

• General Description

The TF060N04NG 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.

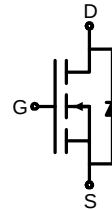
• Features

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

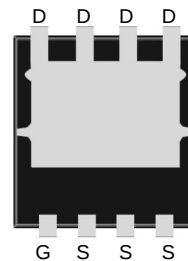
• Product Summary



$$V_{DS} = 40V \quad I_D = 60A$$

$$R_{DS(ON)}(10V_{typ}) = 5.4m\Omega$$

$$R_{DS(ON)}(4.5V_{typ}) = 7.5m\Omega$$



PDFNWB5x6-8L

• Ordering Information:

Part NO.	TF060N04NG
Marking 1	TF060N04NG
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	$I_D @ T_C = 25^\circ C$	60	A
	$I_D @ T_C = 75^\circ C$	42	A
	$I_D @ T_C = 100^\circ C$	35	A
Pulsed Drain Current ①	I_{DM}	160	A
Total Power Dissipation	$P_D @ T_C = 25^\circ C$	50	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 $\leq 2\%$;

Single Pulse Avalanche Energy	E _{AS}		35		mJ	
Avalanche Current	I _{AS} I _{AR}		17		A	
●Thermal resistance						
Parameter		Symbol	Min.	Typ.	Max.	Unit
Thermal resistance, junction - case		R _{thJC}	-	-	3.3	° C/W
Thermal resistance, junction - ambient		R _{thJA}	-	-	62	° 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		5.4	6.5	mΩ
		V _{GS} =4.5V, I _D =15A		7.5	9.0	mΩ
Forward Transconductance	g _{FS}	V _{DS} =25V, I _D =10A		12		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	-	960	-	pF
Output capacitance	Coss		-	340	-	
Reverse transfer capacitance	Crss		-	30	-	
●Gate Charge characteristics(T _a = 25°C)						
Parameter	Symbol	Condition	Min.	Typ	Max.	Unit
Gate Risistance	R _g	f = 1MHz		1.7		Ω
Total gate charge	Qg	V _{DD} = 20V I _D = 20A V _{GS} = 10V	-	15.3	-	nC
Gate - Source charge	Qgs		-	2.0	-	
Gate - Drain charge	Qgd		-	3.0	-	
Turn-ON Delay time	t _{D(on)}	V _{GS} =10V ,V _{DS} =20V R _G =3.0Ω,I _D =20A		8.00		ns
Turn-ON Rise time	t _r			6.00		ns
Turn-Off Delay time	t _{D(off)}			16.0		ns
Turn-Off Fall time	t _f			4.00		ns

