PCMP8N65C2P is 650V/191A SiC Power MOSFET

QDPAK-22L

General Description

PingChuang 191A, 650V SiC MOSFET is an ultrahigh performance power SiC MOSFET,designed for high frequency applications where high efficiency and high reliability are required. The wide band gap material allows the design of a SiC MOSFET structure with low leakage current and conduction losses.

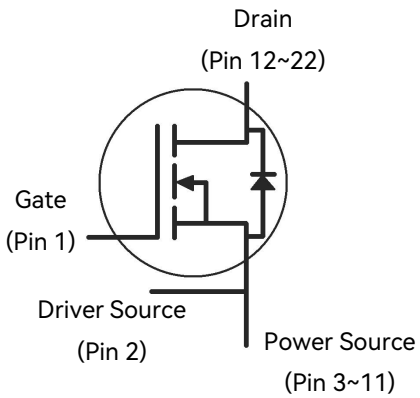
PCMP8N65C2P Summary

Symbol	Value
V_{DS}	650V
$R_{DS(on)}$	8mΩ
I_D@25℃	191A
$Q_{G(typ.)}$	296.6nC

Features

- High Blocking Voltage with Low On-Resistance
- High Speed Switching with Low Capacitance
- Easy to Parallel and Simple to Drive
- Avalanche Ruggedness
- Resistant to Latch-Up
- Halogen Free, RoHS Compliant

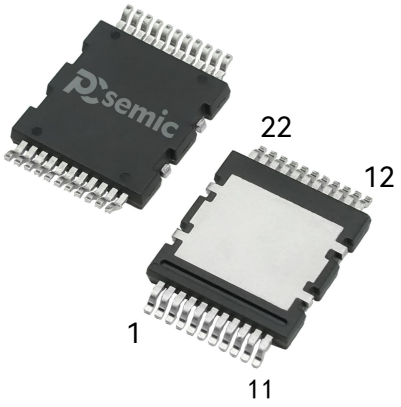
Equivalent Schematic



Applications

- LED Lighting Power Supplies
- High Voltage DC/DC Converters
- Industrial Power Supplies
- HVAC

Package QDPAK-22L



Package Marking

Product#	Marking	Package
PCMP8N65C2P	PCMP8N65C2P	QDPAK-22L

Maximum Ratings (T_C = 25℃ unless otherwise specified)

Symbol	Parameter	Test Conditions	Value	Unit
V_{DSmax}	Drain-Source Voltage	V_{GS}=0V, I_D=100μA	650	V
V_{GSmax}	Gate-Source Voltage	Absolute Maximum Values	-10/+24	V
V_{GSop}	Gate-Source Voltage	Recommended Operational Values	-3/+18	V
I_D	Continuous Drain Current	V_{GS}=18V, T_C=25℃	191	A
		V_{GS}=18V, T_C=100℃	135	A
$I_{D(pulse)}$	Pulsed Drain Current	Pulse Width t_p Limited by T_{Jmax}	381	A
P_D	Power Dissipation	T_C=25℃,T_J=175℃	355	W
T_J ,T_{stg}	Operating Junction and Storage Temperature		-55 to +175	℃

Reverse Diode Characteristics

Symbol	Parameter	Test Conditions	Min	Typ.	Max.	Unit
V_{SD}	Diode Forward Voltage	V_{GS}= 0V, I_{SD}=50A		2.5		V
		V_{GS}= 0V, I_{SD}=50A, T_J=175℃		2.4		V
I_S	Continuous Diode Forward Current	T_C=25℃, V_{GS}= 0V		107		A
t_{rr}	Reverse Recover Time	I_{SD}=100A V_R=400V dI_F/dt =7270A/μs		22.6		ns
Q_{rr}	Reverse Recovery Charge			1072		nC
I_{rrm}	Peak Reverse Recovery Current			89		A

Thermal Characteristics

Symbol	Parameter	Min.	Typ.	Max.	Unit
R_{thJC}	Thermal Resistance from Junction to Case		0.42		℃/W

Electrical Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	V_{GS}=0V, I_D=100μA	650			V
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS}, I_D=30mA	2	2.8	4	V
		V_{DS}=V_{GS}, I_D=30mA, T_J=175℃		2.0		V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=650V, V_{GS}=0V		1	100	μA
I_{GSS}	Gate-Source Leakage Current	V_{DS}=0V, V_{GS}=18V			250	nA
$R_{DS(on)}$	Drain-Source On-State Resistance	V_{GS}=15V, I_D=100A		10.3		mΩ
		V_{GS}=18V, I_D=100A		8.0	10	mΩ
		V_{GS}=15V, I_D=100A,T_J=175℃		10.6		mΩ
		V_{GS}=18V, I_D=100A,T_J=175℃		9.8		mΩ
g_{fs}	Trans Conductance	V_{DS}= 20 V, I_{DS}= 80A		62.3		S
		V_{DS}= 20 V, I_{DS}= 80 A, T_J = 175 ℃		59.2		S
C_{iss}	Input Capacitance	V_{GS}=0V V_{DS}=400V f=100KHz V_{AC}=25mV		6865		pF
C_{oss}	Output Capacitance			481.9		pF
C_{rss}	Reverse Transfer Capacitance			27.8		pF
E_{oss}	C_{oss} Stored Energy			48.7		μJ

