VFTA010R045NA

Datasheet

General Description

$V_{(BR)DSS}$	$R_{DS(ON)\_max}$	I_D
100V	4.5mΩ@10V	130A

Symbol

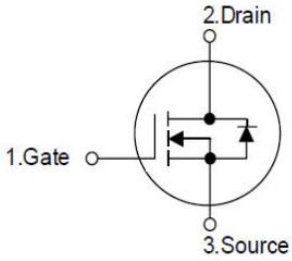
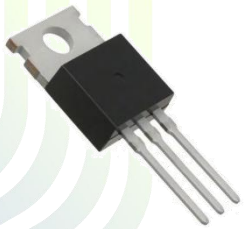


Figure 1 Symbol of VFTA010R045NA

Features

- Low $R_{DS(ON)}$
- Fast Switching and High efficiency
- 100% Avalanche Tested
- RoHS compliant

Package Type



TO-220

Figure 2 Package Type of VFTA010R045NA

Application

- PD charger
- Motor driver
- Switching voltage regulator
- DC-DC converter
- Switched mode power supply

Ordering Information

Product Name	Package
VFTA010R045NA	TO-220

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

Parameter			Symbol	Rating	Unit
Drain-Source Voltage			V_{DSS}	100	V
Gate-Source Voltage			V_{GSS}	±20	V
Continuous Drain Current	(Silicon Limited)	T_C=25ºC	I_D	170	A
Continuous Drain Current	(Wire Bond Limited)	T_C=25ºC		130	
Continuous Drain Current	(Silicon Limited)	T_C=100ºC		120	
Pulsed Drain Current Note 1		T_C=25ºC	$I_{D.pulse}$	675	A
Continuous Diode Forward Current		T_C=25ºC	I_S	130	A
Continuous Drain Current		T_A=25ºC	I_{DSM}	16	A
Continuous Drain Current		T_A=70ºC		12	A
Max Power Dissipation Note 3		T_C=25ºC	P_D	250	W
Max Power Dissipation Note 4		T_A=25ºC	P_{DSM}	2.1	W
Avalanche Energy, Single Pulse Note 2			E_{AS}	484	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 Note 5	$R_{θJC}$		0.5	0.6	ºC/W
Thermal Resistance, Junction-to-Ambient Note 6	$R_{θJA}$		50	60	

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	100			V
Zero Gate Voltage Drain Current		I_{DSS}	V_{DS}=100V, V_{GS}=0V			1	uA
Zero Gate Voltage Drain Current T_J= 125 ºC			V_{DS}=100V, V_{GS}=0V			100	uA
Gate-Body Leakage Current	Forward	I_{GSSF}	V_{GS}=20V, V_{DS}=0V			100	nA
	Reverse	I_{GSSR}	V_{GS}=-20V, V_{DS}=0V			-100	
Gate Threshold Voltage		$V_{GS(TH)}$	V_{DS}=V_{GS}, I_D=250uA	2.2	2.7	3.2	V
Drain-Source On-Resistance[Note7]		$R_{DS(ON)}$	V_{GS}=10V, I_D=40A		3.6	4.5	mΩ
Drain-Source On-Resistance[Note7] T_J= 100 ºC					4.7		
Gate resistance		R_G	f=1 MHz, Open drain		1.8		Ω
Dynamic Characteristics							
Input Capacitance		C_{ISS}	V_{DS}=50V		5440		pF
Output Capacitance		C_{OSS}	V_{GS}=0V		1035		pF
Reverse Transfer Capacitance		C_{RSS}	f=1MHz		35		pF
Turn-on Delay Time		$t_{d(on)}$	V_{DS}=50V		21		ns
Rise Time		t_r	I_D=40A		69		
Turn-off Delay Time		$t_{d(off)}$	R_G=3Ω		57		
Fall Time		t_f	V_{GS}=10V		70		
Gate Charge Characteristics							
Gate to Source Charge		Q_{gs}	V_{GS}=10V		25		nC
Gate to Drain Charge		Q_{gd}	V_{DS}=50V		25		
Gate Charge Total@V_{GS}=10V		Q_g	I_D=40A		91		
Reverse Diode Characteristics							
Drain-Source Diode Forward Voltage		V_{SD}	V_{GS}=0V, I_{SD}=40A		0.8	1.2	V
Reverse Recovery Time		t_{rr}	I_{SD}=40A V_{GS}=0V		59		ns
Reverse Recovery Charge		Q_{rr}	di/dt=100A/us		71		nC

