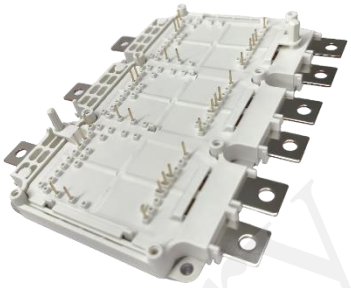
SiC Six-pack Module
PAAC12450CM

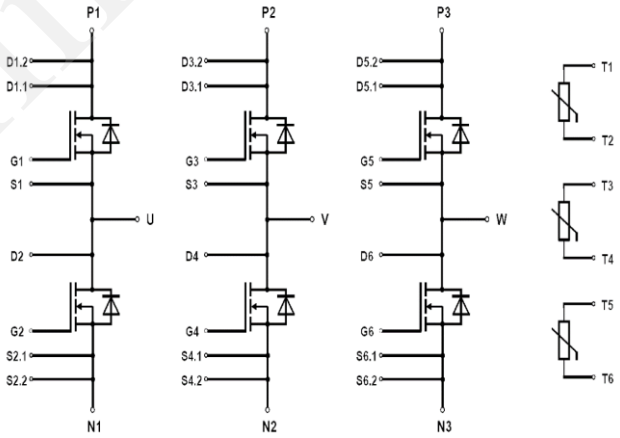


Features

- Silicon Carbide MOSFET
- Low RDSon
- Low Switching Losses
- Si_3N_4 Ceramic
- PinFin Base Plate
- Sliver Sintering Technology
- Die Top System Technology

Applications

- Automotive Applications
- EV/HEV
- Motor Drives



Standards Benefits

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

Order Information

Part Number	Package	Marking
PAAC12450CM	HPD	PAAC12450CM

Contents

1. Maximum Ratings

At T_J= 25℃, 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	450 400	A	V_{GS} =18V T_F = 25℃ T_F = 60℃
Power Dissipation	P_D	1250	W	T_F = 25℃
Operating Junction Temperature	T_J	-55 To +175	℃	

2. Electrical Characteristics

At T_J= 25℃, 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}= 0V I_D= 6mA
Gate Threshold Voltage	$V_{GS(th)}$	1.8	2.1	/	V	V_{DS}= V_{GS} I_D= 100mA T_J= 25℃
Reverse Bias Drain Current	I_{DSS}	/	1	100	μA	V_{GS}= -3V V_{DS}= 1200V
Gate-Source Leakage Current	I_{GSS}	/	1	100	nA	V_{GS}= 18V V_{DS}= 0V
Drain-Source On-State Resistance	$R_{DS(on)}$	/	2.7	/	mΩ	V_{GS}= 18V I_D= 450A T_J= 25℃
		/	3	/		V_{GS}= 18V I_D= 450A T_J= 125℃
		/	3.8	/		V_{GS}= 18V I_D= 450A T_J= 175℃
		/	3.0	/		V_{GS}= 15V I_D= 450A T_J= 25℃
Internal Gate Resistance	$R_{G(int)}$	/	1.4	/	Ω	f= 100kHz V_{AC}= 25mV
Input Capacitance	C_{iss}	/	36	/	nF	V_{GS}= 0V V_{DS}= 800V f= 100kHz V_{AC}= 25mV
Output Capacitance	C_{oss}	/	1.4	/	nF	

Parameter	Symbol	Value			Unit	Test Conditions
		Min.	Typ.	Max.		
Reverse Transfer Capacitance	C_{rss}	/	136	/	pF	
Gate to Source Charge	Q_{gs}	/	513	/	nC	V_{DS}= 800V I_{DS}= 450A V_{GS}= -3 to 18V
Gate to Drain Charge	Q_{gd}	/	224	/		
Total Gate Charge	Q_g	/	1182	/		
Turn-on Energy	E_{on}	/	23	/	mJ	V_{DS}= 800V I_{DS}= 450A Rg= 5Ω V_{GS}= -3V/18V L= 20μH Tj=25℃
Turn-off Energy	E_{off}	/	31	/		
Turn-On Delay Time	$T_{d(on)}$	/	75	/	ns	
Rise Time	T_r	/	178	/		
Turn-Off Delay Time	$T_{d(off)}$	/	337	/		
Fall Time	T_f	/	106	/		
Coss Stored Energy	E_{oss}	/	521	/	μJ	V_{DS}= 800V f= 100kHz
Thermal Resistance from Junction to Cooling Fluid	$R_{\theta JF}$	/	0.12	/	℃/W	ΔV/Δt= 10.0dm³/min; T_F= 60°C

