

1200V 10mΩ 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}

Benefits

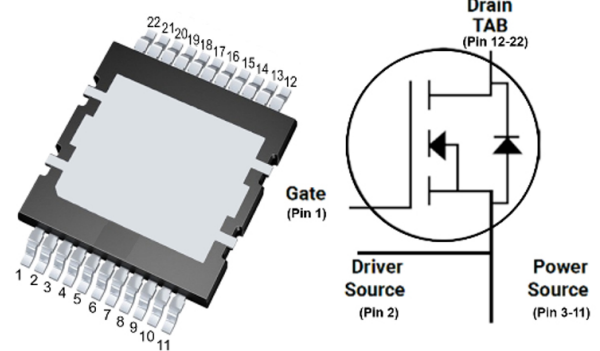
- Superior robustness and system reliability
- Higher system efficiency
- Easier paralleling without thermal runaway
- Capable of high temperature application
- Faster and more efficient switching

Applications:

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

Circuit Diagram

N-Channel MOSFET



Key Performance and Package Parameters

Type	V _{bs}	R _{DS(ON)}	I _D @25°C	I _D @100°C	Marking	Package
PV010S120QNC	1200V	10mΩ	195A	138A	PV010S120QNC	Q-PAK

Absolute Maximum Ratings(T_C=25°C unless otherwise specified)

Parameter	Symbols	Conditions	Value	Unit
Drain - source voltage	V _{DS(max)}	V _{GS} =0V, I _D =100μA	1200	V
Gate - source voltage	V _{GS(max)}	AC	-9 / +23	V
Gate – source voltage	V _{GS(op)}	static	-4 / +18	V
Continuous drain current	I _D	V _{GS} =18V, T _C =25°C V _{GS} =18V, T _C =100°C	195 138	A
Pulsed drain current	I _{D(pulse)}	T _C =25°C	506	A
Total power dissipation	P _D	T _C =25°C	682	W
Operating junction temperature	T _J		-55 to 175	°C
Storage temperature	T _{STG}		-55 to 175	°C
Soldering temperature	T _L		260	°C
Avalanche capability, single pulse*	I _{AV}	V _{DD} =100V, V _{GS} =10V, L=2mH	62	A
Avalanche capability, single pulse**	E _{AV}	V _{DD} =100V, V _{GS} =10V, L=2mH	3844	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	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=30mA$	2.4	3.0	4.0	V
		$V_{DS}=V_{GS}, I_D=30mA, T_J=150^\circ C$	-	2.3	-	
		$V_{DS}=V_{GS}, I_D=30mA, T_J=175^\circ C$	-	2.2	-	
Zero gate voltage drain current	I_{DSS}	$V_{DS}=1200V, V_{GS}=0V$	0	1	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	$R_{DS(on)}$	$V_{GS}=18V, I_D=75A$	-	10	13	mΩ
		$V_{GS}=18V, I_D=75A, T_J=175^\circ C$	-	18	-	
Transconductance	g_{fs}	$V_{DS}=20V, I_D=75A$	-	63	-	S
		$V_{DS}=20V, I_D=75A, T_J=175^\circ C$	-	60	-	
Input capacitance	C_{iss}	$V_{DS}=1000V, V_{GS}=0V$ $f=100kHz, V_{AC}=25mV$	-	6466	-	pF
Output capacitance	C_{oss}		-	264	-	pF
Reverse transfer capacitance	C_{rss}		-	24	-	pF
Coss stored energy	E_{oss}		-	156	-	μJ
Turn-on switching energy	E_{ON}	$V_{DS}=800V, V_{GS}=-4V/18V$ $I_D=75A, R_{G(ext)}=2\Omega, L=200\mu H$	-	398	-	μJ
Turn-off switching energy	E_{OFF}		-	402	-	μJ
Turn-on delay time	$t_{d(on)}$	$V_{DS}=800V, V_{GS}=-4V/18V$ $I_D=75A, R_{G(ext)}=2\Omega, L=200\mu H$	-	23	-	ns
Rise time	t_r		-	28	-	ns
Turn-off delaytime	$t_{d(off)}$		-	65	-	ns
Fall time	t_f		-	12	-	ns
Total gate charge	Q_g	$V_{DS}=800V, V_{GS}=-4V/18V$ $I_D=75A$	-	320	-	nC
Gate-source charge	Q_{gs}		-	84	-	nC
Gate-drain charge	Q_{gd}		-	98	-	nC
Internal gate input resistance	$R_{g(int)}$	$f=1MHz, I_D=0A$	0.5	0.95	1.5-	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}	$V_{GS}=-4V, I_{SD}=50A, T_J=25^\circ C$	-	4.2	-	V
		$V_{GS}=-4V, I_{SD}=50A, T_J=175^\circ C$	-	3.7	-	V
Continuous diode forward current	I_S	$V_{GS}=-4V, T_J=25^\circ C$	-	133	-	A
Reverse recovery time	t_{rr}	$V_{GS}=-4V, I_{SD}=75A, V_R=800V,$ $L=200\mu H, T_J=25^\circ C, di/dt =$	-	25	-	ns
Reverse recovery charge	Q_{rr}		-	457	-	nC
Peak reverse recovery current	I_{rrm}		-	30	-	A

