



July 3rd, 2018

California State IOUs

Southern California Edison (SCE), Pacific Gas and Electric (PG&E), and San Diego Gas and Electric (SDGE)

SCE: smartinvertertechnicalinformation@sce.com, Roger.salas@sce.com, Luis.aguilar@sce.com

PG&E: CTS1@pge.com (Chase Sun)

SDGE: TBialek@semprautilities.com (Tom Bialek)

Dear Southern California Edison, Pacific Gas and Electric, and San Diego Gas and Electric (CA IOU Utilities),

This letter is in response to the CPUC Resolution E-4920, that requires grid support utility interactive inverters to now include a function known as reactive power priority as defined in CPUC Resolution E-4920 for the Volt Var Test. UL reviewed the UL certifications of grid support utility interactive inverters (certified by UL in accordance with UL1741 SA) to verify which inverters have been tested with reactive power priority for the Volt Var Test as defined in CPUC Resolution E-4920. Reactive Power Priority for the Volt/Var test is defined in CPUC Resolution E-4920 as follows:

“In situations where an inverter must make a choice between providing solely real power and reducing some real power to provide/consume reactive power,

- *Inverters set to real power priority provide solely real power, and*
- *Inverters set to reactive power priority reduce some real power to absorb/reject reactive power*

Power priority is only applicable when reactive power is needed due to a voltage deviation and the inverter is operating at its full capacity.”

The below table includes the manufacture name and specific model numbers of the UL certified grid support utility interactive products that have been evaluated to provide the reactive power priority functionality as defined in CPUC Resolution E-4920. Please note that the below table also answers 3 required questions specified by the California IOUs.

Going forward UL will specify reactive power priority as defined in CPUC Resolution E-4920 for the Volt Var Test in our certification documentation and indicate such on our certificates of conformance. Note that additional letters will be sent to the CA IOU’s attention as new products are certified by UL pertaining to these functions.

Please let us know if you have any additional questions.

Sincerely,

Reviewed by,

Scott Picco
Business Development Manager
Tel: 847.664.1817
Scott.Picco@ul.com

Timothy P. Zgonena
Principal Engineer
847.664.3051
Timothy.p.zgonena@ul.com



Question #	Description	Direction for NRTL
1	Is the product capable of providing the required reactive power for the volt/var curve function at all active power levels without derating active power? (Y or N) (Active Power = 20 – 100%)	A "Yes" response meets the intent of the Resolution and Question #2 and #3 do not need to be answered
2	Was the volt/var curve tested with reactive power priority enabled? (Y or N)	A "Yes" response meets the requirements of the Resolution and Question #1 does not need to be answered
3	Was the volt/var curve tested with active power priority enabled? (Y, N, or N/A)	An "N/A" response indicates active power priority is not an option for the inverter. A "Yes" indicates that the inverter must be programmed with the correct profile in the final installation

Grid support Interactive Inverters Certified with Reactive Power Priority

Inverter Manufacturer Company Name	Model Numbers as Currently Show on the CEC List	Question 1 (Y/N)	Question 2 (Y/N)	Question 3 (Y/N)
Bloom Energy Corp	INV-651	No	Yes	Yes
ENPHASE ENERGY INC	S-230-60-LL-2-US, S-230-60-LL-5-US, S-280-60-LL-2-US, S-280-60-LL-5-US, IQ6-60-2-US, IQ6-60-5-US, IQ6-60-ACM-US, IQ6PLUS-72-2-US, IQ6PLUS-72-5-US, IQ6PLUS-72-ACM-US, IQ6PLUS-60-ACB-US, IQ7-60-2-US, IQ7-60-5-US, IQ7-60-B-US, IQ7-60-ACM-US, IQ7PLUS-72-2-US, IQ7PLUS-72-5-US, IQ7PLUS-72-B-US, IQ7PLUS-72-ACM-US, IQ7X-96-2-US, IQ7X-96-5-US, IQ7X-96-B-US, IQ7X-96-ACM-US.	No	Yes	Yes
IDEAL POWER INC	30C, 30C3, 30PV+S, 30PVF+S	No	Yes	Yes



