VFTP010R045NB

Datasheet

General Description

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

Symbol

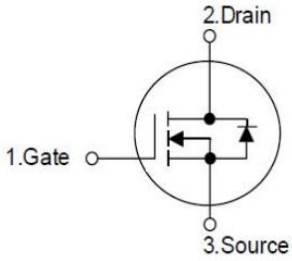
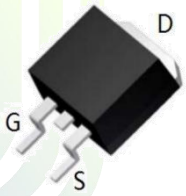


Figure 1 Symbol of VFTP010R045NB

Features

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

Package Type



TO-263

Figure 2 Package Type of VFTP010R045NB

Application

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

Ordering Information

Product Name	Package
VFTP010R045NB	TO-263

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

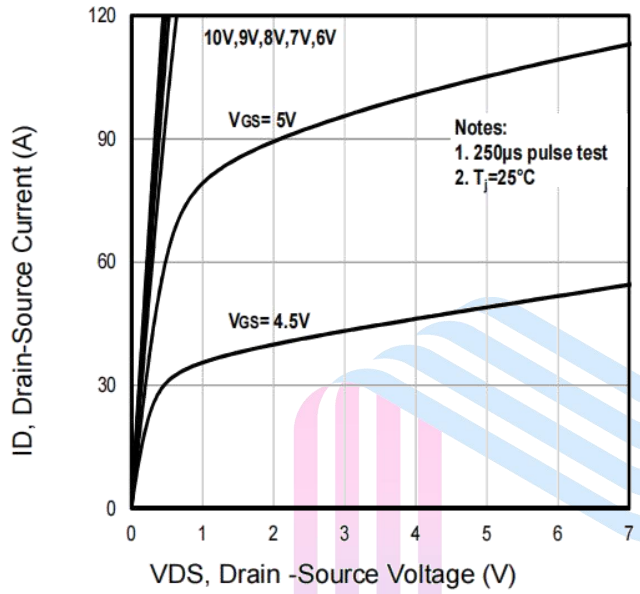


Figure 4: Typ. Gate Charge

