



One of the World's Largest
Manufacturers
of Discrete Semiconductors and Passive Components

Vishay Passive Capacitors

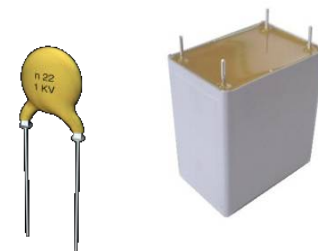
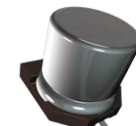


Michael Huang 黄勇
市场部

Focus Specialty Capacitors

主推电容器

- **Aluminum: 铝电容器**
 - Snap-In & Screw terminals, Harsh Application Environments
牛角式和螺栓式，适用于恶劣环境
 - High Temperature Products
高温产品
- **Film: 薄膜电容器**
 - Industrial Power 工业电源
 - DC Link capacitor MKP1848 / 9
DC Link 电容器 MKP1848 / 9
 - RFI Standard X-Line Applications BFC2 339
RFI 标准X电容应用 BFC2 339
 - Snubber for IGBT Direct Mount BFC2 386
用于IGBT直接安装的缓冲电容BFC2 386
- **Ceramic: 陶瓷电容器**
 - VY1 and VY2 Series for lighting and power supplies
用于照明和电源的VY1和VY2系列
 - High voltage for industrial power
用于工业电源的高压产品
 - Focus for new special application designs at industrial power supply and lighting
工业电源和照明中的新型特殊应用



Focus Tantalum & MLCC Capacitors

聚焦钽和MLCC电容器

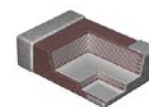
■ Tantalum: 钽电容器

- Molded Chips Specialty Products (TR3, TP3, TH3, T83)
模压型专用产品(TR3, TP3, TH3, T83)
- Coated Chips
涂层型产品
- Hi-Rel , High Voltage Conformal (63/75V)
高可靠高电压涂层产品(63/75V)
- MAP: Continue focus on High CV (Highest in the Market!)
MAP: 专注于小型化产品(市场上最高的规格!)
- Wets: new high energy products for MIL and Medical, High Temperature for Oil Drilling
液钽:用于军工和医疗的新型高能产品, 用于石油勘探的高温产品



■ MLCC:

- HV Arc Guard and Military – CDR, High Rel. parts
HV Arc Guard和军工-- CDR, Hi-Re 高可靠系列
- Non-Magnetic MLCC
无磁性MLCC
- Magnetic Resonance Imaging compatible
磁响应成像
- UHF Chip Antennas for mobile devices (UHF 470 MHz to 860 MHz)
用于移动设备的片式天线(UHF 470 MHz ~ 860 MHz)





One of the World's Largest
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of Discrete Semiconductors and Passive Components

Military & High Reliability Capacitors Tantalum / MLCC

军用高可靠性钽电容器和MLCC电容器



Broadest Line of Tantalum Capacitors

最宽的钽电容器产品线

Solid Tantalums
固钽

Wet Tantalums
液钽

Surface Mount
表面贴装

Leaded
引脚型

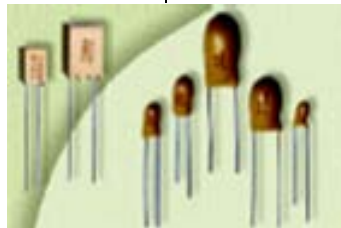
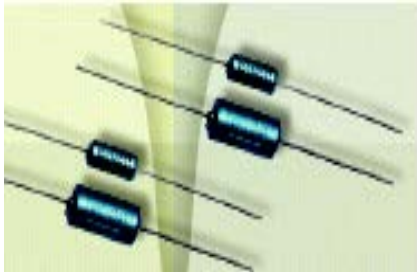
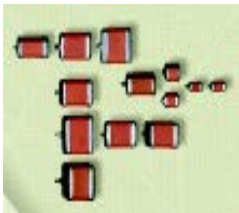
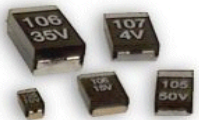
Axial Leaded
径向引脚

Molded Chips 模压贴片
Frameless Molded 无框模压
Conformal Coated 涂层

Axial Leaded 径向引脚
Hermetic Metal Case
密封的金属外壳
Commercial 商用
MIL-C- 39003
CECC

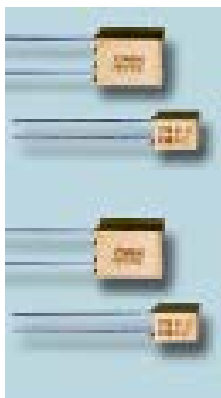
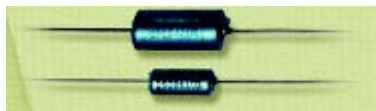
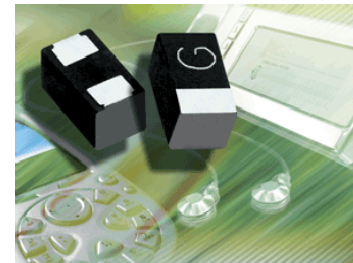
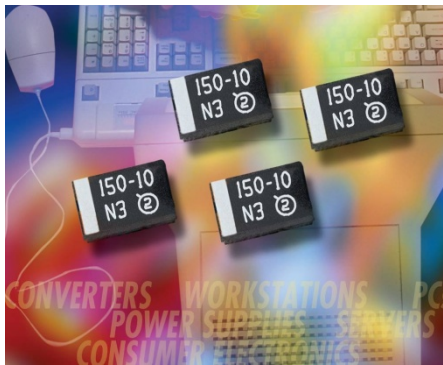
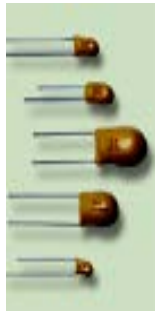
Epoxy Coated
带环氧涂层
Radial Dipped
径向浸渍
Radial Molded
径向模压
Commercial 商用

High Rel Applications
高可靠应用
Silver / Tantalum Case
银/钽外壳
Commercial, CECC
商用, CECC
MIL-C-39006
SPRAGUE, TANSITOR, MALLORY



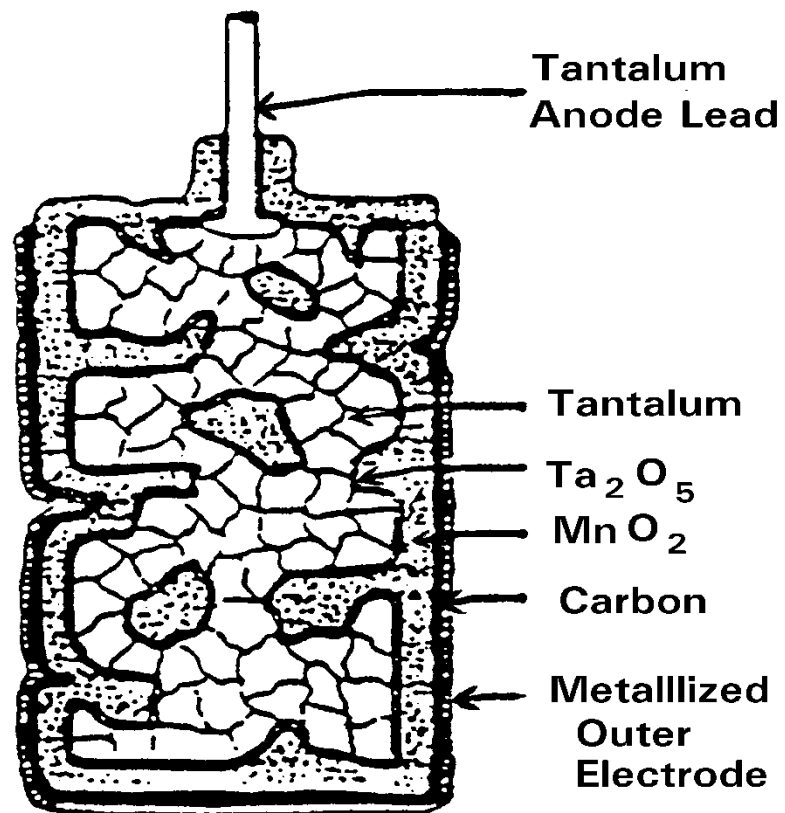
Solid Tantalum

固钽电容器



Solid Tantalum Construction

固钽芯子的结构



Description: Solid Tantalum Hermetic

说明：密封的固态钽电容器

Hermetically Sealed, Solid Tantalum, Metal Case Axial Leaded

严格密封，固钽，径向引脚的金属外壳

MIL-PRF-39003/01 Style CSR13 (standard)

MIL-PRF-39003/03 Style CSR23 (extended)

MIL-PRF-39003/09 Style CSR21 (low ESR)

