

# Code Page 437 (CP437) Character Reference

This document provides a comprehensive reference for the Code Page 437 (CP437) character set, which is the original IBM PC character set used in MS-DOS and early computer systems. This 8x8 pixel font contains 256 characters (0x00 to 0xFF) and is famous for its extensive collection of graphical symbols, box-drawing characters, and international characters.

## Overview

Code Page 437 was the default character set for IBM PC and compatible computers from 1981 to the mid-1990s. It includes:

- **Control characters** (0x00-0x1F)
- **Standard ASCII** (0x20-0x7E)
- **Extended characters** (0x80-0xFF) including:
  - International characters with diacritics
  - Mathematical symbols
  - Greek letters
  - Box-drawing and line characters
  - Shading patterns

## Character Table

Dec	Hex	Character Name (Common)	Display
0	0x00	<b>NULL</b> (Null character)	(null)
1	0x01	<b>Smiling Face (White)</b>	☺
2	0x02	<b>Smiling Face (Black)</b>	☹
3	0x03	<b>Heart</b>	♥
4	0x04	<b>Diamond</b>	♦
5	0x05	<b>Club</b>	♣
6	0x06	<b>Spade</b>	♠
7	0x07	<b>Bullet (Fill)</b>	•
8	0x08	<b>Bullet (Hollow)</b>	◻
9	0x09	<b>Circle (Hollow)</b>	◯
10	0x0A	<b>Bullet (Inverted)</b>	◼
11	0x0B	<b>Male Symbol</b>	♂
12	0x0C	<b>Female Symbol</b>	♀
13	0x0D	<b>Musical Note</b>	♪

Dec	Hex	Character Name (Common)	Display
14	0x0E	Double Musical Note	♪
15	0x0F	Sun	☀
16	0x10	Right-pointing Triangle	▶
17	0x11	Left-pointing Triangle	◀
18	0x12	Up/Down Arrow	↕
19	0x13	Double Exclamation	!!
20	0x14	Paragraph/Pilcrow	¶
21	0x15	Section Sign	§
22	0x16	Rectangle (Hollow)	▣
23	0x17	Up/Down Arrow with Base	↕
24	0x18	Up Arrow	↑
25	0x19	Down Arrow	↓
26	0x1A	Right Arrow	→
27	0x1B	Left Arrow	←
28	0x1C	L-shape/Corner	└
29	0x1D	Left-Right Arrow	↔
30	0x1E	Upward Triangle	▲
31	0x1F	Downward Triangle	▼
32	0x20	Space	(space)
33	0x21	Exclamation Mark	!
34	0x22	Quotation Mark	"
35	0x23	Number Sign	#
36	0x24	Dollar Sign	\$
37	0x25	Percent Sign	%
38	0x26	Ampersand	&
39	0x27	Apostrophe	'
40	0x28	Left Parenthesis	(
41	0x29	Right Parenthesis	)
42	0x2A	Asterisk	*
43	0x2B	Plus Sign	+

Dec	Hex	Character Name (Common)	Display
44	0x2C	Comma	,
45	0x2D	Hyphen-Minus	-
46	0x2E	Period	.
47	0x2F	Slash	/
48	0x30	Digit Zero	0
49	0x31	Digit One	1
50	0x32	Digit Two	2
51	0x33	Digit Three	3
52	0x34	Digit Four	4
53	0x35	Digit Five	5
54	0x36	Digit Six	6
55	0x37	Digit Seven	7
56	0x38	Digit Eight	8
57	0x39	Digit Nine	9
58	0x3A	Colon	:
59	0x3B	Semicolon	;
60	0x3C	Less-than Sign	<
61	0x3D	Equals Sign	=
62	0x3E	Greater-than Sign	>
63	0x3F	Question Mark	?
64	0x40	Commercial At	@
65	0x41	Capital A	A
66	0x42	Capital B	B
67	0x43	Capital C	C
68	0x44	Capital D	D
69	0x45	Capital E	E
70	0x46	Capital F	F
71	0x47	Capital G	G
72	0x48	Capital H	H
73	0x49	Capital I	I

Dec	Hex	Character Name (Common)	Display
74	0x4A	Capital J	J
75	0x4B	Capital K	K
76	0x4C	Capital L	L
77	0x4D	Capital M	M
78	0x4E	Capital N	N
79	0x4F	Capital O	O
80	0x50	Capital P	P
81	0x51	Capital Q	Q
82	0x52	Capital R	R
83	0x53	Capital S	S
84	0x54	Capital T	T
85	0x55	Capital U	U
86	0x56	Capital V	V
87	0x57	Capital W	W
88	0x58	Capital X	X
89	0x59	Capital Y	Y
90	0x5A	Capital Z	Z
91	0x5B	Left Bracket	[
92	0x5C	Backslash	\
93	0x5D	Right Bracket	]
94	0x5E	Caret/Circumflex	^
95	0x5F	Underscore	_
96	0x60	Grave Accent	`
97	0x61	Small A	a
98	0x62	Small B	b
99	0x63	Small C	c
100	0x64	Small D	d
101	0x65	Small E	e
102	0x66	Small F	f
103	0x67	Small G	g

