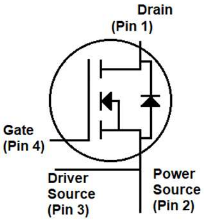
SiC Power MOSFET with Ceramic Isolated Baseplate Tab

AMR075V120H2i



Applications:

- **Solar Inverters**
- **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_{DS}	DC Reverse Voltage	1200	V
V_{GSmax}	Gate-source voltage, max. transient voltage	-11/+25	
V_{GSmax}	Gate-source voltage, max. static voltage	-10/+22	
V_{GSop}	Gate-source voltage	-5/+18	
I_D	Continuous drain current (VGS = 18V)	27	A
	Continuous drain current (VGS = 18V), T_C = 100℃	19	
$I_{D(pulse)}$	Pulsed drain current (Pulse width limited by T_{jmax})	68	A
P_{tot}	Power dissipation	160	W
T_j	Operating junction temperature	-55 to 175	˚C
T_{stg}	Storage temperature	-55 to 175	˚C

Thermal and Mechanical Characteristics

Symbol	Parameter	Min	Typ	Max	Unit
$R_{\theta JC}$	Junction-to-case thermal Resistance	-	TBD	-	℃/W

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

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS} = 0V, I_D = 100μA	1200	-	-	V
$V_{GS(th)}$	Gate-Source Threshold Voltage	V_{DS} = V_{GS}, I_D = 2.5mA [a]	1.8	2.9	4.2	
		V_{DS} = V_{GS}, I_D = 2.5mA, T_j = 175°C [a]	-	2.2	-	
I_{DSS}	Drain-Source Leakage current	V_{DS} = 1200V, V_{GS} = 0V	-	1	150	μA
I_{GSS}	Gate-Source leakage current	-11V < V_{GS} < 25V	-	1	100	nA
$R_{DS(on)}$	Drain-Source ON Resistance	V_{GS} = 15V, I_D = 18A	-	97	-	mΩ
		V_{GS} = 18V, I_D = 18A	-	75	98	
		V_{GS} = 18V, I_D = 18A, T_j = 175°C	-	140	-	
g_{fs}	Transconductance	V_{DS} = 20V, I_D = 18A	-	11	-	S
		V_{DS} = 20V, I_D = 18A, T_j = 175°C	-	10	-	
$R_{g(int)}$	Internal gate resistance	f = 1MHz, V_{AC} = 25mV	-	4.8	-	Ω

[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	-	815	-	pF
C_{oss}	Output Capacitance		-	38	-	
C_{rss}	Reverse Transfer Capacitance		-	3	-	
E_{oss}	C_{oss} stored energy		-	22	-	μJ
Q_{gs}	Gate-Source Gate Charge	V_{DD} = 800V, V_{GS} = -5/+18V, I_D = 18A, I_{GS} = 1mA	-	12	-	nC
Q_{gd}	Gate-Drain Gate Charge		-	14	-	
Q_g	Total Gate Charge		-	40	-	

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} = 800V, V_{GS} = -5/+18V [b], I_D = 18A, $R_{G(ext)}$ = 2.4Ω, L = 110μH	-	6	-	ns
T_r	Rise time		-	12	-	
$T_{d(off)}$	Turn-off delay time		-	17	-	
T_f	Fall time		-	8	-	
E_{on}	Turn On Switching Energy		-	178	-	μJ
E_{off}	Turn Off Switching Energy		-	15	-	
$T_{d(on)}$	Turn-on delay time	V_{DD} = 800V, V_{GS} = -5/+18V [b], I_D = 18A, $R_{G(ext)}$ = 2.4Ω, L = 110μH, T_j = 175°C	-	5	-	ns
T_r	Rise time		-	14	-	
$T_{d(off)}$	Turn-off delay time		-	19	-	
T_f	Fall time		-	8	-	
E_{on}	Turn On Switching Energy		-	267	-	μJ
E_{off}	Turn Off Switching Energy		-	18	-	

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

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

Symbol	Parameter	Test conditions	Min	Typ	Max	Unit
V_{SD}	Body Diode Forward Voltage	V_{GS} = -5V, I_{SD} = 18A	-	4.8	-	V
		V_{GS} = -5V, I_{SD} = 18A, T_j = 175°C	-	4.2	-	
I_S	Continuous diode forward current	V_{GS} = -5V, T_C = 25℃	-	-	27	A
$I_{S,\ pulse}$	Diode Pulse Current	V_{GS} = -5V, pulse width t_p limited by T_{jmax}		-	68	A
t_{rr}	Reverse recovery time	V_{GS} = -5V, I_{SD} = 18A, V_R = 800V, di_f/dt = 3.01kA/μs	-	8	-	ns
Q_{rr}	Reverse recovery charge		-	0.12		μC
I_{rrm}	Peak reverse recovery current		-	26	-	A
t_{rr}	Reverse recovery time	V_{GS} = -5V, I_{SD} = 18A, V_R = 800V, T_j = 175°C , di_f/dt = 2.97kA/μs	-	14	-	ns
Q_{rr}	Reverse recovery charge		-	0.37		μC
I_{rrm}	Peak reverse recovery current		-	46	-	A

