VFTV004R012NA

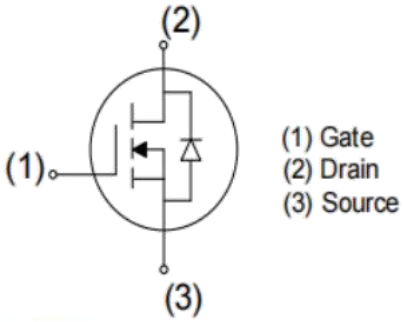
Datasheet

Description

- 40V N-channel SGT MOSFET
- It has been designed to very low on-state resistance and superior UIS performance

$V_{(BR)DSS}$	$R_{DS(ON)\_max}$	I_D
40V	1.2mΩ@10V	160A

Symbol

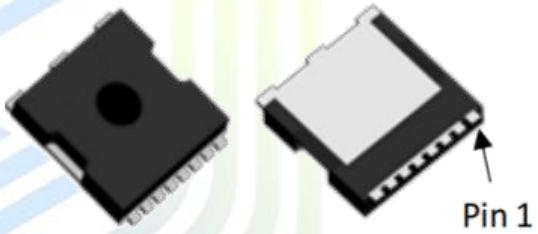


Symbol of VFTV004R012NA

Features

- Ultra low $R_{DS(ON)}$
- RoHS compliant Note 1
- Halogen-free Note 1
- 100% UIS tested

Package Type



Package type of VFTV004R012NA

Application

- Battery management system
- Motor drivers
- DC-DC converter

Ordering Information

Product Name	Package
VFTV004R012NA	TOLL

Absolute Maximum Ratings (T_J= 25 ºC, unless otherwise specified)

Parameter	Symbol	Value	Units
Drain-Source Voltage	V_{DS}	40	V
Drain Current - Continuous (T_C= 25°C) Note1	I_D	380	A
Drain Current - Continuous (T_C= 25°C) Note2		160	A
Drain Current - Continuous (T_C= 100°C)		160	A
Drain Current - Pulsed Note 3	I_{DM}	530	A
Gate-Source Voltage	V_{GS}	± 20	V
Single Pulsed Avalanche Energy Note 4	E_{AS}	841	mJ
Power Dissipation (TC = 25°C)	P_D	278	W
Operating and Storage Temperature Range	T_J,T_{STG}	-55 to +150	°C

Thermal Resistance

Parameter	Symbol	Value	Units
Thermal Resistance, Junction-to-Case, Steady-State	$R_{\theta JC}$	0.45	°C/W
Thermal Resistance, Junction-to-Ambient, Steady State Note 4	$R_{\theta JA}$	35	°C/W

Notes:

1. The max drain current rating is silicon limited
2. The max drain current rating is package limited
3. Repetitive Rating: Pulse width limited by maximum junction temperature
4. L = 0.5 mH, VDD = 40 V, IAS = 58 A, RG = 25 Ω, Starting TJ = 25 °C
5. Mount on minimum PCB layout

