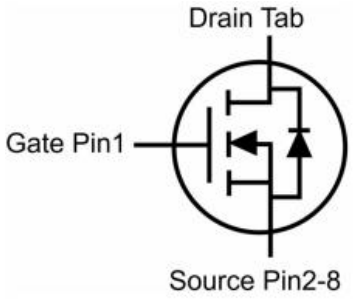
VFTV015R051NA

Datasheet

General Description

$V_{(BR)DSS}$	$R_{DS(ON)\_max}$	I_D
150V	5.1mΩ@10V	295A

Symbol

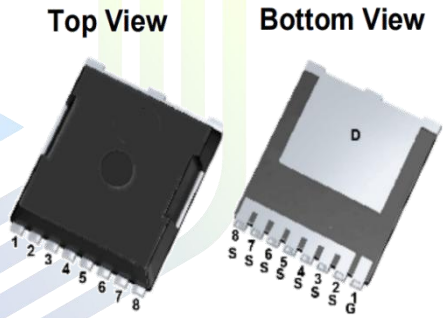


Symbol of VFTV015R051NA

Features

- Low $R_{DS(ON)}$
- Enhance Mode
- 100% Avalanche Tested
- 100% Rg Tested
- Low Gate Charge

Package Type



TOLL

Package Type of VFTV015R051NA

Application

- Battery Management System
- Motor driver
- High Power inverter system
- Switched mode power supply

Ordering Information

Product Name	Package
VFTV015R051NA	TOLL

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

Parameter		Symbol	Rating	Unit
Drain-Source Voltage		V_{DSS}	150	V
Gate-Source Voltage		V_{GSS}	±25	V
Continuous Drain Current	T_C=25ºC	I_D	295	A
Continuous Drain Current	T_C=100ºC		209	A
Pulsed Drain Current[Note1]	T_C=25ºC	$I_{D.pulse}$	804	A
Continuous Diode Forward Current	T_C=25ºC	I_S	295	A
Continuous Drain Current	T_A=25ºC	I_{DSM}	16	A
Continuous Drain Current	T_A=70ºC		13	A
Max Power Dissipation [Note3]	T_C=25ºC	P_D	938	W
Max Power Dissipation[Note4]	T_A=25ºC	P_{DSM}	2.9	
Avalanche Energy, Single Pulse [Not 2]		E_{AS}	1560	mJ
Operation and storage temperature		T_J,T_{STG}	-55 to 175	ºC

Thermal Resistance

Parameter	Symbol	Min	Typ	Max	Unit
Thermal Resistance, Junction-to-Case [Note5]	$R_{θJC}$	-	0.13	0.16	ºC/W
Thermal Resistance, Junction-to-Ambient [Note6]	$R_{θJA}$	-	36	43	

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

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Statistic Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS}=0V, I_D=250uA	150	-	-	V
Zero Gate Voltage Drain Current T_J= 25 ºC	I_{DSS}	V_{DS}=150V, V_{GS}=0V	-	-	1	uA
Zero Gate Voltage Drain Current T_J= 125 ºC		V_{DS}=150V, V_{GS}=0V	-	-	100	uA
Gate-Body Leakage Current	I_{GSS}	V_{GS}=±25V, V_{DS}=0V	-	-	±100	nA
Gate Threshold Voltage	$V_{GS(TH)}$	V_{DS}=V_{GS}, I_D=250uA	2.5	3	3.5	V
Drain-Source On-Resistance[Note8]	$R_{DS(ON)}$	V_{GS}=10V, I_D=80A	-	3.9	5.1	mΩ
Drain-Source On-Resistance[Note8] T_J= 100 ºC			-	5.4	-	
Gate resistance	R_G	f=1 MHz, Open drain	0.5	2.9	5.8	Ω
Dynamic Characteristics						
Input Capacitance[Note7]	C_{ISS}	V_{DS}=75V	5295	10585	18525	pF
Output Capacitance [Note7]	C_{OSS}	V_{GS}=0V	375	745	1310	pF
Reverse Transfer Capacitance[Note7]	C_{RSS}	f=1MHz	5	15	30	pF
Turn-on Delay Time	$t_{d(on)}$	V_{DD}=75V	-	29	-	ns
Rise Time	t_r	I_D=80A	-	75	-	
Turn-off Delay Time	$t_{d(off)}$	R_G=3.9Ω	-	90	-	
Fall Time	t_f	V_{GS}=10V	-	49	-	
Gate Charge Characteristics[Note7]						
Gate to Source Charge	Q_{gs}	V_{GS}=10V	-	46	81	nC
Gate to Drain Charge	Q_{gd}	V_{DS}=75V	-	31	54	
Gate Charge Total@V_{GS}=10V	Q_g	I_D=80A	-	143	250	
Reverse Diode Characteristics						
Drain-Source Diode Forward Voltage	V_{SD}	V_{GS}=0V, I_{SD}=80A	-	0.9	1.2	V
Reverse Recovery Time[Note7]	t_{rr}	I_{SD}=80A V_{GS}=0V	-	147	294	ns
Reverse Recovery Charge[Note7]	Q_{rr}	V_{DD}=75V di/dt=100A/us	-	522	1044	nC

