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 VLVLQH 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

,Q0 DUFK -LQNR6RODU FRP P LWWHG7h9 1 2 5 D JOREDO UHFRJQL HG FHUWLILFDWLRQ ERG WR FRQGXFW FRP SDUDWLYH WHVWLQJ RI WKUHH 39 P RGXOHV DFURVV ILYH W SLFDO VKDGLQJ VFHQDULRV 7HVW GDWD VKR V WKDW XQGHU DOO KWWR P RGHUDWH VKDGLQJ FRQGLWLRQV WKH SR HU GHJUDGDWLRQ RI WKH 7LJHU 1HR P RGXOHV DV VLJQLILFDQWO OR HU 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 ZRUOG DSSOLFDWLRQ HQ LURQP HQWV

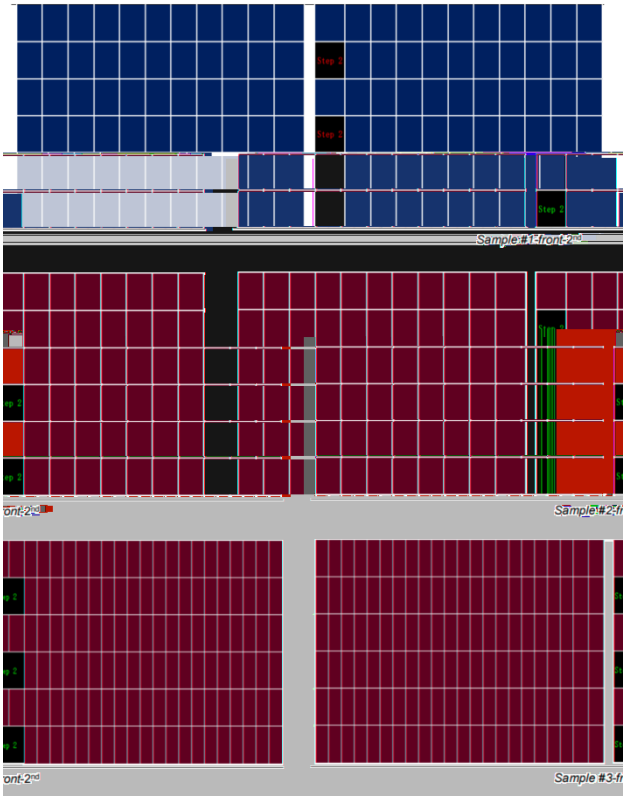
Authoritative Third-Party Testing: Comprehensive Coverage of Five Shading Scenarios

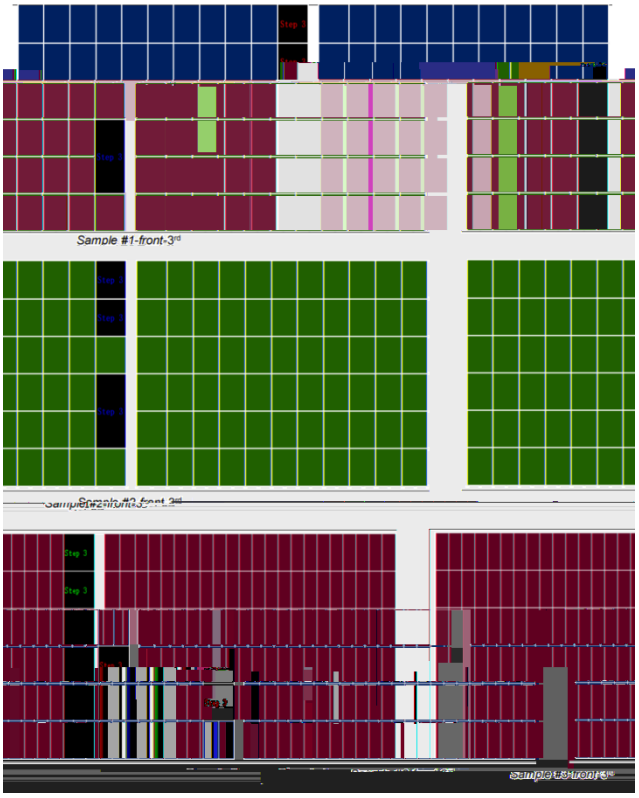
7KLV WHVW DV FRQGXFWHG LQ DFFRUGDQFH LWK WKH , 0 4 7 VWDQGDUG 7KH WHVWLQJ FR HUHG ILYH W SLFDO VFHQDULRV VLQJOH SRLQW VKDGLQJ KDOI SDQHO VKDGLQJ SURJUHVVL H VKDGLQJ P XOWL VWULQJ VKDGLQJ DQG VKRUW VLGH VKDGLQJ IRFXVLQJ RQ VLP XODWLQJ WKH FRP SOH RSHUDWLQJ HQ LURQP HQWV FRP P RQO IRXQG LQ GLVWULEXWHG 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

