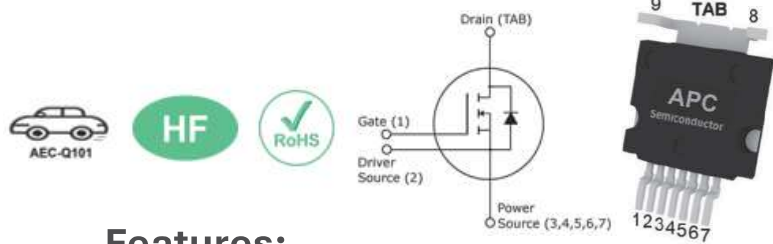




SiC Power MOSFET Transistor

AMR027V065S2



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
- RoHS compliant

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

Symbol	Parameter	Test Conditions	Value	Unit
V_{DSmax}	Drain-source voltage	$V_{GS} = 0V, I_D = 100\mu A$	650	V
V_{GSmax}	Gate-source voltage, max. transient voltage	$t_p \leq 0.5\mu s, D < 1\%$	-10/+25	
V_{GSmax}	Gate-source voltage, max. static voltage		-8/+22	
V_{GSop}	Gate-source voltage	Recommended operation values	-5/+18	
I_D	Continuous drain current	$V_{GS} = 18V$	81	A
		$V_{GS} = 18V, T_C = 100^{\circ}\text{C}$	57	
$I_{D(pulse)}$	Pulsed drain current	Pulse width t_p limited by T_{jmax}	203	A
P_{tot}	Power dissipation		298	W
T_j	Operating junction temperature		-55~175	$^{\circ}\text{C}$
T_{stg}	Storage temperature		-55~175	$^{\circ}\text{C}$
T_L	Soldering temperature	1.6mm from case for 10s	260	$^{\circ}\text{C}$

Thermal Resistance

Symbol	Parameter	Min	Typ	Max	Unit
$R_{\theta JC}$	Junction-to-case thermal Resistance	-	0.42	-	$^{\circ}\text{C/W}$

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

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	$V_{GS} = 0V, I_D = 100\mu A$	650	-	-	V
$V_{GS(th)}$	Gate-Source Threshold Voltage	$V_{DS} = V_{GS}, I_D = 8mA$	1.8	3.4	4.2	
		$V_{DS} = V_{GS}, I_D = 8mA, T_j = 175^\circ\text{C}$	-	2.4	-	
I_{DSS}	Drain-Source Leakage current	$V_{DS} = 650V, V_{GS} = 0V$	-	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	$V_{GS} = 15V, I_D = 30A$	-	37	-	m Ω
		$V_{GS} = 18V, I_D = 30A$	-	27	35	
		$V_{GS} = 18V, I_D = 30A, T_j = 175^\circ\text{C}$	-	32	-	
g_{fs}	Transconductance	$V_{DS} = 20V, I_D = 30A$	-	20	-	S
		$V_{DS} = 20V, I_D = 30A, T_j = 175^\circ\text{C}$	-	19	-	
$R_{g(int)}$	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	$V_{GS} = 0V, V_{DS} = 600V, f = 1MHz, V_{AC} = 25mV$	-	2040	-	pF
C_{oss}	Output capacitance		-	147	-	
C_{rss}	Reverse transfer capacitance		-	8.5	-	
E_{oss}	C_{oss} stored energy	$V_{DD} = 400V, V_{GS} = -5/+18V, I_D = 30A, I_{GS} = 1mA$	-	31	-	μJ
Q_{GS}	Gate to source charge		-	31	-	nC
Q_{GD}	Gate to drain charge		-	21	-	
Q_G	Total gate charge		-	87	-	

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	$V_{DD} = 400\text{V}$, $V_{GS} = -5/+18\text{V}$, $I_D = 30\text{A}$, $R_{G(ext)} = 4.7\Omega$, $L = 110\mu\text{H}$	-	15	-	ns
t_r	Rise time		-	25	-	
$t_{d(off)}$	Turn-off delay time		-	42	-	
t_f	Fall time		-	9	-	
E_{on}	Turn-on switching energy		-	166	-	μJ
E_{off}	Turn-off switching energy		-	79	-	
$t_{d(on)}$	Turn-on delay time	$V_{DD} = 400\text{V}$, $V_{GS} = -5/+18\text{V}$, $I_D = 30\text{A}$, $R_{G(ext)} = 4.7\Omega$, $L = 110\mu\text{H}$ $T_j = 175^\circ\text{C}$	-	12	-	ns
t_r	Rise time		-	23	-	
$t_{d(off)}$	Turn-off delay time		-	54	-	
t_f	Fall time		-	10	-	
E_{on}	Turn-on switching energy		-	139	-	μJ
E_{off}	Turn-off switching energy		-	88	-	

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

Symbol	Parameter	Test conditions	Min	Typ	Max	Unit
V_{SD}	Diode forward voltage	$V_{GS} = -5\text{V}$, $I_{SD} = 30\text{A}$	-	4.0	-	V
		$V_{GS} = -5\text{V}$, $I_{SD} = 30\text{A}$, $T_j = 175^\circ\text{C}$	-	3.6	-	
I_S	Continuous diode forward current	$V_{GS} = -5\text{V}$, $T_C = 25^\circ\text{C}$	-	-	81	A
$I_{S, pulse}$	Diode pulse current	$V_{GS} = -5\text{V}$, pulse width t_p limited by T_{jmax}	-	-	203	A
t_{rr}	Reverse recovery time	$V_{GS} = -5\text{V}$, $I_{SD} = 30\text{A}$, $V_R = 400\text{V}$, $di_f/dt = 0.99\text{kA}/\mu\text{s}$	-	17	-	ns
Q_{rr}	Reverse recovery charge		-	0.16	-	μC
I_{rrm}	Peak reverse recovery current	$V_{GS} = -5\text{V}$, $I_{SD} = 30\text{A}$, $V_R = 400\text{V}$, $di_f/dt = 1.03\text{kA}/\mu\text{s}$, $T_j = 175^\circ\text{C}$	-	16	-	A
t_{rr}	Reverse recovery time		-	22	-	ns
Q_{rr}	Reverse recovery charge		-	0.31	-	μC
I_{rrm}	Peak reverse recovery current		-	22	-	A

