

1200V 17mΩ 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:

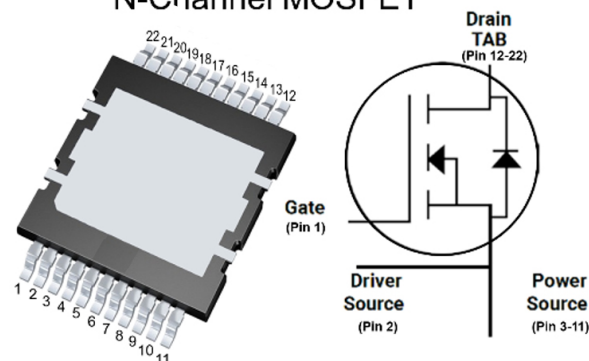
- EV/HEV charging station
- Energy storage and Battery charging
- High voltage DC-DC converters
- Solar / Wind Inverters
- UPS and PFC

Key Performance and Package Parameters

Type	V _{DS}	R _{DS(on)}	I _D @25°C	I _D @100°C	Marking	Package
PV017S120QNC	1200V	17mΩ	126A	89A	PV017S120QNC	Q-DPAK

Circuit Diagram

N-Channel MOSFET

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

Parameter	Symbols	Conditions	Value	Unit
Drain - source voltage	$V_{DS(max)}$	$V_{GS}=0V$, $I_D=100\mu A$	1200	V
Gate - source voltage	$V_{GS(max)}$	AC ($f>1\text{Hz}$, duty cycle $<1\%$, pulse width $<200\text{ns}$)	-9 / +23	V
Gate - source voltage	$V_{GS(op)}$	static	-4 / +18	V
Continuous drain current	I_D	$V_{GS}=18V$, $T_C=25^\circ\text{C}$ $V_{GS}=18V$, $T_C=100^\circ\text{C}$	126 89	A
Pulsed drain current	$I_{D(pulse)}$	$T_C=25^\circ\text{C}$	256	A
Total power dissipation	P_D	$T_C=25^\circ\text{C}$	550	W
Operating junction temperature	T_J		-55 to 175	$^\circ\text{C}$
Storage temperature	T_{STG}		-55 to 175	$^\circ\text{C}$
Soldering temperature	T_L		260	$^\circ\text{C}$
Avalanche capability, single pulse*	I_{AV}	$V_{DD}=100V$, $V_{GS}=10V$, $L=1\text{mH}$	70	A
Avalanche capability, single pulse**	E_{AV}	$V_{DD}=100V$, $V_{GS}=10V$, $L=1\text{mH}$	2450	mJ

*100% tested in 60% rating

**100% tested in 36% rating

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

Parameter	Symbols	Conditions	Value			Unit
			Min	Typ	Max	
Drain-source breakdown voltage	$V_{(BR)DSS}$	$V_{GS}=0V, I_D=100\mu A$	1200	-	-	V
Gate threshold voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=20mA$	2.4	3.0	4.0	V
		$V_{DS}=V_{GS}, I_D=20mA, T_J=150^\circ C$	-	2.3	-	
		$V_{DS}=V_{GS}, I_D=20mA, T_J=175^\circ C$	-	2.2	-	
Zero gate voltage drain current	I_{DSS}	$V_{DS}=1200V, V_{GS}=0V$	0	0.5	100	μA
		$V_{DS}=1200V, V_{GS}=0V, T_J=175^\circ C$	0	5	200	
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	$R_{DS(on)}$	$V_{GS}=18V, I_D=50A$	-	17	24	mΩ
		$V_{GS}=18V, I_D=50A, T_J=175^\circ C$	-	32	-	
Transconductance	g_{fs}	$V_{DS}=20V, I_D=50A$	-	41	-	S
		$V_{DS}=20V, I_D=50A, T_J=175^\circ C$	-	39	-	
Input capacitance	C_{iss}	$V_{DS}=1000V, V_{GS}=0V$ $f=100kHz, V_{AC}=25mV$	-	4350	-	pF
Output capacitance	C_{oss}		-	168	-	pF
Reverse transfer capacitance	C_{rss}		-	14	-	pF
Coss stored energy	E_{oss}		-	98	-	μJ
Turn-on switching energy	E_{ON}	$V_{DS}=800V, V_{GS}=-4V/18V$ $I_D=50A, R_{G(ext)}=2\Omega, L=200\mu H$	-	402	-	μJ
Turn-off switching energy	E_{OFF}		-	110	-	μJ
Turn-on delay time	$t_{d(on)}$	$V_{DS}=800V, V_{GS}=-4V/18V$ $I_D=50A, R_{G(ext)}=2\Omega, L=200\mu H$	-	18	-	ns
Rise time	t_r		-	22	-	ns
Turn-off delaytime	$t_{d(off)}$		-	39	-	ns
Fall time	t_f		-	9	-	ns
Total gate charge	Q_g	$V_{DS}=800V, V_{GS}=-4V/18V$ $I_D=50A$	-	202	-	nC
Gate-source charge	Q_{gs}		-	56	-	nC
Gate-drain charge	Q_{gd}		-	61	-	nC
Internal gate input resistance	$R_{g(int)}$	$f=1MHz, I_D=0A$	-	1.2	-	Ω