Thermal Characteristics

Parameter	Symbols	Conditions	Value			Unit
			Min	Typ	Max	
Thermal resistance	$R_{th(j-c)}$	Junction to case	-	0.19	0.22	°C/W

Typical Characteristics

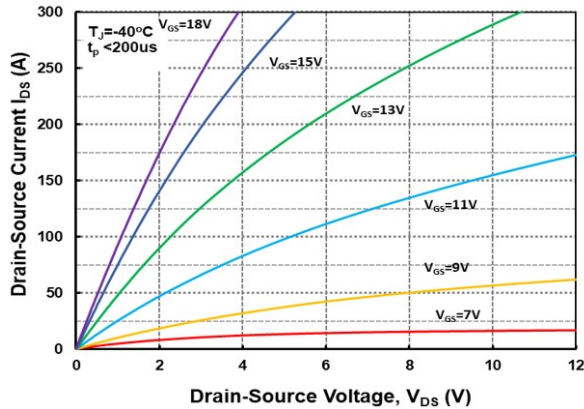


Figure 1: Output Characteristics, $T_J = -40^\circ\text{C}$

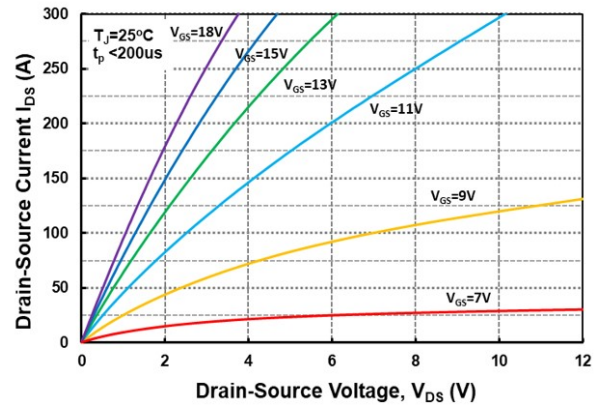


Figure 2: Output Characteristics, $T_J = 25^\circ\text{C}$

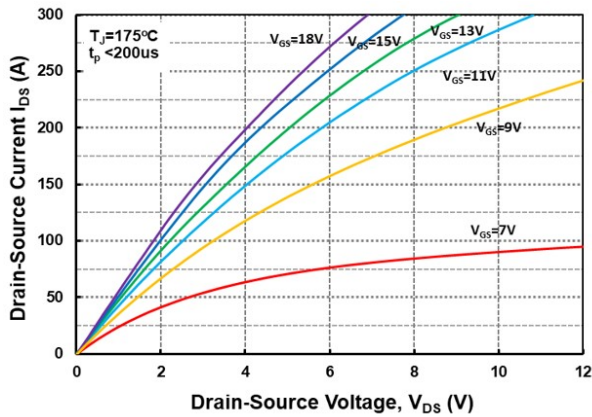


Figure 3: Output Characteristics, $T_J = 175^\circ\text{C}$

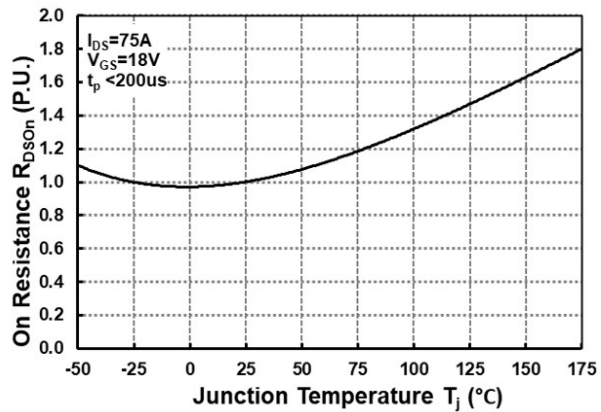


Figure 4: Normalized On-Resistance vs. Temperature

