MA13C12A

1200V/170A SiC MOSFET

Features

- 100% Avalanche tested
- Revolutionary semiconductor material SiliconCarbide
- High blocking voltage with low on-resistance
- High-speed switching with very low switching losses
- High-speedand high robust intrinsic body diode
- Optimized package with separate driver source pin

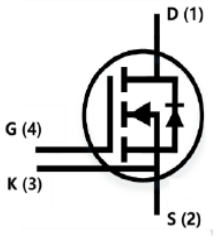
Application

- MotorDrives
- EV battery chargers
- Solar energy system
- UPS
- Industrial motor control

Product Summary

V_{DS}	$R_{DS(ON)}$ TYP	I_D
1200V	13mΩ@18V	170A

TO-247-4L



Pb-Free RoHS Halogen-Free

Absolute Maximum Ratings (T_A=25℃unless otherwise noted)

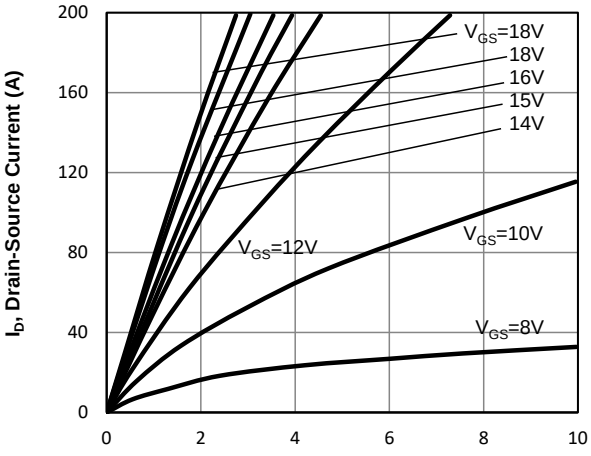
Symbol	Parameter		Rating	Unit
Common Ratings (T_C=25°C Unless Otherwise Noted)				
V_{DS}	Drain-Source Breakdown Voltage		1200	V
V_{GS}	Gate-Source Voltage		-10/+22	V
V_{GSop}	Recommended Operation Voltage of Gate to Source		-4/+18	V
T_J,T_{STG}	Storage Temperature Range		-55 to 175	°C
I_S	Diode Continuous Forward Current	Tc=25°C	170	A
I_{DM}	Pulse Drain Current Tested	Tc=25°C	281	A
		Tc=125°C	162	A
I_D	Continuous Drain Current	Tc=25°C	170	A
		Tc=125°C	87	A
P_D	Maximum Power Dissipation	Tc=25°C	681.8	W
E_{AS}	Single Pulsed Avalanche Energy		729	mJ
$R_{th(j-c)}$	Thermal Resistance from Junction-Case		0.22	K/W

Ordering Information (Example)

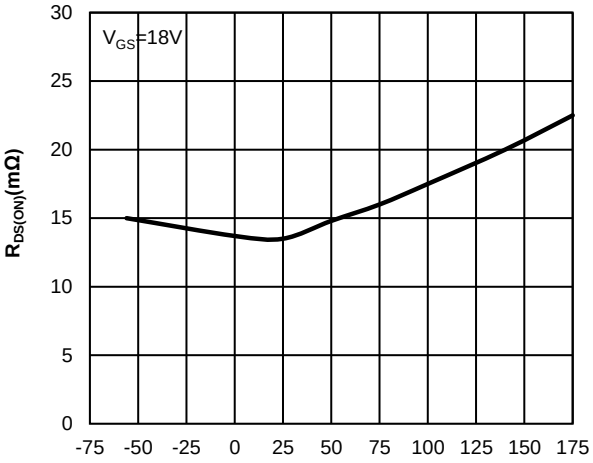
Type	Package	Marking	Minimum Package(pcs)	Inner Box Quantity(pcs)	Outer Carton Quantity(pcs)	Delivery Mode
MA13C12A	TO-247	MA13C12A	/	/	/	/

