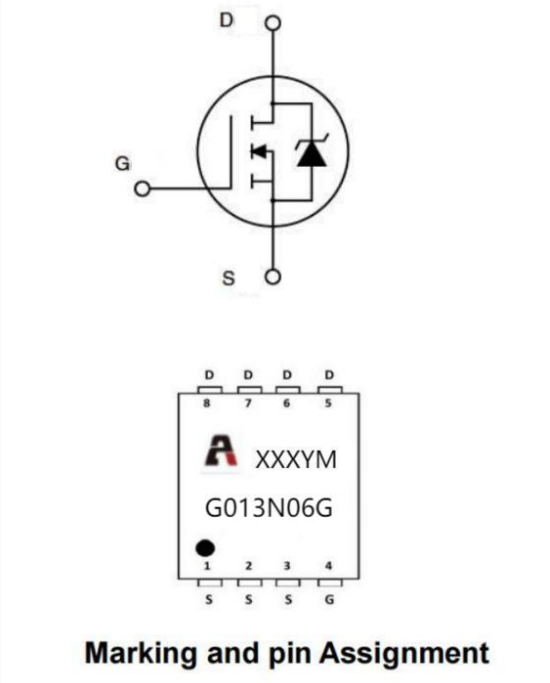
Features

- 60V,220A
  $R_{DS(ON)}$ <1.3mΩ @V_{GS}=10V TYP:1mΩ
  $R_{DS(ON)}$ <2.5mΩ @V_{GS}=4.5V TYP:1.5mΩ
- Split Gate Trench Technology
- Lead free product is acquired
- Excellent $R_{DS(ON)}$ and Low Gate Charge

Applications

- Battery Management System
- Motor Drivers
- DC-DC Converter



Marking and pin Assignment

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity (PCS)
G013N06G	APG013N06G	PDFN5X6	-	-	5000

ABSOLUTE MAXIMUM RATINGS (T_J=25℃ unless otherwise noted)

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DS}	60	V
Gate-Source Voltage	V_{GS}	±20	V
Continuous Drain Current (Tc=25℃)(1)	I_D	220	A
Continuous Drain Current (Tc=100℃)	I_D	140	A
Pulsed Drain Current (2,3)	I_{DM}	600	A
Drain Power Dissipation(1)	P_D	113	W
Single Pulsed Avalanche Energy（V_{DS}=30V,L=0.5mH）	E_{AS}	506	mJ
Thermal Resistance from Junction to Case(1)	$R_{\theta JC}$	1.1	℃/W
Thermal Resistance from Junction to Ambient(1)	$R_{\theta JA}$	45	℃/W
Junction Temperature	T_J	-55~ +150	℃
Storage Temperature	T_{STG}	-55~ +150	℃

MOSFET ELECTRICAL CHARACTERISTICS(T_J=25℃ unless otherwise noted)