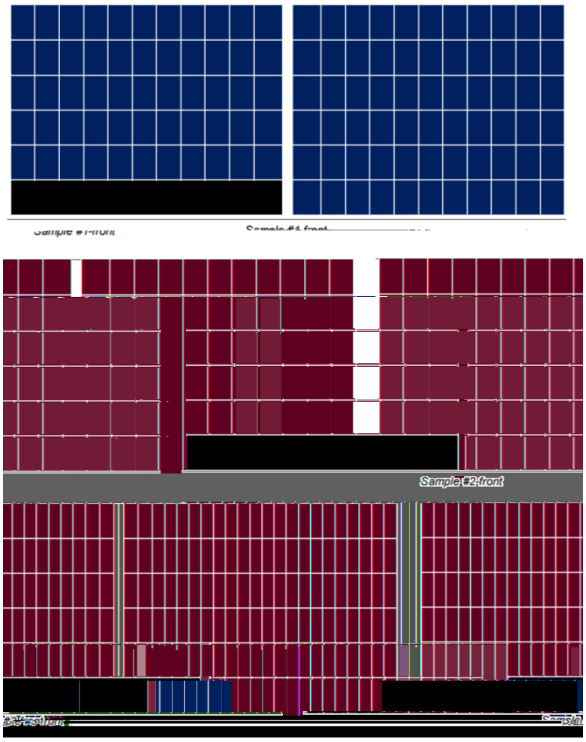

Sample #1-front-3rd

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

6LQJOH FHOO VWULQJ KDOIDUHD VKDGLQJ FDXVHG E EXLOGLQJ SDUDSHWV DQG VKDGR VIURP VXUURXQGLQJ EXLOGLQJ VLV WKH P RVW FRP P RQ VKDGLQJ VFHQDULR LQ GLVWULEXWHG 39 DSSOLFDWLRQV GLUHFWO DIIHFWLQJ WKH VWDELOLW RI D SR HU SODQWV GDLO SR HU JHQHUDWLRQ UH HQXH 7KLV VSHFLDOOHG WHVW DFFXUDWHO UHSOLFDWHV WKLV VFHQDULR WR SUR LGH D GLUHFW FRP SDULVRQ RI WKH WKUHH P RGXOH P RGHOV UHVLVWDQFH WR VKDGLQJ LQGXFHG SR HU ORVV

Module type	Power Loss
%	
1 RUP DO72 3 RQ	
7LJHU1 HR	

7KH WHVW GDWD FOHDUO GHP RQVWUDWHV WKH SURGXFW GLIIHUHQWLDWHG DG DQWDJHV XQGHU WKHVH FRQGLWLRQV ERWK % P RGXOHV DQG FRQ HQWLRQDO KDOIFHOO P RGXOHV H SHULHQFHG SR HU GHJUDGDWLRQ H FHHGLQJ UHVXOWLQJ LQ QHDUOD UHGXFWLRQ LQ SR HU RXWSXW,Q FRQWUDVW WKH 7LJHU1 HR H SHULHQFHG D SR HU GHFD UDWH RI RQO UHSUHVHQWLQJ D UHGXFWLRQ FRP SDUHG WR WKH % P RGXOH 7KLV KHOSV SR HU SODQWV UHFR HU RI ORVW SR HU JHQHUDWLRQ DGGUHVVLQJ WKH LQGXVWU LGH FKDOOHQJH RI VKDGLQJ ORVVHV LQ GLVWULEXWHG URRIWRS V VWHP V DWLVI URRW DQG VLJQLILFDQWO ERRVWLQJ GDLO SR HU JHQHUDWLRQ UH HQXH