Hermetically Sealed Solid Tantalum 严格密封的固态钽

Metal Case Axial Leaded 带径向引线的金属外壳

Capacitance range 容值范围：0.027 ~ 1000 μF

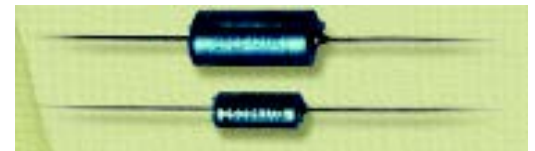
Voltage rating 电压等级：6 to 100 wvdc

Operating Temp 工作温度：-55°C ~ +125°C

Case sizes 外壳尺寸：A, B, C, D

Failure Rates 失效率：M, P, R, S

Weibull 等级：B, C, D



Description

说明

Molded Solid Tantalum Chip 模压固钽贴片电容

MIL-PRF-55365/08 Style CWR11

Capacitance range 容值范围: $0.1 \sim 100 \mu\text{F}$

Voltage rating 电压等级: $4 \sim 50 \text{ wvdc}$

Operating Temp 工作温度: $-55^{\circ}\text{C} \sim +125^{\circ}\text{C}$

Case sizes 外壳尺寸: A, B, C, D

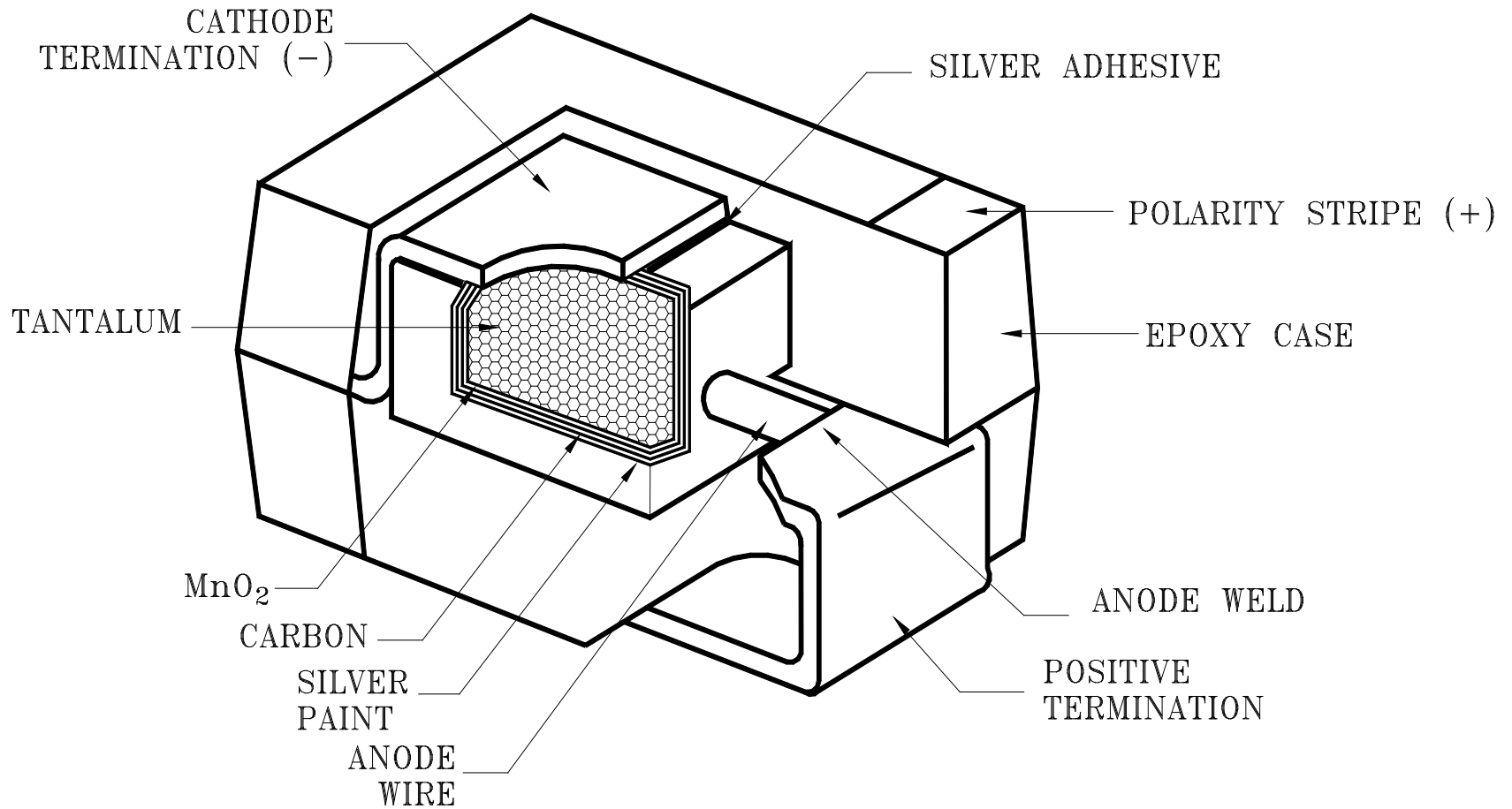
Weibull Failure Rates 失效率: B, C, D

Terminations 端接: (H) solder plate 焊盘



Molded Tantalum Chip CWR 11

模压贴片钽电容 CWR 11



Description 说明

Conformal Coated Solid Tantalum Chip 带涂层的固钽贴片电容

MIL-PRF-55365/04 Style CWR06

Capacitance range 容值范围: 0.1 ~ 100 μF

Voltage rating 电压等级: 4 ~ 50 wvdc

Operating Temperature 工作温度: -55°C ~ $+125^{\circ}\text{C}$

Weibull Failure Rates 威布尔失效率: B & C

Case sizes 外壳尺寸: A,B,C,D,E,F,G,H

Terminations:端接: (B) Gold – standard 金-标准

(H) solder plate 焊盘

(C) solder dipped 浸焊

Surge Current 浪涌: (A) $+25^{\circ}\text{C}$, post Weibull

(B) -55°C & $+85^{\circ}\text{C}$, post Weibull

(C) -55°C & $+85^{\circ}\text{C}$, pre-Weibull



Description 说明

Conformal Coated Solid Tantalum Chip 涂层固钽贴片

MIL-PRF-55365/13 Style CWR16

Capacitance range 容值范围: 0.33 ~ 330 μF

Voltage rating 电压等级: 4 ~ 50 wvdc

Operating Temperature 工作温度: -55°C ~ $+125^{\circ}\text{C}$

Weibull Failure Rates 失效率: B & C

Case sizes 外壳尺寸: A, B, C, D, E, F, G, H

Terminations 端接: **(B) Gold – standard** 金-标准

(H) solder plate 焊盘

(C) solder dipped 浸焊

Surge Current 浪涌: **(A) +25C**

(B) -55°C & $+85^{\circ}\text{C}$, post Weibull

(C) -55°C & $+85^{\circ}\text{C}$, pre-Weibull





New Products Update

新产品速递

Solid Tantalum Chip Capacitors

固钽贴片电容器



Hi-Rel COTS

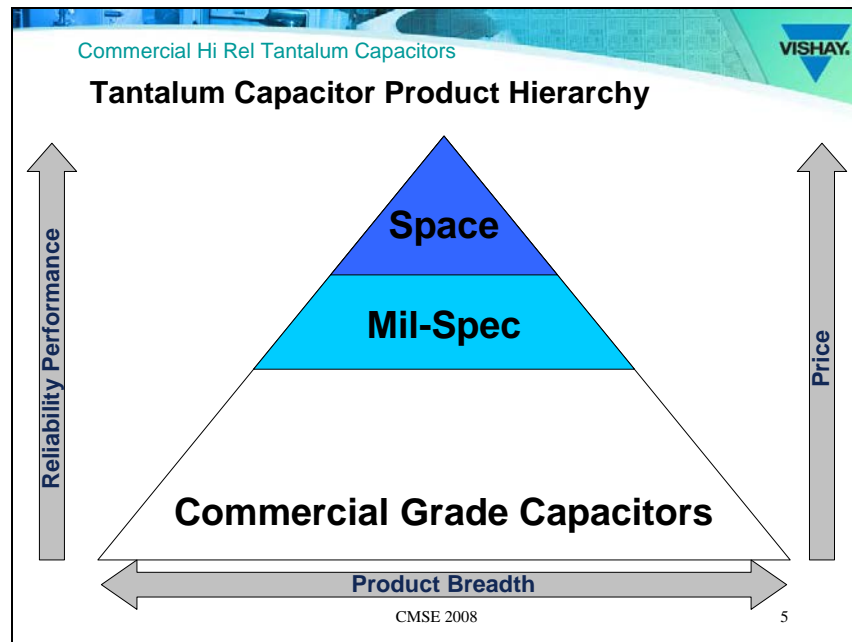


Introduction

介绍

Overview 概览:

- **Commercial industry drives new capacitor technology development**
商用行业推动电容器技术的发展
- **Military qualified capacitor offerings have not kept pace with technology advancements**
符合军标的电容器落后于技术的进步
- **Defense electronics designers require the latest in technology**
国防电子设备的设计者需要最新的技术



- **Lacking alternatives, designers will often select standard commercial products without screening – *This may lead to Reliability Problems***

由于缺少替代产品，设计者常常选用未经筛选的商用产品，这可能导致可靠性问题

A gap exists between what is available commercially and what is available in Mil-Spec

商用产品和符合军标的产品之间存在差距

What are Hi-Rel COTS Capacitors?

什么是Hi-Rel COTS 电容器?

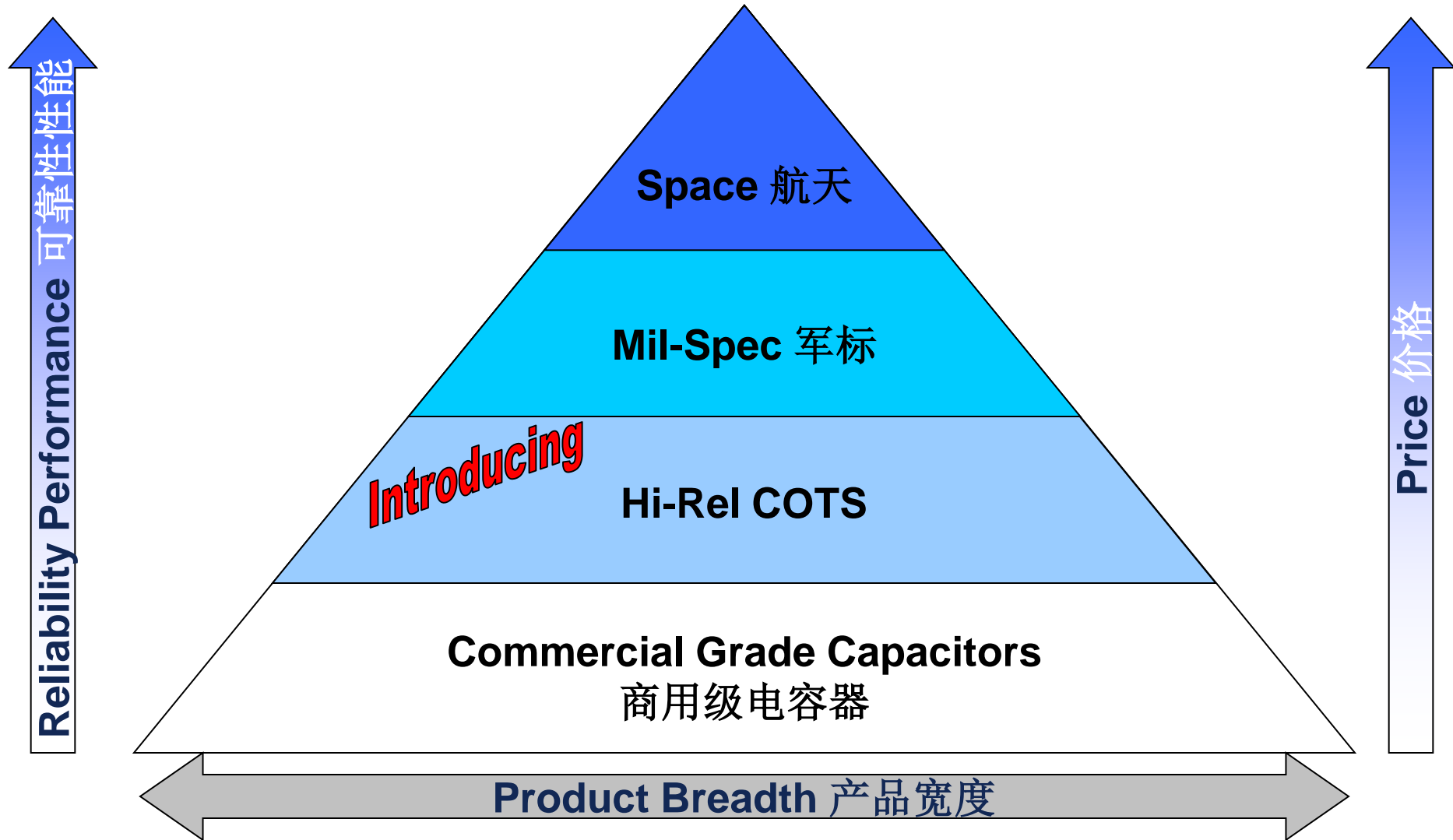
- **Selection of “Robust” Commercial Designs**
选用稳固的商用设计
 - **Redesign for Improved Reliability Where Necessary**
必要时进行重新设计，以提高可靠性

