

Features

- ◆ AEC-Q101 Qualified
- ◆ High Speed Switching with Low Capacitance
- ◆ High Blocking Voltage with Low $R_{DS(on)}$
- ◆ Easy to Parallel
- ◆ Simple to Drive
- ◆ RoHS Compliant

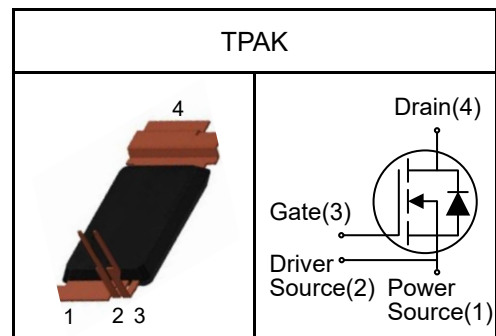
Benefits

- ◆ Increased Power Density
- ◆ Faster Operating Frequency
- ◆ Reduction of Heat Sink Requirements
- ◆ Higher Efficiency
- ◆ Reduced EMI

Applications

- ◆ Power Factor Correction Modules
- ◆ Switch Mode Power Supplies
- ◆ DC-AC Inverters
- ◆ High Voltage DC/DC Converters

Part NO.	HX1M006120P
V_{DS}	= 1200 V
$I_D(T_c=25^\circ\text{C})$	= 280 A
$R_{DS(on)}$	= 6.4 m Ω



Maximum ratings ($T_j=25^\circ\text{C}$ unless otherwise specified)

Symbol	Parameter	Test conditions	Value	Unit
V_{DS}	Drain-Source Voltage		1200	V
I_D	Continuous Drain Current	$T_c=25^\circ\text{C}$ $T_c=100^\circ\text{C}$	280 200	A
I_{DM}	Peak Drain Current	Pulse width t_p limited by T_{jmax}	520	A
V_{GSmax}	Gate-Source Voltage		-8/+22	V
V_{GSop}	Recommend Gate-Source Voltage		-4/+18	V
P_{tot}	Power Dissipation	$T_c=25^\circ\text{C}$ $T_c=100^\circ\text{C}$	909 454	W
T_j	Operating Junction Temperature		-40~175	$^\circ\text{C}$
T_{stg}	Storage Temperature		-40~175	$^\circ\text{C}$

Electrical Characteristics

Static Characteristics

Symbol	Parameter	Test conditions	Value			Unit
			Min.	Typ.	Max.	
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	$I_D=100\mu A$, $V_{GS}=0V$	1200			V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS}=1200V$, $V_{GS}=0V$		1	100	μA
I_{GSS}	Gate-Source Leakage Current	$V_{DS}=0V$, $V_{GS}=18V$			500	nA
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}$, $I_D=70mA$ $T_j=25^\circ C$ $T_j=150^\circ C$ $T_j=175^\circ C$	2	2.8 2.0 1.9	4	V
$R_{DS(on)}$	Drain-Source On-State Resistance	$V_{GS}=18V$, $I_D=125A$ $T_j=25^\circ C$ $T_j=150^\circ C$ $T_j=175^\circ C$		6.4 9.8 10.9		m Ω

Thermal Characteristics

Symbol	Parameter	Value			Unit
		Min.	Typ.	Max.	
$R_{th(j-c)}$	Thermal Resistance from Junction to Case		0.165		$^\circ C/W$

Dynamic Characteristics

Symbol	Parameter	Test conditions	Value			Unit
			Min.	Typ.	Max.	
C_{iss}	Input Capacitance	$V_{DS}=1000V$, $f=100kHz$, $V_{GS}=0V$		12100		pF
C_{oss}	Output Capacitance			462		pF
C_{rss}	Reverse Transfer Capacitance			36		pF
$R_{G(int)}$	Internal Gate Resistance	$f=1MHz$		1.2		Ω
Q_g	Total Gate Charge	$V_{DS}=800V$, $I_D=125A$, $V_{GS}=-4/18V$		485		nC
Q_{gs}	Gate to Source Charge			140		nC
Q_{gd}	Gate to Drain Charge			115		nC

Switching Characteristics

Symbol	Parameter	Test conditions	Value			Unit
			Min.	Typ.	Max.	
$t_{d(on)}$	Turn-On Delay Time	$V_{DD}=800V, I_D=125A,$ $V_{GS}=-4V/18V,$ $R_G=1.0\Omega$		33		ns
t_r	Rise Time			35		ns
$t_{d(off)}$	Turn-Off Delay Time			94		ns
t_f	Fall Time			17		ns
E_{on}	Turn-On Energy			1305		μJ
E_{off}	Turn-Off Energy			705		μJ

Reverse Diode Characteristics

Symbol	Parameter	Test conditions	Value			Unit
			Min.	Typ.	Max.	
V_{SD}	Diode Forward Voltage	$V_{GS}=-4V, I_{SD}=125A$ $T_j=25^\circ C$ $T_j=175^\circ C$		5.1 4.3		V
I_S	Continuous Diode Forward Current	$V_{GS}=-4V$ $T_c=25^\circ C$ $T_c=100^\circ C$		212 125		A
t_{rr}	Reverse Recovery Time	$V_{GS}=-4V, I_{SD}=125A,$ $V_R=800V,$ $di/dt=7000A/\mu s$		27		ns
Q_{rr}	Reverse Recovery Charge			790		nC
I_{rrm}	Peak Reverse Recovery Current			72		A