Electrical Characteristic Diagrams

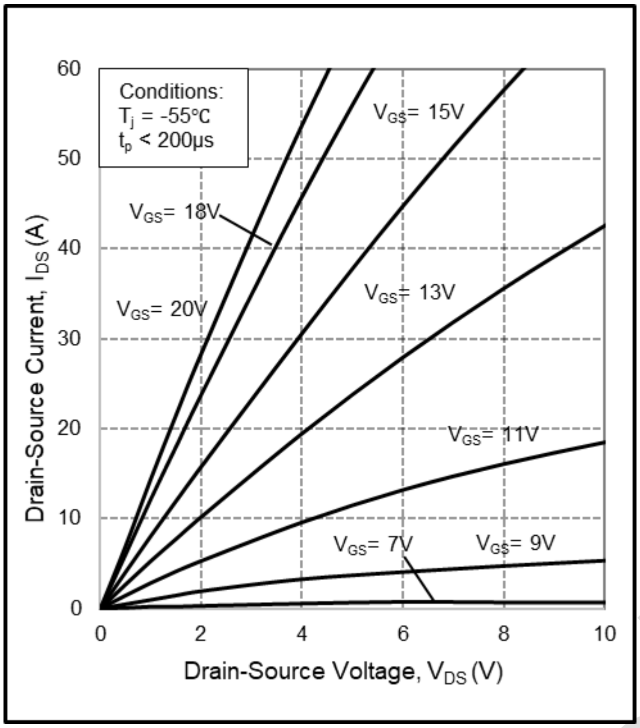


Figure 1. Output characteristics at T_j = -55℃

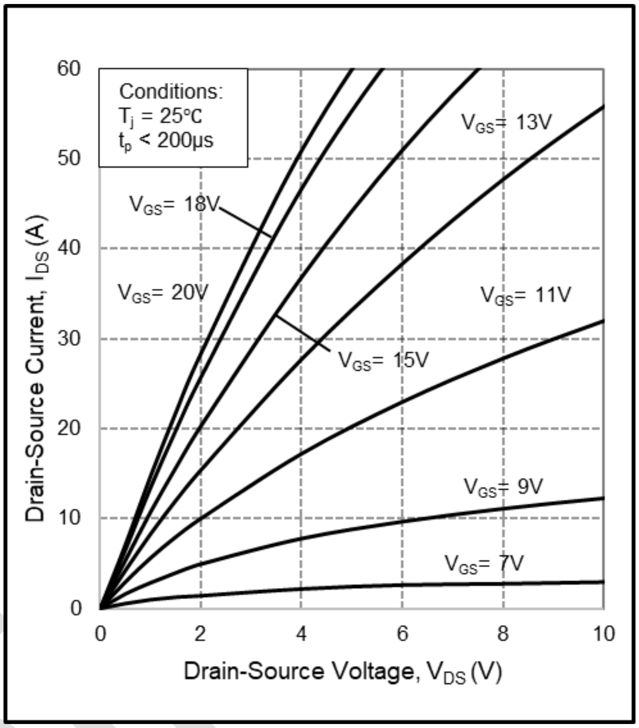


Figure 2. Output characteristics at T_j = 25℃

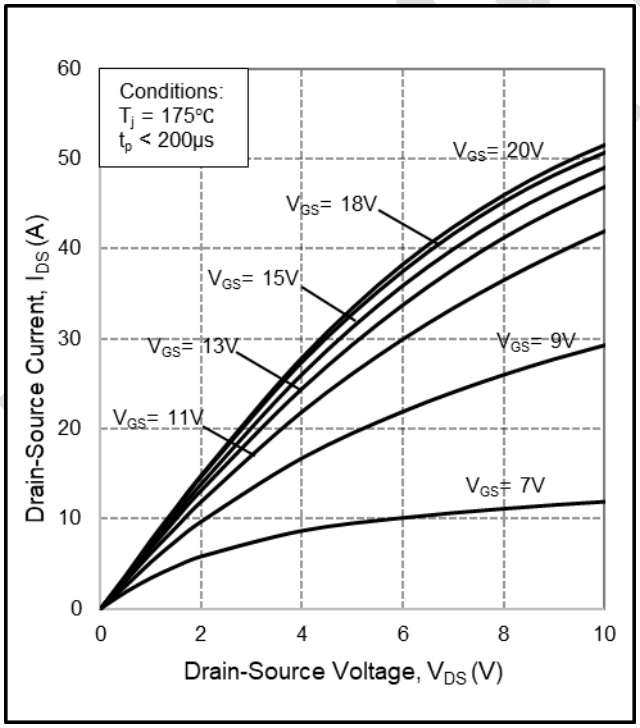


Figure 3. Output characteristics at T_j = 175℃

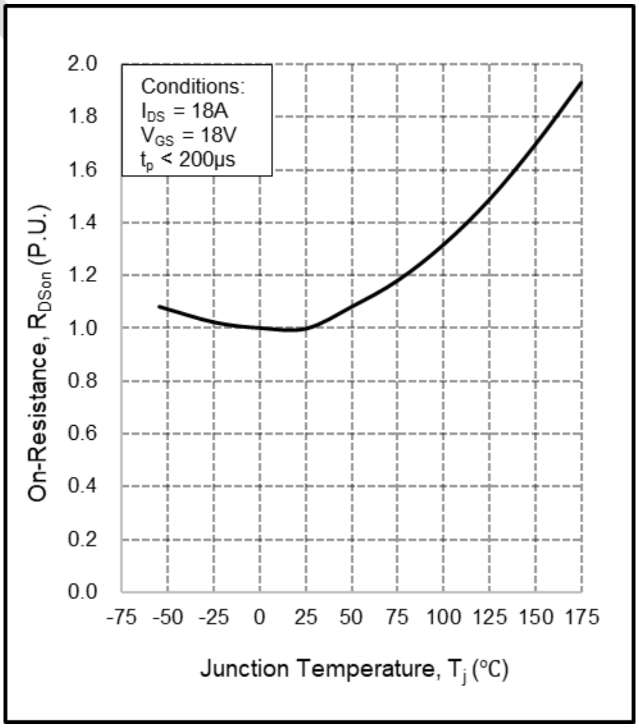