<b>Dec</b>	<b>Hex</b>	<b>Character Name (Common)</b>	<b>Display</b>
104	0x68	<b>Small H</b>	h
105	0x69	<b>Small I</b>	i
106	0x6A	<b>Small J</b>	j
107	0x6B	<b>Small K</b>	k
108	0x6C	<b>Small L</b>	l
109	0x6D	<b>Small M</b>	m
110	0x6E	<b>Small N</b>	n
111	0x6F	<b>Small O</b>	o
112	0x70	<b>Small P</b>	p
113	0x71	<b>Small Q</b>	q
114	0x72	<b>Small R</b>	r
115	0x73	<b>Small S</b>	s
116	0x74	<b>Small T</b>	t
117	0x75	<b>Small U</b>	u
118	0x76	<b>Small V</b>	v
119	0x77	<b>Small W</b>	w
120	0x78	<b>Small X</b>	x
121	0x79	<b>Small Y</b>	y
122	0x7A	<b>Small Z</b>	z
123	0x7B	<b>Left Curly Bracket</b>	{
124	0x7C	<b>Vertical Bar</b>	
125	0x7D	<b>Right Curly Bracket</b>	}
126	0x7E	<b>Tilde</b>	~
127	0x7F	<b>House</b>	⌆




#### Extended Characters (0x80-0xFF)

<b>Dec</b>	<b>Hex</b>	<b>Character Name (Common)</b>	<b>Display</b>
128	0x80	<b>C-cedilla</b>	Ç
129	0x81	<b>U-umlaut</b>	ü
130	0x82	<b>E-acute</b>	é

Dec	Hex	Character Name (Common)	Display
131	0x83	<b>A-circumflex</b>	â
132	0x84	<b>A-umlaut</b>	ä
133	0x85	<b>A-grave</b>	à
134	0x86	<b>A-ring</b>	å
135	0x87	<b>C-cedilla (small)</b>	ç
136	0x88	<b>E-circumflex</b>	ê
137	0x89	<b>E-umlaut</b>	ë
138	0x8A	<b>E-grave</b>	è
139	0x8B	<b>I-umlaut</b>	ï
140	0x8C	<b>I-circumflex</b>	î
141	0x8D	<b>I-grave</b>	ì
142	0x8E	<b>A-umlaut (cap)</b>	Ä
143	0x8F	<b>A-ring (cap)</b>	Å
144	0x90	<b>E-acute (cap)</b>	É
145	0x91	<b>AE-ligature</b>	æ
146	0x92	<b>AE-ligature (cap)</b>	Æ
147	0x93	<b>O-circumflex</b>	ô
148	0x94	<b>O-umlaut</b>	ö
149	0x95	<b>O-grave</b>	ò
150	0x96	<b>U-circumflex</b>	û
151	0x97	<b>U-grave</b>	ù
152	0x98	<b>Y-umlaut</b>	ÿ
153	0x99	<b>O-umlaut (cap)</b>	Ö
154	0x9A	<b>U-umlaut (cap)</b>	Ü
155	0x9B	<b>Cent Sign</b>	¢
156	0x9C	<b>Pound Sterling</b>	£
157	0x9D	<b>Yen</b>	¥
158	0x9E	<b>P-with-hook</b>	₧
159	0x9F	<b>Florin/F-hook</b>	₣
160	0xA0	<b>A-acute</b>	á

Dec	Hex	Character Name (Common)	Display
161	0xA1	I-acute	í
162	0xA2	O-acute	ó
163	0xA3	U-acute	ú
164	0xA4	N-tilde	ñ
165	0xA5	N-tilde (cap)	Ñ
166	0xA6	Feminine Ordinal	ª
167	0xA7	Masculine Ordinal	º
168	0xA8	Inverted Question Mark	¿
169	0xA9	Registered Sign	®
170	0xAA	NOT Sign	¬
171	0xAB	One-Half	½
172	0xAC	One-Quarter	¼
173	0xAD	Exclamation Mark (Inverted)	¡
174	0xAE	Left Double Angle Quote	«
175	0xAF	Right Double Angle Quote	»

Box Drawing and Shading Characters (0xB0-0xDF)

Dec	Hex	Character Name (Common)	Display
176	0xB0	Light Shade	
177	0xB1	Medium Shade	
178	0xB2	Dark Shade	
179	0xB3	Single Vertical Line	
180	0xB4	Single Vertical and Right	├
181	0xB5	Vertical Double/Single Right	┤
182	0xB6	Single Vertical/Double Right	├┐
183	0xB7	Double Top Left Corner	┌
184	0xB8	Double Top Right Corner	┐
185	0xB9	Double Vertical and Right	├┐
186	0xBA	Double Vertical Line	
187	0xBB	Double Top Right Corner	┐

