TF040N03N

● General Description

The TF040N03N 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.

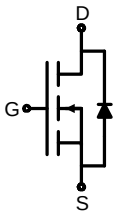
● Features

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

●Application

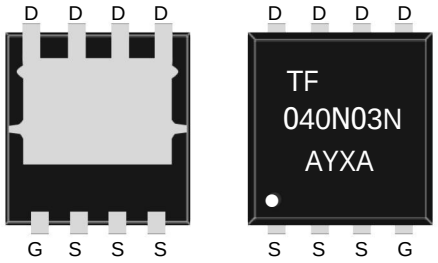
MB/VGA Vcore
SMPS 2nd Synchronous Rectifier
POL application
BLDC Motor driver

● Product Summary



V_{DS} =30V I_D=80A
$R_{DSON(10V\ typ)}$ =4.3mΩ
$R_{DSON(4.5V\ typ)}$ =6.1mΩ

RoHS compliant



PDFNWB5x6-8L

●Ordering Information:

Part NO.	TF040N03N
Marking 1	040N03N
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}	30	V
Gate-Source Voltage	V_{GS}	±20	V
Continuous Drain Current	$I_{D@}T_C$=25℃	80	A
	$I_{D@}T_C$=75℃	60	A
	$I_{D\ @}T_C$=100℃	50	A
Pulsed Drain Current ①	I_{DM}	230	A
Total Power Dissipation	$P_D@T_C$=25℃	50	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}	150	mJ
Avalanche Current	I_{AS} I_{AR}	30	A

●Thermal resistance

Parameter	Symbol	Min.	Typ.	Max.	Unit
Thermal resistance, junction - case	R_{thJC}	-	-	3.5	° C/W
Thermal resistance, junction - ambient	R_{thJA}	-	-	55	° 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	30			V
Gate Threshold Voltage	$V_{GS(TH)}$	V_{GS} =V_{DS}, I_D =250uA	1.0	1.7	2.5	V
Drain-Source Leakage Current	I_{DSS}	V_{DS}=30V, 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=30A		4.3	5.0	mΩ
		V_{GS}=4.5V, I_D=20A		6.1	7.5	mΩ
Forward Transconductance	g_{FS}	V_{DS} =25V, I_D=10A		22		S
Source-drain voltage	V_{SD}	Is=20A			1.20	V

●Electronic Characteristics

Parameter	Symbol	Condition	Min.	Typ	Max.	Unit
Input capacitance	Ciss	Vds=15V,Vgs=0V f = 1MHz	-	1615	-	pF
Output capacitance	Coss		-	245	-	
Reverse transfer capacitance	Crss		-	216	-	

●Gate Charge characteristics(T_a = 25℃)

Parameter	Symbol	Condition	Min.	Typ	Max.	Unit
Gate Risistance	R_g	f = 1MHz		2.1		Ω
Total gate charge	Qg	V_{DD} = 15V	-	42	-	nC
Gate - Source charge	Qgs	I_D = 30A	-	4.0	-	
Gate - Drain charge	Qgd	V_{GS} = 10V	-	14	-	
Turn-ON Delay time	$t_{D(on)}$	V_{GS}=10V ,V_{DS}=15V R_G =3.0Ω, I=20A		7.5		ns
Turn-ON Rise time	t_r			14.5		ns
Turn-Off Delay time	$t_{D(off)}$			35		ns
Turn-Off Fall time	t_f			9.6		ns

