



a YAGEO company

R53B X2 Sales Presentation

R53B X2

EMI Suppression Capacitor

- Rated 350 VAC / 800 VDC
- Parallel Construction
- High Temperature
- Harsh Environment



Overview



Key Benefits



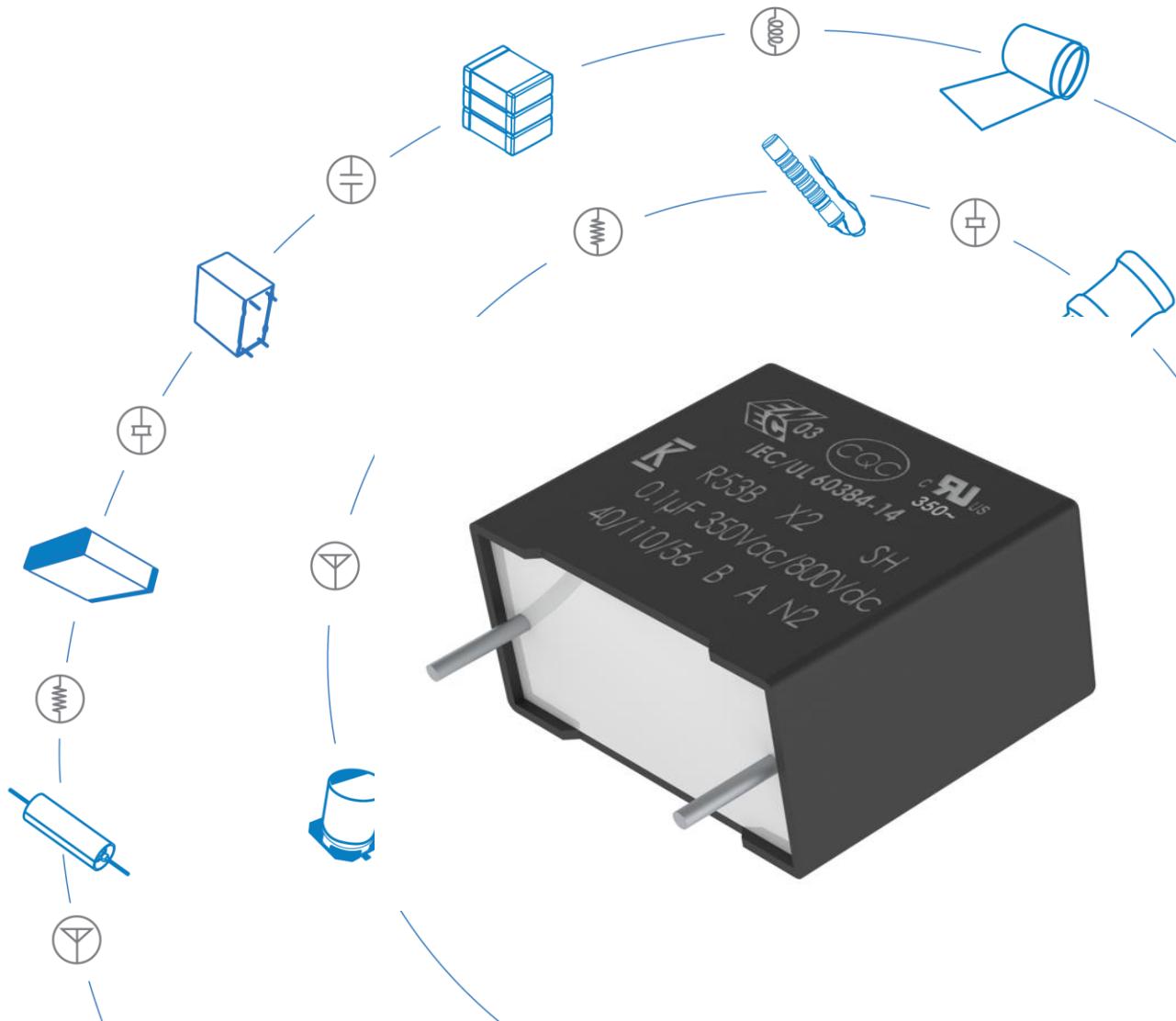
Applications



Versus Competition



Resources



R53B Overview



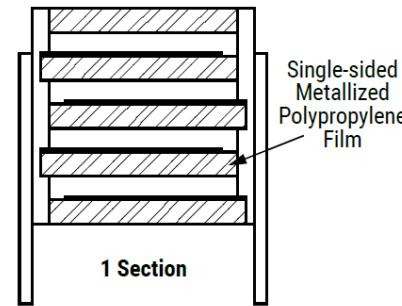
- First to Market X2 MKP technology in terms of combined:



