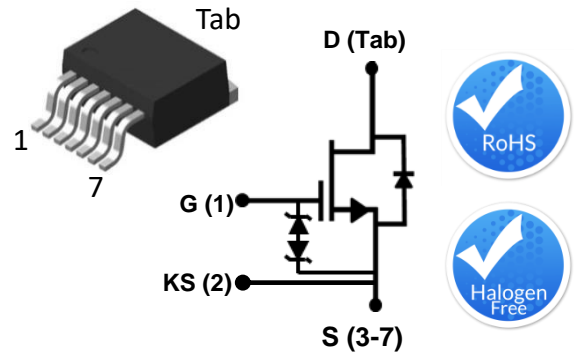


Description

United Silicon Carbide's cascode products co-package its high-performance F3 SiC fast JFETs with a cascode optimized MOSFET to produce the only standard gate drive SiC device in the market today. This series exhibits very fast switching using a D2PAK-7L SMD package and the best reverse recovery characteristics of any device of similar ratings. These devices are excellent for switching inductive loads, and any application requiring standard gate drive.



Part Number	Package	Marking
UF3C120080B7S	D2PAK-7L	UF3C120080B7S

Features

- ◆ Typical on-resistance $R_{DS(on),typ}$ of 80mΩ
- ◆ Maximum operating temperature of 175°C
- ◆ Excellent reverse recovery
- ◆ Low gate charge
- ◆ Low intrinsic capacitance
- ◆ ESD protected, HBM class 2
- ◆ D2PAK-7L package for faster switching, clean gate waveforms

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
Gate-source voltage	V_{GS}	DC	-25 to +25	V
Continuous drain current ¹	I_D	$T_C=25^\circ\text{C}$	33	A
		$T_C=100^\circ\text{C}$	24	A
Pulsed drain current ²	I_{DM}	$T_C=25^\circ\text{C}$	77	A
Single pulsed avalanche energy ³	E_{AS}	$L=15\text{mH}, I_{AS}=2.8\text{A}$	58.5	mJ
Power dissipation	P_{tot}	$T_C=25^\circ\text{C}$	254.2	W
Maximum junction temperature	$T_{J,max}$		175	°C
Operating and storage temperature	T_J, T_{STG}		-55 to 175	°C
Max. lead temperature for soldering, 1/8" from case for 5 seconds	T_L		250	°C

1 Limited by $T_{J,max}$

2 Pulse width t_p limited by $T_{J,max}$

3 Starting $T_J = 25^\circ\text{C}$

Electrical Characteristics ($T_J = +25^\circ\text{C}$ unless otherwise specified)

Typical Performance - Static

Parameter	Symbol	Test Conditions	Value			Units
			Min	Typ	Max	
Drain-source breakdown voltage	BV_{DS}	$V_{GS}=0V, I_D=1mA$	1200			V
Total drain leakage current	I_{DSS}	$V_{DS}=1200V,$ $V_{GS}=0V, T_J=25^\circ\text{C}$		10	75	μA
		$V_{DS}=1200V,$ $V_{GS}=0V, T_J=175^\circ\text{C}$		50		
Total gate leakage current	I_{GSS}	$V_{DS}=0V, T_J=25^\circ\text{C},$ $V_{GS}=-20V / +20V$		6	620	μA
Drain-source on-resistance	$R_{DS(on)}$	$V_{GS}=12V, I_D=20A,$ $T_J=25^\circ\text{C}$		80	100	$m\Omega$
		$V_{GS}=12V, I_D=20A,$ $T_J=175^\circ\text{C}$		172		
Gate threshold voltage	$V_{G(th)}$	$V_{DS}=5V, I_D=10mA$	4	5	6	V
Gate resistance	R_G	$f=1MHz, \text{open drain}$		4.5		Ω

Typical Performance - Reverse Diode

Parameter	Symbol	Test Conditions	Value			Units
			Min	Typ	Max	
Diode continuous forward current ¹	I_S	$T_C=25^\circ\text{C}$			33	A
Diode pulse current ²	$I_{S,pulse}$	$T_C=25^\circ\text{C}$			77	A
Forward voltage	V_{FSD}	$V_{GS}=0V, I_F=10A,$ $T_J=25^\circ\text{C}$		1.5	2	V
		$V_{GS}=0V, I_F=10A,$ $T_J=175^\circ\text{C}$		2		
Reverse recovery charge	Q_{rr}	$V_R=800V, I_F=20A,$ $V_{GS}=-5V, R_{G_EXT}=10\Omega$		TBD		nC
Reverse recovery time	t_{rr}	$di/dt=2300A/\mu\text{s},$ $T_J=25^\circ\text{C}$		TBD		ns
Reverse recovery charge	Q_{rr}	$V_R=800V, I_F=20A,$ $V_{GS}=-5V, R_{G_EXT}=10\Omega$		124		nC
Reverse recovery time	t_{rr}	$di/dt=2300A/\mu\text{s},$ $T_J=150^\circ\text{C}$		13		ns

Typical Performance - Dynamic

Parameter	symbol	Test Conditions	Value			Units
			Min	Typ	Max	
Input capacitance	C_{iss}	$V_{DS}=100V,$ $V_{GS}=0V,$ $f=100kHz$		740		pF
Output capacitance	C_{oss}			100		
Reverse transfer capacitance	C_{rss}			2.1		
Effective output capacitance, energy related	$C_{oss(er)}$	$V_{DS}=0V$ to 800V, $V_{GS}=0V$		59		pF
Effective output capacitance, time related	$C_{oss(tr)}$	$V_{DS}=0V$ to 800V, $V_{GS}=0V$		136		pF
C_{oss} stored energy	E_{oss}	$V_{DS}=800V, V_{GS}=0V$		19		μJ
Total gate charge	Q_G	$V_{DS}=800V, I_D=20A,$ $V_{GS}=-5V$ to 15V		30		nC
Gate-drain charge	Q_{GD}			6		
Gate-source charge	Q_{GS}			10		
Turn-on delay time	$t_{d(on)}$	$V_{DS}=800V, I_D=20A,$ Gate Driver = -5V to +12V, Turn-on $R_{G,EXT}=8.5\Omega,$ Turn-off $R_{G,EXT}=20\Omega$ Inductive Load,		TBD		ns
Rise time	t_r			TBD		
Turn-off delay time	$t_{d(off)}$			TBD		
Fall time	t_f			TBD		
Turn-on energy	E_{ON}	FWD: same device with $V_{GS} = -5V, R_G = 10\Omega$ $T_J=25^\circ C$		TBD		μJ
Turn-off energy	E_{OFF}			TBD		
Total switching energy	E_{TOTAL}			TBD		
Turn-on delay time	$t_{d(on)}$	$V_{DS}=800V, I_D=20A,$ Gate Driver = -5V to +12V, Turn-on $R_{G,EXT}=8.5\Omega,$ Turn-off $R_{G,EXT}=20\Omega$ Inductive Load,		TBD		ns
Rise time	t_r			TBD		
Turn-off delay time	$t_{d(off)}$			TBD		
Fall time	t_f			TBD		
Turn-on energy	E_{ON}	FWD: same device with $V_{GS} = -5V, R_G = 10\Omega$ $T_J=150^\circ C$		TBD		μJ
Turn-off energy	E_{OFF}			TBD		
Total switching energy	E_{TOTAL}			TBD		

Thermal Characteristics

Parameter	symbol	Test Conditions	Value			Units
			Min	Typ	Max	
Thermal resistance, junction-to-case	$R_{\theta JC}$			0.45	0.59	°C/W