E_{ON}	Turn-On Switching Energy	V_{DD}=400V, V_{GS}=-5V/18V, I_D=100A, $R_{G(ext)}$=5Ω, L= 50μH		197.7		μJ
E_{OFF}	Turn-Off Switching Energy			356.7		μJ
$t_{d(on)}$	Turn-On Delay Time			13.8		ns
t_r	Rise Time			11.5		ns
$t_{d(off)}$	Turn-Off Delay Time			44.8		ns
t_f	Fall Time			11.8		ns
$R_{G(int)}$	Internal Gate Resistance	f=1MHz, V_{AC}=25mV		3.81		Ω
Q_{GS}	Gate to Source Charge	V_{DS}=400V ,V_{GS}=-5V/18V I_D=80A		74.2		nC
Q_{GD}	Gate to Drain Charge			123.6		nC
Q_G	Total Gate Charge			296.6		nC

Typical Performance

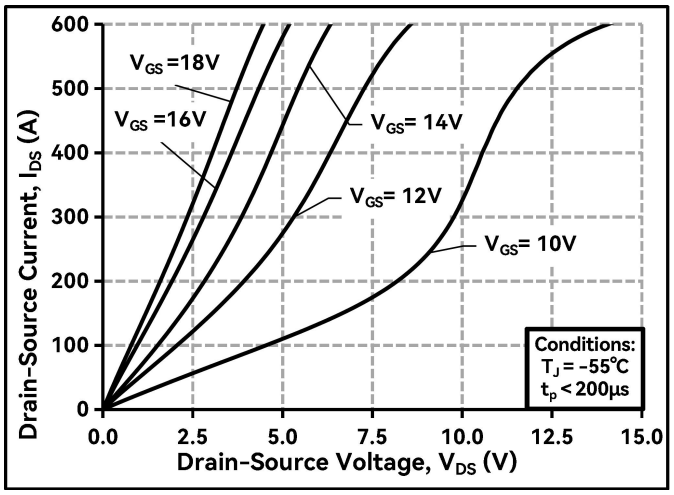


Figure 1: Output Characteristics T_J = -55℃

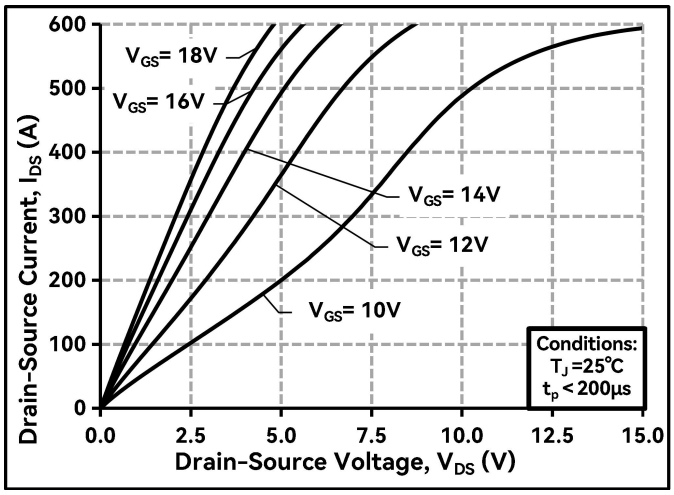


Figure 2: Output Characteristics T_J = 25℃

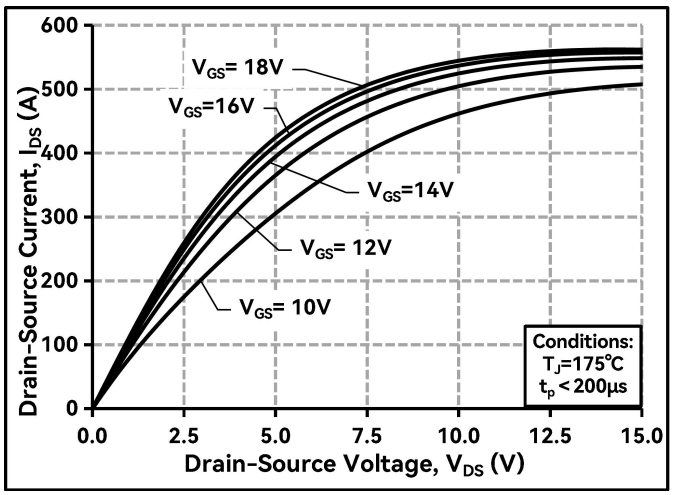


Figure 3: Output Characteristics T_J = 175℃

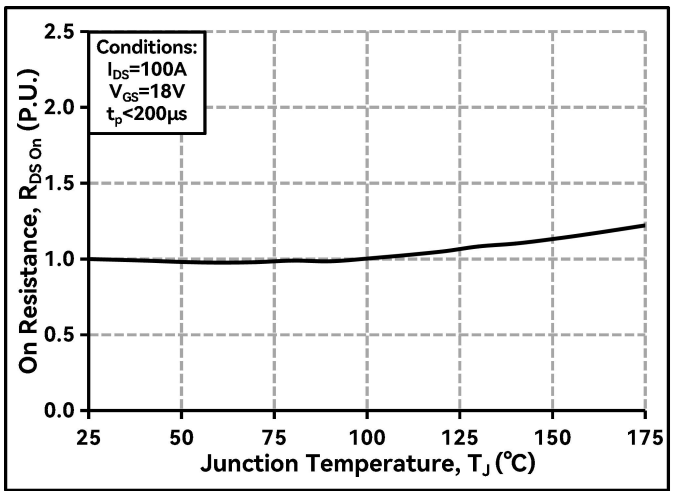


Figure 4: Normalized On-Resistance vs Temperature

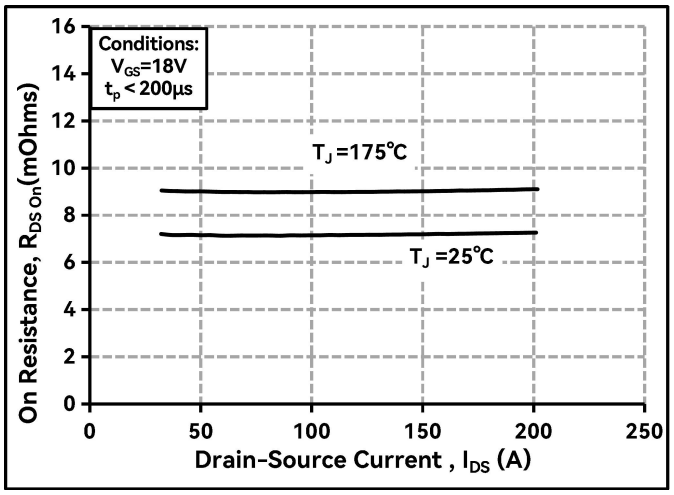


Figure 5: On-Resistance vs Drain Current For Various Temperatures

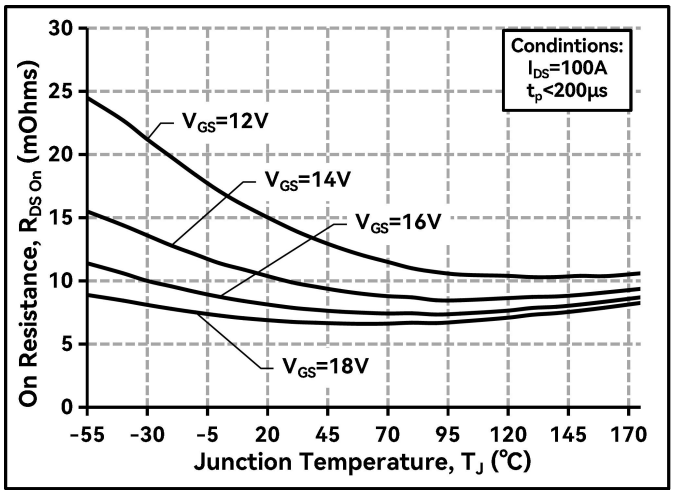


Figure 6: On-Resistance vs Temperature For Various Gate Voltage

