HITAG Classification

Figure 1. HITAG Family

CHIP	XMA
HITAG2	
PCF7936A	N
PCF7941A	N
PCF7945A	N
PCF7952A	N
PCF7953A	N
PCF7961A	N
HITAG2+	
PCF7941A	N
PCF7945A	N
PCF7946A	N
PCF7952A	N
PCF7953A	N
PCF7961A	N
HITAG2+EE	
PCF7941A	512
PCF7945A	1024
PCF7947A	512
PCF7952A	512
PCF7953A	1024
PCF7961A	512
HITAG2 Extended	
PCF7937E	512
PCF7941E	512
PCF7952E	512
PCF7961E	512
HITAG3	
PCF7938X	Y
PCF7941X	Y
PCF7952X	Y
PCF7953X	Y
PCF7961X	Y
HITAG Pro	
PCF7939P	1024
PCF7945P	1024
PCF7953P	1024
HITAG Pro2	
NCF2970V	Y
PCF7939V	Y
PCF7945V	Y
PCF7953V	Y
HITAG AES	
PCF7939M	Y
PCF7945M	Y
PCF7953M	Y
PCF7961M	Y

The Figure 1 reperents the original NXP classification of the HITAG family.

Unlike the old conception in Tango where user could make a choice from a listing of "PCF7936, PCF7941" etc., the original conception confers more significant properties to the letter that follows after numbers, e.g. there is a great difference between PCF7941A and PCF7941X.

The names of transponders are splitted by transponder peripherial capacity

Figure 2. Chip Functionality

HITAG2	Basic functions No BSEL bit
HITAG2+	Basic functions The mark "+": chip has BSEL bit
HITAG2+EE	Basic functions The mark "+": chip has BSEL bit The mark "EE": chip has XMA
HITAG2 Ext.	No BSEL bit Chip has XMA
HITAG3	96-bit encryption Chip has XMA
HITAG Pro	128-bit encryption No TMCF Chip has XMA
HITAG Pro2	Same as HITAG Pro, more flexible remote functionality
HITAG AES	

XMA   Extended Memory Array (additional EEPROM)
BSEL   Bank Select bit in TMCF. Choice between USER and REMO data

Tango combines HITAG2+ and HITAG2+EE in one. The difference between both these types is XMA availability. TMCF is the same for both types.

Figure 3. Relationship between Tango and NXP

Tango menu	NXP Name
HITAG2	HITAG2
HITAG2+EE	HITAG2+ and HITAG2+EE
HITAG2 Extended	HITAG2 Extended
HITAG3	HITAG3
HITAG Pro	HITAG Pro

AUTODETECT
Usually in practice a chip name is unknown. Start your work with the "Autodetect" function. Making the autodetect, Tango selects a better choice for a chip. However, Tango cannot differ HITAG2 and HITAG2+ and makes choice "HITAG2". In this case it may be necessary to change the choice manually.

ASSISTANT
Assistant prevents incorrect choices of a chip type. In case of attempt to read/write a transponder of another type has been detected, the warning dialog will appear. It is possible to disable the Assistant.
Assistant bases its choice on the chip IDE mark (see Figure 4).
This fact means that the assistant warning is not an absolut truth and may produce false alarms.

Figure 4. IDE mark

Mark	Chip
1	PCF7936
2	PCF7946
3	PCF7947
4	PCF7942/44*
5	PCF7943*
6	PCF7941
7	PCF7952
8	PCF7961
9	PCF7945/53
B	PCF7937

IDE Mark

Each HITAG chip contains an unique Device Identifier (IDE) so called a Serial Number.

Bit 7 ot 4 of the IDE serve the function of a chip type identification.

Example. IDE is 2A 48 E2 **1**6, the IDE mark is "1".

HITAG family has reserved certain numbers for chips, see Figure 4.

* PCF7922/43/44 used for BMW only

TMCF

Transponder and Memory Configuration is a set of bits, located in page 3, the leftmost byte.
Access to a transponder is controlled by the TMCF. Various types of transponders have different set of bits in the TMCF.

Figure 5. TMCF Configuration Bits

Name	Full Name	Description	Note
BSEL	Bank Select	0 - Remote pages 1 - User pages	
DCS	Data Coding Select	0 - Manchester 1 - Biphase	
ENC	Enable Cipher Mode	0 - Password Mode 1 - Crypto Mode	
EQM	Equalizer Mode	Communication protocol	
MS0 MS1	Mode Select 0,1	Configures device to support Read Only modes.	Not compatible for HITAG Avoid to change them.
PG3L	Page 3 Lock	Lockes Page3 against writing	OTP
PWP0	Protect Write User Page 6 and 7	Write protection of USER2 and USER3	OTP
PWP1	Protect Write User Page 4 and 5	Write protection of USER0 and USER1	OTP
PWUP	Protect Write User Pages	Assignes write protection for USER0-4	
RCFL	Remote Configuration Lock	Lockes Remote pages against Reading and Writing	OTP
SKL	Secret Key Lock	Read/Write protection of Pages 1 and 2	OTP

OTP - One Time Programmable. Once changed cannot be altered

BSEL

We should pay particular attention to the bit BSEL working with HITAG2+ and HITAG2+EE. The BSEL bit is the 3rd bit of the TMCF. It serves for remapping pages 4 - 7 of a transponder.
At the same time the 3rd bit TMCF of HITAG2 is the ENC bit. The ENC bit controls chip access mode.

The Autodetect function is unable to distinguish HITAG2 and HITAG2+.
For this reason, careful actions should be applied during the TMCF programming.

The HITAG2+EE has XMA feature and Autodetect function makes choice as "HITAG2+EE".