

General Description

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

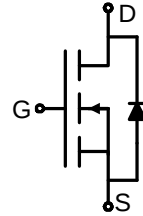
Features

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

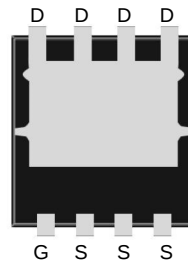
Product Summary



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

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

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



PDFN3333-8L

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}	$V_{GS}=0V, I_D=250\mu A$	20			V
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{GS}=V_{DS}, I_D=250\mu A$	0.50	0.67	0.95	V
Drain-Source Leakage Current	I_{DSS}	$V_{DS}=20V, V_{GS}=0V$			1.0	μA
Gate- Source Leakage Current	I_{GSS}	$V_{GS}=\pm 12V, V_{DS}=0V$			± 100	nA
Static Drain-source On Resistance	$R_{DS(ON)}$	$V_{GS}=4.5V, I_D=20A$		4.3	5.2	m Ω
		$V_{GS}=2.5V, I_D=15A$		6.2	7.2	m Ω
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 $\leq 300\mu s$, Duty cycle $\leq 2\%$;

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

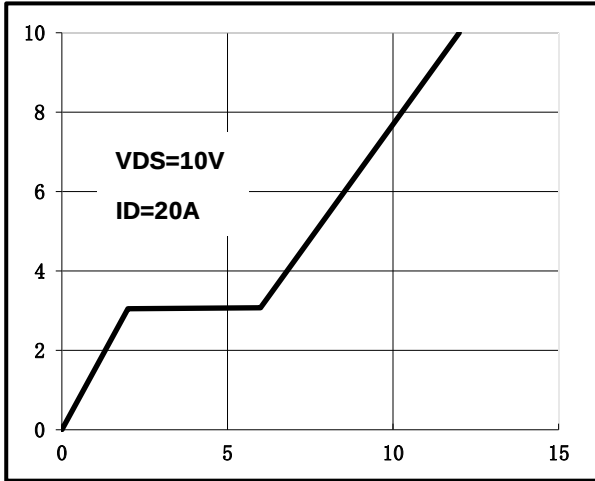


Fig.2 Capacitance Characteristics