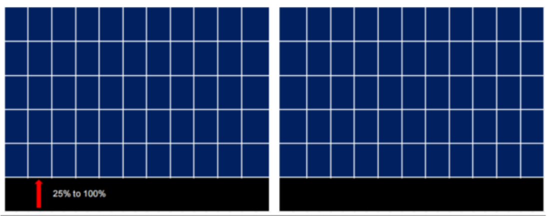


Method 3: 25% Incremental Gradual Shading Test

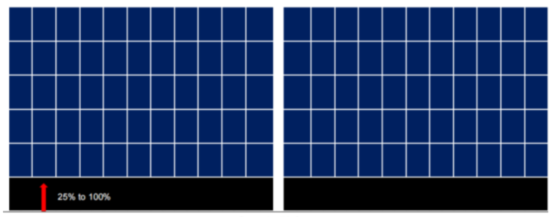
XULQJ ORQJ WHUP RSHUDWLRQ SKRWR ROWDLF PRGXOHVDUH FRQVWDQWOH SRVHG WR LWXHVVXFK DVGXVW DFFXPXODWLRQDQGWKH VSUHDGRI HJHWDWLRQ VD UHVXOWWKH DUHD RI VKDGLQJ JUDGXDOOH SDQGV HDGLQJ WR SURJUHVVL H SR HUORVV D NH IDFWRUDIIHFWLQJ WKH SODQWVOLIHWLPH UH HQXH 7KLVWHVW HPSOR VD VKDGLQJ JUDGLHQWUDQJLQJ IURP WR WR IXOOUHSOLFDWH WKH UHDO ZRUOGFRQGLWLRQV RI ORQJ WHUP JUDGXDOVKDGLQJ RQPRGXOHV

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

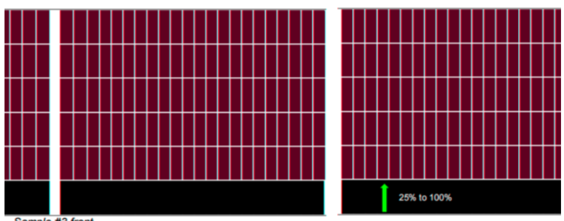
7HVWUHVXOWVVKR WKDW LWKLQ WKH UDQJH RI OLJKWWR PRGHUDWH JUDGXDOVKDGLQJ KLFK DFFRXQWIRUWKH ODUJHVWSURSRUWLRQRI FRQGLWLRQVDWSR HUSODQWV WKH 7LJHU1HR FRQVLVWHQWO RXWSHUIRUPV WKH WR FRPSDULVRQSURGXFWLQWHUPVRI SR HUJHQHUDWLRQVWDELOLW 6SHFLILFDOO LQ VFHQDULRV LWK OLJKWGXVWDFFXPXODWLRQ DQG VSRUDGLF HJHWDWLRQ VKDGLQJ WKH PRGXOH GHJUDGDWLRQUDWH LVRQO EHWWHUWKDQ RI WKH ORVH SHUIRUPHG E % PRGXOHV HIIHFWL HO PLWLJDWLQJ WKH SR HUJHQHUDWLRQGHFOLQH FDXVHG E ORQJ WHUP GXVWDFFXPXODWLRQ HQXQGHU PRGHUDWH VKDGLQJ FRQGLWLRQVRI DQG LWPDLQWDLQVD VLJQLILFDQWOHDG LQUHVLVWDQFH WR SHUIRUPDQFH GHJUDGDWLRQ SUR LGLQJ D VROLG JXDUDQWHH IRUWDEOH UHWXUQVWKURXJKRXWWKH SR HU SODQWVHQWLUH OLIHF FOH



