

1500V 23mΩ SiC MOSFET

Features:

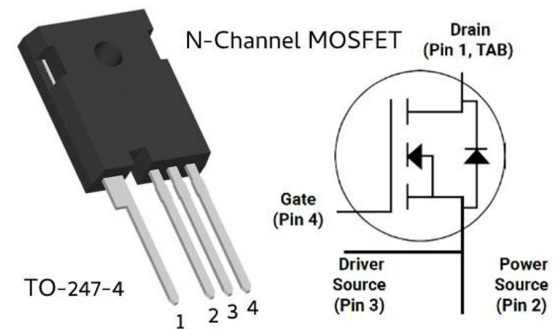
- High blocking voltage with low $R_{DS(on)}$
- High frequency operation with low capacitance
- Simple to drive with -4V/+18V gate
- Robust body diode with low Q_{rr}
- 100% avalanche tested

Benefits

- Superior robustness and system reliability
- Higher system efficiency
- Easier paralleling without thermal runaway
- Capable of high temperature application
- Faster and more efficient switching

Applications:

- Solar Inverters
- SMPS
- Energy storage systems
- High performance DC-DC converters
- UPS
- Motor drivers



Key Performance and Package Parameters

Type	V_{DS}	$R_{DS(ON)}$	$I_D@25^{\circ}C$	$I_D@100^{\circ}C$	Marking	Package
PD023S150AOC	1500V	23mΩ	86A	61A	PD023S150AOC	TO247-4

Absolute Maximum Ratings($T_C=25^{\circ}C$ unless otherwise specified)

Parameter	Symbols	Conditions	Value	Unit
Drain - source voltage	$V_{DS(max)}$	$V_{GS}=0V$, $I_D=100\mu A$	1500	V
Gate - source voltage	$V_{GS(max)}$	AC ($f>1Hz$, duty cycle $<1\%$, pulse width $<200ns$)	-9 / +23	V
Gate – source voltage	$V_{GS(op)}$	Recommend operation	-4 / +18	V
Continuous drain current (limited by $T_{J,max}$)	I_D	$V_{GS}=18V$, $T_C=25^{\circ}C$ $V_{GS}=18V$, $T_C=100^{\circ}C$	86 61	A
Pulsed drain current	$I_{D(pulse)}$	$T_C=25^{\circ}C$	257	A
Total power dissipation #	P_D	$T_C=25^{\circ}C$	417	W
Operating junction temperature	T_J		-55 to 175	$^{\circ}C$
Storage temperature	T_{STG}		-55 to 175	$^{\circ}C$
Soldering temperature	T_L		260	$^{\circ}C$
Avalanche capability, single pulse *	I_{AV}	$V_{DD}=100V$, $V_{GS}=10V$, $L=1mH$	54	A
Avalanche capability, single pulse **	E_{AV}	$V_{DD}=100V$, $V_{GS}=10V$, $L=1mH$	1450	mJ

*100% tested in 60% rating

**100% tested in 36% rating

Electrical Characteristics at T_c = 25°C (unless otherwise specified)

Parameter	Symbols	Conditions	Value			Unit
			Min	Typ	Max	
Drain-source breakdown voltage	V _{(BR)DSS}	V _{GS} =0V, I _D =100μA	1500	-	-	V
Gate threshold voltage ***	V _{GS(TH)}	V _{DS} =V _{GS} , I _D =25mA V _{DS} =V _{GS} , I _D =25mA, T _J =175°C	2.3 -	2.8 2.0	3.8 -	V
Zero gate voltage drain current	I _{DSS}	V _{DS} =1500V, V _{GS} = 0V V _{DS} =1500V, V _{GS} = 0V, T _J =175°C	0 0	1 5	60 200	uA
Gate-source leakage current	I _{GSS}	V _{GS} =18V, V _{DS} =0V	0	5	100	nA
Gate-source leakage current	I _{GSS}	V _{GS} =-4V, V _{DS} =0V	-100	-5	0	nA
Drain-source on-state resistance	R _{DS(on)}	V _{GS} =18V, I _D =50A	-	23	31	mΩ
		V _{GS} =18V, I _D =50A, T _J =175°C	-	47	-	
Transconductance	g _{fs}	V _{DS} =20V, I _D =50A	-	45	-	S
		V _{DS} =20V, I _D =50A, T _J =175°C	-	41	-	S
Input capacitance	C _{iss}	V _{DS} =1000V, V _{GS} =0V f=100KHZ, V _{AC} =25mV	-	3482	-	pF
Output capacitance	C _{oss}		-	101	-	pF
Reverse transfer capacitance	C _{rss}		-	9	-	pF
Coss stored energy	E _{oss}		-	65	-	μJ
Turn-on switching energy	E _{ON}	V _{DS} =1000V, V _{GS} = -4V/18V	-	862	-	μJ
Turn-off switching energy	E _{OFF}	I _D = 50A, R _{G(ext)} =2Ω, L=200μH	-	224	-	μJ
Turn-on delay time	td(on)	V _{DS} =1000V, V _{GS} =-4V/18V I _D = 50A, R _{G(ext)} =2Ω, L=200μH	-	15	-	ns
Rise time	tr		-	9	-	ns
Turn-off delaytime	td(off)		-	36	-	ns
Fall time	tf		-	6.5	-	ns
Total gate charge	Q _g	V _{DS} =1000V, V _{GS} =-4V/18V I _D = 50A	-	154	-	nC
Gate-source charge	Q _{gs}		-	42	-	nC
Gate-drain charge	Q _{gd}		-	39	-	nC
Internal gate input resistance	R _{g(int)}	f=1MHZ, I _D =0A	0.5	0.9	1.5	Ω

