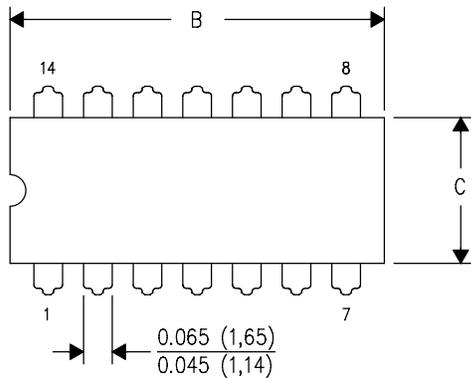
\*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
CD74HC540M96	SOIC	DW	20	2000	367.0	367.0	45.0
CD74HC541M96	SOIC	DW	20	2000	367.0	367.0	45.0
CD74HC541PWR	TSSOP	PW	20	2000	853.0	449.0	35.0
CD74HCT540M96	SOIC	DW	20	2000	367.0	367.0	45.0
CD74HCT541M96	SOIC	DW	20	2000	367.0	367.0	45.0

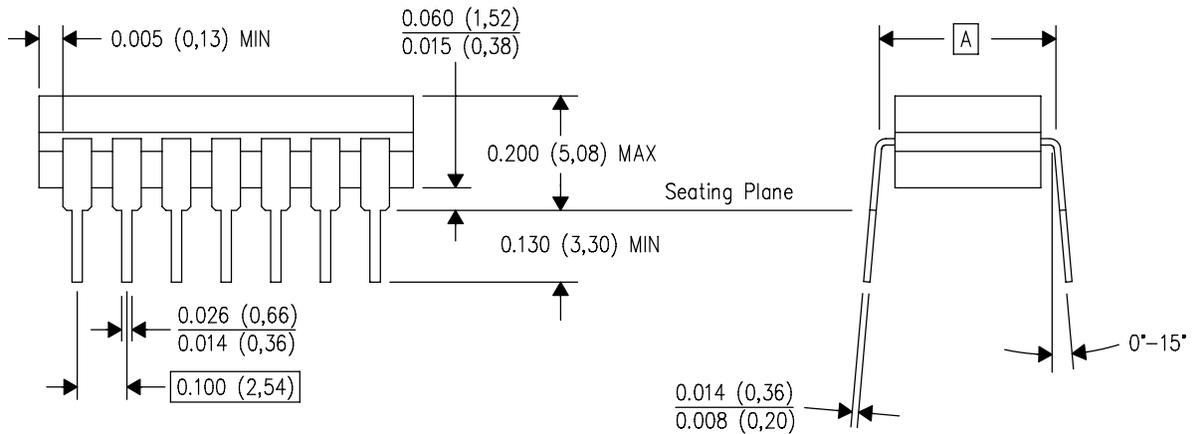
J (R-GDIP-T\*\*)

14 LEADS SHOWN

CERAMIC DUAL IN-LINE PACKAGE



DIM \ PINS **	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)