- **Hi-Rel Qualification (Beyond Standard Commercial Grade)**
Hi-Rel认证(超出标准的商用等级)

- **100% Screening per MIL-PRF-55365**
根据MIL-PRF-55365 标准，100%地进行逐项筛选
(MIL-PRF-55365 covers Surface Mount Solid Tantalum Capacitors)
MIL-PRF-55365包括表面贴装固态钽电容器
 - **Reflow Conditioning** 回流焊调整
 - **Thermal Shock** 热冲击
 - **Surge Current Options** 涌流选项
 - **Reliability Screening Options (Accelerated Voltage Aging)**
可靠性筛选选项（加速的电压老化）

Tantalum Capacitor Product Hierarchy

钽电容器产品的性能分级



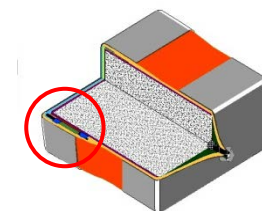
Hi-Rel COTS Products Available

已上市的 Hi-Rel COTS 产品

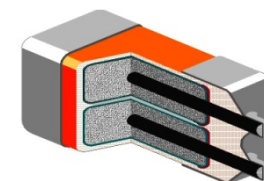


- ✓ **T83: Molded Construction 模压结构**
 - **Includes CWR11 (MIL-PRF-55365/8) values** 包括CWR11(MIL-PRF-55365/8)容值
 - **Includes 293D (Standard) & 593D (Low ESR)** 包括293D(标准)&593D(低ESR)
 - **Values and case sizes not available in MIL-PRF-55365** 提供MIL-PRF-55365中没有的容值和尺寸
 - **Advantage: Common case sizes and values** 优势: 通用尺寸和容值

- ✓ **T95: Conformal Coated Construction 涂层结构**
 - **Includes 195D (formerly CWR10, MIL-PRF-55365/7) values** 包括195D(以前的CWR10, MIL-PRF-55365/7)容值
 - **Includes 595D (Standard) & 594D (Low ESR) values, case sizes and construction not available in MIL-PRF-55365** 包括MIL-PRF-55365 中没有的595D(标准) 和594D(低ESR)容值, 外壳尺寸和结构
 - **Advantage: Low ESR, ESL & High Cap/Voltage** 优势:低ESR, ESL和高容值/电压

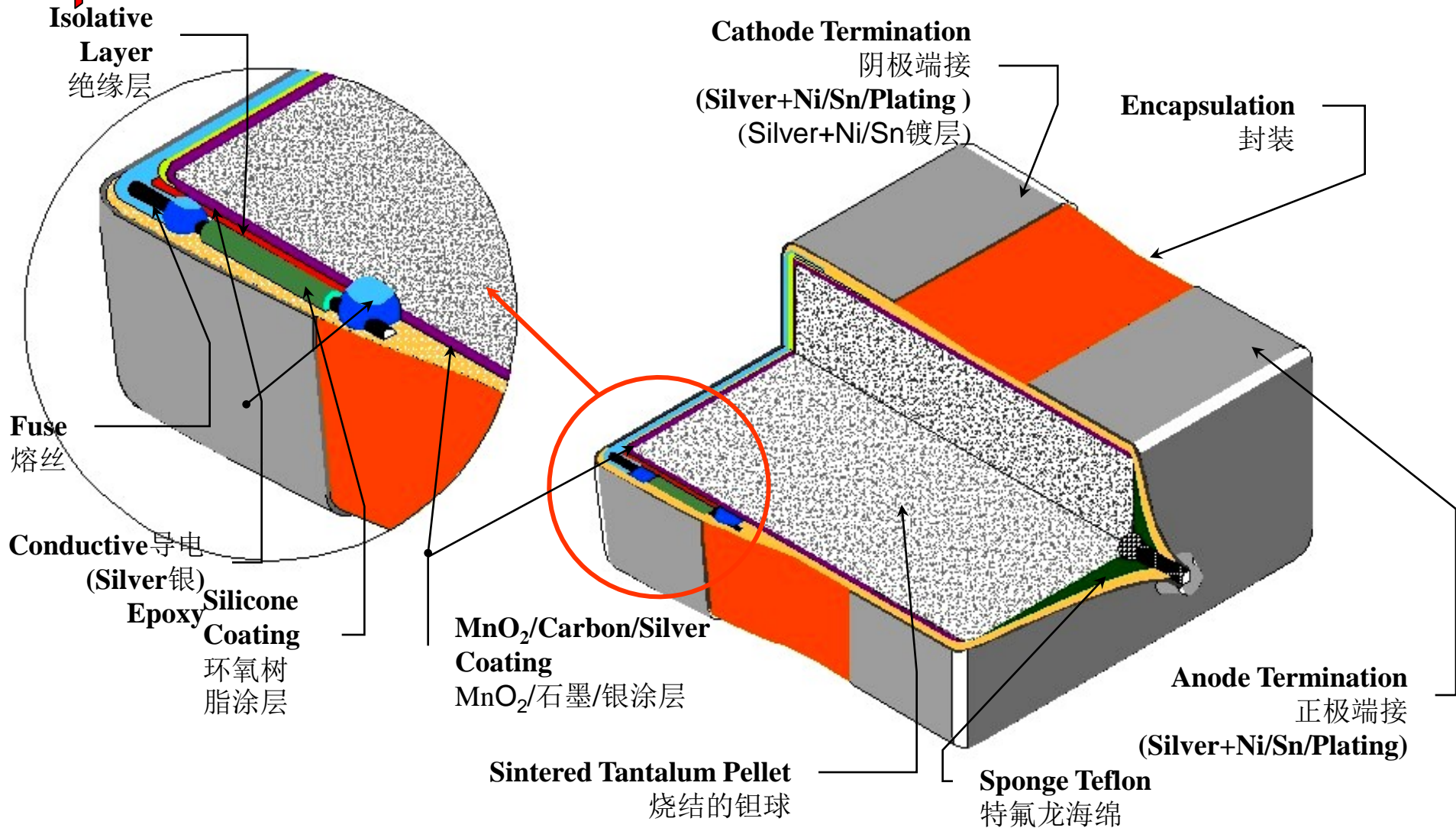


- ✓ **T96: Conformal Construction with Built-In Fuse 带有内置熔丝的涂层结构**
 - **Advantage: Fail-Safe Operation for Safety Critical Applications** 优势: 为涉及安全的关键应用提供故障保护操作



- ✓ **T97: Multi-Anode Conformal Coated Construction 多极涂层结构**
 - **Advantages: 优势:**
 - Lowest ESR Available in a Hi-REL COTS series** 具有Hi-Rel COTS系列中最低的ESR
 - Voltage Ratings to 75V!** 额定电压可达75V

New! T96 Fused Hi-Rel COTS Series Architecture



T97 Hi-Rel COTS Roadmap

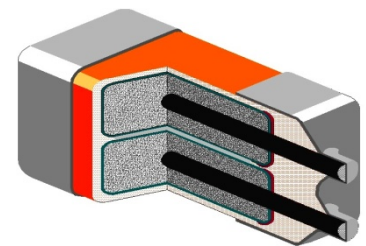
Ultra Low ESR

- Introducing 75V Ratings!**
 引入了75V电压等级
 - Perfect for +35V Applications**
 是+35V应用的绝佳选择
- Industry's Highest Capacitance in SMD Package!**
 在业内采用SMD封装的产品中具有最高的容值
- Dual Anode for Ultra-Low ESR**
 双电极实现了超低ESR
 - Lowest ESR in Hi-Rel COTS Series**
 在Hi-Rel COTS系列中最低的ESR
- Conformal Construction for low ESL**
 为达到低ESR采用了保形结构

Ratings and Case Codes

| Cap (uF) | 4V | 6.3V | 10V | 16V | 20V | 25V | 35V | 50V | 63V | 75V |
|----------|-----|------|-----|-----|-----|-----|-----|-----|-----|-----|
| 10 | | | | | | | | | | F |
| 15 | | | | | | | | E/R | R | F |
| 22 | | | | | | | | E/R | F | |
| 33 | | | | | | | | F | | |
| 47 | | | | | | | R | Z | | |
| 68 | | | | | | R | F | | | |
| 100 | | | | | | F | | | | |
| 150 | | | | | | F | | | | |
| 220 | | | | E | R | | | | | |
| 330 | | V | E | R | F | M | | | | |
| 470 | V | E | E | F | | | | | | |
| 680 | E | E | R | | | | | | | |
| 1000 | E/R | R | F | | | | | | | |
| 1500 | R | F | | | | | | | | |
| 2200 | F | | | | | | | | | |

Best-in-class



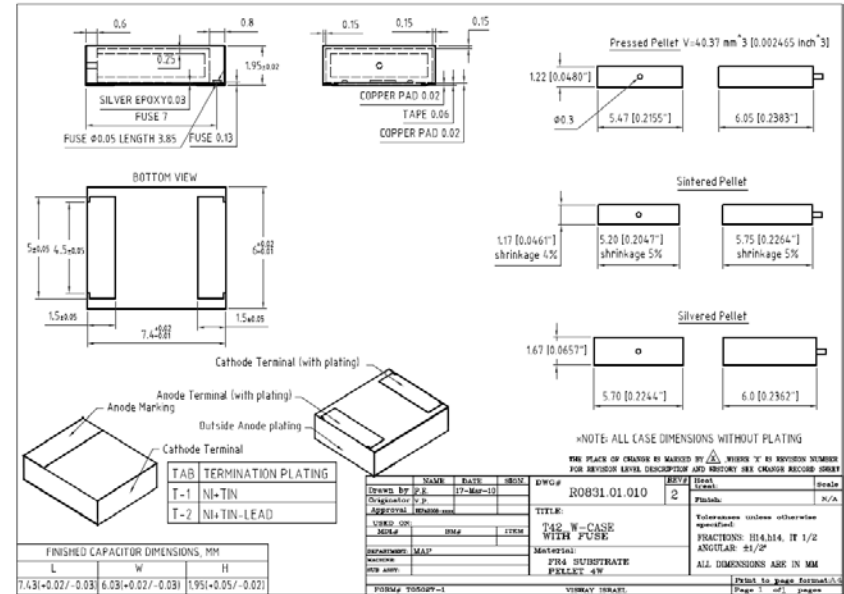
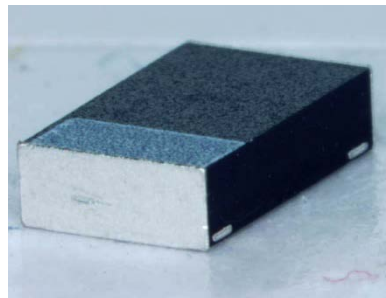


T42 - Fused MAP Introduction

T42-帶保險絲的MAP結構



New in 2011!