Reverse Diode Characteristics at T_c = 25°C (unless otherwise specified)

Parameter	Symbols	Conditions	Value			Unit
			Min	Typ	Max	
Diode Forward Voltage	V _{SD}	V _{GS} =-4V, I _{SD} =50A, T _J =25°C	-	4.8	-	V
Diode Forward Voltage	V _{SD}	V _{GS} =-4V, I _{SD} =50A, T _J =175°C	-	4.3	-	V
Continuous diode forward current	I _S	V _{GS} =-4V, T _J =25°C	-	76	-	A
Reverse recovery time	trr	V _{GS} =-4V, I _{SD} =50A,	-	24	-	ns
Reverse recovery charge	Q _{rr}	V _R =1000V, L=200μH,	-	458	-	nC
Peak reverse recovery current	I _{rrm}	dif/dt=1953A/us	-	34	-	A

Thermal Characteristics

Parameter	Symbols	Conditions	Value			Unit
			Min	Typ	Max	
Thermal resistance	R _{th(j-c)}	Junction to case	-	0.36	0.42	°C/W

Typical Characteristics

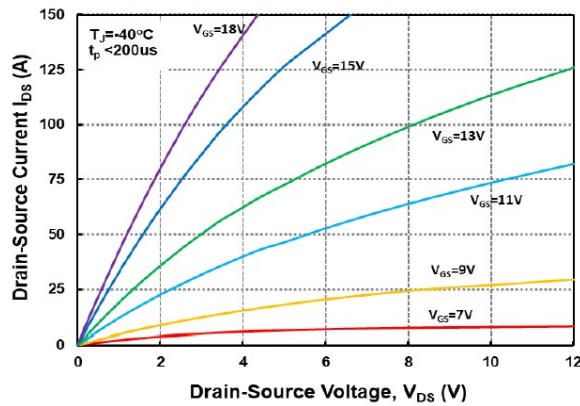


Figure 1: Output Characteristics, $T_J = -40^\circ\text{C}$

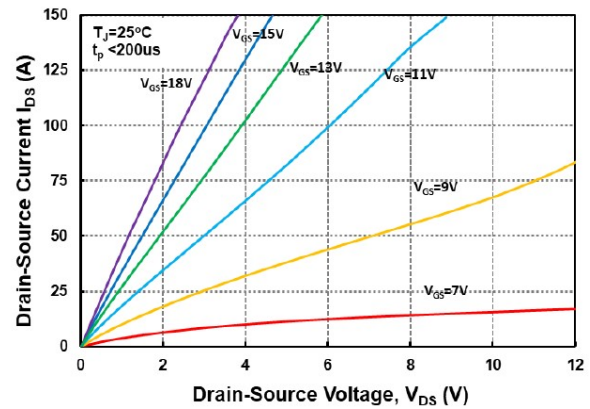


Figure 2: Output Characteristics, $T_J = 25^\circ\text{C}$

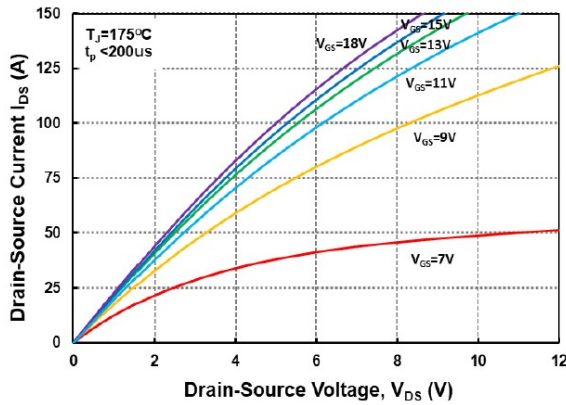


Figure 3: Output Characteristics, $T_J = 175^\circ\text{C}$

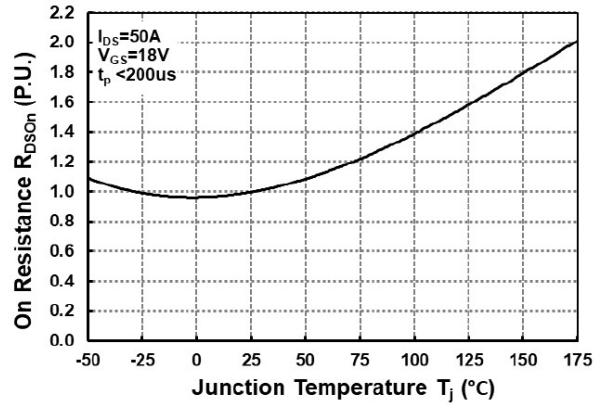


Figure 4: Normalized On-Resistance vs. Temperature

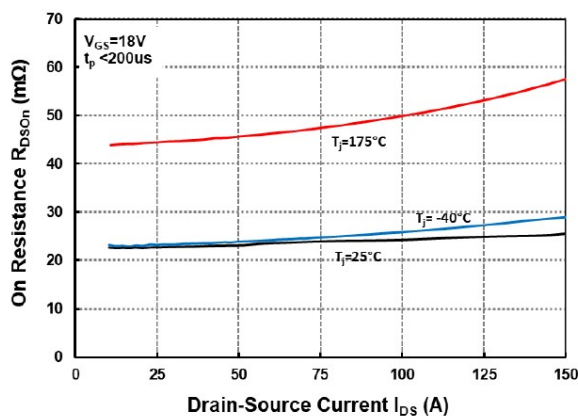


Figure 5: On-Resistance vs. Drain Current for Various Temperatures

