TÜV NORD Authoritative Validation: JinkoSolar's Tiger Neo 3.0 Modules Lead the Industry in Shading Performance

XULQJ WKH DFWXDO RSHUDWLRQ RI VRODU SR HUSODQWV ORFDOOHG VKDGLQJ FDXVHG E ELUG GURSSLQJV OHD HV GXVW DFFXP XODWLRQ DQG EXLOGLQJ VKDGR V LV LQH LWDEOH 7KH UHVXOWLQJ SR HU JHQHUDWLRQ ORVVHV DQG KRWVSRW ULVNV DUH LQFUHDVLQJO EHFRP LQJ VLJQLILFDQW IDFWRUV DIIHFWLQJ WKH ORQJ WHUP SURILWDELOLW RI SR HU SODQWV

,Q 0 DUFK -LQNR6RODU FRP P LWWHG 7h9 1 2 5 D JOREDOO UHFRJQL HG FHUWLILFDWLRQ ERG WR FRQGXFW FRP SDUDWLH WHVWLQJ RI WKUHH 39 P RGXOHV DFURVV ILH W SLFDO VKDGLQJ VFHQDULRV 7HVW GDWD VKR V WKDW XQGHU LGHQWLFDO VKDGLQJ FRQGLWLRQV WKH SR HU JHQHUDWLRQ RI WKH 7LJHU 1HR P RGXOHV DV VLJQLILFDQWO KLJKHU WKDQ WKDW RI WKH FRP SDULVRQ P RGXOHV LWK SR HU JHQHUDWLRQ ORVVHV UHGXFHG E QHDUO LQ VRP H VFHQDULRV 7KLV IXUWKHU DOLGDWHV WKH UHOLDELOLW DG DQWDJHV RI 1 W SH 72 3 RQ P RGXOHV LQ UHDO RUOG DSSOLFDWLRQ HQ LURQP HQWV

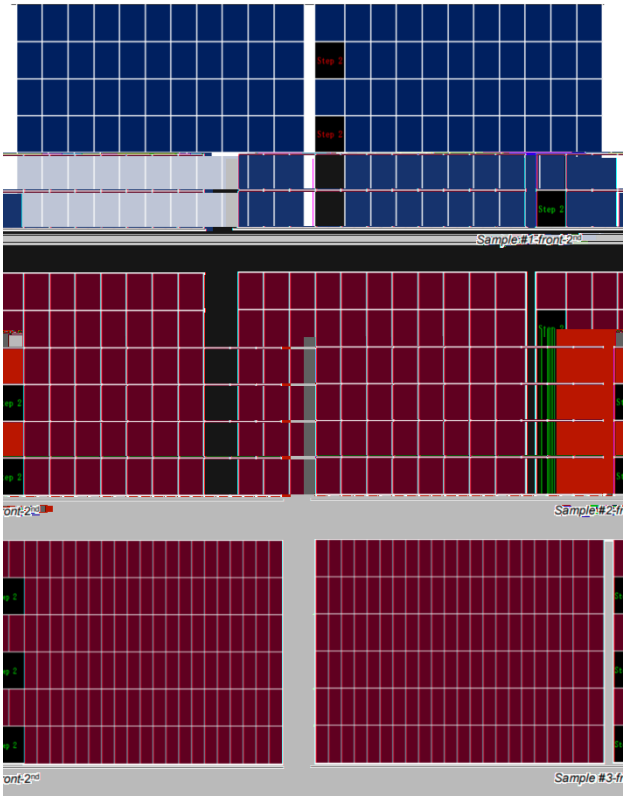
Authoritative Third-Party Testing: Comprehensive Coverage of Five Shading Scenarios

