● General Description

The TF050N04MG combines advanced trench MOSFET technology with a low resistance package to provide extremely low $R_{DS(ON)}$ .This device is ideal for load switch and battery protection applications.

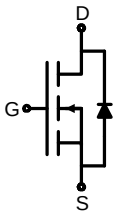
● Features

Advance high cell density Trench technology
Low $R_{DS(ON)}$ to minimize conductive loss
Low Gate Charge for fast switching
Low Thermal resistance

●Application

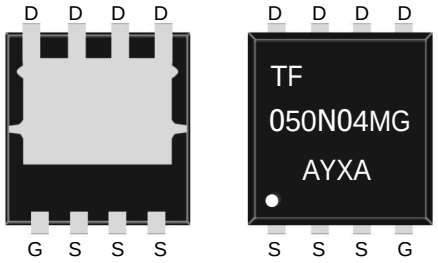
MB/VGA Vcore
SMPS 2nd Synchronous Rectifier
POL application
BLDC Motor driver

● Product Summary



V_{DS} =40V I_D=50A
$R_{DSON(10V\ typ)}$ =4.8mΩ
$R_{DSON(4.5V\ typ)}$ =7.5mΩ

RoHS compliant



PDFNWB3.3x3.3-8L

●Ordering Information:

Part NO.	TF050N04MG
Marking 1	050N04MG:TF050N04MG
Marking 2	TF:tuofeng; AA:device code; Y:year code; X:Week
MOQ	5000

●Absolute Maximum Ratings (T_C =25℃)

Parameter	**Symbol**	Rating	Unit
Drain-Source Voltage	V_{DS}	40	V
Gate-Source Voltage	V_{GS}	±20	V
Continuous Drain Current	$I_{D@}T_C$=25℃	50	A
	$I_{D@}T_C$=75℃	40	A
	$I_{D\ @}T_C$=100℃	30	A
Pulsed Drain Current ①	I_{DM}	150	A
Total Power Dissipation	$P_D@T_C$=25℃	55	W
Total Power Dissipation	$P_D@T_A$=25℃	2.0	W
Operating Junction Temperature	T_J	-55 to 150	℃
Storage Temperature	T_{STG}	-55 to 150	℃

Note: ① Pulse Test : Pulse width ≤ 300μs, Duty cycle ≤ 2% ;

Single Pulse Avalanche Energy	E_{AS}	120	mJ
Avalanche Current	I_{AS} I_{AR}	20	A

●Thermal resistance

Parameter	Symbol	Min.	Typ.	Max.	Unit
Thermal resistance, junction - case	R_{thJC}	-	-	3.2	° C/W
Thermal resistance, junction - ambient	R_{thJA}	-	-	57	° C/W
Soldering temperature, wave soldering for 8s	T_{sold}	-	-	265	° C

●Electronic Characteristics

Parameter	Symbol	Condition	Min.	Typ	Max.	Unit
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS} =0V,I_D =250uA	40			V
Gate Threshold Voltage	$V_{GS(TH)}$	V_{GS} =V_{DS}, I_D =250uA	1.0	1.5	2.5	V
Drain-Source Leakage Current	I_{DSS}	V_{DS}=40V, V_{GS} =0V			1.0	uA
Gate- Source Leakage Current	I_{GSS}	V_{GS}=±20V ,V_{DS} =0V			±100	nA
Static Drain-source On Resistance	$R_{DS(ON)}$	V_{GS}=10V, I_D=20A		4.8	6.5	mΩ
		V_{GS}=4.5V, I_D=15A		7.5	9.0	mΩ
Forward Transconductance	g_{FS}	V_{DS} =25V, I_D=20A		10		S
Source-drain voltage	V_{SD}	Is=20A			1.20	V

●Electronic Characteristics

Parameter	Symbol	Condition	Min.	Typ	Max.	Unit
Input capacitance	Ciss	Vds=20V,Vgs=0V f = 1MHz	-	1048	-	pF
Output capacitance	Coss		-	187	-	
Reverse transfer capacitance	Crss		-	178	-	

●Gate Charge characteristics(T_a = 25℃)

