VFTA010R054NA

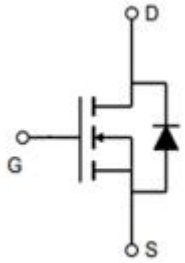
Datasheet

5.4mΩ, 100V, N-Channel Power MOSFET VFTA010R054NA

General Description

$V_{(BR)DSS}$	$R_{DS(ON)\_max}$	I_D
100V	5.4mΩ@10V	120A

Symbol



Symbol of VFTA010R054NA

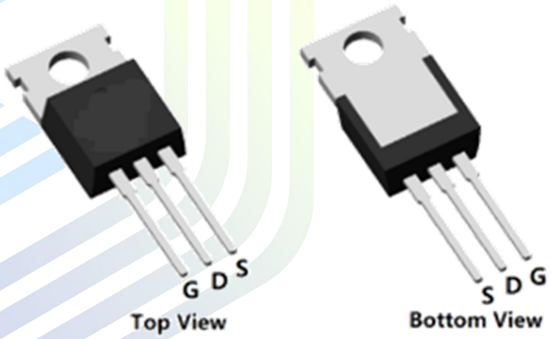
Features

- Extremely low R_{DSON}
- Excellent Low FOM
- Superior E_{AS} performance
- RoHS compliant
- Halogen-free

Application

- Motor Drivers
- DC-DC Converters
- Battery Management System

Package Type



Package Type of VFTA010R054NA

Ordering Information

Product Name	Package
VFTA010R054NA	TO-220

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

Parameter		Symbol	Rating	Unit
Drain-Source Voltage		V_{DS}	100	V
Gate-Source Voltage		V_{GS}	±20	V
Continuous Drain Current	T_C=25ºC Note 1	I_D	133	A
	T_C=25ºC Note 2		120	
	T_C=100ºC		84	
Pulsed Drain Current Note 3		$I_{D,\ pulse}$	480	A
Maximum Continuous Body-Diode Forward Current		I_S	120	A
Maximum Pulsed Body-Diode Forward Current Note 1		I_{SM}	480	A
Max Power Dissipation	T_C=25ºC	P_D	192	W
Avalanche Energy, Single Pulse Note4		E_{AS}	225	mJ
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	$R_{\theta JC}$	-	0.65	-	ºC/W
Thermal Resistance, Junction-to-Ambient Note5	$R_{\theta JA}$	-	55	-	

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. V_{DD}=50V, I_{AS}=30A, L=0.5mH, Rg=25Ω,starting T_J=25 °C.
5. Mount on minimum PCB layout4.

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	100	-	-	V
Drain-Source Leakage Current		I_{DSS}	V_{DS}=100V, V_{GS}=0V	-	-	1	uA
Gate-Source 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	2.0	3.0	4.0	V
Drain-Source On-State Resistance		$R_{DS(ON)}$	V_{GS}=10V, I_D=20A	-	4.5	5.4	mΩ
Dynamic Characteristics							
Input Capacitance		C_{iss}	V_{DS}=50V	-	4666	-	pF
Output Capacitance		C_{oss}	V_{GS}=0V	-	1038	-	pF
Reverse Transfer Capacitance		C_{rss}	f=1MHz	-	45	-	pF
Gate Resistance		R_G	F=1MHz, Open Drain	-	1.5	-	Ω
Gate to Source Charge		Q_{gs}	V_{DS}=50V	-	18	-	nC
Gate to Drain Charge		Q_{gd}	I_D=20A	-	12	-	
Gate Charge Total		Q_g	V_{GS}=10V	-	67	-	
Switching Characteristics							
Turn-on Delay Time		$t_{d(on)}$	V_{DS}=50V	-	26.5	-	ns
Rise Time		t_r	R_L=2.5Ω	-	32	-	
Turn-off Delay Time		$t_{d(off)}$	R_G=6.8Ω	-	65	-	
Fall Time		t_f	V_{GS}=10V	-	32.5	-	
Reverse Diode Characteristics							
Drain-Source Diode Forward Voltage		V_{SD}	V_{GS}=0V, I_S=1A	-	0.7	1.0	V
Reverse Recovery Time		t_{rr}	V_R=50V	-	57	-	ns
Reverse Recovery Charge		Q_{rr}	I_S=15A	-	106	-	nC
Peak Reverse Recovery Current		I_{rmm}	di/dt=100A/us	-	3	-	A