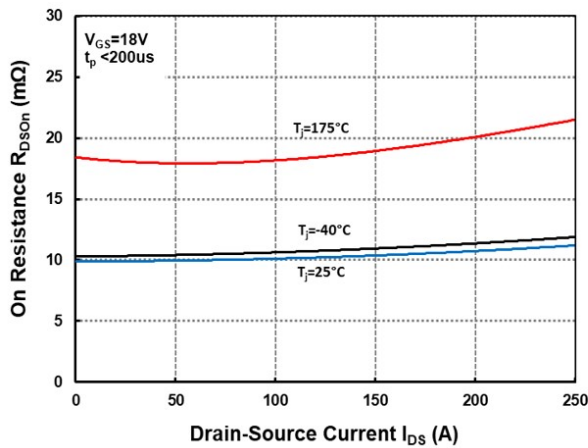


Figure 5: On-Resistance vs. Drain Current for Various Temperatures

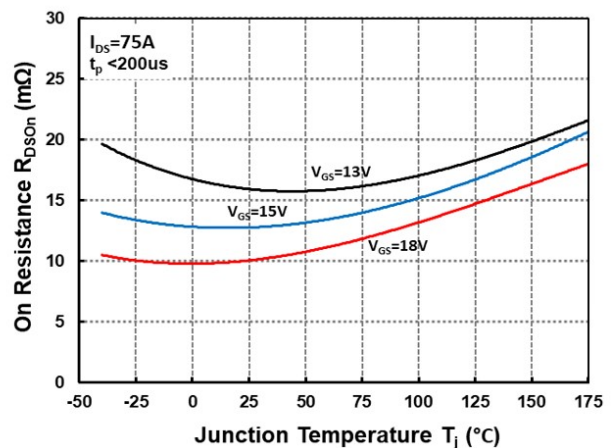


Figure 6: On-Resistance vs. Temperature for Various Gate Voltage

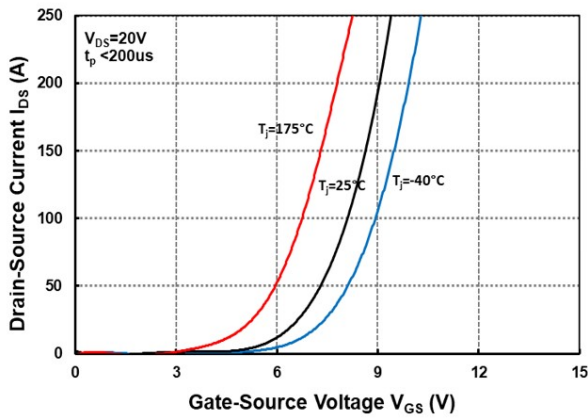


Figure 7: Transfer Characteristic for Various Junction Temperatures

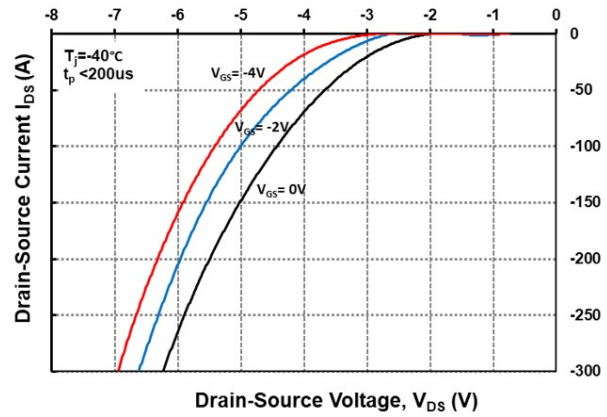


Figure 8: Body Diode Characteristics @ -40°C

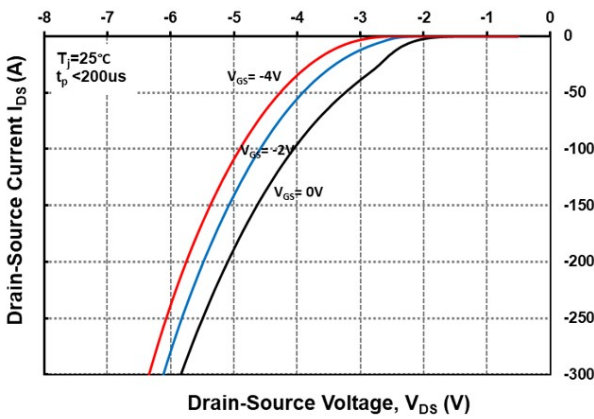


Figure 9: Body Diode Characteristics @ 25°C

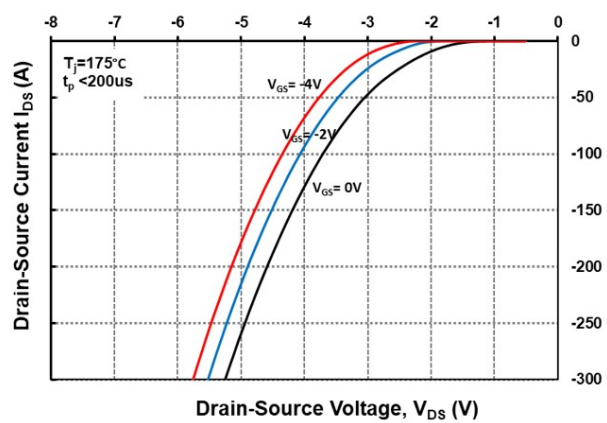