Parameter	Symbol	Condition	Min.	Typ	Max.	Unit
Gate Risistance	R_g	f = 1MHz		1.5		Ω
Total gate charge	Qg	V_{DD} = 20V	-	28.0	-	nC
Gate - Source charge	Qgs	I_D = 20A	-	4.00	-	
Gate - Drain charge	Qgd	V_{GS} = 10V	-	6.00	-	
Turn-ON Delay time	$t_{D(on)}$	V_{GS}=10V ,V_{DS}=20V R_G =3.0Ω, I=20A		4.80		ns
Turn-ON Rise time	t_r			57.0		ns
Turn-Off Delay time	$t_{D(off)}$			17.8		ns
Turn-Off Fall time	t_f			51.0		ns

Fig.1 Power Dissipation

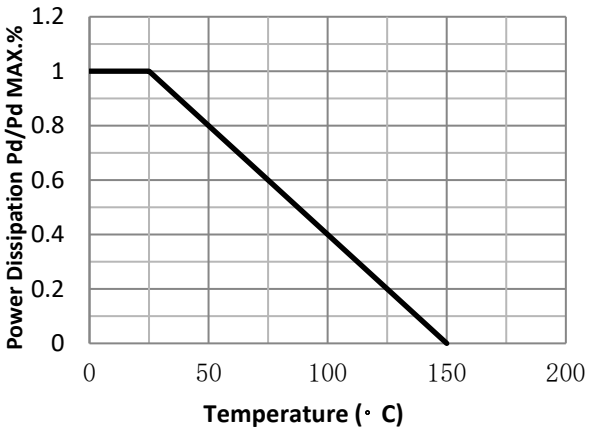


Fig.2 Typical output Characteristics

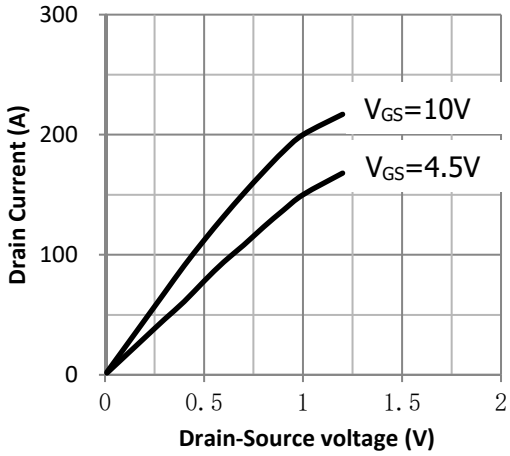


Fig.3 Threshold Voltage V.S Junction Temperature

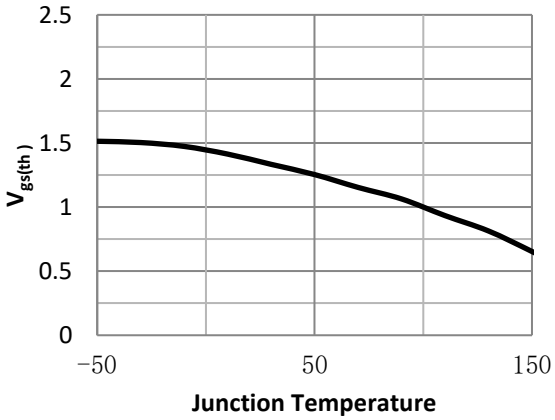


Fig.4 Resistance V.S Drain Current

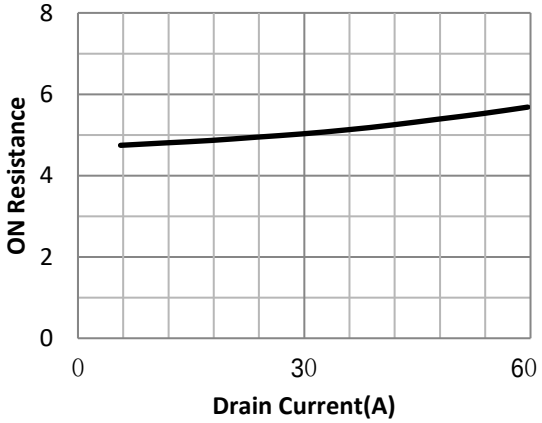