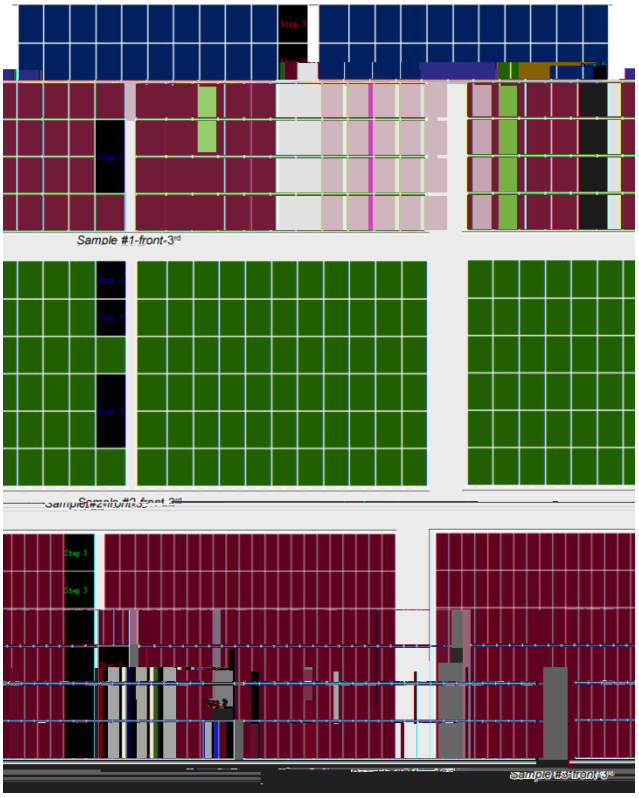
7KLV WHVW DV FRQGXFWHG LQ DFFRUGDQFH LWK WKH , 0 4 7 VWDQGDUG 7KH WHVWLQJ FR HUHG ILH W SLFDO VFHQDULRV VLQJOH SRLQW VKDGLQJ KDOI SDQHO VKDGLQJ SURJUHVVLH VKDGLQJ P XOWLVWULQJ VKDGLQJ DQG VKRUW VLGH VKDGLQJ IRFXVLQJ RQ VLP XODWLQJ WKH FRP SOH RSHUDWLQJ HQ LURQP HQWV FRP P RQO IRXQG LQ GLVWULEXWHG URRIWRS FRP P HUFLDO DQG LQGXVWULDO DQG JURXQG P RXQWHG SR HU SODQWV 7HVWLQJ DV SHUIRUP HG XQGHU 67 VWDQGDUG FRQGLWLRQV : P LUUDGLDQFH 0 VSHFWUXP FHOO WHP SHUDWXUH XVLQJ DQ FODVV SXOVHG VRODU VLP XODWRU

7HVW P RGXOH LQIRUP DWLRQ

Sample	Module type	Pmax[W]
6DP S 6SDQ 0 ,		

Shading Position	BC Module(PL)	Normal TOPCon(PL)	Tiger Neo 3.0(PL)