Figure 4. Normalized on-resistance vs. temperature

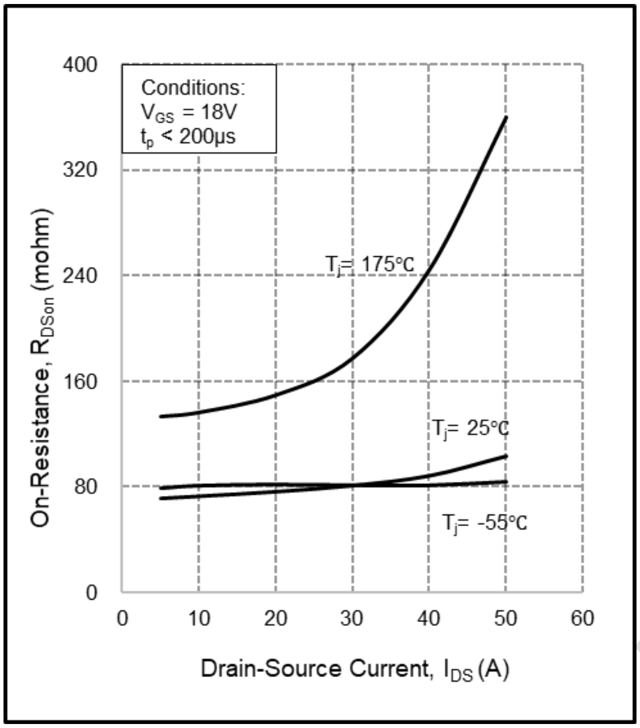


Figure 5. On-resistance vs. drain current for various temperatures

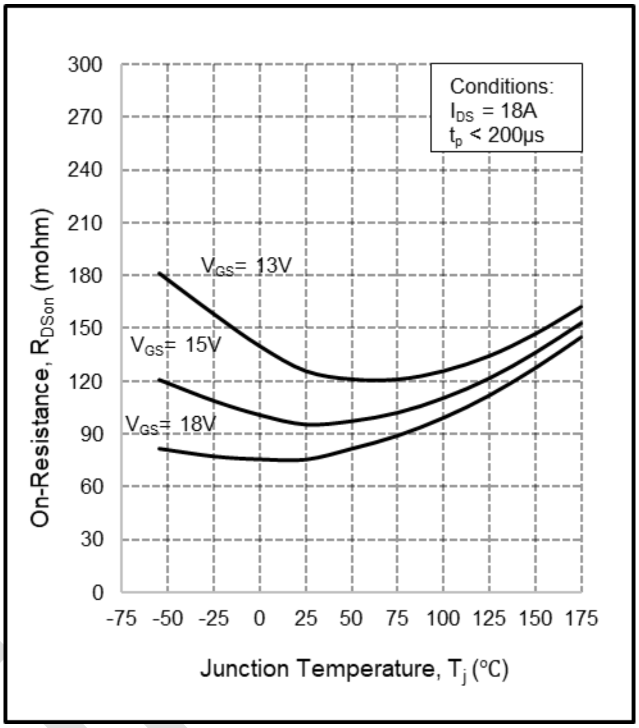


Figure 6. On-resistance vs. temperature for various gate voltages

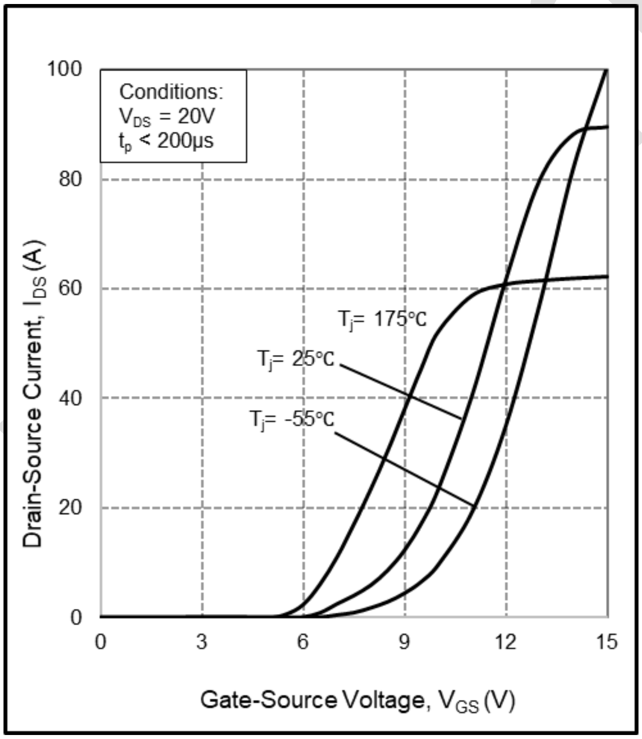


