2.5 Key Codes

Table 2-2 Key Codes – Top Keypad

RCU Key Description*	NEC IR *expanded NEC type code in Hex*	RF Payloads *(code in Decimal)*	
		Byte 0*	Byte 1
TiVo Key	0D	TiVo	0x0d
TV Pwr	10	ZRC	0x40
Live TV	11	TiVo	0x11
Input	34	ZRC	0x34
Info	13	ZRC	0x35
Back	8D	ZRC	0x0d
Zoom	44	TiVo	0x44
Guide	36	ZRC	0x53
Up	14	ZRC	0x01
Left	17	ZRC	0x03
Select	19	ZRC	0x00
Right	15	ZRC	0x04
Down	16	ZRC	0x02
Vol Up	1C	ZRC	0x41
Ch Up	1E	ZRC	0x30
Vol Down	1D	ZRC	0x42
Ch Down	1F	ZRC	0x31
Mute	1B	ZRC	0x65
Rec	20	ZRC	0x62
Thumbs down	18	TiVo	0x18
Thumbs up	1A	TiVo	0x1a
Play	21	ZRC	0x44
Rewind	22	ZRC	0x48
Pause	23	ZRC	0x46
Forward	24	ZRC	0x49
Slow	25	TiVo	0x25

RCU Key Description*	NEC IR *expanded NEC type code in Hex*	RF Payloads *(code in Decimal)*	
		Byte 0*	Byte 1
Instant replay	26	ZRC	0x4c
Skip forward	27	ZRC	0x4b
A Yellow	60	ZRC	0x74
B Blue	61	ZRC	0x71
C Red	62	ZRC	0x72
D Green	63	ZRC	0x73
1	28	ZRC	0x21
2	29	ZRC	0x22
3	2A	ZRC	0x23
4	2B	ZRC	0x24
5	2C	ZRC	0x25
6	2D	ZRC	0x26
7	2E	ZRC	0x27
8	2F	ZRC	0x28
9	30	ZRC	0x29
Clear	32	ZRC	0x2c
0	31	ZRC	0x20
Enter (Last)	33	ZRC	0x2b
On Demand	5D	ZRC	0x52
No Remote Key Low Battery Indicator	65		
Slide Open		TiVo	0x95
Slide Closed		TiVo	0x96

** ZRC = Use Table 2-4 RF4CE ZRC Key Command Definitions for Byte 0.*
TiVo = Use Table 2-5 RF4CE TiVo Vendor-specific Command Definitions for Byte 0.

Table 2-3 RF4CE Data Payloads for Key Presses – Bottom Keypad

Key	Alone or with Cap Key				With Sym Key	
	Byte 0*	Byte 1	Byte 2	Byte 5	Byte 2	Byte 5
A or `	TiVo	0x94	Modifier	0x04	0x00	0x35
B or |	TiVo	0x94	Modifier	0x05	0x02	0x31
C	TiVo	0x94	Modifier	0x06	0x00	0x06
D or =	TiVo	0x94	Modifier	0x07	0x00	0x2e
E or +	TiVo	0x94	Modifier	0x08	0x02	0x2e
F or [	TiVo	0x94	Modifier	0x09	0x00	0x2f
G or]	TiVo	0x94	Modifier	0x0a	0x00	0x30
H or <	TiVo	0x94	Modifier	0x0b	0x02	0x36
I or ?	TiVo	0x94	Modifier	0x0c	0x02	0x38
J or >	TiVo	0x94	Modifier	0x0d	0x02	0x37
K or /	TiVo	0x94	Modifier	0x0e	0x00	0x38
L or ‘	TiVo	0x94	Modifier	0x0f	0x00	0x35
M or .	TiVo	0x94	Modifier	0x10	0x00	0x37
N or ,	TiVo	0x94	Modifier	0x11	0x00	0x36
O or “	TiVo	0x94	Modifier	0x12	0x02	0x36
P	TiVo	0x94	Modifier	0x13	0x00	0x13
Q or ~	TiVo	0x94	Modifier	0x14	0x02	0x35
R or {	TiVo	0x94	Modifier	0x15	0x02	0x2f
S or -	TiVo	0x94	Modifier	0x16	0x00	0x2d
T or }	TiVo	0x94	Modifier	0x17	0x02	0x30
U or :	TiVo	0x94	Modifier	0x18	0x02	0x33
V or \	TiVo	0x94	Modifier	0x19	0x00	0x31
W or _	TiVo	0x94	Modifier	0x1a	0x02	0x2d
X	TiVo	0x94	Modifier	0x1b	0x00	0x1b
Y or ;	TiVo	0x94	Modifier	0x1c	0x00	0x33
Z	TiVo	0x94	Modifier	0x1d	0x00	0x1d
1 or !	TiVo	0x94	0	0x59	0x02	0x59
2 or @	TiVo	0x94	0	0x5a	0x02	0x5a
3 or #	TiVo	0x94	0	0x5b	0x02	0x5b
4 or $	TiVo	0x94	0	0x5c	0x02	0x5c
5 or %	TiVo	0x94	0	0x5d	0x02	0x5d
6 or ^	TiVo	0x94	0	0x5e	0x02	0x5e
7 or &	TiVo	0x94	0	0x5f	0x02	0x5f
8 or *	TiVo	0x94	0	0x60	0x02	0x60
9 or (	TiVo	0x94	0	0x61	0x02	0x61
0 or)	TiVo	0x94	0	0x62	0x02	0x62
Enter	TiVo	0x94	0	0x28	0	0x28
Backspace	TiVo	0x94	0	0x2a	0	0x2a