Sample #1-front-2nd
Sample #3-fr

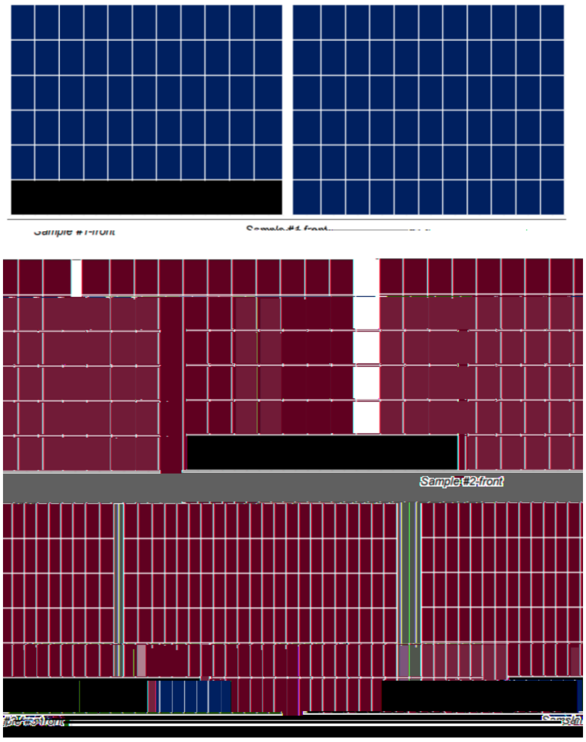

Sample #1-front-3rd

Method 2: Single-cell String Half-Area Shading Test

6LQJOH FHOOVWULQJ KDOIDUHD VKDGLQJ FDXVHG E EXLOGLQJ SDUDSHWDQG VKDGR VIURP VXUURXQGLQJ EXLOGLQJ VLVWKH PRVWFRPPRQVKDGLQJ VFHQDULR LQGLVWULEXWHG 39 DSSOLFDWLRQV GLUHFWO DIIHFWLQJ WKH VWDELOLW RI D SR HUSOQDQWVGDLOSR HUJHQHUDWLRQ UH HQXH 7KLVVSHFLDOOHG WHVWDFFXUDWHO UHSOLFDWHVWKLVVFHQDULR WR SUR LGH D GLUHFWFRPSDULVRQRI WKH WKUHH PRGXOH PRGHOV UHVLVWDQFH WR VKDGLQJ LQGXFHG SR HUORVV

Module type	Power Loss
%	
1 RUPDO72 3 RQ	
7LJHU1 HR	

7KH WHVWGDWD FOHDUO GHPRQVWUDWHV WKH SURGXFW GLIIHUHQWLDWHG DG DQWDJHV XQGHU WKHVH FRQGLWLRQV ERWK %   PRGXOHV DQG FRQ HQWLRQDO KDOIFHOO PRGXOHV H SHULHQFHG SR HU GHJUDGDWLRQH FHHGLQJ UHVXOWLQJ LQ QHDUO D UHGXFWLRQLQSR HURXWSXW,QFRQWUDVWWKH 7LJHU1 HR H SHULHQFHG D SR HUGHFD UDWH RI RQO UHSUHVHQWLQJ D UHGXFWLRQ FRPSDUHG WR WKH % PRGXOH 7KLVKHOSVSR HUSOQDQWVUHFR HU RI ORVWSR HUJHQHUDWLRQ DGGUHVVLQJ WKH LQGXVWU LGH FKDOOHQJH RI VKDGLQJ ORVVHVLQGLVWULEXWHGURRIWRS V VWHP VDWLVWURRW DQG VLJQLILFDQWO ERRVWLQJ GDLOSR HUJHQHUDWLRQUH HQXH

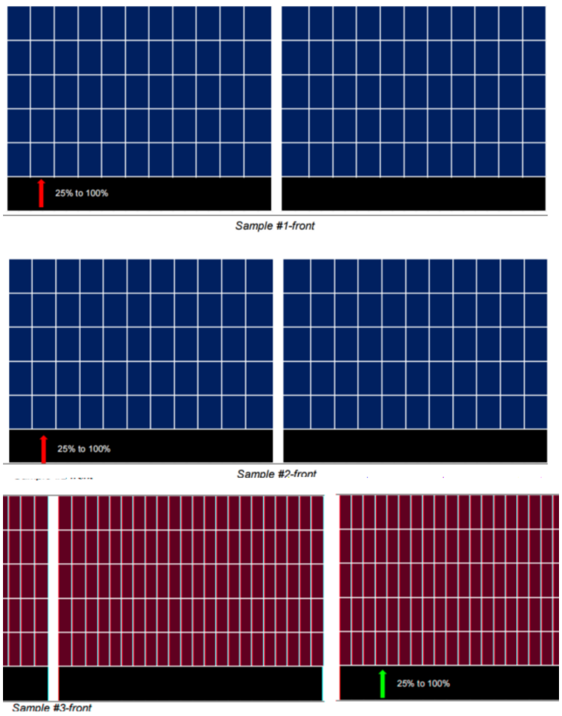


Method 3: 25% Incremental Gradual Shading Test

XULQJ ORQJ WHUP RSHUDWLRQ SKRWR ROWDLF PRGXOHVDUH FRQVWDQWOH SRVHGWR LWXHVVXFK DVGXVW DFFXPXODWLRQDQGWKH VSUHDGRI HJHWDWLRQ VDUHVXOWWKH DUHD RI VKDGLQJ JUDGXDOOH SDQGV OHDGLQJ WR SURJUHVVLYH SR HUORVV D NH IDFWRUDIIHFWLQJ WKH SODQWVOLIHWLPH UH HQXH 7KLVWHVW HPSOR VD VKDGLQJ JUDGLHQWUDQJLQJ IURP WR WR IXOOUHSOLFDWH WKH UHDO RUOGFRQGLWLRQV RI ORQJ WHUP JUDGXDOVKDGLQJ RQPRGXOHV