Electrical Characteristic Diagrams

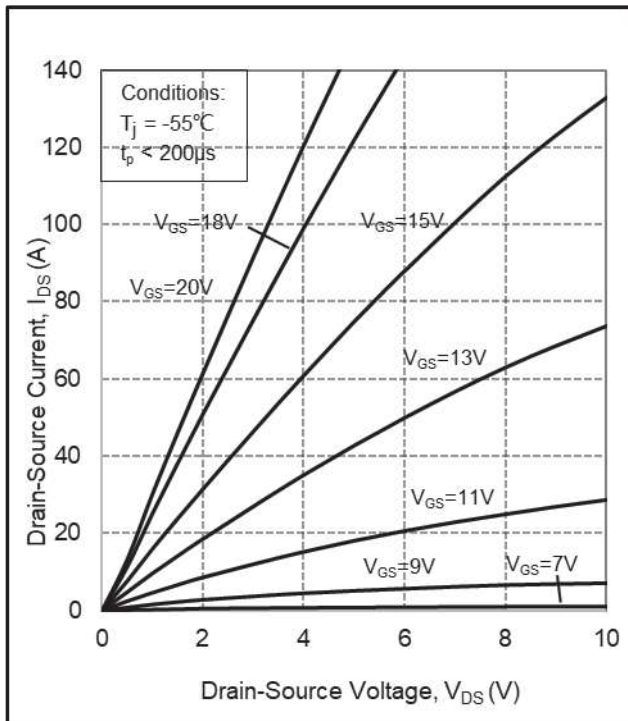
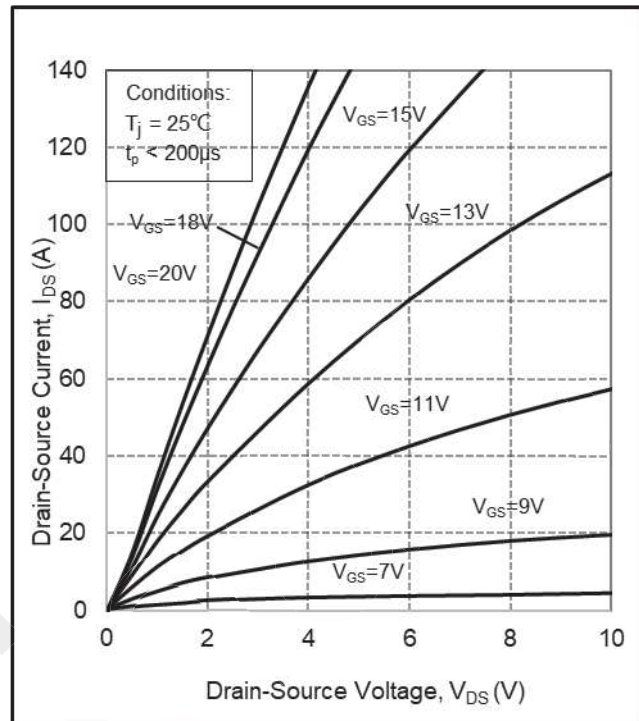
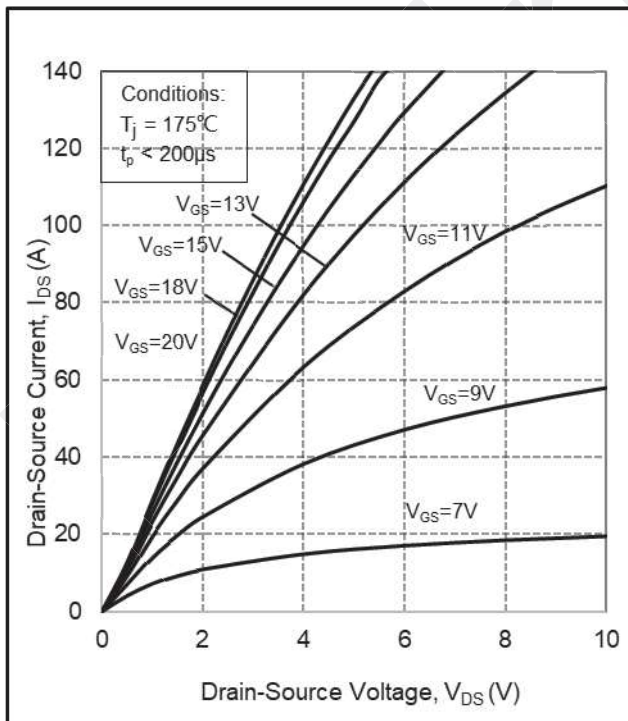
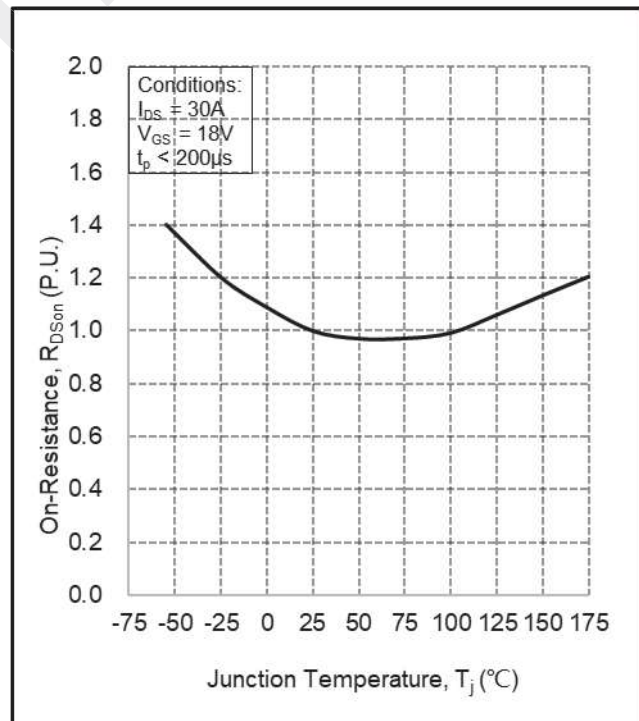
Figure 1. Output characteristics at $T_j = -55^\circ\text{C}$ Figure 2. Output characteristics at $T_j = 25^\circ\text{C}$ Figure 3. Output characteristics at $T_j = 175^\circ\text{C}$ 

