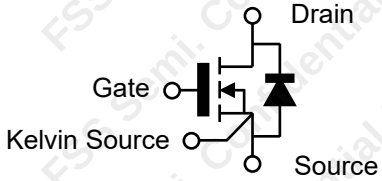
Silicon Carbide MOSFET

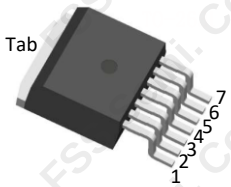
500V, 16mΩ SiC MOSFET – Falcon Series

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).

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

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Drain-Source Voltage	V_{DSS}	500	--	--	V	V_{GS}=0V, I_D=100μA
Continuous Drain Current	I_D	--	79	--	A	V_{GS}=15V, T_C=25°C V_{GS}=15V, T_C=100°C
Pulse Drain Current	$I_{D,\ pulse}$	--	245	--		Per Fig. 13
Continuous Body Diode Current	I_S	--		--		V_{GS}=0V, T_C=25°C
Avalanche Energy, Single Pulse	E_{AS}	--	3000	--	mJ	L=25mH
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 > 1Hz, pulse width < 100ns)
Power Dissipation	P_{tot}	--	245	--	W	T_c=25°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°C, unless otherwise specified)						
Drain-source Breakdown Voltage	$V_{(BR)DSS}$	500	--	--	V	V_{GS}=0V, I_D=100μA, T_j=25°C
Drain-Source On-State Resistance	$R_{DS(on)}$	-- -- --	18 16 20 18	-- -- --	mΩ	V_{GS}=12V, I_D=35A, T_j=25°C V_{GS}=15V, I_D=35A, T_j=25°C V_{GS}=12V, I_D=35A, T_j=100°C V_{GS}=15V, I_D=35A, T_j=100°C
Gate-Source Threshold Voltage	V_{th}	--	2.2	--	V	V_{GS}=V_{DS}, I_D=60mA
Zero Gate Voltage Drain Current	I_{DSS}	--	1	60	μA	V_{DS}=650V, V_{GS}=0V, T_j=25°C
Gate-Source Leakage Current	I_{GSS}	--	--	100	nA	V_{GS}=15V, V_{DS}=0V
Body Diode Forward Voltage	V_{SD}	-- --	3.3 2.9	-- --	V	V_{GS}=0V, I_S=20A, T_j=25°C V_{GS}=0V, I_S=20A, T_j=175°C
AC Characteristics (at T_j = 25°C, unless otherwise specified)						
Input Capacitance	C_{iss}	--	4321	--	pF	V_{DS}=300V, V_{GS}=0V, f=250kHz, V_{AC}=25mV
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=1MHz, V_{AC}=25mV

[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.

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Switching Characteristics:

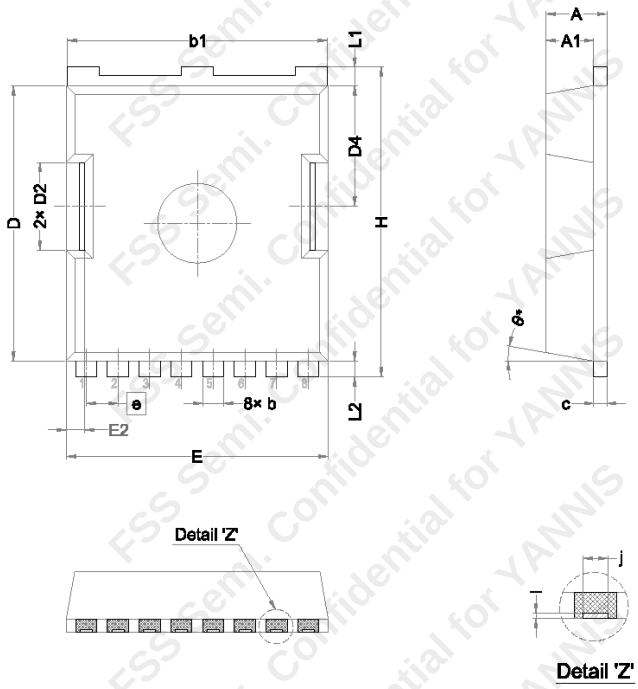
Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Gate Characteristics						
Gate to Source Charge	Q_{GS}	--	19	--	nC	V_{DS}=400V, V_{GS}=0V/15V, I_D=35A
Gate to Drain Charge	Q_{GD}	--	68	--		
Total Gate Charge	Q_G	--	183	--		
Inductive Load						
Turn On Delay Time	$t_{d(on)}$	--		--	ns	V_{DS}=400V, I_D=35A, V_{GS}=-3/+15V, $R_{G_on,\ ext.}$= 2.7Ω , $R_{G_off,\ ext.}$= 1Ω 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=10Ω
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/µs *Q_{rr} herein excluded the Q_{oss} value.
Reverse Recovery Time	t_{rr}	--		--	ns	
Peak Reverse Recovery Current	I_{rrm}	--		--	A	

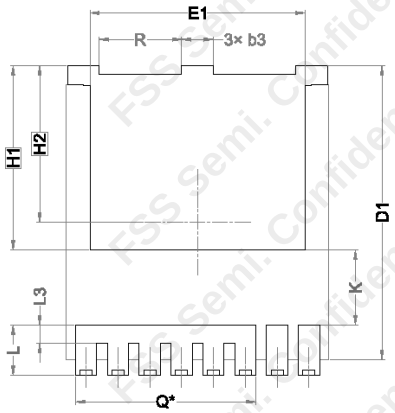
Thermal Characteristics:

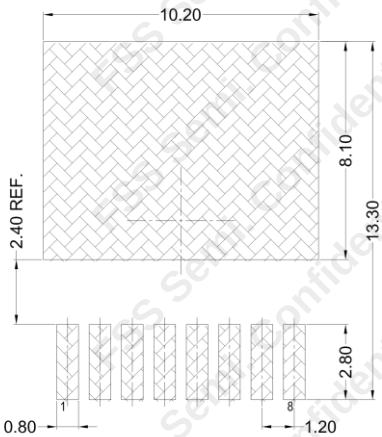
Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Thermal Impedance, junction-case	$R_{th\text{-}jc}$	--	0.6	--	K/W	--
Thermal Impedance, junction-ambient	$R_{th\text{-}ja}$	--	40	--		Device on PCB, with 6 cm² of cooling area

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Package Outline (TOLL, MO-299B)







Land Pattern (Only for reference)

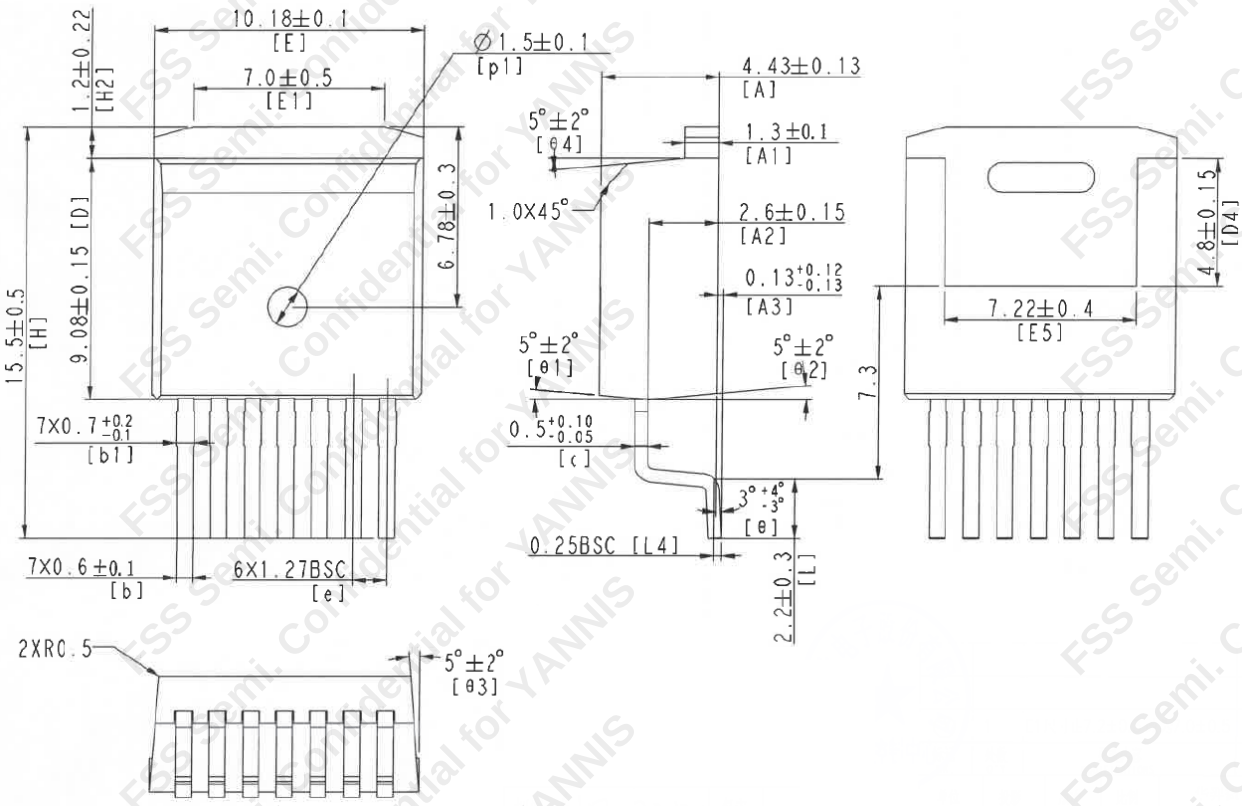
Symbol	Dimension (Millimeters)		
	Min.	Nom.	Max.
A	2.20	2.30	2.40
A1	1.70	1.80	1.90
b	0.70	0.80	0.90
b1	9.70	9.80	9.90
b3	1.10	1.20	1.30
c	0.40	0.50	0.60
D	10.28	10.38	10.48
D1	10.98	11.08	11.18
D2	3.20	3.30	3.40
D4	4.45	4.55	4.65
E	9.80	9.90	10.00
E1	8.00	8.10	8.20
E2	0.60	0.70	0.80
e		1.20 BSC.	
H	11.58	11.68	11.78
H1		6.95 BSC.	
H2		5.89 BSC.	
i		0.10 REF.	
j		0.46REF.	
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.

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Package Outline (TO-263-7L)



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Revision History

Date	Revision	Changes
2025.04	Tentative	First issue.

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