- Harsh environment performance
- High DC voltage capability
- High operating temperature (125 °C)**
- Rated 350 VAC / 800 VDC**

- Cap. Range: 0.068 μ F – **20 μ F**
- Voltage Nominal: 350 V AC | 800 V DC
- Automotive Grade (AEC-Q200)
- Low Halogen Content (JS709C)
- Max. Operational Temperature and Extended Life: 125 °C | 1,000 h (rated voltage)
- Harsh Environment Capability (Temp.|Humidity|Bias Accel. Life Test):
 - 85°C | 85% R.H. | 1,000 h | 350 VAC | 800 VDC (Grade IIIB per IEC)

Internal parallel construction



Lead Space (mm)	Min. C (μ F)	Max. C (μ F)
15	0.068	0.47
22.5	0.22	1.0
27.5	0.82	3.9
37.5	4.7	10
52.5	15	20



Automotive

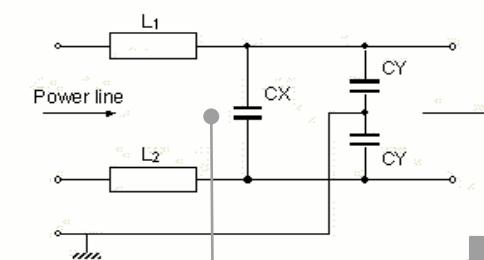


Industrial



Energy

Across-the-Line EMI X2



R53B X2

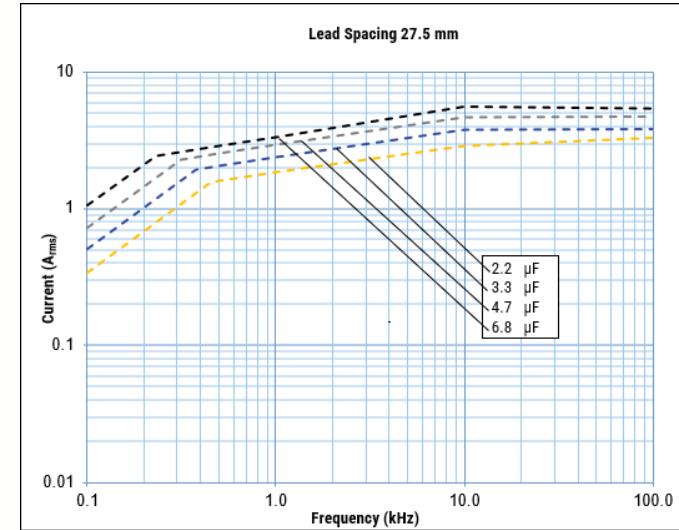
R53B Overview



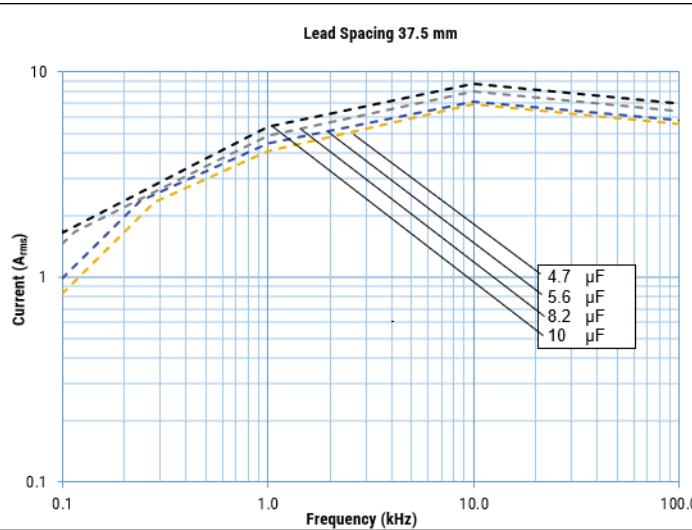
- Comparison between R53B and R53, Class X2, Grade-III B series