Fig.5 On-Resistance VS Gate Source Voltage

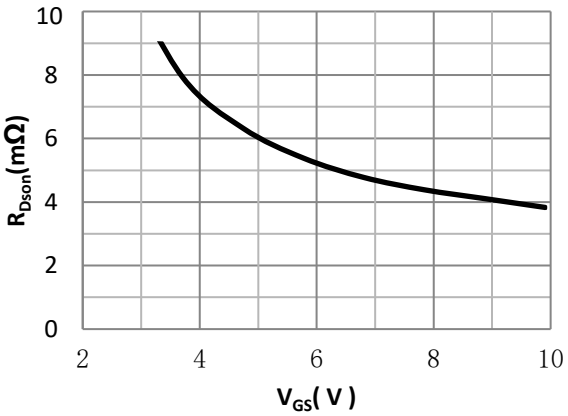


Fig.6 On-Resistance V.S Junction Temperature

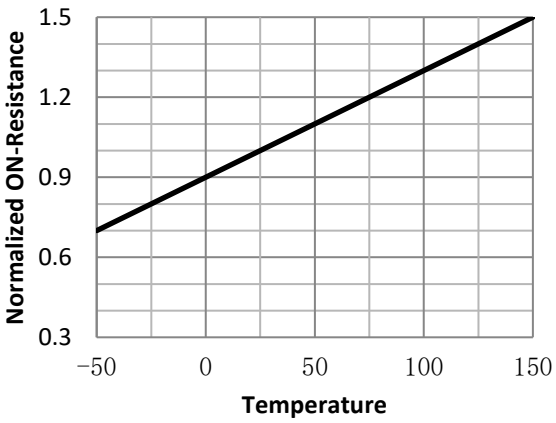


Fig.7 Switching Time Measurement Circuit

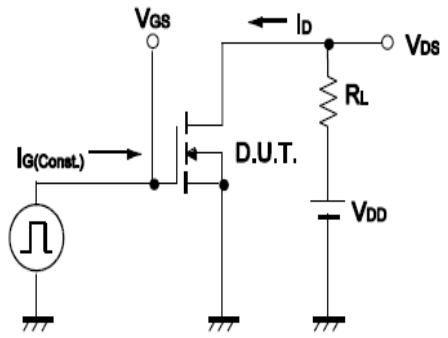


Fig.8 Gate Charge Waveform

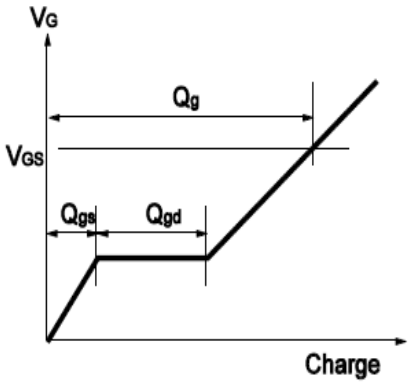


Fig.9 Switching Time Measurement Circuit

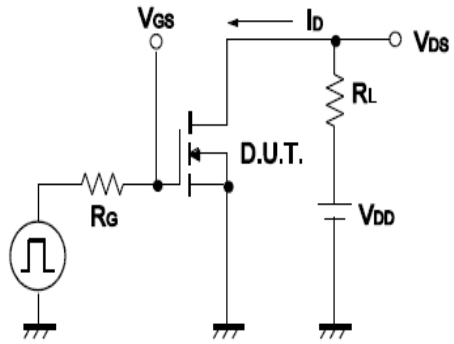


Fig.10 Gate Charge Waveform

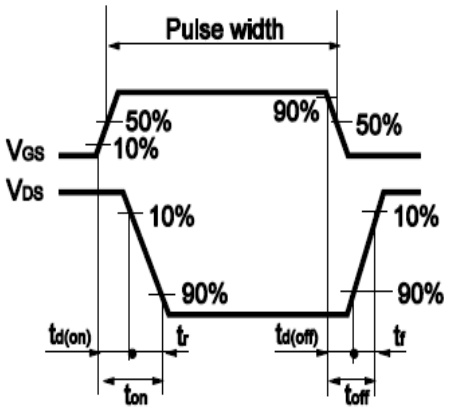


Fig.11 Avalanche Measurement Circuit

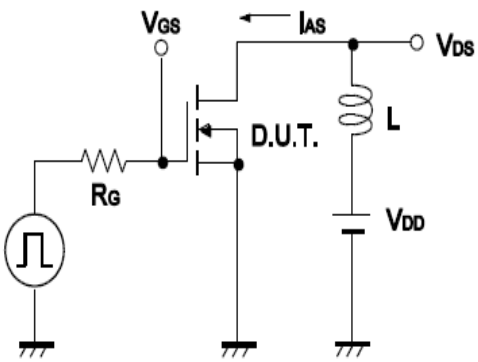
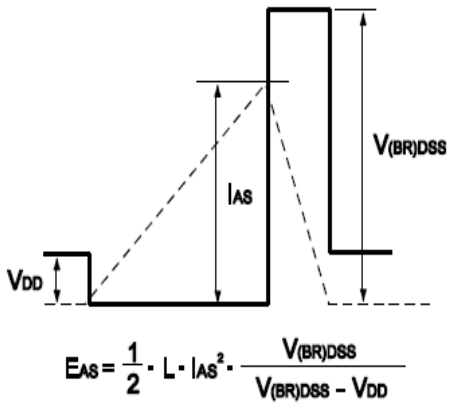
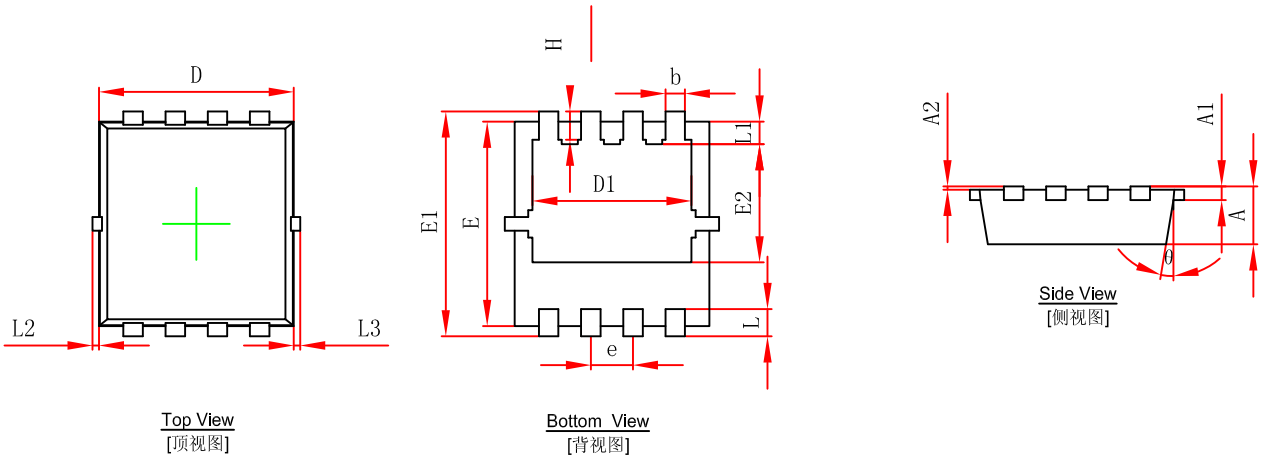


Fig.12 Avalanche Waveform