Notes:

1. Single pulse; pulse width ≤ 100μs.
2. EAS of 484mJ is based on starting T_J = 25°C, L = 0.5mH, R_G = 25Ω, I_{AS} = 44A, V_{GS} =10V;100% FT tested at L = 0.5mH, I_{AS} = 22A.
3. The power dissipation Pd is based on Tj(max), using junction-to-case thermal resistance $R_{θJC}$.
4. The power dissipation Pdsm is based on Tj(max), using junction-to-ambient thermal resistance $R_{θJA}$.
5. Thermal resistance from junction to soldering point (on the exposed drain pad). These tests are performed on a cool plate.
6. The value of $R_{θJA}$ is measured with the device in a still air environment with T_A =25°C.
7. Pulse width ≤ 380μs; duty cycle≤ 2%.

Typical Performance Characteristics

Figure 3: Typ. Output Characteristics

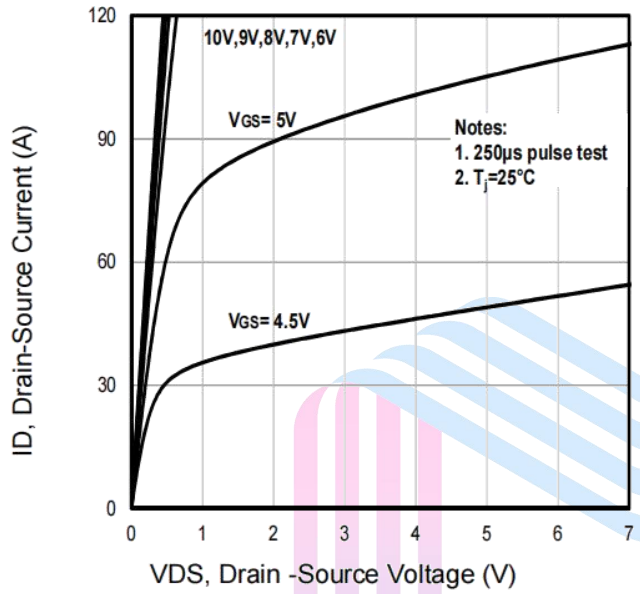


Figure 4: Typ. Gate Charge

