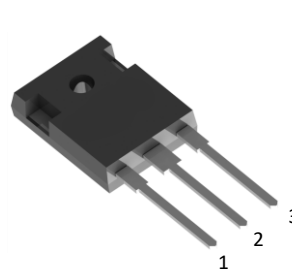
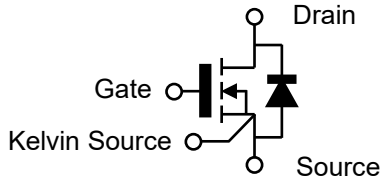


Silicon Carbide MOSFET

650V, 65mΩ SiC MOSFET – Falcon Series



Product Information:



TO-247-3L



TO-247-4L

Features

- Optimized $R_{DS(on)}$ with Rapid Switching Behavior
- Compatible with Standard Gate Drivers
- High Avalanche Endurance Capability
- Optimized for High Power Density Applications
- RoHS Compliant and Halogen Free

Benefits

- Higher System Efficiency
- Increase Parallel Device Convenience
- Enable High Temperature Application
- Allow High Frequency Operation
- Realize Compact and Lightweight Systems
- High Reliability

Terminal	Packaging Type	
	TO-247-3L	TO-247-4L
Gate	1	4
Drain	2, Tab	1, Tab
Source	3	2
Kelvin Source	--	3

Potential Applications

- Switching Mode Power Supply
- PFC & DC/DC Converter
- EV Charging Station
- EV On Board Charger (OBC)
- Renewable Energy
- Power Inverter & Motor Driver

Key Performance Parameters

Parameter	Symbol	Value	Unit
Drain-Source Voltage	$V_{DS @ T_{j(max)}}$	700	V
Recommended Gate-Source Turn-On Voltage	V_{GS}		
Drain-Source On-State Resistance	$R_{DS(on)}$	65	mΩ
Continuous Drain Current	I_D		A
Pulse Drain Current	$I_{D, pulse}$		
Power Dissipation	P_{tot}		W
Avalanche Energy	E_{AS}		mJ
Gate Charge	Q_G		nC
Output Capacitive Charge	Q_{oss}		
Junction & Storage Temperature	T_j, T_{stg}	-55 to 175	°C

Part Number	Package	Marking
FF06080M2Q	TO-247-4L	FF06080M2
FF06080M2E-3	TO-247-3L	FF06080M2

For further information about comparable products, please contact (www.fastsic.com).

Maximum Ratings: ($T_j = 25^\circ\text{C}$, unless otherwise specified)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Drain-Source Voltage	V_{DSS}	650	--	--	V	$V_{GS}=0\text{V}, I_D=100\mu\text{A}$
Continuous Drain Current	I_D	--	--	--	A	$V_{GS}=15\text{V}, T_c=25^\circ\text{C}$ $V_{GS}=15\text{V}, T_c=100^\circ\text{C}$
Pulse Drain Current	$I_{D,pulse}$	--	--	--		Per Fig. 13
Continuous Body Diode Current	I_S	--	--	--		$V_{GS}=0\text{V}, T_c=25^\circ\text{C}$
Avalanche Energy, Single Pulse	E_{AS}	--	--	--	mJ	$L=25\text{mH}$
Operate Gate Source Voltage	$V_{GS,op}$	-8~0	--	12~18	V	Recommended operating values
Transient Gate Source Voltage	$V_{GS,tran.}$	-10	--	21		Transient operating limit ($AC f > 1\text{Hz}$, pulse width $< 100\text{ns}$)
Power Dissipation	P_{tot}	--	--	--	W	$T_c=25^\circ\text{C}$
Junction Temperature	T_j	-55	--	175	°C	--
Storage Temperature	T_{stg}	-55	--	175		
Soldering Temperature	T_L	--	--	260		

Electrical Characteristics:

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Conditions
DC Characteristics (at $T_j = 25^\circ\text{C}$, unless otherwise specified)						
Drain-source Breakdown Voltage	$V_{(BR)DSS}$	650	--	--	V	$V_{GS}=0\text{V}, I_D=100\mu\text{A}, T_j=25^\circ\text{C}$
Drain-Source On-State Resistance	$R_{DS(on)}$	--	94 75 65	--	mΩ	$V_{GS}=12\text{V}, I_D=8\text{A}, T_j=25^\circ\text{C}$ $V_{GS}=15\text{V}, I_D=8\text{A}, T_j=25^\circ\text{C}$ $V_{GS}=18\text{V}, I_D=8\text{A}, T_j=25^\circ\text{C}$
Gate-Source Threshold Voltage	V_{th}	--	2.5	--	V	$V_{GS}=V_{DS}, I_D=8\text{mA}$
Zero Gate Voltage Drain Current	I_{DSS}	--	1	60	μA	$V_{DS}=650\text{V}, V_{GS}=0\text{V}, T_j=25^\circ\text{C}$
Gate-Source Leakage Current	I_{GSS}	--	--	100	nA	$V_{GS}=15\text{V}, V_{DS}=0\text{V}$
Body Diode Forward Voltage	V_{SD}	--	2.63	--	V	$V_{GS}=0\text{V}, I_S=4\text{A}, T_j=25^\circ\text{C}$ $V_{GS}=0\text{V}, I_S=4\text{A}, T_j=175^\circ\text{C}$
AC Characteristics (at $T_j = 25^\circ\text{C}$, unless otherwise specified)						
Input Capacitance	C_{iss}	--	930	--	pF	$V_{DS}=400\text{V}, V_{GS}=0\text{V},$ $f=250\text{kHz}, V_{AC}=25\text{mV}$
Output Capacitance	C_{oss}	--	40.3	--		
Reverse Capacitance	C_{rss}	--	2.5	--		
Effective Output Capacitance, energy related	$C_{o(er)}^1$	--	--	--		
Effective Output Capacitance, time related	$C_{o(tr)}^2$	--	--	--		
C_{oss} Stored Energy	E_{oss}	--	4	--		
Output Capacitive Charge	Q_{oss}	--	30.4	--	nC	
Internal Gate Resistance	$R_{G,int.}$	--	--	--	Ω	$f=1\text{MHz}, V_{AC}=25\text{mV}$

¹ $C_{o(er)}$ is a fixed capacitance that gives the same stored energy as C_{oss} while V_{DS} is rising from 0 to 400V.

² $C_{o(tr)}$ is a fixed capacitance that gives the same charging time as C_{oss} while V_{DS} is rising from 0 to 400V.

Switching Characteristics:

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Gate Characteristics						
Gate to Source Charge	Q_{GS}	--	7.4	--	nC	$V_{DS}=400V, V_{GS}=0V/15V, I_D=35A$
Gate to Drain Charge	Q_{GD}	--	8.3	--		
Total Gate Charge	Q_G	--	27.8	--		
Inductive Load						
Turn On Delay Time	$t_{d(on)}$	--		--	ns	$V_{DS}=400V,$ $I_D=8A,$ $V_{GS}=-3/+15V,$ $R_{G_{on, ext.}} = 2.7\Omega, R_{G_{off, ext.}} = 1\Omega$ External SiC Diode as an FWD
Rise Time	t_r	--		--		
Turn Off Delay Time	$t_{d(off)}$	--		--		
Fall Time	t_f	--		--		
Turn On Switching Energy	E_{on}	--		--	μJ	
Turn Off Switching Energy	E_{off}	--		--		
Resistive Load						
Turn On Delay Time	$t_{d(on)}$	--		--	ns	$V_{DS}=400V,$ $I_D=35A, V_{GS}=-3/+15V,$ $R_L=10\Omega$
Rise Time	t_r	--		--		
Turn Off Delay Time	$t_{d(off)}$	--		--		
Fall Time	t_f	--		--		
Body Diode Characteristics						
Reverse Recovery Charge	Q_{rr}	--	46.2	--	nC	$V_{GS}=0V,$ $I_S=35A, V_{DS}=400V,$ $di/dt=1125A/\mu s$ * Q_{rr} herein excluded the Q_{oss} value.
Reverse Recovery Time	t_{rr}	--		--	ns	
Peak Reverse Recovery Current	I_{rrm}	--		--	A	

Thermal Characteristics:

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Thermal Impedance, junction-case	R_{th-jc}	--		--	K/W	--
Thermal Impedance, junction-ambient	R_{th-ja}	--	40	--		Device on PCB, with 6 cm ² of cooling area

Revision History

Date	Revision	Changes
2025.11	Tentative	First issue.

Important Note (Disclaimer)

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