Typical Performance

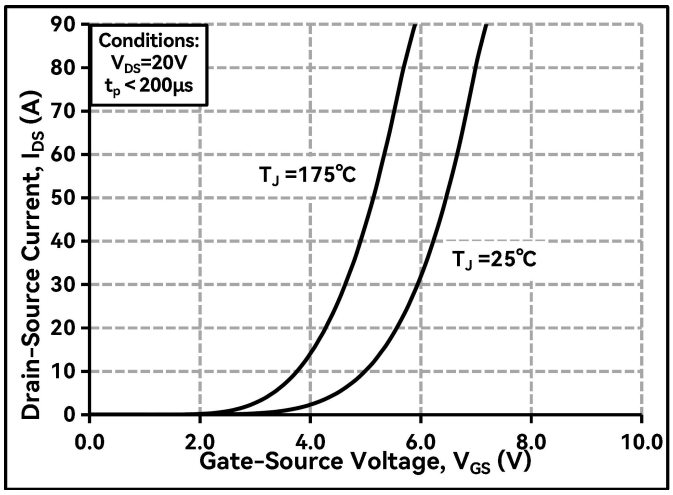


Figure 7: Transfer Characteristic for Various Junction Temperatures

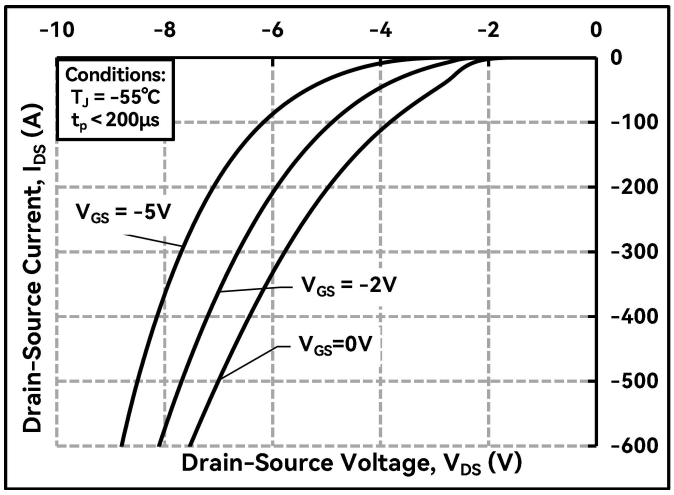


Figure 8: Body Diode Characteristic at -55℃

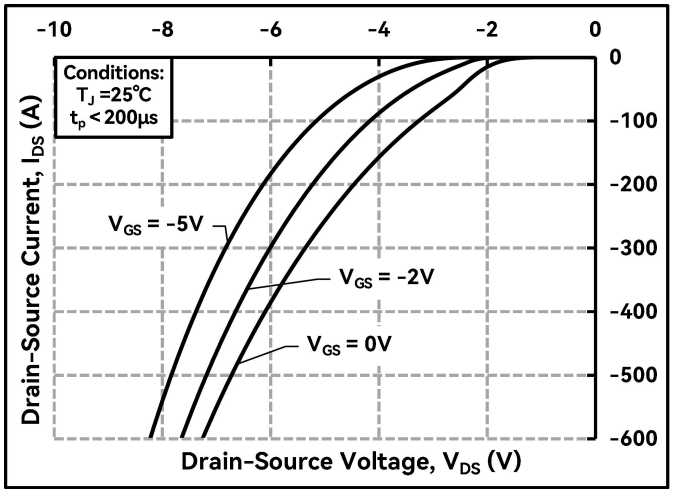


Figure 9: Body Diode Characteristic at 25℃

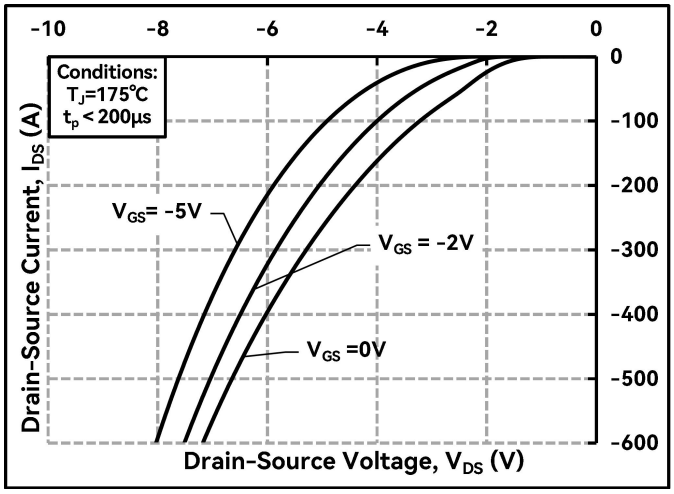


Figure 10: Body Diode Characteristic at 175℃

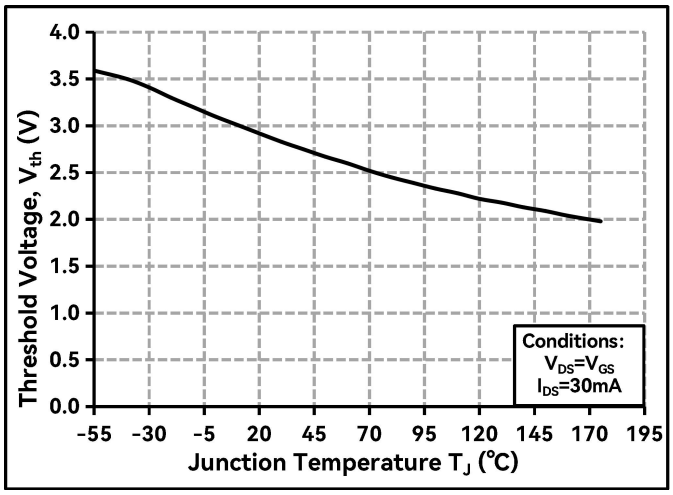


Figure 11: Threshold Voltage vs Temperature

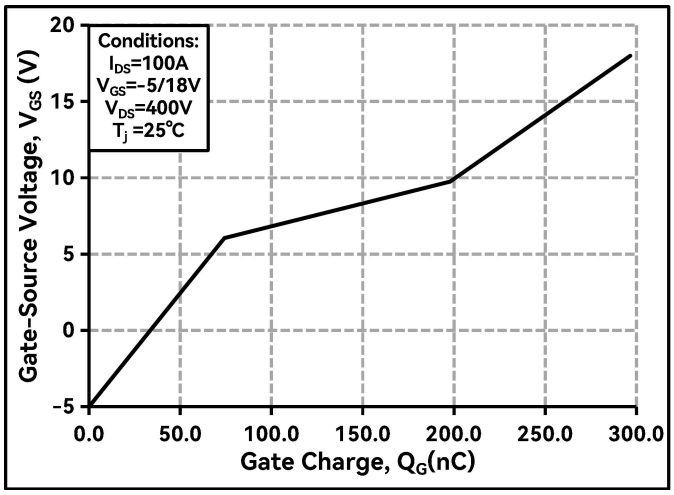