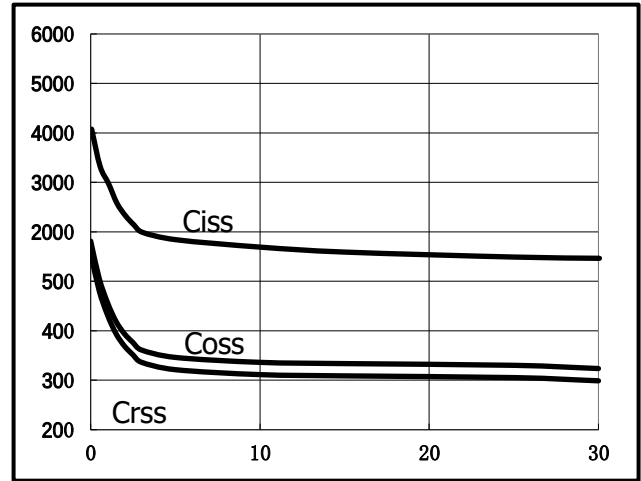


Fig.3 Power Dissipation Derating Curve

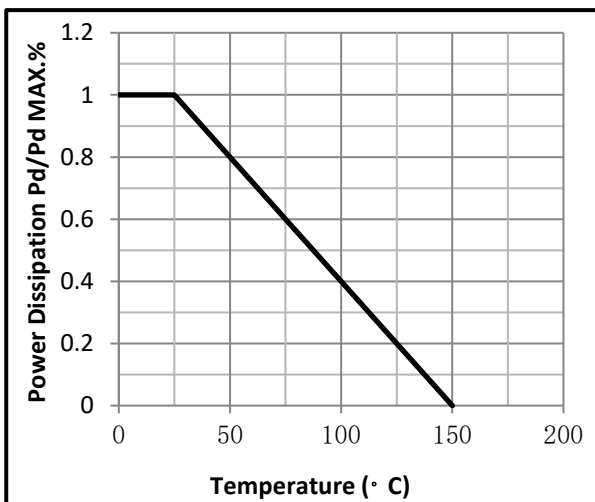


Fig.4 Typical output Characteristics

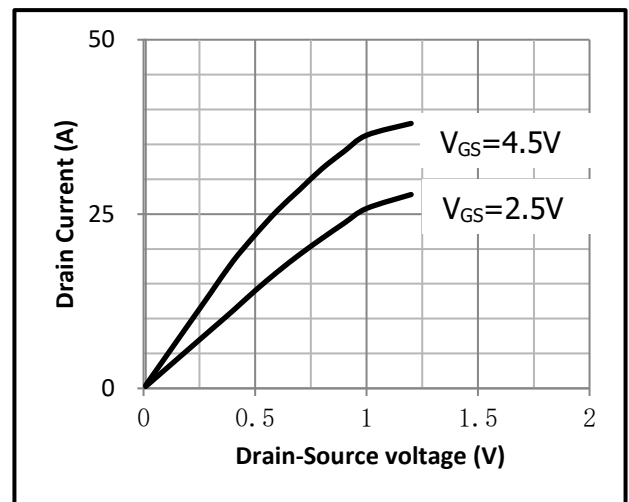


Fig.5 Threshold Voltage V.S Junction Temperature

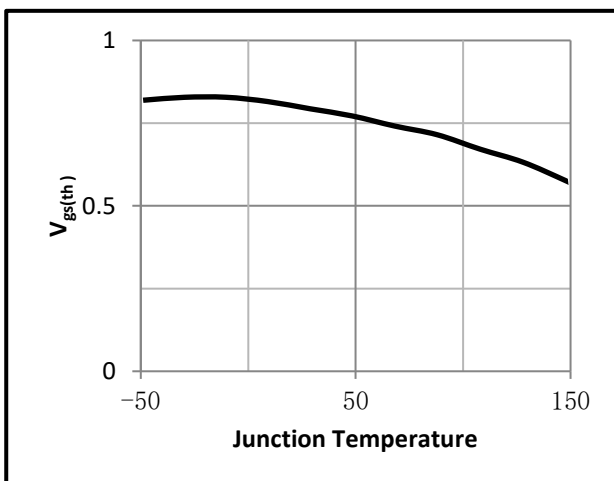


Fig.6 Resistance V.S Drain Current

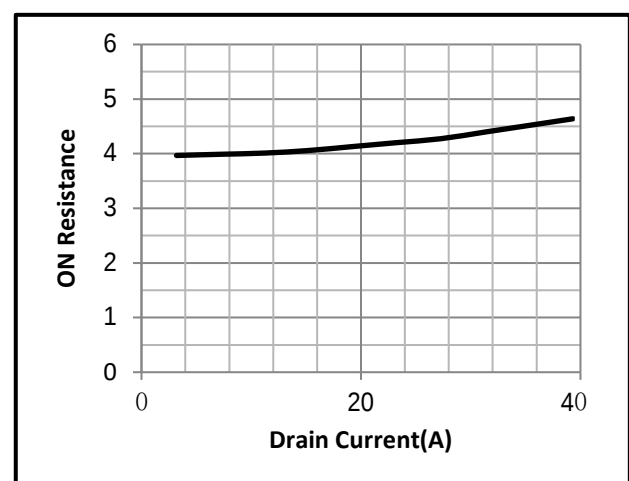


Fig.7 On-Resistance VS Gate Source Voltage

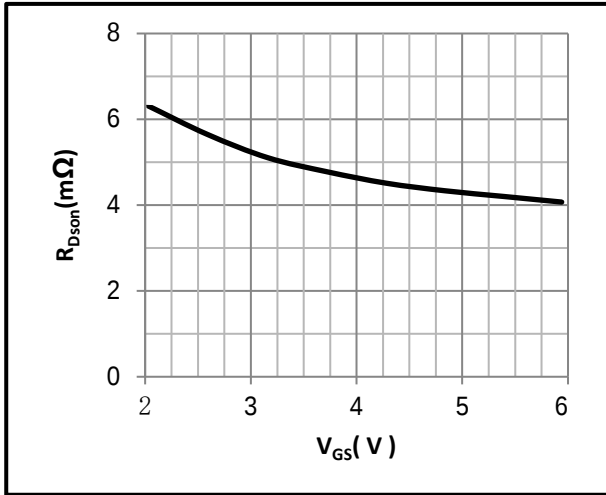


Fig.8 On-Resistance V.S Junction Temperature

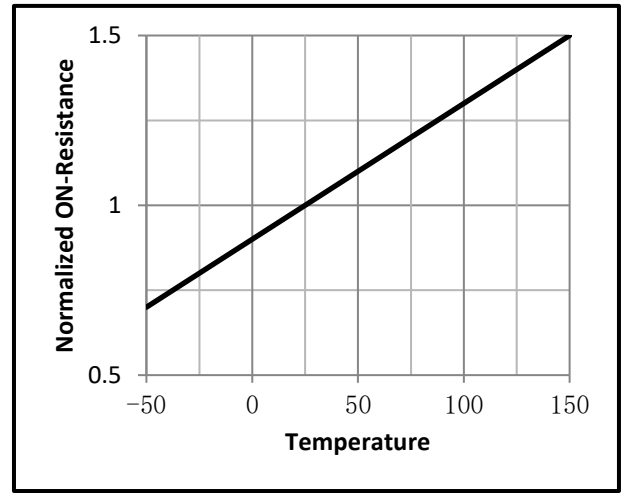


