

Greek characters supported by *alphabet*

Günter Milde

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Abstract

This document lists all Greek characters that are supported by *alphabet*. It also tests the outcome of `\MakeUppercase` and `\MakeLowercase`.

The document is compiled with XeTeX, format version 2023-06-01 patch-level 1, and the L3 programming layer from 2023-08-29. The *babel-greek* version is “2023/08/18 1.14 Greek support for the babel system”.

The `\greekfontencoding` is TU and the current language variant is *polutoniko*.

Contents

1 Input Variants

The columns represent the following input variants:

1. literal character
2. named accent macro + LICR
3. short accent macro + LICR / alias
4. short accent macro (reversed order) + LICR (only composite diacritics)

2 Greek and Coptic

Characters from the Greek and Coptic Unicode block that use the macros defined in *alphabet*:

x0386	Α Α Α	Α Α Α	ά ά ά
x0388	Έ Έ Έ	Έ Έ Έ	έ έ έ
x0389	Ή Ή Ή	Ή Ή Ή	ή ή ή
x038A	Ί Ί Ί	Ί Ί Ί	ί ί ί
x038C	Ό Ό Ό	Ό Ό Ό	ό ό ό
x038E	Υ Υ Υ	Υ Υ Υ	ύ ύ ύ
x038F	Ω Ω Ω	Ω Ω Ω	ώ ώ ώ
x0390	Ͱ Ͱ Ͱ	Ͱ Ͱ Ͱ	Ͱ Ͱ Ͱ
x0391	Α Α	Α Α	α α
x0392	Β Β	Β Β	β β
x0393	Γ Γ	Γ Γ	γ γ
x0394	Δ Δ	Δ Δ	δ δ
x0395	Ε Ε	Ε Ε	ε ε

x0396	Z Z	Z Z	ζ ζ
x0397	H H	H H	η η
x0398	Θ Θ	Θ Θ	θ θ
x0399	I I	I I	ι ι
x039A	K K	K K	κ κ
x039B	Λ Λ	Λ Λ	λ λ
x039C	M M	M M	μ μ
x039D	N N	N N	ν ν
x039E	Ξ Ξ	Ξ Ξ	ξ ξ
x039F	O O	O O	ο ο
0x3A0	Π Π	Π Π	π π
0x3A1	P P	P P	ρ ρ
0x3A3	Σ Σ	Σ Σ	ς ς
0x3A4	T T	T T	τ τ
0x3A5	Υ Υ	Υ Υ	υ υ
0x3A6	Φ Φ	Φ Φ	φ φ
0x3A7	X X	X X	χ χ
0x3A8	Ψ Ψ	Ψ Ψ	ψ ψ
0x3A9	Ω Ω	Ω Ω	ω ω
0x3AA	İ İ İ	İ İ İ	ı ı ı
0x3AB	Ÿ Ÿ Ÿ	Ÿ Ÿ Ÿ	ÿ ÿ ÿ
0x3AC	ά ά ά	Α Α Α	ά ά ά
0x3AD	έ έ έ	Ε Ε Ε	έ έ έ
0x3AE	ή ή ή	Η Η Η	ή ή ή
0x3AF	ί ί ί	Ι Ι Ι	ί ί ί
x03B0	ů ů ů ů	Ÿ Ÿ Ÿ Ÿ	ů ů ů ů
x03B1	α α	Α Α	α α
x03B2	β β	Β Β	β β
x03B3	γ γ	Γ Γ	γ γ
x03B4	δ δ	Δ Δ	δ δ
x03B5	ε ε	Ε Ε	ε ε
x03B6	ζ ζ	Ζ Ζ	ζ ζ
x03B7	η η	Η Η	η η
x03B8	θ θ	Θ Θ	θ θ
x03B9	ι ι	Ι Ι	ι ι
x03BA	κ κ	Κ Κ	κ κ
x03BB	λ λ	Λ Λ	λ λ
x03BC	μ μ	Μ Μ	μ μ
x03BD	ν ν	Ν Ν	ν ν
x03BE	ξ ξ	Ξ Ξ	ξ ξ
x03BF	ο ο	Ο Ο	ο ο
x03C0	π π	Π Π	π π
x03C1	ρ ρ	Ρ Ρ	ρ ρ
x03C2	ς ς ς	Σ Σ Σ	ς ς ς
x03C3	σ σ	Σ Σ	σ σ
x03C4	τ τ	Τ Τ	τ τ
x03C5	υ υ	Υ Υ	υ υ
x03C6	φ φ	Φ Φ	φ φ
x03C7	χ χ	Χ Χ	χ χ
x03C8	ψ ψ	Ψ Ψ	ψ ψ
x03C9	ω ω	Ω Ω	ω ω