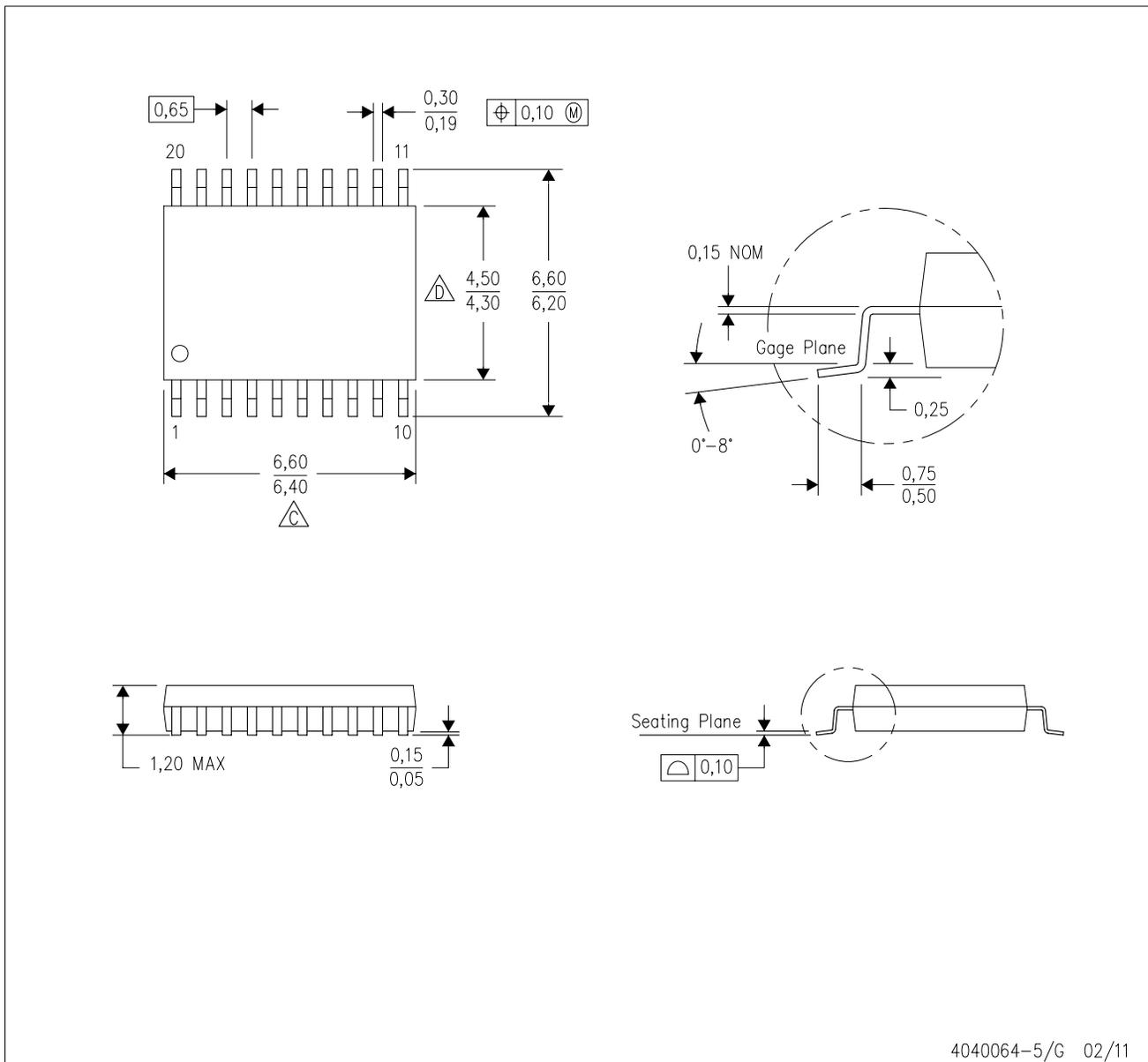


4040083/F 03/03

- 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.

PW (R-PDSO-G20)