Electrical Characteristics Diagrams

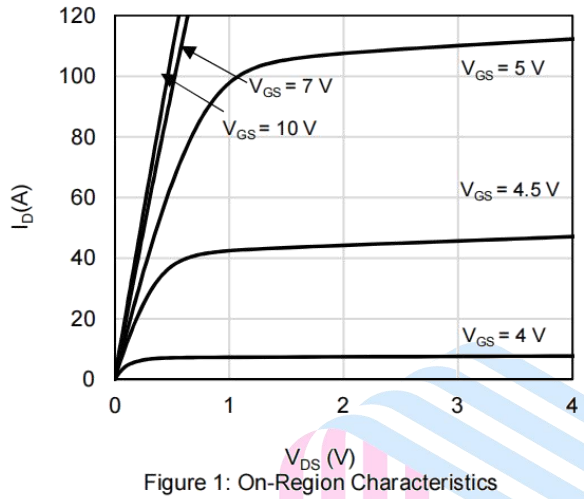


Figure 1: On-Region Characteristics

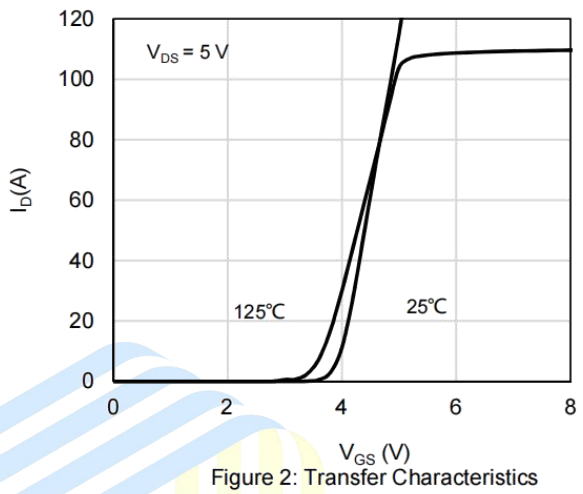


Figure 2: Transfer Characteristics

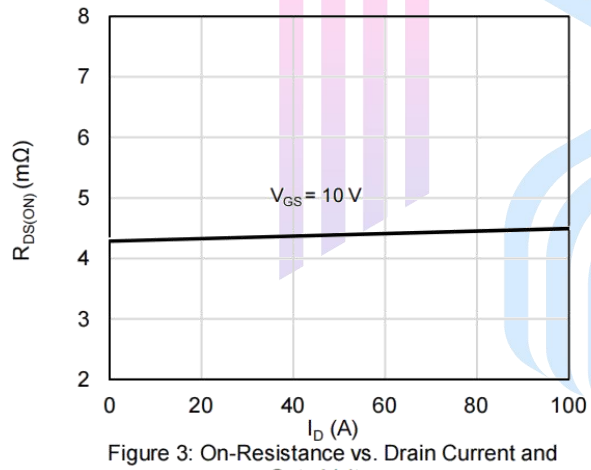


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

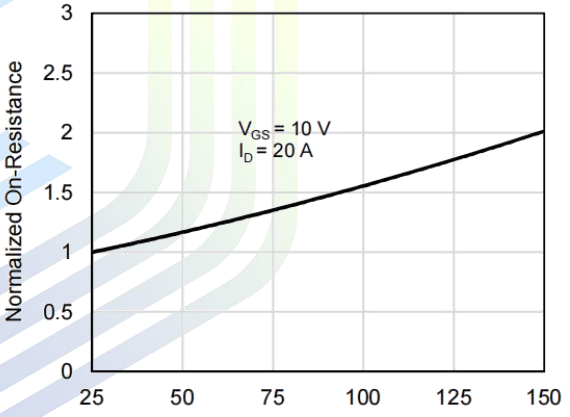


Figure 4: On-Resistance vs. Junction Temperature

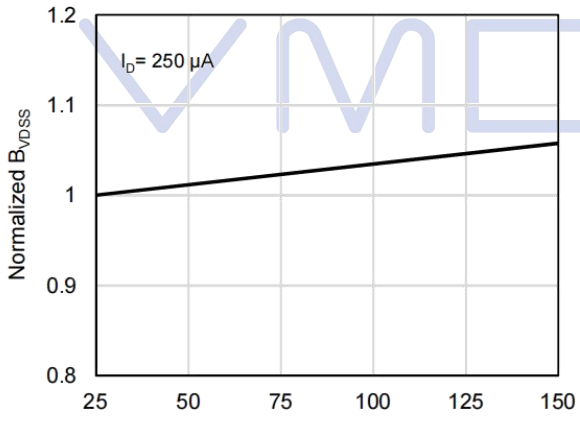


Figure 5: Breakdown Voltage vs. Junction Temperature