T42 Overview 简介

- Tan capacitor with high volumetric efficiency and fail-safe operation built on Vishay's MAP technology
采用Vishay的MAP技术制造，具有高体积效率和故障防护操作功能的钽电容器
- Fused capacitor using the popular R case footprint with 2.0mm height
使用常用的R外形占位，高度2.0mm的带保险丝电容器
- Fused capacitors can be stacked into an array
可堆叠成阵列的带保险丝电容器

Single Capacitor Dimensions 单个电容器的尺寸

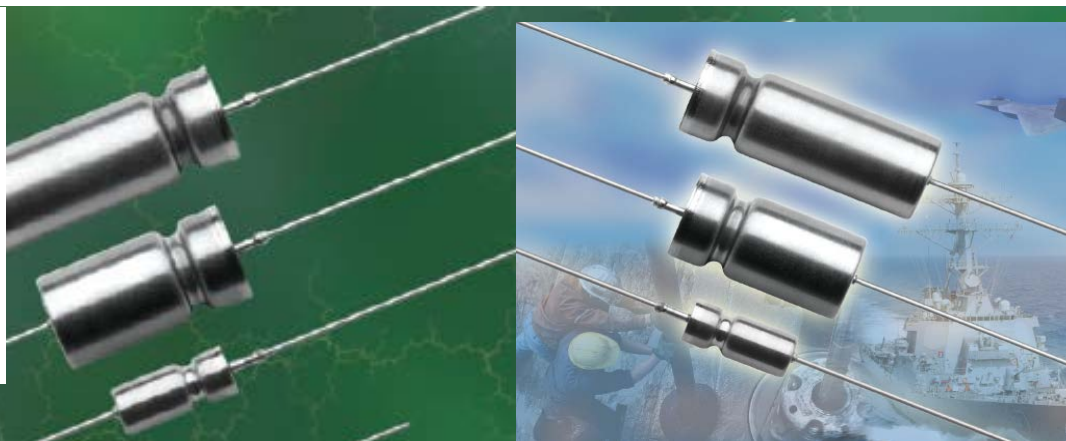
L: $7.3 \pm 0.2\text{mm}$

W: $6 \pm 0.2\text{mm}$

H: 2mm

Stacked up to 6mm 可堆叠至6mm

Wet Tantalum 液钽电容器



Why Wet Tantalum???

为什么采用液钽?

- **Voltage – 6V to 125V standard** 电压：6V~125V的标准电压
 - **Little or no de-rating required** 很少或不需要降额

- **Temperature 温度**
 - **-55C to +200C**

- **High Vibration & Shock 高振动和冲击**
 - **80g sine vibration** 80g的周期振动
 - **52g random** 52g 随机振动
 - **500g shock** 500g冲击

- **Long life 长寿命**
 - **MIL R failure rate (10,000 hr.+)**
MIL R级故障率(10,000小时以上)
 - **No wear-out mechanism**
无疲劳机制
 - **No re-age needed**
无需再次老化

Product Range 产品范围

Silver case cells enclosed in nickel plated steel case
 在镀镍钢外壳内银质框架格

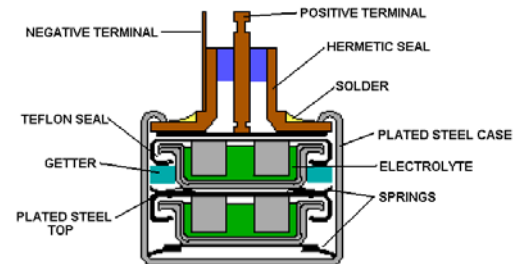
Military: DSCC Drawing 04022 (replaced M39006/10/14/17)
 军标: DSCC图纸 04022(替换M39006/10/14/17)

Commercial 商用: XT

Operating temperature 工作温度: $-55^{\circ}\text{C} \sim +175^{\circ}\text{C}$

Capacitance range 容值范围: $2 \mu\text{F} \sim 2200 \mu\text{F}$

Voltage range 电压范围: $8 \sim 680\text{Vdc} @ 85^{\circ}\text{C}$



Hermetic Sealed, Wet Tantalum, Silver Case,
 严密封装, 液钽, 银外壳

Axial Leaded, Tantalum/Glass Cover
 径向引线, 钽/玻璃护套

Commercial Type: 138D 商用型: 138D

CECC Approved Type/CECC批准的类型: CT9

MIL Approved Type/MIL批准的类型:

CLR65 (M39006/09) – standard ratings 标准等级

CLR69(M39006/21) – extended ratings 扩展等级

Operating temperature 工作温度:

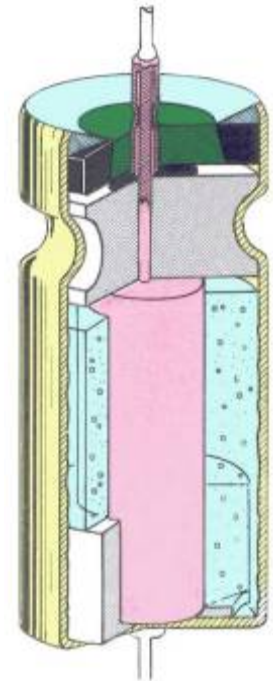
-55° C ~ +125° C

Capacitance range 容值范围: 1.7 μ F ~ 2200 μ F

Voltage range 电压范围: 6 ~ 125 Vdc

Case sizes 外壳尺寸: 1,2,3,4

Failure Rates 失效率: M,P,R



Hermetic Sealed, Wet Tantalum, Tantalum Case

严密封装，液钽，钽外壳

Axial Leaded, Tantalum/Glass Cover

径向引线，钽/玻璃护套

Commercial Type 商用型: 135D

CECC Approved Type: CT79 & 735D CECC批准的类型: CT79和735D

MIL Approved Type: CLR79 (M39006/22) – standard ratings

MIL批准的类型: CLR79(M39006/22)-标准等级

CLR81(M39006/25) – extended ratings 扩展等级

CLR90(M39006/30) – low ESR, standard 低ESR, 标准

CLR91(M39006/31) – low ESR, extended 低ESR, 扩展等级

Operating temperature 工作温度: $-55^{\circ}\text{C} \sim +200^{\circ}\text{C}$

Capacitance range 容值范围: $1.7\mu\text{F} \sim 2200\mu\text{F}$

Voltage range 电压范围: $6 \sim 125\text{Vdc}$

Case sizes 外壳尺寸: 1,2,3,4

Failure Rates 失效率: M,P,R



Hermetic Sealed, Wet Tantalum, Tantalum Case

严密封装，液钽，钽外壳

Axial Leaded, Tantalum/Glass Cover

径向引线，钽/玻璃护套

High Reliability for Space Applications

航天应用，高可靠性



DSCC Styles: 06103 [CLR79 (M39006/22)]

06014 [CLR81 (M39006/25)]

06015 [CLR90 (M39006/30)]

06016 [CLR91 (M39006/31)]

Failure Rate 失效率: R

Characteristic H: 80g sine vibration

H特性: 80g 周期振动

54g random 54g随机振动

500g shock 500g冲击



Hermetic Sealed, Wet Tantalum

严密封装，液钽

Tantalum Case, Axial Leaded

钽外壳，径向引线

Commercial 商用: ST

DSCC Drawing/DSCC图纸: 93026

Operating temperature 工作温度:

-55° C ~ +125° C

Capacitance range 容值范围:

10 μ F ~ 1800 μ F

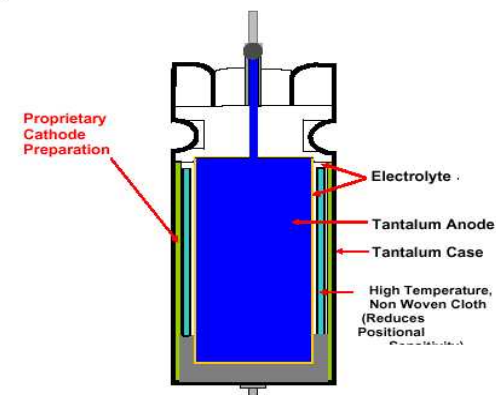
Voltage range 电压范围: 25 to 125 Vdc

Case sizes 外壳尺寸: T1,T2,L2,T3,T4

Failure Rate 失效率: non-ER

TANSITOR
ELECTRONICS, INC.

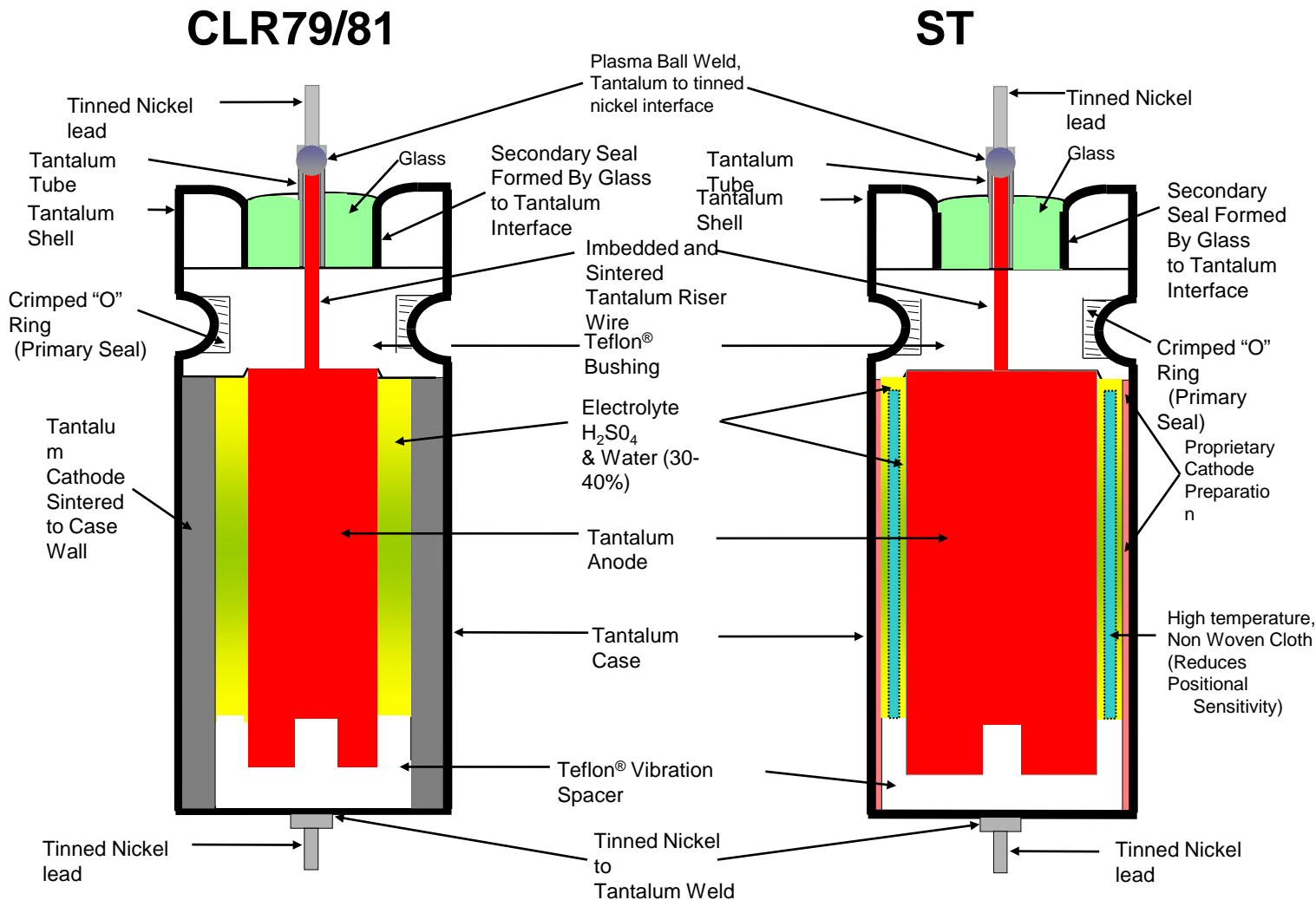
SuperTan®
DESC 93026
Internal Capacitor
System



“SuperTan’s” high performance is a result of an improved “cathode” technique. The use of an upgraded cathode in place of a formed cathode is a viable trade-off as very few applications require a continuous reverse voltage capability.