x03CA	ııı	İİİ	ııı
x03CB	ü ü ü	Ÿ Ÿ Ÿ	ü ü ü
x03CC	ó ó ó	Ο Ο Ο	ó ó ó
x03CD	ú ú ú	Υ Υ Υ	ú ú ú
x03CE	ώ ώ ώ	Ω Ω Ω	ώ ώ ώ
x03D0	ϐ ϐ	Β Β	ϐ ϐ
x03D1	ϑ ϑ	Θ Θ	ϑ ϑ
x03D5	ϕ ϕ	Φ Φ	ϕ ϕ
x03D6	Ϙ Ϙ	Π Π	Ϙ Ϙ
x03D8	ϣ ϣ	Ψ Ψ	ϣ ϣ
x03D9	ϥ ϥ	Ψ Ψ	ϥ ϥ
x03DA	Ϛ Ϛ	Ϛ Ϛ	Ϛ Ϛ
x03DB	ϛ ϛ	ϛ ϛ	ϛ ϛ
x03DC	Ϝ Ϝ	Ϝ Ϝ	Ϝ Ϝ
x03DD	ϝ ϝ	ϝ ϝ	ϝ ϝ
x03DE	Ϟ Ϟ	Ϟ Ϟ	Ϟ Ϟ
x03DF	ϟ ϟ	Ϟ Ϟ	ϟ ϟ
x03E0	Λ Λ	Λ Λ	λ λ
x03E1	λ λ	Λ Λ	λ λ
x03F0	κ κ	Κ Κ	κ κ
x03F1	ρ ρ	Ρ Ρ	ρ ρ
x03F4	Θ Θ	Θ Θ	θ θ
x03F5	€ €	Ε Ε	€ €

3 Greek extended

x1F00	ά ά ά	Α Α Α	ά ά ά
x1F01	ά ά ά	Α Α Α	ά ά ά
x1F02	ǎ ǎ ǎ	Α Α Α Α	ǎ ǎ ǎ ǎ
x1F03	ǎ ǎ ǎ ǎ	Α Α Α Α	ǎ ǎ ǎ ǎ
x1F04	ǎ ǎ ǎ ǎ	Α Α Α Α	ǎ ǎ ǎ ǎ
x1F05	ǎ ǎ ǎ ǎ	Α Α Α Α	ǎ ǎ ǎ ǎ
x1F06	ǎ ǎ ǎ ǎ	Α Α Α Α	ǎ ǎ ǎ ǎ
x1F07	ǎ ǎ ǎ ǎ	Α Α Α Α	ǎ ǎ ǎ ǎ
x1F08	Ά Ά Ά	Α Α Α	ά ά ά
x1F09	Ά Ά Ά	Α Α Α	ά ά ά
x1F0A	Ά Ά Ά Ά	Α Α Α Α	ǎ ǎ ǎ ǎ
x1F0B	Ά Ά Ά Ά	Α Α Α Α	ǎ ǎ ǎ ǎ
x1F0C	Ά Ά Ά Ά	Α Α Α Α	ǎ ǎ ǎ ǎ
x1F0D	Ά Ά Ά Ά	Α Α Α Α	ǎ ǎ ǎ ǎ
x1F0E	Ά Ά Ά Ά	Α Α Α Α	ǎ ǎ ǎ ǎ
x1F0F	Ά Ά Ά Ά	Α Α Α Α	ǎ ǎ ǎ ǎ
x1F10	έ έ έ	Ε Ε Ε	έ έ έ
x1F11	έ έ έ	Ε Ε Ε	έ έ έ
x1F12	ẽ ẽ ẽ	Ε Ε Ε Ε	ẽ ẽ ẽ ẽ
x1F13	ẽ ẽ ẽ ẽ	Ε Ε Ε Ε	ẽ ẽ ẽ ẽ
x1F14	ẽ ẽ ẽ ẽ	Ε Ε Ε Ε	ẽ ẽ ẽ ẽ
x1F15	ẽ ẽ ẽ ẽ	Ε Ε Ε Ε	ẽ ẽ ẽ ẽ