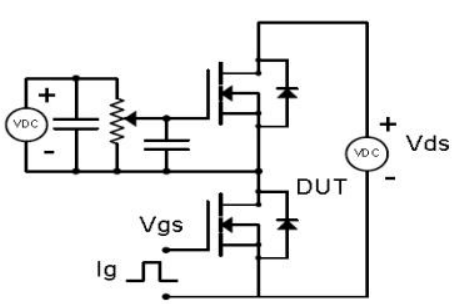
Parameter	Symbol	Test Condition	Min	Type	Max	Unit
Static Characteristics						
Drain-source breakdown voltage	$V_{(BR)DSS}$	V_{GS} = 0V, I_D =250μA	60	-	-	V
Zero gate voltage drain current	I_{DSS}	V_{DS} =60V, V_{GS} = 0V	-	-	1	μA
Gate-body leakage current	I_{GSS}	V_{GS} =±20V, V_{DS} = 0V	-	-	±100	nA
Gate threshold voltage	$V_{GS(th)}$	V_{DS} =V_{GS}, I_D =250μA	1	2	3	V
Drain-source on-resistance(4)	$R_{DS(on)}$	V_{GS} =10V, I_D =50A	-	1	1.3	mΩ
		V_{GS} =4.5V, I_D =50A	-	1.5	2.5	mΩ
Forward transconductance	R_g	V_{GS}= 0V, V_{DS}= 0V, f=1.0MHz	-	1.6	-	Ω
Dynamic characteristics(5)						
Input Capacitance	C_{iss}	V_{DS} =30V, VGS=0V, f=1MHz	-	8410	-	pF
Output Capacitance	C_{oss}		-	1850	-	
Reverse Transfer Capacitance	C_{rss}		-	220	-	
Switching characteristics(5)						
Turn-on delay time	$t_{d(on)}$	V_{DD}=30V, I_D=50A, R_G=6.5Ω, V_{GS}=10V	-	30	-	nS
Turn-on rise time	t_r		-	70	-	
Turn-off delay time	$t_{d(off)}$		-	211	-	
Turn-off fall time	t_f		-	170	-	
Total Gate Charge	Qg	V_{DS}=30V, I_D=50A, V_{GS}=10V	-	168	-	nC
Gate-Source Charge	Qgs		-	38	-	
Gate-Drain Charge	Qgd		-	70	-	
Source-Drain Diode characteristics						
Diode Forward voltage(4)	V_{SD}	T_J=25℃, V_{GS} =0V, I_S=50A	-	0.8	1.2	V
Diode Forward current	I_S	T_C=25℃	-	-	220	A
Body Diode Reverse Recovery Time	trr	T_J=25℃, I_F=50A,di/dt=100A/us	-	69	-	nS
Body Diode Reverse Recovery Charge	Qrr		-	150	-	nC

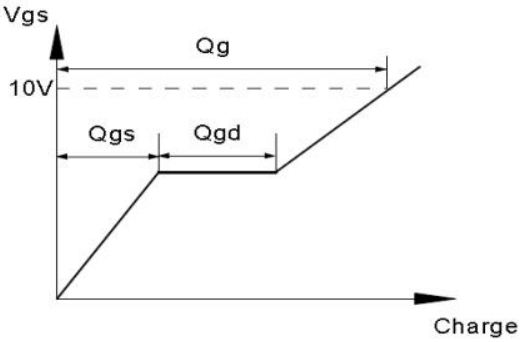
Notes:

1) Surface Mounted on 1 in² pad area, t ≤ 10 sec
2) Pulse width ≤ 10μs, duty cycle ≤ 1 %
3) Limited by bonding wire
4) Pulse width ≤ 300 μs, duty cycle ≤ 2%
5) Guaranteed by design, not subject to production testing

