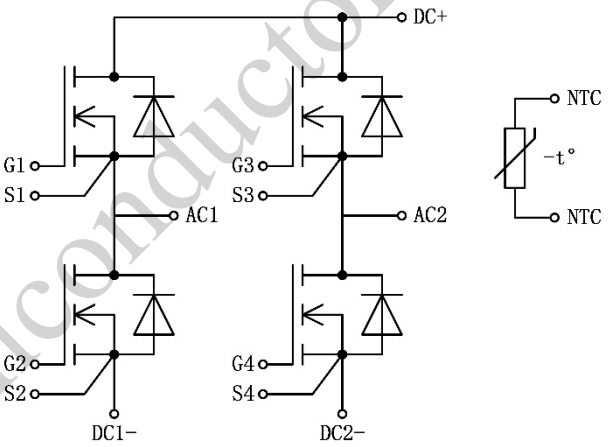
SiC Module PAIB12120AM

Features

- High blocking voltage
- Low on-state resistance
- Low stray inductance
- Low switching loss
- Low thermal resistance



Applications

- High-frequency switching application
- DC/DC converter
- Motor drives
- Solar inverter
- Electric vehicle
- UPS systems

Standards Benefits

- Improve system efficiency
- Improve power density
- Reduce cooling requirement
- Reduce system cost

Order Information

Part Number	Package	Marking
PAIB12120AM	EASY 1B	PAIB12120AM

Contents

1. Maximum Ratings

At T_J= 25℃, unless specified otherwise

Parameter	Symbol	Value	Unit	Test Conditions
Drain - Source Voltage	V_{DSmax}	1200	V	V_{GS}=0V I_D= 100μA
Gate - Source Voltage (Dynamic)	V_{GSmax}	-8 / +22	V	Duty cycle ≤ 1%
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	150	A	V_{GS} =18V T_C = 25℃ T_J = 150℃
		100		V_{GS} =18V T_C = 100℃ T_J = 150℃
Operating Junction Temperature	T_J	-55 To +150	℃	

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= 100μA
Gate Threshold Voltage	$V_{GS(th)}$	/	2.6	/	V	V_{DS}= V_{GS} I_D= 36mA T_J= 25℃
		/	1.9	/		V_{DS}= V_{GS} I_D= 36mA T_J= 150℃

Parameter	Symbol	Value			Unit	Test Conditions
		Min.	Typ.	Max.		
Reverse Bias Drain Current	I_{DSS}	/	1	100	μA	V_{GS}= 0V V_{DS}= 1200V
Gate-Source Leakage Current	I_{GSS}	/	50	250	nA	V_{GS}= 18V V_{DS}= 0V
Drain-Source On-State Resistance	$R_{DS(on)}$	/	8.7	11	mΩ	V_{GS}= 18V I_D= 100A T_J= 25℃
		/	12	/		V_{GS}= 18V I_D= 100A T_J= 150℃
		/	11	14		V_{GS}= 15V I_D= 100A T_J= 25℃
Transconductance	g_{fs}	/	34	/	S	V_{DS}= 20V I_{DS}= 45A T_J= 25℃
		/	40	/		V_{DS}= 20V I_{DS}= 45A T_J= 150℃
Turn-on Energy	E_{on}	/	947	/	μJ	V_{DS}= 800V I_{DS}= 120A V_{GS}= -4V/18V R_G= 1.0Ω L= 50μH T_J= 25℃
Turn-off Energy	E_{off}	/	485	/		
Turn-On Delay Time	$T_{d(on)}$	/	59	/	ns	
Rise Time	T_r	/	33	/		
Turn-Off Delay Time	$T_{d(off)}$	/	78	/		
Fall Time	T_f	/	15	/		

