

● **General Description**

The TF050N04N 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.

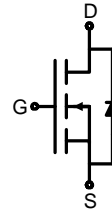
● **Features**

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

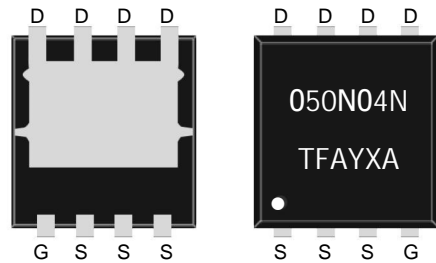
● **Application**

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

● **Product Summary**



$V_{DS} = 40V$ $I_D = 80A$
 $R_{DS(ON)(10V\ typ)} = 4.5m\Omega$
 $R_{DS(ON)(4.5V\ typ)} = 5.3m\Omega$



PDFNWB5x6-8L

● **Ordering Information:**

Part NO.	TF050N04N
Marking 1	050N04N
Marking 2	TF:tuofeng; AA:device code; Y:year code; X:Week
MOQ	5000

● **Absolute Maximum Ratings** ($T_C = 25^\circ C$)

Parameter	Symbol	Rating	Unit
Drain-Source Voltage	V_{DS}	40	V
Gate-Source Voltage	V_{GS}	± 20	V
Continuous Drain Current	$I_D @ T_C = 25^\circ C$	80	A
	$I_D @ T_C = 75^\circ C$	56	A
	$I_D @ T_C = 100^\circ C$	48	A
Pulsed Drain Current ①	I_{DM}	180	A
Total Power Dissipation	$P_D @ T_C = 25^\circ C$	55	W
Total Power Dissipation	$P_D @ T_A = 25^\circ C$	2.0	W
Operating Junction Temperature	T_J	-55 to 150	$^\circ C$
Storage Temperature	T_{STG}	-55 to 150	$^\circ C$

Note: ① Pulse Test : Pulse width $\leq 300\mu s$, Duty cycle $\leq 2\%$;



Shenzhen Tuofeng Semiconductor Technology Co., Ltd
N-CHANNEL ENHANCEMENT MODE POWER MOSFET

TF050N04N

Single Pulse Avalanche Energy	E_{AS}	150	mJ			
Avalanche Current	$I_{AS} I_{AR}$	20	A			
●Thermal resistance						
Parameter	Symbol	Min.	Typ.	Max.	Unit	
Thermal resistance, junction - case	R_{thJC}	-	-	3.0	° C/W	
Thermal resistance, junction - ambient	R_{thJA}	-	-	50	° 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}	$V_{GS} = 0V, I_D = 250\mu A$	40			V
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{GS} = V_{DS}, I_D = 250\mu A$	1.0	1.5	2.5	V
Drain-Source Leakage Current	I_{DSS}	$V_{DS} = 40V, V_{GS} = 0V$			1.0	μA
Gate- Source Leakage Current	I_{GSS}	$V_{GS} = \pm 20V, V_{DS} = 0V$			± 100	nA
Static Drain-source On Resistance	$R_{DS(ON)}$	$V_{GS} = 10V, I_D = 30A$		4.5	6.0	m Ω
		$V_{GS} = 4.5V, I_D = 20A$		5.3	7.5	m Ω
Forward Transconductance	g_{FS}	$V_{DS} = 25V, I_D = 10A$		18		S
Source-drain voltage	V_{SD}	$I_S = 20A$			1.20	V
●Electronic Characteristics						
Parameter	Symbol	Condition	Min.	Typ	Max.	Unit
Input capacitance	C_{iss}	$V_{ds} = 20V, V_{gs} = 0V$ $f = 1MHz$	-	2174	-	pF
Output capacitance	C_{oss}		-	146	-	
Reverse transfer capacitance	C_{rss}		-	150	-	
●Gate Charge characteristics($T_a = 25^\circ C$)						
Parameter	Symbol	Condition	Min.	Typ	Max.	Unit
Gate Resistance	R_g	$f = 1MHz$		1.5		Ω
Total gate charge	Q_g	$V_{DD} = 20V$ $I_D = 20A$ $V_{GS} = 10V$	-	43.2	-	nC
Gate - Source charge	Q_{gs}		-	23.9	-	
Gate - Drain charge	Q_{gd}		-	15.2	-	
Turn-ON Delay time	$t_{D(on)}$	$V_{GS} = 10V, V_{DS} = 20V$ $R_G = 3.0\Omega, I = 20A$		8.8		ns
Turn-ON Rise time	t_r			111		ns
Turn-Off Delay time	$t_{D(off)}$			36.6		ns
Turn-Off Fall time	t_f			103		ns

