P-Channel MOSFET, -30V, -32A, 20mΩ

General Description

The VAT03R0200AF utilizes the advanced Trench technology and low resistance package to achieve extremely low on-resistance device which makes the system design an efficient and reliable solution for use in a wide variety of applications.

Features

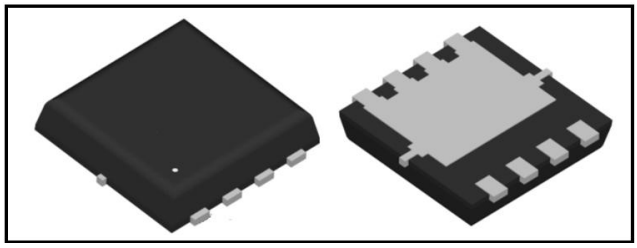
- -30V, -32A, $R_{DS(on)}$=20mΩ@Vgs=-10V
- High Efficiency
- Improved dv/dt, di/dt capability
- 100% EAS Guaranteed
- Green Device

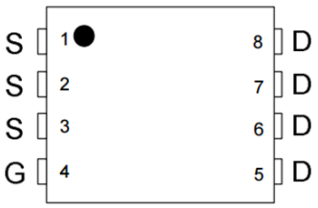
Application

Mother Board, VGA, SMPS

Product Summary

$V_{DS}@T_{j,max}$	-30 V
$R_{DS(on)}@V_{GS}$= -10V	20mΩ
I_D Continuous Current	-32 A





Absolute Maximum Ratings

Parameter	Symbol	Value	Unit	Condition
Drain-Source Voltage	V_{DS}	-30	V	
Continuous drain current(1)	I_D	-32 -20	A	T_C=25 ℃ T_C=100 ℃
Gate-Source Voltage	V_{GS}	±25	V	Static
Pulsed drain current(2)	I_{DM}	-65	A	T_C=25 ℃
Power dissipation @ T_C=25 ℃	P_{diss}	29	W	T_C=25 ℃
Continuous diode forward current	I_S	-32	A	T_C=25 ℃
Storage Temperature Range	T_{STG}	-55 to150	℃	
Operation Junction Temperature Range	T_J	-55 to 150	℃	

(1) Limited by T_{j_max}.

(2) Pulse width T_P limited by $T_{j,max}$

Thermal characteristics

Symbol	Parameter	Min	Typ	Max	Unit
R_{thJC}	Thermal resistance, junction-case	---	---	4.32	℃/W
R_{thJA}	Thermal resistance, junction-ambient	---	---	75	℃/W
T_{sold}	Soldering temperature	---	---	260	℃

Package and Ordering Information

Device	Package	Marking
VAT03R0200AF	PDFN 3x3	B3010

Electrical Characteristics (T_j=25 ℃, unless otherwise specified)

