

# Solar panel voltage and current parameters





## Overview

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What are the performance parameters of a solar panel?

Warranty The main performance parameters of solar panels include short-circuit current (ISC), open-circuit voltage (VOC), peak power (PM), current and voltage at maximum power (Imp and Vmp), efficiency, and fill factor (FF). These parameters help measure a solar panel's ability to convert sunlight into electricity effectively.

What are the key electrical parameters of a solar panel?

Before proceeding with calculations, it is essential to understand the key electrical parameters of a solar panel: Open-Circuit Voltage (Voc): The maximum voltage output when no load is connected. Maximum Power Voltage (Vmp): The voltage at which the panel operates to deliver maximum power.

What are the parameters of a solar cell?

The solar cell parameters are as follows; Short circuit current is the maximum current produced by the solar cell, it is measured in ampere (A) or milli-ampere (mA). As can be seen from table 1 and figure 2 that the open-circuit voltage is zero when the cell is producing maximum current (ISC = 0.65 A).

Why do solar panels need voltage and current calculations?

A well-designed system ensures optimal energy yield, prevents electrical failures, and enhances system longevity. This article provides a comprehensive analysis of voltage and current calculations for different solar panel configurations, including series, parallel, and hybrid arrangements.



## Solar panel voltage and current parameters

### Solar Cell Parameters and Equivalent Circuit

Feb 5, 2016 · 9.1 External solar cell parameters The main parameters that are used to characterise the performance of solar cells are the peak power  $P_{max}$ , the short-circuit current ...

#### Parameters of a Solar Cell and Characteristics of a PV Panel

What Exactly Is A Solar Photovoltaic cell? Working of A Solar Cell Solar Cell

Parameters Photovoltaic Technologies Factors Affecting The Power Generated by Solar Cells A wide variety of solar cells are available in the market, the name of the solar cell technology depends on the material used in that technology. Hence different cells have different cell parameters like short circuit current density, efficiency, open-circuit voltage, fill factor, etc. The following table 2 shows the list of commercially available See more on electrical technology #b\_results .b\_vidAns{border-radius:6px;box-shadow:0 0 0 1px rgba(0,0,0,.05);padding:16px