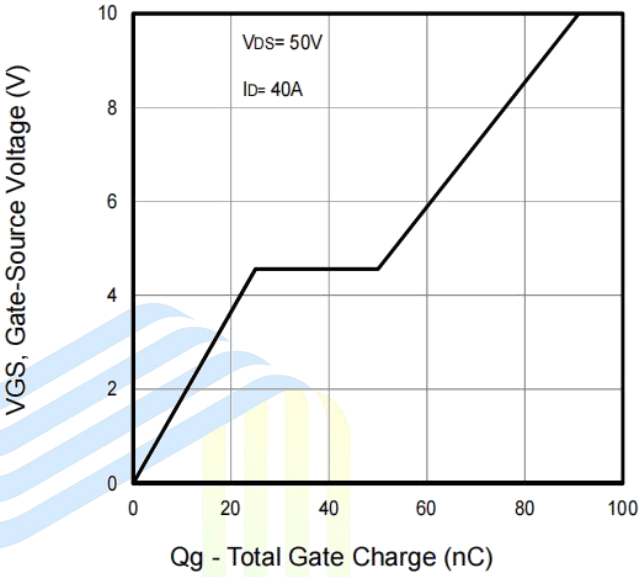


Figure 5: Normalized On-State Resistance

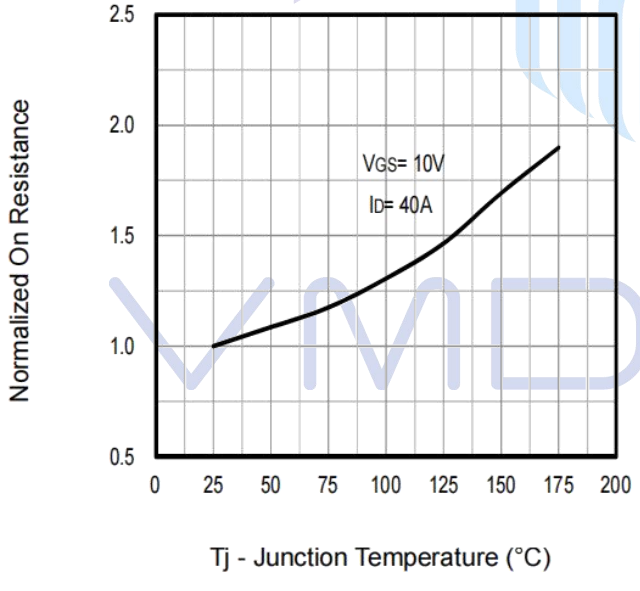


Figure 6: Typ. Transfer Characteristics

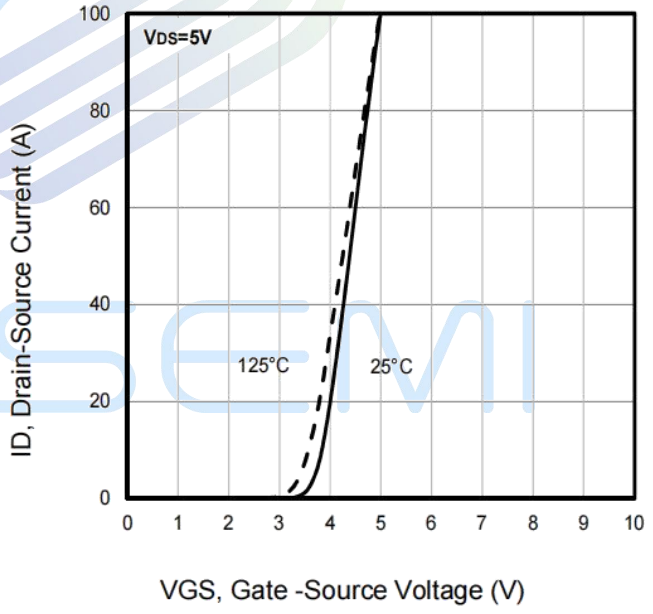


Figure 7: Typical On Resistance Vs VGS

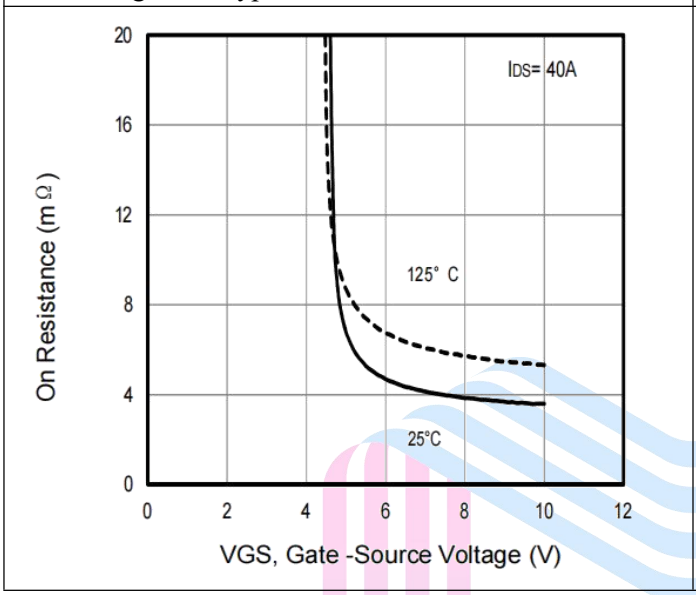


Figure 8: Typical On Resistance Vs ID and Gate

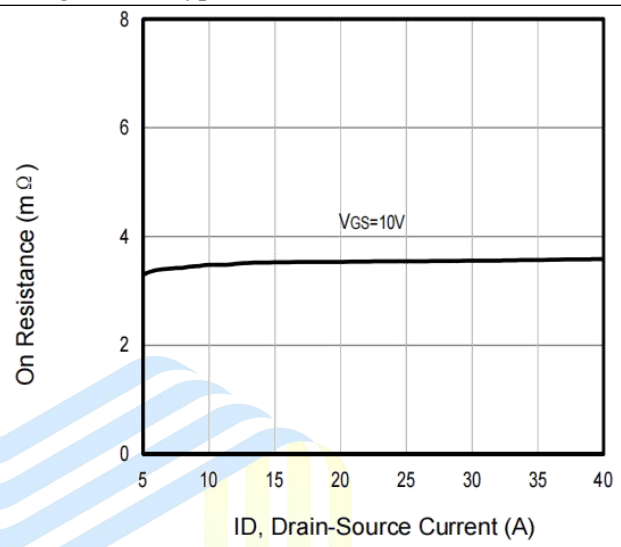


Figure 9: Power Dissipation Vs. Case Temperature