Typical Performance

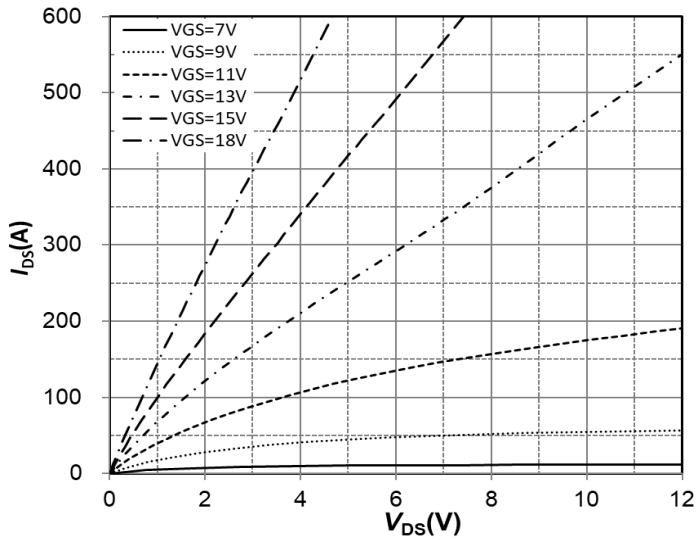


Figure 1. Output Characteristics
 $T_j = -40^{\circ}\text{C}$

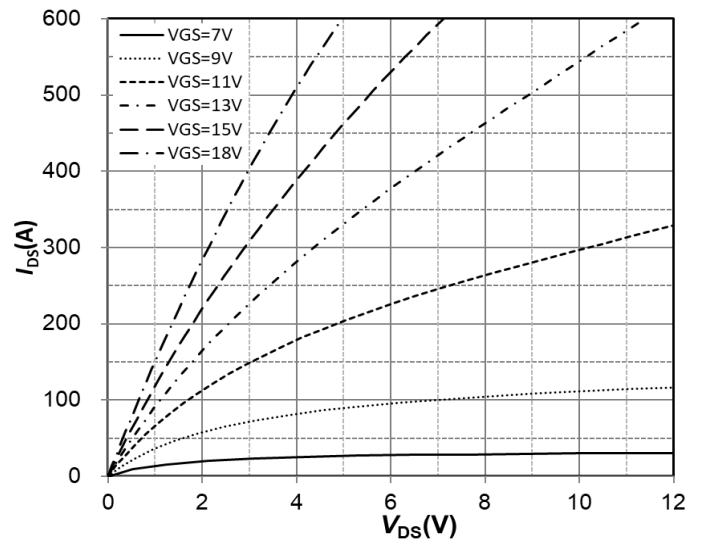


Figure 2. Output Characteristics
 $T_j = 25^{\circ}\text{C}$

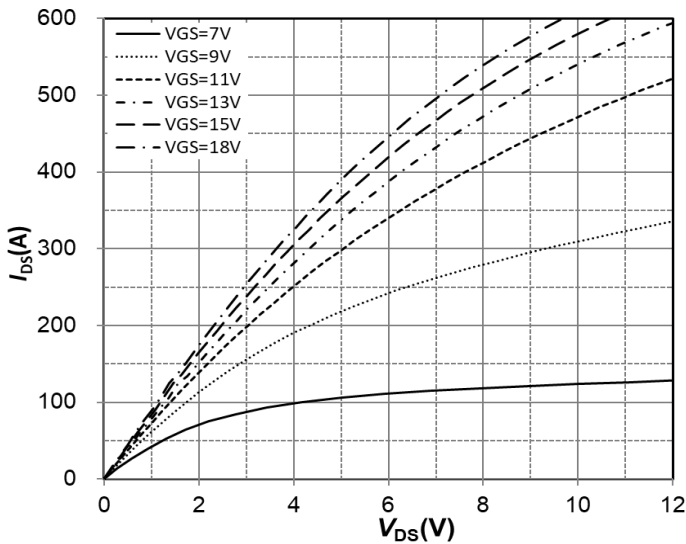


Figure 3. Output Characteristics
 $T_j = 175^{\circ}\text{C}$

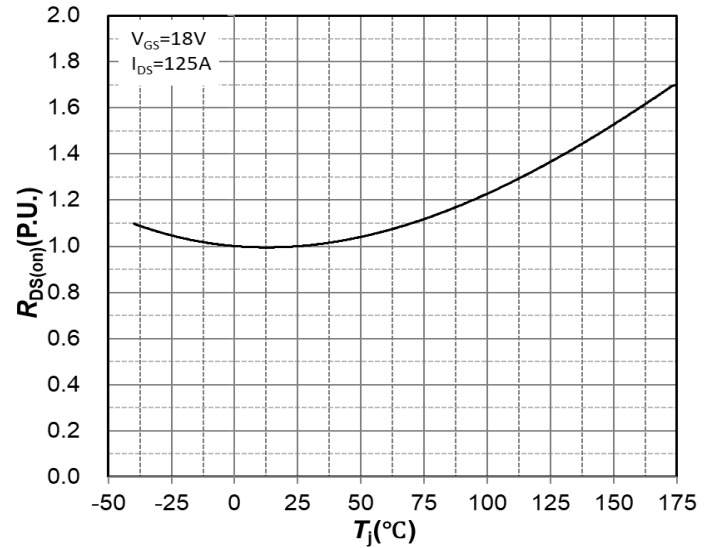


Figure 4. Normalized On-Resistance vs.
Temperature

Typical Performance

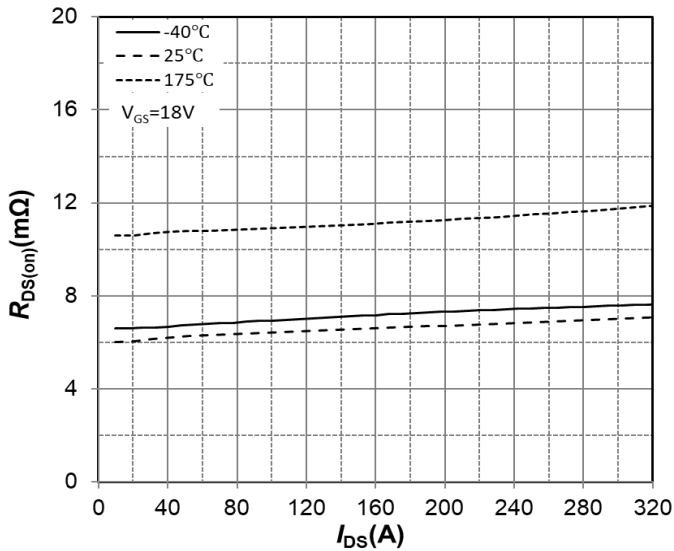


Figure 5. **On-Resistance vs. Drain Current For Various Temperatures**

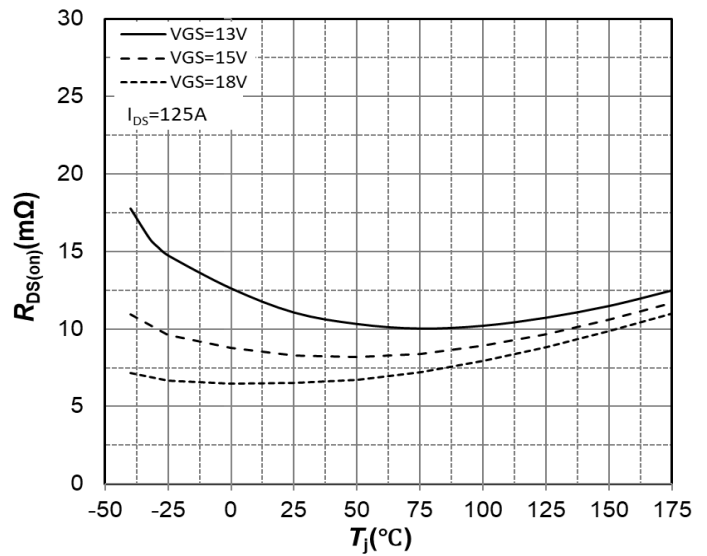