Figure 7. Transfer characteristic for various junction temperatures

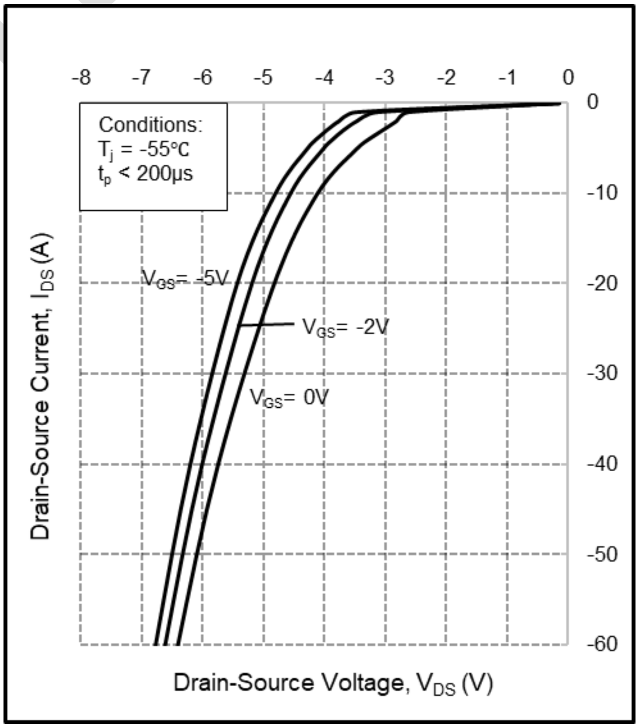


Figure 8. Body diode characteristic at T_j = -55℃

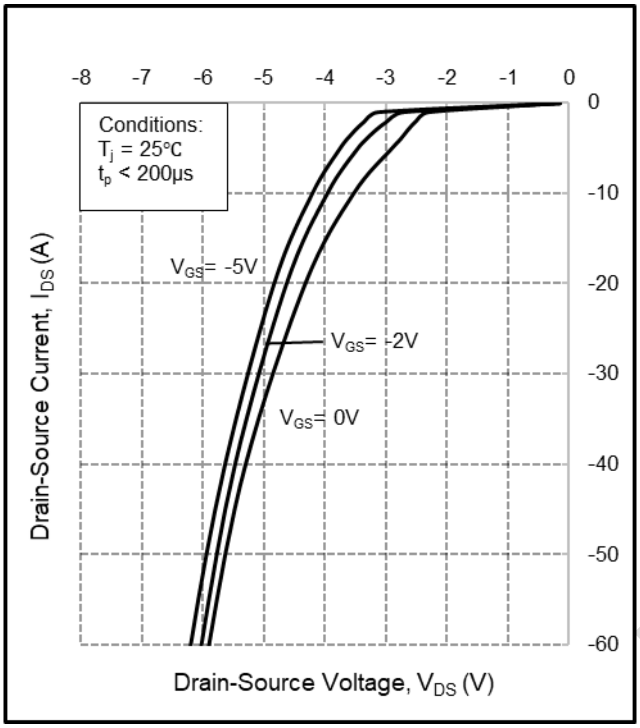


Figure 9. Body diode characteristic at T_j = 25℃

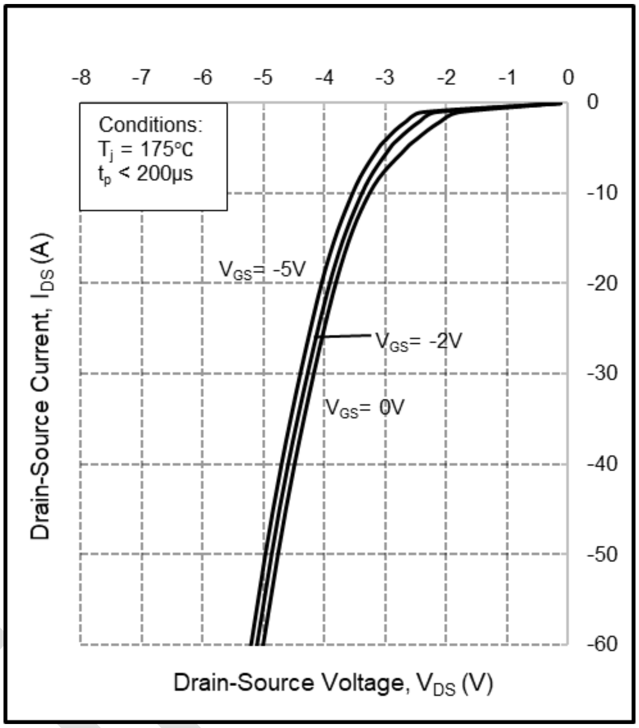


Figure 10. Body diode characteristic at T_j = 175℃