Figure 4. Normalized on-resistance vs. temperature

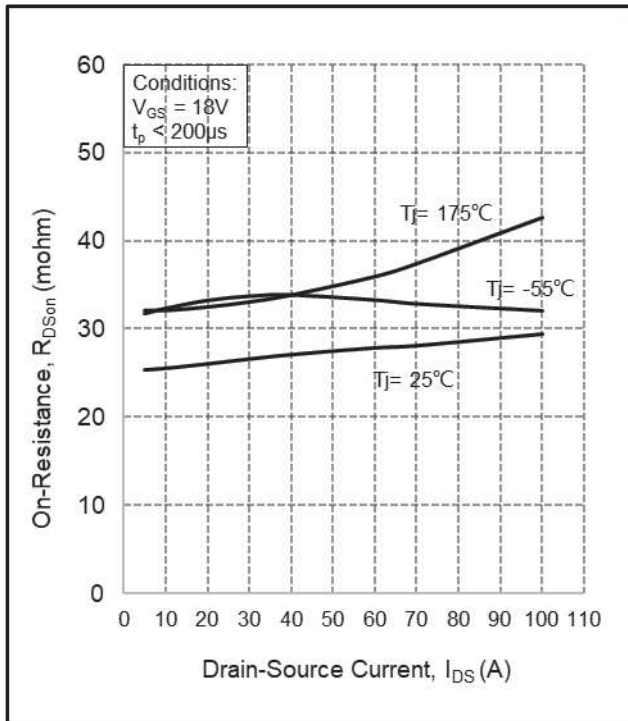


Figure 5. On-resistance vs. drain current for various temperatures

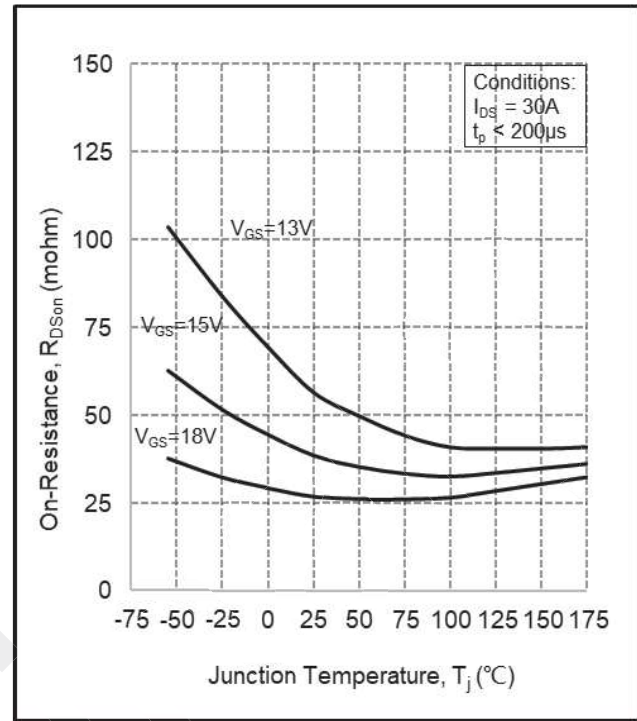


Figure 6. On-resistance vs. temperature for various gate voltages

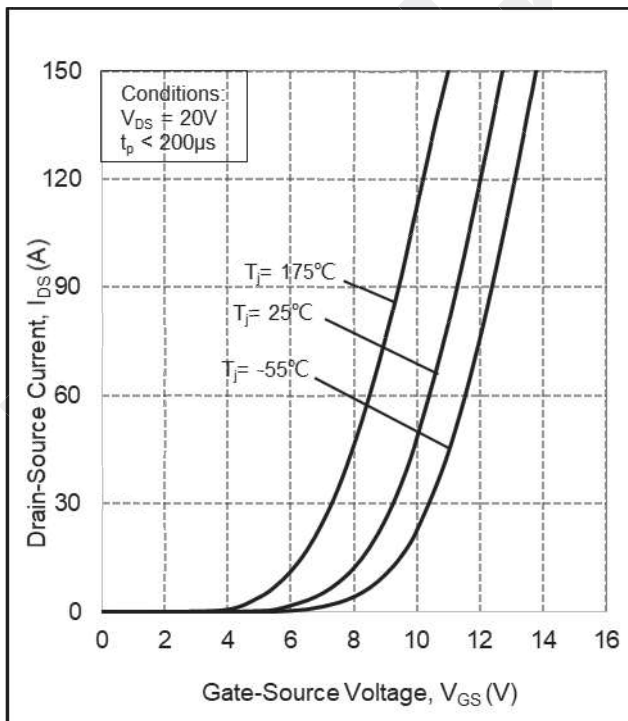


Figure 7. Transfer characteristic for various junction temperatures