Electrical Characteristics(T_J= 25 ºC, unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
StaticCharacteristics						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	V_{GS} = 0 V, I_D = 250 uA	40	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 40 V, V_{GS}=0V	-	-	1	uA
Gate Leakage Current	I_{GSS}	V_{GS} = ± 20 V, V_{DS} = 0 V	-	-	±100	nA
Gate Threshold voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250 uA	2	3	4	V
Drain-Source on-state resistance	$R_{DS(ON)}$	V_{GS} = 10 V, I_D = 50 A	-	1	1.2	mΩ
Dynamic Characteristics						
Input Capacitance	C_{iss}	V_{DS} = 25 V, V_{GS} = 0 V f = 1 MHz	-	7020	-	pF
Output Capacitance	C_{oss}		-	2000	-	pF
Reverse Transfer Capacitance	C_{rss}		-	10	-	pF
Gate Resistance	R_g	f = 1 MHz	-	6.5	-	Ω
Switching Characteristics						
Turn On Delay Time	$T_{D(on)}$	V_{DD}= 20V , R_L=0.4Ω V_{GS} = 10V, R_G = 4Ω	-	28	-	ns
Rise Time	Tr		-	96	-	ns
Turn Off Delay Time	$T_{D(off)}$		-	73	-	ns
Fall Time	T_f		-	116	-	ns
Total Gate Charge	Q_g	V_{DD} = 20 V , I_D = 50 A V_{GS} = 10 V	-	80	-	nC
Gate-Source Charge	Q_{gs}		-	36	-	nC
Gate-Drain Charge	Q_{gd}		-	8	-	nC
Drain-Source Diode Characteristics and Maximum Ratings						
Maximum Continuous Body-Diode Forward Current	I_S		-	160	-	A
Maximum Pulsed Body-Diode Forward Current Note 1	I_{SM}		-	530	-	A
Diode Forward Voltage	V_{SD}	V_{GS} = 0 V,I_S= 40A	-	0.8	1.2	V
Reverse recovery time	T_{rr}	V_{DD}=20V,I_D=40A di/dt=100A/us	-	98	-	ns
Reverse recovery charge	Q_{rr}		-	229	-	nC
Peak Reverse Recovery Current	I_{rrm}		-	4	-	A

