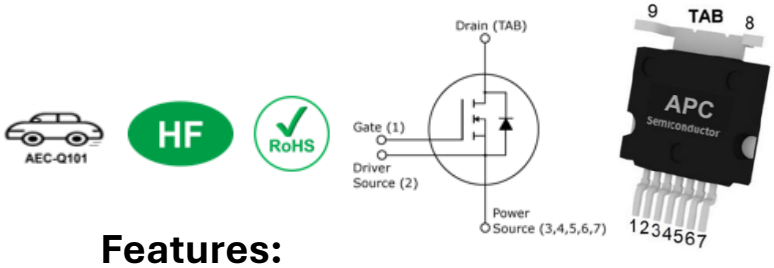
SiC Power MOSFET Transistor
AMR027V065S2



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˚C, unless specified otherwise)

Symbol	Parameter	Test Conditions	Value	Unit
V_{DSmax}	Drain-source voltage	V_{GS} = 0V, I_D = 100μA	650	V
V_{GSmax}	Gate-source voltage, max. transient voltage	$t_p \leq$ 0.5us, 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°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	˚C
T_{stg}	Storage temperature		-55~175	˚C
T_L	Soldering temperature	1.6mm from case for 10s	260	℃

Thermal Resistance

Symbol	Parameter	Min	Typ	Max	Unit
$R_{\theta JC}$	Junction-to-case thermal Resistance	-	0.42	-	℃/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	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 = 175ºC	-	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	-	mΩ
		V_{GS} = 18V, I_D = 30A	-	27	35	
		V_{GS} = 18V, I_D = 30A, T_j = 175ºC	-	32	-	
g_{fs}	Transconductance	V_{DS} = 20V, I_D = 30A	-	20	-	S
		V_{DS} = 20V, I_D = 30A, T_j = 175ºC	-	19	-	
$R_{g(int)}$	Internal gate resistance	f = 1MHz, V_{AC} = 25mV	-	6.5	-	Ω

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} = 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		-	31	-	μJ
Q_{GS}	Gate to source charge	V_{DD} = 400V, V_{GS} = -5/+18V, I_D = 30A, I_{GS} = 1mA	-	31	-	nC
Q_{GD}	Gate to drain charge		-	21	-	
Q_G	Total gate charge		-	87	-	

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} = 400V, V_{GS} = -5/+18V, I_D = 30A, $R_{G(ext)}$ = 4.7Ω, L = 110μH	-	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} = 400V, V_{GS} = -5/+18V, I_D = 30A, $R_{G(ext)}$ = 4.7Ω, L = 110μH Tj=175℃	-	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 ($T_A = 25$ °C, unless specified otherwise)

