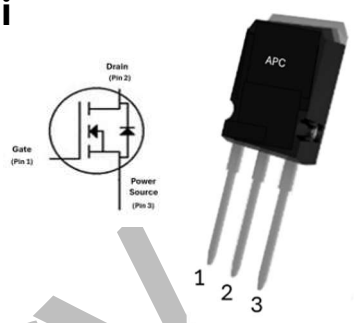
SiC Power MOSFET with Ceramic Isolated Baseplate Tab

AMR450V170E1i



Applications:

- **Uninterrupted power supplies**
- **Switch mode power supplies**
- **Motor drives**

Features:

- **High blocking voltage with low on-resistance**
- **High switching speed with low capacitance**
- **Very low switching losses**
- **Excellent avalanche ruggedness**
- **Very fast and robust intrinsic body diode with low reverse recovery**
- **0V turn-off V_{gs} for gate driving ease**
- **RoHS compliant**

Absolute Maximum Ratings (T_{amb}=25°C, unless specified otherwise)

Symbol	Parameter	Value	Unit
V_{DSmax}	Drain-source voltage	1700	V
V_{GSmax}	Gate-source voltage, max. transient voltage	-10/+27	
V_{GSmax}	Gate-source voltage, max. static voltage	-8/+24	
V_{GSop}	Gate-source voltage	-5/+20	
I_D	Continuous drain current (VGS = 20V)	11.4	A
	Continuous drain current (VGS = 20V), T_C = 100°C	8	
$I_{D(pulse)}$	Pulsed drain current (Pulse width limited by T_{jmax})	28	A
P_{tot}	Power dissipation	200	W
T_j	Operating junction temperature	-55 to 175	°C
T_{stg}	Storage temperature	-55 to 175	°C
T_L	Soldering temperature	260	°C
M	Mounting torque	0.7	Nm

Thermal Resistances

Symbol	Parameter	Min	Typ	Max	Unit
$R_{\theta JC}$	Junction-to-case thermal Resistance	-	0.63	-	°C/W
$R_{\theta JA}$	Junction-to-ambient thermal Resistance	-	-	40	°C/W

Static Electrical Characteristics (T_A =25°C, unless specified otherwise)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	V_{GS} = 0V, I_D = 100μA	1700	/	/	V
$V_{GS(th)}$	Gate-Source Threshold Voltage	V_{DS} = V_{GS}, I_D = 1 mA [a]	1.8	2.6	4.0	
		V_{DS} = V_{GS}, I_D = 1 mA, T_j = 175ºC [a]	-	1.8	-	
I_{DSS}	Drain-Source Leakage current	V_{DS} = 1700V, V_{GS} = 0V	-	1	100	μA
I_{GSS}	Gate-Source leakage current	-10V < V_{GS} < 27V	-	1	100	nA
$R_{DS(on)}$	Drain-Source ON Resistance	V_{GS} = 20V, I_D = 4A	-	0.45	0.6	Ω
		V_{GS} = 20V, I_D = 4A, T_j = 175ºC	-	0.75	-	
g_{fs}	Transconductance	V_{DS} = 20V, I_D = 4A	-	2.0	-	S
		V_{DS} = 20V, I_D = 4A, T_j = 175ºC	-	2.4	-	
$R_{g(int)}$	Internal gate resistance	f = 1MHz, V_{AC} = 25mV	-	5	-	Ω
E_{AS}	Avalanche Energy	L = 5mH, VDD = 50V	-	300	-	mJ

[a] Pre-condition Vth, as per JEDEC standard JEP183A, (Revision of JEP183 January 2021)

Dynamic Characteristics (T_A = 25 °C, unless specified otherwise)