Notes:

1. Pulse width≤100μs;
2. EAS of 1560mJ is based on starting T_J = 25°C, L = 0.5mH, R_G = 25Ω, I_{AS} = 79A, V_{GS} =10V; 100% FT tested at L = 0.5mH, I_{AS} = 43A.
3. The power dissipation P_D is based on $T_{J(max)}$, using junction-to-case thermal resistance $R_{\theta JC}$.
4. The power dissipation P_{DSM} is based on $T_{J(max)}$, using junction-to-ambient thermal resistance $R_{\theta JA}$.
5. Thermal resistance from junction to soldering point (on the exposed drain pad). These tests are performed on a cool plate.
6. These tests are performed with the device mounted on 1 in^2 FR-4 board with 2oz. Copper, in a still air environment with T_A=25°C.
7. Guaranteed by design, not subject to production testing.
8. Pulse width≤380μs; duty cycle≤2%.

Typical Performance Characteristics

Figure 1: Typ. Output Characteristics

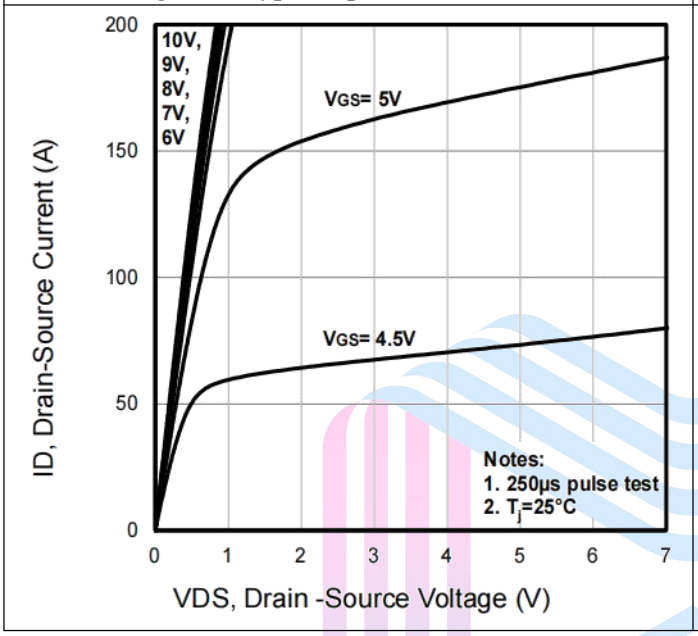


Figure 2: On Resistance Vs Gate -Source Voltage

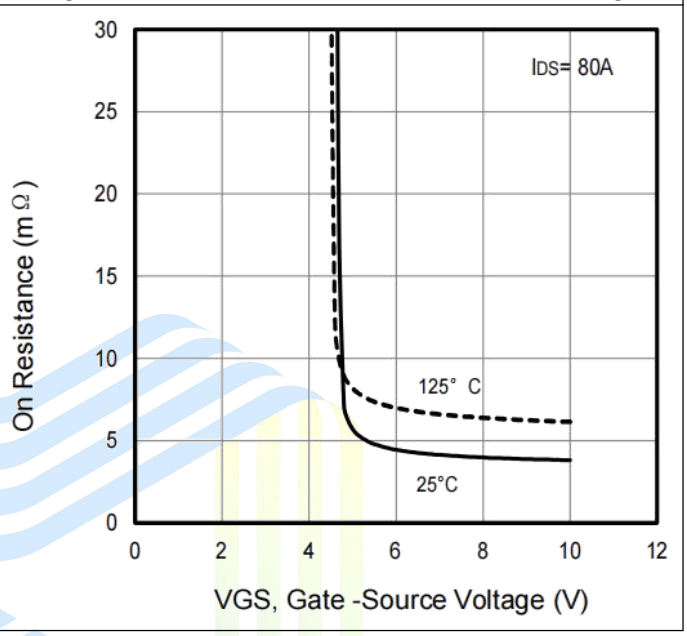


Figure 3: Normalized On-State Resistance

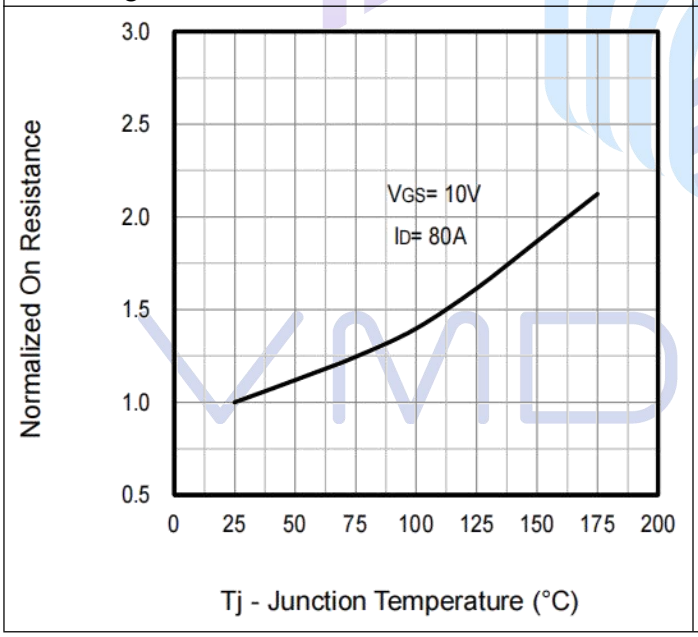


Figure 4: Typ. Transfer Characteristics

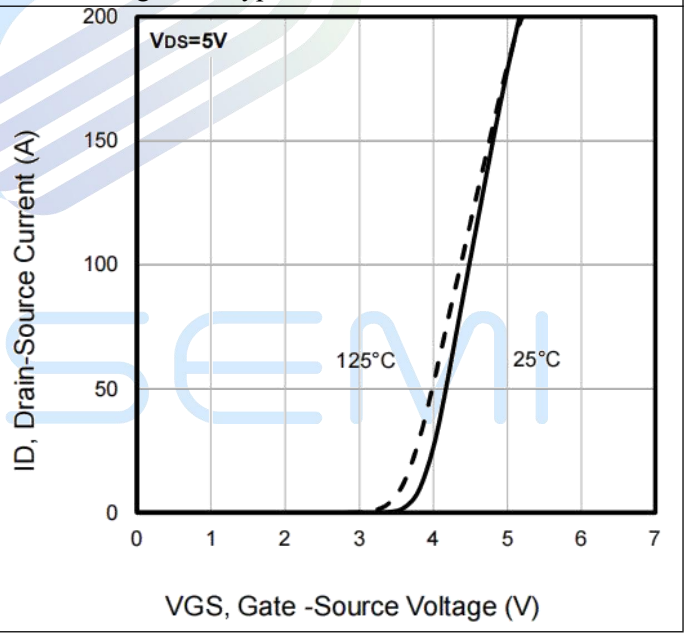