Electrical Characteristics Diagrams

Figure 1: On-Region Characteristics

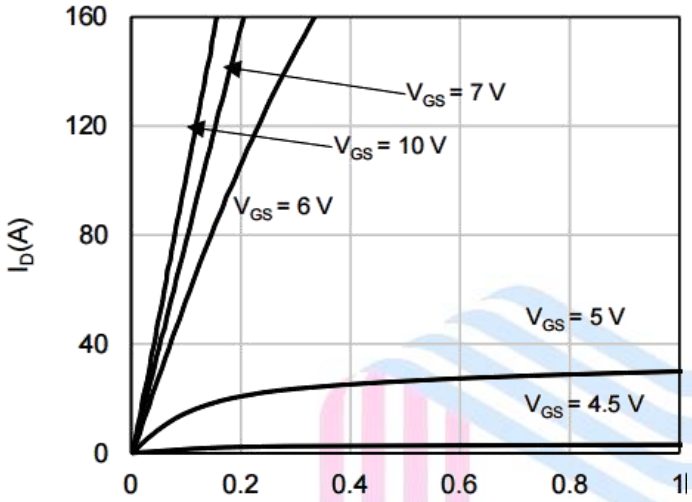


Figure 2: Transfer Characteristics

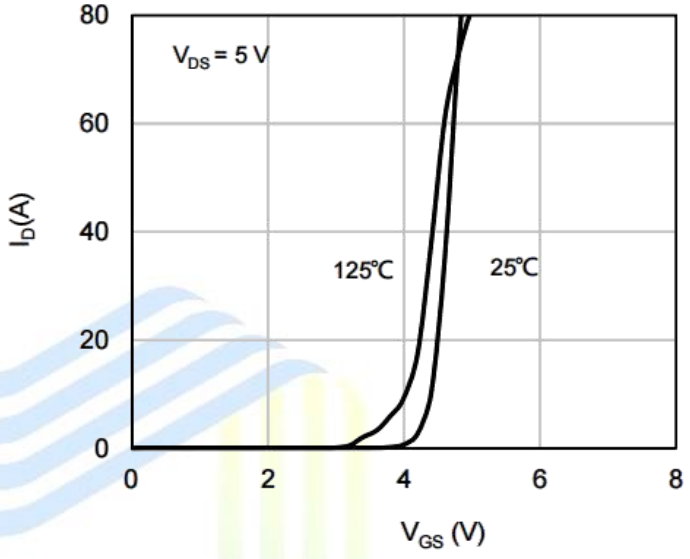


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

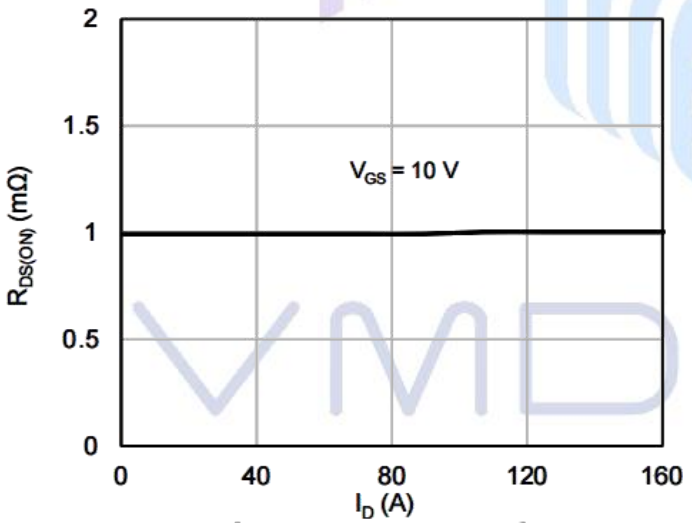


Figure 4:On-Resistance vs. Junction Temperature

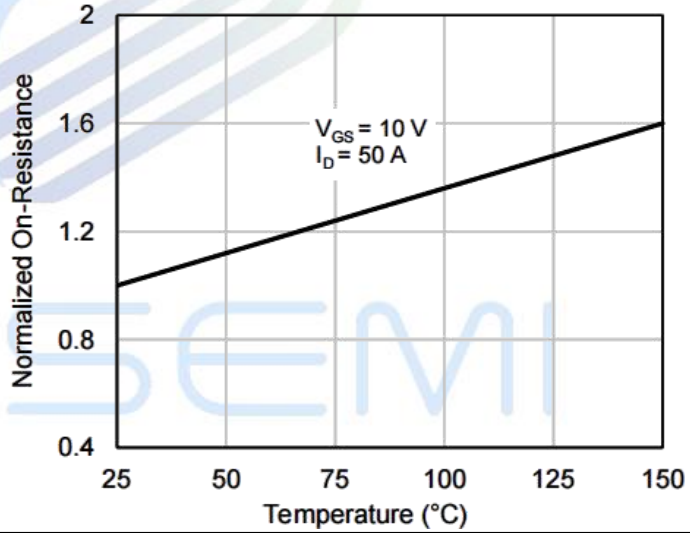