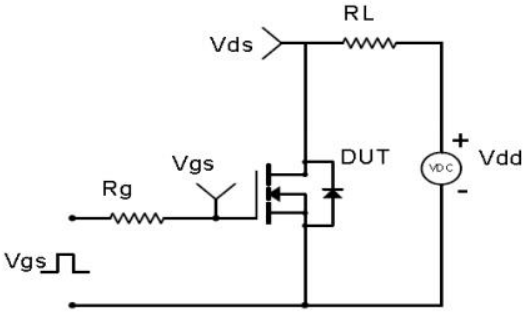
Test Circuit & Waveform

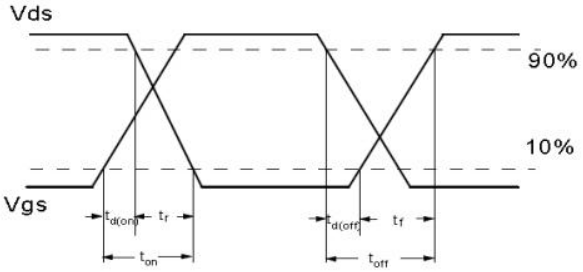
Gate Charge Test Circuit & Waveform



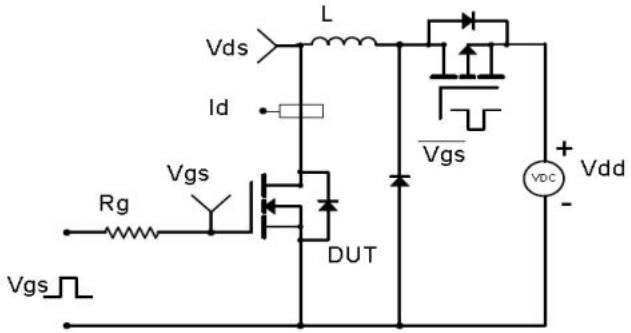


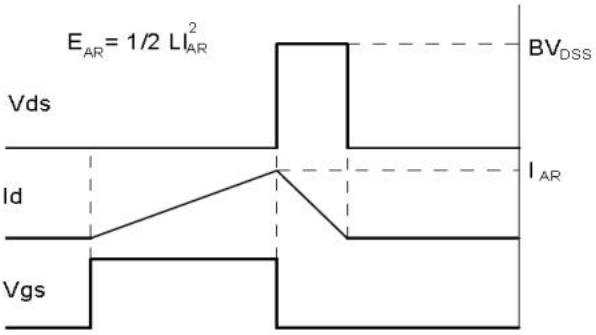
Resistive Switching Test Circuit & Waveforms



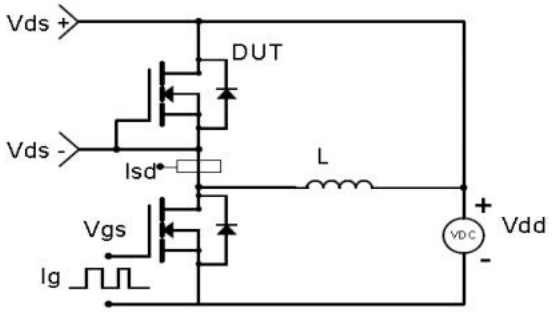


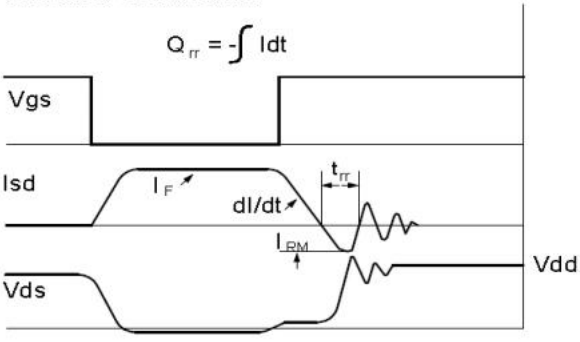
Unclamped Inductive Switching (UIS) Test Circuit & Waveforms





