



BMS Battery Management System Introduction

What is a battery management system (BMS)? A BMS monitors the temperatures across the pack, and open and closes various valves to maintain the temperature of the overall battery within a narrow temperature range to ensure optimal battery performance. Capacity Management Maximizing a battery pack capacity is arguably one of the most vital battery performance features that a BMS provides. How will BMS technology change the future of battery management? As the demand for electric vehicles (EVs), energy storage systems (ESS), and renewable energy solutions grows, BMS technology will continue evolving. The integration of AI, IoT, and smart-grid connectivity will shape the next generation of battery management systems, making them more efficient, reliable, and intelligent. What is a battery management system? (See Simscape Battery example.) A battery management system oversees and controls the power flow to and from a battery pack. During charging, the BMS prevents overcurrent and overvoltage. The constant-current, constant-voltage (CC-CV) algorithm is a common battery charging approach used in a battery management system. Why do batteries need a BMS? The BMS helps batteries last longer too. It balances cells so weaker ones don't limit the pack's performance or get damaged faster. By stopping deep discharge and overcharge, it protects against common causes of permanent capacity loss. Lithium-ion batteries need precise control. Most lithium cells work between 10.5V and 14.8V. Do you need a battery management system? They do, however, have a reputation of occasionally bursting and burning all that energy should they experience excessive stress. This is why they often require battery management systems (BMSs) to keep them under control. In this article, we'll discuss the basics of the BMS concept and go over a few foundational parts that make up the typical BMS. Why are battery management systems important? Safety represents the primary driver behind BMS requirements in most applications, as modern lithium-ion batteries store tremendous amounts of energy in compact packages. Beyond safety considerations, battery management systems provide significant performance benefits that justify their implementation. What is a Battery Management System (BMS)? - There are many BMS design features, with battery pack protection management and capacity management being two essential features. We'll discuss how these two features work here. Introduction to Battery Management Systems Fuse Current Sensing/Coulomb Counting Thermistors Main Switch Balancer Battery cells have given tolerances in their capacity and impedance. So, over cycles, a charge difference can accumulate among cells in series. If a weaker set of cells has less capacity, it will charge faster compared to others in series. The BMS has to therefore stop other cells from charging, or else the weaker cells will get overcharged, as see See more on all about circuits #b_results li.b_ans.b_mop.b_mopb,#b_results li.b_ans.b_nonfirsttopb{border-radius:6px;box-shadow:0 0 0 1px rgba(0,0,0,.05);margin-top:12px;margin-bottom:10px;padding:15px 19px 10px}#b_results li.b_ans.b_mop.b_mopb .b_sideBleed{margin-left:-19px;margin-right:-19px}#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)}



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.b_ans.b_vidAns #serpvidans.vsacf .mc_vtvc,#b_results .b_ans.b_vidAns #serpvidans.vsacf
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#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
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.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:a
uto;display:-webkit-box;-webkit-line-clamp:2;-webkit-box-orient:vertical}#serpvidans.vsacf
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.mc_vtvc_meta .mc_vtvc_meta_block_area,#serpvidans.vsacf .mmlist .mc_vtvc .mc_vtvc_meta .
mc_vtvc_meta_block{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-n
eutral-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 .mc_vtvc_meta_row_channel::before,#serpvidans.vsacf .mc_cwvc .mc_vtvc
.mc_vtvc_meta .mc_vtvc_meta_block .mc_vtvc_meta_row
.mc_vtvc_meta_row_channel::before,#serpvidans.vsacf .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
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.mc_vtvc_meta_block .mc_vtvc_meta_row .mc_vtvc_meta_row_channel::before{content:" .
"}#serpvidans.vsacf .mc_cwvc .mc_vtvc .mc_vtvc_meta .mc_vtvc_meta_block_area
.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-card-default)}.vsacf .b_title .mmtitle{font:var(--bing-
smtc-text-global-subtitle1-strong);margin-bottom:0}.vsacf .b_title .mmtitle
a::after{content:"";margin:5px 5px 0 0;border-top:2px solid var(--smtc-foreground-content-neutral-
primary);border-right:2px solid var(--smtc-foreground-content-neutral-primary);background-
size:7px 7px;width:7px;height:7px;transform:rotate(45deg);display:inline-block;margin-
left:4px}#serpvidans.vsacf .b_title .mmtitle{margin-bottom:0}#serpvidans.vsacf .b_title .mmtitle
a{color:var(--smtc-foreground-content-neutral-primary)}#serpvidans.vsacf .mc_cwvc{width:100
%;margin-bottom:var(--smtc-gap-between-content-x-small)}#serpvidans.vsacf .mc_cwvc