Figure 5: Breakdown Voltage vs. Junction Temperature

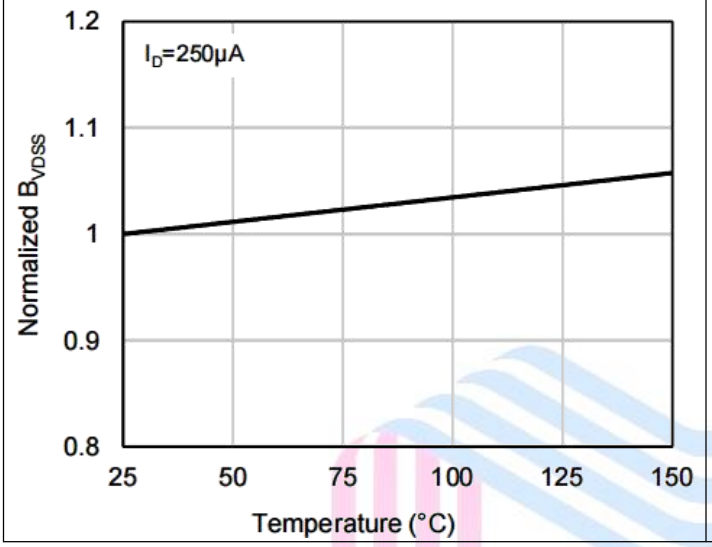


Figure 6: Threshold Voltage vs. Junction Temperature

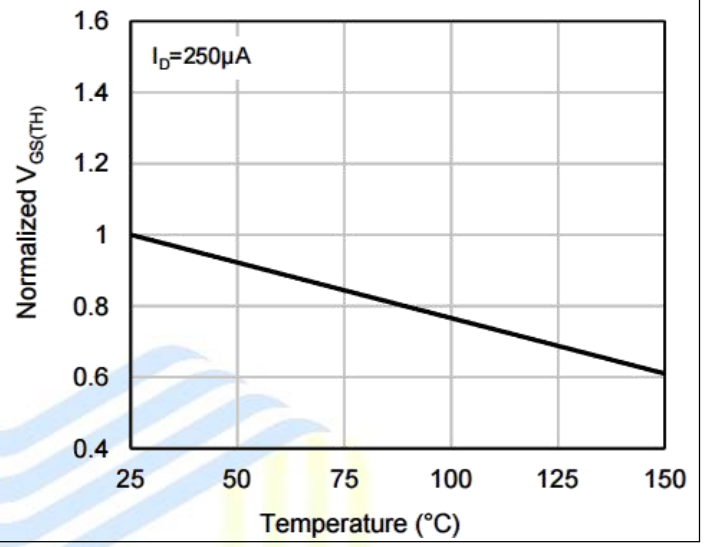


Figure 7: Body-Diode Characteristics

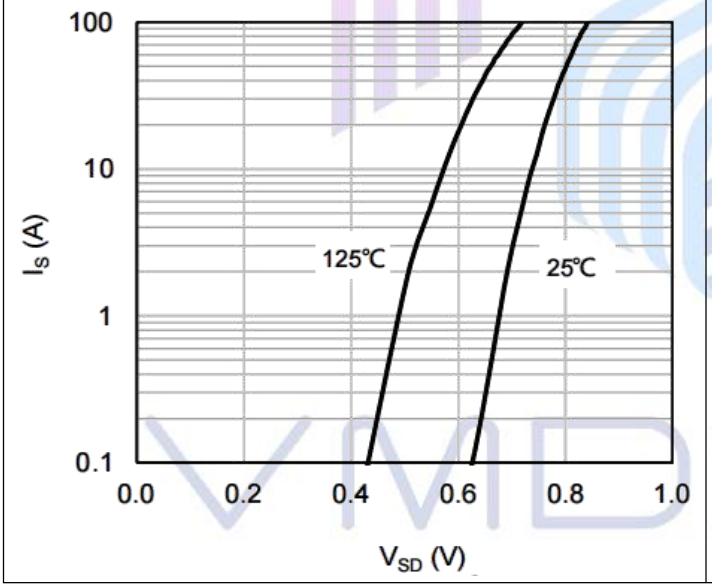


Figure 8: On-Resistance vs. Gate-Source Voltage

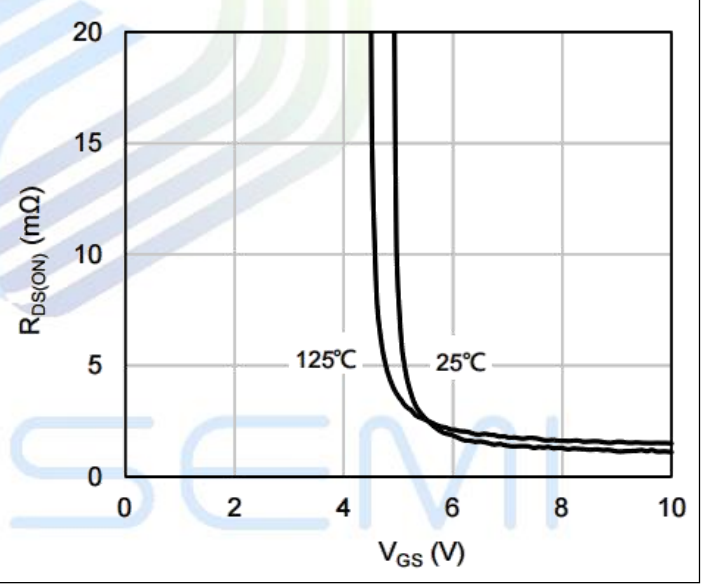


Figure 9: Capacitance Characteristics