Series Name	R53	R53B
AC DC Voltage (V)	310 630	350 800
EMI Class Type	X2	
Harsh Environment	85 °C 85% R.H.	
(THB Accel. Life Test)	310 VAC 1000 h 560 VDC 1,000 h	350 VAC 1,000 h 800 VDC 1,000 h
Cap Range	0.1 µF – 22 µF	0.068 µF – 20 µF
Lead Space (pitch) (mm)	15 to 37.5	15.0 to 52.5
Dielectric	MKP	
AEC-Q200	Yes	
Max. Temp (°C)	110	125
Life at 125 °C	-	1,000 h
Dimensions (mm) (4.7 µF)	16 x 30 x 32	20 x 40 x 42
Current Capability (4.7 µF)	4.62 A at 10 kHz	6.94 A at 10 kHz

R53 Current Capability



R53B Current Capability



R53B Key Benefits



Harsh Environment Performance At Rated Voltage and Smallest Lead Space

R53B is the unique and best solution for applications where the smallest lead spacing, volume (mm^3), and best THB Performance are vital for the electronics designs at the rated voltage.

Example of dimensions and performance of R53B versus the competition for a 0.47 μF X2 EMI solution

Brand Series	Lead Space	Dimensions T,H,L (mm)	Volume (mm^3)	Volume Diff. (%)	Rated Voltage (AC/DC)	Harsh Environment
KEMET R53B	15	11 x 19 x 18	3,762	--	350 / 800	Yes
TDK B32924	27.5	11 x 19 x 31.5	6,583	+ 75%	350 / 650	Yes
FARA C4B(W/V)	22.5	9 x 18.5 x 26.5	4,412	+ 17%	350 / 630	Yes*

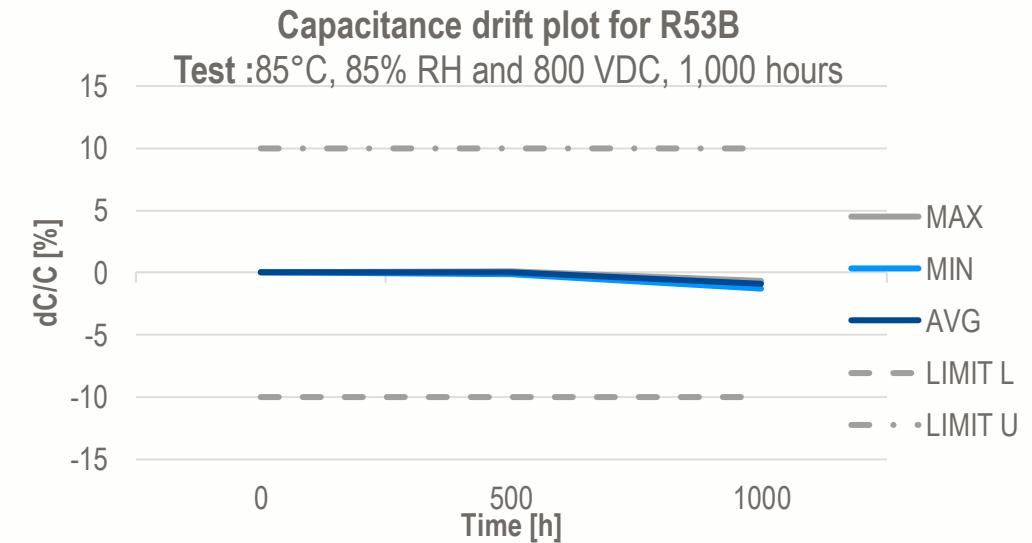
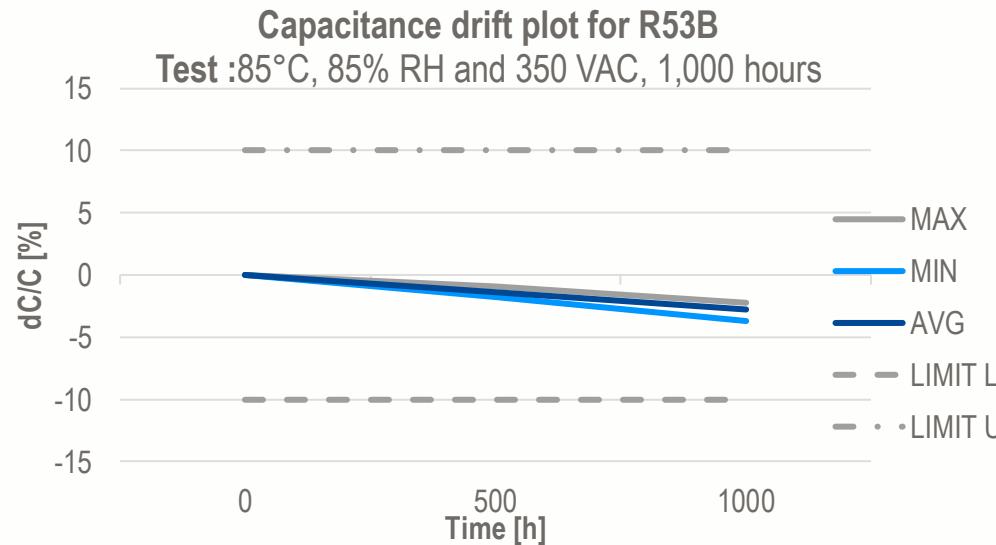
* The FARA series is only for $C>0.47 \mu\text{F}$