.mc_vtvc{box-shadow:none}#serpvidans.vsacf .mc_cwvc .mc_vtvc
.mc_vtvc_meta{height:100%;padding:var(--smtc-gap-between-content-x-small) 0 var(--smtc-gap-
between-content-x-small) var(--mai-smtc-padding-card-default);background:var(--bing-smtc-
background-ctrl-fade-on-image-stop-0)}#serpvidans.vsacf .mc_cwvc .mc_vtvc .mc_vtvc_meta
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.mc_vtvc_con_rc,#serpvidans.vsacf .cardless.mmlist .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:92
px;background:linear-gradient(180deg,var(--bing-smtc-background-ctrl-fade-on-image-stop-0)
0%,var(--mai-smtc-background-ctrl-on-image-rest) 100%)}#serpvidans.vsacf .va_tt a.vsb_tr_t{padding:0
var(--mai-smtc-padding-card-default);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_sldrp .slide:not(:first-child){margin-
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left:var(--smtc-gap-between-content-small))#serpvidans.vsacf .va_tt .vsb_tr_chd .mc_vtvc .mc_vtvc_title{white-space:normal;display:-webkit-box;-webkit-line-clamp:2;-webkit-box-orient:vertical}#serpvidans.vsacf .b_module_expansion_control .b_btnContainer .b_CompactExpansion{background-color:var(--bing-smtc-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{content:"";position:absolute;width:100%;bottom:20px;left:0;height:1px;border-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 .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 .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}#mc_cwvc_1762399712175 { width:356px; max-width:100%; } .mc_vtvc .mc_vtvc_meta { padding: 16px 16px 16px 16px; } .mc_vtvc .mc_vtvc_meta_w { height: 139px; margin-top: -0px; } .mc_vtvc .mc_vtvc_title { height: 54px; line-height: 18px; margin-bottom: 18px; margin-top: 0px; } .mc_vtvc .mc_vtvc_meta_block_area { height: 35px; } .mc_vtvc .vtmu, .mc_vtvc .vtpl { bottom: 147px; } .mc_vtvc_th_dock { height: 139px; } .mc_vtvc_th .cico { height: 200px; } .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
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%22%2F%3E%0D%0A%3C%2Fsvg%3E)}.mc_vtvc_meta{box-sizing:border-box;display:inline-block;line-height:18px;position:relative;width:100%}.mc_vtvc_meta_block{bottom:0;position:absolute;width:100%}.mc_vtvc_meta_row{line-height:16px;font-size:11px;height:17px;overflow:hidden;text-overflow:ellipsis;white-space:nowrap}.mc_vtvc_meta_row a{display:inline-block}.mc_vtvc_meta_row a:hover{text-decoration:underline}.mc_vtvc_meta_block_area{position:relative}.mc_vtvc_meta_block,.mc_vtvc_meta_block a{color:#444}.b_dark .mc_vtvc_meta_block{color:#edebe9}.mc_vtvc_meta_row>:nth-of-type(n+2)::before{content:" "}.mc_vtvc_meta_row .mc_vtvc_meta_row_channel::before{content:" > "}.mc_vtvc_kmt_title{line-height:18px;padding-bottom:4px;font-weight:bold;color:#00809d;text-transform:uppercase;font-size:11px}.mc_vtvc_kmt,.mc_vtvc_con_rc.onhov .wkmt .tbc_tt{display:none}.mc_vtvc_con_rc.onhov .wkmt .mc_vtvc_title{max-height:18px;margin-bottom:18px;overflow:hidden}.mc_vtvc_con_rc.onhov.mmsts .mc_vtvc_title{visibility:hidden}.mc_vtvc_con_rc.onhov .mc_vtvc_kmt{display:block}.mc_vtvc_kmt_content .b_factrow{line-height:17px;font-size:11px;max-height:34px;overflow:hidden;text-overflow:ellipsis;padding:0 16px 0 0;color:#444}.mc_vtvc_meta .mc_vtvc_kmt_title{line-height:18px}.mc_vtvc_title:hover{text-decoration:none}.mc_vtvc_meta_pubdate{color:#444;padding-bottom:3px}.mc_vtvc_meta_channel{color:#444}.mc_vtvc_meta_w,.mc_vplvc_meta_w{position:relative}.mc_vtvc_meta_bg_w,.mc_vplvc_meta_bg_w{height:100%;width:100%;overflow:hidden;position:absolute;top:0}.mc_vtvc_meta_bg_w .cico,.mc_vplvc_meta_bg_w .cico{border-radius:0;overflow:visible}.dg_u .mm_vidch_th_c{overflow:visible}.dg_u .mm_vidch_th_bg img{margin-top:-20px}.emptyStyleForDebuggingPurpose{top:0}.mc_vtvc_meta_w .mc_vtvc_meta{background:rgba(255,255,255,.75)}.mc_vtvc_meta_bg_w img,.mc_vtvc_meta_bg_w .mc_vtvc_cb_w{filter:blur(25px);transform:scale(1.2)}body{--video-metadata-channel-color:#3c3c3c}body.b_dark{--video-metadata-channel-color:unset}.vsarf .mc_vtvc_meta_pubdate{color:unset}.vsarf .mc_vtvc_meta_channel{color:var(--video-metadata-channel-color)}.vsarf .mc_vtvc .mc_vtvc_meta_w .mc_vtvc_title,.vsarf .mc_vtvc .mc_vtvc_meta_w .mc_vtvc_title strong{font-weight:bold}.vsarf .mc_vtvc_meta_w .mc_vtvc_meta_row{font-size:13px}.emptyStyleForDebuggingPurpose{top:0}.vsarf .mc_vtvc_th .cico{height:132px}.emptyStyleForDebuggingPurpose{top:0}.emptyStyleForDebuggingPurpose{top:0}.emptyStyleForDebuggingPurpose{top:0}.emptyStyleForDebuggingPurpose{top:0}.emptyStyleForDebuggingPurpose{top:0}.emptyStyleForDebuggingPurpose{top:0}.emptyStyleForDebuggingPurpose{top:0}.vtbc .mv_vtvc_play{display:inline-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(
X//////////9/gMdvAAACnRSTIMAETNEVWaImbvuo4D1oAAAAB9JRE
FUCB1jmMoABKuaQcSqQhCxKgFGgLhNQIkpQAwA8zkLyQA16F0AAAAASUVORK5CYII=
)).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;display: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);opacit
y:1}.mmsi{height:16px;width:16px;position:relative;top:5px;padding-right:var(--smtc-gap-
between-content-xx-small)}.vrhdata{display:none}.vrhc line.nhvpv .pffvi,.vrhc line.nhvpv[data-
tps="M"] .pffvt,.vrhc line.nhvpv[data-tps="L"] .pffvt{display:inline-flex}.vrhc line.nhvpv