Figure 6. **On-Resistance vs. Temperature For Various Gate Voltage**

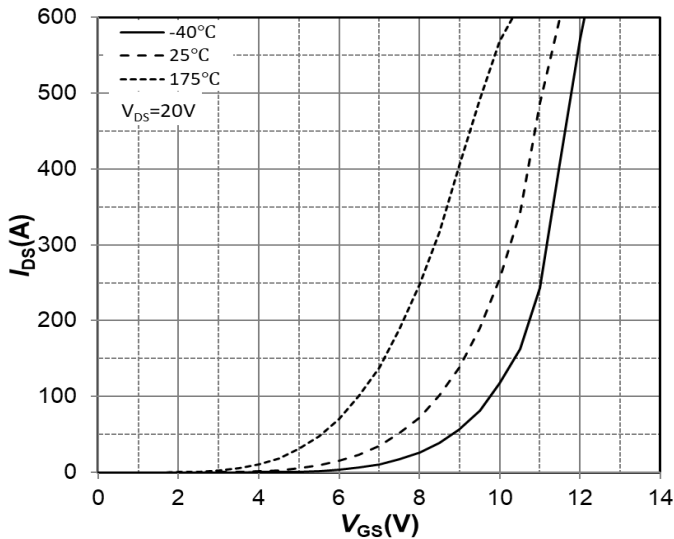


Figure 7. **Transfer Characteristic for Various Junction Temperatures**

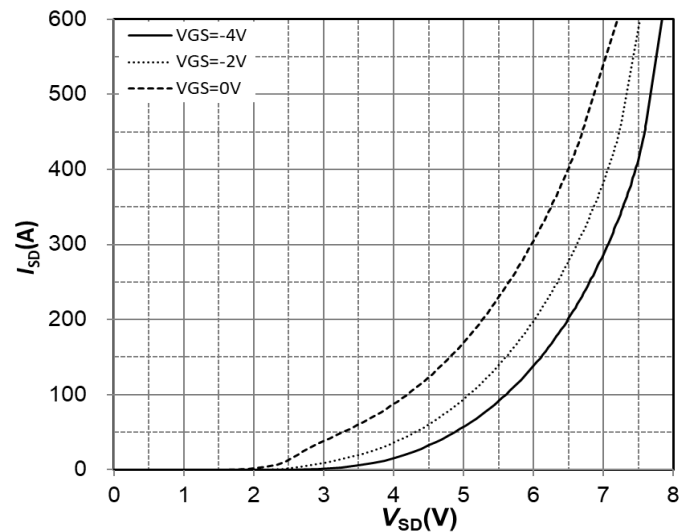


Figure 8. **Body Diode Characteristic $T_J = -40^\circ\text{C}$**

Typical Performance

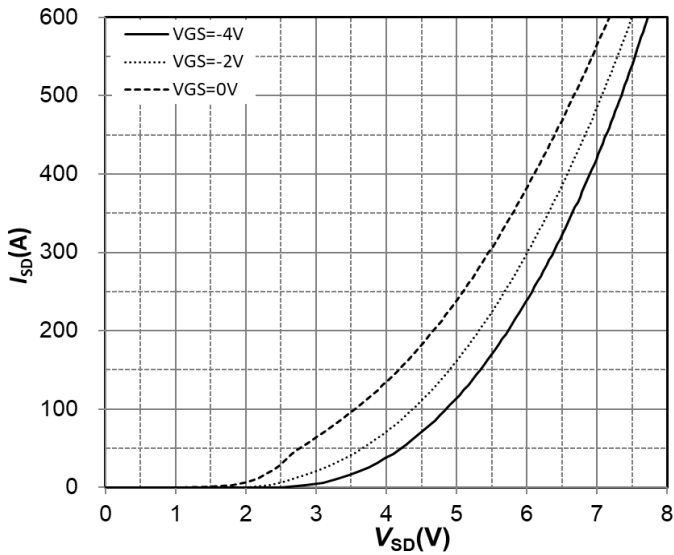


Figure 9. **Body Diode Characteristic**
 $T_j=25^{\circ}\text{C}$

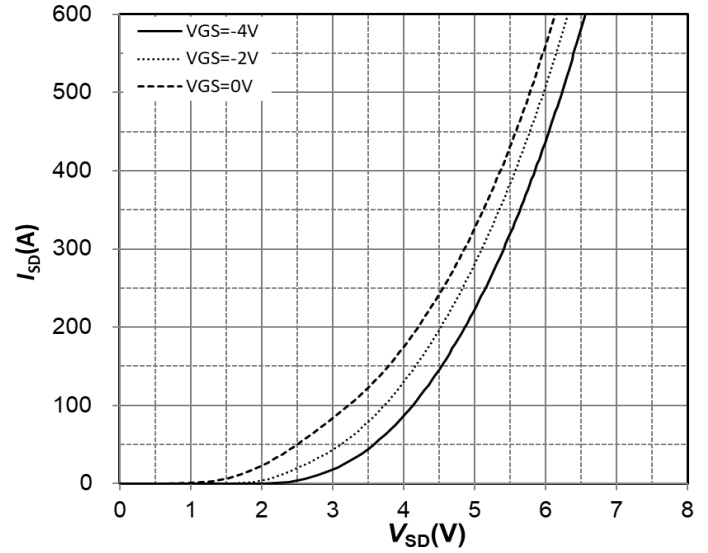


Figure 10. **Body Diode Characteristic**
 $T_j=175^{\circ}\text{C}$

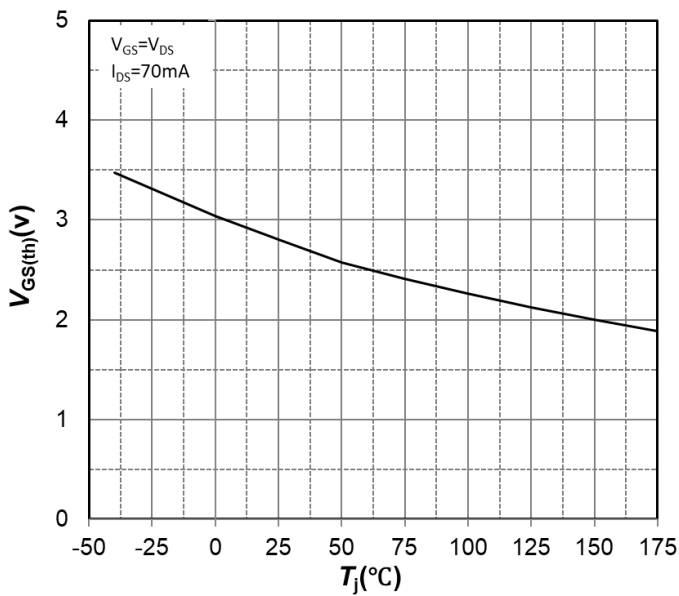


