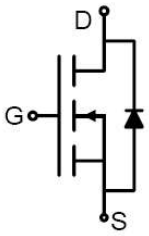
APG068N04Q

N-Channel Enhancement Mosfet

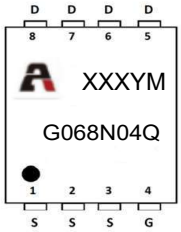
DATA SHEET

Feature

- 40V,54A
  $R_{DS(ON)}$ <6.8mΩ @V_{GS}=10V (TYP:5.7mΩ)
  $R_{DS(ON)}$ <11mΩ @V_{GS}=4.5V (TYP:8.5mΩ)
- Split Gate Trench Technology
- Lead free product is acquired
- Excellent $R_{DS(ON)}$ and Low Gate Charge



Schematic Diagram



Marking and pin assignment

Application

- PWM applications
- Load Switch
- Power management

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity (PCS)
G068N04Q	APG068N04Q	PDFN3X3	13 inch	-	5000

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

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DS}	40	V
Gate-Source Voltage	V_{GS}	±20	V
Continuous Drain Current (T_c =25℃)	I_D	54	A
Continuous Drain Current (T_c =100℃)	I_D	34	A
Pulsed Drain Current (1)	I_{DM}	216	A
Single Pulsed Avalanche Energy (2)	E_{AS}	56	mJ
Power Dissipation	P_D	36	W
Thermal Resistance from Junction to Case	$R_{\theta JC}$	3.4	℃/W
Thermal Resistance from Junction to Ambient	$R_{\theta JA}$	65	℃/W
Junction Temperature	T_J	150	℃
Storage Temperature	T_{STG}	-55~ +150	℃

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

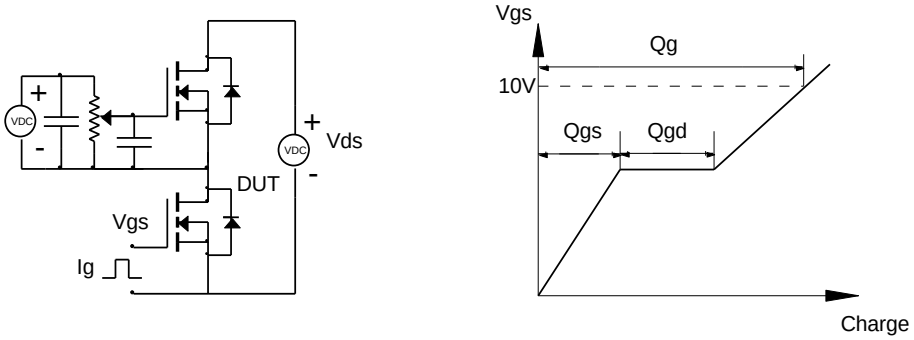
Parameter	Symbol	Test Condition	Min	Type	Max	Unit
Static Characteristics						
Drain-source breakdown voltage	$V_{(BR)DSS}$	V_{GS} = 0V, I_D =250μA	40	-	-	V
Zero gate voltage drain current	I_{DSS}	V_{DS} =40V, V_{GS} = 0V	-	-	1	μA
Gate-body leakage current	I_{GSS}	V_{GS} =±20V, V_{DS} = 0V	-	-	±100	nA
Gate threshold voltage	$V_{GS(th)}$	V_{DS} =V_{GS}, I_D =250μA	1.0	1.6	2.0	V
Drain-source on-resistance	$R_{DS(on)}$	V_{GS} =10V, I_D =20A	-	5.7	6.8	mΩ
		V_{GS} =4.5V, I_D =15A	-	8.5	11	
Gate Resistance	R_g	V_{DS} =V_{GS} =0V, f =1MHz	-	3.6	-	Ω
Dynamic characteristics						
Input Capacitance	C_{iss}	V_{DS} =20V, V_{GS} =0V, f =1MHz	-	840	-	pF
Output Capacitance	C_{oss}		-	254	-	
Reverse Transfer Capacitance	C_{rss}		-	5	-	
Switching characteristics						
Turn-on delay time	$t_{d(on)}$	V_{DD}=20V, I_D=20A, V_{GS}=10V, R_G=10Ω	-	4	-	ns
Turn-on rise time	t_r		-	11	-	
Turn-off delay time	$t_{d(off)}$		-	25	-	
Turn-off fall time	t_f		-	23	-	
Total Gate Charge	Qg	VDS=20V, ID=20A, VGS=4.5V	-	13.1	-	nC
Gate-Source Charge	Qgs		-	2.2	-	
Gate-Drain Charge	Qgd		-	2.6	-	
Reverse Recovery Chrage	Qrr	I_F=20A,di/dt=100A/us		5.8		nC
Reverse Recovery Time	Trr	I_F=20A,di/dt=100A/us		18		ns
Source-Drain Diode characteristics						
Diode Forward voltage	V_{DS}	V_{GS} =0V, I_S=20A	-	-	1.2	V
Diode Forward current	I_S		-	-	54	A