Parameter	Symbol	Value			Unit	Test Conditions
		Min.	Typ.	Max.		
Internal Gate Resistance	$R_{G(int)}$	/	1.4	/	Ω	f= 1MHz V_{AC}= 25mV
Input Capacitance	C_{iss}	/	11	/	nF	V_{GS}= 0V V_{DS}= 800V f= 250kHz V_{AC}= 25mV
Output Capacitance	C_{oss}	/	0.45	/	nF	
Reverse Transfer Capacitance	C_{rss}	/	44	/	pF	
Gate to Source Charge	Q_{gs}	/	221	/	nC	V_{DS}= 800V I_{DS}= 100A V_{GS}= -3 to 18V I_G= 25mA
Gate to Drain Charge	Q_{gd}	/	78	/		
Total Gate Charge	Q_g	/	413	/		
Thermal Resistance from Junction to Case	$R_{\theta JC}$	/	0.40	/	℃/W	

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}	6.1	/	V	V_{GS}= -3V I_{SD}= 100A T_J= 25℃
		5.9	/	V	V_{GS}= -3V I_{SD}= 100A T_J= 150℃
Reverse Recover Time	t_{rr}	37	/	ns	V_{GS}= -4/18V I_{SD}= 120A V_{DS}= 800V d_{if}/d_t=8300A/μs T_J= 25℃
Reverse Recovery Charge	Q_{rr}	1809	/	μC	
Peak Reverse Recovery Current	I_{rrm}	83	/	A	
Reverse Recovery Energy	E_{RR}	1240	/	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)

