GFTVRCE V0050

Chameleon Ultra RFID Emulator User Manual

Model: V0050

Introduction

The Chameleon Ultra is a versatile and portable RFID tool designed for emulation, cloning, and testing of various RFID systems. It serves as a comprehensive solution for managing RFID tags and cards, offering functionalities for security professionals, engineers, and hobbyists. This manual provides detailed instructions for the setup, operation, and maintenance of your Chameleon Ultra device.

Figure 1: Front and back view of the Chameleon Ultra device, showcasing its compact design and internal components.

Setup

1. Initial Charging

Upon receiving your Chameleon Ultra, it is recommended to fully charge the device before first use. The device may arrive with a discharged battery.

1. Connect the Chameleon Ultra to a standard USB power source using a compatible USB cable.
2. Observe the charging indicator (if available) on the device. Charging status may be indicated by an LED light.
3. Allow the device to charge until the battery is full.

Figure 2: The Chameleon Ultra connected to a charging cable, illustrating the charging process.

2. Firmware Update (Optional but Recommended)

For optimal performance and access to the latest features, it is advisable to update the device firmware. This process typically requires specific software and technical knowledge.

- Refer to the official Chameleon Ultra documentation or community resources for detailed instructions on firmware updates.
- Ensure your computer has the necessary drivers and software installed (e.g., ProxSpace environment for Windows).
- Follow the specific steps provided by the manufacturer for connecting the device and initiating the firmware update.

Operating Instructions

The Chameleon Ultra offers three primary functionalities: Emulation, Cloning, and Testing.

1. Emulation

Emulation allows the Chameleon Ultra to behave like a specific RFID tag or system, useful for testing and validating RFID readers.

- Program the Chameleon Ultra with specific data and commands using a programming language (e.g., Lua).
- The device will then transmit this data, which RFID readers will interpret as if it originated from a real RFID tag.

2. Cloning

Cloning involves creating a duplicate of an existing RFID tag. This is useful for replacing lost tags or creating multiple copies.

1. Place the Chameleon Ultra in "tag emulation mode."
2. Program the device to mimic the target RFID tag.

3. Use the Chameleon Ultra to read data from the original RFID tag.
4. Write the captured data onto a blank RFID tag to create a clone.

3. Testing

The Chameleon Ultra can be used to test and validate the behavior of RFID readers and systems under various conditions.

- Emulate RFID tags with specific characteristics, such as a weak signal or different operating frequencies.
- Identify potential issues or weaknesses in RFID systems and optimize their performance.

Supported Functions and Card Types

The Chameleon Ultra supports a wide range of RFID card types and functions. Refer to the tables below for detailed compatibility information.

Supported Functions: Low Frequency Reader

Card Type	Encoding Type	Hardware Support	Software Support	Application Layer Support	Note
Non <125KHz/ASK/PSK/FSK>	No	No	No	No	Only 125 kHz RF, Modulation ASK, FSK and PSK.
EM410x	ASK	Support	Support	Support	
T5577	ASK	Support	Support	Support (Write)	
HID Prox	FSK	Support	Support	Not yet implemented	
Indala	PSK	Support	Support	Not yet implemented	
FDX-B	ASK	Support	Support	Not yet implemented	
Paradox	FSK	Support	Support	Not yet implemented	
Keri	PSK	Support	Support	Not yet implemented	
AWID	FSK	Support	Support	Not yet implemented	
ioProx	FSK	Support	Support	Not yet implemented	
Securakey	ASK	Support	Support	Not yet implemented	
Gallagher	ASK	Support	Support	Not yet implemented	
PAC/Stanley	ASK	Support	Support	Not yet implemented	
Presco	ASK	Support	Support	Not yet implemented	
Visa2000	ASK	Support	Support	Not yet implemented	
Viking	ASK	Support	Support	Not yet implemented	
Noralsy	ASK	Support	Support	Not yet implemented	
NexWatch	PSK	Support	Support	Not yet implemented	
Jablotron	ASK	Support	Support	Not yet implemented	

Figure 3: Table detailing supported Low Frequency (LF) card types and their compatibility with hardware, software, and application layers for reading functions.

