

• General Description

The TF040N03M 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.

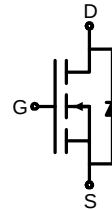
• Features

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

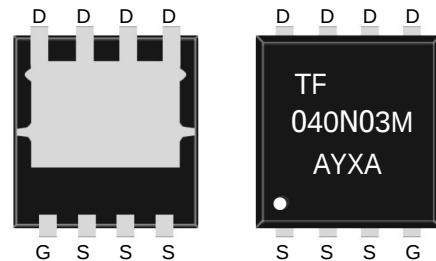
• Product Summary



$$V_{DS} = 30V \quad I_D = 60A$$

$$R_{DS(ON)}(10V \text{ typ}) = 4.0m\Omega$$

$$R_{DS(ON)}(4.5V \text{ typ}) = 6.0m\Omega$$



PDFN3333-8L

• Ordering Information:

Part NO.	TF040N03M
Marking 1	040N03M
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}	30	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
	$I_D @ T_C = 100^\circ C$	36	A
Pulsed Drain Current ①	I_{DM}	200	A
Total Power Dissipation	$P_D @ T_C = 25^\circ C$	40	W
Total Power Dissipation	$P_D @ T_A = 25^\circ C$	1.0	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}		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 =20A		4.0	5.0	mΩ
		V _{GS} =4.5V, I _D =20A		6.0	7.5	mΩ
Forward Transconductance	g _{FS}	V _{DS} =25V, I _D =10A		18		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°C)						
Parameter	Symbol	Condition	Min.	Typ	Max.	Unit
Gate Risistance	R _g	f = 1MHz		2.1		Ω
Total gate charge	Qg	V _{DD} = 15V I _D = 30A V _{GS} = 10V	-	42	-	nC
Gate - Source charge	Qgs		-	4.0	-	
Gate - Drain charge	Qgd		-	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

