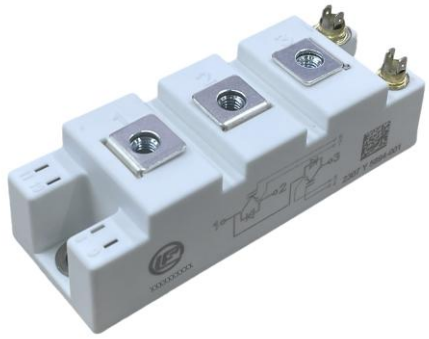
DFS08HF12DEA1

1200V/8mΩ Half Bridge SiC 34mm Module

Description

The DFS08HF12DEA1 offer lower losses and higher energy for soft switching applications.



Features

- 1200V/160A, $R_{DS(ON)}$=8mΩ
- Low switching losses
- Low inductance design
- High current density
- Copper Baseplate

Applications

- Motor drive
- Inverter
- Power supply
- Wind Turbines

Circuit diagram

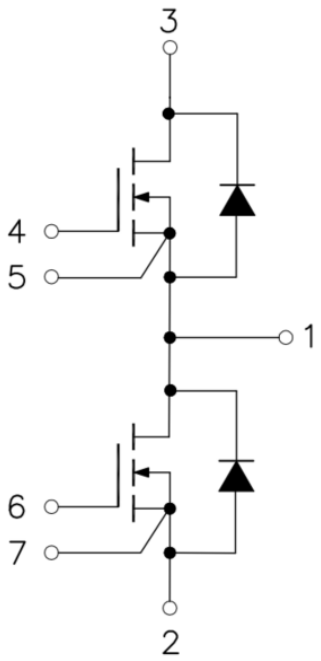


Figure 1. Out drawing & circuit diagram for DFS08HF12DEA1

Pin Configuration and Marking Information

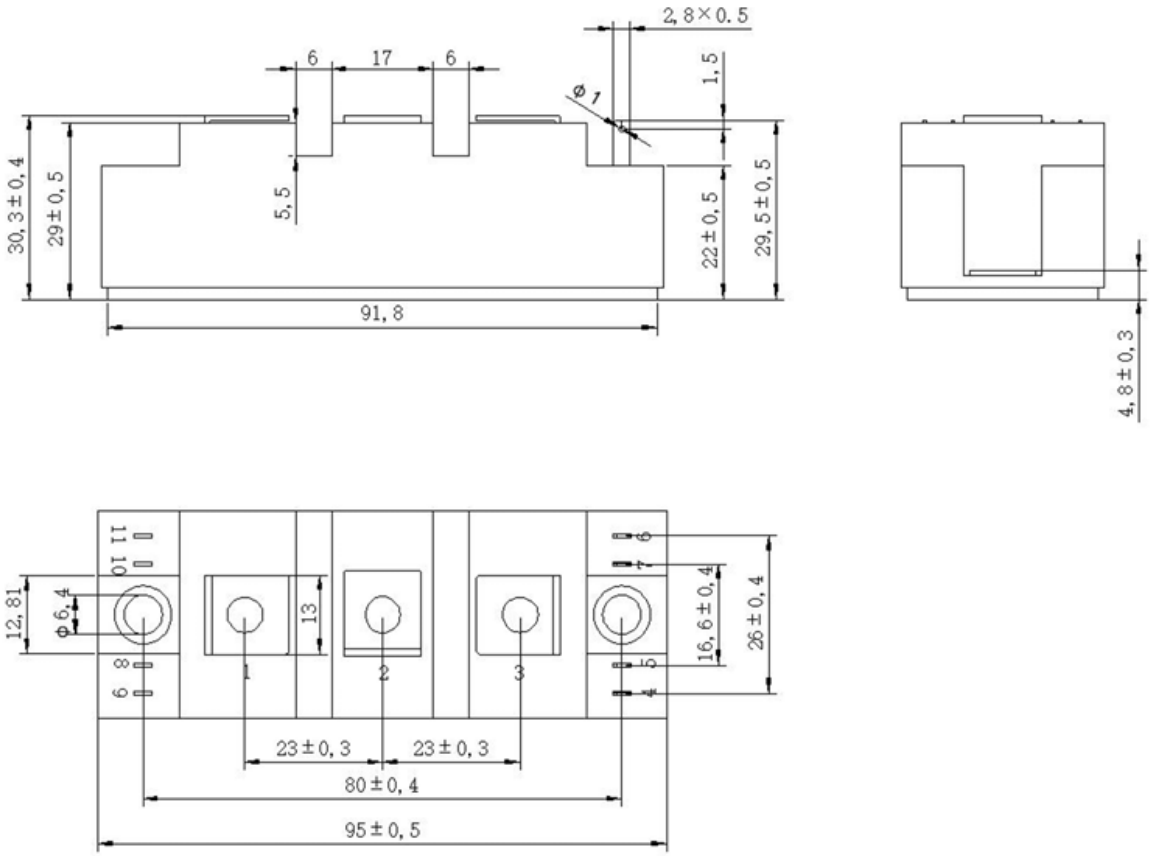


Figure 2. Pin configuration

Module

Parameter	Conditions	Value	Unit
Isolation Voltage	RMS, f = 50Hz, t =1min	2.5	kV
Material of module baseplate	-	Cu	-
Creepage distance	terminal to heatsink terminal to terminal	26 21	mm
Clearance	terminal to heatsink terminal to terminal	23.6 10	mm
CTI	-	>200	-