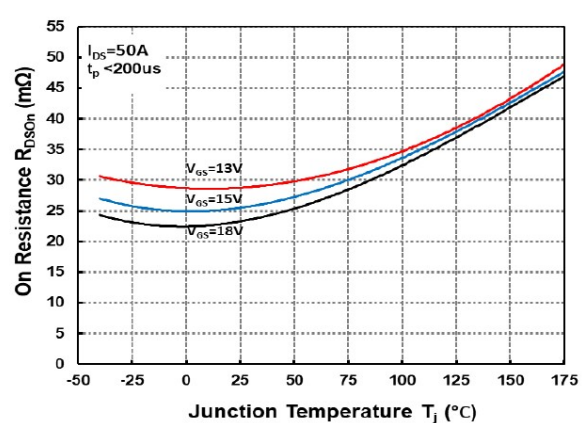


Figure 6: On-Resistance vs. Temperature for Various Gate Voltage

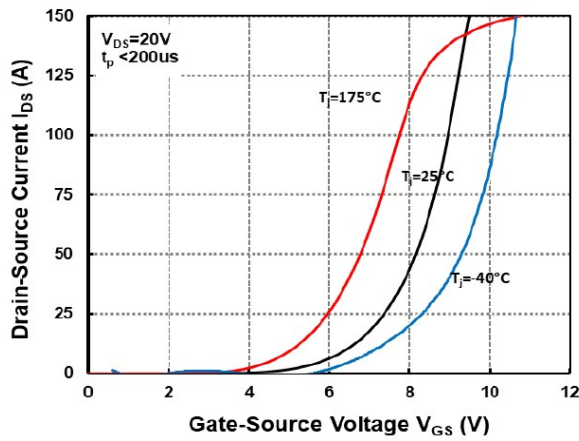


Figure 7. Transfer Characteristic for Various Junction Temperatures

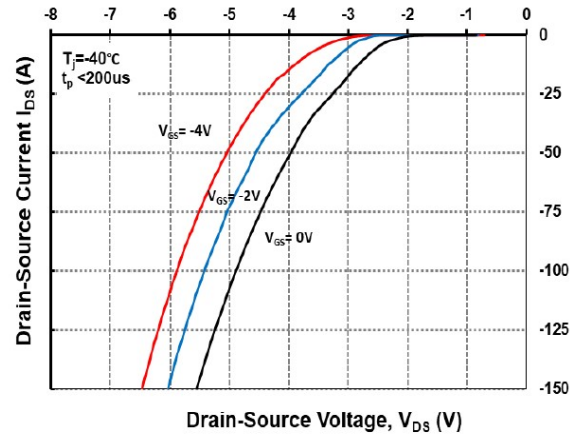


Figure 8. Body Diode Characteristics @ -40°C

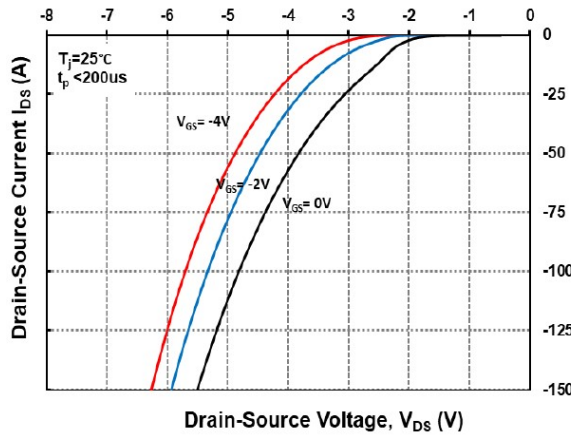


Figure 9. Body Diode Characteristics @ 25°C

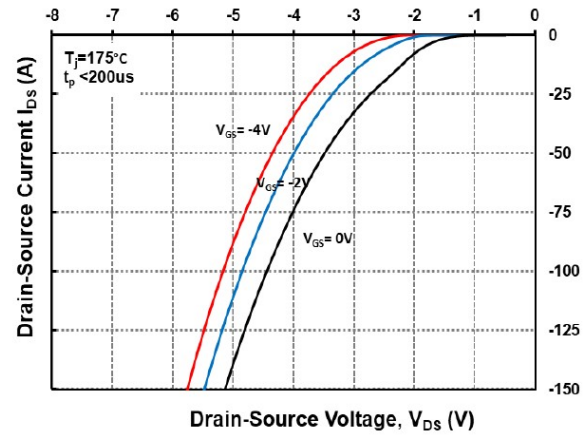


Figure 10. Body Diode Characteristics @ 175°C

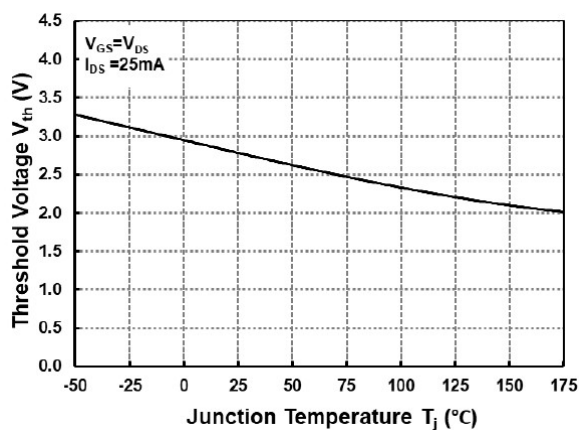


Figure 11. Threshold Voltage vs. Temperature

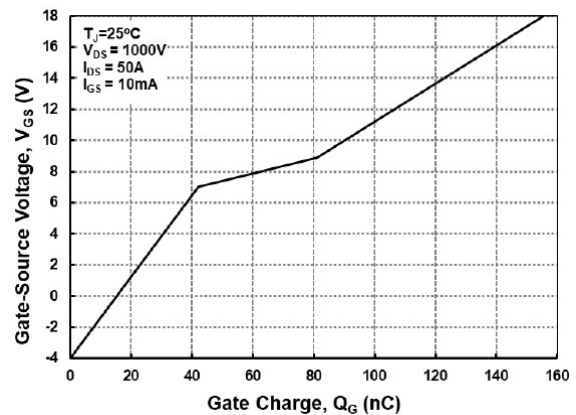


