

TTL設計手冊

增訂三版

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The
TTL
Data Book
for
Design Engineers

香港科技出版社

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第二版

前 言

在這本 832 頁資料中，德州儀器公司很榮幸地展示公司廣多而且進步的 TTL 積體電路之重要技術性資料。

您將找到 TTL 電路標準技術（54/74 系，54H/74H 系，54L/74L 系）和德州儀器的高級技術 TTL 族（如蕭特基定位系 54LS/74LS 及 54S/74S 系和抗幅射及樑形引線）的詳細說明。本書亦將包括高效能隨取記憶的最進步技術。

索引是為方便電路選擇指引您很快找到電路種類而設計。作用和數字索引使您很快地找到所要電路特性的頁數，另外中型積體電路的作用和小型積體電路的插腳分佈圖依型號順序排列以簡化找尋特定作用電路的工作。

高可靠性 TTL 積體電路包含在一節依據一由 TI 建立保證加入而非假設高品質和可靠性的程序 MIL-M-38510 的 MACH IV 採購說明。另一節有關 JAN 積體電路中，有一推介使用方法的表和 TI 型號和 38510 slash sheet 的對照表。

誠心地希望您將發現這本設計工程師的 TTL 資料對您的藏書是有意義地增加。

HW 6/9/0501

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¹See Bipolar Microcomputer Components Data Book, LCC4270.

數字索引

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SN54186	SN74186	†	5-49	SN54S241	SN74S241	6-83	5-55
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† See Bipolar Microcomputer Components Data Book, LCC4270.

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SN54LS244	SN74LS244	6-83	5-66	SN54293	SN74293	7-423	7-423
SN54LS245	SN74LS245	7-349	7-349	SN54LS293	SN74LS293	7-423	7-423
SN54246	SN74246	7-351	7-351	SN54LS296B	SN74LS296B	7-429	7-429
SN54247	SN74247	7-351	7-351	SN54298	SN74298	7-432	7-432
SN54LS247	SN74LS247	7-351	7-351	SN54LS298	SN74LS298	7-432	7-432
SN54248	SN74248	7-351	7-351	SN54LS299	SN74S299	7-437	7-437
SN54LS248	SN74LS248	7-351	7-351	SN54S299	SN74S299	7-437	7-437
SN54249	SN74249	7-351	7-351	SN54LS300A	SN74LS300A	↑	5-64
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SN54251	SN74251	7-362	7-362	SN54S301	SN74S301	↑	5-64
SN54LS251	SN74LS251	7-362	7-362	SN54LS302	SN74LS302	↑	5-64
SN54S251	SN74S251	7-362	7-362	SN54LS314	SN74LS314	↑	5-64
SN54LS253	SN74LS253	7-369	7-369	SN54S314	SN74S314	↑	5-65
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SN54LS259	SN74LS259	7-376	7-376	SN54LS327	SN74LS327	7-445	7-445
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SN54S275	SN74S275	7-391	7-391	SN54LS366A	SN74LS366A	6-36	5-68
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SN54LS279	SN74LS279	6-60	5-60	SN54LS368A	SN74LS368A	6-36	5-69
SN54LS280	SN74LS280	7-406	7-406	SN54S370	SN74S370	↑	5-69
SN54S280	SN74S280	7-406	7-406	SN54S371	SN74S371	↑	5-69
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SN54S283	SN74S283	7-415	7-415	SN54S374	SN74S374	7-471	7-471
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†See Bipolar Microcomputer Components Data Book LCC4270

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*See Bipolar Microcomputer Components Data Book, LCC4270.