Module lead resistance, terminals – chip	T_C =25°C	0.8	mΩ
Mounting torque for module mounting	M5, M6	3 to 6	Nm
Weight	-	170	g

Maximum Ratings (T_j =25°C unless otherwise specified)

Symbol	Parameter	Conditions	Ratings	Unit
V_{DSS}	Drain-Source Voltage	G-S Short	1200	V
V_{GSS}	Gate-Sourse Voltage	D-S Short, AC frequency ⩾1Hz, Note1	-10/23	V
V_{GSOP}			-4/18	
I_{DS}	DC Continuous Drain Current	T_C =25°C, V_{GS} =18V	227	A
		T_C =100°C, V_{GS} =18V	162	A
I_{SD}	Source-Drain Current(diode)	T_C =25°C, with ON signal	227	A
		T_C =100°C, with ON signal	162	A
I_{DSM}	Pulse Drain Current	T_C =25°C, Pulse width =1ms, V_{GS} =18V, Note1	454	A
P_{tot}	Total Power Dissipation	T_C =25°C	1230	W
T_{jmax}	Max Junction Temperature	-	175	°C
T_{stg}	Storage Temperature	-	-55 to 175	°C

Note1: Pulse width limited by maximum junction temperature

SiC MOSFET Electrical characteristics (T_j =25°C unless otherwise specified, chip)