Sample #1-front



Sample #2-front

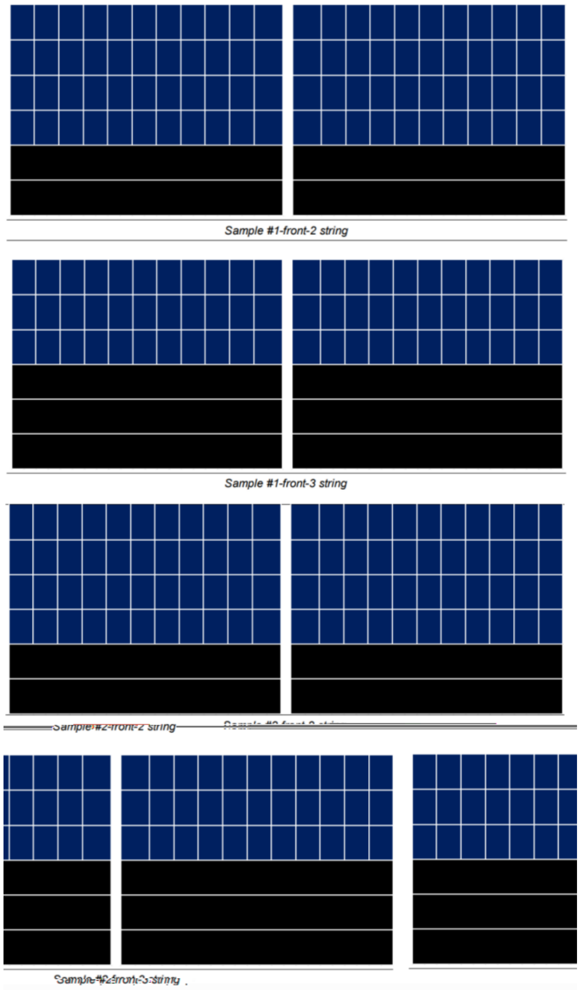


Sample #3-front

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

7R DGGUHVV H WUHP H FRQGLWLRQV FRP P RQO HQFRXQWHUHG LQ JURXQG P RXQWHG DQG FRP P HUFLDO LQGXVWULDO URRIWRS HUSODQWV VXFK DV VKDGLQJ FDXVHG E HQWLODWLRQ HTXLSP HQW ELOOERDUGV DQG ODUJH VWUXFWXUHV WKLV WHVW WDEOLVKHG VFHQDULRV LQ RO LQJ H WHQVL H ORQJ VLGH VKDGLQJ RI WR VWULQJ DQG WKUHH VWULQJ FRQILJXUDWLRQV WR HUL WKH P RGXOHV P D LP XP 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 P RGXOHV HUH HVVHQWLDOO RQ SDU LWK QR VLJQLILFDQW GLIIHUHQFHV KR H HU LQ WKH WULSOH VWULQJ VFHQDULR LQ RO LQJ H WHQVL H VKDGLQJ FR HULQJ RI WKH P RGXOH VXUIDFH DUHD VLJQLILFDQW SHUIRUP DQFH JDSV HP HUJHG