20px;gap:10px;background:#fff}@charset "UTF-8";#b\_results .b\_ans.b\_vidAns{box-shadow:none!important;padding:var(--smtc-gap-between-content-medium) 0!important;background:var(--bing-smtc-background-ctrl-fade-on-image-stop-0)}#b\_results .b\_ans.b\_vidAns #serpvidans.vsacf .mc\_vtvc,#b\_results .b\_ans.b\_vidAns #serpvidans.vsacf .mc\_vtvc\_th,#b\_results .b\_ans.b\_vidAns #serpvidans.vsacf .cico,#b\_results .b\_ans.b\_vidAns #serpvidans.vsacf .mc\_vtvc\_htb,#b\_results .b\_ans.b\_vidAns #serpvidans.vsacf .vrhc,#b\_results .b\_ans.b\_vidAns #serpvidans.vsacf .vrhcp,#b\_results .b\_ans.b\_vidAns #serpvidans.vsacf .vrhtc,#b\_results .b\_ans.b\_vidAns #serpvidans.vsacf .vrhtpc{border-radius:var(--mai-smtc-corner-list-card-nested-default)}#b\_results .b\_ans.b\_vidAns #serpvidans.vsacf .mmlist .mc\_vtvc,#b\_results .b\_ans.b\_vidAns #serpvidans.vsacf .mmlist .mc\_vtvc .mc\_vtvc\_meta{margin:0}#b\_results .b\_ans.b\_vidAns #serpvidans.vsacf .mmlist .mc\_vtvc .mc\_vtvc\_meta .mc\_vtvc\_meta\_channel,#b\_results .b\_ans.b\_vidAns #serpvidans.vsacf .mmlist .mc\_vtvc .mc\_vtvc\_meta .mc\_vtvc\_meta\_row\_channel{color:var(--smtc-foreground-content-neutral-primary)}#serpvidans.vsacf,#serpvidans.vsacf .expctn .expbody,#serpvidans.vsacf .mmlist{display:flex;flex-direction:column;gap:var(--smtc-gap-between-content-medium)}#serpvidans.vsacf .cico{height:auto}#serpvidans.vsacf .mc\_vtvc\_ban\_lo{top:0;right:auto}#serpvidans.vsacf .mc\_cwvc .mc\_vtvc .mc\_vtvc\_meta,#serpvidans.vsacf .mmlist .mc\_vtvc .mc\_vtvc\_meta{height:auto;padding:var(--smtc-gap-between-content-xx-small) 0 var(--smtc-gap-between-content-xx-small) var(--smtc-gap-between-content-medium);display:flex;flex-direction:column;justify-content:space-between}#serpvidans.vsacf .mc\_cwvc .mc\_vtvc .mc\_vtvc\_meta .mc\_vtvc\_title,#serpvidans.vsacf .mmlist .mc\_vtvc .mc\_vtvc\_meta .mc\_vtvc\_title{color:var(--smtc-ctrl-link-foreground-brand-rest);font:var(--bing-smtc-text-global-body2);height:auto;display:-webkit-box;-webkit-line-clamp:2;-webkit-box-orient:vertical}#serpvidans.vsacf .mc\_cwvc .mc\_vtvc .mc\_vtvc\_meta .mc\_vtvc\_meta\_block\_area,#serpvidans.vsacf .mc\_cwvc .mc\_vtvc .mc\_vtvc\_meta .mc\_vtvc\_meta\_block,#serpvidans.vsacf .mmlist .mc\_vtvc .mc\_vtvc\_meta .mc\_vtvc\_meta\_block\_area,#serpvidans.vsacf .mmlist .mc\_vtvc .mc\_vtvc\_meta .mc\_vtvc\_meta\_block\_area{display:flex;flex-direction:column;gap:var(--smtc-padding-ctrl-text-side)}#serpvidans.vsacf .mc\_cwvc .mc\_vtvc .mc\_vtvc\_meta .mc\_vtvc\_meta\_block\_area .mc\_vtvc\_meta\_row,#serpvidans.vsacf .mc\_cwvc .mc\_vtvc .mc\_vtvc\_meta .mc\_vtvc\_meta\_block .mc\_vtvc\_meta\_row,#serpvidans.vsacf .mmlist .mc\_vtvc .mc\_vtvc\_meta .mc\_vtvc\_meta\_block\_area .mc\_vtvc\_meta\_row,#serpvidans.vsacf .mmlist .mc\_vtvc .mc\_vtvc\_meta .mc\_vtvc\_meta\_block .mc\_vtvc\_meta\_row{color:var(--smtc-foreground-content-neutral-primary);height:var(--mai-smtc-padding-card-default);font:var(--bing-smtc-text-global-caption1)}#serpvidans.vsacf .mc\_cwvc .mc\_vtvc .mc\_vtvc\_meta .mc\_vtvc\_meta\_block\_area .mc\_vtvc\_meta\_row