Symbol	Item	Condition		Value			Unit
				Min.	Typ.	Max	
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	V_{GS} =0V, I_D =100μA		1200	-	-	V
$V_{GS(th)}$	Gate-source threshold Voltage	I_{DS} =54mA, V_{DS} =V_{GS}	T_j =25°C	2.0	2.8	3.7	V
			T_j =150°C	-	2.1	-	
			T_j =175°C	-	2.0	-	
I_{DSS}	Zero gate voltage drain Current	V_{DS} =1200V, V_{GS} =0V	Tj =25°C	0	2	100	μA
I_{GSS+}	Gate-Source Leakage Current	V_{GS} =18V, V_{DS} =0V	T_j =25°C	0	2	400	nA
I_{GSS-}		V_{GS} =-4V, V_{DS} =0V	T_j =25°C	-400	-2	0	
$R_{DS(on)}$ (Chip)	Static drain-source On-state resistance	I_{DS} =160A V_{GS} =+18V	T_j =25°C	-	8	9	mΩ
			Tj =150°C	-	12.5	-	
			T_j =175°C	-	14	-	
$V_{DS(on)}$ (Chip)	Static drain-source On-state Voltage	I_{DS} =160A V_{GS} =+18V	T_j =25°C	-	1.30	1.46	V
			Tj =150°C		2.03		
			T_j =175°C	-	2.27	-	
C_{iss}	Input Capacitance	V_{DS} =1000V, V_{GS} =0V f =1MHz, V_{AC} =25mV		-	8.6	-	nF
C_{oss}	Output Capacitance			-	0.428	-	
C_{rss}	Reverse transfer Capacitance			-	0.038	-	
R_{Gint}	Internal gate resistor	f =1MHz, I_{DS}=0V		-	3.2	-	Ω
Q_g	Total gate charge	V_{DD} =800V, I_{DS} =160A, V_{GS} =+18/-4V		-	444	-	nC
Q_{gs}	Gate-source charge			-	110	-	
Q_{gd}	Gate-drain charge			-	176	-	
$R_{th(j-c)}$	FET Thermal Resistance	Junction to Case, Note1		-	0.122	-	°C /W

Note1: Assumes Thermal Conductivity of grease is 2.8 W/m・K and thickness is 50um.

Body Diode Electrical characteristics (T_j=25°C unless otherwise specified, chip: Target)

Symbol	Item	Condition		Value			Unit
				Min.	Typ.	Max	
V_{SD}	Body Diode Forward Voltage	V_{GS} =-4V, I_{SD} =80A	T_j=25°C	-	4.1	-	V
			T_j=150°C	-	3.7	-	
			T_j=175°C	-	3.6	-	
I_S	Continuous Diode Forward Current	V_{GS} = -4V	T_j=25°C	-	-	175	A
T_{rr}	Reverse recovery time	V_{DD}=800V, I_{DS}=160A V_{GS}=+18/-4V, R_g=1Ω Inductive load switching operation	T_j=25°C	-	21	-	ns
Q_{rr}	Reverse recovery charge		T_j=25°C	-	470	-	nC
I_{rr}	Diode switching power dissipation		T_j=25°C	-	40	-	A