Figure 10: Body Diode Characteristics @ 175°C

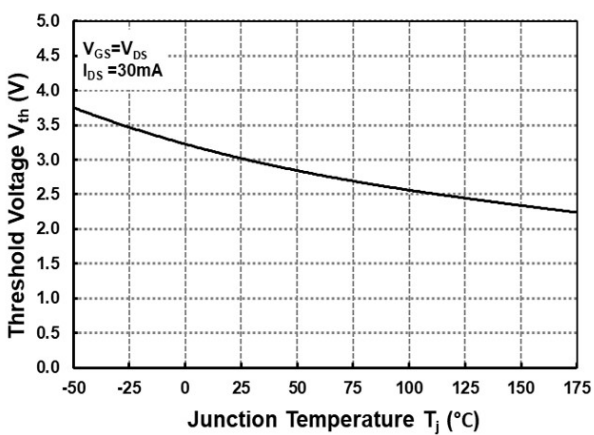


Figure 11: Threshold Voltage vs. Temperature

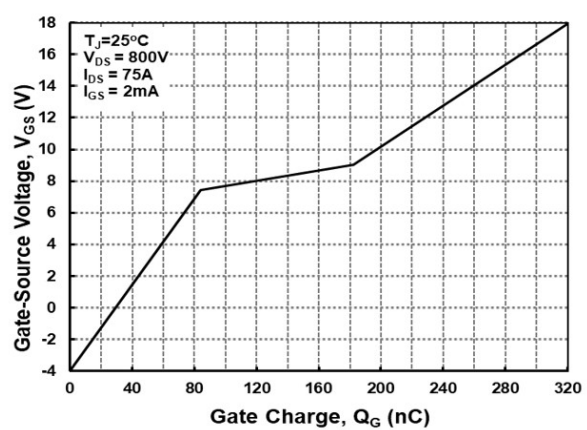


Figure 12: Gate Charge Characteristics

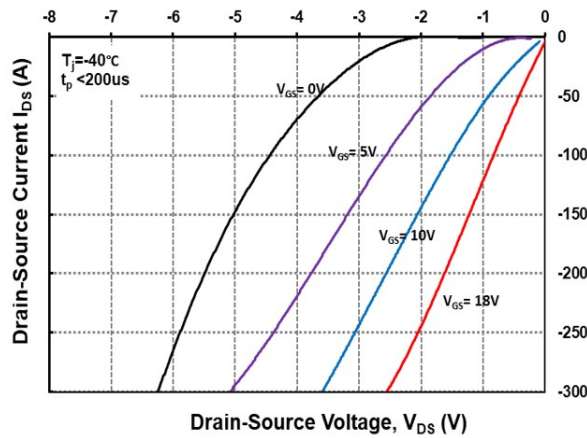


Figure 13: 3rd Quadrant Characteristics @ -40°C

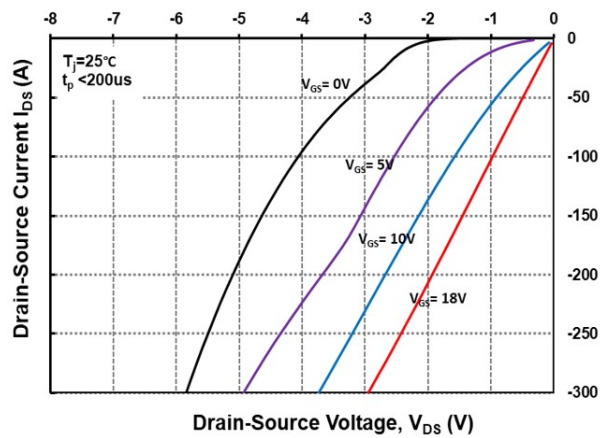


Figure 14: 3rd Quadrant Characteristics @ 25°C

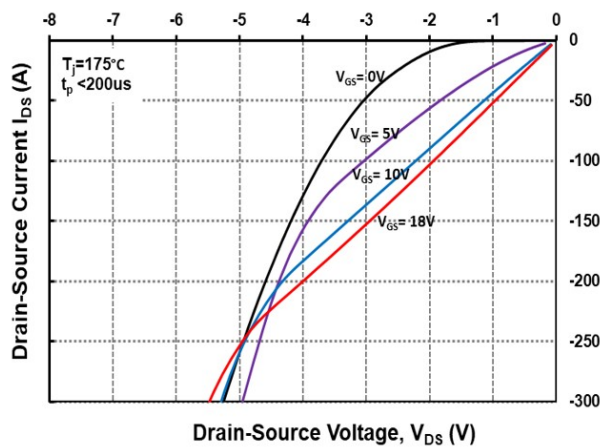


Figure 15: 3rd Quadrant Characteristics @ 175°C

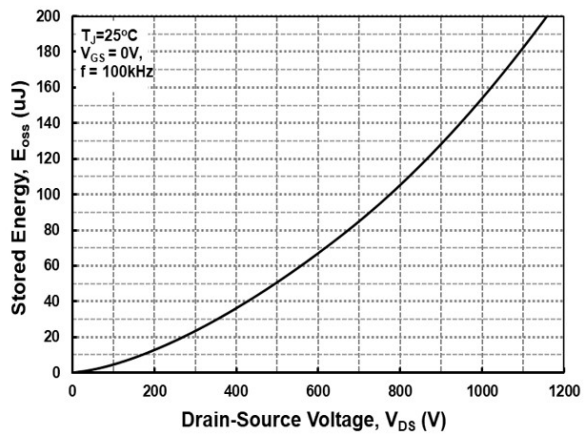


