

General Description

The TF050N02M combines advanced trench MOSFET technology with a low resistance package to provide extremely low $R_{DS(ON)}$.

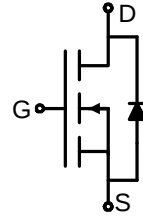
Features

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

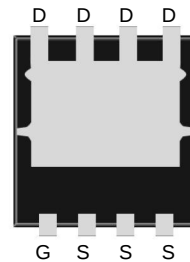
Product Summary



$$V_{DS} = 20V \quad I_D = 60A$$

$$R_{DS(ON)}(4.5V \text{ typ}) = 4.3m\Omega$$

$$R_{DS(ON)}(2.5V \text{ typ}) = 6.2m\Omega$$



PDFNWB3.3x3.3-8L

Ordering Information:

Part NO.	TF050N02M
Marking1	050N02M:TF050N02M
Marking2	TF:tuofeng; Y:year code; X:Week; AA:device code;
Basic ordering unit (pcs)	5000

Absolute Maximum Ratings ($T_J=25^\circ\text{C}$,unless otherwise notse)

Parameter	Symbol	Rating	Unit
Drain-Source Voltage	V_{DS}	20	V
Gate-Source Voltage	V_{GS}	± 12	V
Continuous Drain Current	$I_{D@T_C=25^\circ\text{C}}$	60	A
	$I_{D@T_C=75^\circ\text{C}}$	42	A
	$I_{D@T_C=100^\circ\text{C}}$	36	A
Pulsed Drain Current ^①	I_{DM}	180	A
Total Power Dissipation ^②	$P_D@T_C=25^\circ\text{C}$	20	W
Total Power Dissipation	$P_D@T_A=25^\circ\text{C}$	1.5	W
Operating Junction Temperature	T_J	-55 to 150	$^\circ\text{C}$
Storage Temperature	T_{STG}	-55 to 150	$^\circ\text{C}$

●Thermal resistance

Parameter	Symbol	Min.	Typ.	Max.	Unit
Thermal resistance, junction - case ^②	R _{thJC}	-	-	2.9	° C/W
Thermal resistance, junction - ambient	R _{thJA}	-	-	53	° C/W
Soldering temperature, wavesoldering for 8s	T _{sold}	-	-	265	° C

●Electronic Characteristics(T_j=25 ,unless otherwise notse)

Parameter	Symbol	Condition	Min.	Typ	Max.	Unit
Drain-Source Breakdown Voltage	BV _{DSS}	V _{GS} =0V, I _D =250uA	20			V
Gate Threshold Voltage	V _{GS(TH)}	V _{GS} =V _{DS} , I _D =250uA	0.50	0.67	0.95	V
Drain-Source Leakage Current	I _{DSS}	V _{DS} =20V, V _{GS} =0V			1.0	uA
Gate- Source Leakage Current	I _{GSS}	V _{GS} =±12V, V _{DS} =0V			±100	nA
Static Drain-source On Resistance	R _{DS(ON)}	V _{GS} =4.5V, I _D =20A		4.3	5.2	mΩ
		V _{GS} =2.5V, I _D =15A		6.2	7.2	mΩ
Forward Transconductance	g _{FS}	V _{DS} =10V, I _D =20A		10		S
Source-drain voltage	V _{SD}	I _S =20A		0.80	1.00	V

●Electronic Characteristics

Parameter	Symbol	Condition	Min.	Typ	Max.	Unit
Input capacitance	C _{iss}	V _{DD} =10V f = 1MHz V _{GS} = 0V	-	1400	-	pF
Output capacitance	C _{oss}		-	318.9	-	
Reverse transfer capacitance	C _{rss}		-	307.6	-	

●Gate Charge characteristics(T_j=25 ,unless otherwise notse)

Parameter	Symbol	Condition	Min.	Typ	Max.	Unit
Total gate charge	Q _g	V _{DD} =10V I _D = 15A V _{GS} = 4.5V	-	21.4	-	nC
Gate - Source charge	Q _{gs}		-	3.58	-	
Gate - Drain charge	Q _{gd}		-	2.45	-	

Note:

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

② Device mounted on FR-4 substrate PC board, 2oz copper, with thermal bias to bottom layer 1inch square copper plate;