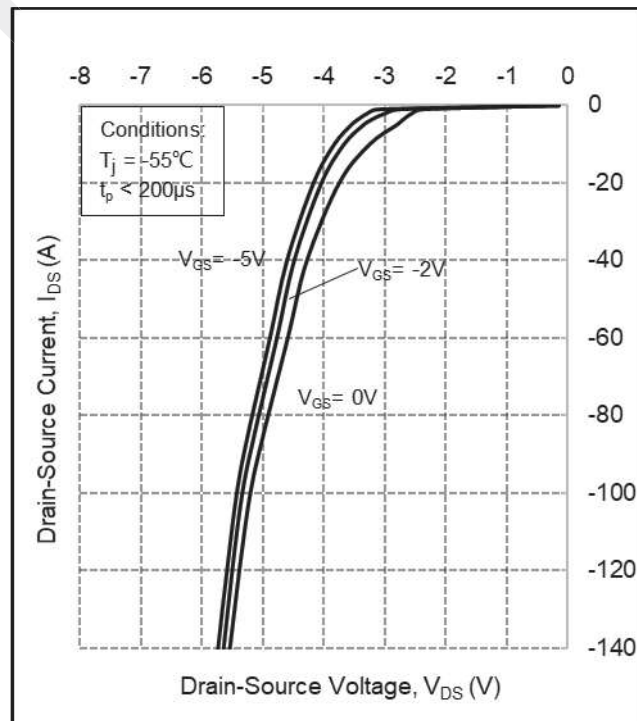


Figure 8. Body diode characteristic at $T_J = -55^\circ\text{C}$

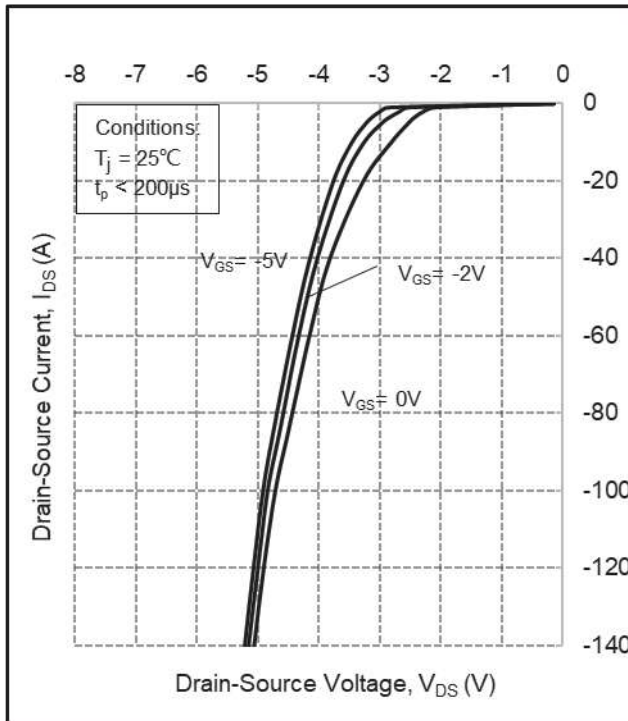
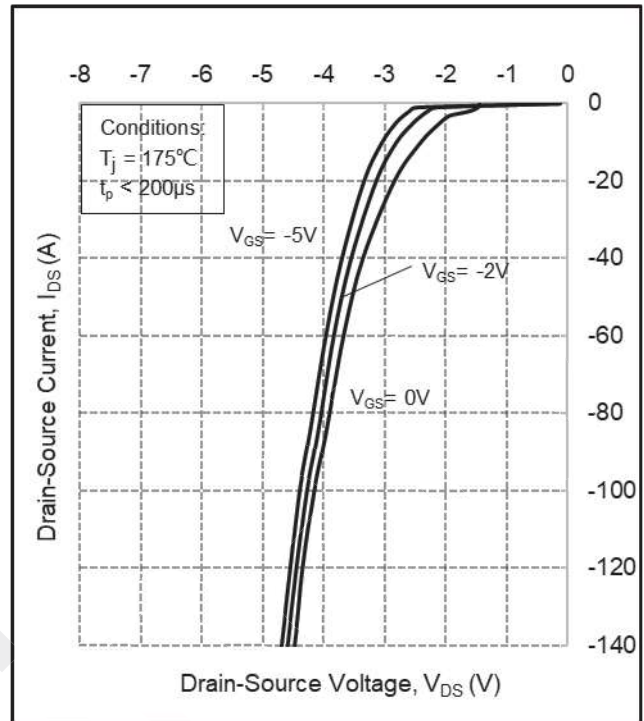
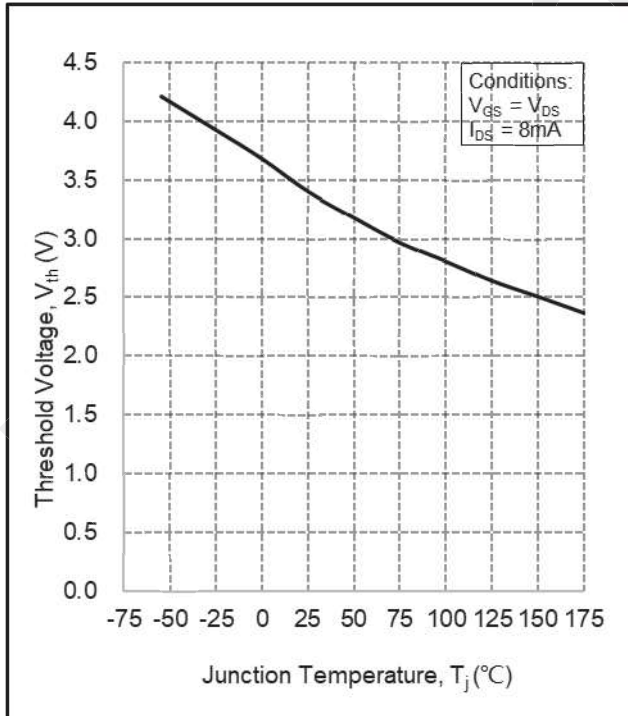
Figure 9. Body diode characteristic at $T_j = 25^\circ\text{C}$ Figure 10. Body diode characteristic at $T_j = 175^\circ\text{C}$ 