R53B Key Benefits



Harsh environment Capability - Accelerated Life Test Under Temperature | Humidity | Bias

- 85°C | 85% R.H. | AC Bias: 350 V | DC Bias: 800 V | 1,000 h | Capacitance Drift ($\Delta C/C$) Limits: $\pm 10\%$



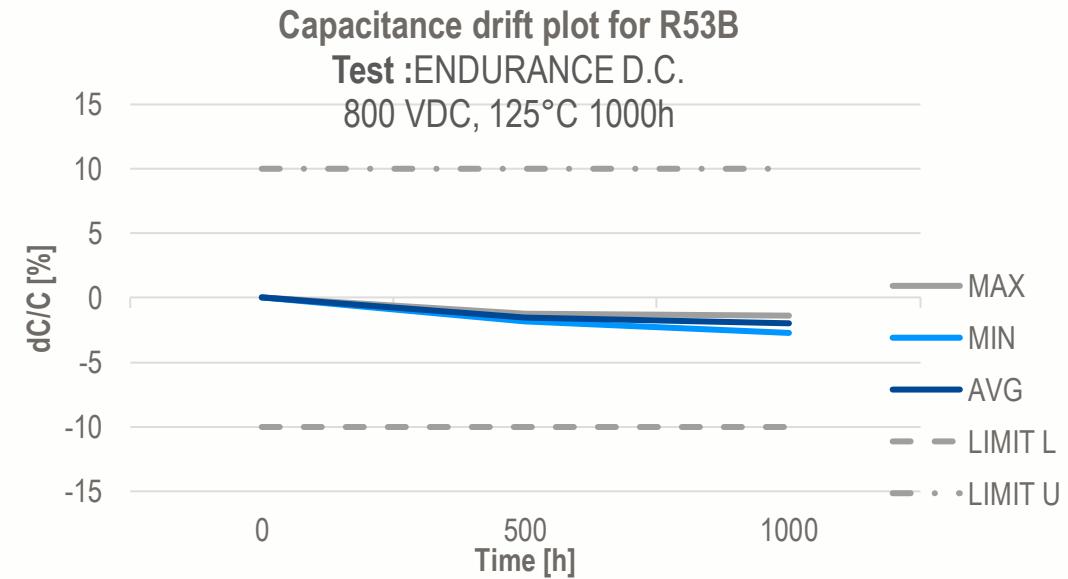
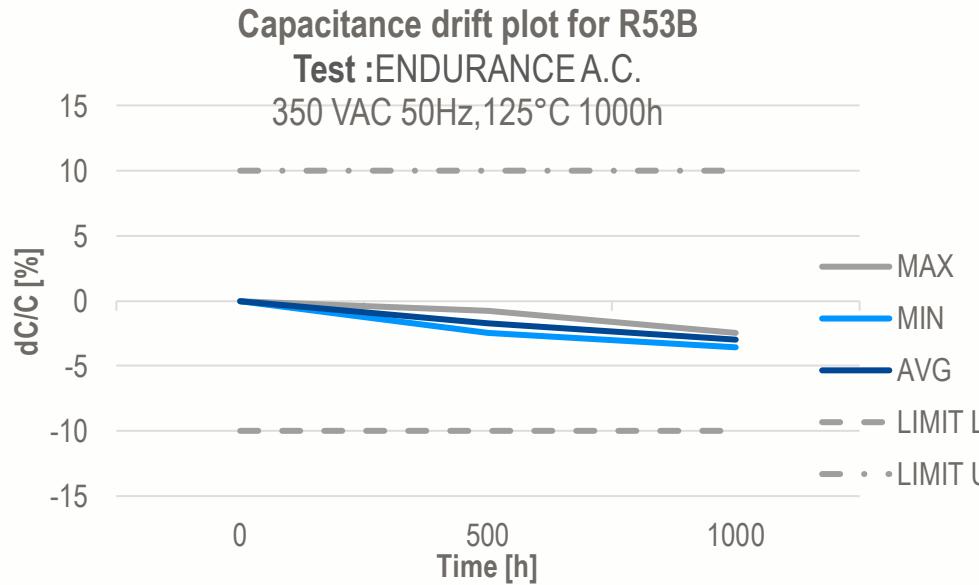
R53B is the only robust EMI X2 technology in the market that offers the smallest lead spacing solution combined with an excellent harsh environment capability in rated AC and DC voltages