3. Reverse Diode Characteristics

At T_J= 25℃, unless specified otherwise (Per Position)

Parameter	Symbol	Value		Unit	Test Conditions
		Typ.	Max.		
Diode Forward Voltage	V_{SD}	5.5	/	V	V_{GS}= -3V I_{SD}= 200A T_J= 25℃
		5.2	/	V	V_{GS}= -3V I_{SD}= 200A T_J= 175℃
Reverse Recover Time	t_{rr}	24	/	ns	V_{DS}= 800V I_{SD}= 450A d_{if}/d_t= 5600A/μs Vgs = -3V T_J= 25℃
Reverse Recovery Charge	Q_{rr}	1.4	/	uC	
Peak Reverse Recovery Current	I_{rrm}	12	/	A	
Reverse Recovery Energy	E_{RR}	432	/	uJ	

4. NTC Thermistor Characteristics

Parameter	Symbol	Value			Unit	Test Conditions
		Min.	Typ.	Max.		
Rated Resistance	R_{NTC}	/	5	/	kΩ	T_{NTC}= 25℃
Resistance Tolerance	△R/R	-5	/	5	%	T_{NTC}= 25℃
B-value	$B_{25/50}$	/	3380	/	K	T_2= 50℃
B-value	$B_{25/85}$	/	3435	/	K	T_2= 80℃
B-value	$B_{25/100}$	/	3485	/	K	T_2= 100℃
Power Dissipation	P_{NTC}	/	/	10	mW	T_{NTC}= 25℃

5. Typical Performance

At T_J= 25℃, unless specified otherwise (Per Position)