Notes:

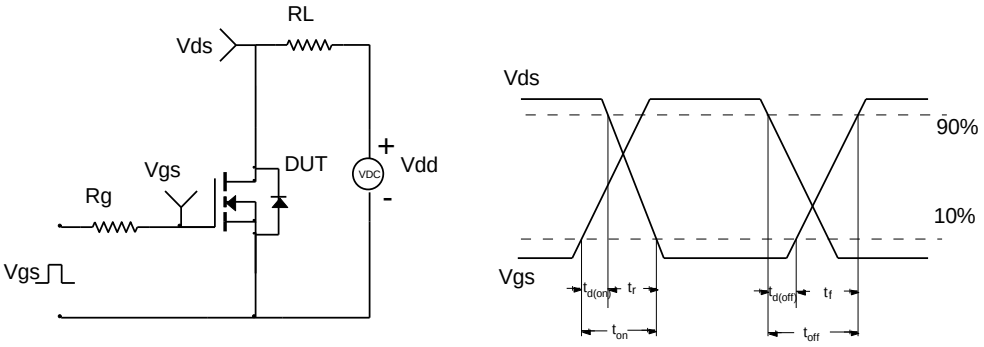
1. Repetitive Rating: pulse width limited by maximum junction temperature
2. EAS Condition:T_J=25℃,V_{DD}=20V,R_G=25Ω,L=0.5mH，I_{AS}=15A

Test Circuit

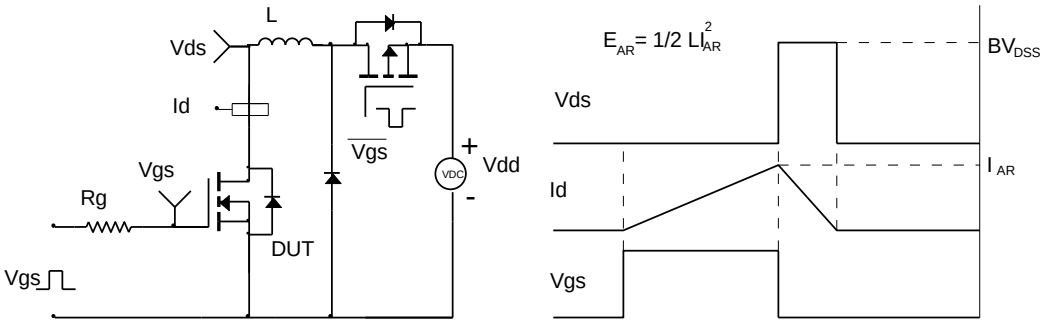
Gate Charge Test Circuit & Waveform



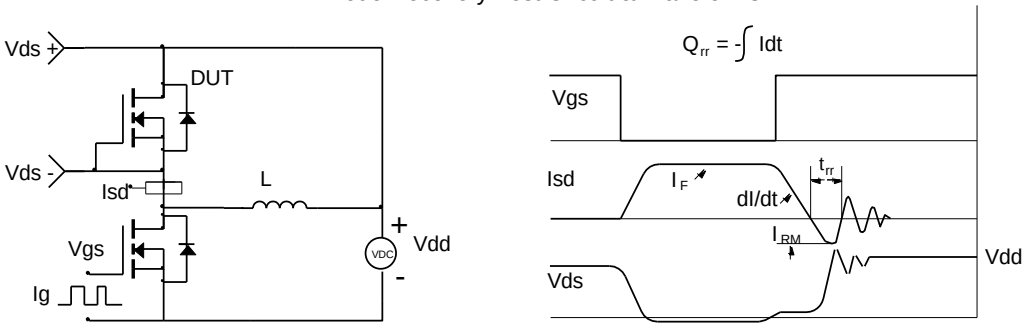
Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms



Electrical Characteristics Diagrams

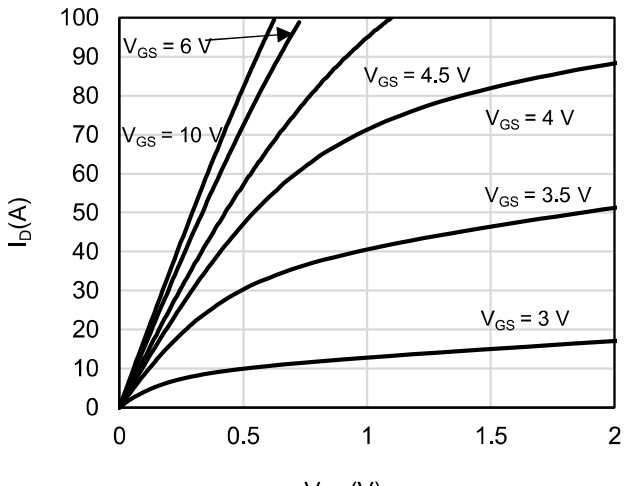


Figure 1: On-Region Characteristics

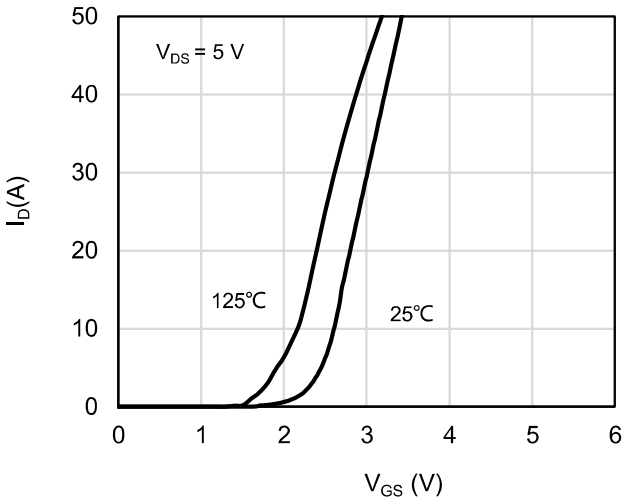


Figure 2: Transfer Characteristics

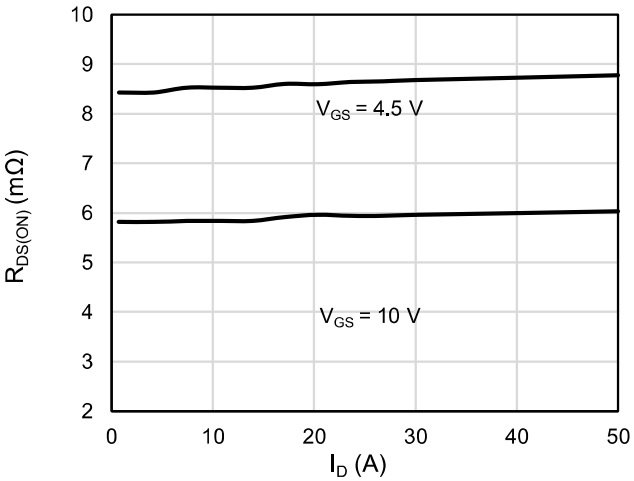


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

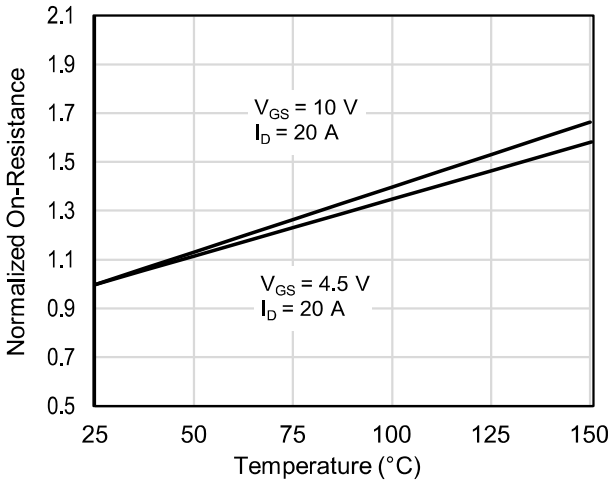


Figure 4: On-Resistance vs. Junction Temperature

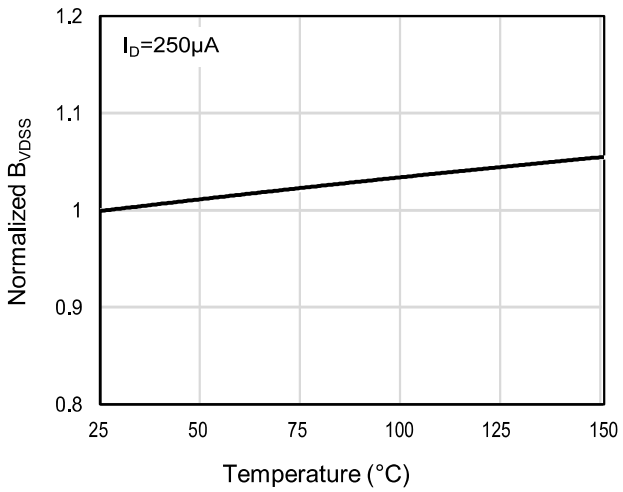


Figure 5: Breakdown Voltage vs. Junction Temperature