x1F50	ù ù ù	Υ Υ Υ	ù ù ù
x1F51	ú ú ú	Υ Υ Υ	ú ú ú
x1F52	û û û û	Υ Υ Υ Υ	û û û û
x1F53	ü ü ü ü	Υ Υ Υ Υ	ü ü ü ü
x1F54	ÿ ÿ ÿ ÿ	Υ Υ Υ Υ	ÿ ÿ ÿ ÿ
x1F55	ẏ ẏ ẏ ẏ	Υ Υ Υ Υ	ẏ ẏ ẏ ẏ
x1F56	Ỳ Ỳ Ỳ Ỳ	Υ Υ Υ Υ	Ỳ Ỳ Ỳ Ỳ
x1F57	ỳ ỳ ỳ ỳ	Υ Υ Υ Υ	ỳ ỳ ỳ ỳ
x1F59	Ȳ Ȳ Ȳ	Υ Υ Υ	ú ú ú
x1F5B	ȳ ȳ ȳ ȳ	Υ Υ Υ Υ	û û û û
x1F5D	ȴ ȴ ȴ ȴ	Υ Υ Υ Υ	ÿ ÿ ÿ ÿ
x1F5F	ȵ ȵ ȵ ȵ	Υ Υ Υ Υ	ẏ ẏ ẏ ẏ
x1F60	ώ ώ ώ	Ω Ω Ω	ώ ώ ώ
x1F61	ὠ ὠ ὠ	Ω Ω Ω	ὠ ὠ ὠ
x1F62	ὡ ὡ ὡ ὡ	Ω Ω Ω Ω	ὡ ὡ ὡ ὡ
x1F63	ὢ ὢ ὢ ὢ	Ω Ω Ω Ω	ὢ ὢ ὢ ὢ
x1F64	ὣ ὣ ὣ ὣ	Ω Ω Ω Ω	ὣ ὣ ὣ ὣ
x1F65	ὤ ὤ ὤ ὤ	Ω Ω Ω Ω	ὤ ὤ ὤ ὤ
x1F66	ὥ ὥ ὥ ὥ	Ω Ω Ω Ω	ὥ ὥ ὥ ὥ
x1F67	ὦ ὦ ὦ ὦ	Ω Ω Ω Ω	ὦ ὦ ὦ ὦ
x1F68	ὧ ὧ ὧ	Ω Ω Ω	ὠ ὠ ὠ
x1F69	Ὠ Ὠ Ὠ	Ω Ω Ω	ὠ ὠ ὠ
x1F6A	Ὧ Ὧ Ὧ Ὧ	Ω Ω Ω Ω	ὡ ὡ ὡ ὡ
x1F6B	ὰ ὰ ὰ ὰ	Ω Ω Ω Ω	ὢ ὢ ὢ ὢ
x1F6C	ά ά ά ά	Ω Ω Ω Ω	ὣ ὣ ὣ ὣ
x1F6D	ὲ ὲ ὲ ὲ	Ω Ω Ω Ω	ὤ ὤ ὤ ὤ
x1F6E	έ έ έ έ	Ω Ω Ω Ω	ὥ ὥ ὥ ὥ
x1F6F	ὴ ὴ ὴ ὴ	Ω Ω Ω Ω	ὦ ὦ ὦ ὦ
x1F70	à à à	A A A	à à à
x1F71	á á á	A A A	á á á
x1F72	è è è	E E E	è è è
x1F73	é é é	E E E	é é é
x1F74	è è è	H H H	è è è
x1F75	é é é	H H H	é é é
x1F76	ì ì ì	I I I	ì ì ì
x1F77	í í í	I I I	í í í
x1F78	ò ò ò	O O O	ò ò ò
x1F79	ó ó ó	O O O	ó ó ó
x1F7A	ù ù ù	Υ Υ Υ	ù ù ù
x1F7B	ú ú ú	Υ Υ Υ	ú ú ú
x1F7C	ò ò ò	Ω Ω Ω	ò ò ò
x1F7D	ó ó ó	Ω Ω Ω	ó ó ó
x1F80	ǎ ǎ ǎ	A. A. A.	ǎ ǎ ǎ
x1F81	ǎ ǎ ǎ	A. A. A.	ǎ ǎ ǎ
x1F82	ǎ ǎ ǎ ǎ	A. A. A. A.	ǎ ǎ ǎ ǎ
x1F83	ǎ ǎ ǎ ǎ	A. A. A. A.	ǎ ǎ ǎ ǎ
x1F84	ǎ ǎ ǎ ǎ	A. A. A. A.	ǎ ǎ ǎ ǎ
x1F85	ǎ ǎ ǎ ǎ	A. A. A. A.	ǎ ǎ ǎ ǎ
x1F86	ǎ ǎ ǎ ǎ	A. A. A. A.	ǎ ǎ ǎ ǎ
x1F87	ǎ ǎ ǎ ǎ	A. A. A. A.	ǎ ǎ ǎ ǎ
x1F88	ǎ ǎ ǎ	A. A. A.	ǎ ǎ ǎ