***Turn-off with -4V gate bias is highly recommended

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

Parameter	Symbols	Conditions	Value			Unit
			Min	Typ	Max	
Diode forward voltage	V_{SD}	$V_{GS}=0V, I_{SD}=40A, T_J=25^\circ C$	-	3.5	-	V
		$V_{GS}=0V, I_{SD}=40A, T_J=175^\circ C$	-	3.2	-	V
Continuous diode forward current	I_S	$V_{GS}=-4V, T_J=25^\circ C$	-	100	-	A
Reverse recovery time	t_{rr}	$V_{GS}=-4V, I_{SD}=50A, V_R=800V,$ $L=200\mu H, di/dt=2500A/\mu s$	-	22	-	ns
Reverse recovery charge	Q_{rr}		-	515	-	nC
Peak reverse recovery current	I_{rrm}		-	40	-	A

Thermal Characteristics

Parameter	Symbols	Conditions	Value			Unit
			Min	Typ	Max	
Thermal resistance	$R_{th(j-c)}$	Junction to case	-	0.27	0.32	°C/W

Typical Characteristics

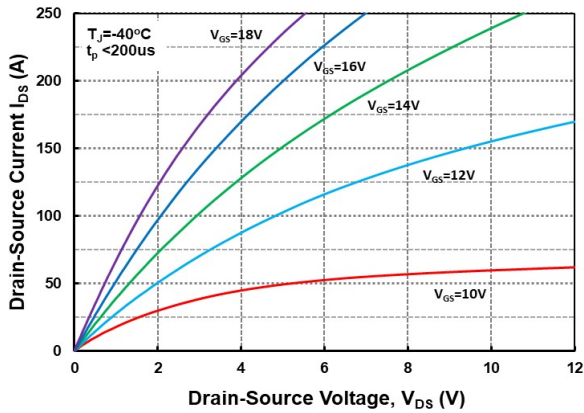


Figure 1: Output Characteristics, $T_J = -40^\circ\text{C}$

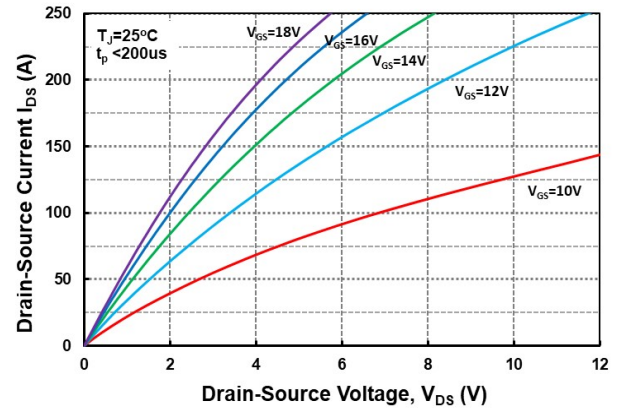


Figure 2: Output Characteristics, $T_J = 25^\circ\text{C}$

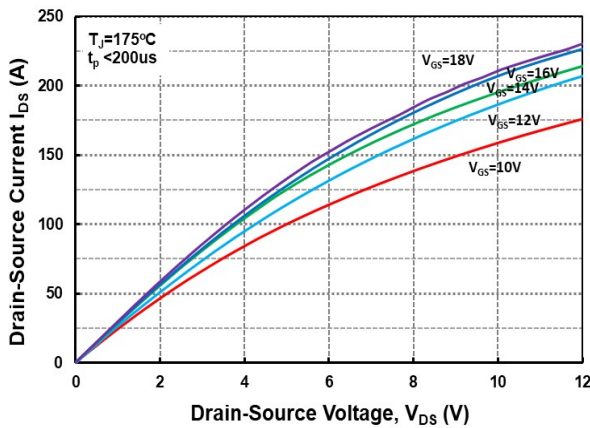


Figure 3: Output Characteristics, $T_J = 175^\circ\text{C}$

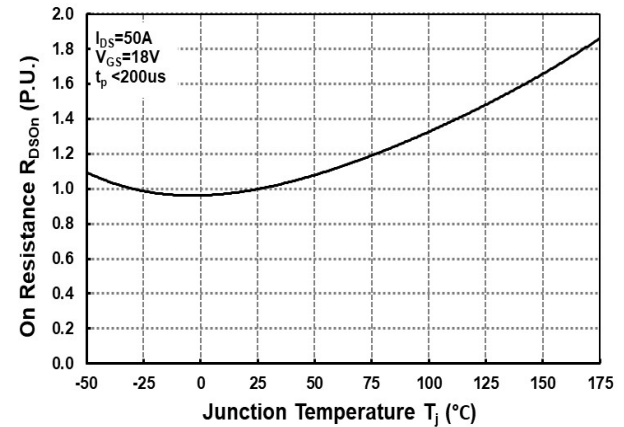


Figure 4: Normalized On-Resistance vs. Temperature

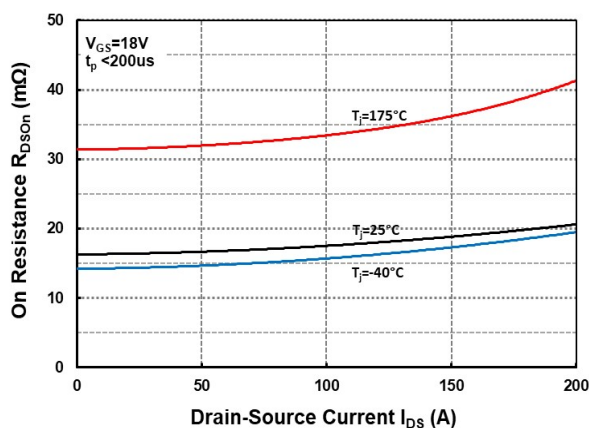


