VSTD065R13ANB

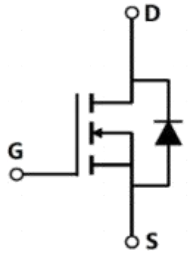
Datasheet

130mΩ, 650V, N-Channel Power MOSFET VSTD065R13ANB

General Description

$V_{(BR)DSS}$	$R_{DS(ON)\_max}$	I_D
650V	130mΩ@10V	25A

Symbol

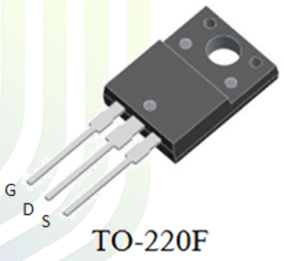


Symbol of VSTD065R13ANB

Features

- Low $R_{DS(on)}$ & FOM
- Extremely low switching loss
- Excellent stability and uniformity
- Ultra-fast and robust body diode

Package Type



TO-220F

Package Type of VSTD065R13ANB

Application

- PC power
- Telecom power
- Server power
- EV Charger
- Motor driver

Ordering Information

Product Name	Package	Marking
VSTD065R13ANB	TO-220F	STD065R13ANB

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

Parameter		Symbol	Rating	Unit
Drain-Source Voltage		V_{DS}	650	V
Gate-Source Voltage		V_{GS}	±30	V
Continuous Drain Current Note 1	T_C=25ºC	I_D	25	A
Pulsed Drain Current Note 2	T_C=25ºC	$I_{D, pulse}$	75	A
Continuous Diode Forward Current Note 1	T_C=25ºC	I_S	25	A
Diode Pulsed Current Note 2	T_C=25ºC	$I_{S, pulse}$	75	A
Max Power Dissipation Note 3	T_C=25ºC	P_D	121	W
Avalanche Current, Single Pulse Note 4		I_{AS}	6.8	A
Avalanche Energy, Single Pulse Note4		E_{AS}	1387	mJ
MOSFET dv/dt ruggedness, V_{DS}=0~480V		dv/dt	50	V/ns
Reverse diode dv/dt, V_{DS}=0~480V, I_{SD}<= I_D		dv/dt	50	V/ns
Operation and storage temperature		T_J,T_{STG}	-55 to 150	ºC

Thermal Resistance

Parameter	Symbol	Min	Typ	Max	Unit
Thermal Resistance, Junction-to-Case	$R_{θJC}$	-	1.03	-	ºC/W
Thermal Resistance, Junction-to-Ambient Note5	$R_{θJA}$	-	62.5	-	

Notes:

Note1: Calculated continuous current based on maximum allowable junction temperature.

Note2: Pulse width limited by safe operating area.

Note3: Based on max. junction temperature, using junction-case thermal resistance.

Note4: V_{DD}=100V, V_{GS}=10V, L=60mH, starting T_A=25 °C.

Note5: When mounted on 1 inch square copper board, t≤10sec. The value in any given application depends on the user's specific board design.

Electrical Characteristics (T_A= 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	650	-	-	V
Drain-Source Leakage Current		I_{DSS}	V_{DS}=650V, V_{GS}=0V	-	-	5	uA
Gate-Source Leakage Current	Forward	I_{GSSF}	V_{GS}=30V, V_{DS}=0V	-	-	100	nA
	Reverse	I_{GSSR}	V_{GS}=-30V, V_{DS}=0V	-	-	-100	
Gate Threshold Voltage		$V_{GS(TH)}$	V_{DS}=V_{GS}, I_D=250uA	3	4	5	V
Drain-Source On-State Resistance		$R_{DS(ON)}$	V_{GS}=10V, I_D=12.5A	-	118	130	mΩ
Gate Resistance		R_G	F=1MHz, Open Drain	-	4.39	-	Ω
Dynamic Characteristics							
Input Capacitance		C_{iss}	V_{DS}=50V	-	2244	-	pF
Output Capacitance		C_{oss}	V_{GS}=0V	-	148	-	pF
Reverse Transfer Capacitance		C_{rss}	f=100kHz	-	3.3	-	pF
Turn-on Delay Time		$t_{d(on)}$	V_{DS}=400V	-	16.57	-	ns
Rise Time		t_r	I_D=12.5A	-	5.4	-	
Turn-off Delay Time		$t_{d(off)}$	R_G=25Ω	-	41.36	-	
Fall Time		t_f	V_{GS}=10V	-	7	-	
Gate Charge Characteristics							
Gate to Source Charge		Q_{gs}	V_{DS}=400V	-	12.5	-	nC
Gate to Drain Charge		Q_{gd}	I_D=12.5A	-	17.87	-	
Gate Charge Total		Q_g	V_{GS}=0 to 10V	-	43.24	-	
Gate Plateau Voltage		$V_{Plateau}$		-	6.5	-	V
Reverse Diode Characteristics							
Drain-Source Diode Forward Voltage		V_{SD}	V_{GS}=0V, I_S=1A	-	0.7	1.4	V
Reverse Recovery Time		t_{rr}	V_R=400V	-	128	-	ns
Reverse Recovery Charge		Q_{rr}	I_S=12.5A	-	814	-	nC
Peak Reverse Recovery Current		I_{rrm}	di/dt=100A/us	-	10.9	-	A