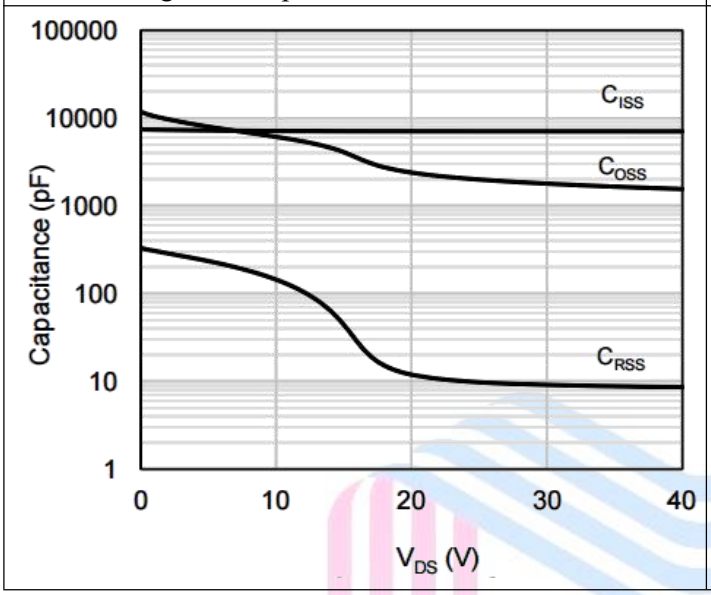


Figure 10: Gate-Charge Characteristics

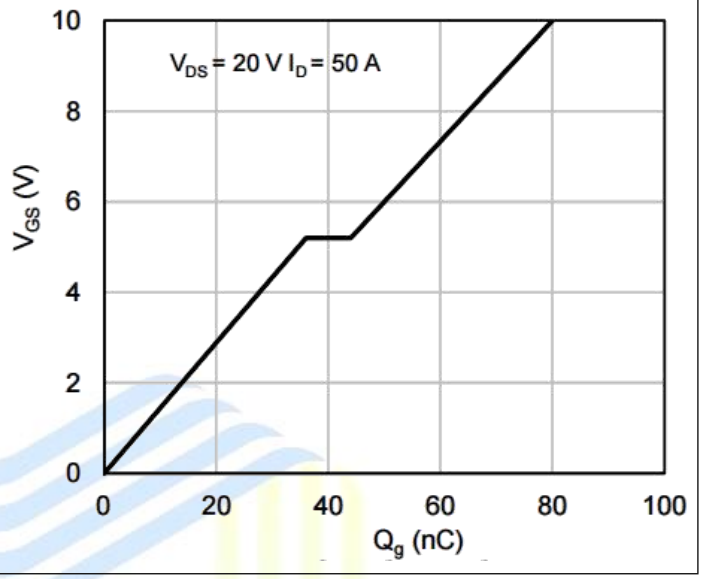


Figure 11: Power De-rating

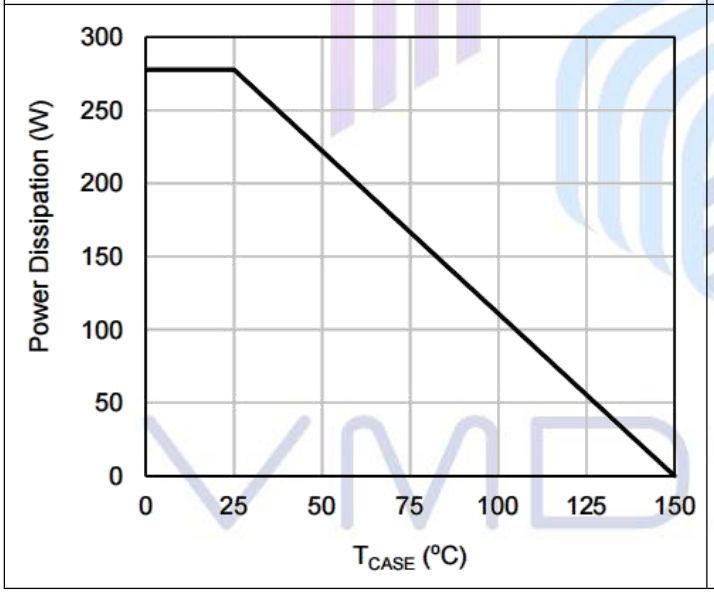


Figure 12: Current De-rating

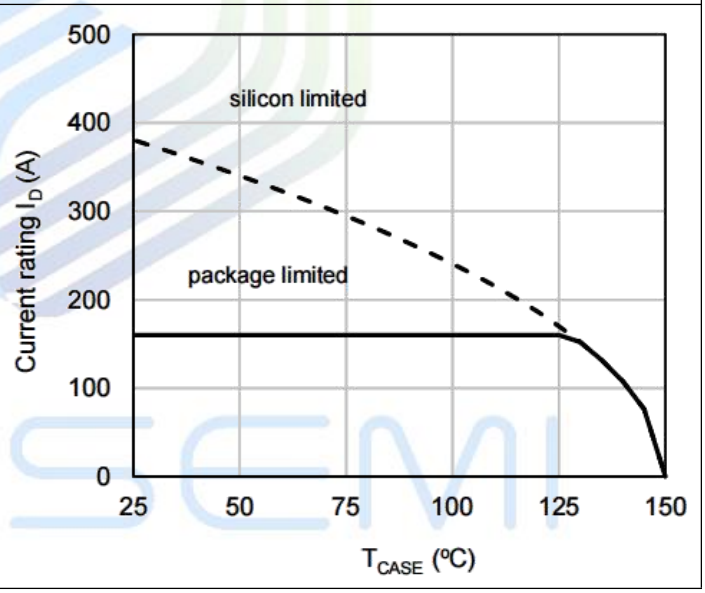


Figure 13: Normalized Maximum Transient Thermal Impedance

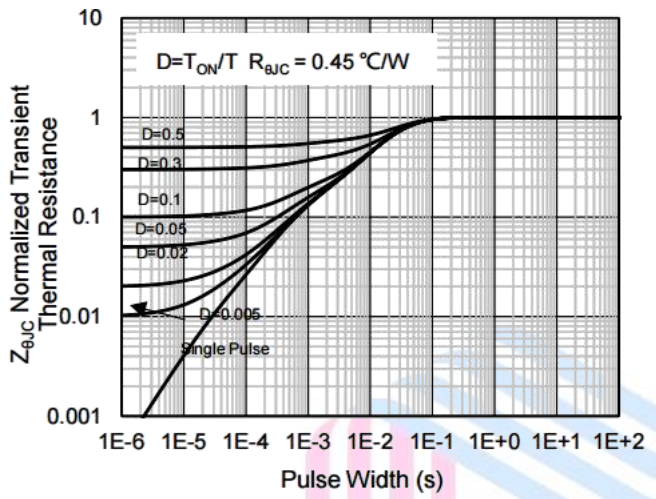
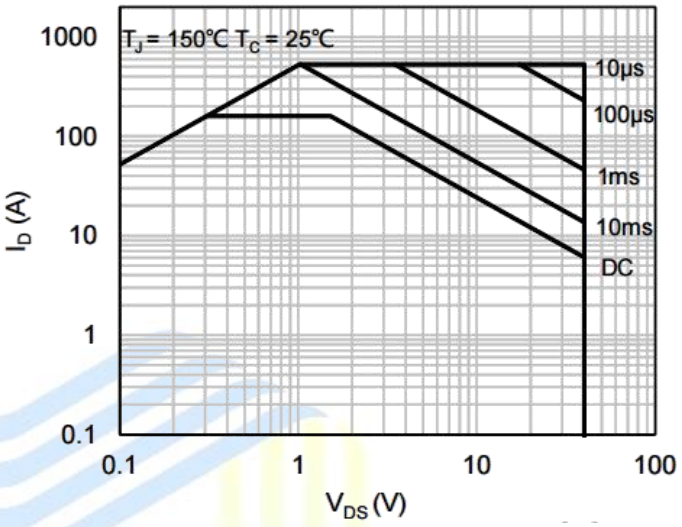