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.mmlist .mc_vtvc .mc_vtvc_meta .mc_vtvc_meta_block_area .mc_vtvc_meta_row
.mc_vtvc_meta_row_channel::before,#serpvidans.vsacf .mmlist .mc_vtvc .mc_vtvc_meta
.mc_vtvc_meta_block .mc_vtvc_meta_row .mc_vtvc_meta_row_channel::before{content:"
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.mc_vtvc_meta_pubdate,#serpvidans.vsacf .mc_cwvc .mc_vtvc .mc_vtvc_meta
.mc_vtvc_meta_block .mc_vtvc_meta_pubdate,#serpvidans.vsacf .mmlist .mc_vtvc .mc_vtvc_meta
.mc_vtvc_meta_block_area .mc_vtvc_meta_pubdate,#serpvidans.vsacf .mmlist .mc_vtvc
.mc_vtvc_meta .mc_vtvc_meta_block .mc_vtvc_meta_pubdate{color:var(--bing-smtc-foreground-
content-neutral-tertiary);padding-bottom:0}.vsacf .mc_cwvc .mc_vtvc_con_rc,.vsacf .mmlist
.mc_vtvc_con_rc{display:flex}.vsacf .mc_cwvc .mc_vtvc_con_rc .mc_vtvc_meta_w,.vsacf .mmlist
.mc_vtvc_con_rc .mc_vtvc_meta_w{height:auto}.vsacf .b_title{padding-left:var(--mai-smtc-padding-
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bottom:0}.vsacf .b_title .mmtitle a::after{content:"";margin:5px 5px 0 0;border-top:2px solid
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content-neutral-primary);background-size:7px 7px;width:7px;height:7px;transform:rotate(45deg);di
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.mc_vtvc_th{height:auto}#serpvidans.vsacf .vsb_tr_c.va_tt{margin:0}#serpvidans.vsacf .vtbc
.mv_vtvc_play,#serpvidans.vsacf .vtbc .mv_vtvc_play_ext{position:static}#serpvidans.vsacf .va_tt
.mc_vtvc_ban_lo{display:block}#serpvidans.vsacf .mc_bc{width:auto;border-radius:var(--smtc-ctrl-
badge-sm-corner);padding:var(--smtc-padding-ctrl-text-side) var(--smtc-gap-between-content-xx-
small)}#serpvidans.vsacf .rmts .mc_bc ems{display:none}#serpvidans.vsacf
a.vsb_tr_t{color:var(--smtc-foreground-content-neutral-primary)}.vsacf .va_tt .vsb_tr_chd
.mc_vtvc_th_dock.rmoverlay{height:36px}.vsacf .va_tt .vsb_tr_chd .mc_vtvc_th_dock{height:92px;
background:linear-gradient(180deg,var(--bing-smtc-background-ctrl-fade-on-image-stop-0)
0%,var(--mai-smtc-background-ctrl-on-image-rest) 100%)}vsacf .va_tt a.vsb_tr_t{padding:0
20px;font:var(--acf-font-title-2-strong)}.vsacf .va_tt .vsb_tr_chd .mc_vtvc .mc_vtvc_meta,.vsacf
.va_tt .vsb_tr_chd .mc_vtvc .mc_vtvc_title{color:var(--mai-smtc-foreground-ctrl-on-image-
rest)}.vsacf span.vcmt_ctt{font:var(--bing-smtc-text-global-caption2);margin:var(--smtc-gap-
between-content-xx-small) 0 0;height:16px}#serpvidans.vsacf .vsb_tr_chd .mc_vtvc_tot
.mc_vtvc_title strong{font-size:14px;line-height:20px;display:unset}#serpvidans.vsacf .va_tt
.b_slrdp .slide:not(:first-child){margin-left:var(--smtc-gap-between-content-
small)}#serpvidans.vsacf .va_tt .vsb_tr_chd .mc_vtvc .mc_vtvc_title{white-space:normal;display:-w
ebkit-box;-webkit-line-clamp:2;-webkit-box-orient:vertical}#serpvidans.vsacf
.b_module_expansion_control .b_btnContainer .b_CompactExpansion{background-color:var(--bing-s
mtc-background-ctrl-neutral-rest);display:flex;justify-content:center;align-
items:center;gap:4px;width:fit-content;height:auto;padding:8px 12px}#serpvidans.vsacf
.b_module_expansion_control .b_btnContainer .b_CompactExpansion .b_CompactExpansionBtnText
{font:var(--bing-smtc-text-global-caption1-strong);color:var(--bing-smtc-foreground-content-brand-
rest)}#serpvidans.vsacf .b_module_expansion_control .b_btnContainer .b_CompactExpansion
.b_arrow{display:flex;margin:0;height:auto}#serpvidans.vsacf .b_module_expansion_control
.b_btnContainer .b_CompactExpansion .b_arrow path#Shape{fill:var(--bing-smtc-foreground-
content-brand-rest)}#serpvidans.vsacf .b_module_expansion_control .b_btnContainer::after{conten