Symbol	Parameter	Test conditions	Min	Typ	Max	Unit
C_{iss}	Input capacitance	V_{GS} = 0V, V_{DS} = 1000V, f = 100kHz, V_{AC} = 25mV	-	454	-	pF
C_{oss}	Output capacitance		-	25	-	
C_{rss}	Reverse transfer capacitance		-	4	-	
E_{oss}	C_{OSS} stored energy		-	15.4	-	μJ
Q_{GS}	Gate to source charge	V_{DD} = 1200V, I_D = 4A, V_{GS} = -5/+20V, I_{GS} = 1mA	-	3.3	-	nC
Q_{GD}	Gate to drain charge		-	18.4	-	
Q_G	Total gate charge		-	33.4	-	

Switching Characteristics ($T_A = 25$ °C, unless specified otherwise)

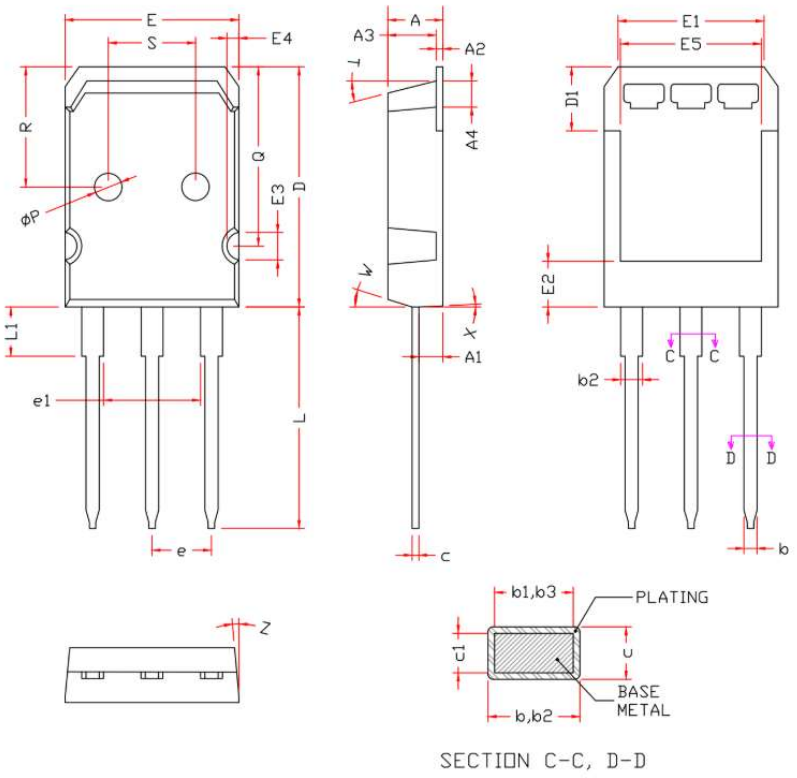
Symbol	Parameter	Test conditions	Min	Typ	Max	Unit
$t_{d(on)}$	Turn-on delay time	V_{DD} = 1200V, V_{GS} = -5/+20V [b], I_D = 4A, $R_{G(ext)}$ = 12Ω, L = 1364μH,	-	TBD	-	ns
t_r	Rise time		-	TBD	-	
$t_{d(off)}$	Turn-off delay time		-	TBD	-	
t_f	Fall time		-	TBD	-	
E_{on}	Turn-on switching energy		-	TBD	-	μJ
E_{off}	Turn-off switching energy		-	TBD	-	
$t_{d(on)}$	Turn-on delay time	V_{DD} = 1200V, V_{GS} = -5/+20V [b], I_D = 4A, $R_{G(ext)}$ = 12Ω, L = 1364μH, T_j = 175°C	-	TBD	-	ns
t_r	Rise time		-	TBD	-	
$t_{d(off)}$	Turn-off delay time		-	TBD	-	
t_f	Fall time		-	TBD	-	
E_{on}	Turn-on switching energy		-	TBD	-	μJ
E_{off}	Turn-off switching energy		-	TBD	-	

[b] This SIC MOSFET can switch with driver pulses 0V to 20V with optimized PCB layouts and gate drive circuits.