Figure 11. Threshold voltage vs. temperature

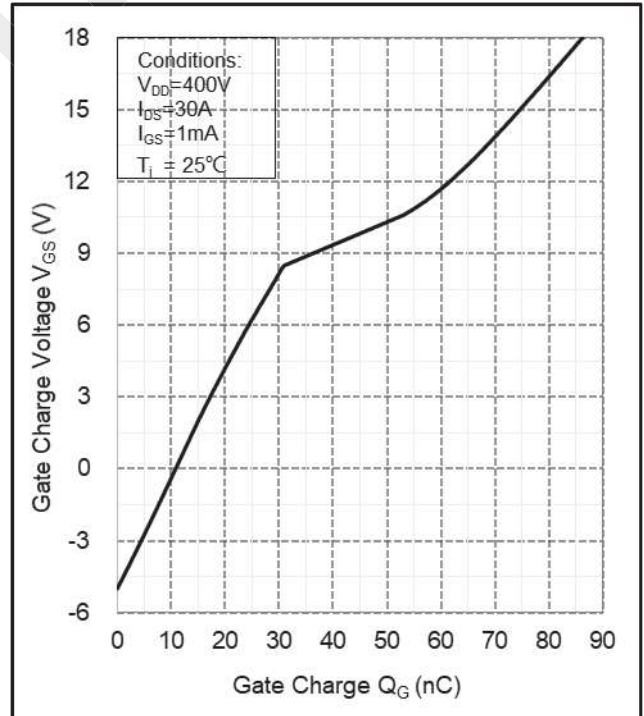


Figure 12. Gate Charge Characteristic

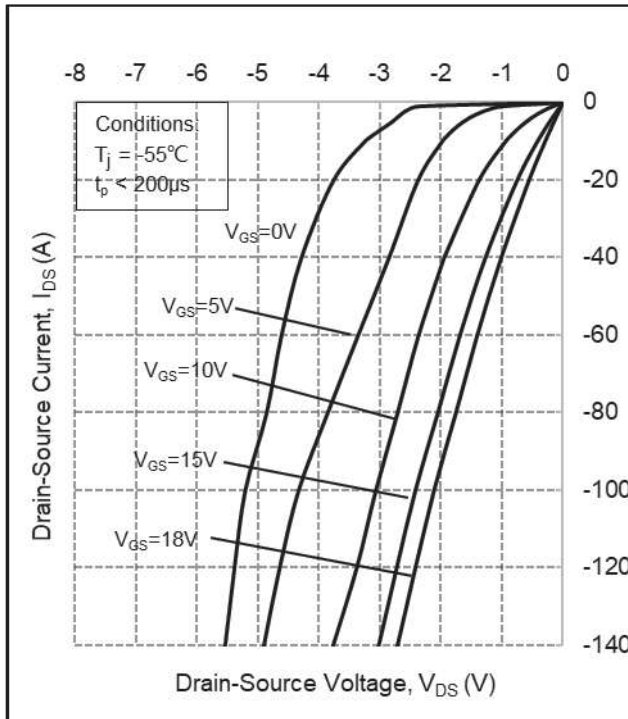


Figure 13. 3rd quadrant characteristic
at $T_j = -55^\circ\text{C}$

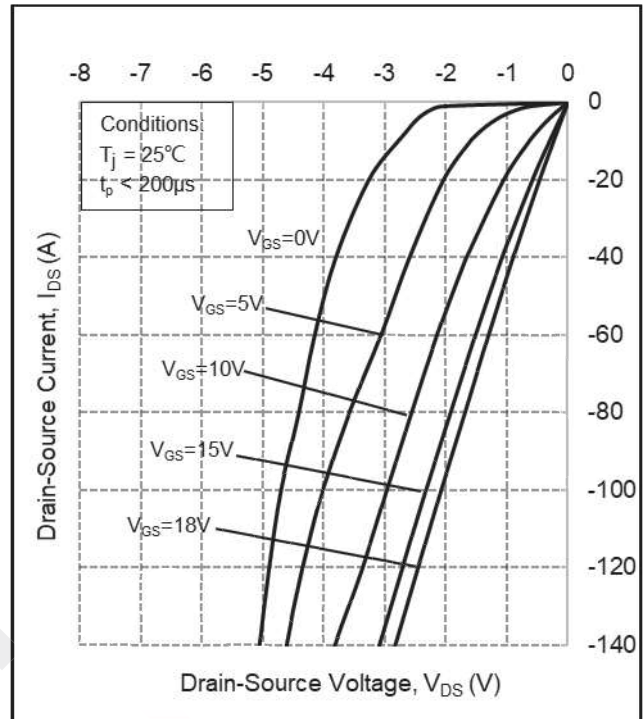


Figure 14. 3rd quadrant characteristic
at $T_j = 25^\circ\text{C}$

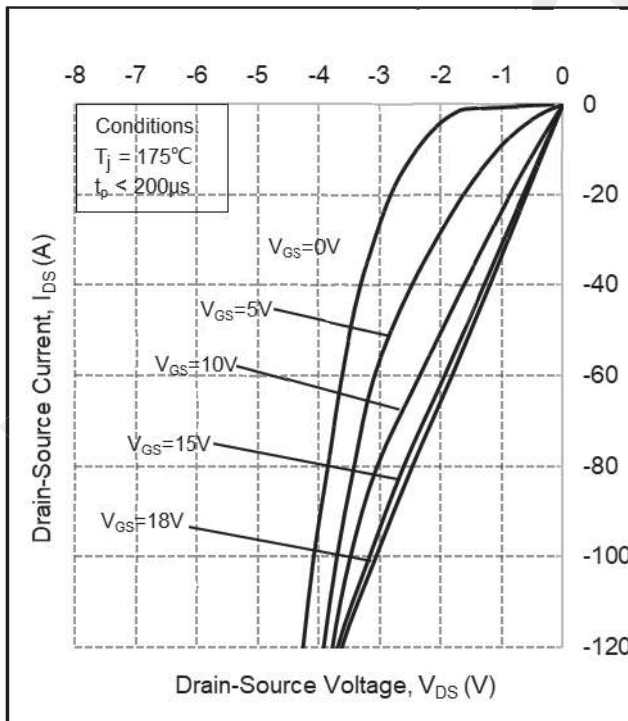