下面各頁包含作用索引及選擇指引，以便於選擇適合特殊應用的特別作用。類似作用的基本特性被列在一塊，以進行比較分析。電氣特性請參考所載頁數。所包括的作用其目錄如下：

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小型積體電路 作用索引 / 選擇指引

圖騰柱輸出之正、非乃閘和倒相器
電性表-6-2頁

說 明	典型傳遞延遲時間	典型每閘功率損耗	裝置型號和包裝				插腳排列頁數
			-55°C至+75°C		0°C至+75°C		
六個倒相器	3 ns	10 mW	SN74004	J, W	SN74004	J, N	6-7
	6 ns	22 mW	SN74004	J, W	SN74004	J, N	
	9.5 ns	2 mW	SN74LS04	J, W	SN74LS04	J, N	
	10 ns	10 mW	SN7404	J, W	SN7404	J, N	
	33 ns	1 mW	SN74LS04	J, T	SN74LS04	J, N	
四個雙輸入正非及閘	3 ns	10 mW	SN74000	J, W	SN74000	J, N	6-8
	6 ns	22 mW	SN74000	J, W	SN74000	J, N	
	9.5 ns	2 mW	SN74LS00	J, W	SN74LS00	J, N	
	10 ns	10 mW	SN7400	J, W	SN7400	J, N	
	33 ns	1 mW	SN74LS00	J, T	SN74LS00	J, N	
三個三輸入正非及閘	3 ns	10 mW	SN74010	J, W	SN74010	J, N	
	6 ns	22 mW	SN74010	J, W	SN74010	J, N	
	9.5 ns	2 mW	SN74LS10	J, W	SN74LS10	J, N	
	10 ns	10 mW	SN7410	J, W	SN7410	J, N	
	33 ns	1 mW	SN74LS10	J, T	SN74LS10	J, N	
二個四輸入正非及閘	3 ns	10 mW	SN74020	J, W	SN74020	J, N	6-10
	6 ns	22 mW	SN74020	J, W	SN74020	J, N	
	9.5 ns	2 mW	SN74LS20	J, W	SN74LS20	J, N	
	10 ns	10 mW	SN7430	J, W	SN7430	J, N	
	33 ns	1 mW	SN74LS20	J, T	SN74LS20	J, N	
八輸入正非及閘	3 ns	10 mW	SN74030	J, W	SN74030	J, N	6-12
	6 ns	22 mW	SN74030	J, W	SN74030	J, N	
	17 ns	2.4 mW	SN74LS30	J, W	SN74LS30	J, N	
	10 ns	10 mW	SN7430	J, W	SN7430	J, N	
	33 ns	1 mW	SN74LS30	J, T	SN74LS30	J, N	
十三輸入正非及閘	3 ns	10 mW	SN74133	J, W	SN74133	J, N	6-36

開集極輸出之正非及閘和倒向器
電性表-6-4頁

說明	典型傳遞延遲時間	典型每閘功率損耗	裝置型號和包裝				插腳排列頁
			-55°C至+75°C		0°C至+75°C		
六個倒相器	5 ns	17.5 mW	SN74005	J, W	SN74005	J, N	6-7
	8 ns	22 mW	SN74005	J, W	SN74005	J, N	
	16 ns	2 mW	SN74LS05	J, W	SN74LS05	J, N	
	34 ns	90 mW	SN7405	J, W	SN7405	J, N	
四個雙輸入正非及閘	5 ns	17.5 mW	SN74003	J, W	SN74003	J, N	6-7
	8 ns	22 mW	SN74003	J, W	SN74003	J, N	6-8
	16 ns	2 mW	SN74LS03	J, W	SN74LS03	J, N	6-8
	16 ns	2 mW	SN74LS03	J, W	SN74LS03	J, N	6-7
	22 ns	10 mW	SN7401	J, W	SN7401	J, N	6-8
	22 ns	10 mW	SN7403	J	SN7403	J, N	6-7
	46 ns	1 mW	SN74LS1	T			6-8
	46 ns	1 mW	SN74LS3	J	SN74LS3	J, N	6-7
三個三輸入正非及閘	16 ns	2 mW	SN74LS12	J, W	SN74LS12	J, N	6-8
	22 ns	10 mW	SN7412	J, W	SN7412	J, N	
二個四輸入正非及閘	5 ns	17.5 mW	SN74022	J, W	SN74022	J, N	6-11
	8 ns	22 mW	SN74022	J, W	SN74022	J, N	
	16 ns	2 mW	SN74LS22	J, W	SN74LS22	J, N	
	22 ns	10 mW	SN7422	J, W	SN7422	J, N	