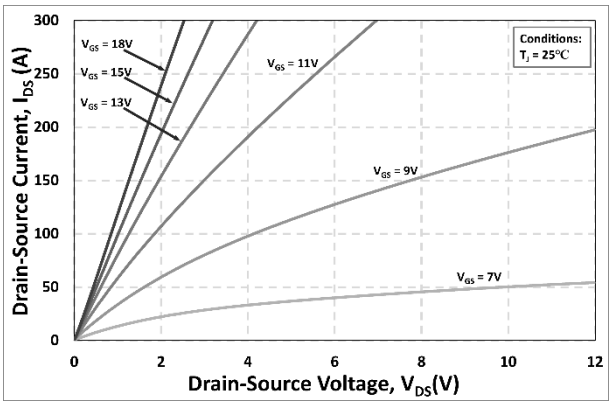


Figure 1. Output Characteristics T_J = 25℃

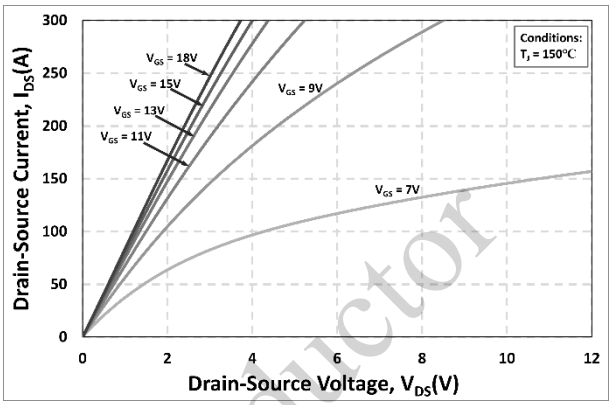


Figure 2. Output Characteristics T_J = 150℃

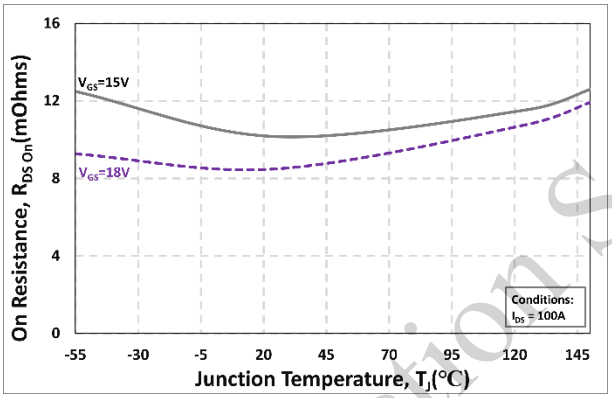


Figure 3. On-State Resistance vs.Junction Temperature

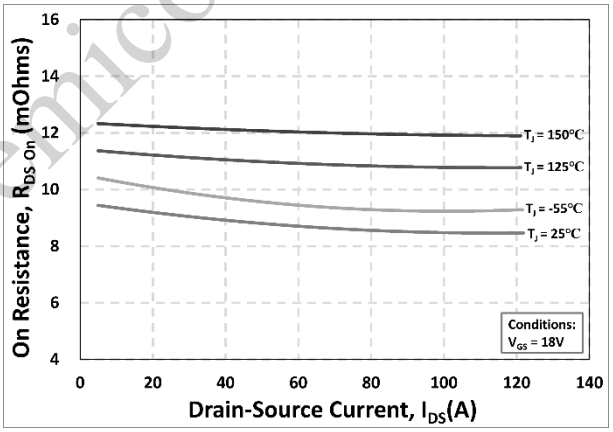


Figure 4. On-Resistance vs. Drain Current Various Temperatures

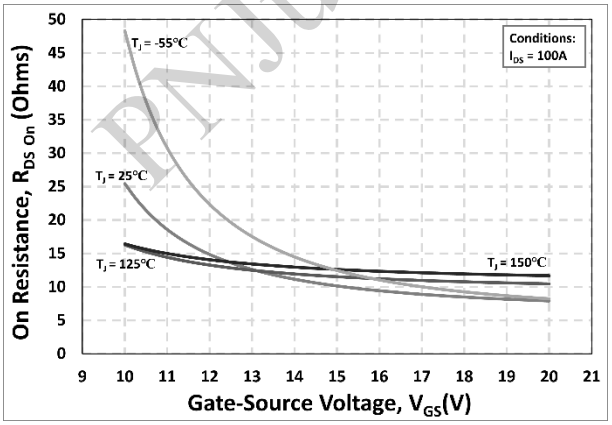


Figure 5. On-Resistance vs. Gate-Source Voltage

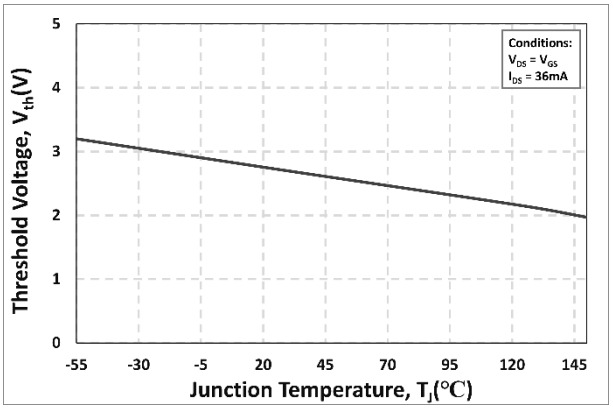