Figure 12. Gate Charge Characteristics

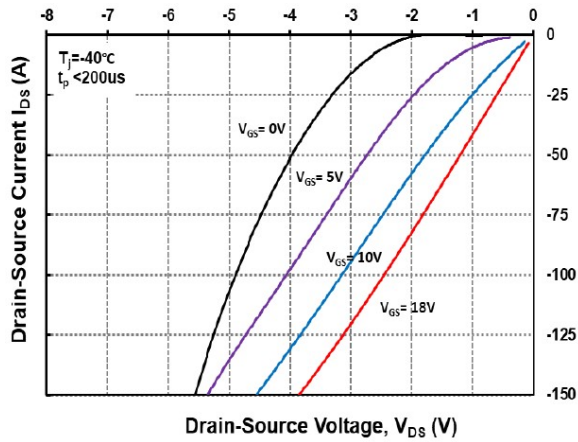


Figure 13. 3rd Quadrant Characteristics @ -40°C

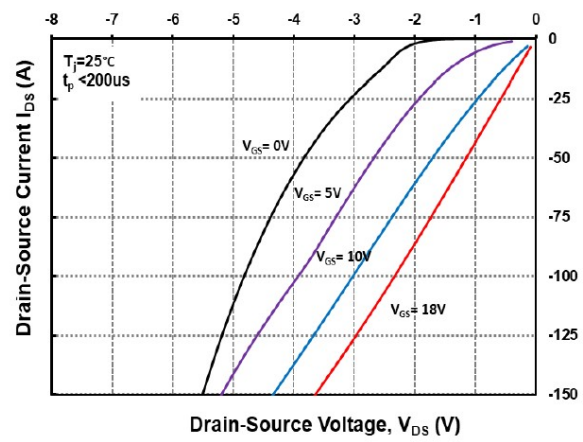


Figure 14. 3rd Quadrant Characteristics @ 25°C

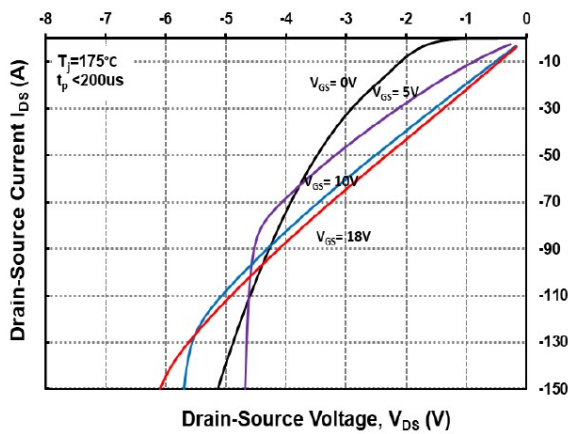


Figure 15. 3rd Quadrant Characteristics @ 175°C

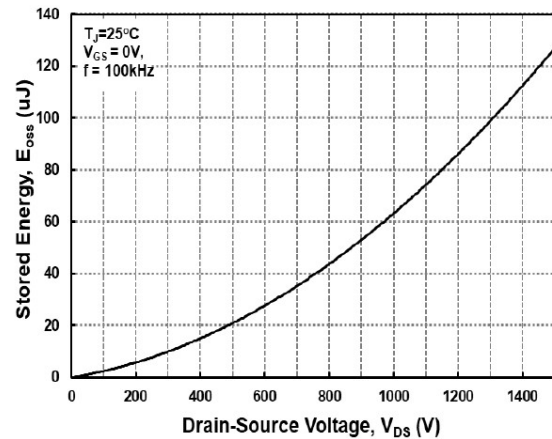


Figure 16. Output Capacitor Stored Energy

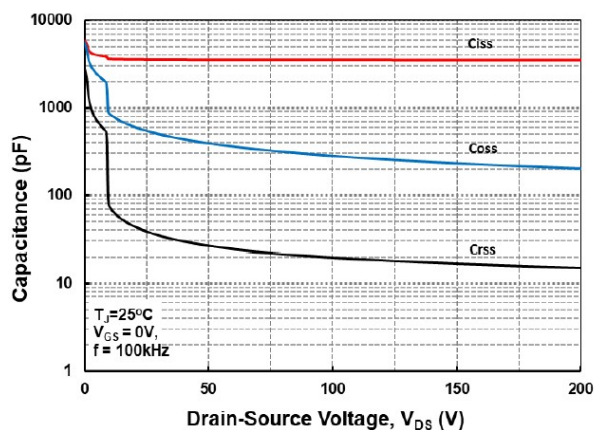


Figure 17. Capacitances vs. Drain-Source Voltage (0-200V)

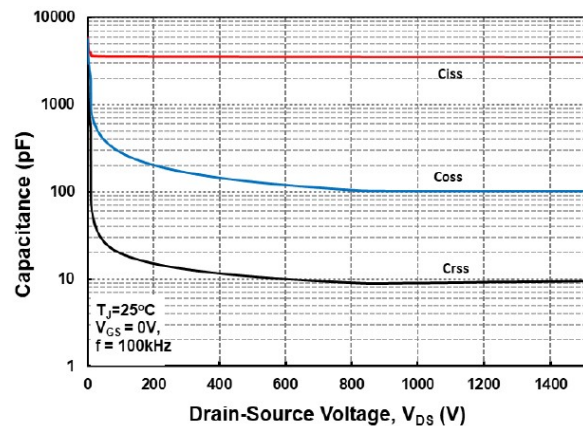


Figure 18. Capacitances vs. Drain-Source Voltage (0-1500V)