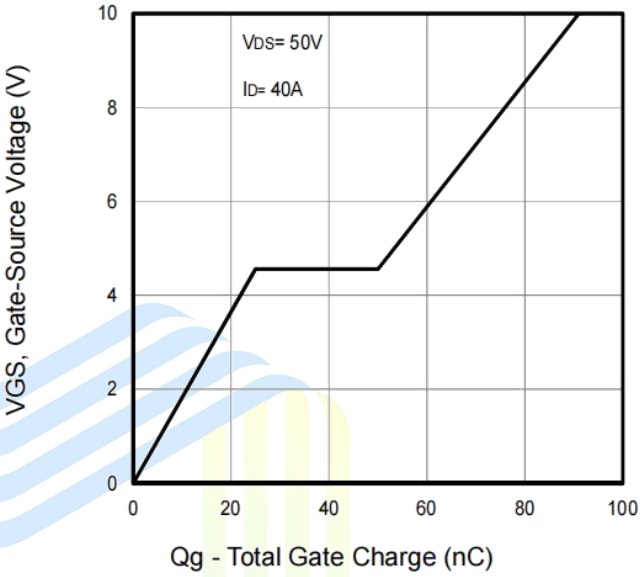


Figure 5: Normalized On-State Resistance

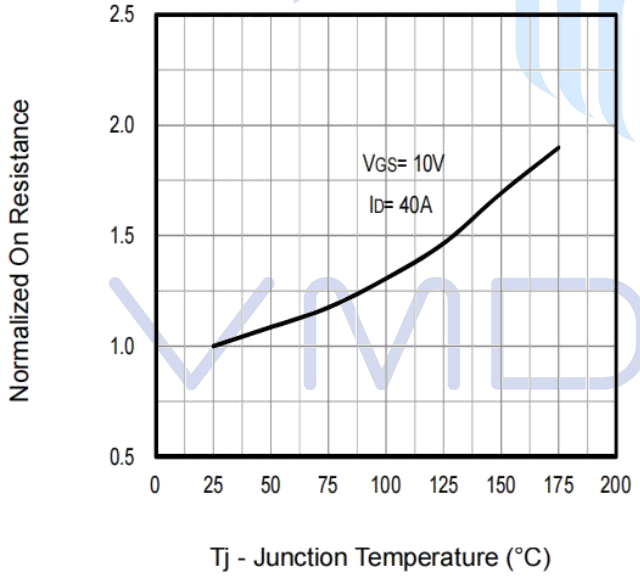


Figure 6: Typ. Transfer Characteristics

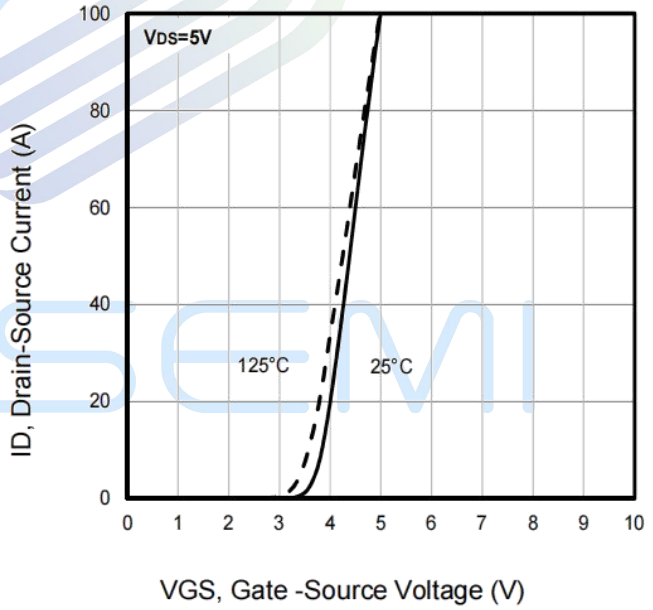


Figure 7: Typical On Resistance Vs VGS

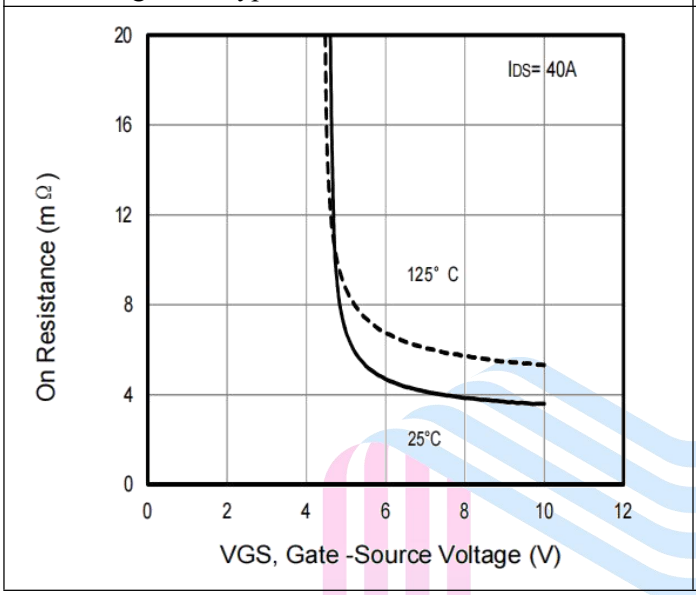


Figure 8: Typical On Resistance Vs ID and Gate