Electrical Characteristics Diagrams

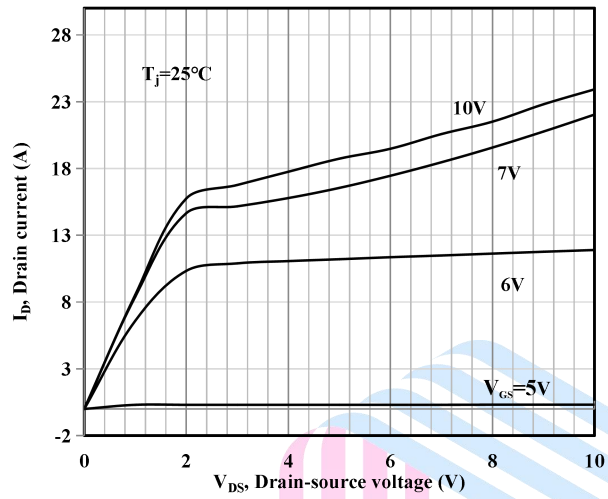


Figure 1. Typ. output characteristics

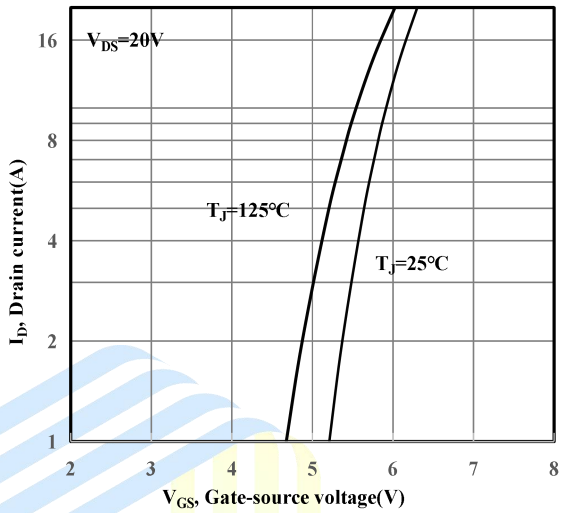


Figure 2. Typ. transfer characteristics

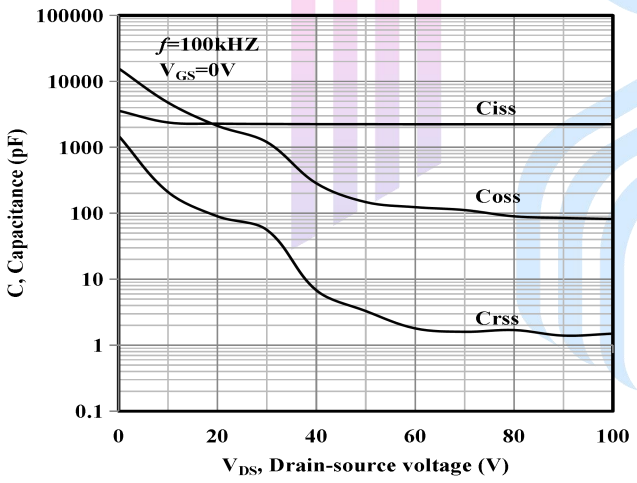


Figure 3. Typ. capacitances

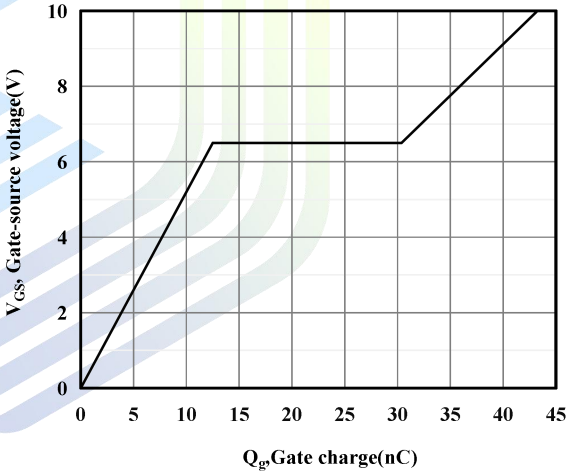


Figure 4. Typ. gate charge

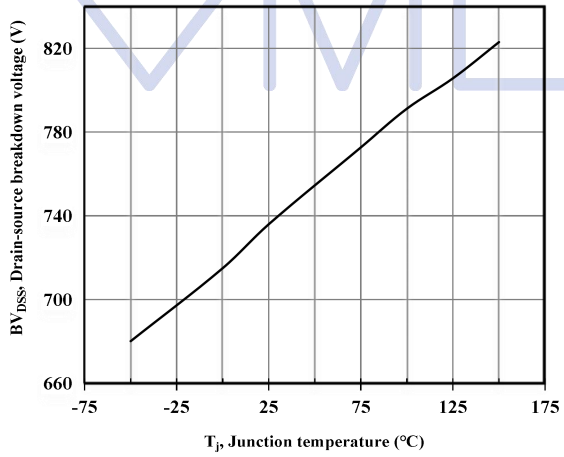


Figure 5. Drain-source breakdown voltage

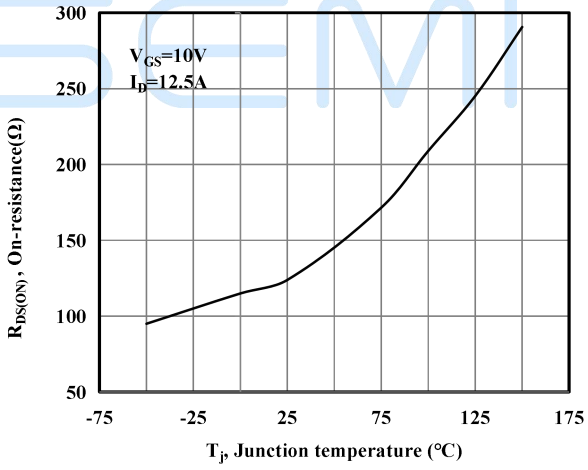


Figure 6. Drain-source on-state resistance

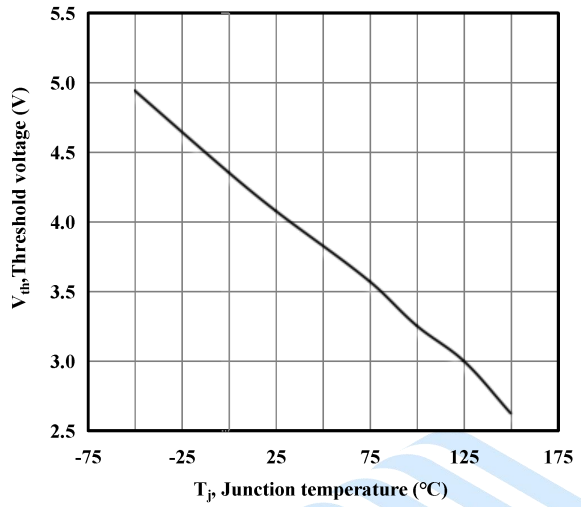


Figure 7. Threshold voltage

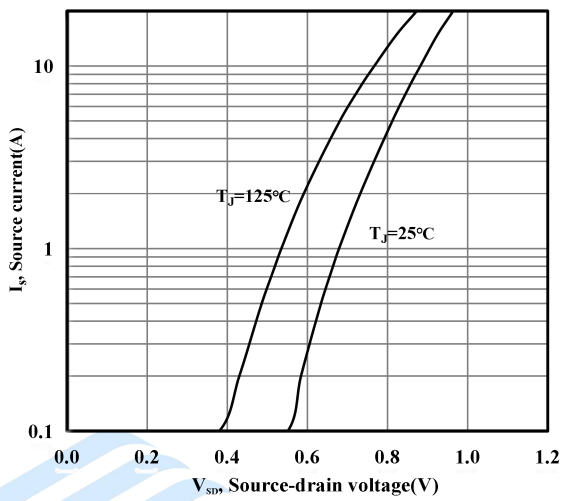


Figure 8. Forward characteristic of body diode

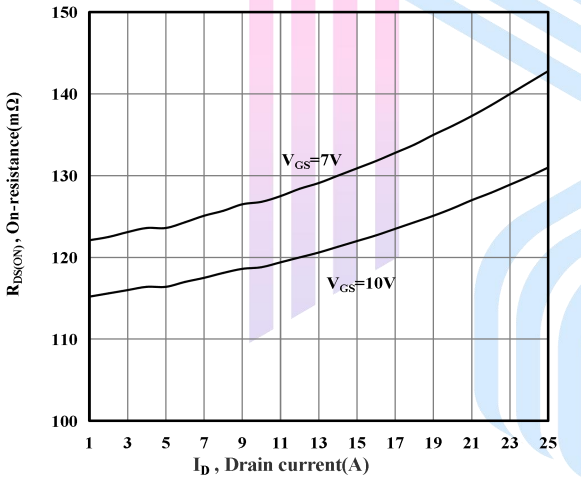


Figure 9. Drain-source on-state resistance

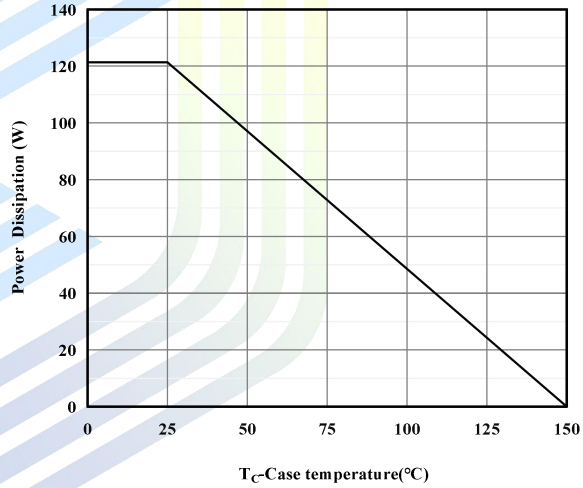


Figure 10. Power dissipation

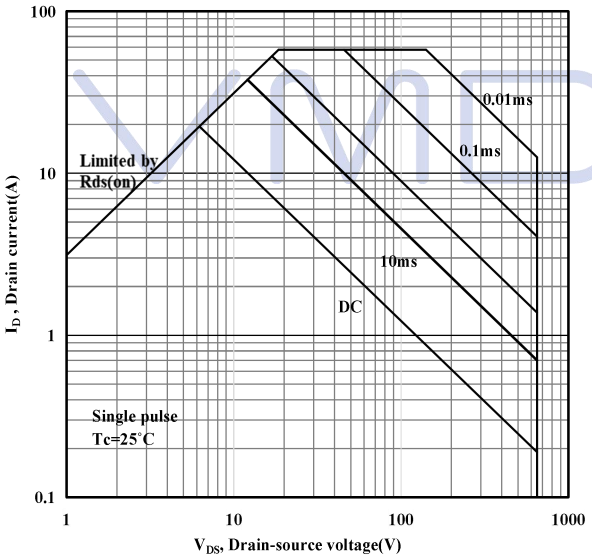


Figure 11. Safe operation area T_C=25℃

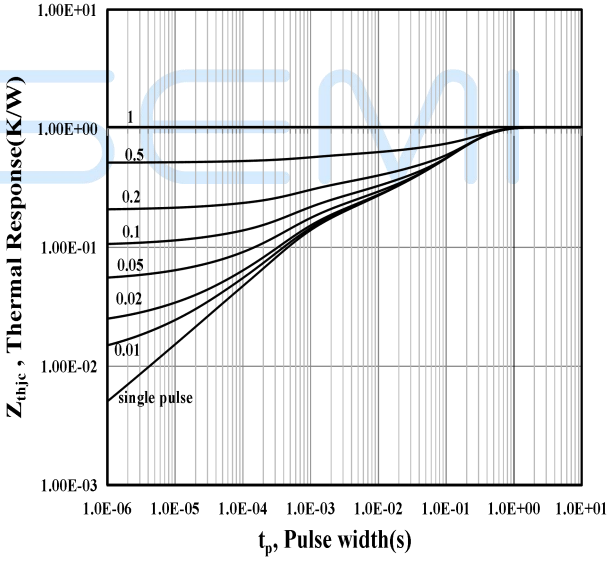