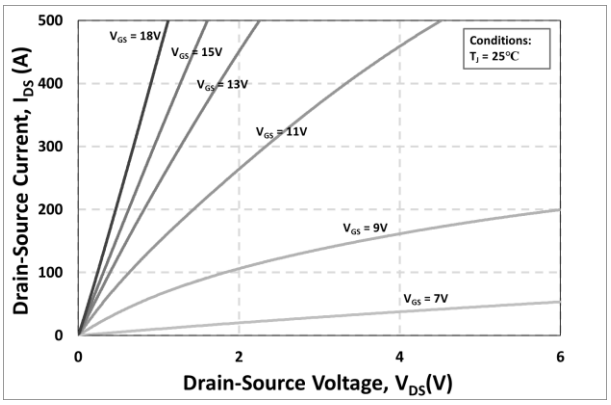


Figure 1. Output Characteristics T_J = 25℃

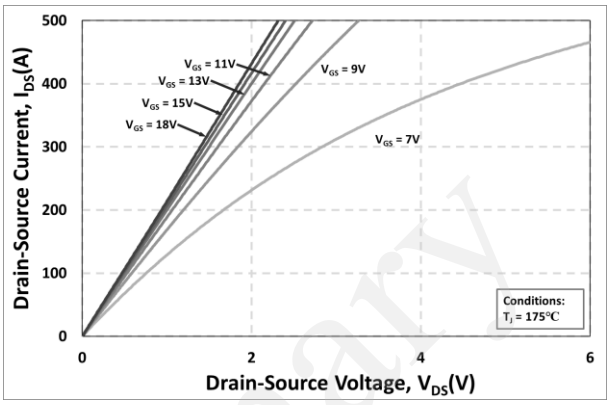


Figure 2. Output Characteristics T_J = 175℃

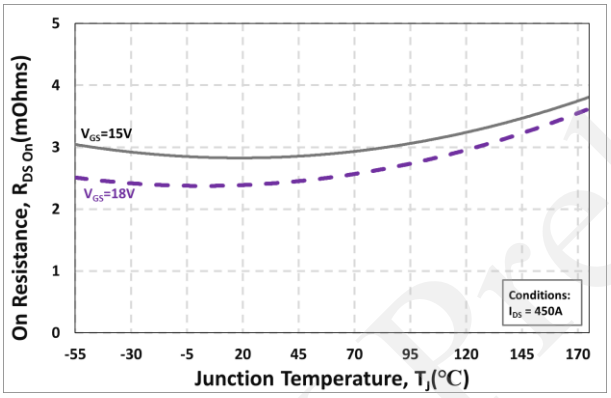


Figure 3. On-State Resistance vs.Junction Temperature

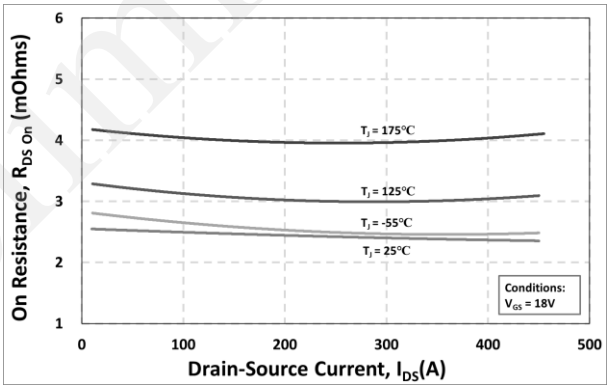


Figure 4. On-Resistance vs. Drain Current Various Temperatures

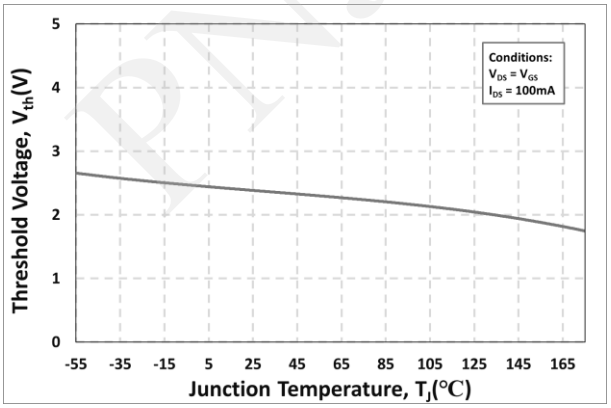


Figure 5. Threshold Voltage vs. Junction Temperature

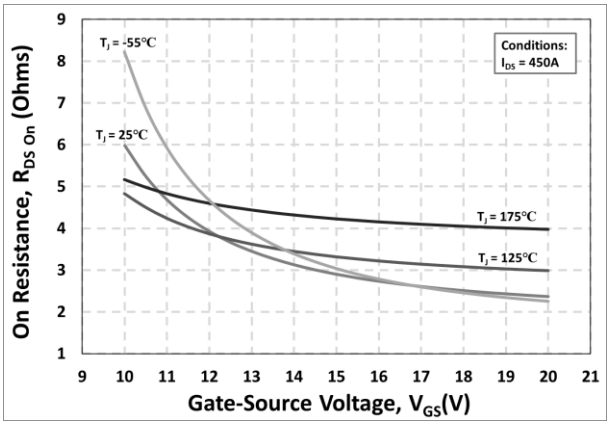