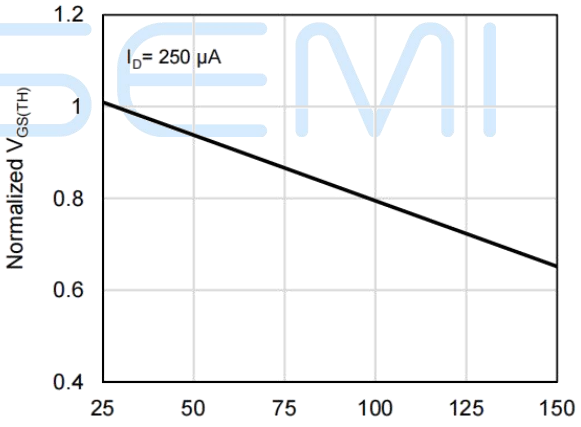


Figure 6: Threshold Voltage vs. Junction Temperature

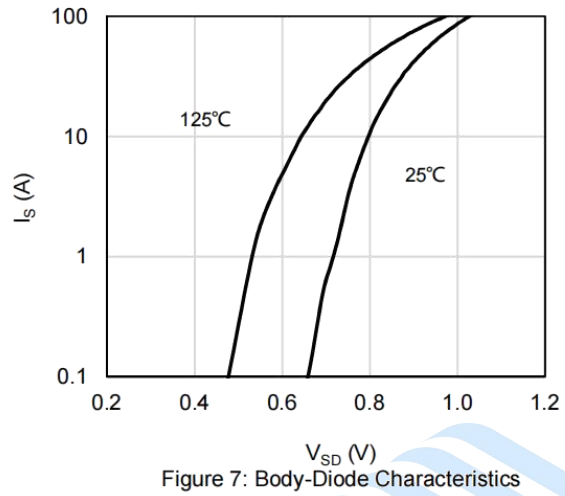


Figure 7: Body-Diode Characteristics

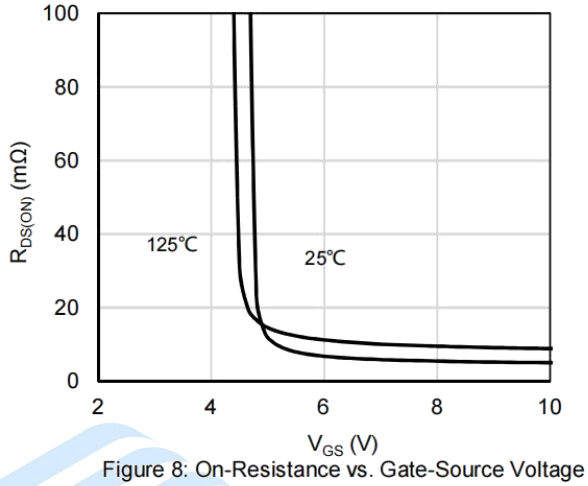


Figure 8: On-Resistance vs. Gate-Source Voltage

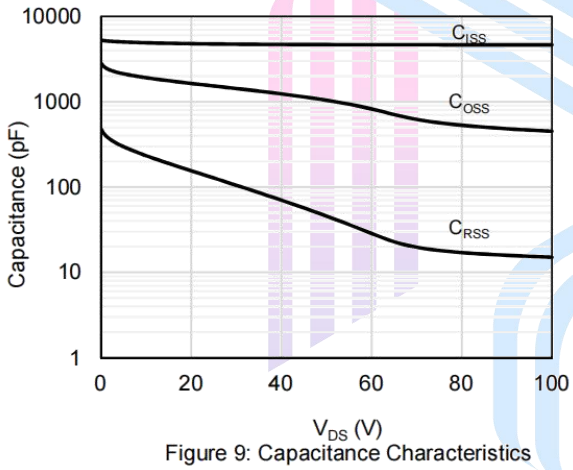


Figure 9: Capacitance Characteristics

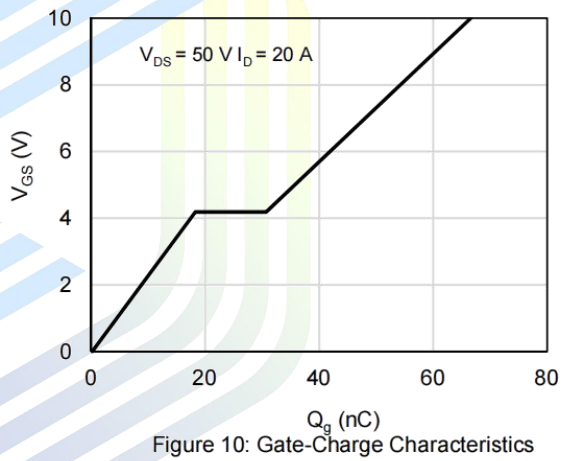


Figure 10: Gate-Charge Characteristics

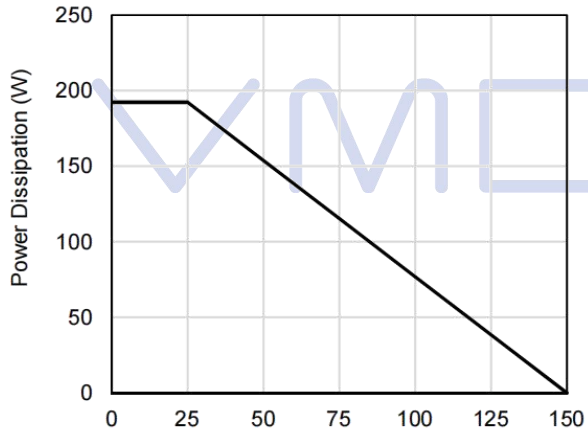


Figure 11: Power De-rating

