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Description

The UF4SC120023K4S is a 1200V, 23mWG4 SiC FET. It is based on a unique 'cascode' circuit configuration, in which a normally-on SiC JFET is co-packaged with a Si MOSFET to produce a normally-off SiC FET device. The device's standard gate-drive characteristics allows for a true "drop-in replacement" to Si IGBTs, Si FETs, SiC MOSFETs or Si superjunction devices. Available in the TO-247-4L package, this device exhibits ultra-low gate charge and exceptional reverse recovery characteristics, making it ideal for switching inductive loads and any application requiring standard gate drive.

Features

- On-resistance $R_{DS(on)}$: 23mW(typ)
- Operating temperature: 175°C (max)
- Excellent reverse recovery: Q_{rr} = 341nC
- Low body diode V_{FSD}: 1.2V
- Low gate charge: Q_G = 37.8nC
- Threshold voltage $V_{G(th)}$: 4.8V (typ) allowing 0 to 15V drive
- Low intrinsic capacitance
- ESD protected: HBM class 2 and CDM class C3
- TO-247-4L package for faster switching, clean gate waveforms

Part Number	Package	Marking
UF4SC120023K4S	TO-247-4L	UF4SC120023K4S

Typical applications

- EV charging
- PV inverters
- Switch mode power supplies
- Power factor correction modules
- Motor drives
- Induction heating

Maximum Ratings

Parameter	Symbol	Test Conditions	Value	Units
Drain-source voltage	V_{DS}		1200	V
	V_{GS}	DC	-20 to +20	V
		AC (f > 1Hz)	-25 to +25	V
	I_D		53	A
	I_{DM}		204	A
	E_{AS}		126	mJ
	dv/dt		150	V/ns
	P_{tot}		385	W
	$T_{J,max}$		175	°C
	T_J, T_{STG}		-55 to 175	°C
	T_L		250	°C

1. Limited by bondwires
2. Pulse width t_p limited by $T_{J,max}$
3. Starting T_J = 25°C

Thermal Characteristics

Parameter	Symbol	Test Conditions	Value			Units
			Min	Typ	Max	
Thermal resistance, junction-to-case	R_q			0.3	0.39	°C/W

Electrical Characteristics (T_J = +25°C unless otherwise specified)

Typical Performance - Static

		Min	Typ	Max	Min	
BV_{DS}		1200				V
			2	60		
			20			
I						

Typical Performance Diagrams

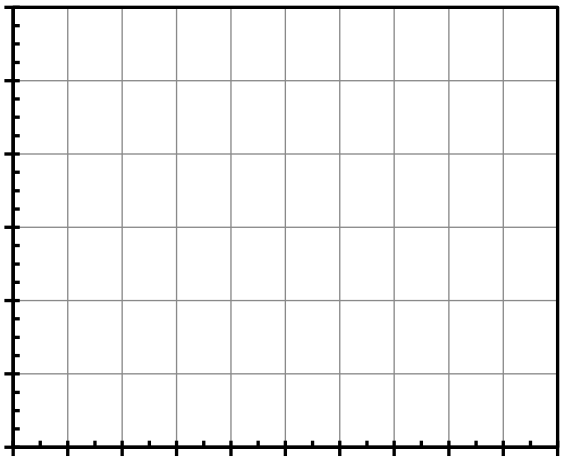

Figure 1. Typical output characteristics at T_J = - 55°C,

Figure 2. Typical output characteristics at T_J = 25°C,

Figure 3. Typical output characteristics at T_J = 175°C, tp < 250ms

Figure 4. Normalized on-resistance vs. temperature at V_{GS} = 12V and I_D = 40A

Figure 7. Threshold voltage vs. junction temperature at V_{DS} = 5V and I_D = 10mA