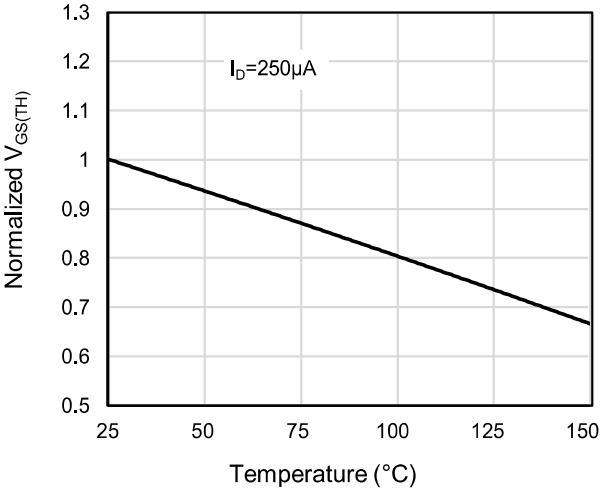


Figure 6: Threshold Voltage vs. Junction Temperature

Electrical Characteristics Diagrams

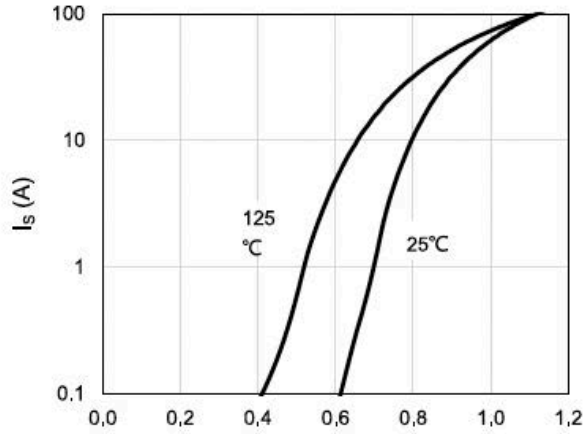


Figure 7: Body-Diode Characteristics

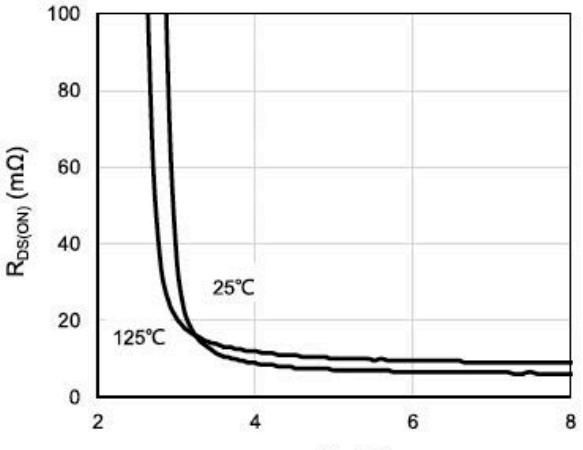


Figure 8: On-Resistance vs. Gate-Source Voltage

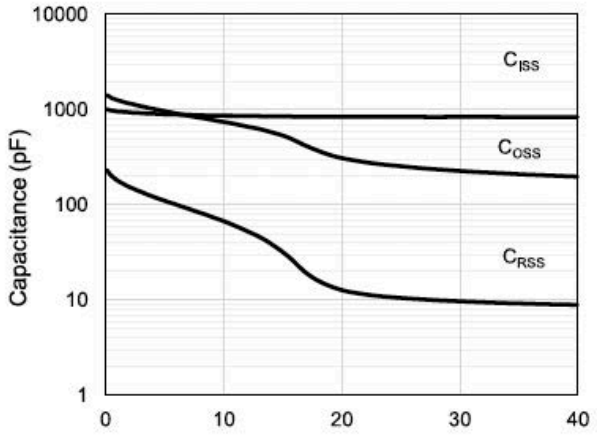


Figure 9: Capacitance Characteristics

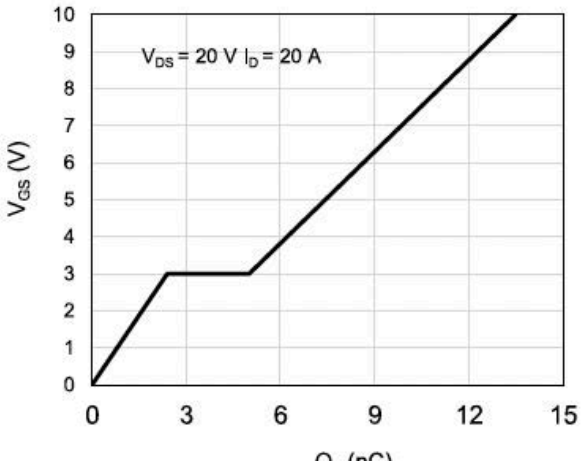


Figure 10: Gate-Charge Characteristics