Figure 12: Gate Charge Characteristics

Typical Performance

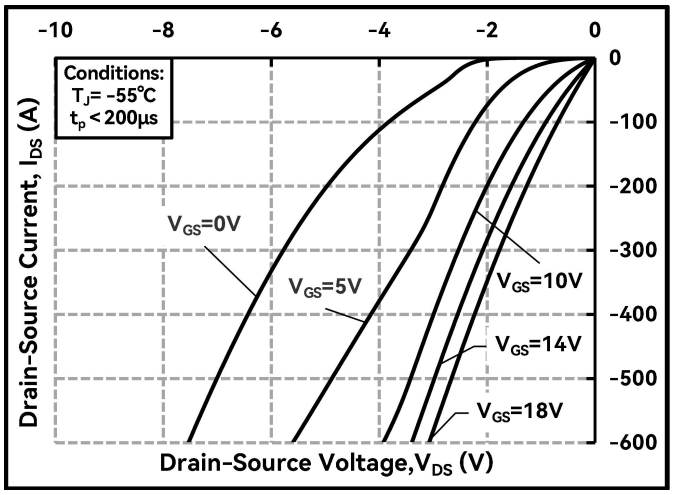


Figure 13: 3rd Quadrant Characteristic at -55℃

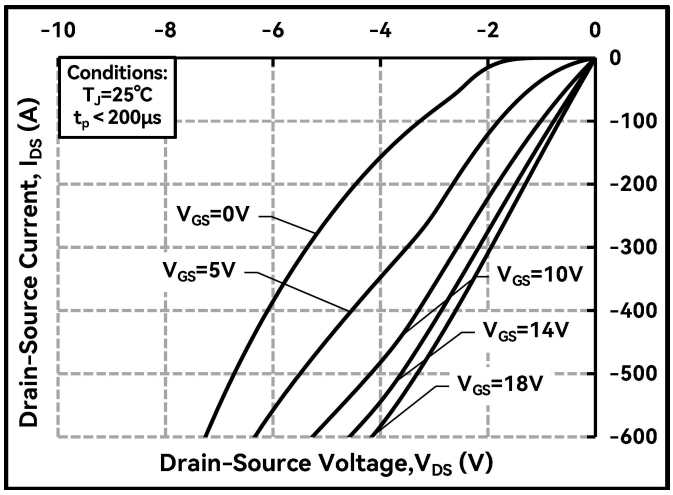


Figure 14: 3rd Quadrant Characteristic at 25℃

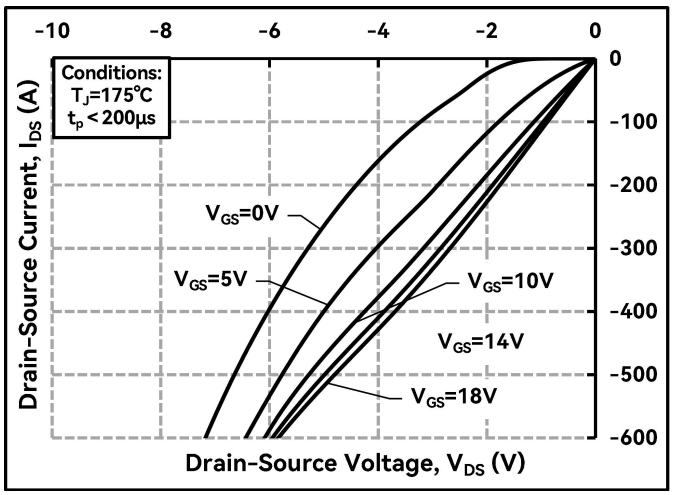


Figure 15: 3rd Quadrant Characteristic at 175℃

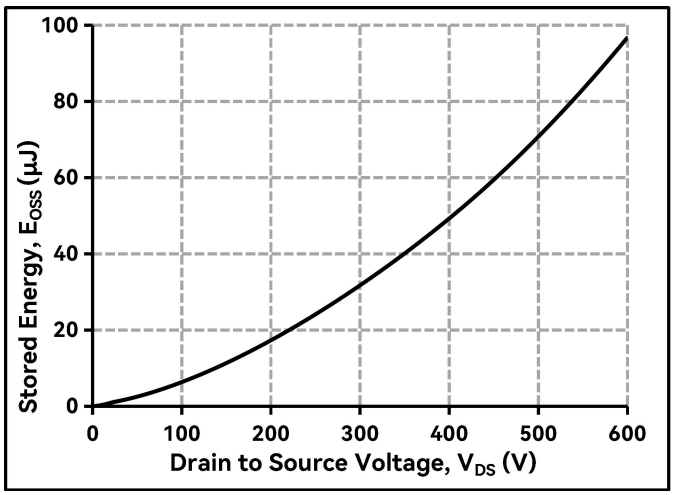


Figure 16: Output Capacitor Stored Energy

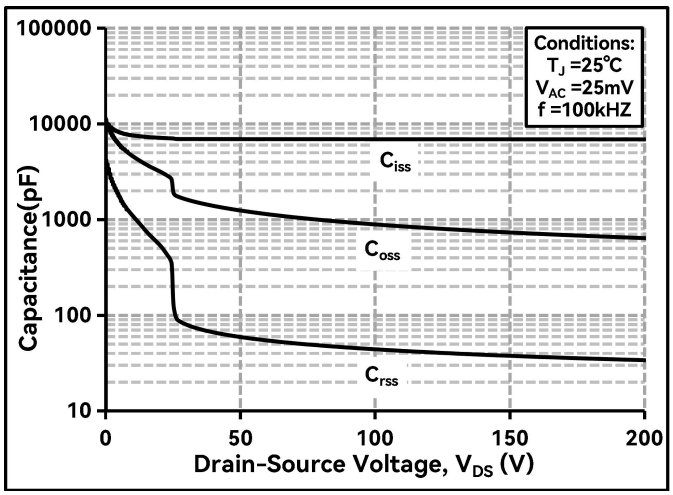


Figure 17: Capacitance vs Drain-Source Voltage (0-200 V)