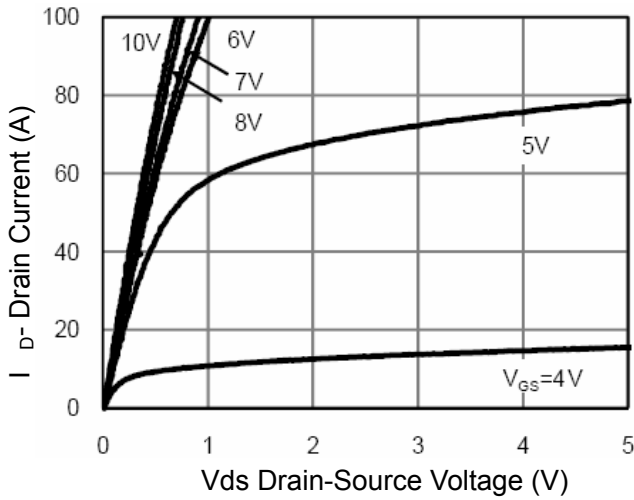


Figure 1 Output Characteristics

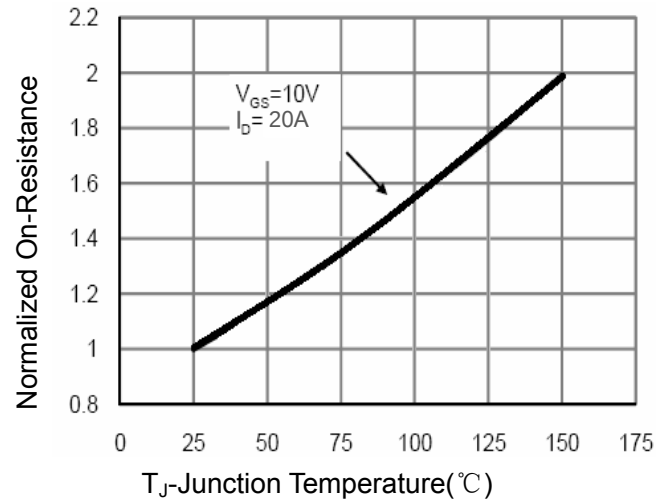


Figure 4 $R_{DS(on)}$ -Junction Temperature

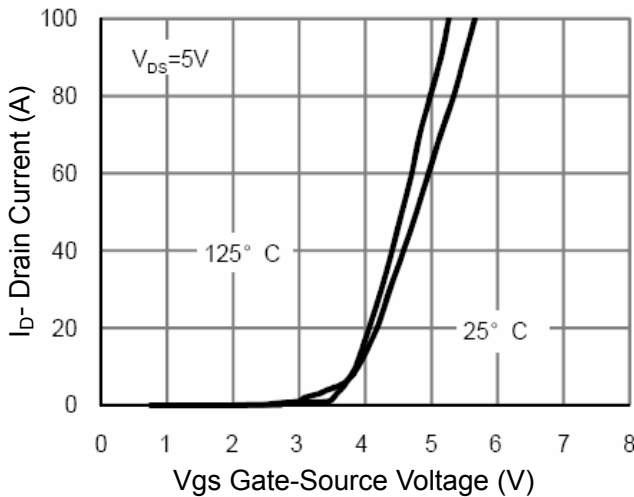


Figure 2 Transfer Characteristics

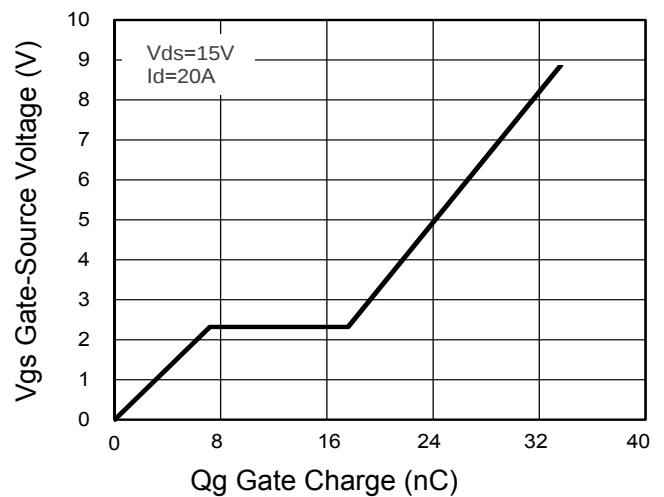


Figure 5 Gate Charge