Diode Recovery Test Circuit & Waveforms





Typical Characteristics

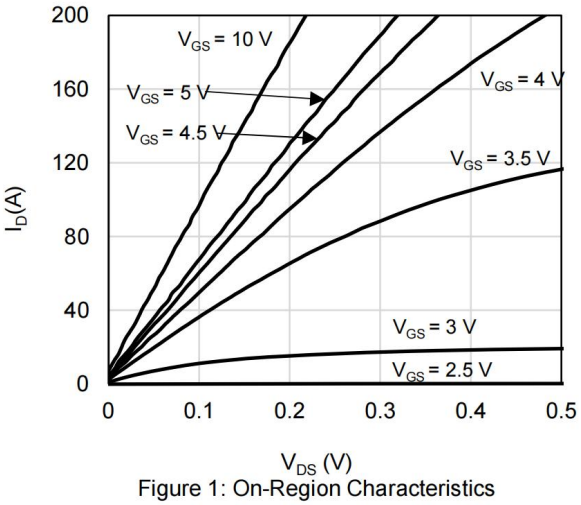


Figure 1: On-Region Characteristics

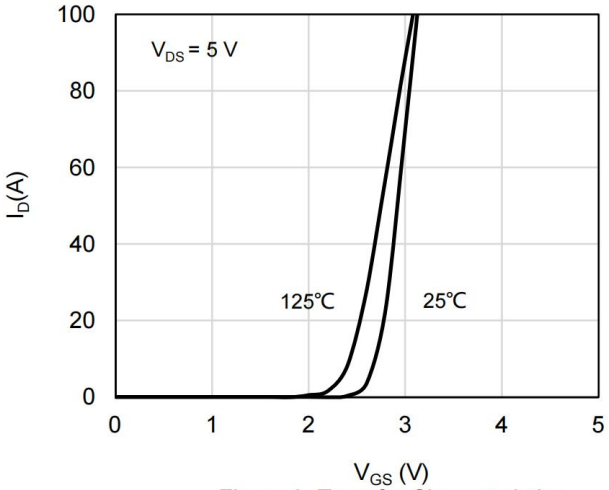


Figure 2: Transfer Characteristics

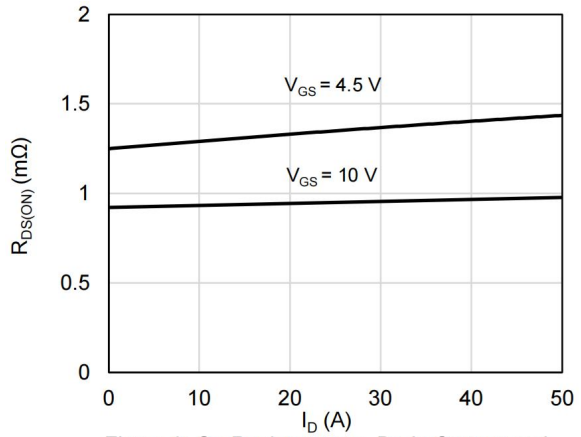


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

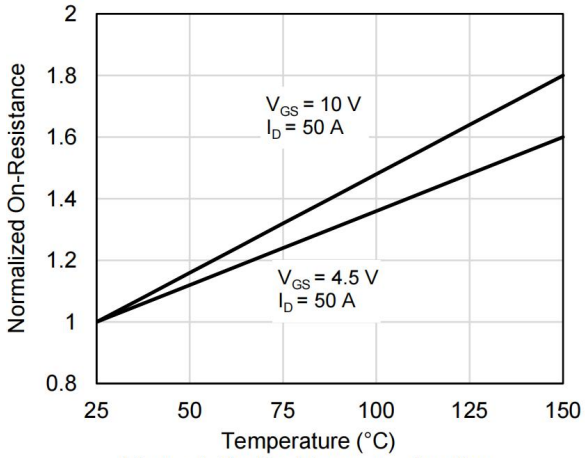


Figure 4: On-Resistance vs. Junction Temperature

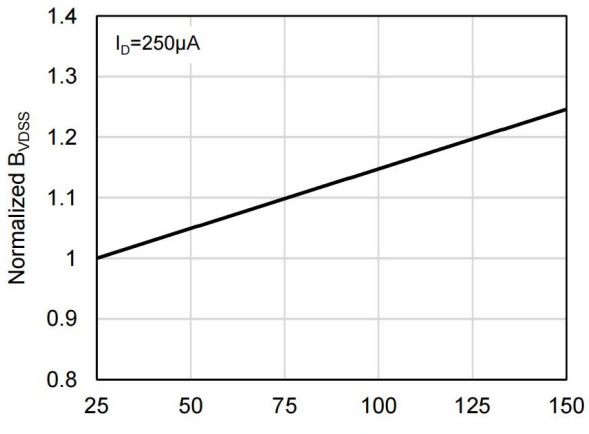


Figure 5: Breakdown Voltage vs. Junction Temperature

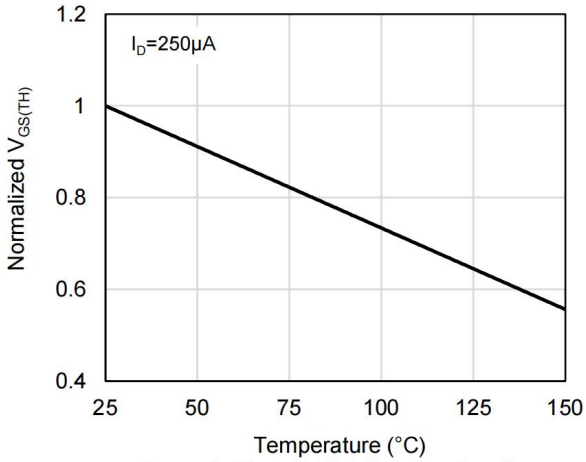


Figure 6: Threshold Voltage vs. Junction Temperature

Typical Characteristics

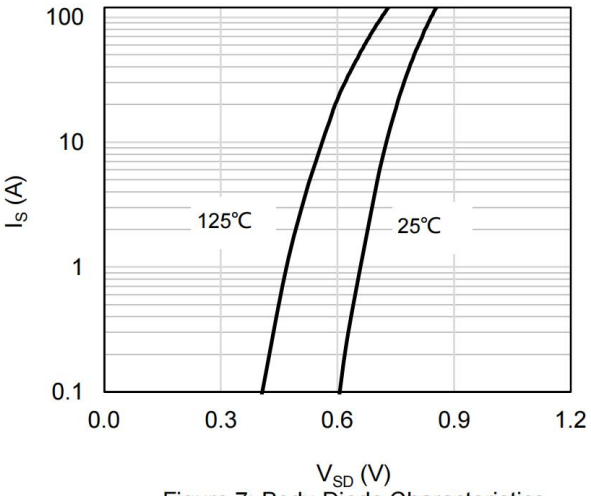


Figure 7: Body-Diode Characteristics