Figure 5: On-Resistance vs. Drain Current for Various Temperatures

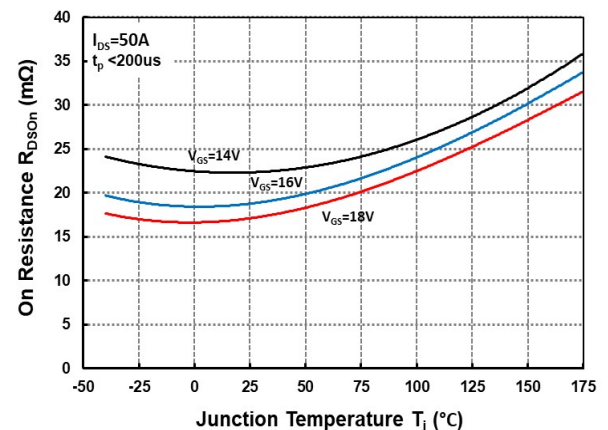


Figure 6: On-Resistance vs. Temperature for Various Gate Voltage

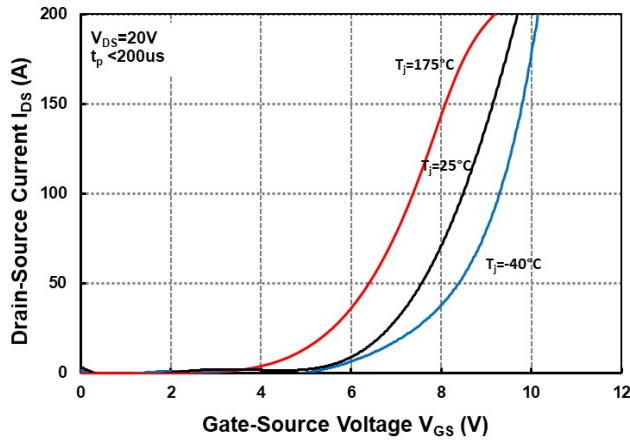


Figure 7: Transfer Characteristic for Various Junction Temperatures

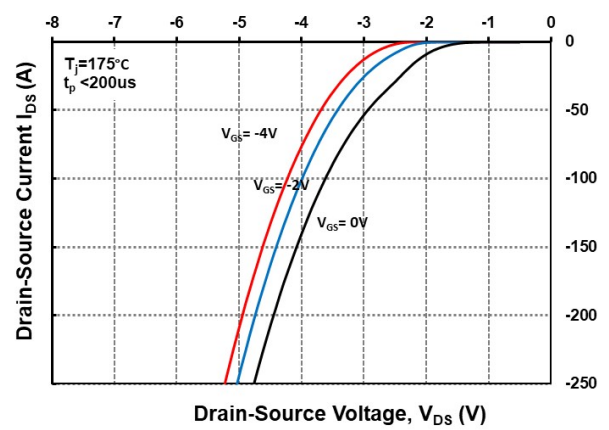


Figure 8: Body Diode Characteristics @ -40°C

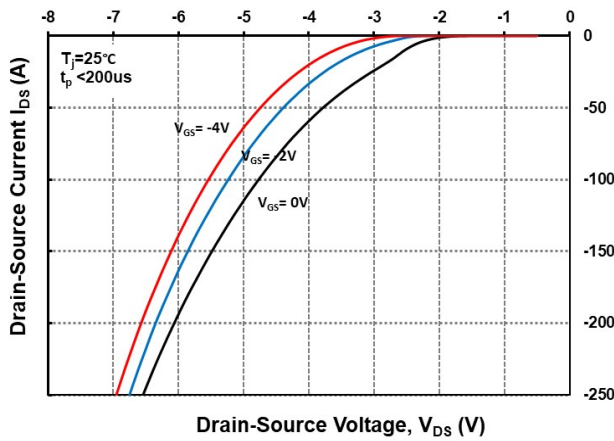


Figure 9: Body Diode Characteristics @ 25°C

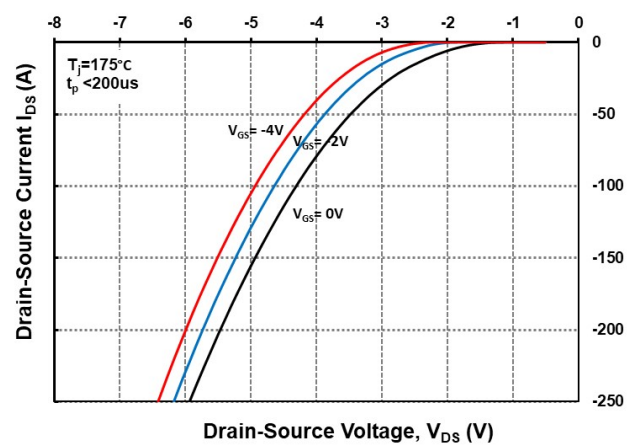


Figure 10: Body Diode Characteristics @ 175°C

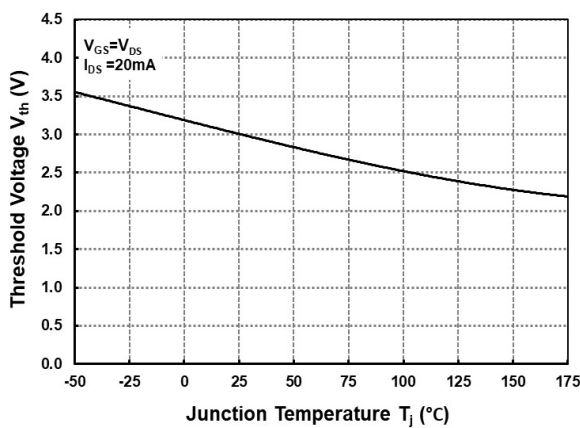