Parameter	Symbol	Min	Typ	Max	Unit	Test Condition
Static Characteristic						
Drain-Source breakdown Voltage	$V_{(BR)DSS}$	-30	---	---	V	V_{GS}=0V, I_D=-0.25mA
Gate Threshold Voltage	$V_{(GS)th}$	-1.0	---	-2.5	V	V_{DS}=V_{GS}, I_D=-0.25mA
Drain-Source on resistance	$R_{(DS)on}$	---	---	20	mΩ	V_{GS}=-10V, I_D=-15A, T_j=25° C
		---	---	32	mΩ	V_{GS}=-4.5V, I_D=-10A, T_j=25° C
Zero gate voltage drain current	I_{DSS}	---	---	1	uA	V_{DS}=-24V, V_{GS}=0V, T_j=25° C
Gate-Source leakage current	I_{GSS}	---	---	100	nA	V_{GS}= ±12V, V_{DS}=0V
Dynamic Characteristic						
Input Capacitance	C_{iss}	---	1345	---	pF	V_{GS}=0V, V_{DS}=-15V, f=1MHz
Output Capacitance	C_{oss}	---	194	---	pF	V_{GS}=0V, V_{DS}=-15V, f=1MHz
Reverse Recovery Capacitance	C_{rss}	---	158	---	pF	V_{GS}=0V, V_{DS}=-15V, f=1MHz
Turn-on delay time	$T_{d(on)}$	---	4.4	---	nS	V_{DD}=-15V, V_{GS}=-10V, I_D=-15A, R_G=3.3Ω;
Rise time	T_r	---	11.2	---	nS	
Turn-off delay time	$T_{d(off)}$	---	34	---	nS	
Fall time	T_f	---	18	---	nS	
Gate Charge Characteristic						
Gate to source charge	Q_{gs}	---	5.4	---	nC	V_{DD}=-15V, I_D=-15A, V_{GS}= -4.5V
Gate to drain charge	Q_{gd}	---	5	---	nC	
Gate charge total	Q_g	---	12.5	---	nC	
Reverse diode characteristic						
Diode forward voltage	V_{FD}	---	---	-1.2	V	V_{GS}=0V, I_F=1A, T_j=25° C
Continuous Source Current	I_{csc}	---	---	-32	A	V_G=V_D=0V, Force current
Pulsed Source Current	I_{sm}	---	---	-65	A	
Reverse Recovery Time	t_{rr}	---	12.4	---	nS	IF=-15A, dI/dt=100A/uS, T_j=25° C
Reverse Recovery Charge	Q_{rr}	---	5	---	nC	