Figure 11. **Threshold Voltage vs. Temperature**

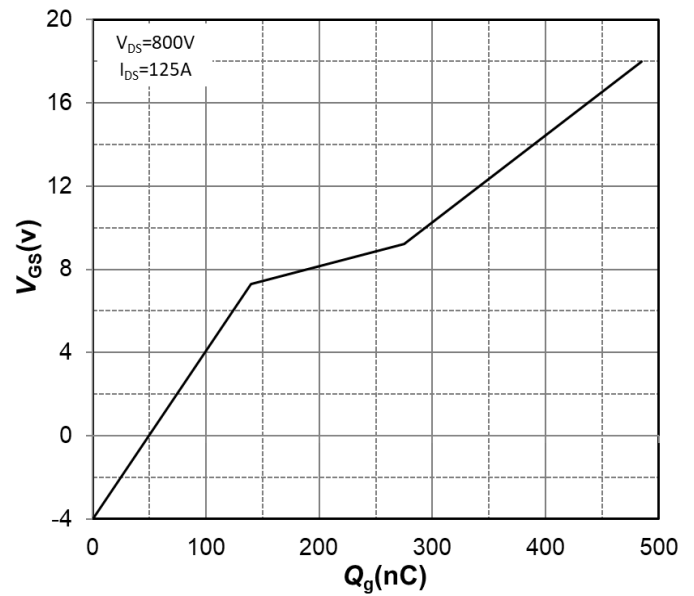


Figure 12. **Gate Charge Characteristics**

Typical Performance

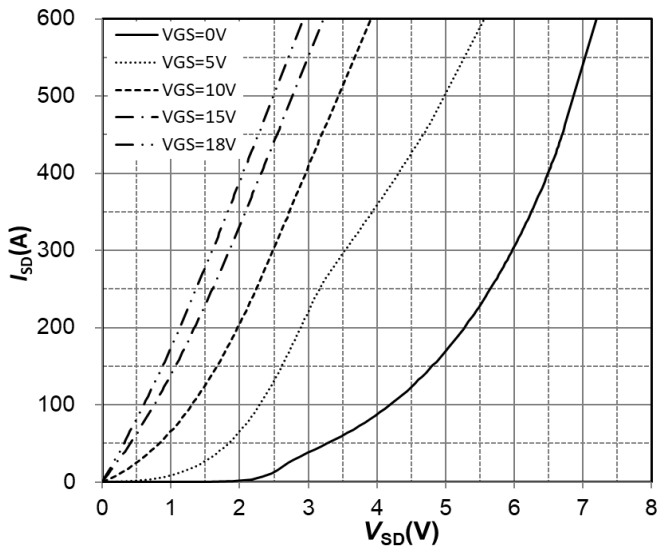


Figure 13. 3rd Quadrant Characteristic
 $T_j = -40^\circ\text{C}$

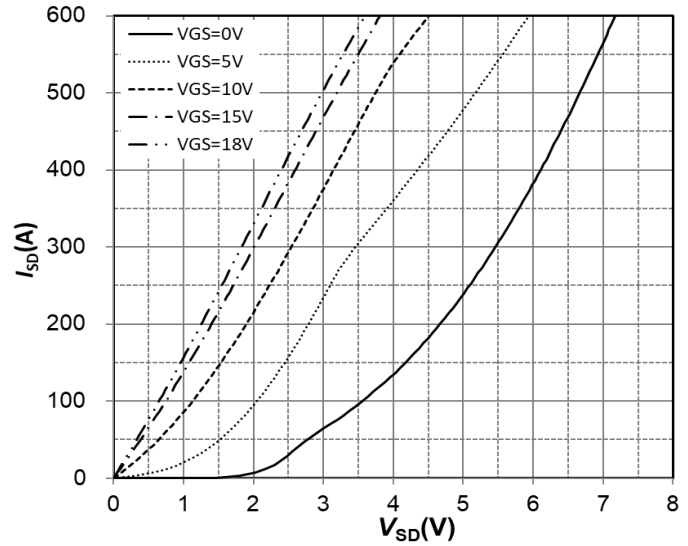


Figure 14. 3rd Quadrant Characteristic
 $T_j = 25^\circ\text{C}$

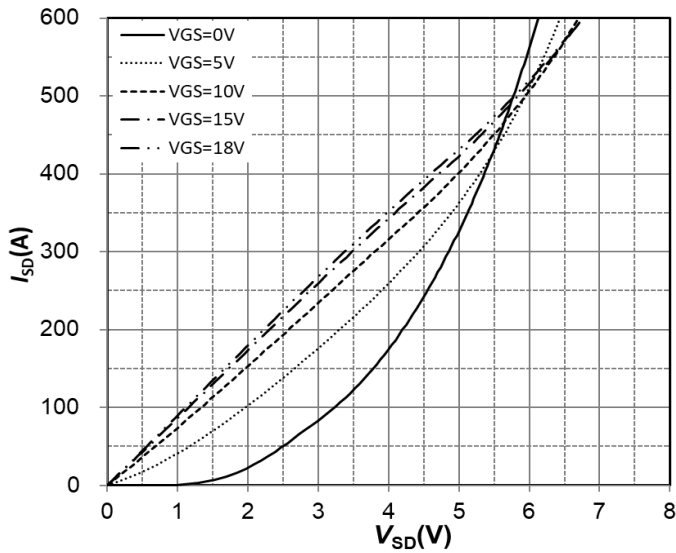


Figure 15. 3rd Quadrant Characteristic
 $T_j = 175^\circ\text{C}$

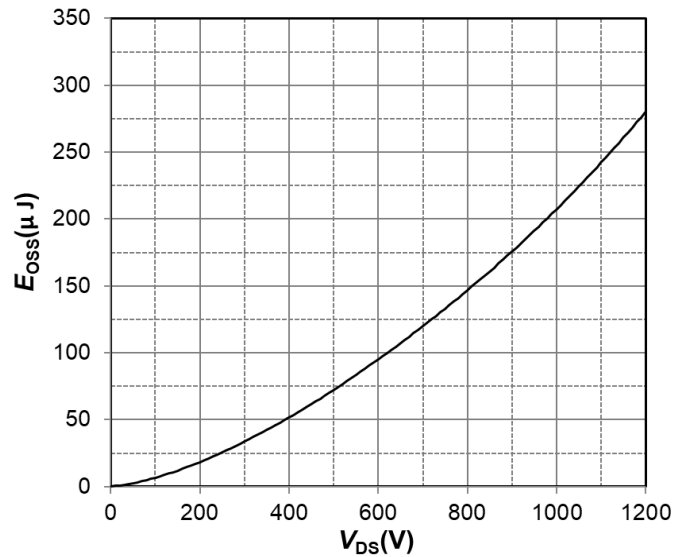


Figure 16. Output Capacitor Stored Energy

Typical Performance