Figure 11: Threshold Voltage vs. Temperature

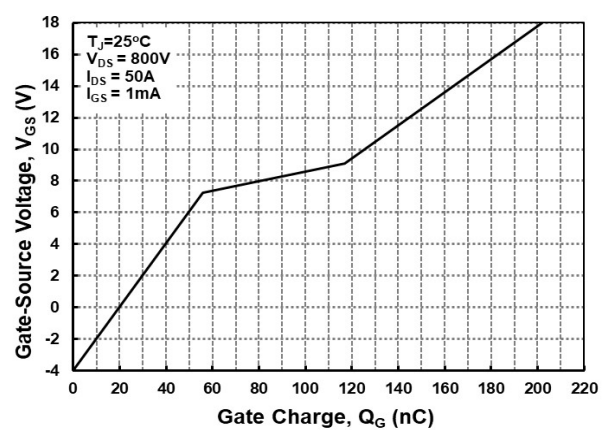


Figure 12: Gate Charge Characteristics

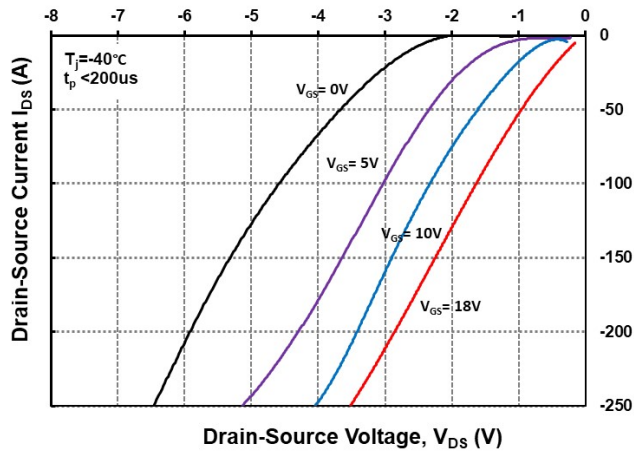


Figure 13: 3rd Quadrant Characteristics @ -40°C

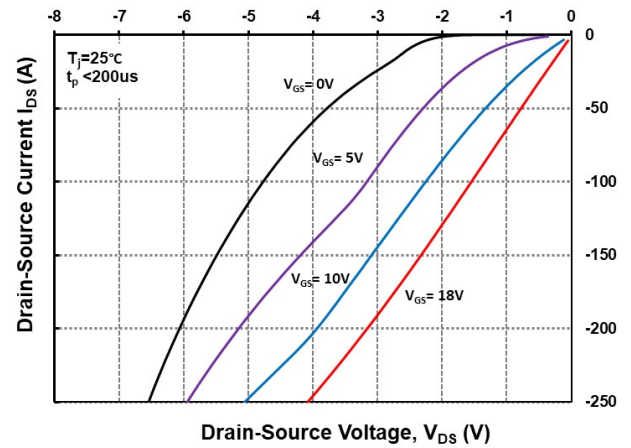


Figure 14: 3rd Quadrant Characteristics @ 25°C

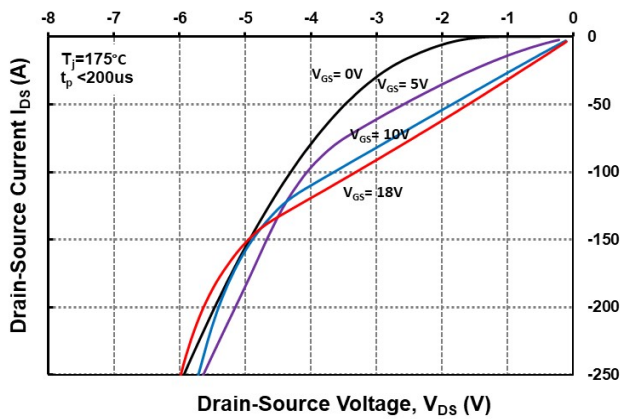


Figure 15: 3rd Quadrant Characteristics @ 175°C

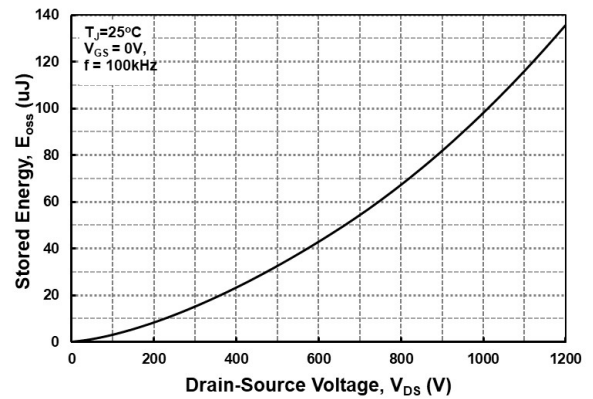


Figure 16: Output Capacitor Stored Energy

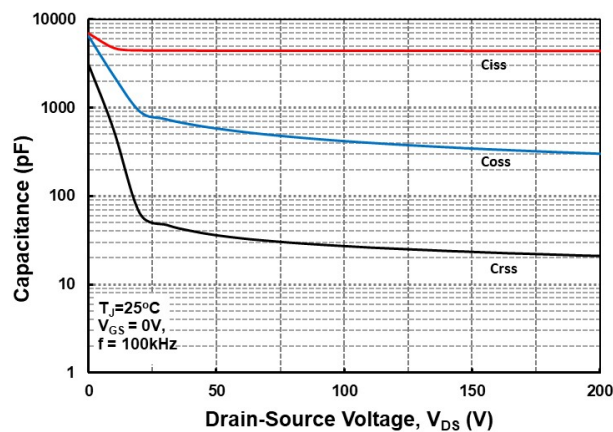


Figure 17: Capacitances vs. Drain-Source Voltage (0-200V)