ST Construction

ST 结构



STE Capacitors

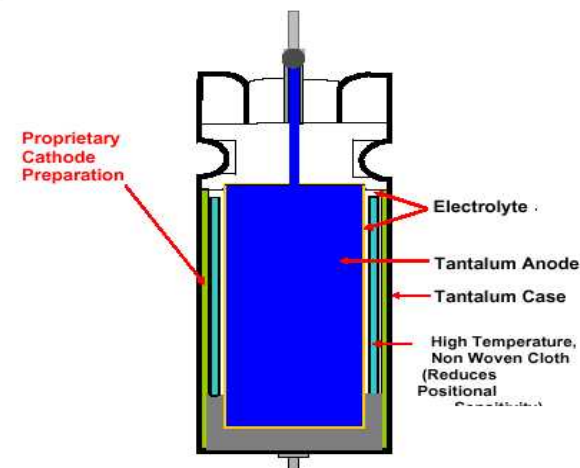
“SuperTan® Extended Ratings”

- **STE Capacitance** 容值: 22uF ~ 10000uF
- **Military** 军用: DSCC 10004
- **Op. Voltage Range** 工作电压范围: 10V ~ 125V
- **Op. Temperature Range** 温度: -55°C ~ +125°C
- **Good Reliability, Long Shelf Life** 优良的可靠性, 长寿命
- **Small Package Size** 封装: T1, T2, T3, & T4
- **Present available ratings**
提供的规格:

- 750 uF / 75V T4
- 1000 uF / 60V T4
- 3300 uF / 16V T3
- 6000 uF / 16V T4
- 4700 uF / 10V T3
- 10000 uF / 10V T4

TANSITOR
ELECTRONICS, INC.

SuperTan®
DESC 93026
Internal Capacitor
System



“SuperTan’s” high performance is a result of an improved “cathode” technique. The use of an upgraded cathode in place of a formed cathode is a viable trade-off as very few applications require a continuous reverse voltage capability.

Wet Tantalum: Molded Case, Surface Mount

液钽：模塑，表面贴装

Industry First!

Molded 135D & ST Series Hermetic Seal, Tantalum Case Capacitors

Commercial Series: M35 – Standard Values (135D capacitors)

Capacitance Range: 1.7 μ F to 330 μ F

Commercial Series: M34 – Extended Range Values (ST capacitors)

Capacitance Range: 10 μ F to 470 μ F

Operating Temperature: -55°C to +125°C

Voltage Range: 6 to 125V_{DC}

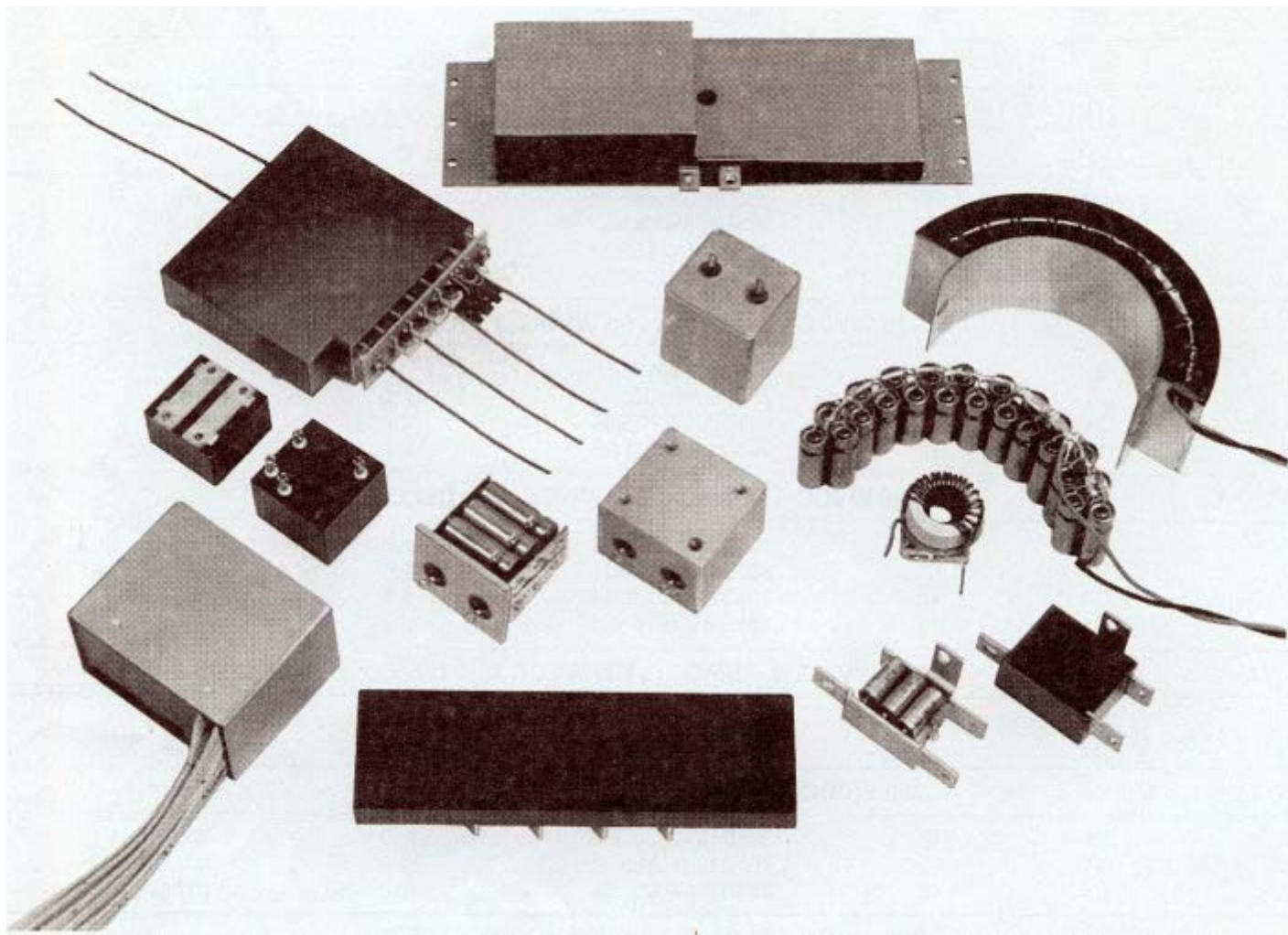
Case Size: C (T1 Case Size Values)

Failure Rate: Non-ER



CUSTOM DESIGN COMPONENT ASSEMBLIES

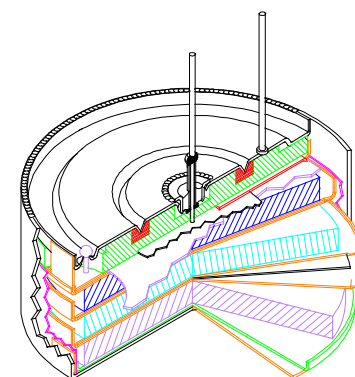
定制设计的元器件组件



HE3 High Energy Capacitor Military DSCC 10011

HE3高能电容器 军用 DSCC 10011

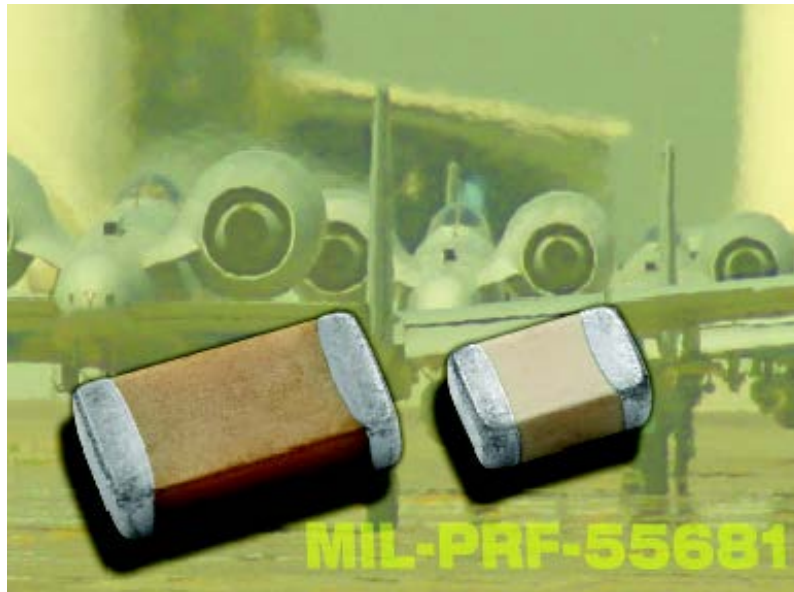
- **Voltage Range: 10V to 125V**
电压范围: 10 V~125 V
- **Cap. Range: 3,300uF to 150,000uF**
容值范围: 3,300 μ F~150,000 μ F
- **Op. Temperature Range: -55C to +85C**
工作温度范围: -55 $^{\circ}$ C~+85 $^{\circ}$ C
- **Case Size: A/B/C (35.56mm D)**
外壳尺寸: A/B/C (35.56mm 直径)
- **Ratings 等级**
 - 54,000 uF / 25V
 - 72,000 uF / 25V
- **24,000uF/ 50V**
 - 8,200 uF/ 80V
 - 3,300 uF/125V





One of the World's Largest
Manufacturers
of Discrete Semiconductors and Passive Components