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

Electrical Characteristic Diagrams

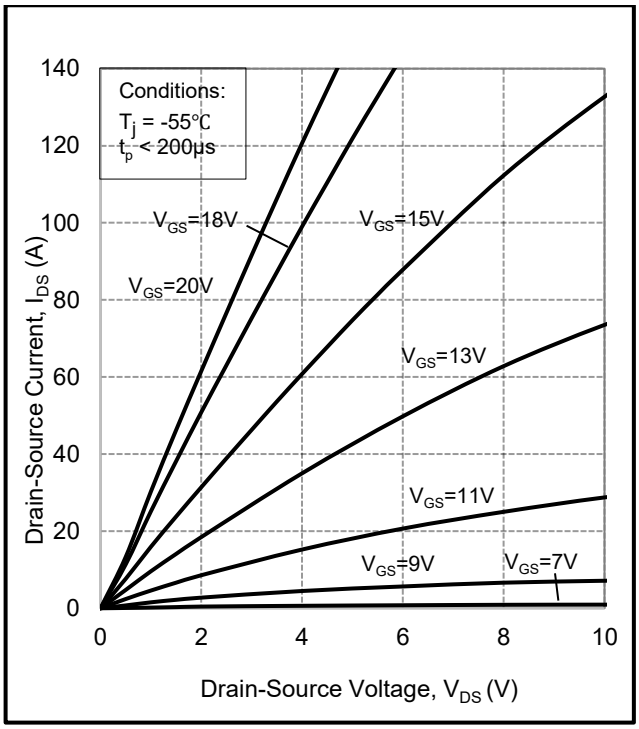


Figure 1. Output characteristics at T_j = -55℃

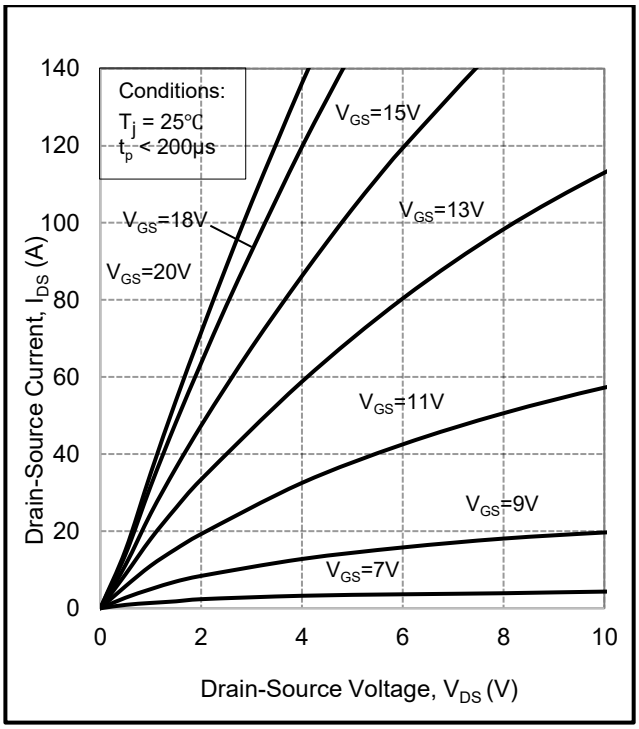


Figure 2. Output characteristics at T_j = 25℃

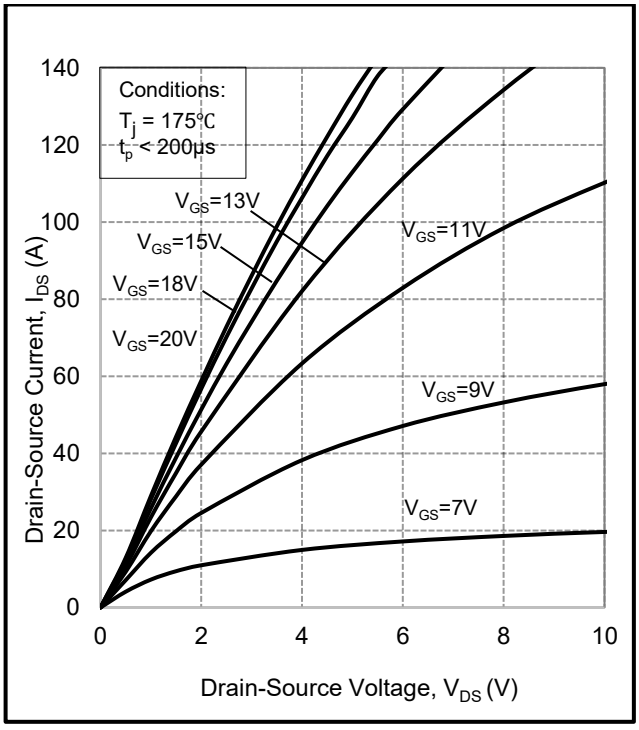


Figure 3. Output characteristics at T_j = 175℃