Figure 6. Threshold Voltage vs. Junction Temperature

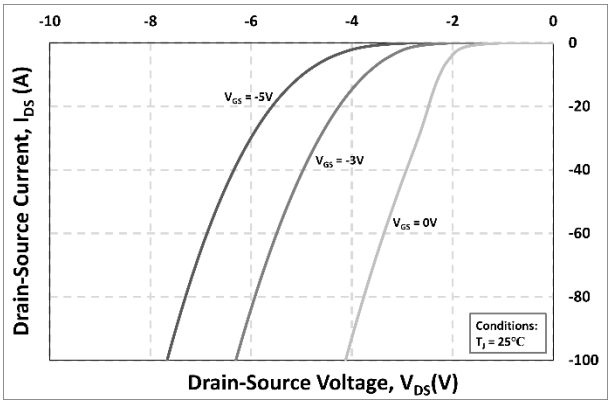


Figure 7. Body Diode Characteristic at 25°C

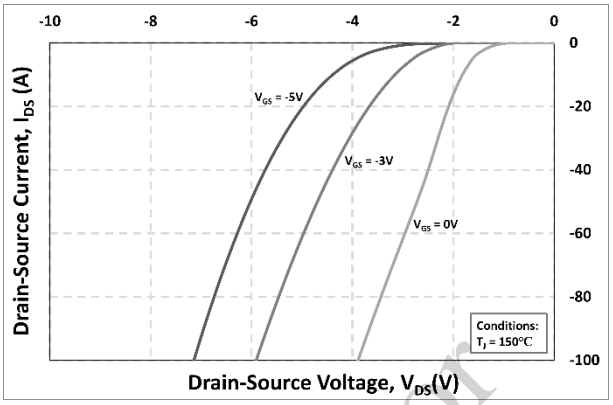


Figure 8. Body Diode Characteristic at 150°C

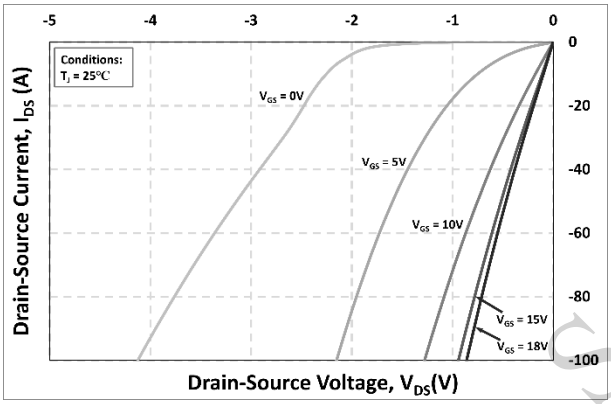


Figure 9. 3rd Quadrant Characteristic at 25°C

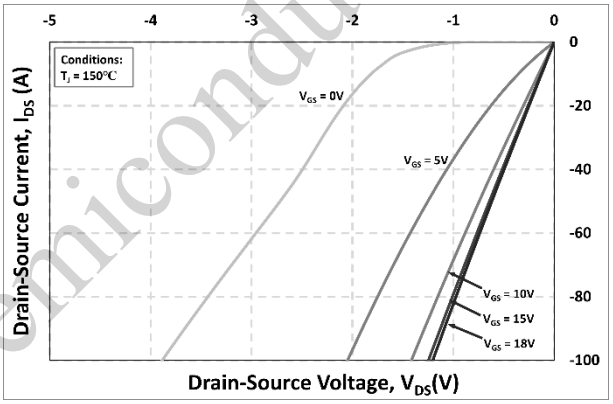


Figure 10. 3rd Quadrant Characteristic at 150°C

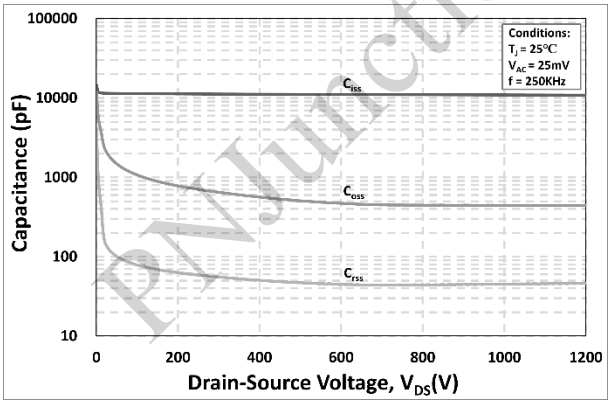


Figure 11. Capacitances vs. Drain-Source Voltage (0 - 1200V)