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radius:1px;background:var(--smtc-stroke-ctrl-on-neutral-rest)}#b_results .b_ans.b_vidAns{box-
shadow:none;padding:12px 20px 0}#b_results .b_ans.b_vidAns
.vasac{padding:unset;margin:0}#b_results .b_ans.b_vidAns .vsa .b_attribution{padding-
bottom:0}#b_results .b_ans.b_vidAns .cardless .salink{margin:0}#b_results .b_ans.b_vidAns
.mmlist .mc_vtvc{margin-top:10px}#b_results .b_ans.b_vidAns .mmlist .mc_vtvc
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.mc_vtvc_meta{display:flex;flex-direction:column;justify-content:space-between;margin:0 10px 4px 12px}#b_results .b_ans.b_vidAns .mmlist .mc_vtvc .mc_vtvc_meta
.mc_vtvc_meta_channel{color:#111}#b_results .b_ans.b_vidAns .mmlist .mc_vtvc .mc_vtvc_meta
.mc_vtvc_meta_row_channel,#b_results .b_ans.b_vidAns .mmlist .mc_vtvc .mc_vtvc_meta
.mc_vtvc_meta_block_area{color:#666}#b_results .b_ans.b_vidAns .mmlist .mc_vtvc
.mc_vtvc_meta .mc_vtvc_meta_block_area{bottom:0;height:unset}.b_dark .vsa.cardless .mc_vtvc{background-color:unset}.mmtitle>a{display:block}.mc_fh{height:100%;border-radius:6px}.mc_tc_bs{overflow:hidden}.mmlist .mc_vtvc .mc_vtvc_meta { padding: 12px 16px 16px 16px; } .mmlist .mc_vtvc .mc_vtvc_meta_w { height: 112px; margin-top: -0px; } .mmlist .mc_vtvc .mc_vtvc_title { height: 44px; line-height: 22px; margin-bottom: 0px; margin-top: 0px; } .mmlist .mc_vtvc .mc_vtvc_meta_block_area { height: 40px; } .mmlist .mc_vtvc .vtmu, .mmlist .mc_vtvc .vtpl { bottom: 120px; } .mmlist .mc_vtvc_th_dock { height: 112px; } .mmlist .mc_vtvc_th .cico { height: 131px; } .mc_vtvc{background-color:#fff;box-shadow:0 0 0 1px rgba(0,0,0,.05);line-height:0;margin:0;position:relative;border-radius:6px;overflow:hidden}.mc_vtvc.noshadow{box-shadow:none}.mc_vtvc_con_rc{border-radius:6px;overflow:hidden;position:relative}.mc_vtvc>a{color:#71777d;display:block;text-decoration:none;width:100%}.mc_vtvc>a:focus::after{outline:2px solid #00a89d;width:100%;height:100%;content:"";outline-offset:-2px;position:absolute;top:0;left:0}.mc_vtvc_th{background-color:#d5d5d5;position:relative}.mc_vtvc_th .cico{border-radius:0}.mc_vtvc_ban_lo,.mc_vtvc_ban_up{position:absolute;vertical-align:middle}.mc_vtvc_ban_lo{bottom:0}.mc_vtvc_ban_up{top:0}.mc_vtvc_title{font-weight:normal;margin-bottom:11px;overflow:hidden;color:#111;height:54px;line-height:18px}.mc_vtvc_title a{display:inline-block;color:#111}.mc_vtvc_title a:hover{text-decoration:underline}.mc_vtvc_src_ic o{float:left;margin-right:4px}.mc_vtvc_act{height:16px;margin-top:-40px;padding:12px 8px;z-index:1}.mc_vtvc_actc{right:16px;bottom:16px;position:absolute;display:inline-block;z-index:1}.mc_vtvc_act_sep{border-top:1px solid #d5d5d5;height:40px;margin:0 8px}.mc_vtvc_fh .mc_vtvc_act_sep,.mc_vtvc_fh .mc_vtvc_act{visibility:hidden}#serpvidans .b_topTitle{margin-bottom:8px}.mc_vtvc_htc{width:100%;height:100%;position:absolute;top:0;bottom:0;left:0;right:0}.mc_vtvc_htb{width:100%;height:100%;background:rgba(0,0,0,.7);position:absolute;top:0;bottom:0;left:0;right:0}.mc_vtvc_ht{width:100%;padding:0 16px;line-height:16px;color:#fff;text-decoration:underline;word-break:break-word;box-sizing:border-box;vertical-align:middle;text-align:center}.mc_vtvc_th_live_b{background-color:#c80000;color:#fff;display:inline-block;padding:2px 8px;font:11px/14px Arial;border-radius:2px;text-transform:uppercase;height:15px;width:26px;position:absolute;left:8px;top:110px}.isvctrl .isv .mc_vtvc_ban_up{left:0;right:initial}.mc_vtvc_ban_lo,.mc_vtvc_ban_up{right:0}.vt_text.b_IRight .b_ILeft{margin:0 0 0 1px;height:14px;line-height:14px;padding:2px 