Figure 16: Output Capacitor Stored Energy

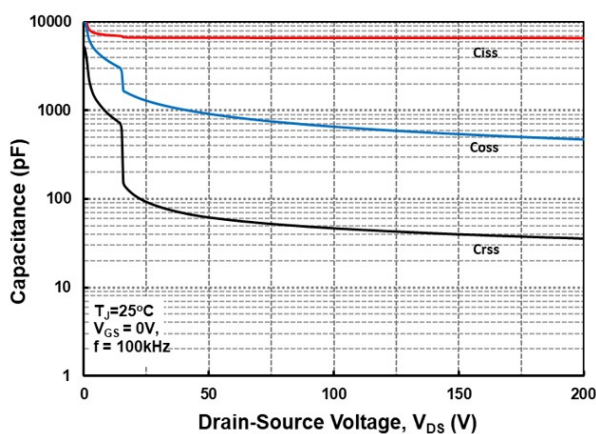


Figure 17: Capacitances vs. Drain-Source Voltage (0-200V)

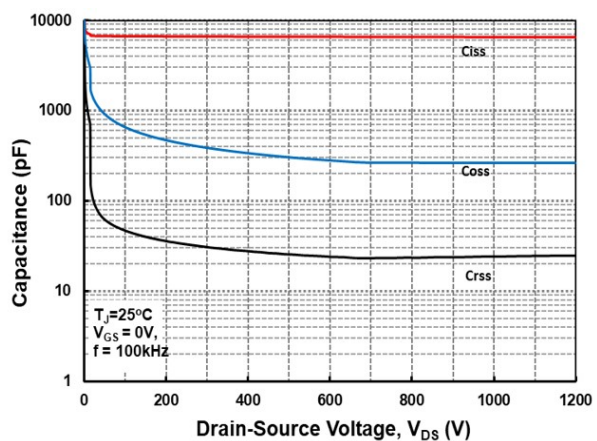


Figure 18: Capacitances vs. Drain-Source Voltage (0-1200V)

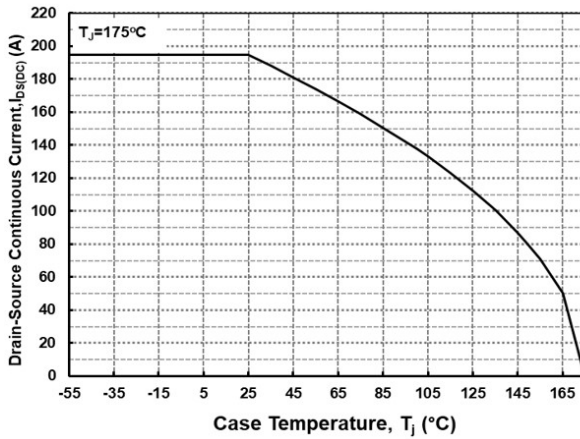


Figure 19: Continuous Drain Current Derating vs. Case Temperature

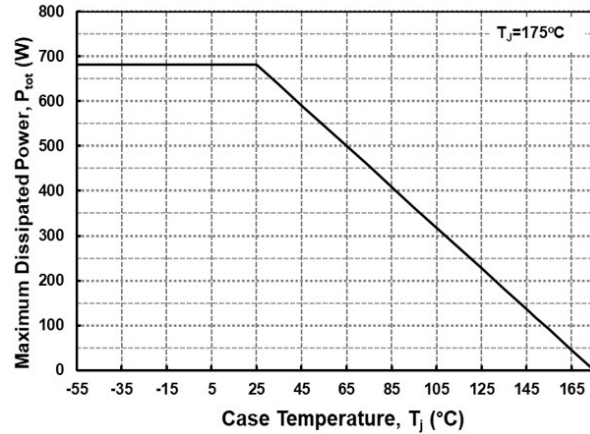


Figure 20: Maximum Power Dissipation Derating vs. Case Temperature

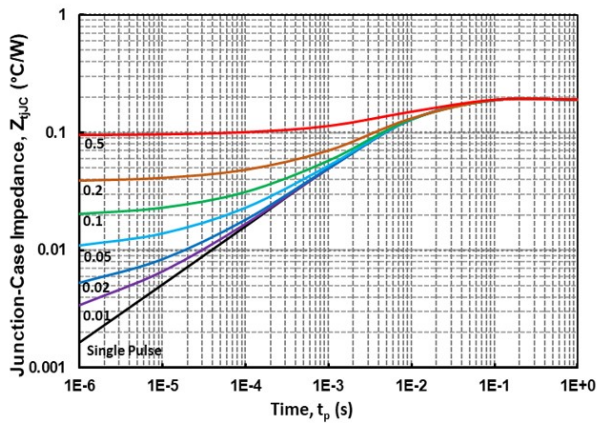


Figure 21: Transient Thermal Impedance (Junction - Case)