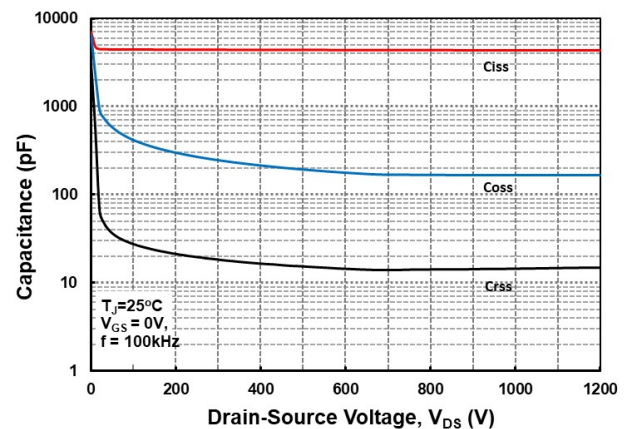


Figure 18: Capacitances vs. Drain-Source Voltage (0-1200V)

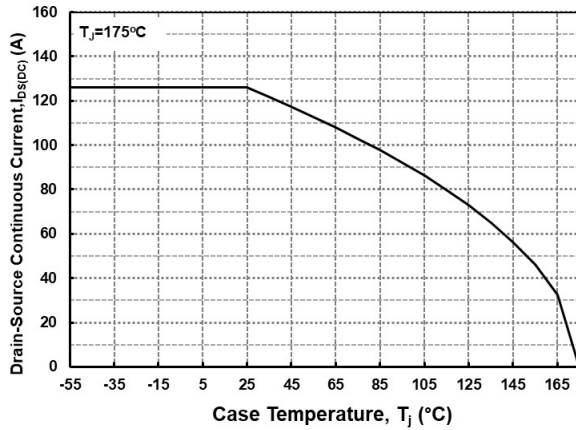


Figure 19: Continuous Drain Current Derating vs. Case Temperature

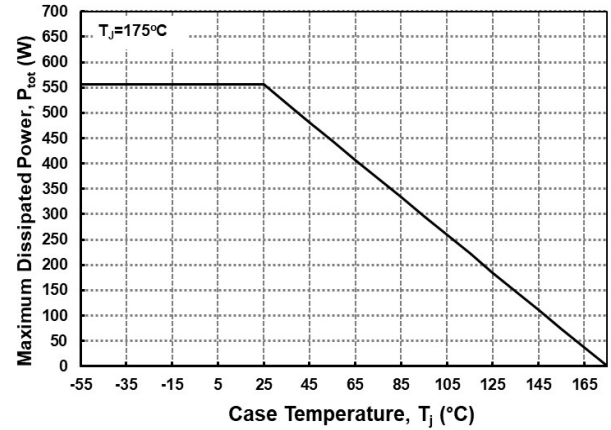


Figure 20: Maximum Power Dissipation Derating vs. Case Temperature

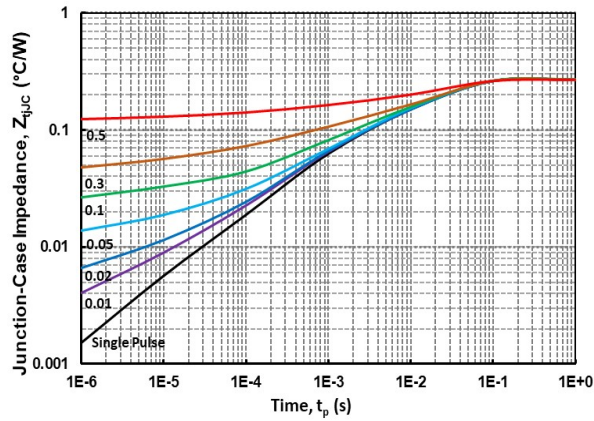


Figure 21: Transient Thermal Impedance (Junction - Case)