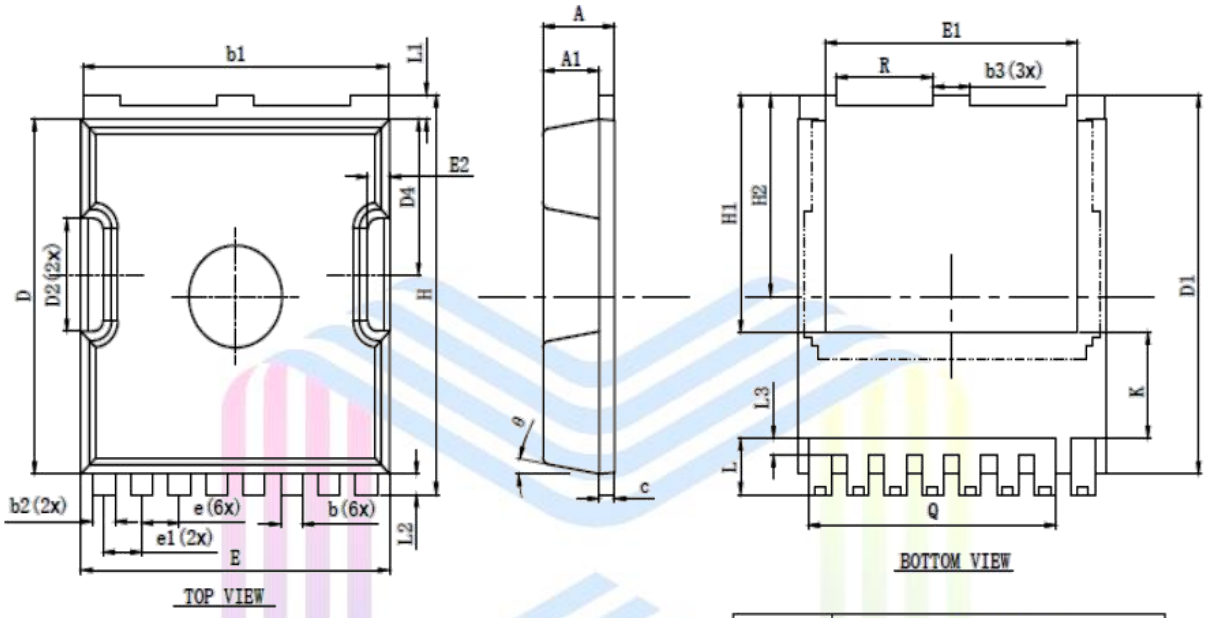


Figure 14: Maximum Forward Biased Safe Operating Area



Mechanical Dimensions

TOLL Package Information



SYMBOL	MILLIMETER		
	MIN.	NOM.	MAX.
A	2.200	2.300	2.400
A1	1.700	1.800	1.900
b	0.600	0.700	0.800
b1	9.700	9.800	9.900
b2	0.650	0.750	0.850
b3	1.100	1.200	1.300
c	0.400	0.500	0.600
D	10.300	10.400	10.500
D1	11.000	11.100	11.200
D2	3.200	3.300	3.400
D4	4.470	4.570	4.670
E	9.800	9.900	10.000
E1	8.000	8.100	8.200
E2	0.500	0.600	0.700
e	1.200 BSC		
e1	1.225 BSC		
H	11.600	11.700	11.800
H1	6.950 BSC		
H2	5.900 BSC		
i	0.100 REF.		
j	0.350 REF.		
K	3.100 REF.		
L	1.550	1.650	1.750
L1	0.600	0.700	0.800
L2	0.500	0.600	0.700
L3	0.400	0.500	0.600
Q	7.950 REF.		
R	3.000	3.100	3.200
θ	10° REF.		

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