

# UNI-T

## Operation Manual

### UTL8200/8500 Series Electronic Load Communication Protocol (SCPI)-V1.0

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Uni-Trend Technology (China) Co., Ltd.

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## SCPI Command Introduction

All the protocol down programming data and up return data are presents by ASCII character string. **A frame data ended by new line separator <LF> (0x0A) or carriage return <CR> (0x0D)** . The protocol supports the data format as following,

- 1) <NR1>, integer, for example **123**.
- 2) <NR2>, a number containing a decimal point, for example **1.234**.
- 3) <NR3>, number express by scientific notation method, for example **1.23E+2**.
- 4) <Nrf>, extension format, including <NR1>, <NR2>, <NR3>, for example **123, 0.123, 1.23E2**.
- 5) <Nrf+>, including <Nrf>,**MIN,MAX**, for example **123, 0.123, 1.23E2, MIN, MAX**. MIN presents the minimum that can be set for load; MAX presents the minimum that can be set for load.
- 6) <Bool>, for example **0 | 1** or **ON | OFF**.

Data unit should follow data, if the unit is the default unit in the follow table, then the unit can be ignore.

Data Type	Default Unit	Support Unit
Voltage	V	mV
Current	A	mA
Power	W	mW
Resistance	ohm	K
Current rate of change	A/mS	A/uS
Voltage rate of change	V/mS	V/uS
Time	mS	S

There are some mnemonic symbols in SCPI command expression. These mnemonic symbols only express the meaning as the following table, it is not the actual contains in SCPI command.

Mnemonic Symbol	Meaning
< >	Parameter abbreviations are enclosed in angle brackets
	Vertical line separate the alternative parameters
[ ]	Optional items are enclosed in square brackets

## Register Description

The protocol supports four groups register,

### 1 ) Questionable Status Register Group

Questionable status register has three of 16bits register; it divided into status register, event register and enable register. When the corresponding bit of status register is changed, the corresponding bit of the event register will be set; if the corresponding bit of enable register is set, it produces an event (QUES set of status byte register.) After performing a read operation of event register, even register will go to zero. The definition of status register as following,

Bit	Name	Meaning
Bit0	VF	
Bit1	OC	The load is on over-current protection
Bit3	OP	The load is on over-power protection
Bit4	OT	The load is on over-heat protection
Bit8	RRV	Remote terminal input reverse polarity
Bit11	UNR	
Bit12	LRV	Local terminal input reverse polarity
Bit13	OV	The load is in over-voltage protection

### 2 ) Standard Event Status Register Group

Standard event status register has two of 16 bits register; it divided into event register and enable register. If the corresponding bit of enable register is set, it produces an event (ESB set of status byte register.) After performing a read operation of event register, even register will go to zero. The definition of event register as following,

Bit	Name	Meaning	Bit Proportion	Answer-back Code
Bit0	OPC	Operation complete	1	"OK! OPC,1"
Bit1	DTE	Data error	2	"Failed! DTE,2"
Bit2	QYE	Query error	4	"Failed! QYE,4"
Bit3	DDE	Device failure	8	"Failed! DDE,8"
Bit4	EXE	Execution error	16	"Failed! EXE,16"
Bit5	CME	Command error	32	"Failed! CME,32"
Bit6	STE	Status error	64	"Failed! STE,64"
Bit7	PON	Load recharge	128	"Failed! PON,128"

### 3 ) Operation Status Register Group

Operation status register has three of 16bits register; it divided into status register, event register and enable register. When the corresponding bit of status register is changed, the corresponding bit of the event register will be set; if the corresponding bit of enable register is set, it produces an event (OPER set of status byte register.) After performing a read operation of event register, even register will go to zero. The definition of status register as following,

Bit	Name	Meaning
Bit0	CAL	The load is on calibration status
Bit5	WTG	The load is on wait for trigger status

### 4) Status Byte Register Group

Status byte register has two of 8bits register, it divided into event reigerster and enable register. When the corresponding bit of event register is changed, it produces an event (RQS set of status byte register.) After performing a read operation of event register, even register will go to zero. The definition of event register as following,

Bit	Name	Meaning
Bit3	QUES	Set, if there is enable query status event
Bit4	MAV	Set, if the output queue has data
Bit5	ESB	Set, if there is enable standard event
Bit6	RQS	
Bit7	OPER	

### Common Command

**\*CLS** command is to delete register as following:

Standard Event Status Register

Questionable Status Register

Operation Status Register

Status Byte Register      error code

**Command syntax**      \*CLS

**\*ESE** command is to compile the enable register value in standard event status register group.

Program parameter is decide which bit1 in standard event register will cause ESB bit set bit1 in stauts byte register group.

**Command syntax**      \*ESE <NRf>

**Parameter**      0~255

**Example**      \*ESE 128

**Query syntax**      \*ESE?

**Return parameterss**      <NR1>

**\*ESR?** command is to read value from standard event register. Afte the command has been executed, value in standard event register will go to zero. The bit definition of standard event register is the same as enable register in standard event status register group.

**Query syntax**      \*ESR?

**Return parameterss**      <NR1>

**\*IDN?** command is to query the relevant information of device. The Return parameterssss are includes four segments, which separate by three comma.

**Query syntax**      \*IDN?

**Return parameterss**      <AARD> segment      Description  
UNI\_T      Manufacturer

xxxxxxxxxx

Serial number

1.2

Software version number

For example, UNI\_T, UTL8511C,xxxxxxxx,1.2

\***OPC** when all previous commands have been executed, OPC bit in standard event register is set bit1.

**Command syntax** \*OPC  
**Query syntax** \*OPC?  
**Return parameters** <NR1>

\***SRE** command is to comply enable register value in status byte register group.

Program parameter is decide which bit 1 in status byte register will cause RQS bit set bit1 in status byte register. The bit definition of enable register in status byte register group is the same as status byte register.

**Command syntax** \*SRE <NRf>  
**Parameter** 0~255  
**Example** \*SRE 128  
**Query syntax** \*SRE?  
**Return parameters** <NR1>

\***STB?** command is to read value of status register. After the command has been executed, value in status register will go to zero.

**Query syntax** \*STB?  
**Return parameters** <NR1>

\***TST?** command is to run a self-inspection and report error.

**Query syntax** \*TST?  
**Return parameters** <NR1> (0 presents no error)

## Essential Command

### System command

**SYSTEM:ERRor?** command is to query error message

**Query syntax** SYSTem:ERRor[:NEXT]?  
**Return parameters** <NR1>, <SRD>  
**Example** SYST:ERR?

**SYSTEM:VERSion?** command is to query SCPI version number of the load, format is YYYY.V

**Query syntax** SYSTem:VERSion?  
**Return parameters** <NR1>, <SRD>

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**Example** SYST:VERS?

**SYSTEM:SENSe** command is to turn on/off remote compensation function.

**Command syntax** SYSTem:SENSe[:STATe] <bool>

**Parameter** 0 | 1 | OFF|ON

**Rest value** OFF

**Example** SYST:SENS ON

**Query syntax** SYSTem:SENSe[:STATe]?

**Return parameterss** 0 | 1

**SYSTEM:LOCAl** command is to enter loack mode, operating the entire key of instrument panel.

**Command syntax** SYSTem:LOCAl

**Example** SYST:LOC

**Query syntax** SYSTem:LOCAl?

**Return parameterss** 0 | 1 (0: close-control, 1: remote-control)

**SYSTEM:REMote** command is to enter remote mode.

The entire key in front panel is forbidden except Shift-Local .Push Shit-Local to exit the mode.

