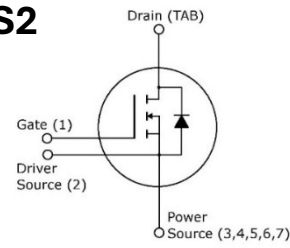




High Power SiC MOSFET Transistor

AMR009V075S2



Applications:

- Solar Inverters
- Uninterrupted power supplies
- Switch mode power supplies
- Motor drives

Features:

- AEC-Q101 qualified
- 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

Absolute Maximum Ratings ($T_{amb}=25^{\circ}\text{C}$, unless specified otherwise)

Symbol	Parameter	Value	Unit
V_{DS}	DC Reverse Voltage	750	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 (Recommended operation values)	-5/+18	
I_D	Continuous drain current ($V_{GS} = 18\text{V}$)	172	A
	Continuous drain current ($V_{GS} = 18\text{V}$), $T_C = 100^{\circ}\text{C}$	122	
$I_{D(pulse)}$	Pulsed drain current	430	A
P_{tot}	Power dissipation	500	W
T_j	Operating junction temperature	-55 to 175	$^{\circ}\text{C}$
T_{stg}	Storage temperature	-55 to 175	$^{\circ}\text{C}$

Thermal and Mechanical Characteristics

Symbol	Parameter	Min	Typ	Max	Unit
$R_{\theta JC}$	Junction-to-case thermal Resistance	-	TBD	-	$^{\circ}\text{C/W}$
$R_{\theta JA}$	Junction-to-ambient thermal Resistance	-	-	TBD	$^{\circ}\text{C/W}$

Static Electrical Characteristics ($T_A = 25^\circ\text{C}$, unless specified otherwise)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS} = 0V, I_D = 100\mu A$	750	-	-	V
$V_{GS(th)}$	Gate-Source Threshold Voltage	$V_{DS} = V_{GS}, I_D = 20mA$	1.8	2.9	4.2	
		$V_{DS} = V_{GS}, I_D = 20mA, T_j = 175^\circ\text{C}$	-	2.0	-	
I_{DSS}	Drain-Source Leakage current	$V_{DS} = 750V, V_{GS} = 0V$	-	1	50	μA
I_{GSS}	Gate-Source leakage current	$V_{GS} = 18V, V_{DS} = 0V$	-	1	250	nA
$R_{DS(on)}$	Drain-Source ON Resistance	$V_{GS} = 15V, I_D = 80A$	-	12	-	m Ω
		$V_{GS} = 18V, I_D = 80A$	-	9	12	
		$V_{GS} = 18V, I_D = 80A, T_j = 175^\circ\text{C}$	-	12	-	
g_{fs}	Transconductance	$V_{DS} = 20V, I_D = 80A$	-	47	-	S
		$V_{DS} = 20V, I_D = 80A, T_j = 175^\circ\text{C}$	-	48	-	
$R_{g(int)}$	Internal gate resistance	$f = 1MHz, V_{AC} = 25mV$	-	6.5	-	Ω

Dynamic Characteristics ($T_A = 25^\circ\text{C}$, unless specified otherwise)

Symbol	Parameter	Test conditions	Min	Typ	Max	Unit
C_{iss}	Input Capacitance	$V_{GS} = 0V, V_{DS} = 700V, f = 100kHz, V_{AC} = 25mV$	-	5107	-	pF
C_{oss}	Output Capacitance		-	387	-	
C_{rss}	Reverse Transfer Capacitance		-	24	-	
E_{oss}	C_{oss} stored energy		-	105	-	μJ
Q_{gs}	Gate-Source Gate Charge	$V_{DD} = 500V, V_{GS} = -5/+18V, I_D = 80A, I_{GS} = 1mA$	-	73	-	nC
Q_{gd}	Gate-Drain Gate Charge		-	50	-	
Q_g	Total Gate Charge		-	218	-	

Switching Characteristics ($T_A = 25^\circ\text{C}$, unless specified otherwise)

Symbol	Parameter	Test conditions	Min	Typ	Max	Unit
$T_{d(on)}$	Turn-on delay time	$V_{DD} = 500V$, $V_{GS} = -5/+18V$, $I_D = 80A$, $R_{G(ext)} = 2.4\Omega$, $L = 110\mu H$	-	21	-	ns
T_r	Rise time		-	45	-	
$T_{d(off)}$	Turn-off delay time		-	91	-	
T_f	Fall time		-	17	-	
E_{on}	Turn On Switching Energy	$V_{DD} = 500V$, $V_{GS} = -5/+18V$, $I_D = 80A$, $R_{G(ext)} = 2.4\Omega$, $L = 110\mu H$, $T_j = 175^\circ\text{C}$	-	967	-	μJ
E_{off}	Turn Off Switching Energy		-	449	-	
$T_{d(on)}$	Turn-on delay time		-	19	-	ns
T_r	Rise time		-	44	-	
$T_{d(off)}$	Turn-off delay time		-	120	-	
T_f	Fall time		-	20	-	
E_{on}	Turn On Switching Energy		-	1028	-	μJ
E_{off}	Turn Off Switching Energy		-	582	-	

Body Diode Characteristics ($T_A = 25^\circ\text{C}$, unless specified otherwise)