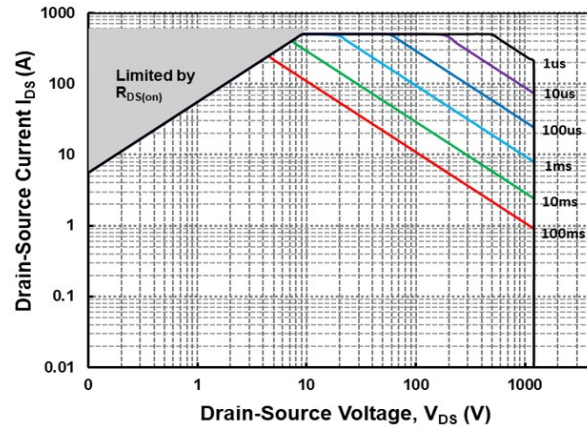


Figure 22: Safe Operating Area

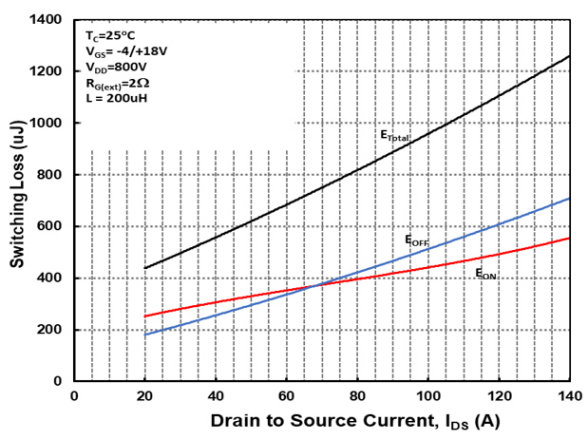


Figure 23: Clamped inductive Switching Energy vs Drain Current (VDD= 800V)

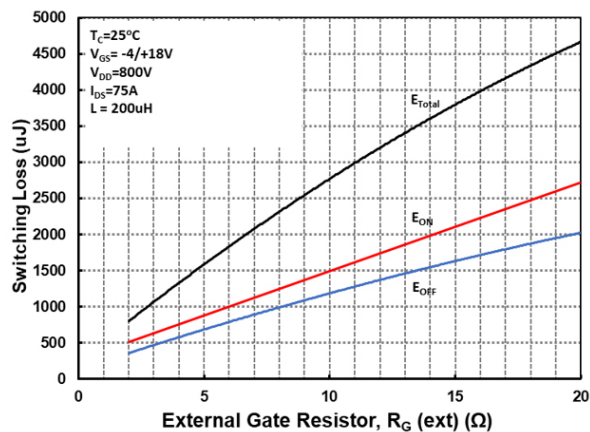


Figure 24: Clamped inductive Switching Energy vs External Gate Resistor $R_{G(ext)}$

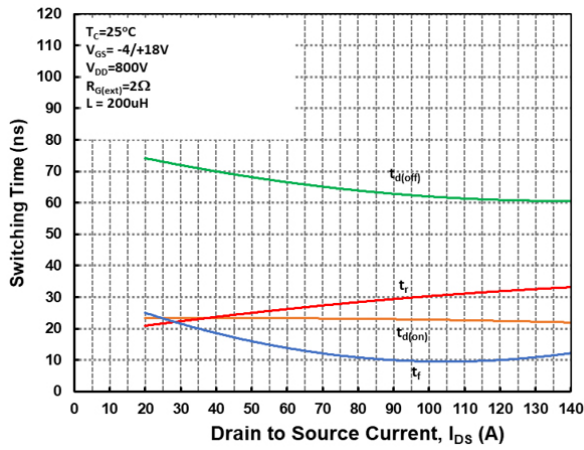


Figure 25: Switching Times vs Drain Current
($V_{DD} = 800\text{V}$)