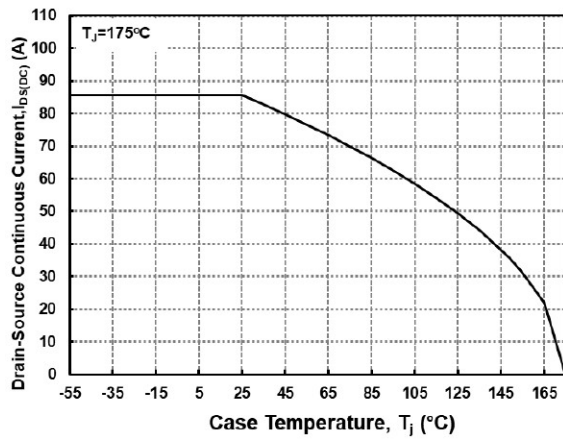


Figure 19. Continuous Drain Current Derating vs. Case Temperature

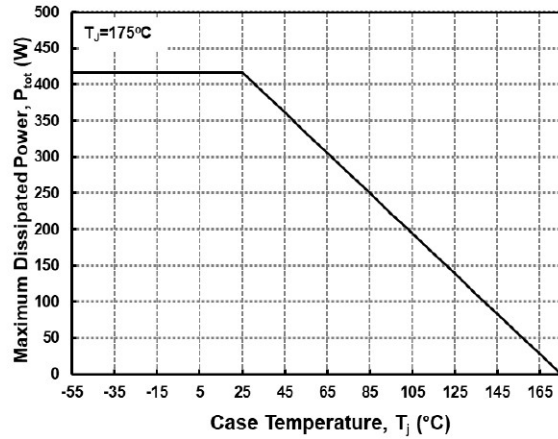


Figure 20. Maximum Power Dissipation Derating vs. Case Temperature

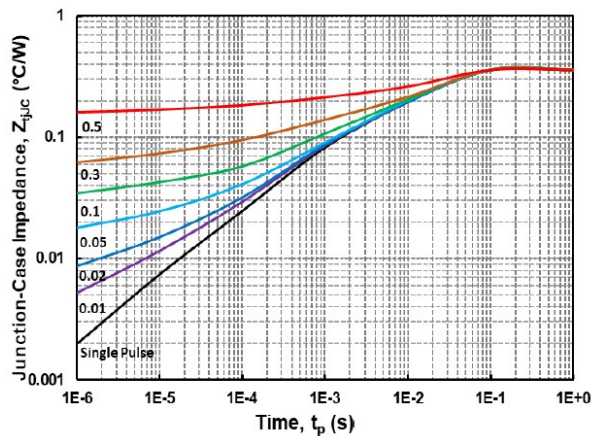


Figure 21. Transient Thermal Impedance (Junction - Case)

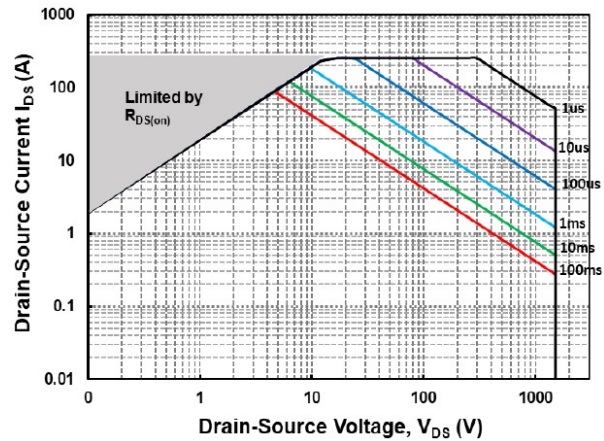


Figure 22. Safe Operating Area

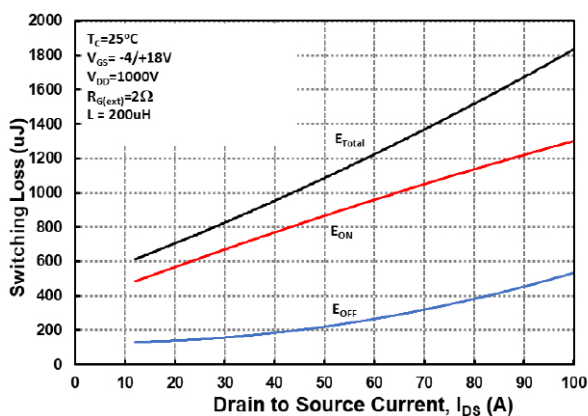


Figure 23. Clamped Inductive Switching Energy vs Drain Current ($V_{DD} = 1000V$)