Shading Ratio	BC type(PL)	Normal TOPCon(PL)	Tiger Neo 3.0(PL)

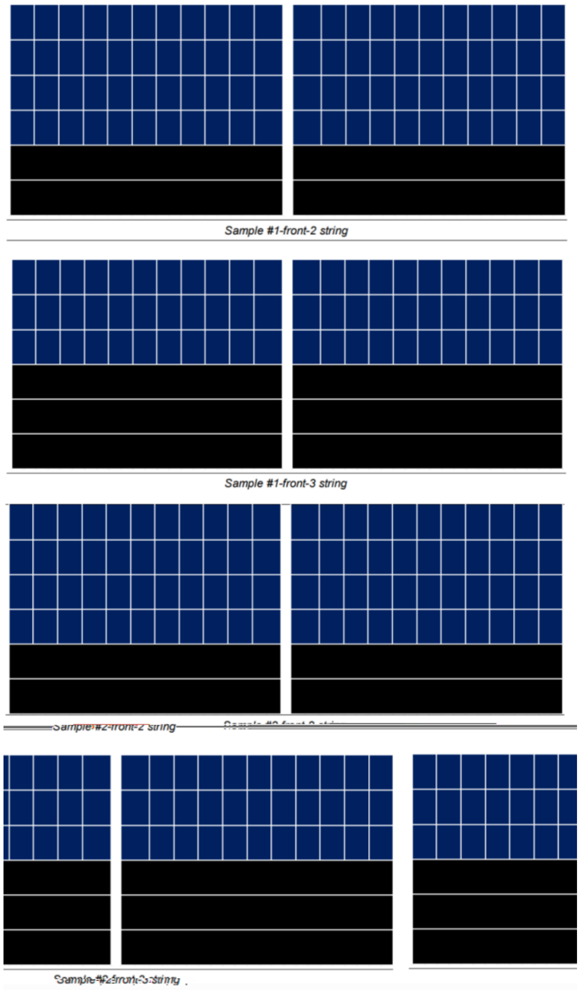
7HVWUHVXOWVVKR WKDW LWKLQWKH UDQJH RI OLJKWWR PRGHUDWH JUDGXDOVKDGLQJ KLFK DFFRXQWIRUWKH ODUJHVWSURSRUWLRQRI FRQGLWLRQVDWSR HUSODQWV WKH 7LJHU1 HR FRQVLVWHQWO RXWSHUIRUPV WKH WR FRPSDULVRQSURGXFWLQWHUPVRI SR HUJHQHUDWLRQWDELOLW 6SHFLILFDOO LQ VFHQDULRV LWK OLJKWGXVWDFFXPXODWLRQ DQG VSRUDGLF HJHWDWLRQ VKDGLQJ WKH PRGXOH GHJUDGDWLRQUDWH LVRQO EHWWKDQ RI WKH ORVH SHUIRUPDQFH GE % PRGXOHV HIIHFWLYHO PLWLJDWLQJ WKH SR HUJHQHUDWLRQGHFOLQH FDXVHGE ORQJ WHUP GXVWDFFXPXODWLRQ HQXQGHU PRGHUDWH VKDGLQJ FRQGLWLRQVRI DQG LWPDLQWDLQVD VLJQLILFDQWOHDG LQUHVLVWDQFH WR SHUIRUPDQFH GHJUDGDWLRQ SUR LGLQJ D VROLG JXDUDQWHH IRUVWDEOH UHWXUQVWKURXJKRXWWKH SR HU SODQWVHQWLUH OLIHF FOH