Fig.1 Power Dissipation

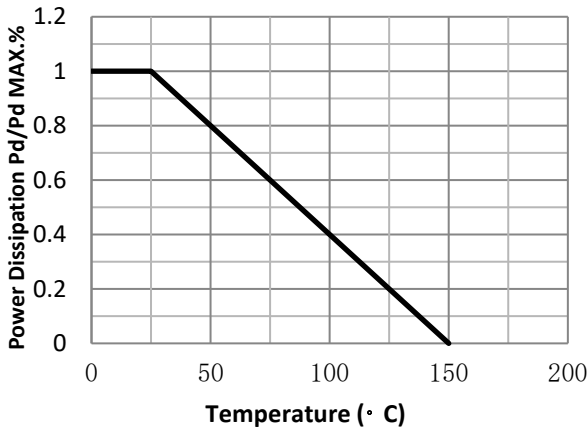


Fig.2 Typical output Characteristics

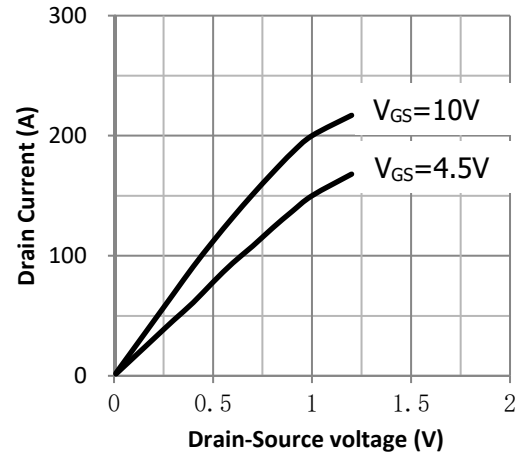


Fig.3 Threshold Voltage V.S Junction Temperature

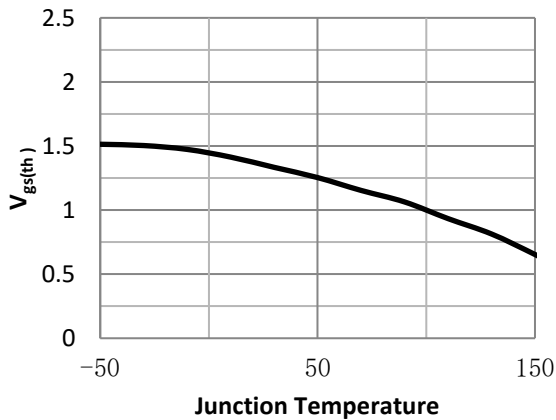


Fig.4 Resistance V.S Drain Current

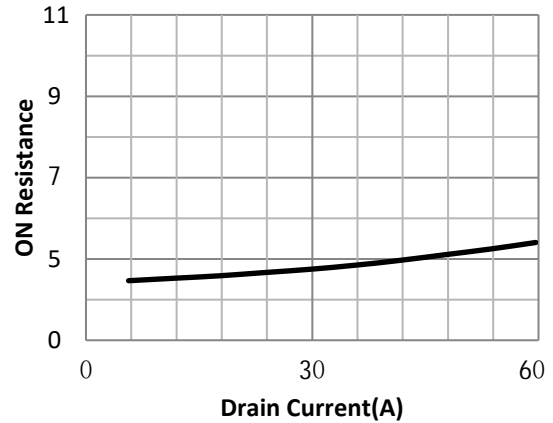


Fig.5 On-Resistance VS Gate Source Voltage

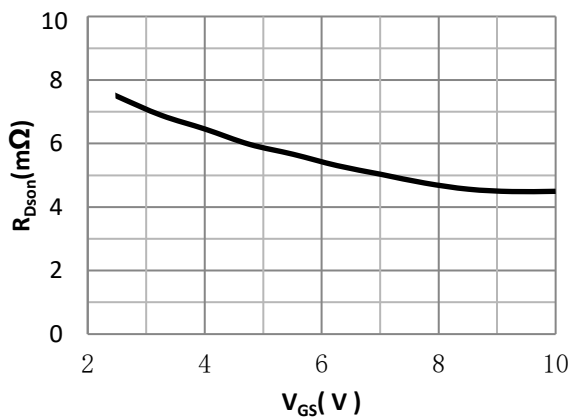


Fig.6 On-Resistance V.S Junction Temperature

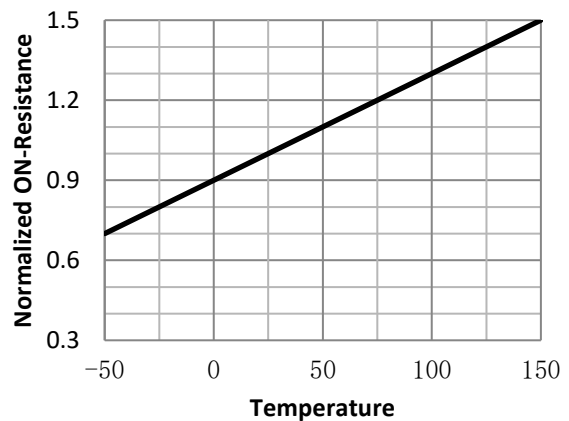


Fig.7 Switching Time Measurement Circuit