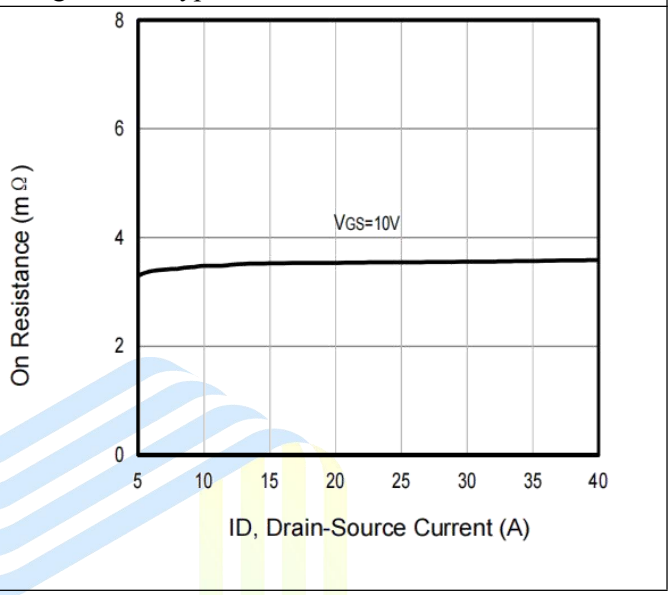


Figure 9: Power Dissipation Vs. Case Temperature

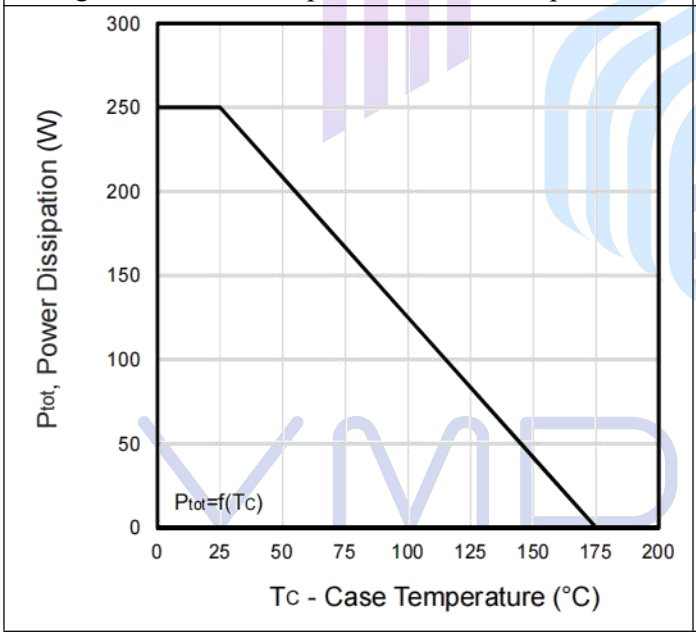


Figure 10: Drain Current Vs. Case Temperature

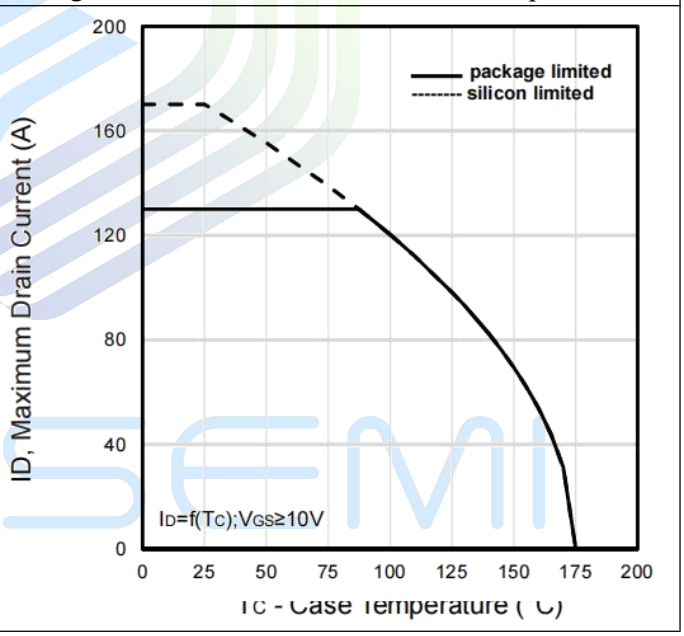


Figure 11: Typ. Capacitances

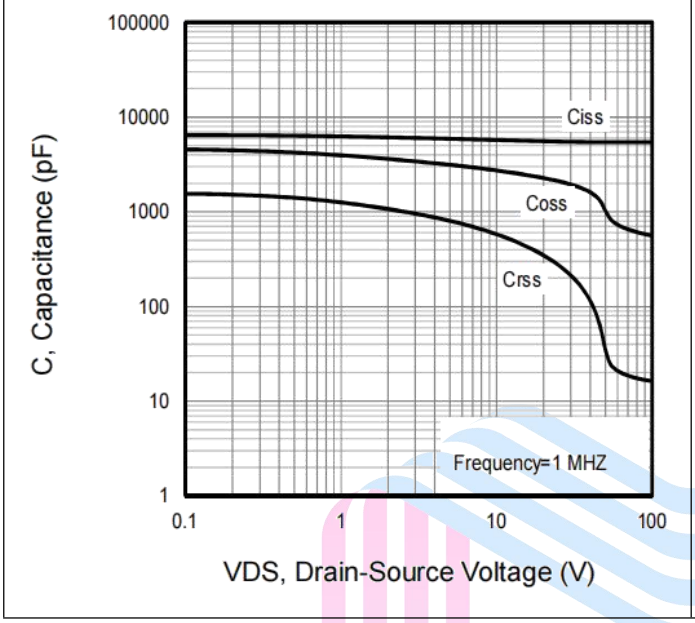