8px;background:rgba(0,0,0,.75);border-radius:2px;font-weight:bold}.mc_vthtb{width:100%;height:100%;background:rgba(0,0,0,.7);position:absolute;top:0;bottom:0;left:0;right:0;display:table}.mc_vtht{width:100%;padding:0 16px;line-height:16px;color:#fff;text-decoration:underline;word-break:break-word;box-sizing:border-box;vertical-align:middle;text-align:center;display:table-cell}.vt_text.b_IRight .b_ILeft{margin:0 0 0 1px;height:14px;line-height:14px;padding:2px 8px;background:rgba(0,0,0,.75);border-radius:2px;font-weight:bold}.emptyStyleForDebuggingPurpose{top:0}.emptyStyleForDebuggingPurpose{top:0}.mc_vtvc_center_play{width:32px;height:32px;background-size:contain;position:absolute;margin:auto;bottom:0;top:0;left:0;right:0;box-shadow:none;border-radius:0}.mc_vtvc_center_play.rmvbg{width:32px;height:32px;background-image:none}.mc_vtvc_htb,.mc_vtvc_ht{display:none}.vt_onhv .mc_vtvc_htb{display:table}.vt_onhv .mc_vtvc_ht{display:table-cell}.mc_vtvc_center_play{display:inline-block}.vt_onhv .mc_vtvc_center_play{display:none}.mc_vtvc .vtmu,.mc_vtvc .vtpl{bottom:163px}.vsarf .mc_vtvc .vtmu,.vsarf .mc_vtvc .vtpl{bottom:122px}.svarh #mmcar .mc_vtvc .vtmu,.svarh #mmcar .mc_vtvc .vtpl{bottom:137px}.svarht #mmcar .mc_vtvc .vtmu,.svarht #mmcar .mc_vtvc .vtpl{top:8px;left:8px}.mc_vtvc_center_play{background-image:url(data:image/svg+xml,%3Csvg%20width%3D%2232%22%20height%3D%2232%22%20viewBox%3D%220%200%2032%2032%22%20fill%3D%22none%22%20xmlns%3D%22http%3A%2F%2F%2F2000%2Fsvg%22%3E%0D%0A%20%20%20%20%3C
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16px;width:16px;position:relative;top:5px;padding-right:var(--smtc-gap-between-content-xx-
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block;position:absolute;bottom:8px;left:9px;height:8px;width:7px}.vtbc
.mv_vtvc_play_ext{background:url(/rp/Lp38sn_O4jegSK0IHxZVxyp-yKQ.png) -172px
-31px;display:inline-block;height:8px;width:12px;position:absolute;bottom:8px;left:6px}.vtbc
.pivot{height:20px;width:8px;min-width:8px}.vtbc .mv_vtvc_play{background:url(data:image/png;b
ase64,iVBORw0KGgoAAAANSUHEUgAAAAcAAAAIBAMAAADHKvg1AAAAIVBMVEX////////////////////
/////////////////9/gMdvAAACnRSTIMAETNEVWAlmbvuo4D1oAAAAB9JREFUCB1jmMoABKuaQcSqQhCxKgFG
gLhNQIkpQAwA8zkLyQAI6F0AAAAASUVORK5CYII=)}.mc_bc_w{height:18px;padding:8px;text-
align:right}.mc_bc{background-color:rgba(0,0,0,.75);padding:2px 8px;line-height:14px;color:#fff;di
splay:inline-block;vertical-align:middle;border-radius:2px;font-weight:bold}.mc_bc_w .pivot{text-
align:center;margin-right:1px;height:14px}.vsarr .mmgrid .mc_bc_w .mc_bc{background-color:rgba
(0,0,0,.75);opacity:1}.mmgrid>div{width:197px;display:inline-block;margin-right:8px;margin-
bottom:8px;box-shadow:0 0 0 1px rgba(0,0,0,.05);position:relative;vertical-
align:top;overflow:hidden;white-space:normal;border-radius:6px}.vsarr .mmgrid>div,.vsarr1stbig
.mmgrid>div{margin-right:8px;margin-bottom:8px}#serpvidansrr .mc_vtvc
.mv_vtvc_meta{height:auto}#serpvidansrr .mc_vtvc .mc_vtvc_title{display:-webkit-box;-webkit-line-
clamp:2;-webkit-box-orient:vertical}.mmgrid .mc_tc{border:0}.vsa .mmgrid>div:nth-
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.vtpl{bottom:128px}.vsarr1stbig .mmgrid>div:nth-child(2){margin-right:0}#serpvidansrr.uipolish
.mv_vtvc_meta_pubdate,#serpvidansrr.uipolish .mc_vtvc_meta_channel,#serpvidansrr.uipolish
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.b_videocard .video_metadata_container,#serpvidansrr #vidans2 .b_videocard
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width:1362.9px){#serpvidansrr .mmgrid>div{width:168px;height:206px}#serpvidansrr
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.rms_img{width:168px;height:100px}#serpvidansrr .mc_vtvc
.mv_vtvc_meta{padding:12px}#serpvidansrr .mc_vtvc .mc_vtvc_title{height:32px;line-