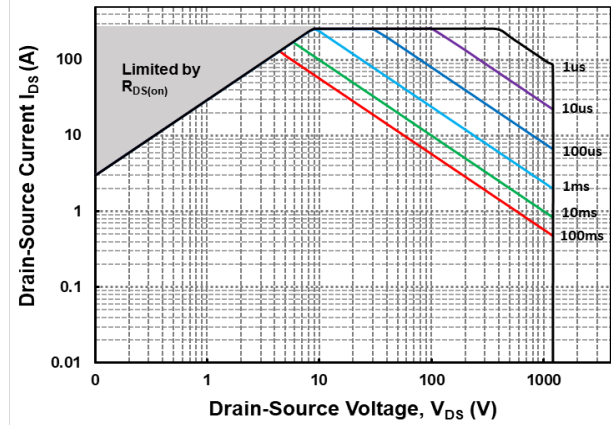


Figure 22: Safe Operating Area

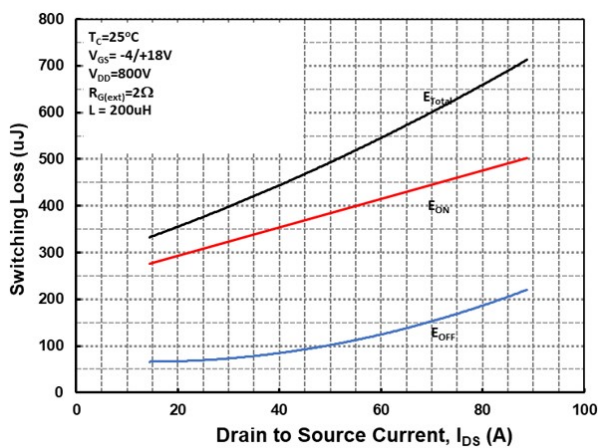


Figure 23: Clamped inductive Switching Energy vs Drain Current (VDD= 800V)

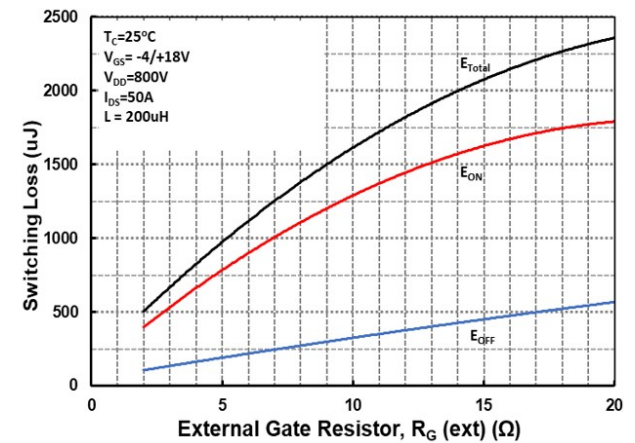


Figure 24: Clamped inductive Switching Energy vs External Gate Resistor R_G(ext)

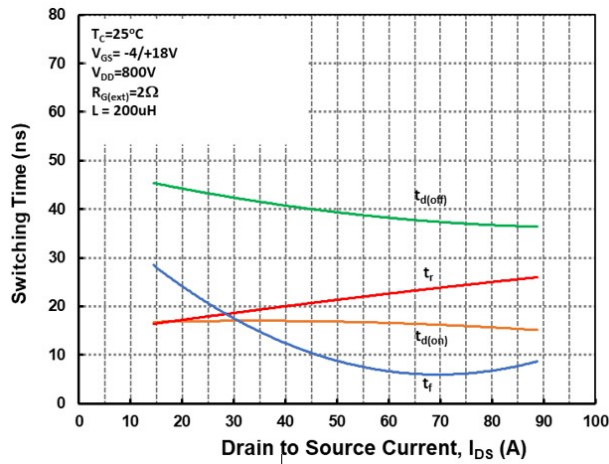


Figure 25: Switching Times vs Drain Current
($V_{DD} = 800\text{V}$)