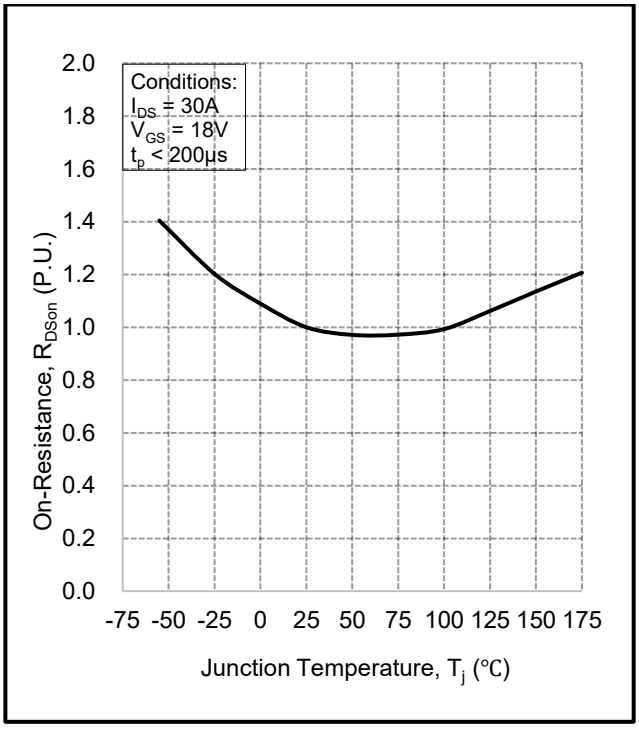


Figure 4. Normalized on-resistance vs. temperature

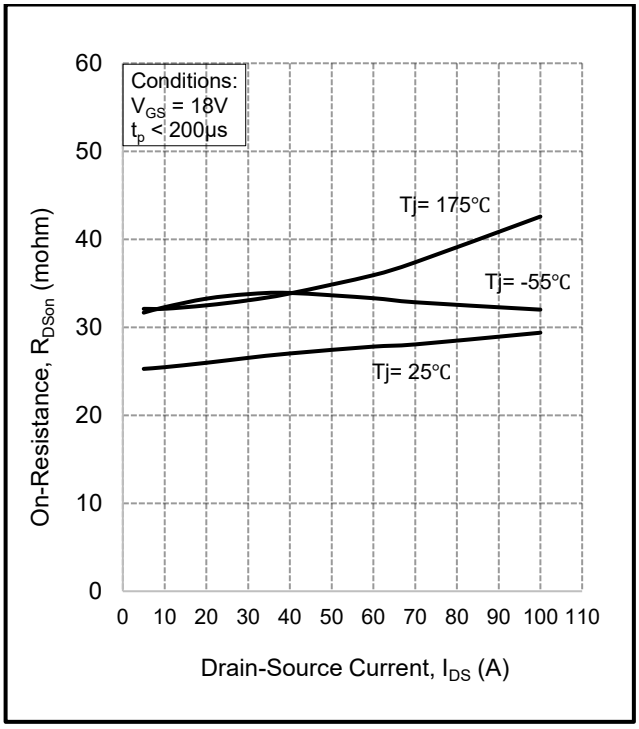


Figure 5. On-resistance vs. drain current
for various temperatures

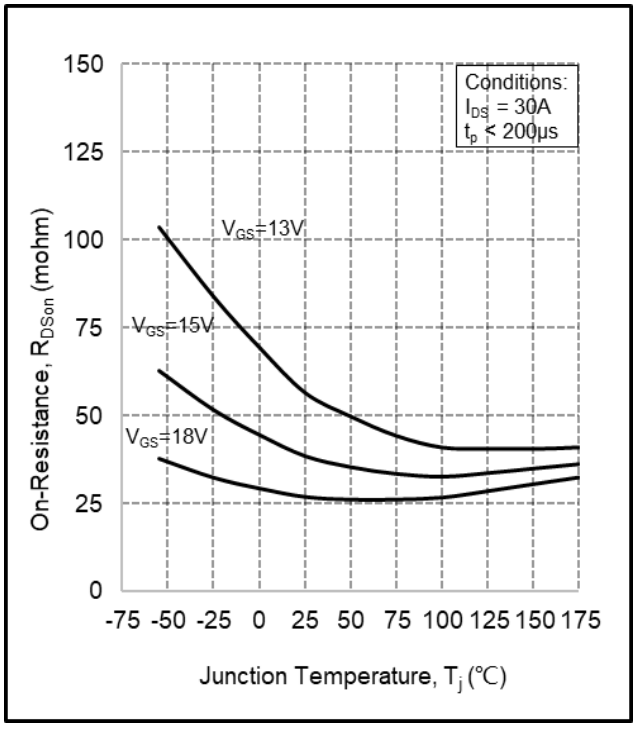


Figure 6. On-resistance vs. temperature
for various gate voltages

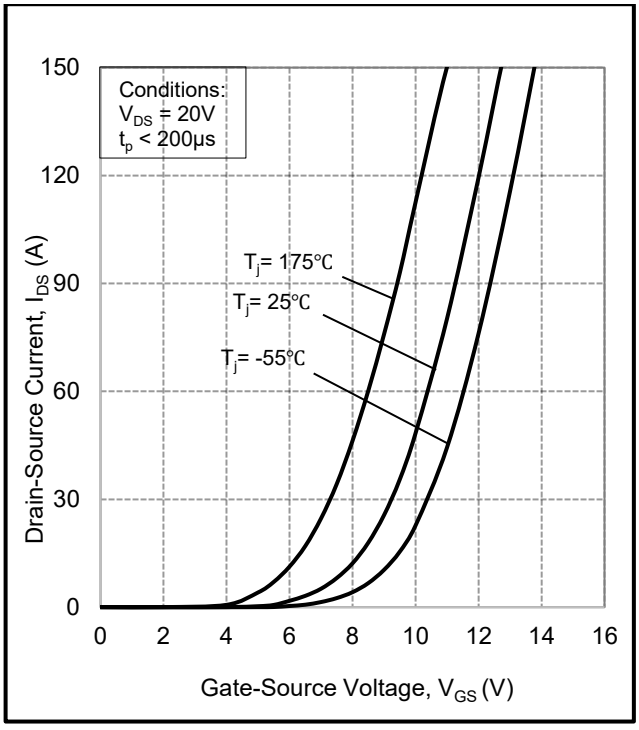