R53B Key Benefits



High Temperature Capability

- VAC: 350 V | VDC: 800 V | Temperature: 125 °C | 1,000 h | Capacitance Drift Limits: $\pm 10\%$



R53B Series is the first to market X2 EMI Suppression solution capable of reaching an extended service life up to 1,000 hours when exposed to an operating temperature of up to 125 °C.

R53B Applications



Automotive



HV DC/DC and DC/AC Converters

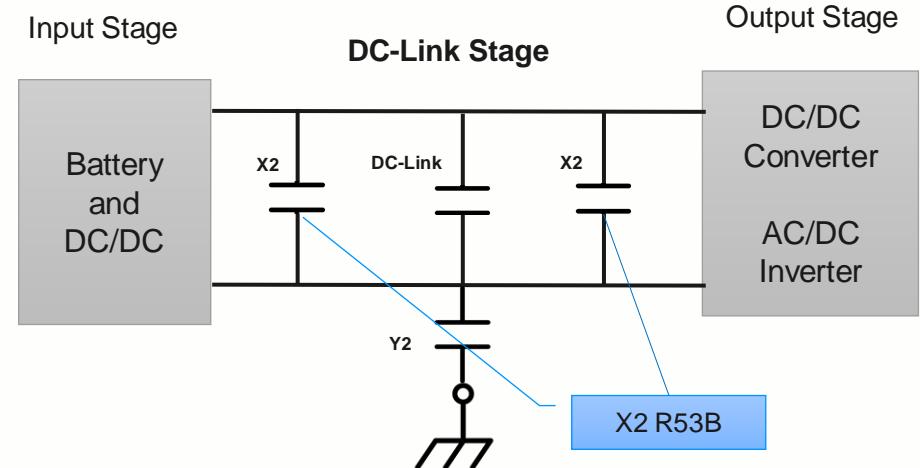
- 800 VDC

Automotive application in the HV filter and HV bus has the rated voltage of 800V, max. will be 1000V.



R53B is an AEC-Q200 qualified capacitor with up to 1,000 VDC capability under extremely high temperature and humidity conditions, and its Hipot test qualifications are up to 2 kV peak.

These features perfectly fit the demanding HV automotive battery systems and traction Inverters for Hybrid and Electric Vehicles.