Dec	Hex	Character Name (Common)	Display
188	0xBC	Double Bottom Right Corner	␣
189	0xBD	Double Bottom Left Corner	␣
190	0xBE	Double Top Left Corner	␣
191	0xBF	Single Top Right Corner	␣
<b>192</b>	<b>0xC0</b>	<b>Single Bottom Left Corner</b>	␣
193	0xC1	Single Horizontal and Up	␣
194	0xC2	Single Horizontal and Down	␣
195	0xC3	Single Vertical and Right	␣
<b>196</b>	<b>0xC4</b>	<b>Single Horizontal Line</b>	—
197	0xC5	Single Cross	⦿
198	0xC6	Double Vertical and Single Right	␣
199	0xC7	Single Vertical and Double Right	␣
200	0xC8	Double Bottom Left Corner	␣
201	0xC9	Double Top Left Corner	␣
202	0xCA	Double Horizontal and Up	␣
203	0xCB	Double Horizontal and Down	␣
204	0xCC	Double Vertical and Single Right	␣
<b>205</b>	<b>0xCD</b>	<b>Double Horizontal Line</b>	=
206	0xCE	Double Cross	⦿
207	0xCF	Single Horizontal and Double Up	␣
208	0xD0	Double Horizontal and Single Up	␣
209	0xD1	Single Horizontal and Double Down	␣
210	0xD2	Double Horizontal and Single Down	␣
211	0xD3	Single Vertical and Double Left	␣
212	0xD4	Double Vertical and Single Left	␣
213	0xD5	Single Vertical and Double Left	␣
214	0xD6	Double Vertical and Single Left	␣
215	0xD7	Vertical Double/Horizontal Single Cross	⦿
216	0xD8	Vertical Single/Horizontal Double Cross	⦿
217	0xD9	Single Bottom Right Corner	␣



Dec	Hex	Character Name (Common)	Display
218	0xDA	Single Top Left Corner	┌
219	0xDB	Full Block	■
220	0xDC	Bottom Half Block	▀
221	0xDD	Left Half Block	▏
222	0xDE	Right Half Block	▎
223	0xDF	Top Half Block	▄

Mathematical and Greek Characters (0xE0-0xFF)

Dec	Hex	Character Name (Common)	Display
224	0xE0	Alpha	α
225	0xE1	Beta	β
226	0xE2	Gamma	Γ
227	0xE3	Pi	π
228	0xE4	Sigma	Σ
229	0xE5	Small Sigma	σ
230	0xE6	Mu	μ
231	0xE7	Tau	τ
232	0xE8	Phi	Φ
233	0xE9	Theta	Θ
234	0xEA	Omega	Ω
235	0xEB	Delta	δ
236	0xEC	Infinity	∞
237	0xED	Phi (small)	φ
238	0xEE	Epsilon	ε
239	0xEF	Intersection	∩
240	0xF0	Identity	≡
241	0xF1	Plus-minus	±
242	0xF2	Greater-or-equal	≥
243	0xF3	Less-or-equal	≤
244	0xF4	Integral Top	∫

Dec	Hex	Character Name (Common)	Display
245	0xF5	Integral Bottom	⌋
246	0xF6	Division	÷
247	0xF7	Approximately Equal	≈
248	0xF8	Degree Sign	°
249	0xF9	Bullet (filled)	·
250	0xFA	Bullet (small square)	▪
251	0xFB	Square Root	√
252	0xFC	Small N	ⁿ
253	0xFD	Superscript 2	²
254	0xFE	Solid Square	■
255	0xFF	Non-breaking Space	(space)

Key Sections in Code Page 437

- **0x00 - 0x1F (0-31): Control Characters and Graphical/Dingbat Symbols** (e.g., smiling faces, card suits, arrows, musical notes).
- **0x20 - 0x7E (32-126): Standard ASCII** (numbers, Latin uppercase and lowercase letters, and punctuation).
- **0x7F (127):** A specific graphical character (house symbol).
- **0x80 - 0xAF (128-175): Extended Latin Characters** (accented letters like Ç, ü, é, and currency symbols like £, ¥).
- **0xB0 - 0xDF (176-223): Box and Line Drawing, and Shading Characters** (used to create borders, tables, and graphical elements in text mode). These are the characters that make up your complex grid patterns.
- **0xE0 - 0xFF (224-255): Mathematical Symbols and Greek Letters** (e.g., α, π, Σ, ±, ÷, ∞).

Usage in FPGA Projects

This character set is commonly used in FPGA projects for:

- Text displays on OLED/LCD screens
- Character-based user interfaces
- Retro computing applications
- Educational projects demonstrating character encoding

The 8x8 pixel format makes it ideal for small displays and provides a good balance between readability and memory usage.

References

- Original IBM PC Character Set

- MS-DOS default codepage
  - VGA text mode font basis
  - Foundation for many modern character encodings
- c:\Users\xiang\ee2026\_Project\docs\cp437\_reference.md