

Snubber Design Guidelines

This SiC FET user guide presents practical solutions and guidelines for using RC snubbers with fast switching SiC devices. The solution is verified by experimental double pulse tests (DPT) results. The snubber loss is precisely measured to assist users in computing the power rating of the snubber resistor. The beneficial impact of the snubber is analyzed for both hard switching and soft switching applications. An application note entitled "Switching fast SiC FETs with a snubber" complements this user guide and can be found at https://unitedsic.com/wp-content/uploads/2019/11/Snubber-AppNotes_V8.pdf

Basic assumptions:

1. Rgon: minimize Qrr to reduce Eon.
2. Rgoff: Small value gives better VGS waveform. UFK3S needs higher Rgoff to avoid oscillation. 0 is possible.
3. Cascode Rg has big impact on turn on didt while limited effect on dvdt.
4. dvdt is affected by snubber.

Guidelines:

Snubber Rule	UF3CxxxxyyK3S	UF3CxxxxyyK4S
Cs (>80m Rdson)	3xCoss(er)	2xCoss(er)
Cs (<30m Rdson)		Coss(er)
Rs (Ω)	5	10

Note: UJ3C show that having snubber Cs can reduce Eoff for soft switching, especially for PSFB.

BOM:

Cs (pF)	Series	Part Number	Package	Rated V
47	COG	202R18N470JV4E	1206	2000V
68		C1206C680JGGAC7800	1206	
100		202R18N101JV4E	1206	
150		C1206C151JGGAC7800	1206	
220		C1206C221JGGAC7800	1206	
330		C1210C331JGGACTU	1210	
680		C1808C681JGGAC7800	1808	

Note: "COG" ceramic capacitors are most stable.

Rs (Ω)	Power Rating (W)	Part Number	Package
4.7	0.25	KTR18EZPF4R70	1206
	0.5	SR1206FR-7W4R7L	1206
	1	CRCW20104R70JNEFHP	2010
	1.5	CRCW25124R70JNEGHP	2512
10	0.25	KTR18EZPF10R0	1206
	0.5	SR1206FR-7W10RL	1206
	1	CRCW201010R0JNEFHP	2010
	1.5	CRCW251210R0JNEGHP	2512

Notes:

1. For "KTR18" resistor is rated at 500V and the overload voltage is 1000V.
2. For "SR1206" resistor is rated at 200V, the overload voltage is 400V, the dielectric withstanding voltage is 500V.

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