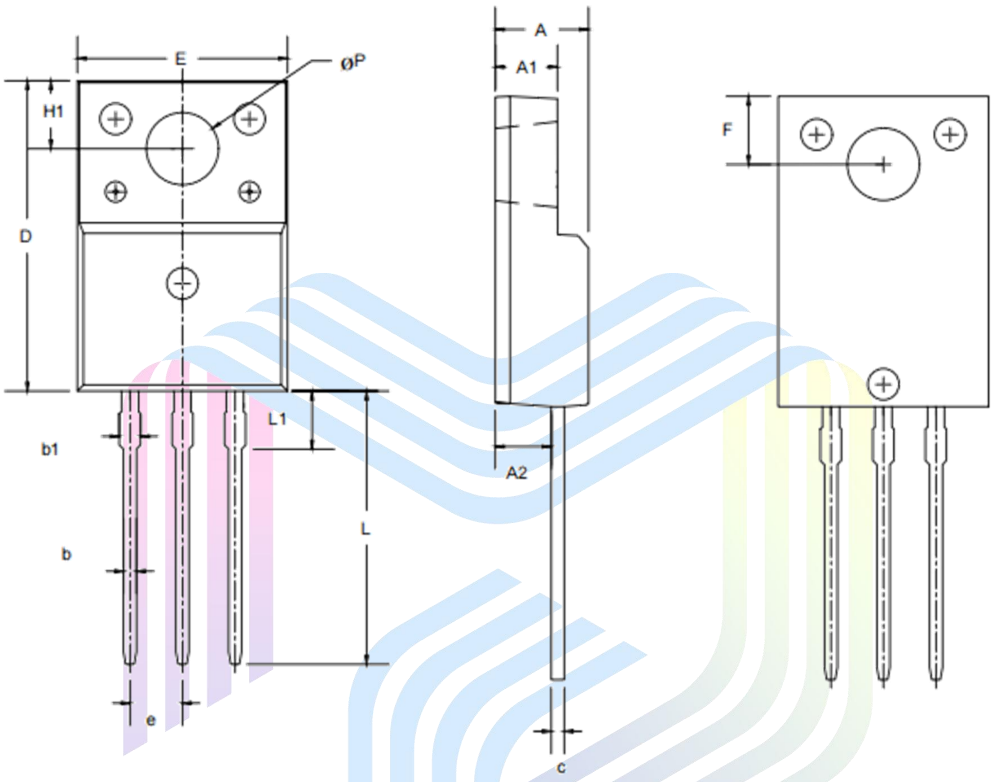


Figure 12. Max. transient thermal impedance

Mechanical Dimensions

TO-220F Package Information



COMMON DIMENSIONS
(UNITS OF MEASURE=MILLIMETER)

SYMBOL	MIN	MAX
A	4.50	4.90
A1	2.30	2.80
A2	2.50	2.90
b	0.70	0.95
b1	1.08	1.55
c	0.40	0.70
D	15.00	16.17
E	9.50	10.50
e	2.54BSC	
F	2.80	3.65
H1	6.7REF	
L	12.50	13.50
L1	2.90	3.90
ΦP	2.90	3.40

NOTICE

Hangzhou VMD Semiconductor Co., Ltd (VMD) reserves the right to make changes without notice in order to improve reliability, function or design and to discontinue any product or service without notice. Customers should obtain the latest relevant information before orders and should verify that such information is current and complete. All products are sold subject to VMD's terms and conditions supplied at the time of order acknowledgement.