Test Conditions

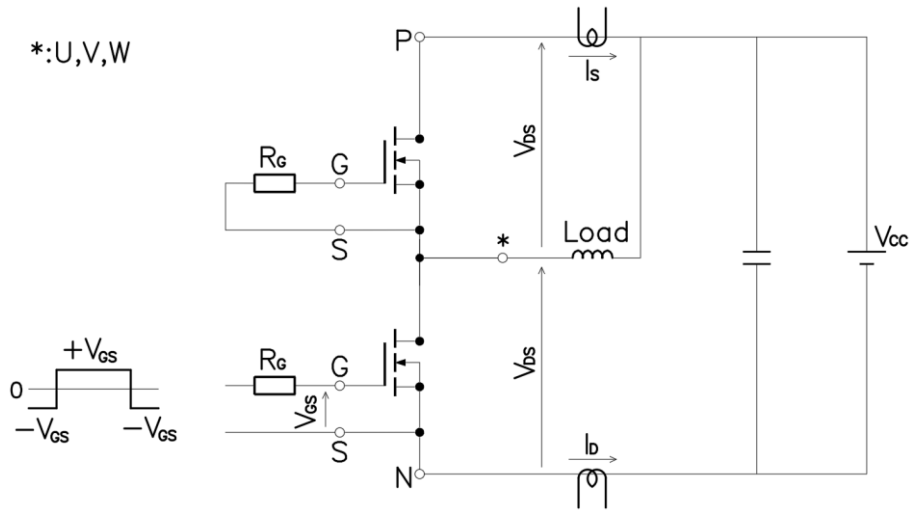


Figure 3. Switching time measure circuit

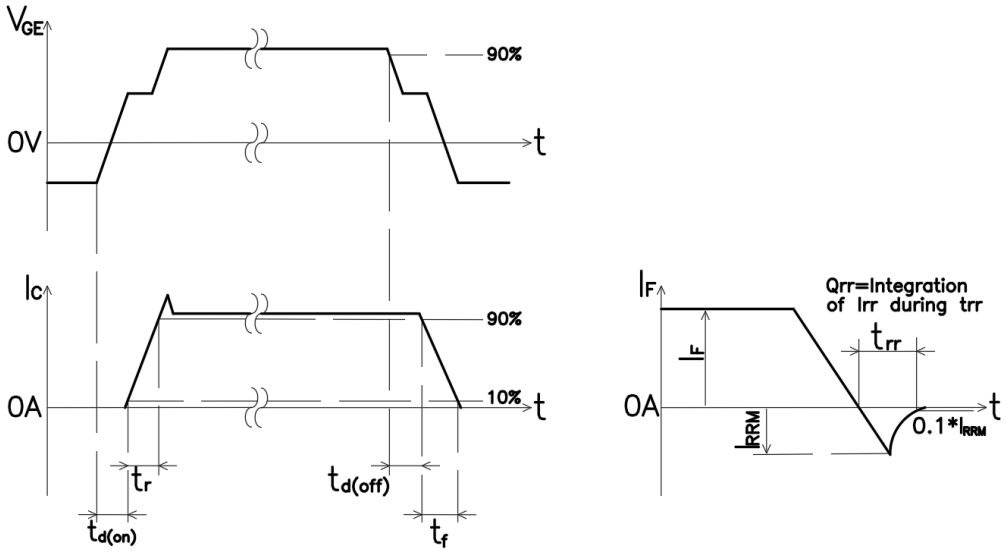


Figure 4. Switching time definition

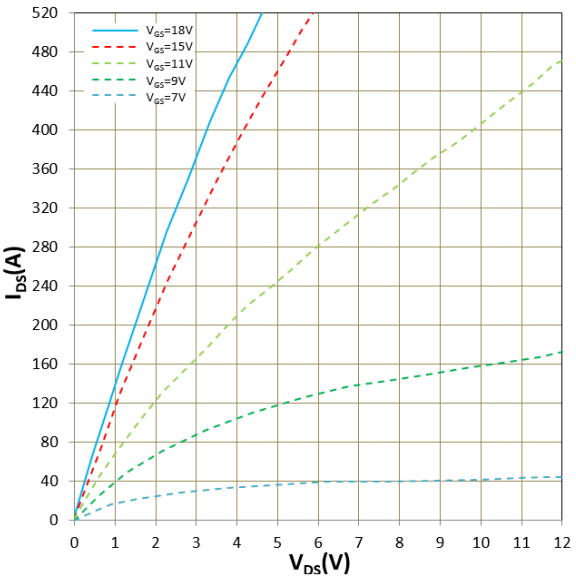


Figure 5. I_{DS} vs V_{DS}
T_j=25°C

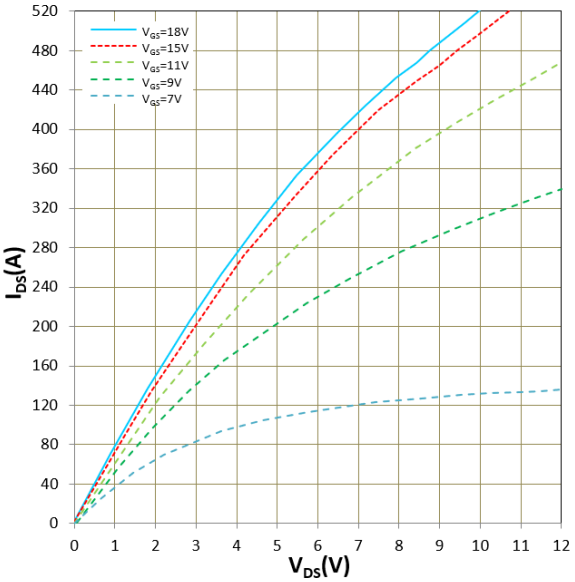


