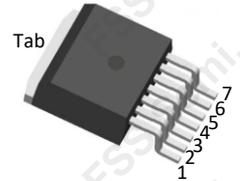
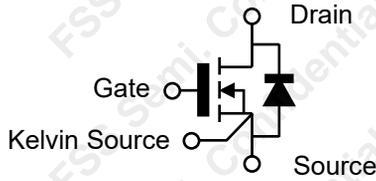


Silicon Carbide MOSFET

500V, 16mΩ SiC MOSFET – Falcon Series



Product Information:



TOLL

TO-263-7L

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

Terminal	Packaging Type	
	TOLL	TO-263-7L
Gate	1	1
Drain	Tab	Tab
Source	3, 4, 5, 6, 7, 8	3, 4, 5, 6, 7
Kelvin Source	2	2

Benefits

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

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	$V_{DS @ T_{j(max)}}$	500	V
Recommended Gate-Source Turn-On Voltage	V_{GS}	15	
Drain-Source On-State Resistance	$R_{DS(on)}$	16	mΩ
Continuous Drain Current	I_D	79	A
Pulse Drain Current	$I_{D, pulse}$	245	
Power Dissipation	P_{tot}	250	W
Avalanche Energy	E_{AS}	3000	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
FF05016M2F	TOLL	FF05016M2
FF05016M2J-7	TO-263-7	FF05016M2

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}	500	--	--	V	$V_{GS}=0\text{V}, I_D=100\mu\text{A}$
Continuous Drain Current	I_D	--	79	--	A	$V_{GS}=15\text{V}, T_c=25^\circ\text{C}$
Pulse Drain Current	$I_{D,pulse}$	--	245	--		$V_{GS}=15\text{V}, T_c=100^\circ\text{C}$
Continuous Body Diode Current	I_S	--	--	--		Per Fig. 13
Avalanche Energy, Single Pulse	E_{AS}	--	3000	--	mJ	$V_{GS}=0\text{V}, T_c=25^\circ\text{C}$ $L=25\text{mH}$
Operate Gate Source Voltage	$V_{GS,op}$	-8~0	--	12~15	V	Recommended operating values
Transient Gate Source Voltage	$V_{GS,tran.}$	-10	--	19		Transient operating limit (AC $f > 1\text{Hz}$, pulse width $< 100\text{ns}$)
Power Dissipation	P_{tot}	--	245	--	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	$V_{(BR)DSS}$	500	--	--	V	$V_{GS}=0\text{V}, I_D=100\mu\text{A}, T_j=25^\circ\text{C}$	
Drain-Source On-State Resistance	$R_{DS(on)}$	--	18 16 20 18	--	mΩ	$V_{GS}=12\text{V}, I_D=35\text{A}, T_j=25^\circ\text{C}$ $V_{GS}=15\text{V}, I_D=35\text{A}, T_j=25^\circ\text{C}$ $V_{GS}=12\text{V}, I_D=35\text{A}, T_j=100^\circ\text{C}$ $V_{GS}=15\text{V}, I_D=35\text{A}, T_j=100^\circ\text{C}$	
Gate-Source Threshold Voltage	V_{th}	--	2.2	--	V	$V_{GS}=V_{DS}, I_D=60\text{mA}$	
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}	--	3.3 2.9	--	V	$V_{GS}=0\text{V}, I_S=20\text{A}, T_j=25^\circ\text{C}$ $V_{GS}=0\text{V}, I_S=20\text{A}, T_j=175^\circ\text{C}$	
AC Characteristics (at $T_j = 25^\circ\text{C}$, unless otherwise specified)							
Input Capacitance	C_{iss}	--	4321	--	pF	$V_{DS}=300\text{V}, V_{GS}=0\text{V},$ $f=250\text{kHz}, V_{AC}=25\text{mV}$	
Output Capacitance	C_{oss}	--	307	--			
Reverse Capacitance	C_{rss}	--	17.2	--			
Effective Output Capacitance, energy related	$C_{o(er)}^1$	--	--	--			
Effective Output Capacitance, time related	$C_{o(tr)}^2$	--	--	--			
C_{oss} Stored Energy	E_{oss}	--	--	--			μJ
Output Capacitive Charge	Q_{oss}	--	--	--			nC
Internal Gate Resistance	$R_{G,int.}$	--	1.5	--	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 300V.