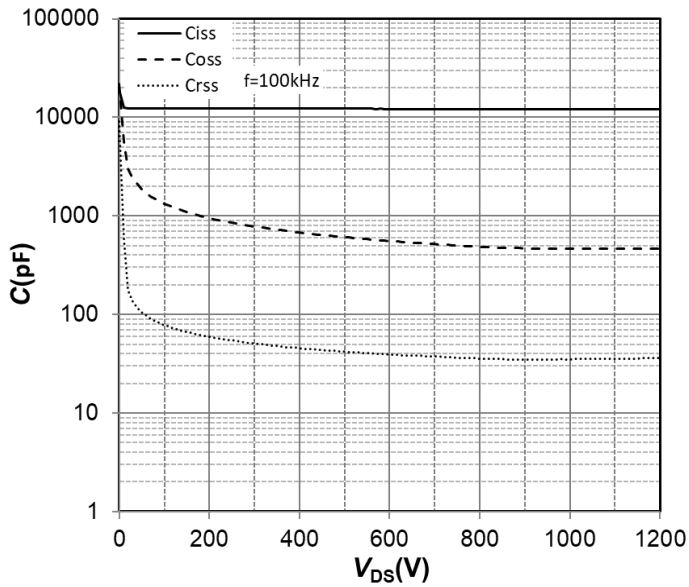


Figure 17. Capacitances vs. Drain-Source

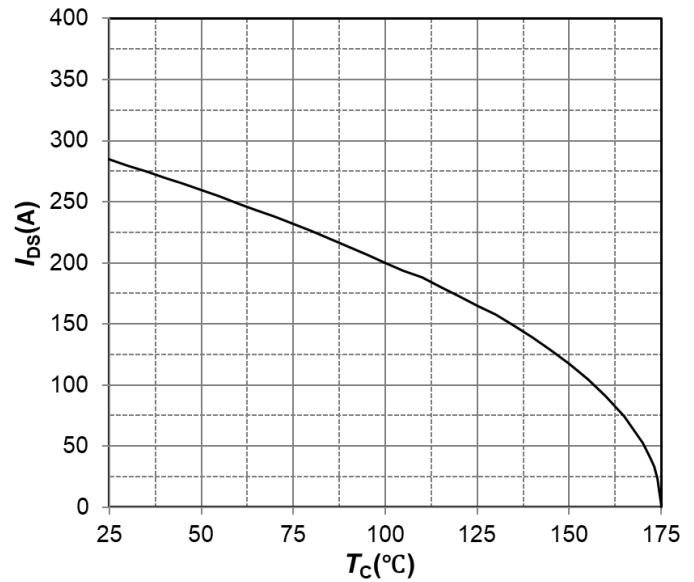


Figure 18. Continuous Drain Current Derating vs. Case Temperature

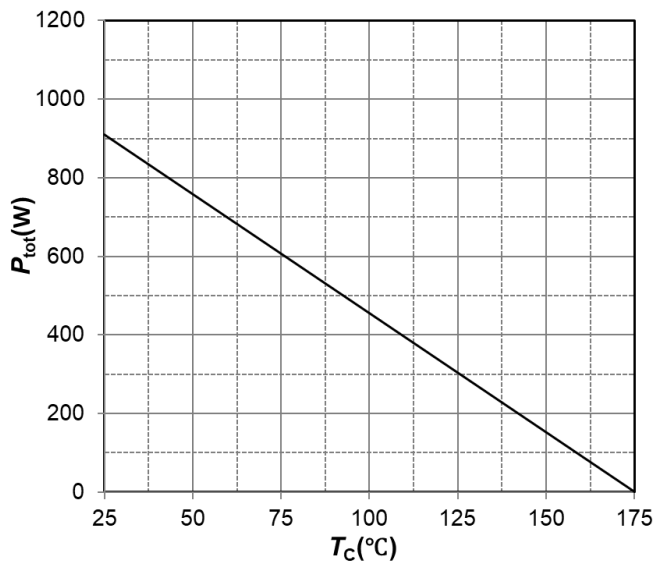


Figure 19. Maximum Power Dissipation Derating vs. Case Temperature

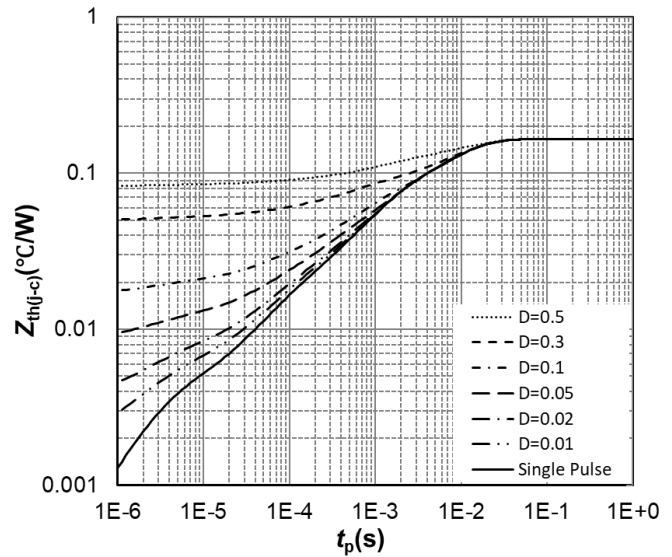


Figure 20. Transient Thermal Impedance

Typical Performance

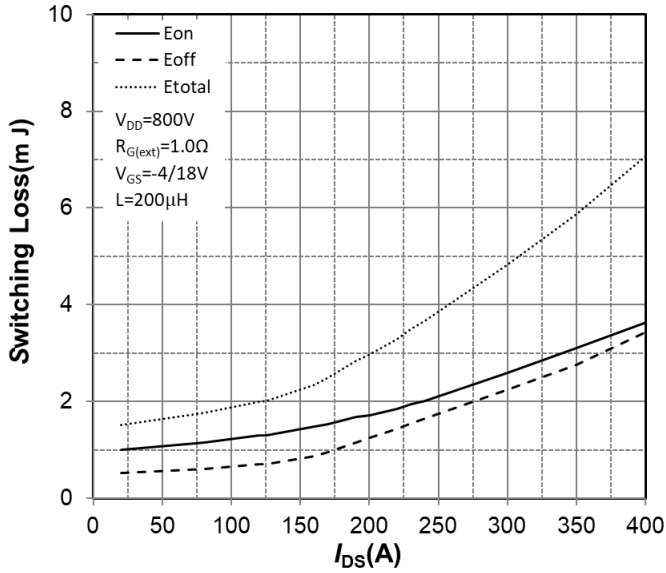


Figure 21. Clamped Inductive Switching Energy vs. Drain Current

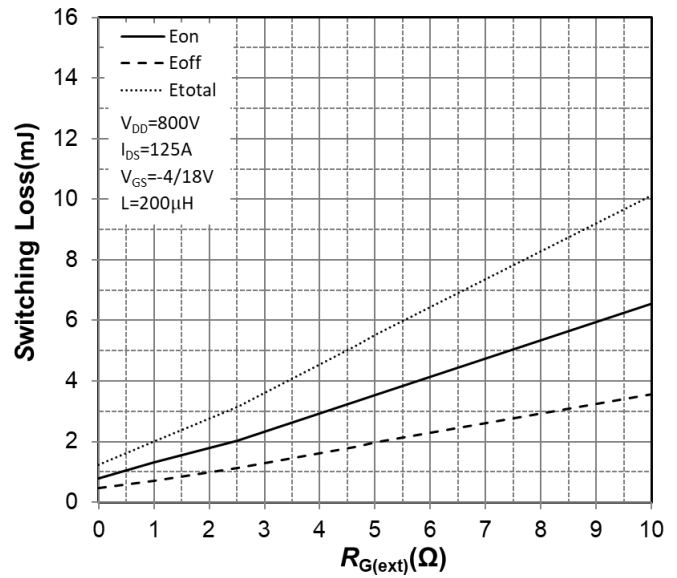