Huawei Technologies Co. LTD.	SUN2000-11.4KTL-USLO, SUN2000-1.4KTLUSLO, SUN2000-10KTL-USLO, SUN2000-10KTL-USLO, SUN2000-9KTL-USLO, SUN2000-9KTL-USLO	No	Yes	N/A
SMA SOLAR TECHNOLOGY AG* * - Note SMA's name is listed on CEC qualified equipment list as "SMA America". SMA Solar Technology AG is the UL applicant name and therefore is the primary company name stated in this letter.	STP 50-US-40, SC 1760-US, SC 1850-US, SC 2000-US, SC 2200-US, SC 2940-US, SC 2500-EV-US, SCS 2500-EV-US, SCS 2200-US, SCS 2475-US, SC 2750-EV-US, SCS 2750-EV-US, SB3.0-1SP-US-40, SB3.8-1SP-US-40, SB5.0-1SP-US-40, SB6.0-1SP-US-40, SB7.0-1SP-US-40, SB7.7-1SP-US-40, SBS6.0-US-10, SBS5.0-US-10, SBS3.8-US-10, STP 12000TL-US-10, SPR12000m-3-H, STP 15000TL-US-10, SPR15000m-3-H, STP 20000TL-US-10, SPR20000m-3-H, STP 24000TL-US-10, SPR24000m-3-H, STP30000TL-US-10, SB3.0-1TP-US-40, SB3.8-1TP-US-40, SB5.0-1TP-US-40, SB6.0-1TP-US-40, SB7.0-1TP-US-40, SB7.7-1TP-US-40	No	Yes	Yes
Sunpower	MI-C-320-US208/240-1X, SPR-X22-370-D-AC, SPR-X22-360-D-AC, SPR-X21-335-BLK-D-AC, SPR-X20-327-BLK-D-AC, SPR-X21-345-D-AC, SPR-X21-335-D-AC, SPR-X20-327-D-AC, SPR-E20-327-D-AC, SPR-E19-320-D-AC, SPR-E18-300-D-AC, SPR-E19-315-D-AC, SPR-E20-335-D-AC, SPR-X19-315-D-AC, SPR-X19-315-BLK-D-AC, SPR-X20-335-D-AC, SPR-X20-335-BLK-D-AC, SPR-X21-350-D-AC, SPR-X21-350-BLK-D-AC, SPR-E21-335-D-AC, SPR-E18-305-C-AC	No	Yes	Yes
LG ELECTRONICS INC	LG325E1C-A5, LG330E1C-A5, LG335E1C-A5, LG315E1K-A5, LG320E1K-A5, LG325E1K-A5	No	Yes	N/A
REFU ELEKTRONIK GMBH	REFUsoI 24K-UL, REFUsoI 24K-UL-AFCI, REFUsoI 48K-UL, REFUsoI 48K-UL-AFCI	No	Yes	N/A
JINKO SOLAR CO LTD	JKMS260M-60B-EP, JKMS265M-60B-EP, JKMS270M-60B-EP, JKMS275M-60B-EP, JKMS275M-60-EP, JKMS280M-60B-EP, JKMS280M-60-EP, JKMS285M-60B-EP, JKMS285M-60-EP, JKMS290M-60B-EP, JKMS290M-60-EP, JKMS295M-60B-EP, JKMS295M-60-EP JKMS300M-60-EP	No	Yes	N/A



Appendix A: Original Request to NRTL's by CA IOUs

To: *Nationally Recognized Testing Laboratories*

From: *Southern California Edison, Pacific Gas and Electric, and San Diego Gas and Electric (CA Utilities)*

On April 27, 2018 the California Energy Division issue Resolution E- 4920 incorporating the requirement of Reactive Power Priority (RPP) for Smart Inverters. The Resolution requires this new requirement to become mandatory July 26, 2018 for new interconnection requests. As to ensure this requirement is properly implemented in the smart inverters, it is necessary to clarify the terminology used to describe the reactive power priority function with the UL1741 SA certification testing process and the terminology used in Resolution E-4920. These clarifications as well as answers to some questions raised on stakeholder calls are as follows:

Clarification to the NRTLs regarding terminology used for evaluation of the product

1. *The term "Real Power" used in E-4920 shall be considered synonymous with the term "Active Power" used in UL-1741 SA and IEEE 1547 (2018).*
2. *Inverters are required to produce the required levels of reactive power at all active (real) power levels from 20% -100% of nameplate active (real) power rating.*
3. *Inverters capable of producing the required level of reactive power without reducing active (real) power, i.e. with no power priority, are considered in compliance with the requirements for Reactive Power Priority contained in resolution E-4920.*
4. *Inverters are permitted to reduce active (real) power in order to produce the required levels of reactive power when operating at their apparent power limit, i.e. Reactive Power Priority.*
5. *Inverters shall not reduce reactive power below the required limits in order to maintain active (real) power output when operating at their apparent power limits, i.e. Active (Real) Power Priority*
6. *Inverters are not required to support multiple reactive power modes. The NRTL shall document if the inverter only operates in Reactive Power Priority mode and is not capable of operating in Active (Real) Power Priority mode.*
7. *Where the inverter supports multiple reactive modes, such modes shall be identified using the terminology contained in the certification information from the NRTL conducting the evaluation. The NRTL shall confirm that each of the multiple modes have been evaluated.*
8. *Where terminology used in NRTL certification information deviate from the terms Active (Real) Power Priority or Reactive Power Priority as defined in resolution E-4920, the NRTL shall provide an explanation of the terms used and how those terms provide equivalency to those used in E-4920.*
9. *Inverters are required to be evaluated using the requirements and test procedures contained in UL 1741 SA13 - Volt/VAr Mode (Q(V)).*
10. *Inverters are required to be evaluated using the requirements and test procedures contained in UL1741 SA8 Anti-Islanding Protection - Unintentional Islanding with Grid Support Functions Enabled. NRTLs shall certify the Unintentional Islanding testing in SA8 has been performed under the worst-case condition created by any of the power priority modes by including the inverter part numbers in the table below.*

In order to allow the interconnection of Smart Inverter to the CA utilities distribution grids, it is required that the NRTLs demonstrate if their UL1741 SA Smart Inverters were properly evaluated to account for the new requirement in the Resolution accounting for the clarifications above.



The NRTLs must answer the question below for each of the inverters which the NRTLs have been certified for UL1741SA. This information must be sent return to the utilities emails below no later than **July 9, 2018** with NRTLs letterhead and signature in order to update the utilities application tools. Information received after July 9, 2019 may cause a delay in the interconnection of the projects.

Southern California Edison: smartinvertertechnicalinformation@sce.com

Copy: Roger.salas@sce.com, Luis.aquilar@sce.com

Question #	Description	Direction for NRTL
1	Is the product capable of providing the required reactive power for the volt/var curve function at all active power levels without derating active power? (Y or N) (Active Power = 20 – 100%)	A "Yes" response meets the intent of the Resolution and Question #2 and #3 do not need to be answered
2	Was the volt/var curve tested with reactive power priority enabled? (Y or N)	A "Yes" response meets the requirements of the Resolution and Question #1 does not need to be answered
3	Was the volt/var curve tested with active power priority enabled? (Y, N, or N/A)	An "N/A" response indicates active power priority is not an option for the inverter. A "Yes" indicates that the inverter must be programmed with the correct profile in the final installation