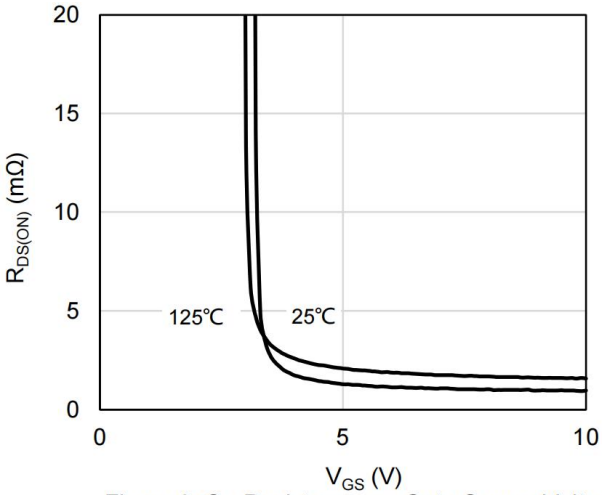


Figure 8: On-Resistance vs. Gate-Source Voltage

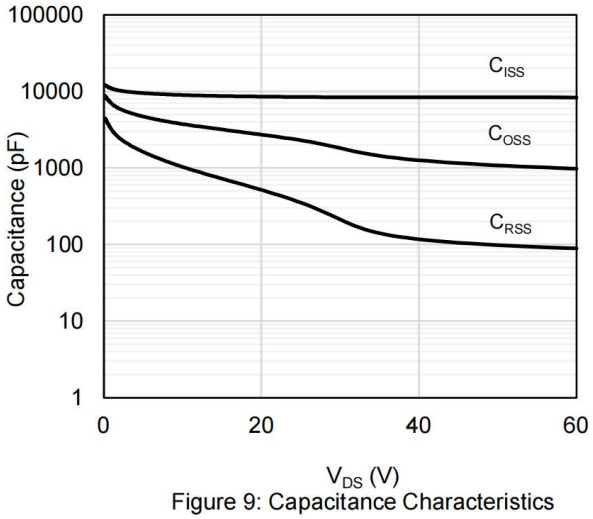


Figure 9: Capacitance Characteristics

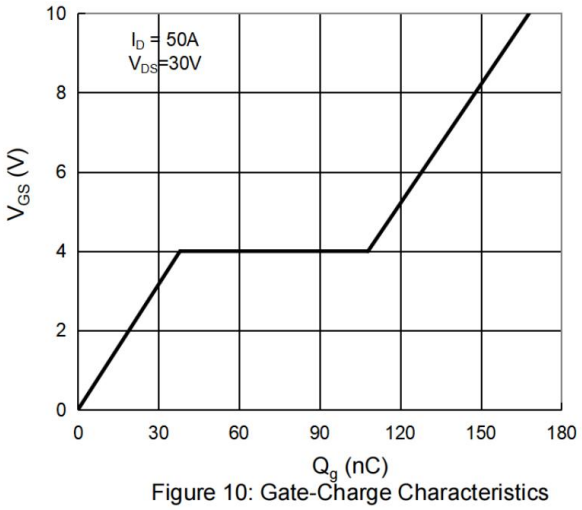


Figure 10: Gate-Charge Characteristics

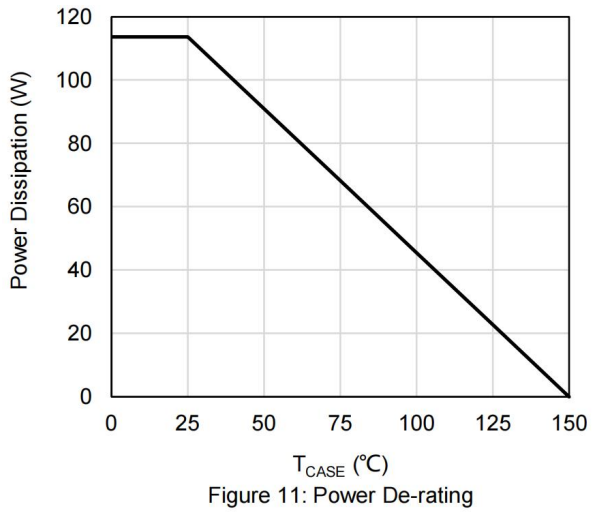


Figure 11: Power De-rating

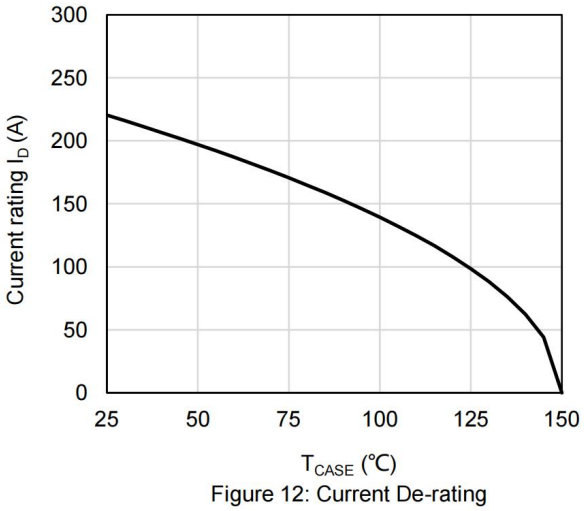


Figure 12: Current De-rating

Typical Characteristics

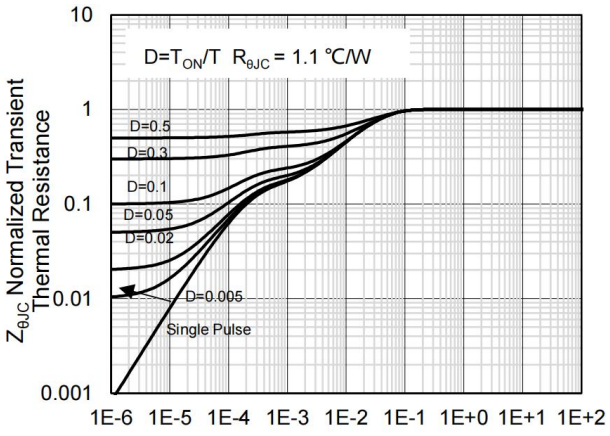


Figure 13: Normalized Maximum Transient Thermal Impedance

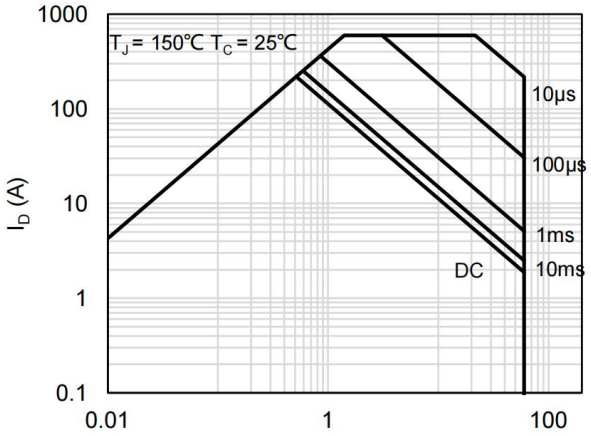
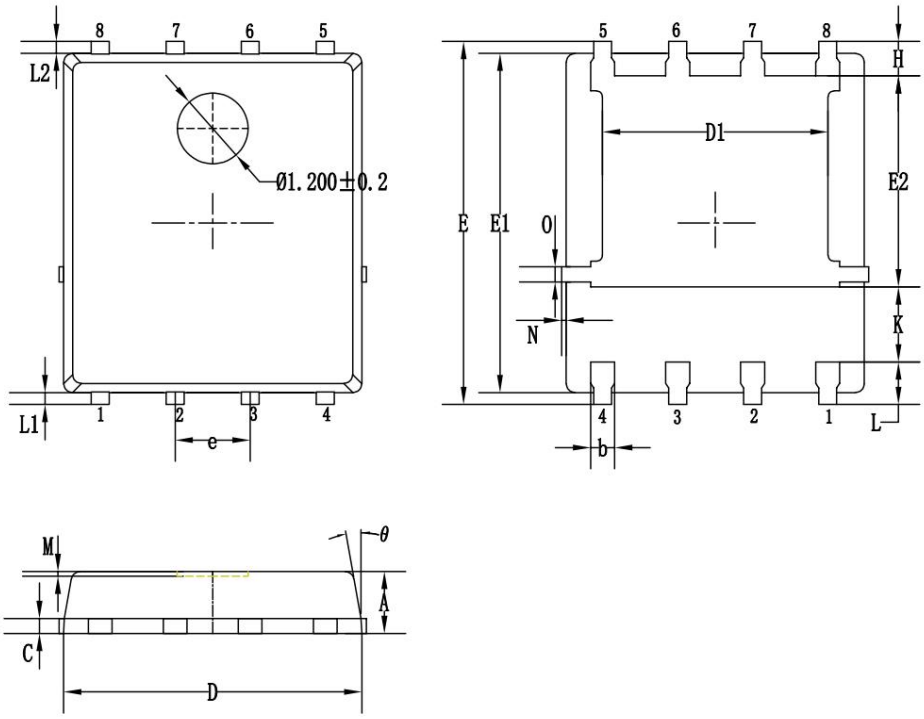


Figure 14: Maximum Forward Biased Safe Operating Area

PDFN5X6 Package Information