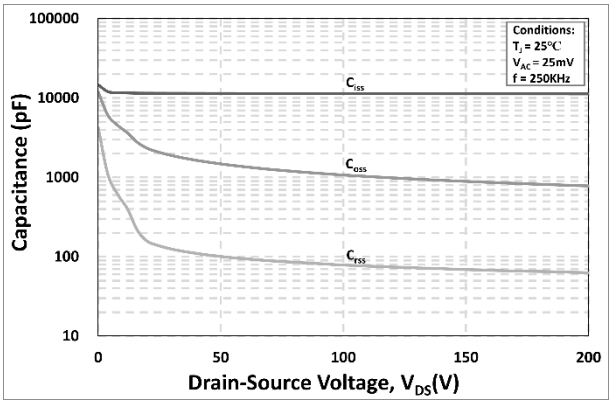


Figure 12. Capacitances vs. Drain-Source Voltage (0 - 200V)

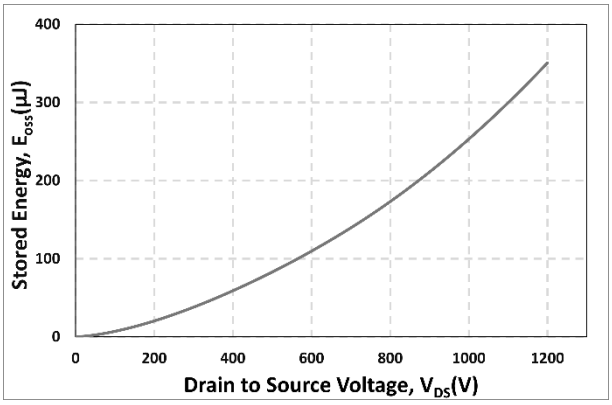


Figure 13. Output Capacitor Stored Energy

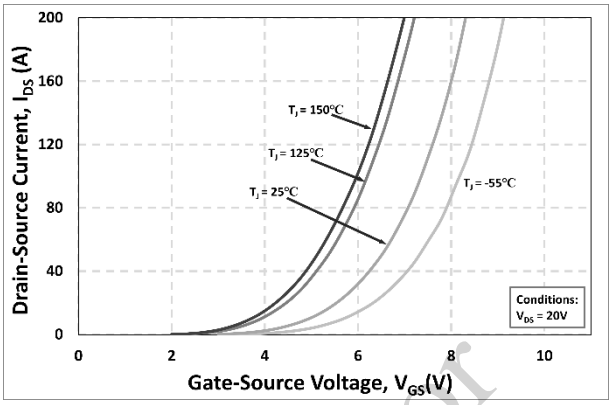


Figure 14. Transfer Characteristic for Various Junction Temperatures

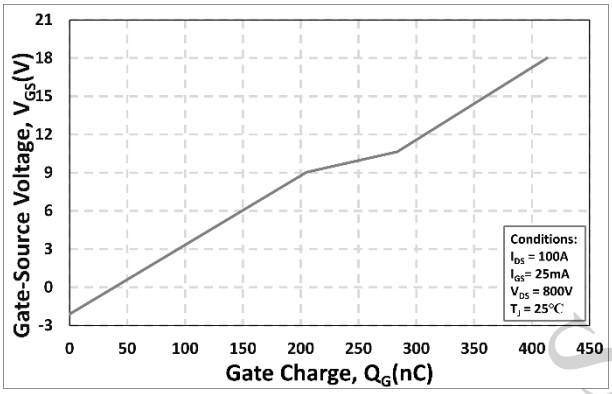


Figure 15. Gate Charge Characteristics

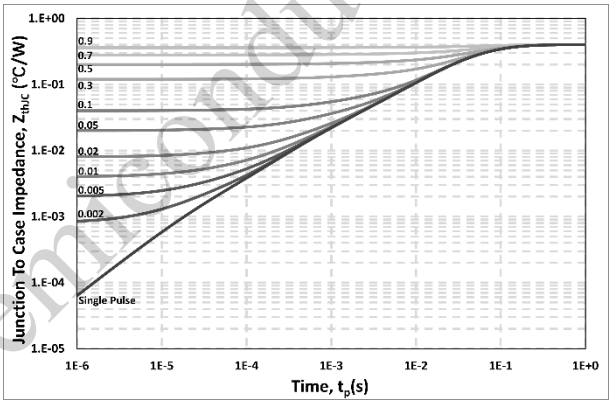


Figure 16. Transient Thermal Impedance (Junction - Case)