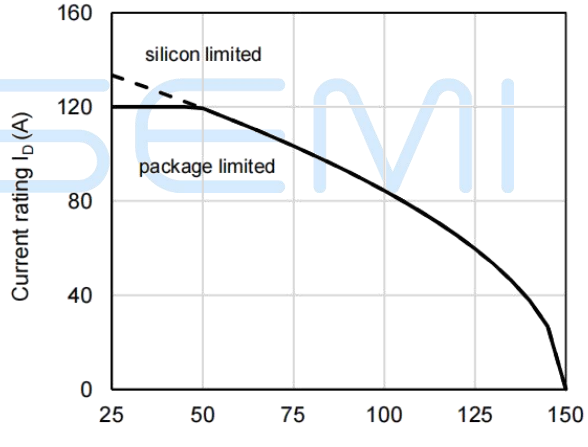


Figure 12: Current De-rating

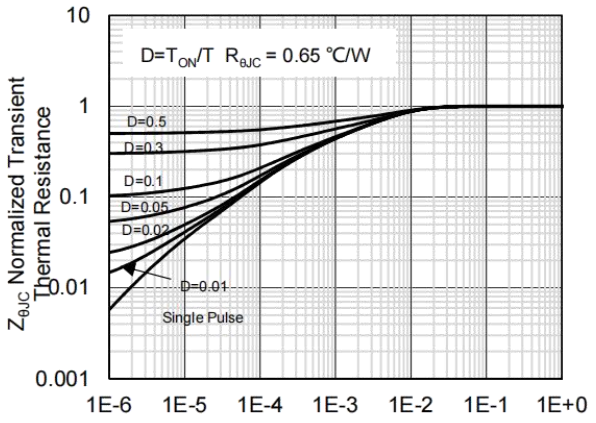


Figure 13: Normalized Maximum Transient Thermal Impedance

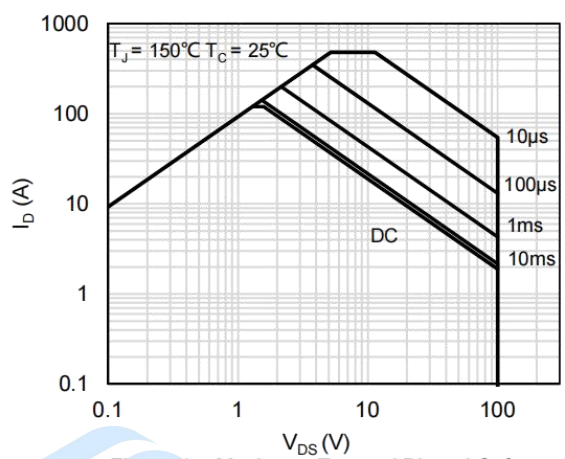
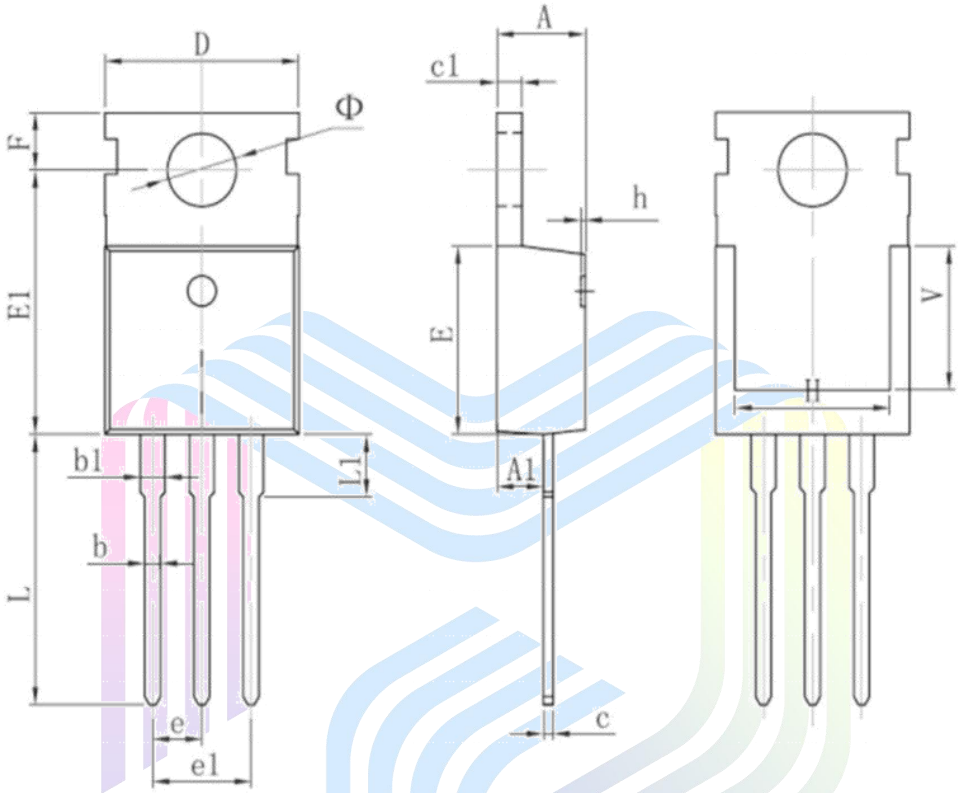


Figure 14: Maximum Forward Biased Safe Operating Area

Mechanical Dimensions

TO-220 Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	4.400	4.600	0.173	0.181
A1	2.250	2.550	0.089	0.100
b	0.710	0.910	0.028	0.036
b1	1.170	1.370	0.046	0.054
c	0.330	0.650	0.013	0.026
c1	1.200	1.400	0.047	0.055
D	9.910	10.250	0.390	0.404
E	8.950	9.750	0.352	0.384
E1	12.650	13.050	0.498	0.514
e	2.540 TYP.		0.100 TYP.	
e1	4.980	5.180	0.196	0.204
F	2.650	2.950	0.104	0.116
H	7.900	8.100	0.311	0.319
h	0.000	0.300	0.000	0.012
L	12.900	13.400	0.508	0.528
L1	2.850	3.250	0.112	0.128
V	6.900 REF.		0.276 REF.	
Φ	3.400	3.800	0.134	0.150

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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