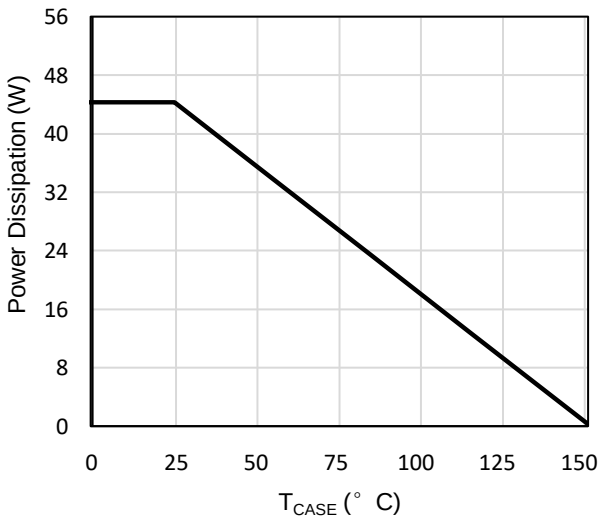


Figure 11: Power De-rating

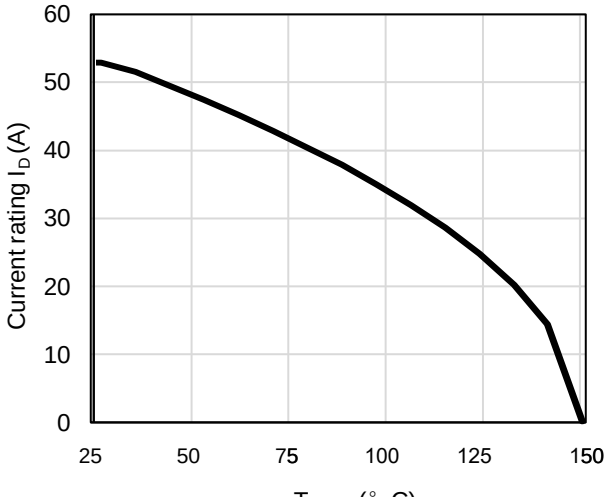


Figure 12: Current De-rating

Electrical Characteristics Diagrams

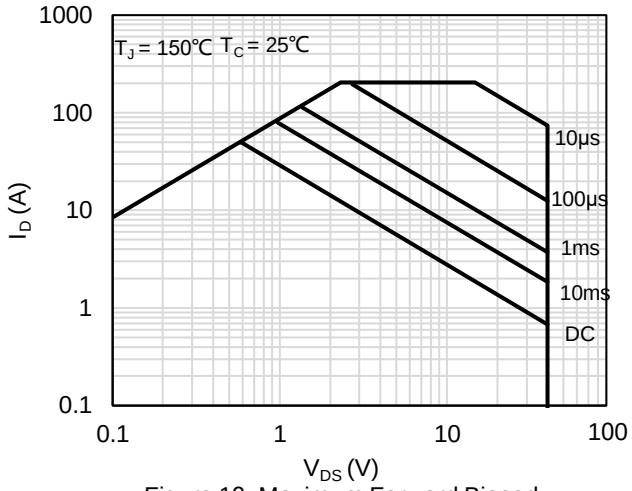


Figure 13: Maximum Forward Biased Safe Operating Area

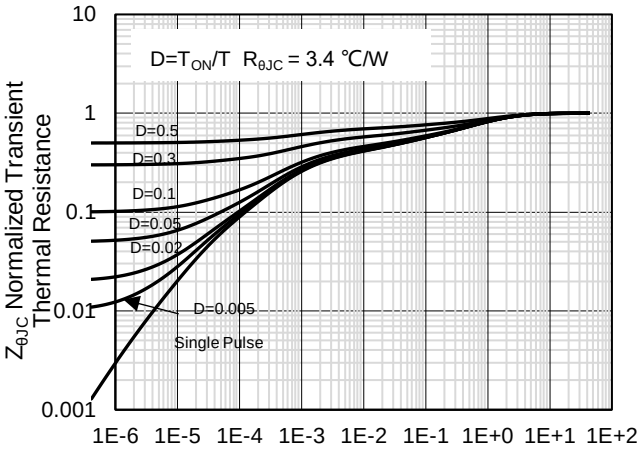
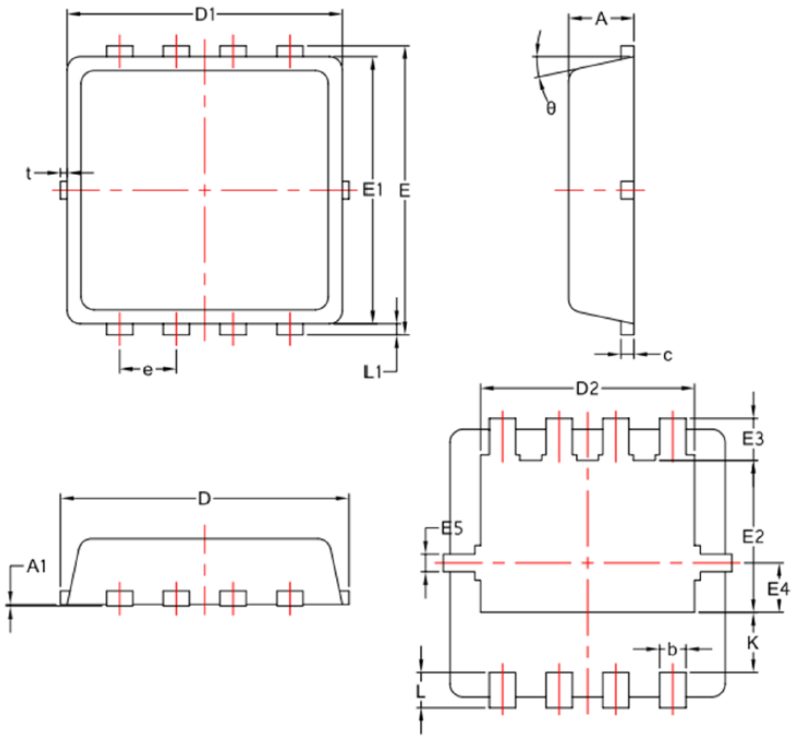


Figure 14: Normalized Maximum Transient Thermal Impedance

PDFN3X3 Package Information



SYMBOL	COMMON		
	MM		
	MIN	NOM	MAX
A	0.70	0.75	0.85
A1	/	/	0.05
b	0.20	0.30	0.40
c	0.10	0.152	0.25
D	3.15	3.30	3.45
D1	3.00	3.15	3.25
D2	2.29	2.45	2.65
E	3.15	3.30	3.45
E1	2.90	3.05	3.20
E2	1.54	1.74	1.94
E3	0.28	0.48	0.65
E4	0.37	0.57	0.77
E5	0.10	0.20	0.30
e	0.60	0.65	0.70
K	0.59	0.69	0.89
L	0.30	0.40	0.50
L1	0.06	0.125	0.20
t	0	0.075	0.13
θ	10°	12°	14°

Revision History

Revision	Release	Remark
V1.0	2023/12/01	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.

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