Figure 6. I_{DS} vs V_{DS}
T_j=175°C

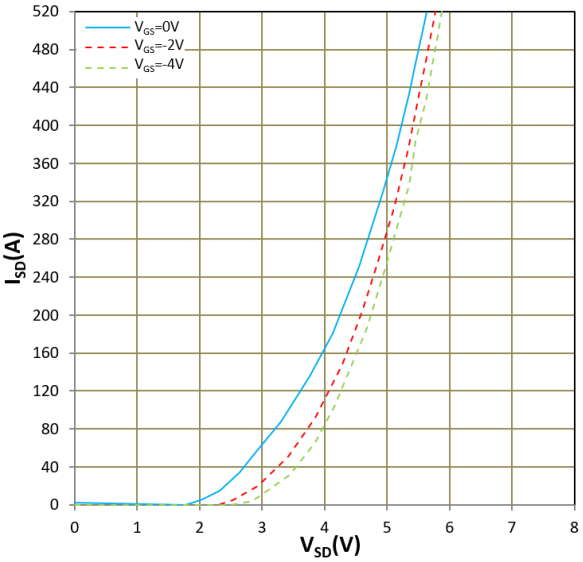


Figure 7. I_{SD} vs V_{SD}
T_j=25°C

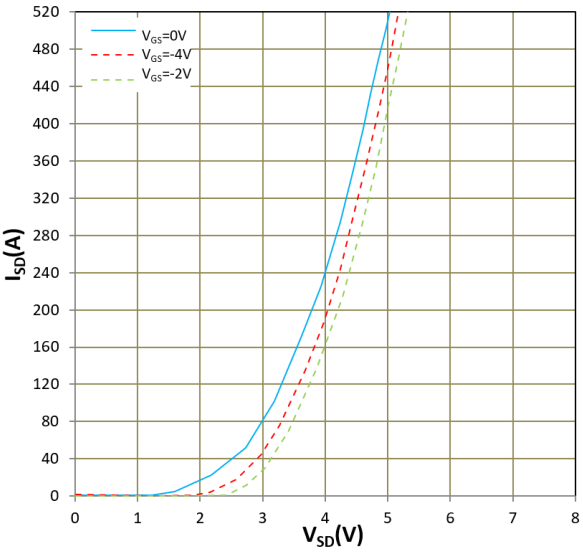


Figure 8. I_{SD} vs V_{SD}
T_j=175°C

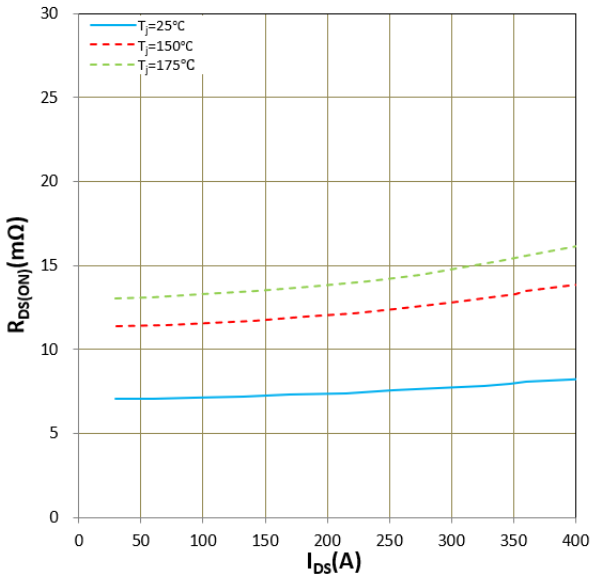


Figure 9.$R_{DS(ON)}$ vs I_{DS}

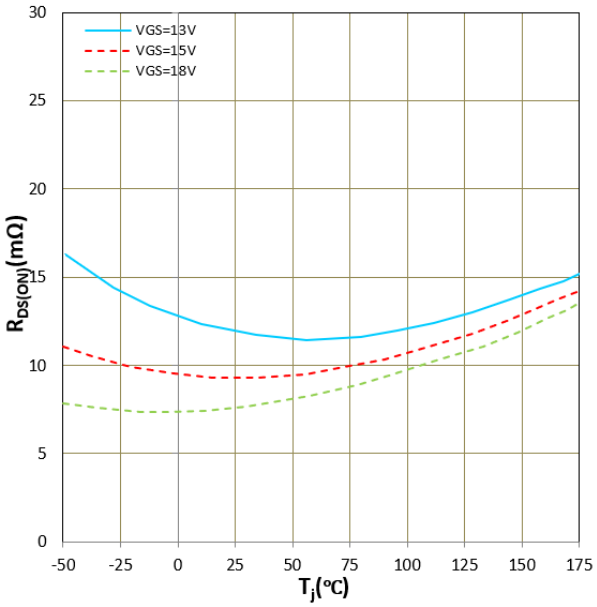