x1F89	À Á Â	À Á Â	Ǻ Ǻ Ǻ
x1F8A	Ã Ä Å	À Á Â	ǻ ǻ ǻ
x1F8B	À Á Â	À Á Â	Ǽ Ǽ Ǽ
x1F8C	À Á Â	À Á Â	ǽ ǽ ǽ
x1F8D	À Á Â	À Á Â	ǿ ǿ ǿ
x1F8E	Ǻ Ǻ Ǻ	À Á Â	ǿ ǿ ǿ
x1F8F	Ǻ Ǻ Ǻ	À Á Â	ǿ ǿ ǿ
x1F90	Ħ Ħ Ħ	H H H	Ħ Ħ Ħ
x1F91	Ħ Ħ Ħ	H H H	Ħ Ħ Ħ
x1F92	Ħ Ħ Ħ	H H H	Ħ Ħ Ħ
x1F93	Ħ Ħ Ħ	H H H	Ħ Ħ Ħ
x1F94	Ħ Ħ Ħ	H H H	Ħ Ħ Ħ
x1F95	Ħ Ħ Ħ	H H H	Ħ Ħ Ħ
x1F96	Ħ Ħ Ħ	H H H	Ħ Ħ Ħ
x1F97	Ħ Ħ Ħ	H H H	Ħ Ħ Ħ
x1F98	Ħ Ħ Ħ	H H H	Ħ Ħ Ħ
x1F99	Ħ Ħ Ħ	H H H	Ħ Ħ Ħ
x1F9A	Ħ Ħ Ħ Ħ	H H H	Ħ Ħ Ħ Ħ
x1F9B	Ħ Ħ Ħ Ħ	H H H	Ħ Ħ Ħ Ħ
x1F9C	Ħ Ħ Ħ Ħ	H H H	Ħ Ħ Ħ Ħ
x1F9D	Ħ Ħ Ħ Ħ	H H H	Ħ Ħ Ħ Ħ
x1F9E	Ħ Ħ Ħ Ħ	H H H	Ħ Ħ Ħ Ħ
x1F9F	Ħ Ħ Ħ Ħ	H H H	Ħ Ħ Ħ Ħ
x1FA0	Ω Ω Ω	Ω Ω Ω	Ω Ω Ω
x1FA1	Ω Ω Ω	Ω Ω Ω	Ω Ω Ω
x1FA2	Ω Ω Ω	Ω Ω Ω	Ω Ω Ω
x1FA3	Ω Ω Ω	Ω Ω Ω	Ω Ω Ω
x1FA4	Ω Ω Ω	Ω Ω Ω	Ω Ω Ω
x1FA5	Ω Ω Ω	Ω Ω Ω	Ω Ω Ω
x1FA6	Ω Ω Ω	Ω Ω Ω	Ω Ω Ω
x1FA7	Ω Ω Ω	Ω Ω Ω	Ω Ω Ω
x1FA8	Ω Ω Ω	Ω Ω Ω	Ω Ω Ω
x1FA9	Ω Ω Ω	Ω Ω Ω	Ω Ω Ω
x1FAA	Ω Ω Ω Ω	Ω Ω Ω Ω	Ω Ω Ω Ω
x1FAB	Ω Ω Ω Ω	Ω Ω Ω Ω	Ω Ω Ω Ω
x1FAC	Ω Ω Ω Ω	Ω Ω Ω Ω	Ω Ω Ω Ω
x1FAD	Ω Ω Ω Ω	Ω Ω Ω Ω	Ω Ω Ω Ω
x1FAE	Ω Ω Ω Ω	Ω Ω Ω Ω	Ω Ω Ω Ω
x1FAF	Ω Ω Ω Ω	Ω Ω Ω Ω	Ω Ω Ω Ω
x1FB0	Ǻ Ǻ Ǻ	Ǻ Ǻ Ǻ	Ǻ Ǻ Ǻ
x1FB1	Ǻ Ǻ Ǻ	Ǻ Ǻ Ǻ	Ǻ Ǻ Ǻ
x1FB2	Ǻ Ǻ Ǻ	Ǻ Ǻ Ǻ	Ǻ Ǻ Ǻ
x1FB3	Ǻ Ǻ Ǻ	Ǻ Ǻ Ǻ	Ǻ Ǻ Ǻ
x1FB4	Ǻ Ǻ Ǻ	Ǻ Ǻ Ǻ	Ǻ Ǻ Ǻ
x1FB6	Ǻ Ǻ Ǻ	Ǻ Ǻ Ǻ	Ǻ Ǻ Ǻ
x1FB7	Ǻ Ǻ Ǻ	Ǻ Ǻ Ǻ	Ǻ Ǻ Ǻ
x1FB8	Ǻ Ǻ Ǻ	Ǻ Ǻ Ǻ	Ǻ Ǻ Ǻ
x1FB9	Ǻ Ǻ Ǻ	Ǻ Ǻ Ǻ	Ǻ Ǻ Ǻ
x1FBA	Ǻ Ǻ Ǻ	Ǻ Ǻ Ǻ	Ǻ Ǻ Ǻ
x1FBB	Ǻ Ǻ Ǻ	Ǻ Ǻ Ǻ	Ǻ Ǻ Ǻ
x1FBC	Ǻ Ǻ Ǻ	Ǻ Ǻ Ǻ	Ǻ Ǻ Ǻ