PDFNWB3.3x3.3-8L Package Outline Dimensions

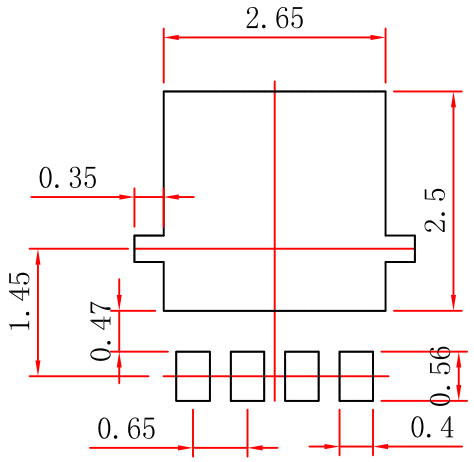


Top View
[顶视图]

Bottom View
[背视图]

Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	0.650	0.850	0.026	0.033
A1	0.152 REF.		0.006 REF.	
A2	0~0.05		0~0.002	
D	2.900	3.100	0.114	0.122
D1	2.300	2.600	0.091	0.102
E	2.900	3.100	0.114	0.122
E1	3.150	3.450	0.124	0.136
E2	1.535	1.935	0.060	0.076
b	0.200	0.400	0.008	0.016
e	0.550	0.750	0.022	0.030
L	0.300	0.500	0.012	0.020
L1	0.180	0.480	0.007	0.019
L2	0~0.100		0~0.004	
L3	0~0.100		0~0.004	
H	0.315	0.515	0.012	0.020
θ	9°	13°	9°	13°

PDFNWB3.3x3.3-8L Suggested Pad Layout



Note:
1.Controlling dimension:in millimeters.
2.General tolerance:±0.05mm.
3.The pad layout is for reference purposes only.