Symbols	Millimeters		
	MIN.	NOM.	MAX.
A	0.90	1.05	1.20
b	0.34	0.40	0.50
C	0.20	0.25	0.35
D	4.80	5.05	5.20
D1	3.72	3.82	3.92
E	5.95	6.15	6.30
E1	5.60	5.75	5.90
E2	3.47	3.57	3.67
e	1.27 BSC.		
H	0.48	0.58	0.68
K	1.17	1.27	1.37
L	0.64	0.74	0.84
L1/L2	0.20 REF.		
θ	8°	10°	12°
M	0.08 REF.		
N	0	-	0.15
O	0.25 REF.		

Revision History

Revision	Release	Remark
V1.0	2024/04/10	Initial Release

Disclaimer

The information given in this document describes the independent performance of the product,but similar performance is not guaranteed under other working conditions,and cannot be guaranteed when installed with other products or equipment.To achieve the required performance of the product in actual scenarios,the customer should conduct a complete application test to assess the functionality of the product.

Allpower assumes no responsibility for equipment failures result from using products at values that exceed the ratings,operating conditions,or other parameters listed in the product specifications.

The product described in this specification is not applicable for aerospace or other applications which
requires high reliability.Customers using or selling these products for use in medical,life-saving,or life-sustaining applications do so at their own risk and agree to fully indemnify.

Due to product or technical improvements,the information described or contained herein may be changed without prior notice.