SUPPORTED FUNCTIONS
LOW FREQUENCY ATTACK

Vulnerability Type	Tag Type	Whether the hardware supports	Does the software support	Whether the application layer supports	Note
Sniffing	125KHz	Support	Support	Not yet implemented	
Brute Force	EM410x ID	Support	Support	Not yet implemented	

SUPPORTED FUNCTIONS
LOW FREQUENCY ATTACK

Card Type	Encoding Type	Whether the hardware supports	Does the software support	Whether the application layer supports	Note
Non <125KHz/ASK/PSK/FSK>	No	No	No	No	Only 125 khz RF, Modulation ASK, FSK and PSK.
Non <125KHz/ASK/PSK/FSK>	No	No	No	No	Only 125 khz RF, Modulation ASK, FSK and PSK.
EM410x	ASK	Support	Support	Support	EM4100 is support(AD 64bit)
T5577	ASK	Support	Support	Not yet implemented	
HID Prox	FSK	Support	Support	Not yet implemented	
Indala	PSK	Support	Support	Not yet implemented	
FDX-B	ASK	Support	Support	Not yet implemented	
Paradox	FSK	Support	Support	Not yet implemented	
Keri	PSK	Support	Support	Not yet implemented	
AWID	FSK	Support	Support	Not yet implemented	
ioProx	FSK	Support	Support	Not yet implemented	
Securakey	ASK	Support	Support	Not yet implemented	
Gallagher	ASK	Support	Support	Not yet implemented	
PAC/Stanley	ASK	Support	Support	Not yet implemented	
Presco	ASK	Support	Support	Not yet implemented	
Visa2000	ASK	Support	Support	Not yet implemented	
Viking	ASK	Support	Support	Not yet implemented	
Noralsy	ASK	Support	Support	Not yet implemented	
NexWatch	PSK	Support	Support	Not yet implemented	
Jablotron	ASK	Support	Support	Not yet implemented	

Supported Functions: Low Frequency Attack

Vulnerability Type	Tag Type	Hardware Support	Software Support	Application Layer Support	Note
Sniffing	125KHz	Support	Support	Not yet implemented	
Brute Force	EM410x ID	Support	Support	Not yet implemented	EM4100 is support(AD 64bit)

Figure 4: Table detailing supported Low Frequency (LF) attack types and their compatibility with hardware, software, and application layers.

Card Type	Encoding Type	Whether the hardware supports	Does the software support	Whether the application layer supports	Note
Non <125KHz/ASK/ PSK/FSK>	No	No	No	No	Only 125 khz RF, Modulation ASK, FSK and PSK.
EM410x	ASK	Support	Support	Support	
T5577	ASK	Support	Support	Support (Write)	
HID Prox	FSK	Support	Support	Not yet implemented	
Indala	PSK	Support	Support	Not yet implemented	
FDX-B	ASK	Support	Support	Not yet implemented	
Paradox	FSK	Support	Support	Not yet implemented	
Keri	PSK	Support	Support	Not yet implemented	
AWID	FSK	Support	Support	Not yet implemented	
ioProx	FSK	Support	Support	Not yet implemented	
Securakey	ASK	Support	Support	Not yet implemented	
Gallagher	ASK	Support	Support	Not yet implemented	
PAC/Stanley	ASK	Support	Support	Not yet implemented	
Presco	ASK	Support	Support	Not yet implemented	
Visa2000	ASK	Support	Support	Not yet implemented	
Viking	ASK	Support	Support	Not yet implemented	
Noralsy	ASK	Support	Support	Not yet implemented	
NexWatch	PSK	Support	Support	Not yet implemented	
Jablotron	ASK	Support	Support	Not yet implemented	

Supported Functions: High Frequency Reader

Card Type	Encoding Type	Hardware Support	Software Support	Application Layer Support	Note
Non <13.56MHz or ISO14443A>	No	No	No	No	NXP RC522 Datasheet
NTAG 21x (210-218)	ISO14443A/106 kbit/s	Support	Support	Not yet implemented	
MIFARE Ultralight	ISO14443A/106 kbit/s	Support	Support	Not yet implemented	
MIFARE Ultralight EV1	ISO14443A/106 kbit/s	Support	Support	Not yet implemented	
MIFARE Ultralight C	ISO14443A/106 kbit/s	Support	Support	Not yet implemented	
MIFARE Classic 1K/2K/4K (4B/7B)	ISO14443A/106 kbit/s	Support	Support	Not yet implemented	
MIFARE DESFire	ISO14443A High Rate	Supports low rates, or possibly higher rates	Supports low rates, or possibly higher rates	Not yet implemented	
MIFARE DESFire EV1	ISO14443A High Rate	Supports low rates, or possibly higher rates	Supports low rates, or possibly higher rates	Not yet implemented	Backward compatible
MIFARE DESFire EV2	ISO14443A High Rate	Supports low rates, or possibly higher rates	Supports low rates, or possibly higher rates	Not yet implemented	
MIFARE PLUS	ISO14443A High Rate	Supports low rates, or possibly higher rates	Supports low rates, or possibly higher rates	Not yet implemented	