Symbol	Parameter	Test conditions	Min	Typ	Max	Unit
V_{SD}	Body Diode Forward Voltage	$V_{GS} = -5V$, $I_{SD} = 50A$	-	3.9	-	V
		$V_{GS} = -5V$, $I_{SD} = 50A$, $T_j = 175^\circ\text{C}$	-	3.5	-	
I_S	Continuous diode forward current	$V_{GS} = -5V$, $T_C = 25^\circ\text{C}$	-	-	172	A
$I_{S, pulse}$	Diode Pulse Current	$V_{GS} = -5V$, pulse width t_p limited by T_{jmax}	-	-	430	A
t_{rr}	Reverse recovery time	$V_{GS} = -5V$, $I_{SD} = 80A$, $V_R = 500V$, $di_f/dt = 1.03kA/\mu s$	-	29	-	ns
Q_{rr}	Reverse recovery charge		-	0.37	-	μC
I_{rrm}	Peak reverse recovery current		-	27	-	A
t_{rr}	Reverse recovery time	$V_{GS} = -5V$, $I_{SD} = 80A$, $V_R = 500V$, $T_j = 175^\circ\text{C}$, $dif/dt = 1.03kA/\mu s$	-	36	-	ns
Q_{rr}	Reverse recovery charge		-	0.67	-	μC
I_{rrm}	Peak reverse recovery current		-	34	-	A

Electrical Characteristic Diagrams

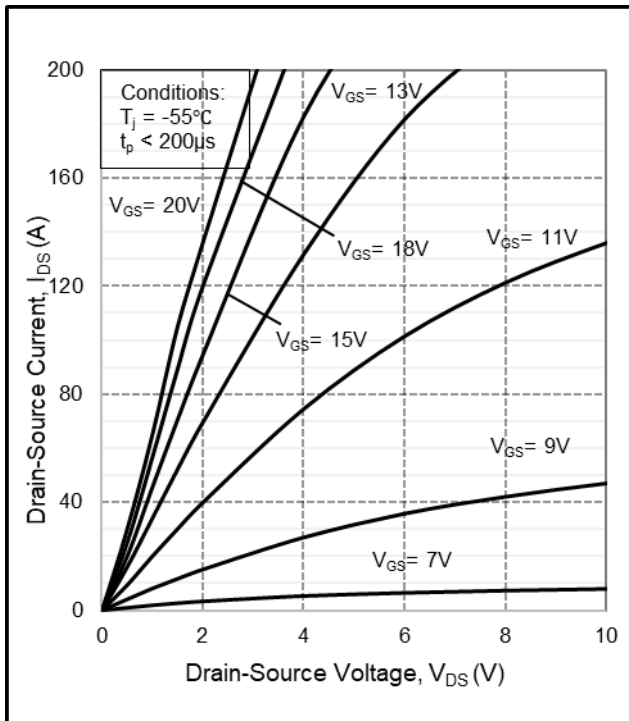
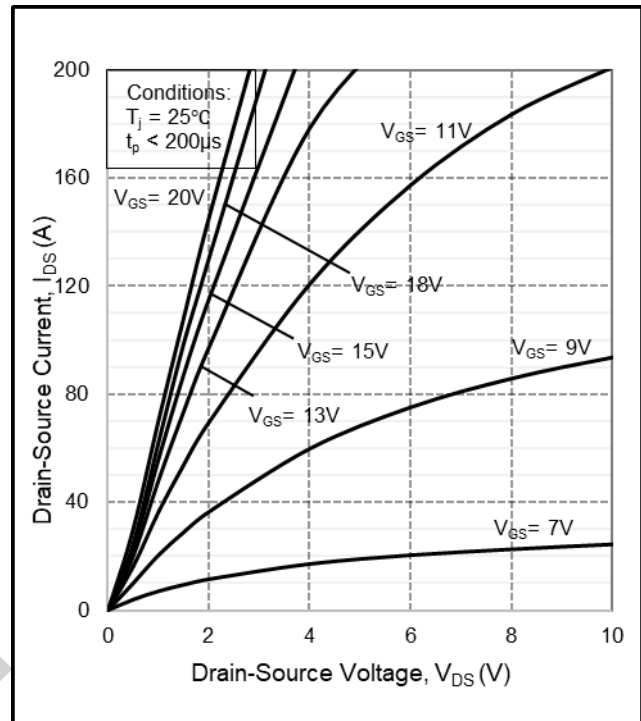
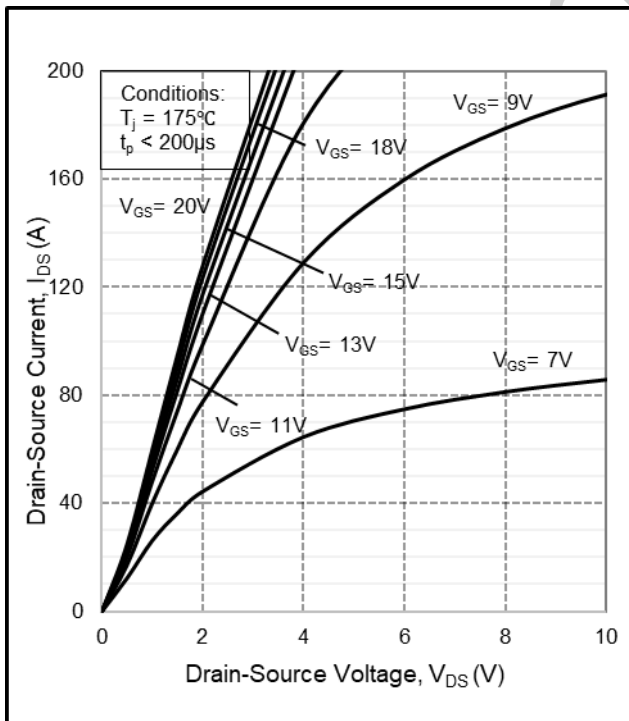
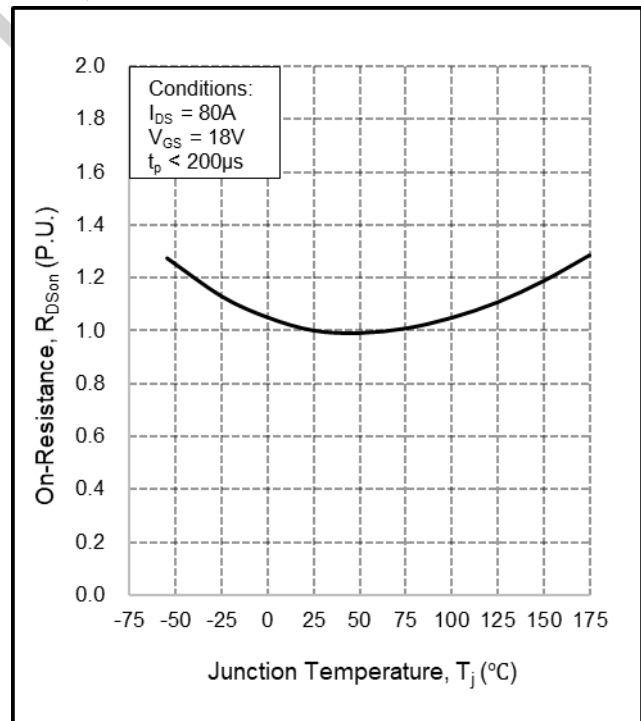
Figure 1. Output characteristics at $T_j = -55^\circ\text{C}$ Figure 2. Output characteristics at $T_j = 25^\circ\text{C}$ Figure 3. Output characteristics at $T_j = 175^\circ\text{C}$ 