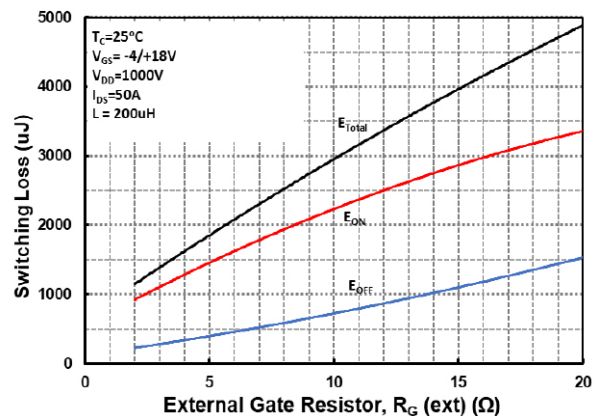


Figure 24. Clamped Inductive Switching Energy vs External Gate Resistor $R_{G(ext)}$

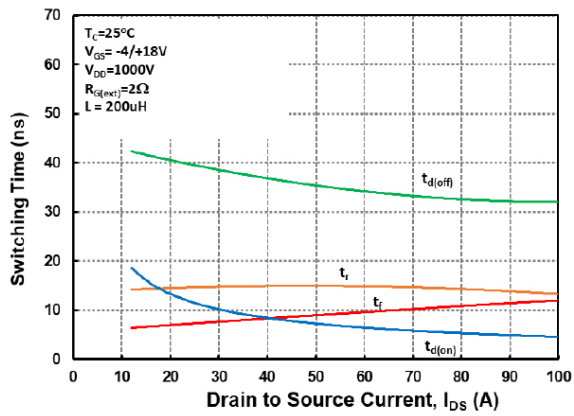


Figure 25. Switching Times vs Drain Current
($V_{DD}=1000\text{V}$)

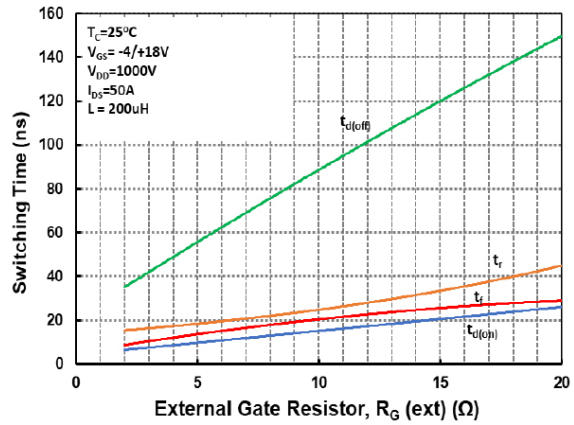
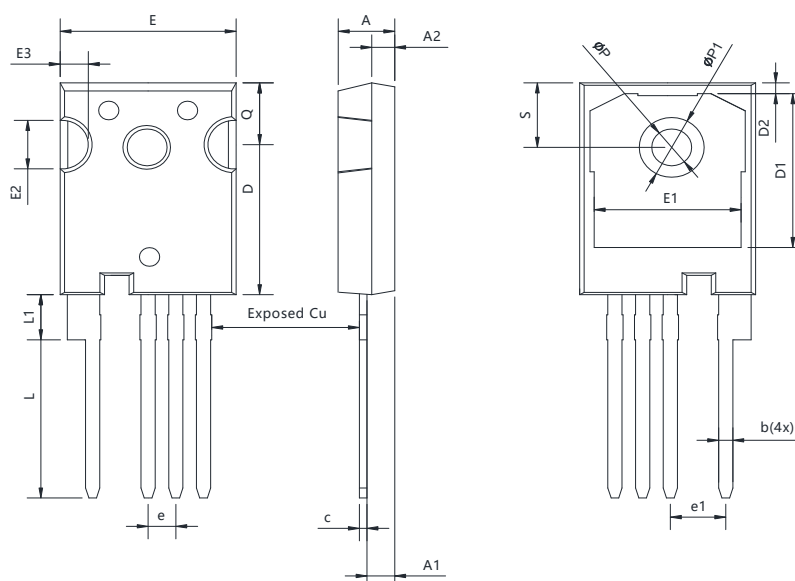


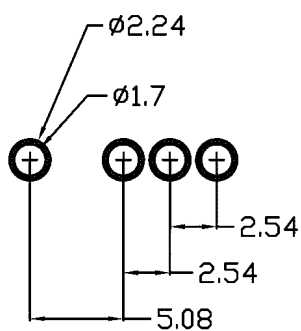
Figure 26. Switching Times vs External
Gate Resistor $R_{G(ext)}$