Figure 22. Clamped Inductive Switching Energy vs. R_G

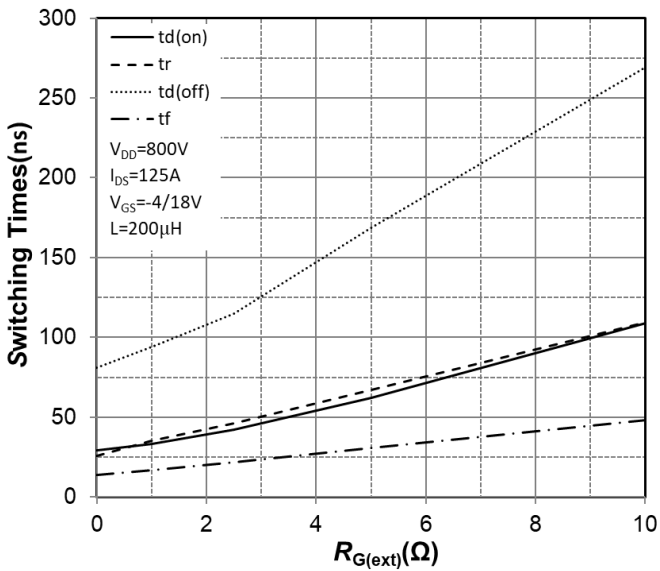


Figure 23. Switching Times vs. R_G

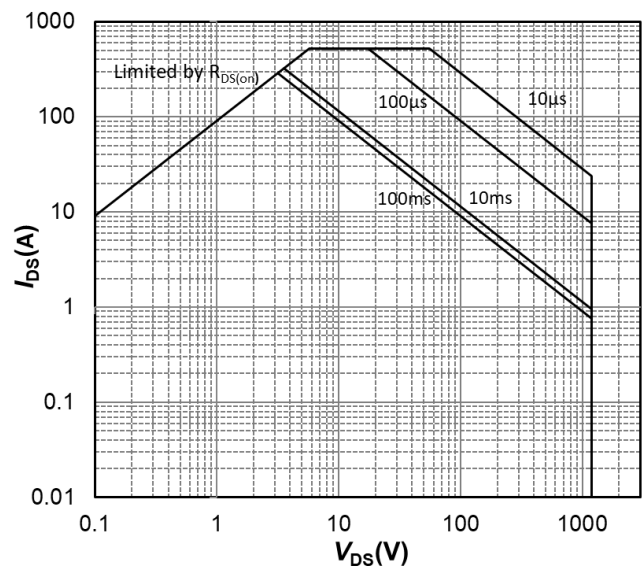
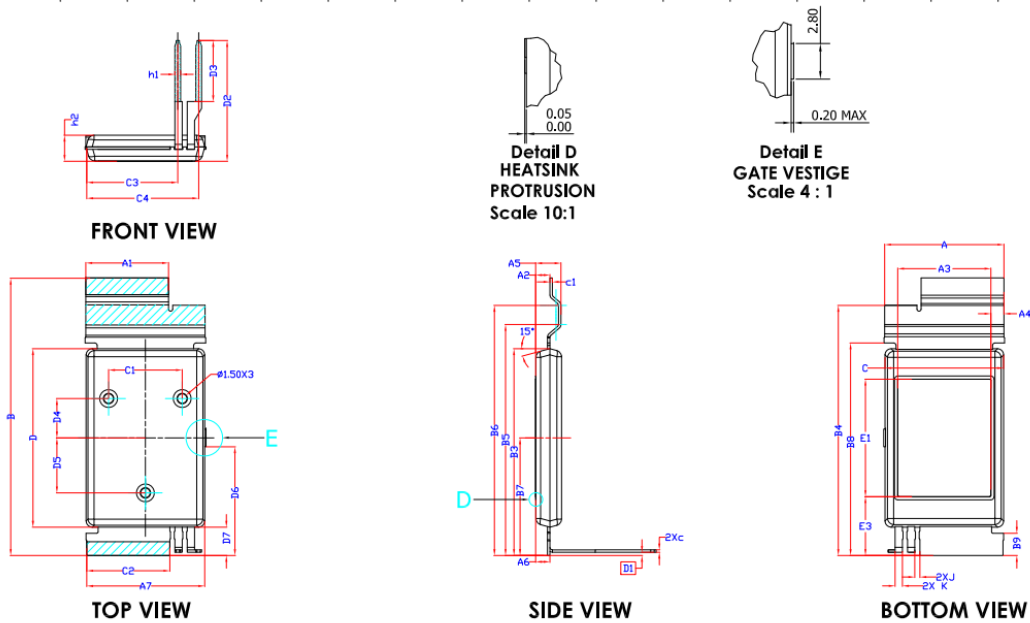


Figure 24. Safe Operating Area

Package Outlines



DIMENSION(IN mm)			
REF	MIN	TYP.	MAX
A	18.70	18.80	18.90
A1	12.95	13.05	13.15
A2	2.16	2.26	2.36
A3	14.60	14.70	14.80
A4	1.95	2.05	2.15
A5	3.90	4.00	4.10
A6	2.16	2.26	2.36
A7	18.50	18.60	18.70
B	43.60	43.70	43.80
B3	32.46	32.56	32.66
B4	39.30	39.40	39.50
B5	36.27	36.37	36.47
B6	39.27	39.37	39.47
B7	18.41	18.51	18.61
B8	33.36	33.46	33.56
B9	3.40	3.50	3.60