Figure 6. On-Resistance vs. Gate-Source Voltage

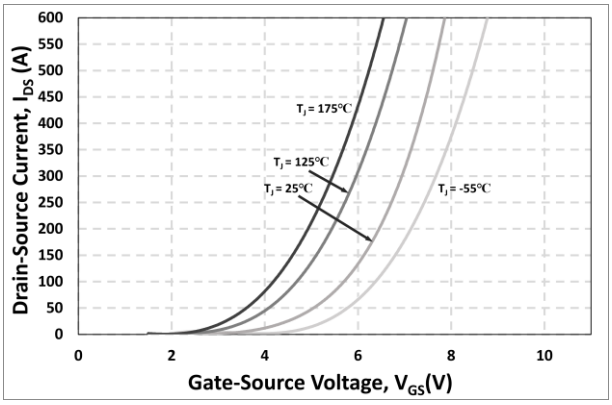


Figure 7. Transfer Characteristic for Various Junction Temperatures

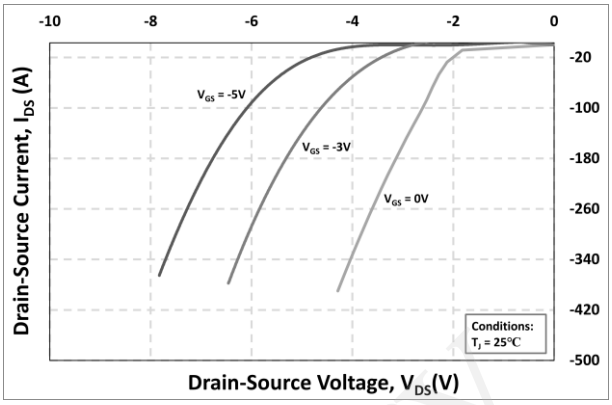


Figure 8. Body Diode Characteristic at 25℃

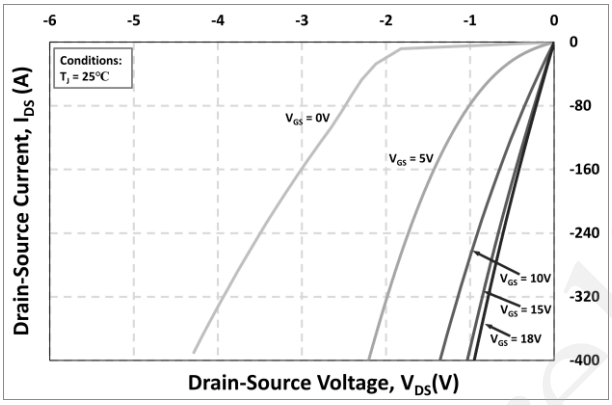


Figure 9. 3rd Quadrant Characteristic at 25℃

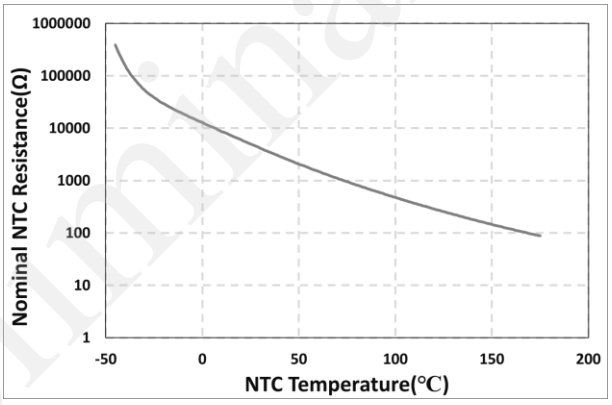


Figure 10. Nominal NTC Resistance vs. NTC Temperature

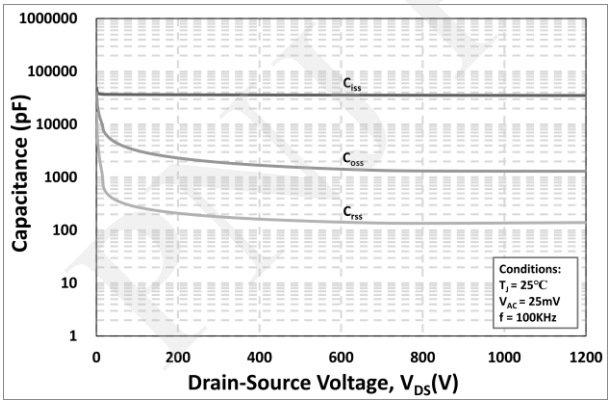


Figure 11. Capacitances vs. Drain-Source Voltage (0-1200V)