Figure 12: Forward Characteristics of Body Diode

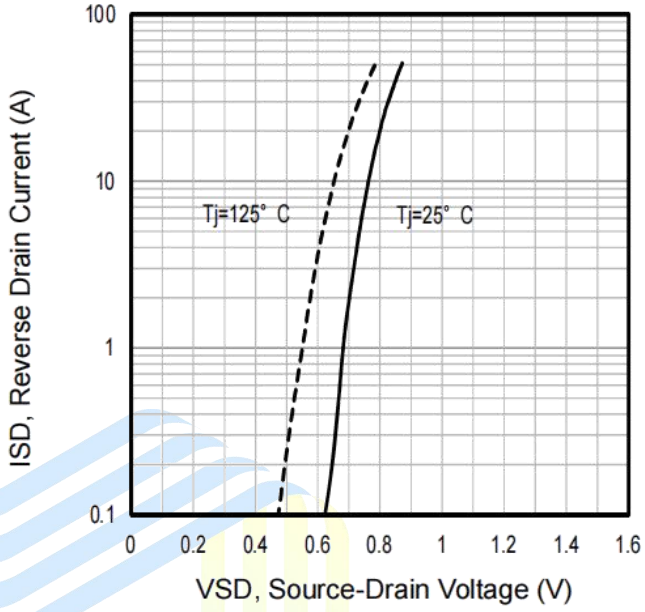


Figure 13: Gate-Source Threshold Voltage

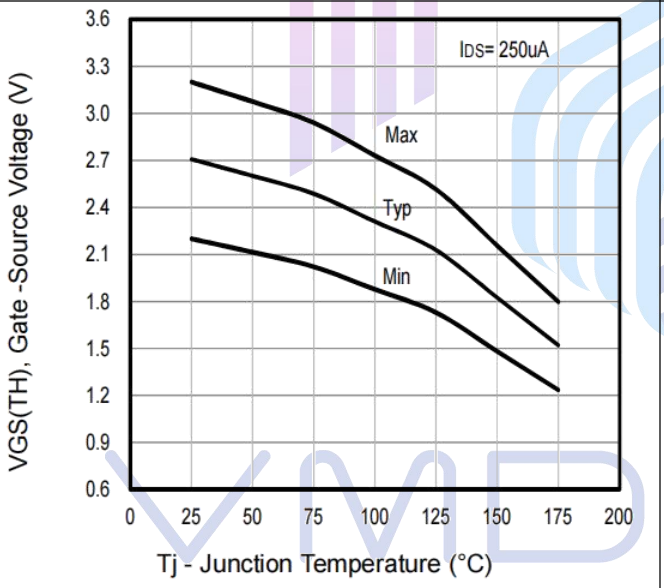


Figure 14: Safe Operating Area

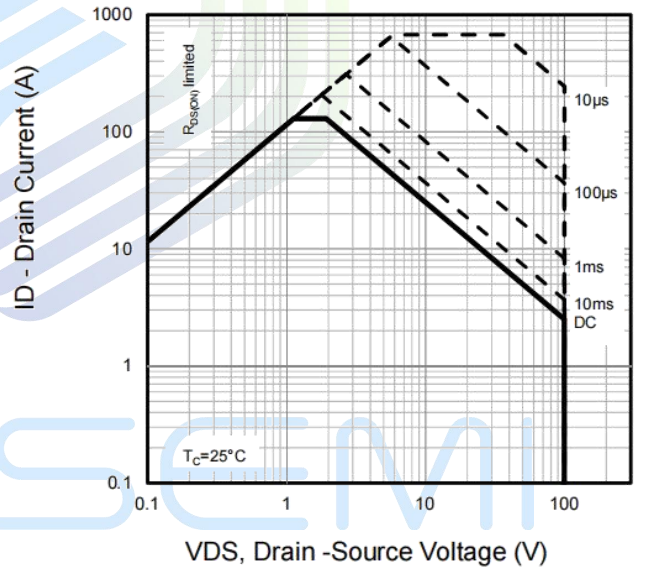
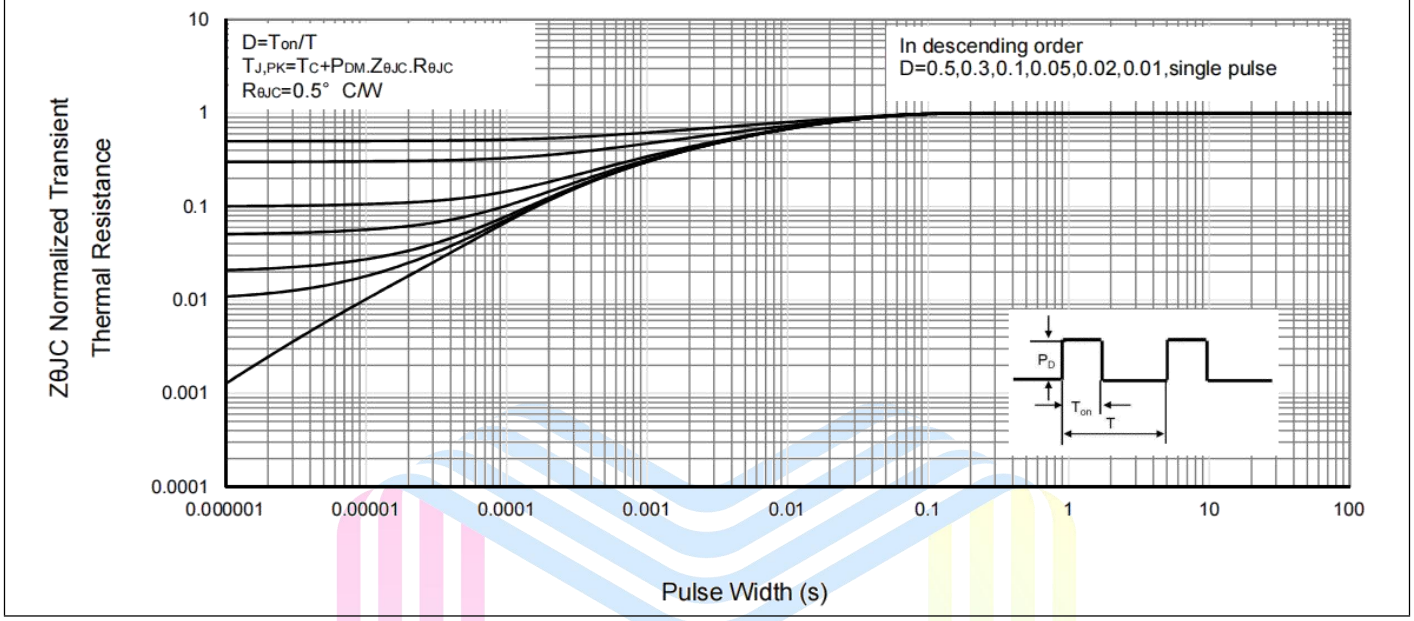
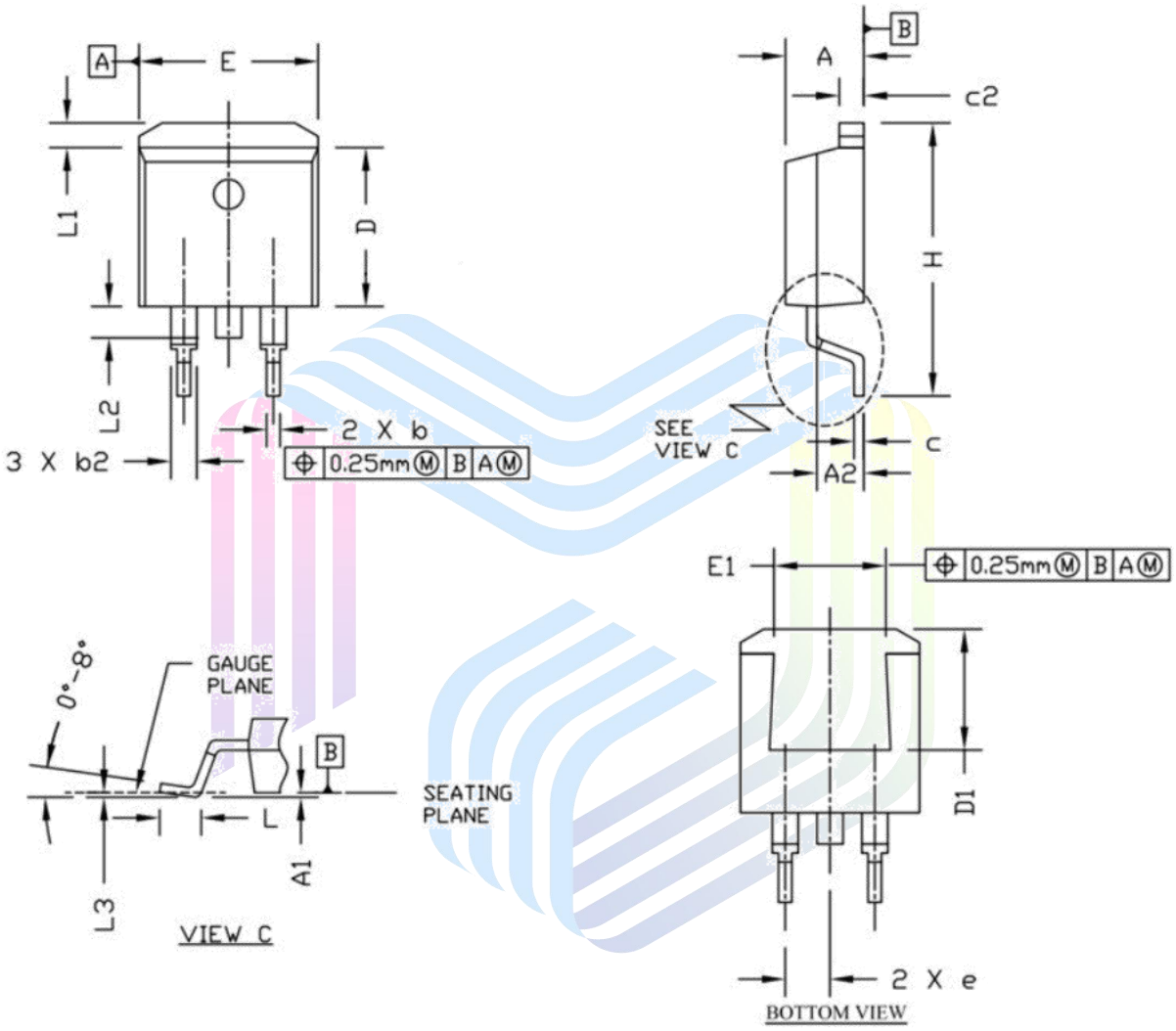