height:16px;margin-bottom:16px}#serpvidansrr .mc_vtvc
.mv_vtvc_meta_block_area{height:34px}#serpvidansrr .mc_vtvc_meta_row{line-height:15px;font-
size:13px;height:15px}#serpvidansrr .mc_vtvc_meta_pubdate{padding-bottom:4px}#serpvidansrr
.mv_vtvc .vtmu,#serpvidansrr .mc_vtvc .vtpl{bottom:114px}#serpvidansrr #vidans2 .b_videocard
.videoPlayer,#serpvidansrr #vidans2 .b_videocard .videoPlayer .cico,#serpvidansrr #vidans2
.b_videocard .videoPlayer .cico .rms_img{width:343px!important;height:194px!important;margin-
right:0}#serpvidansrr @media(max-width:1274.9px){#serpvidansrr
.mmgrid>div{width:124px;height:164px}#serpvidansrr .mmgrid>div .cico,#serpvidansrr
.mmgrid>div .cico .rms_img{width:124px;height:76px}#serpvidansrr .mc_vtvc
.mv_vtvc_meta{padding:8px}#serpvidansrr .mc_vtvc .mc_vtvc_title{height:32px;line-
height:16px;margin-bottom:12px}#serpvidansrr .mc_vtvc
.mv_vtvc_meta_block_area{height:28px}#serpvidansrr .mc_vtvc_meta_row{line-height:13px;font-
size:11px;height:13px}#serpvidansrr .mc_vtvc_meta_pubdate{padding-bottom:2px}#serpvidansrr
.mv_vtvc .vtmu,#serpvidansrr .mc_vtvc .vtpl{bottom:96px}#serpvidansrr #vidans2 .b_videocard
.videoPlayer,#serpvidansrr #vidans2 .b_videocard .videoPlayer .cico,#serpvidansrr #vidans2
.b_videocard .videoPlayer .cico .rms_img{width:256px!important;height:144px!important;margin-
right:0}#serpvidansrr .maskthumb .mc_bc_w{padding:8px 4px 4px
8px}#serpvidansrr.withsplitline .mmgrid>div:nth-last-child(1),#serpvidansrr.withsplitline
.mmgrid>div:nth-last-child(2){margin-bottom:24px}#serpvidansrr.withsplitline .mmgrid{border-
bottom:1px solid #ecec;#ecec;margin-bottom:16px}#serpvidansrr #vidans2 .b_videocard
.video_metadata{max-width:auto;padding:12px 16px}#serpvidansrr #vidans2
```



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.b_videocard{margin-bottom:12px;box-shadow:0 0 1px rgba(0,0,0,.05),0 2px 3px
rgba(0,0,0,.1);border-radius:6px}#serpvidansrr .b_rich{padding-top:0}#serpvidansrr #vidans2
.videoPlayer{border-radius:6px 6px 0 0;overflow:hidden}#serpvidansrr #vidans2 .b_videocard .vid
eo_metadata>h3{white-space:nowrap;overflow:hidden;text-overflow:ellipsis;-webkit-line-clamp:1;li
ne-height:15px;height:15px;font-size:13px;color:#000;margin-bottom:20px;font-
family:Arial,Helvetica,Sans-Serif;font-style:normal;display:block}#serpvidansrr.vsarr1stbig
#vidans2 .b_videocard .video_metadata .actionmenu{display:none}#serpvidansrr #vidans2
.b_videocard .video_summary,#serpvidansrr #vidans2 .b_videocard .video_source{line-
height:15px}#serpvidansrr #vidans2 .b_videocard .videoPlayer .vtbc{right:0}.vrhc line.nhvpv
.pffvi,.vrhc line.nhvpv[data-tps="S"] .pffvt,.vrhc line.nhvpv[data-tps="M"] .pffvt,.vrhc
line.nhvpv[data-tps="L"] .pffvt{display:inline-flex}.vrhc line.nhvpv .vrhctc.pffv
.vrhol{display:none}.vrhc line.nhvpv .vrhctc.pffv .player_ol{background:var(--mai-smtc-background-
ctrl-on-image-hover);transition:background-color .5s;display:flex;align-items:center;justify-content:c
enter;padding:var(--smtc-gap-between-content-x-small);gap:var(--smtc-gap-between-content-x-
small);box-sizing:border-box}.mc_vtvc_th img{transition:all .3s ease-out}.nhvpv+.mc_vtvc_th img{
transform:scale(1.1)}.smtplayerhtml5{height:100%;width:100%;overflow:hidden}.smtplayerhtml5
video{min-height:100%;min-width:100%}.smtplayerhtml5 .videoplaying{background-color:#000}.s
mtplayerhtml5.hide{display:none}.pffvt{display:none;color:var(--mai-smtc-foreground-ctrl-on-imag
e-rest);font:var(--bing-smtc-text-global-
subtitle2-strong)}.pffvi{mask:url(/rp/ui07wU6K7FR_inzG7DRbP1i8fGo.svg) center no-repeat;mask-si
ze:12px;background:var(--bing-smtc-background-card-on-image-