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 300V.

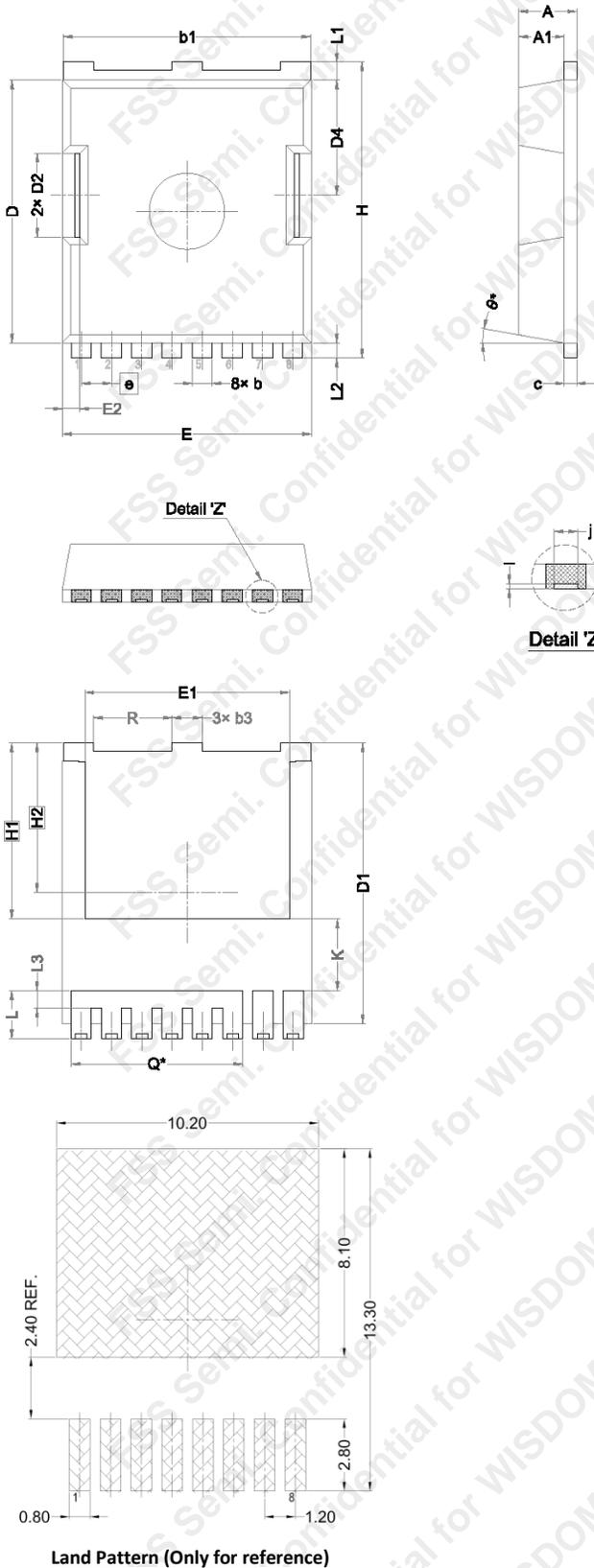
Switching Characteristics:

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Gate Characteristics						
Gate to Source Charge	Q_{GS}	--	19	--	nC	$V_{DS}=400V, V_{GS}=0V/15V, I_D=35A$
Gate to Drain Charge	Q_{GD}	--	68	--		
Total Gate Charge	Q_G	--	183	--		
Inductive Load						
Turn On Delay Time	$t_{d(on)}$	--		--	ns	$V_{DS}=400V,$ $I_D=35A,$ $V_{GS}=-3/+15V,$ $R_{G_{on, ext.}} = 2.7\Omega, R_{G_{off, ext.}} = 1\Omega$ 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}	--		--	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}	--	0.6	--	K/W	--
Thermal Impedance, junction-ambient	R_{th-ja}	--	40	--		Device on PCB, with 6 cm ² of cooling area

Package Outline (TOLL, MO-299B)