Figure 7. Transfer characteristic
for various junction temperatures

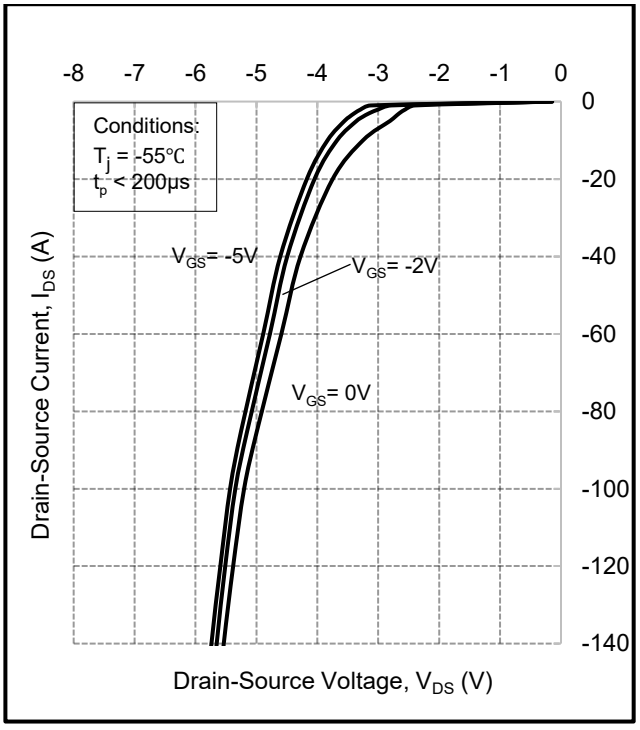


Figure 8. Body diode characteristic at T_j = -55℃

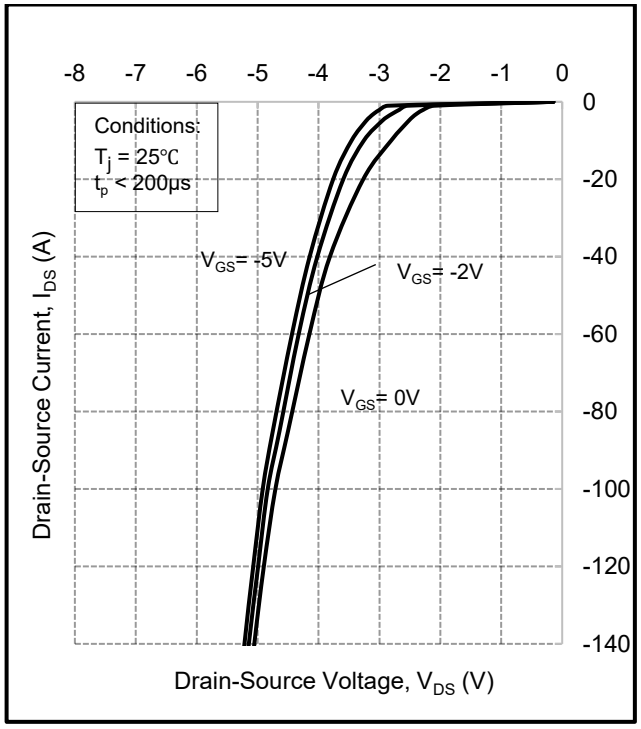


Figure 9. Body diode characteristic at T_j = 25℃

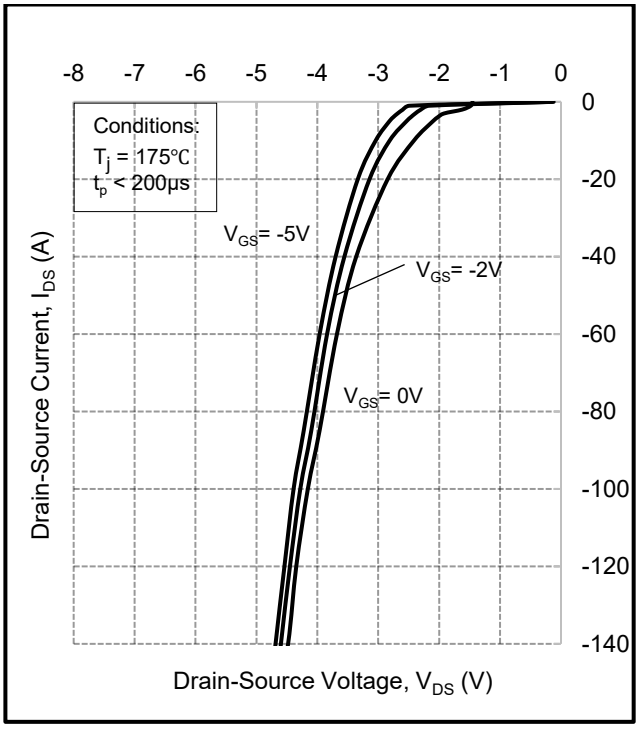


Figure 10. Body diode characteristic at T_j = 175℃

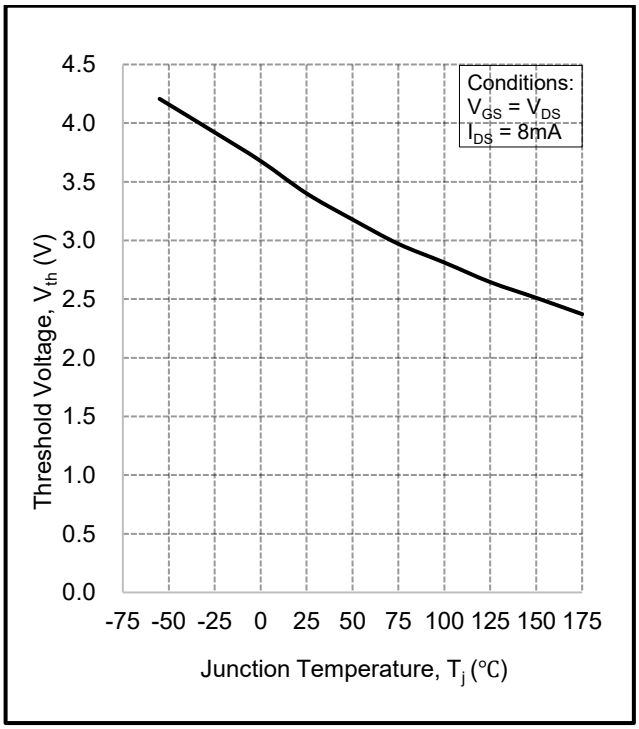