Electrical Characteristic Diagrams

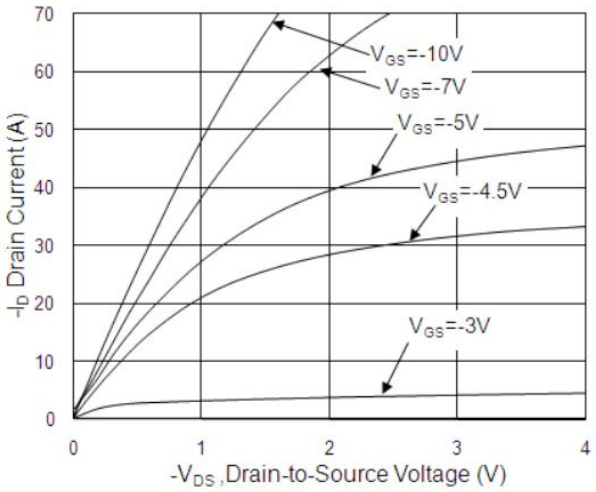


Figure 1 Typical Output Characteristic

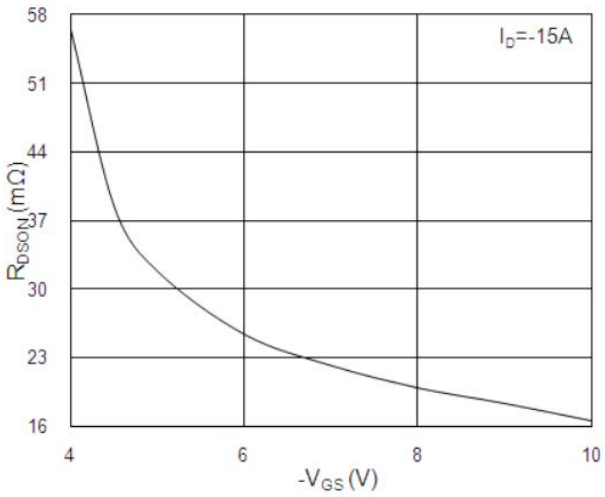


Figure 2 On-Resistance vs. GS voltage

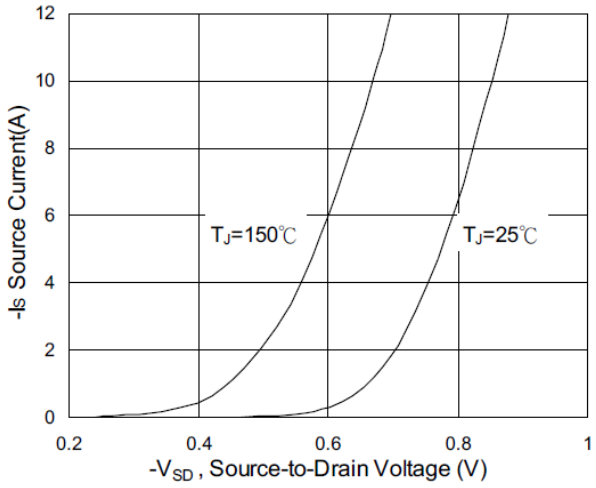


Figure 3 Forward Characteristic of Reverse

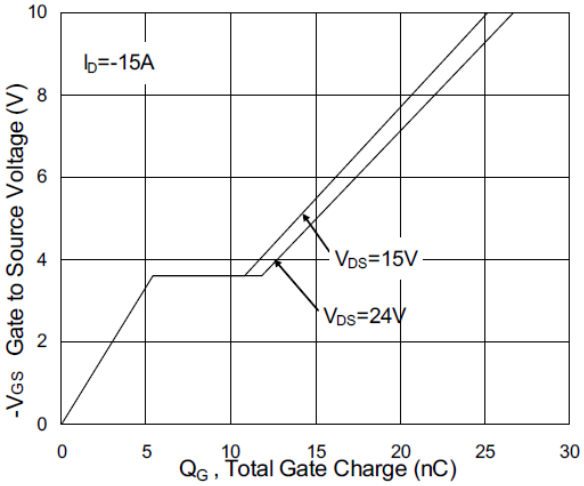


Figure 4 Gate Charge Waveform

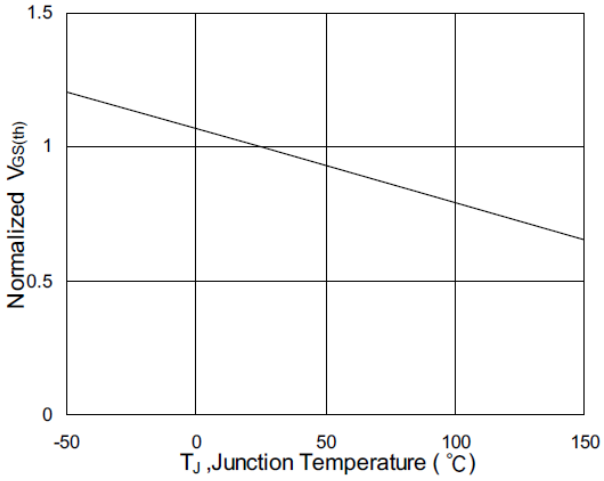