x1FC2	ἡ ἡ ἡ	H H H	ἡ ἡ ἡ
x1FC3	η η η	H H H	η η η
x1FC4	ή ή ή	H H H	ή ή ή
x1FC6	ῆ ῆ ῆ	H H H	ῆ ῆ ῆ
x1FC7	ῆ ῆ ῆ	H H H	ῆ ῆ ῆ
x1FC8	Έ Έ Έ	E E E	Έ Έ Έ
x1FC9	Έ Έ Έ	E E E	Έ Έ Έ
x1FCA	Ή Ή Ή	H H H	ή ή ή
x1FCB	Ή Ή Ή	H H H	ή ή ή
x1FCC	H H H	H H H	η η η
x1FD0	ϊ ι ι	Ϊ Ϊ Ϊ	ϊ ι ι
x1FD1	ι ι ι	Ι Ι Ι	ι ι ι
x1FD2	ϊ ι ι ι ι ι	Ϊ Ϊ Ϊ Ϊ Ϊ Ϊ	ϊ ι ι ι ι ι
x1FD3	ι ι ι ι ι ι	Ι Ι Ι Ι Ι Ι	ι ι ι ι ι ι
x1FD6	ϊ ι ι	Ι Ι Ι	ϊ ι ι
x1FD7	ϊ ι ι ι ι ι	Ϊ Ϊ Ϊ Ϊ Ϊ Ϊ	ϊ ι ι ι ι ι
x1FD8	Ϊ Ϊ Ϊ	Ϊ Ϊ Ϊ	ϊ ι ι
x1FD9	Ι Ι Ι	Ι Ι Ι	ι ι ι
x1FDA	Ί Ί Ί	Ι Ι Ι	ι ι ι
x1FDB	Ί Ί Ί	Ι Ι Ι	ι ι ι
x1FE0	ϋ ϋ ϋ	Υ Υ Υ	ϋ ϋ ϋ
x1FE1	υ υ υ	Υ Υ Υ	υ υ υ
x1FE2	ϋ ϋ ϋ ϋ ϋ ϋ	Υ Υ Υ Υ Υ Υ	ϋ ϋ ϋ ϋ ϋ ϋ
x1FE3	υ υ υ υ υ υ	Υ Υ Υ Υ Υ Υ	υ υ υ υ υ υ
x1FE4	ρ ρ ρ	P P P	ρ ρ ρ
x1FE5	ρ ρ ρ	P P P	ρ ρ ρ
x1FE6	υ υ υ	Υ Υ Υ	υ υ υ
x1FE7	ϋ ϋ ϋ ϋ ϋ ϋ	Υ Υ Υ Υ Υ Υ	ϋ ϋ ϋ ϋ ϋ ϋ
x1FE8	Υ Υ Υ	Υ Υ Υ	υ υ υ
x1FE9	Υ Υ Υ	Υ Υ Υ	υ υ υ
x1FEA	Υ Υ Υ	Υ Υ Υ	υ υ υ
x1FEB	Υ Υ Υ	Υ Υ Υ	υ υ υ
x1FEC	Ρ Ρ Ρ	P P P	ρ ρ ρ
x1FF3	ϖ ϖ ϖ	Ω Ω Ω	ϖ ϖ ϖ
x1FF4	ϖ ϖ ϖ	Ω Ω Ω	ϖ ϖ ϖ
x1FF5	ϖ ϖ ϖ	Ω Ω Ω	ϖ ϖ ϖ
x1FF6	ω ω ω	Ω Ω Ω	ω ω ω
x1FF7	ϖ ϖ ϖ	Ω Ω Ω	ϖ ϖ ϖ
x1FF8	Ο Ο Ο	Ο Ο Ο	ο ο ο
x1FF9	Ο Ο Ο	Ο Ο Ο	ο ο ο
x1FFA	Ω Ω Ω	Ω Ω Ω	ω ω ω
x1FFB	Ω Ω Ω	Ω Ω Ω	ω ω ω
x1FFC	Ω Ω Ω	Ω Ω Ω	ω ω ω