R53B Applications

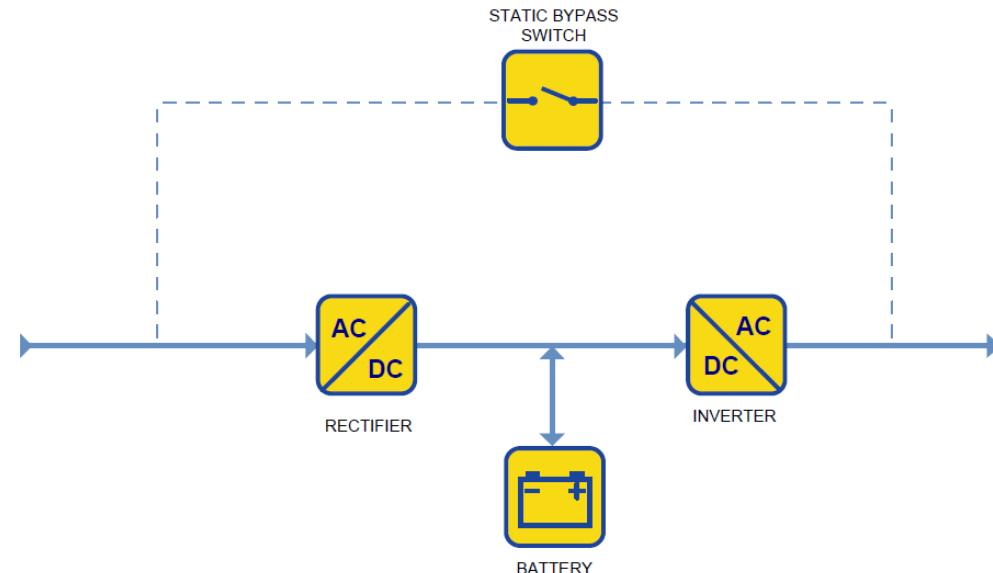


Industrial



3-Phase UPS

R53B high temperature 125 °C, Rated voltage 350 VAC/800 VDC, and high reliability perfectly match the high demanding specifications of the industrial UPS required for the Industrial process, Datacenter and Critical infrastructure.



R53B Applications

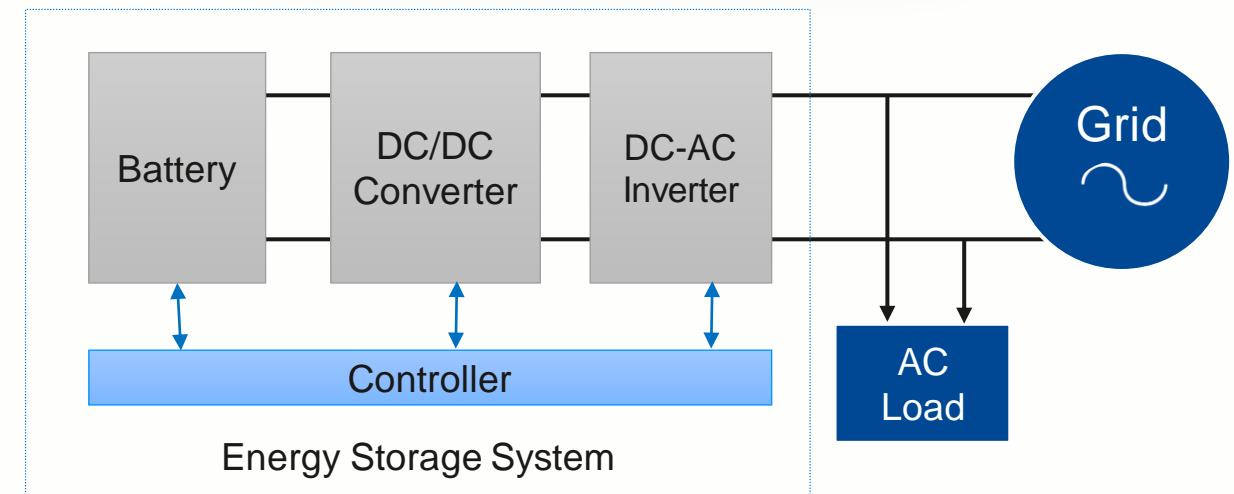


Energy



Battery Energy Systems for Solar Inverters and DC/DC Charging Systems

Thanks to its small lead spacing, Rated 800 VDC and 350 VAC voltage, and its extended reliability in harsh environmental conditions, R53B is the perfect EMI solution for energy storage systems that require multiple X2 capacitors on their DC/DC and DC/AC converters boards.