Method 4: Long-Side Shading Tests for Two-String and Three-String Configurations

7R DGGUHW H WHP H FRQGLWLRQV FRPPRQO HQFRXQWHUHG LQ JURXQGPRXQWHG DQG FRPPHUFLDOLQGXVWULDO URRIWRS HUSODQWV VXFK DV VKDGLQJ FDXVHG E HQWDWLRQ HTXLSPHQW ELOOERDUGV DQG ODUJH VWUXFWXUHV WKLV WHVWHVWDEOLVKHG VFHQDULRV LQ ROLQJ H WHQVL H ORQJ VLGH VKDGLQJ RI WZR VWULQJ DQG WKUHH VWULQJ FRQILJXUDWLRQV WR HUL WKH PRGXOHV PD LPXP SR HU JHQHUDWLRQ FDSDFLW XQGHU VH HUH VKDGLQJ FRQGLWLRQV 7HVW GDWD VKR V WKDW XQGHU GRXEOH VWULQJ ORQJ VLGH VKDGLQJ FRQGLWLRQV SR HU JHQHUDWLRQ ORVVHV IRU WKH WKUHH PRGXOHV HUH HVVHQWLDOO RQ SDU LWK QR VLJQLILFDQW GLIIHUHQFHV KR H HU LQ WKH WULSOH VWULQJ VFHQDULR LQ ROLQJ H WHQVL H VKDGLQJ FR HULQJ RI WKH PRGXOH VXUIDFH DUHD VLJQLILFDQW SHUIRUPDQFH JDSV HPHUJHG

DWD LQGLFDWHV WKDW WKH % PRGXOH H SHULHQFHG D SR HU GHJUDGDWLRQ RI KLOH WKH FRQ HQWLRQDO KDOI FHOO PRGXOH GHJUDGHG E KLOH WKH 7LJHU 1HR UHFRUGHG D GHJUDGDWLRQ UDWH RI RPSDUHG WR WKH % PRGXOH WKLV UHSUHVHQWV D SHUFHQWDJH SRLQW UHGXFWLRQ LQ SR HU ORVV DOOR LQJ LW WR UHFR HU DQ DGGLWLRQDO RI UHPDLQLQJ SR HU JHQHUDWLRQ FDSDFLW XQGHU H WUHPH FRQGLWLRQV RI H WHQVL H VKDGLQJ 7KLV IXOO GHPRQVWUDWHV WKH SURGXFWV H FHSWLRQDO DGDSWDELOLW LQ FRPSOH DQG H WUHPH VFHQDULRV HQDEOLQJ LW WR PLQLPL H UH HQXH ORVVHV FDXVHG E VH HUH VKDGLQJ