Figure 5: On Resistance Vs Drain Current

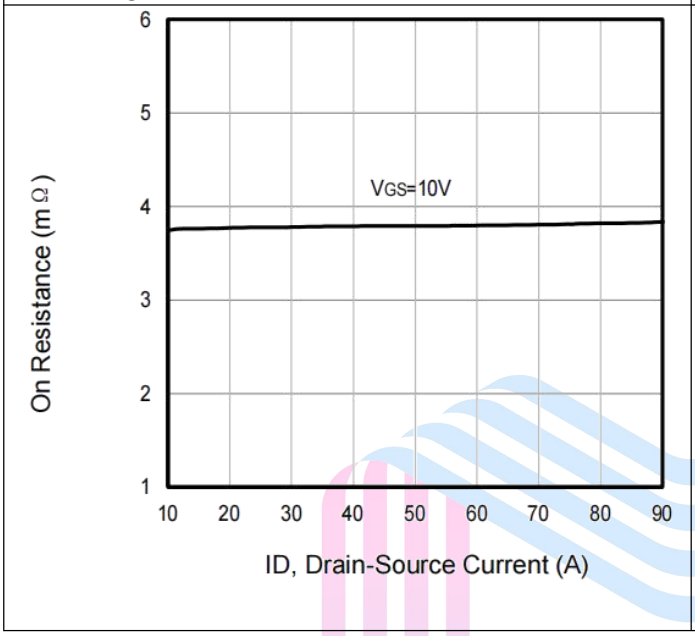


Figure 6: Forward Characteristics of Body Diode

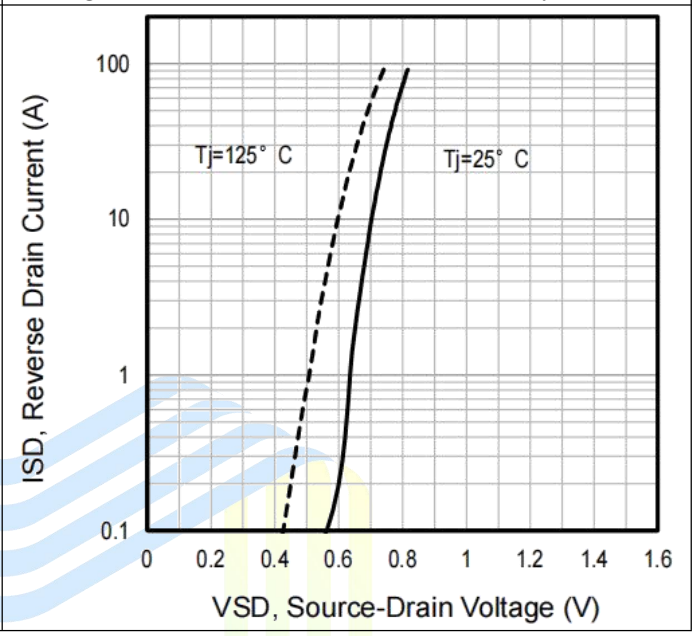


Figure 7: Capacitance Vs. Drain-Source Voltage

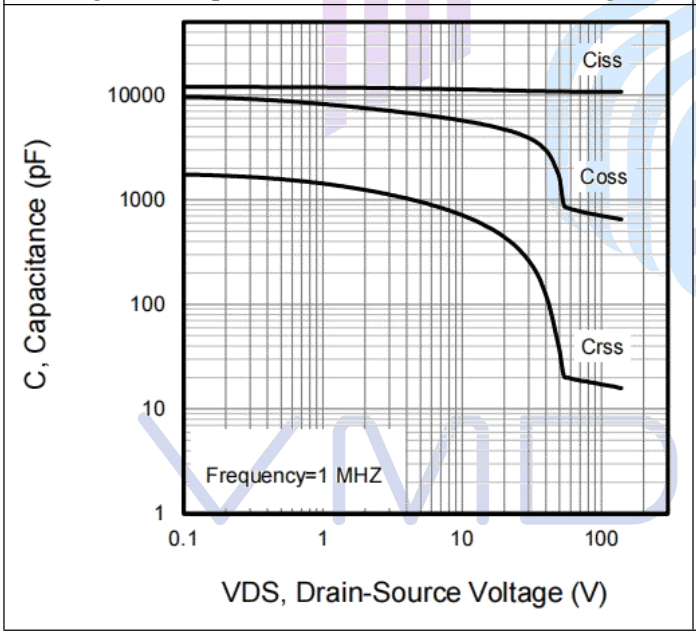


Figure 8: Gate Charge Vs. Gate-Source Voltage

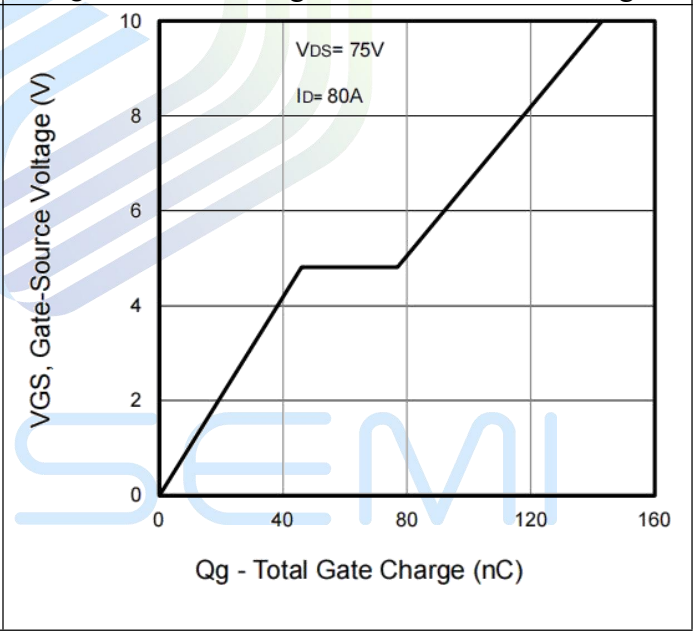