**Command syntax** SYSTem:REMote

**Example** SYST:REM

**Query syntax** SYSTem:REMote?

**Return parameterss** 0 | 1 (0: close-control, 1: remote-control)

**SYSTEM:RWLock** command is to enter remote mode, the entire key in front panel is forbidden.

**Command syntax** SYSTem:RWLock <bool>

**Example** SYST:RWL ON

**Query syntax** SYSTem:RWLock?

**Return parameterss** 0 | 1

### Status Command

**STATus:QUEStionable?** command is to read event register value in questionable register group.

**Query syntax** STATus:QUEStionable[:EVENT]?

**Example** STAT:QUES:EVEN?

**Return parameterss** <NR1>



**STATus:QUESTIONable:CONDition?** command is to read status register value in questionabl register group.

**Query syntax** STATus:QUESTIONable:CONDition?

**Example** STAT:QUES:COND?

**Return parameterss** <NR1>

**STATus:QUESTIONable:ENABLE** command is to set/read enable register value in questionable register group.

**Command syntax** STATus:QUESTIONable:ENABle <NRf+>

**Parameter** 0~32767

**Example** STAT:QUES:ENAB 32

**Query syntax** STATus:QUESTIONable:ENABLE?

**Return parameterss** <NR1>

**STATus:OPERation?** command is to read event register in operation status register group.

**Query syntax** STATus:OPERation[:EVENT]?

**Example** STAT:OPER:EVEN?

**Return parameterss** <NR1>

**STATus: OPERation:CONDition?** command is to read status register in operation status register group.

**Query syntax** STATus:OPERation:CONDition?

**Example** STAT:OPER:COND?

**Return parameterss** <NR1>

**STATus: OPERation:ENABLE** command is to set/read enable register value in operation status register group.

**Command syntax** STATus:OPERation:ENABLE <NRf+>

**Parameter** 0~32767

**Example** STAT:OPER:ENAB 32

**Query syntax** STATus:OPERation:ENABLE?

**Return parameterss** <NR1>

## Import Configuration Command

### Import control

**[SOURCE:]INPut** command is to control the switch setting.

<b>Command syntax</b>	[SOURCE:]INPut[:STATe] <bool>
<b>Parameter</b>	0   1   OFF   ON
<b>Rest value</b>	OFF
<b>Example</b>	INP 1
<b>Query syntax</b>	INPut[:STATe]?
<b>Return paramters</b>	0   1

**[SOURCE:]INPut:PAUSE** command is to input enable or forbidden of pause status. This command is only take effect when the electronic in the four basic modes (CC, CV, CR, CP) and list mode.

<b>Command syntax</b>	[SOURCE:]INPut:PAUSE <bool>
<b>Parameter</b>	0   1   OFF   ON
<b>Reset value</b>	OFF
<b>Example</b>	INP:PAUSE 1
<b>Return syntax</b>	INPut:PAUSE?
<b>Return parameters</b>	0   1

**[SOURCE:]INPut:SHORT** command is to input enable or forbidden of short-circuit status. This command is only take effect when the electronic load on loading in the four basic modes (CC, CV, CR, CP). The continuous time of short-circuit is decide by time parameter.

<b>Command syntax</b>	[SOURCE:]INPut:SHORT <bool>
<b>Parameter</b>	0   1   OFF   ON
<b>Reset value</b>	OFF
<b>Example</b>	INP:SHOR 1
<b>Return syntax</b>	INPut:SHORT?
<b>Return parameters</b>	0   1

**[SOURCE:]INPut:TRIG:SET** command is to input trigger signal. This command is only operating when the load in manual trigger mode and wait for trigger, query returns wait trigger status.

<b>Command syntax</b>	[SOURCE:]INPut:TRIG:SET <bool>
<b>Parameter</b>	1   ON (0 or OFF is invalid)
<b>Reset value</b>	OFF
<b>Example</b>	INP:TRIG:SET 1
<b>Return syntax</b>	INPut:TRIG:SET?
<b>Return parameters</b>	0   1

**[SOURCE:]INPUT:TRIG:MODE** command is to set the trigger mode. This command is only take effect when the electronic load in dynamic mode or list mode.

<b>Command syntax</b>	[SOURCE:]INPUT:TRIG:MODE <bool>
<b>Parameter</b>	0   1 (0-manual, 1-external)
<b>Reset value</b>	0
<b>Example</b>	INP:TRIG:MODE 1
<b>Return syntax</b>	INPUT:TRIG:MODE?
<b>Return parameters</b>	0   1

### System Parameter Setup

**[SOURCE:]CURRENT:SLEW:RISE** command is to set the rise rate of current.

<b>Command syntax</b>	[SOURCE:]CURRENT:SLEW:RISE <NRf+>
<b>Parameter</b>	MIN ~ MAX   MINimum   MAXimum
<b>Unit</b>	A/uS
<b>Reset value</b>	MAXimum
<b>Example</b>	CURR:SLEW:RISE 3
<b>Return syntax</b>	[SOURCE:]CURRENT:SLEW:RISE?
<b>Return parameters</b>	<NR2>

**[SOURCE:]CURRENT:SLEW:FALL** command is to set the fall rate of current.

<b>Command syntax</b>	[SOURCE:]CURRENT:SLEW:RISE <NRf+>
<b>Parameter</b>	MIN ~ MAX   MINimum   MAXimum
<b>Unit</b>	A/uS
<b>Reset value</b>	MAXimum
<b>Example</b>	CURR:SLEW:RISE 3
<b>Return syntax</b>	[SOURCE:]CURRENT:SLEW:RISE?
<b>Return parameters</b>	<NR2>

**[SOURCE:]CURRENT:PROTECTION** command is to set the current protection value.

<b>Command syntax</b>	[SOURCE:]CURRENT:PROTECTION[:LEVEL] <NRf+>
<b>Parameter</b>	0 ~ MAX   MINimum   MAXimum
<b>Unit</b>	A
<b>Reset value</b>	MAXimum
<b>Example</b>	CURR:PROT 3
<b>Return syntax</b>	[SOURCE:]CURRENT:PROTECTION[:LEVEL]?
<b>Return parameters</b>	<NR2>

**[SOURCE:]VOLTAGE:PROTECTION** command is to set the over-voltage protection value.

<b>Command syntax</b>	[SOURce:]VOLTage:PROTection[:LEVel] <NRf+>
<b>Parameter</b>	0 ~ MAX   MINimum   MAXimum
<b>Unit</b>	A
<b>Reset value</b>	MAXimum
<b>Example</b>	VOLT:PROT 3
<b>Return syntax</b>	[SOURce:] VOLTage:PROTection[:LEVel]?
<b>Return parameters</b>	<NR2>

**[SOURce:]POWer:PROTection** command is to set the power protection value.

<b>Command syntax</b>	[SOURce:]POWer:PROTection[:LEVel] <NRf+>
<b>Parameter</b>	0 ~ MAX   MINimum   MAXimum
<b>Unit</b>	W
<b>Reset value</b>	MAXimum(wide-range)
<b>Example</b>	POW:PROT 100
<b>Return syntax</b>	[SOURce:]POWer:PROTection[:LEVel]?
<b>Return parameters</b>	<NR2>

**[SOURce:]VOLTage:[LEVel:] ON** command is to set the start on-loading voltage value (Von).

<b>Command syntax</b>	[SOURce:]Voltage:[LEVel:]ON <NRf+>
<b>Parameter</b>	0 ~ MAX   MINimum   MAXimum
<b>Unit</b>	V
<b>Reset value</b>	1
<b>Example</b>	VOLT:ON 3
<b>Return syntax</b>	[SOURce:]VOLTage:[LEVel:]ON?
<b>Return parameters</b>	<NR2>

**[SOURce:]VOLTage:[LEVel:] OFF** command is to set the start unloading voltage value.

<b>Command syntax</b>	[SOURce:]Voltage:[LEVel:]OFF <NRf+>
<b>Parameter</b>	0 ~ MAX   MINimum   MAXimum
<b>Unit</b>	V
<b>Reset value</b>	0.5
<b>Example</b>	VOLT:OFF 2
<b>Return syntax</b>	[SOURce:]VOLTage:[LEVel:]OFF?
<b>Return parameters</b>	<NR2>

## Operation Mode Control

### [SOURCE:]FUNCTION

[SOURCE:]MODE this two command are equivalent, it's to select input mode of the electronic load.