Figure 11. Threshold voltage vs. temperature

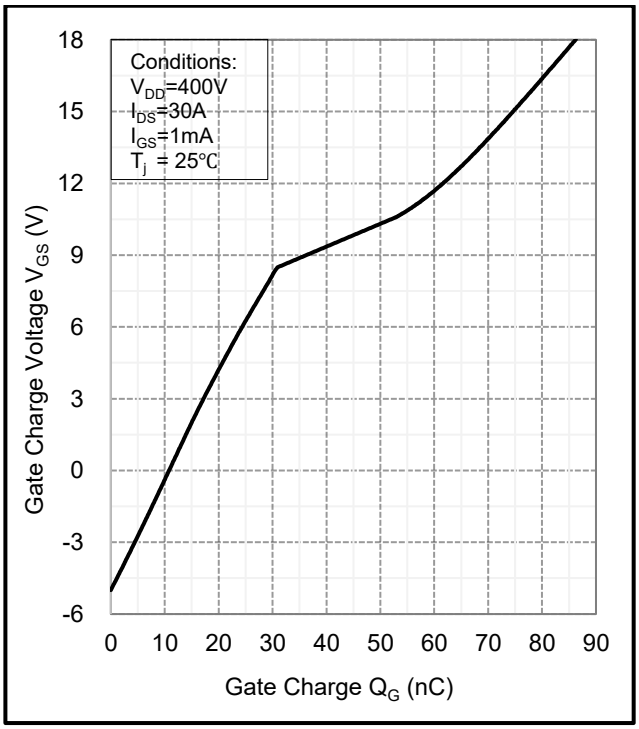


Figure 12. Gate Charge Characteristic

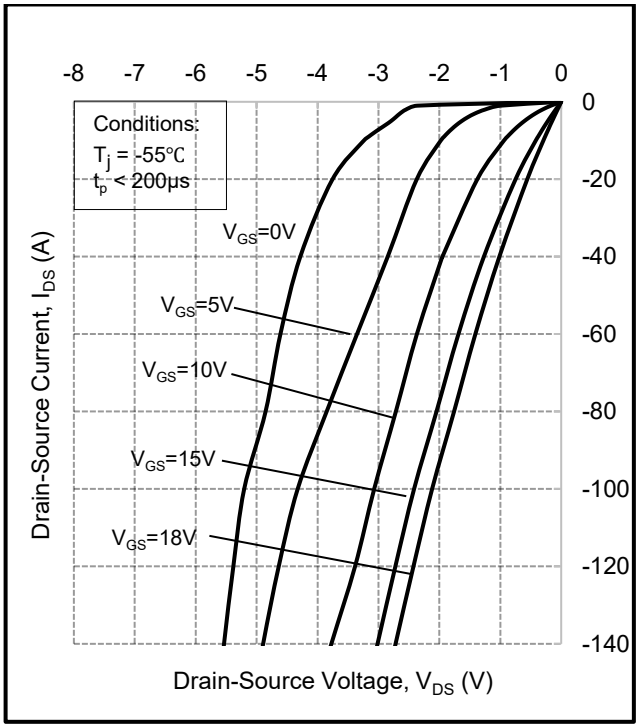


Figure 13. 3rd quadrant characteristic at T_j = -55℃

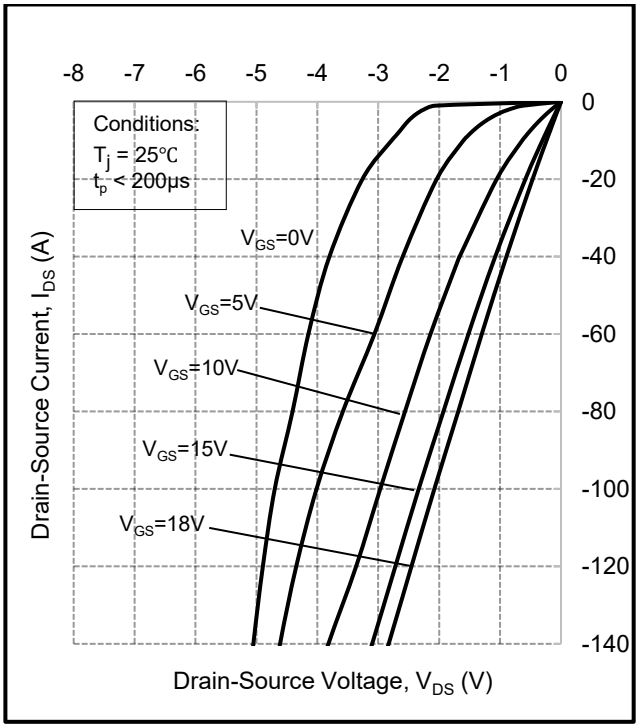


Figure 14. 3rd quadrant characteristic at T_j = 25℃

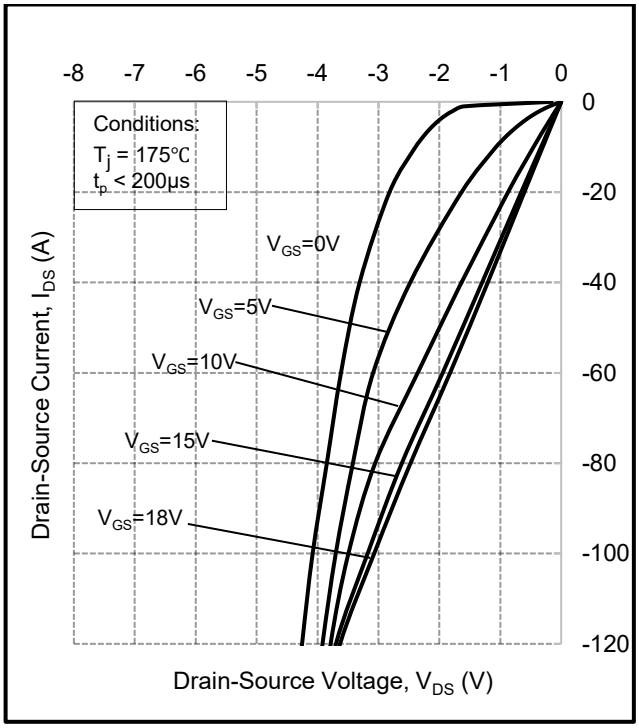