(MLCC) Multi-layer Ceramic Chip Capacitors 多层陶瓷贴片电容器

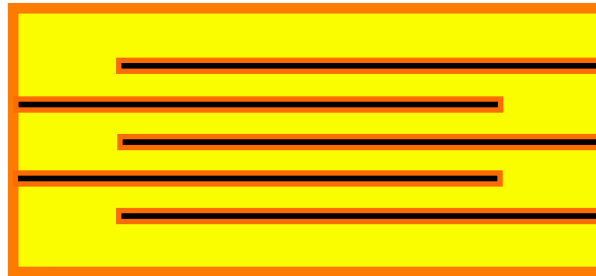


WET VS. DRY PROCESS

液态工艺与干式工艺的比较

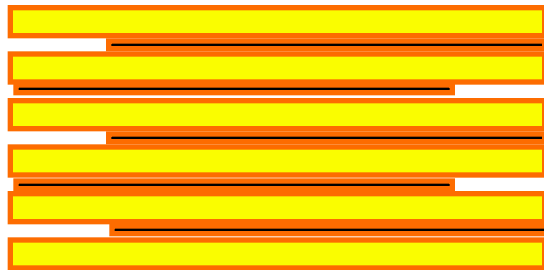
VITRAMON WET PROCESS VITRAMON 液态陶瓷工艺

The Ceramic flows in all "corners" and is forming a homogenous monolithic body
 陶瓷粉末充满了所有边角，形成了同质的一体结构

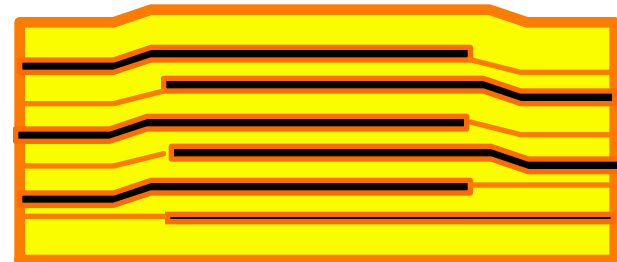


BC Components DRY SHEET PROCESS BC的干片工艺

Before Lamination 迭片前



After Lamination 迭片后

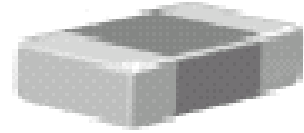


Ceramic Product Summary 陶瓷电容器总结

- Multi-layer Ceramic Chip Capacitors (MLCC)
多层陶瓷贴片电容器(MLCC)
 - MIL-PRF-556871
 - CDR01
 - CDR02
 - CDR03
 - CDR04
 - CDR06
 - CDR31
 - CDR32
 - CDR33
 - CDR34
 - CDR35
 - DSCC (Defense Supply Center-Columbus)
 - DSCC03028
 - DSCC03029
 - DSCC05001
 - DSCC05002
 - DSCC05003
 - DSCC05006
 - DSCC05007
 - Hi-REL COTS
 - COG
 - X7R

Description – CDR

Multi-layer Ceramic Chip Capacitor
多层陶瓷贴片电容器



MIL-PRF-55681/01 Style CDR01-04

MIL-PRF-55681/03 Style CDR06

MIL-PRF-55681/07-11 Style CDR31-35

Capacitance range 容值范围: 0.1pF ~ 0.47 μ F

Voltage rating 电压等级: 50 & 100 Vdc

Operating Temperature 工作温度: -55 $^{\circ}$ C ~ +125 $^{\circ}$ C

Failure Rates 失效率: M, P, R & S

Case size: 1 per each MIL style

0805, 1206, 1210, 1812, 1825

Terminations: (M) Palladium silver 钯银

(U) Tin/lead solder coated 锡/铅焊料涂层

(W) Nickel barrier w/tin plate 带锡板的镍栅栏

(Y) Nickel barrier w/100% tin plate 带完整锡板的镍栅栏

(Z) Nickel barrier w/tin-lead plate 带镀锡板的镍栅栏

CDR Styles vs. Sizes

CDR类型与尺寸

- **CDR31 = 0805**
- **CDR32 = 1206**
- **CDR33 = 1210**
- **CDR34 = 1812**
- **CDR35 = 1825**
- **BX= X7R BP= NPO**

New Ceramic Products

新款陶瓷电容产品

- **Seven (7) US Defense Supply Center (DSCC) Drawings have been issued for BP, BX, BR dielectrics**
第七版美国国防供应中心(DSCC)图纸中引入了BP、BX和BR电介质
 - **DSCC 03028 - 0603 size**
 - **DSCC 03029 - 0402 size**
 - **DSCC 05006 - 0805 size, extended capacitance values**
 - **DSCC 05007 - 1206 size, extended capacitance values**

 - **DSCC 05001 - 0805, high frequency, BP**
 - **DSCC 05002 - 0603, high frequency, BP**
 - **DSCC 05003 - 0402, high frequency, BP**

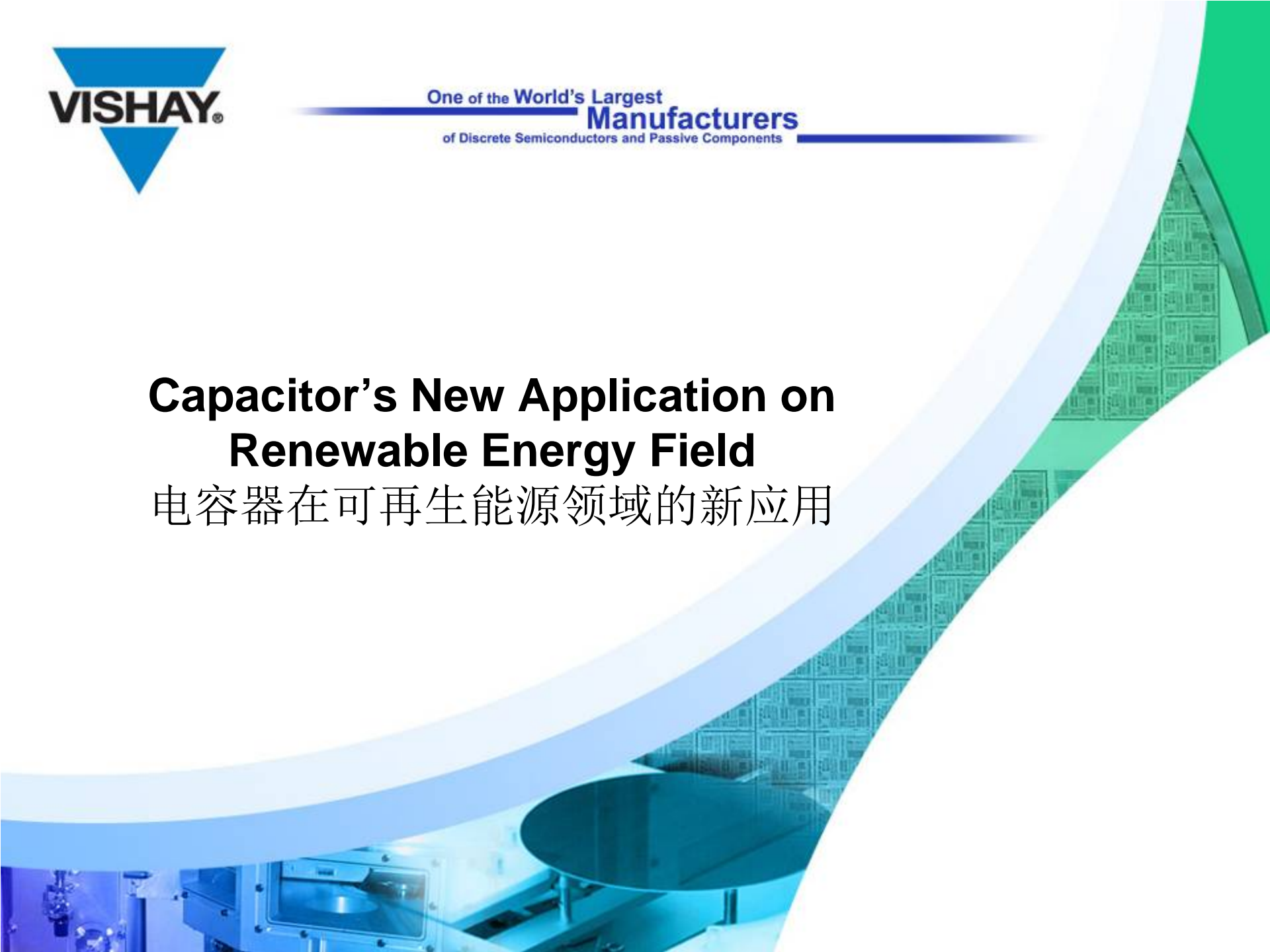
- **Two Vishay HiRel COTS series have been introduced**
Vishay推出了两个HiRel COTS系列
 - **Hi Rel COTS COG**
 - **Hi Rel COTS X7R**



One of the World's Largest
Manufacturers
of Discrete Semiconductors and Passive Components

Capacitor's New Application on Renewable Energy Field

电容器在可再生能源领域的新应用



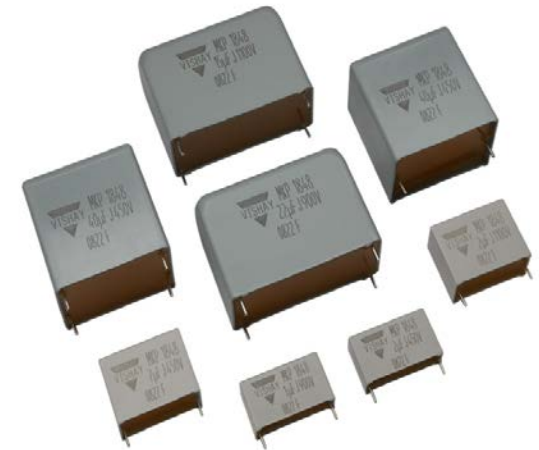
Applications DC Links

DC Link电容器的应用

The most important applications for DC link is to support a DC network by supplying periodically high currents for DC and AC motor drives. We can divide the DC applications into three main fields:

DC link的最重要应用是为交流和直流电机驱动提供周期性的高电流，从而支持直流网络。我们可以把直流应用分成三个主要领域：

- Industrial: renewable energy, motor drives, UPS and welders;
工业：可再生能源，电机驱动，UPS和电焊机
- Automotive: inverters for hybrid and electrical vehicles (HEV);
汽车：混合动力和电动汽车(HEV)的逆变器
- Train: inverters for auxiliary equipments;
火车：辅助设备的逆变器



All of them profoundly rely on better management of the energy conversion.
所有这些应用都极大地依赖更好的能量转换管理

High reliability, withstanding tough ambient conditions, and long expected life are just a few targets of the technical innovations today.