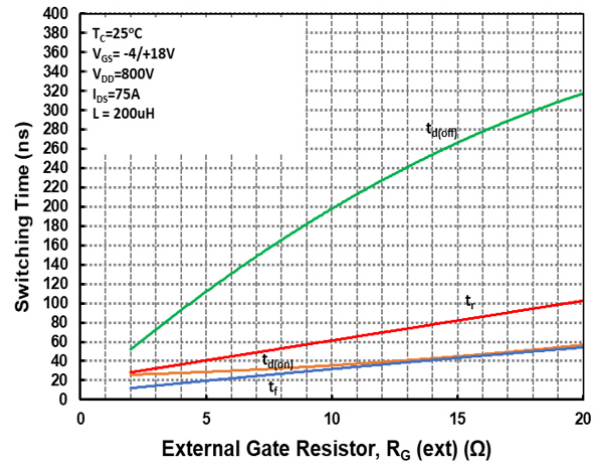
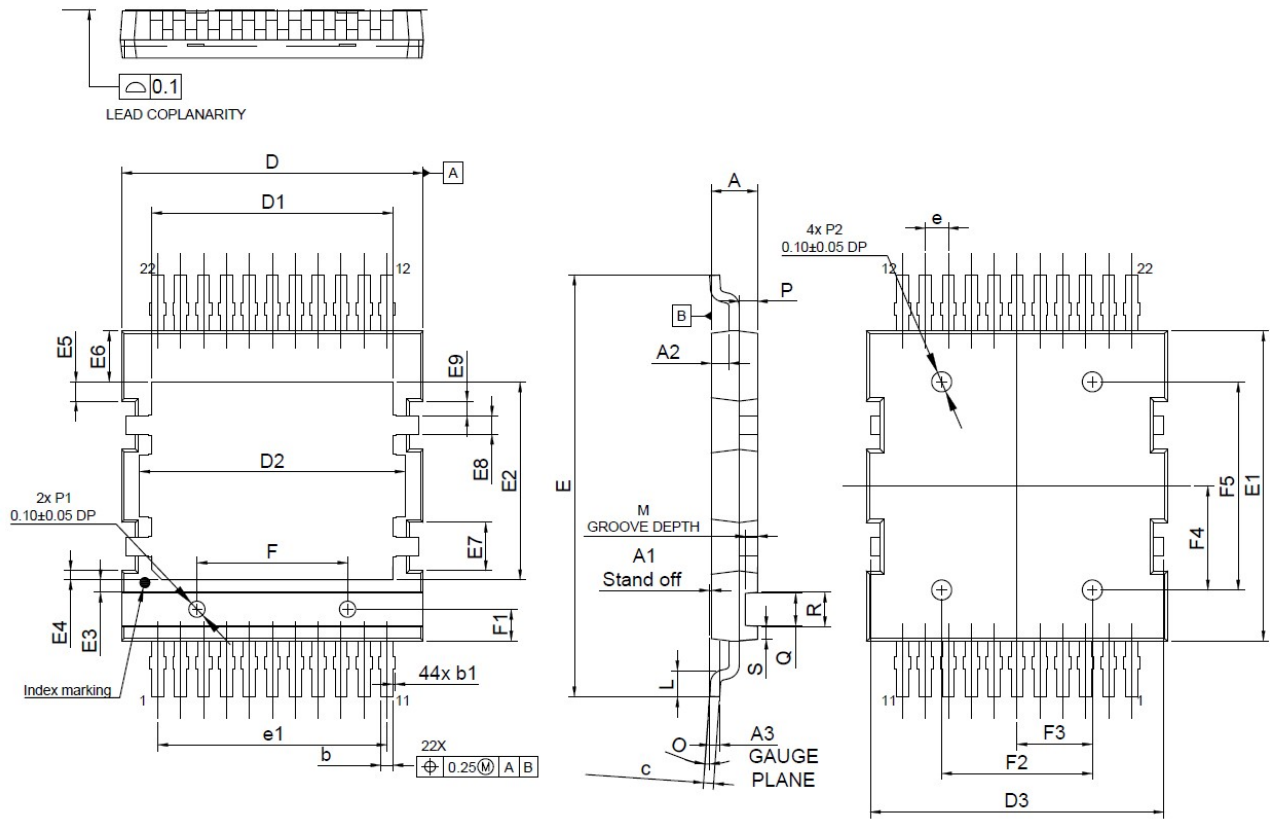


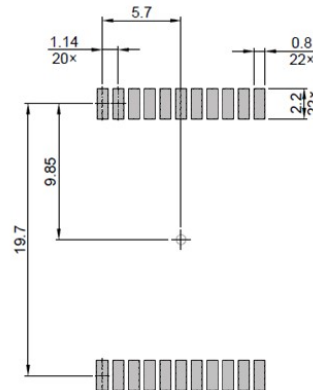
Figure 26: Switching Times vs External Gate Resistor
 $R_{G(ext)}$