Figure 4. Normalized on-resistance vs. temperature

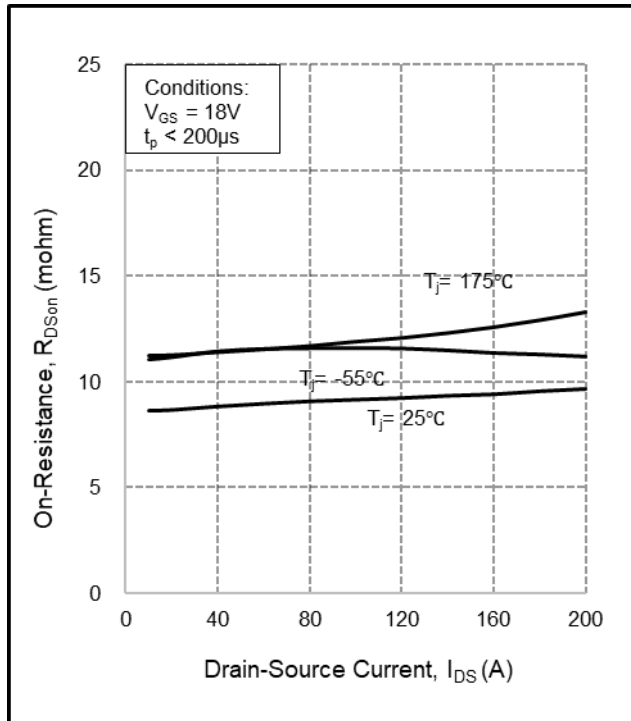


Figure 5. On-resistance vs. drain current for various temperatures

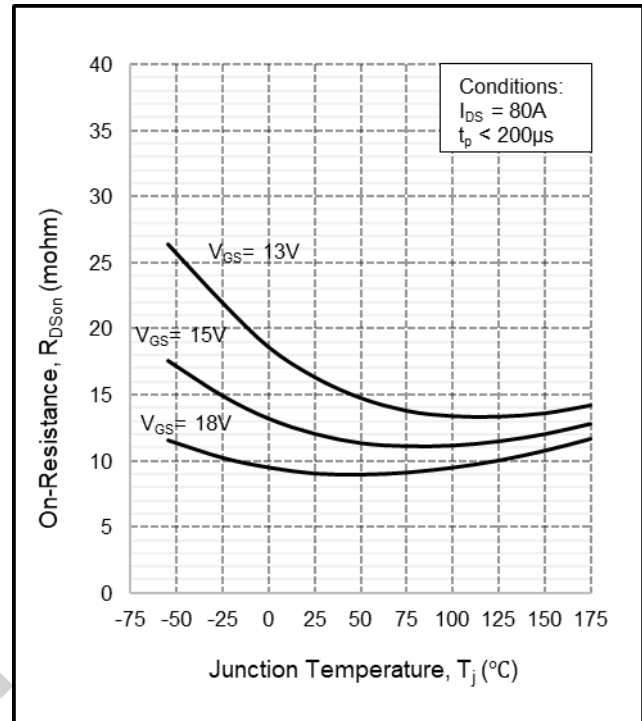


Figure 6. On-resistance vs. temperature for various gate voltages

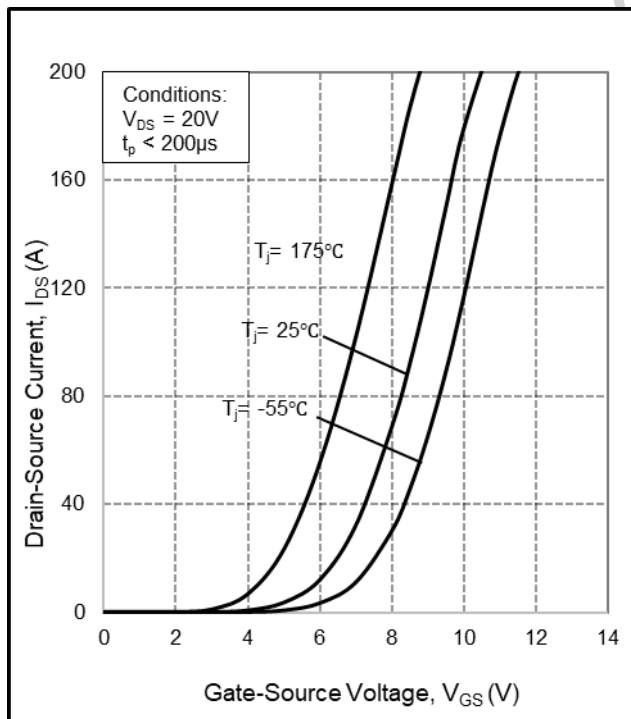


Figure 7. Transfer characteristic for various junction temperatures