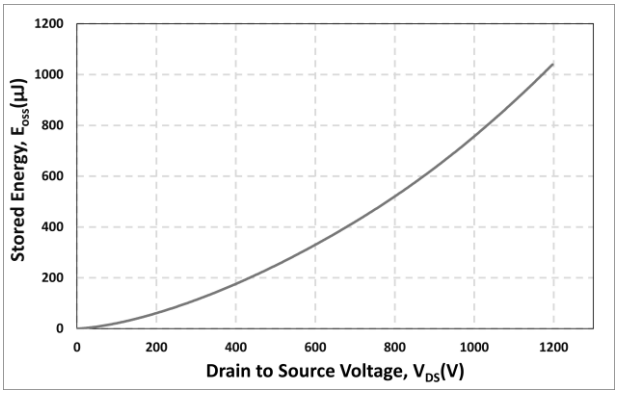


Figure 12. Output Capacitor Stored Energy

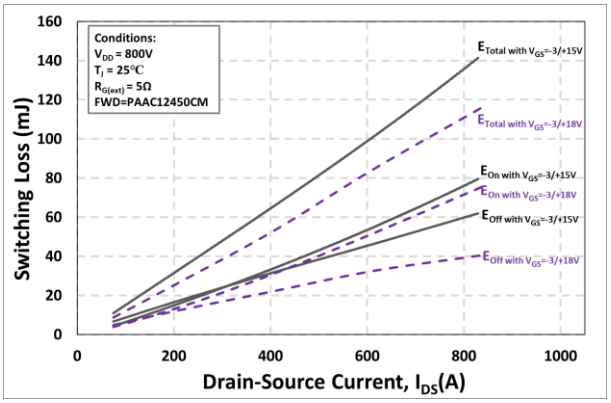


Figure 13. Switching Loss vs. Drain-Source Current (V_{DS} = 800 V)