Figure 15. 3rd quadrant characteristic at T_j = 175℃

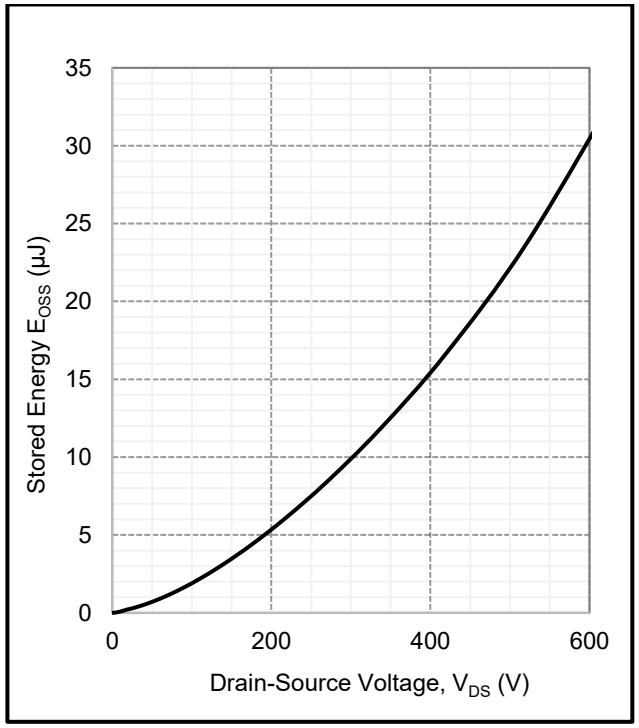


Figure 16. Output capacitor stored energy

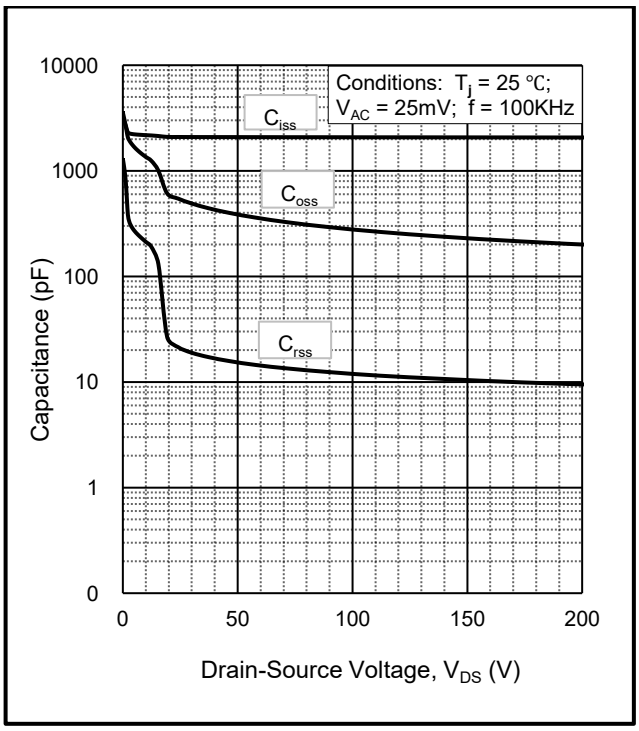


Figure 17. Capacitance vs. drain-source voltage (0 - 200V)

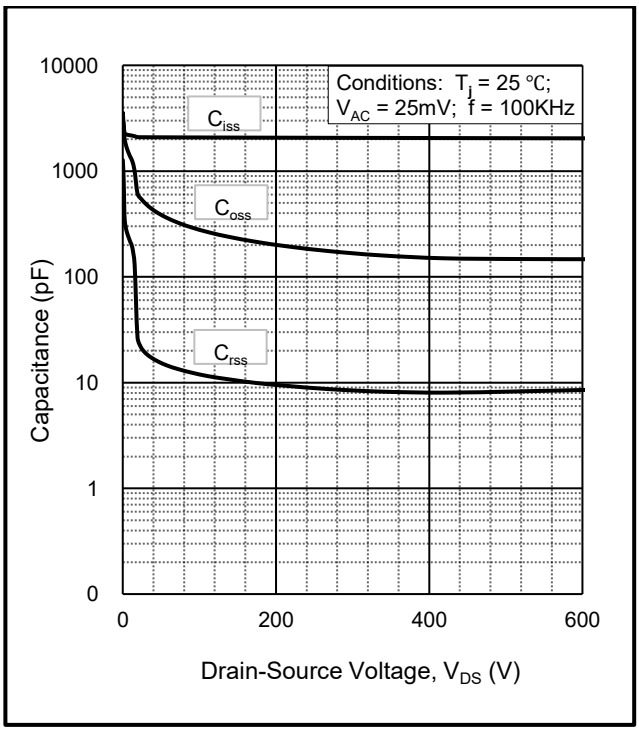


Figure 18. Capacitance vs. drain-source voltage (0 - 600V)