Package Dimensions

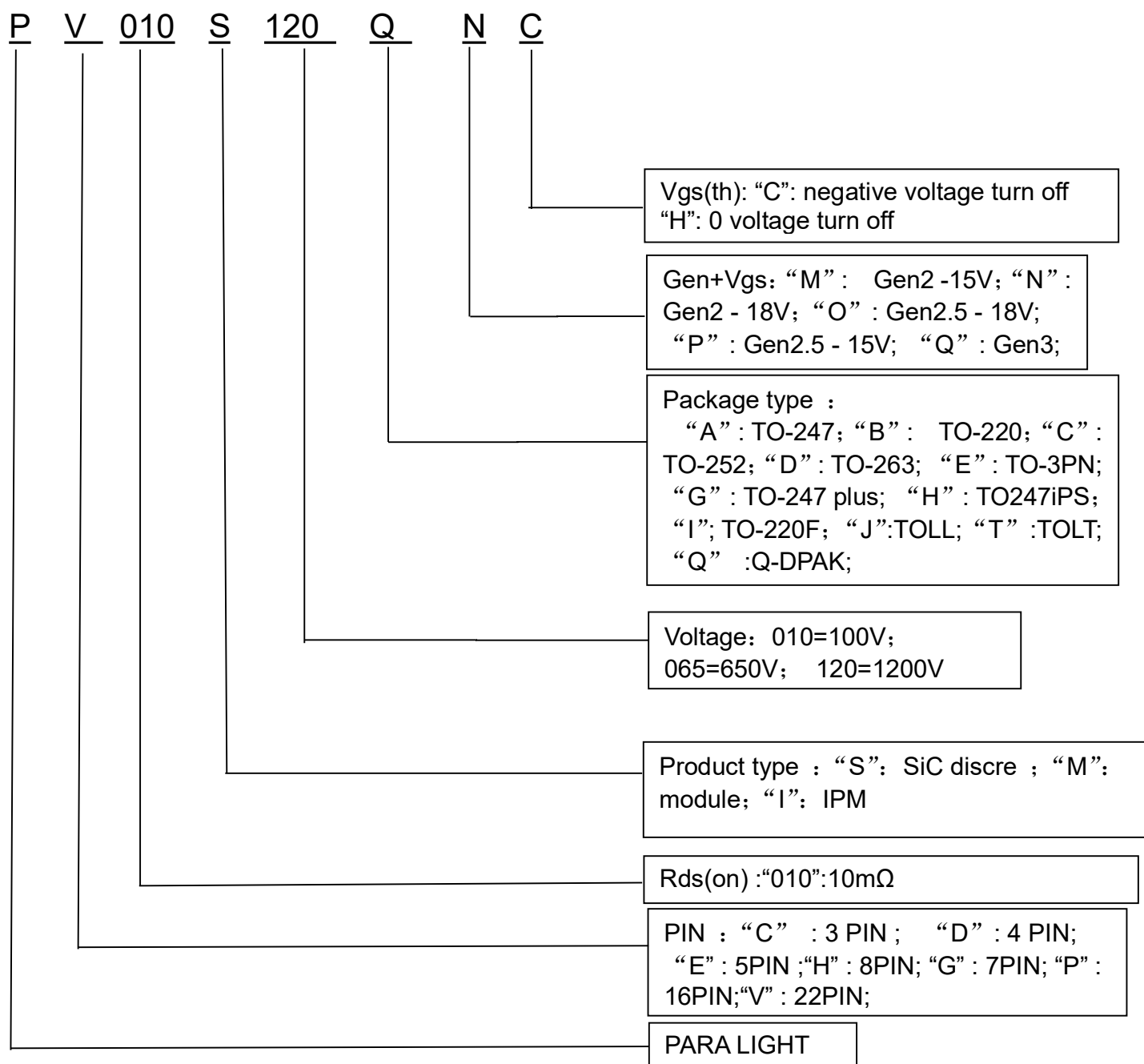


Common dimensions(mm)							
Symbol	Min	Typ	Max	Symbol	Min	Typ	Max
A	2.25	-	2.35	E9	-	0.75	-
A1	0.00	-	0.15	e	-	1.14	-
A2	-	0.90	-	e1	7.40	11.4	-
A3	-	0.50	-	F	-	-	-
b	0.50	-	0.70	F1	1.47	-	7.60
b1	-	-	0.15	F2	7.40	-	7.60
c	0.46	-	0.58	F3	3.65	-	3.85
D	14.9	-	15.10	F4	5.07	-	5.27
D1	-	12.00	-	F5	10.24	-	10.44
D2	-	13.20	-	L	-	1.30	-
D3	14.50	-	14.70	M	-	0.60	-
E	20.81	-	21.11	N	-	22	-
E1	15.30	-	15.50	O	0°	-	8°
E2	-	9.83	-	P	-	0.90	-
E3	-	0.625	-	P1	0.70	-	0.90
E4	-	0.45	-	P2	0.90	-	1.10
E5	-	0.95	-	Q	-	1.60	-
E6	-	2.53	-	R	-	1.70	-
E7	-	2.40	-	S	-	0.631	-
E8	-	0.90	-				

Recommended Solder Pad Layout



PART NO. SYSTEM :



Revision history

Document revision history

Date	Version	Changes
2026.04.24	A / 0	First release.