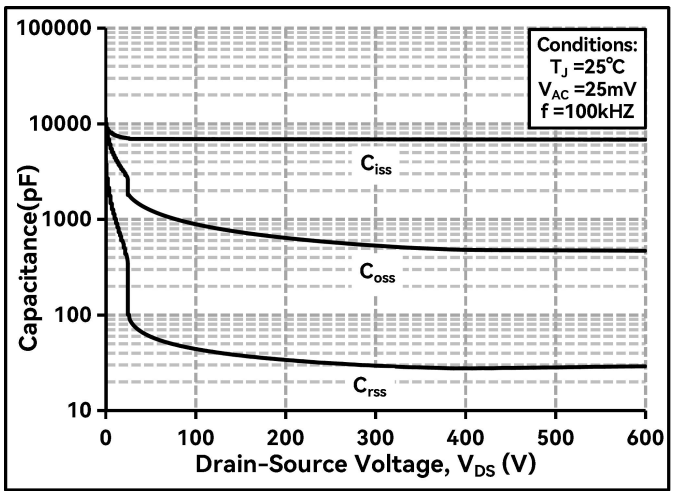


Figure 18: Capacitance vs Drain-Source Voltage (0-600 V)

Typical Performance

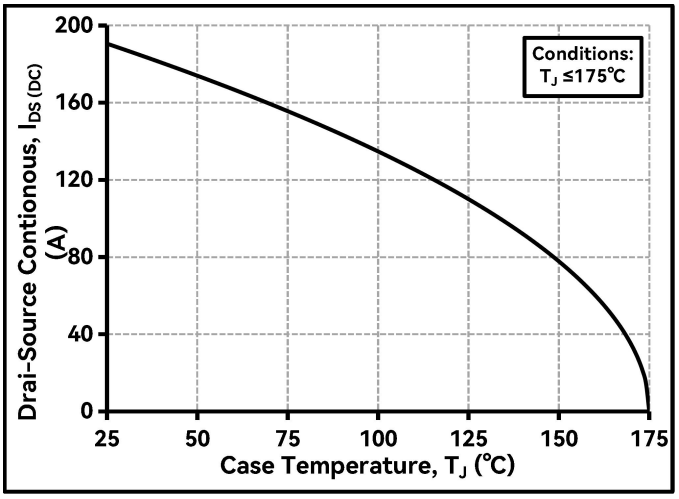


Figure 19: Continuous Drain Current Derating vs Case Temperature

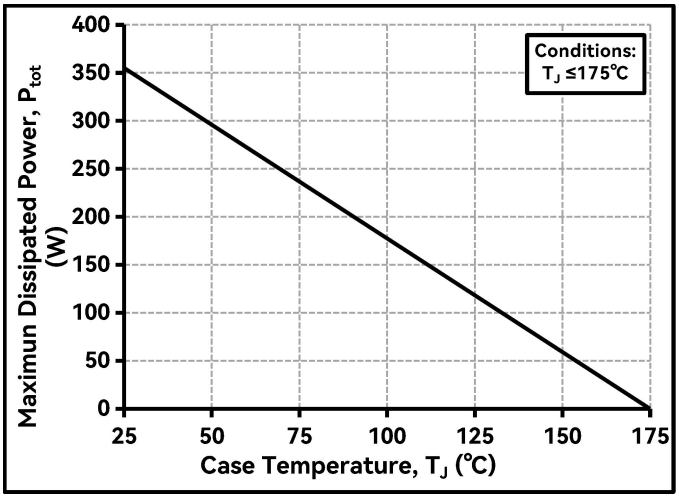


Figure 18: Maximum Power Dissipation Derating vs Case Temperature

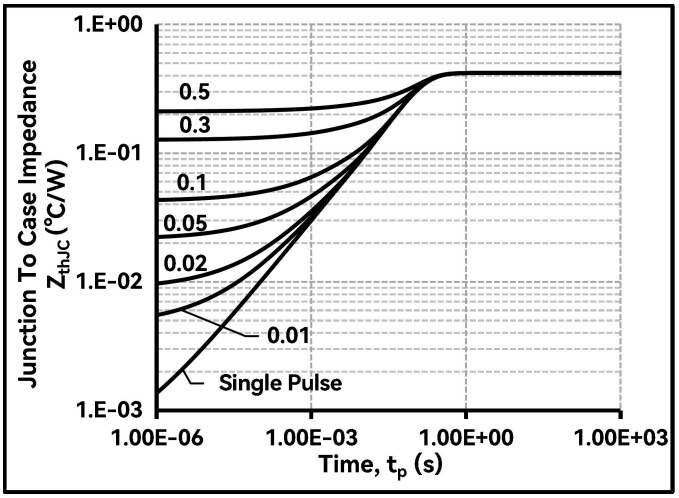


Figure 21: Transient Thermal Impedance (Junction - Case)