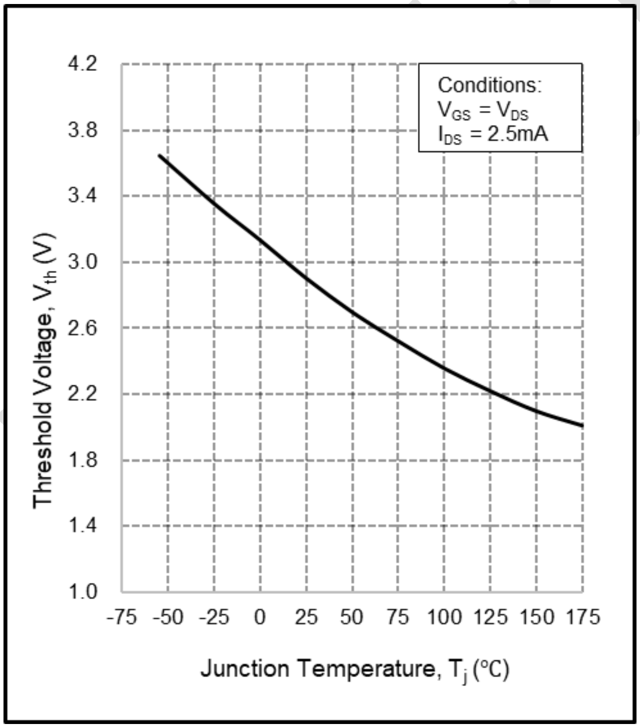


Figure 11. Threshold voltage vs. temperature

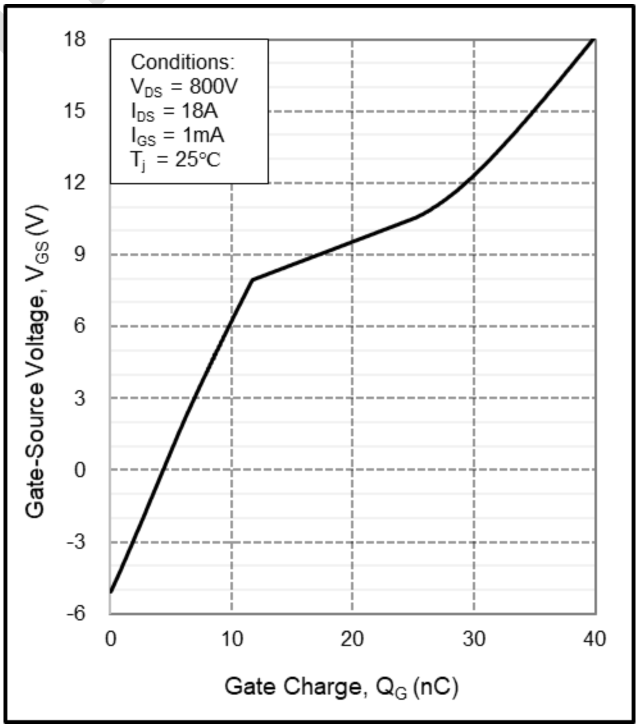


Figure 12. Gate charge characteristics

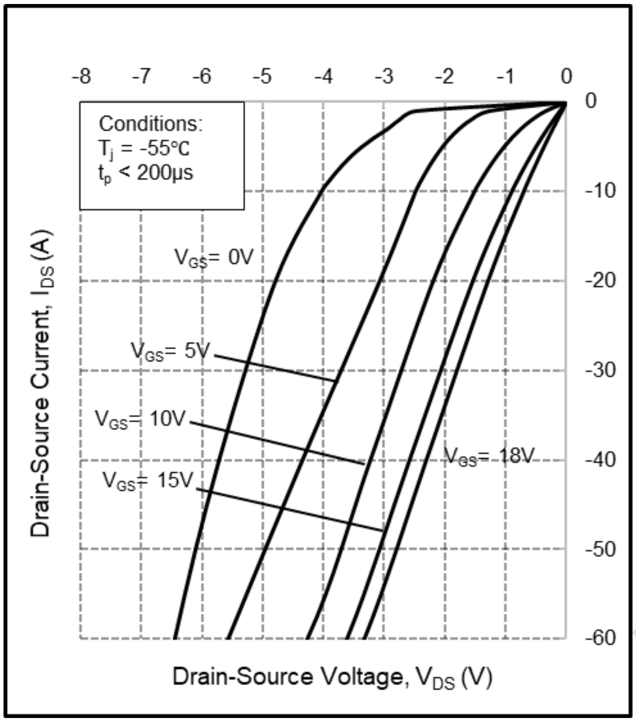


Figure 13. 3rd quadrant characteristic at T_j = -55℃

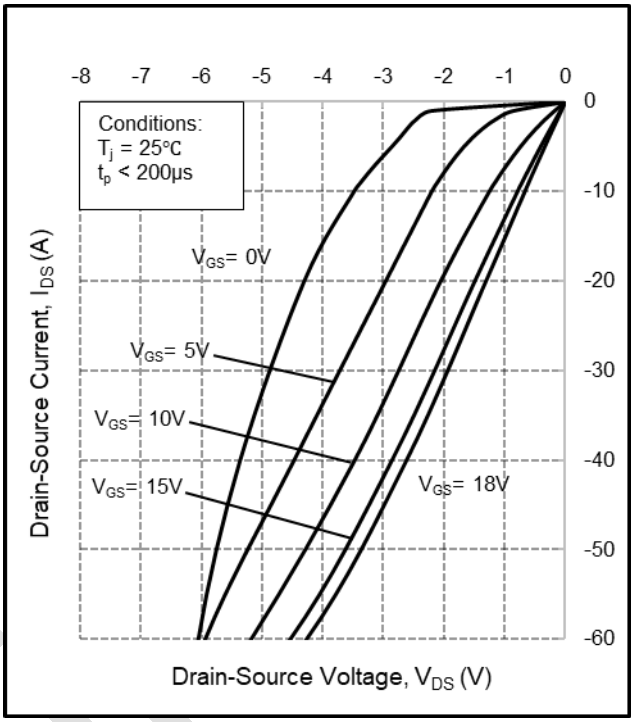