c	0.33	0.38	0.43
c1	0.28	0.38	0.48
C	18.60	18.70	18.80
C1	11.50	11.60	11.70
C2	13.00	13.10	13.20
C3	14.25	14.35	14.45
C4	17.55	17.65	17.75
D	28.00	28.10	28.20
D1	0.40	0.50	0.60
D2	18.90	19.00	19.10
D3	9.50	9.60	9.70
D4	6.10	6.20	6.30
D5	8.55	8.65	8.75
D6	17.01	17.11	17.21
D7	4.36	4.46	4.56
E1	18.40	18.50	18.60
E3	9.16	9.26	9.36
h1	0.85	0.90	0.95
h2	4.00	4.10	4.20
J	0.70	0.80	0.90
K	1.05	1.15	1.25

Revision History

Document Version	Date of Release	Description of Changes
Rev. A	2024-06-27	Release of the datasheet.

MacroCore Semiconductor Ltd.
Suzhou, China
All Rights Reserved.

Information

For further information on technology, delivery terms and conditions and prices, please contact the nearest MCS office.

Disclaimer

The information given in this document shall in no event be regarded as a guarantee of conditions or characteristics. With respect to any examples or hints given herein, any typical values stated herein and/or any information regarding the application of the device. Hereby disclaims any and all warranties and liabilities of any kind, including without limitation, warranties of non-infringement of intellectual property rights of any third party.