

SiC Half-Bridge Module PAAA12600HM

Features

- Silicon Carbide MOSFET
- Low R_{DSon}
- Low Switching Losses

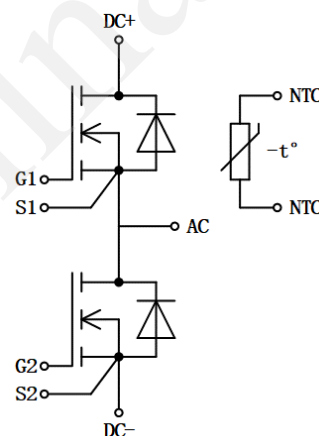


Applications

- EV Chargers
- Industrial Automation & Testing
- Solar

Standards Benefits

- Improve System Efficiency
- Increase Power Density
- Reduce Heat Sink Requirement
- Reduce System Cost



Order Information

Part Number	Package	Marking
PAAA12600HM	ED3	PAAA12600HM

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1. Maximum Ratings

At $T_J = 25^\circ\text{C}$, unless specified otherwise

Parameter	Symbol	Value	Unit	Test Conditions
Drain - Source Voltage	V_{DS}	1200	V	
Gate - Source Voltage (Dynamic)	V_{GSmax}	-8 / +21	V	AC (f > 1Hz)
Gate - Source Voltage(static) turn-on gate voltage turn-off gate voltage	$V_{GS,on}$ $V_{GS,off}$	+15/+18 -3	V	Static
Continuous Drain Current	I_D	600 520	A	$V_{GS} = 18\text{V}$ $T_c = 25^\circ\text{C}$ $T_c = 60^\circ\text{C}$
Power Dissipation	P_D	1250	W	$T_F = 25^\circ\text{C}$
Operating Junction Temperature	T_J	-55 To +175	$^\circ\text{C}$	

2. Electrical Characteristics

At $T_J = 25^\circ\text{C}$, unless specified otherwise (Per Position)

Parameter	Symbol	Value			Unit	Test Conditions
		Min.	Typ.	Max.		
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	1200	/	/	V	$V_{GS} = -3\text{V}$ $I_D = 8\text{mA}$
Gate Threshold Voltage	$V_{GS(th)}$	1.8	2.5	/	V	$V_{DS} = V_{GS}$ $I_D = 141.6\text{mA}$ $T_J = 25^\circ\text{C}$
Reverse Bias Drain Current	I_{DSS}	/	10	300	μA	$V_{GS} = 0\text{V}$ $V_{DS} = 1200\text{V}$
Reverse Bias Drain Current	I_{DSS}	/	1	100	μA	$V_{GS} = -3\text{V}$ $V_{DS} = 1200\text{V}$
Gate-Source Leakage Current	I_{GSS}	/	1	100	nA	$V_{GS} = 18\text{V}$ $V_{DS} = 0\text{V}$
Drain-Source On-State Resistance	$R_{DS(on)}$	/	1.6	/	m Ω	$V_{GS} = 18\text{V}$ $I_D = 600\text{A}$ $T_J = 25^\circ\text{C}$
		/	2.5	/		$V_{GS} = 18\text{V}$ $I_D = 600\text{A}$ $T_J = 125^\circ\text{C}$
		/	3.1	/		$V_{GS} = 18\text{V}$ $I_D = 600\text{A}$ $T_J = 175^\circ\text{C}$
		/	2.2	/		$V_{GS} = 15\text{V}$ $I_D = 600\text{A}$ $T_J = 25^\circ\text{C}$
Internal Gate Resistance	$R_{G(int)}$	/	1.7	/	Ω	$f = 1\text{MHz}$ $V_{AC} = 25\text{mV}$
Input Capacitance	C_{iss}	/	60	/	nF	$V_{GS} = 0\text{V}$ $V_{DS} = 800\text{V}$