Figure 8. Typical gate charge at at V_{DS} = 800V I_D = 40A

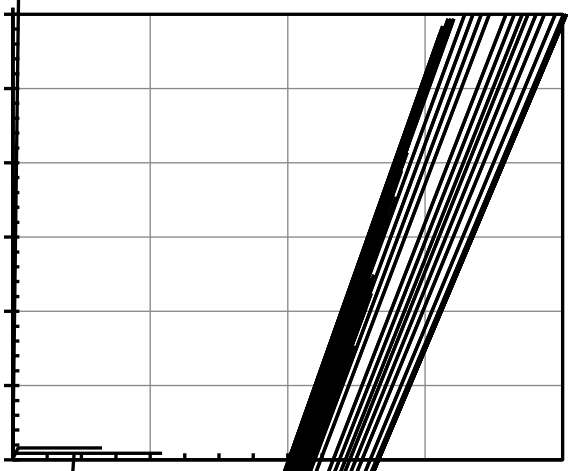

Figure 9. 3rd quadrant characteristics at T_J = -55°C

Figure 10. 3rd quadrant characteristics at T_J = 25°C

Figure 11. 3rd quadrant characteristics at T_J = 175°C

Figure 12. Typical stored energy in C_{OSS} at V_{GS} = 0V

Figure 17. Safe operation area at T_C = 25°C, D = 0, Parameter t_p

Figure 18. Reve rr vs. junct temperature at

0

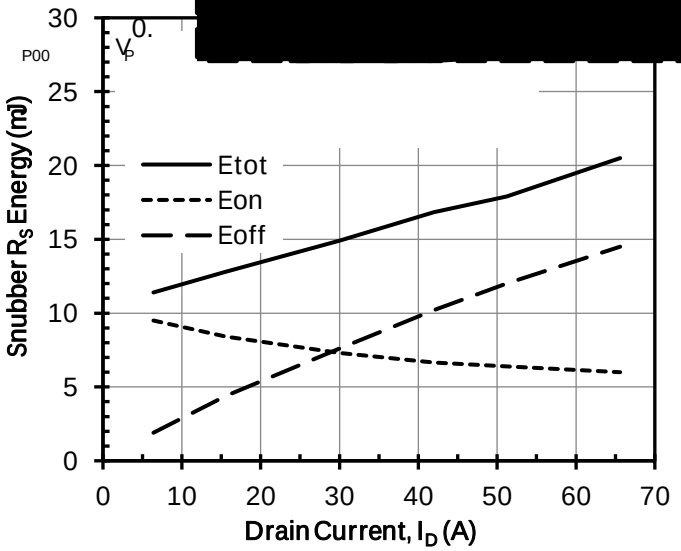

Figure 19. Clamped inductive switching energy vs. drain current at V_{DS} = 800V and T_J = 25°C

Figure 20. RC snubber energy loss vs. drain current at V_{DS} = 800V and T_J = 25°C

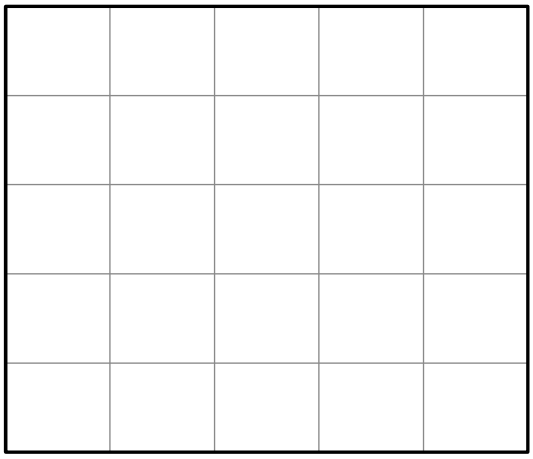

Figure 21. Clamped inductive switching energies vs. $R_{G,EXT}$ at V_{DS} = 800V, I_D =40A, and T_J = 25°C

Figure 22. RC snubber energy loss vs. $R_{G,EXT}$ at V_{DS} = 800V, I_D =40A, and T_J = 25°C

Figure 23. Clamped inductive switching energies vs. snubber capacitance C_S at V_{DS} = 800V, I_D = 40A, and T_J = 25°C

Figure 24. RC snubber energy losses vs. snubber capacitance C_S at V_{DS} = 800V, I_D =40A, and T_J = 25°C

Figure 25. Clamped inductive switching energy vs. junction temperature at V

Applications Information

Important notice

TO-247-4L PACKAGE OUTLINE, PART MARKING AND TUBE SPECIFICATIONS

PACKAGE OUTLINE

DIM				
	MIN	MAX	MIN	MAX

TO-247-4L PACKAGE OUTLINE, PART MARKING AND TUBE SPECIFICATIONS

PART MARKING

PACKING TYPE