Figure 5: Table detailing supported High Frequency (HF) card types and their compatibility with hardware, software, and application layers for reading functions.

SUPPORTED FUNCTIONS
HIGH FREQUENCY READER

Card Type	Encoding Type	Whether the hardware supports	Does the software support	Whether the application layer supports	Note
Non <13.56MHz or ISO14443A>	No	No	No	No	NXP RC522 Datasheet
NTAG 21x (210-218)	ISO14443A/106 kbit/s	Support	Support	Not yet implemented	
MIFARE Ultralight	ISO14443A/106 kbit/s	Support	Support	Not yet implemented	
MIFARE Ultralight Ev1	ISO14443A/106 kbit/s	Support	Support	Not yet implemented	
MIFARE Ultralight C	ISO14443A/106 kbit/s	Support	Support	Not yet implemented	
MIFARE Classic 1K/2K/4K (4B/7B)	ISO14443A/106 kbit/s	Support	Support	Support	
MIFARE DESFire	ISO14443A High Rate	Supports low rates, or possibly higher rates	Supports low rates, or possibly higher rates	Not yet implemented	
MIFARE DESFire EV1	ISO14443A High rate	Supports low rates, or possibly higher rates	Supports low rates, or possibly higher rates	Not yet implemented	Backward compatible
MIFARE DESFire EV2	ISO14443A High rate	Supports low rates, or possibly higher rates	Supports low rates, or possibly higher rates	Not yet implemented	
MIFARE PLUS	ISO14443A High rate	Supports low rates, or possibly higher rates	Supports low rates, or possibly higher rates	Not yet implemented	

Supported Functions: High Frequency Attack

Attack Type	Tag Type	Hardware Support	Software Support	Application Layer Support	Note
Sniffing	No	No	No	No	
MFKEY32 V2	MIFARE Classic	Support	Support	Support	MIFARE Classic Protection
Darkside	MIFARE Classic	Support	Support	Support	Encrypted 4 bit NAck
Nested	MIFARE Classic	Support	Support	Support	PRNG (Distance guess)
StaticNested	MIFARE Classic	Support	Support	Not yet implemented	PRNG (2NT Fast Decrypt)
HardNested	MIFARE Classic	Support	Support	Support	No
Relay attack	ISO14443A	Support	Support	Support	No

Figure 6: Table detailing supported High Frequency (HF) attack types and their compatibility with hardware, software, and application layers.

SUPPORTED FUNCTIONS
HIGH FREQUENCY ATTACK

Attack Type	Tag Type	Whether the hardware supports	Does the software support	Whether the application layer supports	Note
Sniffing	No	No	No	No	
MFKEY32 V2	MIFARE Classic	Support	Support	Support	MIFARE Classic Detection
Darkside	MIFARE Classic	Support	Support	Support	Encrypted 4 bit NAck
Nested	MIFARE Classic	Support	Support	Support	PRNG (Distance guess)
StaticNested	MIFARE Classic	Support	Support	Not yet implemented	PRNG (2NT Fast Decrypt)
HardNested	MIFARE Classic	Support	Support	Not yet implemented	No
Relay attack	ISO14443A	Support	Support	Not yet implemented	No