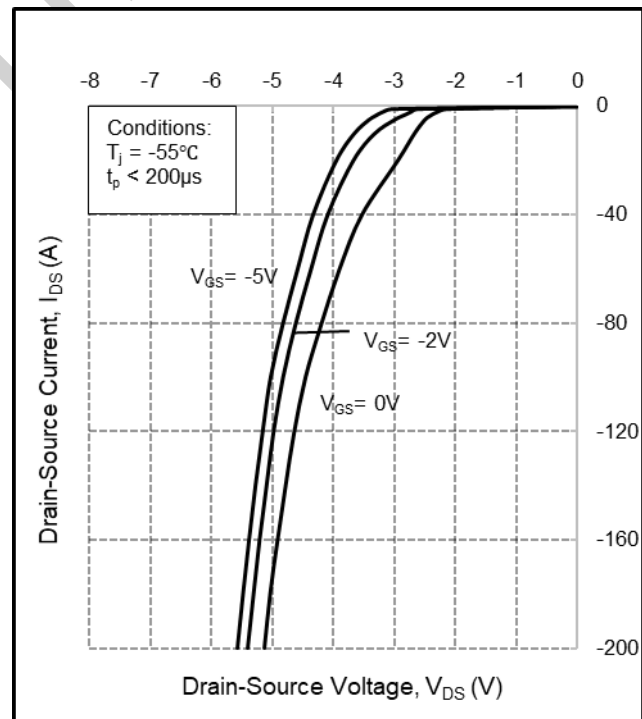


Figure 8. Body diode characteristic at $T_J = -55^\circ\text{C}$

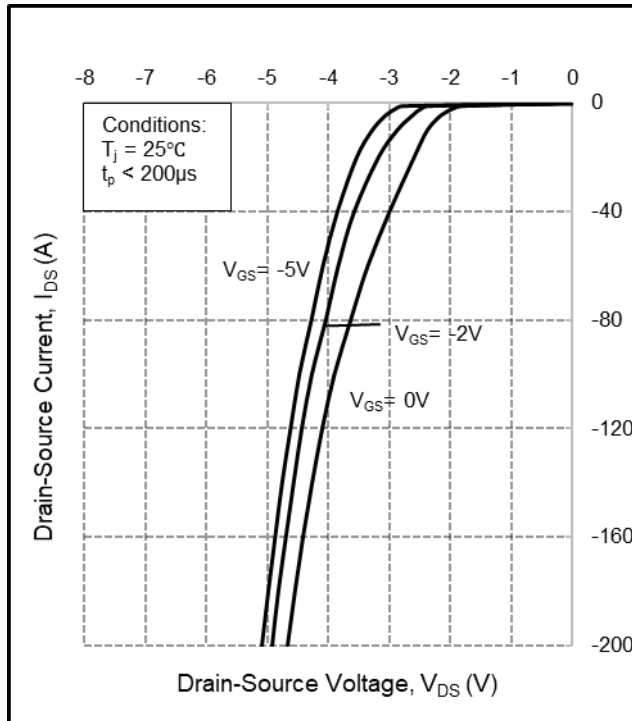
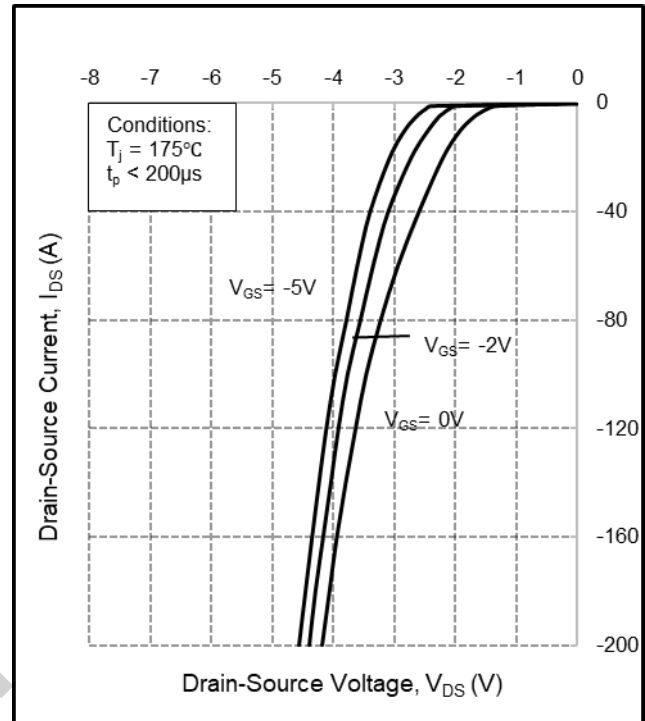
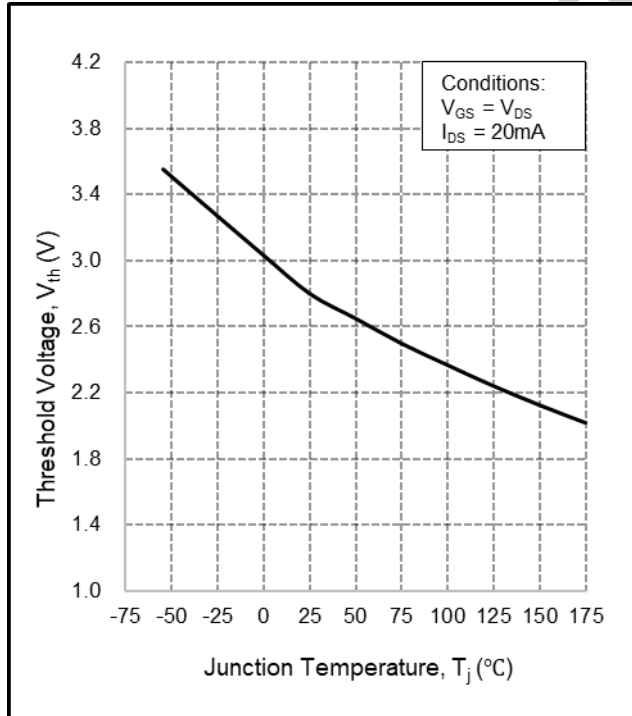
Figure 9. Body diode characteristic at $T_j = 25^\circ\text{C}$ Figure 10. Body diode characteristic at $T_j = 175^\circ\text{C}$ 