Table 2-3 RF4CE Data Payloads for Key Presses – Bottom Keypad

Key	Alone or with Cap Key				With Sym Key	
	Byte 0*	Byte 1	Byte 2	Byte 5	Byte 2	Byte 5
Space	TiVo	0x94	0	0x2c	0	0x2c
Clear	TiVo	0x94	0	0x9c	0	0x9c
Left	TiVo	0x94	0	0x50	0	0x50
_Up	TiVo	0x94	0	0x52	0	0x52
Select	TiVo	0x94	0	0x2c	0	0x2c
Down	TiVo	0x94	0	0x51	0	0x51
Right	TiVo	0x94	0	0x4f	0	0x4f
Search	TiVo	0x93	NA	NA	NA	NA

* *ZRC = Use **Table 2-4 RF4CE ZRC Key Command Definitions** for Byte 0.*
*TiVo = Use **Table 2-5 RF4CE TiVo Vendor-specific Command Definitions** for Byte 0.*

2.6 RF Mode Operation

RF mode is entered by pairing the RCU to a TiVo target device as described in Section 2.2. When operating in RF mode all of the keys will send the RF4CE codes as specified in Table 2-4. This includes the AV remote keys which will send the RF4CE command followed by the appropriate IR command. The key presses will be sent multi-channel with Acknowledgement. If the key can't be sent successfully after 200 ms then the key press will be transferred using IR.

Basic RCU functions are supported via standard ZRC codes as defined by Reference [2] wherever possible. Non-standard buttons are defined using RF4CE vendor specific commands that mirror the format of the ZRC command header. Table 2-4 contains the ZRC key press command definitions, Table 2-5 contains TiVo vendor specific commands and Table 2-2 defines the mapping of key presses on the RCU to the RF4CE codes in the payload of the corresponding commands. "TiVo" and "ZRC" in Table 2-2 refer to the appropriate command from the corresponding command definition tables.

RF4CE key presses will be sent once when the key is depressed and the key release will be sent once when the key is released. When a key is pressed and held for more than 50 ms, it will send the key repeat code every 50 ms. When in RF mode, for unprogrammed AV remote keys, the TiVo codes will only be sent as RF4CE commands unless the RF transmission fails, as above.

Table 2-4 RF4CE ZRC Key Command Definitions

ZRC Command Code	Description
0x00	Reserved
0x01	User Key Pressed
0x02	User Key Repeated
0x03	User Key Released

Table 2-5 RF4CE TiVo Vendor-specific Command Definitions

TiVo Vendor-specific Command Code	Description
0x60	Reserved
0x61	TiVo Specific Key Pressed
0x62	TiVo Specific Key Repeated
0x63	TiVo Specific Key Released
0x64	Sound Audible Alert
0x65	No Action Required
0x66	Battery Status
0x67	Unpair
0x68	Firmware version request/response
0x69	Invoke test (reserved)

The bottom keypad, with the exception of the search button, will send custom TiVo ZRC codes that translate directly into HID reports. The TiVo vendor keypress ZRC code will be followed by 0x94 and then the 9 bytes of a standard boot protocol keyboard report. Bytes 3, 4 and 6-10 are always 0. Only one valid key + modifier can be sent with each report.

The modifier byte will use the value of 0x02 (Left Shift) to indicate that the caps key has been activated either prior to or in conjunction with the pressing of another key. Some keys are not affected by the pressing of the caps key and the number keys will not use the caps key to activate their alternate function, instead they use the Sym key to activate this function for consistency with the behavior of other symbols.

When pressed just prior to or during the pressing of another button the Sym key will cause the transmission of alternate codes as shown in 2.7.

2.7 Target Initiated Transmission

The RCU will wake up once every three seconds and listen for 24 ms to check if the target has any data to transmit. Subsequent behavior will be defined by the contents of the command. Currently the only valid commands are sound audible alert, unpair or firmware version request.

2.8 Discoverability and Pairing

The RCU will be shipped initially in new mode using standard TiVo IR remote control codes. After sending the IR code associated with a pressed key, the controller in new mode will initiate pairing by issuing discovery request command frames using the TiVo Vendor ID. These will be sent every 1 second for 30 seconds after a key is pressed. The TiVo RF4CE module in the target will only respond to discovery requests with a TiVo vendor ID. The target will respond