4 Discussion

This section only discusses differences and limitations due to the (re)definitions of the *alphabet* package. For a general discussion of characters supported by *greek-fontenc*, see [char-list.pdf](#).

4.1 Pre-composed vs. combining characters

All input variants select pre-composed characters if such a character exists.¹

4.2 Symbol variants

For several Greek letters, there are alternative glyphs which may have a different semantic in a mathematical context. Unicode reserves code points for the alternative glyphs (naming them SYMBOL as opposed to LETTER). Some of these symbols are available as `\var<name>` macros in TeX's mathematical mode. *alphabet* makes them available in text mode, too. A full list of symbol-variant macros is in Table 1 in [alphabet-doc.pdf](#).

In text, the alternative glyphs are considered typographical variants without special meaning. The 8-bit LGR font encoding does not allocate code points for them. *Babel-greek*, *textalpha* and *alphabet* provide the `normalize-symbols` option (ignored with Xe/LuaTeX) that is also used in this test document.

Test the handling of symbol variants in text

literal letter, LICR, `\var<name>`, `\<name>symbol`, literal symbol

No case change

ββδδ εεε εεεε θθθθ ΘΘΘΘ κκκκκκ ππππ ρρρρ ϕϕϕϕ

MakeUppercase selects the matching capital letter:

BBBBB EEEEE ΘΘΘΘ ΘΘΘΘ ΚΚΚΚΚ ΠΠΠΠ ΡΡΡΡ ΦΦΦΦ

MakeLowercase selects the lowercase letter (not the symbol):

ββ εε θθ θθ κκ ππ ρρ ϕϕ.

4.3 Hiatus

Tonos and psili mark a *hiatus* (break-up) if placed on the first of two vowels that would otherwise form a diphthong. A dialytika must be placed on the second vowel if they are dropped:

αι αυ ει αι αυ ει αυ → Αῖ Αῦ Εῖ Αῖ Αῦ Εῖ Αῖ (literal)

αι αυ ει αι αυ ει αυ → Αῖ Αῦ Εῖ Αῖ Αῦ Εῖ Αῖ (named+LICR)

αι αυ ει αι αυ ει αυ → Αῖ Αῦ Εῖ Αῖ Αῦ Εῖ Αῖ (short+LICR)

The hiatus feature does not work correctly with the pre-2022 `\MakeUppercase`.

¹With LuaTeX, this document selects the Harfbuzz renderer to enable the NFC normalization (see source `char-list-alphabet.tex`).