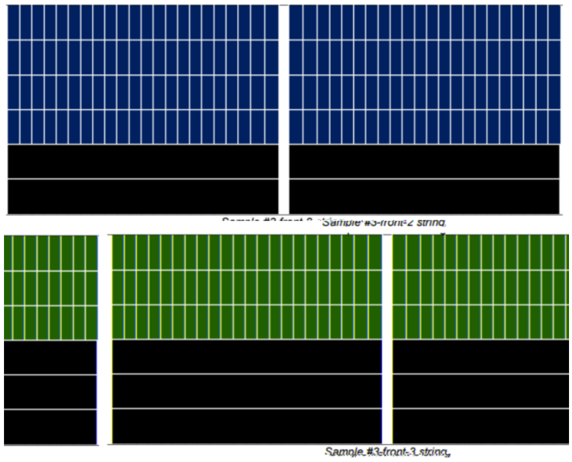


Sample #1-front-2 string

Sample #1-front-3 string

Sample #2-front-2 string

Sample #2-front-3 string

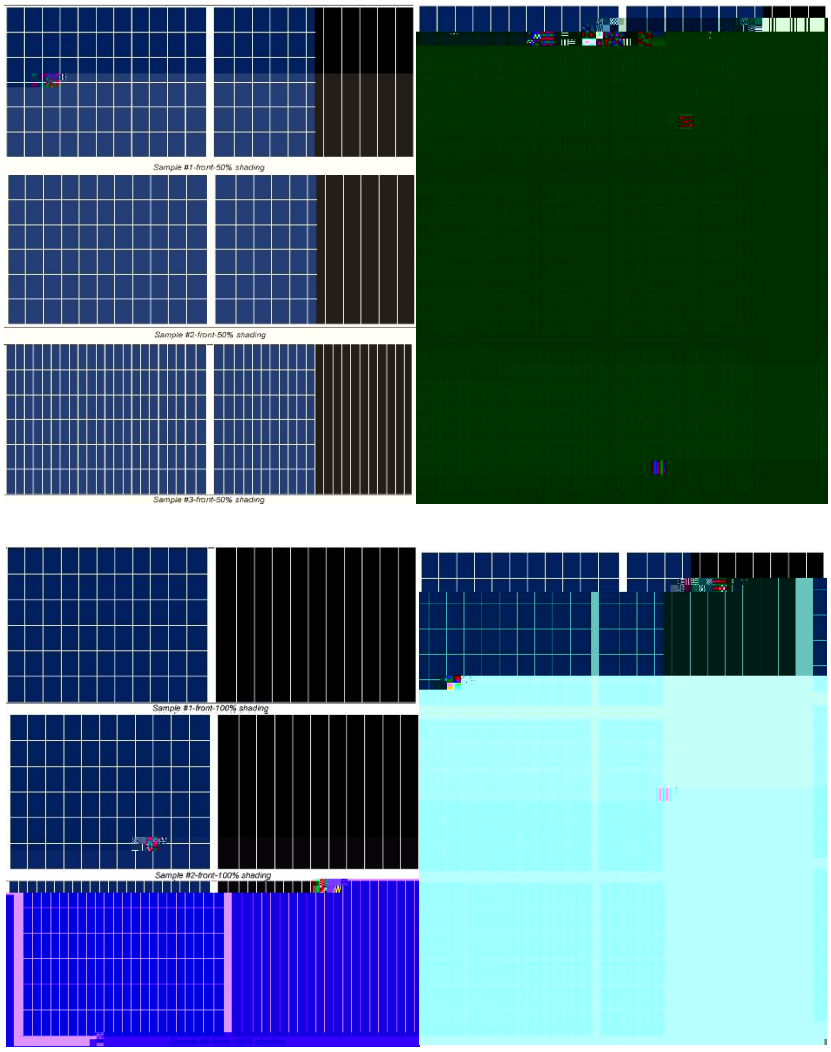


Method 5: Gradual Shading Test on the Short Side

7R FRPSUHKHQVLHO FRHUDOORSHUDWLQJ FRQGLWLRQV WKLV WHVWVLPXOWDQHRXVO VLPXODWHG VKDGLQJ VFHQDULRV H WHQGLQJ IURP WKH VKRUWVLGH RI WKH PRGXOHV VXFK DV JURXQG UHIOHFWLRQV VQR DFFXPXODWLRQ DW WKH EDVH DQG RU HJHWDWLRQ 7KURXJK JUDGLHQW VKDGLQJ WHVWV WKH SHUIRUPDQFH RI WKH WKUHH PRGXOHV XQGHU WKHVH VSHFLILF VKDGLQJ FRQGLWLRQV ZDV HDOXDWHG 7KLV WSH RI VKDGLQJ FDQ HVSHFLDOO FDXVH R HUDOO SLP DWFK LWKLQ WKH VROUFHOOWLQJ VDQG UHSUHVHQWD SK VLFDOSHUIRUPDQFH OP LWDWLRQ WKDWLVGLIILFXOWWR D RLGLQ SKRWR ROWDLF PRGXOHV

Shading Ratio	BC type(PL)	Normal TOPCon(PL)	Tiger Neo 3.0(PL)
KDOIPRGXOH			

%DVHG RQ WKH WHVWUHVXOWV GXH WR SK VLFDOVWUXFWXUDOOP LWDWLRQV WKH WKUHH PRGXOHV SHUIRUPHG VLP LODUO XQGHU VKRUWVLGH VKDGLQJ FRQGLWLRQV LWV SR HU GHJUDGDWLRQ UHP DLQLQJ ODUJHO FRQVLVWHQW HQ XQGHU VXFK FRQGLWLRQV KHUH WKHUH LV QR URRP IRU WHFKQLFDO RSWLP L DWLRQ WKH 7LJHU 1HR FRQWLQXHV WR SHUIRUP FRQVLVWHQWO DFKLH LQJ FRP SDUDEOH RU VOLJKWO VXSHULRU SHUIRUP DQFH LQ VFHQDULRV LWK DQG PRGHUDWH VKRUWVLGH VKDGLQJ 7KLV GHP RQVWUDWHV WKDW WKH SURGXFW KDV QR SHUIRUP DQFH EHDNQHVVHV DFURVV DOO VFHQDULRV IXOO KLJKOLJKWLQJ LWV VWDELOLW DQG UHOLDELOLW