.vrhtc.pffv .vrhol{display:none}.vrhc line.nhvpv .vrhtc.pffv .player_ol{background:var(--mai-smtc-
background-ctrl-on-image-hover);transition:background-color .5s;display:flex;align-items:center;j
ustify-content:center;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%;ov
erflow:hidden}.smtplayerhtml5 video{min-height:100%;min-width:100%}.smtplayerhtml5 .video
playing{background-color:#000}.smtplayerhtml5.hide{display:none}.pffvt{display:none;color:var
(--mai-smtc-foreground-ctrl-on-image-rest);font:var(--bing-smtc-text-global-
subtitle2-strong)}.pffvi{mask:url(/rp/ui07wU6K7FR_inzG7DRbP1i8fGo.svg) center no-repeat;ma
sk-size: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 .vrhtc.pffv .vrhol{display:none}.hvpv.h5s .vrhtc.pffv .player_ol{background:var(--
mai-smtc-background-ctrl-on-image-hover);transition:background-color .5s;display:flex;align-ite
ms: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}.vrhcp .vrh
ol{position:absolute;width:100%;height:35px;max-
height:35px;bottom:0;left:0;padding:0;background:none;display:block;z-index:9}.vrhcp
.vrhol.hide,.vrhcp .vrhol .hide{display:none}.vrhot{white-space:nowrap;text-overflow:ellipsis;ove
rflow: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 .icons{position:absolute;right:8px;top:10px;left:auto;bottom:auto;heig
ht: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-
```



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```
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}.vrhcp .vrhol.npb{height:36px;max-
height:36px}.vrhol .vadda{width:22px;height:18px;padding:0;margin-right:0;margin-left:2px;bott
om: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;m
argin-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;
width: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}.volMuteIcon{width:16px;height:14px;margin:2px 4px;float:left}.vol
MuteHandle{width:22px;height:18px}.vo{background:url(/rp/fFZxBXEIP9WYOO0jhTaElyLhE
VU.svg) no-repeat}.vm{background:url(/rp/fsX-ZVd03wB2TL0vmQJxSp4U9vs.svg) no-
repeat}.vl{background:url(/rp/YXYMPC1Rry_XJGc7Yg8lR4B2eEs.svg) no-
repeat}.vf{background:url(/rp/NosrlR4amKTS1zYxWy3laZN3HRk.svg) no-
repeat}@media(forced-colors:active){.vol{forced-color-adjust:none}}.vrhc
.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}.vrhtc
.hide{display:none}.vrh_clc .vt_vp,.vrh_clc .vrhtc .vrhi,.vrh_clc
.player_ol{cursor:pointer}.vrh_clc .cico{border-
radius:0}.vrhtc{border:hidden;top:0;left:0;padding:0}.vrhc.mousefollow .vrhtc,.vrhc.popout
.vrhtc{background-color:#999}.vrhtpc.load
.player_ol{background:url(/rp/J_o2maogFDeUOsovPJL-ofEuxJ4.gif) center center no-
repeat}.vrhc line .vrhtc .vrhi,.vrhc.popout .vrhtc .vrhi,.vrhc.mousefollow .vrhtc .vrhi{position:abso
lute!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
```



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```
.vrhcp{position:relative;top:0;left:0;display:table-row}.vrhcp
.vrhtc{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,.vr
hc: 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}.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; } .mmlist
.mc_vtvc{margin:10px 1px 0}.mmlist .mc_vtvc_con_rc{display:flex}.cardless .mmlist
.mc_vtvc_con_rc{height:112px}.mmlist .mc_vtvc .mc_vtvc_meta{display:flex;flex-
direction:column;justify-content:space-between;margin:0 10px 4px 12px;padding:0}.mmlist .mc_
vtvc_title{font-weight:400;font-size:16px;height:44px;line-height:22px;margin-bottom:0;margin-
top:0;color:unset}.mmlist .mc_vtvc_meta_row{font-size:13px}.mmlist .mc_vtvc
.mc_vtvc_meta_block_area{height:unset}.mmlist .mc_vtvc .vtmu,.mmlist .mc_vtvc
.vtpl{bottom:8px}.cardless .mmlist .mc_vtvc{box-shadow:none}.cardless.mmlist
.mc_vtvc_center_play{width:32px;height:32px}.cardless.mmlist .mc_vtvc_title{font-
size:16px;color:unset}.cardless.mmlist .mc_vtvc_meta_row{line-height:20px}.cardless.mmlist
.mc_vtvc_meta_pubdate{padding-bottom:2px;color:#666}.cardless.mmlist
.mc_vtvc_th,.cardless.mmlist .mc_vtvc_th .cico,.cardless.mmlist .mc_vtvc_th div.rms_img{border-
radius:6px}.cardless.mmlist .mc_vtvc_th{height:111px}.cardless.mmlist .mc_vtvc_htc{border-
radius:6px;overflow:hidden}#serpvidans.vasac.cardless{box-shadow:none}.cardless.mmlist
.mc_bc{padding:2px 8px;line-height:14px;border-radius:2px;font-weight:normal}.mc_vtvc: hover
.mc_vtvc_title{text-decoration:underline}.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
.mc_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-
child(3n){margin-right:0}.vsa .b_moreLink{padding-top:4px}#serpvidansrr
.mc_vtvc_meta_row{line-height:18px;font-size:100%;height:17px}.vsarr .mmgrid>div:nth-
child(2n){margin-right:0}#serpvidansrr .mc_vtvc .vtmu,#serpvidansrr .mc_vtvc
.vtpl{bottom:128px}.vsarr1stbig .mmgrid>div:nth-child(2){margin-right:0}#serpvidansrr.uipolish
.mc_vtvc_meta_pubdate,#serpvidansrr.uipolish .mc_vtvc_meta_channel,#serpvidansrr.uipolish
#vidans2 .b_videocard .video_metadata .video_source{color:#767676}#serpvidansrr #vidans2
.b_videocard .video_metadata_container,#serpvidansrr #vidans2 .b_videocard
```



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```
.video_metadata_container .video_metadata>h3{width:100%}@media(max-  
width:.9px){#serpvidansrr .mmgrid>div{width:168px;height:206px}#serpvidansrr .mmgrid>div  