Parameter	Symbol	Value			Unit	Test Conditions
		Min.	Typ.	Max.		
Output Capacitance	C_{oss}	/	2.1	/	nF	f= 100kHz V_{AC} = 25mV
Reverse Transfer Capacitance	C_{rss}	/	105	/	pF	
Gate to Source Charge	Q_{gs}	/	784	/	nC	V_{DS} = 800V I_{DS} = 600A V_{GS} = -3 to 18V
Gate to Drain Charge	Q_{gd}	/	398	/		
Total Gate Charge	Q_g	/	1876	/		
Coss Stored Energy	E_{oss}	/	705	/	μJ	V_{DS} = 800V f= 100kHz
Thermal Resistance from Junction to Heatsink	$R_{\theta J}$	/	0.12	/	°C/W	

3. Typical Performance-Reverse Diode

At $T_J = 25^\circ\text{C}$, unless specified otherwise (Per SBD)

Parameter	Symbol	Values			Unit	Test condition
		Min.	Typ.	Max.		
Forward Voltage	V_F	/	1.5	1.8	V	$I_F = 30\text{A}$, $T_J = 25^\circ\text{C}$
			2.1	/		$I_F = 30\text{A}$, $T_J = 175^\circ\text{C}$
Total Capacitive Charge	Q_C	/	131	/	nC	$V_R = 800\text{V}$, $I_F = 30\text{A}$ $di/dt = 200\text{A}/\mu\text{s}$ $T_J = 25^\circ\text{C}$
Capacitance Stored Energy	E_C	/	33	/	μJ	$V_R = 800\text{V}$

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4. NTC Thermistor Characteristics

Parameter	Symbol	Value			Unit	Test Conditions
		Min.	Typ.	Max.		
Rated Resistance	R_{NTC}	/	5	/	k Ω	$T_{NTC} = 25^{\circ}\text{C}$
Resistance Tolerance	$\Delta R/R$	-5	/	5	%	$T_{NTC} = 25^{\circ}\text{C}$
B-value	$B_{25/50}$	/	3380	/	K	$T_2 = 50^{\circ}\text{C}$
B-value	$B_{25/85}$	/	3435	/	K	$T_2 = 80^{\circ}\text{C}$
B-value	$B_{25/100}$	/	3485	/	K	$T_2 = 100^{\circ}\text{C}$
Power Dissipation	P_{NTC}	/	/	10	mW	$T_{NTC} = 25^{\circ}\text{C}$

5. Typical Performance

At $T_J = 25^\circ\text{C}$, unless specified otherwise (Per Position)