Fig.1 Gate-Charge Characteristics

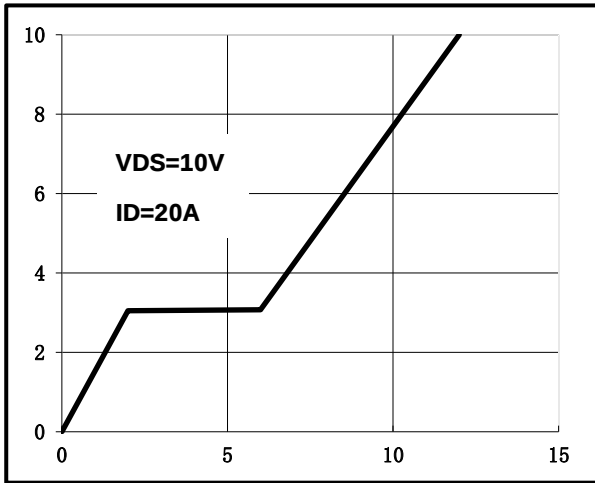


Fig.2 Capacitance Characteristics

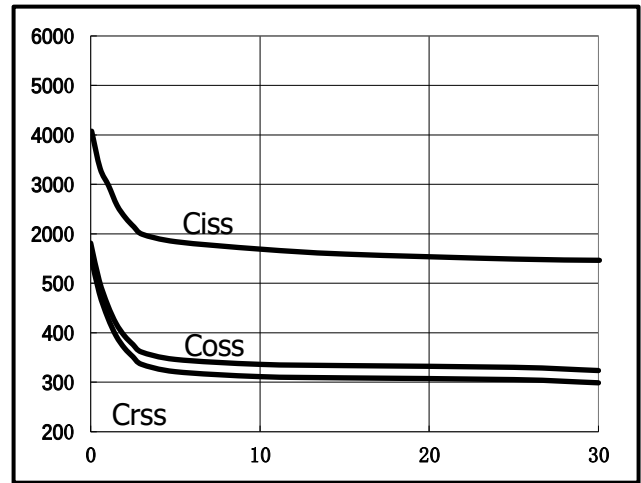


Fig.3 Power Dissipation Derating Curve

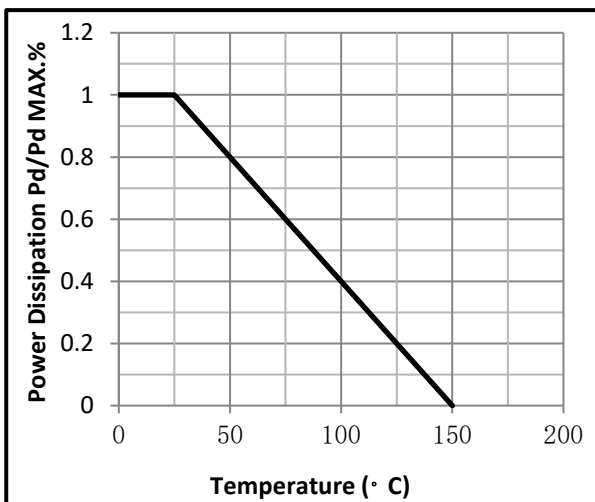


Fig.4 Typical output Characteristics

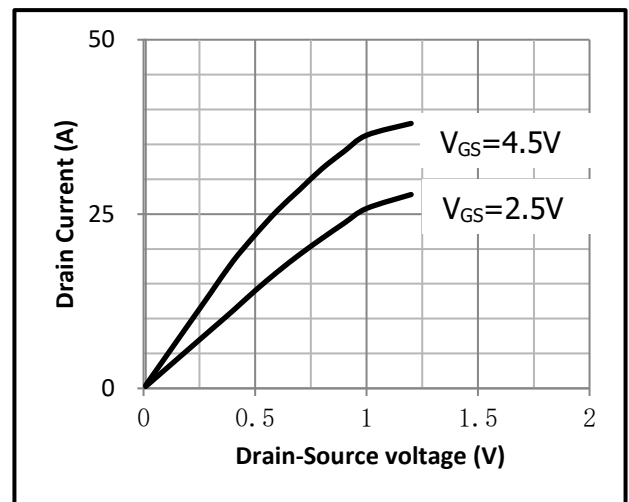


Fig.5 Threshold Voltage V.S Junction Temperature

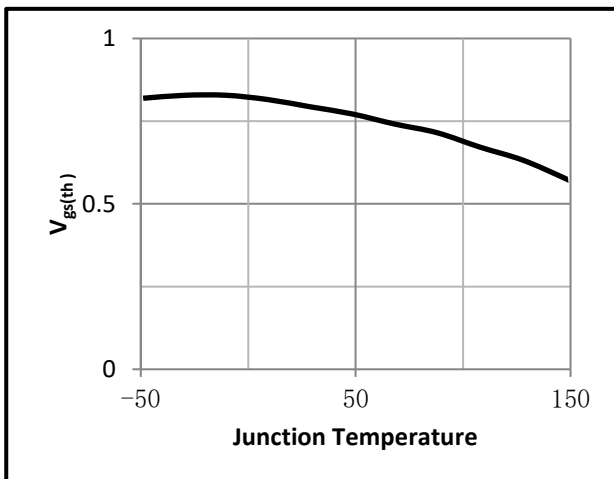