.cico,#serpvidansrr .mmgrid>div .cico .rms_img{width:168px;height:100px}#serpvidansrr  
.mc_vtvc .mc_vtvc_meta{padding:12px}#serpvidansrr .mc_vtvc .mc_vtvc_title{height:32px;line-  
height:16px;margin-bottom:16px}#serpvidansrr .mc_vtvc  
.mc_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  
.mc_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}}@media(max-width:.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  
.mc_vtvc_meta{padding:8px}#serpvidansrr .mc_vtvc .mc_vtvc_title{height:32px;line-  
height:16px;margin-bottom:12px}#serpvidansrr .mc_vtvc  
.mc_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  
.mc_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; margin-bottom:16px}#serpvidansrr #vidans2 .b_videocard  
.video_metadata{max-width:auto;padding:12px 16px}#serpvidansrr #vidans2  
.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 .vi  
deo_metadata>h3{white-space:nowrap;overflow:hidden;text-overflow:ellipsis;-webkit-line-clamp:  
1;line-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}.vsb_tr_c{position:re  
lative;width:100%;overflow:hidden;background:#1d1b28;height:583px;margin-  
bottom:16px}.vsb_tr_c.tr_nh{height:294px}.vsb_tr_c .mm_vrc h2,.vsb_tr_c .mm_vrc  
.see_more{display:none}.vsb_tr_c .mm_vrc>div{padding-bottom:20px}.vsb_tr_c  
.vsb_tr_t{position:absolute;top:16px;left:160px;font:normal 16px/19px "Arial",Helvetica,Sans-
```



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```
Serif;font-weight:700;color:#fff;z-index:1}.vsb_tr_c
.vsb_tr_t::after{width:17px;height:12px;display:inline-block;background-size:7px
12px;background-repeat:no-repeat;background-position-x:right;opacity:.7;content:""}.vsb_tr_c
.vsb_tr_t:hover::after{opacity:1}.vsb_tr_c .mm_vrc .mc_vtvc{background-color:#585858;border-
radius:6px}.vsb_tr_c .mm_vrc .mc_vtvc_con_rc{border-radius:6px}.vsb_tr_c
.vsb_tr_chd{position:absolute;bottom:0;width:100%}.vsb_tr_c .onhov
.mc_vtvc_ban_lo{display:none}.vsb_tr_chd .mc_vtvc_tot .mc_vtvc_title{line-
height:15px}.vsb_tr_chd .mc_vtvc_tot .mc_vtvc_meta_row,.vsb_tr_chd .mc_vtvc_tot
.mc_vtvc_meta_row a{color:#dadada}.vsb_tr_chd .grad_b{top:30%;height:auto}.vsb_tr_chd
.mc_vtvc_tot .mc_vtvc_meta_row{font-size:12px;line-height:16px;height:16px}.vsb_tr_chd
.mc_vtvc_tot .meta_pd_content{display:none}.vsb_tr_chd .mc_vtvc_tot .mc_vtvc_title
strong{font-weight:500}.vsb_tr_c .slide video{object-fit:cover}.vsb_tr_c .mc_vtvc_th
.cico{width:100%;height:100%}.vsb_tr_c .vrhcac{width:647px;position:absolute;width:calc(42%
- 160px);bottom:200px;margin:0 0 0 160px;height:auto;padding:0;pointer-events:auto}.vsb_tr_c
.vrhcac .mc_vtvc_title{font:normal 30px/35px "Arial",Helvetica,Sans-Serif;font-weight:700;heigh
t:70px;overflow:hidden;color:#fff;text-overflow:ellipsis;display:-webkit-box;-webkit-box-
orient:vertical;-webkit-line-clamp:2}.vsb_tr_c .vrhcac
.mc_vtvc_meta_block_area{height:50px;margin:12px 0 0 0}.vsb_tr_c .vrhcac
.mc_vtvc_meta_row{font:normal 13px/15px "Arial",Helvetica,Sans-Serif;margin:5px 0 5px
0;color:#dadada}.vsb_tr_c .mm_vrc .b_overlay .btn.bigrounded .cr>div,.vsb_tr_c .mm_vrc
.b_overlay .btn.bigrounded .cr>div:hover{background-
image:url(/rp/qA6EopzJjTm5qQJvnXlrWGNP778.svg)}.vsb_tr_c .vsb_tr_t::after{background-ima
ge:url(data:image/svg+xml,%3Csvg%20width%3D%227%22%20height%3D%22%20viewBox
%3D%220%200%207%22%20fill%3D%22none%22%20xmlns%3D%22http%3A%2F%2F.w3
%2F%2000%2Fsvg%22%3E%0D%0A%20%20%20%20%3Cpath%20d%3D%22M0.186925%201
.19491L5.%207L0.186925%.8051C-0.0623082%.%20-0.0623082%.%200.186925%.7944C0.436
158%.%200.838112%.%201.08628%.7944L6.81334%207.49465C6.93212%207.36515%207%20
7.18433%207%207C7%206.81567%206.93212%206.63485%206.81334%206.50535L1.08628%
200.205616C0.837052%20-0.0685388%200.435097%20-0.0685388%200.186925%200.205616C
-0.0612477%200.479772%20-0.0623082%200.92192%200.186925%201.19491Z%22%20fill%3
D%22white%22%20fill-opacity%3D%220.7%22%2F%3E%0D%0A%3C%2Fsvg%3E)}.va_tt
.mm_vrc{padding:11px 2px 0 0}.va_tt .vsb_tr_t{position:relative;top:auto;left:auto;font:normal
18px/22px "Arial",Helvetica,Sans-Serif;font-weight:400;color:#4007a2;z-index:auto}.b_dark
.va_tt .vsb_tr_t{color:#82c7ff}.va_tt .vsb_tr_tp,.va_tt .vsb_tr_tl{display:inline-block;margin-
right:5px}.va_tt .vsb_tr_chd{position:relative}.vsb_tr_c.va_tt{--va-st-padding-bottom:16px;height
:auto;background-color:transparent;margin-top:22px;overflow:visible;padding-bottom:var(--va-st-
padding-bottom);margin-bottom:0}.va_tt .mc_vtvc_ban_lo,.va_tt .vsb_tr_t::after,.va_tt
.mc_vtvc:hover .mc_vtvc_center_play,.va_tt .vsb_tr_chd .vt_onhv .mc_vtvc
```



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```
.mc_vtvc_meta{display:none}.va_tt .mc_vtvc:hover .mc_vtvc_ht,.va_tt .mc_vtvc:hover
.mc_vtvc_htb{display:table-cell}.va_tt .mc_vtvc_htb{padding-top:50px;background:linear-
gradient(360deg,rgba(0,0,0,.6) 60.35%,rgba(0,0,0,0) 100%);font-size:11px;line-height:13px}.va_tt
.mc_vtvc_ht{padding:0 24px;text-shadow:0 1px 2px rgba(0,0,0,.2)}.va_tt
.mc_vtvc_center_play{bottom:52px}.va_tt .mc_vtvc:hover .mc_vtvc_title{max-height:52px;white-
space:normal;display:-webkit-box;-webkit-box-orient:vertical;-webkit-line-clamp:4}#serpvidans
.va_tt .slide{margin-right:0;vertical-align:bottom;transition:width .2s,height .2s}#serpvidans .va_tt