Figure 11. Threshold voltage vs. temperature

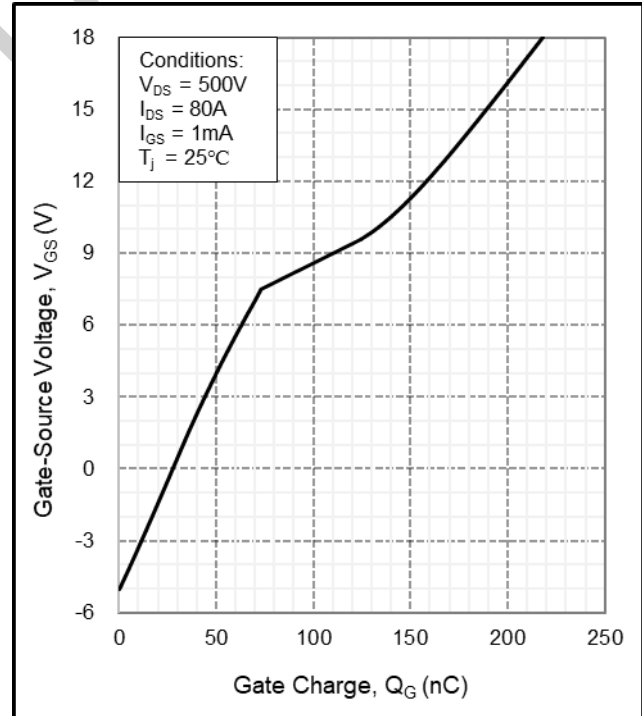


Figure 12. Gate charge characteristics

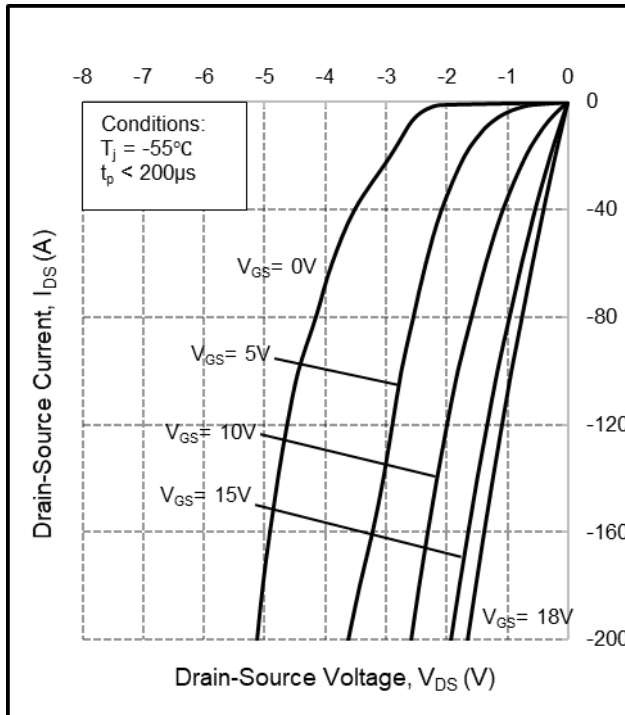


Figure 13. 3rd quadrant characteristic
at $T_j = -55^\circ\text{C}$

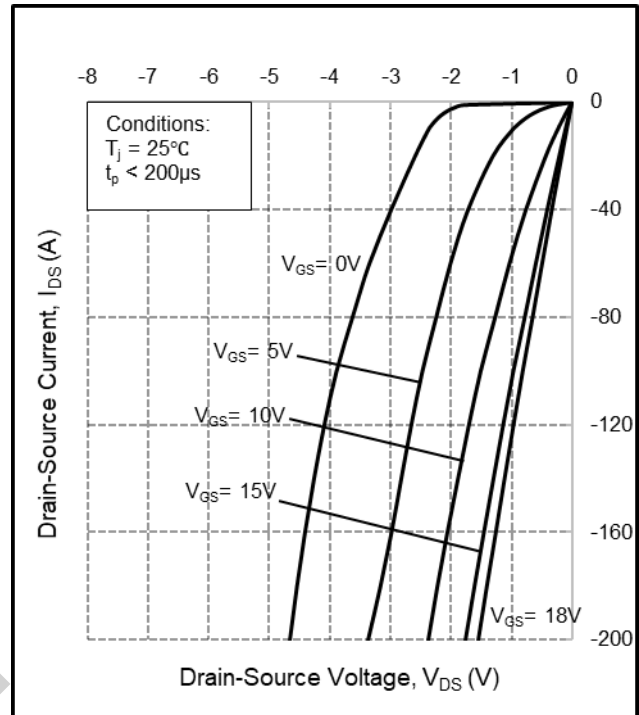


Figure 14. 3rd quadrant characteristic