Comprehensive Comparison: Tiger Neo 3.0 Shading Performance Advantage Matrix

V QWKHVLV RI GDWD IURP IL H VSHFLDOHG VWXV F HEDLO GHP RQVWDWH VWKDWWKH SHURUP DQF H DG DQWDJHVRI 7LJHU1HR DUH KLJKO DCJQHG LWK WKH DF WXDCRSHUDWRQDOFHQDUR VRI VROU SR HUSOQW ,WDFKLH HVVLJQLF DQWUHGXF WRQVLQ SR HUR WDFURW DUR XVKDGLQJ FRQGLWRQV FRP P RQO HQF RXQWHUHG LQ WKH LQGXVW LWK WKH P DJQLWXGH RI WKHVH DG DQWDJHV FRVHO P DWFKLQJ UHDO RUGDS SOEDWRQV KLJKOJKWQJ LWR XWDQGLQJ FRP P HUFLDO DXH

Test Scenario	Advantage of Tiger Neo 3.0	Application
6LQJOH SRLQW VKDGLQJ	HWSR HURW	ELUG GURSSLQJV IDOOHQ OHD HV
6LQJOH VWULQJ KDOI DUHD VKDGLQJ	HWSR HURW	3DUDSHW DQWHQQD KHLJKERULQJ EXLOGLQJ VKDGR V
ILUVW UR VKDGLQJ	HWSR HURW	GXVW DFFXPXODWLRQ VSRUDGLF HJHWDWLRQ
ILUVW UR VKDGLQJ	HWSR HURW	0RGHUDWH GXVW DFFXPXODWLRQ SDUWLDO VKDGR V
7KUHH VWULQJ ORQJ VLGH VKDGLQJ	HWSR HURW	/DUJH REVWDFOH VKDGLQJ

%DVHG RQ FRPSUHKHQVL H UHDO RUOG WHVW GDWD DQG FDWHJRUL]HG E VKDGLQJ FR HUDJH DQG SHUIRUPDQFH GHJUDGDWLRQ WKH VKDGLQJ WROHUDQFH RI WKH WKUHH PRGXOHV IRUPV D FOHDU KLHUDUFK WKDW IXOO DOLJQV LWK WKH DFWXDO RSHUDWLQJ FRQGLWLRQV RI VRODU SR HU SODQWV 8QGHU PLOG DQG PRGHUDWH VKDGLQJ FRQGLWLRQV KLFK DFFRXQW IRU R HU RI WKH LQGXVWU WKH 7LJHU 1HR GHPRQVWUDWHV D V VWHPDWLF SHUIRUPDQFH DG DQWDJH VLJQLILFDQWO RXWSHUIRUPLQJ % PRGXOHV DQG FRQ HQWLRQDO KDOI FHOO PRGXOHV 2QO XQGHU H WUHPH FRQGLWLRQV LWK VKDGLQJ FR HUDJH H FHHGLQJ GXH WR WKH OLPLWDWLRQV RI SK VLFDO VKDGLQJ GR WKH SHUIRUPDQFH OH HOV RI WKH WKUHH PRGXOHV FRQ HUJH LWK QR VLJQLILFDQW GLIIHUHQFHV