PLASTIC SMALL OUTLINE

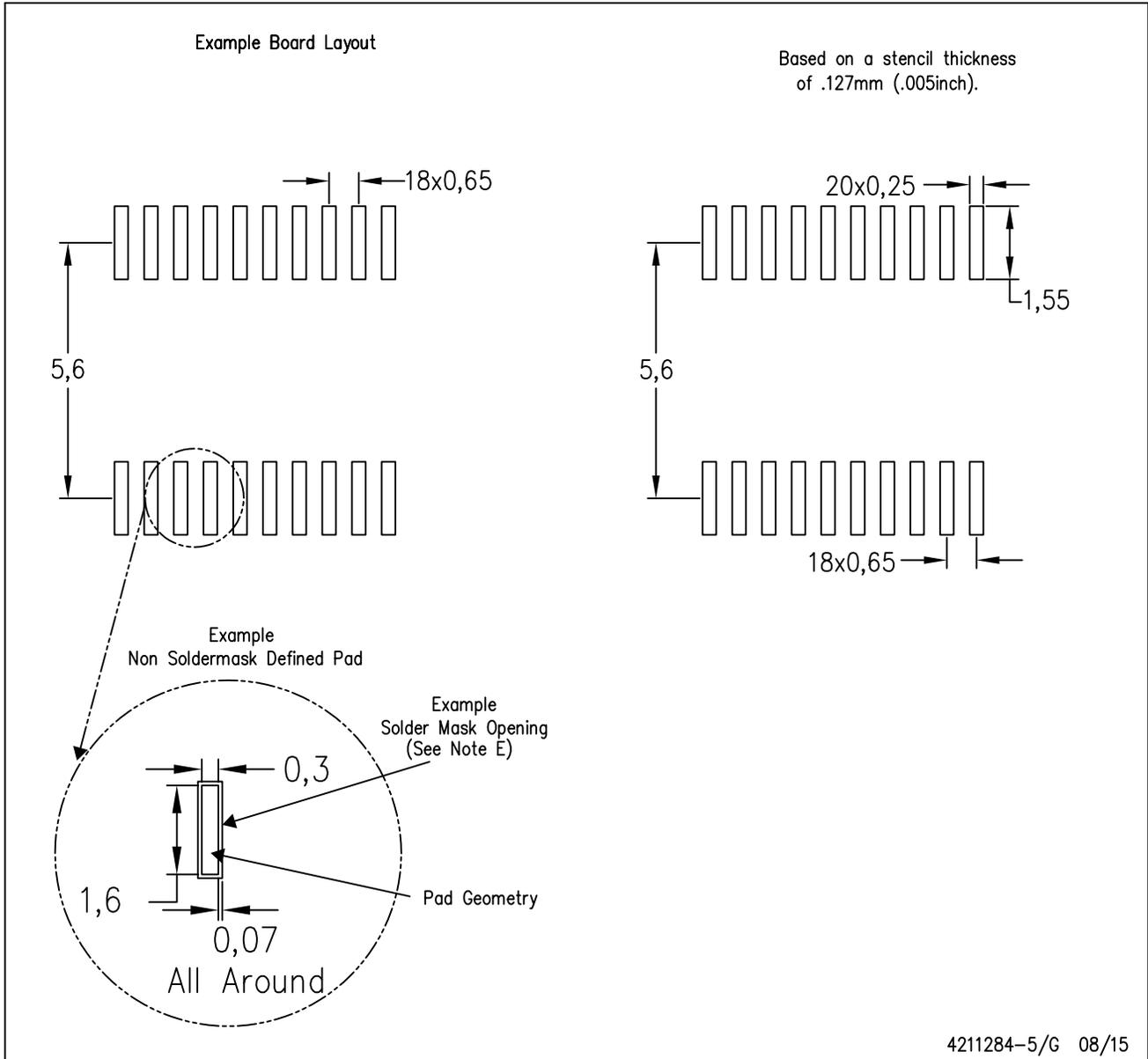


4040064-5/G 02/11

- NOTES:
- A. All linear dimensions are in millimeters. Dimensioning and tolerancing per ASME Y14.5M-1994.
  - 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 0,15 each side.
  - D. Body width does not include interlead flash. Interlead flash shall not exceed 0,25 each side.
  - E. Falls within JEDEC MO-153

PW (R-PDSO-G20)

PLASTIC SMALL OUTLINE



- NOTES:
- A. All linear dimensions are in millimeters.
  - B. This drawing is subject to change without notice.
  - C. Publication IPC-7351 is recommended for alternate design.
  - D. Laser cutting apertures with trapezoidal walls and also rounding corners will offer better paste release. Customers should contact their board assembly site for stencil design recommendations. Refer to IPC-7525 for other stencil recommendations.
  - E. Customers should contact their board fabrication site for solder mask tolerances between and around signal pads.

N (R-PDIP-T\*\*)