.slide:not(:first-child){margin-left:8px}#serpvidans .va_tt .mm_vrc>div{padding-bottom:0}.va_tt
.vsb_tr_chd .mc_vtvc .mc_vtvc_meta{height:auto;padding:8px;color:#ddd}.va_tt .vsb_tr_chd .mc
_vtvc_th_dock{height:72px;position:absolute;bottom:0;background:linear-
gradient(360deg,rgba(0,0,0,.55) 60.35%,rgba(0,0,0,0) 100%)} .va_tt .mc_vtvc_meta_row_channel
{font-size:13px;line-height:15px;font-weight:500;color:#fff;white-
space:nowrap;overflow:hidden;text-overflow:ellipsis;margin-bottom:6px}.va_tt .vsb_tr_chd
.mc_vtvc .mc_vtvc_title{height:auto;font-size:11px;line-height:13px;color:#ddd;white-
space:nowrap;overflow:hidden;text-overflow:ellipsis}.va_tt .slide .mc_vtvc{width:100%}.va_tt
.slide video{object-fit:cover}.va_tt .mc_vtvc_th .cico{width:100%;height:204px}.va_tt .b_overlay
.btn.bigrounded{top:auto;bottom:0;margin-bottom:93px}.va_tt .vt_onhv .mc_vtvc_htb{padding-
top:86px}.va_tt .vsb_tr_chd .mc_vtvc .vtmu,.va_tt .vsb_tr_chd .mc_vtvc .vtpl{bottom:6px}.va_tt
.vcmt_ct,.va_tt .vcmt_ett{display:block;margin-bottom:4px;font-size:11px}.va_tt .vasyt::before{c
ontent:"";background:url(
AYCAYAAADgdz34AAABRklEQVR4Ae2UT0rDQBjFX7QICtaoIOimAReiUNuV696jmx5A8
AalZ/AIpbdwIT2B6wqlWYkuWgnBP7jo+D7SkcmiM4kd6KYPfjNDeHlfJt8kwEYOBXqhgENO
d+SGnJKQ7JFjsr3k/jmZkg/yQn7IE7lncAwjvElmRHlCskKzQMdjuOZWsrcWNS7hX+dmgQurN
QzxDS2YBQ6s1maTb3UCtNsooTOzwI7THkXAYAD0+9narVyTR9aGtVoqpyRRqtdzNXls7qC
CMqpWgXodqNVsrrkZ/ImiimMe6g4wHLqciQx6BzOXGwn93S7QaBQJF6Uy6B28Wq3y1HKS
ZC6uL7PAG1wFymaskg35FY/jX899Kfkxk6vE/JfIRrhvwXJEH8r5C8Iw8kmudGyzbH037nI6Q9
UnWu8i+eDnf38iamC7saVDkJG60Fv0CnB4IzftPhuMAAAAASUVORK5CYII=) no-
repeat;background-size:18px 18px;padding-right:22px}.va_tt .vasig::before{content:"";backgroun
d:url(
4AAAEsUIEQVR4Ad1UTWxUVRT+zn3vzbz5ozNtFQpRa2hDjC6qhKWICwjWTVmwMRKIM
SG44W9hXIGRRKPRUMMCEySgidHExFXjxkgJEU0ISEhEaItg0bZU7bTz99689+49nvem5SfT
hVt5yc3ce+ee7zvf869wP/9o/sXm4bKxUaAfQ6bnVkT9GZNiAwuDPcMiM4MLDZwAKDmJ
NgJoKWGZO6ZzhPK0RHj44+O99GsGltuRhkzJkshwMF00ROwHM6hKzhCnjaREjFBCYmM
HcDWYYmJSQKgbIQgi7XlPXiEom9RKBcf1+X1gMF3USBZQjBk2sdPLY2h+6VTgJqSdYqyb
yVfWPGw9x4FeWxKiIhCY0FH9ZAI7L2yt9vP0BQ0s2dHZJ5hxBO5zReObIWvQMF/Jdv+uwMr
rzzMxo1g4BsNI29q42gK/J6SzGB8bH9zf4E/PqJMUyN/A79ZxVpMSHFwGKMmGGSGuTXlZB
bvxi9BzYgm1+PK3vOJgQe7N4l3HsEuFOIYht6Xu+E79+dAXTX40t1iCQodkRI2yxR6xiEpN
WfjBEsVmVTy6iY/d6rO5zURmvwCcHbQTdknJJe3i875FkHV6c5G4uI0dNyva46Dz0EqX6u0G
```



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FNPzRG1T78HsQxUqAYOQXQAg6+/Nsj90h34TcRIASBUUWFatWJev0xDjlqcaZngKXPt9Bcb
/4IxeK7wipjU+j84sdKL96AnqqKhRsGJCcNVlKi9oUaWojKKlUo4IMecm6k6bZogj5A9uIazVU3jj
GPFNGbI7/5RkqfnYQKw4NorLnU6lGC4YohFK+nLlnkVqarOB5dOAvuKgla8dakMNVyfYZB
OcuAbOTIFWDsuqEO7e5+e2PsPt7BLQORY0WgVxKkjkTjvmAgg6a4xLNwqVqIk/AiKSxXJM
AxJnVEghRIJfXoniPChmQ1ZBNp+W5KCDlgYzmdgVqlgpqWkL91h8xoGRrbkwgNfgCrNU52
RRS2YvnzsbnEJ67kGQvWbeSEktVHE9+ew3y4nlKIYIU0NrISibSj/6x9yk7fByZj98lff68KBD7t
mxJjjSPHU8sAaUWUUQBPFaK22uQTf9DIPfYLEy1NtZ1SaVD6PAP1A+9Dj09BmfbNjhbN0N
PjqOxfzfz/G0my2Onf1WCyDMzYlFzeQVWscHsGtJz15N1astmNL87Gbcna32bGqffAk5KbCQ5
BdKzTYvEV8CXi7fhqSTG3BiXA02i+x7puwRcikgIoOtXObp5idKDr4HVAAsLJi8SzY5y8yyHYh
LGLCuzLk9GzBqkNg0hv34noh5/YTFwnIjdOdzmC8JY8/E+YDFN95CByLx+Gu3U/XCx24PK/
yRddvQx/+D2pWSRvdyhg1s12gg59Chl9mDKW1MzAO3cE1rWvobr6oHKPin4N8QocCUAkT0
RlBGZnoCd+I3NN8IwicqRdTSQqotNtBMgFw6qQH1JufoDcrNz7tPRzBfz3JehZI8BifODDeHU
ZNXAjJFRtUNVipGyilNiWkmse6MvGjoaxnNTyN0NFV7l72S3sstxML9nxBRL7l00c+my8Bhm
vwqZRJVOMKoStCdGQsQV+xbNq1OmYoZL06PzeGi+fwFJbz1IhJBeawAAAABJRu5ErkJgg
g==) no-repeat;background-size:18px 18px;padding-right:22px}.va_tt .vastt::before{content:"";ba
ckground:url(
AABWdVznAAAA90lEQVR4AZWQu2sCQRDGJyYHCQdqPEKqSHr7NOZFyvQJi1YKYII1ir
Y+ieoiKXYKZaniI3WIoqg4AMfhaAcCMJ93q2vwkXODz6WnZnf7swQEUU0w6D1Wn7y4cOJ
O/sLL8cH8ps1ernCdYCueCoJm03iAyaLGWa3SztDFg028BoBvnfdw4IW+r+hTgtLVUX67ZcBcj
CKV0HEl/h0epT2cgT8lBAlyjt+KNNsHMLU3yhUUebH+xGwWx+JRjOKdutUk+53wZVCPLG
vnj/f2ZCFchXh6RjDwYS1dnFLHo8XvZIMNVuE7PyD1SScATcHyqhuNevQt8H62BZHiaf6ZtX
qegAAAABJRu5ErkJggg==) no-repeat;background-size:contain;padding-right:20px}.va_tt
.vasfb::before{content:"";background:url(/rp/zvtkyPveEhrXqHA-euzAa983fpQ.png) no-
repeat;background-size:contain;padding-right:20px}.vcmt_ctt.vasyt::before{background-size:15px
15px;padding-right:19px}.vcmt_ctt.vasig::before{background-size:15px 15px;padding-right:19px
}.vcmt_ctt.vastt::before{background-size:contain;padding-
right:17px}.vcmt_ctt.vasfb::before{padding-right:17px}.mm_vrc{padding:24px 32px}@media
screen and (max-width:1022px){.mm_vrc{margin:0}}@media screen and (max-
width:766px){.mm_vrc{margin:0}}.mm_vrcc{padding:0 0 32px 0;margin-bottom:0}.mm_vrcc
h2{padding-bottom:20px}.mm_vrcc h2 a{font-family:'Segoe UI',Arial,Helvetica;font-
size:20px;color:#000;line-height:18px}.mm_vrcc .b_overlay .btn{z-index:3}.mm_vrcc .vrhc{z-
index:2}.mm_vrcc .mc_vtvc_th .cico{padding-bottom:0}#dg_c .mm_vrc,#dg_c
.mm_vrcc{padding:8px 16px 0 16px}#dg_c .mm_vrcc .mc_vtvc{width:100%}#dg_c .mm_vrcc
a: hover{text-decoration:underline}.isvctrl .mm_vrcc
.slide{overflow:visible}.mm_vrc{padding:16px 100px 0 160px}.mm_vrc .b_overlay
.btn.bigrounded.next{right:-44px}.mm_vrc .b_overlay .btn.bigrounded.prev{left:-44px}.mm_vrc
.b_overlay .btn.bigrounded .cr>div,.mm_vrc .b_overlay .btn.bigrounded .cr>div: hover{box-
shadow:none;border-radius:0;margin:0;background-position:16px 9px;background-size:12px 22px