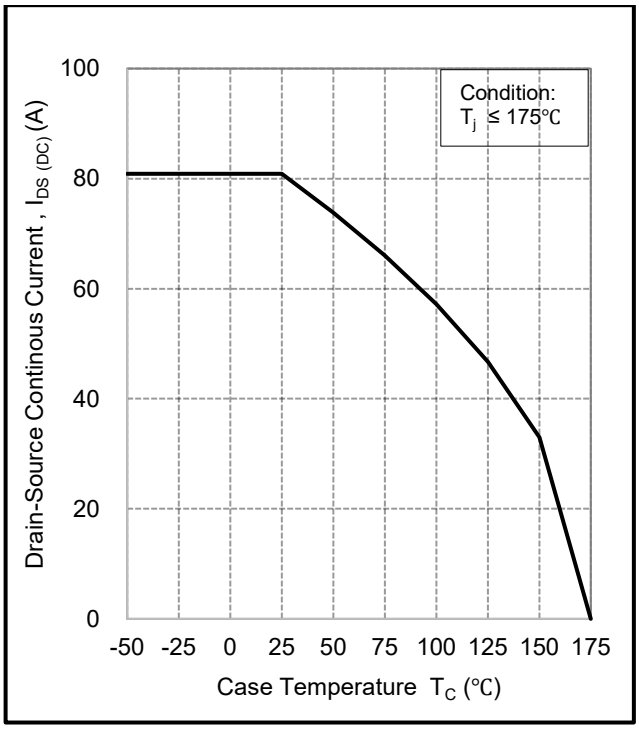


Figure 19. Continuous drain current derating vs. temperature

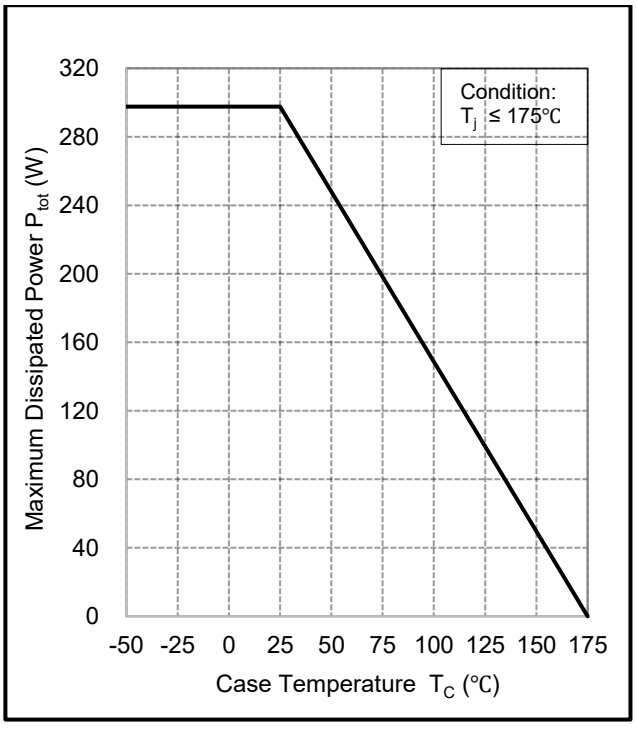


Figure 20. Maximum power dissipation derating vs. temperature

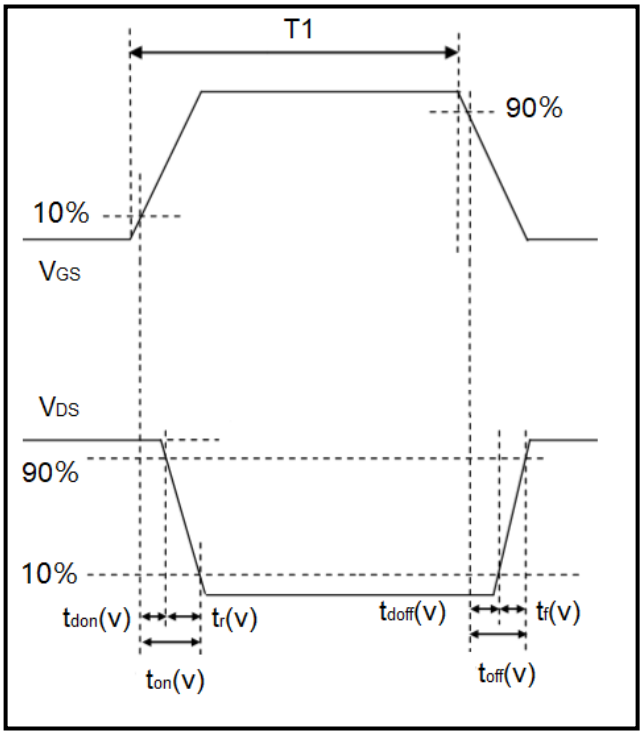


Figure 21. Switching times definition

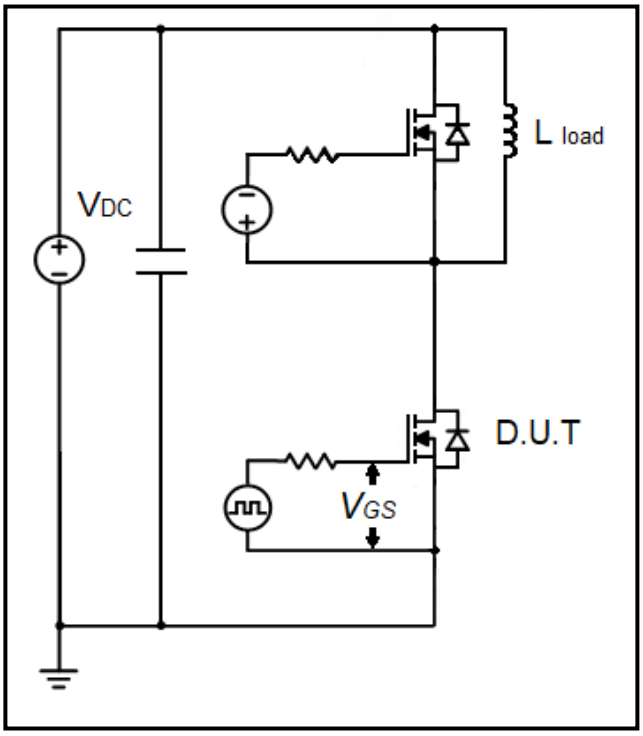


Figure 22. Clamped inductive switching waveform test circuit