Fig.6 Resistance V.S Drain Current

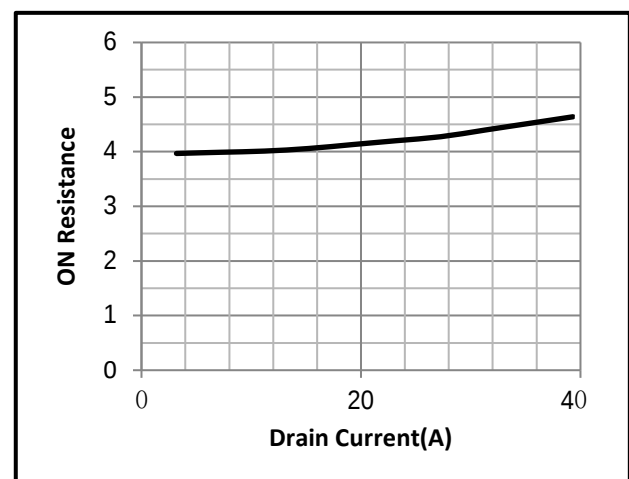


Fig.7 On-Resistance VS Gate Source Voltage

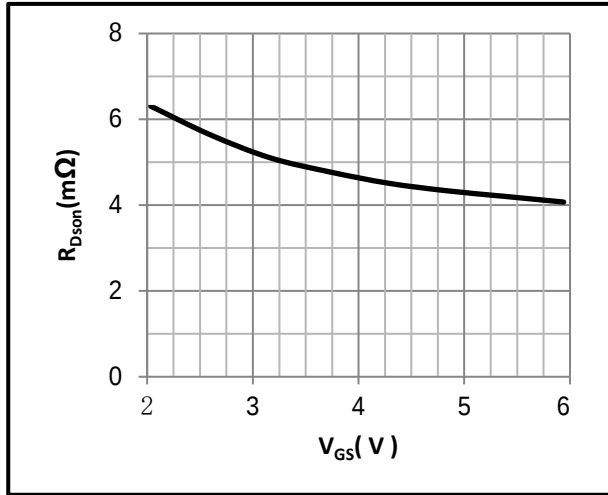


Fig.8 On-Resistance V.S Junction Temperature

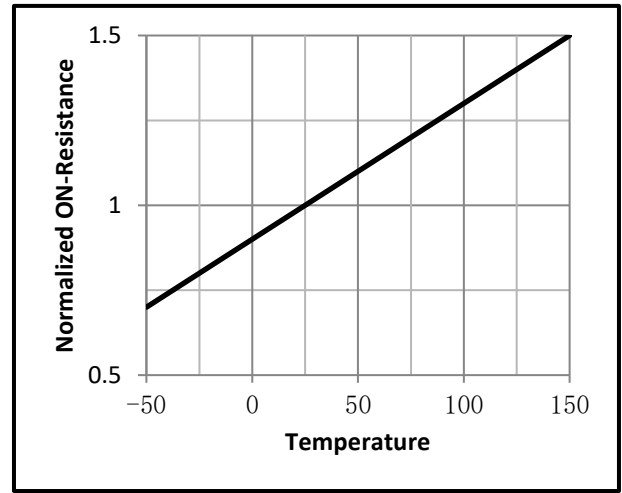


Fig.9 Switching Time Measurement Circuit

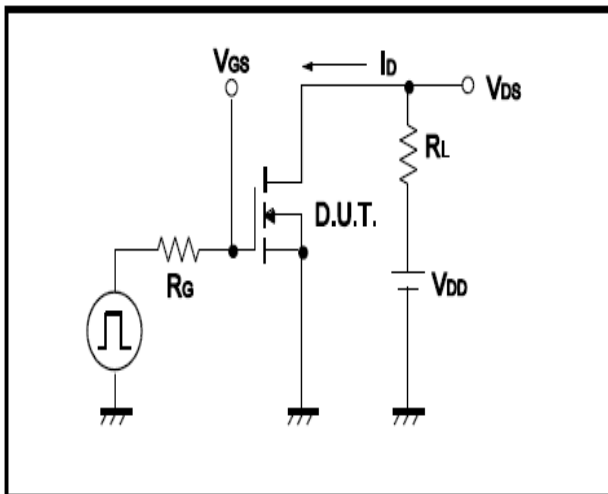


Fig.10 Gate Charge Waveform

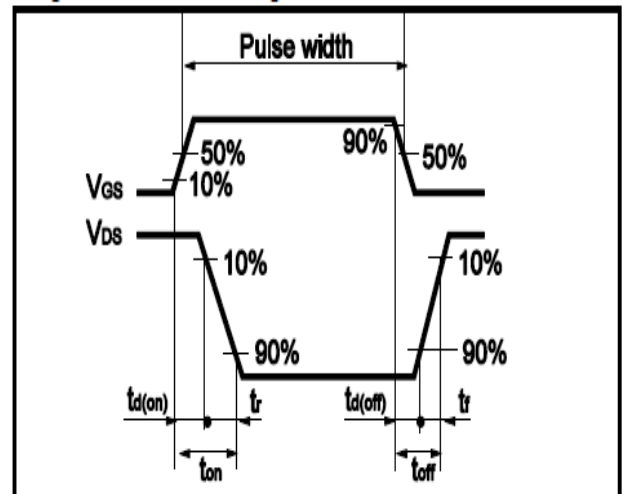