Figure 14. 3rd quadrant characteristic at T_j = 25℃

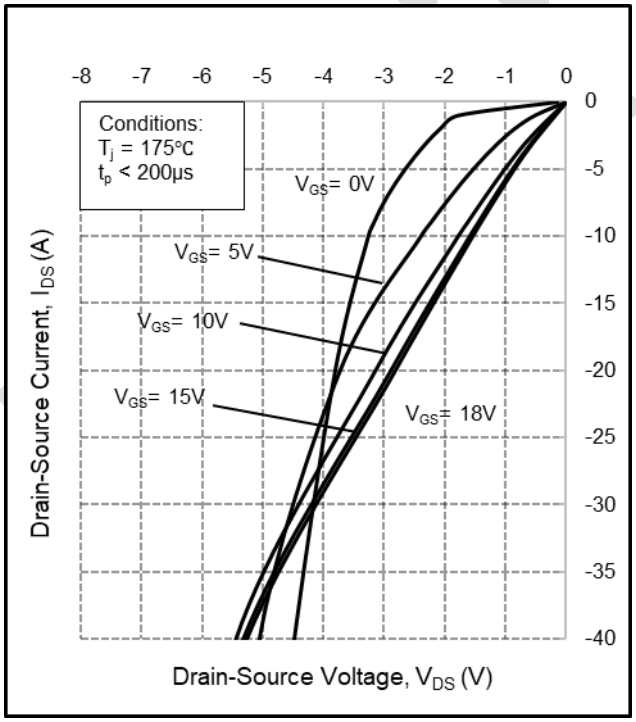


Figure 15. 3rd quadrant characteristic at T_j = 175℃

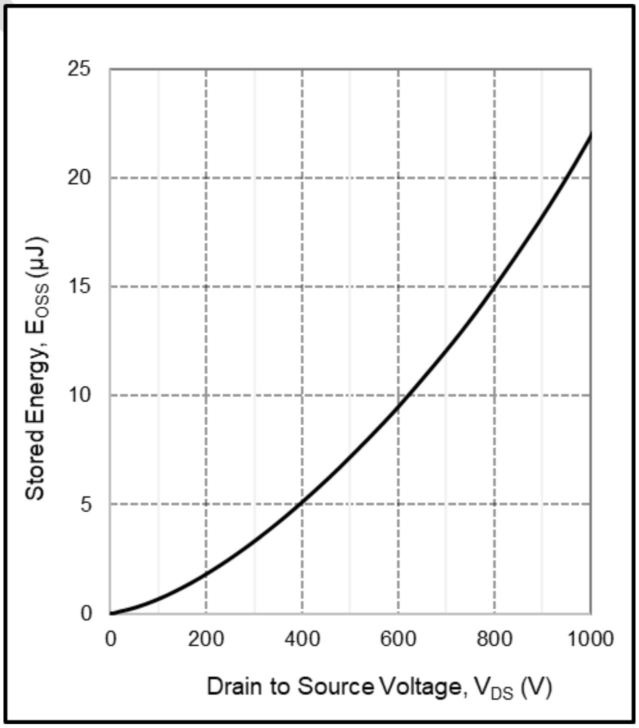


Figure 16. Output capacitor stored energy

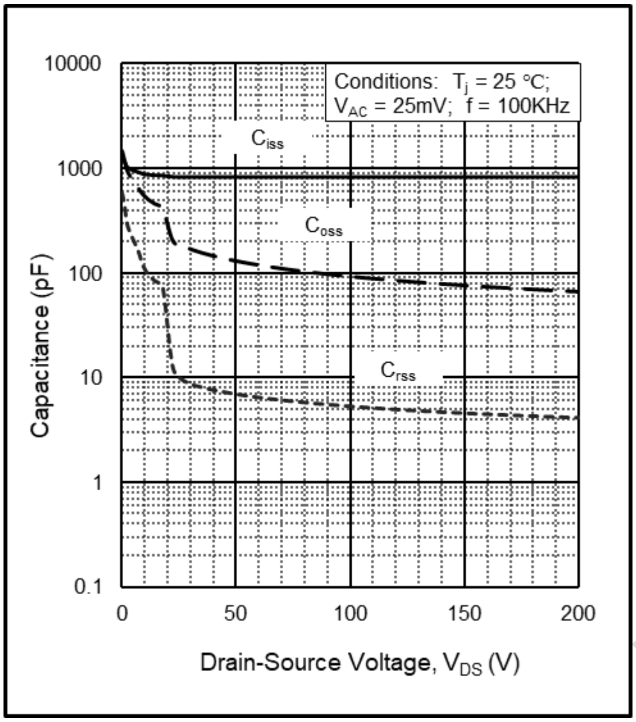


Figure 17. Capacitance vs. drain-source voltage (0 - 200V)