at $T_j = 25^\circ\text{C}$

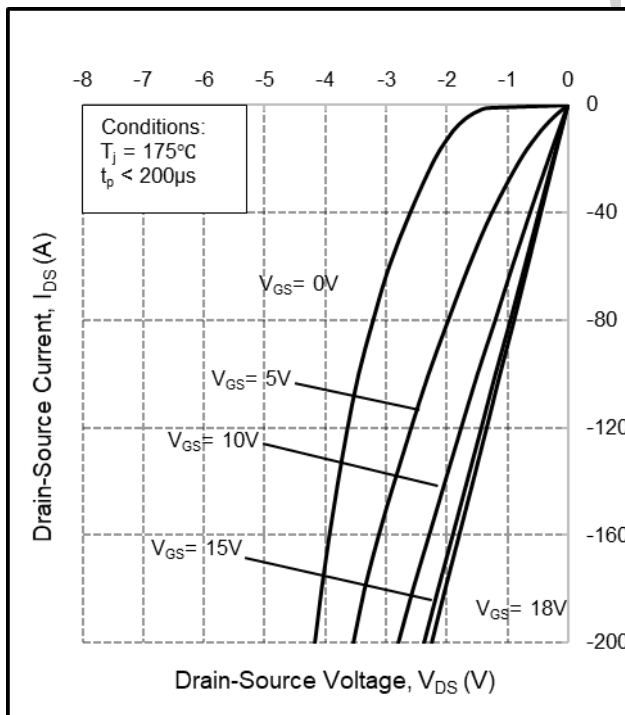


Figure 15. 3rd quadrant characteristic
at $T_j = 175^\circ\text{C}$

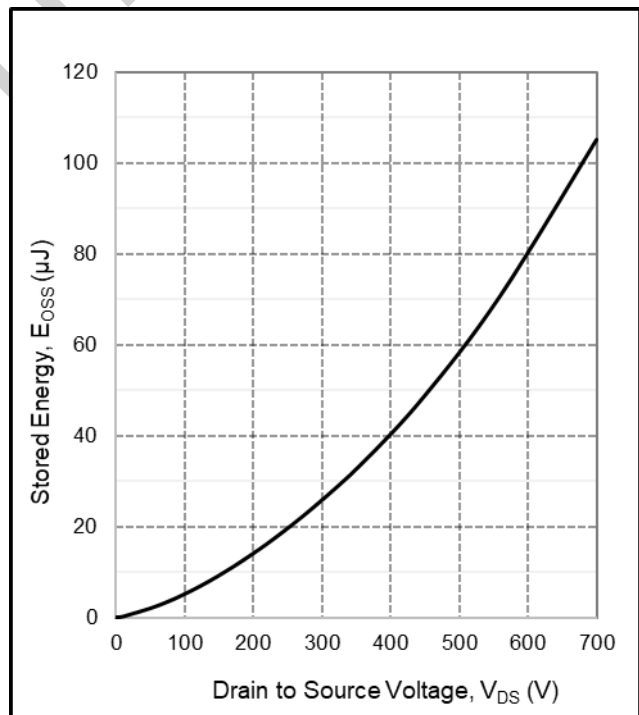


Figure 16. Output capacitor stored energy

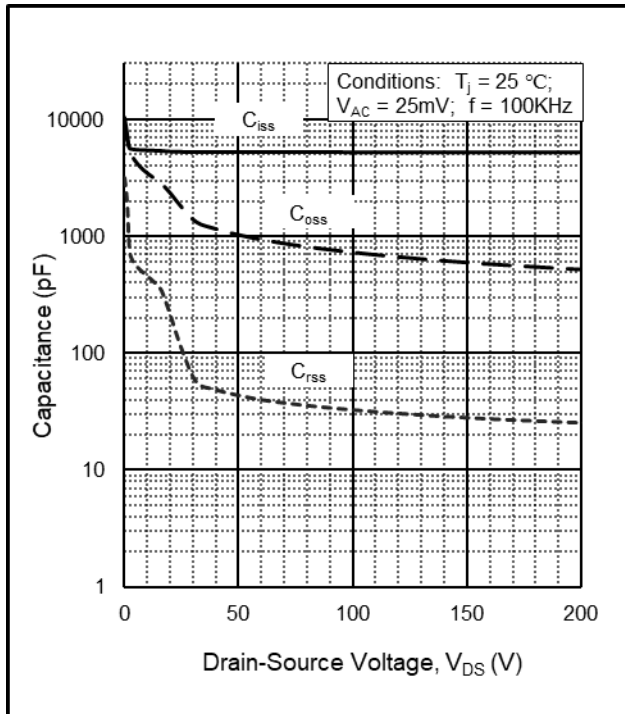


Figure 17. Capacitance vs. drain-source voltage (0 - 200V)