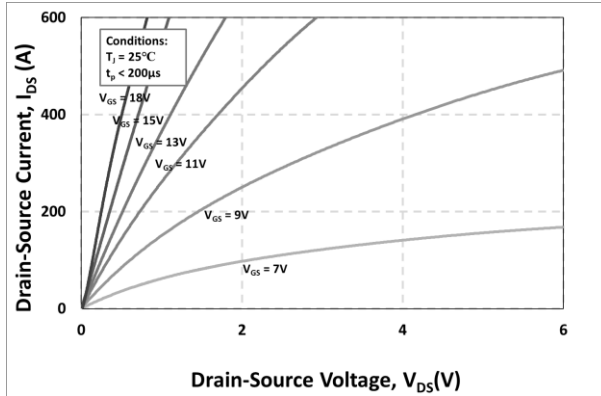


Figure 1. Output Characteristics $T_J = 25^\circ\text{C}$

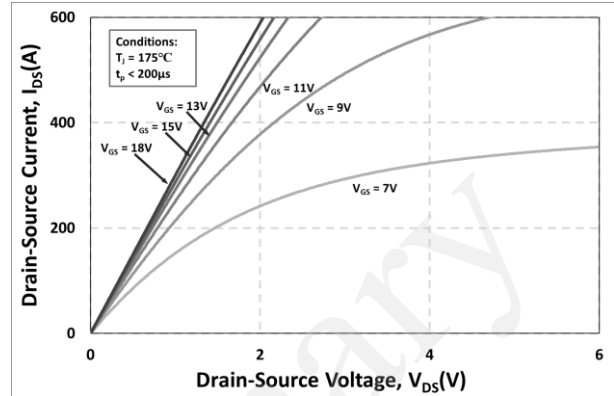


Figure 2. Output Characteristics $T_J = 175^\circ\text{C}$

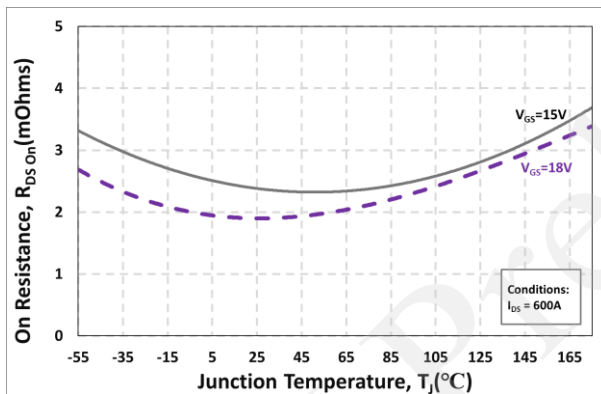


Figure 3. On-State Resistance vs. Junction Temperature

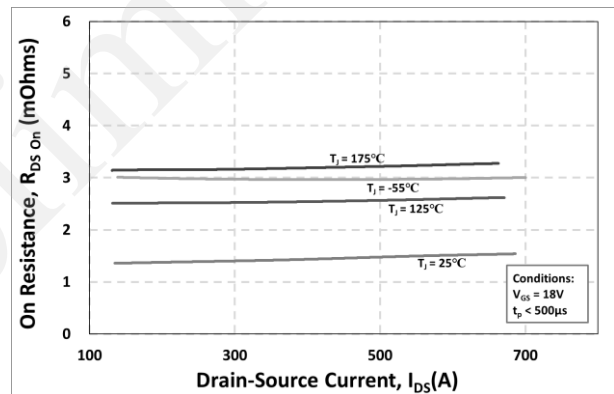


Figure 4. On-Resistance vs. Drain Current Various Temperatures

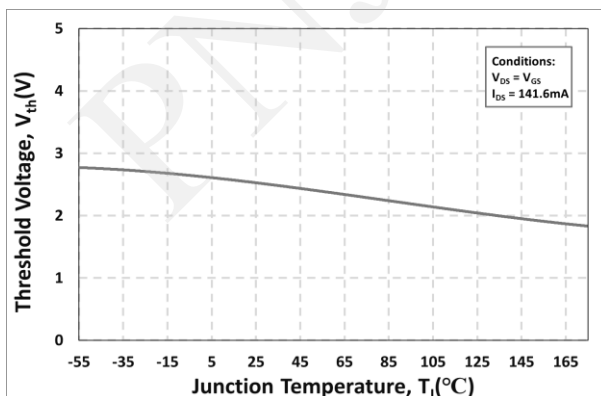