Figure 15. 3rd quadrant characteristic
at $T_j = 175^\circ\text{C}$

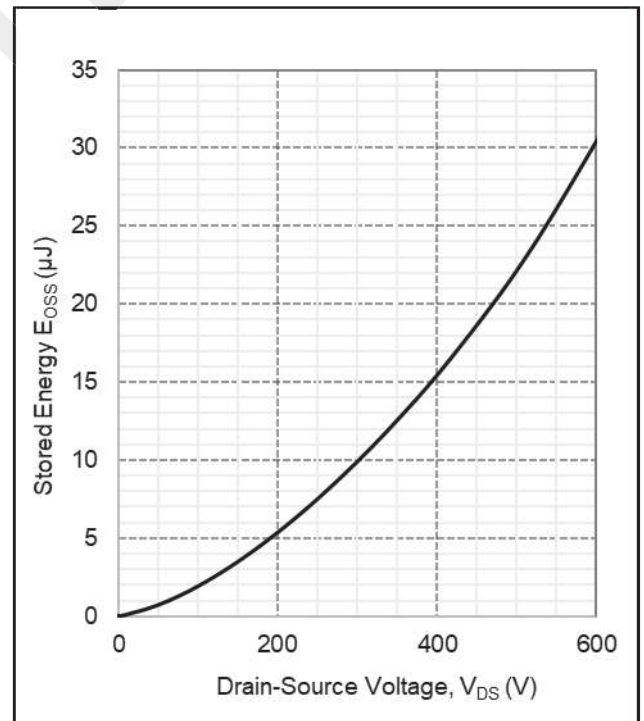


Figure 16. Output capacitor stored energy

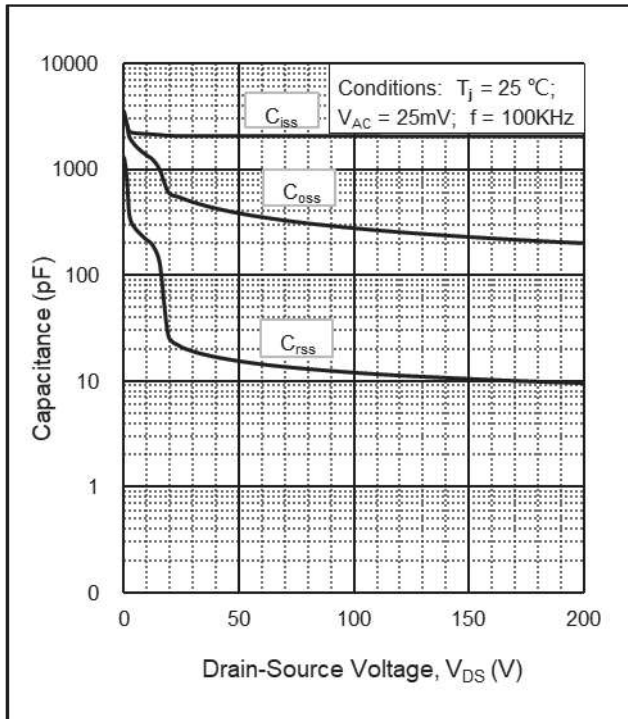


Figure 17. Capacitance vs. drain-source voltage (0 - 200V)

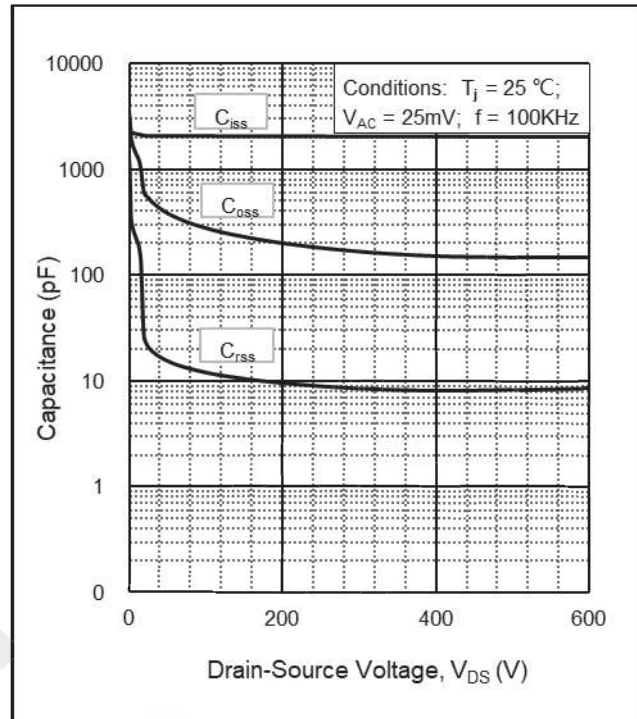


Figure 18. Capacitance vs. drain-source voltage (0 - 600V)