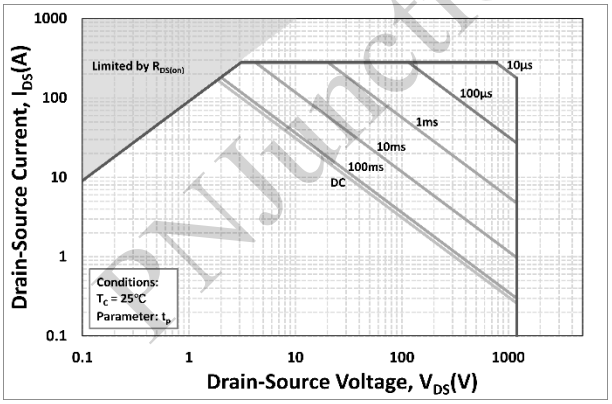


Figure 17. Forward Bias Safe Operating Area (FBSOA)

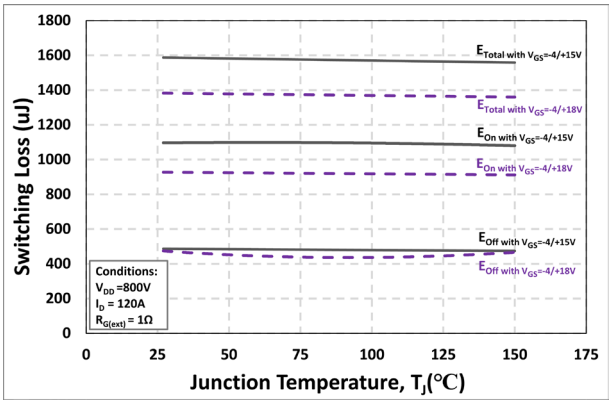


Figure 18. Clamped Inductive Switching Energy vs. Temperature

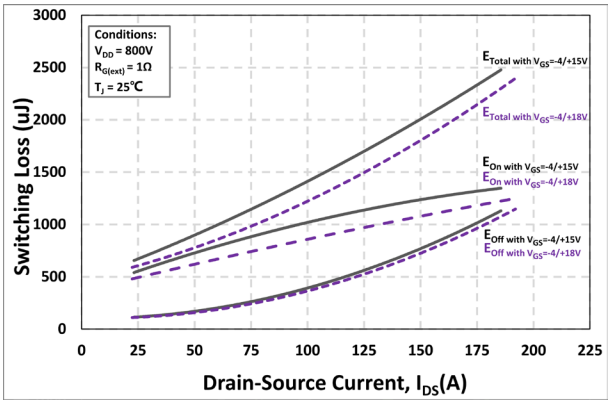


Figure 19. Switching Loss vs. Drain-Source Current (V_{DS} = 800 V)