Typical Electrical and Thermal Characteristics

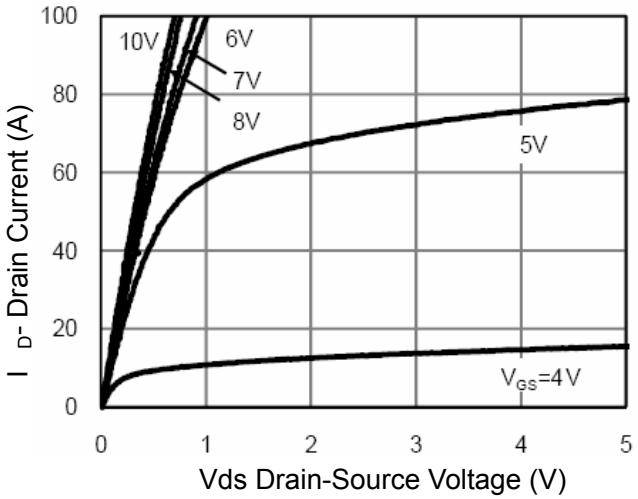


Figure 1 Output Characteristics

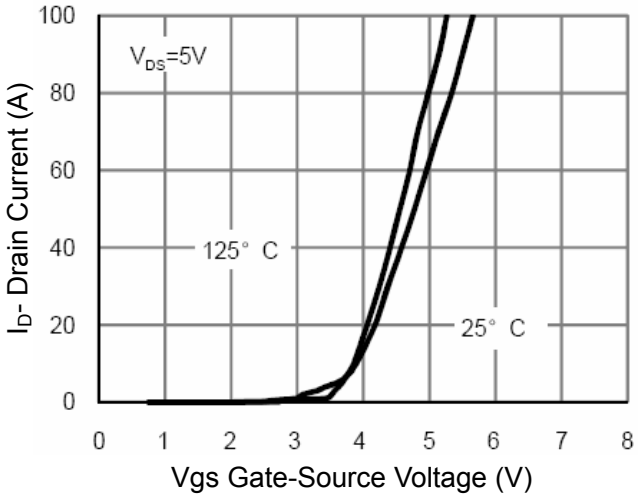


Figure 2 Transfer Characteristics

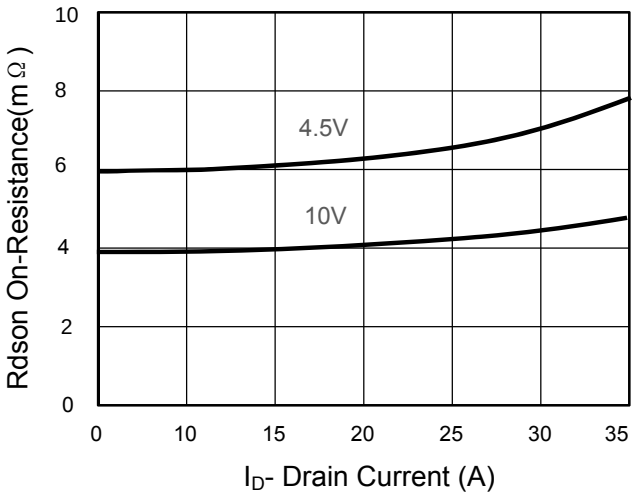


Figure 3 Rdson- Drain Current

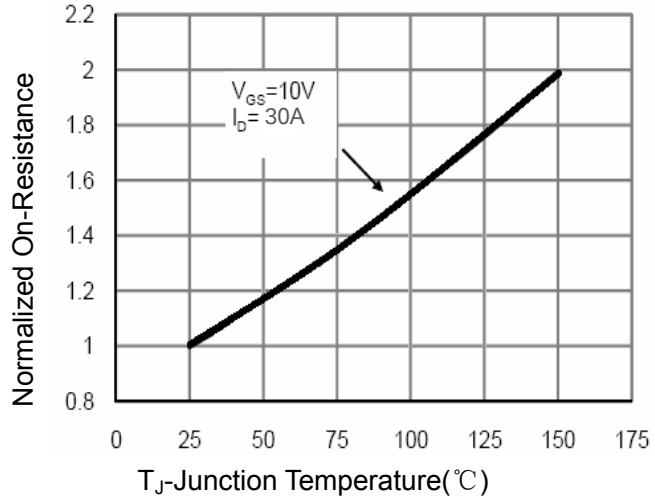