Figure 5. Threshold Voltage vs. Junction Temperature

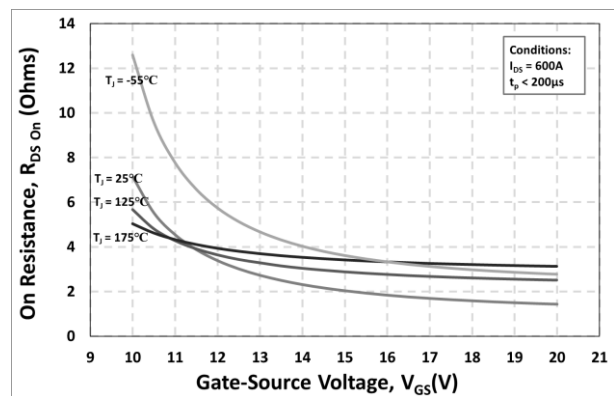


Figure 6. On-Resistance vs. Gate-Source Voltage

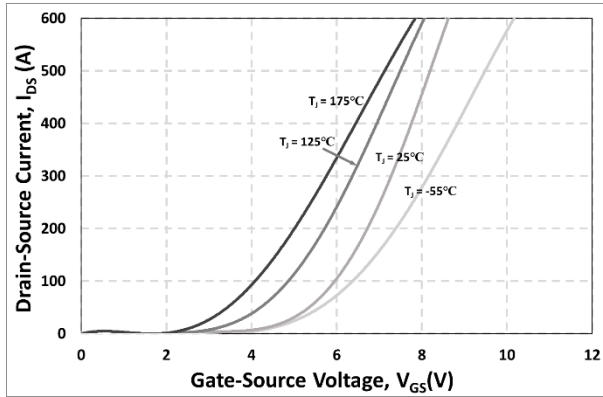


Figure 7. Transfer Characteristic for Various Junction Temperatures

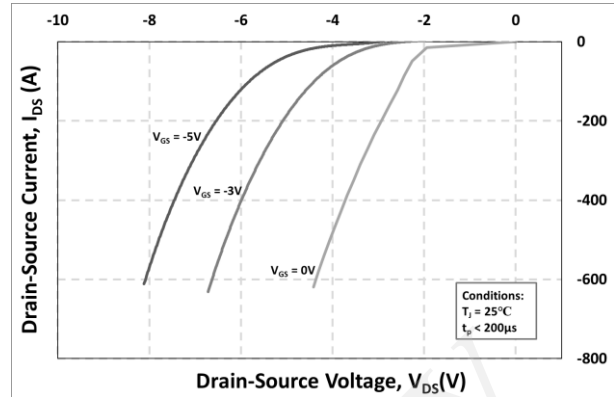


Figure 8. Body Diode Characteristic at 25°C

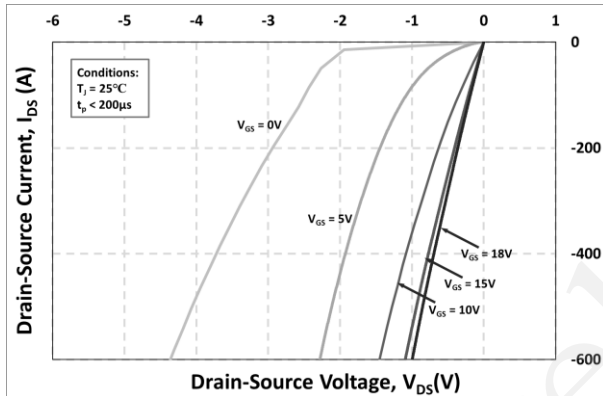


Figure 9. 3rd Quadrant Characteristic at 25°C