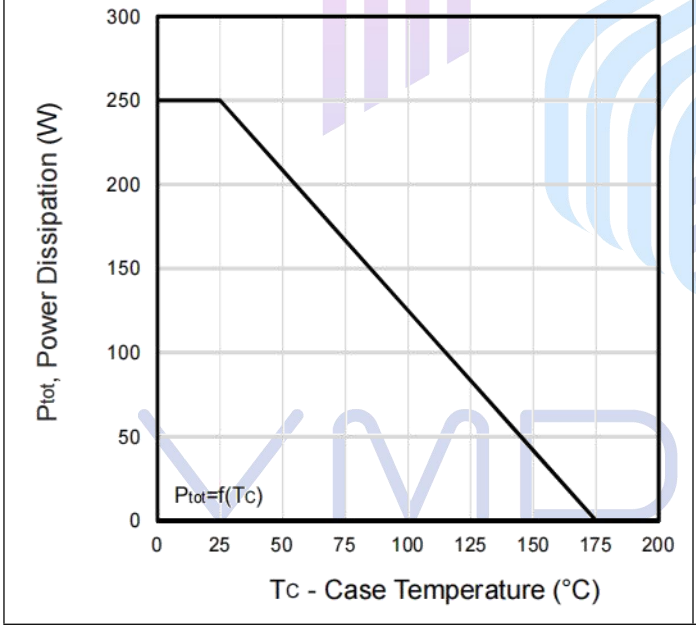


Figure 10: Drain Current Vs. Case Temperature

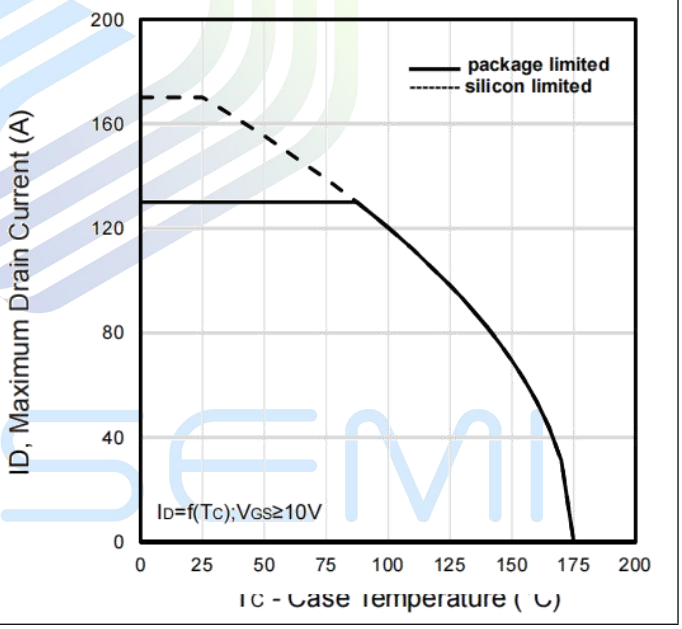


Figure 11: Typ. Capacitances

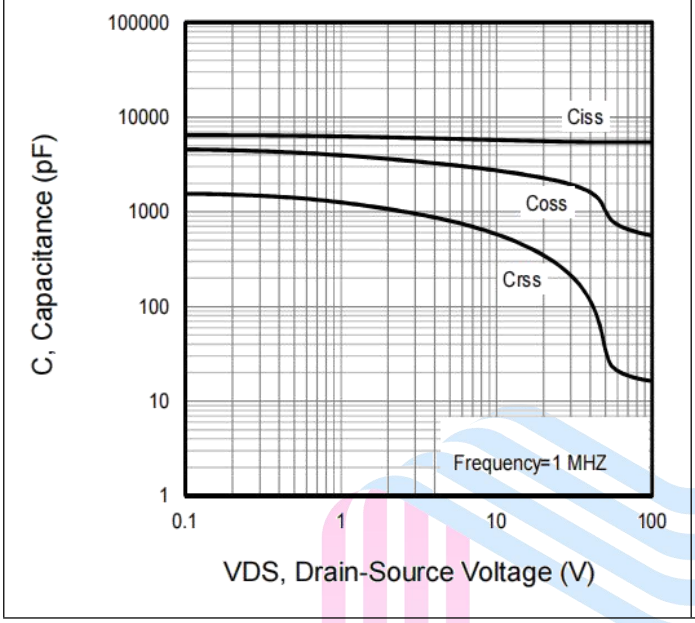


Figure 12: Forward Characteristics of Body Diode

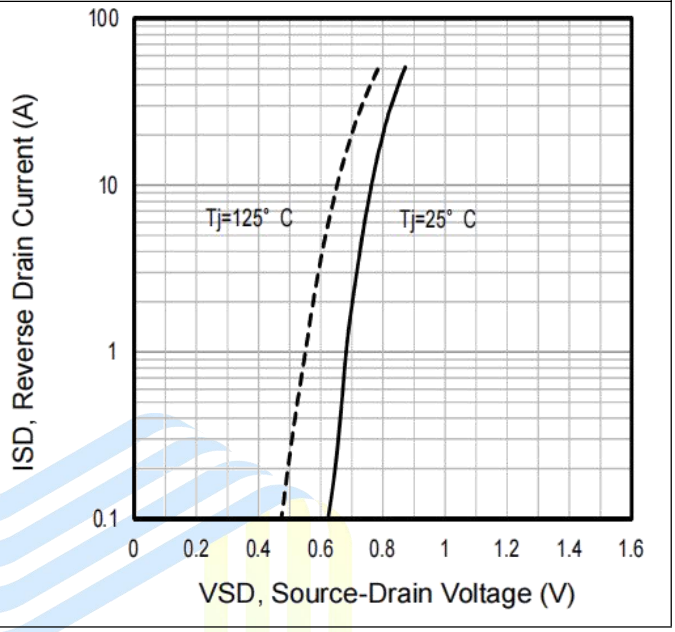


Figure 13: Gate-Source Threshold Voltage

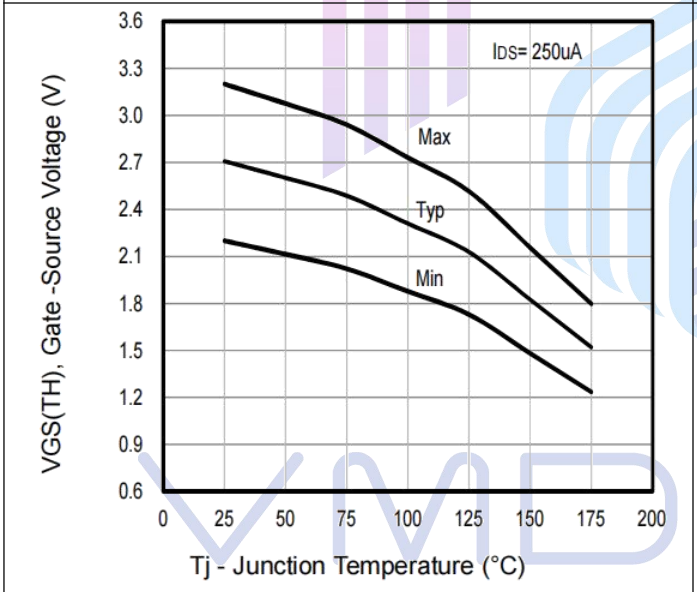