Figure 4 Rdson-JunctionTemperature

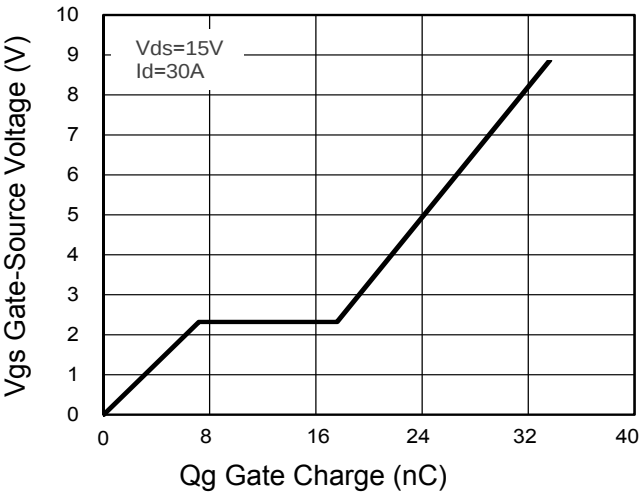


Figure 5 Gate Charge

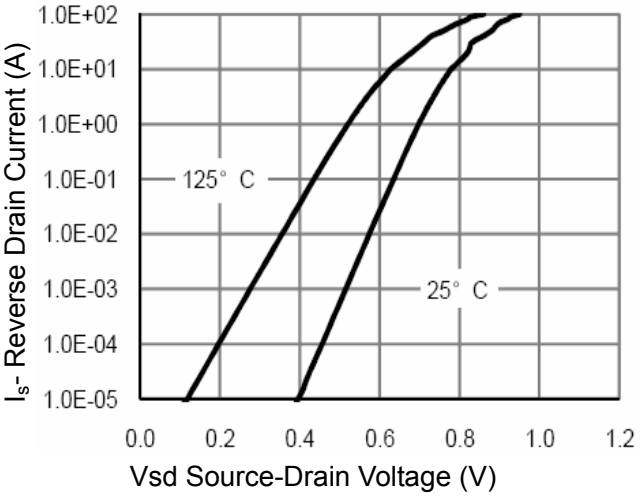


Figure 6 Source- Drain Diode Forward

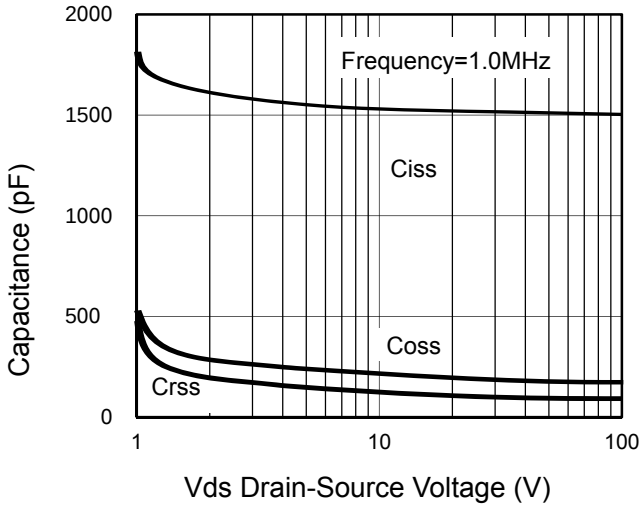


Figure 7 Capacitance vs Vds

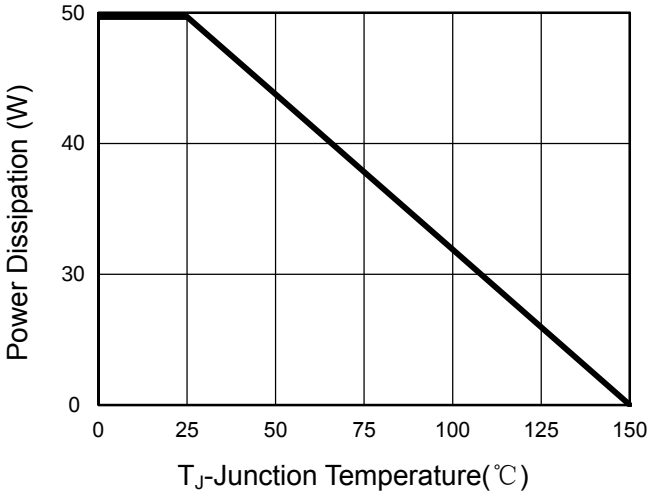


Figure 9 Power De-rating

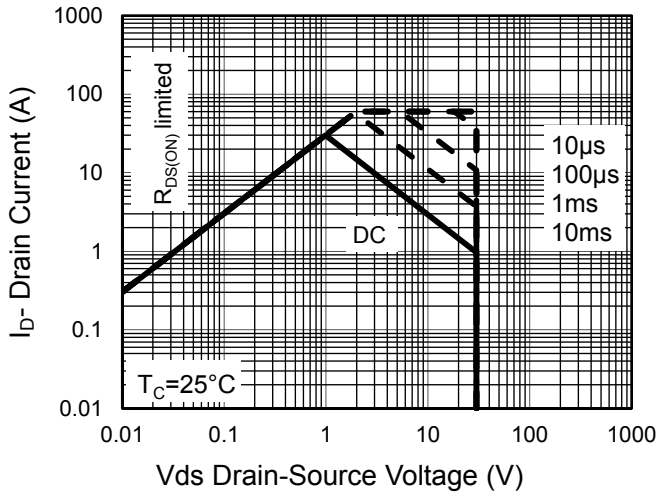