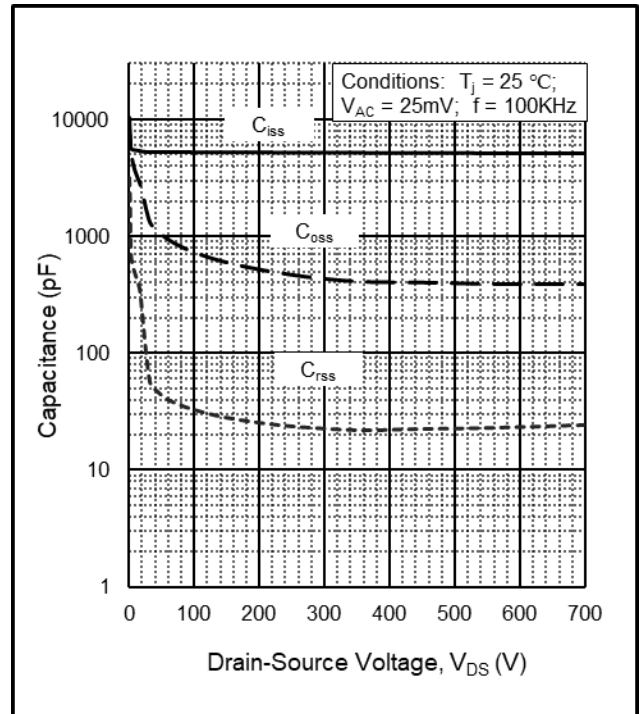


Figure 18. Capacitance vs. drain-source voltage (0 - 600V)

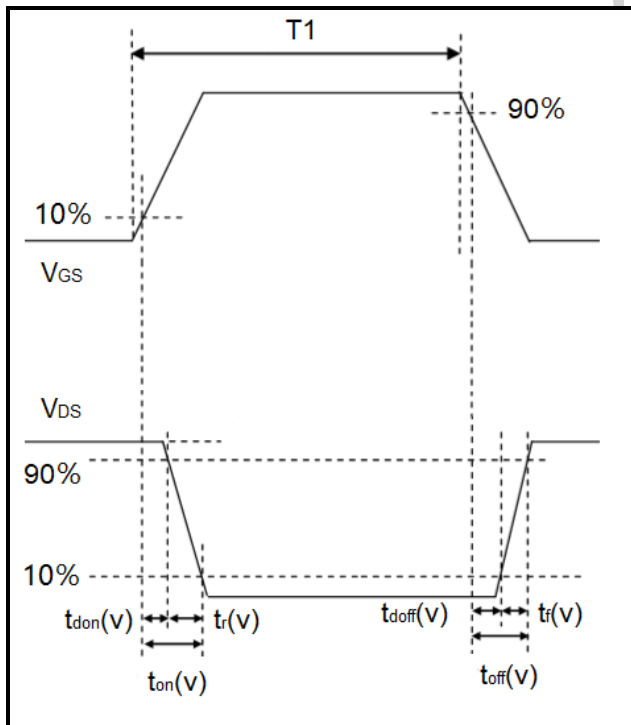


Figure 19. Switching times definition

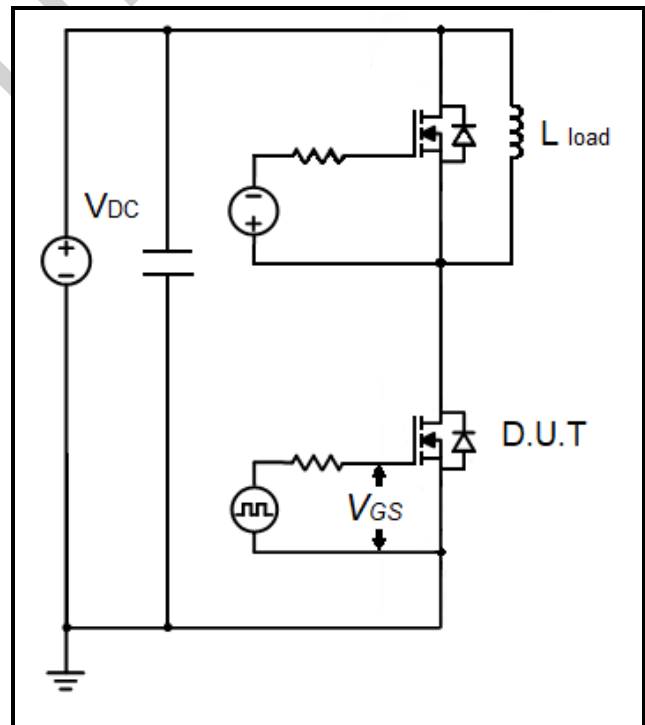
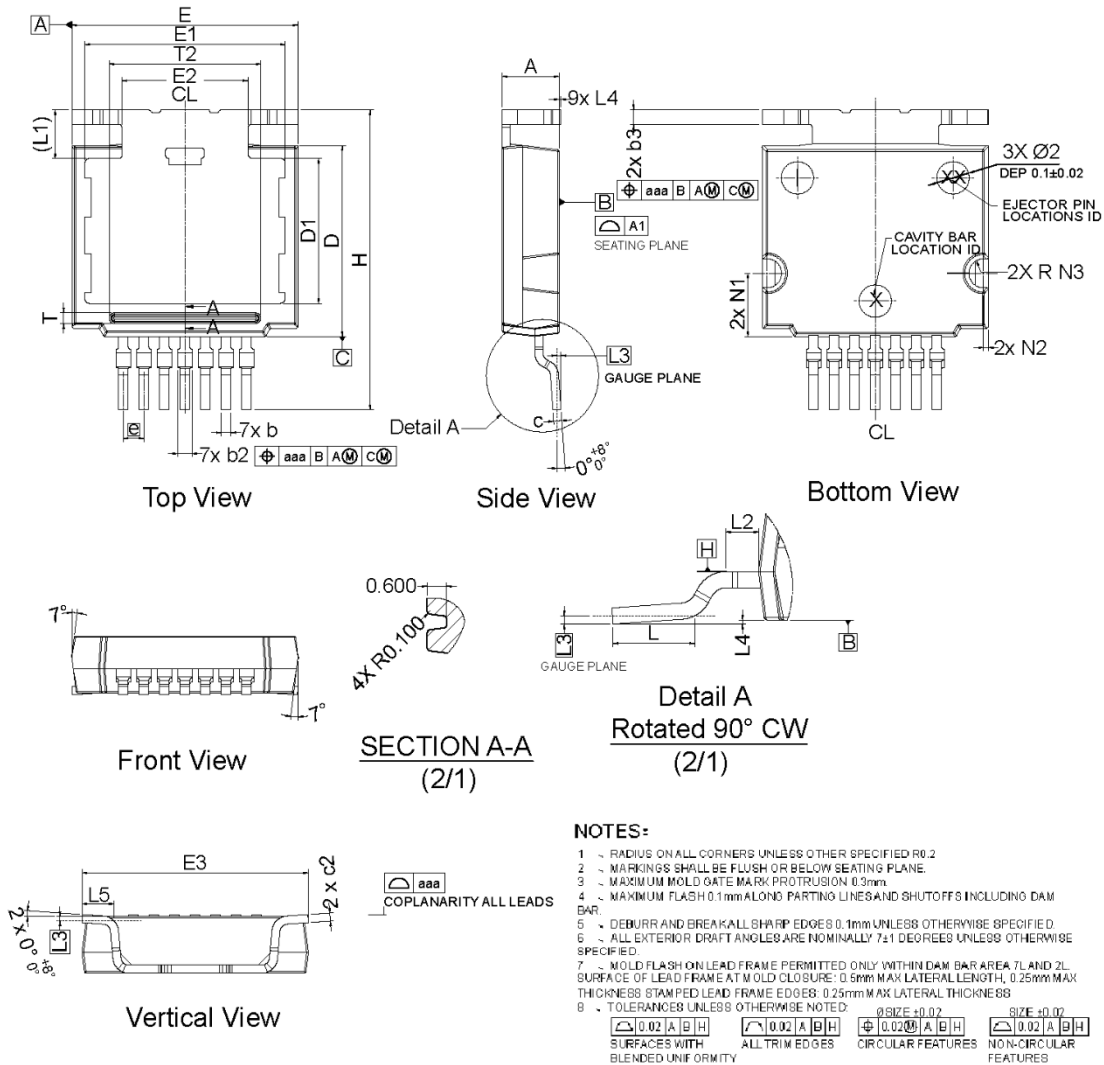