**Command syntax** [SOURCE:]FUNCTION <function>  
[SOURCE:]MODE <function>

Parameter	Operation Mode
CURRent	Constant current operation mode
VOLTage	Constant voltage operation mode
POWer	Constant power operation mode
RESistance	Constant resistance operation mode
DYNAmic	Dynamic current operation mode
DYNV	Dynamic voltage mode
LED	LED mode
OCP	OCP mode
OPP	OPP mode
CCBattery	Battery CC discharge mode
CRBattery	Battery CR discharge mode
CPBattery	Battery CP discharge mode
OVP	OVP mode
LIST	LIST mode
TIMing	Time test

**Reset value** CURRent

**Example** MODE RES

**Return syntax** [SOURCE:]FUNCTION? [SOURCE:]MODE?

**Return parameters** < NR2> Return parameters description as following

Query Return parameters	The corresponding operation mode
0.0	Constant current operation mode
1.0	Constant voltage operation mode
3.0	Constant power operation mode

2.0	Constant resistance operation mode
4.0	Dynamic operation mode
5.0	Dynamic voltage mode
10.0	OCP mode
11.0	OPP mode
12.0	Battery CC discharge mode
13.0	Battery CR discharge mode
14.0	Battery CP discharge mode
18.0	List mode
20.0	LED mode
21.0	Time test
23.0	OVP mode

## Basic Mode Command

**[SOURCE:]CURRENT** command is to set the current in CC mode.

### Command syntax

[SOURCE:]CURRENT[:LEVEL][:IMMEDIATE][:AMPLITUDE] <NRf+>

**Parameter** 0 ~ MAX

**Unit** A

**Reset value** MINimum

**Example** CURR 5

### Return syntax

[SOURCE:]CURRENT[:LEVEL][:IMMEDIATE][:AMPLITUDE]?

**Return parameters** <NR2>

**[SOURCE:]VOLTAGE** command is to set the voltage in CV mode.

### Command syntax

[SOURCE:]VOLTAGE[:LEVEL][:IMMEDIATE][:AMPLITUDE] <NRf+>

**Parameter** 0 ~ MAX

**Unit** V

**Reset value** MAXimum

**Example** VOLT 5

### Return syntax

[SOURCE:]VOLTAGE[:LEVEL][:IMMEDIATE][:AMPLITUDE]?

**Return parameters** <NR2>

**[SOURCE:]POWER** command is to set power in CP mode.

### Command syntax

[SOURce:]POWer[:LEVel][:IMMediate][:AMPLitude] <NRf+>

**Parameter** 0 ~ MAX

**Unit** W

**Reset value** MINimum

**Example** POW 10

**Return syntax**

[SOURce:]POWer[:LEVel][:IMMediate][:AMPLitude]?

**Return parameters** <NR2>

**[SOURce:]RESistance** command is to set resistance in CR mode.

**Command syntax**

[SOURce:]RESistance[:LEVel][:IMMediate][:AMPLitude] <NRf+>

**Parameter** 0 ~ MAX

**Unit** ohm

**Reset value** MAXimum

**Example** RES 5

**Return syntax**

[SOURce:]RESistance[:LEVel][:IMMediate][:AMPLitude]?

**Return parameters** <NR2>

## DYNAMIC Command

**[SOURce:]DYNAMIC:HIGH** command is to set high-level load current in dynamic mode.

**Command syntax** [SOURce:]DYNAMIC:HIGH[:LEVel] <NRf+>

**Parameter** 0 ~ MAX

**Unit** A

**Reset value** 0

**Example** DYN:HIGH 10

**Return syntax** [SOURce:]DYNAMIC:HIGH[:LEVel]?

**Return parameters** <NR2>

**[SOURce:]DYNAMIC:HIGH:DWELI** command is to set the continuous time of high-level load current in dynamic mode.

**Command syntax** [SOURce:]DYNAMIC:HIGH:DWELI <NRf+>

**Parameter** 0.1 ~ 99999

**Unit** mS

**Reset value** 0.1

**Example** DYN:HIGH:DWELI 0.01

**Return syntax** [SOURce:]DYNAMIC:HIGH:DWELI?

**Return parameters** <NR2>

**[SOURCE:]DYNAMIC:LOW** command is to set low-level load current in dynamic mode.

<b>Command syntax</b>	[SOURCE:]DYNAMIC:LOW[:LEVEL] <NRf+>
<b>Parameter</b>	0 ~ MAX   MINimum   MAXimum
<b>Unit</b>	A
<b>Reset value</b>	0
<b>Example</b>	DYN:LOW 1
<b>Return syntax</b>	[SOURCE:]DYNAMIC:LOW[:LEVEL]?
<b>Return parameters</b>	<NR2>

**[SOURCE:]DYNAMIC:LOW:DWELI** command is to set the continuous time of low-level load current in dynamic mode.

<b>Command syntax</b>	[SOURCE:]DYNAMIC:LOW:DWELI <NRf+>
<b>Parameter</b>	0.1 ~ 99999
<b>Unit</b>	mS
<b>Reset value</b>	0.1
<b>Example</b>	DYN:LOW:DWELI 10
<b>Return syntax</b>	[SOURCE:]DYNAMIC:LOW:DWELI?
<b>Return parameters</b>	<NR2>

**[SOURCE:]DYNAMIC:SLEW:RISE** command is to set the rise rate of dynamic mode.

<b>Command syntax</b>	[SOURCE:]DYNAMIC:SLEW:RISE <NRf+>
<b>Parameter</b>	MIN ~ MAX   MINimum   MAXimum
<b>Unit</b>	A/uS
<b>Reset value</b>	MAX
<b>Example</b>	DYN:SLEW:RISE 3
<b>Return syntax</b>	[SOURCE:]DYNAMIC:SLEW:RISE?
<b>Return parameters</b>	<NR2>

**[SOURCE:]DYNAMIC:SLEW:FALL** command is to set the fall rate of dynamic mode.

<b>Command syntax</b>	[SOURCE:]DYNAMIC:SLEW:FALL <NRf+>
<b>Parameter</b>	MIN ~ MAX   MINimum   MAXimum
<b>Unit</b>	A/uS
<b>Reset value</b>	MAX
<b>Example</b>	DYN:SLEW:FALL 3
<b>Return syntax</b>	[SOURCE:]DYNAMIC:SLEW:FALL?
<b>Return parameters</b>	<NR2>

**[SOURCE:]DYNAMIC:MODE** command is to set operation mode in dynamic mode.

<b>Command syntax</b>	[SOURCE:]DYNAMIC:MODE <mode>
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<b>Parameter</b>	CONTInuous   PULSe   TOGGle
<b>Reset value</b>	CONTInuous
<b>Example</b>	DYN:MODE PULS
<b>Return syntax</b>	[SOURce:]DYNamic:MODE?
<b>Return parameters</b>	<NR2>

**[SOURce:]DYNamic:REPeat** command is to set the running repeat time in dynamic mode.

<b>Command syntax</b>	[SOURce:]DYNamic:REPeat <NR1>
<b>Parameter</b>	1~99999
<b>Example</b>	DYN:REP 10
<b>Return syntax</b>	[SOURce:]DYNamic:REP?
<b>Return parameters</b>	<NR2>

## DYNV Command

**[SOURce:]DYNV:HIGH** command is to set high-level load constant voltage value in dynamic voltage mode.

<b>Command syntax</b>	[SOURce:]DYNV:HIGH[:LEVel] <NRf+>
<b>Parameter</b>	0 ~ MAX
<b>Unit</b>	V
<b>Reset value</b>	0
<b>Example</b>	DYNV:HIGH 10
<b>Return syntax</b>	[SOURce:] DYNV:HIGH[:LEVel]?
<b>Return parameters</b>	<NR2>

**[SOURce:] DYNV:HIGH:DWELI** command is to set the continuous time of high-level load constant voltage in dynamic voltage mode.