Figure 8 Safe Operation Area

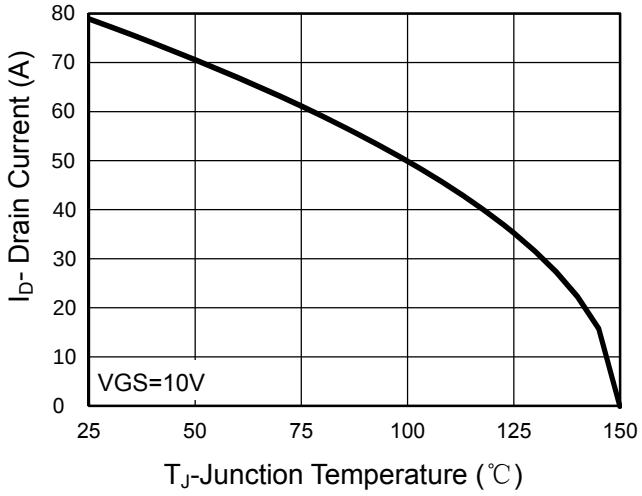


Figure 10 Current De-rating

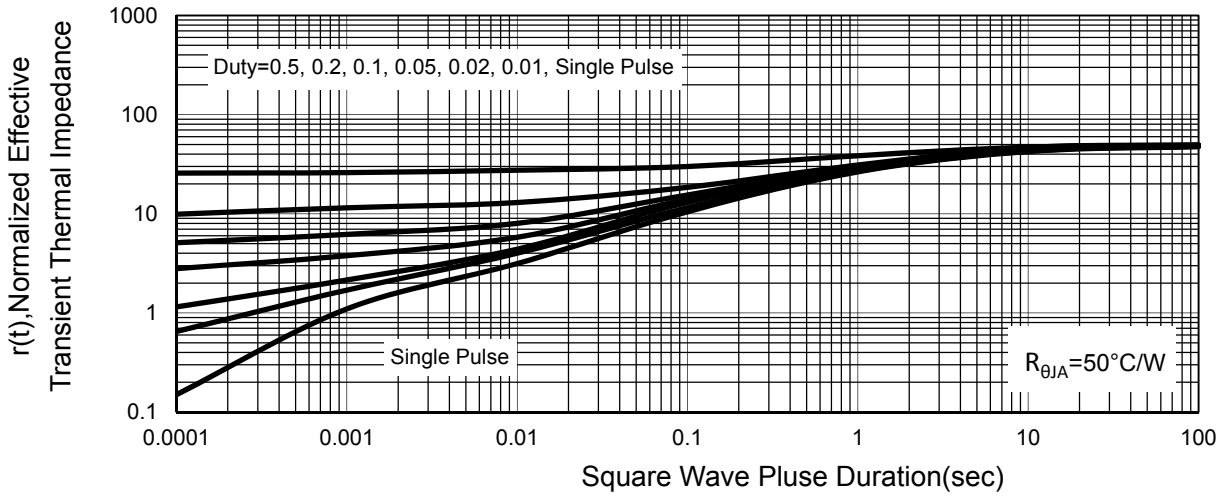


Figure 11 Normalized Maximum Transient Thermal Impedance

Fig.12 Switching Time Measurement

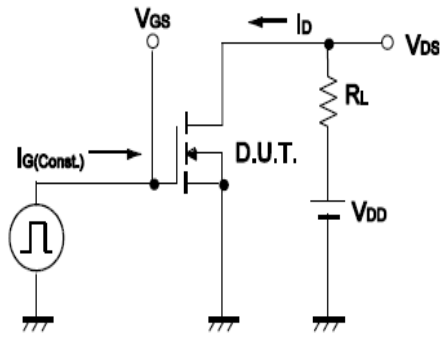
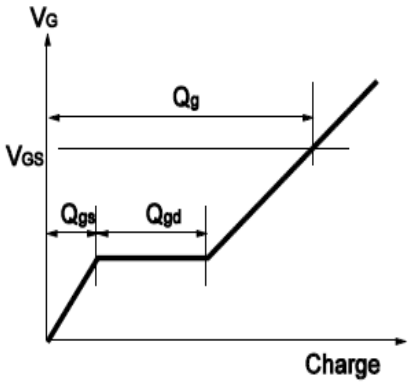