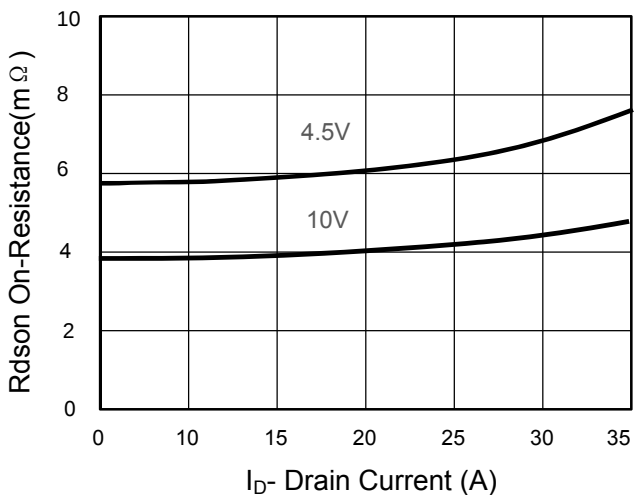


Figure 3 $R_{DS(on)}$ - Drain Current

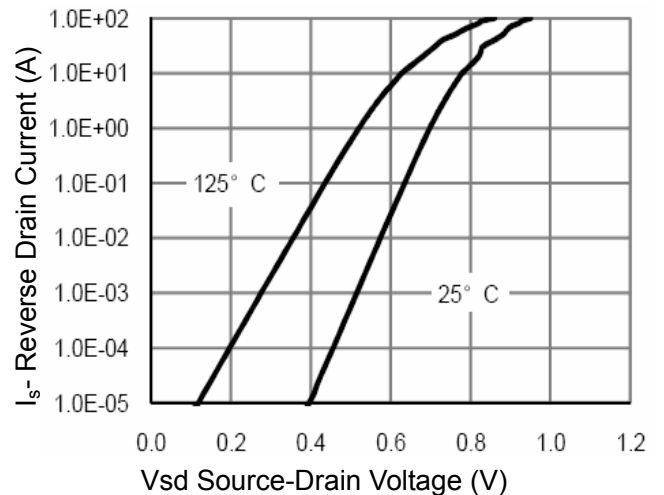


Figure 6 Source- Drain Diode Forward

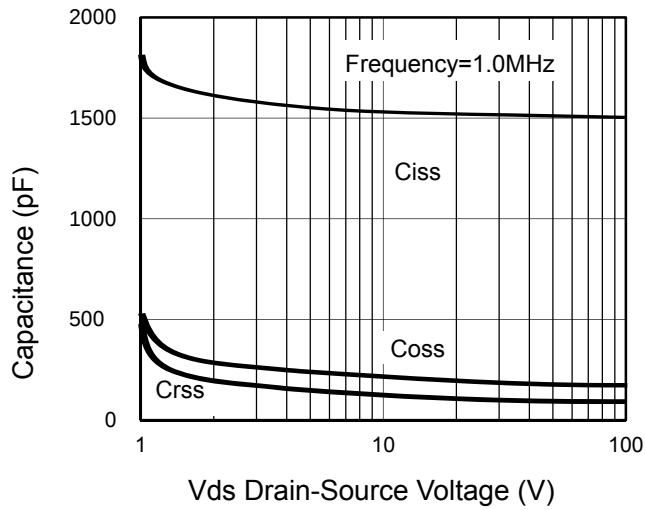


Figure 7 Capacitance vs Vds

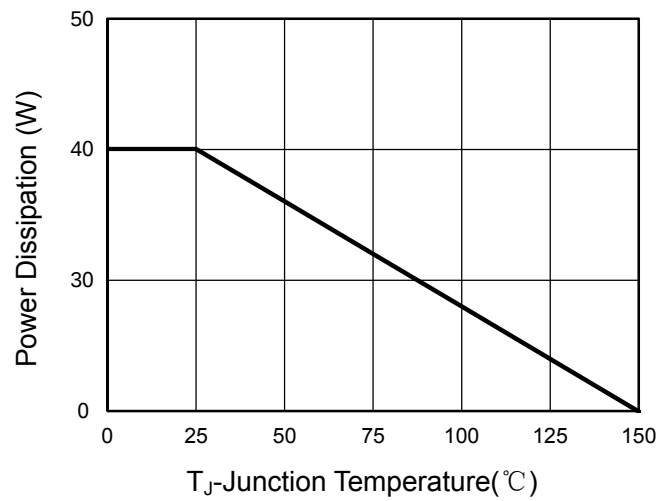


Figure 9 Power De-rating

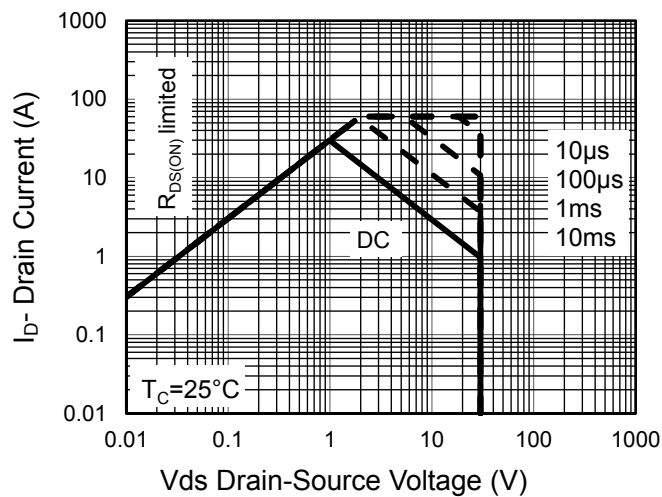