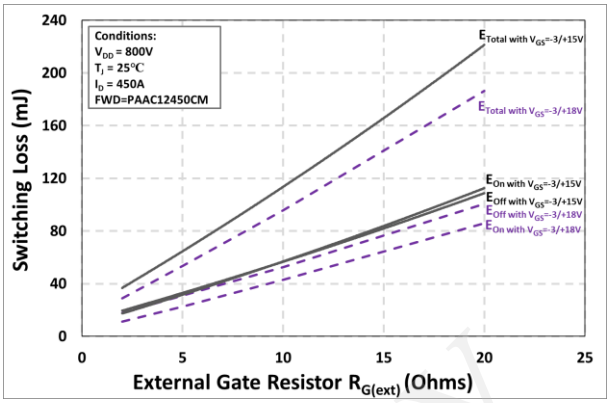


Figure 14. Switching Loss vs. External Gate Resistance

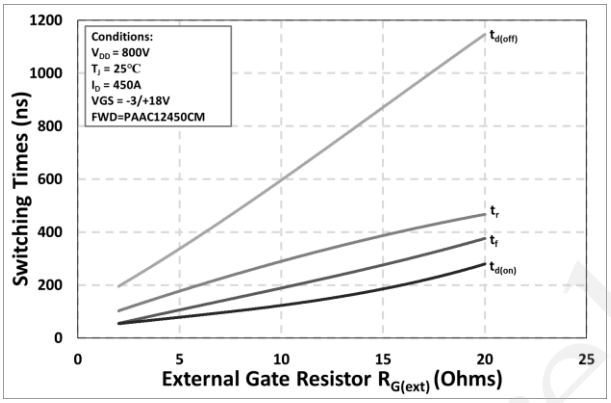


Figure 15. Switching Times vs. External Gate Resistance

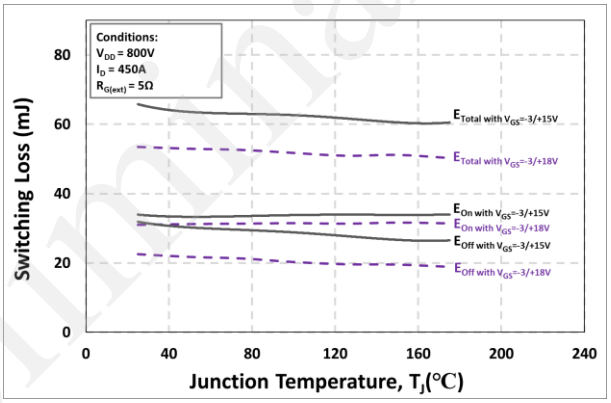


Figure 16. Clamped Inductive Switching Energy vs. Temperature

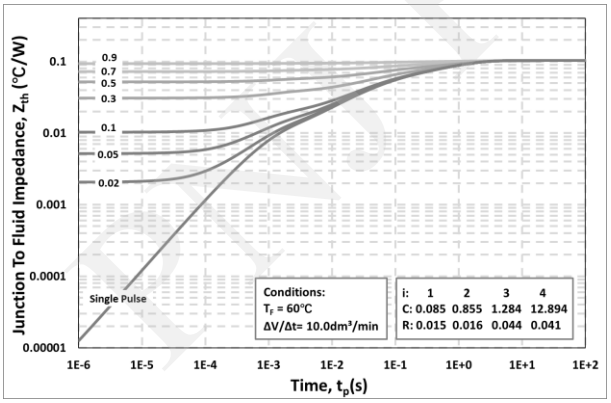
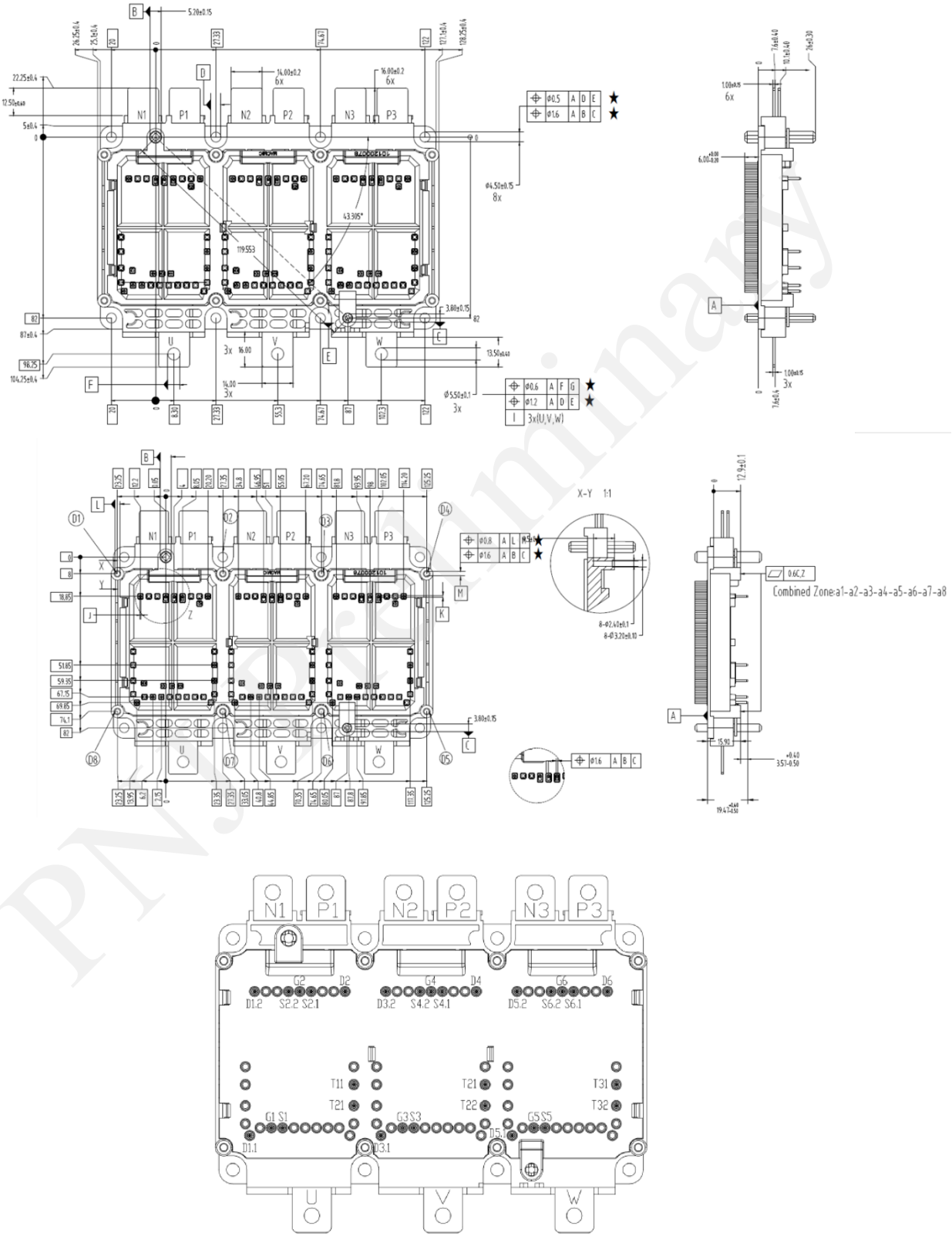


Figure 17. Transient Thermal Impedance (Junction – Cooling Fluid)

6. Package Outlines



Drawing and Dimensions

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