Fig.11 Avalanche Measurement Circuit

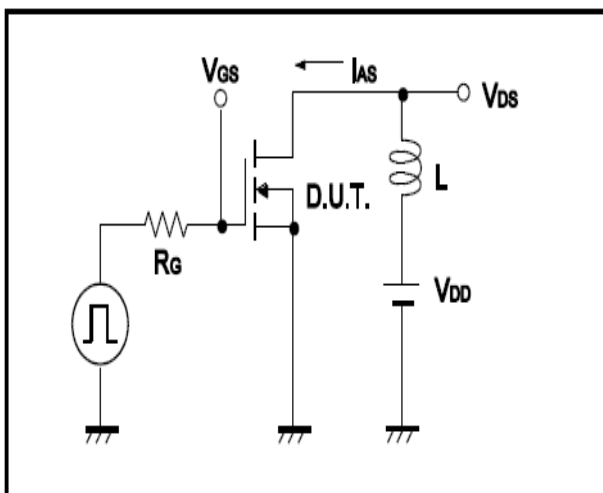
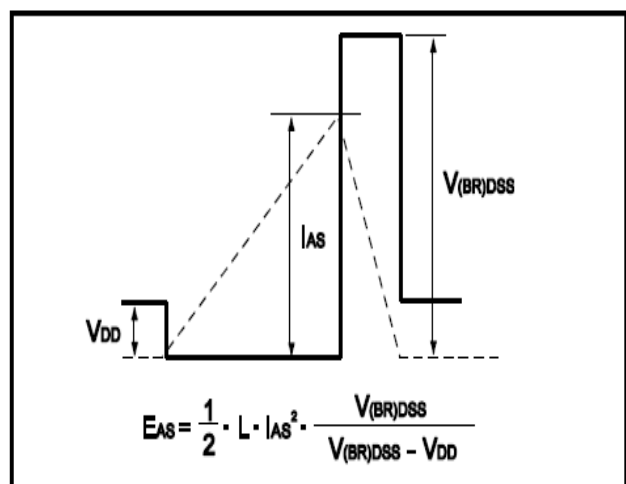
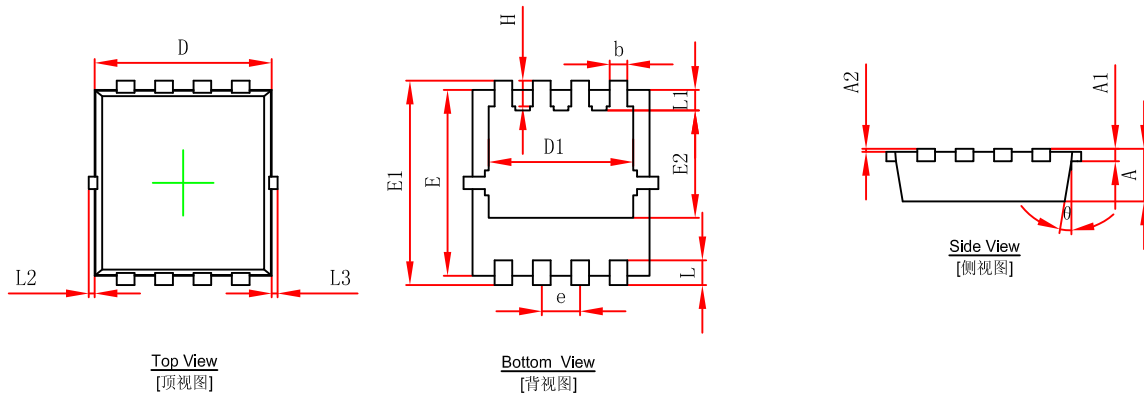


Fig.12 Avalanche Waveform

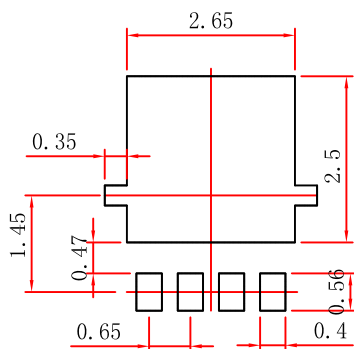


PDFNWB3.3x3.3-8L Package Outline Dimensions



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: $\pm 0.05\text{mm}$.
 3. The pad layout is for reference purposes only.