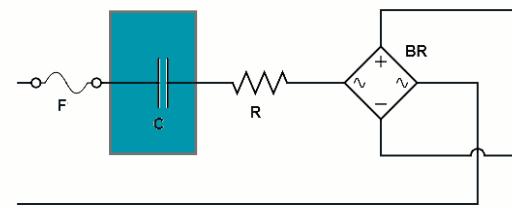


R53B Applications



Smart Utility Meter

- Capacitive PS on E-Meter
- THB with Grade IIIB compliance for long life stability and reliability under harsh environments.
- High Reliability/Lifetime



In Series with the Main

Industrial & Energy



Reliability at AC Voltage

Temperature(°C)	Voltage Ratio (Vac)	Lifetime Khrs [DeltaC=-20%]
85	250	150
	305	150
	330	115
	350	70

R53B versus Competition



Series Name	R53B	B32924*4...B32928*4	C4B (W/V)
AC DC Voltage (V)	350 800	350 650	350 630
EMI Class Type	X2	X2	X2
	85 °C 85% R.H.	85 °C 85% R.H.	85 °C 85% R.H.
Harsh Environment (THB Accel. Life Test)	350 VAC 1,000 h 800 VDC 1,000 h	330 VAC 1000 h Not VDC tested	300 VAC 1000 h Not VDC tested
Cap Range	0.068 µF – 20 µF	0.47 µF – 20 µF	0.1 µF – 20 µF
Lead Space (pitch) (mm)	15.0 to 52.5	27.5 to 52.5	15.0 to 52.5
Dielectric	MKP	MKP	MKP
AEC-Q200	Yes	Yes	No
Max. Temp (°C)	125	110	110
Life at 125 °C	1,000 h	N/A	N/A

R53B X2 capacitors offer the best combined performance in terms of **Lead Space**, **harsh environment**, **high-temperature** and **reliability** in the electronic marketplace.

Frequently Asked Questions

Q: What is the R53B series?

A: The R53B is an X2 Suppression capacitor series constructed of metallized polypropylene film encapsulated with self-extinguishing resin in a box of material that meets the requirements of UL 94 V-0. The R53B series is ideal for harsh environmental conditions and meets the demanding Automotive Electronics Council's AEC-Q200 qualification requirements. And it is THB Grade-IIIB series with high operating temperature (125 °C) and high rated voltage (350 VAC/800 VDC).

Q: What capacitance range is available?

A: 0.068 µF – 20 µF.

Q: What is the part number system of R53B?

A: The structure of the R53B is as follows:

R53	B	I	3100	00	0	0	M	C-Spec
Series	Rated Voltage (VAC)	Lead Spacing (mm)	Capacitance Code (pF)	Packaging	Internal Use	Internal Use	Capacitance Tolerance	(optional)
X2, Metallized Polypropylene	B = 350	I = 15.0 N = 22.5 R = 27.5 W = 37.5 Y = 52.5	The last three digits represent significant figures. The first digit specifies number of zeros to be added.	See Ordering Options Table	0 = Internal Parallel Construction	0 = Internal Use	K = ±10% M = ±20%	blank = standard V103 = 4 pins, S = 37.5mm, S1 = 10.2mm V104 = 4 pins, S = 37.5mm, S1 = 20.3mm

Frequently Asked Questions

Q: What are typical applications associated with the R53B series?

A: Typical applications are the EMI filter stage (across the main/series with the main) in the 3-phase UPS, Smart Meter, Energy Storage and inverters, which needs high THB performance (Grade-IIIB); R53B can also be used in automotive applications such as the HVDC EMI filters where 800 VDC required.

Q: What are typical Lifetime estimated for different application conditions with the R53B series?

A: Here we summarize in the table for this Lifetime estimated in AC and DC voltage applications.

- Reliability at AC Voltages

Temperature(°C)	Voltage Ratio (Vac)	Lifetime Khrs [DeltaC=-20%]
85	250	150
	305	150
	330	115
	350	70

- Reliability at DC Voltage VR - Operation life 100,000 hours at 85°C , 1,000 hours at 125°C in parallel construction

R53B Resources



- Datasheet: https://content.kemet.com/datasheets/KEM_F3131_R53B_X2_350.pdf
- Film Sales Hub: [EMI Suppression Capacitors – R53B](#)
 - Datasheet
 - Sales Presentation and FAQ
 - Product Brief
 - EMI Selection Guideline
 - EMI Family Chart
- Simulation Tools:
 - K-SIM: <https://ksim3.kemet.com/capacitor-simulation>
 - KLEM: <https://ksim3.kemet.com/film-lifetime>

For More Information and Support, Contact:

- Your Local Technical Product Manager, Film Capacitors.
- Technical Product Manager (EMI Film Technology):
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- Film BU Marketing and Design Tools Product Manager:
Jovana Stojanovska (Jovana.Stojanovska@yageo.com)