Figure 5 Normalized $V_{GS(th)}$ vs. T_J

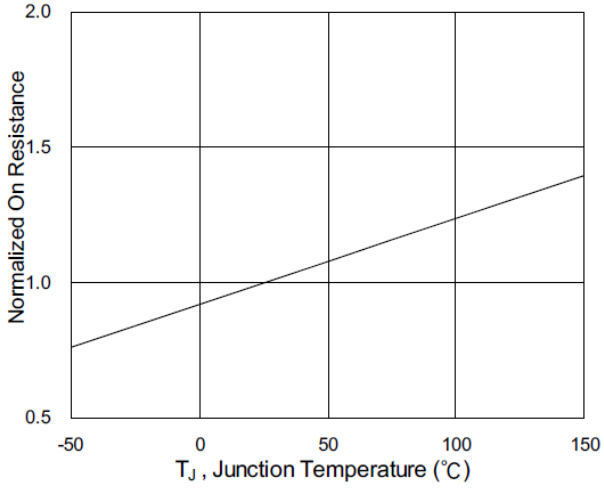


Figure 6 Normalized Rdson vs. T_J

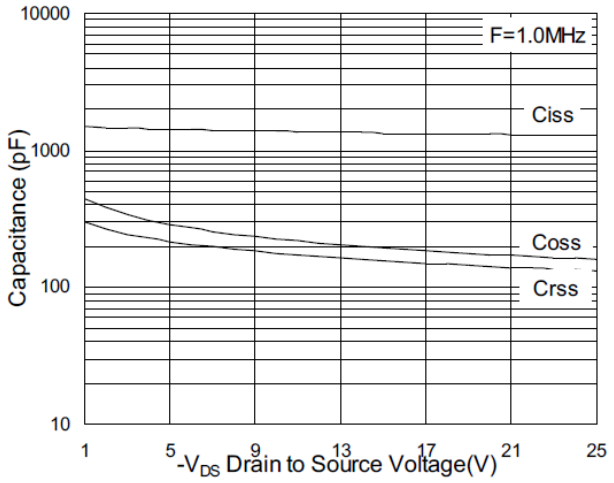


Figure 7 Capacitance Characteristic

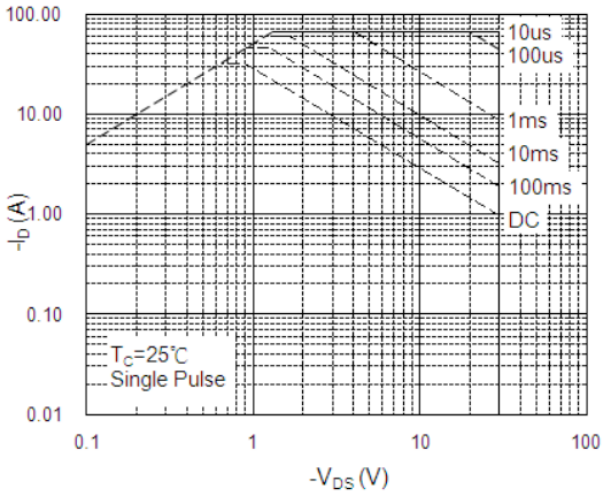


Figure 8 Safe Operating Area

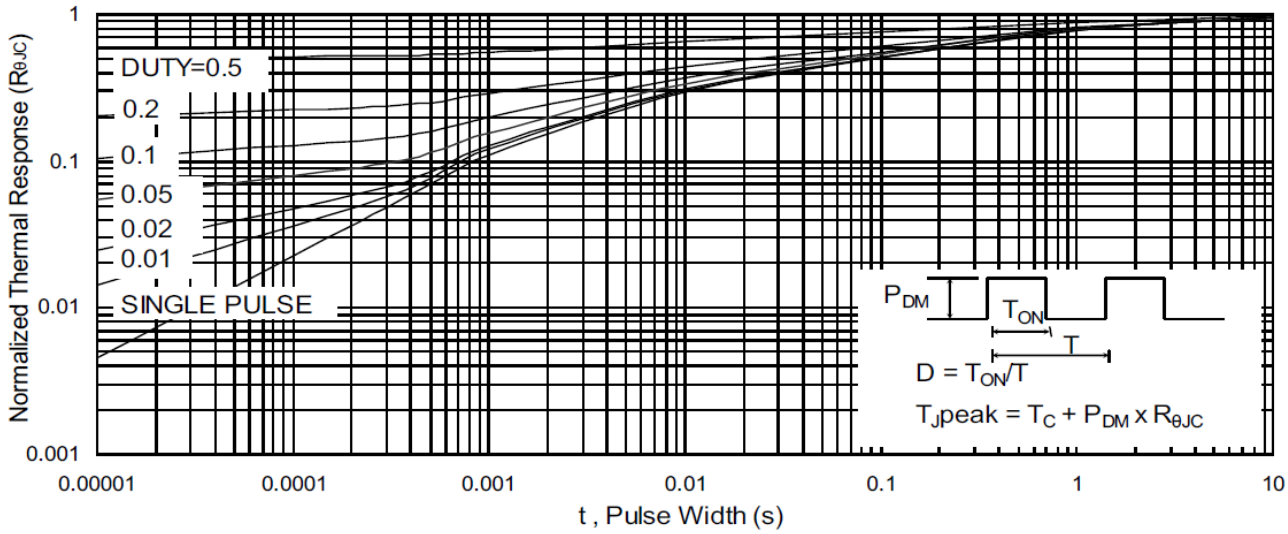


Figure 9 Normalized Maximum Transient Thermal Impedance

Parameter Test Circuits