Reverse SiC Diode Characteristics ($T_A = 25$ °C, unless specified otherwise)

Symbol	Parameter	Test conditions	Min	Typ	Max	Unit
V_{SD}	Diode forward voltage	V_{GS} = -5V, I_{SD} = 4A	-	3.6	-	V
		V_{GS} = -5V, I_{SD} = 4A, T_j = 175°C	-	3.2	-	
I_S	Continuous diode forward current	V_{GS} = -5V, T_C = 25°C	-	-	5	A
$I_{S,\ pulse}$	Diode pulse current	V_{GS} = -5V, pulse width t_p limited by T_{jmax}	-	-	21	A
t_{rr}	Reverse recovery time	V_{GS} = -5V, I_{SD} = 4A, V_R = 1200V, di_f/dt = 0.16kA/μs	-	TBD	-	ns
Q_{rr}	Reverse recovery charge		-	TBD		μC
I_{rrm}	Peak reverse recovery current		-	TBD	-	A
t_{rr}	Reverse recovery time	V_{GS} = -5V, I_{SD} = 4A, V_R = 1200V, T_j = 175°C, di_f/dt = 0.19kA/μs	-	TBD	-	ns
Q_{rr}	Reverse recovery charge		-	TBD	-	μC
I_{rrm}	Peak reverse recovery current		-	TBD	-	A

Package Information:



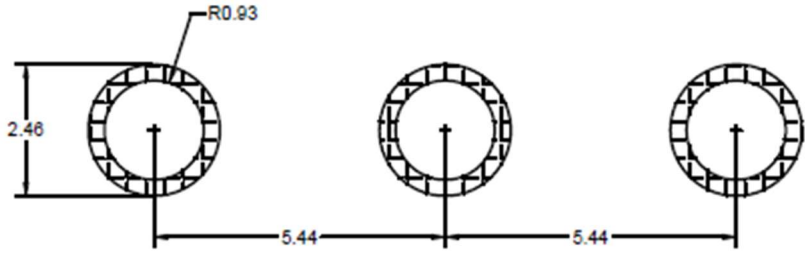
SECTION C-C, D-D

AREA	MIN	NOM	MAX
A	4.84	5.03	5.22
A1	2.29	2.39	2.49
A2	0.65	0.70	0.78
A3	4.20	4.33	4.46
A4	2.07	2.20	2.33
D	21.79	21.94	22.04
D1	5.68	5.83	5.98
E	15.71	15.90	16.09
E1	13.22	13.35	13.48
E2	3.47	4.17	4.87
E3	1.82	2.53	3.24
E4	0.81	1.04	1.24
E5	12.37	12.90	13.43
e		5.40 BSC	
e1		8.79BSC	
L	20.02	20.27	20.52
L1	4.31	4.51	4.71
b	1.06	–	1.32
b1	1.06	1.19	1.27
b2	1.87	–	2.42
b3	1.87	2.01	2.32
c	0.65	–	0.78
c1	0.65	0.70	0.75
ØP	2.40	2.50	2.70
Q	16.83	17.08	17.33
R	10.78	10.98	11.18
S	7.80	8.00	8.20
T		14° REF	
W		21° REF	
X		3° REF	
Z		5° REF	

NOTES :
1. DIMENSION D & E DO NOT INCLUDE MOLD FLASH, MOLD FLASH SHALL NOT EXCEED 0.127 MM PER SIDE. THESE DIMENSIONS ARE MEASURED AT THE OUTERMOST EXTREME OF THE PLASTIC BODY.
2. EJECTION MARK DEPTH $0.10^{+0.15}_{-0.05}$

Recommended Solder Pad Layout

Note: All dimensions are in mm



TO-247-3L

Ordering Information

Part number	AMR450V170E1i
Package	TO-247-3L (Isolated)
Unit quantity	300 EA
Packing type	Tube