Figure 9: $V_{GS(TH)}$ Gate -Source Voltage Vs. Tj

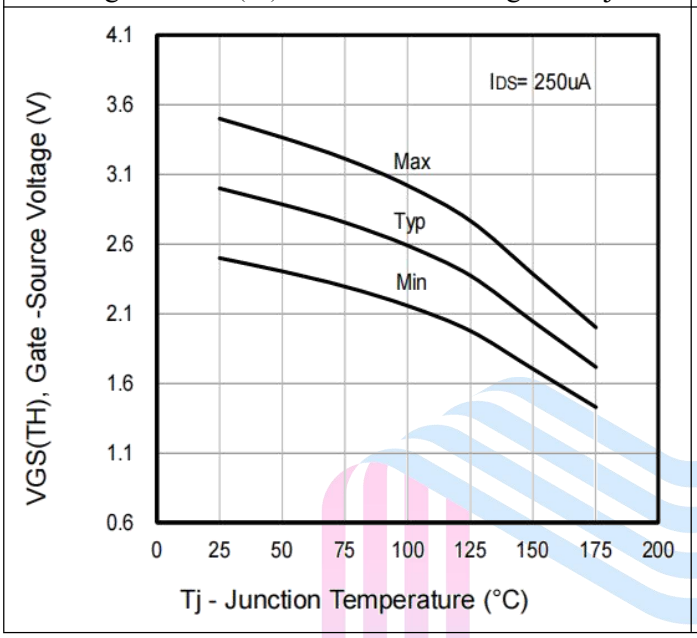


Figure 10: Maximum Safe Operating Area

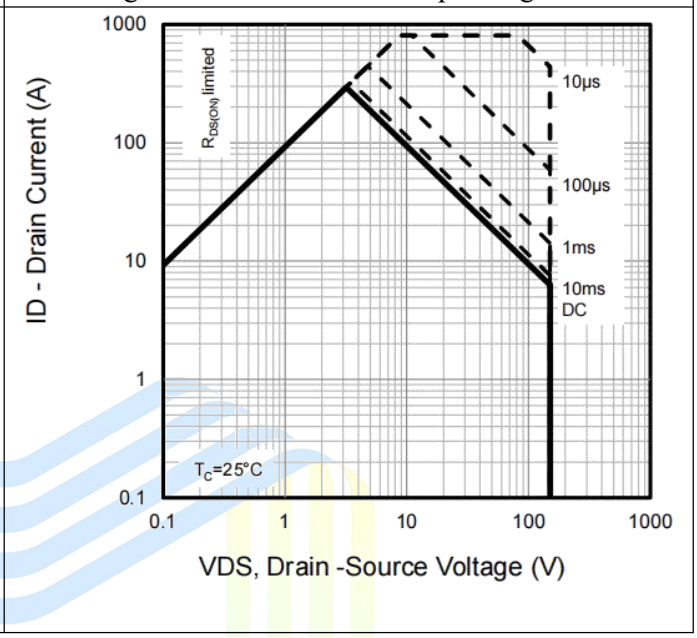


Figure 11: Power Dissipation Vs. Temperature

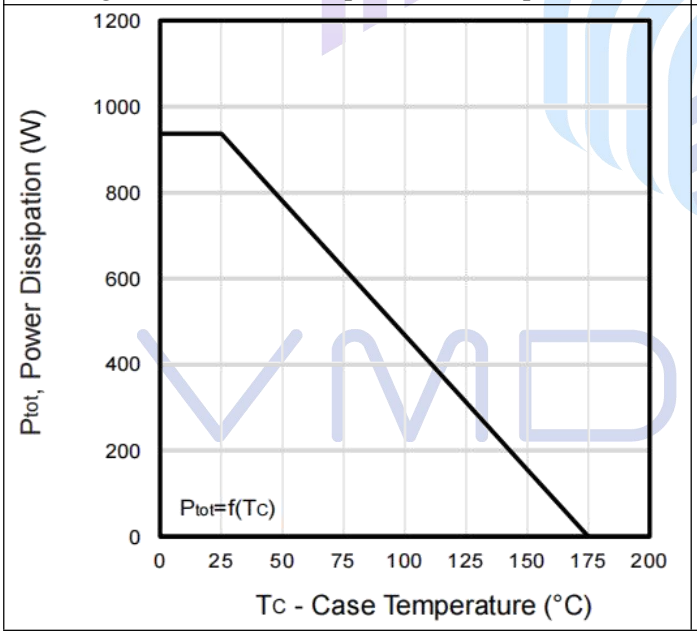


Figure 12: Maximum Drain Current Vs. Temperature

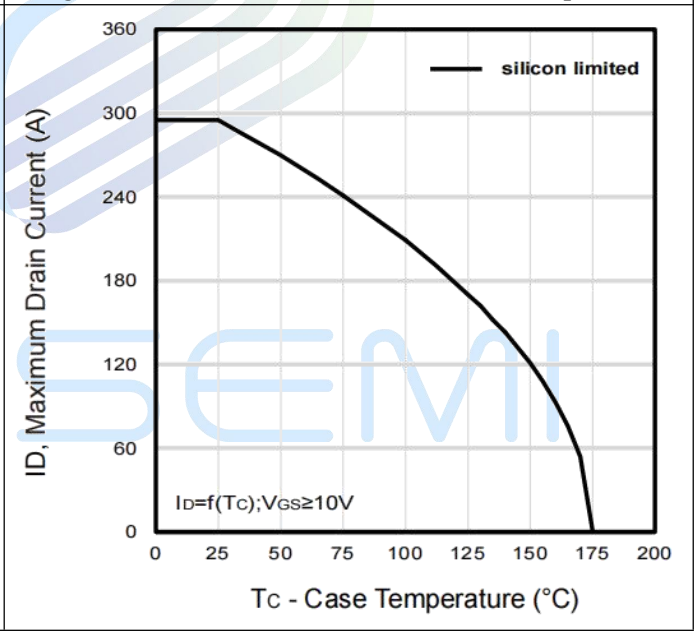
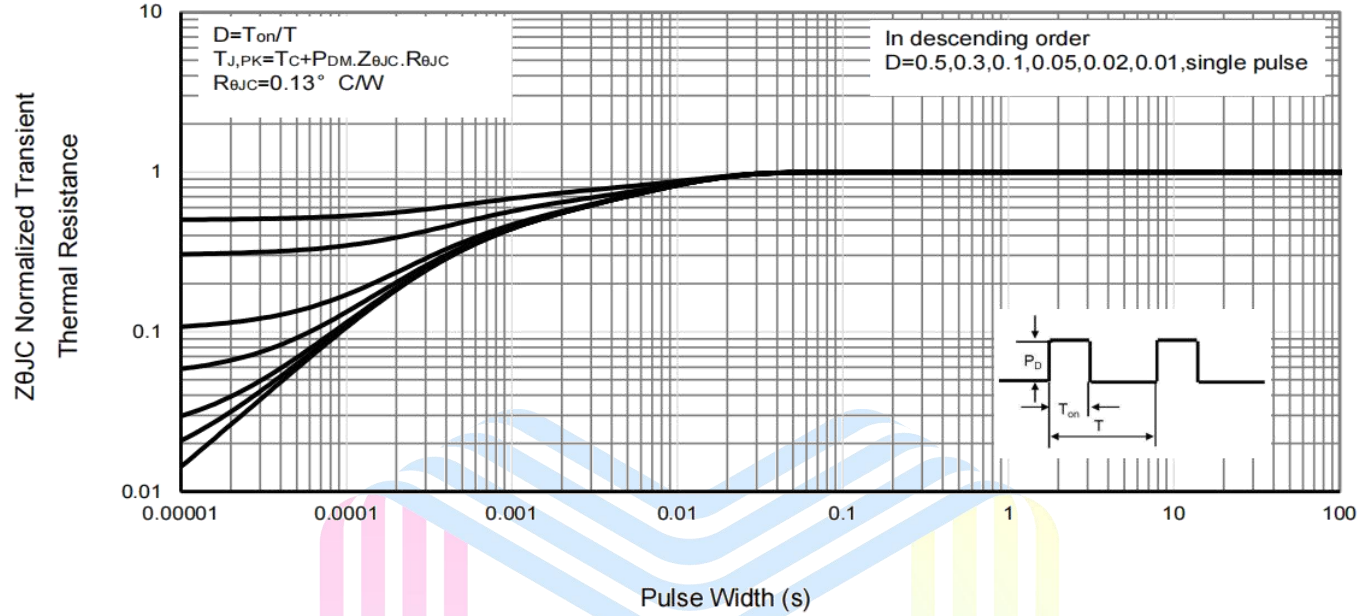