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```
;background-color:transparent;background-
image:url(/rp/rKVnxf6wkbxI0Db2Au3IVC5Sog.svg)}.mm_vrc .b_overlay .btn.bigrounded
.cr>div{opacity:.7}.mm_vrc .b_overlay .btn.bigrounded .cr>div: hover{opacity:1}.mm_vrc h2
a{font-family:"Arial",Helvetica,Sans-Serif;font-style:normal;font-
weight:500;color:#111}.mm_vrc h2{display:inline-block;padding-
bottom:16px}.mm_vrc>div{position:relative;padding-bottom:32px}.mm_vrc
.see_more{position:absolute;right:0;top:3px}.mm_vrc .see_more>a{font-family:"Arial",Helvetica,
Sans-Serif;font-style:normal;font-weight:normal;font-size:16px;line-
height:18px;color:#000}#vsb_more{padding:16px 0 4px 160px;color:#111}#vsb_vid_cat
.mm_vrc h2 a::after{display:inline-block;margin-left:12px;content:"";background-
image:url(/rp/rKVnxf6wkbxI0Db2Au3IVC5Sog.svg);background-size:7px
14px;width:7px;height:14px;opacity:.7}#vsb_vid_cat .mm_vrc h2
a: hover::after{opacity:1}.mm_vrc .mm_vrc_sub{display:inline-block;margin-left:24px}.mm_vrc
.b_hList{position:absolute;height:20px;top:3px;overflow:hidden}.mm_vrc .b_hList>li{padding-
right:24px;padding-bottom:0}.mm_vrc .b_hList a{font:normal 13px/20px "Arial",Helvetica,Sans-
Serif;color:#111}.mm_vrc .mc_vtvc_tot .mmsts .mc_vtvc_meta{display:none}.b_overlay .btn.rou
nded{position:absolute;cursor:pointer;z-index:1;-moz-user-select:none;-khtml-user-select:none;-w
ebkit-user-select:none;-o-user-select:none;-ms-user-select:none;user-select:none}.b_overlay
.btn.rounded,.b_overlay .btn.rounded .bg,.b_overlay .btn.rounded .cr,.b_overlay .btn.rounded
.cr>div,.b_overlay .btn.rounded .vcac>div{border-radius:50%}.b_overlay .btn.rounded
.vcac{height:0}.b_overlay .btn.rounded{height:32px;width:32px;top:50%;margin-
top:-16px}.b_overlay .btn.rounded .bg,.b_overlay .btn.rounded: hover .bg{opacity:0}.b_overlay
.btn.rtl.rounded .cr{direction:ltr}.b_overlay .btn.hidden.rounded .cr,.b_overlay
.btn.disabled.rounded .cr{visibility:hidden}.b_overlay .btn.rounded .cr>div{border:1px solid
#ecec;box-shadow:0 2px 3px 0 rgba(0,0,0,.1);height:30px;width:30px;overflow:hidden;backgro
und-image:none;background-color:#fff}.b_overlay .btn.rounded .cr>div: hover{box-shadow:0 2px
4px 1px rgba(0,0,0,.14)}.b_overlay .btn.rounded .cr>div: after{bottom:5px;background-
color:#fff;transform-origin:-430px 0;display:inline-
block;transform:scale(.5);position:relative}.b_overlay .btn.rounded .cr>div: hover: after{transform-
origin:-514px 0}.b_overlay .btn.ltr.rounded .cr>div: after{right:5px}.b_overlay .btn.rtl.rounded
.cr>div: after{left:5px}.b_overlay .btn.prev.ltr.rounded .cr,.b_overlay .btn.next.rtl.rounded
.cr{transform:scaleX(-1)}body .b_overlay .btn.rounded.next{right:-12px}body .b_overlay
.btn.rounded.prev{left:-13px}.ra_car_container .b_overlay .btn.prev.ltr.rounded
.cr>div,.ra_car_container .b_overlay .btn.next.rtl.rounded
.cr>div{transform:unset}.ra_car_container .b_overlay .btn.rounded .cr>div{background-
position:0;border:unset}.ra_car_container .b_overlay .btn.rounded
.cr>div: after{content:unset}@media screen and (forced-colors:active){.b_overlay
.btn.rounded.hidden *,.b_overlay .btn.rounded.disabled *{background:none}.b_overlay
```



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```
.btn.rounded.hidden,.b_overlay .btn.rounded.disabled{background:none}}.b_overlay .btn.rounded
.cr>div:after{content:url(/rp/EX_mgILPdYtFnI-37m1pZn5YKII.png)}.vsb_tr_chd .mc_vtvc
.mc_vtvc_meta { padding: 10px 10px 10px 10px; } .vsb_tr_chd .mc_vtvc .mc_vtvc_meta_w {
height: 190px; margin-top: -0px; } .vsb_tr_chd .mc_vtvc .mc_vtvc_title { height: 150px; line-
height: 15px; margin-bottom: 0px; margin-top: 0px; } .vsb_tr_chd .mc_vtvc
.mc_vtvc_meta_block_area { height: 20px; } .vsb_tr_chd .mc_vtvc .vtmu, .vsb_tr_chd .mc_vtvc
.vtpl { bottom: 198px; } .vsb_tr_chd .mc_vtvc_th_dock { height: 190px; } .vsb_tr_chd
.mc_vtvc_th_dock { height: 60px; }.tr_bt.mc_vtvc_th img{height:auto;width:100%}.grad_b{posit
ion:absolute;width:100%;top:30%;bottom:0%;background:linear-
gradient(180deg,rgba(48,44,39,0) 0%,#302c27
100%)).mc_vtvc_th_dock{width:100%;background:#302c27}.mc_vtvc_tot
.mc_vtvc_th{background-color:transparent}.vsadc .grad_b{top:81.8%}.mc_vtvc_tot .mc_vtvc_me
ta{line-height:15px;position:absolute;bottom:0%;background:transparent}.mc_vtvc_tot
.mc_vtvc_meta_row{line-height:16px;font-size:12px;height:16px}.mc_vtvc_tot
.mc_vtvc_meta_row,.mc_vtvc_tot .mc_vtvc_meta_row a{color:#dadada}.mc_vtvc_tot
.mc_vtvc_title,.mc_vtvc_tot .mc_vtvc_title a{color:#fff}.vsadc .mc_vtvc_tot .mc_vtvc_title{line-
height:18px}.vsadc .mc_vtvc_tot .mc_vtvc_meta_row,.vsadc .mc_vtvc_tot .mc_vtvc_meta_row
a{color:rgba(255,255,255,.7)}.vsadc .mc_vtvc_meta_pubdate{padding-bottom:2px}.vtdc_default{
background:#302c27}.vtdc_default_g{background:linear-gradient(180deg,rgba(48,2,39,0)
0%,#302c27 100%)).vtdc_black{background:#111}.vtdc_black_g{background:linear-
gradient(180deg,rgba(17,17,17,0) 0%,#111 100%)).vtdc_blue{background:#3a4e74}.vtdc_blue_g
{background:linear-gradient(180deg,rgba(58,78,116,0) 0%,#3a4e74 100%)).vtdc_brown{backgro
und:#69423d}.vtdc_brown_g{background:linear-gradient(180deg,rgba(105,66,61,0) 0%,#69423d
100%)).vtdc_grey{background:#464646}.vtdc_grey_g{background:linear-
gradient(180deg,rgba(70,70,70,0) 0%,#464646 100%)).vtdc_green{background:#324f32}.vtdc_gr