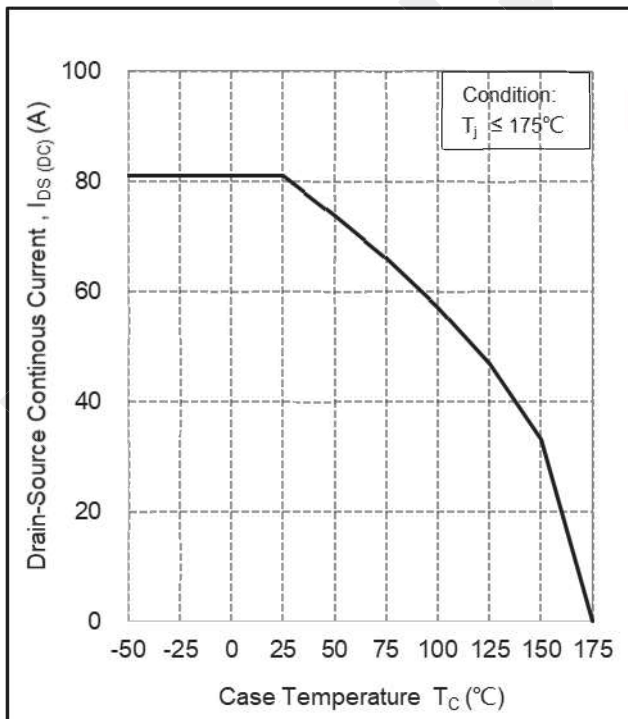


Figure 19. Continuous drain current derating vs. temperature

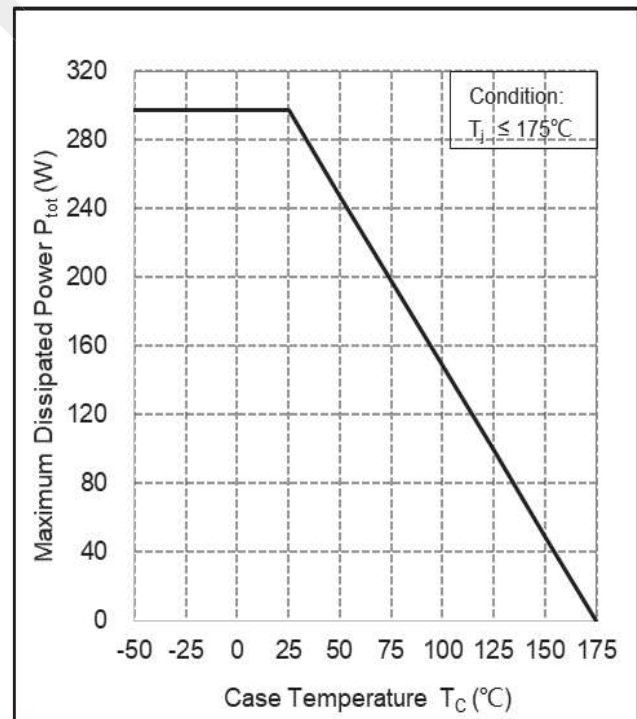


Figure 20. Maximum power dissipation derating vs. temperature

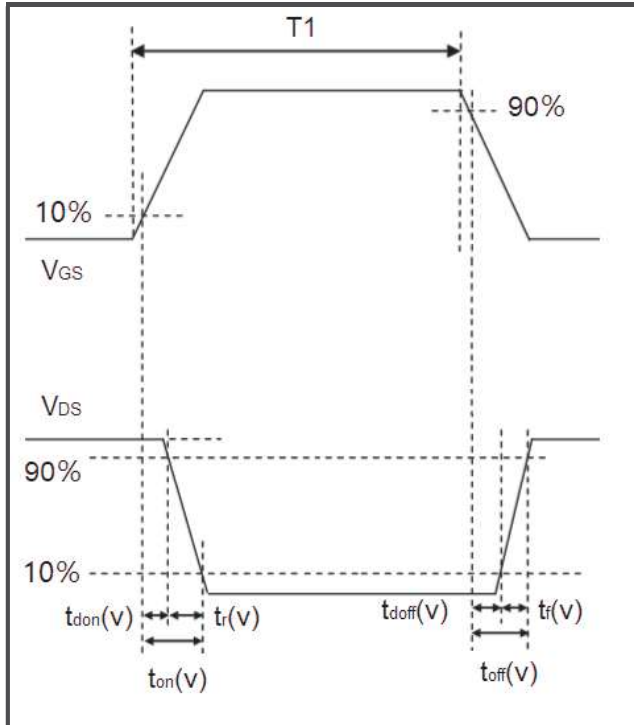


Figure 21. Switching times definition

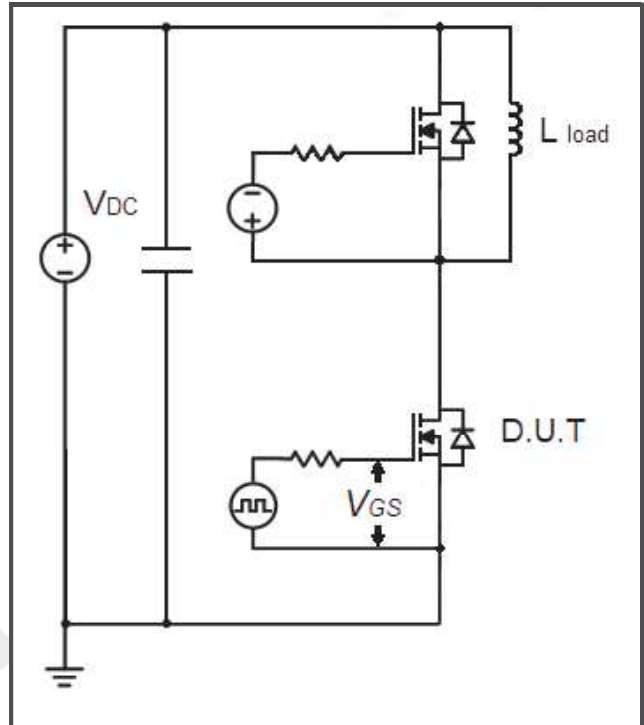