<b>Command syntax</b>	[SOURce:] DYNV:HIGH:DWELI <NRf+>
<b>Parameter</b>	0.1 ~ 99999
<b>Unit</b>	mS
<b>Reset value</b>	0.1
<b>Example</b>	DYNV:HIGH:DWEL 100
<b>Return syntax</b>	[SOURce:] DYNV:HIGH:DWEL?
<b>Return parameters</b>	<NR2>

**[SOURce:] DYNV:LOW** command is to set the low-level load constant voltage in dynamic voltage mode.

<b>Command syntax</b>	[SOURce:] DYNV:LOW[:LEVel] <NRf+>
<b>Parameter</b>	0 ~ MAX  MINimum   MAXimum

<b>Unit</b>	V
<b>Reset value</b>	0
<b>Example</b>	DYNV:LOW 10
<b>Return syntax</b>	[SOURce:] DYNV:LOW[:LEVel]?
<b>Return parameters</b>	<NR2>

**[SOURce:] DYNV:LOW:DWEL** command is to set the continuous time of low-level load constant voltage in dynamic voltage mode

<b>Command syntax</b>	[SOURce:] DYNV:LOW:DWEL <NRf+>
<b>Parameter</b>	0.1 ~ 99999
<b>Unit</b>	mS
<b>Reset value</b>	0.1
<b>Example</b>	DYNV:LOW:DWEL 100
<b>Return syntax</b>	[SOURce:] DYNV:LOW:DWEL?
<b>Return parameters</b>	<NR2>

**[SOURce:] DYNV:SLEW:RISE** command is to set voltage rise rate of dynamic voltage mode.

<b>Command syntax</b>	[SOURce:] DYNV:SLEW:RISE <NRf+>
<b>Parameter</b>	MIN ~ MAX   MINimum   MAXimum
<b>Unit</b>	V/uS
<b>Reset value</b>	MAX
<b>Example</b>	DYNV:SLEW:RISE 3
<b>Return syntax</b>	[SOURce:] DYNV:SLEW:RISE?
<b>Return parameters</b>	<NR2>

**[SOURce:] DYNV:SLEW:FALL** command is to set the voltage fall rate of dynamic voltage mode.

<b>Command syntax</b>	[SOURce:] DYNV:SLEW:FALL <NRf+>
<b>Parameter</b>	MIN ~ MAX   MINimum   MAXimum
<b>Unit</b>	V/uS
<b>Reset value</b>	MAX
<b>Example</b>	DYNV:SLEW:FALL 3
<b>Return syntax</b>	[SOURce:] DYNV:SLEW:FALL?
<b>Return parameters</b>	<NR2>

**[SOURce:] DYNV:MODE** command is to set operation mode in dynamic voltage mode.

<b>Command syntax</b>	[SOURce:] DYNV:MODE <mode>
<b>Parameter</b>	CONTinuous   PULSe   TOGGLE
<b>Reset value</b>	CONTinuous

**Example** DYNV:MODE PULS  
**Return syntax** [SOURce:] DYNV:MODE?  
**Return parameters** <NR2>

**[SOURce:] DYNV:REPeat** command is to set running repeat times in dynamic voltage mode.

**Command syntax** [SOURce:] DYNV:REPeat <NR1>  
**Parameter** 1~99999  
**Example** DYNV:REP 10  
**Return syntax** [SOURce:] DYNV:REP?  
**Return parameters** <NR2>

## LED Command

**LED:VOLTage** command is to set LED Vo.

**Command syntax** LED:VOLTage <Nrf+>  
**Parameter** 0.001~MAX  
**Example** LED:VOLT 18  
**Return syntax** LED:VOLT?  
**Return** <NR2>

**LED:CURREnt** command is to set LED Io.

**Command syntax** LED:CURREnt <Nrf+>  
**Parameter** 0~MAX  
**Example** LED:CURR 0.35  
**Return syntax** LED:CURR?  
**Return** <NR2>

**LED:RCOeff** command is to set LED Rd Coeff.

**Command syntax** LED:RCOeff <Nrf+>  
**Parameter** 0.001~1  
**Example** LED:RCO 0.2  
**Return syntax** LED:RCO?  
**Return** <NR2>

## List Command

**[SOURce:]LIST:REPeat** command is to set execute list repeat times.

**Command syntax** [SOURce:]LIST:REPeat <Nrf+>  
**Parameter** 1 ~ 99999  
**Reset value** 0

**Example** LIST:REPeat 3  
**Return syntax** [SOURce:]LIST:REPeat?  
**Return parameters** <NR2>

**[SOURce:]LIST:STEP** command is to set execute list repeat steps.

**Command syntax** [SOURce:]LIST:STEP <Nrf+>  
**Parameter** 1 ~ 16  
**Example** LIST:STEP 3  
**Return syntax** [SOURce:]LIST:STEP?  
**Return parameters** <NR2>

**[SOURce:]LIST:MODE** command is to set the list continuous running and no exit abnormally.

**Command syntax** [SOURce:] LIST:MODE <CRD>  
**Parameter** CONT | TRIG | CONTERR | CONTERR  
 CONT(continuous), TRIG(trigger), CONTERR(continuous stop by error),  
 CONTERR(continuous trigger stop by error)  
**Example** LIST:MODE CONT  
**Return syntax** [SOURce:]LIST:MODE?  
**Return parameters** <NR2>

**[SOURce:]LIST:DISCharge** command is to set discharge method of fast charge. Paramtere0 means turn off fast discharge, 1 means turn on fast discharge, greater than 128 means turn on fast charge list function.

**Command syntax** [SOURce:] LIST:DISCharge <NR1>  
**Parameter** 0 | 1 | 128 | 129  
**Example** LIST:DISCharge 1  
**Return syntax** [SOURce:]LIST:DISCharge?  
**Return parameters** <NR2>

**[SOURce:]LIST:VStart** command is to set list self-starting voltage.

**Command syntax** [SOURce:] LIST:VStart <Nrf2>  
**Example** LIST:VStart 3  
**Return syntax** [SOURce:]LIST:VStart?  
**Return parameters** <NR2>

**[SOURce:]LIST:SET01:FCP** command is to set the list first step of fast charge protocol. The command step is named as SET with the corresponding number; the maximum number of step cannot exceed 16.

**Command syntax** [SOURce:] LIST:SET01:FCP <Nrf+>  
**Parameter** 0 | 1.0 | 2.0 | 3.0 | 5.0 | 6.0 | 10.0 |  
**Example** LIST:SET01:FCP 2.0  
**Return syntax** [SOURce:]LIST:SET01:FCP?

**Return parameters** <NR2> Parameter meaning as following table

Parameter	Fast charge protocol of list single step
0.0	Regular(no fast charge)
1.0	QC2.0
2.0	QC3.0
3.0	QC4.0
5.0	UPD2.0
6.0	UPD3.0
10.0	PE2.0

**[SOURCE:]LIST:SET01:VQC** command is to set the list first step of fast voltage charge protocol. The command step is named as SET with the corresponding number; the maximum number of step cannot exceed 16.

**Command syntax** [SOURCE:] LIST:SET01:VQC <Nrf+>

**Parameter** 3.3~21

**Example** LIST:SET01:VQC 5.0

**Unit** V

**Return syntax** [SOURCE:]LIST:SET01:VQC?

**Return parameters** <NR2>

**[SOURCE:]LIST:SET01:MODE** command is to set the list first step of on-load mode. The command step is named as SET with the corresponding number; the maximum number of step cannot exceed 16.

**Command syntax** [SOURCE:] LIST:SET01:MODE <Nrf+>

**Parameter** 0.0 | 1.0 | 2.0 | 3.0 | 4.0 | 5.0

**Example** LIST:SET01:MODE 1.0

**Return syntax** [SOURCE:]LIST:SET01:MODE?

**Return parameters** <NR2> Parameter meaning as following table

Parameter	List single step with on-load mode
0.0	CC mode
1.0	CV mode
2.0	CR mode
3.0	CP mode
4.0	OPEN circuit mode
5.0	SHORT short-circuit mode

**[SOURce:]LIST:SET01:VALue** command is to set the the list first step of on-load constant value. The command step is named as SET with the corresponding number; the maximum number of step cannot exceed 16.

**Command syntax** [SOURce:] LIST:SET01:VALue <Nrf+>

**Parameter** 0~ MAXimum

**Example** LIST:SET01:VALue 3

**Return syntax** [SOURce:]LIST:SET01:VAL?

**Return parameters** <NR2>

**[SOURce:]LIST:SET01:DWELl** command is to set the list first step of on-load time. The command step is named as SET with the corresponding number; the maximum number of step cannot exceed 16.

**Command syntax** [SOURce:] LIST:SET01:DWELl <Nrf+>

**Parameter** 0~ 99999

**Unit** mS

**Example** LIST:SET01:DWELl 1000

**Return syntax** [SOURce:]LIST:SET01:DWELl?

**Return parameters** <NR2>

**[SOURce:]LIST:SET01:PROTection** command is to set the list first step of inspect item. The command step is named as SET with the corresponding number; the maximum number of step cannot exceed 16.

**Command syntax** [SOURce:] LIST:SET01:PROTection <Nrf+>

**Parameter** 0~ 99999

**Unit** mS

**Example** LIST:SET01:PROTection 0.0

**Return syntax** [SOURce:]LIST:SET01:PROT?

**Return parameters** <NR2> Parameter meaning as following table

Parameter	Inspection function of list single step
0.0	No inspection
1.0	Inspect current
2.0	Inspect voltage
3.0	Inspect power
4.0	Inspect Vpp
5.0	Inspect Ipp

**[SOURce:]LIST:SET01:UPPer** command is to set the list first step of the high limit protection. The command step is named as SET with the corresponding number; the maximum number of step cannot exceed 16.