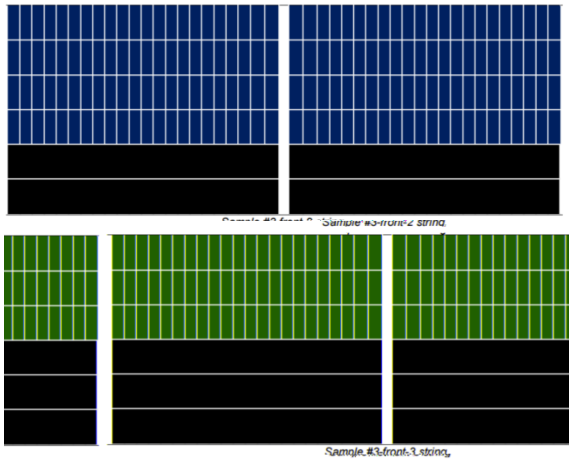
DWD LQGLFDWHV WKDW WKH % P RGXOH H SHULHQFHG D SR HU GHJUDGDWLRQ RI KLOH WKH FRQ HQWLRQDO KDOI FHOO P RGXOH GHJUDGHG E KLOH WKH 7LJHU 1 HR UHFRUGHG D GHJUDGDWLRQ UDWH RI RP SDUHG WR WKH % P RGXOH WKLV UHSUHVHQWV D SHUFHQWDJH SRLQW UHGXFWLRQ LQ SR HU ORVV DOOR LQJ LW WR UHFR HU DQ DGGLWLRQDO RI UHP DLQLQJ SR HU JHQHUDWLRQ FDSDFLW XQGHU H WUHP H FRQGLWLRQV RI H WHQVL H VKDGLQJ 7KLV IXOO GHP RQVWUDWHV WKH SURGXFWV H FHSWLRQDO DGDSWDELOLW LQ FRP SOH DQG H WUHP H VFHQDULRV HQDEOLQJ LW WR P LQLP L 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