Figure 22. Clamped inductive switching waveform test circuit

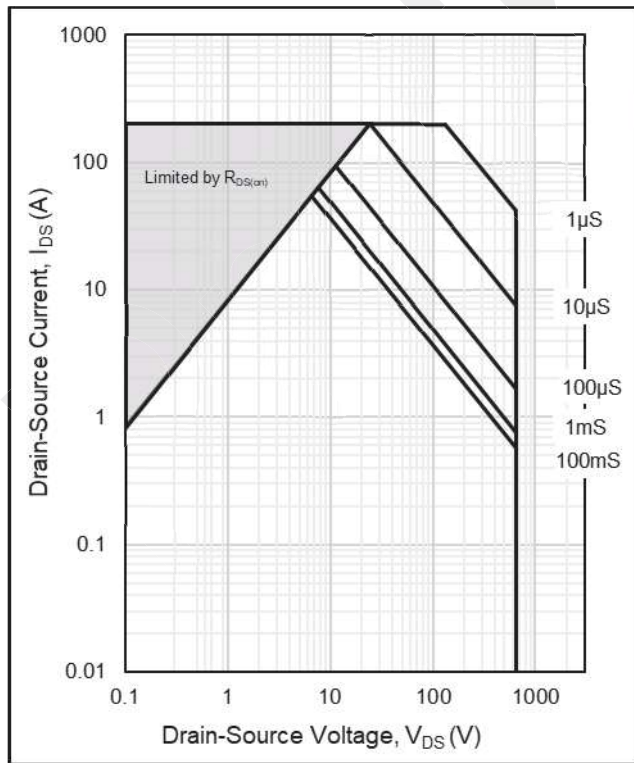
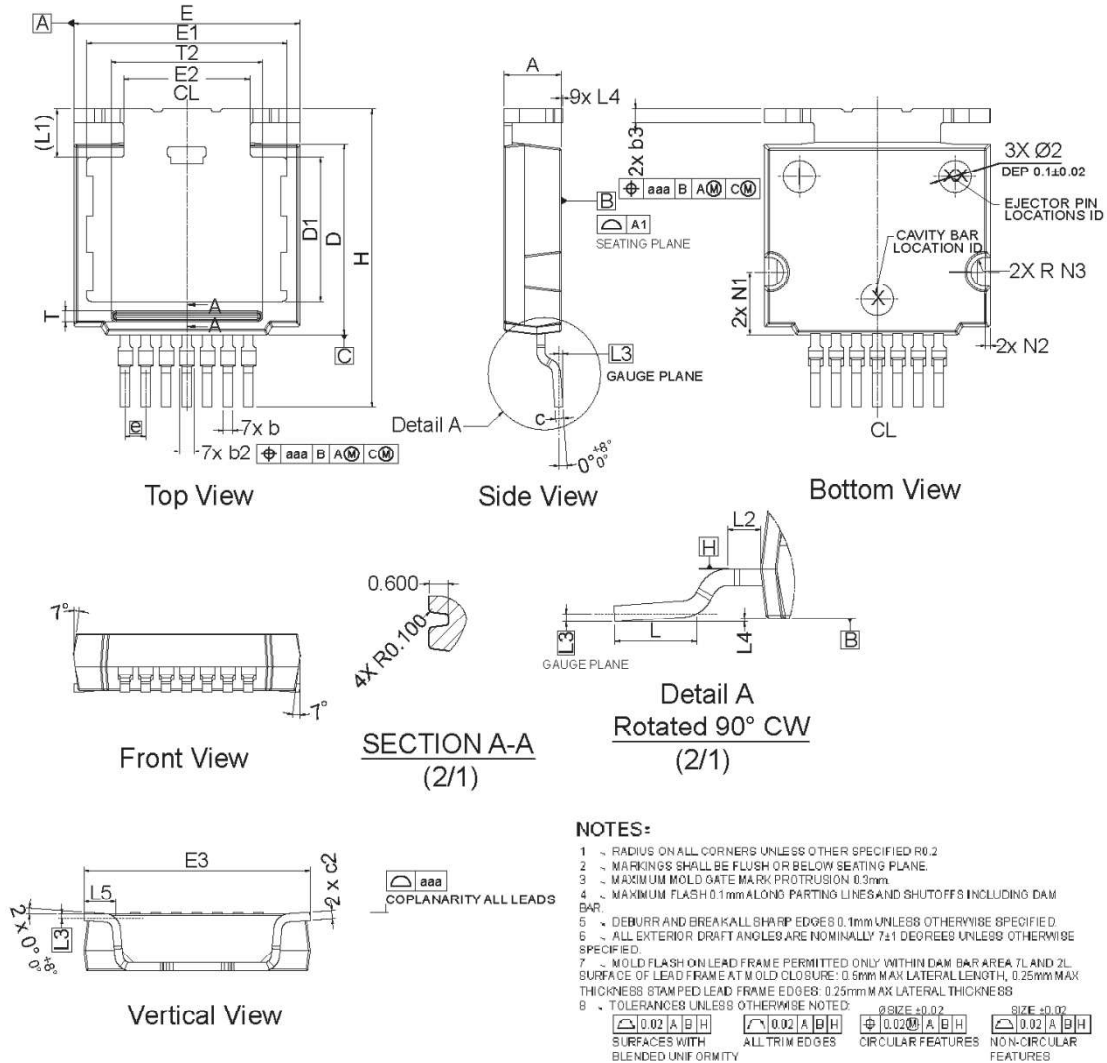


Figure 23. Safe Operating Area

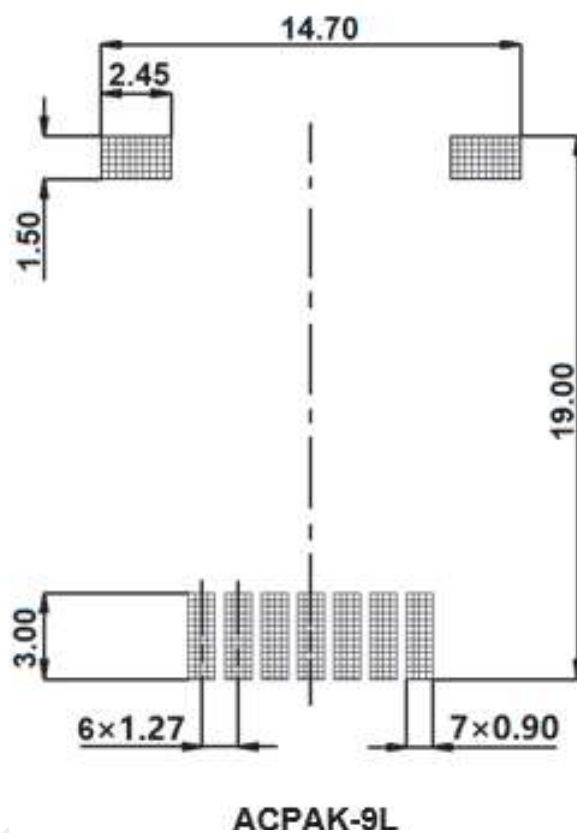
Package Information:



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	AMR027V065S2
Package	ACPAK
Unit quantity	600 EA
Packing type	Tape & Reel