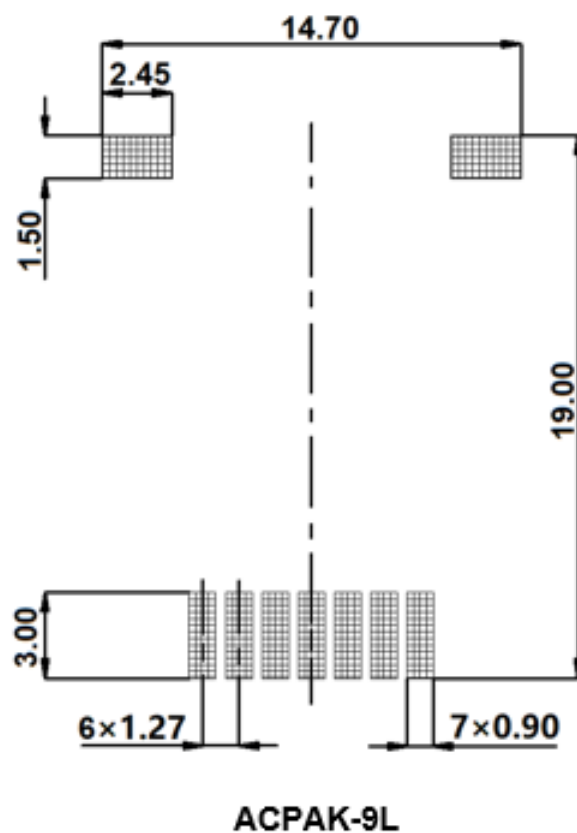
Figure 20. Clamped inductive switching waveform test circuit

Package Information:

Dimension unit: [mm]			
Symbol	Min	Nom	Max
A	3.42	3.51	3.62
A1	-	0.05	-
b	0.50	0.60	0.70
b2	0.50	0.75	1.00
b3	0.87	0.97	1.07
c	0.40	0.50	0.60
c2	0.40	0.50	0.60
D	11.70	11.80	11.90
D1	8.80	8.95	9.10
E	13.90	14.00	14.10
E1	12.30	12.40	12.50
E2	7.70	7.80	7.90
E3	13.90	14.00	14.10
e		1.27 BSC	
H	18.00	18.58	19.00
L	2.40	2.50	2.60
L1	-	3.00	-
L2	0.90	1.00	1.10
L3		0.25 BSC	
L4	0.02	0.12	0.22
L5	1.83	1.93	2.03
aaa	-	0.10	-
N1	3.80	3.90	4.00
N2	0.25	0.30	0.35
N3	0.75	0.85	0.95
T	0.55	0.65	0.75
T2	9.28	9.38	9.48

Recommended Solder Pad Layout

Note: All dimensions are in mm



Ordering Information

Part number	AMR009V075S2
Package	ACPAK
Unit quantity	600 EA
Packing type	Tape & Reel

For more information, visit <https://www.apowerc2.com>