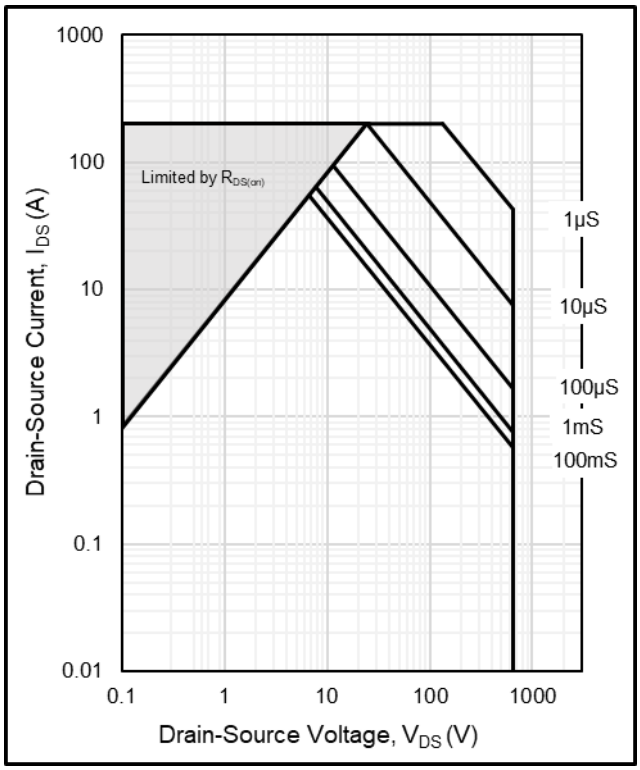
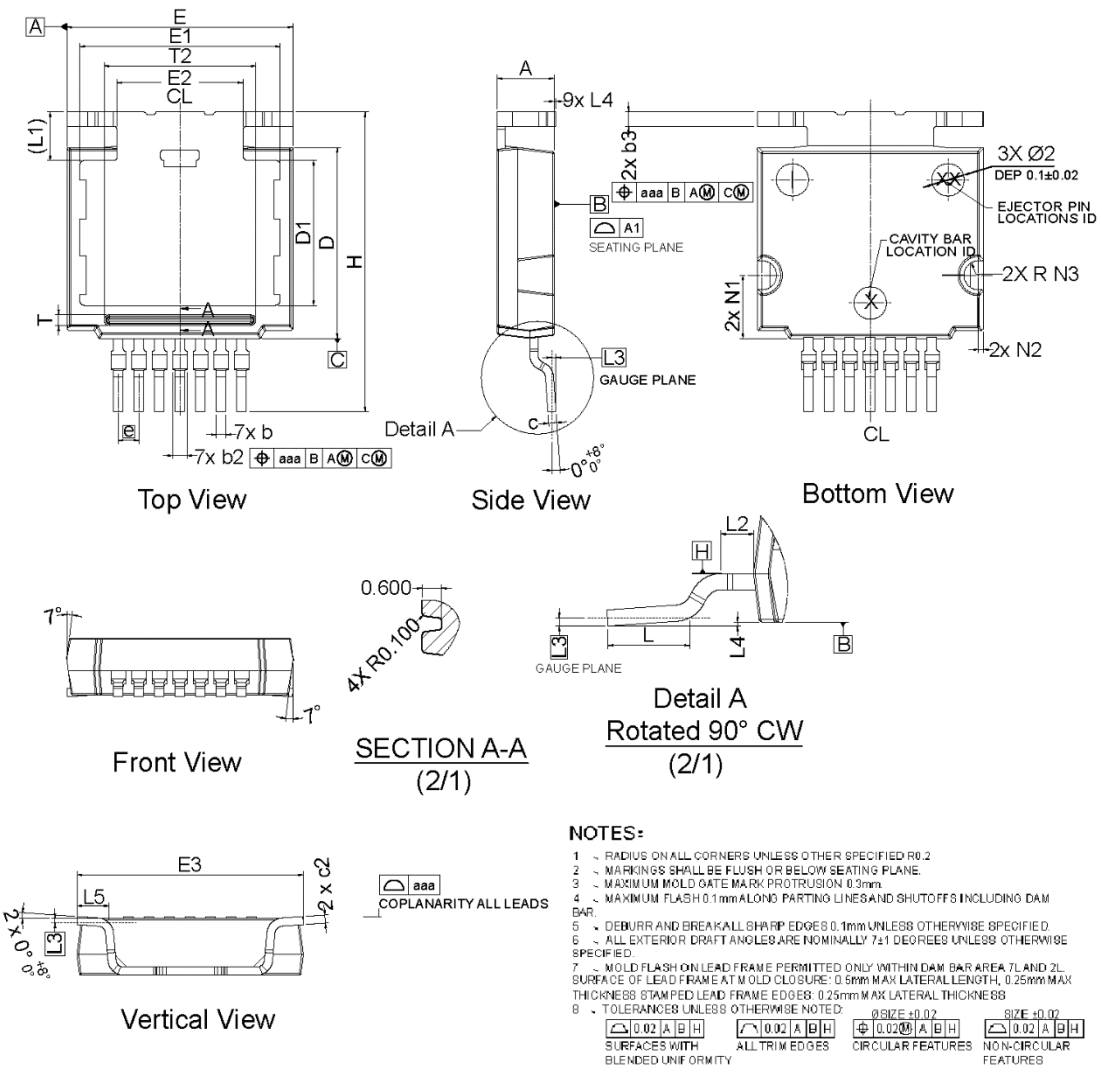


Figure 23. Safe Operating Area

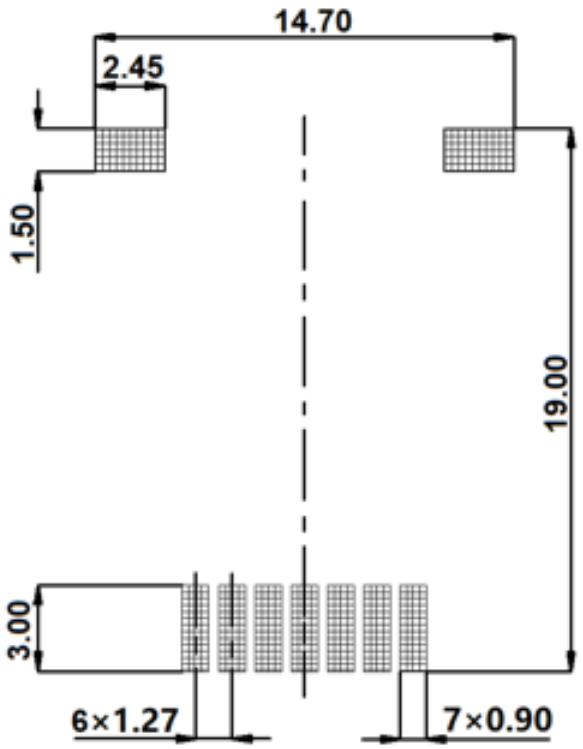
Package Information:



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



ACPAK-9L

Ordering Information

Part number	AMR027V065S2
Package	ACPAK-9L
Unit quantity	600 EA
Packing type	Tape & Reel