<b>Command syntax</b>	[SOURce:] LIST:SET01:UPPer <Nrf+>
<b>Parameter</b>	0~ MAXimum
<b>Example</b>	LIST:SET01:UPPer 3.0
<b>Return syntax</b>	[SOURce:]LIST:SET01:UPP?
<b>Return parameters</b>	<NR2>

**[SOURce:]LIST:SET01:LOWer** command is to set the list first step of the low limit. The command step is named as SET with the corresponding number; the maximum number of step cannot exceed 16.

<b>Command syntax</b>	[SOURce:] LIST:SET01:LOWer <Nrf+>
<b>Parameter</b>	0~ MAXimum
<b>Example</b>	LIST:SET01:LOWer 3.0
<b>Return syntax</b>	[SOURce:]LIST:SET01:LOW?
<b>Return parameters</b>	<NR2>

**[SOURce:]LIST:CALLing** command is to recall the specified group of list file store in device.

<b>Command syntax</b>	[SOURce:] LIST:CALLing <NR1>
<b>Parameter</b>	1~ 60 (confirm by stored group numbers in device)
<b>Example</b>	LIST:CALLing 3
<b>Return syntax</b>	[SOURce:]LIST:CALLing?
<b>Return parameters</b>	255 (255 means recall finised)

**[SOURce:]LIST:RESult?** command is to query running result of list mode.

<b>Command syntax</b>	[SOURce:] LIST:RESult?
<b>Example</b>	LIST:RES?
<b>Return parameters</b>	<NR1> (0~65535)

Return parameters decription: returns integer value, change it into binary number, from top to high, each bit presents single execute result, 1 presents execute successful, 0 presents execute failed.

## MEASure Command

**MEASure:VOLTage?** command is to read the average value of voltage.

<b>Command syntax</b>	MEASure[:SCALar]:VOLTage[:DC]?
<b>Example</b>	MEAS:VOLT?
<b>Return parameters</b>	<NR2>

**MEASure:VOLTage:MAXimum?** command is to read the peak value Vp+ of voltage.

<b>Command syntax</b>	MEASure[:SCALar]:VOLTage:MAXimum?
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**Example** MEAS:VOLT:MAX?

**Return parameters** <NR2>

**MEASure:VOLTage:MINimum?** command is to read the minimum value Vp- of voltage.

**Command syntax** MEASure[:SCALar]:VOLTage:MINimum?

**Example** MEAS:VOLT:MIN?

**Return parameters** <NR2>

**MEASure:VOLTage:PTPeak?** command is to read peak-to-peak value Vpp of voltage.

**Command syntax** MEASure[:SCALar]:VOLTage:PTPeak?

**Example** MEAS:VOLT:PTP?

**Return parameters** <NR2>

**MEASure:CURRent?** command is to read the average of current.

**Command syntax** MEASure[:SCALar]:CURRent[:DC]?

**Example** MEAS:CURR?

**Return parameters** <NR2>

**MEASure:CURRent:MAXimum?** command is to read the peak value Ip+ of current.

**Command syntax** MEASure[:SCALar]:CURRent:MAXimum?

**Example** MEAS:CURR:MAX?

**Return parameters** <NR2>

**MEASure:CURRent:MINimum?** command is to read the minimum value Ip- of current.

**Command syntax** MEASure[:SCALar]:CURRent:MINimum?

**Example** MEAS:CURR:MIN?

**Return parameters** <NR2>

**MEASure:CURRent:PTPeak?** command is to read the peak-to-peak value Ipp of current.

**Command syntax** MEASure[:SCALar]:CURRent:PTPeak?

**Example** MEAS:CURR:PTP?

**Return parameters** <NR2>

**MEASure:POWer?** command is to read the average value of power.

**Command syntax** MEASure[:SCALar]:POWer[:DC]?

**Example** MEAS:POWer?

**Return parameters** <NR2>

**MEASure:RESistance?** command is to read equivalent impedance.

**Command syntax** MEAS[:SCALar]:RESistance[:DC]?

**Example** MEAS:RESistance?



**Return parameters** <NR2>

**MEASure:CAPacity?** command is to read the battery capacity.

**Command syntax** MEAS[:SCALar]:CAPacity[:DC]?

**Example** MEAS: CAPacity?

**Return parameters** <NR2>

## OCP Test Command

**OCP[:STATe]** command is to start or stop OCP test

**Command syntax** OCP[:STATe] <bool>

**Parameter** 0 | 1 | OFF | ON

**Example** OCP ON

**Return syntax** OCP[:STATe]?

**Return** 0 | 1

**OCP:ISart** command is to set the initial current of OCP.

**Command syntax** OCP:ISart <NRf+>

**Parameter** 0 ~MAX

**Unit** A

**Example** OCP:IST 3

**Return syntax** OCP:ISart?

**Return** <NR2>

**OCP:IEND** command is to set the cut-off current of OCP.

**Command syntax** OCP:IEND <NRf+>

**Parameter** 0 ~MAX

**Unit** A

**Example** OCP:IEND 6

**Return syntax** OCP:IEND?

**Return** <NR2>

**OCP:CSTep** command is to set the step-current value of OCP.

**Command syntax** OCP:CSTep <NR2>

**Example** OCP:CSTep 0.1

**Return syntax** OCP:CSTep?

**Return** <NR2>

**OCP:DWELl** command is to set the dwell time of OCP single step.

**Command syntax** OCP:DWELl <NRf+>

**Parameter** 0.1 ~99999

**Unit** mS

**Example** OCP:DWEL 0.1S or OCP:DWEL 10mS  
**Return syntax** OCP:DWEL?  
**Return** <NR2>

**OCP:VTRig** command is to set OCP trigger level.

**Command syntax** OCP:VTRig <NRf+>  
**Parameter** 0.1 ~MAX  
**Unit** V  
**Example** OCP:VTR 11.8  
**Return syntax** OCP:VTRig?  
**Return** <NR2>

**OCP:RESult[:OCP]** command is to query the current value of OCP point.

**Command syntax** OCP:RESult[:OCP]?  
**Unit** A  
**Example** OCP:RES?  
**Return parameters** <NRf+>

**OCP:RESult:PMAX** command is to query PMAX point.

**Command syntax** OCP:RESult:PMAX?  
**Return parameters** <NR2>  
**Unit** W  
**Example** OCP:RES:PMAX?  
**Return** <NRf+>

It presents the maximum output power of PMAX point.

## OPP Test Command

**OPP[:STATe]** command is to start or stop the OPP test.

**Command syntax** OPP[:STATe] <bool>  
**Parameter** 0 | 1 | OFF | ON  
**Example** OPP ON  
**Return syntax** OPP[:STATe]?  
**Return** 0 | 1

**OPP:PStart** command is to set the initial power of OPP.

**Command syntax** OPP:PStart <NRf+>  
**Parameter** 0 ~MAX  
**Unit** W  
**Example** OPP:PST 10  
**Return syntax** OPP:PStart?  
**Return** <NR2>

**OPP:PEND** command is to set the cut-off power of OPP.

<b>Command syntax</b>	OPP:PEND <NRf+>
<b>Parameter</b>	0 ~MAX
<b>Unit</b>	W
<b>Example</b>	OPP:PEND 100
<b>Return syntax</b>	OPP:PEND?
<b>Return</b>	<NR2>

**OPP:CSTep** command is to set the step-power of OPP.

<b>Command syntax</b>	OPP:CSTep <NR2>
<b>Example</b>	OPP:CSTep 1.0
<b>Return syntax</b>	OPP:CSTep?
<b>Return</b>	<NR2>

**OPP:DWELI** command is to set the dwell time of OPP single step.

<b>Command syntax</b>	OPP:DWELI <NRf+>
<b>Parameter</b>	0.1 ~99999
<b>Unit</b>	mS
<b>Example</b>	OPP:DWEL 100
<b>Return syntax</b>	OPP:DWEL?
<b>Return</b>	<NR2>

**OPP:VTRig** command is to set OPP trigger level.

<b>Command syntax</b>	OPP:VTRig <NRf+>
<b>Parameter</b>	0.1 ~MAX
<b>Unit</b>	V
<b>Example</b>	OPP:VTR 11.8
<b>Return syntax</b>	OPP:VTRig?
<b>Return</b>	<NR2>