Figure 8 Safe Operation Area

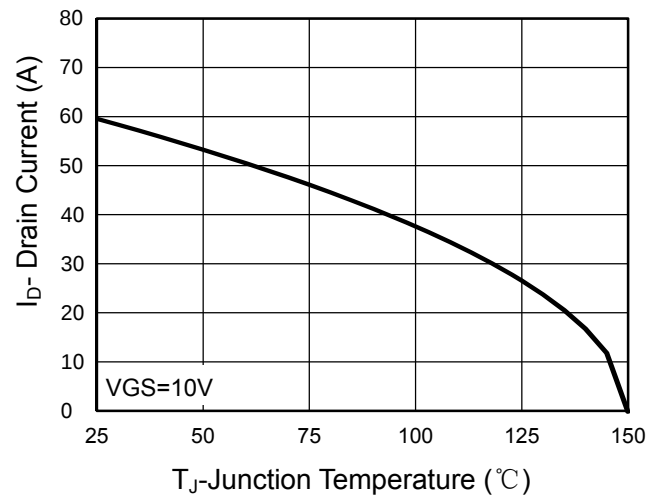


Figure 10 Current De-rating

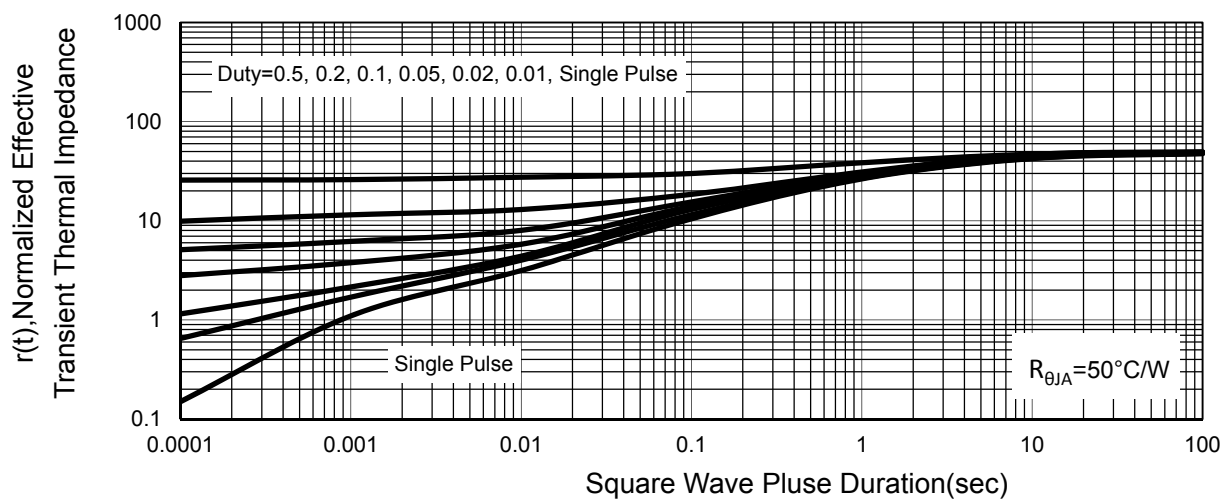


Figure 11 Normalized Maximum Transient Thermal Impedance

Fig.12 Switching Time Measurement

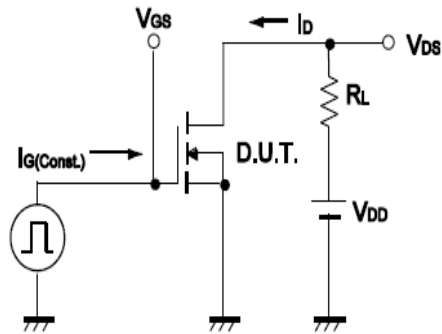
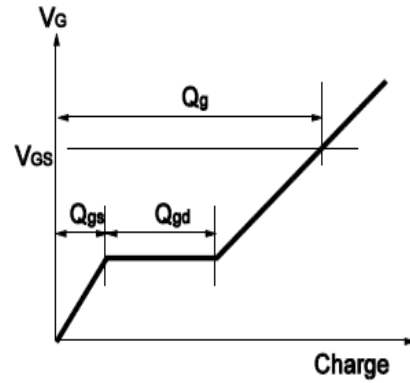