小型積體電路 作用索引 / 選擇指引

圖騰柱輸出之正非或閘

電性表-6-8頁

說 明	典型傳遞 延遲時間	典型每閘 功率損耗	裝置型號和包裝				插腳排列 PAGE N 數
			-55°C to 125°C		0°C to 70°C		
四個雙輸入正非或閘	3.5 ns	29 mW	SN54S02	J, W	SN74S02	J, N	5-8
	10 ns	2.75 mW	SN54LS02	J, W	SN74LS02	J, N	
	10 ns	14 mW	SN5402	J, W	SN7402	J, N	
	33 ns	1.5 mW	SN54L02	J, T	SN74L02	J, N	
三個三輸入正非或閘	8.5 ns	22 mW	SN5427	J, W	SN7427	J, N	5-12
	10 ns	4.5 mW	SN54LS27	J, W	SN74LS27	J, N	
雙四輸入有探取之正非或閘	10.5 ns	23 mW	SN5425	J, W	SN7425	J, N	5-11
二個五輸入正非或閘	4 ns	54 mW	SN54S280	J, W	SN74S280	J, N	5-68

圖騰柱輸出之正及閘

電性表-6-10

說明	典型傳遞 延遲時間	典型每閘 功率損耗	裝置型號和包裝				插腳排列 頁 數
			-55°C to 125°C		0°C to 70°C		
四個雙輸入正及閘	4.75 ns	32 mW	SN54S08	J, W	SN74S08	J, N	5-8
	12 ns	4.25 mW	SN54LS08	J, W	SN74LS08	J, N	
	15 ns	19 mW	SN5408	J, W	SN7408	J, N	
三個三輸入正及閘	4.75 ns	31 mW	SN54S11	J, W	SN74S11	J, N	5-9
	8.2 ns	40 mW	SN54H11	J, W	SN74H11	J, N	
	12 ns	4.25 mW	SN54LS11	J, W	SN74LS11	J, N	
二個四輸入正及閘	8.2 ns	40 mW	SN54H21	J, W	SN74H21	J, N	5-11
	12 ns	4.25 mW	SN54LS21	J, W	SN74LS21	J, N	

開集極輸出之正及閘

電性表-6-12頁

說 明	典型傳遞 延遲時間	典型每閘 功率損耗	裝置型號和包裝				插腳排列 頁 數
			-55°C to 125°C		0°C to 70°C		
四個雙輸入正及閘	6.5 ns	32 mW	SN54S09	J, W	SN74S09	J, N	5-8
	18.5 ns	19.4 mW	SN5409	J, W	SN7409	J, N	
	20 ns	4.25 mW	SN54LS09	J, W	SN74LS09	J, N	
三個三輸入正及閘	6 ns	28 mW	SN54S15	J, W	SN74S15	J, N	5-10
	10.5 ns	38 mW	SN54H15	J, W	SN74H15	J, N	
	20 ns	4.25 mW	SN54LS15	J, W	SN74LS15	J, N	

圖騰柱輸出施密特觸發器正非及閘和倒相器

電性表-6-14頁

說 明	典型每閘 功率損耗	典型每閘 功率損耗	裝置型號和包裝				插腳排列 頁 數
			-55°C to 125°C		0°C to 70°C		
六個施密特觸發 倒相器	0.8 V	15 ns	SN5414	J, W	SN7414	J, N	5-9
	0.8 V	15 ns	SN54LS14	J, W	SN74LS14	J, N	
四個雙輸入正非及施密特 觸發器	0.65 V	8 ns	SN54S132	J, W	SN74S132	J, N	5-37
	0.8 V	15 ns	SN54132	J, W	SN74132	J, N	
	0.8 V	15 ns	SN54LS132	J, W	SN74LS132	J, N	
	0.8 V	16 ns	SN54LS132	J, W	SN74LS132	J, N	
雙四輸入正非及施密特觸發器	0.8 V	16.5 ns	SN5413	J, W	SN7413	J, N	5-9
	0.8 V	16.5 ns	SN54LS13	J, W	SN74LS13	J, N	