VMD, its affiliates, agents, and employees, and all persons acting on its or their behalf, disclaim any and all liability for any errors, inaccuracies or incompleteness contained herein or in any other disclosure relating to any product.

VMD disclaims any and all liability arising out of the use or application of any product described herein or of any information provided herein to the maximum extent permitted by law. The product specifications do not expand or otherwise modify VMD's terms and conditions of purchase, including but not limited to the warranty expressed therein, which apply to these products.

VMD warrants performance of its hardware products to the specifications at the time of sale, testing, reliability and quality control are used to the extent VMD deems necessary to support this warrantee. Except where agreed upon by contractual agreement, testing of all parameters of each product is not necessarily performed.

VMD does not assume any liability arising from the use of any product or circuit designs described herein. Customers are responsible for their products and applications using VMD's components. To minimize risk, customers must provide adequate design and operating safeguards.

VMD does not warrant or convey any license to any intellectual property rights either expressed or implied under its patent rights, nor the rights of others. Reproduction of information in VMD's data sheets or data books is permissible only if reproduction is without modification or alteration. Reproduction of this information with any alteration is an unfair and deceptive business practice.

VMD is not responsible or liable for such altered documentation. Resale of VMD's products with statements different from or beyond the parameters stated by VMD for that product or service voids all express or implied warrantees for the associated VMD product or service and is an unfair and deceptive business practice.

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