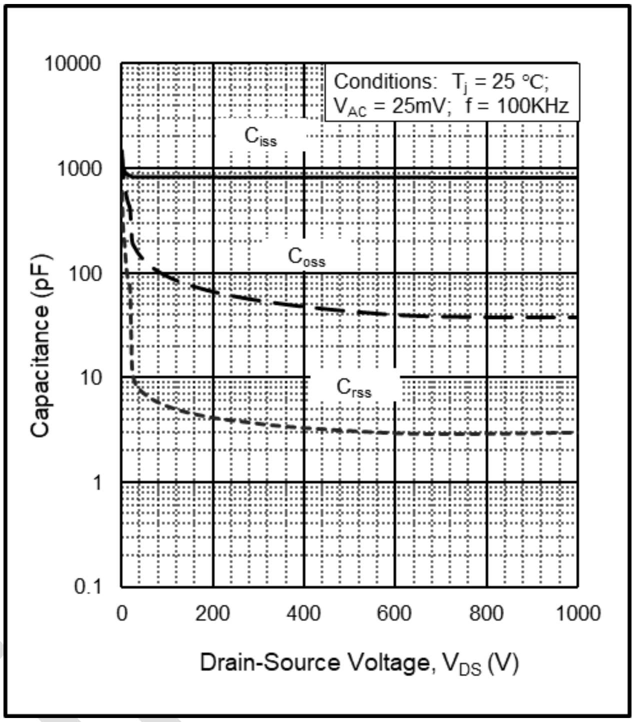


Figure 18. Capacitance vs. drain-source voltage (0 - 1000V)