Fig.9 Switching Time Measurement Circuit

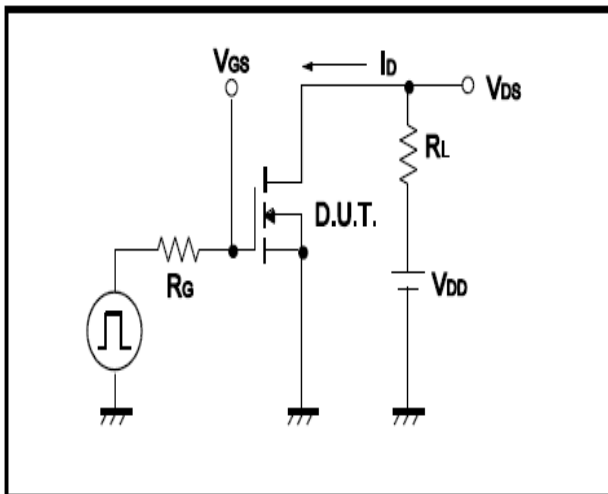


Fig.10 Gate Charge Waveform

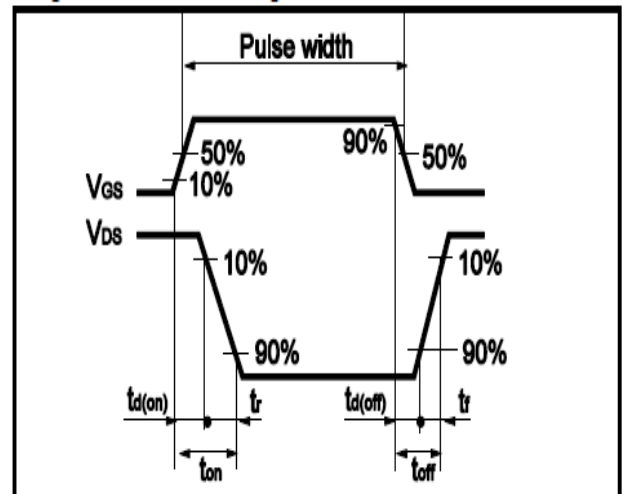


Fig.11 Avalanche Measurement Circuit

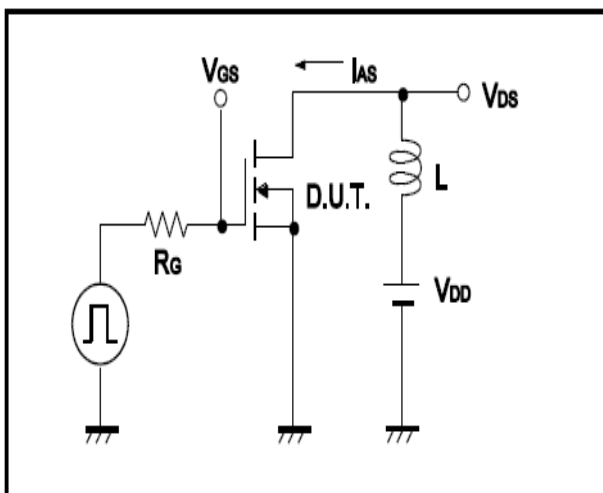
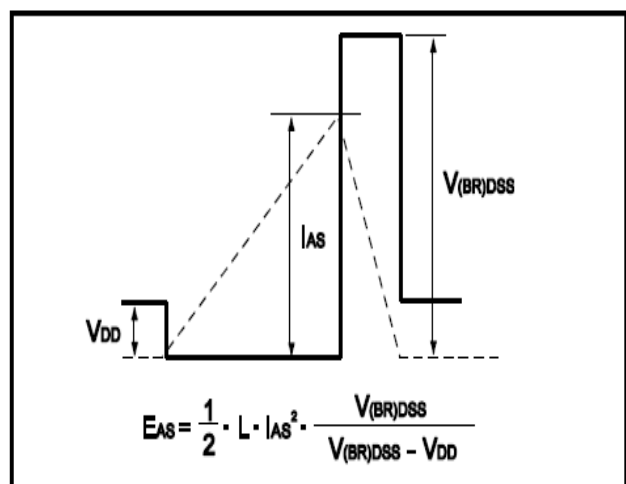
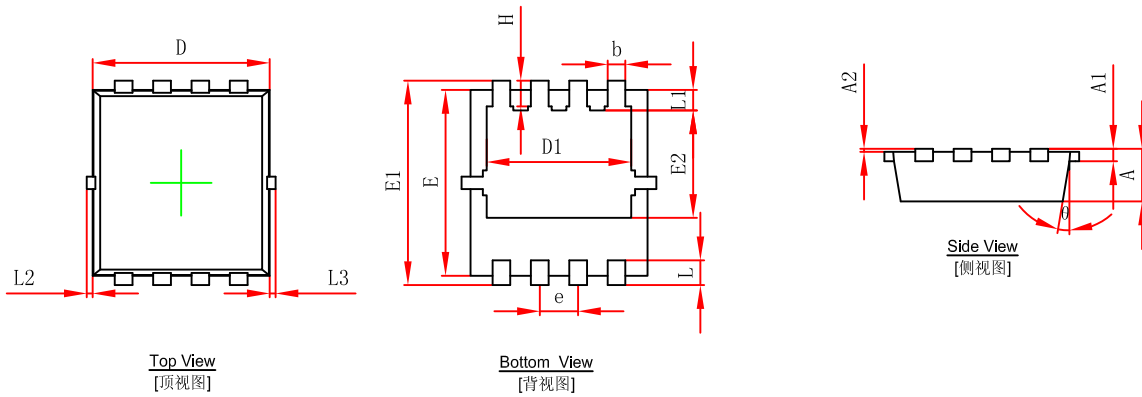


Fig.12 Avalanche Waveform

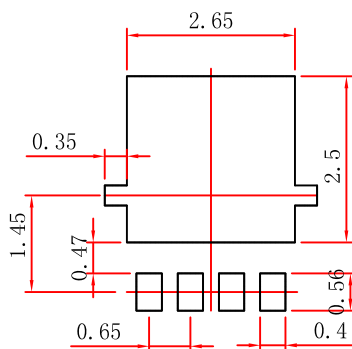


PDFN3333-8L Package Outline Dimensions



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°

PDFN3333-8L 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.