Electrical Characteristics (TJ=25℃ unless otherwise noted)						
Symbol	**Parameter**	**Condition**	**Min**	**Typ**	**Max**	**Unit**
Static Electrical Characteristics @ TJ = 25°C (unless otherwise stated)						
$BV_{(BR)DSS}$	Drain-Source Breakdown Voltage	V_{GS}=0V，I_D=100μA	1200	1500	--	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=1200V，V_{GS}=0V	--	--	20	μA
I_{GSS}	Gate-Body Leakage Current	V_{GS}=22V，V_{DS}=0V	--	--	250	nA
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS}，I_D=21mA	2.0	--	4.0	V
$R_{DS(on)}$	Drain-Source On-State Resistance	V_{GS}=18V，I_D=75A	--	13	--	mΩ
		V_{GS}=18V，I_D=75A，Tj=175℃	--	25	--	mΩ
Dynamic Electrical Characteristics @ TJ = 25°C (unless otherwise stated)						
C_{ISS}	Input Capacitance	V_{DS}=800V，V_{GS}=0V， f=1MHz	--	5357	--	pF
C_{OSS}	Output Capacitance		--	240	--	pF
C_{RSS}	Reverse Transfer Capacitance		--	9	--	pF
Switching Characteristics						
Q_g	Total Gate Charge	V_{DS}=800V，I_D=75A，V_{GS}=-5/18V	--	219	--	nC
Q_{gs}	Gate Source Charge		--	71.6	--	nC
Q_{gd}	Gate Drain Charge		--	17.9	--	nC
$t_{d(on)}$	Turn-on Delay Time	V_{DD}=800V，I_D=75A，V_{GS}=-5/18V，R_G=10Ω	--	16	--	nS
t_r	Turn-on Rise Time		--	17.9	--	nS
$t_{d(off)}$	Turn-Off Delay Time		--	36.2	--	nS
t_f	Turn-Off Fall Time		--	8.5	--	nS
R_g	Gate Resistance	V_{AC}=25mV, f=1MHz	--	1.25	--	Ω
Source- Drain Diode Characteristics						
V_{SD}	Forward on voltage	Tj=25℃，Is=75A	--	4.8	--	V
I_S	Continuous Diode Forward Current	V_{GS}=0V，Tj=25℃	--	281	--	A
t_{rr}	Reverse Recovery Time	V_{GS} = 5V, I_{SD}=75A, V_R=800V, di/dt=1000A/us, Tj=25℃	--	22	--	ns
Q_{rr}	Reverse Recovery Charge		--	0.55	--	nC
I_{rrm}	Peak Reverse Recovery Current		--	45.5	--	A

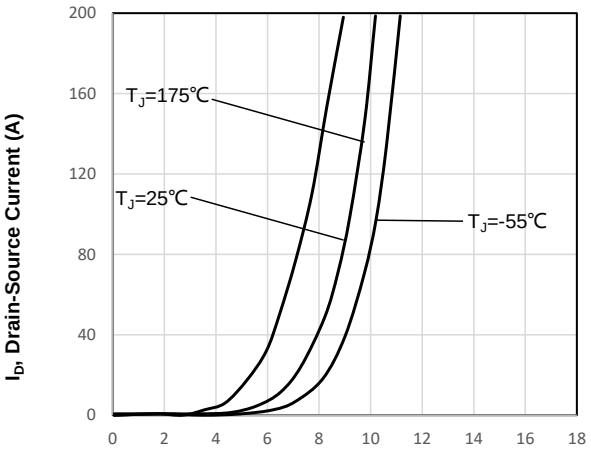
Typical Operating Characteristics



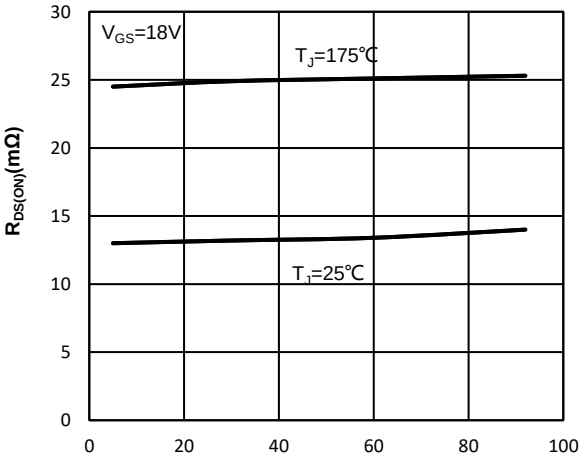
V_{DS}, Drain -Source Voltage (V)
Fig1. Typical Output Characteristics



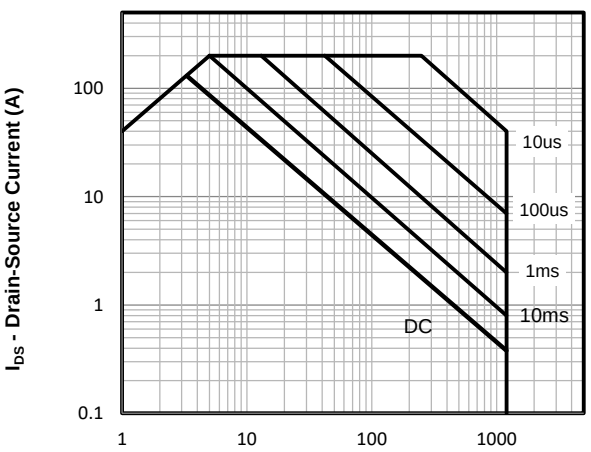
Tj - Junction Temperature (°C)
Fig2. Normalized On-Resistance Vs. Temperature