**OPP:RESult** command is to query the power value of OPP point.

<b>Command syntax</b>	OPP:RESult?
<b>Unit</b>	W
<b>Example</b>	OPP:RES?
<b>Return parameters</b>	<NRf+>

## BATTeRy Test Command

**BATTeRy:CURRent** command is to set the discharge current value of battery constant current.

<b>Command syntax</b>	BATTeRy:CURRent < NRf+>
<b>Parameter</b>	0 ~MAX

<b>Unit</b>	A
<b>Example</b>	BATT:CURR 3
<b>Return syntax</b>	BATTery:CURR?
<b>Return</b>	<NR2>

**BATTery:CCVoltage** command is to set the cut-off voltage of discharge battery constant current.

<b>Command syntax</b>	BATTery:CCVoltage <NRf+>
<b>Parameter</b>	0 ~MAX
<b>Unit</b>	V
<b>Example</b>	BATT:CCV 5.0
<b>Return syntax</b>	BATT:CCV?
<b>Return</b>	<NR2>

**BATTery:RESistance** command is to set discharge resistance of battery constant resistance.

<b>Command syntax</b>	BATTery:RESistance <NRf+>
<b>Parameter</b>	0 ~7.5K
<b>Unit</b>	$\Omega$
<b>Example</b>	BATT:RES 100
<b>Return syntax</b>	BATT:RES?
<b>Return</b>	<NR2>

**BATTery:CRVoltage** command is to set discharge cut-off voltage value of battery constant resistance.

<b>Command syntax</b>	BATTery:CRVoltage <NR2>
<b>Parameter</b>	0 ~MAX
<b>Unit</b>	V
<b>Example</b>	BATT:CRV 5.0
<b>Return syntax</b>	BATT:CRV?
<b>Return</b>	<NR2>

**BATTery:POWer** command is to set discharge power value of battery constant power.

<b>Command syntax</b>	BATTery:POWer <NRf+>
<b>Parameter</b>	0.1 ~MAX
<b>Unit</b>	W
<b>Example</b>	BATT:POW 10.0
<b>Return syntax</b>	BATT:POW?
<b>Return</b>	<NR2>

**BATTery:CPVoltage** command is to set discharge cut-off voltage of battery constant power.

<b>Command syntax</b>	BATTery:CPVoltage <NRf+>
<b>Parameter</b>	0 ~MAX
<b>Unit</b>	V
<b>Example</b>	BATT:CPV 10.0
<b>Return syntax</b>	BATT:CPV?
<b>Return</b>	<NR2>

## OVP Test Command

**OVP[:STATe]** command is to start or stop OVP test.

<b>Command syntax</b>	OVP[:STATe] <bool>
<b>Parameter</b>	0   1   OFF   ON
<b>Example</b>	OVP ON
<b>Return syntax</b>	OVP[:STATe]?
<b>Return</b>	0   1

**OVP:VTRig** command is to set OVP trigger level.

<b>Command syntax</b>	OVP:VTRig <NRf+>
<b>Parameter</b>	1.0 ~MAX
<b>Unit</b>	V
<b>Example</b>	OVP:VTR 4
<b>Return syntax</b>	OVP:VTRig?
<b>Return</b>	<NR2>

**OVP:RESult[:OVP]** command is to query the voltage value of OVP point.

<b>Command syntax</b>	OVP:RESult[:OVP]?
<b>Return parameters</b>	<NRf+>
<b>Unit</b>	V
<b>Example</b>	OVP:RES?
<b>Return</b>	<NR2>

**OVP:RESult:TIME** command is to query tovp.

<b>Command syntax</b>	OVP:RESult:TIME?
<b>Unit</b>	mS
<b>Example</b>	OVP:RES:TIME?
<b>Return parameters</b>	<NR2>

## TIMing Test Command

**TIMing[:STATe]** command is to start or stop Timing test.

<b>Command syntax</b>	TIMing[:STATe] <bool>
<b>Parameter</b>	0   1   OFF   ON
<b>Example</b>	TIM ON
<b>Return syntax</b>	TIMing[:STATe] ?
<b>Return</b>	0   1

**TIMing:LOAD:MODE** command is to set on-load mode in Timing test.

<b>Command syntax</b>	TIMing:LOAD:MODE <mode>
<b>Parameter</b>	CURR   VOLT   RES   POW   OFF
<b>Example</b>	TIM:LOAD:MODE CURR
<b>Return syntax</b>	TIMing:LOAD:MODE?
<b>Return</b>	< NR2>

**Relevant instructions** If TIM:LOAD:SETT OFF , then ignore the setting of this instruction.

**TIMing:LOAD:VALue** command is to set on-load parameter in Timing test.

<b>Command syntax</b>	TIMing:LOAD:VALue <Nrf+>
<b>Parameter</b>	A/V/W/ohm, depend on TIMing:LOAD:MODE
<b>Example</b>	TIM:LOAD:VAL 1
<b>Return syntax</b>	TIMing:LOAD:VALue?
<b>Return</b>	<NR2>

**Relevant instructions** If TIM:LOAD:SETT OFF , then ignore the setting of this instruction.

**TIMing:TStArt:SOURce** command is to set the start trigger source

<b>Command syntax</b>	TIMing:TStArt:SOURce <source>
<b>Parameter</b>	CURR   VOLT   EXT
<b>Example</b>	TIM:TST:SOUR VOLT
<b>Return syntax</b>	TIMing:TStArt:SOURce?
<b>Return</b>	< NR2>

**TIMing:TStArt:EDGE** command is to set the trigger edge of start test.

<b>Command syntax</b>	TIMing:TStArt:EDGE <edge>
<b>Parameter</b>	RISE   FALL
<b>Example</b>	TIM:TST:EDGE RISE
<b>Return syntax</b>	TIMing:TStArt:EDGE?
<b>Return</b>	< NR2>

**TIMing:TStArt:LEVel** command is to set the trigger level of start test

<b>Command syntax</b>	TIMing:TStArt:LEVel <Nrf+>
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**Parameter** depend on start trigger source, that is Timing:TStart:SOURce

**Example** TIM:TST:LEV 1

**Return syntax** TIMing:TStart:LEVel?

**Return** <NR2>

**TIMing:TEND:SOURce** command is to set the trigger source of the end of test.

**Command syntax** TIMing:TEND:SOURce <source>

**Parameter** CURR | VOLT | EXT

**Example** TIM:TEND:SOUR VOLT

**Return syntax** TIMing:TEND:SOURce?

**Return** < NR2>

**TIMing:TEND:EDGE** command is to set the trigger edge of end of test.

**Command syntax** TIMing:TEND:EDGE <edge>

**Parameter** RISE | FALL

**Example** TIM:TEND:EDGE RISE

**Return syntax** TIMing:TEND:EDGE?

**Return** <NR2>

**TIMing:TEND:LEVel** command is to set the trigger level of the end of test

**Command syntax** TIMing:TEND:LEVel <Nrf+>

**Parameter** depend on start trigger source, that is Timing:TEND:SOURce

**Example** TIM:TEND:LEV 5

**Return syntax** TIMing:TEND:LEVel?

**Return** <NR2>

**TIMing:RESult** command is to query Timing test result.

**Command syntax** TIMing:RESult?

**Unit** mS

**Example** TIM:RES?

**Return** <NR2>

## LEFF Test Command (Load Effect Test)

**LEFF [:STATE]** command is to start or stop LEFF test.

**Command syntax** LEFF[:STATE] <bool>

**Parameter** 0 | 1 | OFF | ON

**Example** LEFF ON

**Return syntax** LEFF [:STATE]?

**Return** 0 | 1

**LEFF:VOLTage** command is to set the rated voltage in LEFF test.

<b>Command syntax</b>	LEFF:VOLTage <NRf+>
<b>Parameter</b>	1.0 ~MAX
<b>Unit</b>	V
<b>Example</b>	LEFF:VOLT 5
<b>Return syntax</b>	LEFF: VOLT?
<b>Return</b>	< NRf+>

**LEFF:CURRent** command is set rated current in LEFF test.

<b>Command syntax</b>	LEFF:CURRent <NRf+>
<b>Parameter</b>	0 ~MAX
<b>Unit</b>	A
<b>Example</b>	LEFF:CURR 3
<b>Return syntax</b>	LEFF: CURR?
<b>Return</b>	< NRf+>