Fig.1 Power Dissipation

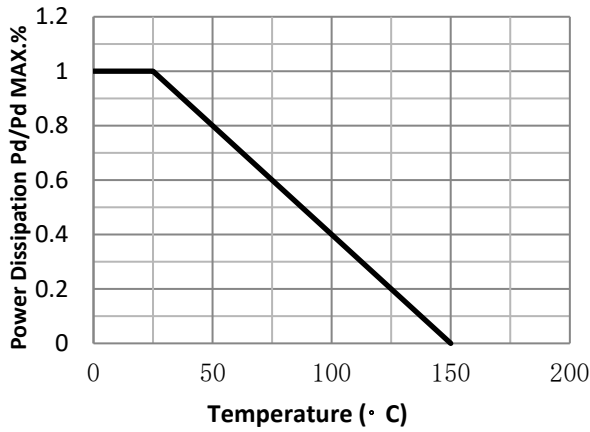


Fig.2 Typical output Characteristics

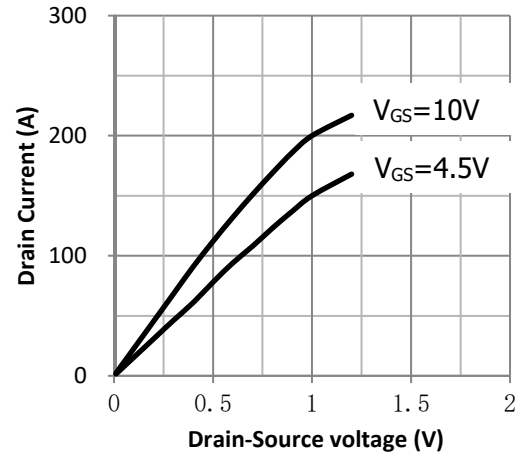


Fig.3 Threshold Voltage V.S Junction Temperature

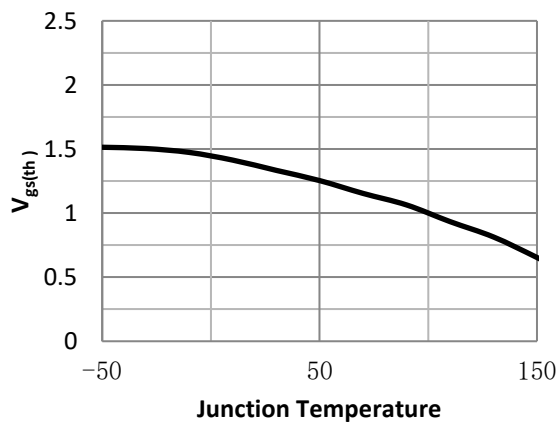


Fig.4 Resistance V.S Drain Current

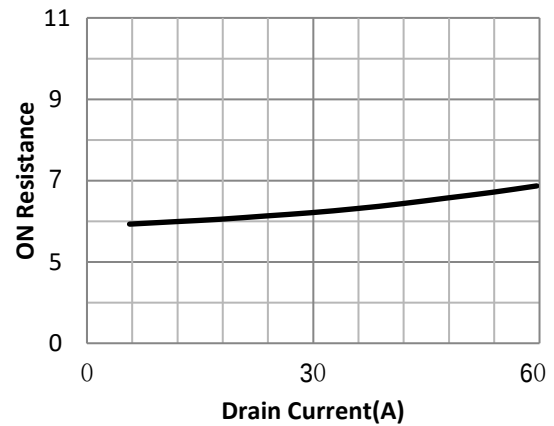


Fig.5 On-Resistance VS Gate Source Voltage

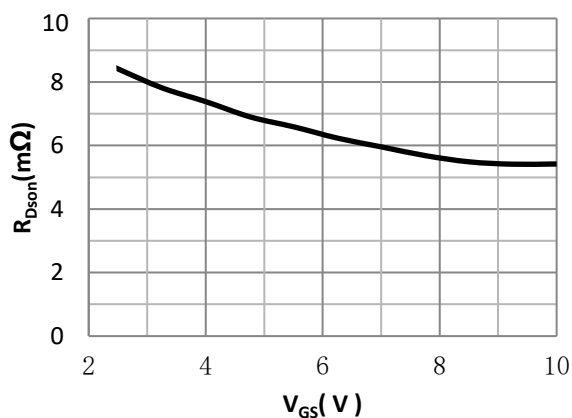


Fig.6 On-Resistance V.S Junction Temperature

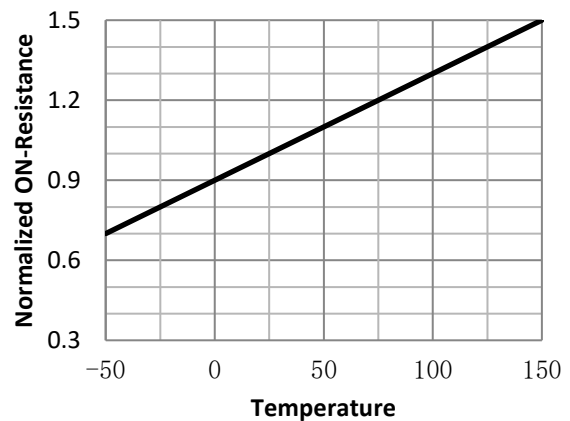


Fig.7 Switching Time Measurement Circuit

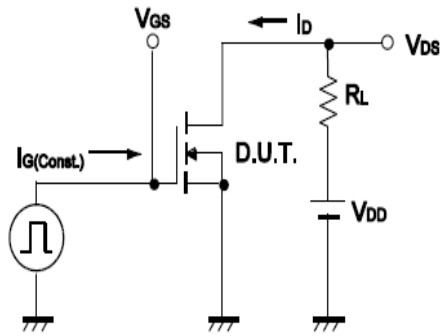