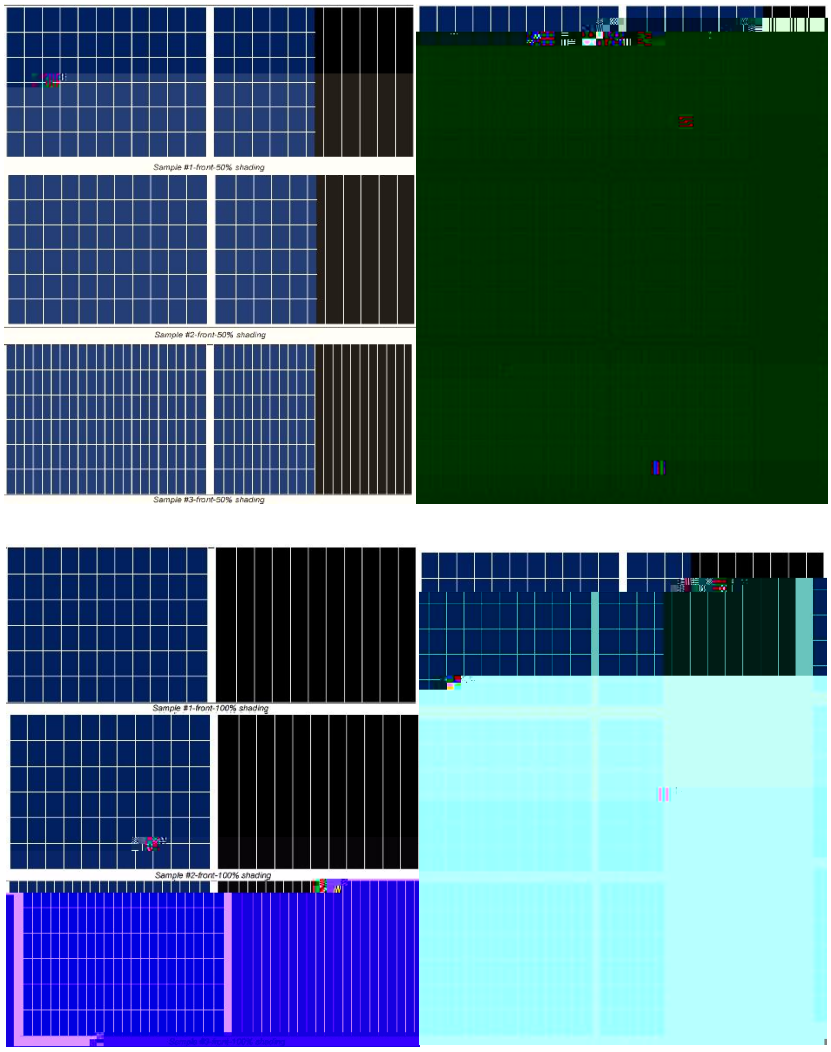


Method 5: Gradual Shading Test on the Short Side

7R FRPSUHKHQVL HO FR HUDOORSHUDWLQJ FRQGLWLRQV WKLV WHVW VLP XOWDQHRXVO VLP XODWHG VKDGLQJ VFHQDULRV H WHQGLQJ IURP WKH VKRUWVLGH RI WKH PRGXOHV VXFK DV JURXQG UHIOHFWLRQV VQR DFFXP XODWLRQ DW WKH EDVH DQG R HJHWDWLRQ 7KURXJK JUDGLHQW VKDGLQJ WHVWV WKH SHUIRUP DQFH RI WKH WKUHH PRGXOHV XQGHU WKHVH VSHFLILF VKDGLQJ FRQGLWLRQV ZDV HYDOXDWHG 7KLV WSH RI VKDGLQJ FDQ HDVLO FDXVH R HUDOO SHUIRUP DQFH PLVP DWFK ZLWKLQ WKH VROUFHOOVWULQJ VDQG UHSUHVHQWV D SK VLFDOSHUIRUP DQFH OLP LWDWLRQ WKDW LV GLIILFXOW WR D RLG LQ SKRWR ROWDLF PRGXOHV

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

%DVHG RQ WKH WHVWUHVXOWV GXH WR SK VLFDOVWUXFWXUDOOLP LWDWLRQV WKH WKUHH PRGXOHV SHUIRUP HG VLP LODUO XQGHU VKRUWVLGH VKDGLQJ FRQGLWLRQV ZLWK SR HU GHJUDGDWLRQ UHP DLQLQJ ODUJHO FRQVLVWHQW H HQ XQGHU VXFK FRQGLWLRQV KHUH WKHUH LV QR URRP IRU WHFKQLFDORSWLP L]DWLRQ WKH 7LJHU 1HR FRQWLQXHV WR SHUIRUP FRQVLVWHQWO DFKLH LQJ FRPSDUDEOH RU VOLJKWO VXSHULRU SHUIRUP DQFH LQ VFHQDULRV ZLWK DQG PRGHUDWH VKRUWVLGH VKDGLQJ 7KLV GHP RQVWUDWHV WKDW WKH SURGXFW KDV QR SHUIRUP DQFH ZHDNQHVVHV DFURVV DOOVFHQDULRV 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	OHWSR HUORW	ELUG GURSSLQJV IDOOHQ OHD HV
6LQJOH VWULQJ KDOIDUHD VKDGLQJ	OHWSR HUORW	3DUDSHW DQQHLJKERULQJ EXLOGLQJ VKDGR V
IILWWUR VKDGLQJ	OHWSR HUORW	GXVWDFFXP XODWLRQ VSRUDGLF HJHWDWLRQ
IILWWUR VKDGLQJ	OHWSR HUORW	0 RGHUDWH GXVWDFFXP XODWLRQ SDUWLDOVKDGR V
7KUHH VWULQJ ORQJ VLGH VKDGLQJ	OHWSR HUORW	/DUJH REVWDFOH VKDGLQJ

%DVHG RQ FRP SUHKHQVLYH UHDO ZRUOG WHVWGDWD DQG FDWHJRUL]HG E VKDGLQJ FR HUDJH DQG SHUIRUP DQFH GHJUDGDWLRQ WKH VKDGLQJ WROHUDQFH RI WKH WKUHH P RGXOHV IRUP V D FOHDU KLHUDUFK WKDW IXOO DOLJQV LWK WKH DFWXDO RSHUDWLQJ FRQGLWLRQV RI VRODU SR HU SODQWV 8QGHU P LOG DQG P RGHUDWH VKDGLQJ FRQGLWLRQV KLFK DFFRXQW IRU R HU RI WKH LQGXVWU WKH 7LJHU1HR GHP RQVWUDWHV D V VWHP DWLF SHUIRUP DQFH DG DQWDJH VLJQLILFDQWO RXWSHUIRUP LQJ % P RGXOHV DQG FRQ HQWLRQDO KDOIFHOOP RGXOHV 2 QO XQGHU H WUHP H FRQGLWLRQV LWK VKDGLQJ FR HUDJH H FHHGLQJ GXH WR WKH OLP LWDWLRQV RI SK VLFDO VKDGLQJ OR V GR WKH SHUIRUP DQFH OH HOV RI WKH WKUHH P RGXOHV FRQ HUJH LWK QR VLJQLILFDQW GLIIHUHQFHV