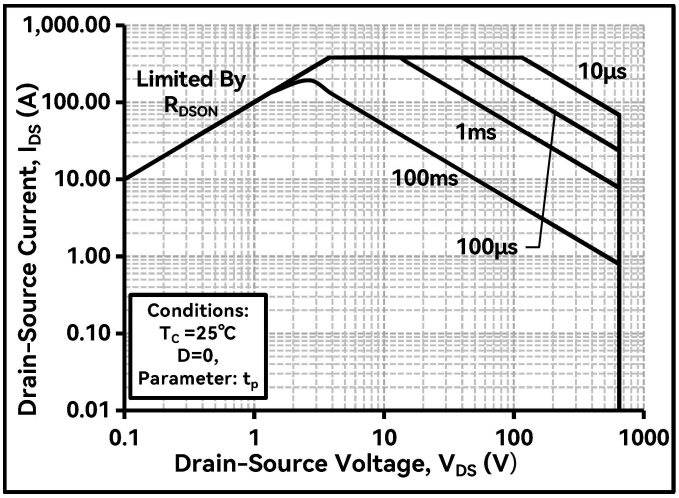


Figure 22: Safe Operating Area

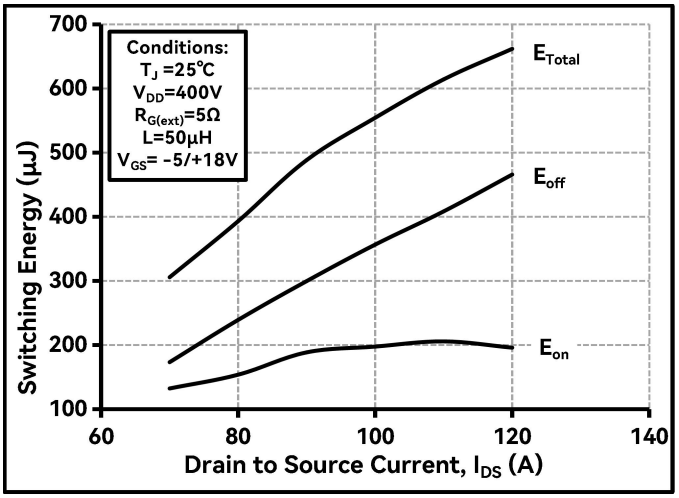


Figure 23: Clamped Inductive Switching Energy vs Drain Current

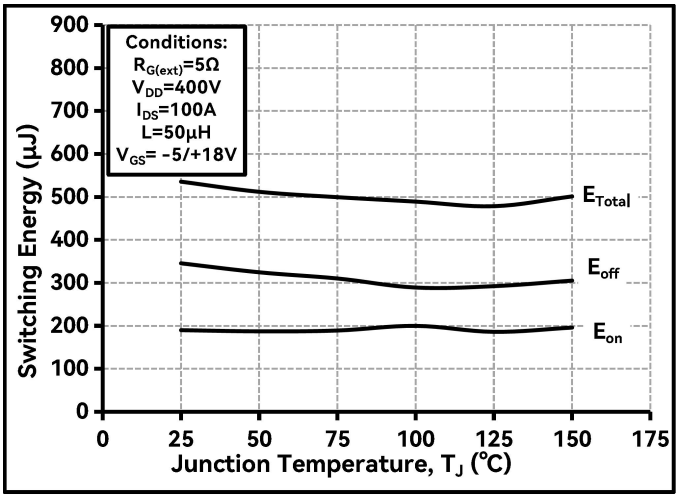


Figure 24: Clamped Inductive Switching Energy vs Temperature

Typical Performance

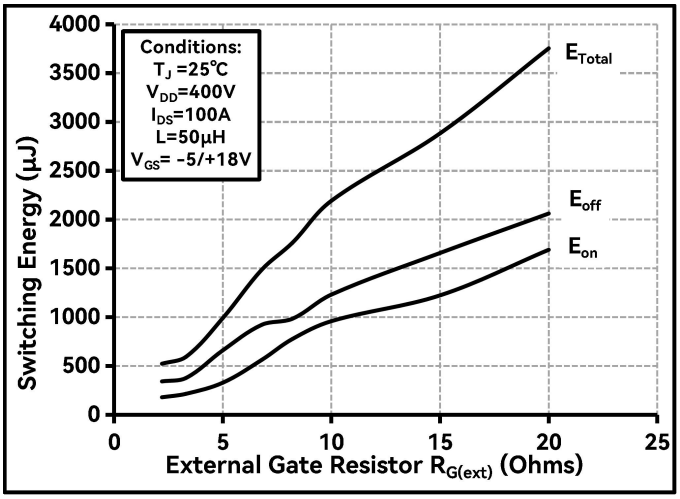


Figure 25: Clamped Inductive Switching Energy vs $R_{G(ext)}$

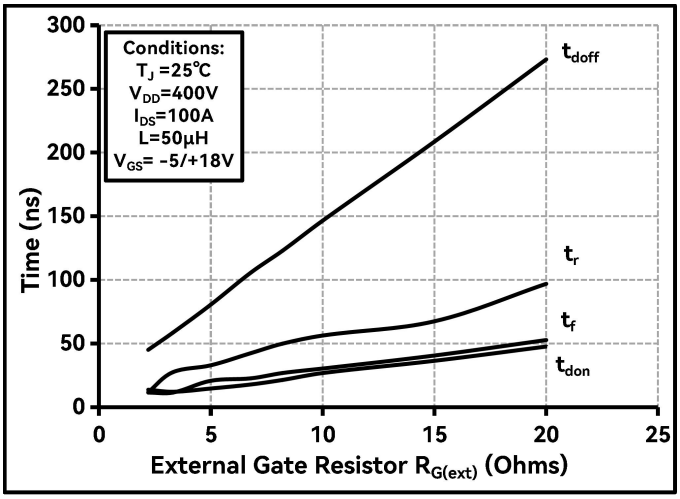
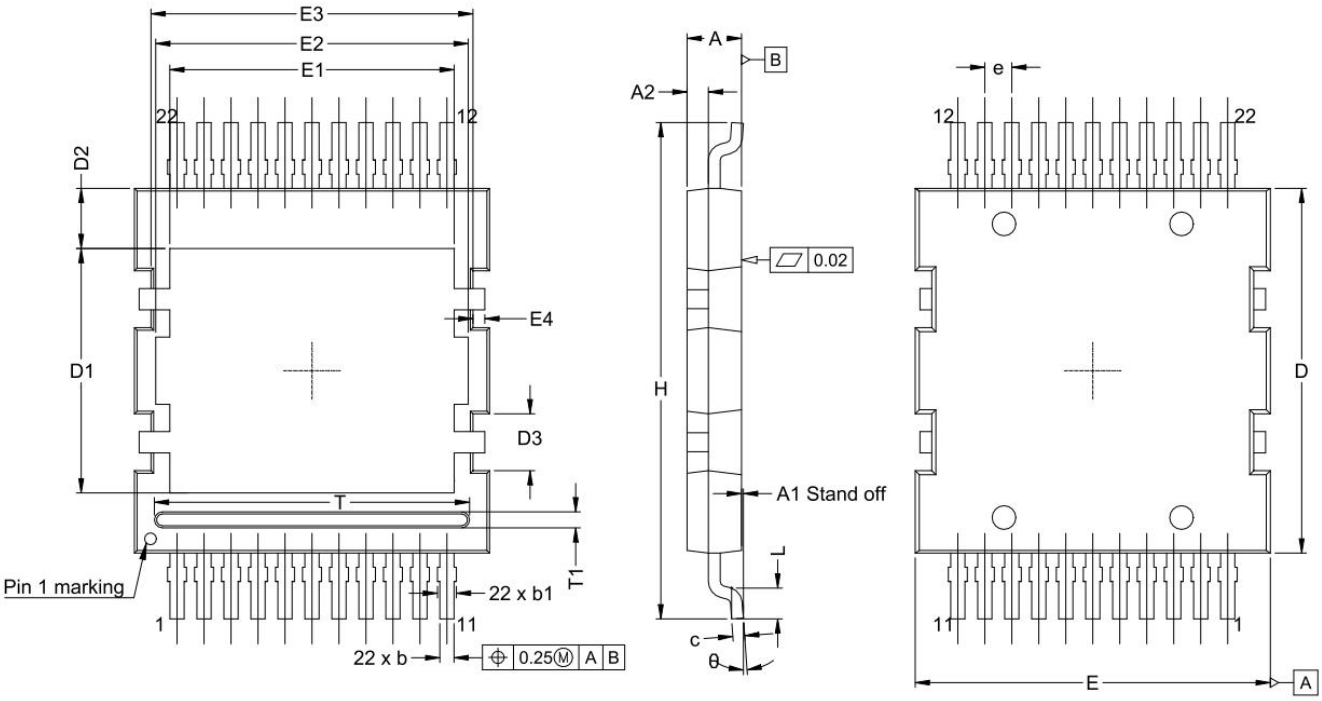


Figure 26: Switching Times vs $R_{G(ext)}$

Package Dimensions

QDPAK-22L



Type	Millimeters		
	Min	Nom	Max
A	2.200	2.300	2.350
A1	0.000	-	0.150
A2	0.800	0.900	1.000
b	0.500	0.600	0.700
b1	0.500	-	0.900
c	0.460	0.500	0.580
e	1.140 BSC		
D	15.300	15.400	15.500
D1	10.23	10.320	10.43
D2	2.540 REF		
D3	2.400 REF		
E	14.900	15.000	15.100
E1	11.910	12.010	12.110
E2	13.200 REF		
E3	13.600 REF		
E4	0.500 REF		

H	20.810	20.960	21.110
L	1.200	1.300	1.400
θ	0°	-	8°
T	13.210	13.310	13.410
T1	0.500	0.670	0.700

UNIT:mm

IMPORTANT NOTICE

The data contained in this product datasheet is exclusively intended for technically trained staff. you and your technical departments will have to evaluate the suitability of the product for the intended application and the completeness of the product data with respect to such application.

This product data sheet is describing the characteristics of this product for which a warranty is granted. Any such warranty is granted exclusively pursuant the terms and conditions of the supply agreement. There will be no guarantee of any kind for the product and its characteristics.

Due to technical requirements our product may contain dangerous substances. For information on the types in question please contact the sales office, which is responsible for you.

Should you intend to use the Product in aviation applications, in health or live endangering or life support applications, please notify.

If and to the extent necessary, please forward equivalent notices to your customers. Changes of this product data sheet are reserved.

For more information on technology, delivery terms and conditions and prices, please contact the nearest PingChuang Technologies Office (www.pcsemic.com).