Figure 14: Safe Operating Area

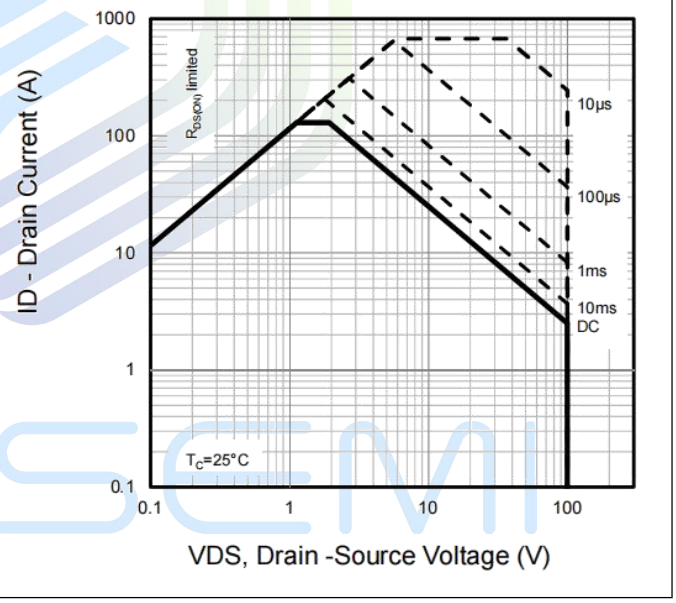
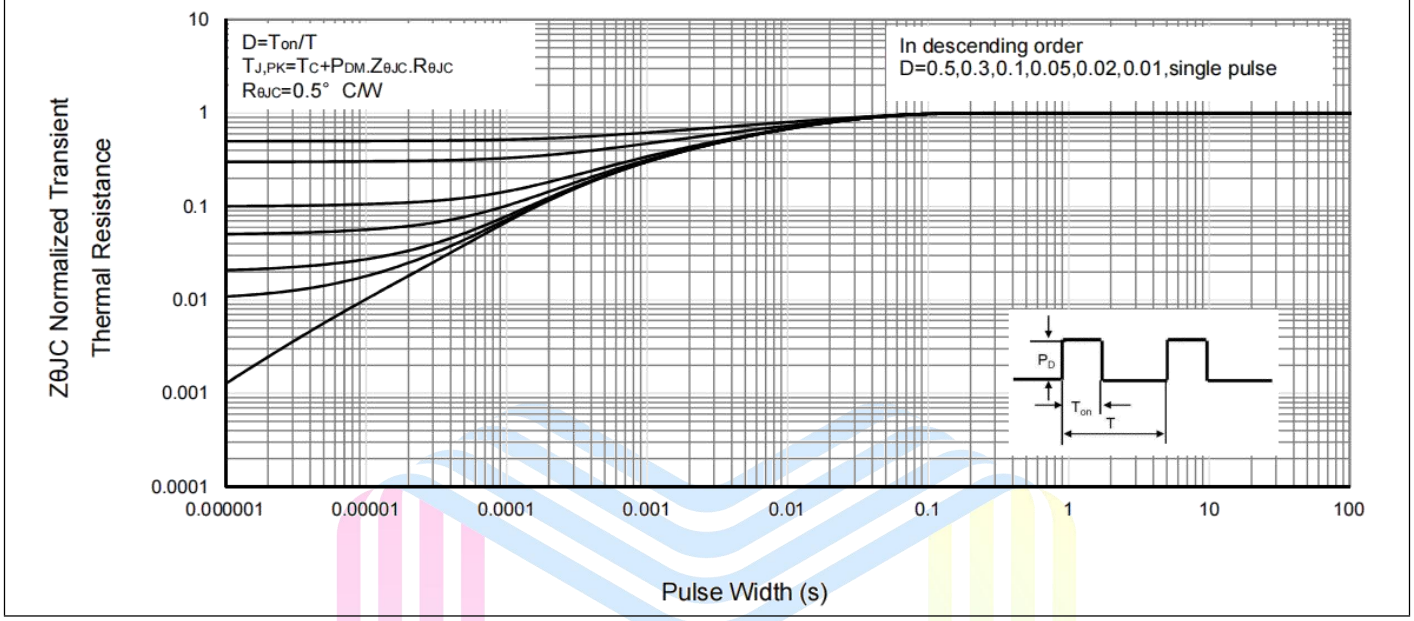
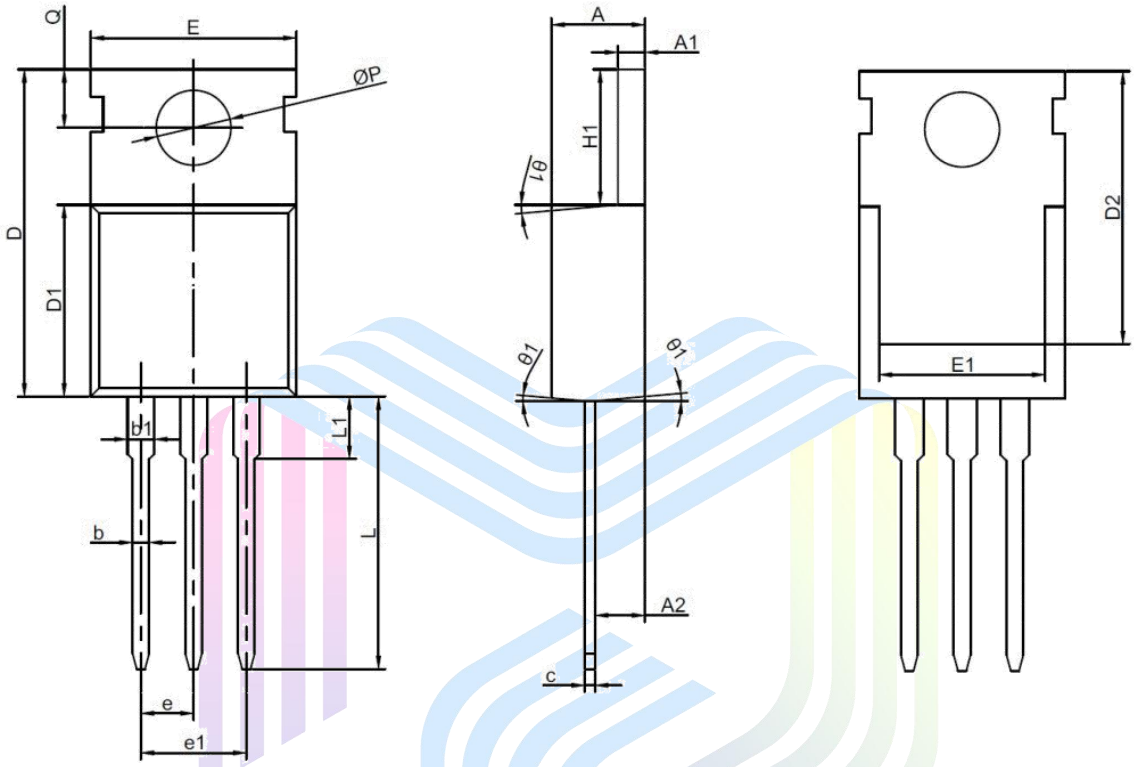


Figure 15: Normalized Maximum Transient Thermal Impedance



Mechanical Dimensions

Package Information TO-220



Symbol	Dimensions (unit: mm)		
	Min	Typ	Max
A	4.30	4.52	4.70
A1	1.15	1.30	1.40
A2	2.20	2.40	2.60
b	0.70	0.80	1.00
b1	1.15	1.32	1.50
c	0.45	0.50	0.65
D	15.10	15.70	16.10
D1	8.80	9.20	9.40
D2	12.80	-	13.70
E	9.65	9.90	10.30
E1	7.00	-	8.2
e	2.54 BSC		
e1	5.08 BSC		
H1	6.20	6.50	6.90
L	12.70	-	13.90
L1	-	-	3.50
ΦP	3.40	3.60	3.80
Q	2.60	2.80	3.00
θ1	1 °	3 °	7 °

Notes:
1. Refer to JEDEC TO-220 variation AB
2. Dimension "D" and "E" do NOT include mold flash.
Mold flash shall not exceed 0.127mm per side.

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