高可靠性，可承受苛刻的环境条件和长预期寿命正是当今技术创新的几个目标。



Industrial DC link Capacitor MKP1848

工业用DC link电容器MKP1848

Construction: 结构

MKP (Metallized Polypropylene Film)
金属化的聚丙烯薄膜

2 or 4 pins, (6 or 12 for the big C-values)
2个或4个引脚(大容量型号具有6个或12个引脚)

Application: 应用

DC-Filtering applications
直流滤波应用

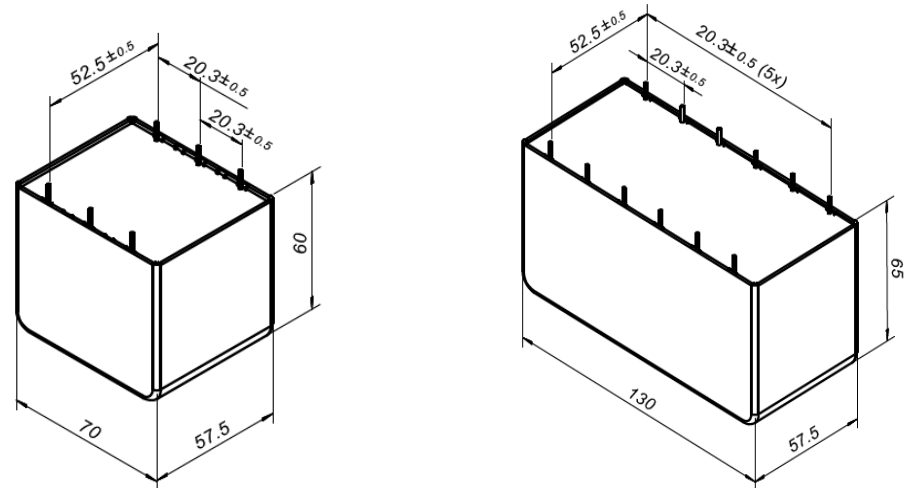
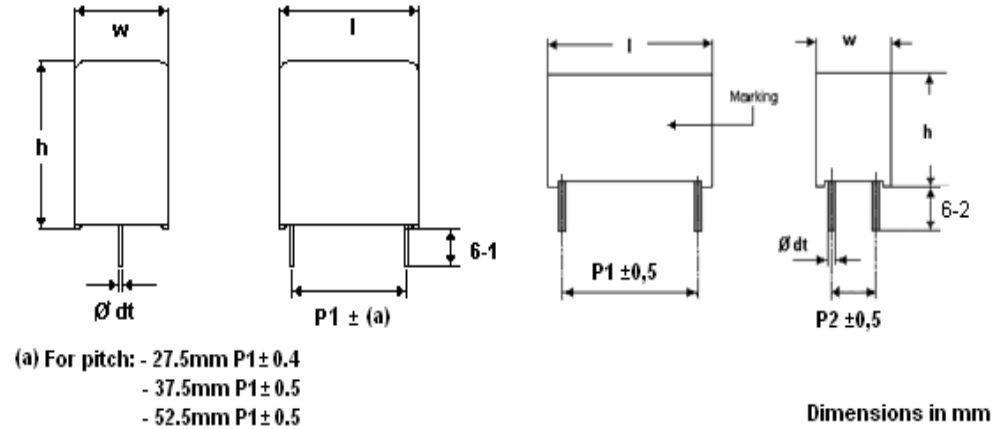
Motor drives, Windmills, Solar Panels
电机驱动, 风力发电机, 太阳能电池板

Parameter: 参数

| | |
|----------|-----------------|
| Undc: 耐压 | Cap range 容值范围 |
| 450VDC | 1...400 μ F |
| 700VDC | 1...320 μ F |
| 900VDC | 1...100 μ F |
| 1100VDC | 1...60 μ F |
| 1200VDC | 1...60 μ F |

Pcm= 27,5...52,5mm

Rated temperature 额定温度: 105° C

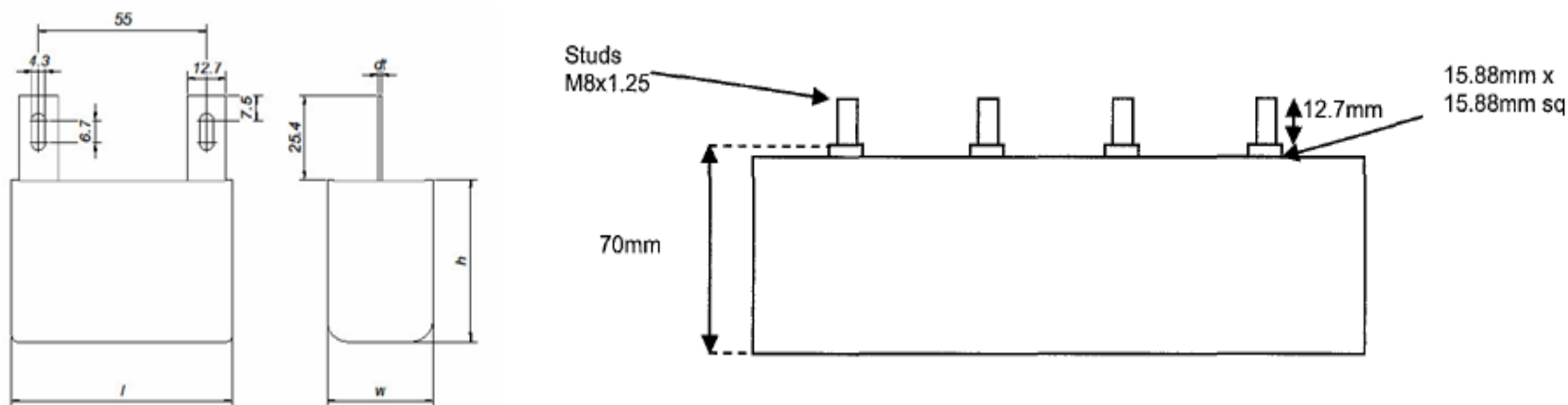


Industrial DC link Capacitor MKP1848

工业用DC link电容器MKP1848

Key benefits 主要优点

- High rms current capabilities up to 1Arms/ μ F 高达1Arms/ μ F的等效电流性能
- Overvoltage withstanding up to 1.3 times the rated voltage (1min/day) 可承受1.3倍额定电压的过压
- Handle a reverse voltage 可处理反向电压
- High peak current capabilities (dv/dt) 高峰值电流(dv/dt)
- Low ESL 低ESL
- No electrolyte inside 内部无电解质
- Long lifetime (no drying out) 长寿命(不会干涸)
- Pitch 27,5mm - 52,5mm and customized solutions 节距27,5mm – 52,5mm和定制方案



Industrial DC link Capacitor MKP1849

工业用DC link电容器MKP1849

Application: 应用

DC-Filtering applications 直流滤波应用

1MW/1.5MW/2MW/2.5MW or above Windmills
1MW/1.5MW/2MW/2.5MW或以上的风力发电机

Terminations: 端接

Tinned Embedded Bus Bar or Screw Connections
镀锡的内嵌式总线或用螺丝连接

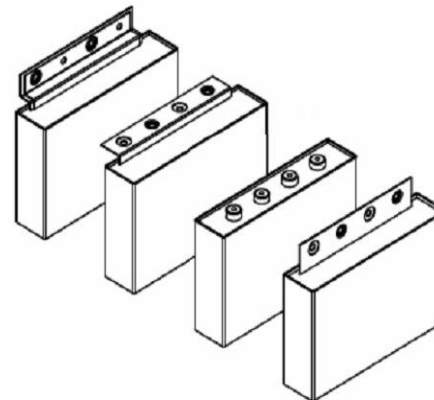
Parameter: 参数

Undc: 耐压

450VDC
575VDC
700VDC
800VDC
900VDC
1100VDC
1200VDC

Cap range 容值范围

500...6000 μ F
500...6000 μ F
500...6000 μ F
500...6000 μ F
500...6000 μ F
500...4000 μ F
500...4000 μ F



Snubber capacitors for industrial applications

工业应用的缓冲电容器



BFC2386 - MKP386M

Why using a snubber? 为什么要使用缓冲器?

- reduce or eliminate voltage or current spikes
减少或消除电压或电流尖峰
- limit dv/dt or di/dt
限制 dv/dt 或 di/dt
- keep the load in the safe operating area (SOA)
使负载处于安全工作区(SOA)
- reduce EMI by clamping voltage and current ringing
钳位电压和电流振荡，减少EMI
- reduce the total losses due to switching
减少由开关引起的总损耗

Ideal snubber capacitor

理想的缓冲电容器

The most important criteria are: 最重要的标准是

- Low self inductance
低自感
- Low ESR (equivalent serie resistance)
低ESR(等效串联电阻)
- High pulse load capability (dv/dt)
高脉冲负载能力(dv/dt)
- low loss factor (tg delta)
低损耗因数(tg delta)

386/386M snubber features: 386/386M 缓冲电容器的特性

- Low loss polypropylene design
低损耗的聚丙烯设计
- Low self inductance achieved by end-surface contacting
用横切面接触实现低自感
- High pulse load capability due to double sided metallization or wave cute
在一侧镀双倍金属或波状造型达到高脉冲负载性能
- High voltage / overvoltage strength
很高的电压/过压强度
- Different connection configurations
不同的连接配置

Solar Energy (PV Grid-Connected Inverters)

太阳能(接入电网的光伏逆变器)

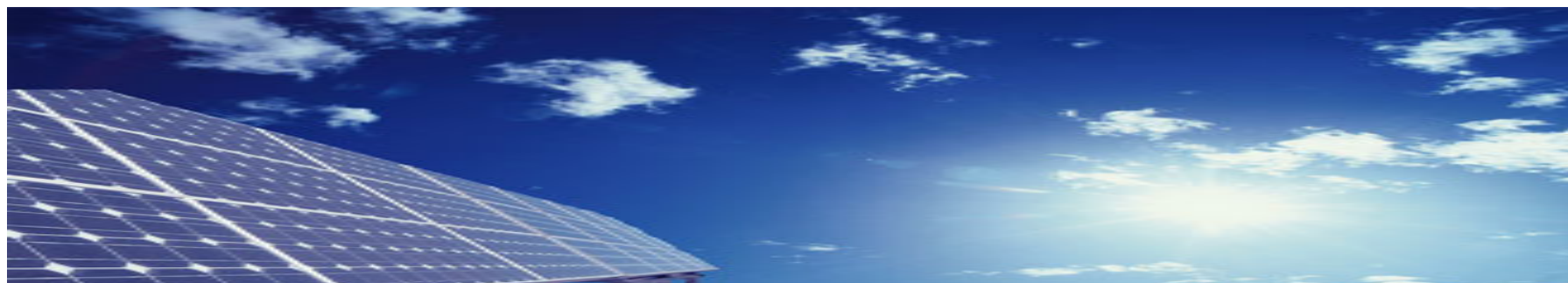
- String Inverters (Professional >10KW)
成串的逆变器(专业级 >10KW)
- Power Plant Inverters (Professional >300KW)
发电厂逆变器(专业级 >300KW)