Figure 15: Normalized Maximum Transient Thermal Impedance



Mechanical Dimensions

Package Information TO-263



Symbol	Dimensions (unit: mm)		
	Min	Typ	Max
A	4.400	4.570	4.700
A1	0.000	0.100	0.200
A2	2.300	2.400	2.500
b	0.700	0.800	0.900
b2	1.200	1.270	1.360
c	0.381	0.500	0.737
c2	1.220	1.300	1.350
D	8.600	9.200	9.300
D1	6.860		
e	2.540 BSC		
E	9.780	9.880	10.260
E1	6.225		
H	14.700	15.100	15.500
L	2.000	2.550	2.750
L1	1.000	1.200	1.400
L2	1.300	1.600	1.700
L3	0.255 BSC		

NNotes:

1. Refer to JEDEC TO-263 variation AB
2. Dimension "D" & "E" do NOT include mold flash, mold flash shall not exceed 0.127mm per side.

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Via-Media Semiconductor Limited Company

http://www.vmdsemi.com

Main Sites:

- **Headquarters**

Hangzhou Via-Media Semiconductor Co., LTD.
1305-1306, Building 71, No. 90, Wensan Road, Xihu District, Hangzhou, Zhejiang Province, P.R. China
Tel: +86-0571-8515 0563

- **Chengdu Office**

Chengdu Winhi Semiconductor Co., LTD.
Floor 15, Building 5, No. 171, Hele 2nd Street, Chengdu, Sichuan Province, P.R. China
Tel: +86-028-8505 0771

- **Shanghai**

Shanghai R&D Center.
1506~1508, Xinyin Building, 888 Yishan Road, Shanghai, P.R of China
Tel: +86-021-54201999

- **Shenzhen**

Shenzhen Sales office
Room 4A15, Block AB, Tianxiang Building, Chegongmiao , Futian District, Shenzhen, P.R of China
Tel: +86-0755-82570682

- **Xi'an**

Xi'an R&D Center
1703B, Building A, Greenland Center, Jinye Road, High-Tech Zone, Xi'an, Shaanxi, P.R of China