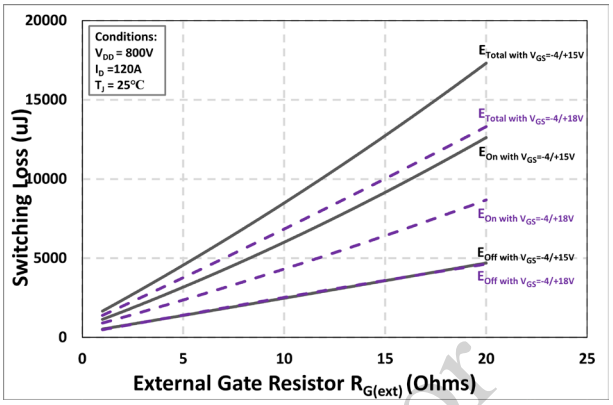


Figure 20. Switching Loss vs. External Gate Resistance

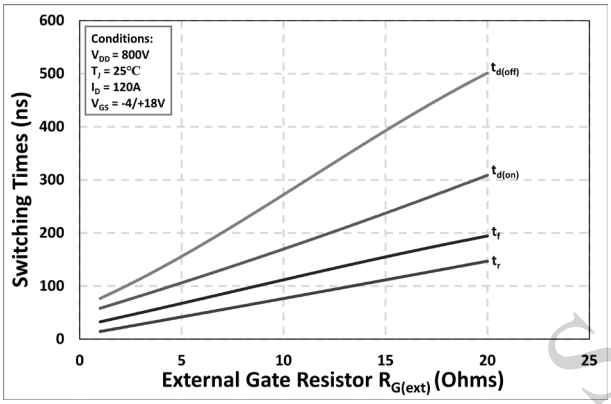
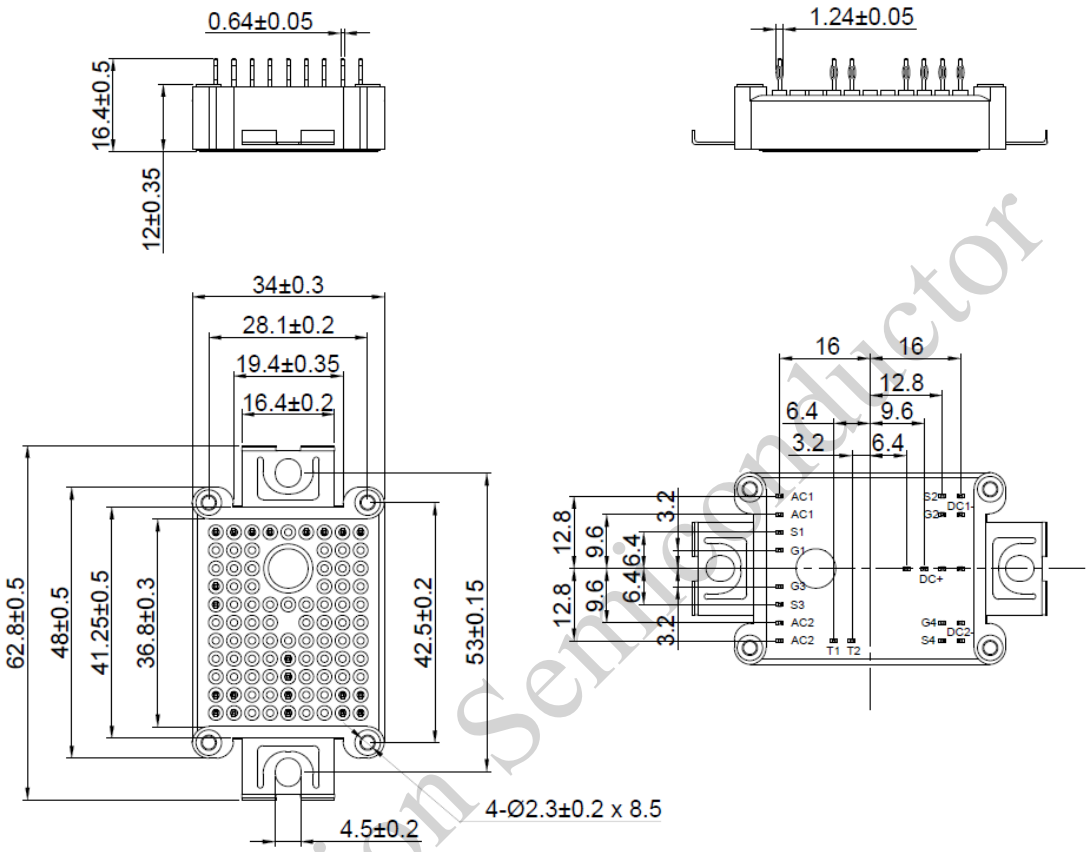


Figure 21. Switching Times vs. External Gate Resistance

6. Package Outlines



Drawing and Dimensions

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