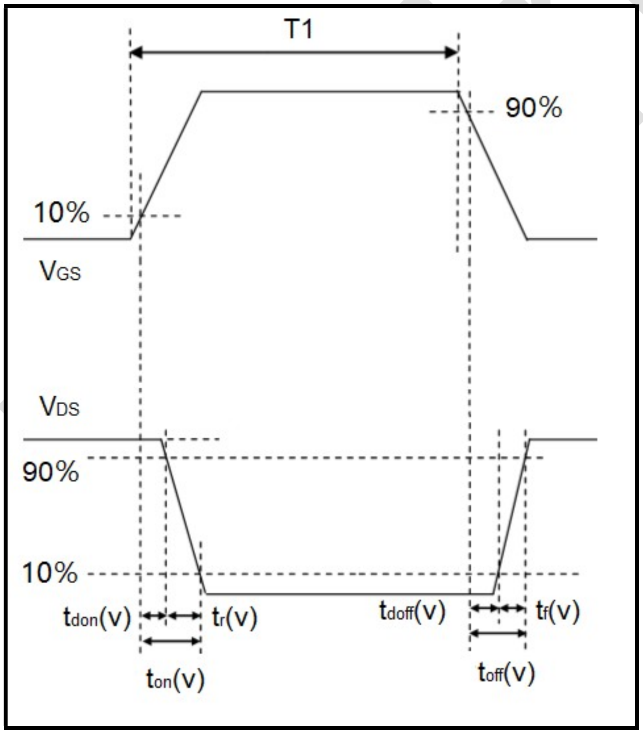


Figure 19. Switching times definition

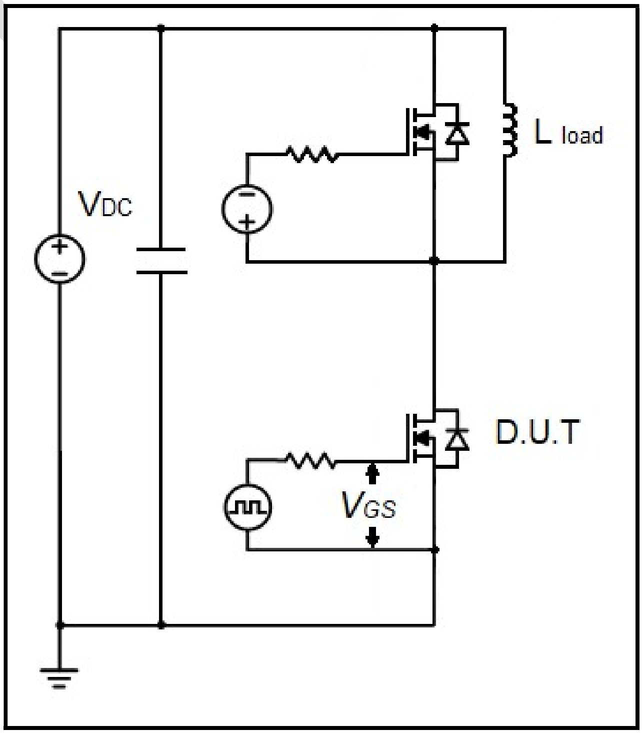


Figure 20. Clamped inductive switching waveform test circuit

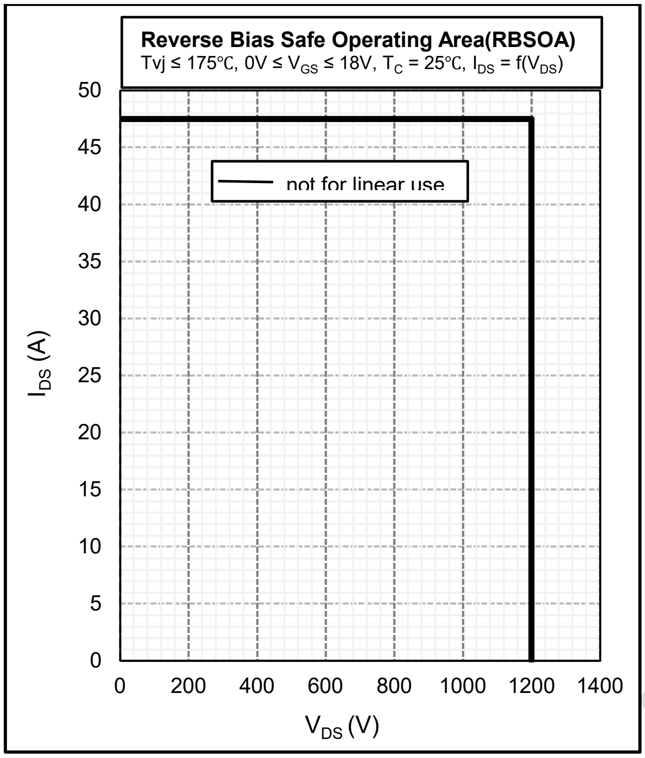
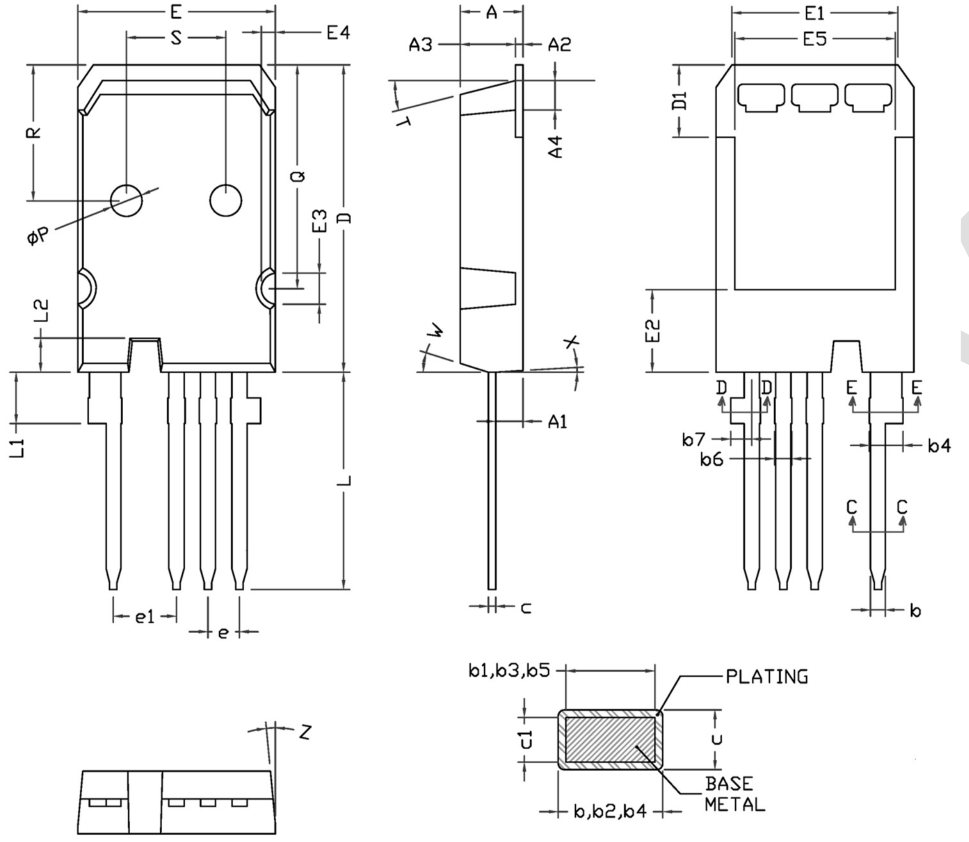


Figure 21. Reverse Bias Safe Operating Area

Package Information:



SECTION C-C, D-D, E-E

AREA	MIN	NOM	MAX
A	4,84	5.03	5.22
Al	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	24,60	24,75	24,85
D1	5,68	5,83	5,98
E	15,71	15,90	16.09
El	13.22	13.35	13.48
E2	5,93	6,63	7.33
E3	1.82	2.53	3.24
E4	0,81	1.04	1.24
E5	12.37	12,90	13.43
e	2.54 BSC		
e1	5.08 BSC		
L	17.27	17,52	17,77
L1	3,97	4.17	4.37
L2	2.35	2.50	2.65

AREA	MIN	NOM	MAX
b	1.07	-	1.33
b1	1.07	1.20	1.28
b2	2.39	-	2,64
b3	2.39	-	2.69
b4	2.39	-	2,94
b5	2.39	2.53	2.84
b6	1.07	-	1.60
b7	1.30	-	1.70
c	0.65	-	0.78
c1	0,65	0.70	0.75
ΦP	2.40	2.50	2.70
Q	17,77	18.02	18.27
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		

Ordering Information

Part number	AMR075V120H2i
Package	TO-247-4L (Isolated)
Unit quantity	300 EA
Packing type	Tube

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