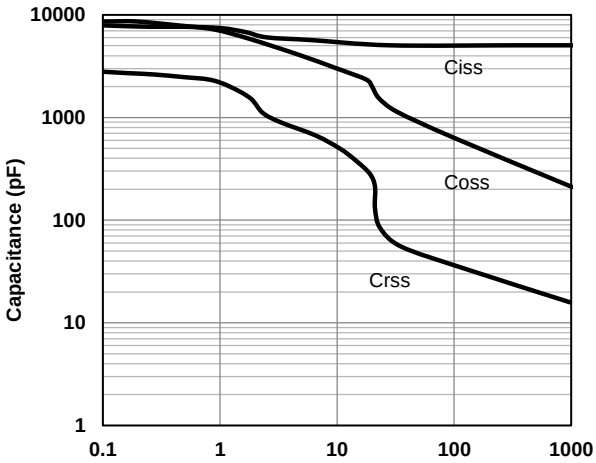
V_{GS}, Gate -Source Voltage (V)
Fig3. Typical Transfer Characteristics



I_D, Drain-Source Current (A)
Fig4. On-Resistance Vs. Drain-Source Current

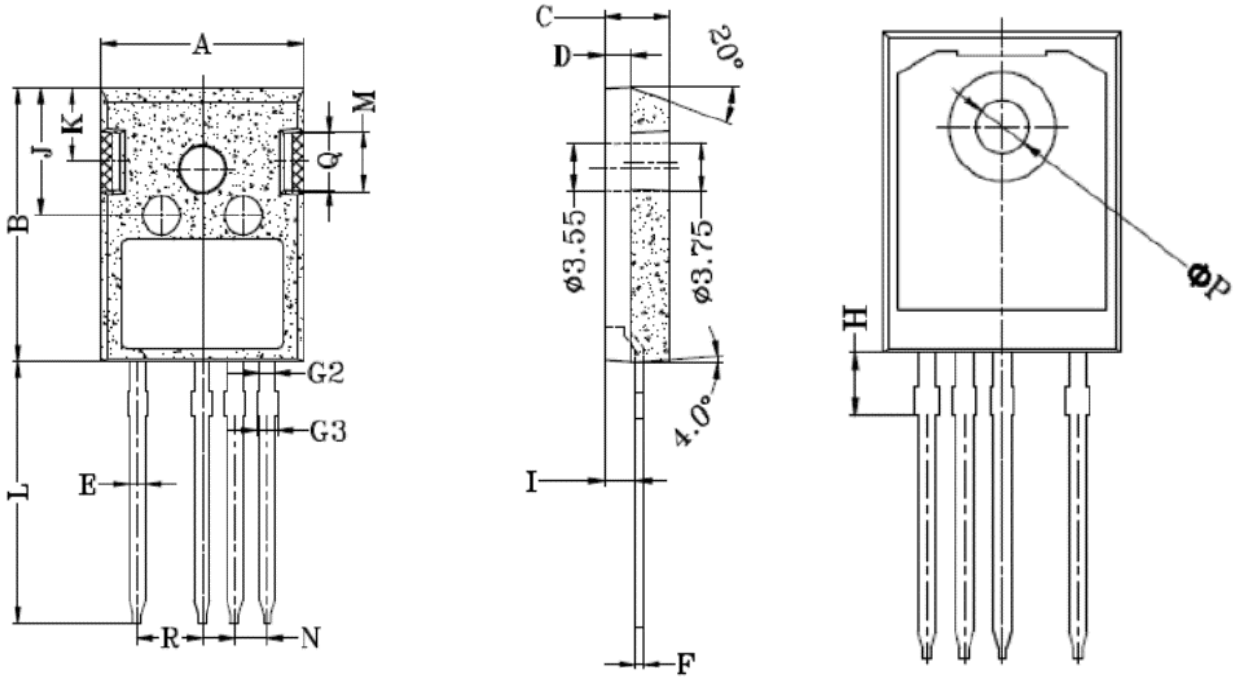


V_{DS}, Drain -Source Voltage (V)
Fig5. Maximum Safe Operating Area



V_{DS} , Drain-Source Voltage (V)
Fig6 Typical Capacitance Vs.Drain-Source

TO-247-4L Package information



Symbol	Dimensions in Millimeters(mm)		Dimensions In Inches	
	Min	Max	Min	Max
A	15.800	16.000	0.625	0.633
B	20.900	21.100	0.826	0.834
C	4.900	5.100	0.194	0.202
D	1.900	2.100	0.075	0.083
E	1.100	1.300	0.043	0.051
F	0.500	0.700	0.020	0.028
G2	1.100	1.300	0.043	0.051
G3	1.180	1.380	0.046	0.054
H	4.180	4.380	0.165	0.173
I	2.300	2.500	0.091	0.099
J	9.650	9.850	0.380	0.388
K	5.540	5.740	0.219	0.227
L	19.800	20.200	0.783	0.799
M	4.500	4.700	0.178	0.186
N	2.340	2.740	0.093	0.108
ΦP	3.400	3.600	0.134	0.142
Q	4.232	4.432	0.167	0.175
R	4.880	5.280	0.192	0.208