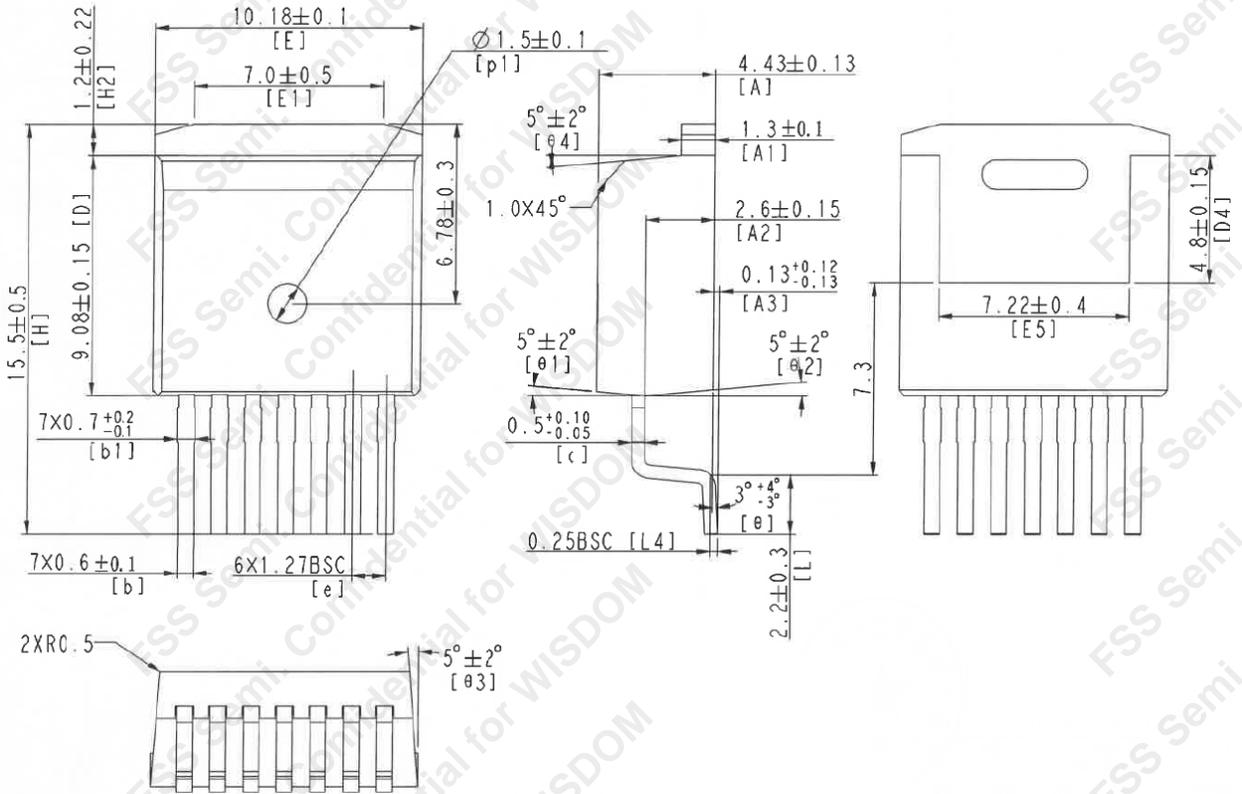


Symbol	Dimension (Millimeters)		
	Min.	Nom.	Max.
A	2.20	2.30	2.40
A1	1.70	1.80	1.90
b	0.70	0.80	0.90
b1	9.70	9.80	9.90
b3	1.10	1.20	1.30
c	0.40	0.50	0.60
D	10.28	10.38	10.48
D1	10.98	11.08	11.18
D2	3.20	3.30	3.40
D4	4.45	4.55	4.65
E	9.80	9.90	10.00
E1	8.00	8.10	8.20
E2	0.60	0.70	0.80
e	1.20 BSC.		
H	11.58	11.68	11.78
H1	6.95 BSC.		
H2	5.89 BSC.		
i	0.10 REF.		
j	0.46 REF.		
K	2.80 REF.		
L	1.40	1.90	2.10
L1	0.60	0.70	0.80
L2	0.50	0.60	0.70
L3	0.30	0.70	0.80
N	8		
Q	6.80 REF.		
R	3.00	3.10	3.20
θ	10° REF.		

Note:

1. Dimensions do not inclusive burrs and mold flash.
2. "*" is for reference.

Package Outline (TO-263-7L)



Revision History

Date	Revision	Changes
2025.04	Tentative	First issue.

Important Note (Disclaimer)

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