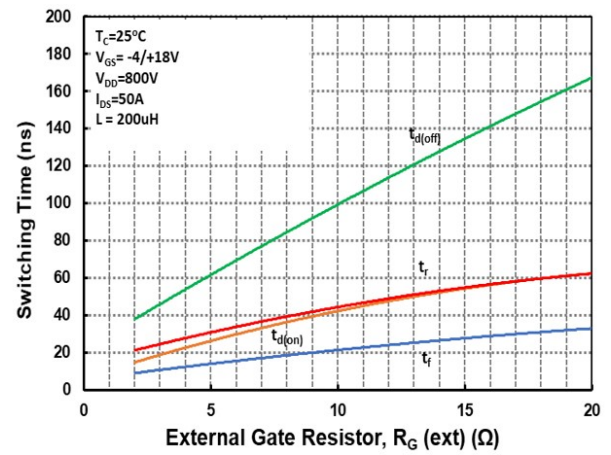
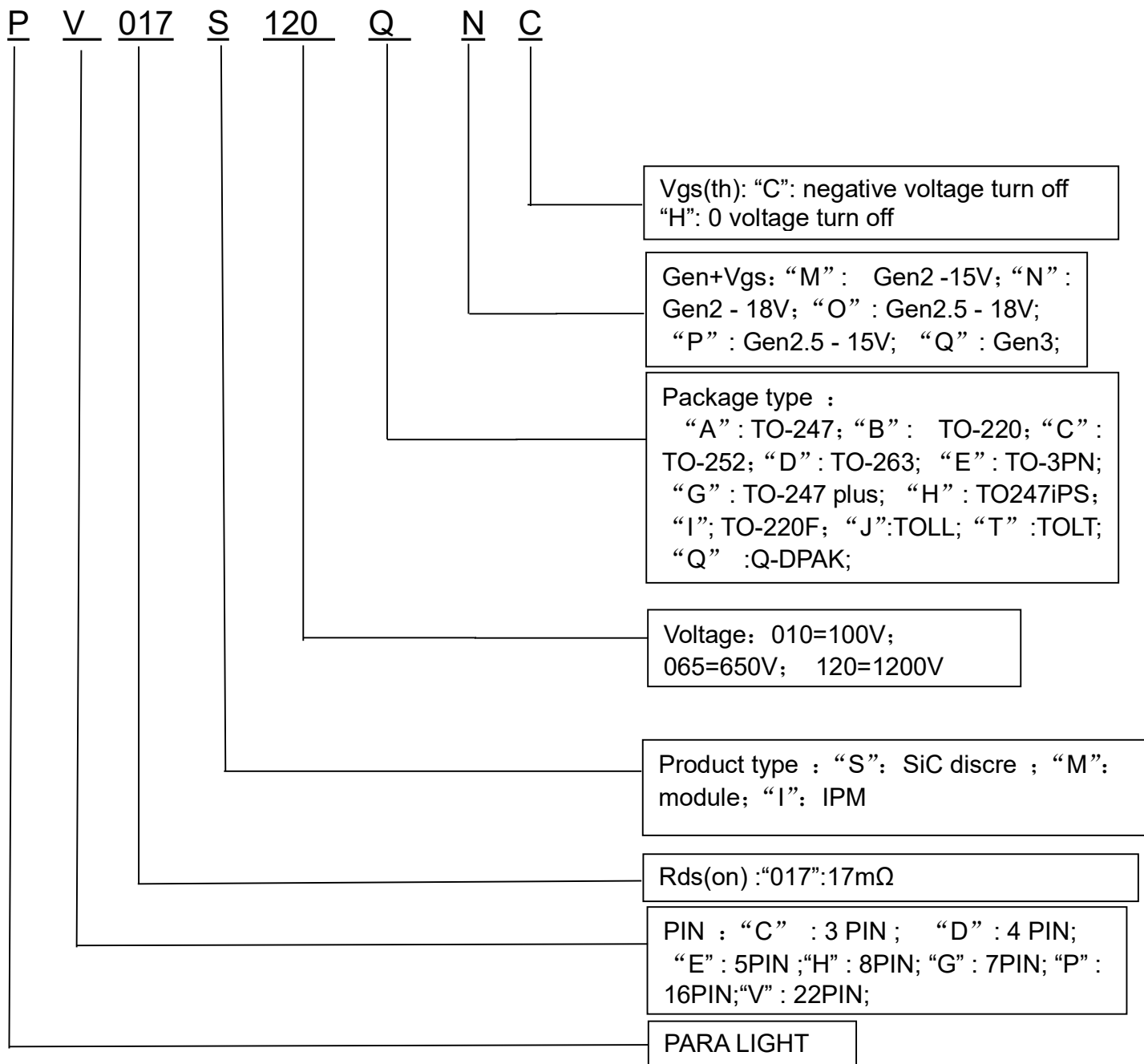


Figure 26: Switching Times vs External Gate Resistor
 $R_{G(ext)}$

LD-R/R043

PART NO. SYSTEM :



Revision history

Document revision history

Date	Version	Changes
2025.12.15	A / 0	First release.