7KH R HUDOO SHUIRUP DQFH UDQNLQJ LV FOHDU XQGHU OLJKW VKDGLQJ FRQGLWLRQV FR HUDJH WKH 7LJHU1HR GHOLYHUV WKH EHVW SHUIRUP DQFH XQGHU P RGHUDWH VKDGLQJ FR HUDJH WKH 7LJHU1HR FRQWLQXHV WR OHDG DQG XQGHU VH HUH VKDGLQJ ! FR HUDJH WKH SHUIRUP DQFH RI WKH WKUHH P RGXOHV FRQ HUJHV 7KLV P HDQV WKDW LQ WKH DVW P DMRULW RI VFHQDULRV GXULQJ D SR HU SODQW V GDLO RSHUDWLRQV WKH 7LJHU1HR 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

7LJHU1HR GHOLYHUV FRP SUHKHQVLYH V VWHP DWLF DG DQWDJHV LQ VKDGLQJ UHVLVWDQFH VWHP P LQJ SULP DULO IURP WKH XQGHUO LQJ DUFKLWHFWXUDO VWUHQJWKV RI 1 W SH 72 3 RQ WHFKQRORJ 7KH SURGXFW LQWHJUDWHV P XOWLSOH FXWWLQJ HGJH LQQR DWLRQV LQFOXGLQJ P XOWL EXVEDU GHVLJQ + 3 KLJK HIILFLHQF FHOO SDVVL DWLRQ 0 ; P HWDOOL]DWLRQ RSWLP L]DWLRQ DQG DQ)3 RSWLP L]HG OD RXW % DGGUHVVLQJ LQGXVWU FKDOOHQJHV VXFK DV SR HU ORVV GXH WR VKDGLQJ KLJK WHP SHUDWXUH GHJUDGDWLRQ DQG ORQJ WHUP HIILFLHQF GHFOLQH DW WKH GHVLJQ VWDJH LWDFKLH HV FRUH SHUIRUP DQFH P HWULFV WKDW FRP SUHKHQVL HO RXWSHUIRUP P DLQVWUHDP LQGXVWU SURGXFWV

,QWHUP V RI FRUH SHUIRUP DQFH P HWULFV 7LJHU1HR IHDWXUHV DQ XOWUD KLJK ELIDFLDOLW RI KLFK LV SHUFHQWDJH SRLQWV KLJKHU WKDQ P DLQVWUHDP % P RGXOHV HQDEOLQJ DQ DGGLWLRQDO SR HU JDLQ IURP WKH UHDU VLGH LQ HQ LURQP HQWV LWK JRRG JURXQG UHIOHFWL LW DQG H FHOOHQW WHP SHUDWXUH FRHIILFLHQW RI HIIHFWL HO UHGXFLQJ SR HU ORVV XQGHU KLJK WHP SHUDWXUH VKDGLQJ FRQGLWLRQV LW DOVR IHDWXUHV XOWUD OR GHJUDGDWLRQ FKDUDFWHULVWLFV LWK ILUVW HDU GHJUDGDWLRQ DQG DQ DQQXDOOLQHDU GHJUDGDWLRQ UDWH RI MXVW HQVXULQJ VWDEOH DQG HIILFLHQWSR HU JHQHUDWLRQ WKURXJKRXW WKH P RGXOH V HDUOLHU F 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