Application Note for Solar Inverters

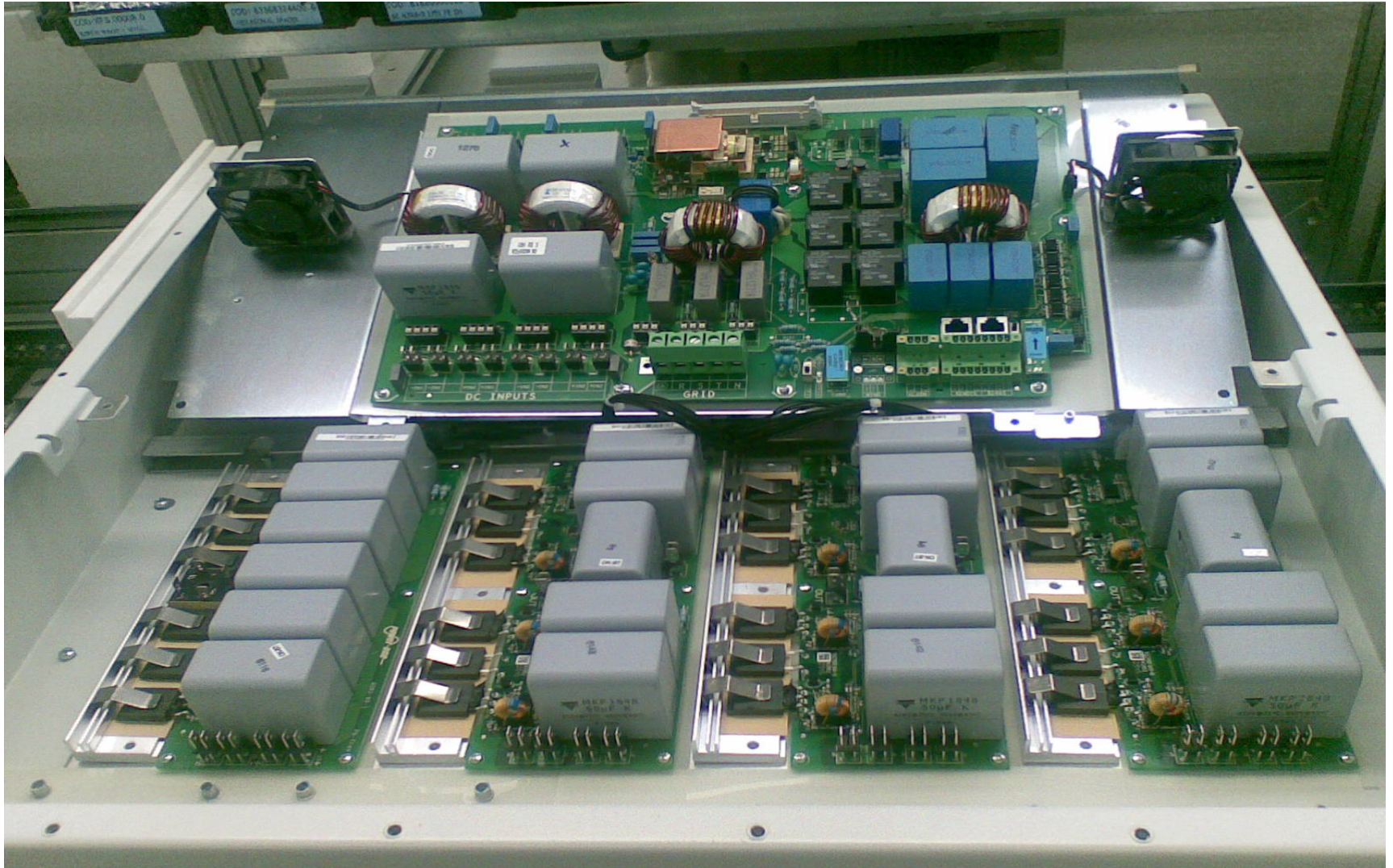
太阳能逆变器的应用要点

| Capacitor 电容器 | Type 类型 | Function 功能 | Family 系列 | Comments 说明 |
|------------------|----------------|---------------------------|----------------|---|
| Film 薄膜 | RFI | X1 | 338 4 (440Vac) | |
| Film 薄膜 | RFI | X2 | 339 (310Vac) | |
| Cer 陶瓷 | RFI | Y1/Y2 | VY1/VY2 | |
| Film 薄膜 | DC-Link | DC + Ripple 直流+纹波 | MKP1848 | Applied for String Type 用于成逆变器 |
| Film 薄膜 | DC-Link | DC + Ripple | MKP1849/ESTA | Applied for Power Plant Type 用于发电厂型逆变器 |
| Film 薄膜 | Snubber 缓冲器 | IGBT Protecting 保护IGBT | 386M | Could be covered by part of DC-Link's function in the future 未来可用DC-Link的部分功能来实现 |



Application Note for Solar Inverters

太阳能电池逆变器的应用要点



Industrial Windmills: Opportunity (Professional > 1MW)

工业级风力发电机: 机遇(专业级>1MW)

1MW or above Windmills: 1MW或以上的风力发电机

Popular IGBT in the market: Semikron 2403GB172 (2400A)

市场上常见的IGBT: Semikron 2403GB172 (2400A)

Al Capacitor Request: 1200Vdc+/20000uF

对铝电容器的要求: 1200Vdc+/20000uF

Film DC-Link Capacitor: 1200Vdc+/2000~3000uF (Life over 20 years)

薄膜DC-Link电容器: 1200Vdc+/2000~3000uF (寿命超过20年)

Snubber Capacitor: 1600Vdc/0.47uF/10% on each terminal

缓冲电容器: 1600Vdc/0.47uF/10%, 在每个接头上

Film Caps Advantages against Aluminum Capacitors

薄膜电容器比铝电容器具有更多的优点

Much Longer expected life (>15 years);

预期寿命要长得多(>15年)

Lower dissipation / higher ripple current;

更低的发热/更高的纹波电流

Better stability vs. time of capacitance value and lower ESR;

更好的稳定性, 容值保持长时间稳定, 更低的ESR

Lower losses and better conversion efficiency

更低的损耗和更高的转换效率



Brief Introduction of MKP386M447160JT0

MKP386M447160JT0的简介

Special designed for Semikron 2403GB172

针对Semikron 2403GB172而特别设计

High Low Leads Termination Design to fit IGBT

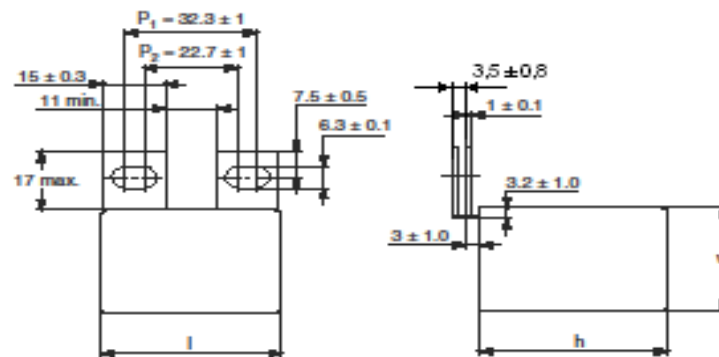
为适应IGBT，采用高低引线端接设计

Few Players: WIMA/CDE/Vishay

仅几家供应商: WIMA/CDE/Vishay

Usage: around 40pcs per IGBT

用量:每个IGBT约使用40片



Electrical Vehicles (E Drive)

电动汽车(E Drive)

- E Car Mini (30KW+)
- E Car (60KW+)
- E Bus (120KW+)



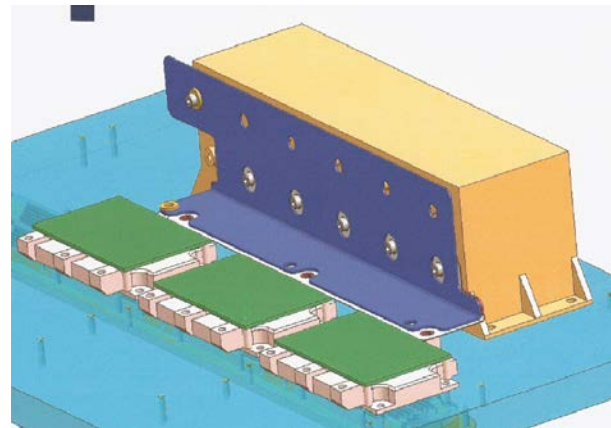
Application Note for E Drive (Reference)

电动汽车的应用要点(参考)

- **30KW E Drive Design** 30KW电动汽车
 - **IGBT Solution: Infineon HybridPACK**
IGBT方案: Infineon HybridPACK 1
 - **MKP1849/450/300uF/10%**
 - **Dimensions: 140*85*45mm**
尺寸: 140*85*45mm

- **60KW E Drive Design** 60 KW电动汽车
 - **IGBT Solution: Infineon HybridPACK 2**
IGBT方案: Infineon HybridPACK 2
 - **MKP1849/550Vdc/820uF/10%**
 - **Dimensions: 237*85*65mm**
尺寸: 237*85*65mm

- **100KW E Drive Design** 100 KW电动汽车
 - **IGBT Solution: Infineon PrimePACK 3**
IGBT方案: Infineon PrimePACK 3
 - **MKP1849/900Vdc/1000uF/10%**
 - **Dimensions: 270*120*85mm**
尺寸: 270*120*85mm



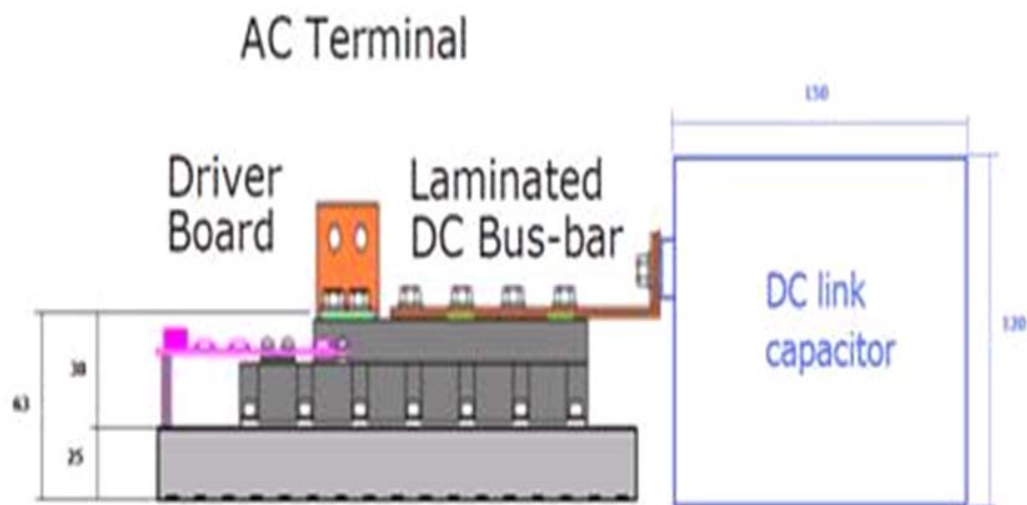
Note

- **In the application of E Drive, MKP1849 cover the function of both DC-Link and Snubber Capacitor**
在电动汽车中, MKP1849涵盖DC-Link和缓冲电容器两种功能

- **Mostly Customized Item**
主要的定制部件

MKP1849/1000 μ F / 900V_{DC} Solution for 130 KW E Drive

用于 130 KW 电动汽车的 MKP1849/1000 μ F / 900V_{DC} 解决方案



Infineon HybridPACK1 Solutions

Infineon的HybridPACK1方案



QUESTIONS



Vishay Component Technology

Vishay的元器件技术

Leading the Industry in Design Innovation

创新的设计，行业的先锋