7KH R HUDOO SHUIRUPDQFH UDQNLQJ LV FOHDU XQGHU OLJKW VKDGLQJ FRQGLWLRQV FR HUDJH WKH 7LJHU 1HR GHOLYHUV WKH EHVW SHUIRUPDQFH XQGHU PRGHUDWH VKDGLQJ FR HUDJH WKH 7LJHU 1HR FRQWLQXHV WR OHDG DQG XQGHU VH HUH VKDGLQJ ! FR HUDJH WKH SHUIRUPDQFH RI WKH WKUHH PRGXOHV FRQ HUJHV 7KLV PHDQV WKDW LQ WKH DVW PDMRULW RI VFHQDULRV GXULQJ D SR HU SODQW V GDLO RSHUDWLRQV WKH 7LJHU 1HR FDQ FRQVLVWHQWO JHQHUDWH H FHVV SR HU UH HQXH HIIHFWL HO DGGUHVVLQJ WKH LQGXVWU V FRUH HIILFLHQF FKDOOHQJHV

Technical Analysis: Why Tiger Neo Performs Better in Shaded Conditions

7LJHU 1HR GHOLYHUV FRPSUHKHQVL H V VWHPDWLF DG DQWDJHV LQ VKDGLQJ UHVLVWDQFH VWHPPLQJ SULPDULO IURP WKH XQGHUO LQJ DUFKLWHFWXUDO VWUHQJWKV RI 1 W SH 7 2 3 RQ WHFKQRORJ 7KH SURGXFW LQWHJUDWHV PXOWLSOH FXWWLQJ HGJH LQQR DWLRQV LQFOXGLQJ PXOWL EXVEDU GHVLJQ + 3 KLJK HIILFLHQF FHOO SDVVL DWLRQ 0 ; PHWDOOL]DWLRQ RSWLPL]DWLRQ DQG DQ)3 RSWLPL]HG OD RXW % DGGUHVVLQJ LQGXVWU FKDOOHQJHV VXFK DV SR HU ORVV GXH WR VKDGLQJ KLJK WHPSHUDWXUH GHJUDGDWLRQ DQG ORQJ WHUP HIILFLHQF GHFOLQH DW WKH GHVLJQ VWDJH LWDFKLH HV FRUH SHUIRUPDQFH PHWULFV WKDW FRPSUHKHQVL HO RXWSHUIRUP PDLQVWUHDP LQGXVWU SURGXFWV

,Q WHUPV RI FRUH SHUIRUPDQFH PHWULFV 7LJHU 1HR IHDWXUHV DQ XOWUD KLJK ELIDFLDOLW RI KLFK LV SHUFHQWDJH SRLQWV KLJKHU WKDQ PDLQVWUHDP % PRGXOHV HQDEOLQJ DQ DGGLWLRQDO SR HU JDLQ IURP WKH UHDU VLGH LQ HQ LURQPHQWV LWK JRRG JURXQG UHIOHFWL LW DQG H FHOOHQW WHPSHUDWXUH FRHIILFLHQW RI HIIHFWL HO UHGXFLQJ SR HU ORVV XQGHU KLJK WHPSHUDWXUH VKDGLQJ FRQGLWLRQV ,W DOVR IHDWXUHV XOWUD ORZ GHJUDGDWLRQ FKDUDFWHULVWLFV LWK ILUVW HDU GHJUDGDWLRQ DQG DQ DQQXDO OLQHDU GHJUDGDWLRQ UDWH RI MXVW HQVXULQJ VWDEOH DQG HIILFLHQW SR HU JHQHUDWLRQ WKURXJKRXW WKH PRGXOH V HDU OLIHF FOH KLOH EDODQFLQJ VKRUW WHUP

VKDGLQJ UHVLVWDQFH LWK RQJ WHUP SR HUWDELOLWV

+RWSRWHIHFWV DQG UH HUH FXUHQW RWKHV DUH WKH SUP DU FDXVHV RI VLJQLFDQW SR HU GHJUDGDWRQ IRQ LQJ VKDGLQJ DQG KD H RQJ EHHQ D WHFKQLFDOERWWOHQHFN LQ WKH LQGXVW /H HUDJLQJ 1 WSH 72 3 RQ FRUH WHFKQRORJ 7LJHU 1HR HP SR V P XQWSEH WHFKQLFDO RSWP LDWRQV WR VXSSUHVV VKDGLQJ RWHVDWWKHLUVRXFH P LWJDWH KRW