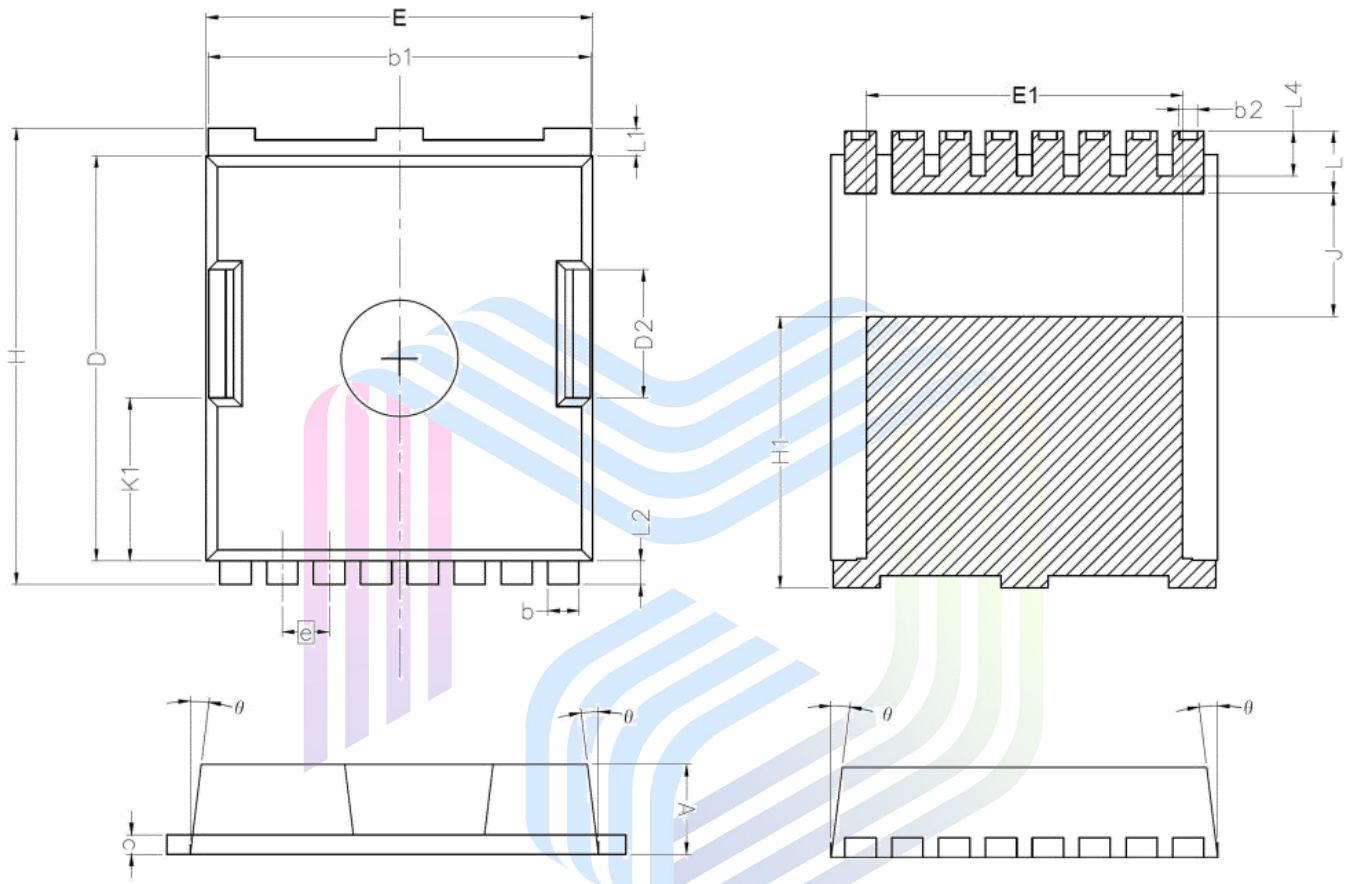


Figure 13: Normalized Maximum Transient Thermal Impedance



Mechanical Dimensions

Package Information TOLL



Note:

1. All dimensions are in mm,angles in degrees.
2. Dimensions do not include mold flash protrusions or gate burrs.

Symbol	DIMENSIONS (unit : mm)			Symbol	DIMENSIONS (unit : mm)		
	Min	Typ	Max		Min	Typ	Max
A	2.20	--	2.40	H	11.48	11.68	11.88
b	0.70	--	0.90	H1	6.75	6.95	7.15
b1	9.70	--	9.90	N	--	8	--
b2	0.42	--	0.50	J	3.00	3.15	3.30
c	0.40	--	0.60	K1	3.98	4.18	4.38
D	10.28	--	10.58	L	1.40	1.60	1.80
D2	3.10	3.30	3.50	L1	0.60	0.70	0.80
E	9.70	9.90	10.10	L2	0.50	0.60	0.70
E1	7.90	8.10	8.30	L4	1.00	1.15	1.30
e	1.20BSC			θ	4°	7°	10°

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