SUPPORTED FUNCTIONS
HIGH FREQUENCY SIMULATION

Card Type	Encoding Type	Whether the hardware supports	Does the software support	Whether the application layer supports	Note
Non <13.56MHz or ISO14443A>	No	No	No	No	NRF52 NFC Module
NTAG 21x (210-218)	ISO14443A/106 kbit/s	Support	Support	Not yet implemented	
MIFARE Ultralight	ISO14443A/106 kbit/s	Support	Support	Not yet implemented	
MIFARE Ultralight Ev1	ISO14443A/106 kbit/s	Support	Support	Not yet implemented	
MIFARE Ultralight C	ISO14443A/106 kbit/s	Support	Support	Not yet implemented	
MIFARE Classic1K/2K/4K (4B/7B)	ISO14443A/106 kbit/s	Support	Support	Support	
MIFARE DESFire	ISO14443A High Rate	Only supported Low rate	Only supported Low rate	Not yet implemented	
MIFARE DESFire EV1	ISO14443A High rate	Only supported Low rate	Only supported Low rate	Not yet implemented	Backward compatible
MIFARE DESFire EV2	ISO14443A High rate	Only supported Low rate	Only supported Low rate	Not yet implemented	
MIFARE PLUS	ISO14443A High rate	Only supported Low rate	Only supported Low rate	Not yet implemented	

Supported Functions: High Frequency Simulation

Card Type	Encoding Type	Hardware Support	Software Support	Application Layer Support	Note
Non <13.56MHz or ISO14443A>	No	No	No	No	NRF52 NFC Module
NTAG 21x (210-218)	ISO14443A/106 kbit/s	Support	Support	Not yet implemented	
MIFARE Ultralight	ISO14443A/106 kbit/s	Support	Support	Not yet implemented	
MIFARE Ultralight EV1	ISO14443A/106 kbit/s	Support	Support	Not yet implemented	
MIFARE Ultralight C	ISO14443A/106 kbit/s	Support	Support	Not yet implemented	
MIFARE Classic 1K/2K/4K (4B/7B)	ISO14443A/106 kbit/s	Support	Support	Not yet implemented	
MIFARE DESFire	ISO14443A High Rate	Only supported Low rate	Only supported Low rate	Not yet implemented	
MIFARE DESFire EV1	ISO14443A High Rate	Only supported Low rate	Only supported Low rate	Not yet implemented	Backward compatible
MIFARE DESFire EV2	ISO14443A High Rate	Only supported Low rate	Only supported Low rate	Not yet implemented	
MIFARE PLUS	ISO14443A High Rate	Only supported Low rate	Only supported Low rate	Not yet implemented	

Figure 7: Table detailing supported High Frequency (HF) simulation types and their compatibility with hardware, software, and application layers.

SUPPORTED FUNCTIONS
HIGH FREQUENCY ATTACK

Attack Type	Tag Type	Whether the hardware supports	Does the software support	Whether the application layer supports	Note
Sniffing	No	No	No	No	
MFKEY32 V2	MIFARE Classic	Support	Support	Support	MIFARE Classic Detection
Darkside	MIFARE Classic	Support	Support	Support	Encrypted 4 bit NAck
Nested	MIFARE Classic	Support	Support	Support	PRNG (Distance guess)
StaticNested	MIFARE Classic	Support	Support	Not yet implemented	PRNG (2NT Fast Decrypt)
HardNested	MIFARE Classic	Support	Support	Not yet implemented	No
Relay attack	ISO14443A	Support	Support	Not yet implemented	No

SUPPORTED FUNCTIONS
HIGH FREQUENCY SIMULATION

Card Type	Encoding Type	Whether the hardware supports	Does the software support	Whether the application layer supports	Note
Non <13.56MHz or ISO14443A>	No	No	No	No	NRF52 NFC Module
NTAG 21x (210-218)	ISO14443A/106 kbit/s	Support	Support	Not yet implemented	
MIFARE Ultralight	ISO14443A/106 kbit/s	Support	Support	Not yet implemented	
MIFARE Ultralight Ev1	ISO14443A/106 kbit/s	Support	Support	Not yet implemented	
MIFARE Ultralight C	ISO14443A/106 kbit/s	Support	Support	Not yet implemented	
MIFARE Classic1K/2K/4K (4B/7B)	ISO14443A/106 kbit/s	Support	Support	Support	
MIFARE DESFire	ISO14443A High Rate	Only supported Low rate	Only supported Low rate	Not yet implemented	
MIFARE DESFire EV1	ISO14443A High rate	Only supported Low rate	Only supported Low rate	Not yet implemented	Backward compatible
MIFARE DESFire EV2	ISO14443A High rate	Only supported Low rate	Only supported Low rate	Not yet implemented	
MIFARE PLUS	ISO14443A High rate	Only supported Low rate	Only supported Low rate	Not yet implemented	