**LEFF:RESult** command is to query LEFF test result.

<b>Command syntax</b>	LEFF:RESult?
<b>Unit</b>	none
<b>Return parameters</b>	< NRf+>
<b>Return parameters range</b>	0.0 - 1.0

## QCM Test Command (Fast Charge Test)

**QCMModule:PROTocol** command is to set the protocol of fast charge.

<b>Command syntax</b>	QCMModule: PROTocol <mode>
<b>Parameter</b>	NULL   QC2   QC3   QC4   PD2   PD3   PE2   BC12
<b>Example</b>	QCM:PROT PD3
<b>Return syntax</b>	QCM:PROT?
<b>Return</b>	< NRf+>

### Parameter description

Parameter string	Return parameters	Description of fast charge protocol
NULL	0.0	Exit fast charge mode
QC2	1.0	QC2.0
QC3	2.0	QC3.0
QC4	3.0	QC4.0
PD2	5.0	PD2.0
PD3	6.0	DP3.0
PE2	9.0	PE2.0
BC12	14.0	BC1.2



**QCModule:D+:VOLTage** command is to query the actual voltage value on DP line.

<b>Command syntax</b>	QCModule:D+:VOLTage?
<b>Parameter</b>	0~3.3
<b>Unit</b>	V
<b>Example</b>	QCM:D+:VOLT?
<b>Return</b>	< NRf+>

**QCModule:D+:SHORT** command is to add 3.3V voltage to D+ (short-circuit test) in BC1.2 protocol.

<b>Command syntax</b>	QCModule:D+:SHORT < bool>
<b>Parameter</b>	0   1   OFF   ON
<b>Example</b>	QCM:D+:SHORT ON
<b>Return syntax</b>	QCM:D+:SHOR?
<b>Return parameters</b>	< bool >

**QCModule:D-:VOLTage** command is to query the actual voltage value on DN line.

<b>Command syntax</b>	QCModule:D-:VOLTage?
<b>Parameter</b>	0~3.3
<b>Unit</b>	V
<b>Example</b>	QCM:D-:VOLT?
<b>Return</b>	< NRf+>

**QCModule:D-:SHORT** command is to add 3.3V voltage to D- (short-circuit test) in BC1.2 protocol.

<b>Command syntax</b>	QCModule:D-:SHORT < bool>
<b>Parameter</b>	0   1   OFF   ON
<b>Example</b>	QCM:D-:SHORT ON
<b>Return syntax</b>	QCM:D-:SHOR?
<b>Return parameters</b>	< bool >

**QCModule:PDO:COUNT** command is to query the quantity of PD power/voltage object.

<b>Command syntax</b>	QCModule:PDO:COUNT?
<b>Unit</b>	none
<b>Example</b>	QCM:PDO:COUN?
<b>Return parameters</b>	< NRf+>
<b>Return parameters range</b>	0 - 7

**QCModule:PDO:LIST** command is to query the list of PD power/voltage.

<b>Command syntax</b>	QCModule:PDO:LIST?
<b>Unit</b>	none

**Example** QCM:PDO:LIST?

**Return parameters** PDO parameter list, each line presents one of voltage object.

Returns data example	Description
FPS:5.0V/3.0A	Fixed power, 5V/3A
BPS:12.0V-5.0V/18.0W	Battery supply, maximum voltage 12V, minimum voltage 5V, maximum power18W
VPS:12.0V-5.0V/2.0A	Variable power, maximum voltage 12V, minimum voltage 5V, maximum current power
PPS: 11.0V-5.9V/3.0A	program-controlled power supply, maximum voltage 11V, minimum voltage 5.9V, maximum current 3A

**QCModule:CONNECT** command is to query the connect status of fast charge protocol.

**Command syntax** QCModule:CONNECT?

**Unit** none

**Example** QCM:CONN?

**Return parameters** < NR2>

**Return parameters range** 0(disconnected) | 1 (connected)

**QCModule:RUN** command is to query the running status of fast charge command.

**Command syntax** QCModule:RUN?

**Unit** none

**Example** QCM:RUN?

**Return parameters** < NR2>

**Return parameters range** 0(not running or end of running) | 1 (running)

**QCModule:RESult** command is to query the running result of fast charge.

**Command syntax** QCModule:RESult?

**Unit** none

**Example** QCM:RES?

**Return parameters** < NR2>

**Return parameters range** 0 (failed) | 1 (successful)

**QCModule:FUNction** command is to set the running mode of fast charge and trigger the power/voltage output.

**Command syntax** QCModule:FUNction < mode>

**Parameter** QCFIX | QCSTEP | PEFIX | PDFIX | DPN

**Example** QCM:FUNC PDFIX

**Return syntax** QCM:FUNC?

**Return parameters** < NRf+>

Parameter description

Parameter strings	Return parameters	Parameter description
QCFIX	0.0	QC constant voltage mode
QCSTEP	1.0	QC stepped mode
PEFIX	2.0	PE constant voltage mode
PDFIX	4.0	PD constant voltage mode
DPDN	5.0	DPDNtest mode (in QC protocol)
/	6.0	List mode, it cannot set independently

Notes: DPDN test mode only can use in QC protocol.

**QCModule:MODE** command is to set the running mode of fast charge (the same as QCM: FUNC)

**Command syntax** QCModule:MODE < mode>

**Parameter** QCFIX | QCSTEP | PEFIX | PDFIX | DPDN

**Example** QCM:MODE PDFIX

**Return syntax** QCM:MODE?

**Return parameters** < NRf+>

Notes: DPDN test mode only can use in QC protocol.

**QCModule:INPut** command is to set the running switch of fast charge.

**Command syntax** QCModule: INPut < bool>

**Parameter** 0 (invalid) | 1 | OFF (invalid) | ON

**Example** QCM:INP ON

**Return syntax** QCM:INP?

**Return parameters** < bool >

**QCModule:QC:VOLTage** command is to set the voltage value in QC constant voltage mode.

**Command syntax** QCModule:QC:VOLTage < NRf+>

**ParameterUnit** V

**Parameter range** 3.3-20

**Example** QCM:QC:VOLT 9

**Return syntax** QCM:QC:VOLT?  
**Return parameters** < NRf+>

**QCModule:QC:START** command is to set the initial voltage value in QC stepped mode.

**Command syntax** QCModule:QC:START < NRf+>  
**ParameterUnit** V  
**Example** QCM:QC:STAR 9  
**Return syntax** QCM:QC:STAR?  
**Return parameters** < NRf+>

**QCModule:QC:STEP** command is to set step voltage value in QC stepped mode.

**Command syntax** QCModule:QC:STEP < NRf+>  
**ParameterUnit** V  
**Example** QCM:QC:STEP 0.2  
**Return syntax** QCM:QC:STEP?  
**Return parameters** < NRf+>

**QCModule:QC:END** command is to set the end voltage value in QC stepped mode.

**Command syntax** QCModule:QC:END < NRf+>  
**ParameterUnit** V  
**Example** QCM:QC:END 12  
**Return syntax** QCM:QC:END?  
**Return parameters** < NRf+>

**QCModule:QC:DWELI** command is to set dwell time of single step in QC stepped mode.

**Command syntax** QCModule:QC:DWELI < NRf+>  
**ParameterUnit** S  
**Example** QCM:QC:DWELI 1000  
**Return syntax** QCM:QC:DWELI?  
**Return parameters** < NRf+>  
**Parameter range** 100-99999

**QCModule:QC:TRIGger** command is to set trigger mode in QC stepped mode.

**Command syntax** QCModule:QC:TRIGger < NRf+>  
**Parameter** 0 (manual) | 1 (auto)  
**ParameterUnit** none  
**Example** QCM:QC:TRIGger 1

<b>Return syntax</b>	QCM:QC:TRIGger?
<b>Return parameters</b>	< NRf+>

**QCM:QC:MANual** command is to send manual trigger in QC stepped mode, this command is only take effect in QC stepped mode and trigger mode must be manual.