Fig.13 Gate Charge Waveform



Circuit Fig.14 Switching Time

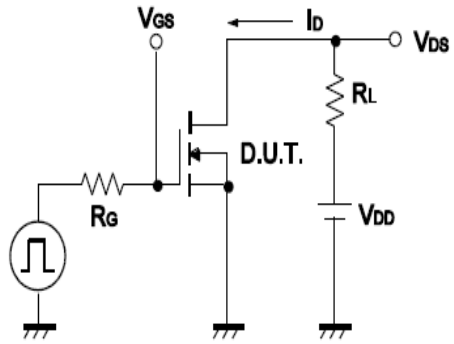
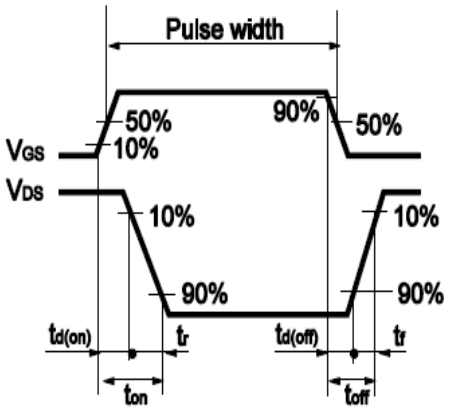


Fig.15 Gate Charge Waveform



Measurement Circuit

Fig.16 Avalanche Measurement Circuit

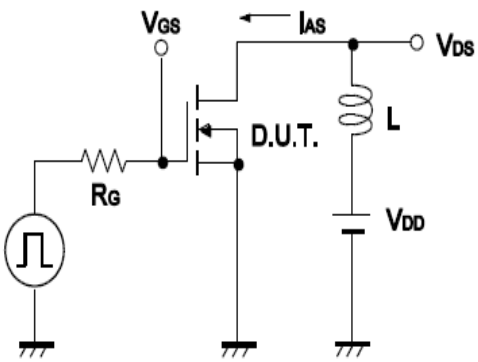
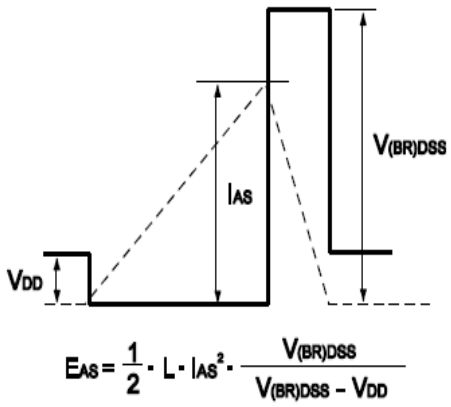
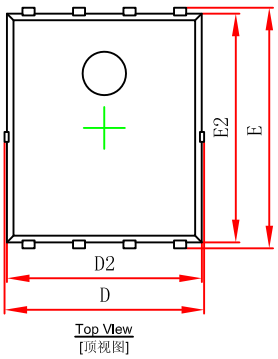
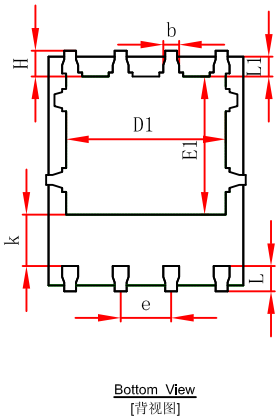


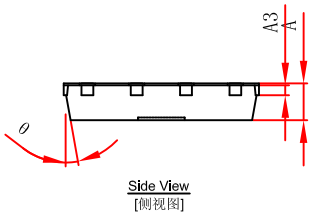
Fig.17 Avalanche Waveform



PDFNWB5x6-8L Package Outline Dimensions

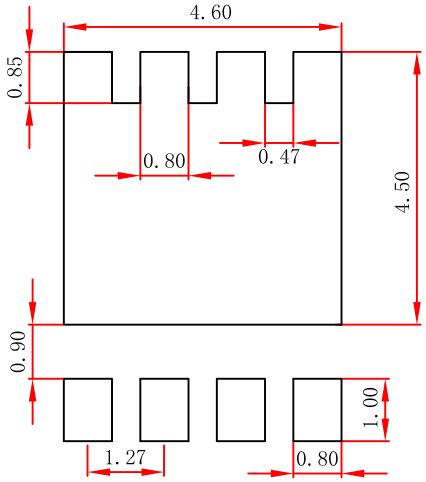






Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	0.900	1.000	0.035	0.039
A3	0.254REF.		0.010REF.	
D	4.944	5.096	0.195	0.201
E	5.974	6.126	0.235	0.241
D1	3.910	4.110	0.154	0.162
E1	3.375	3.575	0.133	0.141
D2	4.824	4.976	0.190	0.196
E2	5.674	5.826	0.223	0.229
k	1.190	1.390	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.