default);width:20px;height:20px;flex-shrink:0;align-self:flex-start}[data-tps="L"]
.pffvt{font:var(--bing-smtc-text-global-subtitle2-strong)}[data-tps="L"]
.pffvi{width:22px;height:22px;mask-size:16px}[data-tps="S"] .pffvt{font-size:0}[data-tps="S"]
.pffvi{width:24px;height:24px;mask-size:24px;align-self:center}.hvpv.h5s .pffvt{display:inline-
flex}.hvpv.h5s .vrhctc.pffv .vrhol{display:none}.hvpv.h5s .vrhctc.pffv
.player_ol{background:var(--mai-smtc-background-ctrl-on-image-hover);transition:background-color
.5s;display:flex;align-items:center;justify-content:center;padding:var(--smtc-gap-between-content-x-
small);gap:var(--smtc-gap-between-content-x-small);box-sizing:border-box}.pffvt{text-
decoration:underline}.vrhctc .vrhol{position:absolute;width:100%;height:35px;max-
height:35px;bottom:0;left:0;padding:0;background:none;display:block;z-index:9}.vrhctc
.vrhol.hide,.vrhctc .vrhol .hide{display:none}.vrhot{white-space:nowrap;text-overflow:ellipsis;overfl
ow:hidden;display:inline-block;position:absolute;max-width:240px;height:18px;line-
height:14px;margin-left:8px;top:10px;left:0;right:0;border-radius:2px;padding-right:8px}.vrhot
div{display:inline-block}.vrhot nt{color:#fff;font-size:11px;font-weight:bold;background-
color:rgba(0,0,0,.75);padding:2px 8px;margin-left:0;top:0;box-sizing:border-
box;position:relative}.vrhc .ricons{position:absolute;right:8px;top:10px;left:auto;bottom:auto;heigh
t:18px;display:inline-block;cursor:pointer}.vrhol.icons_1 .vrhot{margin-right:27px}.vrhol.icons_2
.vrhot{margin-right:49px}.vrhol.icons_3 .vrhot{margin-right:79px}.vrhol .vrhot nt,.vsb_tr_chd
.vrhol.icons_1 .vrhot{margin-
right:0}.vpb{position:absolute;display:block;bottom:0;left:0;height:4px}.vpb
div{position:absolute}.vpb nt{width:0;background:#fff}.vpb
nt.test{display:none}.vpb.back{background-color:#999}.vrhctc .vrhol.npb{height:36px;max-
height:36px}.vrhol .vadda{width:22px;height:18px;padding:0;margin-right:0;margin-left:2px;botto
m:0;position:relative;display:inline-block;z-index:1;background:rgba(0,0,0,.75);border-
radius:2px;overflow:hidden}.vrhol .vadda.hide{display:none}.vrhol .vadda .mc_vfaa{margin:3px
5px}.ricons .vol{float:left}.ricons .adultFlag{float:right}.vol{width:22px;height:18px;bottom:0;mar
gin-left:1px;margin-right:1px;position:relative;display:inline-block}.vol.hide,.vol
.hide{display:none}.vol .bg{background:rgba(0,0,0,.75);border-radius:2px}.vol.bg,.vol
nt{position:absolute;bottom:0}.vol .vol.bg.volnb{border-radius:0 0 2px 2px}.vol
.volsliderHandle.bg{border-radius:2px 2px 0 0}.vol nt .volsliderHandle{height:70px;display:none;wi
dth:22px;float:left;bottom:18px;position:absolute;display:block}.vol nt
```



```
.volsliderHandle.hide{display:none}.volsliderHandle .vsb{height:54px;width:4px;background-color:#999;margin:9px auto 8px;position:relative;display:block;border-radius:2px}.volsliderHandle .vsh{height:6px;width:14px;padding:9px 7px 9px 7px;margin:0 -12px;display:block;position:absolute;top:30px}.volsliderHandle .vsh.hide{display:none}.volsliderHandle .vshi{height:4px;width:14px;background-color:#fff;border-radius:2px}.volMuteCon{width:16px;height:14px;margin:2px 4px;float:left}.volMuteHandle{width:22px;height:18px}.vo{background:url(/rp/ffZxBXEIP9WYOO0jhTaElyLhEVU.svg) no-repeat}.vm{background:url(/rp/fsX-ZVd03wB2TL0vmQJxSp4U9vs.svg) no-repeat}.vl{background:url(/rp/YXYMPC1Rry_XJGc7Yg8IR4B2eEs.svg) no-repeat}.vf{background:url(/rp/NosrIR4amKTs1zYxWy3laZN3HRk.svg) no-repeat}@media(forced-colors:active){.vol{forced-color-adjust:none}.vrhc line .vt_vp,.vrhc.popout .vt_vp,.vrhc.mousefollow .vt_vp{position:absolute;bottom:0;border:hidden;padding:0;top:0;left:0;z-index:3}.vrhrc .hide{display:none}.vrh_clc .vt_vp,.vrh_clc .vrhrc .vrhi,.vrh_clc .player_ol{cursor:pointer}.vrh_clc .cico{border-radius:0}.vrhrc{border:hidden;top:0;left:0;padding:0}.vrhc.mousefollow .vrhrc,.vrhc.popout .vrhrc{background-color:#999}.vrhrc.load .player_ol{background:url(/rp/_o2maogFDeUOsovPJL-ofEuxJ4.gif) center center no-repeat}.vrhc line .vrhrc .vrhi,.vrhc.popout .vrhrc .vrhi,.vrhc.mousefollow .vrhrc .vrhi{position:absolute!important;border:hidden;z-index:2;padding:0;left:0;top:0}.player_ol{position:absolute;width:100%;height:100%;bottom:0;border:hidden;z-index:7}.vrhc.popout,.vrhc line,.vrhc.mousefollow{border-radius:6px;overflow:hidden;display:table-row-group;background:none}.vrhc.popout,.vrhc.mousefollow{z-index:4;box-shadow:0 4px 4px rgba(0,0,0,.1),0 2px 80px rgba(0,0,0,.2)}.vrhc line{z-index:1;margin:0}.vrhc.popout,.vrhc line{position:absolute;top:0}.vrhc.popout{border:1px solid #fff}.vrhc.mousefollow{position:fixed}.vrhrcp{position:relative;top:0;left:0;display:table-row}.vrhrcp .vrhrc{position:relative;overflow:hidden}.vrhc.hide{display:none}@keyframes vh_fadein{from{opacity:0}to{opacity:1}}.vrhc.not(.hide){animation:vh_fadein 250ms}.vrhc line img{color:transparent}.vrhc line.fullsize{height:100%}.vrhc,.vrhc: hover,.vrhc: link,.vrhc: active,.vrhc: visited{color:#000;text-decoration:none}.vrhc.vrh_clc{cursor:pointer}a.hover-anchor{display:block;height:100%;width:100%;text-decoration:none}.vrhstat{height:0;overflow:hidden}Videos of Solar Panel Voltage And Current ParametersWatch video on engineersgarage Solar Panel Parameters Monitoring Using Arduinoengineersgarage Jun 9, 2021Watch video on nevonprojects System To Measure Solar Powernevonprojects May 30, 2014Watch video on energywarden 9:56How Solar Energy Works Diagram (Visuals And Explanations)energywarden Nov 11, 2019Watch full video.b_imgcap_alttitle p strong,.b_imgcap_alttitle .b_factrow strong{color:#767676}#b_results .b_imgcap_alttitle{line-height:22px}.b_imgcap_alttitle{display:flex;flex-direction:row-reverse;gap:var(--mai-smtc-padding-card-default)}.b_imgcap_alttitle .b_imgcap_img{flex-shrink:0;display:flex;flex-direction:column}.b_imgcap_alttitle .b_imgcap_main{min-width:0;flex:1}.b_imgcap_alttitle .b_imgcap_img>div,.b_imgcap_alttitle .b_imgcap_img a{display:flex}.b_imgcap_alttitle .b_imgcap_img img{border-radius:var(--smtc-corner-card-rest)}.b_hList img{display:block}.b_imagePair ner img{display:block;border-radius:6px}.b_algo .vtv2 img{border-radius:0}.b_hList .cico{margin-bottom:10px}.b_title .b_imagePair> ner,.b_vList>li>.b_imagePair> ner,.b_hList .b_imagePair> ner,.b_vPanel>div>.b_imagePair> ner,.b_gridList .b_imagePair> ner,.b_caption .b_imagePair> ner,.b_imagePair> ner>.b_footnote,.b_poleContent .b_imagePair> ner{padding-bottom:0}.b_imagePair> ner{padding-bottom:10px;float:left}.b_imagePair.reverse> ner{float:right}.b_imagePair .b_imagePair:last-child:after{clear:none}.b_algo .b_title .b_imagePair{display:block}.b_imagePair.b_cTxtWithImg>{*vertical-align:middle;display:inline-block}.b_imagePair.b_cTxtWithImg> ner{float:none;padding-right:10px}.b_imagePair.square_s> ner{width:50px}.b_imagePair.square_s{padding-left:60px}.b_imagePair.square_s> ner{margin:2px 0 0 -60px}.b_imagePair.square_s.reverse{padding-left:0;padding-right:60px}.b_imagePair.square_s.reverse> ner{margin:2px -60px 0 0}.b_ci_image_overlay: hover{cursor:pointer}solarcompare Key Parameters that Define Solar Cell ...Aug 15, 2024 · What Parameters define Solar Cell Performance? Parameters including Efficiency,
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### PV Module Performance Characteristics , AE 868: Commercial Solar

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