Fig.8 Gate Charge Waveform

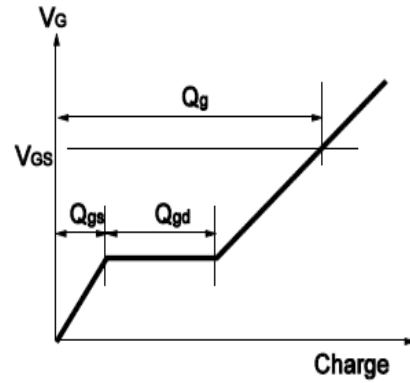


Fig.9 Switching Time Measurement Circuit

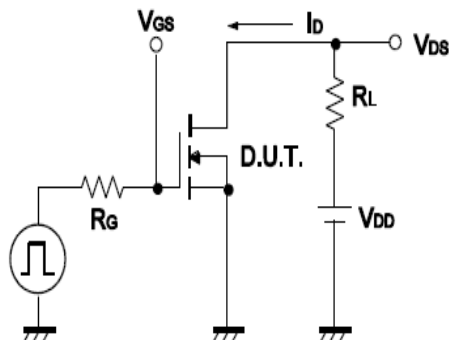


Fig.10 Gate Charge Waveform

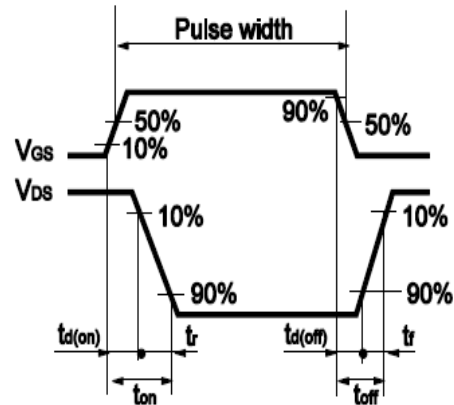


Fig.11 Avalanche Measurement Circuit

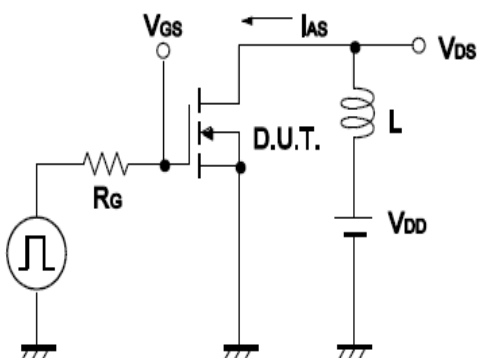
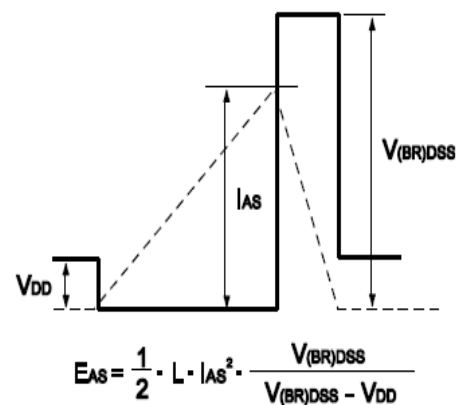
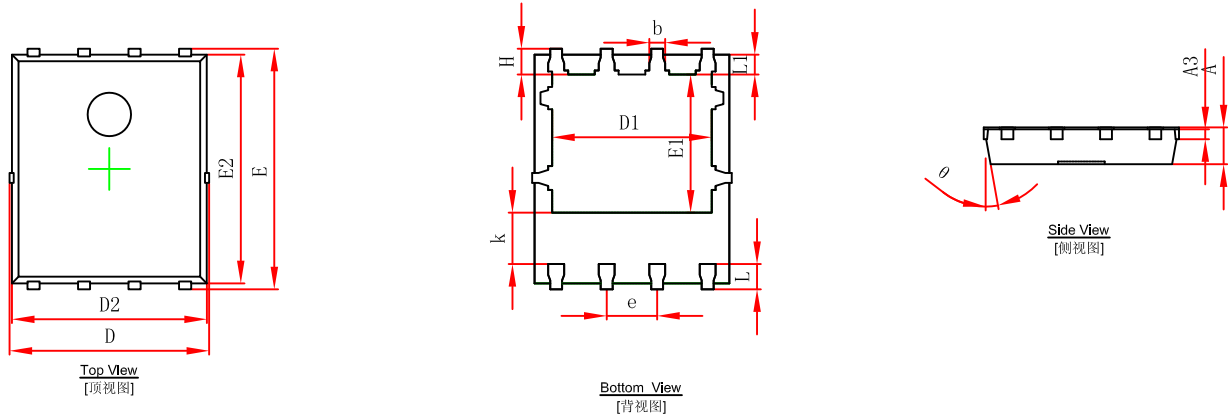


Fig.12 Avalanche Waveform

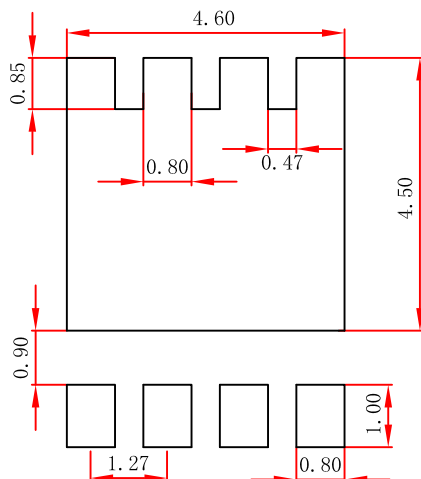


PDFNWB5x6-8L Package Outline Dimensions



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