Package Dimensions

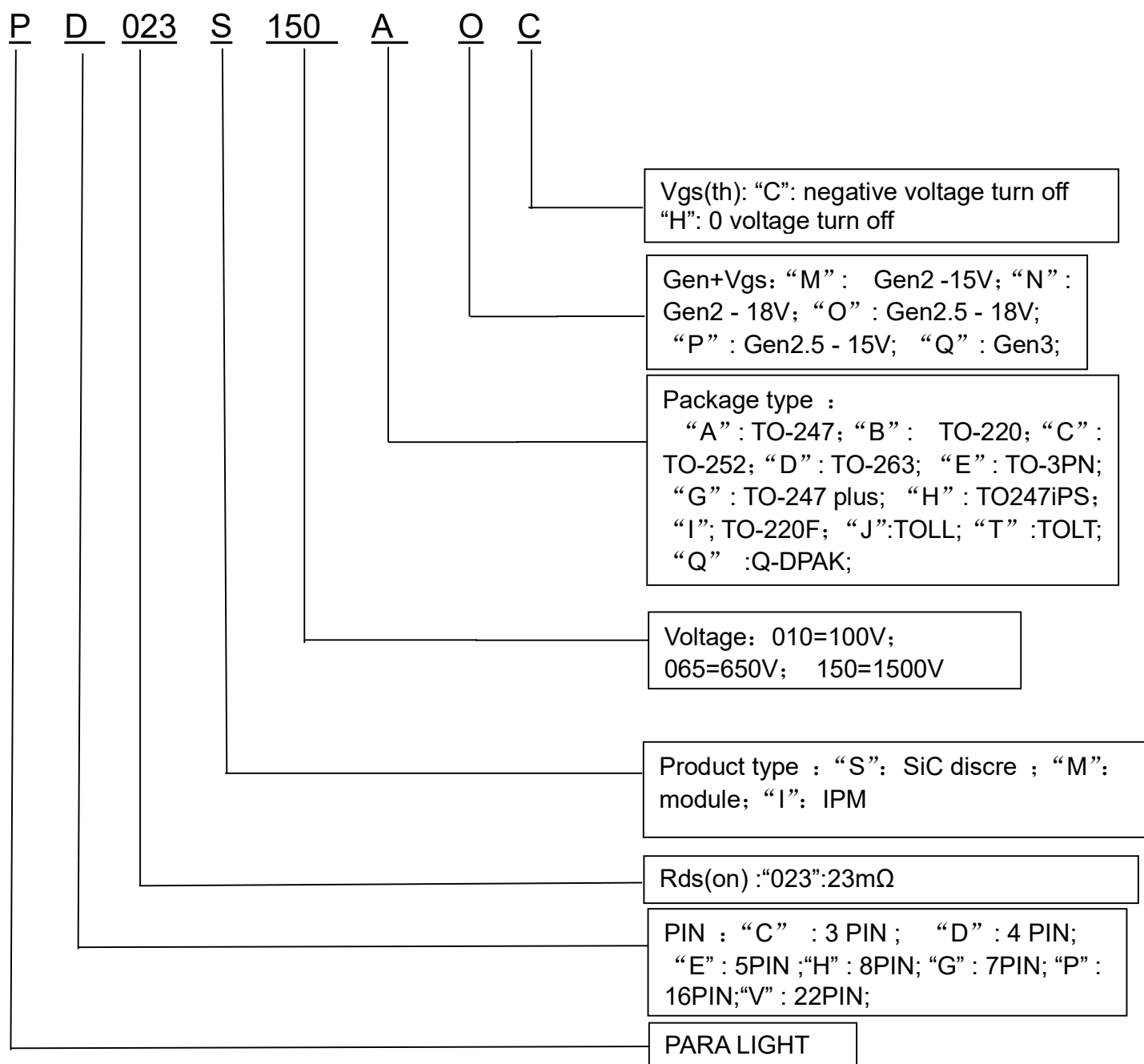


Common dimensions(mm)							
Symbol	Min	Typ	Max	Symbol	Min	Typ	Max
A	4.82	5.02	5.22	E1	13.01	13.26	13.51
A1	2.21	2.41	2.61	E2	4.71	4.91	5.11
A2	1.8	2.0	2.2	E3	2.26	2.46	2.66
b	0.95	1.2	1.45	e	2.54BSC		
b1	1.95	2.2	2.45	e1	5.08BSC		
b2	2.95	3.2	3.45	L	18.23	18.48	18.73
c	0.35	0.6	0.85	L1	2.35	2.60	2.85
D	22.34	22.54	22.74	P	3.41	3.61	3.81
D1	16.3	16.55	16.8	P1	6.94	7.19	7.44
D2	0.99	1.19	1.39	Q	5.59	5.79	5.99
E	15.74	15.94	16.14	S	5.97	6.17	6.37

Recommended Solder Pad Layout



PART NO. SYSTEM :



Revision history

Document revision history

Date	Version	Changes
2026.03.30	A / 0	First release.