een_g{background:linear-gradient(180deg,rgba(50,79,50,0) 0%,#324f32 100%)).vtdc_orange{bac
kground:#8c5400}.vtdc_orange_g{background:linear-gradient(180deg,rgba(140,84,0,0)
0%,#8c5400 100%)).vtdc_pink{background:#a3394b}.vtdc_pink_g{background:linear-
gradient(180deg,rgba(163,57,75,0) 0%,#a3394b 100%)).vtdc_purple{background:#774077}.vtdc_
purple_g{background:linear-gradient(180deg,rgba(119,64,119,0) 0%,#774077 100%)).vtdc_red{b
ackground:#811515}.vtdc_red_g{background:linear-gradient(180deg,rgba(129,21,21,0)
0%,#811515 100%)).vtdc_white{background:#464646}.vtdc_white_g{background:linear-
gradient(180deg,rgba(70,70,70,0) 0%,#464646 100%)).vtdc_yellow{background:#755b00}.vtdc_
yellow_g{background:linear-gradient(180deg,rgba(117,91,0,0) 0%,#755b00 100%)).vtdc_tea
l{background:#256868}.vtdc_tea_g{background:linear-gradient(180deg,rgba(37,104,104,0)
0%,#256868 100%)).cipt,.cipg,.cipa,.cipl,.ciptr,.ciplr{display:inline-block}.cipa,.cipl,.ciplr{cursor
:pointer}.vab{vertical-align:bottom}.vam{vertical-align:middle}.vat{vertical-align:top}.vabl{verti
cal-align:baseline}.vatt{vertical-align:text-top;border-radius:0}.vatb{vertical-align:text-bottom}
```



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evronDown12, evronUp12{background:url(/rp/QKlTrqL25sGDqfRYQjkMWJWDeG8.png) no-repeat;background-size:494px 58px;width:12px;height:12px} evronDown12{background-position:-372px 0} evronUp12{background-position:-372px -14px}@media(prefers-color-scheme:dark){#bpage.b_med evronDown12{background-position:-386px 0}#bpage.b_med evronUp12{background-position:-386px -14px}}#bpage.b_drk evronDown12{background-position:-386px 0}#bpage.b_drk evronUp12{background-position:-386px -14px}.cipt,.cipl{margin-right:10px}.cipt .cico,.cipl .cico,.ciptr .cico,.ciplr .cico{border-radius:0}.b_action>.cipt,.b_action>.cipl{float:left}.ciptr,.ciplr{margin-left:10px}.sw_play{height:16px;width:16px}:not(.dc_aud_wrp)>.sw_play{background-image:url();background-size:16px 16px}#slideexp0_A7716D .slide { width: 94px; margin-right: 20px; }#slideexp0_A7716Dc .b_slidebar .slide { border-radius: 6px; }#slideexp0_A7716D .slide:last-child { margin-right: 1px; }.b_sldrp .slide{box-shadow:0 0 0 1px rgba(0,0,0,.05)}.b_cards .cico,.b_slidebar .slide .cico{border-radius:0}#b_content .b_wpt_container .l_ecrd_imgsetgrid.l_ecrd_imgsetgrid_actionlink .l_ecrd_imgsetgrid_item .cico{border-radius:0!important}.b_sldrp .slide.see_more{box-shadow:0 0 0 0 rgba(0,0,0,0)}.b_sldrp .slide.see_more .carousel_seemore{border:0}.b_sldrp .slide.see_more: hover{box-shadow:0 0 0 0 rgba(0,0,0,0)}#slideexp0_A7716Dc { margin: -4px; } #slideexp0_A7716Dc .b_viewport { padding: 4px 1px 4px 1px; margin: 0 3px; }#slideexp0_A7716Dc .b_slidebar .slide[data-mini="1"] { display:none; }Videos of BMS Battery Management System IntroductionWatch video10:35How does a BMS (Battery Management System) work? | Passive & Active cell balancing ExplainedFoolish Engineer256.8K viewsMay 7, Watch full videoWatch video3:50What is a BMS? Battery Management System ExplainedNXP Developer Zone20.3K viewsApr 20, 2022Watch video3:55Battery management system (BMS) | Building blocks and functions of BMSOwl WiS4.7K views9 months agoWatch video5:31What is a Battery Management System?Stafl Systems312.5K viewsJul 9, Watch full videoShort videosbms battery management system introduction00:43BMS (Battery Management System) Uses and Application __ Lithium Ion Battery BMS01:00#bms module, Battery Management System for Lithium-ion battery and other rechargeable battery00:20BMS: The Missing Link in Your Lithium Battery



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Upgrade00:12?[Battery Management Must-See] Complete Analysis of ANT BMS APP Interface | Quick Start Guide00:47Understanding Common Mode Inductors in Electric Vehicles00:35BMS Battery Management System Functions Explained #shortsSee allWatch full video.rcimgcol .cico { background: #f5f5f5; } .b_drk.rcimgcol .cico, .b_dark.rcimgcol .cico { background: unset; }.b_imgSet .b_hList li.square_m,.b_imgSet .b_hList li.tall_m{width:75px}.b_imgSet .b_hList li.tall_mlb{width:113px}.b_imgSet .b_hList li.tall_mln{width:96px}.b_imgSet .b_hList li.wide_m{width:128px}.b_imgSet.b_Card .b_hList li{padding-left:1px;padding-right:9px}.b_imgSet.b_Card .b_hList li.tall_wfn{width:80px;padding-right:6px}.b_imgSet.b_Card .b_hList li:last-child{padding-right:1px}.b_imgSet.b_Card .b_imgSetData{padding:0 8px 8px;height:40px}.b_imgSet.b_Card .b_imgSetItem{box-shadow:0 0 0 1px rgba(0,0,0,.05),0 2px 3px 0 rgba(0,0,0,1);border-radius:6px;overflow:hidden}.b_imgSet .b_imgSetData p a{color:#444;outline-offset:0}.b_subModule .b_clearfix.b_mhdr .b_floatR .b_moreLink,.b_subModule .b_clearfix.b_mhdr .b_floatR .b_moreLink:visited,.b_subModule>.b_moreLink,.b_subModule>.b_moreLink:visited{color:#767676}.b_imgSet .cico.b_placeholder{display:flex;justify-content:center;background-color:#f5f5f5;background-clip:content-box}.b_imgSet .cico.b_placeholder a{display:flex}.b_imgSet .cico.b_placeholder a img{width:48px;height:48px;margin:auto}@media(max-width:.9px){#b_context .b_entityTP .b_imgSet li:nth-child(5){display:none}.b_imgSet .b_hList li.wide_m:nth-child(3){display:none}}@media(max-width:.9px){#b_context .b_entityTP .b_imgSet li:nth-child(4){display:none}.b_imgSet .b_hList li.wide_m:nth-child(2){display:none}}.rcimgcol .b_imgSet{content-visibility:auto;contain-intrinsic-size:1px 124px}.rcimgcol{height:108px;padding-top:var(--smtc-gap-between-content-x-small);padding-bottom:var(--smtc-gap-between-content-x-small)}.b_algo:has(.b_agh) .rcimgcol{padding-top:var(--smtc-gap-between-content-xx-small)}.rcimgcol .b_imgSet{overflow:hidden}.rcimgcol .b_imgSet ul{overflow-x:auto;overflow-y:hidden;white-space:nowrap;padding-left:var(--mai-smtc-padding-card-default)}.rcimgcol .b_imgSet ul::-webkit-scrollbar{-webkit-appearance:none}.rcimgcol .b_imgSet .b_hList>li{padding-right:var(--smtc-padding-ctrl-text-side)}.rcimgcol .b_imgSet .cico{border-radius:unset}.rcimgcol .b_imgSet .b_hList>li:first-child .cico{border-radius:unset;border-top-left-radius:var(--smtc-corner-card-rest);border-bottom-left-radius:var(--smtc-corner-card-rest);overflow:hidden}.rcimgcol .b_imgSet .b_hList>li:last-child .cico{border-radius:unset;border-top-right-radius:var(--smtc-corner-card-rest);border-bottom-right-radius:var(--smtc-corner-card-rest);overflow:hidden}.rcimgcol .rcimgcol .b_sideBleed{margin-left:unset;margin-right:unset}.rcimgcol .b_imgclgovr{cursor:pointer}.rcimgcol .b_imgclgovr .cico img: hover{transform:scale(1.05);transition:transform .5s ease}#b_content #b_results>.b_algo .b_caption:has(.rcimgcol){padding-right:var(--mai-smtc-padding-card-default);margin-right:calc(-1*var(--mai-smtc-padding-card-default));margin-left:calc(-1*var(--mai-smtc-padding-card-default));padding-left:var(--mai-smtc-padding-card-default)}.b_factrow>li.b_sritem,.b_factrow .ssp_expert{font-weight:bold}.b_factrow.b_twofr .b_sritem>.b_sritemp{display:inline;font-



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weight:normal}.b_factrow.b_twofr .b_sritem{font-weight:bold}.b_factrow.b_twofr .csrc{margin-left:5px}.b_factrow.b_twofr{padding-top:4px}.b_factrow.b_twofr ul:first-child{max-width:calc(50% - 20px)}.b_factrow.b_twofr ul:first-child+ul{max-width:50%}.b_factrow.b_twofr ul li div{white-space:nowrap;text-overflow:ellipsis;overflow:hidden}.b_imagePair.wide_wideAlgo .b_factrow.b_twofr .b_vlist2col{display:flow-root}CourseraIntroduction to battery-management systems - CourseraThis week, you will begin to learn about BMS requirements, and will study the requirements for sensing and high-voltage control in detail. This week, you will continue to learn about BMS Role and Importance of BMS A battery pack's performance, use, and safety are monitored and managed by a battery management system (BMS), an intelligent electronic device. It is a crucial component of contemporary battery technology, especially in What Is a Battery Management System (BMS)? A battery management system (BMS) monitors and manages the operational variables of rechargeable batteries. Explore videos, examples, and documentation. What is a Battery Management System? Complete A Battery Management System (BMS) is an electronic control unit that monitors and manages rechargeable battery packs to ensure safe operation, optimal performance, and extended lifespan.What is a Battery Management System (BMS)? - How it WorksThere are many BMS design features, with battery pack protection management and capacity management being two essential features. We'll discuss how these two features work here. Introduction to Battery Management Systems Learn the high-level basics of what role battery management systems (BMSs) play in power design and what components are necessary for their basic functions. Nowadays, Li Introduction to battery-management systems This week, you will begin to learn about BMS requirements, and will study the requirements for sensing and high-voltage control in detail. This week, you will continue to learn about BMS Role and Importance of BMS A battery pack's performance, use, and safety are monitored and managed by a battery management system (BMS), an intelligent electronic device. It is a crucial component of What is a Battery Management System? Complete Guide to BMS A Battery Management System (BMS) is an electronic control unit that monitors and manages rechargeable battery packs to ensure safe operation, optimal performance, and What is a Battery Management System (BMS)? Essential Guide A battery management system is an electronic system that takes care of rechargeable batteries. It tracks how they work, calculates their status, reports data, controls Battery Management System (BMS) Detailed Explanation: Battery Management System (BMS) is the "intelligent manager" of modern battery packs, widely used in fields such as electric vehicles, energy storage stations, and consumer Whitepaper: Understanding Battery Management Systems This whitepaper provides an in-depth look at Battery Management Systems, exploring their architecture, key features, and how they contribute to battery safety and longevity. Battery Management Systems (BMS): A Complete GuideA Battery Management System (BMS) is essential for ensuring the safe and efficient operation of battery-powered systems. From real-time monitoring and cell balancing to thermal What is a Battery Management System (BMS)? - How it



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