Fig.13 Gate Charge Waveform



Circuit Fig.14 Switching Time

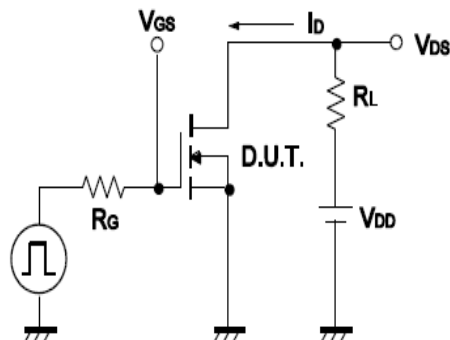
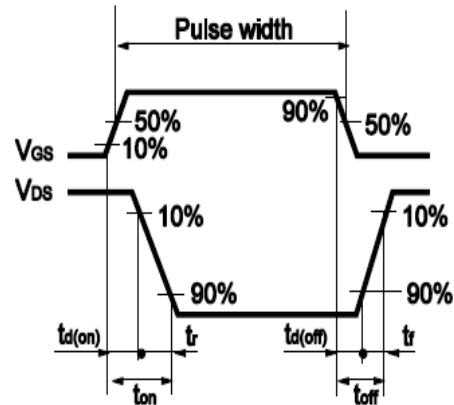


Fig.15 Gate Charge Waveform



Measurement Circuit

Fig.16 Avalanche Measurement Circuit

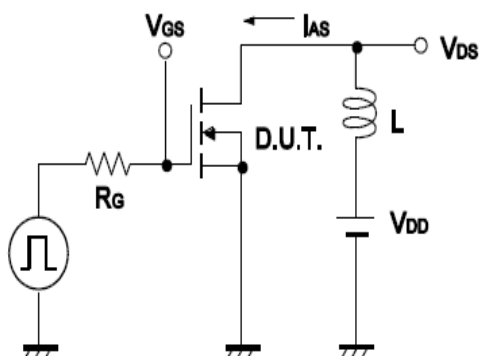
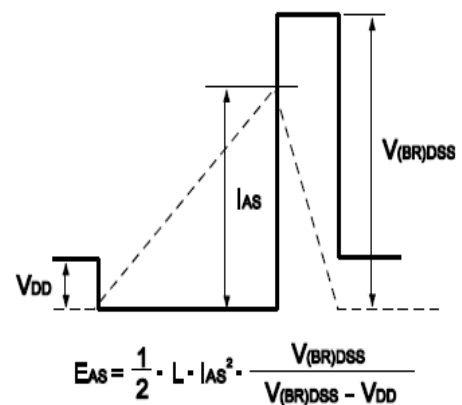
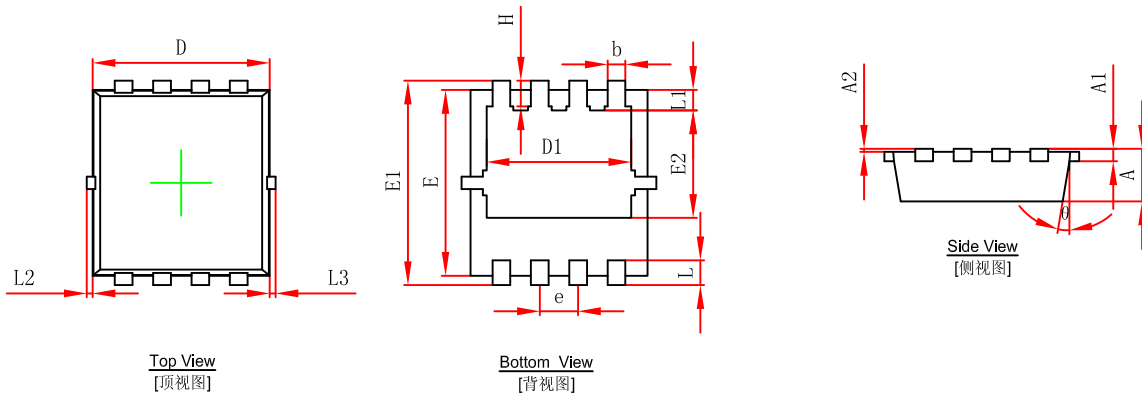


Fig.17 Avalanche Waveform

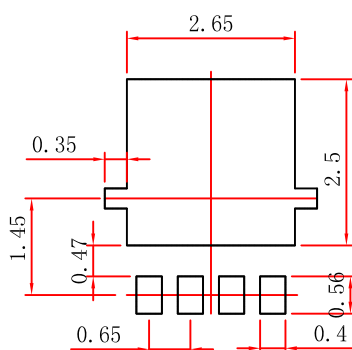


PDFN3333-8L Package Outline Dimensions



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.