小型積體電路 作用索引 / 選擇指引

開關輸出之緩衝器 / 脈動驅動器 電性表 - 6 - 20頁

說明	低位輸出電流	高位輸出電流	典型延遲時間	典型每開功率	裝置型號和包裝				插腳排列頁數
					-55°C至125°C		0°C至70°C		
四個雙輸入正非或緩衝器	48 mA	-2.4 mA	7 ns	28 mW	SN5428	J, W	SN7428	J, N	5-12
	24 mA	-1.2 mA	12 ns	5.5 mW			SN74LS28	J, N	
	12 mA	-1.2 mA	12 ns	5.5 mW	SN54LS28	J, W			
四個雙輸入正非及緩衝器	80 mA	-3 mA	4 ns	41 mW	SN54837	J, W	SN74837	J, N	5-13
	48 mA	-1.2 mA	10.5 ns	27 mW	SN5437	J, W	SN7437	J, N	
	24 mA	-1.2 mA	12 ns	4.3 mW			SN74LS37	J, N	
	12 mA	-1.2 mA	12 ns	4.3 mW	SN54LS37	J, W			
二個四輸入正非及緩衝器	80 mA	-3 mA	4 ns	44 mW	SN54840	J, W	SN74840	J, N	5-14
	80 mA	-1.5 mA	7.5 ns	44 mW	SN54H40	J, W	SN74H40	J, N	
	48 mA	-1.2 mA	10.5 ns	26 mW	SN5440	J, W	SN7440	J, N	
	24 mA	-1.2 mA	12 ns	4.3 mW			SN74LS40	J, N	
	12 mA	-1.2 mA	12 ns	4.3 mW	SN54LS40	J, W			

50 歐姆 775 歐姆線驅動器 電性表 - 6 - 22頁

說 明	低位輸出電流	高位輸出電流	典型延遲時間	典型每開功率	裝置型號和包裝				插腳排列頁數
					-55°C至125°C		0°C至70°C		
二個四輸入正非及線驅動器	80 mA	-40 mA	4 ns	44 mW	SN54S140	J, W	SN74S140	J, N	5-38
四個雙輸入正非或線驅動器	48 mA	-42.4 mA	7 ns	28 mW			SN74128	J, N	5-37
	48 mA	-29 mA	7 ns	28 mW	SN54128	J, W			

開集極輸出之緩衝器和界面開 電性表 - 6 - 24和6 - 26頁

說明	高位輸出電流	低位輸出電流	典型延遲時間	典型每開功率	裝置型號和包裝				插腳排列頁數
					-55°C至125°C		0°C至70°C		
六個緩衝器／驅動器	30 V	40 mA	13 ns	21 mW			SN7407	J, N	5-8
	30 V	30 mA	13 ns	21 mW	SN5437	J, W			5-8
	15 V	40 mA	13 ns	21 mW			SN7417	J, N	5-10
	15 V	30 mA	13 ns	21 mW	SN5417	J, W			5-10
六個倒相緩衝器／驅動器	30 V	40 mA	12.5 ns	26 mW			SN7406	J, N	5-7
	30 V	30 mA	12.5 ns	26 mW	SN5406	J, W			5-7
	15 V	40 mA	12.5 ns	26 mW			SN7416	J, N	5-10
	15 V	30 mA	12.5 ns	26 mW	SN5416	J, W			5-10
四個雙輸入正非及緩衝器	15 V	5 mA	13.5 ns	10 mW	SN5426	J	SN7426	J, N	5-12
	15 V	8 mA	16 ns	2 mW			SN74LS26	J, N	5-12
	15 V	4 mA	16 ns	2 mW	SN54LS26	J, W			5-12
	5.5 V	80 mA	6.5 ns	41 mW	SN54S38	J, W	SN74S38	J, N	5-13
	5.5 V	48 mA	12.5 ns	24 mW	SN5438	J, W	SN7438	J, N	5-13
	5.5 V	24 mA	19 ns	4.3 mW			SN74LS38	J, N	5-13
	5.5 V	12 mA	19 ns	4.3 mW	SN54LS38	J, W			5-13
四個雙輸入正非或緩衝器	5.5 V	48 mA	11 ns	28 mW	SN5433	J, W	SN7433	J, N	5-13
	5.5 V	24 mA	19 ns	5.45 mW			SN74LS33	J, N	
	5.5 V	12 mA	19 ns	5.45 mW	SN54LS33	J, W			