PLASTIC DUAL-IN-LINE PACKAGE

16 PINS SHOWN



4040049/E 12/2002

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

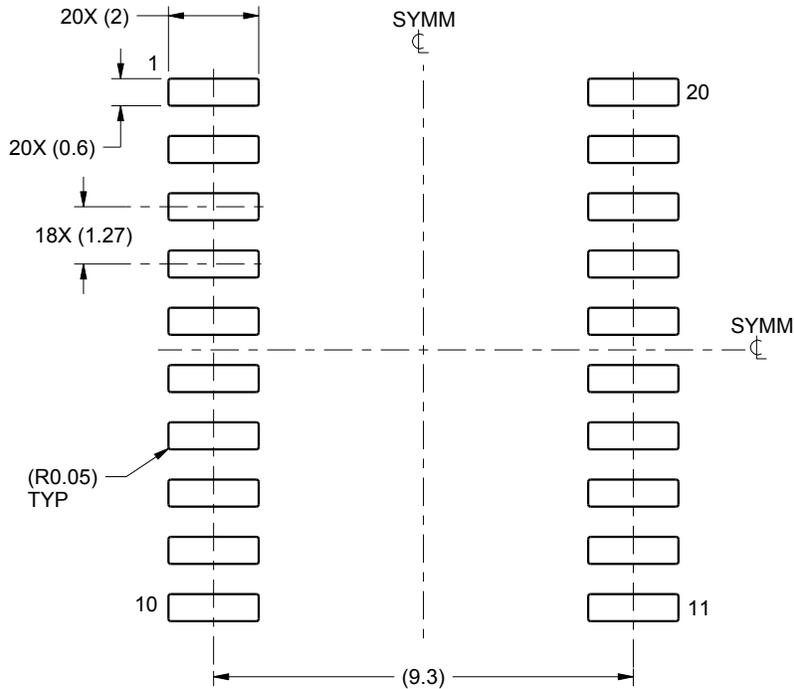


# EXAMPLE BOARD LAYOUT

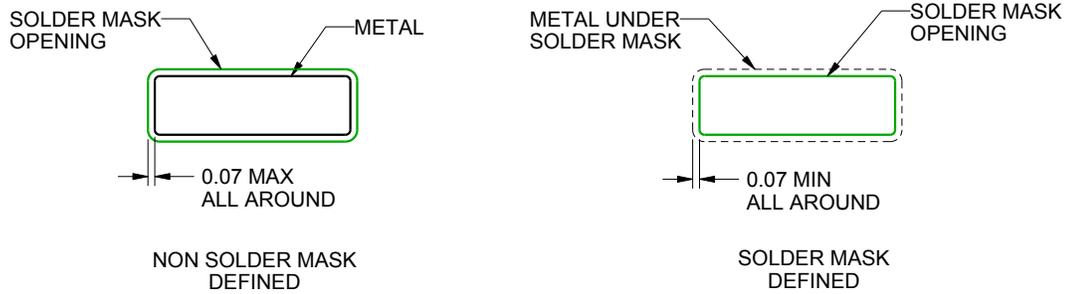
DW0020A

SOIC - 2.65 mm max height

SOIC



LAND PATTERN EXAMPLE  
SCALE:6X



SOLDER MASK DETAILS

4220724/A 05/2016

NOTES: (continued)

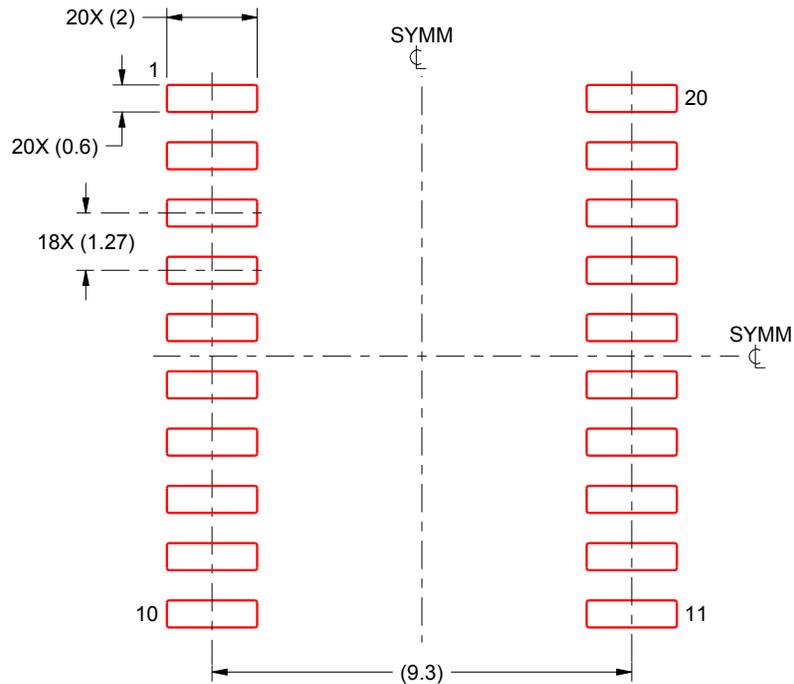
- 6. Publication IPC-7351 may have alternate designs.
- 7. Solder mask tolerances between and around signal pads can vary based on board fabrication site.

# EXAMPLE STENCIL DESIGN

DW0020A

SOIC - 2.65 mm max height

SOIC



SOLDER PASTE EXAMPLE  
BASED ON 0.125 mm THICK STENCIL  
SCALE:6X

4220724/A 05/2016

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.

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