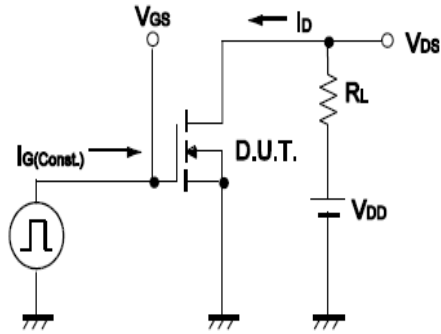


Fig.8 Gate Charge Waveform

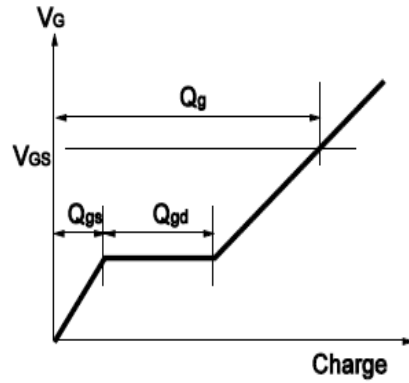


Fig.9 Switching Time Measurement Circuit

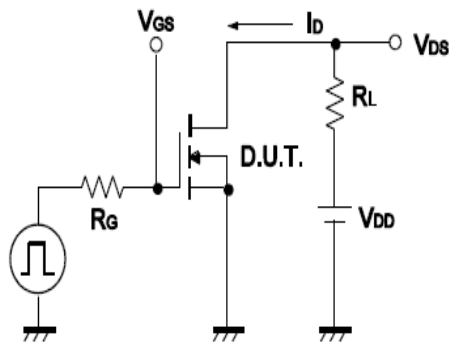


Fig.10 Gate Charge Waveform

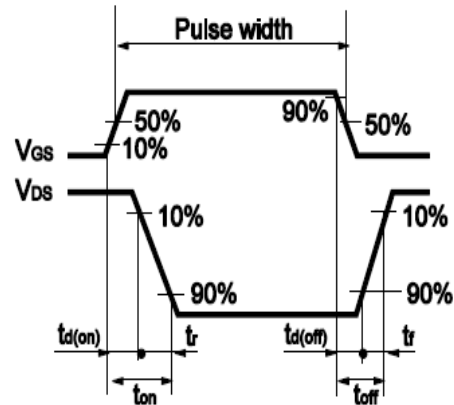


Fig.11 Avalanche Measurement Circuit

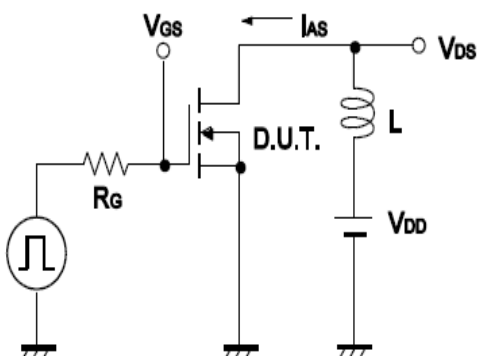
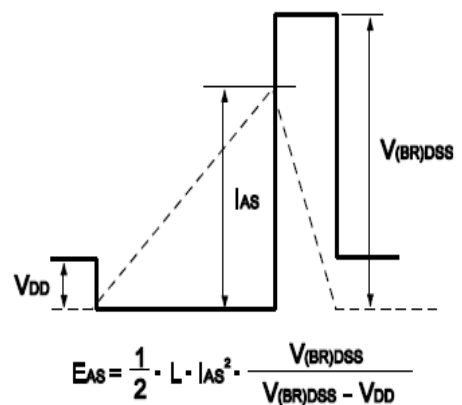
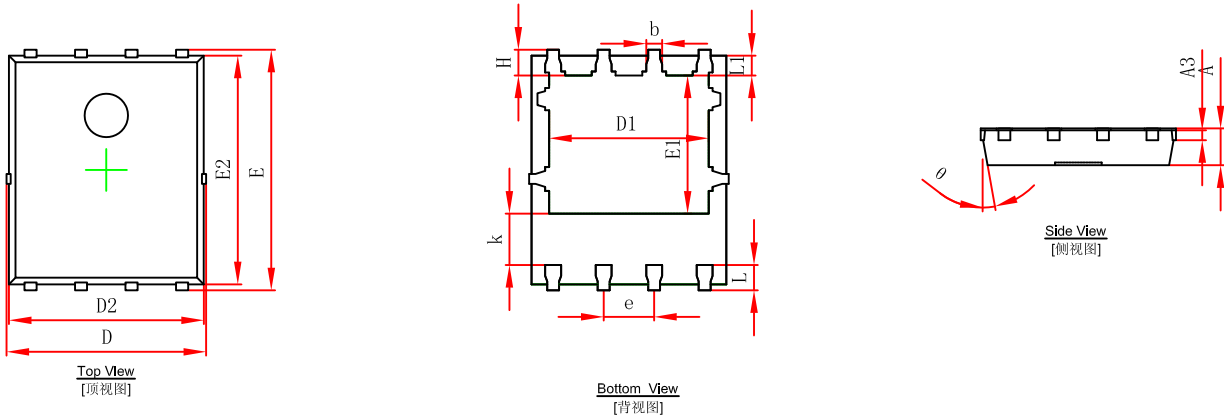


Fig.12 Avalanche Waveform

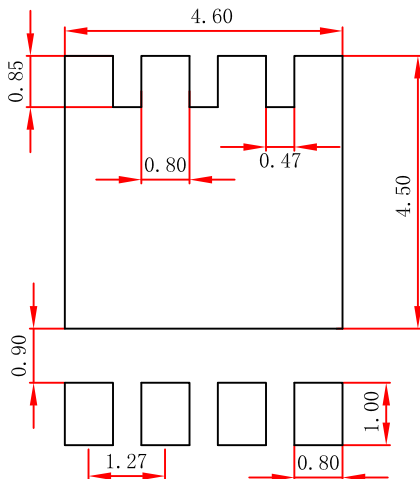


PDFNWB5x6-8L Package Outline Dimensions



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	0.900	1.000	0.035	0.039
A3	0.254REF.		0.010REF.	
D	4.944	5.096	0.195	0.201
E	5.974	6.126	0.235	0.241
D1	3.910	4.110	0.154	0.162
E1	3.375	3.575	0.133	0.141
D2	4.824	4.976	0.190	0.196
E2	5.674	5.826	0.223	0.229
k	1.190	1.390	0.047	0.055
b	0.350	0.450	0.014	0.018
e	1.270TYP.		0.050TYP.	
L	0.559	0.711	0.022	0.028
L1	0.424	0.576	0.017	0.023
H	0.574	0.726	0.023	0.029
θ	10°	12°	10°	12°

PDFNWB5x6-8L Suggested Pad Layout



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