中型積體／大型積體作用 作用索引／選擇指引

有三態輸出之閘，緩衝器，和通道收發器

說明	典型傳遞延遲時間	最大發源電流	最大吸源電流	裝置型號和包裝		插腳排列數	電件頁數	
				-55 C 至 125 C	0 C 至 70 C			
十二輸入非反閘	4.5 ns 4.5 ns	-6.5 mA -2 mA	20 mA 20 mA	SN54S134	J, W	SN74S134 J, N	5.38 6.33	
有獨立輸出控制之四個通道緩衝器／驅動器	8 ns	2.6 mA	24 mA			SN74LS125A	J, N	5.37
	8 ns	-1 mA	12 mA	SN54LS125A	J, W			5.37
	8.5 ns	-2.6 mA	24 mA			SN74LS126A	J, N	5.37
	8.5 ns	-1 mA	12 mA	SN54LS126A	J, W			5.37
	10 ns	-5.2 mA	16 mA			SN74125	J, N	5.37
	10 ns	-2 mA	16 mA	SN54125	J, W			5.37
	10 ns	-5.2 mA	16 mA			SN74126	J, N	5.37
	10 ns	-2 mA	16 mA	SN54126	J, W			5.37
	10 ns	-5.2 mA	16 mA			SN74425	J, N	5.74
	10 ns	-2 mA	16 mA	SN54425	J, W			5.74
	10 ns	-5.2 mA	16 mA			SN74426	J, N	5.75
	10 ns	-2 mA	16 mA	SN54426	J, W			5.75
六個通道緩衝器／驅動器	9.5 ns	-2.6 mA	24 mA			SN74LS365A	J, N	5.68
	9.5 ns	-1 mA	12 mA	SN54LS365A	J, W			5.68
	9.5 ns	-2.6 mA	24 mA			SN74LS366A	J, N	5.68
	9.5 ns	-1 mA	12 mA	SN54LS366A	J, W			5.68
	9.5 ns	-2.6 mA	24 mA			SN74LS367A	J, N	5.69
	9.5 ns	-1 mA	12 mA	SN54LS367A	J, W			5.69
	9.5 ns	-2.6 mA	24 mA			SN74LS368A	J, N	5.69
	9.5 ns	-1 mA	12 mA	SN54LS368A	J, W			5.69
	11 ns	-5.2 mA	32 mA			SN74366A	J, N	5.68
	11 ns	-2 mA	32 mA	SN54366A	J, W			5.68
	11 ns	-5.2 mA	32 mA			SN74368A	J, N	5.69
	11 ns	-2 mA	32 mA	SN54368A	J, W			5.69
	12 ns	-5.2 mA	32 mA			SN74365A	J, N	5.68
	12 ns	-2 mA	32 mA	SN54365A	J, W			5.68
	12 ns	-5.2 mA	32 mA			SN74367A	J, N	5.69
	12 ns	-2 mA	32 mA	SN54367A	J, W			5.69
八個通道緩衝器／驅動器	5 ns	-15 mA	64 mA			SN74S240	J, N	5.54
	5 ns	-12 mA	48 mA	SN54S240	J			5.54
	5 ns	-15 mA	64 mA			SN74S241	J, N	5.55
	5 ns	-12 mA	48 mA	SN54S241	J			5.55
	10 ns	-15 mA	24 mA			SN74LS240	J, N	5.54
	10 ns	-12 mA	12 mA	SN54LS240	J			5.54
	10 ns	-15 mA	24 mA			SN74LS241	J, N	5.55
	10 ns	-12 mA	12 mA	SN54LS241	J			5.55
	10 ns	-15 mA	24 mA			SN74LS244	J, N	5.55
	10 ns	-12 mA	12 mA	SN54LS244	J			5.55
8080 A 系統的控制器和通道驅動器		-1 mA	10 mA			SN74S428	N	7.514
		-1 mA	10 mA			SN74S438	N	7.514
四個收發器	11 ns	-10 mA	24 mA			SN74LS242	J, N	5.55
	11 ns	-12 mA	12 mA	SN54LS242	J, W			5.55
	12 ns	-15 mA	24 mA			SN74LS243	J, N	5.55
	12 ns	-12 mA	12 mA	SN54LS243	J, W			5.55
四個有儲存之收發器	10 ns	-10.3 mA	20 mA			SN74S226	J, N	7.345
	10 ns	-6.5 mA	20 mA	SN54S226	J, W			7.345
八個收發器	12 ns	-15 mA	24 mA			SN74LS245	J, N	7.349
	12 ns	-12 mA	12 mA	SN54LS245	J			7.349