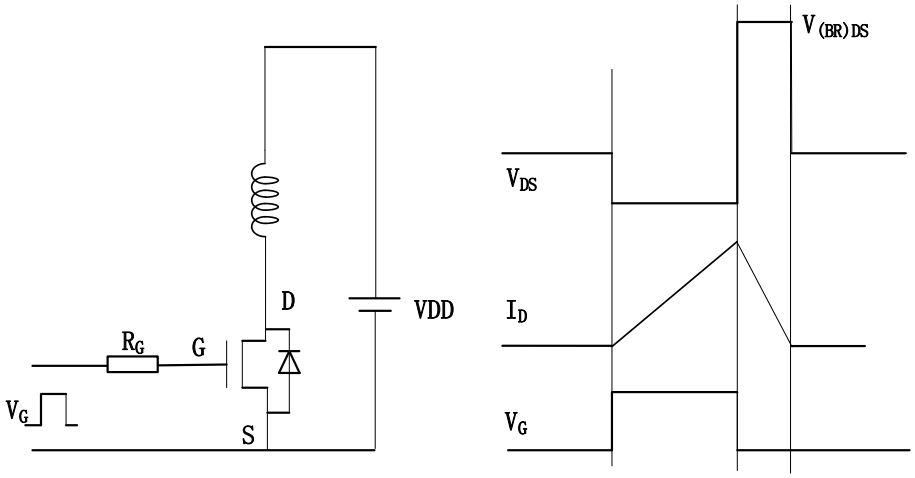


Figure 10 Unclamped Inductive Switching (UIS) Test circuit and waveforms

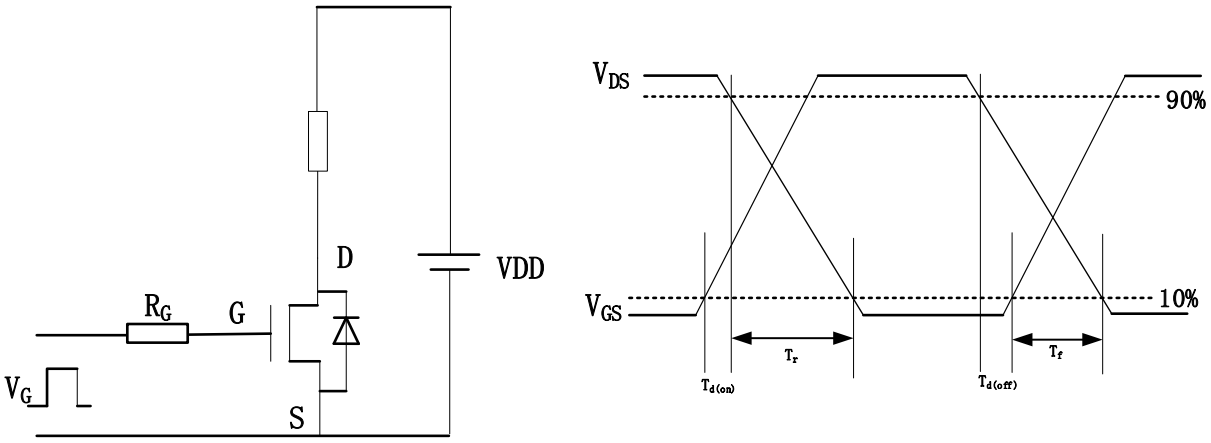


Figure 11 Resistive Switching time Test circuit and waveforms

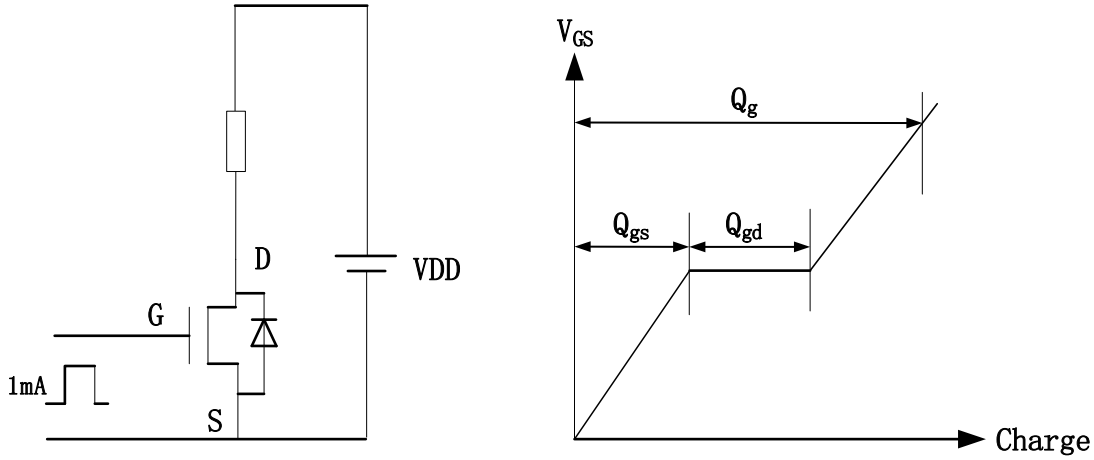
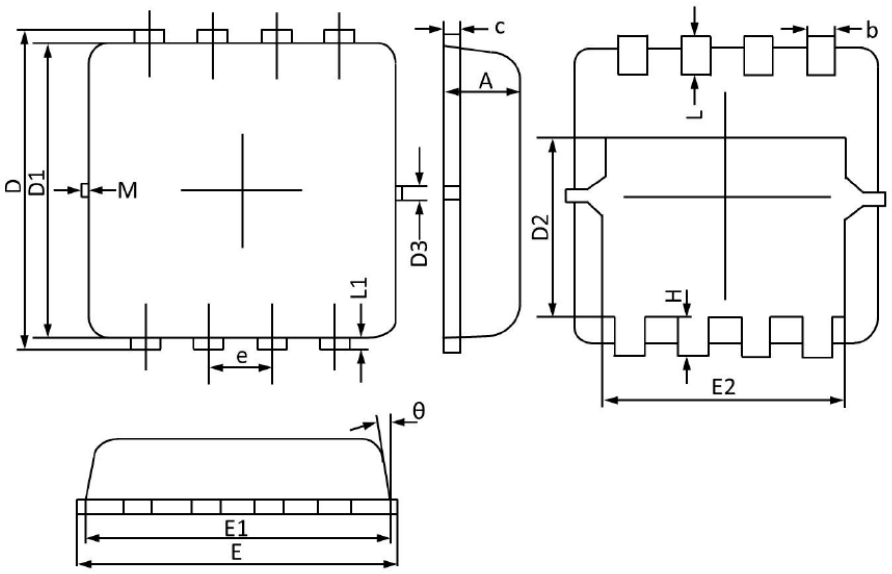


Figure 12 Gate charge Test circuit and waveforms

Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	0.700	0.800	0.028	0.031
b	0.250	0.350	0.010	0.013
c	0.100	0.250	0.004	0.009
D	3.250	3.450	0.128	0.135
D1	3.000	3.200	0.119	0.125
D2	1.780	1.980	0.070	0.077
D3	0.130 REF		0.005 REF	
E	3.200	3.400	0.126	0.133
E1	3.000	3.200	0.119	0.125
E2	2.390	2.590	0.094	0.102
e	0.650 BSC		0.026 BSC	
H	0.300	0.500	0.011	0.019
L	0.300	0.500	0.011	0.019
L1	0.130 REF		0.005 REF	
θ	0°	12°	0°	12°
M	0.150 REF		0.006 REF	