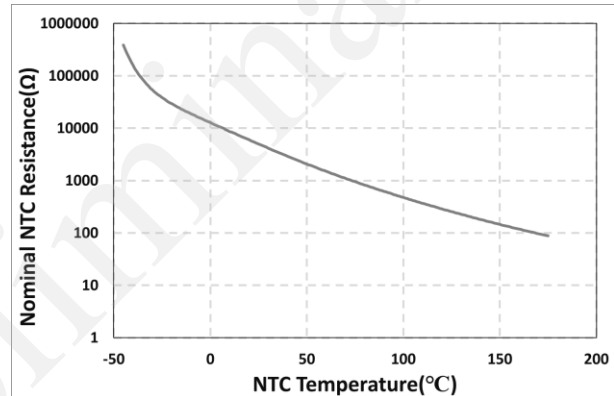


Figure 10. Nominal NTC Resistance vs. NTC Temperature

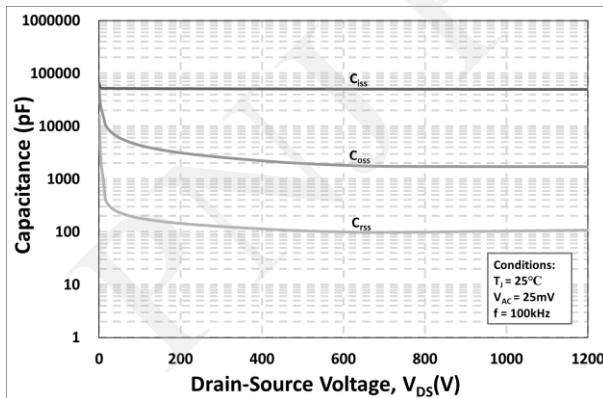


Figure 11. Capacitances vs. Drain-Source Voltage

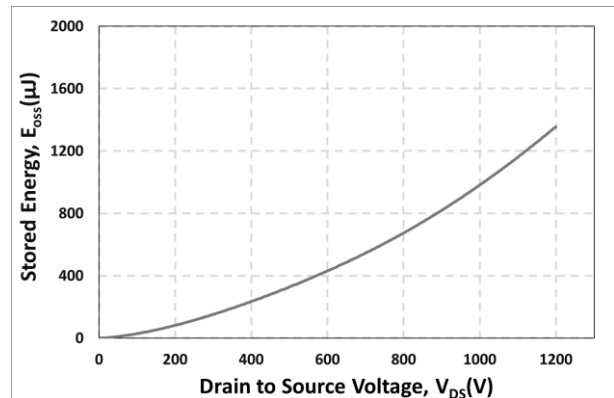
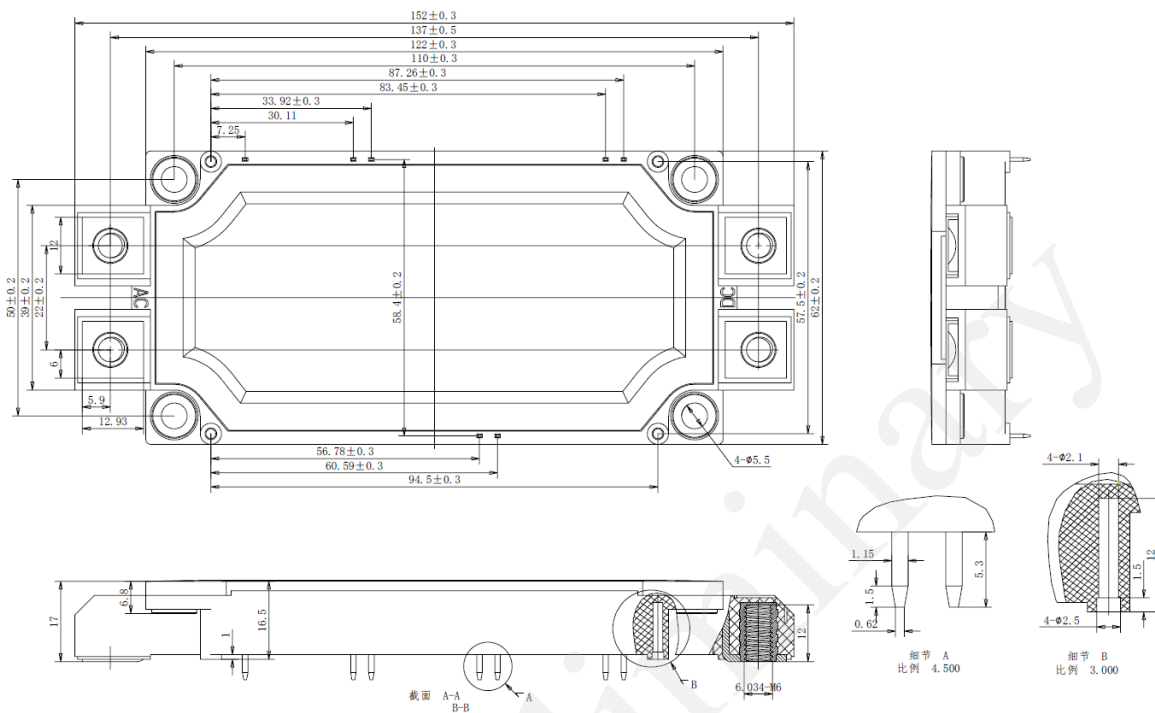


Figure 12. Output Capacitor Stored Energy

6. Package Outlines



Drawing and Dimensions

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