Figure 10.$R_{DS(ON)}$ vs T_j
I_{DS}=160A

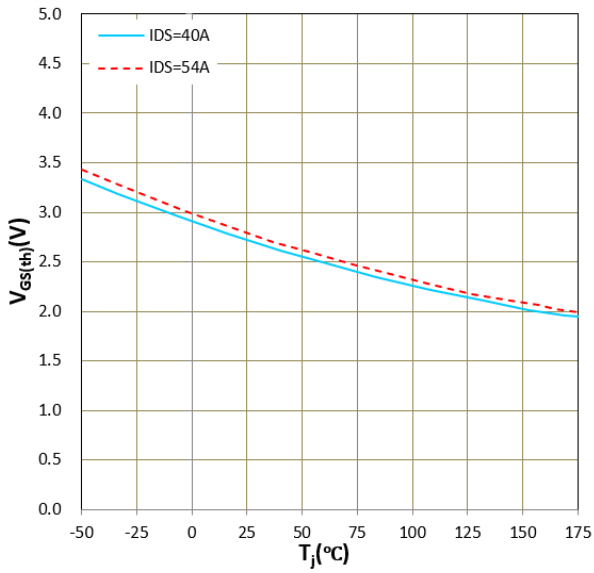


Figure 11. $V_{GS(th)}$ vs T_j
V_{GS}=V_{DS}

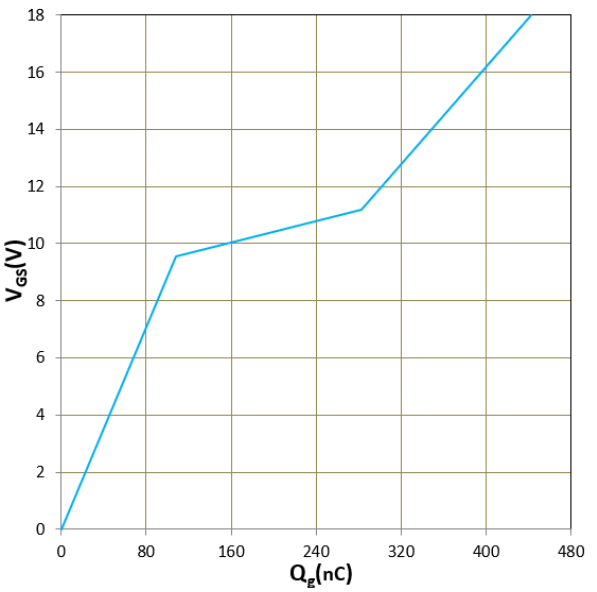


Figure 12. Gate charge
V_{DS}=800V, I_{DS}=160A, I_{GS}=1mA, T_j=25°C

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