SPECIFICATIONS

Key technical specifications for the Chameleon Ultra device:

- **Manufacturer:** GFTVRCE
- **Model Number:** V0050
- **Package Dimensions:** 5 x 4.33 x 0.55 inches
- **Item Weight:** 0.634 ounces (0.02 Kilograms)
- **Material:** Polycarbonate (PC)

- **Color:** Black, Gold
- **Display Type:** LCD
- **Included Components:** NFC
- **Batteries required:** No

Function Comparison Chart

A comparison of Chameleon Ultra's functions against similar RFID products.

	14A Full Simulation	MIFARE Full Simulation	14A Read	Darkside	Nested	StaticNested	Hardnest	Low Frequency Simulation	Low Frequency Read
ChameleonUltra	✔	✔	✔	✔	✔	✔	✔	✔	✔
ChameleonLite	✔	✔	x	x	x	x	x	✔	x
ChameleonTiny	✔	but slow	UID Only	x	x	x	x	✔	x
FlipperZero	✔	but slow	Default Keys Only	x	x	x	x	✔	✔
Keysy	x	x	x	x	x	x	x	x	x

Figure 8: Comparison chart of Chameleon Ultra's RFID functions against other similar devices.

Performance Comparison Chart

A comparison of Chameleon Ultra's performance metrics against similar RFID products.

	Power Consumption of Simulation	Charging Cycle For Daily Use	Battery Reader Read Rate (High Frequency)	AUTH-nt Frame Delay Time	AUTH-nr-at Frame Delay Time	AUTH-at Frame Delay Time
ChameleonUltra	7mA	6 Months	100%	2244uS	3348uS	5652uS
ChameleonLite	7mA	6 Months	100%	2244uS	3348uS	5652uS
ChameleonTiny	35mA	2 Months	20%	9316uS	5412uS	9380uS
FlipperZero	42mA	1 Week	20%	6004uS	8212uS	19156uS
Keysy	x	x	x	x	x	x

Figure 9: Performance comparison chart of Chameleon Ultra against other similar RFID devices.

TROUBLESHOOTING

If you encounter issues with your Chameleon Ultra, consider the following common troubleshooting steps:

- **Device Not Responding/Powering On:** Ensure the device is fully charged. Connect it to a reliable USB power source and allow sufficient charging time.
- **Unable to Read/Scan Cards (LF or HF):**
  - Verify that the card type you are attempting to read is supported by the Chameleon Ultra (refer to the "Supported Functions" tables).
  - Ensure the card is placed correctly and within the optimal reading range of the device.
  - Check if the correct frequency (LF or HF) is selected on the device or in the accompanying software.
  - If specific card types (e.g., LF 125kHz) are not reading, confirm that your device's firmware supports these functions, as some features might be under development or require specific configurations.
- **Connectivity Issues (USB/Bluetooth):**
  - For USB connection, ensure the correct drivers are installed on your computer. Try a different USB port or cable.
  - For Bluetooth connection, ensure Bluetooth is enabled on both the Chameleon Ultra and your host device, and that they are properly paired.
- **Firmware Related Issues:** If the device behaves unexpectedly after a firmware update, or if you suspect a corrupted firmware, refer to the official documentation for instructions on how to re-flash or restore the firmware.

Maintenance

Proper maintenance ensures the longevity and optimal performance of your Chameleon Ultra:

- **Cleaning:** Use a soft, dry cloth to clean the exterior of the device. Avoid using harsh chemicals, solvents, or abrasive materials.
- **Storage:** Store the device in a cool, dry place away from direct sunlight, extreme temperatures, and high humidity.
- **Battery Care:** Although the product states "Batteries required: No", implying an internal rechargeable battery, it's good practice to avoid fully discharging the battery frequently. If storing for extended periods, charge the device to about 50% to prolong battery life.
- **Physical Protection:** While durable, avoid dropping the device or subjecting it to strong impacts.

Warranty and Support

For information regarding product warranty, technical support, or service, please refer to the official website of GFTVRCE or contact their customer support channels. Keep your purchase receipt as proof of purchase for any warranty claims.