<b>Command syntax</b>	QCM:QC:MANual < bool>
<b>Parameter</b>	0 (invalid)   1   OFF(invalid)   ON
<b>ParameterUnit</b>	none
<b>Example</b>	QCM:QC:MANual ON

**QCM:DPDN:PVOLtage** command is to set DP voltage value in DPDN test mode.

<b>Command syntax</b>	QCM:DPDN:PVOLtage < NRf+>
<b>Parameter unit</b>	V
<b>Example</b>	QCM:DPDN:PVOLtage 0.6
<b>Parameter range</b>	0-3.3
<b>Return syntax</b>	QCM:DPDN:PVOL?
<b>Return parameters</b>	< NRf+>

**QCM:DPDN:NVOLtage** command is to set DN voltage value in DPDN test mode.

<b>Command syntax</b>	QCM:DPDN:NVOLtage < NRf+>
<b>Parameter unit</b>	V
<b>Example</b>	QCM:DPDN:NVOLtage 0.6
<b>Parameter range</b>	0-3.3
<b>Return syntax</b>	QCM:DPDN:NVOL?
<b>Return parameters</b>	< NRf+>

**QCM:DPDN:VERRor** command is to set the allowance error voltage value in DPDN test mode.

<b>Command syntax</b>	QCM:DPDN:VERRor < NRf+>
<b>Parameter unit</b>	V
<b>Example</b>	QCM:DPDN:VERRor 0.2
<b>Parameter range</b>	0-3.3
<b>Return syntax</b>	QCM:DPDN:VERR?
<b>Return parameters</b>	< NRf+>

**QCM:DPDN:DWELI** command is to set the continuous time value in DPDN test mode.

<b>Command syntax</b>	QCM:DPDN:DWELI < NRf+>
<b>Parameter unit</b>	ms

<b>Example</b>	QCM:DPDN:DWELI 500
<b>Parameter range</b>	100-99999
<b>Return syntax</b>	QCM:DPDN:DWELI?
<b>Return parameters</b>	< NRf+>

**QCM:PE:VOLTage** command is to set the voltage value in PE constant voltage mode.

<b>Command syntax</b>	QCM:PE:VOLTage < NRf+>
<b>Parameter unit</b>	V
<b>Example</b>	QCM:PE:VOLTage 5
<b>Parameter range</b>	3.3-20
<b>Return syntax</b>	QCM:PE:VOLT?
<b>Return parameters</b>	< NRf+>

**QCM:PD:VOLTage** command is set the voltage value in UPD constant voltage mode.

<b>Command syntax</b>	QCM:PD:VOLTage < NRf+>
<b>Parameter unit</b>	V
<b>Example</b>	QCM:PD:VOLTage 5
<b>Parameter range</b>	3.3-21
<b>Return syntax</b>	QCM:PD:VOLT?
<b>Return parameters</b>	< NRf+>

**QCM:PD:CURRent** command is to set the current value in UPD constant voltage mode.

<b>Command syntax</b>	QCM:PD:CURRent < NRf+>
<b>Parameter unit</b>	A
<b>Example</b>	QCM:PD:CURRent 3
<b>Parameter range</b>	0-5
<b>Return syntax</b>	QCM:PD:CURR?
<b>Return parameters</b>	< NRf+>

**QCM:PD:PDONumber** command is to the voltage object serial number in UPD constant voltage mode.

<b>Command syntax</b>	QCM:PD:PDONumber < NR2>
<b>Parameter unit</b>	none
<b>Example</b>	QCM:PD:PDON 3
<b>Parameter range</b>	1-7, depend on the actual voltage object quantity to select, it must greater than 0
<b>Return syntax</b>	QCM:PD:PDON?

**Return parameters** < NRf+>

### The operation sequence description of remote fast charge:

- ① Select fast charge protocol (PROTOCOL)
- ② Wait for connecting (the process may takes 1-3 seconds)
- ③ Set pattern parameter ( It has five run mode and each pattern parameter should be set.)
- ④ Select run mode (FUNCTION/MODE)
- ⑤ Start to run (INPUT, constant voltage mode can skip this step)
- ⑥ wait to the end of run (the process may takes 1-10seconds, don't need send the end of run command.)
- ⑦ Query the run result (RESULT?)

### Programmable example:

<b>QC2.0/QC3.0 Fixed Point Test</b>	
QCM:PROT QC2	Set the fast charge protocol
QCM:CONN?	Inspect handshake status, send instruction continuously when returns value 1
QCM:QC:VOLT 9	Set the output voltage
QCM:FUNC QCFIX	Select fixed point and trigger output
MODE CURR	Select constant current mode
CURR 1A	Constant current value 1A
INPUT ON	Turn on on-load
INPUT OFF	Turn off on-load
QCM:PROT NULL	Exit fast charge protocol

<b>QC3.0/QC4.0 Stepped Test</b>	
QCM:PROT QC3	Set the fast charge protocol
QCM:CONN?	Inspect handshake status, send instruction continuously when returns value 1
QCM:QC:STAR 5	Initial voltage: 5V
QCM:QC:STEP 0.2	Stepped voltage: 0.2V
QCM:QC:END 12	The end of run voltage: 12V
QCM:QC:DWEL 0.1	Stepped time: 0.1s Stepped time = stepped voltage ÷ 0.2 × 0.1 s
QCM:QC:TRIG 1	Trigger mode: Auto trigger

<del>QCM:MODE QCSTEP</del>	<del>Fast charge mode: stepped mode</del>	<del>UNI-T</del>
QCM:INP ON	Turn on stepped test	
MODE CURR	Select constant current mode	
CURR 1A	Constant current value 1A	
INPUT ON	Turn on on-load	
INPUT OFF	Turn off on-load	
QCM:PROT NULL	Exit fast charge protocol	

PD2.0/PD3.0 Fixed Point Test	
QCM:PROT PD3	Set the fast charge protocol
QCM:CONN?	Inspect handshake status, send instruction continuously when returns value 1
QCM:PDO:COUN?	Query the quantity of power/voltage object PD (this command is not necessary)
QCM:PDO:LIST?	Query the list of PD power/voltage (this command is not necessary)
QCM:PD:PDON 2	Serial number of voltage object: 1
QCM:PD:VOLT 9	Output voltage: 9V
QCM:PD:CURR 2	Output current: 2A
QCM:MODE PDFIX	Select fixed point and trigger output
MODE CURR	Select constant current mode
CURR 1A	Constant current value 1A
INPUT ON	Turn on on-load
INPUT OFF	Turn off on-load
QCM:PROT NULL	Exit fast charge protocol

## PEAK TEST Command

PEAK command os to read maximum/minimum value after starting the test.

**PEAK:VOLTage:MAXimum?** command is to read the maximum value of voltage.

**Command syntax** PEAK:VOLTage:MAXimum?

**Example** PEAK:VOLT:MAX?

**Return parameters** <NR2>

**PEAK:VOLTage:MINimum?** command is to read the minimum value of voltage.

**Command syntax** PEAK:VOLTage:MINimum?

**Example** PEAK:VOLT:MIN?



**Return parameters** <NR2>

**PEAK:CURRent:MAXimum?** command is to read the maximum value of current.

**Command syntax** PEAK:CURRent:MAXimum?

**Example** PEAK:CURR:MAX?

**Return parameters** <NR2>

**PEAK:CURRent:MINimum?** command is to read minimum value of current.

**Command syntax** PEAK:CURRent:MINimum?

**Example** PEAK:CURR:MIN?

**Return parameters** <NR2>

**[SOURce:]CHAN** command is used to set the channel

**Command syntax** [SOURce:]CHAN

**Parameter** 1 | 2

**Example** CHAN1

**Return syntax** [SOURce:]CHAN?

**Return parameters** 1 | 2

## Notes :

- 1) UTL8200/UTL8500 series electronic load is communicated by serial port RS232 if no other specific description, serial port parameters:  
 Baud rate: 4800bps/9600bps (Default) /19.2Kbps/38.4Kbps/57.6Kbps/115.2Kbps  
 Data bit: 8bits;  
 Stop bit: 1bit;  
 Check bit: none;  
 Flow control: none
- 2) If electronic load has no data to respond when the upper computer send SCPI command, the shift message in standard event status register as the answer message to response, the detailed content see the register description.
- 3) The short time interval can not less than 30ms between in two SCPI command when upper computer continuous to send.
- 4) This protocol differs from the standard SCPI, UTL8200/UTL8500 series electronic load support each command only operating one single data.
- 5) This protocol includes the part of remote control operation, user can contact us to get other remoter operation. Our company can compile SCPI protocol as custom made. In addition, we can implement real-time updates.